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When you read wiring diagrams:

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

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

PRECAUTIONS AND PREPARATION

Supplemental Restraint System (SRS) “AIR BAG”

The Supplemental Restraint System “AIR BAG”, used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and in the instrument panel on the passenger side), a diagnosis sensor unit, a crash zone sensor (4WD models), warning lamp, wiring harness, and spiral cable.

The vehicle is equipped with a passenger air bag deactivation switch. Because no rear seat exists where a rear-facing child restraint can be placed, the switch is designed to turn off the passenger air bag so that a rear-facing child restraint can be used in the front passenger seat. The switch is located in the center of the instrument panel, near the ashtray. When the switch is turned to the ON position, the passenger air bag is enabled and could inflate in a frontal collision. When the switch is turned to the OFF position, the passenger air bag is disabled and will not inflate in a frontal collision. A passenger air bag OFF indicator on the instrument panel lights up when the passenger air bag is switched OFF. The driver air bag always remains enabled and is not affected by the passenger air bag deactivation switch.

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses are covered with yellow insulation either just before the harness connectors or on the complete harness, for easy identification.**
- **The vehicle is equipped with a passenger air bag deactivation switch which can be operated by the customer. When the air bag is switched OFF, the passenger air bag is disabled and will not inflate in a frontal collision. When the passenger air bag is switched ON, the passenger air bag is enabled and could inflate in a frontal collision. After SRS maintenance or repair, make sure the passenger air bag deactivation switch is in the same position (ON or OFF) as when the vehicle arrived for service.**

Precautions

- Before proceeding with disassembly, thoroughly clean the outside of the transmission. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transmission.
- Place disassembled parts in order for easier and proper assembly.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced anytime the transmission is disassembled.
- 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. Apply petroleum jelly to protect O-rings and seals, or hold small bearings and washers in place during assembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- If A/T fluid contains frictional material (clutches, bands, etc.), replace radiator and flush cooler line using cleaning solvent and compressed air after repair of A/T. Refer to LC section (“Radiator”, “ENGINE COOLING SYSTEM”).
- After overhaul, refill the transmission with new ATF.
- When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF cooling system. Always follow the procedures under “Changing A/T Fluid” in the MA section when changing A/T fluid.

PRECAUTIONS AND PREPARATION

Service Notice or Precautions

GI

TORQUE CONVERTER SERVICE

MA

The torque converter should be replaced under any of the following conditions:

EM

- External leaks in the hub weld area.
- Converter hub is scored or damaged.
- Converter pilot is broken, damaged or fits poorly into crankshaft.
- Steel particles are found after flushing the cooler and cooler lines.
- Pump is damaged or steel particles are found in the converter.
- Vehicle has TCC shudder and/or no TCC apply. Replace only after all hydraulic and electrical diagnoses have been made. (Converter clutch material may be glazed.)
- Converter is contaminated with engine coolant containing antifreeze.
- Internal failure of stator roller clutch.
- Heavy clutch debris due to overheating (blue converter).
- Steel particles or clutch lining material found in fluid filter or on magnet when no internal parts in unit are worn or damaged — indicates that lining material came from converter.

LC

EC

FE

The torque converter should not be replaced if:

- The fluid has an odor, is discolored, and there is no evidence of metal or clutch facing particles.
- The threads in one or more of the converter bolt holes are damaged.
- Transmission failure did not display evidence of damaged or worn internal parts, steel particles or clutch plate lining material in unit and inside the fluid filter.
- Vehicle has been exposed to high mileage (only). The exception may be where the torque converter clutch dampener plate lining has seen excess wear by vehicles operated in heavy and/or constant traffic, such as taxi, delivery or police use.

CL

MT

AT

ATF COOLER SERVICE

If A/T fluid contains frictional material (clutches, bands, etc.), replace radiator and flush cooler line using cleaning solvent and compressed air after repair of A/T. Refer to LC section (“Radiator”, “ENGINE COOLING SYSTEM”).

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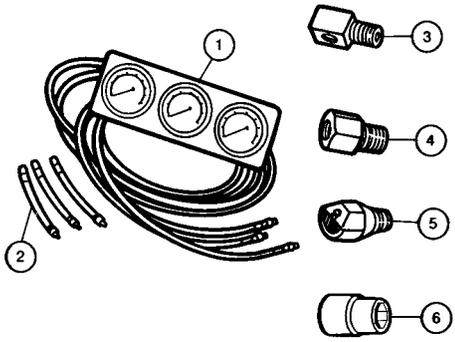
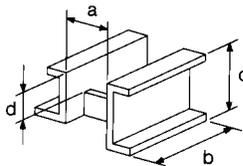
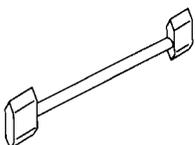
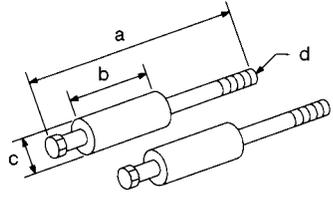
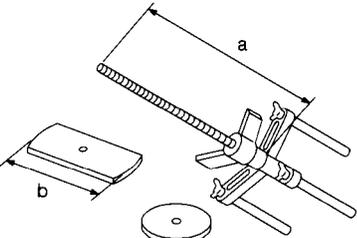
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PRECAUTIONS AND PREPARATION

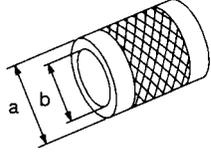
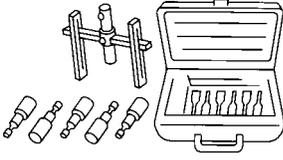
Special Service Tools

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

Tool number (Kent-Moore No.) Tool name	Description
(J34301-C) Oil pressure gauge set ① (J34301-1) Oil pressure gauge ② (J34301-2) Hose ③ (J34298) Joint pipe ④ (J34282-2) Adapter ⑤ (790-301-1230-A) 60° Adapter ⑥ (J34301-15) Square socket	 <p>Measuring line pressure and governor pressure</p> <p>AAT546</p>
ST07870000 (J37068) Transmission case stand	 <p>Disassembling and assembling A/T</p> <p>NT421</p> <p> a: 182 mm (7.17 in) b: 282 mm (11.10 in) c: 230 mm (9.06 in) d: 100 mm (3.94 in) </p>
KV31102100 (J37065) Torque converter one-way clutch check tool	 <p>Checking one-way clutch in torque converter</p> <p>NT098</p>
ST25850000 (J25721-A) Sliding hammer	 <p>Removing oil pump assembly</p> <p>NT422</p> <p> a: 179 mm (7.05 in) b: 70 mm (2.76 in) c: 40 mm (1.57 in) dia. d: M12 x 1.75P </p>
KV31102400 (J34285 and J34285-87) Clutch spring compressor	 <p>Removing and installing clutch return springs</p> <p>NT423</p> <p> a: 320 mm (12.60 in) b: 174 mm (6.85 in) </p>

PRECAUTIONS AND PREPARATION

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST33200000 (J26082) Drift	 <p>NT091</p>	GI MA EM LC
(J34291) Shim setting gauge set	 <p>NT101</p>	EC FE CL MT AT TF PD FA RA BR ST RS BT HA EL IDX

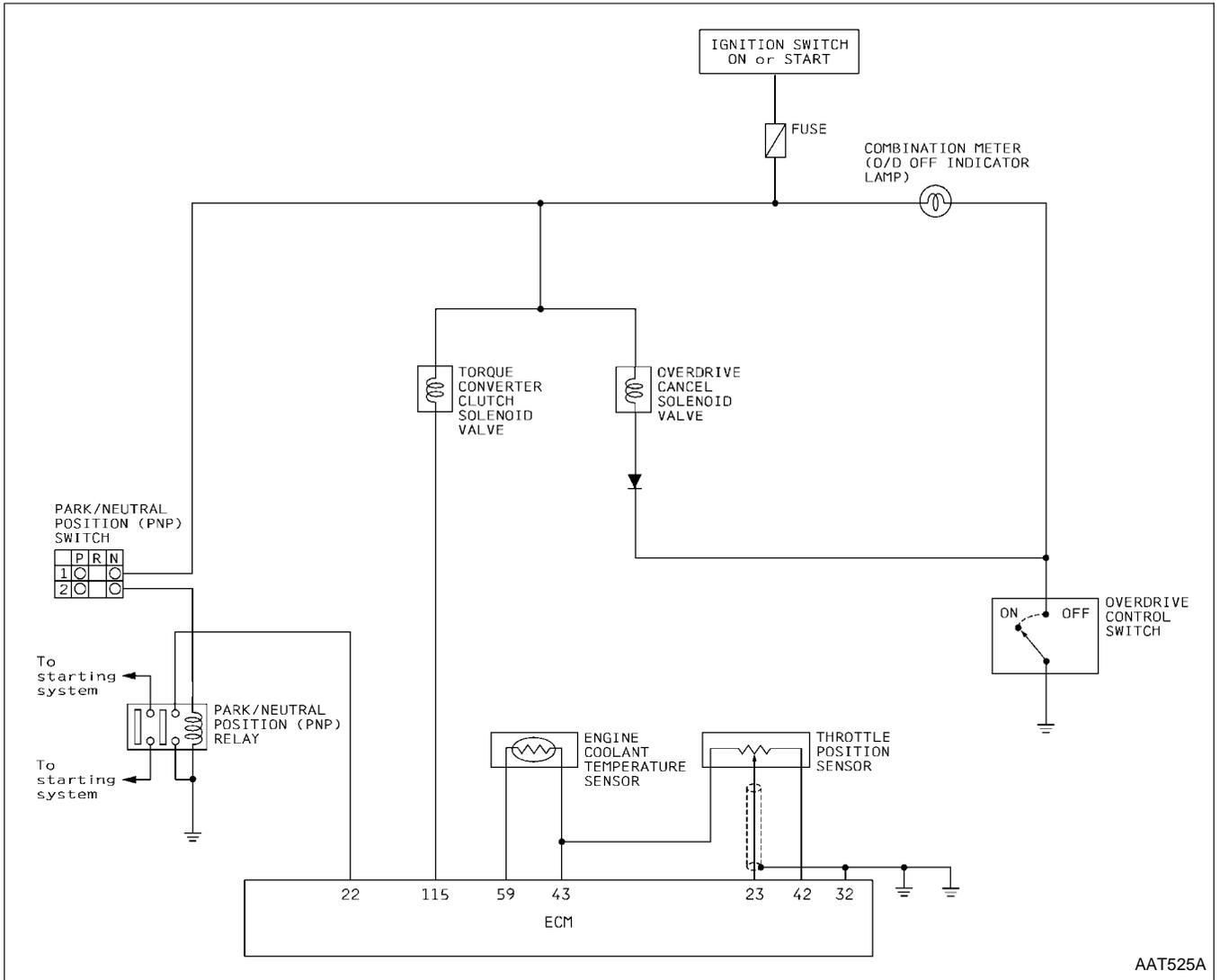
Installing oil pump housing oil seal
Installing rear oil seal

a: 60 mm (2.36 in) dia.
b: 44.5 mm (1.752 in) dia.

Selecting oil pump cover bearing race and oil pump thrust washer

OVERALL SYSTEM

Circuit Diagram

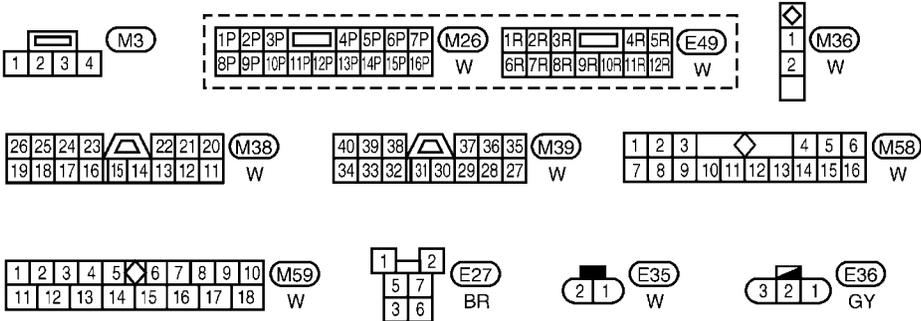
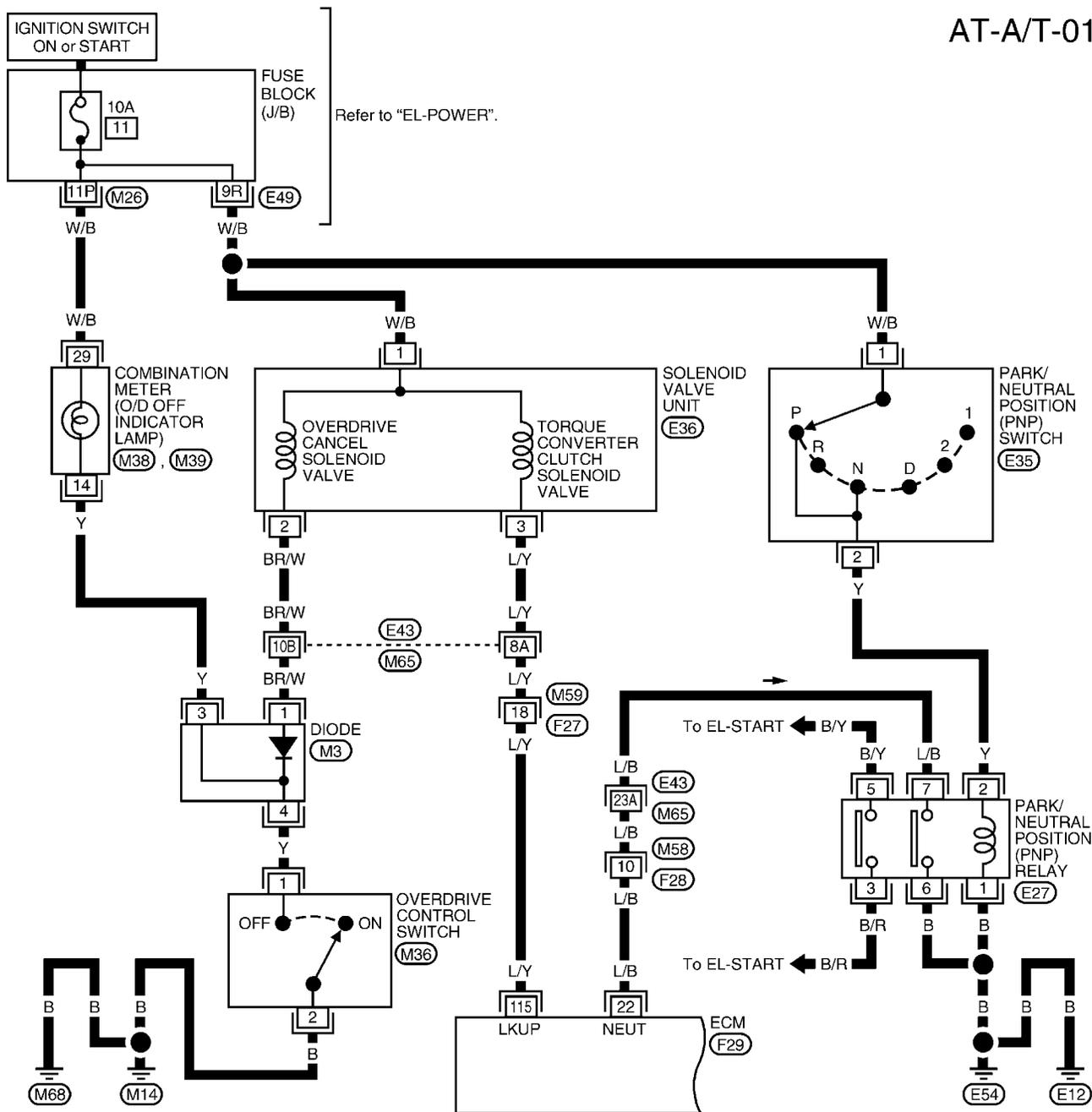


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OVERALL SYSTEM

Wiring Diagram

AT-A/T-01



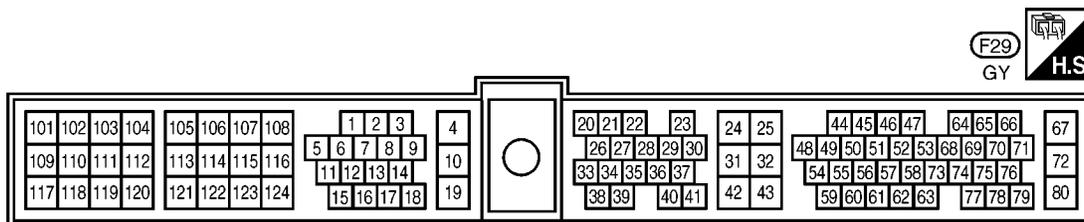
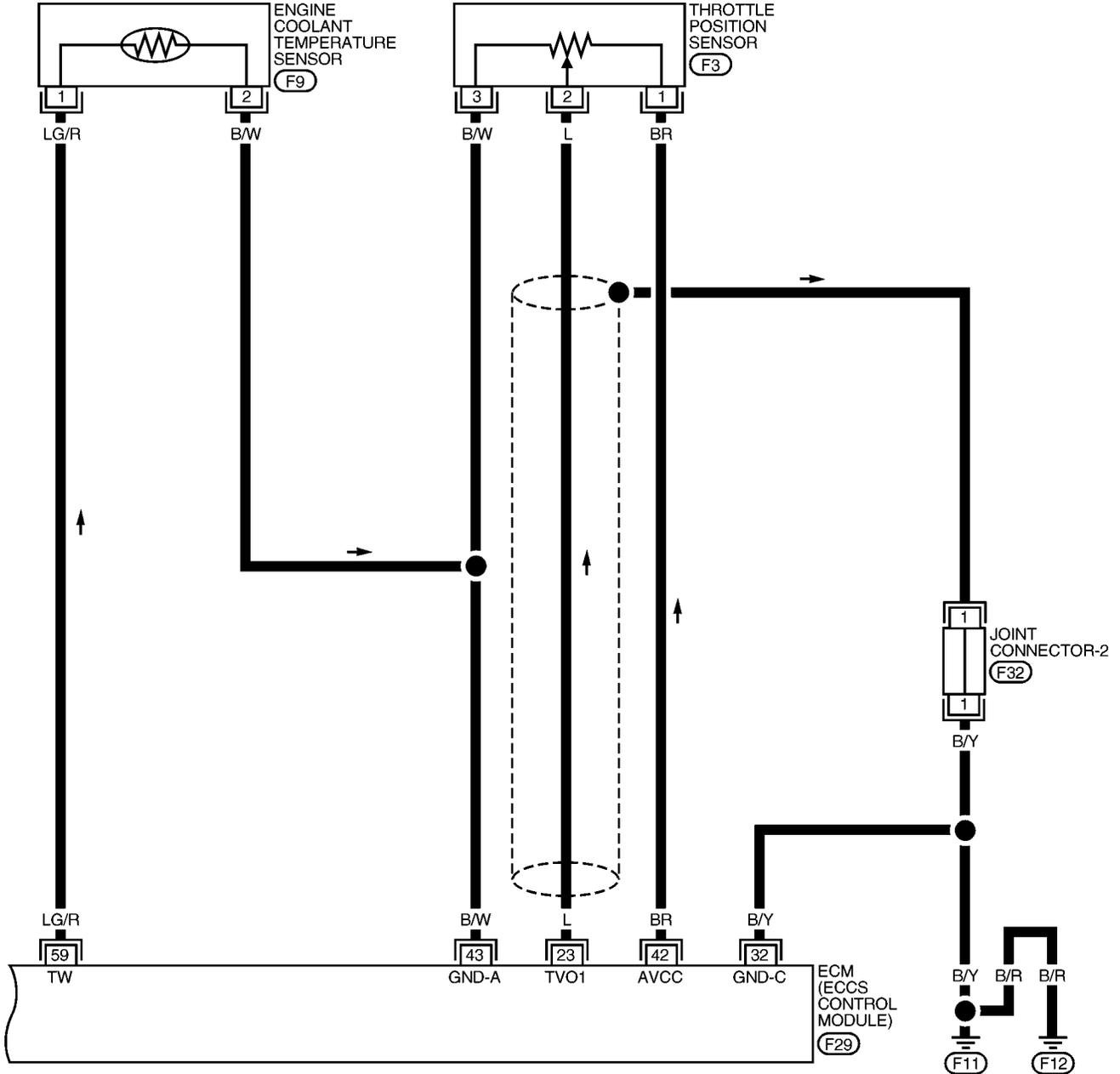
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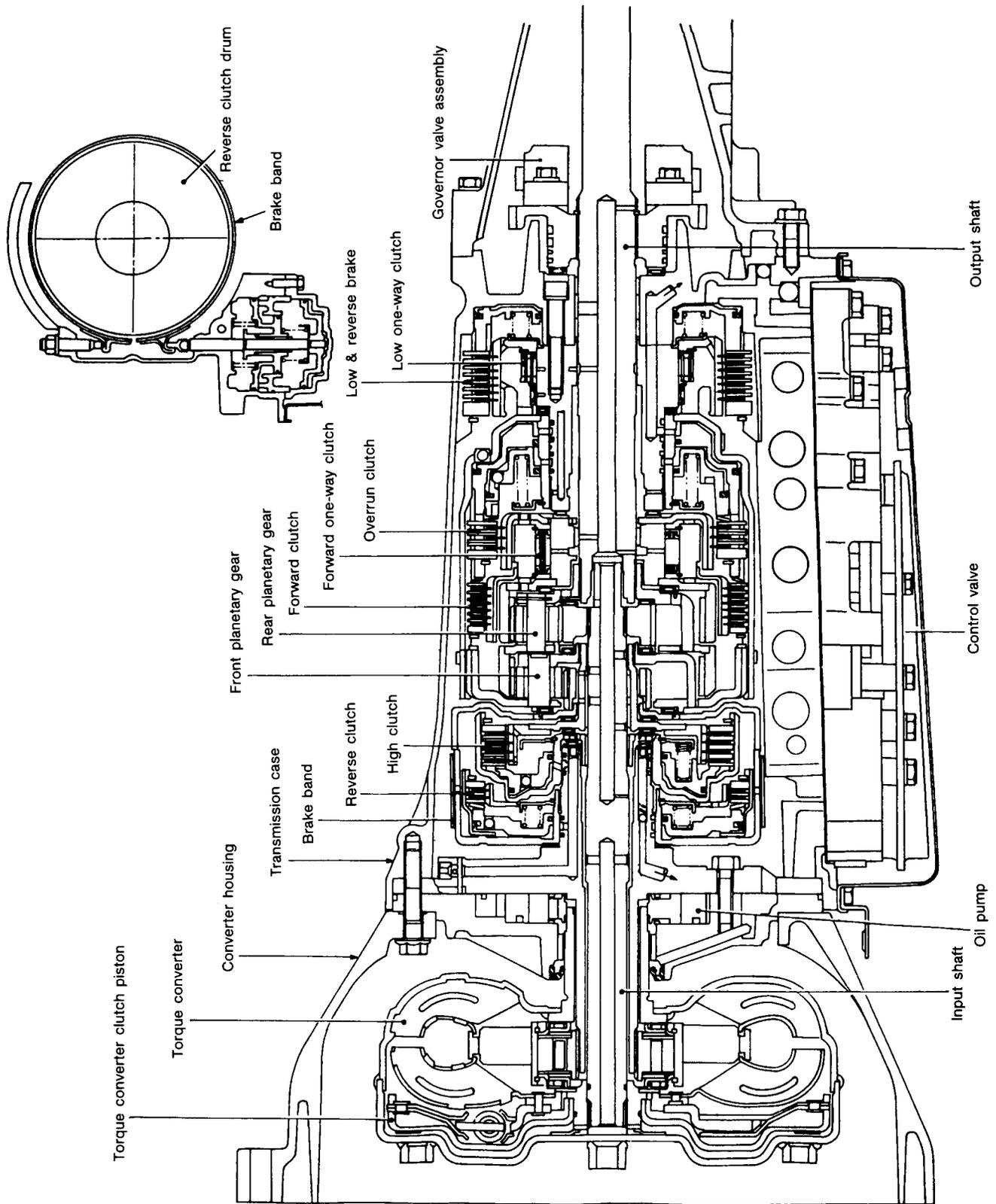
OVERALL SYSTEM Wiring Diagram (Cont'd)

AT-A/T-02



OVERALL SYSTEM

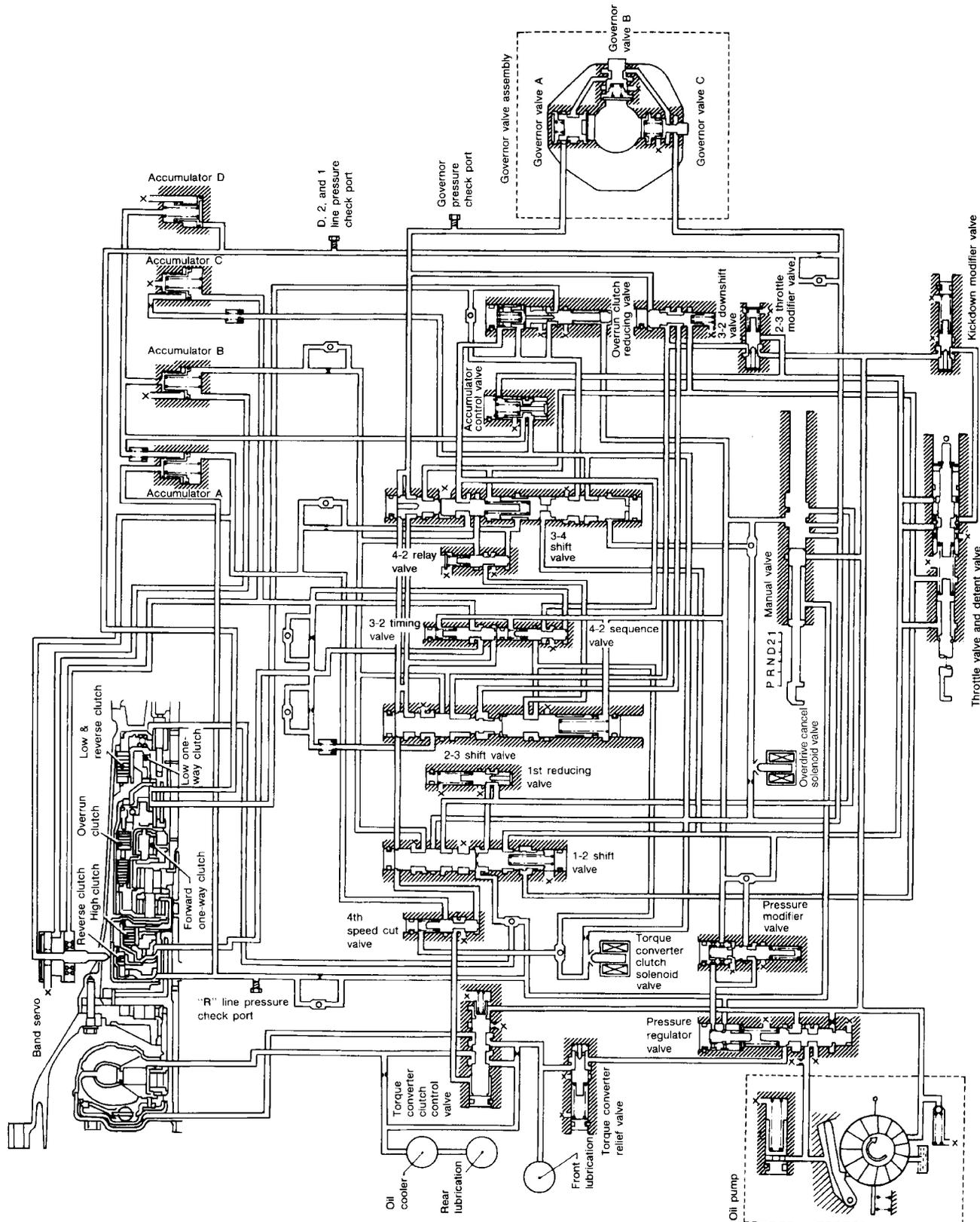
Cross-Sectional View



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OVERALL SYSTEM

Hydraulic Control Circuits



OVERALL SYSTEM

NOTES

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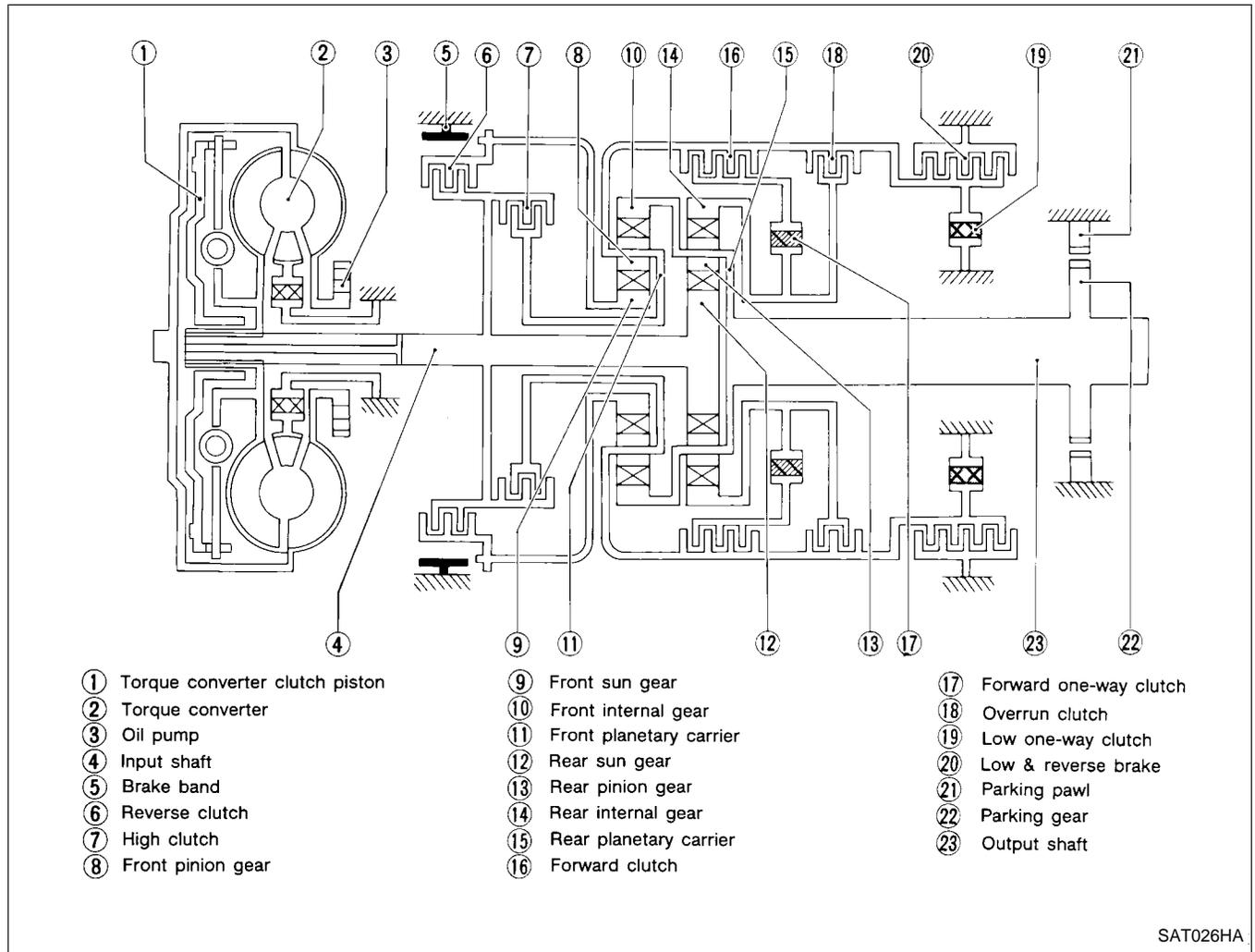
Shift Mechanism

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

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

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

CONSTRUCTION



OVERALL SYSTEM

Shift Mechanism (Cont'd)

FUNCTION OF CLUTCH AND BRAKE

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

CLUTCH AND BAND CHART

Shift position	Reverse clutch ⑥	High clutch ⑦	Forward clutch ⑯	Overrun clutch ⑱	Band servo			Forward one-way clutch ⑰	Low one-way clutch ⑲	Low & reverse brake ⑳	Lock-up	Remarks
					2nd apply	3rd release	4th apply					
P												PARK POSITION
R	○									○		REVERSE POSITION
N												NEUTRAL POSITION
D *4	1st		○	⊗				●	●			Automatic shift 1 ↔ 2 ↔ 3 ↔ 4
	2nd		○	*1 ⊙	○			●				
	3rd		○	⊙	*2 ⊗	⊗		●				
	4th		⊗		*3 ⊗	⊗	○			○		
2	1st		○	⊗				●	●			Automatic shift 1 ↔ 2
	2nd		○	○	○			●				
1	1st		○	○				●		○		Locks (held stationary) in 1st speed 1 ← 2
	2nd		○	○	○			●				

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

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

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

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

○ : Operates.

⊙ : Operates when throttle opening is less than 3/16, activating engine brake.

● : Operates during "progressive" acceleration.

⊗ : Operates but does not affect power-transmission.

⊗ : Operates when throttle opening is less than 3/16 but does not affect engine brake.

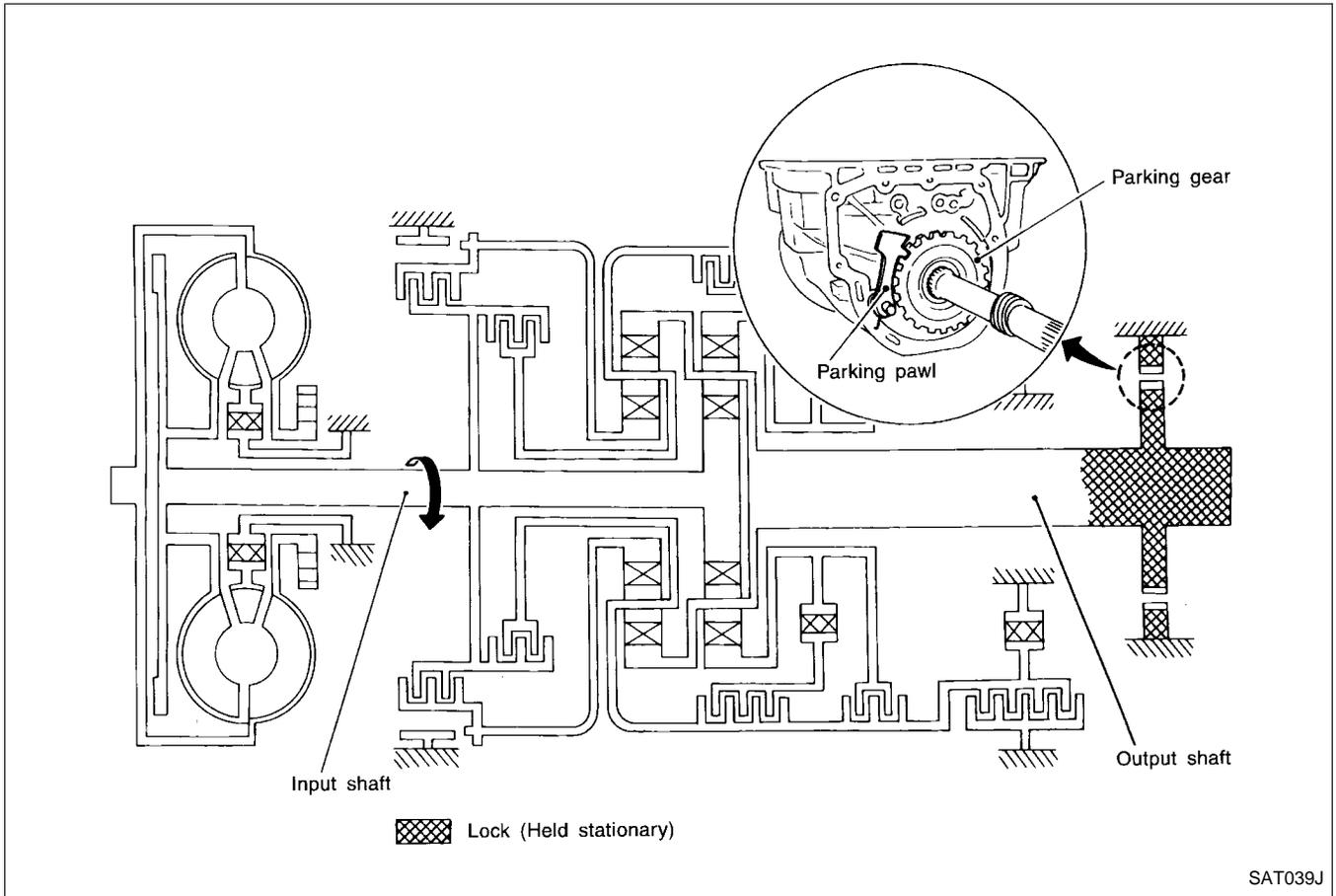
OVERALL SYSTEM

Shift Mechanism (Cont'd)

POWER TRANSMISSION

“N” and “P” positions

- “N” position
No control members operate. Power from the input shaft is not transmitted to the output shaft because the clutches do not operate.
- “P” position
Similar to the “N” position, no control members operate. The parking pawl interconnected with the select lever engages with the parking gear to mechanically hold the output shaft so that the powertrain is locked.

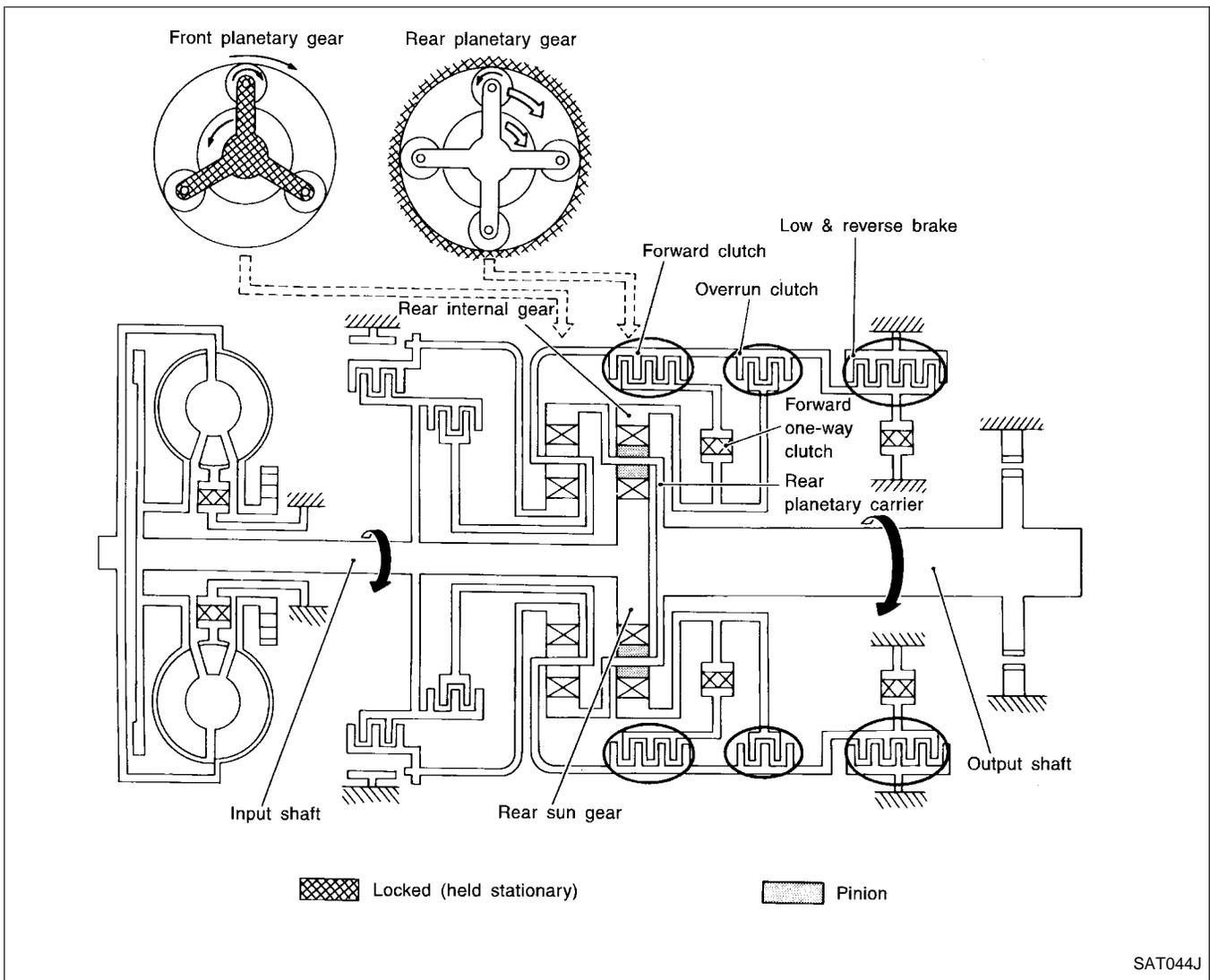


OVERALL SYSTEM

Shift Mechanism (Cont'd)

"1," position

<ul style="list-style-type: none"> ● Forward clutch ● Forward one-way clutch ● Overrun clutch ● Low and reverse brake 	<p>As overrun clutch engages, rear internal gear is locked by the operation of low and reverse brake.</p> <p>This is different from that of D_1 and 2_1.</p>
<p>Engine brake</p>	<p>Overrun clutch always engages, therefore engine brake can be obtained when decelerating.</p>
<p>Power flow</p>	<pre> Input shaft ↓ Rear sun gear ↓ Rear planetary carrier ↓ Output shaft </pre>



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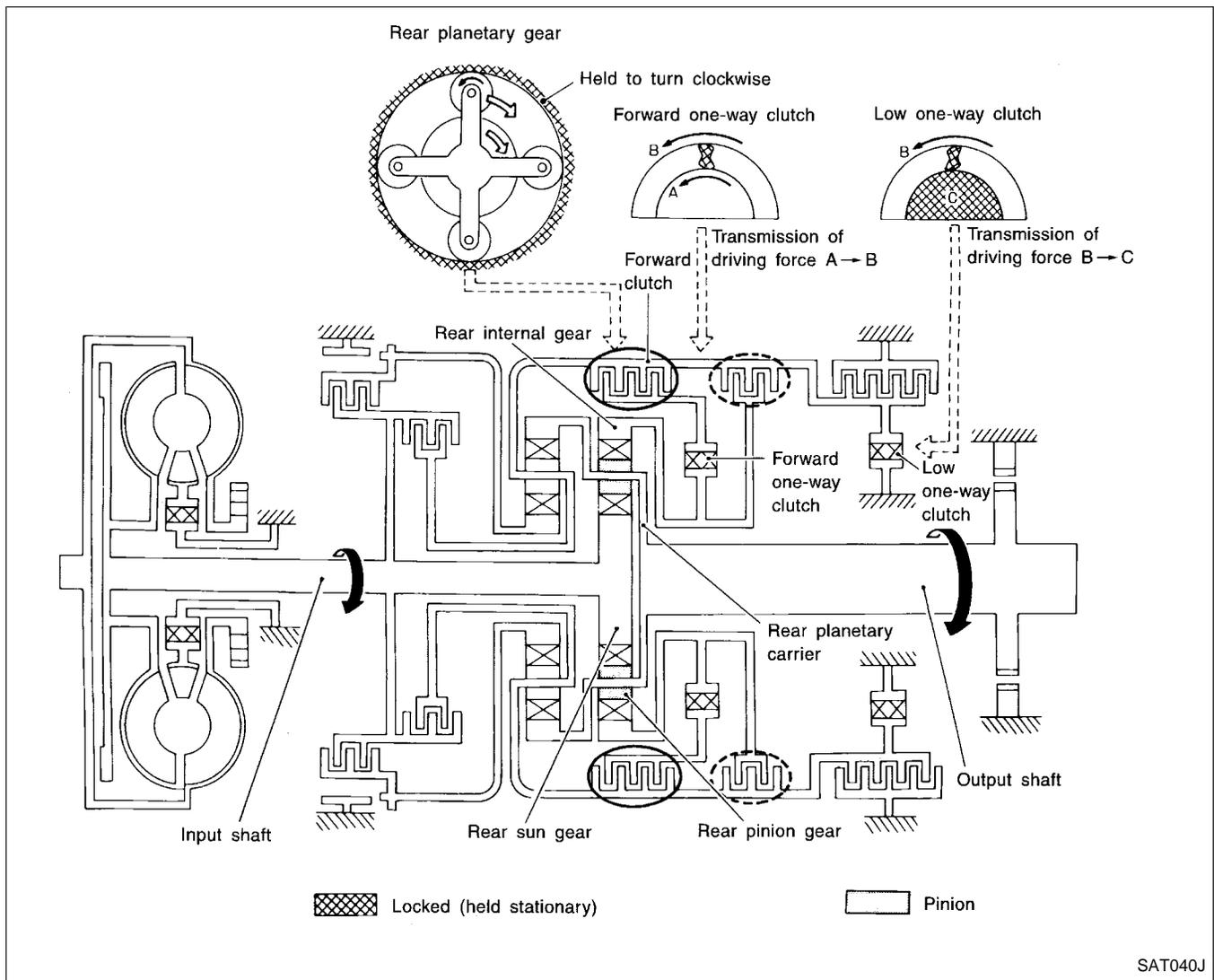
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OVERALL SYSTEM

Shift Mechanism (Cont'd)

"D₁" and "2₁" positions

<ul style="list-style-type: none"> ● Forward one-way clutch ● Forward clutch ● Low one-way clutch 	Rear internal gear is locked to rotate counterclockwise because of the functioning of these three clutches. (Start-up at D ₁).
Overrun clutch engagement conditions (Engine brake)	D ₁ : Overdrive control switch "OFF" and throttle opening is less than 3/16 2 ₁ : Throttle opening less than 3/16 At D ₁ and 2 ₁ positions, engine brake is not activated due to free turning of low one-way clutch.
Power flow	<pre> Input shaft ↓ Rear sun gear ↓ Rear pinion gear ↓ Rear planetary carrier ↓ Output shaft </pre>



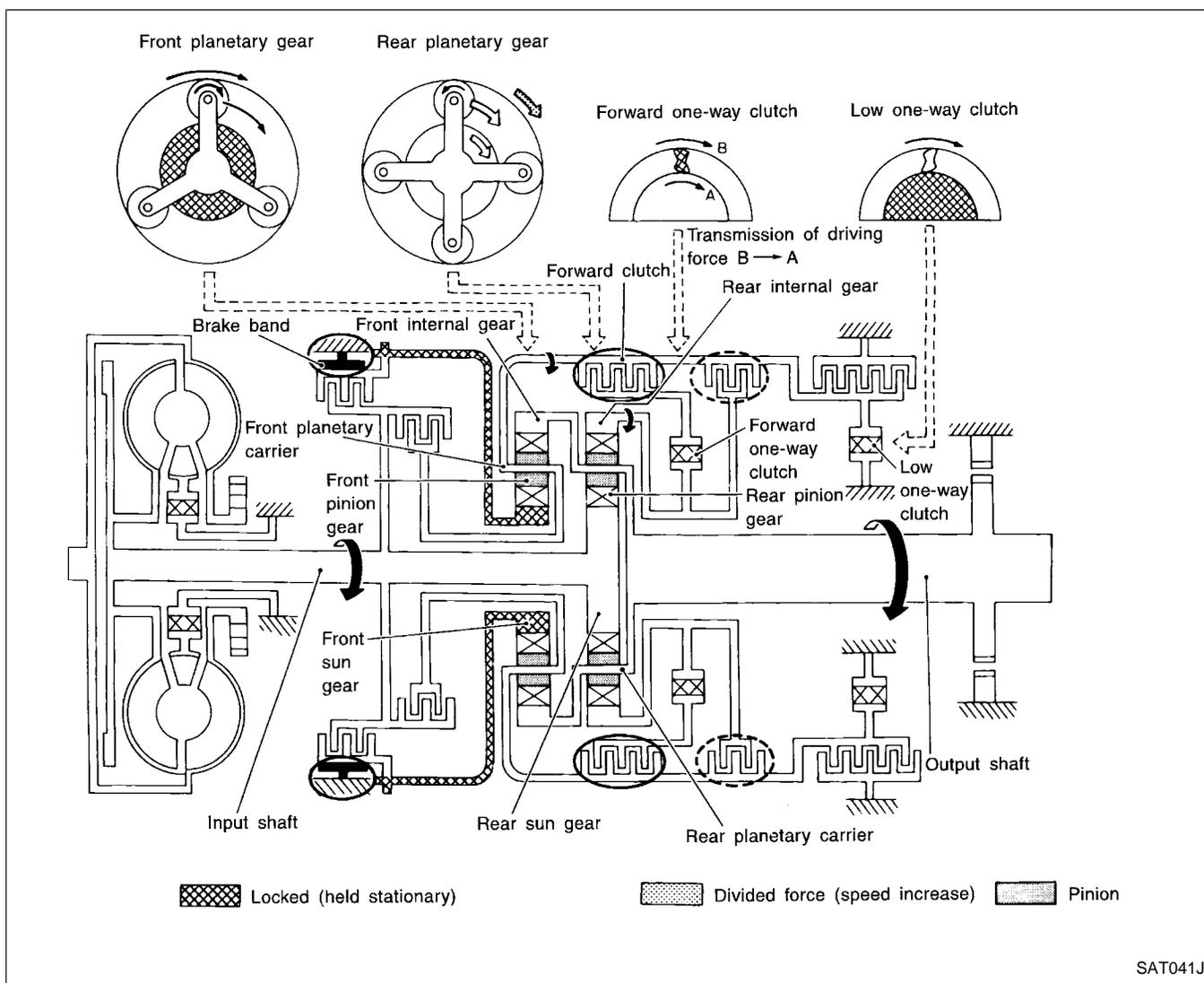
SAT040J

OVERALL SYSTEM

Shift Mechanism (Cont'd)

"D₂", "2₂" and "1₂" positions

<ul style="list-style-type: none"> ● Forward clutch ● Forward one-way clutch ● Brake band 	<p>Rear sun gear drives rear planetary carrier and combined front internal gear. Front internal gear now rotates around front sun gear accompanying front planetary carrier.</p> <p>As front planetary carrier transfers the power to rear internal gear through forward clutch and forward one-way clutch, this rotation of rear internal gear increases the speed of rear planetary carrier compared with that of the 1st speed.</p>
<p>Overrun clutch engagement conditions</p>	<p>D₂: Overdrive control switch "OFF" and throttle opening is less than 3/16 2₂: Throttle opening less than 3/16 1₂: Always engaged</p>
<p>Power flow</p>	<pre> graph TD IS[Input shaft] --> RSG[Rear sun gear] RSG --> FIG[Front internal gear] FIG --> RPC[Rear planetary carrier] FIG --> FPC[Front planetary carrier] RPC --> O[Output] FPC --> RIG[Rear internal gear] RIG --> IS </pre>



