

AUTOMATIC TRANSAXLE

SECTION **AT**

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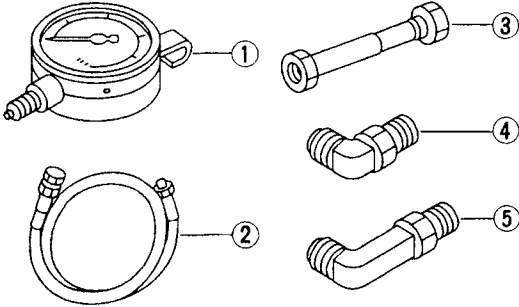
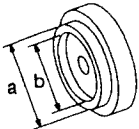
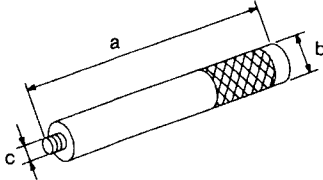
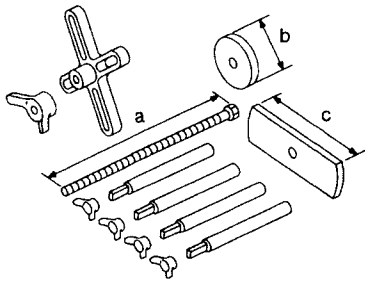
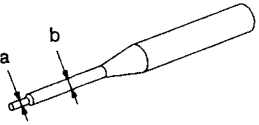
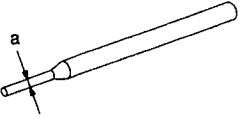
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When you read wiring diagrams:

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

PREPARATION AND PRECAUTIONS

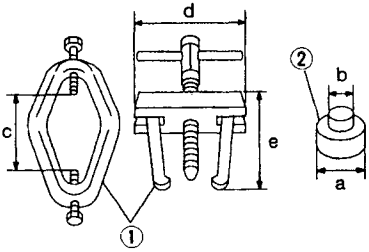
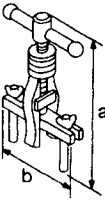
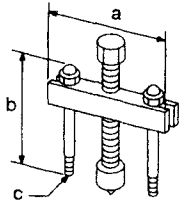
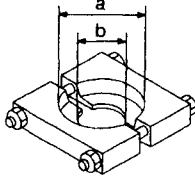
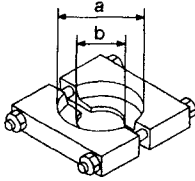
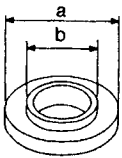
Special Service Tools

Tool number Tool name	Description
ST2505S001 Oil pressure gauge set ① ST25051001 Oil pressure gauge ② ST25052000 Hose ③ ST25053000 Joint pipe ④ ST25054000 Adapter ⑤ ST25055000 Adapter	 Measuring line pressure and governor pressure NT097
KV31103000 Drift	 Installing differential side oil seal (Use with ST35325000) a: 59 mm (2.32 in) dia. b: 49 mm (1.93 in) dia. NT105
ST35325000 Drift	 Installing differential side oil seal (Use with KV31103000) a: 215 mm (8.46 in) b: 25 mm (0.98 in) dia. c: M12 x 1.5P NT417
KV31103200 Clutch spring compressor	 Removing and installing clutch return spring a: 179 mm (7.05 in) b: 76 mm (2.99 in) dia. c: 174 mm (6.85 in) NT425
ST23540000 Pin punch	 Removing and installing parking rod plate and manual plate a: 2.3 mm (0.091 in) dia. b: 4 mm (0.16 in) dia. NT442
KV32101000 Pin punch	 Installing throttle lever and manual shaft retaining pins Removing and installing differential pinion mate shaft lock pin. a: 4 mm (0.16 in) dia. NT410

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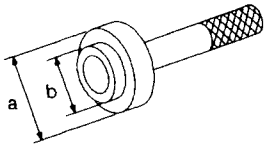
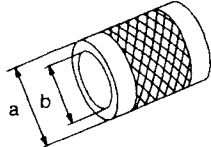
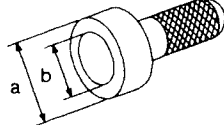
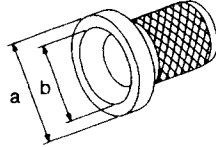
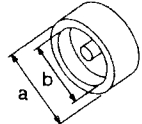
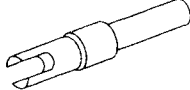
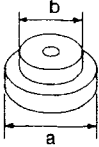
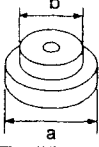
PREPARATION AND PRECAUTIONS

Special Service Tools (Cont'd)

Tool number Tool name	Description	
ST3306S001 Differential side bearing puller set ① ST33051001 Puller ② ST33061000 Adapter	 NT413	Removing differential side bearing inner race a: 38 mm (1.50 in) dia. b: 28.5 mm (1.122 in) dia. c: 130 mm (5.12 in) d: 135 mm (5.31 in) e: 100 mm (3.94 in)
KV381054S0 (ST33290001) Puller	 NT414	● Removing differential side oil seal ● Removing idler gear bearing outer race — EXCEPT MODEL 34X81 — ● Removing output shaft bearing outer race from bearing retainer ● Removing output gear bearing outer race from bearing retainer — MODEL 34X81 — ● Removing differential side bearing outer race ● Removing needle bearing from bearing retainer a: 250 mm (9.84 in) b: 160 mm (6.30 in)
ST27180001 Puller	 NT424	● Removing idler gear ● Removing output gear (Except model 34X81) a: 100 mm (3.94 in) b: 110 mm (4.33 in) c: M8 x 1.25P
ST30031000 Puller	 NT411	Removing reduction pinion gear bearing inner race (Except model 34X81) a: 90 mm (3.54 in) dia. b: 50 mm (1.97 in) dia.
ST30021000 Puller	 NT411	Removing differential side bearing (Except model 34X81) a: 110 mm (4.33 in) dia. b: 68 mm (2.68 in) dia.
ST35272000 Drift	 NT426	● Installing reduction pinion gear bearing inner race ● Installing idler gear bearing inner race ● Installing output gear bearing inner race (Except model 34X81) a: 72 mm (2.83 in) dia. b: 35.5 mm (1.398 in) dia.

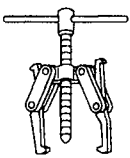
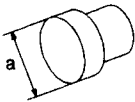
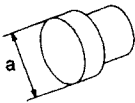
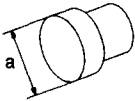
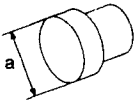
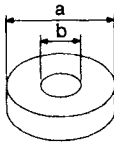
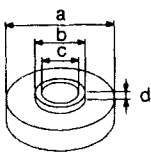
PREPARATION AND PRECAUTIONS

Special Service Tools (Cont'd)

Tool number Tool name	Description	
ST37830000 Drift	 NT427	Installing idler gear bearing outer race a: 62 mm (2.44 in) dia. b: 39 mm (1.54 in) dia.
ST33200000 Drift	 NT091	Installing differential side bearing (Except model 34X81) a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia.
ST35271000 Drift	 NT115	● Installing idler gear ● Installing output gear (Except model 34X81) a: 72 mm (2.83 in) dia. b: 44 mm (1.73 in) dia.
ST33400001 Drift	 NT086	● Installing oil pump housing oil seal ● Installing output gear bearing outer race onto bearing retainer (Except model 34X81) a: 60 mm (2.36 in) dia. b: 47 mm (1.85 in) dia.
KV40104840 Drift	 NT108	Installing output shaft bearing outer race onto bearing retainer (Except model 34X81) a: 49 mm (1.93 in) dia. b: 42 mm (1.65 in) dia.
KV38105710 Preload adapter	 NT087	— MODEL 34X81 — ● Measuring turning torque of final drive assembly ● Measuring clearance between side gear and differential case with washer ● Selecting differential side bearing adjusting shim
ST35321000 Drift	 NT073	Installing output shaft bearing (Model 34X81) a: 49 mm (1.93 in) dia. b: 41 mm (1.61 in) dia.
ST30633000 Drift	 NT073	Installing differential side bearing outer race (Model 34X81) a: 67 mm (2.64 in) dia. b: 49 mm (1.93 in) dia.

PREPARATION AND PRECAUTIONS

Commercial Service Tools

Tool name	Description	
Puller		● Removing idler gear bearing inner race ● Removing and installing band servo piston snap ring — EXCEPT MODEL 34X81 — ● Removing output gear bearing inner race ● Removing differential side bearing
Drift		Removing idler gear bearing inner race (Except model 34X81) a: 34 mm (1.34 in) dia.
Drift		Installing needle bearing onto bearing retainer (Model 34X81) a: 36 mm (1.42 in) dia.
Drift		Removing output gear bearing inner race (Except model 34X81) a: 33 mm (1.30 in) dia.
Drift		Removing differential side bearing (Except model 34X81) a: 38 mm (1.50 in) dia.
Drift		Removing output shaft bearing inner race (Except model 34X81) a: 70 mm (2.76 in) dia. b: 30 mm (1.18 in) dia.
Drift		Installing output shaft bearing inner race (Except model 34X81) a: 70 mm (2.76 in) dia. b: 34 mm (1.34 in) dia. c: 30 mm (1.18 in) dia. d: 2 mm (0.08 in)

PREPARATION AND PRECAUTIONS

Service Notice

- Before proceeding with disassembly, thoroughly clean the outside of the transaxle. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transaxle.
- Place disassembled parts in order, on a parts rack, for easier and proper assembly.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transaxle is disassembled.
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place disassembled valve body parts in order, on a parts rack, for easier and proper assembly. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed vales, 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-ring and seals, or hold bearings and washers in place during assembly. Do not use grease.
- Extremely care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- After overhaul, refill the transaxle with new ATF.

Supplemental Restraint System (SRS) “AIR BAG” (Dual Air Bag System)

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

WARNING:

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

Supplemental Restraint System (SRS) “AIR BAG” (Single Air Bag System)

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

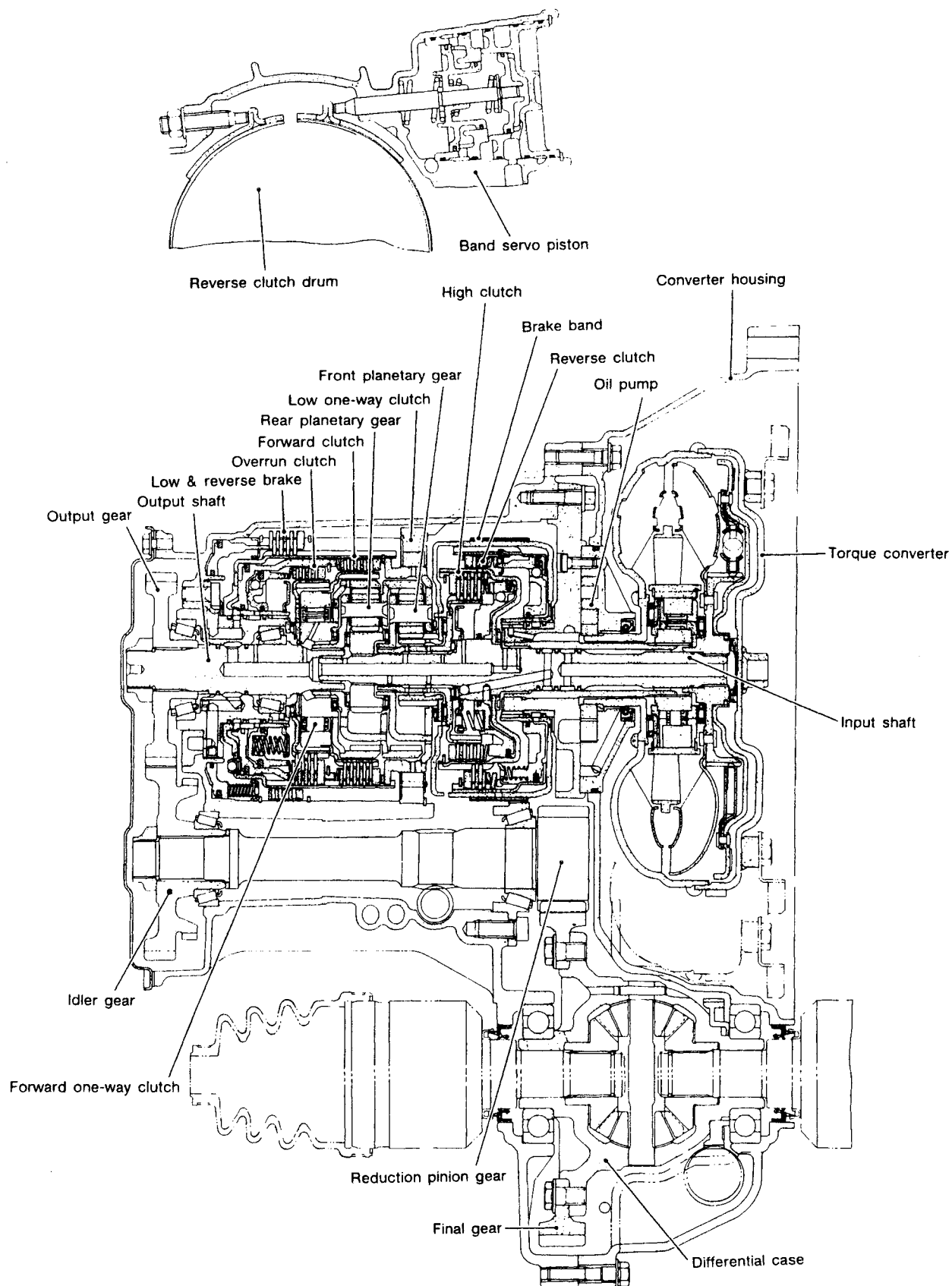
WARNING:

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

DESCRIPTION

Cross-sectional View

EXCEPT MODEL 34X81



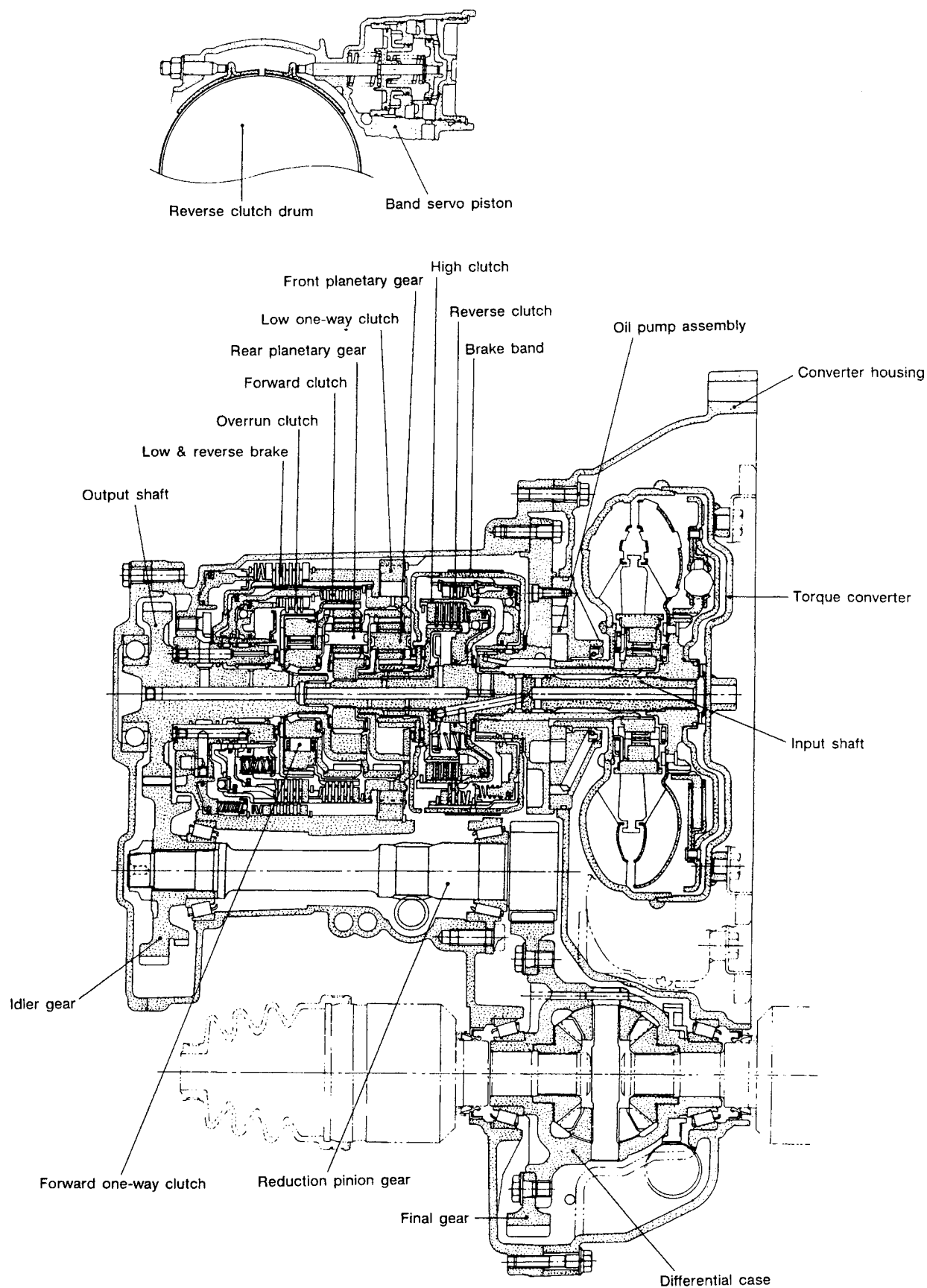
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AT-8

DESCRIPTION

Cross-sectional View (Cont'd)

MODEL 34X81



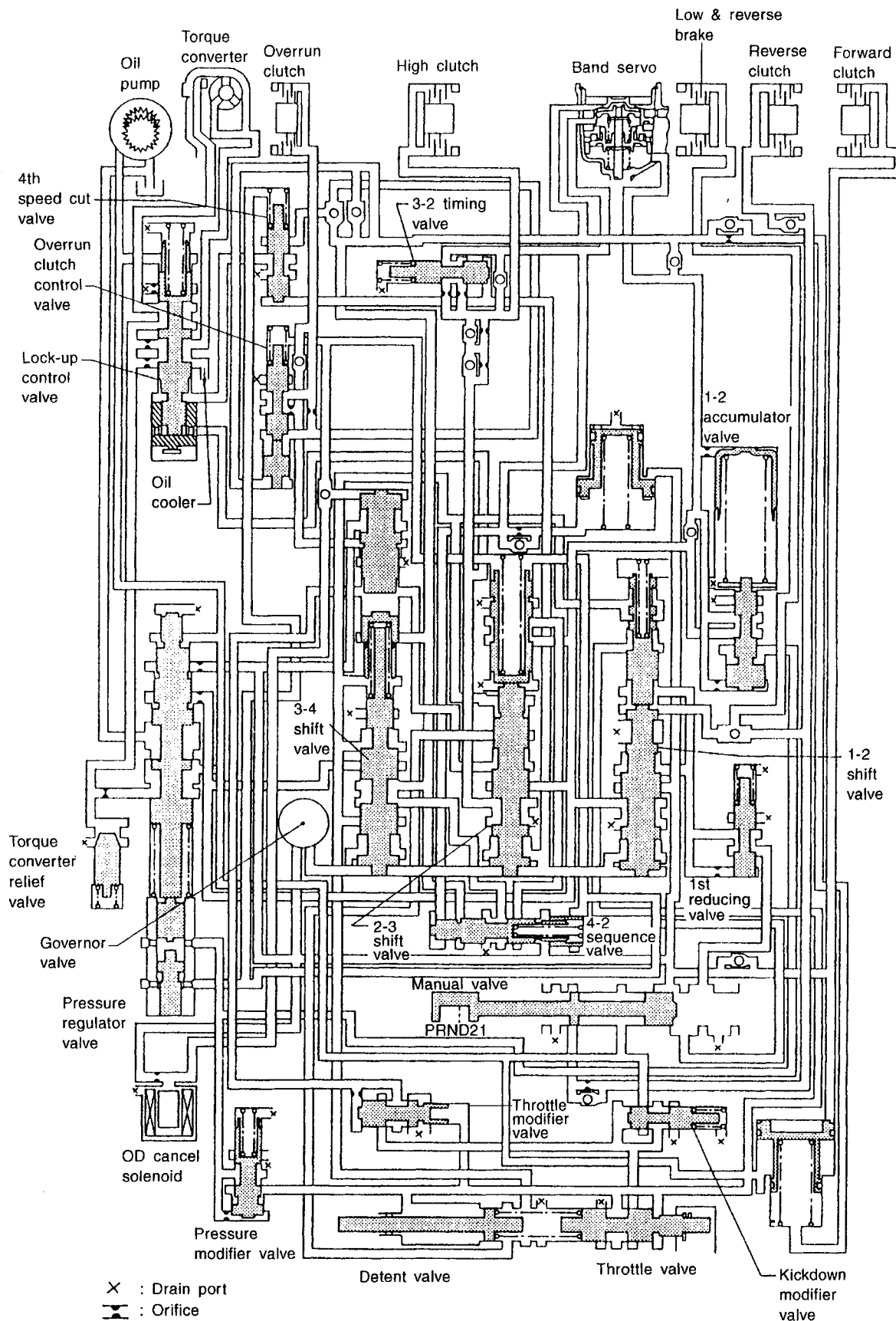
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DESCRIPTION

Hydraulic Control Circuit

MODEL 34X68

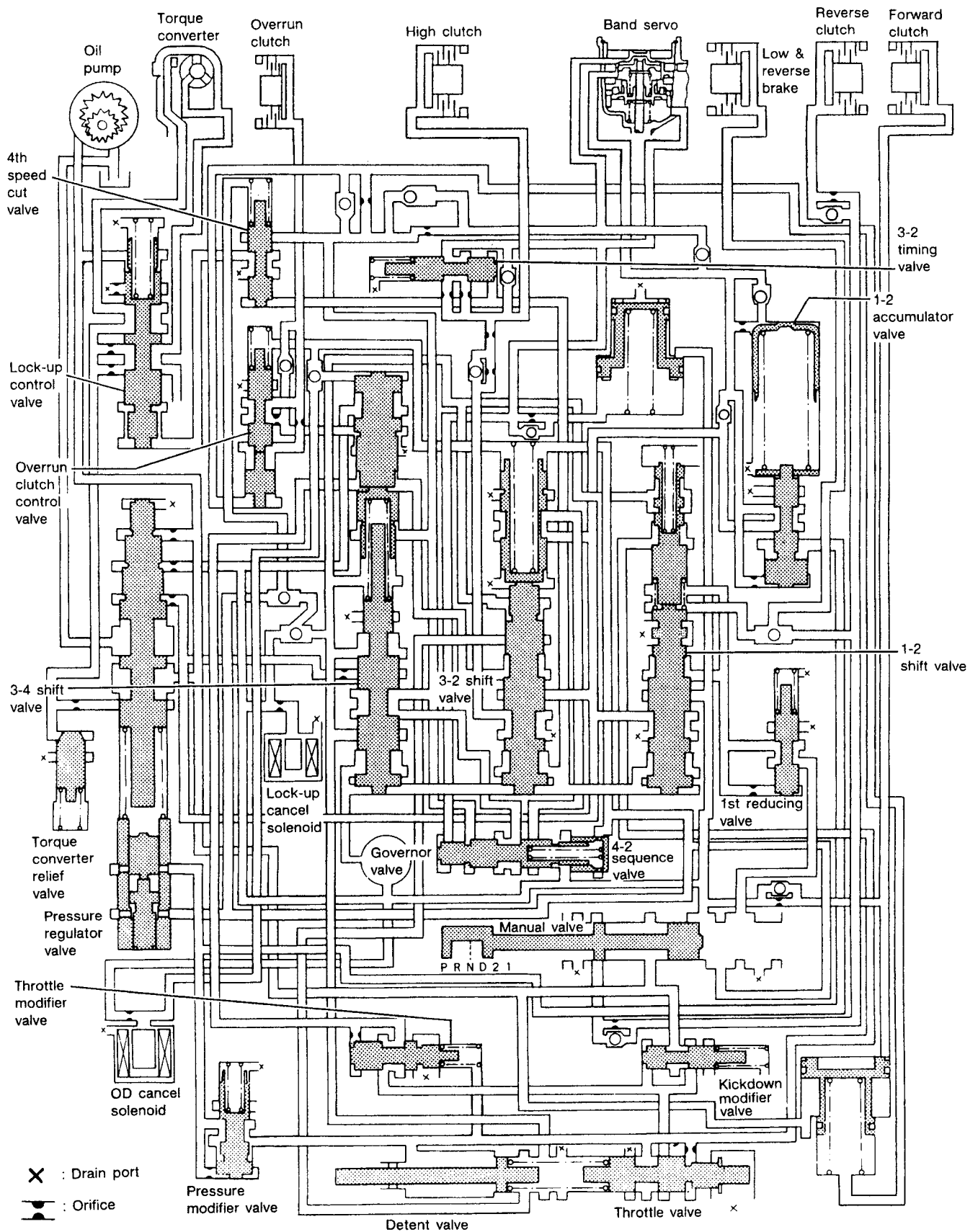


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DESCRIPTION

Hydraulic Control Circuit (Cont'd)

MODEL 34X69 AND 34X70



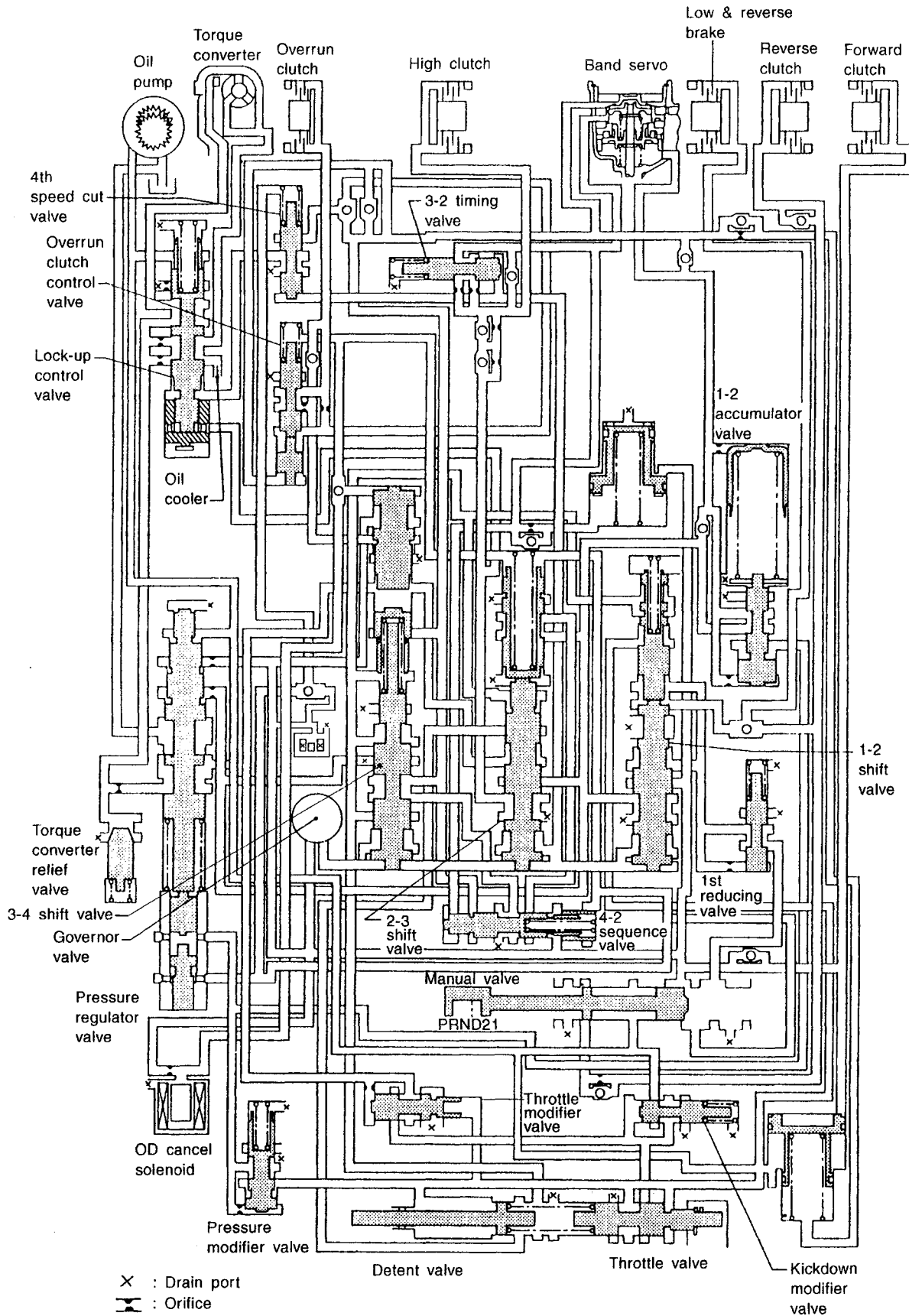
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SAT509H

DESCRIPTION

Hydraulic Control Circuit (Cont'd)

MODEL 34X80

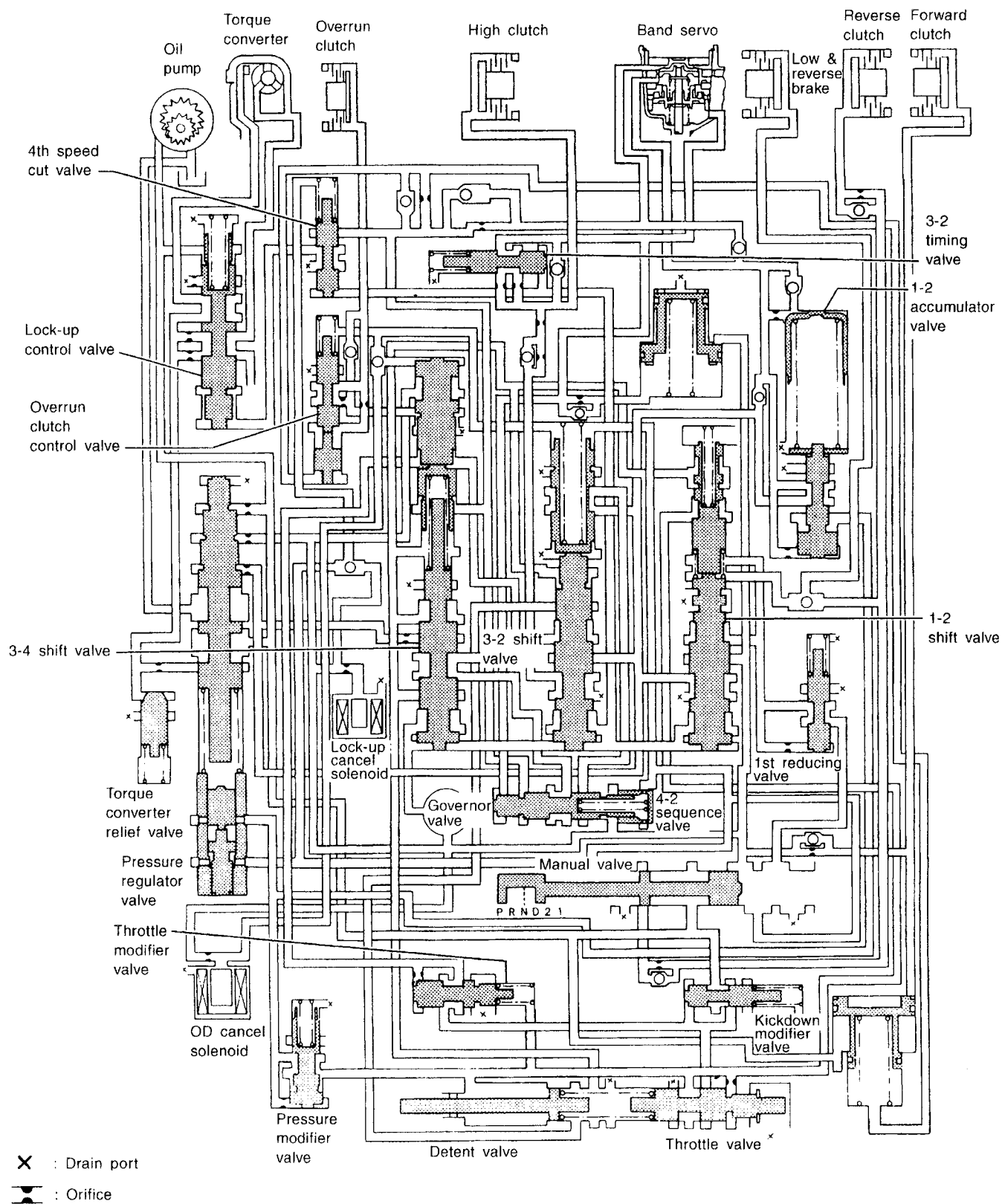


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DESCRIPTION

Hydraulic Control Circuit (Cont'd)

MODEL 34X81

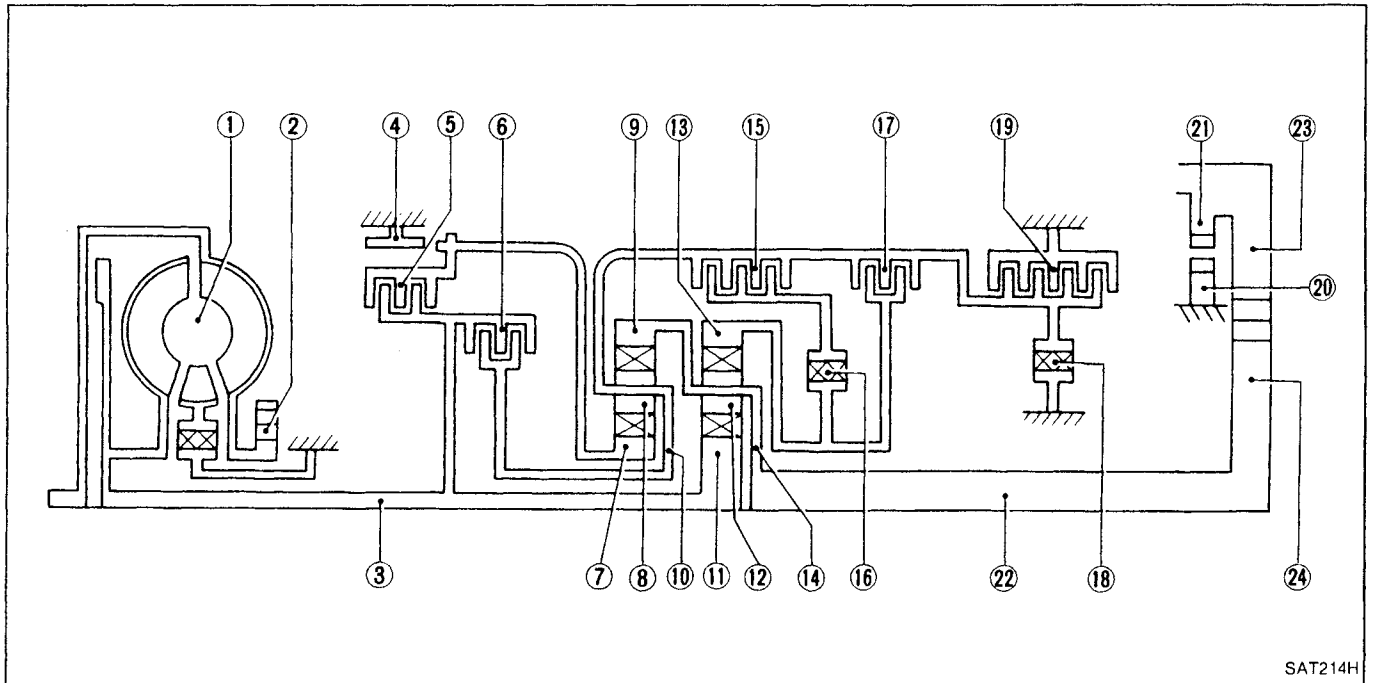


AT

DESCRIPTION

Shift Mechanism

CONSTRUCTION



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

FUNCTION OF CLUTCH AND BRAKE

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

DESCRIPTION

Shift Mechanism (Cont'd)

OPERATION OF CLUTCH AND BRAKE

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

*1 : Operates when overdrive switch is set to "OFF".

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

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

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

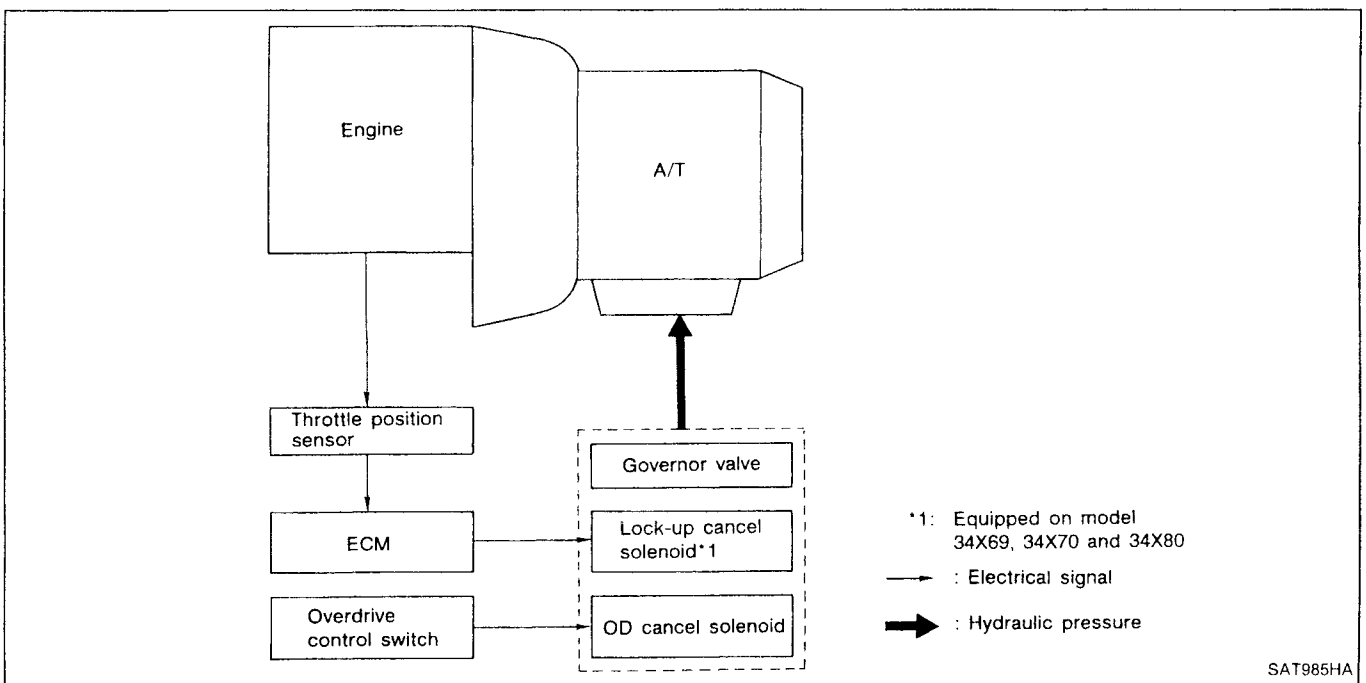
○ : Operates.

● : Operates. During "progressive" acceleration.

⊗ : Operates but does not affect power transmission.

Control System

CONTROL SYSTEM

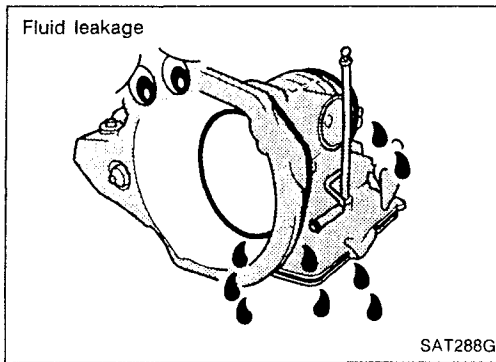


SAT985HA

DESCRIPTION

NOTE

TROUBLE DIAGNOSES



Preliminary Check (Prior to Road Testing)

A/T FLUID CHECK

Fluid leakage check

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

Fluid condition check

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

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

AT

Road Testing

Perform road tests using “Symptom” chart. Refer to page AT-20.

“P” POSITION

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

“R” POSITION

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

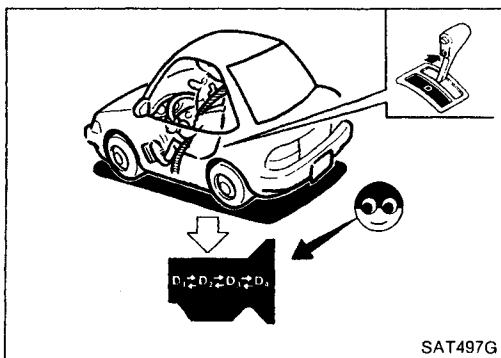
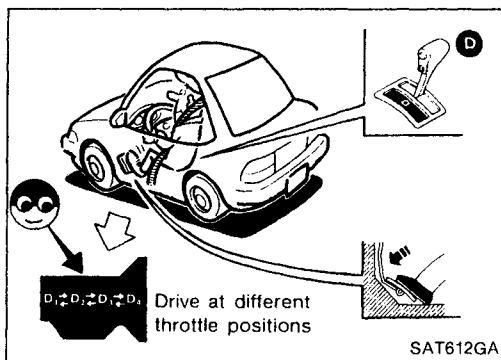
“N” POSITION

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

TROUBLE DIAGNOSES

Road Testing (Cont'd)

"D" POSITION



1. Manually move selector lever from "N" to "D" position, and note shift quality.
2. Using the shift schedule as a reference, drive vehicle in "D" position. Record, on symptom chart, respective vehicle speeds at which up-shifting and down-shifting occur. These speeds are to be read at three different throttle positions (light, half and full), respectively. Also determine the timing at which shocks are encountered during shifting and which clutches are engaged.
3. Determine whether lock-up properly occurs while driving vehicle in proper gear position and at proper vehicle speed.
4. Check to determine if shifting to overdrive gear cannot be made while OD control switch is "OFF".
5. Drive vehicle in "D₃" position at half to light throttle position. Keep driving at 60 to 70 km/h (34 to 43 MPH). Fully depress accelerator pedal to make sure transaxle downshifts from 3rd to 2nd gear.
6. Drive vehicle in "D₂" position at half to light throttle position. Keep driving at 25 to 35 km/h (16 to 22 MPH). Fully depress accelerator pedal to make sure transaxle downshifts from 2nd to 1st gear.

"2" POSITION

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

"1" POSITION

1. Place selector lever in "1" position and accelerate vehicle. Make sure transaxle does not shift from 1st to 2nd gear although vehicle speed increases.
2. Drive 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 allow vehicle to run at 15 to 25 km/h (9 to 16 MPH). Then move selector lever to "1" position to make sure transaxle downshifts to 1st gear.

TROUBLE DIAGNOSES

Road Testing (Cont'd)

SHIFT SCHEDULE

Drive the vehicle for approx. 10 minutes. Measure the oil temperature. When the oil temperature becomes between 50 and 80°C (122 and 176°F), carry out this check.

VEHICLE SPEED WHEN SHIFTING GEARS

Model 34X68

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	48 - 56 (30 - 35)	88 - 96 (55 - 60)	—	133 - 141 (83 - 88)	80 - 88 (50 - 55)	37 - 45 (23 - 28)	45 - 53 (28 - 33)
Half throttle	31 - 39 (19 - 24)	54 - 62 (34 - 39)	102 - 110 (63 - 68)	75 - 83 (47 - 52)	44 - 52 (27 - 32)	7 - 15 (4 - 9)	45 - 53 (28 - 33)

Model 34X69 and 34X70

Throttle position	Vehicle speed km/h (MPH)						
	D ₁ → D ₂	D ₂ → D ₃	D ₃ → D ₄	D ₄ → D ₃	D ₃ → D ₂	D ₂ → D ₁	1 ₂ → 1 ₁
Full throttle	51 - 60 (32 - 37)	94 - 102 (58 - 63)	—	136 - 144 (85 - 89)	85 - 93 (53 - 58)	40 - 48 (25 - 30)	48 - 56 (30 - 35)
Half throttle	30 - 38 (19 - 24)	52 - 60 (32 - 37)	97 - 105 (60 - 65)	67 - 75 (42 - 47)	42 - 50 (26 - 31)	8 - 16 (5 - 10)	48 - 56 (30 - 35)

Model 34X80

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	52 - 60 (32 - 37)	100 - 108 (62 - 67)	—	145 - 153 (90 - 95)	90 - 98 (56 - 61)	40 - 48 (25 - 30)	49 - 57 (30 - 35)
Half throttle	30 - 38 (19 - 24)	53 - 61 (33 - 38)	103 - 111 (64 - 69)	69 - 77 (43 - 48)	42 - 50 (26 - 31)	8 - 16 (5 - 10)	49 - 57 (30 - 35)

Model 34X81

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	58 - 66 (36 - 41)	107 - 115 (66 - 71)	—	160 - 168 (99 - 104)	96 - 104 (60 - 65)	39 - 47 (24 - 29)	48 - 56 (30 - 35)
Half throttle	33 - 41 (21 - 25)	57 - 65 (35 - 40)	105 - 113 (65 - 70)	69 - 77 (43 - 48)	45 - 53 (28 - 33)	8 - 16 (5 - 10)	48 - 56 (30 - 35)

TROUBLE DIAGNOSES

Road Testing (Cont'd)

ROAD TEST SYMPTOM CHART

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

Circled numbers indicate that the transaxle must be removed from the vehicle.

: Valve expected to be malfunctioning

ROAD TEST SYMPTOM CHART Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transaxle must be removed from the vehicle.		ON VEHICLE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
		Oil level and oil quality		Control cable		Inhibitor switch and wiring		Throttle wire		Engine idling speed		Line pressure		Control valve																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

TROUBLE DIAGNOSES

Road Testing (Cont'd)

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

TROUBLE DIAGNOSES

Road Testing (Cont'd)

Numbers are arranged in order of probability.
Perform inspections starting with number one
and work up.
Circled numbers indicate that the transaxle
must be removed from the vehicle.

 : Valve expected to be malfunctioning

Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transaxle must be removed from the vehicle.		ON VEHICLE														
		Oil level and oil quality	Control cable	Inhibitor switch and wiring	Throttle wire	Engine idling speed	Line pressure	Control valve	Throttle valve & detent valve	Manual valve	Pressure regulator valve	3-4 shift valve	2-3 shift valve	1-2 shift valve	Overrun clutch control valve	Pressure modifier valve
Shift quality	Failure to change gear from 4th to 2nd with accelerator pedal depressed.	1	.	.	3	.	2	6								
	Failure to change gear from 3rd to 2nd with accelerator pedal depressed.	1	.	.	3	.	2	6								
	Failure to change gear from 1st to 2nd in "D" and "2" position.	1	.	.	3	.	2	6								
	Vehicle does not start from "1st" in "D" and "2" position.	1	.	.	3	.	2	6								
	Failure to change gear to 3rd and 4th in "D" position.	1	.	.	3	.	2	6								
	Changes gear to 1st directly when selector lever is set from "D" to "1" position.	1	.	.	3	.	2	6								
	Changes gear to 2nd in "1" position.	1	.	.	3	.	2	6								
Lock-up quality	Lock-up point is extremely high or low.	1	.	.	3	.	2	6								
	Torque converter does not lock-up.	1	.	.	3	.	2	7								
	Lock-up is not released when accelerator pedal is released.	1	.	.	.	.	.	2								
Engine does not start in "P" and "N" positions or engine starts in positions other than "P" and "N" positions.		.	2	3	.	.	.	.								
Vehicle moves with selector lever in "P" position.		.	1	.	.	.	.	.								

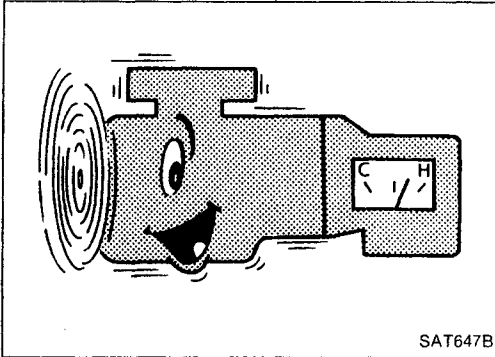
TROUBLE DIAGNOSES

Road Testing (Cont'd)

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

TROUBLE DIAGNOSES



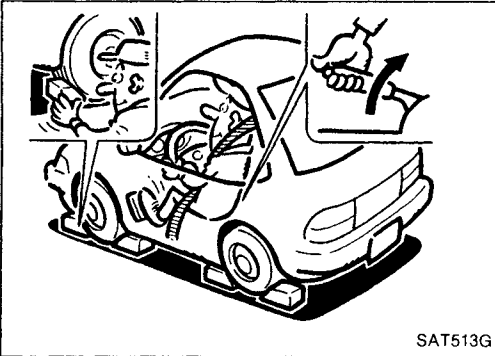
Stall Tasting

STALL TEST PROCEDURE

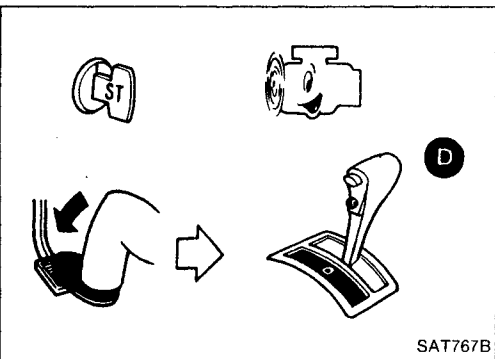
1. Check A/T and engine fluid levels. If necessary, add fluid.
2. Drive vehicle for about 10 minutes until engine oil and ATF reach operating temperature.

ATF operating temperature:

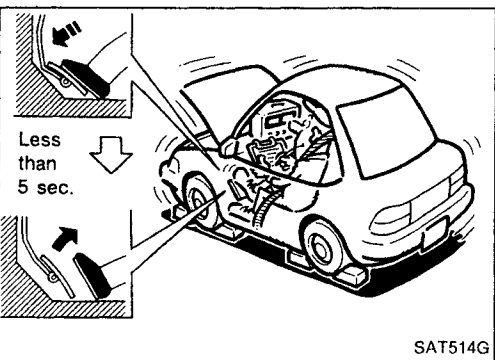
50 - 80°C (122 - 176°F)



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



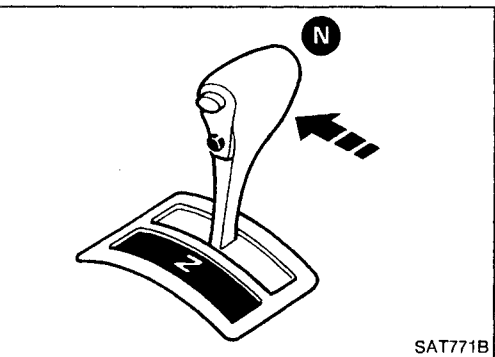
5. Start engine, apply foot brake, and place selector lever in "D" position.



6. Accelerate to wide-open throttle gradually while applying foot brake.
 7. Quickly note the engine stall revolution and immediately release throttle.
- **During test, never hold throttle wide-open for more than 5 seconds.**

Stall revolution standard:

Refer to SDS, AT-166.



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

TROUBLE DIAGNOSES

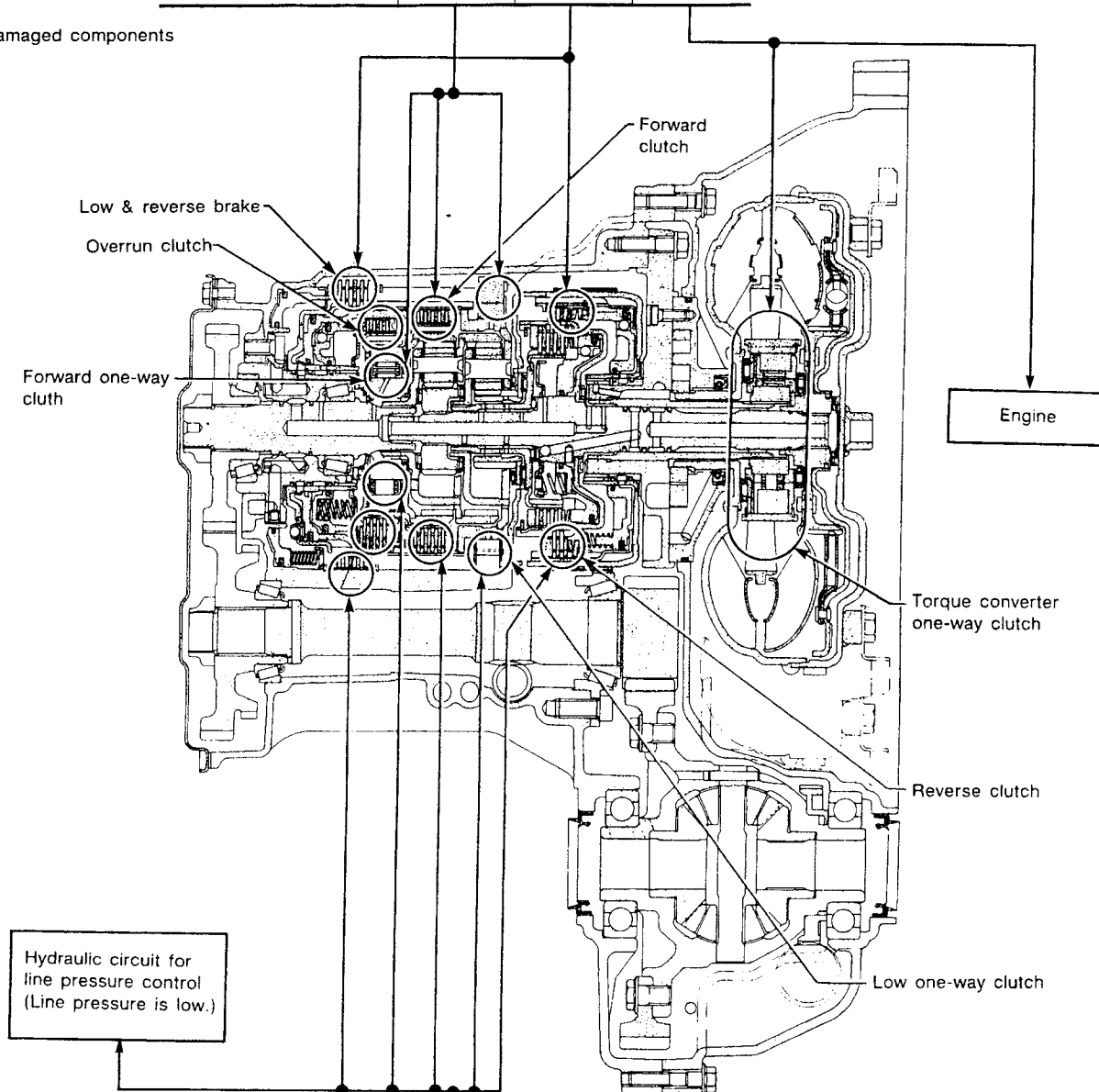
Stall Tasting (Cont'd)

JUDGEMENT OF STALL TEST

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

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

Damaged components

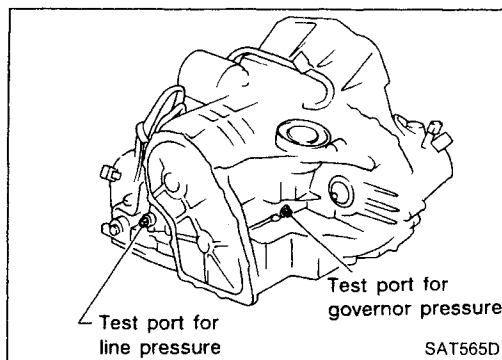


D	H	O
2	H	O
1	H	O
R	H	O
Selector lever position	Judgement	

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

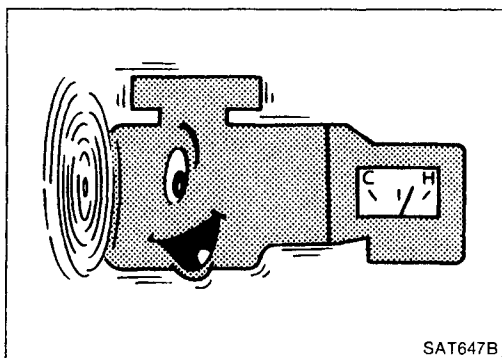
AT

TROUBLE DIAGNOSES



Pressure Testing

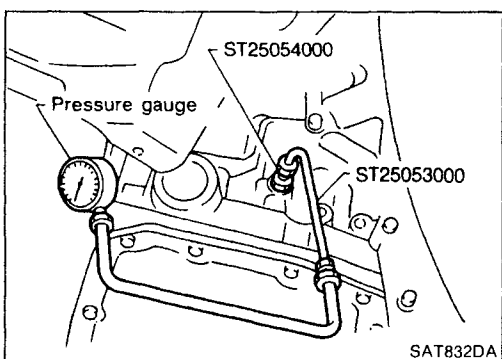
- Location of pressure test port.
- **Always replace pressure plugs as they are self-sealing bolts.**



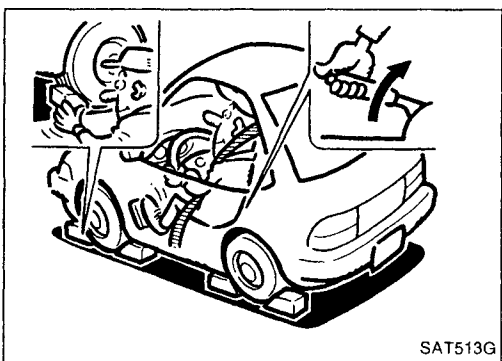
LINE PRESSURE TEST PROCEDURE

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

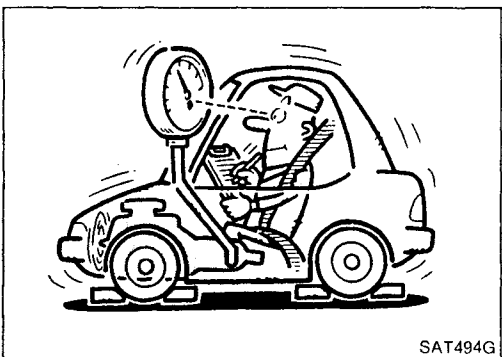
ATF operating temperature:
50 - 80°C (122 - 176°F)



3. Install pressure gauge to line pressure port.



4. Set parking brake and block wheels.
Continue to depress brake pedal fully while performing line pressure test at stall speed.



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

Line pressure:
Refer to SDS, AT-166.

JUDGEMENT OF LINE PRESSURE TEST

- **If line pressure does not rise, first check to make sure that throttle wire is connected properly.**
- 1) When line pressure while idling is low at all positions ("D", "2", "1", "R" and "P"), the problem may be due to:
- Wear on interior of oil pump

TROUBLE DIAGNOSES

Pressure Testing (Cont'd)

- Oil leakage at or around oil pump, control valve body, transmission case or governor
 - Sticking pressure regulator valve
 - Sticking pressure modifier valve
- 2) When line pressure while idling is low at a particular position, check the following.
 - If oil leaks at or around low & reverse brake circuit, line pressure becomes low in "R" position. But line pressure is normal in "P", "D", "2" or "1" position.
 - 3) When line pressure is high while idling, pressure regulator valve may have stuck.

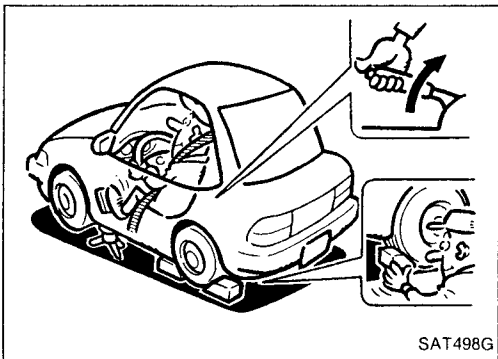
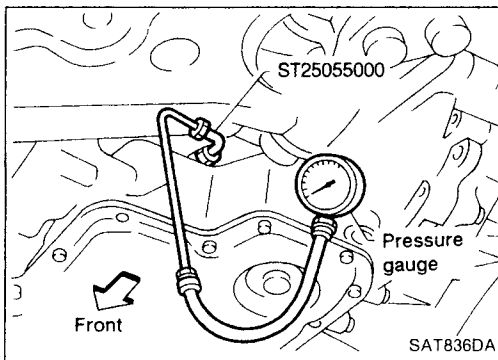
GOVERNOR PRESSURE TESTING

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

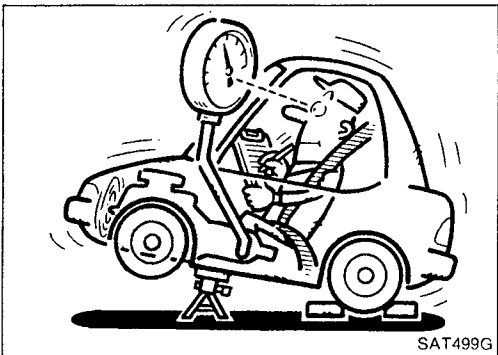
ATF operating temperature:

50 - 80°C (122 - 176°F)

3. Install pressure gauge to governor pressure port.



4. Set parking brake and block rear wheels.
 5. Jack up front wheels.
 6. Set selector lever in D position and drive vehicle.
- Be careful of rotating wheels.**



Governor pressure:

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

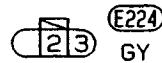
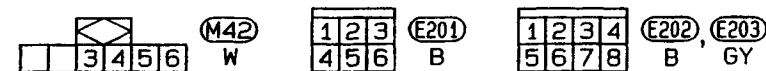
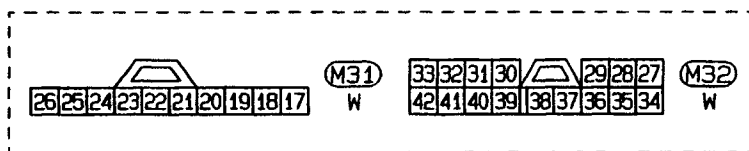
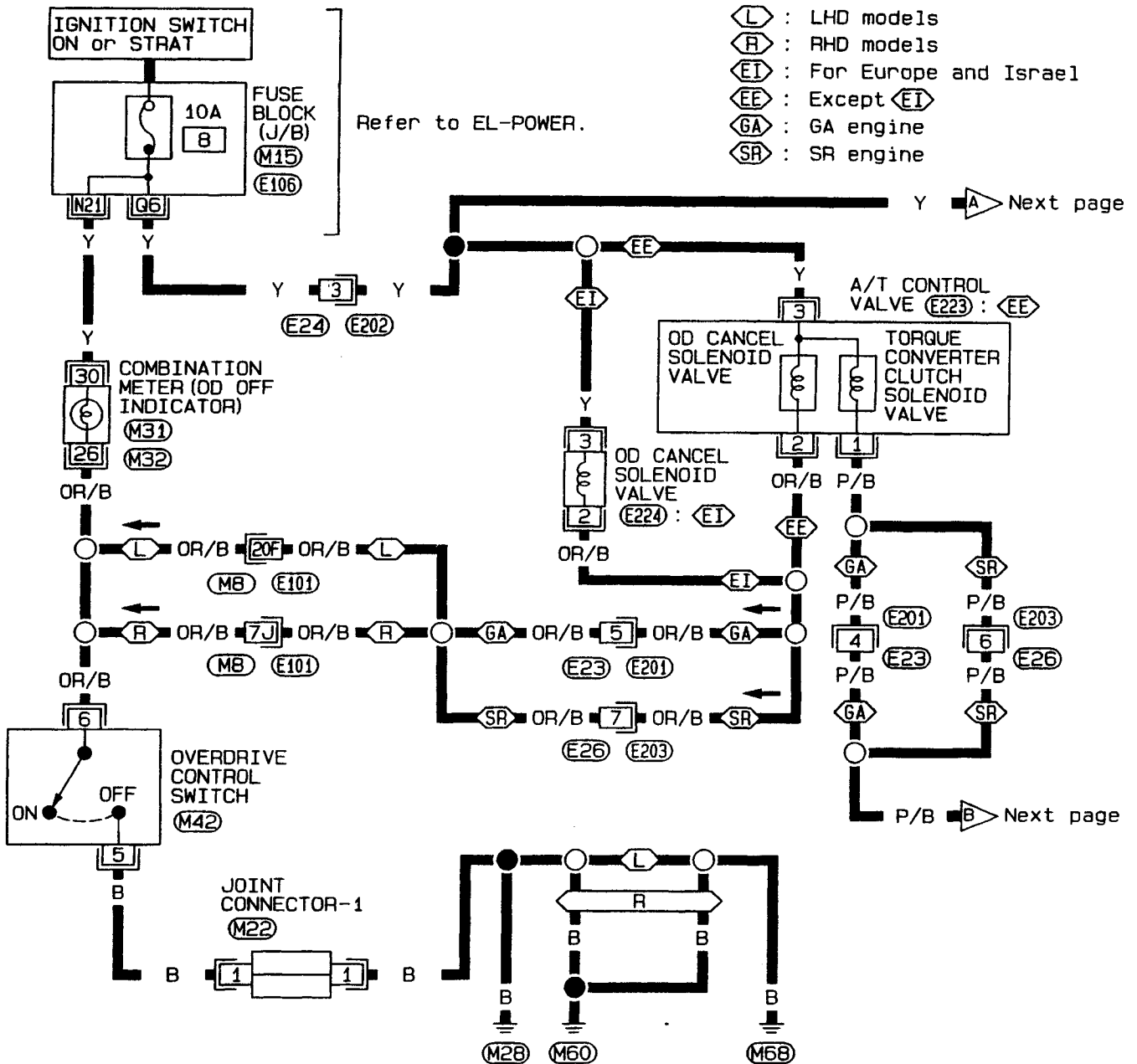
If not, check governor valve assembly. Refer to AT-36.

AT

TROUBLE DIAGNOSES

Wiring Diagram — AT —

AT-A/T-01



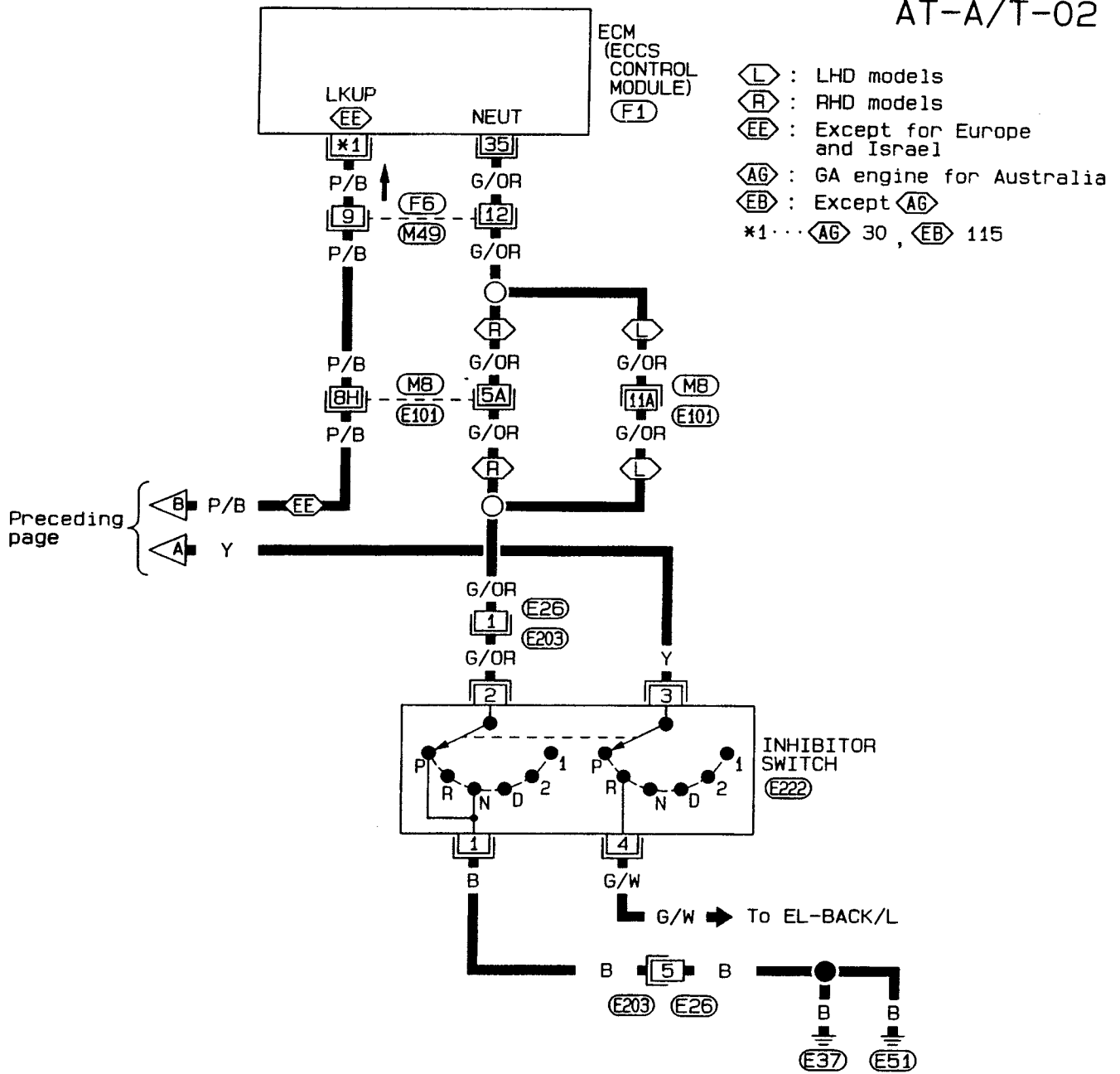
Refer to last page
(Foldout page).

