AUTOMATIC TRANSAXLE

SECTION AT

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NDAT0001

ALPHABETICAL INDEX FOR DTC

NDAT0001S01

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*1: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.

*2: These numbers are prescribed by SAE J2012.

*3: When the fail-safe operation occurs, the MIL illuminates.

*4: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.

P NO. INDEX FOR DTC

=NDAT0001S02

DTC		Items (CONSULT-II screen terms)	Reference page
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P0710	1208	ATF TEMP SEN/CIRC	AT-109
P0720	1102	VEH SPD SEN/CIR AT*4	AT-116
P0725	1207	ENGINE SPEED SIG	AT-122
P0731	1103	A/T 1ST GR FNCTN	AT-126
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P0733	1105	A/T 3RD GR FNCTN	AT-138
P0734	1106	A/T 4TH GR FNCTN	AT-144
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P0744	1107	A/T TCC S/V FNCTN	AT-158
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P0755	1201	SFT SOL B/CIRC*3	AT-177
P1705	1206	TP SEN/CIRC A/T*3	AT-182
P1760	1203	O/R CLTCH SOL/CIRC	AT-189

*1: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.

*2: These numbers are prescribed by SAE J2012.

*3: When the fail-safe operation occurs, the MIL illuminates.

*4: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

Precautions for Supplemental Restraint System (SRS) “AIR BAG”

NDAT0002

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

WARNING:

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

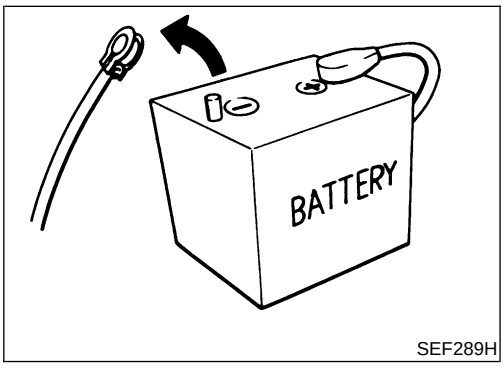
Precautions for On Board Diagnostic (OBD) System of A/T and Engine

NDAT0003

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to an open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Be sure to route and secure the harnesses properly after work. Interference of the harness with a bracket, etc. may cause the MIL to light up due to a short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to a malfunction of the EGR system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the TCM or ECM before returning the vehicle to the customer.**

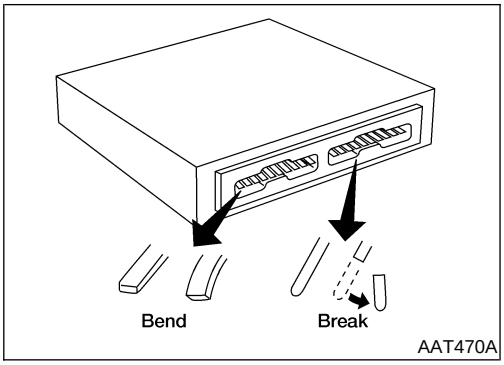


SEF289H

Precautions

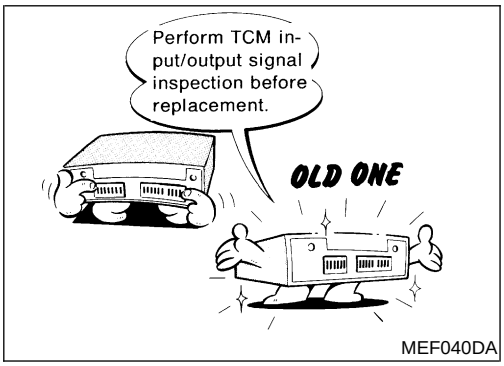
NDAT0004

- **Before connecting or disconnecting the TCM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the TCM. Because battery voltage is applied to TCM even if ignition switch is turned off.**



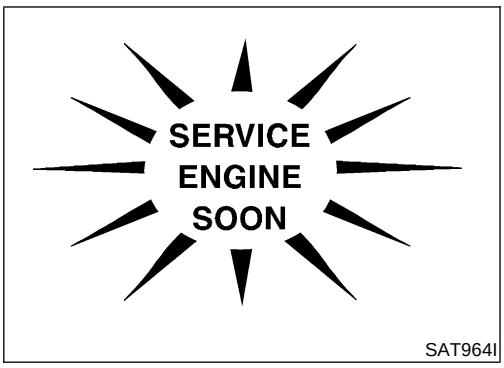
AAT470A

- **When connecting or disconnecting pin connectors into or from TCM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on TCM pin terminal, when connecting pin connectors.



MEF040DA

- **Before replacing TCM, perform TCM input/output signal inspection and make sure whether TCM functions properly or not. (See page AT-95.)**



SAT964I

- **After performing each TROUBLE DIAGNOSIS, perform "DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE".**
  The DTC should not be displayed in the "DTC CONFIRMATION PROCEDURE" if the repair is completed.

- 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 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 for easier and proper assembly. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed valves, sleeves, plugs, etc. will slide along bores in valve body under their own weight.
- Before assembly, apply a coat of recommended ATF to all

parts. Apply petroleum jelly to protect O-rings and seals, or hold bearings and washers in place during assembly. Do not use grease.

- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to "ATF COOLER SERVICE" (Refer to AT-9).
- After overhaul, refill the transaxle with new ATF.
- When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF cooling system.
  Always follow the procedures under "Changing A/T Fluid" in the MA section when changing A/T fluid.

Service Notice or Precautions

NDAT0005

FAIL-SAFE

NDAT0005S01

The TCM has an electronic Fail-Safe (limp home mode). This allows the vehicle to be driven even if a major electrical input/output device circuit is damaged.
Under Fail-Safe, the vehicle always runs in third gear, even with a shift lever position of 1, 2 or D. The customer may complain of sluggish or poor acceleration.
When the ignition key is turned ON following Fail-Safe operation, O/D OFF indicator lamp blinks for about 8 seconds. (For "TCM Self-diagnostic Procedure (No Tools)", refer to AT-48.)
Fail-Safe may occur without electrical circuit damage if the vehicle is driven under extreme conditions (such as excessive wheel spin followed by sudden braking). To recover normal shift pattern, turn the ignition key OFF for 5 seconds, then ON.
The blinking of the O/D OFF indicator lamp for about 8 seconds will appear only once and be cleared. The customer may resume normal driving conditions.
Always follow the "Work Flow" (Refer to AT-59).
The SELF-DIAGNOSIS results will be as follows:
The first SELF-DIAGNOSIS will indicate damage to the vehicle speed sensor or the revolution sensor.
During the next SELF-DIAGNOSIS, performed after checking the sensor, no damages will be indicated.

TORQUE CONVERTER SERVICE

NDAT0005S02

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

- External leaks in the hub weld area.
- Converter hub is scored or damaged.
- Converter pilot is broken, damaged or fits poorly into crankshaft.
- Steel particles are found after flushing the cooler and cooler lines.
- Pump is damaged or steel particles are found in the converter.
- Vehicle has TCC shudder and/or no TCC apply. Replace only after all hydraulic and electrical diagnoses have been made. (Converter clutch material may be glazed.)
- Converter is contaminated with engine coolant containing antifreeze.
- Internal failure of stator roller clutch.
- Heavy clutch debris due to overheating (blue converter).
- Steel particles or clutch lining material found in fluid filter or on magnet when no internal parts in unit are worn or damaged — indicates that lining material came from converter.
  The torque converter should not be replaced if:
- The fluid has an odor, is discolored, and there is no evidence of metal or clutch facing particles.

- The threads in one or more of the converter bolt holes are damaged.
- Transaxle failure did not display evidence of damaged or worn internal parts, steel particles or clutch plate lining material in unit and inside the fluid filter.
- Vehicle has been exposed to high mileage (only). The exception may be where the torque converter clutch dampener plate lining has seen excess wear by vehicles operated in heavy and/or constant traffic, such as taxi, delivery or police use.

ATF COOLER SERVICE

NDAT0005S03

If A/T fluid contains frictional material (clutches, bands, etc.), replace radiator and flush cooler line using cleaning solvent and compressed air after repair of A/T. Refer to ***LC-12*** "Radiator".

OBD-II SELF-DIAGNOSIS

NDAT0005S04

- A/T self-diagnosis is performed by the TCM in combination with the ECM. The results can be read through the blinking pattern of the O/D OFF indicator or the malfunction indicator lamp (MIL). Refer to the table on AT-40 for the indicator used to display each self-diagnostic result.
- The self-diagnostic results indicated by the MIL are automatically stored in both the ECM and TCM memories.
  Always perform the procedure "HOW TO ERASE DTC" on AT-37 to complete the repair and avoid unnecessary blinking of the MIL.
- The following self-diagnostic items can be detected using ECM self-diagnostic results mode* only when the O/D OFF indicator lamp does not indicate any malfunctions.

− park/neutral position (PNP) switch
− A/T 1st, 2nd, 3rd, or 4th gear function
− A/T TCC S/V function (lock-up).

*: For details of OBD-II, refer to "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION", ***EC-65***.

- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector.
  For description and how to disconnect, refer to "Description", ***EL-5***.

Wiring Diagrams and Trouble Diagnosis

NDAT0006

When you read wiring diagrams, refer to the followings:

- "HOW TO READ WIRING DIAGRAMS", ***GI-10***
- "POWER SUPPLY ROUTING" for power distribution circuit, ***EL-10***

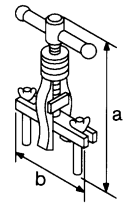
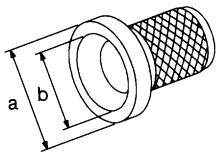
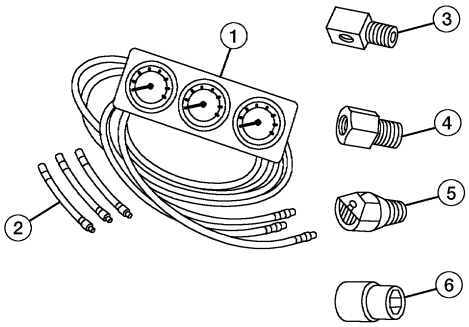
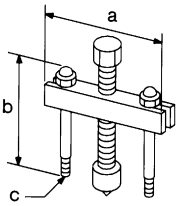
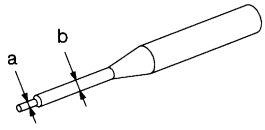
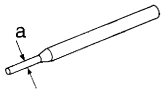
When you perform trouble diagnosis, refer to the followings:

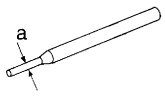
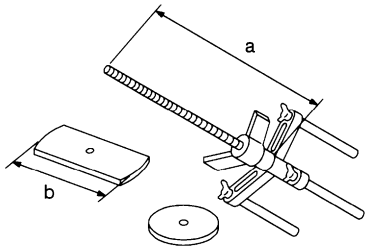
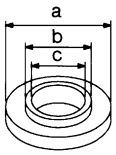
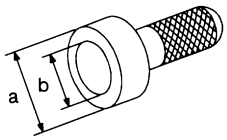
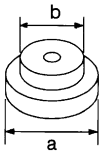
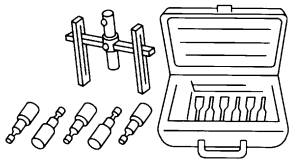
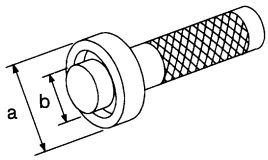
- "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS", ***GI-34***
- "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", ***GI-23***

Special Service Tools

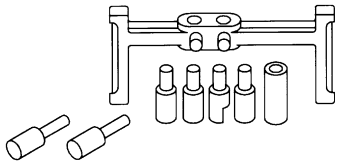
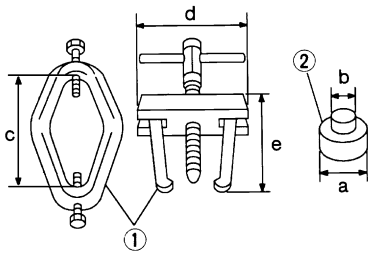
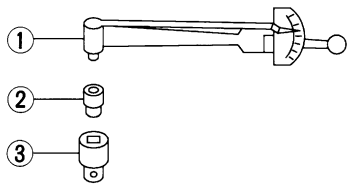
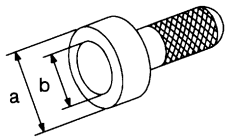
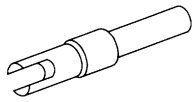
NDAT0007

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

Tool number (Kent-Moore No.) Tool name	Description	
KV381054S0 (J34286) Puller	 NT414	● Removing differential side oil seals ● Removing differential side bearing outer race ● Removing idler gear bearing outer race **a: 250 mm (9.84 in)** **b: 160 mm (6.30 in)**
ST33400001 (J26082) Drift	 NT086	● Installing differential side oil seal (RH side) ● Installing oil seal on oil pump housing **a: 60 mm (2.36 in) dia.** **b: 47 mm (1.85 in) dia.**
(J34301-C) Oil pressure gauge set 1 (J34301-1) Oil pressure gauge 2 (J34301-2) Hoses 3 (J34298) Adapter 4 (J34282-2) Adapter 5 (790-301-1230-A) 60° Adapter 6 (J34301-15) Square socket	 AAT896	● Measuring line pressure
ST27180001 (J25726-A) Puller	 NT424	Removing idler gear **a: 100 mm (3.94 in)** **b: 110 mm (4.33 in)** **c: M8 x 1.25P**
ST23540000 (J25689-A) Pin punch	 NT442	● Removing and installing parking rod plate and manual plate pins **a: 2.3 mm (0.091 in) dia.** **b: 4 mm (0.16 in) dia.**
ST25710000 (J25689-A) Pin punch	 NT410	● Aligning groove of manual shaft and hole of transmission case **a: 2 mm (0.08 in) dia.**

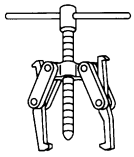
Tool number (Kent-Moore No.) Tool name	Description	
KV32101000 (J25689-A) Pin punch	 NT410	● Installing manual shaft retaining pin **a: 4 mm (0.16 in) dia.**
KV31102400 (J34285 and J34285-87) Clutch spring compressor	 NT423	● Removing and installing clutch return springs ● Installing low and reverse brake piston **a: 320 mm (12.60 in)** **b: 174 mm (6.85 in)**
KV40100630 (J26092) Drift	 NT107	● Installing reduction gear bearing inner race ● Installing idler gear bearing inner race **a: 67.5 mm (2.657 in) dia.** **b: 44 mm (1.73 in) dia.** **c: 38.5 mm (1.516 in) dia.**
ST30720000 (J25405 and J34331) Bearing installer	 NT115	● Installing idler gear bearing outer race **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**
ST35321000 (—) Drift	 NT073	● Installing output shaft bearing **a: 49 mm (1.93 in) dia.** **b: 41 mm (1.61 in) dia.**
(J34291-A) Shim setting gauge set	 NT101	● Selecting oil pump cover bearing race and oil pump thrust washer ● Selecting side gear thrust washer
ST33230000 (J25805-01) Drift	 NT084	● Installing differential side bearing **a: 51 mm (2.01 in) dia.** **b: 28.5 mm (1.122 in) dia.**

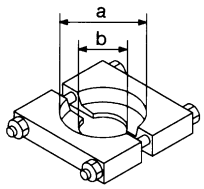
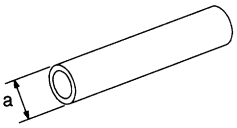
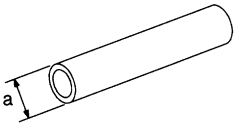
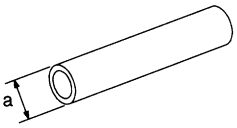
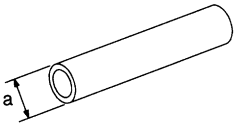
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description
(J34290) Shim selecting tool set	 NT080 ● Selecting differential side bearing adjusting shim
ST3306S001 (J22888-D) Differential side bearing puller set 1 ST33051001 (J22888-D) Puller 2 ST33061000 (J8107-2) Adapter	 AMT153 ● 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)**
ST3127S000 (J25765-A) Preload gauge 1 GG91030000 (J25765-A) Torque wrench 2 HT62940000 (—) Socket adapter 3 HT62900000 (—) Socket adapter	 NT124 ● Checking differential side bearing preload
ST35271000 (J26091) Drift	 NT115 ● Installing idler gear **a: 72 mm (2.83 in) dia.** **b: 63 mm (2.48 in) dia.**
(J39713) Preload adapter	 NT087 ● Selecting differential side bearing adjusting shim ● Checking differential side bearing preload

Commercial Service Tools

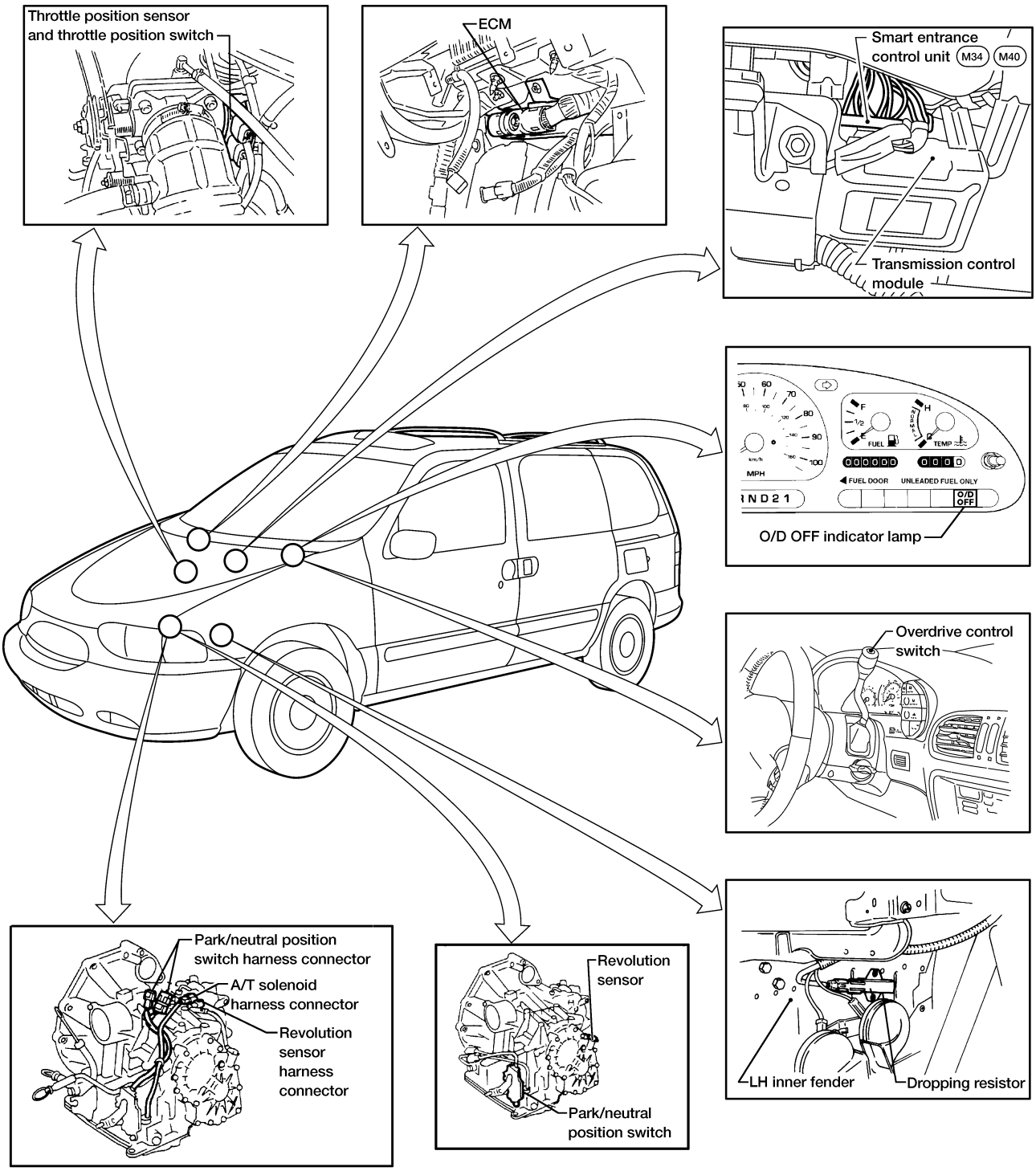
NDAT0008

Tool name	Description
Puller	 NT077 ● Removing idler gear bearing inner race ● Removing and installing band servo piston snap ring

Tool name	Description	
Puller	 NT411	● Removing reduction gear bearing inner race **a: 60 mm (2.36 in) dia.** **b: 35 mm (1.38 in) dia.**
Drift	 NT083	● Installing differential side oil seal (Left side) **a: 90 mm (3.54 in) dia.**
Drift	 NT083	● Installing needle bearing on bearing retainer **a: 36 mm (1.42 in) dia.**
Drift	 NT083	● Removing needle bearing from bearing retainer **a: 33.5 mm (1.319 in) dia.**
Drift	 NT083	● Installing differential side bearing outer race **a: 75 mm (2.95 in) dia.**

A/T Electrical Parts Location

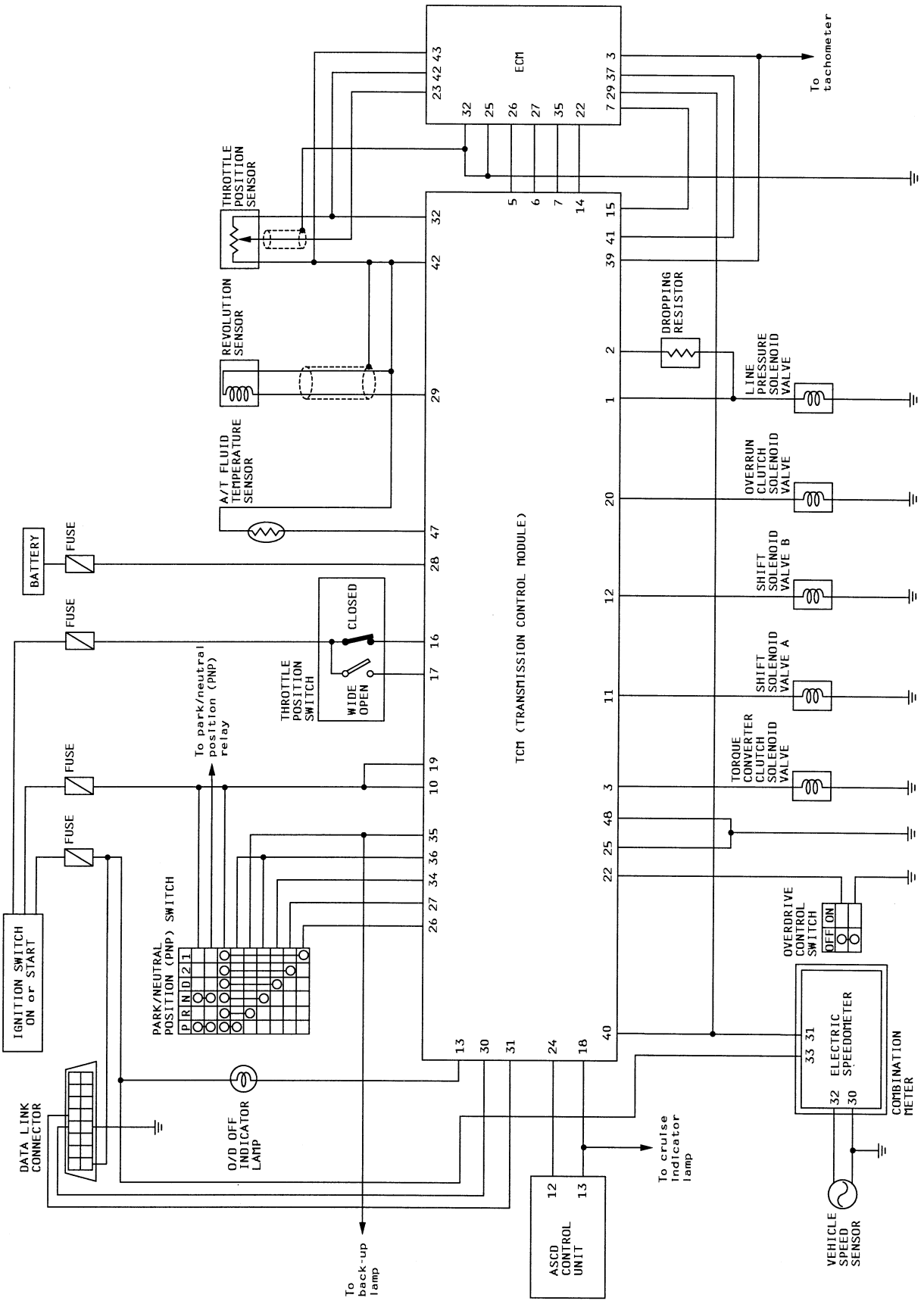
NDAT0009



AAT538A

Circuit Diagram

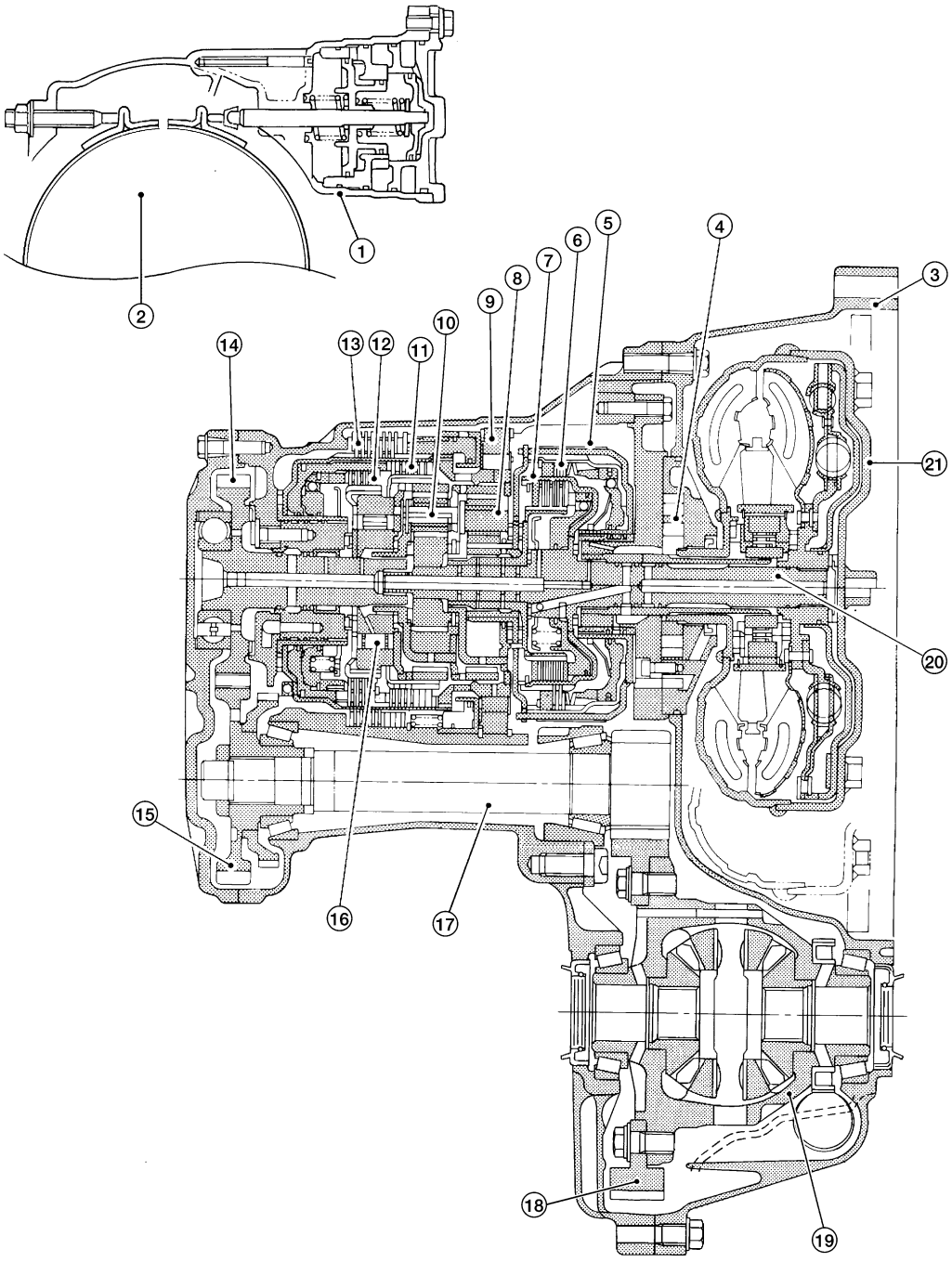
NDAT0010



WAT053

Cross-sectional View

NDAT0012

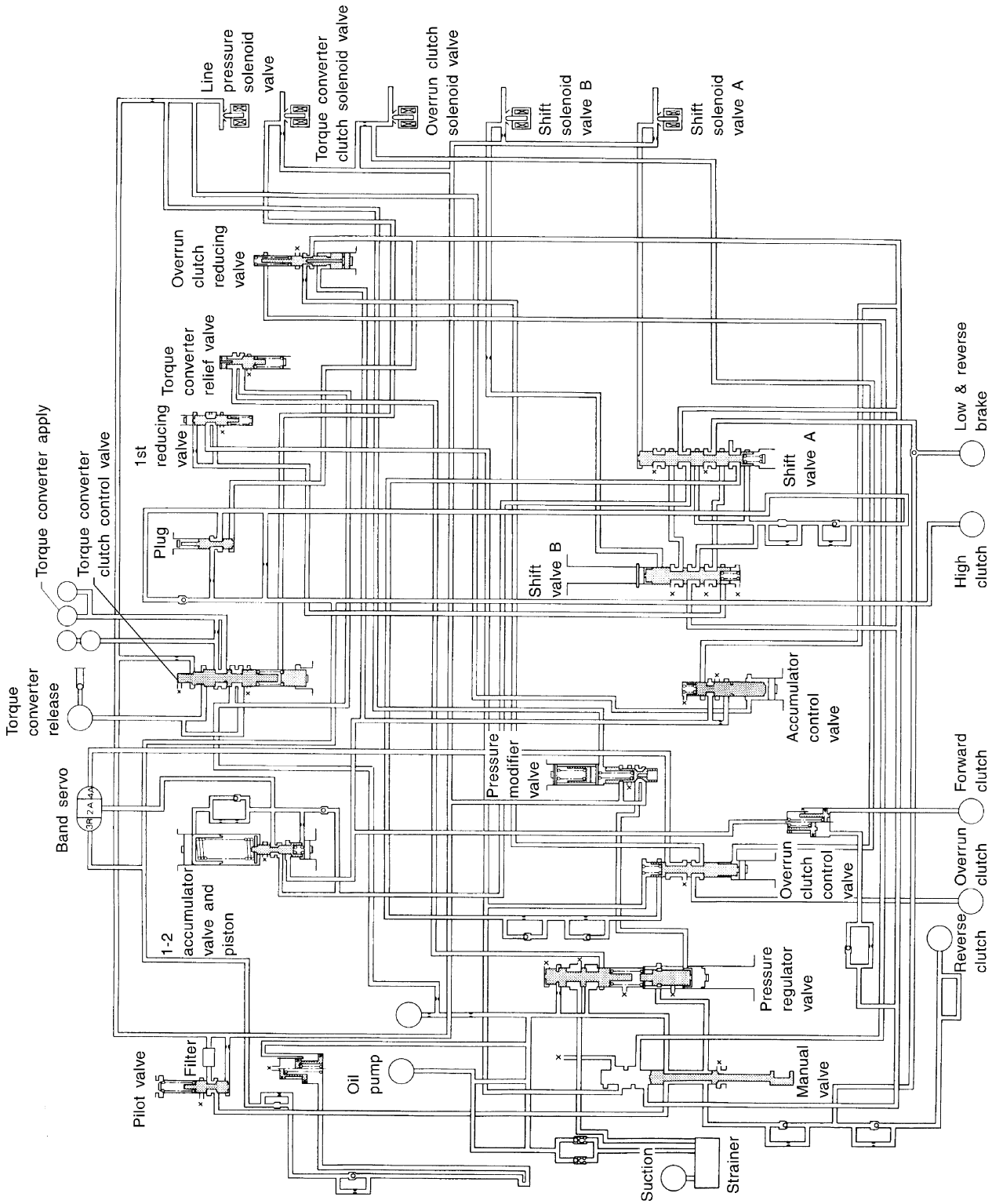


AAT567A

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

Hydraulic Control Circuit

NDAT0013



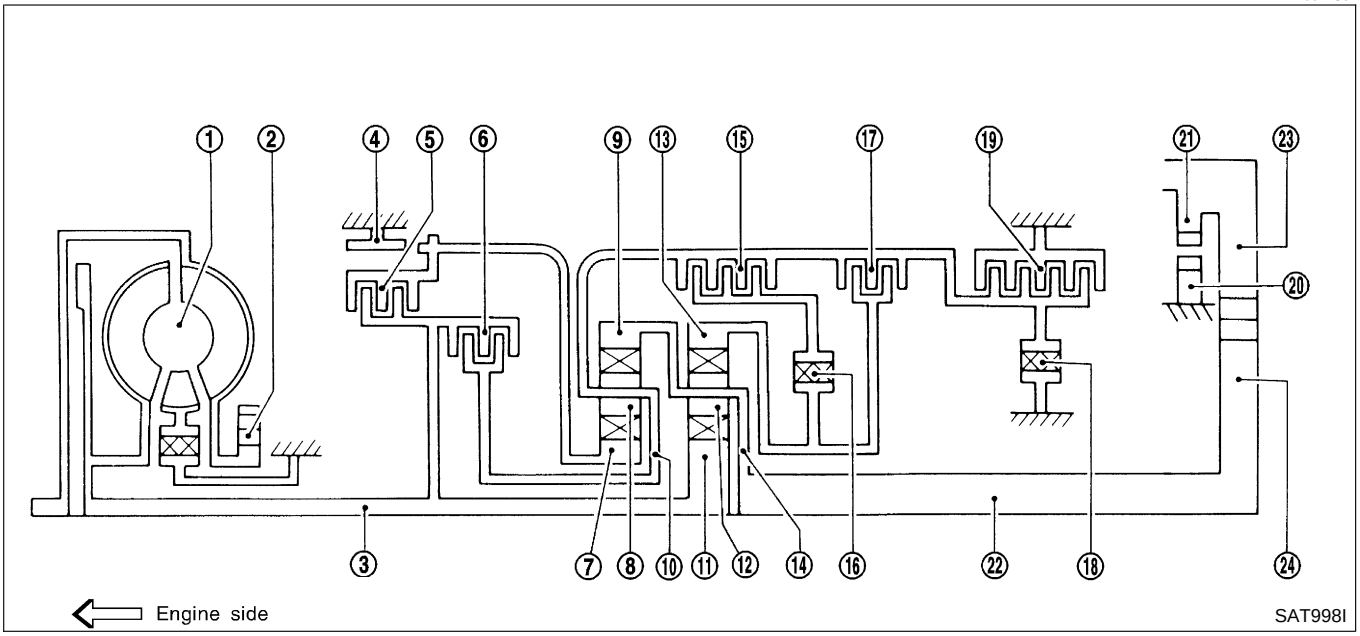
AAT549A

Shift Mechanism

NDAT0014

CONSTRUCTION

NDAT0014S01



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

FUNCTION OF CLUTCH AND BRAKE

=NDAT0014S03

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

CLUTCH AND BAND CHART

NDAT0014S04

Shift position		Reverse clutch **5**	High clutch **6**	Forward clutch **15**	Overrun clutch **17**	Band servo			Forward one-way clutch **16**	Low one-way clutch **18**	Low & reverse brake **19**	Lock-up	Remarks
						2nd apply	3rd release	4th apply					
P													PARK POSITION
R		○									○		REVERSE POSITION
N													NEUTRAL POSITION
D*4	1st			○	*1D				B	B			Automatic shift 1 ⇔ 2 ⇔ 3 ⇔ 4
	2nd			○	*1 A	○			B				
	3rd		○	○	*1 A	*2C	C		B			*5○	
	4th		○	C		*3C	C	○				○	
2	1st			○	D				B	B			Automatic shift 1 ⇔ 2
	2nd			○	A	○			B				
1	1st			○	○				B		○		Locks (held stationary) in 1st speed 1 ⇐ 2
	2nd			○	○	○			B				

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

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

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

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

*5: Operates when overdrive control switch is OFF.

○: Operates

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

B: Operates during "progressive" acceleration.

C: Operates but does not affect power transmission.

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

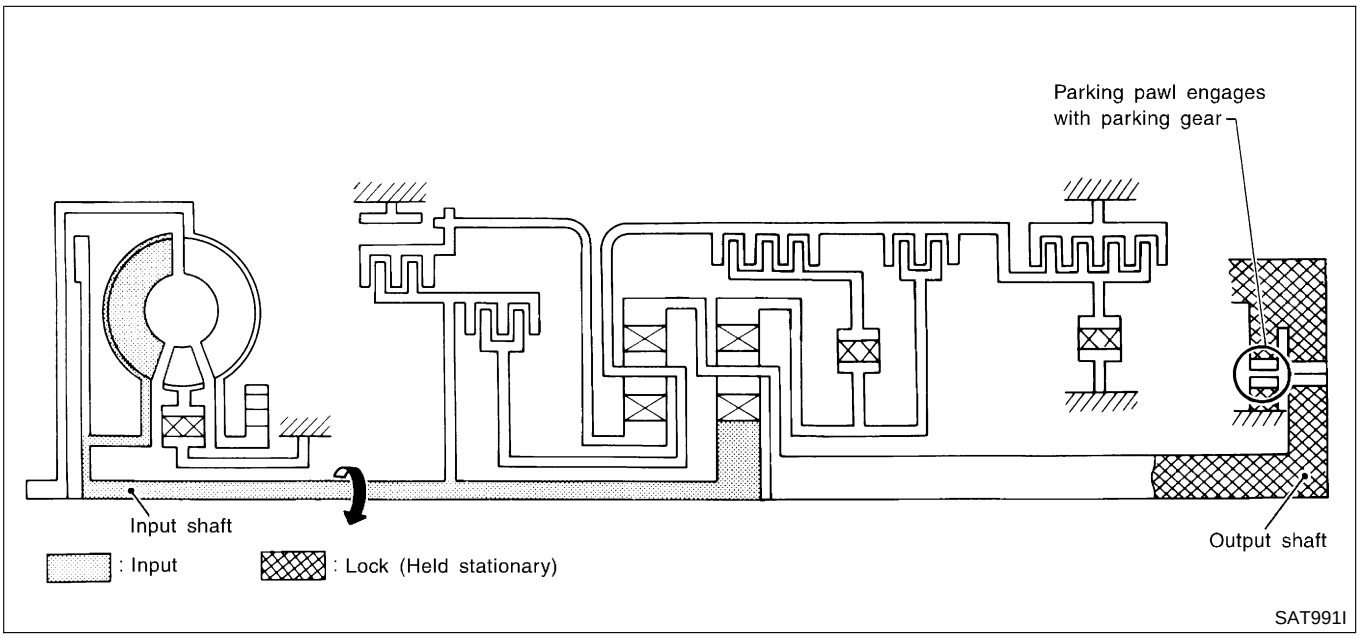
POWER TRANSMISSION

=NDAT0014S02

P and N Positions

NDAT0014S0201

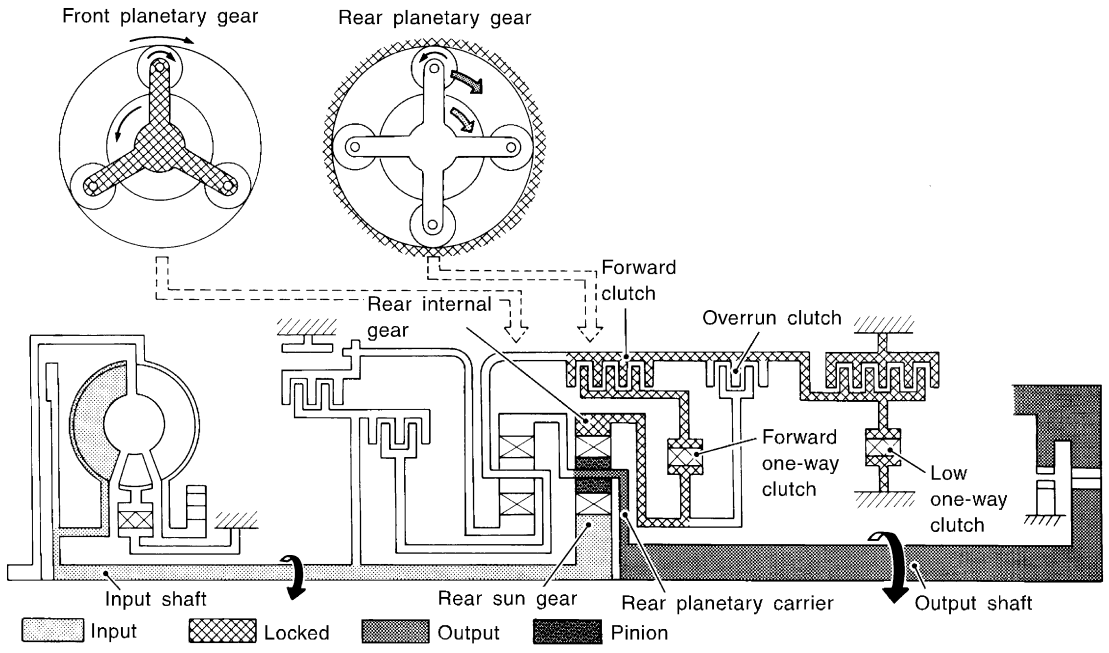
- P position
  Similar to the N position, the clutches do not operate. The parking pawl engages with the parking gear to mechanically hold the output shaft so that the power train is locked.
- N position
  Power from the input shaft is not transmitted to the output shaft because the clutches do not operate.



1_1 Position

=NDAT0014S0202

• **Forward clutch** • **Forward one-way clutch** • **Overrun clutch** • **Low and reverse brake**	As overrun clutch engages, rear internal gear is locked by the operation of low and reverse brake. This is different from that of D_1 and 2_1.
Engine brake	Overrun clutch always engages, therefore engine brake can be obtained when decelerating.



Power flow

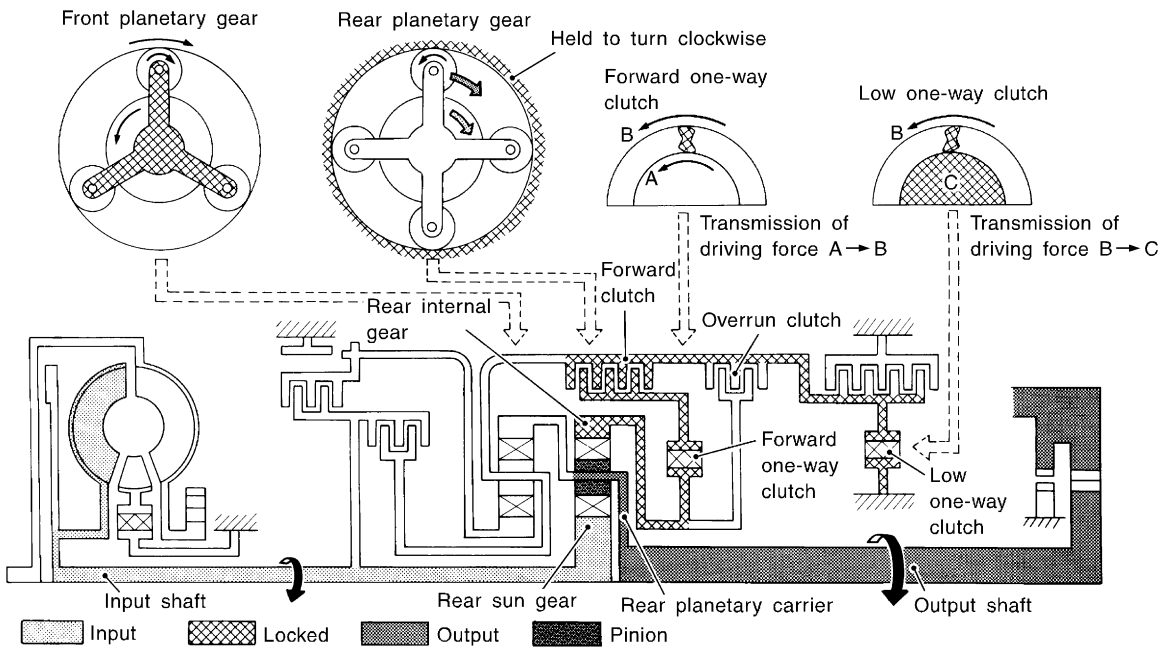
Input shaft
⇩
Rear sun gear
⇩
Rear planetary gear ⇨ Output shaft

AAT537A

D_1 and 2_1 Positions

=NDAT0014S0203

• **Forward one-way clutch** • **Forward clutch** • **Low one-way clutch**	Rear internal gear is locked to rotate counterclockwise because of the functioning of these three clutches.
Overrun clutch engagement conditions (Engine brake)	D_1: Overdrive control switch OFF and throttle opening is less than 3/16 2_1: Always engaged At D_1 and 2_1 positions, engine brake is not activated due to free turning of low one- way clutch.



Power flow

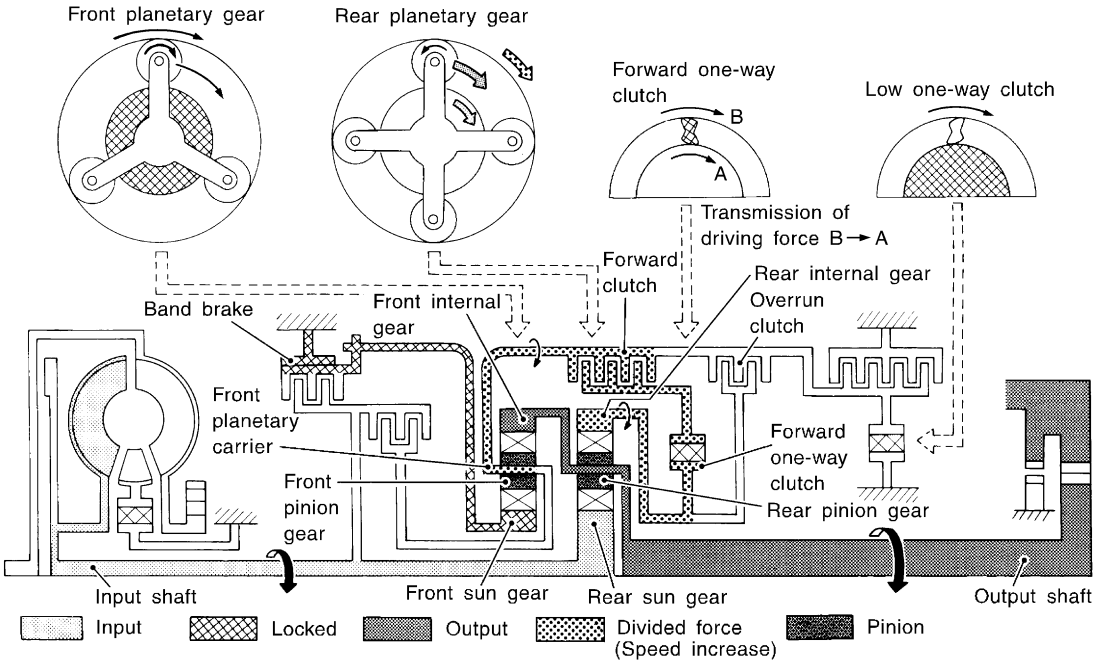
Input shaft
⇩
Rear sun gear
⇩
Rear pinion gear
⇩
Rear planetary carrier → Output shaft

AAT532A

D_2, 2_2 and 1_2 Positions

=NDAT0014S0204

• **Forward clutch** • **Forward one-way clutch** • **Brake band**	Rear sun gear drives rear planetary carrier and combined front internal gear. Front internal gear now rotates around front sun gear accompanying front planetary carrier. As front planetary carrier transfers the power to rear internal gear through forward clutch and forward one-way clutch, this rotation of rear internal gear increases the speed of rear planetary carrier compared with that of the 1st speed.
Overrun clutch engagement conditions	D_2: Overdrive control switch OFF and throttle opening is less than 3/16 2_2 and 1_2: Always engaged



Power flow

Input shaft → Rear sun gear

Front internal gear → Rear planetary carrier + Front internal gear → Output shaft

Front planetary carrier

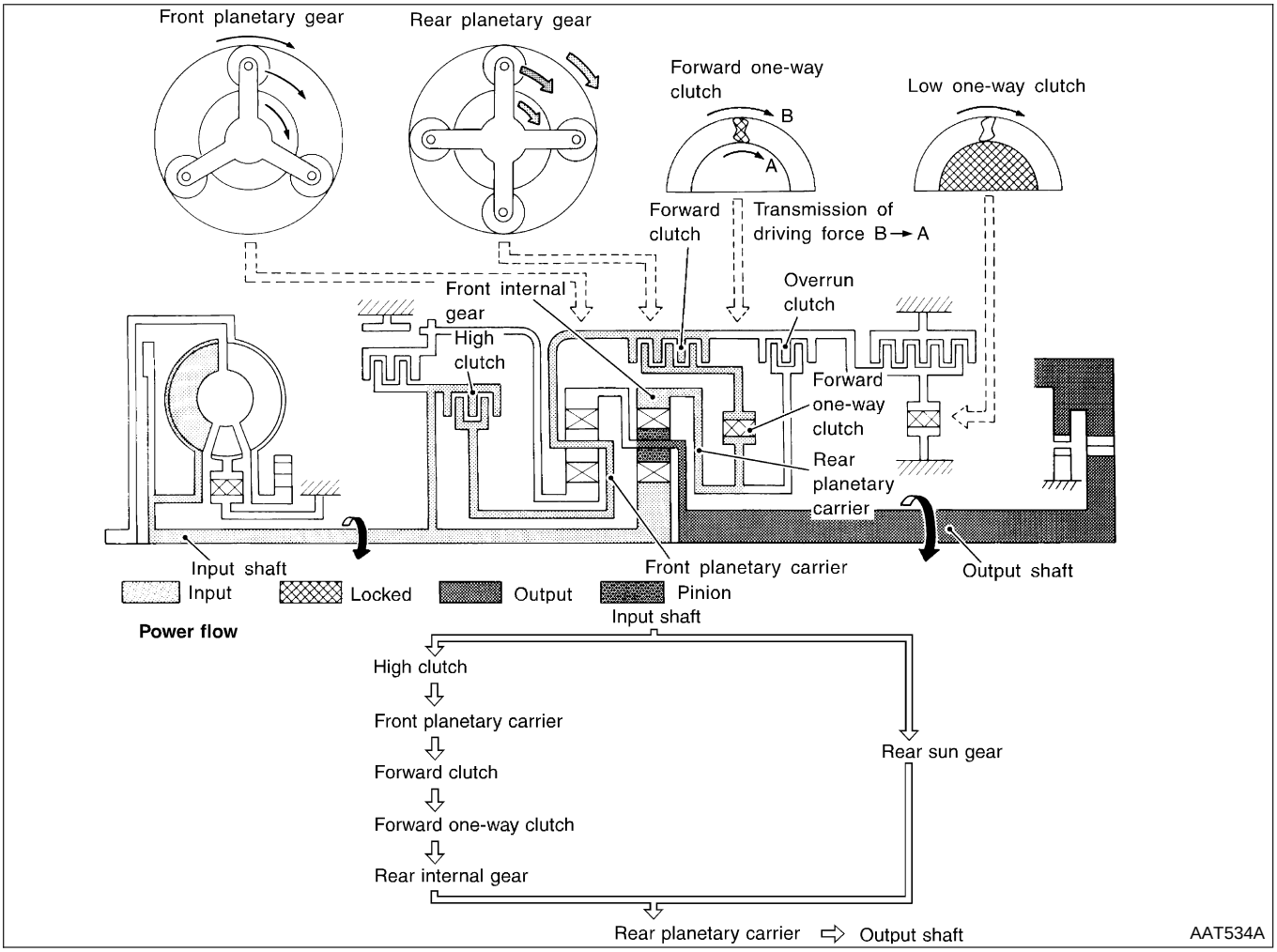
Rear internal gear

AAT533A

D_3 Position

=NDAT0014S0205

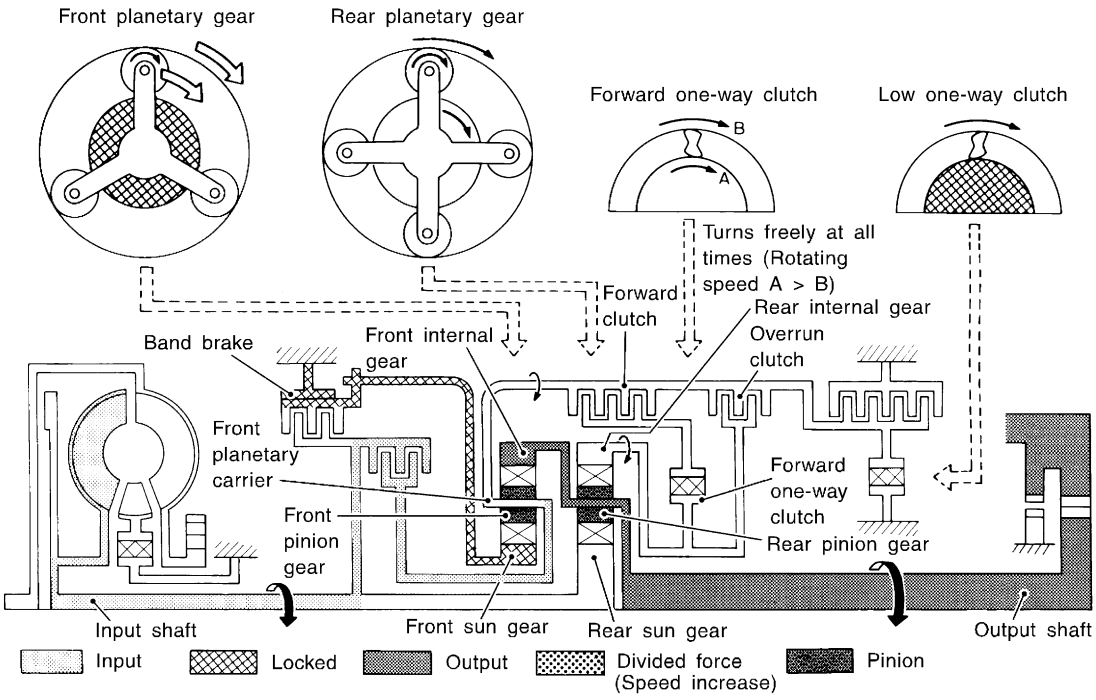
• **High clutch** • **Forward clutch** • **Forward one-way clutch**	Input power is transmitted to front planetary carrier through high clutch. And front planetary carrier is connected to rear internal gear by operation of forward clutch and forward one-way clutch. This rear internal gear rotation and another input (the rear sun gear) accompany rear planetary carrier to turn at the same speed.
Overrun clutch engagement conditions	D_3: Overdrive control switch "OFF" and throttle opening is less than 3/16



D_4 (O/D) Position

=NDAT0014S0206

• **High clutch** • **Brake band** • **Forward clutch** (Does not affect power transmission)	Input power is transmitted to front carrier through high clutch. This front carrier turns around the sun gear which is fixed by brake band and makes front internal gear (output) turn faster.
Engine brake	At D_4 position, there is no one-way clutch in the power transmission line and engine brake can be obtained when decelerating.



Power flow

Input shaft
⇩
High clutch
⇩
Front planetary carrier
⇩
Front pinion gear

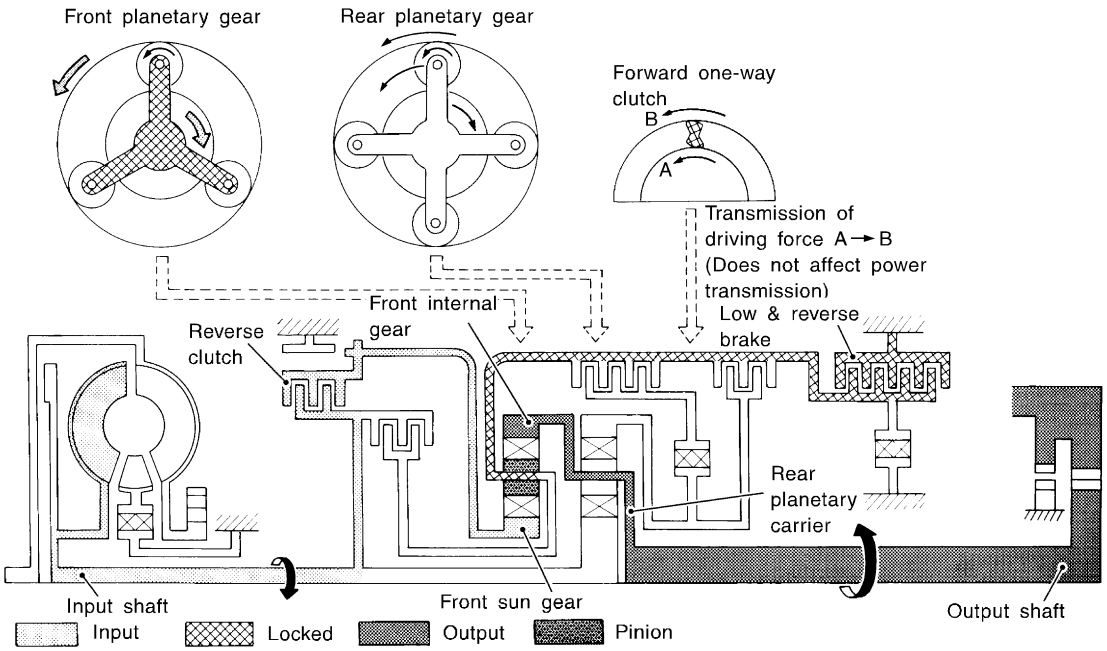
Front internal gear
⇩
Rear planetary carrier
⇩
Output shaft

AAT536A

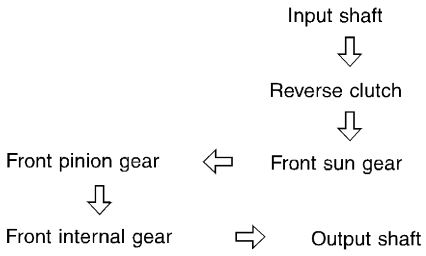
R Position

=NDAT0014S0207

• **Reverse clutch** • **Low and reverse brake**	Front planetary carrier is stationary because of the operation of low and reverse brake. Input power is transmitted to front sun gear through reverse clutch, which drives front internal gear in the opposite direction.
Engine brake	As there is no one-way clutch in the power transmission line, engine brake can be obtained when decelerating.



Power flow



AAT535A

Control System

=NDAT0015

OUTLINE

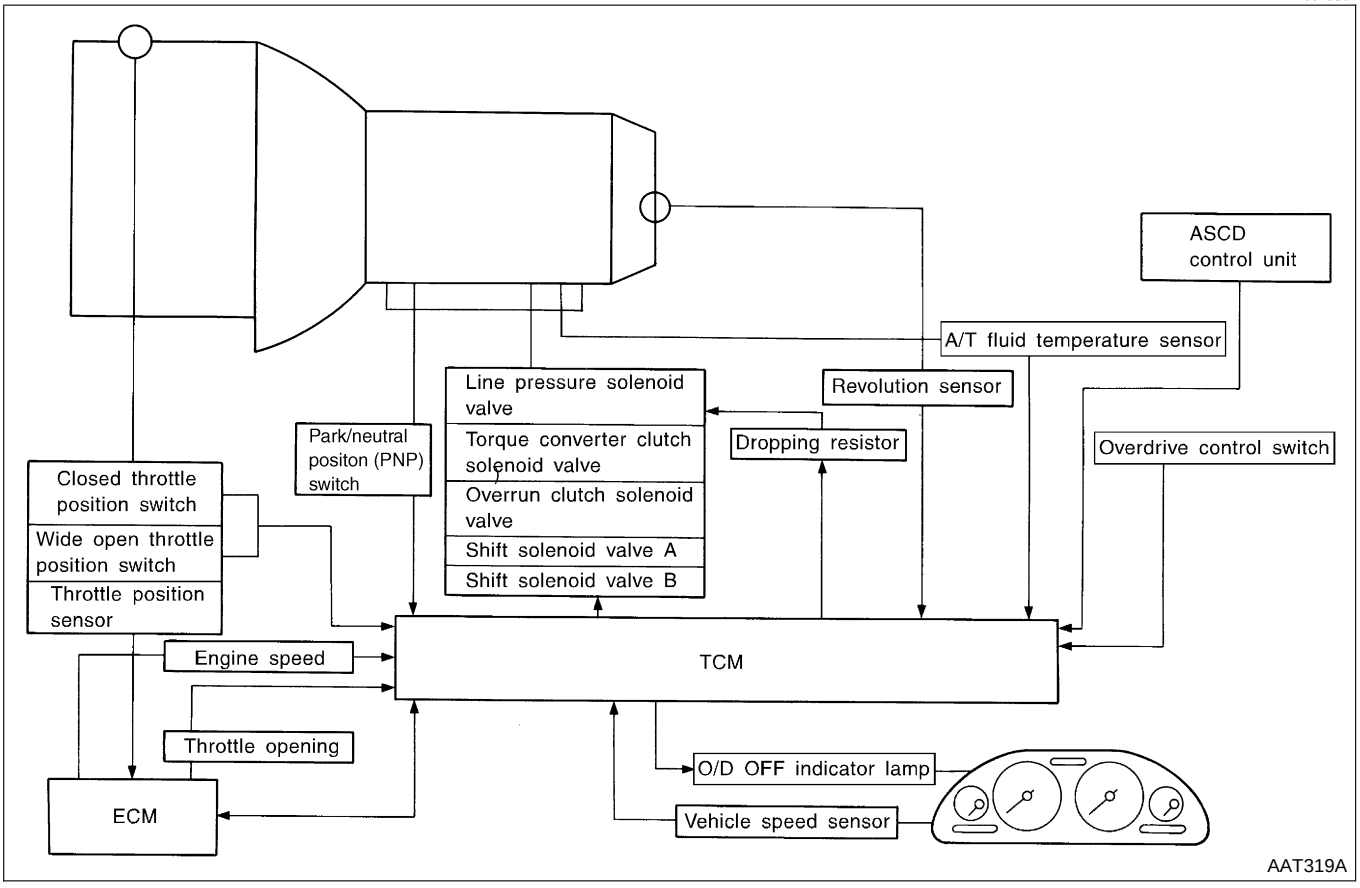
NDAT0015S01

The automatic transaxle senses vehicle operating conditions through various sensors. It always controls the optimum shift position and reduces shifting and lock-up shocks.

SENSORS		TCM		ACTUATORS
Park/neutral position (PNP) switch Throttle position sensor Closed throttle position switch Wide open throttle position switch Engine speed signal A/T fluid temperature sensor Revolution sensor Vehicle speed sensor Overdrive control switch ASCD control unit	▶	Shift control Line pressure control Lock-up control Overrun clutch control Timing control Fail-safe control Self-diagnosis CONSULT-II communication line control Duet-EA control	▶	Shift solenoid valve A Shift solenoid valve B Overrun clutch solenoid valve Torque converter clutch solenoid valve Line pressure solenoid valve O/D OFF indicator lamp

CONTROL SYSTEM

NDAT0015S02



TCM FUNCTION

=NDAT0015S03

The function of the TCM is to:

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

INPUT/OUTPUT SIGNAL OF TCM

NDAT0015S04

	Sensors and solenoid valves	Function
Input	Park/neutral position (PNP) switch	Detects select lever position and sends a signal to TCM.
	Throttle position sensor	Detects throttle valve position and sends a signal to TCM.
	Closed throttle position switch	Detects throttle valve's fully-closed position and sends a signal to TCM.
	Wide open throttle position switch	Detects a throttle valve position of greater than 1/2 of full throttle and sends a signal to TCM.
	Engine speed signal	From ECM.
	A/T fluid temperature sensor	Detects transmission fluid temperature and sends a signal to TCM.
	Revolution sensor	Detects output shaft rpm and sends a signal to TCM.
	Vehicle speed sensor	Used as an auxiliary vehicle speed sensor. Sends a signal when revolution sensor (installed on transmission) malfunctions.
	Overdrive control switch	Sends a signal, which prohibits a shift to D_4 (overdrive) position, to the TCM.
	ASCD control unit	Sends the cruise signal and D_4 (overdrive) cancellation signal from ASCD control unit to TCM.
Output	Shift solenoid valve A/B	Selects shifting point suited to driving conditions in relation to a signal sent from TCM.
	Line pressure solenoid valve	Regulates (or decreases) line pressure suited to driving conditions in relation to a signal sent from TCM.
	Torque converter clutch solenoid valve	Regulates (or decreases) lock-up pressure suited to driving conditions in relation to a signal sent from TCM.
	Overrun clutch solenoid valve	Controls an "engine brake" effect suited to driving conditions in relation to a signal sent from TCM.
	O/D OFF indicator lamp	Shows TCM faults, when A/T control components malfunction.

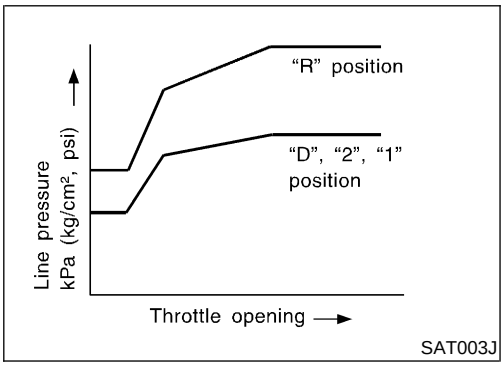
Control Mechanism

=NDAT0016

LINE PRESSURE CONTROL

NDAT0016S01

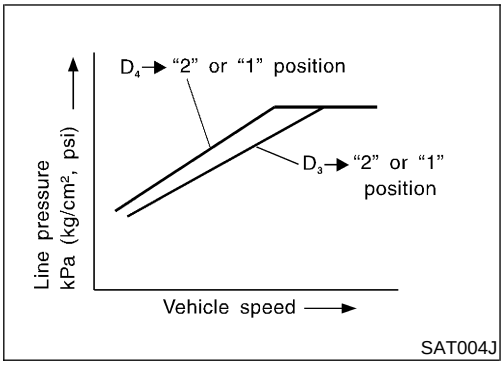
TCM has various line pressure control characteristics to meet the driving conditions.
An ON-OFF duty signal is sent to the line pressure solenoid valve based on TCM characteristics.
Hydraulic pressure on the clutch and brake is electronically controlled through the line pressure solenoid valve to accommodate engine torque. This results in smooth shift operation.



Normal Control

NDAT0016S0101

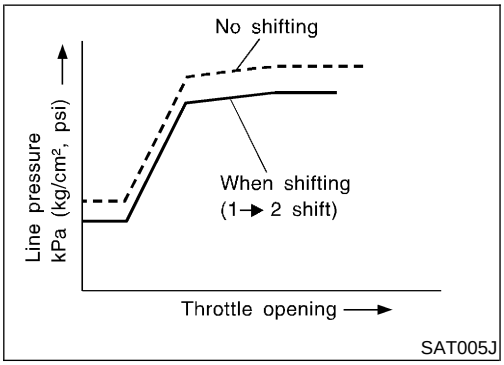
The line pressure to throttle opening characteristics is set for suitable clutch operation.



Back-up Control (Engine brake)

NDAT0016S0102

If the selector lever is shifted to 2 position while driving in D_4 (O/D) or D_3, great driving force is applied to the clutch inside the transmission. Clutch operating pressure (line pressure) must be increased to deal with this driving force.



During Shift Change

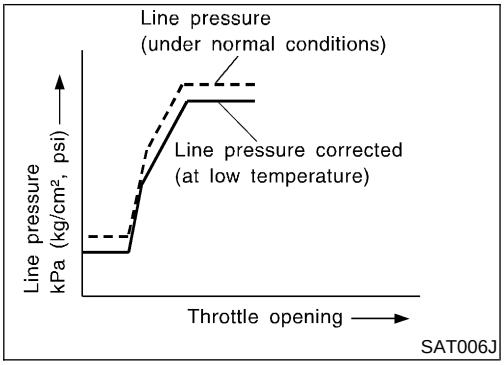
NDAT0016S0103

The line pressure is temporarily reduced corresponding to a change in engine torque when shifting gears (that is, when the shift solenoid valve is switched for clutch operation) to reduce shifting shock.

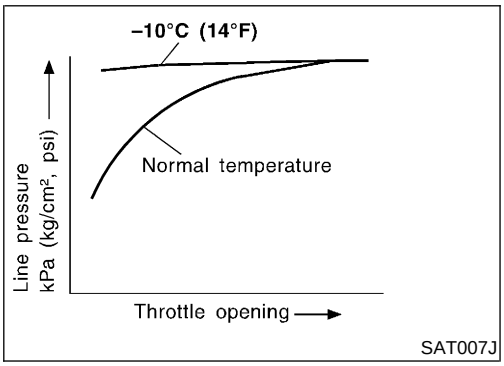
At Low Fluid Temperature

NDAT0016S0104

- Fluid viscosity and frictional characteristics of the clutch facing change with fluid temperature. Clutch engaging or band-contacting pressure is compensated for, according to fluid temperature, to stabilize shifting quality.



- The line pressure is reduced below 60°C (140°F) to prevent shifting shock due to low viscosity of automatic transmission fluid when temperature is low.

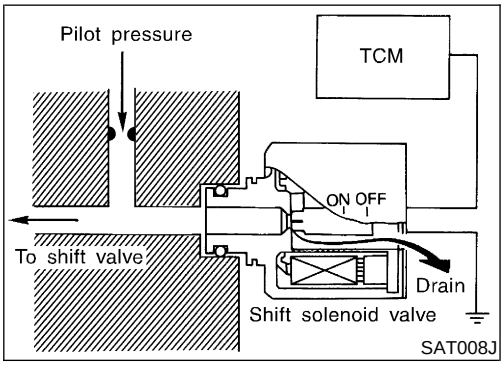


- Line pressure is increased to a maximum irrespective of the throttle opening when fluid temperature drops to −10°C (14°F). This pressure rise is adopted to prevent a delay in clutch and brake operation due to extreme drop of fluid viscosity at low temperature.

SHIFT CONTROL

NDAT0016S02

The shift is regulated entirely by electronic control to accommodate vehicle speed and varying engine operations. This is accomplished by electrical signals transmitted by the revolution sensor and throttle position sensor. This results in improved acceleration performance and fuel economy.



Control of Shift Solenoid Valves A and B

NDAT0016S0201

The TCM activates shift solenoid valves A and B according to signals from the throttle position sensor and revolution sensor to select the optimum gear position on the basis of the shift schedule memorized in the TCM.

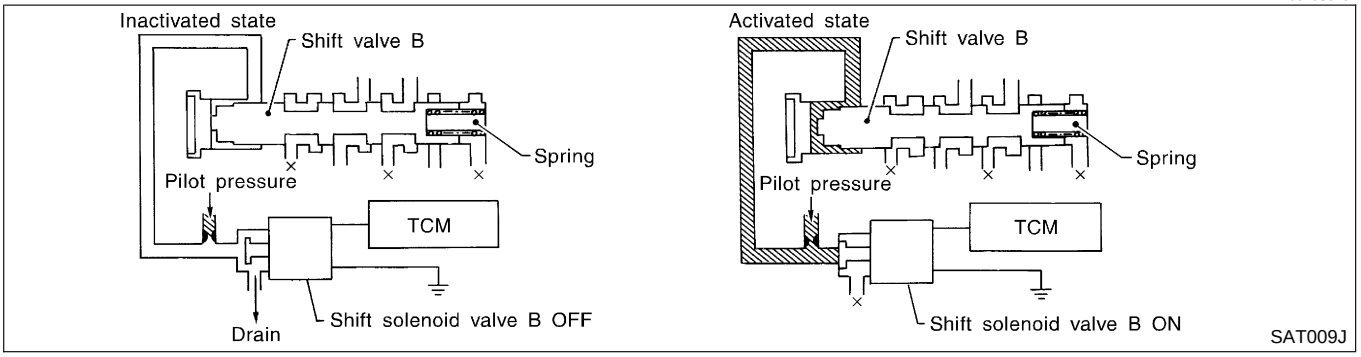
The shift solenoid valve performs simple ON-OFF operation. When set to ON, the drain circuit closes and pilot pressure is applied to the shift valve.

Relation between shift solenoid valves A and B and gear positions

Shift solenoid valve	Gear position				
	D_1, 2_1, 1_1	D_2, 2_2, 1_2	D_3	D_4 (O/D)	N-P
A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)	ON (Closed)
B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)

Control of Shift Valves A and B

NDAT0016S0202



Pilot pressure generated by the operation of shift solenoid valves A and B is applied to the end face of shift valves A and B.
The drawing above shows the operation of shift valve B. When the shift solenoid valve is ON, pilot pressure applied to the end face of the shift valve overcomes spring force, moving the valve upward.

LOCK-UP CONTROL

NDAT0016S03

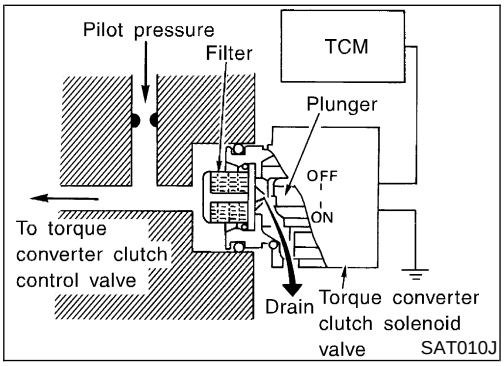
The torque converter clutch piston in the torque converter is locked to eliminate torque converter slip to increase power transmission efficiency. The solenoid valve is controlled by an ON-OFF duty signal sent from the TCM. The signal is converted to an oil pressure signal which controls the lock-up piston.

Conditions for Lock-up Operation

NDAT0016S0301

When vehicle is driven in 4th gear position, vehicle speed and throttle opening are detected. If the detected values fall within the lock-up zone memorized in the TCM, lock-up is performed.

Overdrive control switch	ON	OFF
Selector lever	D position	
Gear position	D_4	D_3
Vehicle speed sensor	More than set value	
Throttle position sensor	Less than set opening	
Closed throttle position switch	OFF	
A/T fluid temperature sensor	More than 40°C (104°F)	

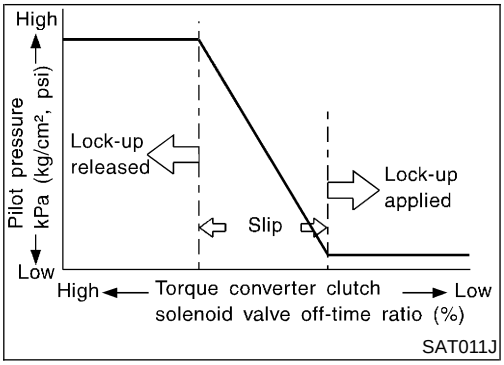


Torque Converter Clutch Solenoid Valve Control

NDAT0016S0302

The torque converter clutch solenoid valve is controlled by the TCM. The plunger closes the drain circuit during the OFF period, and opens the circuit during the ON period. If the percentage of OFF-time increases in one cycle, the pilot pressure drain time is reduced and pilot pressure remains high.
The torque converter clutch piston is designed to slip to adjust the ratio of ON-OFF, thereby reducing lock-up shock.

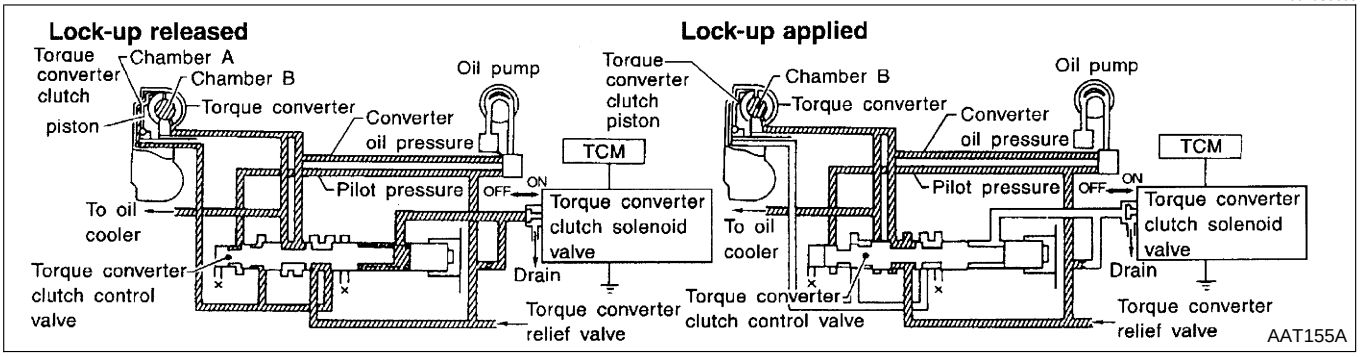
Control Mechanism (Cont'd)



OFF-time INCREASING
↓
Amount of drain DECREASING
↓
Pilot pressure HIGH
↓
Lock-up RELEASING

Torque Converter Clutch Control Valve Operation

NDAT0016S0303



Lock-up released

The OFF-duration of the torque converter clutch solenoid valve is long, and pilot pressure is high. The pilot pressure pushes the end face of the torque converter clutch control valve in combination with spring force to move the valve to the left. As a result, converter pressure is applied to chamber A (torque converter clutch piston release side). Accordingly, the torque converter clutch piston remains unlocked.

Lock-up applied

When the OFF-duration of the torque converter clutch solenoid valve is short, pilot pressure drains and becomes low. Accordingly, the control valve moves to the right by the pilot pressure of the other circuit and converter pressure. As a result, converter pressure is applied to chamber B, keeping the torque converter clutch piston applied.

Also smooth lock-up is provided by transient application and release of the lock-up.

OVERRUN CLUTCH CONTROL (ENGINE BRAKE CONTROL)

NDAT0016S04

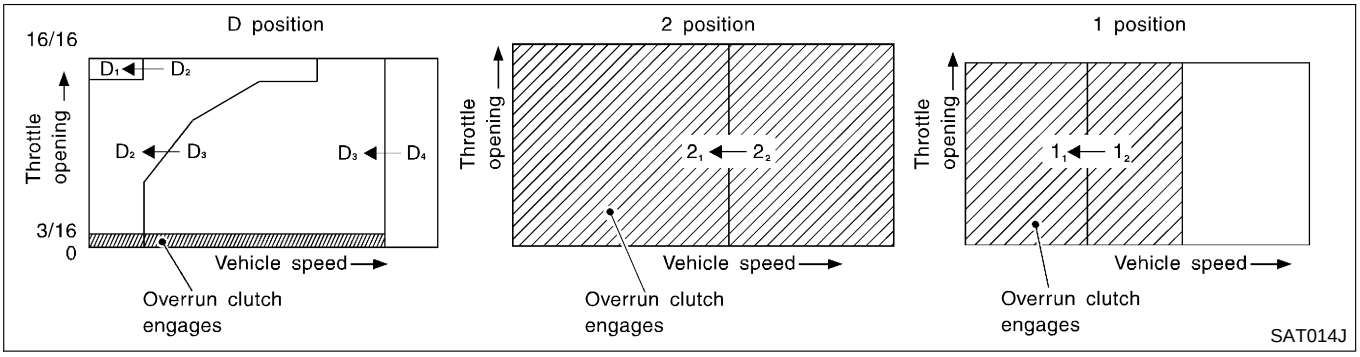
Forward one-way clutch is used to reduce shifting shocks in down-shifting operations. This clutch transmits engine torque to the wheels. However, drive force from the wheels is not transmitted to the engine because the one-way clutch rotates idle. This means the engine brake is not effective.

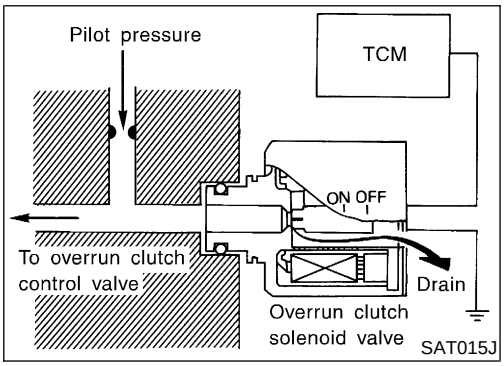
The overrun clutch operates when the engine brake is needed.

Overrun Clutch Operating Conditions

NDAT0016S0401

Selector lever position	Gear position	Throttle opening
D position	D_1, D_2, D_3 gear position	Less than 3/16
2 position	2_1, 2_2 gear position	
1 position	1_1, 1_2 gear position	At any position





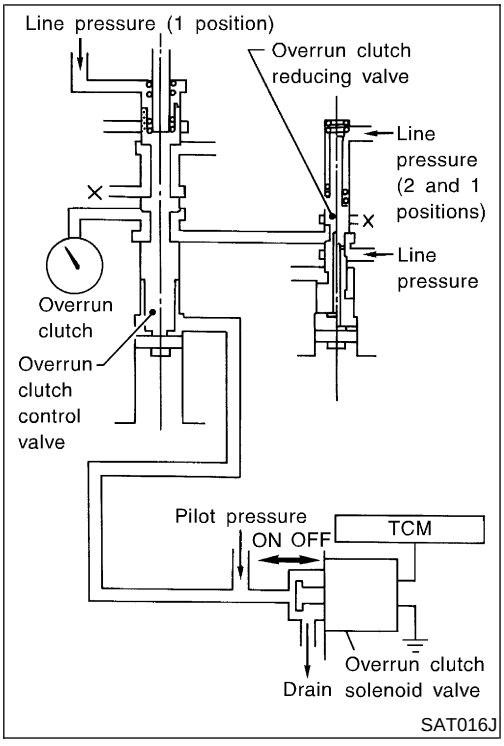
Overrun Clutch Solenoid Valve Control

NDAT0016S0402

The overrun clutch solenoid valve is operated by an ON-OFF signal transmitted by the TCM to provide overrun clutch control (engine brake control).

When this solenoid valve is ON, the pilot pressure drain port closes. When it is OFF, the drain port opens.

During the solenoid valve ON pilot pressure is applied to the end face of the overrun clutch control valve.



Overrun Clutch Control Valve Operation

NDAT0016S0403

When the solenoid valve is ON, pilot pressure is applied to the overrun clutch control valve. This pushes up the overrun clutch control valve. The line pressure is then shut off so that the clutch does not engage.

When the solenoid valve is OFF, pilot pressure is not generated. At this point, the overrun clutch control valve moves downward by spring force. As a result, overrun clutch operation pressure is provided by the overrun clutch reducing valve. This causes the overrun clutch to engage.

In the 1 position, the overrun clutch control valve remains pushed down so that the overrun clutch is engaged at all times.

Control Valve

NDAT0017

FUNCTION OF CONTROL VALVES

NDAT0017S01

Valve name	Function
Pressure regulator valve, plug and sleeve plug	Regulates oil discharged from the oil pump to provide optimum line pressure for all driving conditions.
Pressure modifier valve and sleeve	Used as a signal supplementary valve to the pressure regulator valve. Regulates pressure-modifier pressure (signal pressure) which controls optimum line pressure for all driving conditions.

Control Valve (Cont'd)

Valve name	Function
Pilot valve	Regulates line pressure to maintain a constant pilot pressure level which controls lock-up mechanism, overrun clutch, shift timing.
Accumulator control valve	Regulates accumulator backpressure to pressure suited to driving conditions.
Manual valve	Directs line pressure to oil circuits corresponding to select positions. Hydraulic pressure drains when the shift lever is in Neutral.
Shift valve A	Simultaneously switches four oil circuits using output pressure of shift solenoid valve A to meet driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve B.
Shift valve B	Simultaneously switches three oil circuits using output pressure of shift solenoid valve B in relation to driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve A.
Overrun clutch control valve	Switches hydraulic circuits to prevent engagement of the overrun clutch simultaneously with application of the brake band in D_4. (Interlocking occurs if the overrun clutch engages during D_4.)
"1" reducing valve	Reduces low & reverse brake pressure to dampen engine-brake shock when downshifting from the 1 position 1_2 to 1_1.
Overrun clutch reducing valve	Reduces oil pressure directed to the overrun clutch and prevents engine-brake shock. In 1 and 2 positions, line pressure acts on the overrun clutch reducing valve to increase the pressure-regulating point, with resultant engine brake capability.
Torque converter relief valve	Prevents an excessive rise in torque converter pressure.
Torque converter clutch control valve, plug and sleeve	Activates or inactivates the lock-up function. Also provides smooth lock-up through transient application and release of the lock-up system.
1-2 accumulator valve and piston	Dampens the shock encountered when 2nd gear band servo contracts, and provides smooth shifting.

Introduction

NDAT0018

The A/T system has two self-diagnostic systems.
The first is the emission-related on board diagnostic system (OBD-II) performed by the TCM (transmission control module) in combination with the ECM. The malfunction is indicated by the MIL (malfunction indicator lamp) and is stored as a DTC in the ECM memory but not the TCM memory.
The second is the TCM original self-diagnosis indicated by the O/D OFF indicator lamp. The malfunction is stored in the TCM memory. The detected items are overlapped with OBD-II self-diagnostic items. For detail, refer to AT-52.

OBD-II Function for A/T System

NDAT0019

The ECM provides emission-related on board diagnostic (OBD-II) functions for the A/T system. One function is to receive a signal from the TCM used with OBD-related parts of the A/T system. The signal is sent to the ECM when a malfunction occurs in the corresponding OBD-related part. The other function is to indicate a diagnostic result by means of the MIL (malfunction indicator lamp) on the instrument panel. Sensors, switches and solenoid valves are used as sensing elements.
The MIL automatically illuminates in One or Two Trip Detection Logic when a malfunction is sensed in relation to A/T system parts.

One or Two Trip Detection Logic of OBD-II

NDAT0020

ONE TRIP DETECTION LOGIC

NDAT0020S01

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

TWO TRIP DETECTION LOGIC

NDAT0020S02

When a malfunction is sensed during the first test drive, it is stored in the ECM memory as a 1st trip DTC (diagnostic trouble code) or 1st trip freeze frame data. At this point, the MIL will not illuminate. — First Trip
If the same malfunction as that experienced during the first test drive is sensed during the second test drive, the MIL will illuminate. — Second Trip
A/T-related parts for which the MIL illuminates during the first or second test drive are listed below.

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

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

OBD-II Diagnostic Trouble Code (DTC)

NDAT0021

HOW TO READ DTC AND 1ST TRIP DTC

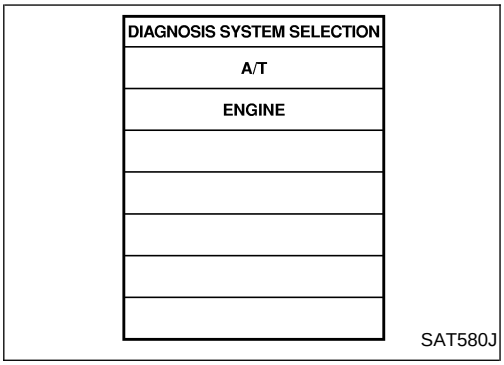
NDAT0021S01

DTC and 1st trip DTC can be read by the following methods.

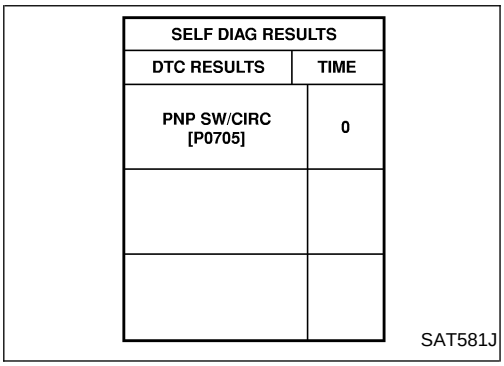
1. **(NO TOOLS No Tools)** The number of blinks of the malfunction indicator lamp in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 1101, 1102, 1103, 1104, etc. For details, refer to EC section [“Malfunction Indicator Lamp (MIL)”, “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION”].
   These DTCs are controlled by NISSAN.
2. **(With CONSULT-II or GST GST)** CONSULT-II or GST (Generic Scan Tool) Examples: P0705, P0710, P0720, P0725, etc.
   These DTCs are prescribed by SAE J2012.
   (CONSULT-II also displays the malfunctioning component or system.)

- **1st trip DTC No. is the same as DTC No.**
- **Output of the diagnostic trouble code indicates that the indicated circuit has a malfunction. However, in case of the Mode II and GST they do not indicate whether the malfunction is still occurring or occurred in the past and returned to normal.**
  CONSULT-II can identify them as shown below. Therefore, using CONSULT-II (if available) is recommended.

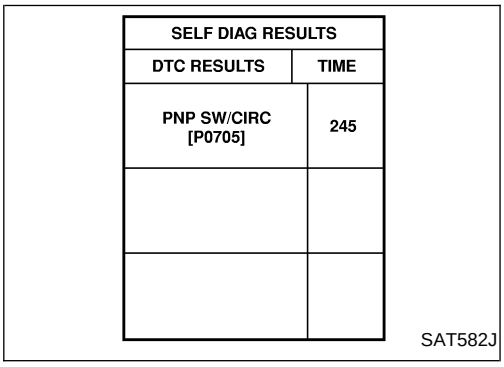
A sample of CONSULT-II display for DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSIS mode for "ENGINE" with CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.



If the DTC is being detected currently, the time data will be "0".



If a 1st trip DTC is stored in the ECM, the time data will be "245".



Freeze Frame Data and 1st Trip Freeze Frame Data

NDAT0021S0101

The ECM has a memory function, which stores the driving condition such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed and vehicle speed at the moment the ECM detects a malfunction.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data, and the data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For detail, refer to "CONSULT-II", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION", ***EC-74***.

Only one set of freeze frame data (either 1st trip freeze frame data of freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 (0701, 0603 - 0608) Fuel Injection System Function — DTC: P0171 (115), P0172 (114), P0174 (0209), P0175 (0210)
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased.

HOW TO ERASE DTC

NDAT0021S02

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

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

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

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

HOW TO ERASE DTC (WITH CONSULT-II)

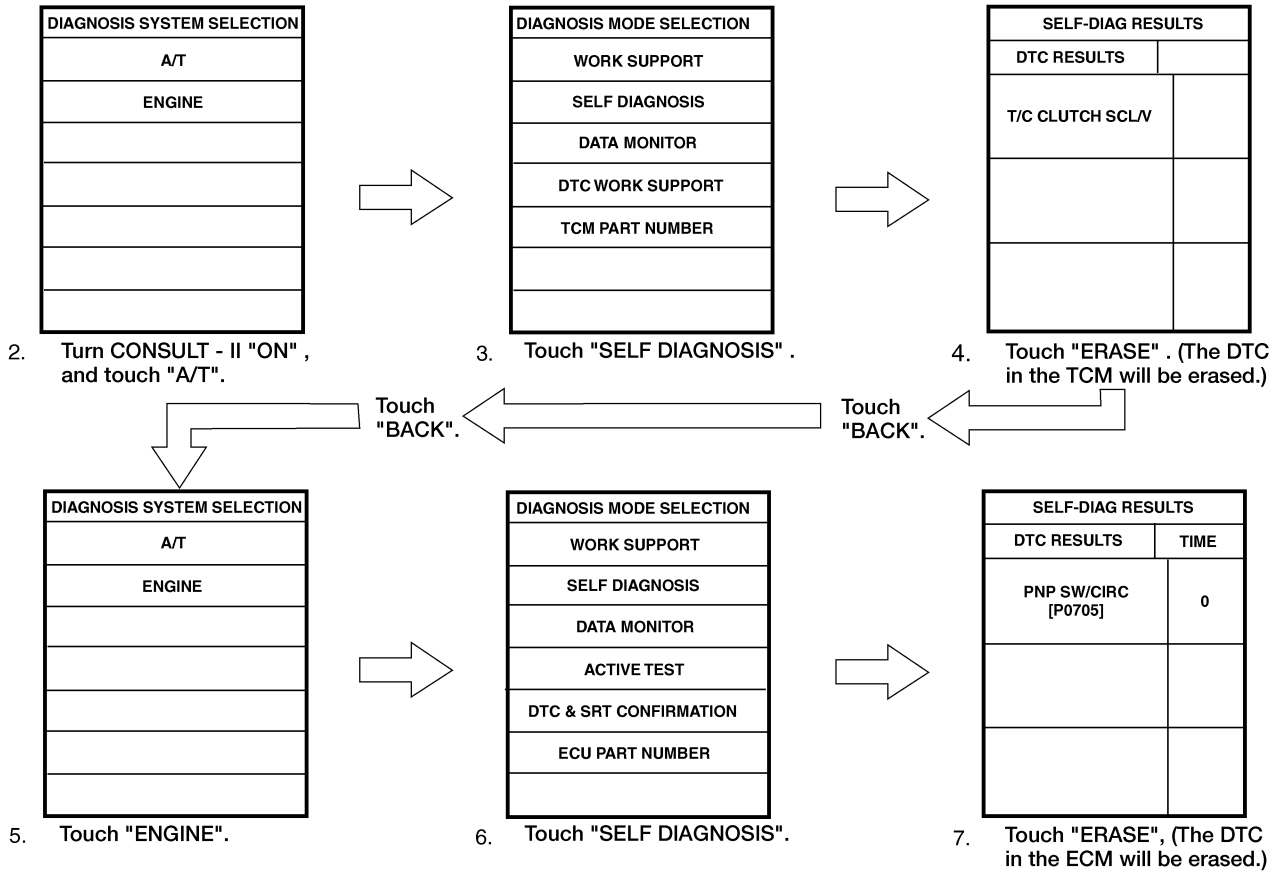
NDAT0021S03

- **If a DTC is displayed for both ECM and TCM, it needs to be erased for both ECM and TCM.**

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

How to erase DTC (With CONSULT -II)

1. If the ignition switch stays "ON" after" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.



WAT069

HOW TO ERASE DTC (WITH GST)

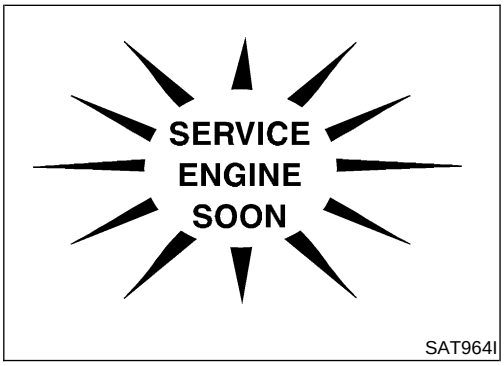
NDAT0021S04

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Perform "OBD-II SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-48. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with Generic Scan Tool (GST). For details, refer to "Generic Scan Tool (GST)", ***EC-64***.

HOW TO ERASE DTC (NO TOOLS)

NDAT0021S05

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Perform "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)". Refer to AT-48. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. Refer to "Description", ***EC-65***.



SAT964I

Malfunction Indicator Lamp (MIL)

NDAT0022

1. The malfunction indicator lamp will light up when the ignition switch is turned ON without the engine running. This is for checking the lamp.
   - If the malfunction indicator lamp does not light up, refer to "Warning Lamps/System Description", ***EL-92***.
     (Or see "Malfunction Indicator Lamp (MIL)", ***EC-65***.)
2. When the engine is started, the malfunction indicator lamp should go off.
   If the lamp remains on, the on board diagnostic system has detected an emission-related (OBD-II) malfunction. For detail,

refer to “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION”, ***EC-51***.

CONSULT-II

NDAT0023

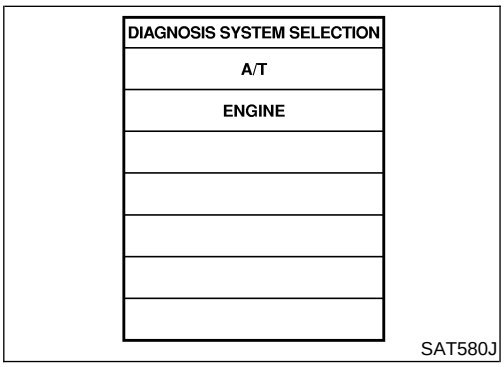
After performing “SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)” (AT-39), place check marks for results on the “Diagnostic Worksheet”, AT-57. Reference pages are provide following the items.

NOTICE:

1) The CONSULT-II electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
   Check for time difference between actual shift timing and the CONSULT-II display. If the difference is noticeable, mechanical parts (except solenoids, sensors, etc.) may be malfunctioning. Check mechanical parts using applicable diagnostic procedures.
2) Shift schedule (which implies gear position) displayed on CONSULT-II and that indicated in Service Manual may differ slightly. This occurs because of the following reasons:

- Actual shift schedule has more or less tolerance or allowance,
- Shift schedule indicated in Service Manual refers to the point where shifts start, and
- Gear position displayed on CONSULT-II indicates the point where shifts are completed.

3) Shift solenoid valve “A” or “B” is displayed on CONSULT-II at the start of shifting. Gear position is displayed upon completion of shifting (which is computed by TCM).
4) Additional CONSULT-II information can be found in the Operation Manual supplied with the CONSULT-II unit.

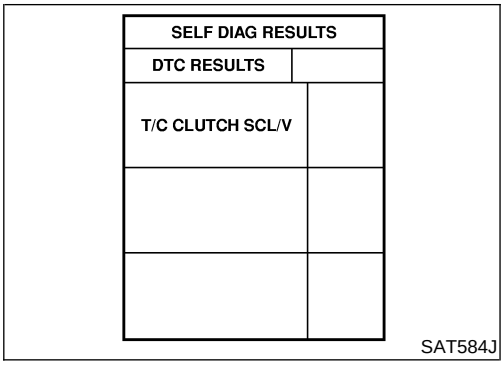


Ⓑ SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)

NDAT0023S02

1. Turn on CONSULT-II and touch “ENGINE” for OBD-II detected items or touch “A/T” for TCM self-diagnosis.
   If A/T is not displayed, check TCM power supply and ground circuit. Refer to AT-95. If result is NG, refer to “POWER SUPPLY ROUTING”, ***EL-10***.

CONSULT-II (Cont'd)



2. Touch "SELF-DIAGNOSIS".
   Display shows malfunction experienced since the last erasing operation.
   CONSULT-II performs real-time diagnosis.
   Also, any malfunction detected while in this mode will be displayed at real time.

SELF-DIAGNOSTIC RESULT TEST MODE

NDAT0023S03

Detected items (Screen terms for CONSULT-II, "SELF-DIAGNOSIS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
"A/T"	"ENGINE"		O/D OFF Available by O/D OFF indicator lamp or "A/T" on CONSULT-II	SERVICE ENGINE SOON Available by malfunction indicator lamp*2, "ENGINE" on CONSULT-II or GST
Park/neutral position (PNP) switch circuit		• TCM does not receive the correct voltage signal (based on the gear position) from the switch.	—	P0705
—	PNP SW/CIRC			
Revolution sensor		• TCM does not receive the proper voltage signal from the sensor.	X	P0720
VHCL SPEED SEN·A/T	VEH SPD SEN/ CIR AT			
Vehicle speed sensor (Meter)		• TCM does not receive the proper voltage signal from the sensor.	X	—
VHCL SPEED SEN·MTR	—			
A/T 1st gear function		• A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	—	P0731*1
—	A/T 1ST GR FNCTN			
A/T 2nd gear function		• A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	—	P0732*1
—	A/T 2ND GR FNCTN			
A/T 3rd gear function		• A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	—	P0733*1
—	A/T 3RD GR FNCTN			
A/T 4th gear function		• A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	—	P0734*1
—	A/T 4TH GR FNCTN			
A/T TCC S/V function (lock-up)		• A/T cannot perform lock-up even if electrical circuit is good.	—	P0744*1
—	A/T TCC S/V FNCTN			
Shift solenoid valve A		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0750
SHIFT SOLENOID/V A	SFT SOL A/CIRC			

Detected items (Screen terms for CONSULT-II, "SELF-DIAGNOSIS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
"A/T"	"ENGINE"		O/D OFF Available by O/D OFF indicator lamp or "A/T" on CONSULT-II	SERVICE ENGINE SOON Available by malfunction indicator lamp*2, "ENGINE" on CONSULT-II or GST
Shift solenoid valve B		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0755
SHIFT SOLENOID/V B	SFT SOL B/CIRC			
Overrun clutch solenoid valve		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P1760
OVERRUN CLUTCH S/V	O/R CLUCH SOL/ CIRC			
T/C clutch solenoid valve		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0740
T/C CLUTCH SOL/V	TCC SOLENOID/ CIRC			
Line pressure solenoid valve		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0745
LINE PRESSURE S/V	L/PRESS SOL/ GRC			
Throttle position sensor Throttle position switch		• TCM receives an excessively low or high voltage from the sensor.	X	P1705
THROTTLE POSI SEN	TP SEN/CIRC A/T			
Engine speed signal		• TCM does not receive the proper voltage signal from the ECM.	X	P0725
ENGINE SPEED SIG				
A/T fluid temperature sensor		• TCM receives an excessively low or high voltage from the sensor.	X	P0710
BATT/FLUID TEMP SEN	ATF TEMP SEN/ CIRC			
TCM (RAM)		• TCM memory (RAM) is malfunctioning	—	—
CONTROL UNIT (RAM)	—			
TCM (ROM)		• TCM memory (ROM) is malfunctioning	—	—
CONTROL UNIT (ROM)	—			
TCM (EEPROM)		• TCM Memory (EEPROM) is malfunctioning	—	—
CONTROL UNIT (EEPROM)	—			
Initial start		• This is not a malfunction message (Whenever shutting off a power supply to the TCM, this message appears on the screen.)	X	—
INITIAL START	—			
No failure (NO SELF DIAGNOSTIC FAILURE INDICATED FURTHER TESTING MAY BE REQUIRED**)		• No failure has been detected.	X	X

X: Applicable

−: Not applicable

CONSULT-II (Cont'd)

*1: These malfunctions cannot be displayed by MIL SERVICE ENGINE SOON if another malfunction is assigned to MIL.
*2: Refer to "Malfunction Indicator Lamp (MIL)", ***EC-65***.

DATA MONITOR MODE (A/T)

NDAT0023S04

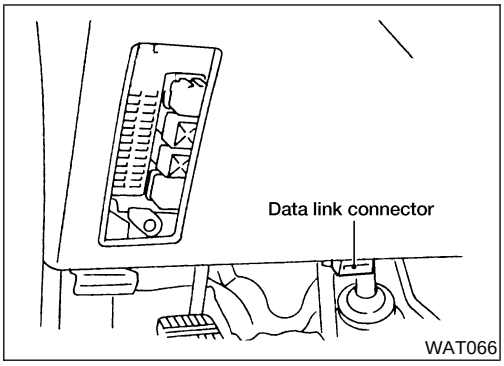
Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
Vehicle speed sensor 1 (A/T) (Revolution sensor)	VHCL/S SE·A/T [km/h] or [mph]	X	—	● Vehicle speed computed from signal of revolution sensor is displayed.	When racing engine in N or P with vehicle stationary, CONSULT-II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

Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
ASCD cruise signal	ASCD·CRUISE [ON/OFF]	X	—	• Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state	• This is displayed even when no ASCD is mounted.
ASCD OD cut signal	ASCD·OD CUT [ON/OFF]	X	—	• Status of ASCD OD release signal is displayed. ON ... OD released OFF ... OD not released	• This is displayed even when no ASCD is mounted.
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of kickdown SW, is displayed.	• This is displayed even when no kickdown switch is equipped.
Closed throttle position switch	CLOSED THL/SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of closed throttle position SW, is displayed.	
Wide open throttle position switch	W/O THRL/P-SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of wide open throttle position SW, is displayed.	
Gear position	GEAR	—	X	• Gear position data used for computation by TCM, is displayed.	
Selector lever position	SLCT LVR POSI	—	X	• Selector lever position data, used for computation by TCM, is displayed.	• A specific value used for control is displayed if fail-safe is activated due to error.
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	• Vehicle speed data, used for computation by TCM, is displayed.	
Throttle position	THROTTLE POSI [/8]	—	X	• Throttle position data, used for computation by TCM, is displayed.	• A specific value used for control is displayed if fail-safe is activated due to error.
Line pressure duty	LINE PRES DTY [%]	—	X	• Control value of line pressure solenoid valve, computed by TCM from each input signal, is displayed.	
Torque converter clutch solenoid valve duty	TCC S/V DUTY [%]	—	X	• Control value of torque converter clutch solenoid valve, computed by TCM from each input signal, is displayed.	
Shift solenoid valve A	SHIFT S/V A [ON/OFF]	—	X	• Control value of shift solenoid valve A, computed by TCM from each input signal, is displayed.	Control value of solenoid is displayed even if solenoid circuit is disconnected. The OFF signal is displayed if solenoid circuit is shorted.
Shift solenoid valve B	SHIFT S/V B [ON/OFF]	—	X	• Control value of shift solenoid valve B, computed by TCM from each input signal, is displayed.	

CONSULT-II (Cont'd)

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

X: Applicable
—: Not applicable



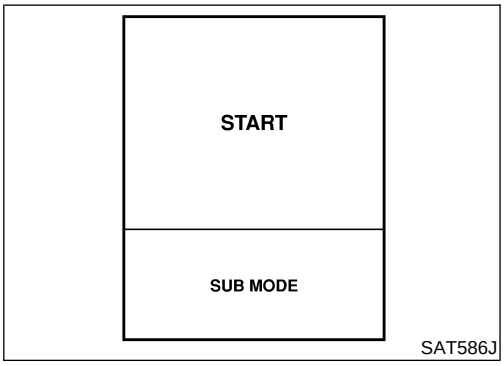
DTC WORK SUPPORT MODE WITH CONSULT-II

NDAT0023S05

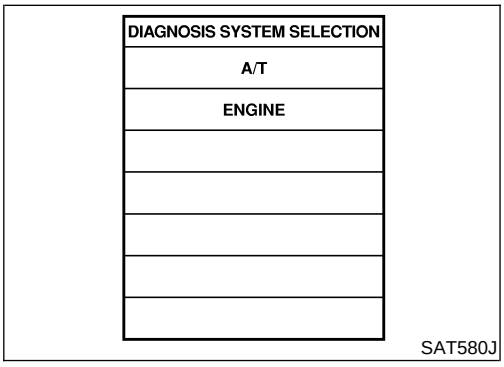
CONSULT-II Setting Procedure

NDAT0023S0501

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



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



5. Touch "A/T".

DIAGNOSIS MODE SELECTION
WORK SUPPORT
SELF DIAGNOSIS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT587J

6. Touch "DTC WORK SUPPORT".

ITEM SELECTION
1ST GR FNCTN P0731
2ND GR FNCTN P0732
3RD GR FNCTN P0733
4TH GRFNCTN P0734
TCC S/V FNCTN P0744

SAT588J

7. Touch select item menu (1ST, 2ND, etc.).

1ST GR FNCTN P0731
THIS SUPPORT FUNCTION IS FOR DTC P0731. SEE THE SERVICE MANUAL ABOUT THE OPERATING CONDITION FOR THIS DIAGNOSIS.

SAT589J

8. Touch "START".

1ST GR FNCTN P0731	
OUT OF CONDTION	
MONITOR	
GEAR	X
VEHICLE SPEED	XXXkm/h
THROTTLE POSI	XXX
TCC S/V DUTY	XXX %

WAT079

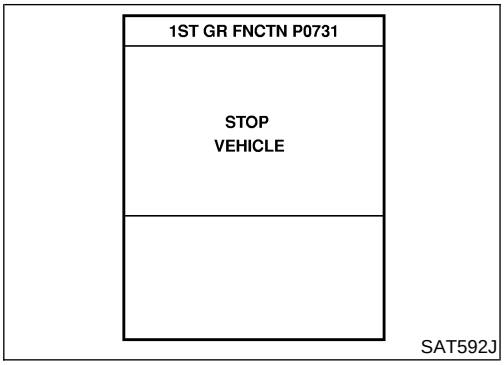
9. Perform driving test according to "DTC CONFIRMATION PROCEDURE" in "TROUBLE DIAGNOSIS FOR DTC".