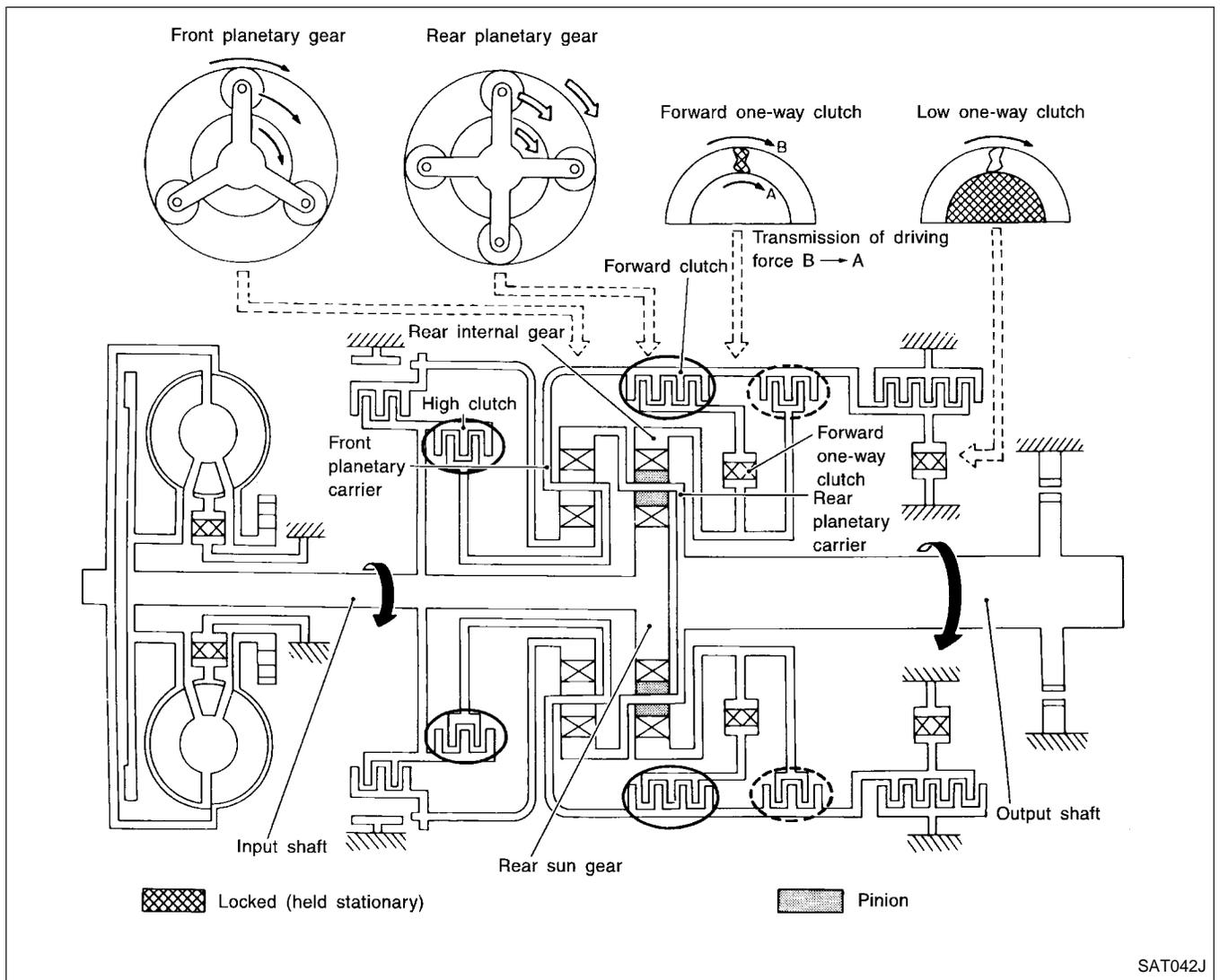
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OVERALL SYSTEM

Shift Mechanism (Cont'd)

"D₃" position

<ul style="list-style-type: none"> ● High clutch ● Forward clutch ● Forward one-way clutch 	<p>Input power is transmitted to front planetary carrier through high clutch. And front planetary carrier is connected to rear internal gear by operation of forward clutch and forward one-way clutch. This rear internal gear rotation and another input (the rear sun gear) accompany rear planetary carrier to turn at the same speed.</p>
<p>Overrun clutch engagement conditions</p>	<p>D₃: Overdrive control switch "OFF" and throttle opening is less than 3/16 Throttle opening less than 3/16</p>
<p>Power flow</p>	<pre> graph TD IS[Input shaft] --> HC[High clutch] HC --> FPC[Front planetary carrier] FPC --> FC[Forward clutch] FC --> FOWC[Forward one-way clutch] FOWC --> RIG[Rear internal gear] RIG --> RPC[Rear planetary carrier] RS[Rear sun gear] --> RPC RPC --> OS[Output Shaft] </pre>



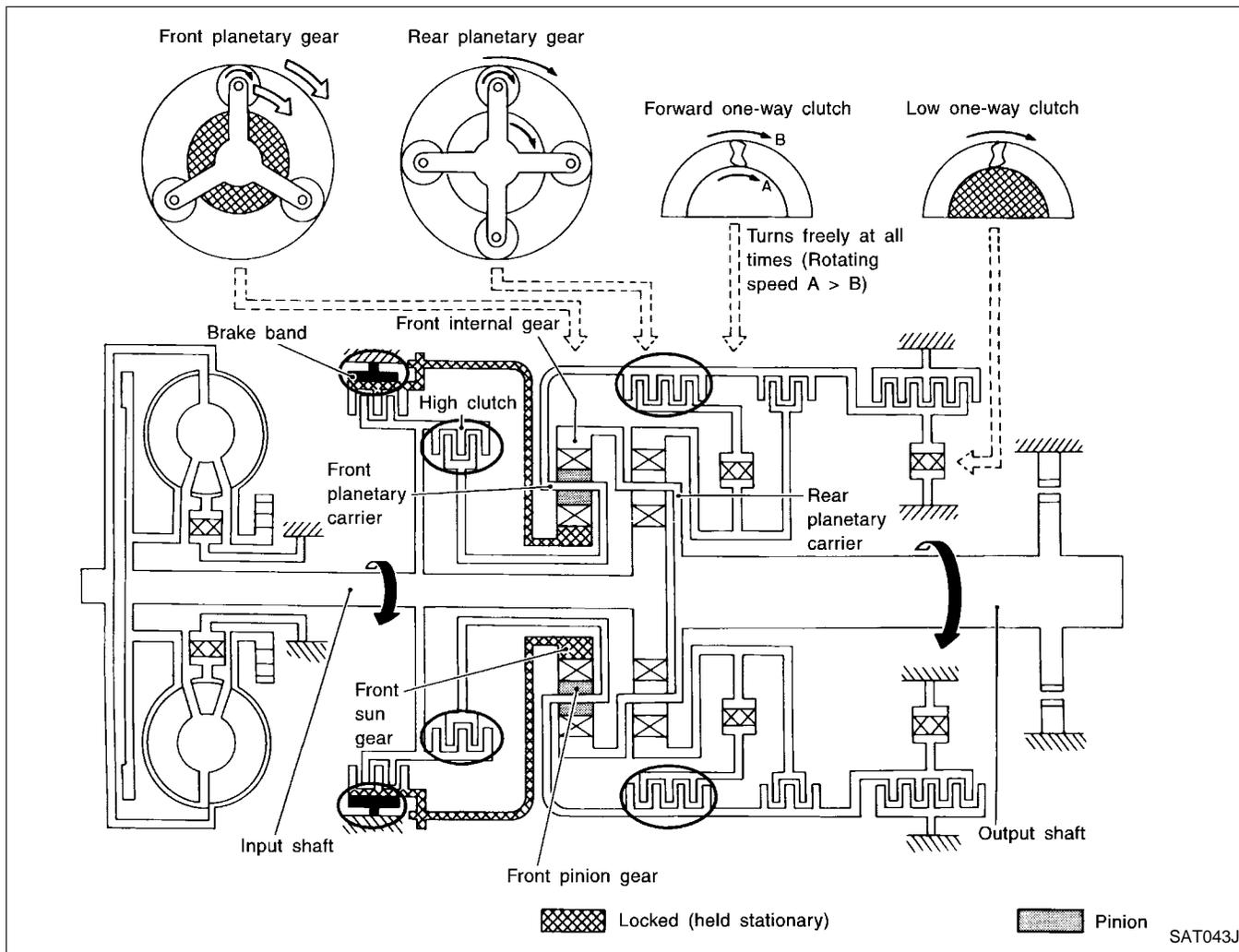
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OVERALL SYSTEM

Shift Mechanism (Cont'd)

"D₄" (OD) position

<ul style="list-style-type: none"> ● High clutch ● Brake band ● Forward clutch (Does not affect power transmission) 	<p>Input power is transmitted to front carrier through high clutch. This front carrier turns around the sun gear which is fixed by brake band and makes front internal gear (output) turn faster.</p>
<p>Engine brake</p>	<p>At D₄ position, there is no one-way clutch in the power transmission line and engine brake can be obtained when decelerating.</p>
<p>Power flow</p>	<pre> Input shaft ↓ High clutch ↓ Front planetary carrier ↓ Front pinion gear ↓ Front internal gear ↓ Rear planetary carrier ↓ Output shaft </pre>

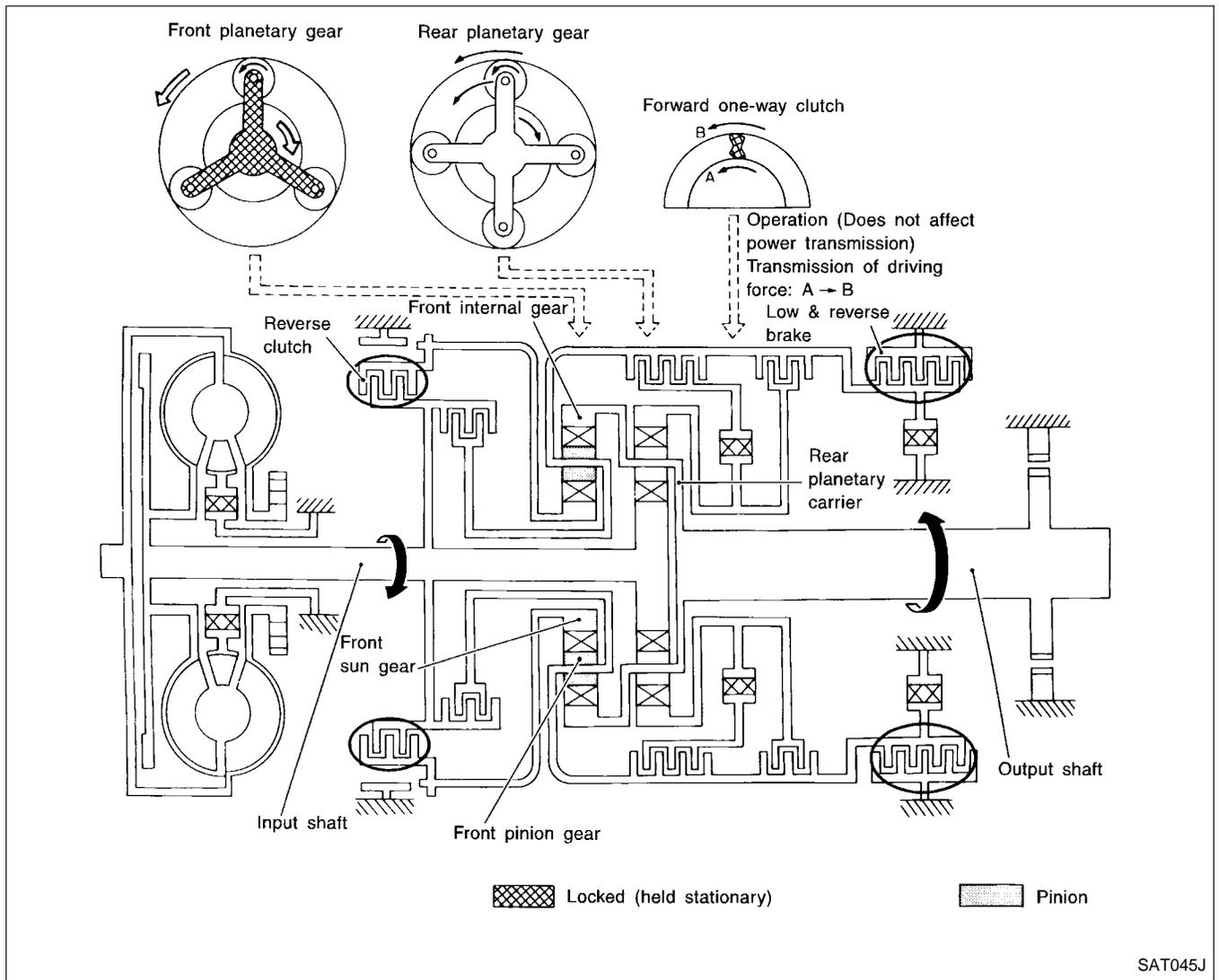


OVERALL SYSTEM

Shift Mechanism (Cont'd)

"R" position

<ul style="list-style-type: none"> ● Reverse clutch ● Low and reverse brake 	<p>Front planetary carrier is stationary because of the operation of low and reverse brake.</p> <p>Input power is transmitted to front sun gear through reverse clutch, which drives front internal gear in the opposite direction.</p>
<p>Engine brake</p>	<p>As there is no one-way clutch in the power transmission line, engine brake can be obtained when decelerating.</p>
<p>Power flow</p>	<pre> graph TD A[Input shaft] --> B[Reverse clutch] B --> C[Front sun gear] C --> D[Front pinion gear] D --> E[Front internal gear] E --> F[Output shaft] </pre>

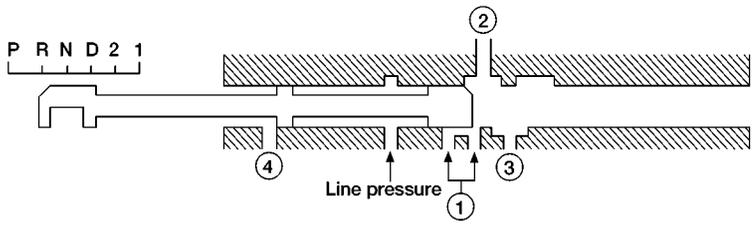


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OVERALL SYSTEM

Shift Mechanism (Cont'd)

FUNCTION OF CONTROL VALVES

Valve Name	Function																																							
Pressure regulator valve	Optimally controls oil under pressure discharged from oil pump in response to driving conditions.																																							
Throttle valve	Regulates line pressure to throttle pressure corresponding with throttle opening.																																							
Detent valve	Activates throttle valve via spring in response to changes in throttle opening, thereby regulating throttle pressure.																																							
Pressure modifier valve	Serves as an auxiliary signal valve of pressure regulator valve to control line pressure in response to driving conditions.																																							
Accumulator control valve	Regulates accumulator pressure to pressure corresponding with driving conditions.																																							
Manual valve	<p>Directs line pressure to each oil circuit selected by the selector lever position.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Position</th> <th colspan="4">Circuit</th> </tr> <tr> <th>①</th> <th>②</th> <th>③</th> <th>④</th> </tr> </thead> <tbody> <tr> <td>P</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>R</td> <td></td> <td></td> <td></td> <td>○</td> </tr> <tr> <td>N</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D</td> <td>○</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>○</td> <td>○</td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>○</td> <td>○</td> <td>○</td> <td></td> </tr> </tbody> </table>  <p>Hydraulic pressure drains when the shift lever is in N and P.</p>	Position	Circuit				①	②	③	④	P					R				○	N					D	○				2	○	○			1	○	○	○	
Position	Circuit																																							
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1	○	○	○																																					
<ul style="list-style-type: none"> ● 1-2 shift valve ● 2-3 shift valve ● 3-4 shift valve 	Provides automatic shift control in response to driving conditions, such as vehicle speed, throttle opening, etc. Shift control is accomplished by activating or deactivating the clutch, brakes, brake bands, etc.																																							
2-3 throttle modifier valve	Controls line pressure to provide optimum shifting point (2nd → 3rd) during partial-open throttle. (2-3 throttle modulator pressure)																																							
3-2 downshift valve	Delivers throttle pressure in a direction that overcomes 2-3 shift valve's governor pressure while shifting from "3rd" to "2nd" in the "D" position.																																							
Kickdown modifier valve	Controls line pressure to provide optimum shifting points (1st → 2nd) and (2nd → 3rd) during kickdowns. (Kickdown modifier pressure)																																							
4-2 relay valve	Operates in conjunction with the 4-2 sequence valve to prevent downshifting from 4th to 3rd, then to 2nd while directly shifting from 4th to 2nd.																																							
4-2 sequence valve	Prevents 4th band servo "apply" pressure from draining during direct shifting from 4th to 2nd before high clutch "apply" pressure and band servo "release" pressure in the same oil circuit are drained.																																							

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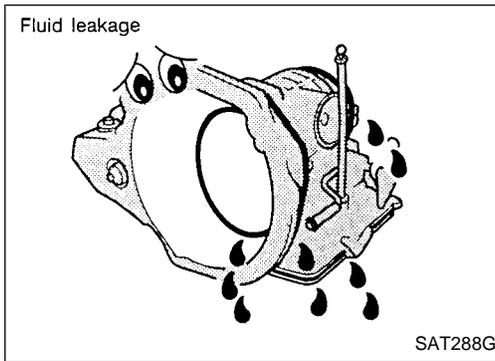
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OVERALL SYSTEM

Shift Mechanism (Cont'd)

Valve name	Function
3-2 timing valve	Engine speed increases in a short period of time at low engine speeds when accelerator is depressed during downshifts from D_3 to D_2 . However, it takes longer for the engine to increase speed at high engine speeds. The 3-2 timing valve serves to delay the band servo "release" draining speed (At this point, the transmission is tentatively set in Neutral) during downshifts from D_3 to D_2 at speeds greater than those in the specifications, thereby providing smooth shifting.
1st reducing valve	Controls low & reverse brake "apply" pressure to relief shocks caused by engine brakes while shifting from 2nd to 1st in the 1 position.
Overrun clutch reducing valve	Controls pressure that operates the overrun clutch to relief shocks caused during engine braking. Line pressure acts on the overrun clutch reducing valve in the 1st or 2nd position to increase the pressure-regulating point with resultant high engine braking capabilities.
4th speed cut valve	Determines lock-up speed while operating in 4th gear.
<ul style="list-style-type: none">● Torque converter clutch control valve● Torque converter clutch solenoid valve	Activates or deactivates lock-up system.
Torque converter relief valve	Prevents abnormal increase of converter oil pressure.

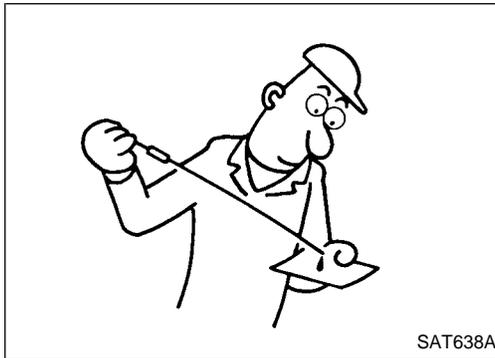
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A/T Fluid Check

FLUID LEAKAGE CHECK

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

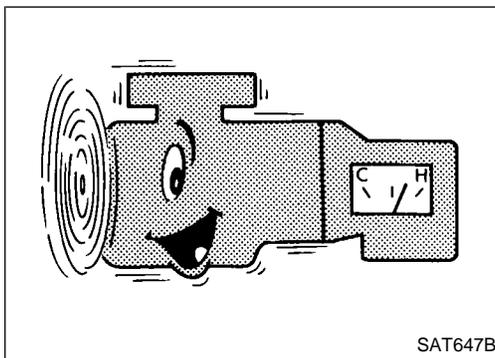


FLUID CONDITION CHECK

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

FLUID LEVEL CHECK

Refer to MA section (“Checking A/T Fluid”, “CHASSIS AND BODY MAINTENANCE”).

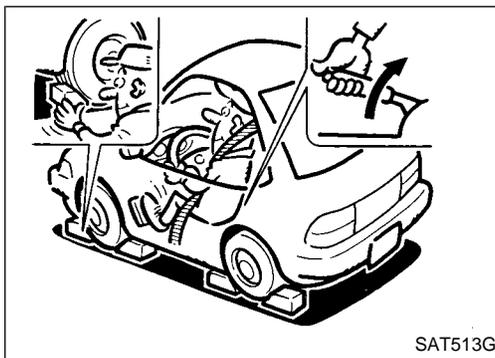


Stall Test

STALL TEST PROCEDURE

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

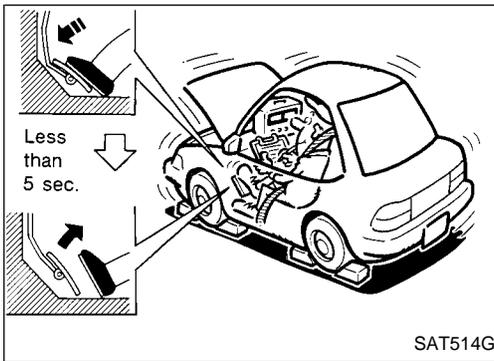
ATF operating temperature:
50 - 80°C (122 - 176°F)



3. 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.

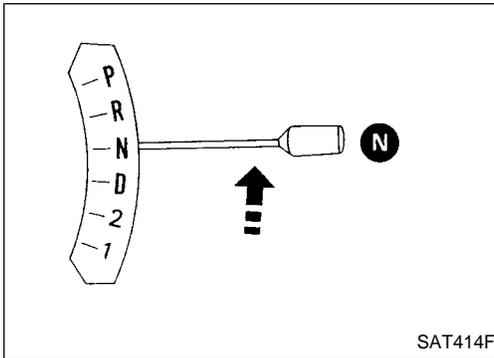
TROUBLE DIAGNOSIS — Basic Inspection

Stall Test (Cont'd)



5. Start engine, apply foot brake, and place selector lever in "D" position.
6. Accelerate to wide open throttle gradually while applying foot brake.
- **During test, never hold throttle wide-open for more than 5 seconds.**
7. Quickly note the engine stall revolution and immediately release throttle.

Stall revolution standard:
2,100 - 2,300 rpm



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

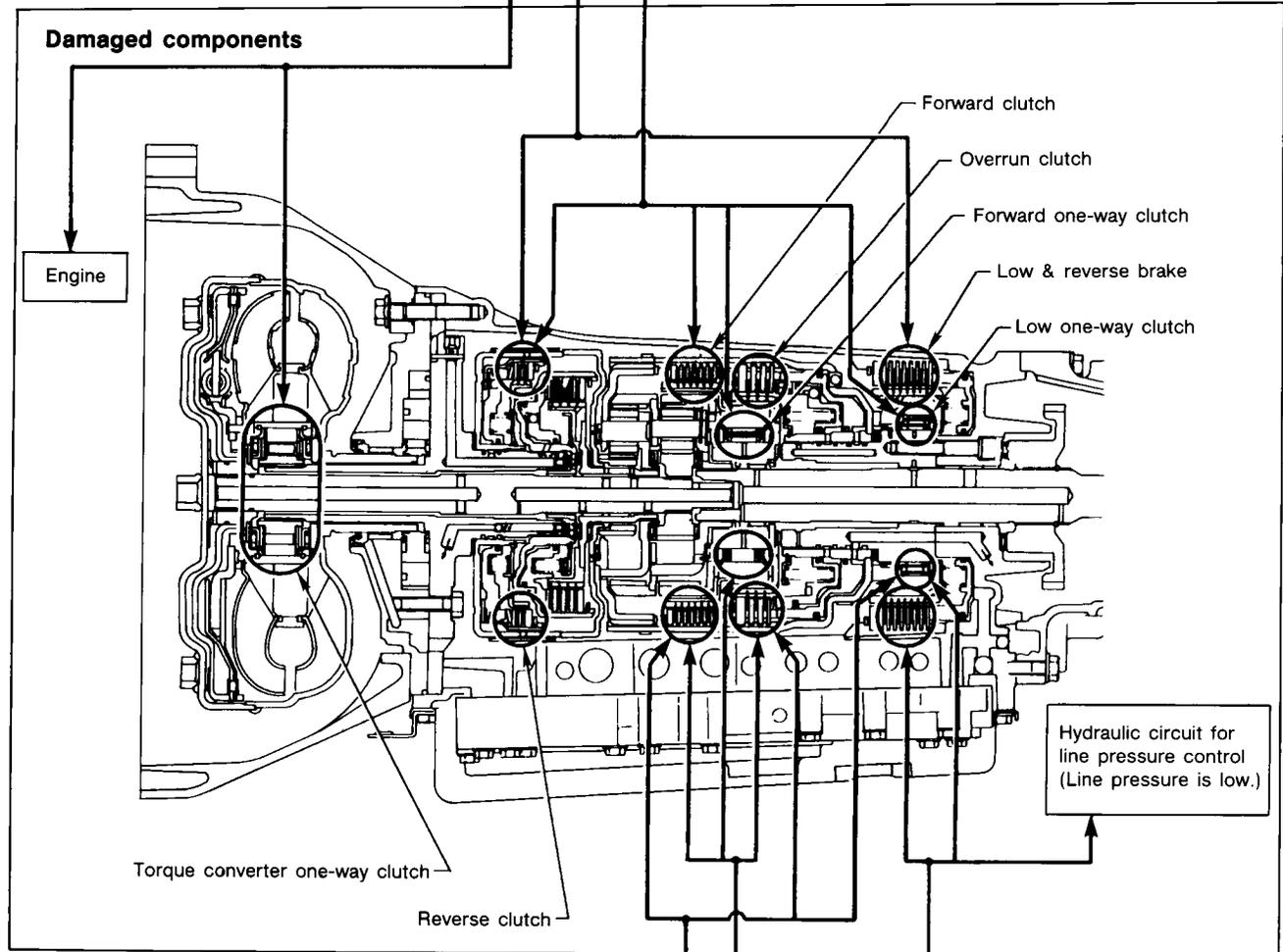
TROUBLE DIAGNOSIS — Basic Inspection

Stall Test (Cont'd)

JUDGEMENT OF STALL TEST

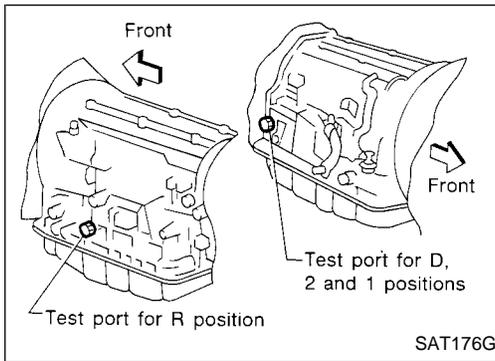
Selector lever position	Judgement		
D	L	O	H
2	L	O	H
1	L	O	O
R	L	H	H

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



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

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

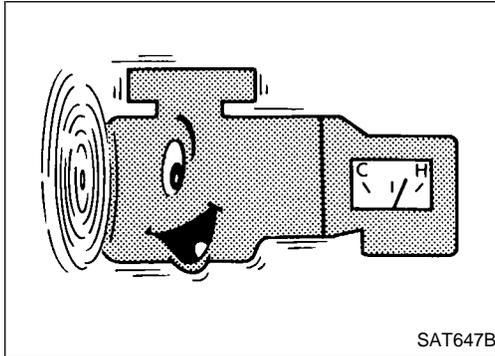


Line Pressure Test

LINE PRESSURE TEST PORTS

Location of line pressure test ports are shown in illustration.

- **Line pressure plugs are hexagon-headed bolts.**
- **Always replace line pressure plugs as they are self-sealing bolts.**



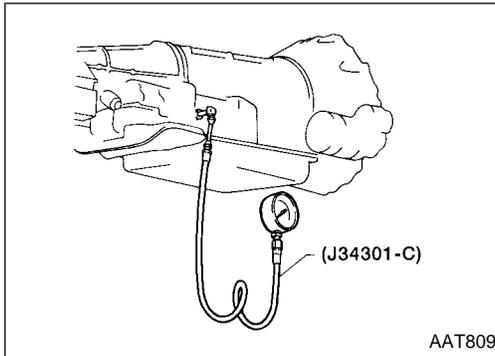
LINE PRESSURE TEST PROCEDURE

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

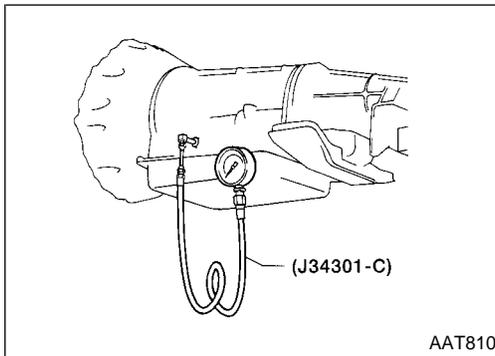
ATF operating temperature:
50 - 80°C (122 - 176°F)

3. Install pressure gauge to line pressure port.

— **D, 2 and 1 positions** —

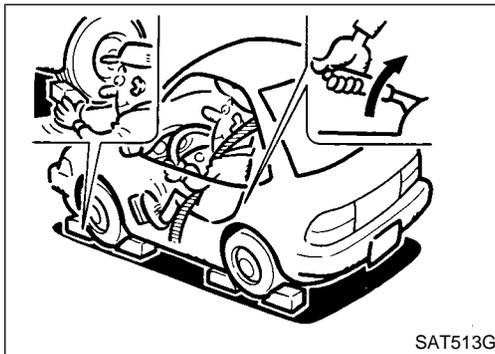


— **R position** —



4. Set parking brake and block wheels.

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



TROUBLE DIAGNOSIS — Basic Inspection

Line Pressure Test (Cont'd)



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

Line pressure:

Engine speed rpm	Line pressure kPa (kg/cm ² , psi)		
	D position (Overdrive control switch ON and OFF)	2 and 1 positions	R position
Idle	471 - 510 (4.8 - 5.2, 68 - 74)	422 - 461 (4.3 - 4.7, 61 - 67)	736 - 775 (7.5 - 7.9, 107 - 112)
Stall	912 - 991 (9.3 - 10.1, 132 - 144)	883 - 961 (9.0 - 9.8, 128 - 139)	1,442 - 1,520 (14.7 - 15.5, 209 - 220)

JUDGEMENT OF LINE PRESSURE TEST

Judgement		Suspected parts
At idle	Line pressure is low in all positions.	<ul style="list-style-type: none"> ● Oil pump wear ● Control piston damage ● Pressure regulator valve or plug sticking ● Spring for pressure regulator valve damaged ● Fluid pressure leakage between oil strainer and pressure regulator valve ● Clogged strainer
	Line pressure is low in particular position.	<ul style="list-style-type: none"> ● Fluid pressure leakage between manual valve and particular clutch. ● For example, line pressure is: <ul style="list-style-type: none"> — Low in "R" and "1" positions, but — Normal in "D" and "2" positions. Therefore, fluid leakage exists at or around low & reverse brake circuit. Refer to CLUTCH AND BAND CHART, AT-13.
	Line pressure is high.	<ul style="list-style-type: none"> ● Maladjustment of throttle position sensor ● Fluid temperature sensor damaged ● Line pressure solenoid valve sticking ● Short circuit of line pressure solenoid valve circuit ● Pressure modifier valve sticking ● Pressure regulator valve or plug sticking
At stall speed	Line pressure is low.	<ul style="list-style-type: none"> ● Maladjustment 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 ● Pressure modifier valve sticking ● Pilot valve sticking

TROUBLE DIAGNOSIS — Basic Inspection

Line Pressure Test (Cont'd)

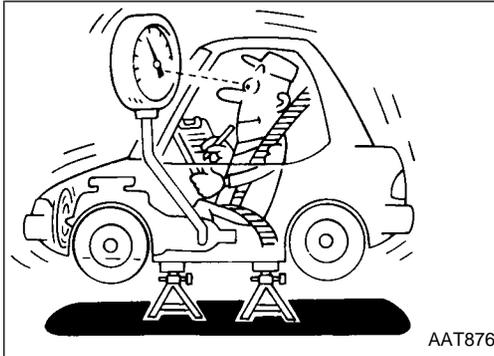
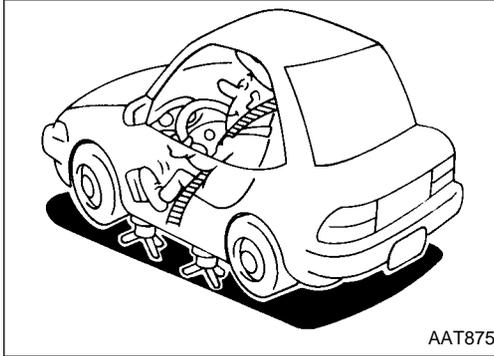
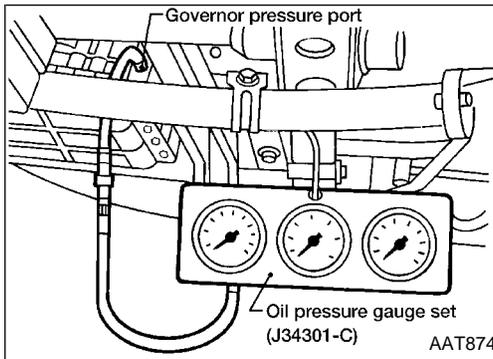
Governor pressure testing

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

ATF operating temperature:

50 - 80°C (122 - 176°F)

3. Install pressure gauge to governor pressure port.



4. Jack up front and rear wheels.
 5. Set selector lever in "D" position and gradually depress accelerator pedal.
- **Be careful of rotating wheels.**

Governor pressure:

- **Governor pressure is not generated when vehicle is stopped.**
- **Governor pressure rises gradually in response to vehicle speed.**

Vehicle speed	Governor pressure kPa (kg/cm ² psi)
0 km/h (0 MPH)	0 (0, 0)
29 km/h (18 MPH)	102.4 - 141.6 (1.22 - 1.26, 17 - 18)
57 km/h (35 MPH)	233.5 - 284.5 (2.40 - 2.90, 34 - 41)
86 km/h (53 MPH)	350.6 - 409.4 (3.58 - 4.18, 51 - 60)

If not, check governor valve assembly. Refer to AT-81.

Road Test

Perform road tests using "Symptom Chart". Refer to AT-30.

"P" POSITION

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

"R" POSITION

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

TROUBLE DIAGNOSIS — Basic Inspection

Road Test (Cont'd)

“N” POSITION

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

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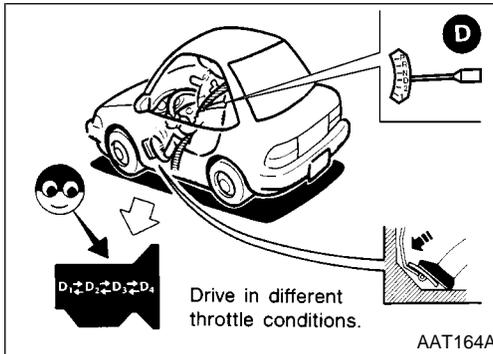
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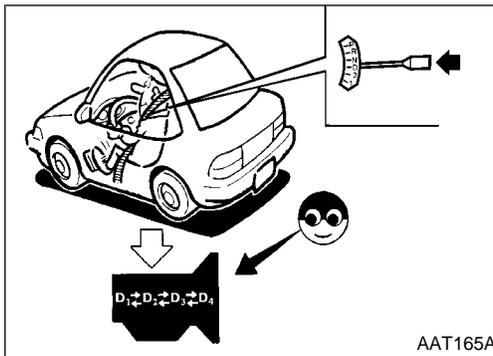
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“D” POSITION

1. Manually shift selector lever from “N” to “D” position, and note shift quality.
2. Using the shift schedule as a reference, drive vehicle in “D” position. Record, on Symptom Chart, respective vehicle speeds at which up-shifting and down-shifting occur. These speeds are to be read at three different throttle positions (light, half and full), respectively. Also determine the timing at which shocks are encountered during shifting and which clutches are engaged.
3. Determine, whether lock-up properly occurs while driving vehicle in proper gear position and at proper speeds.
4. Check to determine if shifting to overdrive gear cannot be made while overdrive control switch is OFF.
5. Drive vehicle at 65 to 80 km/h (40 to 50 MPH) with half to light throttle position (D₃ position). Fully depress accelerator pedal to make sure transmission downshifts from 3rd to 2nd gear.
6. Drive vehicle at 35 to 45 km/h (22 to 28 MPH) with half to light throttle position (D₂ position). Fully depress accelerator pedal to make sure transmission downshifts from 2nd to 1st gear.



“2” POSITION

1. Shift to “2” position and make sure vehicle starts in 1st gear.
2. Increase vehicle speed to make sure transmission upshifts from 1st to 2nd gear.
3. Further increase vehicle speed. Make sure transmission does not upshift to 3rd gear.
4. Drive vehicle at 35 to 45 km/h (22 to 28 MPH) with throttle at half to light position (2₂ position). Fully depress accelerator pedal to make sure transmission downshifts from 2nd to 1st gear.
5. Drive vehicle at idle in “2” position to make sure that transmission downshifts to 1st gear.
6. Move selector lever to “D” position and drive vehicle at 40 to 50 km/h (25 to 31 MPH). Then, move selector lever to “2” position to make sure transmission downshifts to 2nd gear.

“1” POSITION

1. Place selector lever in “1” position and accelerate. Make sure transmission does not shift from 1st to 2nd gear although vehicle speed increases.
2. While driving vehicle in “1” position, release accelerator pedal to make sure that engine compression acts as a brake.
3. Place selector lever in “D” or “2” position and drive vehicle at 20 to 30 km/h (12 to 19 MPH). Then move selector lever to “1” position to make sure transmission downshifts to 1st gear.

TROUBLE DIAGNOSIS — General Description

Symptom Chart

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

: Valve suspected to be malfunctioning

		← ON VEHICLE →															
		Oil level and oil quality	Control linkage	Park/neutral position (PNP) switch and wiring	Throttle wire	Engine idling speed	Line pressure	Control valve	4th speed cut valve	Pressure regulator valve	Pressure modifier valve	1-2 shift valve	2-3 shift valve	3-4 shift valve	Accumulator control valve	3-2 downshift valve	2-3 throttle modifier valve
Sharp shocks in shifting from "N" to "D" position		1	2	.	5	3	4	8									
Shift shocks	When shifting from 1st to 2nd or 2nd to 3rd	1	2	.	4	.	3	7									
	When shifting from 3rd to 4th	1	2	.	4	.	3	6									
	When shifting from "D" to "2" and "1" position. When overdrive control switch is set from ON to OFF	1	2	.	4	.	3	5									
	When shifting from 2nd to 1st in "1" position	1	2	.	4	.	3	5									
Shift slippage when upshifting	When shifting from 1st to 2nd	1	2	.	4	.	3	6									
	When shifting from 2nd to 3rd	1	2	.	4	.	3	6									
	When shifting from 3rd to 4th	1	2	.	4	.	3	6									
Shift slippage with accelerator pedal depressed	When shifting from 4th to 2nd	1	2	.	5	.	3	7									
	When shifting from 4th to 3rd	1	2	.	4	.	3	6									
	When shifting from 4th to 1st and shifting from 3rd to 1st	1	2	.	5	.	3	7									
Poor power/acceleration	When vehicle starts	1	2	.	5	.	3	10									
	When upshifting	1	2	.	4	.	3	8									
No engine braking	When shifting from "D" to "2" and "1" position	1	2	.	4	.	3	6									
	When overdrive control switch is set from ON to OFF	1	2	.	4	.	3	8									
	When shifting from 2nd to 1st in "1" position	1	2	.	4	.	3	6									
Shift quality	Too low a gear change point from 2nd to 3rd and from 3rd to 2nd.	1	.	.	4	.	2	5									
	Too high a gear change point from 2nd to 3rd and from 3rd to 2nd.	1	.	.	4	.	2	5									
	Too low a gear change point from 2nd to 1st in "1" position.	1	.	.	4	.	2	5									
	Too high a gear change point from 2nd to 1st in "1" position.	1	.	.	4	.	2	5									

TROUBLE DIAGNOSIS — General Description

Symptom Chart (Cont'd)

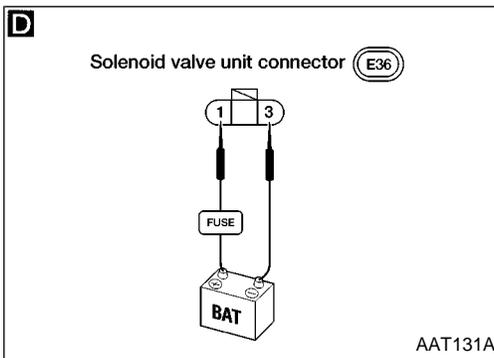
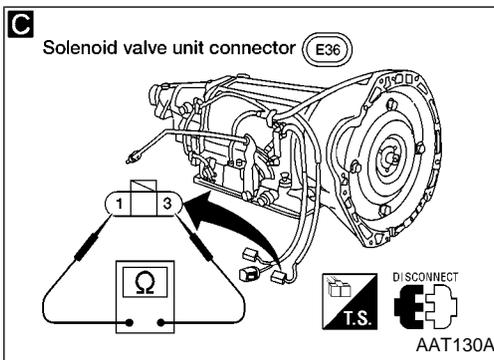
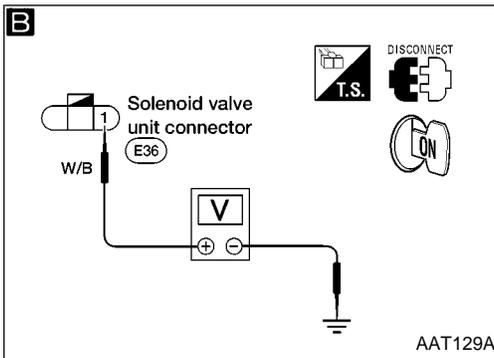
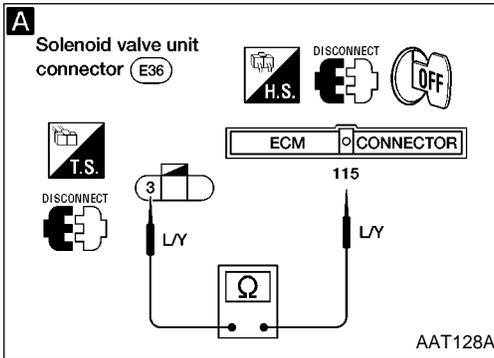
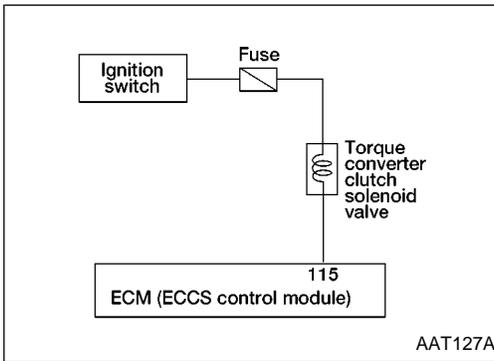
Numbers are arranged in order of the inspection.
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 Numbers in OFF VEHICLE columns indicate that the transmission must be removed from the vehicle to perform the inspection.

: Valve suspected to be malfunctioning

		← ON VEHICLE →																
		Oil level and oil quality	Control linkage	Park/neutral position (PNP) switch and wiring	Throttle wire	Engine idling speed	Line pressure	Control valve	4th speed cut valve	Pressure regulator valve	Pressure modifier valve	1-2 shift valve	2-3 shift valve	3-4 shift valve	Accumulator control valve	3-2 downshift valve	2-3 throttle modifier valve	
Shift quality	Failure to change gear from 4th to 2nd with accelerator pedal depressed.	1	.	.	4	.	2	5										
	Failure to change gear from 3rd to 2nd with accelerator pedal depressed.	1	.	.	4	.	2	5										
	Failure to change gear from 1st to 2nd in "D" and "2" position.	1	.	.	4	.	2	5										
	Vehicle does not start from 1st in "D" and "2" position.	1	.	.	4	.	2	5										
	Failure to change gear to 3rd to 4th in "D" position.	1	.	.	4	.	2	7										
	Changes gear to 1st directly when selector lever is set from "D" to "1" position.	1	.	.	4	.	2	5										
	Changes gear to 2nd in "1" position.	1	.	.	4	.	2	5										
	Too high or low a change point when lock-up operates.	1	.	.	4	.	2	5										
Lock-up quality	Lock-up point is extremely high or low.	1	.	.	4	.	2	5										
	Torque converter does not lock-up.	1	.	.	4	.	2	5										
	Lock-up is not released when accelerator pedal is released.	1	.	.	.	.	.	.				
Engine does not start in "P" and "N" positions, or engine starts in positions other than "P" and "N" positions.		.	2	3	.	.	.	.						
Vehicle moves with selector lever in "P" position.		.	1	.	.	.	.	.					

Torque Converter Clutch Solenoid Valve

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



A

CHECK GROUND CIRCUIT.

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and torque converter clutch solenoid valve harness connector.
3. Check resistance between solenoid valve unit harness terminal (3) and ECM harness terminal (115).

Resistance:
Approximately 0Ω

NG → Repair or replace harness between ECM and torque converter clutch solenoid valve.

OK

B

CHECK POWER SOURCE CIRCUIT.

1. Turn ignition switch ON.
2. Check voltage between solenoid valve unit harness terminal (1) and ground.

Voltage:
Battery voltage

NG → Check the following items:
 • Ignition switch and fuse Refer to EL section ("POWER SUPPLY ROUTING").
 • Harness continuity between fuse and torque converter clutch solenoid valve.

OK

C

CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE (RESISTANCE).

Check resistance between torque converter clutch solenoid valve terminals (1) and (3).

Resistance:
Approximately 25Ω

NG → Replace torque converter clutch solenoid valve.

OK

D

CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE (OPERATION).

1. Remove torque converter clutch solenoid valve. Refer to AT-45.
2. Check torque converter clutch solenoid valve operation.

NG → Replace torque converter clutch solenoid valve.

OK

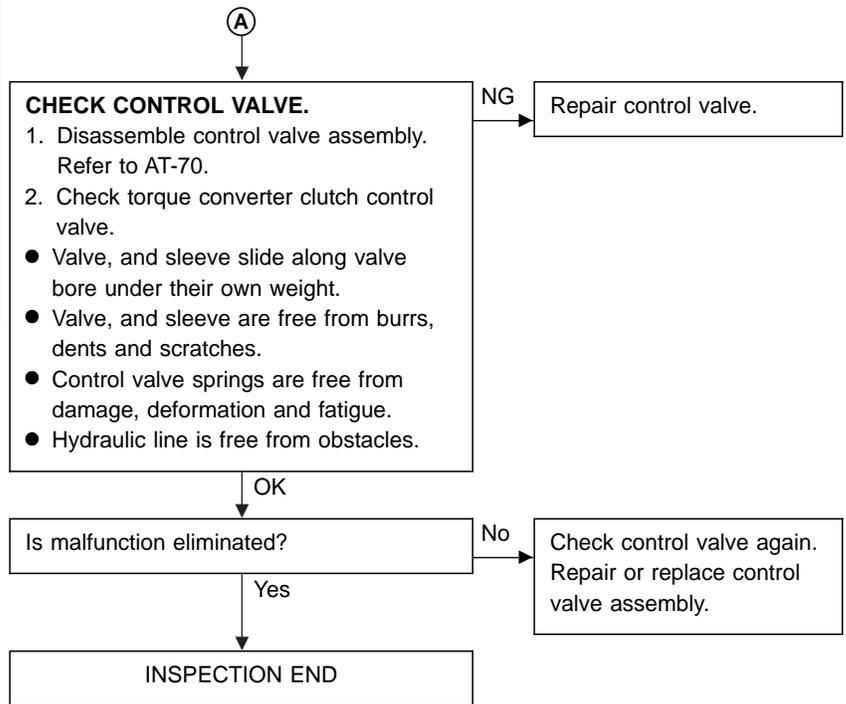
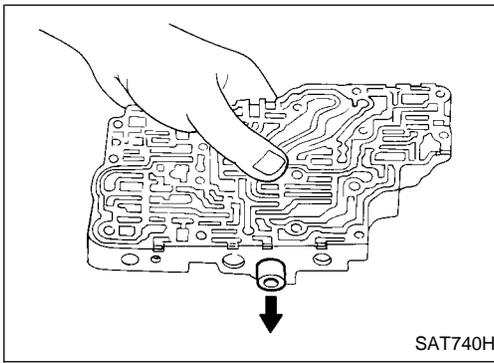
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TROUBLE DIAGNOSIS FOR DTC P1550

Torque Converter Clutch Solenoid Valve (Cont'd)

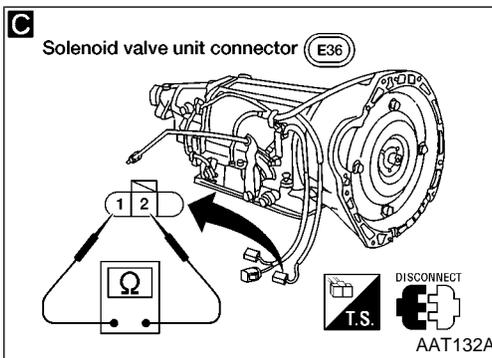
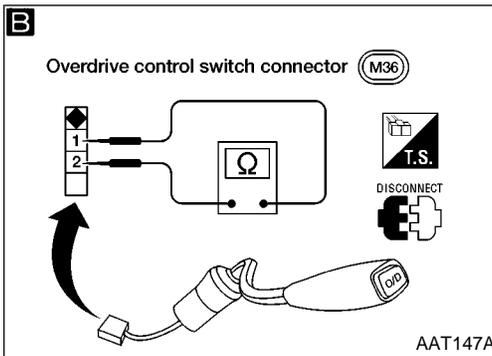
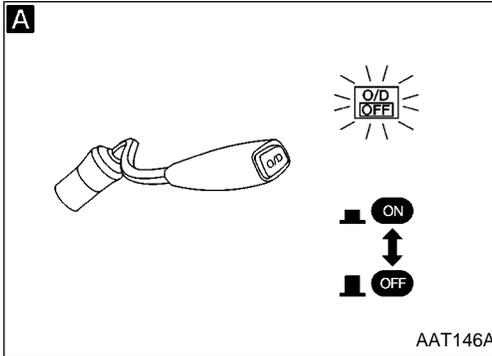
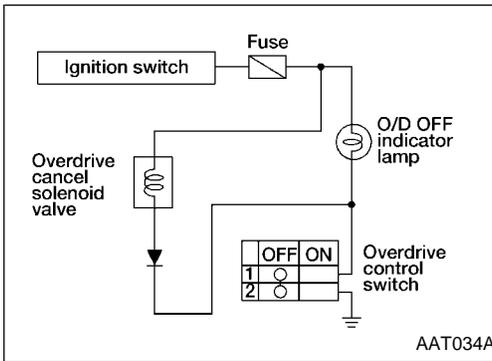
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TROUBLE DIAGNOSES

Component Inspection

OVERDRIVE CONTROL SWITCH AND OVERDRIVE CANCEL SOLENOID VALVE



A

CHECK O/D OFF INDICATOR LAMP CIRCUIT.