M8, E101
M15, E106

TROUBLE DIAGNOSES

Wiring Diagram — AT — (Cont'd)

AT-A/T-02



AT

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20				

(M49)
W

1	2	3	4
5	6	7	8

(E203)
GY

1	2
3	4

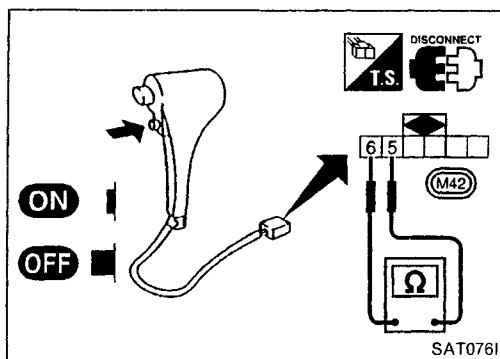
(E222)
GY

Refer to last page (Foldout page).

(MB), (E101)

(F1)

TROUBLE DIAGNOSES

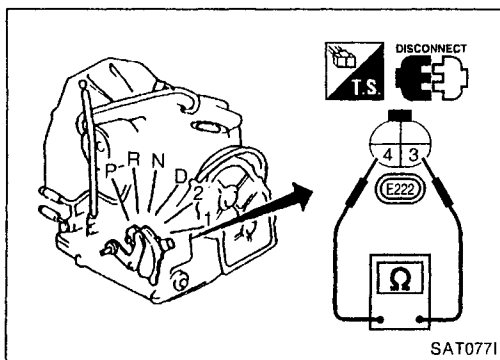


Electrical Components Inspection

OVERDRIVE CONTROL SWITCH

- Check continuity between two terminals.

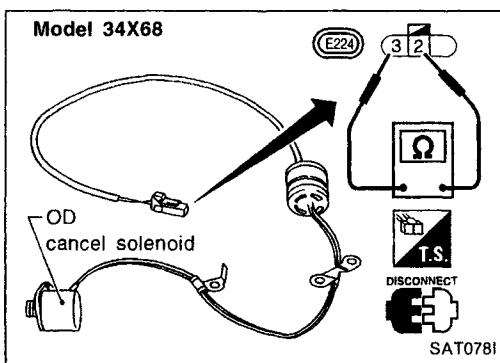
OD switch position	Continuity
ON	No
OFF	Yes



INHIBITOR SWITCH

- Check continuity in "N", "P" and "R" positions.
- With manual shaft held in "N" position, turn manual shaft an equal amount in both directions to see if current flow positions are nearly the same. (When manual lever is in each position, continuity normally exists within 1.5° in either direction.) If current flows outside normal position, or if normal flow position is out of specifications, properly adjust inhibitor switch.

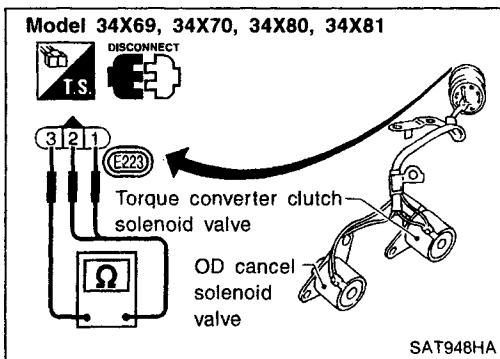
Position	Terminal No.	Continuity
Park/neutral position	③ — ④	No
Reverse position	③ — ④	Yes



OD CANCEL SOLENOID VALVE AND TORQUE CONVERTER CLUTCH SOLENOID VALVE

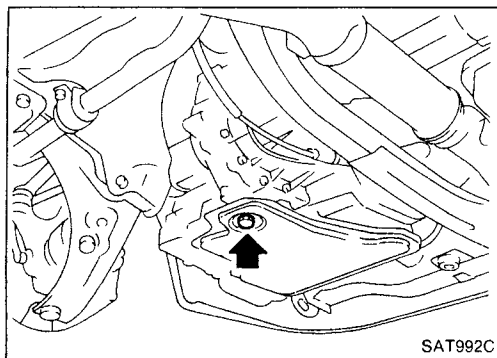
- Check resistance between terminals.

Solenoids	Terminal No.	Resistance
OD cancel solenoid valve	② — ③	Approximately 25Ω
Torque converter clutch solenoid valve	① — ③	

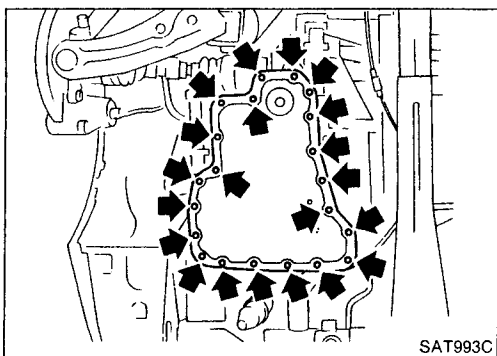


Control Valve Assembly and Accumulator REMOVAL

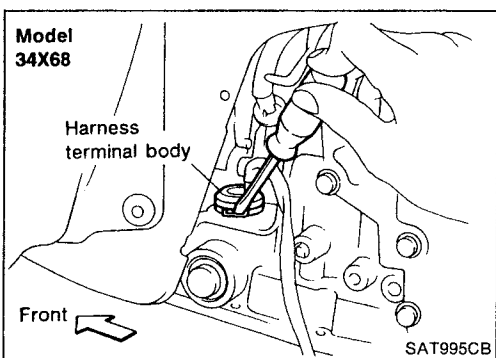
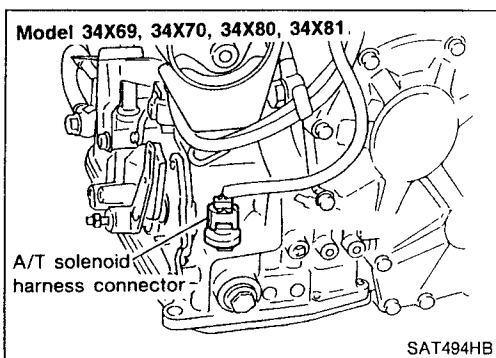
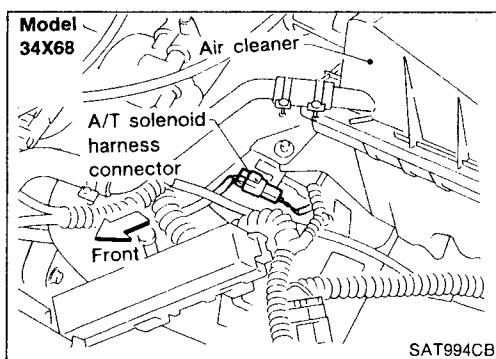
1. Drain ATF from transaxle.



2. Remove oil pan and gasket.



3. Disconnect A/T solenoid harness connector.



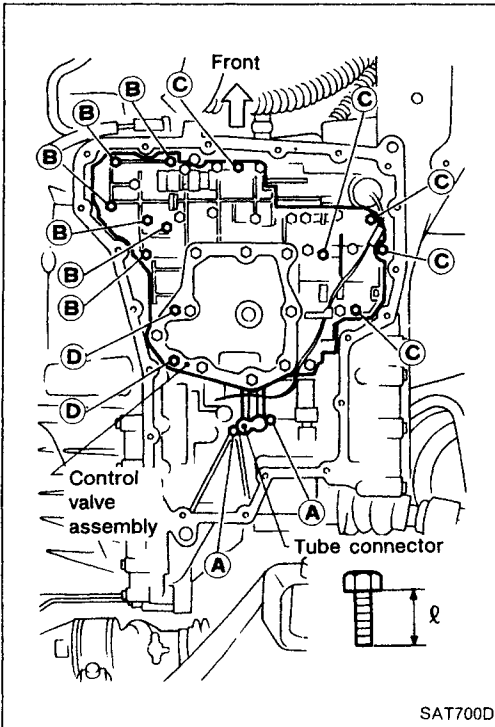
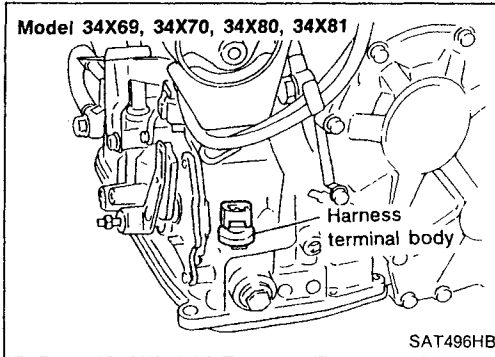
4. Remove stopper ring from A/T solenoid harness terminal body.

5. Pull out A/T solenoid harness from transmission case by pushing terminal body.

AT

ON-VEHICLE SERVICE

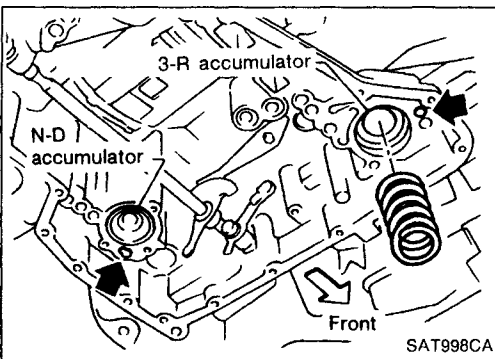
Control Valve Assembly and Accumulator (Cont'd)



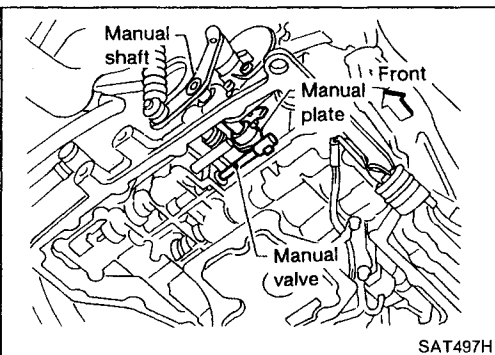
6. Remove control valve assembly by removing fixing bolts.
Bolt length, number and location:

Bolt symbol	A	B	C	D
Bolt length "l"	25.0 (0.984)	33.0 (1.299)	40.0 (1.575)	43.5 (1.713)
Number of bolts	2	6	5	2
Tightening torque N·m (kg-m, in-lb)	7 - 9 (0.7 - 0.9, 61 - 78)			

- Be careful not to drop manual valve, tube connector, tubes and 3-R accumulator return spring.
7. Disassemble and inspect control valve assembly if necessary — Refer to "REPAIR FOR COMPONENT PARTS", AT-74.



8. Remove 3-R and N-D accumulators by applying compressed air if necessary.
- Hold each piston with a rag.



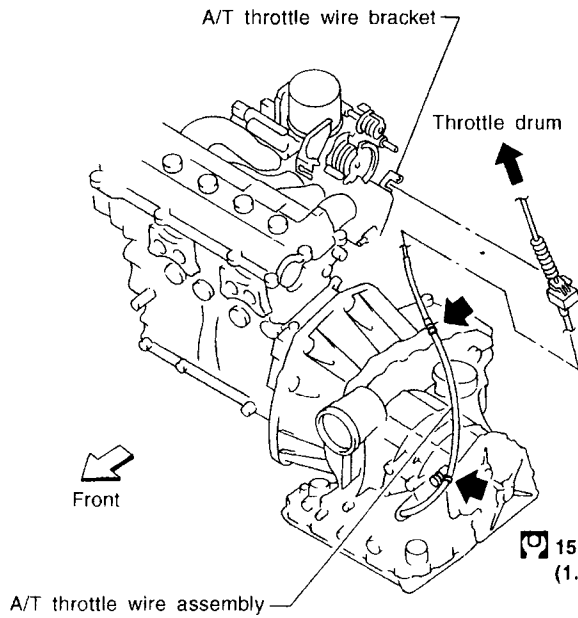
INSTALLATION

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

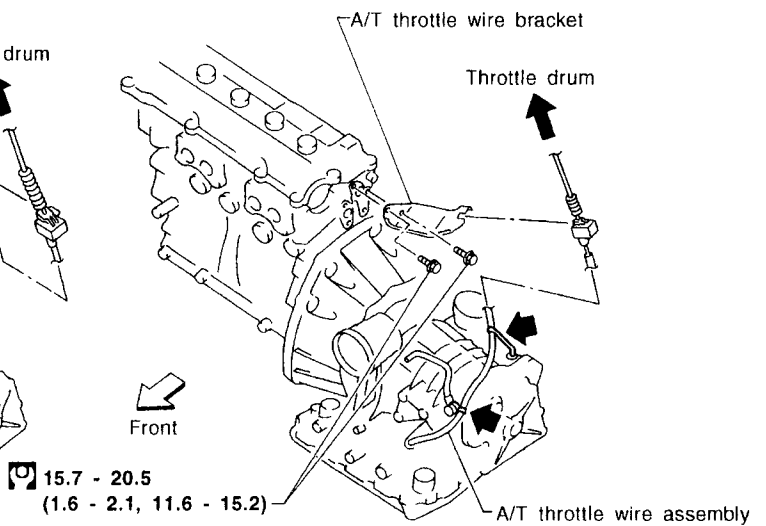
Throttle Wire Adjustment

SEC. 319

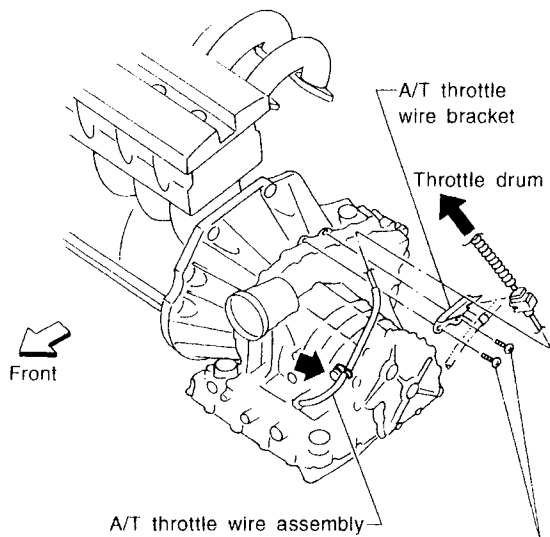
Model 34X68, 34X69



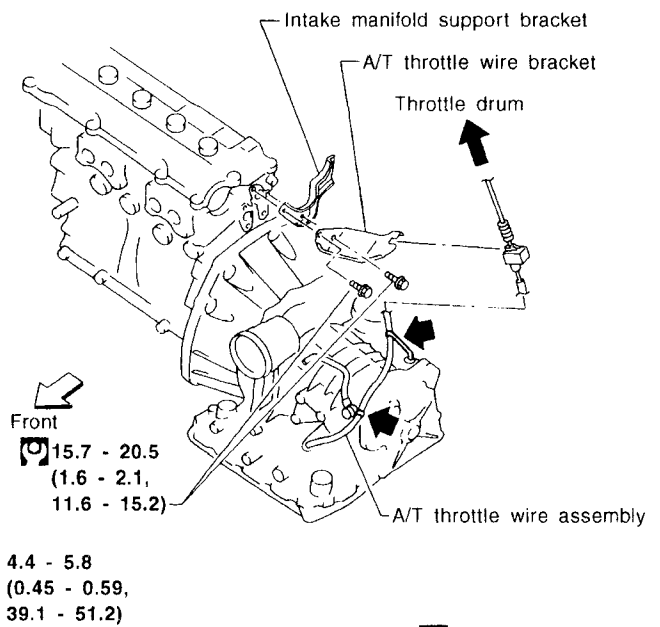
Model 34X70



Model 34X81



Model 34X80



: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

AT

ON-VEHICLE SERVICE

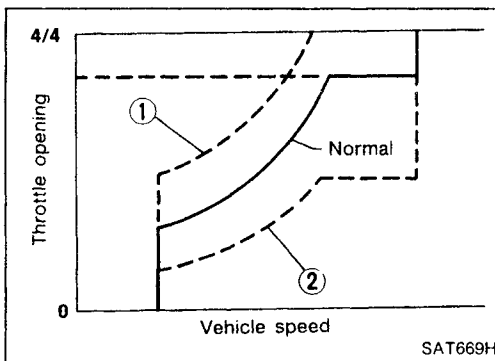
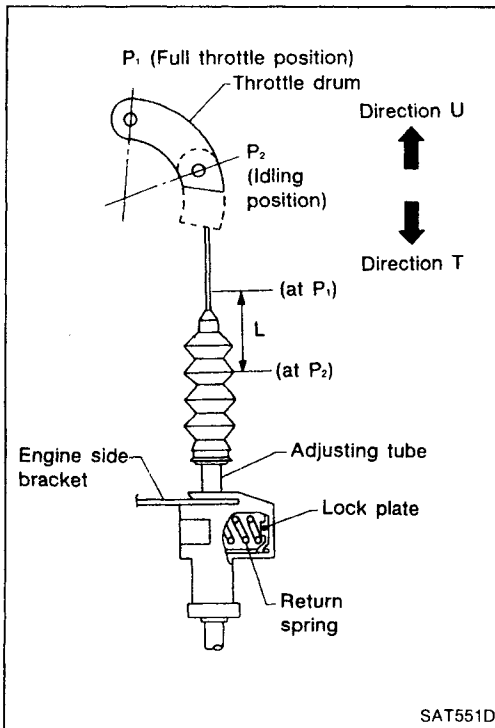
Throttle Wire Adjustment (Cont'd)

1. Turn ignition switch to OFF.
2. While pressing lock plate, move adjusting tube in direction "T" (Transaxle side).
3. Return lock plate.
(Adjusting tube is locked at this time.)
4. Move throttle drum from "P₂" to "P₁" quickly. Adjusting tube moves in direction "U" (Engine side) while depressing the lock plate. Ensure that throttle wire stroke "L" is within the specified range, between full throttle and idle.

Throttle wire stroke "L":

40 - 42 mm (1.57 - 1.65 in)

- **Adjust throttle wire stroke after accelerator wire is installed and adjusted.**
 - **When connecting throttle wire to throttle drum, do not use tools. Manually hook it.**
 - **Put mark on throttle wire to facilitate measuring wire stroke.**
5. Clamp throttle wire at proper positions shown in the illustration after adjusting throttle wire.
 6. After properly adjusting and clamping throttle wire, ensure the parting line is as straight as possible.

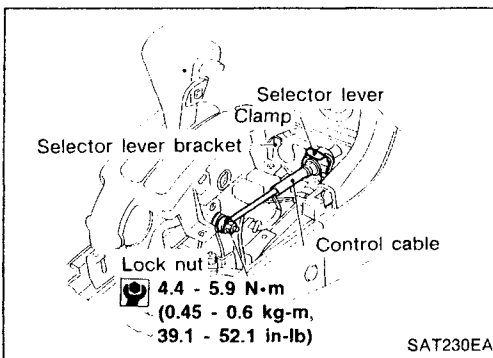
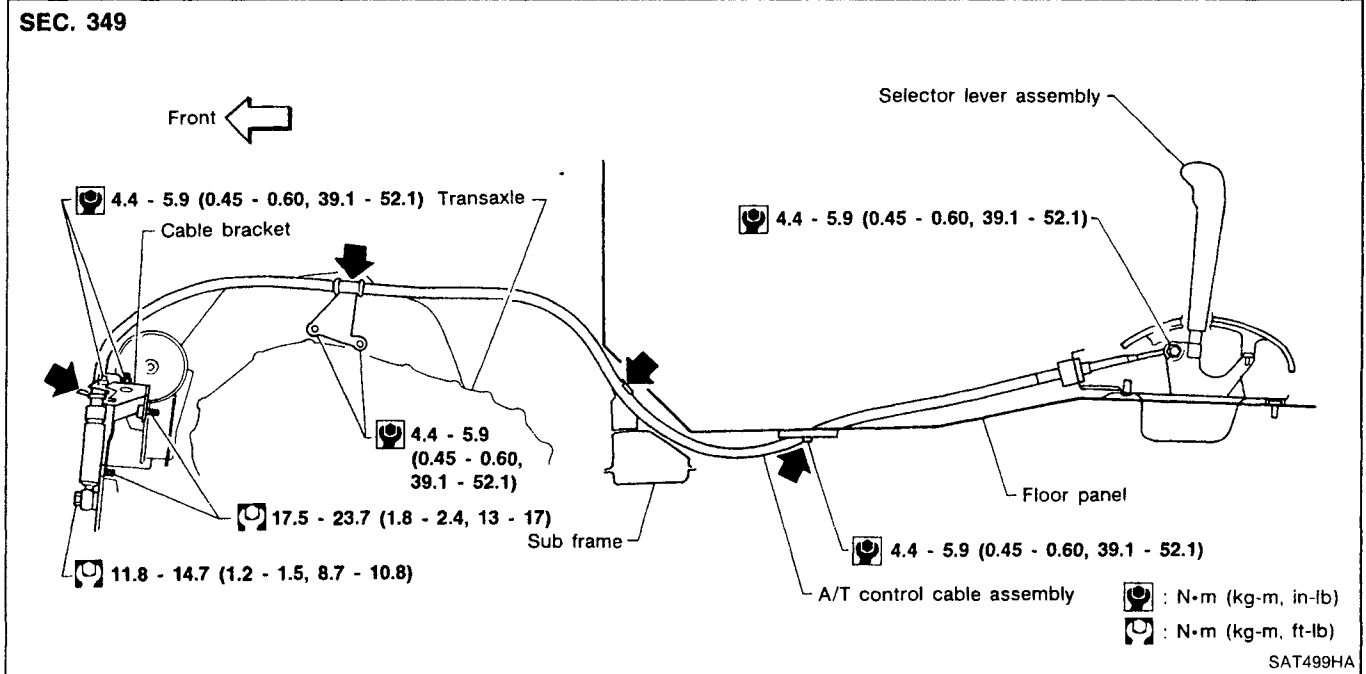


If throttle wire stroke is improperly adjusted the following problems may arise.

- "P₁" is the throttle drum fully-open position. When "P₁" is too far in direction "T", the shift schedule will be ② in the figure. And the kickdown range will greatly increase.
- When "P₁" is too far in direction "U", the shift schedule will be ① in the figure. And the kickdown will not occur.

Control Cable Installation and Adjustment

- Move selector lever from the "P" range to the "1" range. You should be able to feel the detents in each range.
- The control cable needs adjustment in the following cases:
 - 1) When the detents cannot be felt;
 - 2) When the pointer indicating the range is improperly aligned.
- Always adjust control cable when it is removed from selector lever or manual shaft.

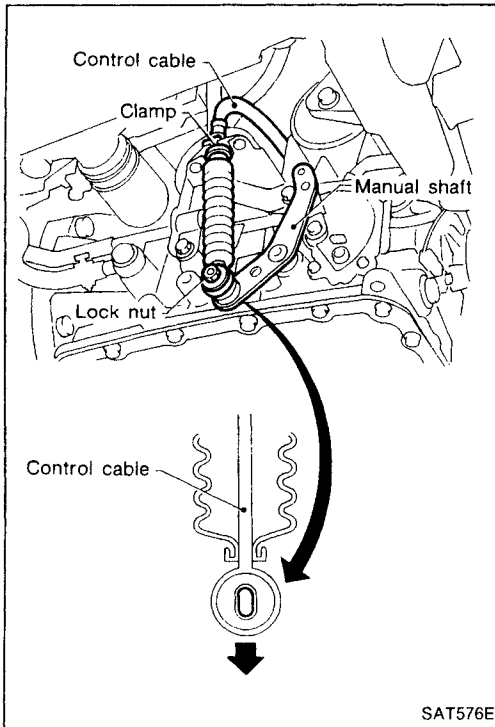


INSTALLATION

1. Place selector lever and manual shaft at "P" position.
2. Connect control cable to selector lever and tighten control cable lock nut. Clamp control cable to selector lever bracket.

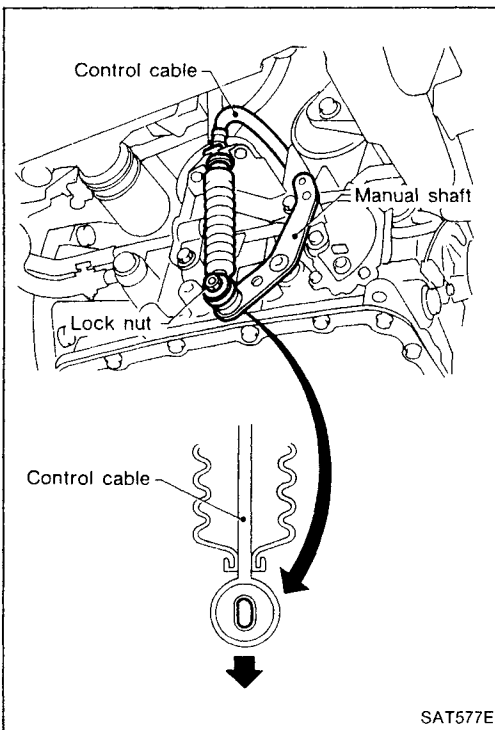
ON-VEHICLE SERVICE

Control Cable Installation and Adjustment (Cont'd)

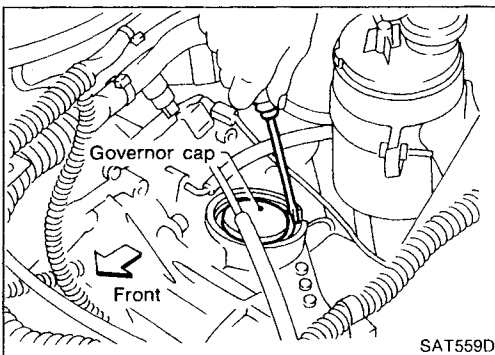


3. Connect control cable to manual shaft and clamp control cable to bracket at transaxle.
4. Pull control cable in the direction of the arrow shown in the illustration by specified force.
Specified force: 6.9 N (0.7 kg, 1.5 lb)
5. Return control cable in the opposite direction of the arrow for 1.0 mm (0.039 in).
6. Tighten control cable lock nut.
7. Move selector lever from "P" position to "1" position. Make sure that selector lever can be moved smoothly without any sliding noise.
8. Apply grease to contacting areas of selector lever and control cable. Install any part removed.

ADJUSTMENT



1. Loosen control cable lock nut at transaxle side.
2. Place selector lever and manual shaft at "P" position.
3. Pull control cable in the direction of the arrow shown in the illustration by specified force.
Specified force: 6.9 N (0.7 kg, 1.5 lb)
4. Return control cable in the opposite direction of the arrow for 1.0 mm (0.039 in).
5. Tighten control cable lock nut.
6. Move selector lever from "P" position to "1" position. Make sure that selector lever can be moved smoothly without any sliding noise.
7. Apply grease to contacting areas of selector lever and control cable.

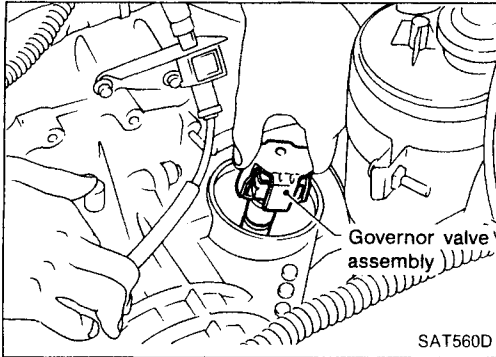


Governor Valve

1. Remove air duct.
2. Remove governor cap snap ring.
3. Remove governor cap.

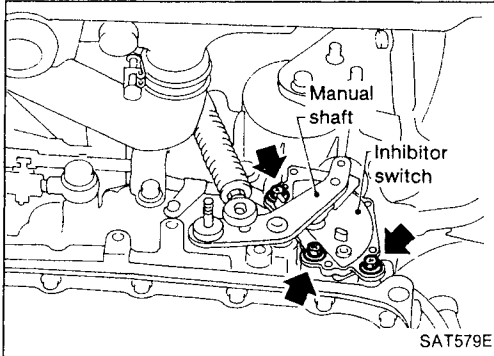
ON-VEHICLE SERVICE

Governor Valve (Cont'd)

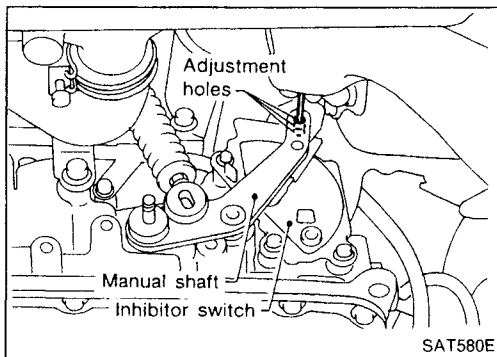


4. Remove governor valve assembly from transaxle.
5. Check governor valve assembly if necessary — Refer to "DISASSEMBLY", AT-65.

Inhibitor Switch Adjustment



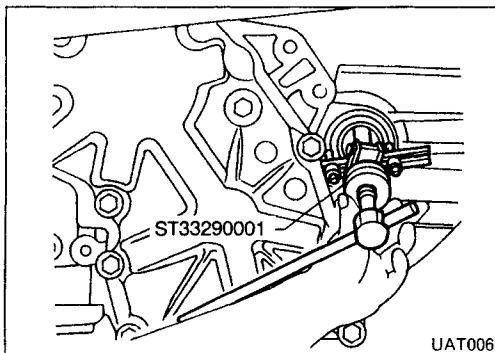
1. Remove control cable end from manual shaft.
2. Set manual shaft in "N" position.
3. Loosen inhibitor switch fixing bolts.



4. Use a 4 mm (0.16 in) pin for this adjustment.
 - a. Insert the pin straight into the manual shaft adjustment hole.
 - b. Rotate inhibitor switch until the pin can also be inserted straight into hole in inhibitor switch.
5. Tighten inhibitor switch fixing bolts.
6. Remove pin from adjustment hole after adjusting inhibitor switch.
7. Reinstall any part removed.
8. Adjust control cable — Refer to "Control Cable Installation and Adjustment", AT-35.
9. Check continuity of inhibitor switch — Refer to "Electrical Components Inspection", AT-30.

AT

Differential Side Oil Seal Replacement



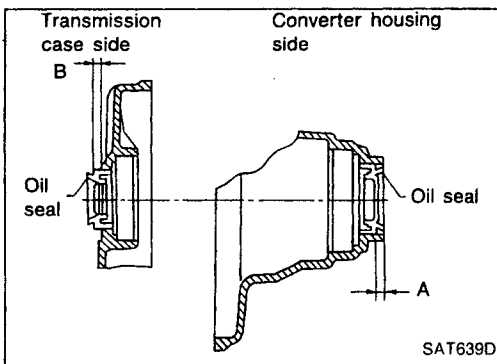
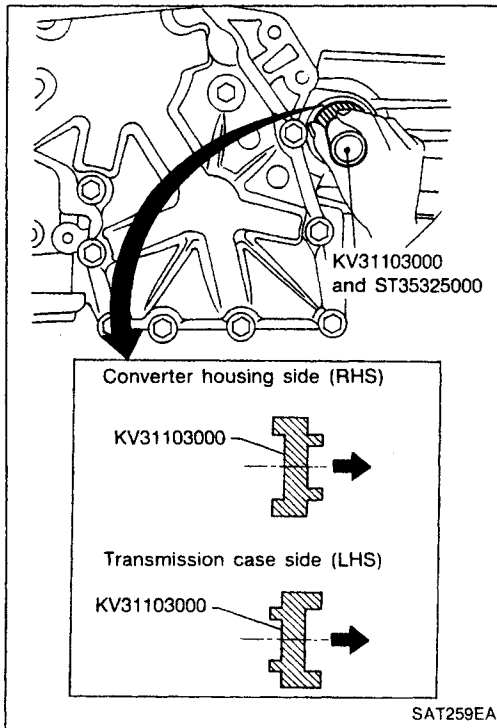
1. Remove drive shaft assemblies. — Refer to FA section ("Removal", "FRONT AXLE — Drive Shaft").
2. Remove oil seals.

ON-VEHICLE SERVICE

Differential Side Oil Seal Replacement (Cont'd)

3. Install oil seals.

- Apply ATF to oil seal surface before installing.



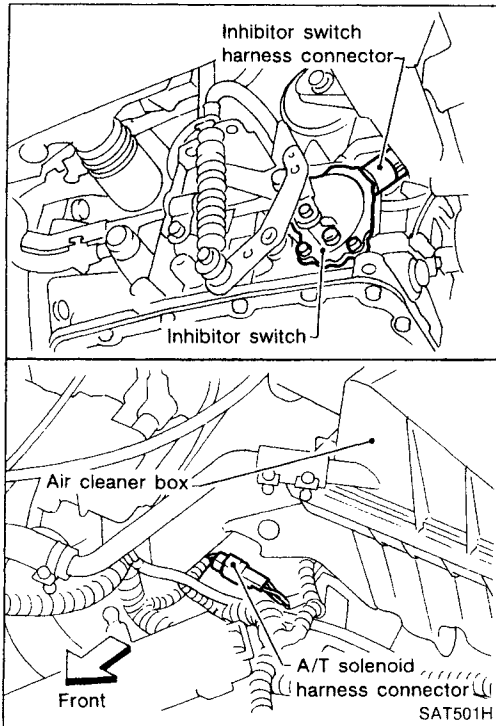
- Install oil seals so that dimensions "A" and "B" are within specifications.

Unit: mm (in)

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

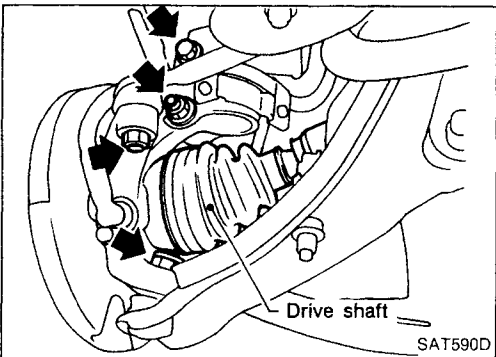
4. Reinstall any part removed.

REMOVAL AND INSTALLATION



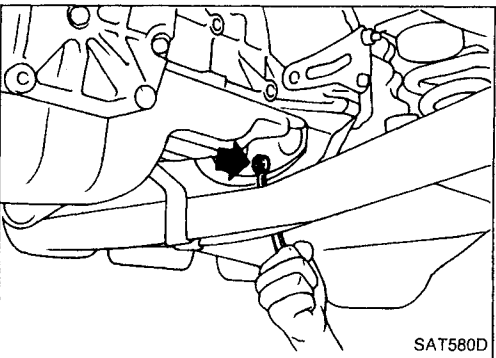
Removal

- Remove battery and bracket.
- Remove air duct.
- Disconnect A/T solenoid harness connector, inhibitor switch harness connector and speedometer pinion harness connector.
- Disconnect throttle wire at engine side.
- Drain ATF.
- Remove undercover and side cover.
- Disconnect control cable from transaxle.
- Disconnect oil cooler hoses.



- Remove drive shafts — Refer to FA section ("Removal", "FRONT AXLE — Drive Shaft").
- Remove exhaust front tube.
- Remove starter motor from transaxle.

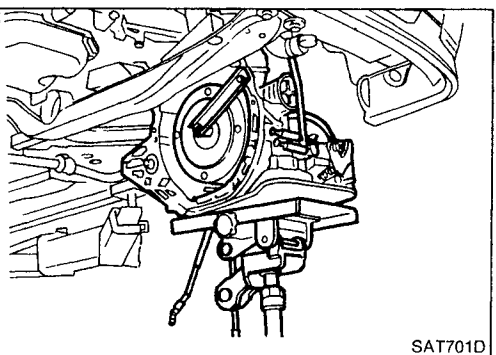
AT



- Remove front and rear gussets and engine rear plate.
- Remove bolts securing torque converter to drive plate.

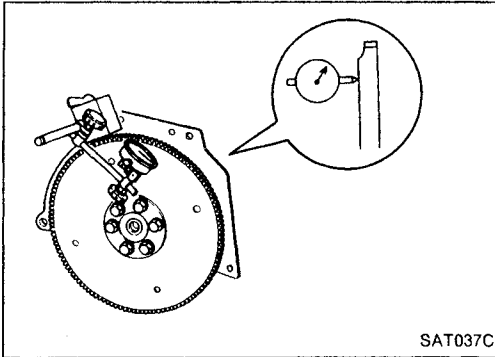
Rotate crankshaft for access to securing bolts.

- Support engine by placing a jack under oil pan.
- Do not place jack under oil pan drain plug.**



- Support transaxle with a jack.
- Remove LH and rear mountings from transaxle.
- Remove bolts fixing A/T to engine.
- Lower transaxle while supporting it with a jack.

REMOVAL AND INSTALLATION



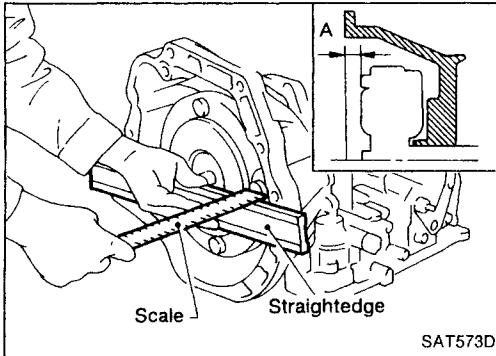
Installation

- Drive plate runout

Maximum allowable runout:

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

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



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

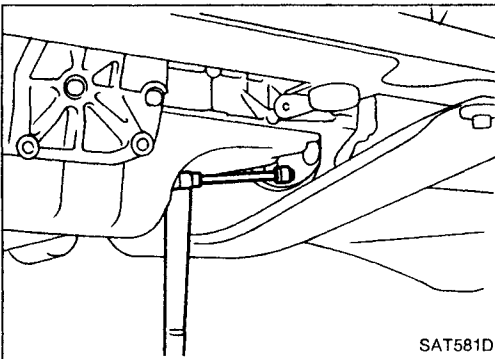
Distance "A":

Except model 34X81

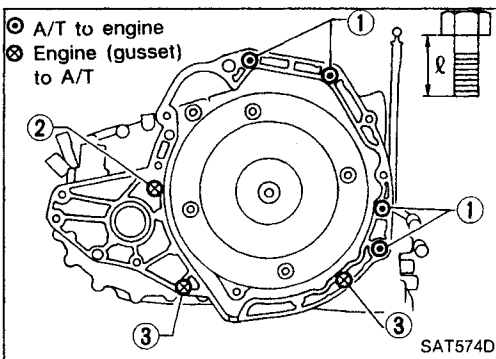
21.1 mm (0.831 in) or more

Model 34X81

15.9 mm (0.626 in) or more



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



- Tighten bolts fixing transaxle

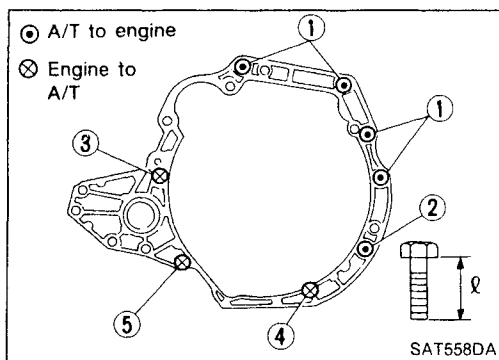
GA engine models

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

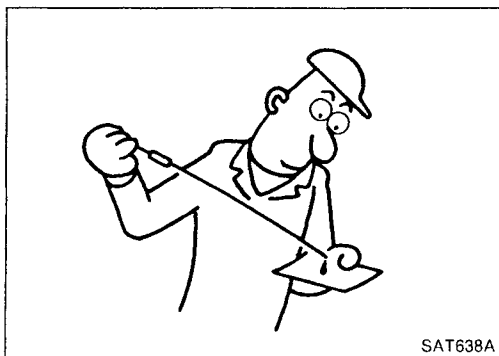
REMOVAL AND INSTALLATION

Installation (Cont'd)

SR engine models



Bolt No.	Tightening torque N·m (kg-m, ft-lb)	Bolt length "L" mm (in)
①	70 - 79 (7.1 - 8.1, 51 - 59)	55 (2.17)
②	70 - 79 (7.1 - 8.1, 51 - 59)	50 (1.97)
③	70 - 79 (7.1 - 8.1, 51 - 59)	65 (2.56)
④	30 - 40 (3.1 - 4.1, 22 - 30)	25 (0.98)
⑤	30 - 40 (3.1 - 4.1, 22 - 30)	40 (1.57)



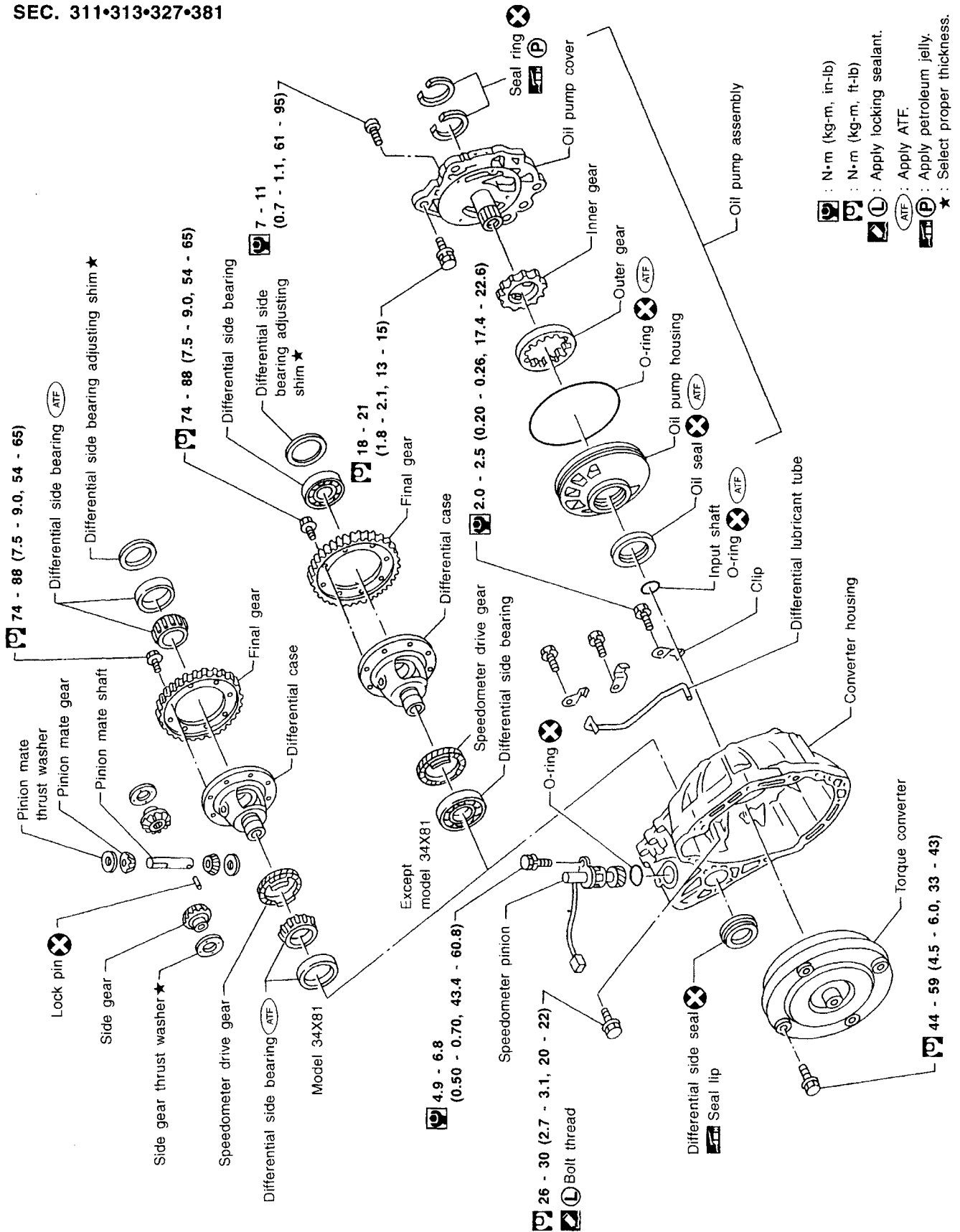
- Reinstall any part removed.
- Adjust throttle wire and control cable. Refer to "ON-VEHICLE SERVICE", AT-33, 35.
- Check inhibitor switch. Refer to "Electrical Components Inspection", AT-30.
- Refill transaxle with ATF and check fluid level, AT-17.
- Move selector lever through all positions to be sure that transaxle operates correctly. With parking brake applied, idle engine. Move selector lever through "N" to "D", to "2", to "1" and "R". A slight shock should be felt through the hand gripping the selector each time the transaxle is shifted.
- Perform road test — Refer to "ROAD TESTING", AT-17.

AT

MAJOR OVERHAUL

All Models

SEC. 311•313•327•381



AT

AT



AT

Except Model 34X81

[illegible]

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

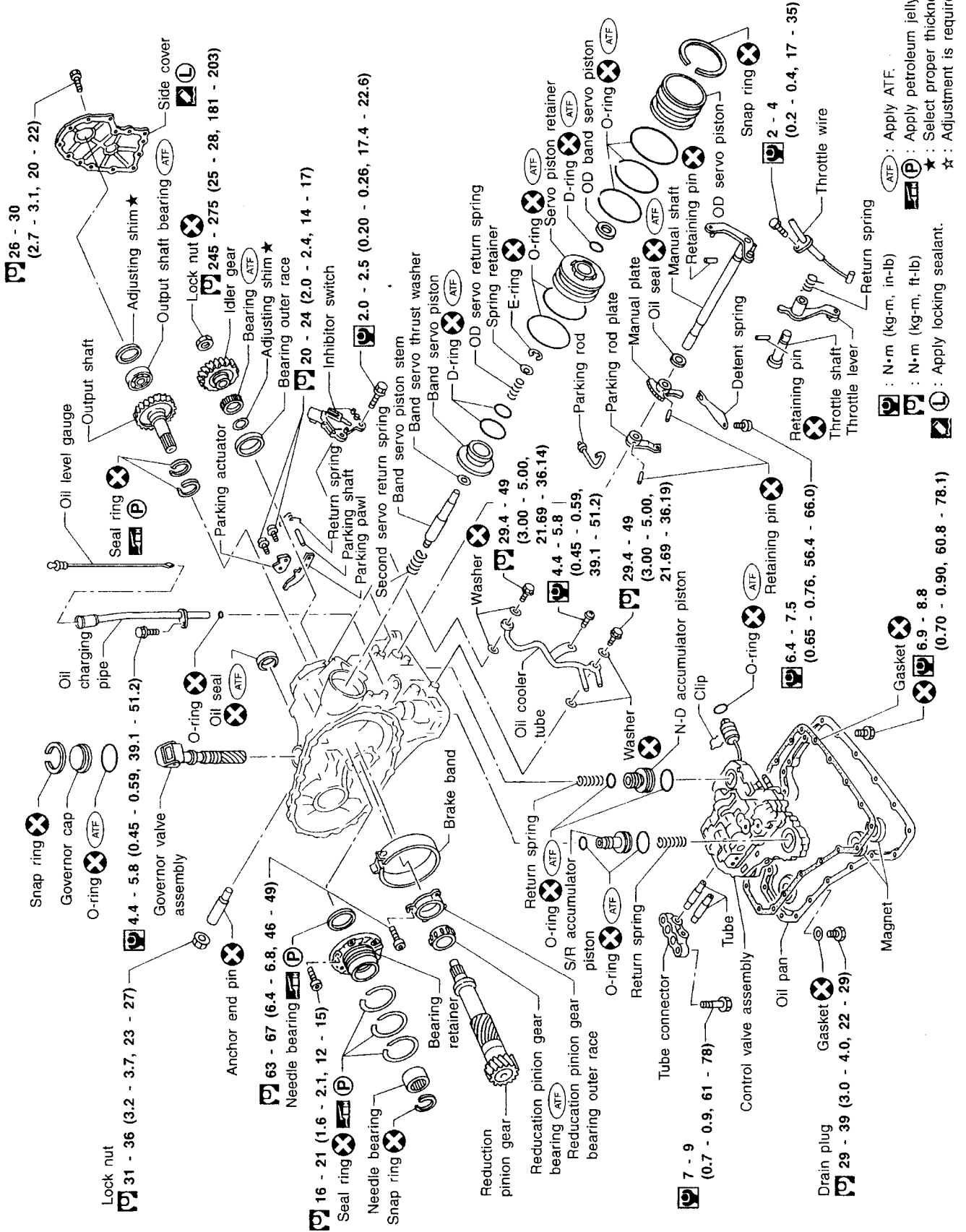
0.9 - 0.8
(0.70 - 0.90, 60.8 - 78.1)

— Gasket   6.9 - 8.8
(0.70 - 0.9)

MAJOR OVERHAUL

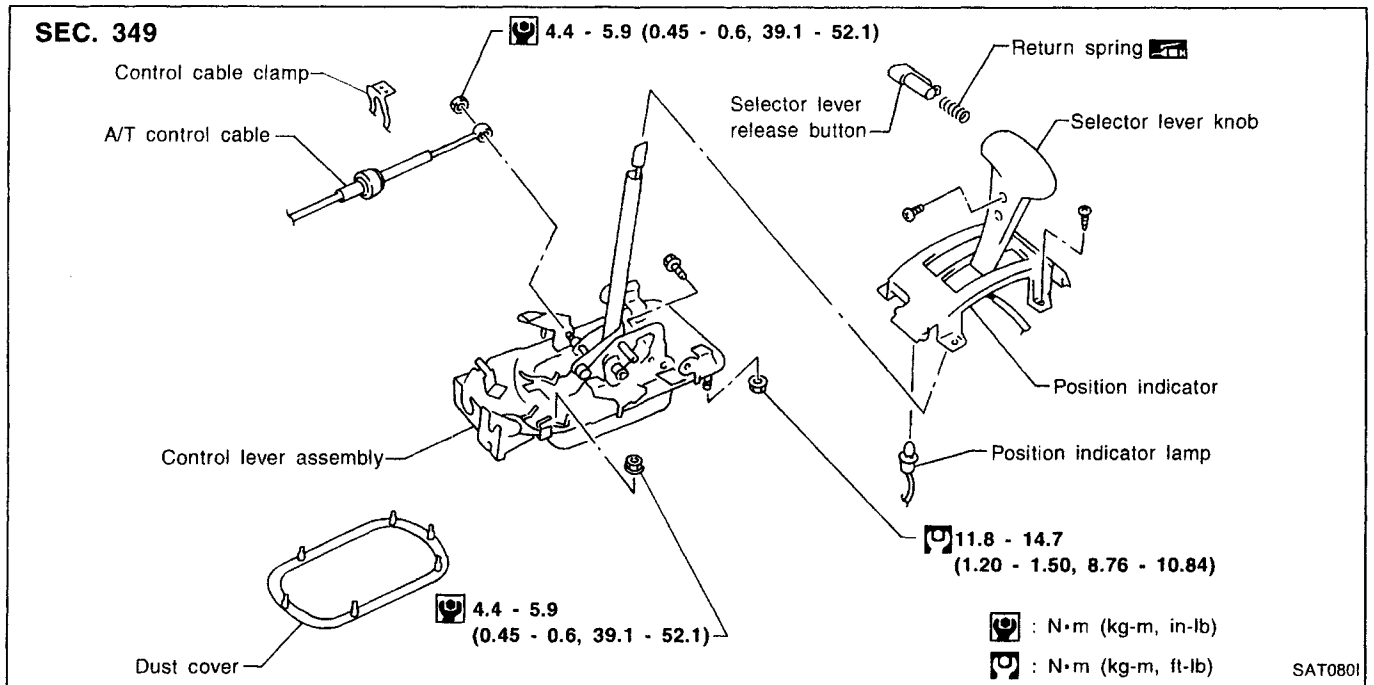
Model 34X81

SEC. 310•311•312•314•315•317•319



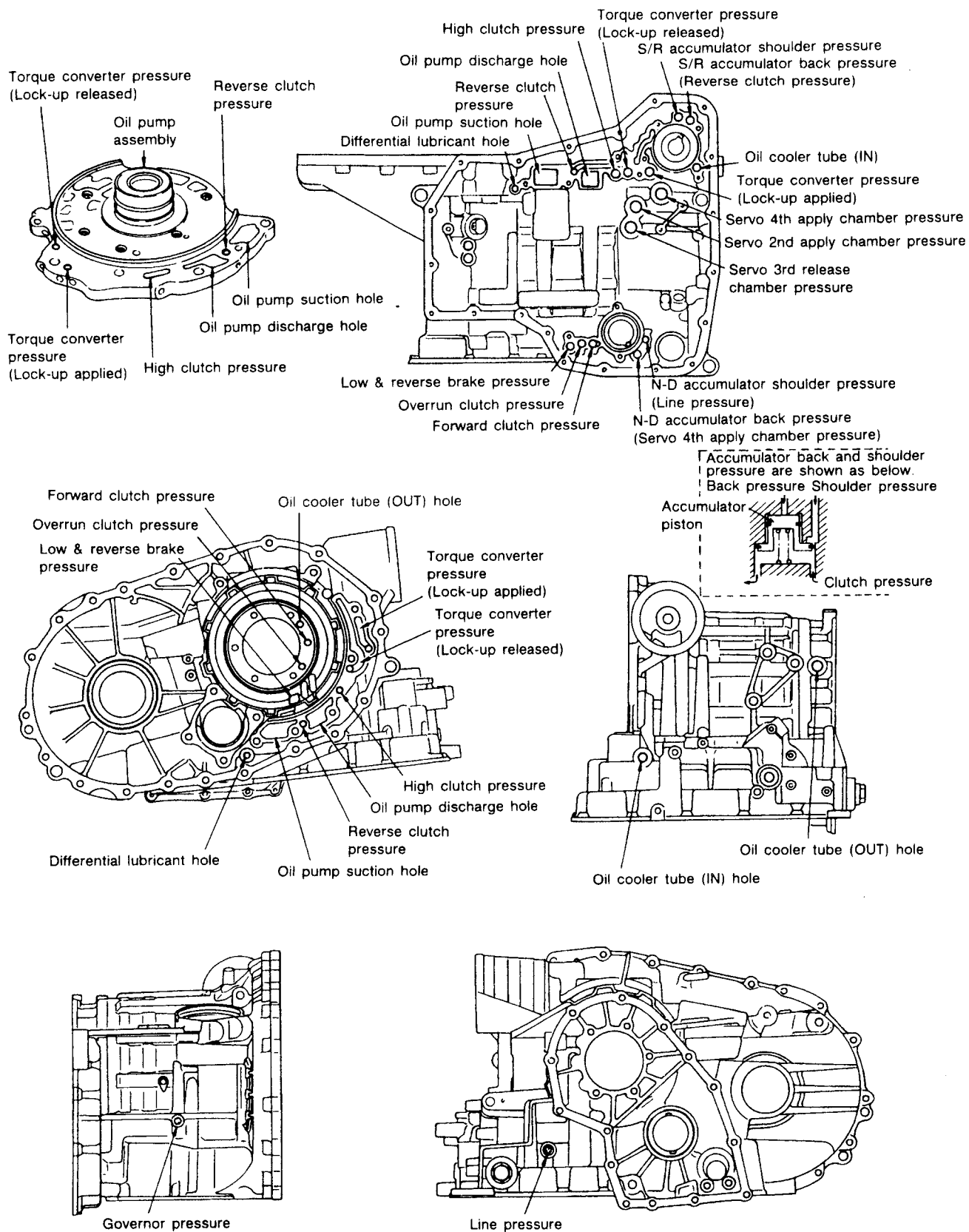
MAJOR OVERHAUL

Shift Control Components



MAJOR OVERHAUL

Oil Channel



AT

MAJOR OVERHAUL

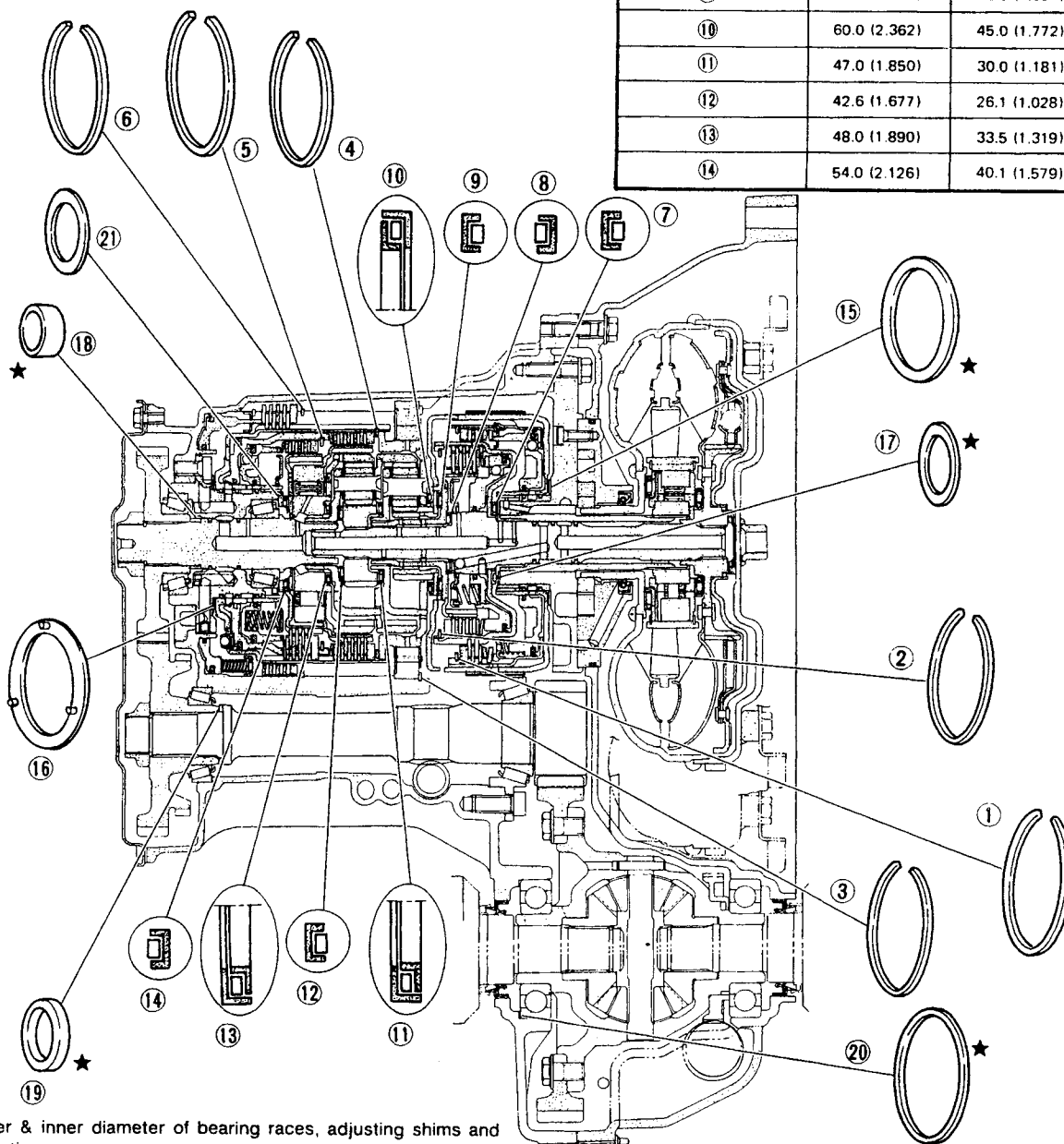
Locations of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings — Except Model 34X81

Outer diameter and color of thrust washers

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

Outer and inner diameter of needle bearings

Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑦	47.0 (1.850)	32.0 (1.260)
⑧	35.0 (1.378)	20.1 (0.791)
⑨	60.0 (2.362)	42.0 (1.654)
⑩	60.0 (2.362)	45.0 (1.772)
⑪	47.0 (1.850)	30.0 (1.181)
⑫	42.6 (1.677)	26.1 (1.028)
⑬	48.0 (1.890)	33.5 (1.319)
⑭	54.0 (2.126)	40.1 (1.579)



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

Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑰	48.0 (1.890)	33.0 (1.299)
⑱	29.0 (1.142)	25.0 (0.984)
⑲	34.5 (1.358)	26.1 (1.028)
⑳	79.5 (3.130)	72.0 (2.835)
㉑	55.0 (2.165)	42.0 (1.654)

★: Select proper thickness.

Outer diameter of snap rings

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

MAJOR OVERHAUL

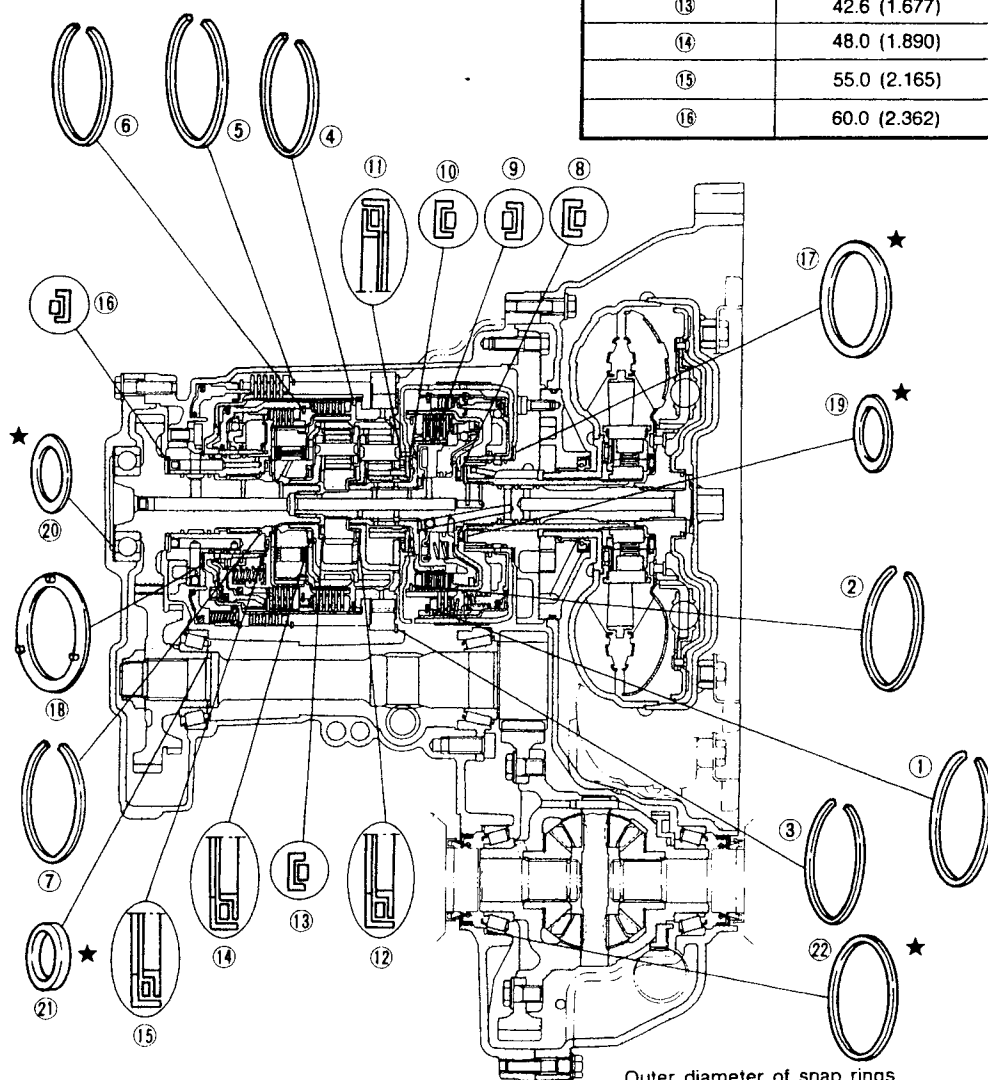
Locations of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings — Model 34X81

Outer diameter and color of thrust washers

Item number	Outer diameter mm (in)	Color
⑬	72.0 (2.835)	Black
⑭	78.5 (3.091)	

Outer & inner diameter of needle bearings

Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑧	47.0 (1.850)	32.0 (1.260)
⑨	35.0 (1.378)	20.0 (0.787)
⑩	60.0 (2.362)	42.0 (1.654)
⑪	60.0 (2.362)	45.0 (1.772)
⑫	47.0 (1.850)	30.0 (1.181)
⑬	42.6 (1.677)	26.1 (1.028)
⑭	48.0 (1.890)	33.5 (1.319)
⑮	55.0 (2.165)	40.5 (1.594)
⑯	60.0 (2.362)	40.1 (1.579)



★ : Select proper thickness.

Outer & inner diameter of bearing race and adjusting shims

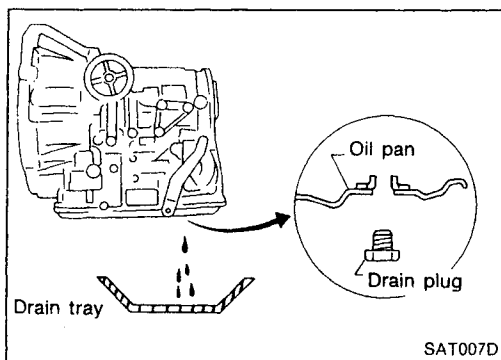
Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑮	48.0 (1.890)	33.0 (1.299)
⑯	72.0 (2.835)	61.0 (2.402)
⑰	34.5 (1.358)	26.1 (1.028)
⑱	68.0 (2.677)	60.0 (2.362)

Outer diameter of snap rings

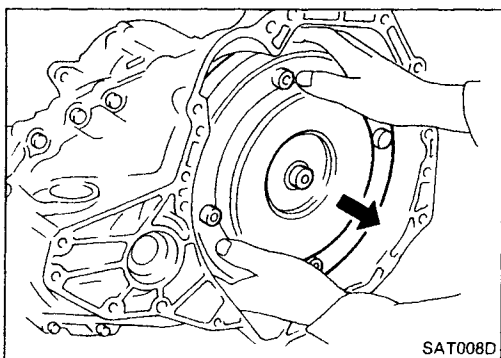
Item number	Outer diameter mm (in)
①	142.0 (5.59)
②	113.0 (4.45)
③	162.4 (6.39)
④	135.4 (5.33)
⑤	161.5 (6.36)
⑥	126.0 (4.96)
⑦	40.5 (1.594)

AT

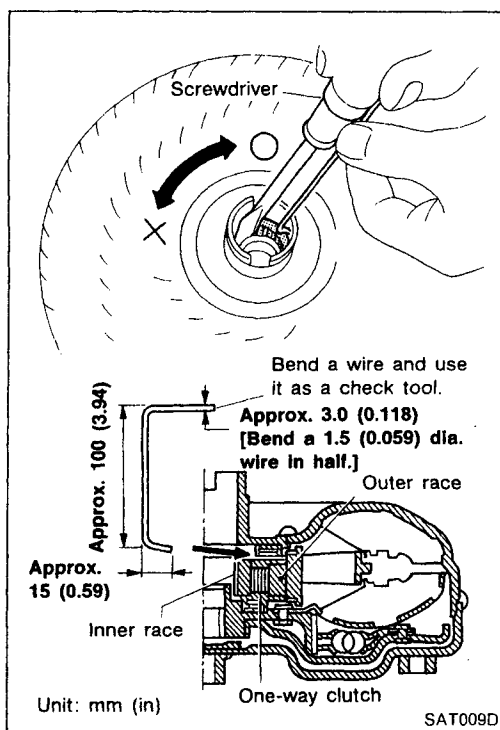
DISASSEMBLY



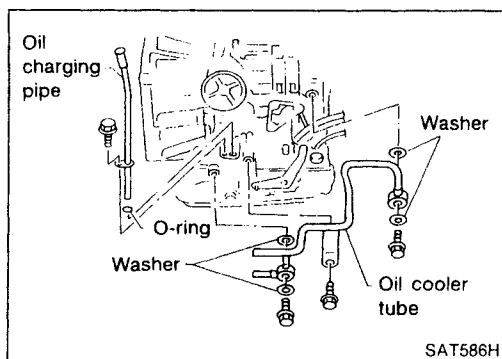
1. Drain ATF through drain plug.