1ST GR FNCTN P0731	
TESTING	
MONITOR	
GEAR	XXX
VEHICLE SPEED	XXXkm/h
THROTTLE POSI	XXX
TCC S/V DUTY	XXX %

SAT591J

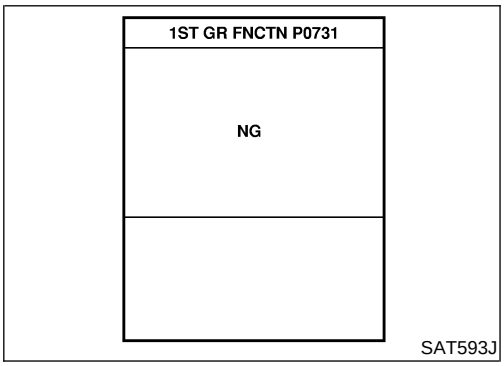
- **When testing conditions are satisfied, CONSULT-II screen changes from "OUT OF CONDITION" to "TESTING".**

CONSULT-II (Cont'd)

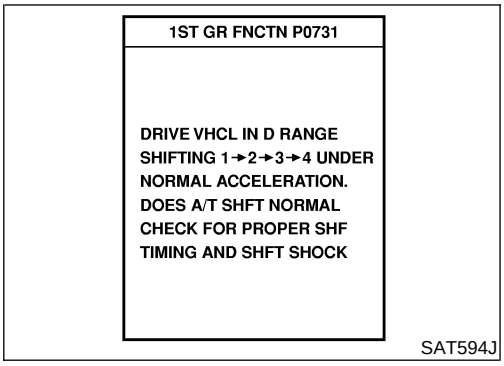


SAT592J

10. Stop vehicle. If "NG" appears on the screen, malfunction may exist. Go to "DIAGNOSTIC PROCEDURE".

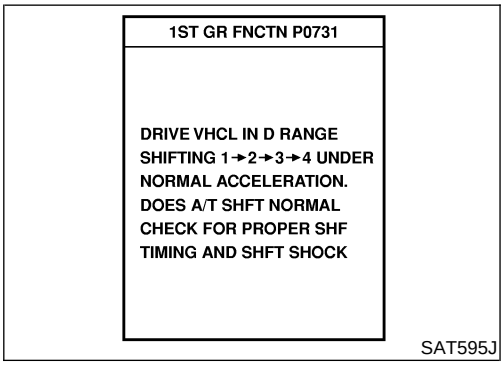


SAT593J



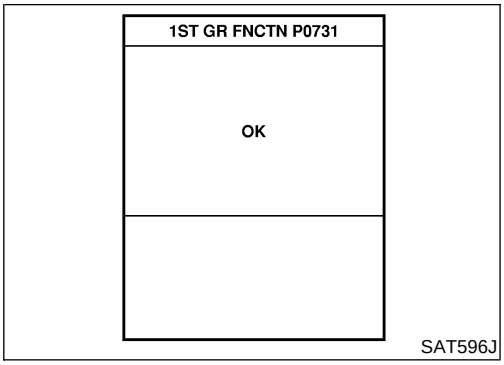
SAT594J

11. Perform test drive to check gear shift feeling in accordance with instructions displayed.

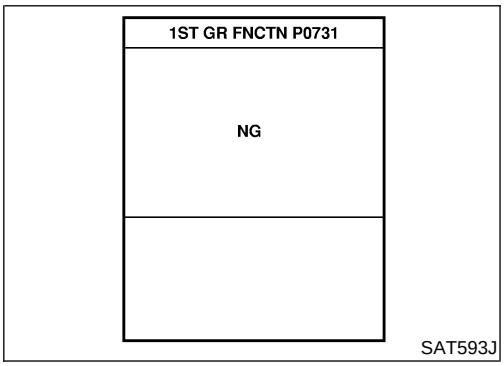


SAT595J

12. Touch "YES" or "NO".



SAT596J



SAT593J

13. CONSULT-II procedure ended.
    If "NG" appears on the screen, a malfunction may exist. Go to "DIAGNOSTIC PROCEDURE".

DTC WORK SUPPORT MODE

NDAT0023S06

DTC work support item	Description	Check item
1ST GR FNCTN P0731	Following items for "A/T 1st gear function (P0731)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
2ND GR FNCTN P0732	Following items for "A/T 2nd gear function (P0732)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
3RD GR FNCTN P0733	Following items for "A/T 3rd gear function (P0733)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Each clutch ● Hydraulic control circuit
4TH GR FNCTN P0734	Following items for "A/T 4th gear function (P0734)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Shift solenoid valve B ● Overrun clutch solenoid valve ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit
TCC S/V FNCTN P0744	Following items for "A/T TCC S/V function (lock-up) (P0744)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Torque converter clutch solenoid valve ● Each clutch ● Hydraulic control circuit

Diagnostic Procedure Without CONSULT-II

NDAT0216

OBD-II SELF-DIAGNOSTIC PROCEDURE (WITH GST)

NDAT0216S01

Refer to “Generic Scan Tool (GST)”, ***EC-81***.

OBD-II SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)

NDAT0216S02

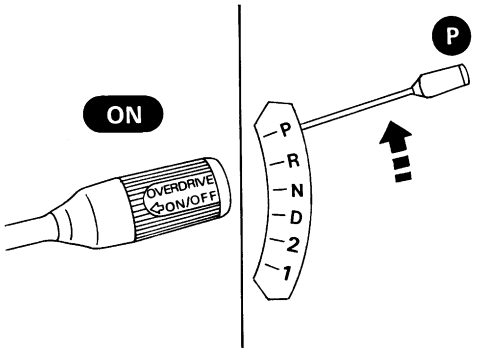
Refer to “Malfunction Indicator Lamp (MIL)”, ***EC-65***.

TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)

NDAT0216S03

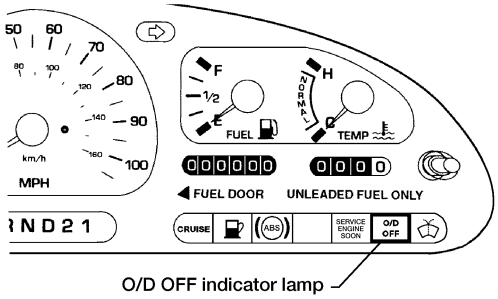
1	CHECK O/D OFF INDICATOR LAMP

1. Move selector lever to P position.
   Start engine and warm it up to normal engine operating temperature.
2. Turn ignition switch to OFF position.
3. Wait 5 seconds.
4. Turn ignition switch to ON position.
   (Do not start engine.)



SAT421F

5. Does O/D OFF indicator lamp come on for about 2 seconds?



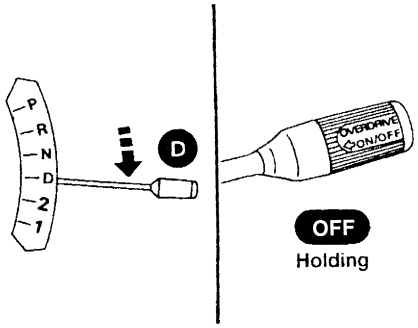
AAT344A

Yes or No

Yes	▶	GO TO 2.
No	▶	Stop procedure. Perform “1. O/D OFF Indicator Lamp Does Not Come On”, AT-212 before proceeding.

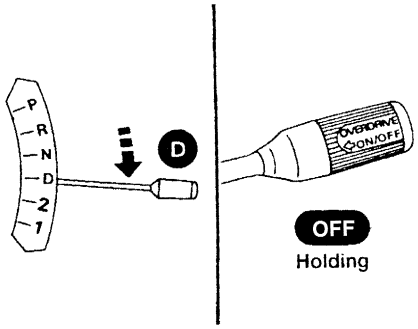
2	JUDGEMENT PROCEDURE STEP 1

1. Turn ignition switch to OFF position.
2. Turn ignition switch to ACC position.
3. Move selector lever from P to D position.



AAT156A

4. Turn ignition switch to ON position.
   (Do not start engine.)
5. Depress and hold overdrive control switch in OFF position (the O/D OFF indicator lamp will be ON) until directed to release the switch. (If O/D OFF indicator lamp does not come on, refer to "JUDGEMENT PROCEDURE STEP 3 and 4" on AT-51).



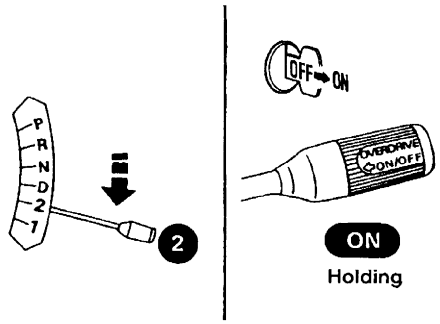
AAT156A

6. Turn ignition switch to OFF position.
7. Turn ignition switch to ON position (Do not start engine.)
8. Release the overdrive control switch (the O/D OFF indicator lamp will be OFF).
9. Wait 2 seconds.

▶	GO TO 3.

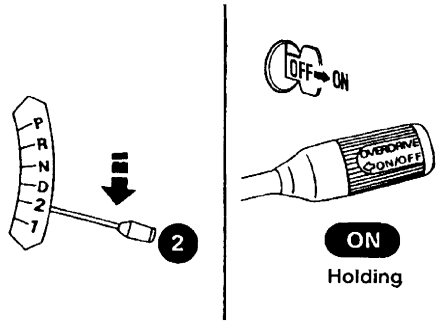
3	JUDGEMENT PROCEDURE STEP 2

1. Move selector lever to 2 position.



AAT157A

2. Depress and release overdrive control switch in ON position until next step is completed (the O/D OFF indicator lamp will be ON).



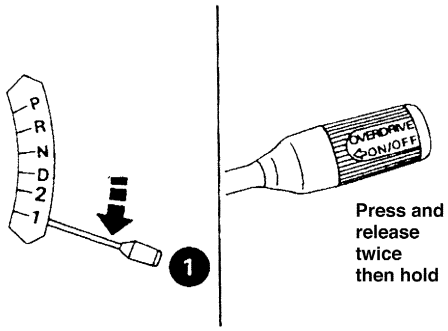
AAT157A

3. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be OFF) until directed to release the switch.

▶	GO TO 4.

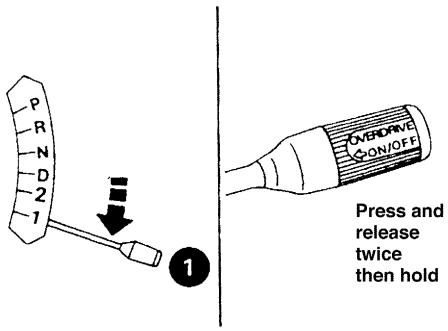
4	JUDGEMENT PROCEDURE STEP 3

1. Move selector lever to 1 position.
2. Release the overdrive control switch.



AAT158A

3. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be ON).
4. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be OFF).
5. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be ON) until directed to release the switch.

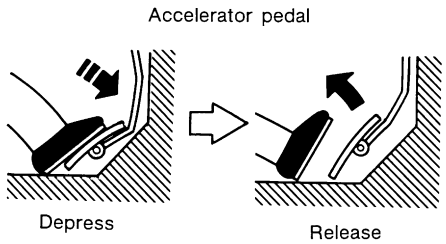


AAT158A

▶	GO TO 5.

5	JUDGEMENT PROCEDURE STEP 4

1. Depress accelerator pedal fully and release it.
2. Release the overdrive control switch (the O/D OFF indicator lamp will begin to flash ON and OFF).

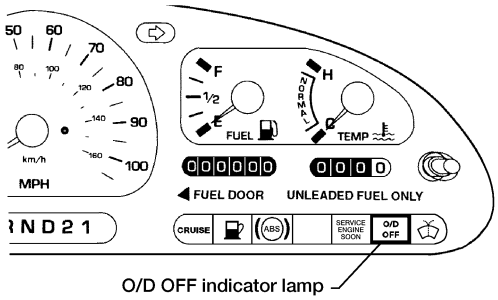


SAT981F

▶	GO TO 6.

6	CHECK SELF-DIAGNOSTIC CODE

Check O/D OFF indicator lamp.
Refer to "JUDGEMENT OF SELF-DIAGNOSIS CODE", AT-52.



AAT344A

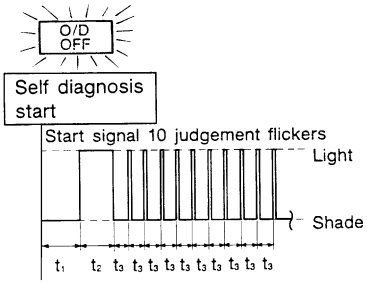
▶ **DIAGNOSIS END**

JUDGEMENT OF SELF-DIAGNOSIS CODE

NDAT0216S04

O/D OFF indicator lamp:

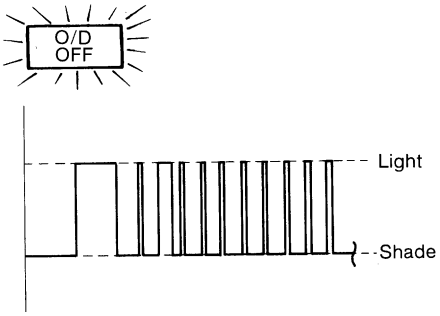
All judgement flickers are the same.



SAT436F

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

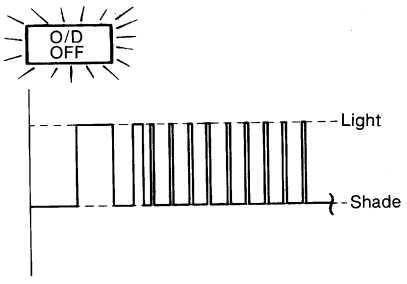
2nd judgement flicker is longer than others.



SAT439F

Vehicle speed sensor circuit is short-circuited or disconnected.
⇒ **Go to VEHICLE SPEED SENSOR·MTR, AT-201.**

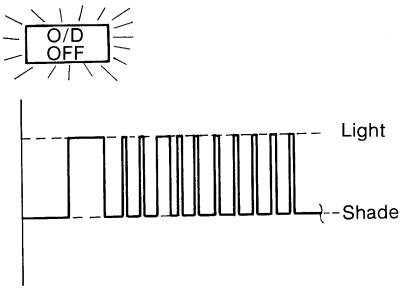
1st judgement flicker is longer than others.



SAT437F

Revolution sensor circuit is short-circuited or disconnected.
⇒ **Go to VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR) (DTC: 1102), AT-116.**

3rd judgement flicker is longer than others.

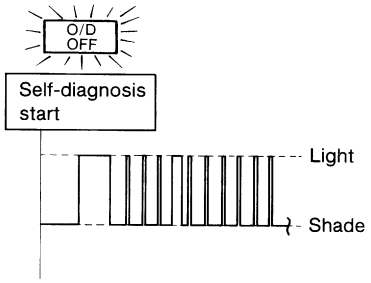


SAT441F

Throttle position sensor circuit is short-circuited or disconnected.
⇒ **Go to THROTTLE POSITION SENSOR (DTC: 1206), AT-182.**

O/D OFF indicator lamp:

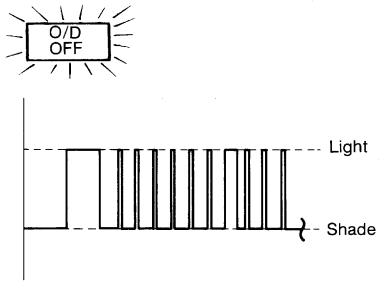
4th judgement flicker is longer than others.



SAT443F

Shift solenoid valve A circuit is short-circuited or disconnected.
⇒ **Go to SHIFT SOLENOID VALVE A (DTC: 1108), AT-172.**

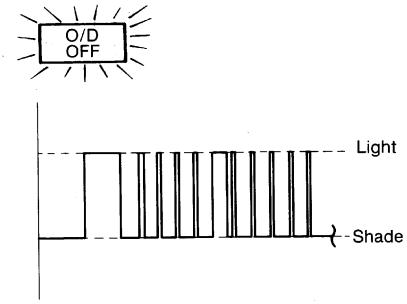
7th judgement flicker is longer than others.



SAT449F

Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to TORQUE CONVERTER CLUTCH SOLENOID VALVE (DTC: 1204), AT-153.**

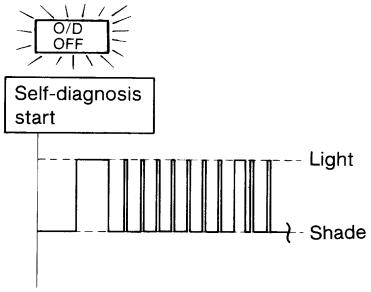
5th judgement flicker is longer than others.



SAT445F

Shift solenoid valve B circuit is short-circuited or disconnected.
⇒ **Go to SHIFT SOLENOID VALVE B (DTC: 1201), AT-177.**

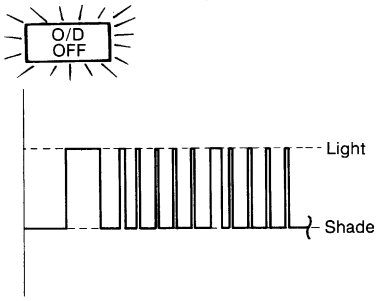
8th judgement flicker is longer than others.



SAT451F

A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged.
⇒ **Go to A/T FLUID TEMPERATURE SENSOR AND TCM POWER SOURCE, AT-194.**

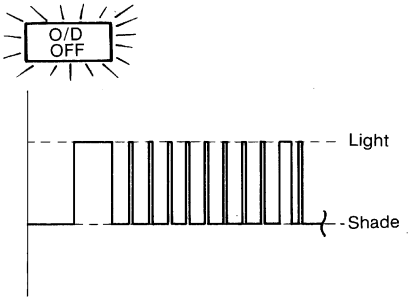
6th judgement flicker is longer than others.



SAT447F

Overrun clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to OVERRUN CLUTCH SOLENOID VALVE (DTC: 1203), AT-189.**

9th judgement flicker is longer than others.

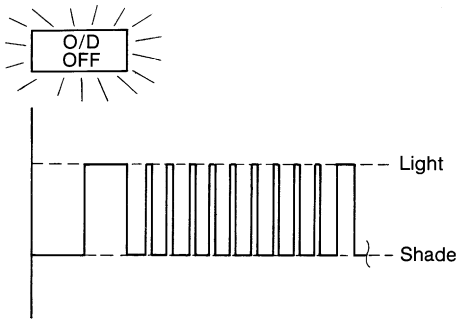


SAT453F

Engine speed signal circuit is short-circuited or disconnected.
⇒ **Go to ENGINE SPEED SIGNAL (DTC: 1207), AT-122.**

O/D OFF indicator lamp:

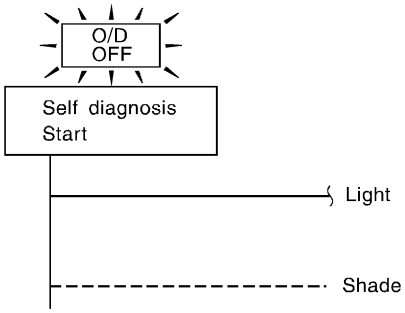
10th judgement flicker is longer than others.



SAT455F

Line pressure solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to LINE PRESSURE SOLENOID VALVE (DTC: 1205), AT-166.**

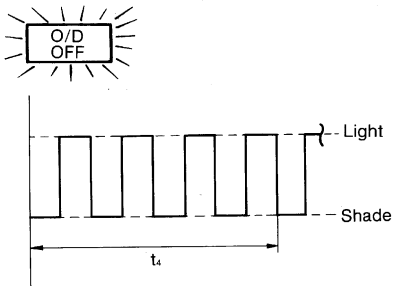
Lamp comes on.



SAT367J

Park/neutral position (PNP) switch, overdrive control switch or throttle position switch circuit is disconnected or TCM is damaged.
⇒ **Go to 21. TCM Self-diagnosis Does Not Activate (Park/neutral position (PNP), Overdrive Control and Throttle Position Switch Circuit Checks), AT-250.**

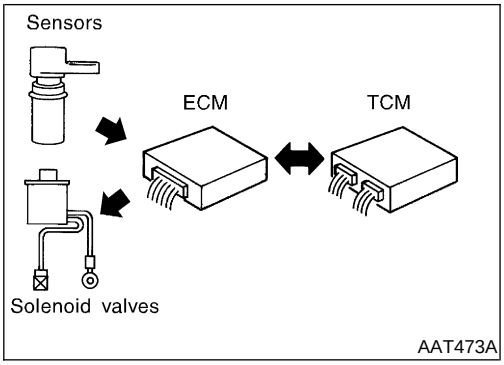
Flickers as shown below.



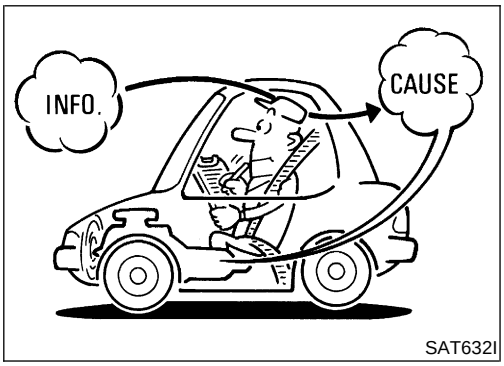
SAT457F

Battery power is low.
Battery has been disconnected for a long time.
Battery is connected conversely.
(When reconnecting TCM connectors. — This is not a problem.)

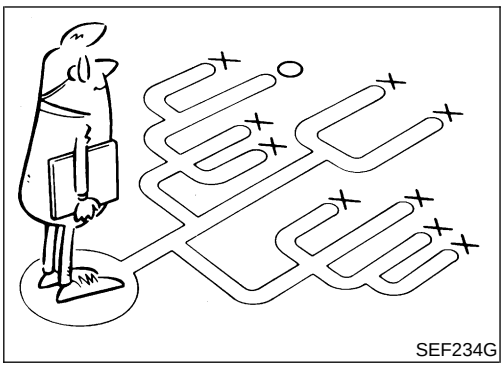
t_1 = 2.5 seconds t_2 = 2.0 seconds t_3 = 1.0 second t_4 = 1.0 second



AAT473A



SAT632I


SEF234G

Introduction

NDAT0026

The TCM receives a signal from the vehicle speed sensor, throttle position sensor or park/neutral position (PNP) switch and provides shift control or lock-up control via A/T solenoid valves.

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

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

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

A visual check only, may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow”. Refer to AT-59.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “DIAGNOSITC WORKSHEET” like the example (AT-56) should be used.

Start your diagnosis by looking for “conventional” problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.

Also check related Service bulletins for information.

DIAGNOSTIC WORKSHEET

=NDAT0026S01

Information from Customer

NDAT0026S0101

KEY POINTS

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

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

Diagnostic Worksheet

=NDAT0026S0102

1.	☐ Read the Fail-safe and listen to customer complaints.		AT-8
2.	☐ CHECK A/T FLUID		AT-61
	☐ Leakage (Follow specified procedure) ☐ Fluid condition ☐ Fluid level		
3.	☐ Perform STALL TEST and PRESSURE TEST.		AT-61,65
	☐ Stall test — Mark possible damaged components/others.		
	☐ Torque converter one-way clutch ☐ Reverse clutch ☐ Forward clutch ☐ Overrun clutch ☐ Forward one-way clutch	☐ Low & reverse brake ☐ Low one-way clutch ☐ Engine ☐ Line pressure is low ☐ Clutches and brakes except high clutch and brake band are OK	
	☐ Pressure test — Suspected parts:		
4.	☐ Perform all ROAD TEST and mark required procedures.		AT-66
4-1.	Check before engine is started.		AT-67
	☐ SELF-DIAGNOSTIC PROCEDURE - Mark detected items.		
	☐ Park/neutral position (PNP) switch, AT-102. ☐ A/T fluid temperature sensor, AT-109. ☐ Vehicle speed sensor·A/T (Revolution sensor), AT-116. ☐ Engine speed signal, AT-122. ☐ Torque converter clutch solenoid valve, AT-158. ☐ Line pressure solenoid valve, AT-166. ☐ Shift solenoid valve A, AT-172. ☐ Shift solenoid valve B, AT-177. ☐ Throttle position sensor, AT-182. ☐ Overrun clutch solenoid valve, AT-189. ☐ Park/neutral position (PNP), overdrive control and throttle position switches, AT-250. ☐ A/T fluid temperature sensor and TCM power source, AT-194. ☐ Vehicle speed sensor·MTR, AT-201. ☐ Control Unit (RAM) Control Unit (ROM), AT-205 ☐ Control Unit (EEPROM), AT-207 ☐ Battery ☐ Others		
4-2.	Check at idle		AT-68
	☐ 1. O/D OFF Indicator Lamp Does Not Come On, AT-212. ☐ 2. Engine Cannot Be Started In P and N Position, AT-214. ☐ 3. In P Position, Vehicle Moves Forward or Backward When Pushed, AT-215. ☐ 4. In N Position, Vehicle Moves, AT-216. ☐ 5. Large Shock. N → R Position, AT-218. ☐ 6. Vehicle Does Not Creep Backward In R Position, AT-220. ☐ 7. Vehicle Does Not Creep Forward In D, 2 or 1 Position, AT-224.		

4.	4-3.	Cruise test	AT-71 AT-75
		Part-1	
		☐ 8. Vehicle Cannot Be Started From D_1, AT-227. ☐ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-230. ☐ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-233. ☐ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-236. ☐ 12. A/T Does Not Perform Lock-up, AT-239. ☐ 13. A/T Does Not Hold Lock-up Condition, AT-241. ☐ 14. Lock-up Is Not Released, AT-243. ☐ 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$), AT-244.	
		Part-2	AT-79
		☐ 16. Vehicle Does Not Start From D_1, AT-246. ☐ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-230. ☐ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-233. ☐ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-236.	
		Part-3	AT-81
		☐ 17. A/T Does Not Shift: $D_4 \rightarrow D_3$ When Overdrive Control Switch ON → OFF, AT-247. ☐ 15. Engine Speed Does Not Return To Idle (Engine Brake In D_3), AT-244. ☐ 18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever D → 2 Position, AT-248. ☐ 15. Engine Speed Does Not Return To Idle (Engine Brake In 2_2), AT-244. ☐ 19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever 2 → 1 Position, AT-249. ☐ 20. Vehicle Does Not Decelerate By Engine Brake, AT-250. ☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.	
		☐ Park/neutral position (PNP) switch, AT-102. ☐ A/T fluid temperature sensor, AT-109. ☐ Vehicle speed sensor·A/T (Revolution sensor), AT-116. ☐ Engine speed signal, AT-122. ☐ Torque converter clutch solenoid valve, AT-153. ☐ Line pressure solenoid valve, AT-166. ☐ Shift solenoid valve A, AT-176. ☐ Shift solenoid valve B, AT-177. ☐ Throttle position sensor, AT-182. ☐ Overrun clutch solenoid valve, AT-189. ☐ Park/neutral position (PNP), overdrive control and throttle position switches, AT-250. ☐ A/T fluid temperature sensor and TCM power source, AT-194. ☐ Vehicle speed sensor·MTR, AT-201. ☐ Control Unit (RAM) Control Unit (ROM), AT-205 ☐ Control Unit (EEPROM), AT-207 ☐ Battery ☐ Others	
5.	☐ For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.		AT-40
6.	☐ Perform all ROAD TEST and re-mark required procedures.		AT-66
7.	☐ Perform DTC CONFIRMATION PROCEDURE for following MIL indicating items and check out NG items. Refer to EC section ["Emission-related Diagnostic Information", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].		EC section
	☐ DTC (P0731, 1103) A/T 1st gear function, AT-126. ☐ DTC (P0732, 1104) A/T 2nd gear function, AT-132. ☐ DTC (P0733, 1105) A/T 3rd gear function, AT-138. ☐ DTC (P0734, 1106) A/T 4th gear function, AT-144. ☐ DTC (P0744, 1107) A/T TCC S/V function (lock-up), AT-158.		
8.	☐ Perform the Diagnostic Procedures for all remaining items marked NG. Repair or replace the damaged parts. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the component inspection orders.)		AT-84 AT-95
9.	☐ Erase DTC from TCM and ECM memories.		AT-37

Work Flow

NDAT0027

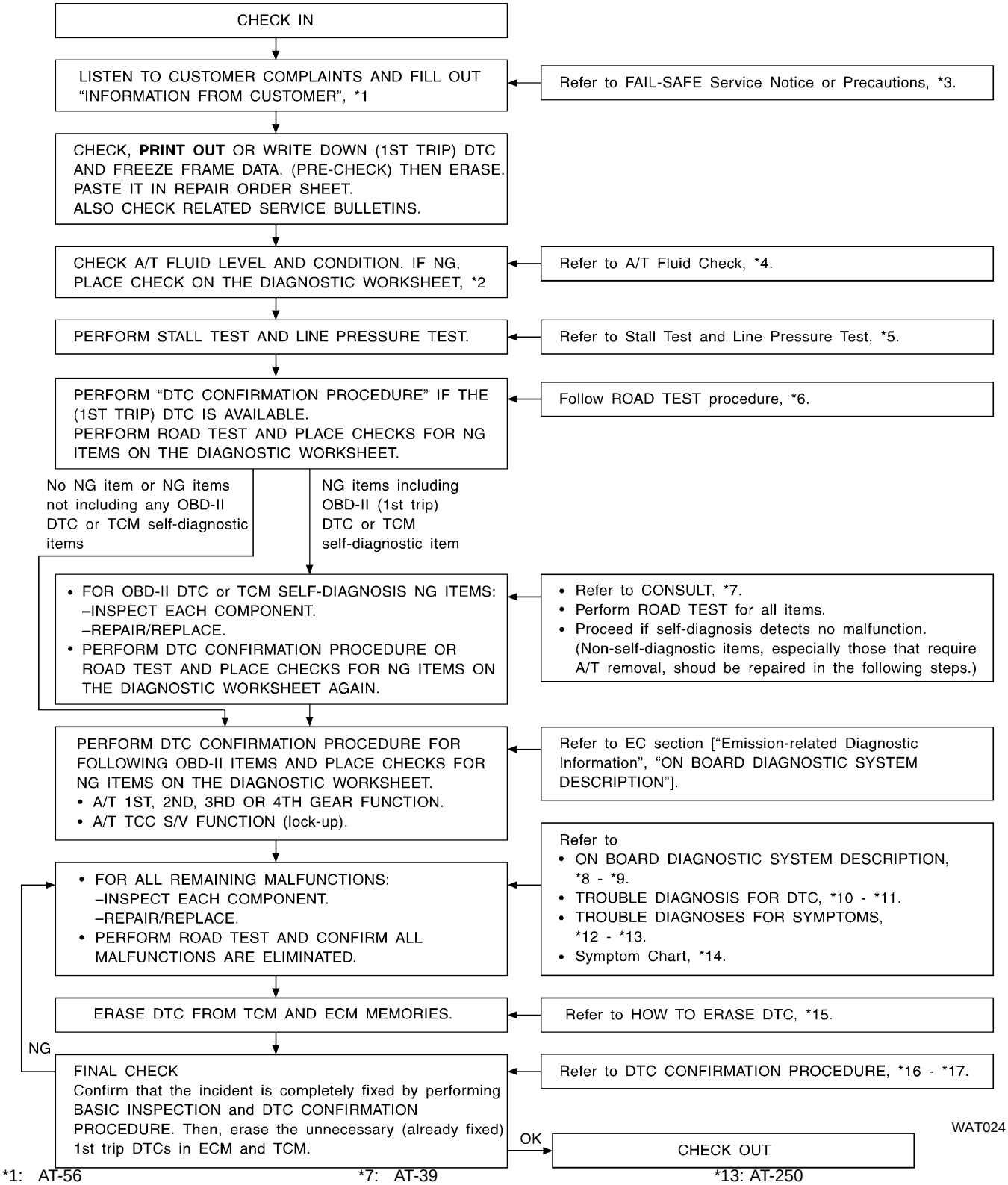
HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

NDAT0027S01

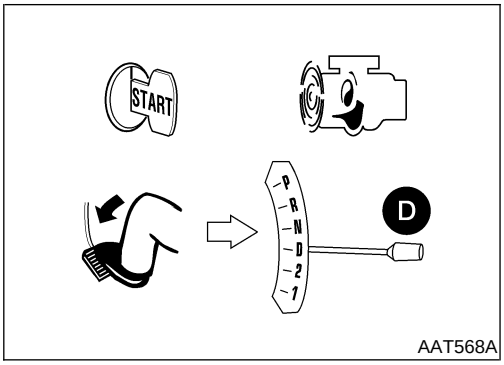
A good understanding of the malfunction conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.
Make good use of the two sheets provided, “Information from Customer” (AT-56) and “Diagnostic Worksheet” (AT-57), to perform the best troubleshooting possible.

WORK FLOW CHART

=NDAT0027S02



*1: AT-56
*2: AT-57
*3: AT-8
*4: AT-61
*5: AT-61, 65
*6: AT-66
*7: AT-39
*8: AT-35
*9: AT-52
*10: AT-102
*11: AT-201
*12: AT-209
*13: AT-250
*14: AT-84
*15: AT-37
*16: AT-103
*17: AT-205



AAT568A

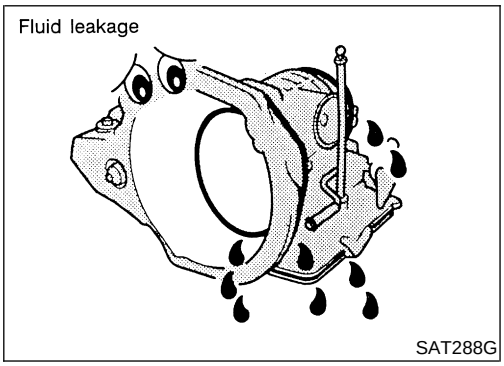
A/T Fluid Check

NDAT0028

FLUID LEAKAGE CHECK

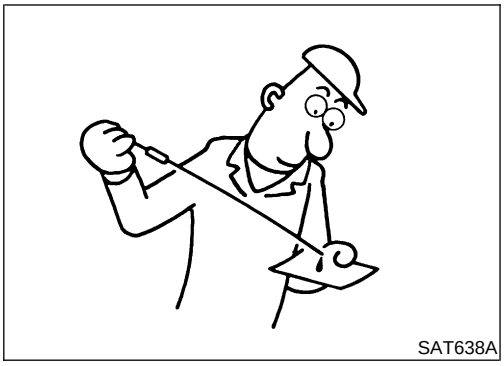
NDAT0028S01

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.



SAT288G

4. Check for fresh leakage.


SAT638A

FLUID CONDITION CHECK

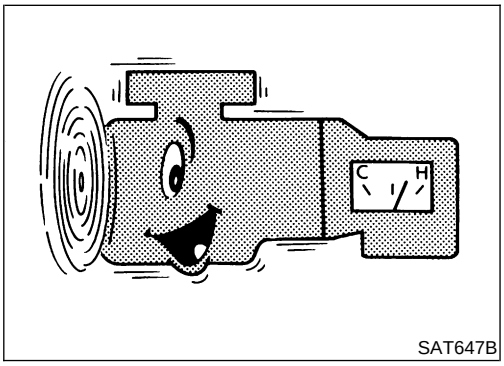
NDAT0028S02

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

NDAT0028S03

Refer to ***MA-25*** “Checking A/T Fluid”.



SAT647B

Stall Test

NDAT0029

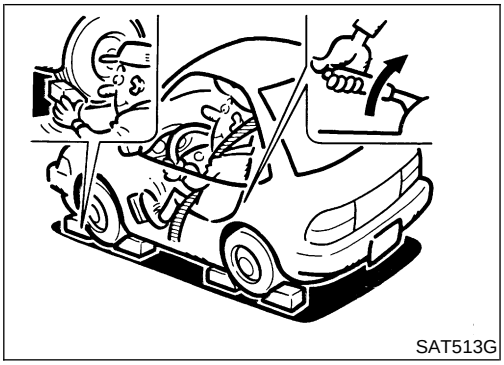
STALL TEST PROCEDURE

NDAT0029S01

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

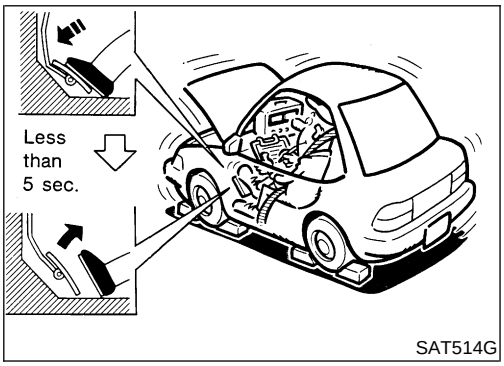
ATF operating temperature:
50 - 80°C (122 - 176°F)

Stall Test (Cont'd)


SAT513G

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

- **It is good practice to mark the point of specified engine rpm on indicator.**

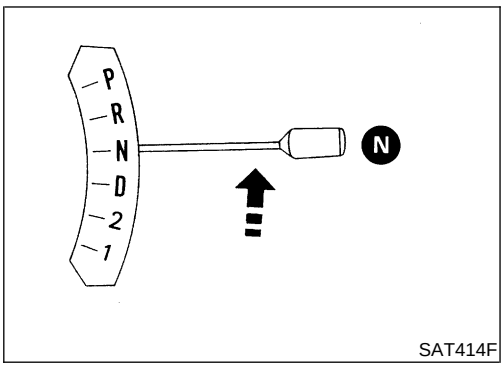


SAT514G

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

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

Stall revolution:
1,900 - 2,200 rpm



SAT414F

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.

JUDGEMENT OF STALL TEST

NDAT0029S02

The test result and possible damaged components relating to each result are shown in the illustrations on next page.
In order to pinpoint the possible damaged components, follow the "WORK FLOW CHART"shown in AT-60.

NOTE:
Stall revolution is too high in D, 2 or 1 position:

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

Stall revolution is too high in R position:

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

Stall revolution within specifications:

- Vehicle does not achieve speed of more than 80 km/h (50

MPH). ..... One-way clutch seizure in torque converter housing

CAUTION:

Be careful since automatic fluid temperature increases abnormally.

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

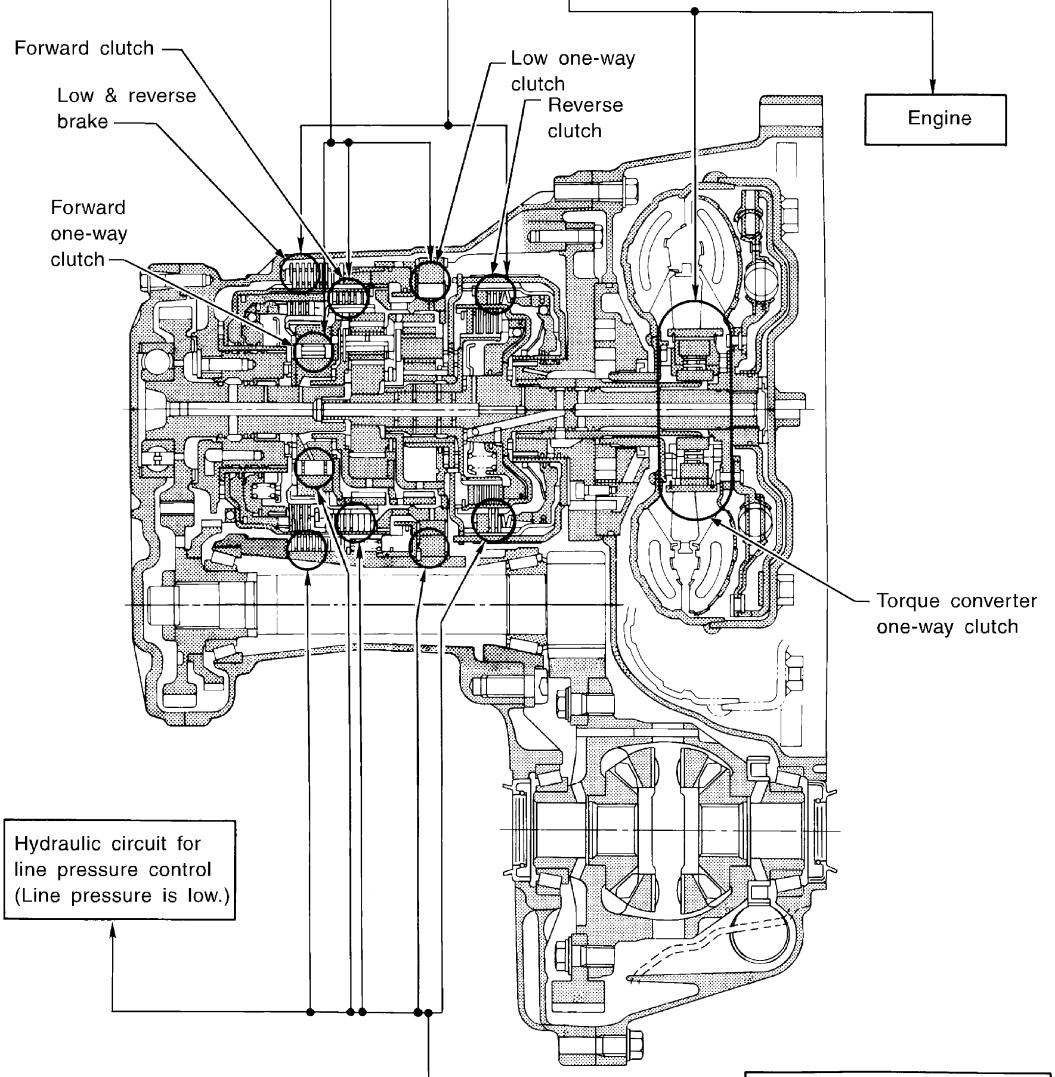
Stall revolution less than specifications:

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

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.

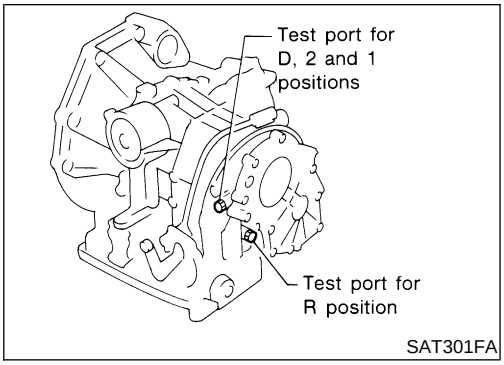
Damaged components



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.)

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

SAT907I



SAT301FA

Line Pressure Test

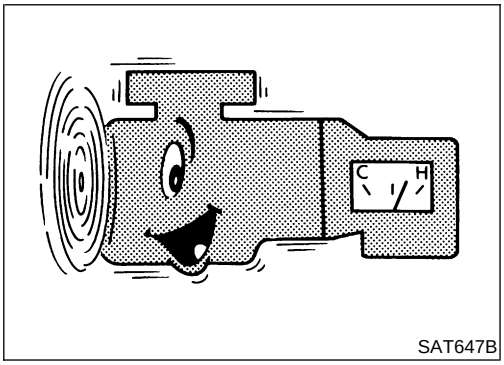
NDAT0030

LINE PRESSURE TEST PORTS

NDAT0030S01

Location of line pressure test ports are shown in the illustration.

- **Always replace pressure plugs as they are self-sealing bolts.**



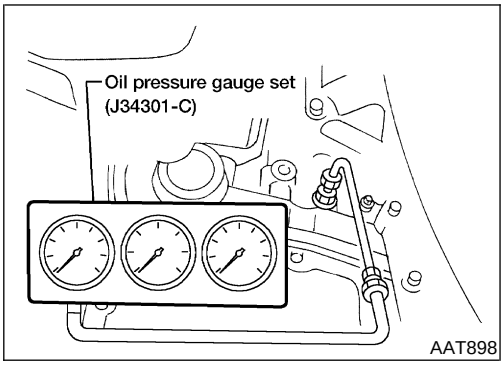
SAT647B

LINE PRESSURE TEST PROCEDURE

NDAT0030S02

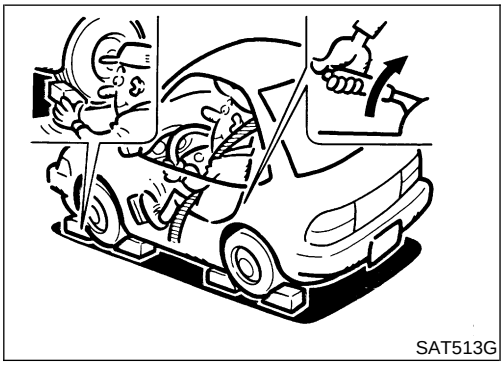
1. Check A/T fluid and engine oil levels. If necessary, add fluid and oil.
2. Drive vehicle for approx. 10 minutes or until fluid and oil reach operating temperature.

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

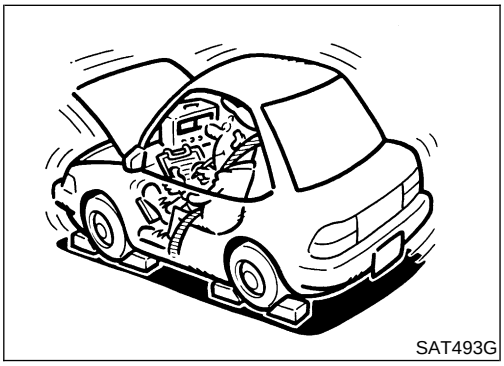


AAT898

3. Install pressure gauge to corresponding line pressure port.


SAT513G

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


SAT493G

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

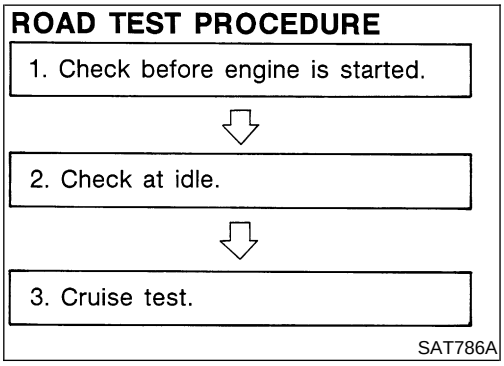
  Line pressure: Refer to SDS, AT-365.

Line Pressure Test (Cont'd)

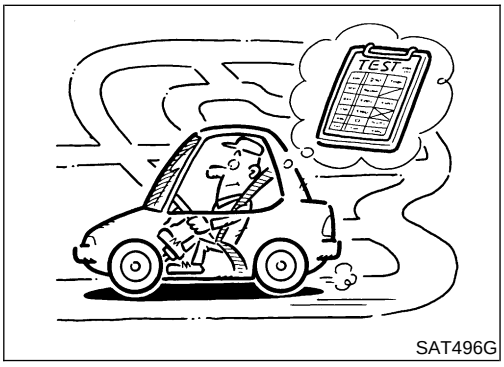
JUDGEMENT OF LINE PRESSURE TEST

NDAT0030S03

Judgement		Suspected parts
At idle	Line pressure is low in all positions.	• Oil pump wear • Control piston damage • Pressure regulator valve or plug sticking • Spring for pressure regulator valve damaged • Fluid pressure leakage between oil strainer and pressure regulator valve • Clogged strainer
	Line pressure is low in particular position.	• Fluid pressure leakage between manual valve and particular clutch • For example, line pressure is: − Low in R and 1 positions, but − Normal in D and 2 positions. Therefore, fluid leakage exists at or around low and reverse brake circuit. Refer to "CLUTCH AND BRAKE CHART", AT-19.
	Line pressure is high.	• Maladjustment of throttle position sensor • A/T fluid temperature sensor damaged • Line pressure solenoid valve sticking • Short circuit of line pressure solenoid valve circuit • Pressure modifier valve sticking • Pressure regulator valve or plug sticking • Open in dropping resistor circuit
At stall speed	Line pressure is low.	• Maladjustment of throttle position sensor • Line pressure solenoid valve sticking • Short circuit of line pressure solenoid valve circuit • Pressure regulator valve or plug sticking • Pressure modifier valve sticking • Pilot valve sticking



SAT786A



SAT496G

Road Test

NDAT0031

DESCRIPTION

NDAT0031S01

- The purpose of the test is to determine overall performance of A/T and analyze causes of problems.
- The road test consists of the following three parts:

1. Check before engine is started
2. Check at idle
3. Cruise test

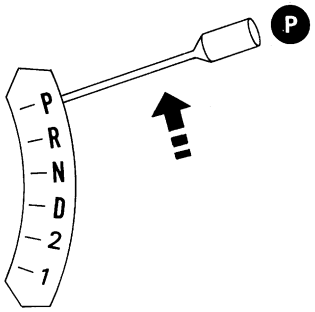
- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items until specified symptom is found. Troubleshoot items which check out No Good after road test. Refer to "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" and "TROUBLE DIAGNOSES FOR SYMPTOMS", AT-35 to AT-52 and AT-209 to AT-250.

1. CHECK BEFORE ENGINE IS STARTED

=NDAT0031S02

1	CHECK O/D OFF INDICATOR LAMP

1. Park vehicle on flat surface.
2. Move selector lever to P position.



SAT408F

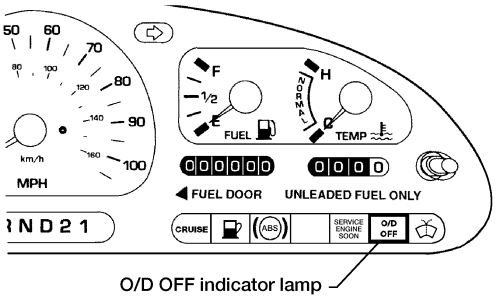
3. Turn ignition switch to OFF position. Wait at least 5 seconds.
4. Turn ignition switch to ON position. (Do not start engine.)
5. Does O/D OFF indicator lamp come on for about 2 seconds?

Yes or No

Yes	▶	GO TO 2.
No	▶	Stop ROAD TEST. Go to "1. O/D OFF Indicator Lamp Does Not Come On", AT-212.

2	CHECK O/D OFF INDICATOR LAMP

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



AAT344A

Yes or No

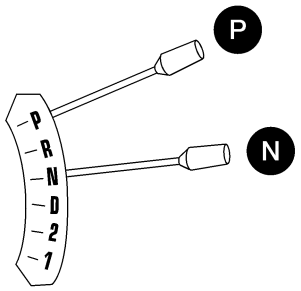
Yes	▶	Perform self-diagnosis and check NG items on the DIAGNOSTIC WORKSHEET, AT-56. Refer to TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS), AT-48.
No	▶	1. Turn ignition switch to OFF position. 2. Perform self-diagnosis and note NG items. Refer to TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS), AT-48. 3. Go to "2. CHECK AT IDLE", AT-68.

2. CHECK AT IDLE

NDAT0031S03

1	CHECK ENGINE START

1. Park vehicle on flat surface.
2. Move selector lever to P position.



AAT579A

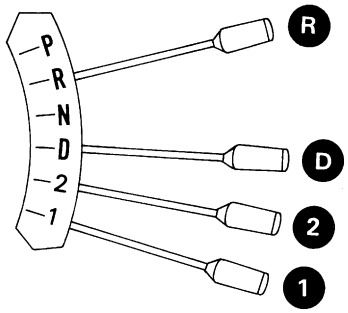
3. Turn ignition switch to OFF position.
4. Turn ignition switch to START position.
5. Is engine started?

Yes or No

Yes	▶	GO TO 2.
No	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "2. Engine Cannot Be Started In P and N Position", AT-214. Continue ROAD TEST.

2	CHECK ENGINE START

1. Turn ignition switch to ACC position.
2. Move selector lever to D, 1, 2 or R position.



SAT412F

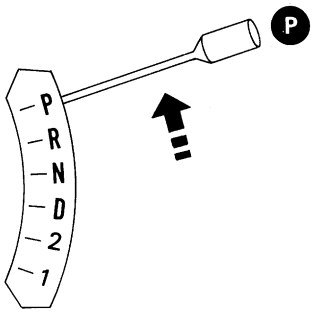
3. Turn ignition switch to START position.
4. Is engine started?

Yes or No

Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Mark the box on the DIAGNOSTIC WORKSHEET. Go to "2. Engine Cannot Be Started In P and N Position", AT-214. Continue ROAD TEST.
No	▶	GO TO 3.

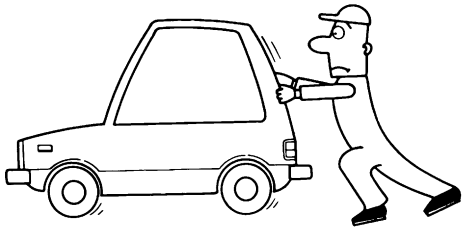
3	CHECK VEHICLE MOVE

1. Move selector lever to P position.



SAT408F

2. Turn ignition switch to OFF position.
3. Release parking brake.
4. Push vehicle forward or backward.



SAT796A

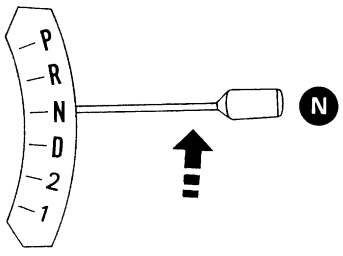
5. Does vehicle move when it is pushed forward or backward?
6. Apply parking brake.

Yes or No

Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "3. In P Position, Vehicle Moves Forward Or Backward When Pushed", AT-215. Continue ROAD TEST.
No	▶	GO TO 4.

4	CHECK VEHICLE MOVE

1. Start engine.
2. Move selector lever to N position.



SAT414F

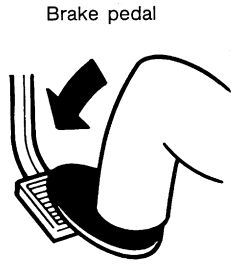
3. Release parking brake.
4. Does vehicle move forward or backward?

Yes or No

Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "4. In N Position, Vehicle Moves", AT-216. Continue ROAD TEST.
No	▶	GO TO 5.

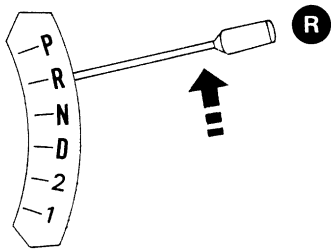
5	CHECK SHIFT LOCK

1. Apply foot brake.



SAT797A

2. Move selector lever to R position.



SAT416F

3. Is there large shock when changing from N to R position?

Yes or No

Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "5. Large Shock N → R Position", AT-218. Continue ROAD TEST.
No	▶	GO TO 6.

6	CHECK VEHICLE MOVE

1. Release foot brake for several seconds.

SAT799A

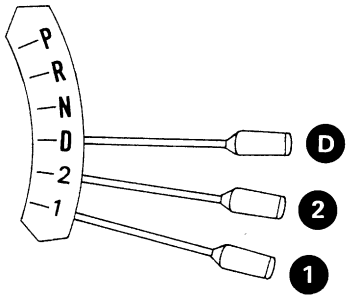
2. Does vehicle creep backward when foot brake is released?

Yes or No

Yes	▶	GO TO 7.
No	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "6. Vehicle Does Not Creep Backward In R Position", AT-220. Continue ROAD TEST.

7	CHECK VEHICLE MOVE

1. Move selector lever to D, 2 and 1 positions and check if vehicle creeps forward.

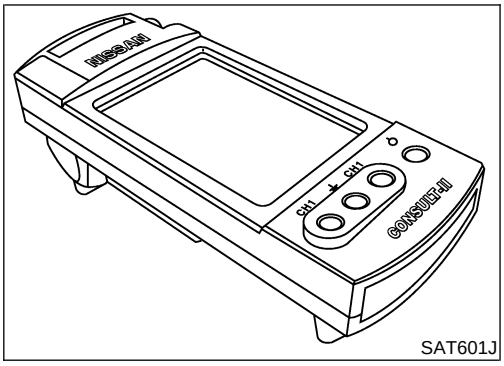


SAT418F

2. Does vehicle creep forward in all three positions?

Yes or No

Yes	▶	Go to 3. CRUISE TEST, AT-71.
No	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position", AT-224. Continue ROAD TEST.



SAT601J

3. CRUISE TEST

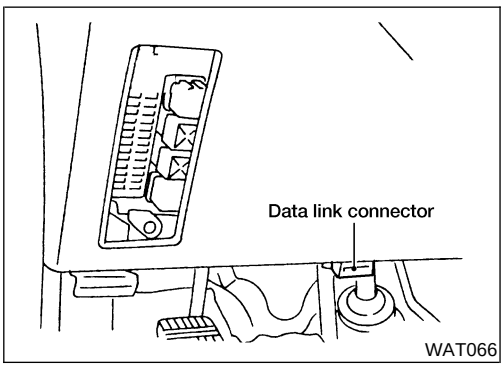
NDAT0031S04

- Check all items listed in Parts 1 through 3.

With CONSULT-II

NDAT0031S0401

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

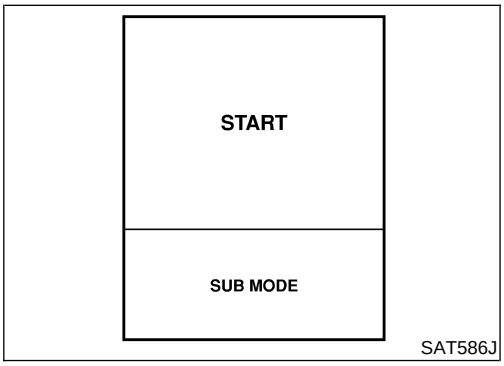


WAT066

CONSULT-II Setting Procedure

NDAT0031S0402

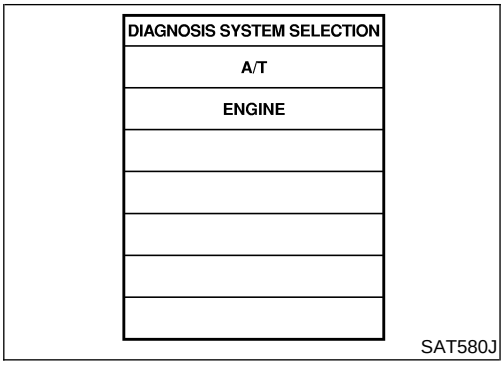
1. Turn ignition switch OFF.
2. Connect CONSULT-II to Data link connector. Data link connector for CONSULT-II is located in left side dash panel lower.



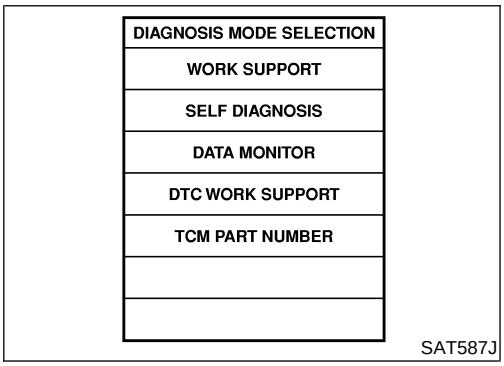
SAT586J

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

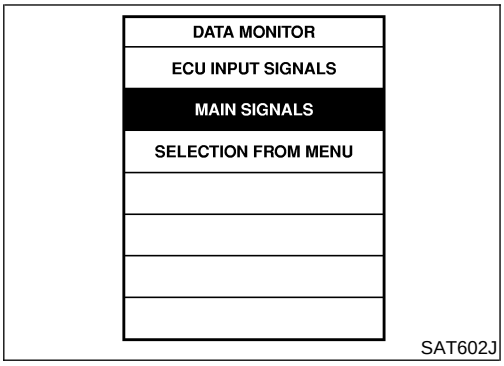
Road Test (Cont'd)



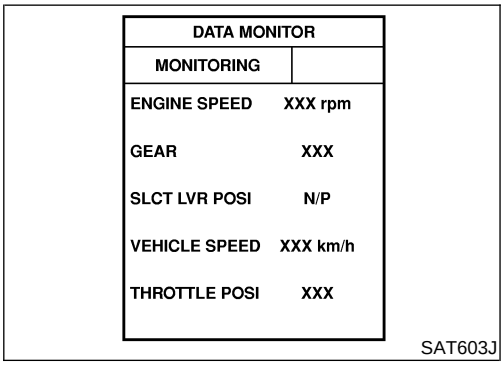
5. Touch "A/T".



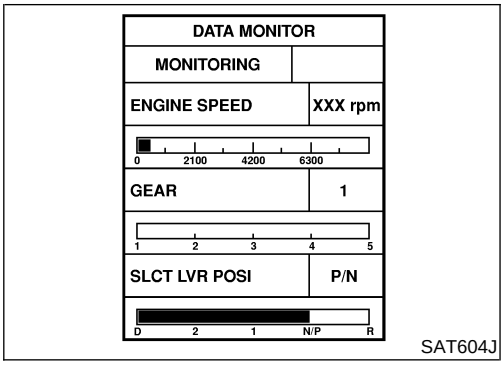
6. Touch "DATA MONITOR".



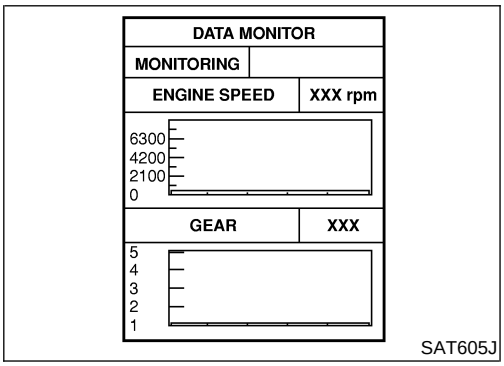
7. Touch "MAIN SIGNALS" to set recording condition.
8. See "NUMERICAL DISPLAY","BARCHART DISPLAY" or "LINE GRAPH DISPLAY".
9. Touch "START"



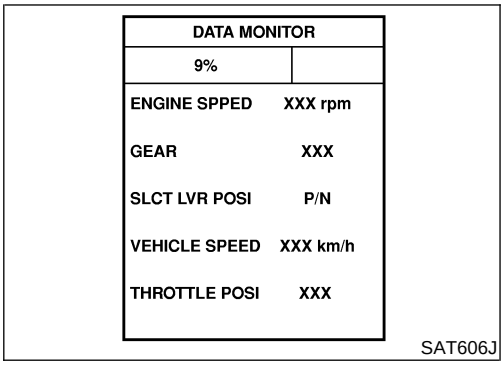
10. When performing cruise test, touch "Store Data" key.



SAT604J

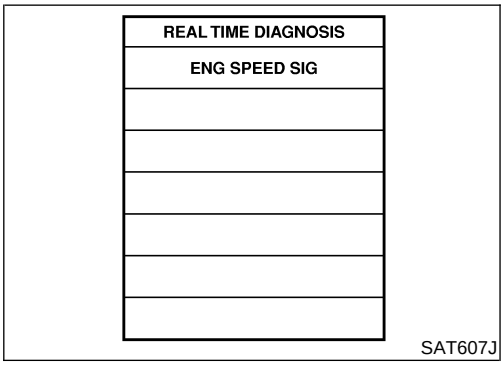


SAT605J



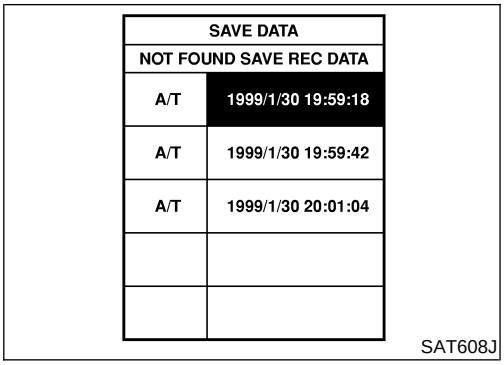
SAT606J

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

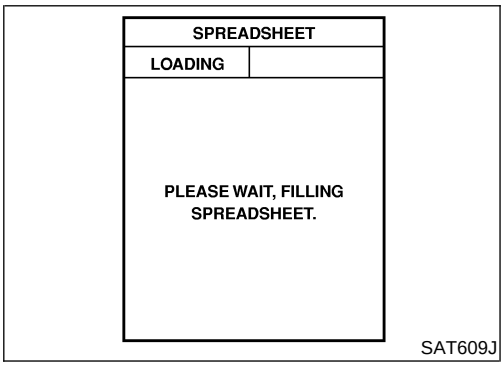


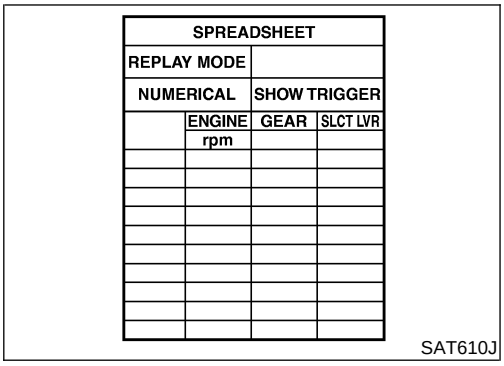
SAT607J

12. Touch "DISPLAY".
13. Touch "BACK".

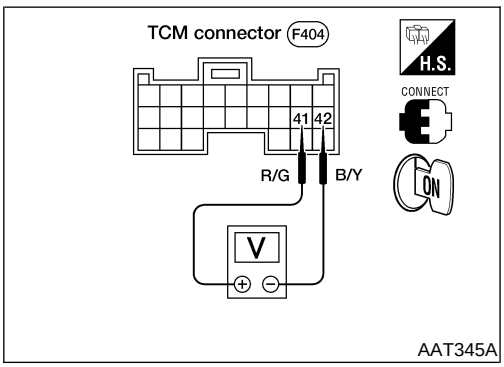


14. Touch "STORE".





15. Touch "BACK".
16. Touch "DISPLAY".
17. Touch "Print All"
18. Check the monitor data printed out.
19. Continue cruise test part 2 and 3.



Without CONSULT-II

NDAT0031S0403

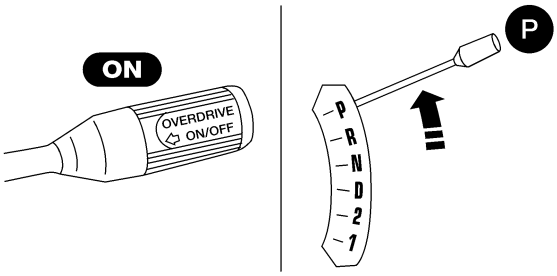
- Throttle position sensor can be checked by voltage across terminals 41 and 42 of TCM.

Cruise Test — Part 1

=NDAT0031S0404

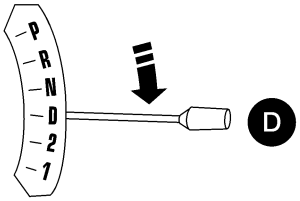
1	CHECK STARTING GEAR (D_1) POSITION

1. Drive vehicle for approx. 10 minutes to warm engine oil and ATF up to operating temperature.
   ATF operating temperature:
   50 - 80°C (122 - 176°F)
2. Park vehicle on flat surface.
3. Set overdrive control switch to ON position.
4. Move selector lever to P position.



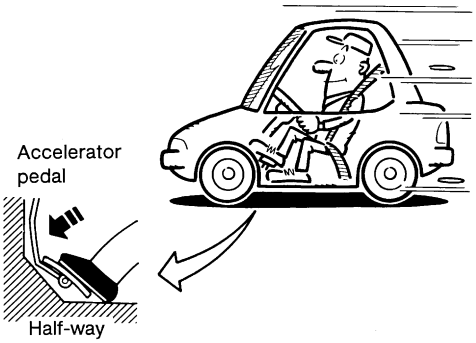
AAT569A

5. Start engine.
6. Move selector lever to D position.



AAT570A

7. Accelerate vehicle by constantly depressing accelerator pedal half-way.



SAT495G

8. Does vehicle start from D_1?
   Read gear position.

Yes or No

Yes	▶	GO TO 2.
No	▶	Go to "8. Vehicle Cannot Be Started From D_1", AT-227. Continue ROAD TEST.

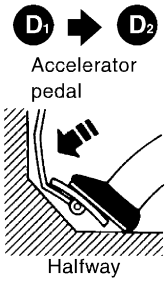
2	CHECK SHIFT UP (D_1 TO D_2)

Does A/T shift from D_1 to D_2 at the specified speed?

Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_1 to D_2:

Refer to Shift schedule, AT-365.



SAT954I

Yes or No

Yes	▶	GO TO 3.
No	▶	Go to "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-230. Continue ROAD TEST.

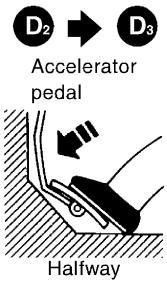
3	CHECK SHIFT UP (D_2 TO D_3)

Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_2 to D_3:

Refer to Shift schedule, AT-365.



SAT955I

Yes or No

Yes	▶	GO TO 4.
No	▶	Go to "10. A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-233. Continue ROAD TEST.

4	CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_3 to D_4:

Refer to shift schedule, AT-365.

Yes or No

Yes	▶	GO TO 5.
No	▶	Go to "11. A/T Does Not Shift: $D_3 \rightarrow D_4$", AT-236. Continue ROAD TEST.

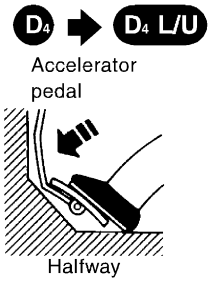
5	CHECK LOCK-UP (D_4 TO D_4L/U)

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

Read vehicle speed, throttle position when lock-up duty becomes 94%.

Specified speed when lock-up occurs:

Refer to Shift schedule, AT-365.



SAT957I

Yes or No

Yes	▶	GO TO 6.
No	▶	Go to "12. A/T Does Not Perform Lock-up", AT-239. Continue ROAD TEST.

6	CHECK HOLD LOCK-UP

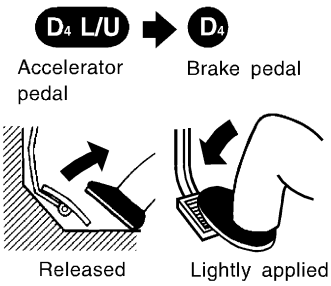
Does A/T hold lock-up condition for more than 30 seconds?

Yes or No

Yes	▶	GO TO 7.
No	▶	Go to "13. A/T Does Not Hold Lock-up Condition", AT-241.

7	CHECK SHIFT DOWN (D_4L/U TO D_4)

1. Release accelerator pedal.



SAT958I

2. Is lock-up released when accelerator pedal is released?

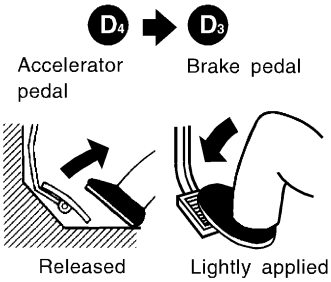
Yes or No

Yes	▶	GO TO 8.
No	▶	Go to "14. Lock-up Is Not Released", AT-243. Continue ROAD TEST.

Road Test (Cont'd)

8	CHECK SHIFT DOWN (D_4 TO D_3)

1. Decelerate vehicle by applying foot brake lightly.



SAT959I

2. Does engine speed return to idle smoothly when A/T is shifted from D_4 to D_3?
   Read gear position and engine speed.

Yes or No

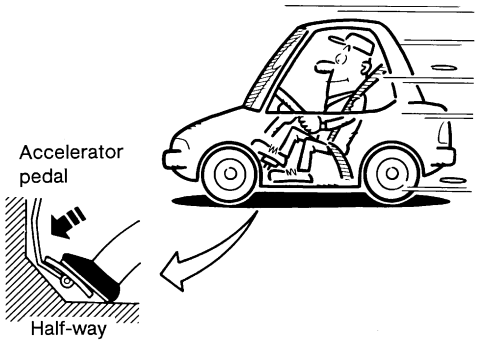
Yes	▶	1. Stop vehicle. 2. Go to "Cruise Test — Part 2", AT-79.
No	▶	Go to "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-244. Continue ROAD TEST.

Cruise Test — Part 2

=NDAT0031S0405

1	CHECK STARTING GEAR (D_1) POSITION

1. Confirm overdrive control switch is in ON position.
2. Confirm selector lever is in D position.
3. Accelerate vehicle by half throttle again.



SAT495G

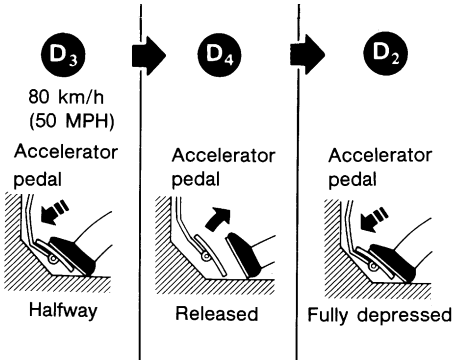
4. Does vehicle start from D_1?
   Read gear position.

Yes or No

Yes	▶	GO TO 2.
No	▶	Go to "16. Vehicle Does Not Start From D_1", AT-246. Continue ROAD TEST.

2	CHECK SHIFT UP AND SHIFT DOWN (D_3 TO D_4 TO D_2)

1. Accelerate vehicle to 80 km/h (50 MPH) as shown in illustration.
2. Release accelerator pedal and then quickly depress it fully.



SAT404H

3. Does A/T shift from D_4 to D_2 as soon as accelerator pedal is depressed fully?
   Read gear position and throttle position.

Yes or No

Yes	▶	GO TO 3.
No	▶	Go to "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-230. Continue ROAD TEST.

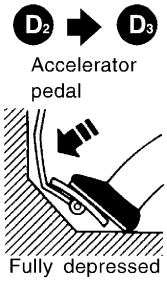
3	CHECK SHIFT UP (D_2 TO D_3)

Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_2 to D_3:

Refer to Shift schedule, AT-365.



SAT960I

Yes or No

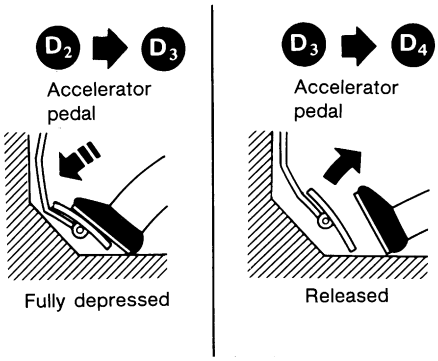
Yes	▶	GO TO 4.
No	▶	Go to "10. A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-233. Continue ROAD TEST.

4	CHECK SHIFT UP (D_3 TO D_4) AND ENGINE BRAKE

Release accelerator pedal after shifting from D_2 to D_3.

Does A/T shift from D_3 to D_4 and does vehicle decelerate by engine brake?

Read gear position, throttle position and vehicle speed.



SAT405H

Yes or No

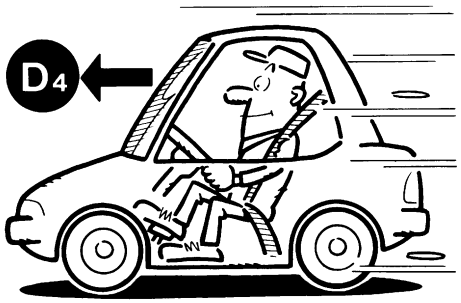
Yes	▶	1. Stop vehicle. 2. Go to "CRUISE TEST — Part 3", AT-81.
No	▶	Go to "11. A/T Does Not Shift: $D_3 \rightarrow D_4$", AT-236. Continue ROAD TEST.

Cruise Test — Part 3

=NDAT0031S0406

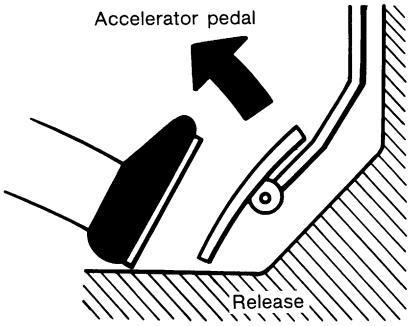
1	VEHICLE SPEED (D_4) POSITION

1. Confirm overdrive control switch is in ON position.
2. Confirm selector lever is in D position.
3. Accelerate vehicle using half-throttle to D_4.



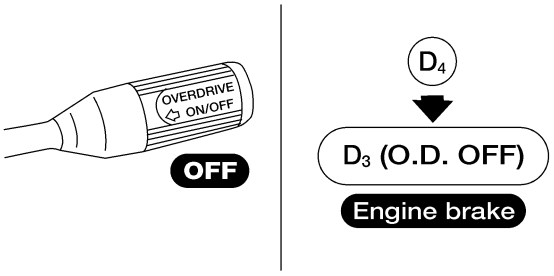
SAT812A

4. Release accelerator pedal.



SAT813A

5. Set overdrive control switch to OFF position while driving in D_4.
6. Does A/T shift from D_4 to D_3 (O/D OFF)?
   Ⓟ **Read gear position and vehicle speed.**



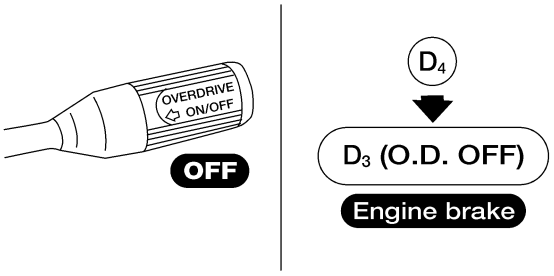
AAT571A

Yes or No

Yes	▶	GO TO 2.
No	▶	Go to "17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch ON → OFF, AT-247. Continue ROAD TEST.

2	CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?



AAT571A

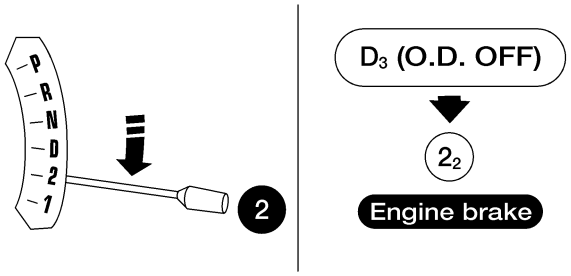
Yes or No

Yes	▶	GO TO 3.
No	▶	Go to "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-244. Continue ROAD TEST.

3	CHECK SHIFT DOWN (D_3 TO D_2)

1. Move selector lever from D to 2 position while driving in D_3 (O/D OFF).
2. Does A/T shift from D_3 (O/D OFF) to 2_2?

Read gear position.



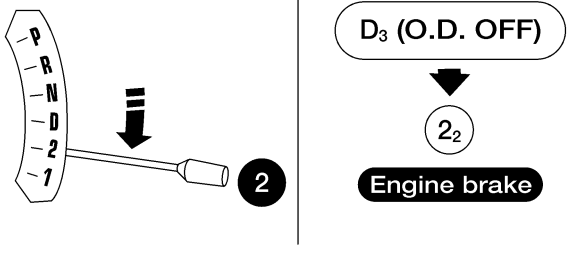
AAT572A

Yes or No

Yes	▶	GO TO 4.
No	▶	Go to "18. A/T Does Not Shift: $D_3 \rightarrow D_2$, When Selector Lever D → 2 Position", AT-248. Continue ROAD TEST.

4	CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?



AAT572A

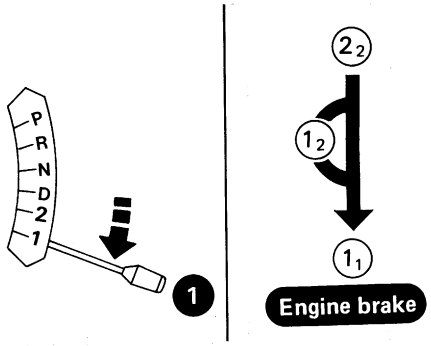
Yes or No

Yes	▶	GO TO 5.
No	▶	Go to "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-244. Continue ROAD TEST.

5	CHECK SHIFT DOWN (2_2 TO 1_1)

1. Move selector lever from 2 to 1 position while driving in 2_2.
2. Does A/T shift from 2_2 to 1_1 position?

Ⓔ **Read gear position.**



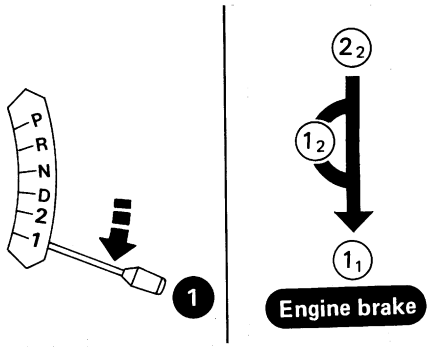
SAT425F

Yes or No

Yes	▶	GO TO 6.
No	▶	Go to "19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever 2 → 1 Position", AT-249. Continue ROAD TEST.

6	CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?



SAT425F

Yes or No

Yes	▶	1. Stop vehicle. 2. Perform self-diagnosis. Refer to TCM Self-diagnostic Procedure (No Tools), AT-48.
No	▶	Go to "20. Vehicle Does Not Decelerate By Engine Brake", AT-250. Continue ROAD TEST.

Symptom Chart

NDAT0032

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

Symptom	Condition	Diagnostic Item	Reference Page
Engine cannot be started in P and N positions. AT-214	ON vehicle	1. Ignition switch and starter	***SC-6***
		2. Control cable adjustment	AT-268
		3. Park/neutral position (PNP) switch adjustment	AT-267
Engine starts in positions other than P and N. AT-214	ON vehicle	1. Control cable adjustment	AT-268
		2. Park/neutral position (PNP) switch adjustment	AT-267
Transaxle noise in P and N positions.	ON vehicle	1. Fluid level	AT-61
		2. Line pressure test	AT-65
		3. Throttle position sensor (Adjustment)	***EC-41***
		4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-116, 201
		5. Engine speed signal	AT-122
	OFF vehicle	6. Oil pump	AT-294
		7. Torque converter	AT-277
Vehicle moves when changing into P position or parking gear does not disengage when shifted out of P position. AT-215	ON vehicle	1. Control cable adjustment	AT-268
	OFF vehicle	2. Parking components	AT-346
Vehicle runs in N position. AT-216	ON vehicle	1. Control cable adjustment	AT-268
	OFF vehicle	2. Forward clutch	AT-320
		3. Reverse clutch	AT-312
		4. Overrun clutch	AT-320
Vehicle will not run in R position (but runs in D, 2 and 1 positions). Clutch slips. Very poor acceleration. AT-220	ON vehicle	1. Control cable adjustment	AT-268
		2. Line pressure test	AT-65
		3. Line pressure solenoid valve	AT-166
		4. Control valve assembly	AT-266
	OFF vehicle	5. Reverse clutch	AT-312
		6. High clutch	AT-315
		7. Forward clutch	AT-320
		8. Overrun clutch	AT-320
		9. Low & reverse brake	AT-325

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Vehicle braked when shifting into R position.	ON vehicle	1. Fluid level	AT-61
		2. Control cable adjustment	AT-268
		3. Line pressure test	AT-65
		4. Line pressure solenoid valve	AT-166
		5. Control valve assembly	AT-266
	OFF vehicle	6. High clutch	AT-315
		7. Brake band	AT-337
		8. Forward clutch	AT-320
		9. Overrun clutch	AT-320
Sharp shock in shifting from N to D position.	ON vehicle	1. Engine idling rpm	***EC-41***
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Line pressure test	AT-65
		4. A/T fluid temperature sensor	AT-109
		5. Engine speed signal	AT-122
		6. Line pressure solenoid valve	AT-166
		7. Control valve assembly	AT-266
		8. Accumulator N-D	AT-266
	OFF vehicle	9. Forward clutch	AT-320
Vehicle will not run in D and 2 positions (but runs in 1 and R positions).	ON vehicle	1. Control cable adjustment	AT-268
	OFF vehicle	2. Low one-way clutch	AT-272
Vehicle will not run in D, 1, 2 positions (but runs in R position). Clutch slips. Very poor acceleration. AT-224	ON vehicle	1. Fluid level	AT-61
		2. Line pressure test	AT-65
		3. Line pressure solenoid valve	AT-166
		4. Control valve assembly	AT-266
		5. Accumulator N-D	AT-266
	OFF vehicle	6. Reverse clutch	AT-312
		7. High clutch	AT-315
		8. Forward clutch	AT-320
		9. Forward one-way clutch	AT-328
		10. Low one-way clutch	AT-272

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Clutches or brakes slip somewhat in starting.	ON vehicle	1. Fluid level	AT-61
		2. Control cable adjustment	AT-268
		3. Throttle position sensor (Adjustment)	***EC-41***
		4. Line pressure test	AT-65
		5. Line pressure solenoid valve	AT-166
		6. Control valve assembly	AT-266
		7. Accumulator N-D	AT-266
	OFF vehicle	8. Forward clutch	AT-320
		9. Reverse clutch	AT-312
		10. Low & reverse brake	AT-325
		11. Oil pump	AT-294
		12. Torque converter	AT-277
Excessive creep.	ON vehicle	1. Engine idling rpm	***EC-41***
No creep at all. AT-220, 224	ON vehicle	1. Fluid level	AT-61
		2. Line pressure test	AT-65
		3. Control valve assembly	AT-266
	OFF vehicle	4. Forward clutch	AT-320
		5. Oil pump	AT-294
		6. Torque converter	AT-277
Failure to change gear from D_1 to D_2.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-267
		2. Control cable adjustment	AT-268
		3. Shift solenoid valve A	AT-172
		4. Control valve assembly	AT-266
		5. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-116, 201
	OFF vehicle	6. Brake band	AT-337
Failure to change gear from D_2 to D_3.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-267
		2. Control cable adjustment	AT-268
		3. Shift solenoid valve B	AT-177
		4. Control valve assembly	AT-266
		5. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-116, 201
	OFF vehicle	6. High clutch	AT-315
		7. Brake band	AT-337

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Failure to change gear from D_3 to D_4.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-267
		2. Control cable adjustment	AT-268
		3. Shift solenoid valve A	AT-172
		4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-116, 201
		5. A/T fluid temperature sensor	AT-109
	OFF vehicle	6. Brake band	AT-337
Too high a gear change point from D_1 to D_2, from D_2 to D_3, from D_3 to D_4. AT-230, 233, 236	ON vehicle	1. Throttle position sensor (Adjustment)	***EC-41***
		2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-116, 201
		3. Shift solenoid valve A	AT-172
		4. Shift solenoid valve B	AT-177
Gear change directly from D_1 to D_3 occurs.	ON vehicle	1. Fluid level	AT-61
		2. Accumulator servo release	AT-266
	OFF vehicle	3. Brake band	AT-337
Engine stops when shifting lever into R, D, 2 and 1.	ON vehicle	1. Engine idling rpm	***EC-41***
		2. Torque converter clutch solenoid valve	AT-153
		3. Control valve assembly	AT-266
	OFF vehicle	4. Torque converter	AT-277
Too sharp a shock in change from D_1 to D_2.	ON vehicle	1. Throttle position sensor (Adjustment)	***EC-41***
		2. Line pressure test	AT-65
		3. Accumulator servo release	AT-266
		4. Control valve assembly	AT-266
		5. A/T fluid temperature sensor	AT-109
	OFF vehicle	6. Brake band	AT-337
Too sharp a shock in change from D_2 to D_3.	ON vehicle	1. Throttle position sensor (Adjustment)	***EC-41***
		2. Line pressure test	AT-65
		3. Control valve assembly	AT-266
	OFF vehicle	4. High clutch	AT-315
		5. Brake band	AT-337
Too sharp a shock in change from D_3 to D_4.	ON vehicle	1. Throttle position sensor (Adjustment)	***EC-41***
		2. Line pressure test	AT-65
		3. Control valve assembly	AT-266
	OFF vehicle	4. Brake band	AT-337
		5. Overrun clutch	AT-320

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Almost no shock or clutches slipping in change from D_1 to D_2.	ON vehicle	1. Fluid level	AT-61
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Line pressure test	AT-65
		4. Accumulator servo release	AT-266
		5. Control valve assembly	AT-266
	OFF vehicle	6. Brake band	AT-337
Almost no shock or slipping in change from D_2 to D_3.	ON vehicle	1. Fluid level	AT-61
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Line pressure test	AT-65
		4. Control valve assembly	AT-266
	OFF vehicle	5. High clutch	AT-315
		6. Forward clutch	AT-320
Almost no shock or slipping in change from D_3 to D_4.	ON vehicle	1. Fluid level	AT-61
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Line pressure test	AT-65
		4. Control valve assembly	AT-266
	OFF vehicle	5. High clutch	AT-315
		6. Brake band	AT-337
Vehicle braked by gear change from D_1 to D_2.	ON vehicle	1. Fluid level	AT-61
	OFF vehicle	2. Reverse clutch	AT-312
		3. Low & reverse brake	AT-325
		4. High clutch	AT-315
		5. Low one-way clutch	AT-272
Vehicle braked by gear change from D_2 to D_3.	ON vehicle	1. Fluid level	AT-61
	OFF vehicle	2. Brake band	AT-337
Vehicle braked by gear change from D_3 to D_4.	ON vehicle	1. Fluid level	AT-61
	OFF vehicle	2. Overrun clutch	AT-320
		3. Forward one-way clutch	AT-328
		4. Reverse clutch	AT-312

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Maximum speed not attained. Acceleration poor.	ON vehicle	1. Fluid level	AT-61
		2. Park/neutral position (PNP) switch adjustment	AT-267
		3. Shift solenoid valve A	AT-172
		4. Shift solenoid valve B	AT-177
		5. Control valve assembly	AT-266
	OFF vehicle	6. Reverse clutch	AT-312
		7. High clutch	AT-315
		8. Brake band	AT-337
		9. Low & reverse brake	AT-325
		10. Oil pump	AT-294
		11. Torque converter	AT-277
Failure to change gear from D_4 to D_3.	ON vehicle	1. Fluid level	AT-61
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Overrun clutch solenoid valve	AT-189
		4. Shift solenoid valve A	AT-172
		5. Line pressure solenoid valve	AT-166
		6. Control valve assembly	AT-266
	OFF vehicle	7. Low & reverse brake	AT-325
		8. Overrun clutch	AT-320
Failure to change gear from D_3 to D_2 or from D_4 to D_2.	ON vehicle	1. Fluid level	AT-61
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Shift solenoid valve A	AT-172
		4. Shift solenoid valve B	AT-177
		5. Control valve assembly	AT-266
	OFF vehicle	6. High clutch	AT-315
		7. Brake band	AT-337
Failure to change gear from D_2 to D_1 or from D_3 to D_1.	ON vehicle	1. Fluid level	AT-61
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Shift solenoid valve A	AT-172
		4. Shift solenoid valve B	AT-177
		5. Control valve assembly	AT-266
	OFF vehicle	6. Low one-way clutch	AT-272
		7. High clutch	AT-315
		8. Brake band	AT-337

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Gear change shock felt during deceleration by releasing accelerator pedal.	ON vehicle	1. Throttle position sensor (Adjustment)	***EC-41***
		2. Line pressure test	AT-65
		3. Overrun clutch solenoid valve	AT-189
		4. Control valve assembly	AT-266
Too high a change point from D_4 to D_3, from D_3 to D_2, from D_2 to D_1.	ON vehicle	1. Throttle position sensor (Adjustment)	***EC-41***
		2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-116, 201
Kickdown does not operate when depressing pedal in D_4 within kickdown vehicle speed.	ON vehicle	1. Throttle position sensor (Adjustment)	***EC-41***
		2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-116, 201
		3. Shift solenoid valve A	AT-172
		4. Shift solenoid valve B	AT-177
Kickdown operates or engine overruns when depressing pedal in D_4 beyond kickdown vehicle speed limit.	ON vehicle	1. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-116, 201
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Shift solenoid valve A	AT-172
		4. Shift solenoid valve B	AT-177
Races extremely fast or slips in changing from D_4 to D_3 when depressing pedal.	ON vehicle	1. Fluid level	AT-61
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Line pressure test	AT-65
		4. Line pressure solenoid valve	AT-166
		5. Control valve assembly	AT-266
	OFF vehicle	6. High clutch	AT-315
		7. Forward clutch	AT-320
Races extremely fast or slips in changing from D_4 to D_2 when depressing pedal.	ON vehicle	1. Fluid level	AT-61
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Line pressure test	AT-65
		4. Line pressure solenoid valve	AT-166
		5. Shift solenoid valve A	AT-172
		6. Control valve assembly	AT-266
	OFF vehicle	7. Brake band	AT-337
		8. Forward clutch	AT-320

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Races extremely fast or slips in changing from D_3 to D_2 when depressing pedal.	ON vehicle	1. Fluid level	AT-61
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Line pressure test	AT-65
		4. Line pressure solenoid valve	AT-166
		5. Control valve assembly	AT-266
		6. A/T fluid temperature sensor	AT-109
	OFF vehicle	7. Brake band	AT-337
		8. Forward clutch	AT-320
		9. High clutch	AT-315
Races extremely fast or slips in changing from D_4 or D_3 to D_1 when depressing pedal.	ON vehicle	1. Fluid level	AT-61
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Line pressure test	AT-65
		4. Line pressure solenoid valve	AT-166
		5. Control valve assembly	AT-266
	OFF vehicle	6. Forward clutch	AT-320
		7. Forward one-way clutch	AT-328
		8. Low one-way clutch	AT-272
Vehicle will not run in any position.	ON vehicle	1. Fluid level	AT-61
		2. Control cable adjustment	AT-268
		3. Line pressure test	AT-65
		4. Line pressure solenoid valve	AT-166
	OFF vehicle	5. Oil pump	AT-294
		6. High clutch	AT-315
		7. Brake band	AT-337
		8. Low & reverse brake	AT-325
		9. Torque converter	AT-277
		10. Parking components	AT-346
Transaxle noise in D, 2, 1 and R positions.	ON vehicle	1. Fluid level	AT-61
	ON vehicle	2. Torque converter	AT-277

Symptom Chart (Cont'd)

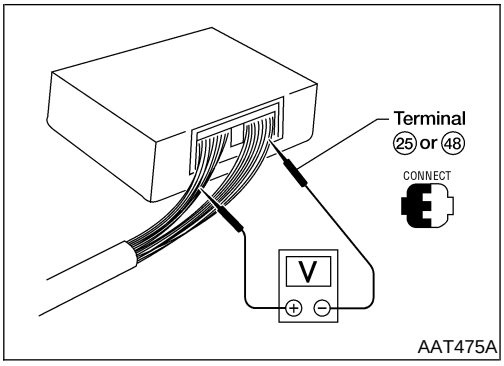
Symptom	Condition	Diagnostic Item	Reference Page
Failure to change from D_3 to 2_2 when changing lever into 2 position. AT-244	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-267
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Overrun clutch solenoid valve	AT-189
		4. Shift solenoid valve B	AT-177
		5. Shift solenoid valve A	AT-172
		6. Control valve assembly	AT-266
		7. Control cable adjustment	AT-268
	OFF vehicle	8. Brake band	AT-337
		9. Overrun clutch	AT-320
Gear change from 2_2 to 2_3 in 2 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-267
Engine brake does not operate in "1" position. AT-246	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-267
		2. Control cable adjustment	AT-268
		3. Throttle position sensor (Adjustment)	***EC-41***
		4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-116, 201
		5. Shift solenoid valve A	AT-172
		6. Control valve assembly	AT-266
		7. Overrun clutch solenoid valve	AT-189
	OFF vehicle	8. Overrun clutch	AT-320
		9. Low & reverse brake	AT-325
Gear change from 1_1 to 1_2 in 1 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-267
		2. Control cable adjustment	AT-268
Does not change from 1_2 to 1_1 in 1 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-267
		2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-116, 201
		3. Shift solenoid valve A	AT-172
		4. Control valve assembly	AT-266
		5. Overrun clutch solenoid valve	AT-189
	OFF vehicle	6. Overrun clutch	AT-320
		7. Low & reverse brake	AT-325
Large shock changing from 1_2 to 1_1 in 1 position.	ON vehicle	1. Control valve assembly	AT-266
	ON vehicle	2. Low & reverse brake	AT-325

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Transaxle overheats.	ON vehicle	1. Fluid level	AT-61
		2. Engine idling rpm	***EC-41***
		3. Throttle position sensor (Adjustment)	***EC-41***
		4. Line pressure test	AT-65
		5. Line pressure solenoid valve	AT-166
		6. Control valve assembly	AT-266
	OFF vehicle	7. Oil pump	AT-294
		8. Reverse clutch	AT-312
		9. High clutch	AT-315
		10. Brake band	AT-337
		11. Forward clutch	AT-320
		12. Overrun clutch	AT-320
		13. Low & reverse brake	AT-325
		14. Torque converter	AT-277
ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	ON vehicle	1. Fluid level	AT-61
	OFF vehicle	2. Reverse clutch	AT-312
		3. High clutch	AT-315
		4. Brake band	AT-337
		5. Forward clutch	AT-320
		6. Overrun clutch	AT-320
		7. Low & reverse brake	AT-325
Offensive smell at fluid charging pipe.	ON vehicle	1. Fluid level	AT-61
	OFF vehicle	2. Torque converter	AT-277
		3. Oil pump	AT-294
		4. Reverse clutch	AT-312
		5. High clutch	AT-315
		6. Brake band	AT-337
		7. Forward clutch	AT-320
		8. Overrun clutch	AT-320
		9. Low & reverse brake	AT-325

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Torque converter is not locked up.	ON vehicle	1. Throttle position sensor (Adjustment)	***EC-41***
		2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-116, 201
		3. Park/neutral position (PNP) switch adjustment	AT-267
		4. Engine speed signal	AT-122
		5. A/T fluid temperature sensor	AT-109
		6. Line pressure test	AT-65
		7. Torque converter clutch solenoid valve	AT-153
		8. Control valve assembly	AT-266
	OFF vehicle	9. Torque converter	AT-277
Torque converter clutch piston slip.	ON vehicle	1. Fluid level	AT-61
		2. Throttle position sensor (Adjustment)	***EC-41***
		3. Line pressure test	AT-65
		4. Torque converter clutch solenoid valve	AT-153
		5. Line pressure solenoid valve	AT-166
		6. Control valve assembly	AT-266
	OFF vehicle	7. Torque converter	AT-277
Lock-up point is extremely high or low. AT-239	ON vehicle	1. Throttle position sensor (Adjustment)	***EC-41***
		2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-116, 201
		3. Torque converter clutch solenoid valve	AT-153
		4. Control valve assembly	AT-266
A/T does not shift to D_4 when driving with overdrive control switch ON.	ON vehicle	1. Throttle position sensor (Adjustment)	***EC-41***
		2. Park/neutral position (PNP) switch adjustment	AT-267
		3. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-116, 201
		4. Shift solenoid valve A	AT-172
		5. Overrun clutch solenoid valve	AT-189
		6. Control valve assembly	AT-266
		7. A/T fluid temperature sensor	AT-109
		8. Line pressure solenoid valve	AT-166
	OFF vehicle	9. Brake band	AT-337
		10. Overrun clutch	AT-320
Engine is stopped at R, D, 2 and 1 positions.	ON vehicle	1. Fluid level	AT-61
		2. Torque converter clutch solenoid valve	AT-153
		3. Shift solenoid valve B	AT-177
		4. Shift solenoid valve A	AT-172
		5. Control valve assembly	AT-266



TCM Terminals and Reference Value

NDAT0033

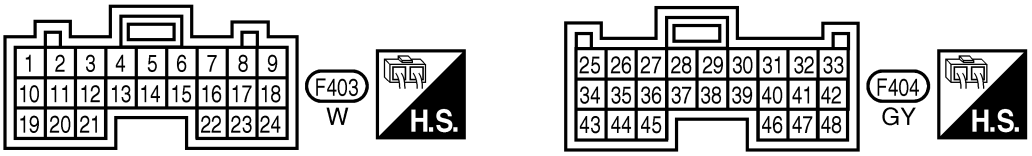
PREPARATION

NDAT0033S01

- Measure voltage between each terminal and terminal 25 or 48 by following “TCM INSPECTION TABLE”.

TCM HARNESS CONNECTOR TERMINAL LAYOUT

NDAT0033S02



AAT346A

TCM INSPECTION TABLE

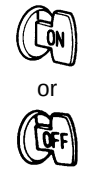
NDAT0033S03

(Data are reference values.)

Terminal No.	Wire color	Item	Condition		Judgement standard
1	G/R	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
				When depressing accelerator pedal fully after warming up engine.	0.5V or less
2	Y/B	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0.5V or less
3	OR/L	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	1V or less
5*	G/W	DT1		—	—
6*	W	DT2		—	—
7*	P/B	DT3		—	—
10	LG	Power source	 or 	When turning ignition switch to ON.	Battery voltage
				When turning ignition switch to OFF.	1V or less

TCM Terminals and Reference Value (Cont'd)

Terminal No.	Wire color	Item	Condition		Judgement standard
11	Y/PU	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in D_1 or D_4.)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in D_2 or D_3.)	1V or less
12	Y/G	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in D_1 or D_2.)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in D_3 or D_4.)	1V or less
13	L/OR	O/D OFF indicator lamp		When setting overdrive control switch in OFF position.	1V or less
				When setting overdrive control switch in ON position.	Battery voltage
14*	GY/R	N position signal		When setting selector lever to P or N position.	1V or less
				When setting selector lever to other positions.	Approximately 5V
15*	G/B	OBD-II output		—	—
16	BR/Y	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine.	Battery voltage
				When depressing accelerator pedal after warming up engine.	1V or less
17	R/W	Wide open throttle position switch (in throttle position switch)		When depressing accelerator pedal more than half-way after warming up engine.	Battery voltage
				When releasing accelerator pedal after warming up engine.	1V or less
18	R/Y	ASCD cruise switch		When ASCD cruise is being performed. ("CRUISE" lamp comes on.)	Battery voltage
				When ASCD cruise is not being performed. ("CRUISE" lamp does not comes on.)	1V or less
19	LG	Power source		Same as No. 10	
20	OR/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	1V or less

Terminal No.	Wire color	Item	Condition		Judgement standard
22	G/OR	Overdrive control switch		When setting overdrive control switch in ON position	Battery voltage
				When setting overdrive control switch in OFF position	1V or less
24	LG/R	ASCD OD cut signal		When "ACCEL" set switch on ASCD cruise is in D_4 position.	5 - 8V
				When "ACCEL" set switch on ASCD cruise is in D_3 position.	1V or less
25	B/R	Ground		—	—
26	L/B	PNP switch 1 position		When setting selector lever to 1 position.	Battery voltage
				When setting selector lever to other positions.	1V or less
27	L/Y	PNP switch 2 position		When setting selector lever to 2 position.	Battery voltage
				When setting selector lever to other positions.	1V or less
28	PU	Power source (Memory back-up)		When turning ignition switch to OFF.	Battery voltage
				When turning ignition switch to ON.	Battery voltage
29	W	Revolution sensor (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
				When vehicle parks.	0V
30**	Y/R	Data link connector		—	—
31**	Y/B	Data link connector		—	—
32	BR	Throttle position sensor (Power source)		—	4.5 - 5.5V
34	L/W	PNP switch D position		When setting selector lever to D position.	Battery voltage
				When setting selector lever to other positions.	1V or less
35	L/R	PNP switch R position		When setting selector lever to R position.	Battery voltage
				When setting selector lever to other positions.	1V or less
36	L	PNP switch P or N position		When setting selector lever to P or N position.	Battery voltage
				When setting selector lever to other positions.	1V or less

TCM Terminals and Reference Value (Cont'd)

Terminal No.	Wire color	Item	Condition		Judgement standard
39	G/W	Engine speed signal		When engine runs at idle speed.	Approximately 0.6V
				When engine runs at 4,000 rpm.	Approximately 1.6V
40	G/Y	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1V and more than 4.5V
41	R/G	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: Approximately 0.5V Fully-open throttle: Approximately 4V
42	B/Y	Throttle position sensor (Ground)		—	—
47	SB	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	Approximately 1.5V
				When ATF temperature is 80°C (176°F).	Approximately 0.5V
48	B/R	Ground		—	—

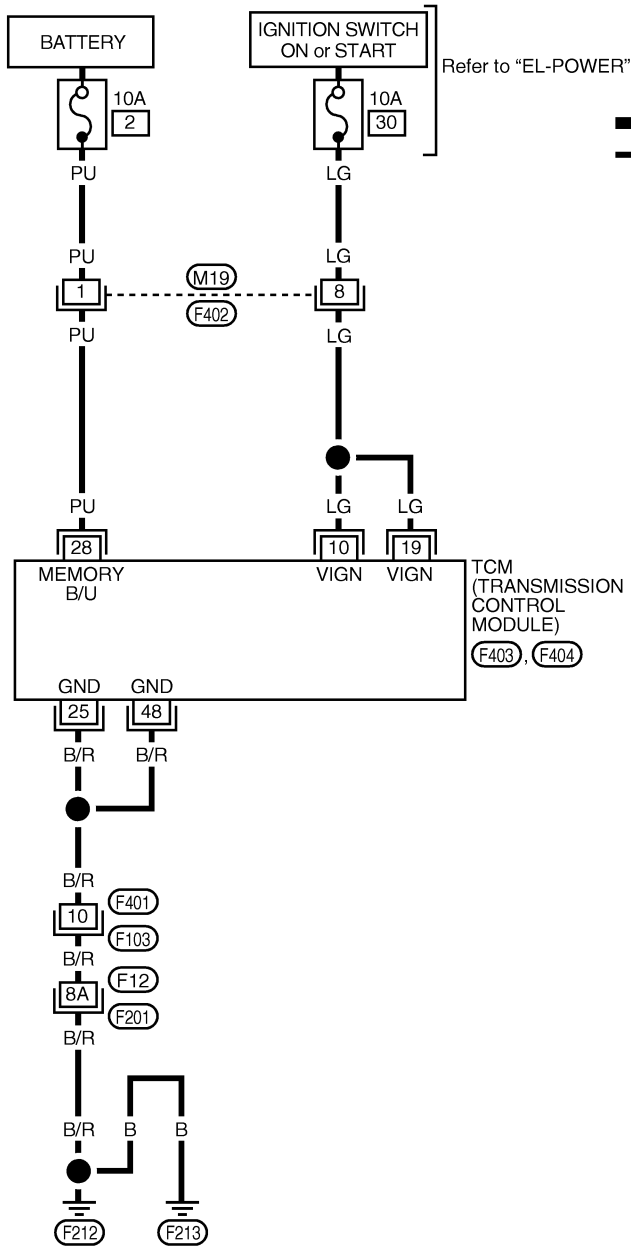
*: These terminals are connected to the ECM.

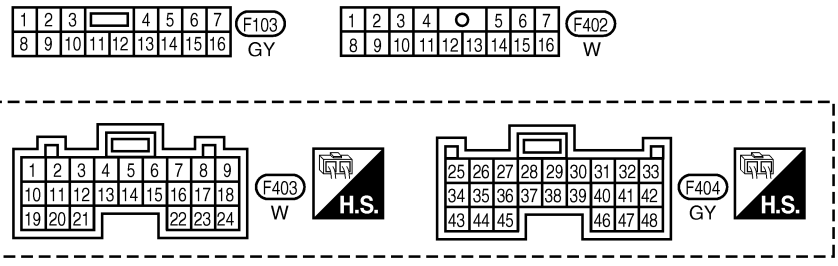
**: These terminals are connected to the Data link connector for CONSULT-II.

Wiring Diagram — AT — MAIN

NDAT0034

AT-MAIN-01





Refer to the following.
F12 , F201 SUPER MULTIPLE JUNCTION (SMJ)

WAT054

Wiring Diagram — AT — MAIN (Cont'd)

TCM TERMINALS AND REFERENCE VALUE

NDAT0034S01

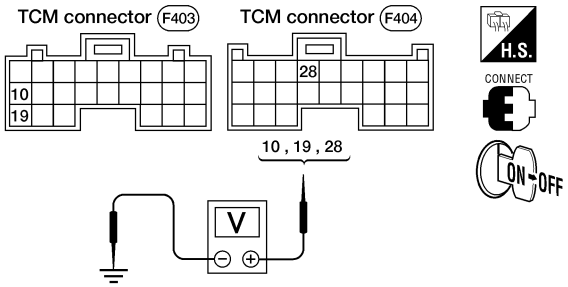
Terminal No.	Wire color	Item	Condition		Judgement standard
10	LG	Power source	ON or OFF	When turning ignition switch to ON.	Battery voltage
				When turning ignition switch to OFF.	1V or less
19	LG	Power source		Same as No. 10	
25	B/R	Ground		—	—
28	PU	Power source (Memory back-up)	ON or OFF	When turning ignition switch to OFF.	Battery voltage
				When turning ignition switch to ON.	Battery voltage
48	B/R	Ground		—	—

DIAGNOSTIC PROCEDURE

NDAT0034S02

1 **CHECK TCM POWER SOURCE–STEP 1.**

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminals 10, 19, 28 and ground.



AAT347A

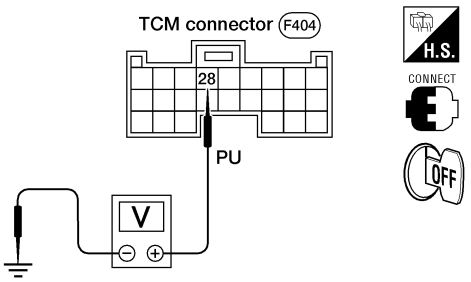
Voltage:
Battery voltage

OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following items:** ● Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness) ● Ignition switch and fuse Refer to "POWER SUPPLY ROUTING", ***EL-10***.

2 **CHECK TCM POWER SOURCE–STEP 2.**

1. Turn ignition switch to OFF position.
2. Check voltage between TCM terminal 28 and ground.



Voltage: Battery Voltage

WAT067

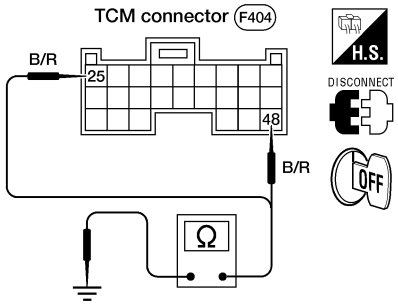
If OK, check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following items:** ● Harness for short or open between ignition switch and TCM terminal 28 (Main harness) ● Ignition switch and fuse Refer to "POWER SUPPLY ROUTING", ***EL-10***.

3 **CHECK TCM GROUND CIRCUIT.**

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between TCM terminals 25, 48 and ground.