1. Turn ignition switch ON.
(Do not start engine.)
2. Set overdrive control switch OFF.
O/D OFF indicator lamp should come on.

OK → Go to **C**

NG

Check the following items:

- O/D OFF indicator lamp
Refer to EL section ("METER AND GAUGES").
- Ignition switch and fuse
Refer to EL section ("POWER SUPPLY ROUTING").

OK

B

CHECK OVERDRIVE CONTROL SWITCH.

Check continuity between overdrive control switch terminals ① and ②.

Overdrive control switch position	Continuity
ON	No
OFF	Yes

NG → Replace overdrive control switch.

OK

C

CHECK OVERDRIVE CANCEL SOLENOID VALVE.

Check resistance between overdrive cancel solenoid valve terminals ① and ②.

Resistance:
Approximately 25Ω

NG → Replace overdrive cancel solenoid valve.

OK

Check the following items:

- Harness continuity between fuse and overdrive cancel solenoid valve
- Harness continuity between overdrive cancel solenoid valve and overdrive control switch
- Condition of diode

OK

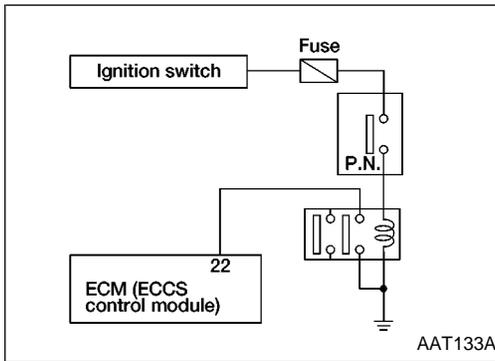
INSPECTION END

TROUBLE DIAGNOSES

Component Inspection (Cont'd)

PARK/NEUTRAL POSITION (PNP) SWITCH

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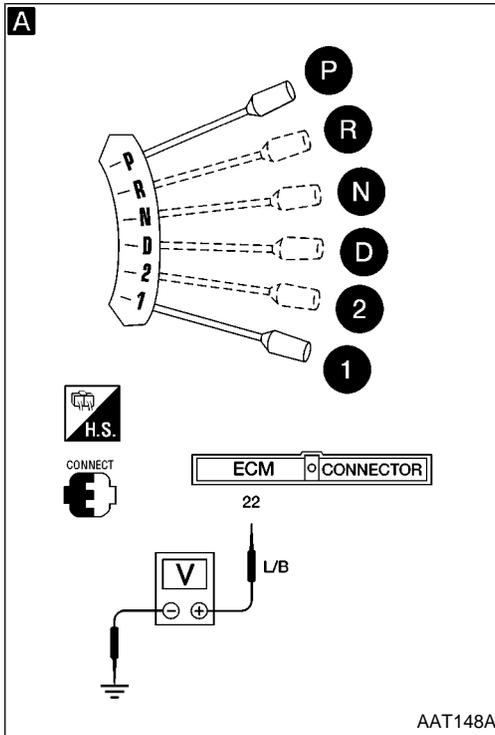
A

CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT.

1. Turn ignition switch ON.
(Do not start engine.)
2. Check voltage between ECM terminal ②② and ground while moving selector lever through each position.
“P”, “N” position: 0V
“R”, “D”, “2”, “1” position: Approx. 5V

OK → INSPECTION END.

NG ↓



B

CHECK POWER SUPPLY FOR PARK/NEUTRAL POSITION (PNP) SWITCH.

1. Disconnect park/neutral position (PNP) switch harness connector.
2. Turn ignition switch ON.
(Do not start engine.)

Do approx. 12 volts exist between park/neutral position (PNP) switch harness terminal ① and body ground?

No → Check 10A fuse (No. ①①, located in the fuse block), harness and connector. Refer to EL section (“Wiring Diagram”, “POWER SUPPLY ROUTING”).

Yes ↓

C

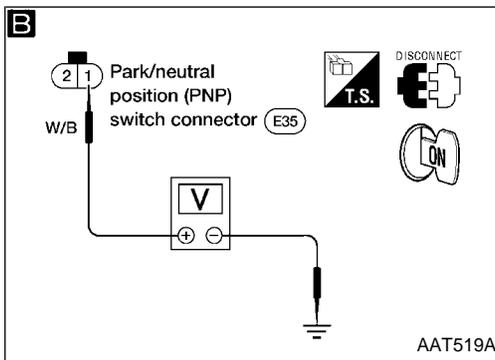
CHECK PARK/NEUTRAL POSITION (PNP) SWITCH.

- Check continuity in “N”, “P” and “R” positions.
- With manual lever held in each position, turn manual shaft 1.5° in both directions. (When manual lever is in each position, continuity normally exists within 1.5° range.) If continuity does not exist equally in either direction, properly adjust park/neutral position (PNP) switch. Refer to AT-47.

Position	Terminal No.			
	①	②	③	⑤
Park/neutral position	○—○			
R			○—○	

NG → Replace park/neutral position (PNP) switch.

OK ↓

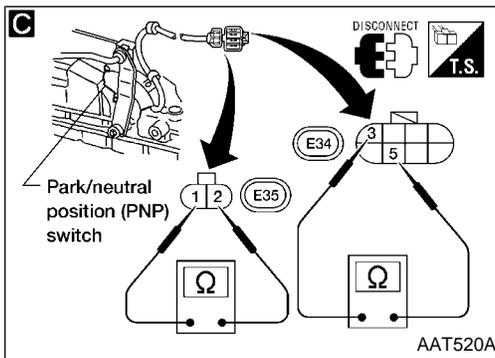


Reconnect park/neutral position (PNP) switch harness connector.

↓

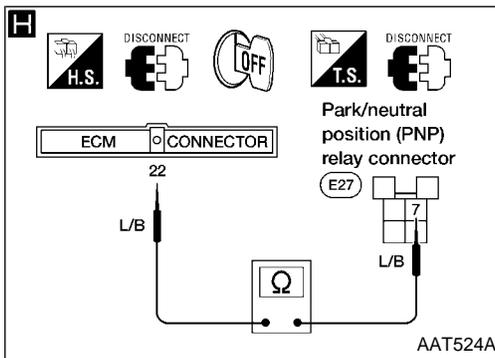
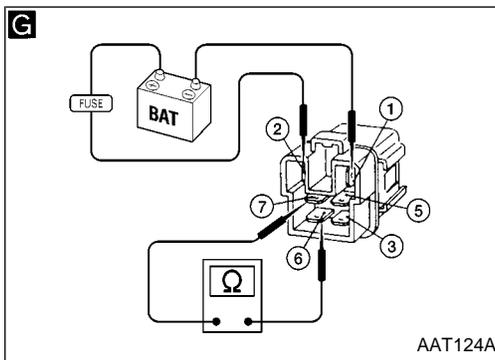
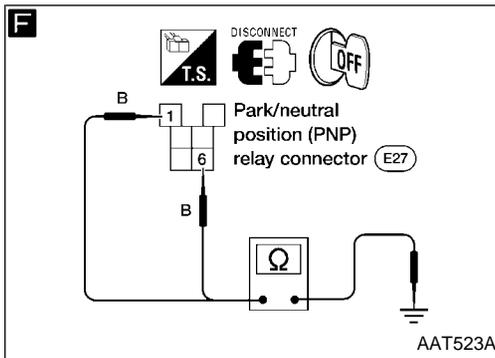
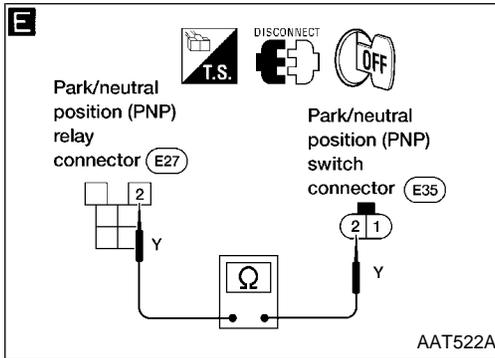
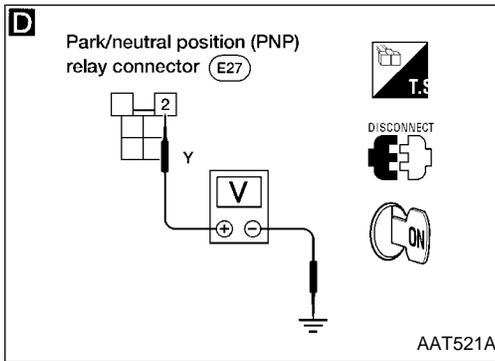
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TROUBLE DIAGNOSES

Component Inspection (Cont'd)



A

D CHECK POWER SUPPLY FOR PARK/NEUTRAL POSITION (PNP) RELAY.

1. Turn ignition switch ON.
2. Disconnect park/neutral position (PNP) relay harness connector.
3. Put selector lever in "P" or "N" position. Do approx. 12 volts exist between park/neutral position (PNP) relay harness terminal ② and body ground?

No → **E**

Yes → **F**

E

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector. Check circuit continuity between park/neutral position (PNP) switch harness terminal ② and park/neutral position (PNP) relay harness terminal ②. **Continuity should exist.** If OK, check harness for short.

F CHECK BODY GROUND CIRCUIT FOR PARK/NEUTRAL POSITION (PNP) RELAY.

1. Turn ignition switch OFF.
2. Does continuity exist between park/neutral position (PNP) relay terminals ①, ⑥ and body ground? **Continuity should exist.**

OK → **G**

NG → Repair harness or connector.

G CHECK PARK/NEUTRAL POSITION (PNP) RELAY.

Check continuity between terminals ⑥ and ⑦.

Condition	Continuity
12V direct current supply between terminals ① and ②	Yes
No current supply	No

OK → **H**

NG → Replace park/neutral position (PNP) relay.

H

1. Turn ignition switch OFF.
2. Check circuit continuity between ECM harness terminal ②② and park/neutral position (PNP) relay harness terminal ⑦. **Continuity should exist.** If OK, check harness for short.

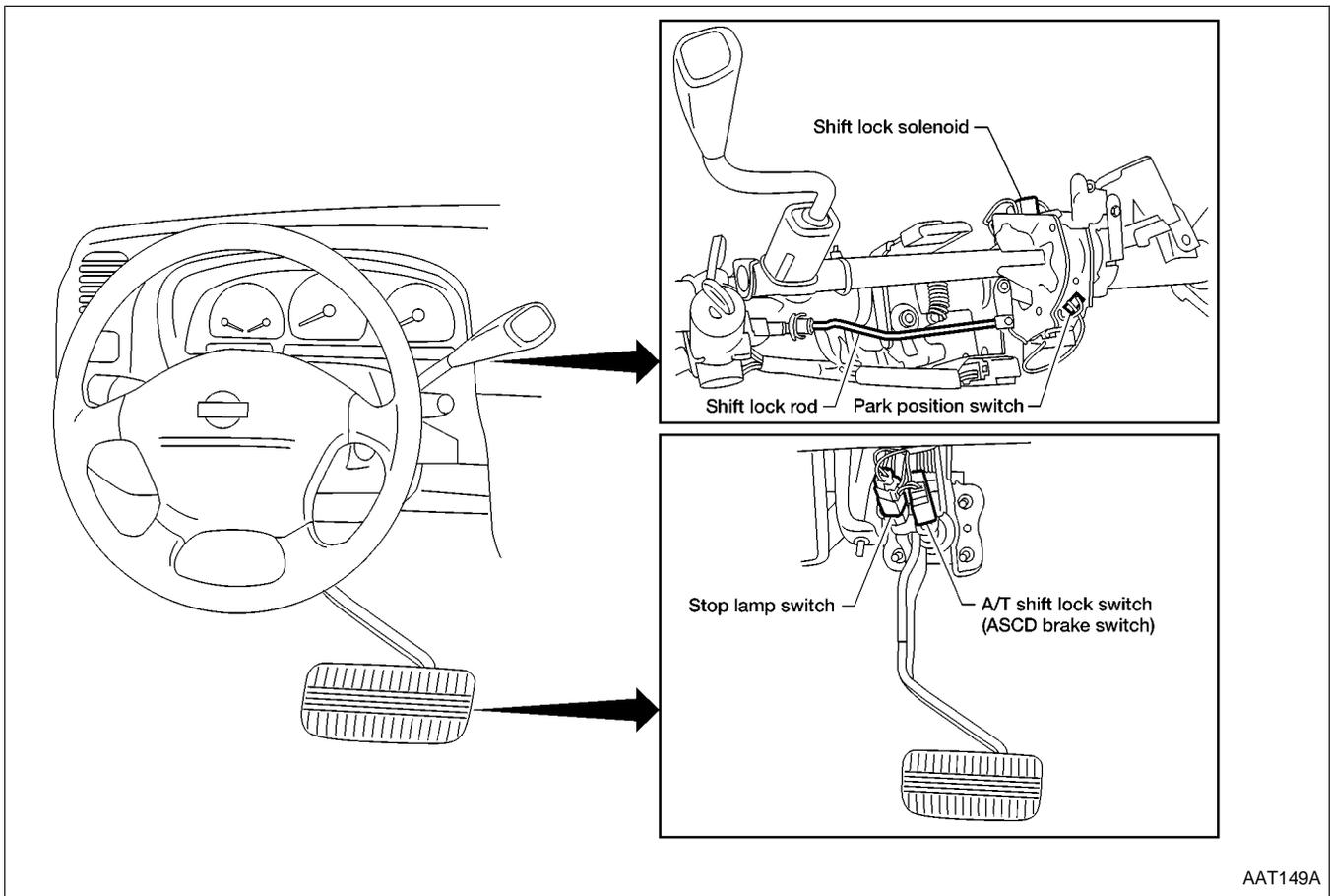
OK → Replace ECM.

NG → Repair harness or connector.

Description

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

Shift Lock System Electrical Parts Location



Removal — Shift Lock Solenoid

1. Remove lower instrument cover LH and knee protector.
2. Remove steering column covers.
3. Disconnect A/T device connector.
4. Remove two screws and two nuts attaching steering column.
5. Disconnect shift lock rod.
6. Remove shift control cable.
7. Remove two bolts attaching shift control tube and remove shift control tube.
8. Remove two screws from shift lock solenoid and two screws from park position switch.

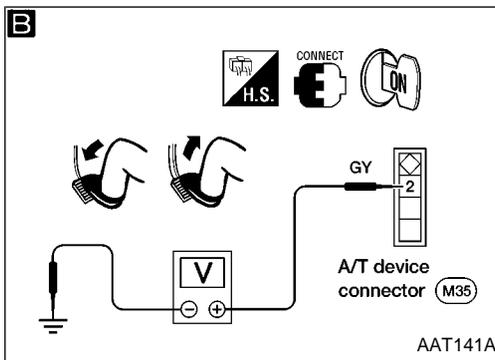
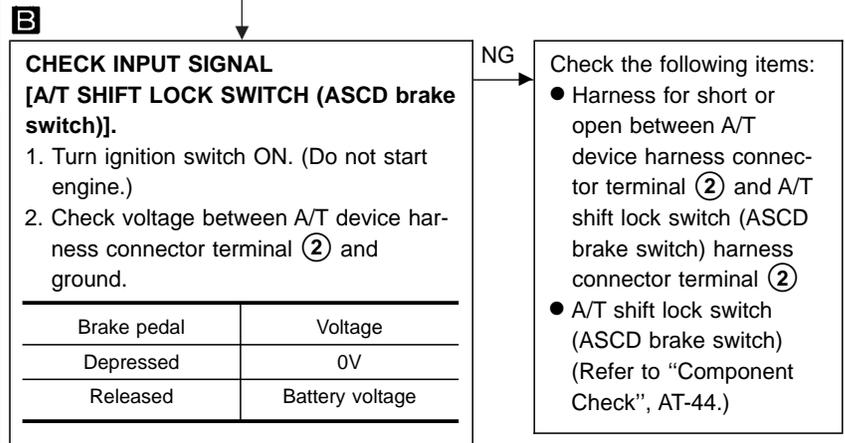
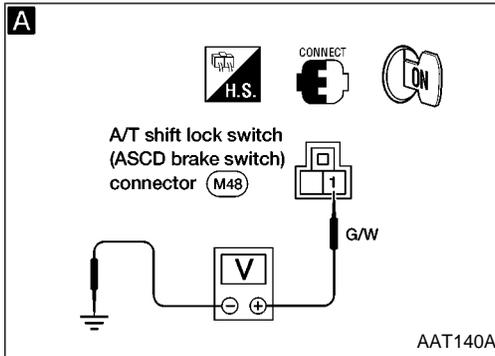
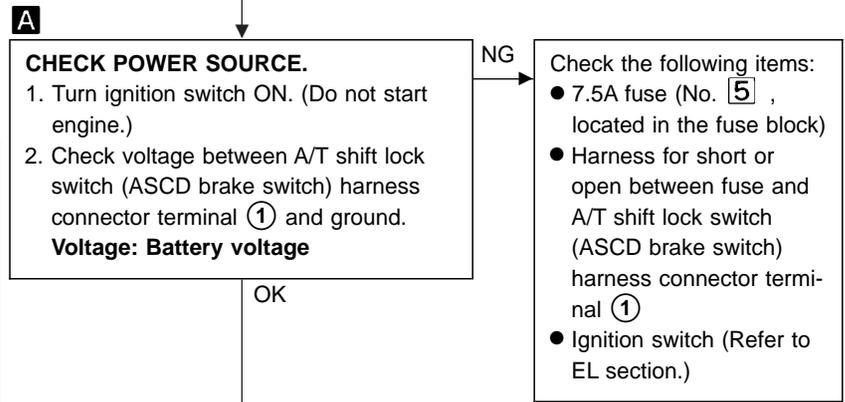
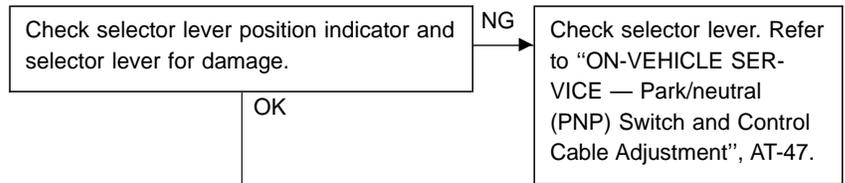
Diagnostic Procedure

SYMPTOM 1:

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

SYMPTOM 2:

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



OK →

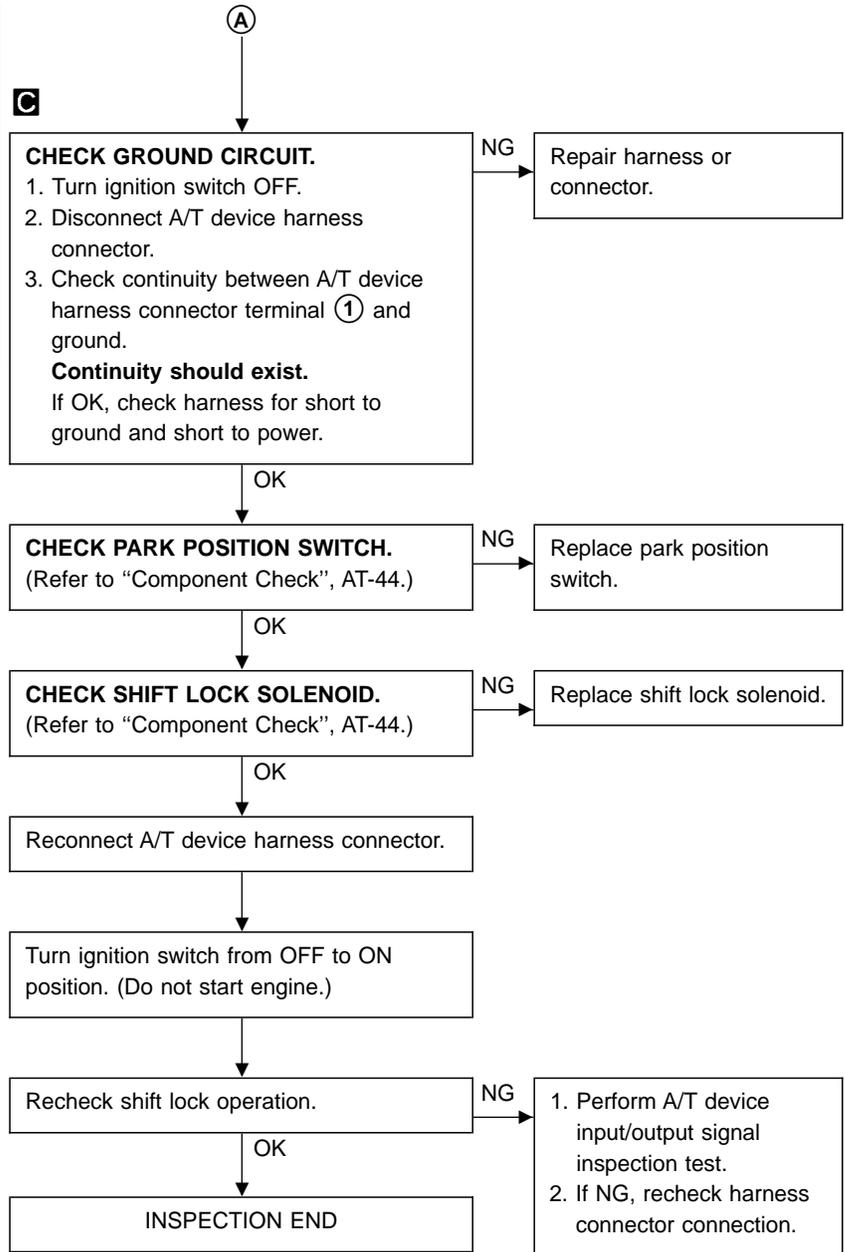
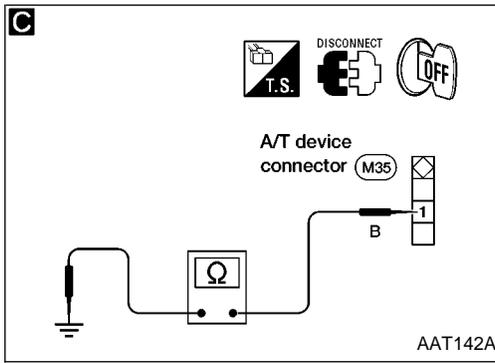
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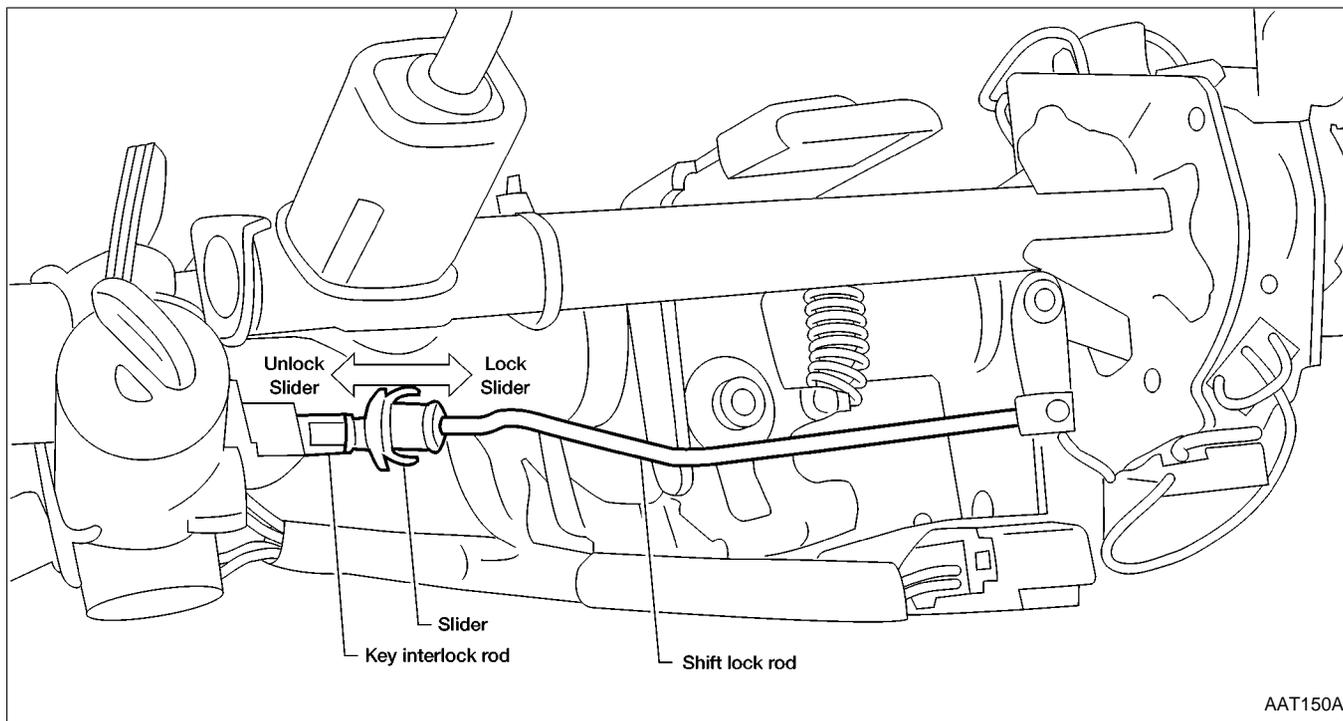
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TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure (Cont'd)



Shift Lock Rod

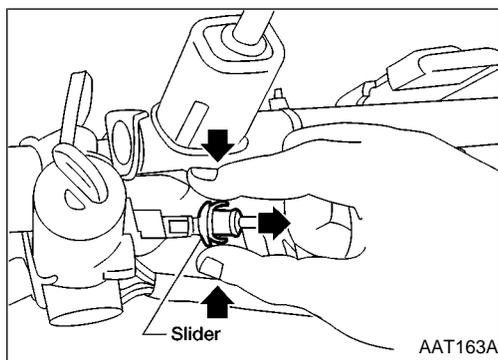


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REMOVAL

1. Turn ignition key to ACC position.
2. Unlock slider by squeezing lock tabs.
3. Remove shift lock rod from key interlock rod.
 - For removal of key interlock rod, refer to ST section (“Disassembly and Assembly”, “STEERING WHEEL AND STEERING COLUMN”).

TF
PD
FA



INSTALLATION AND ADJUSTMENT

1. Place selector lever in Park “P” position.
 2. Turn ignition key to ACC position.
 3. Insert shift lock rod into slider.
 4. Grab key interlock rod and push toward shift lock rod to adjust.
- Do not hold shift lock rod.**
5. Lock slider into position.
 6. Test shift lock operation.

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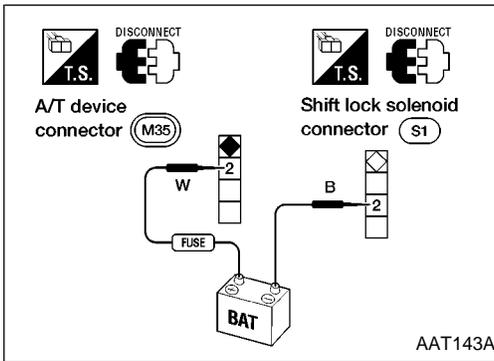
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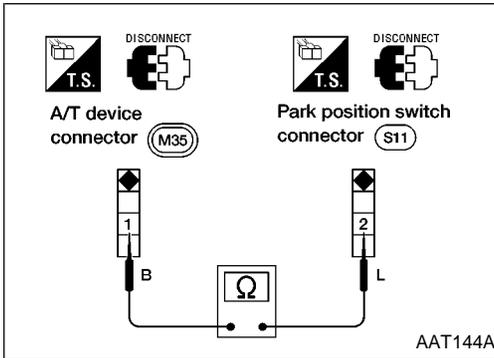
TROUBLE DIAGNOSES — A/T Shift Lock System



Component Check

SHIFT LOCK SOLENOID

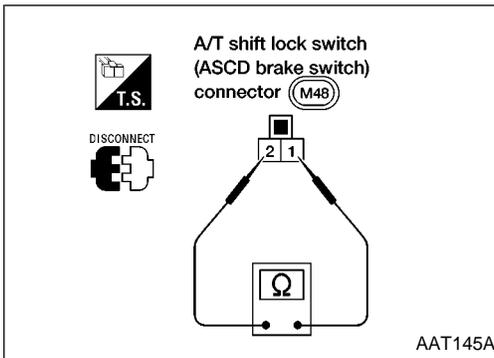
- Check operation by applying battery voltage to A/T device harness terminal ② and shift lock solenoid harness terminal ②.



PARK POSITION SWITCH

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

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

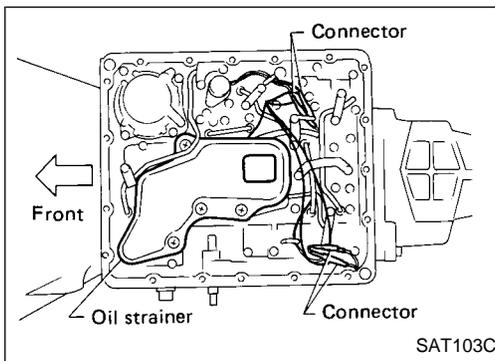


A/T SHIFT LOCK SWITCH (ASCD BRAKE SWITCH)

- Check continuity between terminals ① and ②

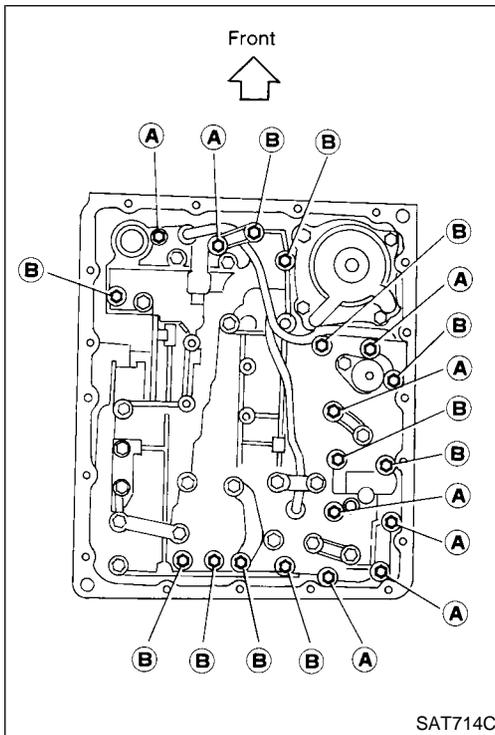
Condition	Continuity
When brake pedal is depressed	No
When brake pedal is released	Yes

Check A/T shift lock switch (ASCD brake switch) after adjusting brake pedal. Refer to BR section ("Adjustment", BRAKE PEDAL AND BRACKET").



Control Valve Assembly and Accumulators Removal

1. Drain ATF from drain plug.
2. Remove oil pan and gasket.
3. Remove oil strainer.
4. Disconnect harness connector.

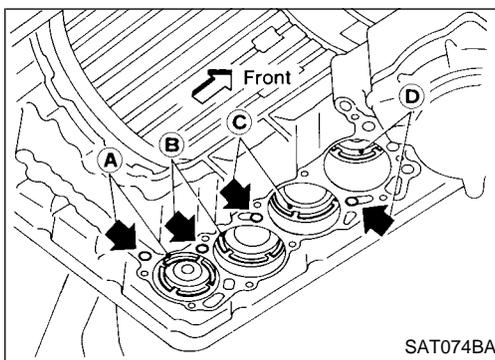


5. Remove control valve assembly by removing fixing bolts.

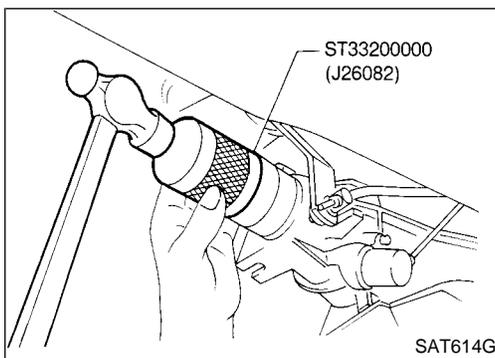
Bolt length and location

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

- **Be careful not to drop manual valve out of valve body.**
6. Remove solenoids and valves from valve body if necessary.
 7. Remove terminal cord assembly if necessary.



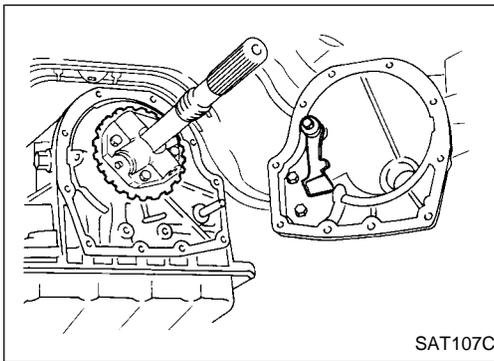
8. Remove accumulators Ⓐ, Ⓑ, Ⓒ and Ⓓ by applying compressed air if necessary.
 - **Hold each piston with a rag.**
9. Reinstall any part removed.
 - **Always use new sealing parts.**
 - **After installing control valve assembly, make sure that selector lever can be moved to all positions.**



Rear Oil Seal Replacement

1. Remove propeller shaft from vehicle. Refer to PD section ("Removal and Installation", "PROPELLER SHAFT").
2. Remove rear oil seal.
3. Install rear oil seal.
 - **Apply ATF before installing.**
4. Reinstall any part removed.

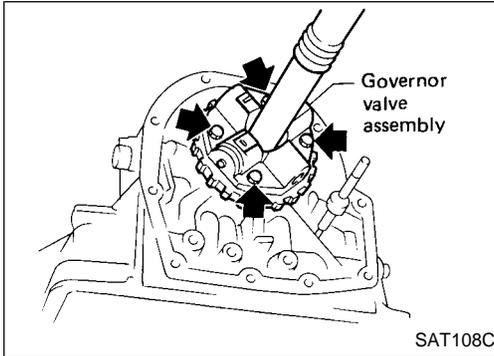
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Parking Components Inspection

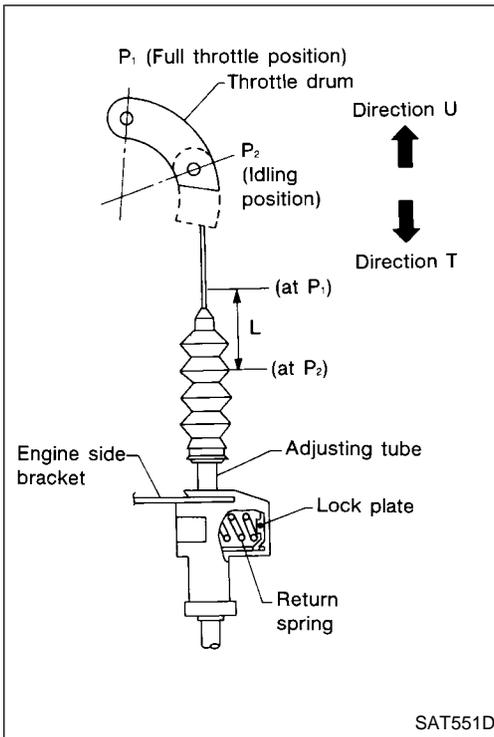
1. Remove propeller shaft from vehicle. Refer to PD section ("Removal and Installation", "PROPELLER SHAFT").
 2. Support A/T assembly with a jack.
 3. Remove rear engine mounting member.
 4. Remove rear extension from transmission case.
 5. Replace parking components if necessary.
 6. Reinstall any part removed.
- **Always use new sealing parts.**



SAT108C

Governor Valve

1. Remove propeller shaft from vehicle. Refer to PD section ("Removal and Installation", "PROPELLER SHAFT").
2. Support A/T assembly with a jack.
3. Remove rear engine mounting member from A/T assembly.
4. Remove rear extension from transmission case.
5. Remove governor valve assembly.
6. Inspect and repair governor valve assembly. Refer to REPAIR FOR COMPONENT PARTS, AT-81.



SAT551D

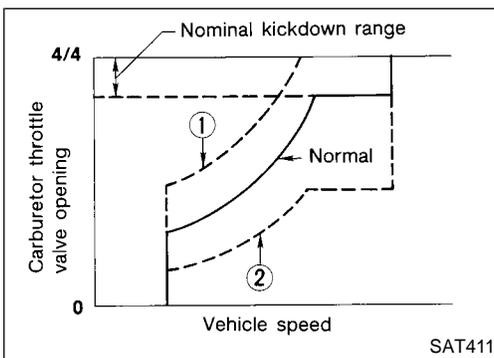
Throttle Wire Adjustment

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

Throttle wire stroke "L":

39 - 43 mm (1.54 - 1.69 in)

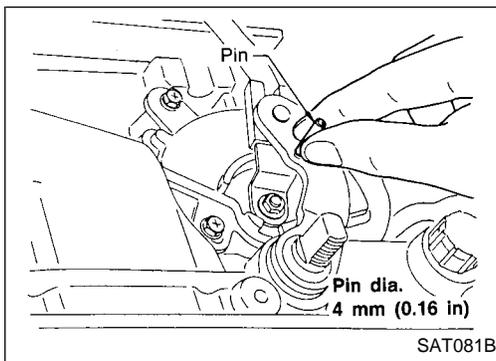
- **Adjust throttle wire stroke after accelerator wire is installed and adjusted.**
- **When connecting throttle wire to throttle drum, do not use tools. Manually hook wire.**
- **Put mark on throttle wire for measuring wire stroke.**



SAT411

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

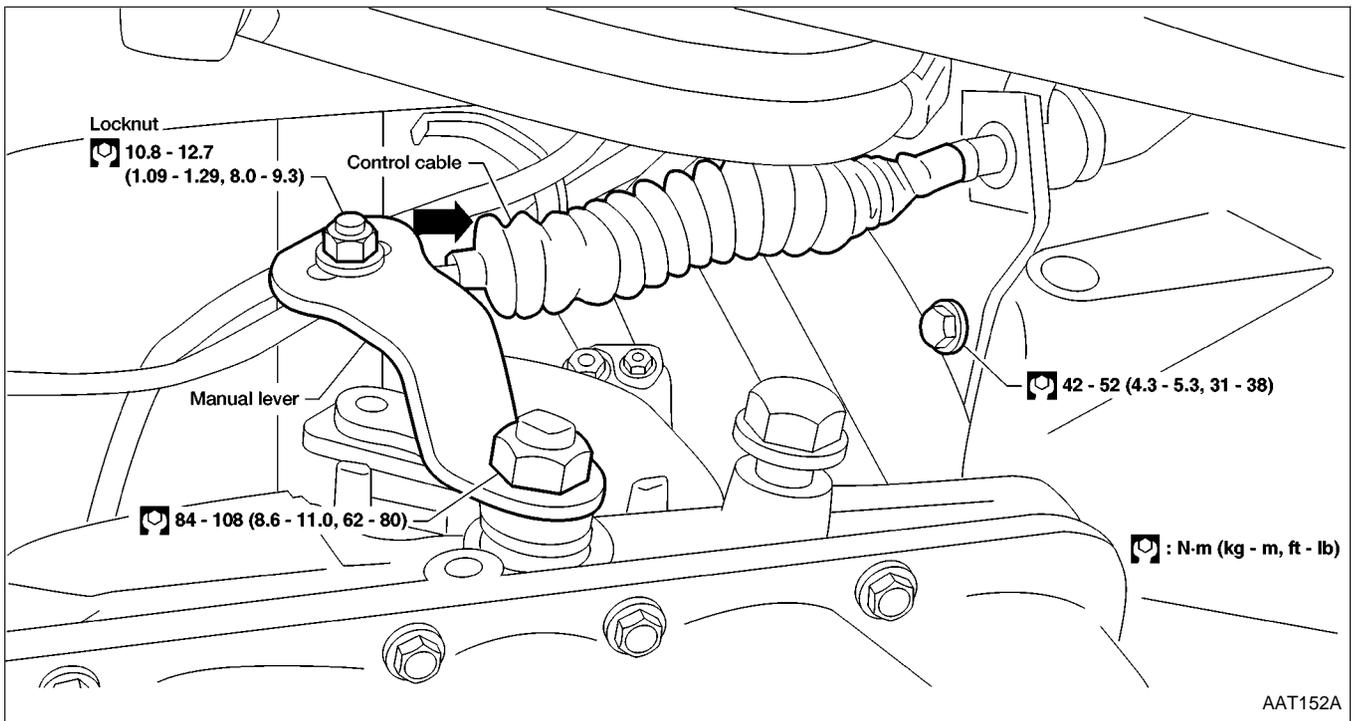
- When the throttle drum fully-open position "P₁" is too far toward Direction T, the shift schedule will be as shown by ② in the figure, and the kickdown range will greatly increase.
- When the throttle drum fully-open position "P₁" is too far toward Direction U, the shift schedule will be as shown by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



Park/Neutral Position (PNP) Switch Adjustment

1. Remove control linkage and manual lever from manual shaft.
2. Set manual shaft in "N" position.
3. Loosen park/neutral position (PNP) switch fixing bolts.
4. Insert pin into adjustment holes in both park/neutral position (PNP) switch and manual as near vertical as possible.
5. Tighten park/neutral position (PNP) switch fixing bolts.
6. Remove pin.
7. Reinstall any part removed.
8. Adjust control linkage. Refer to "Control Cable Adjustment" below.
9. Check continuity of park/neutral position (PNP) switch. Refer to AT-37.

Control Cable Adjustment



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

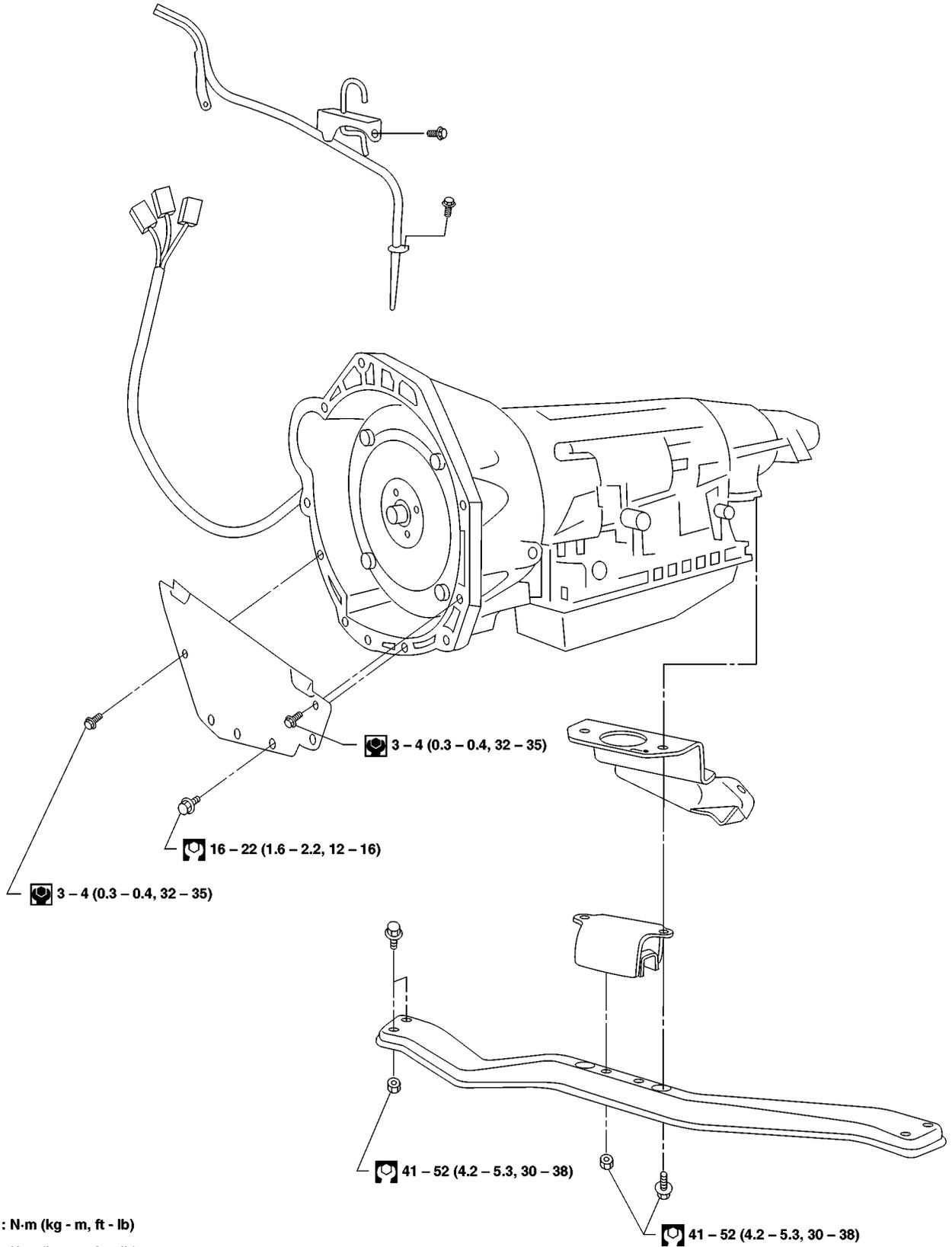
If the detents cannot be felt, the linkage needs adjustment.

1. Place selector lever in "P" position.
2. Loosen control cable lock nut and place manual shaft in "P" position.
3. Push control cable in the direction of the arrow shown in the illustration by specified force.
Specified force: 19.6 N (2.0 kg, 4.4 lb)
4. Return control cable in the opposite direction of the arrow for 1.0 mm (0.039 in).
5. Tighten control cable lock nut.
6. Move selector lever from "P" to "1" position again. Make sure that selector lever moves smoothly.
7. Apply grease to contacting areas of selector lever and control cable. Install any part removed.

- **Make sure that the starter operates when the selector lever is placed in the "N" or "P" position.**
- **Make sure that the transmission is locked properly when the selector lever is placed in the "P" position.**

REMOVAL AND INSTALLATION

SEC. 112 • 200 • 310



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

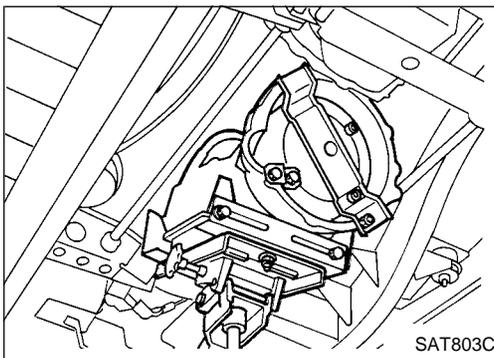
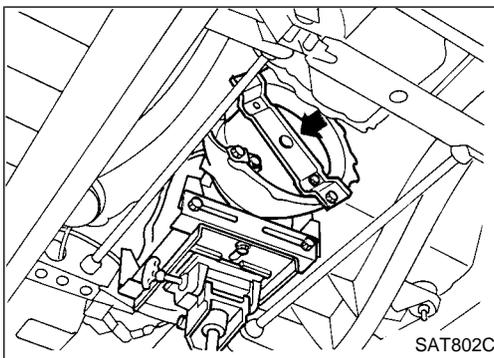
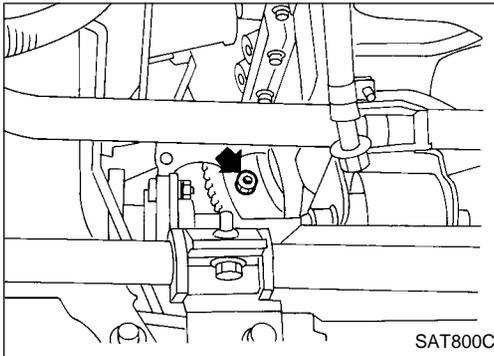
Removal

CAUTION:

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

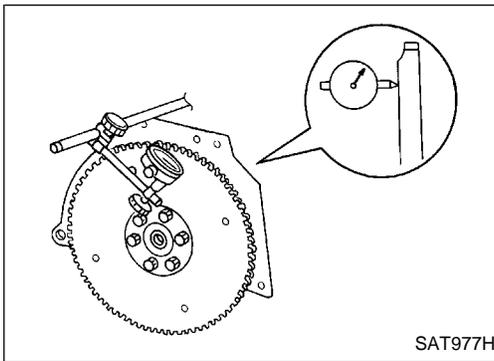
NOTE: To prevent oil spills, drain A/T fluid before removing A/T assembly or insert plug into rear oil seal after removing rear propeller shaft.

1. Disconnect battery negative terminal.
2. Remove fluid charging pipe from A/T assembly and plug opening.
3. Remove oil cooler pipe from A/T assembly and plug opening.
4. Remove A/T vent hose.
5. Remove propeller shaft.
Refer to PD section ("Removal and Installation", "PROPELLER SHAFT").
- **Be careful not to damage spline, sleeve yoke and rear oil seal.**
6. Remove A/T control cable from manual shaft.
7. Disconnect A/T harness connectors and vehicle speed sensor harness connector.
8. Disconnect throttle wire from A/T assembly.
9. Remove starter motor.
10. Remove bolts securing torque converter to drive plate.
- **Rotate crankshaft to gain access to securing bolts.**



11. Support A/T assembly with a jack.
12. Remove rear mounting bracket from body and A/T assembly.
Refer to EM section ("ENGINE REMOVAL").
13. Remove bolts securing A/T assembly to engine.
14. Pull A/T assembly backwards.
- **Secure torque converter to prevent it from dropping.**
- **Secure A/T assembly to a jack.**
15. Slant and lower A/T assembly.

REMOVAL AND INSTALLATION



Installation

1. Check drive plate runout.

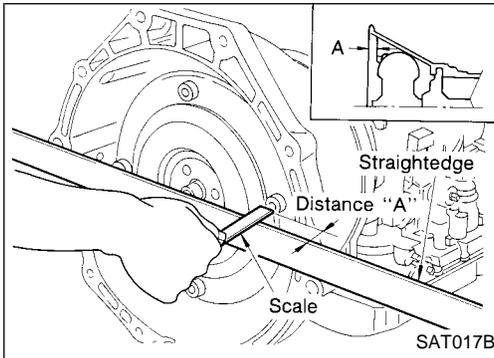
CAUTION:

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

Maximum allowable runout:

Refer to EM section (“Inspection”, “CYLINDER BLOCK”).

