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When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

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

Alphabetical & P No. Index for DTC

ALPHABETICAL INDEX FOR DTC

Items (CONSULT-II screen terms)	DTC		Reference page
	ECM*1	CONSULT-II GST*2	
A/T 1ST GR FNCTN	1103	P0731	AT-95
A/T 2ND GR FNCTN	1104	P0732	AT-101
A/T 3RD GR FNCTN	1105	P0733	AT-107
A/T 4TH GR FNCTN	1106	P0734	AT-113
A/T TCC S/V FNCTN	1107	P0744	AT-125
ATF TEMP SEN/CIRC	1208	P0710	AT-83
ENGINE SPEED SIG	1207	P0725	AT-92
L/PRESS SOL/CIRC	1205	P0745	AT-133
O/R CLTCH SOL/CIRC	1203	P1760	AT-154
PNP SW/CIRC	1101	P0705	AT-78
SFT SOL A/CIRC*3	1108	P0750	AT-138
SFT SOL B/CIRC*3	1201	P0755	AT-143
TCC SOLENOID/CIRC	1204	P0740	AT-120
TP SEN/CIRC A/T*3	1206	P1705	AT-148
VEH SPD SEN/CIR AT*4	1102	P0720	AT-88

*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 signal’’ meet the fail-safe condition at the same time.

P NO. INDEX FOR DTC

DTC		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*1		
P0705	1101	PNP SW/CIRC	AT-78
P0710	1208	ATF TEMP SEN/CIRC	AT-83
P0720	1102	VEH SPD SEN/CIR AT*4	AT-88
P0725	1207	ENGINE SPEED SIG	AT-92
P0731	1103	A/T 1ST GR FNCTN	AT-95
P0732	1104	A/T 2ND GR FNCTN	AT-101
P0733	1105	A/T 3RD GR FNCTN	AT-107
P0734	1106	A/T 4TH GR FNCTN	AT-113
P0740	1204	TCC SOLENOID/CIRC	AT-120
P0744	1107	A/T TCC S/V FNCTN	AT-125
P0745	1205	L/PRESS SOL/CIRC	AT-133
P0750	1108	SFT SOL A/CIRC*3	AT-138
P0755	1201	SFT SOL B/CIRC*3	AT-143
P1705	1206	TP SEN/CIRC A/T*3	AT-148
P1760	1203	O/R CLTCH SOL/CIRC	AT-154

Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL L30 is as follows (The composition varies according to the destination and optional equipment):

- For a frontal collision
  The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), front seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
  The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), side air bag (satellite) sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

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

WARNING:

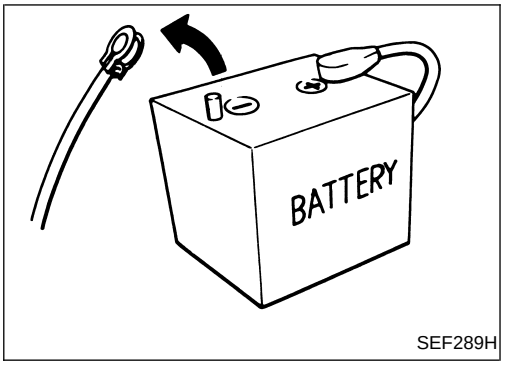
- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation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

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

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 and ECM before returning the vehicle to the customer.**
- **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 EL section ("Description", "HARNESS CONNECTOR").**



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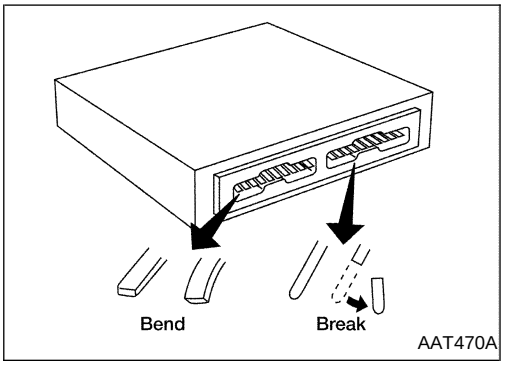
Precautions

- **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.**



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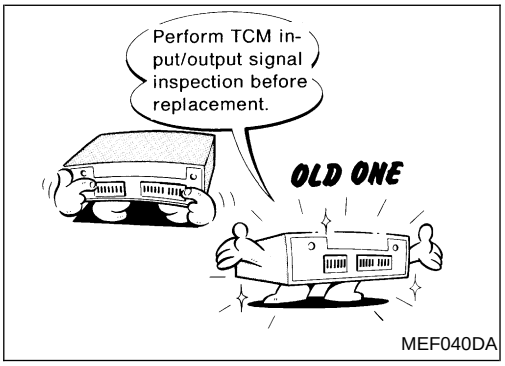
- **When connecting or disconnecting pin connectors into or from TCM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on TCM pin terminal, when connecting pin connectors.



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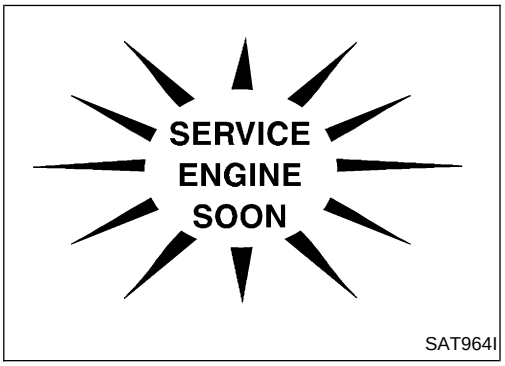
- **Before replacing TCM, perform TCM input/output signal inspection and make sure whether TCM functions properly or not. (See page AT-72.)**



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- **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.

Precautions (Cont'd)

- 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-8.
- 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

FAIL-SAFE

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-45.]
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-53.
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

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

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

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

OBD-II SELF-DIAGNOSIS

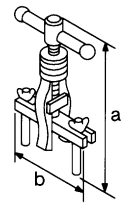
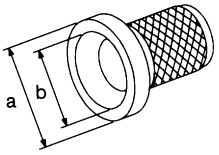
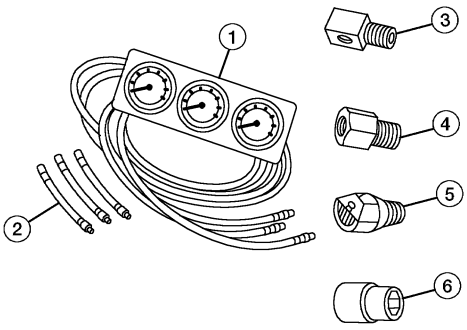
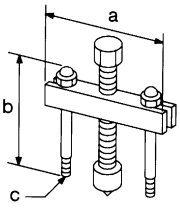
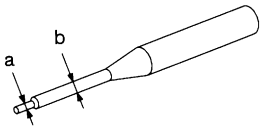
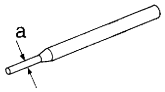
- A/T self-diagnosis is performed by the TCM in combination with the ECM. The results can be read through the blinking pattern of the O/D OFF indicator or the malfunction indicator lamp (MIL). Refer to the table on AT-39 for the indicator used to display each self-diagnostic result.
- The self-diagnostic 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-36 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).

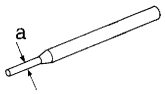
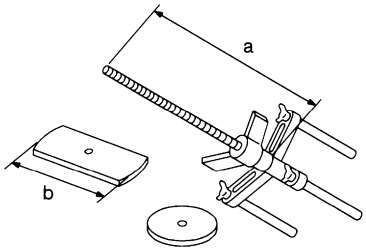
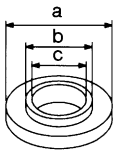
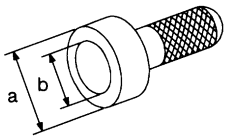
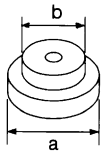
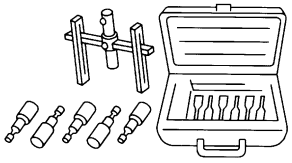
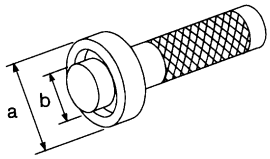
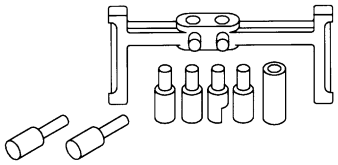
  *: For details of OBD-II, refer to EC section ("ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION").
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to EL section, "Description 'HARNESS CONNECTOR'."**

Special Service Tools

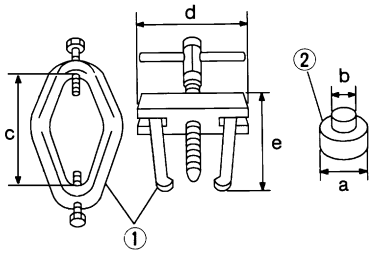
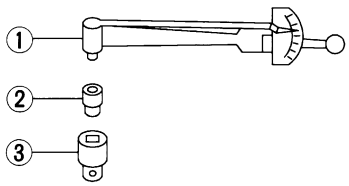
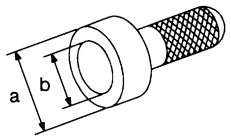
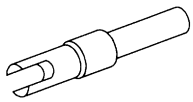
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
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 (J34302) 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.**

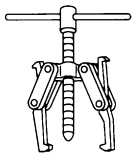
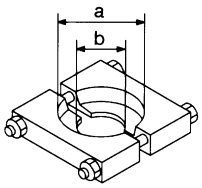
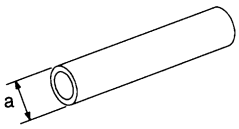
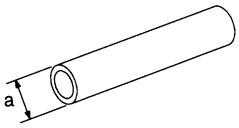
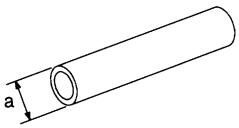
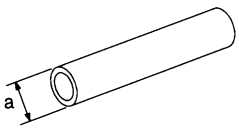
Special Service Tools (Cont'd)

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.**
(J34290) Shim selecting tool set	 NT080	Selecting differential side bearing adjusting shim

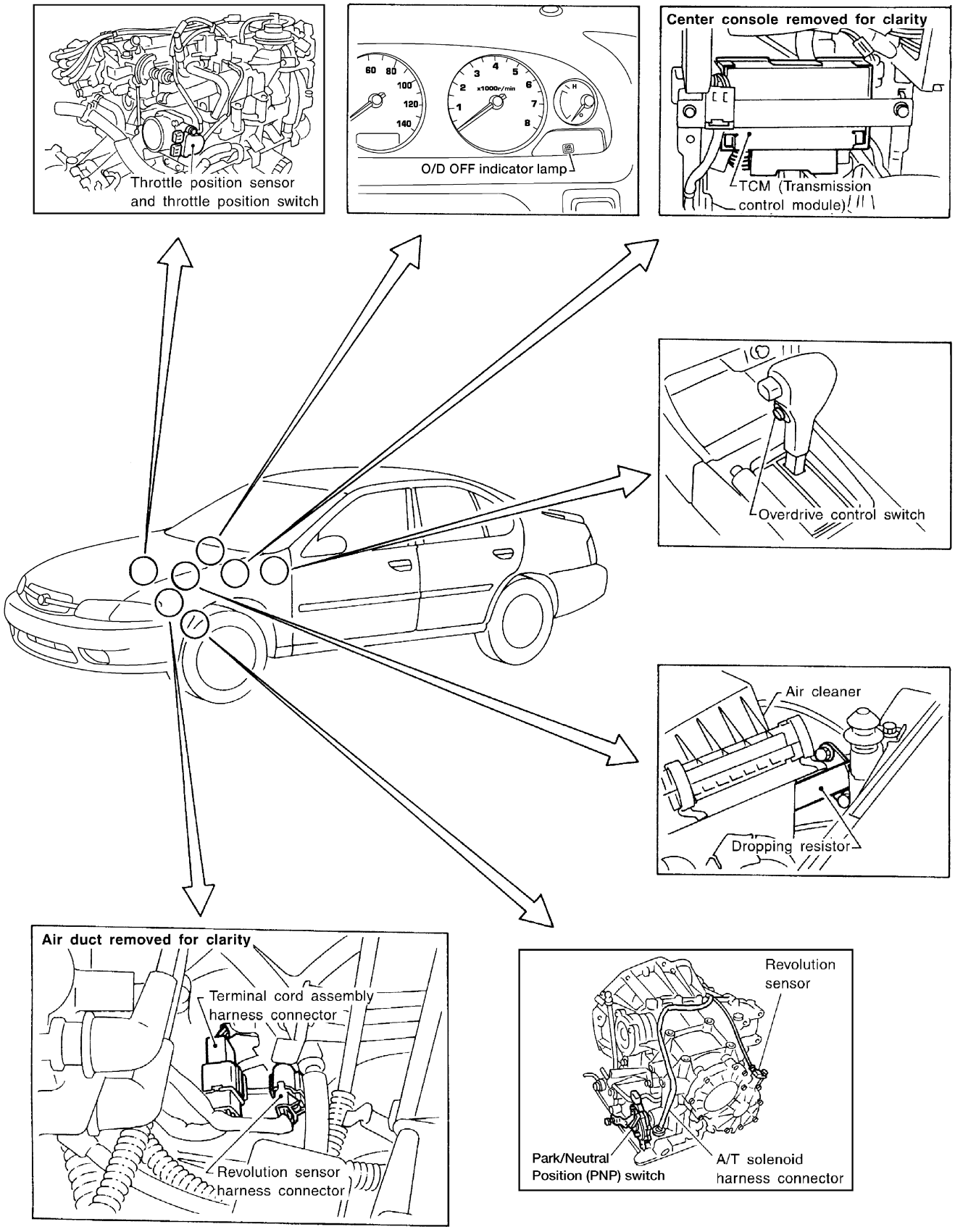
Special Service Tools (Cont'd)

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

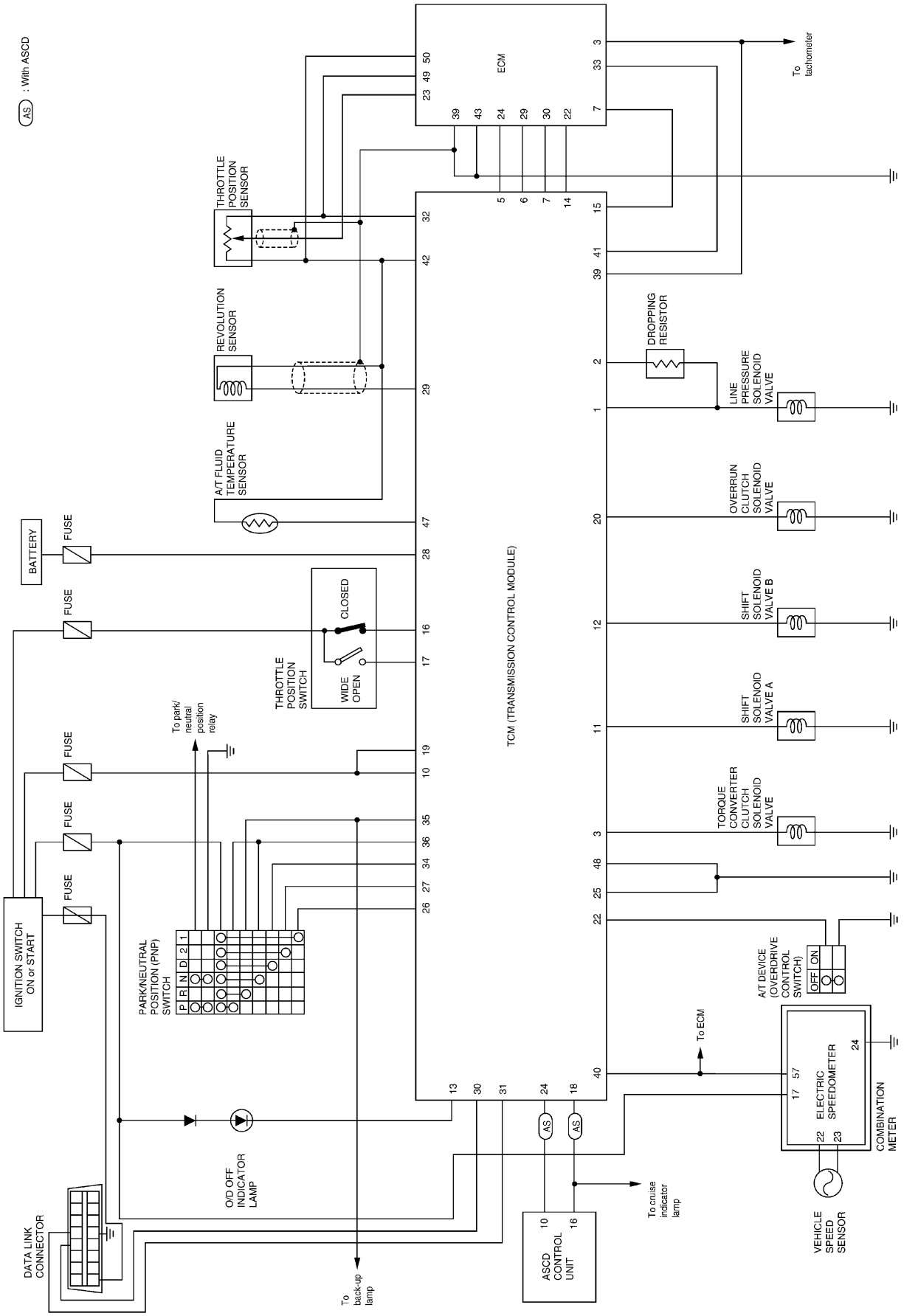
Tool name	Description	
Puller	 NT077	● Removing idler gear bearing inner race ● Removing and installing band servo piston snap ring
Puller	 NT411	Removing reduction gear bearing inner race **a: 60 mm (2.36 in) dia.** **b: 35 mm (1.38 in) dia.**
Drift	 NT083	Installing differential side oil seal (Left 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



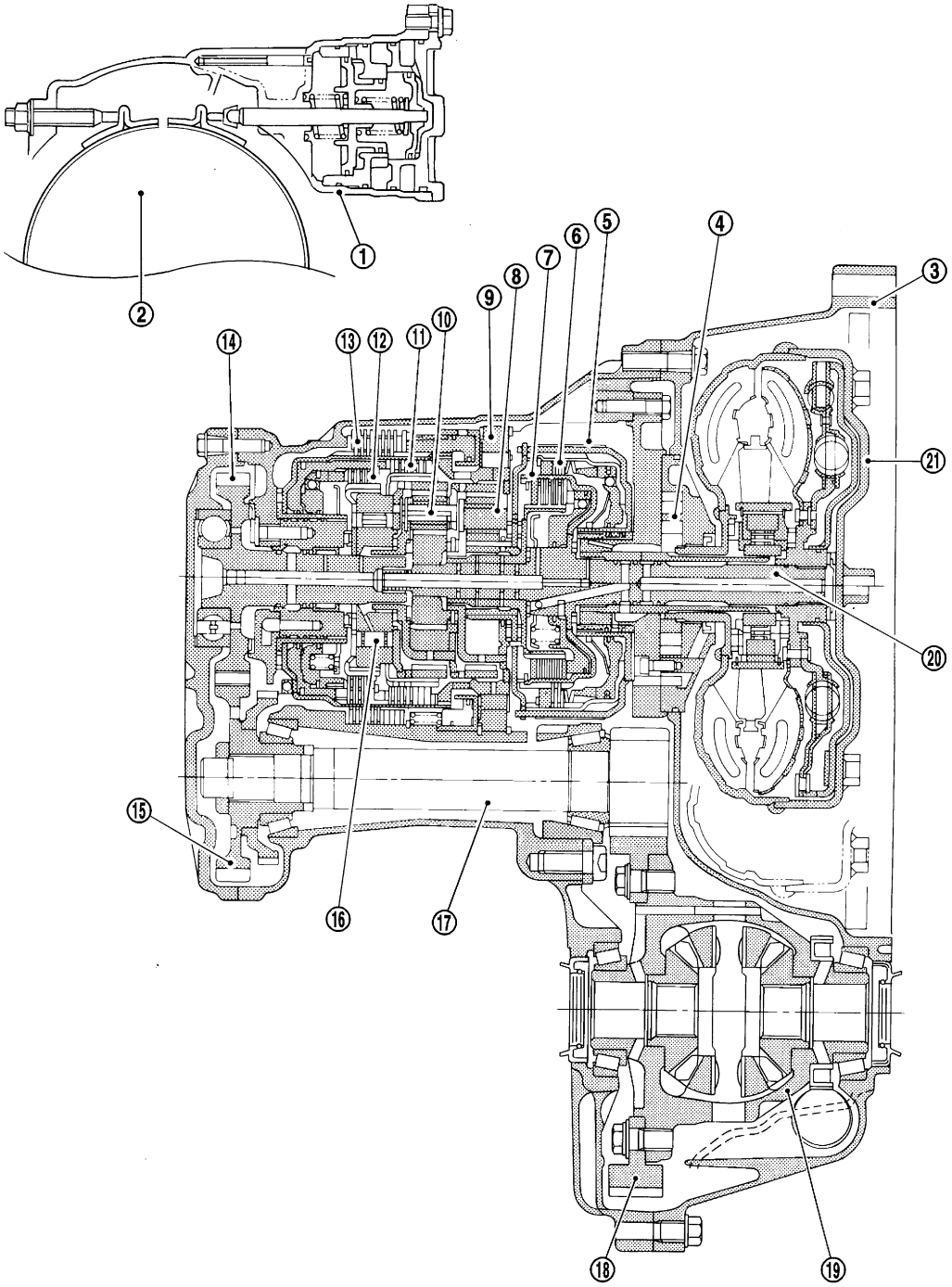
WAT052

Circuit Diagram for Quick Pinpoint Check



WAT525

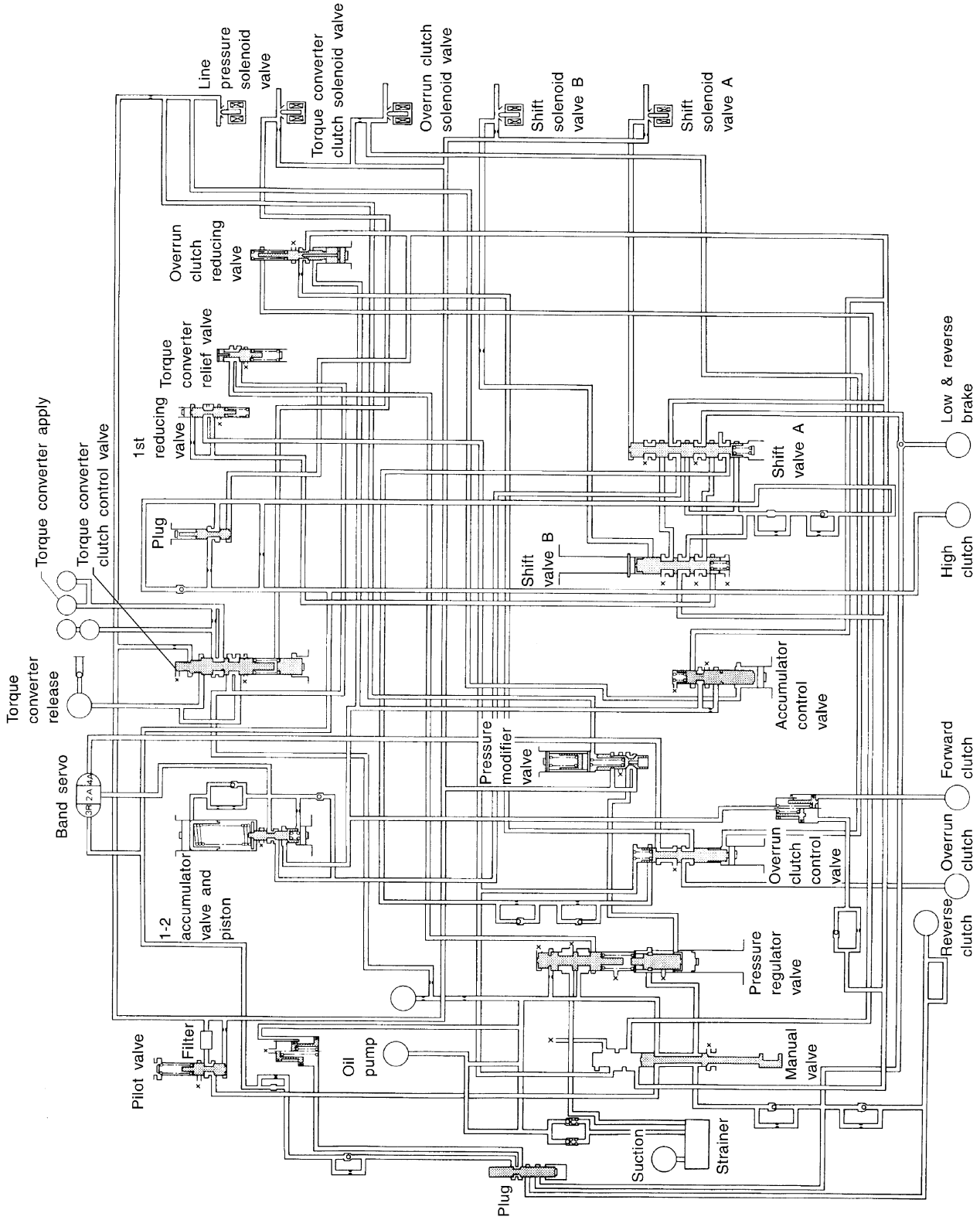
Cross-sectional View



SAT901I

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

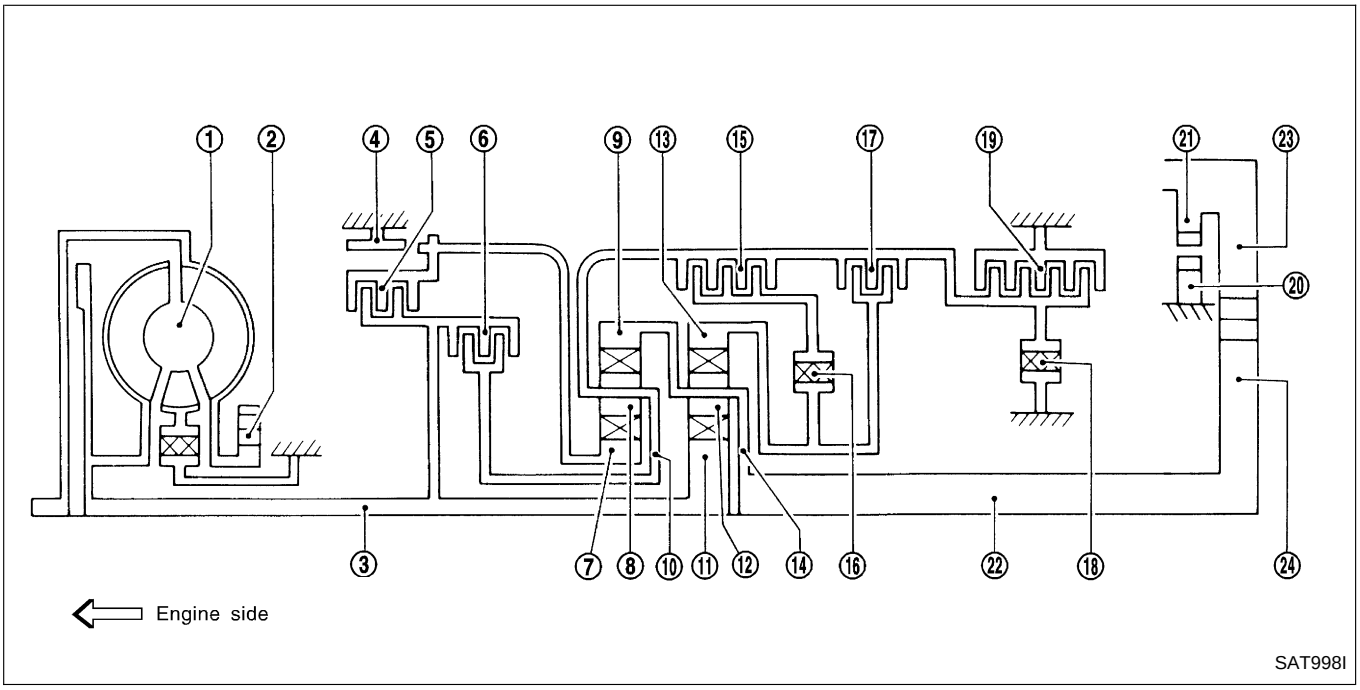
Hydraulic Control Circuit



SAT902I

Shift Mechanism

CONSTRUCTION



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

FUNCTION OF CLUTCH AND BRAKE

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

Shift Mechanism (Cont'd)

CLUTCH AND BAND CHART

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			○	*1 ⊗				●	●			Automatic shift 1 ↔ 2 ↔ 3 ↔ 4
	2nd			○	*1 ◎	○			●				
	3rd		○	○	*1 ◎	*2 Ⓧ	Ⓧ		●			*5 ○	
	4th		○	Ⓧ		*3 Ⓧ	Ⓧ	○				○	
2	1st			○	⊗				●	●			Automatic shift 1 ↔ 2 ← 3
	2nd			○	◎	○			●				
1	1st			○	○				●		○		Locks (held stationary) in 1st speed 1 ← 2 ← 3
	2nd			○	○	○			●				

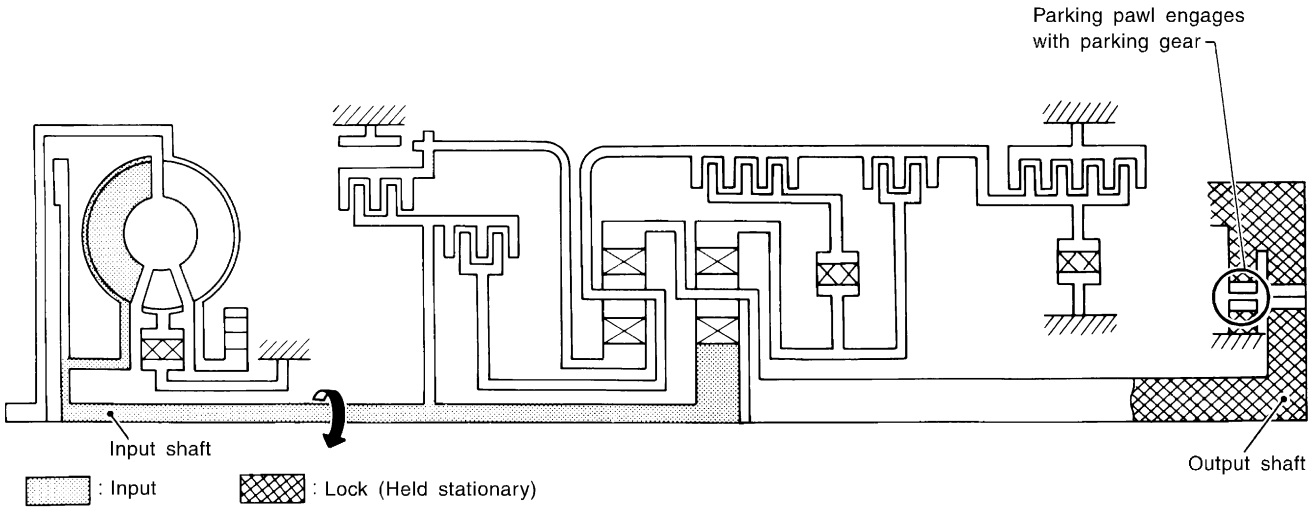
*1: Operates when overdrive control switch is set in "OFF" position.
*2: Oil pressure is applied to both 2nd "apply" side and 3rd "release" side of band servo piston. However, brake band does not contract because oil pressure area on the "release" side is greater than that on the "apply" side.
*3: Oil 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
◎ : Operates when throttle opening is less than 3/16, activating engine brake.
● : Operates during "progressive" acceleration.
⊗ : Operates but does not affect power transmission.
Ⓧ : Operates when throttle opening is less than 3/16, but does not affect engine brake.

POWER TRANSMISSION

"N" and "P" positions

- "N" position
  Power from the input shaft is not transmitted to the output shaft because the clutches do not operate.
- "P" position
  Similar to the "N" position, 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.

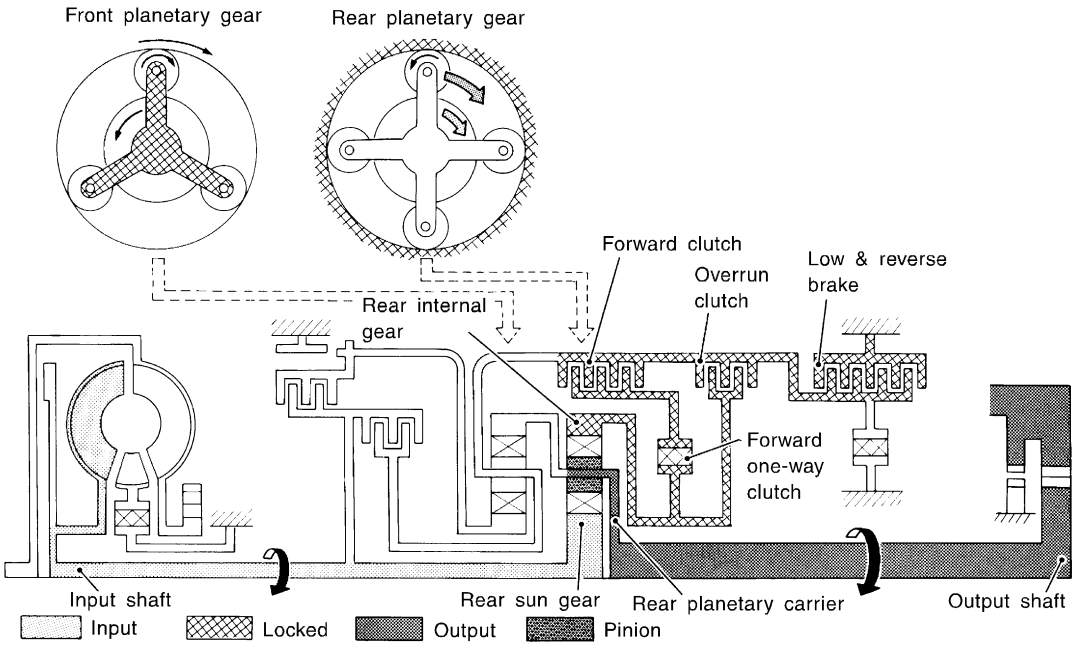


SAT991I

Shift Mechanism (Cont'd)

"1_1" position

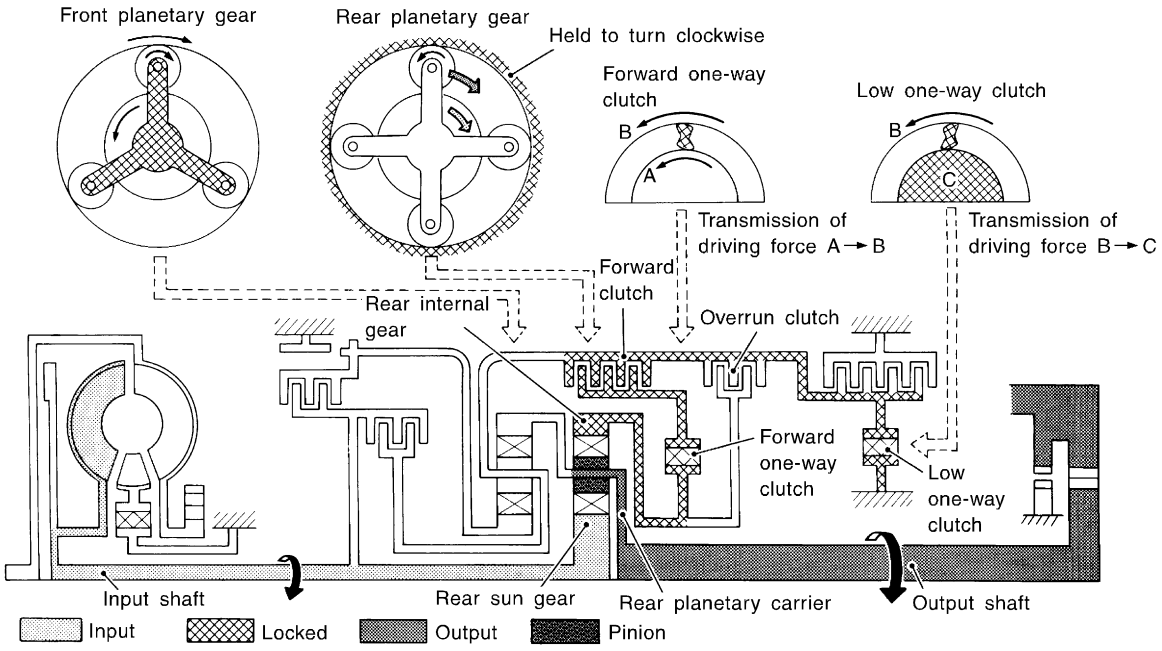
● **Forward clutch** ● **Forward one-way clutch** ● **Overrun clutch** ● **Low and reverse brake**	As overrun clutch engages, rear internal gear is locked by the operation of low and reverse brake. This is different from that of D_1 and 2_1.
Engine brake	Overrun clutch always engages, therefore engine brake can be obtained when decelerating.
Power flow	Input shaft ⬇ Rear sun gear ⬇ Rear pinion gear ⬇ Rear planetary carrier ⬇ Output shaft



Shift Mechanism (Cont'd)

"D_1" and "2_1" positions

● **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 planetary carrier ↓ Output shaft

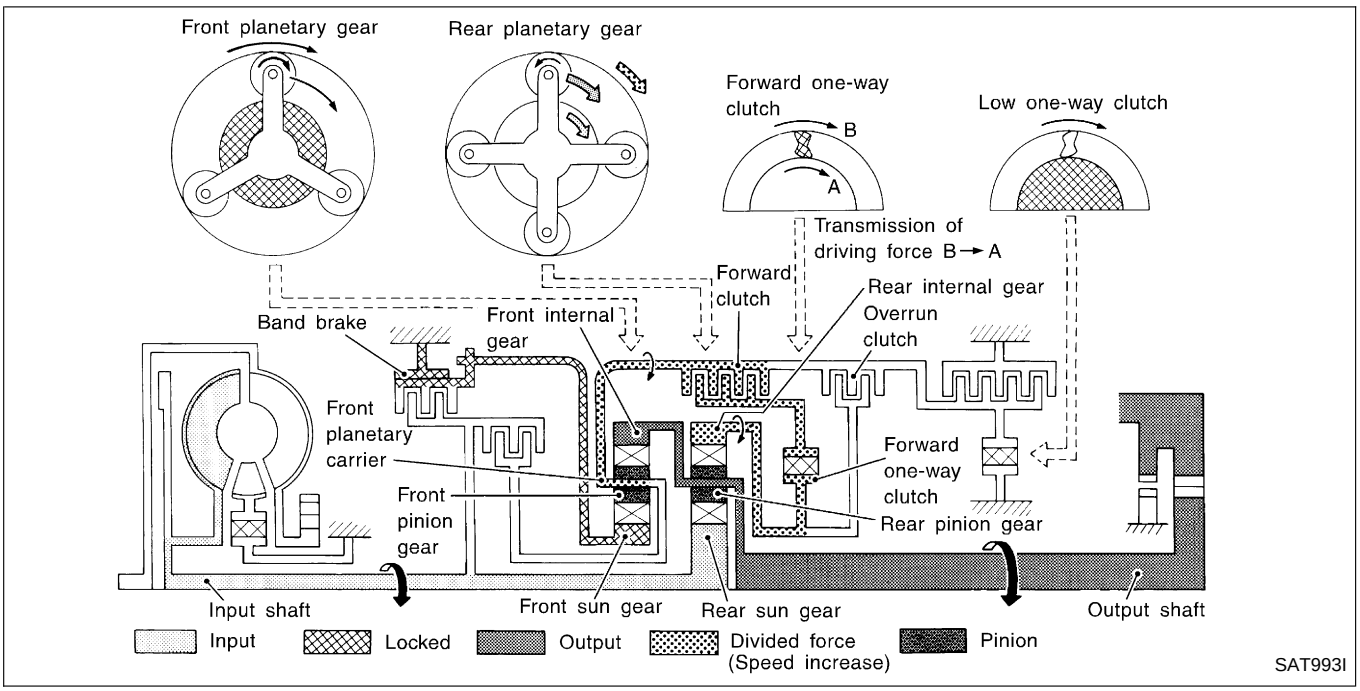


SAT992I

Shift Mechanism (Cont'd)

"D_2", "2_2" and "1_2" positions

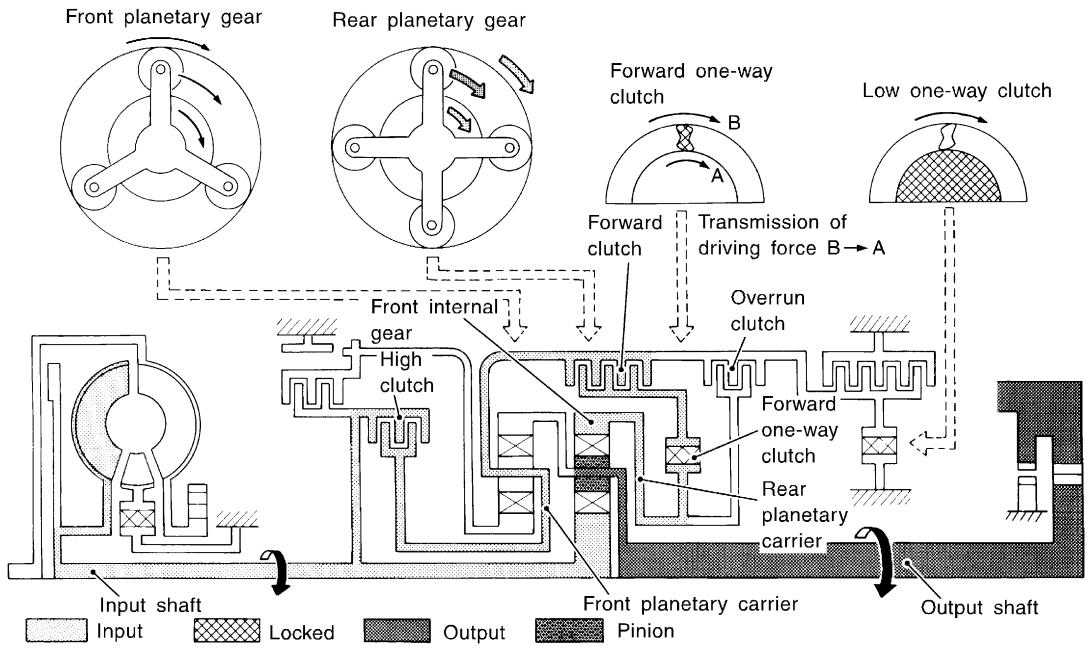
● **Forward clutch** ● **Forward one-way clutch** ● **Brake band**	Rear sun gear drives rear planetary carrier and combined front internal gear. Front internal gear now rotates around front sun gear accompanying front planetary carrier. As front planetary carrier transfers the power to rear internal 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 → Rear pinion gear → Rear planetary carrier → Output shaft / Front internal gear → Front pinion gear → Front planetary carrier → Forward clutch → Forward one-way clutch → Rear internal gear



Shift Mechanism (Cont'd)

"D_3" position

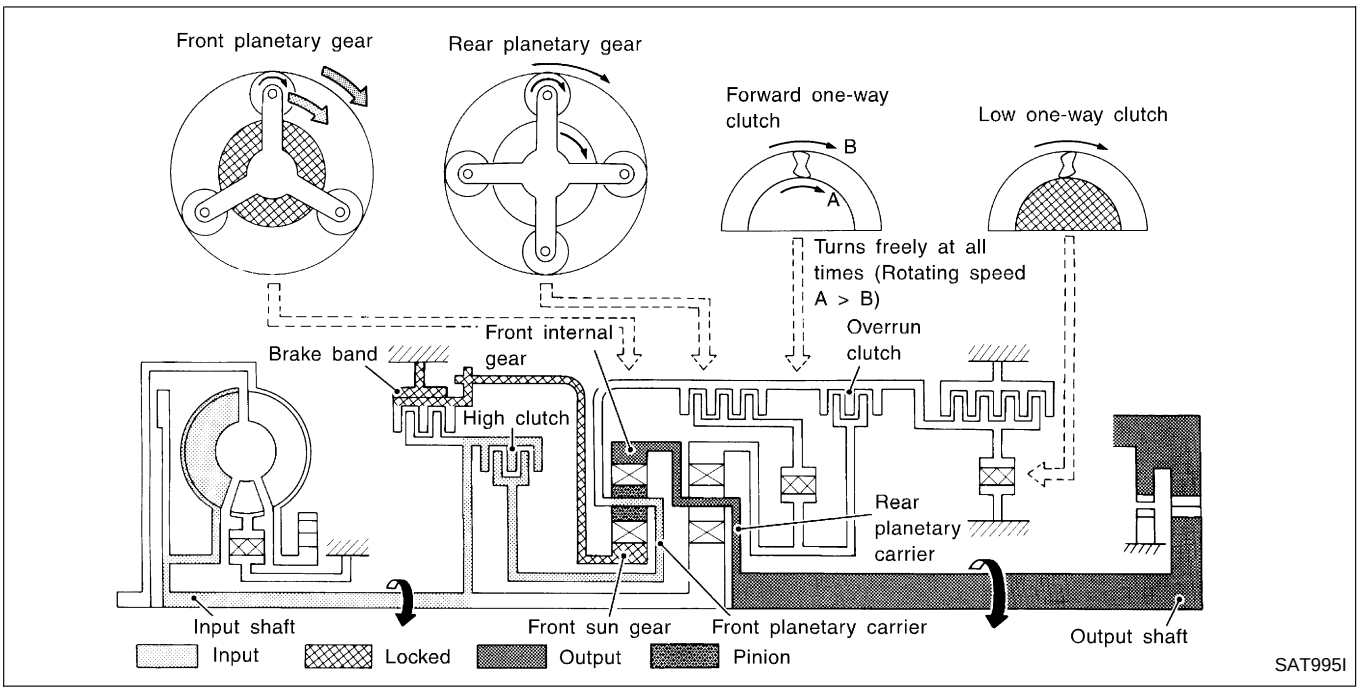
● **High clutch** ● **Forward clutch** ● **Forward one-way clutch**	Input power is transmitted to front planetary carrier through high clutch. And front planetary carrier is connected to rear internal gear by operation of forward clutch and forward one-way clutch. This rear internal gear rotation and 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
Power flow	Input shaft → High clutch → Front carrier → Forward clutch → Forward one-way clutch → Rear internal gear → Rear pinion gear → Rear planetary carrier → Output shaft Input shaft → Rear sun gear → Rear pinion gear



Shift Mechanism (Cont'd)

"D_4" (OD) position

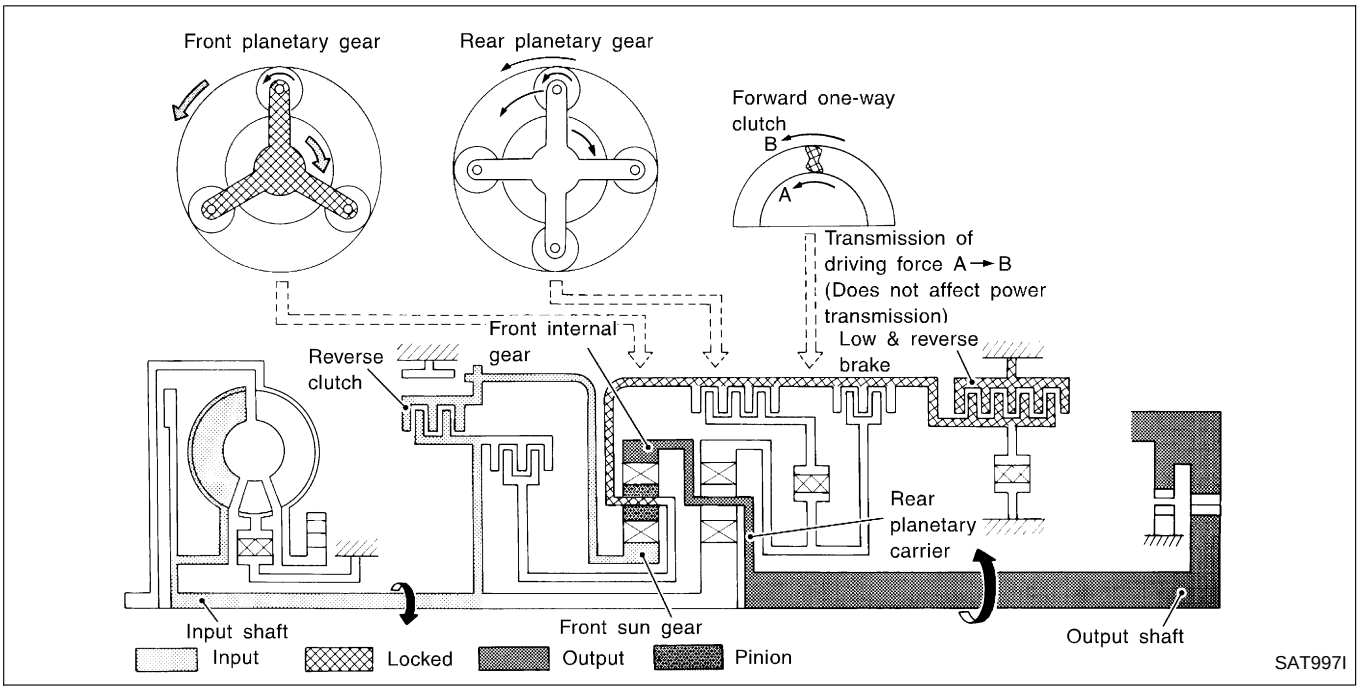
● **High clutch** ● **Brake band** ● **Forward clutch** (Does not affect power transmission)	Input power is transmitted to front carrier through high clutch. This front carrier turns around the sun gear which is fixed by brake band and makes front internal gear (output) turn faster.
Engine brake	At D_4 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



Shift Mechanism (Cont'd)

"R" position

● **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	Input shaft ↓ Reverse clutch ↓ Front sun gear ↓ Front pinion gear ↓ Front internal gear ↓ Output shaft



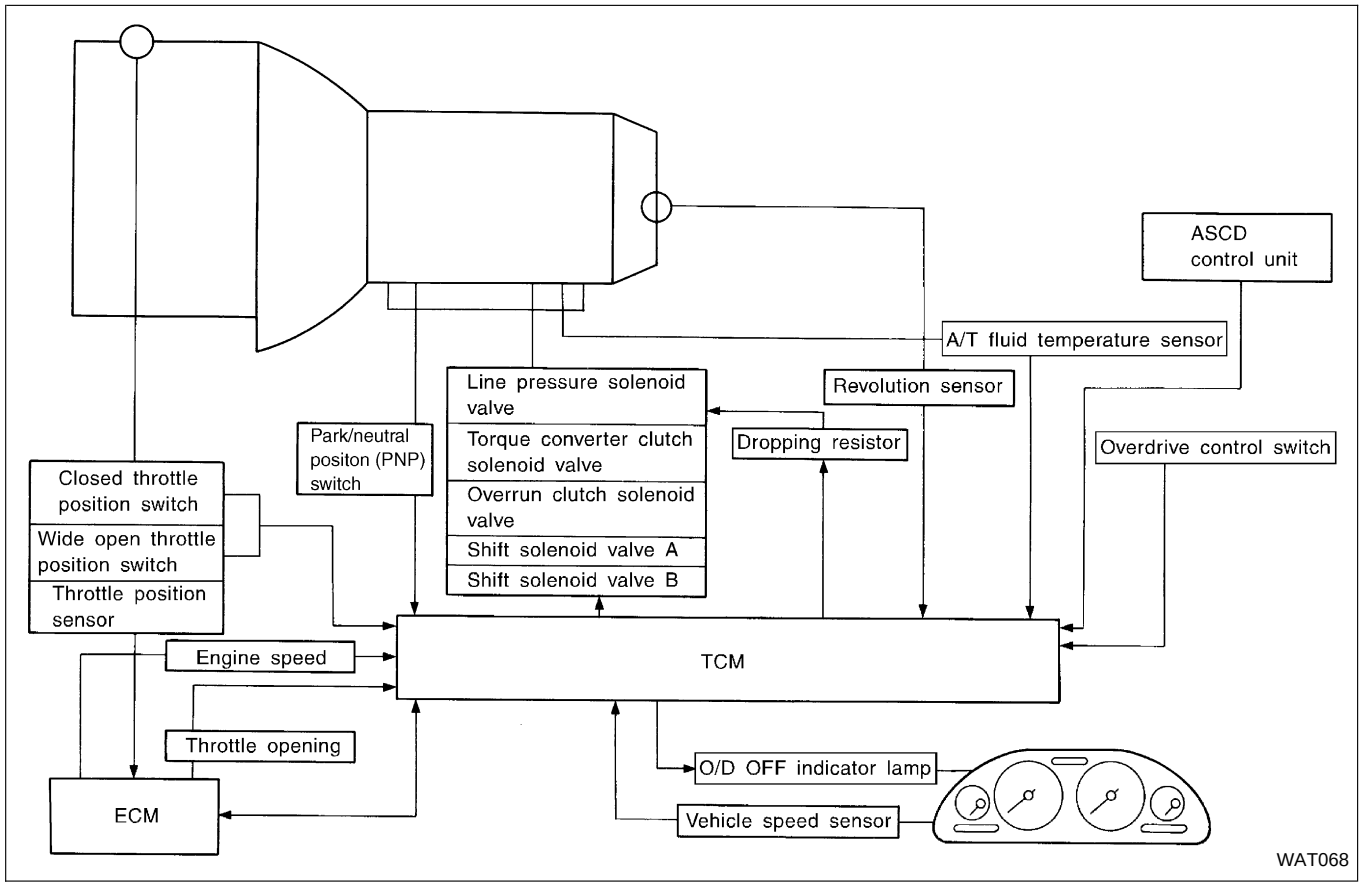
Control System

OUTLINE

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



Control System (Cont'd)

TCM FUNCTION

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.

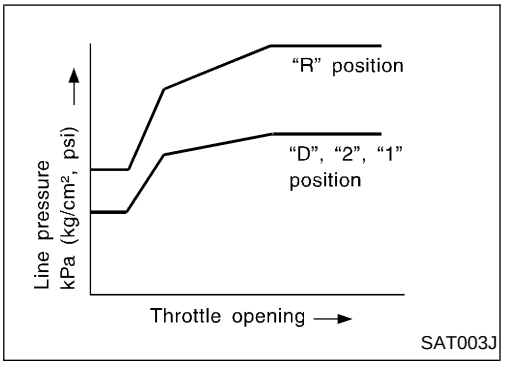
INPUT/OUTPUT SIGNAL OF TCM

	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

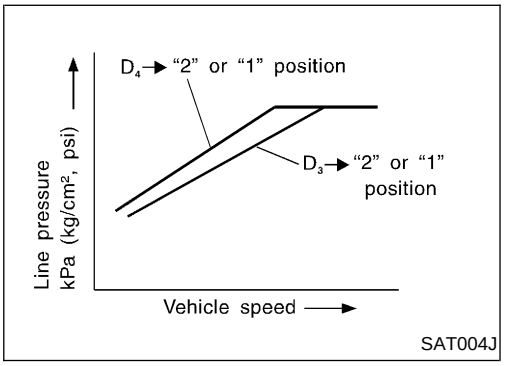
LINE PRESSURE CONTROL

TCM has various line pressure control characteristics to match 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.



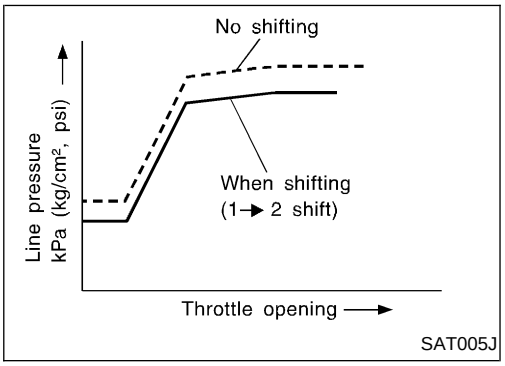
Normal control

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



Back-up control (Engine brake)

If the selector lever is shifted to ''2'' position while driving in D_4 (OD) 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.



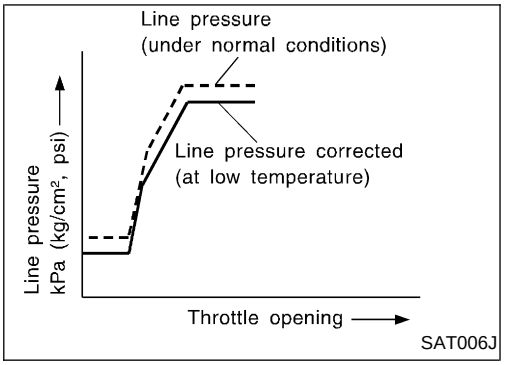
During shift change

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.

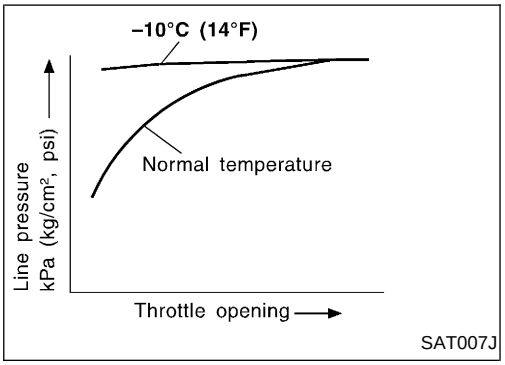
At low fluid temperature

- 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.

Control Mechanism (Cont'd)



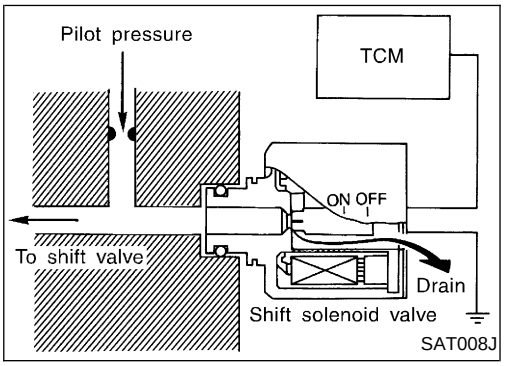
- The line pressure is reduced below 60°C (140°F) to prevent shifting shock due to low viscosity of automatic transaxle fluid when temperature is low.



- 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

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

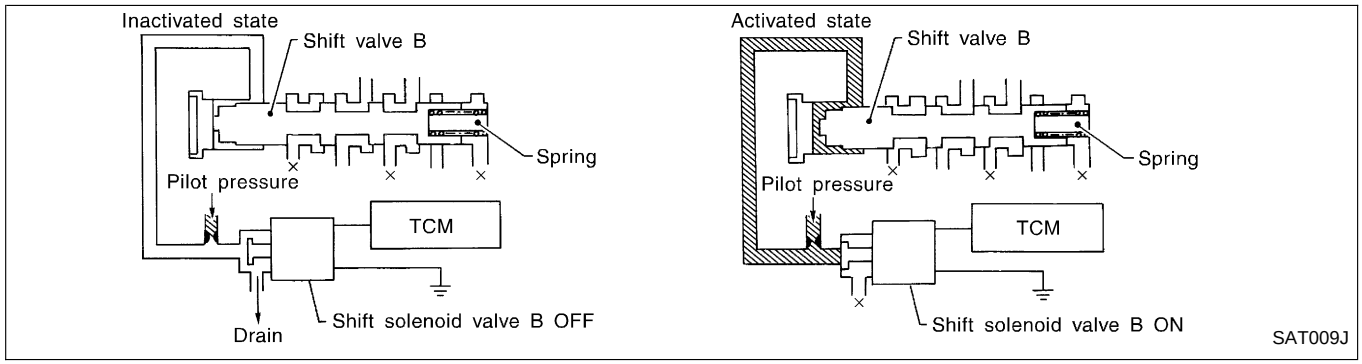
The TCM activates shift solenoid valves A and B according to signals from the throttle position sensor and revolution sensor to select the optimum gear position on the basis of the shift schedule memorized in the TCM.
The shift solenoid valve performs simple ON-OFF operation. When set to ON, the drain circuit closes and pilot pressure is applied to the shift valve.

Relation between shift solenoid valves A and B and gear positions

Gear position / Shift solenoid valve	D_1, 2_1, 1_1	D_2, 2_2, 1_2	D_3	D_4 (OD)	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 Mechanism (Cont'd)

Control of shift valves A and B



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.

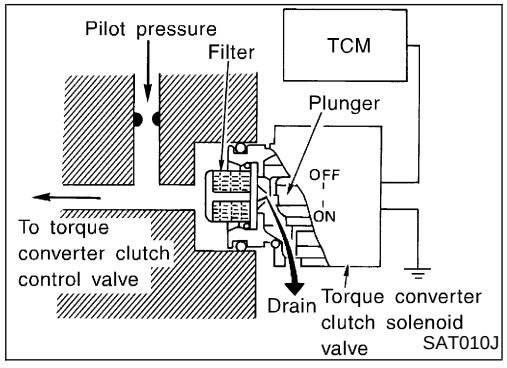
LOCK-UP CONTROL

The lock-up 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

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.

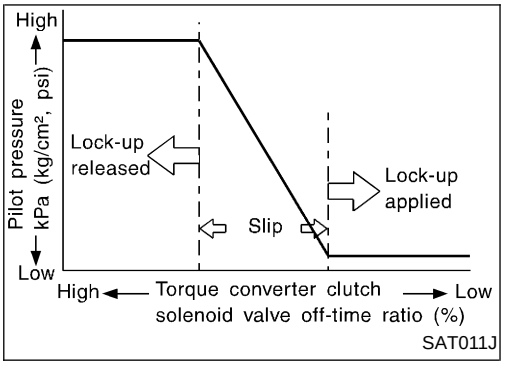
Overdrive control switch	ON	OFF
Selector lever	"D" position	
Gear position	D_4	D_3
Vehicle speed sensor	More than set value	
Throttle position sensor	Less than set opening	
Closed throttle position switch	OFF	
A/T fluid temperature sensor	More than 40°C (104°F)	

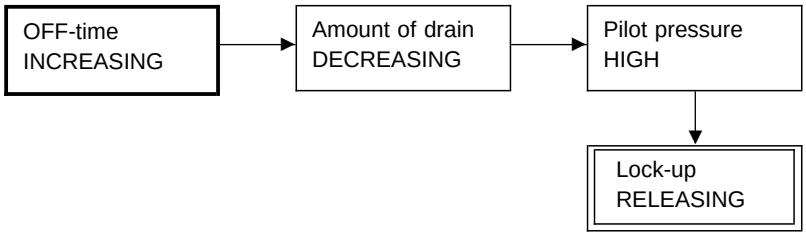


Torque converter clutch solenoid valve control

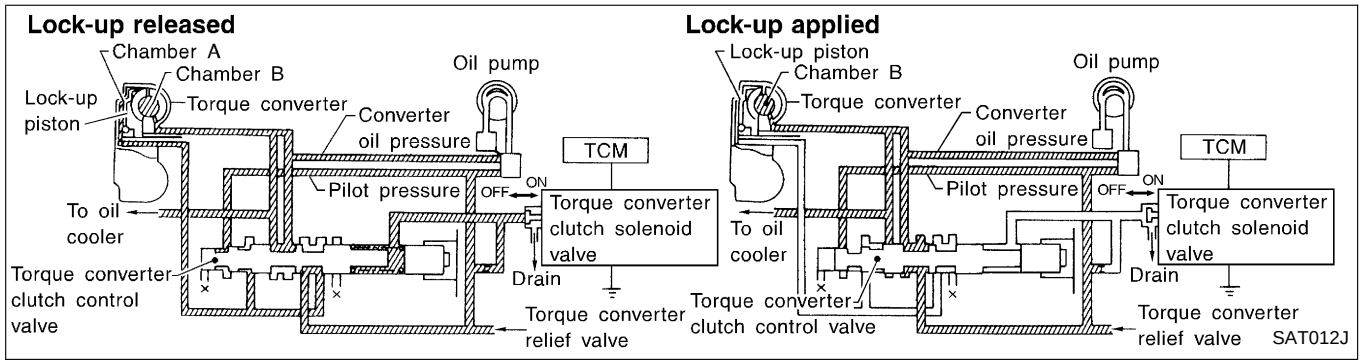
The torque converter clutch solenoid valve is controlled by the TCM. The plunger closes the drain circuit during the OFF period, and opens the circuit during the ON period. If the percentage of OFF-time increases in one cycle, the pilot pressure drain time is reduced and pilot pressure remains high.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

Control Mechanism (Cont'd)





Torque converter clutch control valve operation



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 (lock-up piston release side). Accordingly, the lock-up 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 lock-up piston applied.

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

OVERRUN CLUTCH CONTROL (ENGINE BRAKE CONTROL)

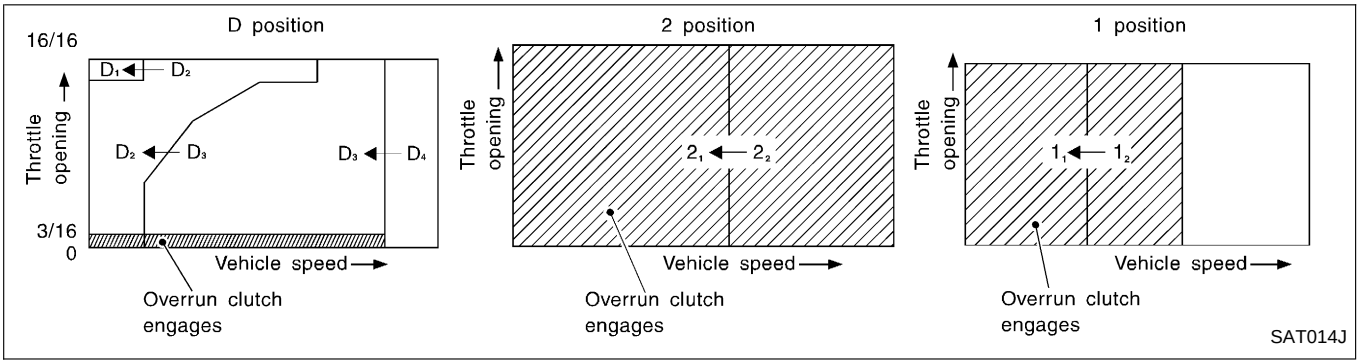
Forward one-way clutch is used to reduce shifting shocks in downshifting operations. This clutch transmits engine torque to the wheels. However, drive force from the wheels is not transmitted to the engine because the one-way clutch rotates idle. This means the engine brake is not effective.

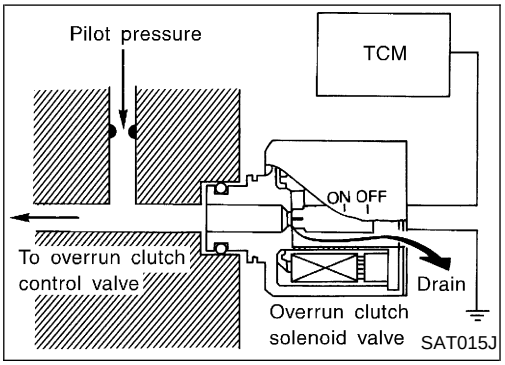
The overrun clutch operates when the engine brake is needed.

Overrun clutch operating conditions

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

Control Mechanism (Cont'd)



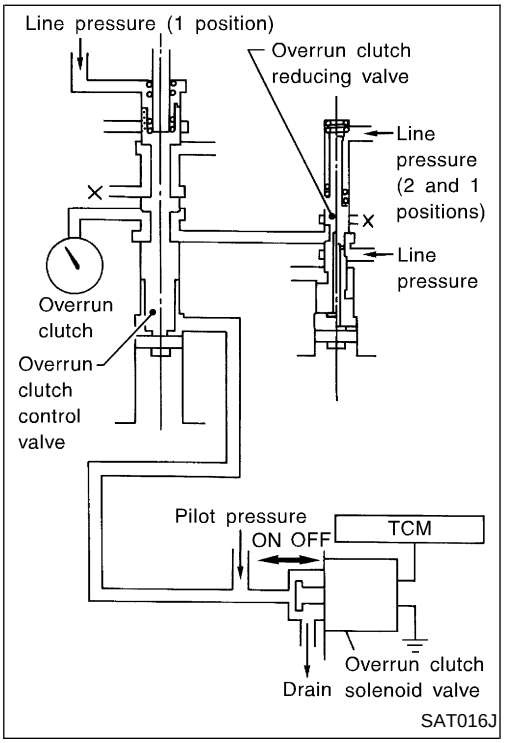


Overrun clutch solenoid valve control

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

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 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

FUNCTION OF CONTROL VALVES

Valve name	Function
Pressure regulator valve, plug and sleeve	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.
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 back-pressure 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.)
“1st ” reducing valve	Reduces low & reverse brake pressure to dampen engine-brake shock when down-shifting 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

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-39.

OBD-II Function for A/T System

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

ONE TRIP DETECTION LOGIC

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

TWO TRIP DETECTION LOGIC

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

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

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

OBD-II Diagnostic Trouble Code (DTC)

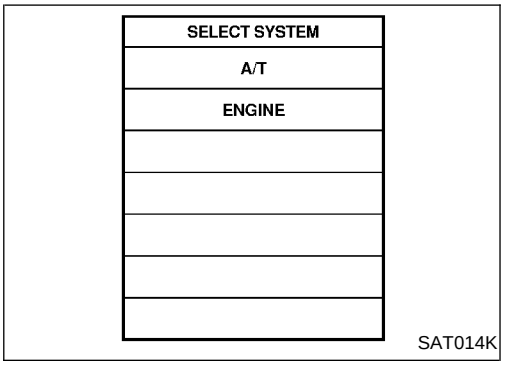
How to read DTC and 1st trip DTC

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

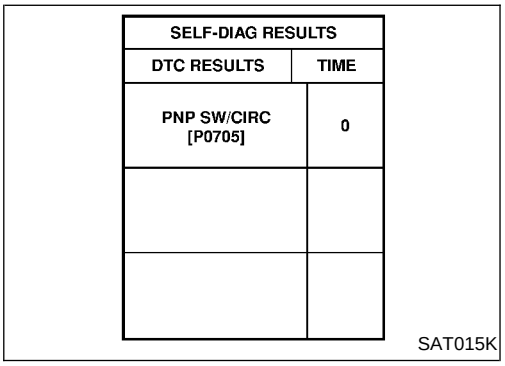
(With CONSULT-II or GST GST) CONSULT-II or GST (Generic Scan Tool) Examples: P0705, P0710,P0720, P0725, etc. These DTCs are prescribed by SAE J2012. (CONSULT-II also displays the malfunctioning component or system.)

OBD-II Diagnostic Trouble Code (DTC) (Cont'd)

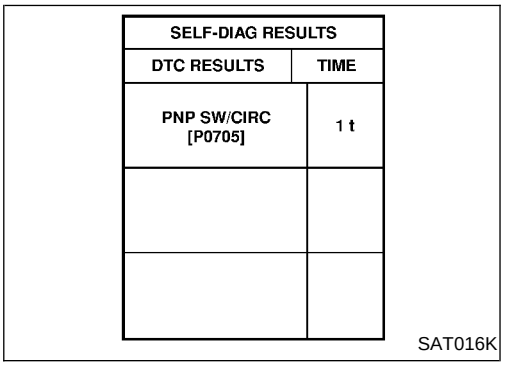
- **1st trip DTC No. is the same as DTC No.**
- **Output of the diagnostic trouble code indicates that the indicated circuit has a malfunction. However, in case of GST, it does not indicate whether the malfunction is still occurring or occurred in the past and returned to normal.**
  CONSULT-II can identify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



A sample of CONSULT-II display for DTC and 1st trip DTC are shown at left. 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".