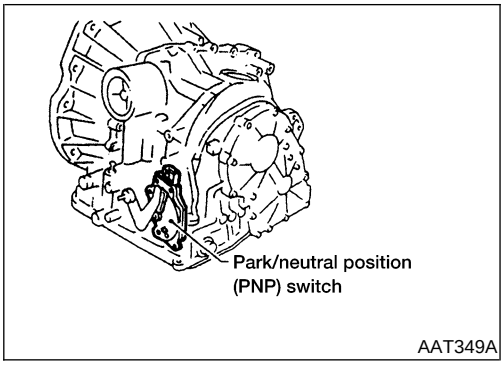
AAT348A

Continuity should exist.

If OK, check harness for short to ground and short to power.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.



Description

NDAT0035

- The park/neutral position (PNP) switch includes a transmission range switch.
- The transmission range switch detects the selector lever position and sends a signal to the TCM.

TCM TERMINALS AND REFERENCE VALUE

NDAT0035S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard
26	L/B	PNP switch 1 position		When setting selector lever to 1 position.	Battery voltage
				When setting selector lever to other positions.	1V or less
27	L/Y	PNP switch 2 position		When setting selector lever to 2 position.	Battery voltage
				When setting selector lever to other positions.	1V or less
34	L/W	PNP switch D position		When setting selector lever to D position.	Battery voltage
				When setting selector lever to other positions.	1V or less
35	L/R	PNP switch R position		When setting selector lever to R position.	Battery voltage
				When setting selector lever to other positions.	1V or less
36	L	PNP switch P or N position		When setting selector lever to P or N position.	Battery voltage
				When setting selector lever to other positions.	1V or less

ON BOARD DIAGNOSIS LOGIC

NDAT0035S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: PNP SW/CIRC	TCM does not receive the correct voltage signal from the switch based on the gear position.	• Harness or connectors (The park/neutral position (PNP) switch circuit is open or shorted.) • Park/neutral position (PNP) switch
: P0705		
: MIL Code No. 1101		

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

DIAGNOSIS MODE SELECTION
WORK SUPPORT
SELF DIAGNOSIS
DATA MONITOR
FUNCTION TEST
DTC WORK SUPPORT

SAT617J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

=NDAT0035S03

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

With CONSULT-II

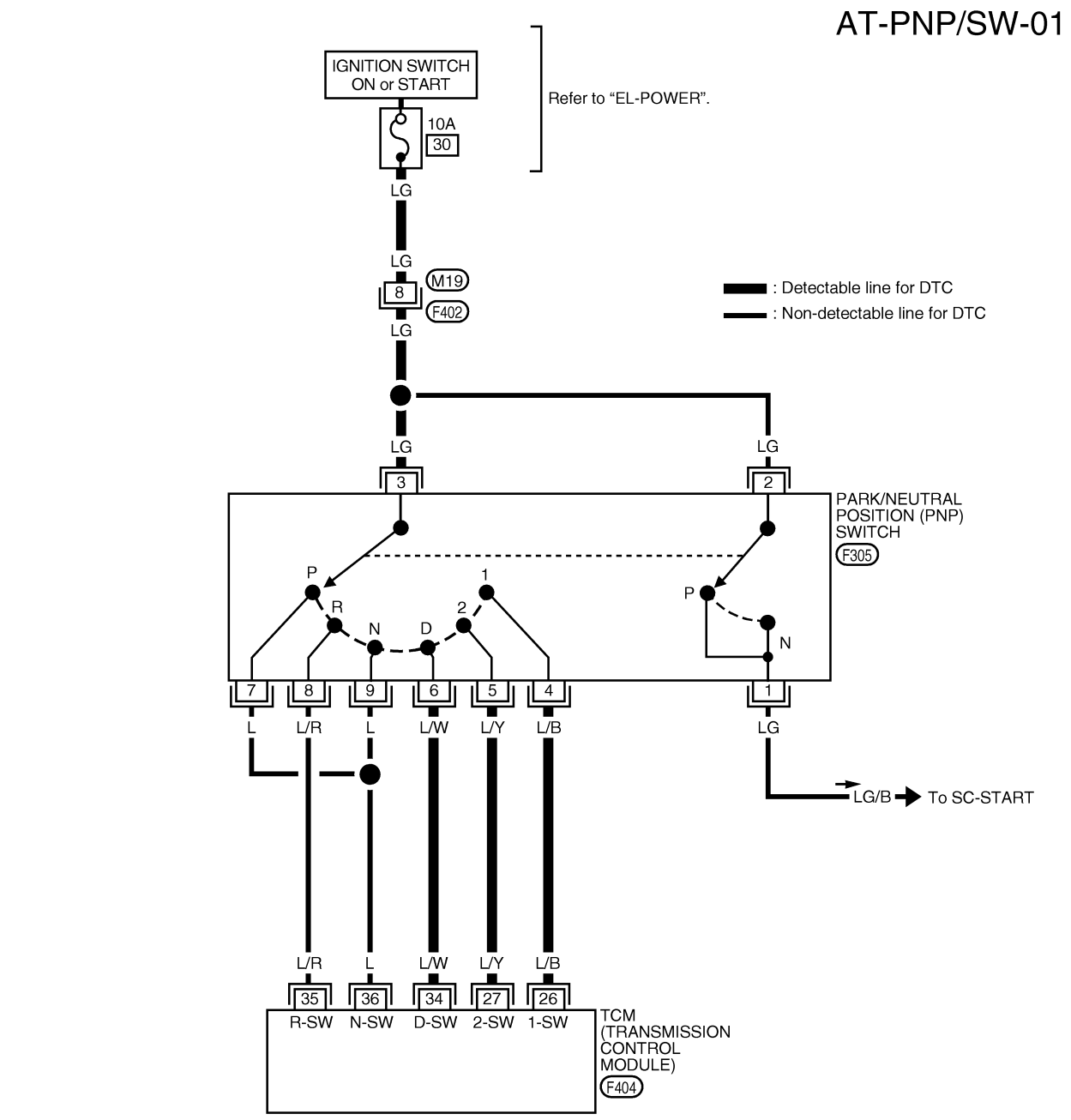
1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
3) Start engine and maintain the following conditions for at least 5 consecutive seconds.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.3V
   Selector lever: D position (O/D ON or OFF)

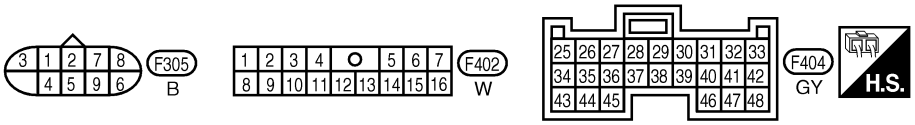
With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — PNP/SW

NDAT0197





WAT055

Diagnostic Procedure

NDAT0036

1	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT (With CONSULT-II)

With CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Select “ECU INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out P, R, N, D, 2 and 1 position switches moving selector lever to each position.
   Check the signal of the selector lever position is indicated properly.

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

DATA MONITOR	
MONITORING	
PN POSI SW	OFF
R POSITION SW	OFF
D POSITION SW	OFF
2 POSITION SW	ON
1 POSITION SW	OFF

SAT701J

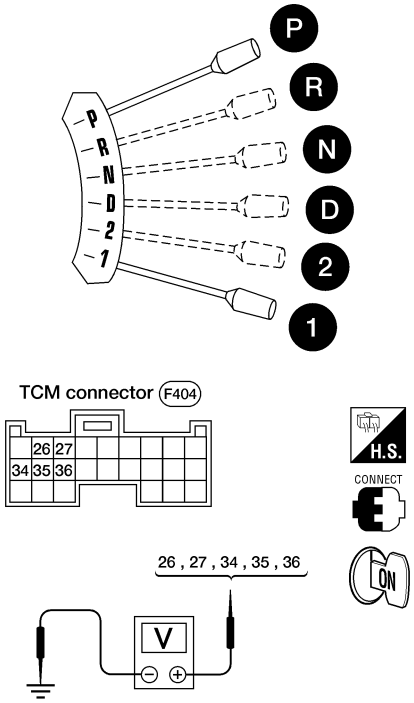
OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following items:** ● Park/neutral position (PNP) switch Refer to “Component Inspection”, AT-108. ● Harness for short or open between ignition switch and park/neutral position (PNP) switch (Main harness) ● Harness for short or open between park/neutral position (PNP) switch and TCM (Main harness) ● Ignition switch and fuse Refer to “POWER SUPPLY ROUTING”, ***EL-10***.

2	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT (Without CONSULT-II)

Without CONSULT-II

1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between TCM terminals 26, 27, 34, 35, 36 and ground while moving selector lever through each position.



AAT350A

Voltage:
B: Battery voltage
0: 0V

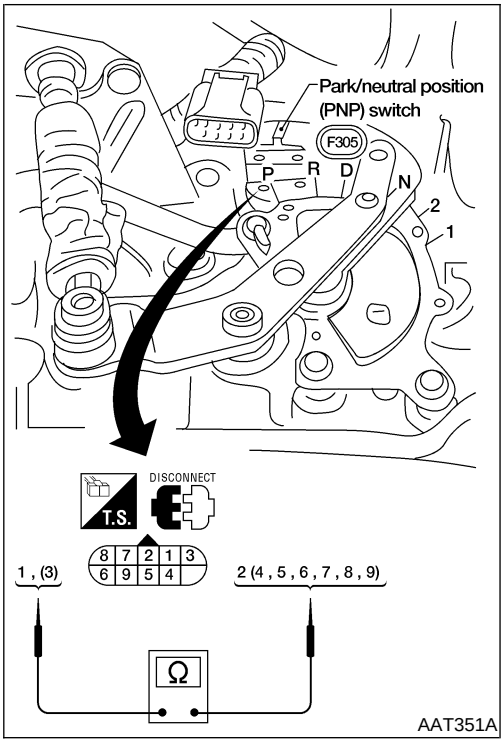
Lever position	Terminal No.				
	36	35	34	27	26
P, N	**B**	0	0	0	0
R	0	**B**	0	0	0
D	0	0	**B**	0	0
2	0	0	0	**B**	0
1	0	0	0	0	**B**

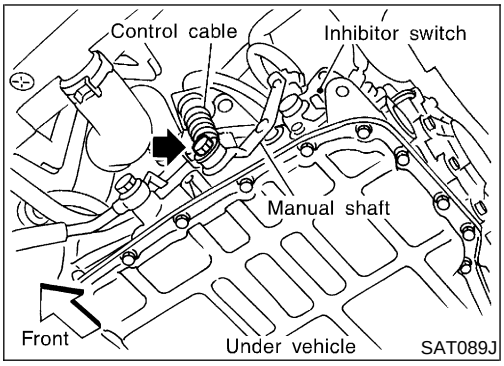
MTBL0119

OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following items:** ● Park/neutral position (PNP) switch Refer to "Component Inspection", AT-108. ● Harness for short or open between ignition switch and park/neutral position (PNP) switch (Main harness) ● Harness for short or open between park/neutral position (PNP) switch and TCM (Main harness) ● Ignition switch and fuse Refer to "POWER SUPPLY ROUTING", ***EL-10***.

3	CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-103.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.





Component Inspection

=NDAT0037

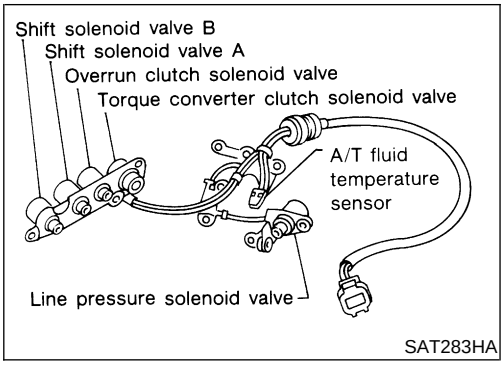
PARK/NEUTRAL POSITION SWITCH

NDAT0037S01

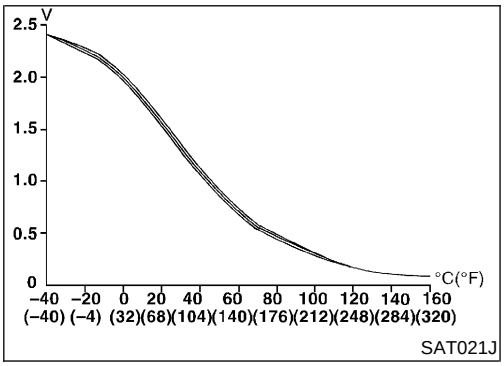
1. Check continuity between terminals 1 and 2 and between terminals 3 and 4, 5, 6, 7, 8, 9 while moving manual shaft through each position.

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

2. If NG, check again with manual control cable disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control cable. Refer to AT-268.
4. If NG on step 2, remove park/neutral position (PNP) switch from A/T and check continuity of park/neutral position (PNP) switch terminals. Refer to step 1.
5. If OK on step 4, adjust park/neutral position (PNP) switch. Refer to AT-267.
6. If NG on step 4, replace park/neutral position (PNP) switch.



SAT283HA



SAT021J

Description

NDAT0038

The A/T fluid temperature sensor detects the A/T fluid temperature and sends a signal to the TCM.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NDAT0038S01

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	Approximately 1.5V ↓ Approximately 0.5V

TCM TERMINALS AND REFERENCE VALUE

NDAT0038S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard
42	B/Y	Throttle position sensor (Ground)		—	—
47	SB	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	Approximately 1.5V
				When ATF temperature is 80°C (176°F).	Approximately 0.5V

ON BOARD DIAGNOSIS LOGIC

NDAT0038S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: ATF TEMP SEN/CIRC	TCM receives an excessively low or high voltage from the sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • A/T fluid temperature sensor
: P0710		
: MIL Code No. 1208		

Description (Cont'd)

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

DIAGNOSIS MODE SELECTION
WORK SUPPORT
SELF DIAGNOSIS
DATA MONITOR
FUNCTION TEST
DTC WORK SUPPORT

SAT617J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0038S04

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

With CONSULT-II

1) Turn ignition switch ON and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
2) Start engine and maintain the following conditions for at least 10 minutes (Total). (It is not necessary to maintain continuously.)
   CMPS·RPM (REF): 450 rpm or more
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (O/D ON)

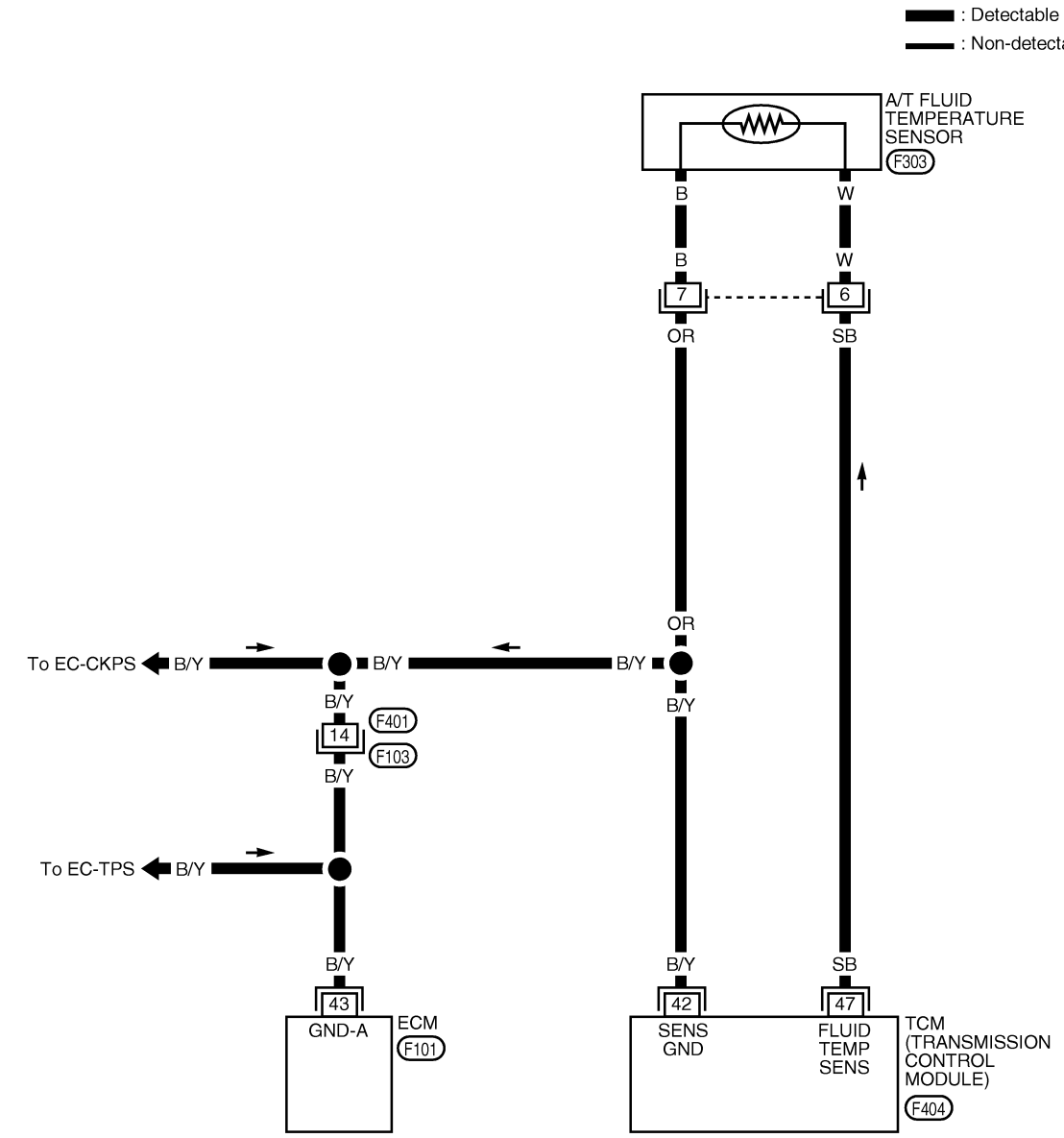
With GST

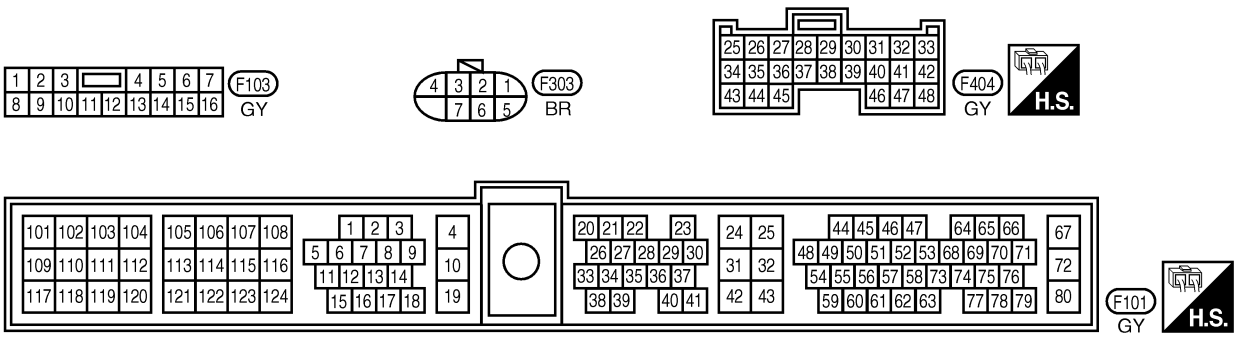
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — FTS

NDAT0198

AT-FTS-01





WAT056

Diagnostic Procedure

NDAT0039

1	INSPECTION START	
Do you have CONSULT-II? **Yes or No**		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (With CONSULT-II)	

With CONSULT-II

1. Start engine.
2. Select “ECU INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

3. Read out the value of “FLUID TEMP SE”.

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

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

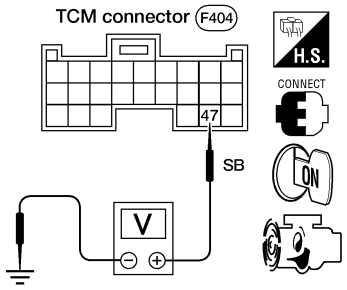
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

3	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (Without CONSULT-II)

Without CONSULT-II

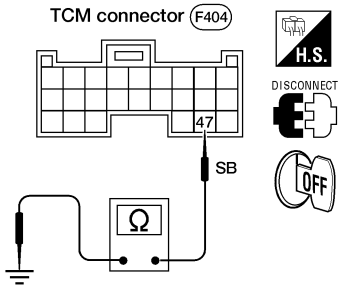
1. Start engine.
2. Check voltage between TCM terminal 47 and ground while warming up A/T.



AAT353A

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

3. Turn ignition switch to OFF position.
4. Disconnect TCM harness connector.
5. Check continuity between terminal 47 and ground.



AAT354A

Continuity should exist.
If OK, check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

4	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-110.

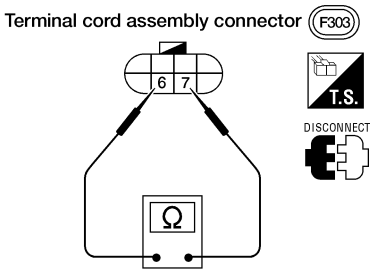
OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

Diagnostic Procedure (Cont'd)

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

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminals 6 and 7 when A/T is cold.



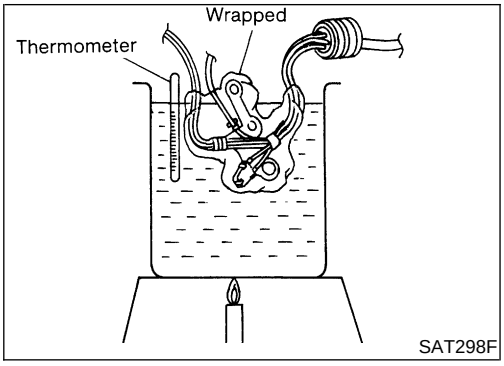
AAT352A

Resistance:
Cold [20°C (68°F)]
Approximately 2.5 kΩ

4. Reinstall any part removed.

OK or NG

OK (with CONSULT-II)	▶	GO TO 2.
OK (without CONSULT-II)	▶	GO TO 3.
NG	▶	1. Remove oil pan. 2. Check the following items: ● A/T fluid temperature sensor Refer to "Component Inspection", AT-115. ● Harness of terminal cord assembly for short or open



Component Inspection

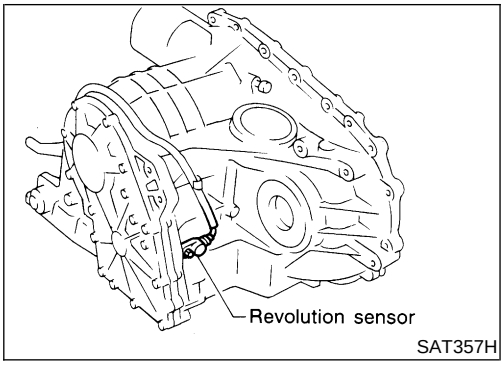
=NDAT0040

A/T FLUID TEMPERATURE SENSOR

NDAT0040S01

- For removal, refer to AT-266.
- Check resistance between two terminals while changing temperature as shown at left.

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



Description

NDAT0041

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

TCM TERMINALS AND REFERENCE VALUE

NDAT0041S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard
29	W	Revolution sensor (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
				When vehicle parks.	0V
42	B/Y	Throttle position sensor (Ground)		—	—

ON BOARD DIAGNOSIS LOGIC

NDAT0041S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: VEH SPD SEN/CIR AT	TCM does not receive the proper voltage signal from the sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Revolution sensor
: P0720		
: MIL Code No. 1102		

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

DIAGNOSIS MODE SELECTION
WORK SUPPORT
SELF DIAGNOSIS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT587J

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

DIAGNOSIS MODE SELECTION
WORK SUPPORT
SELF DIAGNOSIS
DATA MONITOR
FUNCTION TEST
DTC WORK SUPPORT

SAT617J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0041S03

CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

With CONSULT-II

1) Turn ignition switch ON and select "ECU INPUT SIGNALS" in " DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Drive vehicle and check for an increase of "VHCL/S SE·A/T" value in response to "VHCL/S SE·MTR" value increase.
   If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-202.
   If the check result is OK, go to following step.
3) Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
4) Start engine and maintain the following conditions for at least 5 consecutive seconds.
   VHCL SPEED SE: 30 km/h (19 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (O/D ON)
   Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.
   If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-119.
   If the check result is OK, go to following step.
5) Maintain the following conditions for at least 5 consecutive seconds.
   CMPS·RPM (REF): 3,500 rpm or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (O/D ON)
   Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.

With GST

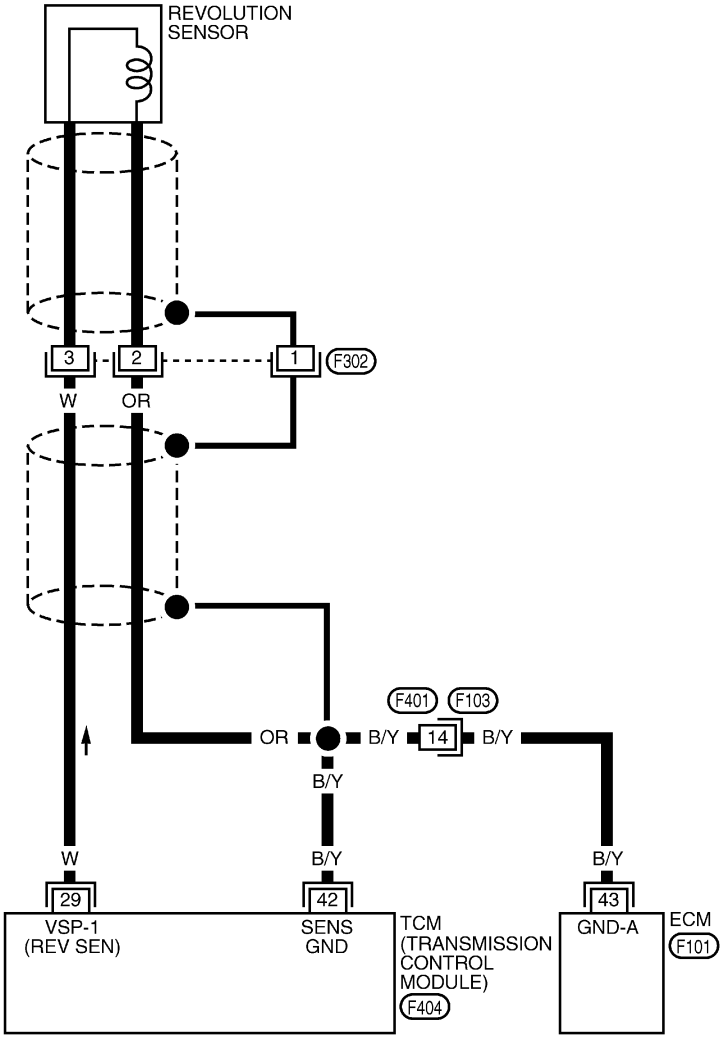
Follow the procedure "With CONSULT-II".

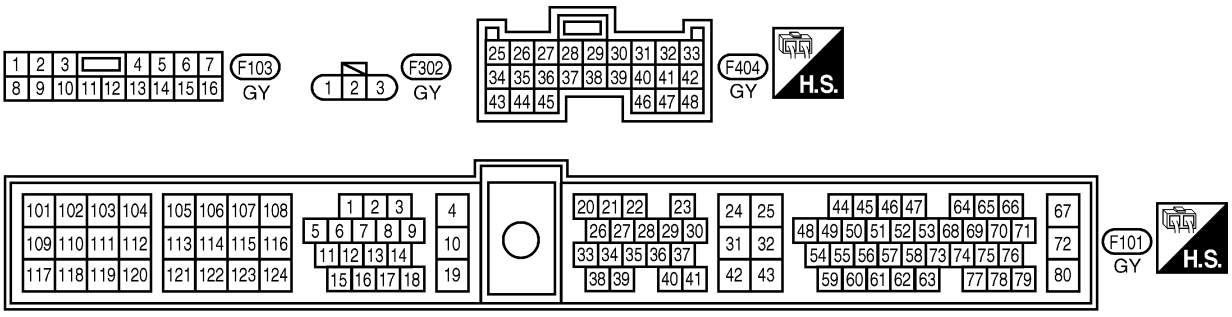
Wiring Diagram — AT — VSSA/T

NDAT0199

AT-VSSAT-01

: Detectable line for DTC
: Non-detectable line for DTC





AAT268A

Diagnostic Procedure

NDAT0042

1	CHECK INPUT SIGNAL (With CONSULT-II)

With CONSULT-II

1. Start engine.
2. Select “ECU INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

3. Read out the value of “VHCL/S SE·A/T” while driving.
   Check the value changes according to driving speed.

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

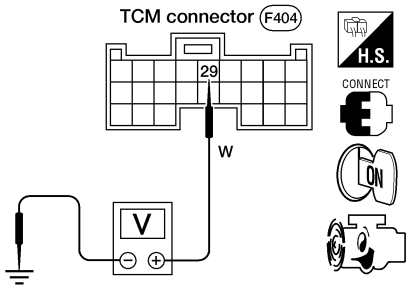
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

2	CHECK INPUT SIGNAL (Without CONSULT-II)

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 29 and ground while driving. (Measure with AC range.)



AAT355A

Voltage:
At 0 km/h (0 MPH):
0V
At 30 km/h (19 MPH):
1V or more
(Voltage rises gradually in response to vehicle speed.)

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	CHECK REVOLUTION SENSOR

Refer to "Component Inspection", AT-121.

OK or NG

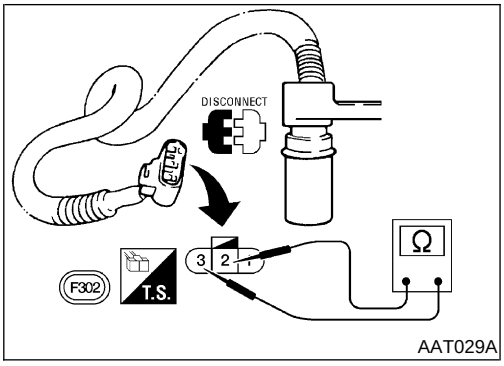
OK (with CONSULT-II)	▶	GO TO 1.
OK (without CONSULT-II)	▶	GO TO 2.
NG	▶	Repair or replace revolution sensor.

4	CHECK DTC

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

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.



Component Inspection

=NDAT0043

REVOLUTION SENSOR

NDAT0043S02

- For removal, refer to AT-267.
- Check resistance between terminals 1, 2 and 3.

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

Description

NDAT0044

The engine speed signal is sent from the ECM to the TCM.

TCM TERMINALS AND REFERENCE VALUE

NDAT0044S01

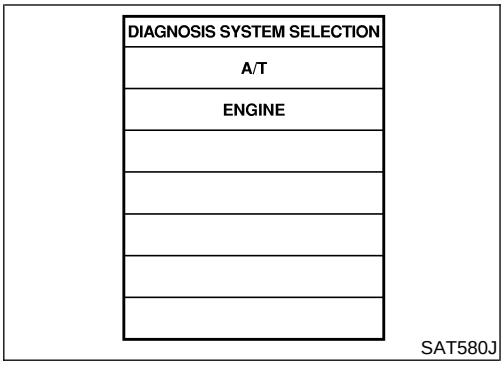
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard
39	G/W	Engine speed signal		When engine runs at idle speed.	Approximately 0.6V
				When engine runs at 4,000 rpm.	Approximately 1.6V

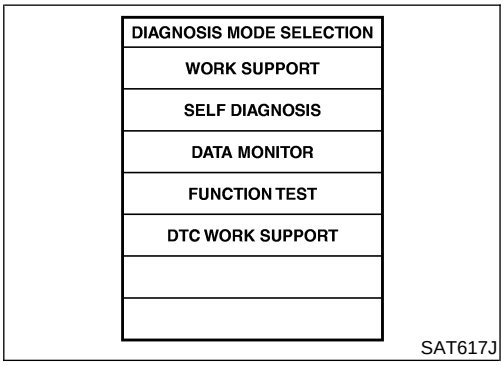
ON BOARD DIAGNOSIS LOGIC

NDAT0044S02

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: ENGINE SPEED SIG	TCM does not receive the proper voltage signal from ECM.	• Harness or connectors (The sensor circuit is open or shorted.)
: P0725		
: MIL Code No. 1207		



SAT580J



SAT617J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0044S03

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

With CONSULT-II

1) Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
2) Start engine and maintain the following conditions for at least 10 consecutive seconds.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (O/D ON)

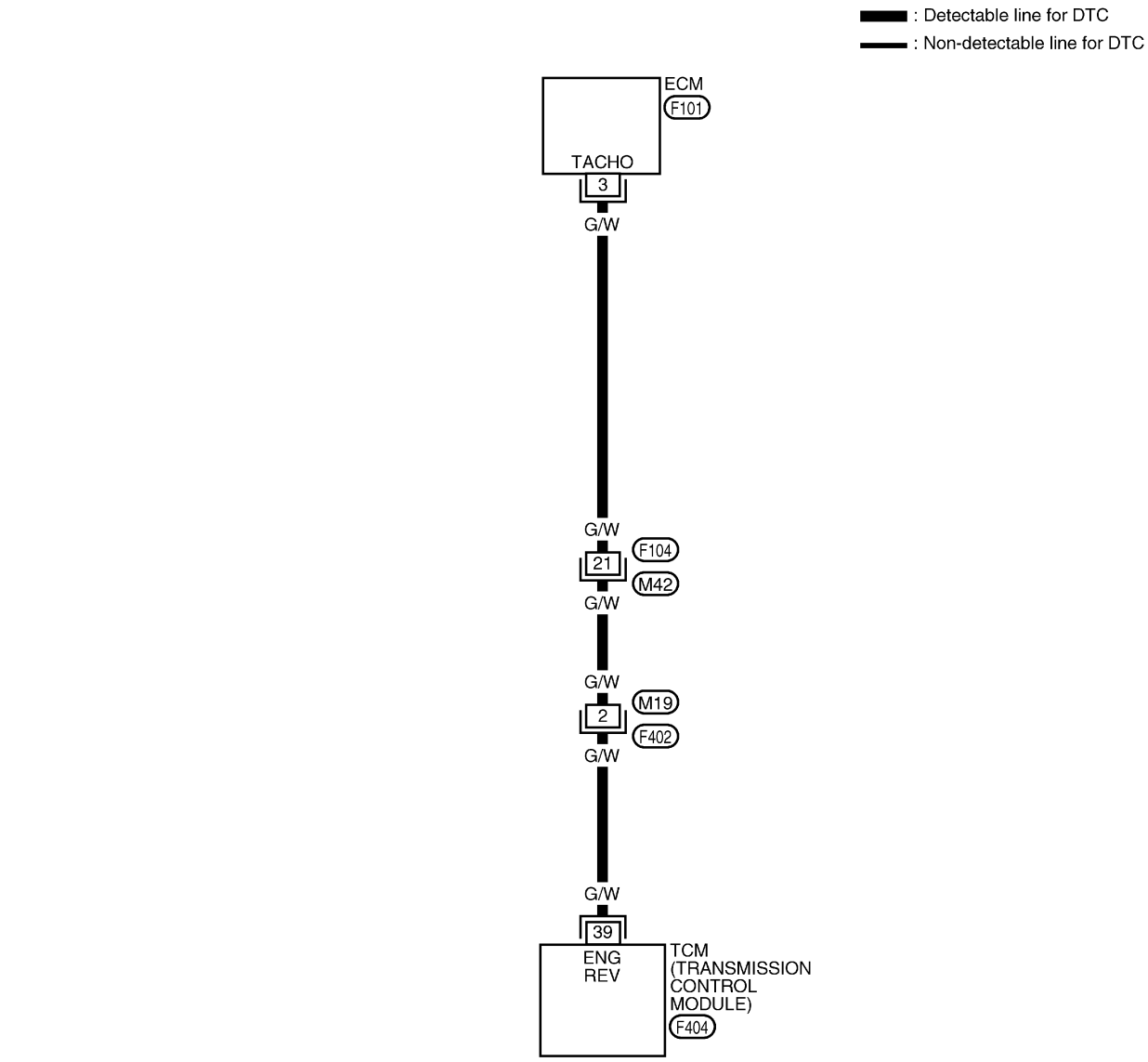
With GST

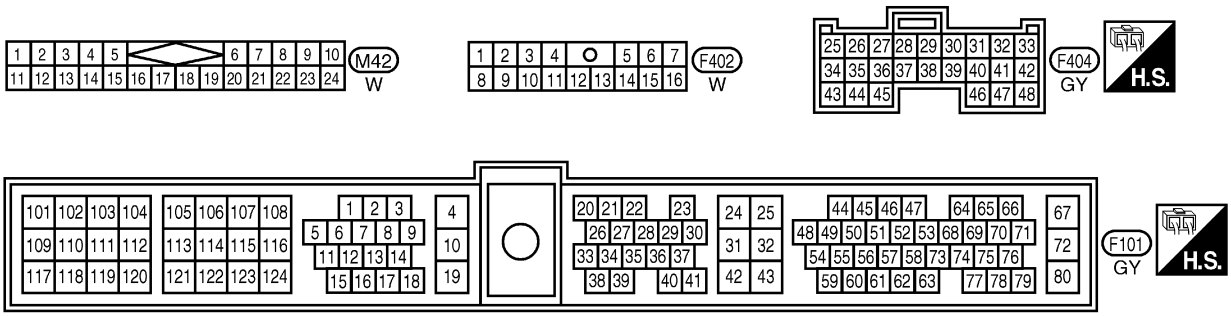
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — ENGSS

NDAT0200

AT-ENGSS-01





AAT277A

Diagnostic Procedure

NDAT0045

1	CHECK DTC WITH ECM	
Perform diagnostic test mode II (self-diagnostic results) for engine control. Check ignition signal circuit condition.		
OK or NG		
OK (with CONSULT-II)	▶	GO TO 2.
OK (without CONSULT-II)	▶	GO TO 3.
NG	▶	Check ignition signal circuit for engine control. Refer to “DTC P1320 Ignition Signal”, ***EC-425***.

2	CHECK INPUT SIGNAL (With CONSULT-II)	

With CONSULT-II

1. Start engine.
2. Select “ECU INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

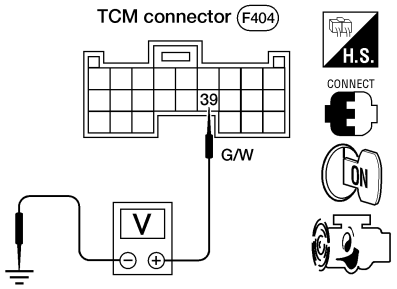
3. Read out the value of “ENGINE SPEED”.
   Check engine speed changes according to throttle position.

DATA MONITOR	
MONITORING	
ENGINE SPEED	XXX rpm
TURBINE REV	XXX rpm
OVERDRIVE SW	ON
PN POSI SW	OFF
R POSITION SW	OFF

SAT645J

OK or NG

OK	▶	GO TO 4.
NG	▶	**Check the following items:** ● Harness for short or open between TCM and ECM ● Resistor and ignition coil Refer to “DTC P1320 Ignition Signal”, ***EC-425***.

3	CHECK INPUT SIGNAL (Without CONSULT-II)	
⊗ **Without CONSULT-II** 1. Start engine. 2. Check voltage between TCM terminal 39 and ground.  AAT356A **Voltage:** **0.6 (Idle speed) - 1.6V (4,000 rpm)**		
OK or NG		
OK	▶	GO TO 4.
NG	▶	**Check the following items:** ● Harness for short or open between TCM and ECM ● Resistor and ignition coil Refer to "DTC P1320 Ignition Signal", ***EC-425***.

4	CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-122.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

Description

NDAT0046

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into first gear position as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

TCM TERMINALS AND REFERENCE VALUE

NDAT0046S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard
11	Y/PU	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in D_1 or D_4.)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in D_2 or D_3.)	1V or less
12	Y/G	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in D_1 or D_2.)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in D_3 or D_4.)	1V or less

ON BOARD DIAGNOSTIC LOGIC

NDAT0046S02

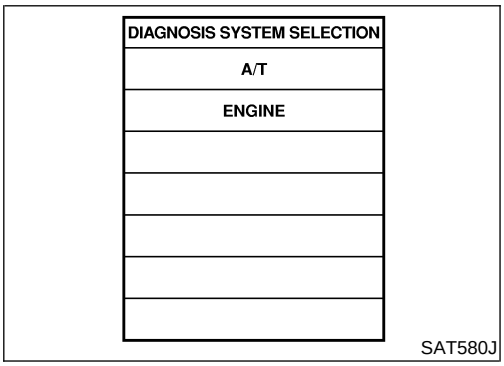
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (1st) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when either shift solenoid valve A is stuck open or shift solenoid valve B is stuck open.

Gear position supposed by TCM	**1**	2	3	4
In case of gear position with no malfunctions	**1**	2	3	4
In case of gear position with shift solenoid valve A stuck open	**2***	2	3	3
In case of gear position with shift solenoid valve B stuck open	**4***	3	3	4

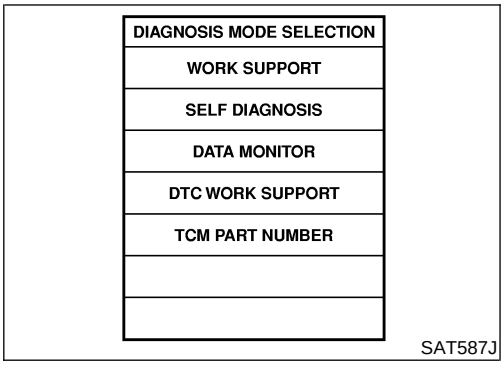
*: P0731 is detected.

Description (Cont'd)

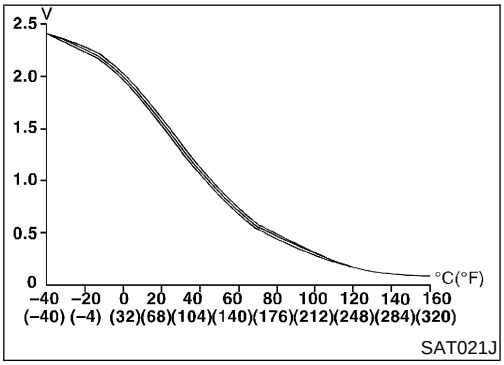
Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 1ST GR FNCTN	A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	• Shift solenoid valve A • Shift solenoid valve B • Each clutch • Hydraulic control circuit
GST : P0731		
NO TOOLS : MIL Code No. 1103		



SAT580J



SAT587J



SAT021J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0046S03

CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always drive vehicle on a level road to improve the accuracy of test.

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

With CONSULT-II

1) Start engine and select "ECU INPUT SIGNAL" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3) Select "1ST GR FNCTN P0731" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4) Accelerate vehicle to 20 to 25 km/h (12 to 16 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (O/D ON)
   - **Check that "GEAR" shows "2" after releasing pedal.**
5) Depress accelerator pedal to WOT (more than 7.0/8 of "THROTTLE POSI") quickly from a speed of 20 to 25 km/h (12 to 16 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-130.
   If "STOP VEHICLE" appears on CONSULT-II screen, go to the following step.
   - **Check that "GEAR" shows "1" when depressing accelerator pedal to WOT.**
   - **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAGNOSIS" for "ENGINE". In case a 1st trip DTC other than P0731 is shown, refer to applicable**

"TROUBLE DIAGNOSIS FOR DTC".

6) Stop vehicle.
7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists	1 → 2 → 3 → 4
Malfunction for P0731 exists.	2 → 2 → 3 → 3
	4 → 3 → 3 → 4

8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
   Refer to "DIAGNOSTIC PROCEDURE", AT-130.
   Refer to shift schedule, AT-365.

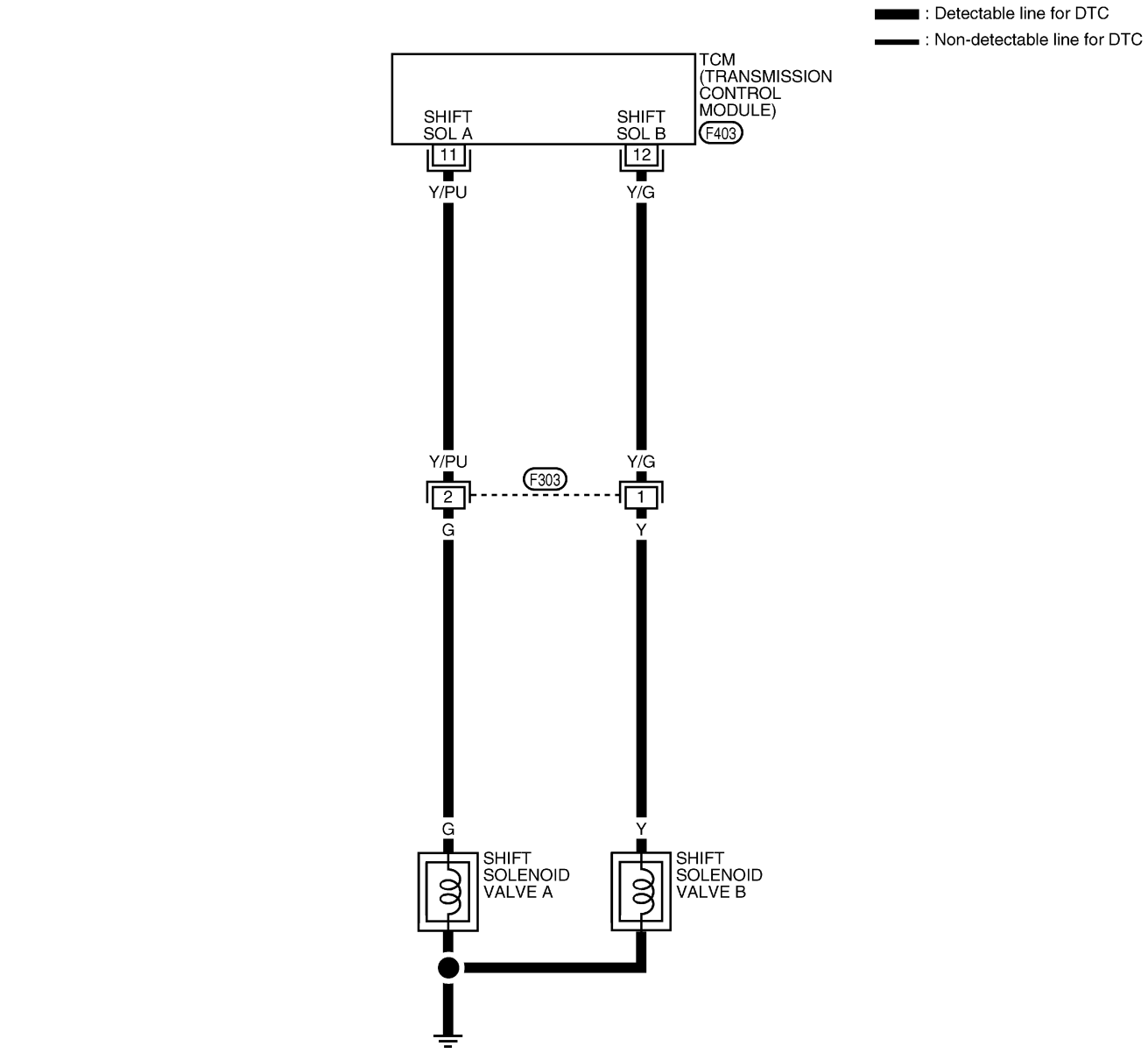
With GST

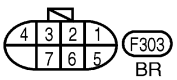
Follow the procedure "With CONSULT-II".

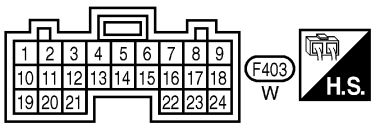
Wiring Diagram — AT — 1ST

NDAT0201

AT-1STSIG-01





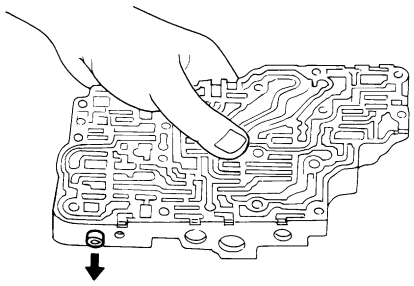


AAT278A

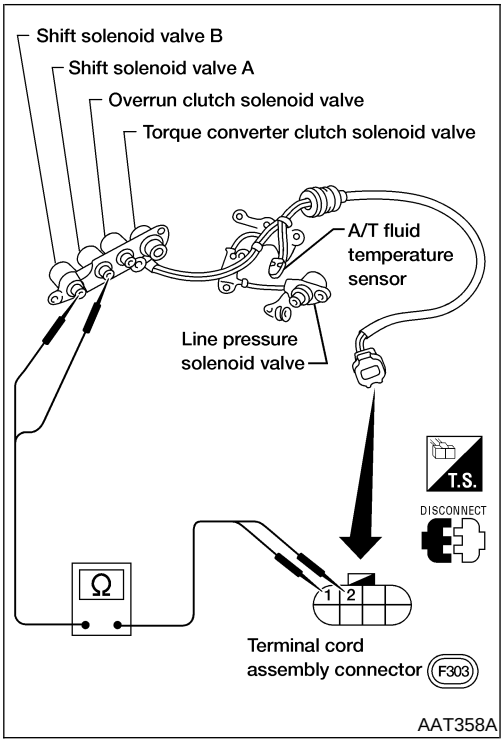
Diagnostic Procedure

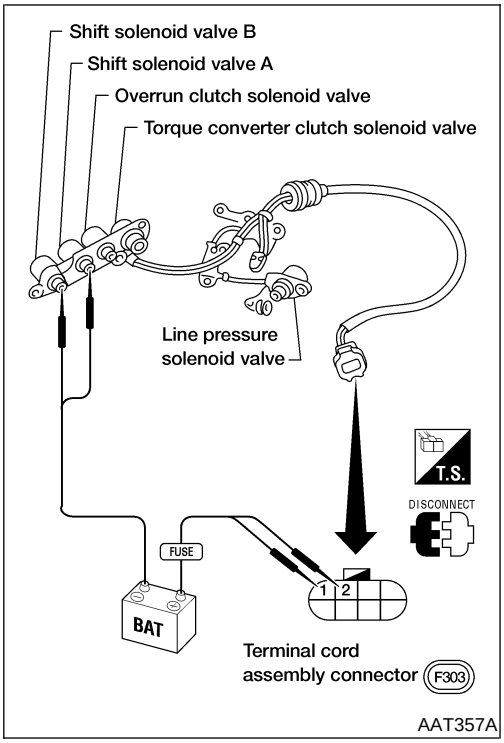
NDAT0047

1	CHECK SHIFT SOLENOID VALVE	
1. Remove control valve assembly. Refer to AT-266. 2. Check shift solenoid valve operation. ● Shift solenoid valve A ● Shift solenoid valve B Refer to “Component Inspection”, AT-131.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace shift solenoid valve assembly.

2	CHECK CONTROL VALVE	
1. Disassemble control valve assembly. Refer to “Control Valve Assembly”, AT-298. 2. Check to ensure that: ● Valve, sleeve and plug slide along valve bore under their own weight. ● Valve, sleeve and plug are free from burrs, dents and scratches. ● Control valve springs are free from damage, deformation and fatigue. ● Hydraulic line is free from obstacles.		
 SAT367H		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair control valve assembly.

3	CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-127.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	Check control valve again. Repair or replace control valve assembly.





Component Inspection

=NDAT0048

SHIFT SOLENOID VALVE A AND B

NDAT0048S01

- For removal, refer to AT-266.

Resistance Check

NDAT0048S0101

- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 40Ω
Shift solenoid valve B	1		

Operation Check

NDAT0048S0102

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

Description

NDAT0049

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into second gear position as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

TCM TERMINALS AND REFERENCE VALUE

NDAT0049S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard
12	Y/G	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in D_1 or D_2.)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in D_3 or D_4.)	1V or less

ON BOARD DIAGNOSTIC LOGIC

NDAT0049S02

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (2nd) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve B is stuck open.

Gear position supposed by TCM	1	**2**	3	4
In case of gear position with no malfunctions	1	**2**	3	4
In case of gear position with shift solenoid valve B stuck open	4	**3***	3	4

*: P0732 is detected.

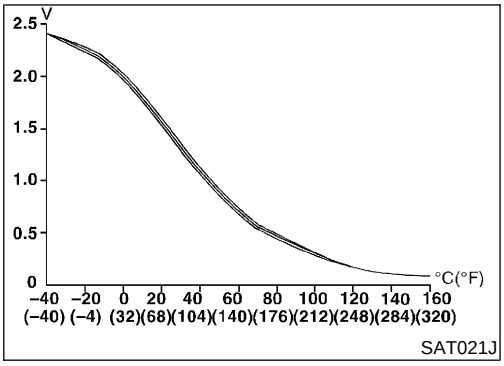
Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 2ND GR FNCTN	A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	• Shift solenoid valve B • Each clutch • Hydraulic control circuit
GST : P0732		
NO TOOLS : MIL Code No. 1104		

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

DIAGNOSIS MODE SELECTION
WORK SUPPORT
SELF DIAGNOSIS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT587J



SAT021J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0049S03

CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always drive vehicle on a level road to improve the accuracy of test.

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

With CONSULT-II

1) Start engine and select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3) Select "2ND GR FNCTN P0732" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4) Accelerate vehicle to 57 to 62 km/h (35 to 39 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8
   Selector lever: D position (O/D ON)
   - **Check that "GEAR" shows "3" or "4" after releasing pedal.**
5) Depress accelerator pedal to WOT (more than 7.0/8 of "THROTTLE POSI") quickly from a speed of 57 to 62 km/h (35 to 39 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETE". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE",AT-136.
   If "STOP VEHICLE" appears on CONSULT-II screen, go to following step.
   - **Check that "GEAR" shows "2" when depressing accelerator pedal to WOT.**
   - **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAGNOSIS" for "ENGINE". In case a 1st trip DTC other than P0732 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".**
6) Stop vehicle.
7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists	1 → 2 → 3 → 4
Malfunction for P0732 exists.	4 → 3 → 3 → 4

8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)

Description (Cont'd)

Refer to "DIAGNOSTIC PROCEDURE", AT-136.
Refer to shift schedule, AT-365.

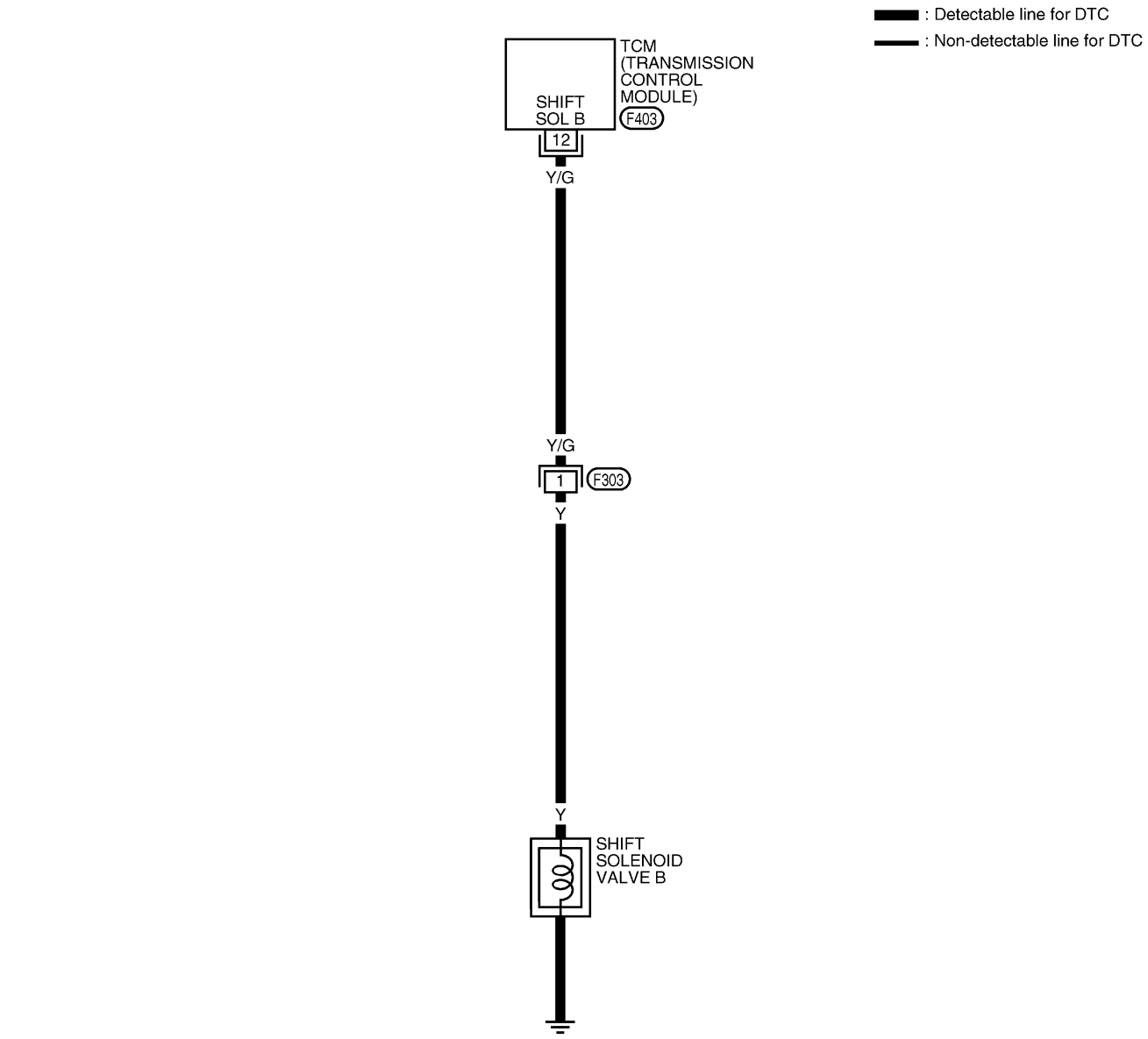
With GST

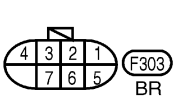
Follow procedure "With CONSULT-II".

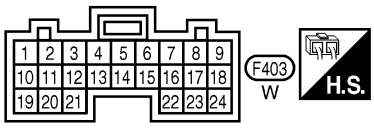
Wiring Diagram — AT — 2ND

NDAT0202

AT-2NDSIG-01





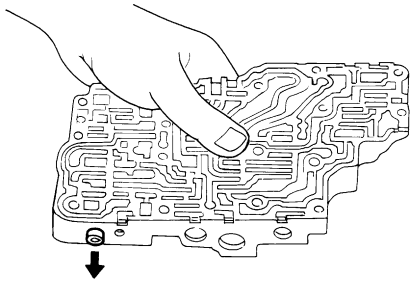


AAT279A

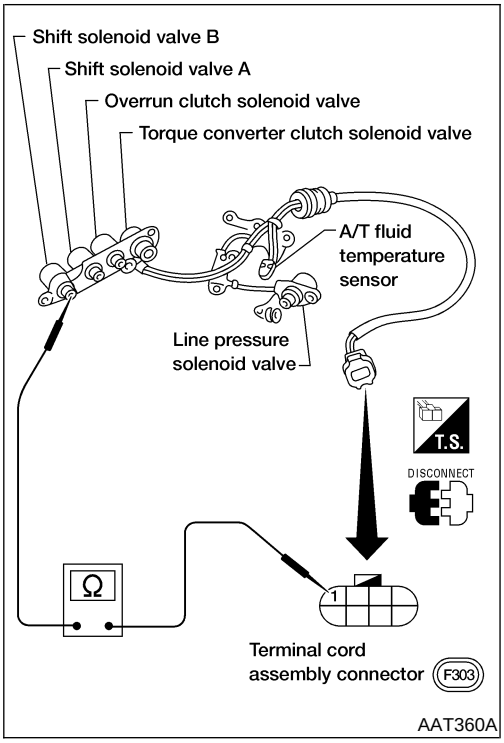
Diagnostic Procedure

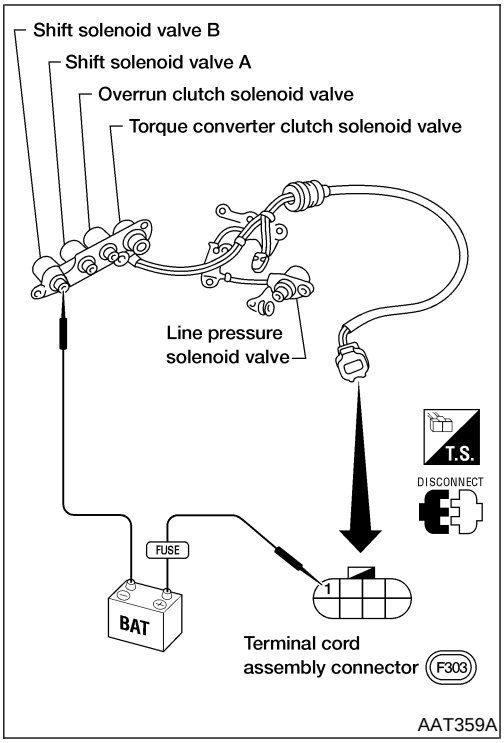
NDAT0050

1	CHECK SHIFT SOLENOID VALVE	
1. Remove control valve assembly. Refer to AT-266. 2. Check shift solenoid valve operation. ● Shift solenoid valve B Refer to “Component Inspection”, AT-137.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace shift solenoid valve assembly.

2	CHECK CONTROL VALVE	
1. Disassemble control valve assembly. Refer to “Control Valve Assembly”, AT-298. 2. Check to ensure that: ● Valve, sleeve and plug slide along valve bore under their own weight. ● Valve, sleeve and plug are free from burrs, dents and scratches. ● Control valve springs are free from damage, deformation and fatigue. ● Hydraulic line is free from obstacles.		
 SAT367H		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair control valve assembly.

3	CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-133.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	Check control valve again. Repair or replace control valve assembly.





Component Inspection

=NDAT0051

SHIFT SOLENOID VALVE B

NDAT0051S01

- For removal, refer to AT-266.

Resistance Check

NDAT0051S0101

- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	1	Ground	20 - 40Ω

Operation Check

NDAT0051S0102

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

Description

NDAT0052

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into third gear position as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning servo piston or brake band, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

TCM TERMINALS AND REFERENCE VALUE

NDAT0052S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard
11	Y/PU	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in D_1 or D_4.)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in D_2 or D_3.)	1V or less

ON BOARD DIAGNOSTIC LOGIC

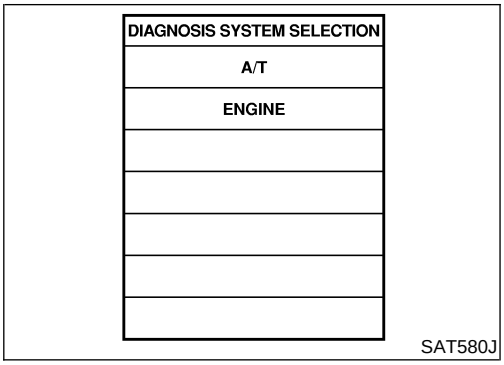
NDAT0052S02

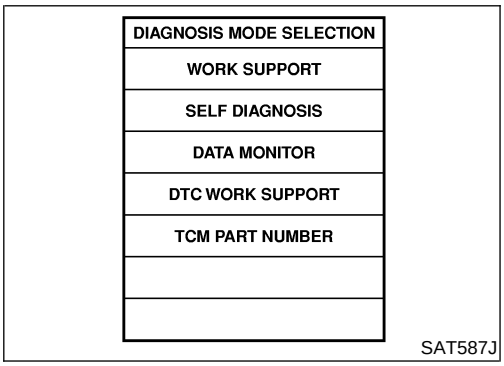
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (3rd) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve A is stuck closed.

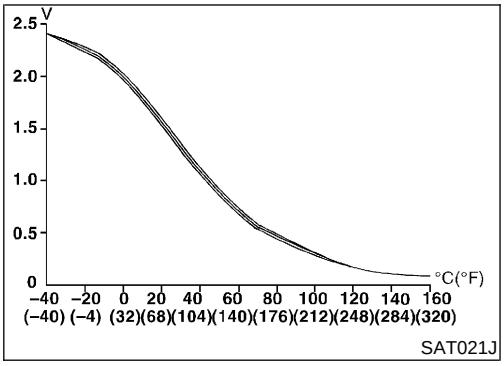
Gear position supposed by TCM	1	2	**3**	4
In case of gear position with no malfunctions	1	2	**3**	4
In case of gear position with shift solenoid valve A stuck closed	1	1	**4***	4

*: P0733 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T 3RD GR FNCTN	A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	• Shift solenoid valve A • Each clutch • Hydraulic control circuit
: P0733		
: MIL Code No. 1105		







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0052S03

CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always drive vehicle on a level road to improve the accuracy of test.

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

With CONSULT-II

1) Start engine and select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3) Select "3RD GR FNCTN P0733" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4) Accelerate vehicle to 70 to 85 km/h (43 to 53 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD "ON")
   - **Check that "GEAR" shows "4" after releasing pedal.**
5) Depress accelerator pedal steadily with 3.5/8 - 4.5/8 of "THROTTLE POSI" from a speed of 70 to 85 km/h (43 to 53 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-142.
   If "STOP VEHICLE" appears on CONSULT-II screen, go to following step.
   - **Check that "GEAR" shows "3" when depressing accelerator pedal with 3.5/8 - 4.5/8 of "THROTTLE POSI".**
   - **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAGNOSIS" for "ENGINE". In case a 1st trip DTC other than P0733 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".**
6) Stop vehicle.
7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists.	1 → 2 → 3 → 4
Malfunction for P0733 exists.	1 → 1 → 4 → 4

8) Make sure that "OK" is displayed. (If "NG" is displayed, refer

to “DIAGNOSTIC PROCEDURE”.)
Refer to “DIAGNOSTIC PROCEDURE”, AT-142.
Refer to shift schedule, AT-365.

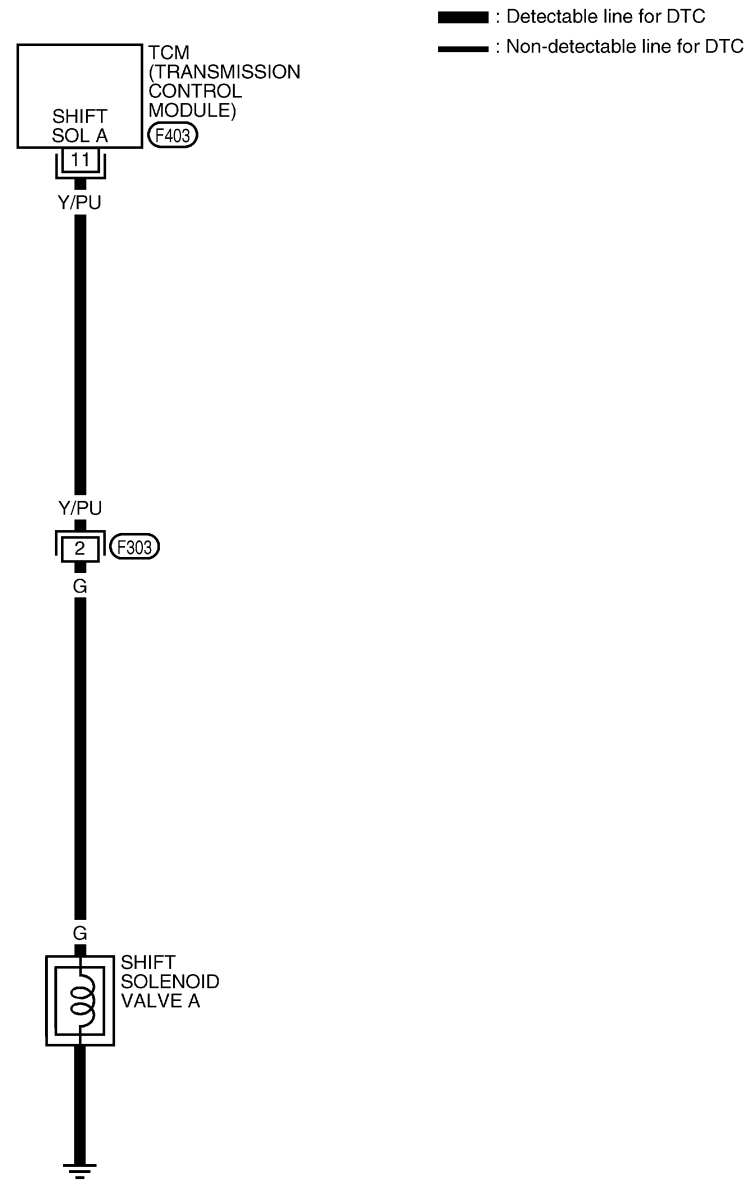
With GST

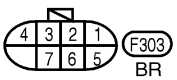
Follow the procedure “With CONSULT-II”.

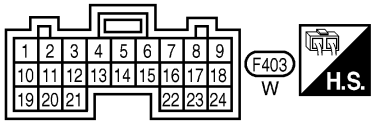
Wiring Diagram — AT — 3RD

NDAT0203

AT-3RDSIG-01





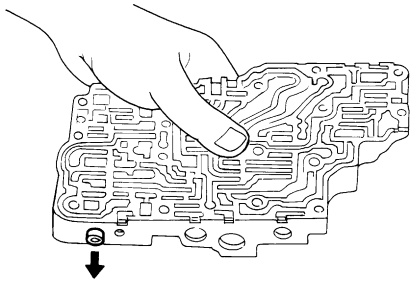


AAT280A

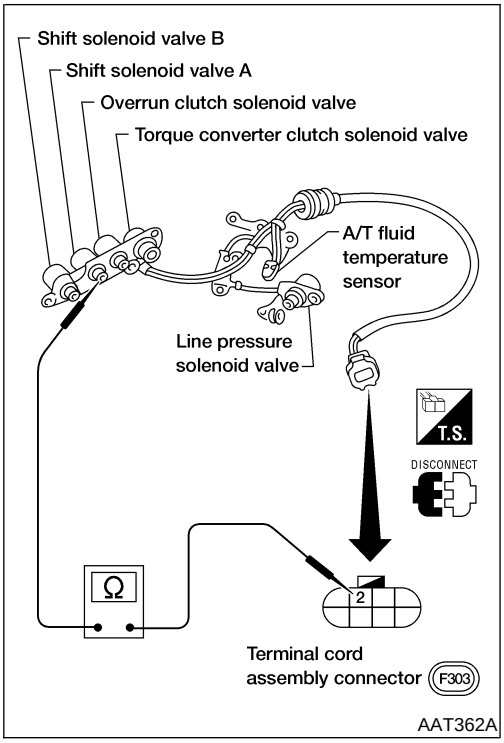
Diagnostic Procedure

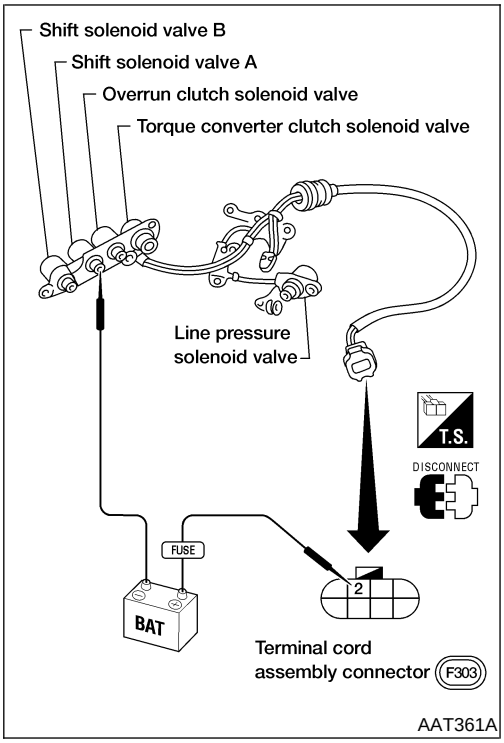
NDAT0053

1	CHECK SHIFT SOLENOID VALVE	
1. Remove control valve assembly. Refer to AT-266. 2. Check shift solenoid valve operation. ● Shift solenoid valve A Refer to “Component Inspection”, AT-143.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace shift solenoid valve assembly.

2	CHECK CONTROL VALVE	
1. Disassemble control valve assembly. Refer to “Control Valve Assembly”, AT-298. 2. Check to ensure that: ● Valve, sleeve and plug slide along valve bore under their own weight. ● Valve, sleeve and plug are free from burrs, dents and scratches. ● Control valve springs are free from damage, deformation and fatigue. ● Hydraulic line is free from obstacles.		
 SAT367H		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair control valve assembly.

3	CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-139.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	Check control valve again. Repair or replace control valve assembly.





Component Inspection

=NDAT0054

SHIFT SOLENOID VALVE A

NDAT0054S01

- For removal, refer to AT-266.

Resistance Check

NDAT0054S0101

- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 40Ω

Operation Check

NDAT0054S0102

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

Description

NDAT0055

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

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NDAT0055S01

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Torque converter clutch solenoid valve duty	Lock-up OFF ↓ Lock-up ON	Approximately 4% ↓ Approximately 94%
Line pressure solenoid valve duty	Small throttle opening (Low line pressure) ↓ Large throttle opening (High line pressure)	Approximately 24% ↓ Approximately 95%

TCM TERMINALS AND REFERENCE VALUE

NDAT0055S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard
1	G/R	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
				When depressing accelerator pedal fully after warming up engine.	0.5V or less
2	Y/B	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0.5V or less
11	Y/PU	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in D_1 or D_4.)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in D_2 or D_3.)	1V or less
12	Y/G	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in D_1 or D_2.)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in D_3 or D_4.)	1V or less

ON BOARD DIAGNOSTIC LOGIC

NDAT0055S03

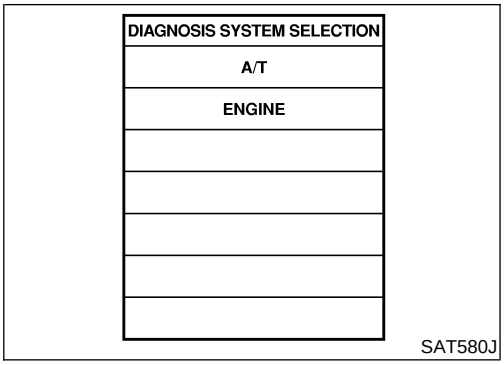
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is much lower than the position (4th) supposed by TCM, the slip ratio will be much less than normal. In case the ratio does not reach the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve B is stuck closed.

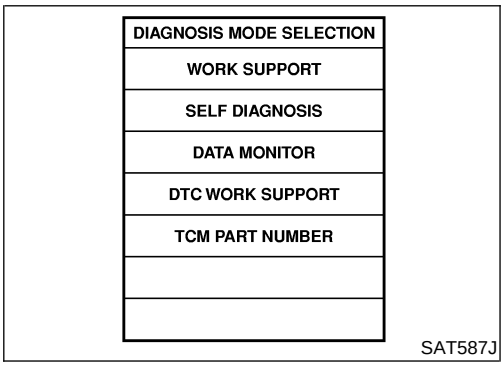
Gear position supposed by TCM	1	2	3	**4**
In case of gear position with no malfunctions	1	2	3	**4**
In case of gear position with shift solenoid valve B stuck closed	1	2	2	**1***

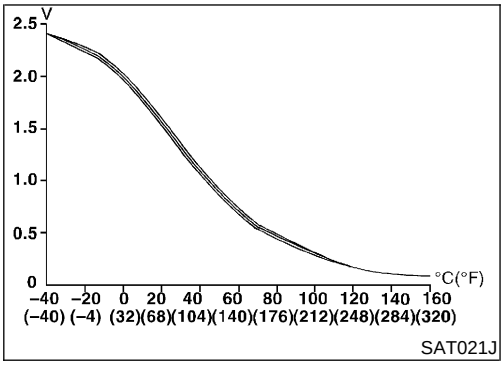
*: P0734 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 4TH GR FNCTN	A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	• Shift solenoid valve A • Shift solenoid valve B • Overrun clutch solenoid valve • Line pressure solenoid valve • Each clutch • Hydraulic control circuit • Torque converter clutch solenoid valve
: P0734		
: MIL Code No. 1106		

Description (Cont'd)







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0055S04

CAUTION:

- **Always drive vehicle at a safe speed.**
- **If conducting this "DTC CONFIRMATION PROCEDURE" again, always turn ignition switch OFF and wait at least 5 seconds before continuing.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always drive vehicle on a level road to improve the accuracy of test.

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

With CONSULT-II

1) Start engine and select "ECU INPUT SIGNAL" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3) Select "4TH GR FNCTN P0734" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4) Accelerate vehicle to 42 to 52 km/h (26 to 32 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 5.5/8 (at all times during step 4)
   Selector lever: D position (O/D ON)
   - **Check that "GEAR" shows "3" after releasing pedal.**
5) Depress accelerator pedal steadily with 1.0/8 - 2.0/8 of "THROTTLE POSI" from a speed of 42 to 52 km/h (26 to 32 MPH) until "TESTING" has turned to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-149.
   If "STOP VEHICLE" appears on CONSULT-II screen, go to following step.
   - **Check that "GEAR" shows "4" when depressing accelerator pedal with 1.0/8 - 2.0/8 of "THROTTLE POSI".**
   - **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAGNOSIS" for "ENGINE". In case a 1st trip DTC other than P0734 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".**
6) Stop vehicle.
7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists	1 → 2 → 3 → 4

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
Malfunction for P0734 exists.	1 → 2 → 2 → 1

8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
   Refer to "DIAGNOSTIC PROCEDURE", AT-149.
   Refer to shift schedule, AT-365.

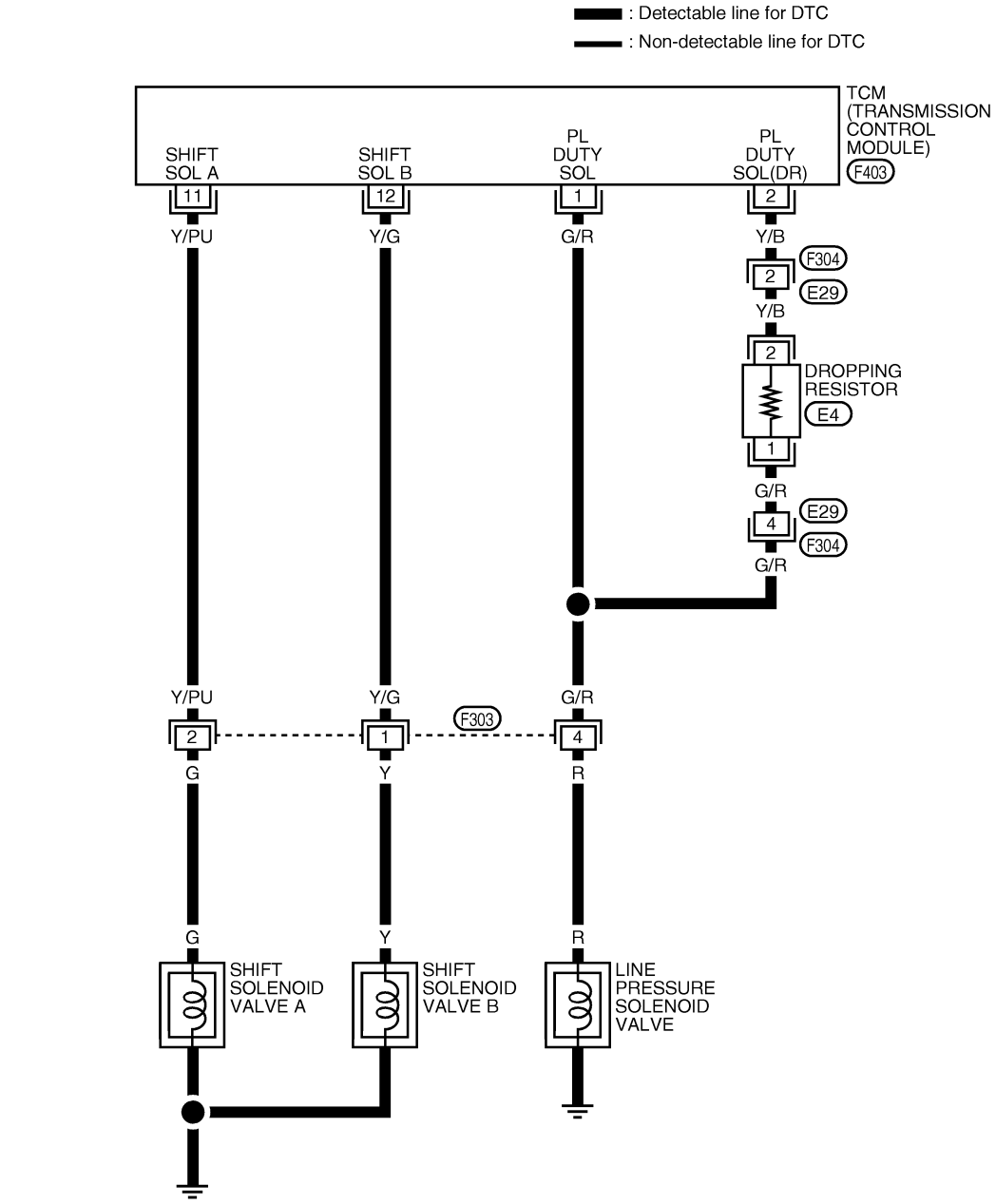
With GST

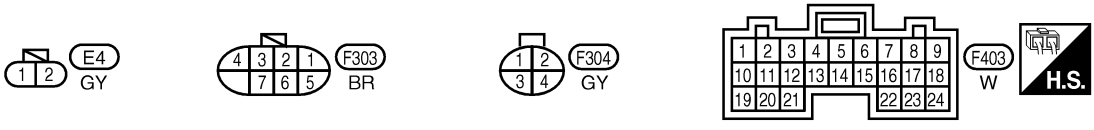
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — 4TH

NDAT0204

AT-4THSIG-01





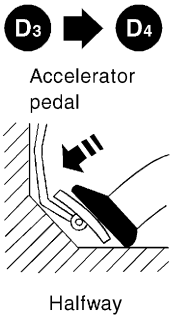
WAT057

Diagnostic Procedure

NDAT0056

1	CHECK SHIFT UP (D_3 TO D_4)

During “Cruise test − Part 1” (AT-75), does A/T shift from D_3 to D_4 at the specified speed?



SAT988H

Yes or No

Yes	▶	GO TO 9.
No	▶	GO TO 2.

2	CHECK LINE PRESSURE

Perform line pressure test.
Refer to AT-65.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 6.

3	CHECK SOLENOID VALVES

1. Remove control valve assembly.
   Refer to AT-266.
2. Refer to “Component Inspection”, AT-152.

OK or NG

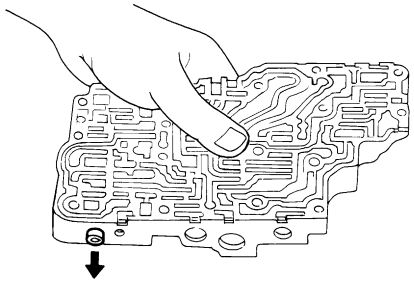
OK	▶	GO TO 4.
NG	▶	Replace solenoid valve assembly.

Diagnostic Procedure (Cont'd)

4	CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-298.
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



SAT367H

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair control valve.

5	CHECK SHIFT UP (D_3TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

OK or NG

OK	▶	GO TO 9.
NG	▶	Check control valve again. Repair or replace control valve assembly.

6	CHECK LINE PRESSURE SOLENOID VALVE

1. Remove control valve assembly.
   Refer to AT-266.
2. Refer to "Component Inspection", AT-298.

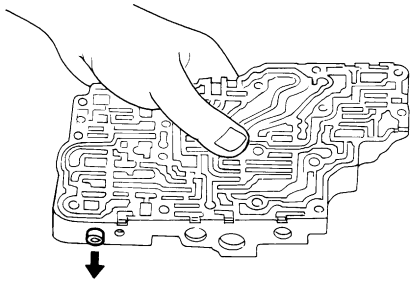
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace solenoid valve assembly.

7	CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-298.
2. Check line pressure circuit valves for sticking.

- Pressure regulator valve
- Pilot valve
- Pressure modifier valve



SAT367H

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair control valve.

8	CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

OK or NG

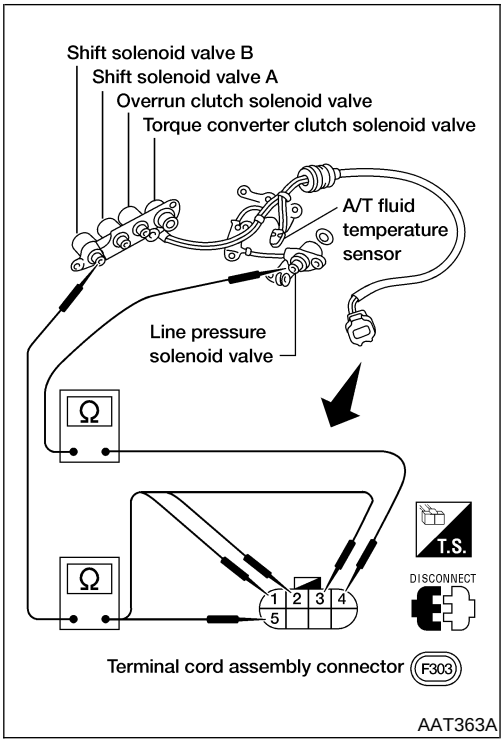
OK	▶	GO TO 9.
NG	▶	Check control valve again. Repair or replace control valve assembly.

9	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-146.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Perform "Cruise Test—Part 1" again and return to the start point of this flow chart.



Component Inspection

=NDAT0057

SOLENOID VALVES

NDAT0057S01

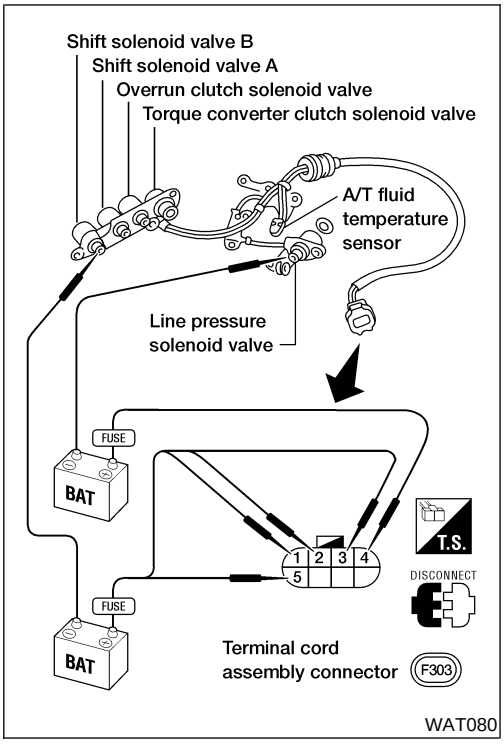
- For removal, refer to AT-266.

Resistance Check

NDAT0057S0101

- Check resistance between two terminals.

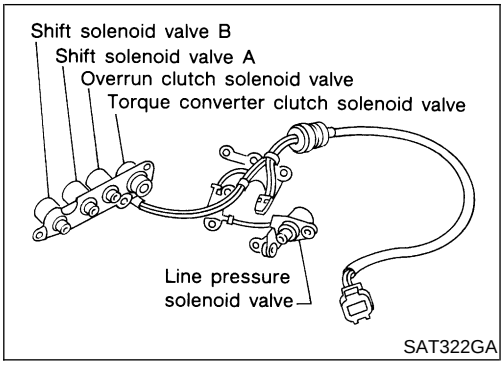
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 40Ω
Shift solenoid valve B	1		
Line pressure solenoid valve	4		2.5 - 5Ω



Operation Check

NDAT0057S0102

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



Description

NDAT0058

The torque converter clutch solenoid valve is activated, with the gear in D_4, by the TCM in response to signals sent from the vehicle speed and throttle position sensors. Lock-up piston operation will then be controlled.
Lock-up operation, however, is prohibited when A/T fluid temperature is too low.
When the accelerator pedal is depressed (less than 2/8) in lock-up condition, the engine speed should not change abruptly. If there is a big jump in engine speed, there is no lock-up.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NDAT0058S01

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Torque converter clutch solenoid valve duty	Lock-up OFF ↓ Lock-up ON	Approximately 4% ↓ Approximately 94%

TCM TERMINALS AND REFERENCE VALUE

NDAT0058S02

Remarks: Specification data are reference values.

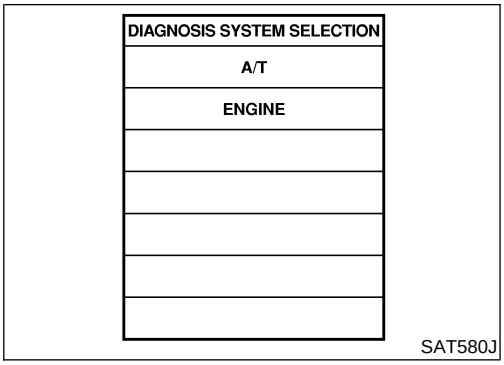
Terminal No.	Wire color	Item	Condition		Judgement standard
3	OR/L	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	1V or less

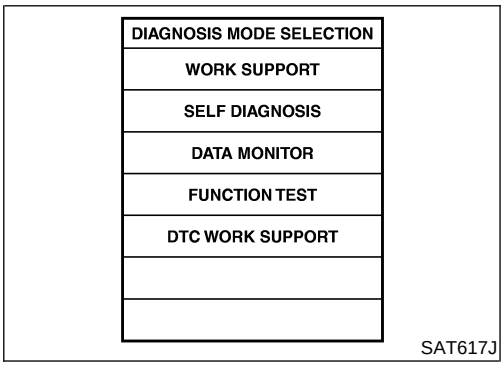
ON BOARD DIAGNOSIS LOGIC

NDAT0058S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: TCC SOLENOID/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • T/C clutch solenoid valve
: P0740		
: MIL Code No. 1204		

Description (Cont'd)





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0058S04

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

With CONSULT-II

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II and wait at least 1 second.

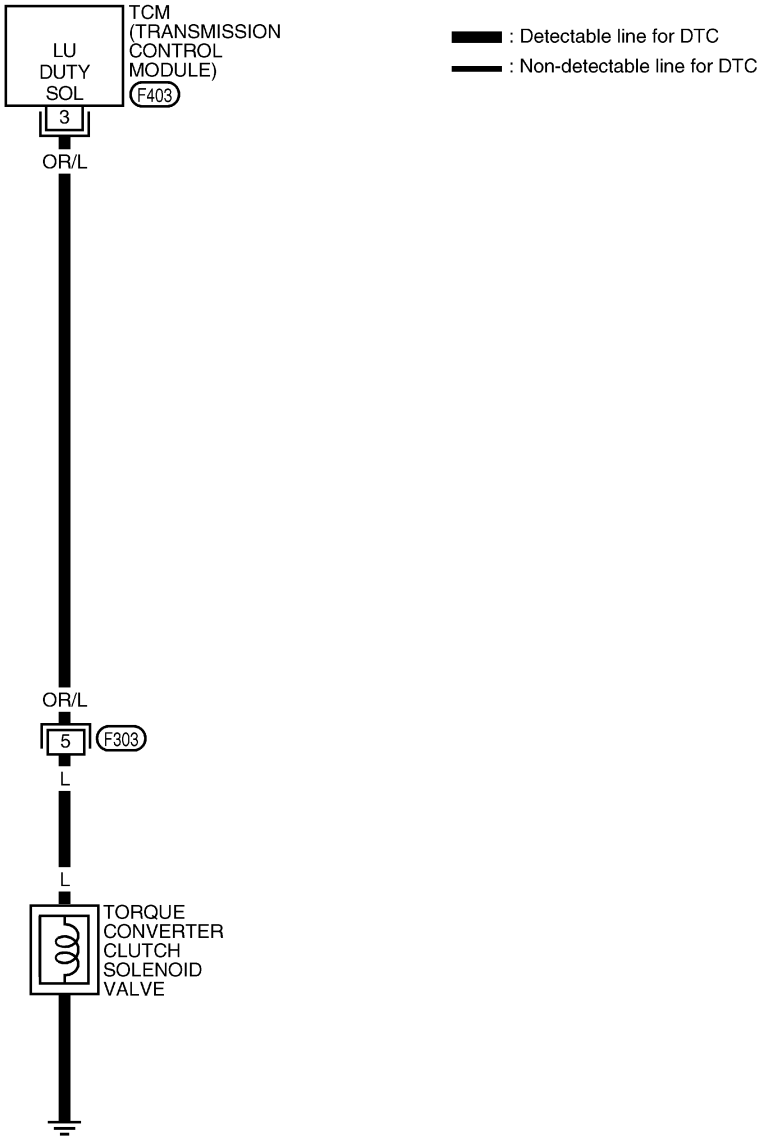
With GST

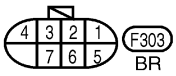
Follow procedure "With CONSULT-II".

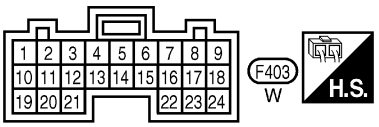
Wiring Diagram — AT — TCV

NDAT0205

AT-TCV-01







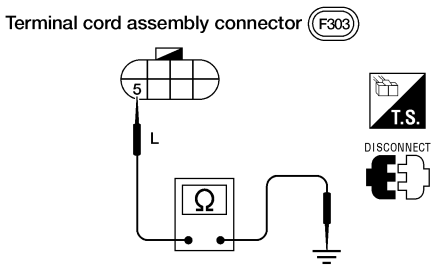
AAT269A

Diagnostic Procedure

NDAT0059

1	CHECK GROUND CIRCUIT

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



AAT365A

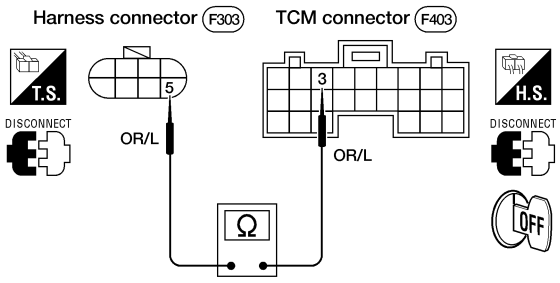
Resistance:
10 - 16Ω

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Remove oil pan. Refer to AT-266. 2. Check the following items: ● Torque converter clutch solenoid valve Refer to “Component Inspection”, AT-157. ● Harness of terminal cord assembly for short or open

2	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal 5 and TCM harness connector terminal 3.



AAT366A

Continuity should exist.
If OK, check harness for short to ground and short to power.
4. Reinstall any part removed.

OK or NG

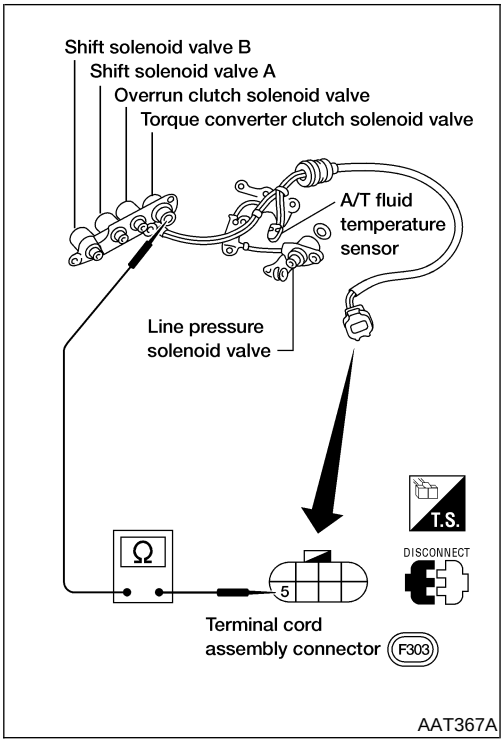
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK DTC

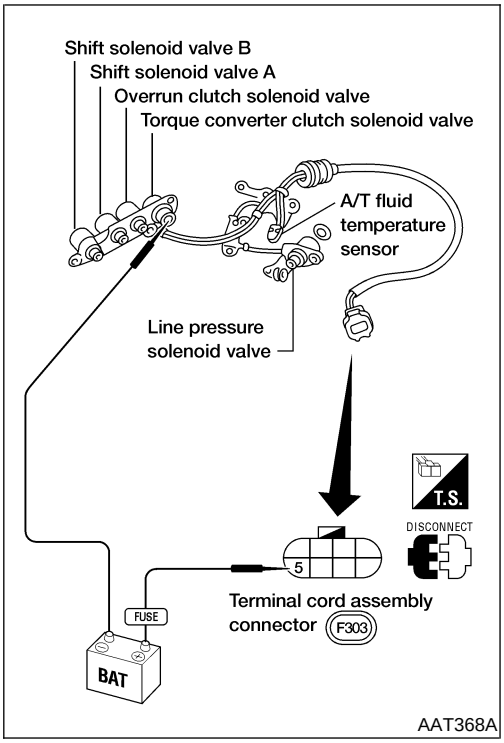
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-154.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.



AAT367A



AAT368A

Component Inspection

TORQUE CONVERTER CLUTCH SOLENOID VALVE

=NDAT0060
NDAT0060S01

- For removal, refer to AT-266.

Resistance Check

NDAT0060S0101

- Check resistance between two terminals.

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

Operation Check

NDAT0060S0102

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

Description

NDAT0061

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

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NDAT0061S01

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Torque converter clutch solenoid valve duty	Lock-up OFF ↓ Lock-up ON	Approximately 4% ↓ Approximately 94%

TCM TERMINALS AND REFERENCE VALUE

NDAT0061S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard
1	G/R	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
				When depressing accelerator pedal fully after warming up engine.	0.5V or less
2	Y/B	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0.5V or less
3	OR/L	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	1V or less

ON BOARD DIAGNOSTIC LOGIC

NDAT0061S03

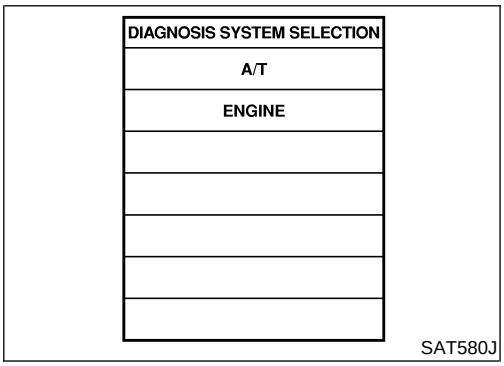
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is much lower than the position (4th) supposed by TCM, the slip ratio will be much less than normal. In case the ratio does not reach the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve B is stuck closed.

Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4

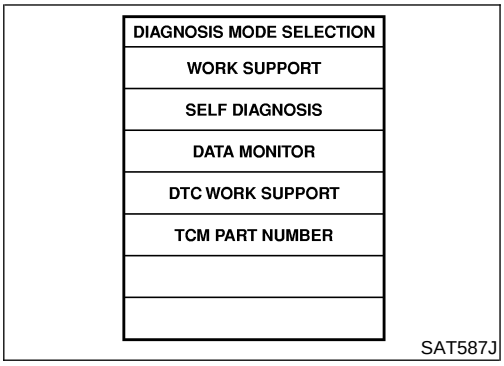
Gear position supposed by TCM	1	2	3	4
In case of gear position with shift solenoid valve B stuck closed	1	2	2	1*

*: P0744 is detected.

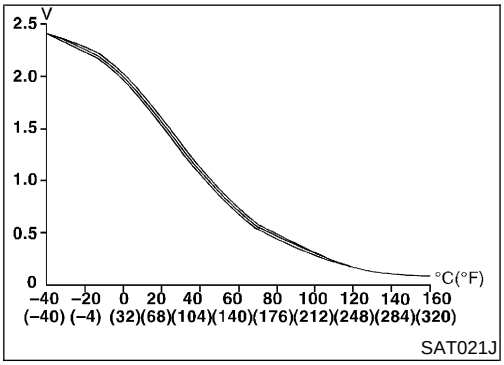
Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T TCC S/V FNCTN : P0744 : MIL Code No. 1107	A/T cannot perform lock-up even if electrical circuit is good.	• Torque converter clutch solenoid valve • Each clutch • Hydraulic control circuit



SAT580J



SAT587J



SAT021J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0061S04

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

With CONSULT-II

1) Start engine and select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive vehicle to decrease voltage (warm up the fluid) or stop engine to increase voltage (cool down the fluid).
3) Select "TCC S/V FNCTN P0744" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4) Accelerate vehicle to more than 80 km/h (50 MPH) and maintain the following condition continuously until "TESTING" has turned to "COMPLETE". (It will take approximately 30 seconds after "TESTING" shows.)
   THROTTLE POSI: 1.0/8 - 2.0/8 (at all times during step 4)
   Selector lever: D position (O/D ON)
   TCC S/V DUTY: More than 94%
   VHCL/S SE·A/T: Constant speed of more than 80 km/h (50 MPH)
   - **Check that "GEAR" shows "4".**
   - **For shift schedule, refer to SDS, AT-365.**
   - **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAGNOSIS". In case a 1st trip DTC other than P0744 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".**
5) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
   Refer to "DIAGNOSTIC PROCEDURE", AT-161.
   Refer to shift schedule, AT-365.

With GST

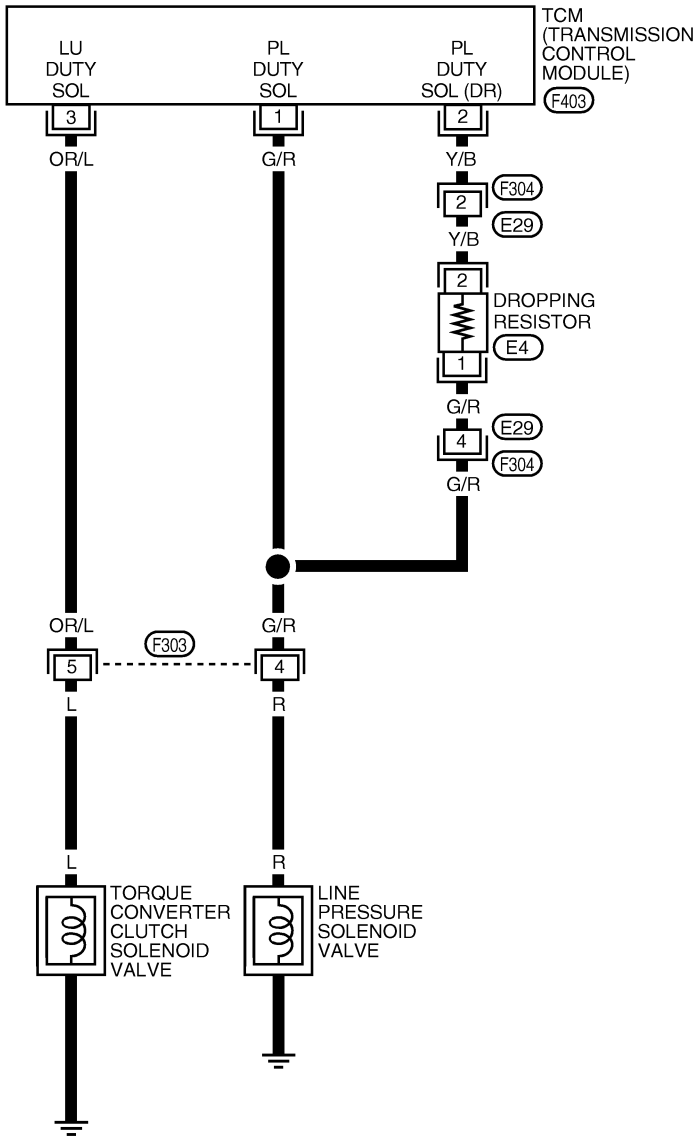
Follow procedure "With CONSULT-II".

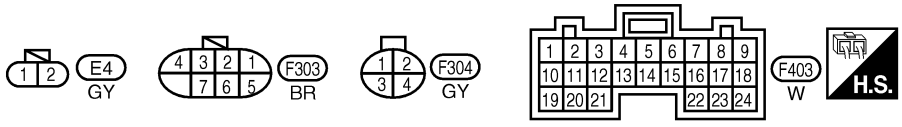
Wiring Diagram — AT — TCCSIG

NDAT0206

: Detectable line for DTC
: Non-detectable line for DTC

AT-TCCSIG-01





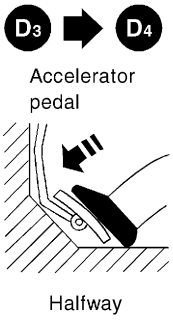
WAT058

Diagnostic Procedure

NDAT0062

1	CHECK SHIFT UP (D_3 TO D_4)

During “Cruise test − Part 1” (AT-75), does A/T shift from D_3 to D_4 at the specified speed?



SAT988H

Yes or No

Yes	▶	GO TO 10.
No	▶	GO TO 2.

2	CHECK LINE PRESSURE

Perform line pressure test.
Refer to AT-65.

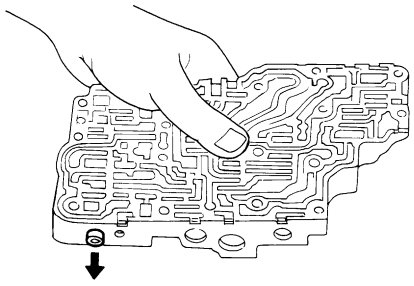
OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 6.

3	CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-298.
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



SAT367H

OK or NG

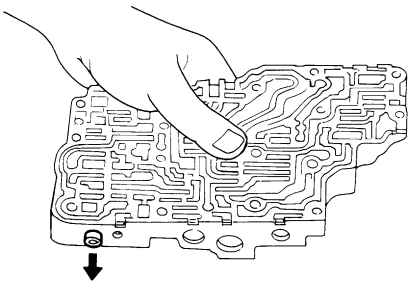
OK	▶	GO TO 4.
NG	▶	Repair control valve.

Diagnostic Procedure (Cont'd)

4	CHECK SHIFT UP (D_3 TO D_4)	
Does A/T shift from D_3 to D_4 at the specified speed?		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Check control valve again. Repair or replace control valve assembly.

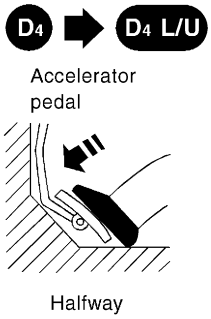
5	CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-159.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	GO TO 10.Check for proper lock-up.

6	CHECK LINE PRESSURE SOLENOID VALVE	
1. Remove control valve assembly. Refer to AT-266. 2. Check line pressure solenoid valve operation. Refer to AT-165.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace solenoid valve assembly.

7	CHECK CONTROL VALVE	
1. Disassemble control valve assembly. Refer to AT-298. 2. Check line pressure circuit valves for sticking. ● Pressure regulator valve ● Pilot valve ● Pressure modifier valve		
 SAT367H		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair control valve.

8	CHECK SHIFT UP (D_3 TO D_4)	
Does A/T shift from D_3 to D_4 at the specified speed?		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Check control valve again. Repair or replace control valve assembly.

9	CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-159.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	GO TO 10.Check for proper lock-up.

10	CHECK LOCK-UP	
During "Cruise test − Part 1" (AT-75), does A/T perform lock-up at the specified speed?		
 SAT989H		
Yes or No		
Yes	▶	Perform "Cruise test − Part 1" again and return to the start point of this flow chart.
No	▶	GO TO 11.

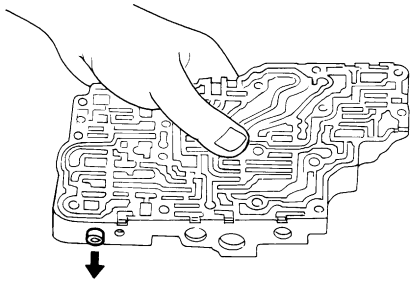
11	CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE	
1. Remove control valve assembly. Refer to AT-266. 2. Check torque converter clutch solenoid valve operation. Refer to AT-165.		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Replace solenoid valve assembly.

Diagnostic Procedure (Cont'd)

12	CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-298.
2. Check control valves for sticking.

- Torque converter clutch control valve
- Torque converter clutch relief valve



SAT367H

OK or NG

OK	▶	GO TO 13.
NG	▶	Repair control valve.

13	CHECK LOCK-UP

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

Yes or No

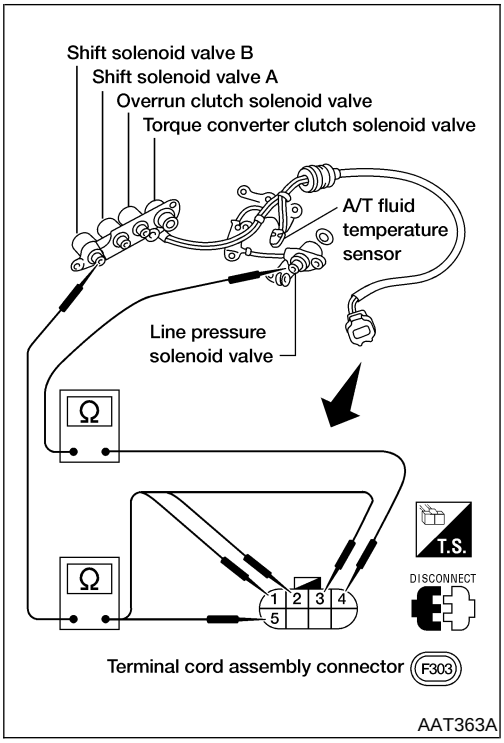
Yes	▶	GO TO 14.
No	▶	Check control valve again. Repair or replace control valve assembly.