2. Remove torque converter.

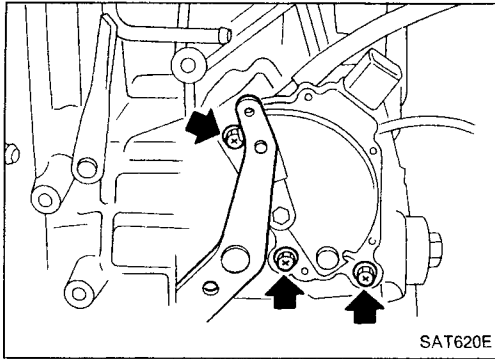


3. Check torque converter one-way clutch using check tool as shown at left.
 - a. Insert check tool into the groove of bearing support built into one-way clutch outer race.
 - b. While fixing bearing support with check tool, rotate one-way clutch spline using flat-bladed screwdriver.
 - c. Check inner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

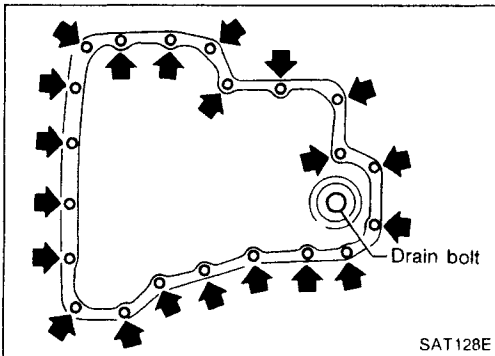


4. Remove oil charging pipe and oil cooler tube.

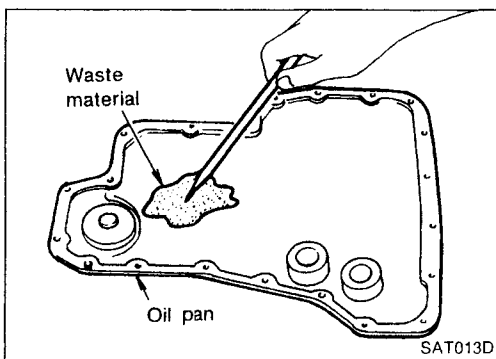
DISASSEMBLY



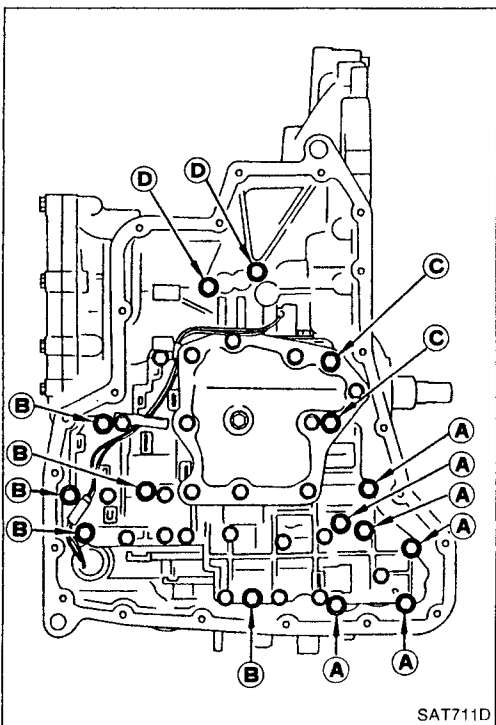
5. Set manual shaft to "P" position.
6. Remove inhibitor switch.



7. Remove oil pan and oil pan gasket.
 - Do not reuse oil pan bolts.



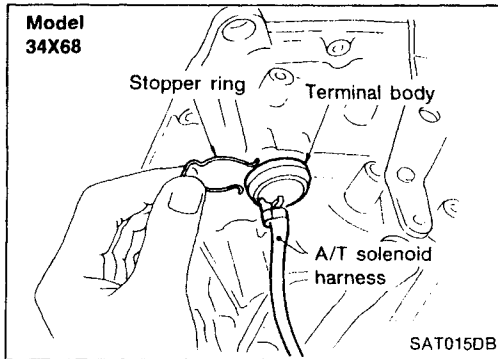
8. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves,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



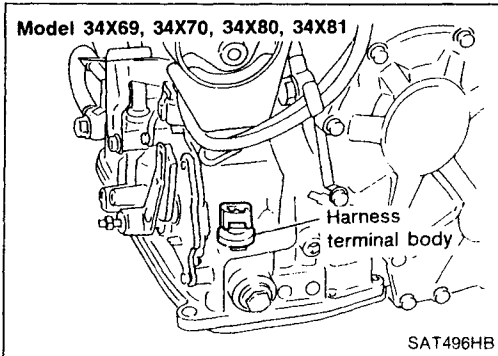
9. Remove control valve assembly according to the following procedures.
 - a. Remove control valve assembly mounting bolts (A), (B), (C) and (D).

AT

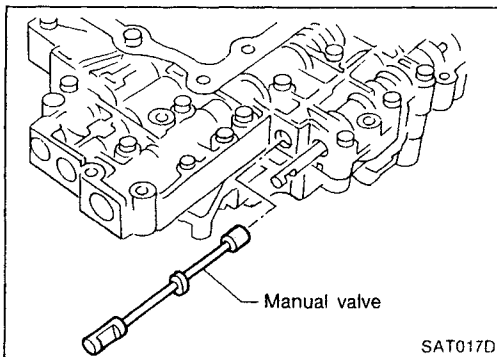
DISASSEMBLY



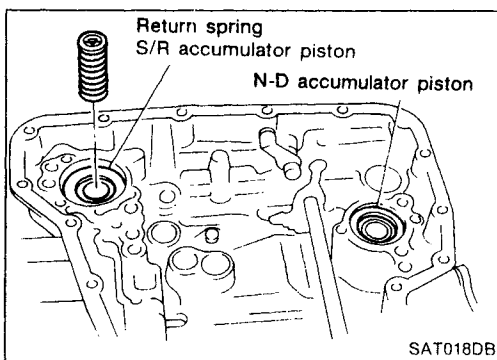
b. Remove stopper ring from terminal body.



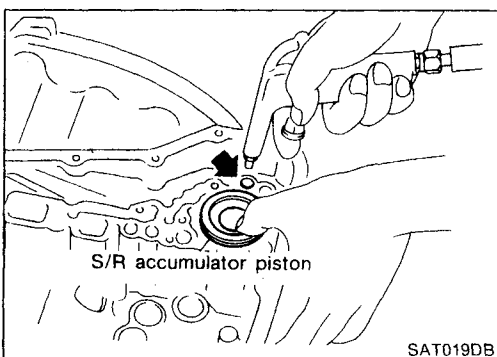
c. Push terminal body into transmission case and draw out solenoid harness.



10. Remove manual valve from control valve assembly.



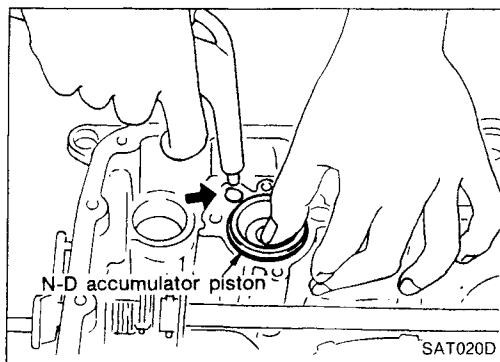
11. Remove return spring from S/R accumulator piston.



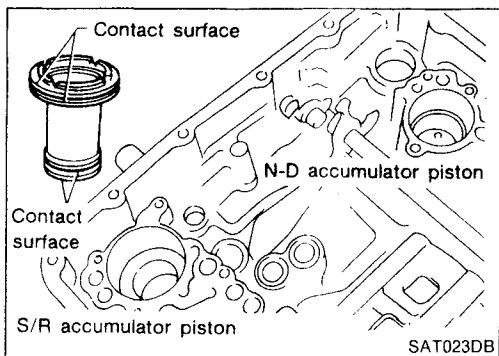
12. Remove S/R accumulator piston with compressed air.

13. Remove O-rings from S/R accumulator piston.

DISASSEMBLY



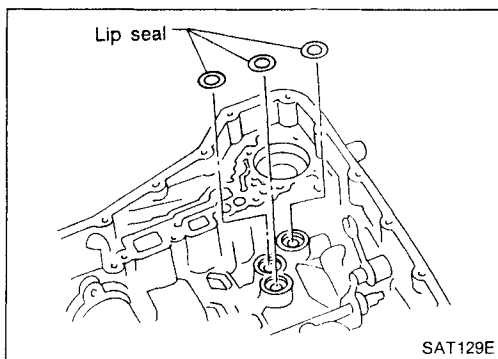
14. Remove N-D accumulator piston and return spring with compressed air.
15. Remove O-rings from N-D accumulator piston.



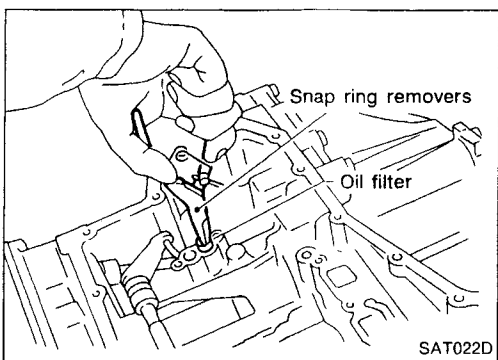
16. Check accumulator pistons and contact surface of transmission case for damage.
17. Check accumulator return springs for damage and free length.

Unit: mm (in)

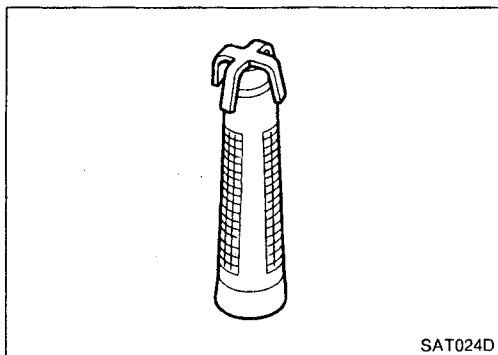
Spring	Free length	Outer diameter
S/R accumulator spring	56.4 (2.220)	21.0 (0.827)
N-D accumulator spring	43.5 (1.713)	28.0 (1.102)



18. Remove lip seals from band servo oil port.



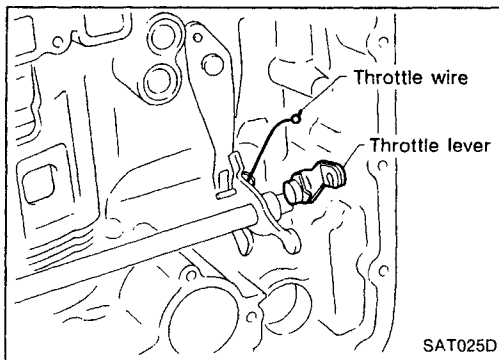
19. Remove oil filter for governor.



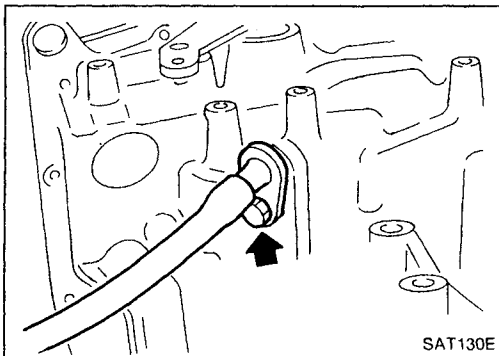
20. Check oil filter for governor for damage or clogging.

AT

DISASSEMBLY

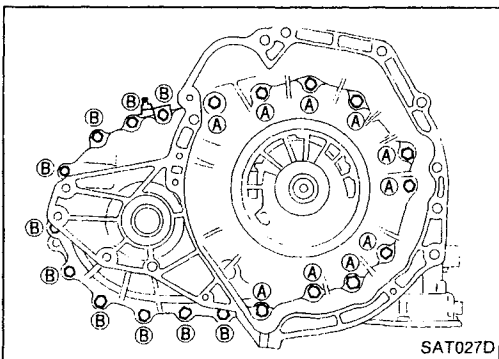


21. Remove throttle wire from throttle lever.



22. Remove throttle wire mounting bolt.

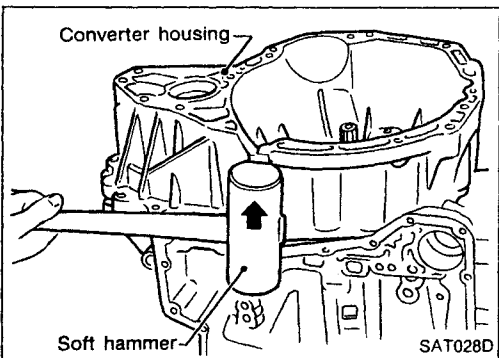
23. Draw out throttle wire from transmission case.



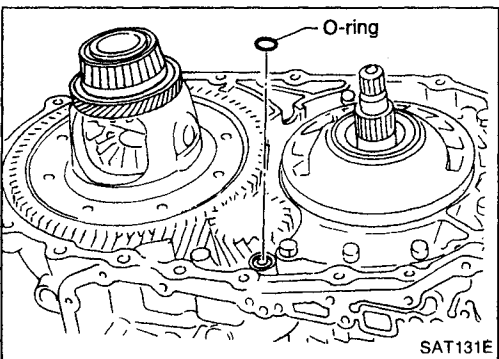
— All models —

24. Remove converter housing according to the following procedures.

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

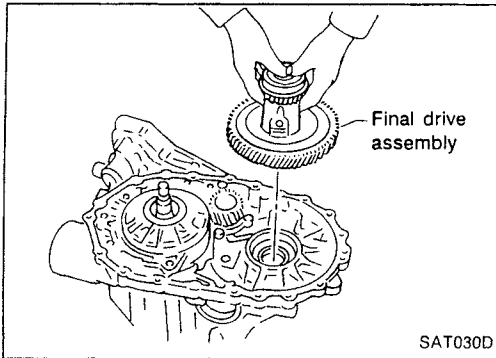


b. Remove converter housing.

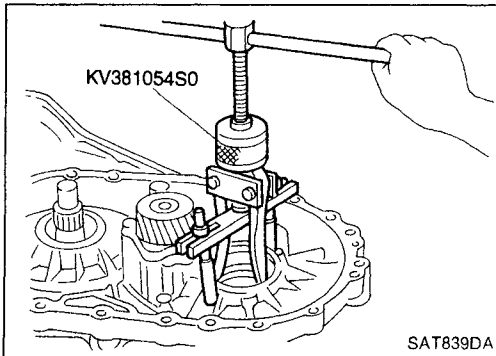


c. Remove O-ring from differential oil port.

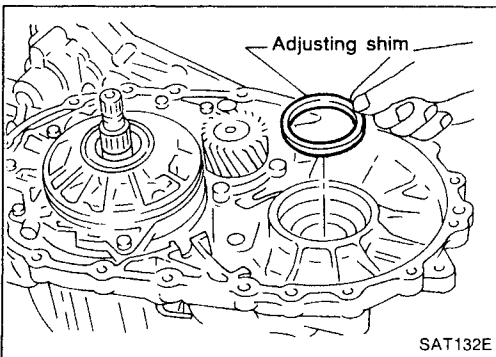
DISASSEMBLY



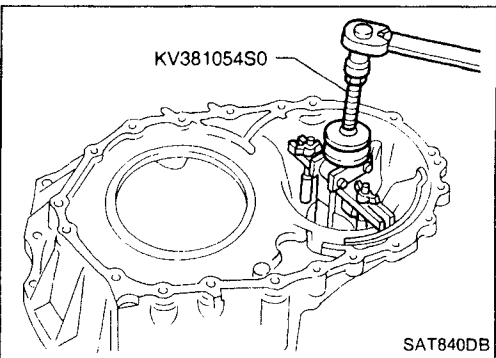
25. Remove final drive assembly from transmission case.
- If it is difficult to lift up by hand, tap final drive slightly with a soft hammer (Except model 34X81).



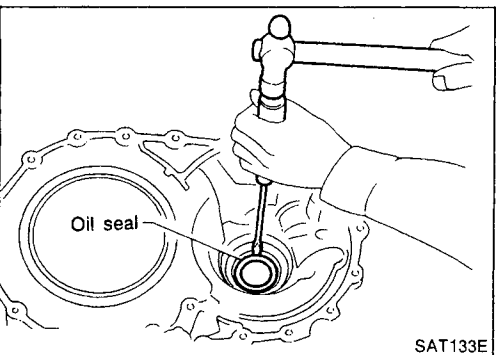
26. Remove differential side bearing outer race from transmission case (Model 34X81).



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



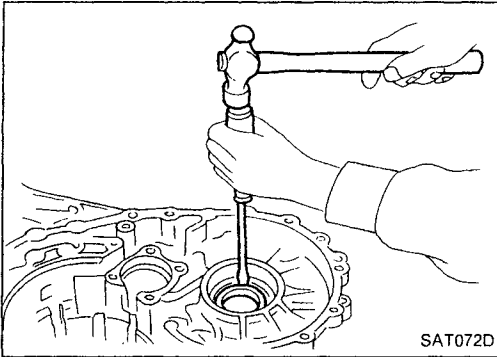
28. Remove differential side bearing outer race from converter housing (Model 34X81).



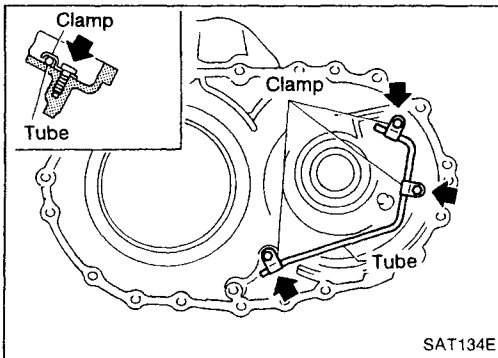
29. Remove oil seal from converter housing using a screwdriver.
- Be careful not to damage case.

AT

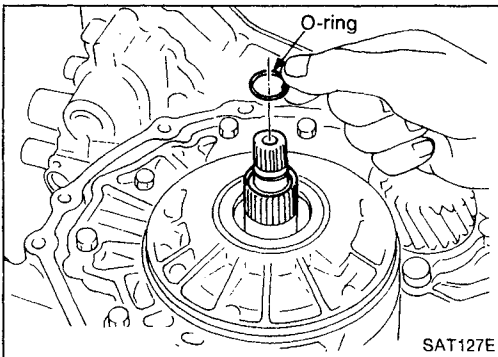
DISASSEMBLY



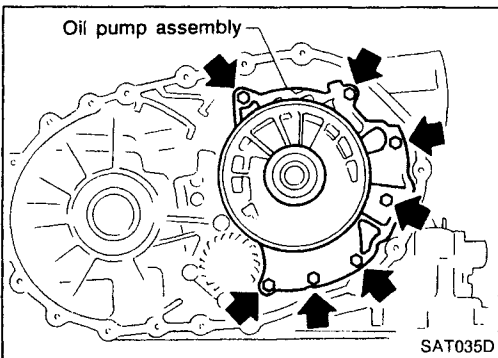
30. Remove side oil seal from transmission case using a screwdriver.



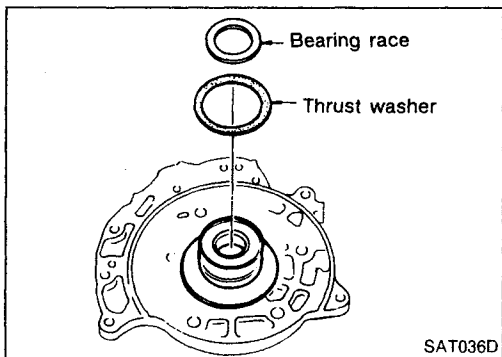
31. Remove oil tube from converter housing.



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

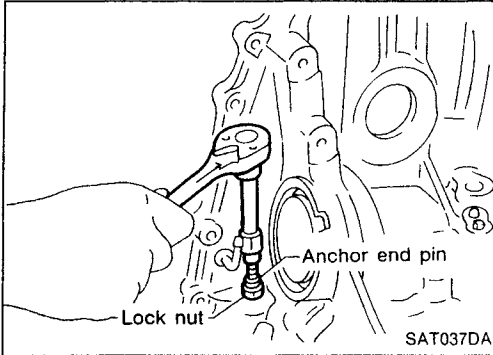


b. Remove oil pump assembly from transmission case.

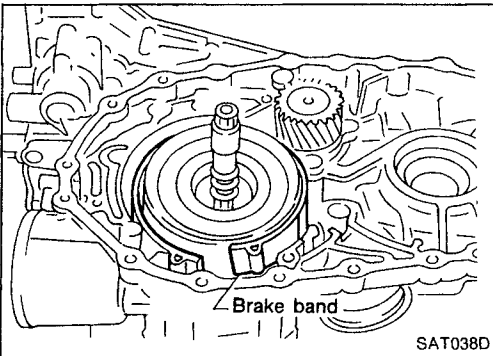


c. Remove thrust washer and bearing race from oil pump assembly.

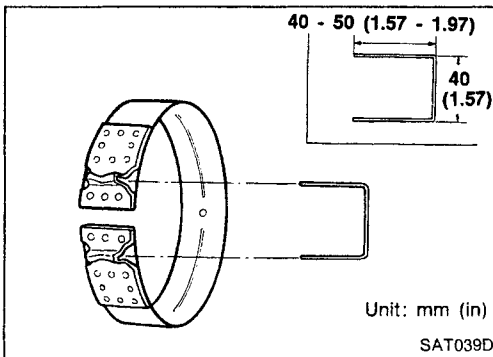
DISASSEMBLY



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

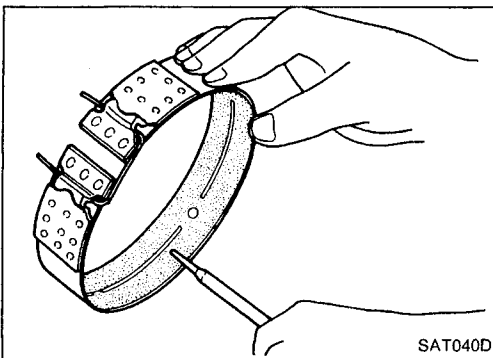


- Remove brake band from transmission case.

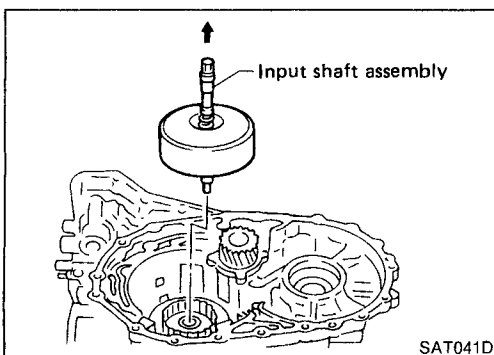


- To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at left. Leave the clip in position after removing the brake band.**

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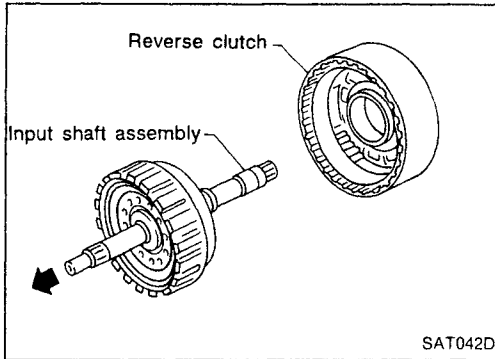


- Check brake band facing for damage, cracks, wear or burns.

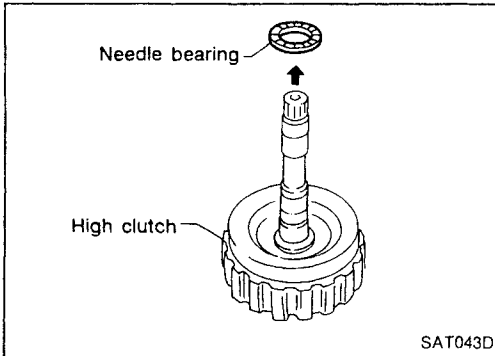


34. Remove input shaft assembly (high clutch) and reverse clutch according to the following procedures.
- Remove input shaft assembly (high clutch) with reverse clutch.

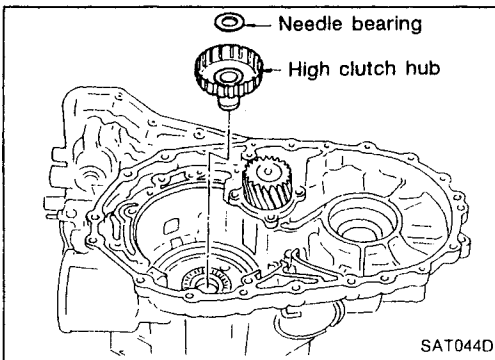
DISASSEMBLY



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

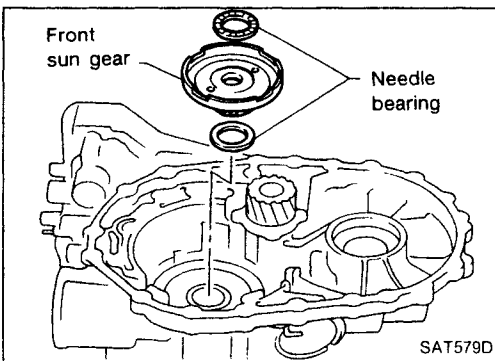


- c. Remove needle bearing from high clutch drum.
d. Check input shaft assembly and needle bearing for damage or wear.



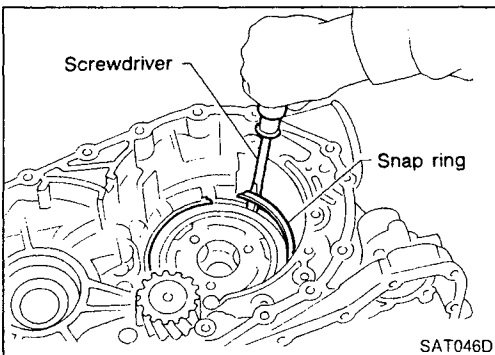
35. Remove high clutch hub and needle bearing from transmission case.

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



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

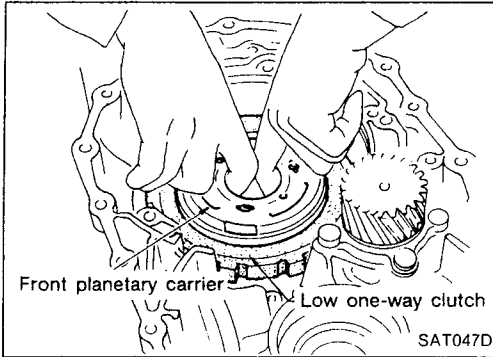
38. Check front sun gear and needle bearings for damage or wear.



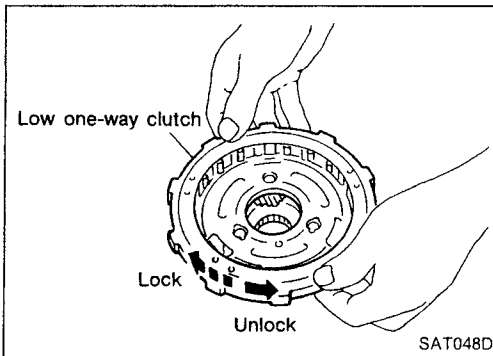
39. Remove front planetary carrier assembly and low one-way clutch according to the following procedures.

- a. Remove snap ring using a screwdriver.

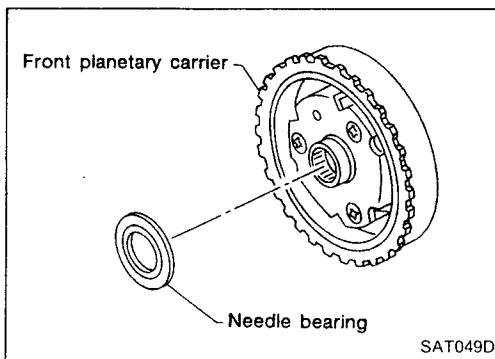
DISASSEMBLY



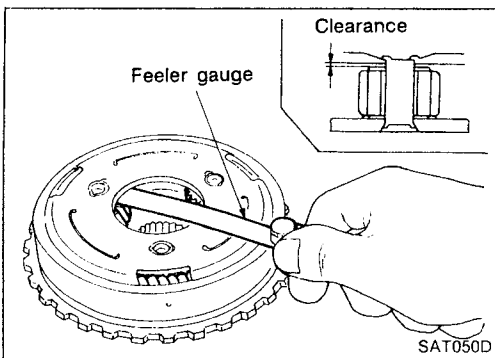
- b. Remove front planetary carrier with low one-way clutch.



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



- e. Remove needle bearing from front planetary carrier.

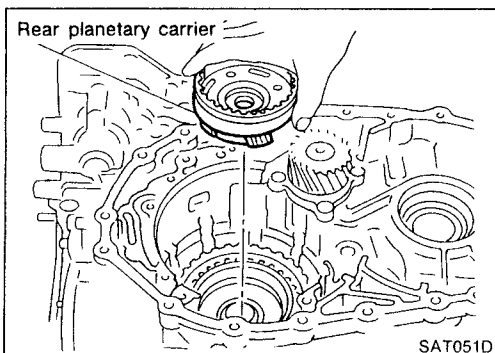


- f. Check front planetary carrier, low one-way clutch and needle bearing for damage or wear.
g. Check clearance between pinion washer and planetary carrier using feeler gauge.

Standard clearance:

0.15 - 0.70 mm (0.0059 - 0.0276 in)

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

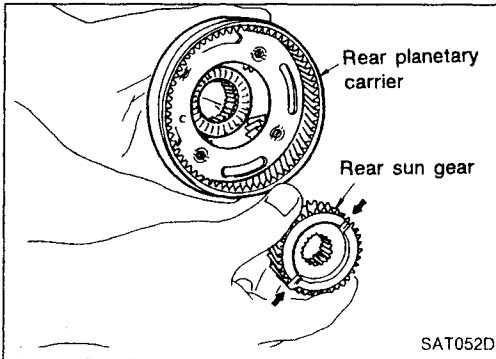


40. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.

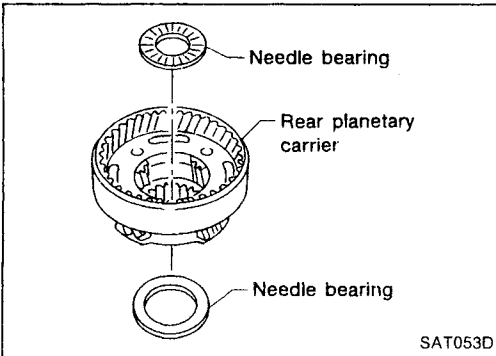
- a. Remove rear planetary carrier assembly from transmission case.

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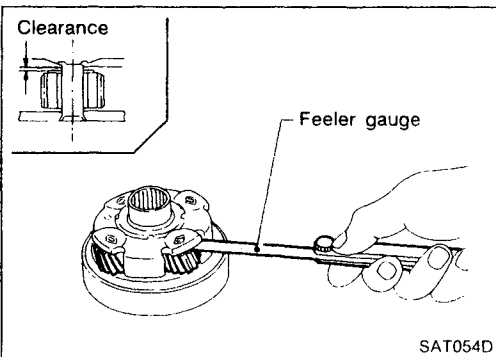
DISASSEMBLY



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



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



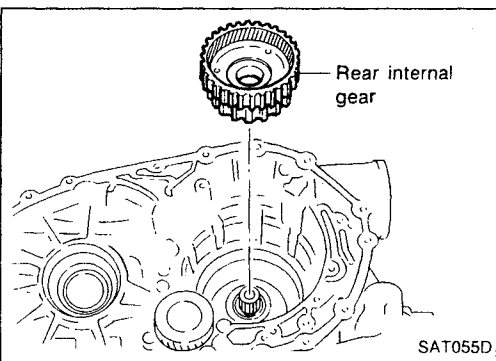
- d. Check rear planetary carrier, rear sun gear and needle bearings for damage or wear.

- e. Check clearance between pinion washer and rear planetary carrier using feeler gauge.

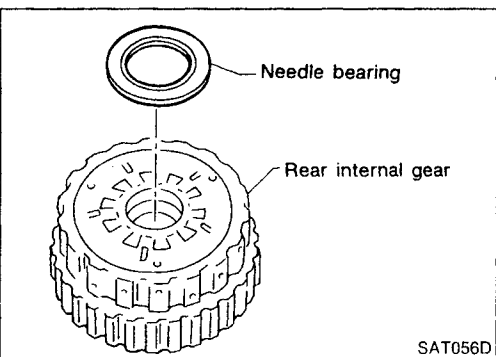
Standard clearance:

0.15 - 0.70 mm (0.0059 - 0.0276 in)

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



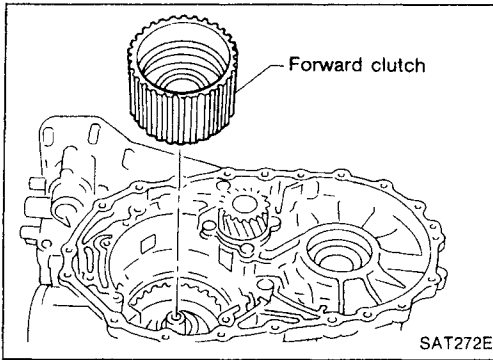
41. Remove rear internal gear from transmission case.



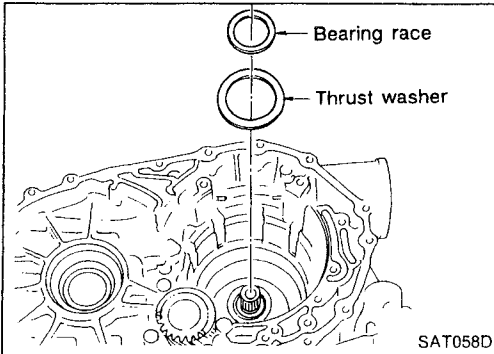
42. Remove needle bearing from rear internal gear.

43. Check needle bearing for damage or wear.

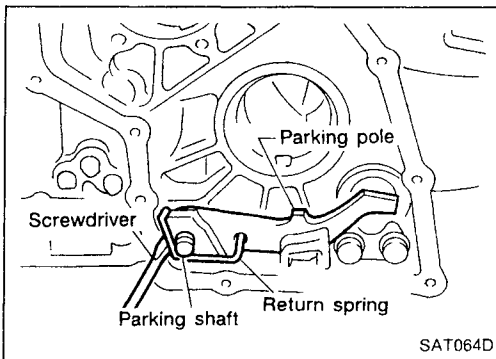
DISASSEMBLY



44. Remove forward clutch assembly from transmission case.

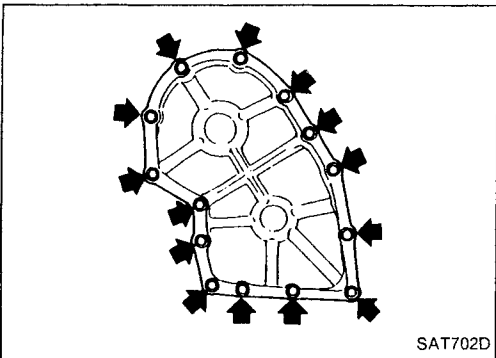


45. Remove thrust washer and bearing race from transmission case.



— All models —

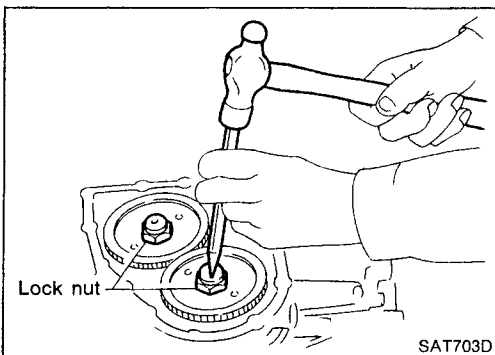
46. Remove return spring from parking shaft using a screwdriver.



— Except model 34X81 —

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

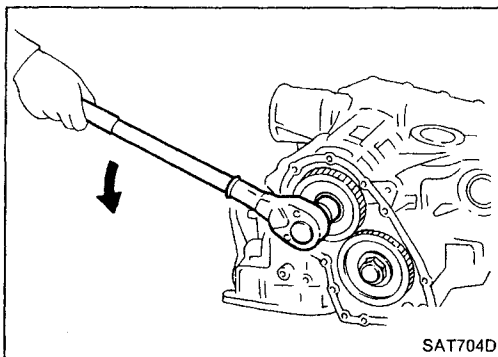
- a. Remove side cover.
- **Do not reuse side cover bolts.**



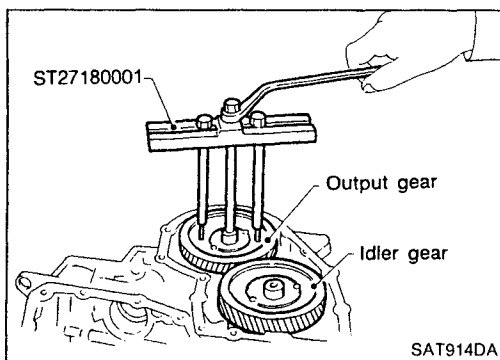
- b. Set manual lever to "P" position to fix idler gear and output gear.
- c. Unlock both idler gear and output gear lock nuts using a pin punch.

AT

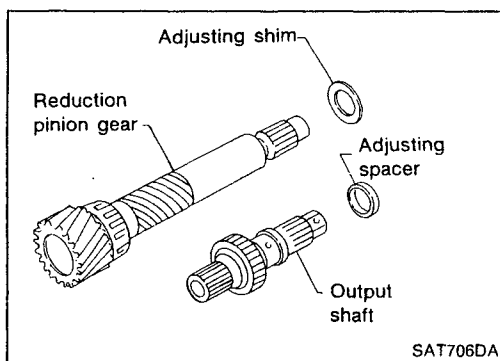
DISASSEMBLY



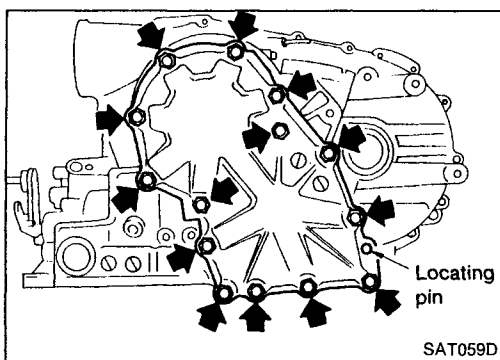
- d. Remove idler gear and output gear lock nuts.
 ● **Do not reuse idler gear and output gear lock nuts.**



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



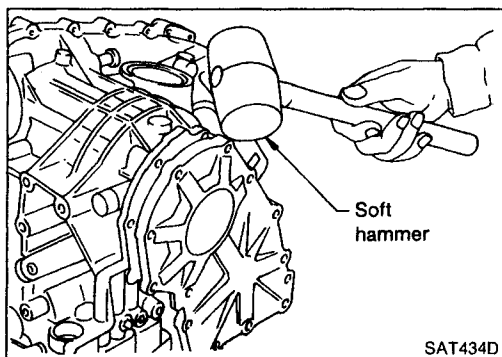
- f. Remove reduction pinion gear and output shaft.
 g. Remove adjusting shim from reduction pinion gear.
 h. Remove adjusting spacer from output shaft.



— Model 34X81 —

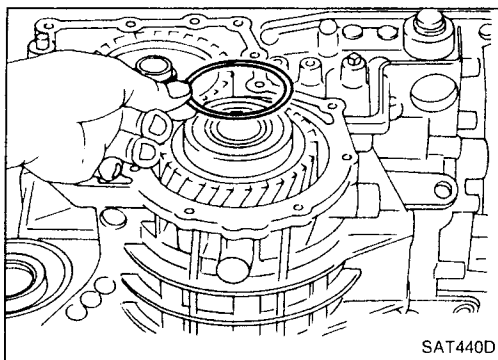
47. Remove output shaft assembly according to the following procedures.

- a. Remove side cover bolts.

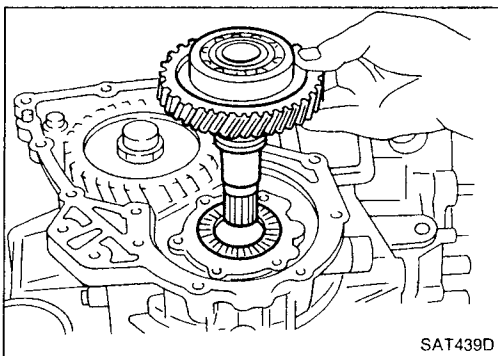


- b. Remove side cover by lightly tapping it with a soft hammer.
 ● **Be careful output shaft assembly does not drop out when removing cover.**

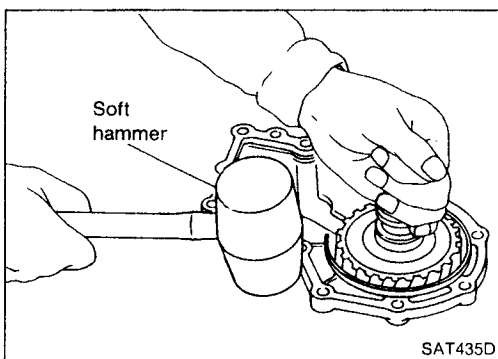
DISASSEMBLY



c. Remove adjusting shim.

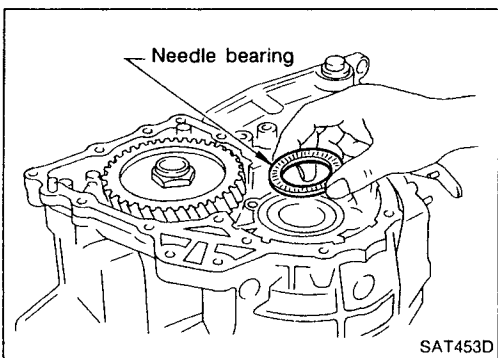


d. Remove output shaft assembly.

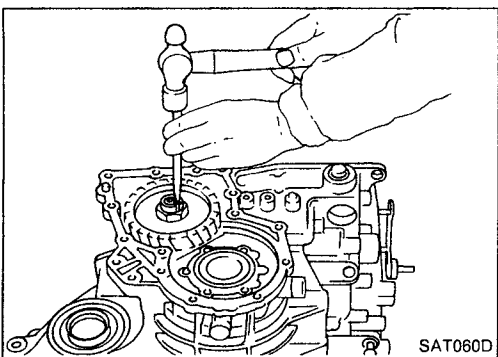


- If output shaft assembly is still attached to side cover, separate the two by tapping cover with a soft hammer.

AT



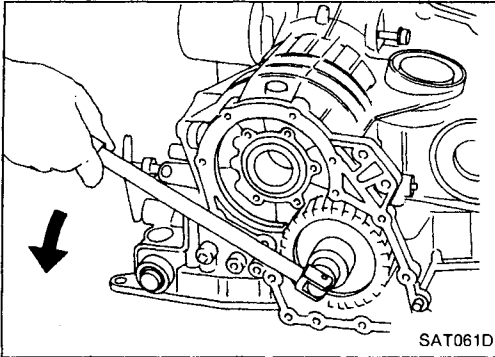
e. Remove needle bearing.



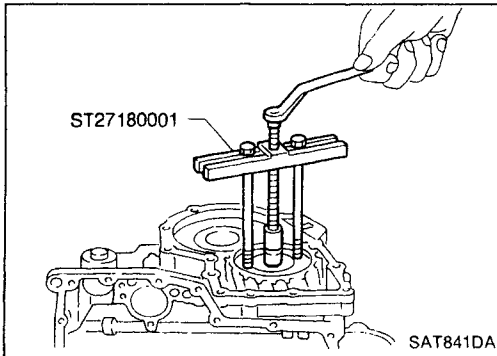
48. Disassemble reduction pinion gear according to the following procedures.

- Set manual shaft to position "P" to fix idler gear.
- Unlock idler gear lock nut using a pin punch.

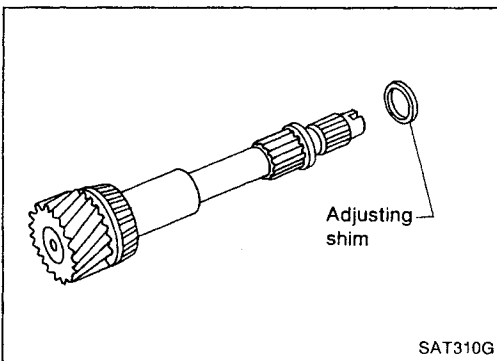
DISASSEMBLY



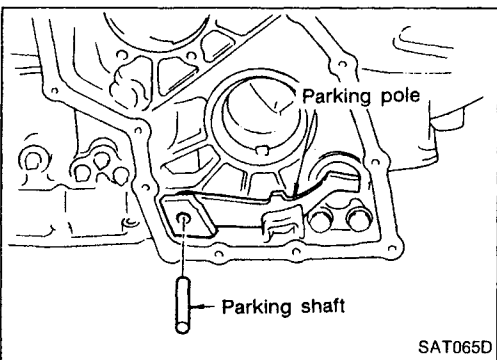
- c. Remove idler gear lock nut.
- **Do not reuse idler gear lock nut.**



- d. Remove idler gear with puller.

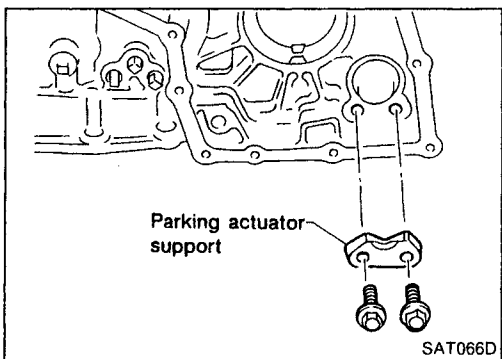


- e. Remove reduction pinion gear.
- f. Remove adjusting shim from reduction pinion gear.



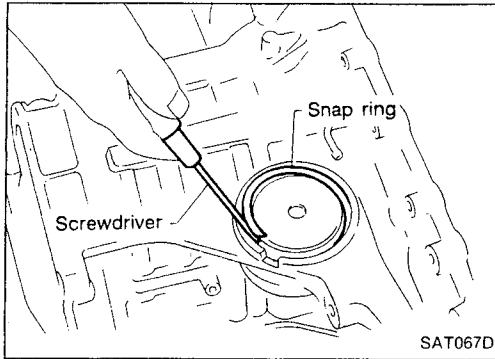
— All models —

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

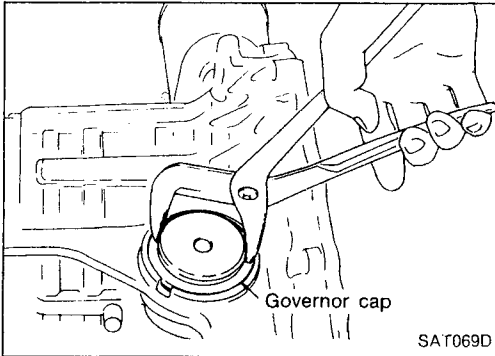


- 51. Remove parking actuator support from transmission case.
- 52. Check parking actuator support for damage or wear.

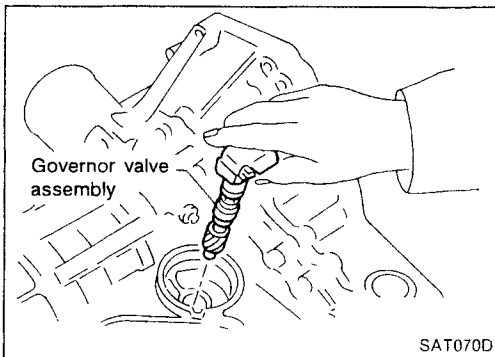
DISASSEMBLY



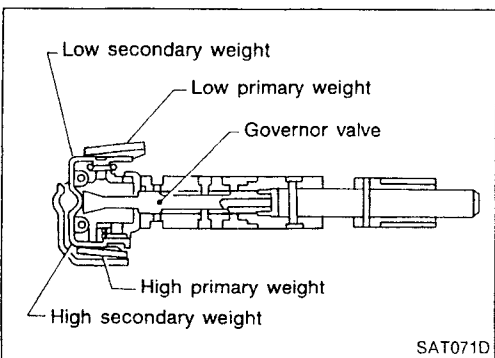
53. Remove governor valve assembly according to the following procedures.
- Remove snap ring using a screwdriver.



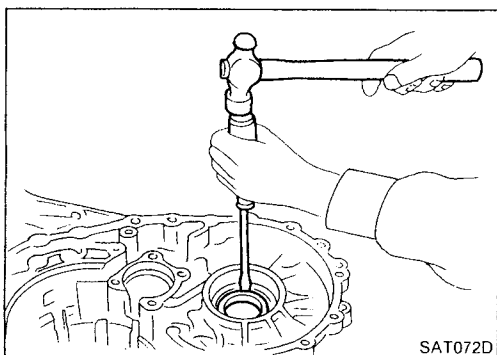
- Remove governor cap using water pump pliers.
- Remove O-ring from governor cap.



- Remove governor valve assembly.



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



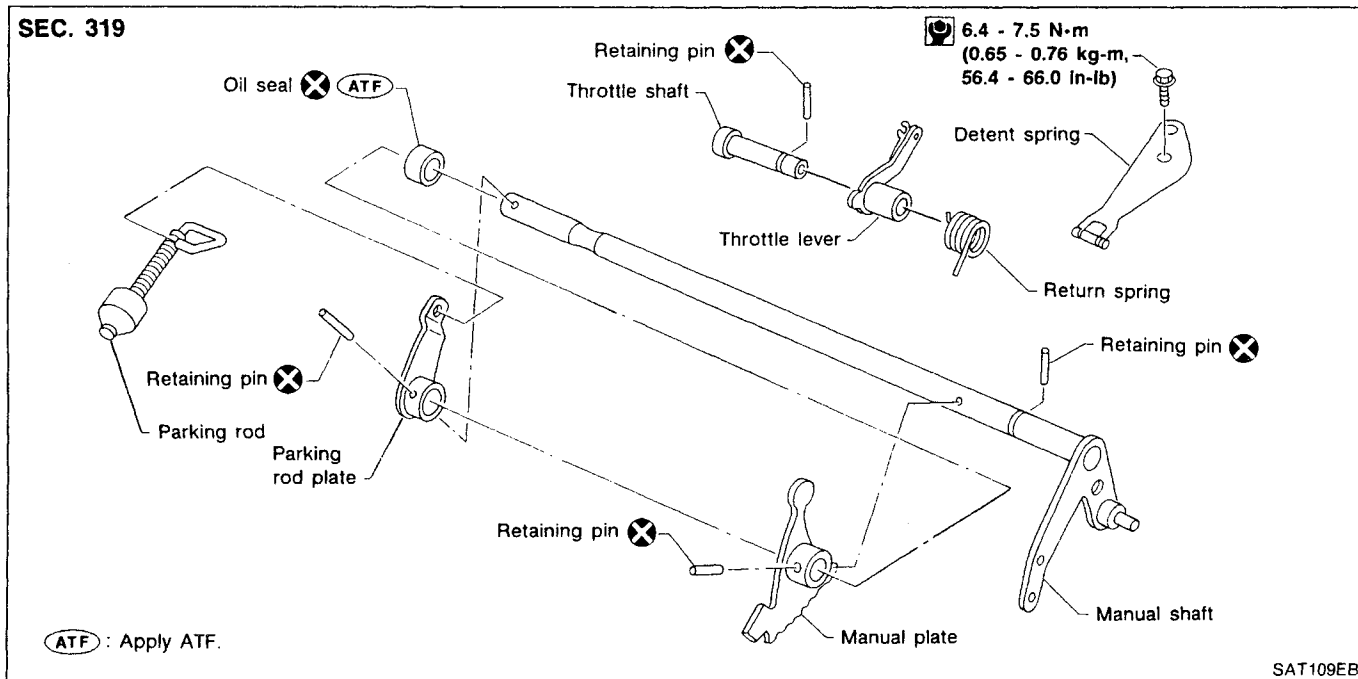
54. Remove side oil seal from transmission case using a screwdriver.

- Be careful not to damage case.

AT

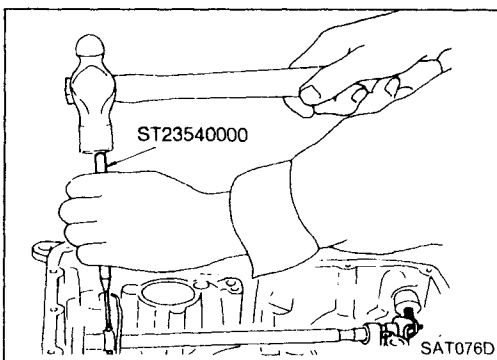
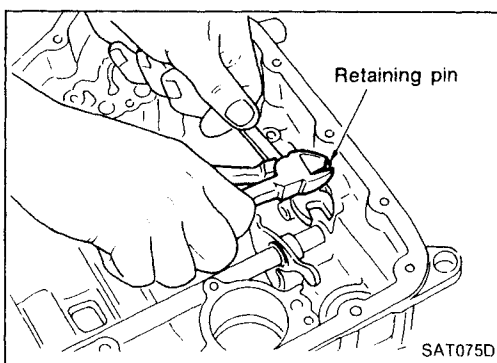
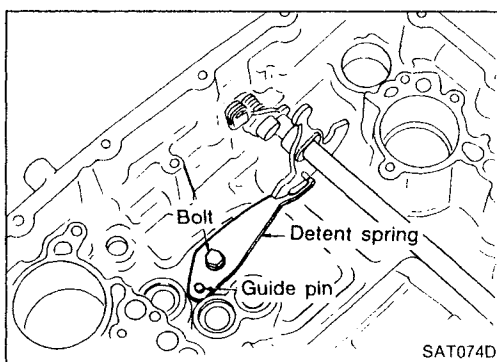
REPAIR FOR COMPONENT PARTS

Manual Shaft and Throttle Lever



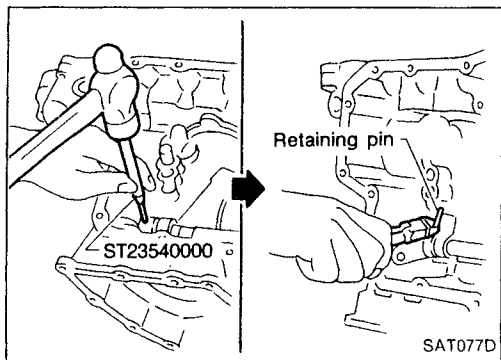
REMOVAL

1. Remove detent spring from transmission case.
2. Pull out throttle shaft retaining pin, then draw out throttle shaft from transmission case.
3. Drive out manual plate retaining pin.

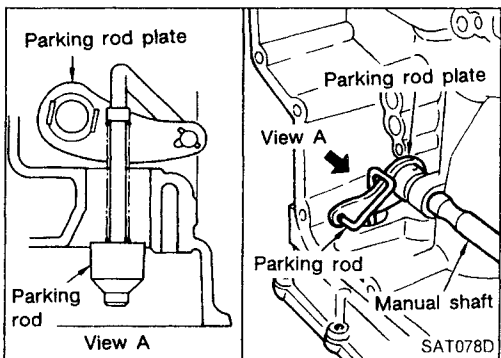


REPAIR FOR COMPONENT PARTS

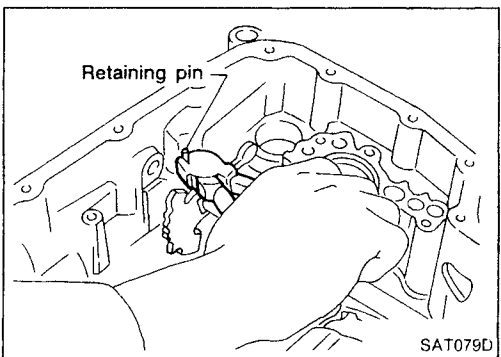
Manual Shaft and Throttle Lever (Cont'd)



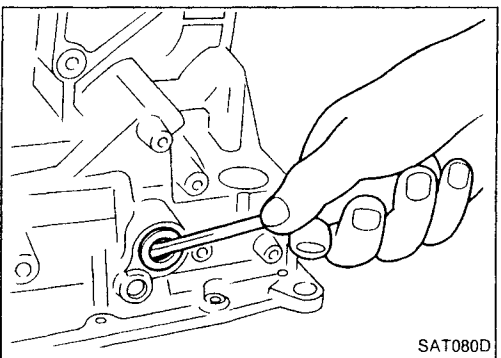
4. Drive and then pull out parking rod plate retaining pin.



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



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



9. Remove manual shaft oil seal.

INSPECTION

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

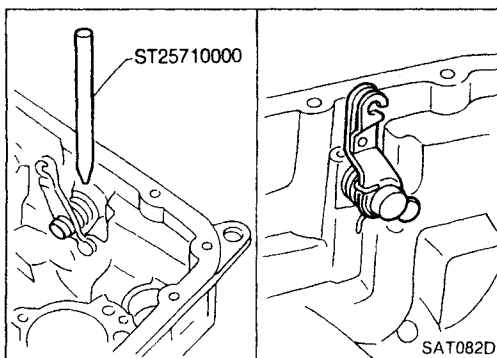
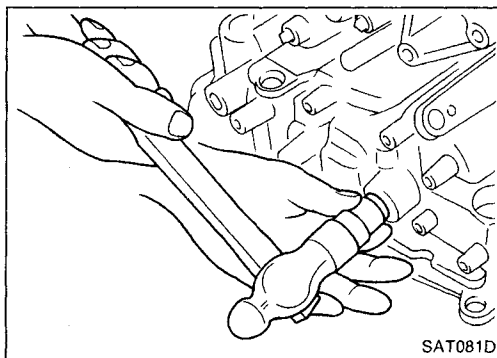
AT

REPAIR FOR COMPONENT PARTS

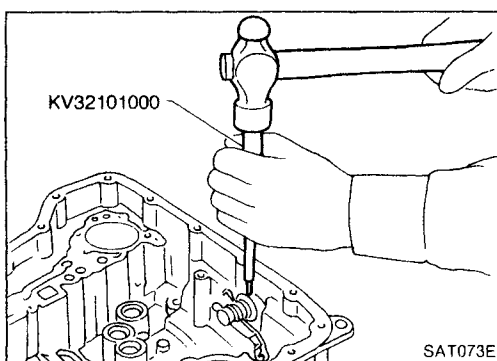
Manual Shaft and Throttle Lever (Cont'd)

INSTALLATION

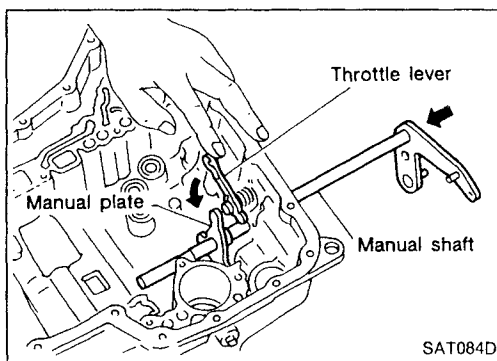
1. Install manual shaft oil seal.
- Apply ATF to outer surface of oil seal.



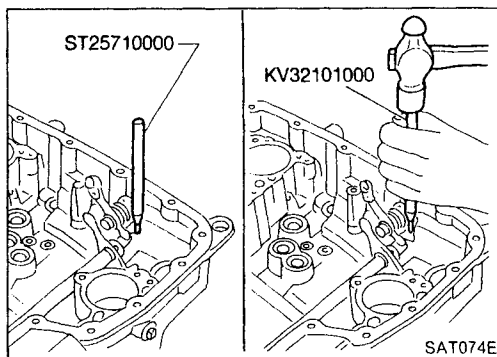
2. Install throttle lever and return spring on throttle shaft.
3. Install throttle lever assembly on transmission case.



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



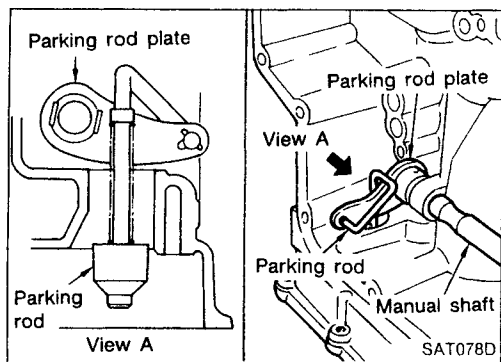
6. Move throttle lever in the direction of the arrow.
7. Install manual shaft and manual plate.



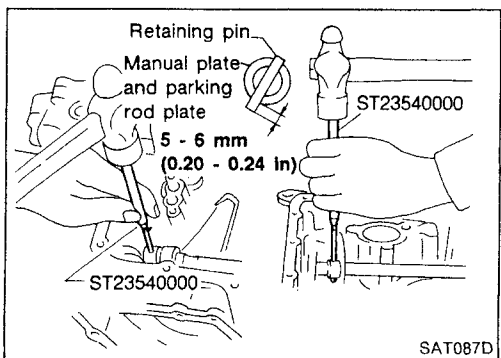
8. Align groove of manual shaft and hole of transmission case.
9. Install manual shaft retaining pin.

REPAIR FOR COMPONENT PARTS

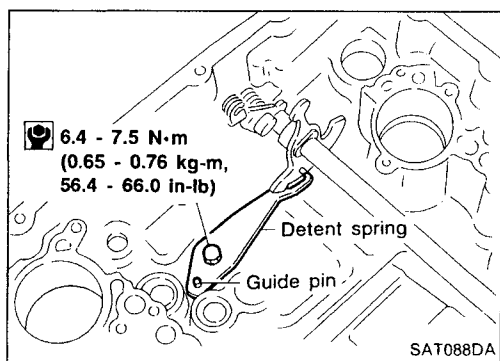
Manual Shaft and Throttle Lever (Cont'd)



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



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



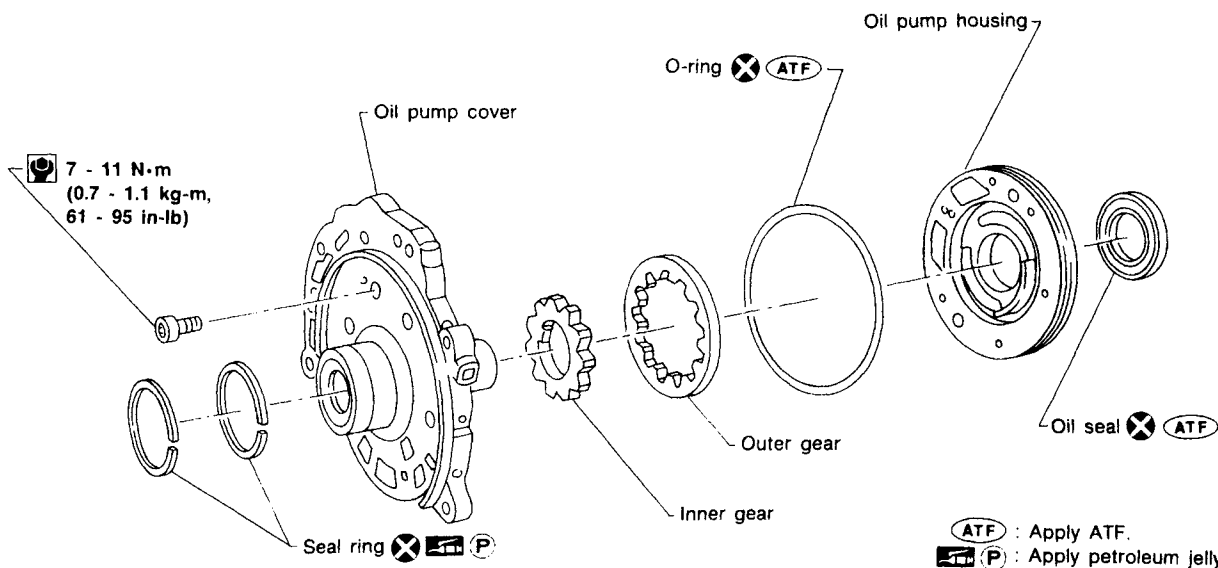
13. Install detent spring.

AT

REPAIR FOR COMPONENT PARTS

Oil Pump

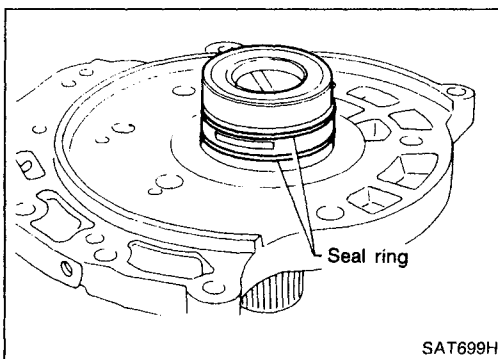
SEC. 313



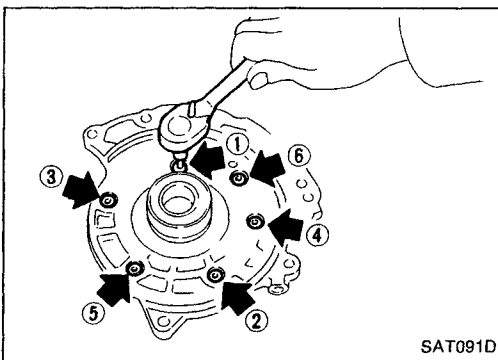
SAT698HA

DISASSEMBLY

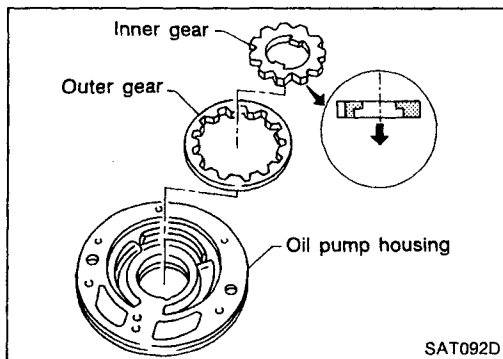
1. Remove seal rings.



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



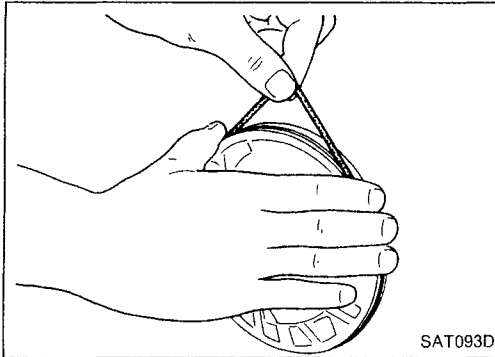
3. Remove inner and outer gear from oil pump housing.



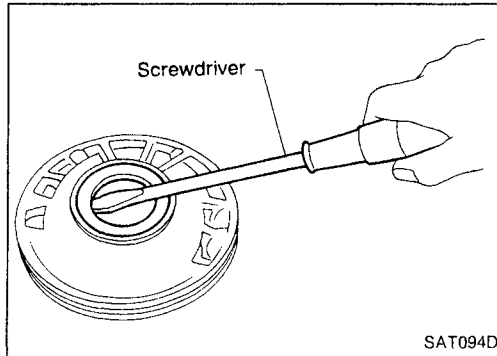
REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)

4. Remove O-ring from oil pump housing.



5. Remove oil pump housing oil seal.

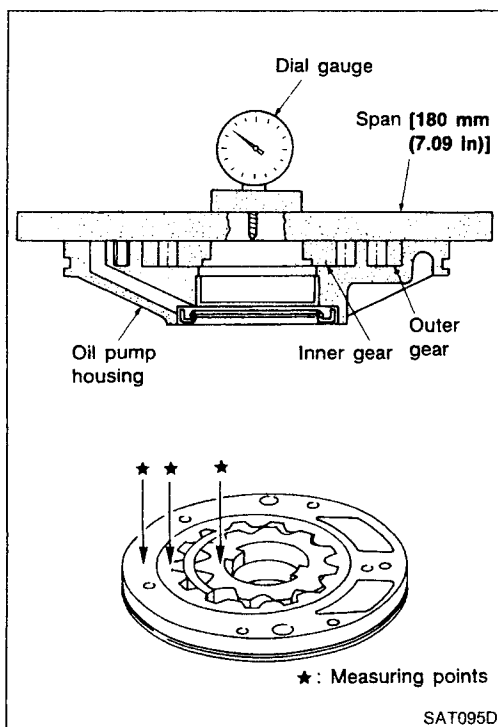


INSPECTION

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

- Check for wear or damage.

AT



Side clearance

- Measure side clearance of inner and outer gears in at least four places around each outside edge. Maximum measured values should be within specified ranges.

Standard clearance:

0.02 - 0.04 mm (0.0008 - 0.0016 in)

- If clearance is below standard, select inner and outer gears as a set to assure clearance within specifications.

Inner and outer gear:

Refer to SDS, AT-169.

- If clearance is more than standard, replace whole oil pump assembly except oil pump cover.

REPAIR FOR COMPONENT PARTS

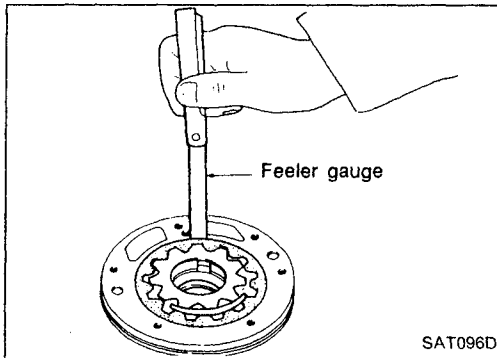
Oil Pump (Cont'd)

- Measure clearance between outer gear and oil pump housing.

Standard clearance:

0.08 - 0.15 mm (0.0031 - 0.0059 in)

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



Seal ring clearance

- Install new seal rings onto oil pump cover.
- Measure clearance between seal ring and ring groove.