OBD-II Diagnostic Trouble Code (DTC) (Cont'd)

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

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 EC section (''CONSULT-II'', ''ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION'').
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 (0115), P0172 (0114), 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

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''.

- **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)

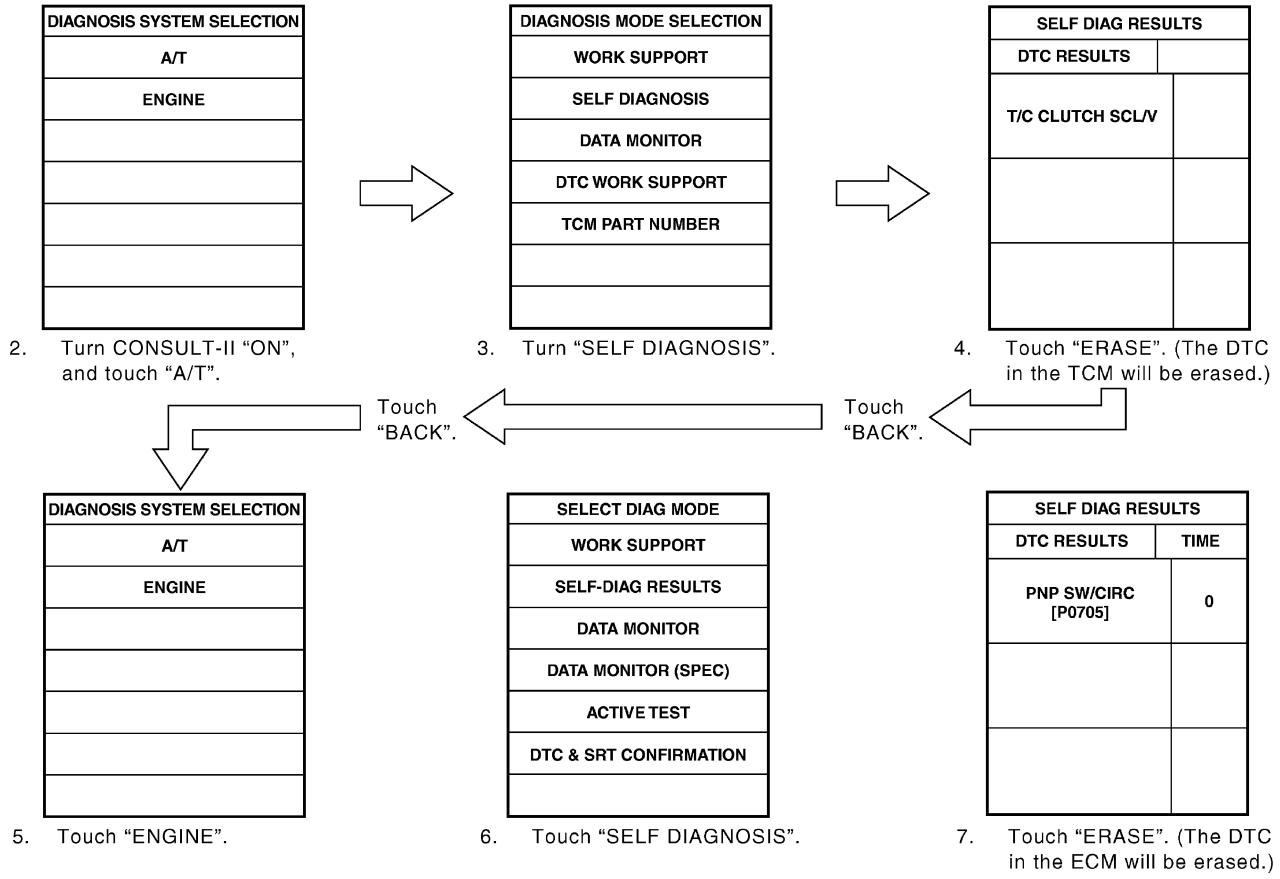
- **If a DTC is displayed for both ECM and TCM, it needs to be erased for both ECM and TCM.**

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-DIAG RESULTS''.
4. Touch ''ERASE''. (The DTC in the TCM will be erased.) Then touch ''BACK'' twice.
5. Touch ''ENGINE''.
6. Touch ''SELF-DIAG RESULTS''.
7. Touch ''ERASE''. (The DTC in the ECM will be erased.)

OBD-II Diagnostic Trouble Code (DTC) (Cont'd)

How to erase DTC (With CONSULT-II)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.



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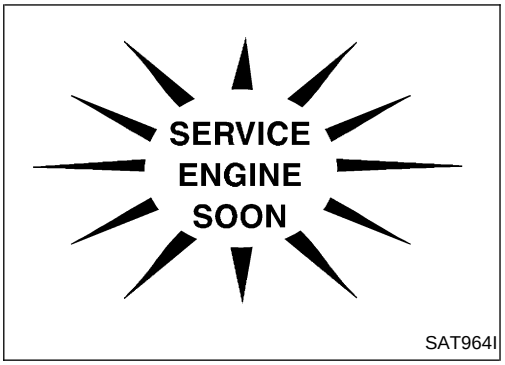
HOW TO ERASE DTC (With GST)

1. If the ignition switch stays ''ON'' after repair work, be sure to turn ignition switch ''OFF'' once. Wait at least 5 seconds and then turn it ''ON'' (engine stopped) again.
2. Perform ''OBD-II SELF-DIAGNOSTIC PROCEDURE (No Tools)''. Refer to AT-45. (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 EC section, ''Generic Scan Tool (GST)''.



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Malfunction Indicator Lamp (MIL)

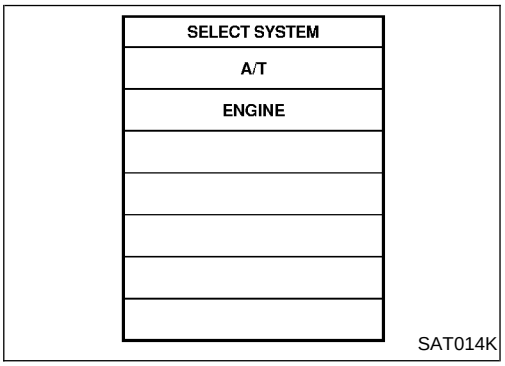
1. The malfunction indicator lamp will light up when the ignition switch is turned ON without the engine running. This is for checking the lamp.
- If the malfunction indicator lamp does not light up, refer to EL section ''WARNING LAMPS'' and ''WARNING CHIME''). (Or see MIL & Data Link Connectors in EC section.)

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 EC section ''ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION''.

CONSULT-II

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.



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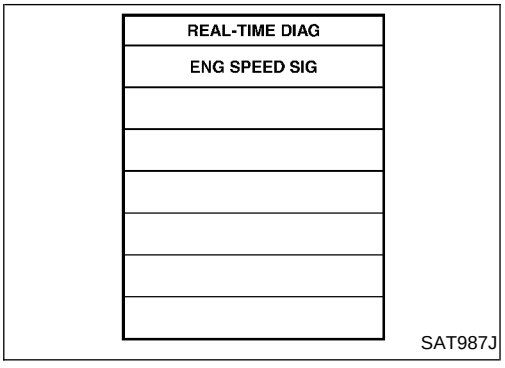
SELF-DIAGNOSIS

After performing this procedure, place check marks for results on the ''DIAGNOSTIC WORKSHEET'', AT-51. Reference pages are provided following the items.

SELF-DIAGNOSTIC PROCEDURE (With CONSULT-II)

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-72. If result is NG, refer to EL section ''POWER SUPPLY ROUTING''.



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

CONSULT-II (Cont'd)

SELF-DIAGNOSTIC RESULT TEST MODE

Detected items (Screen terms for CONSULT-II, "SELF DIAGNOSIS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
			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
"A/T"	"ENGINE"			
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			
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/CIRC			
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 (EEP ROM)		● TCM memory (EEP ROM) is malfunctioning.	—	—
CONT UNIT (EEP ROM)	—			
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

*1 : These malfunctions cannot be displayed by MIL SERVICE ENGINE SOON if another malfunction is assigned to MIL.

*2 : Refer to EC section "Malfunction Indicator Lamp (MIL)".

CONSULT-II (Cont'd)

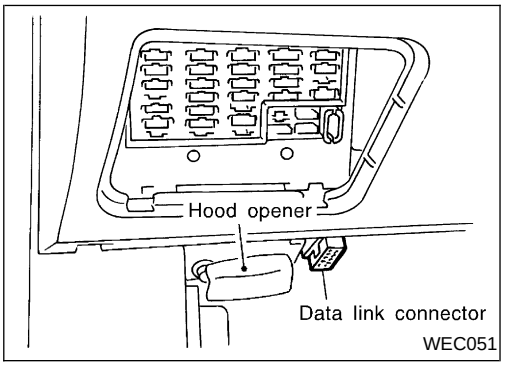
DATA MONITOR MODE (A/T)

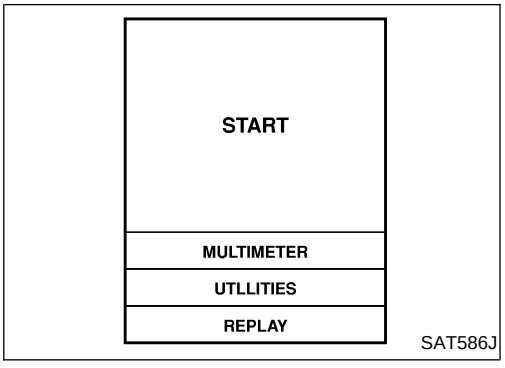
Monitor items	Display	Monitor select		Description	Remarks
		TCM input signals	Main signals		
Vehicle speed sensor 1 (A/T) (Revolution sensor)	VHCL/S SE·A/T [km/h] or [mph]	X	—	● Vehicle speed computed from signal of revolution sensor is displayed.	When racing engine in "N" or "P" position with vehicle stationary, CONSULT data may not indicate 0 km/h (0 mph).
Vehicle speed sensor 2 (Meter)	VHCL/S SE·MTR [km/h] or [mph]	X	—	● Vehicle speed computed from signal of vehicle speed sensor is displayed.	Vehicle speed display may not be accurate under approx. 10 km/h (6 mph). It may not indicate 0 km/h (0 mph) when vehicle is stationary.
Throttle position sensor	THRTL POS SEN [V]	X	—	● Throttle position sensor signal voltage is displayed.	
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.	
PN position switch	PN POSI SW [ON/OFF]	X	—	● ON/OFF state computed from signal of PN position SW is displayed.	
R position switch	R POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of R position SW is displayed.	
D position switch	D POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of D position SW is displayed.	
2 position switch	2 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 2 position SW, is displayed.	
1 position switch	1 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 1 position SW, is displayed.	
ASCD cruise signal	ASCD·CRUISE [ON/OFF]	X	—	● Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state	● This is displayed even when no ASCD is mounted.
ASCD OD cut signal	ASCD·OD CUT [ON/OFF]	X	—	● Status of ASCD OD release signal is displayed. ON ... OD released OFF ... OD not released	● This is displayed even when no ASCD is mounted.
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.	

CONSULT-II (Cont'd)

Monitor items	Display	Monitor select		Description	Remarks
		TCM input signals	Main signals		
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.	
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



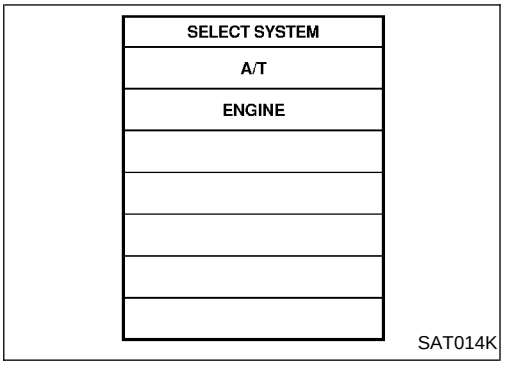


DTC WORK SUPPORT MODE WITH CONSULT-II

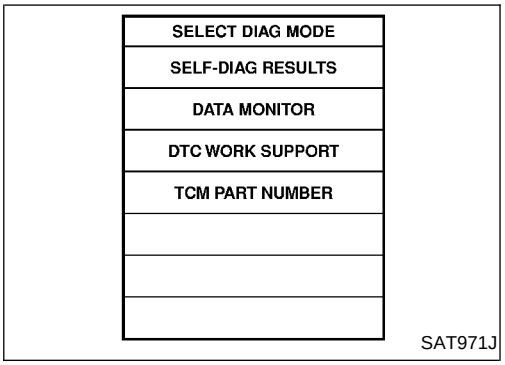
CONSULT-II setting procedure

1. Turn ignition switch "OFF".
2. Connect CONSULT-II to data link connector which is located in lower left side dash panel.
3. Turn ignition switch "ON".
4. Touch "START".

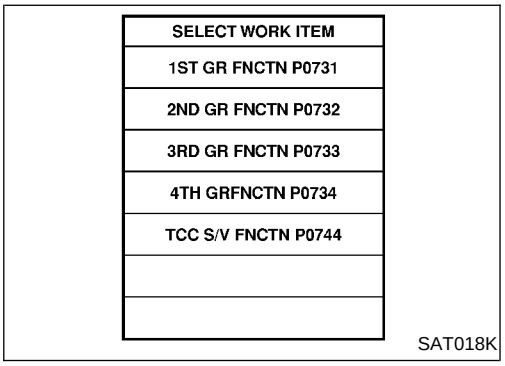
CONSULT-II (Cont'd)



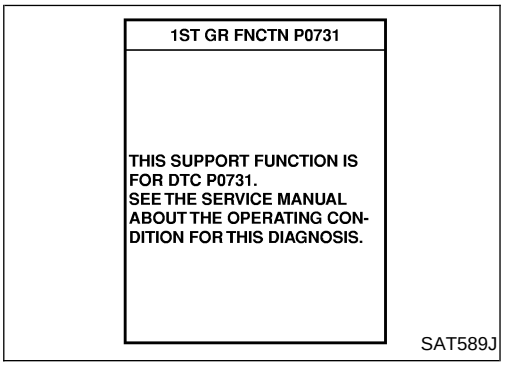
5. Touch "A/T".



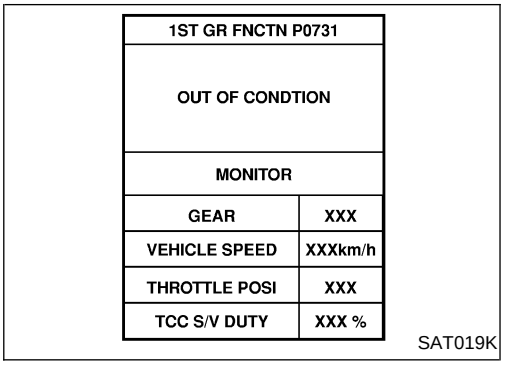
6. Touch "DTC WORK SUPPORT".



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

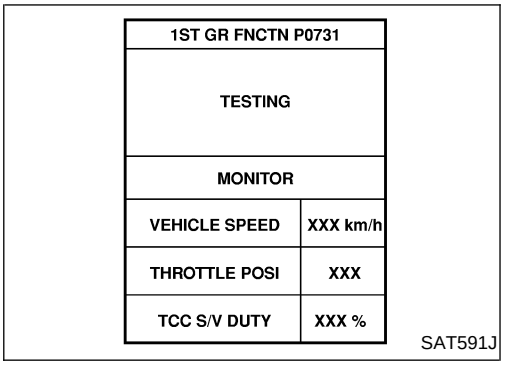


8. Touch "START".

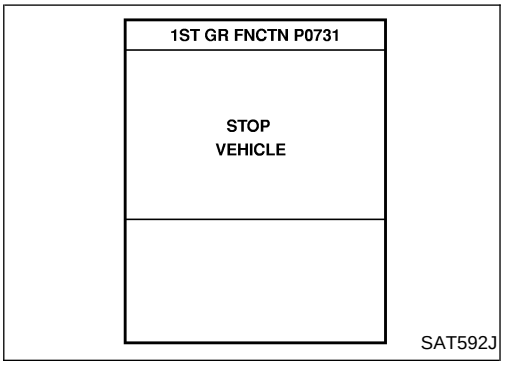


9. Perform driving test according to "DTC CONFIRMATION PROCEDURE" in "TROUBLE DIAGNOSIS FOR DTC".

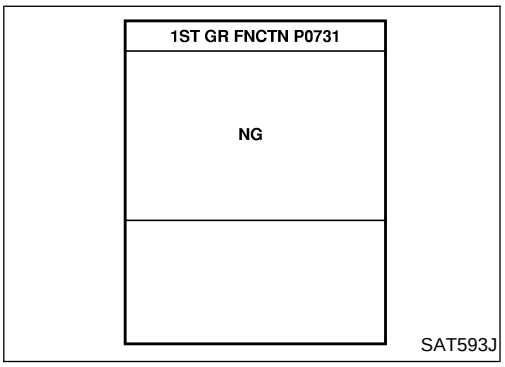
CONSULT-II (Cont'd)

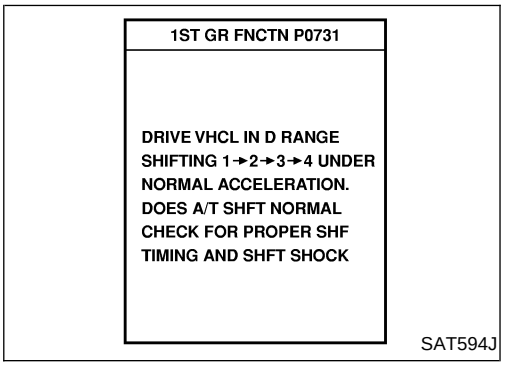


- **When testing conditions are satisfied, CONSULT screen changes from "OUT OF CONDITION" to "TESTING".**

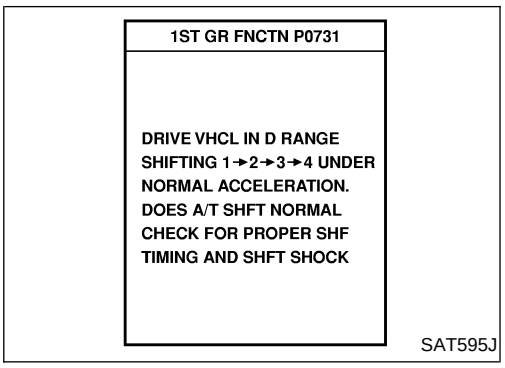


10. Stop vehicle. If "NG" appears on the screen, malfunction may exist. Go to "DIAGNOSTIC PROCEDURE".



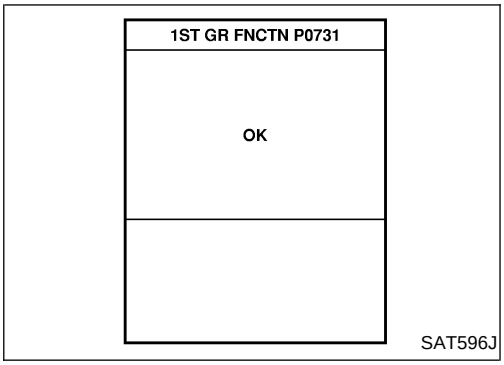


11. Perform test drive to check gear shift feeling in accordance with instructions displayed.

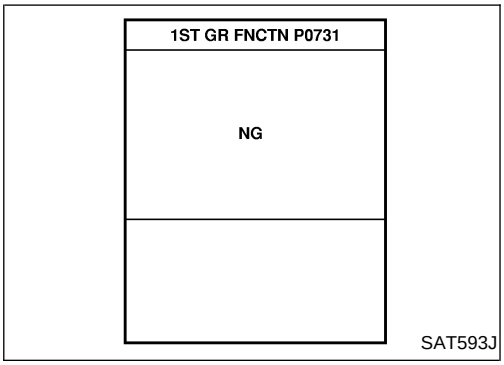


12. Touch "YES" or "NO".

CONSULT-II (Cont'd)



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

DTC work support item	Description	Check items (Possible cause)
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

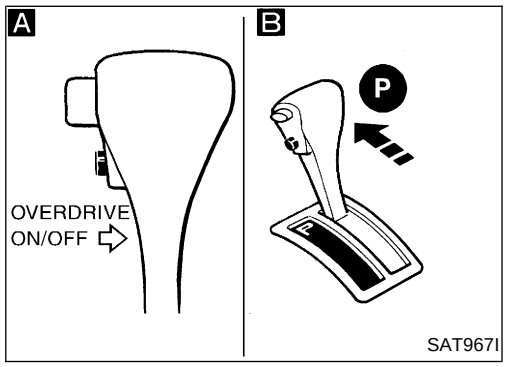
Diagnostic Procedure Without CONSULT-II

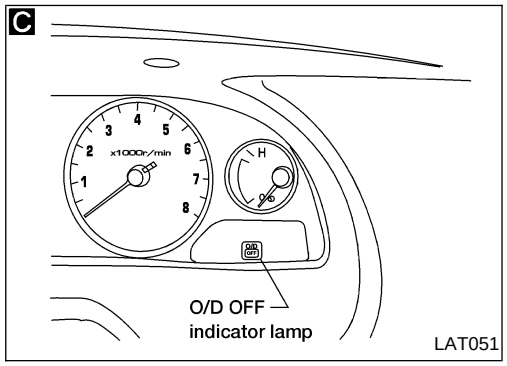
OBD-II SELF-DIAGNOSTIC PROCEDURE (With GST)

Refer to EC section ''Generic Scan Tool (GST)''.

OBD-II SELF-DIAGNOSTIC PROCEDURE (No Tools)

Refer to EC section ''Malfunction Indicator Lamp (MIL)''.





TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)

DIAGNOSIS START

A B C

1. Move selector lever in ''P'' position. Start the engine. Warm engine to normal operating temperature.
2. Turn ignition switch to ''OFF'' position.
3. Wait 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?

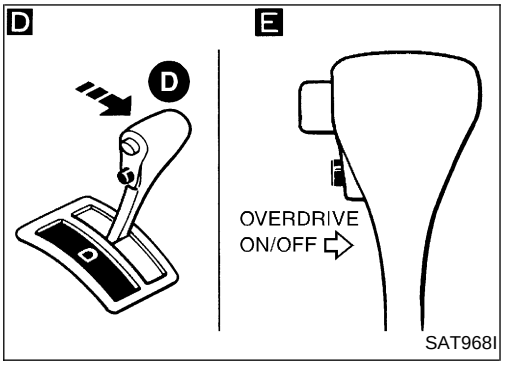
No → Go to ''1. O/D OFF Indicator Lamp Does Not Come On'', AT-174.

Yes → Ⓐ (Go to next page.)

TBD

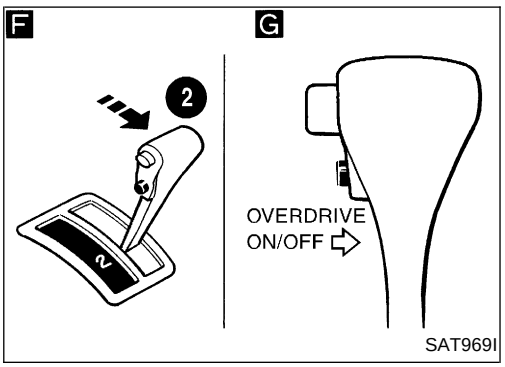
Diagnostic Procedure Without CONSULT-II (Cont'd)

D E



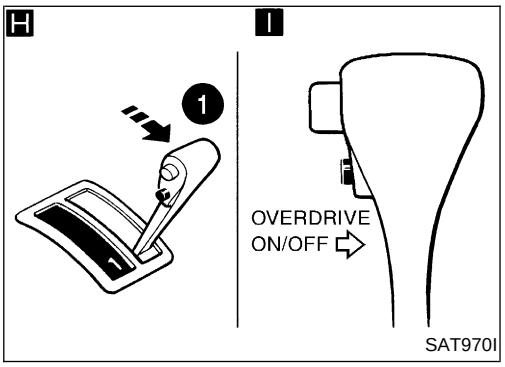
SAT968I

F G



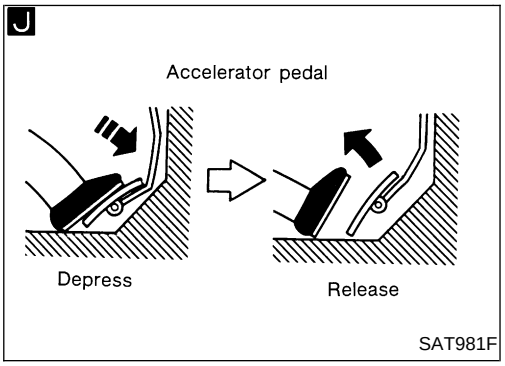
SAT969I

H I



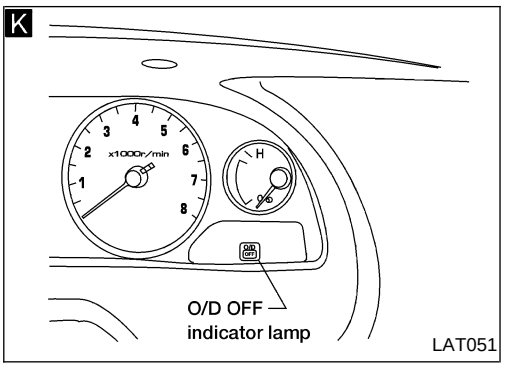
SAT970I

J



SAT981F

K



LAT051

TBD

Ⓐ

D E

1. Turn ignition switch to "OFF" position.
2. Turn ignition switch to "ACC" position.
3. Move selector lever from "P" to "D" position.
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, go to step B on AT-193.)
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.

F G

10. Move selector lever to "2" position.
11. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be "ON").
12. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be "OFF") until directed to release the switch.

H I

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

J K

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

Check O/D OFF indicator lamp.
Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE, AT-47.

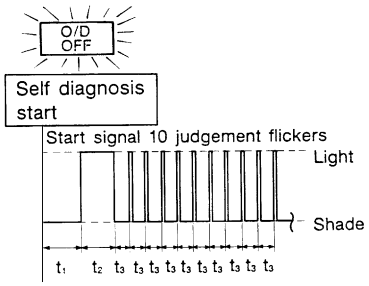
DIAGNOSIS END

Diagnostic Procedure Without CONSULT-II (Cont'd)

JUDGEMENT OF SELF-DIAGNOSIS CODE

O/D OFF indicator lamp:

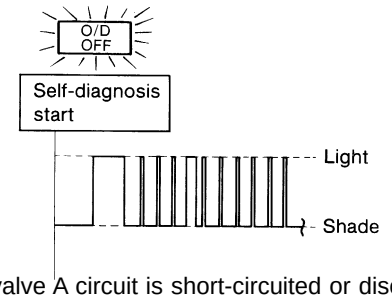
All judgement flickers are the same.



SAT436F

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

4th judgement licker is longer than others.

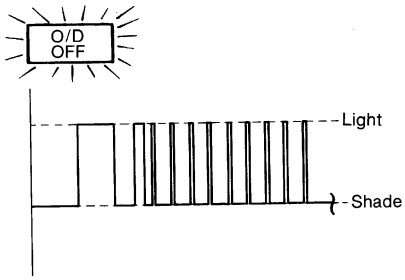


SAT443F

Shift solenoid valve A circuit is short-circuited or disconnected.

➡ **Go to SHIFT SOLENOID VALVE A (DTC: 1108), AT-138.**

1st judgement flicker is longer than others.

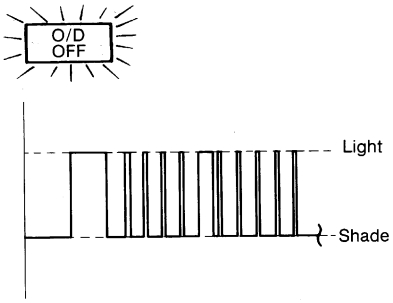


SAT437F

Revolution sensor circuit is short-circuited or disconnected.

➡ **Go to VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR) (DTC: 1102), AT-88.**

5th judgement flicker is longer than others.

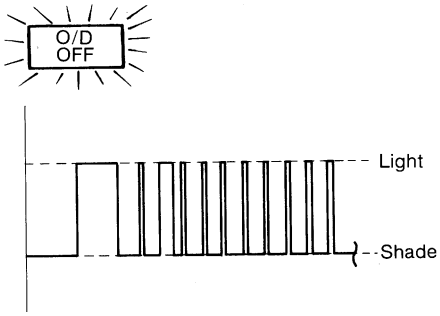


SAT445F

Shift solenoid valve B circuit is short-circuited or disconnected.

➡ **Go to SHIFT SOLENOID VALVE B (DTC: 1201), AT-143.**

2nd judgement flicker is longer than others.

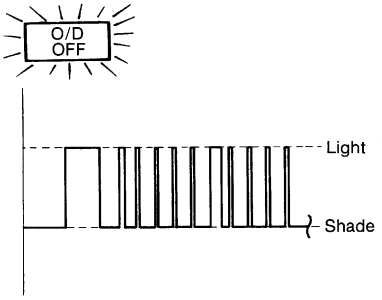


SAT439F

Vehicle speed sensor circuit is short-circuited or disconnected.

➡ **Go to VEHICLE SPEED SENSOR·MTR, AT-163.**

6th judgement flicker is longer than others.

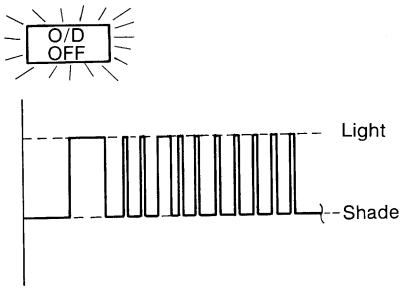


SAT447F

Overrun clutch solenoid valve circuit is short-circuited or disconnected.

➡ **Go to OVERRUN CLUTCH SOLENOID VALVE (DTC: 1203), AT-154.**

3rd judgement flicker is longer than others.

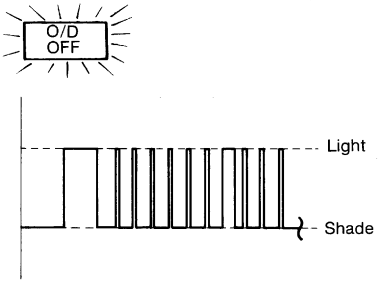


SAT441F

Throttle position sensor circuit is short-circuited or disconnected.

➡ **Go to THROTTLE POSITION SENSOR (DTC: 1206), AT-148.**

7th judgement flicker is longer than others.



SAT449F

Torque converter clutch solenoid valve circuit is short-circuited or disconnected.

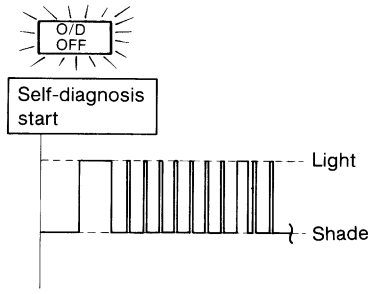
➡ **Go to TORQUE CONVERTER CLUTCH SOLENOID VALVE (DTC: 1204), AT-120.**

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

Diagnostic Procedure Without CONSULT-II (Cont'd)

O/D OFF indicator lamp:

8th judgement flicker is longer than others.

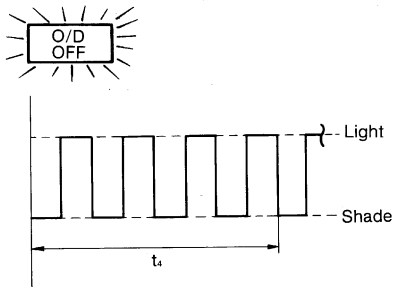


SAT451F

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-158.**

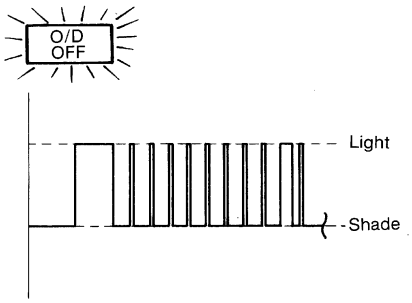
Flickers as shown below.



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.)

9th judgement flicker is longer than others.

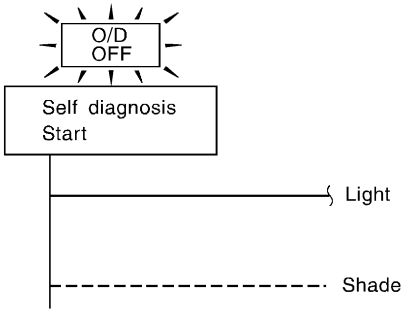


SAT453F

Engine speed signal circuit is short-circuited or disconnected.

➡ **Go to ENGINE SPEED SIGNAL (DTC: 1207), AT-92.**

Lamp comes on.

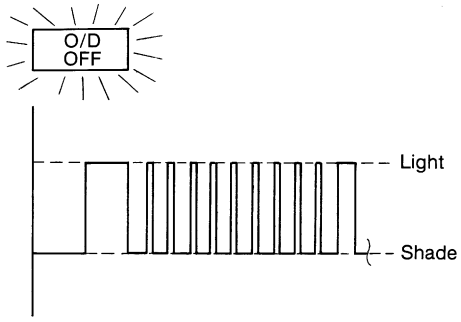


SAT367J

PNP switch, overdrive control switch or throttle position switch circuit is disconnected or TCM is damaged.

➡ **Go to PNP, OVERDRIVE CONTROL AND THROTTLE POSITION SWITCHES, AT-189.**

10th judgement flicker is longer than others.

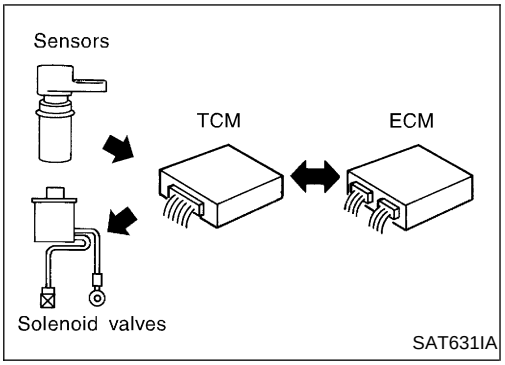


SAT455F

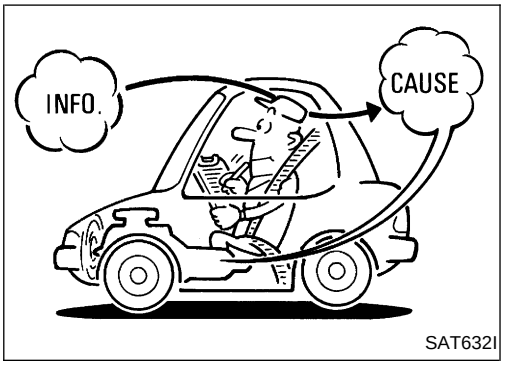
Line pressure solenoid valve circuit is short-circuited or disconnected.

➡ **Go to LINE PRESSURE SOLENOID VALVE (DTC: 1205), AT-133.**

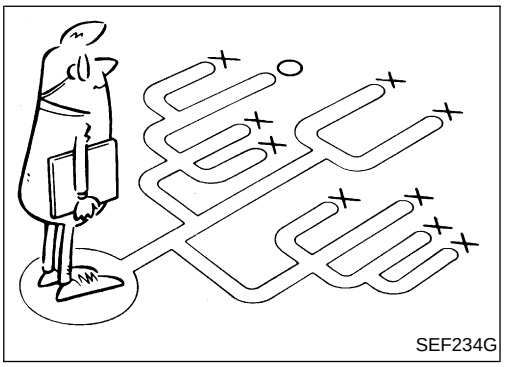
t_4 = 1.0 second



SAT631IA



SAT632I


SEF234G

Introduction

The TCM receives a signal from the vehicle speed sensor, throttle position sensor or 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-53.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A ‘‘Diagnostic Worksheet’’ like the example (AT-50) 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

INFORMATION FROM CUSTOMER

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

Customer name MR/MS	Model & Year	VIN
Trans. model	Engine	Mileage
Incident Date	Manuf. Date	In Service Date
Frequency	☐ 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 (Cont'd)

DIAGNOSTIC WORKSHEET

1.	☐ Read the Fail-safe and listen to customer complaints.	AT-7
2.	☐ CHECK A/T FLUID	AT-54
	☐ Leakage (Follow specified procedure) ☐ Fluid condition ☐ Fluid level	
3.	☐ Perform STALL TEST and LINE PRESSURE TEST.	AT-54, 57
	☐ 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 ☐ Line pressure test — Suspected parts:	
4.	☐ Perform all ROAD TEST and mark required procedures.	AT-58
	4-1. Check before engine is started ☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items. ☐ PNP switch, AT-78. ☐ A/T fluid temperature sensor, AT-83. ☐ Vehicle speed sensor·A/T (Revolution sensor), AT-88. ☐ Engine speed signal, AT-92. ☐ Torque converter clutch solenoid valve, AT-120. ☐ Line pressure solenoid valve, AT-133. ☐ Shift solenoid valve A, AT-138. ☐ Shift solenoid valve B, AT-143. ☐ Throttle position sensor, AT-148. ☐ Overrun clutch solenoid valve, AT-154. ☐ A/T fluid temperature sensor and TCM power source, AT-158. ☐ Vehicle speed sensor·MTR, AT-163. ☐ Control unit (RAM) Control unit (ROM), AT-167. ☐ Control unit (EEPROM), AT-169. ☐ PNP, overdrive control and throttle position switches, AT-189. ☐ Battery ☐ Others	AT-59
	4-2. Check at idle ☐ 1. O/D OFF Indicator Lamp Does Not Come On, AT-174. ☐ 2. Engine Cannot Be Started In "P" And "N" Position, AT-175. ☐ 3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed, AT-175. ☐ 4. In "N" Position, Vehicle Moves, AT-176. ☐ 5. Large Shock. "N" → "R" Position, AT-177. ☐ 6. Vehicle Does Not Creep Backward In "R" Position, AT-178. ☐ 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position, AT-179.	AT-60
	4-3. Cruise test Part-1 ☐ 8. Vehicle Cannot Be Started From D_1, AT-180. ☐ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-181. ☐ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-182. ☐ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-183. ☐ 12. A/T Does Not Perform Lock-up, AT-184. ☐ 13. A/T Does Not Hold Lock-up Condition, AT-185. ☐ 14. Lock-up Is Not Released, AT-185. ☐ 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$), AT-186.	AT-62, AT-65

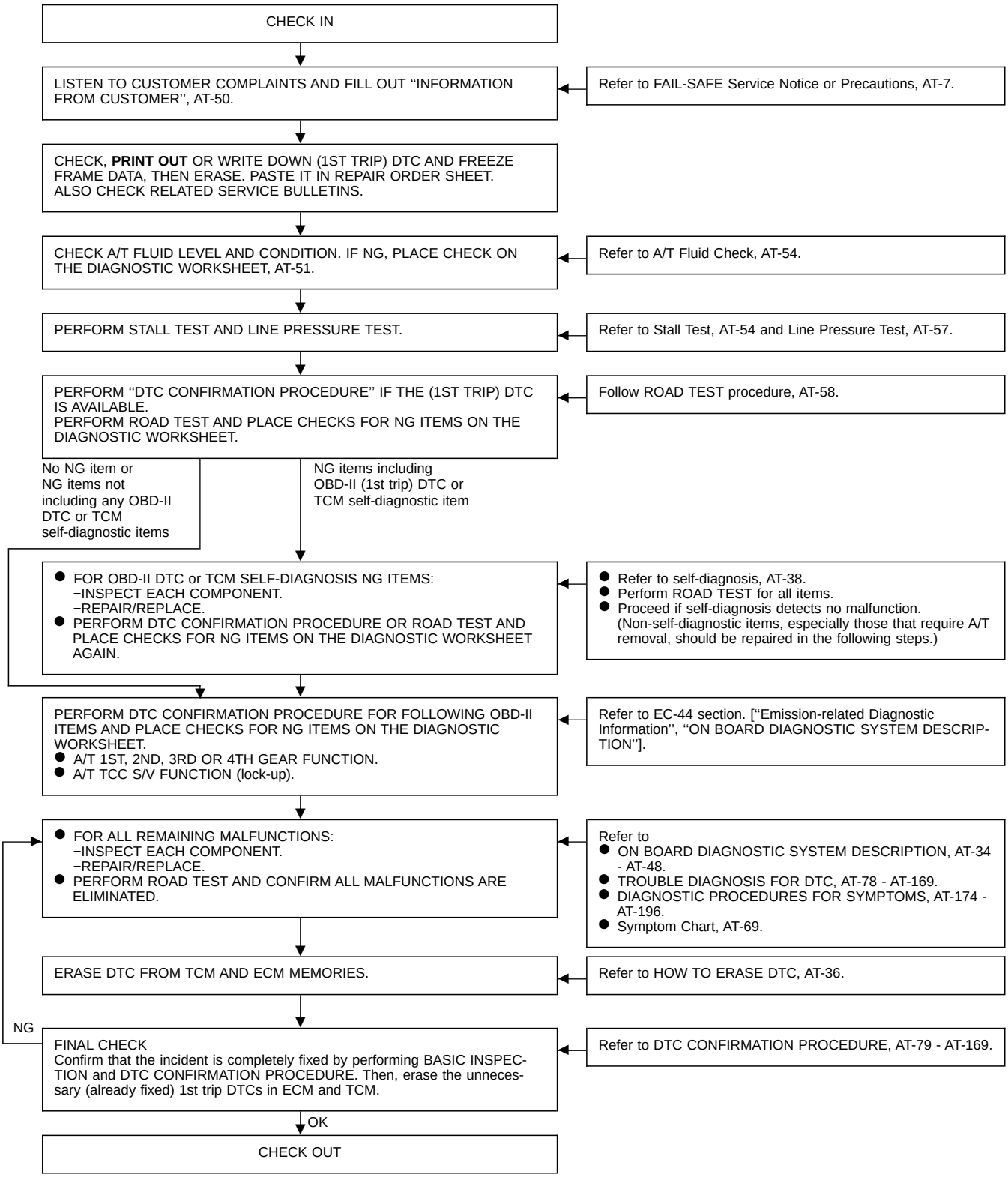
Diagnostic Worksheet (Cont'd)

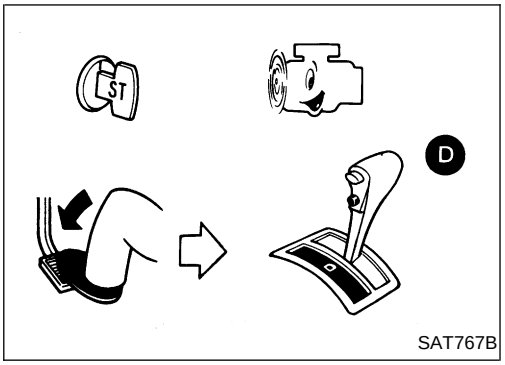
4.	Part-2 ☐ 16. Vehicle Does Not Start From D_1, AT-187. ☐ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-181. ☐ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-182. ☐ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-183.	AT-67
	Part-3 ☐ 17. A/T Does Not Shift: $D_4 \rightarrow D_3$ When Overdrive Control Switch "ON" → "OFF", AT-187 ☐ 15. Engine Speed Does Not Return To Idle (Engine Brake In D_3), AT-186. ☐ 18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever "D" → "2" Position, AT-188. ☐ 15. Engine Speed Does Not Return To Idle (Engine Brake In 2_2), AT-186. ☐ 19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever "2" → "1" Position, AT-188. ☐ 20. Vehicle Does Not Decelerate By Engine Brake, AT-189. ☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items. ☐ PNP switch, AT-78. ☐ A/T fluid temperature sensor, AT-83. ☐ Vehicle speed sensor·A/T (Revolution sensor), AT-88. ☐ Engine speed signal, AT-92. ☐ Torque converter clutch solenoid valve, AT-120. ☐ Line pressure solenoid valve, AT-133. ☐ Shift solenoid valve A, AT-138. ☐ Shift solenoid valve B, AT-143. ☐ Throttle position sensor, AT-148. ☐ Overrun clutch solenoid valve, AT-154. ☐ A/T fluid temperature sensor and TCM power source, AT-158. ☐ Vehicle speed sensor·MTR, AT-163. ☐ Control unit (RAM) Control unit (ROM), AT-167. ☐ Control unit (EEPROM), AT-169. ☐ PNP, overdrive control and throttle position switches, AT-189. ☐ Battery ☐ Others	AT-68
5.	☐ For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.	AT-39
6.	☐ Perform all ROAD TEST and re-mark required procedures.	AT-58
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"]. ☐ DTC (P0731, 1103) A/T 1st gear function, AT-95. ☐ DTC (P0732, 1104) A/T 2nd gear function, AT-101. ☐ DTC (P0733, 1105) A/T 3rd gear function, AT-107. ☐ DTC (P0734, 1106) A/T 4th gear function, AT-113. ☐ DTC (P0744, 1107) A/T TCC S/V function (lock-up), AT-125.	EC section
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-72, AT-69
9.	☐ Erase DTC from TCM and ECM memories.	AT-36

Work Flow

HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

A good understanding of the malfunction conditions can make troubleshooting faster and more accurate. In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.
Make good use of the two sheets provided, ''INFORMATION FROM CUSTOMER'', AT-50 and ''DIAGNOSTIC WORKSHEET'', AT-51, to perform the best troubleshooting possible.



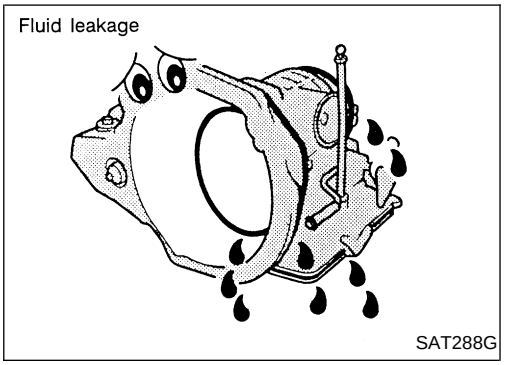


SAT767B

A/T Fluid Check

FLUID LEAKAGE CHECK

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



SAT288G

4. Check for fresh leakage.

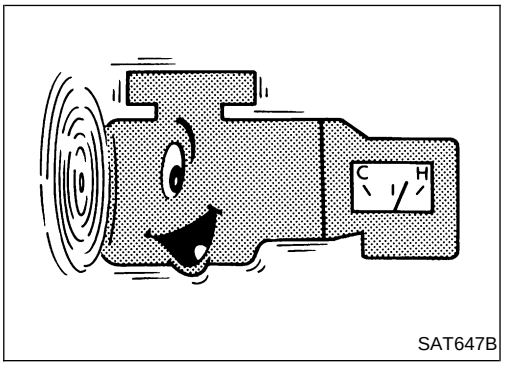
FLUID CONDITION CHECK


SAT638A

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

FLUID LEVEL CHECK

Refer to MA section, "Checking A/T Fluid".



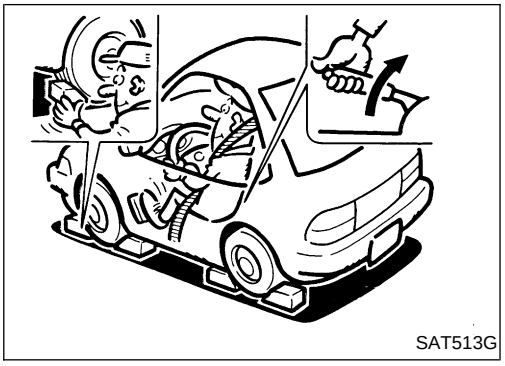
SAT647B

Stall Test

STALL TEST PROCEDURE

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.

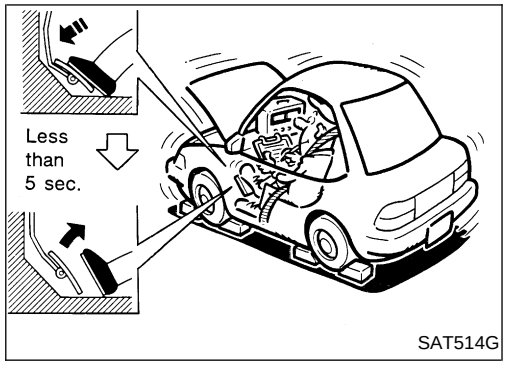
   ATF operating temperature:
   50 - 80°C (122 - 176°F)


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.**

Stall Test (Cont'd)

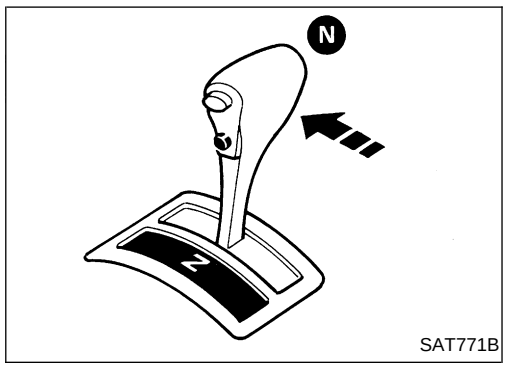


SAT514G

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:
2,800 - 3,100 rpm



SAT771B

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

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 shown in AT-53.

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

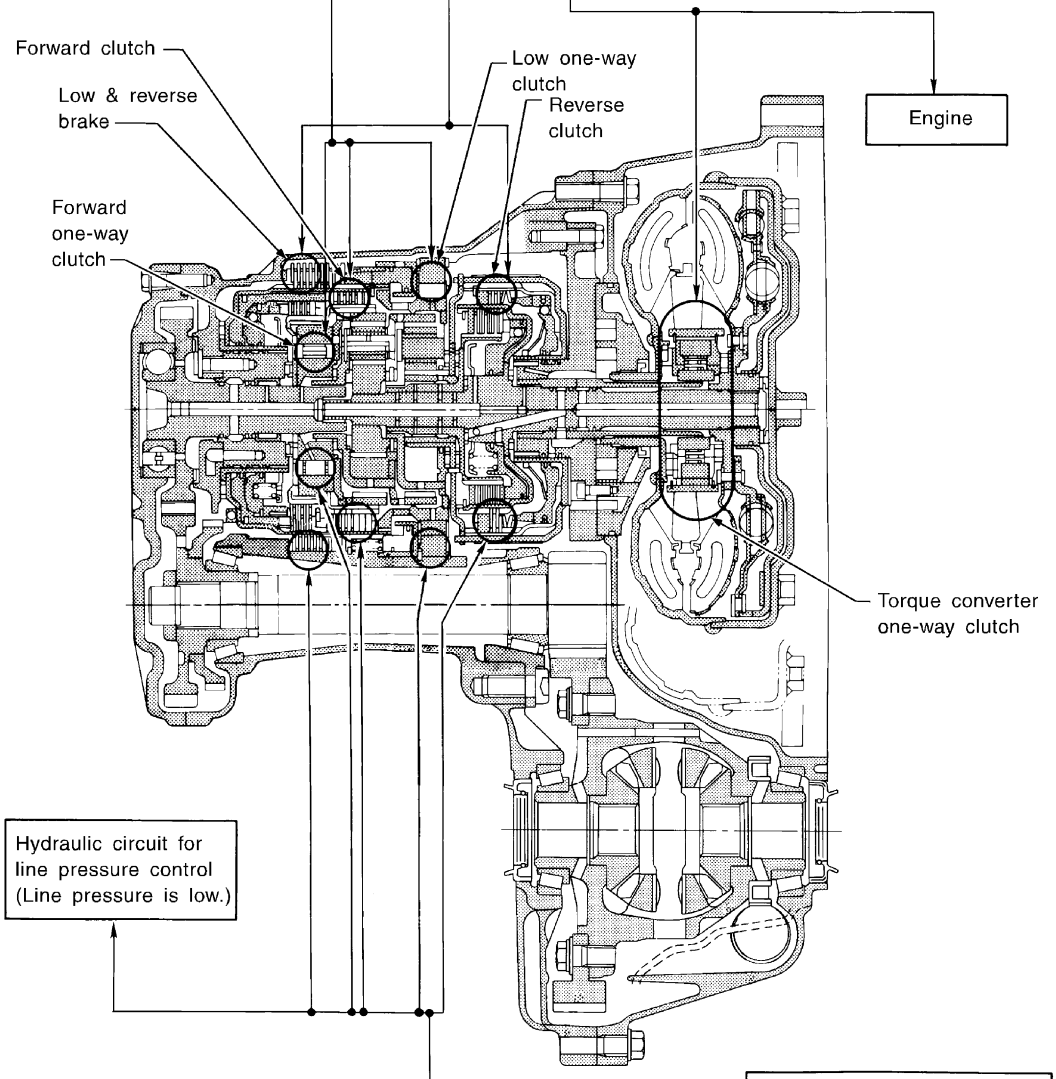
Stall Test (Cont'd)

Judgement of stall test

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

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

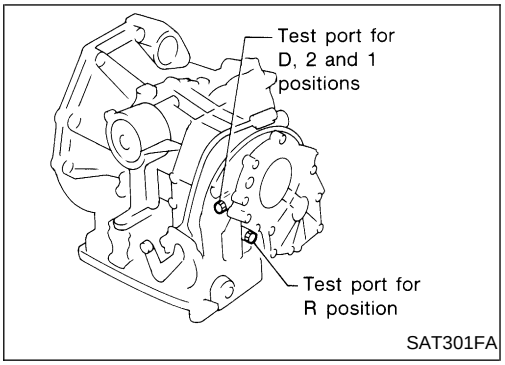
Damaged components



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



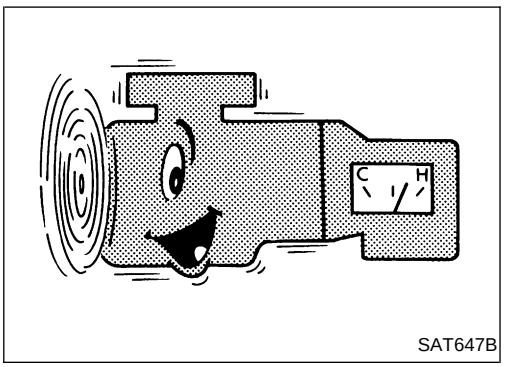
SAT301FA

Line Pressure Test

LINE PRESSURE TEST PORTS

Location of pressure test ports are shown in the illustration.

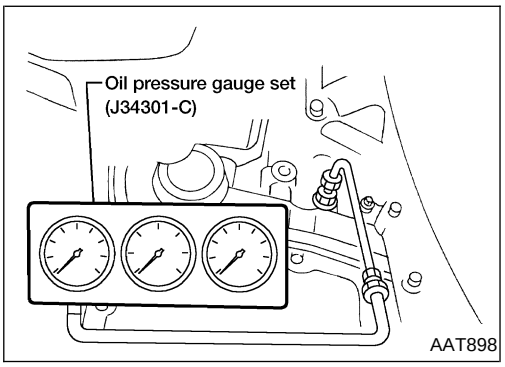
- **Always replace pressure plugs as they are self-sealing bolts.**



SAT647B

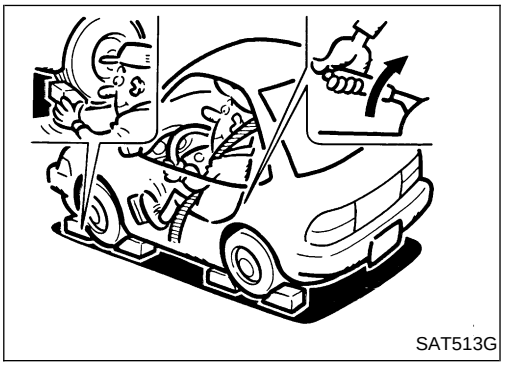
LINE PRESSURE TEST PROCEDURE

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)

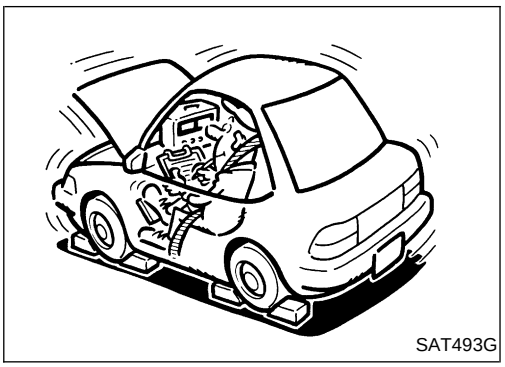


AAT898

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

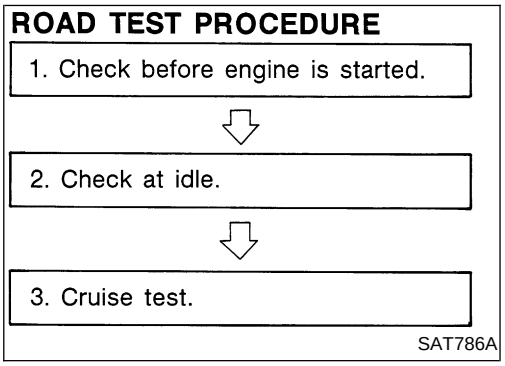
5. Start engine and measure line pressure at idle and stall speed.
- **When measuring line pressure at stall speed, follow the stall test procedure.**

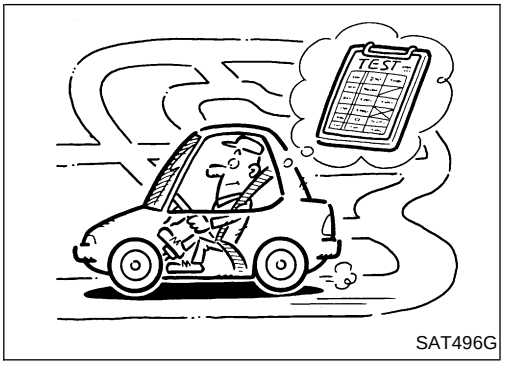
Line pressure: Refer to "LINE PRESSURE", AT-302.

Line Pressure Test (Cont'd)

JUDGEMENT OF LINE PRESSURE TEST

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 BAND CHART", AT-18.
	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





Road Test

DESCRIPTION

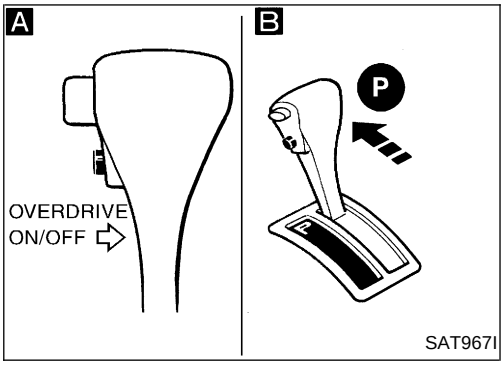
- The purpose of the test is to determine overall performance of A/T and analyze causes of problems.
- The road test consists of the following three parts:

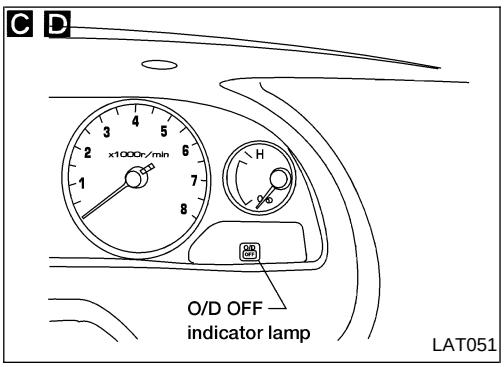
1. Check before engine is started
2. Check at idle
3. Cruise test

- 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 "DIAGNOSTIC PROCEDURES FOR SYMPTOMS", AT-34 - AT-48 and AT-171 - AT-196.

Road Test (Cont'd)

1. CHECK BEFORE ENGINE IS STARTED





TBD

A B C

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

No → Stop ROAD TEST. Go to "1. O/D OFF Indicator Lamp Does Not Come On", AT-174.

Yes ↓

D

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

Yes → Perform self-diagnosis and check NG items on the DIAGNOSTIC WORKSHEET, AT-51. Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-45.

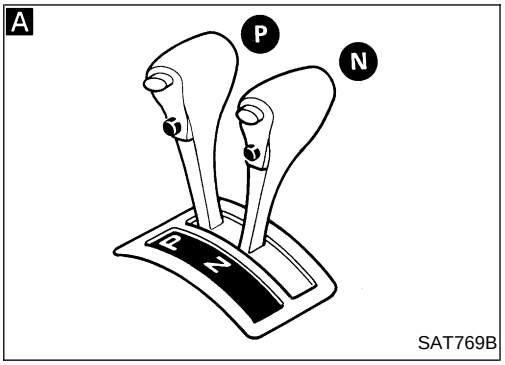
No ↓

1. Turn ignition switch to "OFF" position.
2. Perform self-diagnosis and note NG items.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-45.
3. Go to "2. CHECK AT IDLE", AT-60.

Road Test (Cont'd)

2. CHECK AT IDLE

A



SAT769B

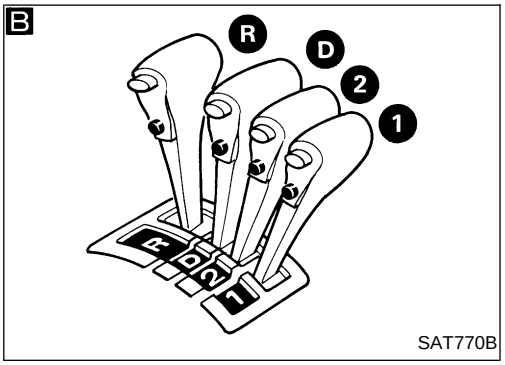
1. Park vehicle on flat surface.
2. Move selector lever to "P" position.
3. Turn ignition switch to "OFF" position.
4. Turn ignition switch to "START" position.
5. Is engine started?

No → Mark the box on the DIAGNOSTIC WORKSHEET. Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-175. Continue ROAD TEST.

Yes ↓

Turn ignition switch to "ACC" position. ↓

B



SAT770B

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

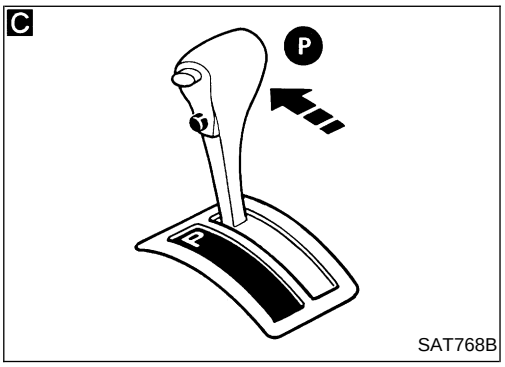
Yes → Mark the box on the DIAGNOSTIC WORKSHEET. Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-175. Continue ROAD TEST.

No ↓

C

1. Move selector lever to "P" position.
2. Turn ignition switch to "OFF" position.
3. Release parking brake.

C



SAT768B

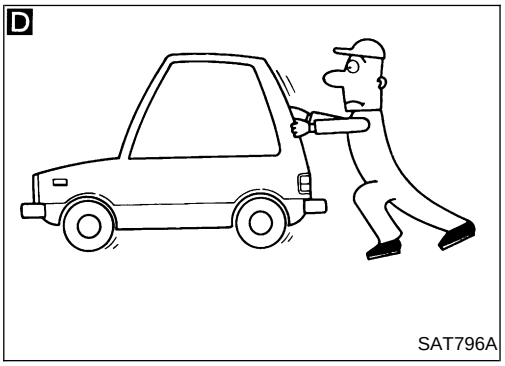
D

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

Yes → Mark the box on the DIAGNOSTIC WORKSHEET. Go to "3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed", AT-175. Continue ROAD TEST.

No ↓

D


SAT796A

E

1. Start engine.
2. Move selector lever to "N" position.
3. Release parking brake.
4. Does vehicle move forward or backward?

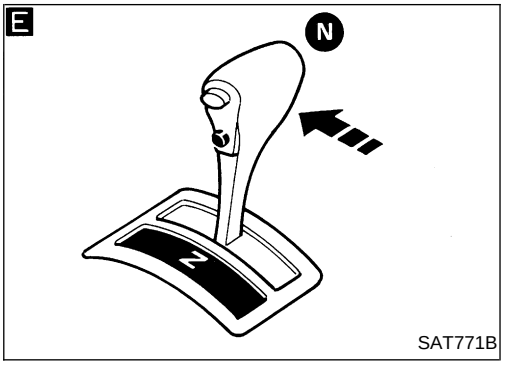
Yes → Mark the box on the DIAGNOSTIC WORKSHEET. Go to "4. In "N" Position, Vehicle Moves", AT-176. Continue ROAD TEST.

No ↓

Ⓐ

(Go to next page.)

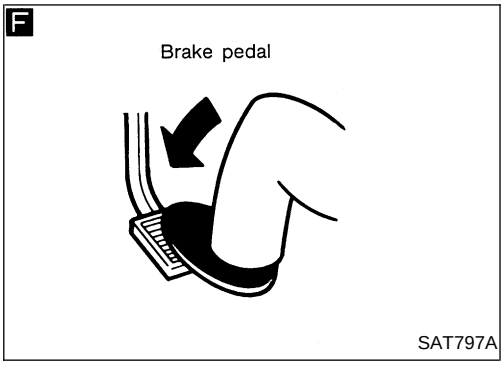
E



SAT771B

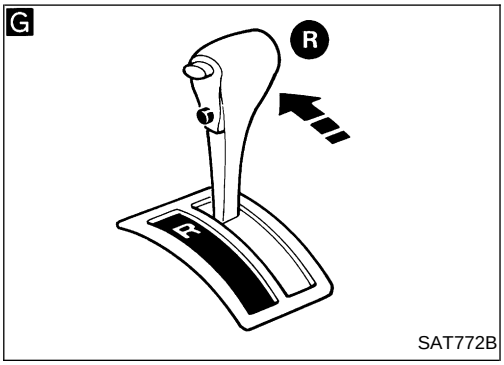
Road Test (Cont'd)

F



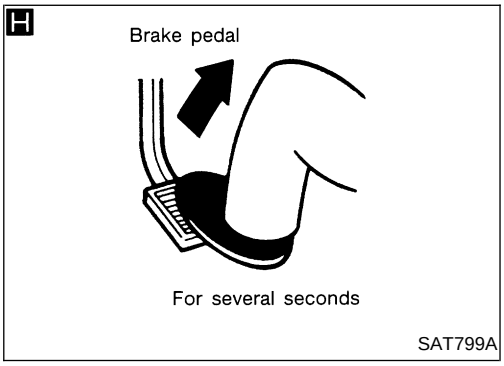
SAT797A

G



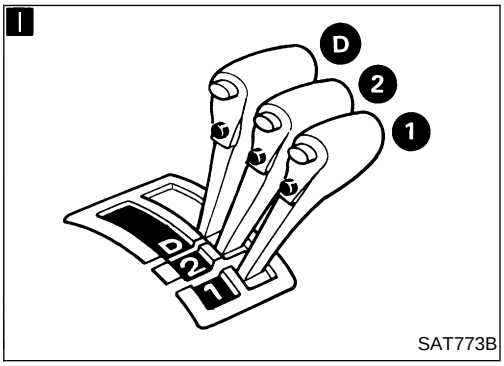
SAT772B

H



SAT799A

I



SAT773B

Ⓐ

F

Apply foot brake.

G

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

Yes → Mark the box on the DIAGNOSTIC WORKSHEET. Go to "5. Large Shock "N" → "R" Position", AT-177. Continue ROAD TEST.

No

H

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

No → Mark the box on the DIAGNOSTIC WORKSHEET. Go to "6. Vehicle Does Not Creep Backward In "R" Position", AT-178. Continue ROAD TEST.

Yes

I

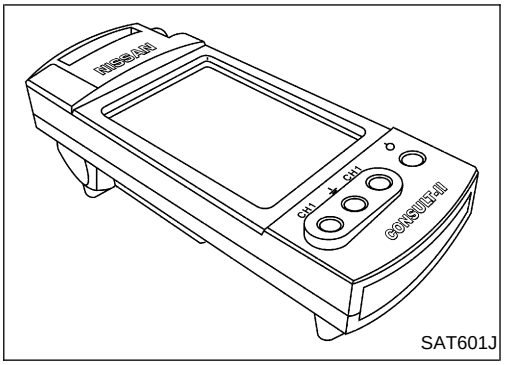
1. Move selector lever to "D", "2" and "1" positions and check if vehicle creeps forward.
2. Does vehicle creep forward in all three positions?

No → Mark the box on the DIAGNOSTIC WORKSHEET. Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position", AT-179. Continue ROAD TEST.

Yes

Go to 3. CRUISE TEST, AT-62.

Road Test (Cont'd)



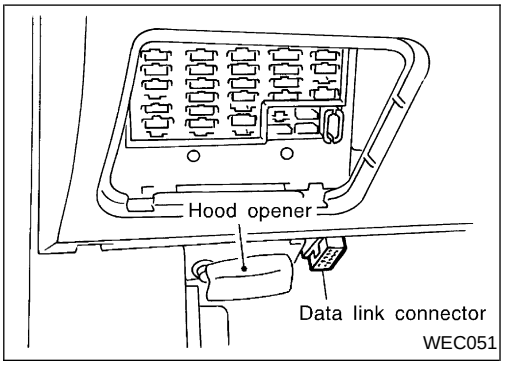
SAT601J

3. CRUISE TEST

- Check all items listed in Parts 1 through 3.

With CONSULT-II

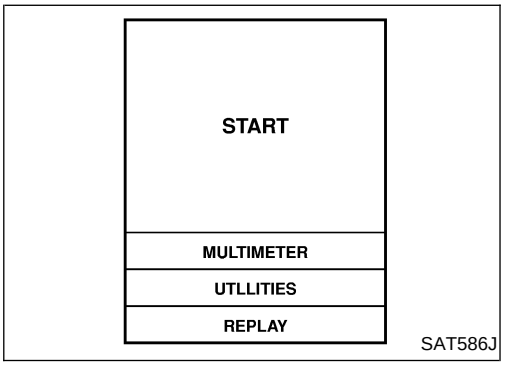
- Using CONSULT-II, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per Shift Schedule.



WEC051

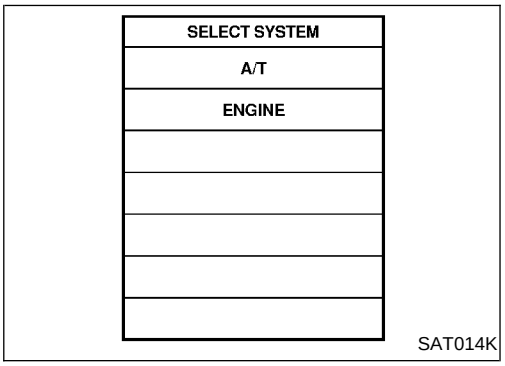
CONSULT-II setting procedure

1. Turn ignition switch "OFF".
2. Connect CONSULT-II to Data Link Connector which is located in lower left side dash panel.