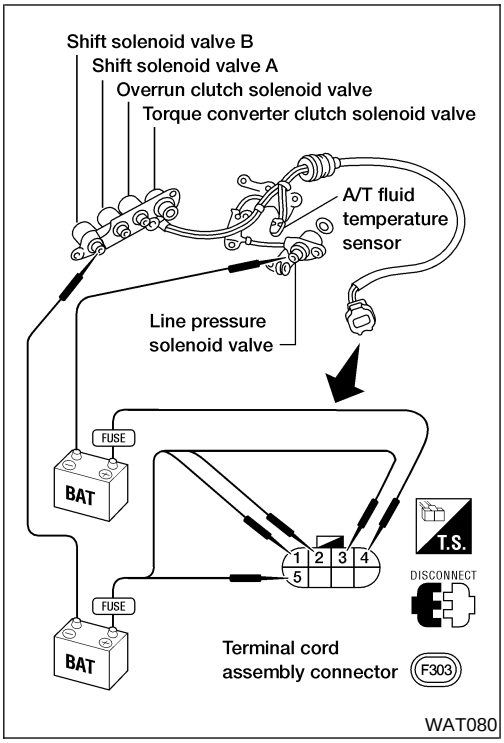
14	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-159.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Perform "Cruise test — Part 1" again and return to the start point of this flow chart.





Component Inspection

=NDAT0063

SOLENOID VALVES

NDAT0063S01

- For removal, refer to AT-266.

Resistance Check

NDAT0063S0101

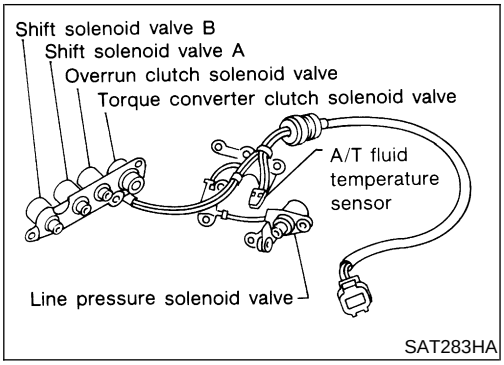
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	4	Ground	2.5 - 5Ω
Torque converter clutch solenoid valve	5		10 - 16Ω

Operation Check

NDAT0063S0102

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



Description

NDAT0064

The line pressure solenoid valve regulates the oil pump discharge pressure to suit the driving condition in response to a signal sent from the TCM.

The line pressure duty cycle value is not consistent when the closed throttle position switch is ON. To confirm the line pressure duty cycle at low pressure, the accelerator (throttle) should be open until the closed throttle position switch is OFF.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NDAT0064S01

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Line pressure solenoid valve duty	Small throttle opening (Low line pressure) ↓ Large throttle opening (High line pressure)	Approximately 24% ↓ Approximately 95%

NOTE:

The line pressure duty cycle value is not consistent when the closed throttle position switch is ON. To confirm the line pressure duty cycle at low pressure, the accelerator (throttle) should be open until the closed throttle position switch is OFF.

TCM TERMINALS AND REFERENCE VALUE

NDAT0064S02

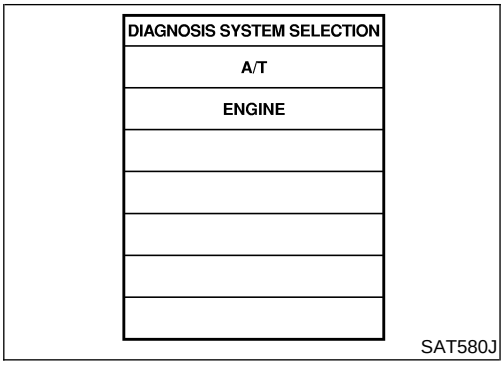
Remarks: Specification data are reference values.

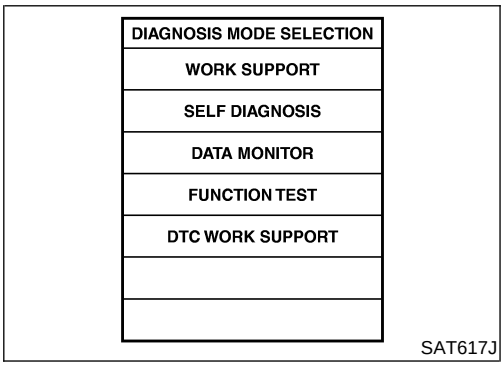
Terminal No.	Wire color	Item	Condition		Judgement standard
1	G/R	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
				When depressing accelerator pedal fully after warming up engine.	0.5V or less
2	Y/B	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0.5V or less

ON BOARD DIAGNOSIS LOGIC

NDAT0064S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: L/PRESS SOL/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • Line pressure solenoid valve
: P0745		
: MIL Code No. 1205		





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0064S04

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

With CONSULT-II

1) Turn ignition switch ON and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
2) Depress accelerator pedal completely and wait at least 1 second.

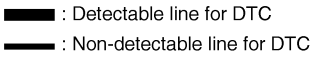
With GST

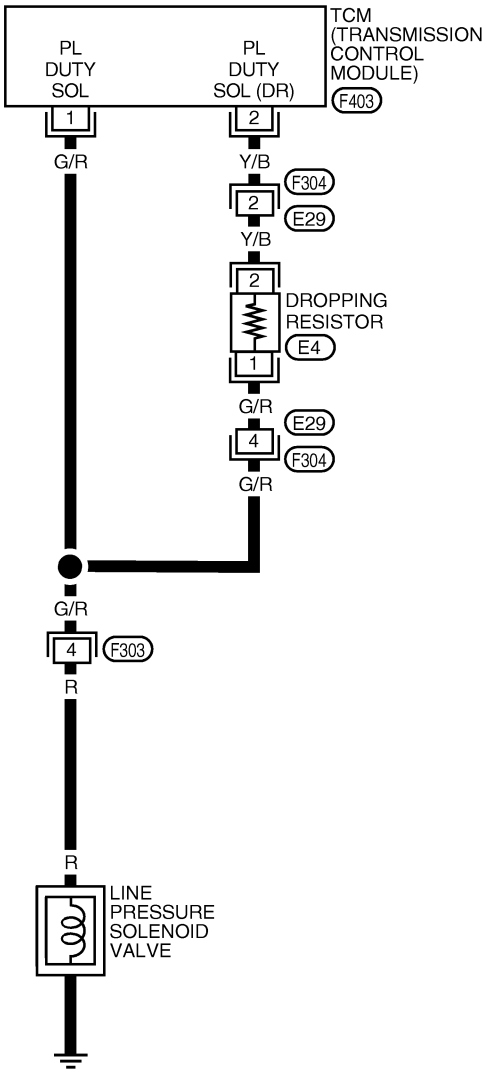
Follow the procedure "With CONSULT-II".

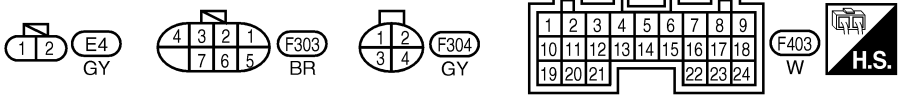
Wiring Diagram — AT — LPSV

NDAT0207

AT-LPSV-01







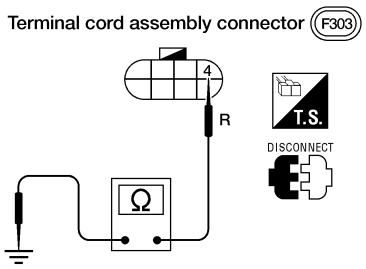
WAT059

Diagnostic Procedure

NDAT0065

1	CHECK VALVE RESISTANCE

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal 4 and ground.



AAT369A

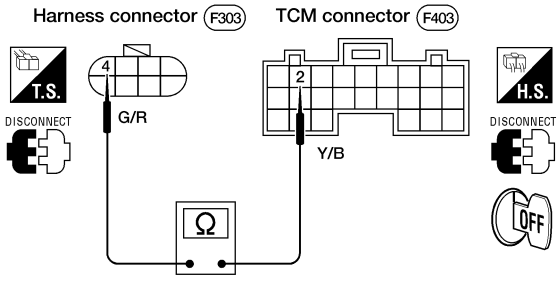
Resistance:
2.5 - 5Ω

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Remove control valve assembly. Refer to AT-266. 2. Check the following items: ● Line pressure solenoid valve Refer to “Component Inspection”, AT-171. ● Harness of terminal cord assembly for short or open

2	CHECK POWER SOURCE AND DROPPING RESISTOR CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 4 and TCM harness connector terminal 2.



AAT370A

Resistance:
11.2 - 12.8Ω

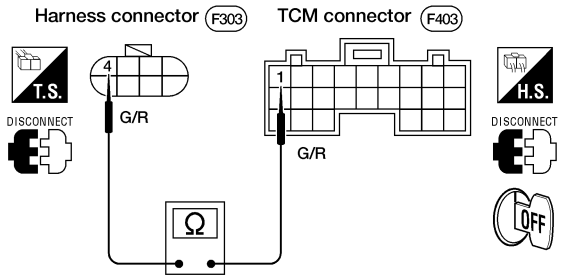
OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following items:** ● Dropping resistor Refer to “Component Inspection”, AT-171. ● Harness for short or open between TCM terminal 2 and terminal cord assembly (Main harness)

Diagnostic Procedure (Cont'd)

3	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Check continuity between terminal 4 and TCM harness connector terminal 1.



AAT371A

Continuity should exist.
If OK, check harness for short to ground and short to power.

3. Reinstall any part removed.

OK or NG

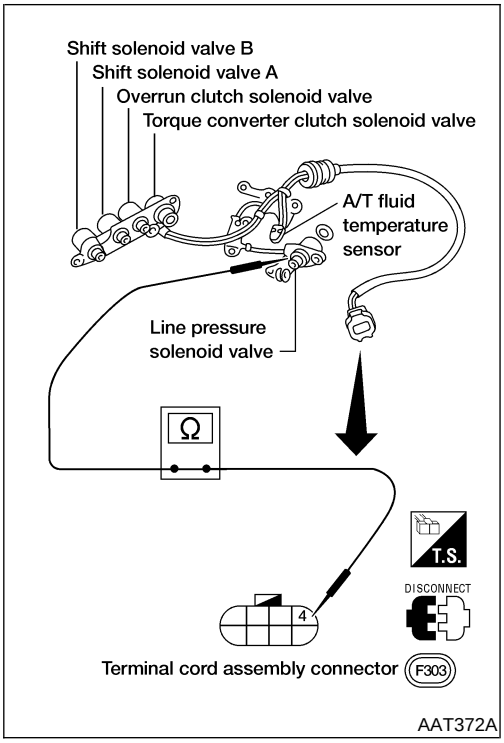
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-167.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.



Component Inspection

=NDAT0066

LINE PRESSURE SOLENOID VALVE

NDAT0066S01

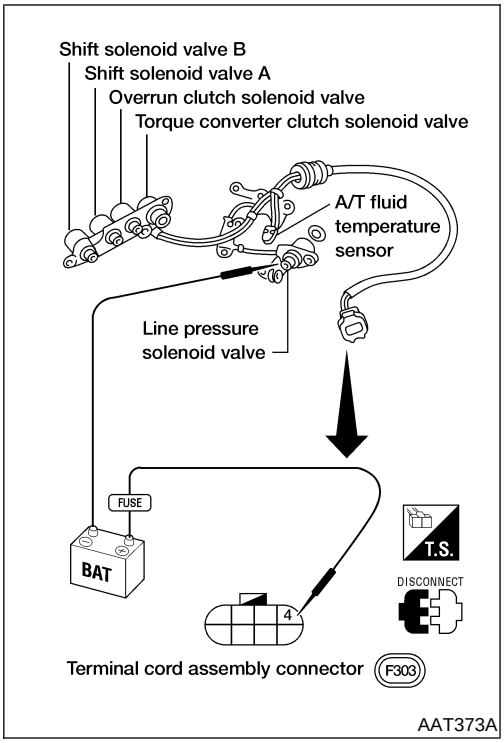
- For removal, refer to AT-266.

Resistance Check

NDAT0066S0101

- Check resistance between two terminals.

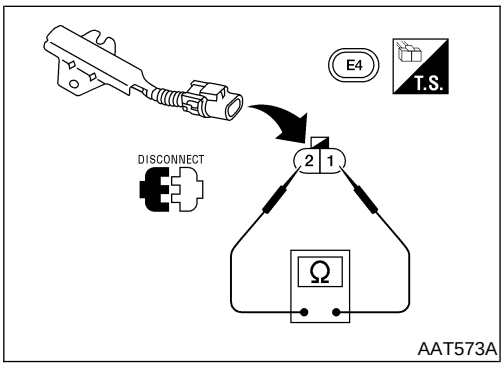
Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	4	Ground	2.5 - 5Ω



Operation Check

NDAT0066S0102

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

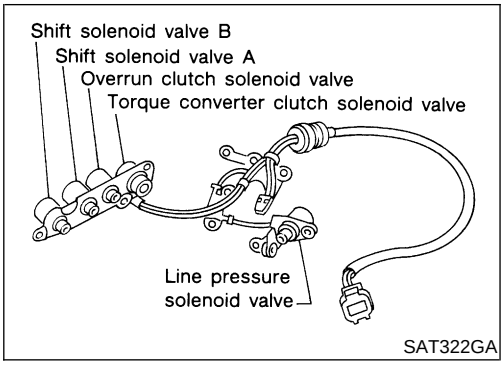


DROPPING RESISTOR

NDAT0066S02

- Check resistance between two terminals.

Resistance: 11.2 - 12.8Ω



Description

NDAT0067

Shift solenoid valves A and B are turned ON or OFF by the TCM in response to signals sent from the park/neutral position (PNP) switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

TCM TERMINALS AND REFERENCE VALUE

NDAT0067S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard
11	Y/PU	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in D_1 or D_4.)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in D_2 or D_3.)	1V or less

ON BOARD DIAGNOSIS LOGIC

NDAT0067S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: SFT SOL A/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • Shift solenoid valve A
: P0750		
: MIL Code No. 1108		

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

DIAGNOSIS MODE SELECTION
WORK SUPPORT
SELF DIAGNOSIS
DATA MONITOR
FUNCTION TEST
DTC WORK SUPPORT

SAT617J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0067S03

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

With CONSULT-II

1) Turn ignition switch ON and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
2) Start engine.
3) Drive vehicle in D position and allow the transmission to shift 1 → 2 ("GEAR").

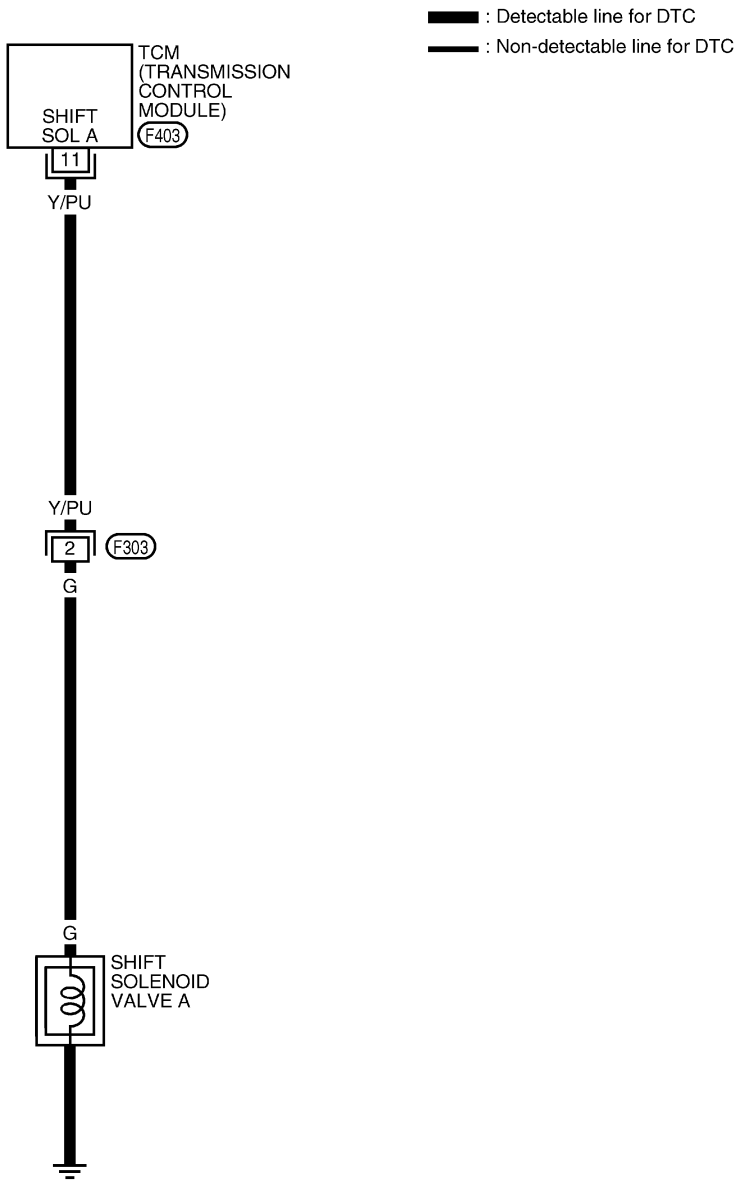
With GST

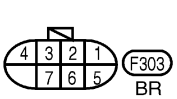
Follow the procedure "With CONSULT-II".

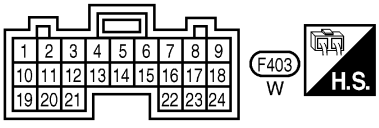
Wiring Diagram — AT — SSV/A

NDAT0208

AT-SSV/A-01







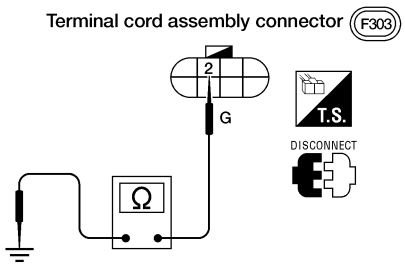
AAT282A

Diagnostic Procedure

NDAT0068

1	CHECK CHECK VALVE RESISTANCE

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



AAT375A

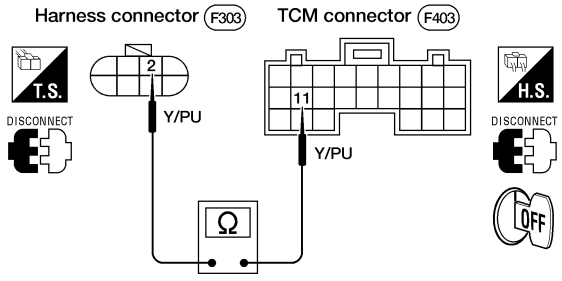
Resistance:
20 - 40Ω

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Remove control valve assembly. Refer to AT-266. 2. Check the following items: ● Shift solenoid valve A Refer to “Component Inspection”, AT-176. ● Harness of terminal cord assembly for short or open

2	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal 2 and TCM harness connector terminal 11.
   Continuity should exist.



AAT374A

   If OK, check harness for short to ground and short to power.
4. Reinstall any part removed.

OK or NG

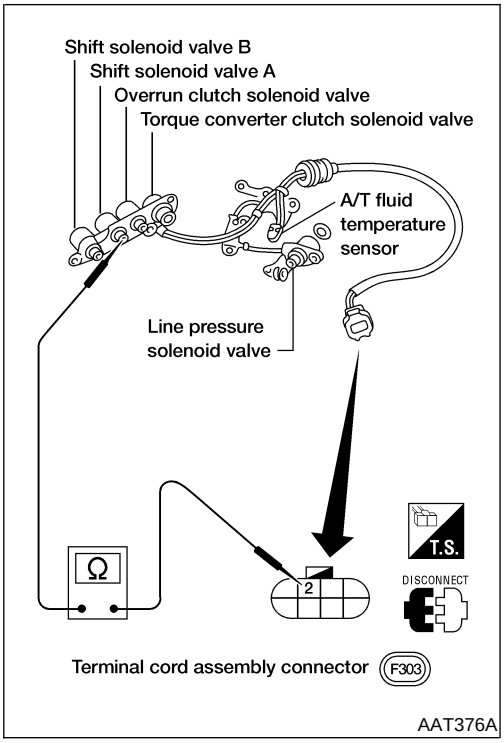
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-173.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.



Component Inspection

=NDAT0069

SHIFT SOLENOID VALVE A

NDAT0069S01

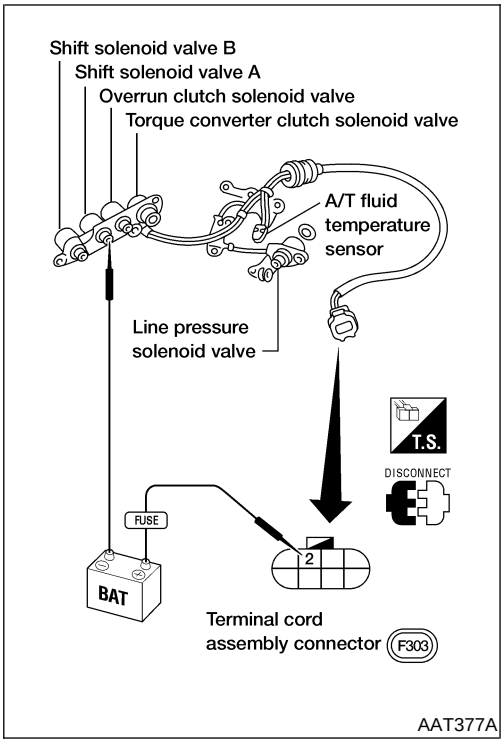
- For removal, refer to AT-266.

Resistance Check

NDAT0069S0101

- Check resistance between two terminals.

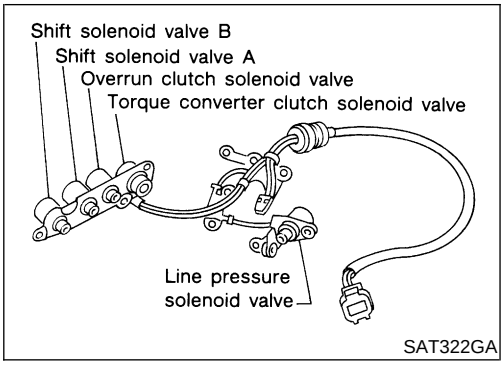
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 40Ω



Operation Check

NDAT0069S0102

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



Description

NDAT0070

Shift solenoid valves A and B are turned ON or OFF" by the TCM in response to signals sent from the park/neutral position (PNP) switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

TCM TERMINALS AND REFERENCE VALUE

NDAT0070S01

Remarks: Specification data are reference values.

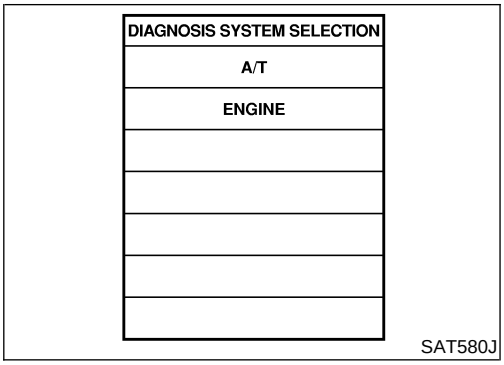
Terminal No.	Wire color	Item	Condition		Judgement standard
12	Y/G	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in D_1 or D_2.)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in D_3 or D_4.)	1V or less

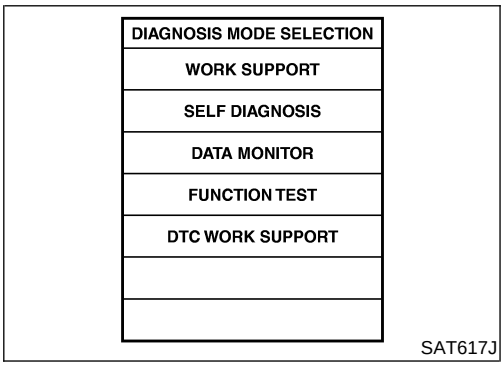
ON BOARD DIAGNOSIS LOGIC

NDAT0070S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: SFT SOL B/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • Shift solenoid valve B
: P0755		
: MIL Code No. 1201		

Description (Cont'd)





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0070S03

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

With CONSULT-II

1) Turn ignition switch ON and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
2) Start engine.
3) Drive vehicle in D position and allow the transmission to shift 1 → 2 → 3 ("GEAR").

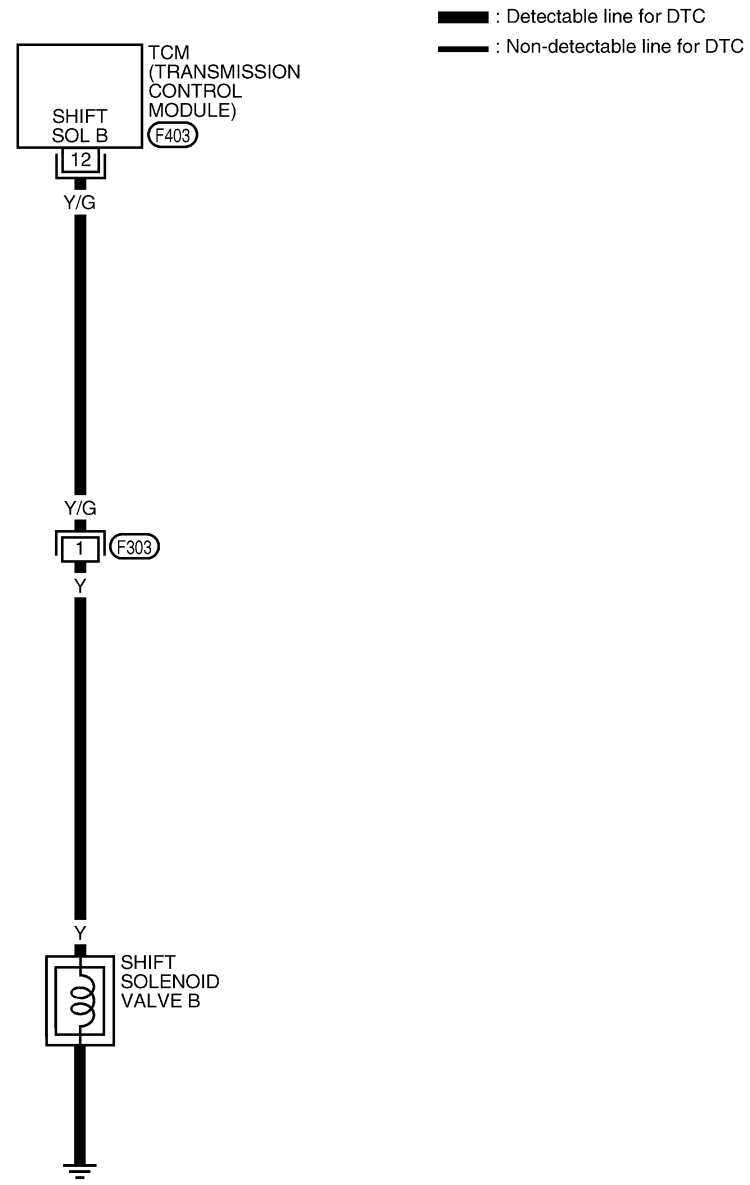
With GST

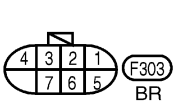
Follow the procedure "With CONSULT-II".

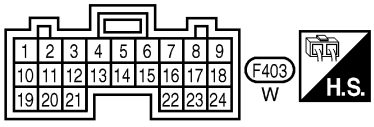
Wiring Diagram — AT — SSV/B

NDAT0209

AT-SSV/B-01







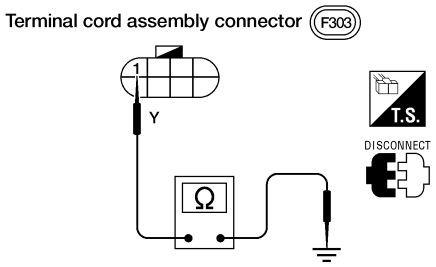
AAT283A

Diagnostic Procedure

NDAT0071

1	CHECK VALVE RESISTANCE

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



AAT378A

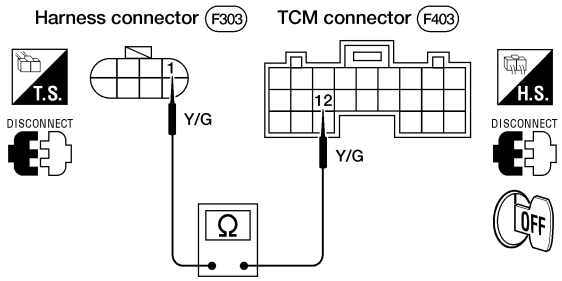
Resistance:
20 - 40Ω

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Remove control valve assembly. Refer to AT-266. 2. Check the following items: ● Shift solenoid valve B Refer to “Component Inspection”, AT-181. ● Harness of terminal cord assembly for short or open

2	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal 1 and TCM harness connector terminal 12.



AAT379A

Continuity should exist.
If OK, check harness for short to ground and short to power.
4. Reinstall any part removed.

OK or NG

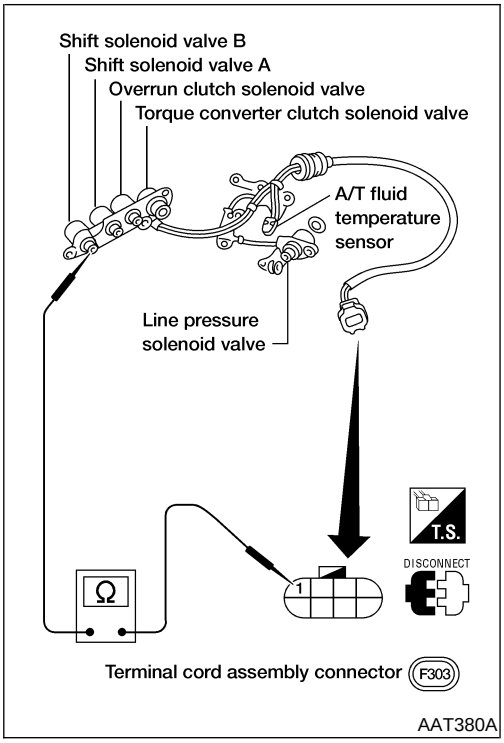
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

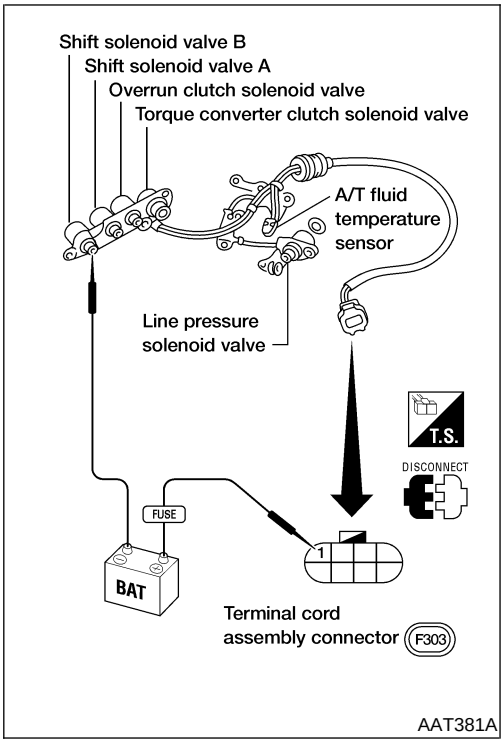
3	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-178.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.





Component Inspection

=NDAT0072

SHIFT SOLENOID VALVE B

NDAT0072S01

- For removal, refer to AT-266.

Resistance Check

NDAT0072S0101

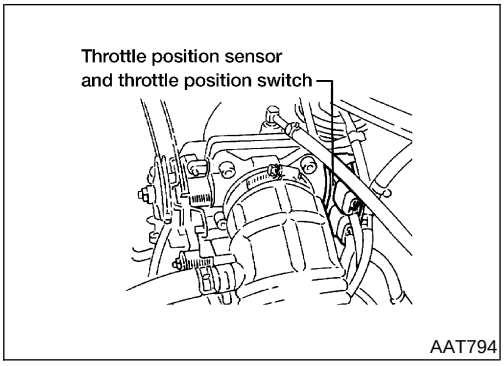
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	1	Ground	20 - 40Ω

Operation Check

NDAT0072S0102

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



Description

NDAT0073

- Throttle position sensor
  The throttle position sensor detects the throttle valve position and sends a signal to the TCM.
- Throttle position switch
  Consists of a wide open throttle position switch and a closed throttle position switch.
  The wide open throttle position switch sends a signal to the TCM when the throttle valve is open at least 1/2 of the full throttle position. The closed throttle position switch sends a signal to the TCM when the throttle valve is fully closed.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NDAT0073S01

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Throttle position sensor	Fully-closed throttle	Approximately 0.5V
	Fully-open throttle	Approximately 4V

TCM TERMINALS AND REFERENCE VALUE

NDAT0073S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard
16	BR/Y	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine.	Battery voltage
				When depressing accelerator pedal after warming up engine.	1V or less
17	R/W	Wide open throttle position switch (in throttle position switch)		When depressing accelerator pedal more than half-way after warming up engine.	Battery voltage
				When releasing accelerator pedal after warming up engine.	1V or less
32	BR	Throttle position sensor (Power source)		—	4.5 - 5.5V
41	R/G	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: Approximately 0.5V Fully-open throttle: Approximately 4V
42	B/Y	Throttle position sensor (Ground)		—	—

ON BOARD DIAGNOSIS LOGIC

NDAT0073S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: TP SEN/CIRC A/T	TCM receives an excessively low or high voltage from the sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Throttle position sensor • Throttle position switch
: P1705		
: MIL Code No. 1206		

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

DIAGNOSIS MODE SELECTION
WORK SUPPORT
SELF DIAGNOSIS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT587J

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

DIAGNOSIS MODE SELECTION
WORK SUPPORT
SELF DIAGNOSIS
DATA MONITOR
FUNCTION TEST
DTC WORK SUPPORT

SAT617J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0073S04

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

With CONSULT-II

1) Turn ignition switch ON and select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Check the following.

Accelerator pedal condition	THRTL POS SEN	CLOSED THL/SW	W/O THRL/P·SW
Fully released	Less than 4.7V	ON	OFF
Partially depressed	0.1 - 4.6V	OFF	OFF
Fully depressed	1.9 - 4.6V	OFF	ON

If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-185.
If the check result is OK, go to following step.

3) Turn ignition switch ON and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
4) Start engine and maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
VHCL SPEED SE: 10 km/h (6 MPH) or more
THRTL POS SEN: Approximately 3V or less
Selector lever: D position (O/D ON)
If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-185.
If the check result is OK, go to following step.
5) Maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
VHCL SPEED SE: 10 km/h (6 MPH) or more
Accelerator pedal: Wide open throttle
Selector lever: D position (O/D ON)

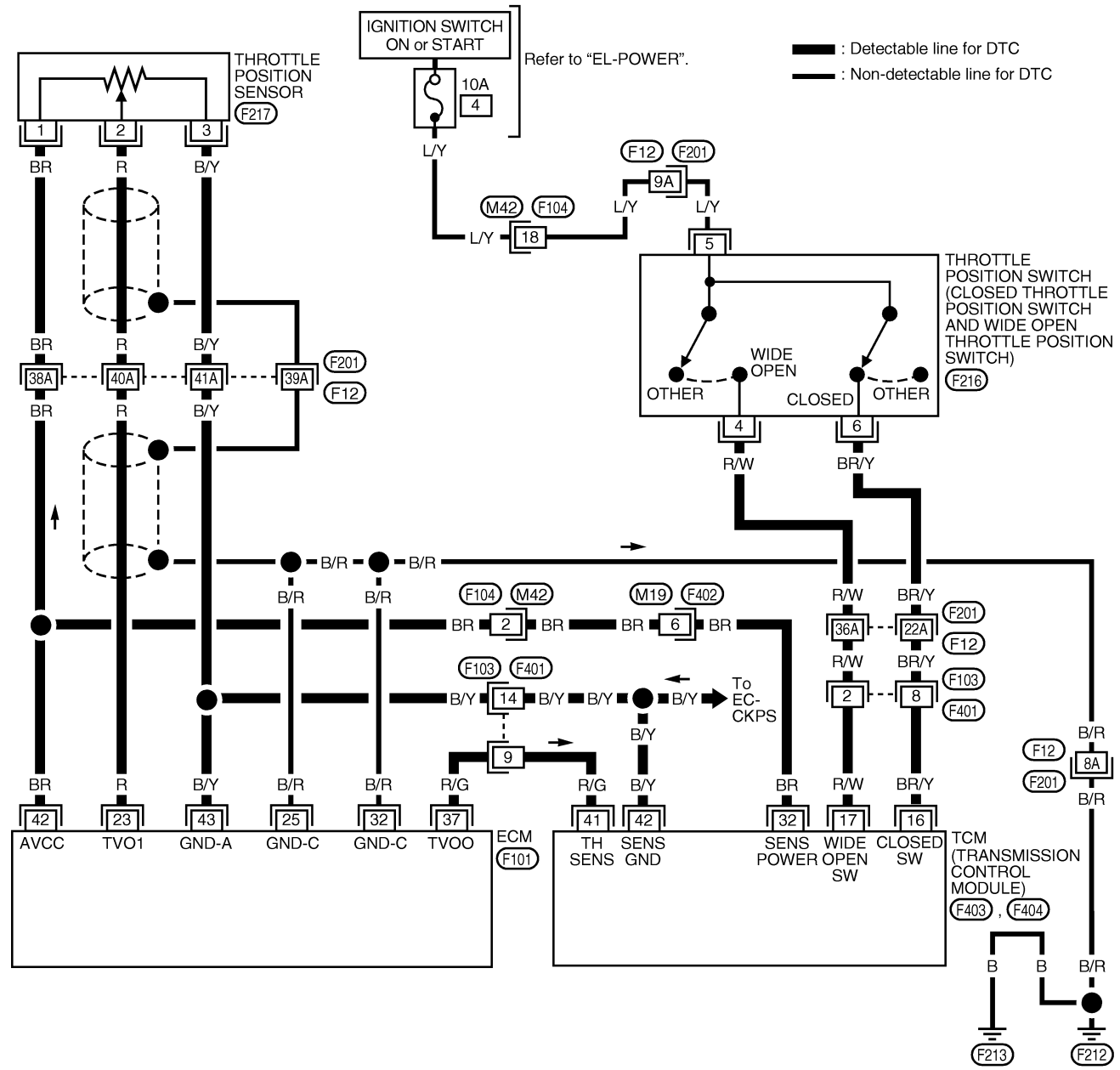
With GST

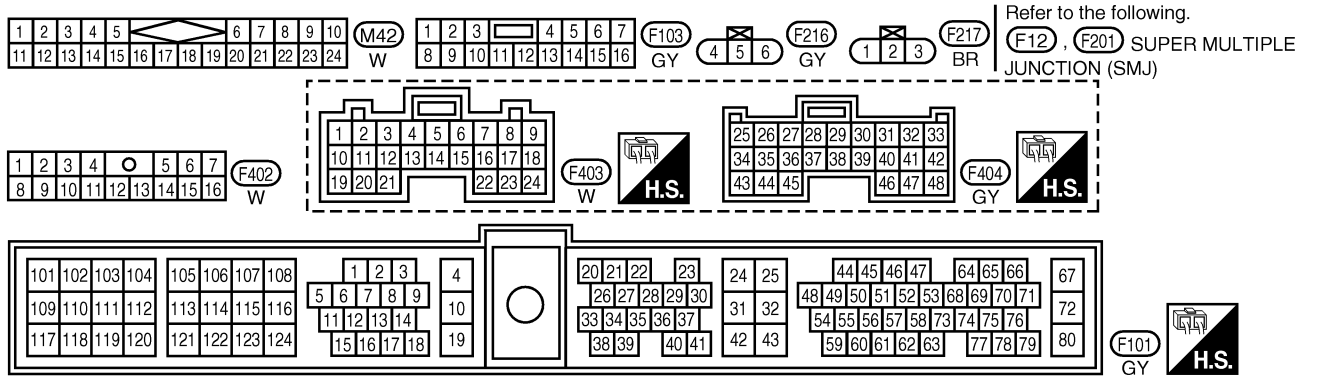
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — TPS

NDAT0210

AT-TPS-01





WAT060

Diagnostic Procedure

NDAT0074

1	CHECK DTC WITH ECM	
Perform diagnostic test mode II (self- diagnostic results) for engine control. Refer to ***EC-65*** “Malfunction Indicator Lamp (MIL)”.		
OK or NG		
OK (with CONSULT-II)	▶	GO TO 2.
OK (without CONSULT-II)	▶	GO TO 3.
NG	▶	Check throttle position sensor circuit for engine control. Refer to “DTC P0120 Throttle Position Sensor”, ***EC-162***.

2	CHECK INPUT SIGNAL (With CONSULT-II)	

With CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Select “ECU INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

3. Read out the value of “THRTL POS SEN”.
   Voltage:
   Fully-closed throttle:
   Approximately 0.5V
   Fully-open throttle:
   Approximately 4V

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

OK or NG

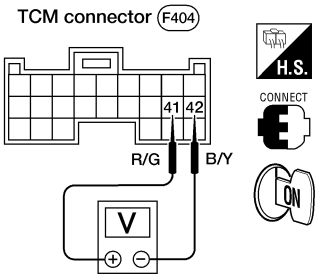
OK	▶	GO TO 4.
NG	▶	Check harness for short or open between ECM and TCM regarding throttle position sensor circuit. (Main harness)

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL (Without CONSULT-II)

Without CONSULT-II

1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between TCM terminals 41 and 42 while accelerator pedal is depressed slowly.



AAT382A

Voltage:
Fully-closed throttle valve:
Approximately 0.5V
Fully-open throttle valve:
Approximately 4V
(Voltage rises gradually in response to throttle position)

OK or NG

OK	▶	GO TO 5.
NG	▶	Check harness for short or open between ECM and TCM regarding throttle position sensor circuit. (Main harness)

4	CHECK THROTTLE POSITION SWITCH CIRCUIT (With CONSULT-II)

With CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out "CLOSED THL/SW" and "W/O THRL/P-SW" depressing and releasing accelerator pedal.
   Check the signal of throttle position switch is indicated properly.

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

MTBL0011

DATA MONITOR	
MONITORING	
POWERSHIFT SW	OFF
CLOSED THL/SW	OFF
W/O THRL/P-SW	OFF
HOLD SW	OFF
BRAKE SW	ON

SAT702J

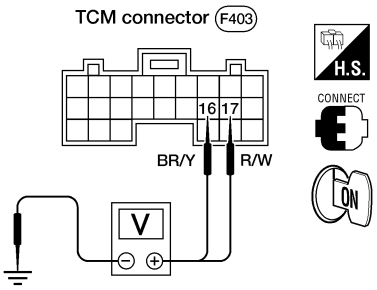
OK or NG

OK	▶	GO TO 6.
NG	▶	**Check the following items:** ● Throttle position switch — Refer to "Components Inspection", AT-188. ● Harness for short or open between ignition switch and throttle position switch (Main harness) ● Harness for short or open between throttle position switch and TCM (Main harness)

5	CHECK THROTTLE POSITION SWITCH CIRCUIT (Without CONSULT-II)

Without CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminals 16, 17 and ground while depressing, and releasing accelerator pedal slowly.
   (After warming up engine)



AAT383A

Accelerator pedal condition	Voltage	
	Terminal No. 16	Terminal No. 17
Released	Battery voltage	1V or less
Fully depressed	1V or less	Battery voltage

MTBL0120

OK or NG

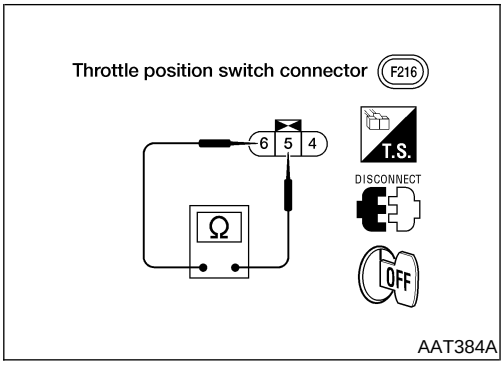
OK	▶	GO TO 6.
NG	▶	**Check the following items:** ● Throttle position switch — Refer to "Components Inspection", AT-188. ● Harness for short or open between ignition switch and throttle position switch (Main harness) ● Harness for short or open between throttle position switch and TCM (Main harness)

6	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-183.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.



Component Inspection

=NDAT0075

THROTTLE POSITION SWITCH

NDAT0075S01

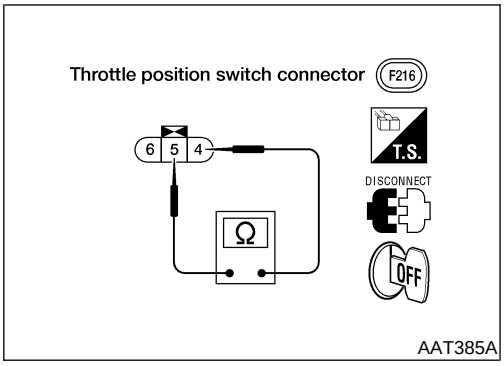
Closed Throttle Position Switch (Idle position)

NDAT0075S0101

- Check continuity between terminals 5 and 6.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

- To adjust closed throttle position switch, refer to “Basic Inspection”, ***EC-88***.

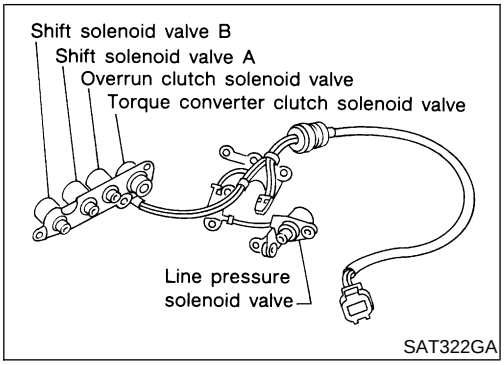


Wide Open Throttle Position Switch

NDAT0075S0102

- Check continuity between terminals 4 and 5.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes



SAT322GA

Description

NDAT0076

The overrun clutch solenoid valve is activated by the TCM in response to signals sent from the park/neutral position (PNP) switch, overdrive control switch, vehicle speed and throttle position sensors. The overrun clutch operation will then be controlled.

TCM TERMINALS AND REFERENCE VALUE

NDAT0076S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard
20	OR/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	1V or less

ON BOARD DIAGNOSIS LOGIC

NDAT0076S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: O/R CLTCH SOL/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • Overrun clutch solenoid valve
: P1760		
: MIL Code No. 1203		

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J

DIAGNOSIS MODE SELECTION
WORK SUPPORT
SELF DIAGNOSIS
DATA MONITOR
FUNCTION TEST
DTC WORK SUPPORT

SAT617J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0076S03

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always drive vehicle on a level road to improve accuracy of test.

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

With CONSULT-II

1) Turn ignition switch ON and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
2) Start engine.
3) Accelerate vehicle to a speed of more than 10 km/h (6 MPH) with D position (O/D ON).
4) Release accelerator pedal completely with D position (O/D OFF).

Description (Cont'd)

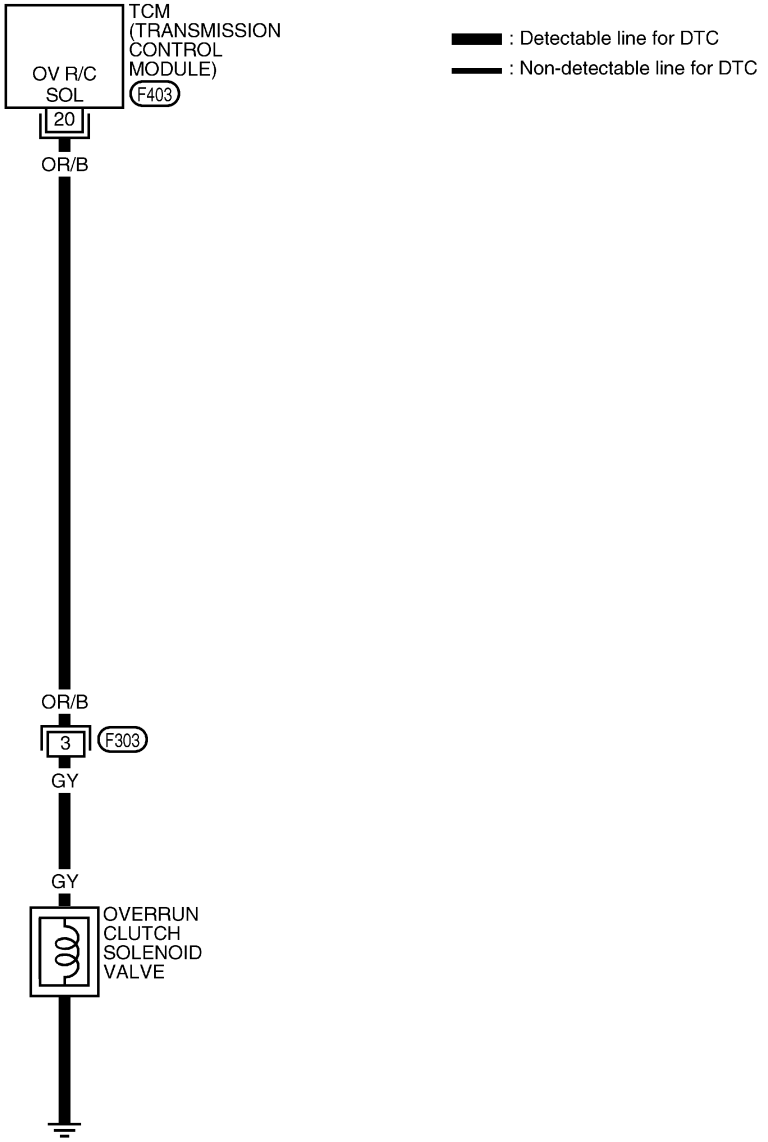
With GST

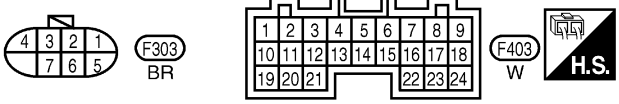
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — OVRCSV

NDAT0211

AT-OVRCSV-01





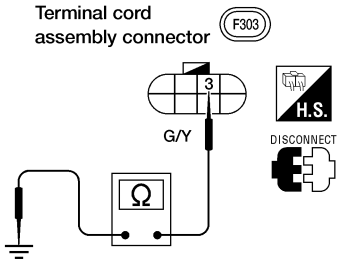
AAT272A

Diagnostic Procedure

NDAT0077

1	CHECK VALVE RESISTANCE

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



AAT386A

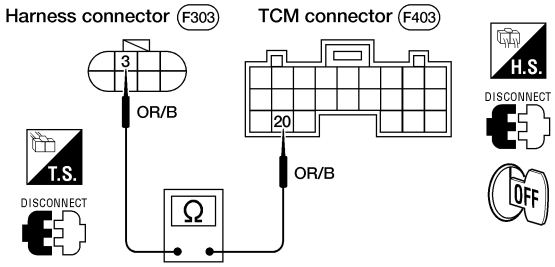
Resistance:
20 - 30Ω

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Remove control valve assembly. Refer to AT-266. 2. Check the following items: ● Overrun clutch solenoid valve Refer to “Component Inspection”, AT-193. ● Harness of terminal cord assembly for short or open

2	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal 3 and TCM harness connector terminal 20.



AAT387A

If OK, check harness for short to ground and short to power.
Continuity should exist.

4. Reinstall any part removed.

OK or NG

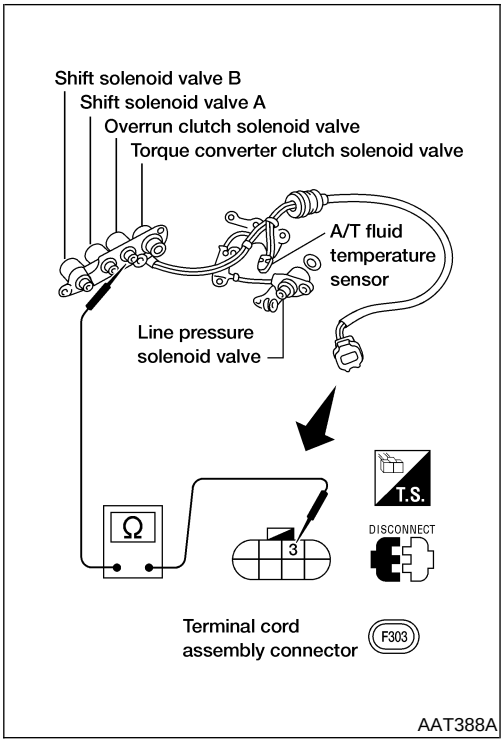
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

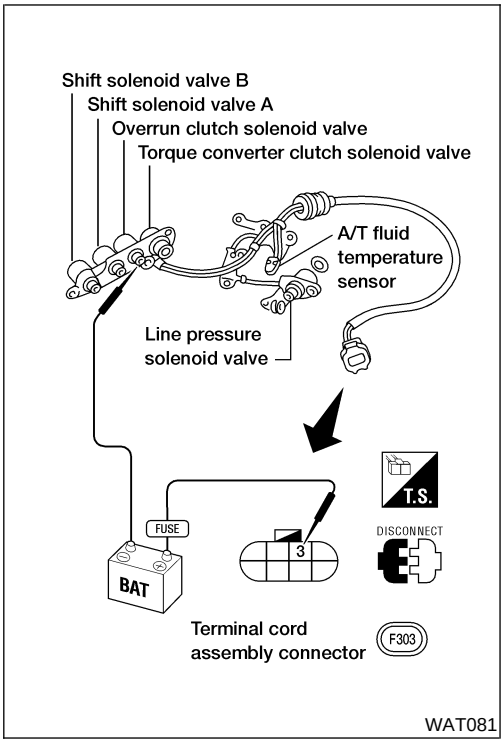
3	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-189.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.





Component Inspection

=NDAT0078

OVERRUN CLUTCH SOLENOID VALVE

NDAT0078S01

- For removal, refer to AT-266.

Resistance Check

NDAT0078S0101

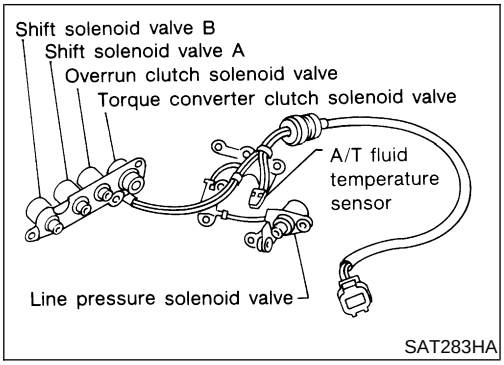
- Check resistance between two terminals.

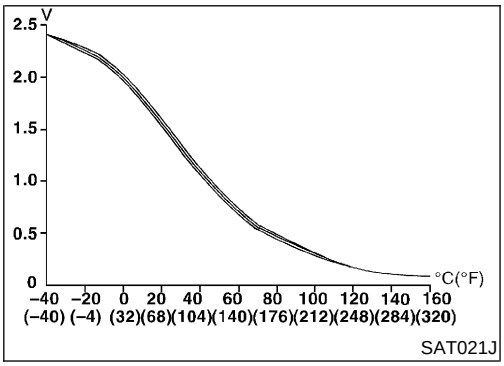
Solenoid valve	Terminal No.		Resistance (Approx.)
Overrun clutch solenoid valve	3	Ground	20 - 40Ω

Operation Check

NDAT0078S0102

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





Description

NDAT0079

The A/T fluid temperature sensor detects the A/T fluid temperature and sends a signal to the TCM.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NDAT0079S01

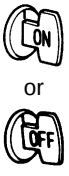
Remarks: Specification data are reference values.

Monitor item	Condition	Specification
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	Approximately 1.5V ↓ Approximately 0.5V

TCM TERMINALS AND REFERENCE VALUE

NDAT0079S02

Remarks: Specification data are reference values.

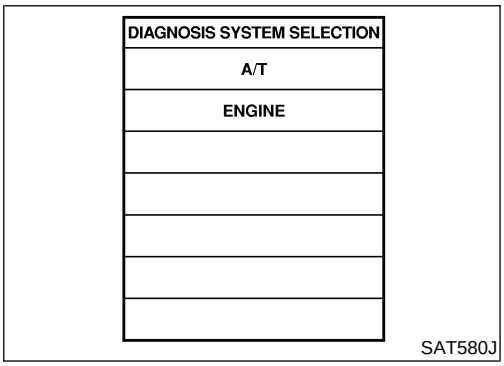
Terminal No.	Wire color	Item	Condition		Judgement standard
10	LG	Power source		When turning ignition switch to ON.	Battery voltage
				When turning ignition switch to OFF.	1V or less
19	LG	Power source		Same as No. 10	
28	PU	Power source (Memory back-up)		When turning ignition switch to OFF.	Battery voltage
				When turning ignition switch to ON.	Battery voltage
42	B/Y	Throttle position sensor (Ground)		—	—
47	SB	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	Approximately 1.5V
				When ATF temperature is 80°C (176°F).	Approximately 0.5V

Description (Cont'd)

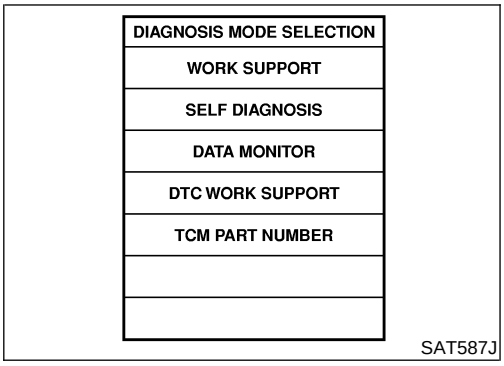
ON BOARD DIAGNOSIS LOGIC

NDAT0079S03

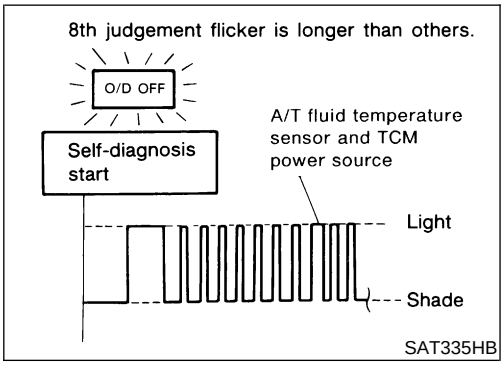
Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: BATT/FLUID TEMP SEN	TCM receives an excessively low or high voltage from the sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • A/T fluid temperature sensor
: 8th judgement flicker		



SAT580J



SAT587J



SAT335HB

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0079S04

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

With CONSULT-II

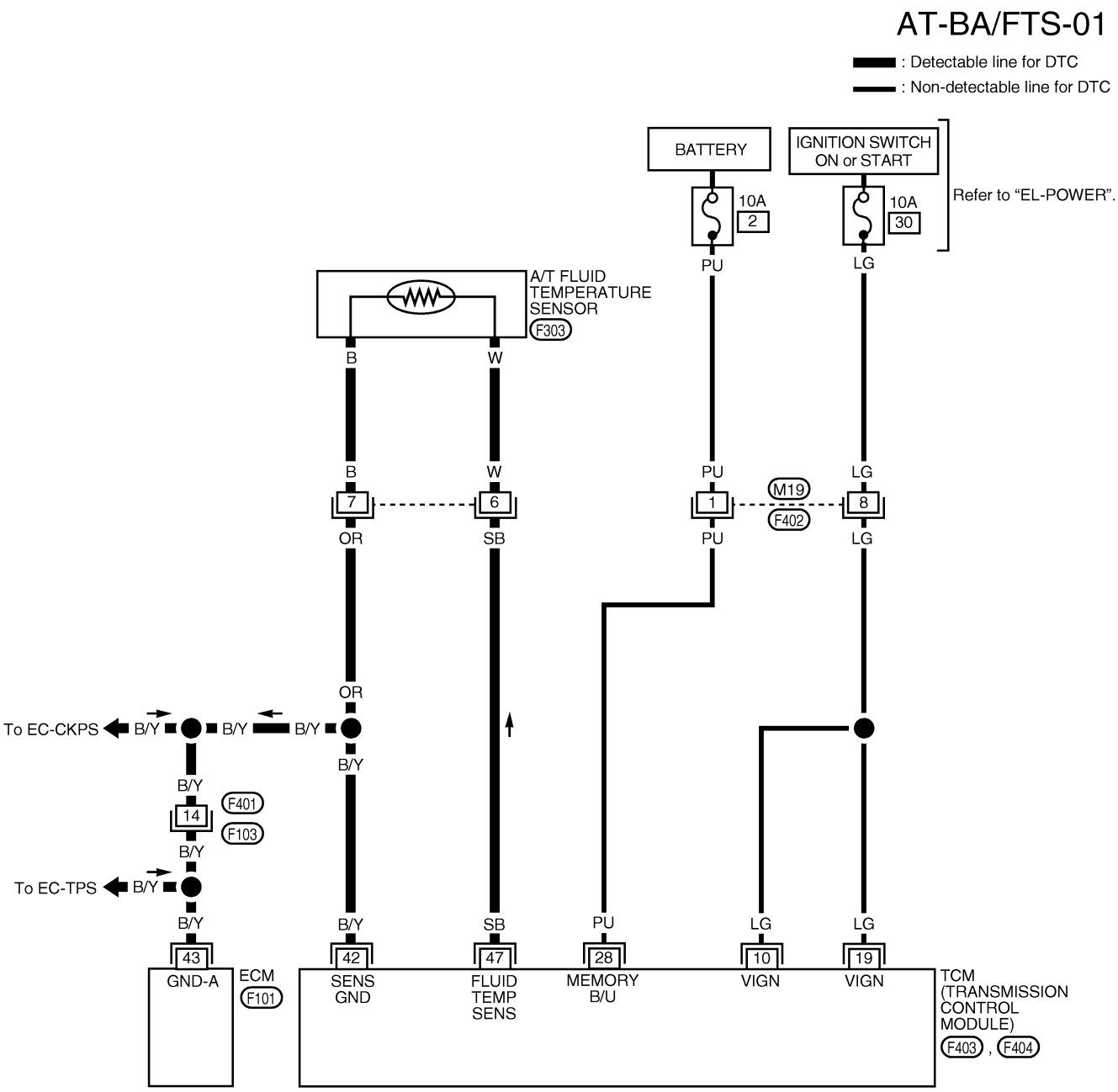
1) Start engine.
2) Select "DATA MONITOR" mode for "A/T" with CONSULT-II.
3) Drive vehicle under the following conditions:
   Selector lever in D, vehicle speed higher than 20 km/h (12 MPH).

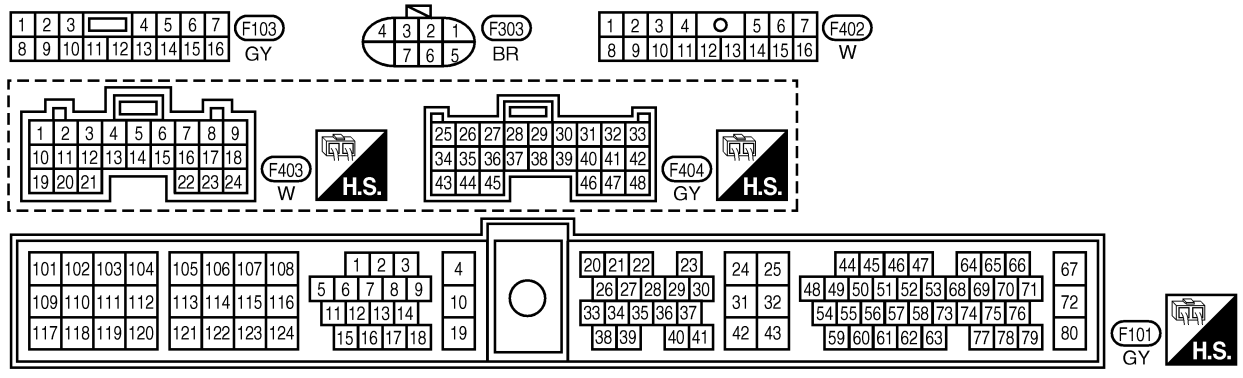
Without CONSULT-II

1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in D, vehicle speed higher than 20 km/h (12 MPH).
3) Perform self-diagnosis.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS), AT-48.

Wiring Diagram — AT — BA/FTS

NDAT0212





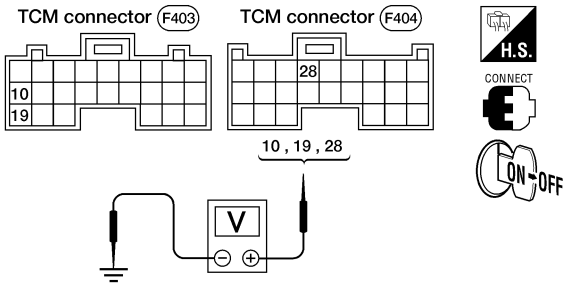
WAT061

Diagnostic Procedure

NDAT0080

1 CHECK TCM POWER SOURCE

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminals 10, 19, 28 and ground.
   Voltage:
   Battery voltage
3. Turn ignition switch to OFF position.
4. Check voltage between TCM terminal 28 and ground.



AAT347A

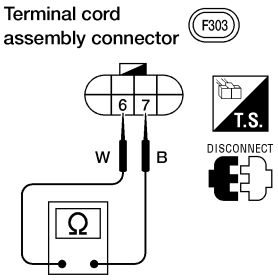
Voltage:
Battery voltage

OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following items:** ● Harness for short or open between ignition switch and TCM (Main harness) ● Ignition switch and fuse Refer to “POWER SUPPLY ROUTING”, ***EL-10***.

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

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminals 6 and 7 when A/T is cold.



AAT390A

Resistance:
Cold [20°C (68°F)]
Approximately 2.5 kΩ

4. Reinstall any part removed.

OK or NG

OK (with CONSULT-II)	▶	GO TO 3.
OK (without CONSULT-II)	▶	GO TO 4.
NG	▶	1. Remove oil pan. 2. Check the following items: ● A/T fluid temperature sensor Refer to “Component Inspection”, AT-200. ● Harness of terminal cord assembly for short or open

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (With CONSULT-II)

With CONSULT-II

1. Start engine.
2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out the value of "FLUID TEMP SE".

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

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

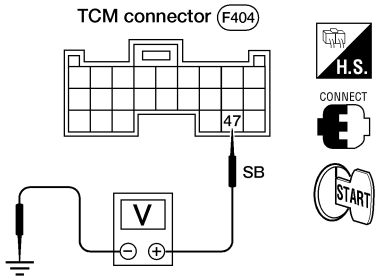
OK or NG

OK	▶	GO TO 5.
NG	▶	**Check the following item:** ● Harness for short or open between TCM, ECM and terminal cord assembly (Main harness) ● Ground circuit for ECM Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", ***EC-122***.

4	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (Without CONSULT-II)

Without CONSULT-II

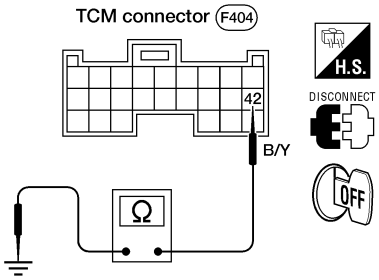
1. Start engine.
2. Check voltage between TCM terminal 47 and ground while warming up A/T.



AAT391A

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

3. Turn ignition switch to OFF position.
4. Disconnect TCM harness connector.
5. Check resistance between terminal 42 and ground.



AAT392A

Continuity should exist.

OK or NG

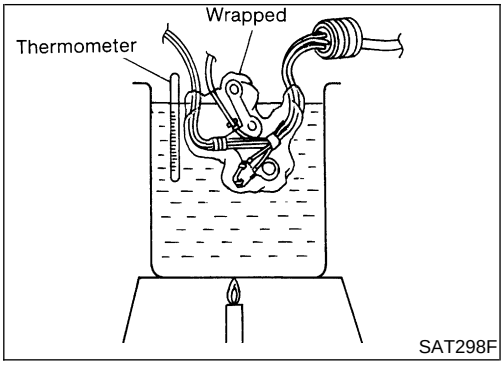
OK	▶	GO TO 5.
NG	▶	**Check the following item:** ● Harness for short or open between TCM, ECM and terminal cord assembly (Main harness) ● Ground circuit for ECM Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", ***EC-122***.

5	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-195.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.



Component Inspection

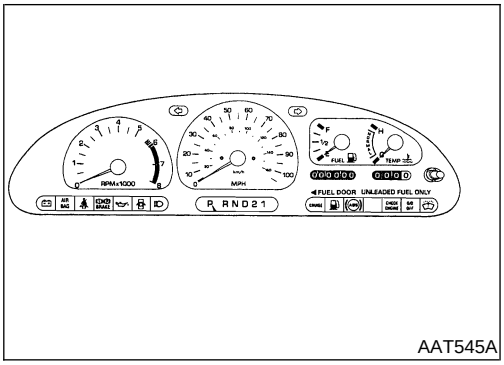
=NDAT0081

A/T FLUID TEMPERATURE SENSOR

NDAT0081S01

- For removal, refer to AT-266.
- Check resistance between two terminals while changing temperature as shown at left.

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



AAT545A

Description

NDAT0082

The vehicle speed sensor·MTR is built into the speedometer assembly. The sensor functions as an auxiliary device to the revolution sensor when it is malfunctioning. The TCM will then use a signal sent from the vehicle speed sensor·MTR.

TCM TERMINALS AND REFERENCE VALUE

NDAT0082S01

Remarks: Specification data are reference values.

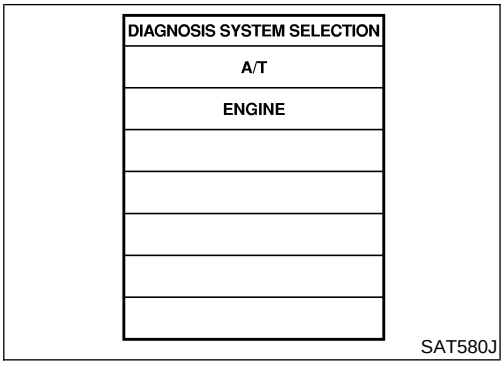
Terminal No.	Wire color	Item	Condition		Judgement standard
40	G/Y	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1V and more than 4.5V

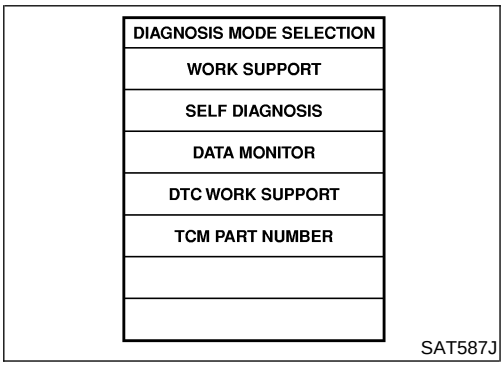
ON BOARD DIAGNOSIS LOGIC

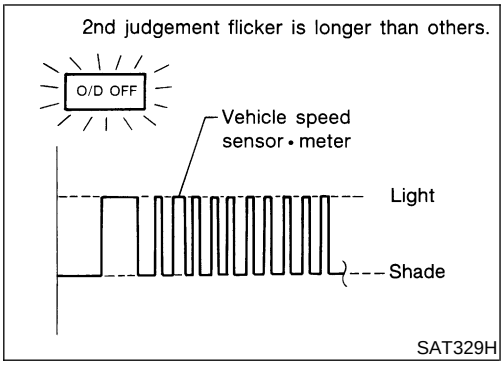
NDAT0082S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: VHCL SPEED SEN·MTR	TCM does not receive the proper voltage signal from the sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Vehicle speed sensor
: 2nd judgement flicker		

Description (Cont'd)







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NDAT0082S03

CAUTION:

- **Always drive vehicle at a safe speed.**
- **If conducting this "DTC CONFIRMATION PROCEDURE" again, always turn ignition switch OFF and wait at least 5 seconds before continuing.**

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

With CONSULT-II

1) Turn ignition switch ON and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Start engine and accelerate vehicle from 0 to 25 km/h (0 to 16 MPH).

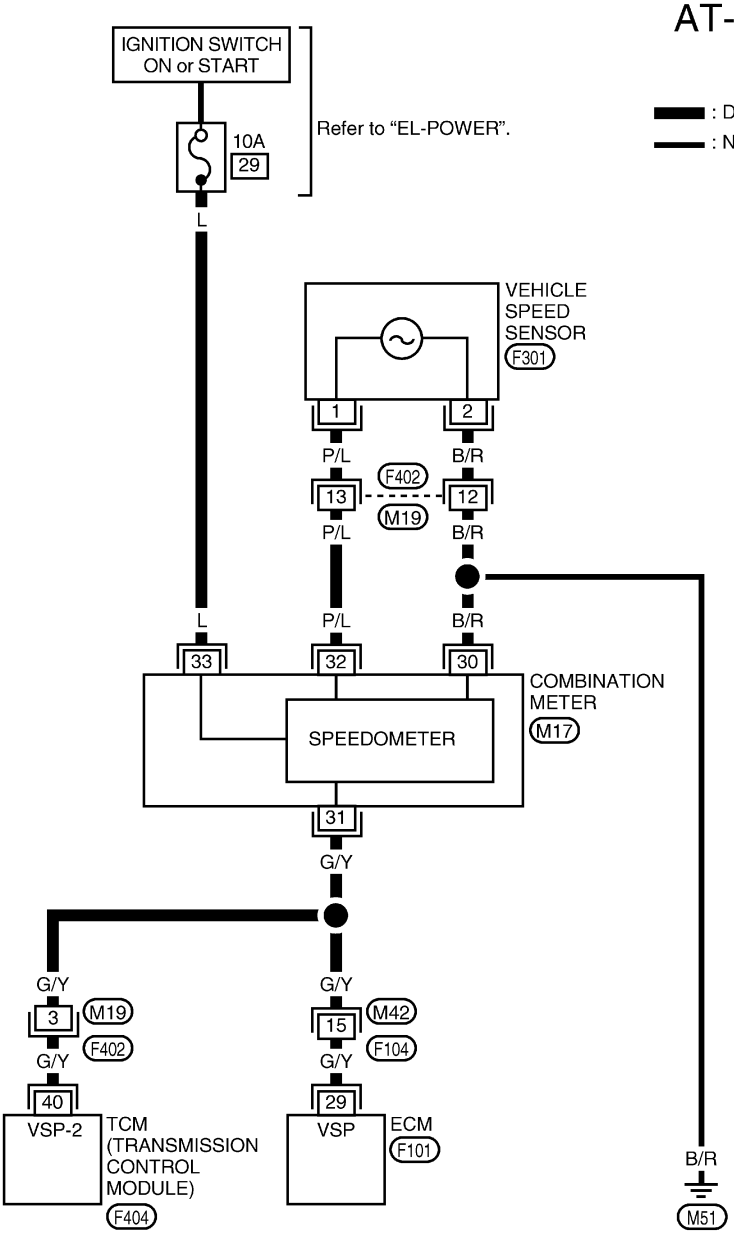
Without CONSULT-II

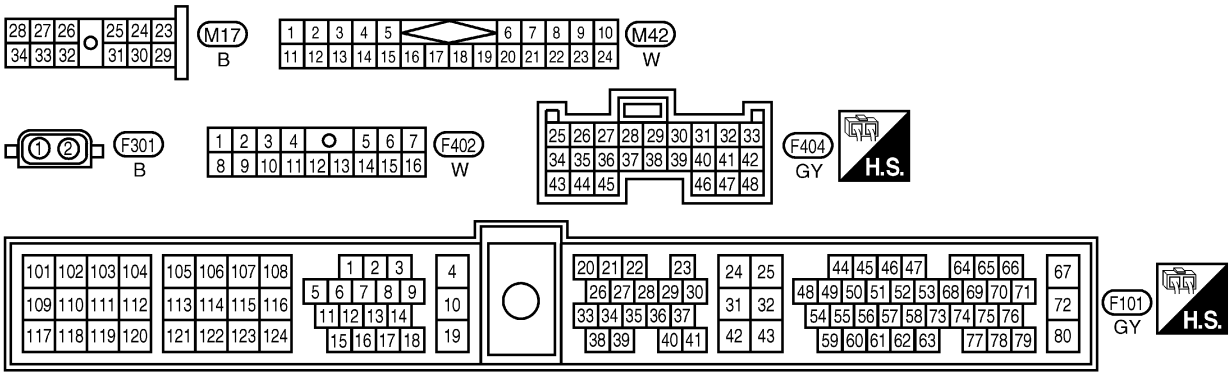
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in D and vehicle speed higher than 25 km/h (16 MPH).
3) Perform self-diagnosis.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS), AT-48.

Wiring Diagram — AT — VSSMTR

NDAT0213

AT-VSSMTR-01





AAT273A

Diagnostic Procedure

NDAT0083

1	CHECK INPUT SIGNAL

With CONSULT-II

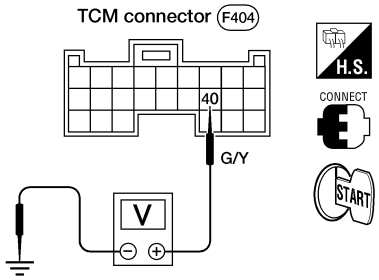
1. Start engine.
2. Select “ECU INPUT SIGNAL” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “VHCL/S SE·MTR” while driving.
   Check the value changes according to driving speed.

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 40 and ground while driving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.



AAT393A

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

OK or NG

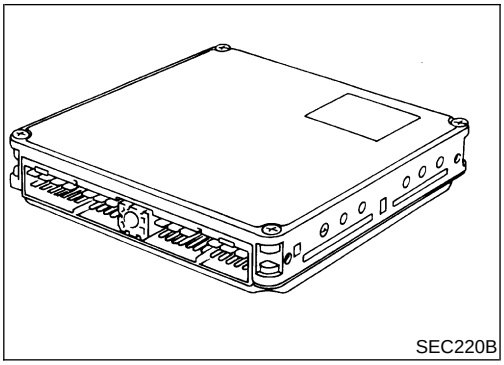
OK	▶	GO TO 2.
NG	▶	**Check the following items:** ● Vehicle speed sensor and ground circuit for vehicle speed sensor Refer to “METERS AND GAUGES”,***EL-80***. ● Harness for short or open between TCM and vehicle speed sensor (Main harness)

2	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-202.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.


SEC220B

Description

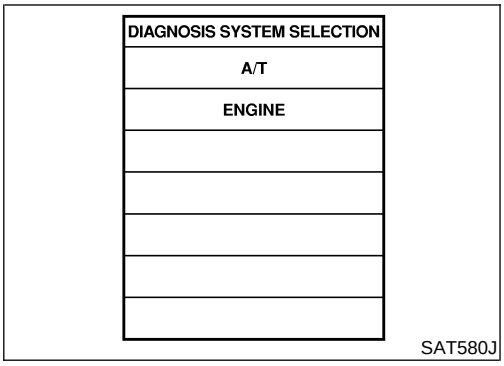
NDAT0226

The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the A/T.

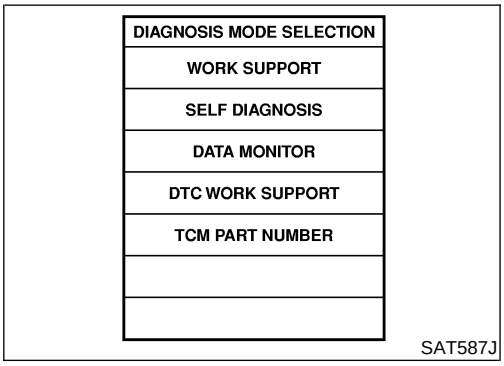
On Board Diagnosis Logic

NDAT0227

Diagnostic trouble code	Malfunction is detected when ...	Check Item (Possible Cause)
Ⓐ : CONTROL UNIT (RAM) : CONTROL UNIT (ROM)	• TCM memory (RAM) or (ROM)	• TCM



SAT580J



SAT587J

DTC Confirmation Procedure

NDAT0228

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

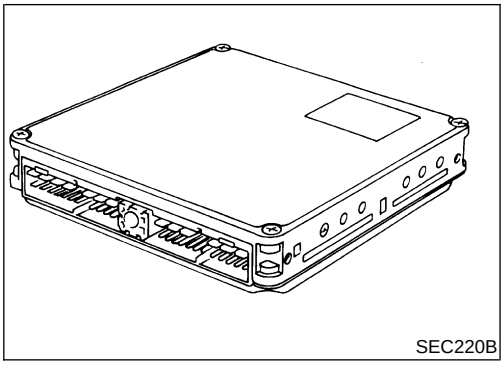
Ⓐ **With CONSULT-II**

1) Turn ignition switch ON and select "DATA MONITOR" mode for A/T with CONSULT-II.
2) Start engine.
3) Run engine for at least 2 seconds at idle speed.

Diagnostic Procedure

NDAT0229

1	INSPECTION START	
With CONSULT-II 1. Turn ignition switch ON and select “SELF DIAGNOSIS” mode for A/T with CONSULT-II. 2. Touch “ERASE”. 3. **Perform “DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE”.** 4. Is the “CONTROL UNIT (RAM)” or “CONTROL UNIT (ROM)” displayed again?		
Yes or No		
Yes	▶	Replace TCM.
No	▶	**INSPECTION END**



SEC220B

Description

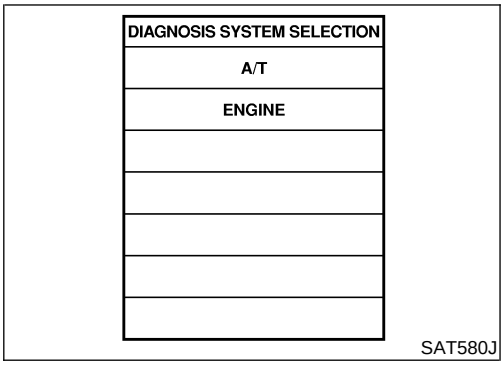
NDAT0217

The TCM consists of a microcomputer and connectors for signal input and output for power supply. The unit controls the A/T.

On Board Diagnosis Logic

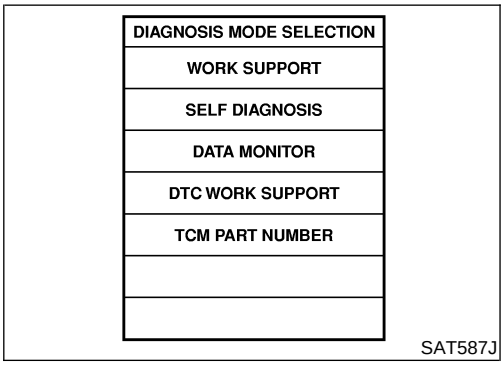
NDAT0218

Diagnosis trouble code	Malfunction is detected when...	Check item (Possible cause)
Ⓑ : CONTROL UNIT (EEPROM)	TCM memory (EEPROM) is malfunctioning.	TCM



DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

SAT580J



DIAGNOSIS MODE SELECTION
WORK SUPPORT
SELF DIAGNOSIS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT587J

DTC Confirmation Process

NDAT0219

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

Ⓑ With CONSULT-II

1) Turn ignition switch "ON" and select "DATA MONITOR" mode for A/T with CONSULT-II.
2) Start engine.
3) Run engine for at least 2 seconds at idle speed.

Diagnostic Procedure

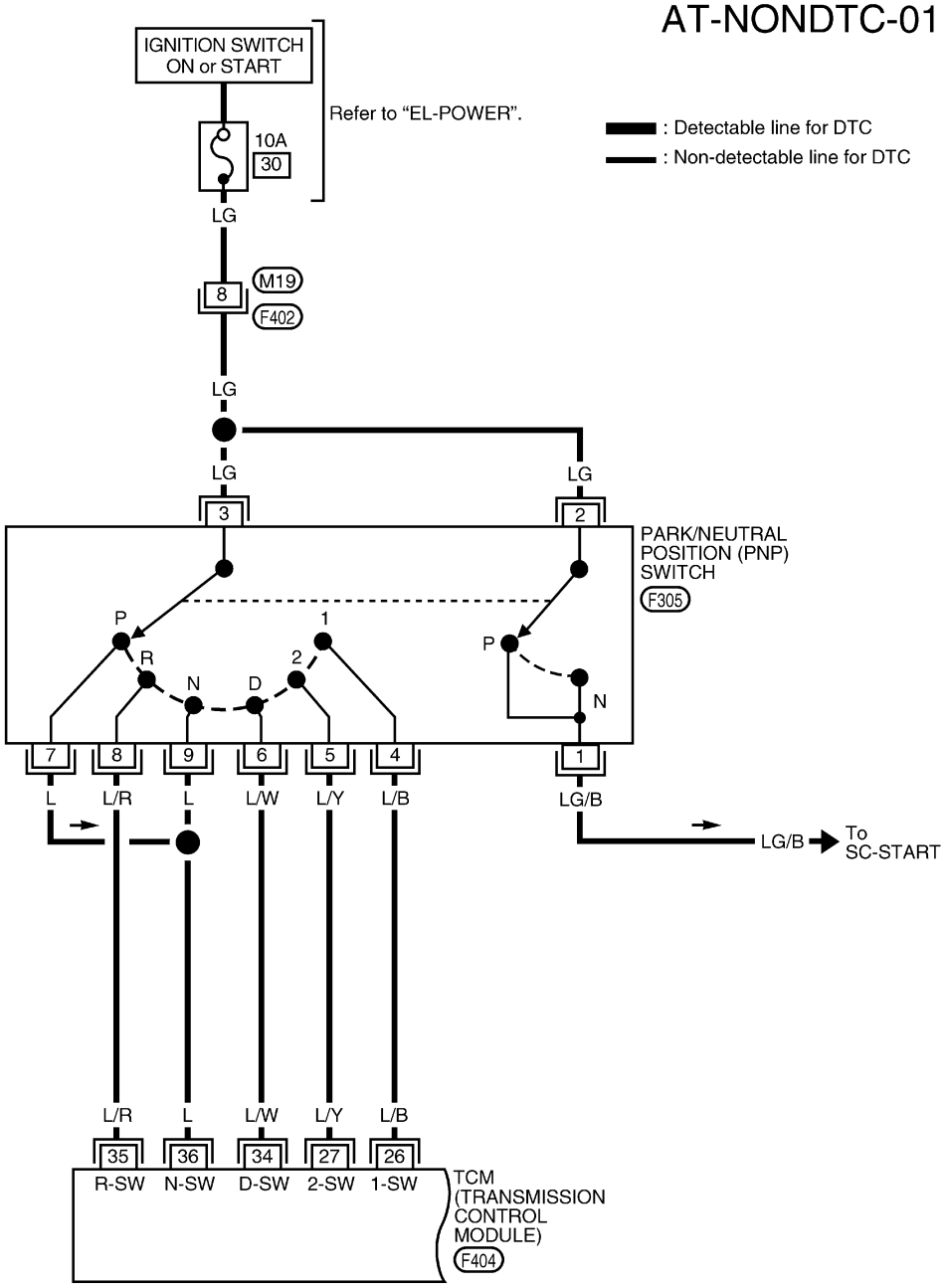
NDAT0220

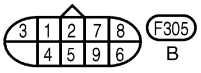
1	CHECK DTC	
With CONSULT-II 1. Turn ignition switch “ON” and select “SELF-DIAGNOSIS” mode for A/T with CONSULT-II. 2. Move selector lever to “R” position. 3. Depress accelerator pedal (Full throttle position). 4. Touch “ERASE”. 5. Turn ignition switch to “OFF” position for 10 seconds. **Perform DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE.** See previous page. 6. Is the “CONTROL UNIT (EEPROM)” displayed again?		
Yes or No		
Yes	▶	Replace TCM.
No	▶	**INSPECTION END**

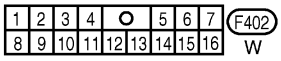
Wiring Diagram — AT — NONDTC

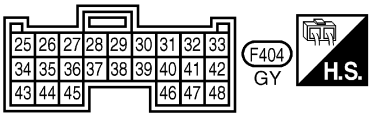
NDAT0214

AT-NONDTC-01



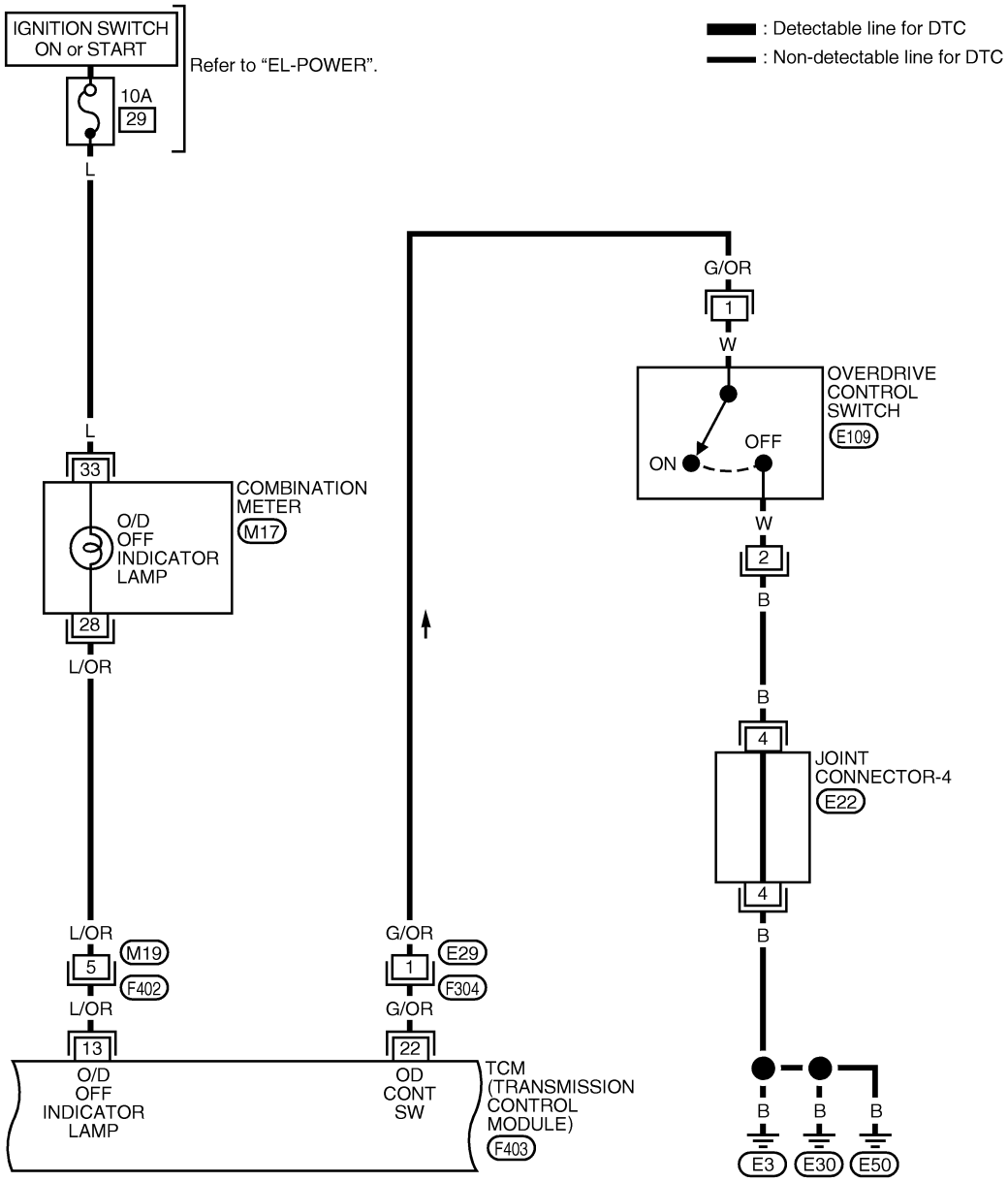


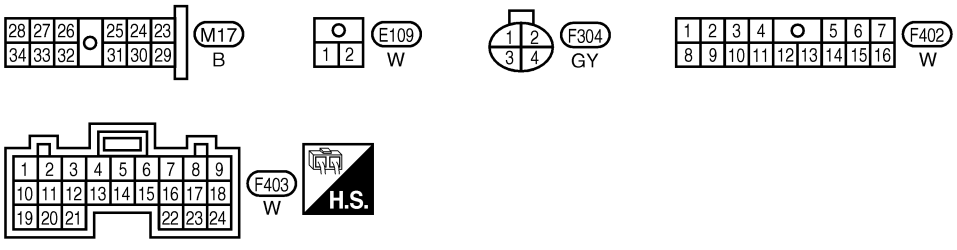




AAT286A

AT-NONDTC-02

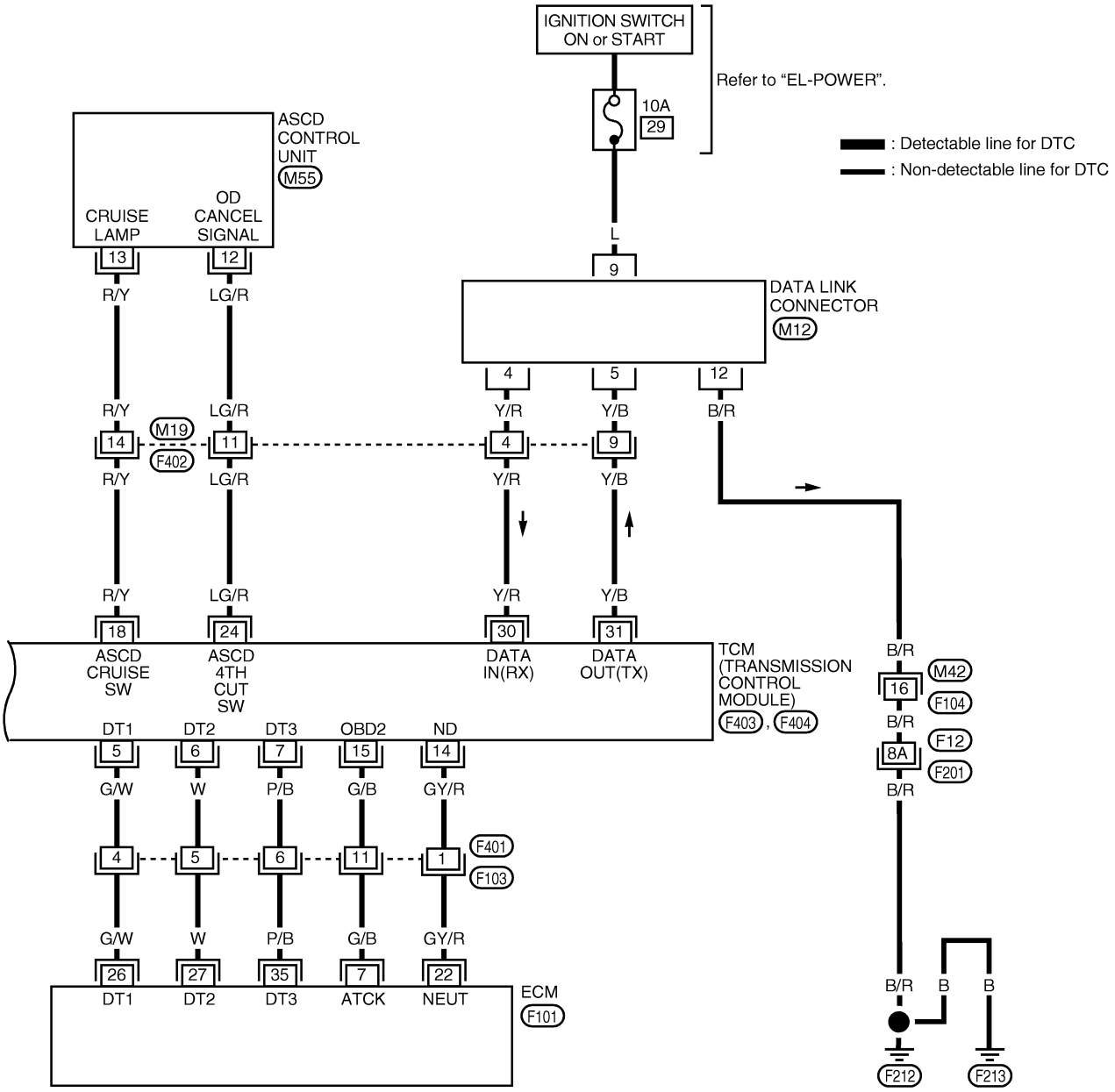


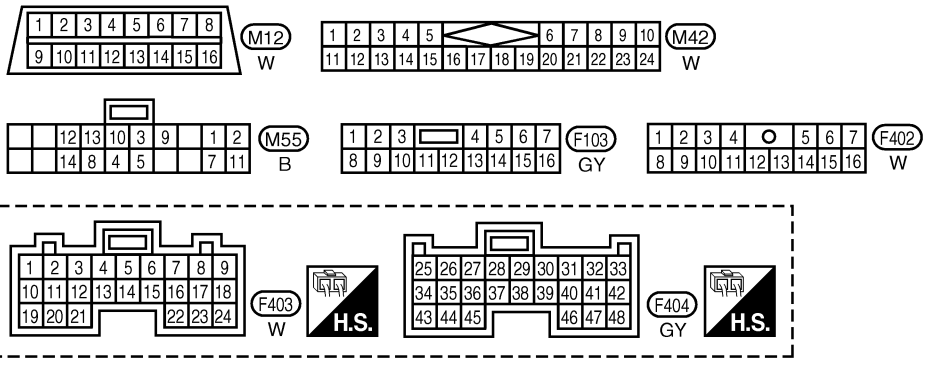


Refer to the following.
E22 JOINT CONNECTOR

WAT062

AT-NONDTC-03





Refer to the following.
F12, F201 SUPER MULTIPLE JUNCTION (SMJ)
F101 ELECTRICAL UNITS

WAT063

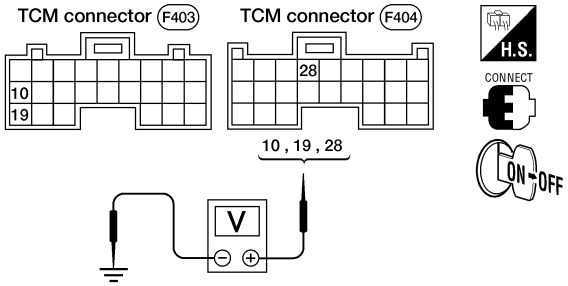
1. O/D OFF Indicator Lamp Does Not Come On

NDAT0084

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

1	CHECK TCM POWER SOURCE-STEP 1

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminals 10, 19, 28 and ground.



AAT347A

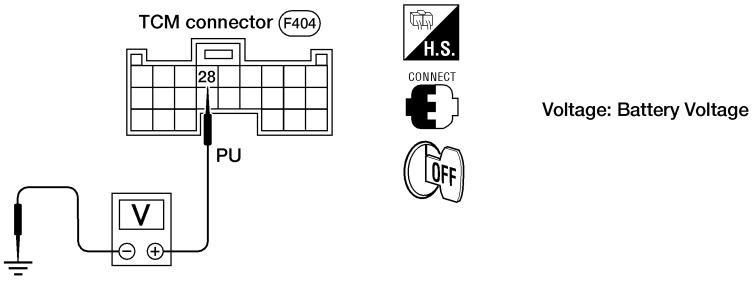
Voltage:
Battery voltage

OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following items:** ● Harness for short or open between ignition switch and TCM (Main harness) Refer to “Wiring Diagram — AT — MAIN” in AT-99. ● Ignition switch and fuse Refer to “POWER SUPPLY ROUTING”, ***EL-10***.

2	CHECK TCM POWER SOURCE STEP-2

1. Turn ignition switch to OFF position.
2. Check voltage between TCM terminal 28 and ground.



WAT067

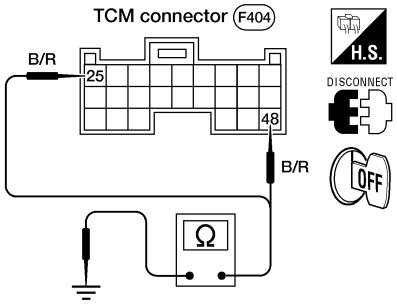
Voltage
Battery Voltage
If OK, check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following items:** ● Harness for short or open between ignition switch and TCM terminal 28 (Main harness) ● Ignition switch and fuse Refer to “POWER SUPPLY AND GROUND”, ***EL-10***

3	CHECK TCM GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between TCM terminals 25, 48 and ground.



AAT348A

Continuity should exist.

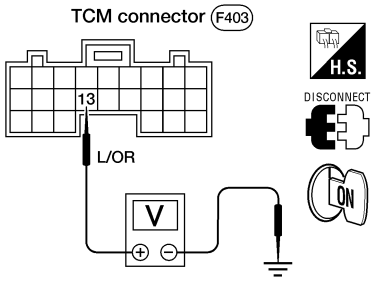
If OK, check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors. Refer to "Wiring Diagram — AT — MAIN" in AT-99.

4	CHECK LAMP CIRCUIT

1. Turn ignition switch to OFF position.
2. Check resistance between TCM terminals 10 and 13.



AAT394A

Resistance:
50 - 100Ω

3. Reinstall any part removed.

OK or NG

OK	▶	GO TO 5.
NG	▶	**Check the following items:** ● O/D OFF indicator lamp Refer to EL section. ● Harness and fuse for short or open between ignition switch and O/D OFF indicator lamp (Main harness) Refer to "POWER SUPPLY ROUTING", ***EL-10***. ● Harness for short or open between O/D OFF indicator lamp and TCM

5	CHECK SYMPTOM

Check again.

OK or NG

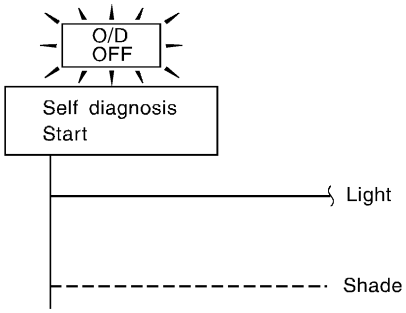
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

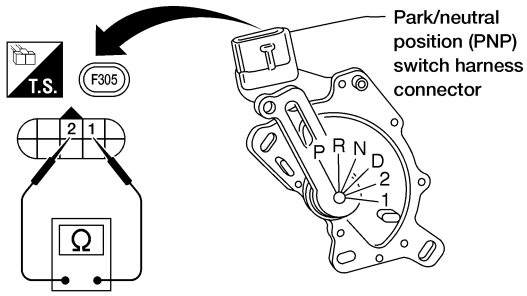
2. Engine Cannot Be Started In P and N Position

=NDAT0085

SYMPTOM:

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

1	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT
With CONSULT-II Does “ECU INPUT SIGNAL” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit? **Without CONSULT-II** Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?  SAT367J	
Yes or No	
Yes ▶	Check park/neutral position (PNP) switch circuit. Refer to “DTC P0705”, AT-102.
No ▶	GO TO 2.

2	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH
Check for short or open of park/neutral position (PNP) switch harness connector terminals 1 and 2. Refer to “Component Inspection”, AT-108.  AAT395A	
OK or NG	
OK ▶	GO TO 3.
NG ▶	Repair or replace park/neutral position (PNP) switch.

3	CHECK STARTING SYSTEM
Check starting system. Refer to EL section (“System Description”, “STARTING SYSTEM”).	
OK or NG	
OK ▶	**INSPECTION END**
NG ▶	Repair or replace damaged parts.

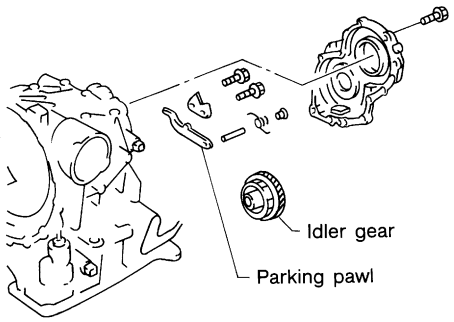
3. In P Position, Vehicle Moves Forward or Backward When Pushed

=NDAT0086

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

1	CHECK PARKING COMPONENTS

Check parking components. Refer to “Overhaul” and “Assembly”, AT-272, 346.



SAT282F

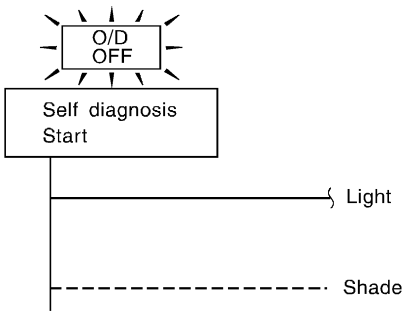
OK or NG

OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.

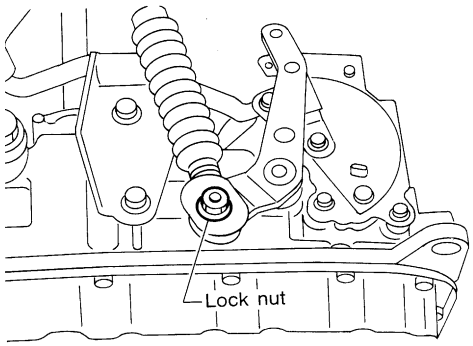
4. In N Position, Vehicle Moves

=NDAT0087

SYMPTOM:
Vehicle moves forward or backward when selecting N position.

1	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT
With CONSULT-II Does “ECU INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?	
Without CONSULT-II Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?  SAT367J	
Yes or No	
Yes ▶	Check park/neutral position (PNP) switch circuit. Refer to “DTC P0705”, AT-102.
No ▶	GO TO 2.

2	CHECK CONTROL LINKAGE
Check control cable. Refer to AT-268.	
OK or NG	
OK ▶	GO TO 4.
NG ▶	GO TO 3.

3	ADJUST CONTROL CABLE
Adjust control cable.  SAT405F	
▶	Refer to AT-268.

4	CHECK A/T FLUID LEVEL

Check A/T fluid level again.

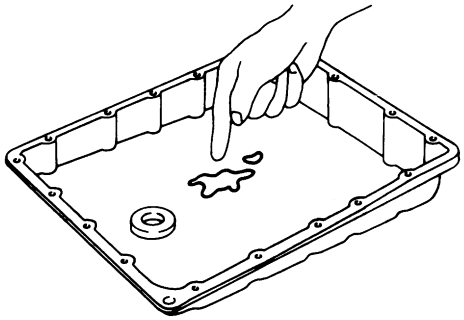
SAT638A

OK or NG

OK	▶	GO TO 5.
NG	▶	Refill ATF.

5	CHECK A/T FLUID CONDITION

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



SAT171B

OK or NG

OK	▶	GO TO 6.
NG	▶	1. Disassemble A/T. 2. Check the following items: ● Forward clutch assembly ● Overrun clutch assembly ● Reverse clutch assembly

6	CHECK SYMPTOM

Check again.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

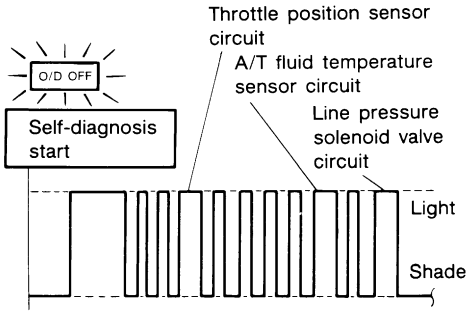
5. Large Shock. N → R Position

=NDAT0088

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

1	CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to A/T fluid temperature sensor, line pressure solenoid valve or throttle position sensor circuit?



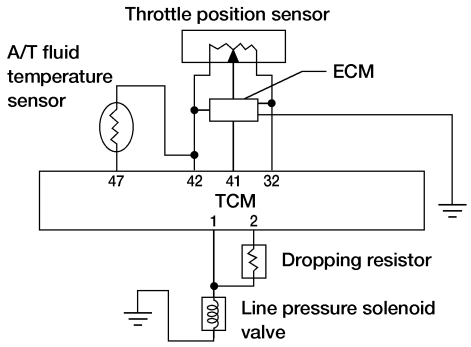
SAT345HA

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK DAMAGED CIRCUIT

Check damaged circuit.

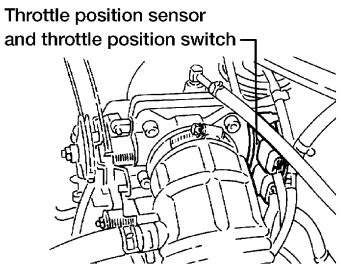


AAT396A

	▶	Refer to “DTC P0710, P0745 or P1705”, AT-109, 166 or 182.

3	CHECK THROTTLE POSITION SENSOR

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



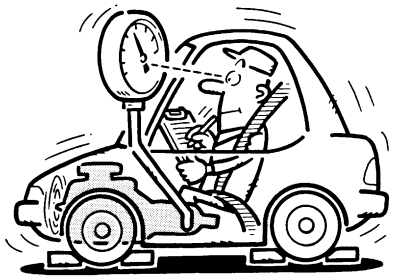
AAT794

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace throttle position sensor.