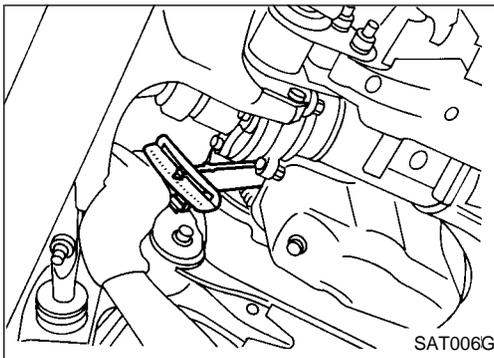
If this runout is out of specification, replace drive plate with ring gear.



2. When connecting torque converter to transmission, measure distance “A” to be certain that they are correctly assembled.

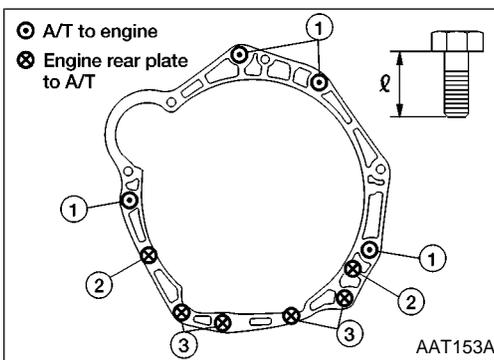
Distance “A”:

26.0 mm (1.024 in) or more



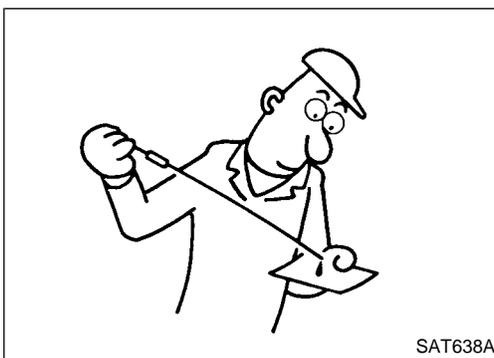
3. Install converter to drive plate.

- **With converter installed, rotate crankshaft several turns to check that transmission rotates freely without binding.**



4. Tighten bolts securing transmission.

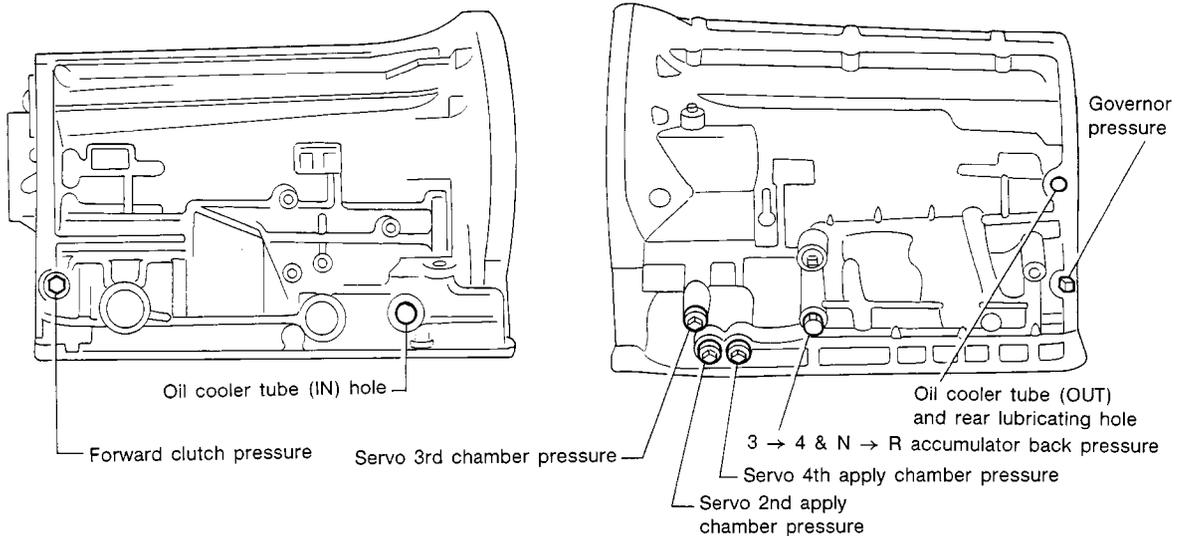
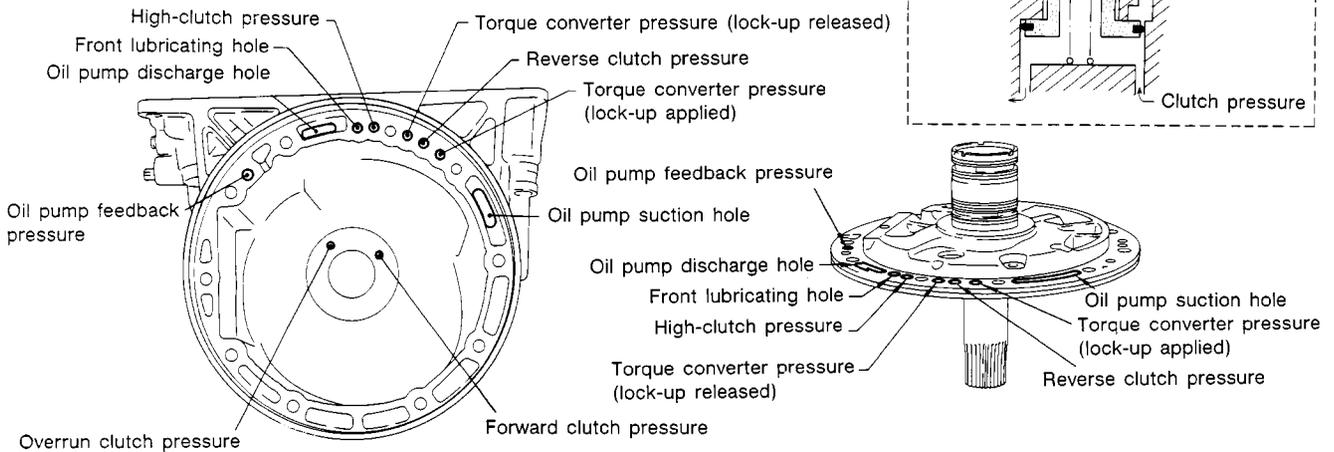
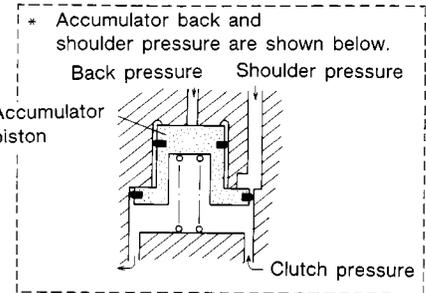
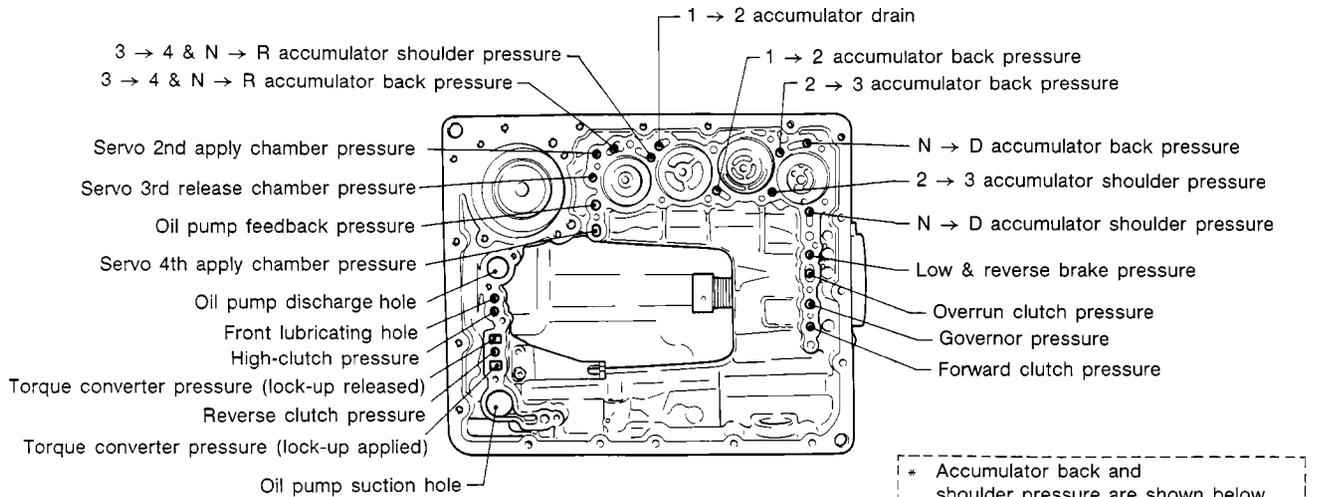
Bolt No.	Tightening torque N-m (kg-m, ft-lb)	Bolt length “l” mm (in)
①	39 - 49 (4.0 - 5.0, 29 - 36)	43 (1.69)
②	3 - 4 (0.3 - 0.4, 2.2 - 2.9)	16 (0.63)
③	16 - 22 (1.6 - 2.2, 12 - 16)	16 (0.63)



5. Reinstall any part removed.
6. Adjust control cable. Refer to AT-47.
7. Adjust throttle wire. Refer to AT-46.
8. Adjust park/neutral position (PNP) switch. Refer to AT-47.
9. Refill transmission with ATF and check fluid level.
10. Move selector lever through all positions to be sure that transmission operates correctly.
With parking brake applied, allow engine to idle. Move selector lever through “N” to “D”, to “2”, to “1” and to “R”. A slight shock should be felt through hand gripping the selector each time the transmission is shifted.
11. Perform road test. Refer to “ROAD TEST”, AT-28.

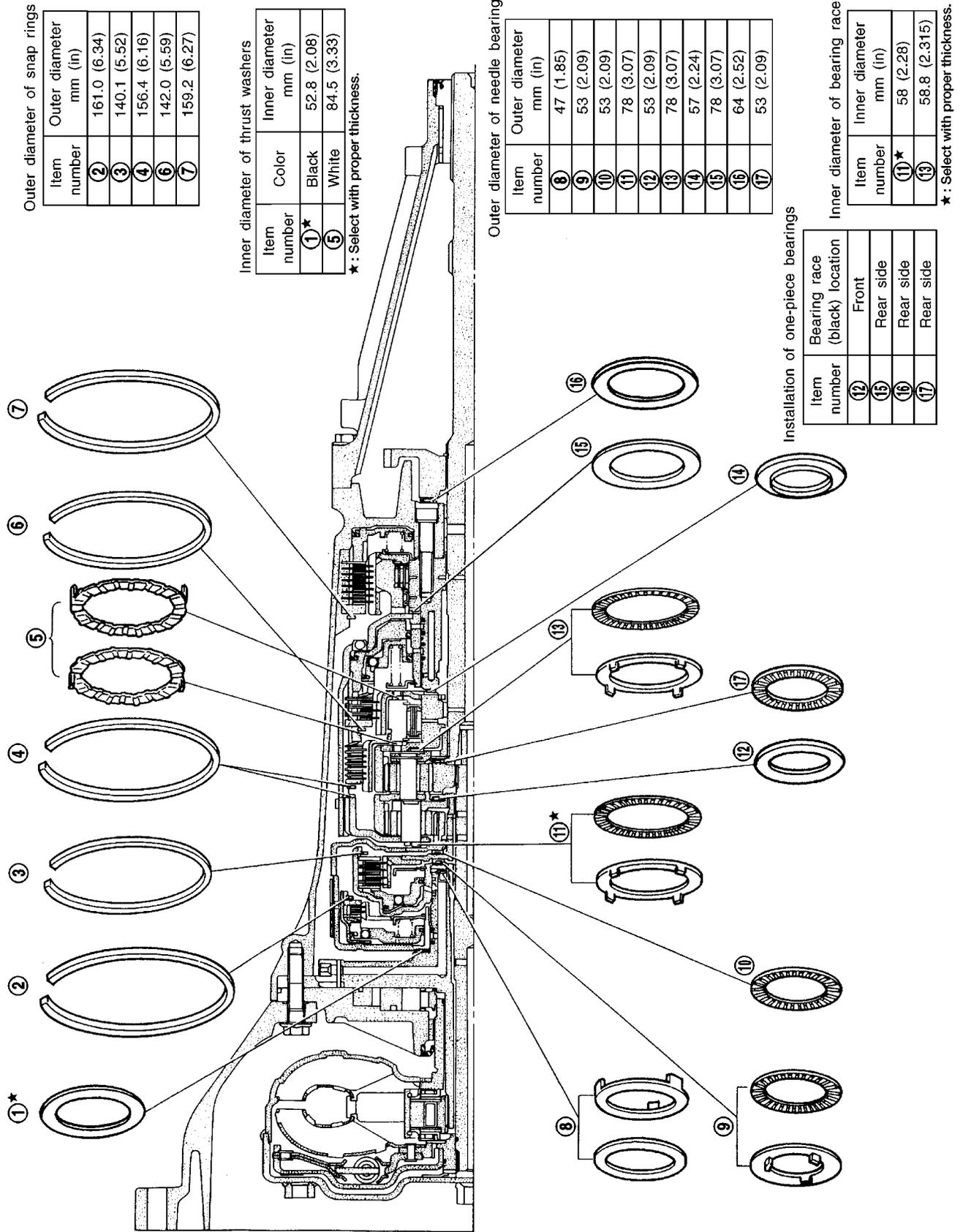
MAJOR OVERHAUL

Oil Channel



MAJOR OVERHAUL

Locations of Needle Bearings, Thrust Washers and Snap Rings



Outer diameter of snap rings

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

Inner diameter of thrust washers

Item number	Color	Inner diameter mm (in)
①*	Black	52.8 (2.08)
⑤	White	84.5 (3.33)

*: Select with proper thickness.

Outer diameter of needle bearings

Item number	Outer diameter mm (in)
⑧	47 (1.85)
⑨	53 (2.09)
⑩	53 (2.09)
⑪	78 (3.07)
⑫	53 (2.09)
⑬	78 (3.07)
⑭	57 (2.24)
⑮	78 (3.07)
⑯	64 (2.52)
⑰	53 (2.09)

Installation of one-piece bearings

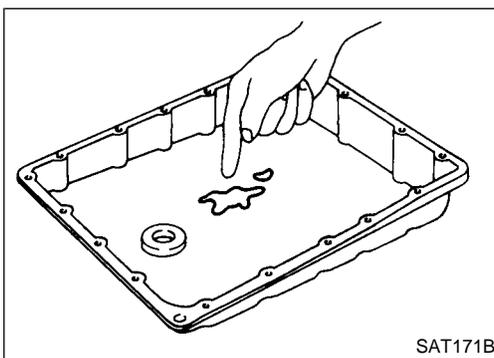
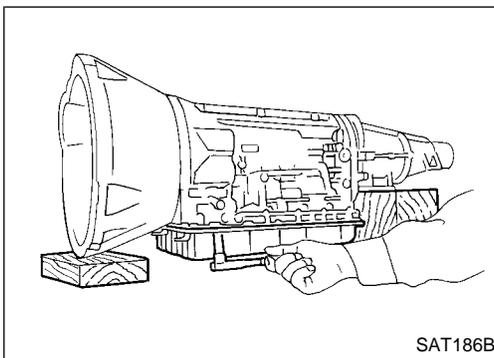
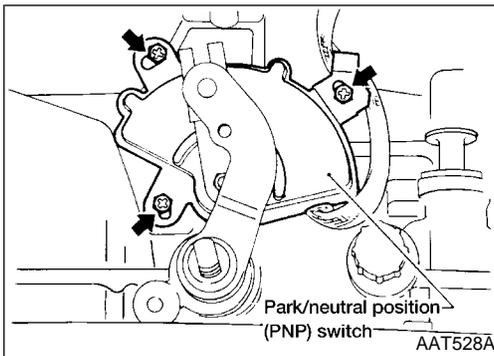
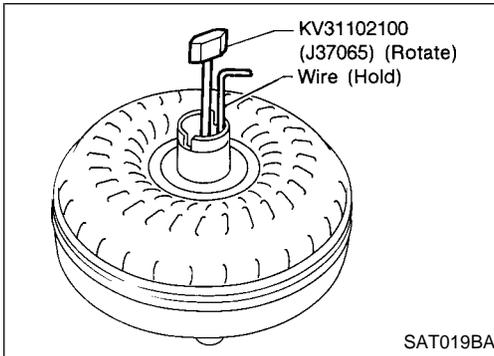
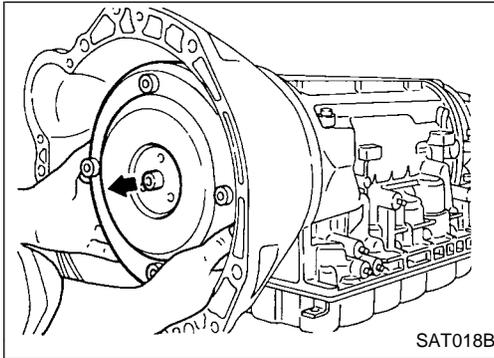
Item number	Bearing race (black) location
⑫	Front
⑮	Rear side
⑯	Rear side
⑰	Rear side

Inner diameter of bearing races

Item number	Inner diameter mm (in)
⑪*	58 (2.28)
⑬	58.8 (2.315)

*: Select with proper thickness.

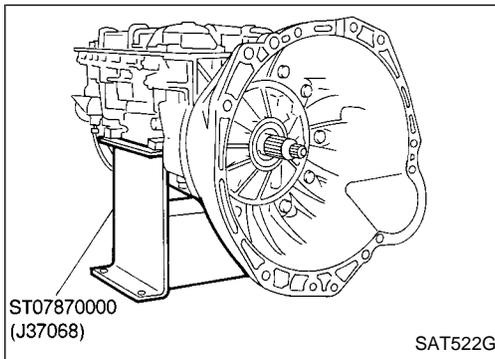
DISASSEMBLY



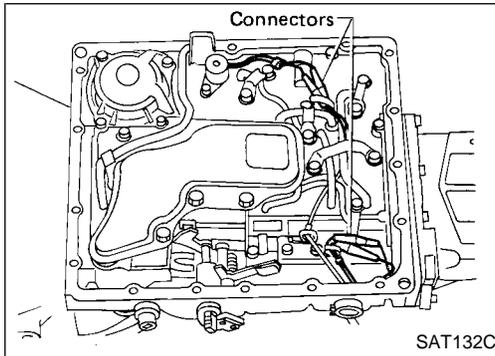
1. Removing torque converter by holding it firmly and turning while pulling straight out.
2. Check torque converter one-way clutch.
 - a. Insert Tool into spline of one-way clutch inner race.
 - b. Hook bearing support unitized with one-way clutch outer race with suitable wire.
 - c. Check that one-way clutch inner race rotates only clockwise with Tool while holding bearing support with wire.
3. Remove park/neutral position (PNP) switch from transmission case.
4. Separate the oil pan and transmission case.
 - a. Drain ATF from drain plug.
 - b. Raise oil pan by placing wooden blocks under converter housing and adapter case.
 - c. Remove oil pan and gasket.
 - **Always place oil pan straight down so that foreign particles inside will not move.**
 - **Do not reuse oil pan bolts.**
5. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish buildup. Varnish can cause valves, servo, and clutches to stick and may inhibit pump pressure.
 - **If frictional material is detected, replace radiator after repair of A/T. Refer to LC section (“Radiator”, “ENGINE COOLING SYSTEM”).**

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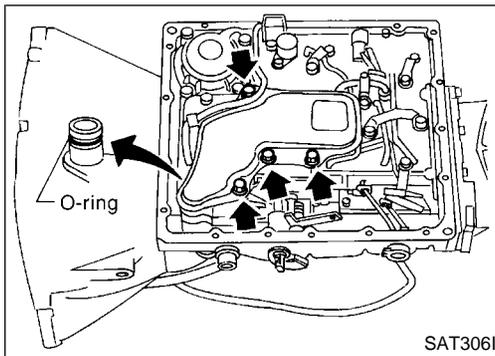
DISASSEMBLY



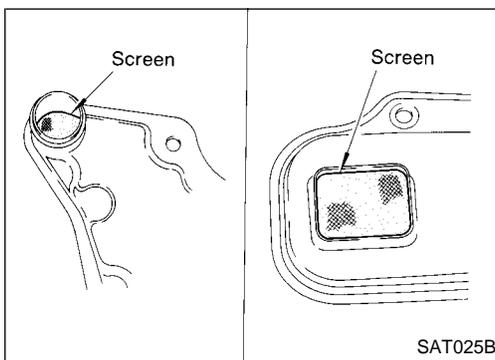
6. Place transmission into Tool with the control valve facing up.



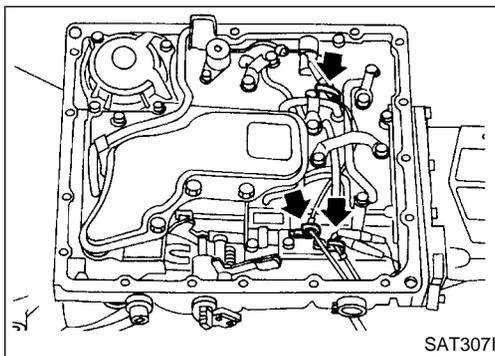
7. Remove torque converter clutch solenoid valve and overdrive cancel solenoid valve connectors.



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

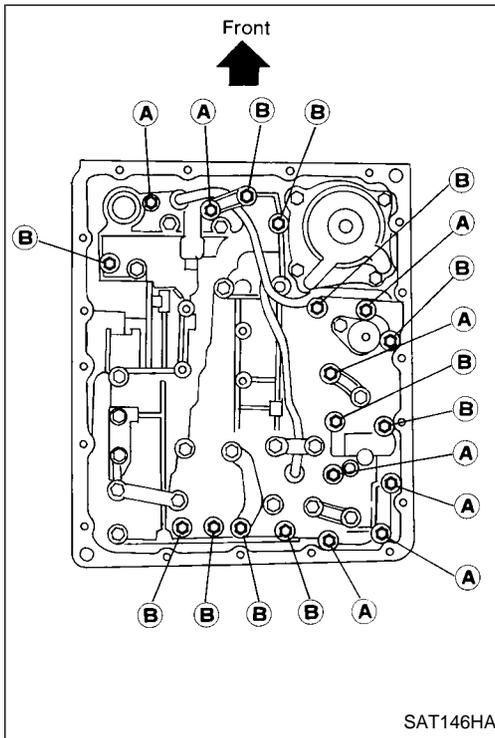


b. Check oil strainer screen for damage.



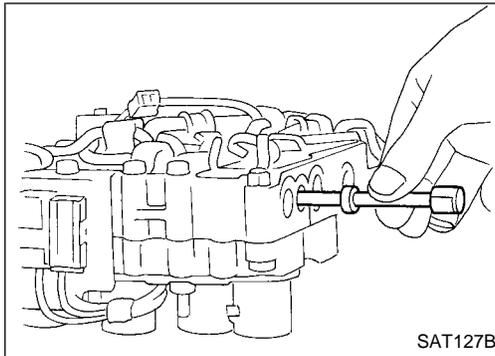
9. Remove control valve assembly.
a. Straighten terminal clips to free terminal cords then remove terminal clips.

DISASSEMBLY

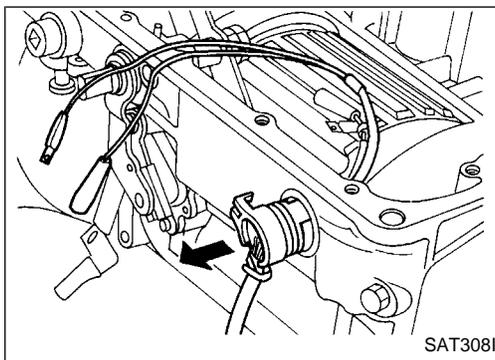


- b. Remove bolts (A) and (B), and remove control valve assembly from transmission.

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

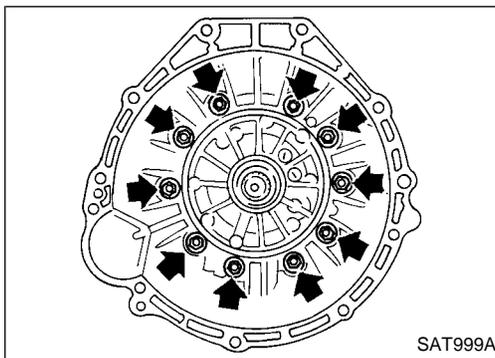


- c. Remove manual valve from control valve assembly.



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

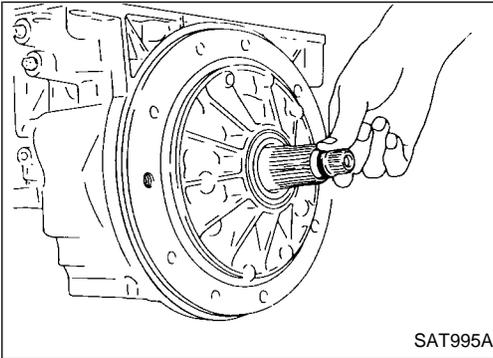
- Be careful not to damage cord.
- Do not remove terminal cord assembly unless it is damaged.



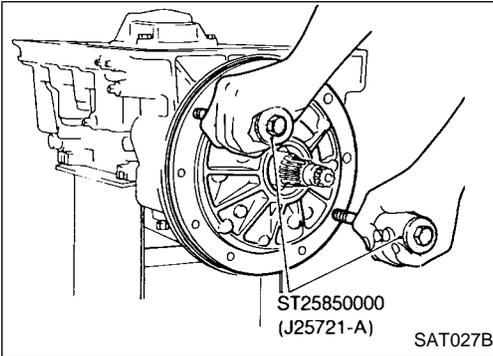
11. Remove converter housing.
- Remove converter housing bolts.
 - Remove traces of sealant.
- Be careful not to scratch converter housing.

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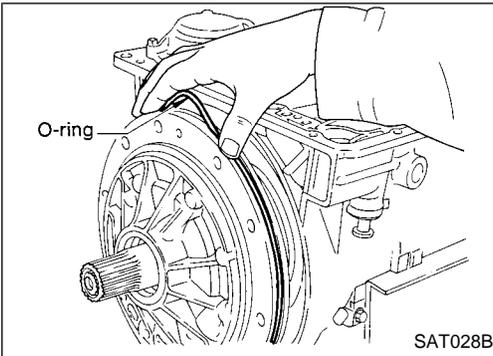


12. Remove O-ring from input shaft.



13. Remove oil pump assembly.

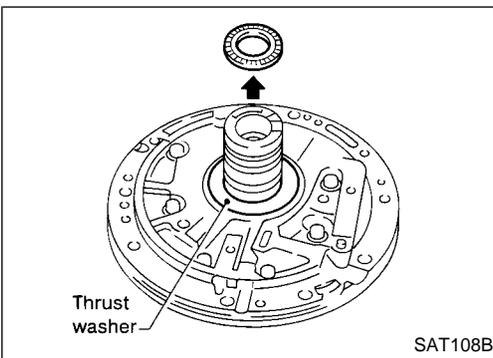
a. Attach Tool to oil pump assembly and extract it evenly from transmission case.



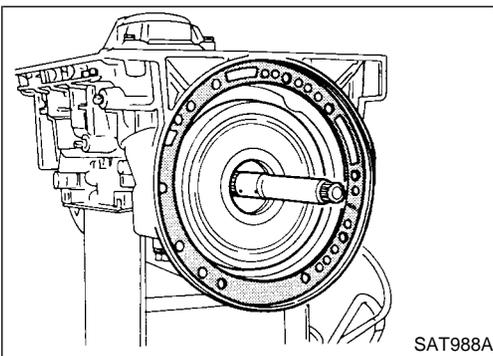
b. Remove O-ring from oil pump assembly.

c. Remove traces of sealant from oil pump housing.

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

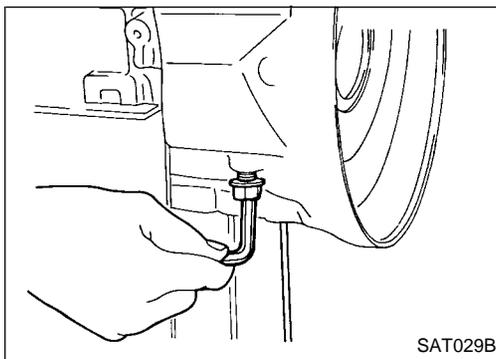


d. Remove needle bearing and thrust washer from oil pump assembly.

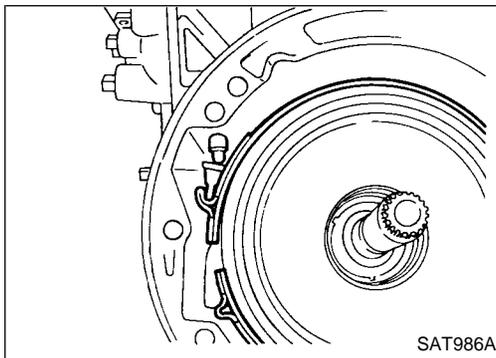


14. Remove input shaft and oil pump gasket.

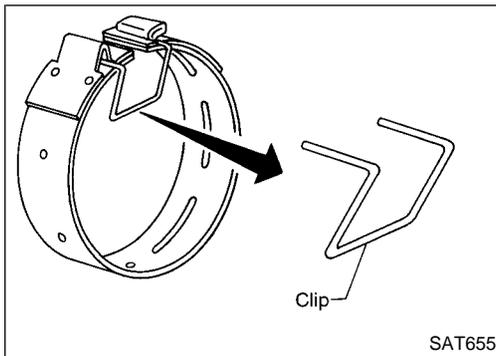
DISASSEMBLY



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

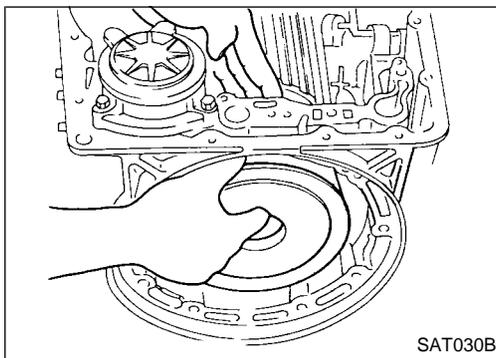


- Remove brake band and band strut from transmission case.

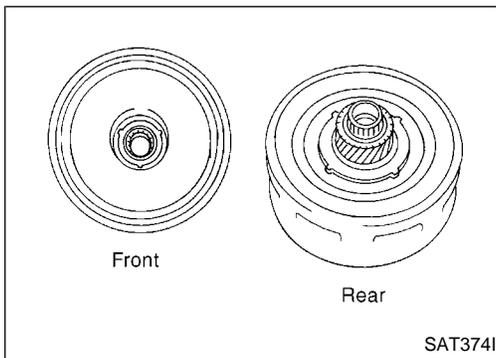


- To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at left. Leave the clip in position after removing the brake band.

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



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



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

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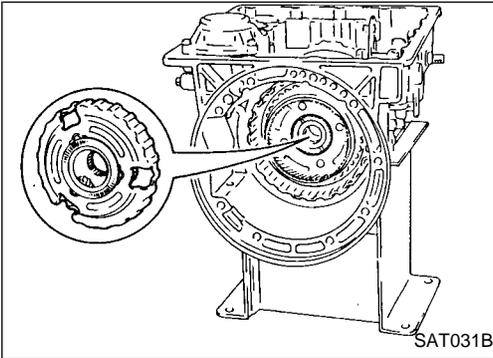
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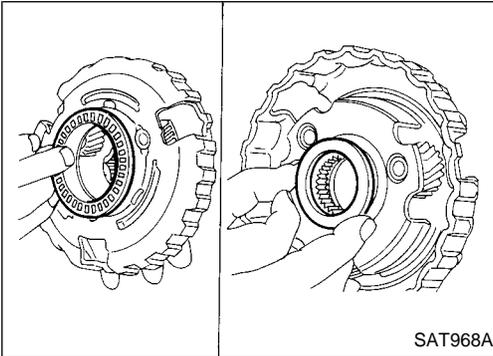
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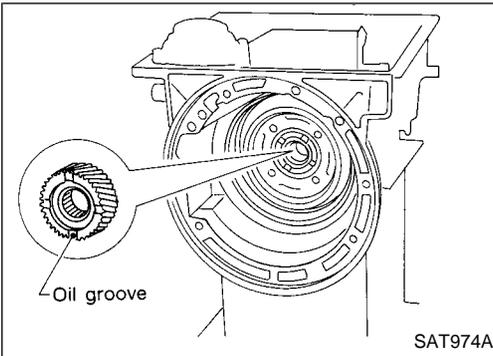
DISASSEMBLY



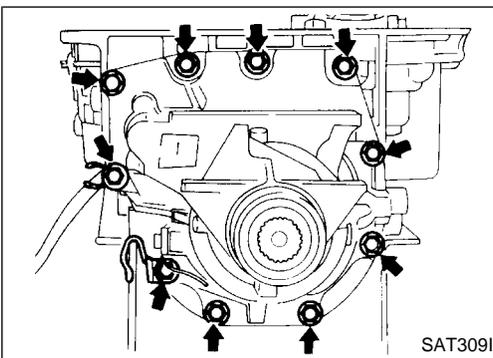
d. Remove front planetary carrier from transmission case.



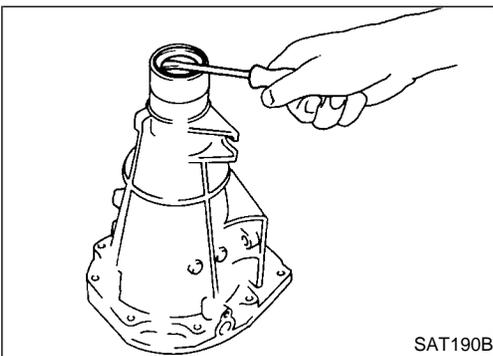
e. Remove front needle bearing from front planetary carrier.
f. Remove rear bearing from front planetary carrier.



g. Remove rear sun gear from transmission case.

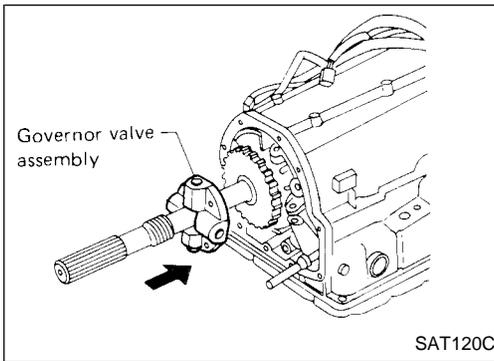


17. Remove rear extension case.
a. Remove rear extension case from transmission case.
b. Remove rear extension gasket from transmission case.

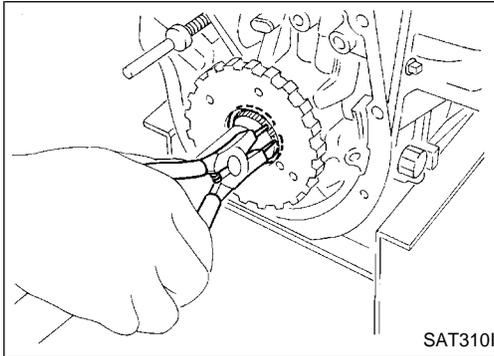


c. Remove oil seal from rear extension case.
● **Do not remove oil seal unless it is to be replaced.**

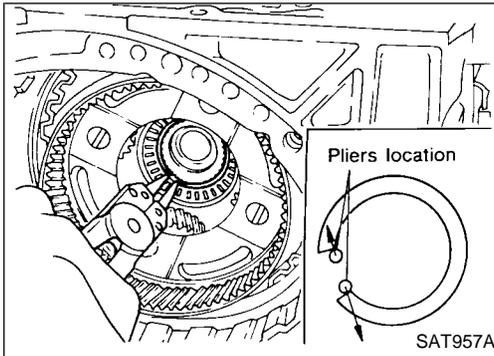
DISASSEMBLY



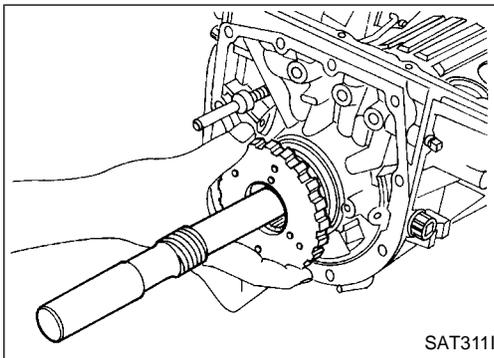
18. Remove output shaft and parking gear.
a. Remove governor valve assembly.



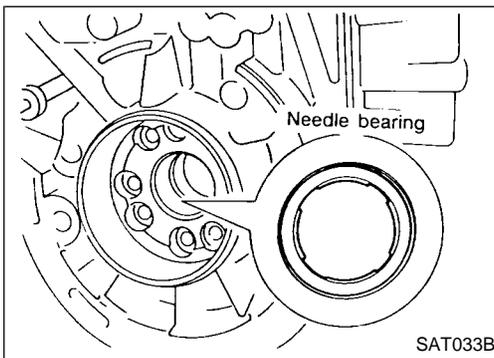
- b. Remove rear snap ring from output shaft.



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



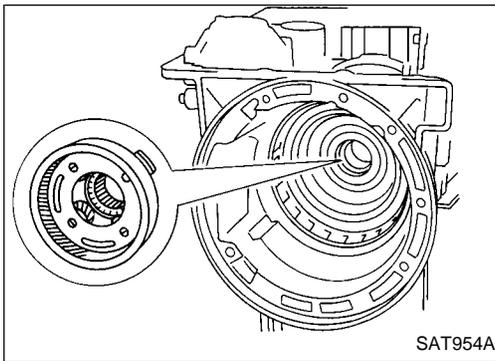
- e. Remove output shaft and parking gear as a unit from transmission case.
f. Remove parking gear from output shaft.



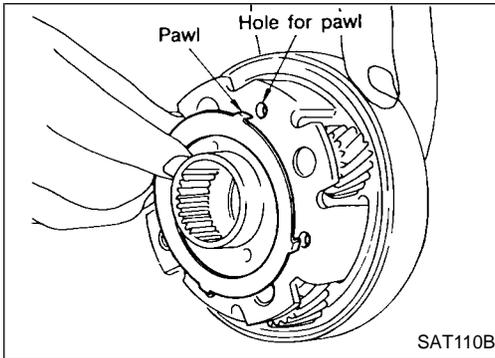
- g. Remove needle bearing from transmission case.

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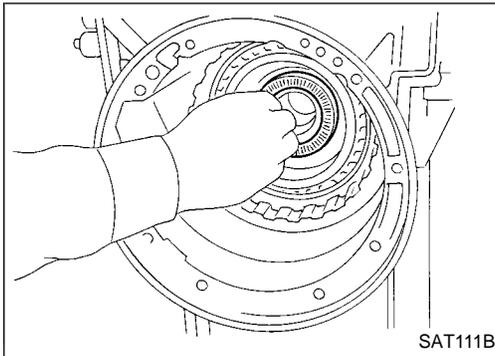
DISASSEMBLY



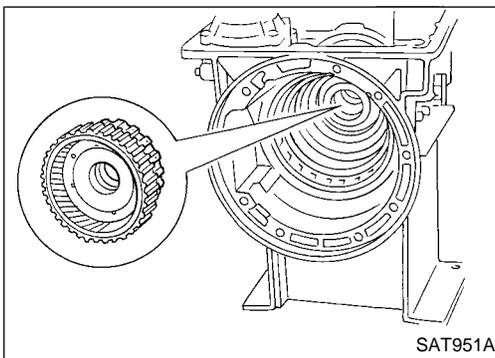
19. Remove rear side clutch and gear components.
 - a. Remove front internal gear.



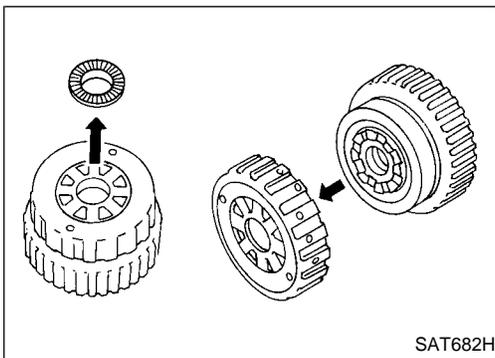
- b. Remove bearing race from front internal gear.



- c. Remove needle bearing from rear internal gear.

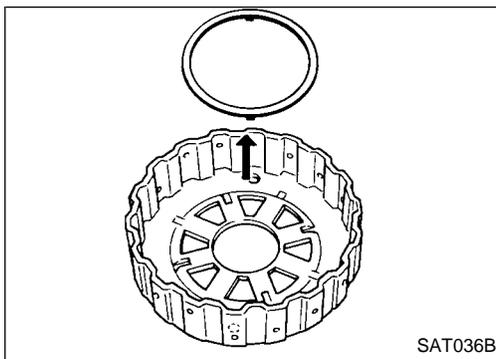


- d. Remove rear internal gear, forward clutch hub and overrun clutch hub as a set from transmission case.

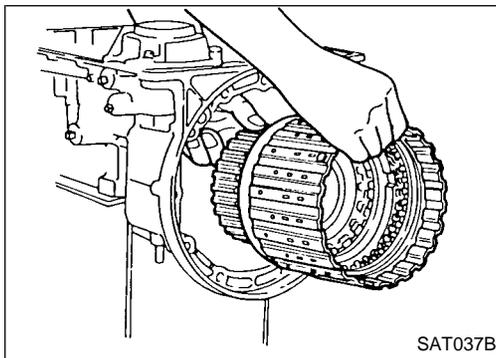


- e. Remove needle bearing from overrun clutch hub.
 - f. Remove overrun clutch hub from rear internal gear and forward clutch hub.

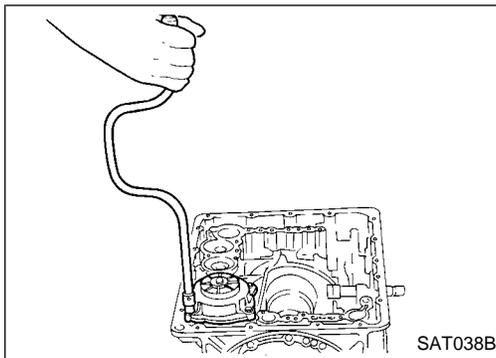
DISASSEMBLY



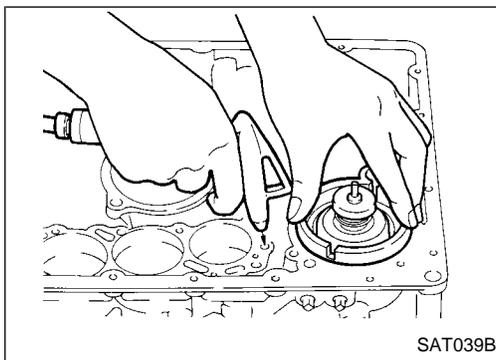
g. Remove thrust washer from overrun clutch hub.



h. Remove forward clutch assembly from transmission case.



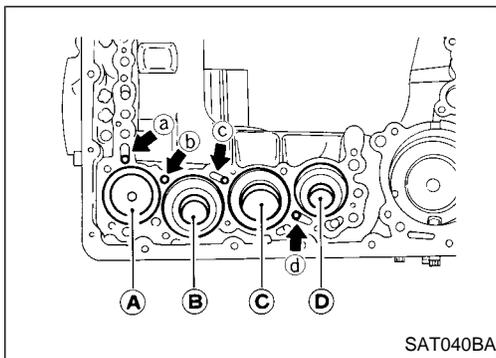
20. Remove band servo and accumulator components.
a. Remove band servo retainer from transmission case.



b. Apply compressed air to oil hole until band servo piston comes out of transmission case.

- **Hold piston with a rag and gradually direct air to oil hole.**

c. Remove return springs.



d. Remove springs from accumulator pistons (A), (B), (C) and (D).

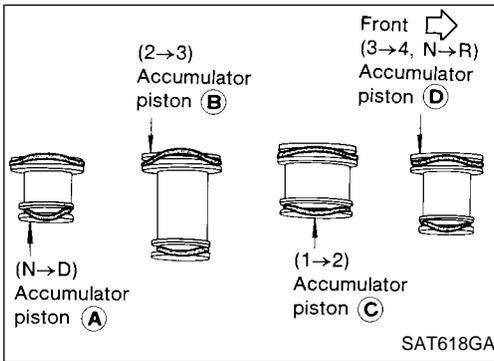
e. Apply compressed air to each oil hole until piston comes out.

- **Hold piston with a rag and gradually direct air to oil hole.**

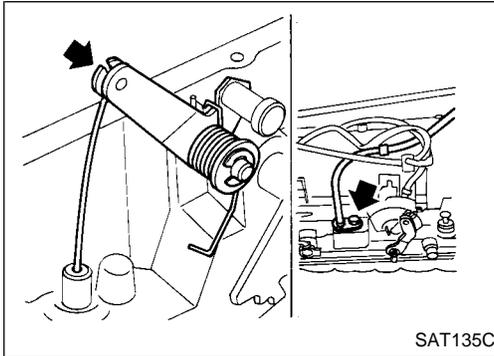
Identification of accumulator pistons	(A)	(B)	(C)	(D)
Identification of oil holes	(a)	(b)	(c)	(d)

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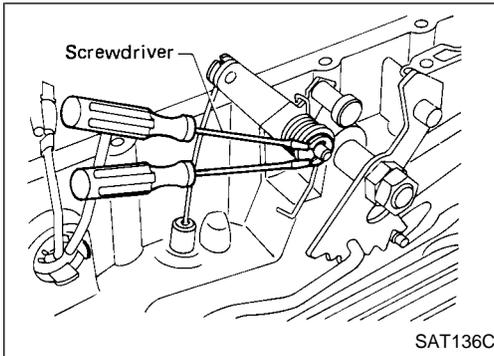
DISASSEMBLY



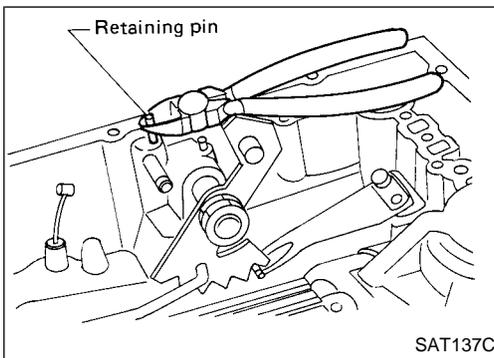
- f. Remove O-ring from each piston.



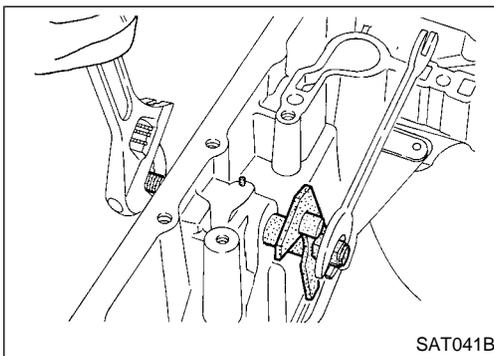
21. Remove throttle wire components if necessary.
a. Remove throttle wire from A/T assembly.



- b. Remove throttle lever shaft E-ring.
c. Remove return spring.
d. Remove throttle lever.

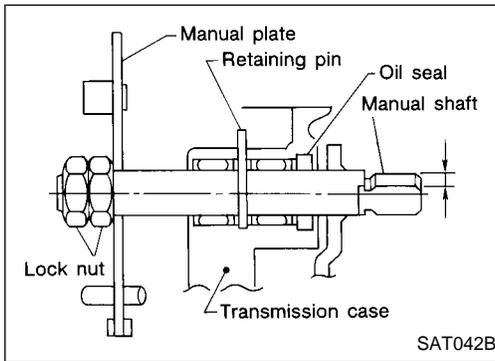


- e. Remove throttle lever shaft retaining pin and throttle lever shaft.



22. Remove manual shaft components, if necessary.
a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.

DISASSEMBLY



b. Remove retaining pin from transmission case.

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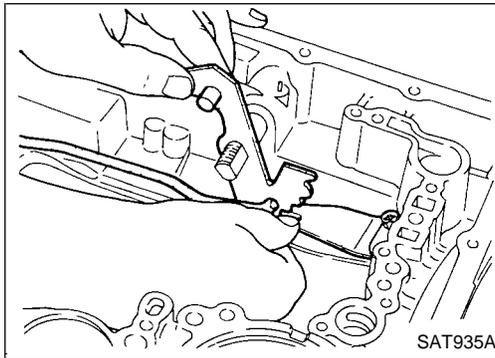
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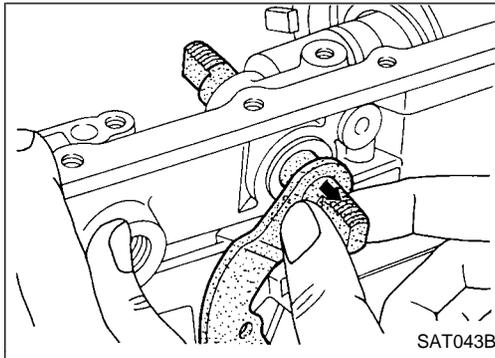
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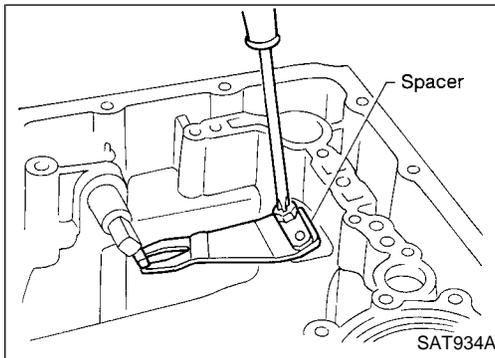
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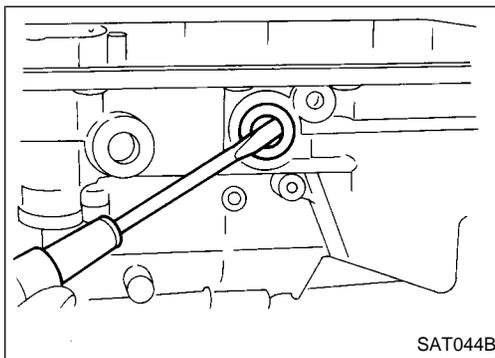
c. While pushing detent spring down, remove manual plate and parking rod from transmission case.



d. Remove manual shaft from transmission case.