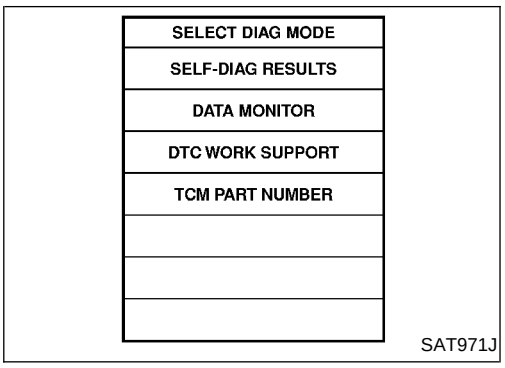
SAT586J

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



SAT014K

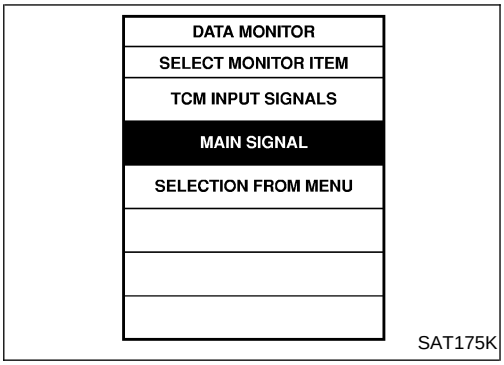
5. Touch "A/T".



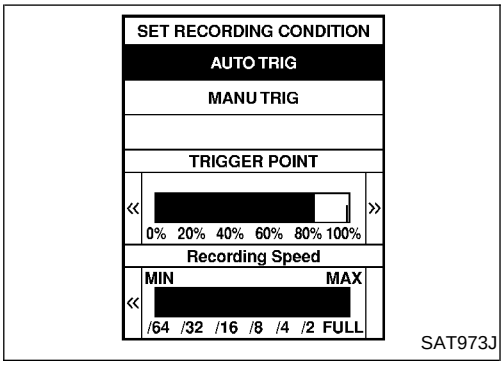
SAT971J

6. Touch "DATA MONITOR".

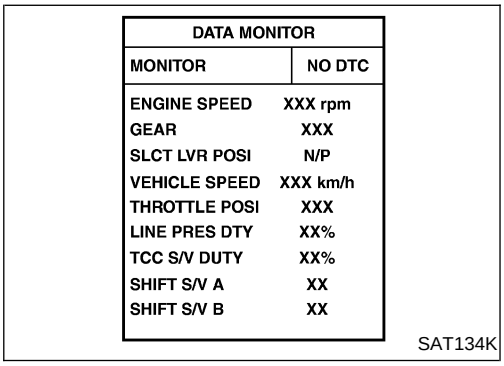
Road Test (Cont'd)



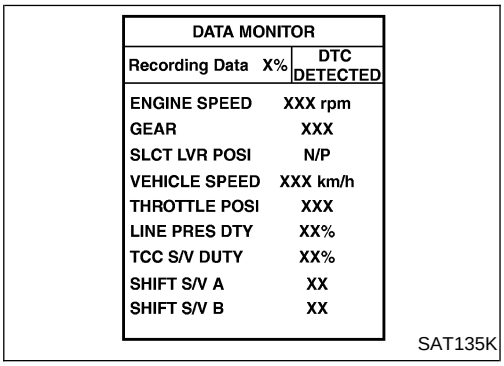
7. Touch "MAIN SIGNALS" or "TCM INPUT SIGNALS".
8. See "Numerical Display", "Bar Chart Display" or "Line Graph Display".



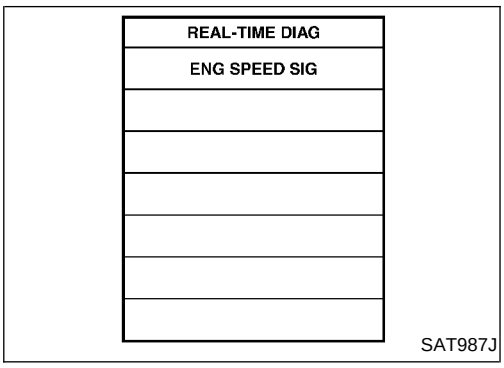
9. Touch SETTING to set recording condition ("AUTO TRIG" or "MANU TRIG" and touch "BACK".
10. Touch "START".



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

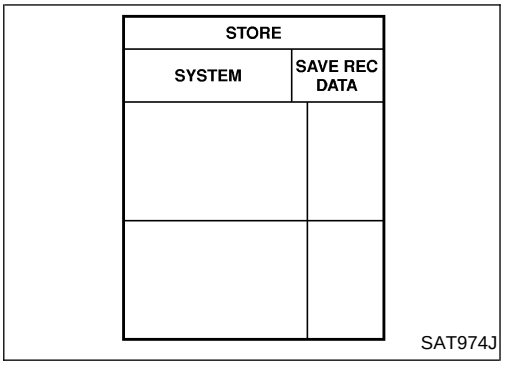


12. After finishing cruise test part 1, touch "STOP".

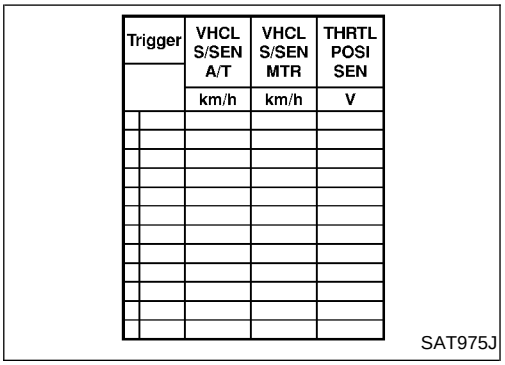


13. Touch "STORE" and touch "BACK".

Road Test (Cont'd)

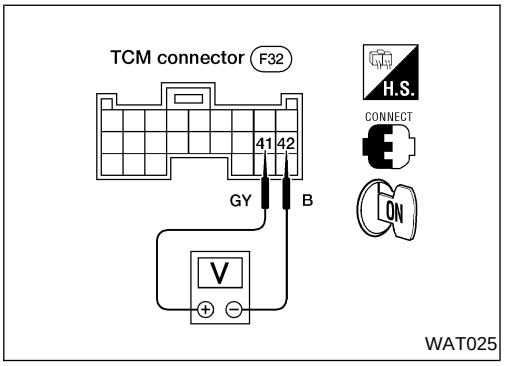


SAT974J



SAT975J

14. Touch "DISPLAY".
15. Touch "PRINT".
16. Check the monitor data printed out.
17. Continue cruise test part 2 and 3.



WAT025

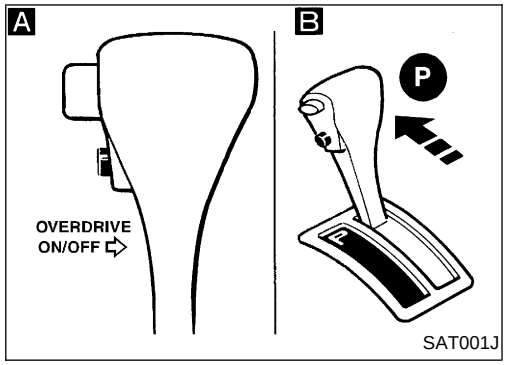
OR

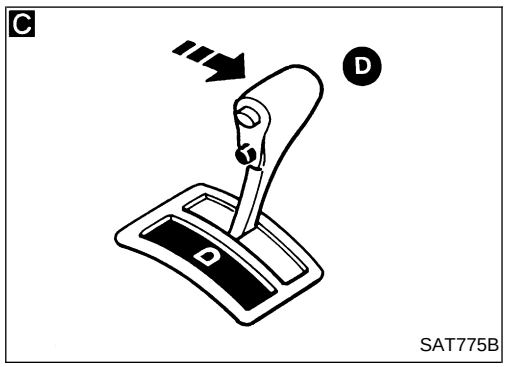
Without CONSULT-II

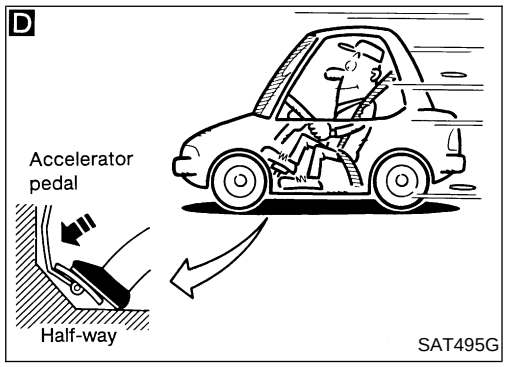
- Throttle position sensor can be checked by voltage across terminals ㊶ and ㊷ of TCM.

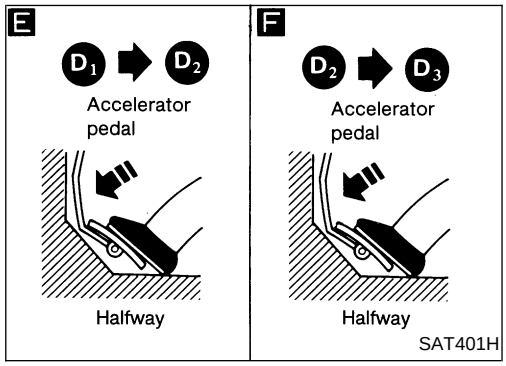
Road Test (Cont'd)

CRUISE TEST — Part 1









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)

A **B**

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

C

Move selector lever to "D" position.

D

Accelerate vehicle by constantly depressing accelerator pedal half-way.

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

No → Go to "8. Vehicle Cannot Be Started From D_1", AT-180. Continue ROAD TEST.

Yes

E

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-302.

No → Go to "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-181. Continue ROAD TEST.

Yes

F

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-302.

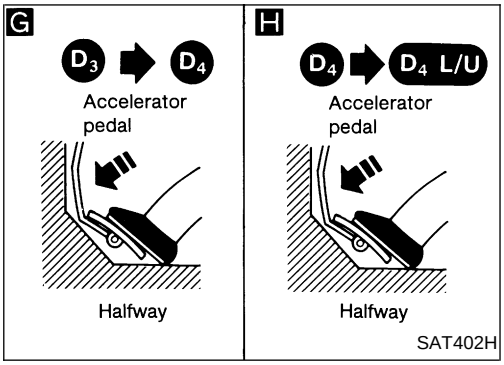
No → Go to "10. A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-182. Continue ROAD TEST.

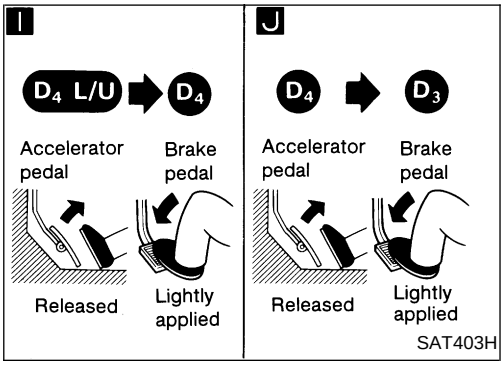
Yes

Ⓐ

(Go to next page.)

Road Test (Cont'd)





Ⓐ

G

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-302.

No → Go to "11. A/T Does Not Shift: $D_3 \rightarrow D_4$", AT-183. Continue ROAD TEST.

Yes

H

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-302.

No → Go to "12. A/T Does Not Perform Lock-up", AT-184. Continue ROAD TEST.

Yes

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

No → Go to "13. A/T Does Not Hold Lock-up Condition", AT-185.

Yes

I

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

No → Go to "14. Lock-up Is Not Released", AT-185. Continue ROAD TEST.

Yes

J

1. Decelerate vehicle by applying foot brake lightly.
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.

No → Go to "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-186. Continue ROAD TEST.

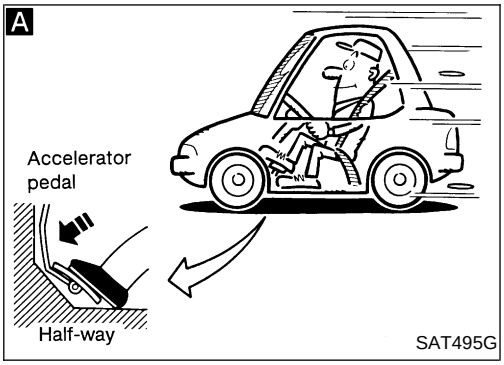
Yes

1. Stop vehicle.
2. Go to "CRUISE TEST — Part 2", AT-67.

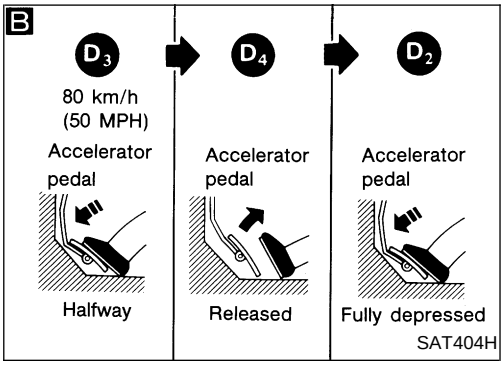
Road Test (Cont'd)

CRUISE TEST — Part 2

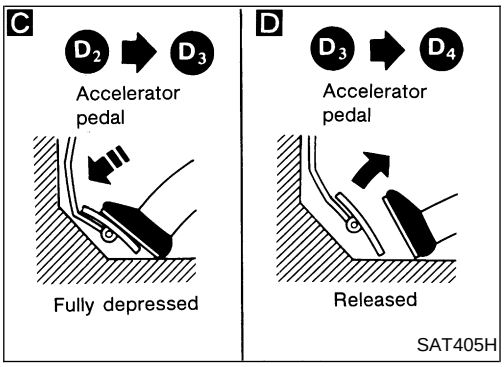
A



B



C D



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

↓

A

1. Accelerate vehicle by half throttle again.
2. Does vehicle start from "D_1"?

Read gear position.

No → Go to "16. Vehicle Does Not Start From D_1", AT-187. Continue ROAD TEST.

Yes ↓

B

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

No → Go to "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-181. Continue ROAD TEST.

Yes ↓

C

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-302.

No → Go to "10. A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-182. Continue ROAD TEST.

Yes ↓

D

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.

No → Go to "11. A/T Does Not Shift: $D_3 \rightarrow D_4$", AT-183. Continue ROAD TEST.

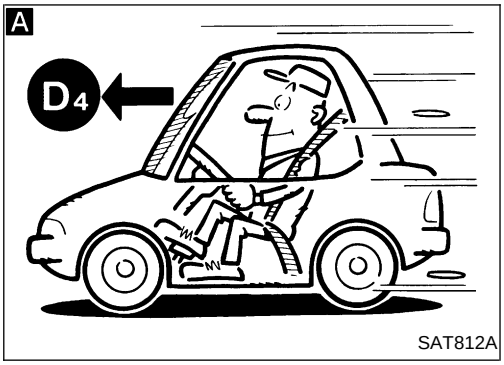
Yes ↓

1. Stop vehicle.
2. Go to "CRUISE TEST — Part 3", AT-68.

Road Test (Cont'd)

CRUISE TEST — Part 3

A



SAT812A

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

↓

A

Accelerate vehicle using half-throttle to "D_4".

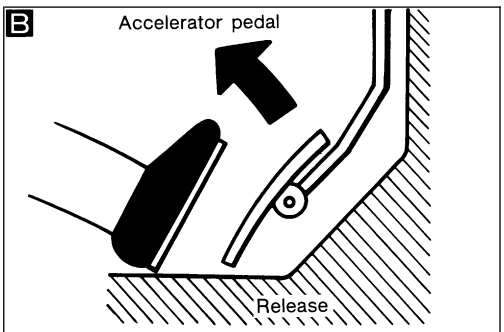
↓

B

Release accelerator pedal.

↓

B



SAT813A

C

Set overdrive control switch to "OFF" position while driving in "D_4".

↓

D

Does A/T shift from "D_4" to "D_3" (O/D OFF)?

Read gear position and vehicle speed.

No → Go to "17. A/T Does Not Shift: D_4 → D_3, When Overdrive Control Switch "ON" → "OFF", AT-187. Continue ROAD TEST.

Yes ↓

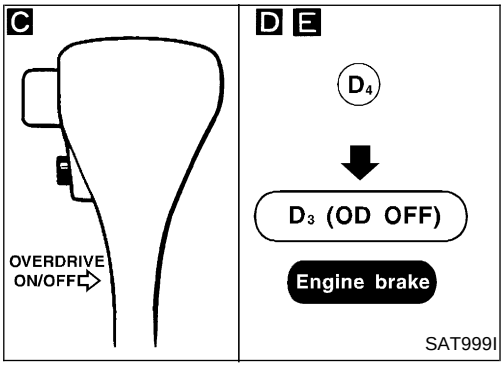
E

Does vehicle decelerate by engine brake?

No → Go to "15. Engine Speed Does Not Return To Idle (Light Braking D_4 → D_3)", AT-186. Continue ROAD TEST.

Yes ↓

C D E



SAT999I

F

Move selector lever from "D" to "2" position while driving in "D_3" (O/D OFF).

↓

G

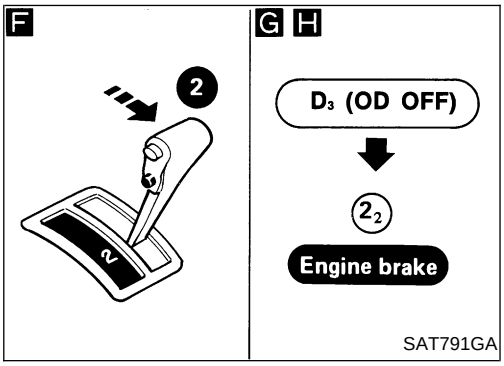
Does A/T shift from "D_3" (O/D OFF) to "2_2"?

Read gear position.

No → Go to "18. A/T Does Not Shift: D_3 → D_2, When Selector Lever "D" → "2" Position", AT-188. Continue ROAD TEST.

Yes ↓

F G H



SAT791GA

H

Does vehicle decelerate by engine brake?

No → Go to "15. Engine Speed Does Not Return To Idle (Light Braking D_4 → D_3)", AT-186. Continue ROAD TEST.

Yes ↓

I J

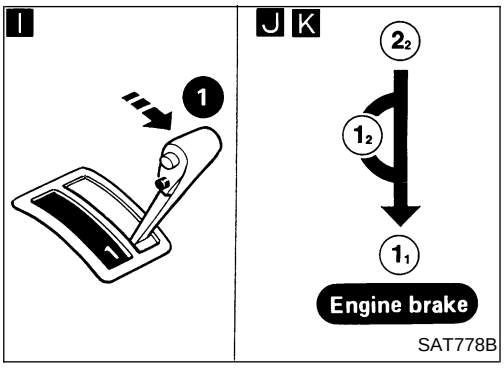
1. Move selector lever from "2" to "1" position while driving in "2_2".
2. Does A/T shift from "2_2" to "1_1" position?

Read gear position.

No → Go to "19. A/T Does Not Shift: 2_2 → 1_1, When Selector Lever "2"→ "1" Position", AT-188. Continue ROAD TEST.

Yes ↓

I J K



SAT778B

K

Does vehicle decelerate by engine brake?

No → Go to "20. Vehicle Does Not Decelerate By Engine Brake", AT-189. Continue ROAD TEST.

Yes ↓

1. Stop vehicle.
2. Perform self-diagnosis. Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-45.

Symptom Chart

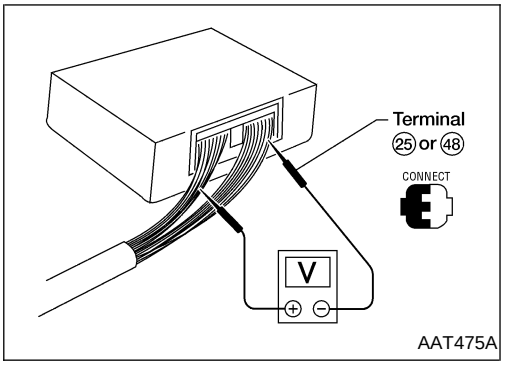
		ON vehicle									OFF vehicle					
Reference page (AT-)		54, 206	205	88, 92, 163	57	204, 138	143, 133	120, 154	83, 204	204	215, 231	249, 252	256, 264	256	262, 273	—
Reference page (AT-)	Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transaxle must be removed from the vehicle.	Fluid level Control cable adjustment	PNP switch adjustment Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor Engine speed signal	Engine idling rpm Line pressure	Control valve assembly Shift solenoid valve A	Shift solenoid valve B Line pressure solenoid valve	Torque converter clutch solenoid valve Overrun clutch solenoid valve	A/T fluid temperature sensor Accumulator N-D	Accumulator servo release Ignition switch and starter	Torque converter Oil pump	Reverse clutch High clutch	Forward clutch Forward one-way clutch	Overrun clutch Low one-way clutch	Low & reverse brake Brake band	Parking components
175	Engine does not start in “N”, “P” positions.	. 2	3 .	. .	. .	. .	. .	. .	. .	. 1	. .	. .	. .	. .	. .	.
175	Engine starts in positions other than “N” and “P”.	. 1	2 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	.
—	Transaxle noise in “P” and “N” positions.	1 .	. 3	4 5	. 2	. .	. .	. .	. .	. .	⑦ ⑥	. .	. .	. .	. .	.
175	Vehicle moves when changing into “P” position or parking gear does not disengage when shifted out of “P” position.	. 1	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	②
176	Vehicle runs in “N” position.	. 1	. .	. .	. .	. .	. .	. .	. .	. .	. .	③ .	② .	④ .	. .	.
178	Vehicle will not run in “R” position (but runs in “D”, “2” and “1” positions). Clutch slips. Very poor acceleration.	. 1	. .	. .	. 2	4 .	. 3	. .	. .	. .	. .	⑤ ⑥	⑦ .	⑧ .	⑨ .	.
—	Vehicle braked when shifting into “R” position.	1 2	. .	. .	. 3	5 .	. 4	. .	. .	. .	. .	. ⑥	⑧ .	⑨ .	. ⑦	.
—	Sharp shock in shifting from “N” to “D” position.	. .	. 2	. 5	1 3	7 .	. 6	. .	4 8	. .	. .	. .	⑨ .	. .	. .	.
—	Vehicle will not run in “D” and “2” positions (but runs in “1” and “R” positions).	. 1	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. ②	. .	.
179	Vehicle will not run in “D”, “1”, “2” positions (but runs in “R” position). Clutch slips. Very poor acceleration.	1 .	. .	. .	. 2	4 .	. 3	. .	. 5	. .	. .	⑥ ⑦	⑧ ⑨	. ⑩	. .	.
—	Clutches or brakes slip somewhat in starting.	1 2	. 3	. .	. 4	6 .	. 5	. .	. 7	. .	⑫ ⑪	⑨ .	⑧ .	. .	⑩ .	.
—	Excessive creep.	. .	. .	. .	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	.
178, 179	No creep at all.	1 .	. .	. .	. 2	3 .	. .	. .	. .	. .	⑥ ⑤	. .	④ .	. .	. .	.
—	Failure to change gear from “D_1” to “D_2”.	. 2	1 .	5 .	. .	4 3	. .	. .	. .	. .	. .	. .	. .	. .	. ⑥	.
—	Failure to change gear from “D_2” to “D_3”.	. 2	1 .	5 .	. .	4 .	3 .	. .	. .	. .	. .	. ⑥	. .	. .	. ⑦	.
—	Failure to change gear from “D_3” to “D_4”.	. 2	1 .	4 .	. .	. 3	. .	. .	5 .	. .	. .	. .	. .	. .	. ⑥	.
181, 182, 183	Too high a gear change point from “D_1” to “D_2”, from “D_2” to “D_3”, from “D_3” to “D_4”.	. .	. 1	2 .	. .	. 3	4 .	. .	. .	. .	. .	. .	. .	. .	. .	.
—	Gear change directly from “D_1” to “D_3” occurs.	1 .	. .	. .	. .	. .	. .	. .	. .	2 .	. .	. .	. .	. .	. ③	.
—	Engine stops when shifting lever into “R”, “D”, “2” and “1”.	. .	. .	. .	1 .	3 .	. .	2 .	. .	. .	④ .	. .	. .	. .	. .	.
—	Too sharp a shock in change from “D_1” to “D_2”.	. .	. 1	. .	. 2	4 .	. .	. .	5 .	3 .	. .	. .	. .	. .	. ⑥	.
—	Too sharp a shock in change from “D_2” to “D_3”.	. .	. 1	. .	. 2	3 .	. .	. .	. .	. .	. .	. ④	. .	. .	. ⑤	.

Symptom Chart (Cont'd)

		ON vehicle										OFF vehicle					
Reference page (AT-)		54, 206	205	88, 92, 163	57	204, 138	143, 133	120, 154	83, 204	204	215, 231	249, 252	256, 264	256	262, 273	—
Reference page (AT-)	Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transaxle must be removed from the vehicle.	Fluid level Control cable adjustment	PNP switch adjustment Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor Engine speed signal	Engine idling rpm Line pressure	Control valve assembly Shift solenoid valve A	Shift solenoid valve B Line pressure solenoid valve	Torque converter clutch solenoid valve Overrun clutch solenoid valve	A/T fluid temperature sensor Accumulator N-D	Accumulator servo release Ignition switch and starter	Torque converter Oil pump	Reverse clutch High clutch	Forward clutch Forward one-way clutch	Overrun clutch Low one-way clutch	Low & reverse brake Brake band	Parking components
—	Too sharp a shock in change from "D_3" to "D_4".	. .	. 1	. .	. 2	3 .	. .	. .	. .	. .	. .	. .	. .	⑤ .	. ④	.
—	Almost no shock or clutches slipping in change from "D_1" to "D_2".	1 .	. 2	. .	. 3	5 .	. .	. .	. .	4 .	. .	. .	. .	. .	. ⑥	.
—	Almost no shock or slipping in change from "D_2" to "D_3".	1 .	. 2	. .	. 3	4 .	. .	. .	. .	. .	. .	. ⑤	. .	. .	. ⑥	.
—	Almost no shock or slipping in change from "D_3" to "D_4".	1 .	. 2	. .	. 3	4 .	. .	. .	. .	. .	. .	. ⑤	. .	. .	. ⑥	.
—	Vehicle braked by gear change from "D_1" to "D_2".	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	② ④	. .	. ⑤	③ .	.
—	Vehicle braked by gear change from "D_2" to "D_3".	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. ②	.
—	Vehicle braked by gear change from "D_3" to "D_4".	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	④ .	. ③	② .	. .	.
—	Maximum speed not attained. Acceleration poor.	1 .	2 .	. .	. .	5 3	4 .	. .	. .	. .	⑪ ⑩	⑥ ⑦	. .	. .	⑨ ⑧	.
—	Failure to change gear from "D_4" to "D_3".	1 .	. 2	. .	. .	6 4	. 5	. 3	. .	. .	. .	. .	. .	⑧ .	⑦ .	.
—	Failure to change gear from "D_3" to "D_2" or from "D_4" to "D_2".	1 .	. 2	. .	. .	5 3	4 .	. .	. .	. .	. .	. ⑥	. .	. .	. ⑦	.
—	Failure to change gear from "D_2" to "D_1" or from "D_3" to "D_1".	1 .	. 2	. .	. .	5 3	4 .	. .	. .	. .	. .	. ⑦	. .	. ⑥	. ⑧	.
—	Gear change shock felt during deceleration by releasing accelerator pedal.	. .	. 1	. .	. 2	4 .	. .	. 3	. .	. .	. .	. .	. .	. .	. .	.
—	Too high a change point from "D_4" to "D_3", from "D_3" to "D_2", from "D_2" to "D_1".	. .	. 1	2 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	.
—	Kickdown does not operate when depressing pedal in "D_4" within kickdown vehicle speed.	. .	. 1	2 .	. .	. 3	4 .	. .	. .	. .	. .	. .	. .	. .	. .	.
—	Kickdown operates or engine overruns when depressing pedal in "D_4" beyond kickdown vehicle speed limit.	. .	. 2	1 .	. .	. 3	4 .	. .	. .	. .	. .	. .	. .	. .	. .	.
—	Races extremely fast or slips in changing from "D_4" to "D_3" when depressing pedal.	1 .	. 2	. .	. 3	5 .	. 4	. .	. .	. .	. .	. ⑥	⑦ .	. .	. .	.
—	Races extremely fast or slips in changing from "D_4" to "D_2" when depressing pedal.	1 .	. 2	. .	. 3	6 5	. 4	. .	. .	. .	. .	. .	⑧ .	. .	. ⑦	.
—	Races extremely fast or slips in changing from "D_3" to "D_2" when depressing pedal.	1 .	. 2	. .	. 3	5 .	. 4	. .	6 .	. .	. .	. ⑨	⑧ .	. .	. ⑦	.
—	Races extremely fast or slips in changing from "D_4" or "D_3" to "D_1" when depressing pedal.	1 .	. 2	. .	. 3	5 .	. 4	. .	. .	. .	. .	. .	⑥ ⑦	. ⑧	. .	.
—	Vehicle will not run in any position.	1 2	. .	. .	. 3	. .	. 4	. .	. .	. .	⑨ ⑤	. ⑥	. .	. .	⑧ ⑦	⑩
—	Transaxle noise in "D", "2", "1" and "R" positions.	1 .	. .	. .	. .	. .	. .	. .	. .	. .	② .	. .	. .	. .	. .	.

Symptom Chart (Cont'd)

		ON vehicle									OFF vehicle					
Reference page (AT-)		54, 206	205	88, 92, 163	57	204, 138	143, 133	120, 154	83, 204	204	215, 231	249, 252	256, 264	256	262, 273	—
Reference page (AT-)	Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transaxle must be removed from the vehicle.	Fluid level Control cable adjustment	PNP switch adjustment Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor Engine speed signal	Engine idling rpm Line pressure	Control valve assembly Shift solenoid valve A	Shift solenoid valve B Line pressure solenoid valve	Torque converter clutch solenoid valve Overrun clutch solenoid valve	A/T fluid temperature sensor Accumulator N-D	Accumulator servo release Ignition switch and starter	Torque converter Oil pump	Reverse clutch High clutch	Forward clutch Forward one-way clutch	Overrun clutch Low one-way clutch	Low & reverse brake Brake band	Parking components
186	Failure to change from "D_3" to "2_2" when changing lever into "2" position.	. 7	1 2	. .	. .	6 5	4 .	. 3	. .	. .	. .	. .	. .	⑨ .	. ⑧	.
—	Gear change from "2_2" to "2_3" in "2" position.	. .	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	.
187	Engine brake does not operate in "1" position.	. 2	1 3	4 .	. .	6 5	. .	. 7	. .	. .	. .	. .	. .	⑧ .	⑨ .	.
—	Gear change from "1_1" to "1_2" in "1" position.	. 2	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	.
—	Does not change from "1_2" to "1_1" in "1" position.	. .	1 .	2 .	. .	4 3	. .	. 5	. .	. .	. .	. .	. .	⑥ .	⑦ .	.
—	Large shock changing from "1_2" to "1_1" in "1" position.	. .	. .	. .	. .	1 .	. .	. .	. .	. .	. .	. .	. .	. .	② .	.
—	Transaxle overheats.	1 .	. 3	. .	2 4	6 .	. 5	. .	. .	. .	⑭ ⑦	⑧ ⑨	⑪ .	⑫ .	⑬ ⑩	.
—	ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	② ③	⑤ .	⑥ .	⑦ ④	.
—	Offensive smell at fluid charging pipe.	1 .	. .	. .	. .	. .	. .	. .	. .	. .	② ③	④ ⑤	⑦ .	⑧ .	⑨ ⑥	.
—	Torque converter is not locked up.	. .	3 1	2 4	. 6	8 .	. .	7 .	5 .	. .	⑨ .	. .	. .	. .	. .	.
—	Torque converter clutch piston slip.	1 .	. 2	. .	. 3	6 .	. 5	4 .	. .	. .	⑦ .	. .	. .	. .	. .	.
184	Lock-up point is extremely high or low.	. .	. 1	2 .	. .	4 .	. .	3 .	. .	. .	. .	. .	. .	. .	. .	.
—	A/T does not shift to "D_4" when driving with overdrive control switch "ON".	. .	2 1	3 .	. 8	6 4	. .	. 5	7 .	. .	. .	. .	. .	⑩ .	. ⑨	.
—	Engine is stopped at "R", "D", "2" and "1" positions.	1 .	. .	. .	. .	5 4	3 .	2 .	. .	. .	. .	. .	. .	. .	. .	.

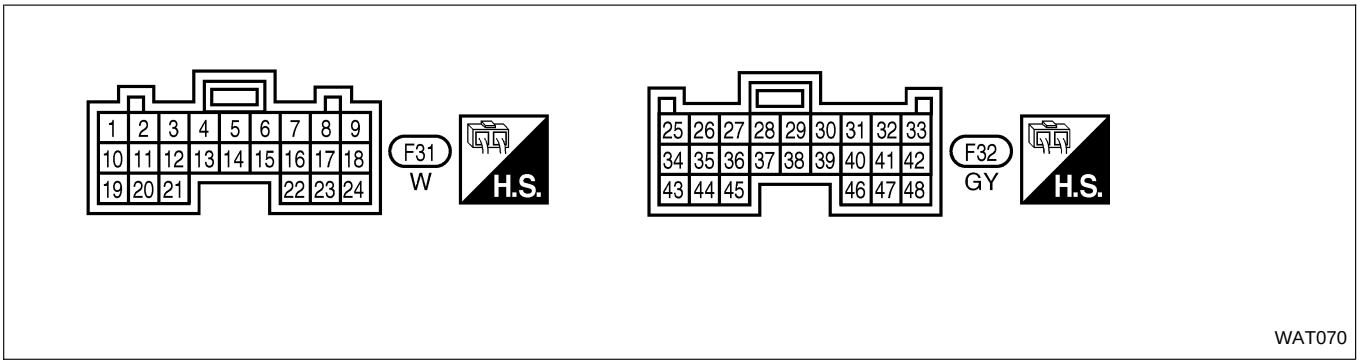


TCM Terminals and Reference Value

PREPARATION

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

TCM HARNESS CONNECTOR TERMINAL LAYOUT



TCM INSPECTION TABLE

(Data are reference values.)

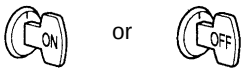
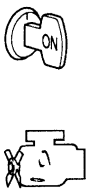
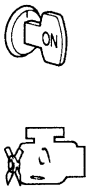
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	R/W	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
				When depressing accelerator pedal fully after warming up engine.	0V
2	P/B	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V
3	R	Torque converter clutch solenoid-valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	0V
4	—	—		—	—
5*1	Y/B	DT1		—	—
6*1	Y/G	DT2		—	—
7*1	Y/R	DT3		—	—
8	—	—		—	—
9	—	—		—	—
10	SB	Power source		When turning ignition switch to "ON".	Battery voltage
				When turning ignition switch to "OFF".	0V

*1: These terminals are connected to the ECM.

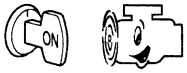
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
11	L/W	Shift solenoid-valve A		When shift solenoid valve A operates. (When driving in "D_1" or "D_4".)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in "D_2" or "D_3".)	0V
12	L/Y	Shift solenoid valve 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".)	0V
13	OR/B	O/D OFF indicator lamp		When setting overdrive control switch in "OFF" position.	0V
				When setting overdrive control switch in "ON" position.	Battery voltage
14*1	G/OR	"N" position signal		When setting selector lever to "N" or "P" position.	0V
				When setting selector lever to other positions.	5V
15*1	PU	OBD-II output		—	—
16	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.	0V
17	LG	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.	0V
18	OR	ASCD cruise signal		When ASCD cruise is being performed. ("CRUISE" light comes on.)	Battery voltage
				When ASCD cruise is not being performed. ("CRUISE" light does not comes on.)	0V
19	SB	Power source		When turning ignition switch to "ON".	Battery voltage
				When turning ignition switch to "OFF".	0V
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	0V
21	—	—		—	—

*1: These terminals are connected to the ECM.

TCM Terminals and Reference Value (Cont'd)

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
22	G/R	Overdrive control switch		When setting overdrive control switch in "ON" position	Battery voltage
				When setting overdrive control switch in "OFF" position	0V
23	—	—		—	—
24	W/B	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.	0V
25	B	Ground		—	0V
26	OR/L	PNP Switch "1"		When setting selector lever to "1" position.	Battery voltage
				When setting selector lever to other positions.	0V
27	B/Y	PNP Switch "2"		When setting selector lever to "2" position.	Battery voltage
				When setting selector lever to other positions.	0V
28	R/B	Power source (Memory back-up)		When turning ignition switch to "OFF".	Battery voltage
				When turning ignition switch to "ON".	Battery voltage
29	L	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*2	G/B	—		—	—
31*2	GY/L	—		—	—
32	R	Throttle position sensor (Power source)		Ignition switch ON.	4.5 - 5.5V
				Ignition switch OFF.	0V
33	—	—		—	—
34	W/G	PNP Switch "D"		When setting selector lever to "D" position.	Battery voltage
				When setting selector lever to other positions.	0V
35	G	PNP Switch "R" position		When setting selector lever to "R" position.	Battery voltage
				When setting selector lever to other positions.	0V
36	GY/R	PNP Switch "N" or "P" position		When setting selector lever to "N" or "P" position.	Battery voltage
				When setting selector lever to other positions.	0V
37	—	—		—	—

*2: These terminals are connected to the Data Link Connector.

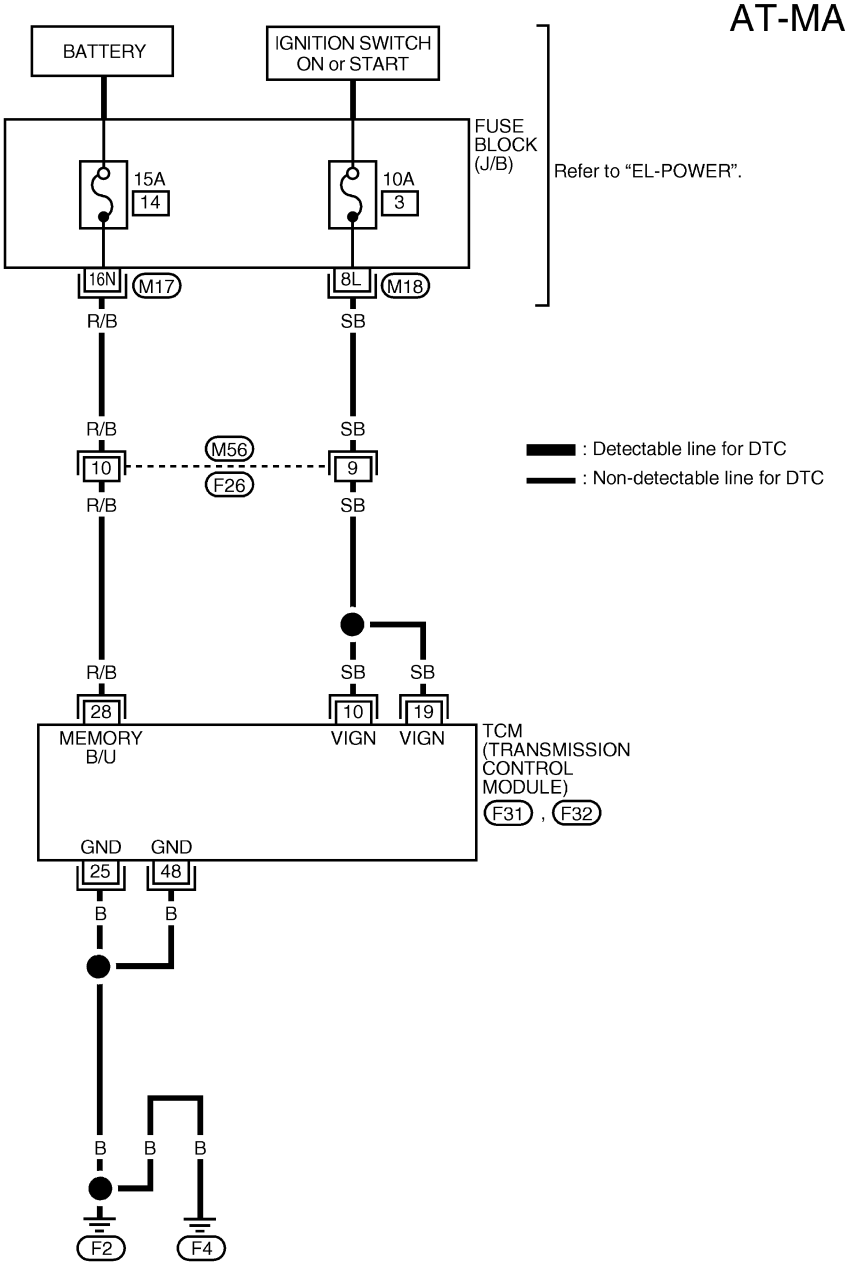
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
38	—	—		When engine runs at idle speed.	0.6V
39*1	L/OR	Engine speed signal		When engine runs at 4000 RPM.	1.6V
40	PU/R	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1V and more than 4.5V
41*1	GY	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.5V Fully-open throttle: 4V
42	B	Throttle position sensor (Ground)		—	0V
43	—	—		—	—
44	—	—		—	—
45	—	—		—	—
46	—	—		—	—
47	BR	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.5V
				When ATF temperature is 80°C (176°F).	0.5V
48	B	Ground		—	0V

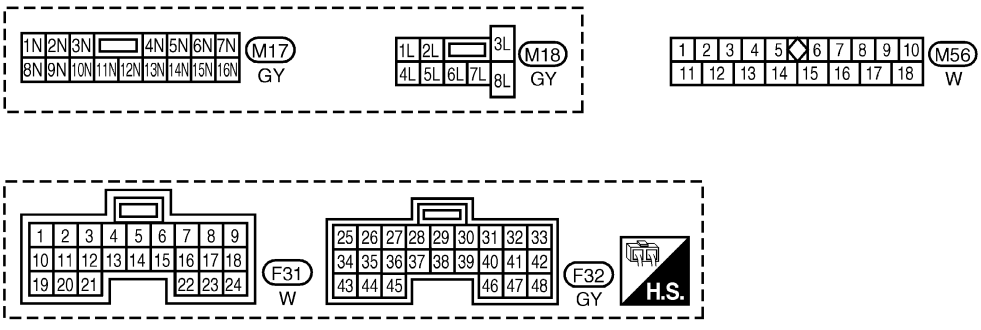
*1 This terminal is connected to the ECM.

Main Power Supply and Ground Circuit

WIRING DIAGRAM — AT — MAIN

AT-MAIN-01



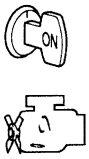


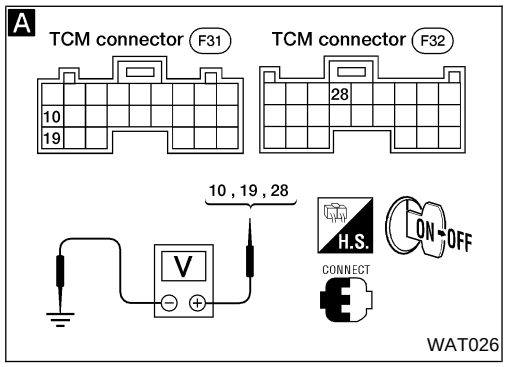
WAT002

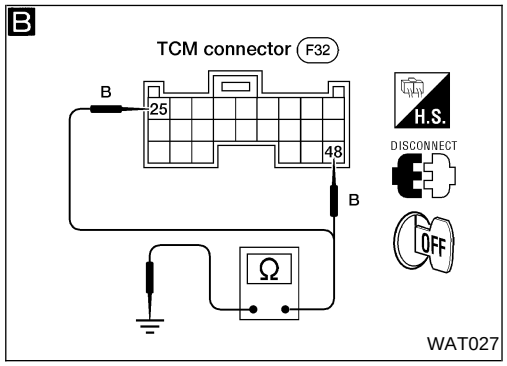
Main Power Supply and Ground Circuit (Cont'd)

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
10	SB	Power source		When turning ignition switch to "ON".	Battery voltage
				When turning ignition switch to "OFF".	0V
19	SB	Power source		Same as No. 10	
25	B	Ground		—	0V
28	R/B	Power source (Memory back-up)	 or 	When turning ignition switch to "OFF".	Battery voltage
				When turning ignition switch to "ON".	Battery voltage
48	B	Ground		—	0V





DIAGNOSTIC PROCEDURE

INSPECTION START

A

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.
   Voltage: Battery voltage

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 EL section "POWER SUPPLY ROUTING".

OK

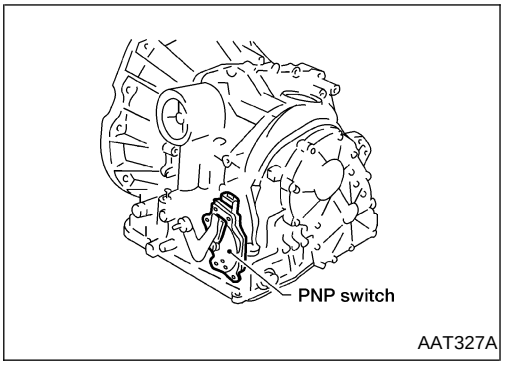
B

CHECK TCM GROUND CIRCUIT.
1. Turn ignition switch to "OFF" position.
2. Disconnect TCM harness connector.
3. Check continuity between terminals ㉕, ㊽ and ground.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Repair open circuit or short to ground or short to power in harness or connectors.

OK

INSPECTION END



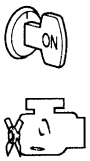
Park/Neutral Position (PNP) Switch

DESCRIPTION

- The PNP switch assembly 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

Remarks: Specification data are reference values.

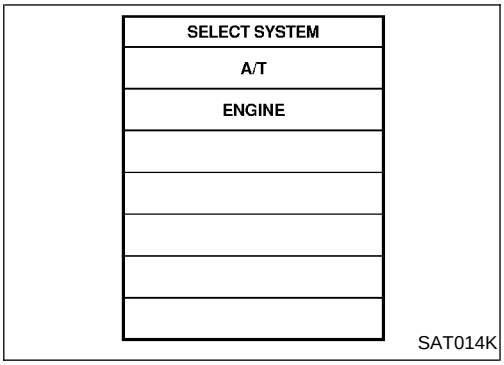
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
26	OR/L	PNP Switch "1" position		When setting selector lever to "1" position.	Battery voltage
				When setting selector lever to other positions.	0V
27	B/Y	PNP Switch "2" position		When setting selector lever to "2" position.	Battery voltage
				When setting selector lever to other positions.	0V
34	W/G	PNP Switch "D" position		When setting selector lever to "D" position.	Battery voltage
				When setting selector lever to other positions.	0V
35	G	PNP Switch "R" position		When setting selector lever to "R" position.	Battery voltage
				When setting selector lever to other positions.	0V
36	GY/R	PNP Switch "N" or "P" position		When setting selector lever to "N" or "P" position.	Battery voltage
				When setting selector lever to other positions.	0V

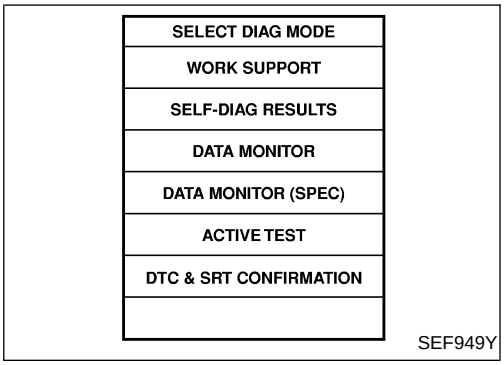
ON BOARD DIAGNOSIS LOGIC

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

Park/Neutral Position (PNP) Switch (Cont'd)

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE





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".
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 (OD "ON" or "OFF")

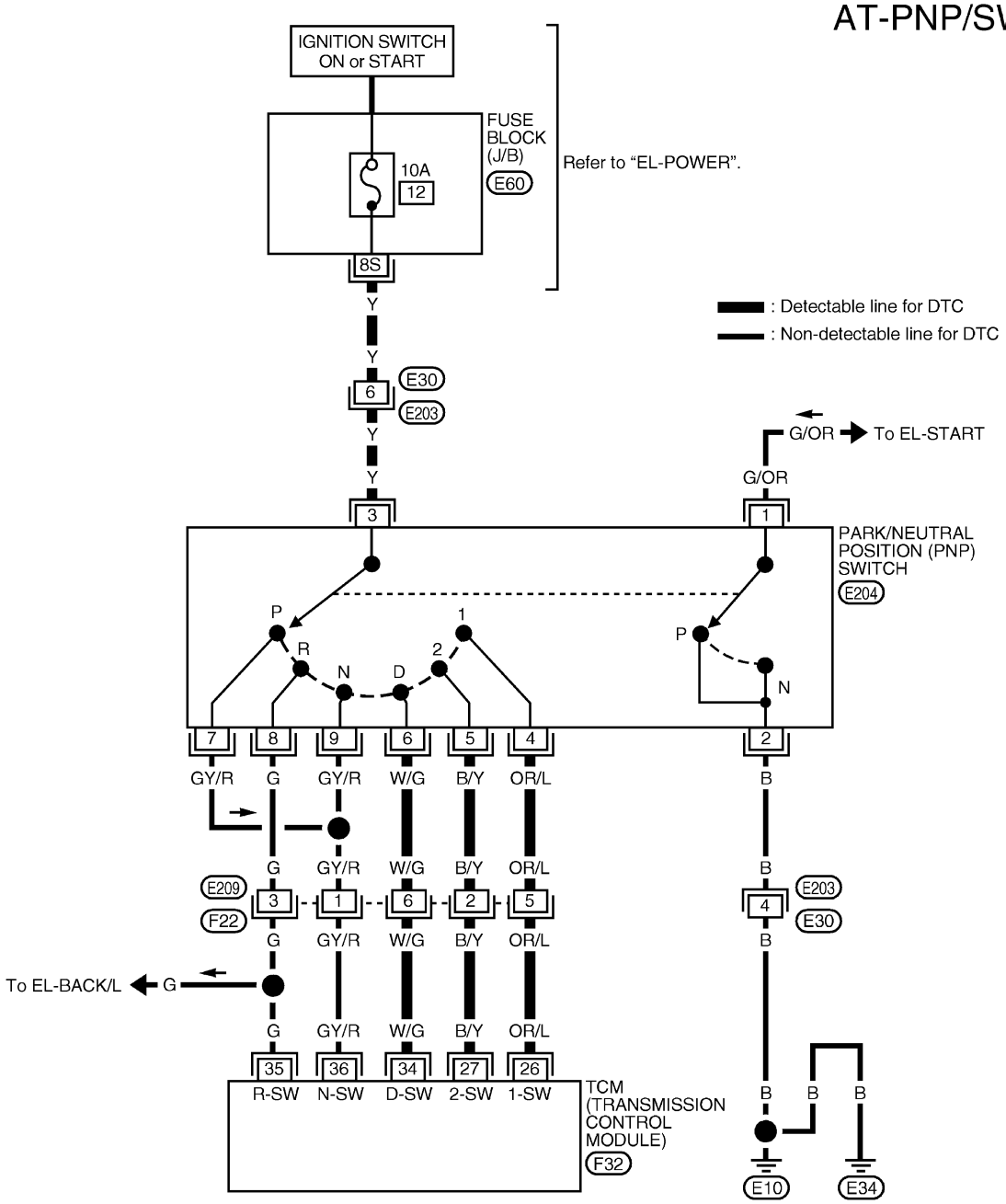
With GST

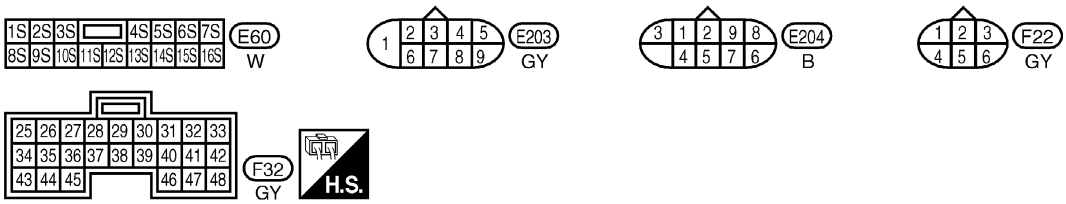
Follow the procedure "With CONSULT-II".

Park/Neutral Position (PNP) Switch (Cont'd)

WIRING DIAGRAM — AT — PNP/SW

AT-PNP/SW-01





WAT003

Park/Neutral Position (PNP) Switch (Cont'd)

DIAGNOSTIC PROCEDURE

A

SELECT SYSTEM
A/T
ENGINE

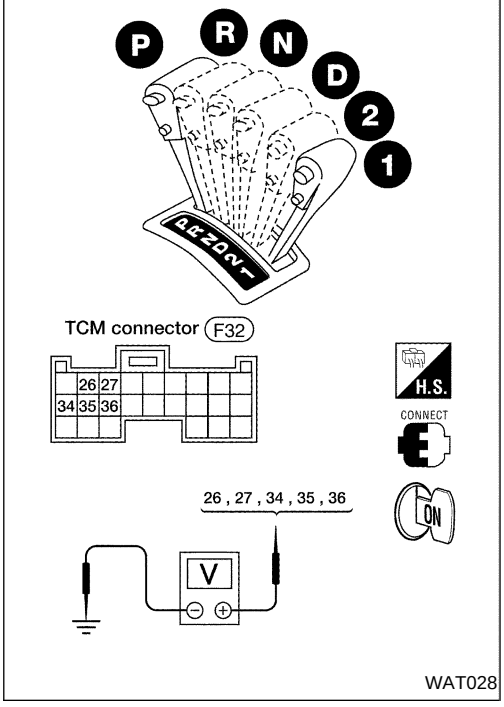
SAT014K

A

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

SAT701J

A



WAT028

INSPECTION START

A

CHECK PNP SWITCH CIRCUIT.

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

NG → Check the following items:
- PNP switch
  Refer to "Component Inspection", AT-82.
- Harness for short or open between ignition switch and PNP switch (Main harness)
- Harness for short or open between PNP switch and TCM (Main harness)
- Ignition switch and fuse
  Refer to EL section ("POWER SUPPLY ROUTING").

OR

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.
   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**

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-79.

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

OK

INSPECTION END

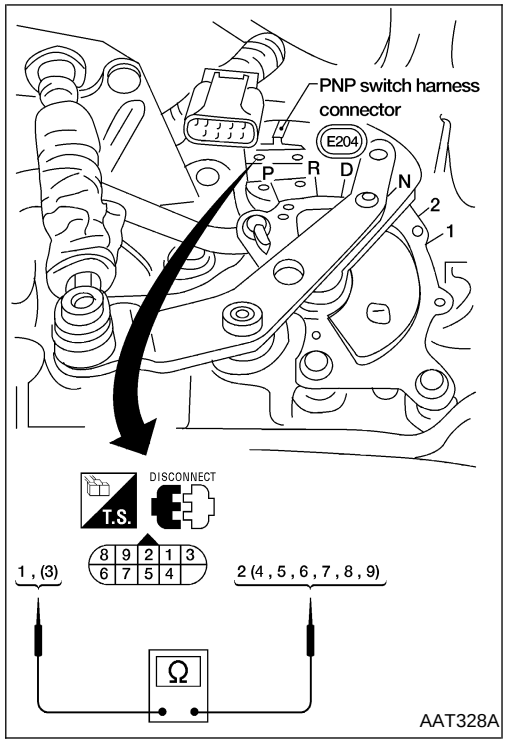
Park/Neutral Position (PNP) Switch (Cont'd)

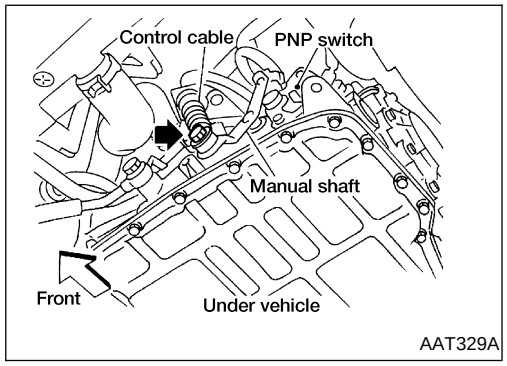
COMPONENT INSPECTION

PNP switch

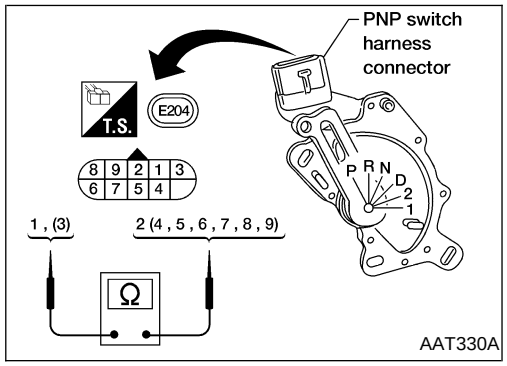
1. Check continuity between terminals ① and ② and between terminals ③ and ④, ⑤, ⑥, ⑦, ⑧, ⑨ while moving manual shaft through each position.

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	

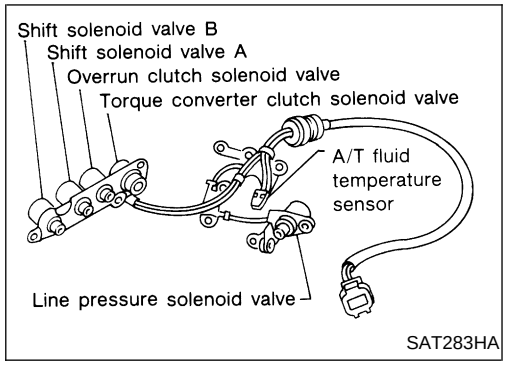


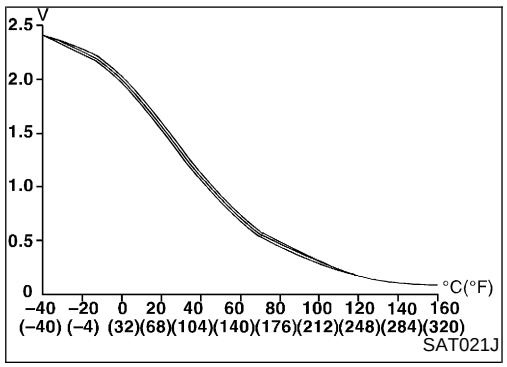


2. If NG, check again with manual control cable disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control cable. Refer to AT-206.



4. If NG on step 2, remove PNP switch from A/T and check continuity of PNP switch terminals. Refer to step 1.
5. If OK on step 4, adjust PNP switch. Refer to AT-205.
6. If NG on step 4, replace PNP switch.





A/T Fluid Temperature Sensor

DESCRIPTION

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

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approx.)	
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	1.5V ↓ 0.5V	2.5 Ω ↓ 0.3k Ω

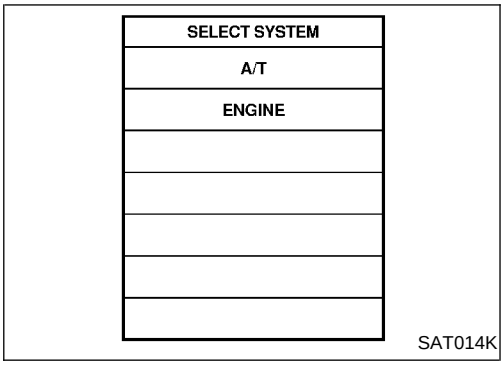
TCM TERMINALS AND REFERENCE VALUE

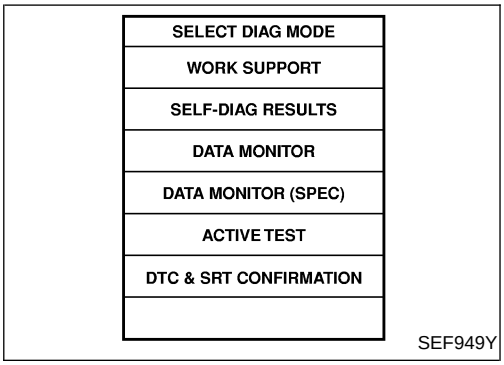
Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: ATF TEMP SEN/CIRC : P0710 : MIL Code No. 1208	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





A/T Fluid Temperature Sensor (Cont'd)

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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 "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 (OD "ON")

With GST

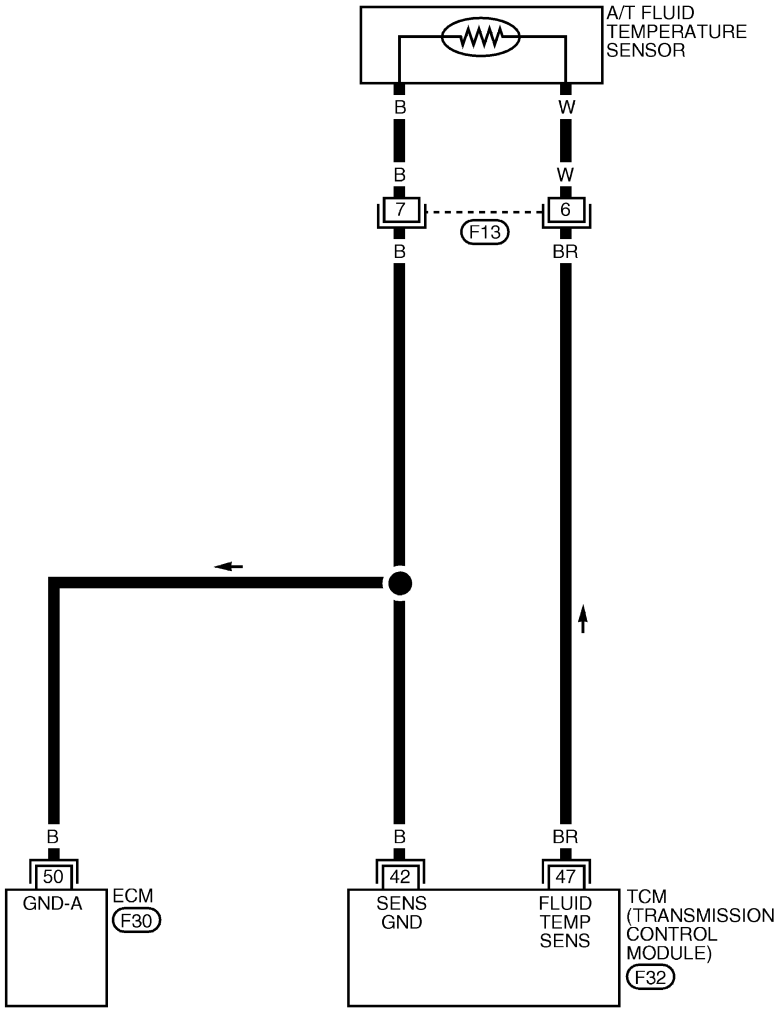
Follow the procedure "With CONSULT-II".

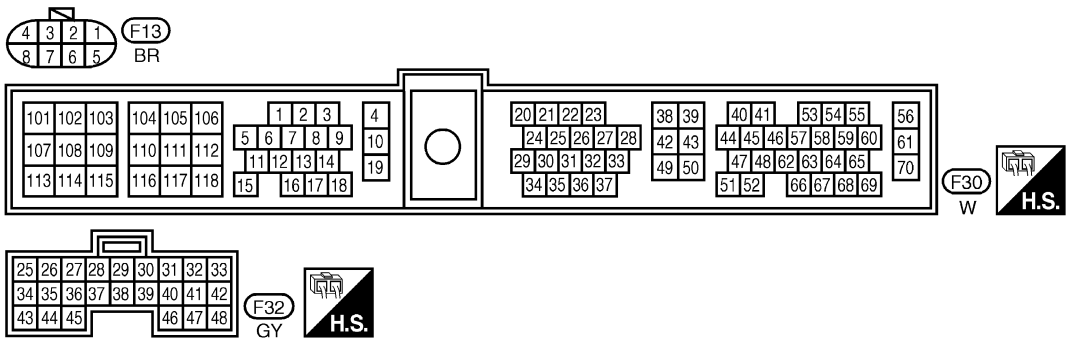
A/T Fluid Temperature Sensor (Cont'd)

WIRING DIAGRAM — AT — FTS

AT-FTS-01

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



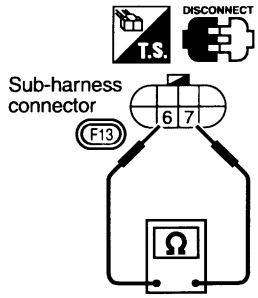


WAT004

A/T Fluid Temperature Sensor (Cont'd)

DIAGNOSTIC PROCEDURE

A



SAT956HA

B

SELECT SYSTEM
A/T
ENGINE

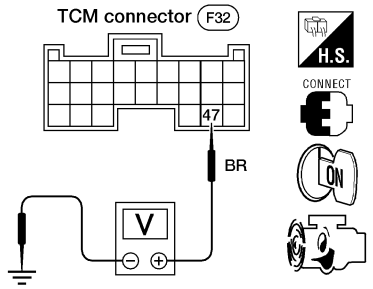
SAT014K

B

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

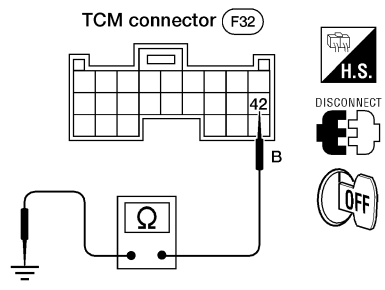
SAT614J

B



WAT029

B



WAT044

INSPECTION START

A

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.
   Resistance:
   Cold [20°C (68°F)]
   Approximately 2.5 kΩ
4. Reinstall any part removed.

NG →
1. Remove oil pan.
2. Check the following items:
   - A/T fluid temperature sensor
     Refer to "Component Inspection", AT-87.
   - Harness of terminal cord assembly for short or open

OK ↓

B

CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR.

1. Start engine.
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out the value of "FLUID TEMP SE".
   Voltage:
   Cold [20°C (68°F)] →
   Hot [80°C (176°F)]:
   Approximately
   1.5V → 0.5V

NG →
Check the following item:
- Harness for short to ground or short to power or open between TCM, ECM and terminal cord assembly (Main harness)
- Ground circuit for ECM
  Refer to EC section, "TROUBLE DIAGNOSIS FOR POWER SUPPLY".

OR

1. Start engine.
2. Check voltage between TCM terminal ㊼ and ground while warming up A/T.
   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 ㊷ and ground.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-84.

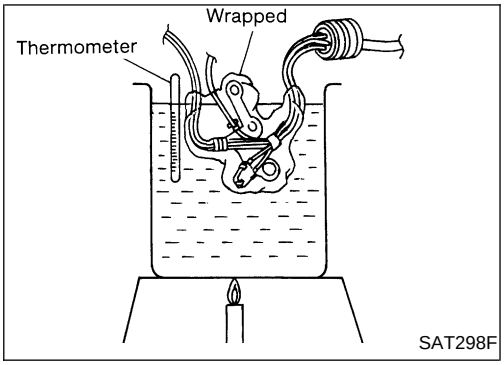
NG →
1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END

A/T Fluid Temperature Sensor (Cont'd)

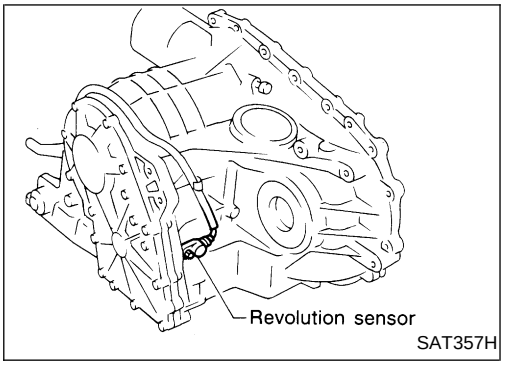
COMPONENT INSPECTION



A/T fluid temperature sensor

- For removal, refer to AT-204.
- Check resistance between two terminals while changing temperature as shown at left.

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



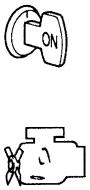
Vehicle Speed Sensor·A/T (Revolution sensor)

DESCRIPTION

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.

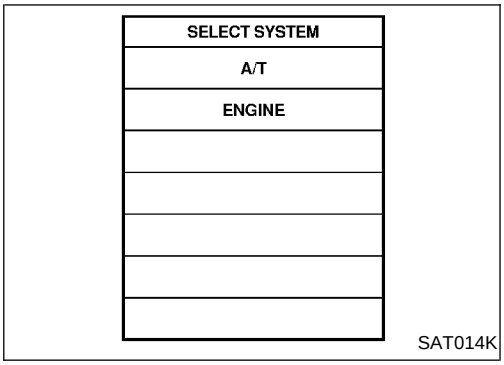
TCM TERMINALS AND REFERENCE VALUE

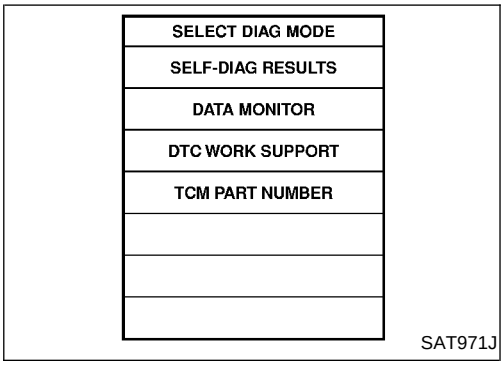
Remarks: Specification data are reference values.

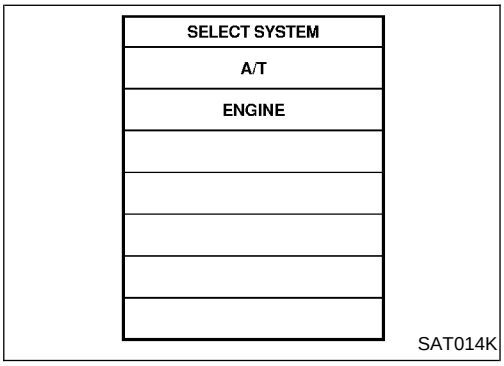
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
29	L	Revolution sensor (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
				When vehicle parks.	0V
42	B	Throttle position sensor (Ground)		—	—

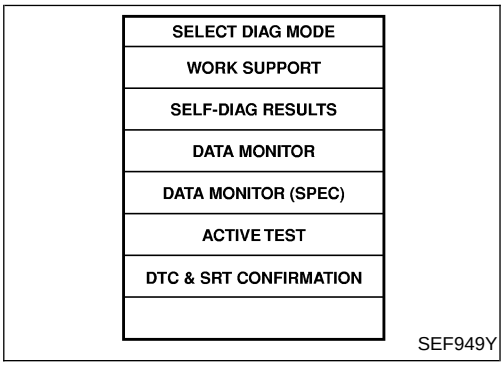
ON BOARD DIAGNOSIS LOGIC

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









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

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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.**

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

With CONSULT-II

1) Turn ignition switch "ON" and select "TCM 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-164.
   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 (OD "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-91.
   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 (OD "ON")
   Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.