4	CHECK LINE PRESSURE

Check line pressure at idle with selector lever in D position. Refer to "LINE PRESSURE TEST", AT-65.



SAT494G

OK or NG

OK	▶	GO TO 5.
NG	▶	1. Remove control valve assembly. Refer to AT-266. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve

5	CHECK SYMPTOM

Check again.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

6. Vehicle Does Not Creep Backward In R Position

=NDAT0089

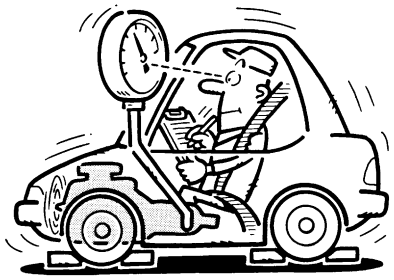
SYMPTOM:
Vehicle does not creep backward when selecting R position.

1	CHECK A/T FLUID LEVEL	
Check A/T fluid level again.  SAT638A **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Refill ATF.

2	CHECK STALL REVOLUTION	
Check stall revolution with selector lever in 1 and R positions.  SAT493G		
OK or NG		
OK	▶	GO TO 3.
OK in 1 position, NG in R position	▶	1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-266. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: ● Oil pump assembly ● Torque converter ● Reverse clutch assembly ● High clutch assembly
NG in both 1 and R positions	▶	1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-266. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: ● Oil pump assembly ● Torque converter ● Reverse clutch assembly ● High clutch assembly ● Low & reverse brake assembly ● Low one-way clutch

3	CHECK LINE PRESSURE

Check line pressure at idle with selector lever in R position. Refer to "LINE PRESSURE TEST", AT-65.



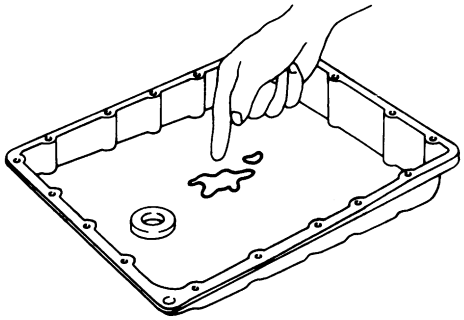
SAT494G

OK or NG

OK	▶	GO TO 4.
NG	▶	1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-266. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following item: ● Oil pump assembly

4	CHECK A/T FLUID CONDITION

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



SAT171B

OK or NG

OK	▶	GO TO 5.
NG	▶	1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-266. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: ● Oil pump assembly ● Torque converter ● Reverse clutch assembly ● High clutch assembly ● Low & reverse brake assembly ● Low one-way clutch

5	CHECK SYMPTOM	
Check again. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

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

=NDAT0090

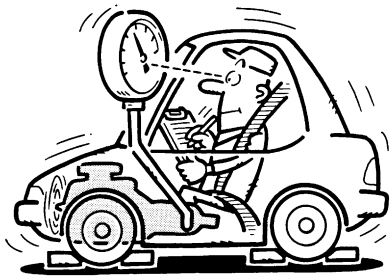
SYMPTOM:
Vehicle does not creep forward when selecting D, 2 or 1 position.

1	CHECK A/T FLUID LEVEL	
Check A/T fluid level again.  SAT638A **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Refill ATF.

2	CHECK STALL REVOLUTION	
Check stall revolution with selector lever in D position. Refer to “STALL TEST”, AT-61.  SAT493G **OK or NG**		
OK	▶	GO TO 3.
NG	▶	1. Remove control valve assembly. Refer to AT-266. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: ● Oil pump assembly ● Forward clutch assembly ● Forward one-way clutch ● Low one-way clutch ● Low & reverse brake assembly ● Torque converter

3	CHECK LINE PRESSURE

Check line pressure at idle with selector lever in D position. Refer to "LINE PRESSURE TEST", AT-65.



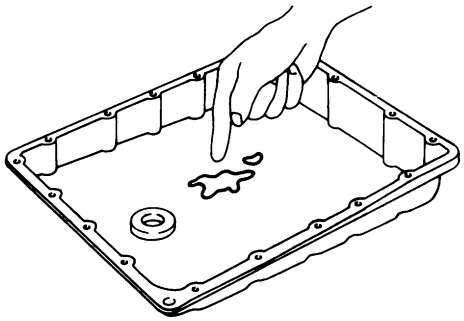
SAT494G

OK or NG

OK	▶	GO TO 4.
NG	▶	1. Remove control valve assembly. Refer to AT-266. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following item: ● Oil pump assembly

4	CHECK A/T FLUID CONDITION

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



SAT171B

OK or NG

OK	▶	GO TO 5.
NG	▶	1. Remove control valve assembly. Refer to AT-266. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: ● Oil pump assembly ● Forward clutch assembly ● Forward one-way clutch ● Low one-way clutch ● Low & reverse brake assembly ● Torque converter

7. Vehicle Does Not Creep Forward in D, 2 or 1 Position (Cont'd)

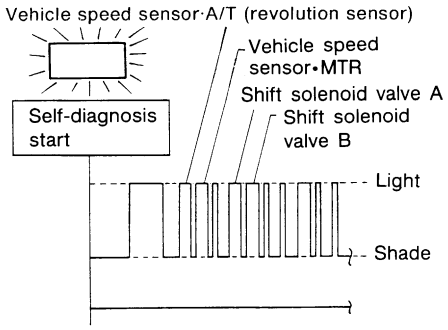
5	CHECK SYMPTOM	
Check again. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

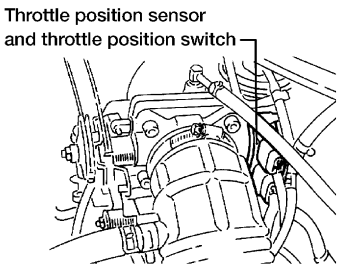
8. Vehicle Cannot Be Started From D_1

=NDAT0091

SYMPTOM:
Vehicle cannot be started from D_1 on Cruise test — Part 1.

1	CHECK SYMPTOM	
Is 6. Vehicle Does Not Creep Backward In R Position OK?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Go to 6. Vehicle Does Not Creep Backward In R Position, AT-220.

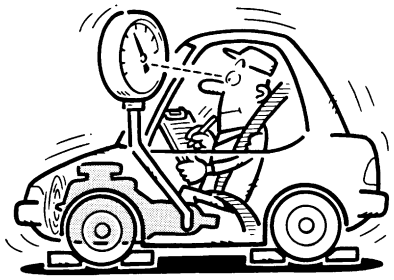
2	CHECK SELF-DIAGNOSTIC RESULTS	
Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test?		
 SAT934FB		
Yes or No		
Yes	▶	Check damaged circuit. Refer to “DTC P0720, P0750, P0755 or VHCL SPEED SEN·MTR”, AT-116, 172, 177 or 201.
No	▶	GO TO 3.

3	CHECK THROTTLE POSITION SENSOR	
Check throttle position sensor. Refer to “DTC P0120 Throttle Position Sensor”, ***EC-162***.		
 AAT794		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace throttle position sensor.

8. Vehicle Cannot Be Started From D_1 (Cont'd)

4	CHECK LINE PRESSURE

Check line pressure at stall point with selector lever in D position. Refer to "LINE PRESSURE TEST", AT-65.



SAT494G

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING ITEM

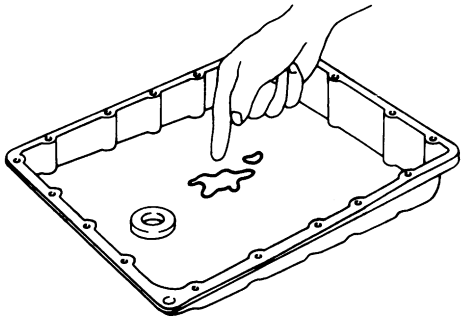
1. Remove control valve assembly. Refer to AT-266.
2. Check the following items:
- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check the following items:
- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- High clutch assembly
- Torque converter
- Oil pump assembly

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace damaged parts.

6	CHECK A/T FLUID CONDITION

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



SAT171B

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 5.

7	DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-266.
2. Check the following items:
- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace damage parts.

8	CHECK SYMPTOM

Check again.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

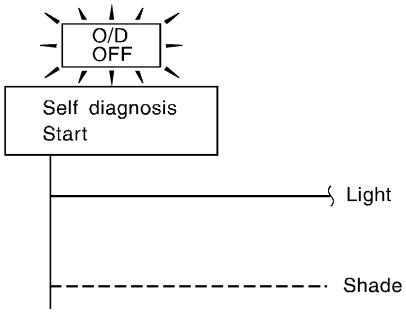
9. A/T Does Not Shift: $D_1 \rightarrow D_2$ or Does Not Kickdown: $D_4 \rightarrow D_2$

=NDAT0092

SYMPTOM:
A/T does not shift from D_1 to D_2 at the specified speed.
A/T does not shift from D_4 to D_2 when depressing accelerator pedal fully at the specified speed.

1	CHECK SYMPTOM	
Are 7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position and 8. Vehicle Cannot Be Started From D_1 OK?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Go to 7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position and 8. Vehicle Cannot Be Started From D_1, AT-224, AT-227.

2	CHECK SELF-DIAGNOSTIC RESULTS	
With CONSULT-II Does “ECU INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?		
Without CONSULT-II Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?		



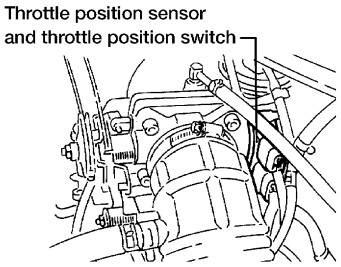
SAT367J

Yes or No		
Yes	▶	Check park/neutral position (PNP) switch circuit. Refer to “DTC P0705”, AT-102.
No	▶	GO TO 3.

3	CHECK VEHICLE SPEED SENSOR·A/T AND VEHICLE SPEED SENSOR·MTR CIRCUIT	
Check vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuit. Refer to “DTC P0720 and VHCL SPEED SEN·MTR”, AT-116, AT-201.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuits.

4	CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to "Throttle Position Sensor (DTC: 0403)", ***EC-170***.



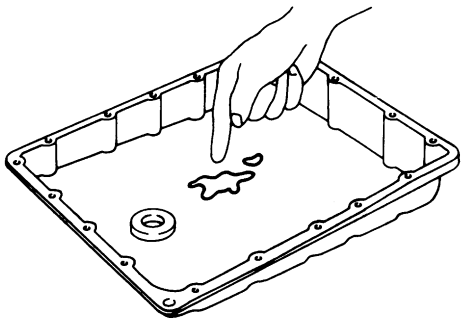
AAT794

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace throttle position sensor.

5	CHECK A/T FLUID CONDITION

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



SAT171B

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-266.
2. Check the following items:
- Shift valve A
- Shift solenoid valve A
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check the following items:
- Servo piston assembly
- Brake band
- Oil pump assembly

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace damaged parts.

7	DETECT MALFUNCTIONING ITEM	
1. Remove control valve. Refer to AT-266. 2. Check the following items: ● Shift valve A ● Shift solenoid valve A ● Pilot valve ● Pilot filter		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair or replace damaged parts.

8	CHECK SYMPTOM	
Check again.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

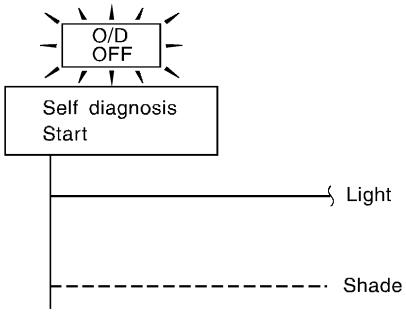
10. A/T Does Not Shift: $D_2 \rightarrow D_3$

=NDAT0093

SYMPTOM:
A/T does not shift from D_2 to D_3 at the specified speed.

1	CHECK SYMPTOM	
Are 7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position and 8. Vehicle Cannot Be Started From D_1 OK?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Go to 7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position and 8. Vehicle Cannot Be Started From D_1, AT-224, AT-227.

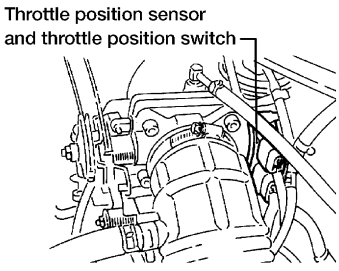
2	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT	
With CONSULT-II Does “ECU INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?		
Without CONSULT-II Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?		



SAT367J

Yes or No		
Yes	▶	Check park/neutral position (PNP) switch circuit. Refer to “DTC P0705”, AT-102.
No	▶	GO TO 3.

3	CHECK THROTTLE POSITION SENSOR	
Check throttle position sensor. Refer to “DTC P0120 Throttle Position Sensor”, ***EC-162***.		

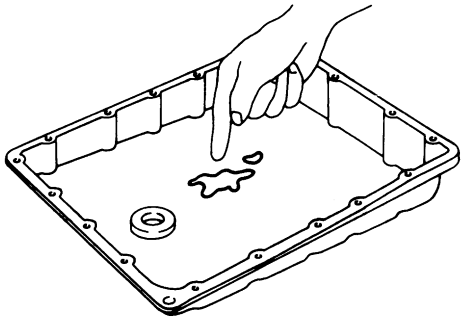


AAT794

OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace throttle position sensor.

4	CHECK A/T FLUID CONDITION

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



SAT171B

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-266.
2. Check the following items:
- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check the following items:
- Servo piston assembly
- High clutch assembly
- Oil pump assembly

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

6	DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-266.
2. Check the following items:
- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

7	CHECK SYMPTOM	
Check again. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

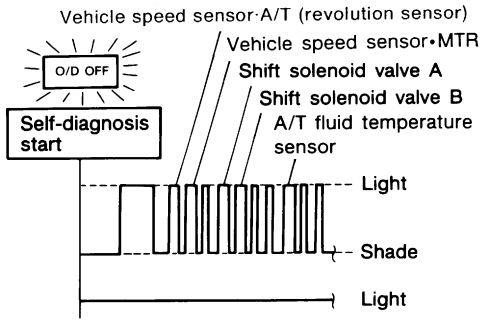
11. A/T Does Not Shift: $D_3 \rightarrow D_4$

=NDAT0094

SYMPTOM:

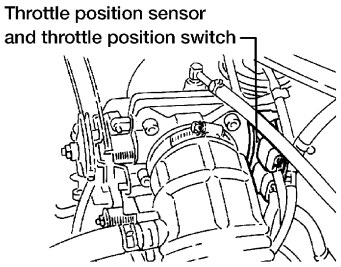
- **A/T does not shift from D_3 to D_4 at the specified speed.**
- **A/T must be warm before D_3 to D_4 shift will occur.**

1	CHECK SYMPTOM	
Are 7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position and 8. Vehicle Cannot Be Started From D_1 OK?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Go to 7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position and 8. Vehicle Cannot Be Started From D_1, AT-224, AT-227.

2	CHECK SELF-DIAGNOSTIC RESULTS	
With CONSULT-II Does “ECU INPUT SIGNALS” in “DATA MONITOR” show damage to any of the following circuits? ● Park/neutral position (PNP) switch ● Overdrive control switch ● A/T fluid temperature sensor ● Vehicle speed sensor·A/T (revolution sensor) ● Shift solenoid valve A or B ● Vehicle speed sensor·MTR		
Without CONSULT-II ● Does self-diagnosis, after cruise test, show damage to any of the following circuits? ● Park/neutral position (PNP) switch ● Overdrive control switch ● A/T fluid temperature sensor ● Vehicle speed sensor·A/T (revolution sensor) ● Shift solenoid valve A or B ● Vehicle speed sensor·MTR		
 SAT363HC		
Yes or No		
Yes	▶	Check damaged circuit. Refer to “DTC P0705, P0710, P0720, P0750, P0755 or VHCL SPEED SEN·MTR”, AT-102, AT-109, AT-116, AT-172, AT-177 or AT-201.
No	▶	GO TO 3.

3	CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to "DTC P0120 Throttle Position Sensor", ***EC-162***.



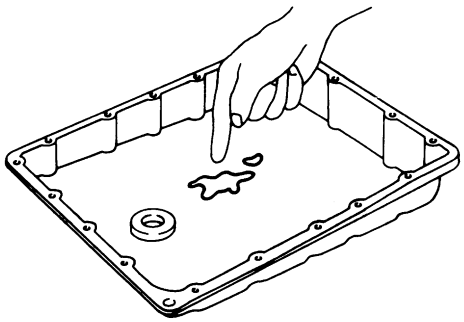
AAT794

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace throttle position sensor.

4	CHECK A/T FLUID CONDITION

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



SAT171B

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-266.
2. Check the following items:
- Shift valve B
- Overrun clutch control valve
- Shift solenoid valve B
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check the following items:
- Servo piston assembly
- Brake band
- Torque converter
- Oil pump assembly

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

11. A/T Does Not Shift: $D_3 \rightarrow D_4$ (Cont'd)

6	DETECT MALFUNCTIONING ITEM	
1. Remove control valve assembly. Refer to AT-266. 2. Check the following items: ● Shift valve B ● Overrun clutch control valve ● Shift solenoid valve B ● Pilot valve ● Pilot filter		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

7	CHECK SYMPTOM	
Check again.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

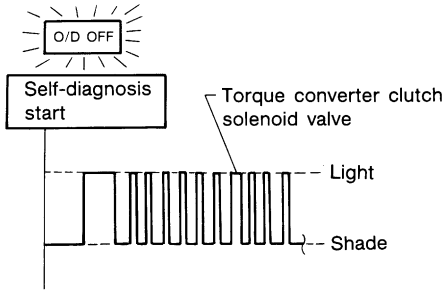
12. A/T Does Not Perform Lock-up

=NDAT0095

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

1	CHECK SELF-DIAGNOSTIC RESULTS

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



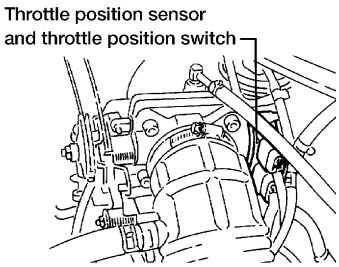
SAT346H

Yes or No

Yes	▶	Check torque converter clutch solenoid valve circuit. Refer to “DTC P0740”, AT-153.
No	▶	GO TO 2.

2	CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to “TROUBLE DIAGNOSIS FOR DTC P0120”, ***EC-162***.



AAT794

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace throttle position sensor.

3	DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-266.
2. Check following items:
- Torque converter clutch control valve
- Torque converter relief valve
- Torque converter clutch solenoid valve
- Pilot valve
- Pilot filter

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

12. A/T Does Not Perform Lock-up (Cont'd)

4	CHECK SYMPTOM	
Check again. **OK or NG**		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

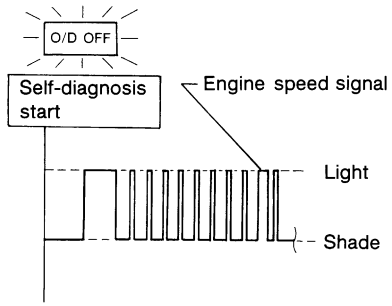
13. A/T Does Not Hold Lock-up Condition

=NDAT0096

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

1	CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to engine speed signal circuit after cruise test?



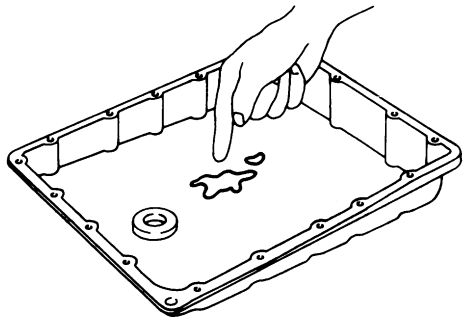
SAT347H

Yes or No

Yes	▶	Check engine speed signal circuit. Refer to “DTC P0725”, AT-122.
No	▶	GO TO 2.

2	CHECK A/T FLUID CONDITION

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



SAT171B

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-266.
2. Check the following items:
- Torque converter clutch control valve
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check torque converter and oil pump assembly.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

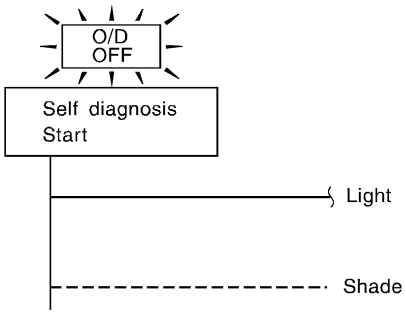
4	DETECT MALFUNCTIONING ITEM	
1. Remove control valve assembly. Refer to AT-266. 2. Check the following items: ● Torque converter clutch control valve ● Pilot valve ● Pilot filter		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

5	CHECK SYMPTOM	
Check again.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

14. Lock-up Is Not Released

=NDAT0097

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

1	CHECK THROTTLE POSITION SWITCH CIRCUIT	
With CONSULT-II Does “ECU INPUT SIGNALS” in “DATA MONITOR” show damage to closed throttle position switch circuit? **Without CONSULT-II** Does self-diagnosis show damage to closed throttle position switch circuit?  SAT367J		
Yes or No		
Yes	▶	Check closed throttle position switch circuit. Refer to “DTC P0705”, AT-102.
No	▶	GO TO 2.

2	CHECK SYMPTOM	
Check again.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)

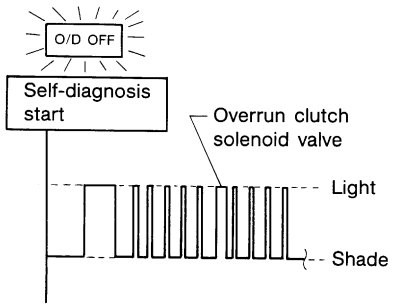
=NDAT0098

SYMPTOM:

- **Engine speed does not smoothly return to idle when A/T shifts from D_4 to D_3.**
- **Vehicle does not decelerate by engine brake when turning overdrive control switch OFF.**
- **Vehicle does not decelerate by engine brake when shifting A/T from D to 2 position.**

1	CHECK SELF-DIAGNOSTIC RESULTS

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



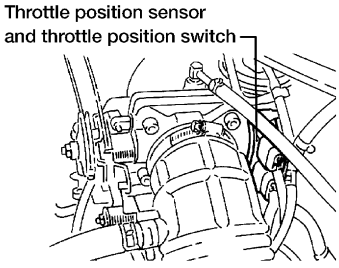
SAT348H

Yes or No

Yes	▶	Check overrun clutch solenoid valve circuit. Refer to “DTC P1760”, AT-189.
No	▶	GO TO 2.

2	CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to “DTC P0120 Throttle Position Sensor”, ***EC-162***.



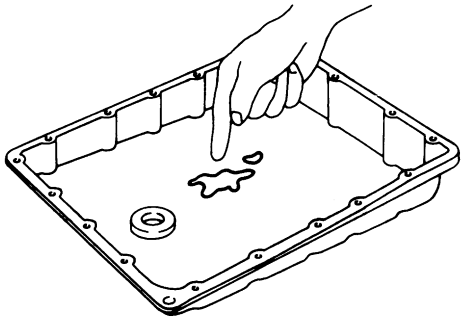
AAT794

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace throttle position sensor.

3	CHECK A/T FLUID CONDITION

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



SAT171B

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-266.
2. Check the following items:
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve
3. Disassemble A/T.
4. Check the following items:
- Overrun clutch assembly
- Oil pump assembly

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

5	DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-266.
2. Check the following items:
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

6	CHECK SYMPTOM

Check again.

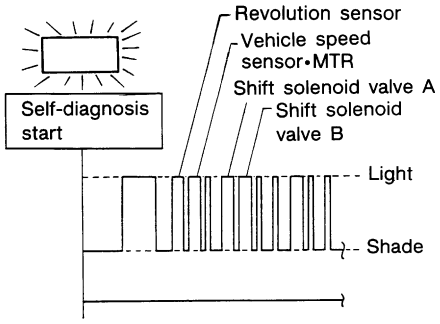
OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

16. Vehicle Does Not Start From D_1

=NDAT0099

SYMPTOM:
Vehicle does not start from D_1 on Cruise test — Part 2.

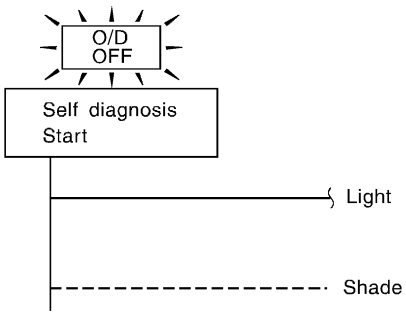
1	CHECK SELF-DIAGNOSTIC RESULTS	
Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test?  SAT934FA		
Yes or No		
Yes	▶	Check damaged circuit. Refer to “DTC P0720, P0750, P0755 or VHCL SPEED SEN·MTR”, AT-116, 172, 177 or 201.
No	▶	GO TO 2.

2	CHECK SYMPTOM	
Check again. **OK or NG**		
OK	▶	Go to 8. Vehicle Cannot Be Started From D_1, AT-227.
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch ON → OFF

=NDAT0100

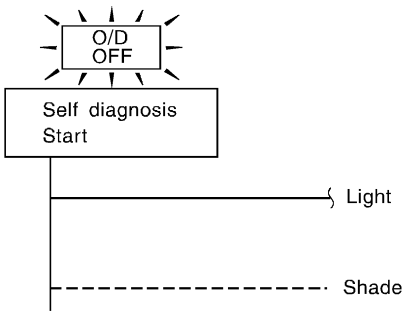
SYMPTOM:
A/T does not shift from D_4 to D_3 when changing overdrive control switch to OFF position.

1	CHECK OVERDRIVE SWITCH CIRCUIT	
With CONSULT-II Does “ECU INPUT SIGNALS” in “DATA MONITOR” show damage to overdrive control switch circuit? **Without CONSULT-II** Does self-diagnosis show damage to overdrive control switch circuit?  SAT367J **Yes or No**		
Yes	▶	Check overdrive control switch circuit. Refer to “DTC P0705”, AT-102.
No	▶	Go to 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-233.

18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever D $\rightarrow$ 2 Position

=NDAT0101

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

1	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT	
With CONSULT-II Does “ECU INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit? **Without CONSULT-II** Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?  SAT367J		
Yes or No		
Yes	▶	Check park/neutral position (PNP) switch circuit. Refer to “DTC P0705”, AT-102.
No	▶	Go to 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-230.

19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever 2 → 1 Position

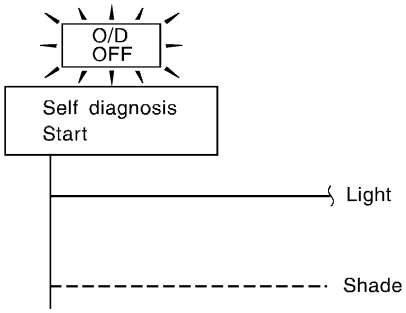
=NDAT0102

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

1	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT

With CONSULT-II
Does “ECU INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?



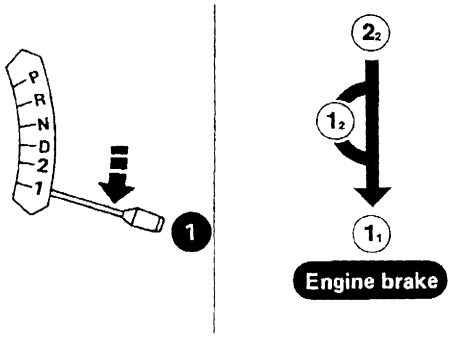
SAT367J

Yes or No

Yes	▶	Check park/neutral position (PNP) switch circuit. Refer to “DTC P0705”, AT-102.
No	▶	GO TO 2.

2	CHECK SYMPTOM

Check again.



AAT159A

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

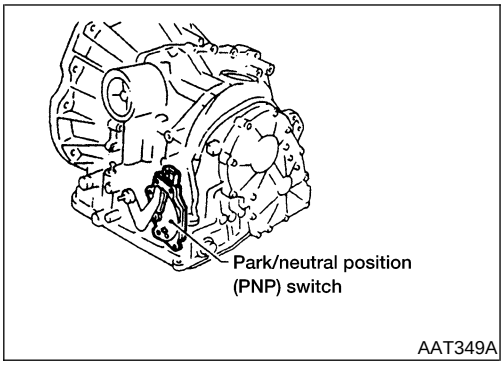
20. Vehicle Does Not Decelerate By Engine Brake

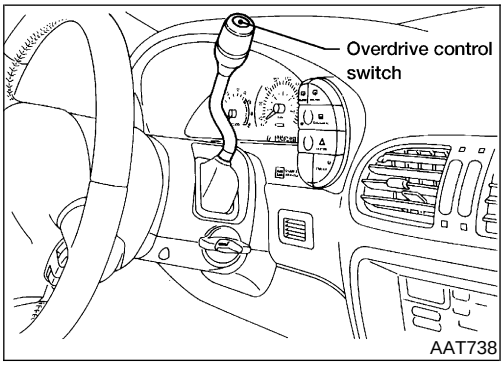
=NDAT0103

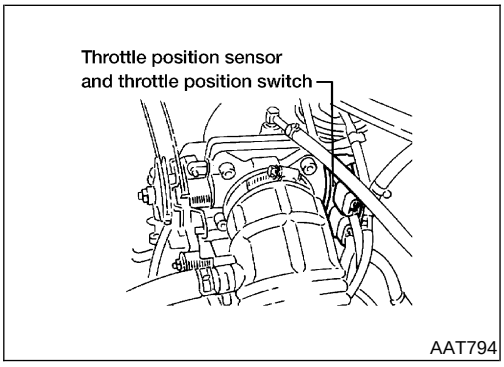
SYMPTOM:

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

1	CHECK SYMPTOM	
Is 6. Vehicle Does Not Creep Backward In R Position OK?		
Yes or No		
Yes	▶	Go to 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$), AT-244.
No	▶	Go to 6. Vehicle Does Not Creep Backward In R Position, AT-220.







21. TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Throttle Position Switches Circuit Checks)

NDAT0104

SYMPTOM:

O/D OFF indicator lamp does not come on in TCM self-diagnostic procedure even if the lamp circuit is good.

DESCRIPTION

NDAT0104S01

- Park/neutral position (PNP) switch
  The park/neutral (PNP) switch assembly includes a transmission range switch. The transmission range switch detects the selector lever position and sends a signal to the TCM.
- Overdrive control switch
  Detects the overdrive control switch position (ON or OFF) and sends a signal to the TCM.
- Throttle position switch
  Consists of a wide open throttle position switch and a closed throttle position switch.
  The wide open throttle position switch sends a signal to the TCM when the throttle valve is open at least 1/2 of the full throttle position. The closed throttle position switch sends a signal to the TCM when the throttle valve is fully closed.

DIAGNOSTIC PROCEDURE

=NDAT0104S02

NOTE:
The diagnostic procedure includes inspections for the overdrive control and throttle position switch circuits.

1	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT (With CONSULT-II)	

With CONSULT-II
1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out P/N, R, D, 2 and 1 position switches moving selector lever to each position.
   Check that the signal of the selector lever position is indicated properly.

DATA MONITOR	
MONITORING	
PN POSI SW	OFF
R POSITION SW	OFF
D POSITION SW	OFF
2 POSITION SW	ON
1 POSITION SW	OFF

SAT701J

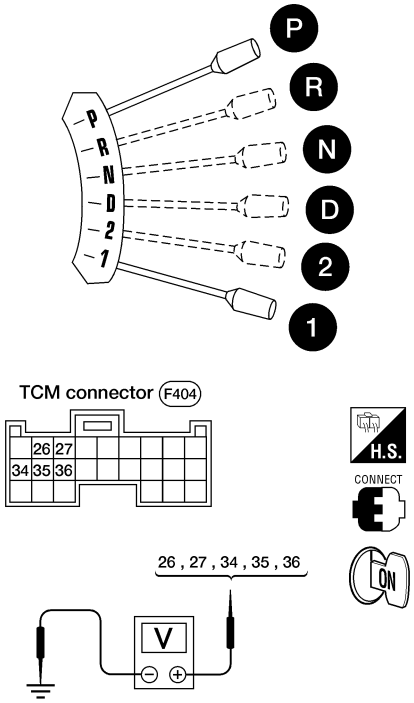
OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following items:** ● Park/neutral position (PNP) switch (Refer to "Component Inspection", AT-257.) ● Harness for short or open between ignition switch and park/neutral position (PNP) switch (Main harness) ● Harness for short or open between park/neutral position (PNP) switch and TCM (Main harness)

2	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT (Without CONSULT-II)

Without CONSULT-II

1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between TCM terminals 26, 27, 34, 35, 36 and ground while moving selector lever through each position.



AAT350A

Voltage:
B: Battery voltage
0: 0V

Lever position	Terminal No.				
	36	35	34	27	26
P, N	**B**	0	0	0	0
R	0	**B**	0	0	0
D	0	0	**B**	0	0
2	0	0	0	**B**	0
1	0	0	0	0	**B**

MTBL0119

OK or NG

OK	▶	GO TO 4.
NG	▶	**Check the following items:** ● Park/neutral position (PNP) switch (Refer to "Component Inspection", AT-257.) ● Harness for short or open between ignition switch and park/neutral position (PNP) switch (Main harness) ● Harness for short or open between park/neutral position (PNP) switch and TCM (Main harness)

3	CHECK OVERDRIVE CONTROL SWITCH CIRCUIT (With CONSULT-II)

With CONSULT-II

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out "OVERDRIVE SWITCH".
   Check the signal of the overdrive control switch is indicated properly.
   (Overdrive control switch "ON" displayed on CONSULT-II means overdrive "OFF".)

DATA MONITOR	
MONITORING	
ENGINE SPEED	XXX rpm
TURBINE REV	XXX rpm
OVERDRIVE SW	ON
PN POSI SW	OFF
R POSITION SW	OFF

SAT645J

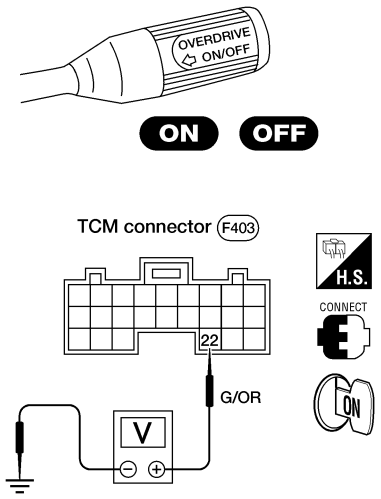
OK or NG

OK	▶	GO TO 5.
NG	▶	**Check the following items:** ● Overdrive control switch (Refer to "Component Inspection", AT-257.) ● Harness for short or open between TCM and overdrive control switch (Main harness) ● Harness of ground circuit for overdrive control switch (Main harness) for short or open

4	CHECK OVERDRIVE CONTROL SWITCH CIRCUIT (Without CONSULT-II)

Without CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminal 22 and ground when overdrive control switch is ON and OFF.



AAT397A

Switch position	Voltage
ON	Battery voltage
OFF	1V or less

MTBL0106

OK or NG

OK	▶	GO TO 6.
NG	▶	**Check the following items:** ● Overdrive control switch (Refer to "Component Inspection", AT-257.) ● Harness for short or open between TCM and overdrive control switch (Main harness) ● Harness of ground circuit for overdrive control switch (Main harness) for short or open

5	CHECK THROTTLE POSITION SWITCH CIRCUIT (With CONSULT-II)

With CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out "CLOSED THL/SW" and "W/O THRL/P-SW" depressing and releasing accelerator pedal.
   Check the signal of throttle position switch is indicated properly.

DATA MONITOR	
MONITORING	
POWERSHIFT SW	OFF
CLOSED THL/SW	OFF
W/O THRL/P-SW	OFF
HOLD SW	OFF
BRAKE SW	ON

SAT702J

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

MTBL0011

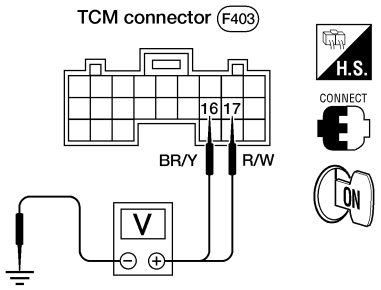
OK or NG

OK	▶	GO TO 7.
NG	▶	**Check the following items:** ● Throttle position switch — Refer to "Component Inspection", AT-257. ● Harness for short or open between ignition switch and throttle position switch (Main harness) ● Harness for short or open between throttle position switch and TCM (Main harness)

6	CHECK THROTTLE POSITION SWITCH CIRCUIT (Without CONSULT-II)

Without CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminals 16, 17 and ground while depressing, and releasing accelerator pedal slowly.
   (After warming up engine)



AAT383A

Accelerator pedal condition	Voltage	
	Terminal No. 16	Terminal No. 17
Released	Battery voltage	1V or less
Fully depressed	1V or less	Battery voltage

MTBL0120

OK or NG

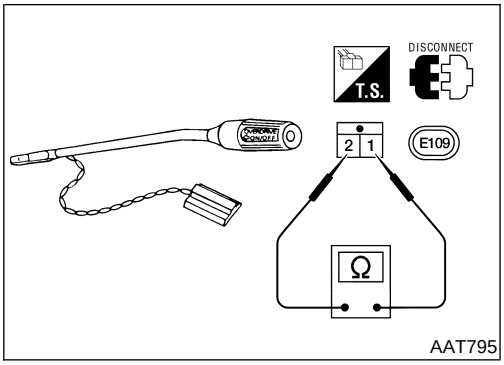
OK	▶	GO TO 7.
NG	▶	**Check the following items:** ● Throttle position switch — Refer to "Component Inspection", AT-257. ● Harness for short or open between ignition switch and throttle position switch (Main harness) ● Harness for short or open between throttle position switch and TCM (Main harness)

7	CHECK DTC

Perform Diagnostic procedure, AT-251.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.



COMPONENT INSPECTION

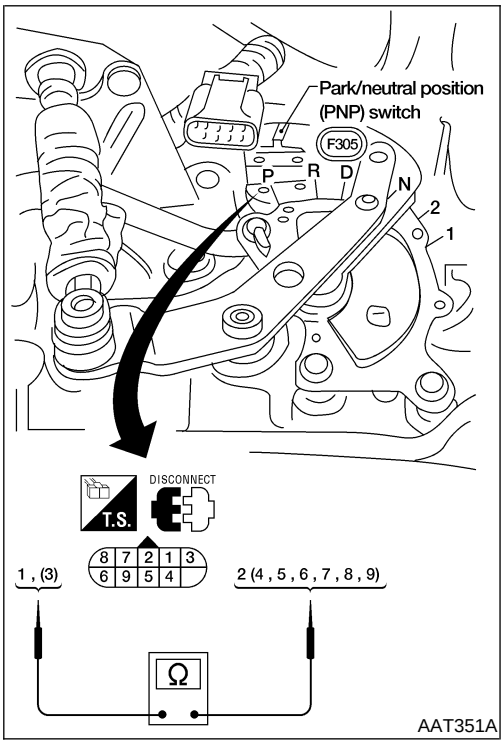
=NDAT0104S03

Overdrive Control Switch

NDAT0104S0301

- Check continuity between two terminals.

Switch position	Continuity
ON	No
OFF	Yes

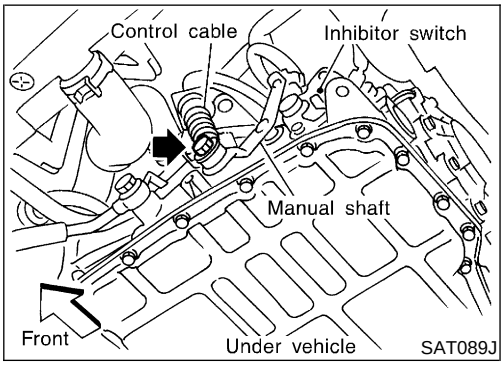


Park/Neutral Position (PNP) Switch

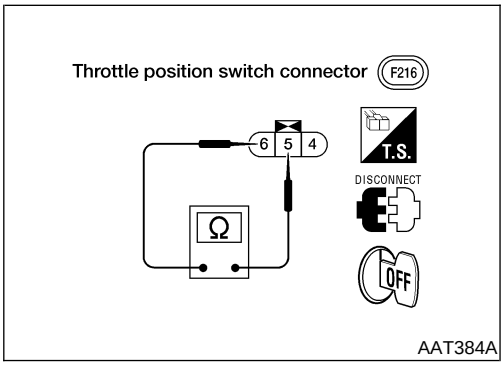
NDAT0104S0302

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

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



2. If NG, check again with manual control cable disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control cable. Refer to AT-268.
4. If NG on step 2, remove park/neutral position (PNP) switch from A/T and check continuity of park/neutral position (PNP) switch terminals. Refer to step 1.
5. If OK on step 4, adjust park/neutral position (PNP) switch. Refer to AT-267.
6. If NG on step 4, replace park/neutral position (PNP) switch.



Throttle Position Switch

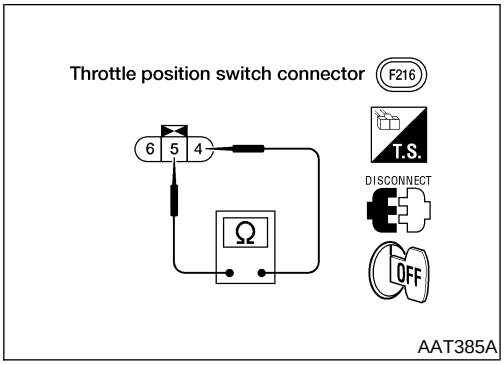
NDAT0104S0303

Closed throttle position switch (idle position)

- Check continuity between terminals 5 and 6.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

- To adjust closed throttle position switch, refer to "Basic Inspection", ***EC-88***.



Wide open throttle position switch

- Check continuity between terminals 4 and 5.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

Description

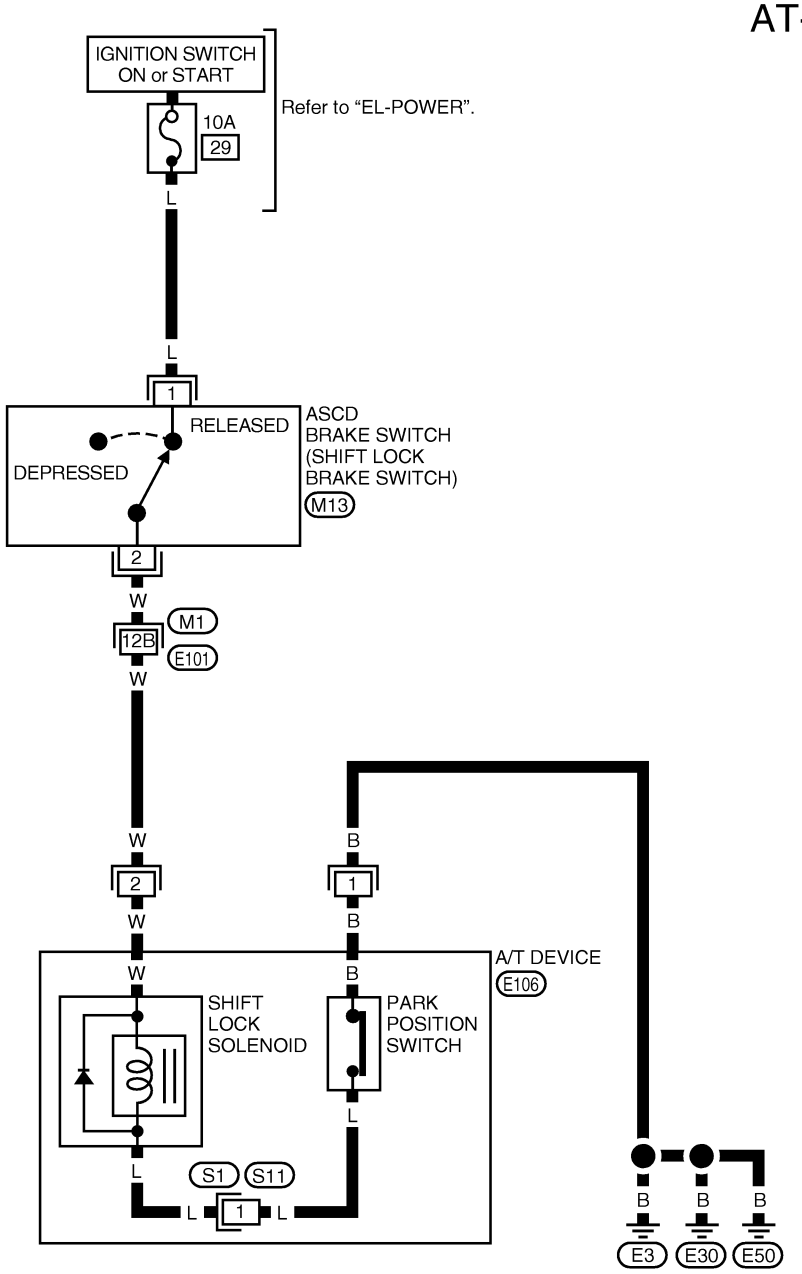
NDAT0105

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

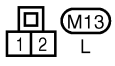
Wiring Diagram — SHIFT —

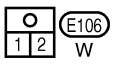
NDAT0108

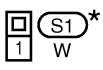
AT-SHIFT-01



Refer to the following.
M1 , E101 SUPER MULTIPLE JUNCTION (SMJ)





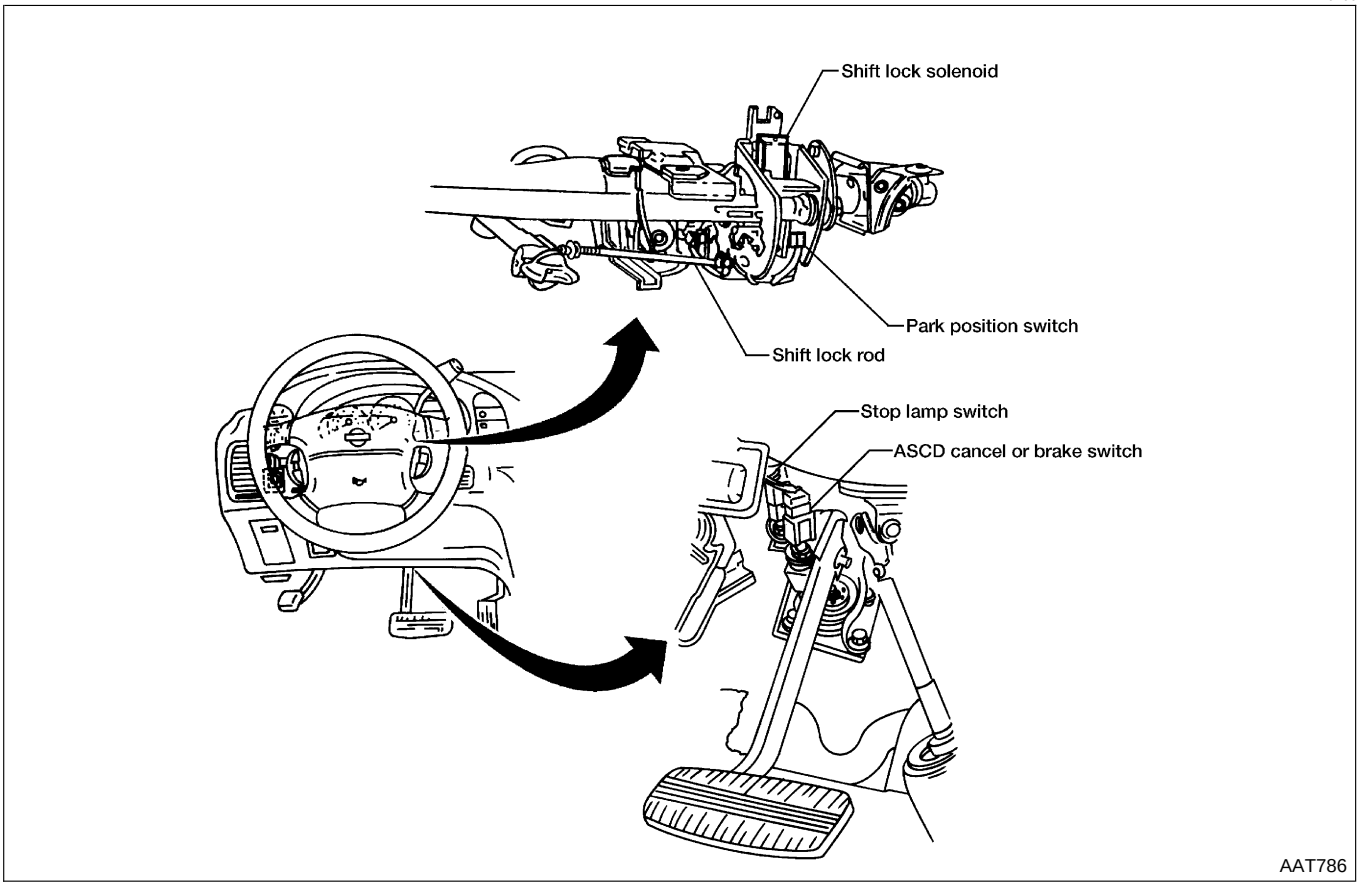


* This connector is not shown in "HARNESS LAYOUT " of EL section.

WAT064

Shift Lock System Electrical Parts Location

NDAT0106



Removal

NDAT0107

SHIFT LOCK SOLENOID

NDAT0107S01

1. Remove lower instrument cover LH and knee protector.
2. Remove heater duct.
3. Remove steering column covers.
4. Disconnect position indicator wire.
5. Remove four nuts attaching steering column.
6. Disconnect shift lock rod.
7. Remove shift control cable.
8. Disconnect ignition switch connector.
9. Remove two bolts attaching shift control tube and remove shift control tube.
10. Remove two screws from shift lock solenoid and two screws from park position switch.

SHIFT LOCK ROD

NDAT0107S02

1. Turn ignition key to ACC position.
2. Unlock slider by squeezing lock tabs.
3. Remove shift lock rod from key interlock rod.

- For removal of key interlock rod, refer to ***ST-13*** “Disassembly and Assembly”.

Diagnostic Procedure

NDAT0109

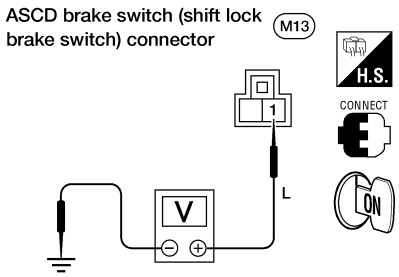
SYMPTOM 1:

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

SYMPTOM 2:

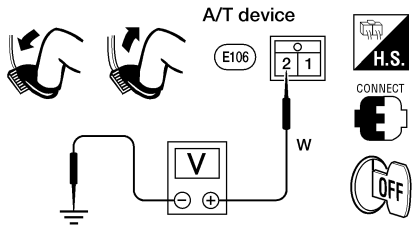
Ignition key cannot be removed when selector lever is set to P position. It can be removed when selector lever is set to any position except P.

1	CHECK KEY INTERLOCK ROD
Check selector lever position for damage. **OK or NG**	
OK ▶	GO TO 2.
NG ▶	Check selector lever. Refer to “ON-VEHICLE SERVICE — Park/Neutral Position (PNP) Switch and Control Cable Adjustment”, AT-267, AT-268.

2	CHECK POWER SOURCE
1. Turn ignition switch to ON position. (Do not start engine.) 2. Check voltage between A/T shift lock switch (ASCD brake switch) harness terminal 1 and ground.  AAT398A **Voltage:** **Battery voltage** **OK or NG**	
OK ▶	GO TO 3.
NG ▶	**Check the following items:** 1. Harness for short or open between battery and ASCD brake switch (Shift lock brake switch) harness terminal 1 2. Fuse 3. Ignition switch (Refer to ***EL-17***.)

3	CHECK INPUT SIGNAL A/T DEVICE

Turn ignition switch to ON position. (Do not start engine.)
- Check voltage between A/T device harness terminal 2 and ground.



AAT399A

Brake pedal	Voltage
Depressed	0V
Released	Battery voltage

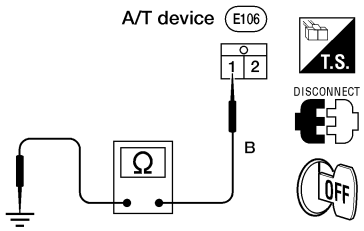
MTBL0107

OK or NG

OK	▶	GO TO 4.
NG	▶	**Check the following items:** 1. Harness for short or open between A/T device harness connector 2 and ASCD brake switch (Shift lock brake switch) harness connector 2 2. ASCD brake switch (Shift lock brake switch) (Refer to "Component Check", AT-265.)

4	CHECK GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect A/T device harness connector.
3. Check continuity between A/T device harness terminal 1 and ground.



AAT400A

Continuity should exist.
If OK, check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK PARK POSITION SWITCH

Refer to "Component Check", AT-265.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace park position switch.

Diagnostic Procedure (Cont'd)

6	CHECK SHIFT LOCK SOLENOID	
Refer to "Component Check", AT-265.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace shift lock solenoid.

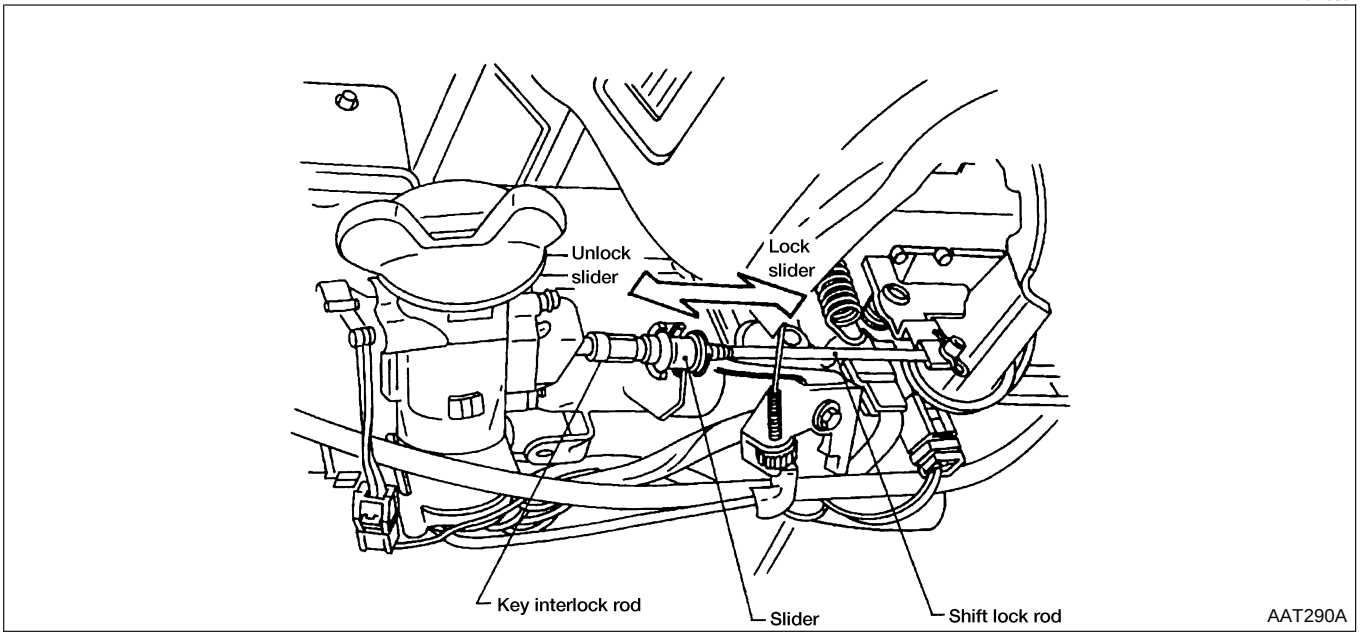
7	CHECK SHIFT LOCK OPERATION	
1. Reconnect shift lock harness connector. 2. Turn ignition switch from OFF to ON position. (Do not start engine.) 3. Recheck shift lock operation.		
OK or NG		
OK	▶	INSPECTION END
NG	▶	1. Perform A/T device input/output signal inspection test. 2. If NG, recheck harness connector connection.

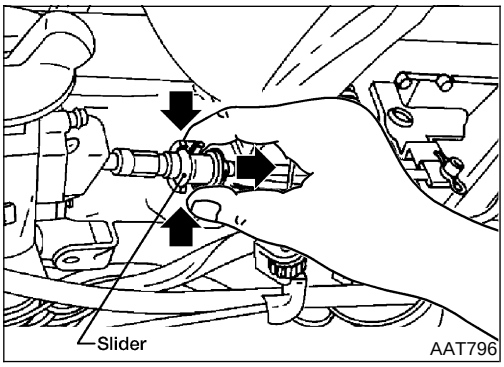
Installation and Adjustment

NDAT0110

SHIFT LOCK ROD

NDAT0110S01

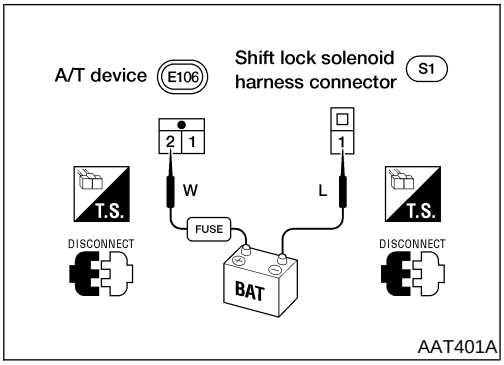




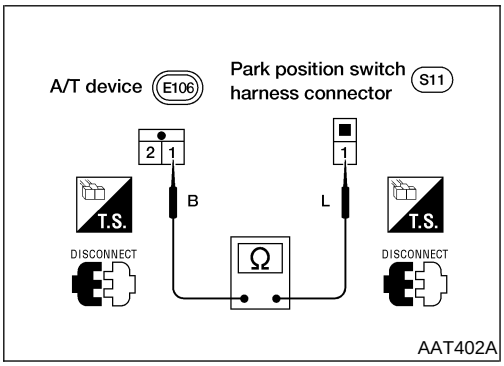
1. Place selector lever in Park "P" position.
2. Turn ignition key to LOCK position.
3. Insert shift lock rod into slider.
4. Grab key interlock rod and push toward shift lock rod to adjust.

Do not hold shift lock rod.

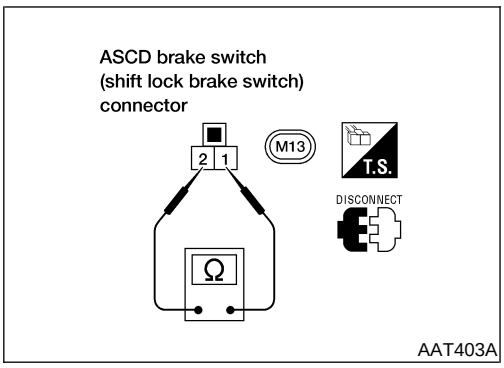
5. Lock slider into position.
6. Test shift lock operation.



AAT401A



AAT402A



AAT403A

Component Check

NDAT0111

SHIFT LOCK SOLENOID

NDAT0111S01

- Check operation by applying battery voltage to A/T device harness terminal 2 and shift lock solenoid harness terminal 1.

PARK POSITION SWITCH

NDAT0111S02

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

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

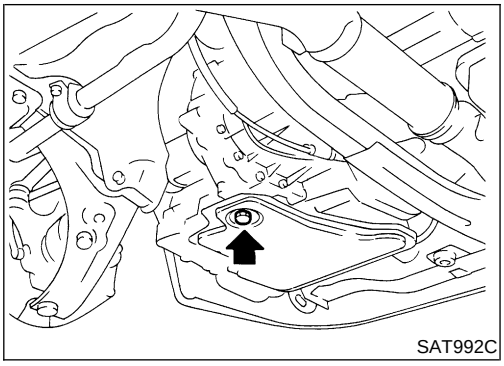
ASCD BRAKE SWITCH (SHIFT LOCK BRAKE SWITCH)

NDAT0111S03

- Check continuity between terminals 1 and 2.

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

Check ASCD brake switch (shift lock brake switch) after adjusting brake pedal — refer to “Adjustment”, *BR-13*.


SAT992C

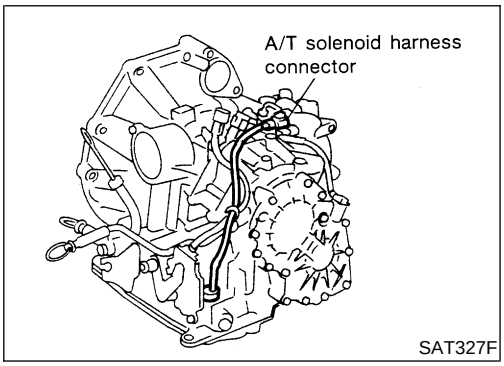
Control Valve Assembly and Accumulators

NDAT0112

REMOVAL

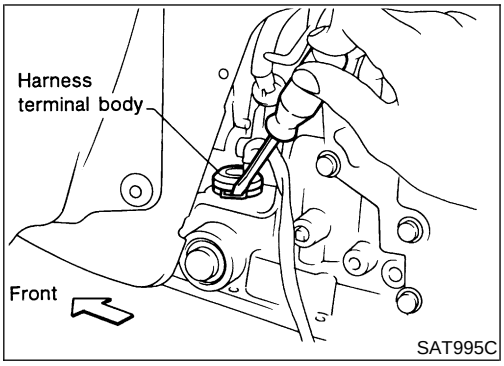
NDAT0112S01

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



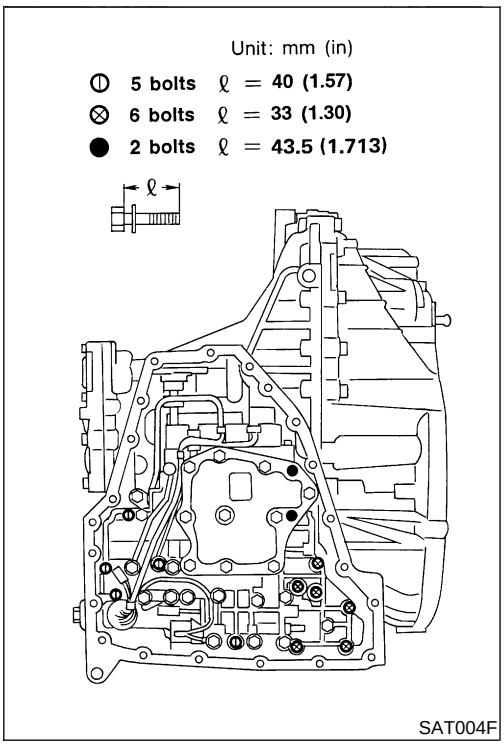
SAT327F

3. Disconnect A/T solenoid harness connector.



SAT995C

4. Remove stopper ring from terminal cord assembly harness terminal body.
5. Remove terminal cord assembly harness from transmission case by pushing on terminal body.



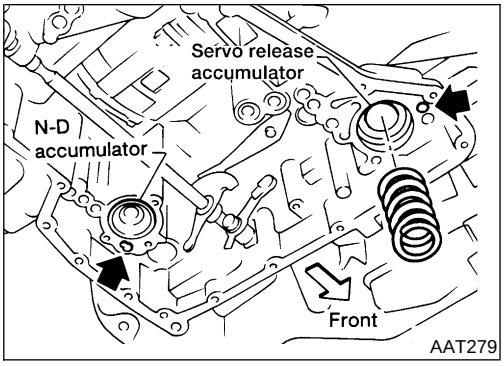
SAT004F

6. Remove control valve assembly by removing fixing bolts **I**, **X** and ●.

Bolt length, number and location are shown in the illustration.

- **Be careful not to drop manual valve and servo release accumulator return spring.**

7. Disassemble and inspect control valve assembly if necessary. Refer to AT-298.

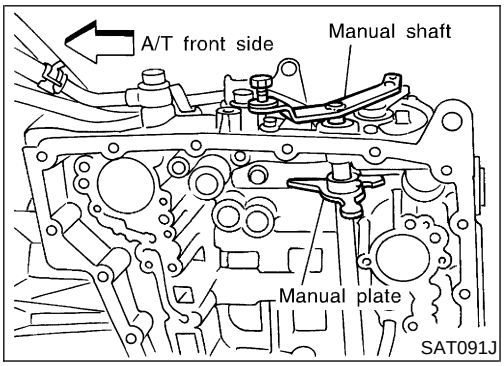


8. Remove servo release and N-D accumulators by applying compressed air if necessary.
- **Hold each piston with a rag.**

INSTALLATION

NDAT0112S02

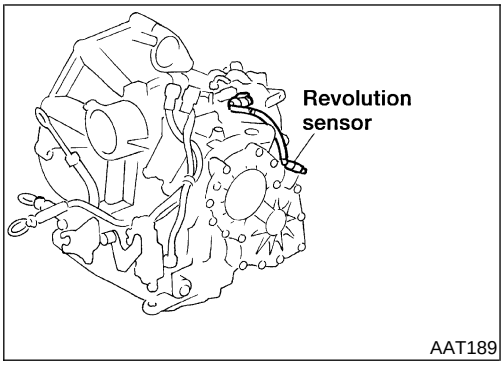
- **Set manual shaft in Neutral, then align manual plate with groove in manual valve.**
- **After installing control valve assembly, make sure that selector lever can be moved to all positions.**



Revolution Sensor Replacement

NDAT0113

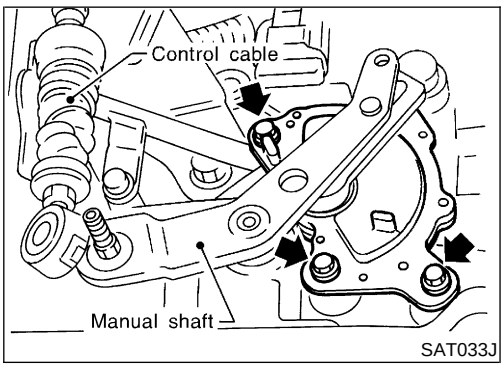
1. Remove under cover.
2. Remove revolution sensor from A/T.
3. Reinstall any part removed.
- **Always use new sealing parts.**



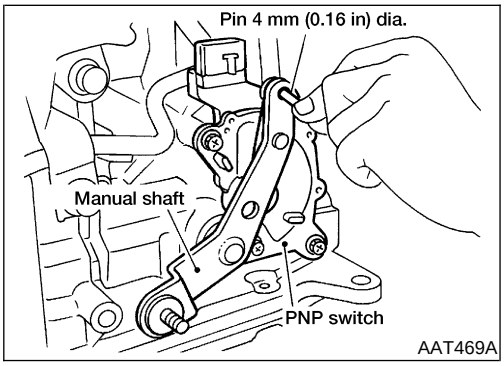
Park/Neutral Position (PNP) Switch Adjustment

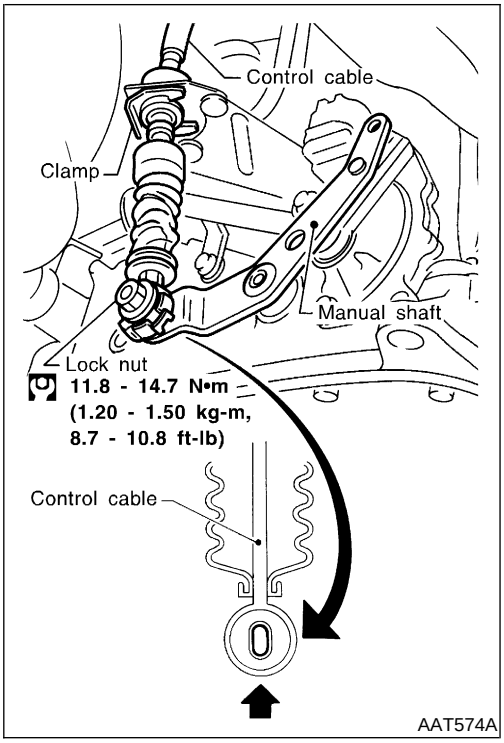
NDAT0114

1. Remove control cable from manual shaft.
2. Set manual shaft in N position.
3. Loosen park/neutral position (PNP) switch fixing bolts.



4. Insert pin into adjustment holes in both park/neutral position (PNP) switch and manual shaft as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of park/neutral position (PNP) switch. Refer to AT-108.





Control Cable Adjustment

NDAT0115

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

1. Place selector lever in P position.
2. Loosen control cable lock nut and place manual shaft in P position.

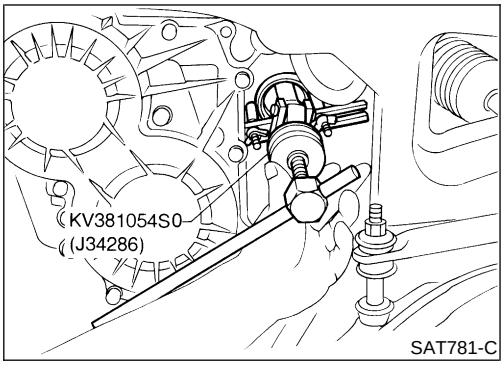
CAUTION:

Turn wheels more than 1/4 rotations and apply the park lock.

3. Push control cable in the direction of the arrow shown in the illustration by specified force.

   Specified force: 4.9 - 9.8 N (0.5 - 1.0 kg, 1.1 - 2.2 lb)
4. Tighten control cable lock nut.
5. Move selector lever from P to 1 position again. Make sure that selector lever moves smoothly.

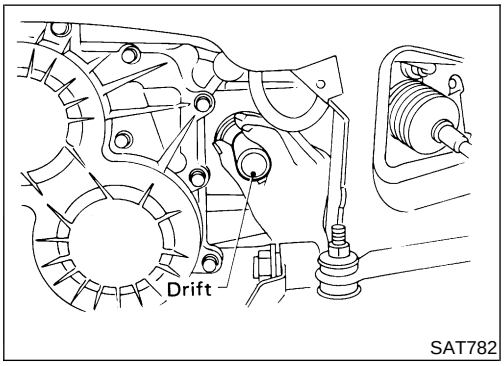
- **Make sure that the starter operates when the selector lever is placed in the N or P position.**
- **Make sure that the transmission is locked properly when the selector lever is placed in the P position.**



Differential Side Oil Seal Replacement

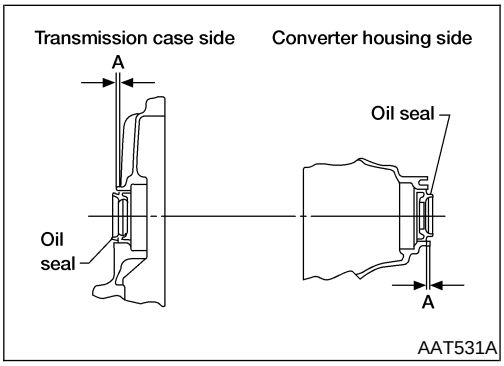
NDAT0116

1. Remove drive shaft assembly. Refer to ***AX-10*** “Removal”.
2. Remove oil seal.



3. Install oil seal.

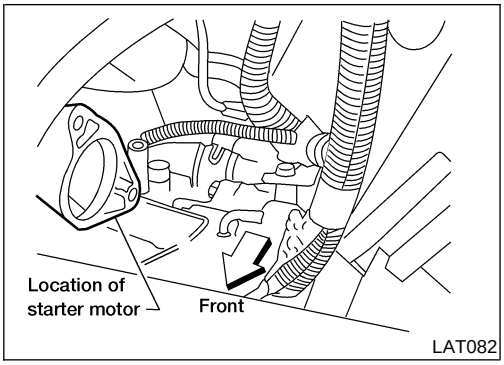
- **Apply ATF before installing.**



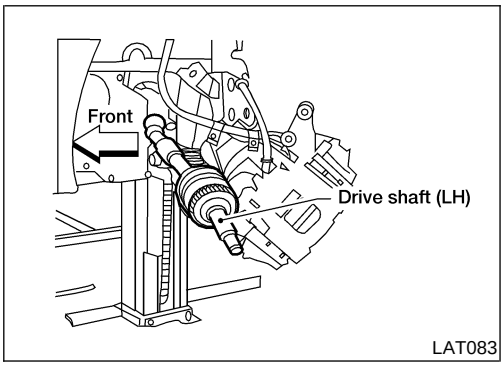
- **Install oil seals so dimension A is within specification**

  A: -0.5 mm (-0.02 in) to 0.5 (0.02 in)

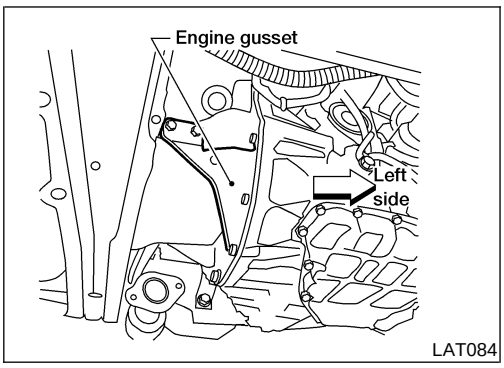
4. Reinstall any part removed.



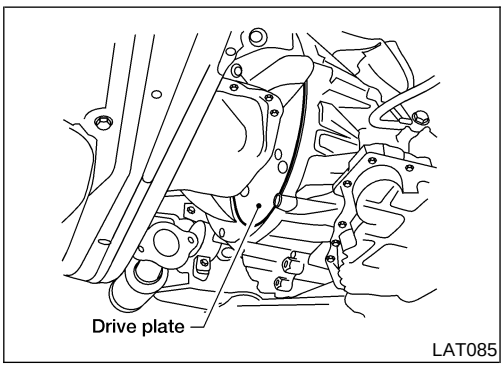
LAT082



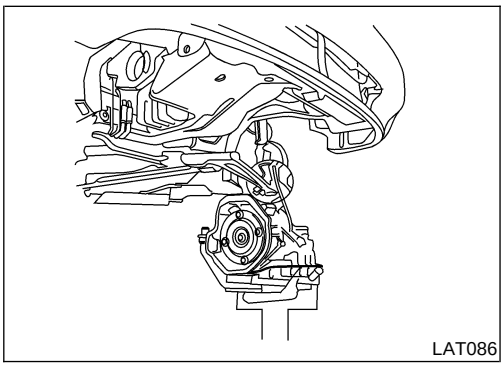
LAT083



LAT084



LAT085


LAT086

Removal

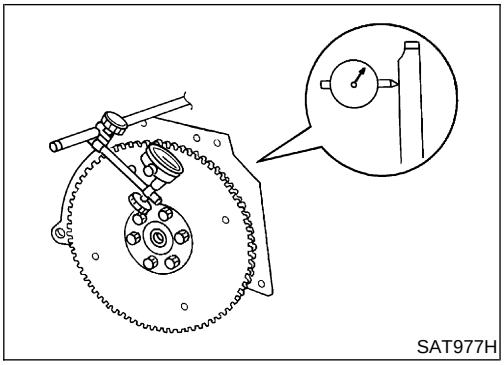
NDAT0117

CAUTION:

When removing the transaxle assembly from engine, first remove the crankshaft position sensor (OBD) from the assembly.

Be careful not to damage sensor edge.

1. Remove battery and battery tray.
2. Remove resonator.
3. Disconnect terminal cord assembly harness connector, vacuum lines and starter motor.
4. Drain ATF.
5. Remove drive shafts. Refer to “REMOVAL”, “FRONT AXLE”, ***AX-10***
6. Remove A/T cooler hose and control cable.
7. Remove front exhaust manifold.
8. Remove crankshaft position sensor (OBD) from transaxle.
9. Remove engine gusset and torque converter under cover. Refer to “Engine Mounting”, ***EM-44***.
10. Remove bolts from drive plate for torque converter.
- Rotate crankshaft for access to securing bolts.
11. Support transaxle
12. Remove front mounting.
13. Remove rear mounting.
14. Remove bolts fixing A/T to engine.
15. Lower transaxle while supporting it with a jack.


SAT977H

Installation

NDAT0118

- Drive plate runout

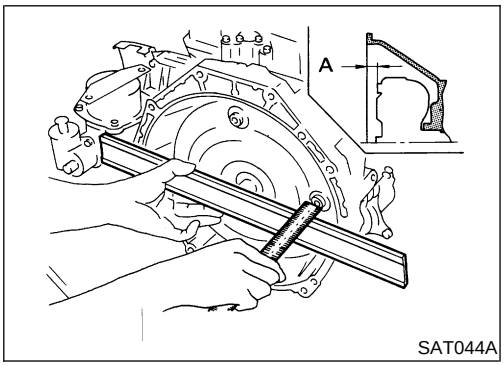
CAUTION:

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

Maximum allowable runout:

Refer to “Inspection”, *EM-56*.

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

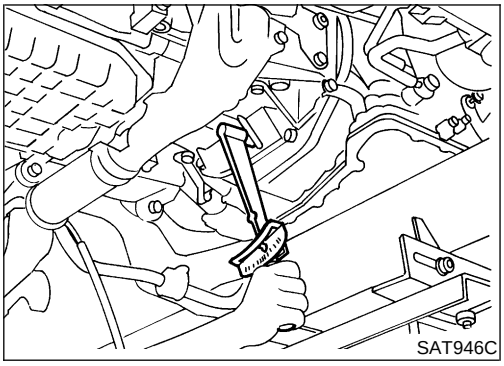


SAT044A

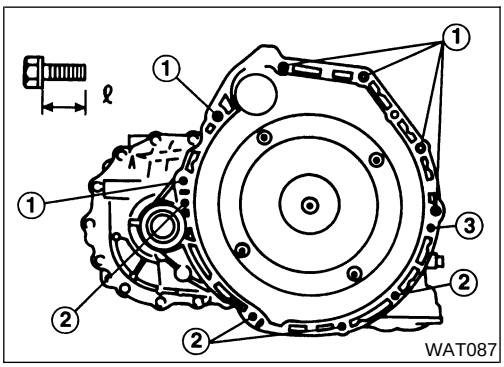
- When connecting torque converter to transaxle, measure distance “A” to be certain that they are correctly assembled.

Distance “A”:

19 mm (0.75 in) or more


SAT946C

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



WAT087

- Tighten bolts securing transaxle.
- Tighten LH mounting bracket bolts to the specified torque. Refer to “ENGINE REMOVAL”, ***EM-43***.
- Tighten rear plate cover bolts to the specified torque. Refer to “OIL PAN”, ***EM-14***.

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
1	39 - 49 (4.0 - 5.0, 29 - 36)	60 (2.36)
2	30 - 40 (3.1 - 4.1, 22 - 30)	25 (0.98)
3*	30 - 40 (3.1 - 4.1, 22 - 30)	25 (0.98)

*: TORX bolt

- Reinstall any part removed.

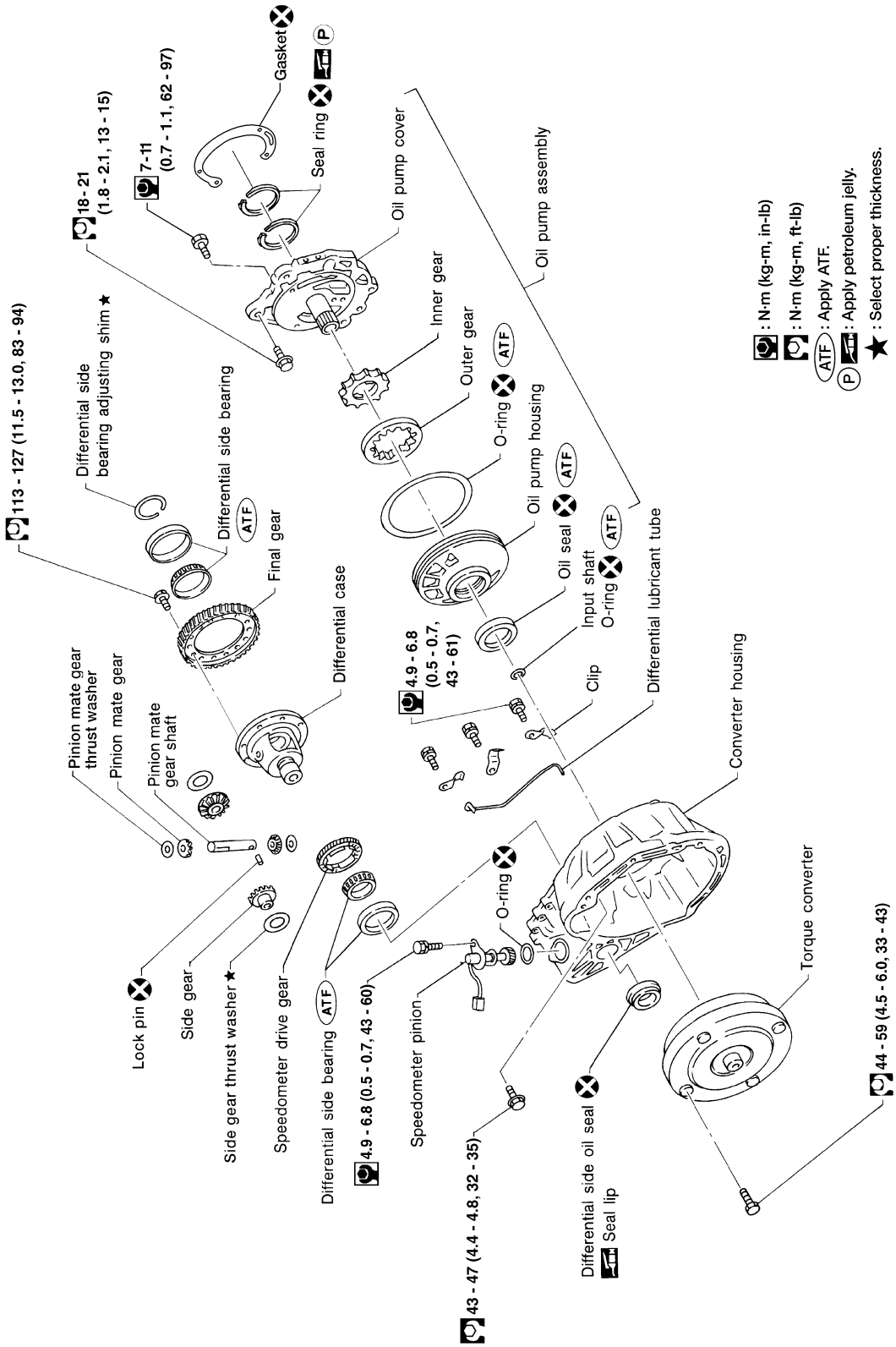

SAT638A

- Check fluid level in transaxle.
- Move selector lever through all positions to be sure that transaxle operates correctly.
  With parking brake applied, rotate engine at idling. Move selector lever through N to D, to 2, to 1 and to R position. A slight shock should be felt by hand gripping selector each time transaxle is shifted.
- Perform road test. Refer to AT-66.

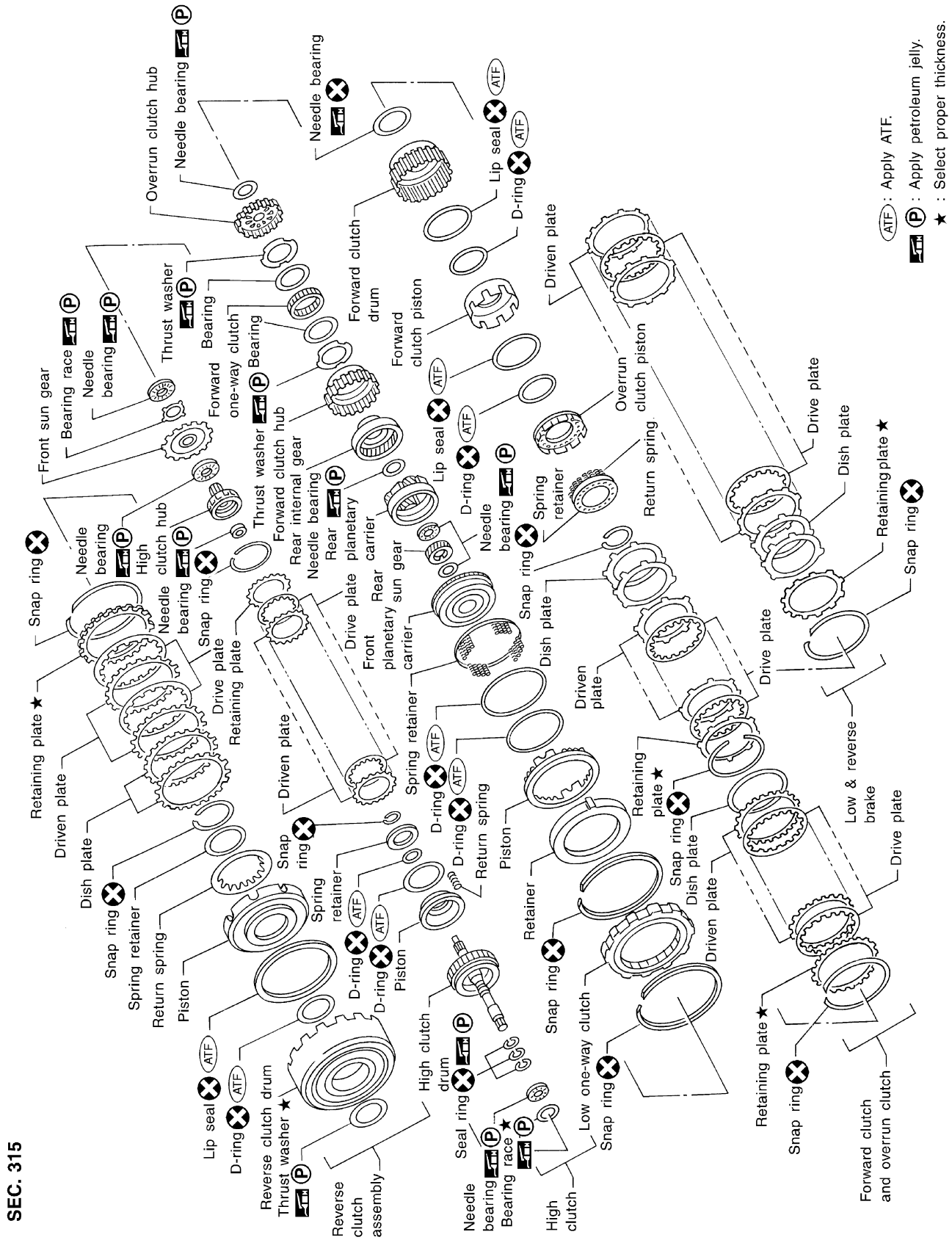
Components

NDAT0119

SEC. 311 • 313 • 327 • 381

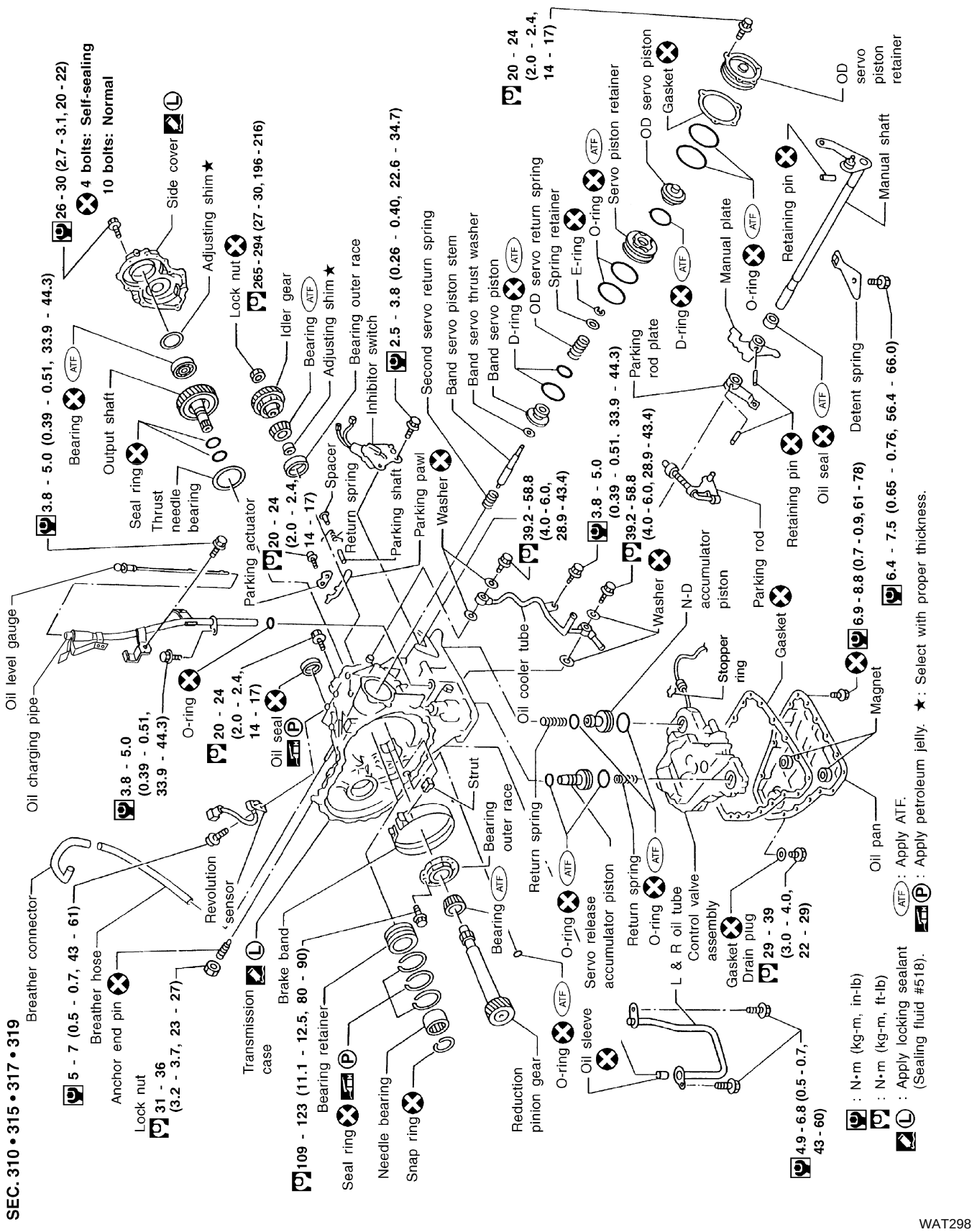


WAT088



SEC. 315

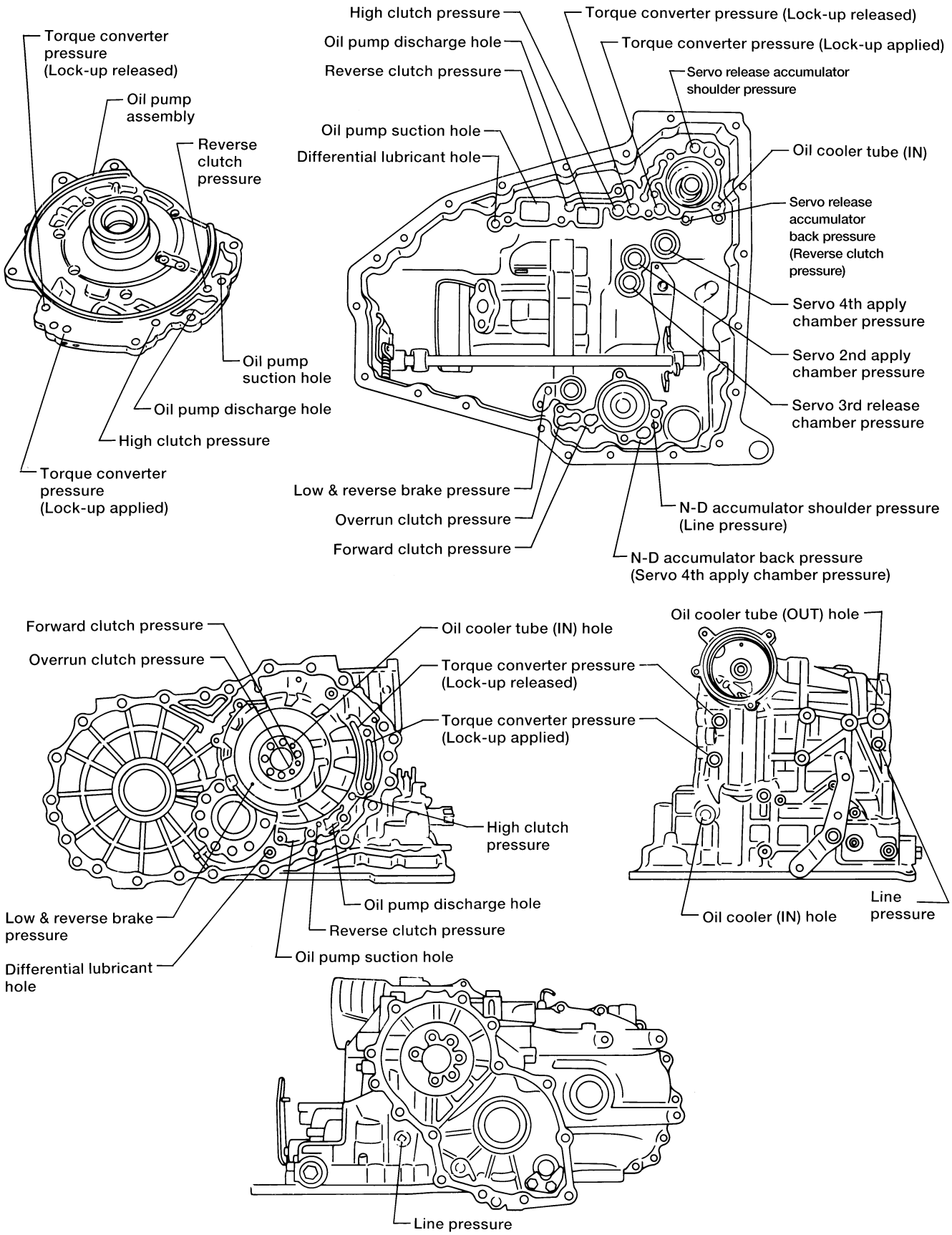
AAT461A


SEC. 310 • 315 • 317 • 319
Oil level gauge
Oil charging pipe
Breather connector
5 - 7 (0.5 - 0.7, 43 - 61)
Breather hose
Anchor end pin
Lock nut
31 - 36 (3.2 - 3.7, 23 - 27)
Revolution sensor
Transmission case
Brake band
109 - 123 (11.1 - 12.5, 80 - 90)
Bearing retainer
Seal ring
Needle bearing
Snap ring
Reduction pinion gear
3.8 - 5.0 (0.39 - 0.51, 33.9 - 44.3)
O-ring
20 - 24 (2.0 - 2.4, 14 - 17)
Oil seal
Parking actuator
3.8 - 5.0 (0.39 - 0.51, 33.9 - 44.3)
Seal ring
Thrust needle bearing
Output shaft
Bearing
26 - 30 (2.7 - 3.1, 20 - 22)
4 bolts: Self-sealing
10 bolts: Normal
Side cover
Adjusting shim
Lock nut
265 - 294 (27 - 30, 196 - 216)
Idler gear
Bearing
Adjusting shim
Spacer
Return spring
Bearing outer race
Inhibitor switch
2.5 - 3.8 (0.26 - 0.40, 22.6 - 34.7)
Parking shaft
Parking pawl
Washer
Second servo return spring
Band servo piston stem
Band servo thrust washer
Band servo piston
D-ring
39.2 - 58.8 (4.0 - 6.0, 28.9 - 43.4)
Oil cooler tube
3.8 - 5.0 (0.39 - 0.51, 33.9 - 44.3)
39.2 - 58.8 (4.0 - 6.0, 28.9 - 43.4)
Washer
N-D accumulator piston
Parking rod
Gasket
Retaining pin
Oil seal
Detent spring
6.9 - 8.8 (0.7 - 0.9, 61 - 78)
Magnet
Oil pan
6.4 - 7.5 (0.65 - 0.76, 56.4 - 66.0)
20 - 24 (2.0 - 2.4, 14 - 17)
OD servo return spring
Spring retainer
E-ring
O-ring
Servo piston retainer
Parking rod plate
D-ring
Manual plate
O-ring
Retaining pin
Manual shaft
OD servo piston
OD servo piston
Gasket
D-ring
OD servo piston retainer
Strut
Bearing outer race
Return spring
Servo release accumulator piston
Return spring
O-ring
L & R oil tube
Control valve assembly
Gasket
Drain plug
29 - 39 (3.0 - 4.0, 22 - 29)
4.9 - 6.8 (0.5 - 0.7, 43 - 60)
Bearing
O-ring
Oil sleeve
O-ring
Stopper ring
: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)
: Apply locking sealant (Sealing fluid #518).
ATF : Apply ATF.
P : Apply petroleum jelly.
★: Select with proper thickness.

WAT298

Oil Channel

NDAT0120



AAT291A

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

NDAT0121

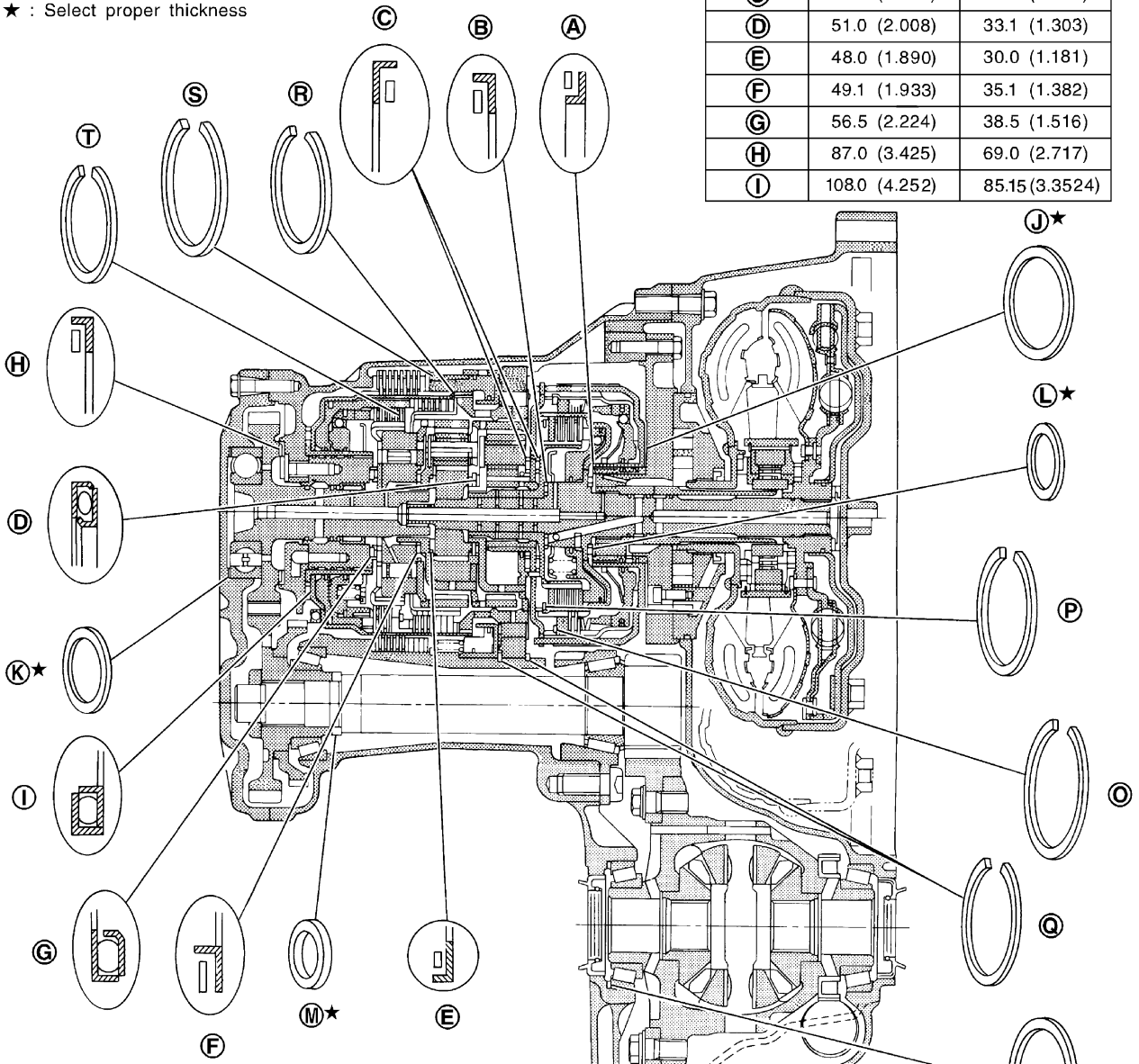
Outer diameter of thrust washers

Item number	Outer diameter mm (in)
Ⓙ★	76.0 (2.992)
Ⓚ★	80.0 (3.150)

★ : Select proper thickness

Outer and inner diameter of needle bearings

Item number	Outer diameter mm (in)	Inner diameter mm (in)
Ⓐ	49.1 (1.933)	35.1 (1.382)
Ⓑ	42.0 (1.654)	23.0 (0.906)
Ⓒ	70.0 (2.756)	50.0 (1.969)
Ⓓ	51.0 (2.008)	33.1 (1.303)
Ⓔ	48.0 (1.890)	30.0 (1.181)
Ⓕ	49.1 (1.933)	35.1 (1.382)
Ⓖ	56.5 (2.224)	38.5 (1.516)
Ⓗ	87.0 (3.425)	69.0 (2.717)
Ⓘ	108.0 (4.252)	85.15 (3.3524)



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

Item number	Outer diameter mm (in)	Inner diameter mm (in)
Ⓛ★	51.0 (2.008)	36.0 (1.417)
Ⓜ★	38.0 (1.496)	28.1 (1.106)
Ⓝ★	75.0 (2.953)	68.0 (2.677)
	98.0 (3.858)	91.0 (3.583)

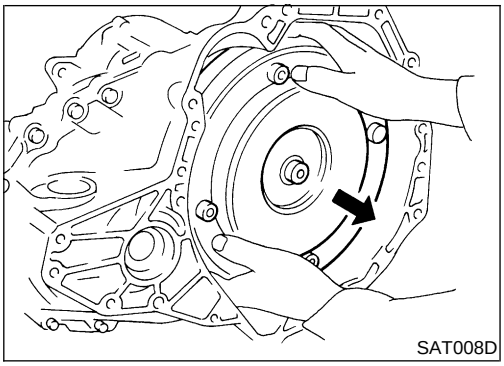
★ : Select proper thickness

Outer diameter of snap rings

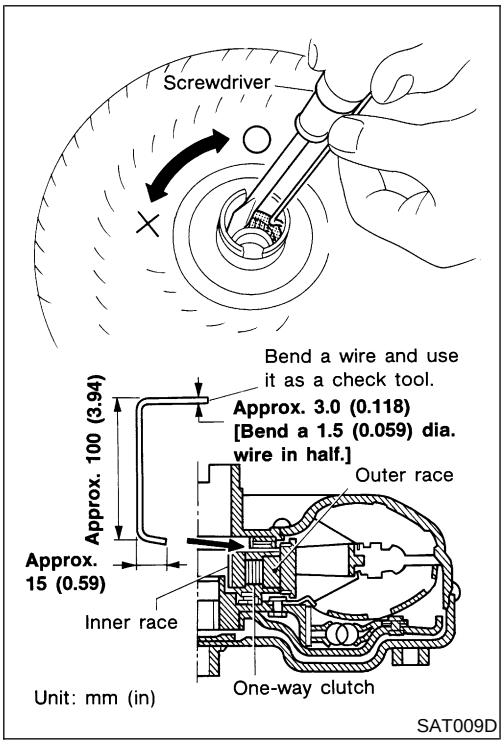
Item number	Outer diameter mm (in)
Ⓞ	150 (5.91)
Ⓟ	119.1 (4.689)
Ⓠ	182.8 (7.197)
Ⓡ	144.8 (5.701)
Ⓢ	173.8 (6.843)
Ⓣ	133.9 (5.272)

WAT090

DISASSEMBLY

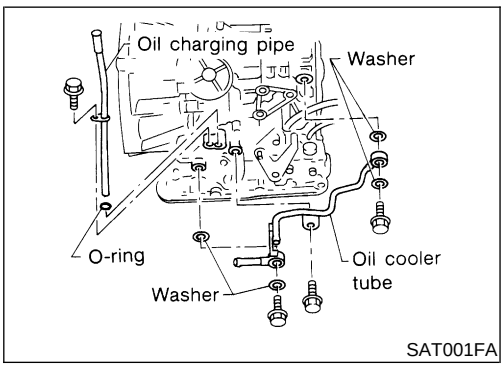

SAT008D

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



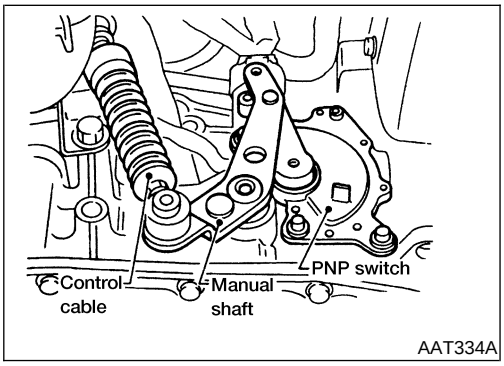
SAT009D

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



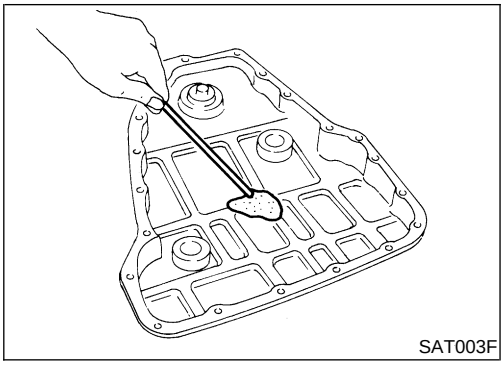
SAT001FA

4. Remove oil charging pipe and oil cooler tube.

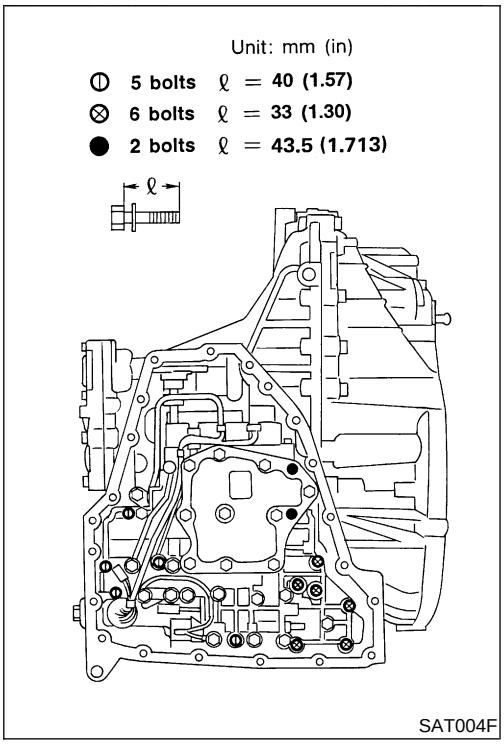


AAT334A

5. Set manual shaft to position P.
6. Remove park/neutral position (PNP) switch.


SAT003F

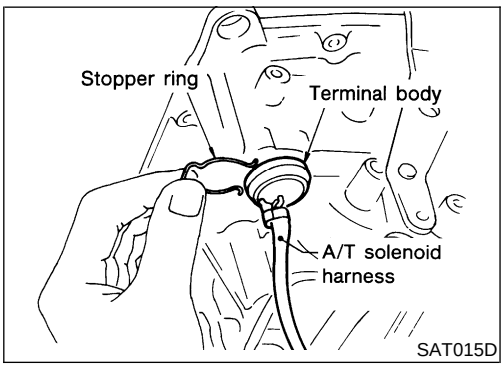
7. Remove oil pan and oil pan gasket.
- **Do not reuse oil pan bolts.**
8. Check foreign materials in oil pan to help determine causes of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. 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 "Radiator", *LC-12*.**



SAT004F

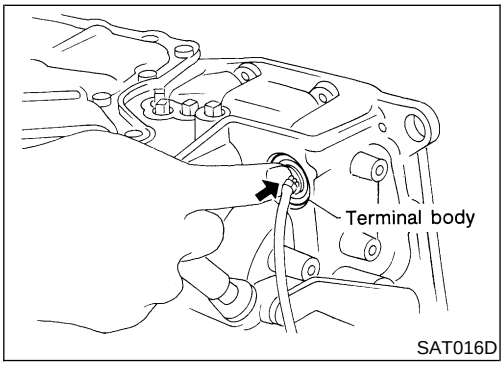
9. Remove control valve assembly according to the following procedures.

a. Remove control valve assembly mounting bolts **I**, **X** and ●.



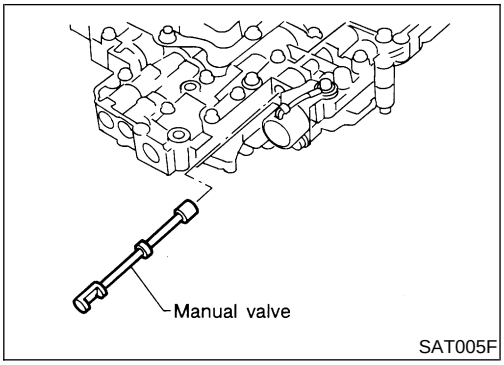
SAT015D

b. Remove stopper ring from terminal body.