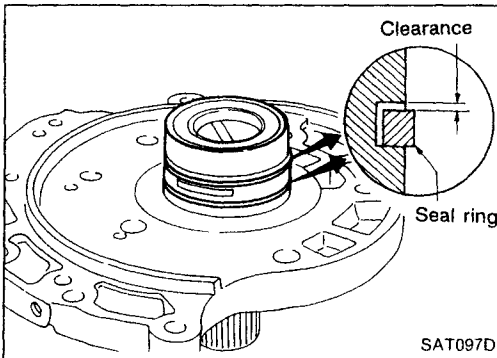
Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Allowable limit:

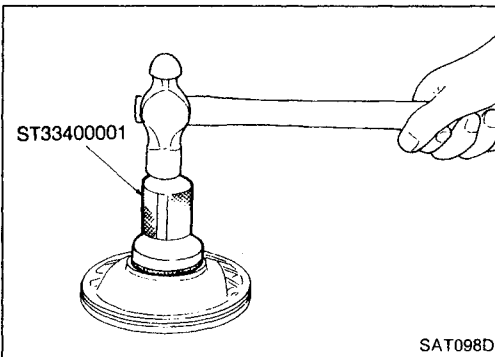
0.25 mm (0.0098 in)

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



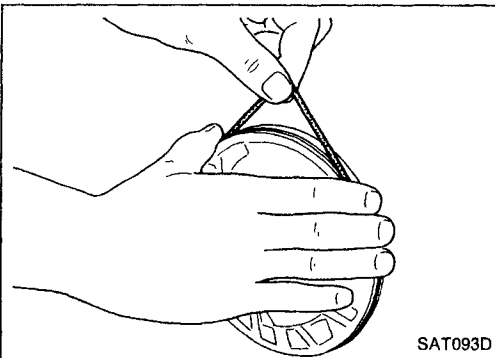
ASSEMBLY

1. Install oil seal on oil pump housing.



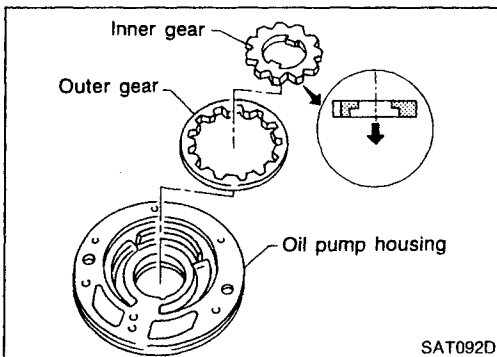
2. Install O-ring on oil pump housing.

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



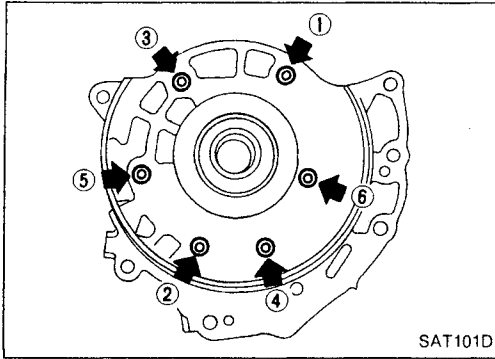
3. Install inner and outer gears on oil pump housing.

- **Take care with the direction of the inner gear.**

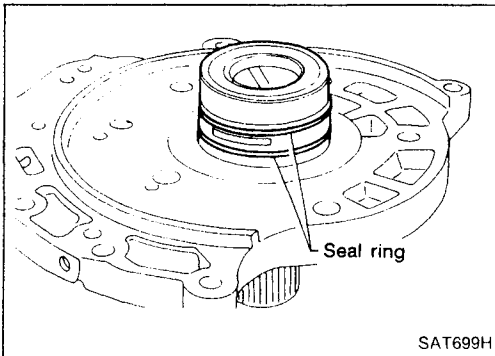


REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)



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

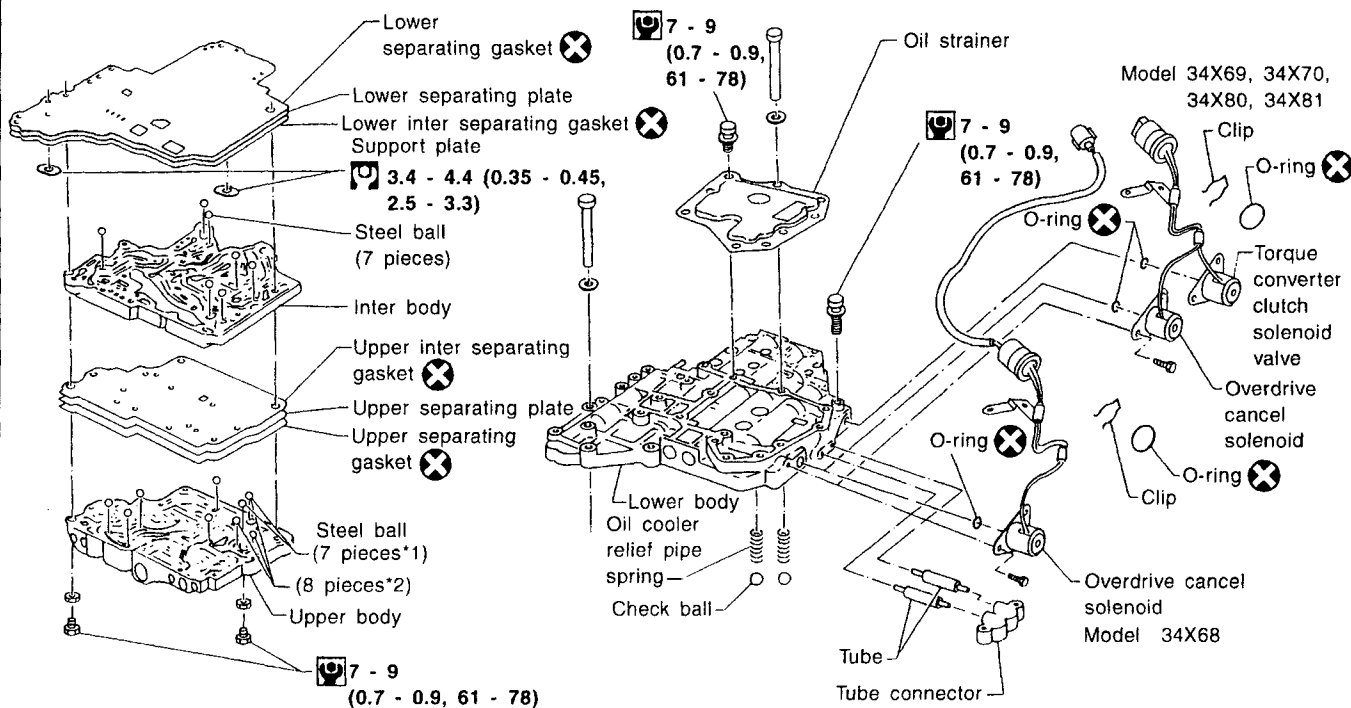


5. Install new seal rings carefully after packing ring groove with petroleum jelly.
 - **Do not spread gap of seal ring excessively while installing.**
It may deform the ring.

REPAIR FOR COMPONENT PARTS

Control Valve Assembly

SEC. 317



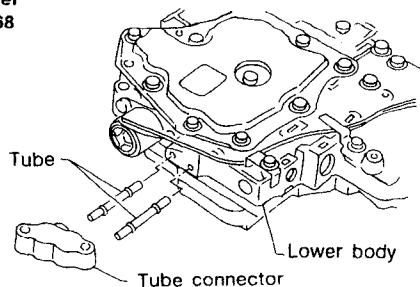
⊙ : N·m (kg-m, in-lb)

*1 : Model 34X68

*2 : Model 34X69, 34X70, 34X80, 34X81

SAT0811

Model 34X68

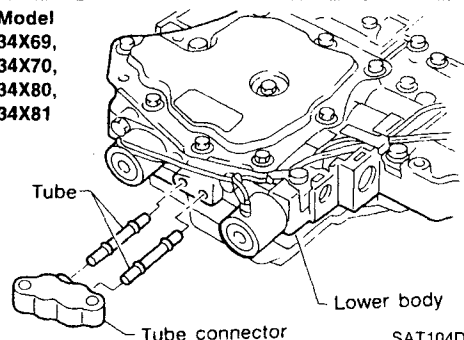


SAT603DB

DISASSEMBLY

1. Remove tube connector and tube from control valve lower body.

Model 34X69, 34X70, 34X80, 34X81



SAT104DB

REPAIR FOR COMPONENT PARTS

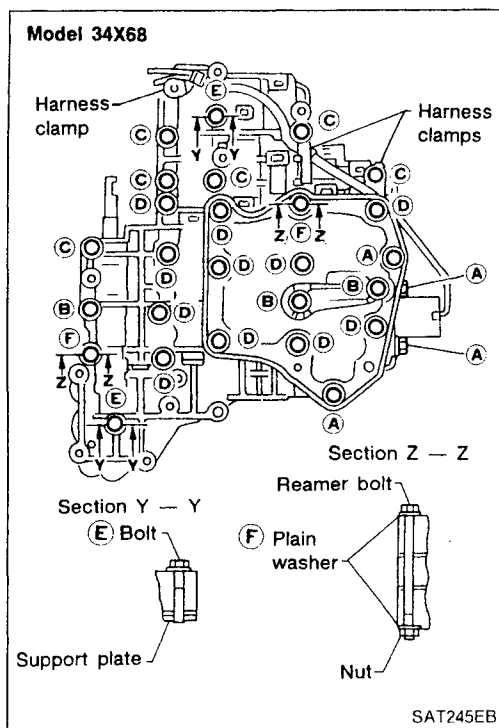
Control Valve Assembly (Cont'd)

2. Disassemble upper, inter and lower bodies using the following procedures.

Bolt length, number and location:

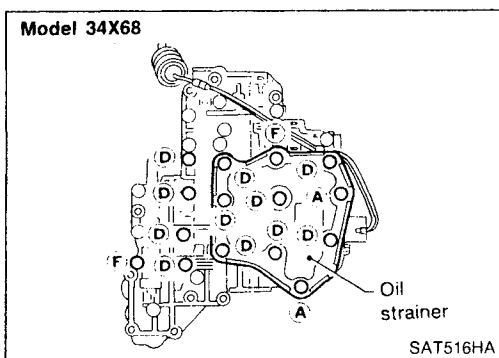
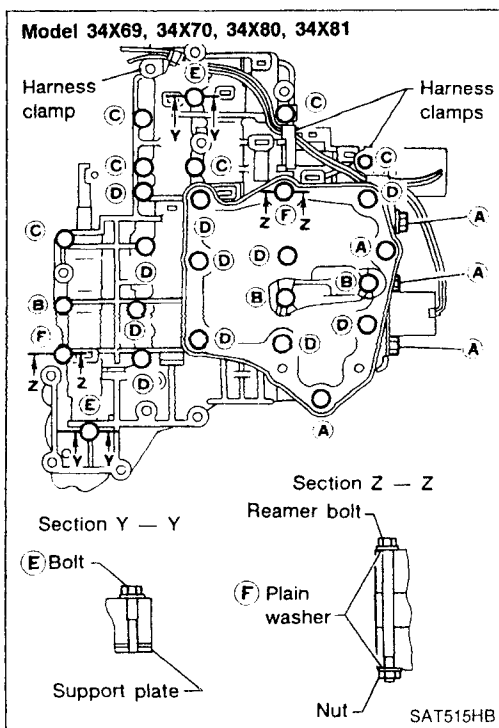
Without torque converter clutch solenoid valve

Bolt symbol	(A)	(B)	(C)	(D)	(E)	(F)
Bolt length "ℓ"	13.5	58.0	40.0	66.0	33.0	78.0
 ℓ mm (in)	(0.531)	(2.283)	(1.575)	(2.598)	(1.299)	(3.071)
Number of bolts	4	3	6	11	2	2



With torque converter clutch solenoid valve

Bolt symbol	(A)	(B)	(C)	(D)	(E)	(F)
Bolt length "ℓ"	13.5	58.0	40.0	66.0	33.0	78.0
 ℓ mm (in)	(0.531)	(2.283)	(1.575)	(2.598)	(1.299)	(3.071)
Number of bolts	5	3	6	11	2	2

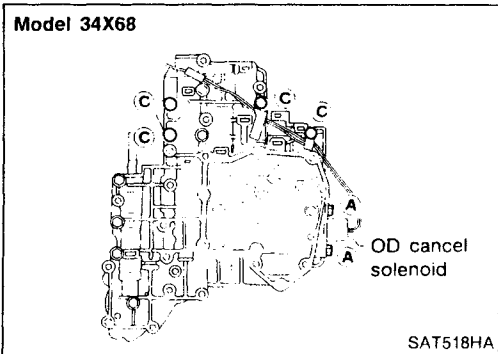
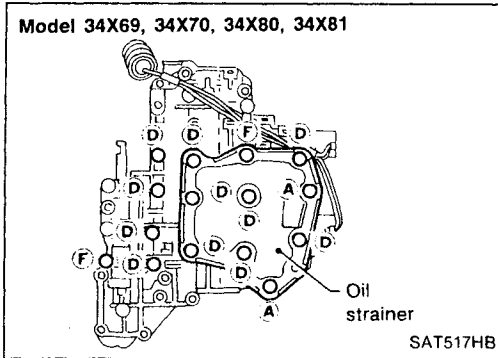


- Remove bolts (A), (D) and (F) shown in the illustration.
- Remove oil strainer from control valve assembly.

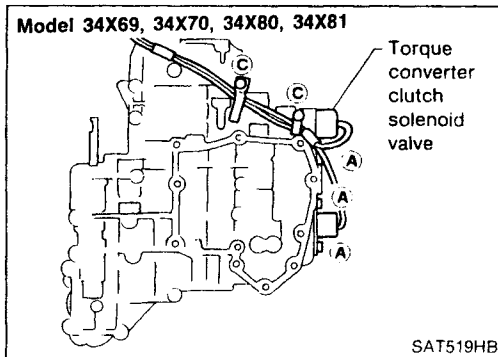
AT

REPAIR FOR COMPONENT PARTS

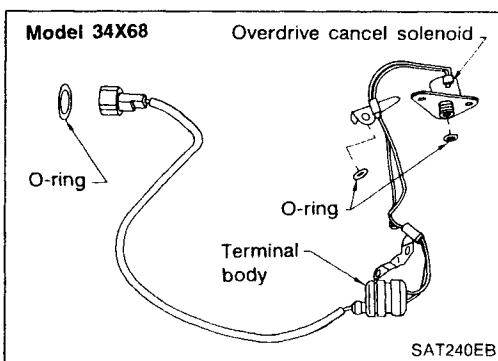
Control Valve Assembly (Cont'd)



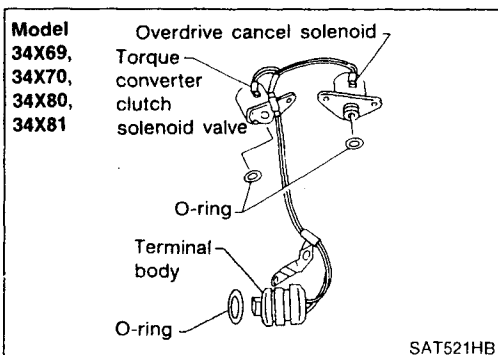
- c. Remove OD cancel solenoid from control valve assembly. (Model 34X68)



- d. Remove OD cancel solenoid and torque converter clutch solenoid valve from control valve assembly. (Model 34X69, 34X70, 34X80, 34X81)



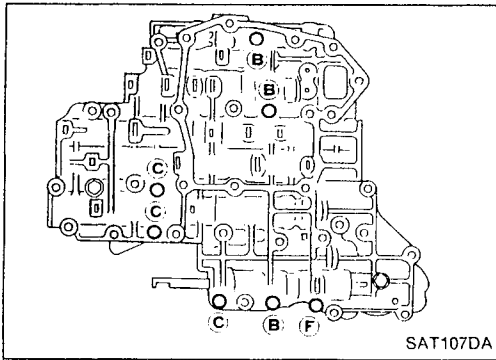
- e. Remove O-rings from OD cancel solenoid, and harness terminal body. (Model 34X68)



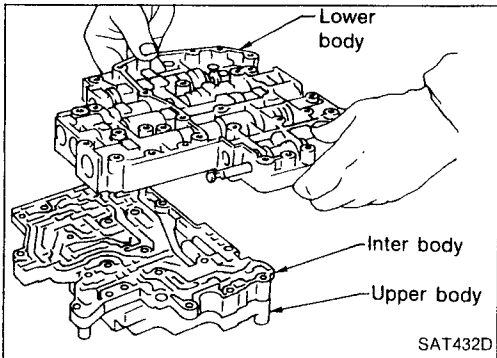
- f. Remove O-rings from OD cancel solenoid, torque converter clutch solenoid valve and harness terminal body. (Model 34X69, 34X70, 34X80, 34X81)

REPAIR FOR COMPONENT PARTS

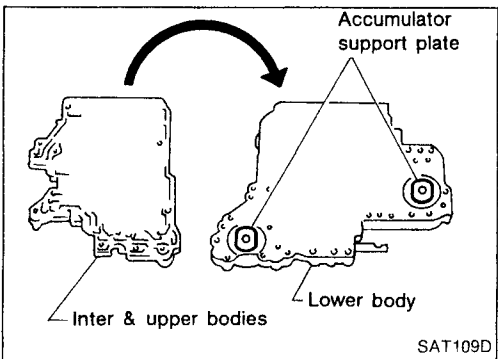
Control Valve Assembly (Cont'd)



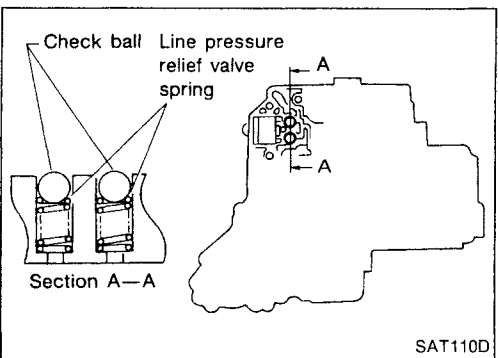
g. Place upper body facedown, and remove bolts.



h. Remove lower body from inter body and upper body.



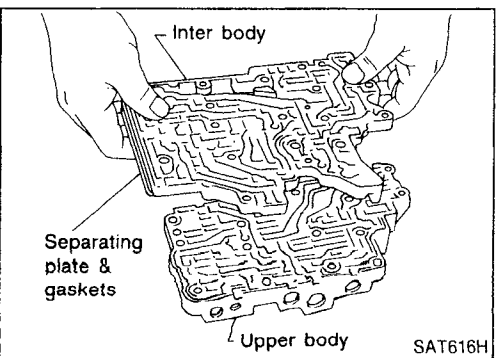
i. Turn over lower body, and remove accumulator support plate.



j. Remove separating plate and separating gaskets from lower body.

k. Remove steel balls and relief valve springs from lower body.

● **Be careful not to lose steel balls and relief valve springs.**



l. Remove inter body from upper body.

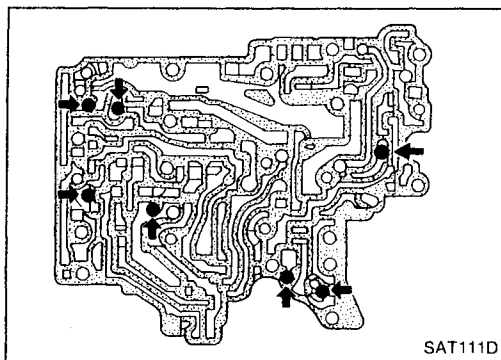
AT

REPAIR FOR COMPONENT PARTS

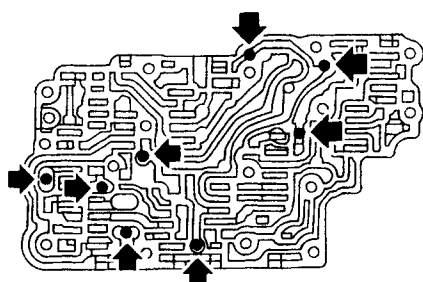
Control Valve Assembly (Cont'd)

m. Check to see that steel balls are properly positioned in inter body and then remove them.

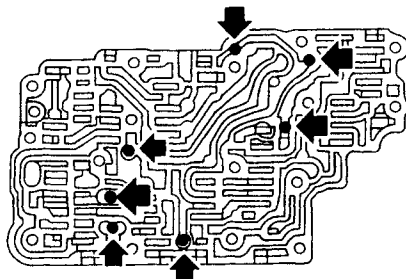
- **Be careful not to lose steel balls.**



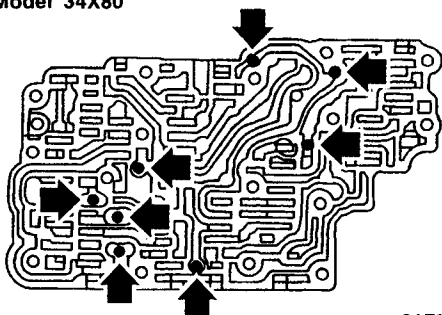
Model 34X69 and 34X70



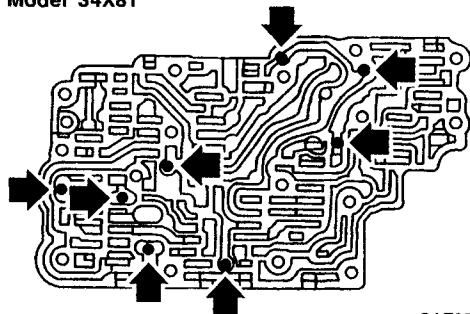
Model 34X68



Model 34X80



Model 34X81



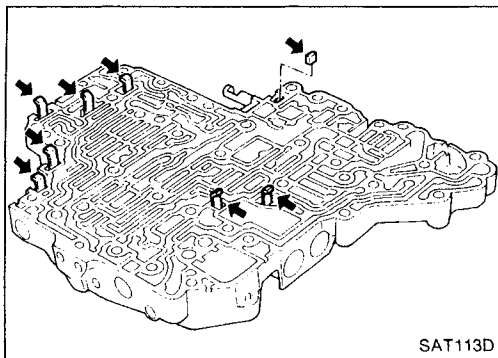
REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

INSPECTION

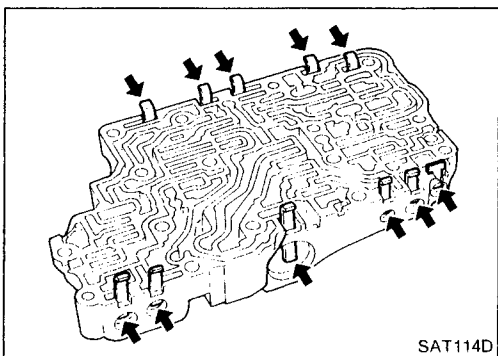
Lower and upper bodies

- Check to see that retainer plates are in proper position in lower body.



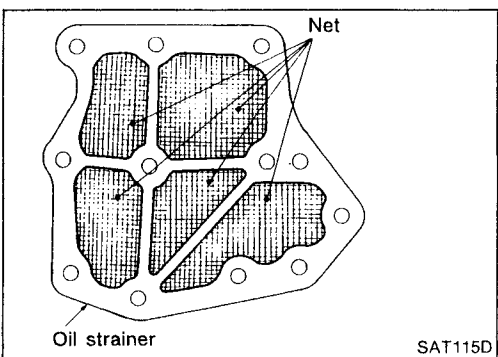
- Check to see that retainer plates are in proper position in upper body.

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



Oil strainer

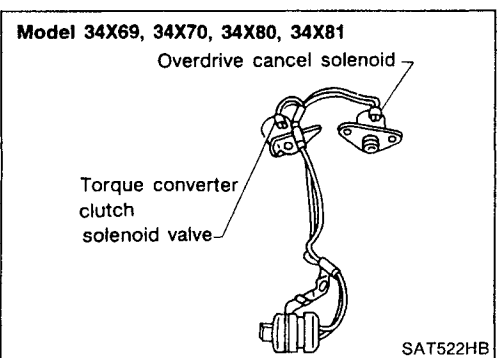
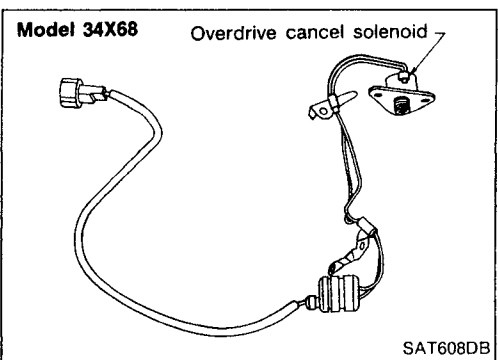
- Check wire netting of oil strainer for damage.



AT

OD cancel solenoid and torque converter clutch solenoid valve

- Measure resistance — Refer to "Electrical Components Inspection", AT-30.



REPAIR FOR COMPONENT PARTS

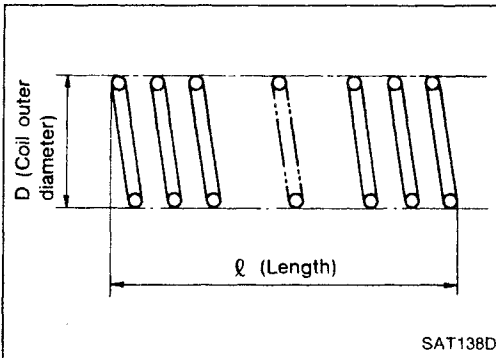
Control Valve Assembly (Cont'd)

Oil cooler relief valve spring

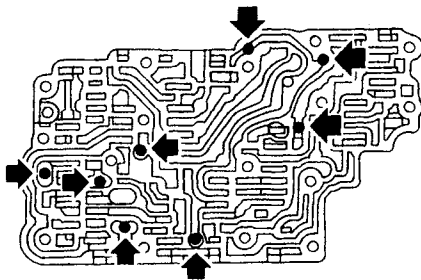
- Check for damage or deformation.
- Measure free length and outer diameter of valve spring.

Inspection standard:

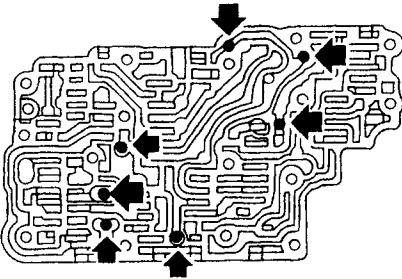
Refer to SDS, AT-167.



Model 34X69 and 34X70

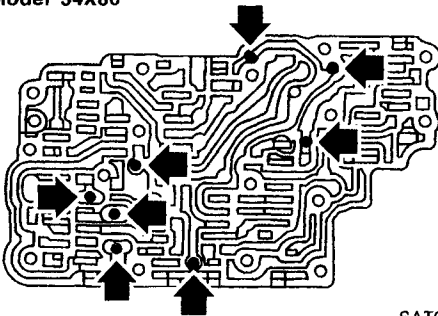


Model 34X68



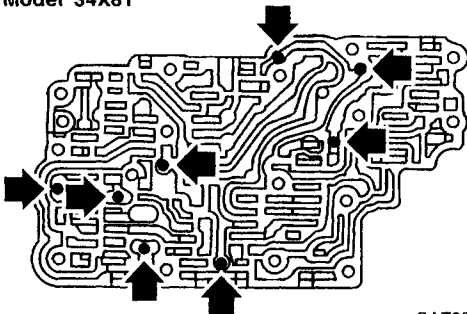
SAT523H

Model 34X80



SAT082I

Model 34X81



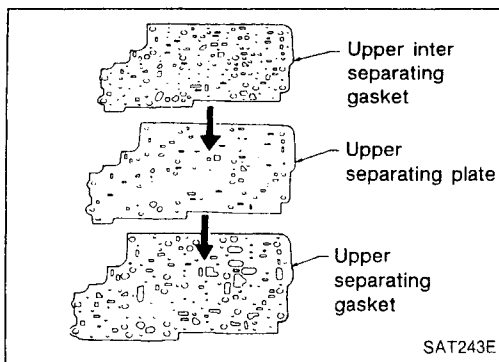
SAT083I

ASSEMBLY

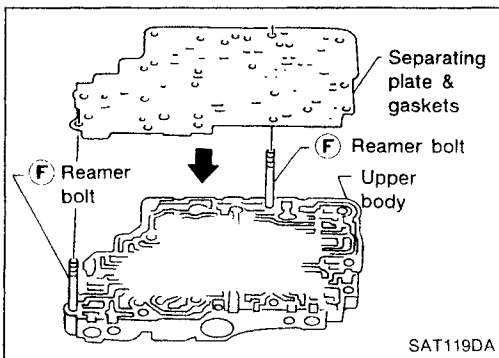
1. Install upper, inter and lower body.
 - a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

REPAIR FOR COMPONENT PARTS

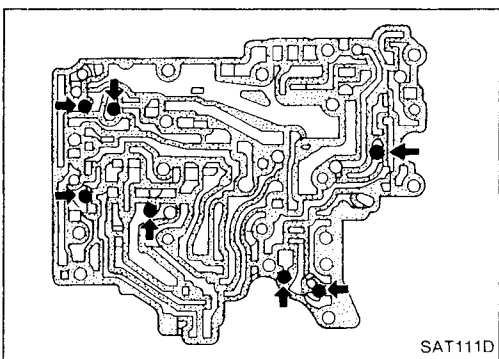
Control Valve Assembly (Cont'd)



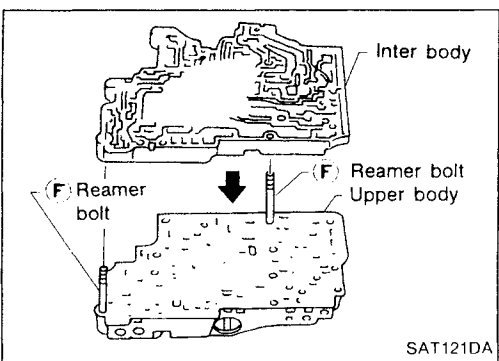
- b. Install new upper separating gasket, new upper inter separating gasket and upper separating plate in order shown in illustration.



- c. Install reamer bolts (F) from bottom of upper body and install separating gaskets and separating plate as a set on upper body using reamer bolts as guides.

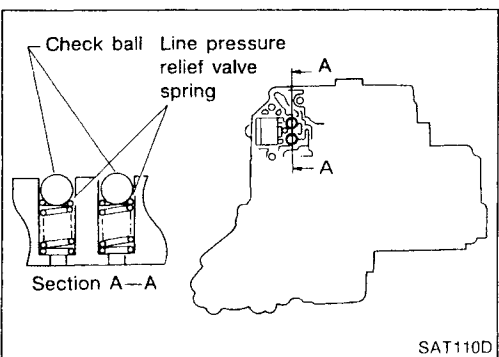


- d. Place lower body side of inter body face up. Install steel balls in their proper positions.



- e. Install inter body on upper body using reamer bolts (F) as guides.

- Be careful not to dislocate or drop steel balls.

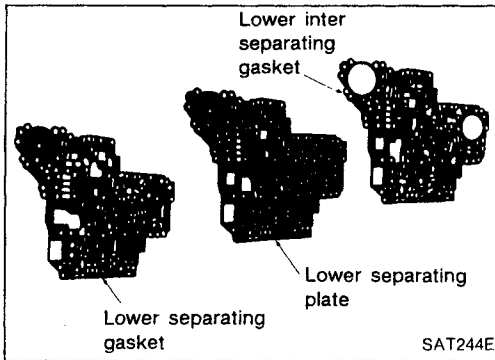


- f. Install steel balls and relief valve springs in their proper positions in lower body.

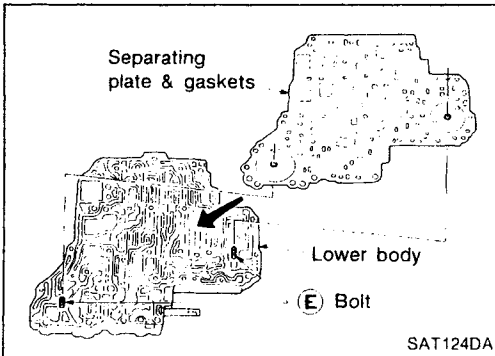
AT

REPAIR FOR COMPONENT PARTS

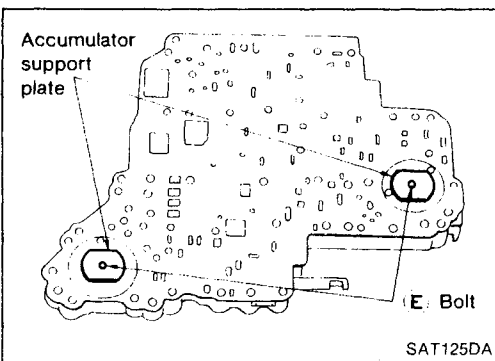
Control Valve Assembly (Cont'd)



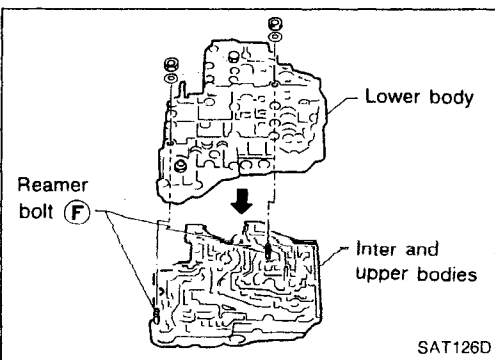
- g. Install new lower separating gasket, new lower inter separating gasket and lower separating plate in order shown in illustration.



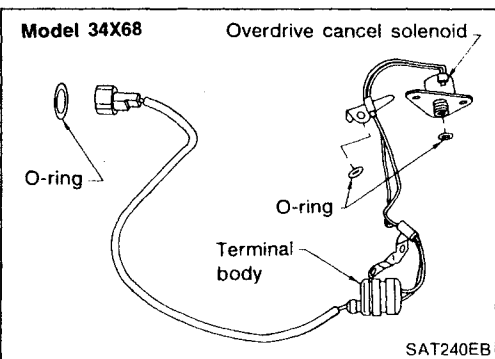
- h. Install support plate fixing bolts (E) from bottom of lower body and install separating gaskets and separating plate as a set on lower body using bolts (E) as guides.



- i. Temporarily install support plates on lower body.



- j. Install lower body on inter body using reamer bolts (F) as guides and tighten reamer bolts (F) slightly.

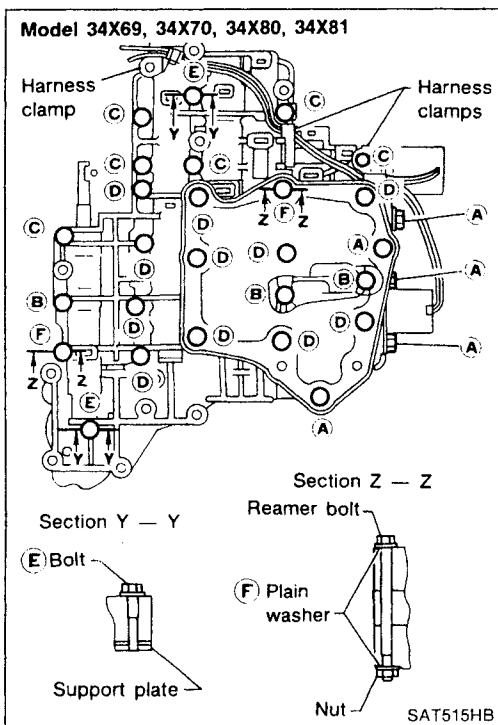
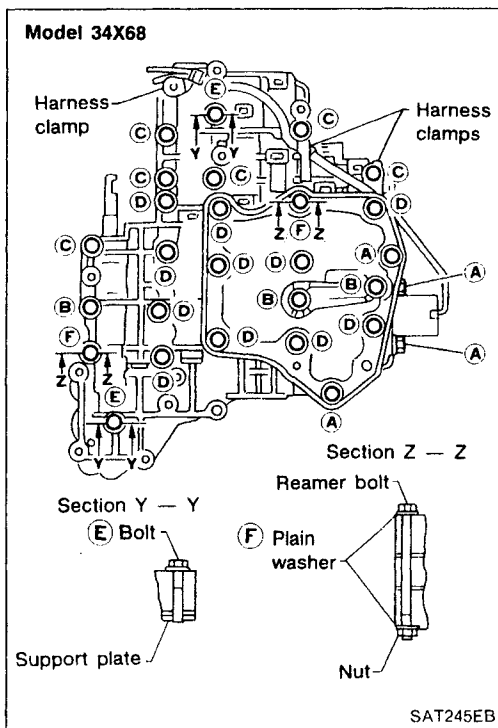
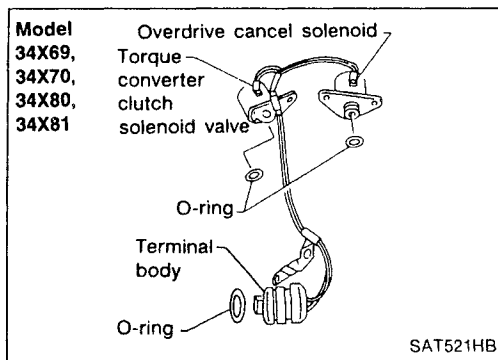


2. Install O-rings to OD cancel solenoid, torque converter clutch solenoid valve and harness connector.

- Apply ATF to O-rings.

REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)



3. Install and tighten bolts.

Bolt length, number and location:

Without torque converter clutch solenoid valve

Bolt symbol	(A)	(B)	(C)	(D)	(E)	(F)
Bolt length "ℓ"  ℓ mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	4	3	6	11	2	2
Tightening torque N·m (kg-m, in-lb)	7 - 9 (0.7 - 0.9, 61 - 78)				3.4 - 4.4 (0.35 - 0.45, 30.4 - 39.1)	7 - 9 (0.7 - 0.9, 61 - 78)

AT

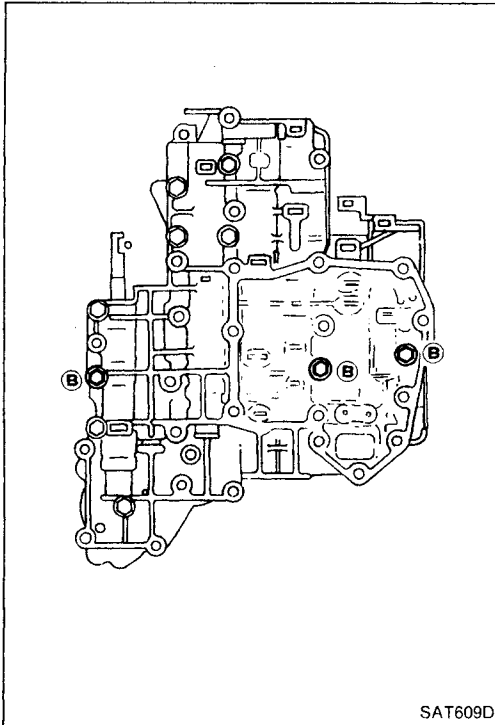
With torque converter clutch solenoid valve

Bolt symbol	(A)	(B)	(C)	(D)	(E)	(F)
Bolt length "ℓ"  ℓ mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	5	3	6	11	2	2
Tightening torque N·m (kg-m, in-lb)	7 - 9 (0.7 - 0.9, 61 - 78)				3.4 - 4.4 (0.35 - 0.45, 30.4 - 39.1)	7 - 9 (0.7 - 0.9, 61 - 78)

REPAIR FOR COMPONENT PARTS

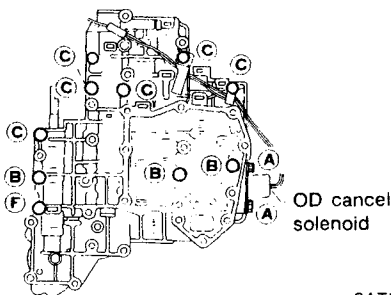
Control Valve Assembly (Cont'd)

- a. Install and tighten bolts **(B)** slightly.



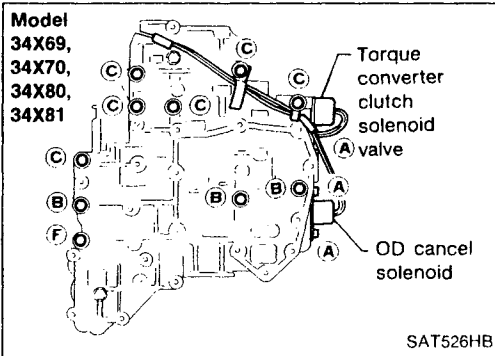
SAT609D

Model 34X68



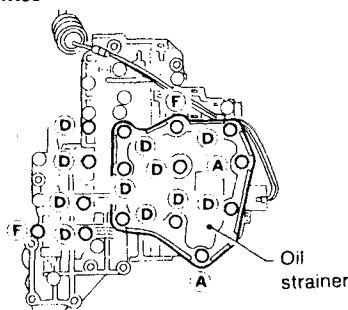
SAT525HA

- b. Install OD cancel solenoid to lower body. (Model 34X68)
 c. Install OD cancel solenoid and torque converter clutch solenoid valve to lower body. (Except model 34X68)
 d. Install and tighten bolts **(A)** and **(C)** slightly.
 e. Remove both reamer bolts **(F)** previously installed as guides. Install one reamer bolt **(F)** (marked in illustration) from lower body side.
 f. Tighten bolts **(A)**, **(B)**, **(C)** and **(F)** to specified torque.
⚙️ : 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



SAT526HB

Model 34X68



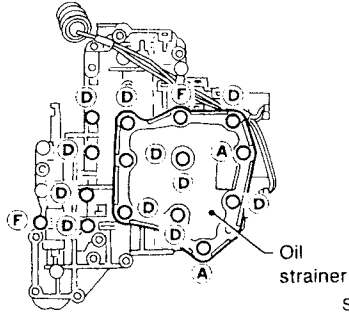
SAT516HA

- g. Install oil strainer and the other bolt **(F)** (marked in illustration), then tighten bolts **(A)**, **(D)** and **(F)** to specified torque.
⚙️ : 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)

REPAIR FOR COMPONENT PARTS

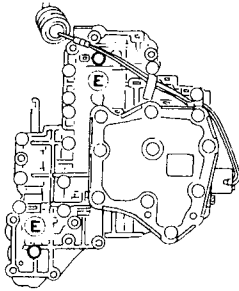
Control Valve Assembly (Cont'd)

Model 34X69, 34X70, 34X80, 34X81



SAT517HB

Model 34X68

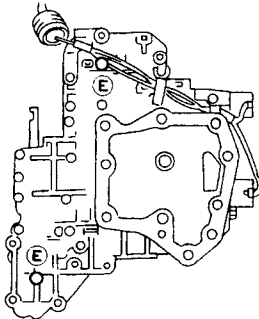


SAT529HA

- h. Install support plates and tighten bolts ⑤ to specified torque.

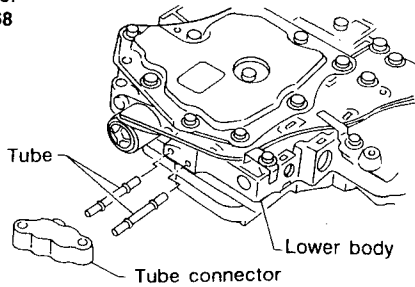
⑤ : 3.4 - 4.4 N·m (0.35 - 0.45 kg-m, 30.4 - 39.1 in-lb)

Model
34X69,
34X70,
34X80,
34X81



SAT530HB

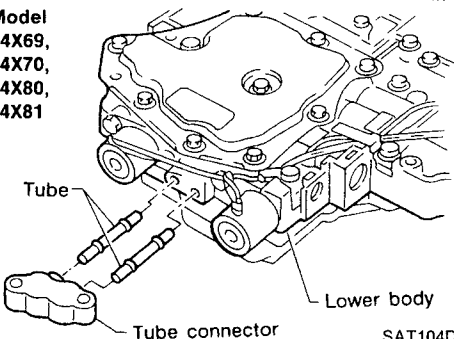
Model
34X68



SAT603DB

- i. Install tube connector and tubes to lower body.
● Install oil circuit side of tube connector face up.

Model
34X69,
34X70,
34X80,
34X81

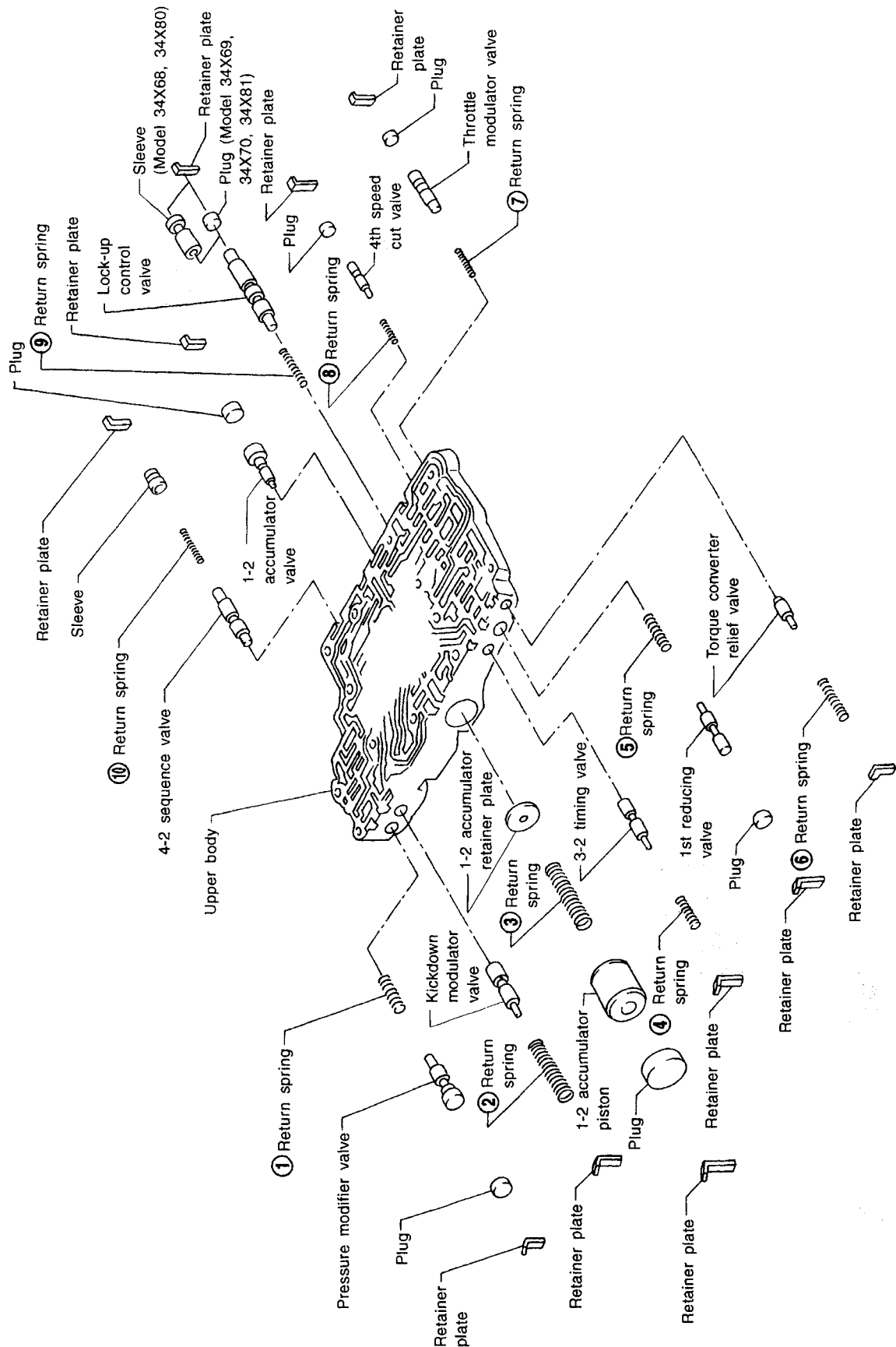


SAT104DB

AT

Control Valve Upper Body

SEC. 317



Apply ATF to all components before their installation.

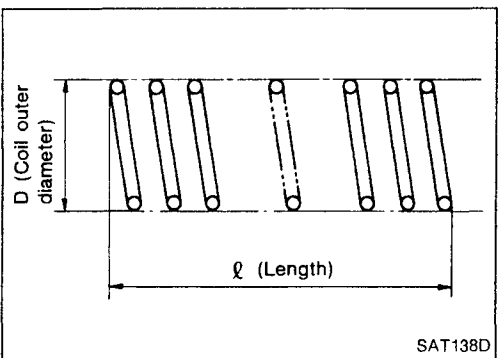
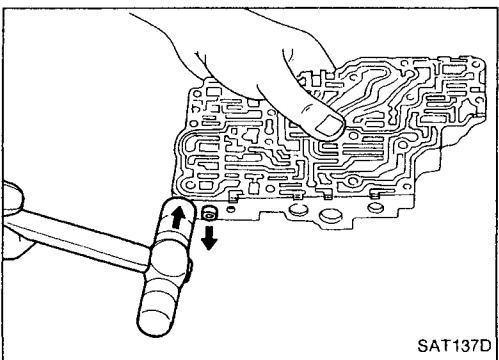
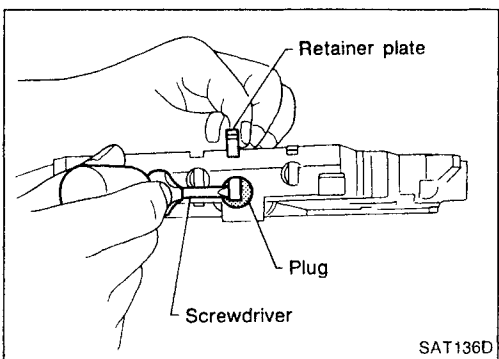
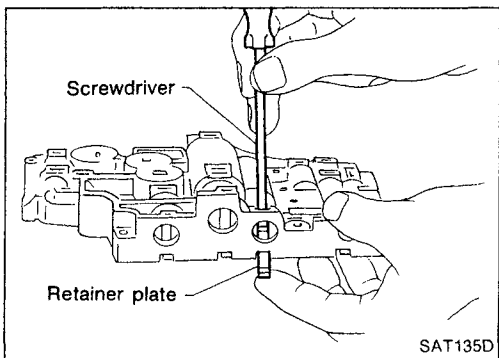
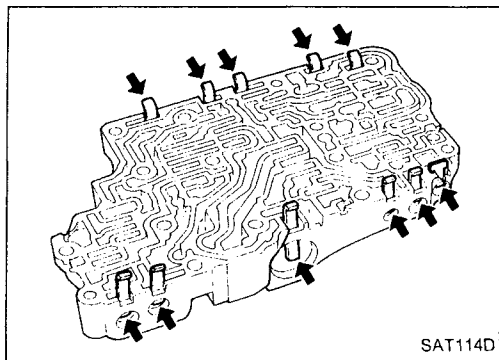
Numbers preceding valve springs correspond with those shown in Spring Chart of SDS on page AT-167.

SAT2021

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd) DISASSEMBLY

1. Remove valves at retainer plates.
 - Do not use a magnetic "hand".



- a. Use a screwdriver to remove retainer plates.

- b. Remove retainer plates while holding spring, plugs and sleeves.
 - Remove plug slowly to prevent internal parts from jumping out.

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

INSPECTION

Valve spring

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

Inspection standard:

Refer to SDS, AT-167.

- Replace valve springs if deformed or fatigued.

Control valves

- Check sliding surfaces of valves, sleeves and plugs.

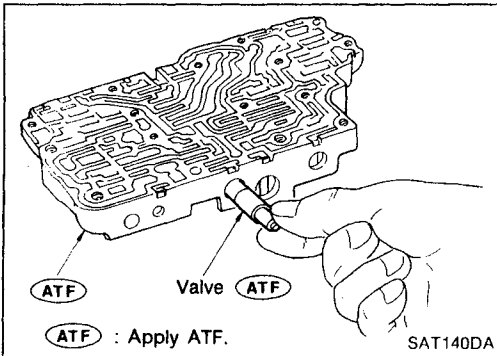
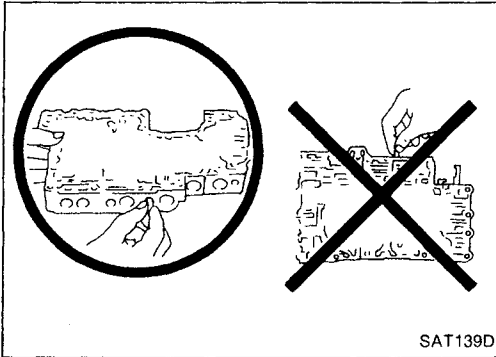
AT

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

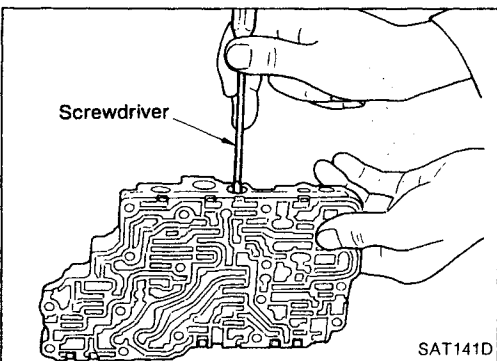
ASSEMBLY

- Lay the control valve body down when installing valves.
- Do not stand the control valve body on edge.

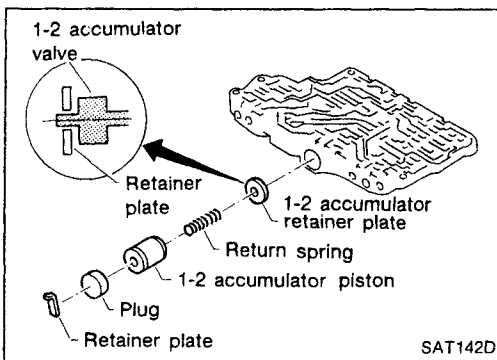


1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.

- Be careful not to scratch or damage valve body.

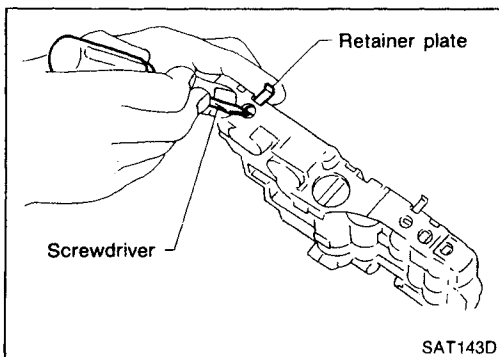


- Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.



1-2 accumulator valve

- Install 1-2 accumulator valve. Align 1-2 accumulator retainer plate from opposite side of control valve body.
- Install return spring and 1-2 accumulator piston.



2. Install retainer plates.

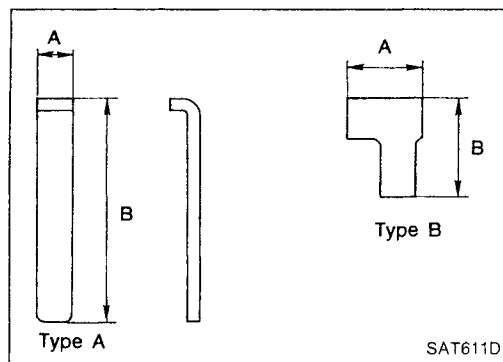
- While pushing plug or return spring, install retainer plate.

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

Retainer plate:

Unit: mm (in)



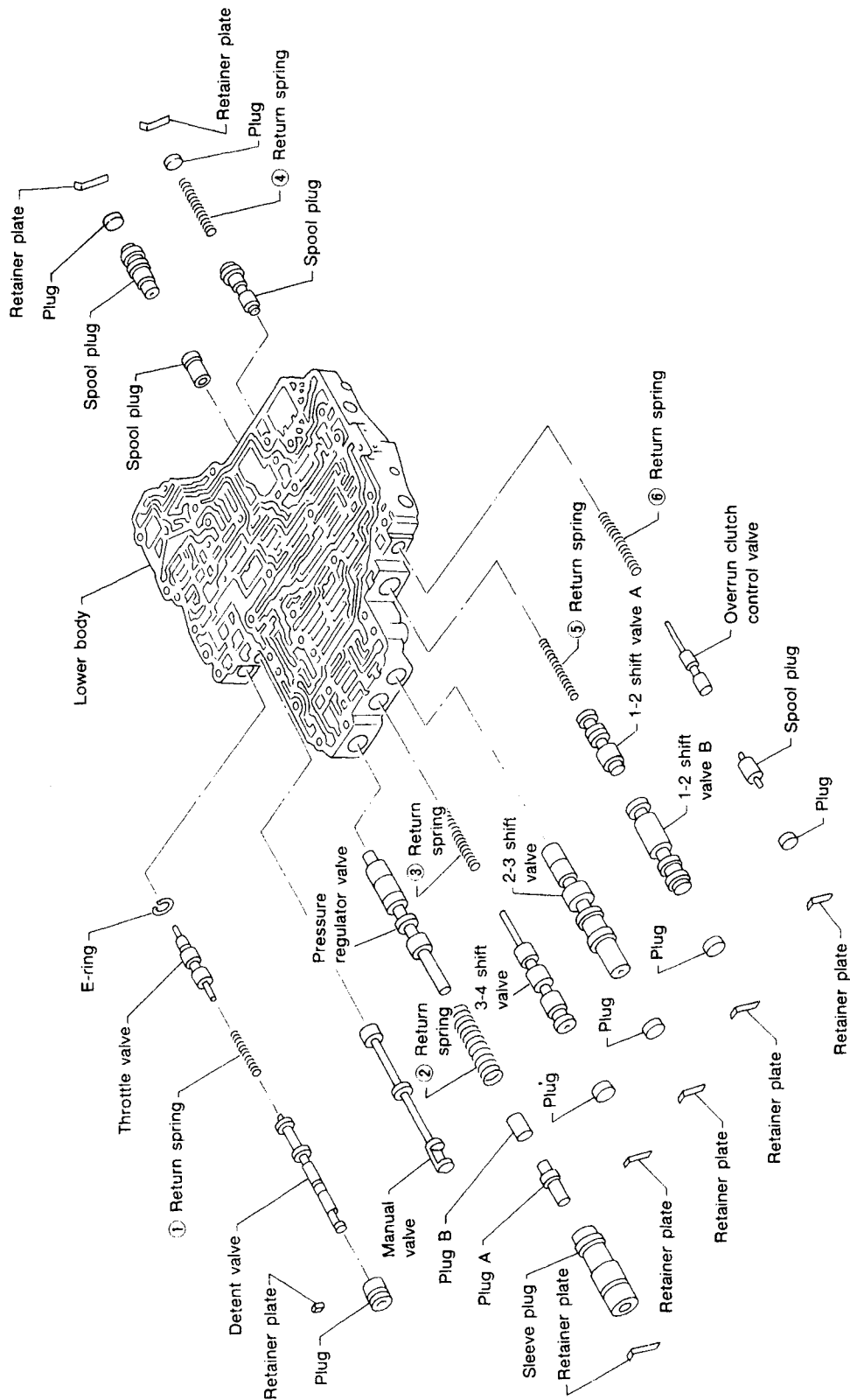
Name of control valves	Length A	Length B	Type
Pressure modifier valve	6.0 (0.236)	28.0 (1.102)	A
Lock-up control valve			
4-2 sequence valve			
Kickdown modulator valve	6.0 (0.236)	21.5 (0.846)	
3-2 timing valve			
1st reducing valve			
Throttle modulator valve			
4th speed cut valve	6.0 (0.236)	38.5 (1.516)	
1-2 accumulator valve			
Torque converter relief valve	13.0 (0.512)	17.0 (0.669)	B

- Install proper retainer plates.

REPAIR FOR COMPONENT PARTS

Control Valve Lower Body

SEC. 317



Apply ATF to all components before their installation.

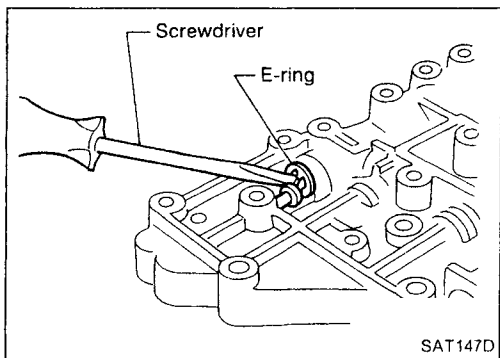
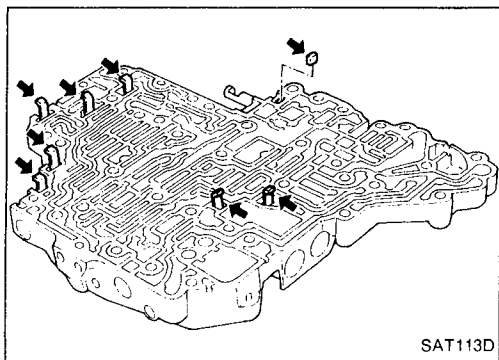
Numbers preceding valve springs correspond with those shown in Spring Chart of SDS on page AT-167.

REPAIR FOR COMPONENT PARTS

Control Valve Lower Body (Cont'd)

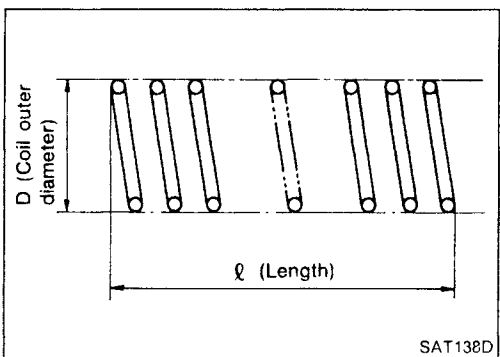
DISASSEMBLY

1. Remove valves at retainer plate.
For removal procedures, refer to "DISASSEMBLY" in "Control Valve Upper Body", AT-87.



Throttle valve

- Remove throttle valve at E-ring.



INSPECTION

Valve springs

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

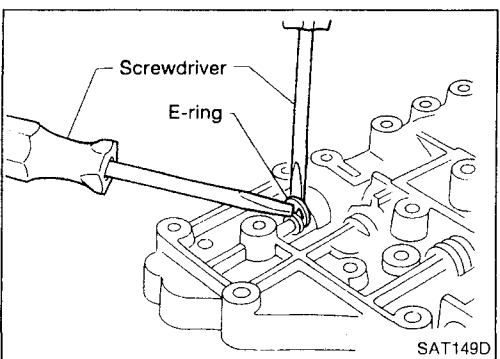
Inspection standard:

Refer to SDS, AT-167.

- Replace valve springs if deformed or fatigued.

Control valves

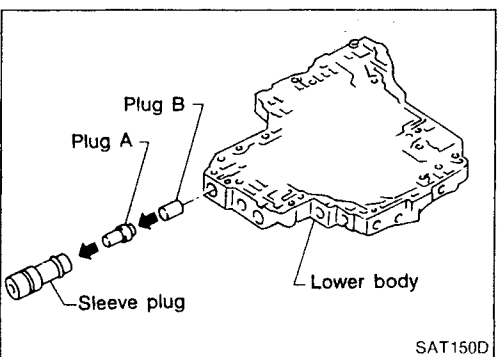
- Check sliding surfaces of control valves, sleeves and plugs for damage.



ASSEMBLY

Throttle valve

- Insert throttle valve to control valve body and then install E-ring to throttle valve.



Pressure regulator valve

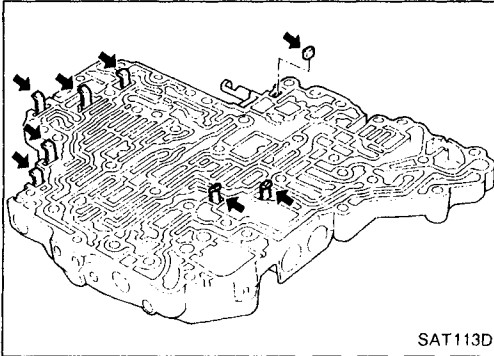
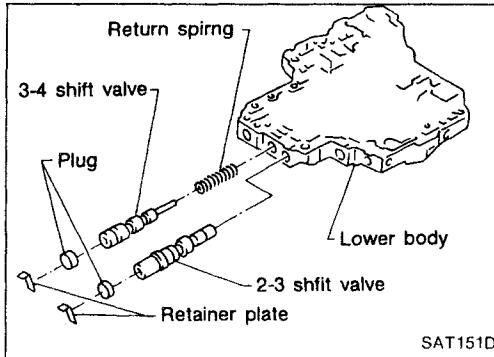
- Install pressure regulator valve after assembling sleeve plug, plug A and plug B.

REPAIR FOR COMPONENT PARTS

Control Valve Lower Body (Cont'd)

3-4 shift valve and 2-3 shift valve

- Install 3-4 shift valve and 2-3 shift valve after fixing plugs to retainer plates on the opposite side.

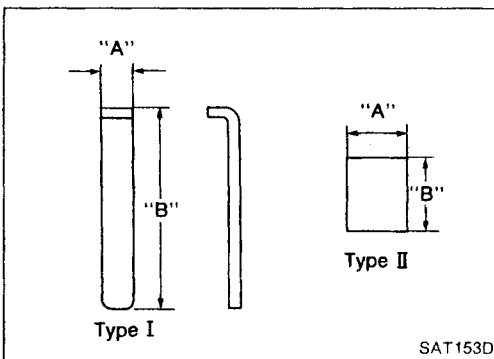


- Install control valves.
For installation procedures, refer to "ASSEMBLY in "Control Valve Upper Body", AT-87.

Retainer plate:

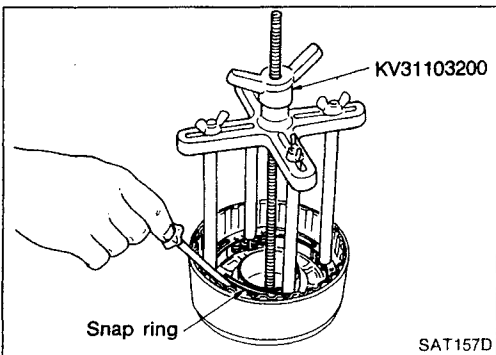
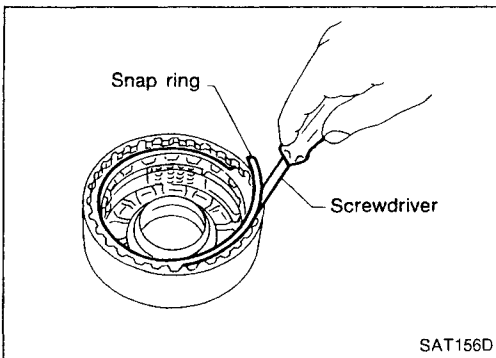
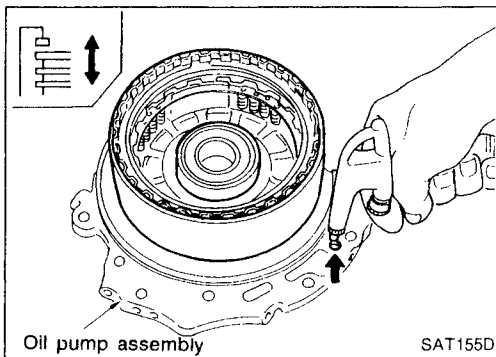
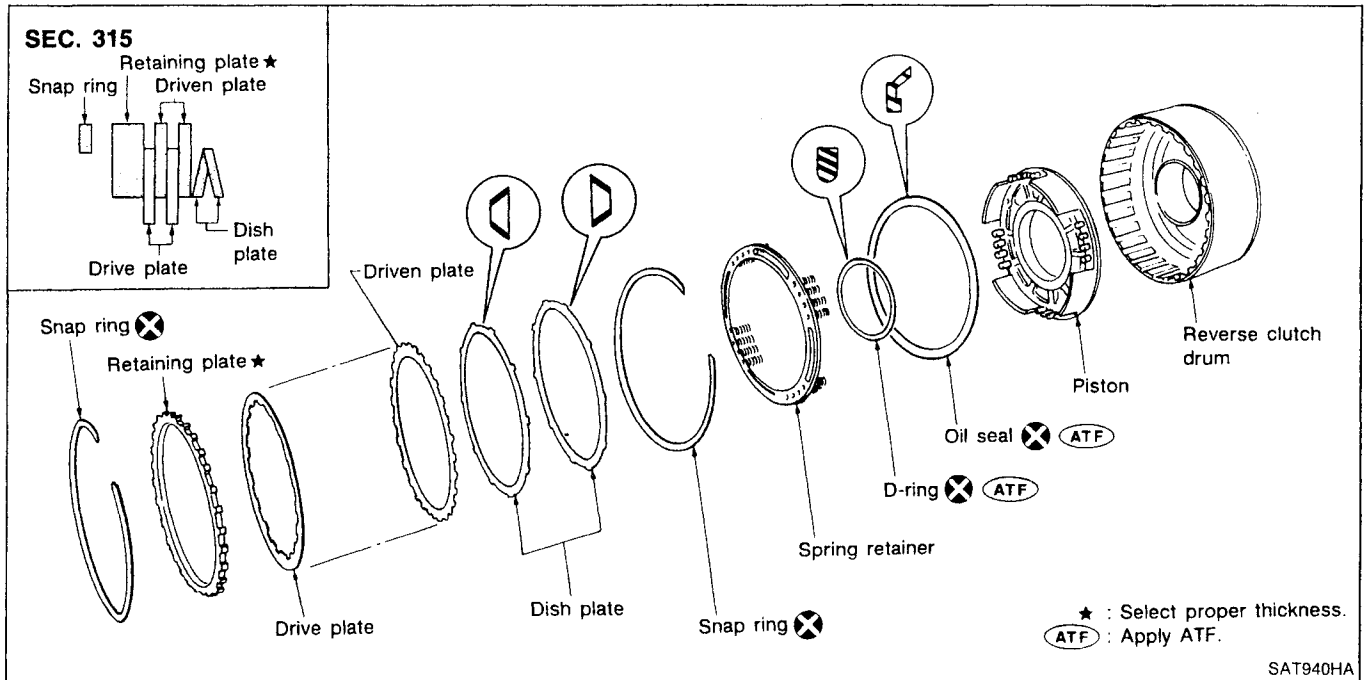
Unit: mm (in)

Name of control valve	Length A	Length B	Type
Throttle valve & detent valve	6.0 (0.236)	7.2 (0.283)	II
Pressure regulator valve	6.0 (0.236)	28.0 (1.102)	I
3-4 shift valve			
2-3 shift valve			
1-2 shift valve			
Overrun clutch control valve			



- Install proper retainer plates.