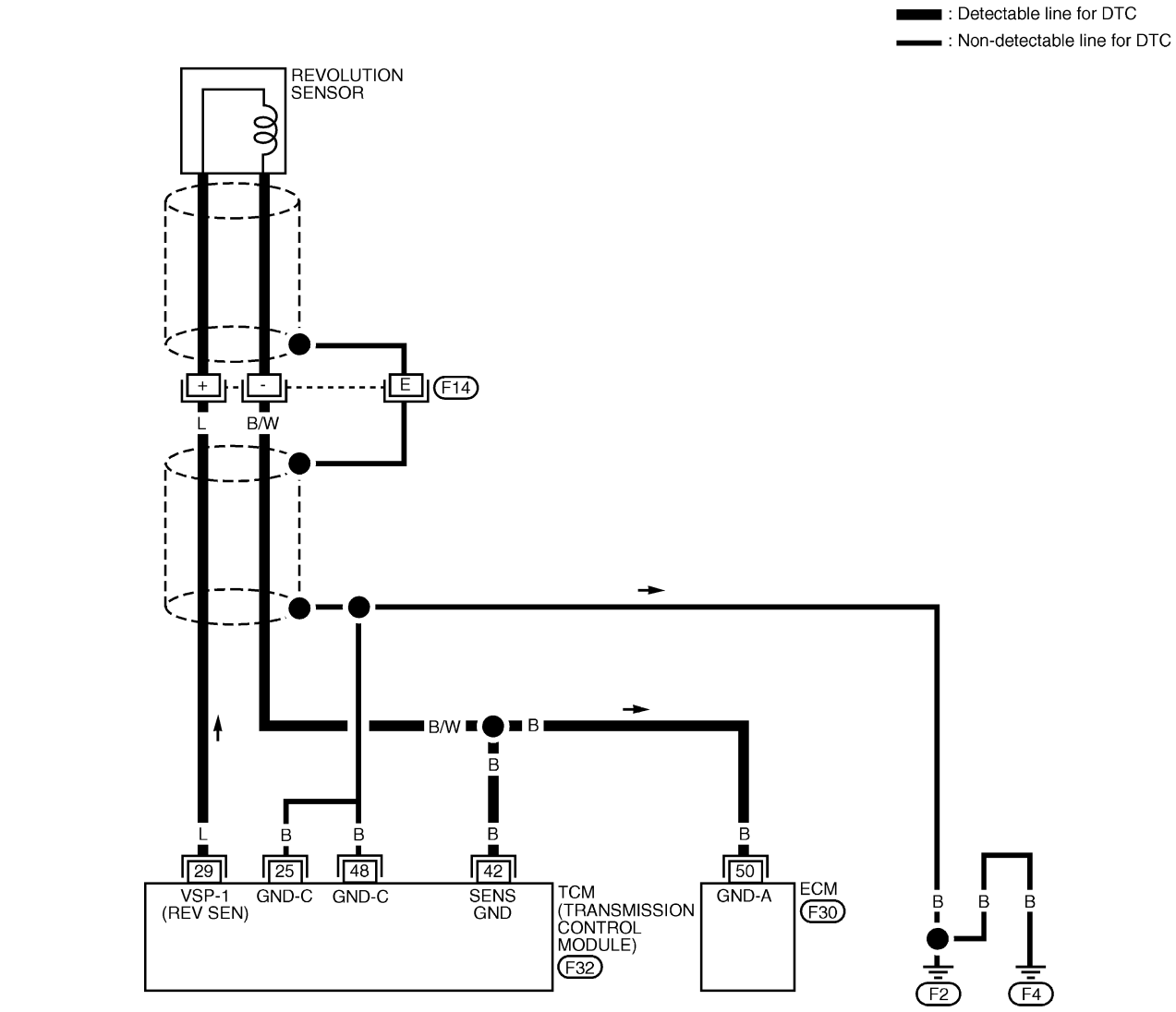
With GST

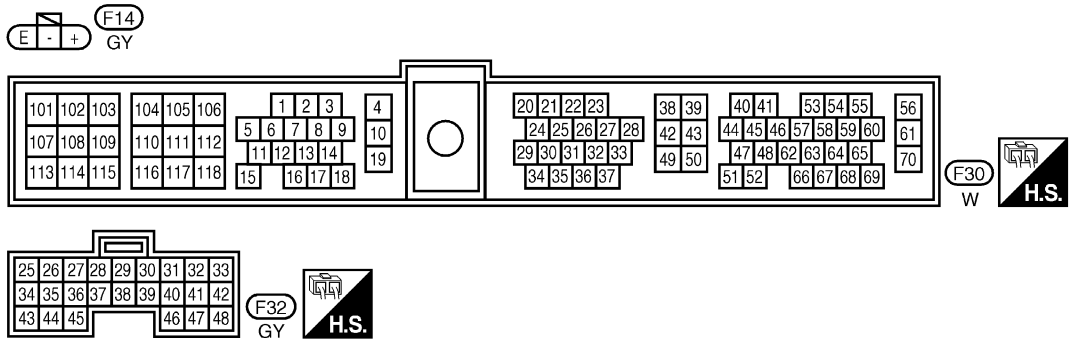
Follow the procedure "With CONSULT-II".

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

WIRING DIAGRAM — AT — VSSAT

AT-VSSAT-01

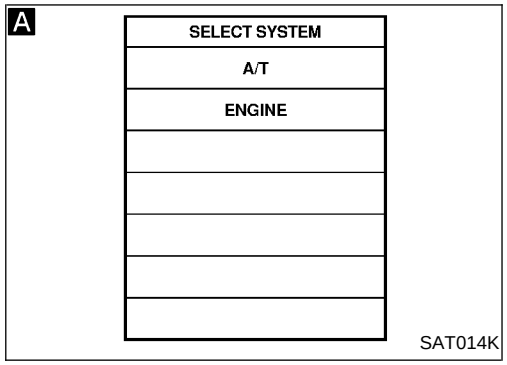


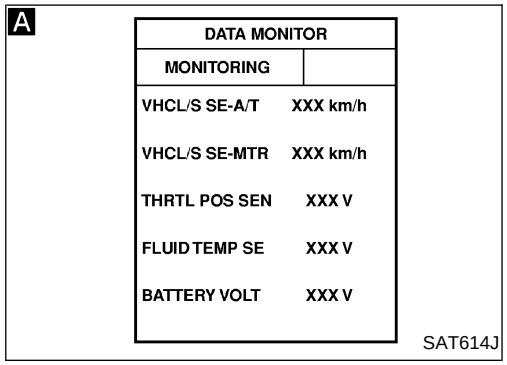


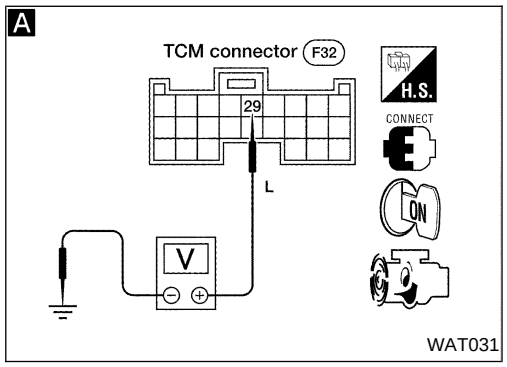
WAT005

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

DIAGNOSTIC PROCEDURE







INSPECTION START

CHECK REVOLUTION SENSOR.
Refer to "Component Inspection" below.

NG → Repair or replace revolution sensor.

OK

A

CHECK INPUT SIGNAL.

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

OR

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

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

NG → Check the following items:
- Harness for short or open between TCM, ECM and revolution sensor (Main harness)
- Ground circuit for ECM Refer to EC section "TROUBLE DIAGNOSIS FOR POWER SUPPLY".

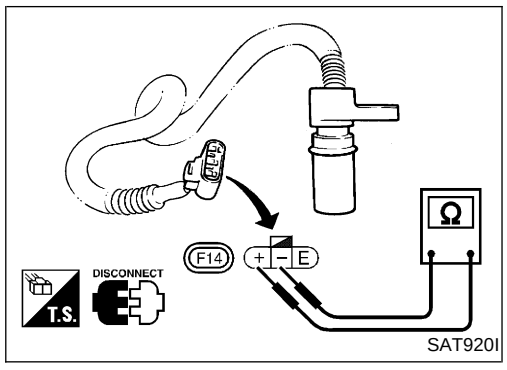
OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-89.

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

OK

INSPECTION END



COMPONENT INSPECTION

Revolution sensor

- For removal, refer to AT-205.
- Check resistance between terminals ⊕ and ⊖.

Terminal No.		Resistance
⊕	⊖	500 - 650Ω

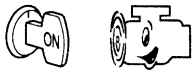
Engine Speed Signal

DESCRIPTION

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

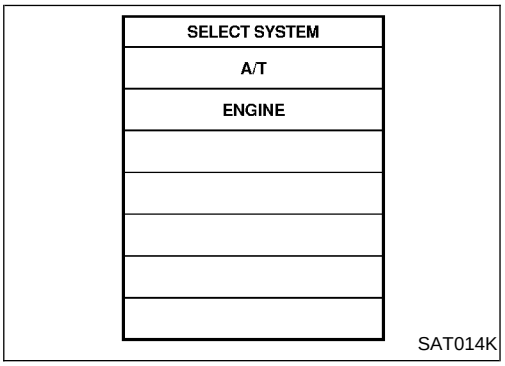
TCM TERMINALS AND REFERENCE VALUE

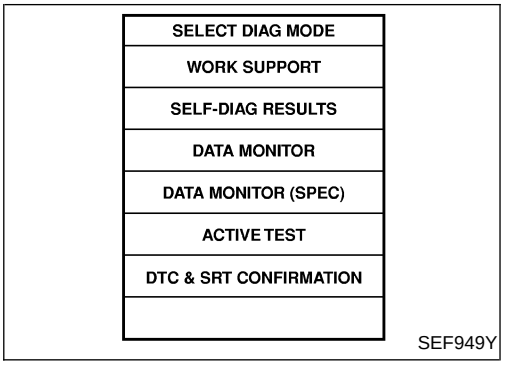
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
39	L/OR	Engine speed signal		When engine runs at idle speed.	0.6V
				When engine runs at 4,000 rpm.	1.6V

ON BOARD DIAGNOSIS LOGIC

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





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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 "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 (OD "ON")

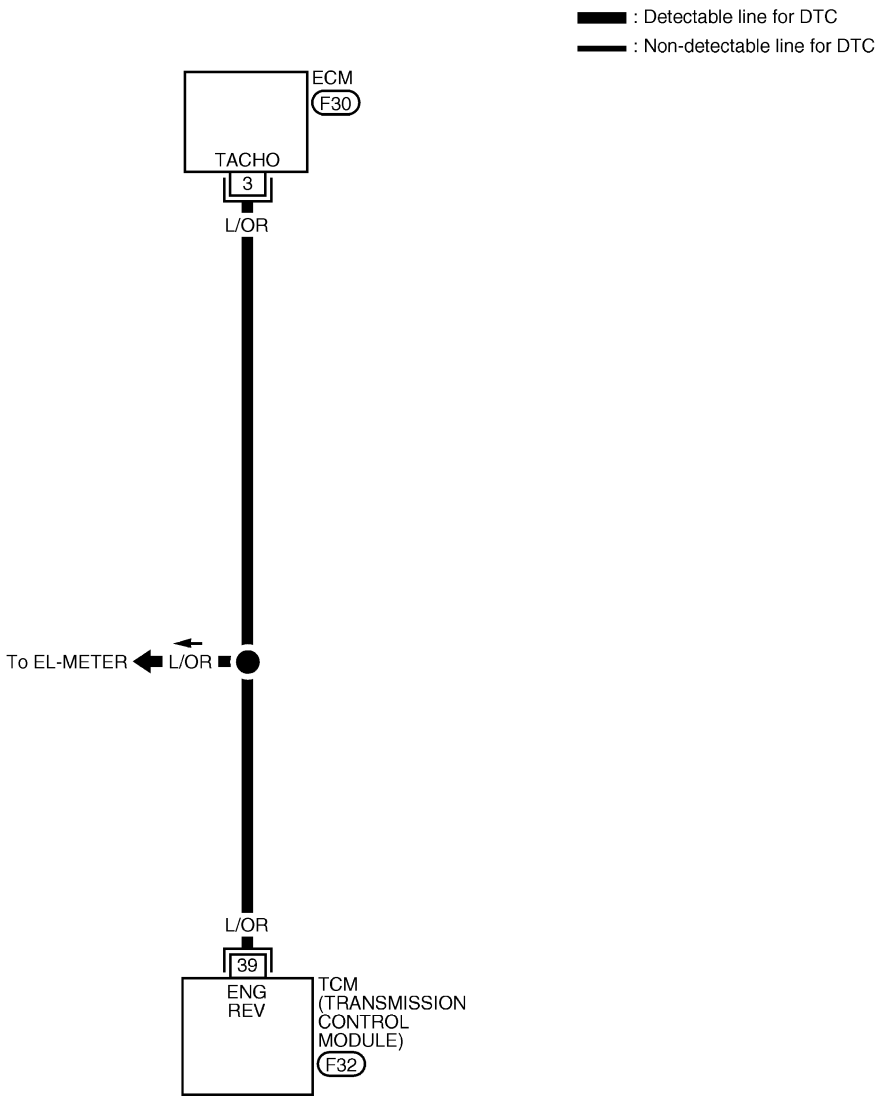
With GST

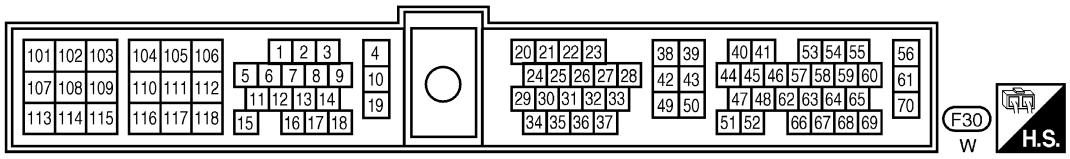
Follow the procedure "With CONSULT-II".

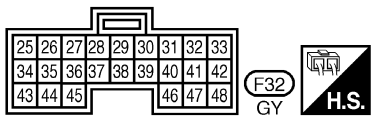
Engine Speed Signal (Cont'd)

WIRING DIAGRAM — AT — ENGSS

AT-ENGSS-01







WAT006

Engine Speed Signal (Cont'd)

DIAGNOSTIC PROCEDURE

A

SELECT SYSTEM
A/T
ENGINE

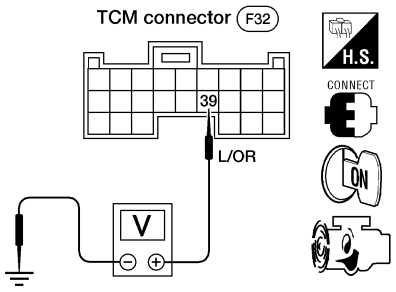
SAT014K

A

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

SAT645J

A



WAT032

INSPECTION START

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

NG → Check ignition signal circuit for engine control. Refer to EC section ("Ignition Signal").

OK

A

CHECK INPUT SIGNAL.

1. Start engine.
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out the value of "ENGINE SPEED".
   Check engine speed changes according to throttle position.

OR

1. Start engine.
2. Check voltage between TCM terminal (39) and ground.
   Voltage:
   0.6 - 1.6V

NG → Check the following items:
- Harness for short or open between TCM and ECM
- Resistor and ignition coil Refer to EC section "Ignition Signal (DTC: 0201)".

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-92.

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

OK

INSPECTION END

A/T 1st Gear Function

DESCRIPTION

- 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

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
11	L/W	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".)	0V
12	L/Y	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".)	0V

ON BOARD DIAGNOSTIC LOGIC

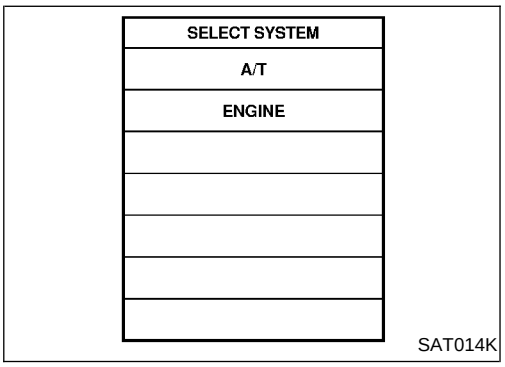
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
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.

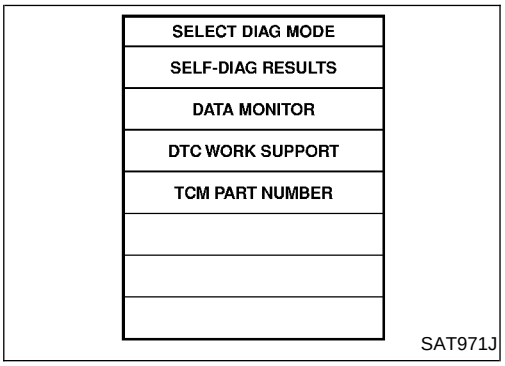
A/T 1st Gear Function (Cont'd)

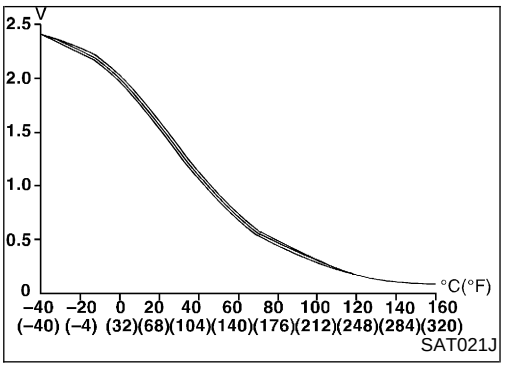
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve A stuck open	②	2	3	3
In case of gear position with shift solenoid valve B stuck open	④	3	3	4

○: P0731 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 1ST GR FNCTN : P0731 : MIL Code No. 1103	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







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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:

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 "TCM 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 "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
   Selector lever: D position (OD "ON")

- **Check that "GEAR" shows "2" after releasing pedal.**

A/T 1st Gear Function (Cont'd)

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 ''COMPLETE''. (It will take approximately 3 seconds.)
If the check result NG appears on CONSULT-II screen, go to ''DIAGNOSTIC PROCEDURE'', AT-99.
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

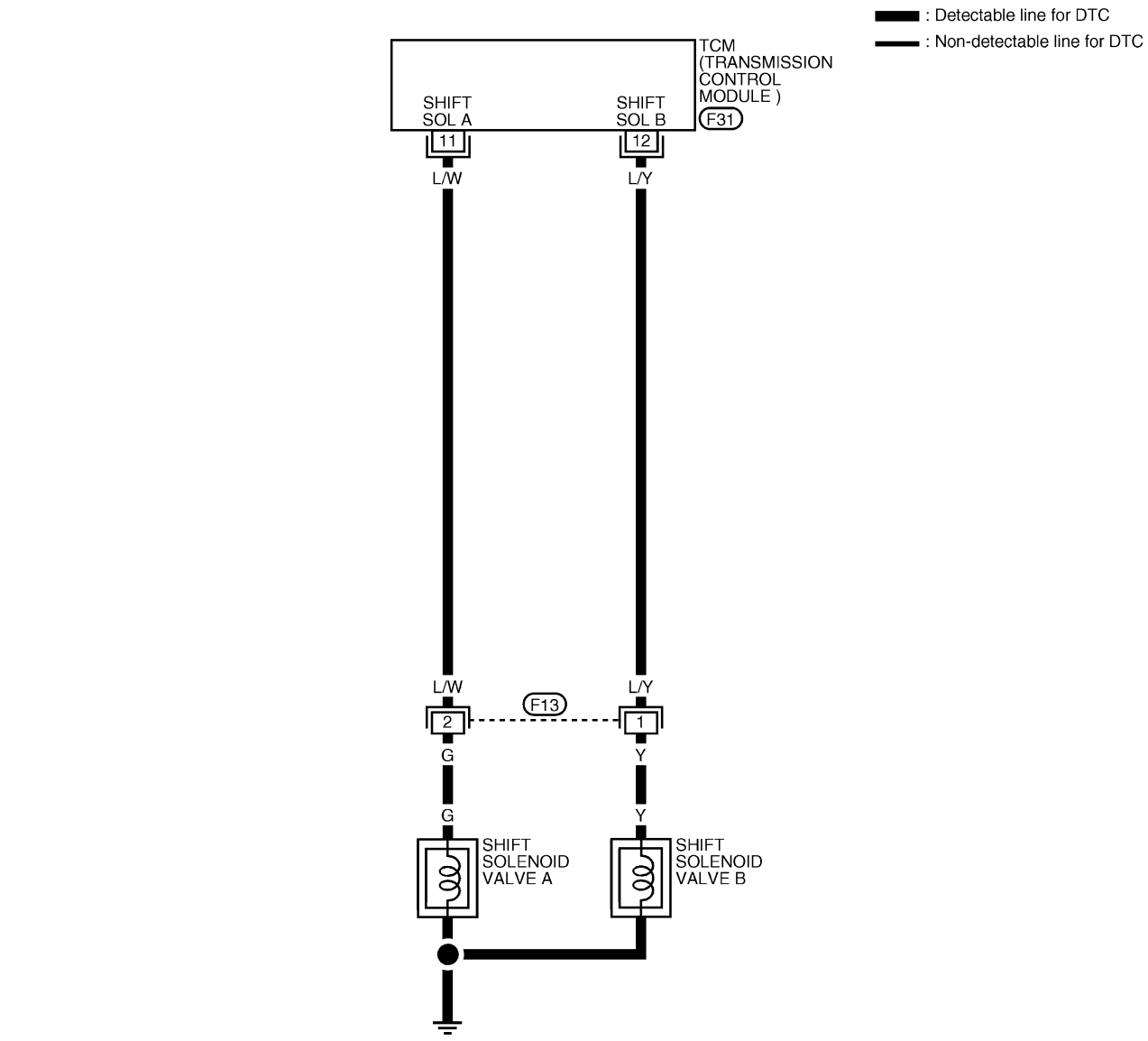
8) Make sure that ''OK'' is displayed. (If ''NG'' is displayed, refer to ''DIAGNOSTIC PROCEDURE''.)
Refer to ''DIAGNOSTIC PROCEDURE'', AT-99.
Refer to shift schedule, AT-302.

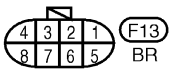
With GST
Follow the procedure ''With CONSULT-II''.

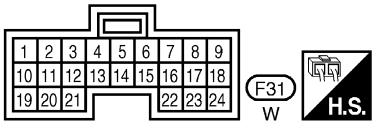
A/T 1st Gear Function (Cont'd)

WIRING DIAGRAM — AT — 1ST

AT-1STSIG-01



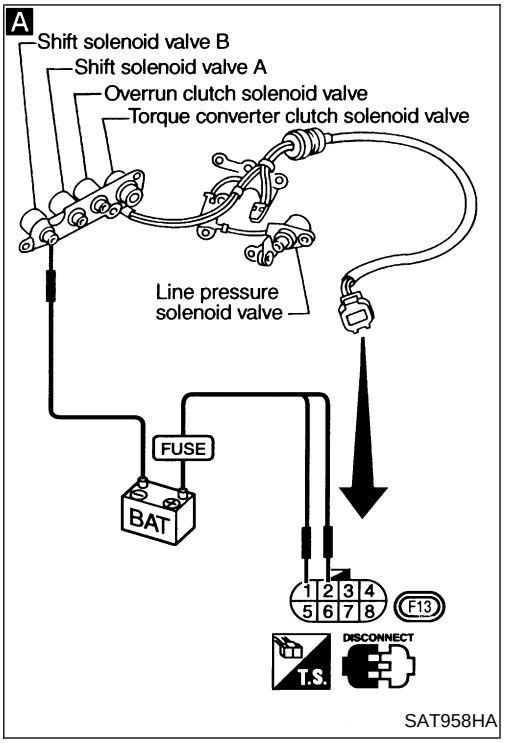


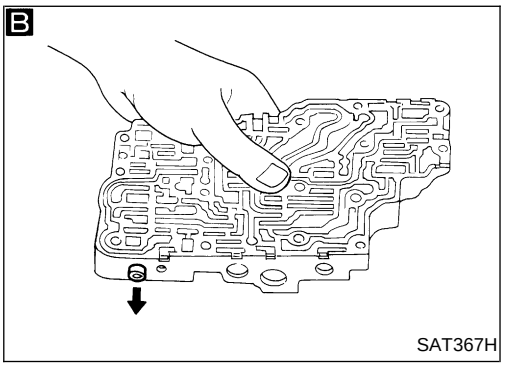


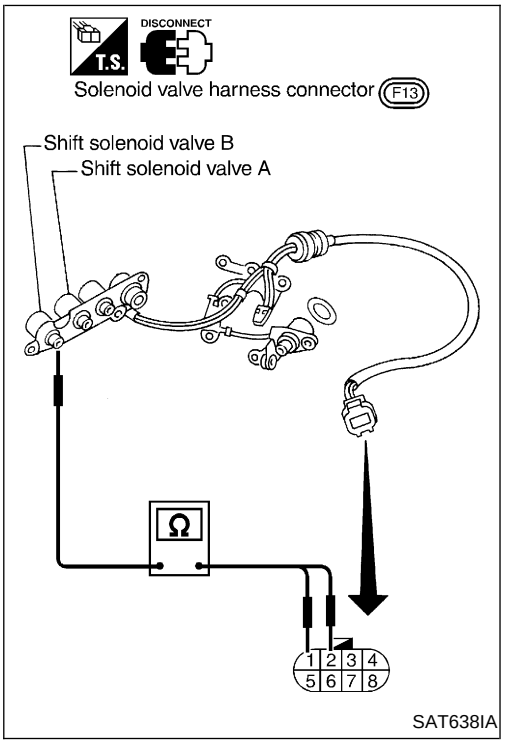
WAT007

A/T 1st Gear Function (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK SHIFT SOLENOID VALVE.
1. Remove control valve assembly. Refer to AT-204.
2. Check shift solenoid valve operation.
   - Shift solenoid valve A
   - Shift solenoid valve B

   Refer to "Component Inspection" below.

NG → Repair or replace shift solenoid valve assembly.

OK

B

CHECK CONTROL VALVE.
1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-235.
2. Check to ensure that:
   - Valve, sleeve and plug slide along valve bore under their own weight.
   - Valve, sleeve and plug are free from burrs, dents and scratches.
   - Control valve springs are free from damage, deformation and fatigue.
   - Hydraulic line is free from obstacles.

NG → Repair control valve assembly.

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-96.

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

OK

INSPECTION END

COMPONENT INSPECTION

Shift solenoid valve A and B

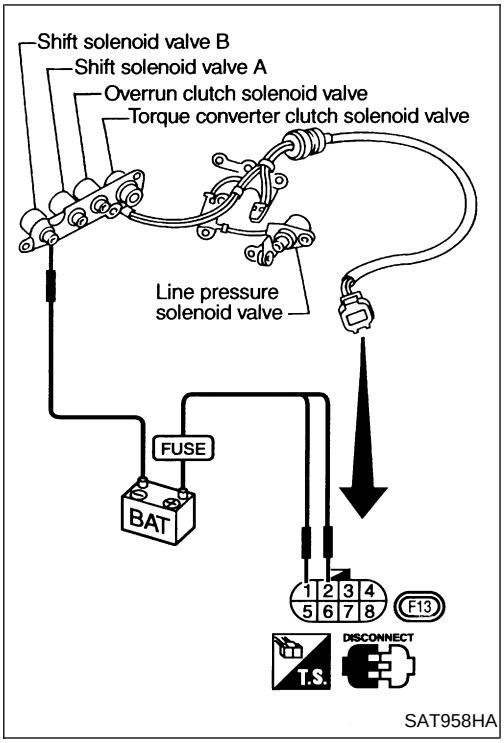
- For removal, refer to AT-204.

Resistance check

- Check resistance between two terminals.

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

A/T 1st Gear Function (Cont'd)



Operation check

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

A/T 2nd Gear Function

DESCRIPTION

- 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

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
12	L/Y	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".)	0V

ON BOARD DIAGNOSTIC LOGIC

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

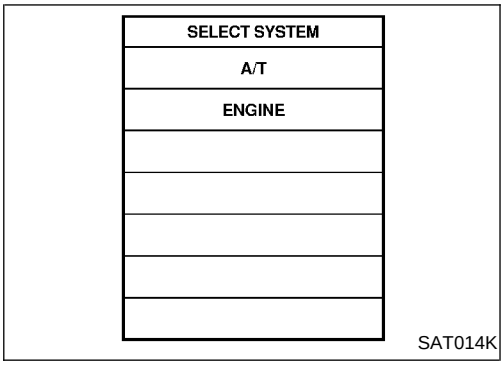
If the actual gear position is higher than the position (2nd) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.

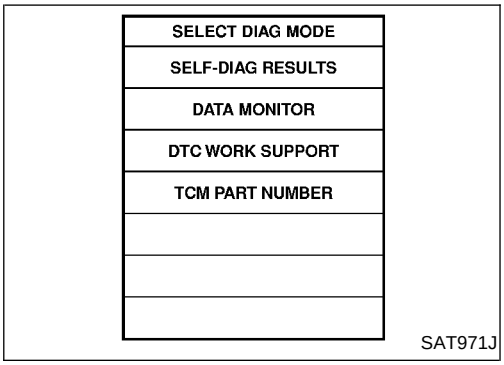
This malfunction will be caused when shift solenoid valve B is stuck open.

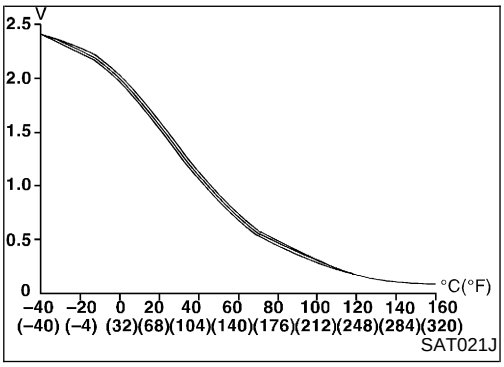
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve B stuck open	4	③	3	4

○: P0732 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 2ND GR FNCTN : P0732 : MIL Code No. 1104	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







A/T 2nd Gear Function (Cont'd)

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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:

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 "TCM 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 60 to 65 km/h (37 to 40 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8
   Selector lever: D position (OD "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 60 to 65 km/h (37 to 40 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-105.
   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

A/T 2nd Gear Function (Cont'd)

8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
   Refer to "DIAGNOSTIC PROCEDURE", AT-105.
   Refer to shift schedule, AT-302.

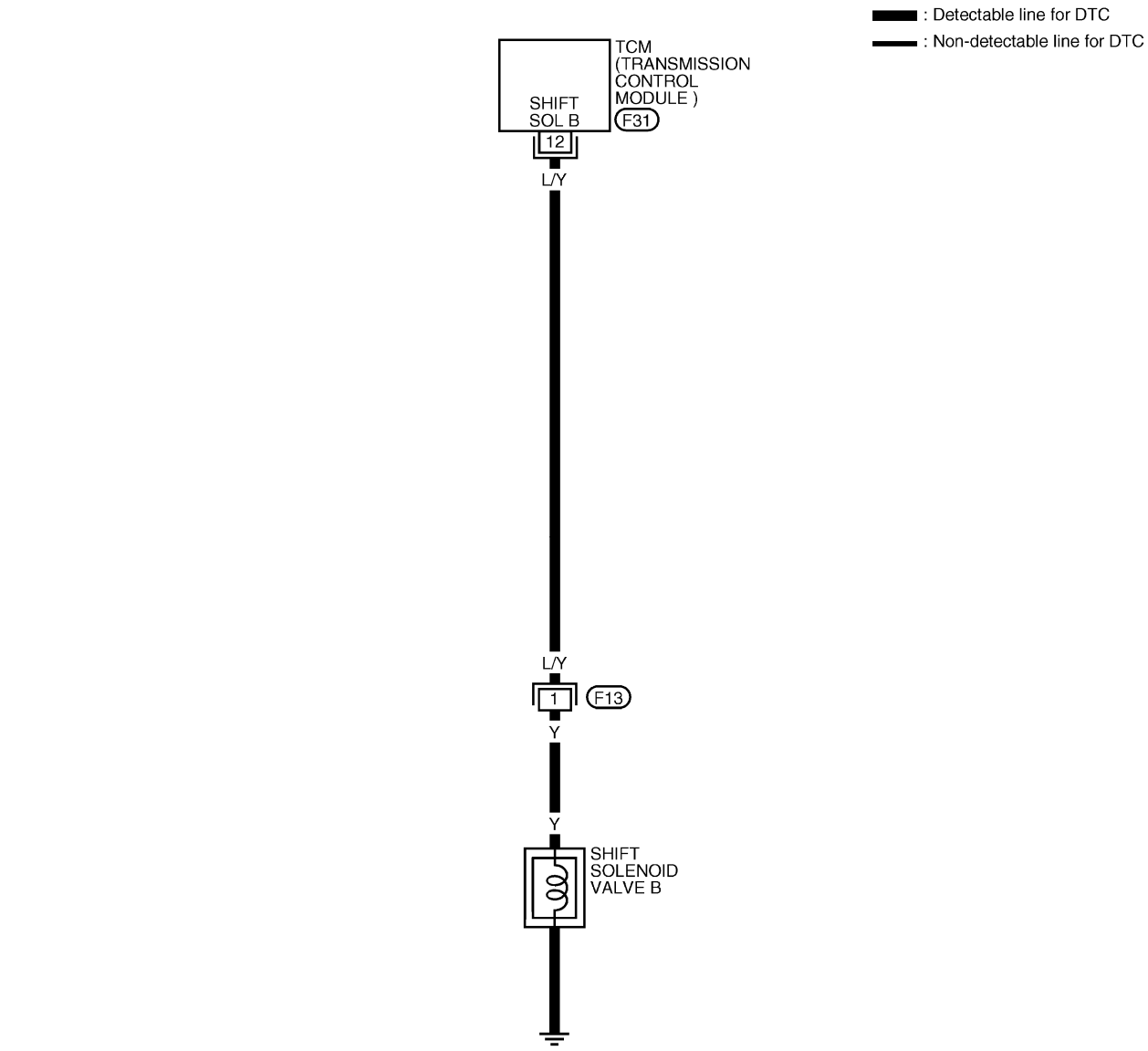
WITH GST

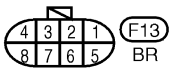
Follow the procedure "With CONSULT-II".

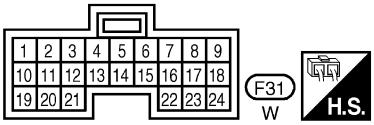
A/T 2nd Gear Function (Cont'd)

WIRING DIAGRAM — AT — 2ND

AT-2NDSIG-01



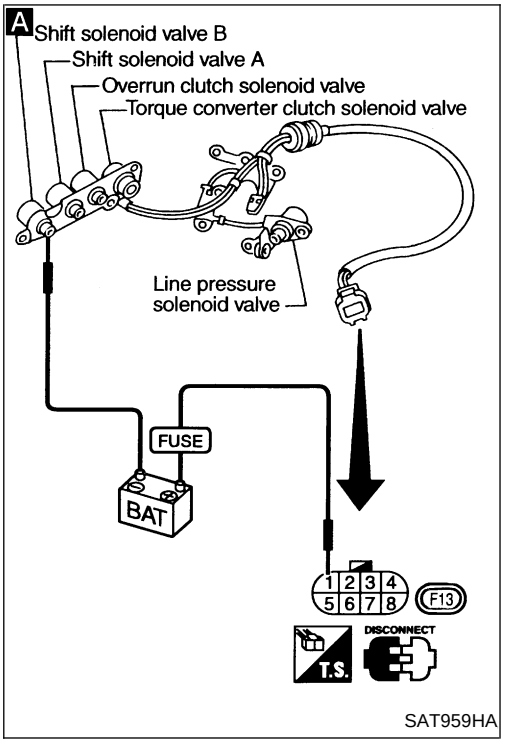




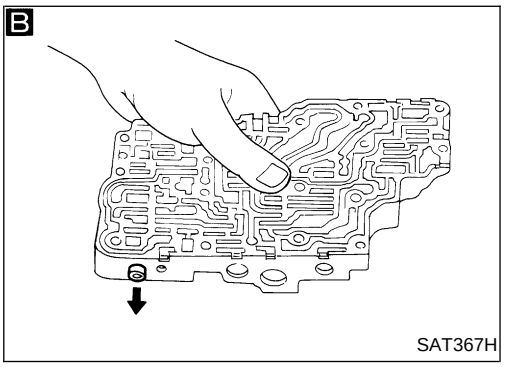
WAT008

A/T 2nd Gear Function (Cont'd)

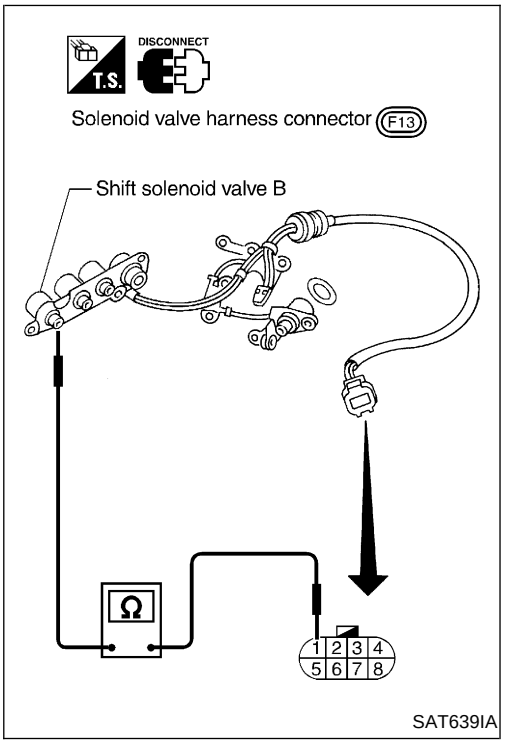
DIAGNOSTIC PROCEDURE



SAT959HA



SAT367H



SAT639IA

INSPECTION START

A

CHECK SHIFT SOLENOID VALVE.
1. Remove control valve assembly. Refer to AT-204.
2. Check shift solenoid valve operation.
   - Shift solenoid valve B

   Refer to "Component Inspection" below.

NG → Repair or replace shift solenoid valve assembly.

OK

B

CHECK CONTROL VALVE.
1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-235.
2. Check to ensure that:
   - Valve, sleeve and plug slide along valve bore under their own weight.
   - Valve, sleeve and plug are free from burrs, dents and scratches.
   - Control valve springs are free from damage, deformation and fatigue.
   - Hydraulic line is free from obstacles.

NG → Repair control valve assembly.

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-102.

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

OK

INSPECTION END

COMPONENT INSPECTION

Shift solenoid valve B

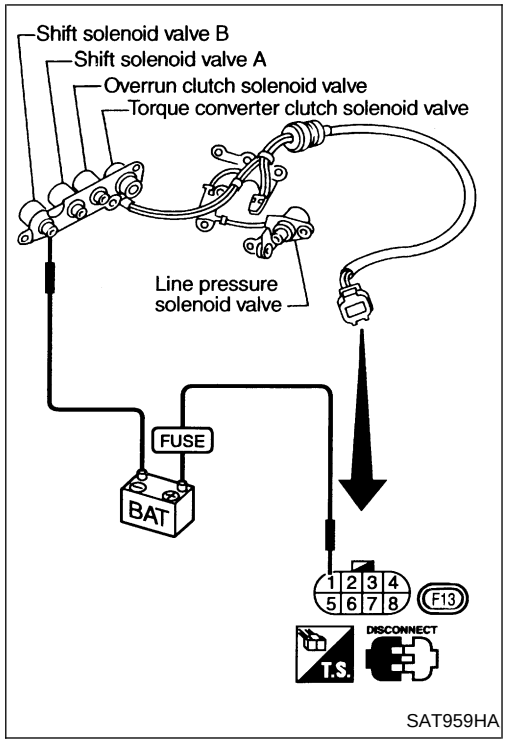
- For removal, refer to AT-204.

Resistance check

- Check resistance between two terminals.

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

A/T 2nd Gear Function (Cont'd)



Operation check

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

A/T 3rd Gear Function

DESCRIPTION

- 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

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
11	L/W	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".)	0V

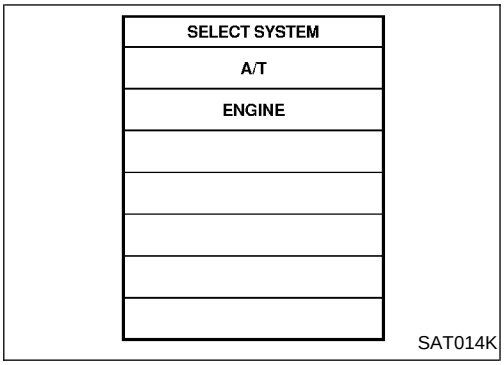
ON BOARD DIAGNOSTIC LOGIC

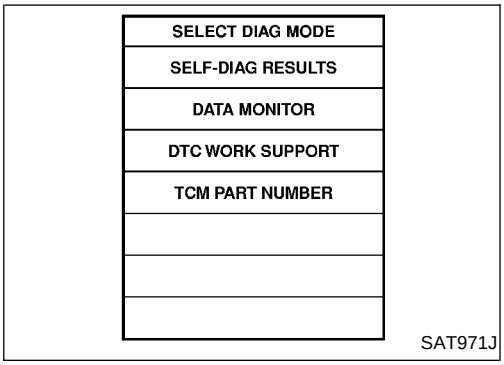
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
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.

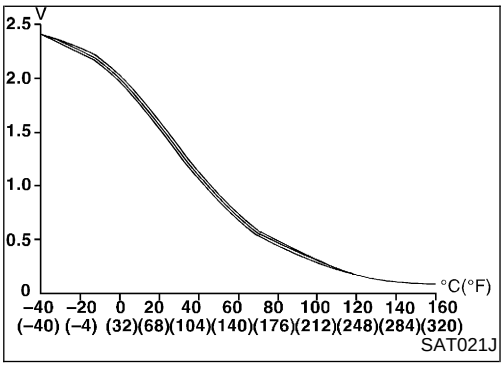
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve A stuck closed	1	1	④	4

○: P0733 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 3RD GR FNCTN : P0733 : MIL Code No. 1105	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







A/T 3rd Gear Function (Cont'd)

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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:

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 "TCM 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 65 to 80 km/h (40 to 50 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8
   Selector lever: D position (OD "ON")
   - **Check that "GEAR" shows "4" after releasing pedal.**
5) Depress accelerator pedal with 3.5/8 - 4.5/8 of "THROTTLE POSI" from a speed of 65 to 80 km/h (40 to 50 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-111.
   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.)

A/T 3rd Gear Function (Cont'd)

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

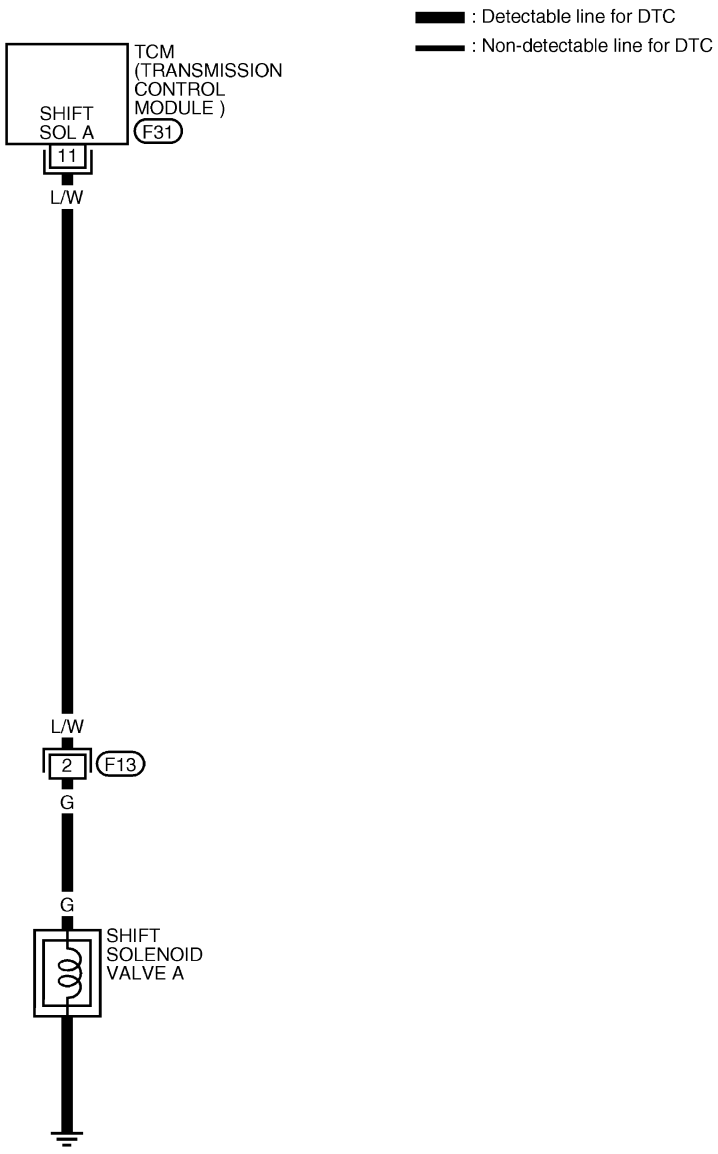
8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
   Refer to "DIAGNOSTIC PROCEDURE", AT-111.
   Refer to shift schedule, AT-302.

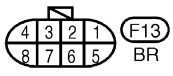
With GST
Follow the procedure "With CONSULT-II".

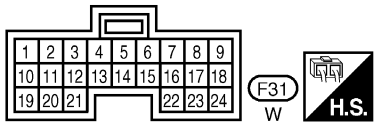
A/T 3rd Gear Function (Cont'd)

WIRING DIAGRAM — AT — 3RD

AT-3RDSIG-01



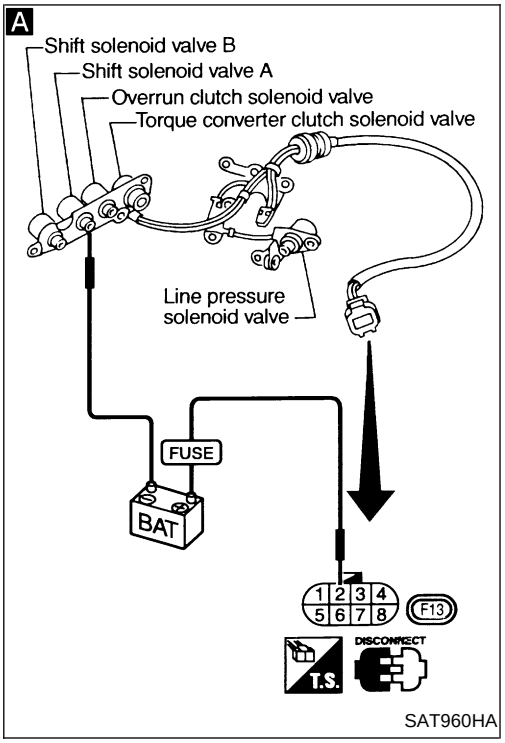




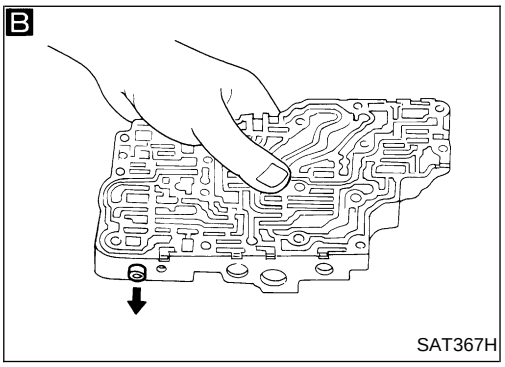
WAT009

A/T 3rd Gear Function (Cont'd)

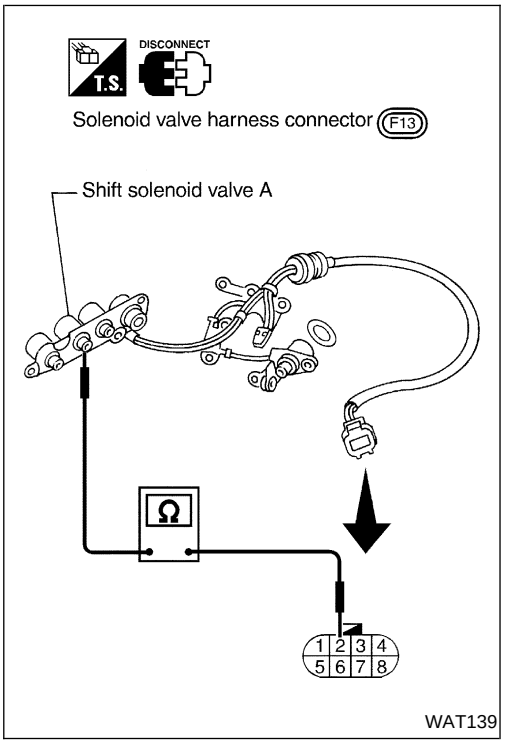
DIAGNOSTIC PROCEDURE



SAT960HA



SAT367H



WAT139

INSPECTION START

A

CHECK SHIFT SOLENOID VALVE.
1. Remove control valve assembly. Refer to AT-204.
2. Check shift solenoid valve operation.
   - Shift solenoid valve A

   Refer to "Component Inspection" below.

NG → Repair or replace shift solenoid valve assembly.

OK

B

CHECK CONTROL VALVE.
1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-235.
2. Check to ensure that:
   - Valve, sleeve and plug slide along valve bore under their own weight.
   - Valve, sleeve and plug are free from burrs, dents and scratches.
   - Control valve springs are free from damage, deformation and fatigue.
   - Hydraulic line is free from obstacles.

NG → Repair control valve assembly.

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-108.

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

OK

INSPECTION END

COMPONENT INSPECTION

Shift solenoid valve A

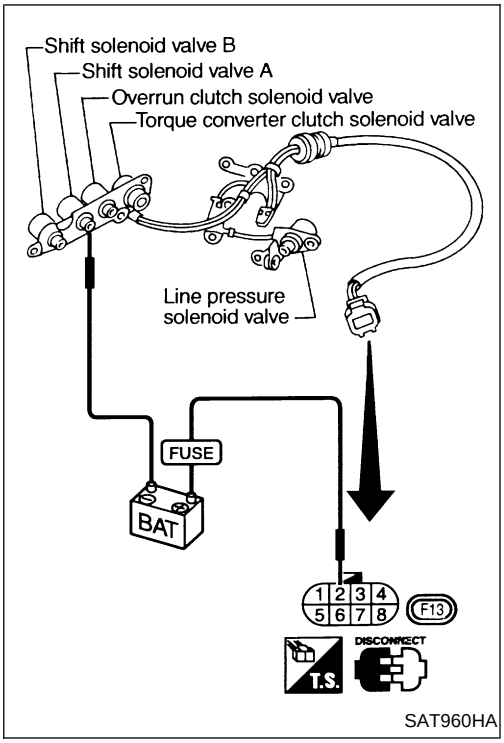
- For removal, refer to AT-204.

Resistance check

- Check resistance between two terminals.

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

A/T 3rd Gear Function (Cont'd)



Operation check

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

A/T 4th Gear Function

DESCRIPTION

- 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 REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

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

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	R/W	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.	0V
2	P/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.	0V
3	R	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	0V
11	L/W	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".)	0V
12	L/Y	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".)	0V
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	0V

A/T 4th Gear Function (Cont'd)

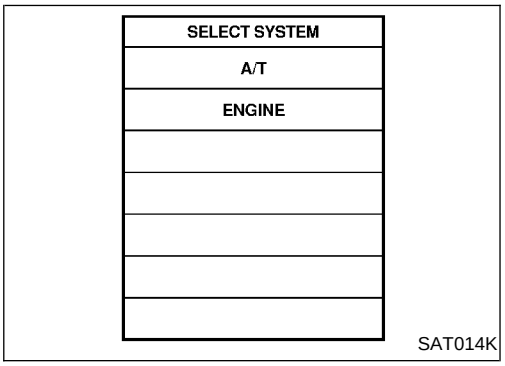
ON BOARD DIAGNOSTIC LOGIC

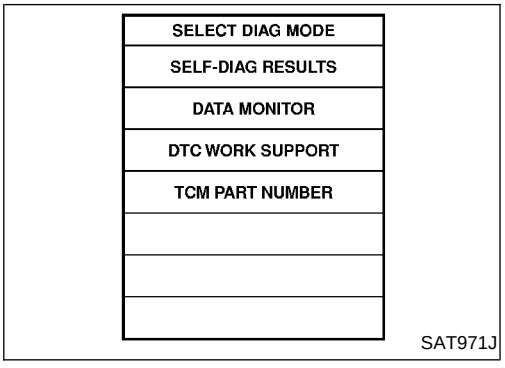
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
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 : P0734 : MIL Code No. 1106	A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	● Shift solenoid valve A ● Shift solenoid valve B ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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

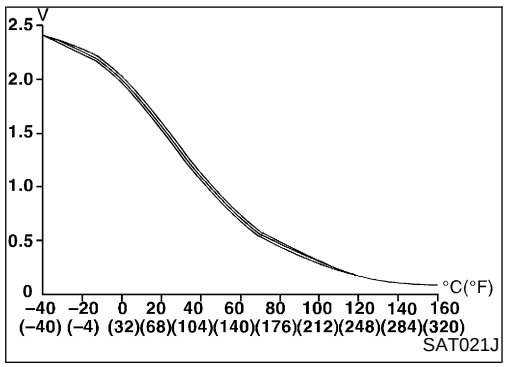
After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Start engine and select "TCM 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

A/T 4th Gear Function (Cont'd)

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 39 to 50 km/h (24 to 31 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 5.5/8
   Selector lever: D position (OD "ON")
   - **Check that "GEAR" shows "3" after releasing pedal.**
5) Depress accelerator pedal with 1.0/8 - 2.0/8 of "THROTTLE POSI" from a speed of 39 to 50 km/h (24 to 31 MPH) until "TESTING" has turned 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-117.
   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
Malfunction for P0734 exists.	1 → 2 → 2 → 1

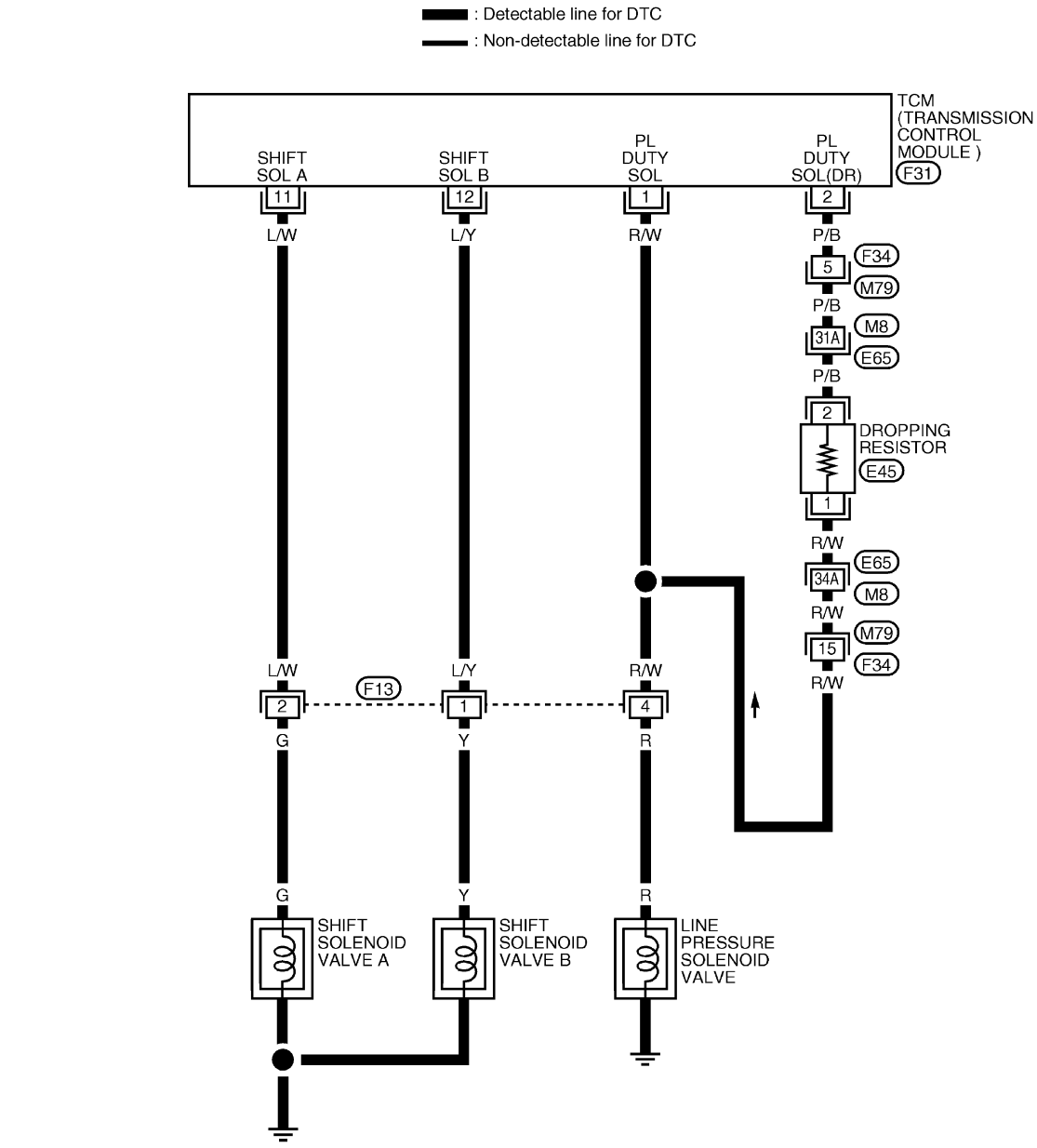
8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
   Refer to "DIAGNOSTIC PROCEDURE", AT-117.
   Refer to shift schedule, AT-302.

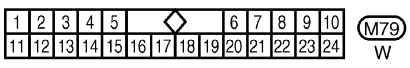
With GST
Follow the procedure "With CONSULT-II".

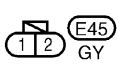
A/T 4th Gear Function (Cont'd)

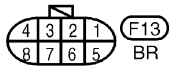
WIRING DIAGRAM — AT — 4TH

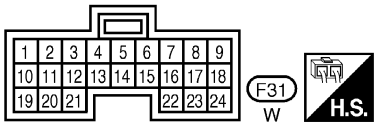
AT-4THSIG-01









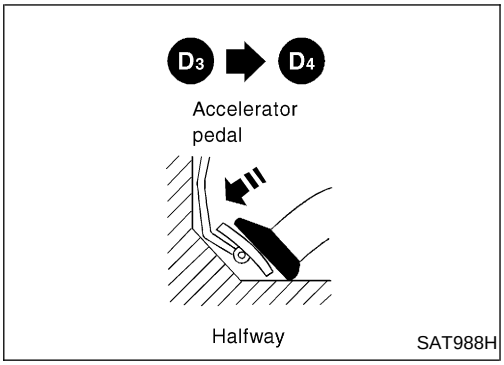


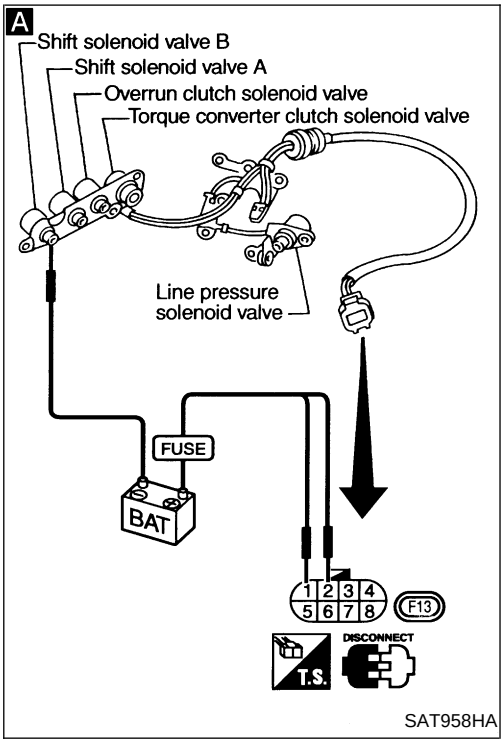
Refer to the following.
M8, E65 SUPER MULTIPLE JUNCTION (SMJ)

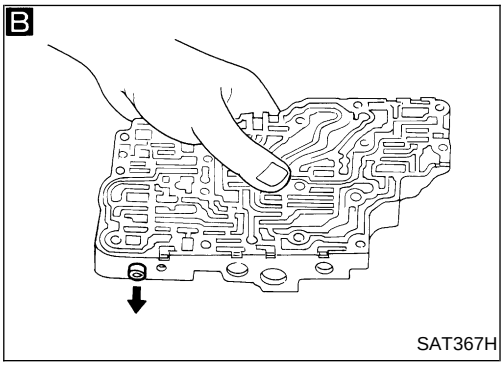
WAT010

A/T 4th Gear Function (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

During "Cruise test − Part 1" (AT-65), does A/T shift from D_3 to D_4 at the specified speed?

- Yes → Perform Diagnostic Trouble Code (DTC) Confirmation Procedure, (AT-114).
- No ↓

Perform line pressure test. Refer to AT-57.

- NG → Go to Ⓐ.
- OK ↓

A

CHECK SOLENOID VALVES.
1. Remove control valve assembly. Refer to AT-204.
2. Refer to "Component Inspection", AT-119.

- NG → Replace solenoid valve assembly.
- OK ↓

B

CHECK CONTROL VALVE.
1. Disassemble control valve assembly. Refer to AT-235.
2. Check to ensure that:
- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.

- NG → Repair control valve.
- OK ↓

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

- NG → Check control valve again. Repair or replace control valve assembly.
- OK ↓

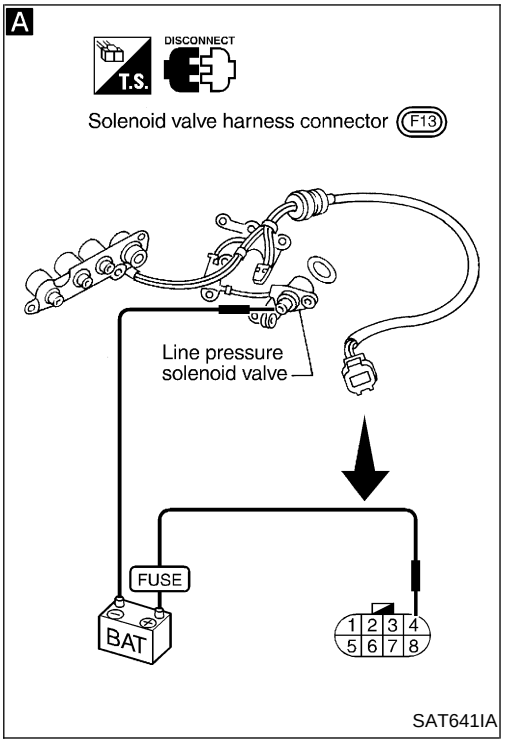
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-114.

- NG → Perform "CRUISE TEST-Part 1" (AT-65) again and return to the start point of this flow chart.
- OK ↓

INSPECTION END

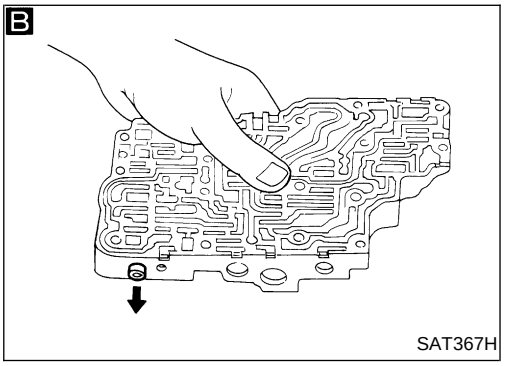
A/T 4th Gear Function (Cont'd)

A



SAT641IA

B



SAT367H

Ⓐ

A

CHECK LINE PRESSURE SOLENOID VALVE.
1. Remove control valve assembly. Refer to AT-204.
2. Refer to "Component Inspection", AT-119.

NG → Replace solenoid valve assembly.

OK

B

CHECK CONTROL VALVE.
1. Disassemble control valve assembly. Refer to AT-235.
2. Check line pressure circuit valves for sticking.
- Pressure regulator valve
- Pilot valve
- Pressure modifier valve

NG → Repair control valve.

OK

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

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

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-114.

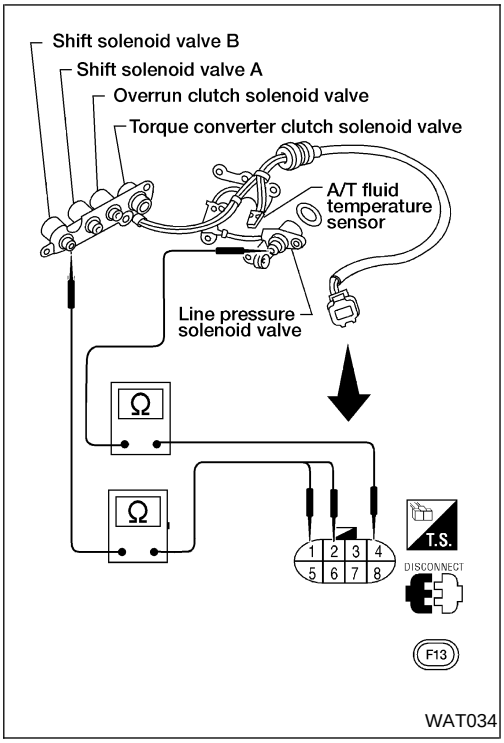
NG → Perform "CRUISE TEST-Part 1" (AT-65) again and return to the start point of this flow chart.

OK

INSPECTION END

A/T 4th Gear Function (Cont'd)

COMPONENT INSPECTION



WAT034

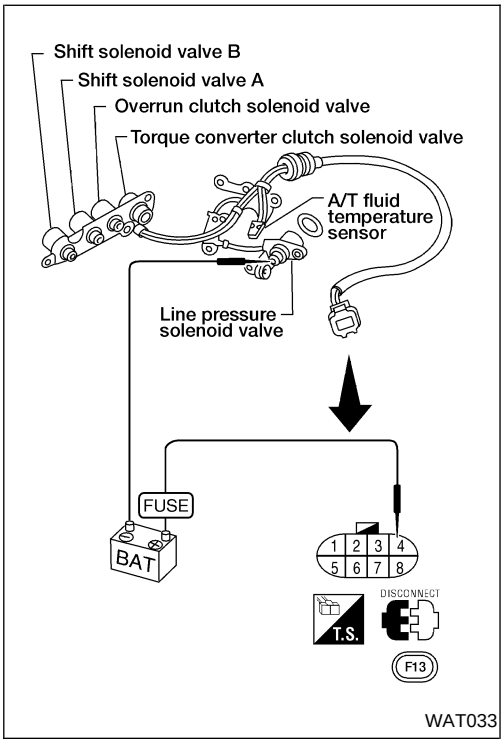
Solenoid valves

- For removal, refer to AT-204.

Resistance check

- Check resistance between two terminals.

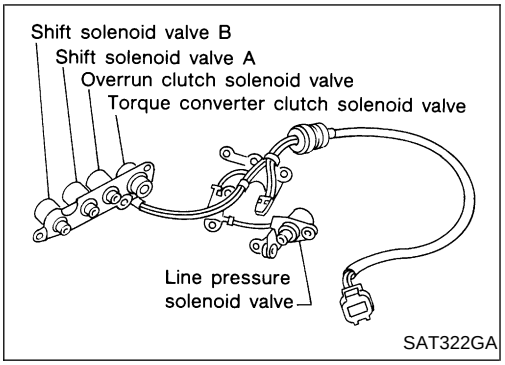
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	②	Ground	20 - 40Ω
Shift solenoid valve B	①		
Line pressure solenoid valve	④		2.5 - 5Ω



WAT033

Operation check

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



Torque Converter Clutch Solenoid Valve

DESCRIPTION

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 2.0/8) 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 REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approx.)
Torque converter clutch solenoid valve duty	Lock-up "OFF" ↓ Lock-up "ON"	4% ↓ 94%

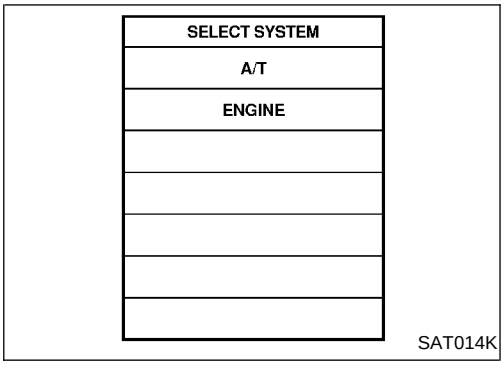
TCM TERMINALS AND REFERENCE VALUE

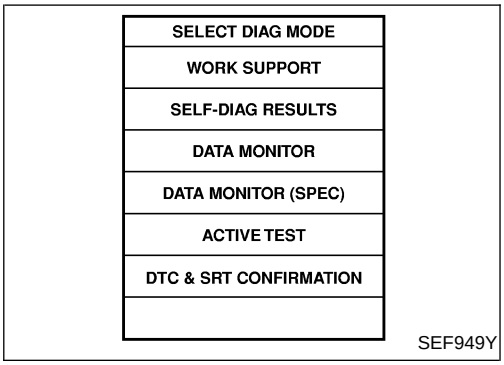
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
3	R	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: TCC SOLENOID/CIRC : P0740 : MIL Code No. 1204	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





Torque Converter Clutch Solenoid Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:

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

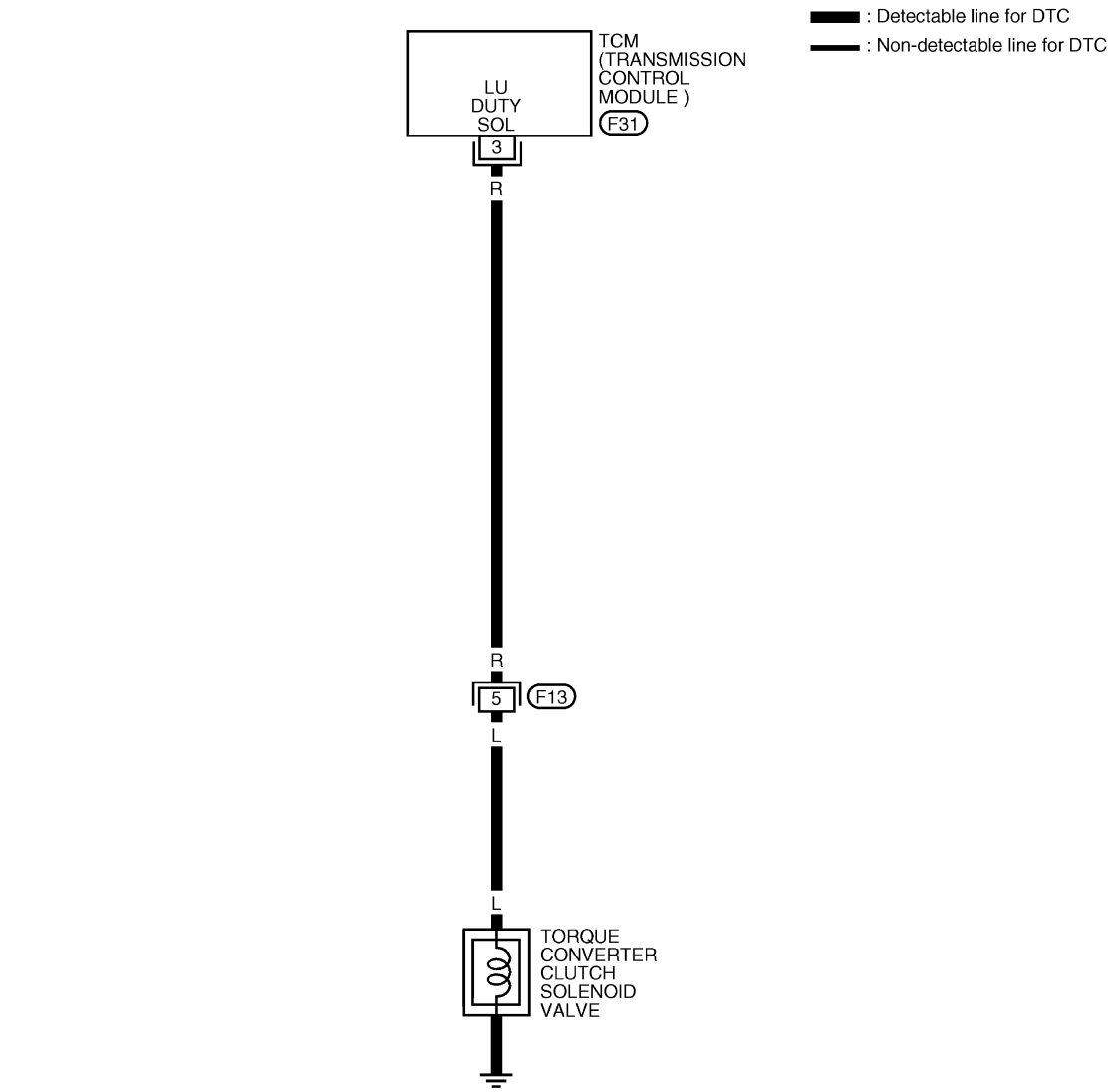
With GST

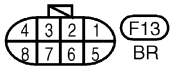
Follow the procedure "With CONSULT-II".