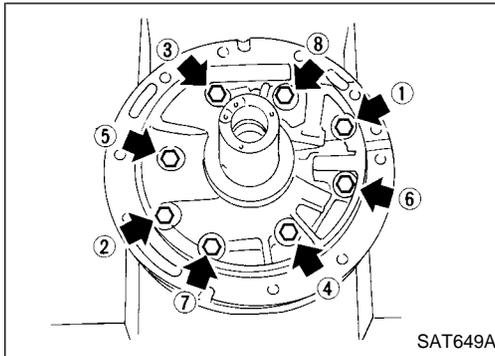
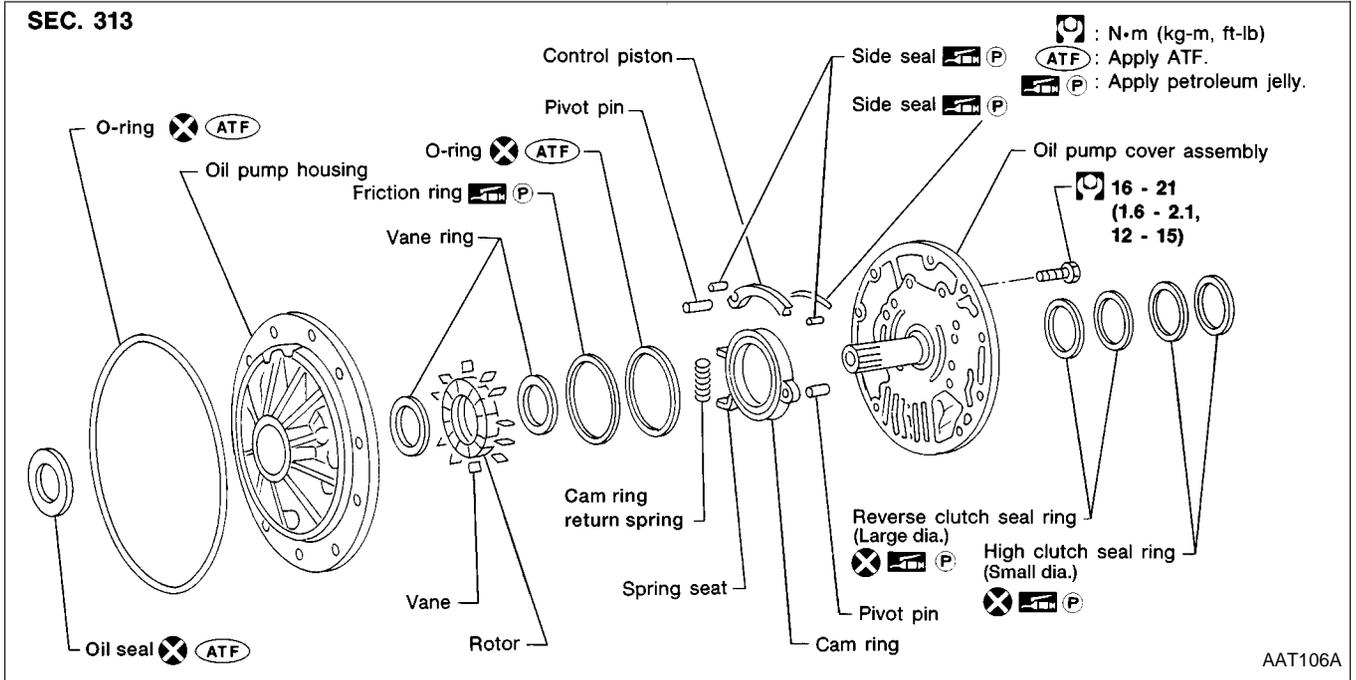
e. Remove spacer and detent spring from transmission case.



f. Remove oil seal from transmission case.

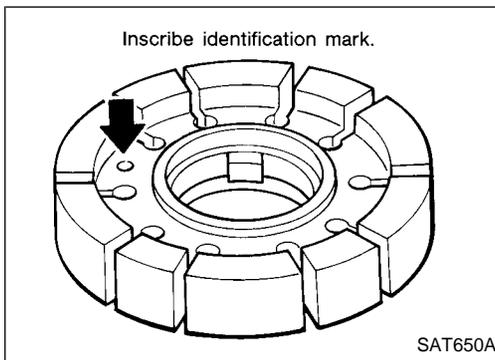
REPAIR FOR COMPONENT PARTS

Oil Pump



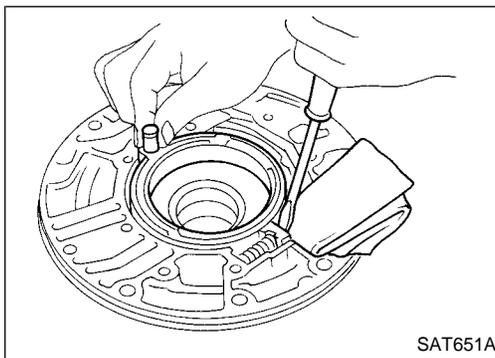
DISASSEMBLY

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



2. Remove rotor, vane rings and vanes.

- Inscribe a mark on back of rotor for identification of fore-aft direction when reassembling rotor. Then remove rotor.

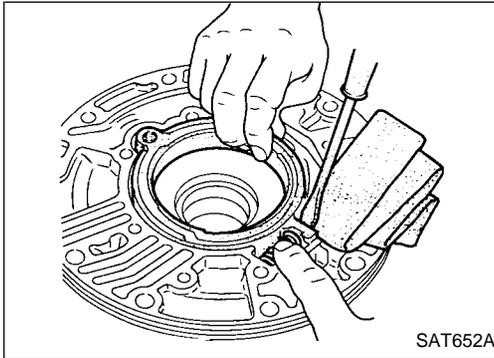


3. While pushing on cam ring, remove pivot pin.

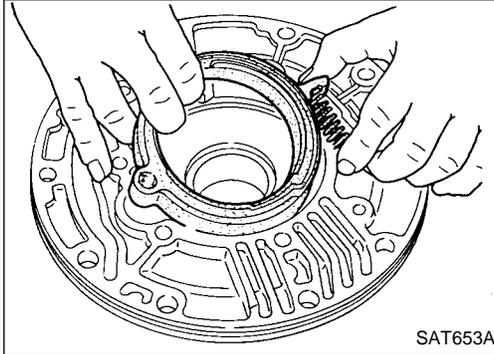
- Be careful not to scratch oil pump housing.

REPAIR FOR COMPONENT PARTS

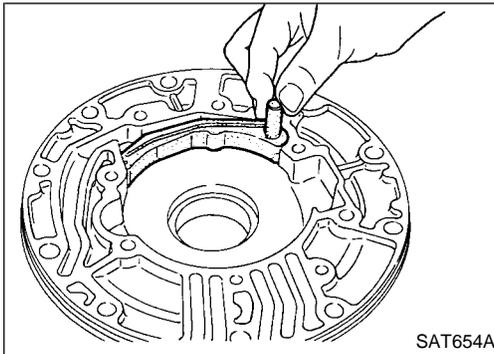
Oil Pump (Cont'd)



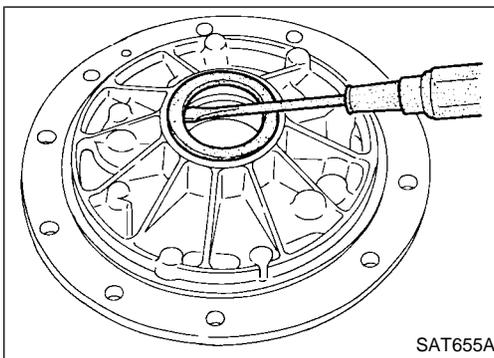
4. While holding cam ring and cam ring return spring, lift out cam ring return spring.
 - Be careful not to damage oil pump housing.
 - Hold cam ring return spring to prevent it from jumping.



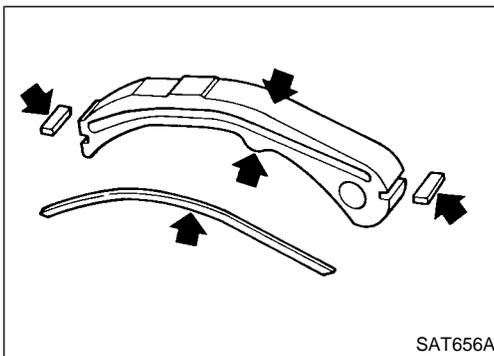
5. Remove cam ring and cam ring return spring from oil pump housing.



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



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



INSPECTION

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

- Check for wear and damage.

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REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)

Side clearances

- Measure side clearances between end of oil pump housing and cam ring, rotor, vanes and control piston in at least four places along their circumferences. Maximum measured values should be within specified ranges.
- **Before measuring side clearance, check that friction rings, O-ring, control piston side seals and cam ring return spring are removed.**

Standard clearance (Cam ring, rotor, vanes and control piston):

Refer to SDS, AT-125.

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

Seal ring clearance

- Measure clearance between seal ring and ring groove.

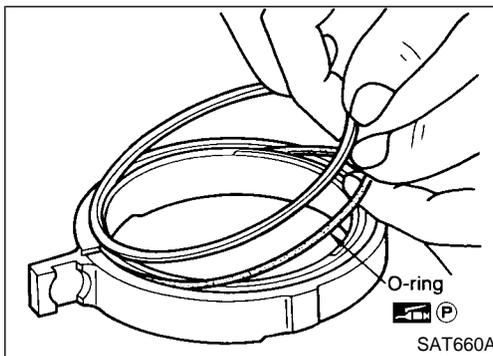
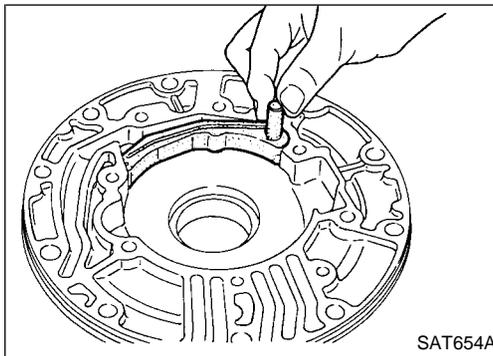
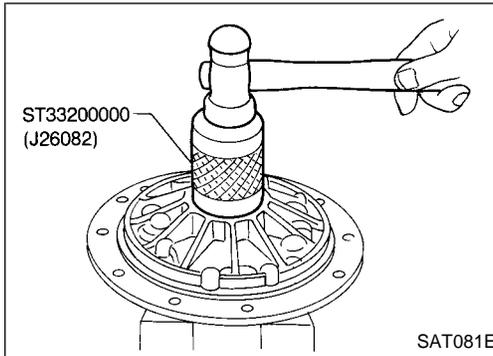
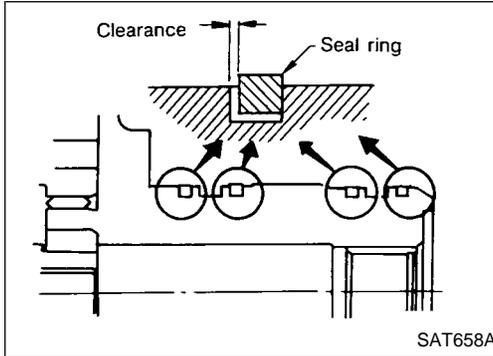
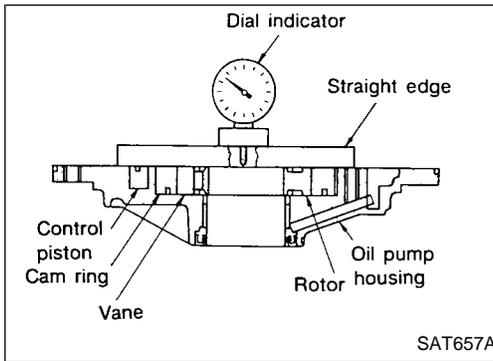
Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Wear limit:

0.25 mm (0.0098 in)

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

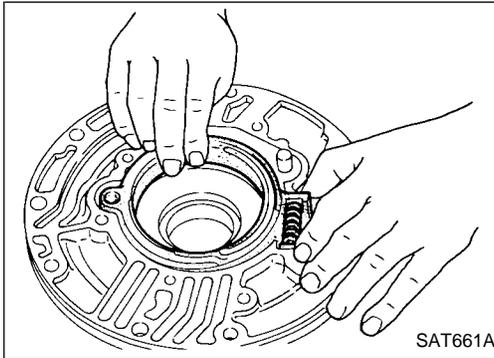


ASSEMBLY

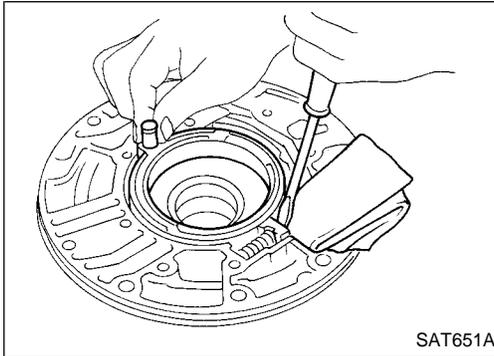
1. Drive oil seal into oil pump housing.
 - **Apply ATF to outer periphery and lip surface.**
2. Install cam ring in oil pump housing as follows:
 - a. Install side seal on control piston.
 - **Pay attention to its direction — black surface faces toward control piston.**
 - **Apply petroleum jelly to side seal.**
 - b. Install control piston on oil pump.
 - c. Install O-ring and friction ring on cam ring.
 - **Apply petroleum jelly to O-ring.**

REPAIR FOR COMPONENT PARTS

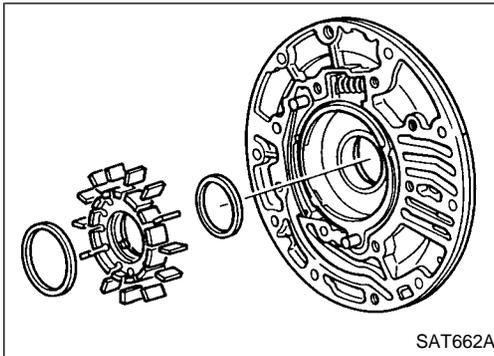
Oil Pump (Cont'd)



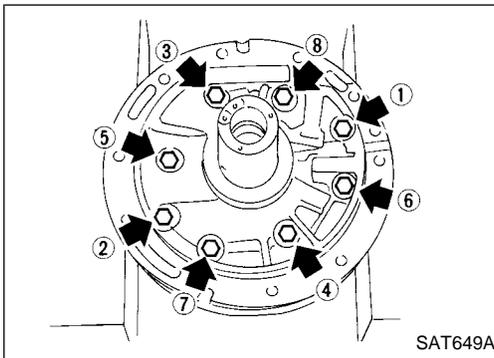
- d. Assemble cam ring, cam ring return spring and spring seat. Install spring by pushing it against pump housing.



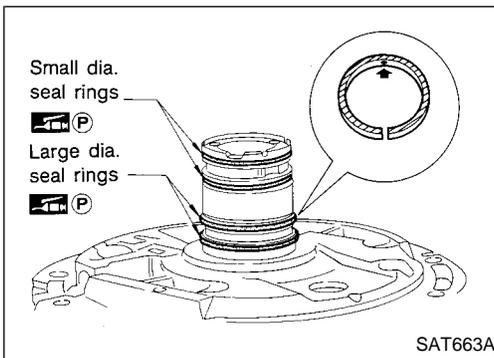
- e. While pushing on cam ring install pivot pin.



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



4. Install oil pump housing and oil pump cover.
a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly in oil pump housing assembly, then remove masking tape.
b. Tighten bolts in numerical order as shown.



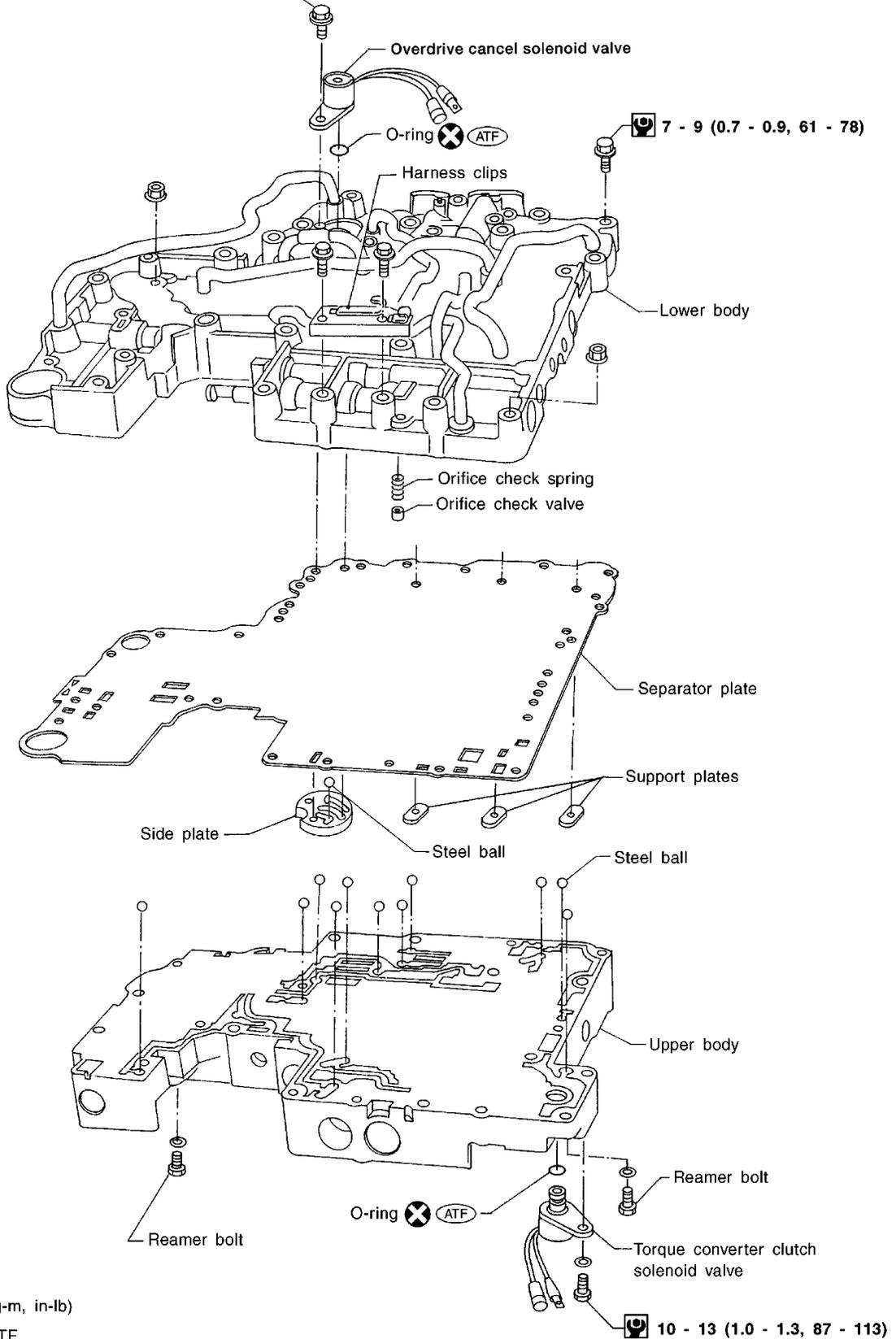
5. Install seal rings carefully after packing ring grooves with petroleum jelly. Press rings down into jelly for a close fit.
● Seal rings come in two different diameters. Check fit carefully in each groove.
Small dia. seal ring:
No mark
Large dia. seal ring:
Yellow mark in area shown by arrow
● Do not spread gap of seal ring excessively while installing. It may deform ring.

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Control Valve Assembly

SEC. 317

 10 - 13 (1.0 - 1.3, 87 - 113)



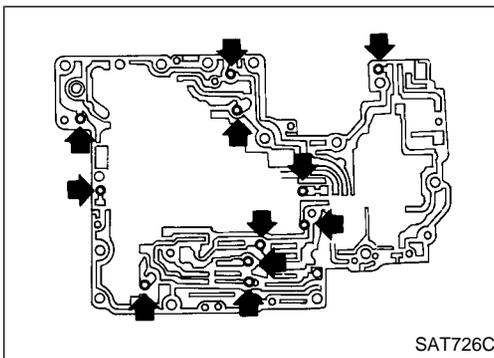
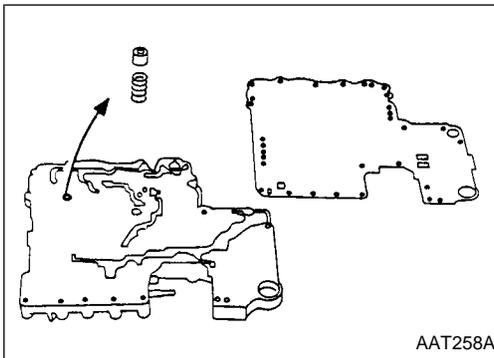
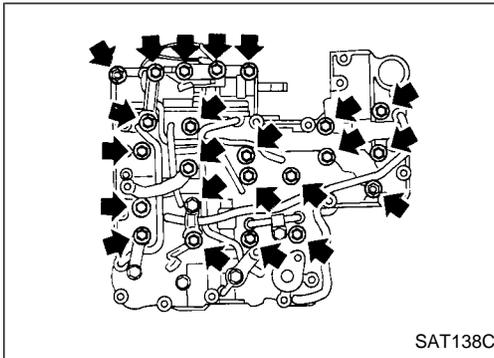
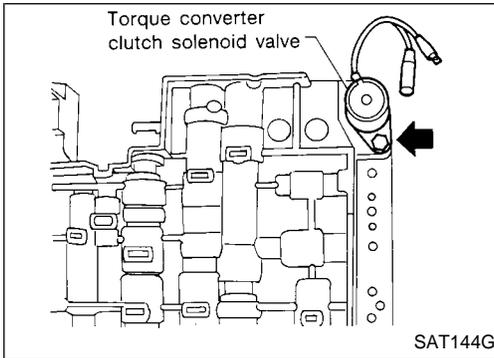
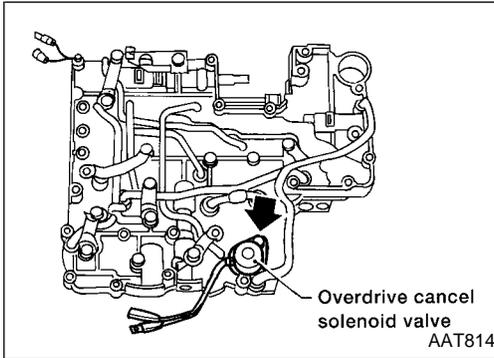
 : N·m (kg-m, in-lb)

 : Apply ATF.

REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

DISASSEMBLY



1. Remove solenoids.
 - a. Remove overdrive cancel solenoid valve and side plate from lower body.
 - b. Remove O-ring from solenoid.

- c. Remove torque converter clutch solenoid valve from upper body.
 - d. Remove O-ring from solenoid valve.

2. Disassemble upper and lower bodies.

- a. Place upper body facedown, and remove bolts, reamer bolts, side plate and support plates.
 - b. Remove lower body and separator plate as a unit from upper body.

- **Be careful not to drop orifice check valve, spring and steel balls.**

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

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

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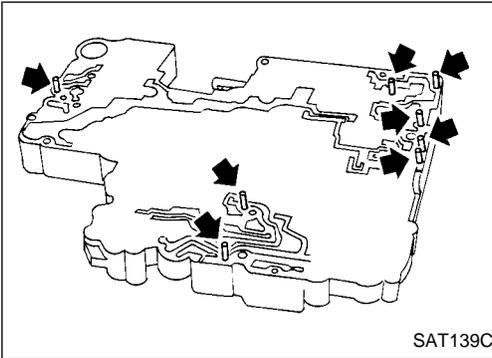
REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

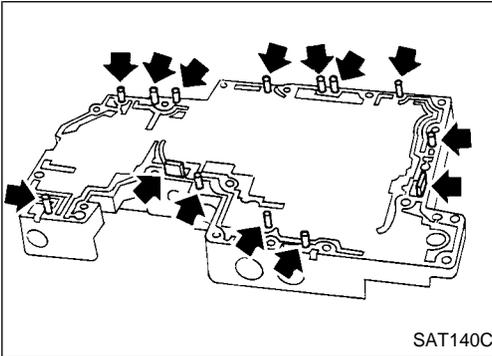
INSPECTION

Lower and upper bodies

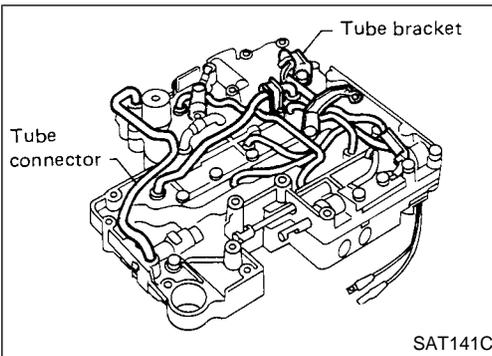
- Check to see that there are pins and retainer plates in lower body.



- Check to see that there are pins and retainer plates in upper body.
- **Be careful not to lose these parts.**



- Check to make sure that oil circuits are clean and free from damage.
- Check tube brackets and tube connectors for damage.

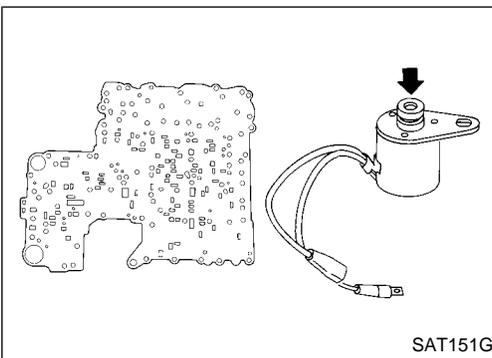


Separator plate

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

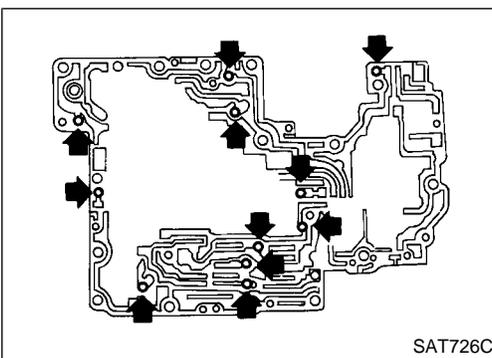
Overdrive cancel solenoid valve and torque converter clutch solenoid valve

- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Component Inspection", AT-36.



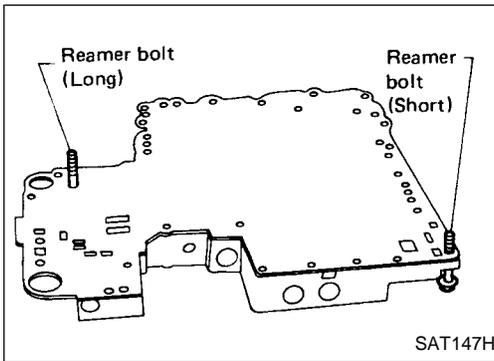
ASSEMBLY

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

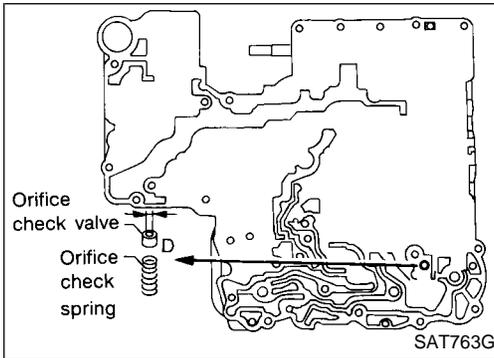


REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

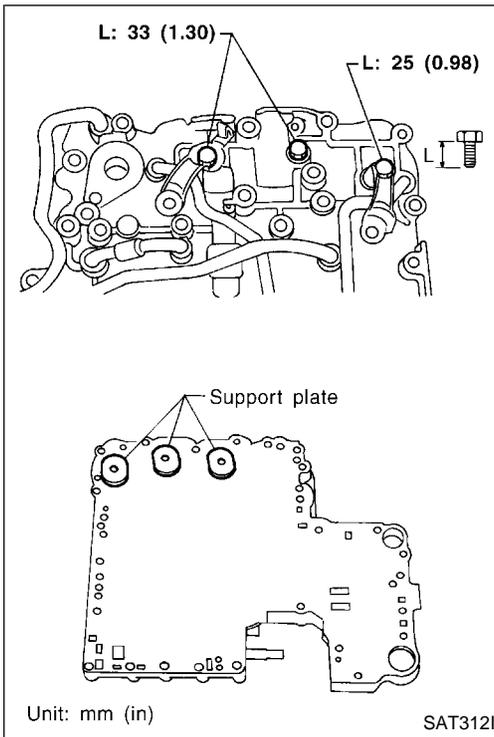


- b. Install reamer bolts from bottom of upper body.

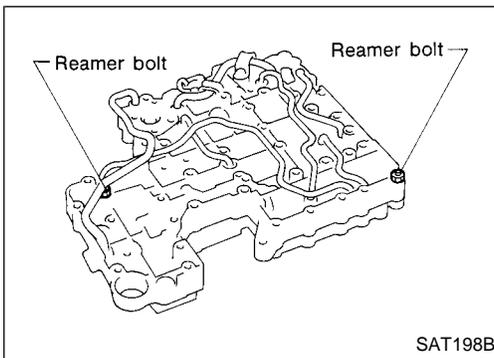


- c. Place oil circuit of lower body faceup. Install orifice check spring, orifice check valve.

D: mm (in)
2.0 (0.079)



- d. Install separator plate on lower body.
e. Temporarily install support plates, side plate (with steel ball) and tube brackets.



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

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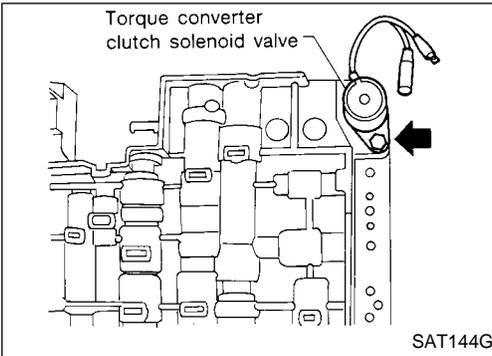
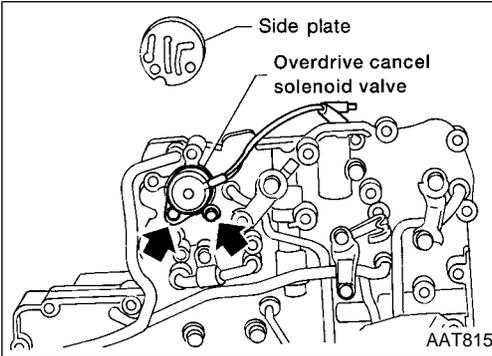
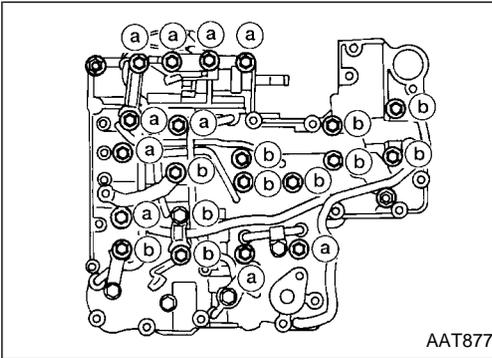
REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

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

Bolt length and location:

		Bolt symbol	
		(a)	(b)
Bolt length	mm (in)	45 (1.77)	33 (1.30)



2. Install solenoids.

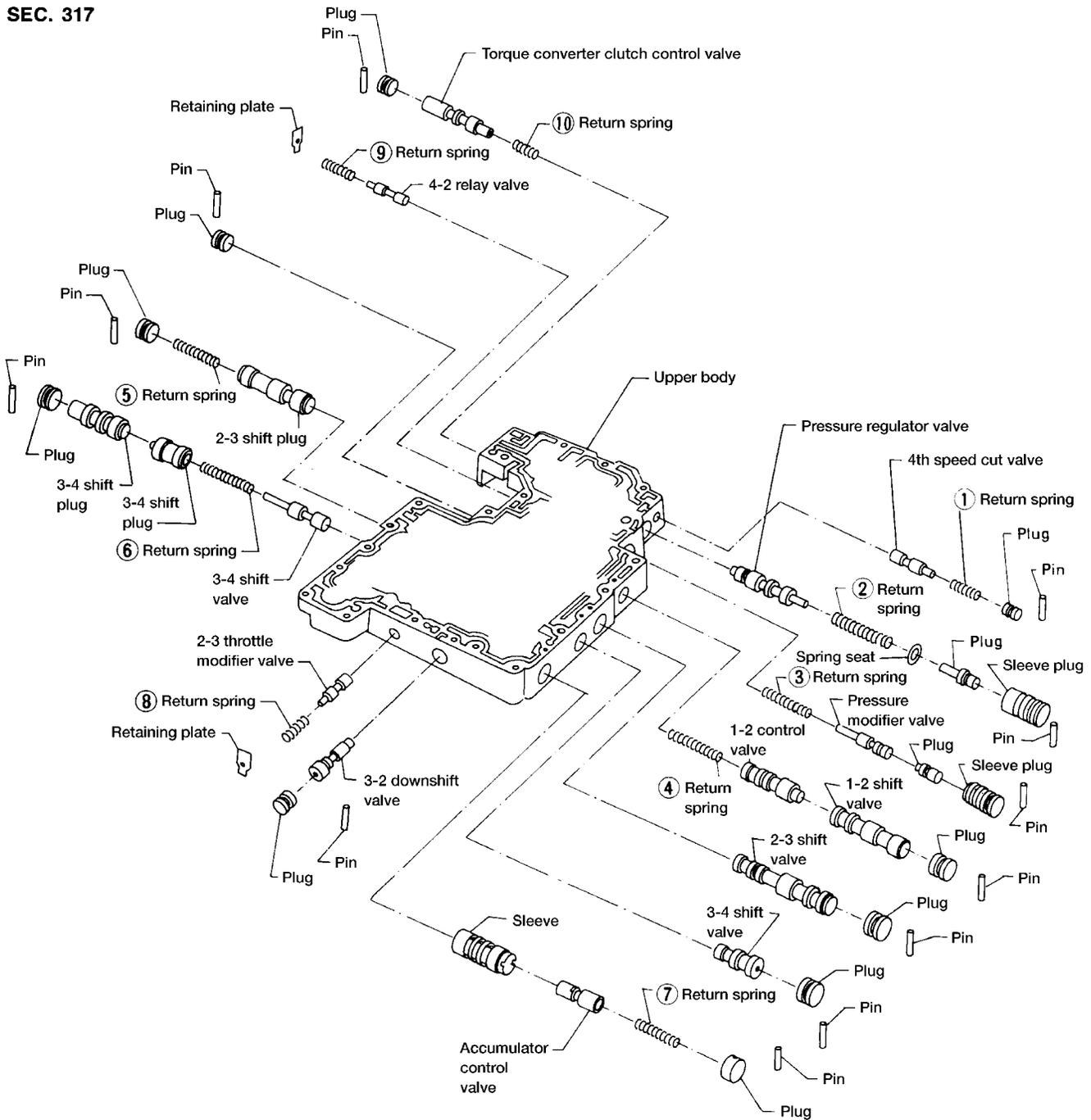
a. Attach O-ring and install overdrive cancel solenoid valve and side plate onto lower body.

b. Attach O-ring and install torque converter clutch solenoid valve onto upper body.

3. Tighten bolt.

Control Valve Upper Body

SEC. 317



Apply ATF to all components before their installation.

AAT040A

Numbers preceding valve springs correspond with those shown in Return Springs Chart on SDS, AT-123.

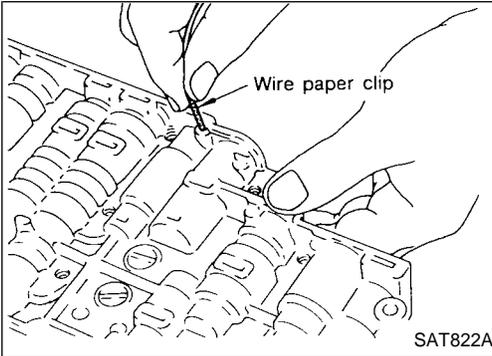
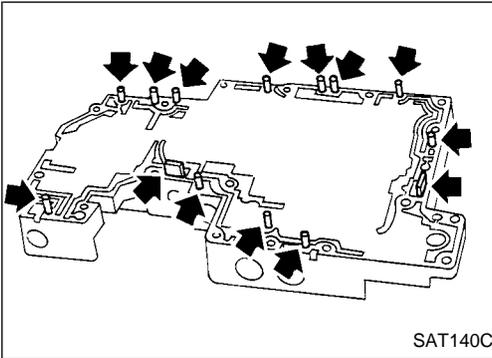
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REPAIR FOR COMPONENT PARTS

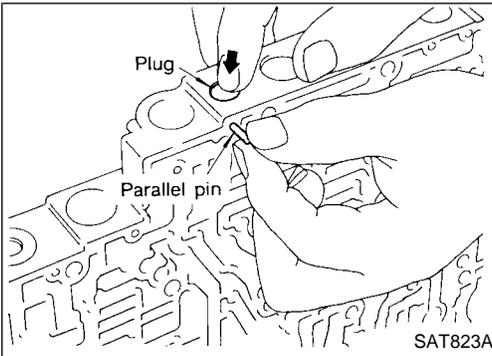
Control Valve Upper Body (Cont'd)

DISASSEMBLY

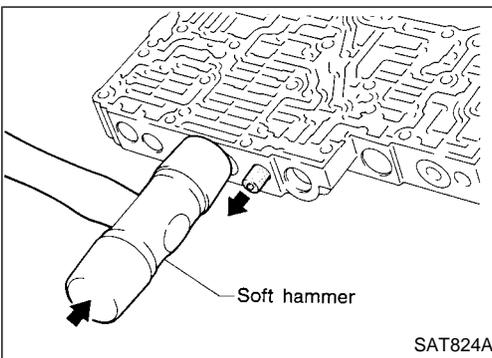
1. Remove valves at parallel pins.
 - Do not use a magnetic pick-up tool.



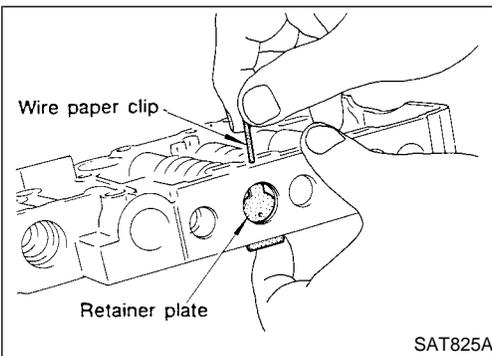
- a. Use a wire paper clip to push out parallel pins.



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



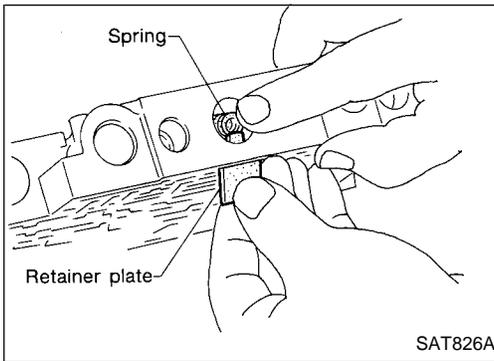
- c. Place mating surface of valve facedown, and remove internal parts.
 - If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer.
 - Be careful not to drop or damage valves and sleeves.



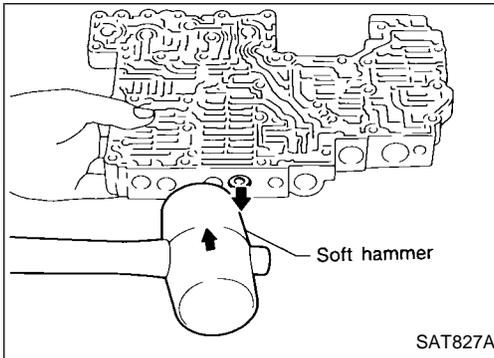
2. Remove valves at retainer plates.
 - a. Pry out retainer plate with wire paper clip.

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

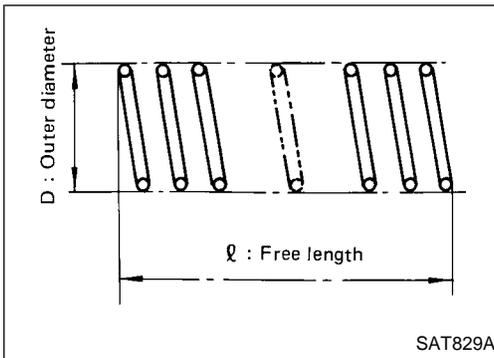


b. Remove retainer plates while holding spring.



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

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



INSPECTION

Valve springs

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

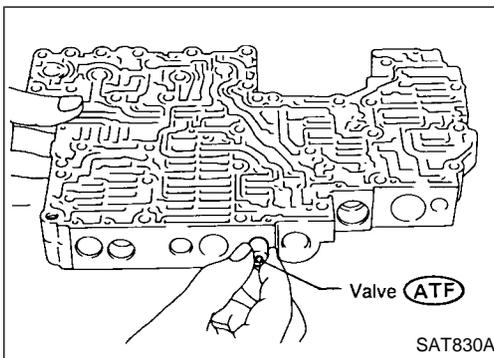
Inspection standard:

Refer to SDS, AT-123.

- Replace valve springs if deformed or fatigued.

Control valves

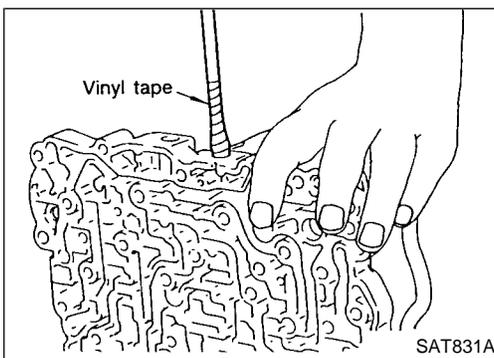
- Check sliding surfaces of valves, sleeves and plugs.



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.

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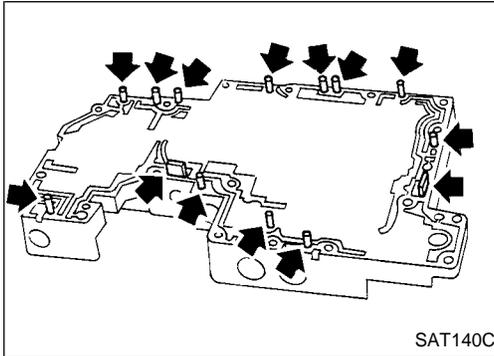
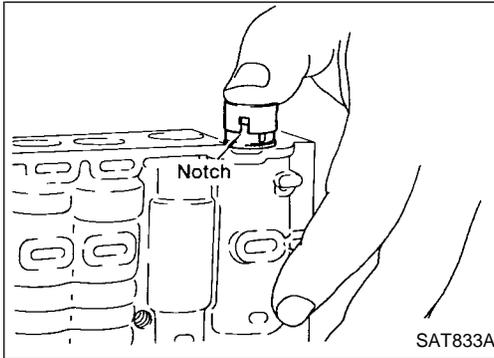
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REPAIR FOR COMPONENT PARTS

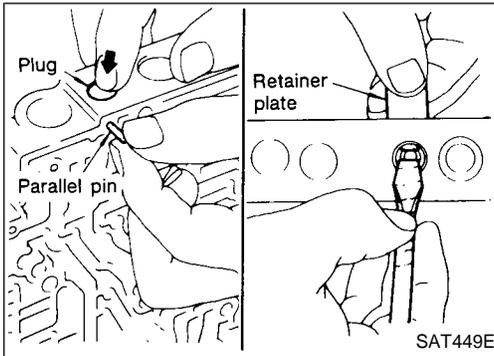
Control Valve Upper Body (Cont'd)

Accumulator control plug

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



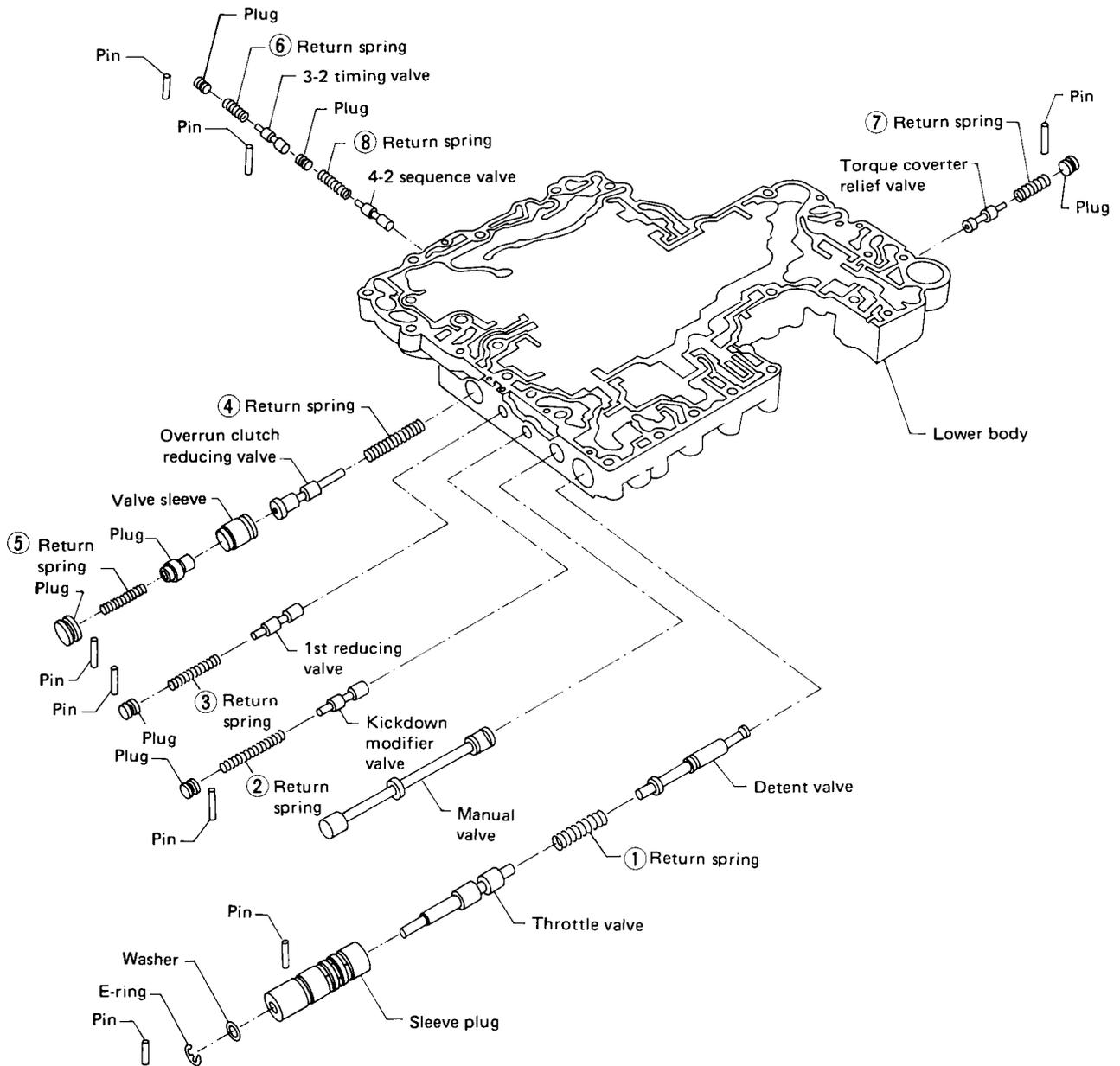
2. Install parallel pins and retainer plates.



- While pushing plug, install parallel pin.
- Insert retainer plate while pushing spring.

Control Valve Lower Body

SEC. 317



Apply ATF to all components before their installation.

SAT752GA

Numbers preceding valve springs correspond with those shown in Return Springs Chart on SDS, AT-123.

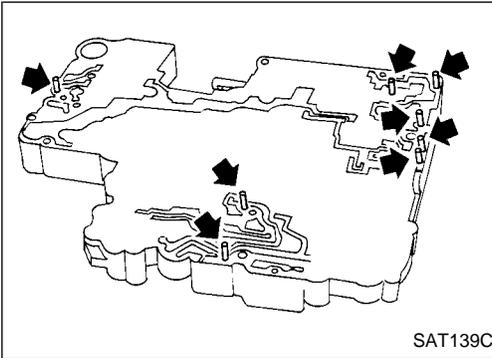
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REPAIR FOR COMPONENT PARTS

Control Valve Lower Body (Cont'd)

DISASSEMBLY

1. Remove valves at parallel pins.
2. Remove valves at retainer plates.
For removal procedures, refer to "DISASSEMBLY", "Control Valve Upper Body," AT-76.



INSPECTION

Valve springs

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

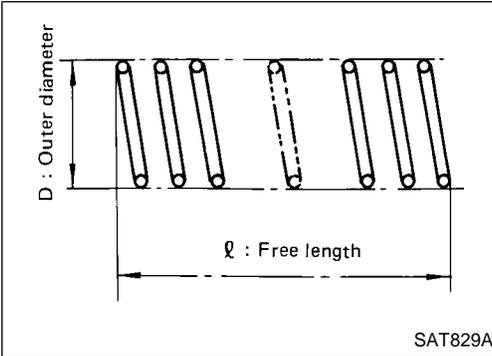
Inspection standard:

Refer to SDS, AT-123.

- Replace valve springs if deformed or fatigued.