Reverse Clutch



DISASSEMBLY

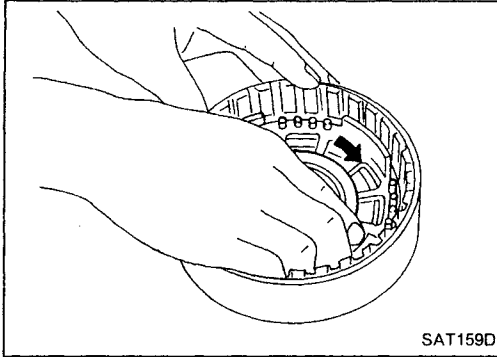
1. Check operation of reverse clutch.
 - a. Install seal ring onto drum support of oil pump cover and install reverse clutch assembly. Apply compressed air to oil hole.
 - b. Check to see that retaining plate moves to snap ring.
 - c. If retaining plate does not contact snap ring,
 - D-ring might be damaged.
 - Oil seal might be damaged.
 - Fluid might be leaking past piston check ball.
2. Remove snap ring.
3. Remove drive plates, driven plates, retaining plate, and dish plates.
4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.
 - **Set Tool directly above springs.**
 - **Do not expand snap ring excessively.**
5. Remove spring retainer and return springs.
 - **Do not remove return springs from spring retainer.**

AT

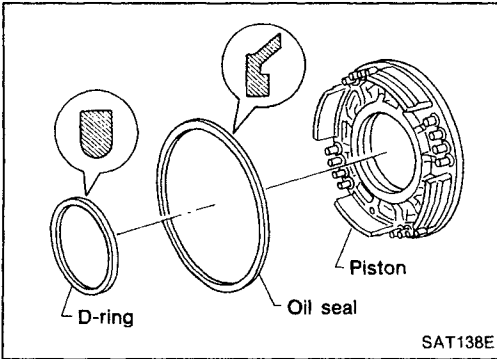
REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)

6. Remove piston from reverse clutch drum by turning it.



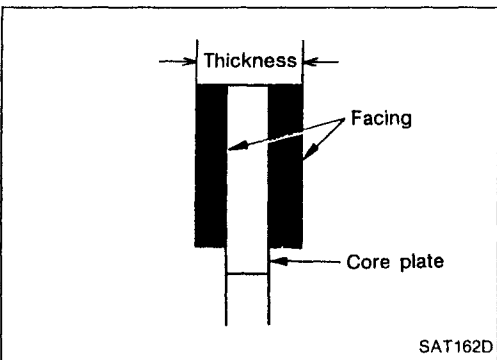
7. Remove D-ring and oil seal from piston.



INSPECTION

Reverse clutch snap ring, spring retainer and return springs

- Check for deformation, fatigue or damage.
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**



Reverse clutch drive plates

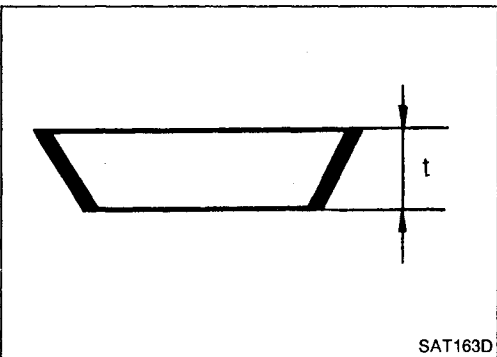
- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

Standard value 2.0 mm (0.079 in)

Wear limit 1.8 mm (0.071 in)

- If not within wear limit, replace.



Reverse clutch dish plates

- Check for deformation or damage.
- Measure thickness of dish plate.

Thickness of dish plate:

2.89 - 3.19 mm (0.1138 - 0.1256 in)

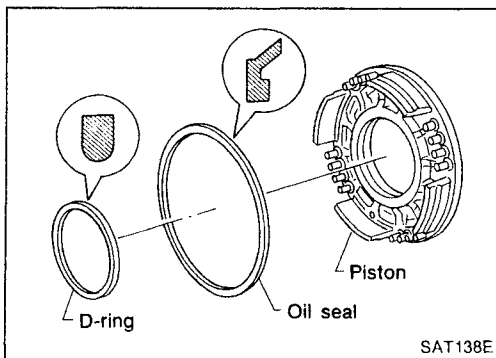
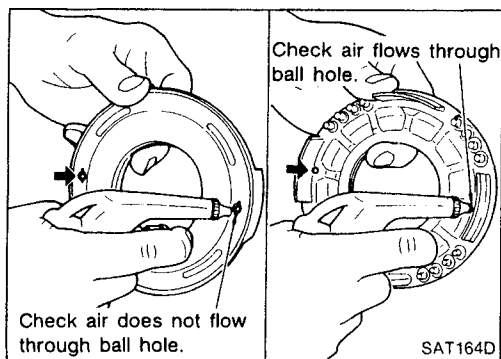
- If deformed or fatigued, replace.

REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)

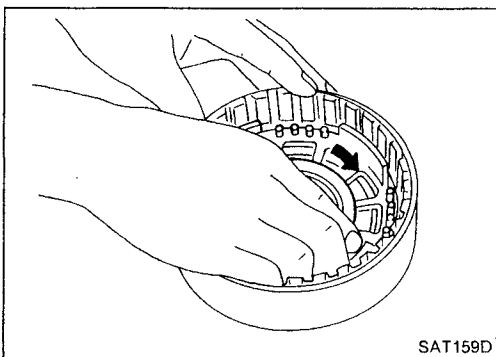
Reverse clutch piston

- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure air leaks past ball.

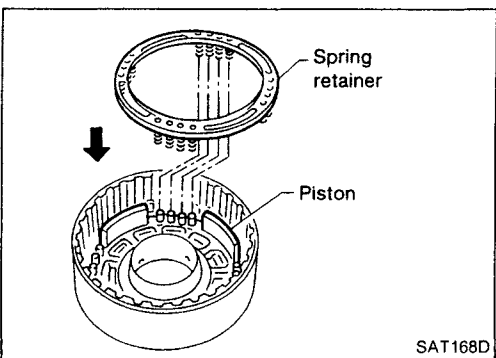


ASSEMBLY

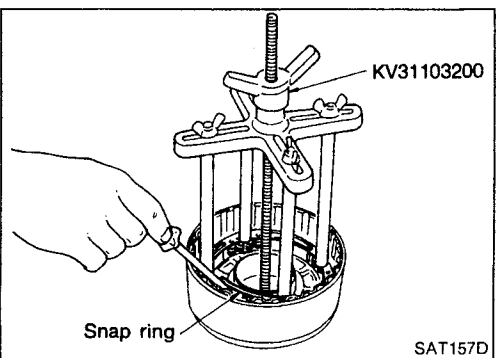
1. Install D-ring and oil seal on piston.
 - Take care with the direction of the oil seal.
 - Apply ATF to both parts.



2. Install piston assembly by turning it slowly.



3. Install return springs and spring retainer on piston.



4. Set Tool on spring retainer and install snap ring while compressing return springs.
 - Set Tool directly above return springs.

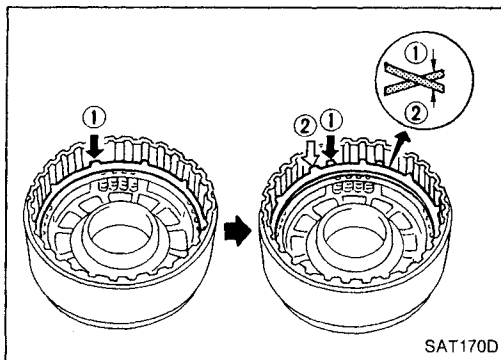
AT

REPAIR FOR COMPONENT PARTS

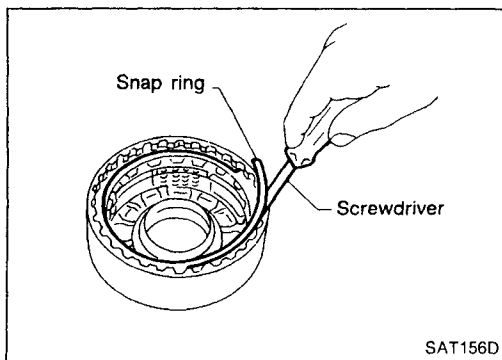
Reverse Clutch (Cont'd)

5. Install drive plates, driven plates, retaining plate and dish plates.

- Do not align the projections of any two dish plates.



6. Install snap ring.



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

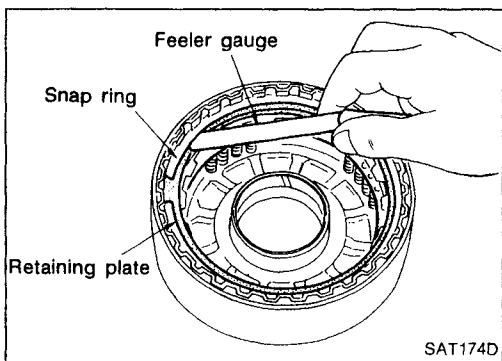
Specified clearance:

Standard 0.5 - 0.8 mm (0.020 - 0.031 in)

Allowable limit 1.2 mm (0.047 in)

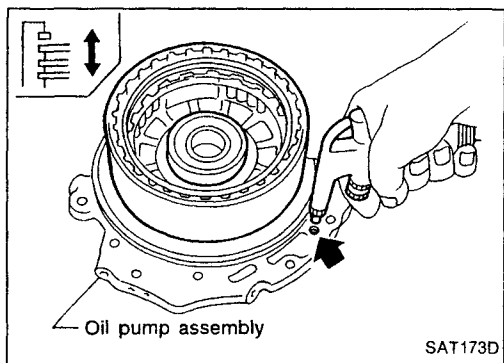
Retaining plate:

Refer to SDS, AT-168.



8. Check operation of reverse clutch.

Refer to "DISASSEMBLY" in "Reverse Clutch", AT-93.

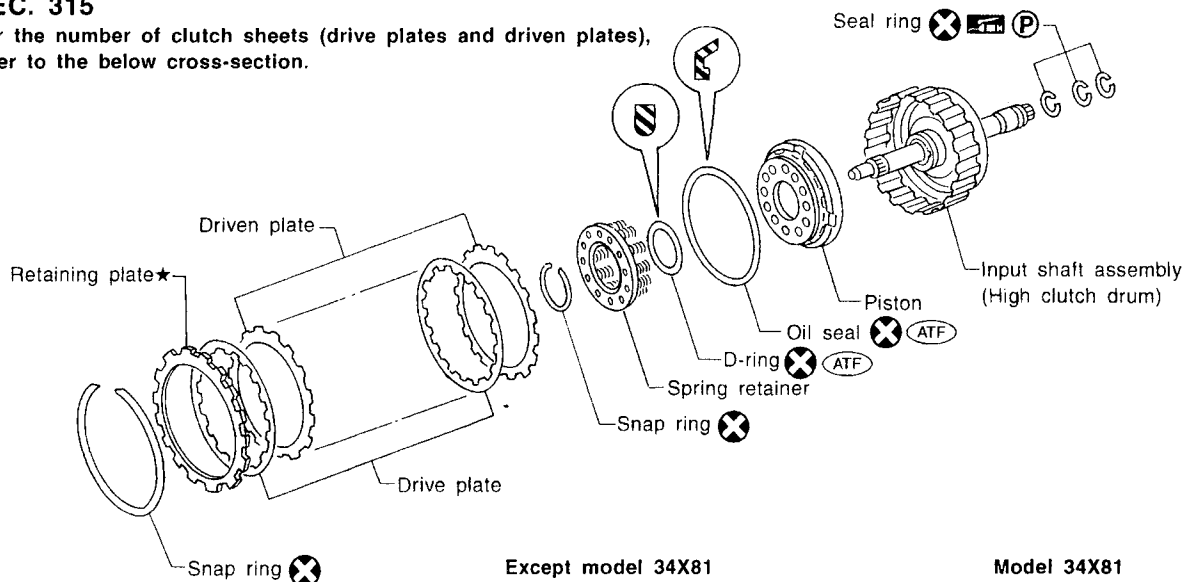


REPAIR FOR COMPONENT PARTS

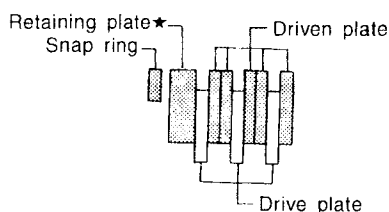
High Clutch

SEC. 315

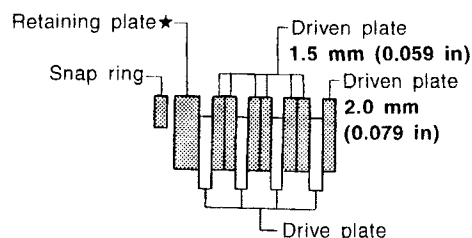
For the number of clutch sheets (drive plates and driven plates), refer to the below cross-section.



Except model 34X81



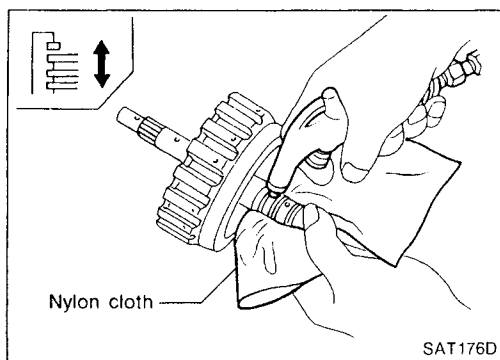
Model 34X81



- (P) : Apply petroleum jelly.
- (ATF) : Apply ATF.
- ★ : Select proper thickness.

SAT0841

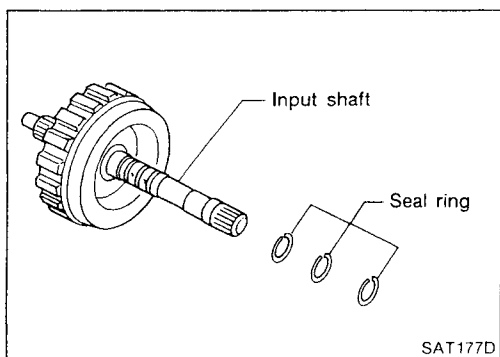
AT



DISASSEMBLY

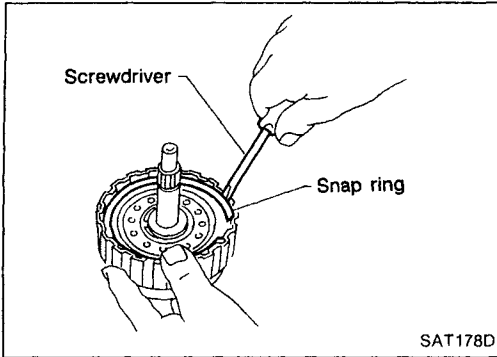
1. Check operation of high clutch.
 - a. Apply compressed air to oil hole of input shaft.
 - **Stop up a hole on opposite side of input shaft.**
 - b. Check to see that retaining plate moves to snap ring.
 - c. If retaining plate does not contact snap ring,
 - D-ring might be damaged.
 - Oil seal might be damaged.
 - Fluid might be leaking past piston check ball.

2. Remove seal rings from input shaft.

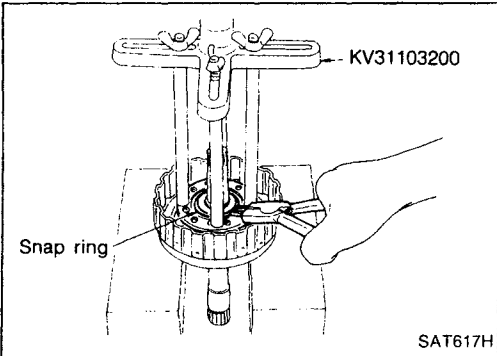


REPAIR FOR COMPONENT PARTS

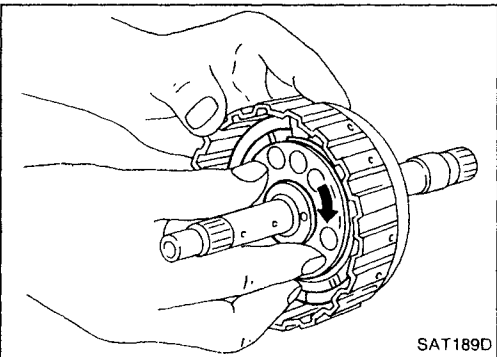
High Clutch (Cont'd)



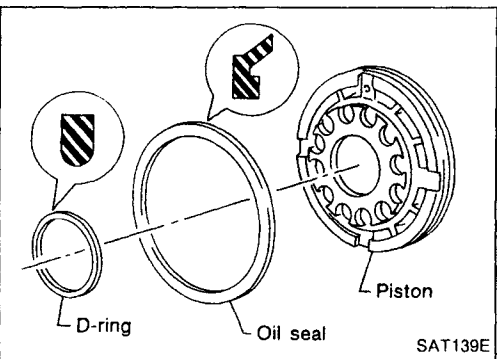
3. Remove snap ring.
4. Remove drive plates, driven plates and retaining plate.



5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.
 - **Set Tool directly above springs.**
 - **Do not expand snap ring excessively.**
6. Remove spring retainer and return springs.
 - **Do not remove return springs from spring retainer.**



7. Remove piston from high clutch drum by turning it.



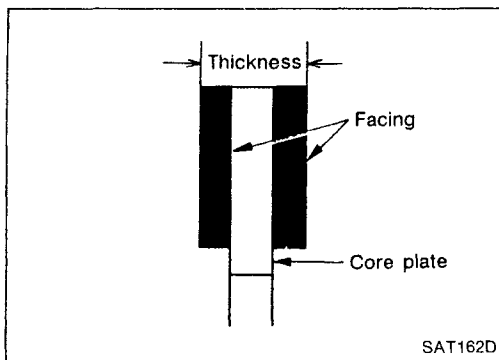
8. Remove D-ring and oil seal from piston.

INSPECTION

Reverse clutch snap ring, spring retainer and return springs

- Check for deformation, fatigue or damage.
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**

REPAIR FOR COMPONENT PARTS



High Clutch (Cont'd)

High clutch drive plates

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

Thickness of drive plate:

Except model 34X81

Standard value 2.0 mm (0.079 in)

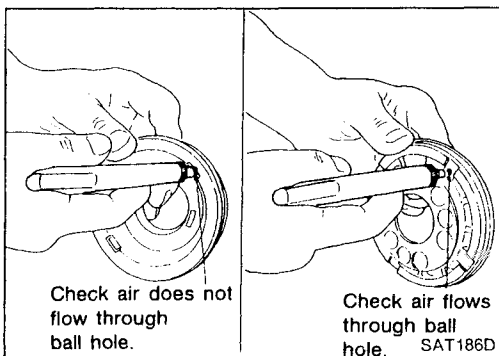
Wear limit 1.8 mm (0.071 in)

Model 34X81

Standard value 1.6 mm (0.063 in)

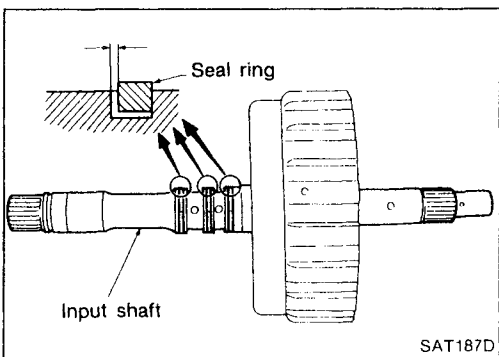
Wear limit 1.4 mm (0.055 in)

- If not within wear limit, replace.



High clutch piston

- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure air leaks past ball.



Seal ring clearance

- Install new seal rings onto input shaft.
- Measure clearance between seal ring and ring groove.

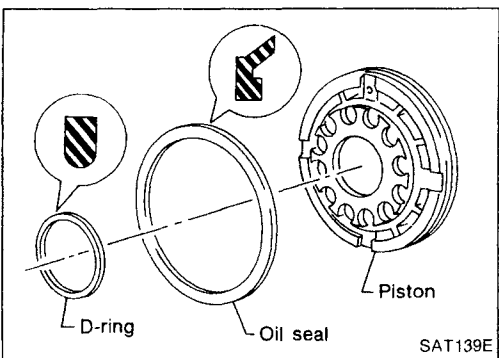
Standard clearance:

0.08 - 0.23 mm (0.0031 - 0.0091 in)

Allowable limit:

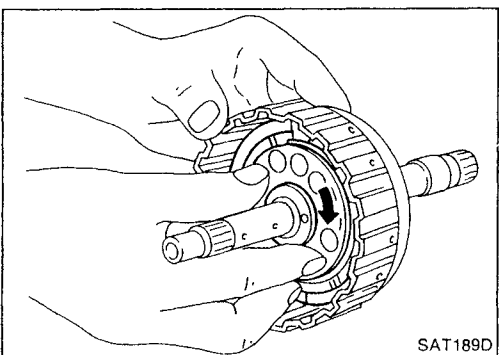
0.23 mm (0.0091 in)

- If not within wear limit, replace input shaft assembly.



ASSEMBLY

1. Install D-ring and oil seal on piston.
 - Take care with the direction of the oil seal.
 - Apply ATF to both parts.



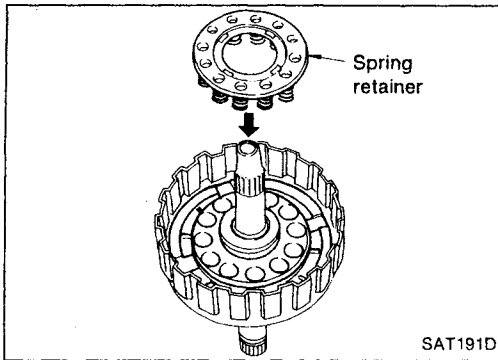
2. Install piston assembly by turning it slowly.
 - Apply ATF to inner surface of drum.

AT

REPAIR FOR COMPONENT PARTS

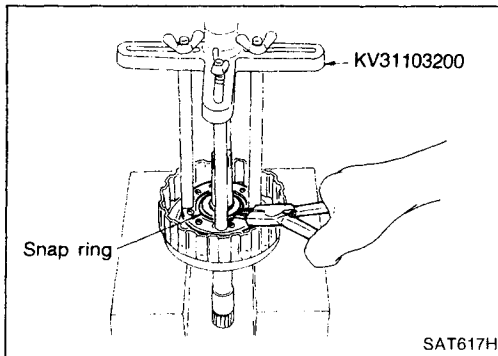
High Clutch (Cont'd)

3. Install return springs and spring retainer on piston.

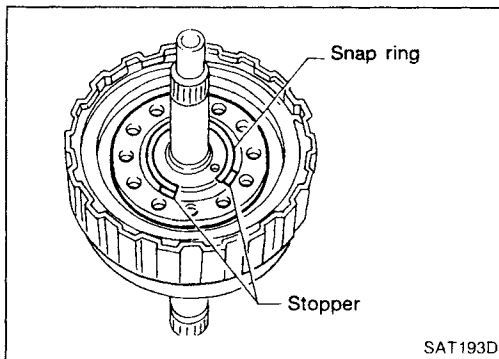


4. Set Tool on spring retainer and install snap ring while compressing return springs.

- Set Tool directly above return springs.



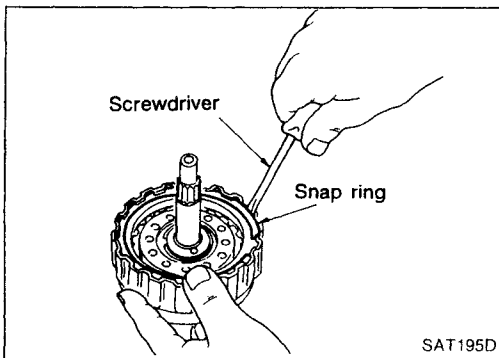
- Do not align snap ring gap with spring retainer stopper.



5. Install drive plates, driven plates and retaining plate.

- Take care with the order and direction of plates.

6. Install snap ring.



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

Specified clearance:

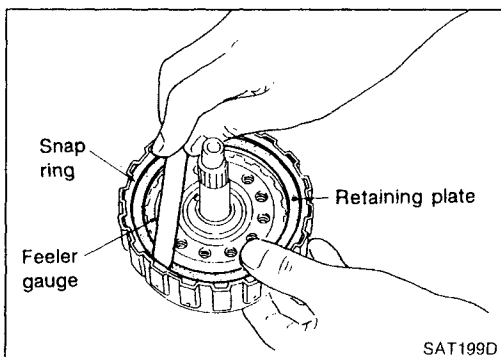
Standard 1.4 - 1.8 mm (0.055 - 0.071 in)

Allowable limit (Except model 34X81) 2.4 mm (0.094 in)

Allowable limit (Model 34X81) 2.6 mm (0.102 in)

Retaining plate:

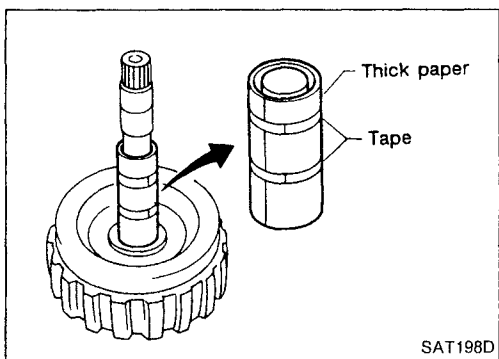
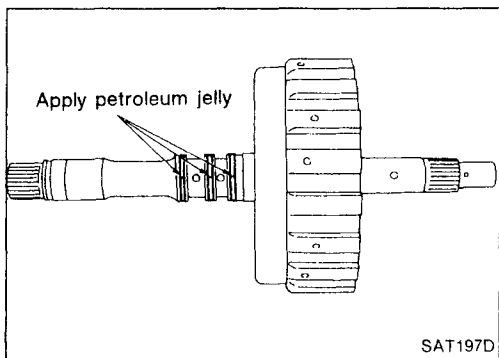
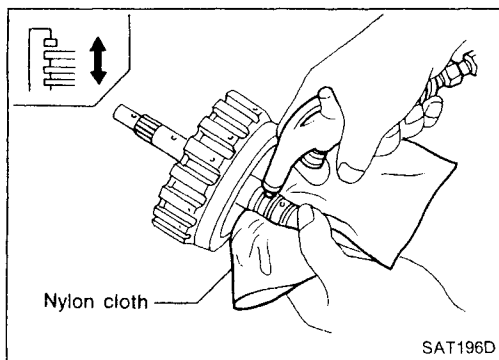
Refer to SDS, AT-168.



REPAIR FOR COMPONENT PARTS

High Clutch (Cont'd)

8. Check operation of high clutch.
Refer to "DISASSEMBLY" in "High Clutch", AT-97.

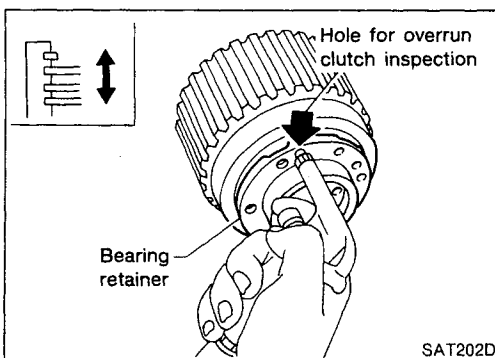
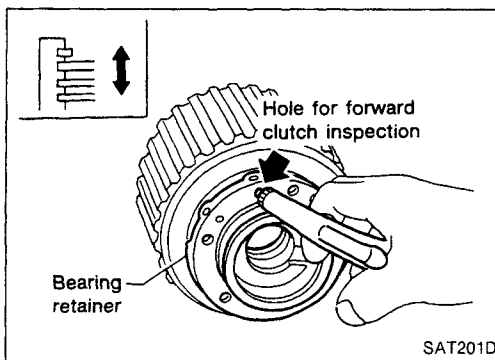
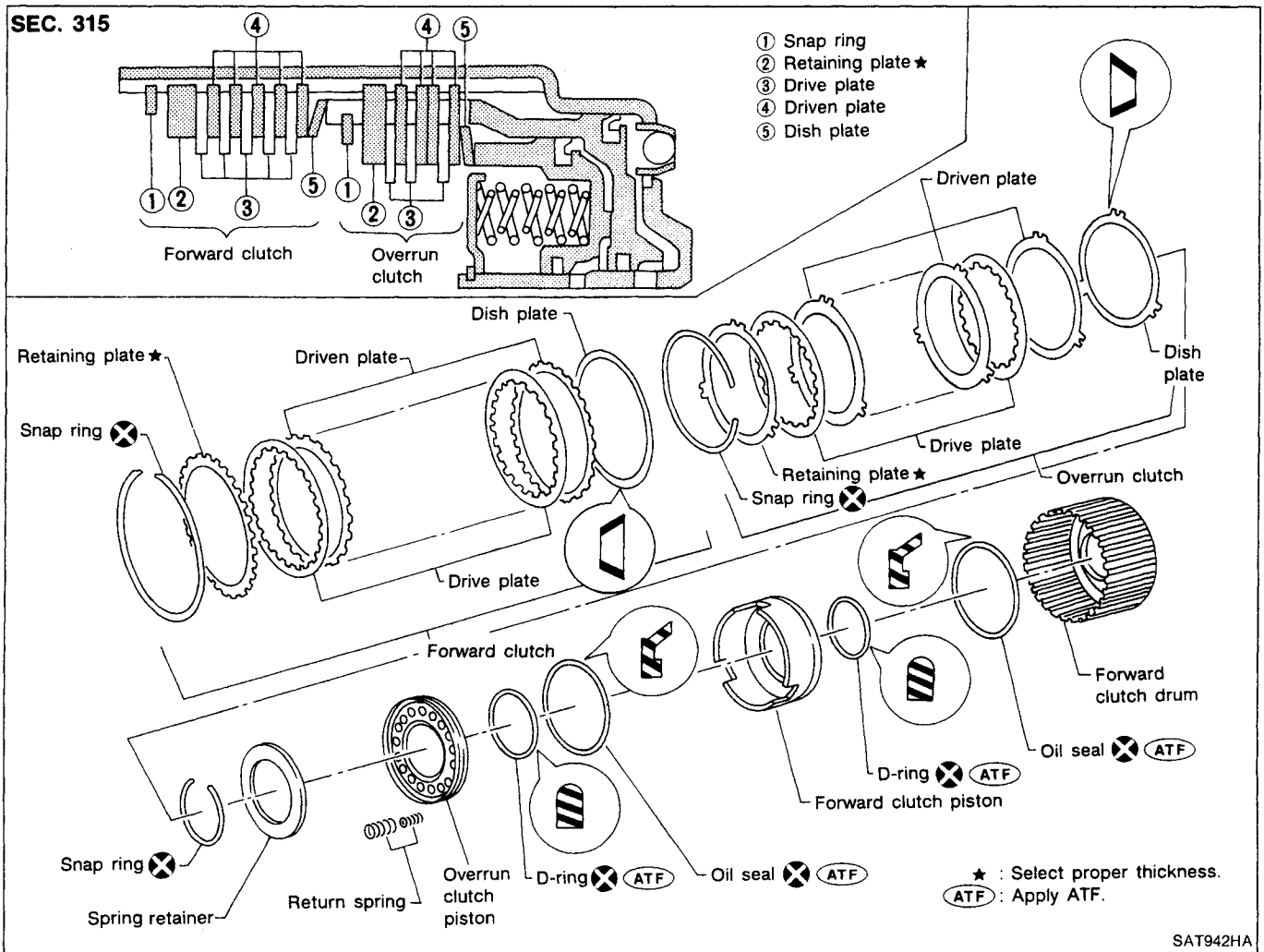


9. Install seal rings to input shaft.
- **Apply petroleum jelly to seal rings.**
 - **Roll paper around seal rings to prevent seal rings from spreading.**

AT

REPAIR FOR COMPONENT PARTS

Forward Clutch and Overrun Clutch

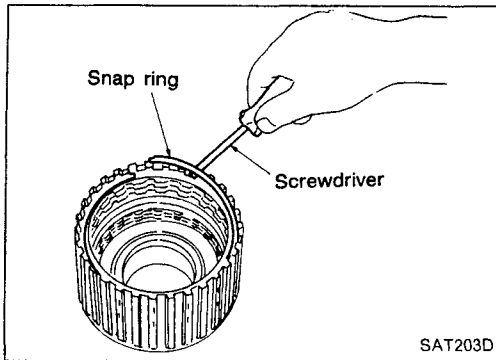


DISASSEMBLY

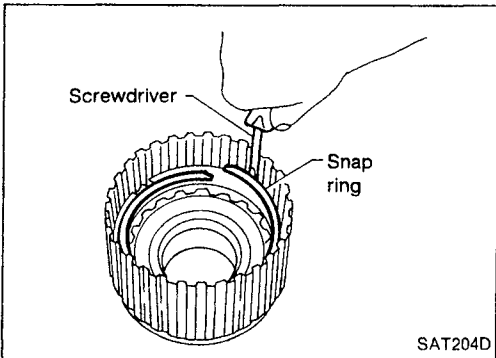
1. Check operation of forward clutch and overrun clutch.
 - a. Install bearing retainer on forward clutch drum.
 - b. Apply compressed air to oil hole of forward clutch drum.
 - c. Check to see that retaining plate moves to snap ring.
- d. If retaining plate does not contact snap ring,
 - D-ring might be damaged.
 - Oil seal might be damaged.
 - Fluid might be leaking past piston check ball.

REPAIR FOR COMPONENT PARTS

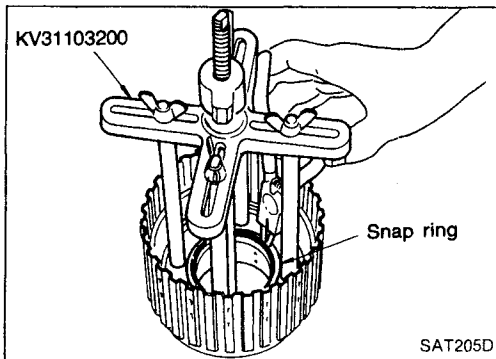
Forward Clutch and Overrun Clutch (Cont'd)



2. Remove snap ring for forward clutch.
3. Remove drive plates, driven plates, retaining plate and dish plate for forward clutch.



4. Remove snap ring for overrun clutch.
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.

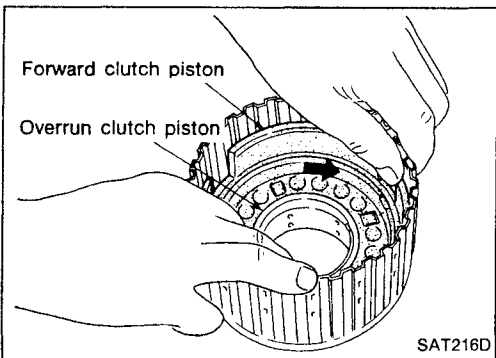


6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.

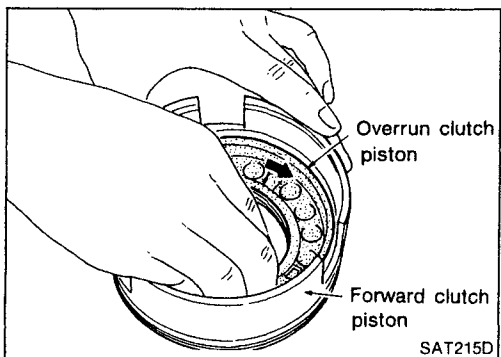
- **Set Tool directly above return springs.**

- **Do not expand snap ring excessively.**

7. Remove spring retainer and return springs.



8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.



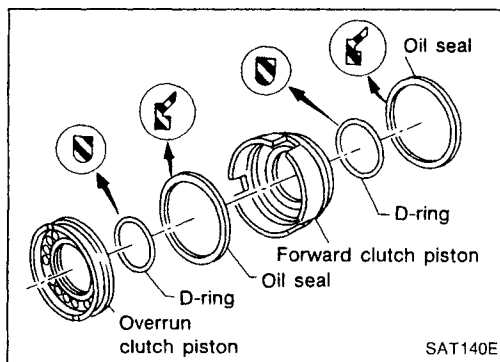
9. Remove overrun clutch piston from forward clutch piston by turning it.

AT

REPAIR FOR COMPONENT PARTS

Forward Clutch and Overrun Clutch (Cont'd)

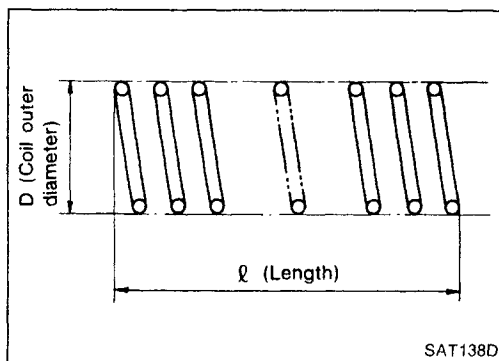
10. Remove D-rings and oil seals from forward clutch piston and overrun clutch piston.



INSPECTION

Snap rings and spring retainer

- Check for deformation, fatigue or damage.



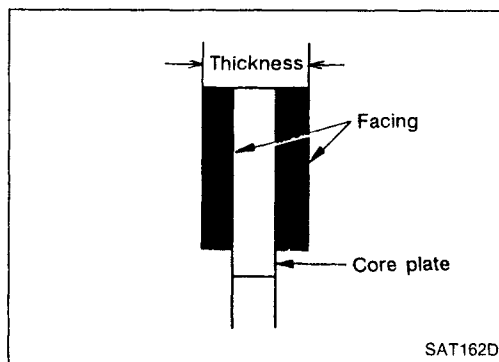
Forward clutch and overrun clutch return springs

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

Inspection standard:

Refer to SDS, AT-169.

- Replace if deformed or fatigued.



Forward clutch and overrun clutch drive plates

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

Thickness of drive plate:

Forward clutch

Standard value 1.8 mm (0.071 in)

Wear limit 1.6 mm (0.063 in)

Overrun clutch

Standard value 1.6 mm (0.063 in)

Wear limit 1.4 mm (0.055 in)

- If not within wear limit, replace.

Forward clutch and overrun clutch dish plates

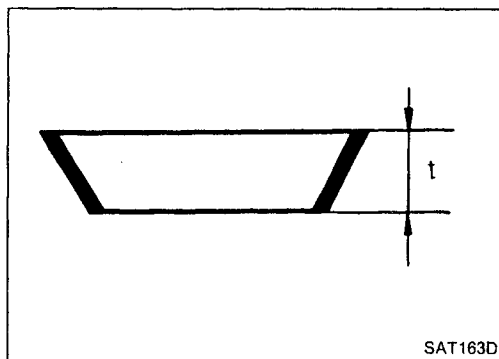
- Check for deformation or damage.
- Measure thickness of dish plate.

Thickness of dish plate:

Forward clutch 2.35 - 2.65 mm (0.0925 - 0.1043 in)

Overrun clutch 2.00 - 2.30 mm (0.0787 - 0.0906 in)

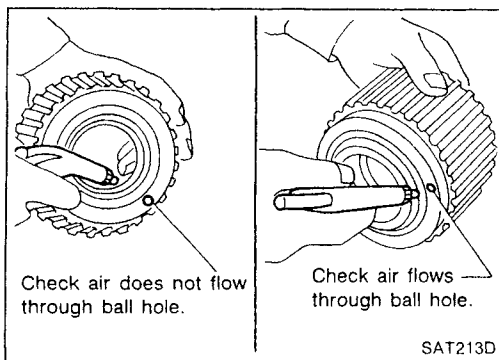
- If deformed or fatigued, replace.



REPAIR FOR COMPONENT PARTS

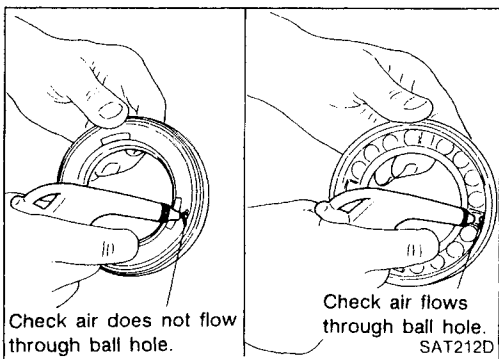
Forward Clutch and Overrun Clutch (Cont'd)

Forward clutch drum



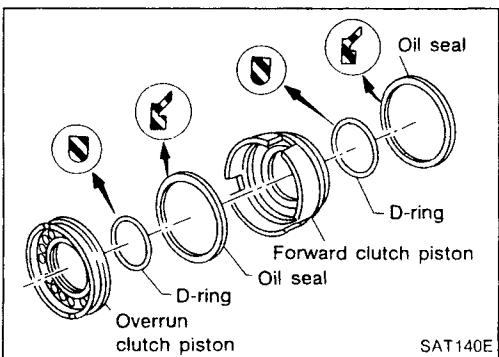
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole from outside of forward clutch drum. Make sure air leaks past ball.
- Apply compressed air to oil hole from inside of forward clutch drum. Make sure there is no air leakage.

Overrun clutch piston



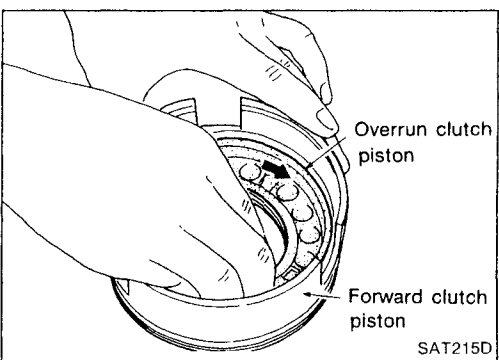
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side. Make sure air leaks past ball.

ASSEMBLY

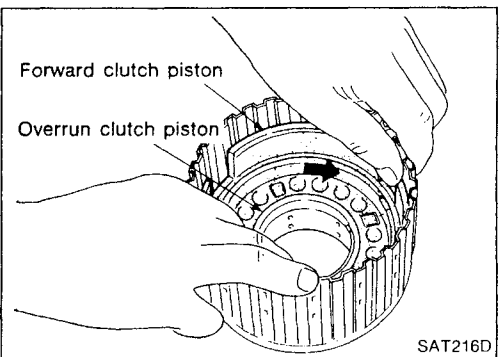


1. Install D-rings and oil seals on forward clutch piston and overrun clutch piston.

- Take care with direction of oil seal.
- Apply ATF to both parts.



2. Install overrun clutch piston assembly on forward clutch piston while turning it slowly.

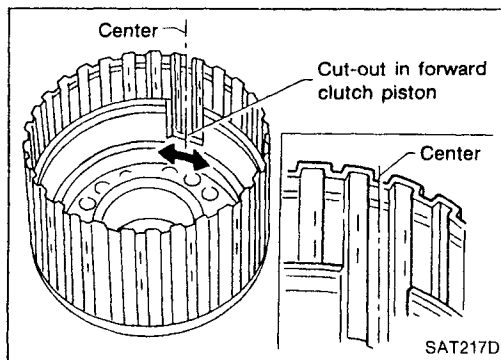


3. Install forward clutch piston assembly on forward clutch drum while turning it slowly.

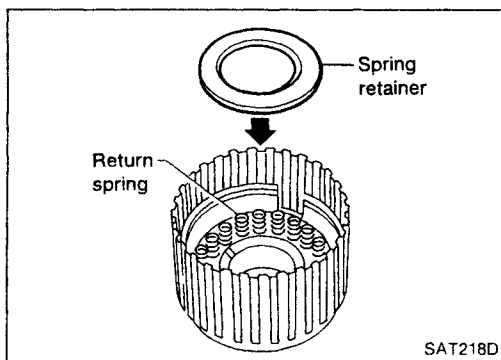
AT

REPAIR FOR COMPONENT PARTS

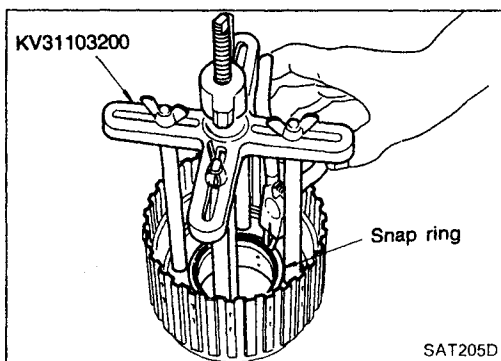
Forward Clutch and Overrun Clutch (Cont'd)



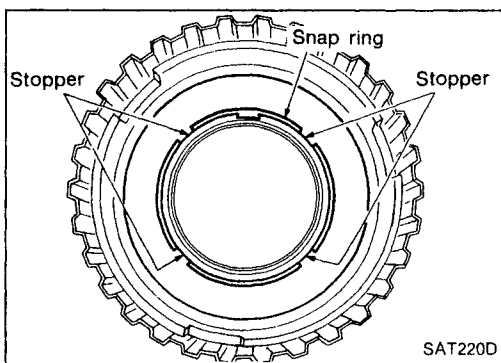
4. Align notch in forward clutch piston with groove in forward clutch drum.



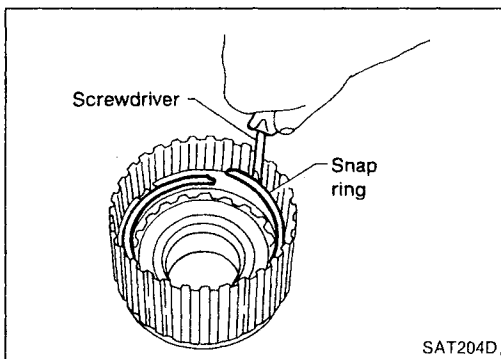
5. Install return springs on piston.
6. Install spring retainer on return springs.



7. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly above return springs.**



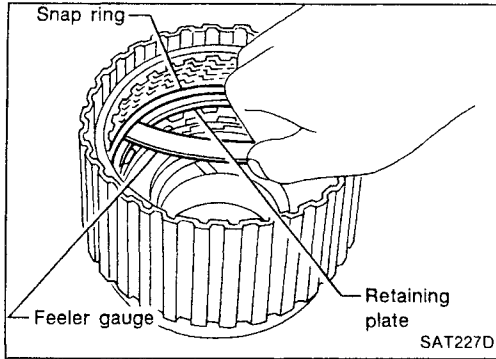
- **Do not align snap ring gap with spring retainer stopper.**



8. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
9. Install snap ring for overrun clutch.

REPAIR FOR COMPONENT PARTS

Forward Clutch and Overrun Clutch (Cont'd)



10. Measure clearance between overrun clutch retaining plate and snap ring.

If not within allowable limit, select proper retaining plate.

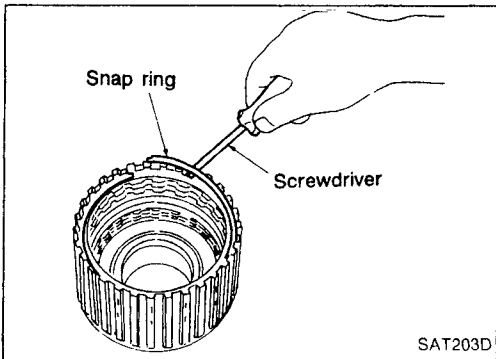
Specified clearance:

Standard 1.0 - 1.4 mm (0.039 - 0.055 in)

Allowable limit 2.0 mm (0.079 in)

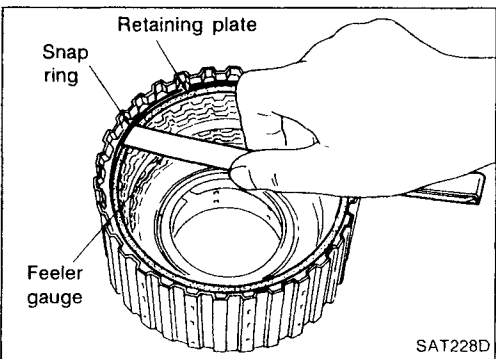
Overrun clutch retaining plate:

Refer to SDS, AT-168.



11. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.

12. Install snap ring for forward clutch.



13. Measure clearance between forward clutch retaining plate and snap ring.

If not within allowable limit, select proper retaining plate.

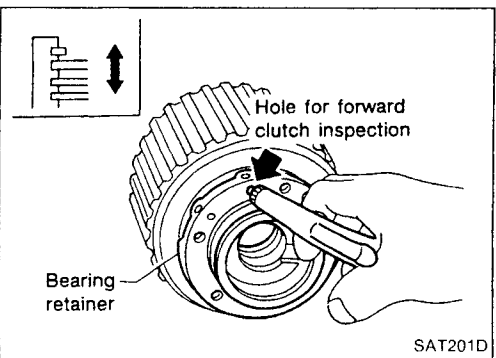
Specified clearance:

Standard 0.45 - 0.85 mm (0.0177 - 0.0335 in)

Allowable limit 1.85 mm (0.0728 in)

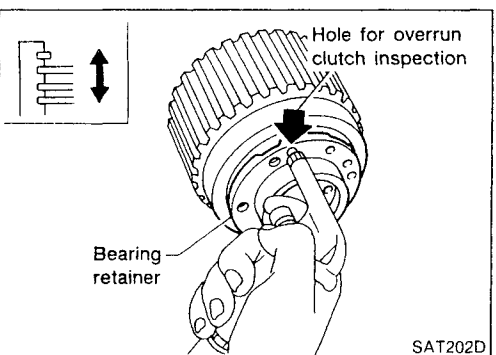
Forward clutch retaining plate:

Refer to SDS, AT-168.



14. Check operation of forward clutch.

Refer to "DISASSEMBLY" in "Forward Clutch and Overrun Clutch", AT-102.



15. Check operation of overrun clutch.

Refer to "DISASSEMBLY" in "Forward Clutch and Overrun Clutch", AT-102.

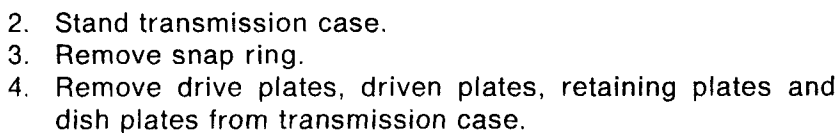
AT

★ : Select proper thickness.
 ATF : Apply ATF.

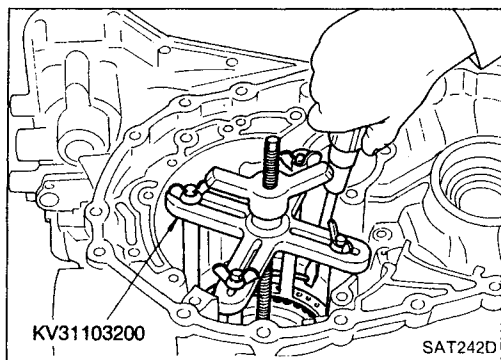
Retaining plate ★
 Snap ring X
 Drive plate
 Retaining plate
 Driven plate
 Spring retainer
 Snap ring X
 Dish plate
 D-ring X ATF
 Oil seal X ATF
 Piston

Retaining plate ★
 Snap ring
 Driven plate
 Retaining plate
 Drive plate
 Dish plate

SAT943HA

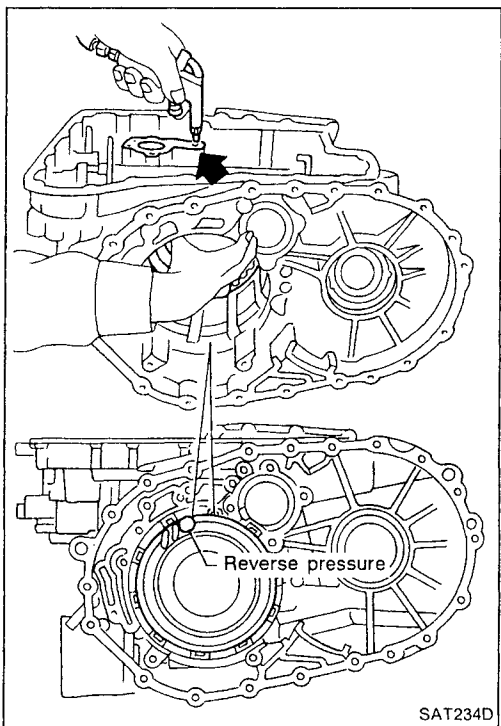


REPAIR FOR COMPONENT PARTS

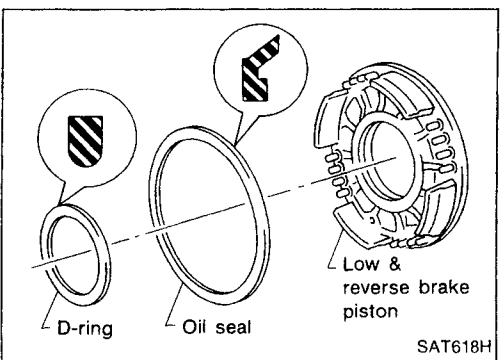


Low & Reverse Brake (Cont'd)

5. Set Tool on spring retainer and remove snap ring while compressing return springs.
 - **Set Tool directly above return springs.**
 - **Do not expand snap ring excessively.**
6. Remove spring retainer and return springs.
 - **Do not remove return springs from spring retainer.**



7. Apply compressed air to oil hole of transmission case while holding piston.
8. Remove piston from transmission case by turning it.



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

INSPECTION

Low & reverse clutch snap ring, spring retainer and return springs

- Check for deformation, fatigue or damage.
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**

AT

REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)

Low & reverse brake drive plate

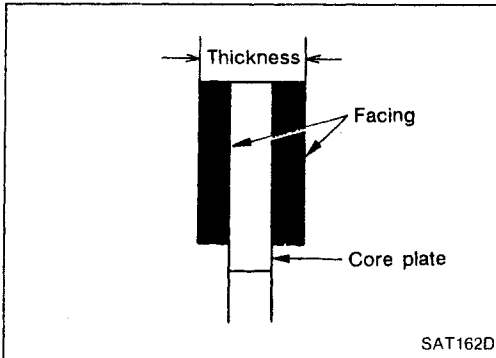
- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

Standard value 2.0 mm (0.079 in)

Wear limit 1.8 mm (0.071 in)

- If not within wear limit, replace.



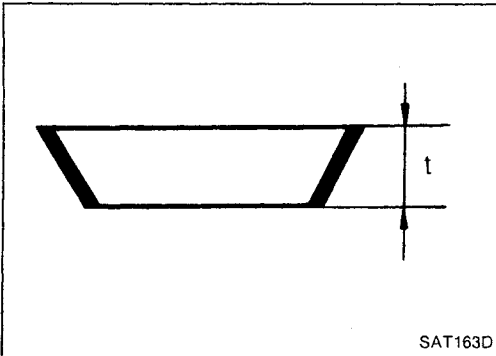
Low & reverse brake dish plates

- Check for deformation or damage.
- Measure thickness of dish plate.

Thickness of dish plate:

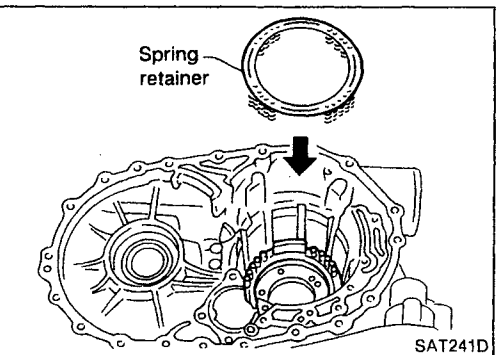
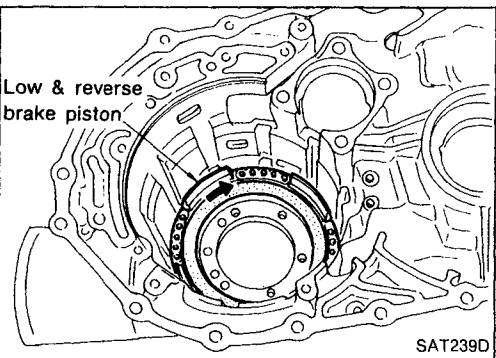
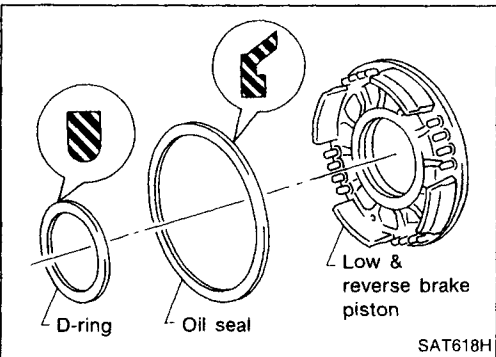
3.00 - 3.30 mm (0.1181 - 0.1299 in)

- If deformed or fatigued, replace.



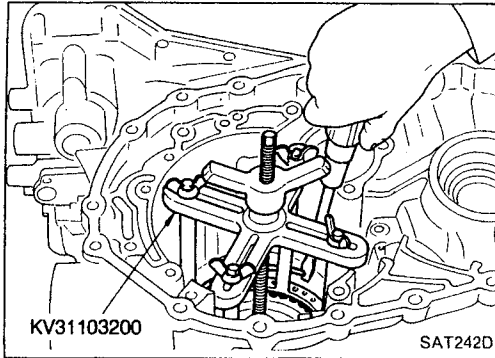
ASSEMBLY

1. Install D-ring and oil seal on piston.
 - Take care with the direction of the oil seal.
 - Apply ATF to D-ring and oil seal.
2. Stand transmission case.
3. Install piston assembly on transmission case while turning it slowly.
 - Apply ATF to inner surface of transmission case.
4. Install return springs and spring retainer on piston.

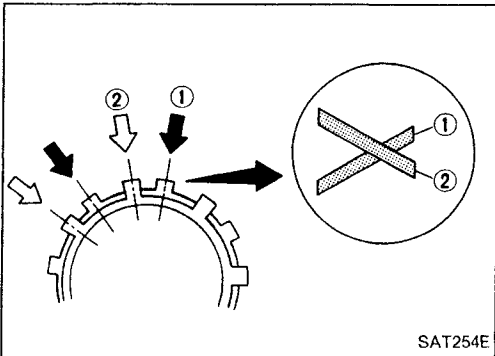


REPAIR FOR COMPONENT PARTS

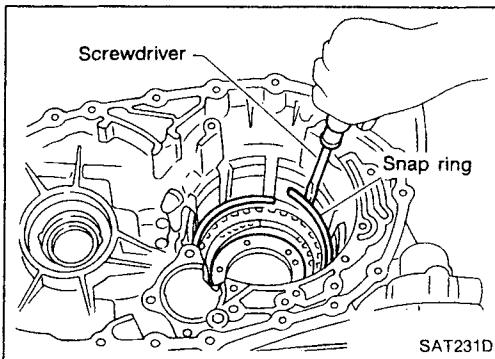
Low & Reverse Brake (Cont'd)



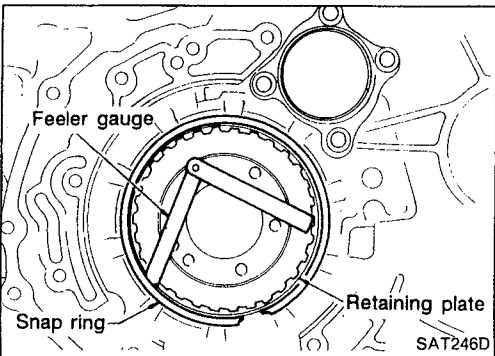
5. Install snap ring while compressing return springs.
 - **Set Tool directly above return springs.**



6. Install drive plates, driven plates, retaining plates and dish plates.
 - **Do not align the projections on the two dish plates.**



7. Install snap ring.



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

Specified clearance:

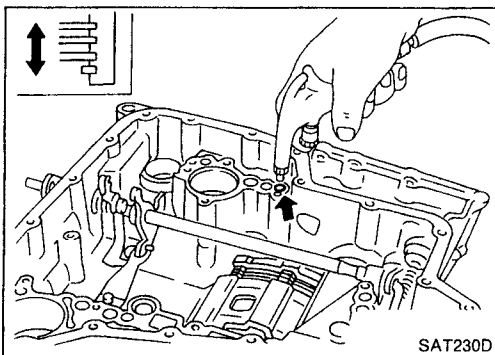
Standard 1.4 - 1.8 mm (0.055 - 0.071 in)

Allowable limit

2.8 mm (0.110 in)

Retaining plate:

Refer to SDS, AT-169.



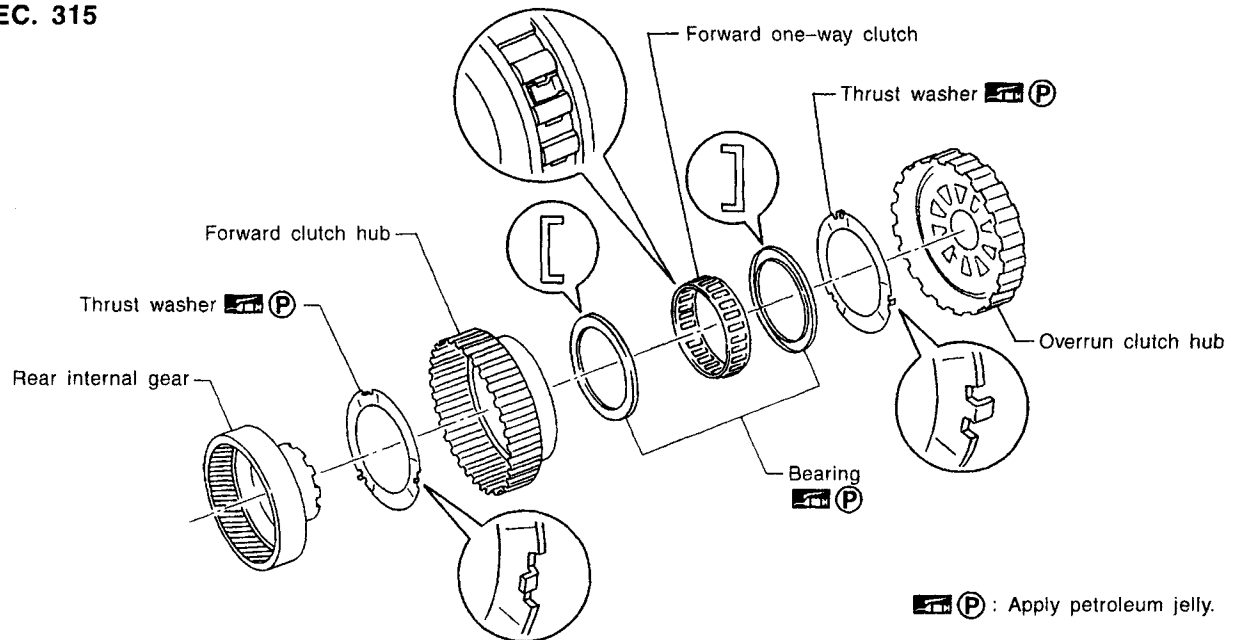
9. Check operation of low & reverse brake. Refer to "DISASSEMBLY" in "Low & Reverse Brake", AT-108.

AT

REPAIR FOR COMPONENT PARTS

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

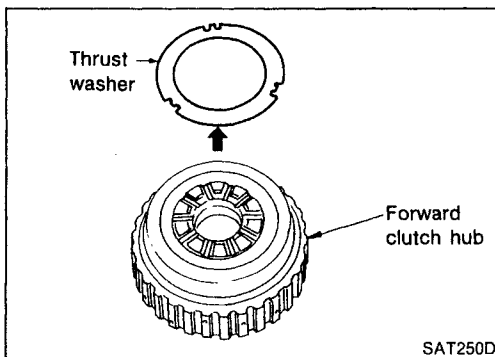
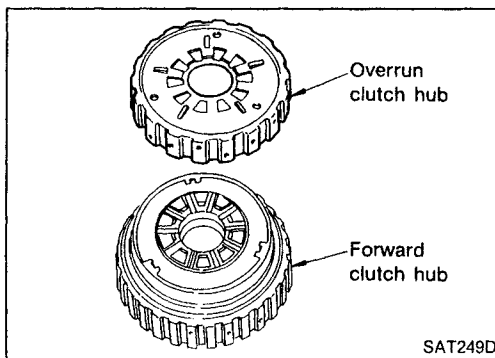
SEC. 315



SAT975H

DISASSEMBLY

1. Remove snap ring from overrun clutch hub.
2. Remove overrun clutch hub from forward clutch hub.

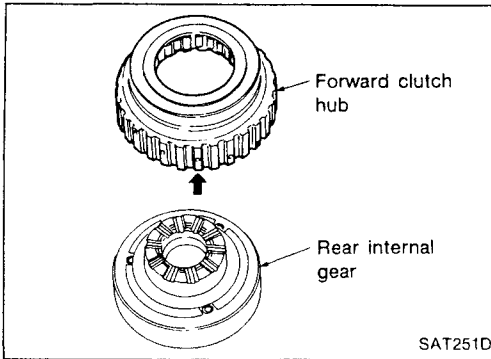


3. Remove thrust washer from forward clutch hub.

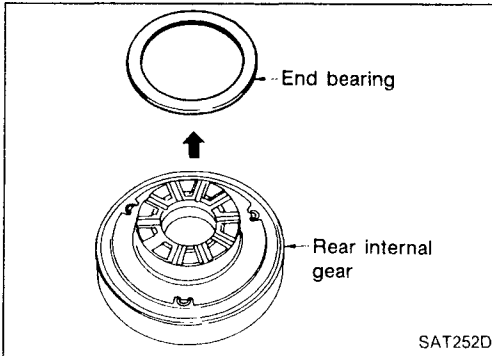
REPAIR FOR COMPONENT PARTS

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

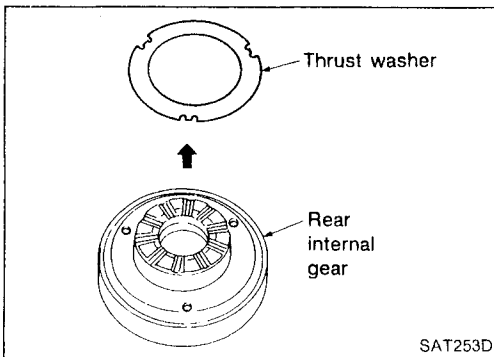
4. Remove forward clutch hub from rear internal gear.



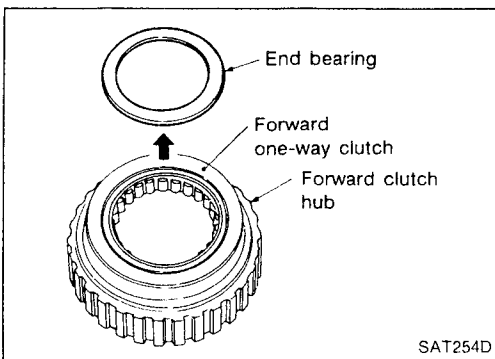
5. Remove end bearing from rear internal gear.



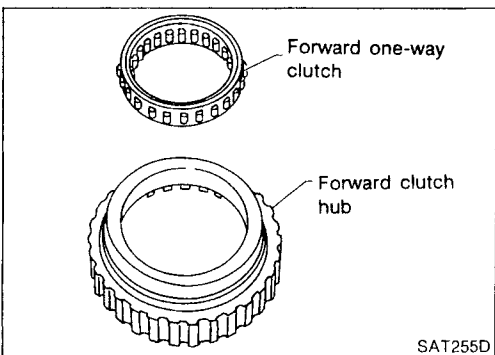
6. Remove thrust washer from rear internal gear.



7. Remove end bearing from forward one-way clutch.



8. Remove one-way clutch from forward clutch hub.



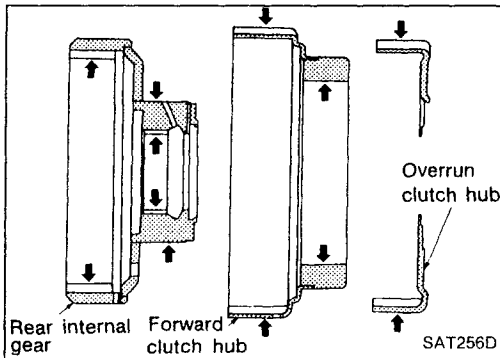
AT

REPAIR FOR COMPONENT PARTS

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

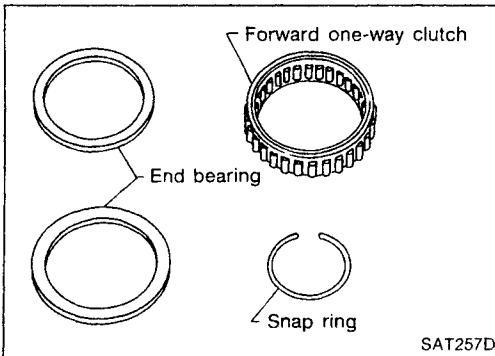
Rear internal gear, forward clutch hub and overrun clutch hub

- Check rubbing surface for wear or damage.