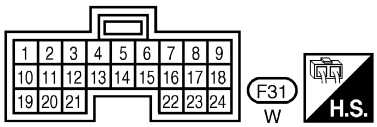
Torque Converter Clutch Solenoid Valve (Cont'd)

WIRING DIAGRAM — AT — TCV

AT-TCV-01



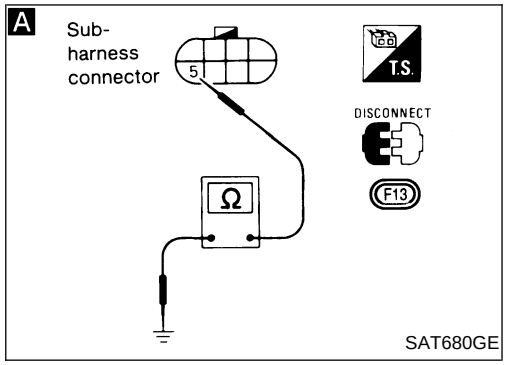


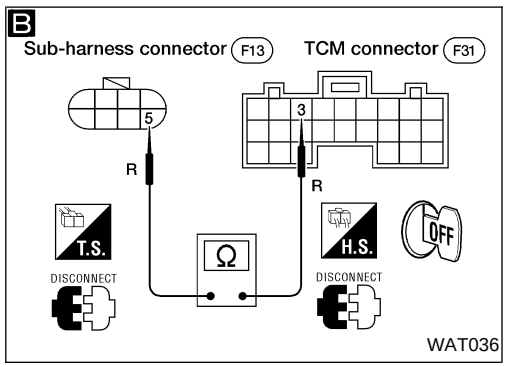


WAT011

Torque Converter Clutch Solenoid Valve (Cont'd)

DIAGNOSTIC PROCEDURE





INSPECTION START

A

CHECK GROUND CIRCUIT.
1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑤ and ground.
   Resistance: 10 - 20Ω

NG →
1. Remove oil pan. Refer to AT-204.
2. Check the following items:
- Torque converter clutch solenoid valve
  Refer to "Component Inspection", AT-124.
- Harness of terminal cord assembly for short or open

OK ↓

B

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

NG → Repair open circuit or short to ground or short to power in harness or connectors.

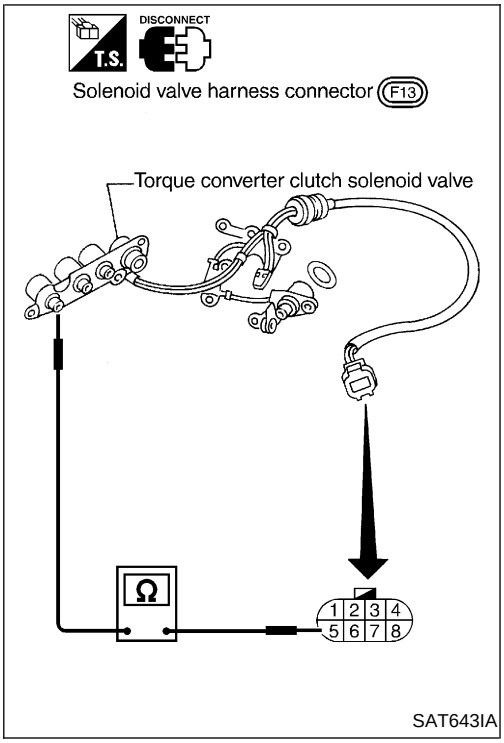
OK ↓

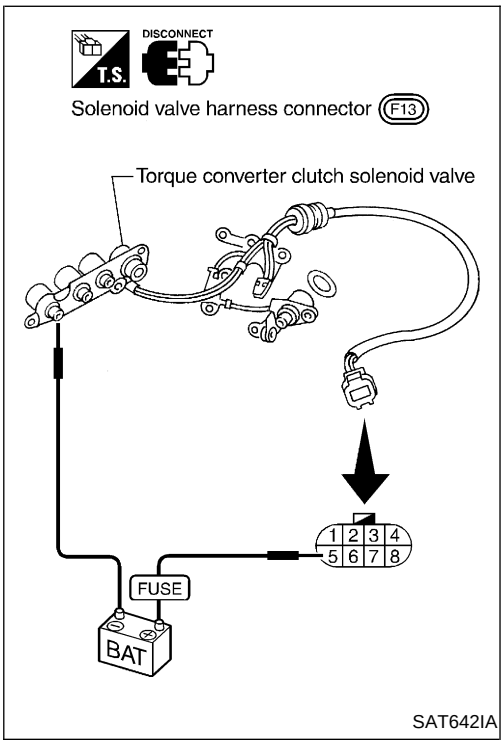
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-121.

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

OK ↓

INSPECTION END





Torque Converter Clutch Solenoid Valve (Cont'd)

COMPONENT INSPECTION

Torque converter clutch solenoid valve

- For removal, refer to AT-204.

Resistance check

- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Torque converter clutch solenoid valve	⑤	Ground	10 - 20Ω

Operation check

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

A/T TCC S/V Function (Lock-up)

DESCRIPTION

- 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 REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approx.)
Torque converter clutch solenoid valve duty	Lock-up "OFF" ↓ Lock-up "ON"	4% ↓ 94%

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	R/W	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.	0V
2	P/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.	0V
3	R	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	0V

A/T TCC S/V Function (Lock-up) (Cont'd)

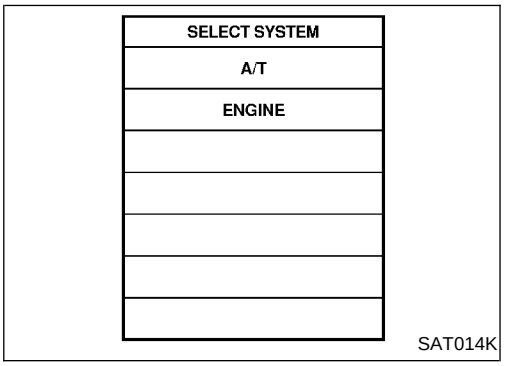
ON BOARD DIAGNOSTIC LOGIC

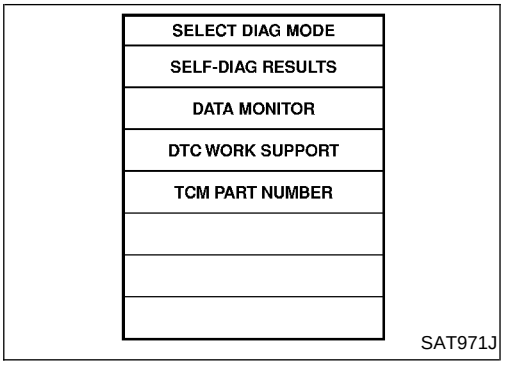
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
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

○: 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





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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.**

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

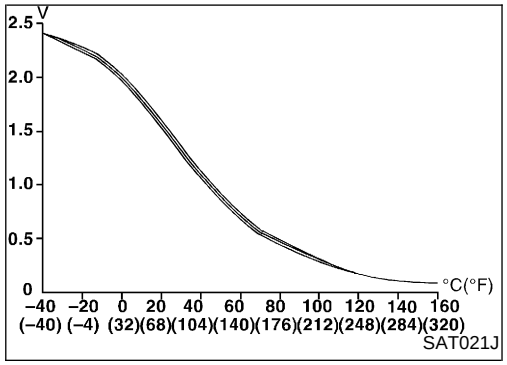
After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Start engine and select "TCM 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).

A/T TCC S/V Function (Lock-up) (Cont'd)

3) Select "TCC S/V FNCTN P0744" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II.



4) Accelerate vehicle to more than 70 km/h (43 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
Selector lever: D position (OD "ON")
TCC S/V DUTY: More than 94%
VHCL/S SE·A/T: Constant speed of more than 70 km/h (43 MPH)

- **Check that "GEAR" shows "4".**
- **For shift schedule, refer to SDS, AT-302.**
- **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".**

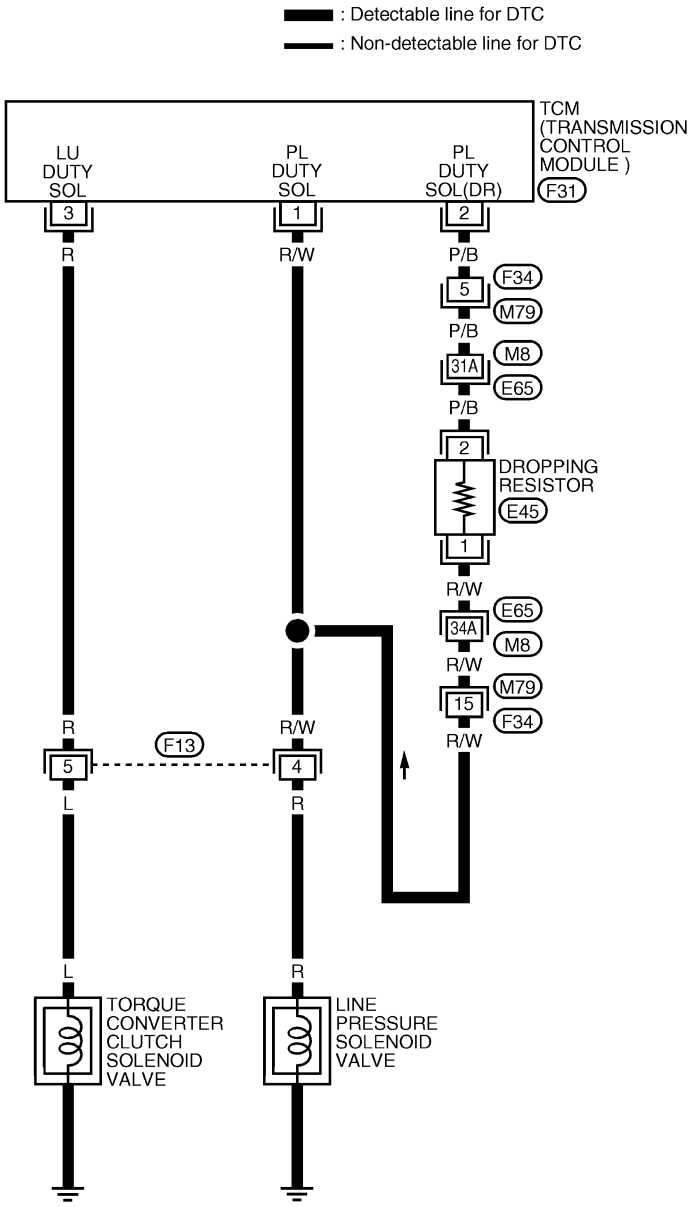
5) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
Refer to "DIAGNOSTIC PROCEDURE", AT-129.
Refer to shift schedule, AT-302.

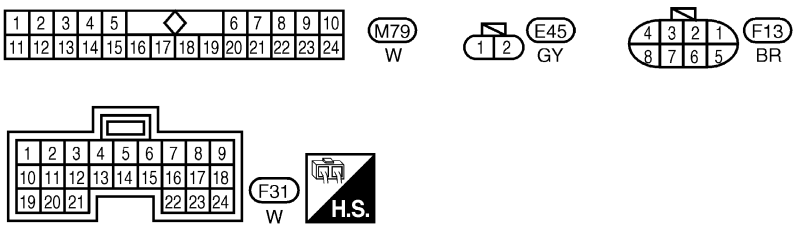
With GST
Follow the procedure "With CONSULT-II".

A/T TCC S/V Function (Lock-up) (Cont'd)

WIRING DIAGRAM — AT — TCCSIG

AT-TCCSIG-01



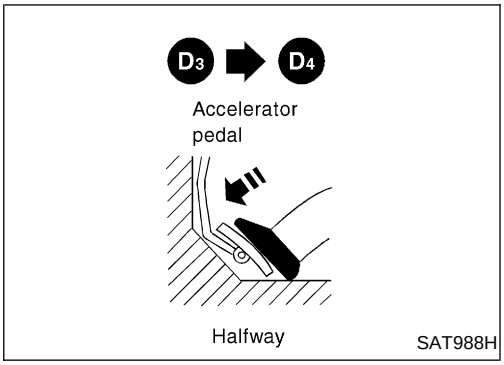


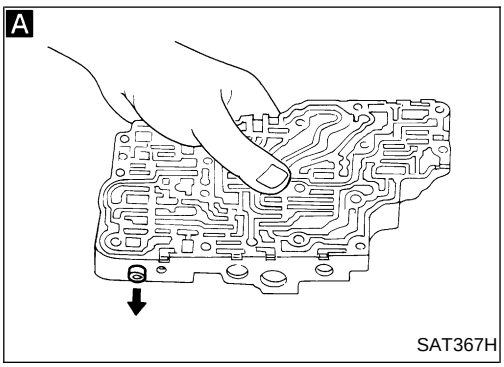
Refer to the following.
M8, E65 SUPER MULTIPLE JUNCTION (SMJ)

WAT012

A/T TCC S/V Function (Lock-up) (Cont'd)

DIAGNOSTIC PROCEDURE





INSPECTION START

During "Cruise test − Part 1" (AT-65), does A/T shift from D_3 to D_4 at the specified speed?

- Yes → Go to (B) and check for proper lock-up.
- No ↓

Perform line pressure test. Refer to AT-57.

- NG → Go to (A).
- OK ↓

A

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to AT-235.
2. Check to ensure that:

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

- NG → Repair control valve.
- OK ↓

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

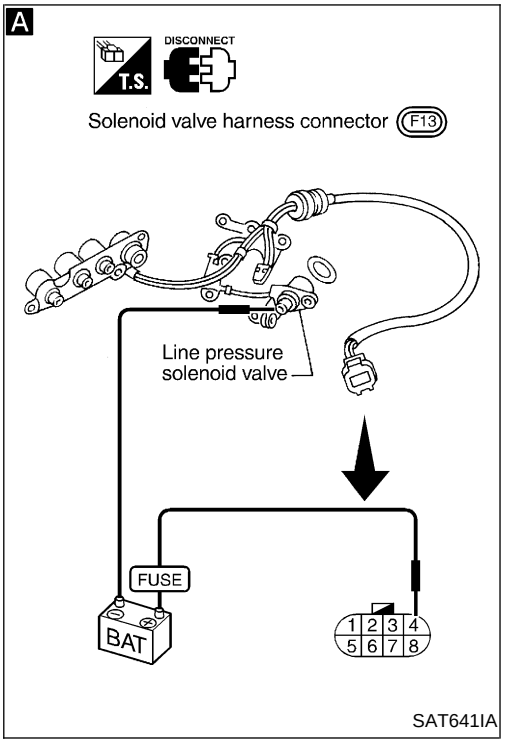
- NG → Check control valve again. Repair or replace control valve assembly.
- OK ↓

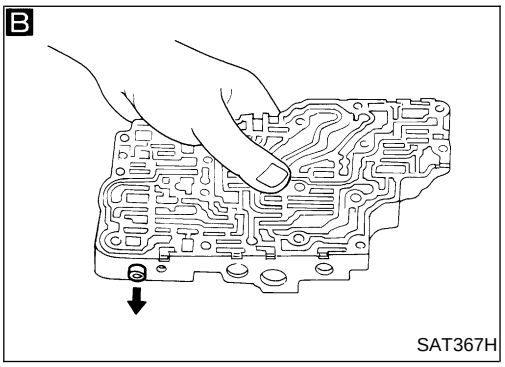
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-126.

- NG → Go to (B) and check for proper lock-up.
- OK ↓

INSPECTION END

A/T TCC S/V Function (Lock-up) (Cont'd)





Ⓐ

A

CHECK LINE PRESSURE SOLENOID VALVE.
1. Remove control valve assembly. Refer to AT-204.
2. Check line pressure solenoid valve operation. Refer to AT-132.

NG → Replace solenoid valve assembly.

OK

B

CHECK CONTROL VALVE.
1. Disassemble control valve assembly. Refer to AT-235.
2. Check line pressure circuit valves for sticking.
- Pressure regulator valve
- Pilot valve
- Pressure modifier valve

NG → Repair control valve.

OK

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

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

OK

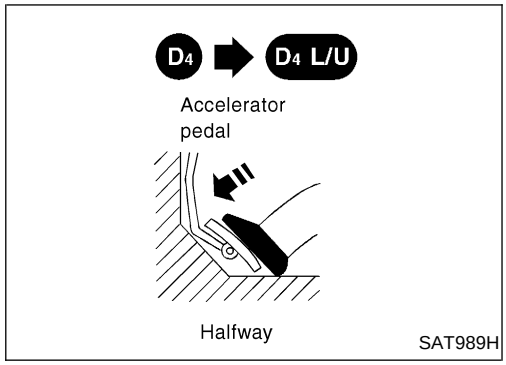
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-126.

NG → Go to Ⓑ and check for proper lock-up.

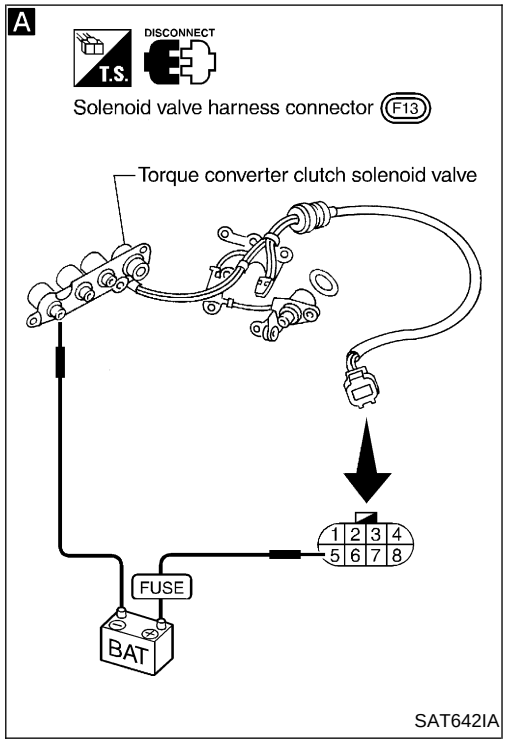
OK

INSPECTION END

A/T TCC S/V Function (Lock-up) (Cont'd)



A



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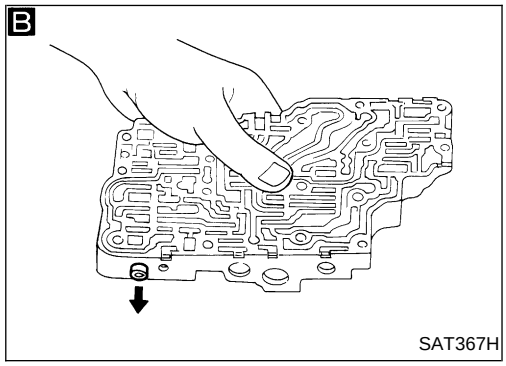


Ⓑ

During "Cruise test − Part 1" (AT-65), does A/T perform lock-up at the specified speed?

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

No

A

CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE.
1. Remove control valve assembly. Refer to AT-204.
2. Check torque converter clutch solenoid valve operation. Refer to AT-132.

NG → Replace solenoid valve assembly.

OK

B

CHECK CONTROL VALVE.
1. Disassemble control valve assembly. Refer to AT-235.
2. Check control valves for sticking.
- Torque converter clutch control valve
- Torque converter clutch relief valve

NG → Repair control valve.

OK

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

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

Yes

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

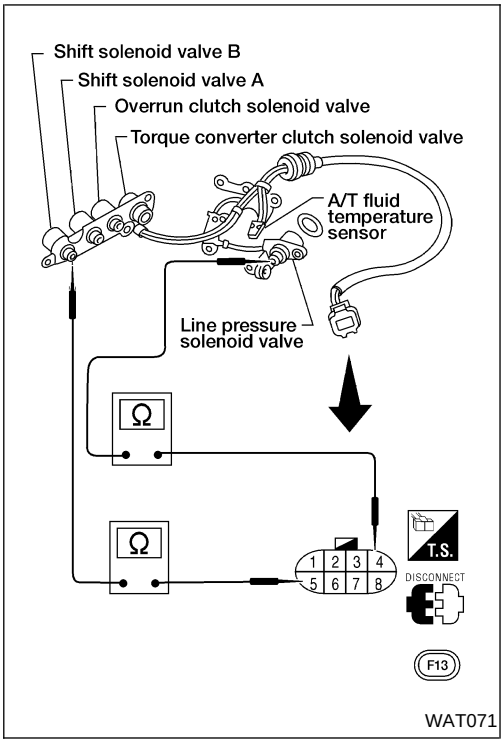
NG → Perform "Cruise test — Part 1" again and return to the start point of this flow chart.

OK

INSPECTION END

A/T TCC S/V Function (Lock-up) (Cont'd)

COMPONENT INSPECTION



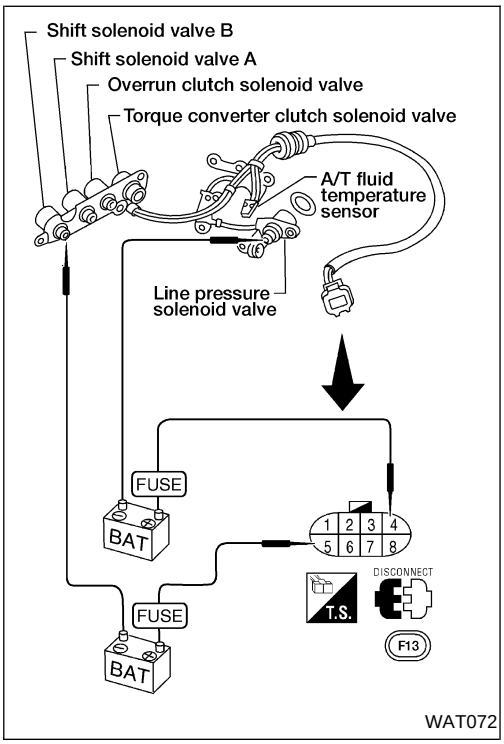
Solenoid valves

- For removal, refer to AT-204.

Resistance check

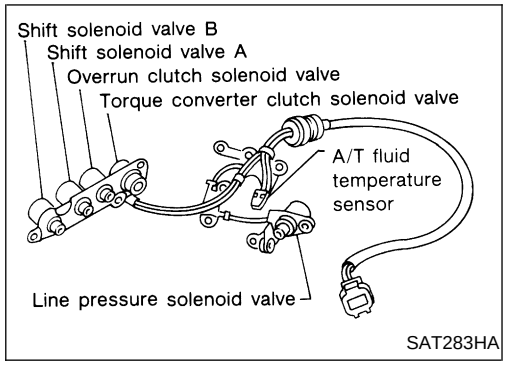
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	④	Ground	2.5 - 5Ω
Torque converter clutch solenoid valve	⑤		10 - 20Ω



Operation check

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



Line Pressure Solenoid Valve

DESCRIPTION

The line pressure solenoid valve regulates the oil pump discharge pressure to suit the driving condition in response to a signal sent from the 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 REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

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

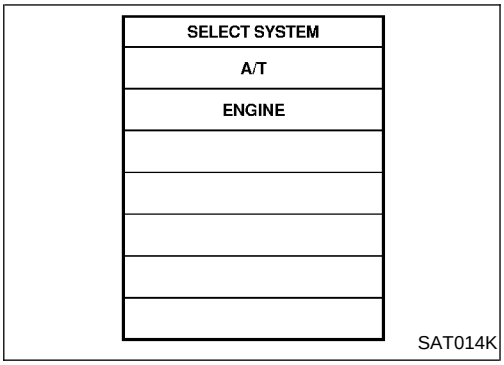
TCM TERMINALS AND REFERENCE VALUE

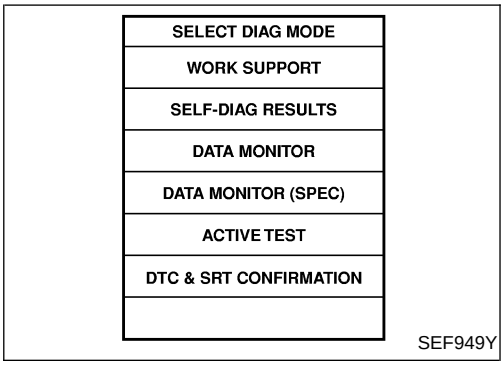
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	R/W	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.	0V
2	P/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.	0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: L/PRESS SOL/CIRC : P0745 : MIL Code No. 1205	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





Line Pressure Solenoid Valve (Cont'd)

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:

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 "ENGINE" with CONSULT-II.
2) Depress accelerator pedal completely and wait at least 1 second.

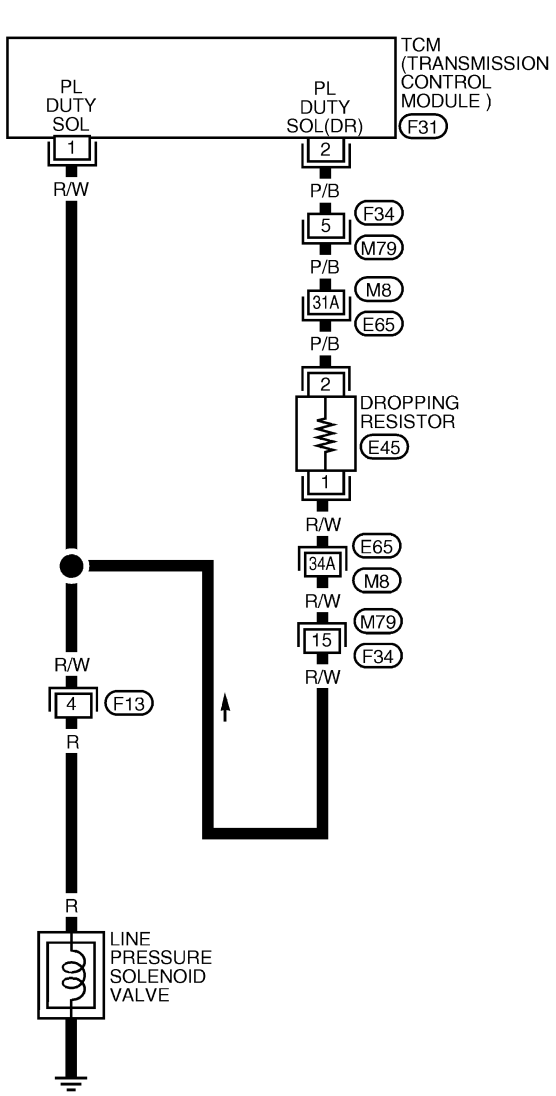
With GST

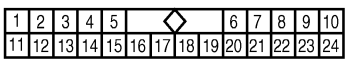
Follow the procedure "With CONSULT-II".

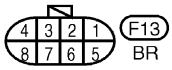
Line Pressure Solenoid Valve (Cont'd)

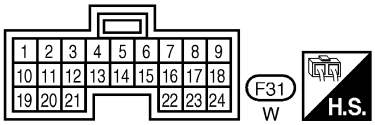
WIRING DIAGRAM — AT — LPSV

AT-LPSV-01









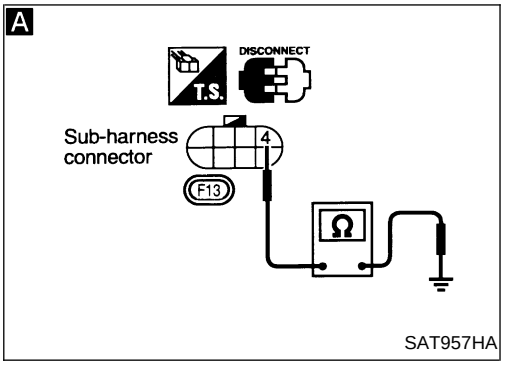
Refer to the following.
M8 , E65 SUPER MULTIPLE JUNCTION (SMJ)

WAT013

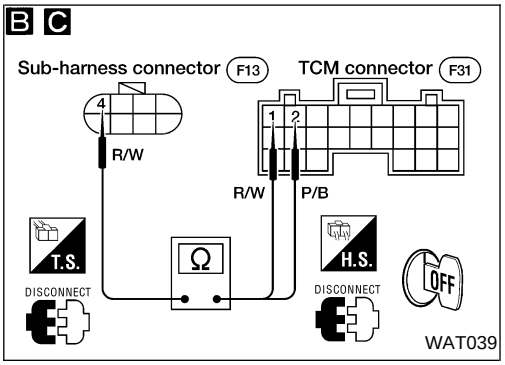
Line Pressure Solenoid Valve (Cont'd)

DIAGNOSTIC PROCEDURE

A



B C



INSPECTION START

A

CHECK VALVE RESISTANCE.
1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check valve resistance between terminal ④ and ground.
   Resistance: 2.5 - 5Ω

NG →
1. Remove control valve assembly. Refer to AT-204.
2. Check the following items:
   - Line pressure solenoid valve
     Refer to "Component Inspection", AT-137.
   - Harness of terminal cord assembly for short or open

OK ↓

B

CHECK POWER SOURCE CIRCUIT OF DROPPING RESISTOR.
1. Turn ignition switch to "OFF" position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal ④ and TCM harness connector terminal ②.
   Resistance: 11.2 - 12.8Ω

NG →
Check the following items:
- Dropping resistor
  Refer to "Component Inspection", AT-137.
- Harness for short or open between TCM terminal ② and terminal cord assembly (Main harness)

OK ↓

C

CHECK POWER SOURCE CIRCUIT.
1. Turn ignition switch to "OFF" position.
2. Check continuity between terminal ④ and TCM harness connector terminal ①.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.
3. Reinstall any part removed.

NG →
Repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-134.

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

OK ↓

INSPECTION END

Line Pressure Solenoid Valve (Cont'd)

COMPONENT INSPECTION

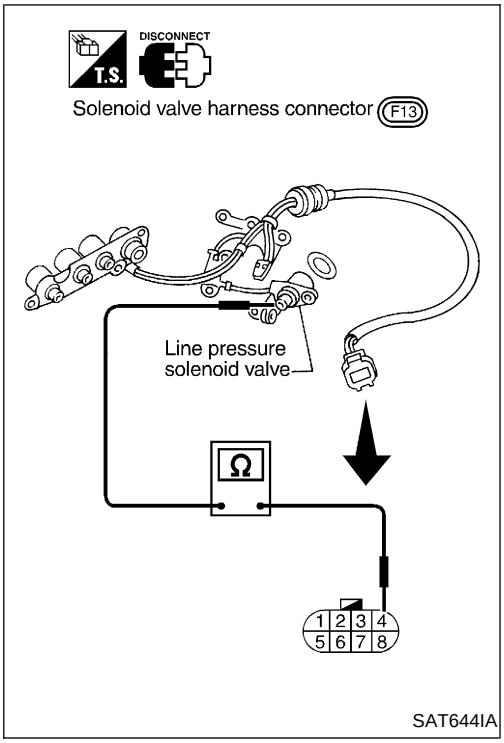
Line pressure solenoid valve

- For removal, refer to AT-204.

Resistance check

- Check resistance between two terminals.

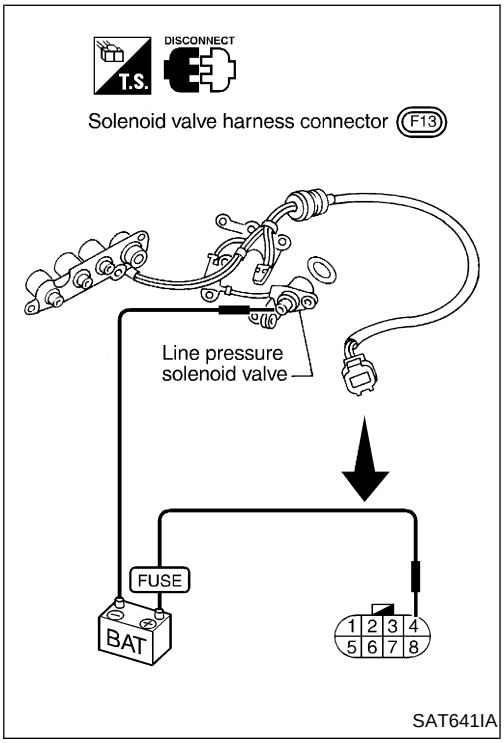
Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	④	Ground	2.5 - 5Ω



SAT644IA

Operation check

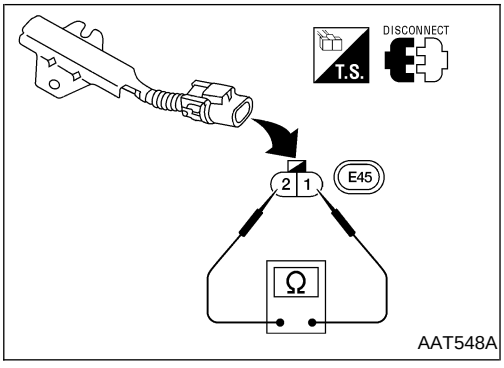
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground.



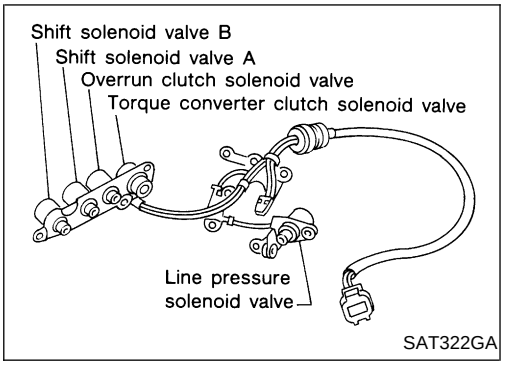
SAT641IA

Dropping resistor

- Check resistance between two terminals.
  Resistance (Approx.): 12Ω



AAT548A



Shift Solenoid Valve A

DESCRIPTION

Shift solenoid valves A and B are turned ''ON'' or ''OFF'' by the TCM in response to signals sent from the 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

Remarks: Specification data are reference values.

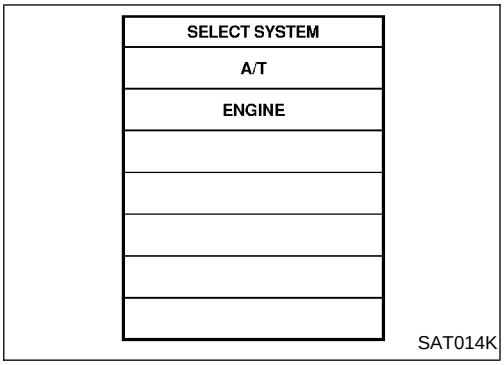
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
11	L/W	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in ''D_1'' or ''D_4''.)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in ''D_2'' or ''D_3''.)	0V

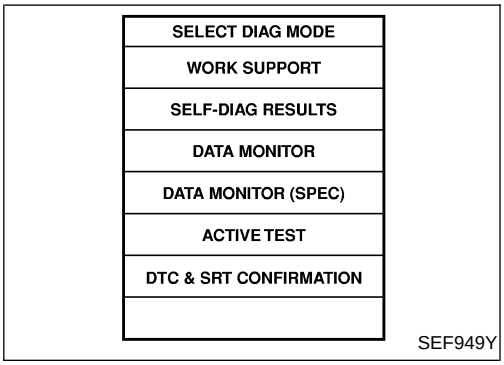
ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: SFT SOL A/CIRC : P0750 : MIL Code No. 1108	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

Shift Solenoid Valve A (Cont'd)

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE





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 "ENGINE" with CONSULT-II.
2) Start engine.
3) Drive vehicle in D position and allow the transmission to shift "1" → "2" ("GEAR").

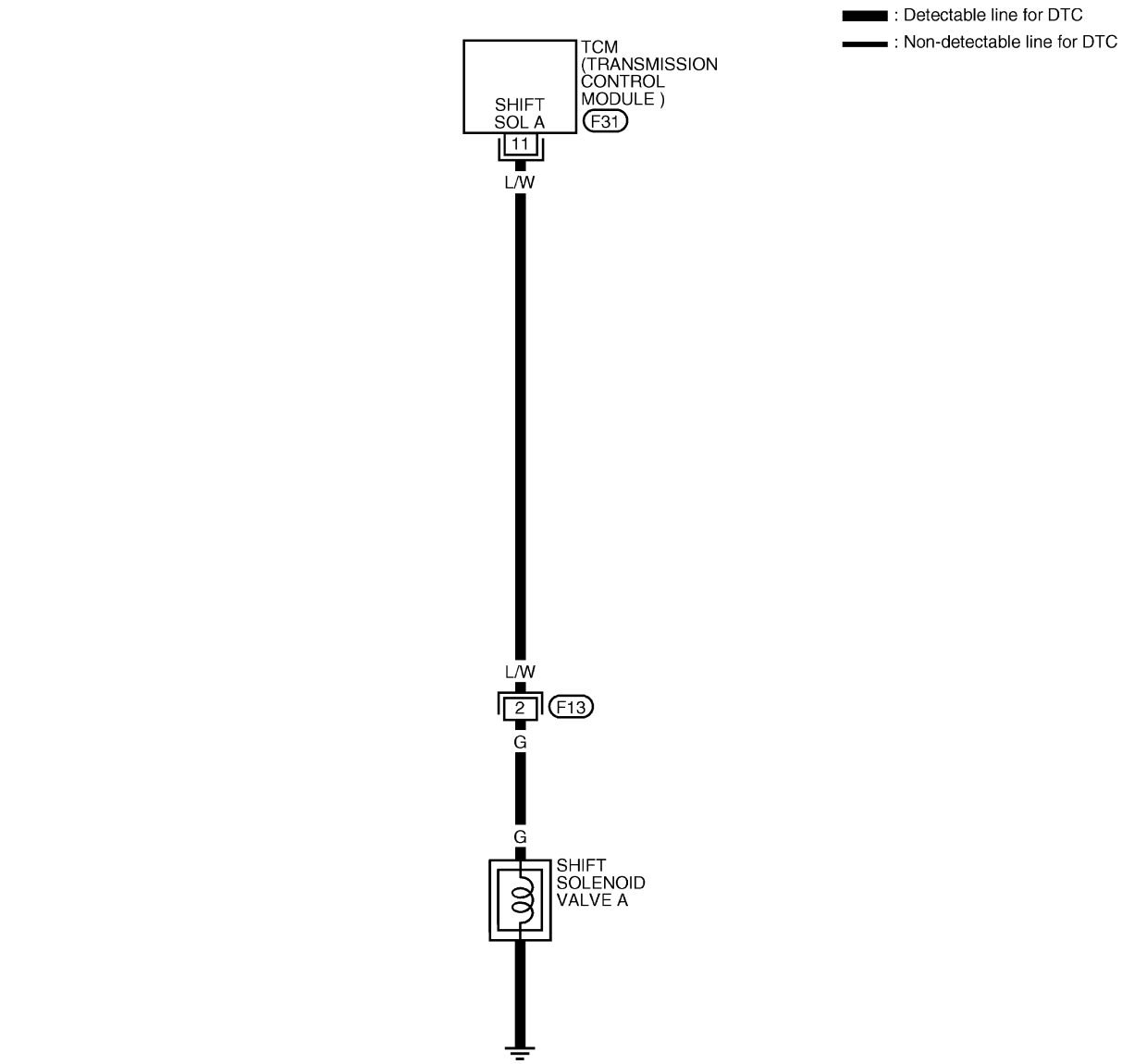
With GST

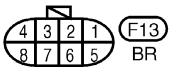
Follow the procedure "With CONSULT-II".

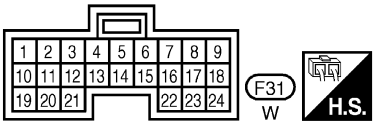
Shift Solenoid Valve A (Cont'd)

WIRING DIAGRAM — AT — SSV/A

AT-SSV/A-01





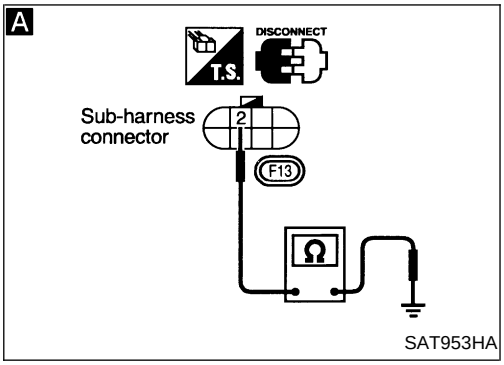


WAT014

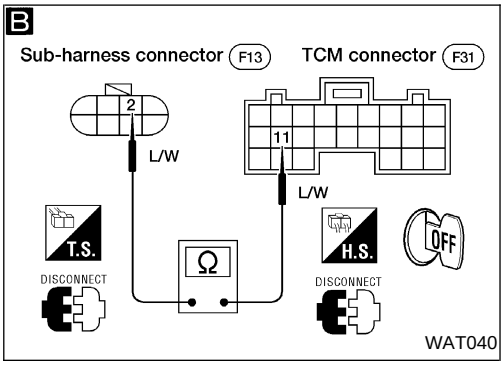
Shift Solenoid Valve A (Cont'd)

DIAGNOSTIC PROCEDURE

A



B



INSPECTION START

A

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.
   Resistance: 20 - 40Ω

NG →
1. Remove control valve assembly. Refer to AT-204.
2. Check the following items:
- Shift solenoid valve A Refer to "Component Inspection", AT-142.
- Harness of terminal cord assembly for short or open

OK ↓

B

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

NG → Repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-139.

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

OK ↓

INSPECTION END

Shift Solenoid Valve A (Cont'd)

COMPONENT INSPECTION

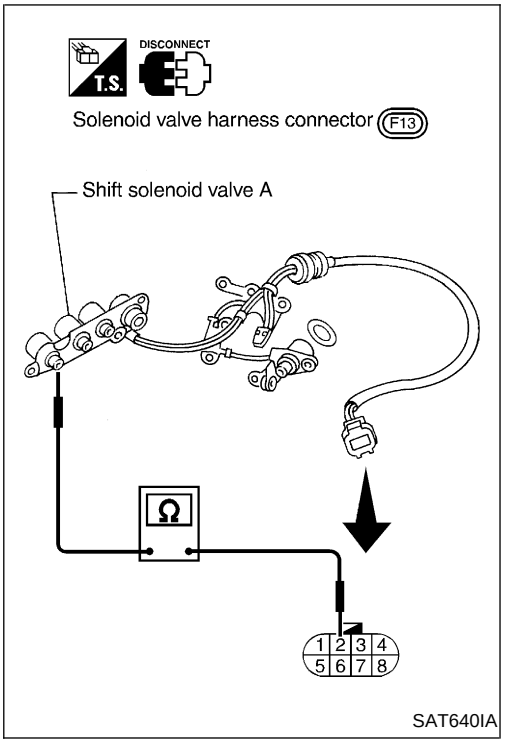
Shift solenoid valve A

- For removal, refer to AT-204.

Resistance check

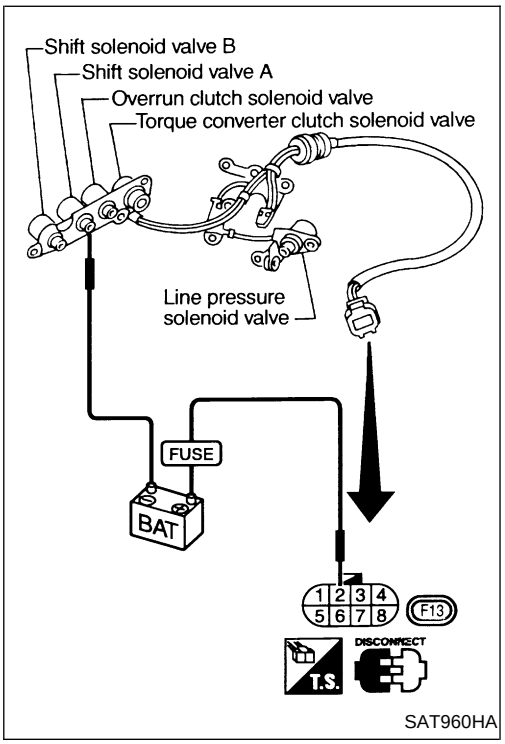
- Check resistance between two terminals.

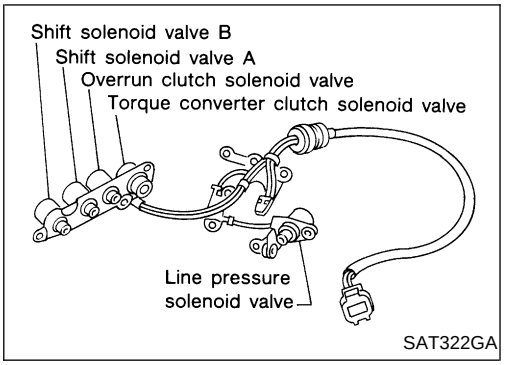
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	②	Ground	20 - 40Ω



Operation check

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





Shift Solenoid Valve B

DESCRIPTION

Shift solenoid valves A and B are turned ''ON'' or ''OFF'' by the TCM in response to signals sent from the 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

Remarks: Specification data are reference values.

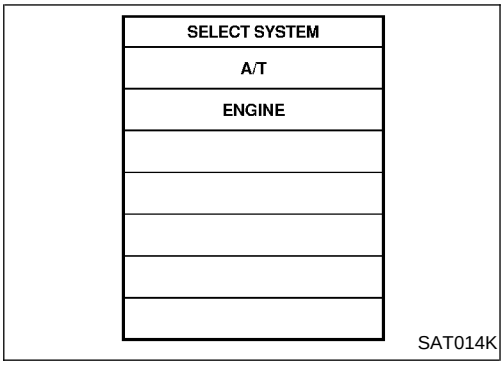
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
12	L/Y	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in ''D_1'' or ''D_2''.)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in ''D_3'' or ''D_4''.)	0V

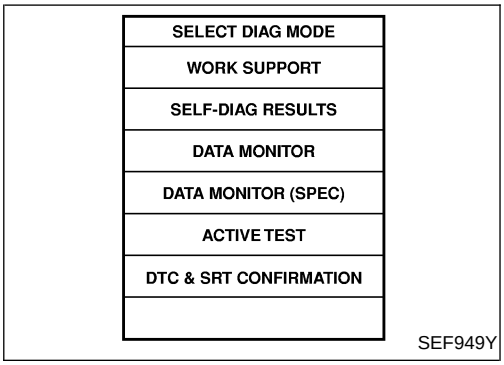
ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: SFT SOL B/CIRC : P0755 : MIL Code No. 1201	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

Shift Solenoid Valve B (Cont'd)

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE





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 "ENGINE" with CONSULT-II.
2) Start engine.
3) Drive vehicle in D position and allow the transmission to shift 1 → 2 → 3 ("GEAR").

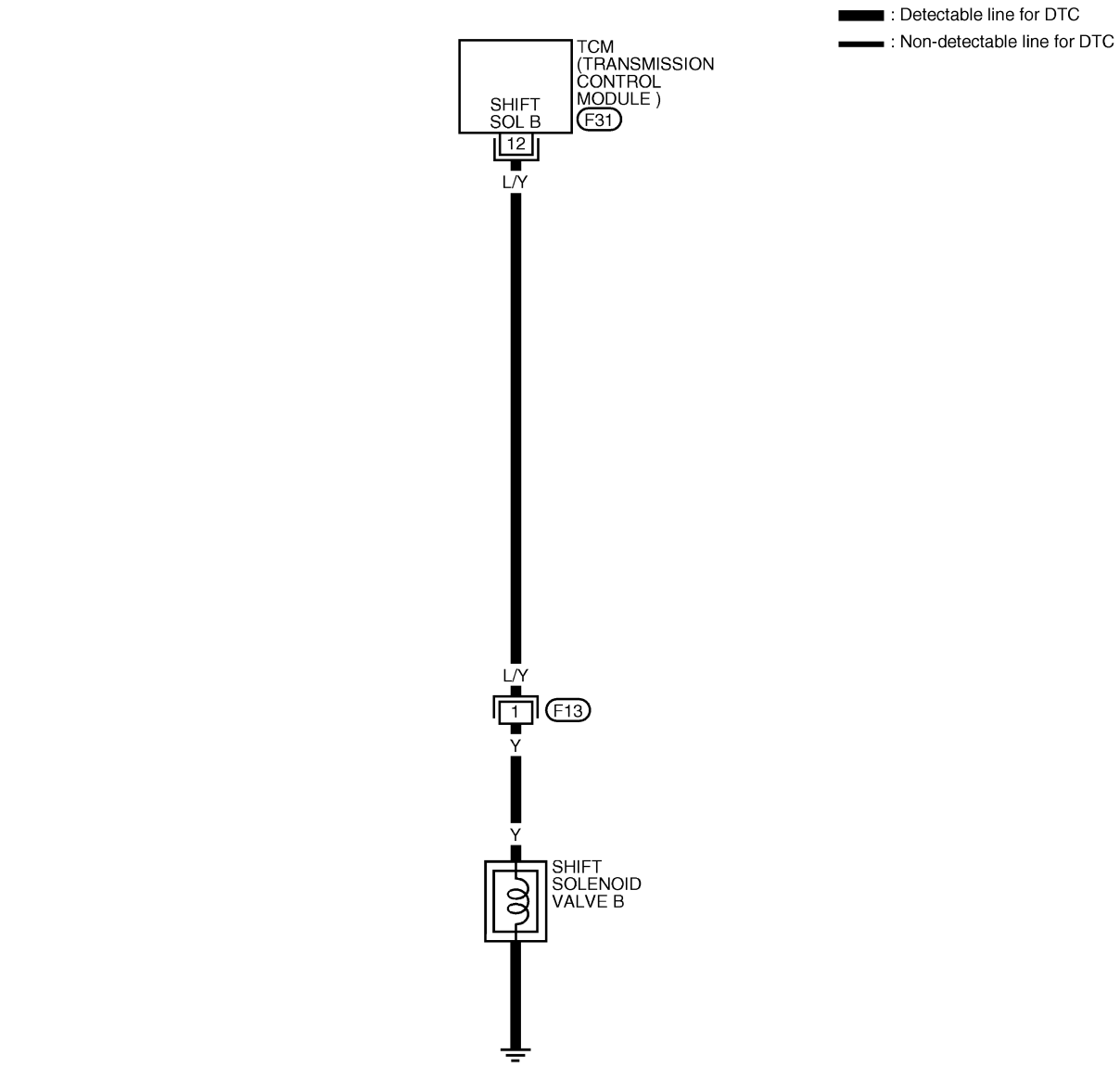
With GST

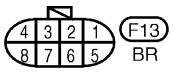
Follow the procedure "With CONSULT-II."

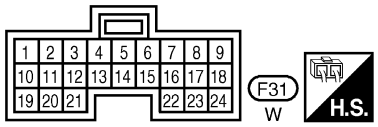
Shift Solenoid Valve B (Cont'd)

WIRING DIAGRAM — AT — SSV/B

AT-SSV/B-01





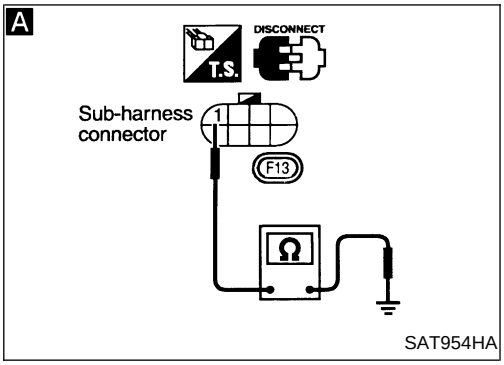


WAT015

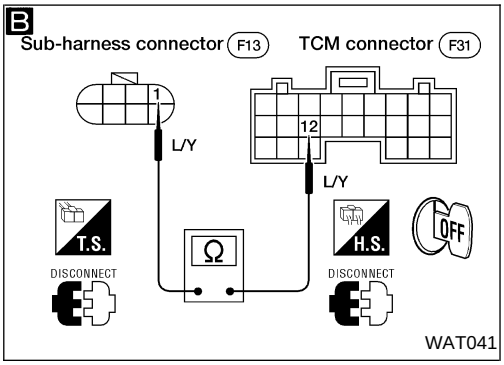
Shift Solenoid Valve B (Cont'd)

DIAGNOSTIC PROCEDURE

A



B



INSPECTION START

A

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.
   Resistance: 20 - 40Ω

NG

1. Remove control valve assembly. Refer to AT-204.
2. Check the following items:
   - Shift solenoid valve B Refer to "Component Inspection", AT-147.
   - Harness of terminal cord assembly for short or open

OK

B

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

NG

Repair open circuit or short to ground or short to power in harness or connectors.

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-144.

NG

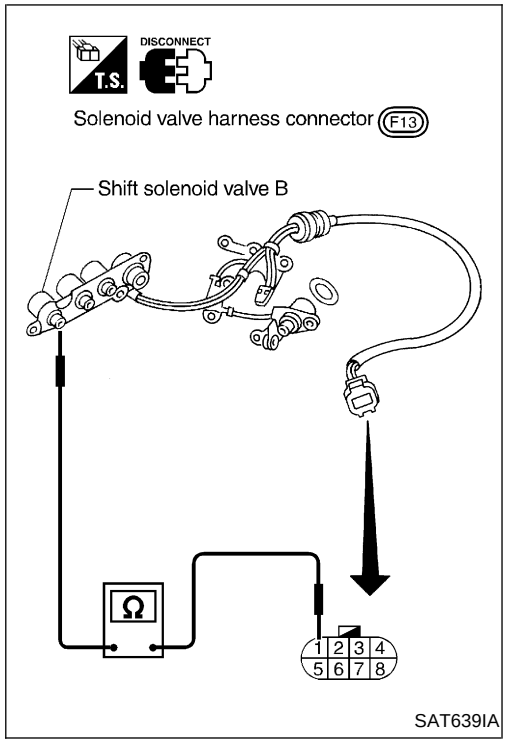
1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK

INSPECTION END

Shift Solenoid Valve B (Cont'd)

COMPONENT INSPECTION



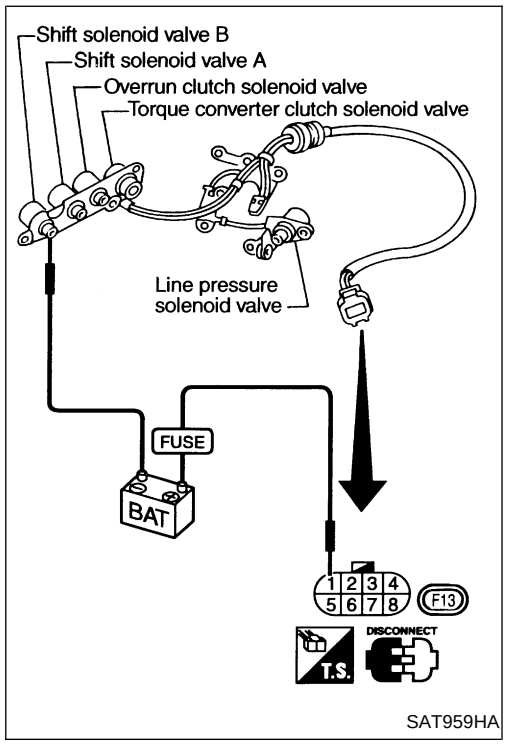
Shift solenoid valve B

- For removal, refer to AT-204.

Resistance check

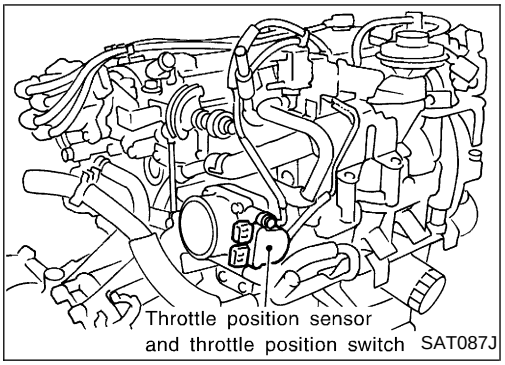
- Check resistance between two terminals.

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



Operation check

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


Throttle position sensor and throttle position switch SAT087J

Throttle Position Sensor

DESCRIPTION

- 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 REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approx.)
Throttle position sensor	Fully-closed throttle	0.5V
	Fully-open throttle	4V

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

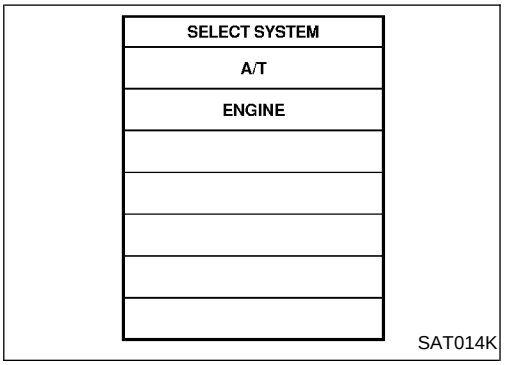
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
16	Y	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine.	Battery voltage
				When depressing accelerator pedal after warming up engine.	0V
17	LG	Wide open throttle 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.	0V
32	R	Throttle position sensor (Power source)		Ignition switch ON	4.5 - 5.5V
				Ignition switch OFF	0V
41*1	GY	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.5V Fully-open throttle: 4V
42	B	Throttle position sensor (Ground)		—	—

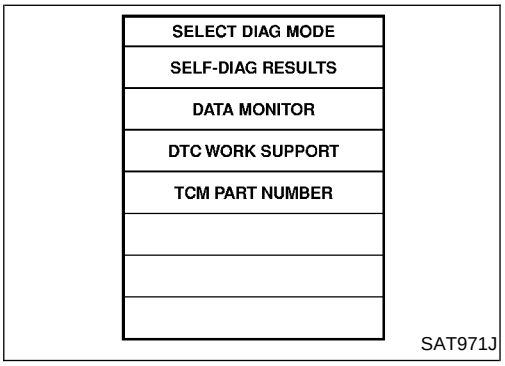
*1 This terminal is connected to the ECM.

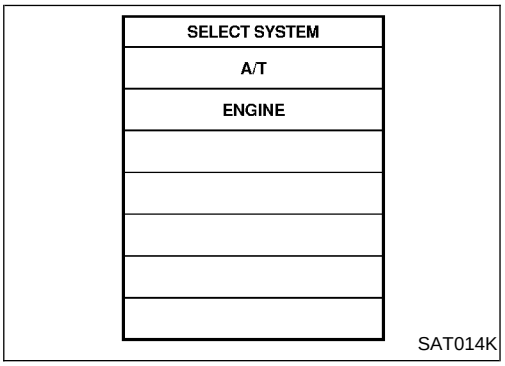
Throttle Position Sensor (Cont'd)

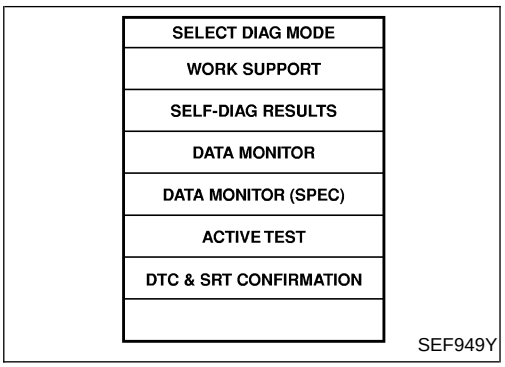
ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: TP SEN/CIRC A/T : P1705 : MIL Code No. 1206	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









DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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 "TCM 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	More than 0.1V	OFF	ON

If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-151.
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.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: Approximately 3V or less
   Selector lever: D position (OD "ON")
   If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-151.
   If the check result is OK, go to following step.
5) Maintain the following conditions for at least 3 consecutive seconds.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   Accelerator pedal: Wide open throttle
   Selector lever: D position (OD "ON")

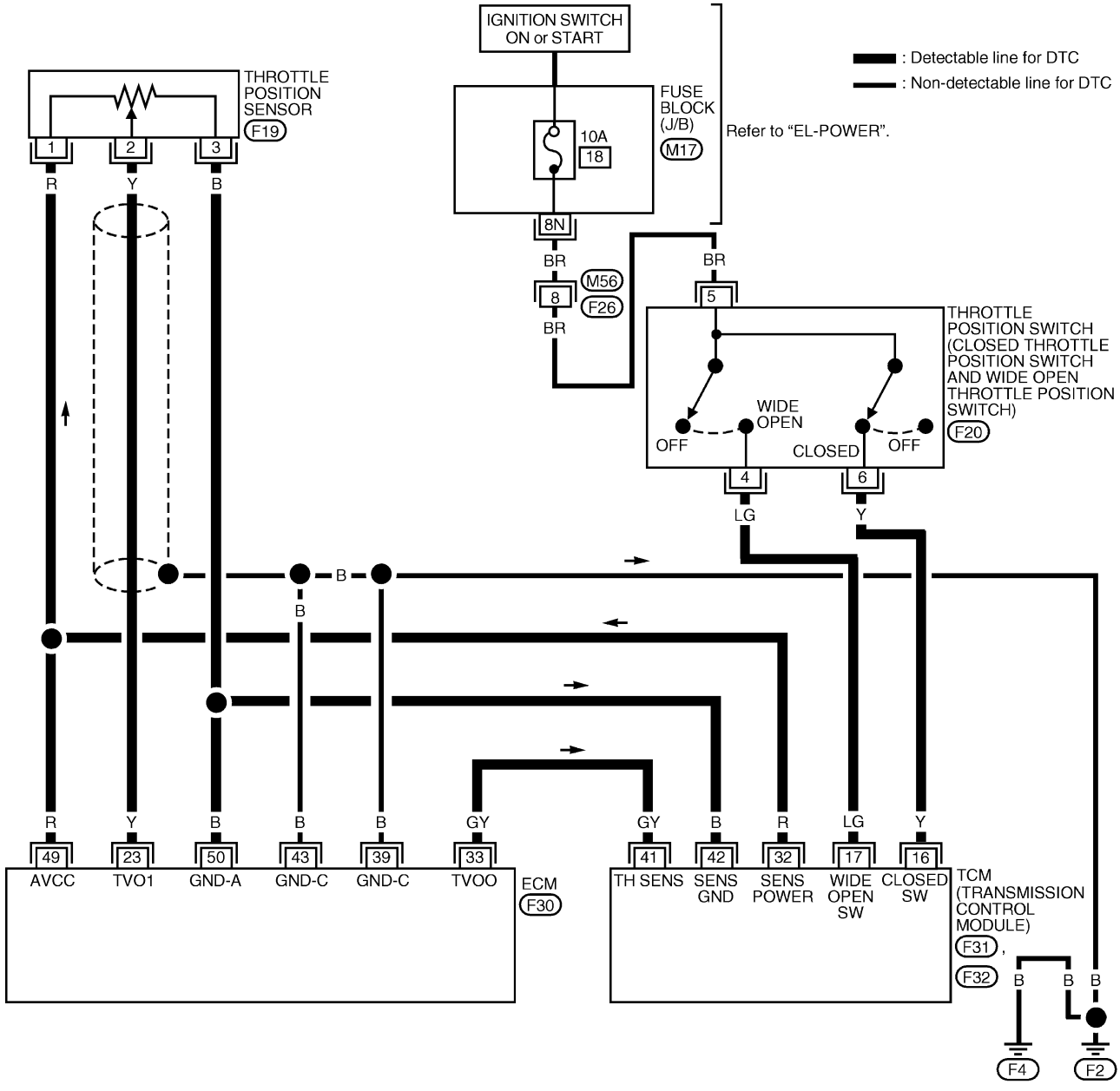
With GST

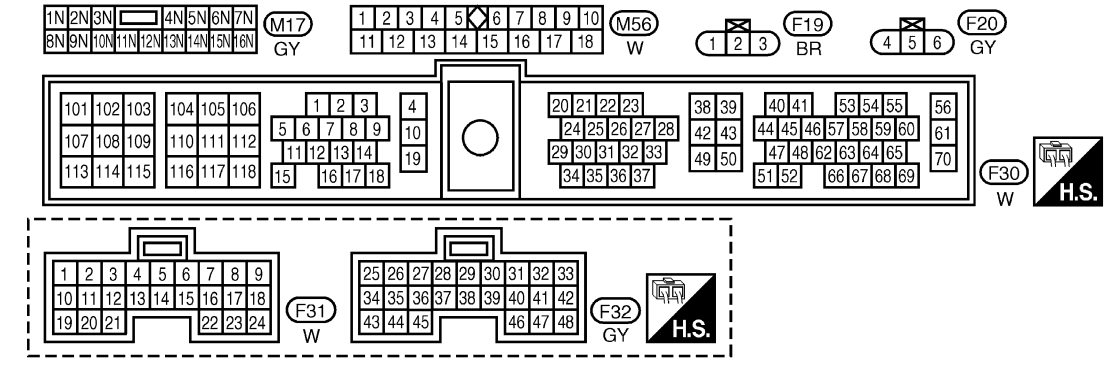
Follow the procedure "With CONSULT-II".

Throttle Position Sensor (Cont'd)

WIRING DIAGRAM — AT — TPS

AT-TPS-01





WAT016

Throttle Position Sensor (Cont'd)

DIAGNOSTIC PROCEDURE

A

SELECT SYSTEM
A/T
ENGINE

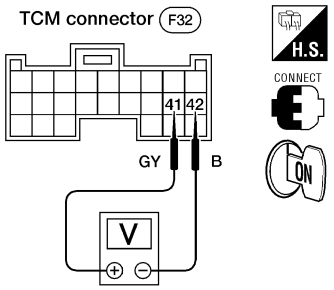
SAT014K

A

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

A



WAT025

INSPECTION START

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

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

OK

A

CHECK INPUT SIGNAL.

1. Turn ignition switch to “ON” position. (Do not start engine.)
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “THRTL POS SEN”.

Voltage:
Fully-closed throttle:
Approximately 0.5V
Fully-open throttle:
Approximately 4V

NG → Check harness for short or open between ECM and TCM regarding throttle position sensor circuit. (Main harness)

OR

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.

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

OK

(A)

(Go to next page.)

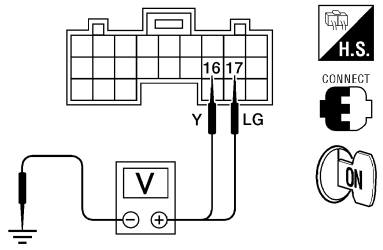
Throttle Position Sensor (Cont'd)

C

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

SAT702J

C



WAT049

A

C

CHECK THROTTLE POSITION SWITCH CIRCUIT.

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

OR

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)

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

NG →
Check the following items:
- Throttle position switch — Refer to "Components Inspection", AT-153.
- 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)

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-149.

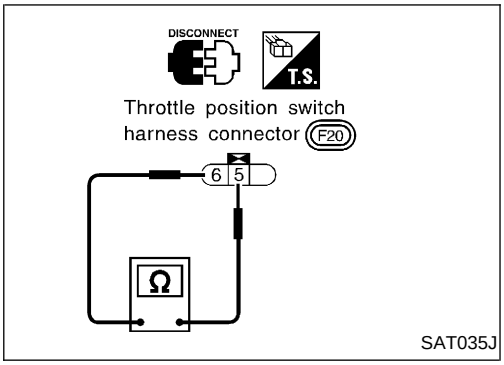
NG →
1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END

Throttle Position Sensor (Cont'd)

COMPONENT INSPECTION



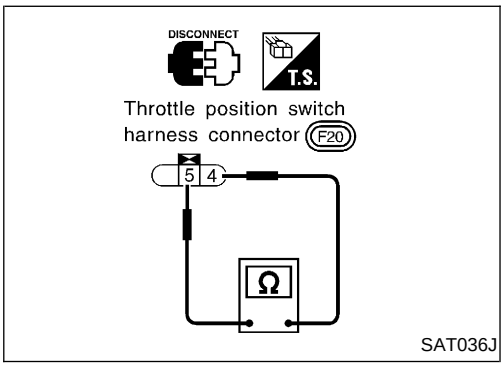
Throttle position switch

Closed throttle position switch (idle position)

- Check continuity between terminals ⑤ and ⑥.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

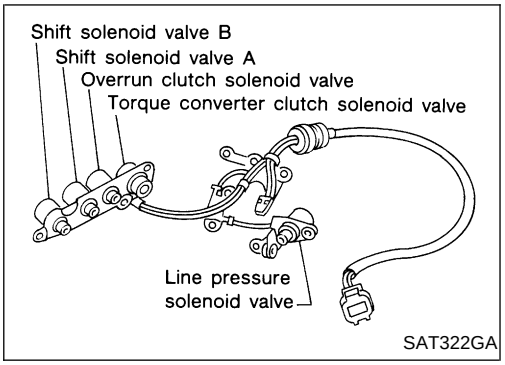
- To adjust closed throttle position switch, refer to EC section "Basic Inspection".