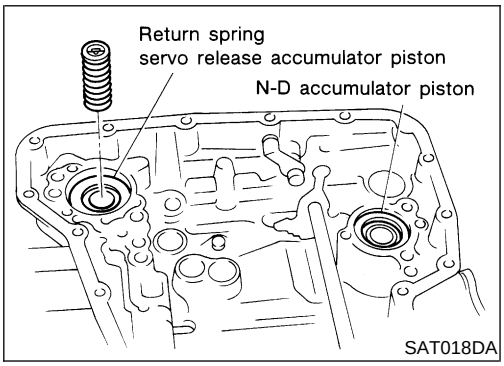


SAT016D

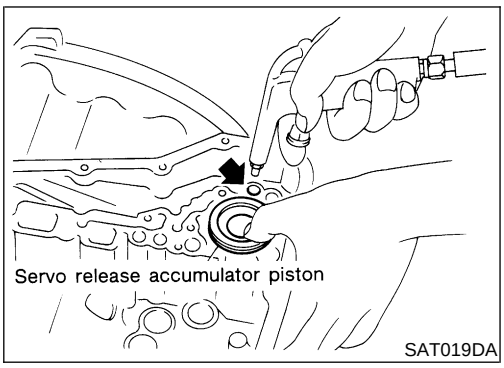
c. Push terminal body into transmission case and draw out solenoid harness.



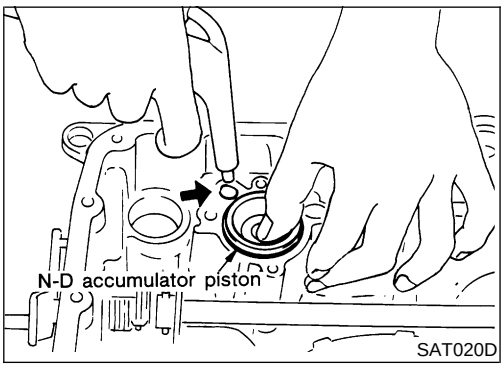
10. Remove manual valve from control valve assembly.



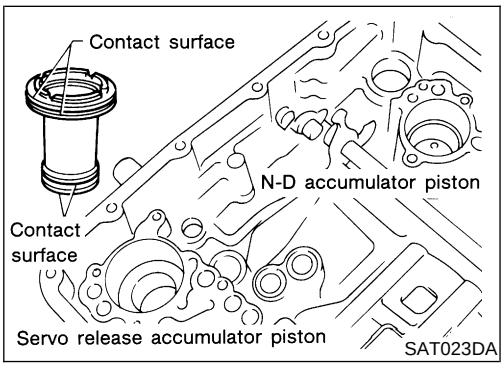
11. Remove return spring from servo release accumulator piston.



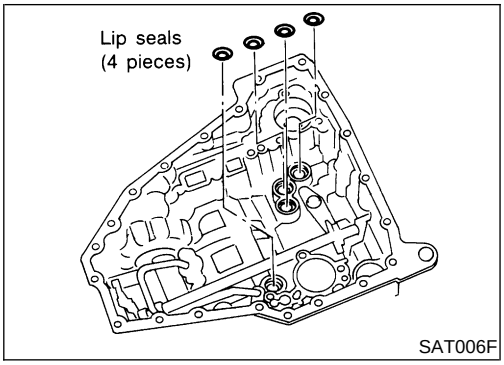
12. Remove servo release accumulator piston with compressed air.
13. Remove O-rings from servo release accumulator piston.



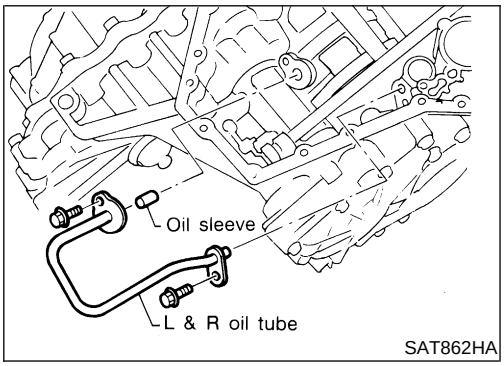
14. Remove N-D accumulator piston and return spring with compressed air.
15. Remove O-rings from N-D accumulator piston.



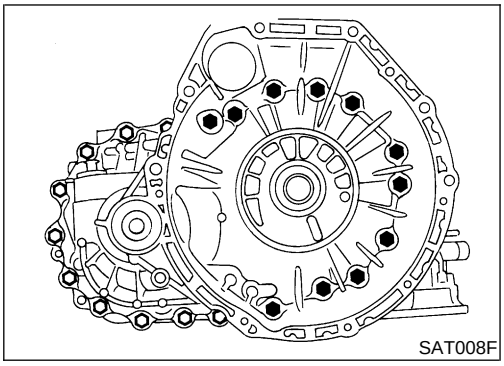
16. Check accumulator pistons and contact surface of transmission case for damage.
17. Check accumulator return springs for damage and free length.



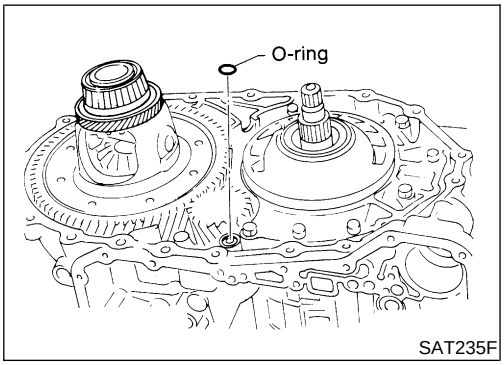
18. Remove lip seals.



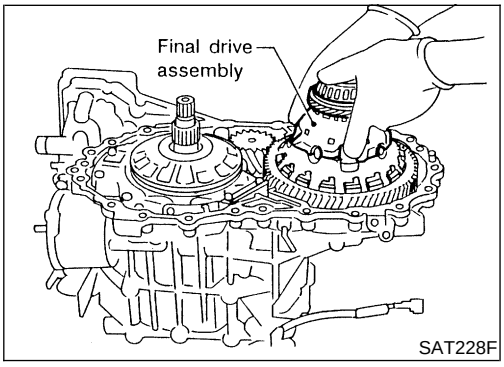
19. Remove L & R oil tube and oil sleeve.



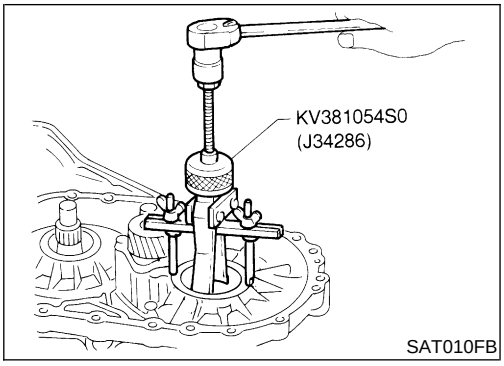
20. Remove converter housing according to the following procedures.
a. Remove converter housing mounting bolts.
b. Remove converter housing by tapping it lightly.



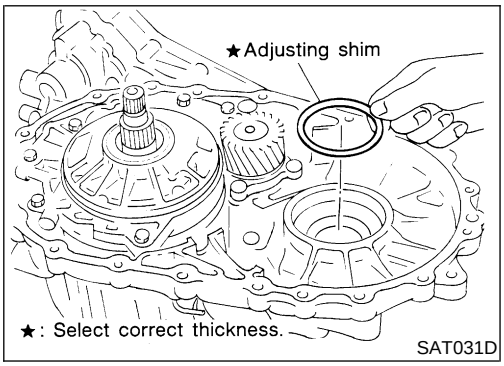
c. Remove O-ring from differential oil port.



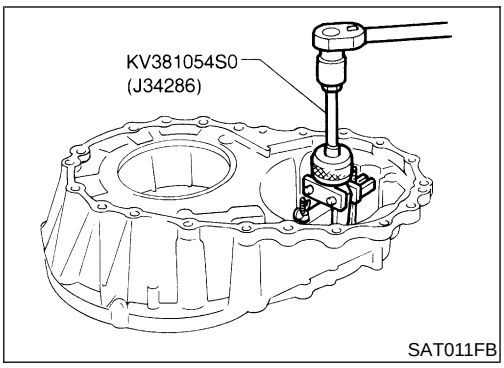
21. Remove final drive assembly from transmission case.



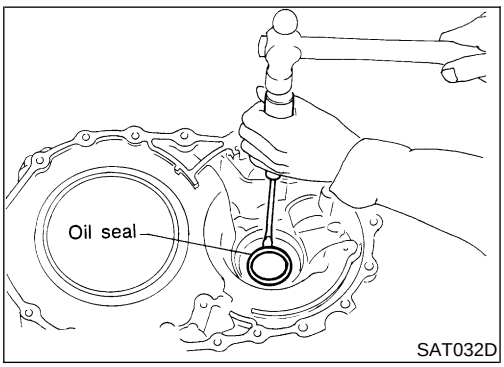
22. Remove differential side bearing outer race from transmission case.



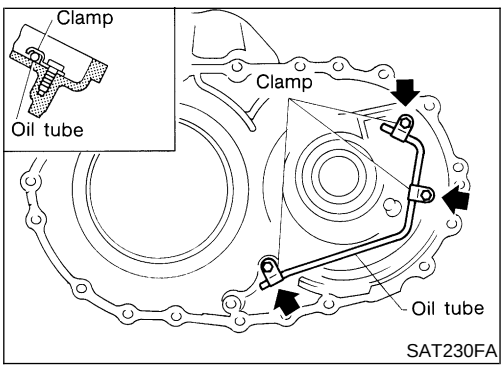
23. Remove differential side bearing adjusting shim from transmission case.



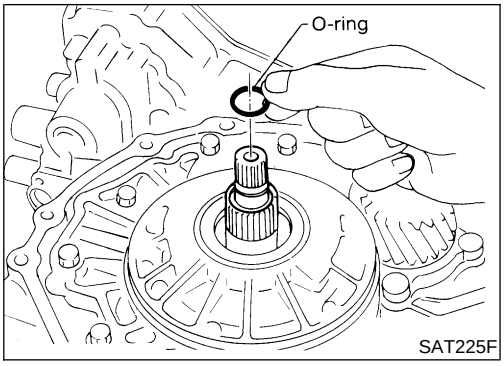
24. Remove differential side bearing outer race from converter housing.



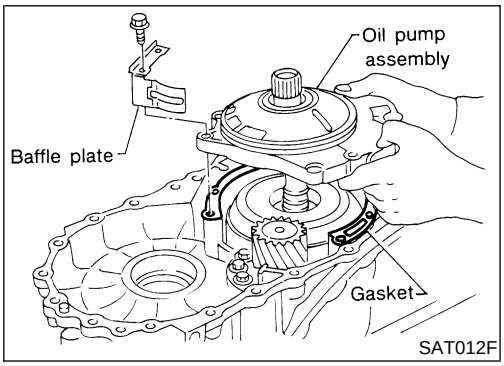
25. Remove oil seal with screwdriver from converter housing.
- **Be careful not to damage case.**



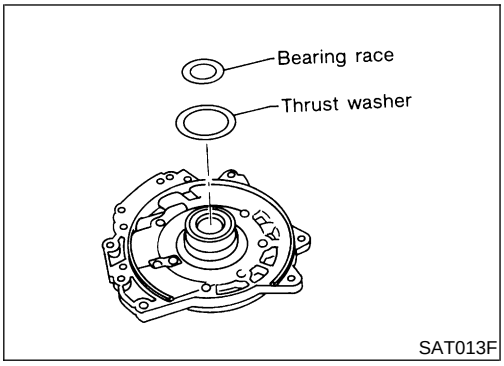
26. Remove oil tube from converter housing.



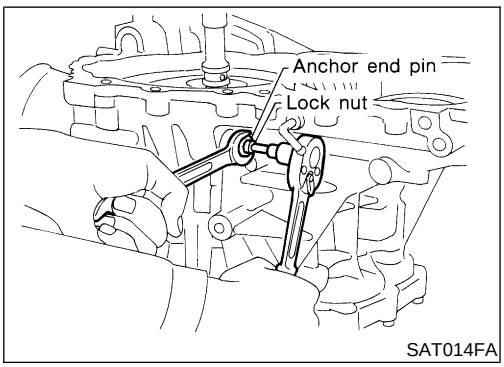
27. Remove oil pump according to the following procedures.
a. Remove O-ring from input shaft.



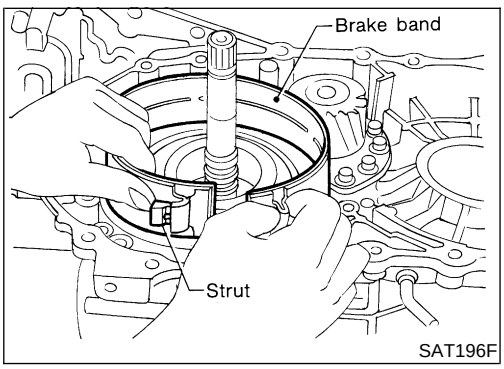
b. Remove oil pump assembly, baffle plate and gasket from transmission case.



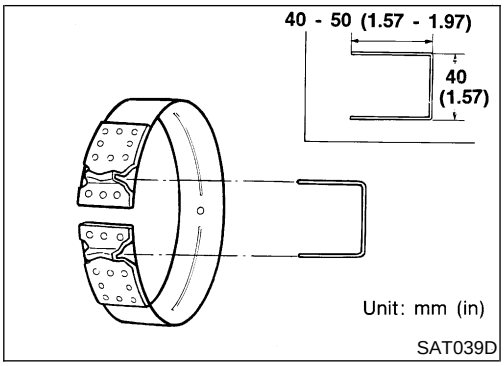
c. Remove thrust washer and bearing race from oil pump assembly.



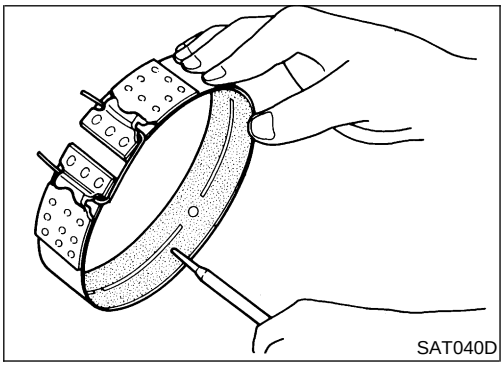
28. Remove brake band according to the following procedures.
a. Loosen lock nut, then back off anchor end pin.
- **Do not reuse anchor end pin.**



b. Remove brake band and strut from transmission case.



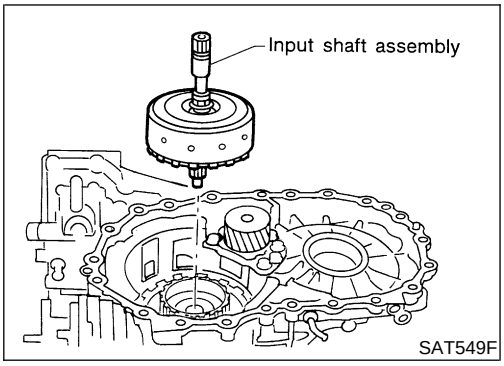
- **To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at left.**
  Leave the clip in position after removing the brake band.

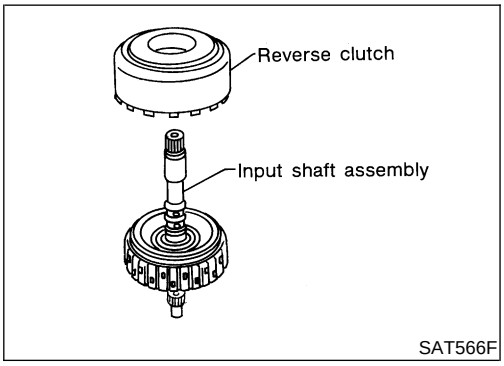


c. Check brake band facing for damage, cracks, wear or burns.

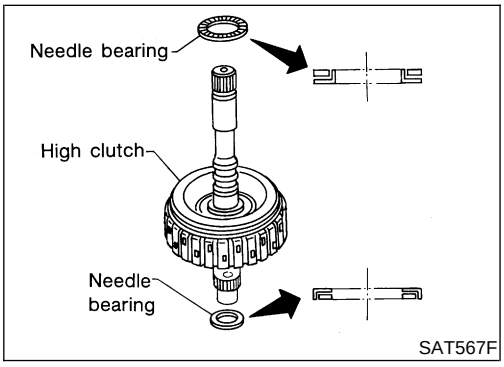
29. Remove input shaft assembly (high clutch) and reverse clutch according to the following procedures.

a. Remove input shaft assembly (high clutch) with reverse clutch.

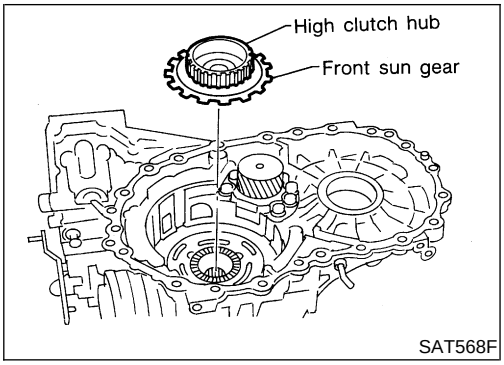




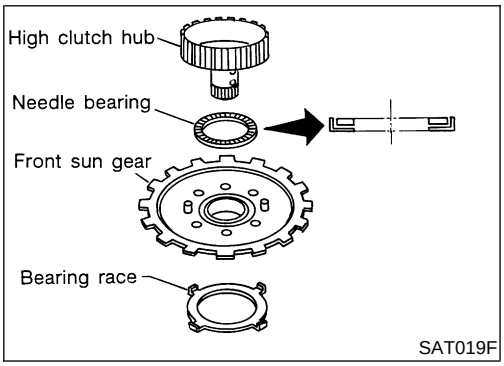
b. Remove input shaft assembly (high clutch) from reverse clutch.



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

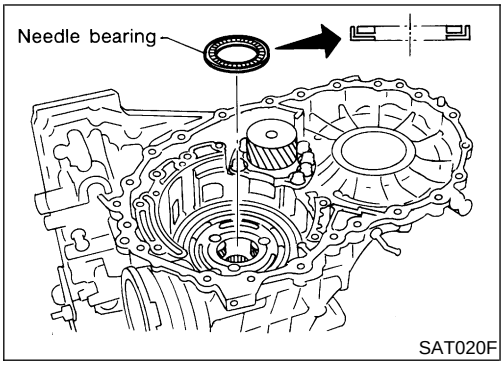


d. Remove high clutch hub and front sun gear from transmission case.

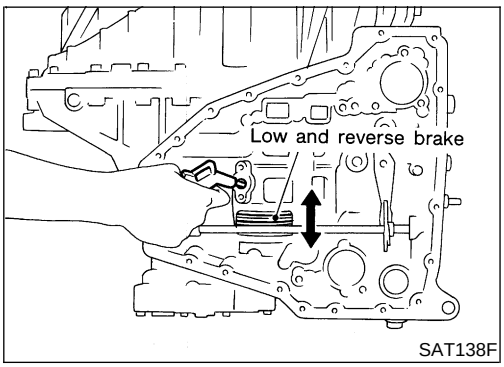


e. Remove front sun gear and needle bearing from high clutch hub and check for damage or wear.

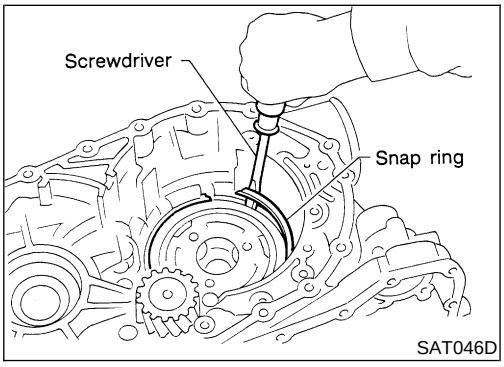
f. Remove bearing race from front sun gear and check for damage or wear.



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

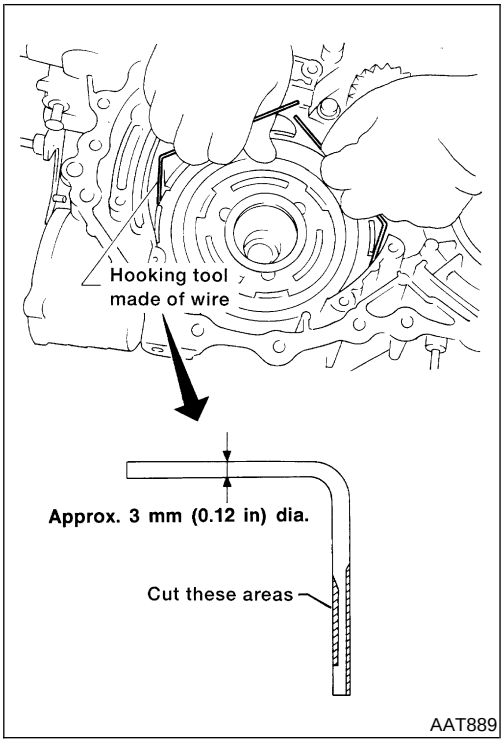


31. Apply compressed air and check to see that low and reverse brake operates.

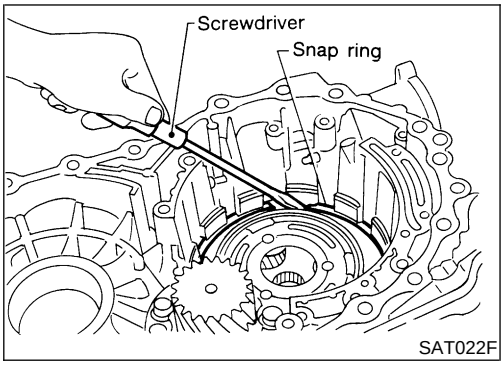


32. Remove low one-way clutch and front planetary carrier assembly according to the following procedures.

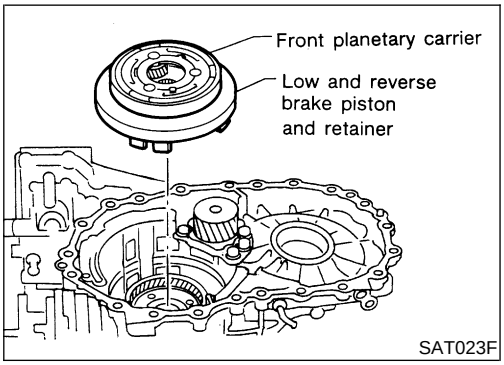
a. Remove snap ring with flat-bladed screwdriver.



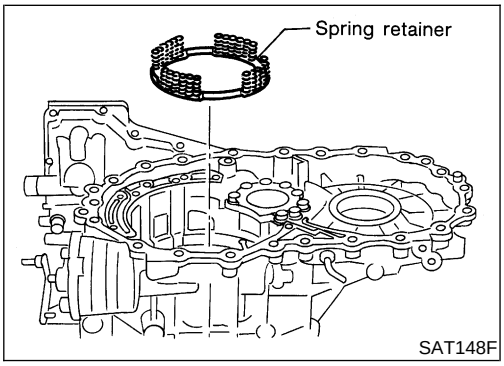
b. Remove low one-way clutch with a hook made of wire.



c. Remove snap ring with flat-bladed screwdriver.

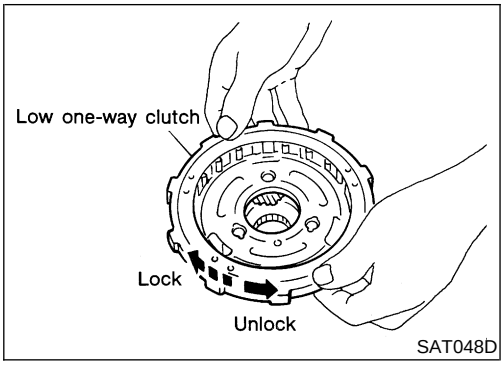


d. Remove front planetary carrier with low and reverse brake piston and retainer.

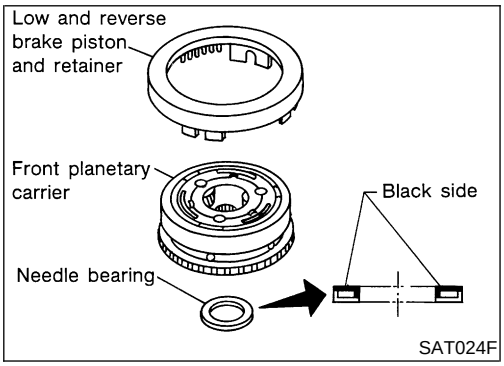


e. Remove low and reverse brake spring retainer.

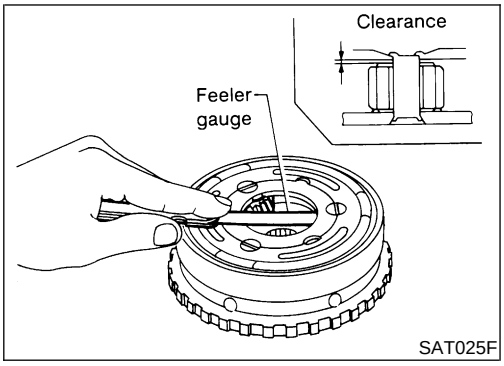
- **Do not remove return springs from spring retainer.**



f. Check that low one-way clutch rotates in the direction of the arrow and locks in the opposite direction.



g. Remove needle bearing, low and reverse brake piston and retainer from front planetary carrier.



h. Check front planetary carrier, low one-way clutch and needle bearing for damage or wear.

i. Check clearance between planetary gears and planetary carrier with feeler gauge.

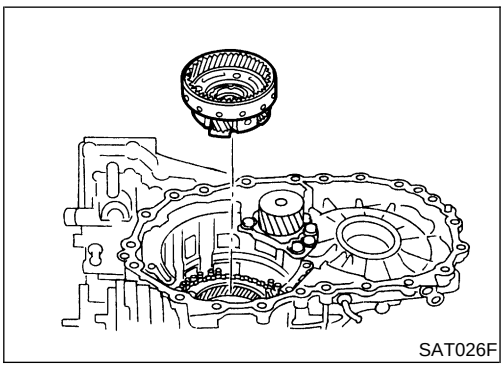
Standard clearance:

0.20 - 0.70 mm (0.0079 - 0.0276 in)

Allowable limit:

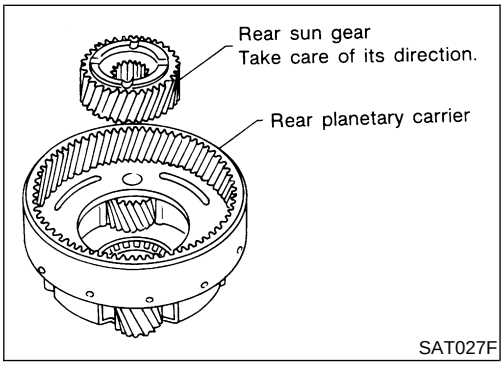
0.80 mm (0.0315 in)

Replace front planetary carrier if the clearance exceeds allowable limit.

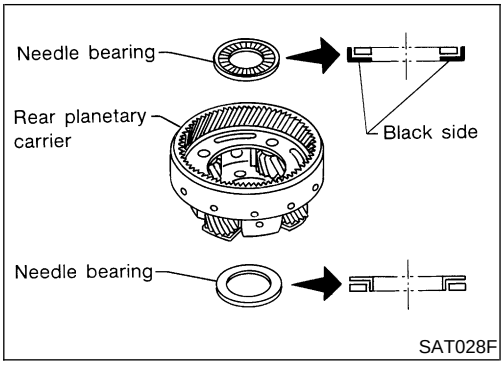


33. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.

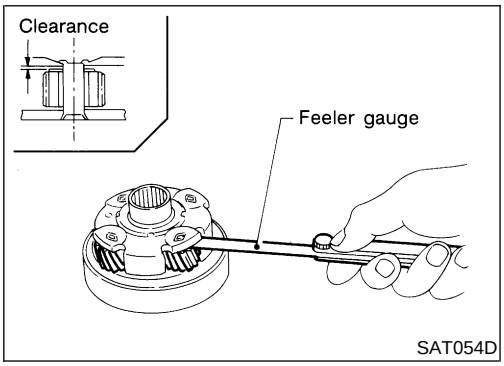
a. Remove rear planetary carrier assembly from transmission case.



b. Remove rear sun gear from rear planetary carrier.



c. Remove needle bearings from rear planetary carrier assembly.



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

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

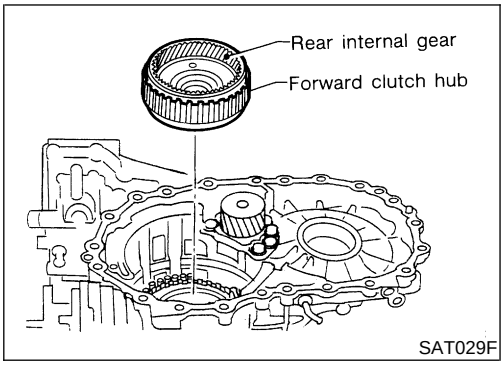
Standard clearance:

0.20 - 0.70 mm (0.0079 - 0.0276 in)

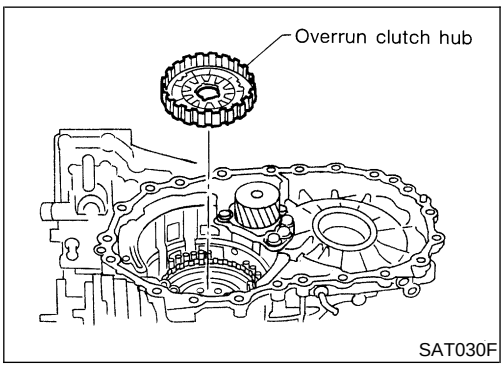
Allowable limit:

0.80 mm (0.0315 in)

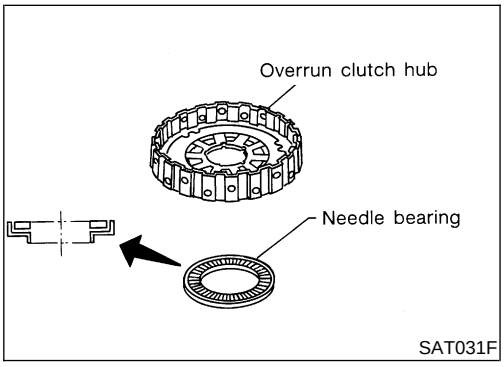
Replace rear planetary carrier if the clearance exceeds allowable limit.



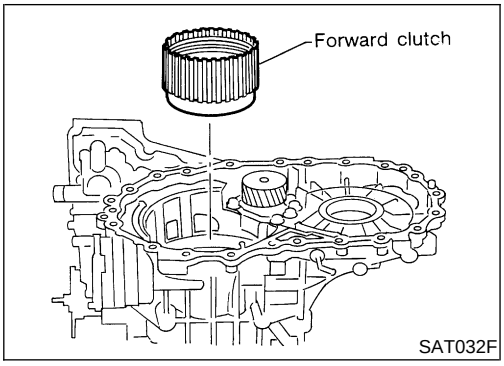
34. Remove rear internal gear and forward clutch hub from transmission case.



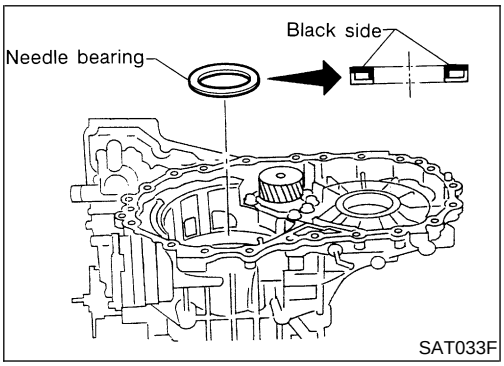
35. Remove overrun clutch hub from transmission case.



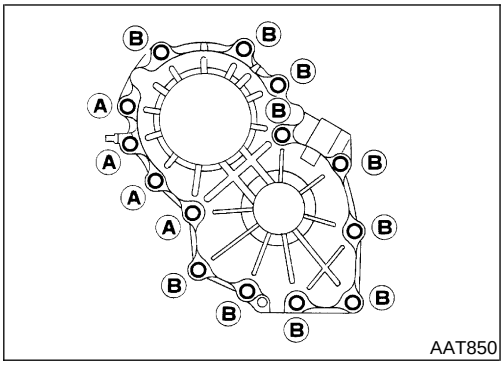
36. Remove needle bearing from overrun clutch hub and check for damage or wear.



37. Remove forward clutch assembly from transmission case.



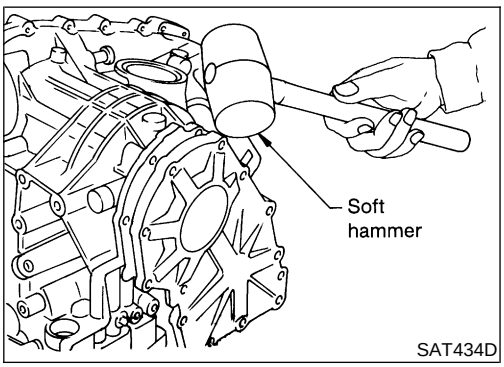
38. Remove needle bearing from transmission case.



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

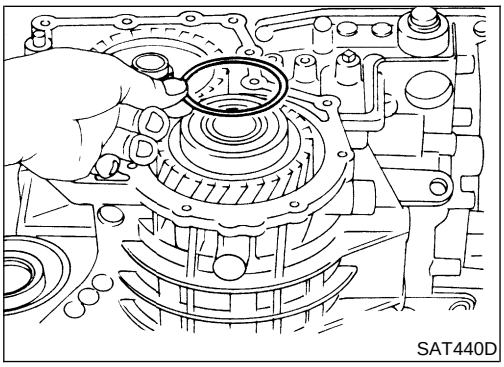
a. Remove side cover bolts.

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

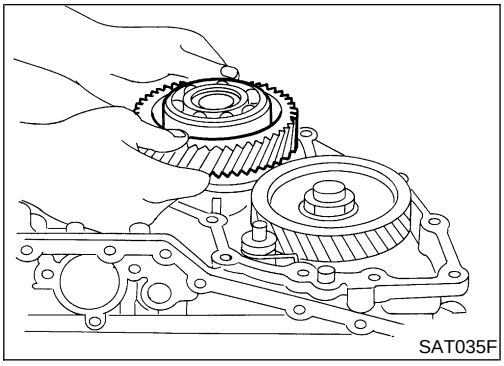


b. Remove side cover by lightly tapping it with a soft hammer.

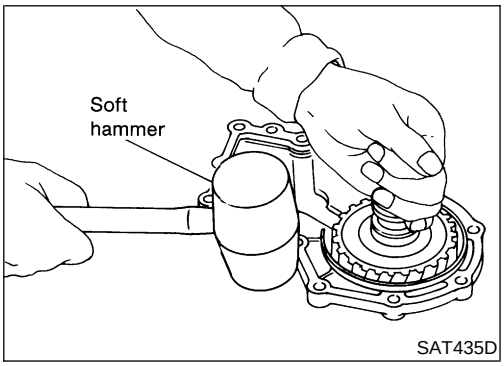
- **Be careful not to drop output shaft assembly. It might come out when removing side cover.**



c. Remove adjusting shim.

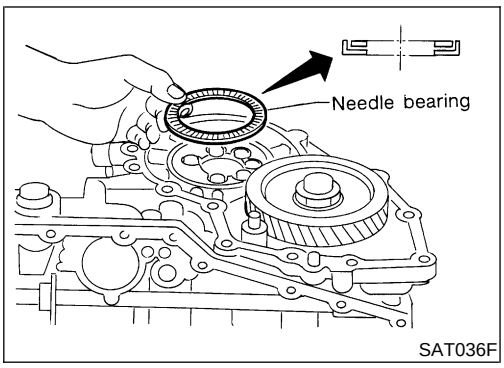

SAT035F

d. Remove output shaft assembly.



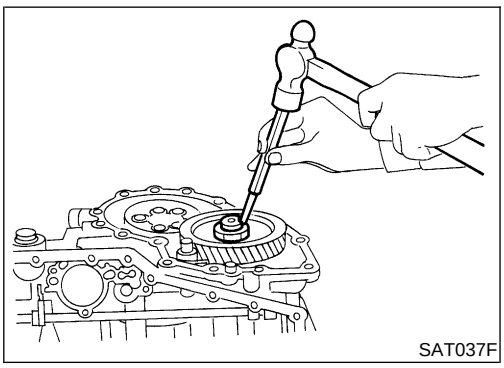
SAT435D

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

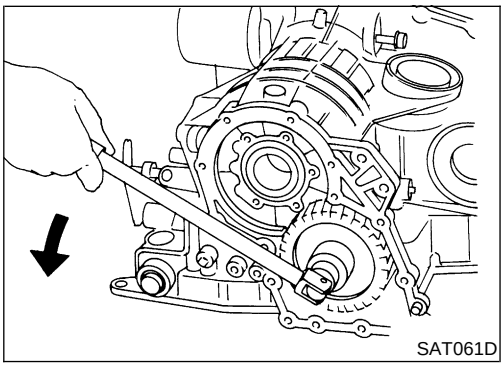


SAT036F

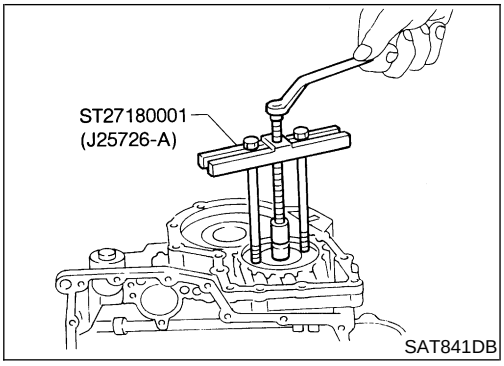
e. Remove needle bearing.


SAT037F

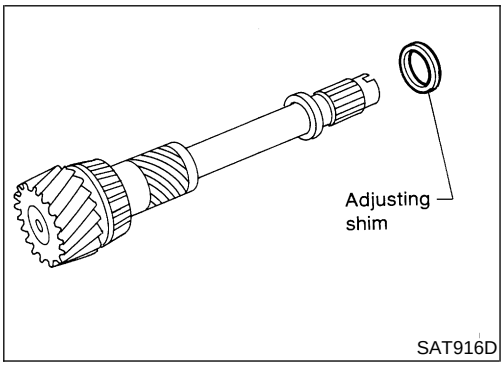
40. Disassemble reduction pinion gear according to the following procedures.
a. Set manual shaft to position P to fix idler gear.
b. Unlock idler gear lock nut using a pin punch.


SAT061D

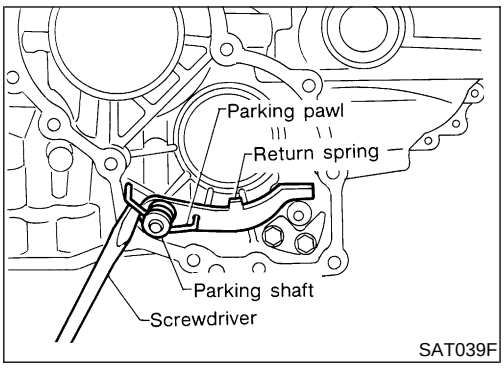
c. Remove idler gear lock nut.
- **Do not reuse idler gear lock nut.**



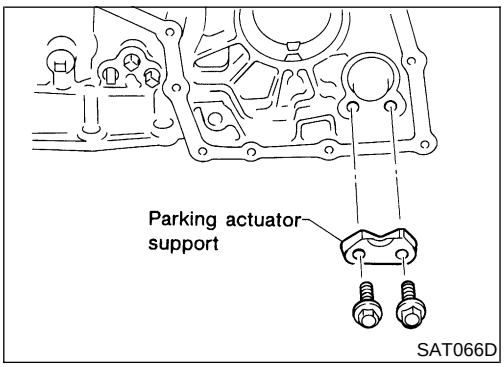
d. Remove idler gear with puller.



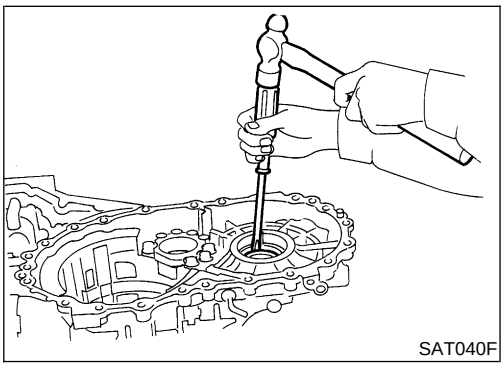
e. Remove reduction pinion gear.
f. Remove adjusting shim from reduction pinion gear.



41. Remove return spring from parking shaft with screwdriver.
42. Draw out parking shaft and remove parking pawl from transmission case.
43. Check parking pawl and shaft for damage or wear.



44. Remove parking actuator support from transmission case.
45. Check parking actuator support for damage or wear.

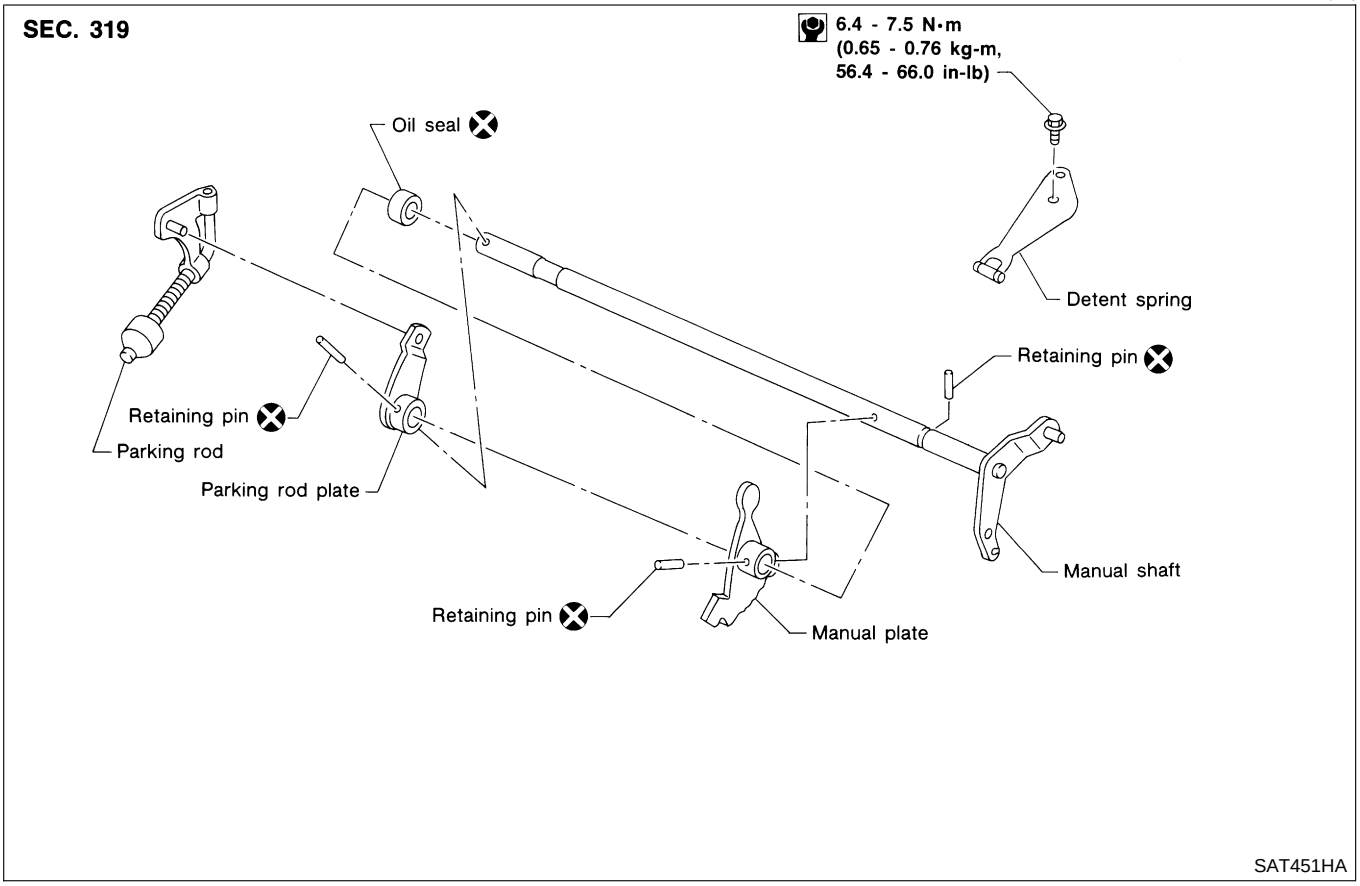


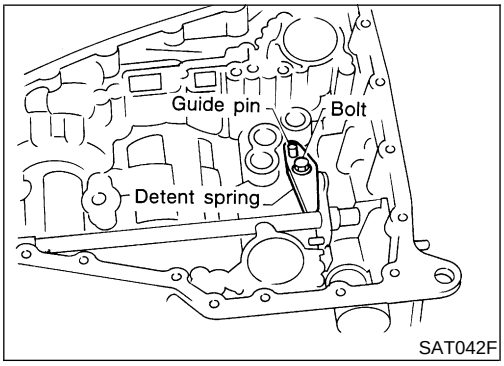
46. Remove side oil seal with screwdriver from transmission case.

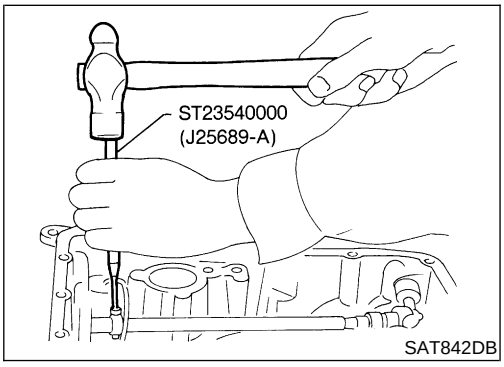
Manual Shaft

COMPONENTS

NDAT0123





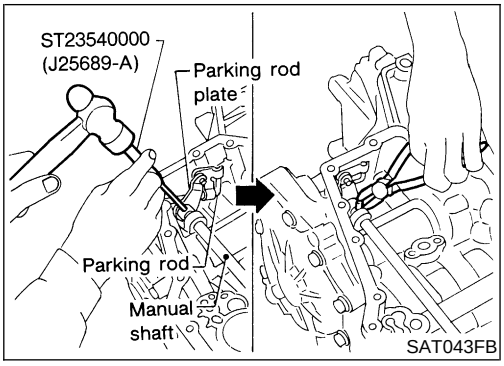


REMOVAL

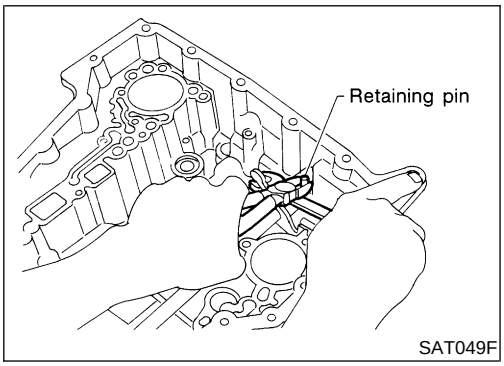
NDAT0124

1. Remove detent spring from transmission case.

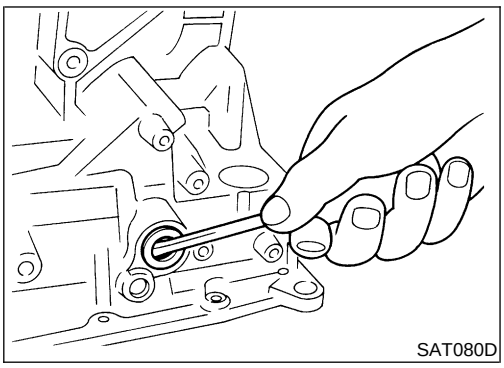
2. Drive out manual plate retaining pin.



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



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

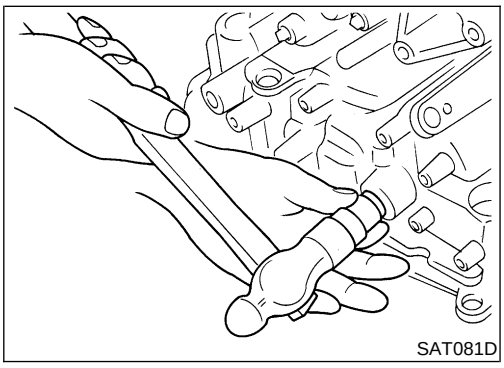


8. Remove manual shaft oil seal.

INSPECTION

NDAT0125

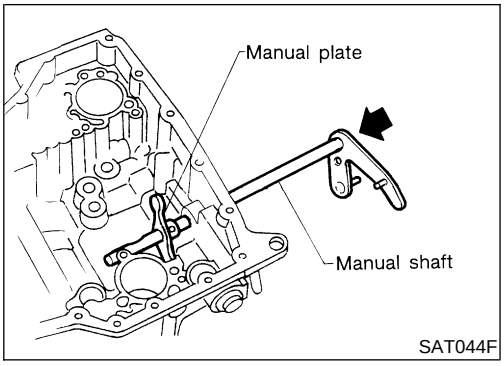
- Check component parts for wear or damage. Replace if necessary.



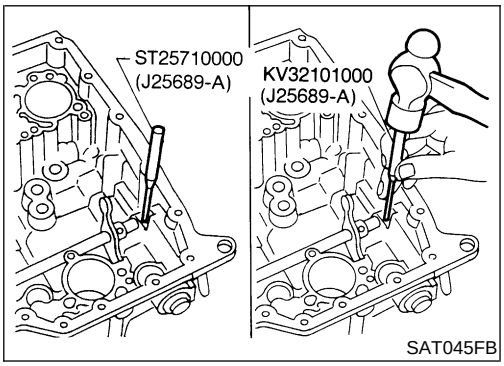
INSTALLATION

NDAT0126

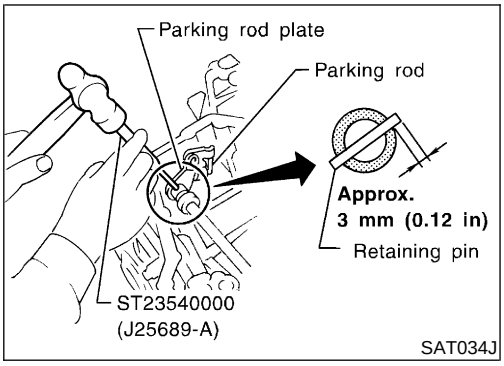
1. Install manual shaft oil seal.
- **Apply ATF to outer surface of oil seal.**



2. Install manual shaft and manual plate.

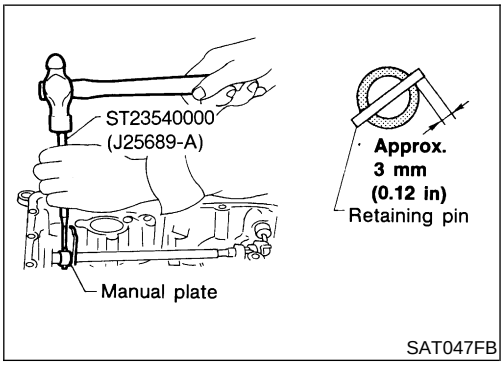


3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin up to bottom of hole.



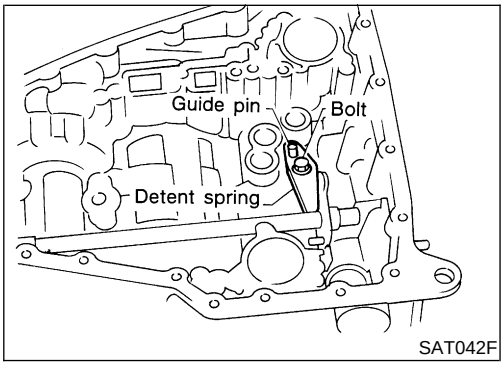
5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft and drive retaining pin.

- **Both ends of pin should protrude.**



7. Drive manual plate retaining pin.

- **Both ends of pin should protrude.**

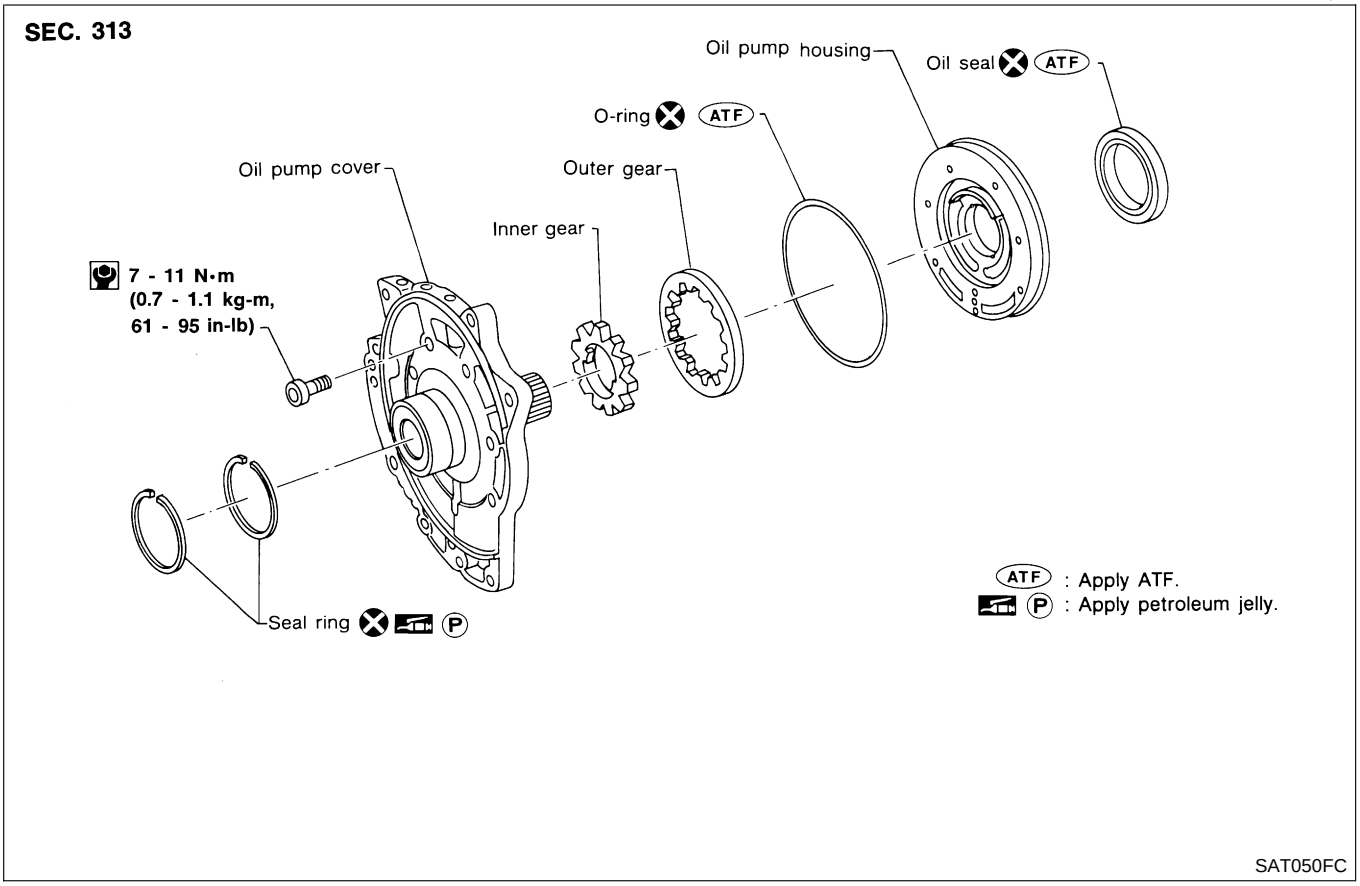


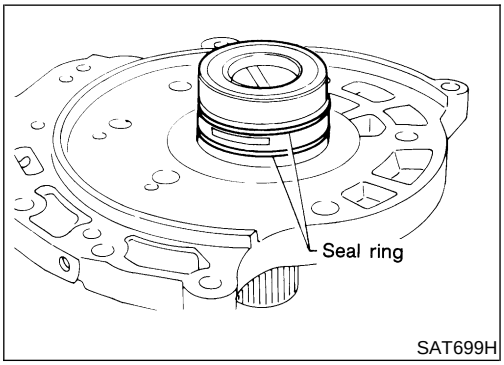
8. Install detent spring.

Oil Pump

COMPONENTS

NDAT0127

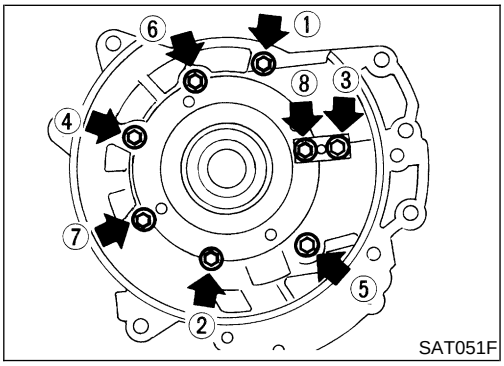




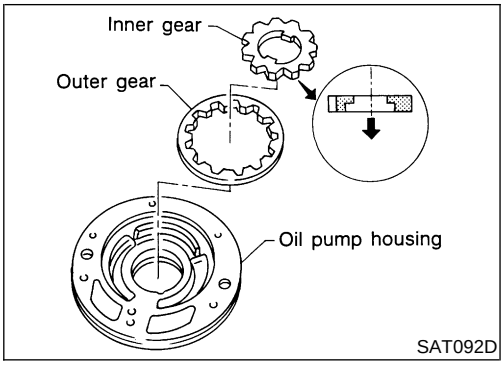
DISASSEMBLY

NDAT0128

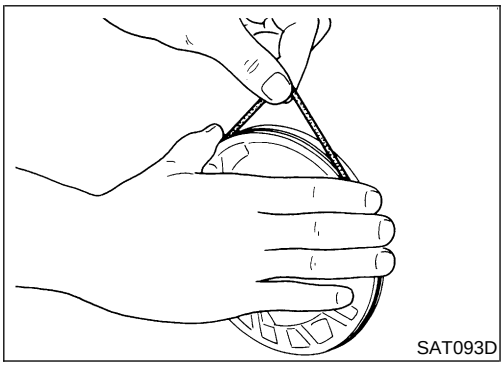
1. Remove seal rings.



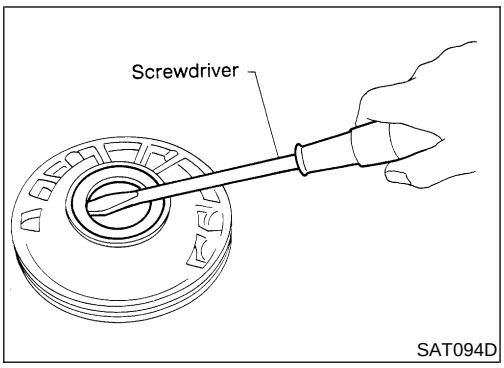
2. Loosen bolts in a crisscross pattern and remove oil pump cover.



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



4. Remove O-ring from oil pump housing.



5. Remove oil pump housing oil seal.

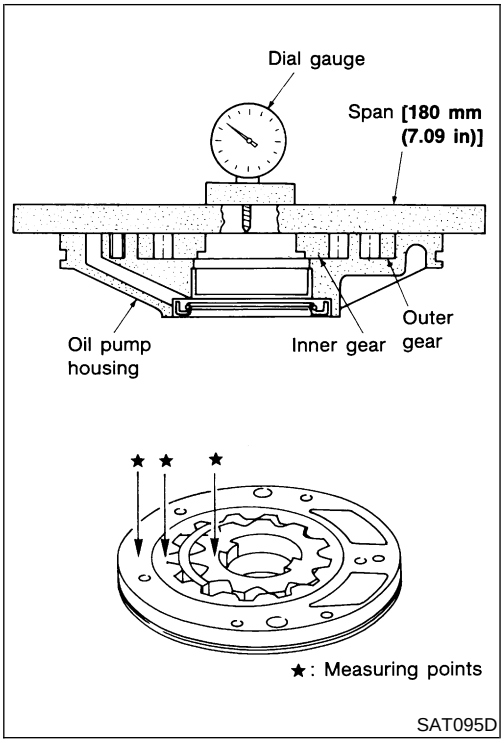
INSPECTION

NDAT0129

Oil Pump Housing, Oil Pump Cover, Inner Gear and Outer Gear

NDAT0129S01

- Check for wear or damage.



Side Clearances

NDAT0129S02

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

  Standard clearance:

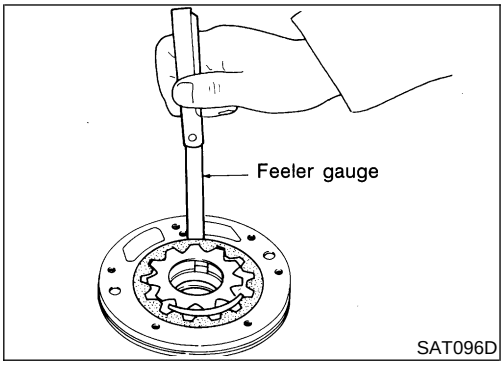
  0.030 - 0.050 mm (0.0012 - 0.0020 in)

- If clearance is less than standard, select inner and outer gear as a set so that clearance is within specifications.

  Inner and outer gear:

  Refer to SDS, AT-370.

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



- Measure clearance between outer gear and oil pump housing.

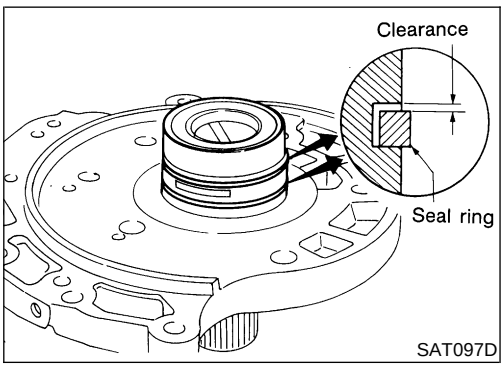
  Standard clearance:

  0.111 - 0.181 mm (0.0044 - 0.0071 in)

  Allowable limit:

  0.181 mm (0.0071 in)

- If not within allowable limit, replace whole oil pump assembly except oil pump cover.



Seal Ring Clearance

NDAT0129S03

- Measure clearance between seal ring and ring groove.

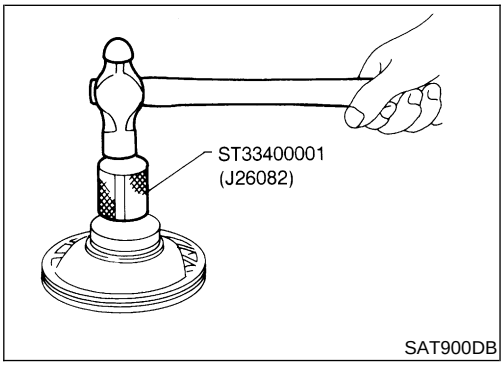
  Standard clearance:

  0.1 - 0.25 mm (0.0039 - 0.0098 in)

  Allowable limit:

  0.25 mm (0.0098 in)

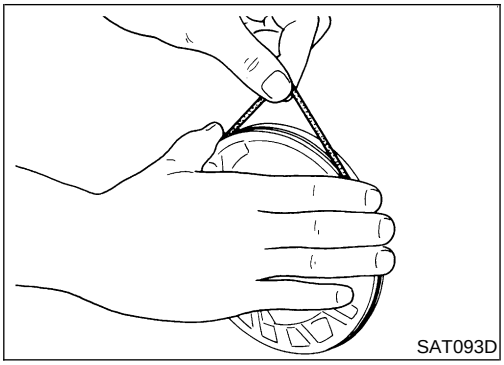
- If not within allowable limit, replace oil pump cover assembly.



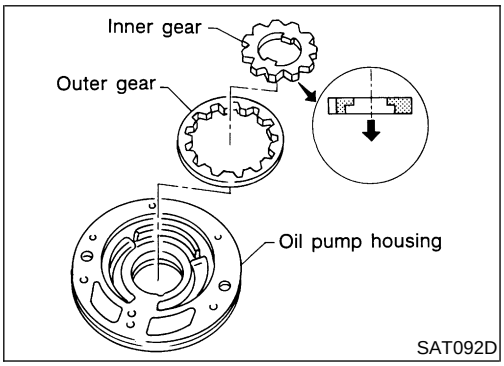
ASSEMBLY

NDAT0130

1. Install oil seal on oil pump housing.

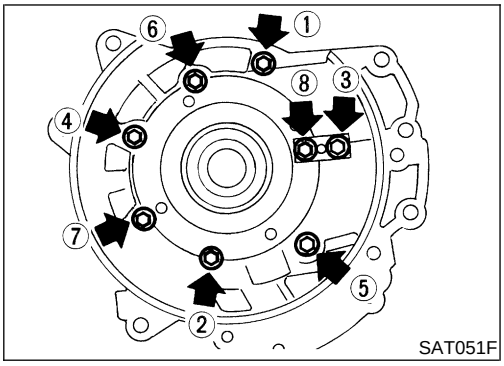

SAT093D

2. Install O-ring on oil pump housing.
- **Apply ATF to O-ring.**



SAT092D

3. Install inner and outer gears on oil pump housing.
- **Be careful of direction of inner gear.**



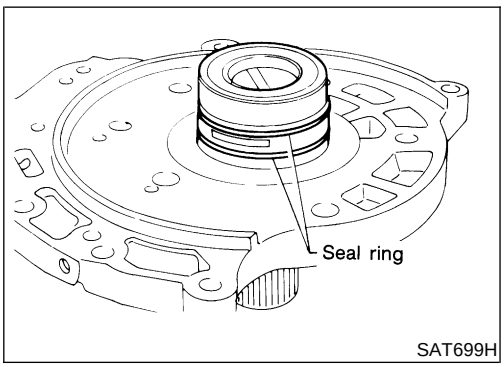
SAT051F

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 a crisscross pattern.

: 7 - 11 N·m (0.7 - 1.1 kg-m, 61 - 95 in-lb)



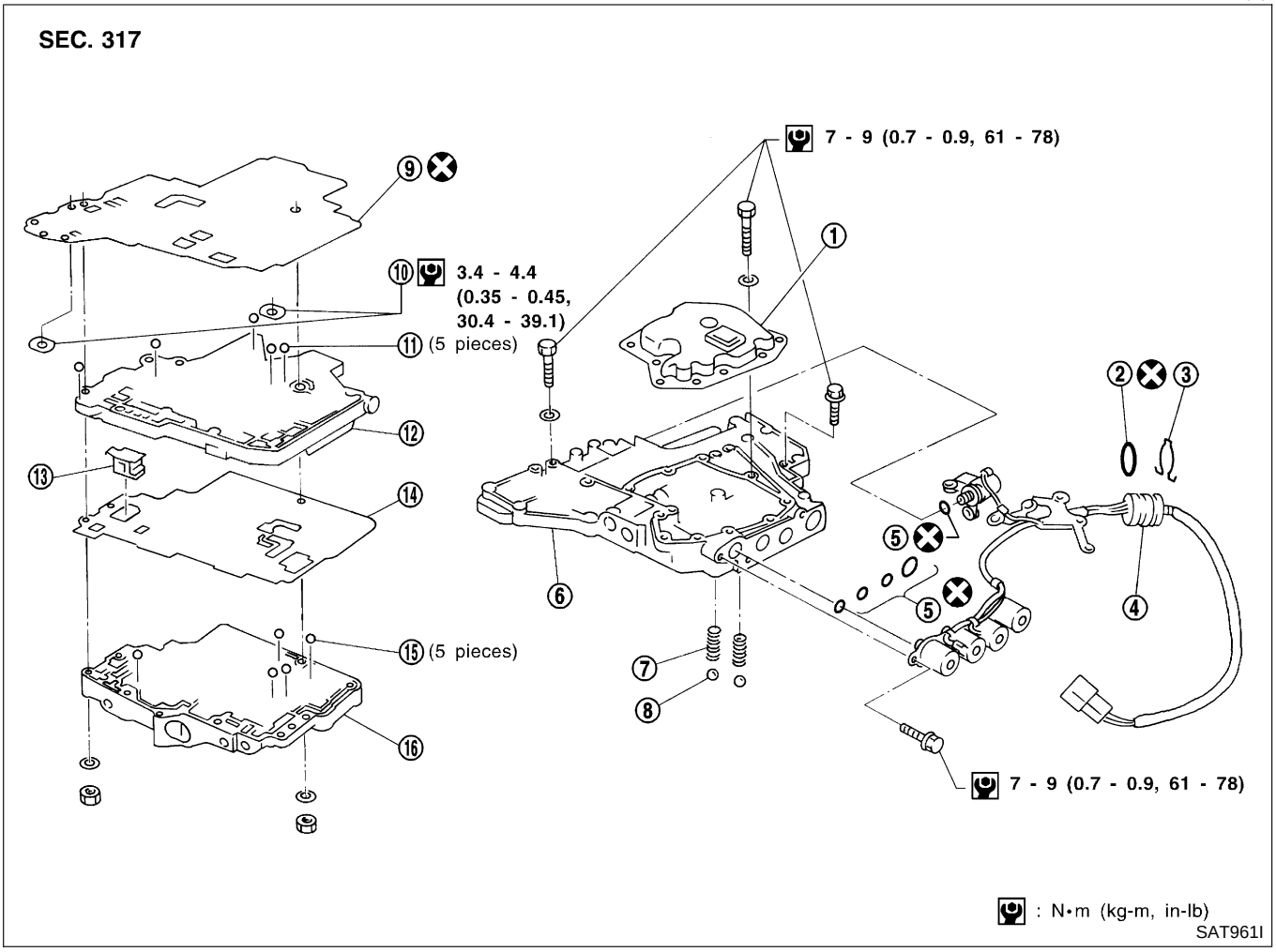
SAT699H

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

Control Valve Assembly

COMPONENTS

=NDAT0131



1. Oil strainer
2. O-ring
3. Stopper ring
4. Terminal body
5. O-rings
6. Control valve lower body
7. Oil cooler relief valve spring
8. Check ball
9. Separating plate
10. Support plate
11. Steel ball
12. Control valve inter body
13. Pilot filter
14. Separating plate
15. Steel ball
16. Control valve upper body

DISASSEMBLY

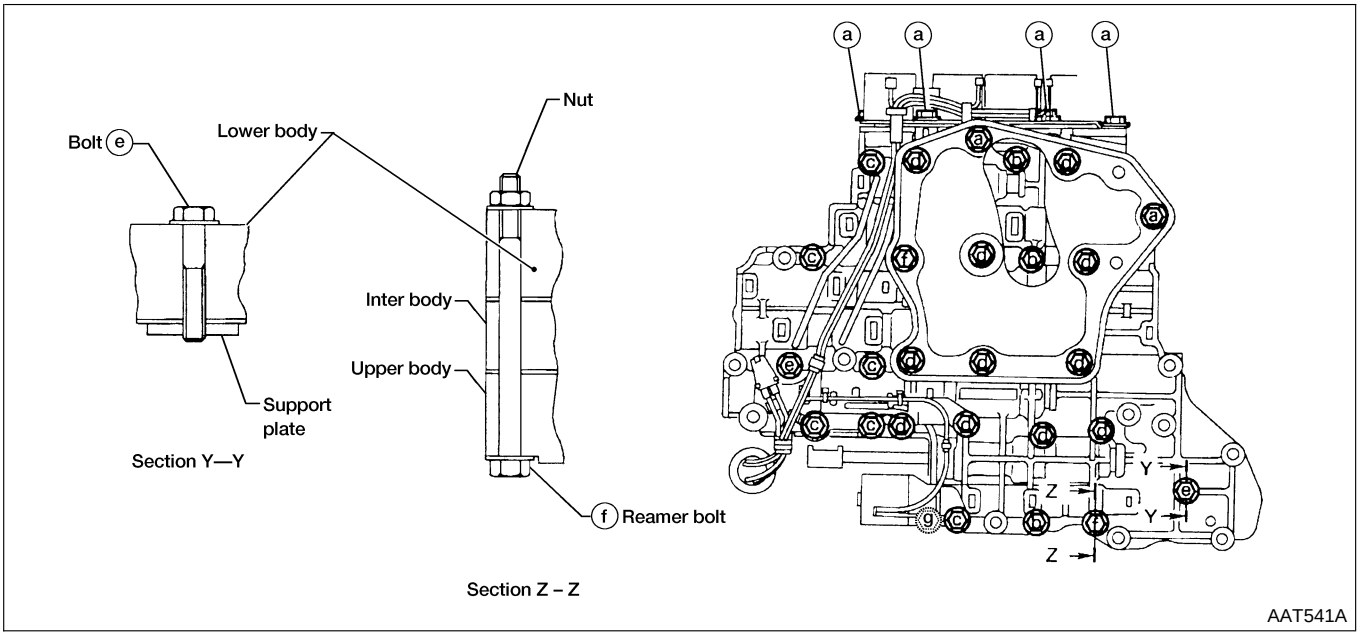
NDAT0132

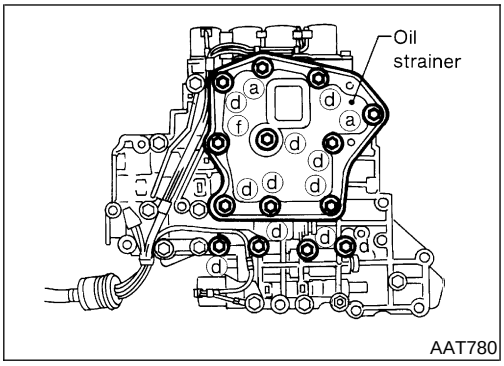
Disassemble upper, inter and lower bodies.

Bolt length, number and location:

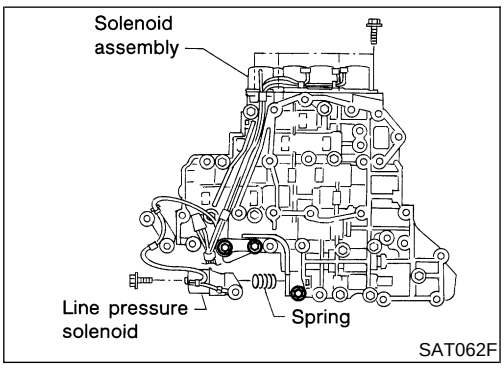
Bolt symbol	a	b	c	d	e	f	g
Bolt length "ℓ" mm (in) 	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)	18.0 (0.709)
Number of bolts	6	3	6	11	2	2	1

f: Reamer bolt and nut.

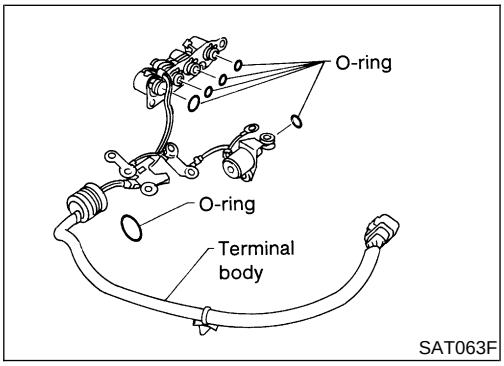




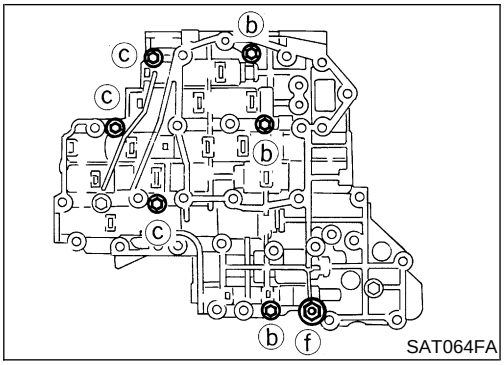
1. Remove bolts **a**, **d** and nut **f** and remove oil strainer from control valve assembly.



2. Remove solenoid valve assembly and line pressure solenoid valve from control valve assembly.

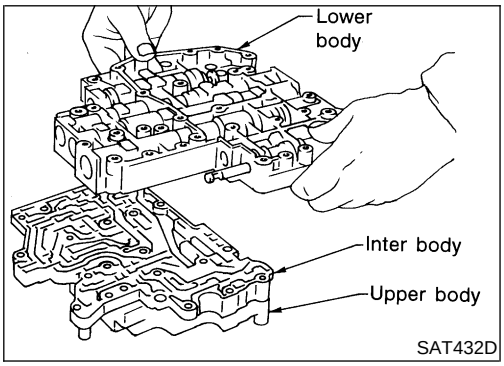


3. Remove O-rings from solenoid valves and terminal body.



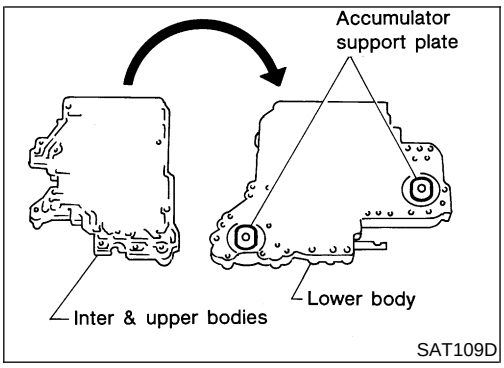
SAT064FA

4. Place upper body facedown, and remove bolts **b**, **c** and nut **f**.



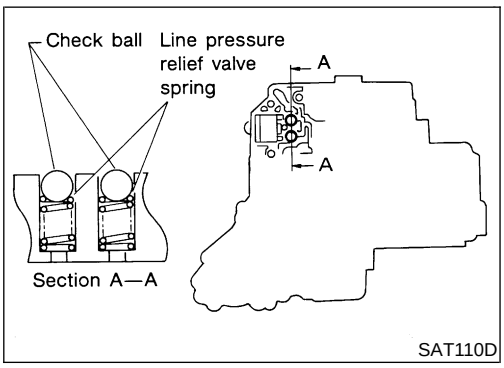
SAT432D

5. Remove inter body from lower body.



SAT109D

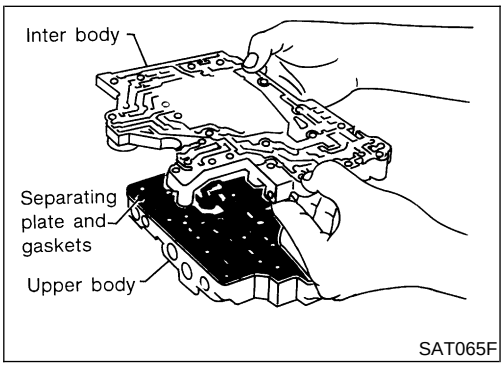
6. Turn over lower body, and remove accumulator support plate.



SAT110D

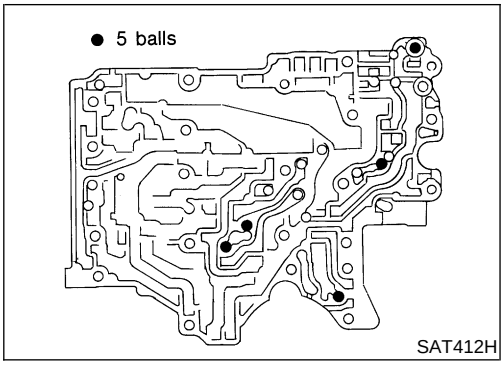
7. Remove bolts **e**, separating plate and separating gasket from lower body.
8. Remove steel balls and relief valve springs from lower body.

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

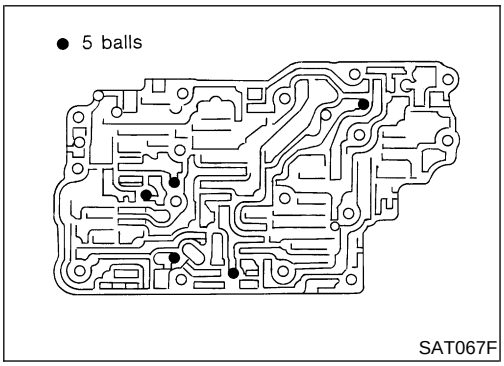


SAT065F

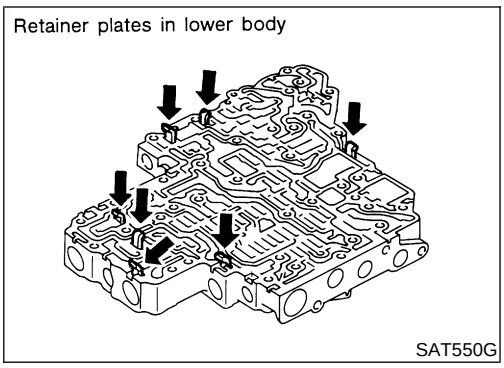
9. Remove inter body from upper body.



10. Check to see that steel balls are properly positioned in inter body and then remove them.
- **Be careful not to lose steel balls.**



11. Check to see that steel balls are properly positioned in upper body and then remove them.
- **Be careful not to lose steel balls.**



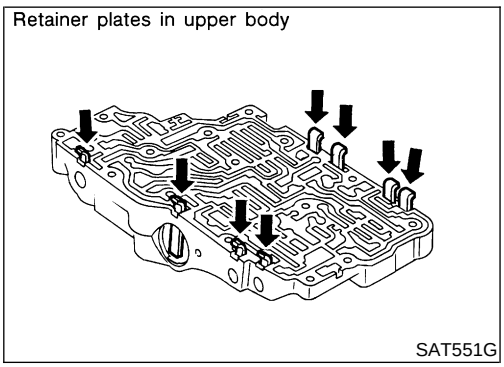
INSPECTION

NDAT0133

Lower and Upper Bodies

NDAT0133S01

- Check to see that retainer plates are properly positioned in lower body.

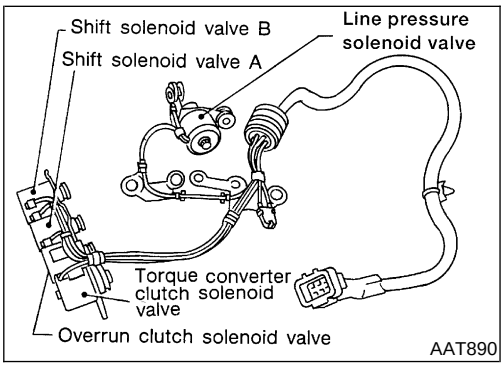


- Check to see that retainer plates are properly positioned in upper body.
- **Be careful not to lose these parts.**

Oil Strainer

NDAT0133S02

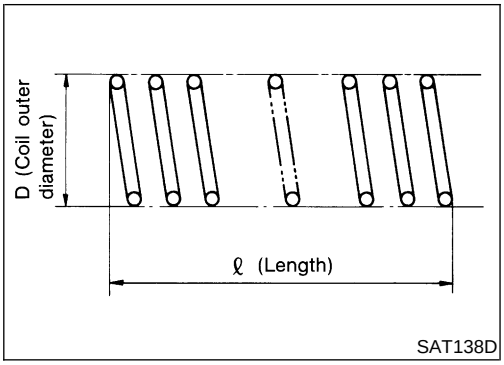
- Check wire netting of oil strainer for damage.



Shift Solenoid Valves "A" and "B", Line Pressure Solenoid Valve, Torque Converter Clutch Solenoid Valve and Overrun Clutch Solenoid Valve

NDAT0133S03

- Measure resistance. Refer to "Components Inspection", AT-152.



SAT138D

Oil Cooler Relief Valve Spring

NDAT0133S04

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

Inspection standard:

Unit: mm (in)

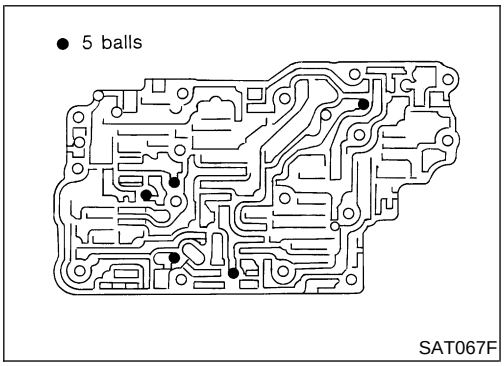
Part No.	ℓ	D
31742-80L12	17.02 (0.6701)	8.0 (0.315)

ASSEMBLY

NDAT0134

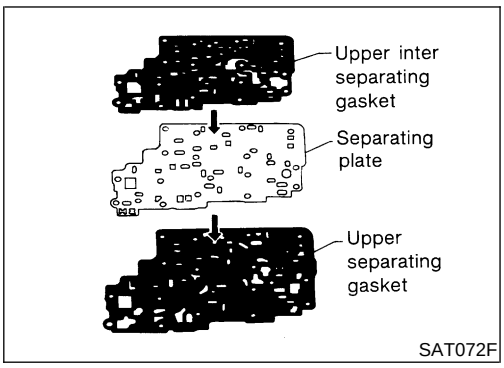
1. Install upper, inter and lower body.

a. Place oil circuit of upper body face up. Install steel balls in their proper positions.



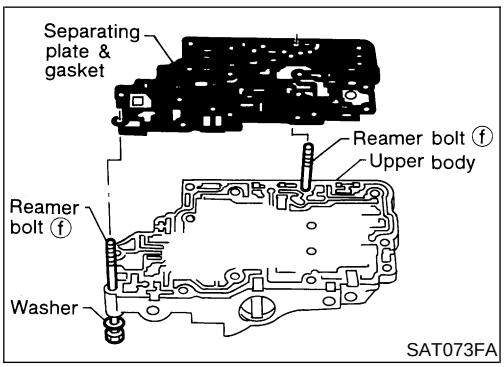
SAT067F

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



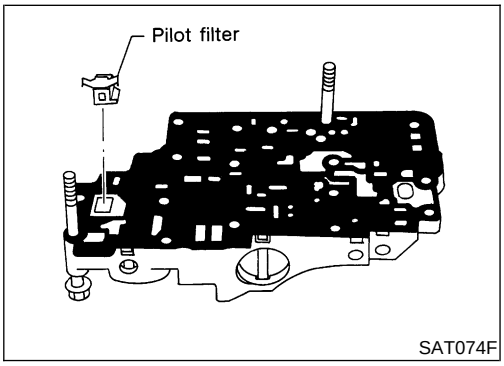
SAT072F

c. Install reamer bolts **f** from bottom of upper body. Using reamer bolts as guides, install separating plate and gaskets as a set.

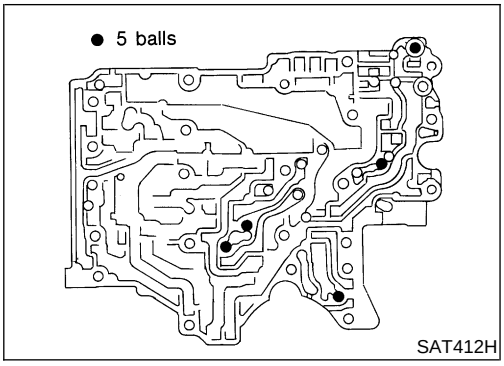


SAT073FA

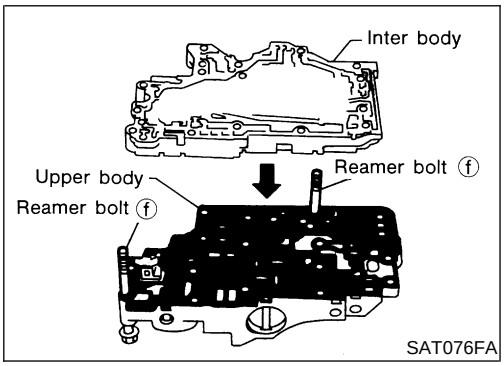
d. Install pilot filter.



SAT074F

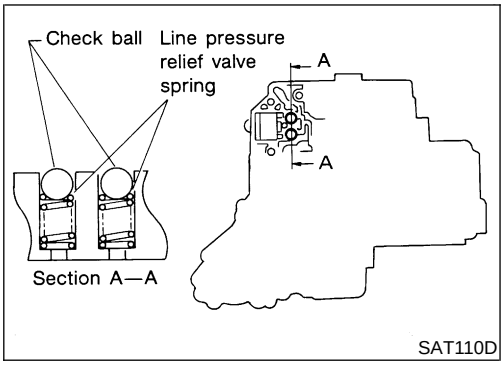


e. Place lower body as shown in illustration (side of inter body face up). Install steel balls in their proper positions.

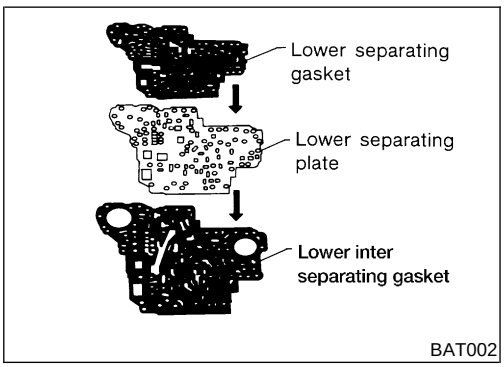


f. Install inter body on upper body using reamer bolts **f** as guides.

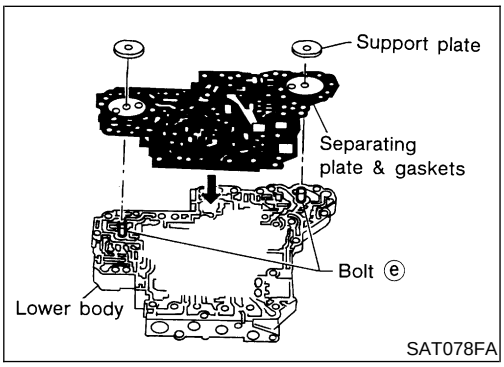
- **Be careful not to dislocate or drop steel balls.**



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

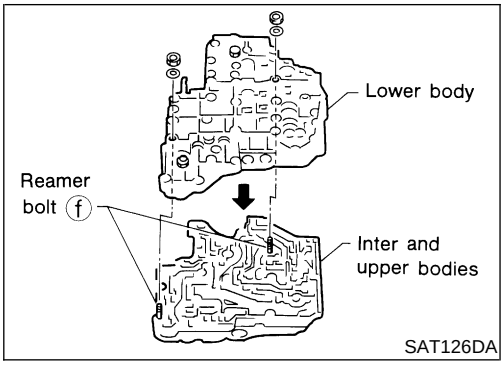


h. Install lower separating gasket, lower inter separating gasket and lower separating plate in order shown in illustration.

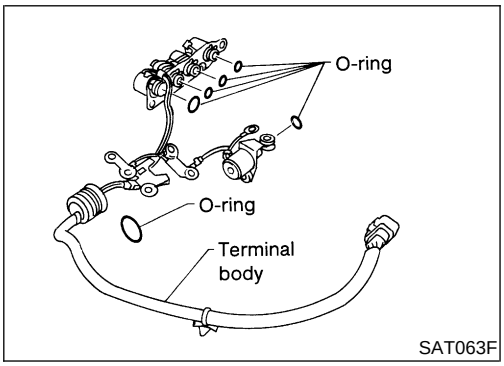


i. Install bolts **e** from bottom of lower body. Using bolts **e** as guides, install separating plate and gaskets as a set.

j. Temporarily install support plates on lower body.



k. Install lower body on inter body using reamer bolts **f** as guides and tighten reamer bolts **f** slightly.



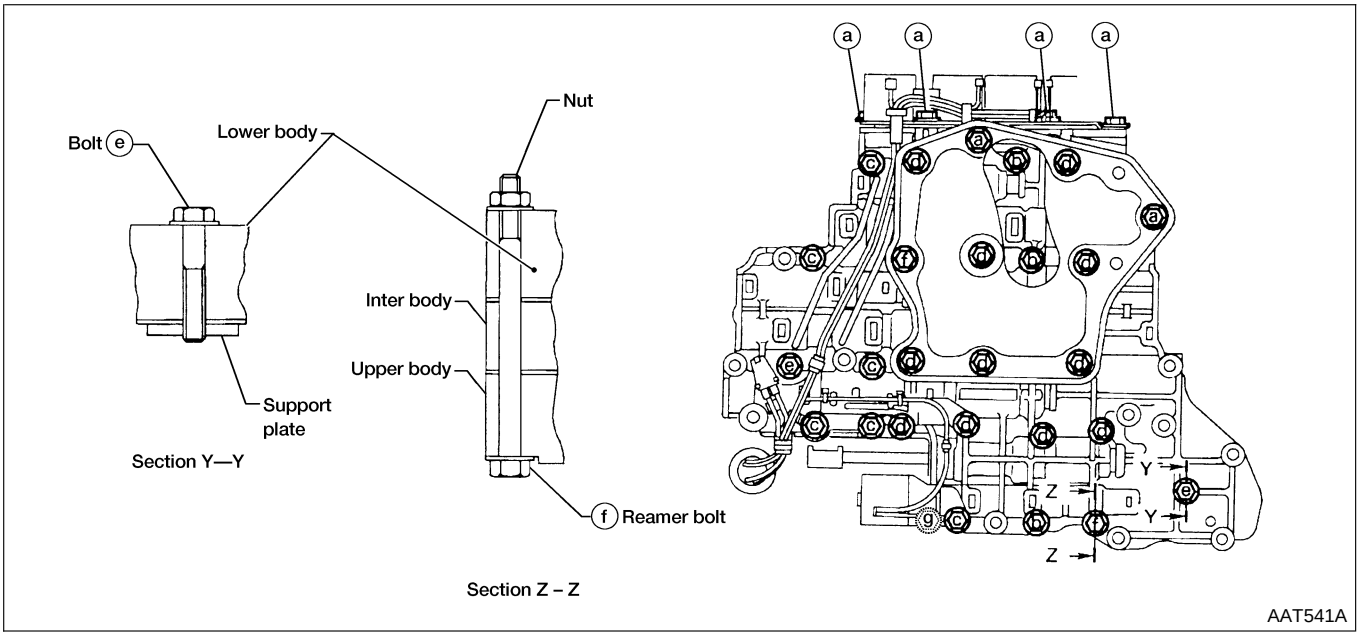
2. Install O-rings to solenoid valves and terminal body.

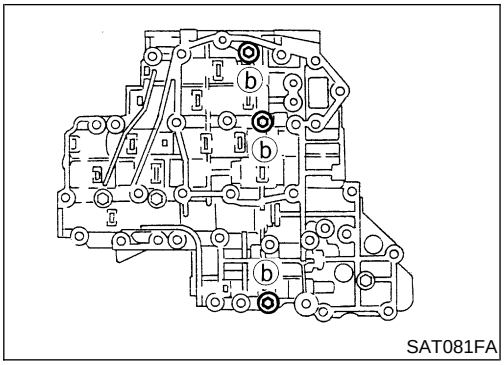
- **Apply ATF to O-rings.**

3. Install and tighten bolts.

Bolt length, number and location:

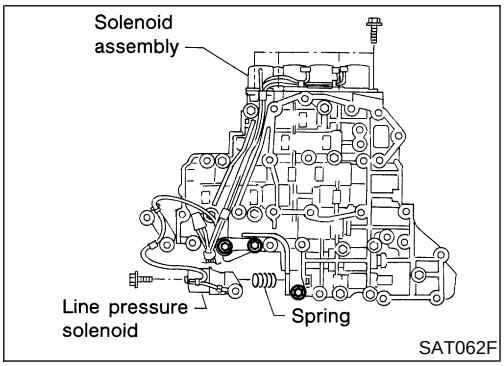
Bolt symbol	a	b	c	d	e	f	g
Bolt length "ℓ" mm (in) 	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)	18.0 (0.709)
Number of bolts	6	3	6	11	2	2	1





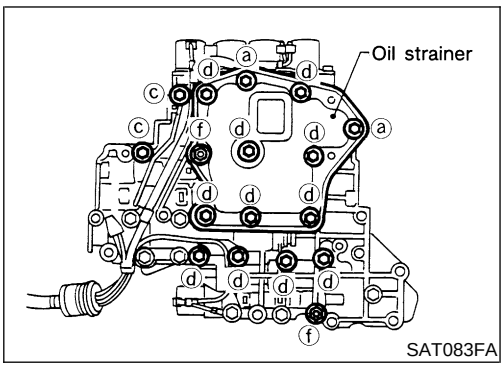
SAT081FA

a. Install and tighten bolts **b** to specified torque.
: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



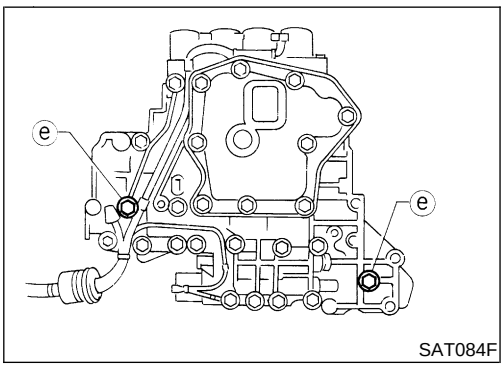
SAT062F

b. Install solenoid valve assembly and line pressure solenoid valve to lower body.



SAT083FA

c. Set oil strainer, then tighten bolts **a**, **c**, **d** and nuts **f** to specified torque.
: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



SAT084F

d. Tighten bolts **e** to specified torque.
: 3.4 - 4.4 N·m (0.35 - 0.45 kg-m, 30.4 - 39.1 in-lb)

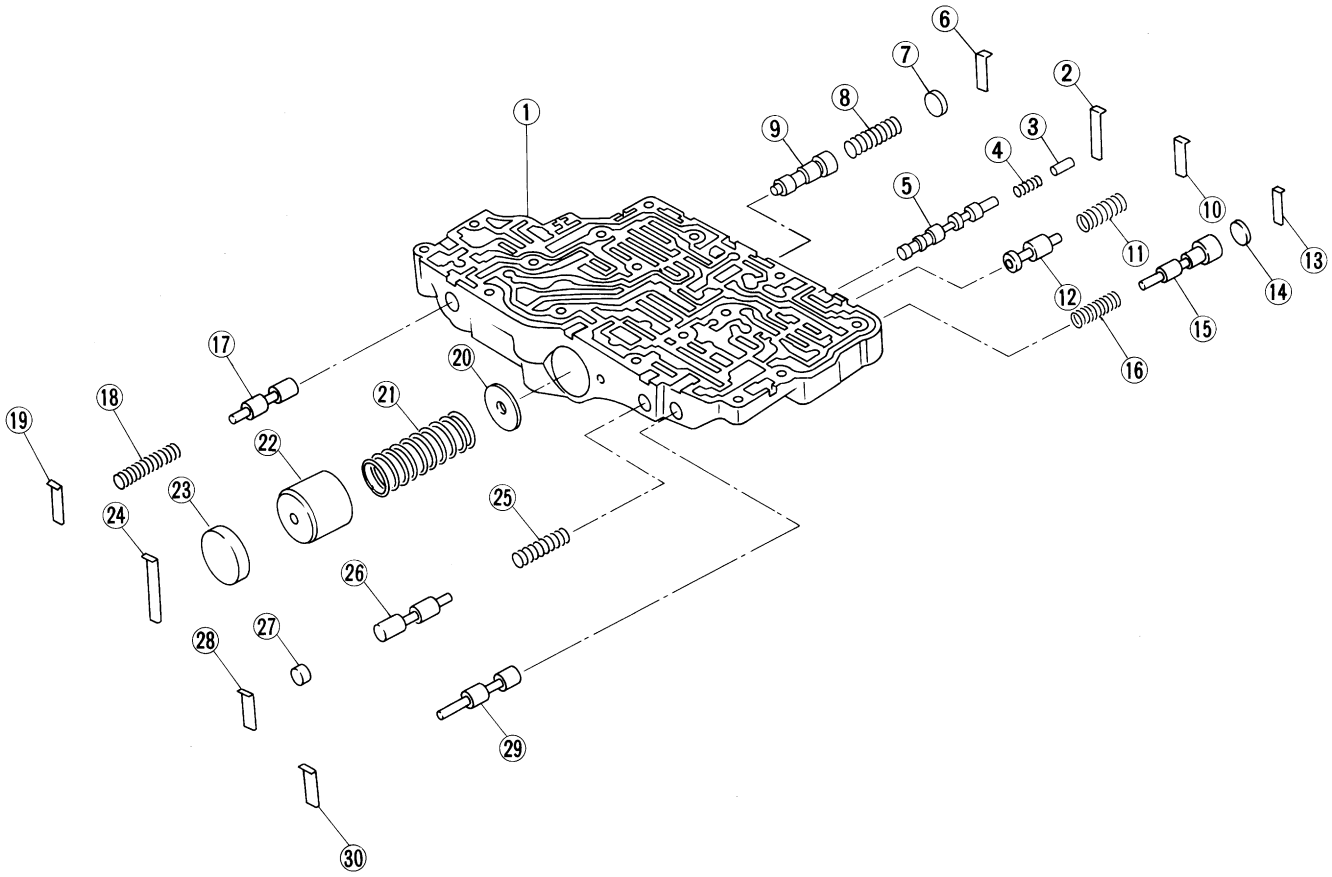
Control Valve Upper Body

COMPONENTS

=NDAT0135

Apply ATF to all components before installation.

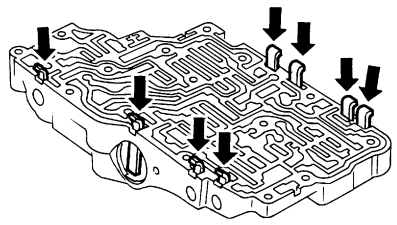
SEC. 317



SAT859H

1. Upper body
2. Retainer plate
3. Plug
4. Return spring
5. Torque converter clutch control valve
6. Retainer plate
7. Plug
8. Return spring
9. 1-2 accumulator valve
10. Retainer plate
11. Return spring
12. Torque converter relief valve
13. Retainer plate
14. Plug
15. Overrun clutch reducing valve
16. Return spring
17. Pilot valve
18. Return spring
19. Retainer plate
20. 1-2 accumulator retainer plate
21. Return spring
22. 1-2 accumulator piston
23. Plug
24. Retainer plate
25. Return spring
26. 1st reducing valve
27. Plug
28. Retainer plate
29. Plug
30. Retainer plate

Retainer plates in upper body



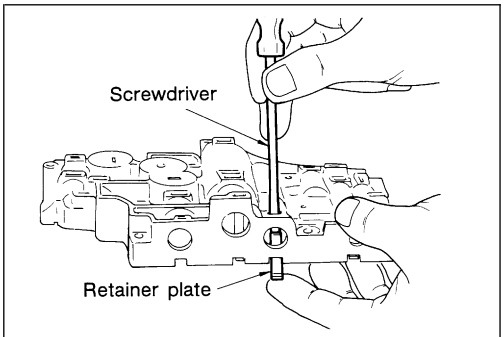
SAT551G

DISASSEMBLY

NDAT0136

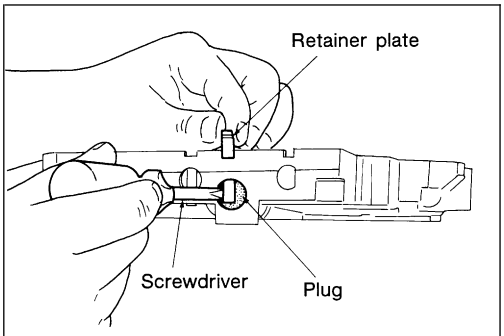
1. Remove valves at retainer plates.

- **Do not use a magnetic pick-up tool.**



SAT553G

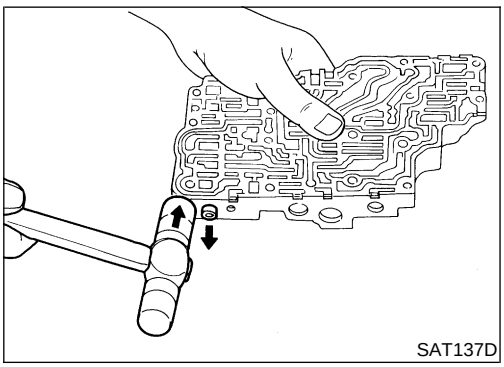
a. Use a screwdriver to remove retainer plates.



SAT554G

b. Remove retainer plates while holding spring, plugs or sleeves.

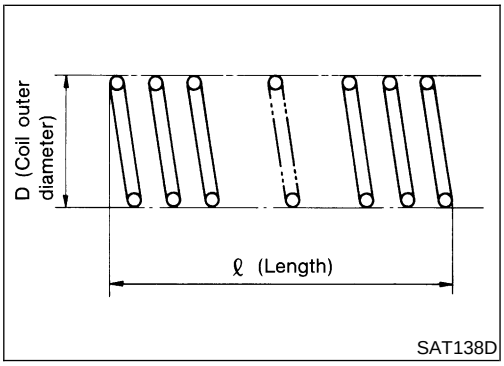
- **Remove plugs slowly to prevent internal parts from jumping out.**



SAT137D

c. Place mating surface of valve body face down, and remove internal parts.

- **If a valve is hard to remove, place valve body face down and lightly tap it with a soft hammer.**
- **Be careful not to drop or damage valves and sleeves.**



SAT138D

INSPECTION

NDAT0137

Valve Spring

NDAT0137S01

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

  Inspection standard:

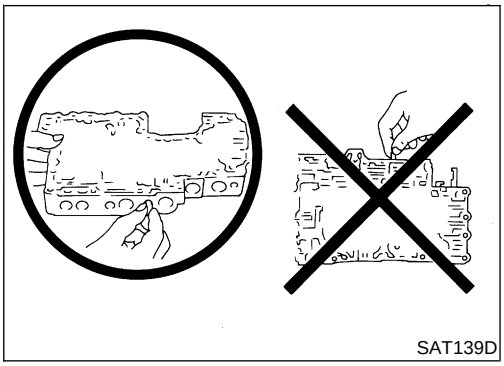
  Refer to SDS, AT-366.

- Replace valve springs if deformed or fatigued.

Control Valves

NDAT0137S02

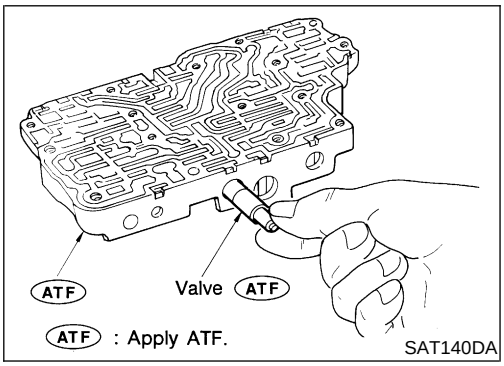
- Check sliding surfaces of valves, sleeves and plugs.


SAT139D

ASSEMBLY

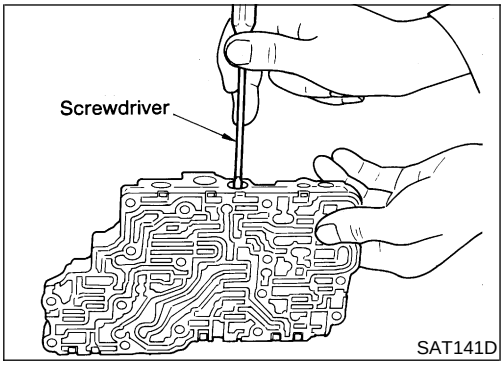
NDAT0138

- **Lay control valve body down when installing valves. Do not stand the control valve body upright.**



SAT140DA

1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.
- **Be careful not to scratch or damage valve body.**



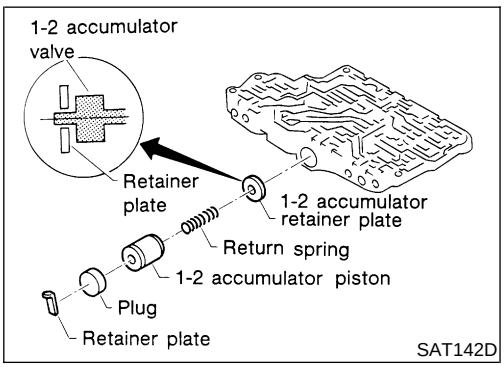
SAT141D

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

1-2 Accumulator Valve

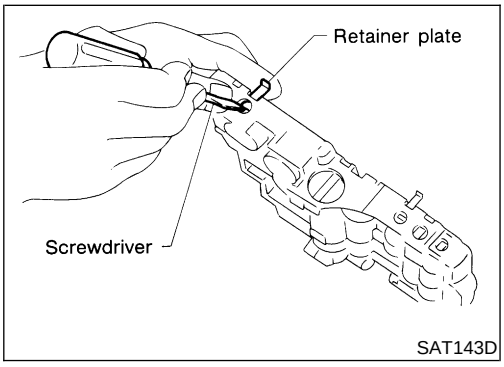
NDAT0138S01

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

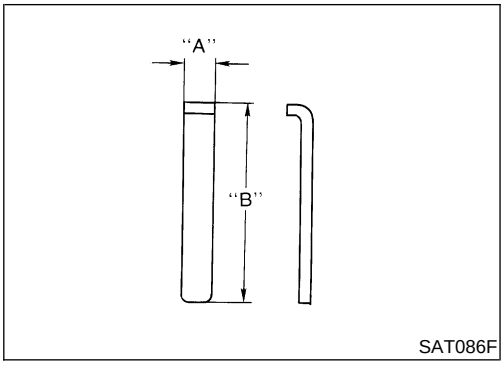


SAT142D

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



SAT143D



Retainer Plate (Upper body)

NDAT0138S02

Unit: mm (in)

No.	Name of control valve	Length A	Length B
19	Pilot valve	6.0 (0.236)	21.5 (0.846)
28	1st reducing valve		
10	Torque converter relief valve		
30	Plug		
6	1-2 accumulator valve		38.5 (1.516)
24	1-2 accumulator piston valve		
13	Overrun clutch reducing valve		24.0 (0.945)
2	Torque converter clutch control valve		28.0 (1.102)

- Install proper retainer plates.
  Refer to "Control Valve Upper Body", AT-306.