Snap ring, end bearings and forward one-way clutch

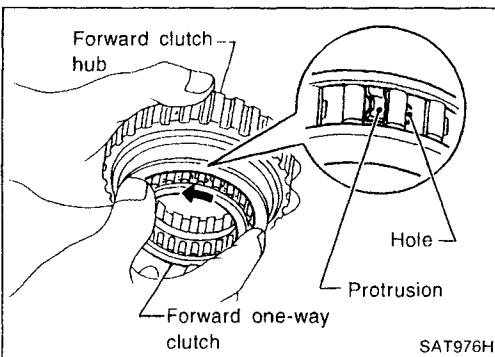
- Check snap ring and end bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.



ASSEMBLY

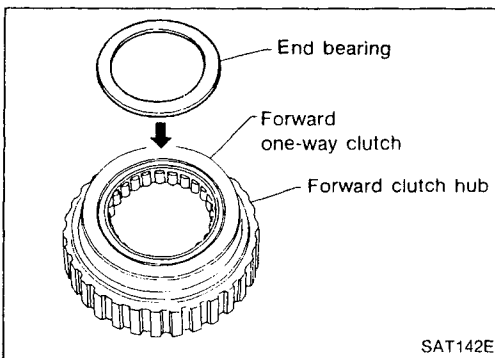
1. Install forward one-way clutch on forward clutch.

- Take care with the direction of the forward one-way clutch.



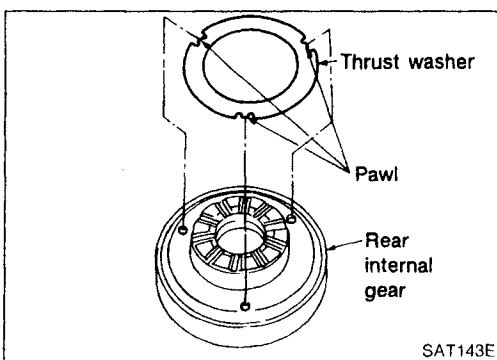
2. Install end bearing on forward one-way clutch.

- Apply petroleum jelly to end bearing.



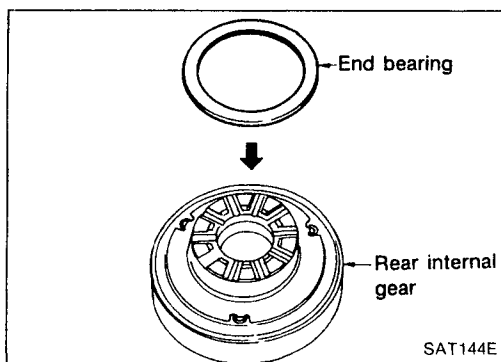
3. Install thrust washer on rear internal gear.

- Apply petroleum jelly to thrust washer.
- Align pawls of thrust washer with holes of rear internal gear.

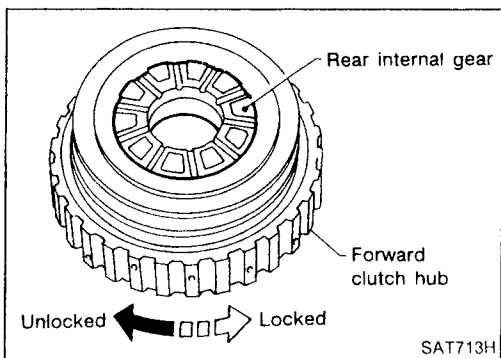


REPAIR FOR COMPONENT PARTS

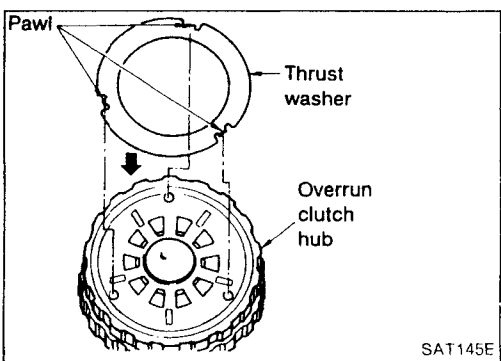
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



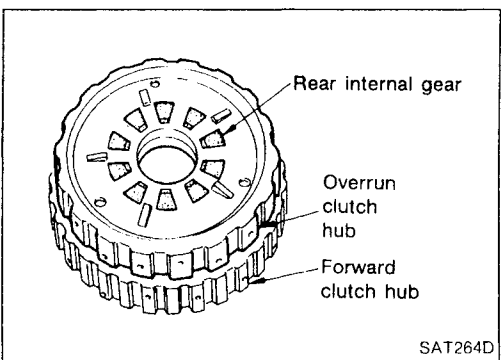
4. Install end bearing on rear internal gear.
 - Apply petroleum jelly to end bearing.



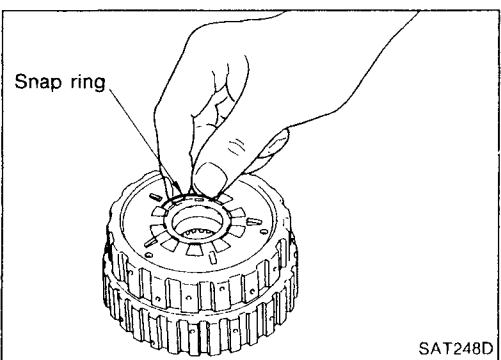
5. Install forward clutch hub on rear internal gear.
 - Check operation of forward one-way clutch. Hold rear internal gear and turn forward clutch hub. Check forward clutch hub for correct locking and unlocking directions.
 - If not as shown in illustration, check installation direction of forward one-way clutch.



6. Install thrust washer on overrun clutch hub.
 - Apply petroleum jelly to thrust washer.
 - Align pawls of thrust washer with holes of overrun clutch hub.



7. Install overrun clutch hub on rear internal gear.
 - Align projections of rear internal gear with holes of overrun clutch hub.



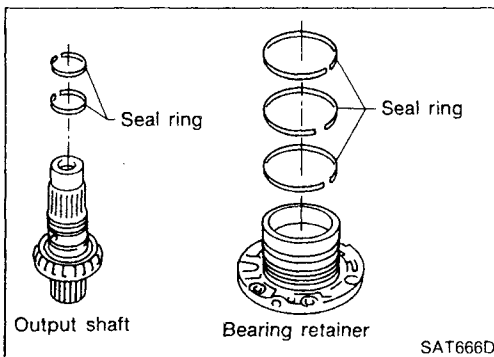
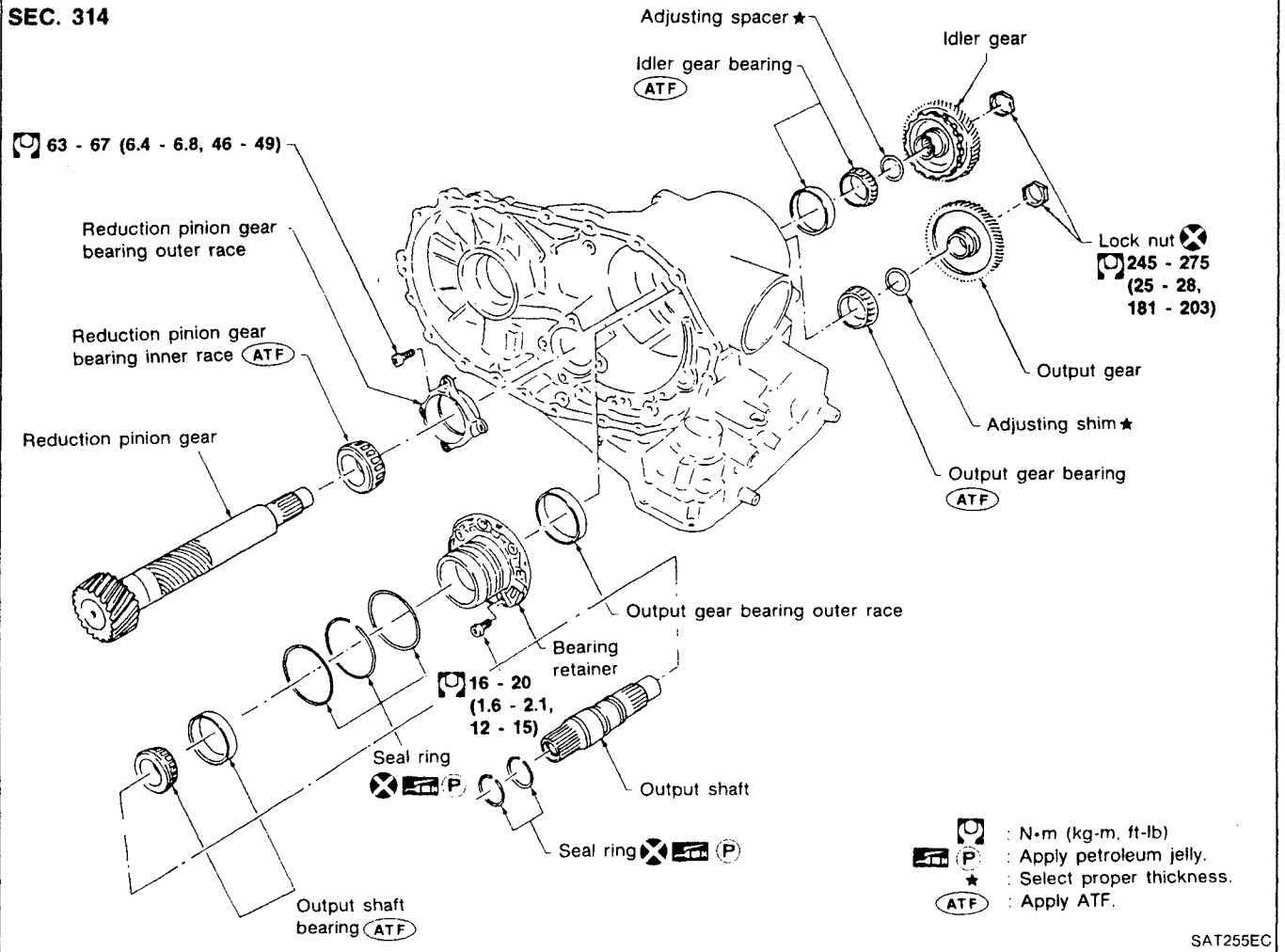
8. Install snap ring to groove of rear internal gear.

AT

REPAIR FOR COMPONENT PARTS

Output Shaft, Output Gear, Idler Gear, Reduction Pinion Gear and Bearing Retainer — Except Model 34X81

SEC. 314



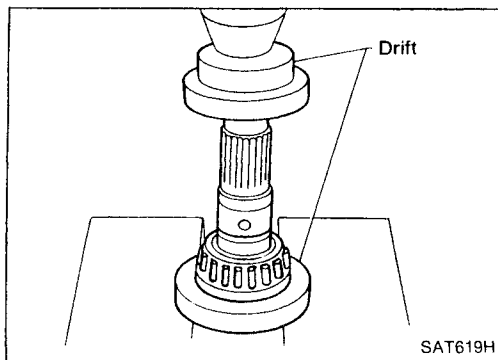
DISASSEMBLY

1. Remove seal rings from output shaft and bearing retainer.

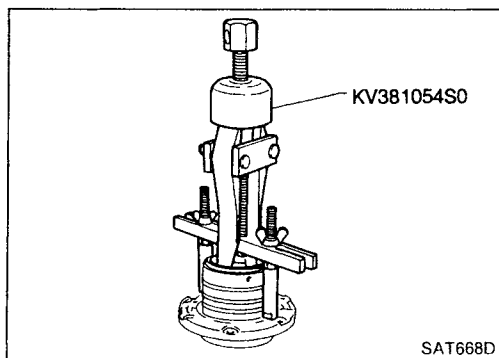
REPAIR FOR COMPONENT PARTS

Output Shaft, Output Gear, Idler Gear, Reduction Pinion Gear and Bearing Retainer — Except Model 34X81 (Cont'd)

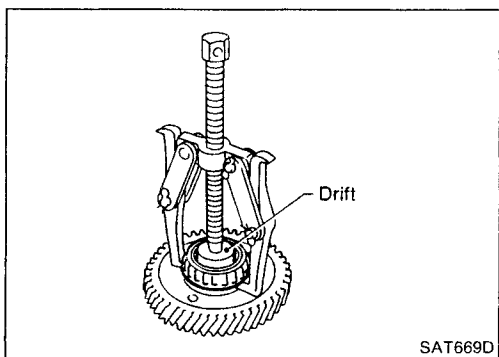
2. Press out output shaft bearing inner race.



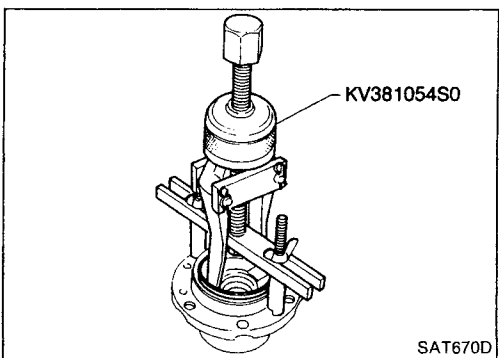
3. Remove output shaft bearing outer race from bearing retainer.



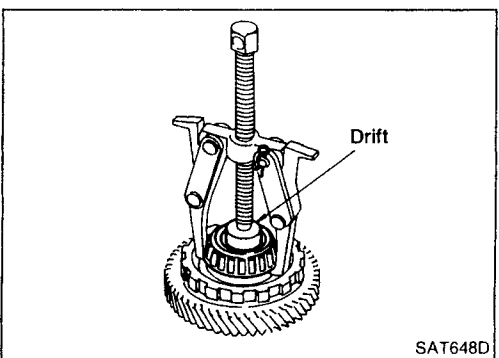
4. Remove output gear bearing inner race.



5. Remove output gear bearing outer race from bearing retainer.



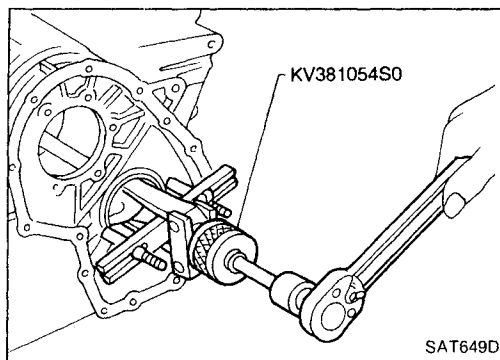
6. Remove idler gear bearing inner race.



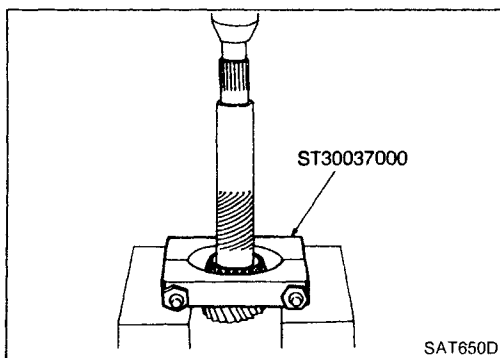
AT

REPAIR FOR COMPONENT PARTS

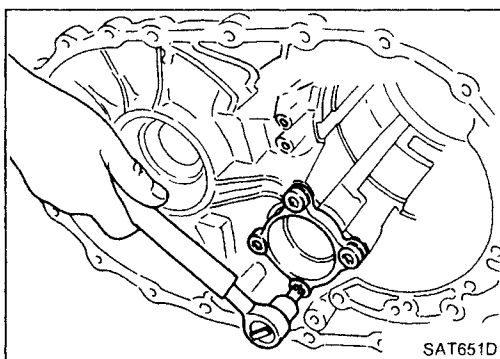
Output Shaft, Output Gear, Idler Gear, Reduction Pinion Gear and Bearing Retainer — Except Model 34X81 (Cont'd)



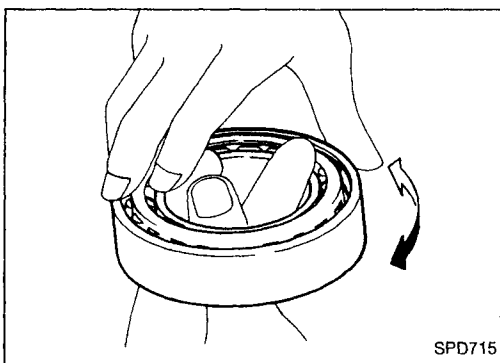
7. Remove idler gear bearing outer race from transmission case.



8. Press out reduction pinion gear inner race from reduction pinion gear.



9. Remove reduction pinion gear bearing outer race from transmission case.



INSPECTION

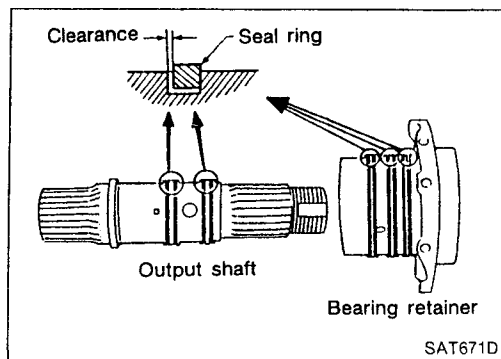
Output shaft, output gear, idler gear and reduction pinion gear

- Check shafts for cracks, wear or bending.
- Check gears for wear, chips and cracks.

Bearings

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace inner and outer races as a set.**

REPAIR FOR COMPONENT PARTS



Output Shaft, Output Gear, Idler Gear, Reduction Pinion Gear and Bearing Retainer — Except Model 34X81 (Cont'd)

Seal ring clearance

- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.

Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Wear limit:

0.25 mm (0.0098 in)

- If not within wear limit, replace output shaft.
- Install new seal rings to bearing retainer.
- Measure clearance between seal ring and ring groove of bearing retainer.

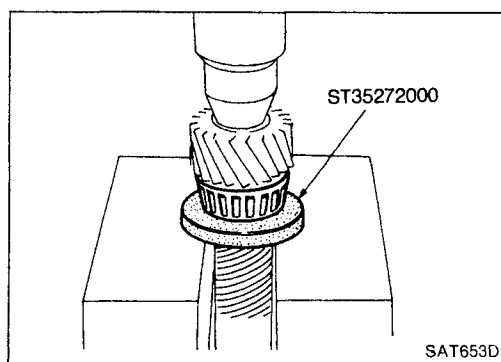
Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Wear limit:

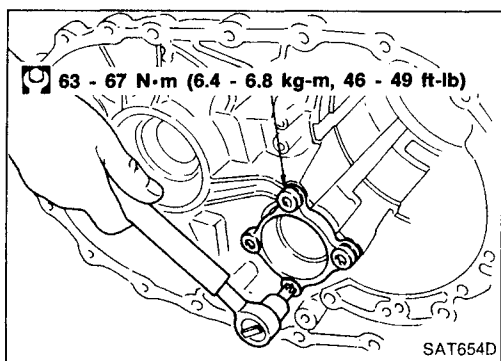
0.25 mm (0.0098 in)

- If not within wear limit, replace bearing retainer.

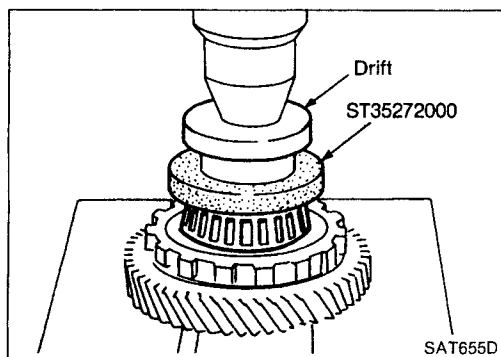


ASSEMBLY

1. Press reduction pinion gear bearing inner race on reduction pinion gear.



2. Install reduction pinion gear bearing outer race on transmission case.

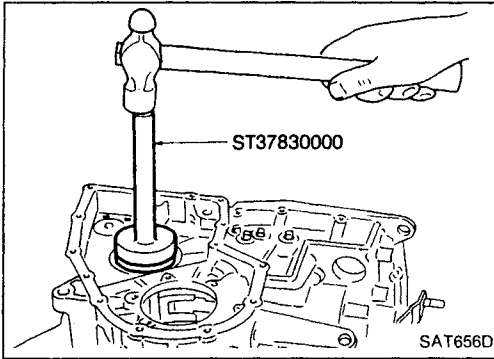


3. Press idler gear bearing inner race on idler gear.

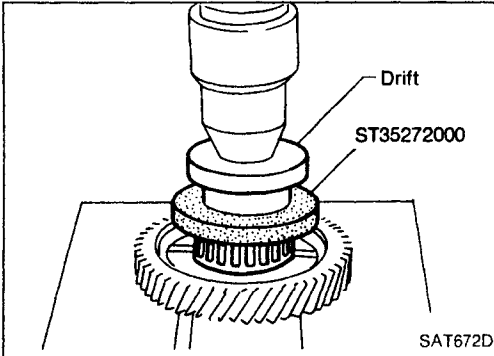
REPAIR FOR COMPONENT PARTS

Output Shaft, Output Gear, Idler Gear, Reduction Pinion Gear and Bearing Retainer — Except Model 34X81 (Cont'd)

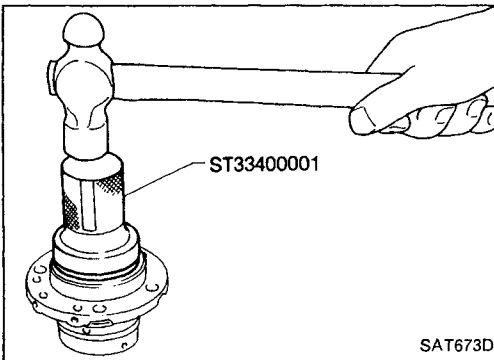
4. Install idler gear bearing outer race on transmission case.



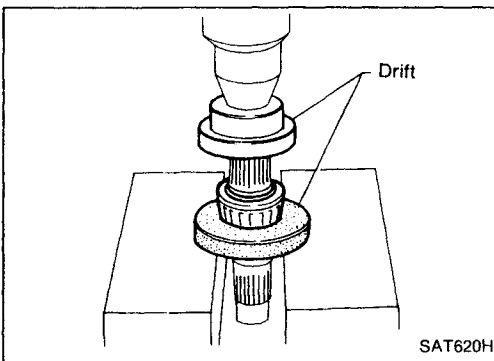
5. Press output gear bearing inner race on output gear.



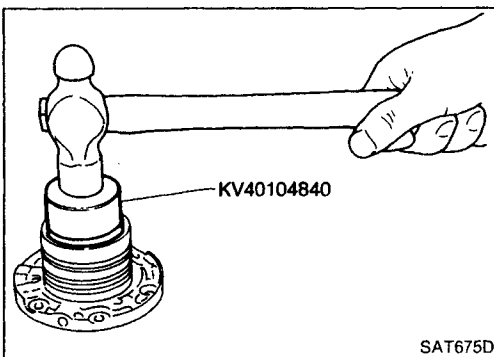
6. Install output gear bearing outer race on bearing retainer.



7. Press output shaft bearing inner race on output shaft.



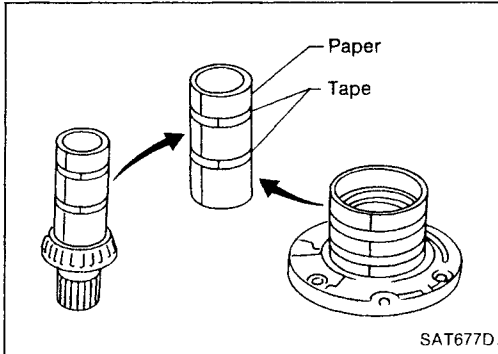
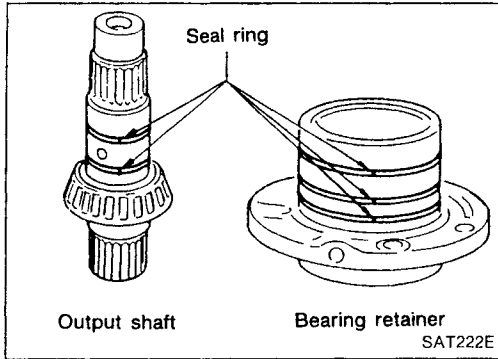
8. Install output shaft bearing outer race on bearing retainer.



REPAIR FOR COMPONENT PARTS

Output Shaft, Output Gear, Idler Gear, Reduction Pinion Gear and Bearing Retainer — Except Model 34X81 (Cont'd)

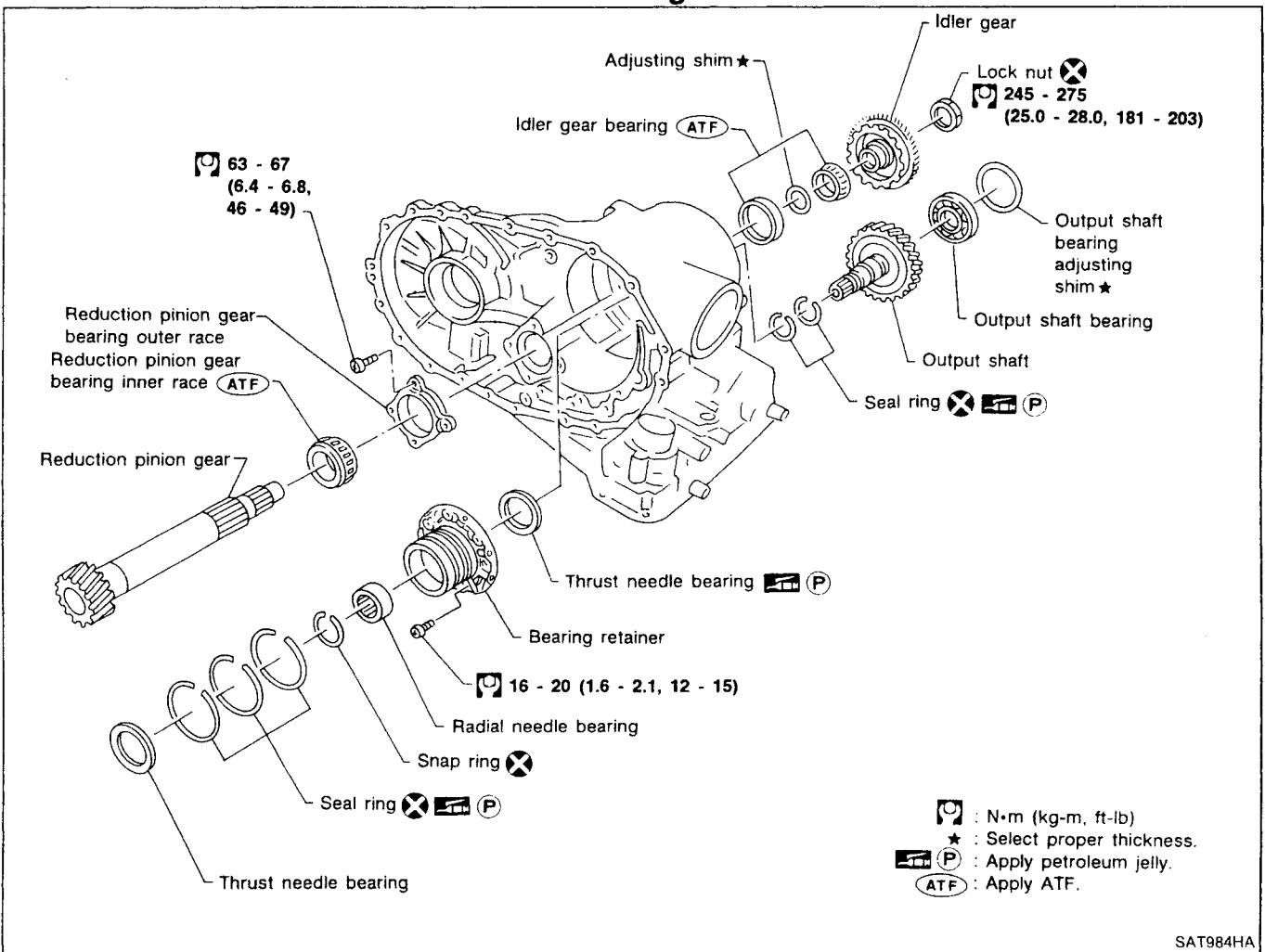
9. Install new seal rings onto output shaft and bearing retainer.
 - Apply petroleum jelly to seal rings.



10. Roll paper around seal rings to prevent seal rings from spreading.

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer — Model 34X81

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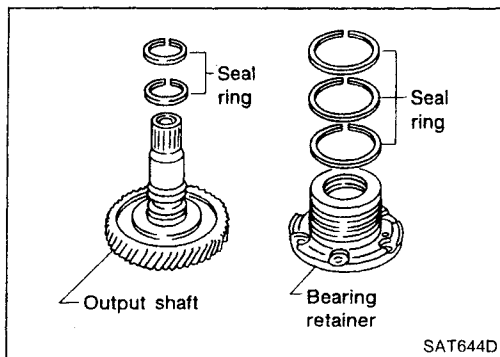
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REPAIR FOR COMPONENT PARTS

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer — Model 34X81 (Cont'd)

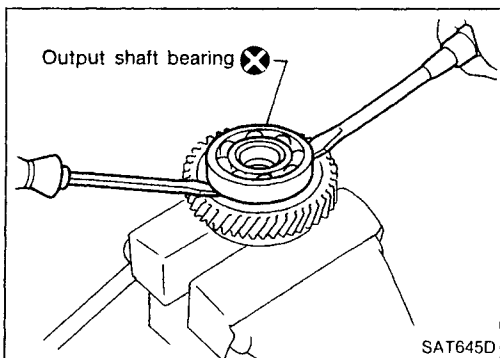
DISASSEMBLY

1. Remove seal rings from output shaft and bearing retainer.

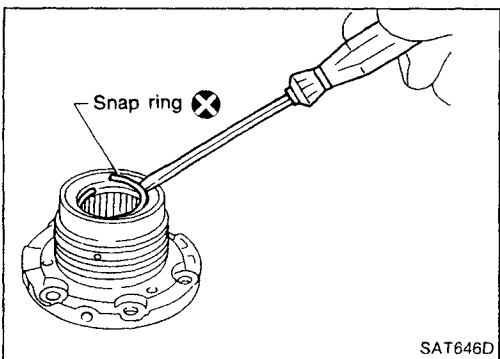


2. Remove output shaft bearing with screwdrivers.

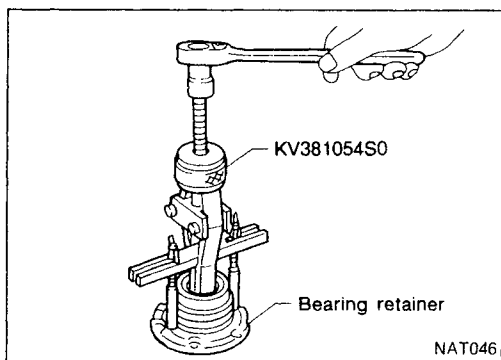
- Always replace bearing with a new one when removed.
- Do not damage output shaft.



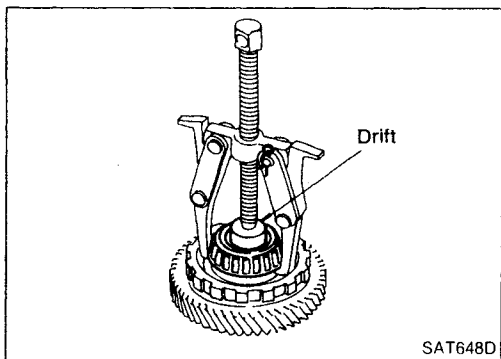
3. Remove snap ring from bearing retainer.



4. Remove needle bearing from bearing retainer.



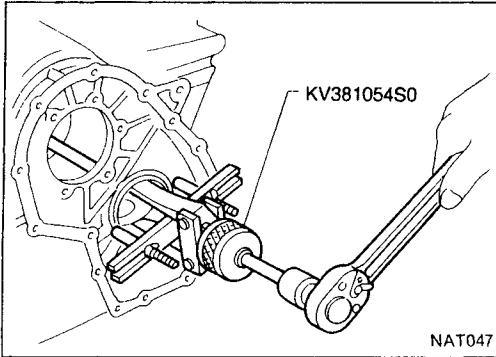
5. Remove idler gear bearing inner race from idler gear.



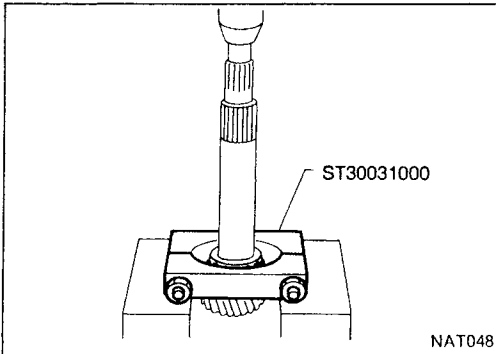
REPAIR FOR COMPONENT PARTS

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer — Model 34X81 (Cont'd)

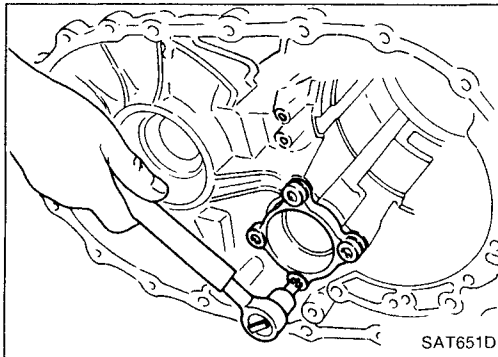
6. Remove idler gear bearing outer race from transmission case.



7. Press out reduction pinion gear bearing inner race from reduction pinion gear.



8. Remove reduction pinion gear bearing outer race from transmission case.



AT

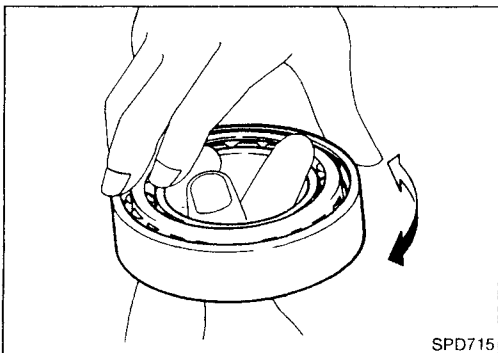
INSPECTION

Output shaft, idler gear and reduction pinion gear

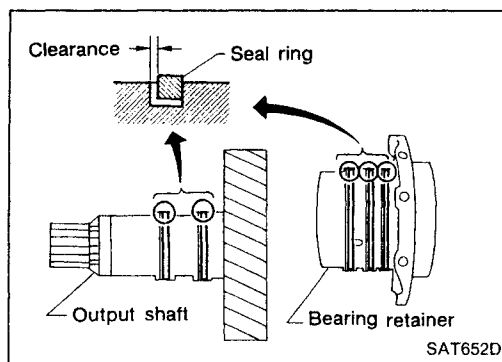
- Check shafts for cracks, wear or bending.
- Check gears for wear, chips and cracks.

Bearing

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**



REPAIR FOR COMPONENT PARTS



Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer — Model 34X81 (Cont'd) Seal ring clearance

- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.

Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Allowable limit:

0.25 mm (0.0098 in)

- If not within allowable limit, replace output shaft.
- Install new seal rings to bearing retainer.
- Measure clearance between seal ring and ring groove of bearing retainer.

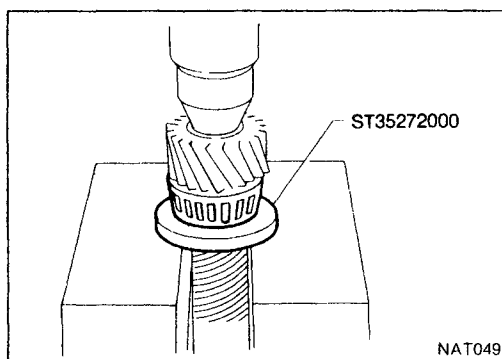
Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Allowable limit:

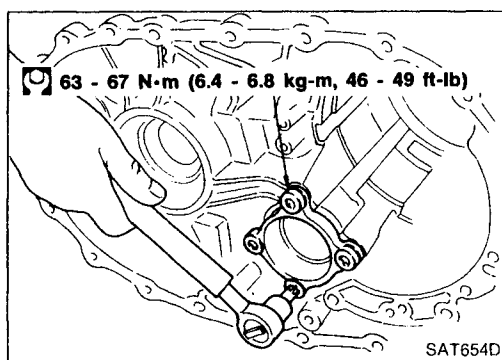
0.25 mm (0.0098 in)

- If not within allowable limit, replace bearing retainer.

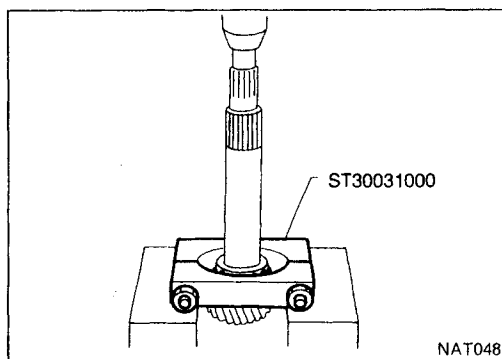


ASSEMBLY

1. Press reduction pinion gear bearing inner race on reduction pinion gear.



2. Install reduction pinion gear bearing outer race on transmission case.

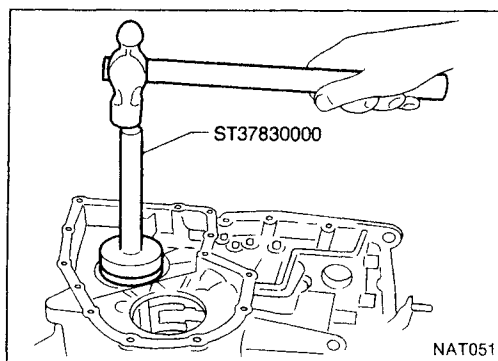


3. Press idler gear bearing inner race on idler gear.

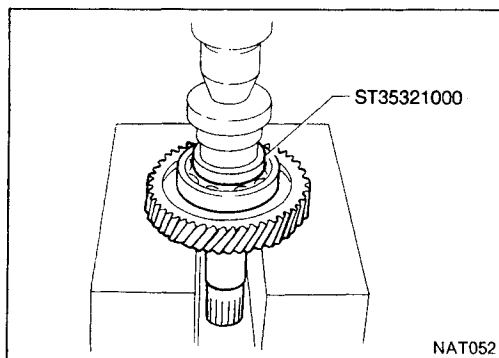
REPAIR FOR COMPONENT PARTS

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer — Model 34X81 (Cont'd)

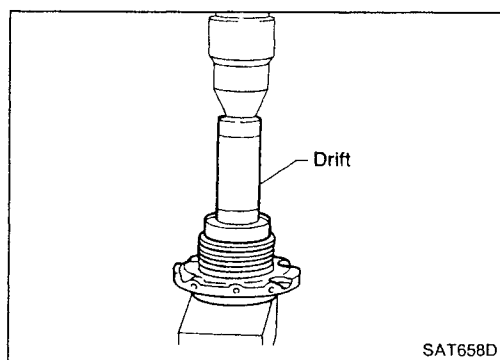
4. Install idler gear bearing outer race on transmission case.



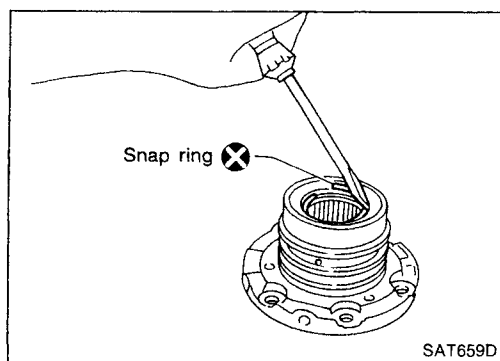
5. Press output shaft bearing on output shaft.



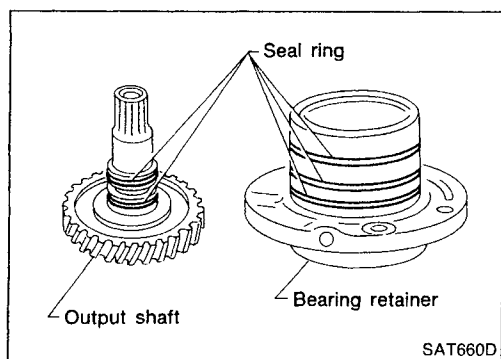
6. Press needle bearing on bearing retainer.



7. Install snap ring to bearing retainer.



8. After packing ring grooves with petroleum jelly, carefully install new rings on output shaft and bearing retainer.

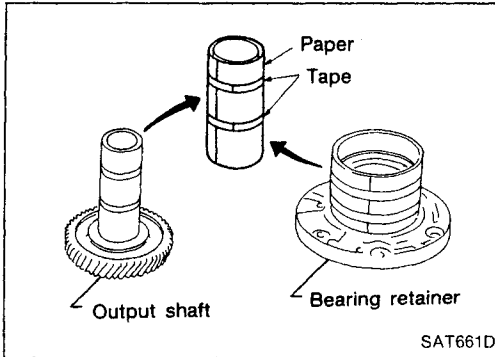


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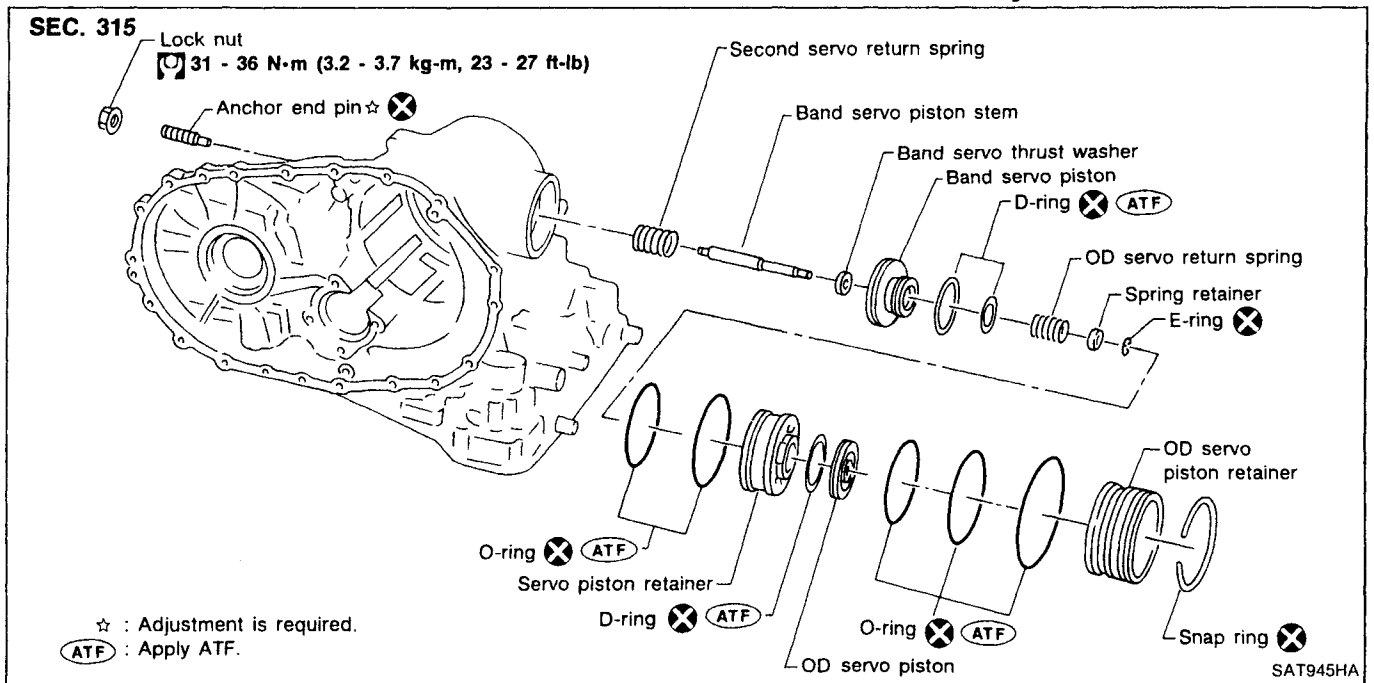
REPAIR FOR COMPONENT PARTS

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer — Model 34X81 (Cont'd)

- Roll paper around seal rings to prevent seal rings from spreading.

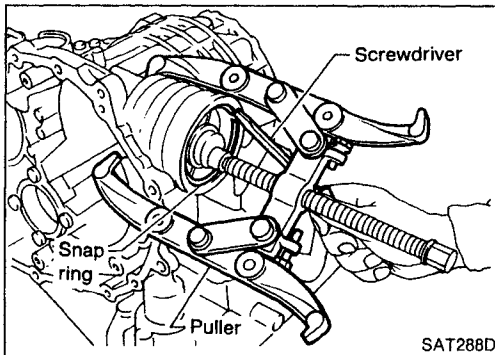


Band Servo Piston Assembly



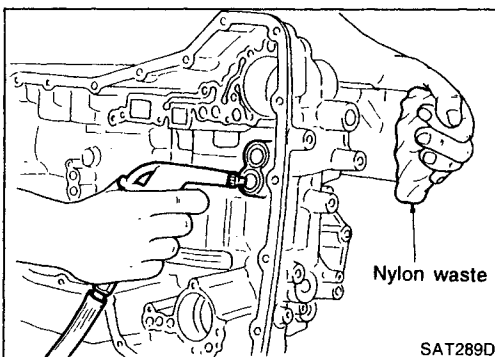
DISASSEMBLY

1. Remove band servo piston snap ring.



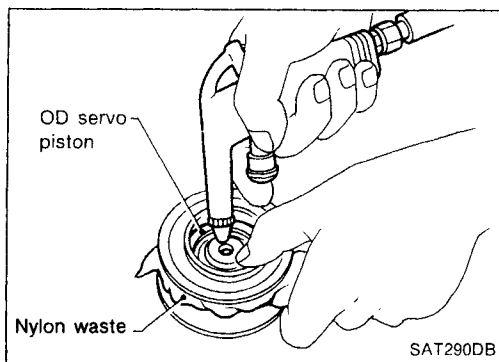
2. Apply compressed air to oil hole in transmission case to remove OD servo piston retainer and band servo piston assembly.

- Hold band servo piston assembly with a rag.



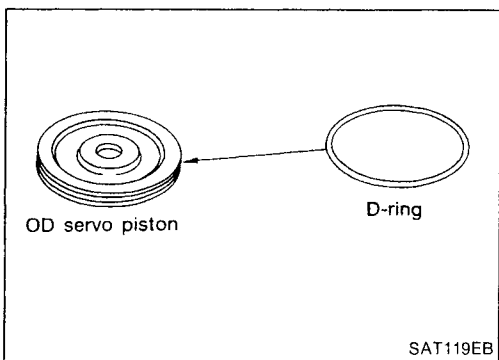
REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)

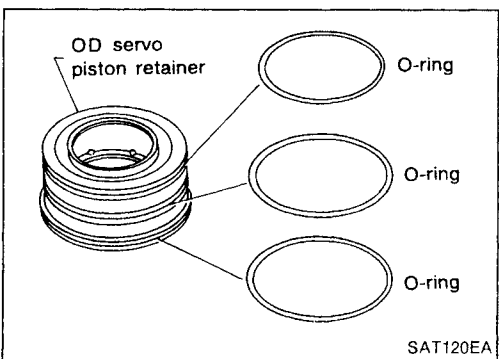


3. Apply compressed air to oil hole in OD servo piston retainer to remove OD servo piston from retainer.

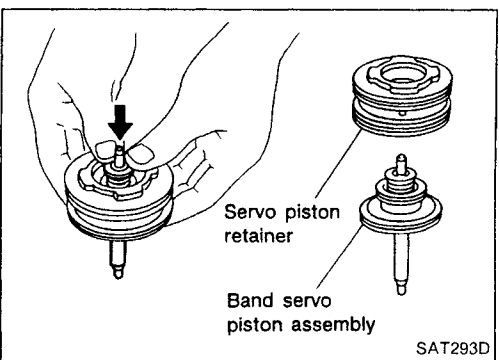
- Hold OD servo piston while applying compressed air.



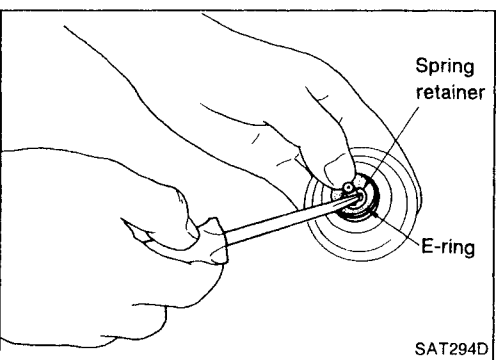
4. Remove D-ring from OD servo piston.



5. Remove O-rings from OD servo piston retainer.



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

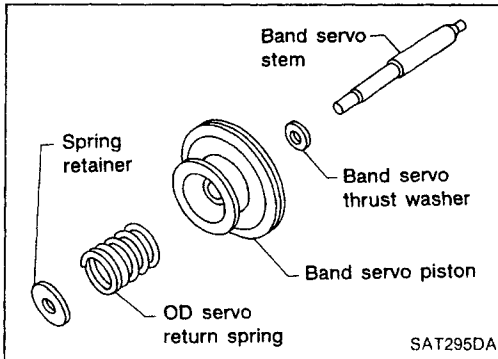


7. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

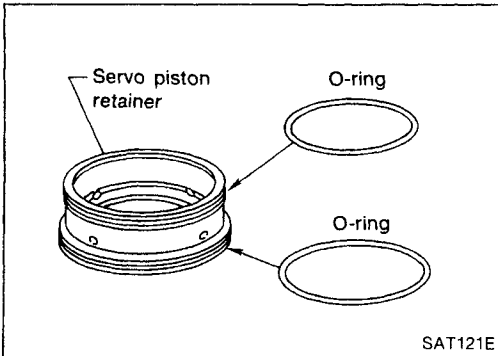
AT

REPAIR FOR COMPONENT PARTS

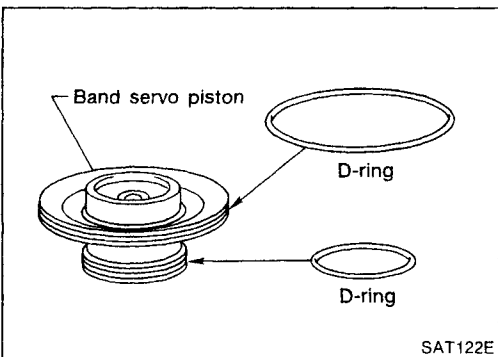
Band Servo Piston Assembly (Cont'd)



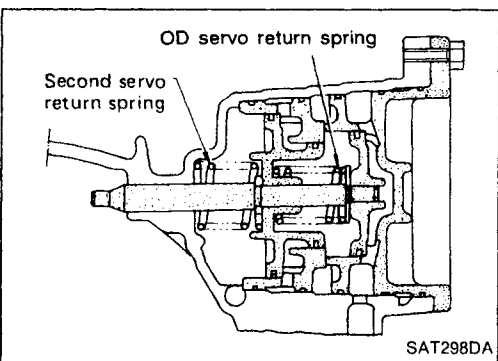
8. Remove OD servo return spring, band servo thrust washer and band servo piston stem from band servo piston.



9. Remove O-rings from servo piston retainer.



10. Remove D-rings from band servo piston.



INSPECTION

Pistons, retainers and piston stem

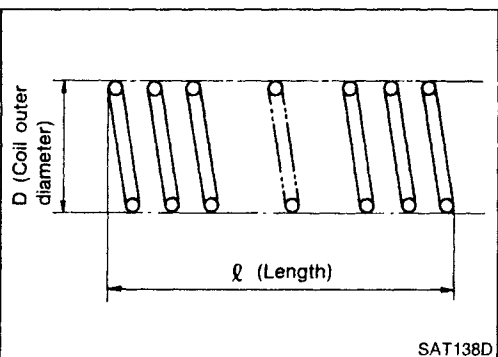
- Check frictional surfaces for abnormal wear or damage.

Return springs

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

Inspection standard:

Refer to SDS, AT-174.



REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)

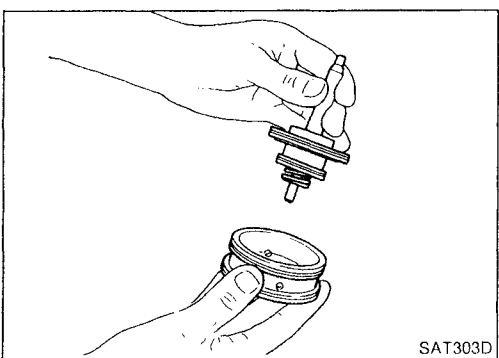
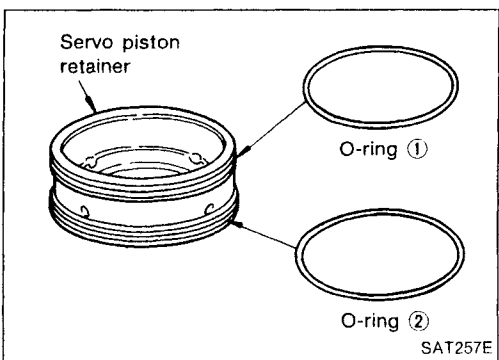
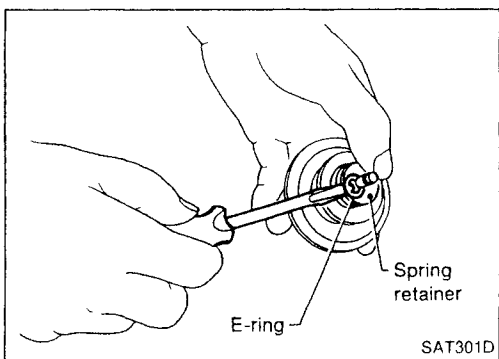
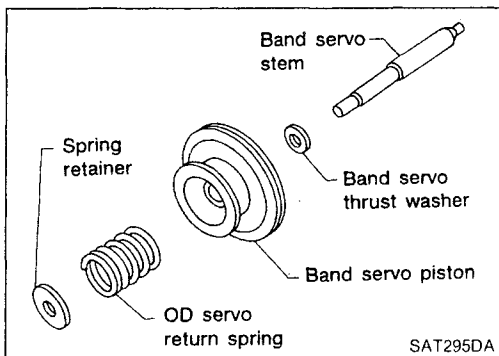
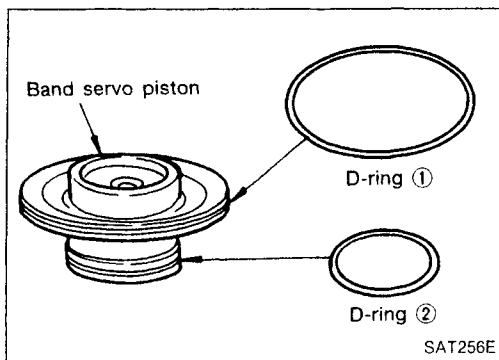
ASSEMBLY

1. Install D-rings to band servo piston.
 - Apply ATF to D-rings.
 - Pay attention to the position of each D-ring.

D-rings:

Unit: mm (in)

D-ring	Inner diameter	
	Except model 34X81	Model 34X81
①	53.8 (2.118)	51.9 (2.043)
②	31.7 (1.248)	29.8 (1.173)



2. Install band servo piston stem, band servo thrust washer, OD servo return spring and spring retainer to band servo piston.

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

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

O-rings:

Unit: mm (in)

O-ring	Inner diameter
①	65.5 (2.579)
②	67.0 (2.638)

5. Install band servo piston assembly to servo piston retainer by pushing it inward.

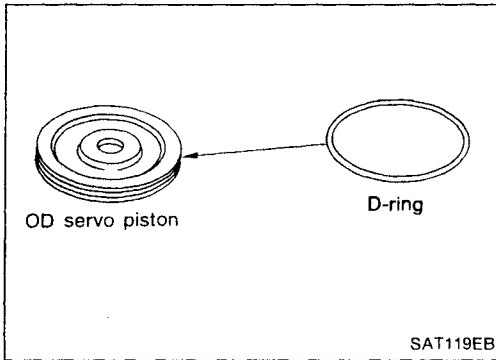
AT

REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)

6. Install D-ring to OD servo piston.

- Apply ATF to D-ring.



7. Install O-rings to OD servo piston retainer.

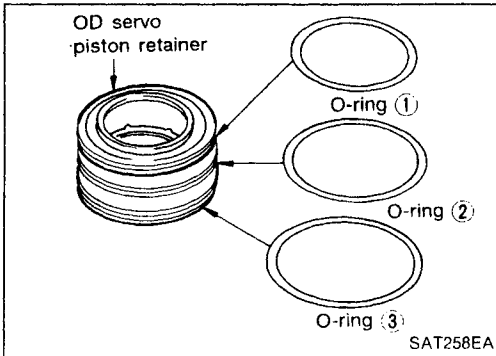
- Apply ATF to O-rings.

- Pay attention to the position of each O-ring.

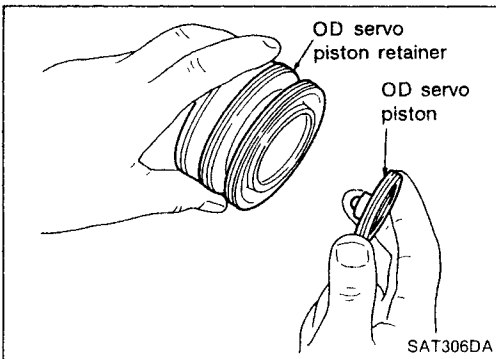
O-rings:

Unit: mm (in)

O-ring	Inner diameter
①	69.5 (2.736)
②	71.0 (2.795)
③	73.0 (2.874)

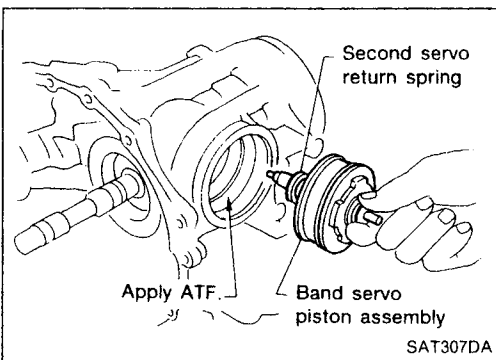


8. Install OD servo piston to OD servo piston retainer.



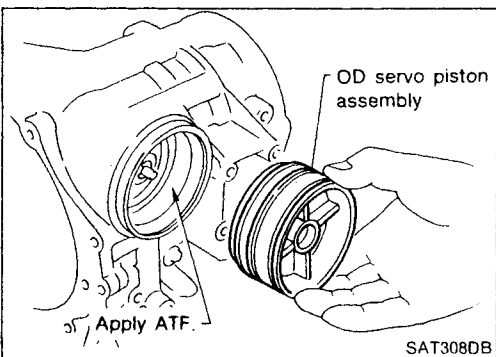
9. Install band servo piston assembly and 2nd servo return spring to transmission case.

- Apply ATF to O-ring of band servo piston and transmission case.



10. Install OD servo piston assembly to transmission case.

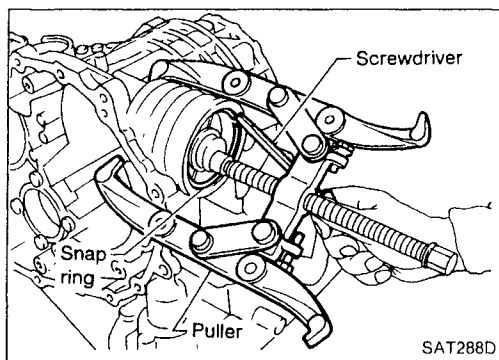
- Apply ATF to O-ring of band servo piston and transmission case.



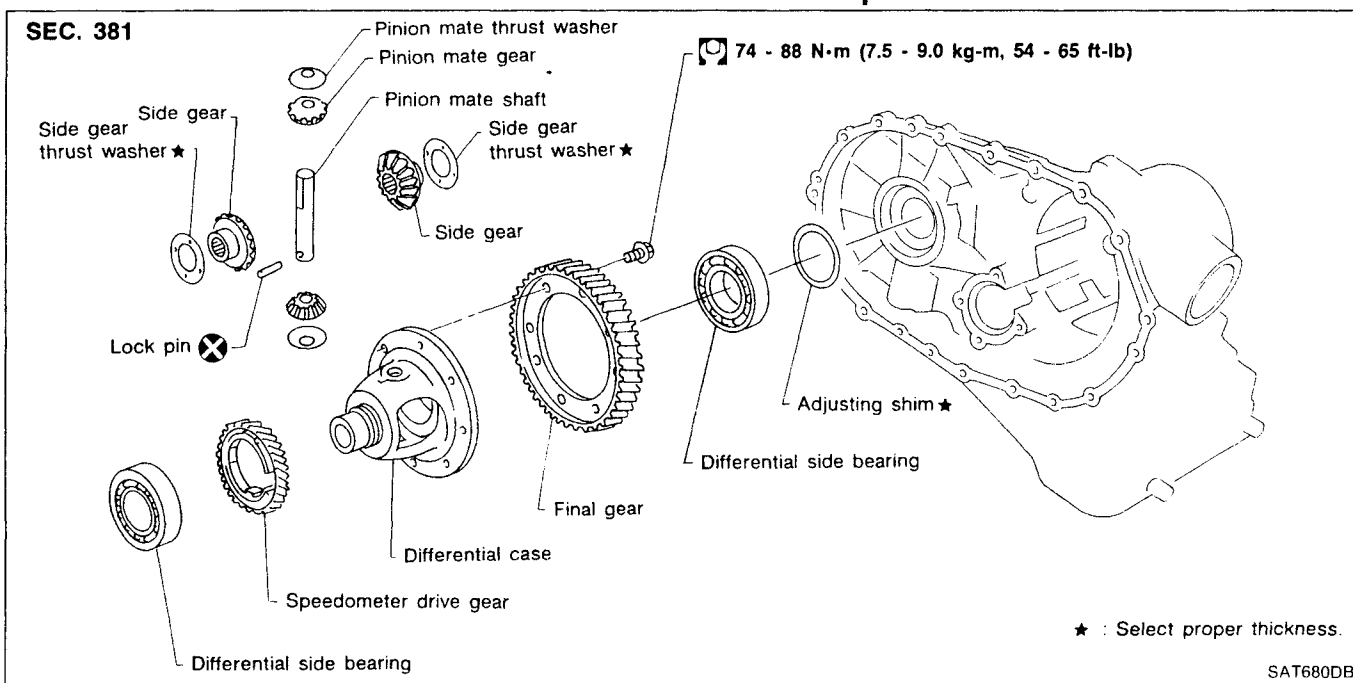
REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)

11. Install band servo piston snap ring to transmission case.

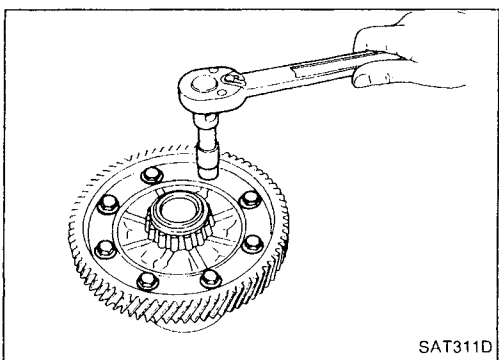


Final Drive — Except Model 34X81

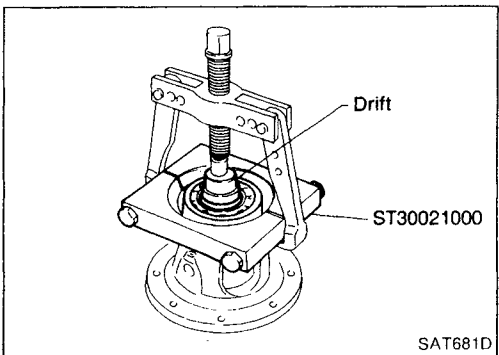


DISASSEMBLY

1. Remove final gear.



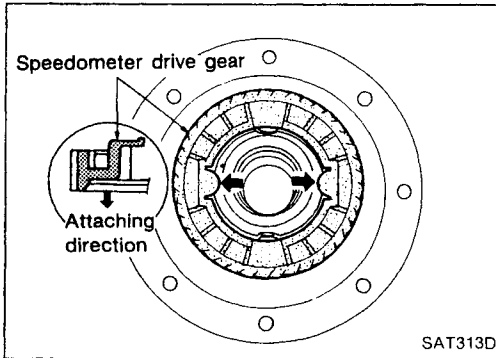
2. Press out differential side bearings.



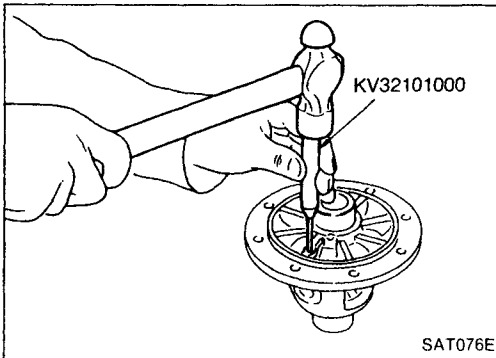
REPAIR FOR COMPONENT PARTS

Final Drive — Except Model 34X81 (Cont'd)

3. Remove speedometer drive gear.

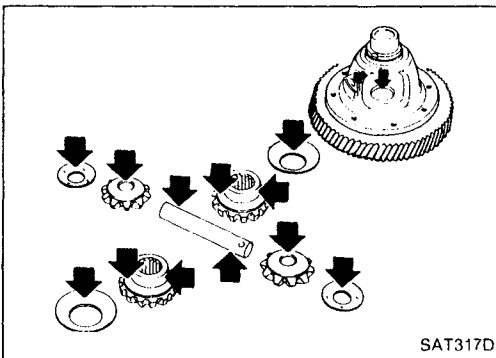
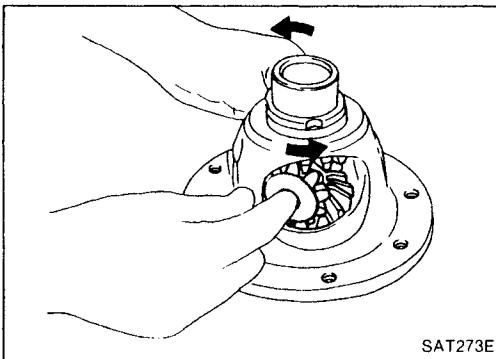


4. Drive out pinion mate shaft lock pin.



5. Draw out pinion mate shaft from differential case.

6. Remove pinion mate gears and side gears.



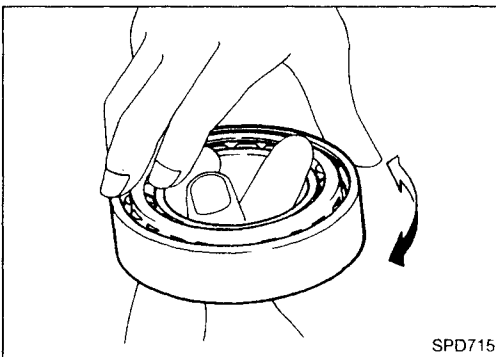
INSPECTION

Gear, washer, shaft and case

- Check mating surfaces of differential case, side gears and pinion mate gears.
- Check washers for wear.

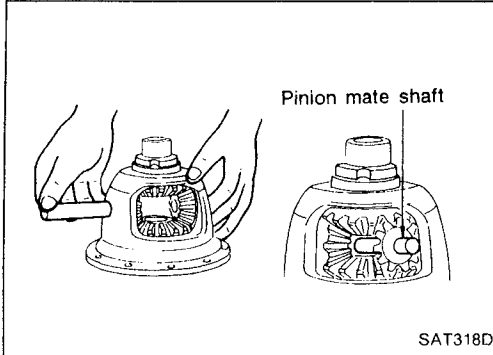
Bearings

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.