Wide open throttle position switch

- Check continuity between terminals ④ and ⑤.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes



Overrun Clutch Solenoid Valve

DESCRIPTION

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

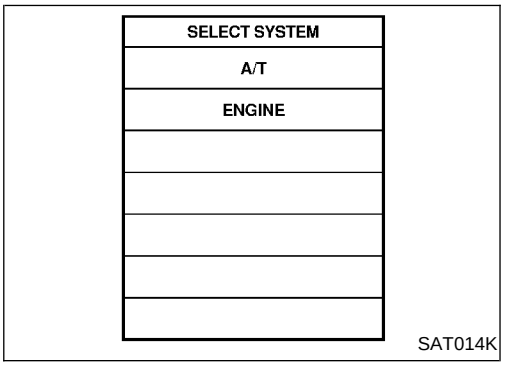
TCM TERMINALS AND REFERENCE VALUE

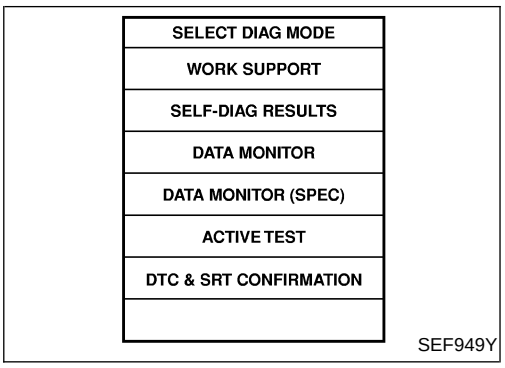
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: O/R CLTCH SOL/CIRC : P1760 : MIL Code No. 1203	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





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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.**

NOTE:

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 and drive the vehicle under the following conditions.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   Selector lever: D position (OD "ON" or "OFF")

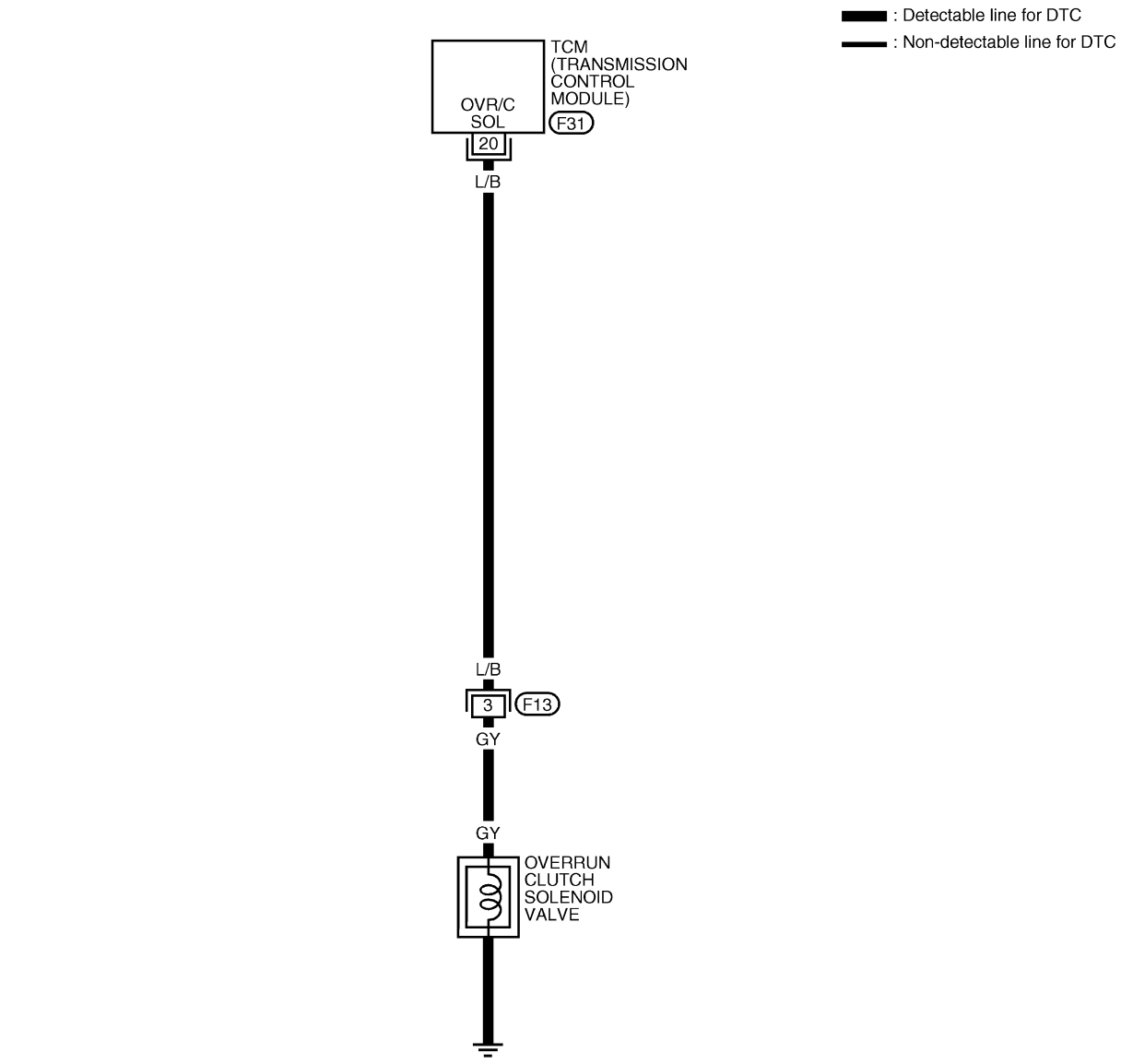
With GST

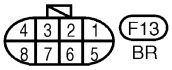
Follow the procedure "With CONSULT-II".

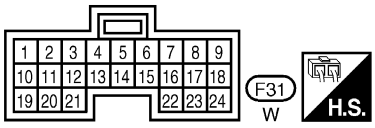
Overrun Clutch Solenoid Valve (Cont'd)

WIRING DIAGRAM — AT — OVRCSV

AT-OVRCSV-01



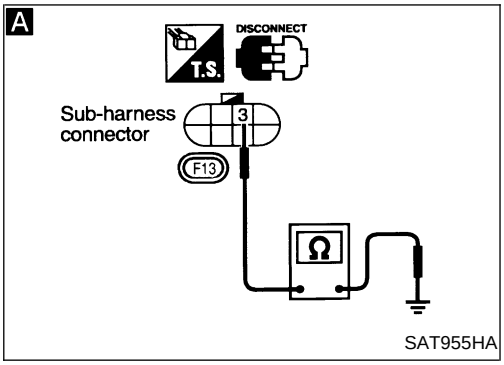


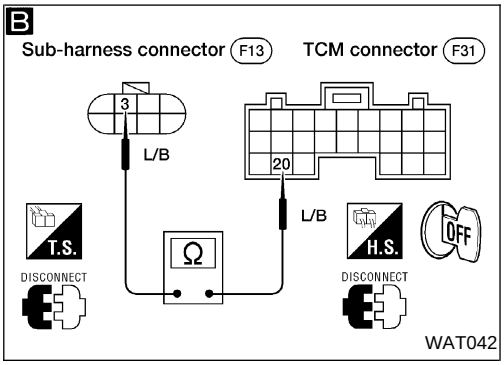


WAT017

Overrun Clutch Solenoid Valve (Cont'd)

DIAGNOSTIC PROCEDURE





INSPECTION START

A

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.
   Resistance: 20 - 40Ω

NG →
1. Remove control valve assembly. Refer to AT-204.
2. Check the following items:
- Overrun clutch solenoid valve
  Refer to "Component Inspection", AT-157.
- Harness of terminal cord assembly for short or open

OK ↓

B

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

NG → Repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

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

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

OK ↓

INSPECTION END

Overrun Clutch Solenoid Valve (Cont'd)

COMPONENT INSPECTION

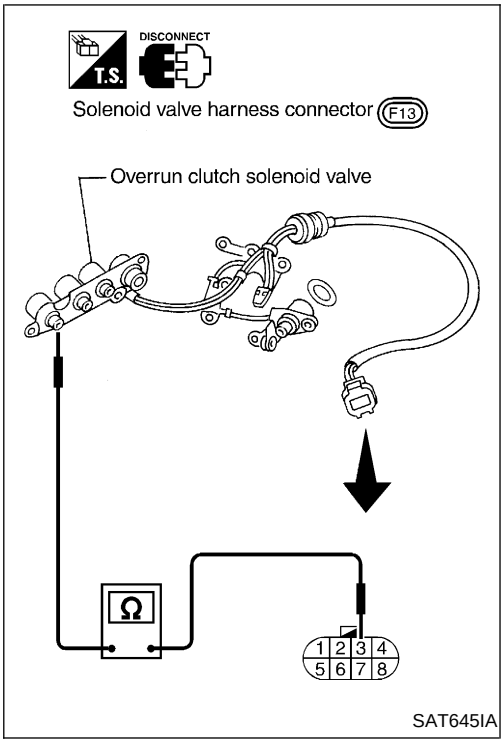
Overrun clutch solenoid valve

- For removal, refer to AT-204.

Resistance check

- Check resistance between two terminals.

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



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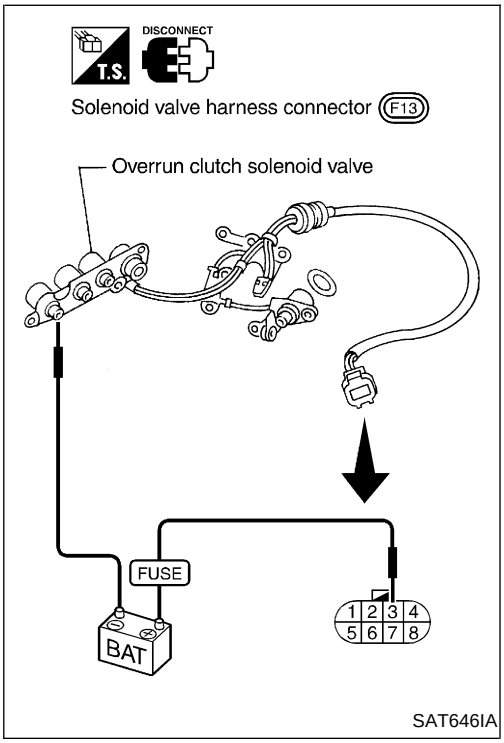
Operation check

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



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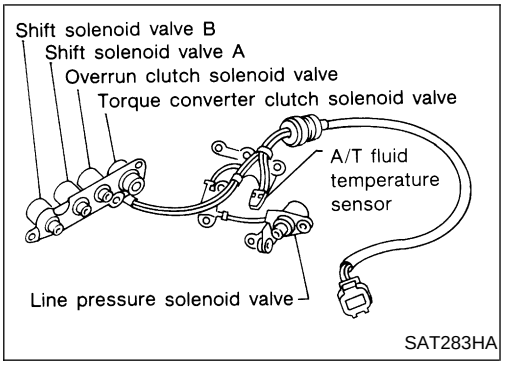
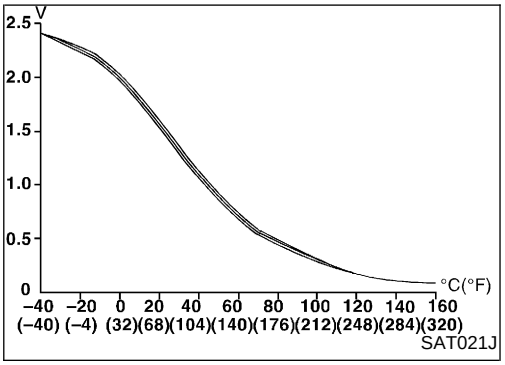




A/T Fluid Temperature Sensor Circuit and TCM Power Source

DESCRIPTION

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

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approx.)	
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	1.5V ↓ 0.5V	2.5 kΩ ↓ 0.3 kΩ

TCM TERMINALS AND REFERENCE VALUE

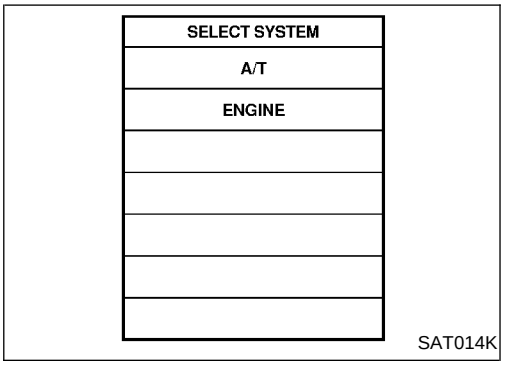
Remarks: Specification data are reference values.

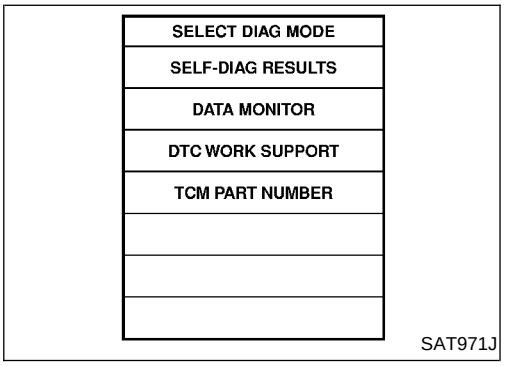
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
10	SB	Power source	 	When turning ignition switch to “ON”.	Battery voltage
				When turning ignition switch to “OFF”.	0V
19	SB	Power source		Same as No. 10	
28	R/B	Power source (Memory back-up)	 or 	When turning ignition switch to “OFF”.	Battery voltage
				When turning ignition switch to “ON”.	Battery voltage
42	B	Throttle position sensor (Ground)	 	—	—
47	BR	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.5V
				When ATF temperature is 80°C (176°F).	0.5V

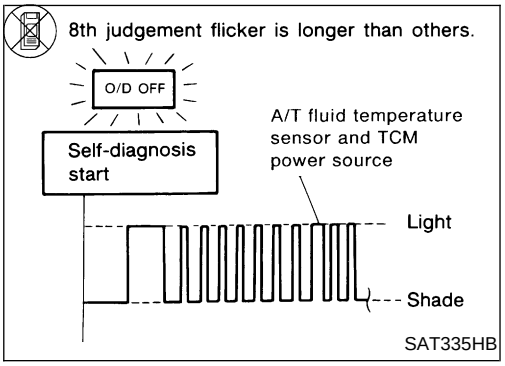
A/T Fluid Temperature Sensor Circuit and TCM Power Source (Cont'd)

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: BATT/FLUID TEMP SEN : 8th judgement flicker	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







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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).

OR

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-45.

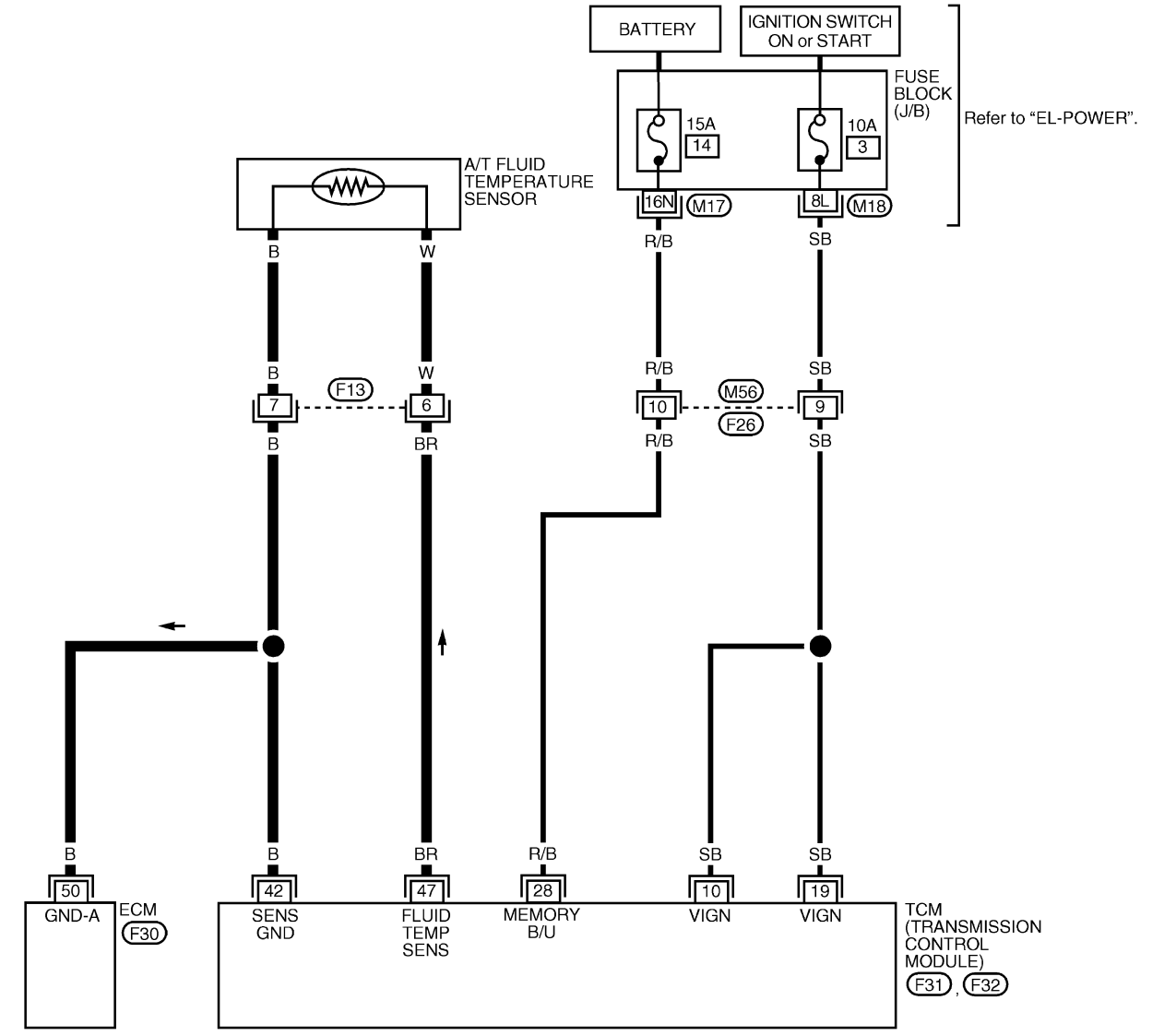
A/T Fluid Temperature Sensor Circuit and TCM Power Source (Cont'd)

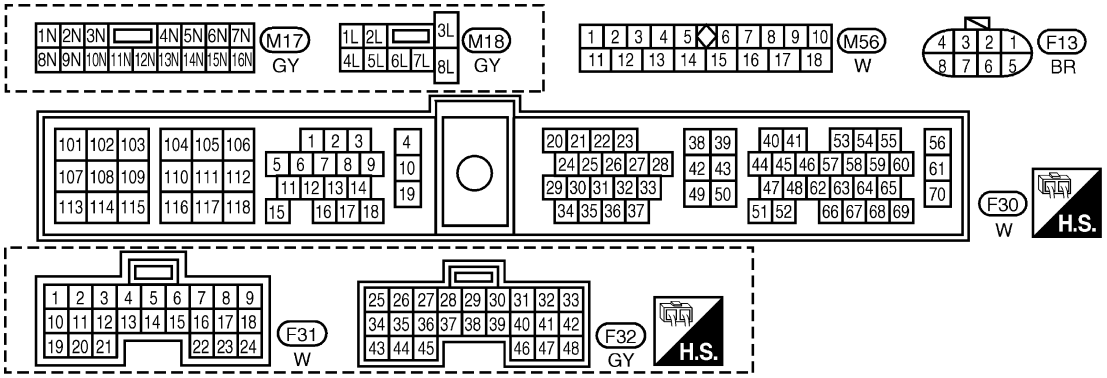
WIRING DIAGRAM — AT — BA/FTS

AT-BA/FTS-01

: Detectable line for DTC

: Non-detectable line for DTC

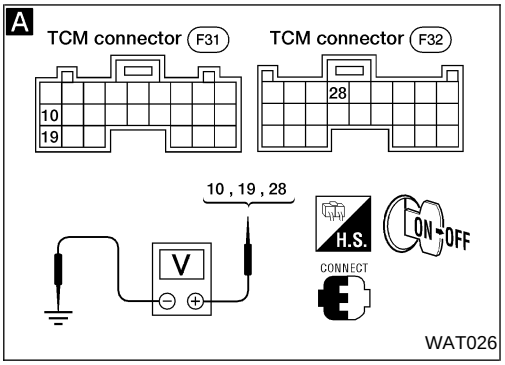


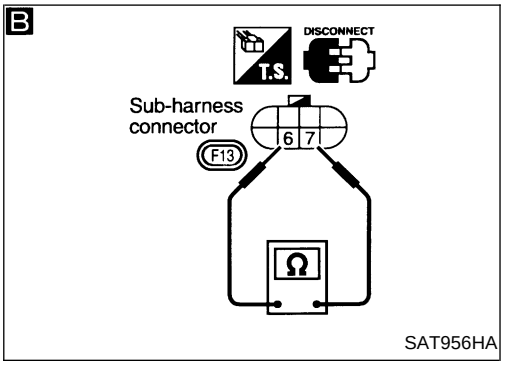


WAT018

A/T Fluid Temperature Sensor Circuit and TCM Power Source (Cont'd)

DIAGNOSTIC PROCEDURE





INSPECTION START

A

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.
   Voltage: Battery voltage

NG →

Check the following items:
- Harness for short or open between ignition switch and TCM (Main harness)
- Ignition switch and fuse
  Refer to EL section "POWER SUPPLY ROUTING".

OK ↓

B

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

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminals ⑥ and ⑦ when A/T is cold.
   Resistance:
   Cold [20°C (68°F)]
   Approximately 2.5 kΩ
4. Reinstall any part removed.

NG →

1. Remove oil pan.
2. Check the following items:
- A/T fluid temperature sensor
  Refer to "Component Inspection", AT-162.
- Harness of terminal cord assembly for short or open

OK ↓

Ⓐ

(Go to next page.)

A/T Fluid Temperature Sensor Circuit and TCM Power Source (Cont'd)

C

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

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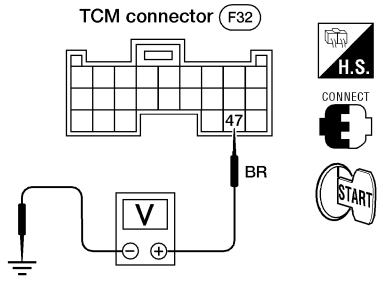
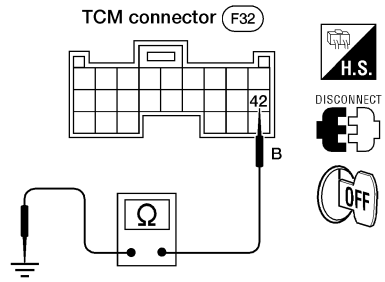
C



WAT043

C



WAT044

Ⓐ

C

CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR.

1. Start engine.
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out the value of "FLUID TEMP SE".
   Voltage:
   Cold [20°C (68°F)] →
   Hot [80°C (176°F)]:
   Approximately
   1.5V → 0.5V

NG → Check the following item:
- Harness for short or open between TCM, ECM and terminal cord assembly (Main harness)
- Ground circuit for ECM Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY").

OR

1. Start engine.
2. Check voltage between TCM terminal (47) and ground while warming up A/T.
   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.
   Continuity should exist.

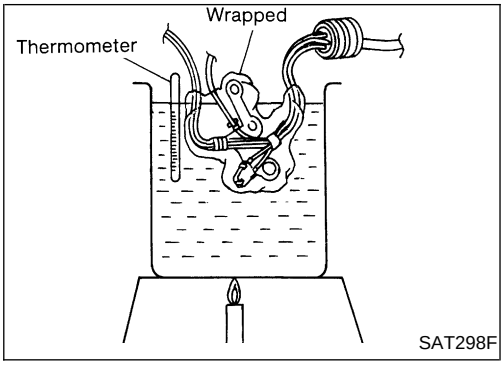
OK ↓

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

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

OK ↓

INSPECTION END



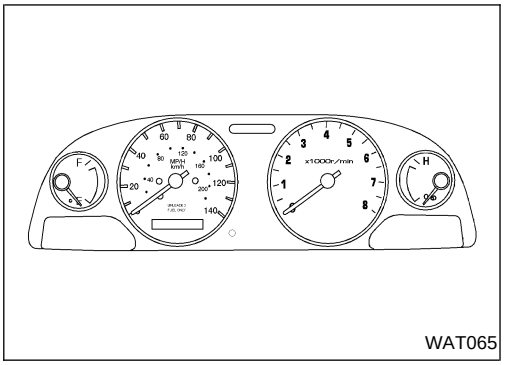
SAT298F

COMPONENT INSPECTION

A/T fluid temperature sensor

- For removal, refer to AT-204.
- Check resistance between two terminals while changing temperature as shown at left.

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



Vehicle Speed Sensor·MTR

DESCRIPTION

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

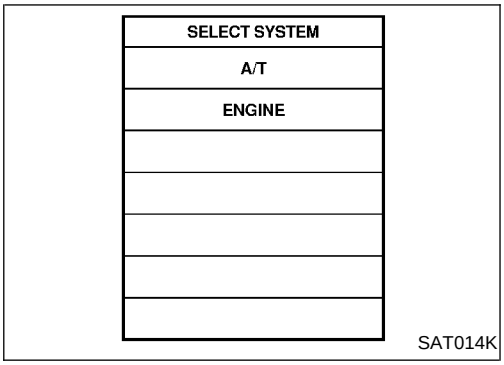
TCM TERMINALS AND REFERENCE VALUE

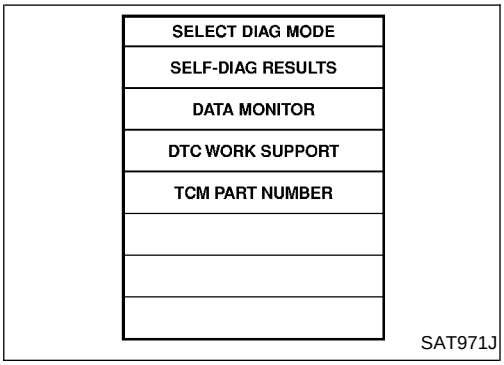
Remarks: Specification data are reference values.

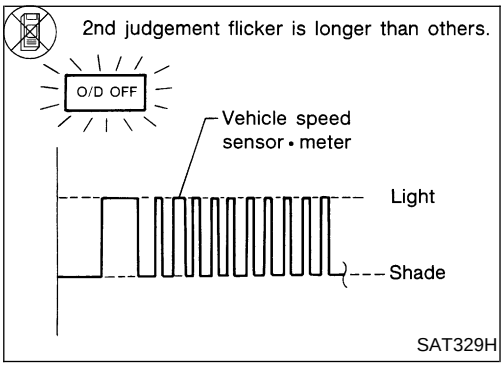
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
40	PU/R	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1V and more than 4.5V

ON BOARD DIAGNOSIS LOGIC

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







Vehicle Speed Sensor·MTR (Cont'd)

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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).

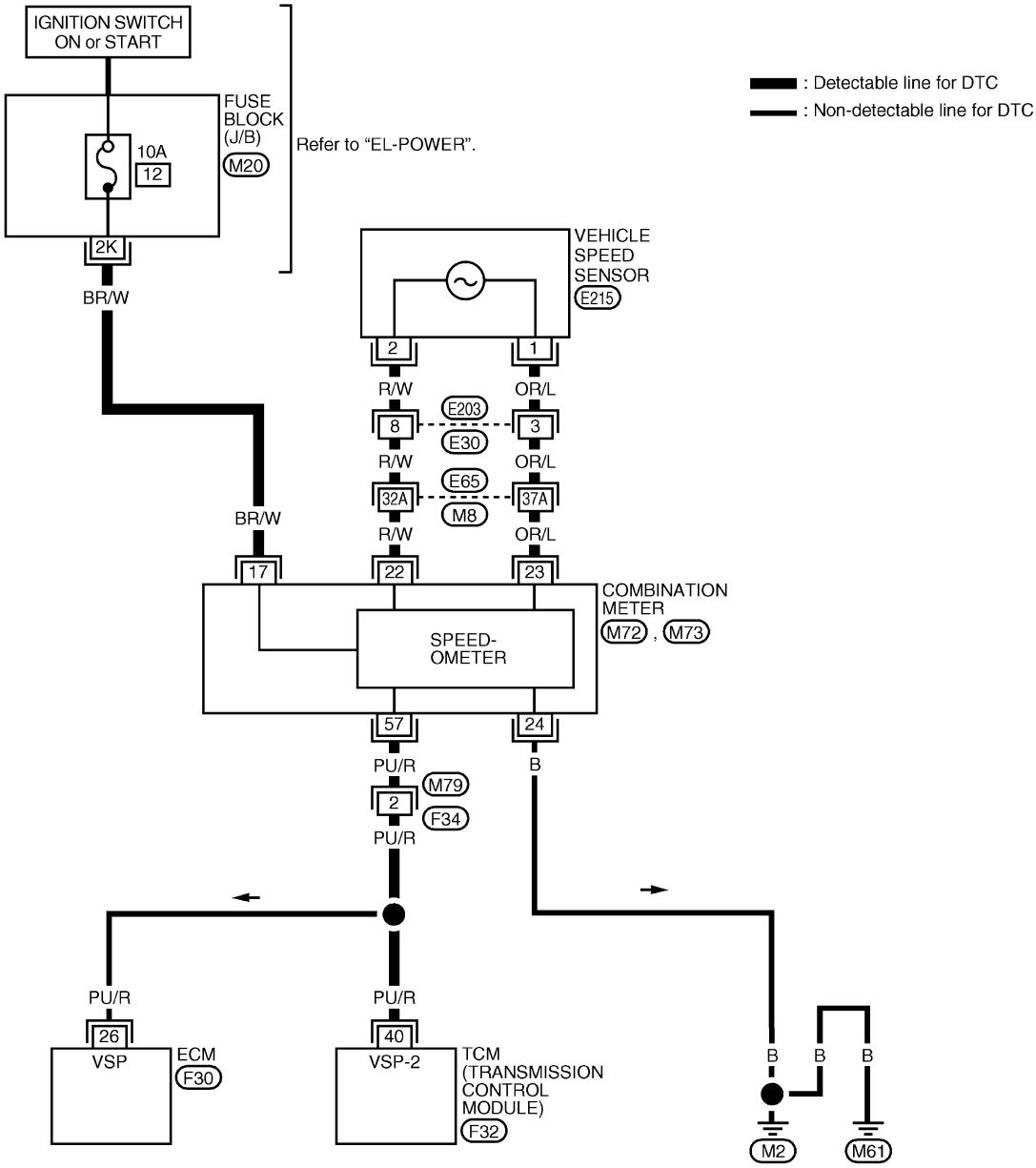
OR

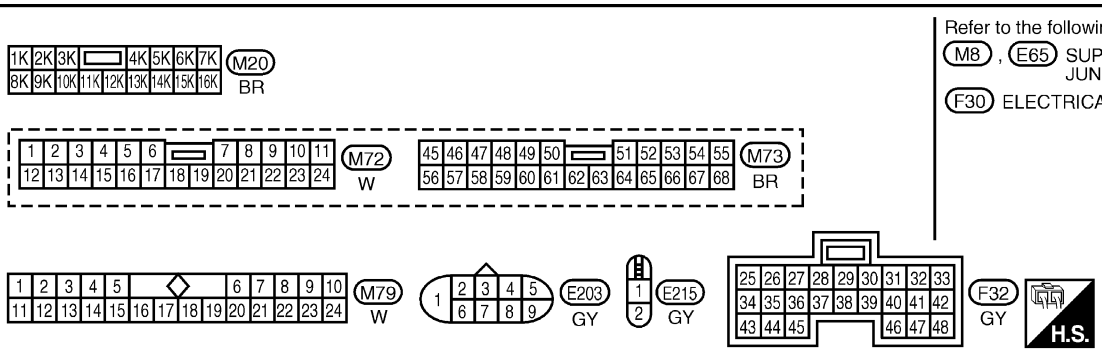
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D" and vehicle speed higher than 25 km/h (16 MPH).
3) Perform self-diagnosis.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-45.

Vehicle Speed Sensor·MTR (Cont'd)

WIRING DIAGRAM — AT — VSSMTR

AT-VSSMTR-01





WAT019

Vehicle Speed Sensor·MTR (Cont'd)

DIAGNOSTIC PROCEDURE

A

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

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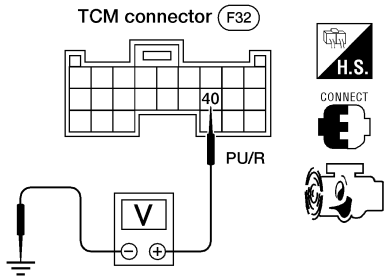
A



WAT045

INSPECTION START

A

CHECK INPUT SIGNAL.

1. Start engine.
2. Select "TCM INPUT SIGNALS" 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.

OR

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.

Voltage:

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

NG →

Check the following items:

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

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-164.

NG →

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

OK ↓

INSPECTION END

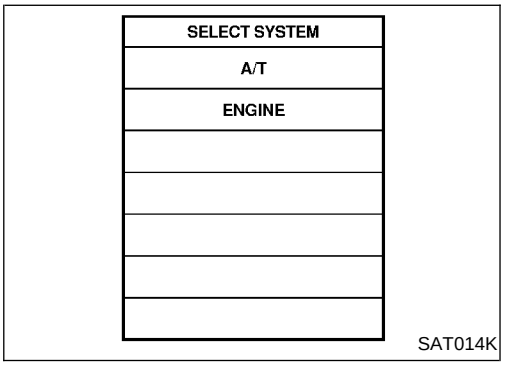
TCM (Transmission Control Module)

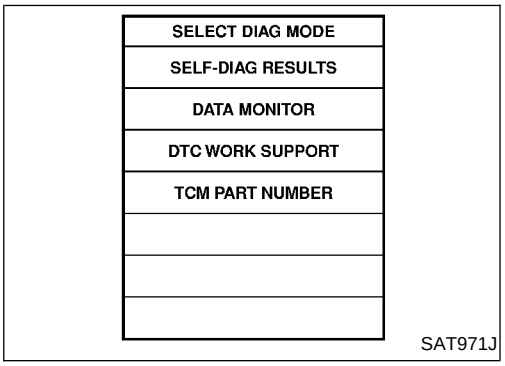
DESCRIPTION

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

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





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

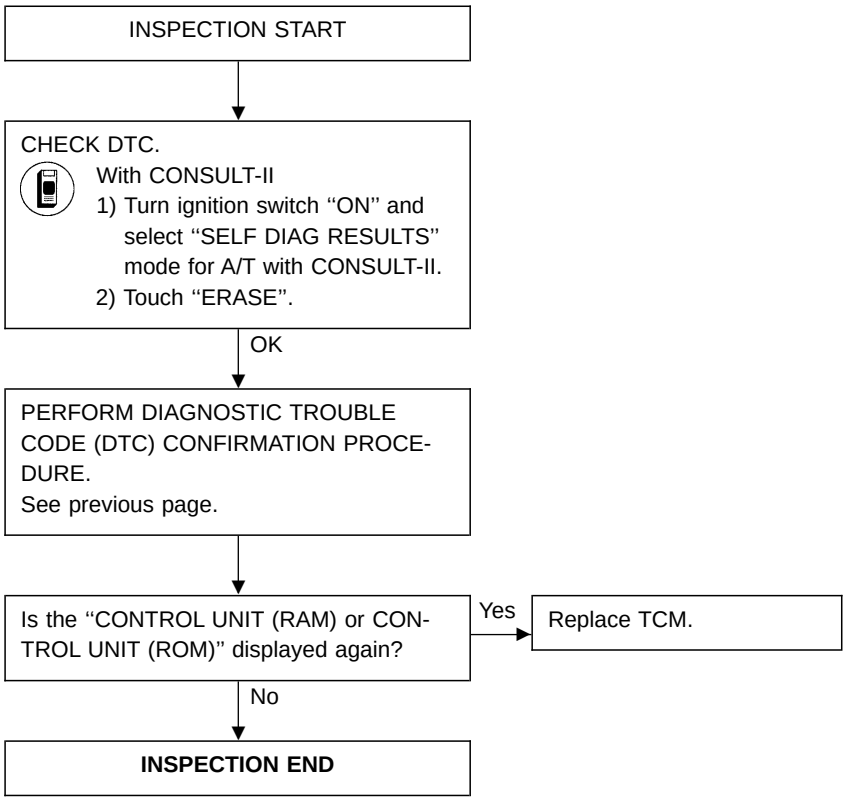
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

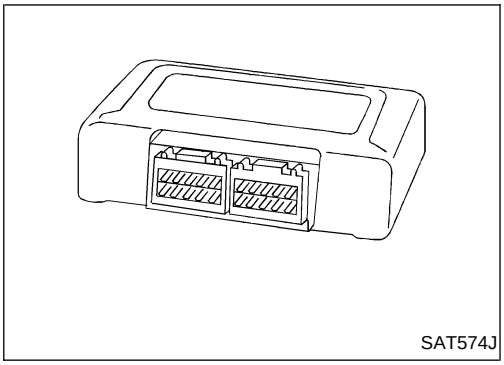
With CONSULT-II

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.

TCM (Transmission Control Module) (Cont'd)

DIAGNOSTIC PROCEDURE




SAT574J

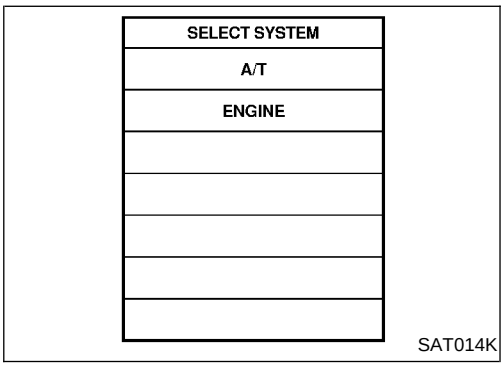
TCM (Transmission Control Module)

DESCRIPTION

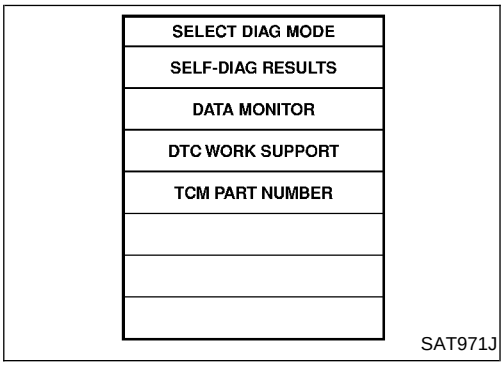
The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the A/T.

On board diagnosis logic

Diagnostic trouble code	Malfunction is detected when ...	Check Item (Possible Cause)
: CONTROL UNIT (EEPROM)	TCM memory (EEPROM) is malfunctioning.	TCM



SAT014K



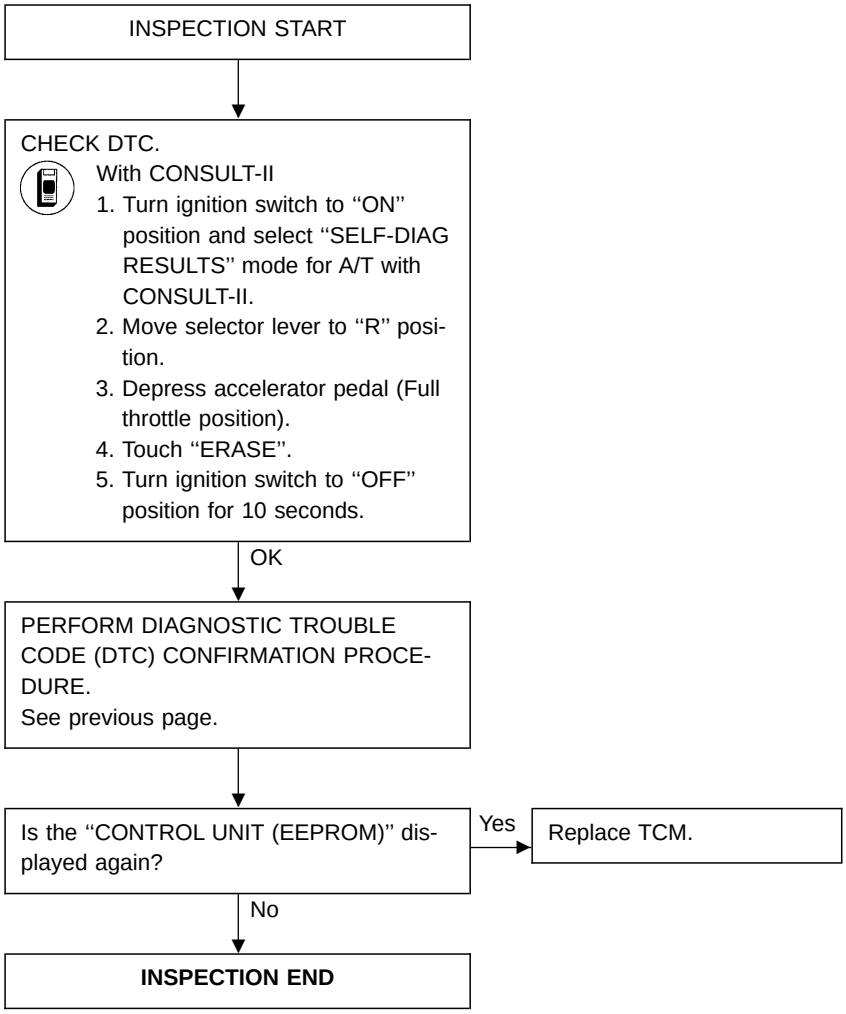
SAT971J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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

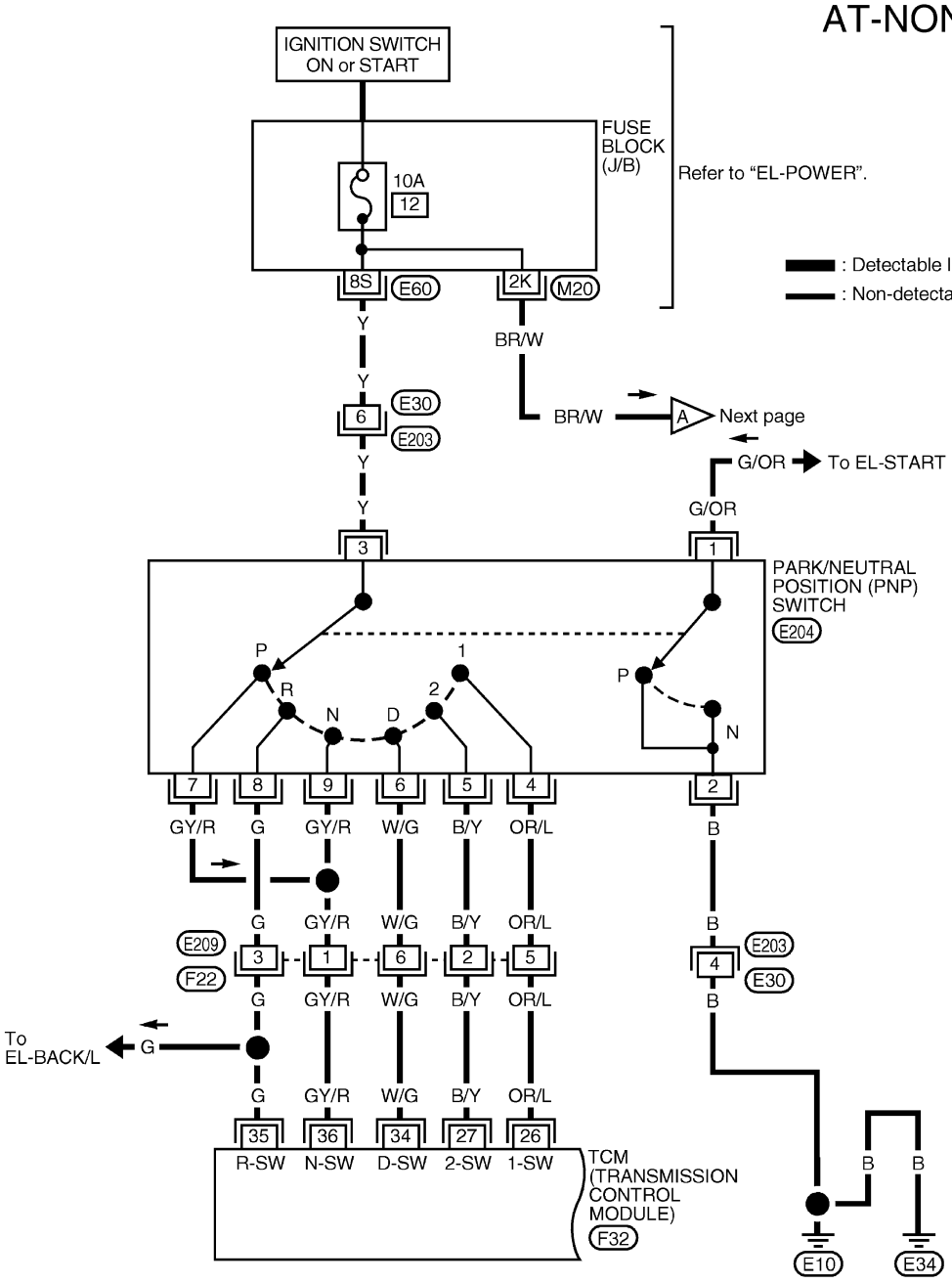
1) Turn ignition switch ''ON'' and select ''DATA MONITOR'' mode for A/T with CONSULT-II.
2) Start engine.
3) Run engine for at least 2 seconds at idle speed.

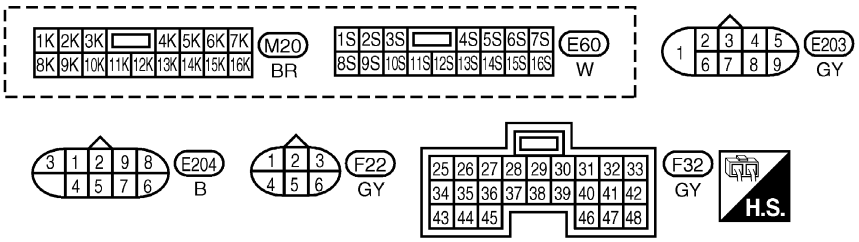

INSPECTION START
CHECK DTC.
With CONSULT-II
1. Turn ignition switch to ''ON'' position and select ''SELF-DIAG RESULTS'' mode for A/T with CONSULT-II.
2. Move selector lever to ''R'' position.
3. Depress accelerator pedal (Full throttle position).
4. Touch ''ERASE''.
5. Turn ignition switch to ''OFF'' position for 10 seconds.
OK
PERFORM DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE.
See previous page.
Is the ''CONTROL UNIT (EEPROM)'' displayed again?
Yes
Replace TCM.
No
INSPECTION END

Non-detectable Items

WIRING DIAGRAM — AT — NON-DTC

AT-NONDTC-01

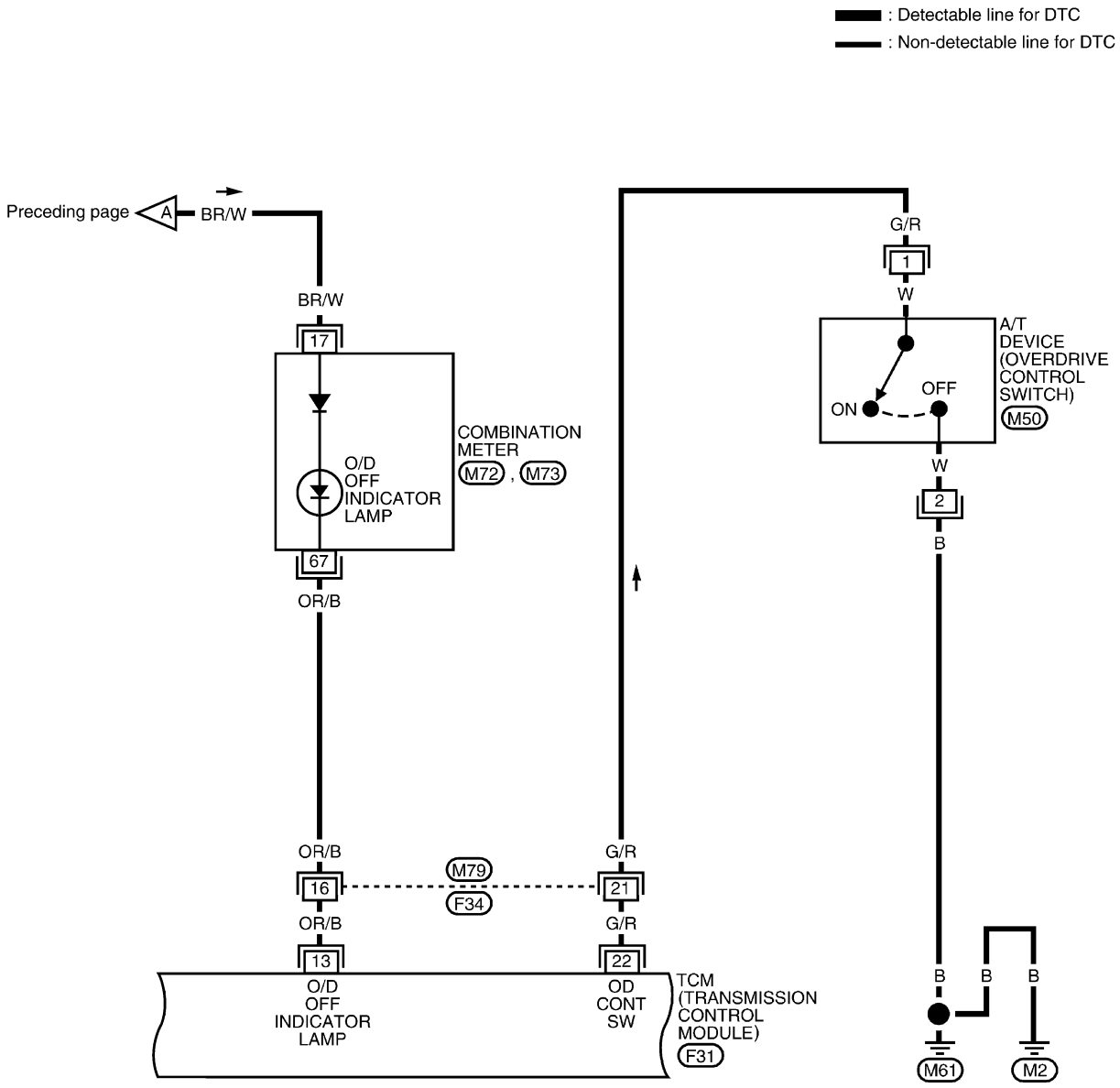


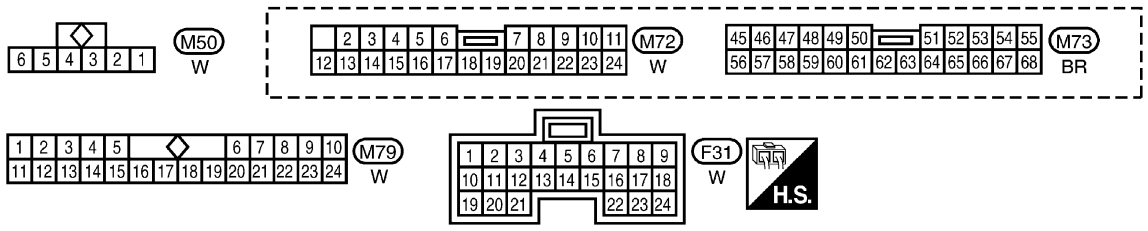


WAT020

Non-detectable Items (Cont'd)

AT-NONDTC-02

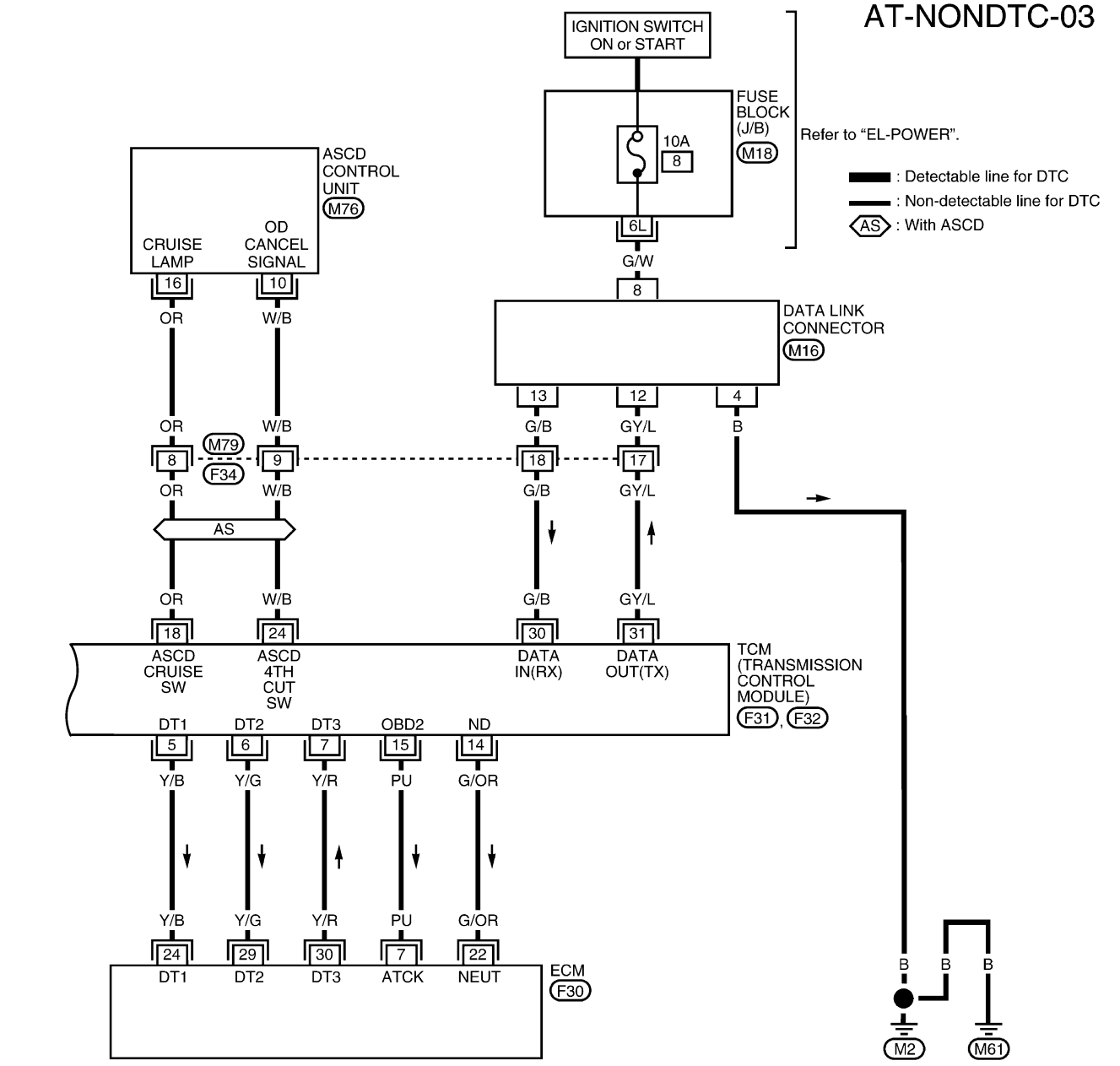




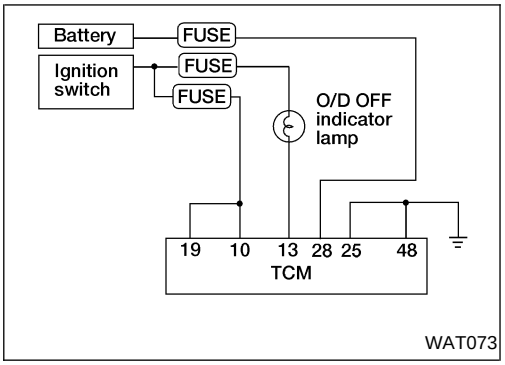
WAT526

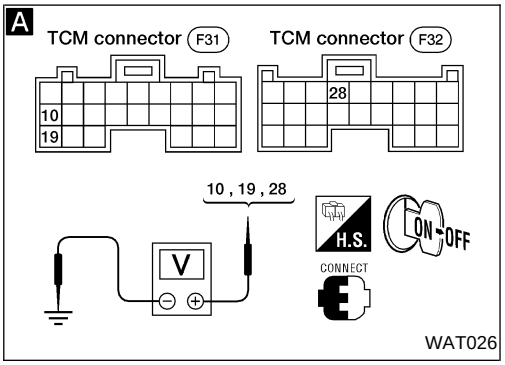
Non-detectable Items (Cont'd)

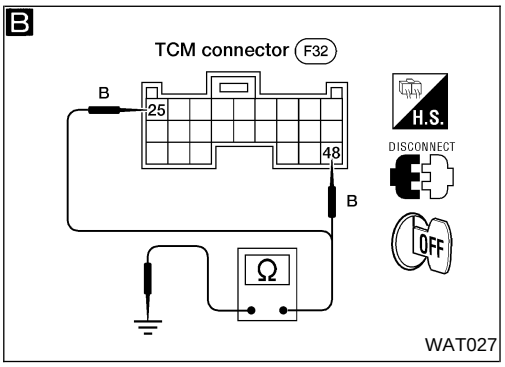
AT-NONDTC-03

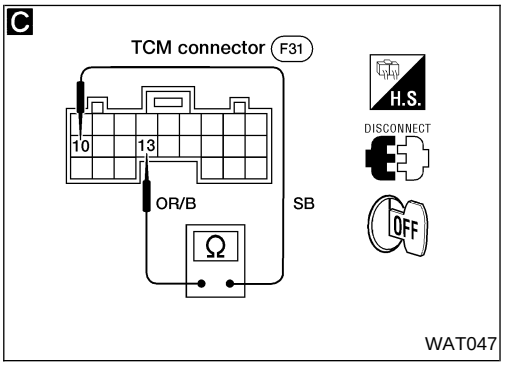


WAT331









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

SYMPTOM:

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

A

CHECK 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.
   Voltage: Battery voltage

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-76.
- Ignition switch and fuse
  Refer to EL section ("POWER SUPPLY ROUTING").

OK ↓

B

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

NG →
Repair open circuit or short to ground or short to power in harness or connectors.
Refer to "Wiring Diagram — AT — MAIN" in AT-76.

OK ↓

C

CHECK LAMP CIRCUIT.
1. Turn ignition switch to "OFF" position.
2. Check resistance between TCM terminals ⑬ and ⑩.
   Resistance: 50 - 100Ω
3. Reinstall any part removed.

NG →
Check the following items:
- O/D OFF indicator lamp
  Refer to EL section ["METERS AND GAUGES (Schematic)"].
- Harness and fuse for short or open between ignition switch and O/D OFF indicator lamp (Main harness)
  Refer to EL section ("POWER SUPPLY ROUTING").
- Harness for short or open between O/D OFF indicator lamp and TCM

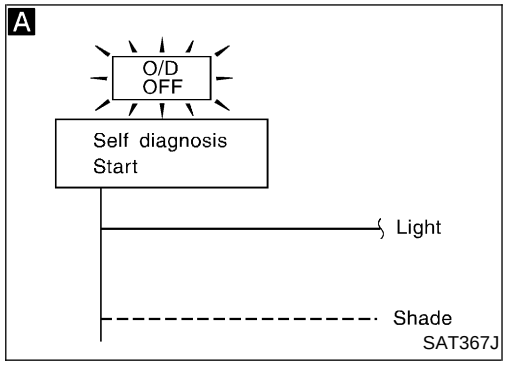
OK ↓

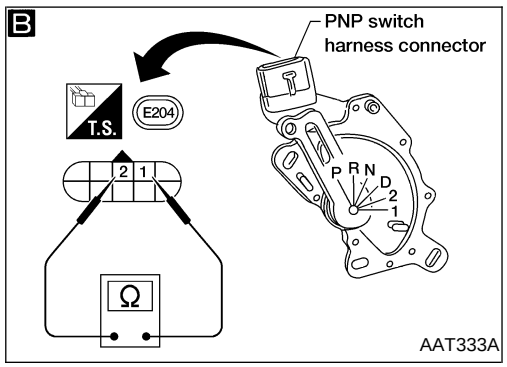
Check again.

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

OK ↓

INSPECTION END





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

SYMPTOM:

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

Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit? — Yes → Check PNP switch circuit. Refer to "DTC P0705", AT-78.

OR

A

Does self-diagnosis show damage to PNP switch circuit?

No

B

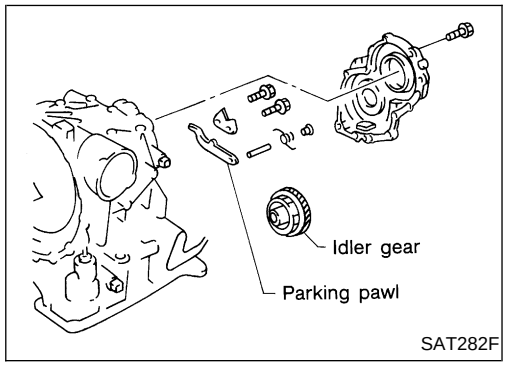
Check for short or open of PNP switch harness connector terminals ① and ②. Refer to "Component Inspection", AT-82. — NG → Repair or replace PNP switch.

OK

Check starting system. Refer to EL section ("System Description", "STARTING SYSTEM"). — NG → Repair or replace damaged parts.

OK

INSPECTION END



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

SYMPTOM:

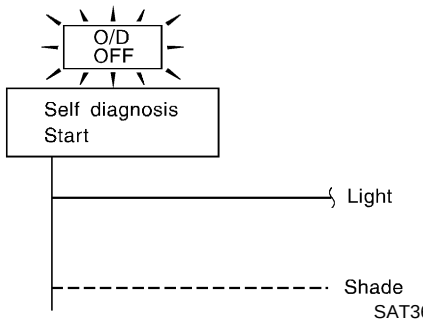
Vehicle moves when it is pushed forward or backward with selector lever in "P" position.

Check parking components. Refer to "Parking Pawl Components", AT-215, 282. — NG → Repair or replace damaged parts.

OK

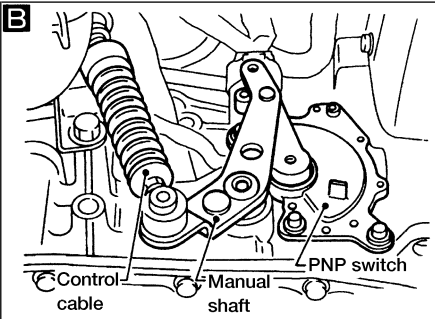
INSPECTION END

A



SAT367J

B

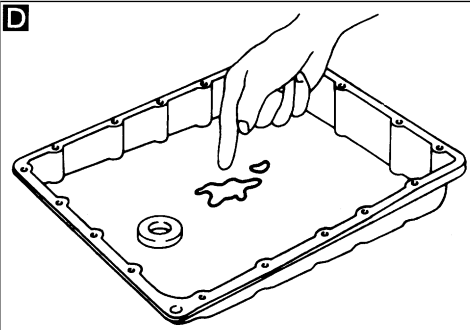


AAT334A

C

SAT638A

D



SAT171B

4. In "N" Position, Vehicle Moves

SYMPTOM:

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

Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit? → Yes → Check PNP switch circuit. Refer to "DTC P0705", AT-78.

OR

A

Does self-diagnosis show damage to PNP switch circuit? → Yes → Check PNP switch circuit. Refer to "DTC P0705", AT-78.

No

B

Check control cable. Refer to AT-206. → NG → Adjust control cable. Refer to AT-206.

OK

C

Check A/T fluid level again. → NG → Refill ATF.

OK

D

1. Remove oil pan.
2. Check A/T fluid condition. → NG →
   1. Disassemble A/T.
   2. Check the following items:
      - Forward clutch assembly
      - Overrun clutch assembly
      - Reverse clutch assembly

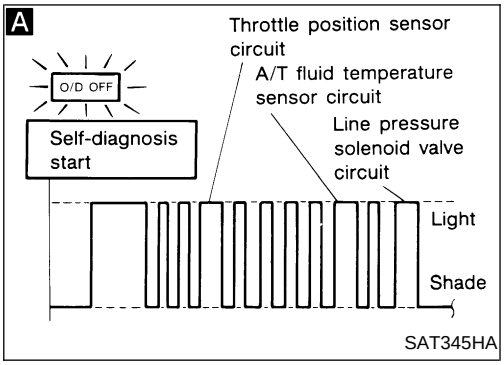
OK

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

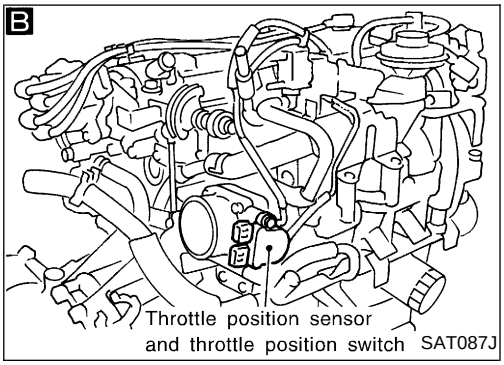
OK

INSPECTION END

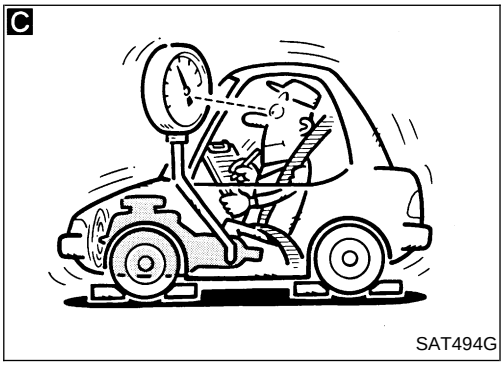
A



B



C



5. Large Shock. “N” → “R” Position

SYMPTOM:

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

A

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

Yes → Check damaged circuit. Refer to “DTC P0710, P0745 or P1705”, AT-83, 133 or 148.

No

B

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

NG → Repair or replace throttle position sensor.

OK

C

Check line pressure at idle with selector lever in “D” position. Refer to “LINE PRESSURE TEST”, AT-57.

NG →
1. Remove control valve assembly. Refer to AT-204.
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

OK

Check again.

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

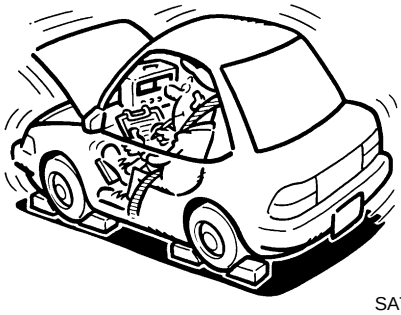
OK

INSPECTION END

A

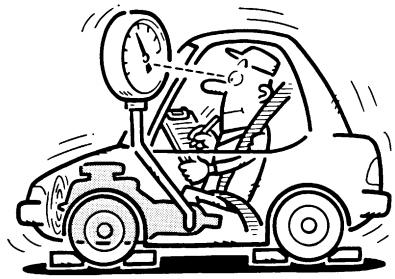
SAT638A

B



SAT493G

C



SAT494G

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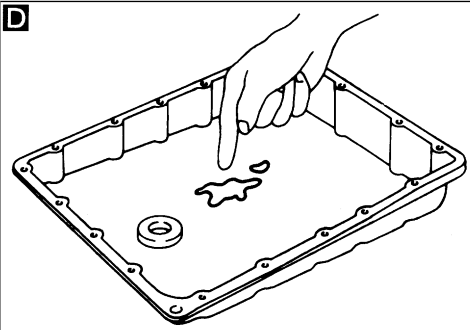


SAT171B

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

SYMPTOM:

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

A

Check A/T fluid level again.

NG → Refill ATF.

OK ↓

Refill ATF. → Ⓐ

NG in both "1" and "R" positions ↓

B

Check stall revolution with selector lever in "1" and "R" positions.

NG →

1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-204.
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

OK ↓

OK in "1" position
NG in "R" position ↓

1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-204.
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

C

Check line pressure at idle with selector lever in "R" position. Refer to "LINE PRESSURE TEST", AT-57.

NG →

1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-204.
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

OK ↓

D

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

NG → Ⓐ

OK ↓

Check again.

NG →

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

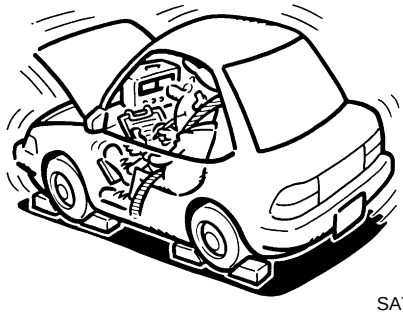
OK ↓

INSPECTION END

A

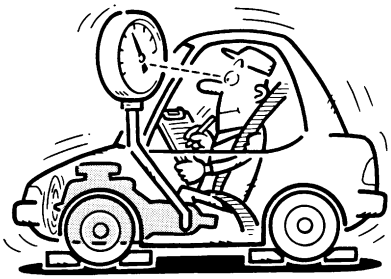
SAT638A

B



SAT493G

C



SAT494G

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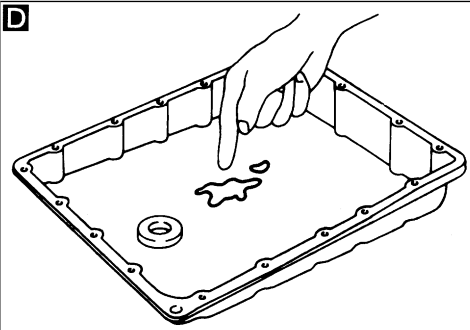


SAT171B

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

SYMPTOM:

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

A

Check A/T fluid level again.

NG → Refill ATF.

OK ↓

B

Check stall revolution with selector lever in "D'' position. Refer to "STALL TESTING'', AT-54.

NG → 1. Remove control valve assembly. Refer to AT-204.
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

OK ↓

C

Check line pressure at idle with selector lever in "D'' position. Refer to "LINE PRESSURE TEST'', AT-57.

OK ↓

NG →
1. Remove control valve assembly. Refer to AT-204.
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

D

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

NG → Ⓐ

OK ↓

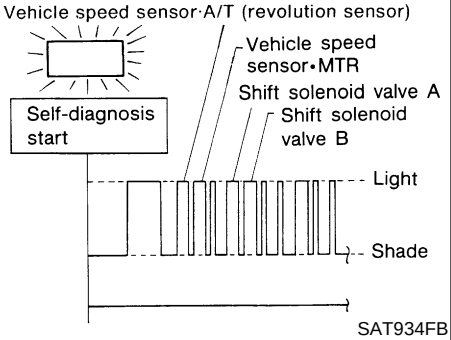
Check again.

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

OK ↓

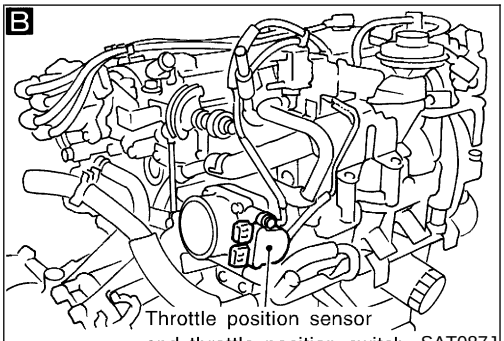
INSPECTION END

A



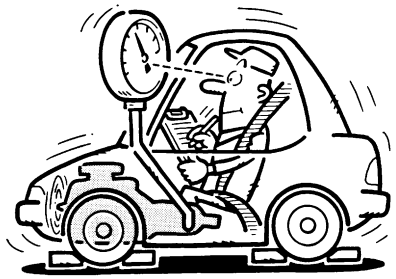
SAT934FB

B



SAT087J

C



SAT494G

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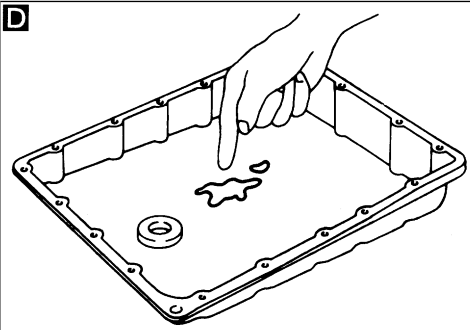


SAT171B

8. Vehicle Cannot Be Started From D_1

SYMPTOM:

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

Is 6. Vehicle Does Not Creep Backward In "R" Position OK?

No → Go to 6. Vehicle Does Not Creep Backward In "R" Position, AT-178.

Yes

A

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?

Yes → Check damaged circuit. Refer to "DTC P0720, P0750, P0755 or VHCL SPEED SEN·MTR", AT-88, 138, 143 or 163.

No

B

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

NG → Repair or replace throttle position sensor.

OK

C

Check line pressure at stall point with selector lever in "D" position. Refer to "LINE PRESSURE TEST", AT-57.