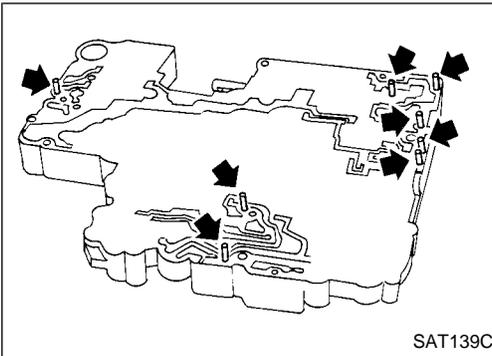
Control valves

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



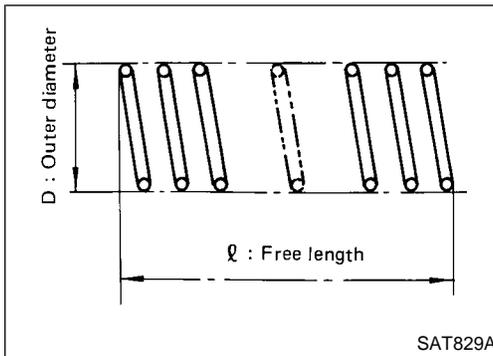
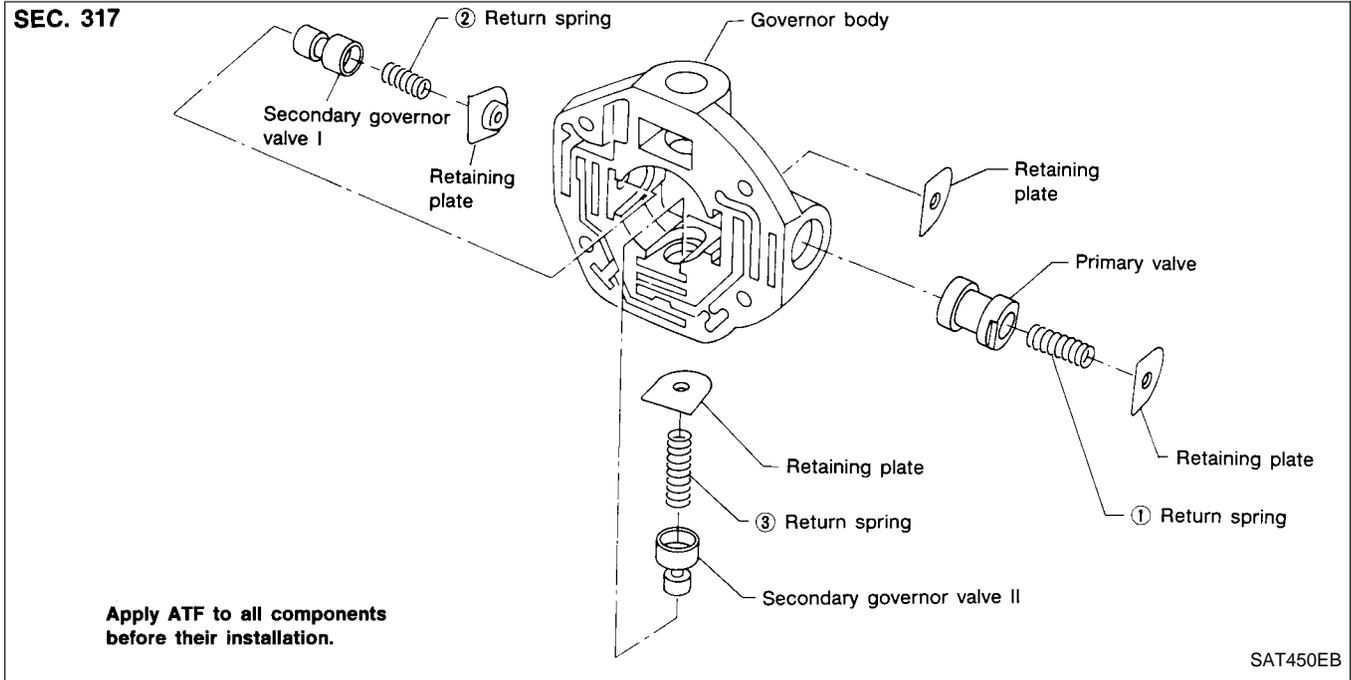
ASSEMBLY

- Install control valves.
For installation procedures, refer to "ASSEMBLY", "Control Valve Upper Body," AT-77.



Governor Valve Assembly

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INSPECTION

Valve springs

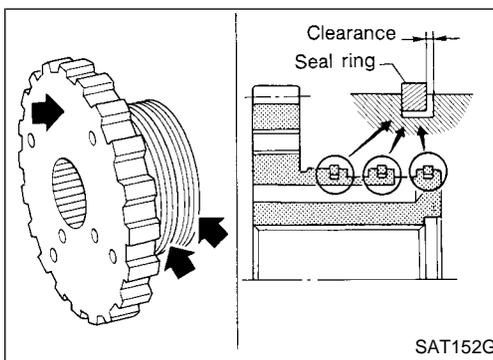
- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.

Inspection standard:

Refer to SDS, AT-123.

Governor valves and valve body

- Check governor valves and valve body for indication of burning or scratches.



Parking Gear

INSPECTION

- Check contacting surface of parking gear and ring groove areas for wear.
- Measure clearance between seal ring and ring groove.

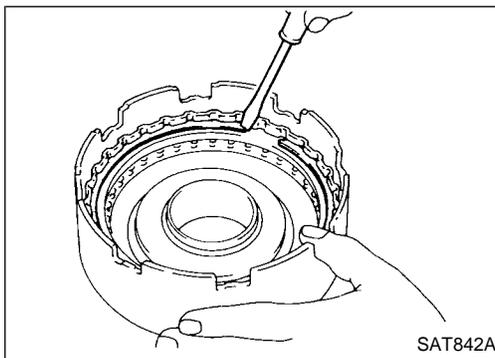
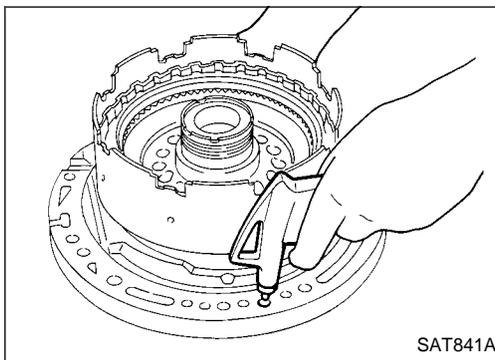
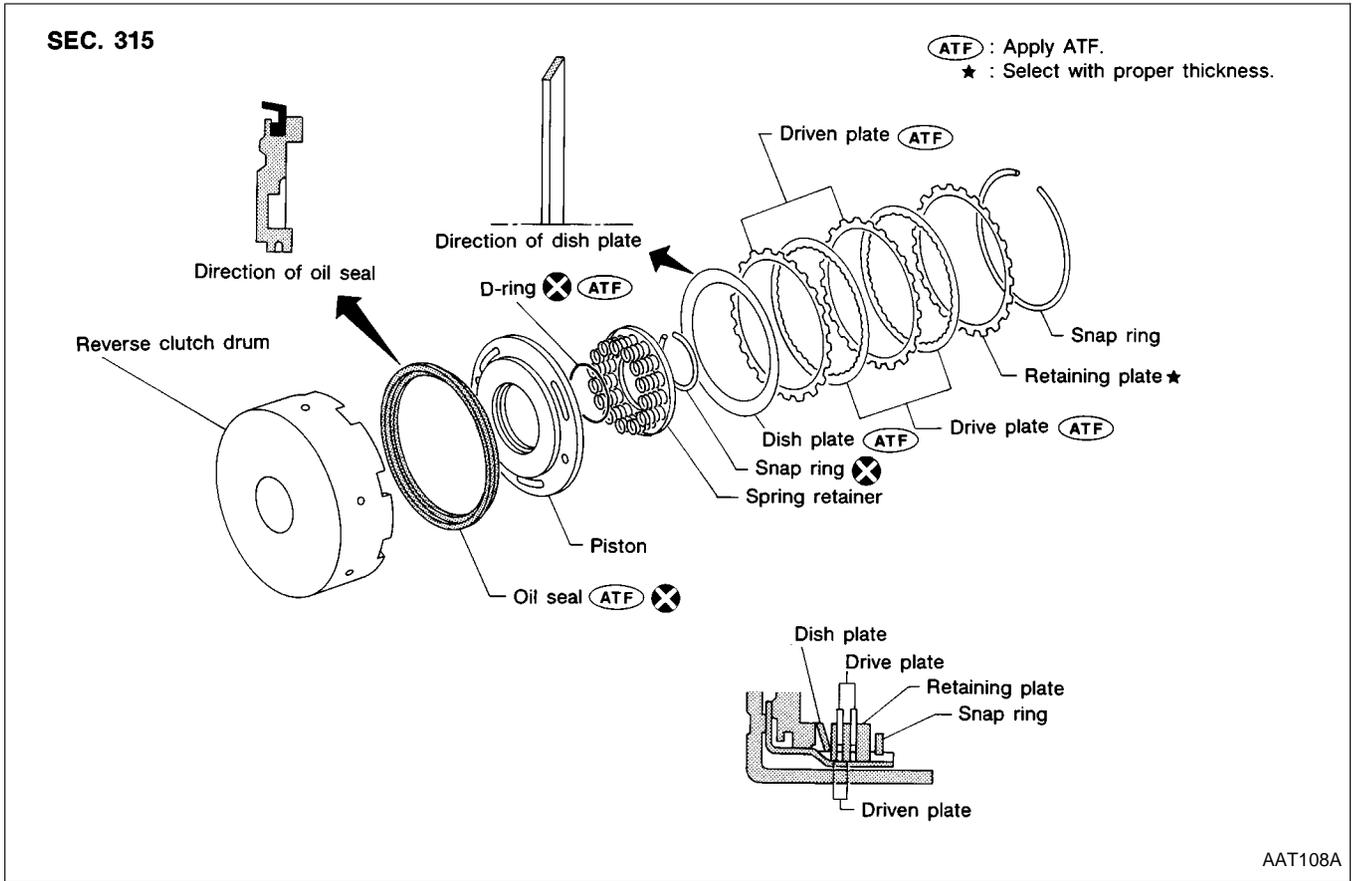
Standard clearance:

0.15 - 0.40 mm (0.0059 - 0.0157 in)

Wear limit:

0.40 mm (0.0157 in)

Reverse Clutch

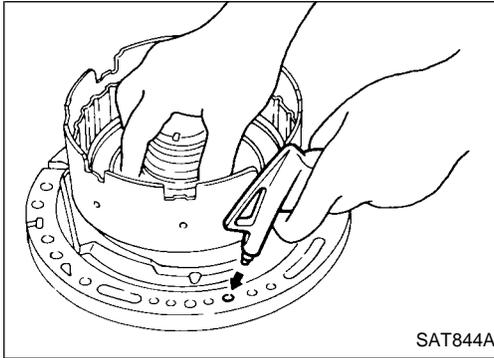
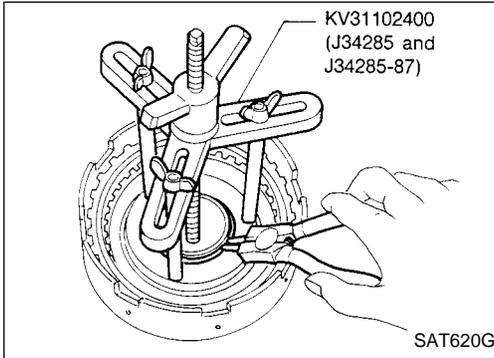


DISASSEMBLY

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

REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)

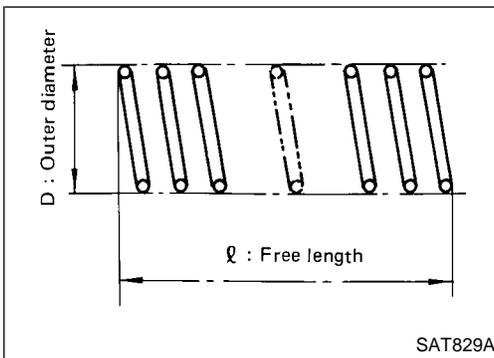


3. Remove snap ring from clutch drum while compressing clutch springs.
 - **Set Tool directly over springs.**
 - **Do not expand snap ring excessively.**
4. Remove spring retainer and return spring.
5. Install seal ring onto oil pump cover and install reverse clutch drum. While holding piston, gradually apply compressed air to oil hole until piston is removed.
 - **Do not apply compressed air abruptly.**
6. Remove D-ring and oil seal from piston.

INSPECTION

Reverse clutch snap ring and spring retainer

- Check for deformation, fatigue and damage.

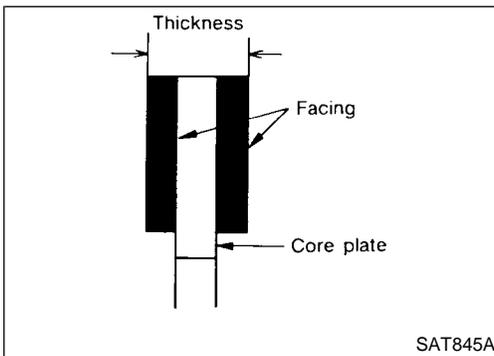


Reverse clutch return springs

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

Inspection standard:

Refer to SDS, AT-123.



Reverse clutch drive plates

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

Thickness of drive plate:

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

Wear limit 1.80 mm (0.0709 in)

- If not within wear limit, replace.

Reverse clutch dish plate

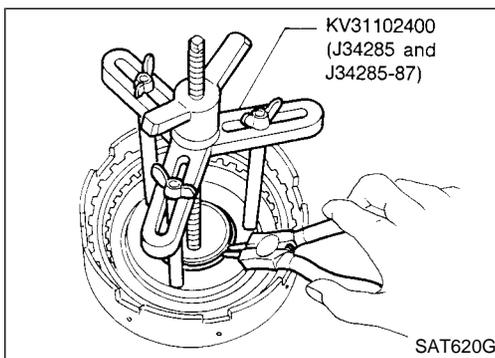
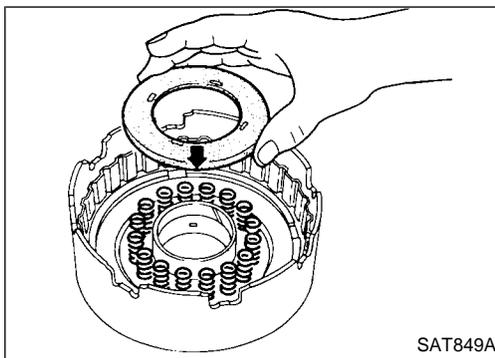
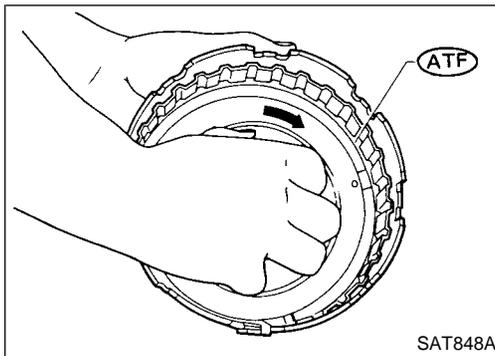
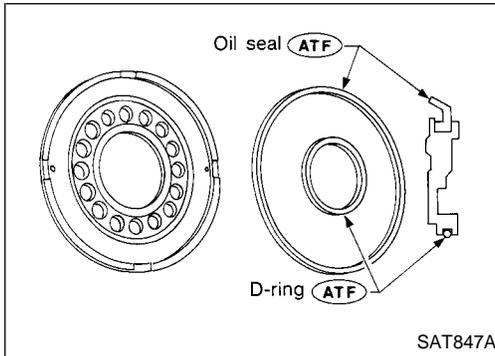
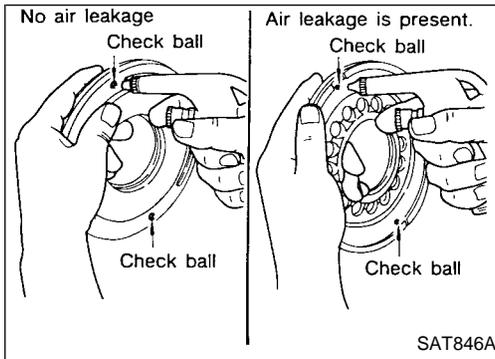
- Check for deformation and damage.

REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)

Reverse clutch piston

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



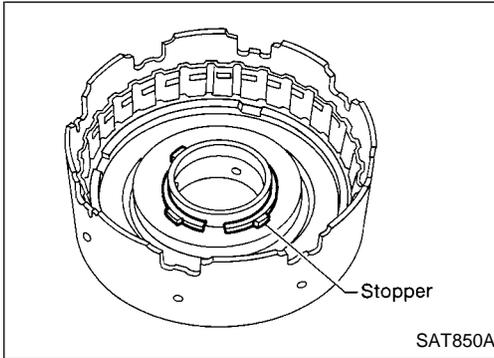
ASSEMBLY

1. Install D-ring and oil seal on piston.
 - **Apply ATF to both parts.**
 - **Take care with the direction of oil seal.**
2. Install piston assembly by turning it slowly and evenly.
 - **Apply ATF to inner surface of drum.**
3. Install return springs and spring retainer.
4. Set Tool on spring retainer and install snap ring while compressing clutch springs.

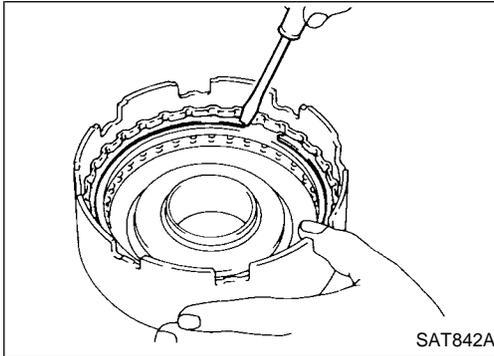
REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)

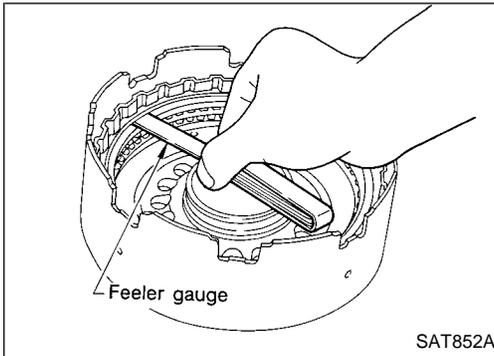
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- Do not align snap ring gap with spring retainer stopper.



5. Install drive plates, driven plates, retaining plate and dish plate.
6. Install snap ring.



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

Specified clearance:

Standard

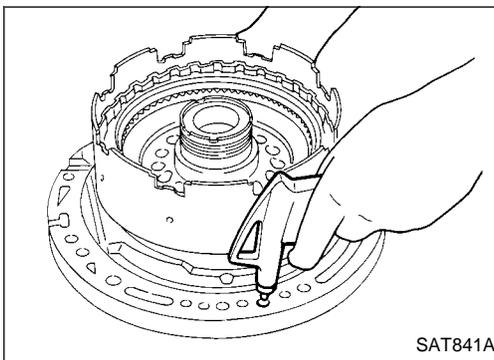
0.5 - 0.8 mm (0.020 - 0.031 in)

Allowable limit

1.2 mm (0.047 in)

Retaining plate:

Refer to SDS, AT-124.

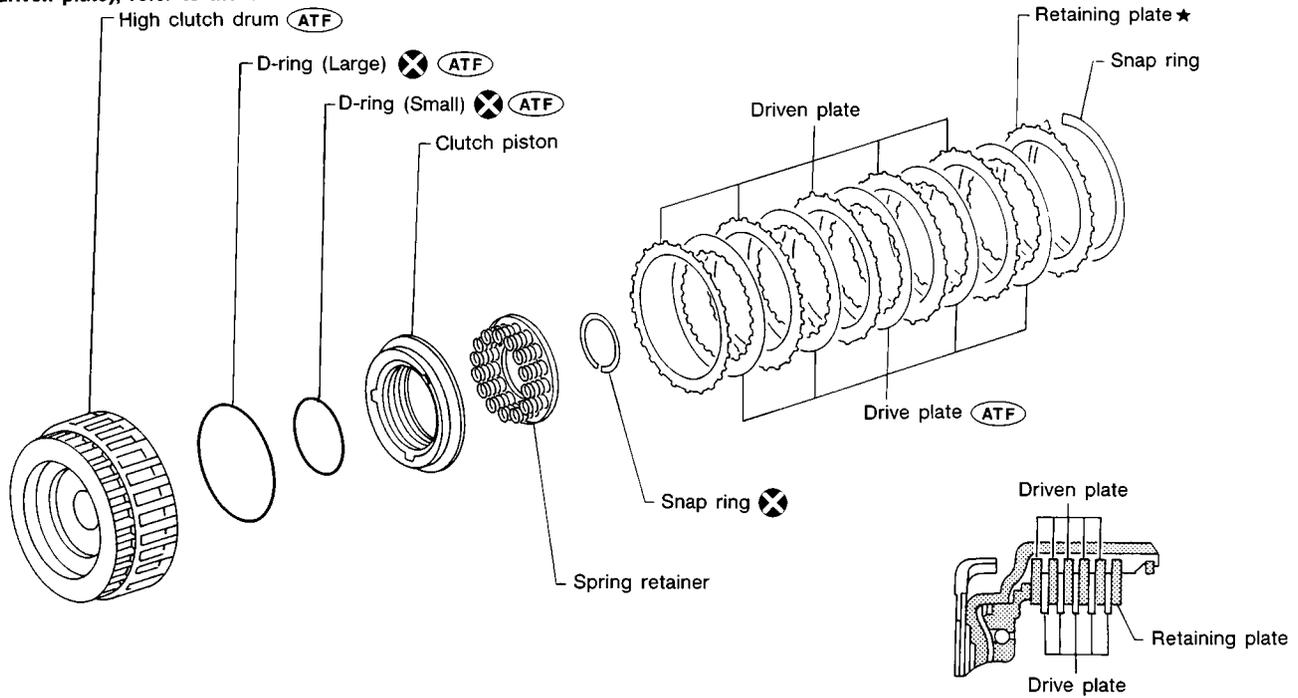


8. Check operation of reverse clutch.
Refer to "DISASSEMBLY", "Reverse Clutch", AT-82.

High Clutch

SEC. 315

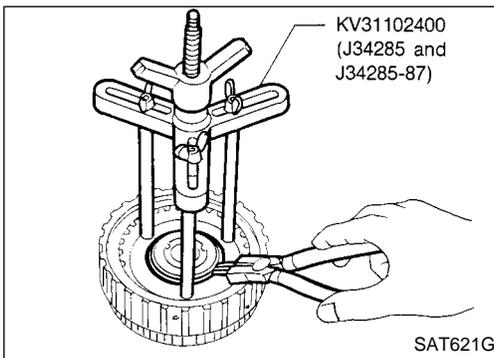
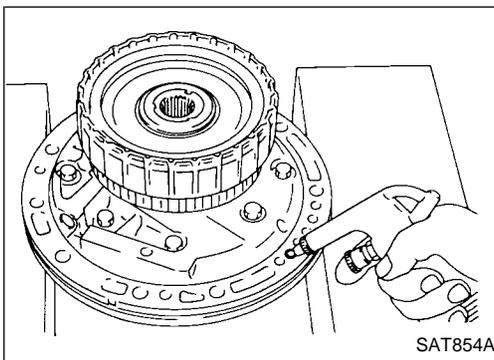
For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section.



(ATF) : Apply ATF.

★ : Select with proper thickness.

AAT109A



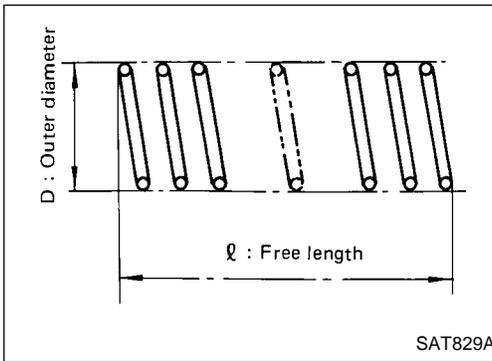
DISASSEMBLY AND ASSEMBLY

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

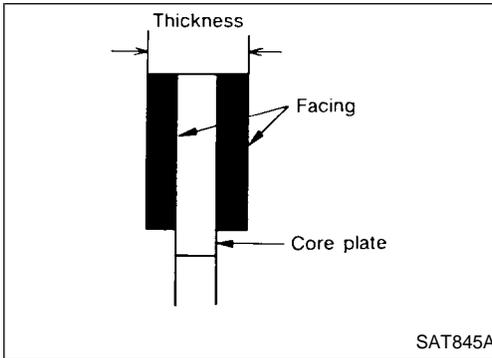
- Check of high clutch operation
- Removal and installation of return spring

REPAIR FOR COMPONENT PARTS

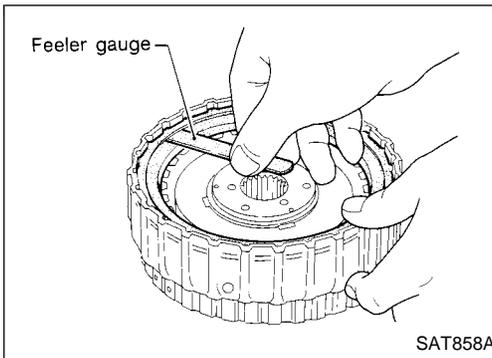
High Clutch (Cont'd)



- Inspection of high clutch return springs
Inspection standard:
Refer to SDS, AT-123.



- Inspection of high clutch drive plate
Thickness of drive plate:
Standard
1.52 - 1.67 mm (0.0598 - 0.0657 in)
Wear limit
1.40 mm (0.0551 in)



- Measurement of clearance between retaining plate and snap ring
Specified clearance:
Standard
1.8 - 2.2 mm (0.071 - 0.087 in)
Allowable limit
2.8 mm (0.110 in)
Retaining plate:
Refer to SDS, AT-124.

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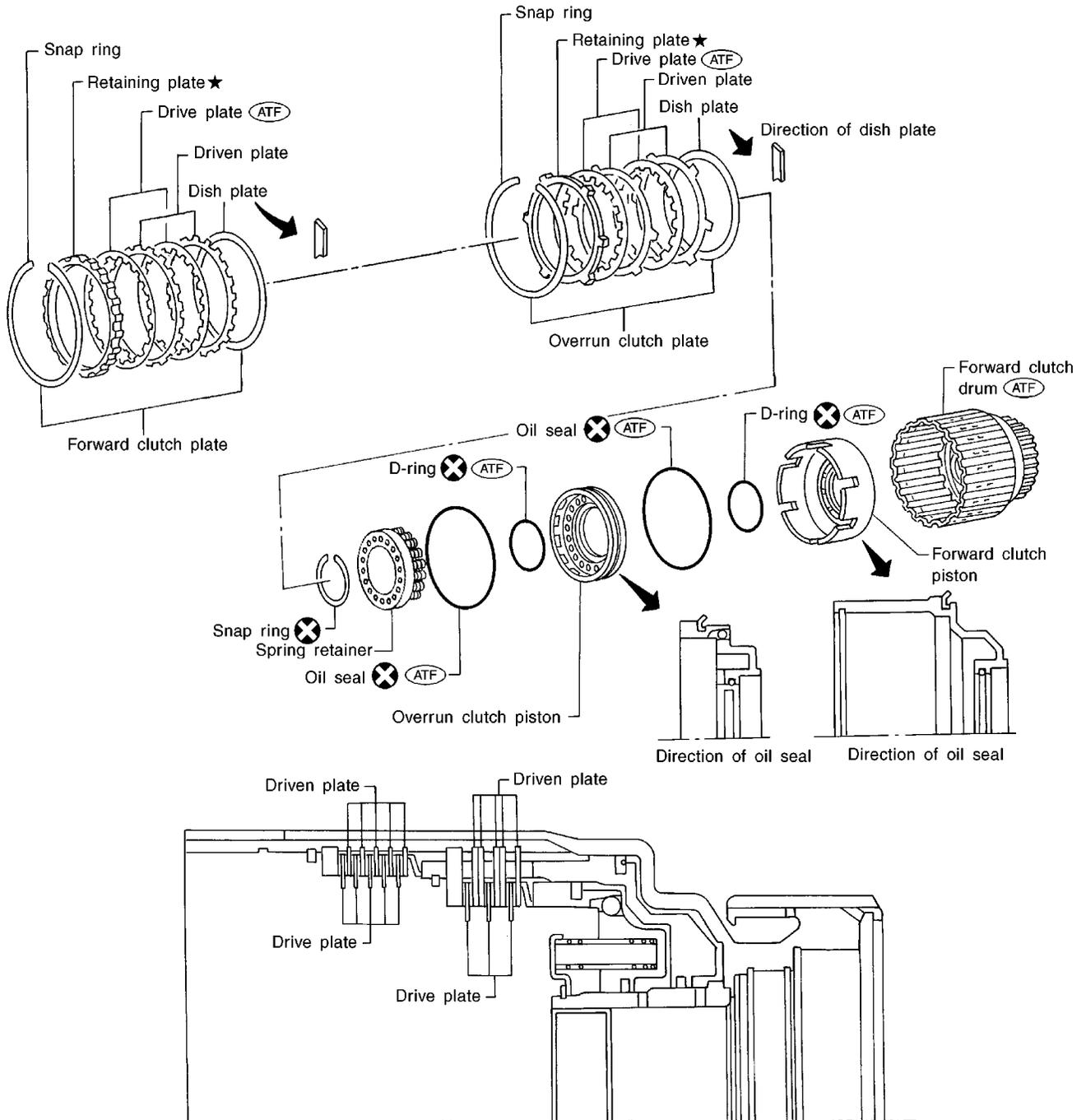
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REPAIR FOR COMPONENT PARTS

Forward and Overrun Clutches

SEC. 315

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



(ATF) : Apply ATF.

★ : Select with proper thickness.

REPAIR FOR COMPONENT PARTS

Forward and Overrun Clutches (Cont'd)

DISASSEMBLY AND ASSEMBLY

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

- Check of forward clutch operation.

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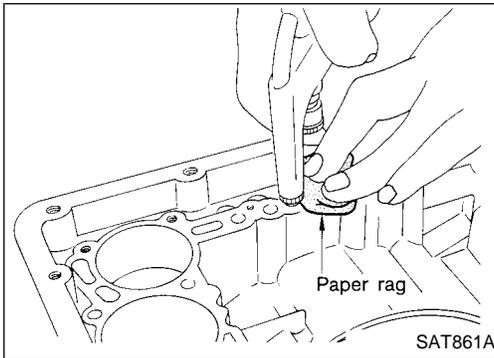
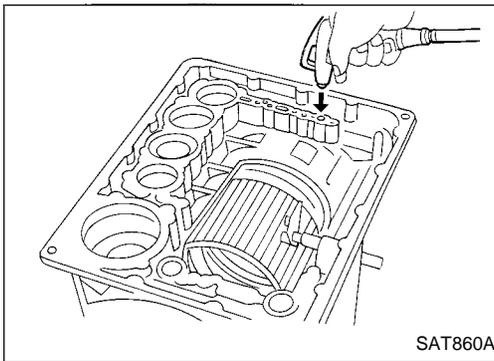
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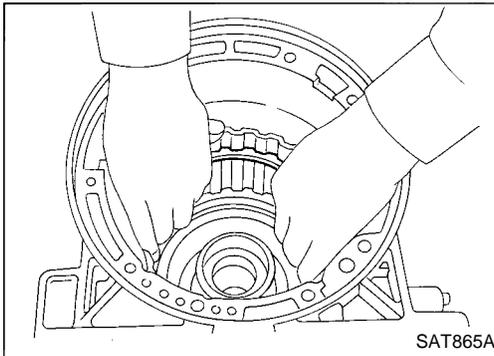
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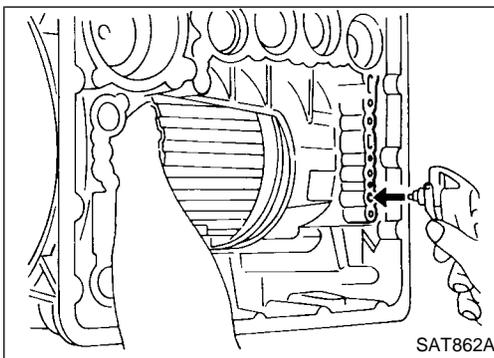


- Check of overrun clutch operation.



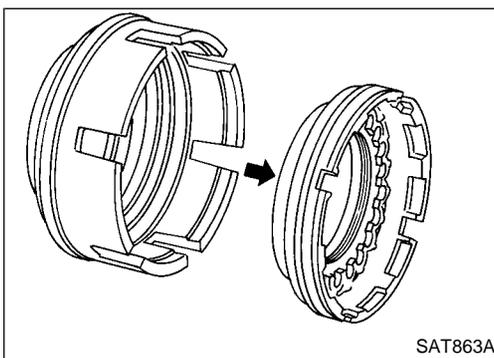
- Removal of forward clutch drum

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



- Removal of forward clutch and overrun clutch pistons

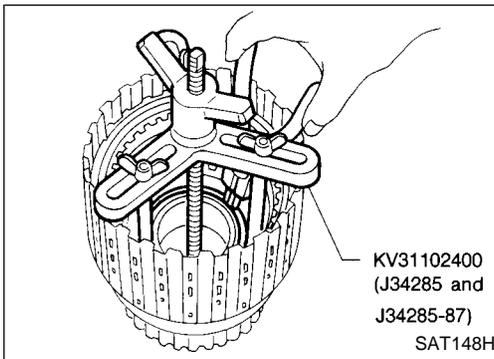
1. While holding overrun clutch piston, gradually apply compressed air to oil hole.



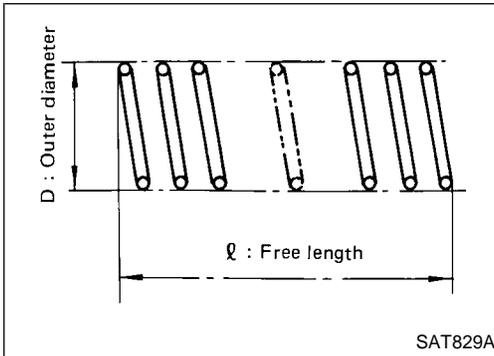
2. Remove overrun clutch from forward clutch.

REPAIR FOR COMPONENT PARTS

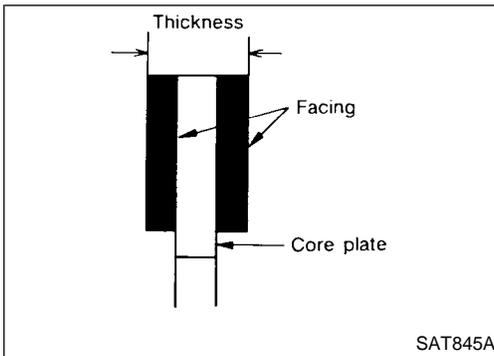
Forward and Overrun Clutches (Cont'd)



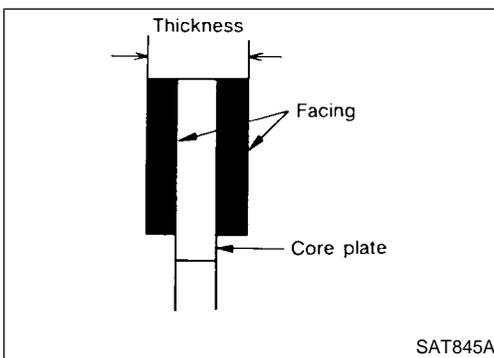
- Removal and installation of return springs



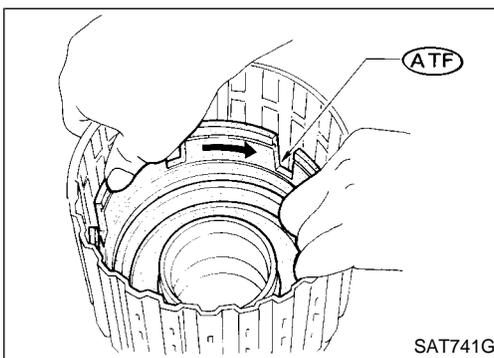
- Inspection of forward clutch and overrun clutch return springs
Inspection standard:
Refer to SDS, AT-123.



- Inspection of forward clutch drive plates
Thickness of drive plate:
Standard
1.52 - 1.67 mm (0.0598 - 0.0657 in)
Wear limit
1.40 mm (0.0551 in)



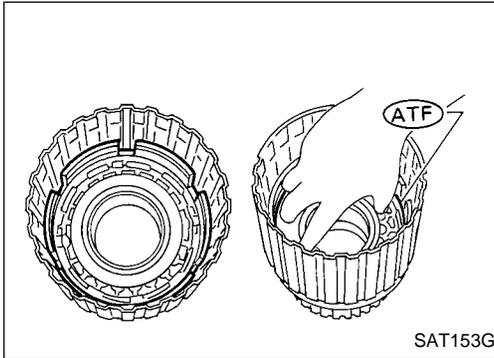
- Inspection of overrun clutch drive plates
Thickness of drive plate:
Standard
1.90 - 2.05 mm (0.0748 - 0.0807 in)
Wear limit
1.80 mm (0.0709 in)



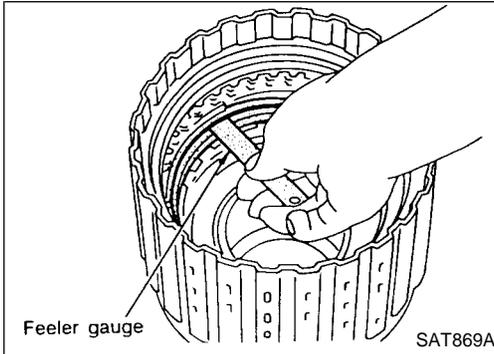
- Installation of forward clutch piston and overrun clutch piston
- 1. Install forward clutch piston by turning it slowly and evenly.
- **Apply ATF to inner surface of clutch drum.**

REPAIR FOR COMPONENT PARTS

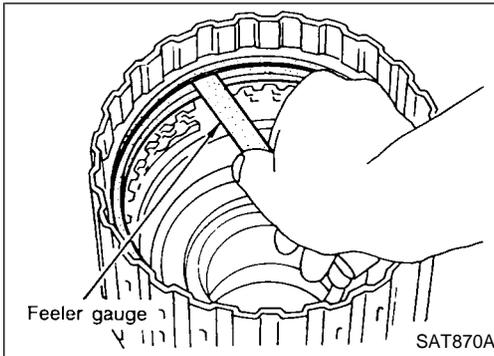
Forward and Overrun Clutches (Cont'd)



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



- Measurement of clearance between retaining plate and snap ring of overrun clutch
Specified clearance:
Standard
1.0 - 1.4 mm (0.039 - 0.055 in)
Allowable limit
2.0 mm (0.079 in)
Retaining plate:
Refer to SDS, AT-124.



- Measurement of clearance between retaining plate and snap ring of forward clutch
Specified clearance:
Standard
0.35 - 0.75 mm (0.0138 - 0.0295 in)
Allowable limit
1.85 mm (0.728 in)
Retaining plate:
Refer to SDS, AT-124.

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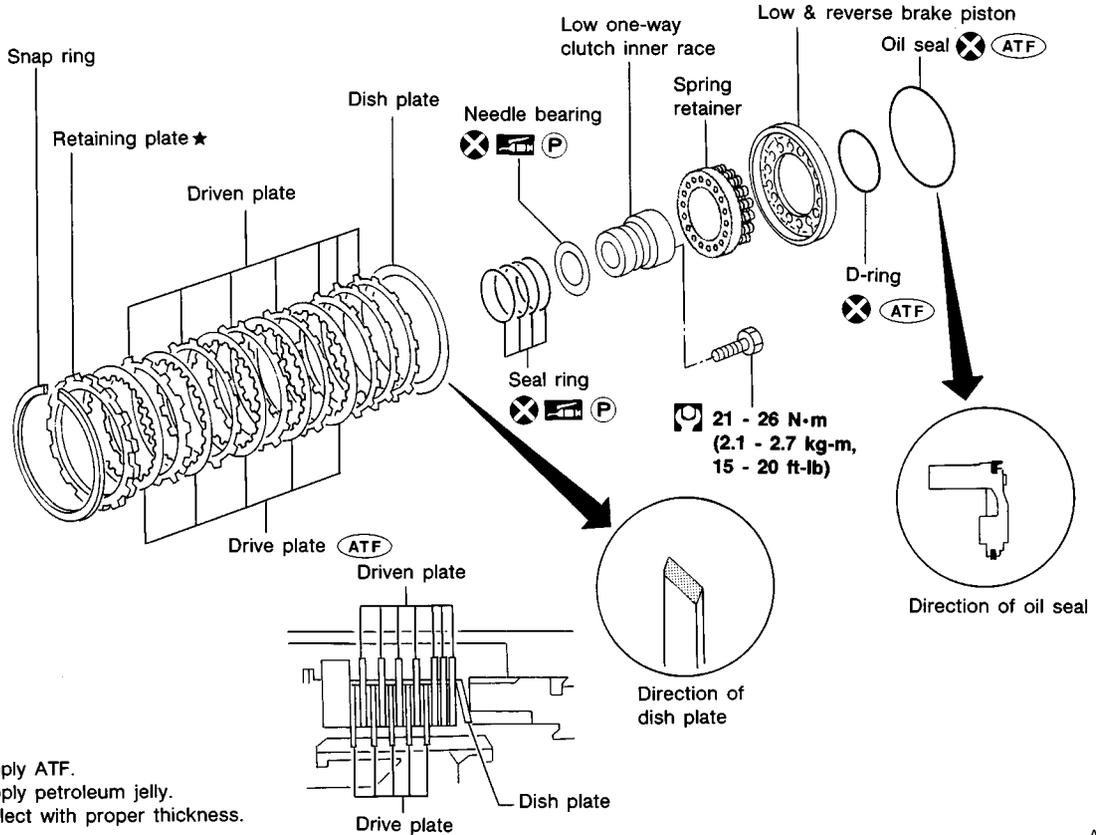
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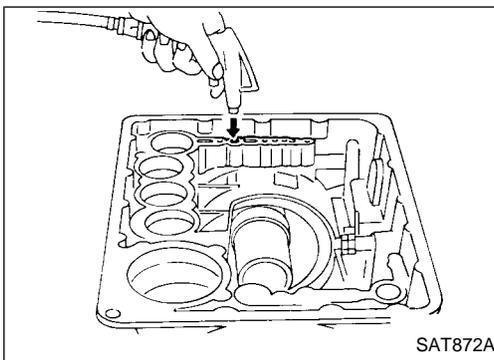
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Low & Reverse Brake

SEC. 315

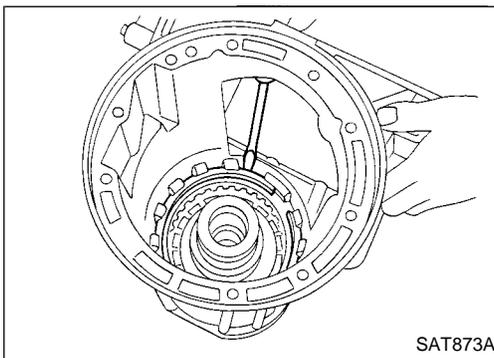


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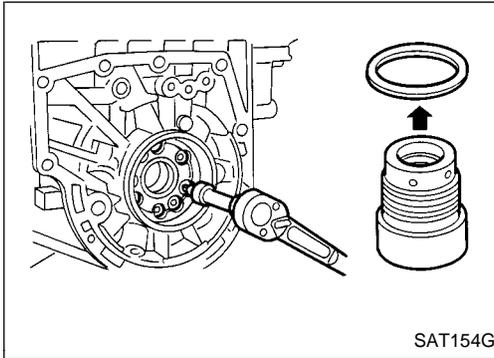
DISASSEMBLY

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

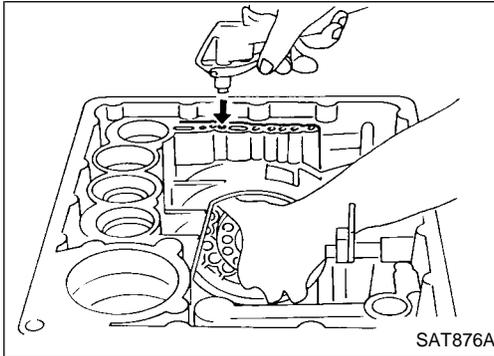


REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)



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

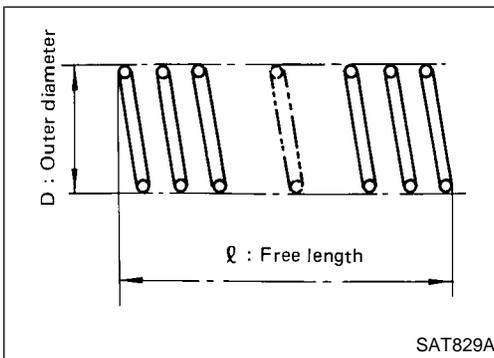


6. Remove low & reverse brake piston using compressed air.
7. Remove oil seal and D-ring from piston.

INSPECTION

Low & reverse brake snap ring and spring retainer

- Check for deformation, or damage.

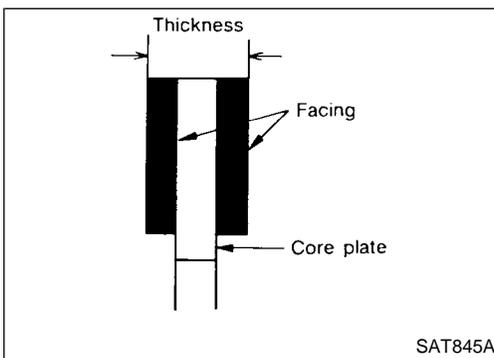


Low & reverse brake return springs

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

Inspection standard:

Refer to SDS, AT-123.



Low & reverse brake drive plates

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

Thickness of drive plate:

Standard value

1.52 - 1.67 mm (0.0598 - 0.0657 in)

Wear limit

1.4 mm (0.055 in)

- If not within wear limit, replace.

REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)

Low one-way clutch inner race

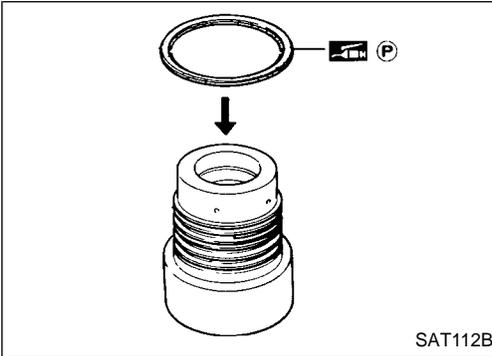
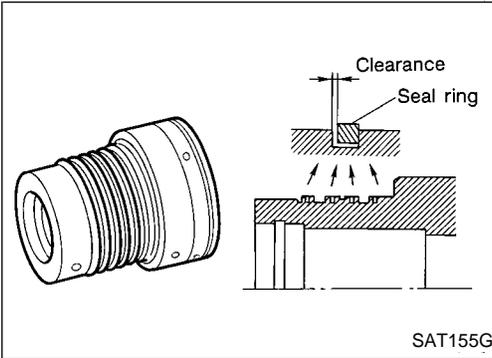
- Check frictional surface of inner race for wear or damage.
- Install new seal rings onto low one-way clutch inner race.
- **Be careful not to expand seal ring gap excessively.**
- Measure seal ring-to-groove clearance.

Inspection standard:

Standard value 0.10 - 0.25 mm (0.0039 - 0.0098 in)

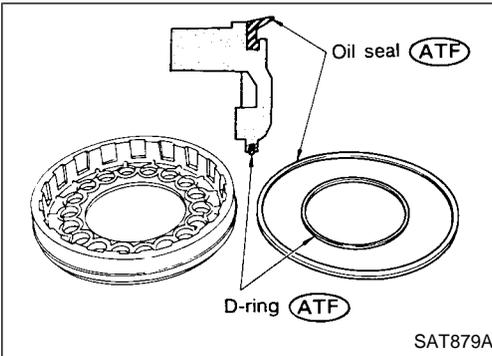
Allowable limit 0.25 mm (0.0098 in)

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

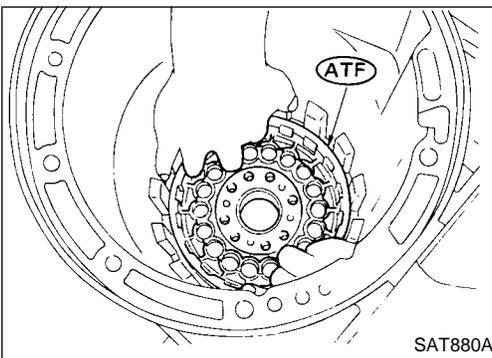


ASSEMBLY

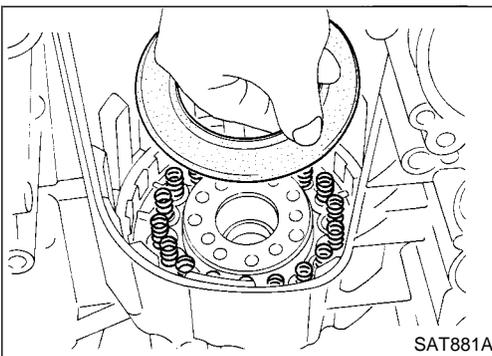
1. Install needle bearing onto one-way clutch inner race.
 - **Pay attention to its direction — black surface faces to rear side.**
 - **Apply petroleum jelly to thrust washers.**



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



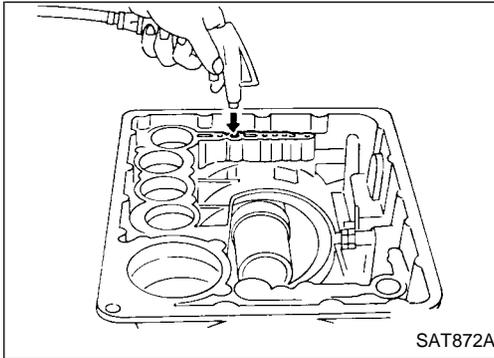
3. Install piston by rotating it slowly and evenly.
 - **Apply ATF to inner surface of transmission case.**



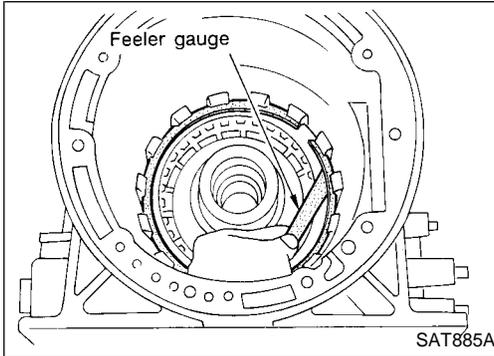
4. Install return springs, spring retainer and low one-way clutch inner race onto transmission case.
5. Install dish plate, low & reverse brake drive plates, driven plates and retaining plate.
6. Install snap ring on transmission case.

REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)



7. Check operation of low & reverse brake clutch piston. Refer to "DISASSEMBLY", AT-92.



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

Specified clearance:

Standard

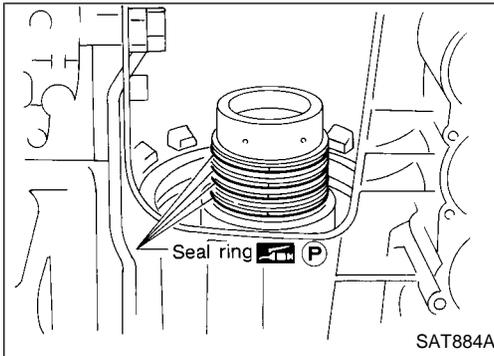
0.5 - 0.8 mm (0.020 - 0.031 in)

Allowable limit

2.3 mm (0.091 in)

Retaining plate:

Refer to SDS, AT-124.