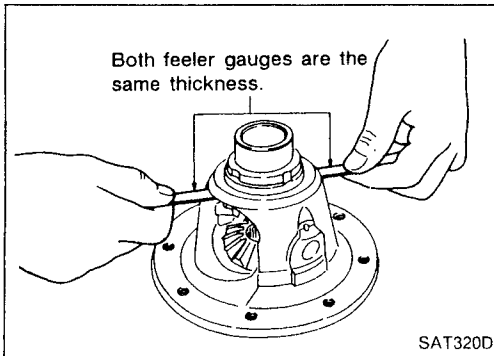


REPAIR FOR COMPONENT PARTS

Final Drive — Except Model 34X81 (Cont'd) ASSEMBLY



1. Install side gears and side gear thrust washers in differential case.
 2. Install pinion mate gears and pinion mate thrust washers in the differential case while rotating them.
- **Apply ATF to all parts.**



3. Measure clearance between side gear and differential case with washers.

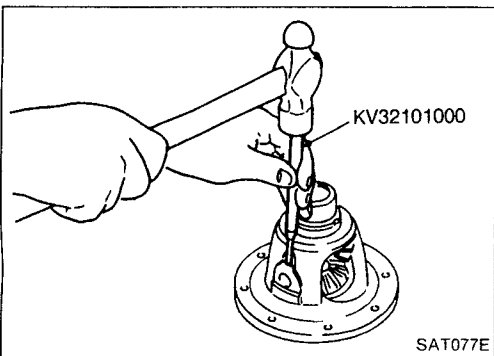
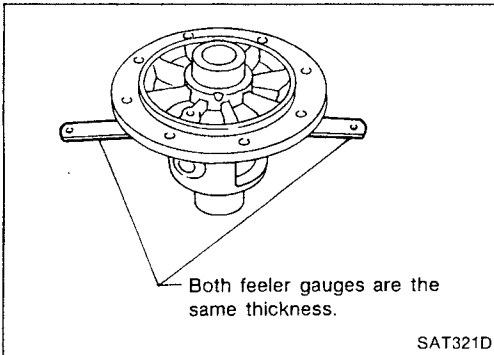
Clearance between side gear and differential case with washers:

0.1 - 0.2 mm (0.004 - 0.008 in)

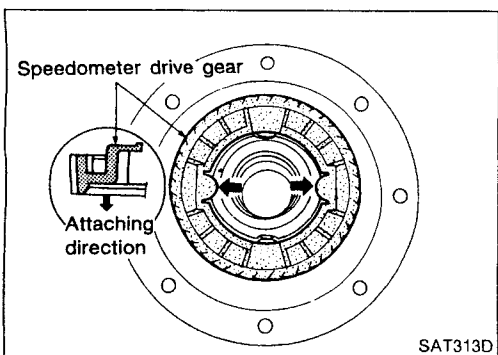
- If not within specification, adjust clearance by changing thickness of side gear thrust washers.

Side gear thrust washer:

Refer to SDS, AT-170.



4. Install lock pin.
- **Make sure that lock pin is flush with case.**



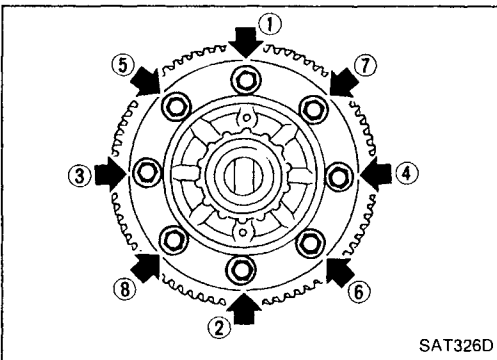
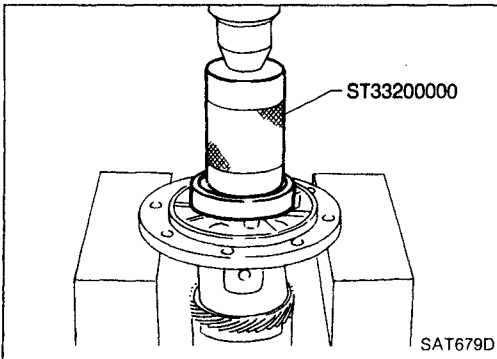
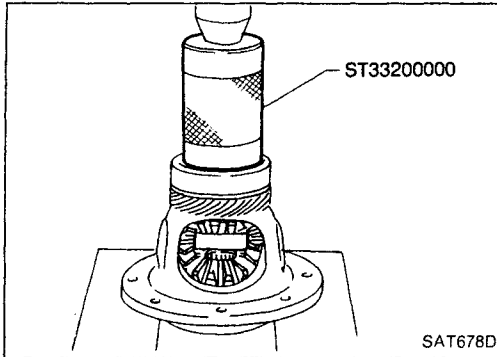
5. Install speedometer drive gear on differential case.
- **Align projection of speedometer drive gear with groove of differential case.**

AT

REPAIR FOR COMPONENT PARTS

Final Drive — Except Model 34X81 (Cont'd)

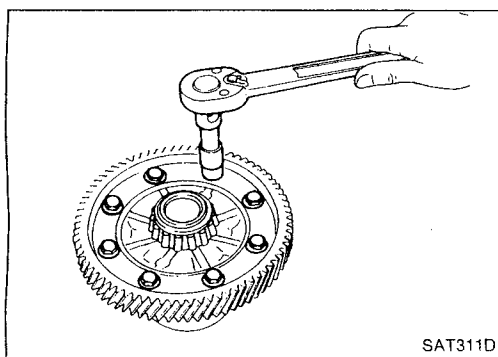
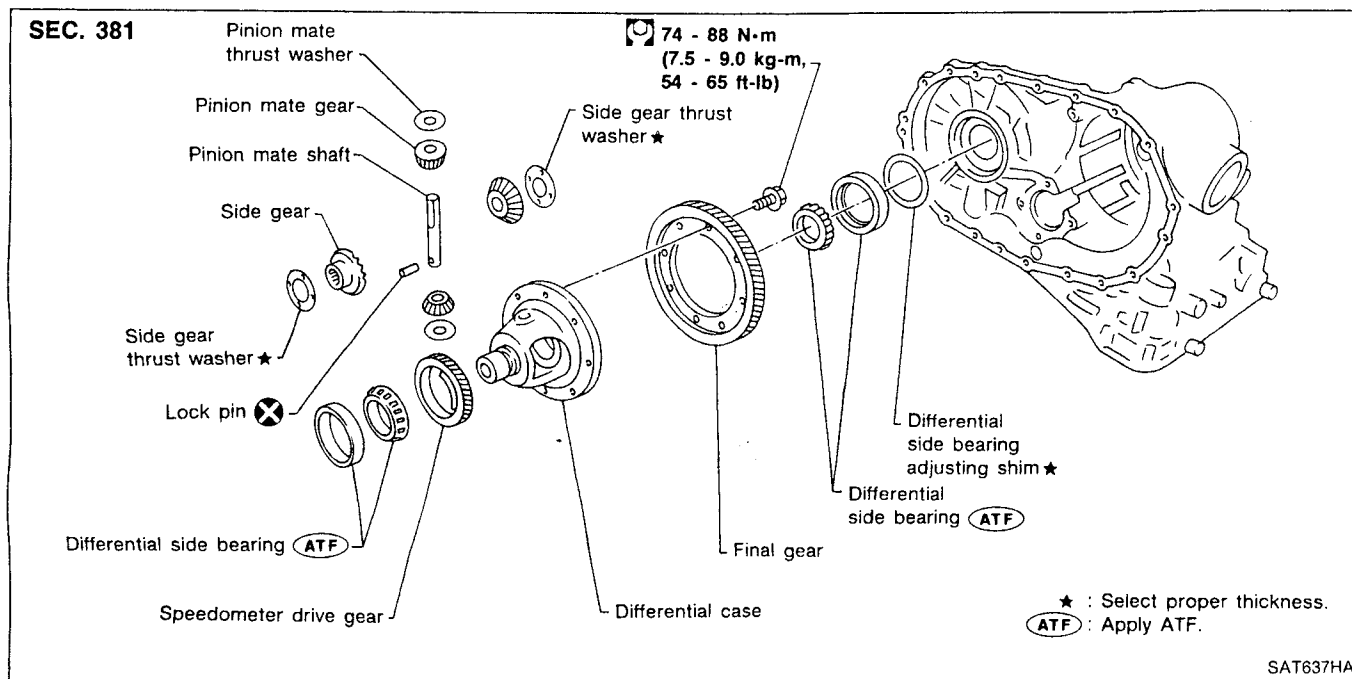
6. Press differential side bearings on differential case.



7. Install final gear and tighten fixing bolts in numerical order.

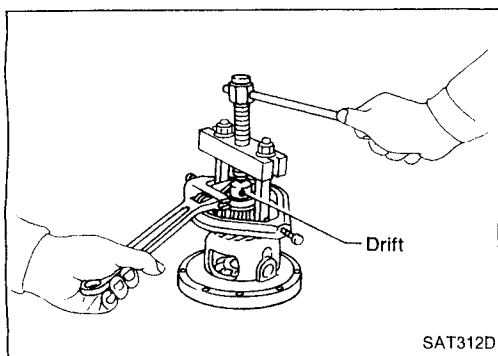
REPAIR FOR COMPONENT PARTS

Final Drive — Model 34X81

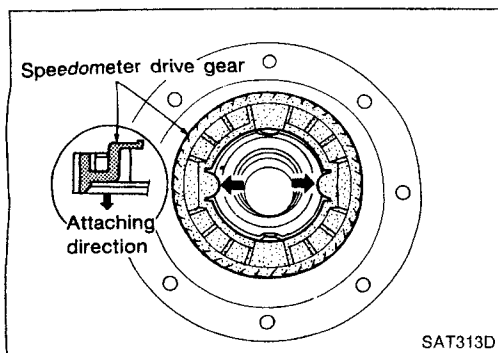


DISASSEMBLY

1. Remove final gear.



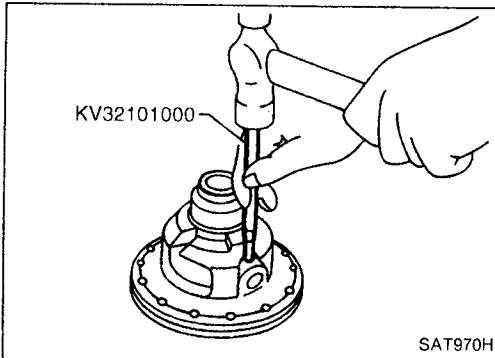
2. Press out differential side bearings.



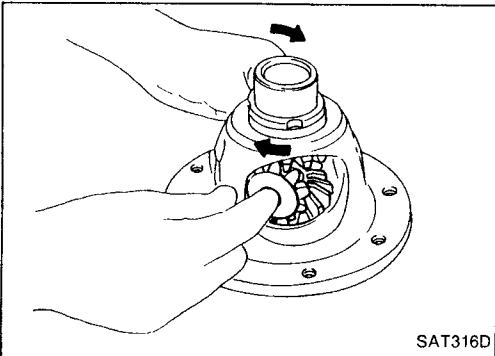
3. Remove speedometer drive gear.

REPAIR FOR COMPONENT PARTS

Final Drive — Model 34X81 (Cont'd)

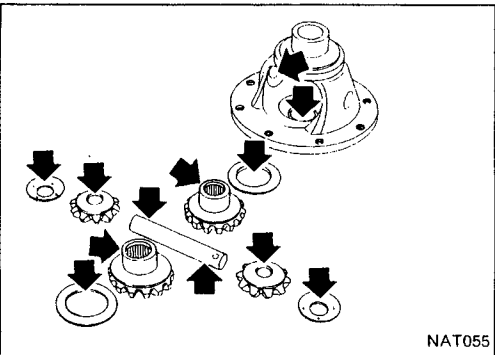


4. Drive out pinion mate shaft lock pin.



5. Draw out pinion mate shaft from differential case.

6. Remove pinion mate gears and side gears.



INSPECTION

Gear, washer, shaft and case

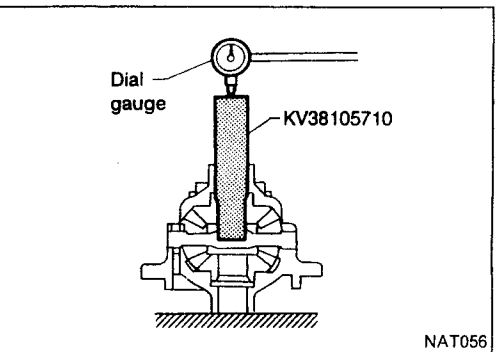
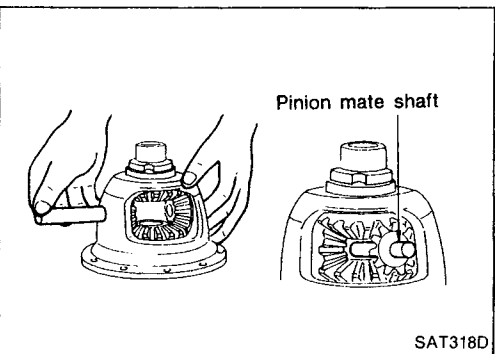
- Check mating surfaces of differential case, side gears and pinion mate gears.
- Check washers for wear.

Bearings

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**

ASSEMBLY

1. Install side gear and thrust washers in differential case.
 2. Install pinion mate gears and pinion mate thrust washers in differential case while rotating them.
- **Apply ATF to any parts.**



3. Measure clearance between side gear and differential case with washers using the following procedure.
 - a. Set Tool and dial indicator on side gear.
 - b. Move side gear up and down to measure dial indicator deflection. Always measure indicator deflection on both side gears.

Clearance between side gear and differential case with washers:

0.1 - 0.2 mm (0.004 - 0.008 in)

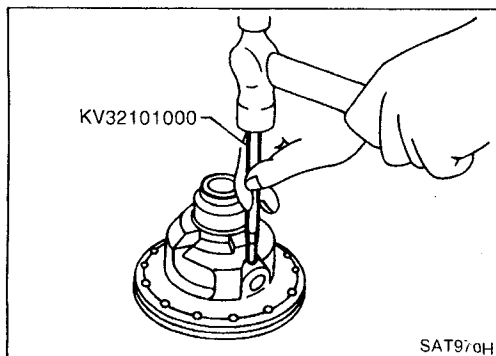
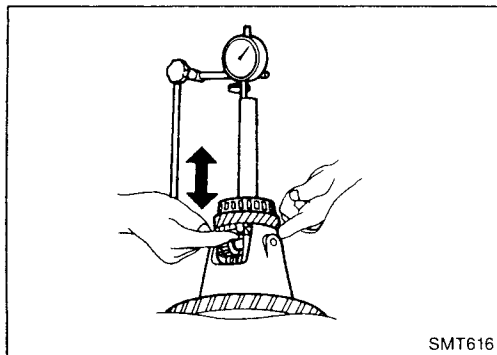
REPAIR FOR COMPONENT PARTS

Final Drive — Model 34X81 (Cont'd)

- c. If not within specifications, adjust clearance by changing thickness of side gear thrust washers.

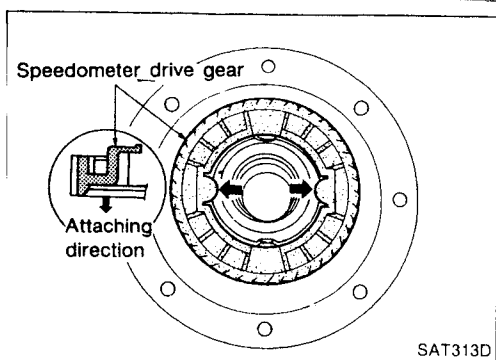
Side gear thrust washer:

Refer to SDS, AT-170.



4. Install lock pin.

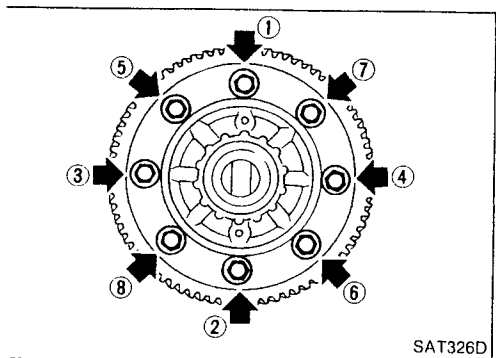
- **Make sure that lock pin is flush with case.**



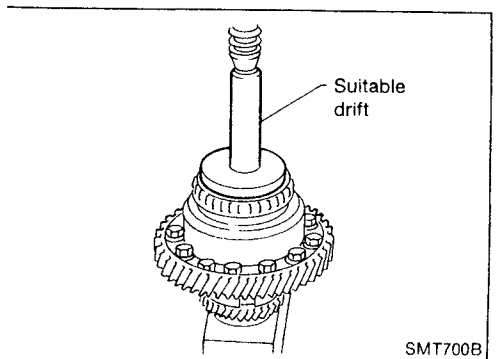
5. Install speedometer drive gear on differential case.

- **Align the projection of speedometer drive gear with the groove of differential case.**

AT

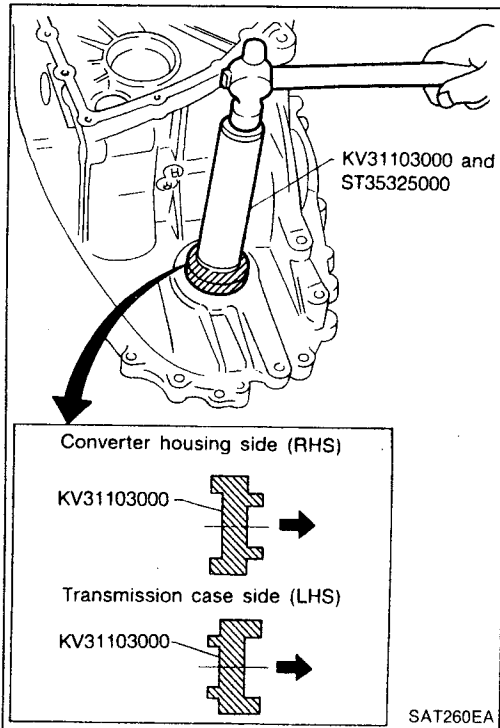


6. Install final gear and tighten fixing bolts in numerical order.



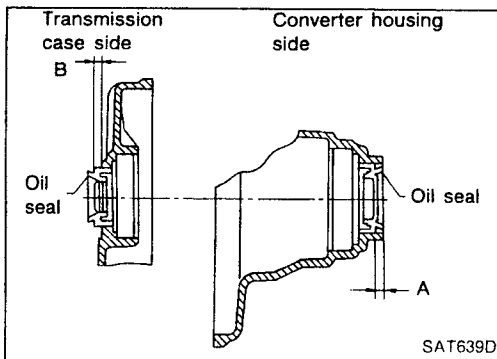
7. Press on differential side bearings.

ASSEMBLY



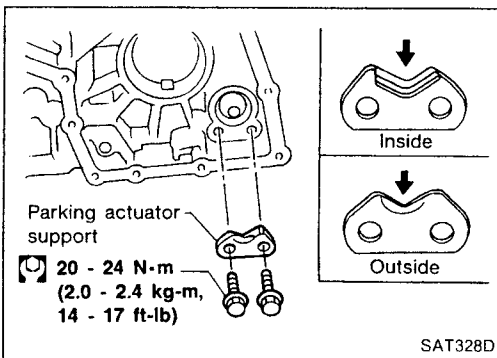
Assembly 1

1. Install differential side oil seals on transmission case and converter housing, so that "A" and "B" are within specifications.

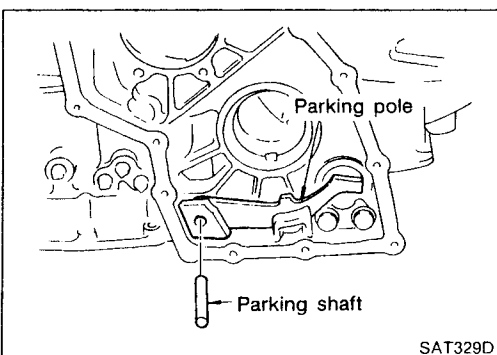


Unit: mm (in)

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



2. Install parking actuator support to transmission case.
 - Pay attention to direction of parking actuator support.

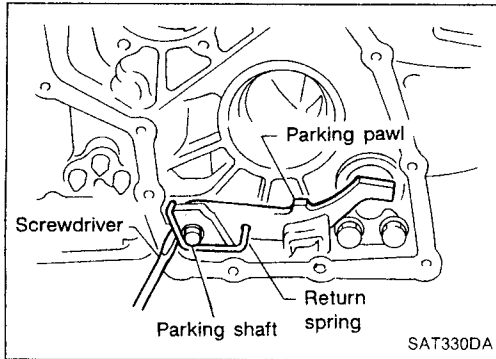


3. Install parking pawl on transmission case and fix it with parking shaft.

ASSEMBLY

Assembly 1 (Cont'd)

4. Install return spring.

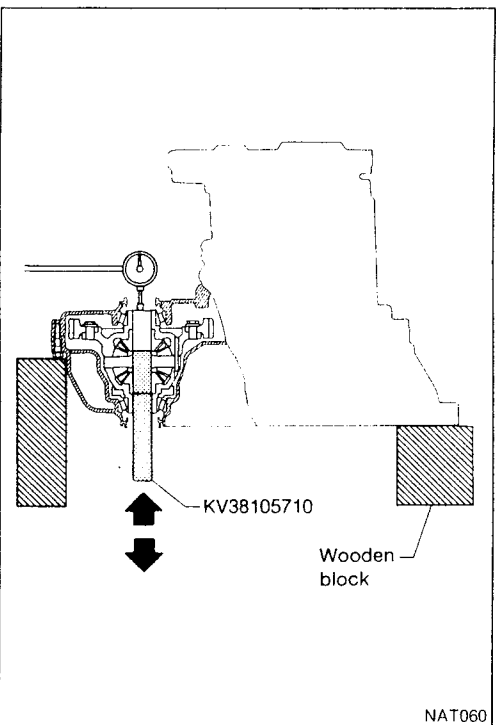
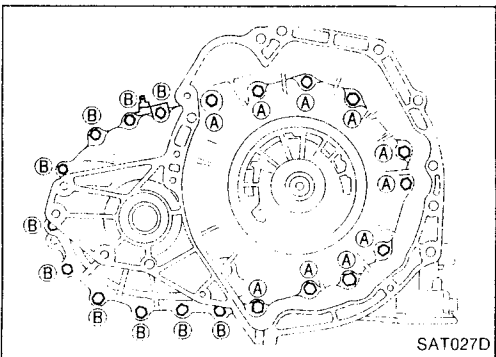
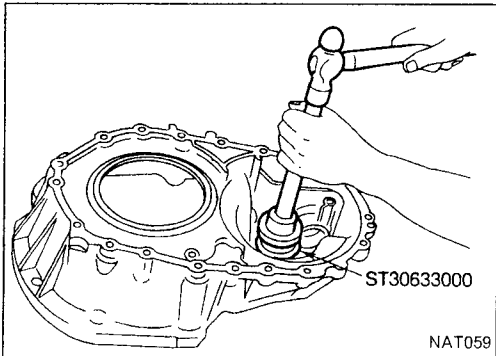


Adjustment 1

DIFFERENTIAL SIDE BEARING PRELOAD

— Model 34X81 —

1. Install differential side bearing outer race without adjusting shim on transmission case.
2. Install differential side bearing outer race on converter housing.
3. Place final drive assembly on transmission case.
4. Install transmission case on converter housing. Tighten transmission case fixing bolts (A) and (B) to the specified torque.



5. Attach dial indicator on differential case at transmission case side.
6. Insert Tool into differential side gear from converter housing.
7. Move Tool up and down and measure dial indicator deflection.
8. Select proper thickness of differential side bearing adjusting shim(s) using SDS table as a guide.

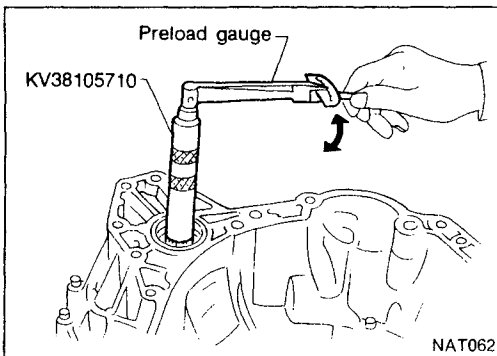
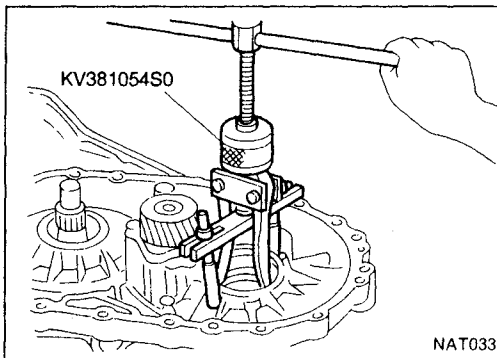
Differential side bearing adjusting shim:

Refer to SDS, AT-170.

AT

ASSEMBLY

Adjustment 1 (Cont'd)



9. Remove converter housing from transmission case.
10. Remove final drive assembly from transmission case.
11. Remove differential side bearing outer race from transmission case.
12. Reinstall differential side bearing outer race and shim(s) selected from SDS table on transmission case.
13. Reinstall converter housing on transmission case and tighten transmission case fixing bolts to the specified torque.

14. Insert Tool into differential case and measure turning torque of final drive assembly.

- Turn final drive assembly in both directions several times to seat bearing rollers correctly.

Turning torque of final drive assembly (New bearing):

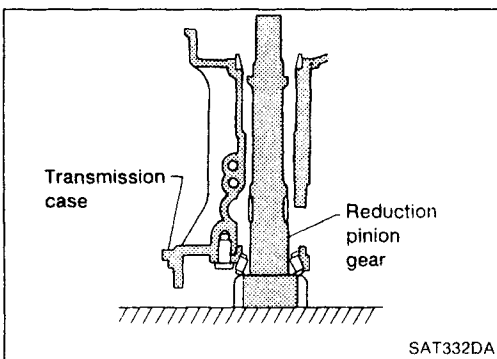
0.49 - 1.08 N·m (5.0 - 11.0 kg·cm, 4.3 - 9.5 in·lb)

- When old bearing is used again, turning torque will be slightly less than the above.
- Make sure torque is close to the specified range.

REDUCTION PINION GEAR BEARING PRELOAD

— All models —

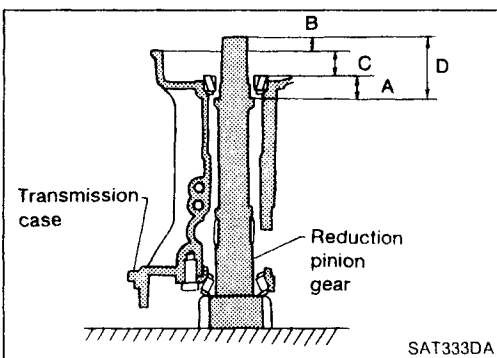
1. Select proper thickness of reduction pinion gear bearing adjusting shim using the following procedures.
 - a. Place reduction pinion gear on transmission case as shown.



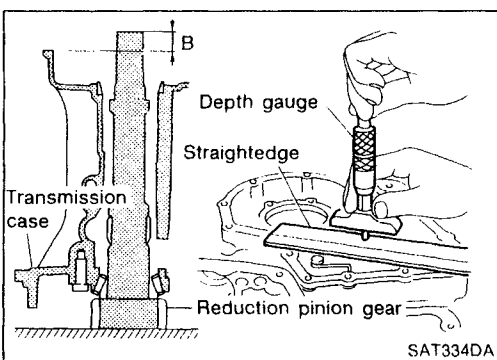
- b. Place idler gear bearing on transmission case.
 - c. Measure dimensions "B", "C" and "D" and calculate dimension "A".

$$A = D - (B + C)$$

"A": Distance between surface of idler gear bearing inner race and adjusting shim mating surface of reduction pinion gear.

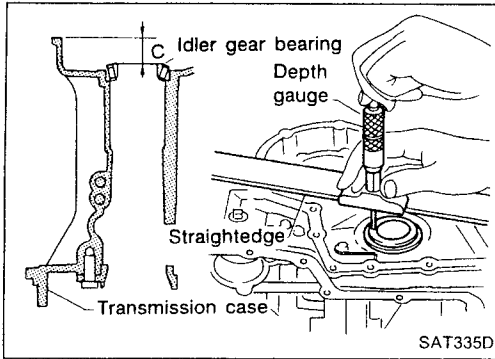


- Measure dimension "B" between end of reduction pinion gear and surface of transmission case.
- Measure in at least two places.

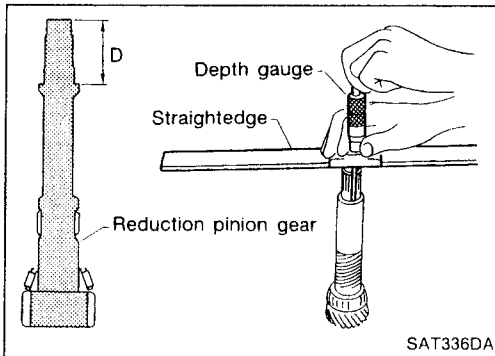


ASSEMBLY

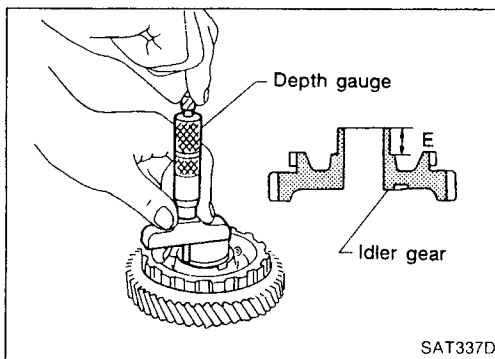
Adjustment 1 (Cont'd)



- Measure dimension "C" between surface of idler gear bearing inner race and converter housing fitting surface of transmission case.
- **Measure in at least two places.**



- Measure dimension "D" between end of reduction pinion gear and adjusting shim mating surface of reduction pinion gear.
- **Measure in at least two places.**
- Calculate dimension "A"
 $A = D - (B + C)$



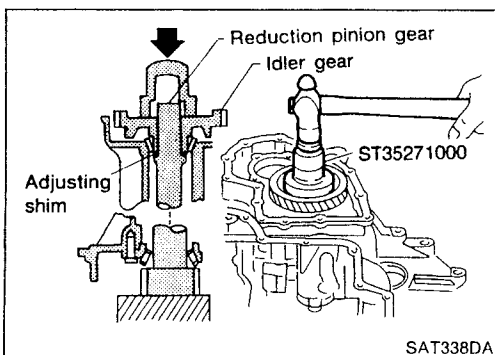
- d. Measure dimension "E" between end of idler gear and idler gear bearing of idler gear inner race mating surface.
- **Measure in at least two places.**

- e. Calculate "T" and select proper thickness of reduction pinion gear bearing adjusting shim using SDS table as a guide.

$$T = A - E$$

Reduction pinion gear bearing adjusting shim:

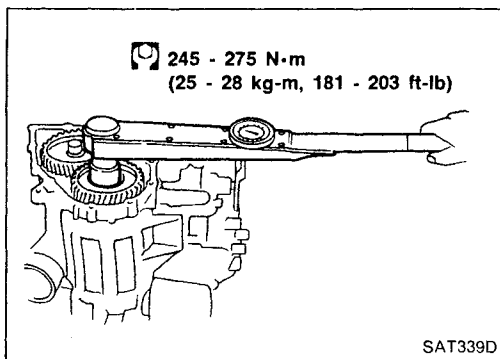
Refer to SDS, AT-171.



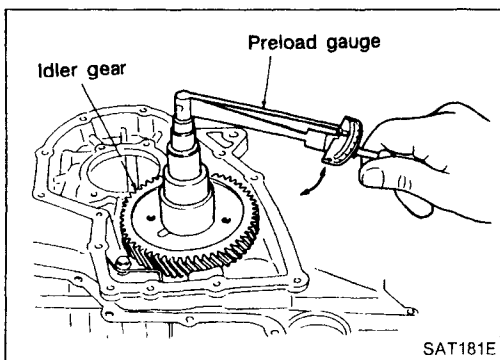
2. Install reduction pinion gear and reduction pinion gear bearing adjusting shim selected in step 2-e on transmission case.
3. Press idler gear bearing inner race on idler gear.
4. Press idler gear on reduction pinion gear.
- **Press idler gear so that idler gear can be locked with parking pawl.**

ASSEMBLY

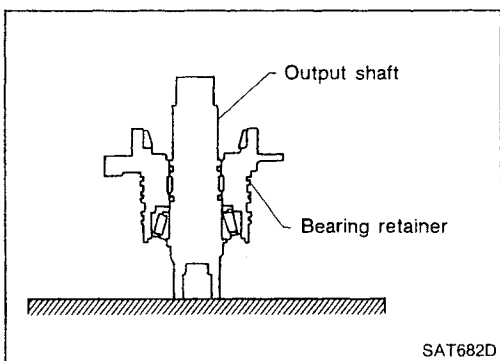
Adjustment 1 (Cont'd)



5. Tighten idler gear lock nut to specified torque.
- Lock idler gear with parking pawl when tightening lock nut.



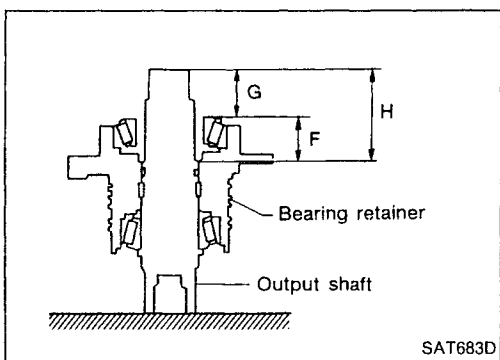
6. Measure reduction pinion gear bearing preload.
- When measuring bearing preload, turn reduction pinion gear in both directions several times to seat bearing rollers correctly.
- Reduction pinion gear bearing preload:
0.11 - 0.69 N·m (1.1 - 7.0 kg-cm, 0.95 - 6.08 in-lb)
- If not within specified range, readjust bearing preload.



OUTPUT SHAFT BEARING PRELOAD

— Except model 34X81 —

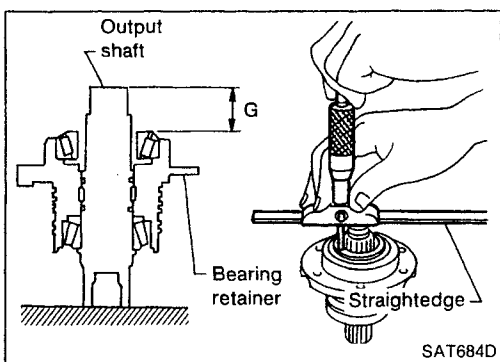
1. Select proper thickness of output shaft bearing adjusting spacer using the following procedures.
 - a. Remove paper rolled around output shaft.
 - b. Place bearing retainer on output shaft.



- c. Place output gear bearing inner race on bearing retainer.
- d. Measure dimensions "G" and "H" and calculate dimension "F".

"F": Distance between the surface of output gear bearing inner race and adjusting shim mating surface of output shaft.

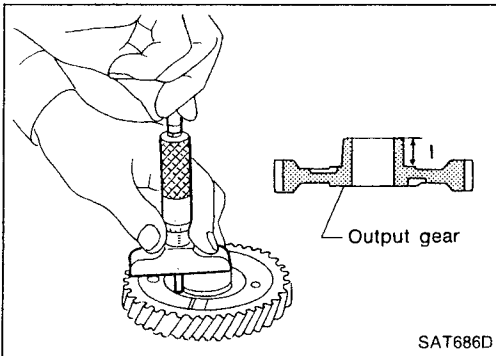
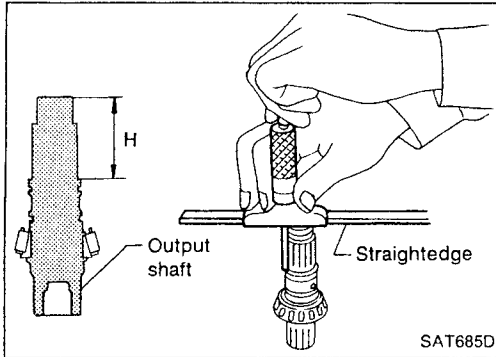
$$F = H - G$$



- Measure dimension "G" between end of output shaft and surface of output gear bearing inner race.
- Measure in at least two places.

ASSEMBLY

Adjustment 1 (Cont'd)



- Measure dimension "H" between end of output shaft and adjusting spacer mating surface of output shaft.
- **Measure in at least two places.**
- Calculate dimension "F".

$$F = H - G$$

- e. Measure distance "I" between end of output gear (adjusting spacer mating surface) and bearing inner race fitting surface.
- **Measure in at least two places.**

- f. Calculate dimension "T₂".

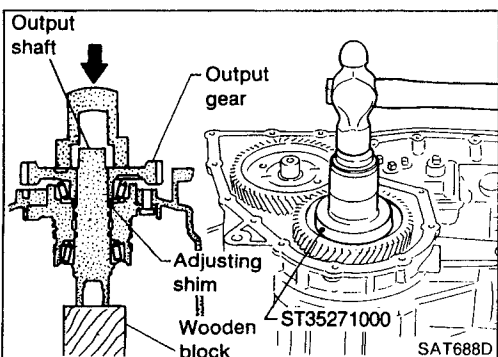
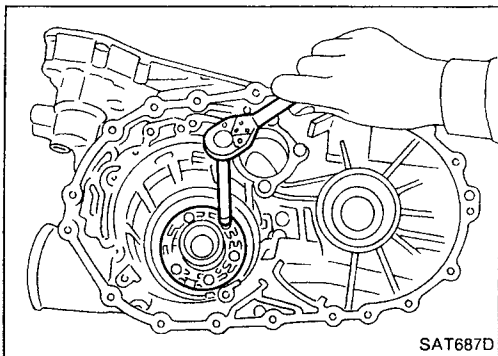
"T₂": Distance between adjusting spacer mating surface of output gear and output shaft

$$T_2 = F - I$$

- g. Select proper thickness of output shaft bearing adjusting spacer using SDS table as a guide.

Output shaft bearing adjusting spacer:

Refer to SDS, AT-172.



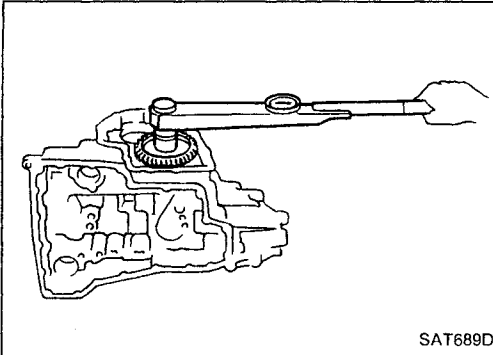
- 2. Install bearing retainer on transmission case.

- 3. Place output shaft on bearing retainer.
- 4. Place output shaft bearing adjusting spacer selected in step 1-g on output shaft.
- 5. Press output gear bearing inner race on output gear.
- 6. Press output gear on output shaft.

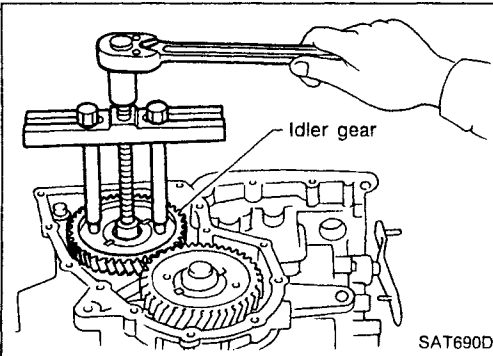
ASSEMBLY

Adjustment 1 (Cont'd)

7. Tighten output gear lock nut to specified torque.



8. Remove idler gear to measure output shaft bearing preload.



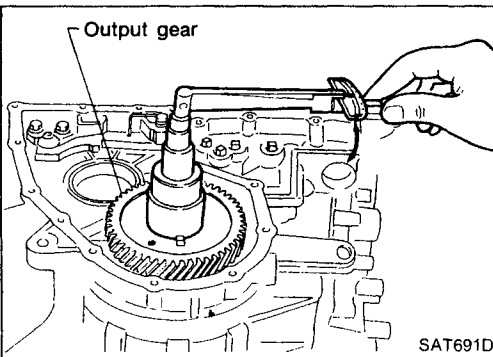
9. Measure output shaft bearing preload.

- When measuring bearing preload, turn output shaft in both directions several times to seat bearing rollers correctly.

Output shaft bearing preload:

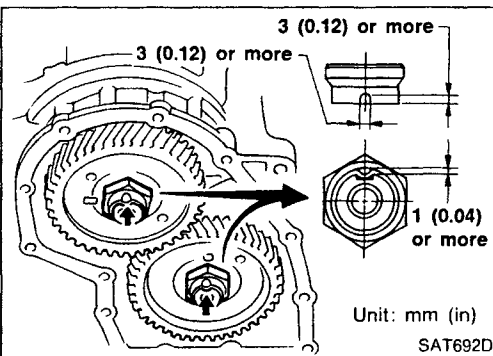
0.25 - 0.88 N·m

(2.5 - 9.0 kg-cm, 2.2 - 7.8 in-lb)



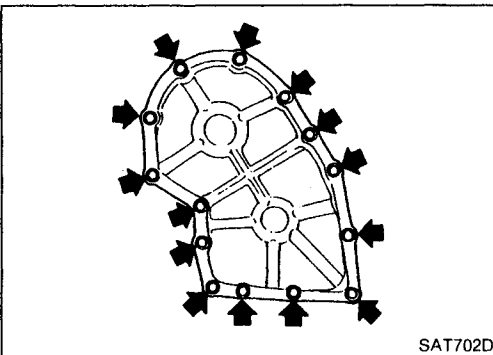
10. Install idler gear and tighten lock nut to specified torque.

11. After properly adjusting "turning" torque, clinch idler gear and output gear lock nuts as shown.



12. Install new gasket and side cover on transmission case.

- Always replace side cover bolts.

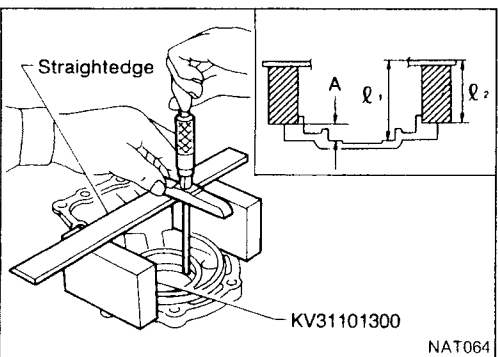
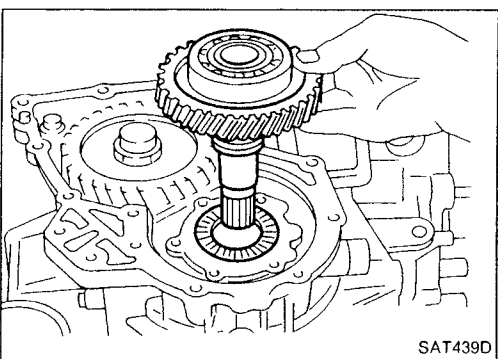
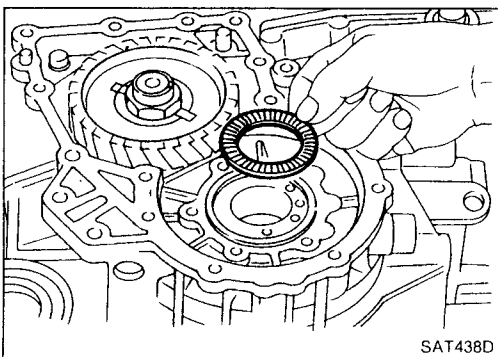
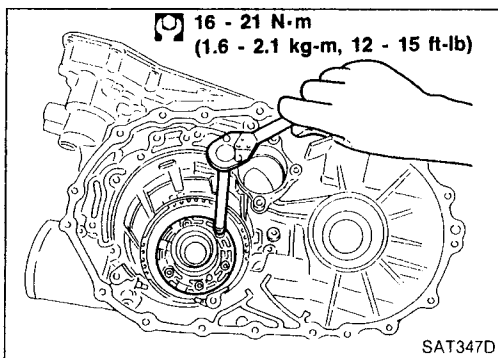
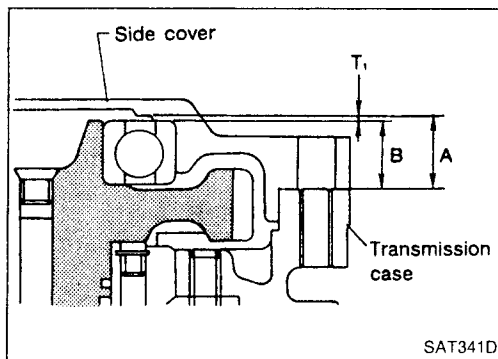


ASSEMBLY

Adjustment 1 (Cont'd) OUTPUT SHAFT END PLAY

— Model 34X81 —

- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



1. Install bearing retainer for output shaft.
2. Install output shaft thrust needle bearing on bearing retainer.
3. Install output shaft on transmission case.
4. Measure dimensions "l₁" and "l₂" at side cover and then calculate dimension "A".

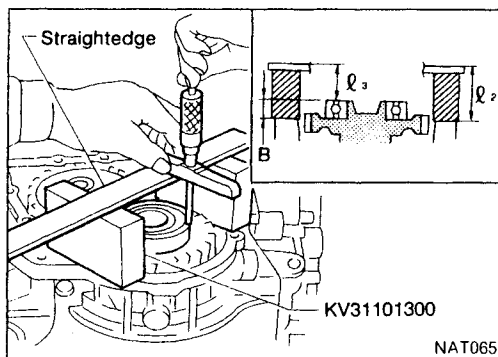
- Measure dimension "l₁" and "l₂" in at least two places.
 "A": Distance between transmission case fitting surface and adjusting shim mating surface.

$$A = l_1 - l_2$$
 l₂: Height of gauge

AT

ASSEMBLY

Adjustment 1 (Cont'd)

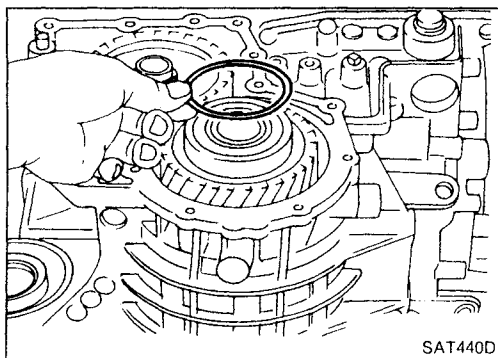


5. Measure dimensions " l_2 " and " l_3 " and then calculate dimension " B ".

- Measure " l_2 " and " l_3 " in at least two places.

" B ": Distance between the end of output shaft bearing outer race and the side cover fitting surface of transmission case.

$$B = l_2 - l_3 \quad l_2: \text{Height of gauge}$$



6. Select proper thickness of adjusting shim so that output shaft end play (clearance between side cover and output shaft bearing) is within specifications.

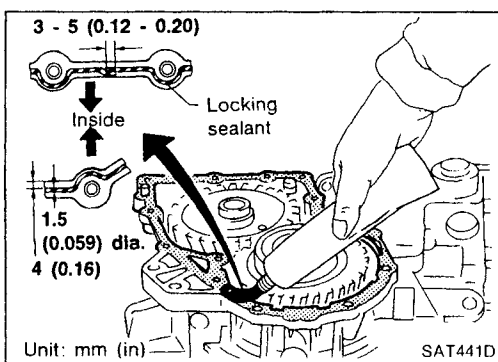
Output shaft end play (A - B):

0 - 0.5 mm (0 - 0.020 in)

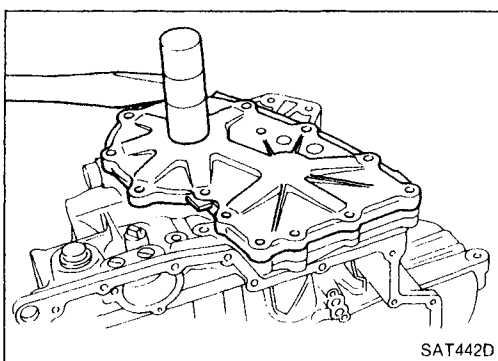
Output shaft end play adjusting shim:

Refer to SDS, AT-172.

7. Install adjusting shim on output shaft bearing.

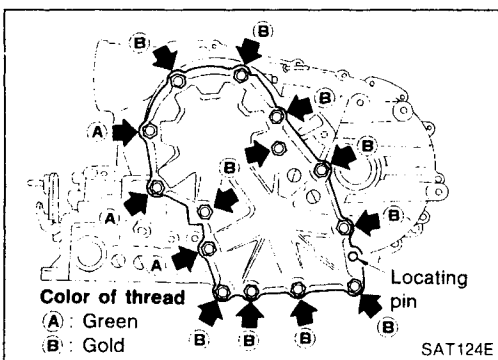


8. Apply locking sealant to transmission case as shown in illustration.



9. Install side cover on transmission case.

- Apply locking sealant to the mating surface of transmission case.



10. Tighten side cover fixing bolts to specified torque.

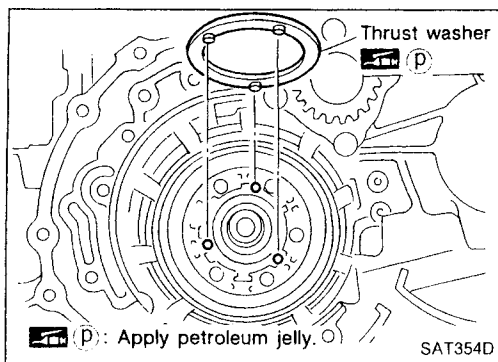
- Do not mix bolts (A) and (B).
- Always replace bolts (A) as they are self-sealing bolts.

ASSEMBLY

Assembly 2

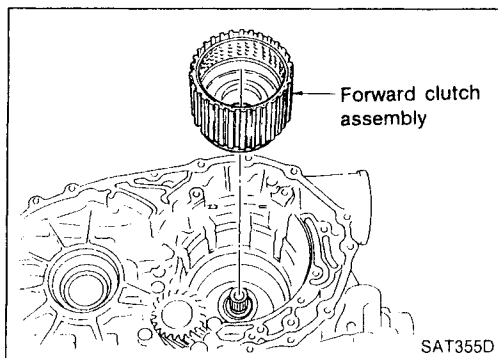
— All models —

1. Remove paper rolled around bearing retainer.
 2. Install thrust washer on bearing retainer.
- **Apply petroleum jelly to thrust washer.**



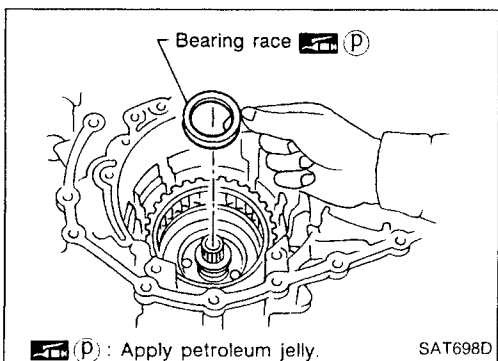
3. Install forward clutch assembly.

- **Align teeth of low & reverse brake drive plates before installing.**
- **Make sure that bearing retainer seal rings are not spread.**

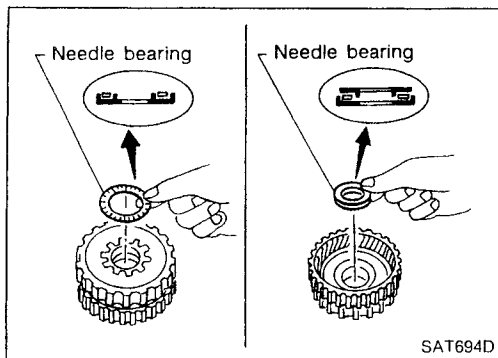


— Except model 34X81 —

4. Install bearing race on bearing retainer.
- **Apply petroleum jelly to bearing race.**

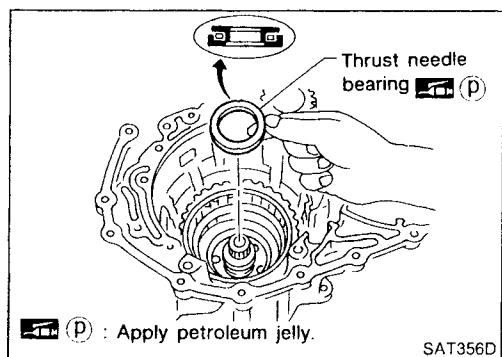


5. Install needle bearings on rear internal gear.
- **Apply petroleum jelly to needle bearings.**
 - **Pay attention to direction of needle bearing.**



— Model 34X81 —

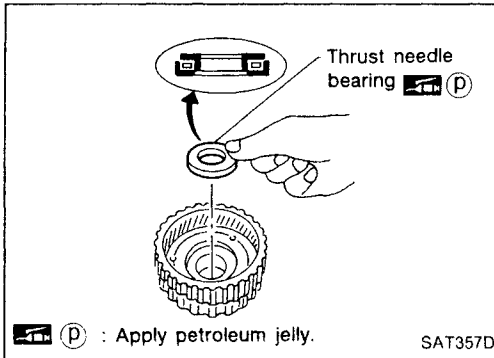
4. Install thrust needle bearing on bearing retainer.
- **Apply petroleum jelly to thrust bearing.**
 - **Pay attention to direction of thrust needle bearing.**



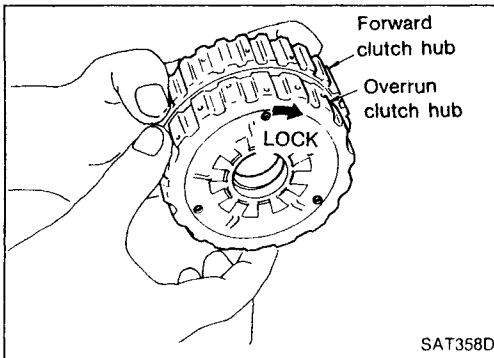
AT

ASSEMBLY

Assembly 2 (Cont'd)

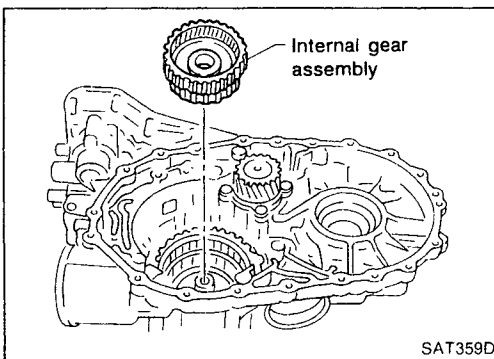


5. Install thrust needle bearing on rear internal gear.
 - Apply petroleum jelly to thrust needle bearing.
 - Pay attention to direction of thrust needle bearing.

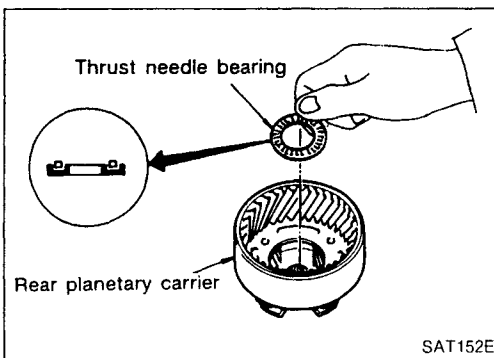


— All models —

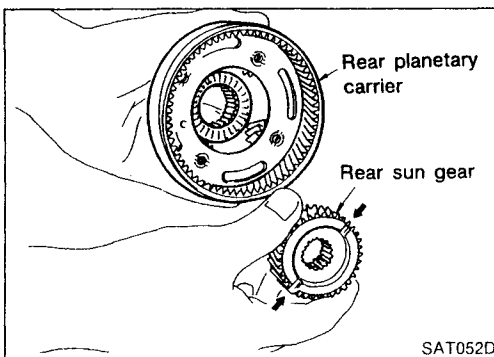
6. Hold forward clutch hub and turn overrun clutch hub.
 - Check overrun clutch hub for directions of lock and unlock.
 - If not as shown in illustration, check installed direction of forward one-way clutch.



7. Install rear internal gear assembly.
 - Align teeth of forward clutch and overrun clutch drive plate.



8. Install needle bearing on rear planetary carrier.
 - Apply petroleum jelly to needle bearing.
 - Pay attention to direction of needle bearing.

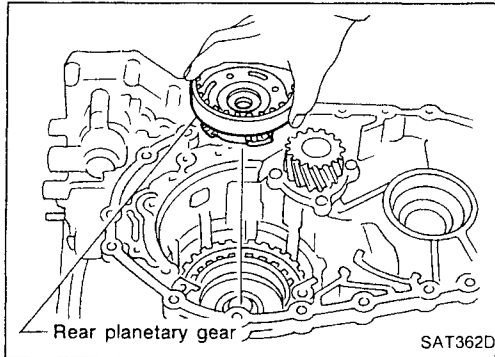


9. Install rear sun gear on rear planetary carrier.
 - Pay attention to direction of rear sun gear.

ASSEMBLY

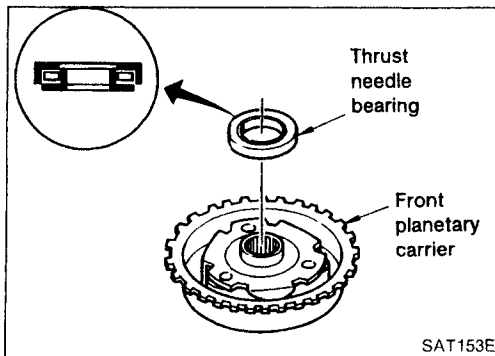
Assembly 2 (Cont'd)

10. Install rear planetary carrier on transmission case.



11. Install thrust needle bearing on front planetary carrier.

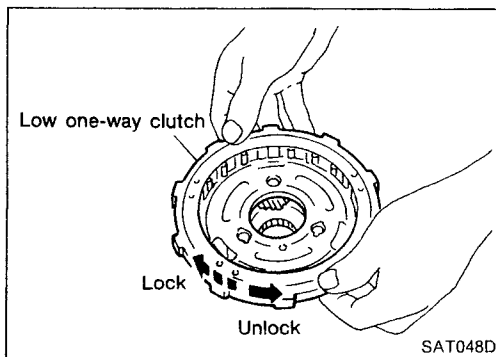
- Apply petroleum jelly to thrust needle bearing.
- Pay attention to direction of thrust needle bearing.



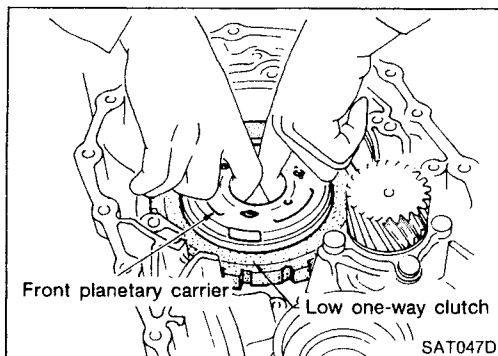
12. Install low one-way clutch to front planetary carrier by turning it in the direction of the arrow as shown.

13. While holding front planetary carrier, turn low one-way clutch.

Check low one-way clutch for correct directions of lock and unlock.

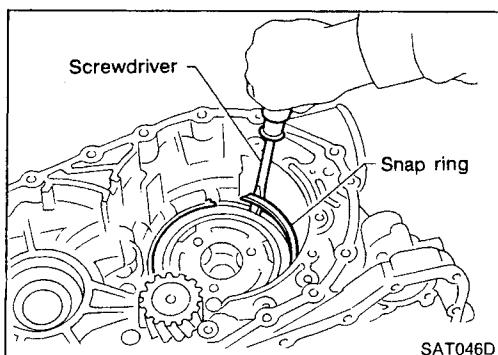


14. Install front planetary carrier assembly on transmission case.



15. Install snap ring with screwdriver.

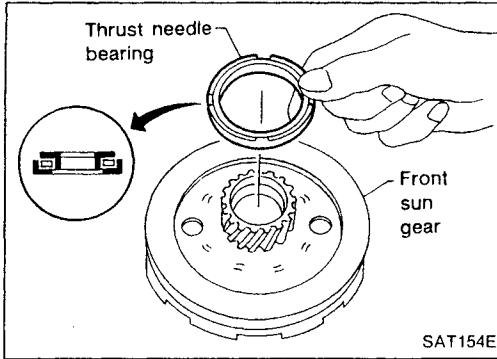
- Forward clutch and bearings must be correctly installed for snap ring to fit groove of transmission case.



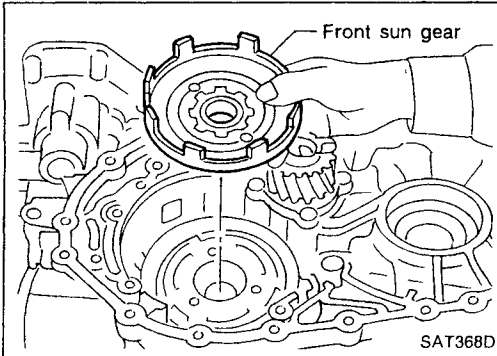
AT

ASSEMBLY

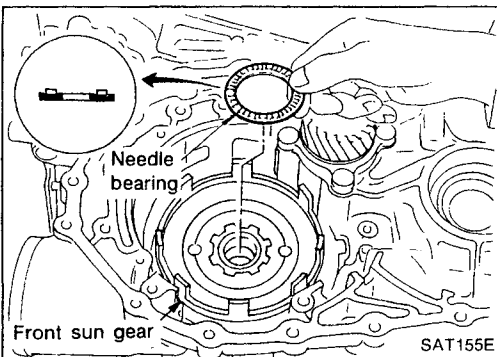
Assembly 2 (Cont'd)



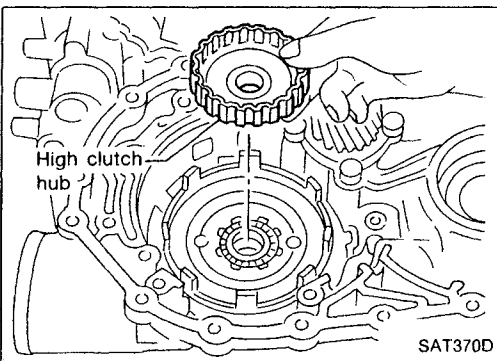
16. Install needle bearing on front sun gear.
- Apply petroleum jelly to needle bearing.
 - Pay attention to direction of needle bearing.



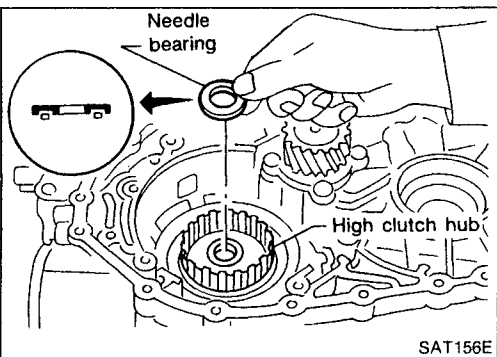
17. Install front sun gear on front planetary carrier.



18. Install needle bearing on front sun gear.
- Apply petroleum jelly to needle bearing.
 - Pay attention to direction of needle bearing.



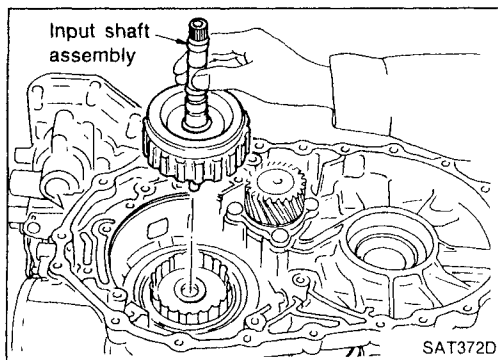
19. Install high clutch hub on front sun gear.



20. Install needle bearing on high clutch hub.
- Apply petroleum jelly to needle bearing.
 - Pay attention to direction of needle bearing.

ASSEMBLY

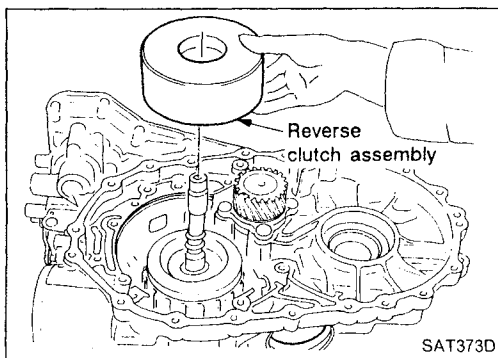
Assembly 2 (Cont'd)



21. Remove paper rolled around input shaft.

22. Install input shaft assembly.

- Align teeth of high clutch drive plates before installing.



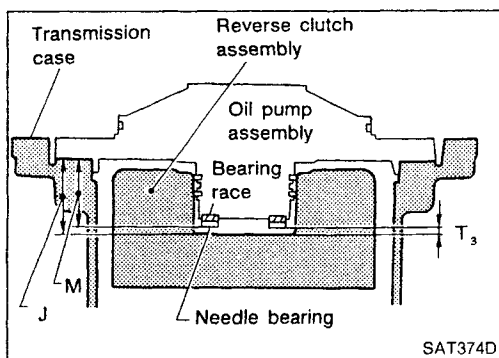
23. Install reverse clutch assembly.

- Align teeth of reverse clutch drive plates before installing.

Adjustment 2

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

Part name	Total end play	Reverse clutch end play
Transmission case	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●	●
Reverse clutch drum	—	●



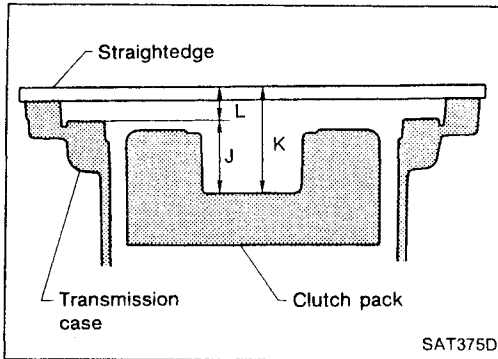
TOTAL END PLAY

- Measure clearance between reverse clutch drum and needle bearing for oil pump cover.
- Select proper thickness of bearing race so that end play is within specifications.

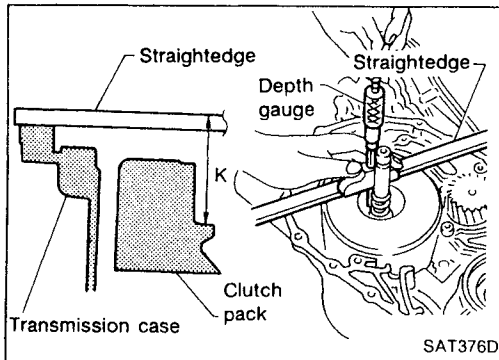
ASSEMBLY

Adjustment 2 (Cont'd)

1. Measure dimensions "K" and "L" and then calculate dimension "J".



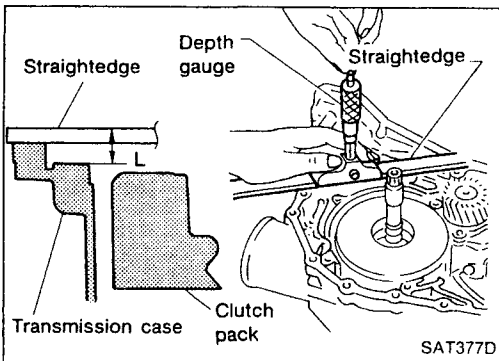
- a. Measure dimension "K".



- b. Measure dimension "L".
- c. Calculate dimension "J".

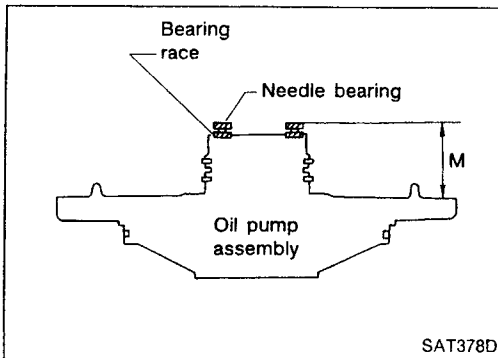
- "J": Distance between oil pump fitting surface of transmission case and needle bearing mating surface of high clutch drum.

$$J = K - L$$



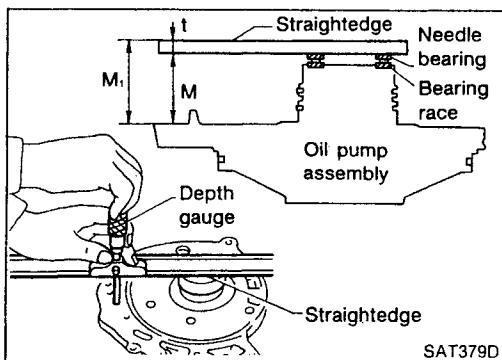
2. Measure dimension "M".

- a. Place bearing race and needle bearing on oil pump assembly.



- b. Measure dimension "M".

- "M": Distance between transmission case fitting surface and needle bearing on oil pump cover.
- M₁: Indication of gauge.

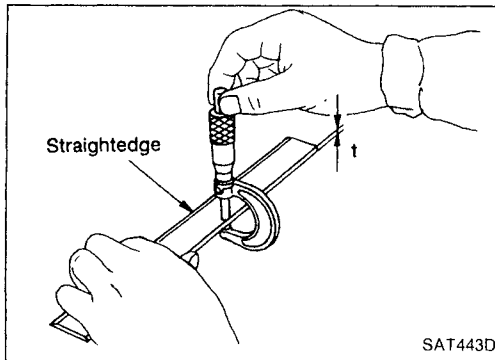


ASSEMBLY

Adjustment 2 (Cont'd)

- c. Measure thickness of straightedge "t".

$$M = M_1 - t$$



3. Adjust total end play " T_3 ".

$$T_3 = J - M$$

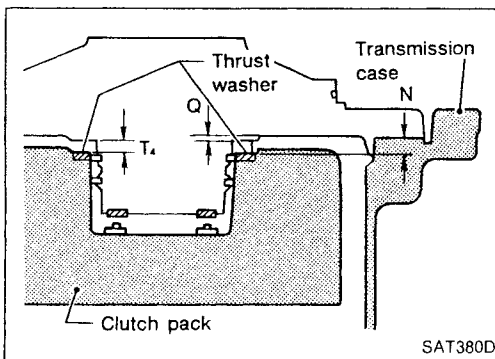
Total end play " T_3 ":

0.25 - 0.55 mm (0.0098 - 0.0217 in)

- Select proper thickness of bearing race so that total end play is within specifications.