NG → 1. Remove control valve assembly. Refer to AT-204.
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

D

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

NG → (same as above)

OK

1. Remove control valve assembly. Refer to AT-204.
2. Check the following items:
- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK → (same as above)

OK

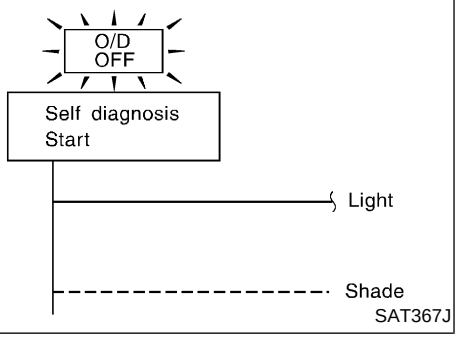
Check again.

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

OK

INSPECTION END

A



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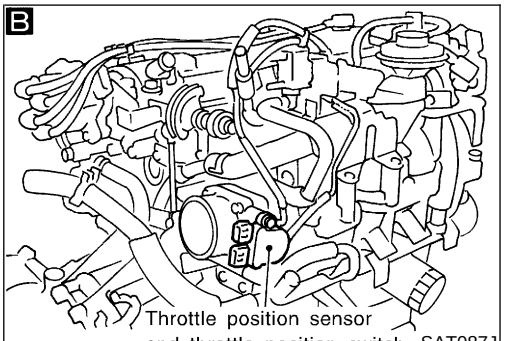

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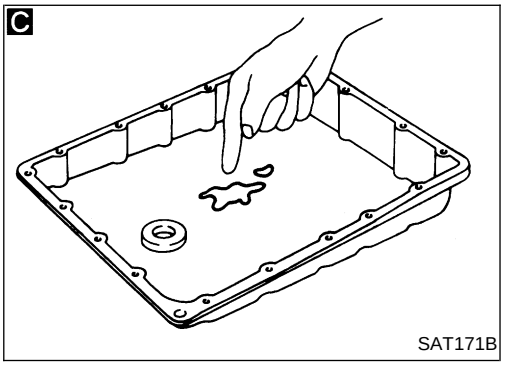


9. A/T Does Not Shift: $D_1 \rightarrow D_2$ or Does Not Kickdown: $D_4 \rightarrow D_2$

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.

Are 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From D_1 OK? — 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-179, 180.

Yes ↓

Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit? — Yes → Check PNP switch circuit. Refer to "DTC P0705", AT-78.

OR

A

Does self-diagnosis show damage to PNP switch circuit?

No ↓

Check vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuit. Refer to "DTC P0720 and VHCL SPEED SEN·MTR", AT-88, 163. — NG → Repair or replace vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuits.

OK ↓

B

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

OK ↓

C

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

— NG → 1. Remove control valve. Refer to AT-204.
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 ↓

1. Remove control valve. Refer to AT-204.
2. Check the following items:
- Shift valve A
- Shift solenoid valve A
- Pilot valve
- Pilot filter

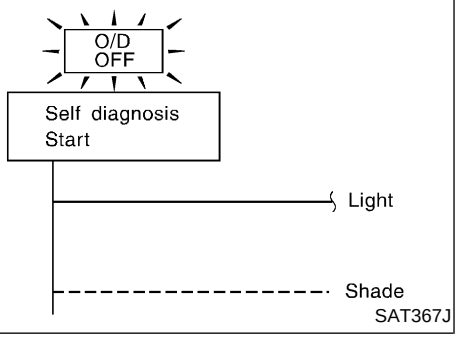
OK ↓

Check again. — NG → 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK ↓

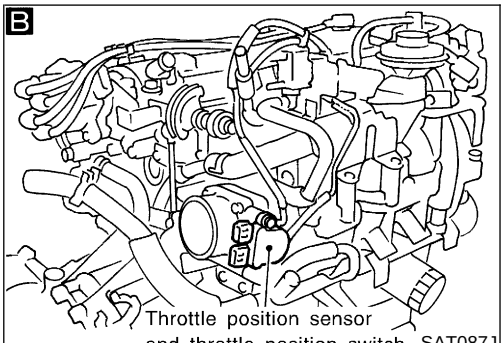
INSPECTION END

A



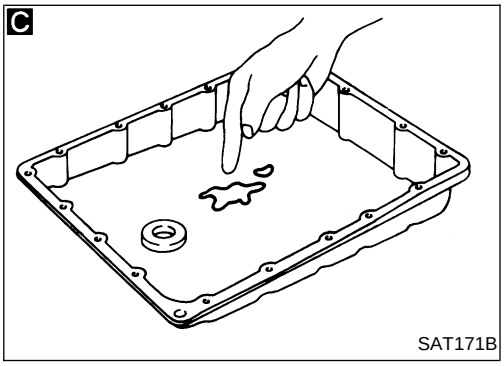
SAT367J

B



SAT087J

C



SAT171B

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

SYMPTOM:

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

Are 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From D_1 OK?

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-179, 180.

Yes ↓

Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?

Yes → Check PNP switch circuit. Refer to "DTC P0705", AT-78.

OR

A

Does self-diagnosis show damage to PNP switch circuit?

No ↓

B

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

NG → Repair or replace throttle position sensor.

OK ↓

C

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

NG → 1. Remove control valve assembly. Refer to AT-204.
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 ↓

1. Remove control valve assembly. Refer to AT-204.
2. Check the following items:
- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK ↓

OK ← (from NG)

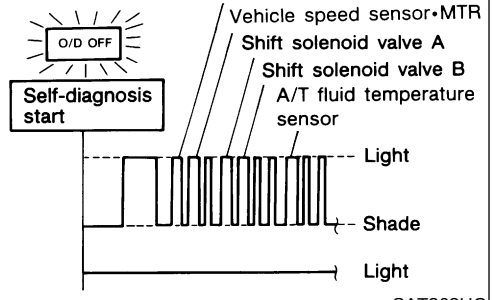
Check again.

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

OK ↓

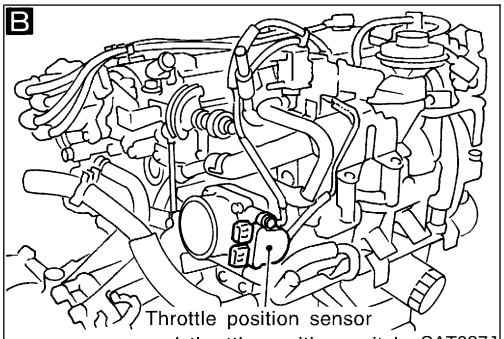
INSPECTION END

A



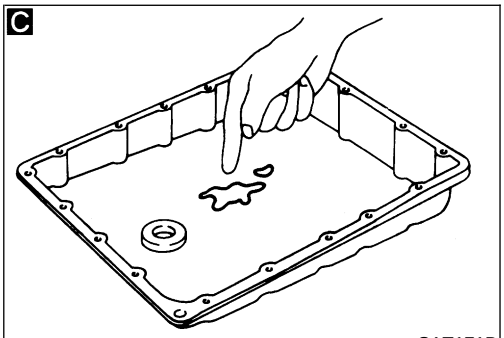
SAT363HC

B



SAT087J

C



SAT171B

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

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.**

Are 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From D_1 OK?

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-179, 180.

Yes ↓

Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to any of the following circuits?

Yes → Check damaged circuit. Refer to "DTC P0705, P0710, P0720, P0750, P0755 or VHCL SPEED SEN·MTR", AT-78, 83, 88, 138, 143 or 163.

OR

A

Does self-diagnosis, after cruise test, show damage to any of the following circuits?

- 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

No ↓

B

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

NG → Repair or replace throttle position sensor.

OK ↓

C

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

NG → 1. Remove control valve assembly. Refer to AT-204.
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 ↓

1. Remove control valve assembly. Refer to AT-204.
2. Check the following items:
- Shift valve B
- Overrun clutch control valve
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK ↓

OK ← (from 4. Check the following items)

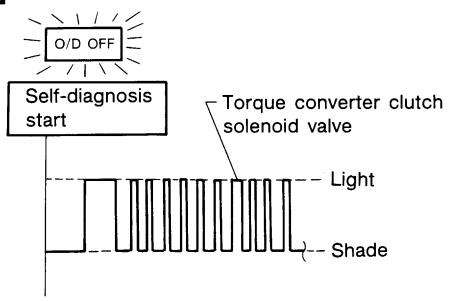
Check again.

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

OK ↓

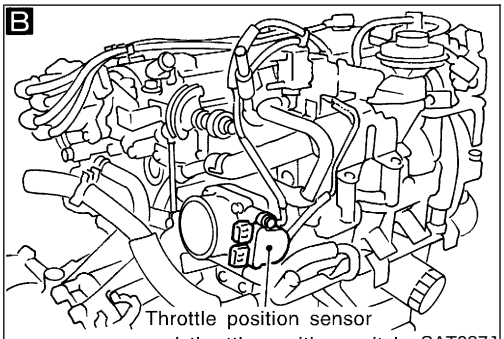
INSPECTION END

A



SAT346H

B



SAT087J

12. A/T Does Not Perform Lock-up

SYMPTOM:

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

A

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

Yes → Check torque converter clutch solenoid valve circuit. Refer to ''DTC P0740'', AT-120.

No

B

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

OK

1. Remove control valve. Refer to AT-204.
2. Check following items:
- Torque converter clutch control valve
- Torque converter relief valve
- Torque converter clutch solenoid valve
- Pilot valve
- Pilot filter

NG → Repair or replace damaged parts.

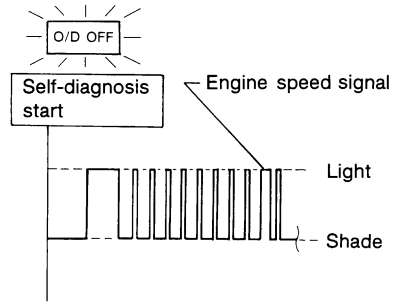
OK

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

OK

INSPECTION END

A



SAT347H

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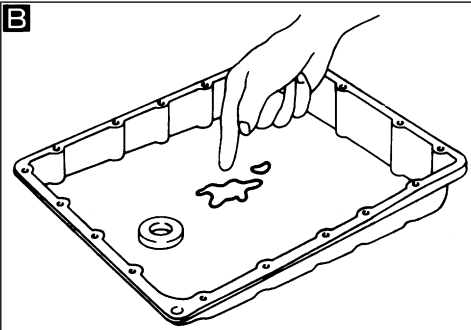


SAT171B

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

SYMPTOM:

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

A

Does self-diagnosis show damage to engine speed signal circuit after cruise test?

Yes → Check engine speed signal circuit. Refer to "DTC P0725", AT-92.

No

B

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

NG → 1. Remove control valve assembly. Refer to AT-204.
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

1. Remove control valve assembly. Refer to AT-204.
2. Check the following items:
- Torque converter clutch control valve
- Pilot valve
- Pilot filter

OK

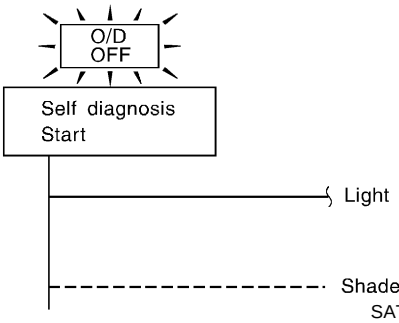
Check again.

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

OK

INSPECTION END

A



SAT367J

14. Lock-up Is Not Released

SYMPTOM:

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

Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to closed throttle position switch circuit?

Yes → Check closed throttle position switch circuit. Refer to "DTC P1705", AT-148.

OR

A

Does self-diagnosis show damage to closed throttle position switch circuit?

No

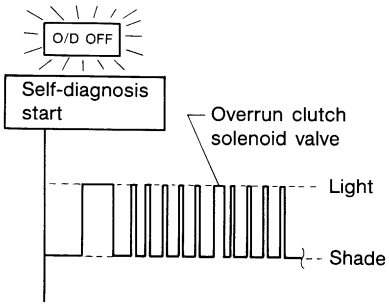
Check again.

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

OK

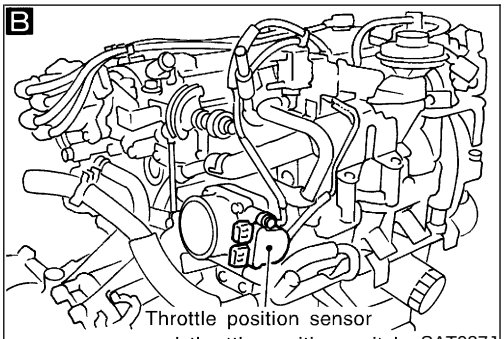
INSPECTION END

A



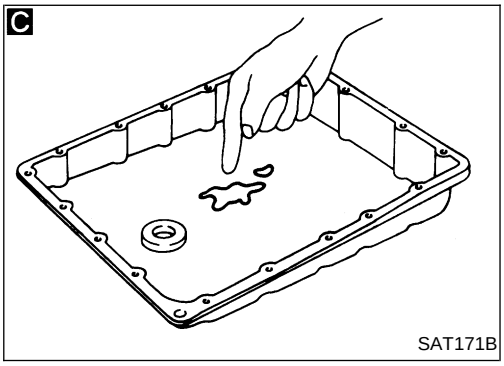
SAT348H

B



SAT087J

C



SAT171B

15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)

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.**

A

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

Yes → Check overrun clutch solenoid valve circuit. Refer to "DTC P1760", AT-156.

No

B

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

NG → Repair or replace throttle position sensor.

OK

C

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

NG →
1. Remove control valve assembly. Refer to AT-204.
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

1. Remove control valve assembly. Refer to AT-204.
2. Check the following items:
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

OK

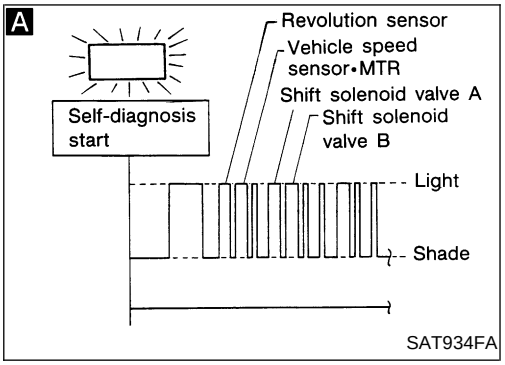
OK

Check again.

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

OK

INSPECTION END



16. Vehicle Does Not Start From D_1

SYMPTOM:

Vehicle does not start from D_1 on Cruise test — Part 2.

A

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?

Yes → Check damaged circuit. Refer to "DTC P0720, P0750, P0755 or VHCL SPEED SEN·MTR", AT-88, 138, 143 or 163.

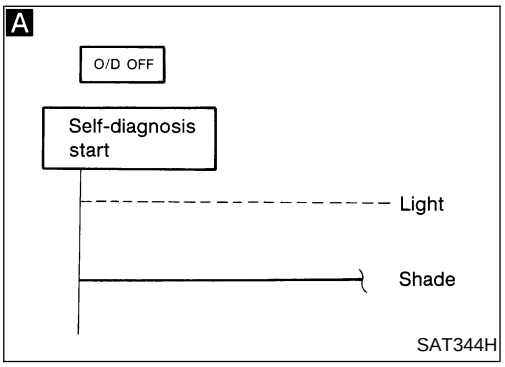
No ↓

Check again.

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

OK ↓

Go to 8. Vehicle Cannot Be Started From D_1, AT-180.



17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch "ON" → "OFF"

SYMPTOM:

A/T does not shift from D_4 to D_3 when changing overdrive control switch to "OFF" position.

Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to overdrive control switch circuit?

Yes → Check overdrive control switch circuit. Refer to AT-193.

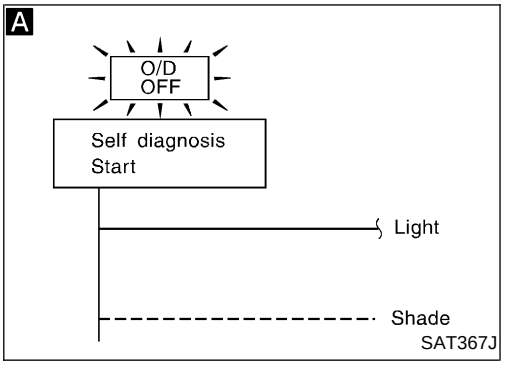
OR

A

Does self-diagnosis show damage to overdrive control switch circuit?

No ↓

Go to 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-182.



18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever "D" → "2" Position

SYMPTOM:

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

Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?

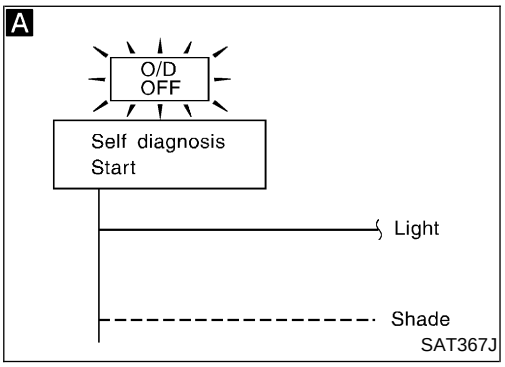
Yes → Check PNP switch circuit. Refer to "DTC P0705", AT-78.

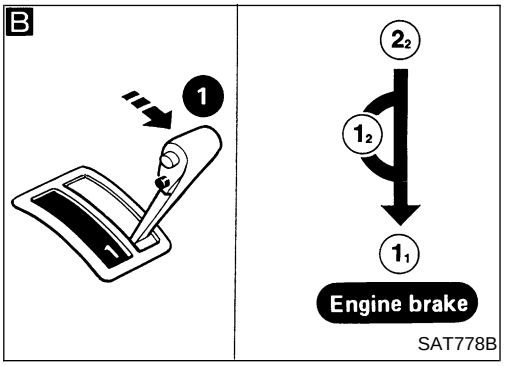
OR

A

Does self-diagnosis show damage to PNP switch circuit?

No → Go to 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-181.





19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever "2" → "1" Position

SYMPTOM:

A/T does not shift from 2_2 to 1_1 when changing selector lever from "2" to "1" position.

Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?

Yes → Check PNP switch circuit. Refer to "DTC P0705", AT-78.

OR

A

Does self-diagnosis show damage to PNP switch circuit?

No

B

Check again.

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

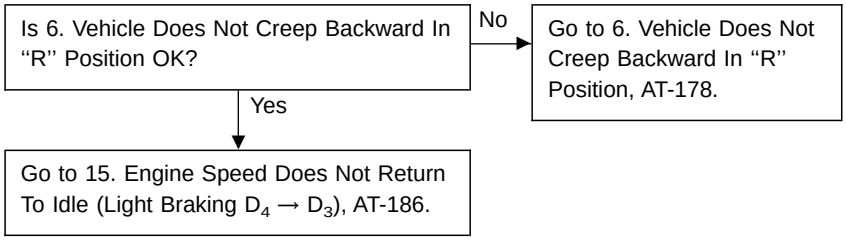
OK

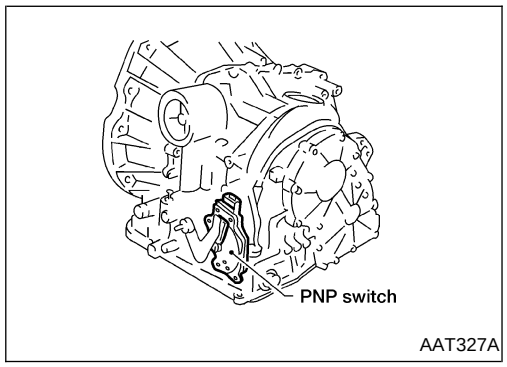
INSPECTION END

20. Vehicle Does Not Decelerate By Engine Brake

SYMPTOM:

Vehicle does not decelerate by engine brake when shifting from 2_2 (1_2) to 1_1.



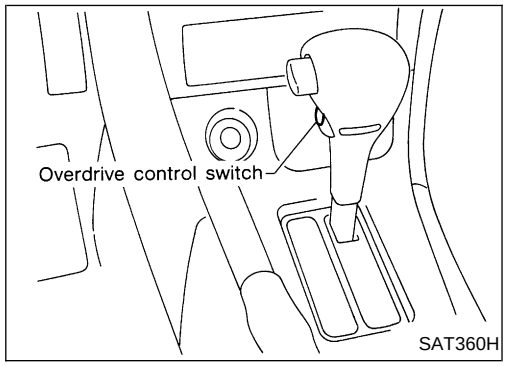


21. TCM Self-diagnosis Does Not Activate (Park/Neutral Position (PNP), Overdrive Control and Throttle Position Switch Circuit Checks)

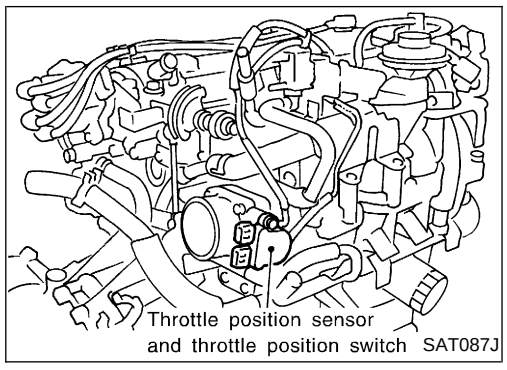
SYMPTOM:

O/D OFF indicator lamp does not come on in TCM self-diagnostic procedure even if the lamp circuit is good.

DESCRIPTION



- PNP switch
  The 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.



21. TCM Self-diagnosis Does Not Activate (Park/Neutral Position (PNP), Overdrive Control and Throttle Position Switch Circuit Checks) (Cont'd)

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
5*1	Y/B	DT1		—	—
6*1	Y/G	DT2		—	—
7*1	Y/R	DT3		—	—
13	OR/B	O/D OFF indicator lamp		When setting overdrive control switch in "OFF" position.	0V
				When setting overdrive control switch in "ON" position.	Battery voltage
14*1	G/OR	"N" position signal		When setting selector lever to "N" or "P" position.	0V
				When setting selector lever to other positions.	5V
15*1	PU	OBD-II output		—	—
16	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.	0V
17	LG	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.	0V
18	OR	ASCD cruise signal		When ASCD cruise is being performed. ("CRUISE" light comes on.)	Battery voltage
				When ASCD cruise is not being performed. ("CRUISE" light does not comes on.)	0V
22	G/R	Overdrive control switch		When setting overdrive control switch in "ON" position	Battery voltage
				When setting overdrive control switch in "OFF" position	0V
24	W/B	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.	0V
26	OR/L	PNP Switch "1" position		When setting selector lever to "1" position.	Battery voltage
				When setting selector lever to other positions.	0V

*1: These terminals are connected to the ECM.

21. TCM Self-diagnosis Does Not Activate (Park/Neutral Position (PNP), Overdrive Control and Throttle Position Switch Circuit Checks) (Cont'd)

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
27	B/Y	PNP Switch "2" position		When setting selector lever to "2" position.	Battery voltage
				When setting selector lever to other positions.	0V
30*2	G/B	—		—	—
31*2	GY/L	—		—	—
34	W/G	PNP Switch "D" position		When setting selector lever to "D" position.	Battery voltage
				When setting selector lever to other positions.	0V
35	G	PNP Switch "R" position		When setting selector lever to "R" position.	Battery voltage
				When setting selector lever to other positions.	0V
36	GY/R	PNP Switch "N" or "P" position		When setting selector lever to "N" or "P" position.	Battery voltage
				When setting selector lever to other positions.	0V

*2: These terminals are connected to the Data Link Connector.

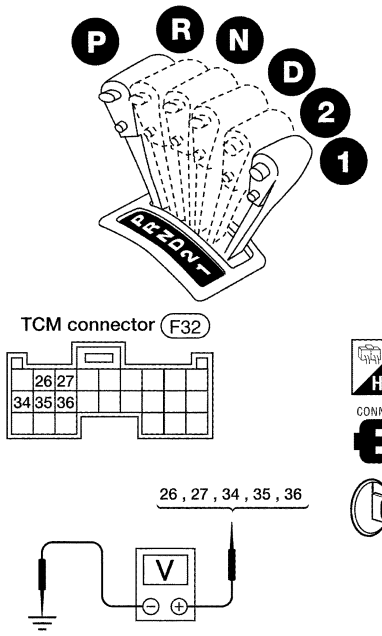
21. TCM Self-diagnosis Does Not Activate (Park/Neutral Position (PNP), Overdrive Control and Throttle Position Switch Circuit Checks) (Cont'd)

A

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

SAT701J

A



WAT028

DIAGNOSTIC PROCEDURE

A

CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT.

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out "PN", "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.

NG → Check the following items:
- PNP switch (Refer to "Component Inspection", AT-195.)
- Harness for short or open between ignition switch and PNP switch (Main harness)
- Harness for short or open between PNP switch and TCM (Main harness)

OR

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.
   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**

OK → Ⓐ

(Go to next page.)

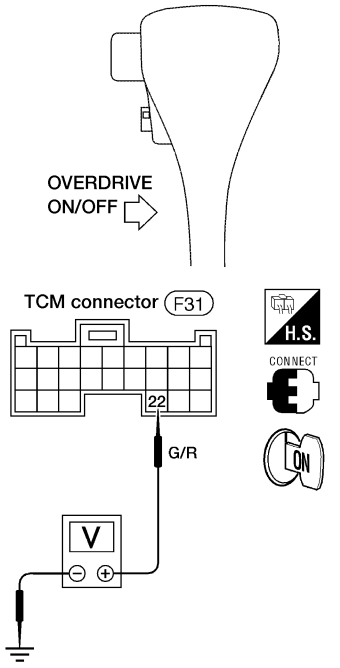
21. TCM Self-diagnosis Does Not Activate (Park/Neutral Position (PNP), Overdrive Control and Throttle Position Switch Circuit Checks) (Cont'd)

B

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

SAT701J

B



WAT048

A

B

CHECK OVERDRIVE CONTROL SWITCH CIRCUIT.

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

NG → Check the following items:
- Overdrive control switch (Refer to "Component Inspection", AT-195.)
- 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

OR

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".

Switch position	Voltage (Approx.)
ON	Battery voltage
OFF	0V

OK

B

(Go to next page.)

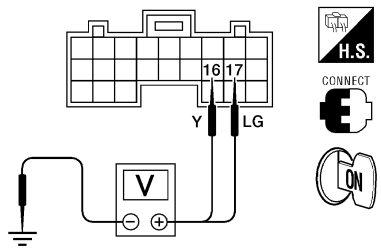
21. TCM Self-diagnosis Does Not Activate (Park/Neutral Position (PNP), Overdrive Control and Throttle Position Switch Circuit Checks) (Cont'd)

C

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

SAT702J

C



WAT049

B

C

CHECK THROTTLE POSITION SWITCH CIRCUIT.

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

NG → Check the following items:
- Throttle position switch — Refer to "Component Inspection", AT-196.
- 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)

OR

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)

Accelerator pedal condition	Voltage (Approx.)	
	Terminal No. (16)	Terminal No. (17)
Released	Battery voltage	0V
Fully depressed	0V	Battery voltage

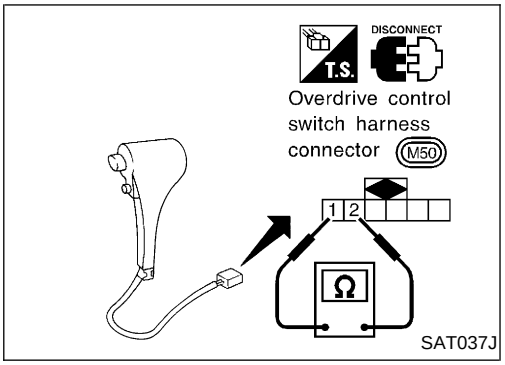
OK ↓

Perform self-diagnosis again after driving for a while.

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

OK ↓

INSPECTION END



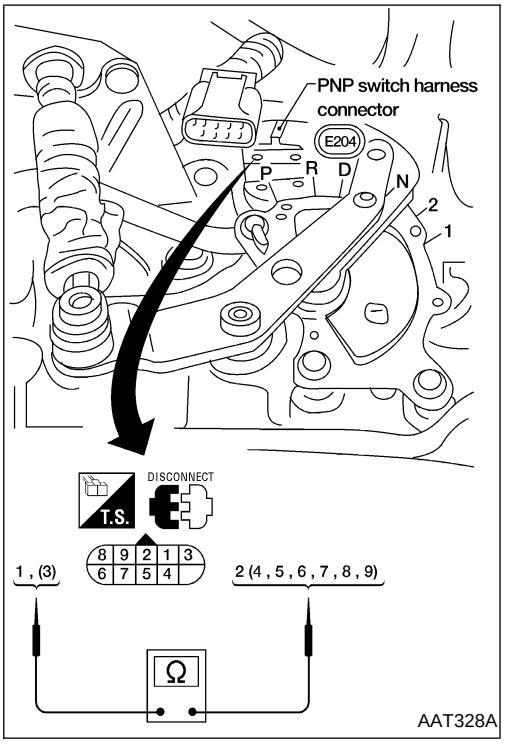
21. TCM Self-diagnosis Does Not Activate (Park/Neutral Position (PNP), Overdrive Control and Throttle Position Switch Circuit Checks) (Cont'd)

COMPONENT INSPECTION

Overdrive control switch

- Check continuity between two terminals.

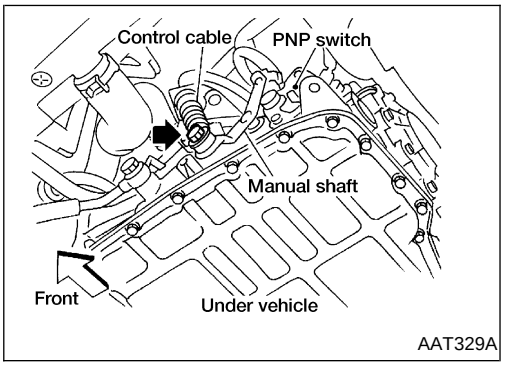
Switch position	Continuity
ON	No
OFF	Yes



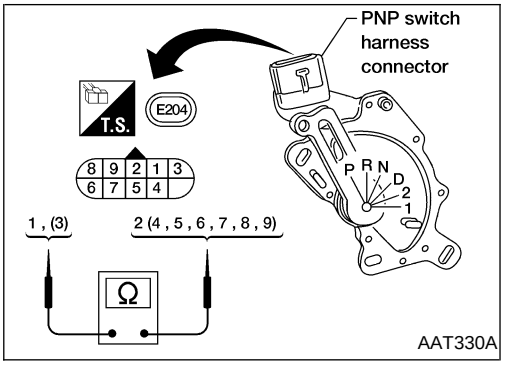
Park/Neutral Position (PNP) switch

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.

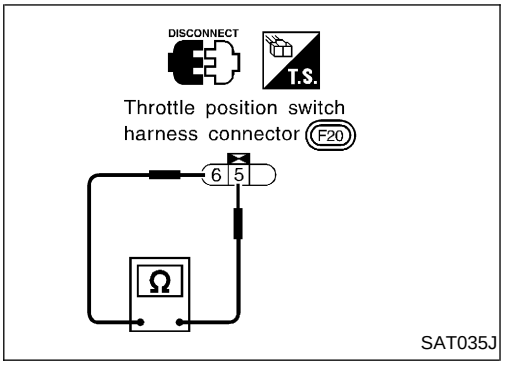
Lever position	Terminal No.	
P	③ — ⑦	① — ②
R	③ — ⑧	
N	③ — ⑨	① — ②
D	③ — ⑥	
2	③ — ⑤	
1	③ — ④	



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-206.



4. If NG on step 2, remove PNP switch from A/T and check continuity of PNP switch terminals. Refer to step 1.
5. If OK on step 4, adjust PNP switch. Refer to AT-205.
6. If NG on step 4, replace PNP switch.



21. TCM Self-diagnosis Does Not Activate (Park/Neutral Position (PNP), Overdrive Control and Throttle Position Switch Circuit Checks) (Cont'd)

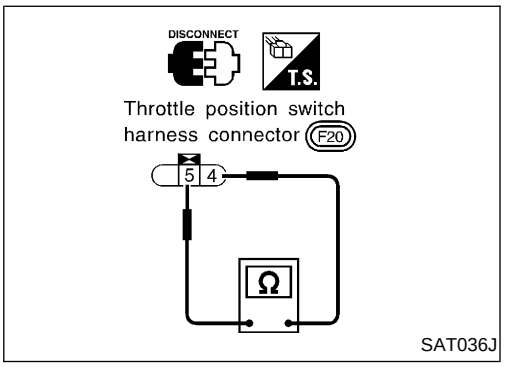
Throttle position switch

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 EC section (''Basic Inspection'', ''TROUBLE DIAGNOSIS — Basic Inspection'').



Wide open throttle position switch

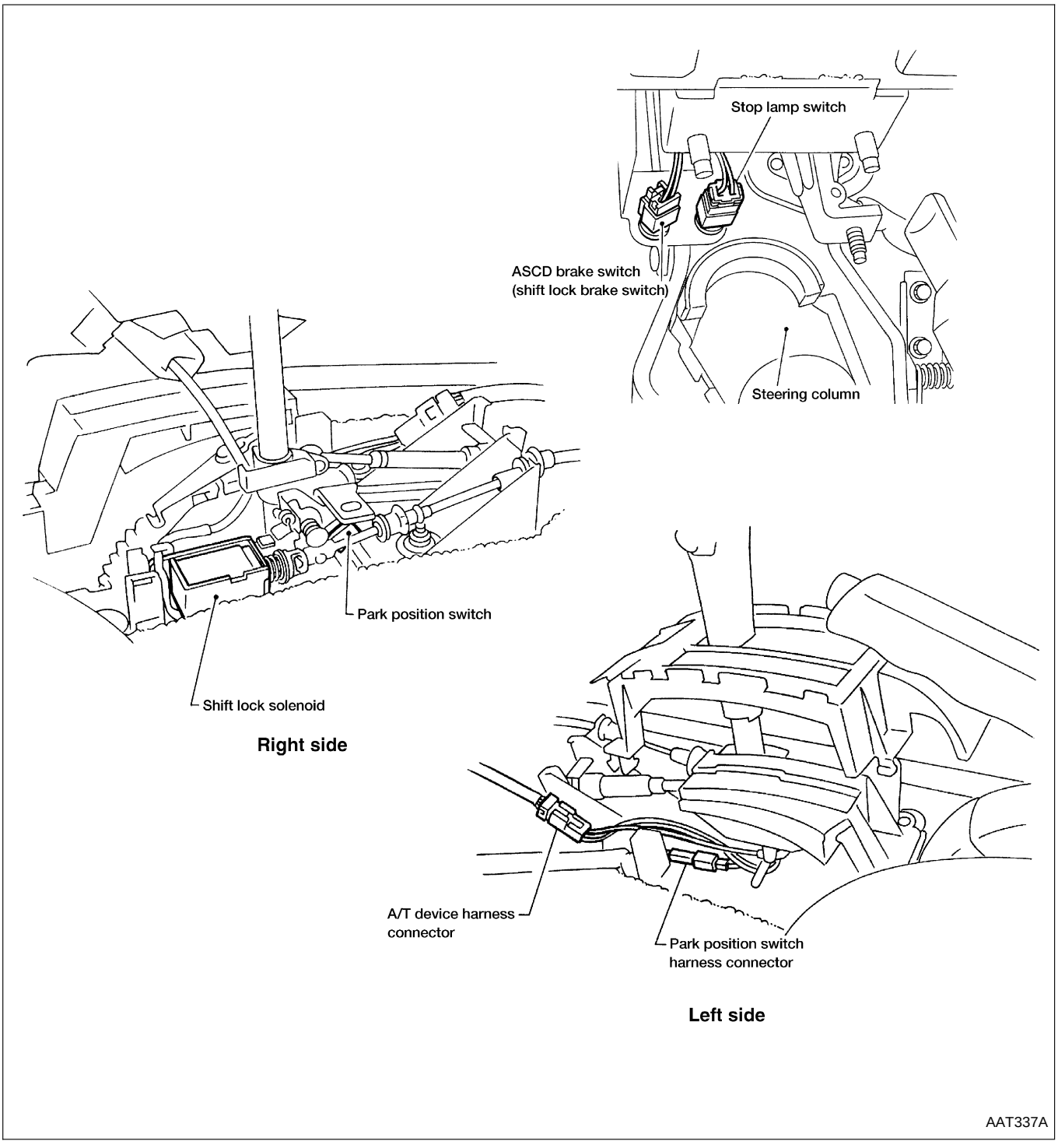
- Check continuity between terminals ④ and ⑤.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

Description

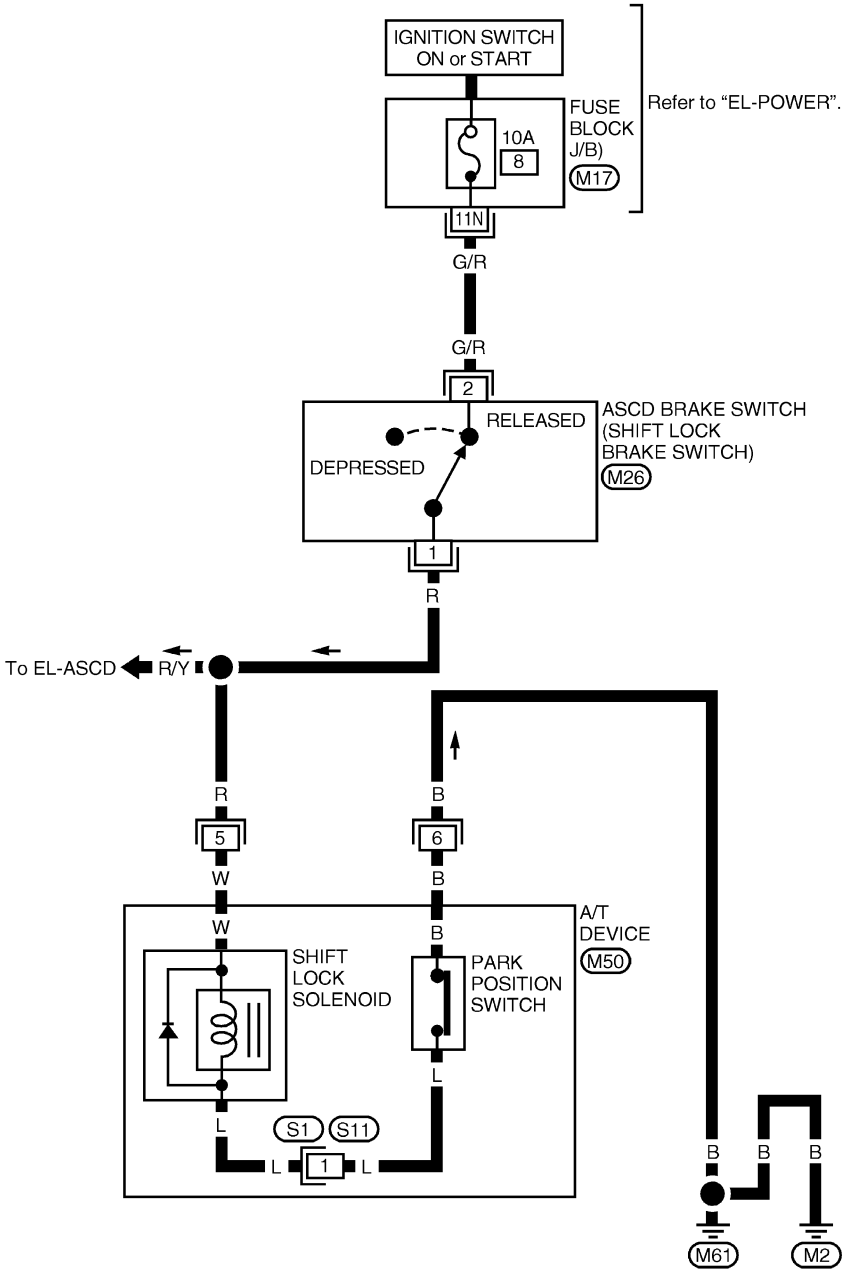
- The mechanical key interlock mechanism also operates as a shift lock:
  With the key switch turned to ON, the selector lever cannot be shifted from "P" (parking) to any other position unless the brake pedal is depressed.
  With the key removed, the selector lever cannot be shifted from "P" to any other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

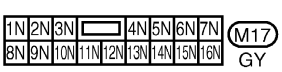
Shift Lock System Electrical Parts Location

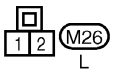


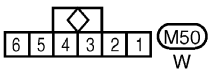
Wiring Diagram — SHIFT —

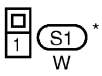
AT-SHIFT-01











* This connector is not shown in "HARNESS LAYOUT " of EL section.

WAT023

Diagnostic Procedure

SYMPTOM 1:

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

SYMPTOM 2:

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

Check key interlock cable for damage.

NG → Repair key interlock cable. Refer to "Key Interlock Cable", AT-201.

OK ↓

Check selector lever position for damage.

NG → Check selector lever. Refer to "ON-VEHICLE SERVICE — PNP Switch and Control Cable Adjustment", AT-205, 206.

OK ↓

A

CHECK POWER SOURCE.

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between ASCD brake switch (shift lock brake switch) harness terminal ② and ground.
   Voltage: Battery voltage

NG → Check the following items:
1. Harness for short or open between battery and ASCD brake switch (shift lock brake switch) harness terminal ②
2. Fuse
3. Ignition switch (Refer to EL section.)

OK ↓

B

CHECK INPUT SIGNAL
A/T DEVICE

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

- Check voltage between A/T device harness terminal ⑤ and ground.

Brake pedal	Voltage
Depressed	0V
Released	Battery voltage

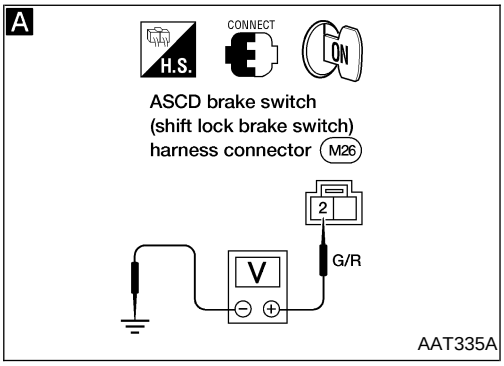
NG → Check the following items:
1. Harness for short or open between A/T device harness connector ⑤ and ASCD brake switch (shift lock brake switch) harness connector ①
2. ASCD brake switch (shift lock brake switch) (Refer to "Component Check", AT-203.)

OK ↓

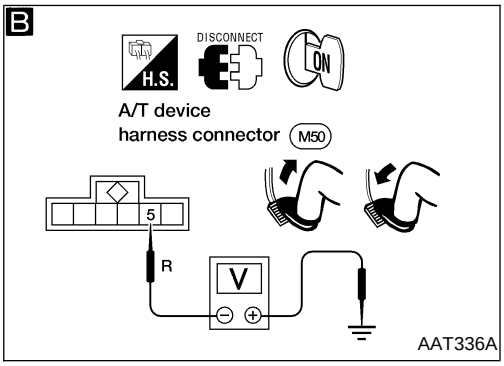
Ⓐ

(Go to next page.)

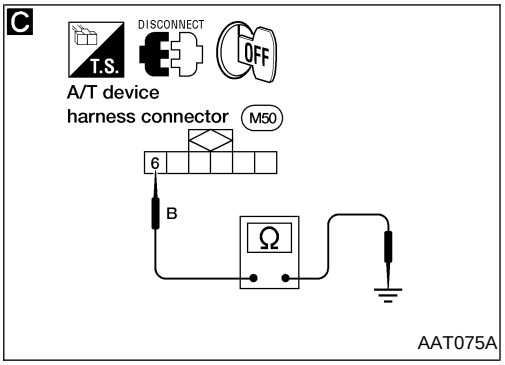
A



B



Diagnostic Procedure (Cont'd)



Ⓐ

C

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 ⑥ and ground.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

NG → Repair open circuit or short to ground or short to power in harness or connectors.

OK ↓

CHECK PARK POSITION SWITCH.
Refer to "Component Check", AT-202.

NG → Replace park position switch.

OK ↓

CHECK SHIFT LOCK SOLENOID.
Refer to "Component Check", AT-202.

NG → Replace shift lock solenoid.

OK ↓

Reconnect shift lock harness connector.

↓

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

↓

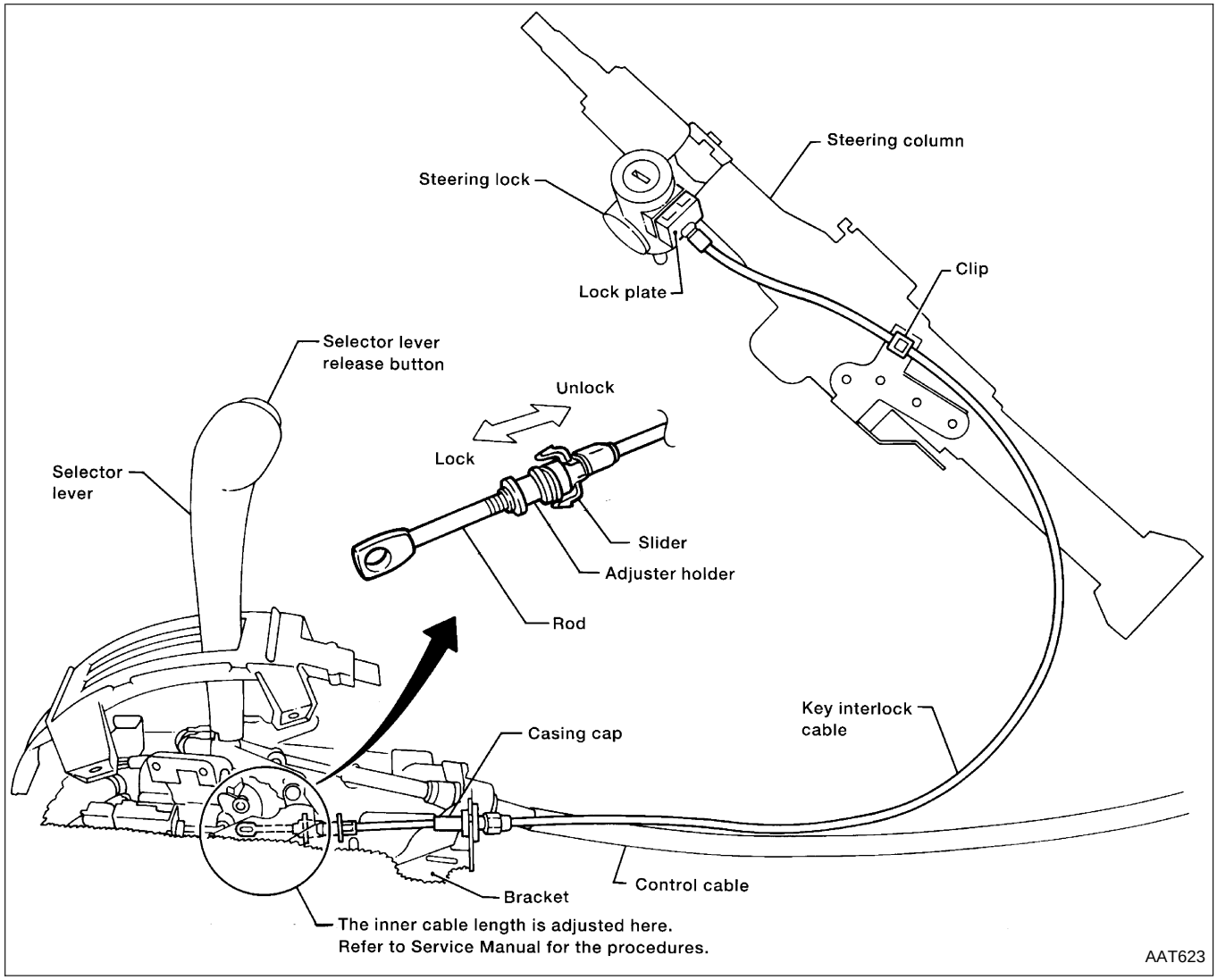
Recheck shift lock operation.

NG → 1. Perform A/T device input/output signal inspection test.
2. If NG, recheck harness connector connection.

OK ↓

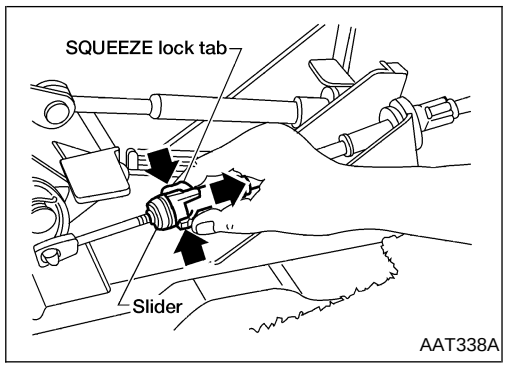
INSPECTION END

Key Interlock Cable



CAUTION:

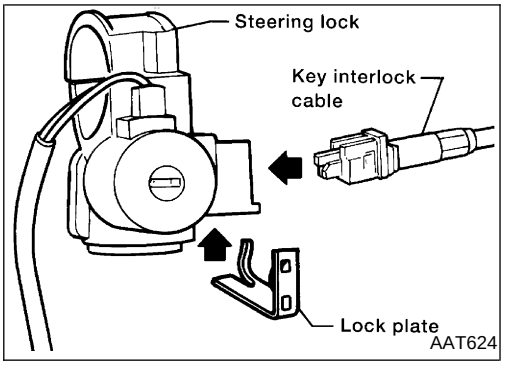
- **Install key interlock cable in such a way that it will not be damaged by sharp bends, twists or interference with adjacent parts.**
- **After installing key interlock cable to control device, make sure that casing cap and bracket are firmly secured in their positions. If casing cap can be removed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



REMOVAL

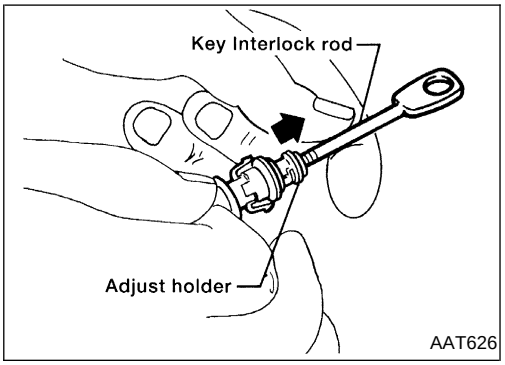
Unlock slider by squeezing lock tabs from adjuster holder and remove rod from cable.

Key Interlock Cable (Cont'd)

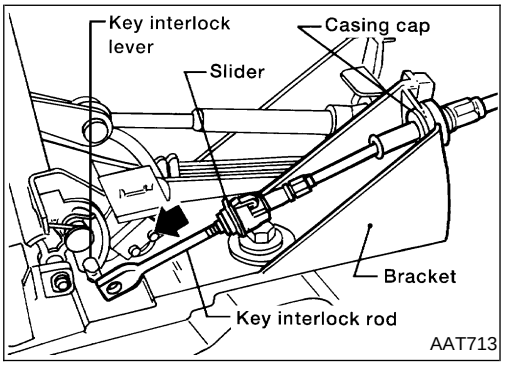


INSTALLATION

1. Remove key from key cylinder.
2. Set key interlock cable to steering lock assembly and install lock plate.
3. Clamp cable to steering column and fix to control cable with band.
4. Set control lever to ''P'' position.



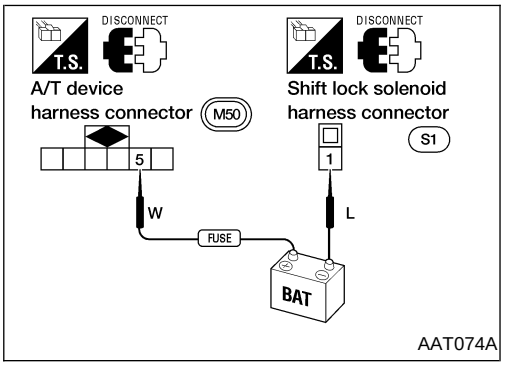
5. Insert key interlock rod into adjuster holder.



6. Install casing cap to bracket.
7. Install key interlock rod to key interlock lever.
8. Move slider in order to fix adjuster holder to interlock rod.

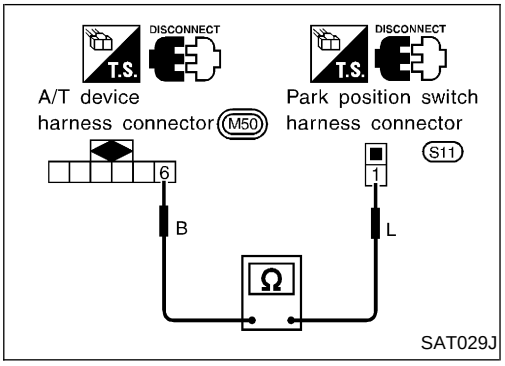
Component Check

SHIFT LOCK SOLENOID



- Check operation by applying battery voltage to A/T device harness terminal ⑤ and shift lock solenoid harness terminal ①.

PARK POSITION SWITCH

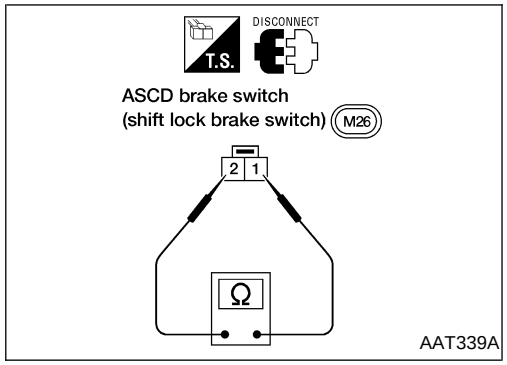


- Check continuity between A/T device harness terminal ⑥ and park position switch harness terminal ①.

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

Component Check (Cont'd)

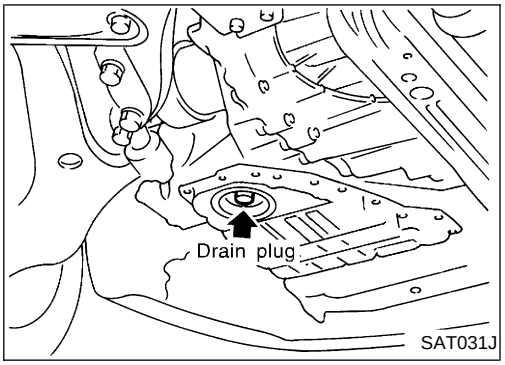
ASCD BRAKE SWITCH (SHIFT LOCK BRAKE SWITCH)



- 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 BR section "Adjustment".

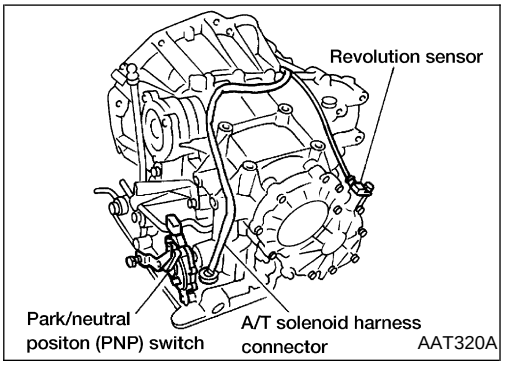


Control Valve Assembly and Accumulator

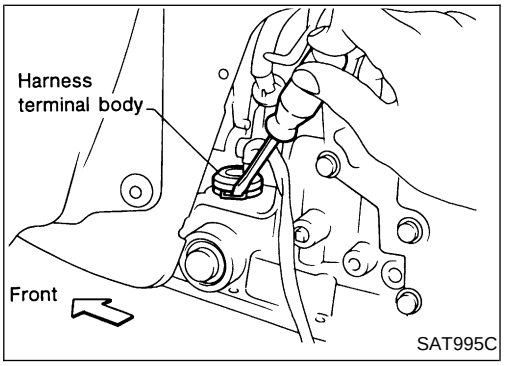
REMOVAL

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

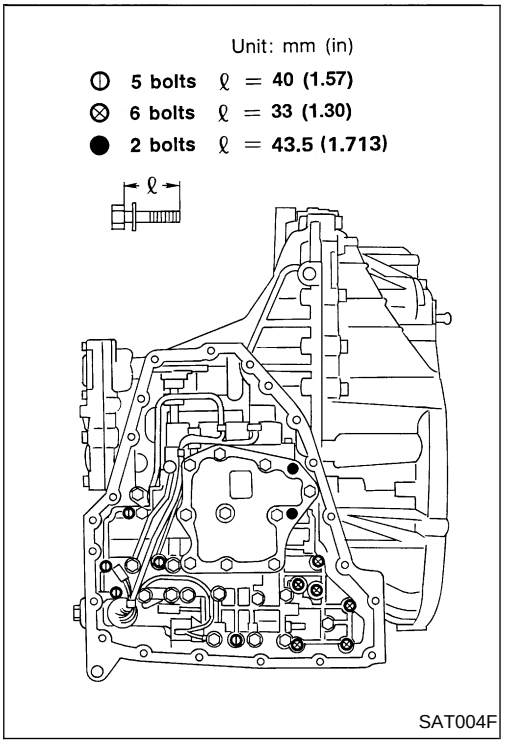
- **Always replace oil pan bolts as they are self-sealing bolts.**



3. Disconnect A/T solenoid harness connector.



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.



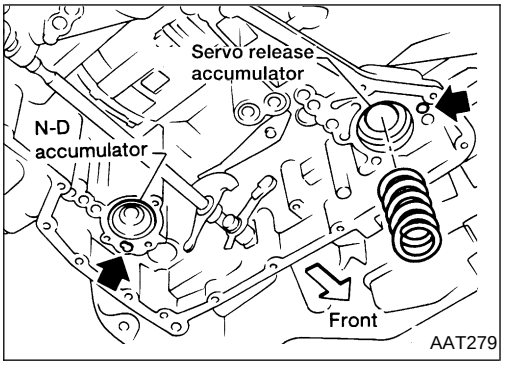
6. Remove control valve assembly by removing fixing bolts Ⓘ, Ⓧ and ●.

Bolt length, number and location are shown in the illustration.

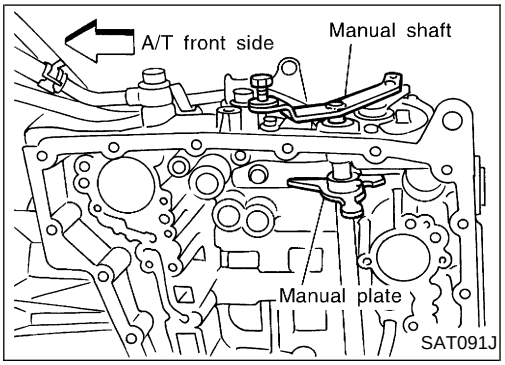
- **Be careful not to drop manual valve and servo release accumulator return spring.**

7. Disassemble and inspect control valve assembly if necessary. Refer to AT-235.

Control Valve Assembly and Accumulator (Cont'd)

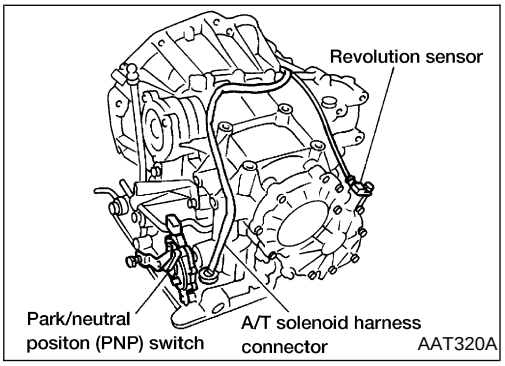


8. Remove servo release and N-D accumulators by applying compressed air if necessary.
- **Hold each piston with a rag.**



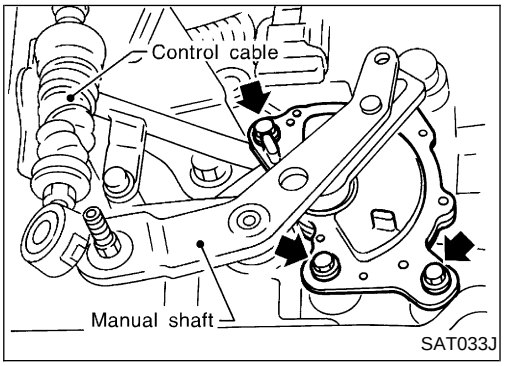
INSTALLATION

- **Set manual shaft in Neutral, 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.**



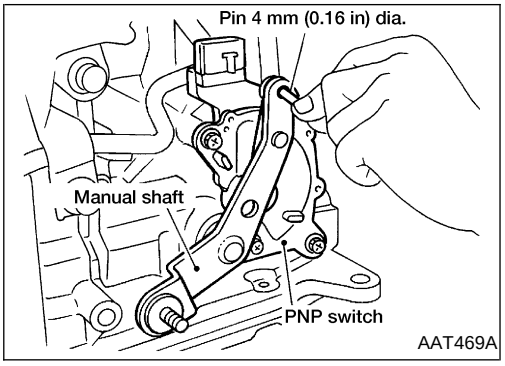
Revolution Sensor Replacement

1. Remove under cover.
2. Remove revolution sensor from A/T.
3. Reinstall any part removed.
- **Always use new sealing parts.**

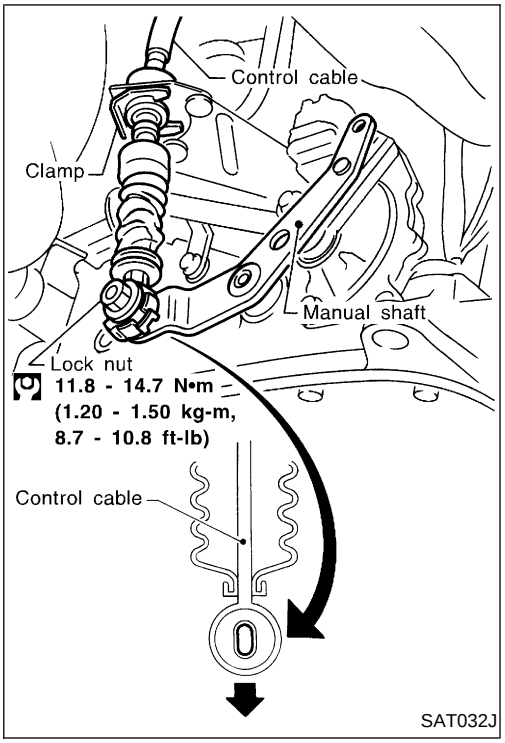


Park/Neutral Position (PNP) Switch Adjustment

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-82.



Control Cable Adjustment

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

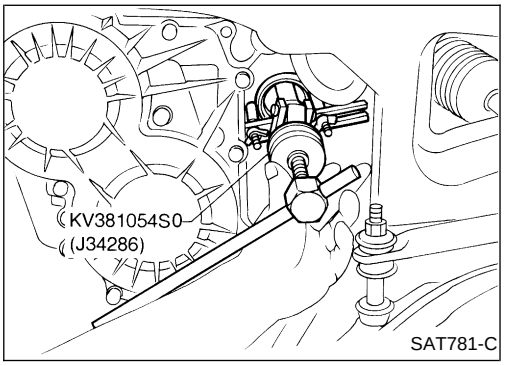
1. Place selector lever in ‘‘P’’ position.
2. Loosen control cable lock nut and place manual shaft in ‘‘P’’ position.

CAUTION:

Turn wheels more than 1/4 rotations and apply the park lock.

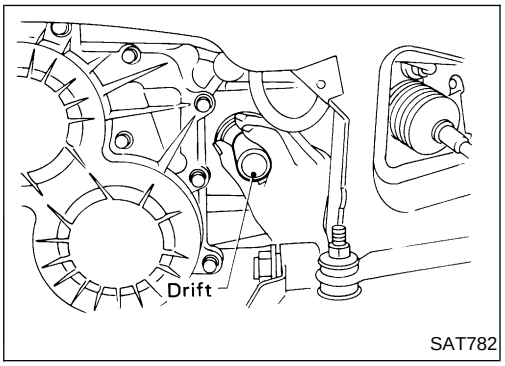
3. Pull control cable in the direction of the arrow shown in the illustration by specified force.
   Specified force: 9.8 N (1.0 kg, 2.2 lb)
4. Tighten control cable lock nut.
5. Move selector lever from ‘‘P’’ to ‘‘1’’ position again. Make sure that selector lever moves smoothly.

- **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.**



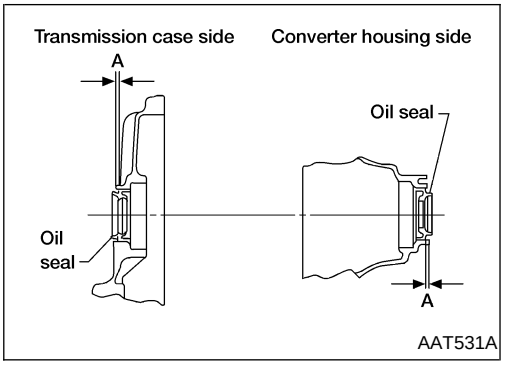
Differential Side Oil Seal Replacement

1. Remove drive shaft assembly. Refer to FA section ‘‘Removal’’.
2. Remove oil seal.



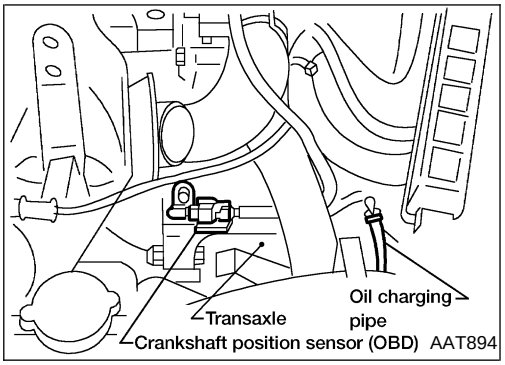
3. Install oil seal.

- **Apply ATF before installing.**



- **Install oil seals so that dimension “A” is within specification.**
  A: −0.5 mm (−0.02 in) to 0.5 mm (0.02 in)

4. Reinstall any part removed.

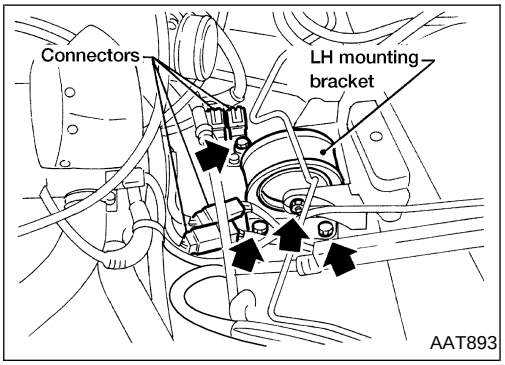


Removal

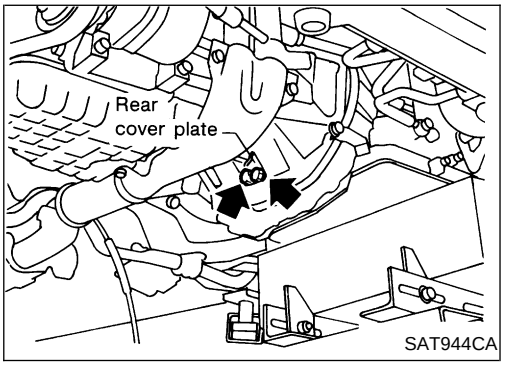
CAUTION:

When removing the transaxle assembly from engine, first remove the crankshaft position sensor (OBD) from the assembly.

Be careful not to damage sensor edge.

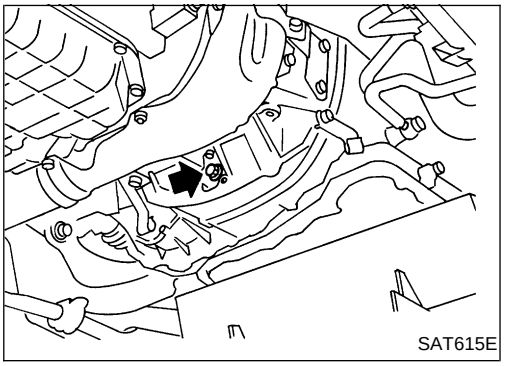


1. Remove battery and bracket.
2. Remove air cleaner and resonator.
3. Disconnect terminal cord assembly harness connector and park/neutral position (PNP) switch harness connectors.
4. Disconnect harness connectors of revolution sensor, ground and vehicle speed sensor.
5. Remove crankshaft position sensor (OBD) from transaxle.
6. Remove LH mounting bracket from transaxle and body.
   Tighten LH mounting bracket bolts to the specified torque. Refer to EM section, ‘‘ENGINE REMOVAL’’.
7. Disconnect control cable at transaxle side.
8. Drain ATF.
9. Remove drive shafts. Refer to FA section ‘‘Removal’’.
10. Disconnect oil cooler piping.
11. Remove starter motor from transaxle.
12. Support engine by placing a jack under oil pan.

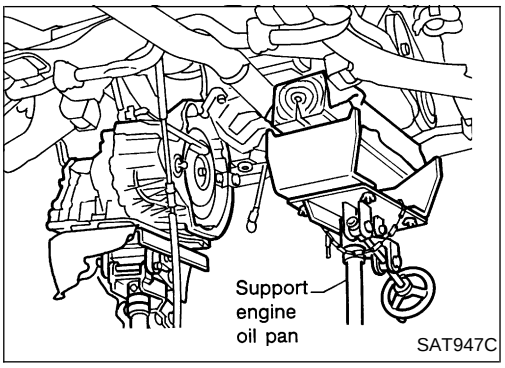


- **Do not place jack under oil pan drain plug.**

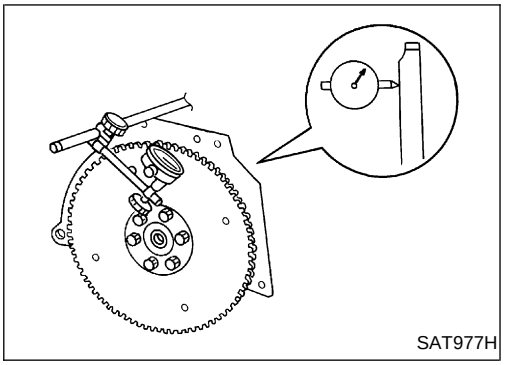
13. Remove center member.
    Tighten center member bolts to the specified torque. Refer to EM section, ‘‘ENGINE REMOVAL’’.
14. Remove rear cover plate and bolts securing torque converter to drive plate.
    Tighten rear plate cover bolts to the specified torque. Refer to EM section, ‘‘OIL PAN’’.



- **Rotate crankshaft for access to securing bolts.**



15. Support transaxle with a jack.
16. Remove bolts fixing A/T to engine.
17. Lower transaxle while supporting it with a jack.


SAT977H

Installation

- Drive plate runout

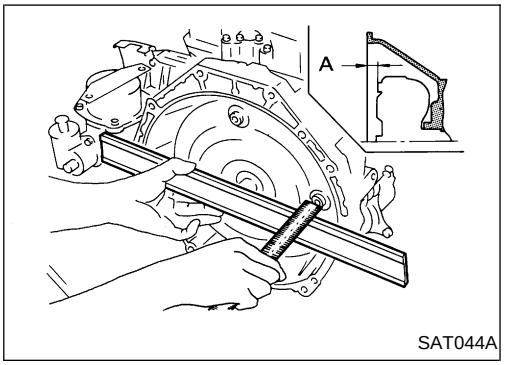
CAUTION:

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

Maximum allowable runout:

Refer to EM section, "CYLINDER BLOCK".