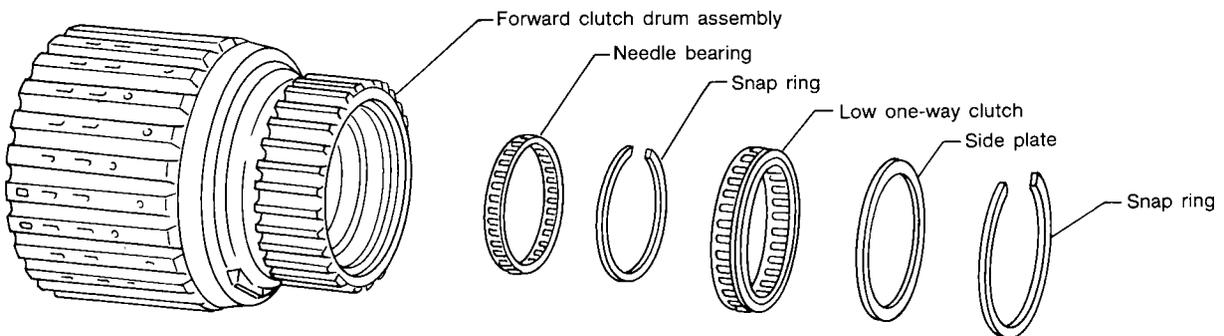


9. Install low one-way clutch inner race seal ring.

- **Apply petroleum jelly to seal ring.**
- **Make sure seal rings are pressed firmly into place and held by petroleum jelly.**

Forward Clutch Drum Assembly

SEC. 315



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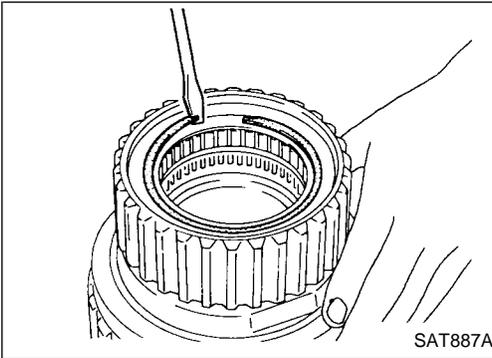
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REPAIR FOR COMPONENT PARTS

Forward Clutch Drum Assembly (Cont'd)

DISASSEMBLY

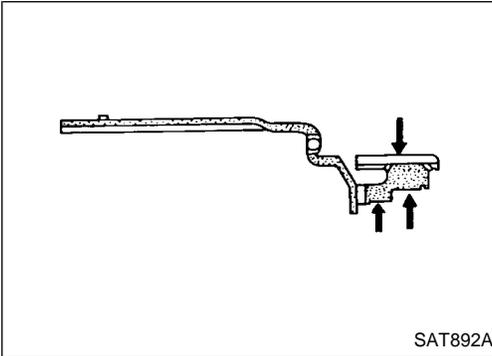
1. Remove snap ring from forward clutch drum.
2. Remove side plate from forward clutch drum.
3. Remove low one-way clutch from forward clutch drum.
4. Remove snap ring from forward clutch drum.
5. Remove needle bearing from forward clutch drum.



INSPECTION

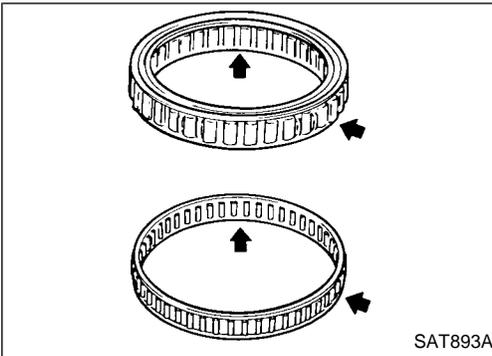
Forward clutch drum

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



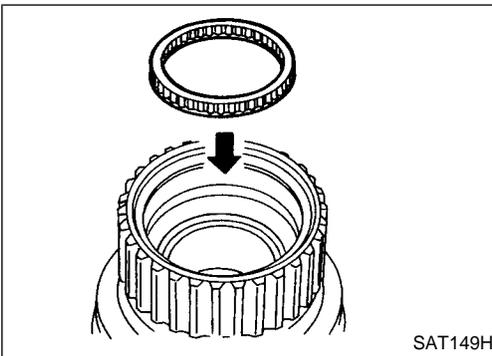
Needle bearing and low one-way clutch

- Check frictional surface for wear or damage.

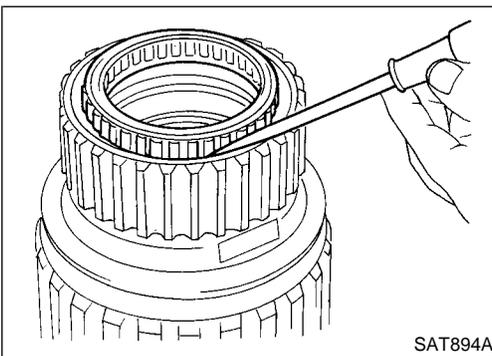


ASSEMBLY

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

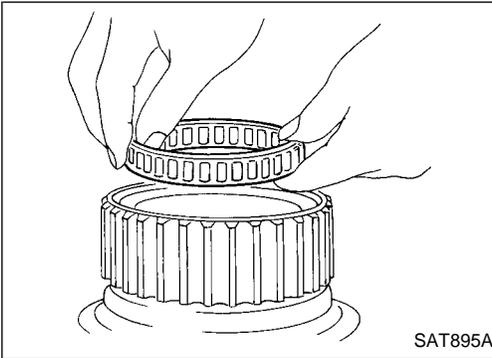


3. Install low one-way clutch onto forward clutch drum by pushing the roller in evenly.



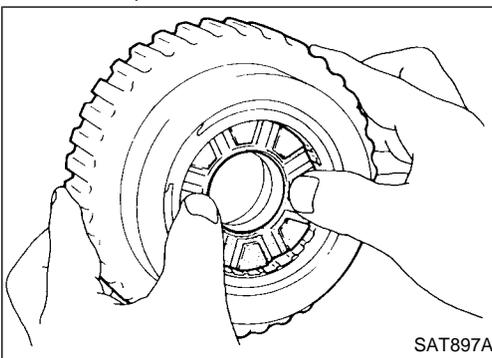
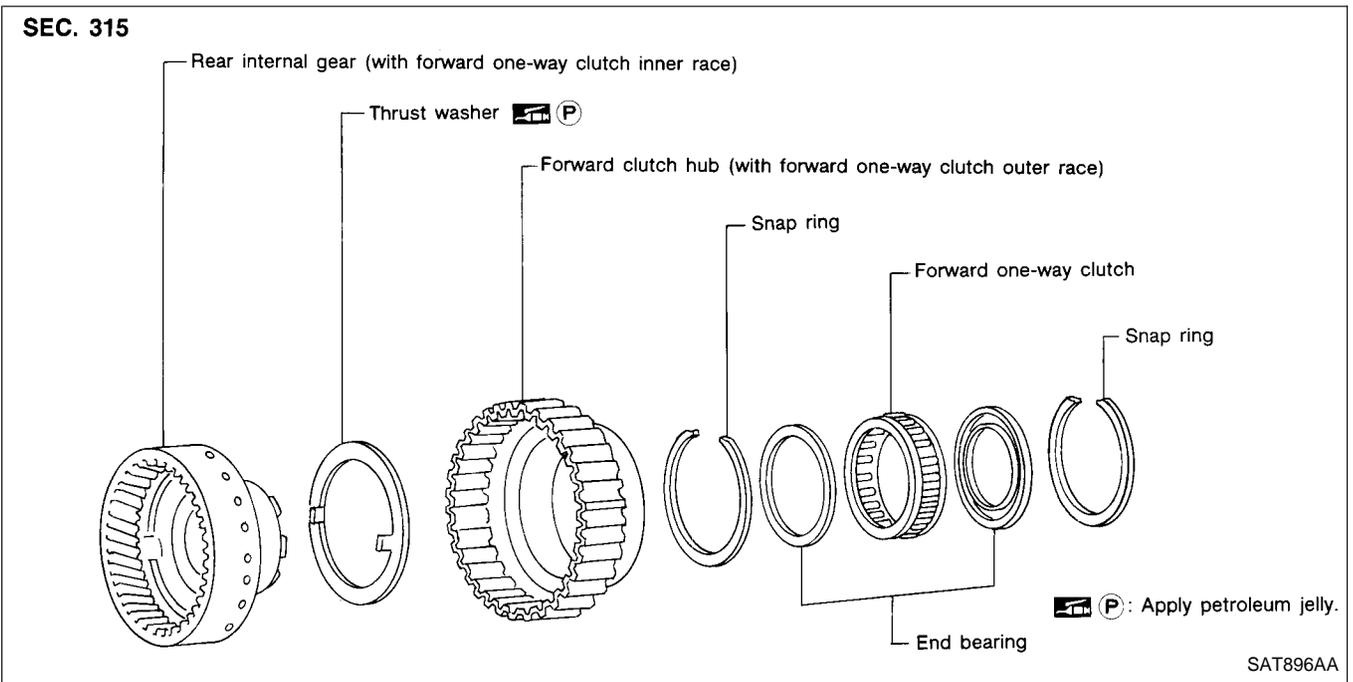
REPAIR FOR COMPONENT PARTS

Forward Clutch Drum Assembly (Cont'd)



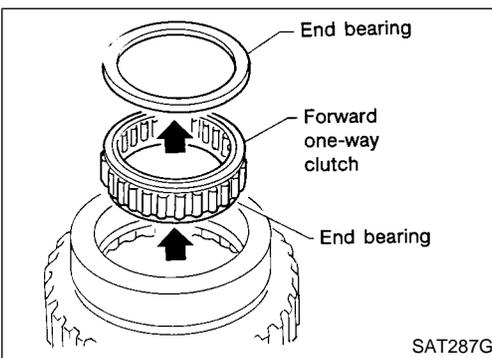
- Install low one-way clutch with flange facing rearward.
4. Install side plate onto forward clutch drum.
 5. Install snap ring onto forward clutch drum.

Rear Internal Gear and Forward Clutch Hub



DISASSEMBLY

1. Remove rear internal gear by pushing forward clutch hub forward.
2. Remove thrust washer from rear internal gear.
3. Remove snap ring from forward clutch hub.
4. Remove end bearing.



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

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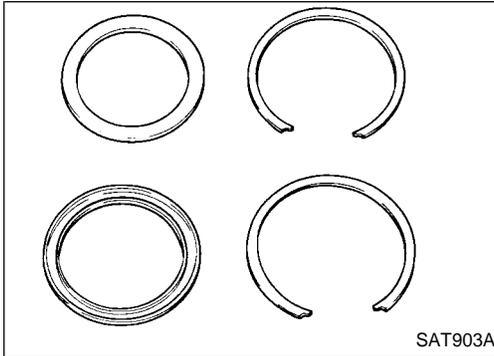
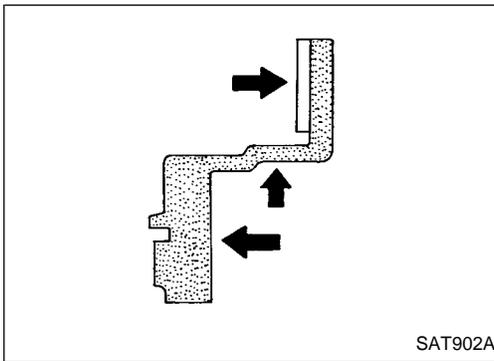
REPAIR FOR COMPONENT PARTS

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

INSPECTION

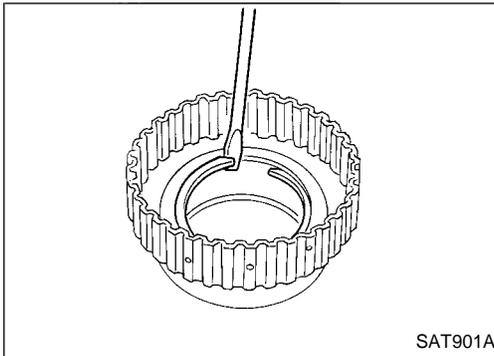
Rear internal gear and forward clutch hub

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



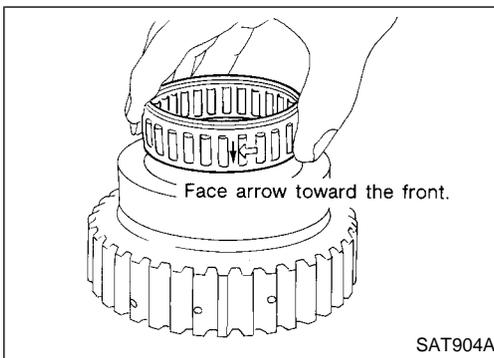
Snap ring and end bearing

- Check for deformation or damage.

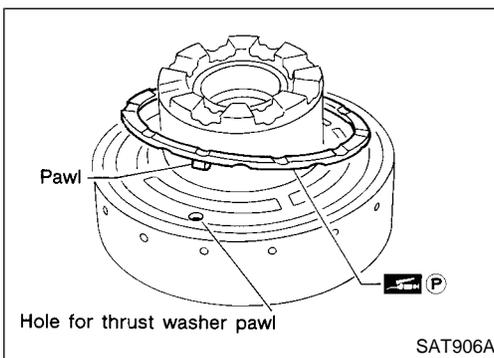


ASSEMBLY

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



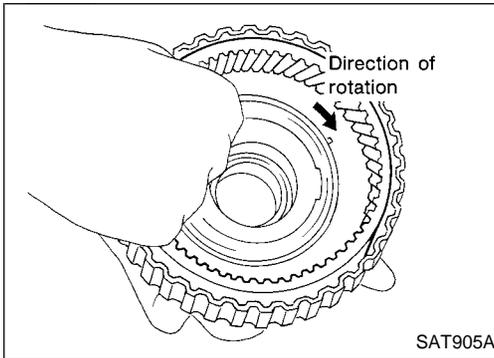
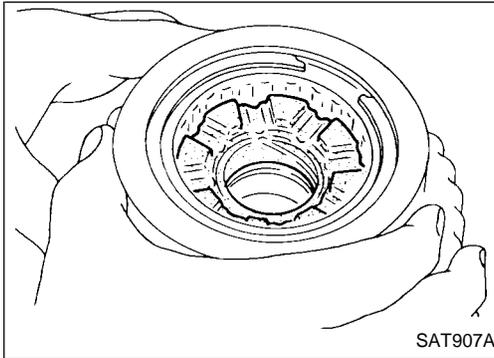
3. Install forward one-way clutch onto clutch hub.
 - **Install forward one-way clutch with flange facing rearward.**
4. Install end bearing.
5. Install snap ring onto forward clutch hub.



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

REPAIR FOR COMPONENT PARTS

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

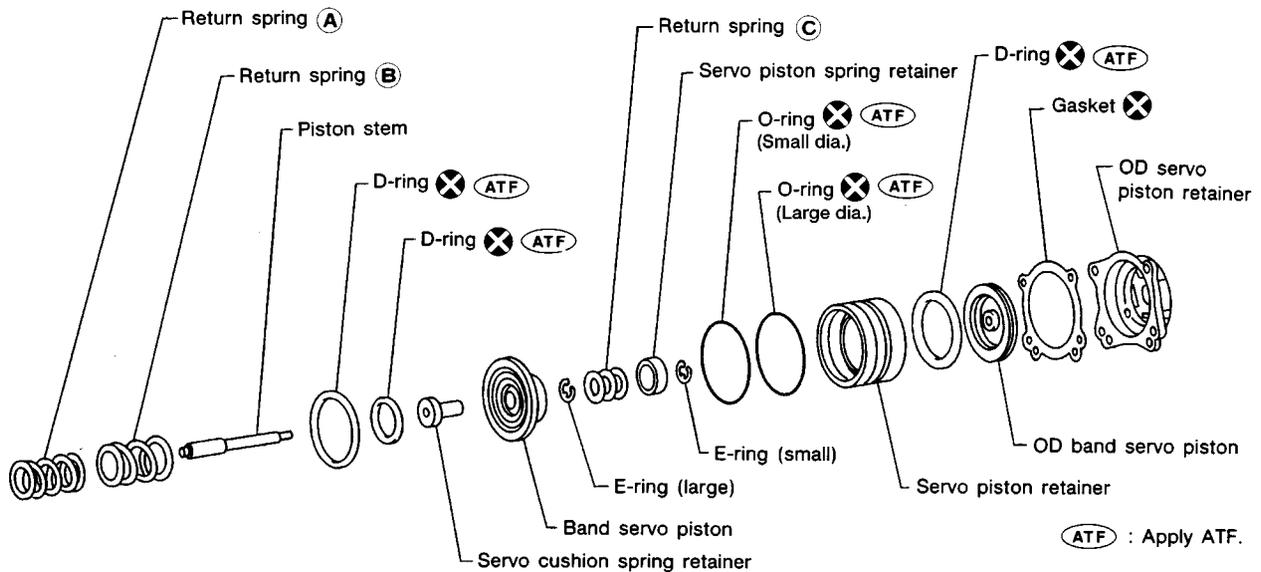


7. Position forward clutch hub in rear internal gear.

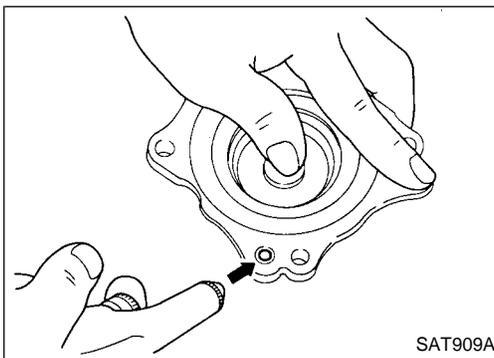
8. After installing, check to assure that forward clutch hub rotates clockwise.

Band Servo Piston Assembly

SEC. 315



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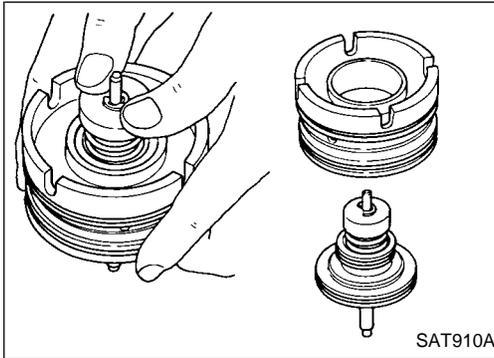


DISASSEMBLY

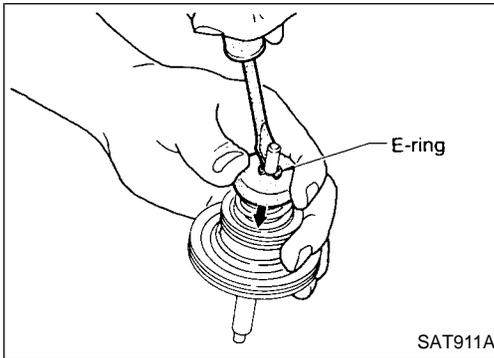
1. Block one oil hole in OD servo piston retainer and the center hole in OD band servo piston.
2. Apply compressed air to the other oil hole in piston retainer to remove OD band servo piston from retainer.
3. Remove D-ring from OD band servo piston.

REPAIR FOR COMPONENT PARTS

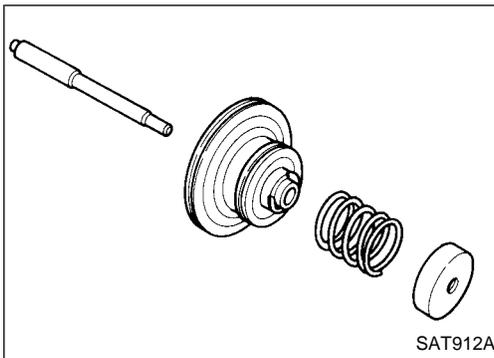
Band Servo Piston Assembly (Cont'd)



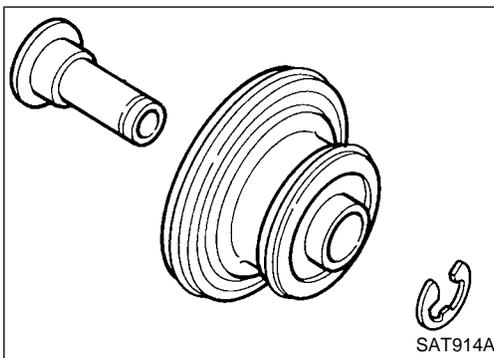
4. Remove band servo piston assembly from servo piston retainer by pushing it forward.



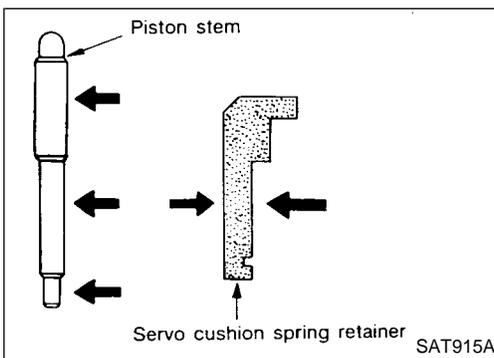
5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.



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



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



INSPECTION

Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.

REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)

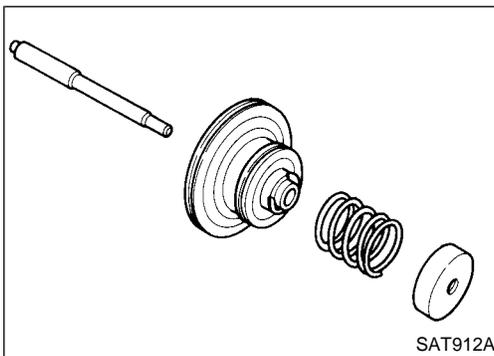
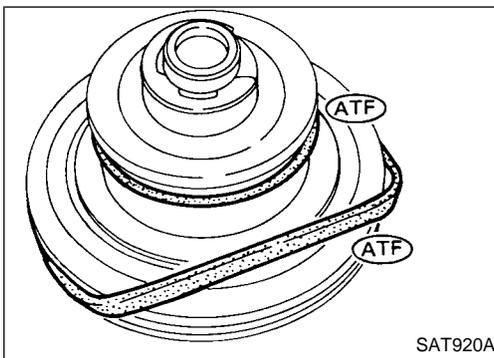
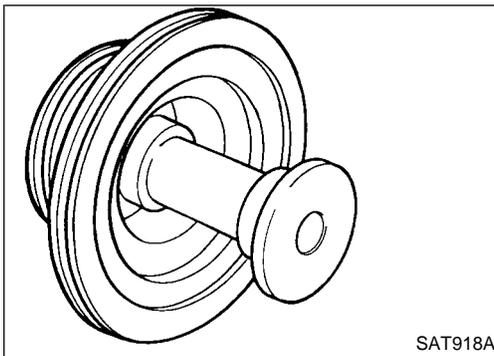
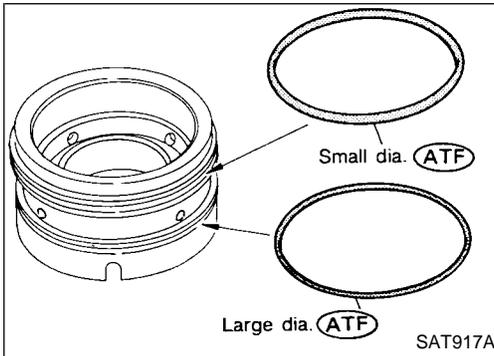
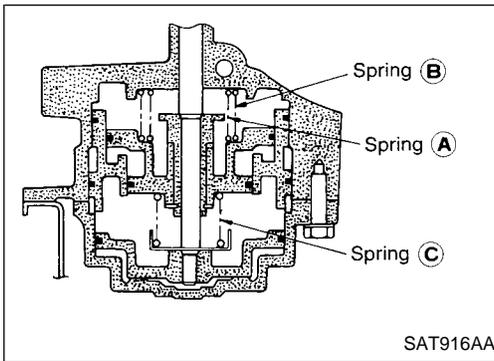
Return springs

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

Inspection standard:

Refer to SDS, AT-123.

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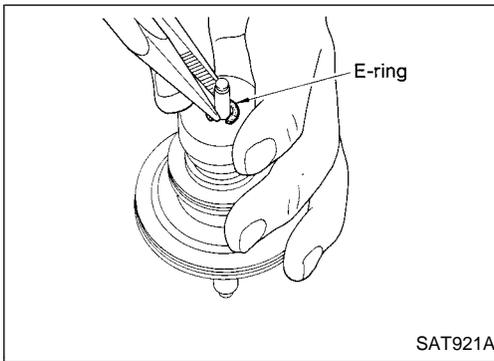


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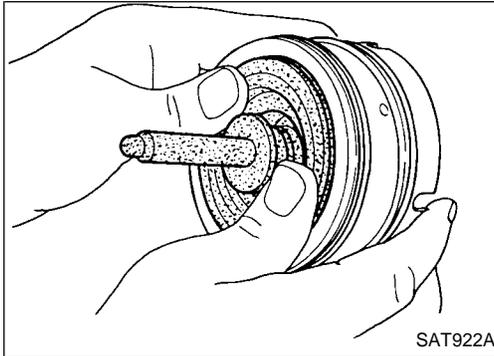
1. Install O-rings onto servo piston retainer.
 - **Apply ATF to O-rings.**
 - **Pay attention to position of each O-ring.**
2. Install servo cushion spring retainer onto band servo piston.
3. Install E-ring onto servo cushion spring retainer.
4. Install D-rings onto band servo piston.
 - **Apply ATF to D-rings.**
5. Install servo piston spring retainer, return spring © and piston stem onto band servo piston.

REPAIR FOR COMPONENT PARTS

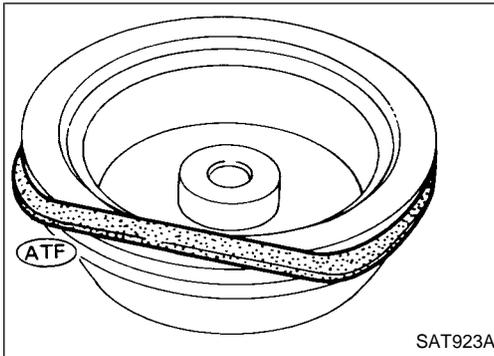
Band Servo Piston Assembly (Cont'd)



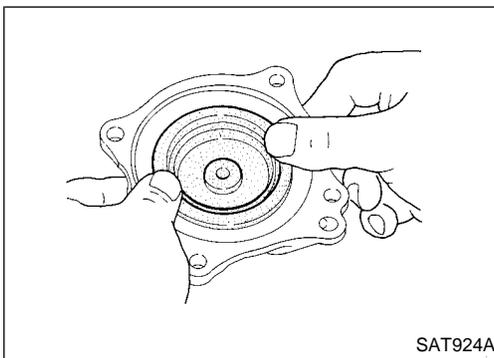
6. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



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



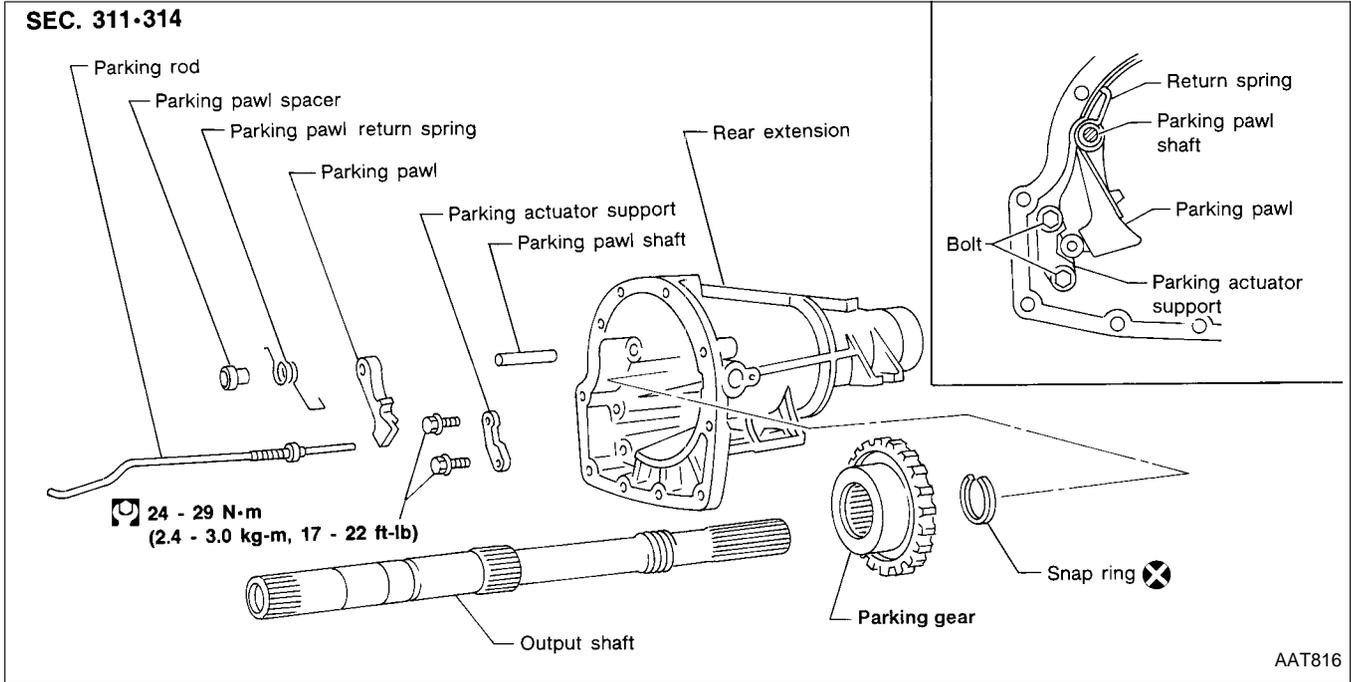
8. Install D-ring on OD band servo piston.
 - **Apply ATF to D-ring.**



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

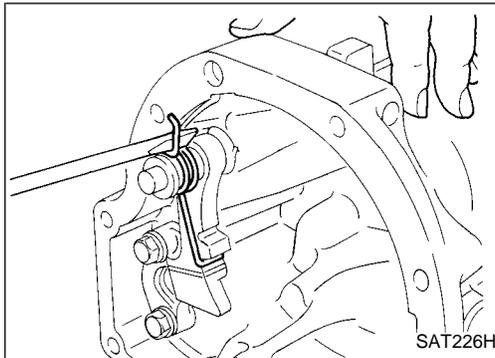
Parking Pawl Components

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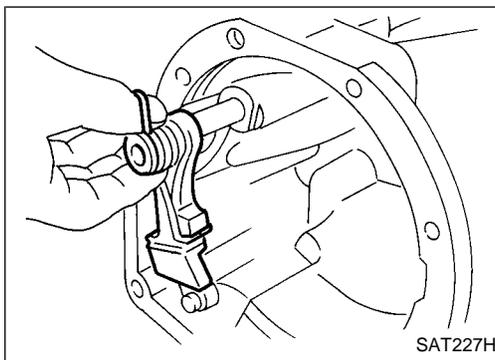


DISASSEMBLY

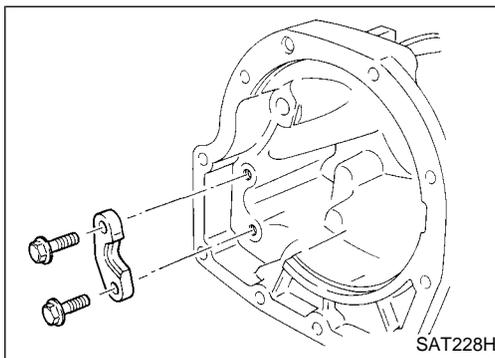
1. Slide return spring to the front of rear extension flange.



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



4. Remove parking actuator support from rear extension.



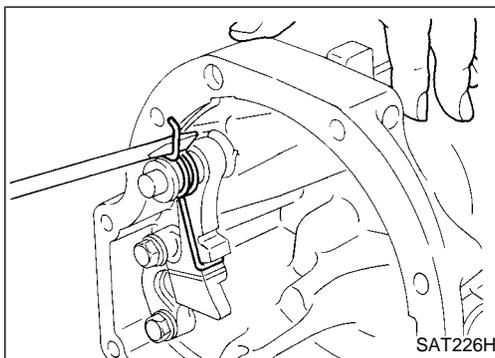
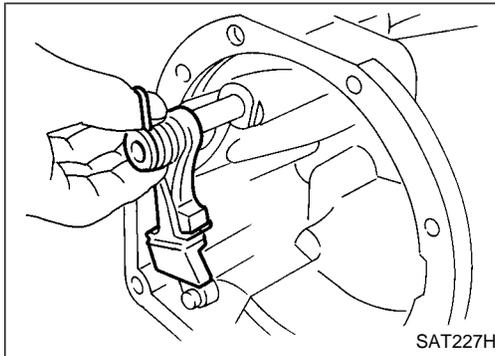
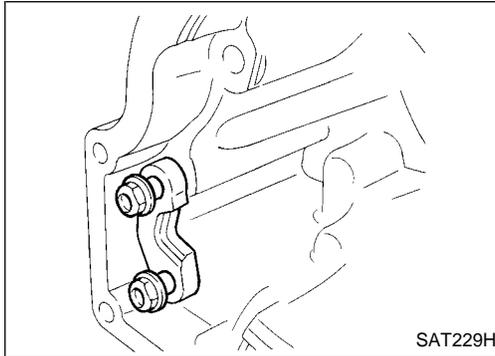
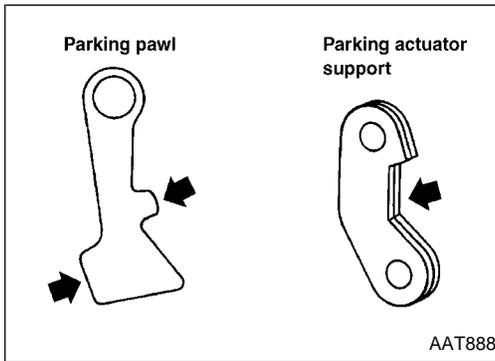
REPAIR FOR COMPONENT PARTS

Parking Pawl Components (Cont'd)

INSPECTION

Parking pawl and parking actuator support

- Check contact surface of parking rod and parking gear for wear.



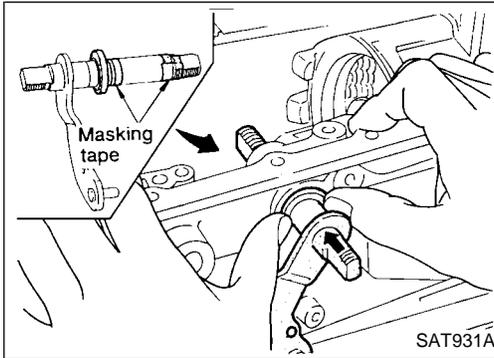
ASSEMBLY

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

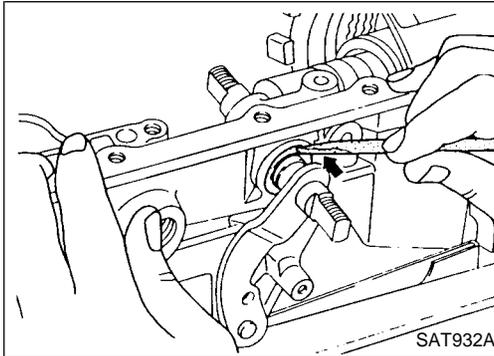
ASSEMBLY

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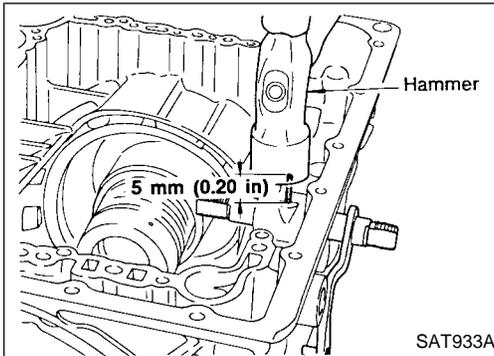
Assembly (1)



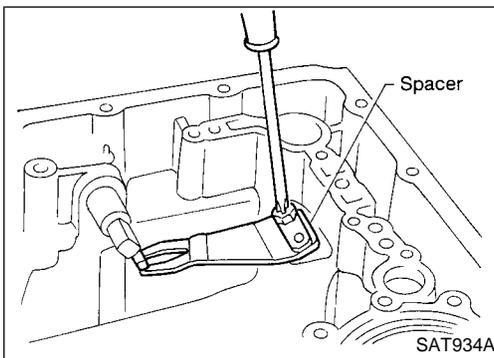
1. Install manual shaft components.
 - a. Install oil seal onto manual shaft.
 - **Apply ATF to oil seal.**
 - **Wrap threads of manual shaft with masking tape.**
 - b. Insert manual shaft and oil seal as a unit into transmission case.
 - c. Remove masking tape.



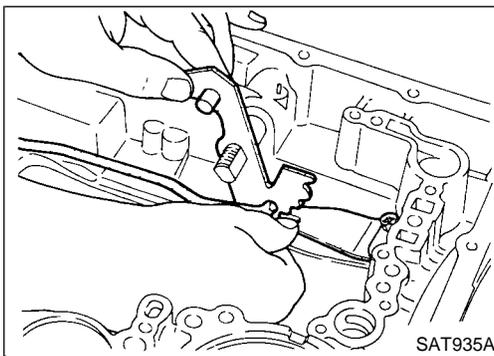
- d. Push oil seal evenly and install it onto transmission case.



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



- f. Install detent spring and spacer.

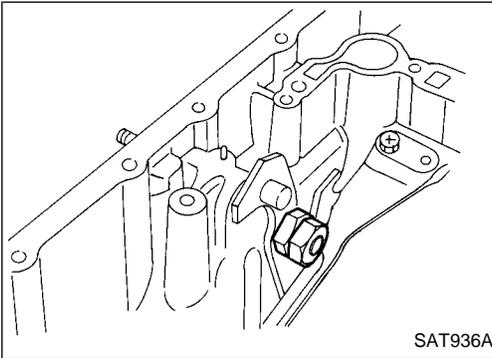


- g. While pushing detent spring down, install manual plate onto manual shaft.

ASSEMBLY

Assembly (1) (Cont'd)

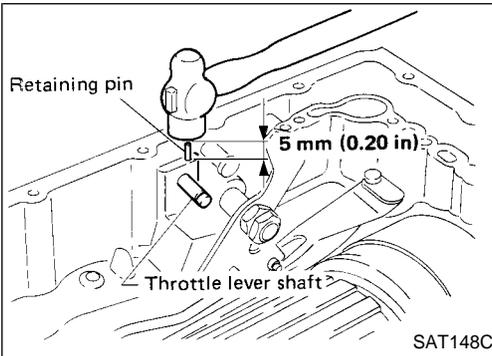
h. Install lock nuts onto manual shaft.



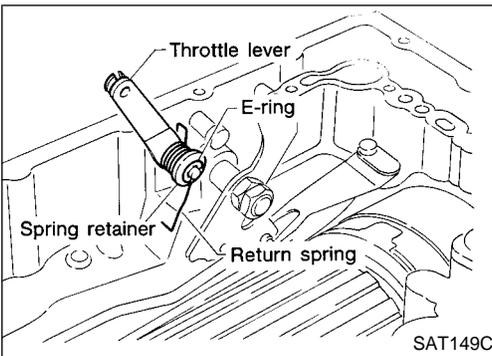
2. Install throttle lever components.

a. Install throttle lever shaft.

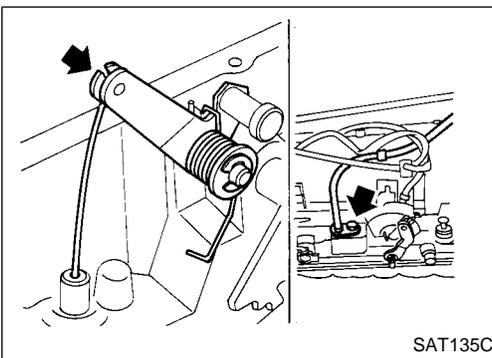
b. Align groove in shaft with drive pin hole, then drive pin into position as shown in figure at left.



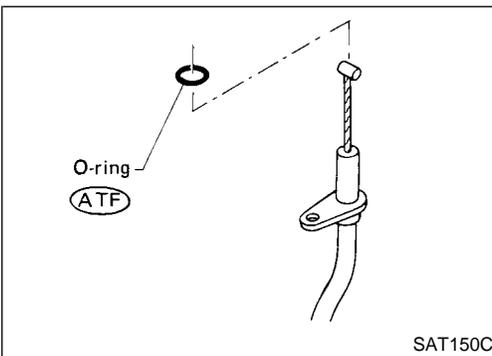
c. Install throttle lever, return spring, spring retainer and E-ring.



d. Install throttle wire.

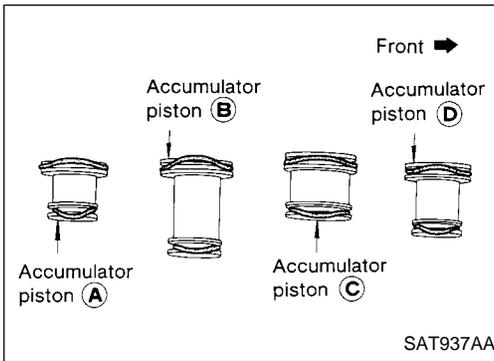


• Apply ATF to O-ring.

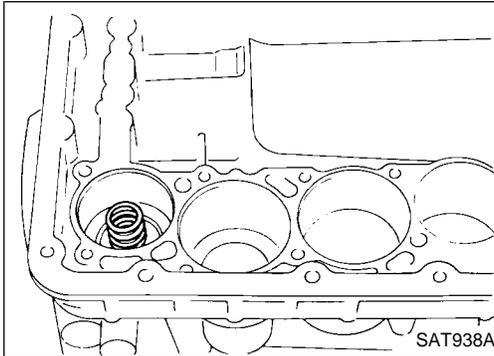


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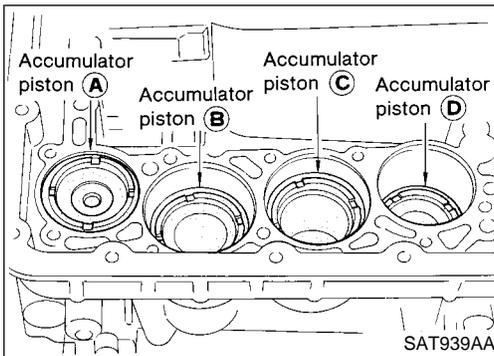
Assembly (1) (Cont'd)



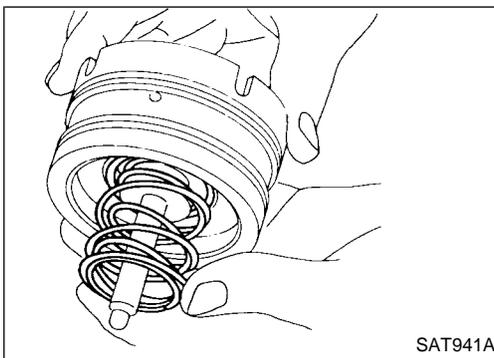
3. Install accumulator piston.
- a. Install O-rings onto accumulator piston.
- **Apply ATF to O-rings.**
Accumulator piston O-rings:
Refer to SDS, AT-123.



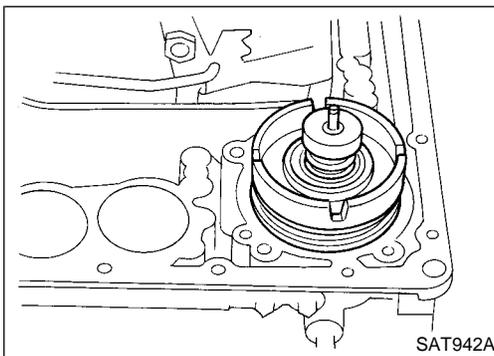
- b. Install return spring for accumulator **A** onto transmission case.
- **Free length of return spring:**
Refer to SDS, AT-123.



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



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

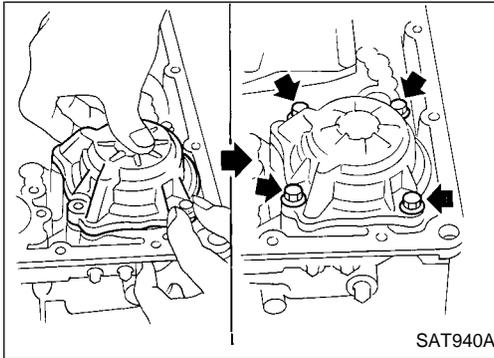


- b. Install band servo piston onto transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**
- c. Install gasket for band servo onto transmission case.

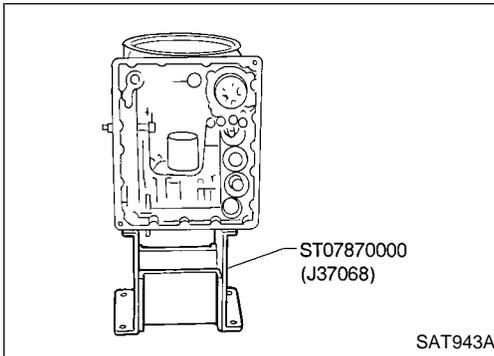
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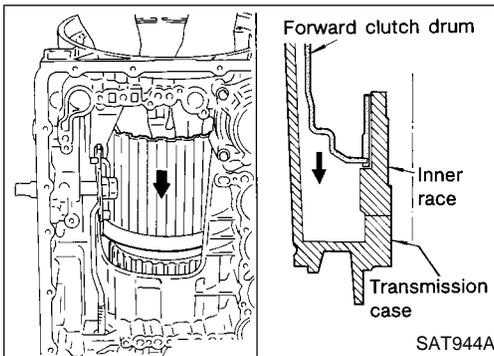
Assembly (1) (Cont'd)



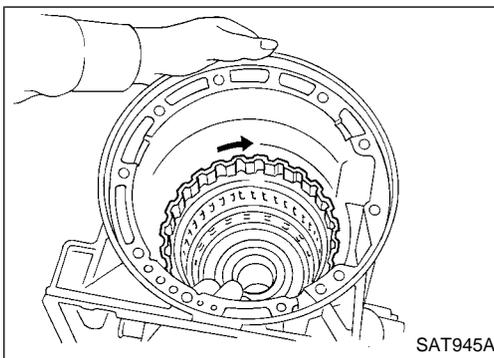
- d. Install OD servo piston retainer onto transmission case.



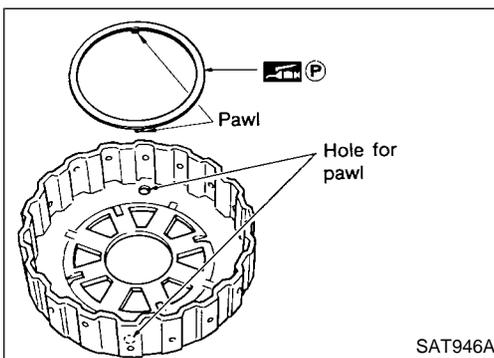
5. Install rear side clutch and gear components.
a. Place transmission case in vertical position.



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



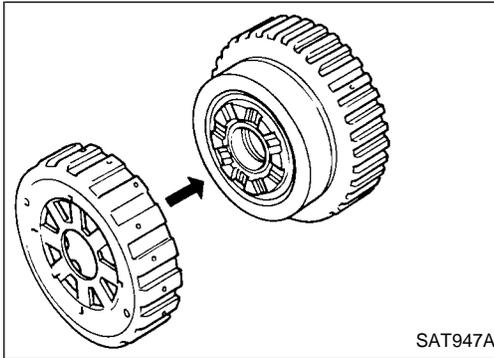
- c. Check to be sure that rotation direction of forward clutch assembly is correct.



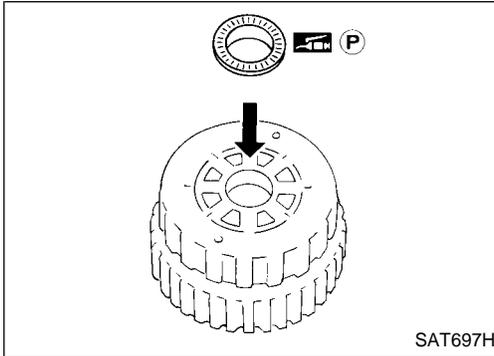
- d. Install thrust washer onto front of overrun clutch hub.
- Apply petroleum jelly to the thrust washer.
 - Insert pawls of thrust washer securely into holes in overrun clutch hub.

ASSEMBLY

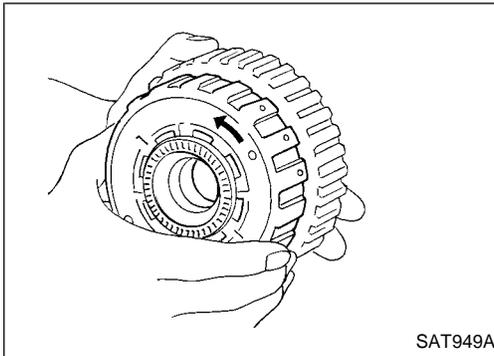
Assembly (1) (Cont'd)



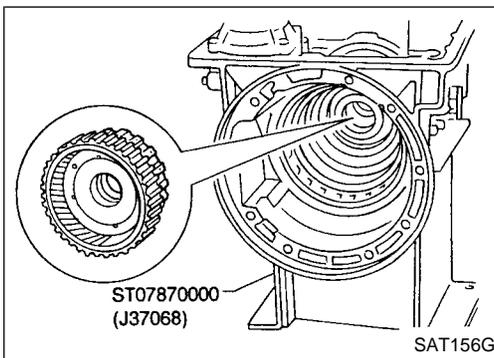
e. Install overrun clutch hub onto rear internal gear assembly.



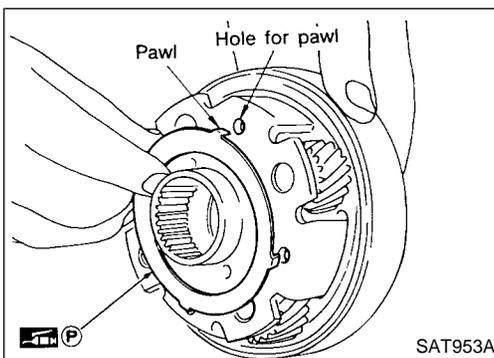
f. Install needle bearing onto rear of overrun clutch hub.
● **Apply petroleum jelly to needle bearing.**



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



h. Place transmission case into horizontal position.
i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.