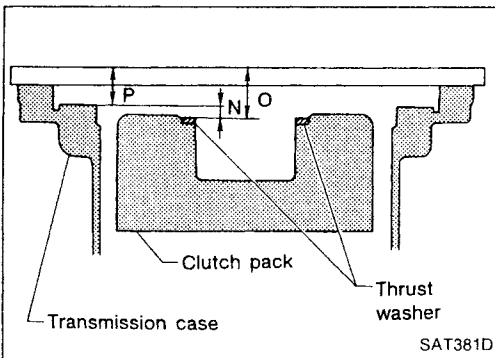
Bearing races:

Refer to SDS, AT-173.

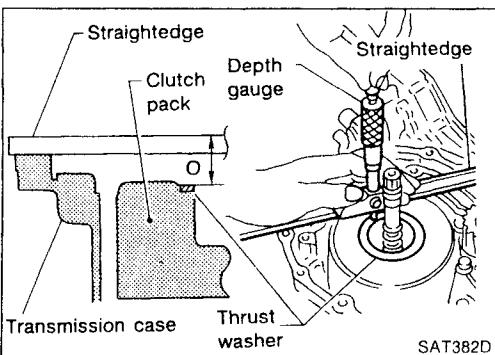


REVERSE CLUTCH END PLAY

- Measure clearance between oil pump cover and thrust washer for reverse clutch drum.
- Select proper thickness of thrust washer so that end play is within specifications.



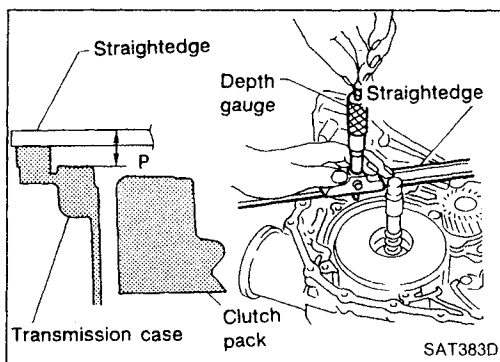
1. Measure dimensions "O" and "P" and then calculate dimension "N".



- a. Place thrust washer on reverse clutch drum.
b. Measure dimension "O".

ASSEMBLY

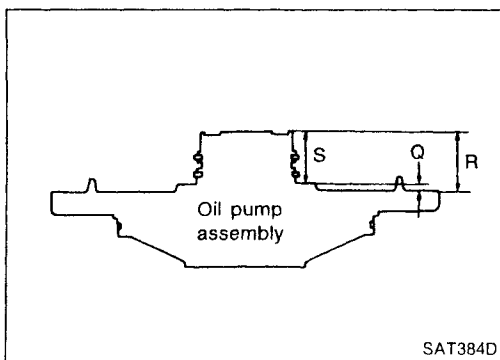
Adjustment 2 (Cont'd)



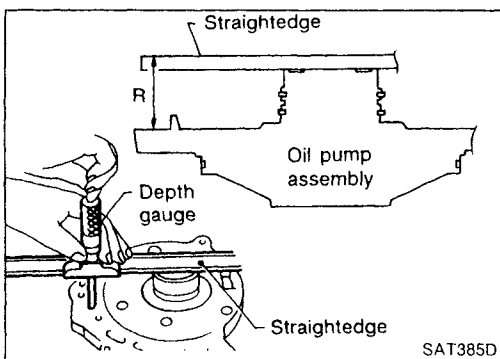
- c. Measure dimension "P".
- d. Calculate dimension "N".

- **"N": Distance between oil pump fitting surface of transmission case and thrust washer on reverse clutch drum.**

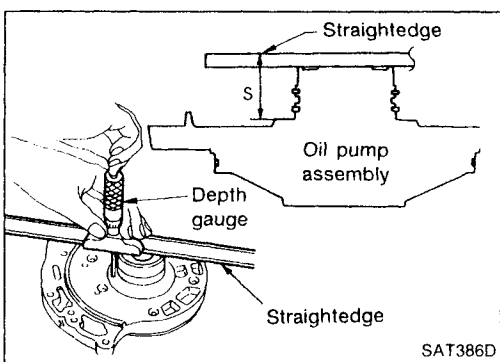
$$N = O - P$$



2. Measure dimensions "R" and "S" and then calculate dimension "Q".



- a. Measure dimension "R".



- b. Measure dimension "S".
- c. Calculate dimension "Q".

- **"Q": Distance between transmission case fitting surface and thrust washer mating surface.**

$$Q = R - S$$

3. Adjust reverse clutch end play " T_4 ".

$$T_4 = N - Q$$

Reverse clutch end play:

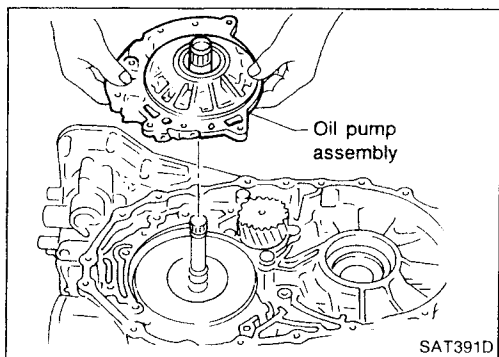
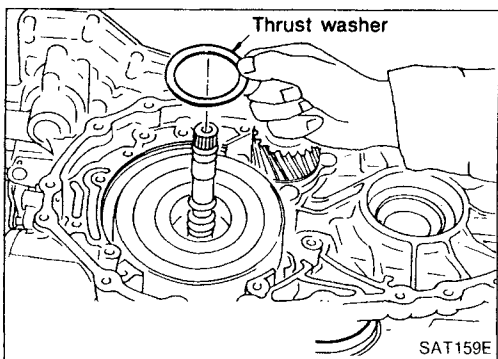
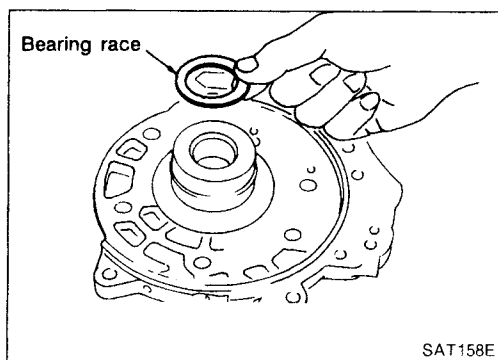
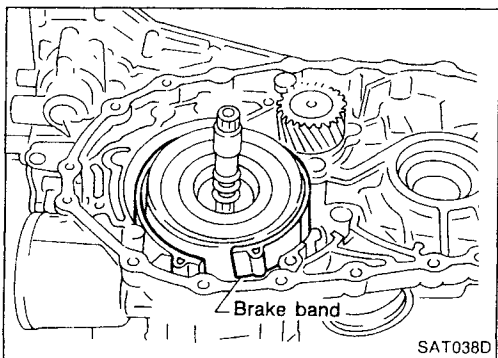
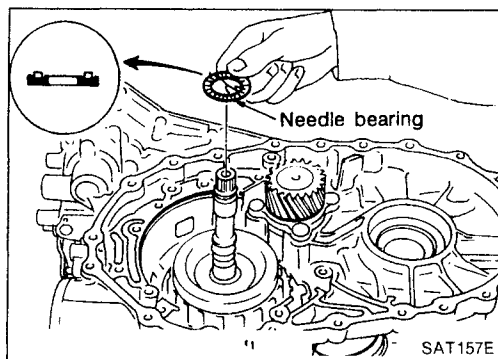
0.65 - 1.00 mm (0.0256 - 0.0394 in)

- Select proper thickness of thrust washer so that reverse clutch end play is within specifications.

Thrust washer:

Refer to SDS, AT-173.

ASSEMBLY



Assembly 3

1. Remove reverse clutch assembly and install needle bearing on high clutch assembly.
2. Install reverse clutch assembly.

- **Pay attention to direction of needle bearing.**

3. Install anchor end pin, washer and lock nut on transmission case.
4. Place brake band on outside of reverse clutch drum. Tighten anchor end pin just enough so brake band is evenly fitted on reverse clutch drum.

5. Place bearing race selected in total end play adjustment step on oil pump cover.
- **Apply petroleum jelly to bearing race.**

6. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.
- **Apply petroleum jelly to thrust washer.**

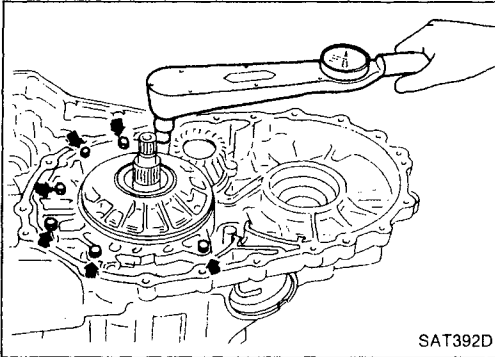
7. Install oil pump assembly on transmission case.

AT

ASSEMBLY

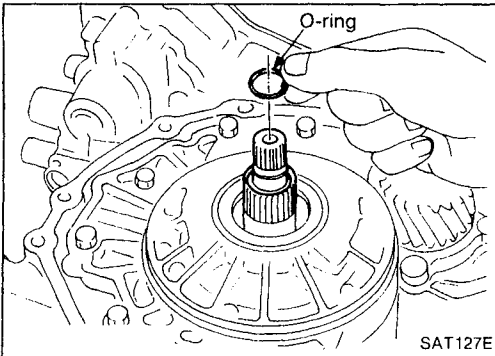
Assembly 3 (Cont'd)

8. Tighten oil pump fixing bolts to specified torque.



9. Install O-ring to input shaft.

- Apply ATF to O-ring.

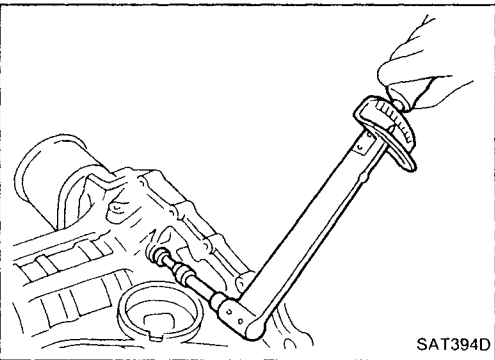


10. Adjust brake band.

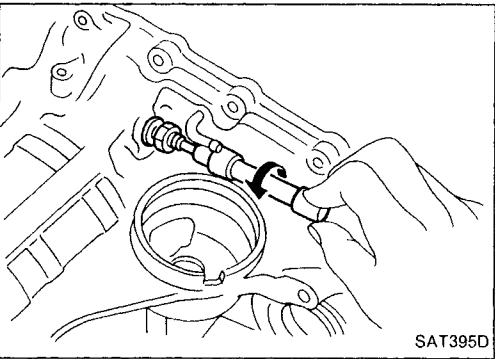
a. Tighten anchor end pin to specified torque.

Anchor end pin:

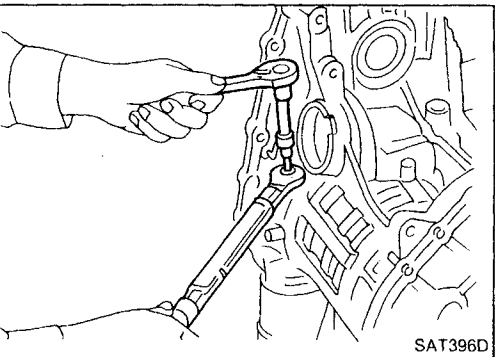
 : 3.9 - 5.9 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)



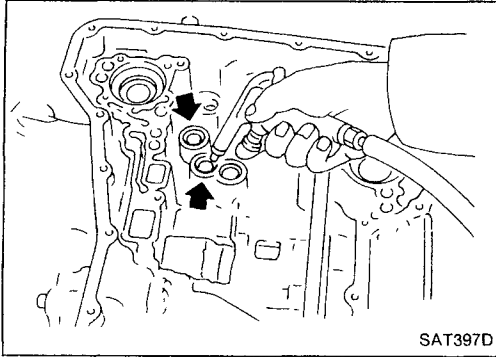
b. Back off anchor end pin two and a half turns.



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



ASSEMBLY



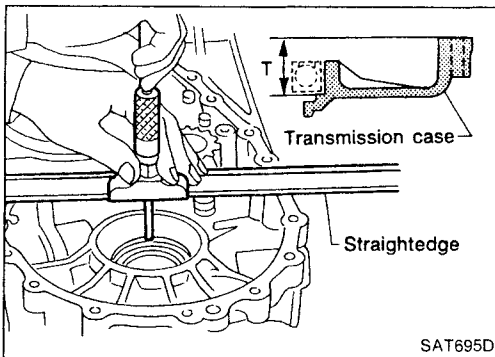
11. Apply compressed air to oil holes of transmission case and check operation of brake band.

Adjustment 3

FINAL DRIVE END PLAY

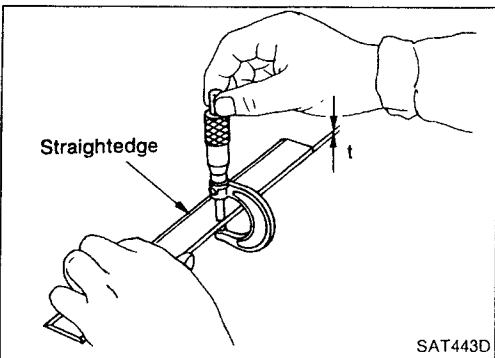
— Except model 34X81 —

- Measure clearance between differential side bearing and transmission case.
- Select proper thickness of adjusting shim so that end play is within specifications.



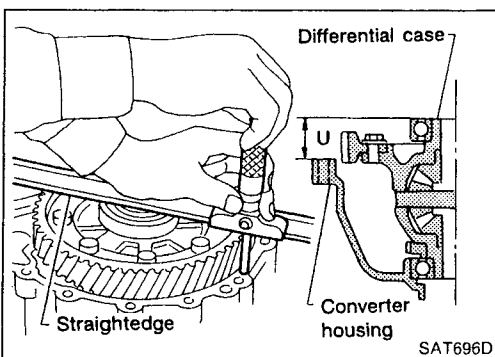
1. Measure dimension "T" between side bearing fitting surface of transmission case and converter housing fitting surface of transmission case.

"T₁": indication of gauge



2. Measure thickness of straightedge "t".

$$T = T_1 - t$$

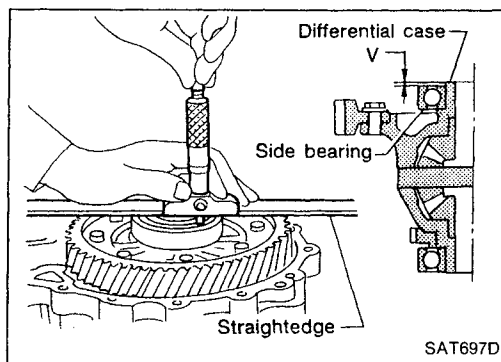


3. Place final drive assembly on converter housing.
4. Measure dimension "U" between end of differential case and transmission case fitting surface of converter housing.

AT

ASSEMBLY

Adjustment 3 (Cont'd)



5. Measure dimension "V" between end of differential case and adjusting shim mating surface of differential side bearing.

6. Calculate final drive end play.

Final drive end play:

$$T - U + V$$

7. Select proper thickness of differential side bearing adjusting shim so that final drive end play is within specifications.

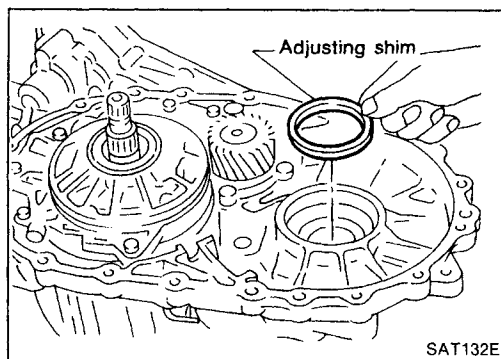
Final drive end play:

$$0 - 0.15 \text{ mm } (0 - 0.0059 \text{ in})$$

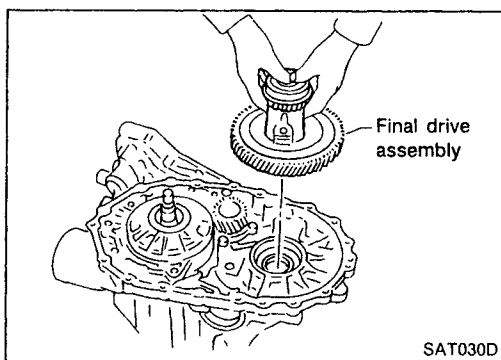
Differential side bearing adjusting shim:

Refer to SDS, AT-170.

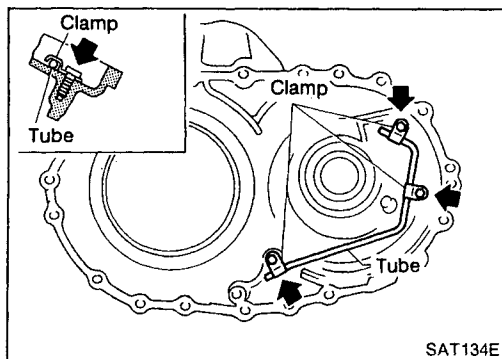
Assembly 4



1. Install differential side bearing adjusting shim selected in final drive end play adjustment step on transmission case.



2. Install final drive assembly on transmission case.



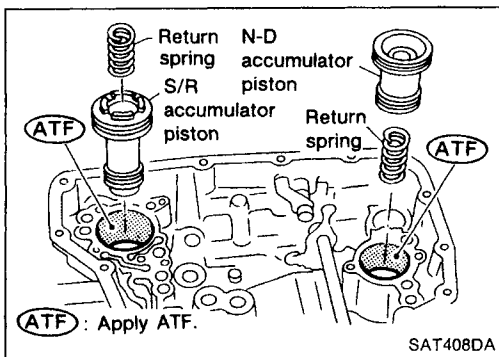
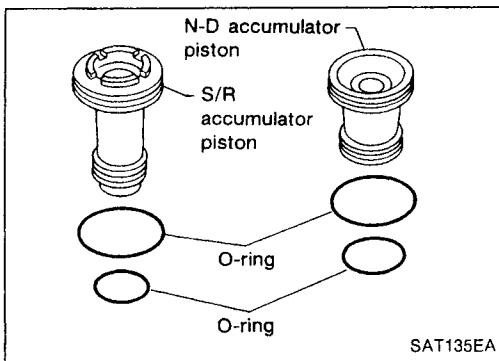
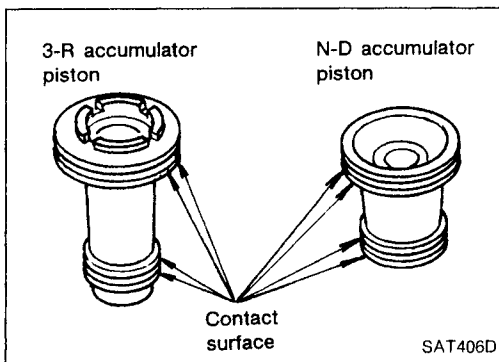
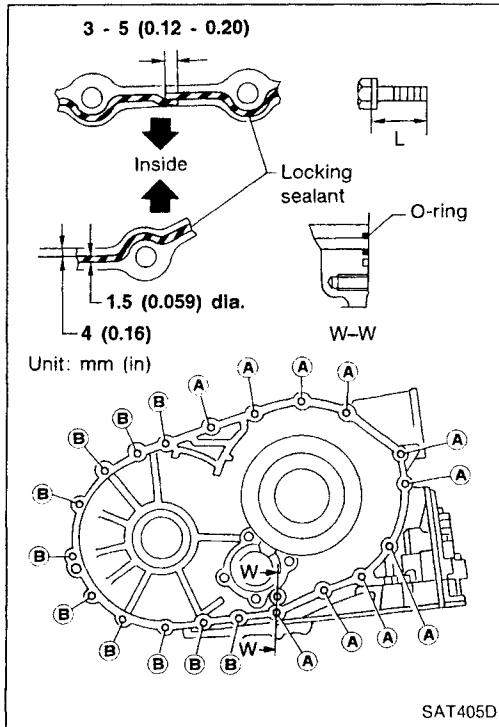
3. Install oil tube on converter housing.

ASSEMBLY

Assembly 4 (Cont'd)

4. Install O-ring on differential oil port of transmission case.
5. Install converter housing on transmission case.
- **Apply locking sealant to mating surface of converter housing.**

Bolt	Length mm (in)
(A)	32.8 (1.291)
(B)	40 (1.57)



6. Install accumulator piston.
 - a. Check contact surface of accumulator piston for damage.

- b. Install O-rings on accumulator piston.
 - Apply ATF to O-rings.

Accumulator piston O-rings:

Unit: mm (in)		
Accumulator	Inner diameter (Small)	Inner diameter (Large)
S/R accumulator	26.9 (1.059)	44.2 (1.740)
N-D accumulator	34.6 (1.362)	39.4 (1.551)

- c. Install accumulator pistons and return springs on transmission case.

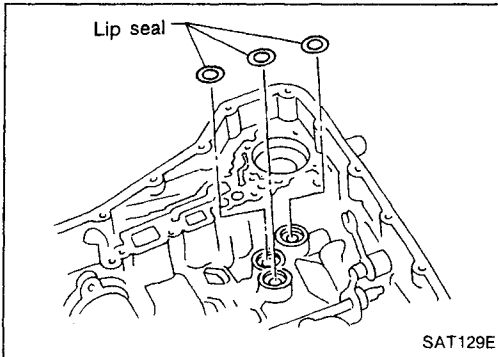
- **Apply ATF to inner surface of transmission case.**

Return springs:

Unit: mm (in)		
Spring	Free length	Outer diameter
S/R accumulator spring	56.4 (2.220)	21.0 (0.827)
N-D accumulator spring	43.5 (1.713)	28.0 (1.102)

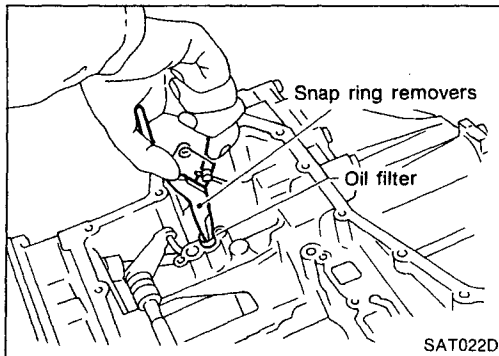
ASSEMBLY

Assembly 4 (Cont'd)



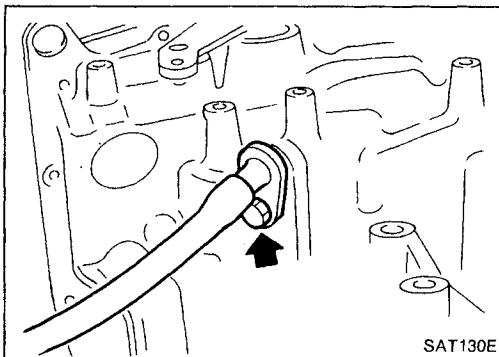
7. Install lip seals for band servo oil holes on transmission case.

- **Apply petroleum jelly to lip seals.**

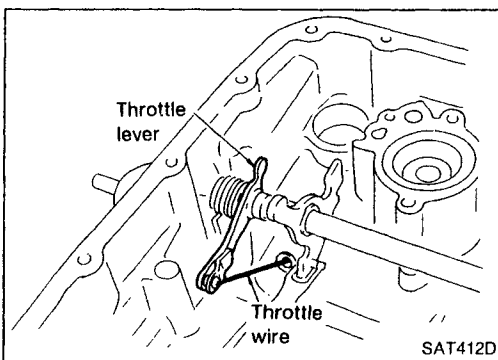


8. Install oil filter for governor valve.

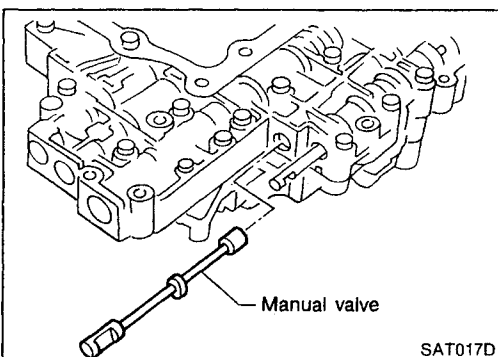
- **Take care with its direction.**



9. Install throttle wire to transmission case.



10. Install throttle wire to throttle lever.



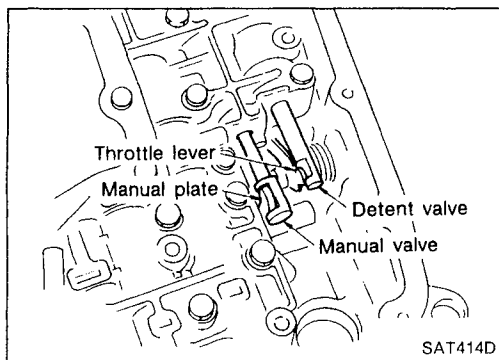
11. Install control valve assembly.

a. Insert manual valve into control valve assembly.

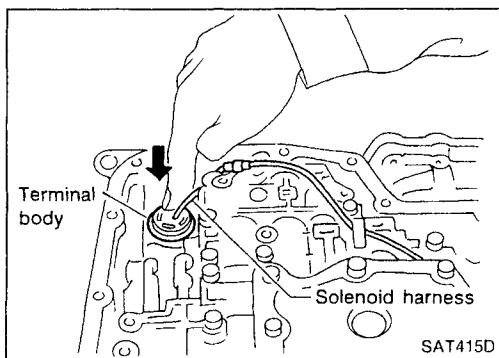
- **Apply ATF to manual valve.**

ASSEMBLY

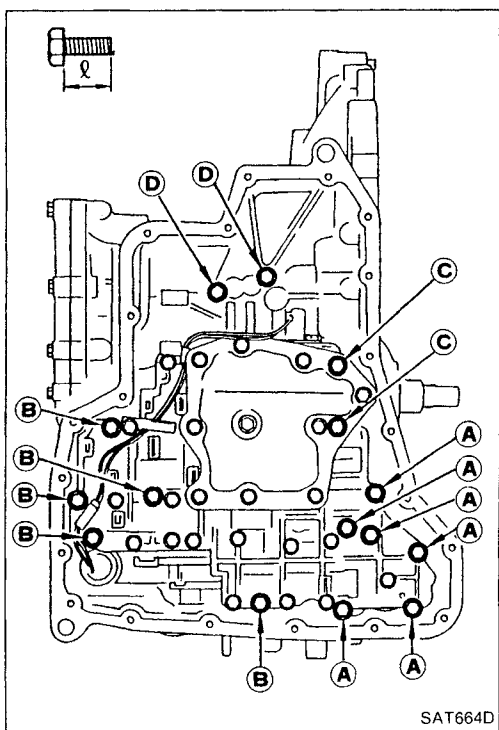
Assembly 4 (Cont'd)



- b. Set manual shaft in Neutral position.
- c. Install control valve assembly on transmission case while aligning manual valve with manual plate and detent valve with throttle lever.



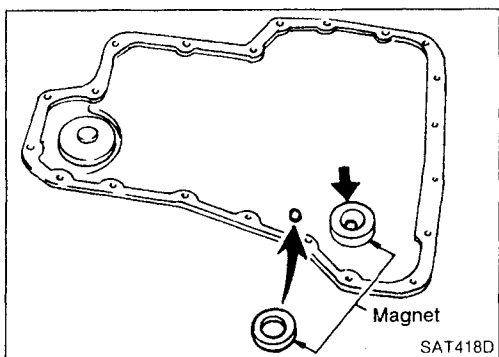
- d. Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.
- e. Install clip to terminal body.



- f. Tighten bolts **A**, **B**, **C** and **D**.

Bolt length, number and location:

Bolt	A	B	C	D
Bolt length "L" mm (in)	33.0 (1.299)	40.0 (1.575)	43.5 (1.713)	25.0 (0.984)
Number of bolts	6	5	2	2
Tightening torque N·m (kg·m, in·lb)	7 - 9 (0.7 - 0.9, 61 - 78)			

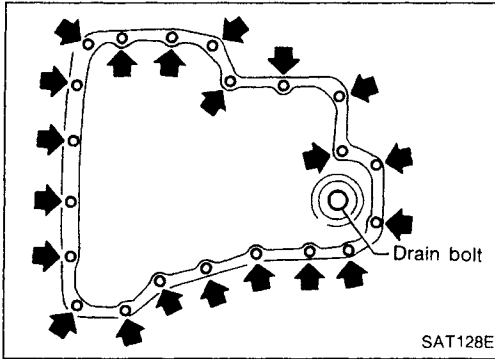


12. Install oil pan.
- a. Attach magnet to oil pan.

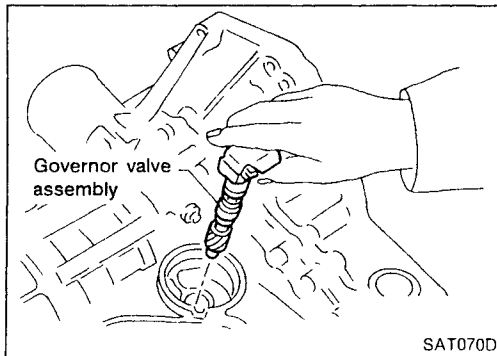
AT

ASSEMBLY

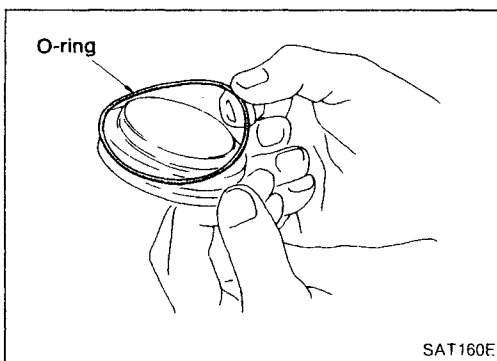
Assembly 4 (Cont'd)



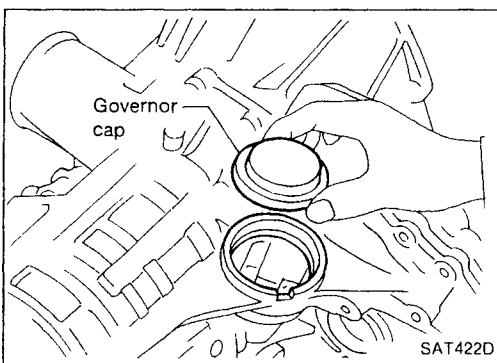
- b. Install new oil pan gasket on transmission case.
- c. Install oil pan on transmission case.
 - **Always replace oil pan bolts.**
 - **Tighten the four bolts in a criss-cross pattern to prevent dislocation of gasket.**
- d. Tighten drain plug to specified torque.



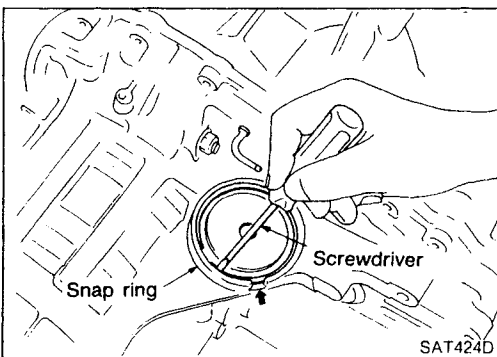
- 13. Install governor valve.
 - a. Install governor valve assembly into transmission case.



- b. Install O-ring to governor cap.
 - **Apply ATF to O-ring.**



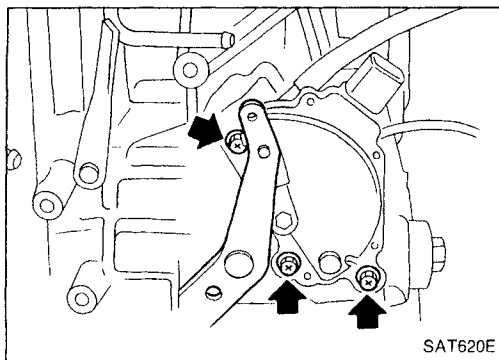
- c. Install governor cap onto transmission case.



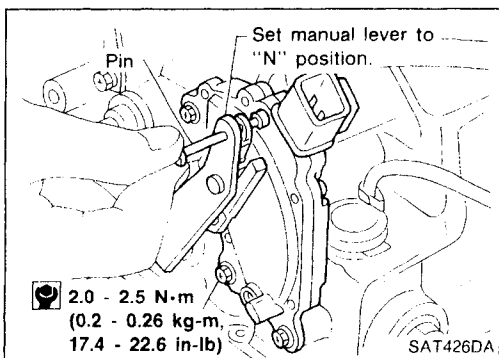
- d. Install snap ring onto transmission case with a screwdriver.
 - **Align snap ring gap with the notch of transmission case.**

ASSEMBLY

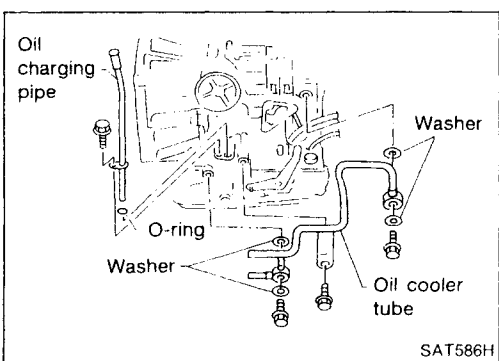
Assembly 4 (Cont'd)



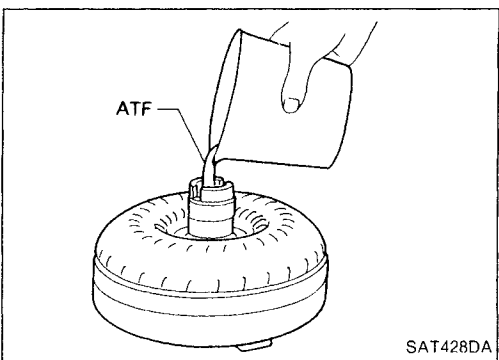
14. Install inhibitor switch.
 - a. Set manual shaft in "P" position.
 - b. Temporarily install inhibitor switch on manual shaft.
 - c. Move selector lever to "N" position.



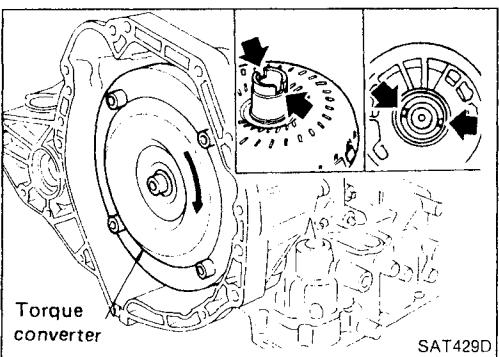
- d. Use a 4 mm (0.157 in) pin for this adjustment.
 - 1) Insert the pin straight into the manual shaft adjustment hole.
 - 2) Rotate inhibitor switch until the pin can also be inserted straight into hole in inhibitor switch.
- e. Tighten inhibitor switch fixing bolts.
- f. Remove pin from adjustment hole after adjusting inhibitor switch.



15. Install oil charging pipe and oil cooler tube to transmission case.



16. Install torque converter.
 - a. Pour ATF into torque converter.
 - **Approximately 1 liter (7/8 Imp qt) of fluid is required for a new torque converter.**
 - **When reusing old torque converter, add the same amount of fluid as was drained.**



- b. Install torque converter while aligning notches of torque converter with notches of oil pump.

AT

ASSEMBLY

Assembly 4 (Cont'd)

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

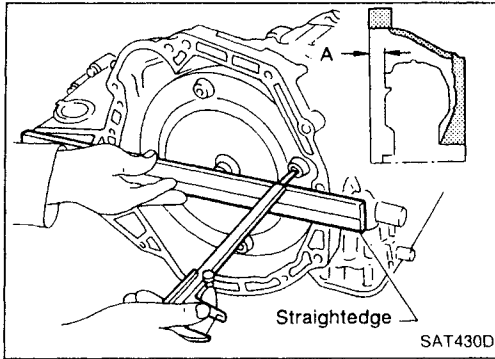
Distance "A":

Except model 34X81

21.1 mm (0.831 in) or more

Model 34X81

15.9 mm (0.626 in) or more



SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

Applied model	Except Europe and Australia	Europe	Except Europe and Australia	Australia	Australia
	GA15DE	GA16DE			SR20DE
	With catalyzer		Without catalyzer		
Automatic transaxle model	RL4F03A				
Automatic transaxle assembly					
Model code number	34X69	34X68	34X70	34X80	34X81
Transaxle gear ratio					
1st	2.861	2.8611	2.861		
2nd	1.562	1.5622	1.562		
3rd	1.000	1.0000	1.000		
4th	0.697	0.6979	0.697		
Reverse	2.310	2.3103	2.310		
Final drive	3.827	4.0721	3.827		
Recommended oil	Genuine Nissan ATF or equivalent				
Oil capacity (Imp qt)	7.0 (6-1/8)				

Specifications and Adjustments

VEHICLE SPEED WHEN SHIFTING GEARS

Model 34X68

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	48 - 56 (30 - 35)	88 - 96 (55 - 60)	—	133 - 141 (83 - 88)	80 - 88 (50 - 55)	37 - 45 (23 - 28)	45 - 53 (28 - 33)
Half throttle	31 - 39 (19 - 24)	54 - 62 (34 - 39)	102 - 110 (63 - 68)	75 - 83 (47 - 52)	44 - 52 (27 - 32)	7 - 15 (4 - 9)	45 - 53 (28 - 33)

Model 34X69 and 34X70

Throttle position	Vehicle speed km/h (MPH)						
	D ₁ → D ₂	D ₂ → D ₃	D ₃ → D ₄	D ₄ → D ₃	D ₃ → D ₂	D ₂ → D ₁	1 ₂ → 1 ₁
Full throttle	51 - 60 (32 - 37)	94 - 102 (58 - 63)	—	136 - 144 (85 - 89)	85 - 93 (53 - 58)	40 - 48 (25 - 30)	48 - 56 (30 - 35)
Half throttle	30 - 38 (19 - 24)	52 - 60 (32 - 37)	97 - 105 (60 - 65)	67 - 75 (42 - 47)	42 - 50 (26 - 31)	8 - 16 (5 - 10)	48 - 56 (30 - 35)

Model 34X80

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	52 - 60 (32 - 37)	100 - 108 (62 - 67)	—	145 - 153 (90 - 95)	90 - 98 (56 - 61)	40 - 48 (25 - 30)	49 - 57 (30 - 35)
Half throttle	30 - 38 (19 - 24)	53 - 61 (33 - 38)	103 - 111 (64 - 69)	69 - 77 (43 - 48)	42 - 50 (26 - 31)	8 - 16 (5 - 10)	49 - 57 (30 - 35)

Model 34X81

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	58 - 66 (36 - 41)	107 - 115 (66 - 71)	—	160 - 168 (99 - 104)	96 - 104 (60 - 65)	39 - 47 (24 - 29)	48 - 56 (30 - 35)
Half throttle	33 - 41 (21 - 25)	57 - 65 (35 - 40)	105 - 113 (65 - 70)	69 - 77 (43 - 48)	45 - 53 (28 - 33)	8 - 16 (5 - 10)	48 - 56 (30 - 35)

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

VEHICLE SPEED WHEN PERFORMING LOCK-UP

Model 34X68

Throttle position	Gear position	Vehicle speed km/h (MPH)
		Lock-up "ON"
Half throttle	D ₄	102 - 110 (63 - 68)

Model 34X69 and 34X70

Throttle position	Gear position	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Half throttle	D ₄	112 - 120 (70 - 75)	97 - 105 (60 - 65)

Model 34X80

Throttle position	Gear position	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Half throttle	D ₄	116 - 124 (72 - 77)	97 - 105 (60 - 65)

Model 34X81

Throttle position	Gear position	Vehicle speed km/h (MPH)
		Lock-up "ON"
Half throttle	D ₄	105 - 113 (65 - 70)

STALL REVOLUTION

Engine		Stall revolution rpm
GA15DE	Model 34X69	2,400 - 2,700
GA16DE	Model 34X70, 34X80	2,550 - 2,850
	Model 34X68, 34X80	2,450 - 2,750
SR20DE	Model 34X81	1,850 - 2,150

THROTTLE WIRE ADJUSTMENT

Unit: mm (in)

Throttle wire stroke	40 - 42 (1.57 - 1.65)
----------------------	-----------------------

LINE PRESSURE

Model 34X68, 34X69 and 34X70

Engine speed rpm	Line pressure kPa (bar, kg/cm ² , psi)			
	R position	D position	2 position	1 position
Idle	883 (8.83, 9.0, 128)	637 (6.37, 6.5, 92)	1,147 (11.47, 11.7, 166)	1,147 (11.47, 11.7, 166)
Stall	1,765 (17.65, 18.0, 256)	1,275 (12.75, 13.0, 185)	1,275 (12.75, 13.0, 185)	1,275 (12.75, 13.0, 185)

Model 34X80

Engine speed rpm	Line pressure kPa (bar, kg/cm ² , psi)			
	R position	D position	2 position	1 position
Idle	883 (8.83, 9.0, 128)	637 (6.37, 6.5, 92)	1,147 (11.47, 11.7, 166)	1,147 (11.47, 11.7, 166)
Stall	1,765 (17.65, 18.0, 256)	1,275 (12.75, 13.0, 185)	1,275 (12.75, 13.0, 185)	1,275 (12.75, 13.0, 185)

Model 34X81

Engine speed rpm	Line pressure kPa (bar, kg/cm ² , psi)			
	R position	D position	2 position	1 position
Idle	883 (8.83, 9.0, 128)	637 (6.37, 6.5, 92)	1,147 (11.47, 11.7, 166)	1,147 (11.47, 11.7, 166)
Stall	1,765 (17.65, 18.0, 256)	1,275 (12.75, 13.0, 185)	1,275 (12.75, 13.0, 185)	1,275 (12.75, 13.0, 185)

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

CONTROL VALVES

Control valve return springs

Unit: mm (in)

Parts				Part No.	Free length	Outer diameter
			Model			
Upper body	①	Pressure modifier valve spring	34X69, 34X70, 34X68, 34X80, 34X81	31742-31X64	25.02 (0.9850)	7.9 (0.311)
	②	Kickdown modulator valve spring		31742-31X03	40.5 (1.594)	9.0 (0.354)
	③	1-2 accumulator valve spring	34X80	31742-31X04	51.14 (2.0134)	17.0 (0.669)
			34X69, 34X70, 34X68, 34X81	31742-31X63	50.8 (2.000)	17.0 (0.669)
	④	3-2 timing valve spring		31736-21X00	26.3 (1.035)	7.2 (0.283)
	⑤	1st reducing valve spring		31835-21X08	22.6 (0.890)	7.3 (0.287)
	⑥	Torque converter relief valve spring		31742-31X06	23.5 (0.925)	7.4 (0.291)
	⑦	Throttle modulator valve spring	34X68, 34X81	31742-31X07	29.5 (1.161)	5.5 (0.217)
			34X69, 34X70, 34X80	31742-31X18	29.5 (1.161)	5.5 (0.217)
	⑧	4th speed cut valve spring	34X69, 34X70, 34X80	31736-01X02	21.7 (0.854)	6.65 (0.2618)
			34X68	31756-21X02	22.6 (0.890)	7.3 (0.287)
			34X81	31835-21X02	23.2 (0.913)	6.2 (0.244)
	⑨	Lock-up control valve spring		31742-31X08	39.5 (1.555)	5.0 (0.197)
	⑩	4-2 sequence valve spring		31742-31X09	39.5 (1.555)	5.1 (0.201)
	—	Oil cooler relief valve spring		31872-31X00	17.02 (0.6701)	8.0 (0.315)
Lower body	①	Throttle valve and detent valve spring	34X81	31802-31X06	32.0 (1.260)	10.0 (0.394)
			34X69, 34X70, 34X68, 34X80	31802-31X07	33.0 (1.299)	10.0 (0.394)
	②	Pressure regulator valve spring		31742-31X00	52.24 (2.0567)	15.0 (0.591)
	③	3-4 shift valve spring	34X68	31762-31X00	52.0 (2.047)	8.0 (0.315)
			34X69, 34X70, 34X80	31762-31X13	52.0 (2.047)	7.45 (0.2933)
			34X81	31762-31X11	52.0 (2.047)	8.0 (0.315)
	④	2-3 shift valve spring		31762-31X01	52.7 (2.075)	7.0 (0.276)
	⑤	1-2 shift valve spring		31762-31X02	45.9 (1.807)	5.3 (0.209)
⑥	Overrun clutch control valve spring		31742-31X60	48.9 (1.925)	7.0 (0.276)	

AT

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

CLUTCH AND BRAKES

Model	34X68, 34X69, 34X70, 34X80	34X81
Reverse clutch		
Number of drive plates	2	
Number of driven plates	2	
Drive plate thickness mm (in)		
Standard	2.0 (0.079)	
Wear limit	1.8 (0.071)	
Clearance mm (in)		
Standard	0.5 - 0.8 (0.020 - 0.031)	
Allowable limit	1.2 (0.047)	
Thickness of retaining plates	Thickness mm (in)	Part number
	4.4 (0.173)	31537-31X00
	4.6 (0.181)	31537-31X01
	4.8 (0.189)	31537-31X02
	5.0 (0.197)	31537-31X03
	5.2 (0.205)	31537-31X04
High clutch		
Number of drive plates	3	4
Number of driven plates	5	6 + 1
Drive plate thickness mm (in)		
Standard	2.0 (0.079)	1.6 (0.063)
Wear limit	1.8 (0.071)	1.4 (0.055)
Clearance mm (in)		
Standard	1.4 - 1.8 (0.055 - 0.071)	
Allowable limit	2.4 (0.094)	2.6 (0.102)
Thickness of retaining plates	Thickness mm (in)	
	3.8 (0.150)	31537-31X11
	4.0 (0.157)	31537-31X12
	4.2 (0.165)	31537-31X13
	4.4 (0.173)	31537-31X14
	4.6 (0.181)	31537-31X15
	4.8 (0.189)	31537-31X16
		5.0 (0.197) 31537-31X17

Model	34X68, 34X69, 34X70, 34X80	34X81
Forward clutch		
Number of drive plates	5	
Number of driven plates	5	
Drive plate thickness mm (in)		
Standard	1.8 (0.071)	
Wear limit	1.6 (0.063)	
Clearance mm (in)		
Standard	0.45 - 0.85 (0.0177 - 0.0335)	
Allowable limit	1.85 (0.0728)	
Thickness of retaining plate	Thickness mm (in)	Part number
	3.6 (0.142)	31537-31X60
	3.8 (0.150)	31537-31X61
	4.0 (0.157)	31537-31X62
	4.2 (0.165)	31537-31X63
	4.4 (0.173)	31537-31X64
	4.6 (0.181)	31537-31X65
Overrun clutch		
Number of drive plates	3	
Number of driven plates	4	
Drive plate thickness mm (in)		
Standard	1.6 (0.063)	
Wear limit	1.4 (0.055)	
Clearance mm (in)		
Standard	1.0 - 1.4 (0.039 - 0.055)	
Allowable limit	2.0 (0.079)	
Thickness of retaining plate	Thickness mm (in)	Part number
	3.6 (0.142)	31567-31X72
	3.8 (0.150)	31567-31X73
	4.0 (0.157)	31567-31X74
	4.2 (0.165)	31567-31X75
	4.4 (0.173)	31567-31X76

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

Model	34X68, 34X69, 34X70, 34X80	34X81
Low & reverse brake		
Number of drive plates	5	
Number of driven plates	5	
Drive plate thickness mm (in)		
Standard	2.0 (0.079)	
Wear limit	1.8 (0.071)	
Clearance mm (in)		
Standard	1.4 - 1.8 (0.055 - 0.071)	
Allowable limit	2.8 (0.110)	
Thickness of retaining plate	Thickness mm (in)	Part number
	3.6 (0.142)	31667-31X10
	3.8 (0.150)	31667-31X11
	4.0 (0.157)	31667-31X12
	4.2 (0.165)	31667-31X13
	4.4 (0.173)	31667-31X14
	4.6 (0.181)	31667-31X15
Brake band		
Anchor end bolt tightening torque N·m (kg-m, in-lb)	3.9 - 5.9 (0.4 - 0.6, 35 - 52)	
Number of returning revolutions for anchor end bolt	2.5 ± 0.125	
Lock nut tightening torque N·m (kg-m, ft-lb)	31 - 36 (3.2 - 3.7, 23 - 27)	

Clutch and brake return springs

Unit: mm (in)

Return spring		Free length	Outer diameter
Forward clutch (Overrun clutch) (16 pcs)	Inner	26.3 (1.035)	7.7 (0.303)
	Outer	26.6 (1.047)	10.6 (0.417)
Reverse clutch (16 pcs)		18.6 (0.732)	8.0 (0.315)
High clutch (12 pcs)		19.7 (0.776)	11.1 (0.437)

OIL PUMP

Oil pump side clearance mm (in)	0.02 - 0.04 (0.0008 - 0.0016)	
Thickness of inner gears and outer gears	Inner gear	
	Thickness mm (in)	Part number
	9.99 - 10.00 (0.3933 - 0.3937)	31346-31X00
	9.98 - 9.99 (0.3929 - 0.3933)	31346-31X01
	9.97 - 9.98 (0.3925 - 0.3929)	31346-31X02
	Outer gear	
	Thickness mm (in)	Part number
	9.99 - 10.00 (0.3933 - 0.3937)	31347-31X00
	9.98 - 9.99 (0.3929 - 0.3933)	31347-31X01
	9.97 - 9.98 (0.3925 - 0.3929)	31347-31X02
Clearance between oil pump housing and outer gear mm (in)		
Standard	0.08 - 0.15 (0.0031 - 0.0059)	
Allowable limit	0.15 (0.0059)	
Oil pump cover seal ring clearance mm (in)		
Standard	0.10 - 0.25 (0.0039 - 0.0098)	
Allowable limit	0.25 (0.0098)	

INPUT SHAFT

Input shaft seal ring clearance mm (in)	
Standard	0.08 - 0.23 (0.0031 - 0.0091)
Allowable limit	0.23 (0.0091)

PLANETARY CARRIER

Clearance between planetary carrier and pinion washer mm (in)	
Standard	0.15 - 0.70 (0.0059 - 0.0276)
Allowable limit	0.80 (0.0315)

AT

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

FINAL DRIVE

Differential side gear clearance

Clearance between side gear and differential case with washer	mm (in)	0.1 - 0.2 (0.004 - 0.008)
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Differential side gear thrust washers (Model 34X69)

Thickness mm (in)	Part number
0.75 - 0.80 (0.0295 - 0.0315)	38424-31X00
0.80 - 0.85 (0.0315 - 0.0335)	38424-31X01
0.85 - 0.90 (0.0335 - 0.0354)	38424-31X02
0.90 - 0.95 (0.0354 - 0.0374)	38424-31X03
0.95 - 1.00 (0.0374 - 0.0394)	38424-31X04

Differential side gear thrust washers (Except model 34X69)

Thickness mm (in)	Part number
0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115

Differential case end play (Except model 34X81)

Differential case end play	mm (in)	0 - 0.15 (0 - 0.0059)
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Bearing preload (Model 34X81)

Differential side bearing pre-load "T"	mm (in)	0.04 - 0.09 (0.0016 - 0.0035)
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Turning torque (Model 34X81)

Turning torque of final drive assembly	N·m (kg-cm, in-lb)	0.49 - 1.08 (5.0 - 11.0, 4.3 - 9.5)
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Differential side bearing adjusting shims (Except model 34X81)

Thickness mm (in)	Part number
0.48 (0.0189)	38454-M8001
0.56 (0.0220)	38454-M8003
0.64 (0.0252)	38454-M8005
0.72 (0.0283)	38454-M8007
0.80 (0.0315)	38454-M8009
0.88 (0.0346)	38454-M8011
0.96 (0.0378)	38454-M8013
1.04 (0.0409)	38454-M8015

Differential side bearing adjusting shims (Model 34X81)

Thickness mm (in)	Part number
0.40 (0.0157)	31499-21X07
0.44 (0.0173)	31499-21X08
0.48 (0.0189)	31499-21X09
0.52 (0.0205)	31499-21X10
0.56 (0.0220)	31499-21X11
0.60 (0.0236)	31499-21X12
0.64 (0.0252)	31499-21X13
0.68 (0.0268)	31499-21X14
0.72 (0.0283)	31499-21X15
0.76 (0.0299)	31499-21X16
0.80 (0.0315)	31499-21X17
0.84 (0.0331)	31499-21X18
0.88 (0.0346)	31499-21X19
0.92 (0.0362)	31499-21X20
1.44 (0.0567)	31499-21X21

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

Table for selecting differential side bearing adjusting shim(s)

Unit: mm (in)	
Dial indicator deflection	Suitable shim(s)
0.31 - 0.35 (0.0122 - 0.0138)	0.40 (0.0157)
0.35 - 0.39 (0.0138 - 0.0154)	0.44 (0.0173)
0.39 - 0.43 (0.0154 - 0.0169)	0.48 (0.0189)
0.43 - 0.47 (0.0169 - 0.0185)	0.52 (0.0205)
0.47 - 0.51 (0.0185 - 0.0201)	0.56 (0.0220)
0.51 - 0.55 (0.0201 - 0.0217)	0.60 (0.0236)
0.55 - 0.59 (0.0217 - 0.0232)	0.64 (0.0252)
0.59 - 0.63 (0.0232 - 0.0248)	0.68 (0.0268)
0.63 - 0.67 (0.0248 - 0.0264)	0.72 (0.0283)
0.67 - 0.71 (0.0264 - 0.0280)	0.76 (0.0299)
0.71 - 0.75 (0.0280 - 0.0295)	0.80 (0.0315)
0.75 - 0.79 (0.0295 - 0.0311)	0.84 (0.0331)
0.79 - 0.83 (0.0311 - 0.0327)	0.88 (0.0346)
0.83 - 0.87 (0.0327 - 0.0343)	0.92 (0.0362)
0.87 - 0.91 (0.0343 - 0.0358)	0.48 (0.0189) + 0.48 (0.0189)
0.91 - 0.95 (0.0358 - 0.0374)	0.48 (0.0189) + 0.52 (0.0205)
0.95 - 0.99 (0.0374 - 0.0390)	0.52 (0.0205) + 0.52 (0.0205)
0.99 - 1.03 (0.0390 - 0.0406)	0.52 (0.0205) + 0.56 (0.0220)
1.03 - 1.07 (0.0406 - 0.0421)	0.56 (0.0220) + 0.56 (0.0220)
1.07 - 1.11 (0.0421 - 0.0437)	0.56 (0.0220) + 0.60 (0.0236)
1.11 - 1.15 (0.0437 - 0.0453)	0.60 (0.0236) + 0.60 (0.0236)
1.15 - 1.19 (0.0453 - 0.0469)	0.60 (0.0236) + 0.64 (0.0252)
1.19 - 1.23 (0.0469 - 0.0484)	0.64 (0.0252) + 0.64 (0.0252)
1.23 - 1.27 (0.0484 - 0.0500)	0.64 (0.0252) + 0.68 (0.0268)
1.27 - 1.31 (0.0500 - 0.0516)	0.68 (0.0268) + 0.68 (0.0268)
1.31 - 1.35 (0.0516 - 0.0531)	0.68 (0.0268) + 0.72 (0.0283)
1.35 - 1.39 (0.0531 - 0.0547)	1.44 (0.0567)
1.39 - 1.43 (0.0547 - 0.0563)	0.72 (0.0283) + 0.76 (0.0299)
1.43 - 1.47 (0.0563 - 0.0579)	0.76 (0.0299) + 0.76 (0.0299)
1.47 - 1.51 (0.0579 - 0.0594)	0.76 (0.0299) + 0.80 (0.0315)
1.51 - 1.55 (0.0594 - 0.0610)	0.80 (0.0315) + 0.80 (0.0315)
1.55 - 1.59 (0.0610 - 0.0626)	0.80 (0.0315) + 0.84 (0.0331)
1.59 - 1.63 (0.0626 - 0.0642)	0.84 (0.0331) + 0.84 (0.0331)
1.63 - 1.67 (0.0642 - 0.0657)	0.84 (0.0331) + 0.88 (0.0346)
1.67 - 1.71 (0.0657 - 0.0673)	0.88 (0.0346) + 0.88 (0.0346)
1.71 - 1.75 (0.0673 - 0.0689)	0.88 (0.0346) + 0.92 (0.0362)
1.75 - 1.79 (0.0689 - 0.0705)	0.92 (0.0362) + 0.92 (0.0362)
1.79 - 1.83 (0.0705 - 0.0720)	0.44 (0.0173) + 1.44 (0.0567)
1.83 - 1.87 (0.0720 - 0.0736)	0.48 (0.0189) + 1.44 (0.0567)
1.87 - 1.91 (0.0736 - 0.0752)	0.52 (0.0205) + 1.44 (0.0567)
1.91 - 1.95 (0.0752 - 0.0768)	0.56 (0.0220) + 1.44 (0.0567)

Bearing preload (Model 34X81)

Reduction pinion gear bearing preload	mm (in)	0.05 (0.0020)
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Reduction pinion gear bearing adjusting shims

Thickness mm (in)	Part number
1.74 (0.0685)	31438-31X16
1.78 (0.0701)	31438-31X17
1.82 (0.0717)	31438-31X18
1.86 (0.0732)	31438-31X19
1.90 (0.0748)	31438-31X20
1.92 (0.0756)	31439-31X60
1.94 (0.0764)	31438-31X21
1.96 (0.0772)	31439-31X61
1.98 (0.0780)	31438-31X22
2.00 (0.0787)	31439-31X62
2.02 (0.0795)	31438-31X23
2.04 (0.0803)	31439-31X63
2.06 (0.0811)	31438-31X24
2.08 (0.0819)	31439-31X64
2.10 (0.0827)	31438-31X60
2.12 (0.0835)	31439-31X65
2.14 (0.0843)	31438-31X61
2.16 (0.0850)	31439-31X66
2.18 (0.0858)	31438-31X62
2.20 (0.0866)	31439-31X67
2.22 (0.0874)	31438-31X63
2.24 (0.0882)	31439-31X68
2.26 (0.0890)	31438-31X64
2.28 (0.0898)	31439-31X69
2.30 (0.0906)	31438-31X65
2.34 (0.0921)	31438-31X66
2.38 (0.0937)	31438-31X67
2.42 (0.0953)	31438-31X68
2.46 (0.0969)	31438-31X69
2.50 (0.0984)	31438-31X70
2.54 (0.1000)	31438-31X71
2.58 (0.1016)	31438-31X72
2.62 (0.1031)	31438-31X73
2.66 (0.1047)	31438-31X74

AT

REDUCTION GEAR

Bearing preload (Model 34X68, 34X69, 34X70, 34X80)

Reduction pinion gear bearing preload	N·m (kg·cm, in·lb)	0.11 - 0.69 (1.1 - 7.0, 0.95 - 6.08)
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SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

Table for selecting reduction pinion gear bearing adjusting shim

Unit: mm (in)	
Dimension "T"	Suitable shim(s)
1.77 - 1.81 (0.0697 - 0.0713)	1.74 (0.0685)
1.81 - 1.85 (0.0713 - 0.0728)	1.78 (0.0701)
1.85 - 1.89 (0.0728 - 0.0744)	1.82 (0.0717)
1.89 - 1.93 (0.0744 - 0.0760)	1.86 (0.0732)
1.93 - 1.96 (0.0760 - 0.0772)	1.90 (0.0748)
1.96 - 1.98 (0.0772 - 0.0780)	1.92 (0.0756)
1.98 - 2.00 (0.0780 - 0.0787)	1.94 (0.0764)
2.00 - 2.02 (0.0787 - 0.0795)	1.96 (0.0772)
2.02 - 2.04 (0.0795 - 0.0803)	1.98 (0.0780)
2.04 - 2.06 (0.0803 - 0.0811)	2.00 (0.0787)
2.06 - 2.08 (0.0811 - 0.0819)	2.02 (0.0795)
2.08 - 2.10 (0.0819 - 0.0827)	2.04 (0.0803)
2.10 - 2.12 (0.0827 - 0.0835)	2.06 (0.0811)
2.12 - 2.14 (0.0835 - 0.0843)	2.08 (0.0819)
2.14 - 2.16 (0.0843 - 0.0850)	2.10 (0.0827)
2.16 - 2.18 (0.0850 - 0.0858)	2.12 (0.0835)
2.18 - 2.20 (0.0858 - 0.0866)	2.14 (0.0843)
2.20 - 2.22 (0.0866 - 0.0874)	2.16 (0.0850)
2.22 - 2.24 (0.0874 - 0.0882)	2.18 (0.0858)
2.24 - 2.26 (0.0882 - 0.0890)	2.20 (0.0866)
2.26 - 2.28 (0.0890 - 0.0898)	2.22 (0.0874)
2.28 - 2.30 (0.0898 - 0.0906)	2.24 (0.0882)
2.30 - 2.32 (0.0906 - 0.0913)	2.26 (0.0890)
2.32 - 2.34 (0.0913 - 0.0921)	2.28 (0.0898)
2.34 - 2.37 (0.0921 - 0.0933)	2.30 (0.0906)
2.37 - 2.41 (0.0933 - 0.0949)	2.34 (0.0921)
2.41 - 2.45 (0.0949 - 0.0965)	2.38 (0.0937)
2.45 - 2.49 (0.0965 - 0.0980)	2.42 (0.0953)
2.49 - 2.53 (0.0980 - 0.0996)	2.46 (0.0969)
2.53 - 2.57 (0.0996 - 0.1012)	2.50 (0.0984)
2.57 - 2.61 (0.1012 - 0.1028)	2.54 (0.1000)
2.61 - 2.65 (0.1028 - 0.1043)	2.58 (0.1016)
2.65 - 2.69 (0.1043 - 0.1059)	2.62 (0.1031)
2.69 - 2.73 (0.1059 - 0.1075)	2.66 (0.1047)

Bearing preload (Except model 34X81)

Output shaft bearing preload N·m (kg-cm, in-lb)	0.25 - 0.88 (2.5 - 9.0, 2.2 - 7.8)
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Output shaft bearing adjusting spacers (Except model 34X81)

Thickness mm (in)	Part number
6.26 (0.2465)	31437-31X16
6.30 (0.2480)	31437-31X17
6.34 (0.2496)	31437-31X18
6.38 (0.2512)	31437-31X19
6.42 (0.2528)	31437-31X20
6.46 (0.2543)	31437-31X21
6.50 (0.2559)	31437-31X22
6.54 (0.2575)	31437-31X23
6.58 (0.2591)	31437-31X24
6.62 (0.2606)	31437-31X60
6.64 (0.2614)	31437-31X78
6.66 (0.2622)	31437-31X61
6.68 (0.2630)	31437-31X79
6.70 (0.2638)	31437-31X62
6.72 (0.2646)	31437-31X80
6.74 (0.2654)	31437-31X63
6.76 (0.2661)	31437-31X81
6.78 (0.2669)	31437-31X64
6.80 (0.2677)	31437-31X82
6.82 (0.2685)	31437-31X65
6.84 (0.2693)	31437-31X83
6.86 (0.2701)	31437-31X66
6.88 (0.2709)	31437-31X84
6.90 (0.2717)	31437-31X67
6.92 (0.2724)	31437-31X46
6.94 (0.2732)	31437-31X68
6.96 (0.2740)	31437-31X47
6.98 (0.2748)	31437-31X69
7.00 (0.2756)	31437-31X48
7.02 (0.2764)	31437-31X70
7.06 (0.2780)	31437-31X71
7.10 (0.2795)	31437-31X72
7.14 (0.2811)	31437-31X73
7.18 (0.2827)	31437-31X74
7.22 (0.2843)	31437-31X75

OUTPUT SHAFT

Seal ring clearance

Output shaft seal ring clearance mm (in)	
Standard	0.10 - 0.25 (0.0039 - 0.0098)
Allowable limit	0.25 (0.0098)

End play (Model 34X81)

Output shaft end play mm (in)	0 - 0.5 (0 - 0.020)
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SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

Table for selecting output shaft bearing adjusting spacer

Unit: mm (in)

Dimension "T"	Suitable spacer
6.29 - 6.33 (0.2476 - 0.2492)	6.26 (0.2465)
6.33 - 6.37 (0.2492 - 0.2508)	6.30 (0.2480)
6.37 - 6.41 (0.2508 - 0.2524)	6.34 (0.2496)
6.41 - 6.45 (0.2524 - 0.2539)	6.38 (0.2512)
6.45 - 6.49 (0.2539 - 0.2555)	6.42 (0.2528)
6.49 - 6.53 (0.2555 - 0.2571)	6.46 (0.2543)
6.53 - 6.57 (0.2571 - 0.2587)	6.50 (0.2559)
6.57 - 6.61 (0.2587 - 0.2602)	6.54 (0.2575)
6.61 - 6.65 (0.2602 - 0.2618)	6.58 (0.2591)
6.65 - 6.68 (0.2618 - 0.2630)	6.62 (0.2606)
6.68 - 6.70 (0.2630 - 0.2638)	6.64 (0.2614)
6.70 - 6.72 (0.2638 - 0.2646)	6.66 (0.2622)
6.72 - 6.74 (0.2646 - 0.2654)	6.68 (0.2630)
6.74 - 6.76 (0.2654 - 0.2661)	6.70 (0.2638)
6.76 - 6.78 (0.2661 - 0.2669)	6.72 (0.2646)
6.78 - 6.80 (0.2669 - 0.2677)	6.74 (0.2654)
6.80 - 6.82 (0.2677 - 0.2685)	6.76 (0.2661)
6.82 - 6.84 (0.2685 - 0.2693)	6.78 (0.2669)
6.84 - 6.86 (0.2693 - 0.2701)	6.80 (0.2677)
6.86 - 6.88 (0.2701 - 0.2709)	6.82 (0.2685)
6.88 - 6.90 (0.2709 - 0.2717)	6.84 (0.2693)
6.90 - 6.92 (0.2717 - 0.2724)	6.86 (0.2701)
6.92 - 6.94 (0.2724 - 0.2732)	6.88 (0.2709)
6.94 - 6.96 (0.2732 - 0.2740)	6.90 (0.2717)
6.96 - 6.98 (0.2740 - 0.2748)	6.92 (0.2724)
6.98 - 7.00 (0.2748 - 0.2756)	6.94 (0.2732)
7.00 - 7.02 (0.2756 - 0.2764)	6.96 (0.2740)
7.02 - 7.04 (0.2764 - 0.2772)	6.98 (0.2748)
7.04 - 7.06 (0.2772 - 0.2780)	7.00 (0.2756)
7.06 - 7.09 (0.2780 - 0.2791)	7.02 (0.2764)
7.09 - 7.13 (0.2791 - 0.2807)	7.06 (0.2780)
7.13 - 7.17 (0.2807 - 0.2823)	7.10 (0.2795)
7.17 - 7.21 (0.2823 - 0.2839)	7.14 (0.2811)
7.21 - 7.25 (0.2839 - 0.2854)	7.18 (0.2827)
7.25 - 7.29 (0.2854 - 0.2870)	7.22 (0.2843)

BEARING RETAINER

Seal ring clearance

Bearing retainer seal ring clearance mm (in)	
Standard	0.10 - 0.25 (0.0039 - 0.0098)
Allowable limit	0.25 (0.0098)

TOTAL END PLAY

Total end play mm (in)	
	0.25 - 0.55 (0.0098 - 0.0217)

Bearing races for adjusting total end play

Thickness mm (in)	Part number
0.6 (0.024)	31435-31X01
0.8 (0.031)	31435-31X02
1.0 (0.039)	31435-31X03
1.2 (0.047)	31435-31X04
1.4 (0.055)	31435-31X05
1.6 (0.063)	31435-31X06
1.8 (0.071)	31435-31X07
2.0 (0.079)	31435-31X08

REVERSE CLUTCH END PLAY

Reverse clutch end play mm (in)	
	0.65 - 1.00 (0.0256 - 0.0394)

Thrust washers for adjusting reverse clutch end play

Thickness mm (in)	Part number
0.65 (0.0256)	31508-31X00
0.80 (0.0315)	31508-31X01
0.95 (0.0374)	31508-31X02
1.10 (0.0433)	31508-31X03
1.25 (0.0492)	31508-31X04
1.40 (0.0551)	31508-31X05

ACCUMULATOR

O-ring

Unit: mm (in)

Accumulator	Inner diameter (Small)	Inner diameter (Large)
S/R accumulator	26.9 (1.059)	44.2 (1.740)
N-D accumulator	34.6 (1.362)	39.4 (1.551)

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

Return spring

Unit: mm (in)

Accumulator	Free length	Outer diameter
S/R accumulator spring	56.4 (2.220)	21.0 (0.827)
N-D accumulator spring	43.5 (1.713)	28.0 (1.102)

BAND SERVO

Return spring

Unit: mm (in)

Return spring	Free length	Outer diameter
2nd servo return spring	32.5 (1.280)	25.9 (1.020)
OD servo return spring	31.0 (1.220)	21.7 (0.854)

REMOVAL AND INSTALLATION

Distance between end of converter housing and torque converter	Except model 34X81 21.1 mm (0.831 in) or more
	Model 34X81 15.9 mm (0.626 in) or more