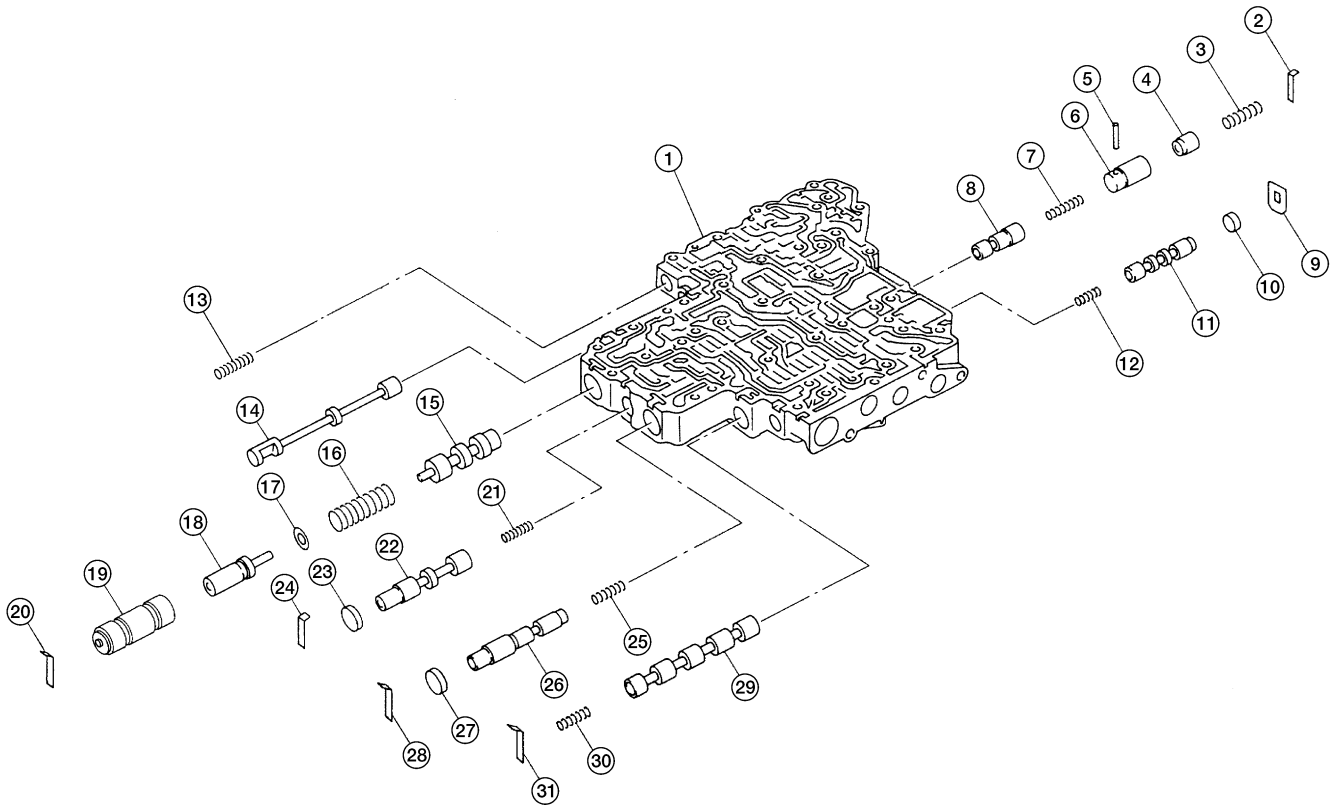
Control Valve Lower Body

COMPONENTS

=NDAT0139

Apply ATF to all components before installation.

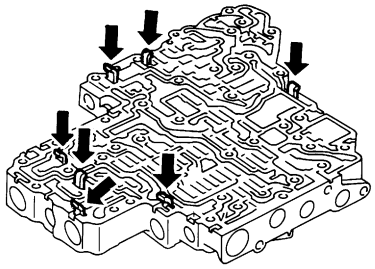
SEC. 317



AAT465A

1. Lower body
2. Retainer plate
3. Return spring
4. Piston
5. Parallel pin
6. Sleeve
7. Return spring
8. Pressure modifier valve
9. Retainer plate
10. Plug
11. Shift valve B
12. Return spring
13. Return spring
14. Manual valve
15. Pressure regulator valve
16. Return spring
17. Spring seat
18. Plug
19. Sleeve
20. Retainer plate
21. Return spring
22. Overrun clutch control valve
23. Plug
24. Retainer plate
25. Return spring
26. Accumulator control valve
27. Plug
28. Retainer plate
29. Shift valve A
30. Retainer spring
31. Retainer plate

Retainer plates in lower body

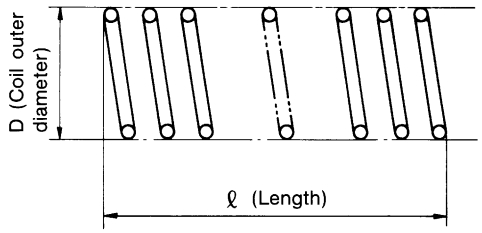


SAT550G

DISASSEMBLY

NDAT0140

- Remove valves at retainer plate.
  For removal procedures, refer to "DISASSEMBLY", "Control Valve Upper Body", AT-307.



SAT138D

INSPECTION

NDAT0141

Valve Springs

NDAT0141S01

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

  Inspection standard:

  Refer to SDS, AT-366.

- Replace valve springs if deformed or fatigued.

Control Valves

NDAT0141S02

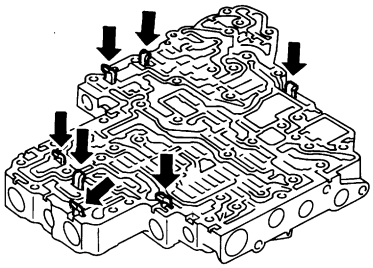
- Check sliding surfaces of control valves, sleeves and plugs for damage.

ASSEMBLY

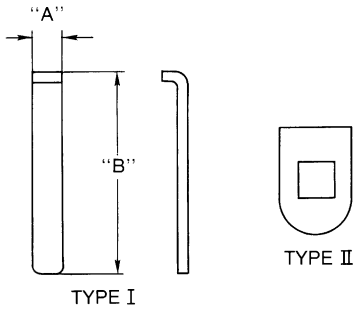
NDAT0142

- Install control valves.
  For installation procedures, refer to "ASSEMBLY", "Control Valve Upper Body", AT-308.

Retainer plates in lower body



SAT550A



SAT089F

Retainer Plate (Lower body)

NDAT0142S01

Unit: mm (in)

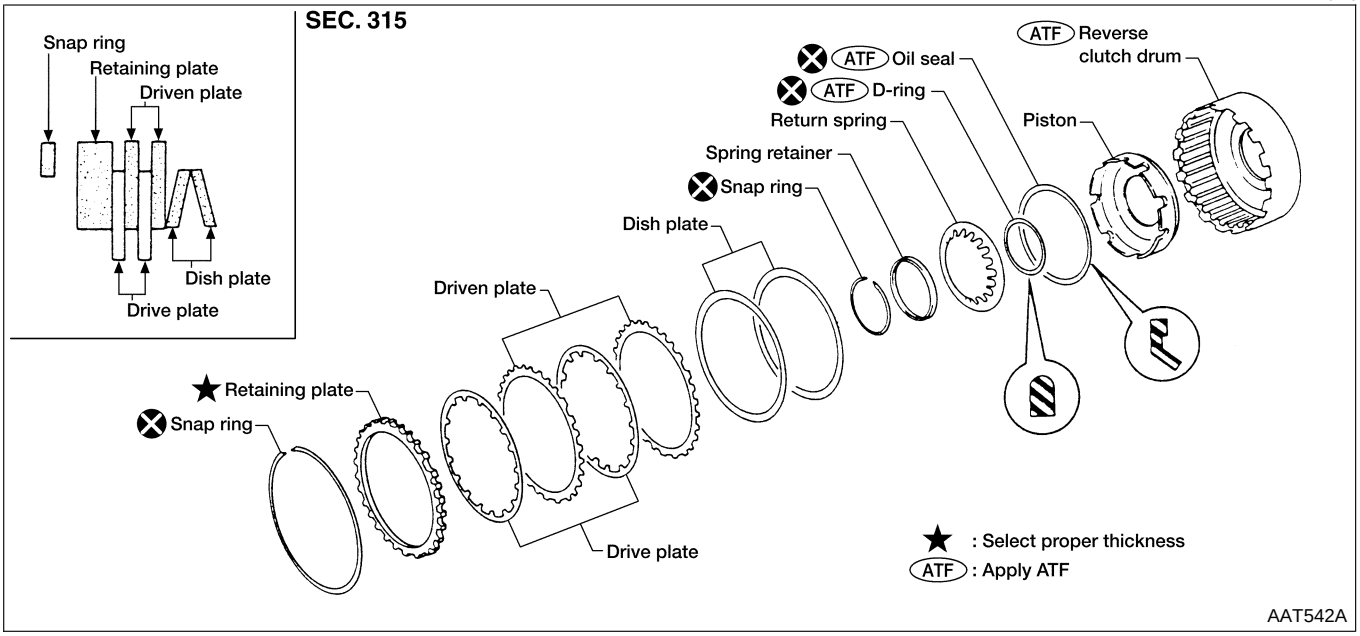
No.	Name of control valve and plug	Length A	Length B	Type
21	Pressure regulator valve	6.0 (0.236)	28.0 (1.102)	I
29	Accumulator control valve			
32	Shift valve A			
25	Overrun clutch control valve			
2	Pressure modifier valve			
9	Shift valve B	—	—	II

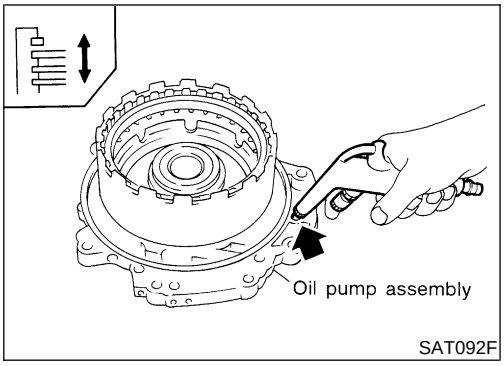
- Install proper retainer plates.
  Refer to "Control Valve Lower Body", AT-310.

Reverse Clutch

COMPONENTS

NDAT0143





DISASSEMBLY

NDAT0144

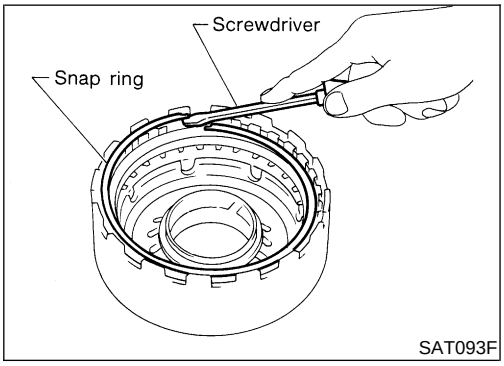
1. Check operation of reverse clutch

a. Install seal ring onto drum support of oil pump cover and install reverse clutch assembly. Apply compressed air to oil hole.

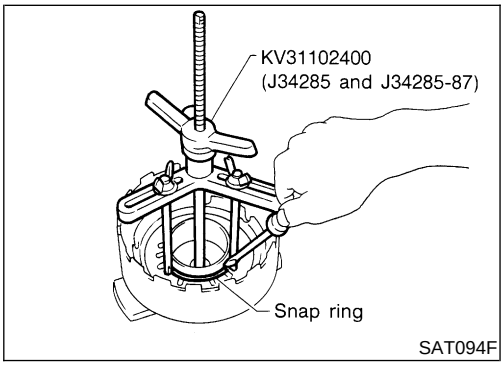
b. Check to see that retaining plate moves to snap ring.

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.



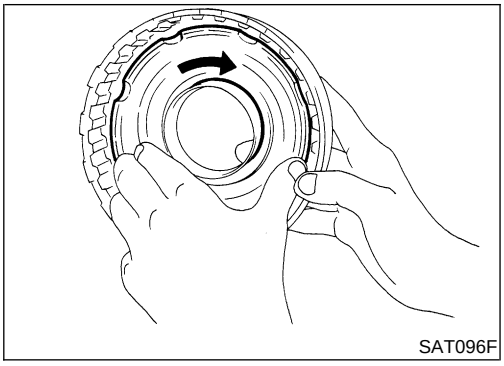
2. Remove snap ring.
3. Remove drive plates, driven plates, retaining plate, and dish plates.



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

- **Set Tool directly over springs.**
- **Do not expand snap ring excessively.**

5. Remove spring retainer and return springs.


SAT096F

6. Remove piston from reverse clutch drum by turning it.
7. Remove D-ring and lip seal from piston.

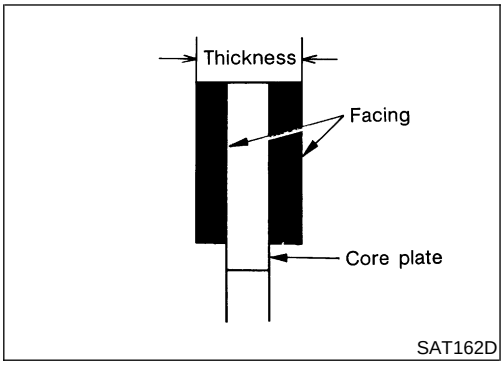
INSPECTION

NDAT0145

Reverse Clutch Snap Ring, Spring Retainer and Return Springs

NDAT0145S01

- Check for deformation, fatigue or damage.
  If necessary, replace.

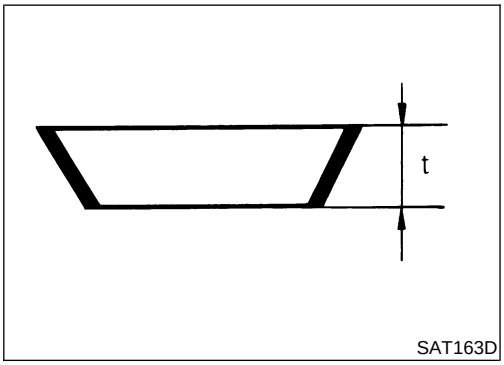


SAT162D

Reverse Clutch Drive Plates

NDAT0145S02

- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value: 1.6 mm (0.063 in)
  Wear limit: 1.4 mm (0.055 in)
- If not within wear limit, replace.



SAT163D

Reverse Clutch Dish Plates

NDAT0145S03

- Check for deformation or damage.
- Measure thickness of dish plate.
  Thickness of dish plate: 3.08 mm (0.1213 in)
- If deformed or fatigued, replace.

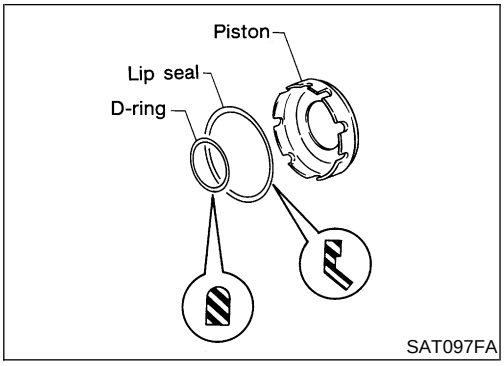
Reverse Clutch Piston

NDAT0145S04

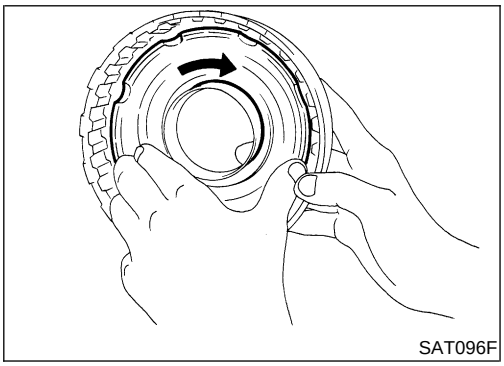
- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure that air leaks past ball.

ASSEMBLY

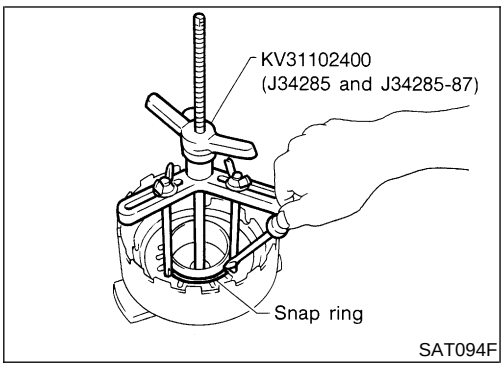
NDAT0146



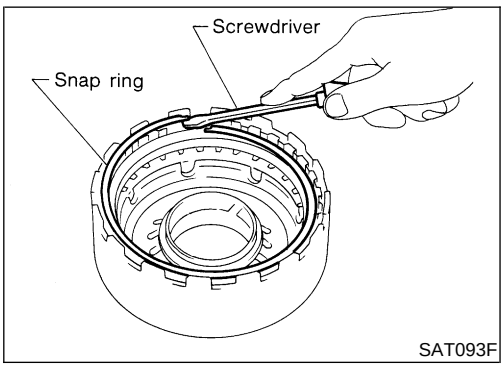
1. Install D-ring and lip seal on piston.
- **Take care with the direction of lip seal.**
- **Apply ATF to both parts.**



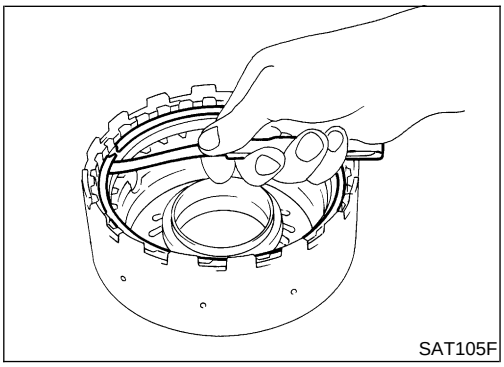
2. Install piston assembly by turning it slowly.
- **Apply ATF to inner surface of drum.**



3. Install return springs and spring retainer on piston.
4. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly over return springs.**



5. Install drive plates, driven plates, retaining plate and dish plates.
- **Take care with order of plates.**
6. Install snap ring.



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

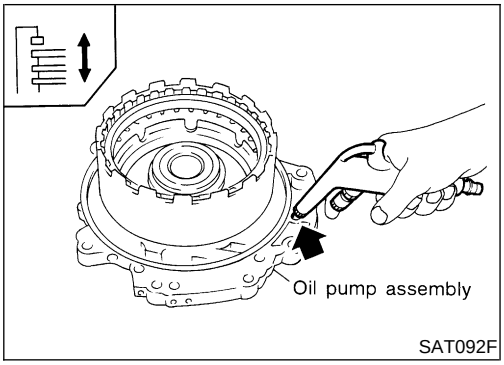
Specified clearance:

Standard 0.5 - 0.8 mm (0.020 - 0.031 in)

Allowable limit 1.2 mm (0.047 in)

Retaining plate:

Refer to SDS, AT-367.

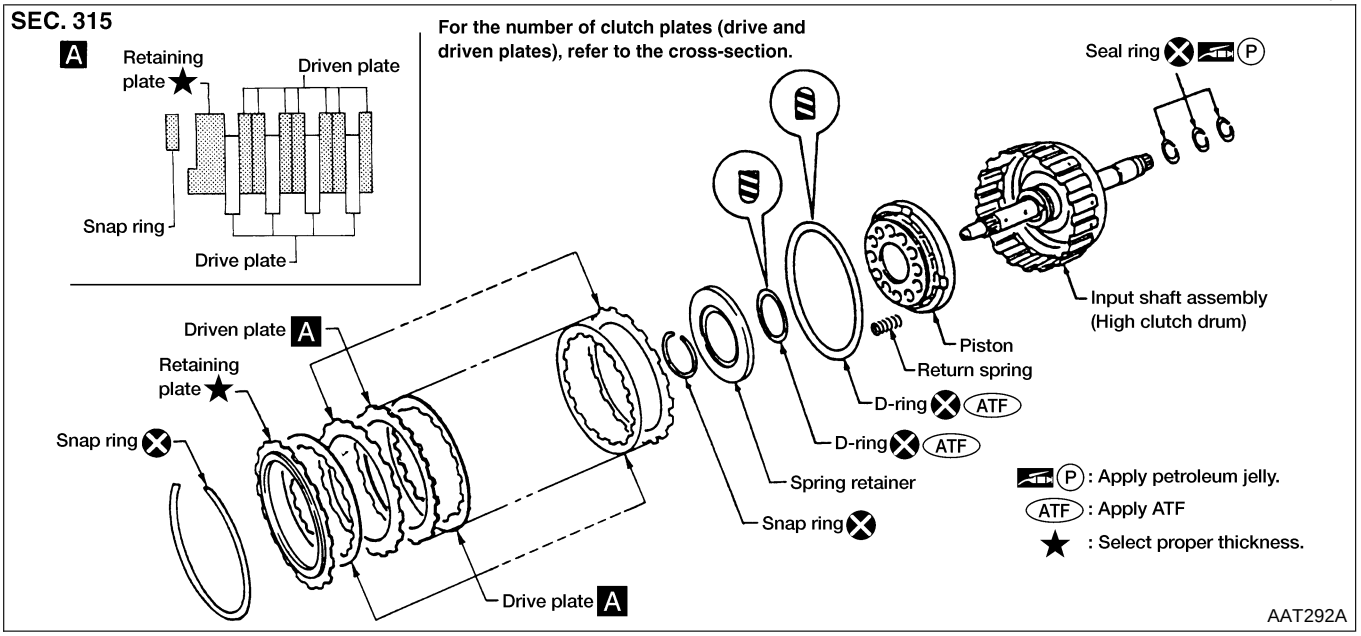


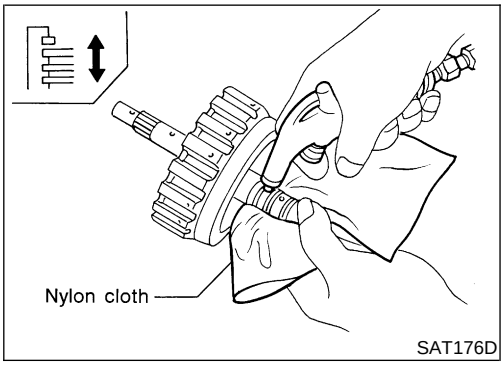
8. Check operation of reverse clutch.
   Refer to "DISASSEMBLY", "Reverse Clutch", AT-312.

High Clutch

COMPONENTS

NDAT0147





DISASSEMBLY

NDAT0148

1. Check operation of high clutch.

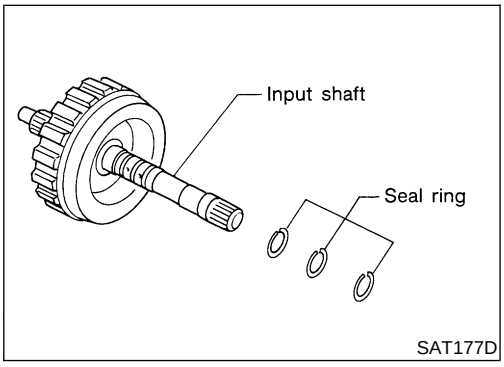
a. Apply compressed air to oil hole of input shaft with nylon cloth.

- **Stop up hole on opposite side of input shaft with nylon cloth.**

b. Check to see that retaining plate moves to snap ring.

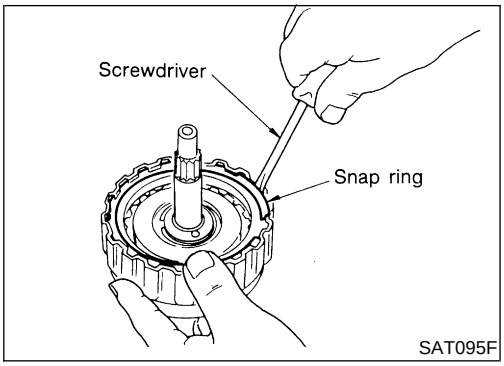
c. If retaining plate does not contact snap ring:

- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.

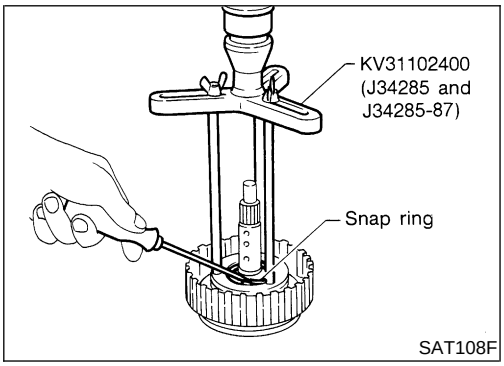


2. Remove seal rings from input shaft.

- **Always replace when removed.**

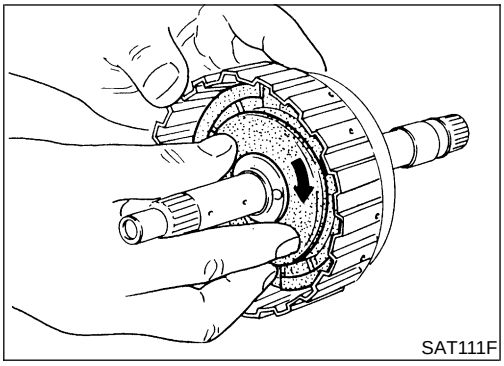


3. Remove snap ring.
4. Remove drive plates, driven plates and retaining plate.

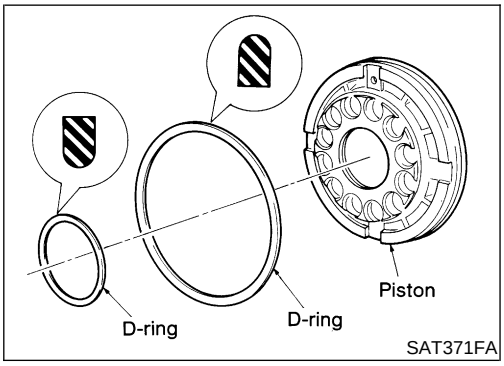


5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.
- **Set Tool directly over springs.**
- **Do not expand snap ring excessively.**

6. Remove spring retainer and return springs.



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



8. Remove D-rings from piston.

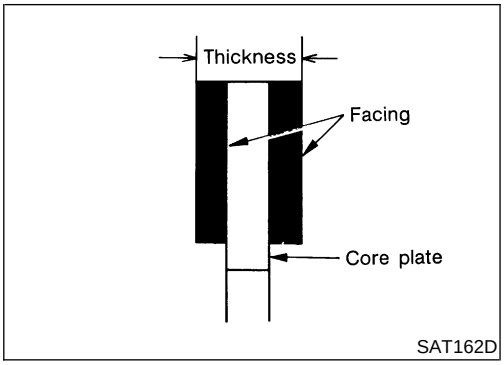
INSPECTION

NDAT0149

High Clutch Snap Ring, Spring Retainer and Return Springs

NDAT0149S01

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



SAT162D

High Clutch Drive Plates

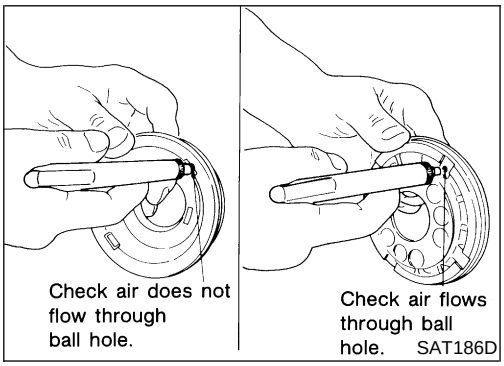
NDAT0149S02

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

  Thickness of drive plate:

  Standard value 1.6 mm (0.063 in)

  Wear limit 1.4 mm (0.055 in)
- If not within wear limit, replace.

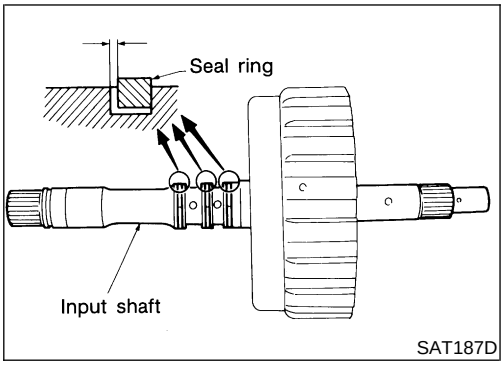


SAT186D

High Clutch Piston

NDAT0149S03

- Make sure that 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 that air leaks past ball.



SAT187D

Seal Ring Clearance

NDAT0149S04

- 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)

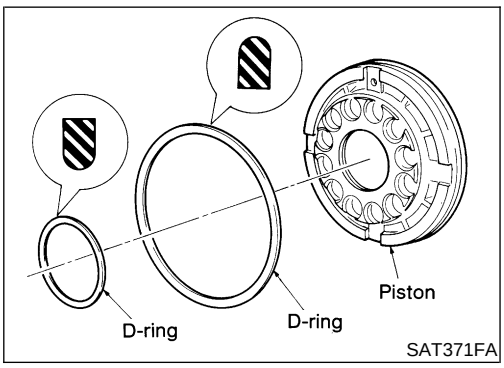
  Allowable limit:

  0.23 mm (0.0091 in)
- If not within allowable limit, replace input shaft assembly.

ASSEMBLY

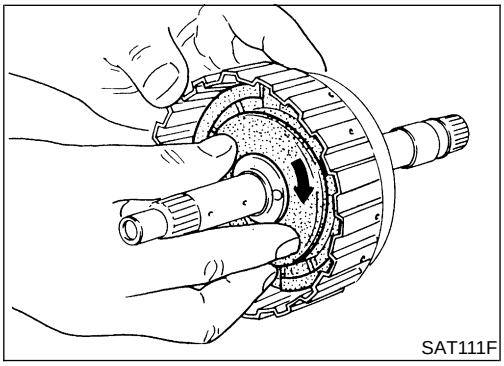
NDAT0150

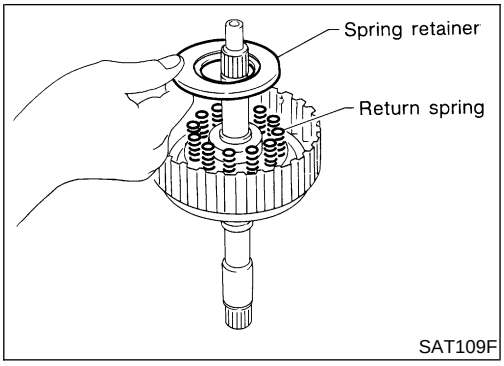
1. Install D-rings on piston.
- **Apply ATF to both parts.**



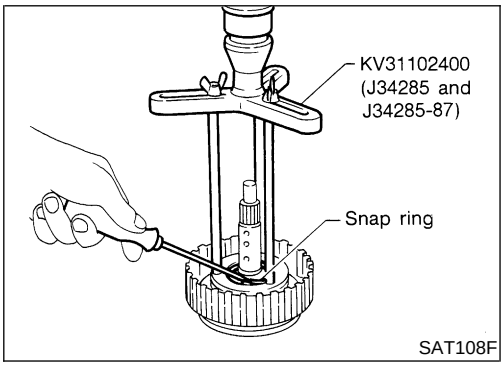
SAT371FA

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


SAT111F

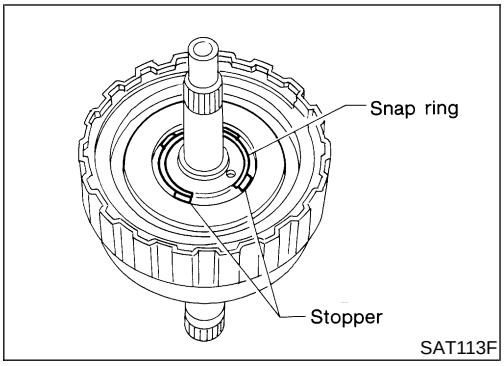


3. Install return springs and spring retainer on piston.

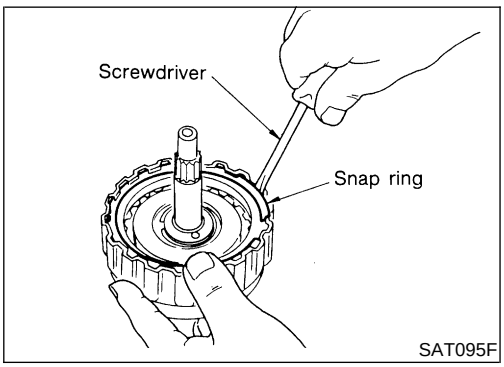


4. Set Tool on spring retainer and install snap ring while compressing return springs.

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



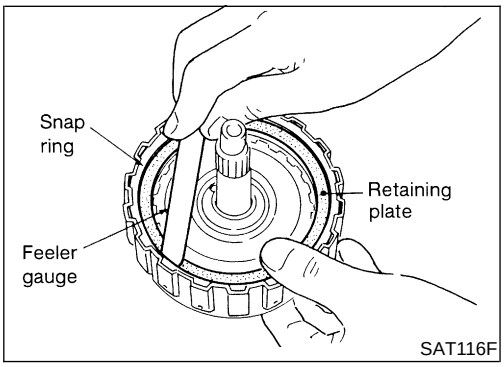
- **Do not align snap ring gap with spring retainer stopper.**



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.

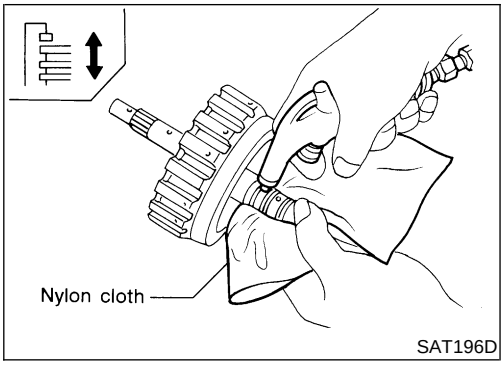
Specified clearance:

Standard 1.8 - 2.2 mm (0.071 - 0.087 in)

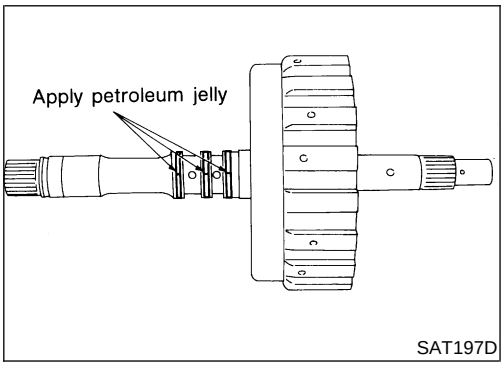
Allowable limit 2.8 mm (0.110 in)

Retaining plate:

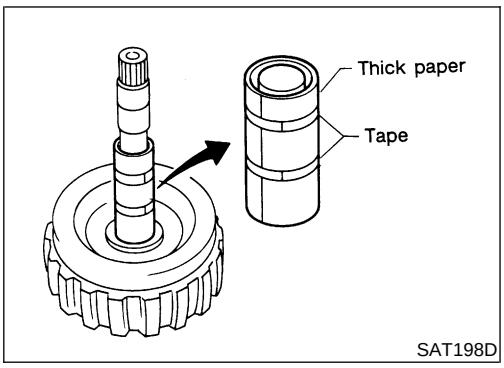
Refer to SDS, AT-367.



8. Check operation of high clutch.
   Refer to "DISASSEMBLY", "High Clutch", AT-315.



9. Install seal rings to input shaft.
- **Apply petroleum jelly to seal rings.**
- **Always replace when removed.**

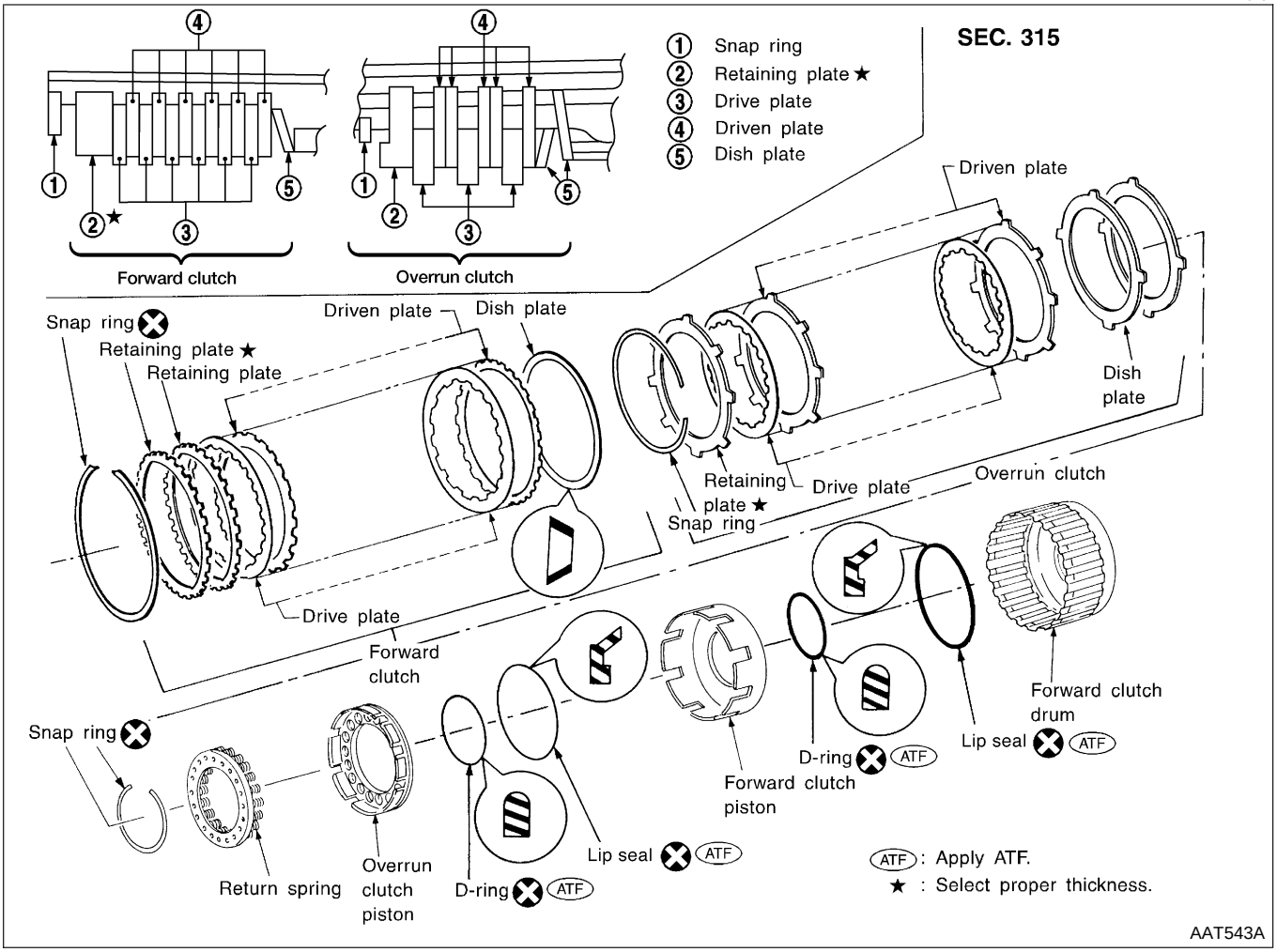


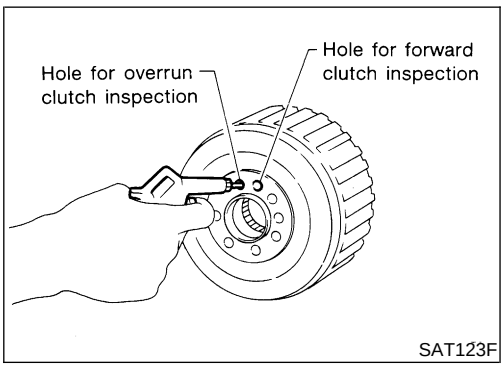
- **Roll paper around seal rings to prevent seal rings from spreading.**

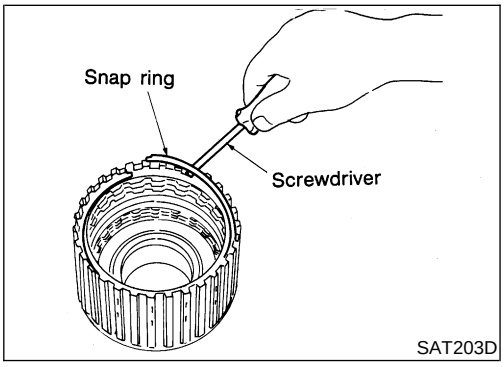
Forward and Overrun Clutches

COMPONENTS

NDAT0151







DISASSEMBLY

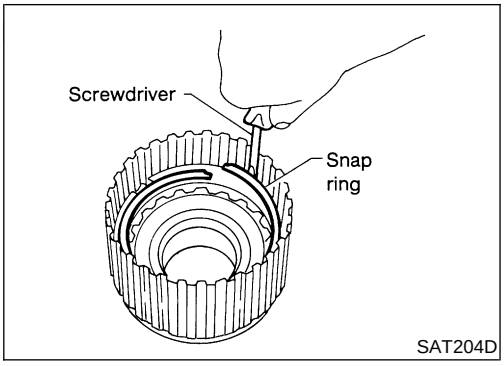
NDAT0152

1. Check operation of forward clutch and overrun clutch.

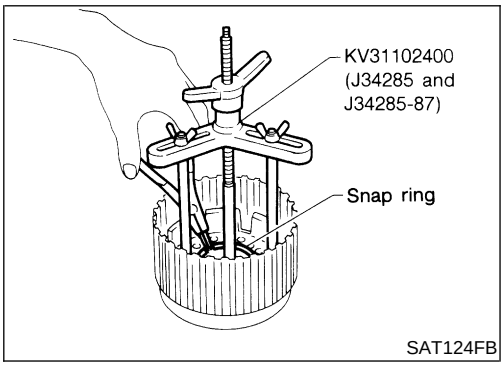
a. Install bearing retainer on forward clutch drum.
b. Apply compressed air to oil hole of forward clutch drum.
c. Check to see that retaining plate moves to snap ring.
d. If retaining plate does not contact snap ring:

- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.

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

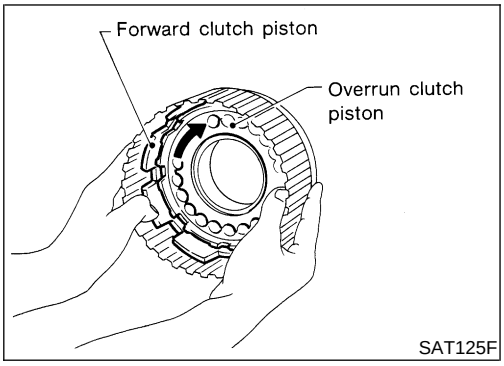


4. Remove snap ring for overrun clutch.
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.

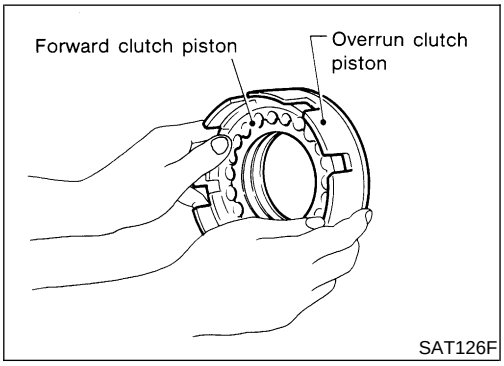


6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.
- **Set Tool directly over return springs.**
- **Do not expand snap ring excessively.**

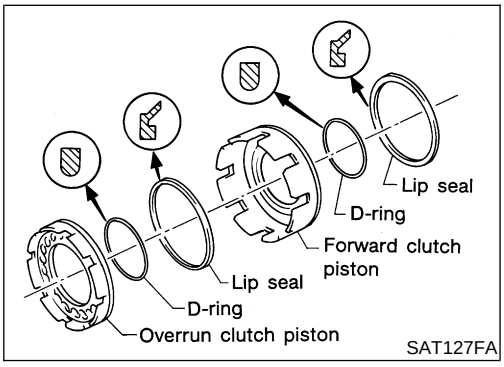
7. Remove spring retainer and return springs.
- **Do not remove return springs from spring retainer.**



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



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



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

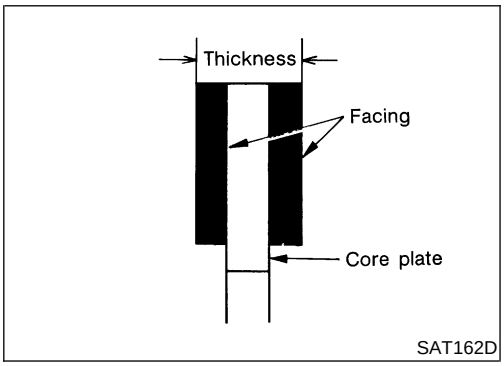
INSPECTION

NDAT0153

Snap Rings, Spring Retainer and Return Springs

NDAT0153S01

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



Forward Clutch and Overrun Clutch Drive Plates

NDAT0153S02

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

  Thickness of drive plate:

  Forward clutch

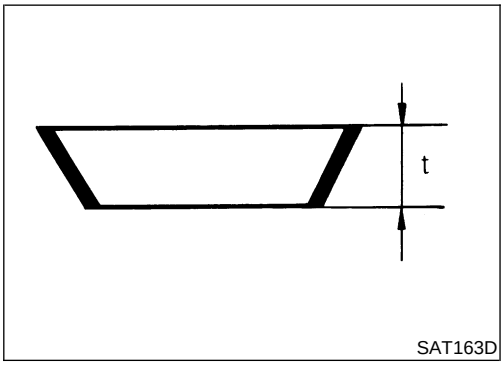
  Standard value: 1.6 mm (0.063 in)

  Wear limit: 1.4 mm (0.055 in)

  Overrun clutch

  Standard value: 1.6 mm (0.063 in)

  Wear limit: 1.4 mm (0.055 in)
- If not within wear limit, replace.



Forward Clutch and Overrun Clutch Dish Plates

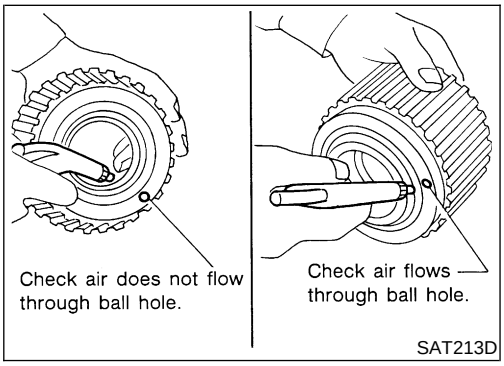
NDAT0153S03

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

  Thickness of dish plate:

  Forward clutch 2.7 mm (0.106 in)

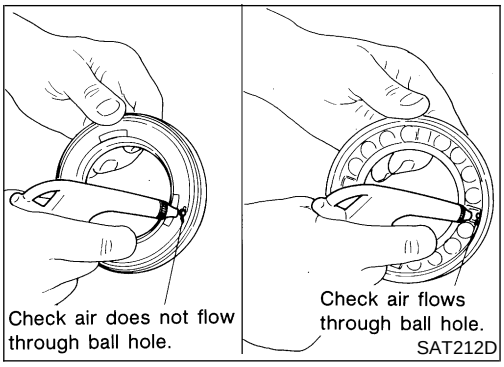
  Overrun clutch 2.7 mm (0.106 in)
- If deformed or fatigued, replace.



Forward Clutch Drum

NDAT0153S04

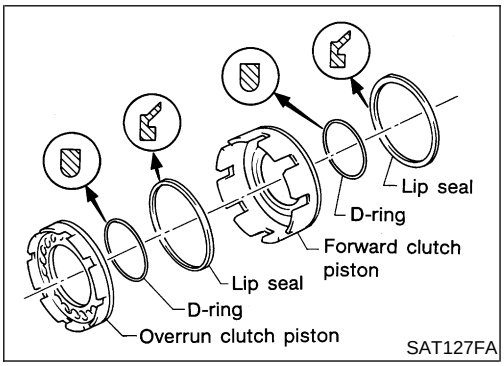
- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole from outside of forward clutch drum. Make sure air leaks past ball.
- Apply compressed air to oil hole from inside of forward clutch drum. Make sure there is no air leakage.



Overrun Clutch Piston

NDAT0153S05

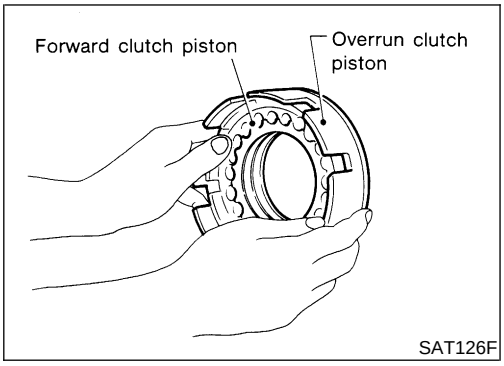
- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side. Make sure that air leaks past ball.



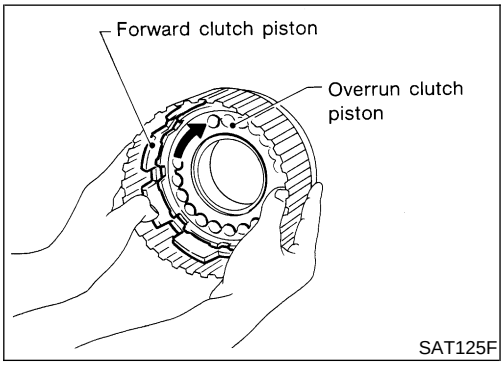
ASSEMBLY

NDAT0154

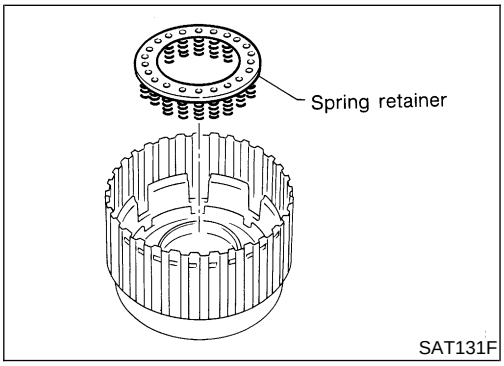
1. Install D-rings and lip seals on forward clutch piston and overrun clutch piston.
- **Take care with direction of lip seal.**
- **Apply ATF to both parts.**



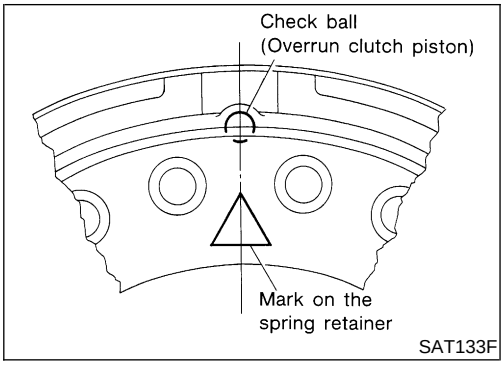
2. Install overrun clutch piston assembly on forward clutch piston by turning it slowly.
- **Apply ATF to inner surface of forward clutch piston.**



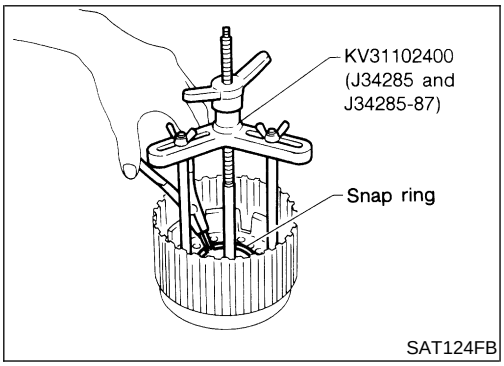
3. Install forward clutch piston assembly on forward clutch drum by turning it slowly.
- **Apply ATF to inner surface of drum.**



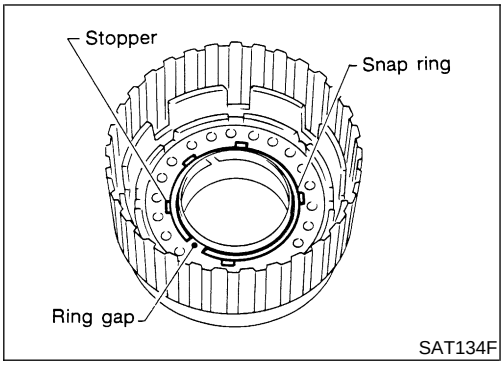
4. Install return spring on overrun clutch piston.



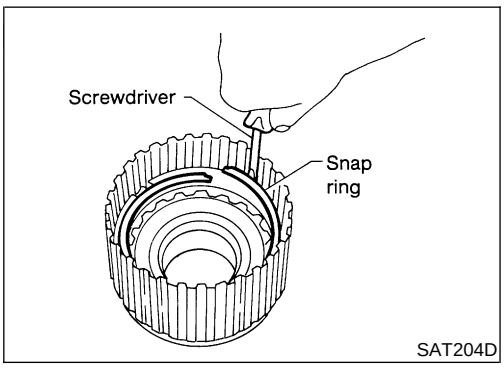
- Align the mark on spring retainer with check ball in overrun clutch piston.



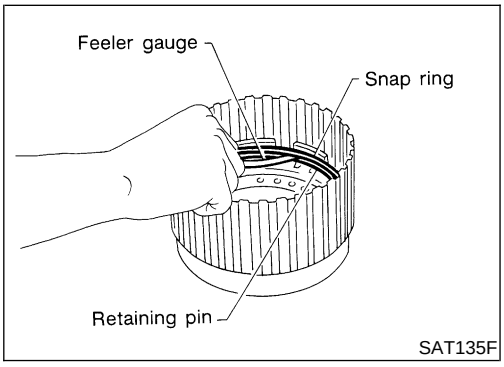
5. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly over return springs.**



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



6. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
- **Take care with order of plates.**
7. Install snap ring for overrun clutch.



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

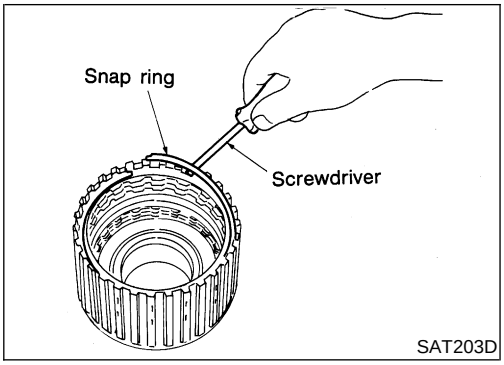
Specified clearance:

Standard 0.7 - 1.1 mm (0.028 - 0.043 in)

Allowable limit 1.7 mm (0.067 in)

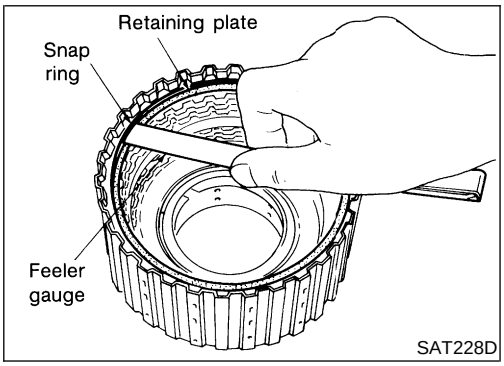
Overrun clutch retaining plate:

Refer to SDS, AT-368.



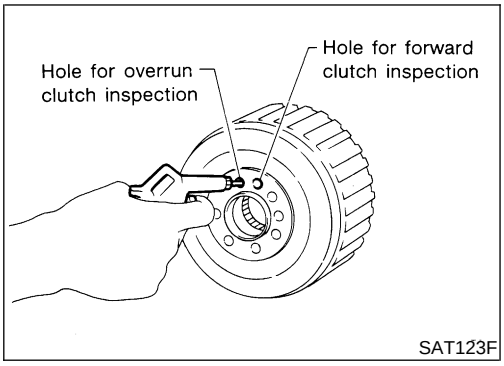
9. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.
- **Take care with order of plates.**

10. Install snap ring for forward clutch.



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

Specified clearance:
Standard 0.45 - 0.85 mm (0.0177 - 0.0335 in)
Allowable limit 1.85 mm (0.0728 in)
Forward clutch retaining plate:
Refer to SDS, AT-367.



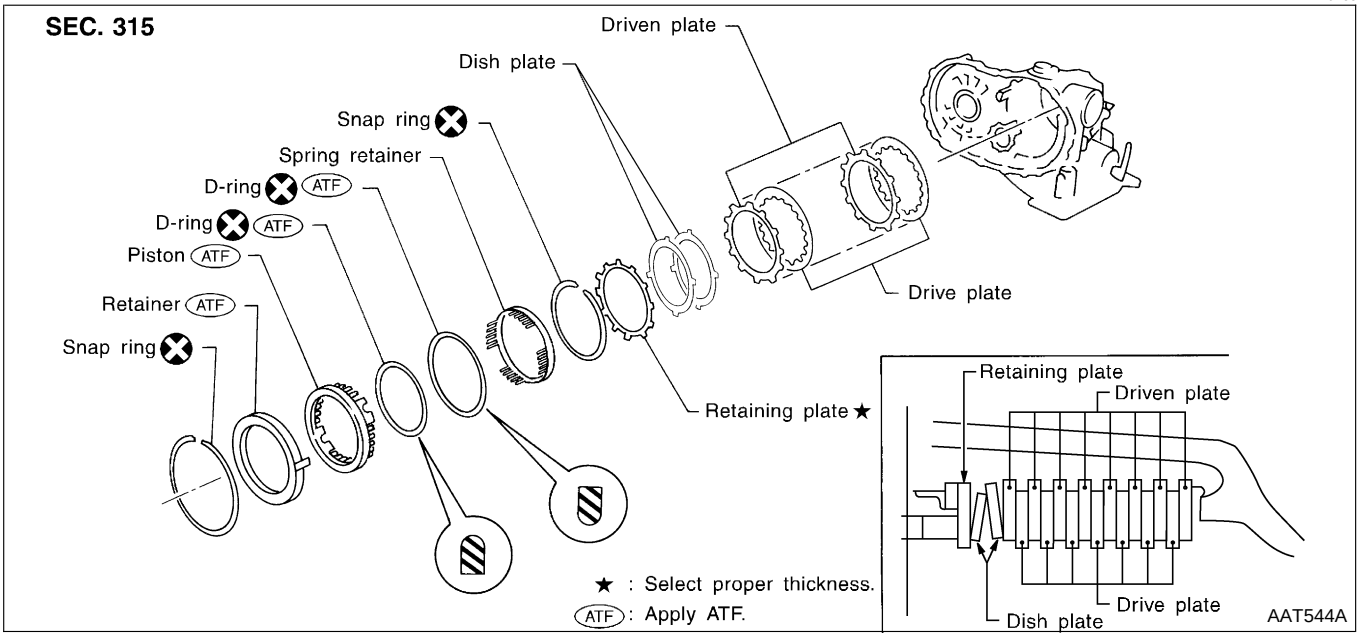
12. Check operation of forward clutch.
Refer to "DISASSEMBLY", "Forward Clutch and Overrun Clutch", AT-320.

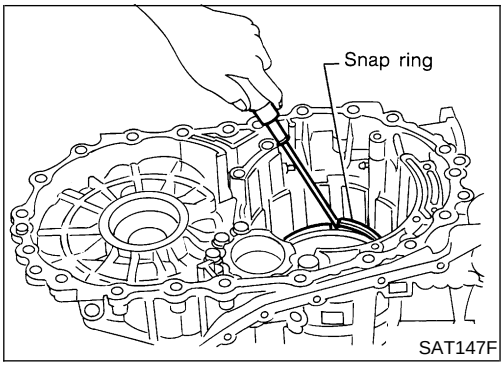
13. Check operation of overrun clutch.
Refer to "DISASSEMBLY", "Forward Clutch and Overrun Clutch", AT-320.

Low & Reverse Brake

COMPONENTS

NDAT0155





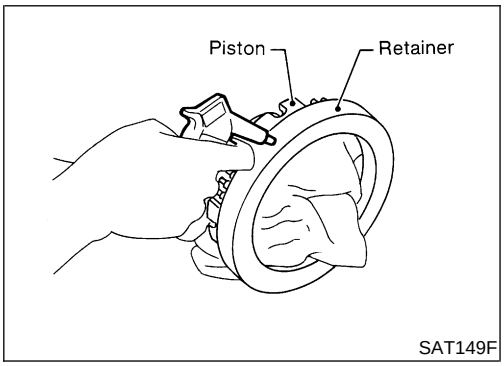
DISASSEMBLY

NDAT0156

1. Check operation of low & reverse brake.

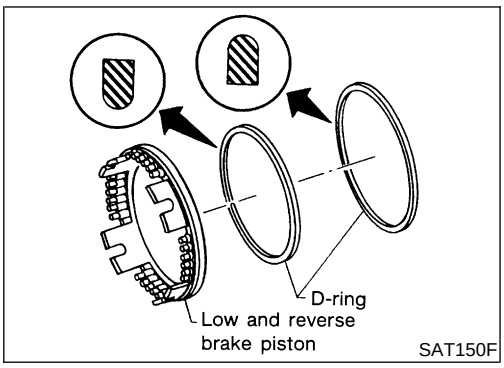
a. Apply compressed air to oil hole of transmission case.
b. Check to see that retaining plate moves to snap ring.
c. If retaining plate does not contact snap ring:

- D-ring might be damaged.
- Fluid might be leaking past piston check ball.



2. In order to remove piston, apply compressed air to oil hole of retainer while holding piston.

- **Apply air gradually and allow piston to come out evenly.**



3. Remove D-rings from piston.

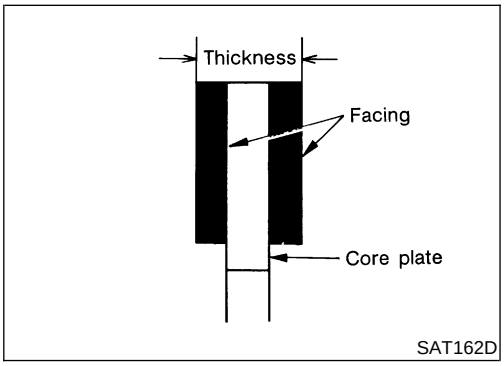
INSPECTION

NDAT0157

Low and Reverse Brake Snap Ring, Spring Retainer and Return Springs

NDAT0157S01

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



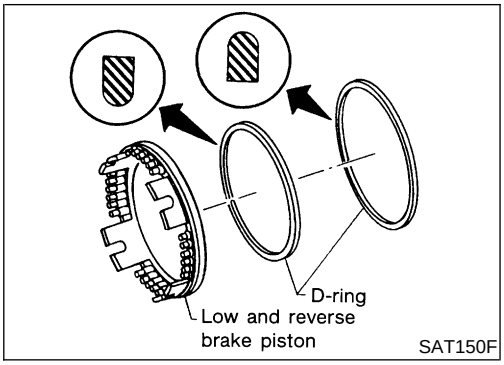
Low and Reverse Brake Drive Plate

NDAT0157S02

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

Thickness of drive plate:
Standard value 1.8 mm (0.071 in)
Wear limit 1.6 mm (0.063 in)

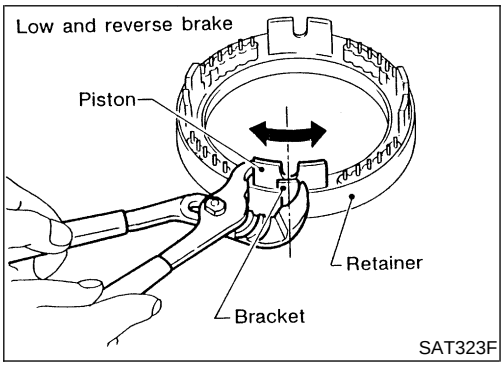
- If not within wear limit, replace.



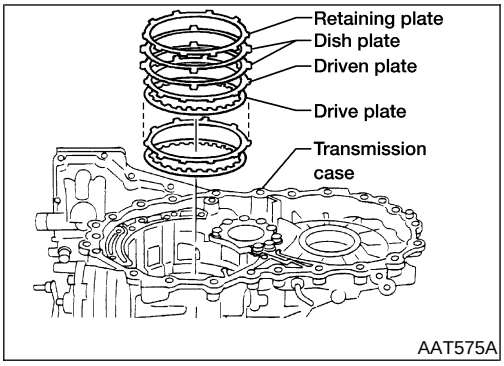
ASSEMBLY

NDAT0158

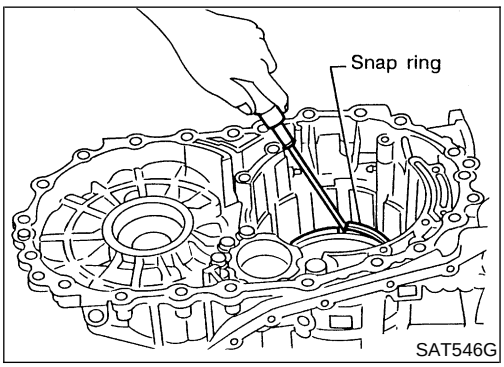
1. Install D-rings on piston.
- **Apply ATF to both parts.**



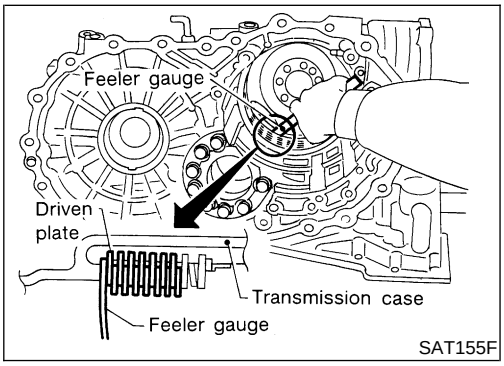
2. Set and align piston with retainer.
- **This operation is required in order to engage the protrusions of piston to return springs correctly.**
Further procedures are given in "ASSEMBLY".



3. Install driven plates, drive plates, retaining plate and dish plate on transmission case.
- **Take care with order of plates and direction of dish plate.**



4. Install snap ring.



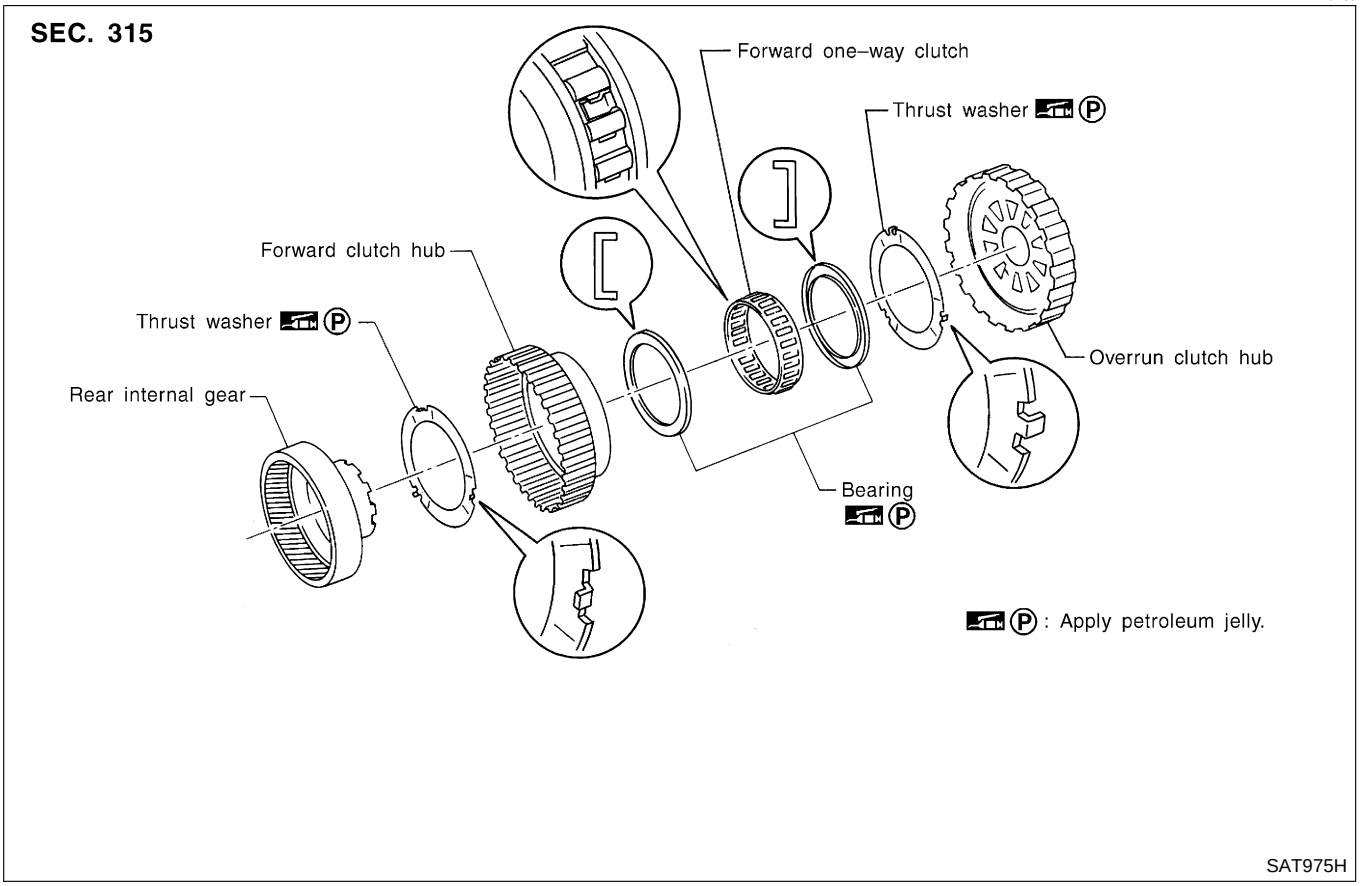
5. Measure clearance between driven plate and transmission case. If not within allowable limit, select proper retaining plate. (front side)

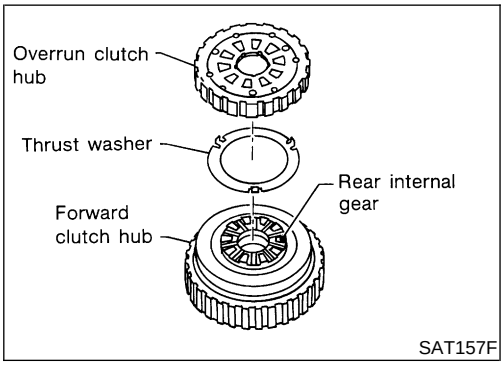
Specified clearance:
Standard 1.7 - 2.1 mm (0.067 - 0.083 in)
Allowable limit 3.3 mm (0.130 in)
Retaining plate:
Refer to SDS, AT-368.

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

COMPONENTS

NDAT0159

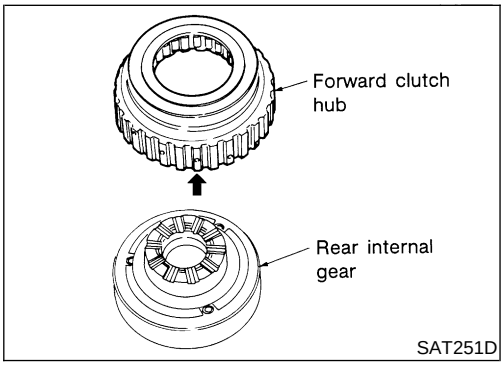




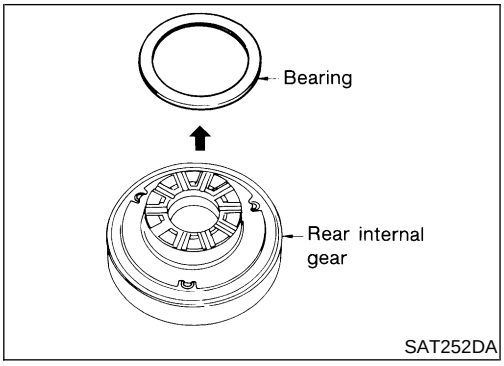
DISASSEMBLY

NDAT0160

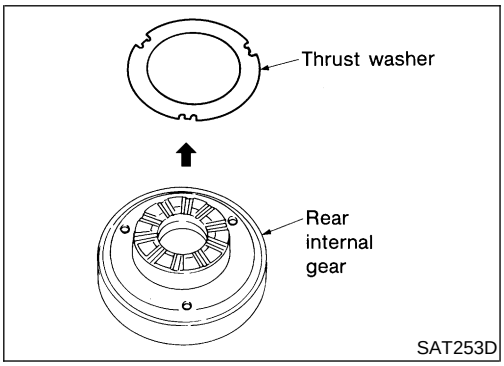
1. Remove overrun clutch hub and thrust washer from forward clutch hub.



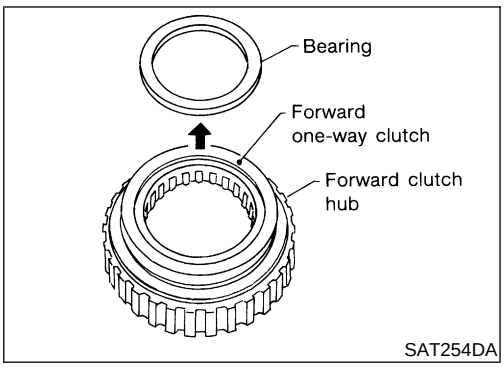
2. Remove forward clutch hub from rear internal gear.



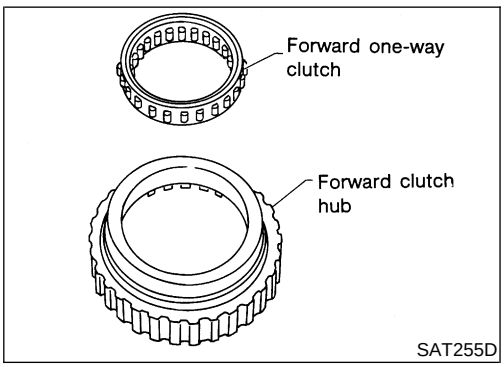
3. Remove bearing from rear internal gear.



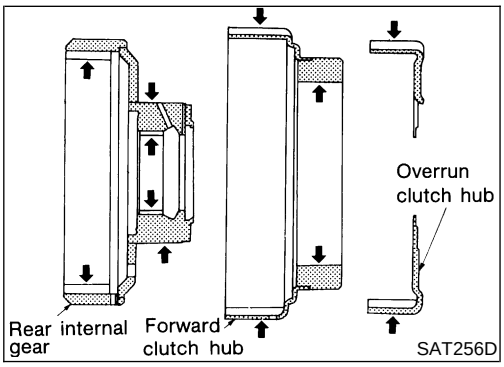
4. Remove thrust washer from rear internal gear.



5. Remove bearing from forward one-way clutch.



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



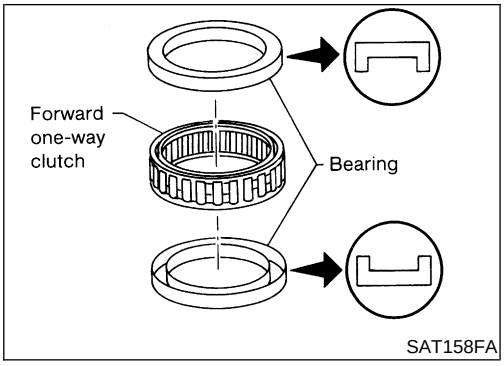
INSPECTION

NDAT0161

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

NDAT0161S01

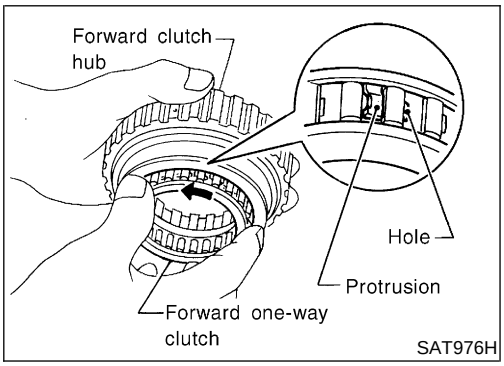
- Check rubbing surfaces for wear or damage.



Bearings and Forward One-way Clutch

NDAT0161S02

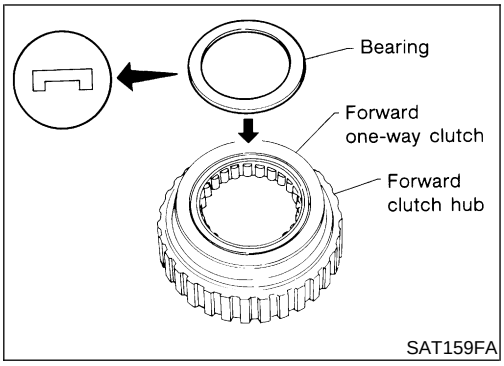
- Check bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.



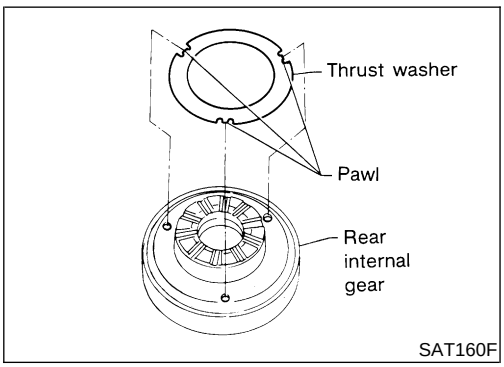
ASSEMBLY

NDAT0162

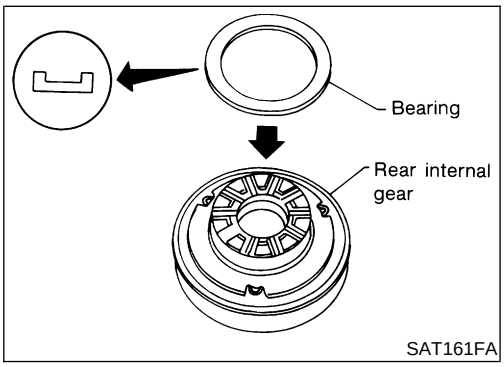
1. Install forward one-way clutch on forward clutch.
- **Take care with the direction of forward one-way clutch.**



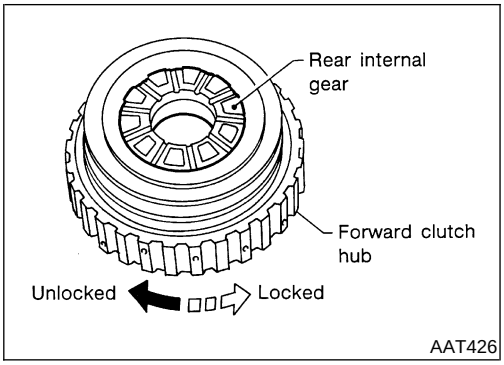
2. Install bearing on forward one-way clutch.
- **Apply petroleum jelly to bearing.**



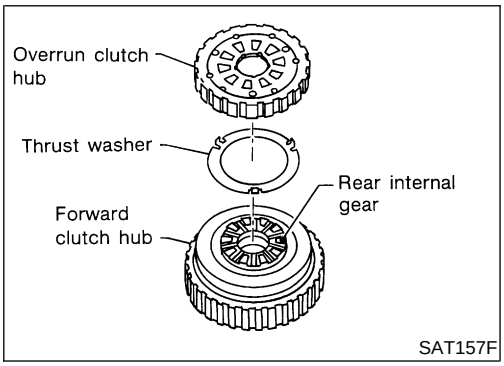
3. Install thrust washer on rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Align hooks of thrust washer with holes of rear internal gear.**



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



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

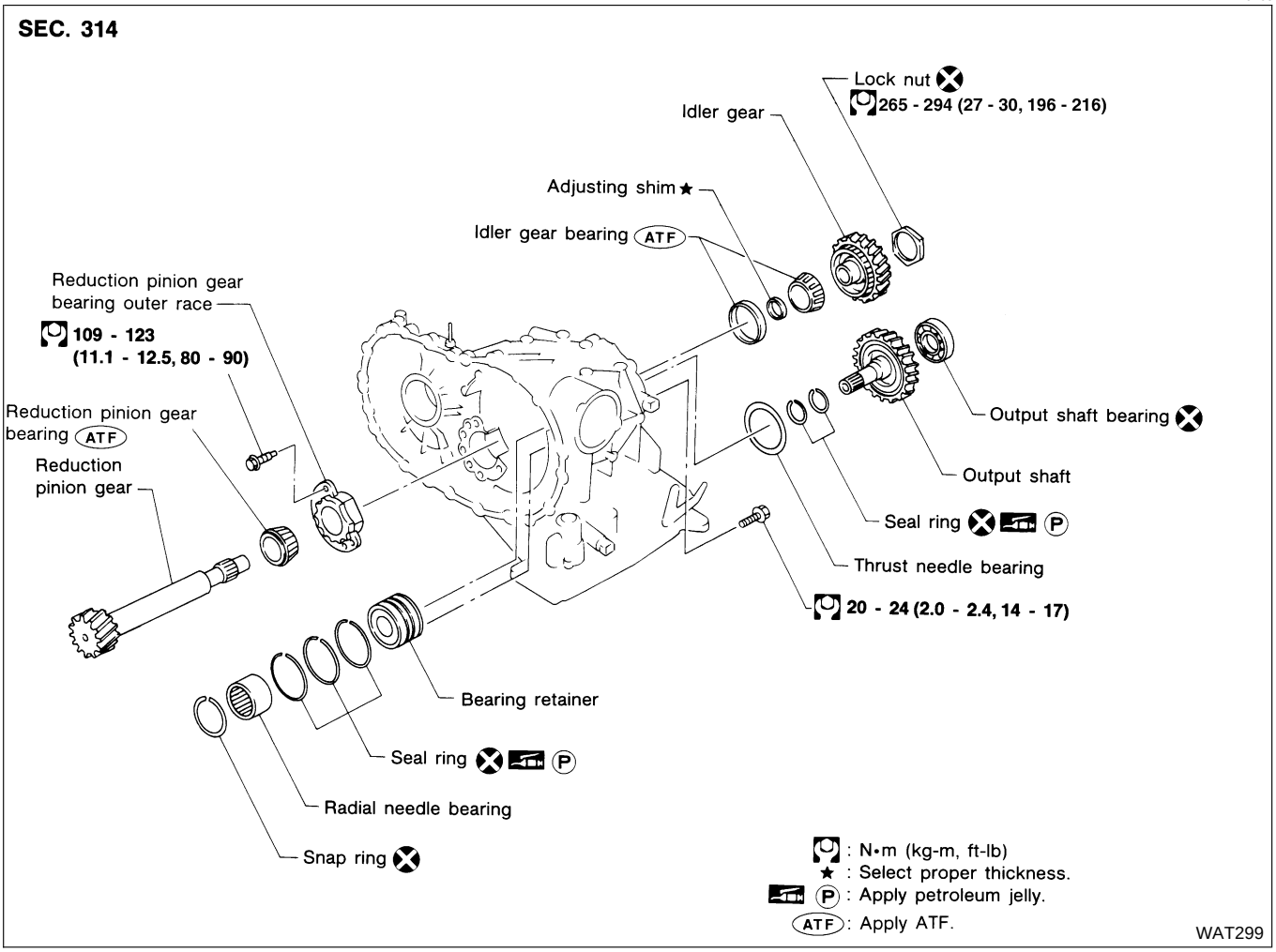


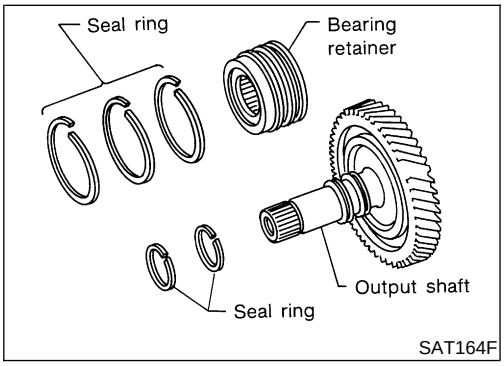
6. Install thrust washer and overrun clutch hub.
- **Apply petroleum jelly to thrust washer.**
- **Align hooks of thrust washer with holes of overrun clutch hub.**
- **Align projections of rear internal gear with holes of overrun clutch hub.**

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer

COMPONENTS

NDAT0163

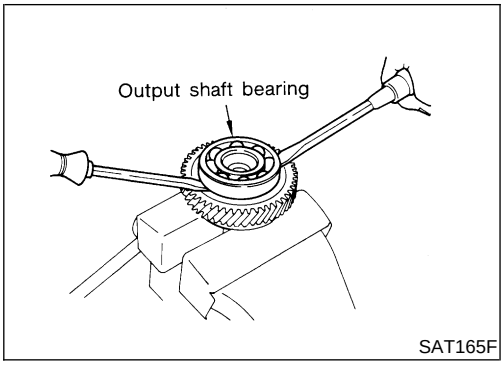




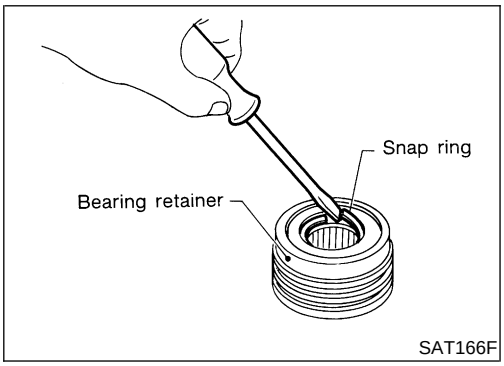
DISASSEMBLY

NDAT0164

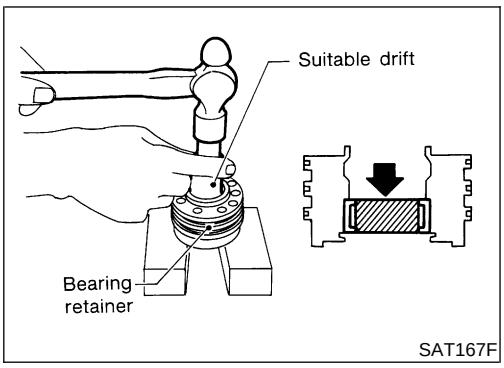
1. Remove seal rings from output shaft and bearing retainer.



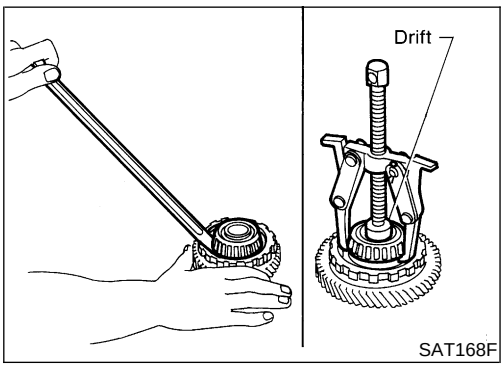
2. Remove output shaft bearing with screwdrivers.
- **Always replace bearing with a new one when removed.**
- **Do not damage output shaft.**



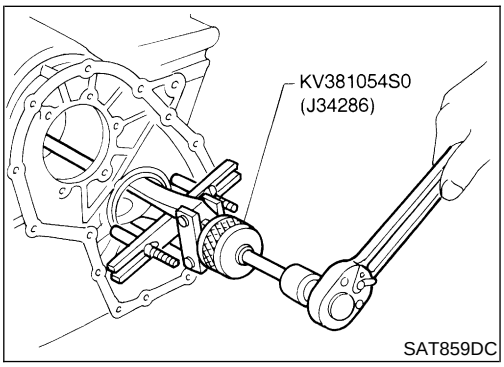
3. Remove snap ring from bearing retainer.



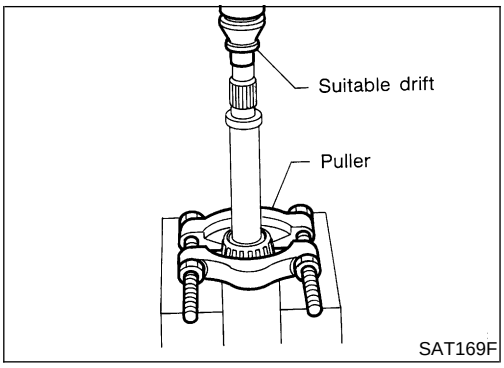
4. Remove needle bearing from bearing retainer.



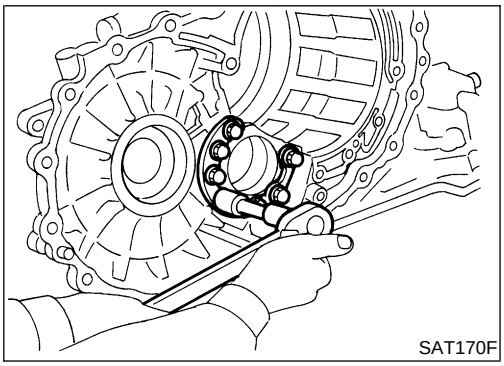
5. Remove idler gear bearing inner race from idler gear.



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.

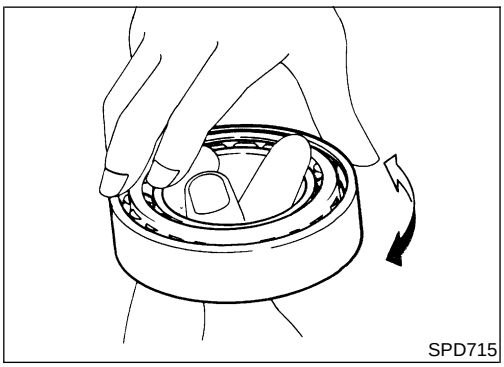
INSPECTION

NDAT0165

Output Shaft, Idler Gear and Reduction Pinion Gear

NDAT0165S01

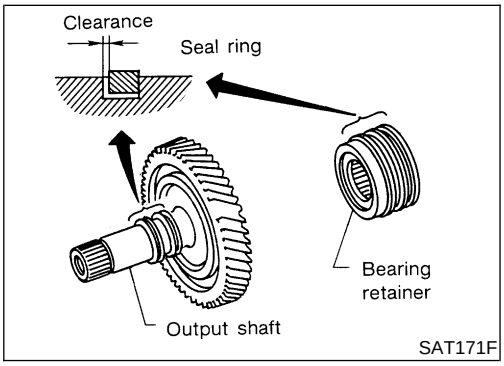
- Check shafts for cracks, wear or bending.
- Check gears for wear, chips and cracks.



Bearing

NDAT0165S02

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



Seal Ring Clearance

NDAT0165S03

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

  Standard clearance:

  0.10 - 0.25 mm (0.0039 - 0.0098 in)

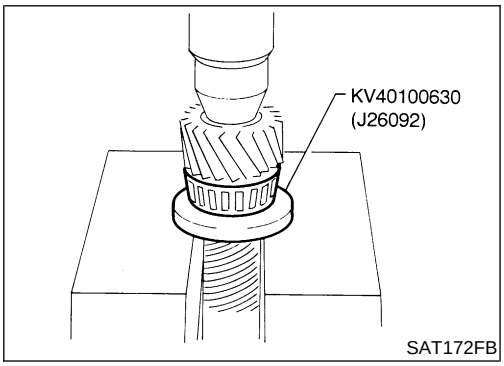
  Allowable limit:

  0.25 mm (0.0098 in)
- If not within allowable limit, replace output shaft.
- Install new seal rings to bearing retainer.

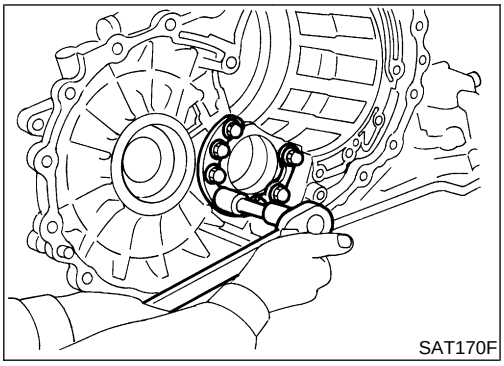
- Measure clearance between seal ring and ring groove of bearing retainer.
  Standard clearance:
  0.10 - 0.30 mm (0.0039 - 0.0118 in)
  Allowable limit:
  0.30 mm (0.0118 in)
- If not within allowable limit, replace bearing retainer.

ASSEMBLY

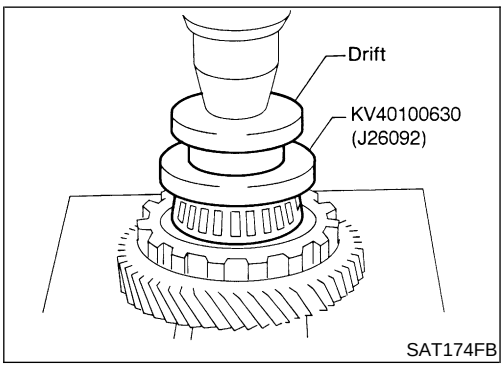
NDAT0166



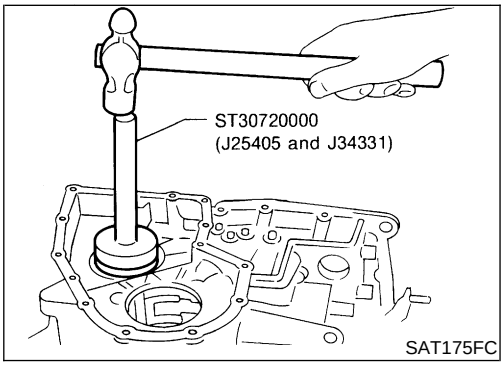
1. Press reduction pinion gear bearing inner race on reduction pinion gear.



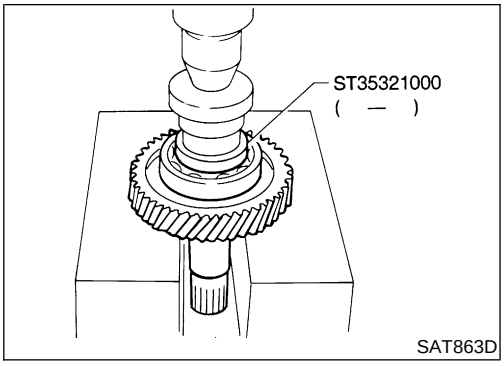
2. Install reduction pinion gear bearing outer race on transmission case.
   : 109 - 123 N·m (11.1 - 12.5 kg-m, 80 - 90 ft-lb)



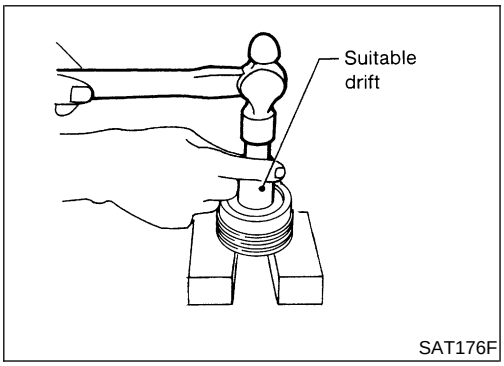
3. Press idler gear bearing inner race on idler gear.



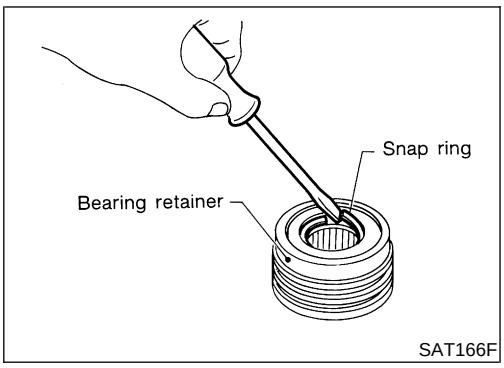
4. Install idler gear bearing outer race on transmission case.



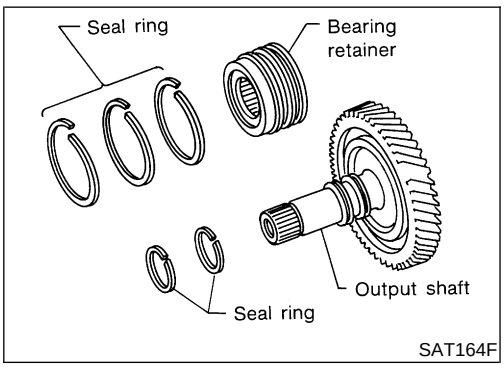
5. Press output shaft bearing on output shaft.



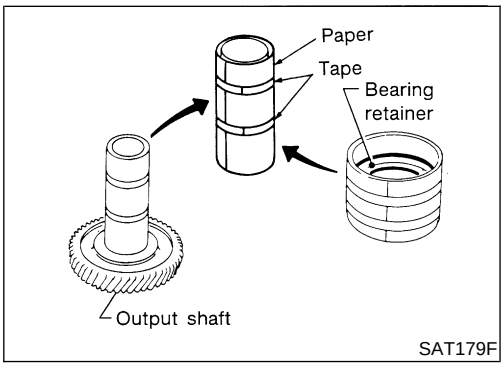
6. Press needle bearing on bearing retainer.



7. Install snap ring to bearing retainer.



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

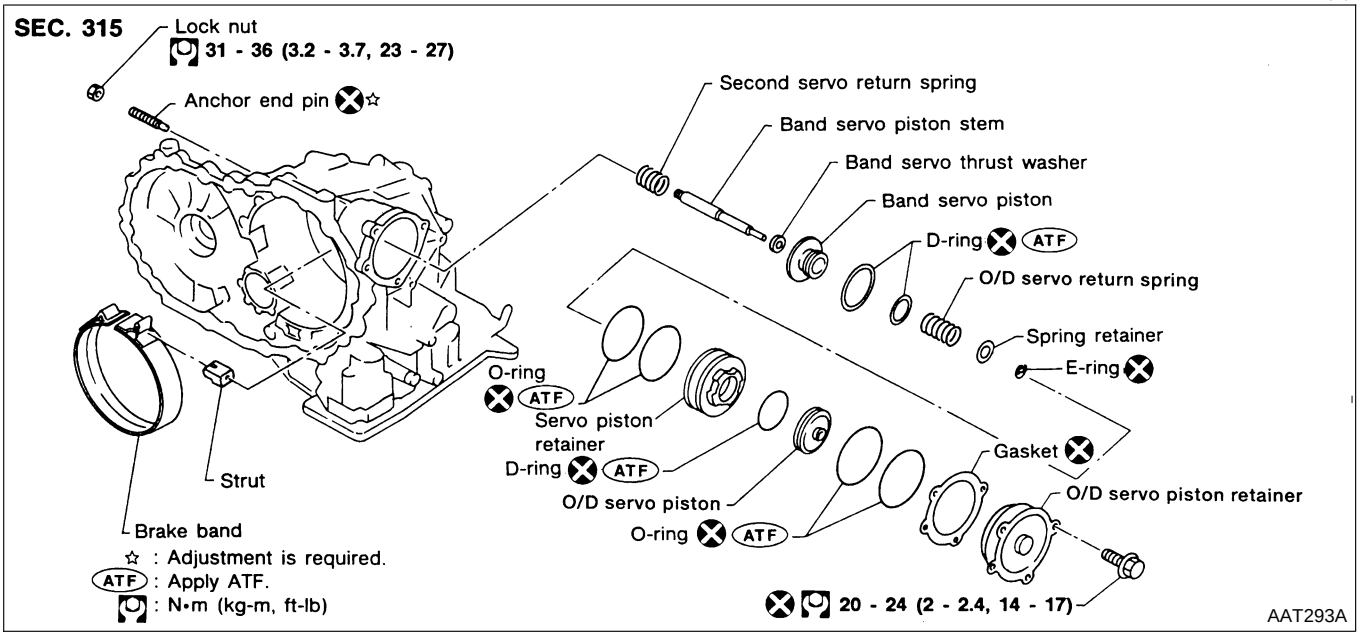


- **Roll paper around seal rings to prevent seal rings from spreading.**

Band Servo Piston Assembly

COMPONENTS

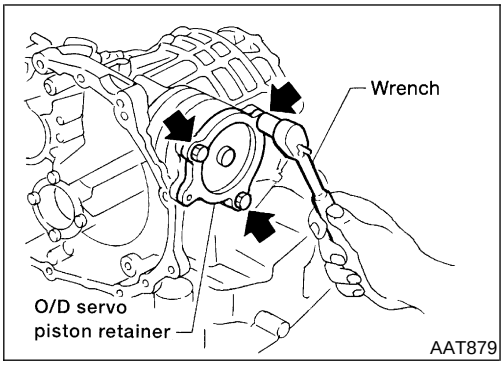
NDAT0167



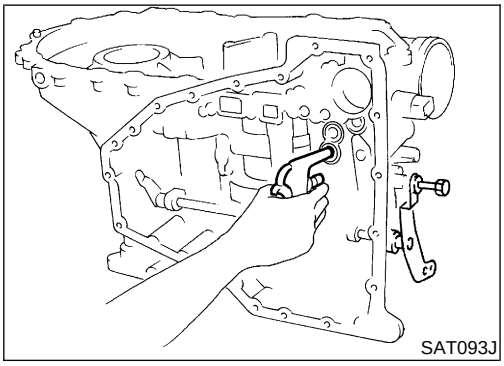
DISASSEMBLY

NDAT0168

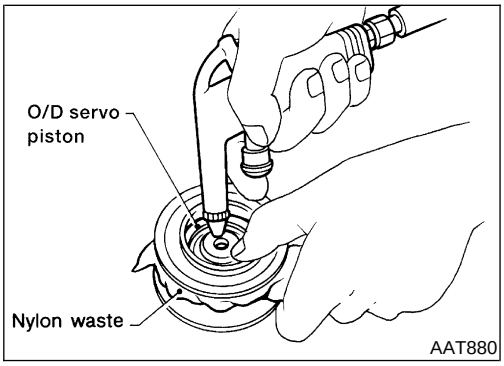
1. Remove band servo piston fixing bolts.

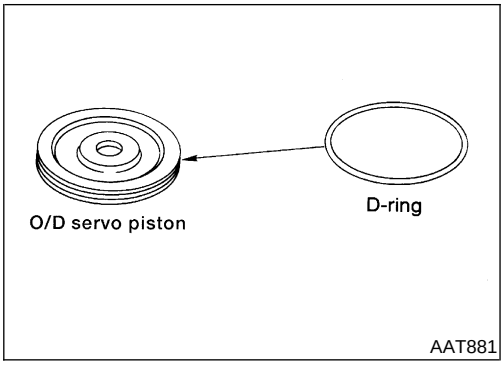


2. Apply compressed air to oil hole in transmission case to remove O/D servo piston retainer and band servo piston assembly.
- **Hold band servo piston assembly with a rag or nylon waste.**

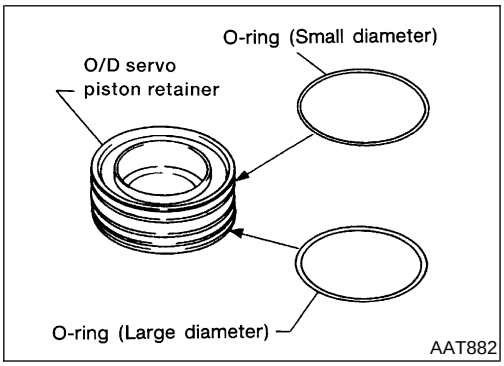


3. Apply compressed air to oil hole in O/D servo piston retainer to remove O/D servo piston from retainer.
- **Hold O/D band servo piston while applying compressed air.**

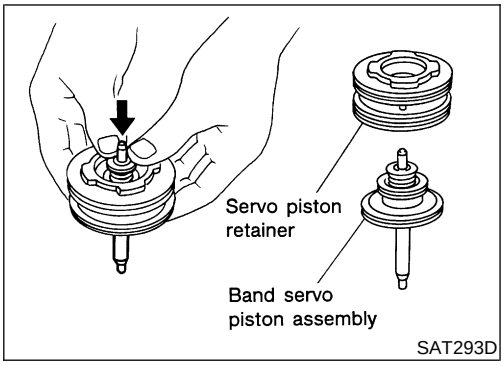




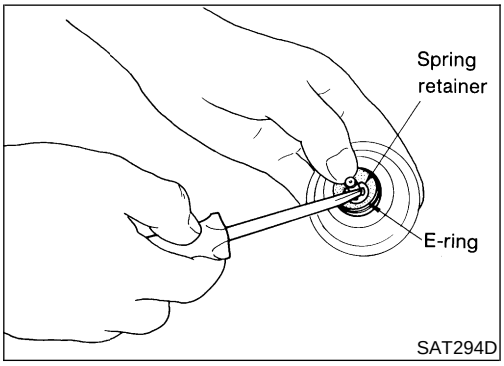
4. Remove D-ring from O/D servo piston.



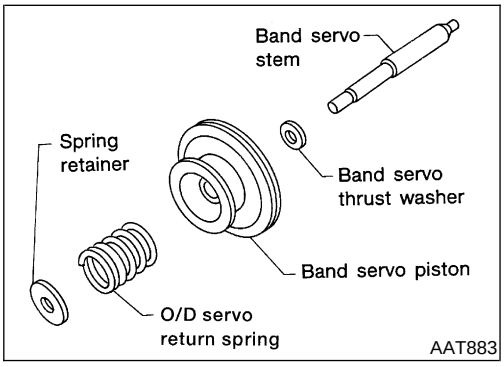
5. Remove O-rings from O/D servo piston retainer.



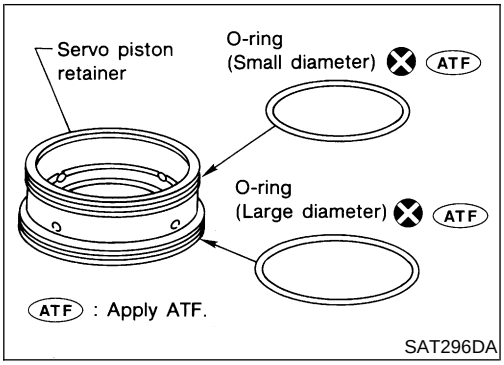
6. Remove band servo piston assembly from servo piston retainer by pushing it forward.



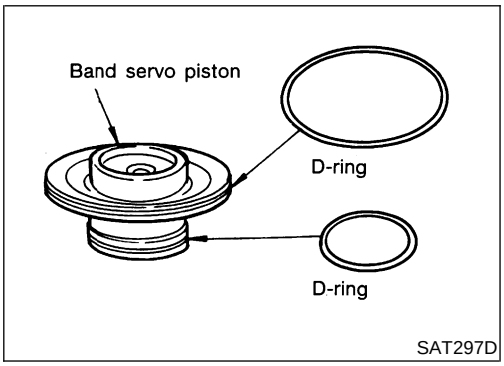
7. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.



8. Remove O/D 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.

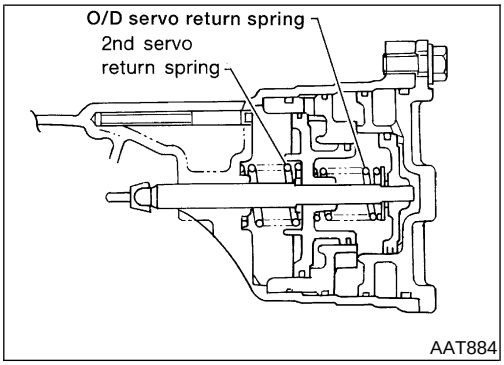
INSPECTION

NDAT0169

Pistons, Retainers and Piston Stem

NDAT0169S01

- Check frictional surfaces for abnormal wear or damage.



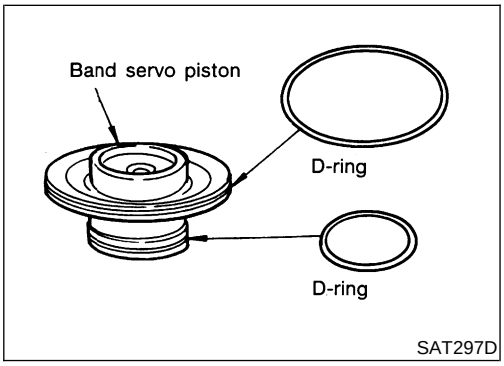
Return Springs

NDAT0169S02

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

Inspection standard:

Refer to SDS, AT-371.