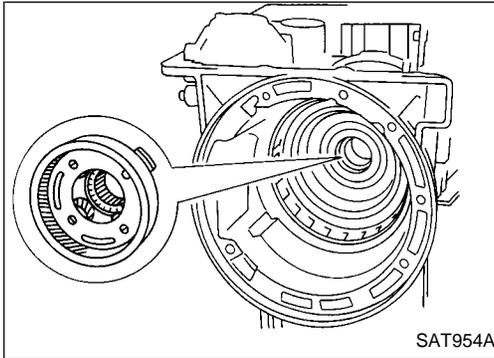


j. Install needle bearing onto rear internal gear.
● **Apply petroleum jelly to needle bearing.**
k. Install bearing race onto rear of front internal gear.
● **Apply petroleum jelly to bearing race.**
● **Securely engage pawls of bearing race with holes in front internal gear.**

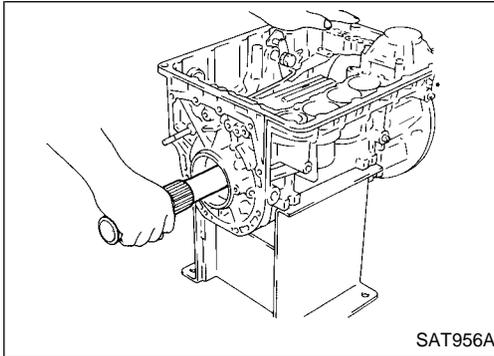
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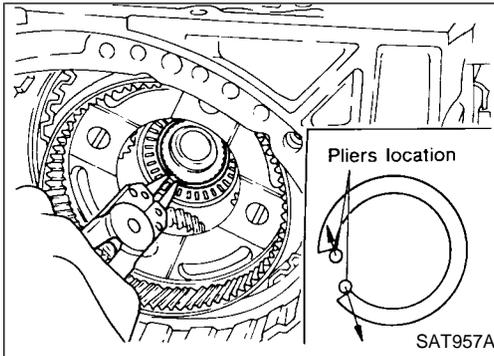
Assembly (1) (Cont'd)



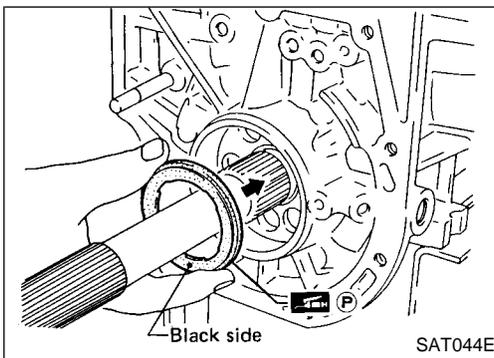
- I. Install front internal gear on transmission case.



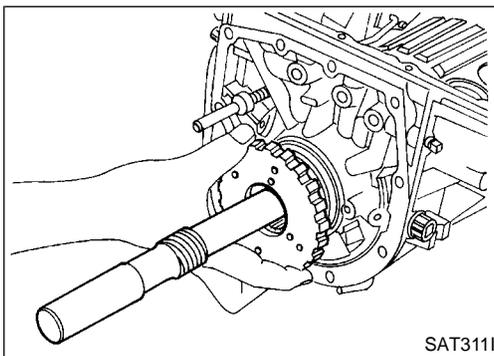
6. Install output shaft and parking gear.
 - a. Insert output shaft from rear of transmission case while slightly lifting front internal gear.
 - **Do not force output shaft against front of transmission case.**



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



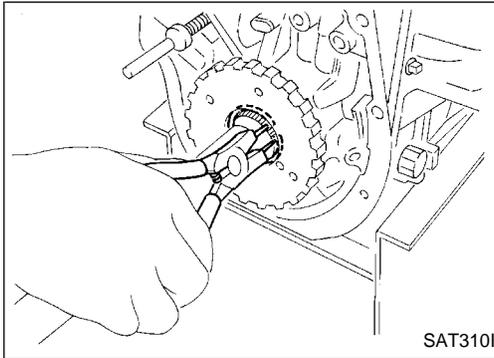
- c. Install needle bearing on transmission case.
 - **Pay attention to its direction — black side faces the rear.**
 - **Apply petroleum jelly to needle bearing.**



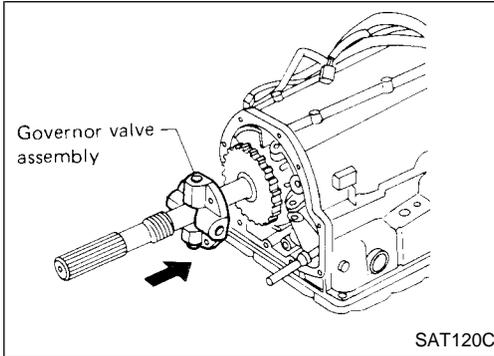
- d. Install parking gear on transmission case.

ASSEMBLY

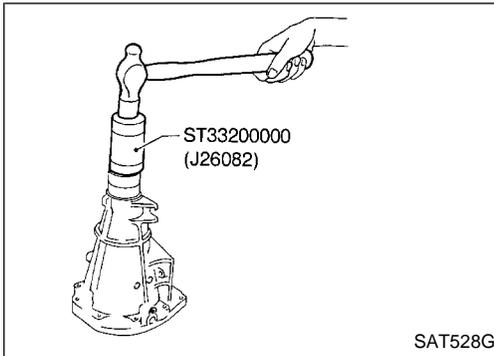
Assembly (1) (Cont'd)



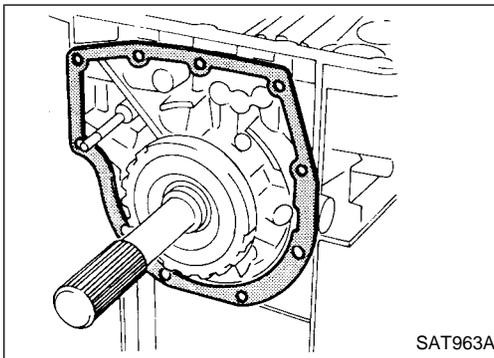
- e. Install snap ring on rear of output shaft.
- **Check to be sure output shaft cannot be removed in forward direction.**



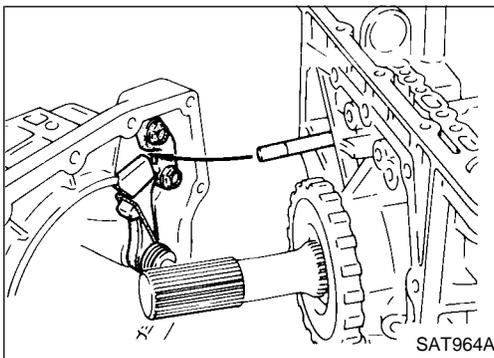
- f. Install governor valve assembly on oil distributor.



- 7. Install rear extension case.
- a. Install oil seal on rear extension case.
- **Apply ATF to oil seal.**



- b. Install rear extension gasket on transmission case.

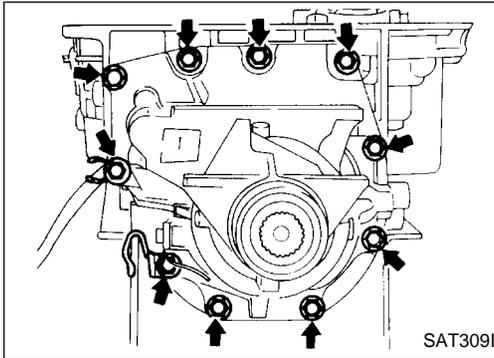


- c. Install parking rod on transmission case.

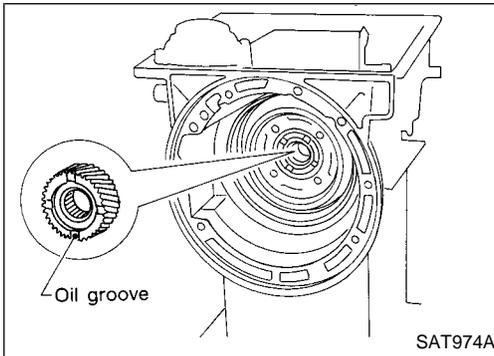
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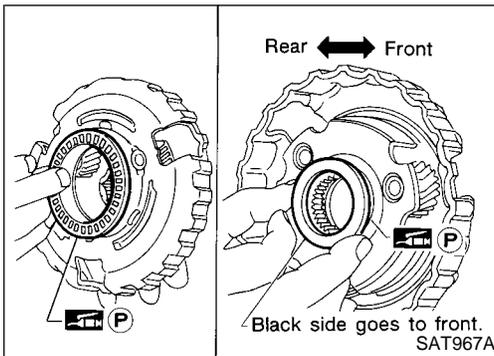
Assembly (1) (Cont'd)



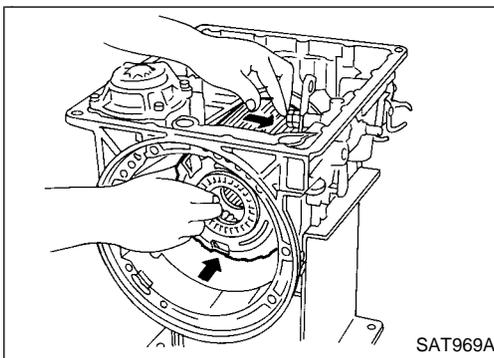
- d. Install rear extension case on transmission case. Tighten bolts to specified torque.
⌚: 20 - 25 N·m (2.0 - 2.5 kg-m, 14 - 18 ft-lb)



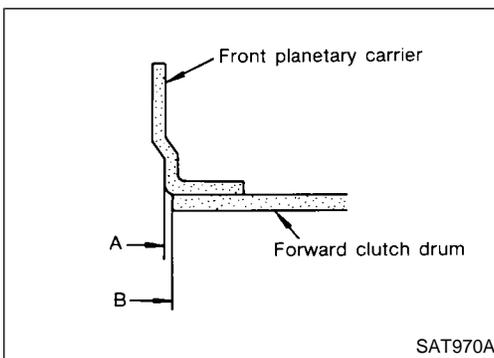
8. Install front side clutch and gear components.
a. Install rear sun gear on transmission case.
● **Pay attention to its direction.**



- b. Install needle bearing on front of front planetary carrier.
● **Apply petroleum jelly to needle bearing.**
c. Install needle bearing on rear of front planetary carrier.
● **Apply petroleum jelly to needle bearing.**
● **Pay attention to its direction — black side faces the front.**



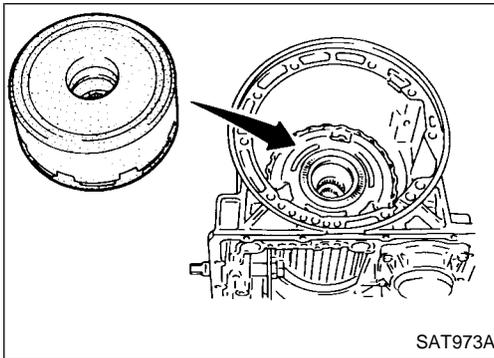
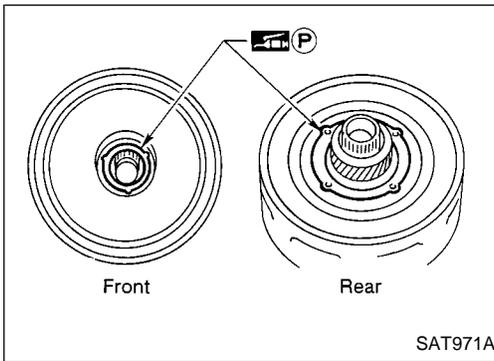
- d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.



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

ASSEMBLY

Assembly (1) (Cont'd)



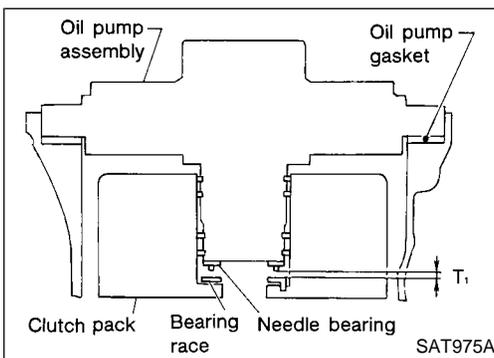
- e. Install bearing races on front and rear of clutch pack.
 - Apply petroleum jelly to bearing races.
 - Securely engage pawls of bearing races with holes in clutch pack.
- f. Place transmission case in vertical position.

- g. Install clutch pack into transmission case.

Adjustment

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

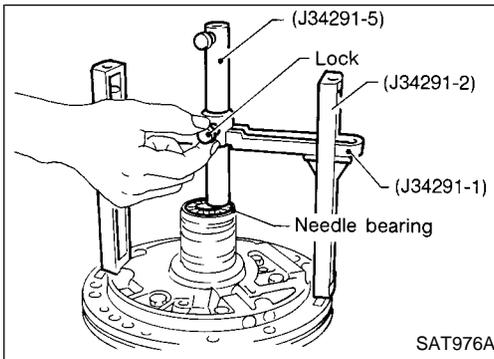
Part name	Item	
	Total end play	Reverse clutch end play
Transmission case	●	●
Low one-way clutch inner race	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover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



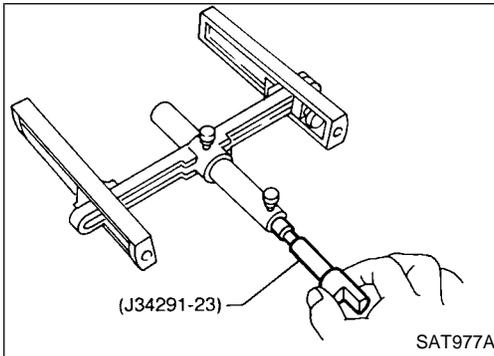
1. Adjust total end play.
Total end play "T₁":
0.25 - 0.55 mm (0.0098 - 0.0217 in)

ASSEMBLY

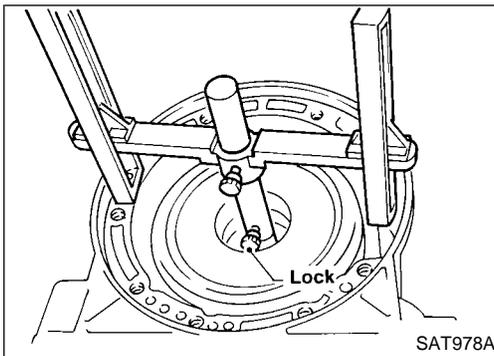
Adjustment (Cont'd)



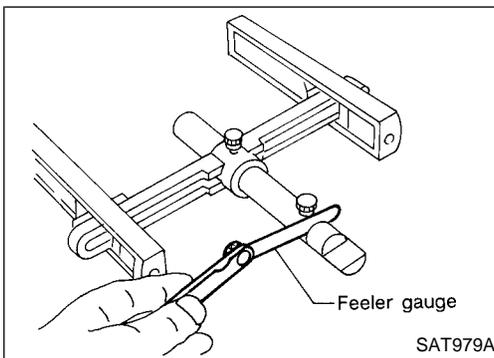
- a. With original needle bearing installed, place J34291-1 (bridge), J34291-2 (legs) and the J34291-5 (gauging cylinder) onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly and gauging cylinder should rest on top of the needle bearing. Lock gauging cylinder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



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



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



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

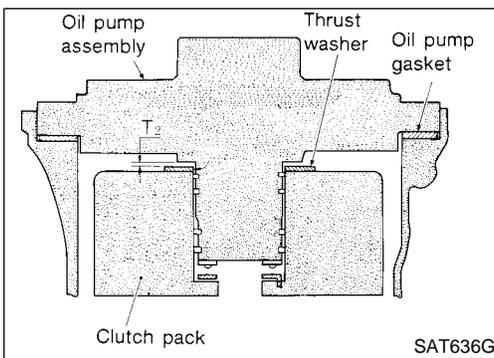
Total end play "T₁":

0.25 - 0.55 mm (0.0098 - 0.0217 in)

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

Available oil pump cover bearing race:

Refer to SDS, AT-125.



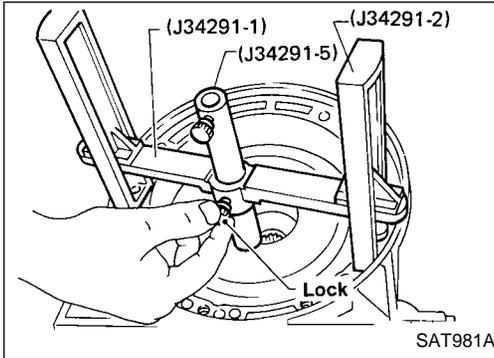
2. Adjust reverse clutch drum end play.

Reverse clutch drum end play "T₂":

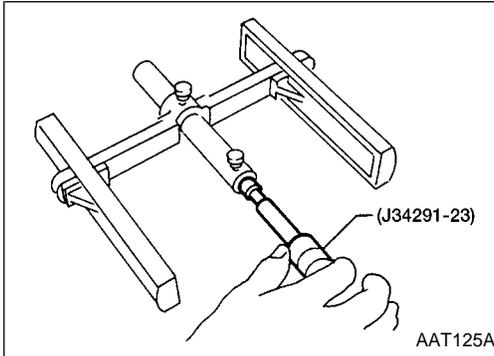
0.55 - 0.90 mm (0.0217 - 0.0354 in)

ASSEMBLY

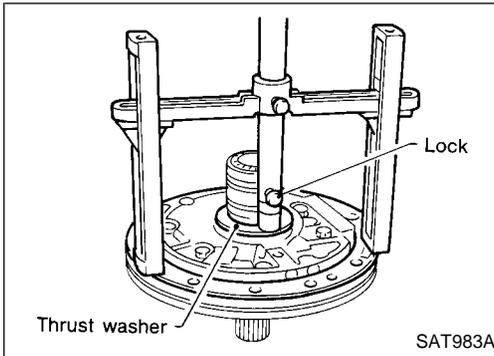
Adjustment (Cont'd)



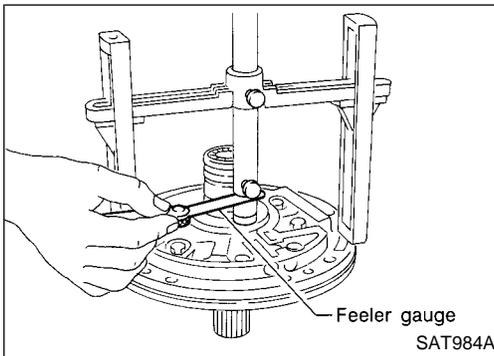
- a. Place J34291-1 (bridge), J34291-2 (legs) and J34291-5 (gauging cylinder) on machined surface of transmission case (no gasket) and allow gauging cylinder to rest on front thrust surface of reverse clutch drum. Lock cylinder in place with set screw.



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



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



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

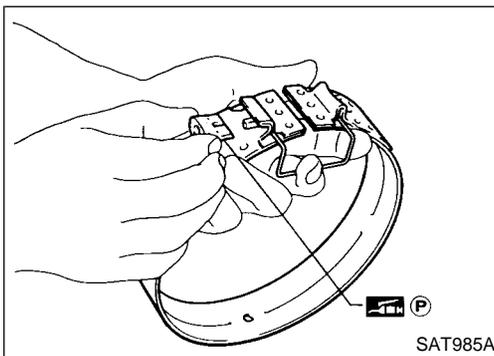
Reverse clutch drum end play "T₂":

0.55 - 0.90 mm (0.0217 - 0.0354 in)

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

Available oil pump thrust washer:

Refer to SDS, AT-125.



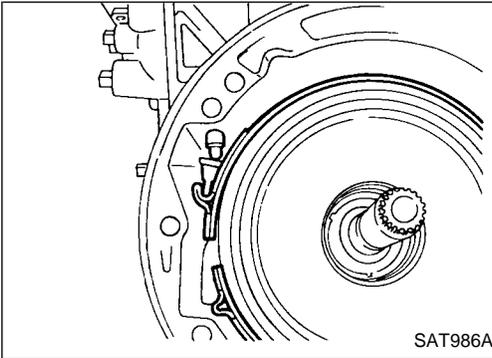
Assembly (2)

1. Place transmission case into horizontal position.
2. Install brake band and band strut.
 - a. Install band strut on brake band.
 - **Apply petroleum jelly to band strut.**

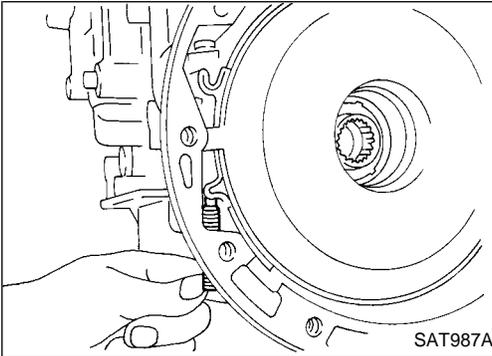
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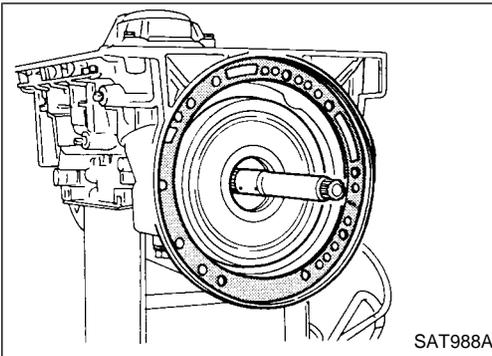
Assembly (2) (Cont'd)



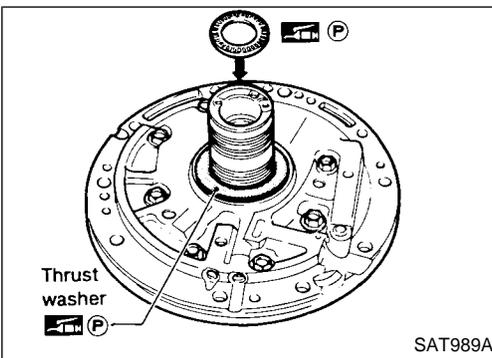
- b. Place brake band around reverse clutch drum, and insert band strut into end of band servo piston stem.



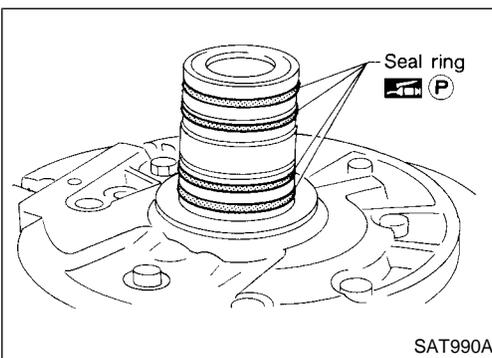
- c. Install anchor end pin on transmission case. Then, tighten anchor end pin just enough so that reverse clutch drum (clutch pack) will not tilt forward.



3. Install input shaft on transmission case.
- **Pay attention to its direction — O-ring groove side faces front.**
4. Install gasket on transmission case.



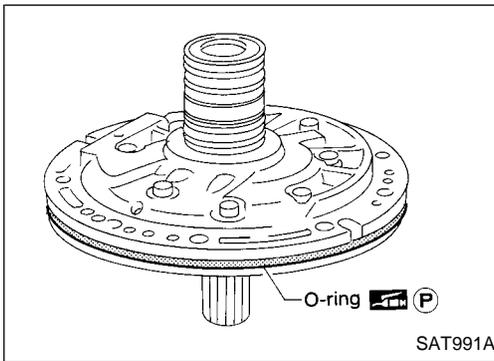
5. Install oil pump assembly.
- a. Install needle bearing on oil pump assembly.
- **Apply petroleum jelly to the needle bearing.**
- b. Install selected thrust washer on oil pump assembly.
- **Apply petroleum jelly to thrust washer.**



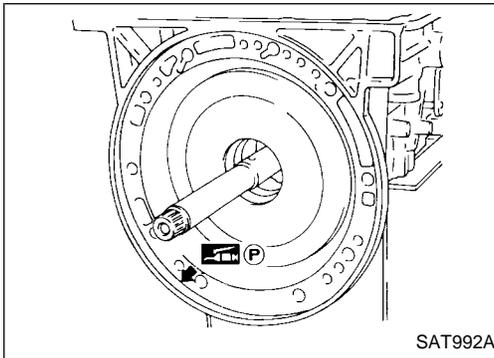
- c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit.

ASSEMBLY

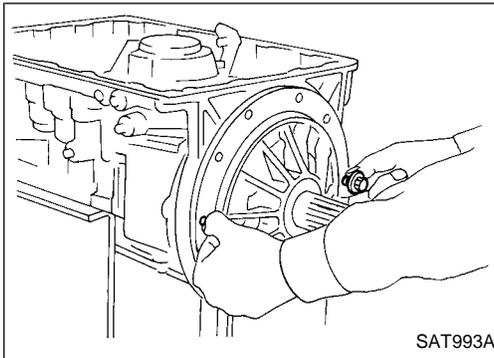
Assembly (2) (Cont'd)



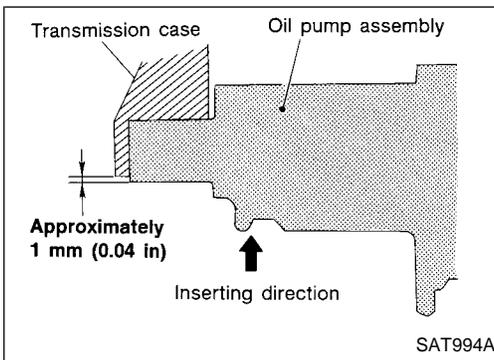
- d. Install O-ring on oil pump assembly.
- Apply petroleum jelly to O-ring.



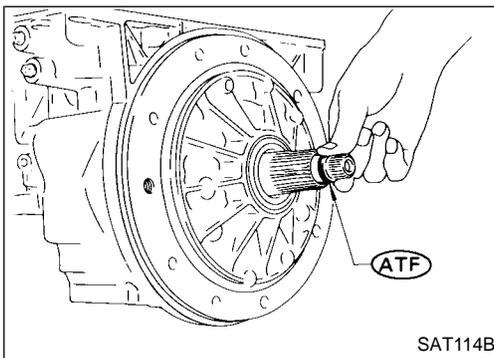
- e. Apply petroleum jelly to mating surface of transmission case and oil pump assembly.



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



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

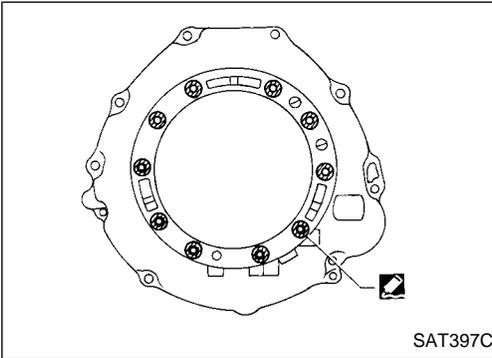


6. Install O-ring on input shaft.
- Apply ATF to O-rings.

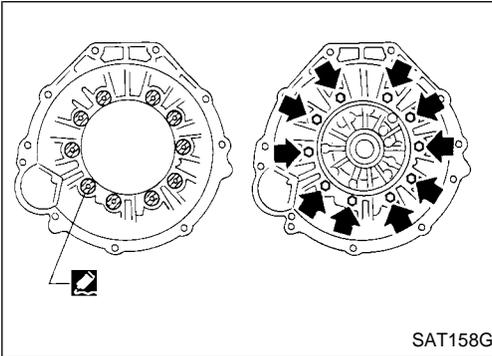
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ASSEMBLY

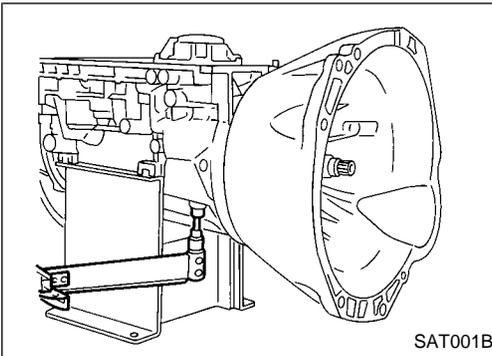
Assembly (2) (Cont'd)



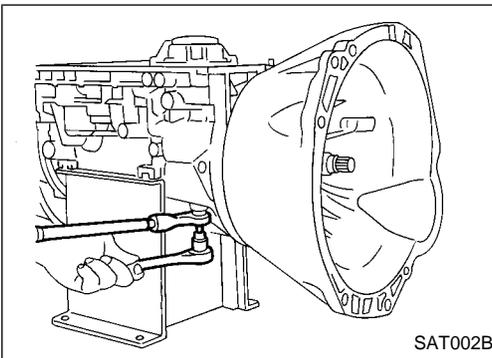
7. Install converter housing.
- a. Apply genuine anaerobic liquid gasket Three Bond TB1215, Loctite Part No. 51813 or equivalent around bolt holes in converter housing.
- **Do not apply too much sealant.**



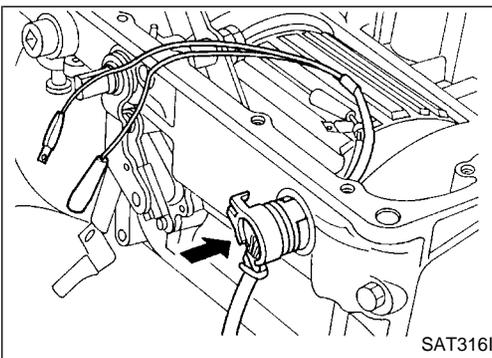
- b. Apply genuine anaerobic liquid gasket Three Bond TB1215, Loctite Part No. 51813 or equivalent to seating surfaces of bolts that secure front of converter housing.
- c. Install converter housing on transmission case.



8. Adjust brake band.
- a. Tighten anchor end pin to specified torque.
Anchor end pin:
●: **4 - 6 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)**
- b. Back off anchor end pin two and a half turns.



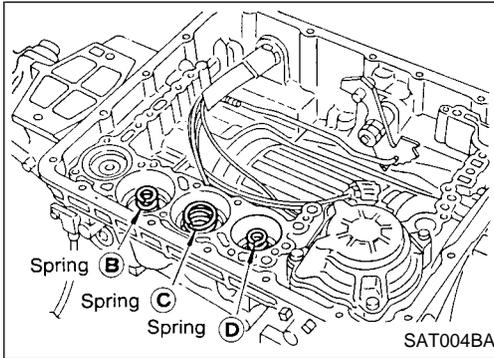
- c. While holding anchor end pin, tighten lock nut.



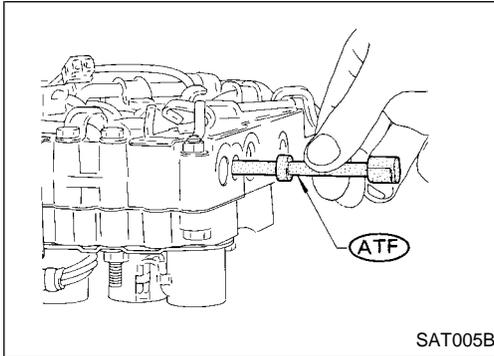
9. Install terminal cord assembly.
- a. Install O-ring on terminal cord assembly.
- **Apply petroleum jelly to O-ring.**
- b. Compress terminal cord assembly stopper and install terminal cord assembly on transmission case.

ASSEMBLY

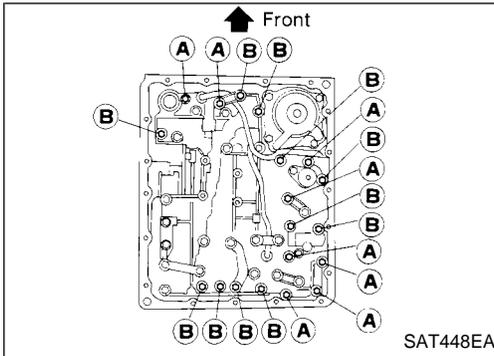
Assembly (2) (Cont'd)



10. Install control valve assembly.
- a. Install accumulator piston return springs (B), (C) and (D).
Free length of return springs:
Refer to SDS, AT-123.

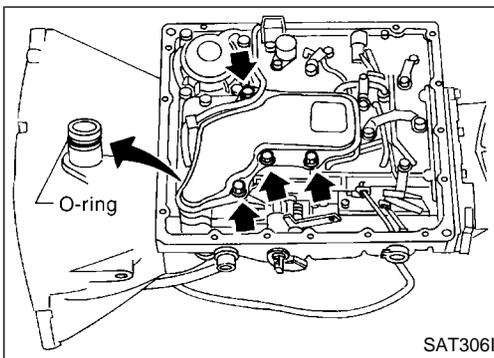


- b. Install manual valve on control valve.
 • **Apply ATF to manual valve.**

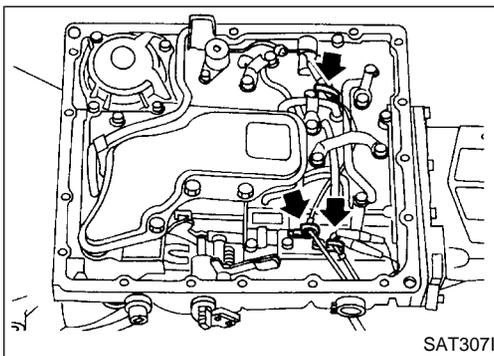


- c. Install control valve assembly on transmission case.
 d. Install connector tube brackets and tighten bolts (A) and (B).
 • **Check that terminal assembly harness does not catch.**

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



- e. Install O-ring on oil strainer.
 • **Apply petroleum jelly to O-ring.**
 f. Install oil strainer on control valve.

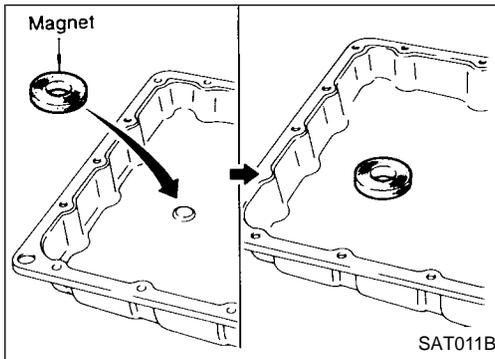


- g. Securely fasten terminal harness with clips.

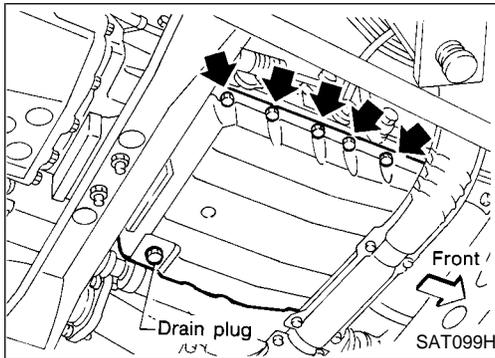
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ASSEMBLY

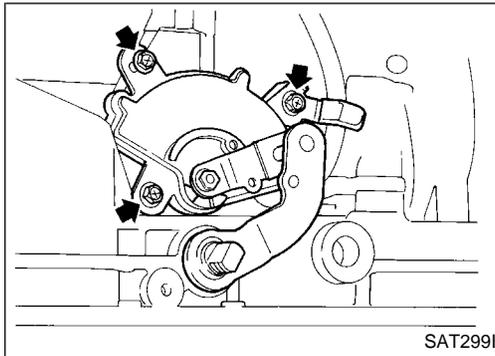
Assembly (2) (Cont'd)



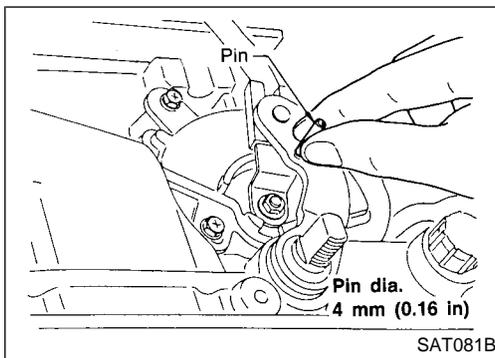
11. Install oil pan.
 - a. Attach a magnet to oil pan.



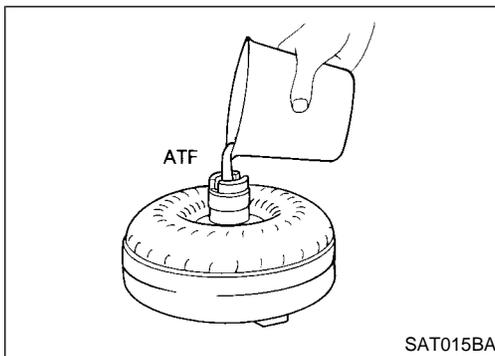
- b. Install new oil pan gasket on transmission case.
 - c. Install oil pan and bracket on transmission case.
 - Always replace oil pan bolts; they are self-sealing bolts.
 - Before installing bolts, remove traces of sealant and oil from mating surface and thread holes.
 - Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.
 - d. Tighten drain plug.



12. Install park/neutral position (PNP) switch.
 - a. Check that manual shaft is in "1" position.
 - b. Temporarily install park/neutral position (PNP) switch on manual shaft.
 - c. Move manual shaft to "N".



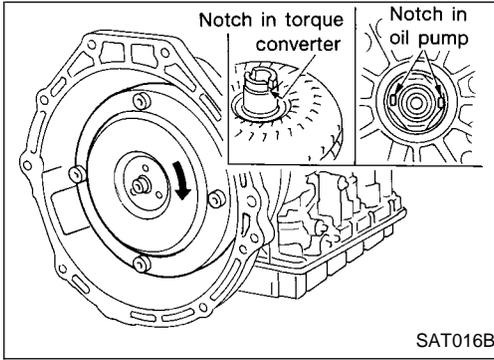
- d. Use a 4 mm (0.16 in) pin for this adjustment.
 - 1) Insert the pin straight into the manual shaft adjustment hole.
 - 2) Rotate park/neutral position (PNP) switch until the pin can also be inserted straight into hole in park/neutral position (PNP) switch.
 - e. Tighten park/neutral position (PNP) switch fixing bolts.
 - f. Remove pin from adjustment hole after adjusting park/neutral position (PNP) switch.



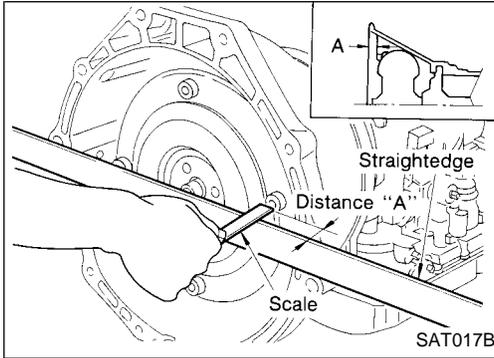
13. Install torque converter.
 - a. Pour ATF into torque converter.
 - Approximately 2 liters (2-1/8 US qt, 1-3/4 Imp qt) of fluid are required for a new torque converter.
 - When reusing old torque converter, add the same amount of fluid as was drained.

ASSEMBLY

Assembly (2) (Cont'd)



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



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

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

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SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

Automatic transmission model	RL4R01A
Transmission model code number	49X11
Stall torque ratio	2.0 : 1
Transmission gear ratio	
1st	2.785
2nd	1.545
Top	1.000
OD	0.694
Reverse	2.272
Recommended fluid	Nissan Matic "D" (Continental U.S. and Alaska) or Genuine Nissan Automatic Transmission Fluid (Canada)*1
Fluid capacity | (US qt, Imp qt)	7.9 (8-3/8, 7)

*1: Refer to MA section ("Fluids and Lubricants", "RECOMMENDED FLUIDS AND LUBRICANTS").

Specifications and Adjustment

SHIFT SCHEDULE

Vehicle speed when shifting gears

Throttle position	Vehicle speed km/h (MPH)						
	D ₁ → D ₂	D ₂ → D ₃	D ₃ → D ₄	D ₄ → D ₃	D ₃ → D ₂	D ₂ → D ₁	1 ₂ → 1 ₁
Full throttle	46 - 50 (29 - 31)	88 - 96 (55 - 60)	—	126 - 136 (78 - 85)	80 - 88 (50 - 55)	41 - 45 (25 - 28)	41 - 45 (25 - 28)
Half throttle	29 - 33 (18 - 21)	56 - 64 (35 - 40)	105 - 114 (65 - 71)	60 - 70 (37 - 43)	26 - 32 (16 - 20)	12 - 16 (7 - 10)	41 - 45 (25 - 28)

Vehicle speed when performing and releasing lock-up

Throttle position	D ₄	
	Vehicle speed km/h (MPH)	
	Lock-up ON	Lock-up OFF
4/8	105 - 113 (65 - 70)	61 - 69 (38 - 43)
3/8	76 - 84 (47 - 52)	55 - 63 (34 - 39)
2/8	58 - 66 (36 - 41)	55 - 63 (34 - 39)
1/8	58 - 66 (36 - 41)	55 - 63 (34 - 39)

LINE PRESSURE

Engine speed rpm	Line pressure kPa (kg/cm ² , psi)		
	D position (Overdrive control switch ON and OFF)	2 and 1 positions	R position
Idle	471 - 510 (4.8 - 5.2, 68 - 74)	422 - 461 (4.3 - 4.7, 61 - 67)	736 - 775 (7.5 - 7.9, 107 - 112)
Stall	912 - 991 (9.3 - 10.1, 132 - 144)	883 - 961 (9.0 - 9.8, 128 - 139)	1,442 - 1,520 (14.7 - 15.5, 209 - 220)

STALL REVOLUTION

Stall revolution	rpm	2,100 - 2,300
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SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustment (Cont'd)

RETURN SPRINGS

Unit: mm (in)

Parts		Item			
		Part No.	Free length	Outer diameter	
Control valve	Upper body	① 4th speed cut valve spring	31756-48X06	23.5 (0.925)	7.4 (0.2913)
		② Pressure regulator valve spring	31742-48X23	51.2 (2.016)	12.1 (0.476)
		③ Pressure modifier valve spring	31742-48X13	40.83 (1.6075)	8.0 (0.315)
		④ 1-2 shift valve spring	31762-48X00	43.4 (1.709)	6.0 (0.236)
		⑤ 2-3 shift valve spring	31762-48X14	47.4 (1.866)	9.0 (0.354)
		⑥ 3-4 shift valve spring	31762-48X06	44.03 (1.7335)	8.0 (0.315)
		⑦ Accumulator control valve spring	31742-48X24	30.3 (1.193)	8.0 (0.315)
		— 3-2 downshift valve spring	—	—	—
		⑧ 2-3 throttle modifier valve spring	31742-41X21	33.0 (1.299)	6.5 (0.256)
		⑨ 4-2 relay valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
	⑩ Torque converter clutch control valve spring	31742-48X07	20.0 (0.787)	5.45 (0.2146)	
	Lower body	① Throttle valve & detent valve spring	31802-48X02	34.23 (1.3476)	11.0 (0.433)
		② Kickdown modifier valve spring	31756-48X12	42.8 (1.685)	7.0 (0.276)
		③ 1st reducing valve spring	31756-48X04	34.1 (1.343)	7.0 (0.276)
		④ Overrun clutch reducing valve spring	31742-48X21	33.2 (1.307)	7.7 (0.303)
			31742-48X05	31.0 (1.220)	5.2 (0.205)
		⑥ 3-2 timing valve spring	31742-48X15	23.0 (0.906)	7.0 (0.276)
		⑦ Torque converter relief valve spring	31742-41X23	38.0 (1.496)	9.0 (0.354)
		⑧ 4-2 sequence valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
Governor valve	① Primary valve spring	31742-48X11	19.1 (0.752)	9.05 (0.3563)	
	② Secondary governor valve I spring	31742-48X09	30.58 (1.2039)	9.2 (0.362)	
	③ Secondary governor valve II spring	31742-48X10	16.79 (0.6610)	9.0 (0.354)	
Reverse clutch	16 pcs	31521-41X02 (Assembly)	19.7 (0.7756)	11.6 (0.457)	
High clutch	10 pcs	31521-41X03 (Assembly)	24.2 (0.9528)	11.6 (0.457)	
Forward clutch (Overrun clutch)	20 pcs	31521-41X00 (Assembly)	35.77 (1.4083)	9.7 (0.382)	
Low & reverse brake	18 pcs	31655-41X00 (Assembly)	22.3 (0.878)	11.2 (0.4409)	
Band servo	Spring (A)	31605-41X05	45.6 (1.795)	34.3 (1.350)	
	Spring (B)	31605-41X00	53.8 (2.118)	40.3 (1.587)	
	Spring (C)	31605-41X01	29.7 (1.1693)	27.6 (1.087)	
Accumulator	Accumulator (A)	31605-41X02	43.0 (1.693)	18.0 (0.709)	
	Accumulator (B)	31605-41X15	66.0 (2.598)	20.8 (0.819)	
	Accumulator (C)	31605-51X01	45.0 (1.772)	29.3 (1.154)	
	Accumulator (D)	31605-41X06	58.4 (2.299)	17.3 (0.681)	

ACCUMULATOR O-RING

Accumulator	Diameter mm (in)			
	(A)	(B)	(C)	(D)
Small diameter end	28.6 (1.13)	31.5 (1.24)	44 (1.73)	28.6 (1.13)
Large diameter end	44 (1.73)	48.8 (1.92)	48.8 (1.92)	44 (1.73)

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustment (Cont'd)

CLUTCHES AND BRAKES

Code number		49X11	
1. Reverse clutch			
Number of drive plates		2	
Number of driven plates		2	
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)	
	Wear limit	1.80 (0.0709)	
Clearance mm (in)	Standard	0.5 - 0.8 (0.020 - 0.031)	
	Allowable limit	1.2 (0.047)	
Thickness of retaining plate	Thickness mm (in)	Part number	
	4.8 (0.189)	31537-42X02	
	5.0 (0.197)	31537-42X03	
	5.2 (0.205)	31537-42X04	
	5.4 (0.213)	31537-42X05	
	5.6 (0.220)	31537-42X06	
	2. High clutch		
Number of drive plates		5	
Number of driven plates		5	
Thickness of drive plate mm (in)	Standard	1.52 - 1.67 (0.0598 - 0.0657)	
	Wear limit	1.40 (0.0551)	
Clearance mm (in)	Standard	1.8 - 2.2 (0.071 - 0.087)	
	Allowable limit	2.8 (0.110)	
Thickness of retaining plate	Thickness mm (in)	Part number	
	3.4 (0.134)	31537-41X71	
	3.6 (0.142)	31537-41X61	
	3.8 (0.150)	31537-41X62	
	4.0 (0.157)	31537-41X63	
	4.2 (0.165)	31537-41X64	
	4.4 (0.173)	31537-41X65	
	4.6 (0.181)	31537-41X66	
	4.8 (0.189)	31537-41X67	
3. Forward clutch			
Number of drive plates		5	
Number of driven plates		5	
Thickness of drive plate mm (in)	Standard	1.52 - 1.67 (0.0598 - 0.0657)	
	Wear limit	1.40 (0.0551)	
Clearance mm (in)	Standard	0.35 - 0.75 (0.0138 - 0.0295)	
	Allowable limit	1.85 (0.0728)	
Thickness of retaining plate	Thickness mm (in)	Part number	
	8.0 (0.315)	31537-41X00	
	8.1 (0.319)	31537-42X60	
	8.2 (0.323)	31537-41X01	
	8.3 (0.327)	31537-42X61	
	8.4 (0.331)	31537-41X02	
	8.5 (0.335)	31537-42X62	
	8.6 (0.339)	31537-41X03	
	8.7 (0.343)	31537-42X63	
	8.8 (0.346)	31537-41X04	
	8.9 (0.350)	31537-42X64	
	9.0 (0.354)	31537-41X05	
	9.1 (0.358)	31537-42X65	
9.2 (0.362)	31537-41X06		

4. Overrun clutch			
Number of drive plates		3	
Number of driven plates		5	
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)	
	Wear limit	1.80 (0.0709)	
Clearance mm (in)	Standard	1.0 - 1.4 (0.039 - 0.055)	
	Allowable limit	2.0 (0.079)	
Thickness of retaining plate	Thickness mm (in)	Part number	
	4.2 (0.165)	31537-41X80	
	4.4 (0.173)	31537-41X81	
	4.6 (0.181)	31537-41X82	
	4.8 (0.189)	31537-41X83	
	5.0 (0.197)	31537-41X84	
5. Low & reverse brake			
Number of drive plates		5	
Number of driven plates		7	
Thickness of drive plate mm (in)	Standard	1.52 - 1.67 (0.0598 - 0.0657)	
	Wear limit	1.40 (0.0551)	
Clearance mm (in)	Standard	0.5 - 0.8 (0.020 - 0.031)	
	Allowable limit	2.3 (0.091)	
Thickness of retaining plate	Thickness mm (in)	Part number	
	7.2 (0.283)	31667-41X13	
	7.4 (0.291)	31667-41X14	
	7.6 (0.299)	31667-41X07	
	7.8 (0.307)	31667-41X08	
	8.0 (0.315)	31667-41X00	
	8.2 (0.323)	31667-41X01	
	8.4 (0.331)	31667-41X02	
	8.6 (0.339)	31667-41X03	
	8.8 (0.346)	31667-41X04	
	9.0 (0.354)	31667-41X05	
	9.2 (0.362)	31667-41X06	
	6. Brake band		
Anchor end pin tightening torque N-m (kg-m, in-lb)		4 - 6 (0.4 - 0.6, 35 - 52)	
Number of returning revolutions for anchor end pin		2.5	

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustment (Cont'd)

OIL PUMP AND LOW ONE-WAY CLUTCH

Oil pump clearance	mm (in)	
Cam ring — oil pump housing		
Standard		0.01 - 0.024 (0.0004 - 0.0009)
Rotor, vanes and control piston — oil pump housing		
Standard		0.03 - 0.044 (0.0012 - 0.0017)
Seal ring clearance	mm (in)	
Standard		0.10 - 0.25 (0.0039 - 0.0098)
Allowable limit		0.25 (0.0098)

TOTAL END PLAY

Total end play "T ₁ "	0.25 - 0.55 mm (0.0098 - 0.0217 in)	
Thickness of oil pump cover bearing race	Thickness mm (in)	Part number
	0.8 (0.031)	31435-41X01
	1.0 (0.039)	31435-41X02
	1.2 (0.047)	31435-41X03
	1.4 (0.055)	31435-41X04
	1.6 (0.063)	31435-41X05
	1.8 (0.071)	31435-41X06
2.0 (0.079)	31435-41X07	

PARKING GEAR

Seal ring — ring groove clearance	mm (in)	
Standard		0.15 - 0.40 (0.0059 - 0.0157)
Allowable limit		0.40 (0.0157)

REVERSE CLUTCH DRUM END PLAY

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

REMOVAL AND INSTALLATION

Manual control linkage	
Number of returning revolutions for lock nut	2
Lock nut tightening torque N-m (kg-m, ft-lb)	11 - 15 (1.1 - 1.5, 8 - 11)
Distance between end of converter housing and torque converter mm (in)	26.0 (1.024) or more

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

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ST

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NOTES