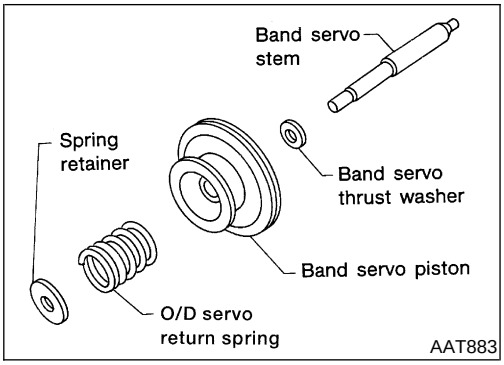


ASSEMBLY

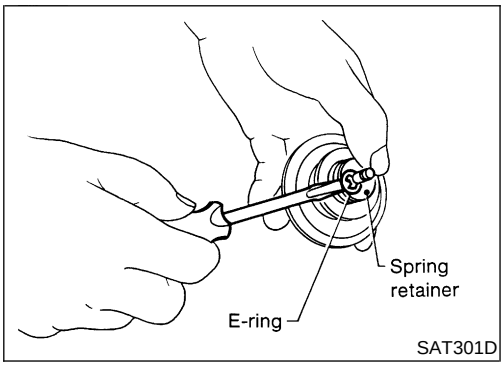
NDAT0170

1. Install D-rings to servo piston retainer.

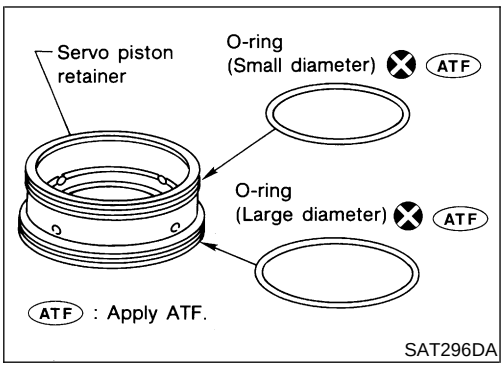
- **Apply ATF to D-rings.**
- **Pay attention to position of each O-ring.**



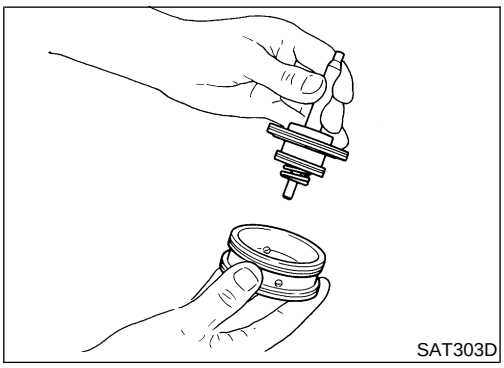
2. Install band servo piston stem, band servo thrust washer, O/D servo return spring and spring retainer to band servo piston.



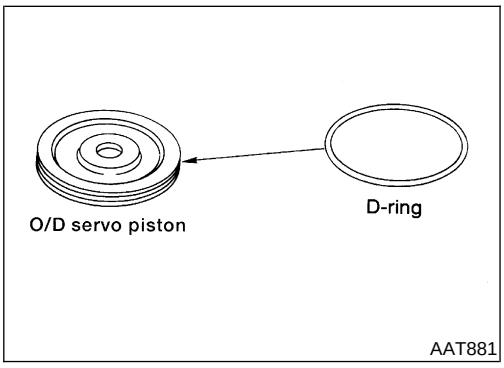
3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



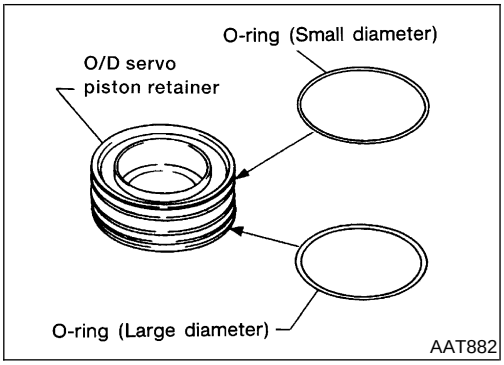
4. Install O-rings to servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**



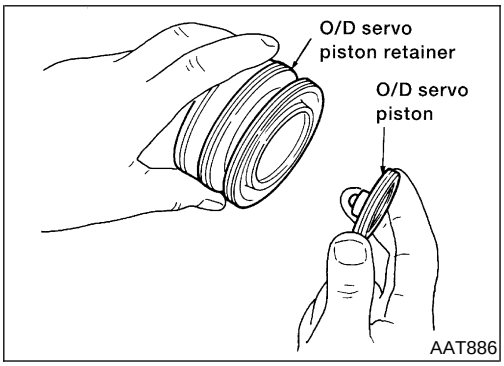
5. Install band servo piston assembly to servo piston retainer by pushing it inward.



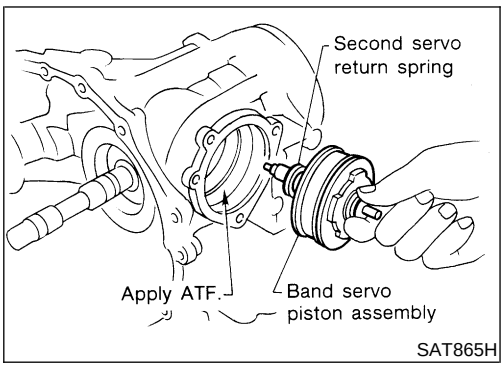
6. Install D-ring to O/D servo piston.
- **Apply ATF to D-ring.**



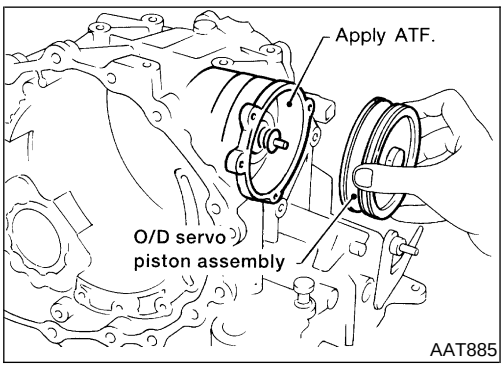
7. Install O-rings to O/D servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**



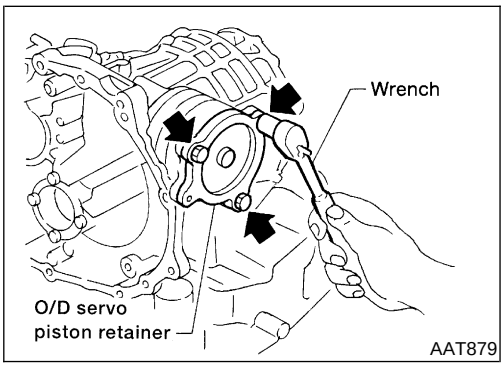
8. Install O/D servo piston to O/D servo piston retainer.



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 O/D servo piston assembly to transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**

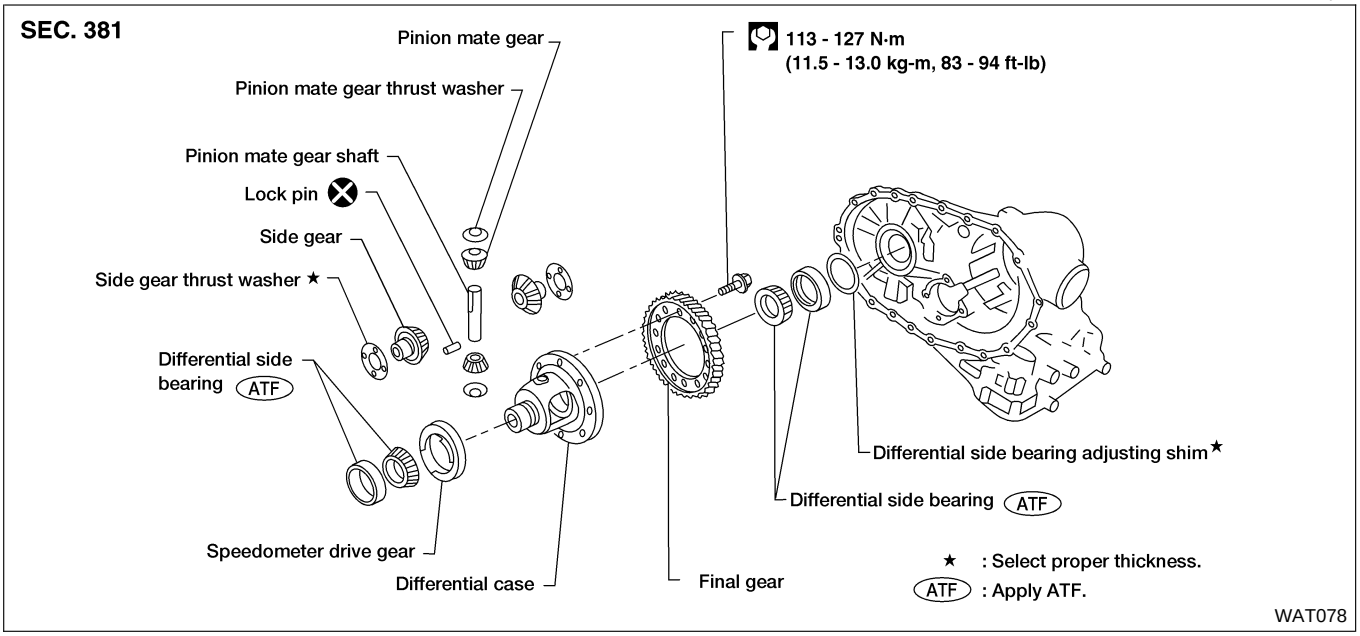


11. Install O/D servo piston retainer to transmission case.
: 20 - 24 N·m (2 - 2.4 kg-m, 14 - 17 ft-lb)

Final Drive

COMPONENTS

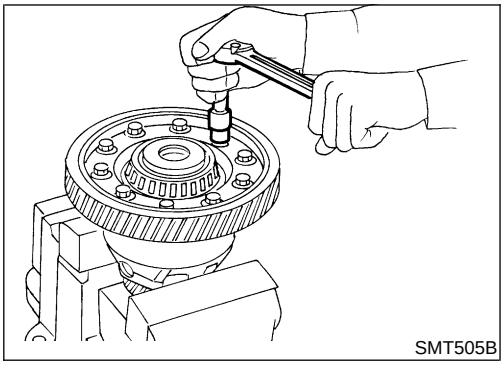
NDAT0171



DISASSEMBLY

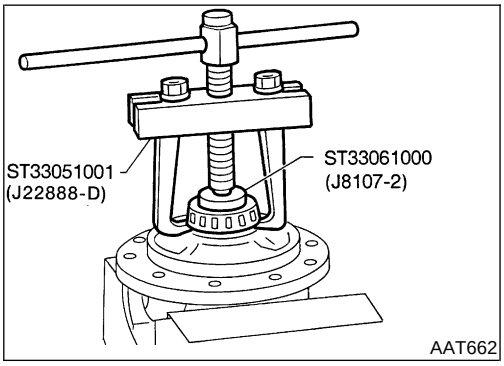
NDAT0172

1. Remove final gear.

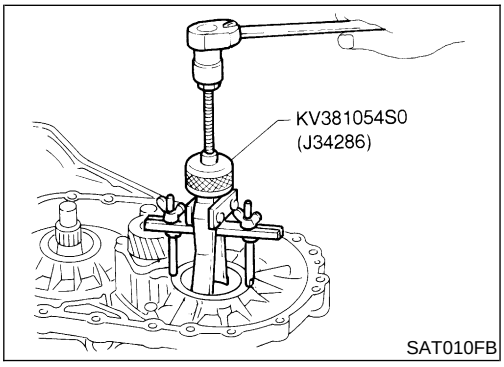


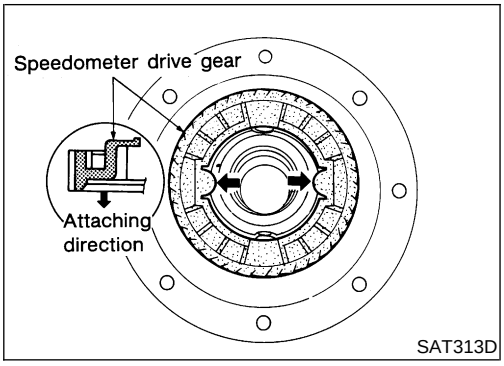
2. Press out differential side bearings.

- **Be careful not to mix up the right and left bearings.**

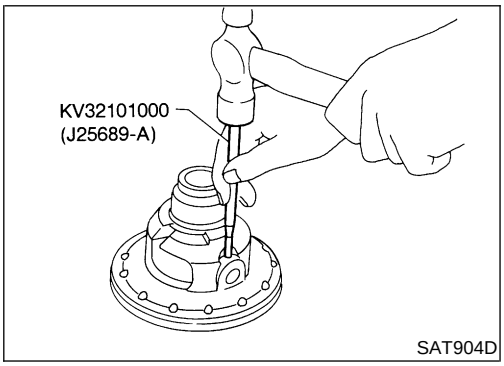


3. Remove differential side bearing outer race, and side bearing adjusting shim from transmission case.

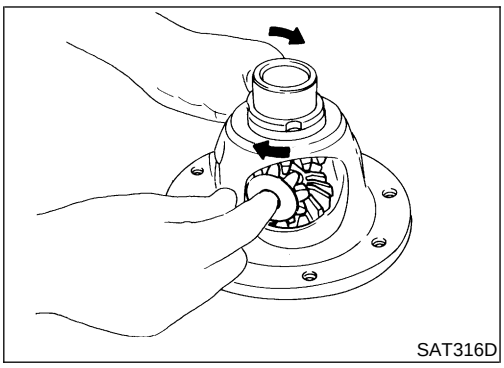




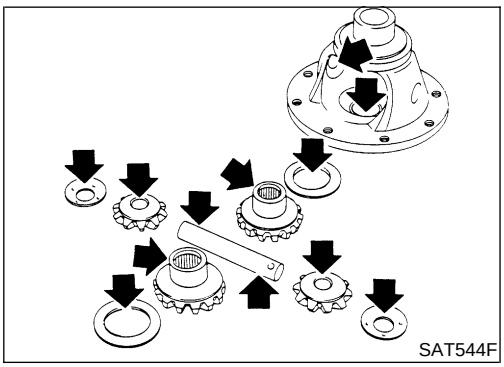
4. Remove speedometer drive gear.



5. Drive out pinion mate gear shaft lock pin.



6. Draw out pinion mate gear shaft lock pin.
7. Remove pinion mate gears and side gears.



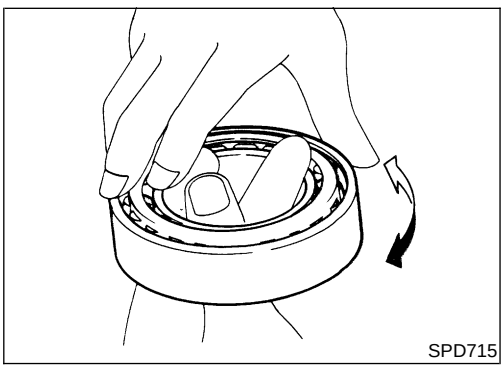
INSPECTION

NDAT0173

Gear, Washer, Shaft and Case

NDAT0173S01

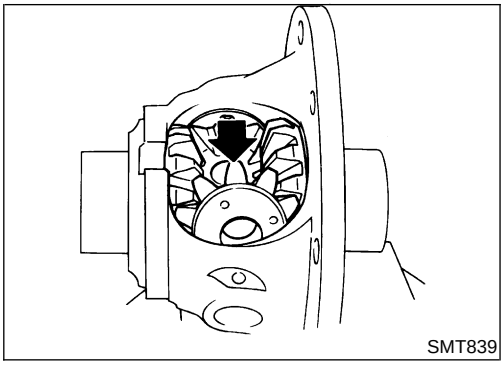
- Check mating surfaces of differential case, side gears and pinion mate gears.
- Check washers for wear.



Bearings

NDAT0173S02

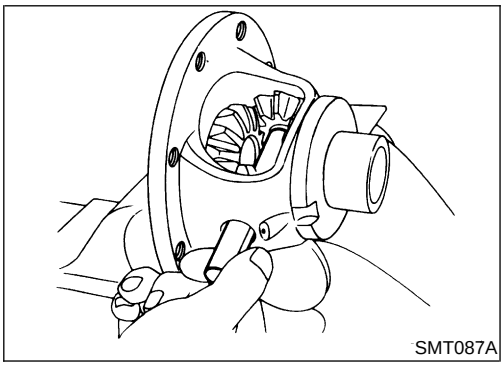
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**


SMT839

ASSEMBLY

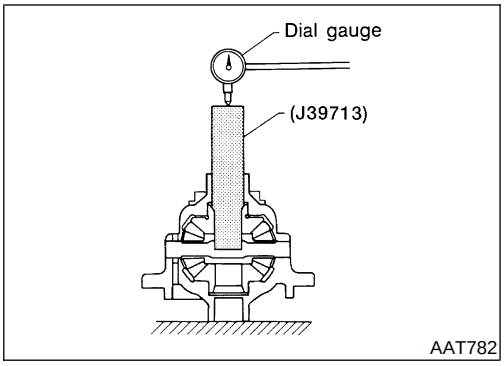
NDAT0174

1. Attach side gear thrust washers to side gears, then install pinion mate gear thrust washers and pinion mate gears in place.


SMT087A

2. Insert pinion mate gear shaft.

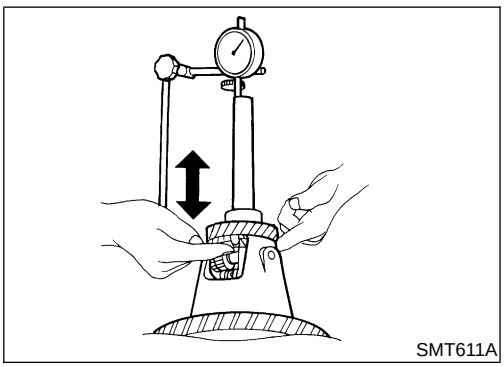
- **When inserting, be careful not to damage pinion mate gear thrust washers.**



AAT782

3. Measure clearance between side gear and differential case with washers following the procedure below:

a. Set Tool and dial indicator on side gear.


SMT611A

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

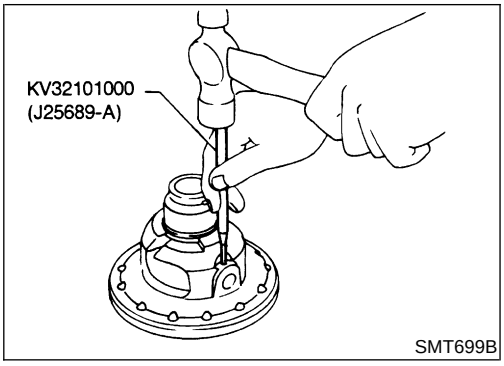
Clearance between side gear and differential case with washer:

0.1 - 0.2 mm (0.004 - 0.008 in)

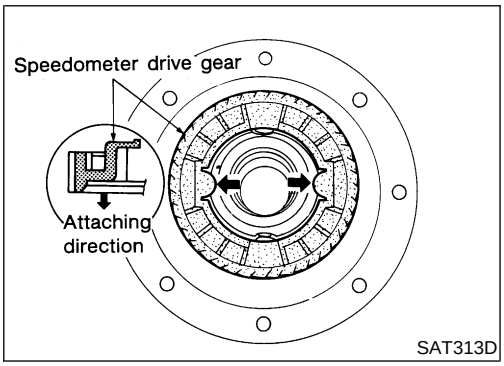
c. If not within specification, adjust clearance by changing thickness of differential side gear thrust washers.

Differential side gear thrust washers:

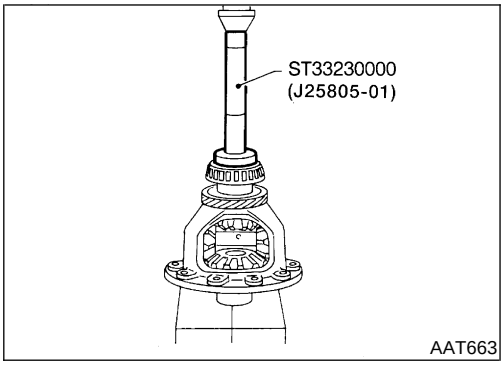
Refer to SDS, AT-368.



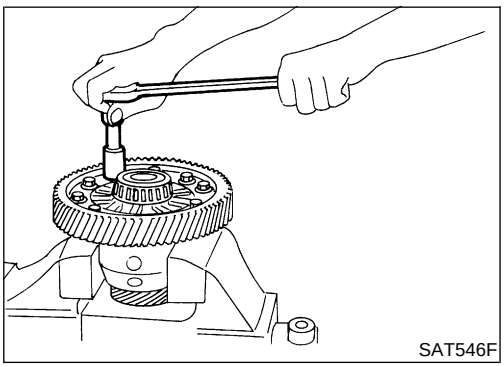
4. Install lock pin.
- **Make sure that lock pin is flush with case.**



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



6. Press on differential side bearings.

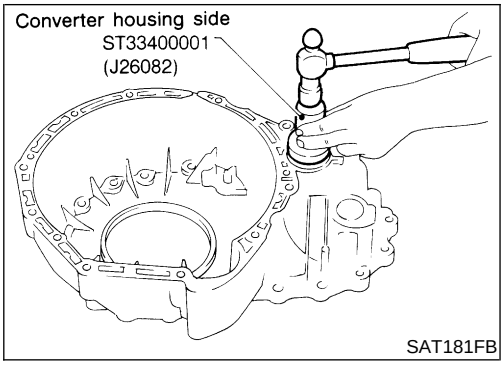


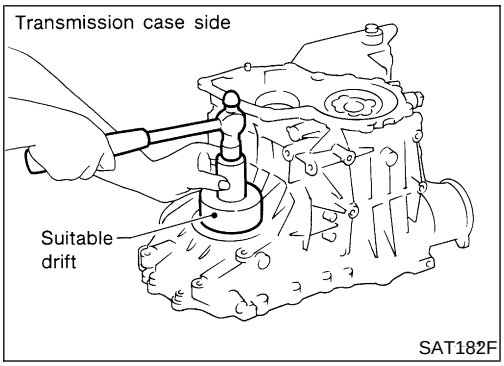
7. Install final gear and tighten fixing bolts in a crisscross pattern.
: 113 - 127 N·m (11.5 - 13.0 kg-m, 83 - 94 ft-lb)

Assembly (1)

NDAT0175

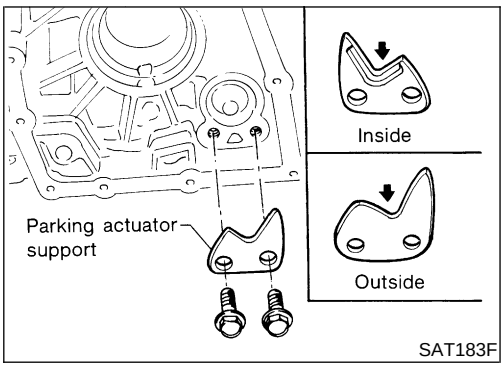
1. Install differential side oil seals on transmission case and converter housing.



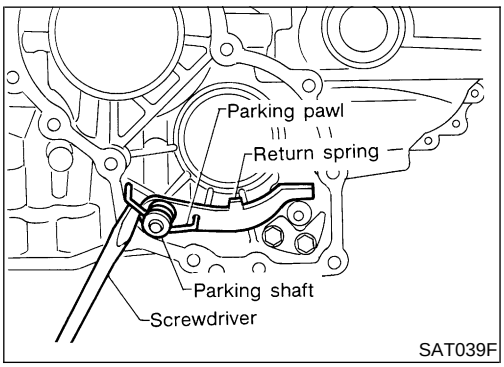


2. Install parking actuator support to transmission case.

- **Pay attention to direction of parking actuator support.**



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



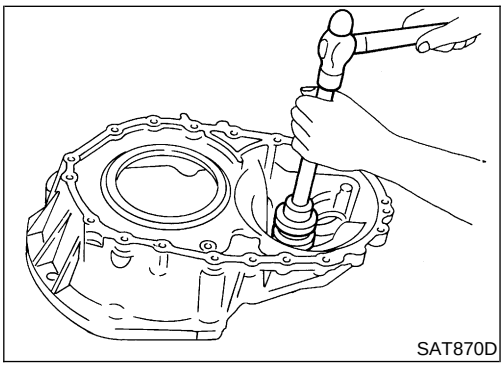
Adjustment (1)

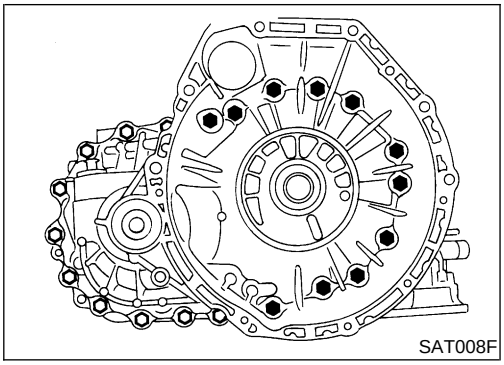
NDAT0176

DIFFERENTIAL SIDE BEARING PRELOAD

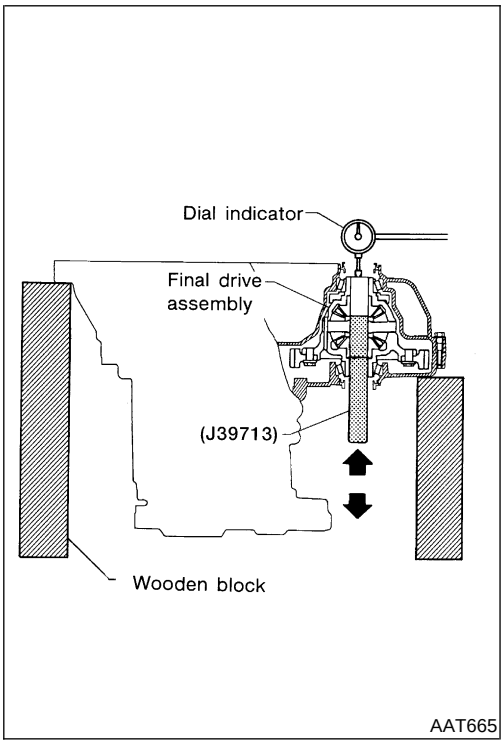
NDAT0176S01

1. Install differential side bearing outer race without adjusting shim on transmission case.
2. Install differential side bearing outer race on converter housing.




SAT008F

3. Place final drive assembly on transmission case.
4. Install transmission case on converter housing. Tighten transmission case fixing bolts to the specified torque. Refer to AT-272.



AAT665

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

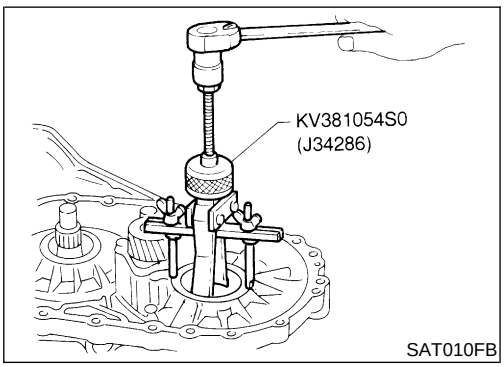
Suitable shim thickness = Dial indicator deflection + Specified bearing preload

Differential side bearing preload adjusting shim:

Refer to SDS, AT-369.

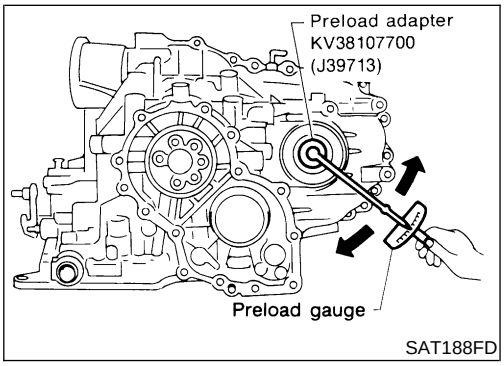
Bearing preload:

0.05 - 0.09 mm (0.0020 - 0.0035 in)



SAT010FB

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. Refer to AT-272.



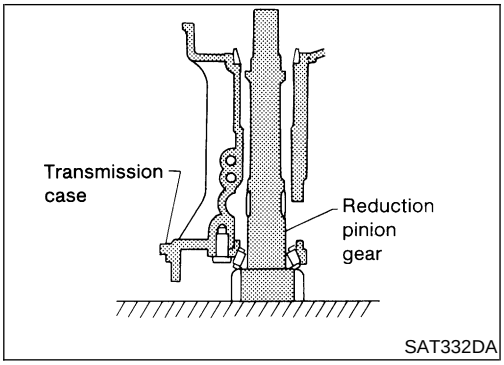
SAT188FD

14. Insert Tool 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):

  0.78 - 1.37 N·m (8.0 - 14.0 kg-cm, 6.9 - 12.2 in-lb)
- **When old bearing is used again, turning torque will be slightly less than the above.**
- **Make sure torque is close to the specified range.**

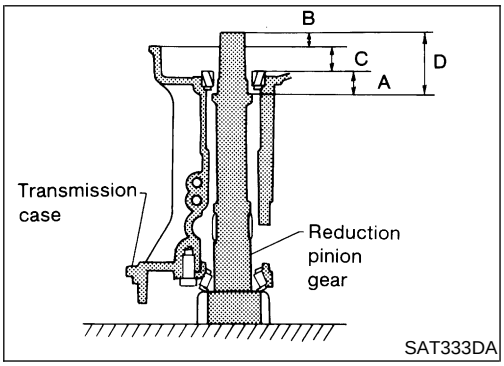


REDUCTION PINION GEAR BEARING PRELOAD

NDAT0176S02

1. Remove transmission case and final drive assembly from converter housing.
2. Select proper thickness of reduction pinion gear bearing adjusting shim using the following procedures.

a. Place reduction pinion gear on transmission case as shown.

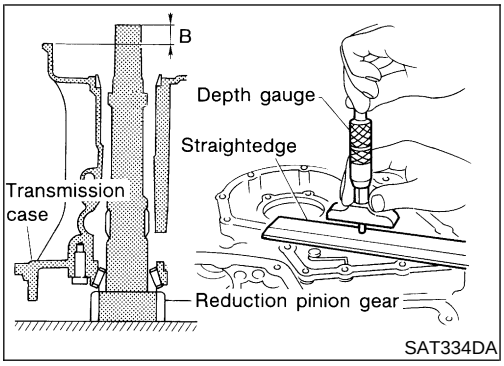


b. Place idler gear bearing on transmission case.

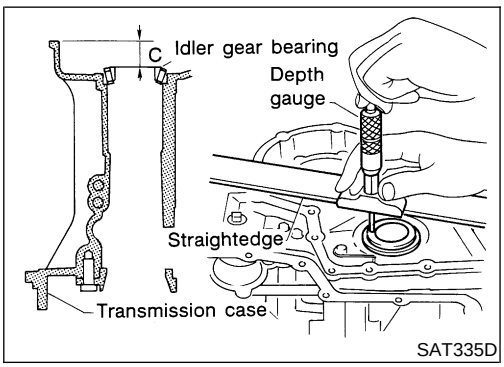
c. Measure dimensions "B" "C" and "D" and calculate dimension "A".

A = D − (B + C)

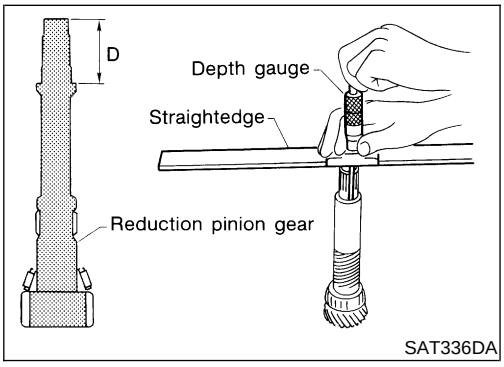
"A": Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction pinion gear.



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

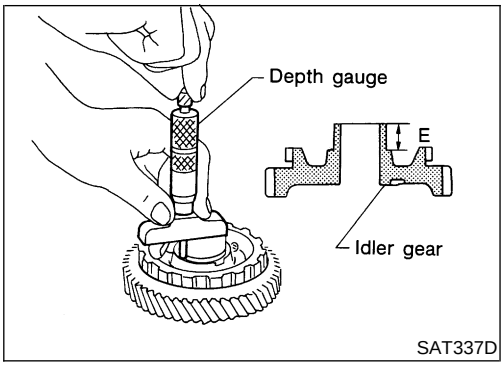


- Measure dimension "C" between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension "C" in at least two places.**



- Measure dimension "D" between the end of reduction pinion gear and the adjusting shim mating surface of reduction pinion gear.
- **Measure dimension "D" in at least two places.**
- Calculate dimension "A".

A = D − (B + C)

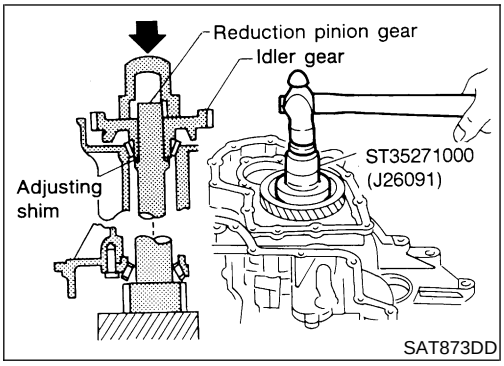


d. Measure dimension "E" between the end of idler gear and the idler gear bearing inner race mating surface of idler gear.

- **Measure dimension "E" in at least two places.**

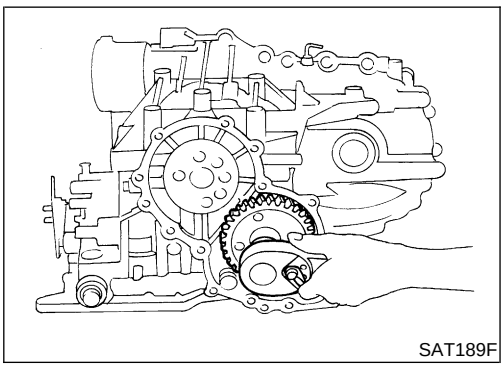
e. Select proper thickness of reduction pinion gear bearing adjusting shim.

Proper shim thickness = A − E − 0.05 mm (0.0020 in)*
(* ... Bearing preload)
Reduction pinion gear bearing adjusting shim:
Refer to SDS, AT-370.



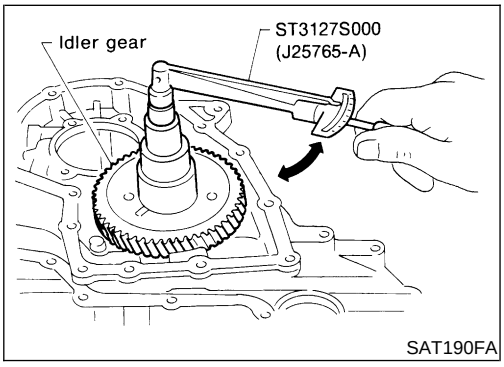
3. Install reduction gear and reduction gear bearing adjusting shim selected in step 2-e on transmission case.
4. Press idler gear bearing inner race on idler gear.
5. Press idler gear on reduction gear.

- **Press idler gear until idler gear fully contacts adjusting shim.**



6. Tighten idler gear lock nut to the specified torque. Refer to AT-332.

- **Lock idler gear with parking pawl when tightening lock nut.**



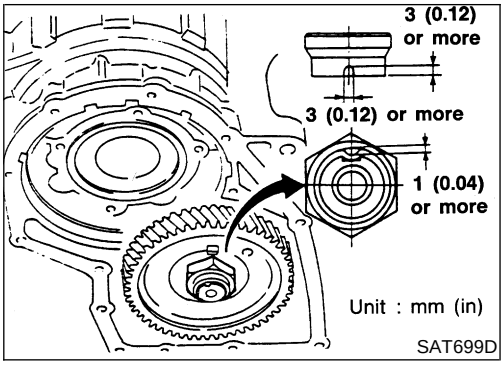
7. Measure turning torque of reduction pinion gear.

- **When measuring turning torque, turn reduction pinion gear in both directions several times to seat bearing rollers correctly.**

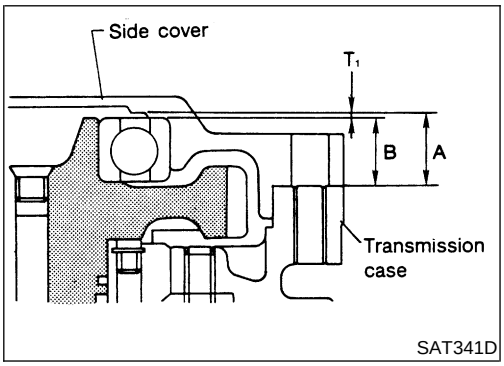
Turning torque of reduction pinion gear:
0.05 - 0.39 N·m (0.5 - 4.0 kg-cm, 0.43 - 3.47 in-lb)

- **If turning torque is out of specification, decrease or increase thickness of reduction pinion gear bearing adjusting shim.**

Adjustment (1) (Cont'd)



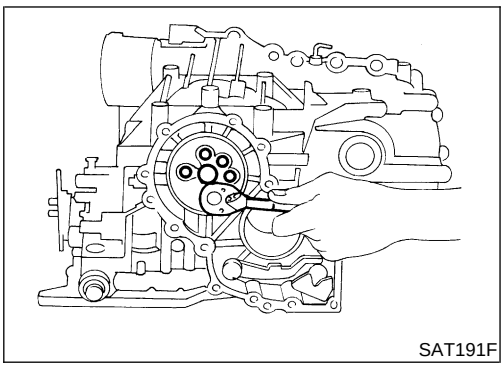
8. After properly adjusting turning torque, clinch idler gear lock nut as shown.



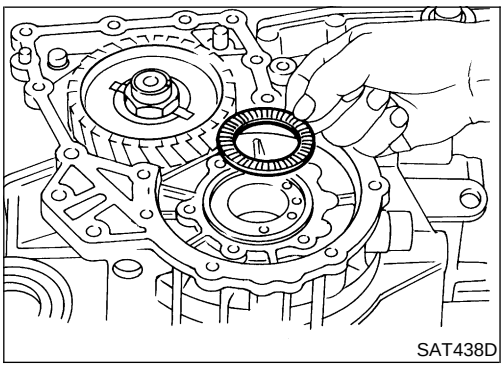
OUTPUT SHAFT END PLAY

NDAT0176S03

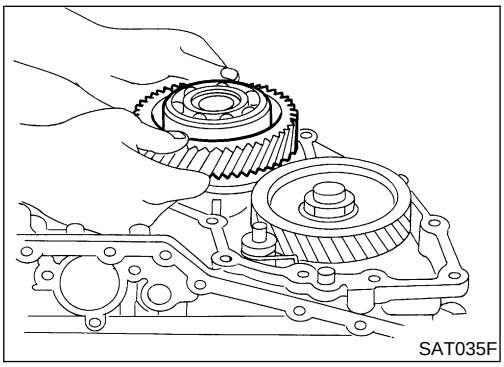
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



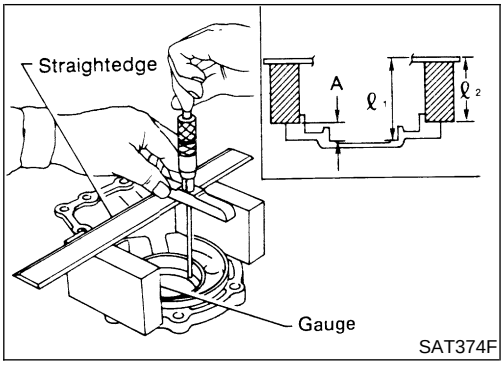
1. Install bearing retainer for output shaft.



2. Install output shaft thrust needle bearing on bearing retainer.



3. Install output shaft on transmission case.



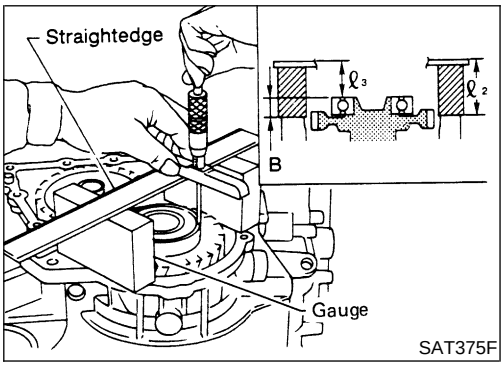
4. Measure dimensions "ℓ_1" and "ℓ_2" at side cover and then calculate dimension "A".

- **Measure dimension "ℓ_1" and "ℓ_2" in at least two places.**

"A": Distance between transmission case fitting surface and adjusting shim mating surface.

$A = \ell_1 - \ell_2$

ℓ_2: Height of gauge



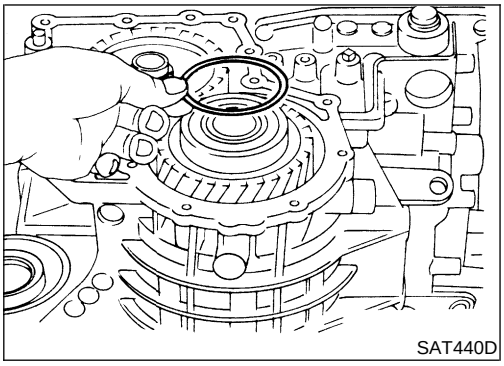
5. Measure dimensions "ℓ_2" and "ℓ_3" and then calculate dimension "B".

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

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

$B = \ell_2 - \ell_3$

ℓ_2: Height of gauge



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

Output shaft end play (A − B):

0 - 0.15 mm (0 - 0.0059 in)

Output shaft end play adjusting shims:

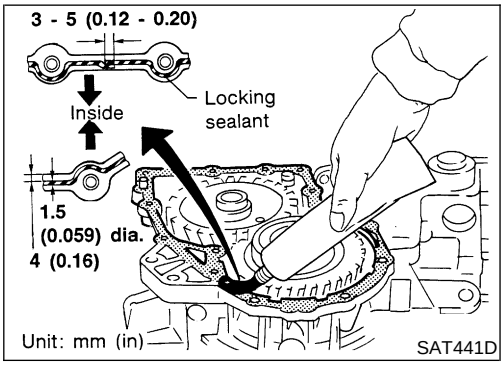
Refer to SDS, AT-371.

7. Install adjusting shim on output shaft bearing.

Assembly (2)

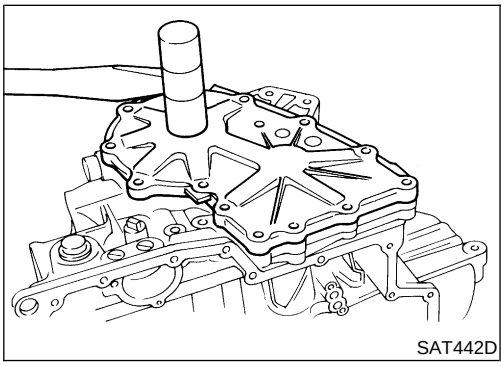
NDAT0177

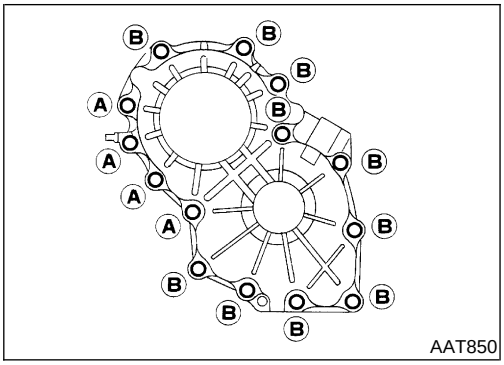
1. Apply locking sealant (Loctite #518) to transmission case as shown in illustration.



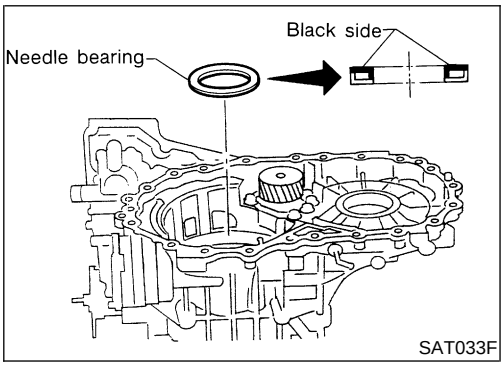
2. Set side cover on transmission case.

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

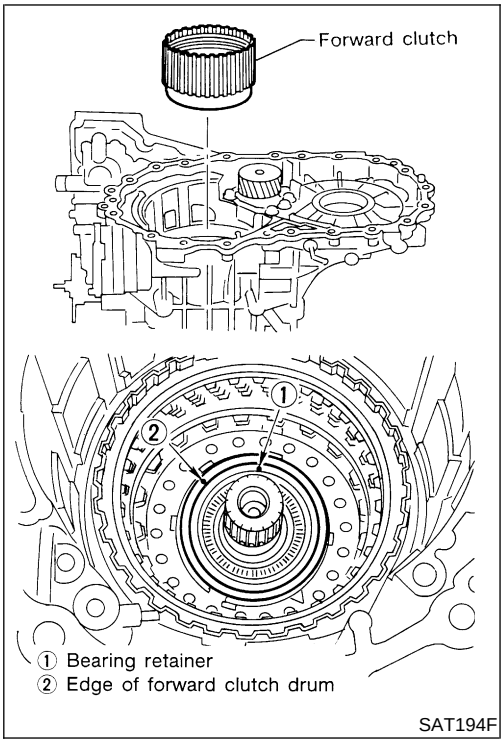




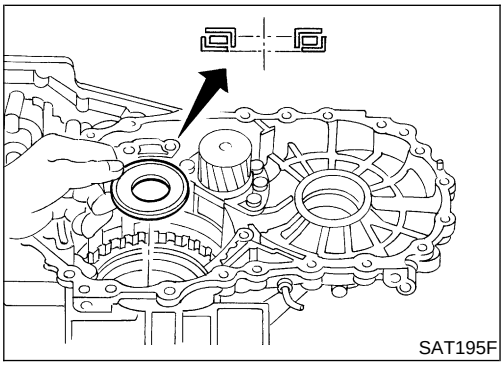
3. Tighten side cover fixing bolts to specified torque.
   : **3.0 - 3.4 N·m (0.31 - 0.35 kg-m, 26.9 - 30.4 in-lb)**
- **Do not mix bolts A and B.**
- **Always replace bolts A as they are self-sealing bolts.**



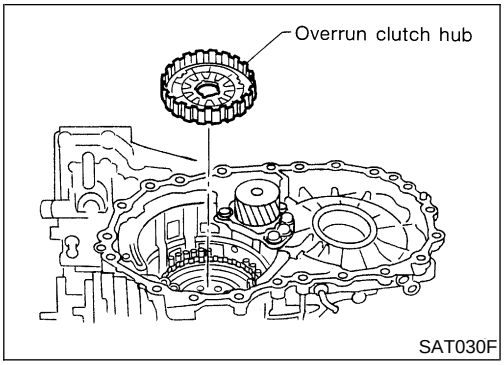
4. Remove paper rolled around bearing retainer.
5. Install thrust washer on bearing retainer.
- **Apply petroleum jelly to thrust washer.**



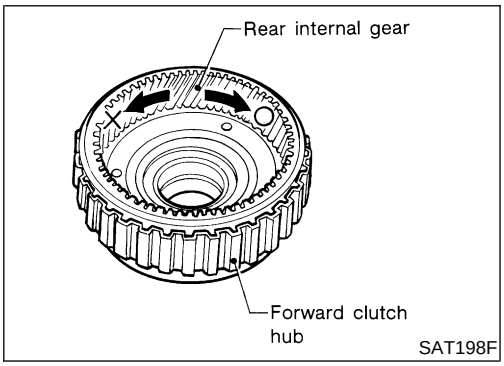
6. Install forward clutch assembly.
- **Align teeth of low & reverse brake drive plates before installing.**
- **Make sure that bearing retainer seal rings are not spread.**
- **If forward clutch assembly is correctly seated, points 1 and 2 are at almost same level.**



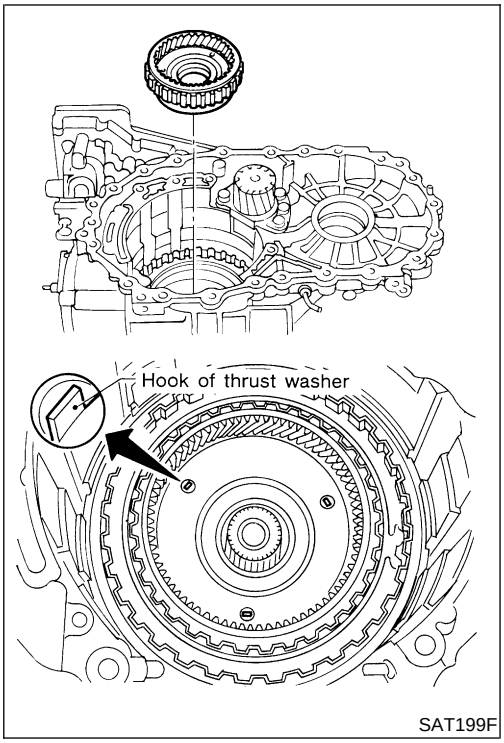
7. Install thrust needle bearing on bearing retainer.
- **Apply petroleum jelly to thrust needle bearing.**
- **Pay attention to direction of thrust needle bearing.**



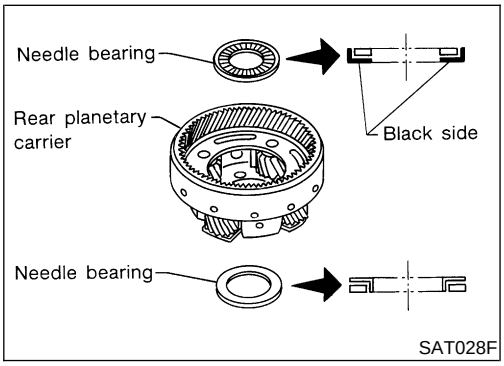
8. Install overrun clutch hub.
- **Apply petroleum jelly to thrust washers.**
- **Align teeth of overrun clutch drive plates before installing.**



9. Hold forward clutch hub and turn rear internal gear.
   Check overrun clutch hub for correct directions of lock and unlock.
- **If not shown as illustrated, check installed direction of forward one-way clutch.**

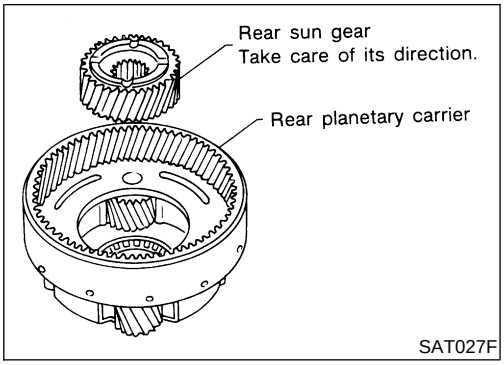


10. Install forward clutch hub and rear internal gear assembly.
- **Align teeth of forward clutch drive plates before installing.**
- **Check that three hooks of thrust washer are correctly aligned after installing.**



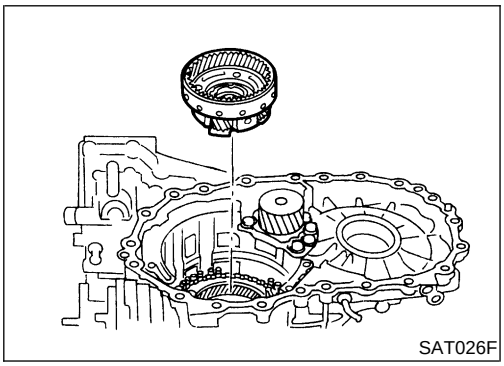
11. Install rear planetary carrier assembly and rear sun gear according to the following procedures.

a. Install needle bearings on rear planetary carrier.
- **Apply petroleum jelly to needle bearings.**
- **Pay attention to direction of needle bearings.**

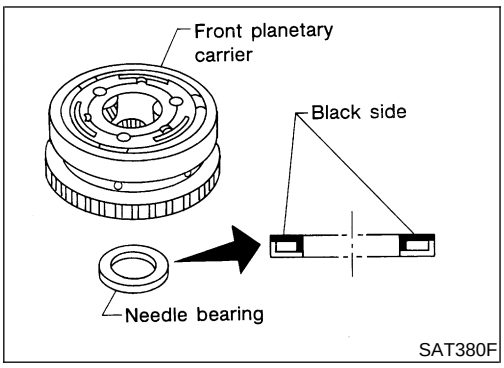


b. Install rear sun gear on rear planetary carrier.

- **Pay attention to direction of rear sun gear.**

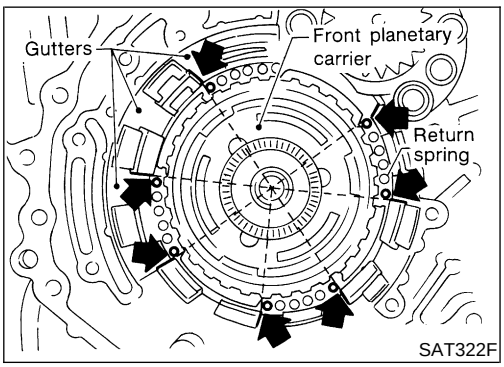


c. Install rear planetary carrier on transmission case.



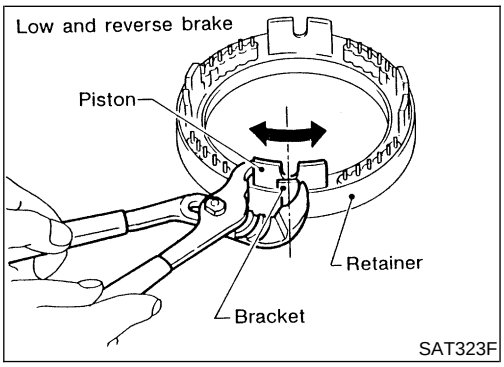
12. Install thrust needle bearing on front planetary carrier, then install them together on transmission case.

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

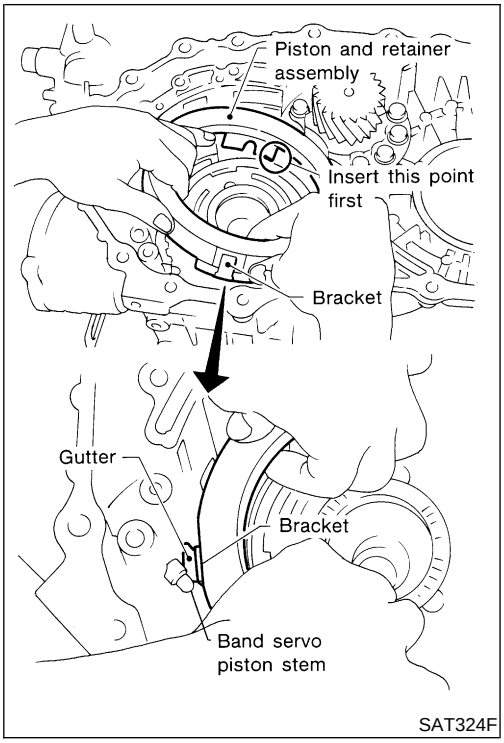


13. Install low and reverse brake piston according to the following procedures.

a. Set and align return springs to transmission case gutters as shown in illustration.

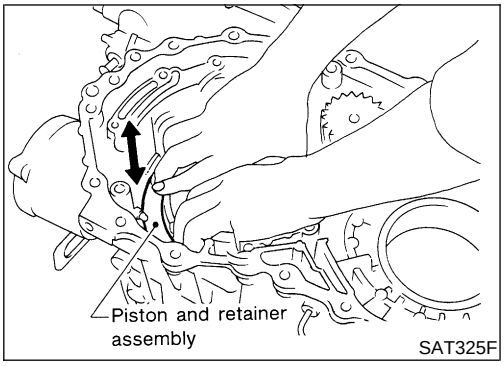


b. Set and align piston with retainer.



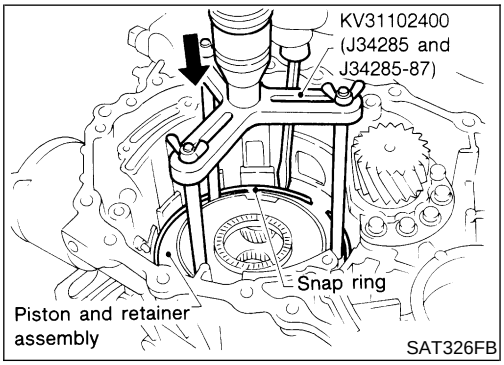
c. Install piston and retainer assembly on the transmission case.

- **Align bracket to specified gutter as indicated in illustration.**

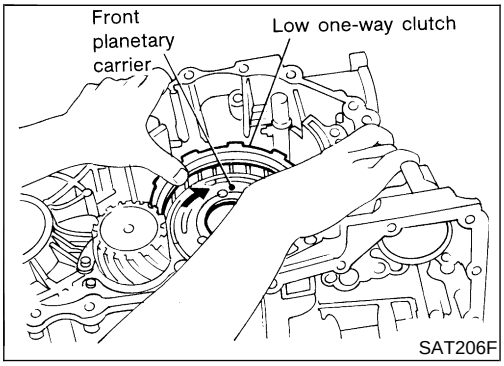


d. Check that each protrusion of piston is correctly set to corresponding return spring as follows.

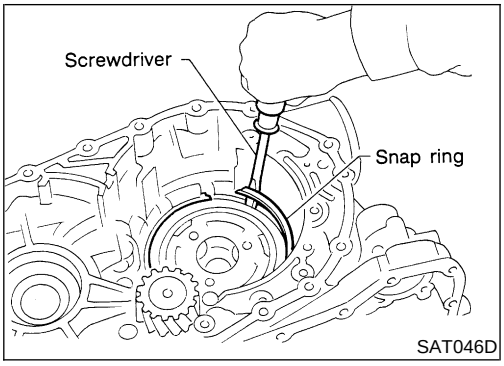
- **Push piston and retainer assembly evenly and confirm they move smoothly.**
- **If they can not move smoothly, remove piston and retainer assembly and align return spring correctly as instructed in step "a".**



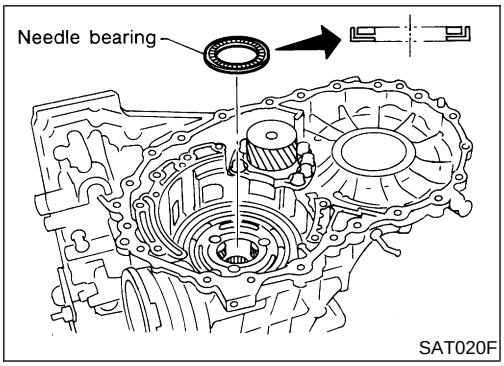
e. Push down piston and retainer assembly and install snap ring.



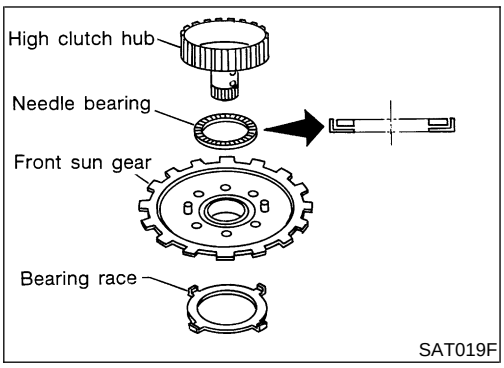
14. Install low one-way clutch to front planetary carrier by turning carrier in the direction of the arrow shown.



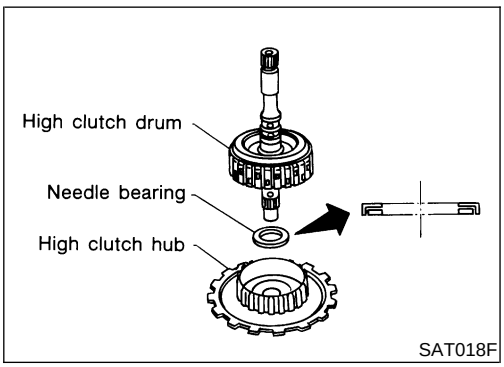
15. Install snap ring with screwdriver.
- **Forward clutch and bearing must be correctly installed for snap ring to fit into groove of transmission case.**



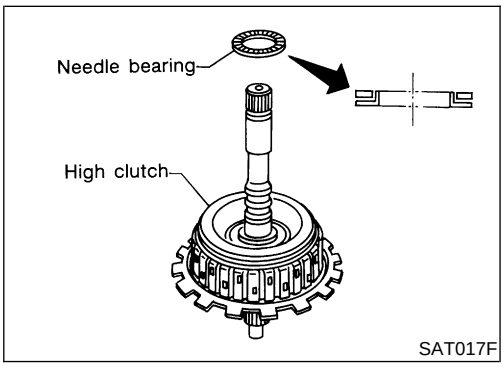
16. Install needle bearing on transmission case.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



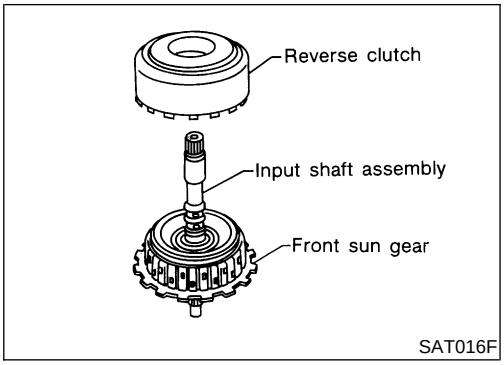
17. Install bearing race, needle bearing and high clutch hub on front sun gear.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



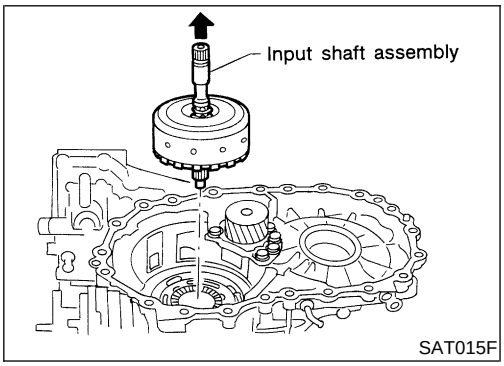
18. Install needle bearing and high clutch drum on high clutch hub.



19. Install needle bearing on high clutch drum.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



20. Remove paper rolled around input shaft.
21. Install input shaft assembly in reverse clutch.
- **Align teeth of reverse clutch drive plates before installing.**



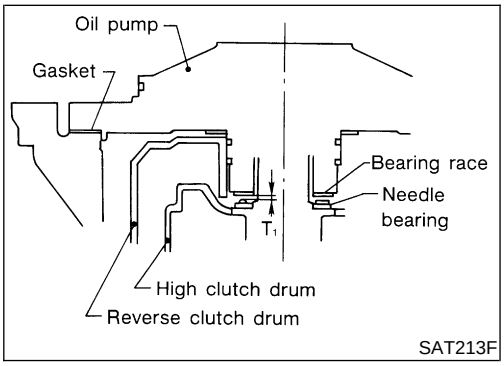
22. Install reverse clutch assembly on transmission case.
- **Align teeth of high clutch drive plates before installing.**

Adjustment (2)

NDAT0178

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	—	●

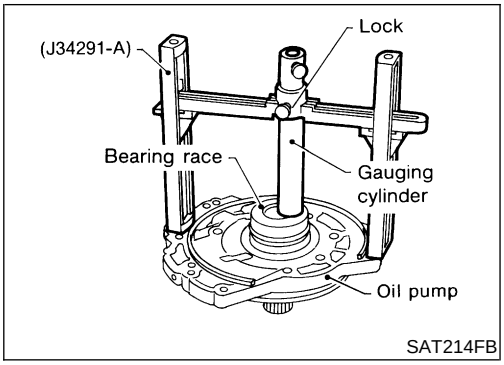


TOTAL END PLAY

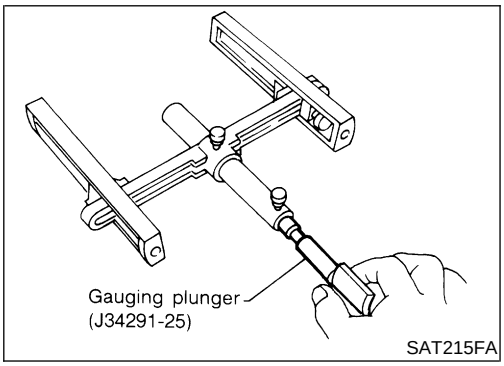
NDAT0178S01

1. Adjust total end play "T_1".

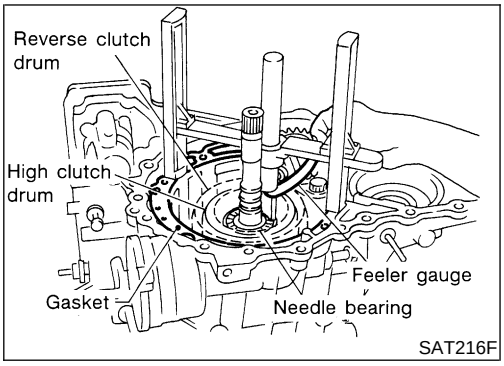
Adjustment (2) (Cont'd)



a. With original bearing race installed, place Tool onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly. The gauging cylinder should rest on top of bearing race. Lock gauging cylinder in place with set screw.



b. Install gauging plunger into cylinder.



c. With needle bearing installed on high clutch drum, place Tool legs on machined surface of transmission case (with gasket). Then allow plunger to rest on needle bearing.

d. Measure gap between cylinder and plunger. This measurement should give exact total end play.

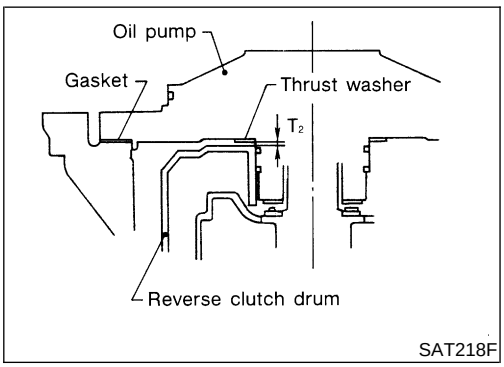
Total end play "T_1":

0.25 - 0.55 mm (0.0098 - 0.0217 in)

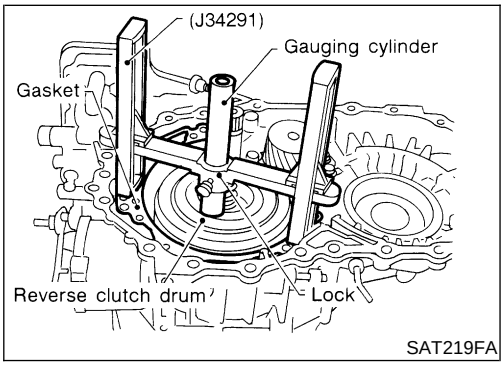
- If end play is out of specification, decrease or increase thickness of bearing race as necessary.

Available bearing race for adjusting total end play:

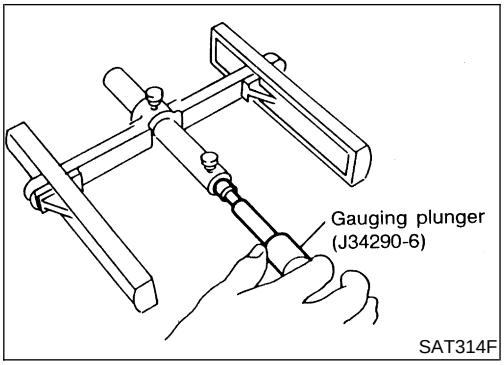
Refer to SDS, AT-372.



2. Adjust reverse clutch drum end play "T_2".



a. Place Tool on machined surface of transmission case (with gasket). Then allow gauging cylinder to rest on reverse clutch drum. Lock cylinder in place with set screw.



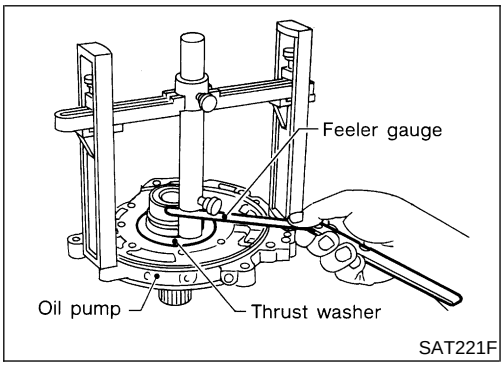
SAT314F

b. Install gauging plunger into cylinder.
c. With original thrust washer installed on oil pump, place Tool legs onto machined surface of oil pump assembly. Then allow plunger to rest on thrust washer.
d. Measure gap between cylinder and plunger with feeler gauge. This measurement should give exact reverse clutch drum end play.

Reverse clutch drum end play "T_2":
0.55 - 0.90 mm (0.0217 - 0.0354 in)

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

Available thrust washer for adjusting reverse clutch drum end play:
Refer to SDS, AT-372.

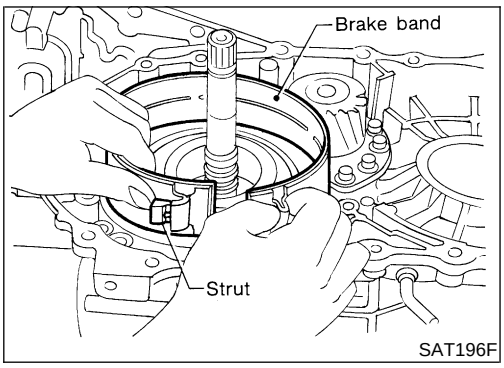


SAT221F

Assembly (3)

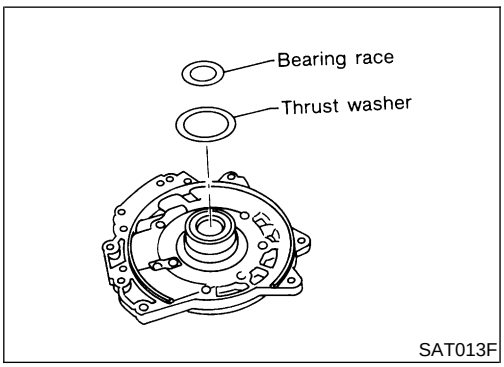
NDAT0179

1. Install anchor end pin and lock nut on transmission case.
2. Place brake band on outside of reverse clutch drum. Tighten anchor end pin just enough so that brake band is evenly fitted on reverse clutch drum.



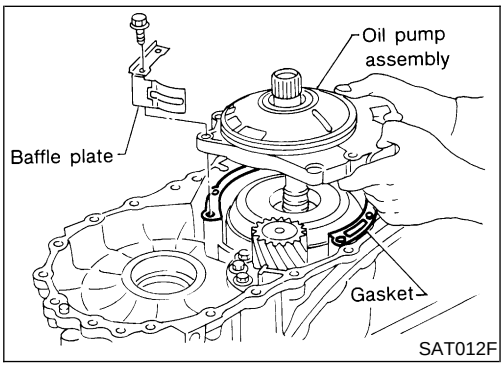
SAT196F

3. Place bearing race selected in total end play adjustment step on oil pump cover.
- **Apply petroleum jelly to bearing race.**
4. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.
- **Apply petroleum jelly to thrust washer.**

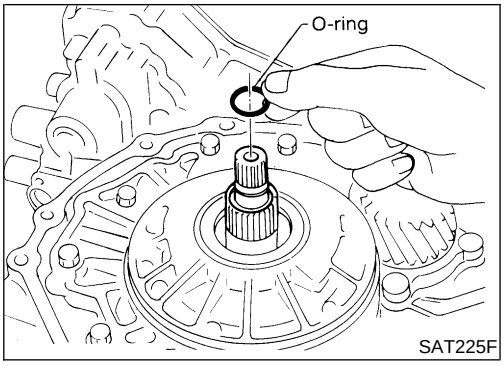


SAT013F

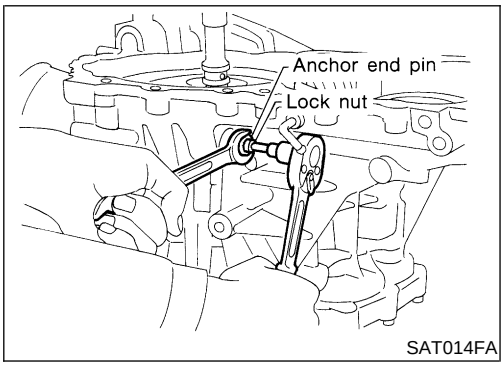
5. Install oil pump assembly, baffle plate and gasket on transmission case.
6. Tighten oil pump fixing bolts to the specified torque.



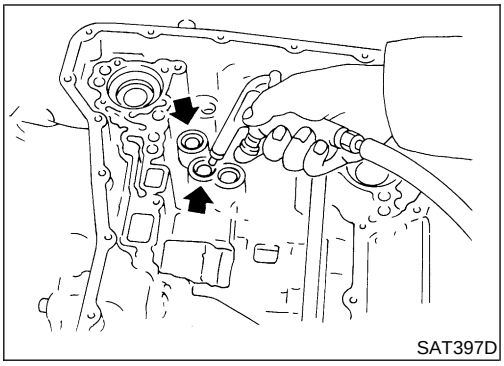
SAT012F



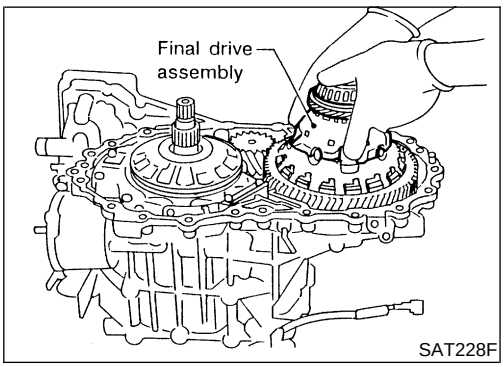
7. Install O-ring to input shaft.
- **Apply ATF to O-ring.**



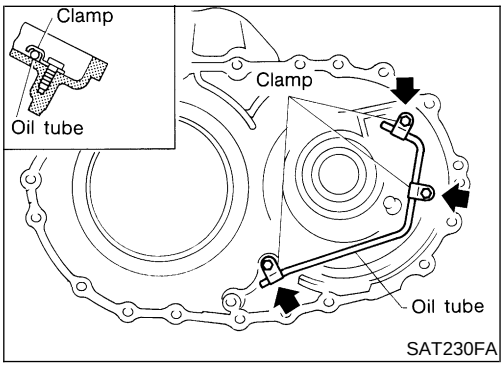
8. Adjust brake band.
a. Tighten anchor end pin to the specified torque.
Anchor end pin:
: 3.9 - 5.9 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)
b. Back off anchor end pin two and a half turns.
c. While holding anchor end pin, tighten lock nut.
Lock nut:
: 31 - 36 N·m (3.2 - 3.7 kg-m, 23 - 27 ft-lb)



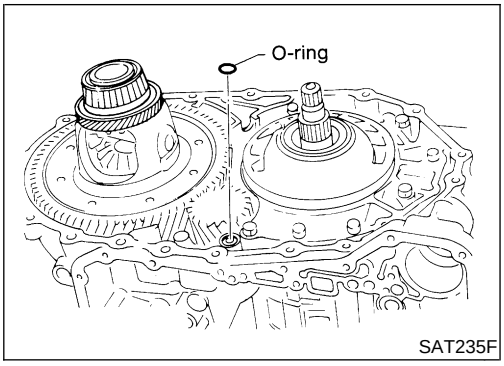
9. Apply compressed air to oil holes of transmission case and check operation of brake band.



10. Install final drive assembly on transmission case.

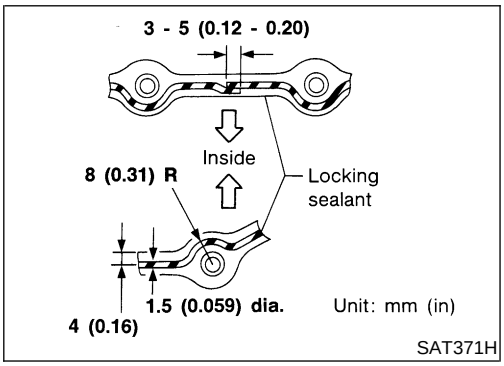


11. Install oil tube on converter housing.



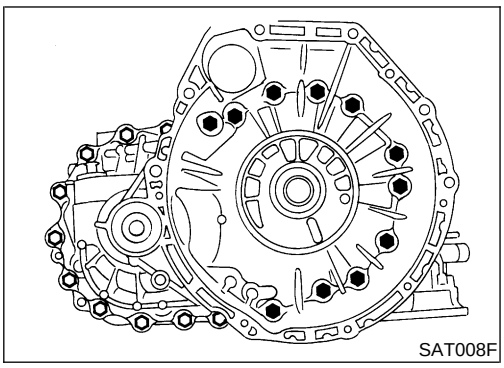
SAT235F

12. Install O-ring on differential oil port of transmission case.

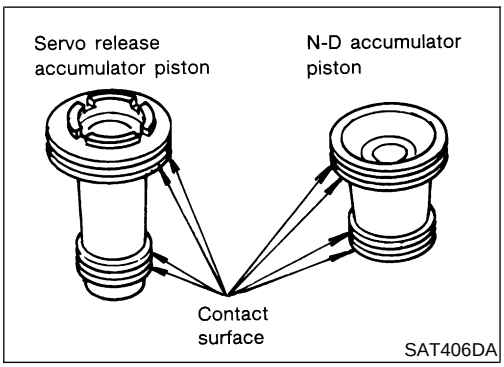


SAT371H

13. Install converter housing on transmission case.
- **Apply locking sealant (Loctite #518) to mating surface of converter housing.**


SAT008F

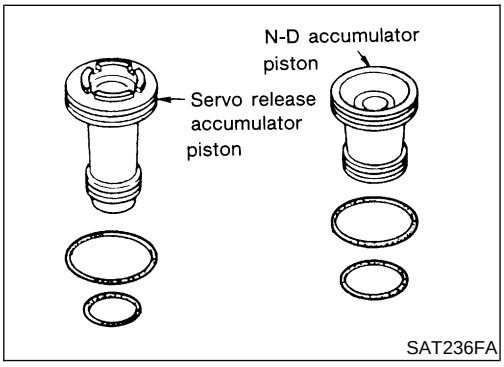
14. Install accumulator piston.
a. Check contact surface of accumulator piston for damage.



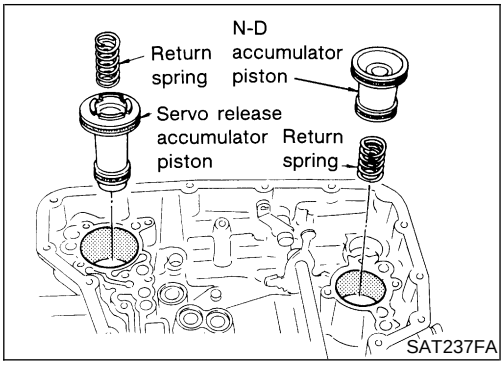
SAT406DA

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

Accumulator piston O-rings:
Refer to SDS, AT-366.



SAT236FA

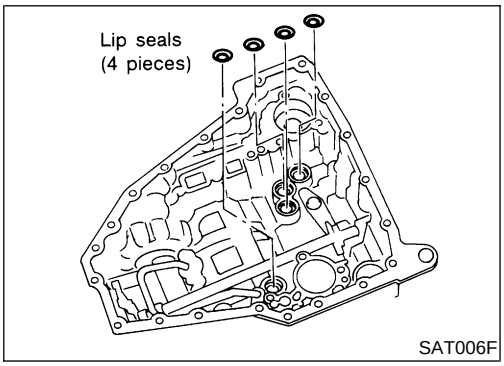


c. Install accumulator pistons and return springs on transmission case.

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

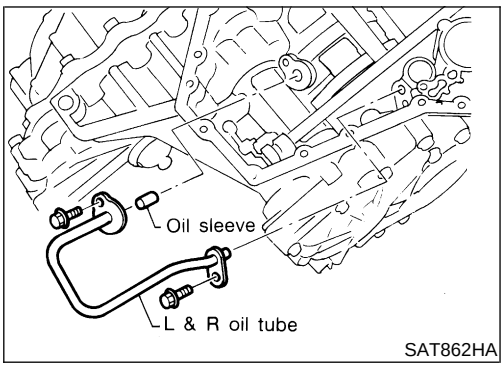
Return springs:

Refer to SDS, AT-366.



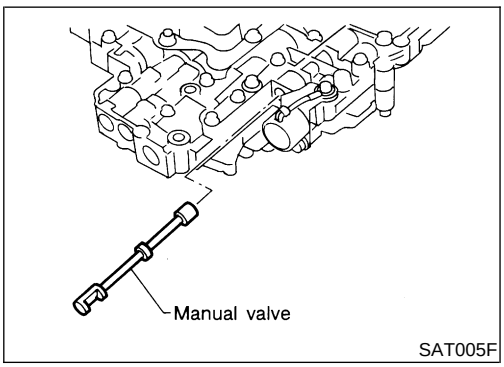
15. Install lip seals for band servo oil holes on transmission case.

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



16. Install L & R oil tube and oil sleeve.

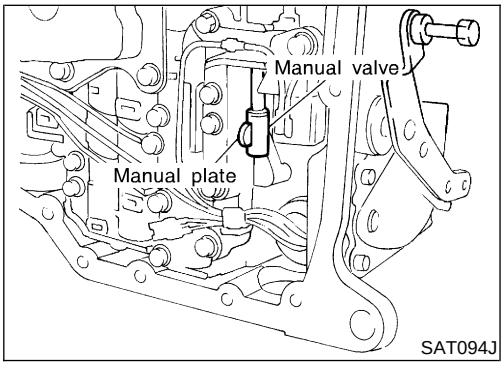
: 5 - 7 N·m (0.5 - 0.7 kg-m, 43 - 61 in-lb)



17. Install control valve assembly.

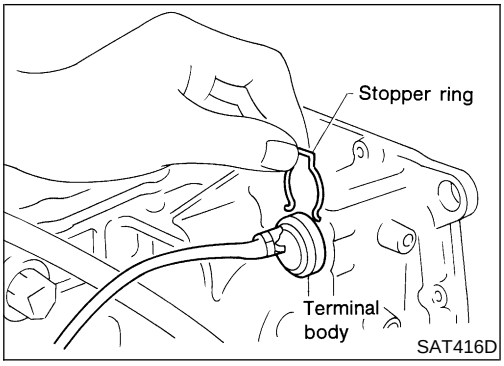
a. Insert manual valve into control valve assembly.

- **Apply ATF to manual valve.**

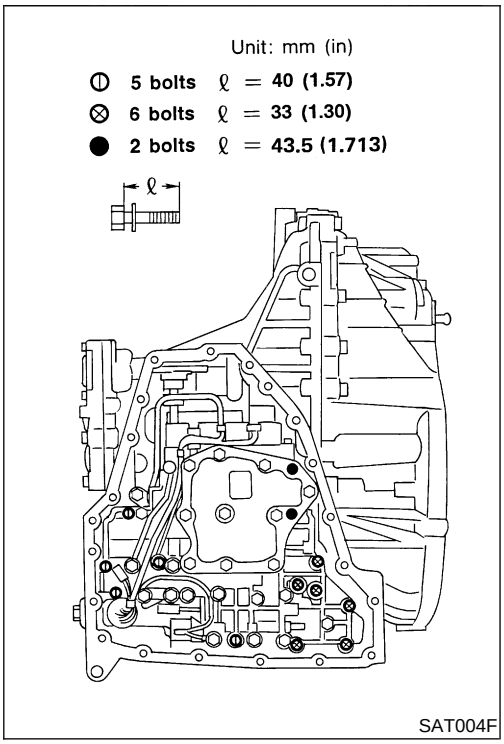


b. Set manual shaft in Neutral position.

c. Install control valve assembly on transmission case while aligning manual valve with manual plate.



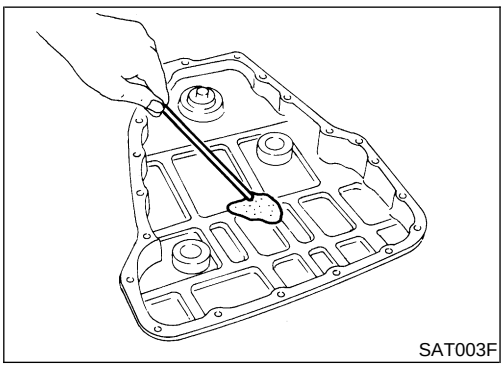
d. Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.
e. Install stopper ring to terminal body.



f. Tighten bolts **I**, **X** and ●.

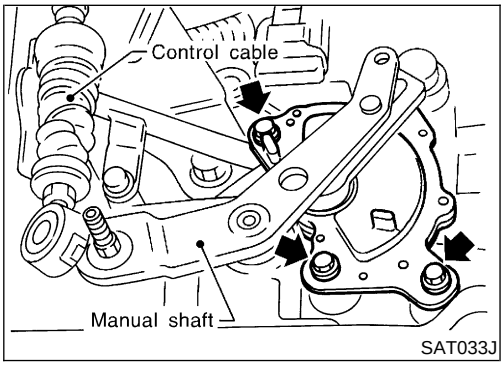
Bolt length, number and location:

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

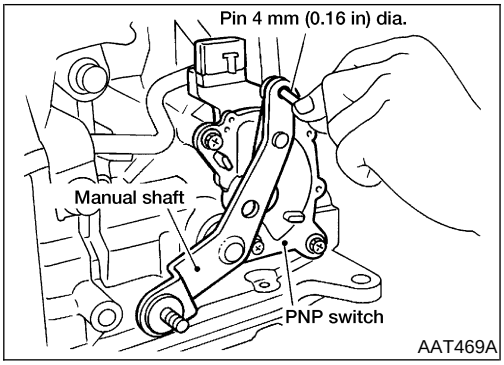


18. Install oil pan.
a. Attach a magnet to oil pan.
b. Install new oil pan gasket on transmission case.
c. Install oil pan on transmission case.
- **Always replace oil pan bolts as they are self-sealing bolts.**
- **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**

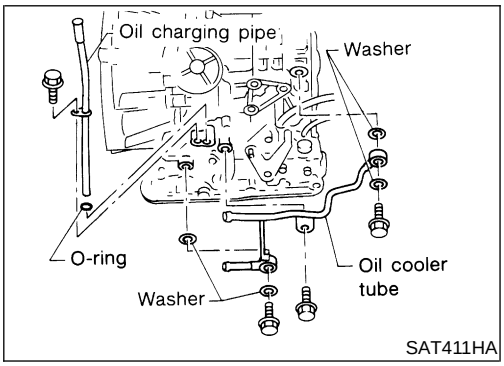
d. Tighten oil pan bolts and drain plug to the specified torque. Refer to AT-272.



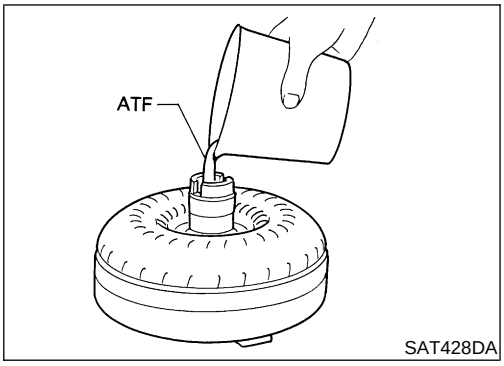
19. Install park/neutral position (PNP) switch.
a. Set manual shaft in P position.
b. Temporarily install park/neutral position (PNP) switch on manual shaft.
c. Move selector lever to N position.



d. Use a 4 mm (0.16 in) pin for this adjustment.
i. Insert the pin straight into the manual shaft adjustment hole.
ii. Rotate park/neutral position (PNP) switch until the pin can also be inserted straight into hole in park/neutral position (PNP) switch.
e. Tighten park/neutral position (PNP) switch fixing bolts. Refer to AT-272.
f. Remove pin from adjustment hole after adjusting park/neutral position (PNP) switch.

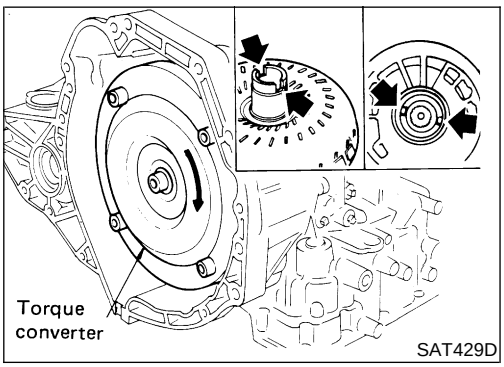


20. Install oil charging pipe and oil cooler tube to transmission case.

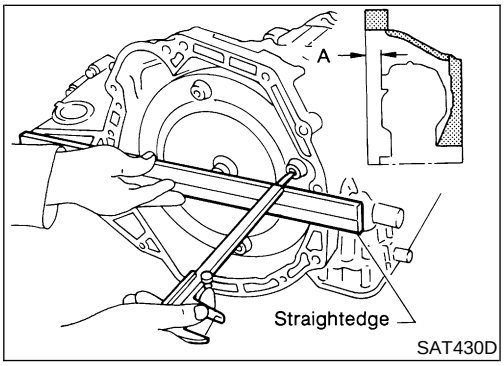


21. Install torque converter.
a. Pour ATF into torque converter.

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



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



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

Distance A: 19 mm (0.75 in) or more

General Specifications

NDAT0180

Engine		VG33E
Automatic transaxle model		RE4F04A
Automatic transaxle assembly	Model code number	80X77
Transaxle gear ratio	1st	2.785
	2nd	1.545
	3rd	1.000
	4th	0.694
	Reverse	2.272
	Final drive	3.789
Recommended fluid		Nissan Matic “D” (Continental U.S. and Alaska) or Canada Nissan Automatic Transmission Fluid *1
Fluid capacity ℓ(US qt, Imp qt)		9.4 (10, 8-1/4)

*1: Refer to ***MA-11***“Fluids and Lubricants”.

Shift Schedule

NDAT0181

VEHICLE SPEED WHEN SHIFTING GEARS THROTTLE POSITION

NDAT0181S01

Throttle position	Shift pattern	Vehicle speed km/h (MPH)						
		$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
Full throttle	Comfort	56 - 64 (35 - 40)	102 - 110 (63 - 68)	165 - 173 (103 - 108)	161 - 169 (100 - 105)	92 - 100 (57 - 62)	41 - 49 (25 - 30)	56 - 64 (35 - 40)
Half throttle	Comfort	36 - 44 (22 - 27)	50 - 58 (31 - 36)	128 - 136 (80 - 85)	69 - 77 (43 - 48)	33 - 41 (21 - 25)	6 - 14 (4 - 9)	56 - 64 (35 - 40)

VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

NDAT0181S02

Throttle position	Shift pattern	OD switch	Gear position	Vehicle speed km/h (MPH)	
				Lock-up ON	Lock-up OFF
2.0/8	Comfort	ON	D_4	95 - 103 (59 - 64)	73 - 81 (45 - 50)
		OFF	D_3	86 - 94 (53 - 58)	83 - 91 (52 - 57)

Stall Revolution

NDAT0182

Engine	Stall revolution rpm
VG33E	1,900 - 2,200

Line Pressure

NDAT0183

Engine speed rpm	Line pressure kPa (kg/cm^2, psi)	
	D, 2 and 1 positions	R position
Idle	500 (5.1, 73)	779 (7.95, 113.0)
Stall	1,216 (12.4, 176)	1,883 (19.21, 273.0)

Control Valves

NDAT0184

CONTROL VALVE AND PLUG RETURN SPRINGS

NDAT0184S01

Unit: mm (in)

Parts			Item		
			Part No. *	Free length	Outer diameter
Upper body	18	Pilot valve spring	31742-80L05	36.0 (1.417)	8.1 (0.319)
	8	1-2 accumulator valve spring (small)	31742-80L06	20.5 (0.807)	7.0 (0.276)
	21	1-2 accumulator piston spring (large)	31742-80L07	49.25 (1.9390)	19.6 (0.772)
	25	1st reducing valve spring	31742-80L08	27.0 (1.063)	7.0 (0.276)
	16	Overrun clutch reducing valve spring	31742-80L09	37.5 (1.476)	6.9 (0.272)
	11	Torque converter relief valve spring	31742-80L10	31.0 (1.220)	9.0 (0.354)
	4	Torque converter clutch control valve spring	31742-80L11	39.5 (1.555)	11.0 (0.433)
Lower body	16	Pressure regulator valve spring	31742-80L01	45.0 (1.772)	15.0 (0.591)
	25	Overrun clutch control valve spring	31762-80L00	21.7 (0.854)	7.0 (0.276)
	30	Accumulator control valve spring	31742-80L02	22.0 (0.866)	6.5 (0.256)
	31	Shift valve A spring	31762-80L00	21.7 (0.854)	7.0 (0.276)
	12	Shift valve B spring	31762-80L00	21.7 (0.854)	7.0 (0.276)
	7	Pressure modifier valve spring	31742-80L03	30.5 (1.201)	9.8 (0.386)
	3		31742-80L04	32.0 (1.260)	6.9 (0.272)
	13	Return spring	31742-80L00	17.0 (0.669)	10.7 (0.421)
	—	Oil cooler relief valve spring	31742-80L12	17.02 (0.670)	8.0 (0.315)

*: Always check with the Parts Department for the latest parts information.

Accumulator

NDAT0185

O-RING

NDAT0185S01

Unit: mm (in)

Accumulator	Inner diameter (Small)	Inner diameter (Large)
Servo release accumulator	26.9 (1.059)	44.2 (1.740)
N-D accumulator	34.6 (1.362)	39.4 (1.551)

RETURN SPRING

NDAT0185S02

Unit: mm (in)

Accumulator	Free length	Outer diameter
Servo release accumulator	52.5 (2.067)	20.4 (0.803)
N-D accumulator	43.5 (1.713)	28.0 (1.102)

Clutch and Brakes

NDAT0186

REVERSE CLUTCH

NDAT0186S01

Number of drive plates		2	
Number of driven plates		2	
Drive plate thickness mm (in)	Standard	1.6 (0.063)	
	Allowable limit	1.4 (0.055)	
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 *
		6.6 (0.260) 6.8 (0.268) 7.0 (0.276) 7.2 (0.283) 7.4 (0.291) 7.6 (0.299) 7.8 (0.307)	31537-80L00 31537-80L01 31537-80L02 31537-80L03 31537-80L04 31537-80L05 31537-80L06

*: Always check with the Parts Department for the latest parts information.

HIGH CLUTCH

NDAT0186S02

Number of drive plates		4	
Number of driven plates		6 + 1	
Drive plate thickness mm (in)	Standard	1.6 (0.063)	
	Allowable limit	1.4 (0.055)	
Clearance mm (in)	Standard	1.8 - 2.2 (0.071 - 0.087)	
	Allowable limit	3.0 (0.118)	
Thickness of retaining plates		Thickness mm (in)	Part number *
		3.0 (0.118) 3.2 (0.126) 3.4 (0.134) 3.6 (0.142) 3.8 (0.150)	31537-80L19 31537-80L20 31537-80L21 31537-80L22 31537-80L23

*: Always check with the Parts Department for the latest parts information.

FORWARD CLUTCH

NDAT0186S03

Number of drive plates		6	
Number of driven plates		6	
Drive plate thickness mm (in)	Standard	1.6 (0.063)	
	Allowable limit	1.4 (0.055)	
Clearance mm (in)	Standard	0.45 - 0.85 (0.0177 - 0.0335)	
	Allowable limit	2.05 (0.0807)	
Thickness of retaining plates		Thickness mm (in)	Part number *
		3.2 (0.126) 3.4 (0.134) 3.6 (0.142) 3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173)	31537-80L18 31537-80L17 31537-80L12 31537-80L13 31537-80L14 31537-80L15 31537-80L16

*: Always check with the Parts Department for the latest parts information.

OVERRUN CLUTCH

NDAT0186S04

Number of drive plates		3	
Number of driven plates		5	
Drive plate thickness mm (in)	Standard	1.6 (0.063)	
	Allowable limit	1.4 (0.055)	
Clearance mm (in)	Standard	0.7 - 1.1 (0.028 - 0.043)	
	Allowable limit	1.7 (0.067)	
Thickness of retaining plates		Thickness mm (in)	Part number *
		3.0 (0.118) 3.2 (0.126) 3.4 (0.134) 3.6 (0.142) 3.8 (0.150)	31537-80L07 31537-80L08 31537-80L09 31537-80L10 31537-80L11

*: Always check with the Parts Department for the latest parts information.

LOW & REVERSE BRAKE

NDAT0186S05

Number of drive plates		7	
Number of driven plates		7	
Drive plate thickness mm (in)	Standard	1.8 (0.071)	
	Allowable limit	1.6 (0.063)	
Clearance mm (in)	Standard	1.7 - 2.1 (0.067 - 0.083)	
	Allowable limit	3.5 (0.138)	
Thickness of retaining plates		Thickness mm (in)	Part number *
		2.0 (0.079) 2.2 (0.087) 2.4 (0.094) 2.6 (0.102) 2.8 (0.110) 3.0 (0.118) 3.2 (0.126) 3.4 (0.134)	31667-80L00 31667-80L01 31667-80L02 31667-80L03 31667-80L04 31667-80L05 31667-80L06 31667-80L07

*: Always check with the Parts Department for the latest parts information.

BRAKE BAND

NDAT0186S06

Anchor end pin tightening torque N·m (kg-m, in-lb)	3.5 - 5.9 (0.36 - 0.6, 31 - 52)
Number of returning revolutions for anchor end pin	2.5
Lock nut tightening torque N·m (kg-m, ft-lb)	31 - 36 (3.2 - 3.7, 23 - 27)

Final Drive

NDAT0187

DIFFERENTIAL SIDE GEAR CLEARANCE

NDAT0187S01

Clearance between side gear and differential case with washer mm (in)	0.1 - 0.2 (0.004 - 0.008)

DIFFERENTIAL SIDE GEAR THRUST WASHERS

NDAT0187S02

Thickness mm (in)	Part number *
0.75 (0.0295)	38424-81X00
0.80 (0.0315)	38424-81X01
0.85 (0.0335)	38424-81X02
0.90 (0.0354)	38424-81X03
0.95 (0.0374)	38424-81X04

*: Always check with the Parts Department for the latest parts information.

DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTING SHIMS

NDAT0187S03

Thickness mm (in)	Part number *
0.48 (0.0189)	31438-80X00
0.52 (0.0205)	31438-80X01
0.56 (0.0220)	31438-80X02
0.60 (0.0236)	31438-80X03
0.64 (0.0252)	31438-80X04
0.68 (0.0268)	31438-80X05
0.72 (0.0283)	31438-80X06
0.76 (0.0299)	31438-80X07
0.80 (0.0315)	31438-80X08
0.84 (0.0331)	31438-80X09
0.88 (0.0346)	31438-80X10
0.92 (0.0362)	31438-80X11

*: Always check with the Parts Department for the latest parts information.

BEARING PRELOAD

NDAT0187S04

Differential side bearing preload mm (in)	0.05 - 0.09 (0.0020 - 0.0035)

TURNING TORQUE

NDAT0187S05

Turning torque of final drive assembly N·m (kg-cm, in-lb)	0.78 - 1.37 (8.0 - 14.0, 6.9 - 12.2)

CLUTCH AND BRAKE RETURN SPRINGS

NDAT0187S06

Unit: mm (in)

Parts	Free length	Outer diameter
Forward clutch (Overrun clutch) (22 pcs)	21.4 (0.843)	10.3 (0.406)
High clutch (12 pcs)	22.5 (0.886)	10.8 (0.425)
Low & reverse brake (24 pcs)	24.1 (0.949)	6.6 (0.260)

Planetary Carrier and Oil Pump

NDAT0188

PLANETARY CARRIER

NDAT0188S01

Clearance between planetary carrier and pinion washer mm (in)	Standard	0.20 - 0.70 (0.0079 - 0.0276)
	Allowable limit	0.80 (0.0315)

OIL PUMP

NDAT0188S02

Oil pump side clearance mm (in)		0.030 - 0.050 (0.0012 - 0.0020)	
Thickness of inner gears and outer gears		Inner gear	
		Thickness mm (in)	Part number *
		11.99 - 12.0 (0.4720 - 0.4724) 11.98 - 11.99 (0.4717 - 0.4720) 11.97 - 11.98 (0.4713 - 0.4717)	31346-80L00 31346-80L01 31346-80L02
		Outer gear	
		Thickness mm (in)	Part number*
		11.99 - 12.0 (0.4720 - 0.4724) 11.98 - 11.99 (0.4717 - 0.4720) 11.97 - 11.98 (0.4713 - 0.4717)	31347-80L00 31347-80L01 31347-80L02
Clearance between oil pump housing and outer gear mm (in)	Standard	0.111 - 0.181 (0.0044 - 0.0071)	
	Allowable limit	0.181 (0.0071)	
Oil pump cover seal ring clearance mm (in)	Standard	0.1 - 0.25 (0.0039 - 0.0098)	
	Allowable limit	0.25 (0.0098)	

*: Always check with the Parts Department for the latest parts information.

Input Shaft

NDAT0189

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

Reduction Pinion Gear

NDAT0190

TURNING TORQUE

NDAT0190S01

Turning torque of reduction pinion gear N·m (kg-cm, in-lb)	0.05 - 0.39 (0.5 - 4.0, 0.43 - 3.47)

REDUCTION PINION GEAR BEARING ADJUSTING SHIMS

NDAT0190S02

NO.	Thickness mm (in)	Part number*	NO.	Thickness mm (in)	Part number *
1	5.00 (0.1969)	31439-81X00	39	5.76 (0.2268)	31439-81X69
2	5.02 (0.1976)	31439-81X01	40	5.78 (0.2276)	31439-81X70
3	5.04 (0.1984)	31439-81X02	41	5.80 (0.2283)	31439-81X71
4	5.06 (0.1992)	31439-81X03	42	5.82 (0.2291)	31439-81X72
5	5.08 (0.2000)	31439-81X04	43	5.84 (0.2299)	31439-81X73
6	5.10 (0.2008)	31439-81X05	44	5.86 (0.2307)	31439-81X74
7	5.12 (0.2016)	31439-81X06	45	5.88 (0.2315)	31439-81X75
8	5.14 (0.2024)	31439-81X07	46	5.90 (0.2323)	31439-81X76
9	5.16 (0.2031)	31439-81X08	47	5.92 (0.2331)	31439-81X77
10	5.18 (0.2039)	31439-81X09	48	5.94 (0.2339)	31439-81X78
11	5.20 (0.2047)	31439-81X10	49	5.96 (0.2346)	31439-81X79
12	5.22 (0.2055)	31439-81X11	50	5.98 (0.2354)	31439-81X80
13	5.24 (0.2063)	31439-81X12	51	6.00 (0.2362)	31439-81X81
14	5.26 (0.2071)	31439-81X13	52	4.50 (0.1772)	31439-83X00
15	5.28 (0.2079)	31439-81X14	53	4.52 (0.1780)	31439-83X01
16	5.30 (0.2087)	31439-81X15	54	4.54 (0.1787)	31439-83X02

Reduction Pinion Gear (Cont'd)

NO.	Thickness mm (in)	Part number*	NO.	Thickness mm (in)	Part number *
17	5.32 (0.2094)	31439-81X16	55	4.56 (0.1795)	31439-83X03
18	5.34 (0.2102)	31439-81X17	56	4.58 (0.1803)	31439-83X04
19	5.36 (0.2110)	31439-81X18	57	4.60 (0.1811)	31439-83X05
20	5.38 (0.2118)	31439-81X19	58	4.62 (0.1819)	31439-83X06
21	5.40 (0.2126)	31439-81X20	59	4.64 (0.1827)	31439-83X07
22	5.42 (0.2134)	31439-81X21	60	4.66 (0.1835)	31439-83X08
23	5.44 (0.2142)	31439-81X22	61	4.68 (0.1843)	31439 83X09
24	5.46 (0.2150)	31439-81X23	62	4.70 (0.1850)	31439 83X10
25	5.48 (0.2157)	31439-81X24	63	4.72 (0.1858)	31439 83X11
26	5.50 (0.2165)	31439-81X46	64	4.74 (0.1866)	31439 83X12
27	5.52 (0.2173)	31439-81X47	65	4.76 (0.1874)	31439 83X13
28	5.54 (0.2181)	31439-81X48	66	4.78 (0.1882)	31439 83X14
29	5.56 (0.2189)	31439-81X49	67	4.80 (0.1890)	31439 83X15
30	5.58 (0.2197)	31439-81X60	68	4.82 (0.1898)	31439 83X16
31	5.60 (0.2205)	31439-81X61	69	4.84 (0.1906)	31439 83X17
32	5.62 (0.2213)	31439-81X62	70	4.86 (0.1913)	31439 83X18
33	5.64 (0.2220)	31439-81X63	71	4.88 (0.1921)	31439 83X19
34	5.66 (0.2228)	31439-81X64	72	4.90 (0.1929)	31439 83X20
35	5.68 (0.2236)	31439-81X65	73	4.92 (0.1937)	31439 83X21
36	5.70 (0.2244)	31439-81X66	74	4.94 (0.1945)	31439 83X22
37	5.72 (0.2252)	31439-81X67	75	4.96 (0.1953)	31439 83X23
38	5.74 (0.2260)	31439-81X68	76	4.98 (0.1961)	31439 83X24

*: Always check with the Parts Department for the latest parts information.

Band Servo

RETURN SPRING

NDAT0191

NDAT0191S01

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)

Output Shaft

SEAL RING CLEARANCE

NDAT0192

NDAT0192S01

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

END PLAY

NDAT0192S02

Output shaft end play mm (in)	0 - 0.15 (0 - 0.0059)

Output Shaft (Cont'd)

OUTPUT SHAFT ADJUSTING SHIMS

NDAT0192S03

Thickness mm (in)	Part number *
0.80 (0.0315)	31438-80X60
0.84 (0.0331)	31438-80X61
0.88 (0.0346)	31438-80X62
0.92 (0.0362)	31438-80X63
0.96 (0.0378)	31438-80X64
1.00 (0.0394)	31438-80X65
1.04 (0.0409)	31438-80X66
1.08 (0.0425)	31438-80X67
1.12 (0.0441)	31438-80X68
1.16 (0.0457)	31438-80X69
1.20 (0.0472)	31438-80X70

*: Always check with the Parts Department for the latest parts information.

Bearing Retainer

NDAT0193

SEAL RING CLEARANCE

NDAT0193S01

Bearing retainer seal ring clearance mm (in)	Standard	0.10 - 0.30 (0.0039 - 0.0118)
	Allowable limit	0.30 (0.0118)

Total End Play

NDAT0194

Total end play "T_1" mm (in)	0.25 - 0.55 (0.0098 - 0.0217)

BEARING RACE FOR ADJUSTING TOTAL END PLAY

NDAT0194S01

Thickness mm (in)	Part number *
0.8 (0.031)	31435-80X00
1.0 (0.039)	31435-80X01
1.2 (0.047)	31435-80X02
1.4 (0.055)	31435-80X03
1.6 (0.063)	31435-80X04
1.8 (0.071)	31435-80X05
2.0 (0.079)	31435-80X06
0.9 (0.035)	31435-80X09
1.1 (0.043)	31435-80X10
1.3 (0.051)	31435-80X11
1.5 (0.059)	31435-80X12
1.7 (0.067)	31435-80X13
1.9 (0.075)	31435-80X14

*: Always check with the Parts Department for the latest parts information.

Reverse Clutch End Play

NDAT0195

Reverse clutch end play mm (in)	0.55 - 0.90 (0.0217 - 0.0354)

THRUST WASHERS FOR ADJUSTING REVERSE CLUTCH DRUM END PLAY

NDAT0195S01

Thickness mm (in)	Part number *
0.80 (0.0315)	31508-80X13
0.95 (0.0374)	31508-80X14
1.10 (0.0433)	31508-80X15
1.25 (0.0492)	31508-80X16
1.40 (0.0551)	31508-80X17
1.55 (0.0610)	31508-80X18
1.70 (0.0669)	31508-80X19
1.85 (0.0728)	31508-80X20

*: Always check with the Parts Department for the latest parts information.

Removal and Installation

NDAT0196

Unit: mm (in)

Distance between end of converter housing and torque converter	19 (0.75)

Shift Solenoid Valves

NDAT0221

Gear	Solenoid A	Solenoid B
1st	ON	ON
2nd	OFF	ON
3rd	OFF	OFF
4th	ON	OFF

Solenoid Valves

NDAT0222

Solenoid Valve	Resistance	Terminal Number
Shift Solenoid A	20–40Ω	2
Shift Solenoid B	20–40Ω	1
Overrun Clutch Solenoid	20–40Ω	3
Line Pressure Solenoid	2.5–5Ω	4
Torque Converter Clutch Solenoid	10–20Ω	5

A/T Fluid Temperature Sensor

NDAT0223

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

Revolution Sensor

NDAT0224

Resistance	500–650 Ω

Dropping Resistor

NDAT0225

Resistance	11.2–12.6 Ω