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

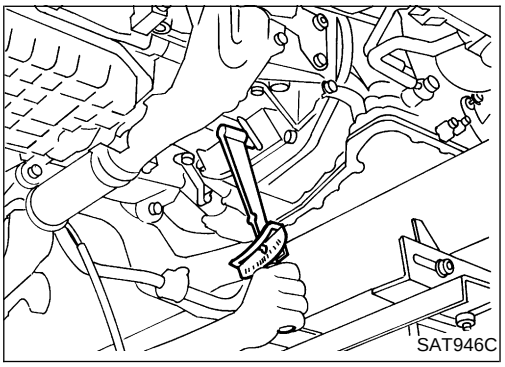


SAT044A

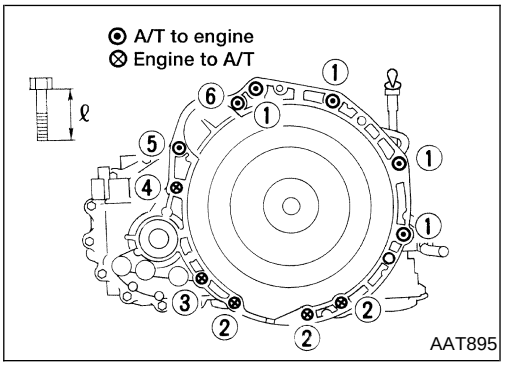
- When connecting torque converter to transaxle, measure distance "A" to be certain that they are correctly assembled.

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.**



AAT895

- Tighten bolts securing transaxle.
- Tighten LH mounting bracket bolts to the specified torque. Refer to EM section, "ENGINE REMOVAL".
- Tighten center member bolts to the specified torque. Refer to EM section, "ENGINE REMOVAL".
- Tighten rear plate cover bolts to the specified torque. Refer to EM section, "OIL PAN".

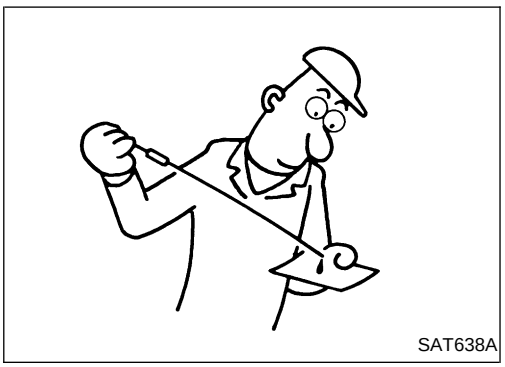
Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
①	39 - 49 (4.0 - 5.0, 29 - 36)	45 (1.77)
②	30 - 36 (3.1 - 3.7, 22 - 27)	30 (1.18)
③	30 - 36 (3.1 - 3.7, 22 - 27)	40 (1.57)
④	74 - 83 (7.5 - 8.5, 54 - 61)	45 (1.77)
⑤	30 - 36 (3.1 - 3.7, 22 - 27)	80 (3.15)
⑥	30 - 36 (3.1 - 3.7, 22 - 27)	65 (2.56)

- Reinstall any part removed.
- Tighten starter motor to transaxle.

: 30.40 - 41.29 N·m (3.1 - 4.2 kg-m, 22.4 - 30.5 ft-lb)

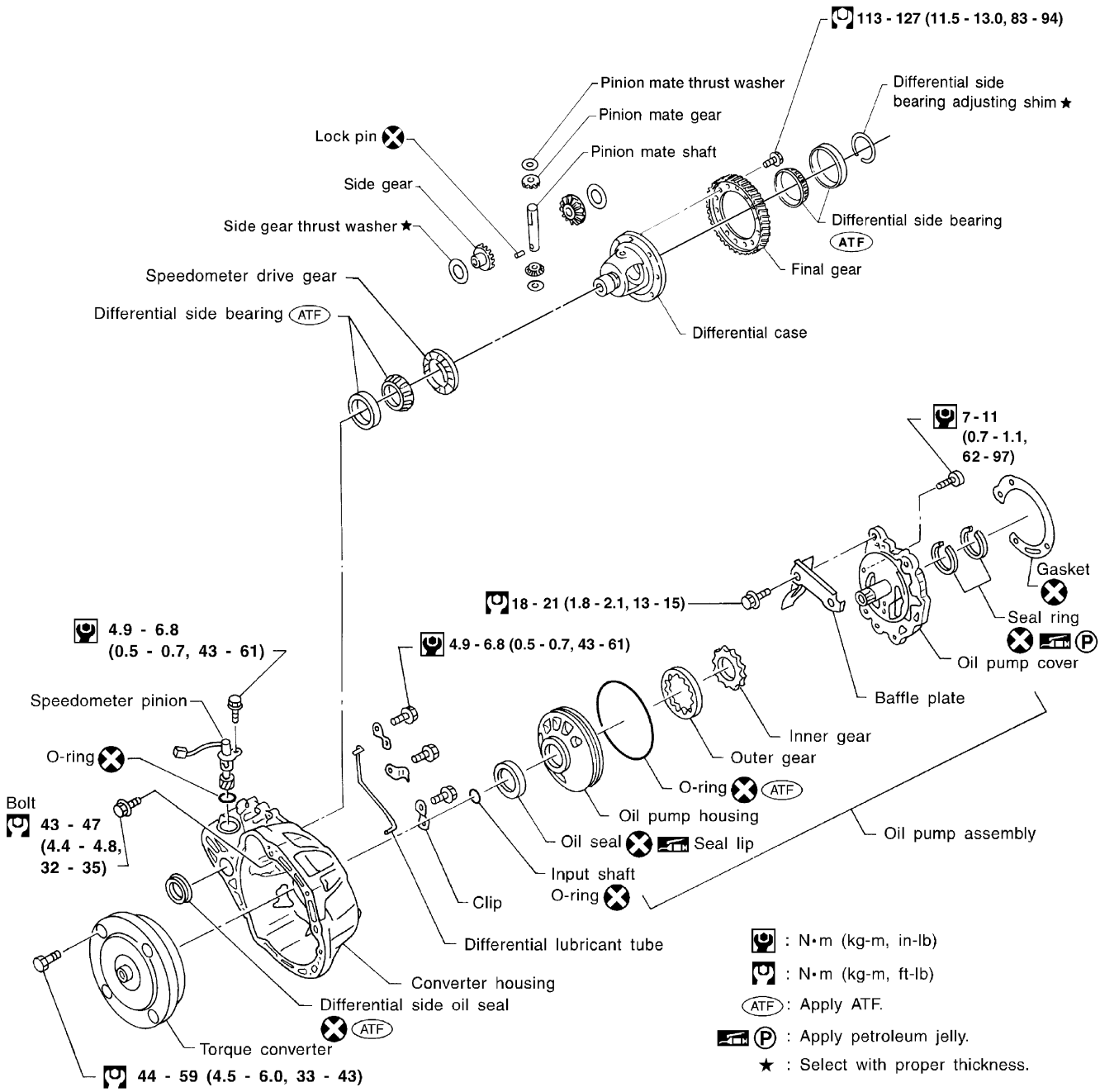
Installation (Cont'd)

- Install drive shafts. Refer to FA SECTION (''INSTALLATION'', ''FRONT AXLE—Drive Shaft'').

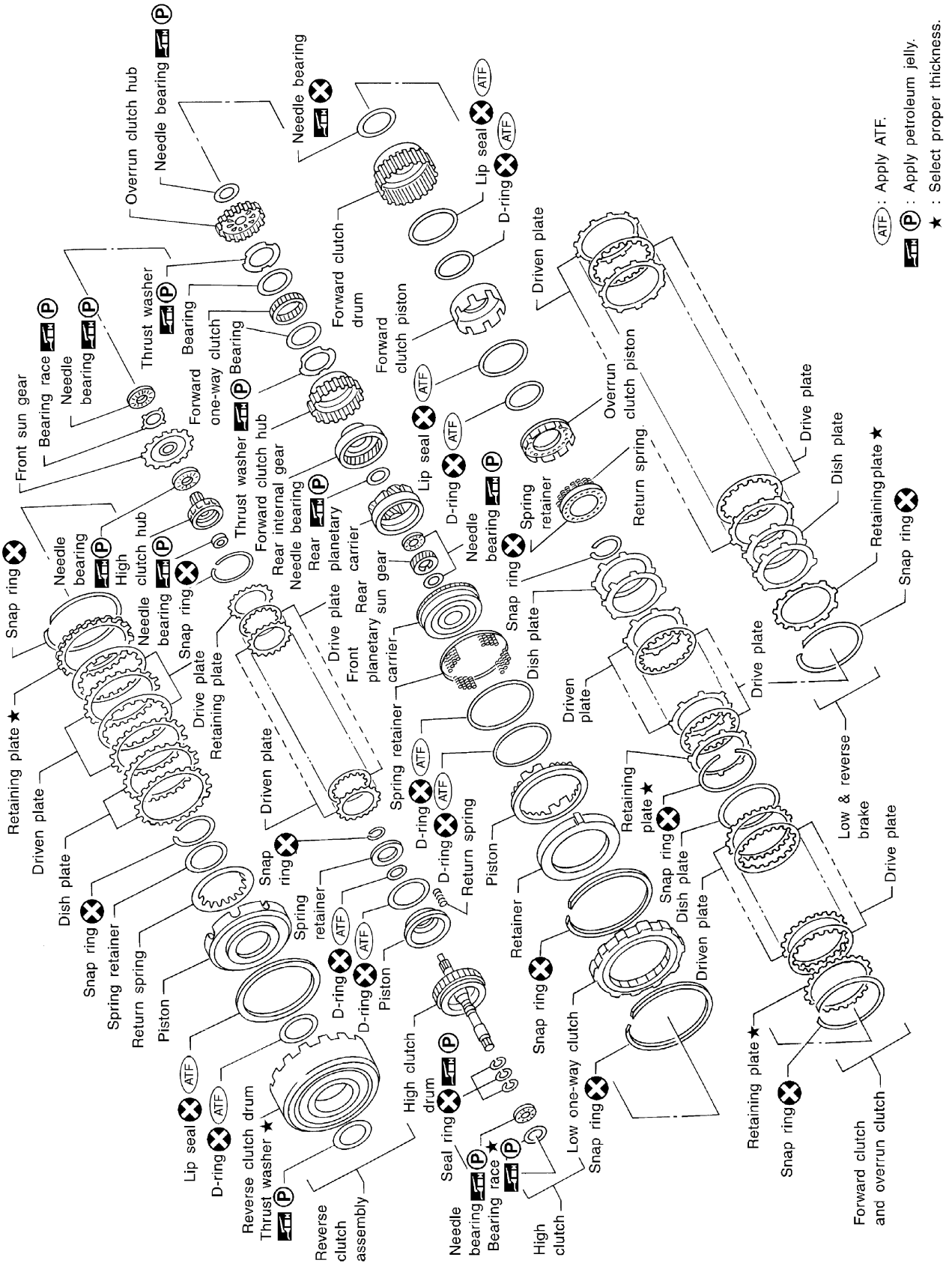

SAT638A

- 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-58.

SEC. 311•313•327•381

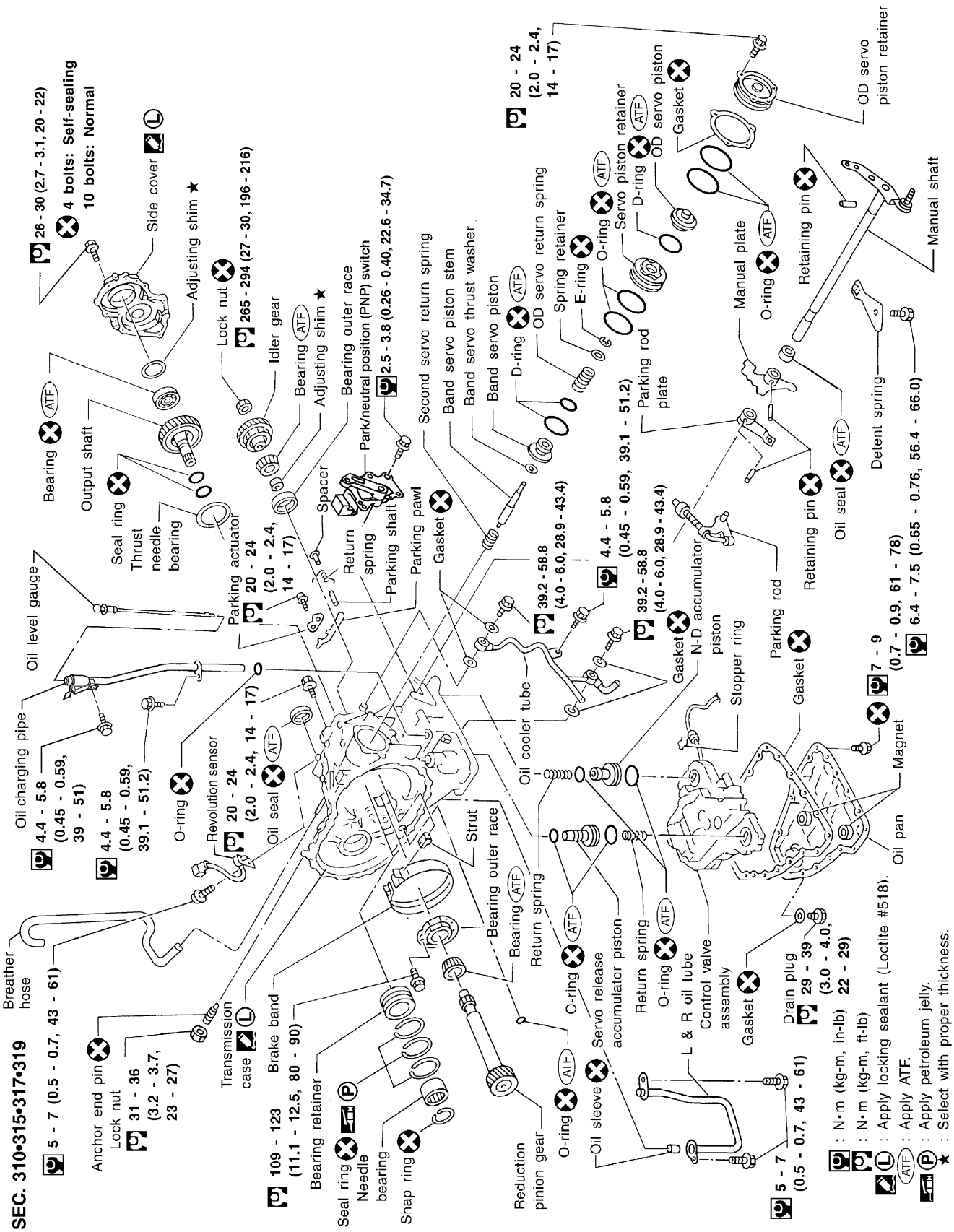


WAT075



SEC. 315

AAT461A


SEC. 310•315•317•319
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 (ATF)
Adjusting shim ★
Spacer
Bearing outer race
Park/neutral position (PNP) switch
2.5 - 3.8 (0.26 - 0.40, 22.6 - 34.7)
Second servo return spring
Band servo piston stem
Band servo thrust washer
Band servo piston
D-ring (ATF)
OD servo return spring
20 - 24 (2.0 - 2.4, 14 - 17)
Spring retainer
E-ring
O-ring (ATF)
Servo piston retainer
D-ring (ATF)
OD servo piston
Gasket
OD servo piston retainer
Manual plate
O-ring (ATF)
Retaining pin
Manual shaft
Detent spring
Oil seal (ATF)
Retaining pin
Parking rod
Parking rod plate
4.4 - 5.8 (0.45 - 0.59, 39.1 - 51.2)
Gasket
N-D accumulator piston
Stopper ring
Gasket
Parking rod
39.2 - 58.8 (4.0 - 6.0, 28.9 - 43.4)
Oil cooler tube
Oil pan
Magnet
7 - 9 (0.7 - 0.9, 61 - 78)
6.4 - 7.5 (0.65 - 0.76, 56.4 - 66.0)
Drain plug
29 - 39 (3.0 - 4.0, 22 - 29)
Gasket
Control valve assembly
L & R oil tube
Return spring
O-ring (ATF)
Servo release accumulator piston
Oil sleeve
O-ring (ATF)
Return spring
Bearing (ATF)
Bearing outer race
Strut
Reduction pinion gear
Snap ring
Needle bearing
Seal ring
Bearing retainer
Brake band
109 - 123 (11.1 - 12.5, 80 - 90)
Transmission case
Anchor end pin
Lock nut
31 - 36 (3.2 - 3.7, 23 - 27)
Breather hose
5 - 7 (0.5 - 0.7, 43 - 61)
Oil charging pipe
4.4 - 5.8 (0.45 - 0.59, 39 - 51)
4.4 - 5.8 (0.45 - 0.59, 39.1 - 51.2)
O-ring
Revolution sensor
20 - 24 (2.0 - 2.4, 14 - 17)
Oil seal (ATF)
Oil level gauge
Parking actuator
20 - 24 (2.0 - 2.4, 14 - 17)
Parking shaft
Return spring
Parking pawl
Gasket
Bearing (ATF)
Output shaft
Seal ring
Thrust needle bearing
5 - 7 (0.5 - 0.7, 43 - 61)
: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)
: Apply locking sealant (Loctite #518).
: Apply ATF.
: Apply petroleum jelly.
: Select with proper thickness.

WAT295

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

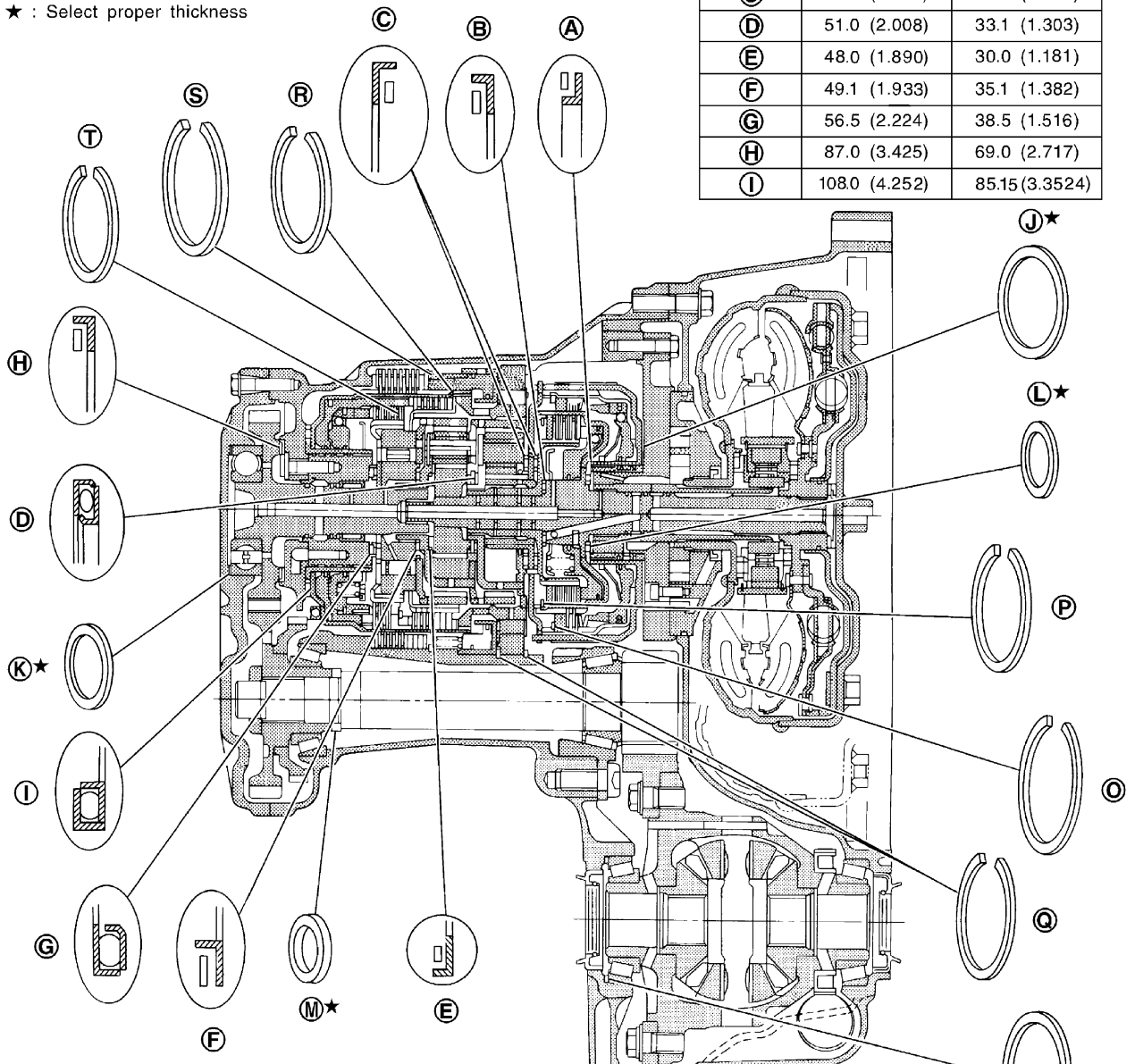
Outer diameter of thrust washers

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)

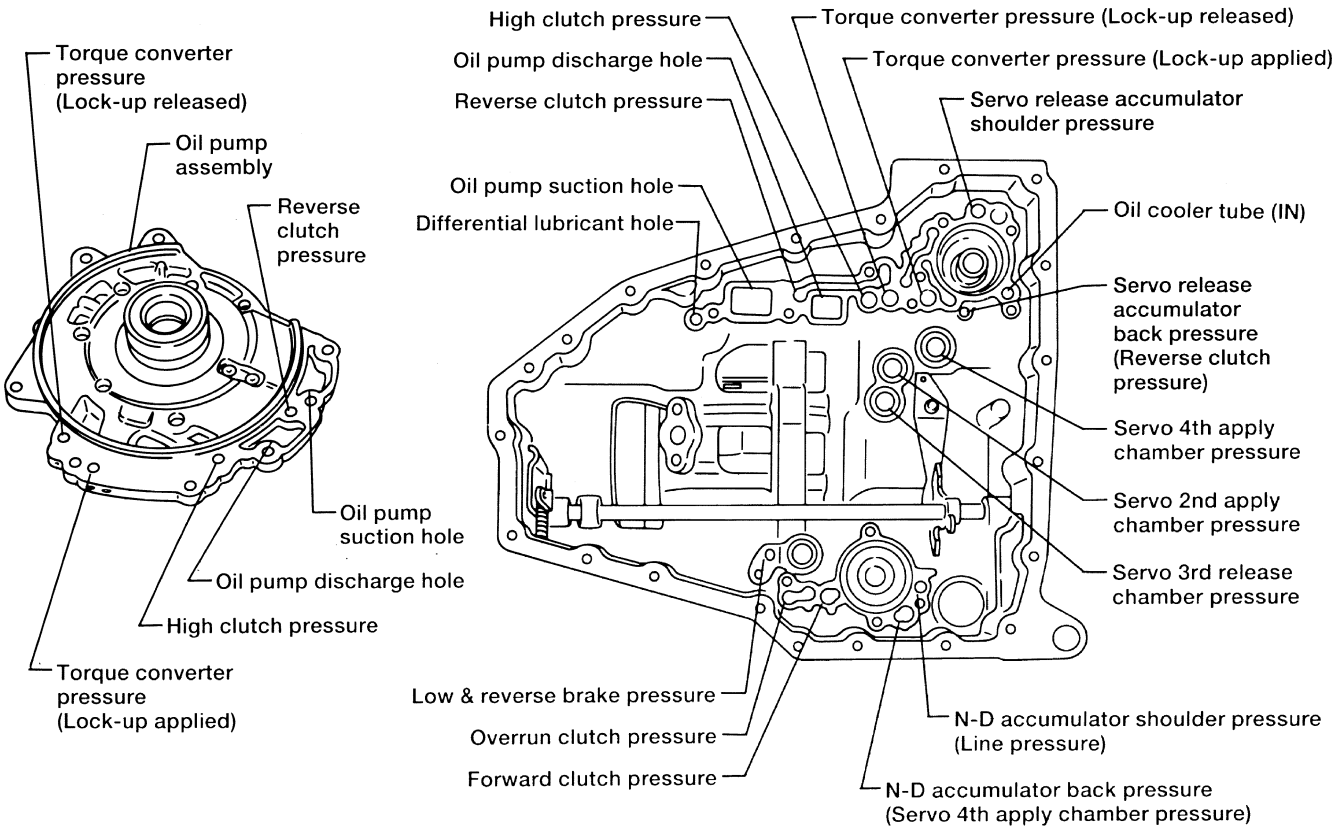
★ : Select proper thickness

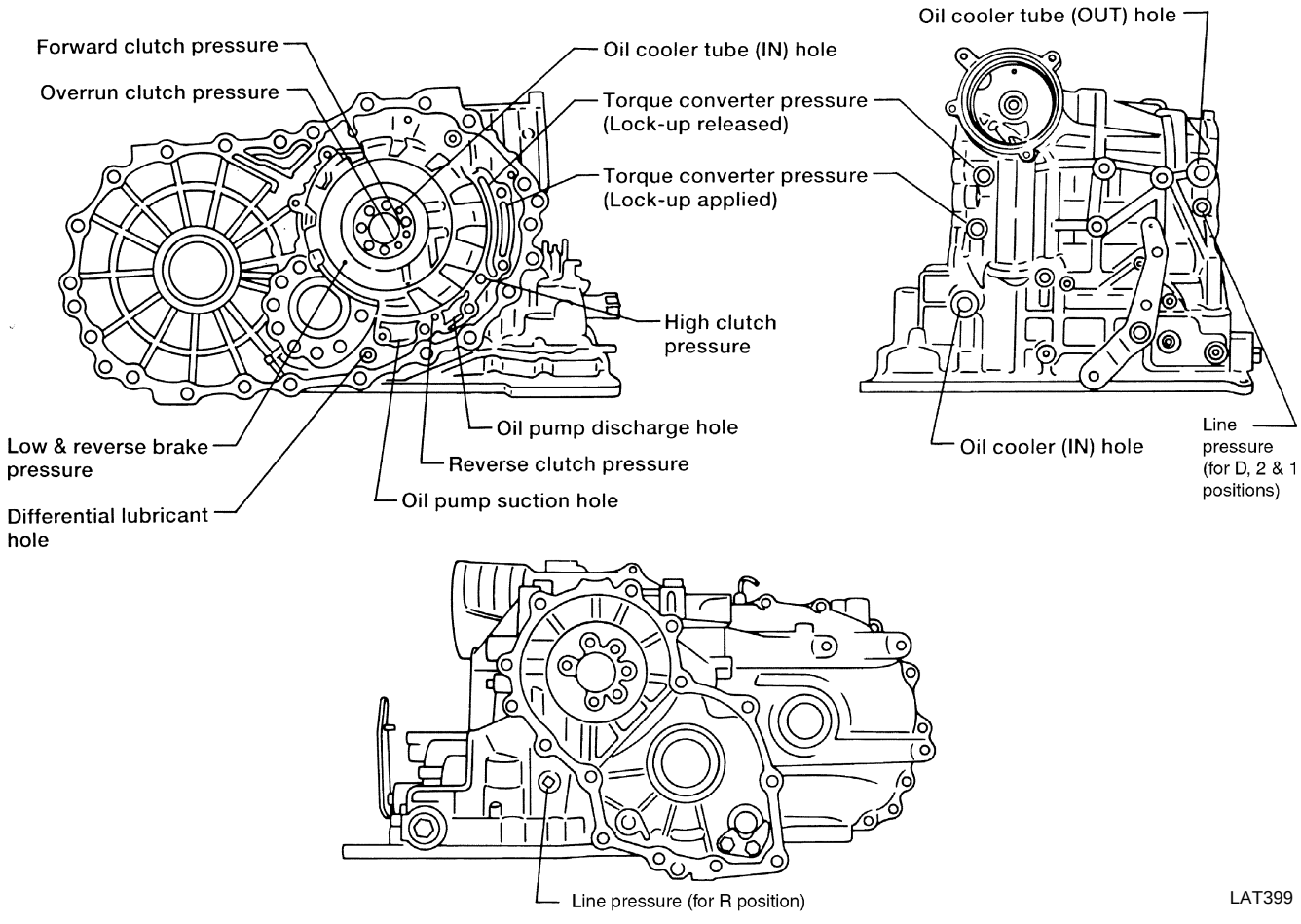
Outer diameter of snap rings

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)

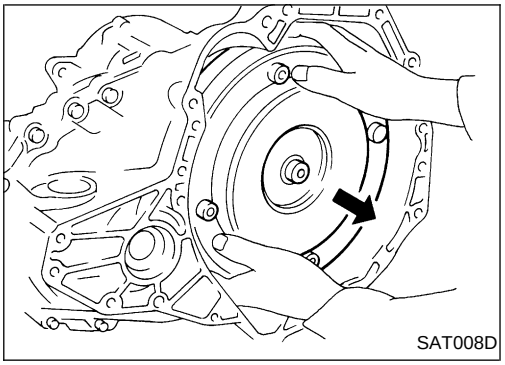
WAT077

Oil Channel

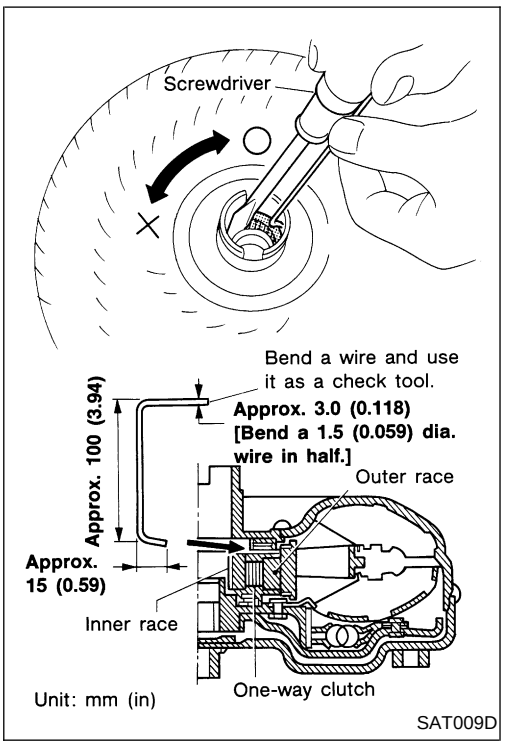




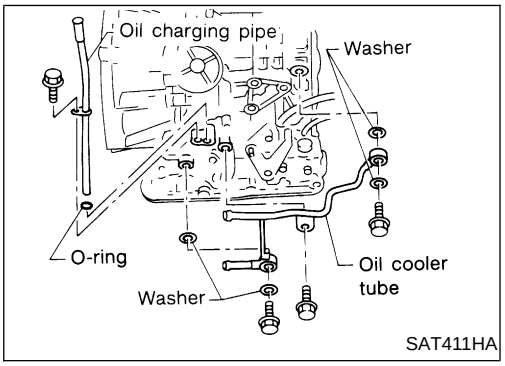
LAT399



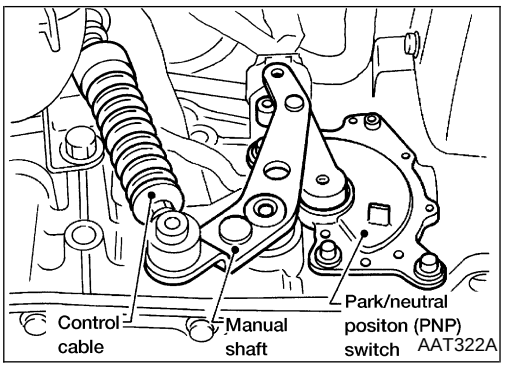
1. Drain ATF through drain plug.
2. Remove torque converter.



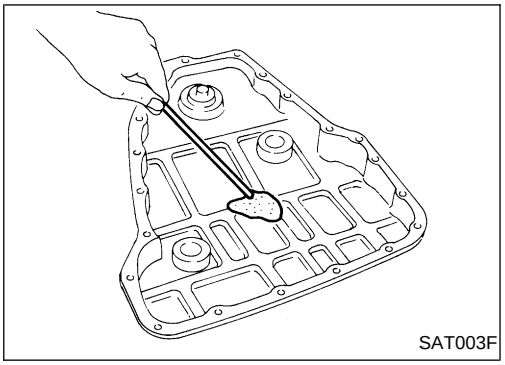
3. Check torque converter one-way clutch using check tool as shown at left.
a. Insert check tool into the groove of bearing support built into one-way clutch outer race.
b. When fixing bearing support with check tool, rotate one-way clutch spline using screwdriver.
c. Check that inner race rotates clockwise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



4. Remove oil charging pipe and oil cooler tube.



5. Set manual shaft to position ‘‘P’’.
6. Remove park/neutral position (PNP) switch.


SAT003F

7. Remove oil pan and oil pan gasket.

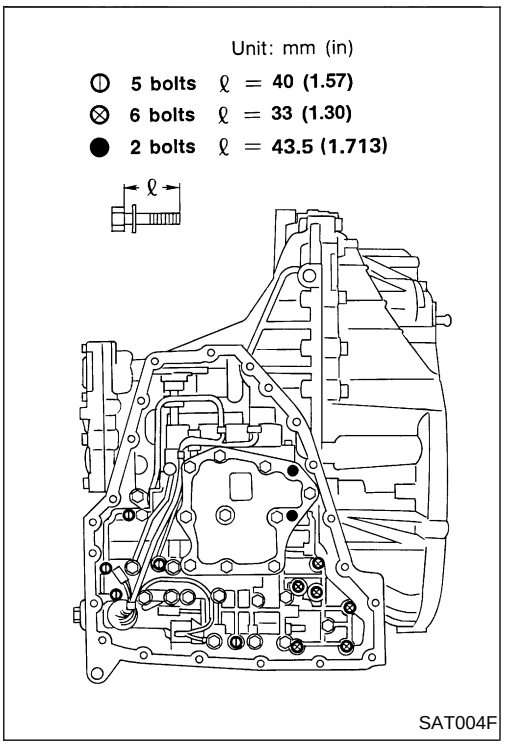
- **Always replace oil pan bolts as they are self-sealing bolts.**

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.

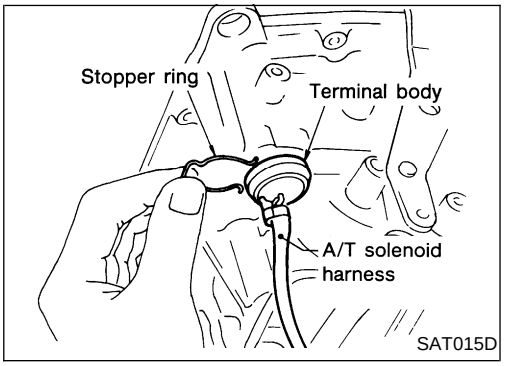
- **If frictional material is detected, replace radiator after repair of A/T. Refer to LC section, ''Radiator''.**

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

a. Remove control valve assembly mounting bolts Ⓘ, Ⓧ and ● .

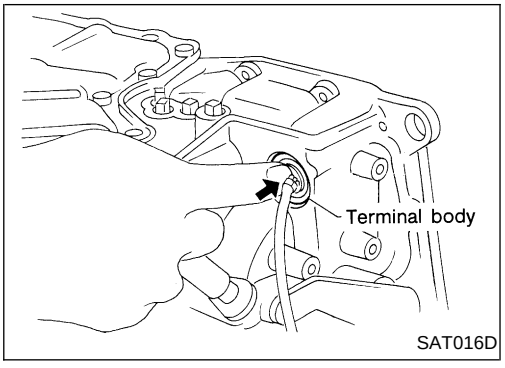


SAT004F



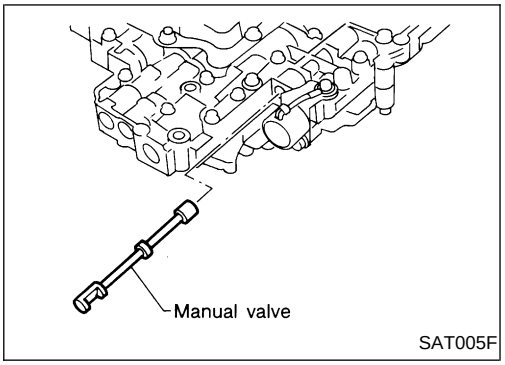
SAT015D

b. Remove stopper ring from terminal body.

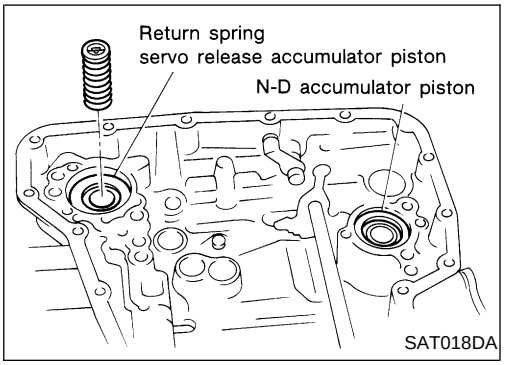


SAT016D

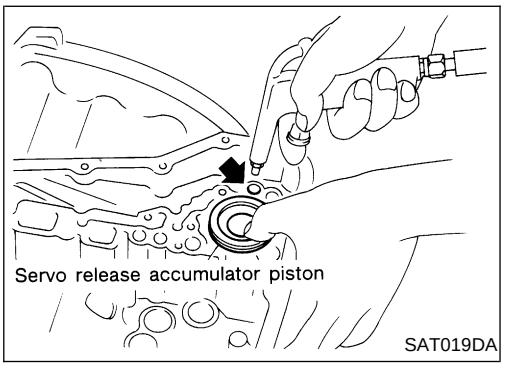
c. Push terminal body into transmission case and draw out solenoid harness.



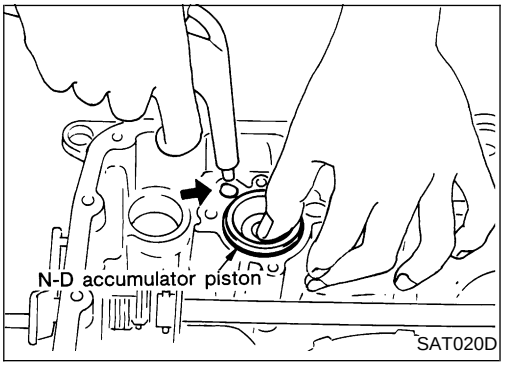
10. Remove manual valve from control valve assembly.



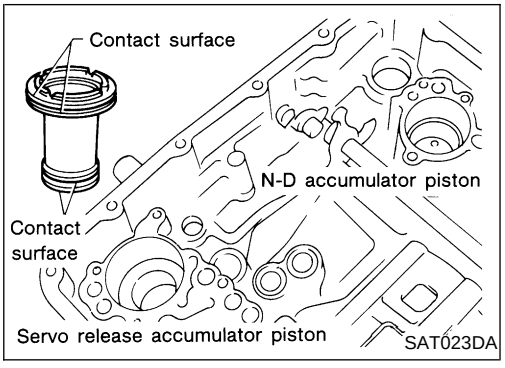
11. Remove return spring from servo release accumulator piston.



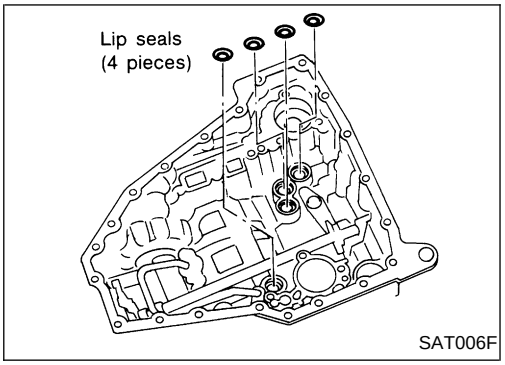
12. Remove servo release accumulator piston with compressed air.
13. Remove O-rings from servo release accumulator piston.



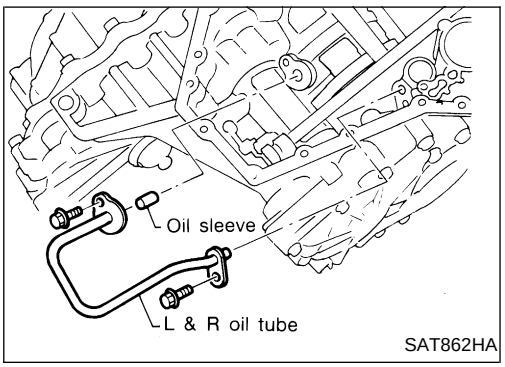
14. Remove N-D accumulator piston and return spring with compressed air.
15. Remove O-rings from N-D accumulator piston.



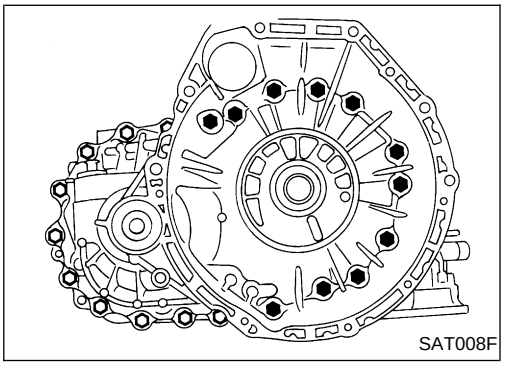
16. Check accumulator pistons and contact surface of transmission case for damage.
17. Check accumulator return springs for damage and free length.



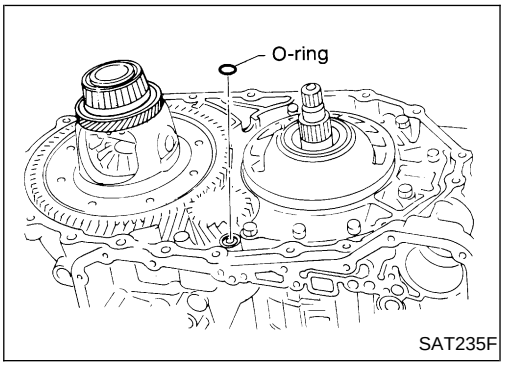
18. Remove lip seals.



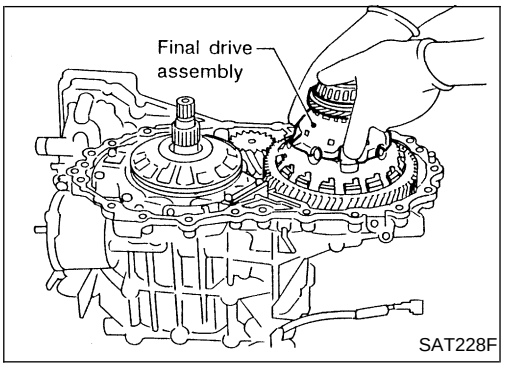
19. Remove L & R oil tube and oil sleeve.



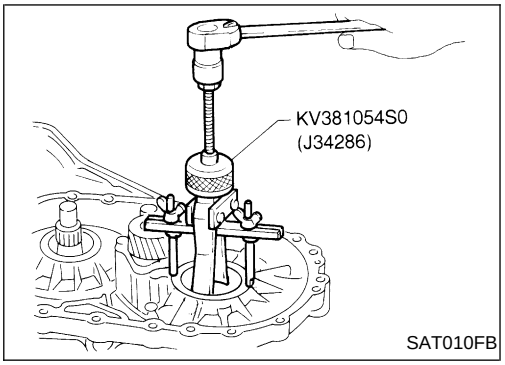
20. Remove converter housing according to the following procedures.
a. Remove converter housing mounting bolts.
b. Remove converter housing by tapping it lightly.



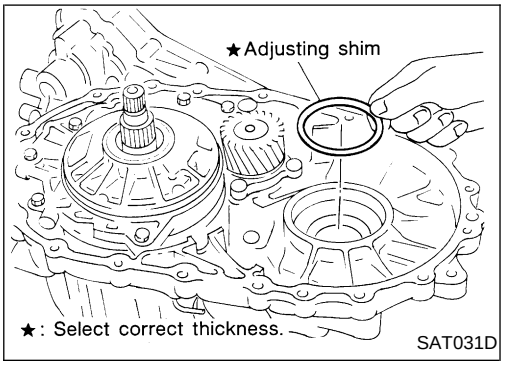
c. Remove O-ring from differential oil port.



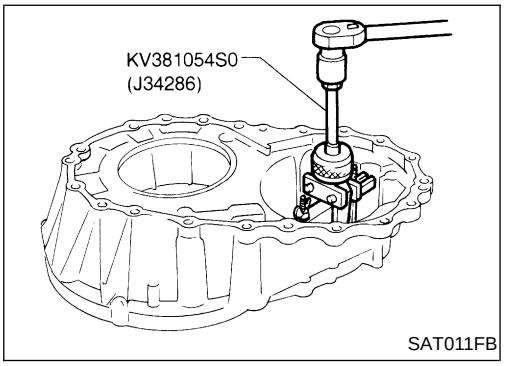
21. Remove final drive assembly from transmission case.



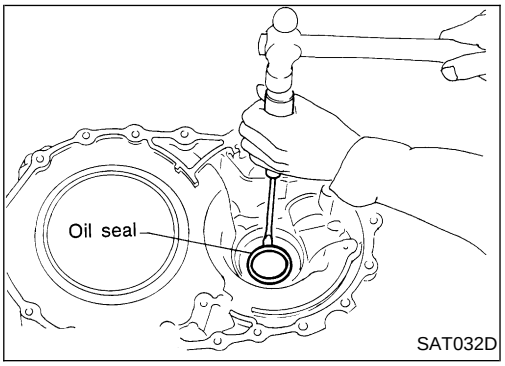
22. Remove differential side bearing outer race from transmission case.



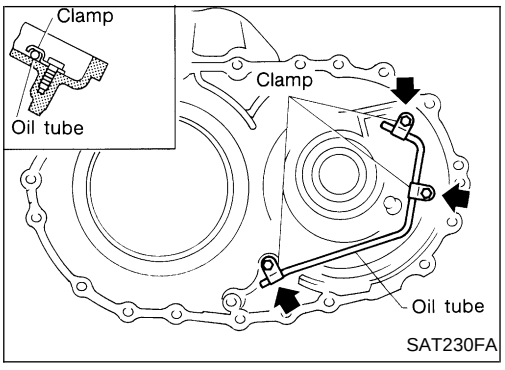
23. Remove differential side bearing adjusting shim from transmission case.



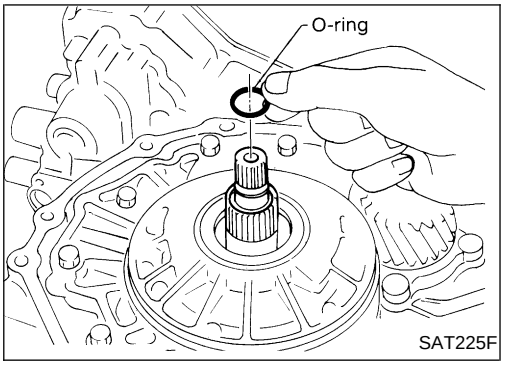
24. Remove differential side bearing outer race from converter housing.



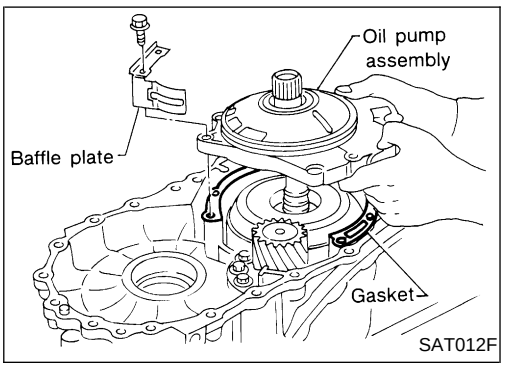
25. Remove oil seal with screwdriver from converter housing.
- **Be careful not to damage case.**



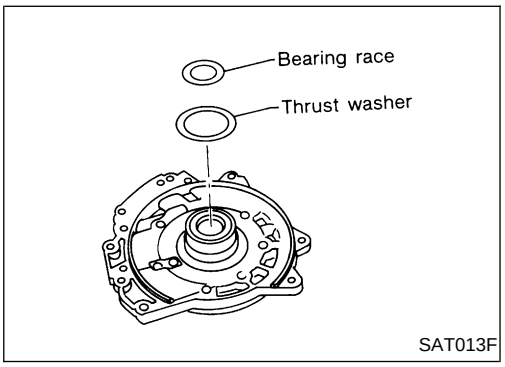
26. Remove oil tube from converter housing.



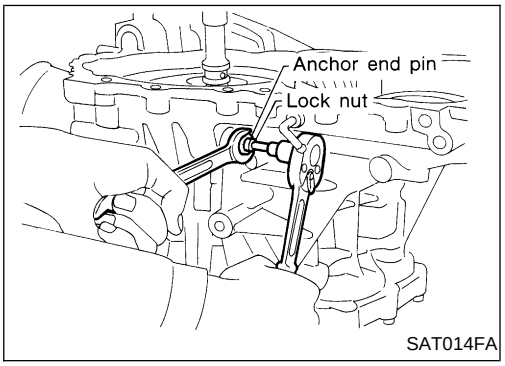
27. Remove oil pump according to the following procedures.
a. Remove O-ring from input shaft.



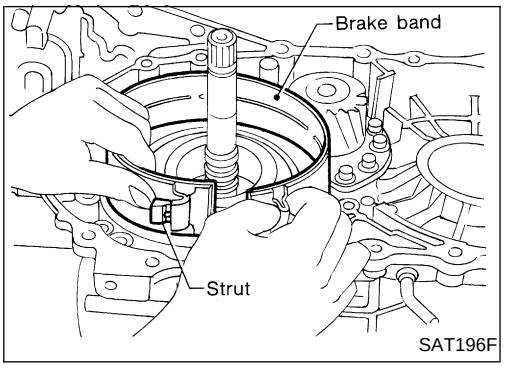
b. Remove oil pump assembly, baffle plate and gasket from transmission case.



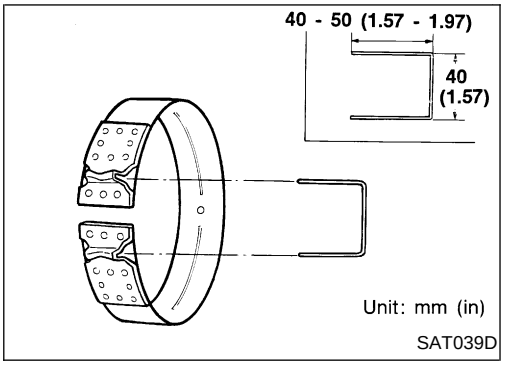
c. Remove thrust washer and bearing race from oil pump assembly.



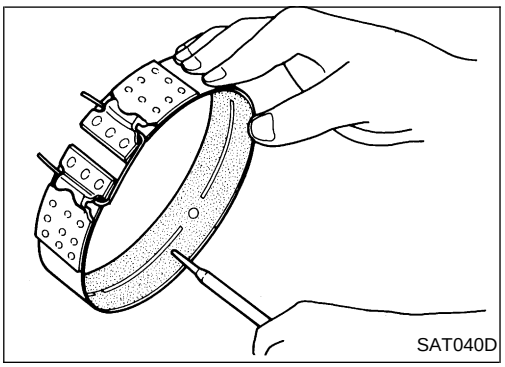
28. Remove brake band according to the following procedures.
a. Loosen lock nut, then back off anchor end pin.
- **Do not reuse anchor end pin.**



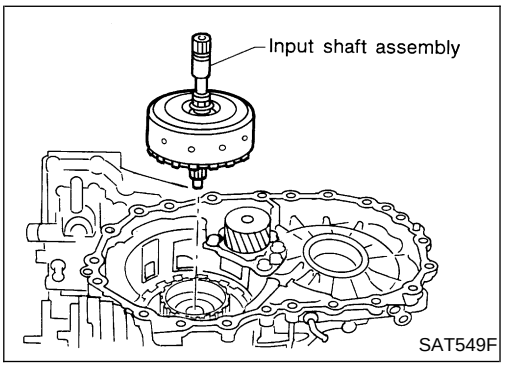
b. Remove brake band and strut from transmission case.



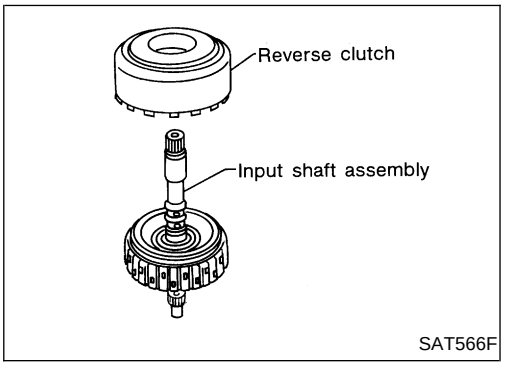
- **To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at left.**
  Leave the clip in position after removing the brake band.



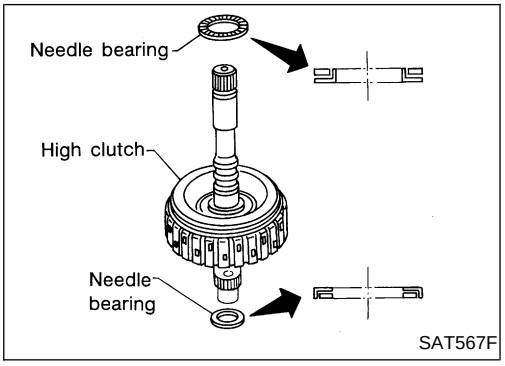
c. Check brake band facing for damage, cracks, wear or burns.



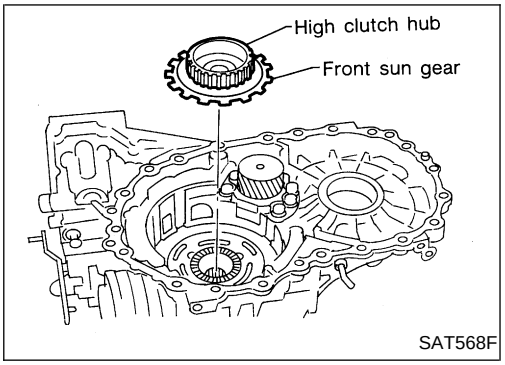
29. Remove input shaft assembly (high clutch) and reverse clutch according to the following procedures.
a. Remove input shaft assembly (high clutch) with reverse clutch.



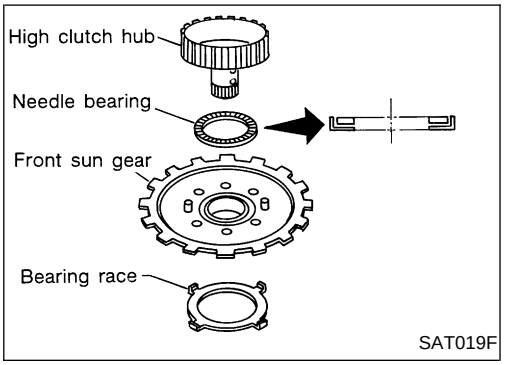
b. Remove input shaft assembly (high clutch) from reverse clutch.



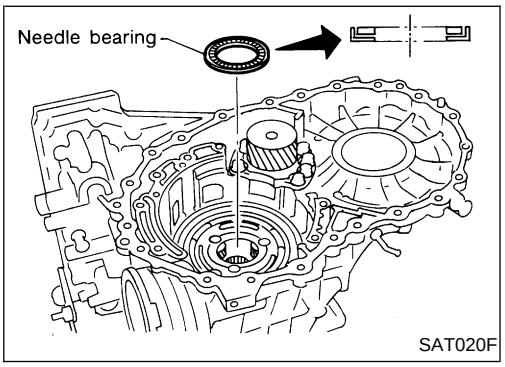
c. Remove needle bearings from high clutch drum and check for damage or wear.



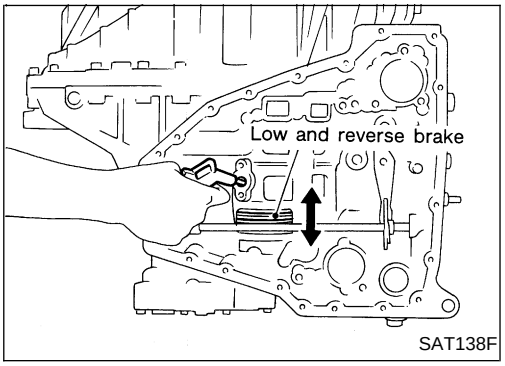
d. Remove high clutch hub and front sun gear from transmission case.



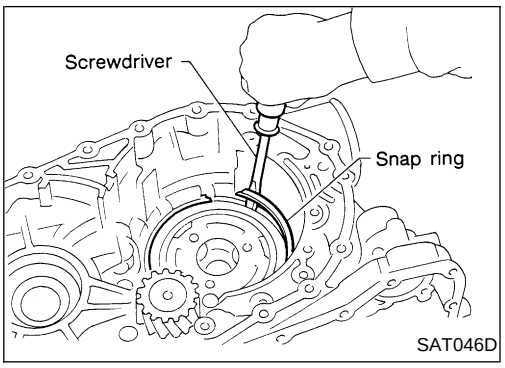
e. Remove front sun gear and needle bearing from high clutch hub and check for damage or wear.
f. Remove bearing race from front sun gear and check for damage or wear.



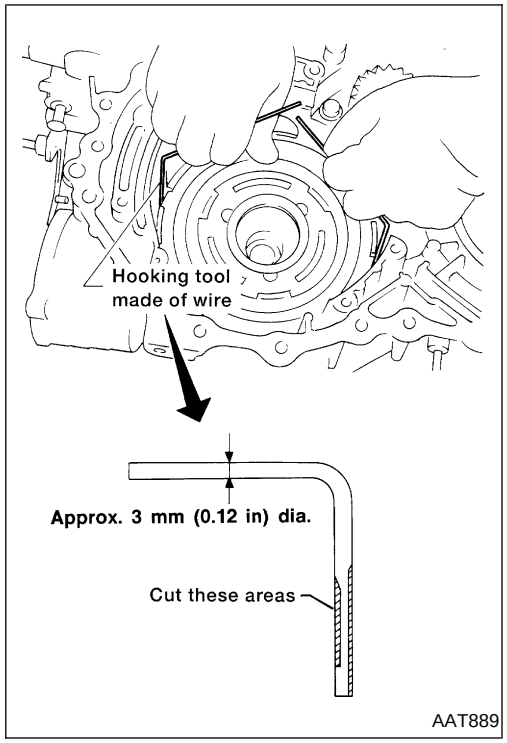
30. Remove needle bearing from transmission case and check for damage or wear.



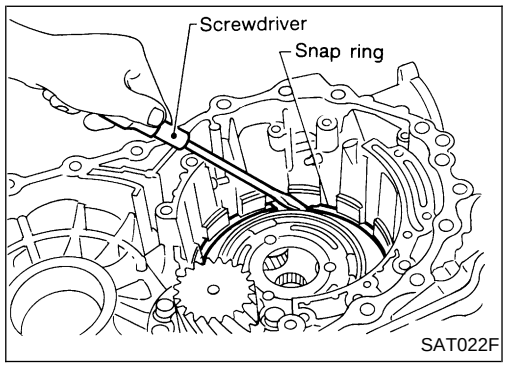
31. Apply compressed air and check to see that low and reverse brake operates.



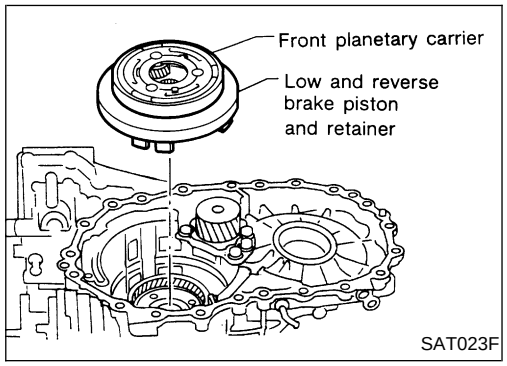
32. Remove low one-way clutch and front planetary carrier assembly according to the following procedures.
a. Remove snap ring with flat-bladed screwdriver.



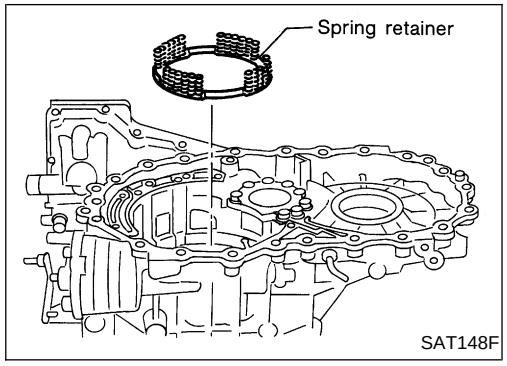
b. Remove low one-way clutch with a hook made of wire.



c. Remove snap ring with flat-bladed screwdriver.

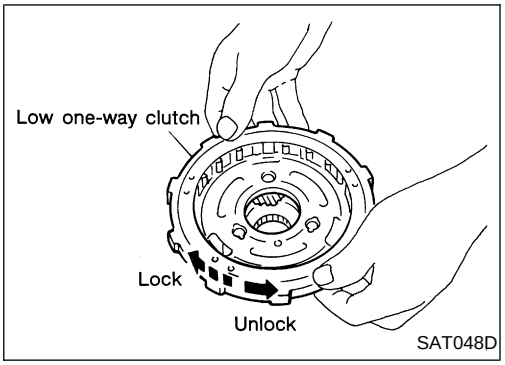


d. Remove front planetary carrier with low and reverse brake piston and retainer.

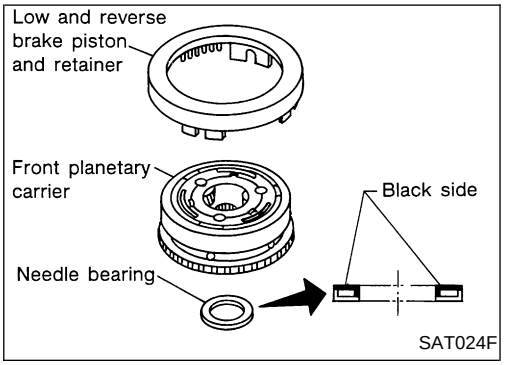


e. Remove low and reverse brake spring retainer.

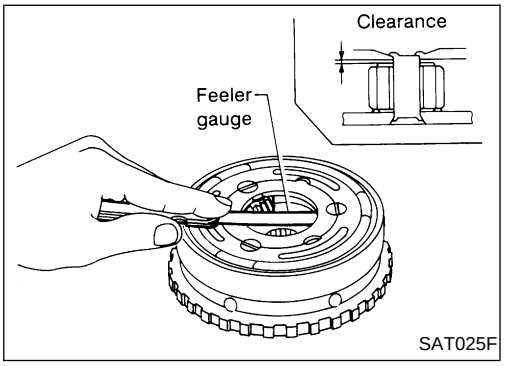
- **Do not remove return springs from spring retainer.**



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.

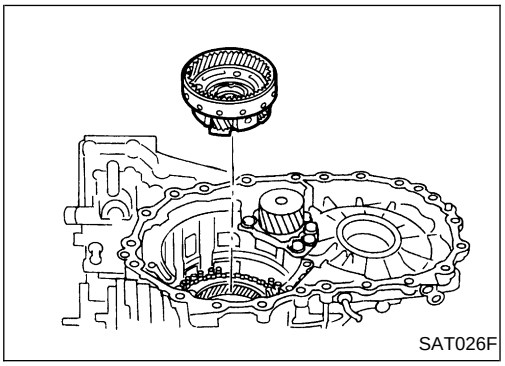
Standard clearance:

0.20 - 0.70 mm (0.0079 - 0.0276 in)

Allowable limit:

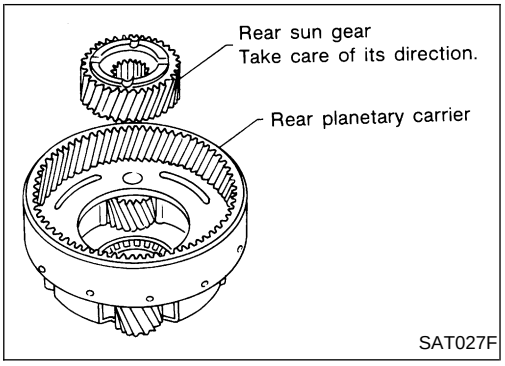
0.80 mm (0.0315 in)

Replace front planetary carrier if the clearance exceeds allowable limit.

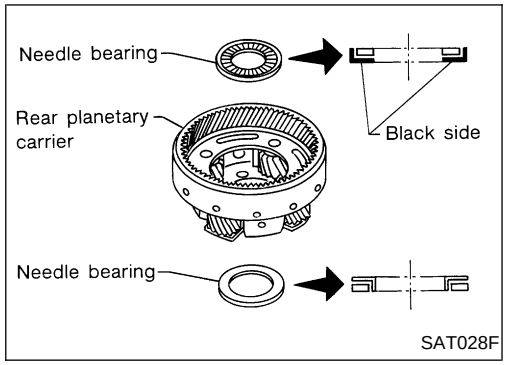


33. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.

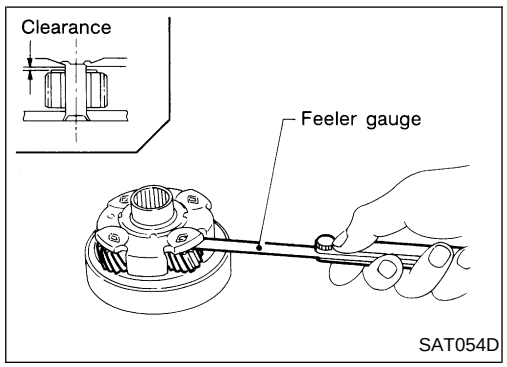
a. Remove rear planetary carrier assembly from transmission case.



b. Remove rear sun gear from rear planetary carrier.



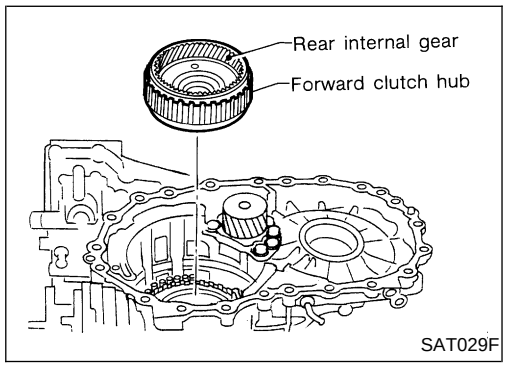
c. Remove needle bearings from rear planetary carrier assembly.



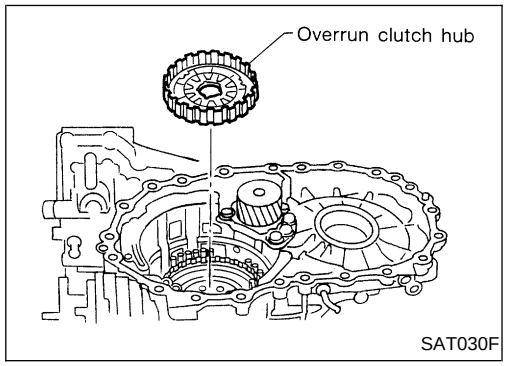
d. Check rear planetary carrier, rear sun gear and needle bearings for damage or wear.
e. Check clearance between pinion washer and rear planetary carrier with feeler gauge.

Standard clearance:
0.20 - 0.70 mm (0.0079 - 0.0276 in)
Allowable limit:
0.80 mm (0.0315 in)

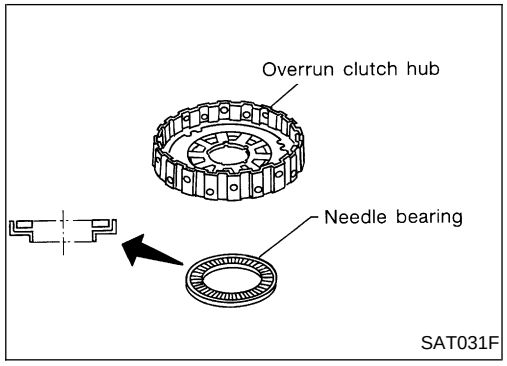
Replace rear planetary carrier if the clearance exceeds allowable limit.



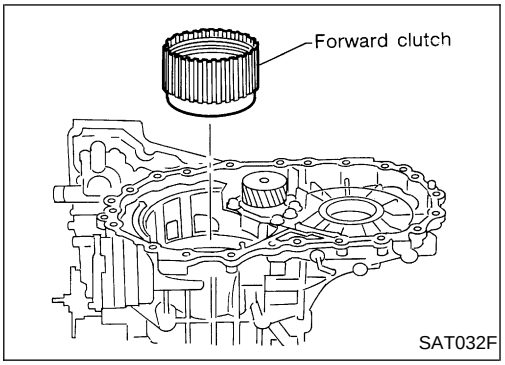
34. Remove rear internal gear and forward clutch hub from transmission case.



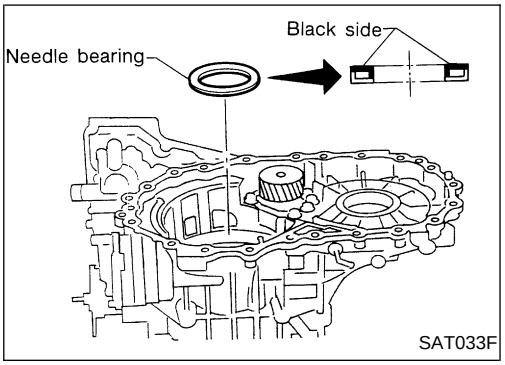
35. Remove overrun clutch hub from transmission case.



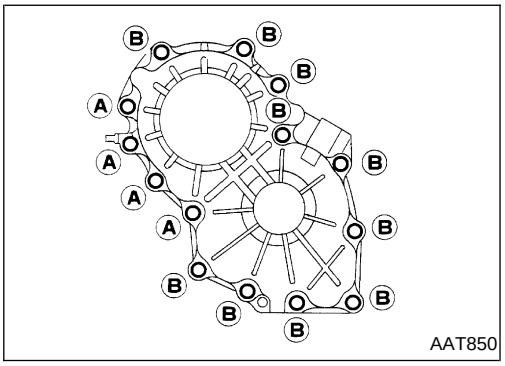
36. Remove needle bearing from overrun clutch hub and check for damage or wear.



37. Remove forward clutch assembly from transmission case.



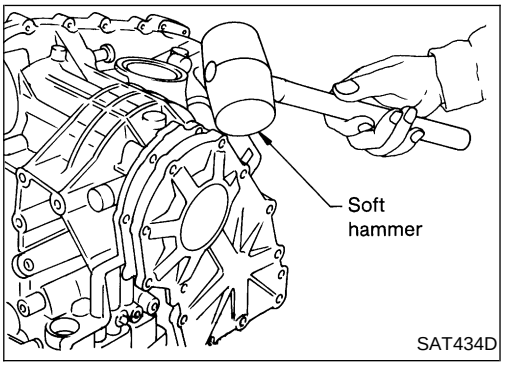
38. Remove needle bearing from transmission case.



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

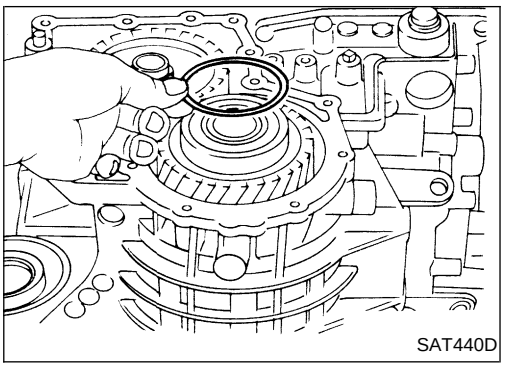
a. Remove side cover bolts.

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

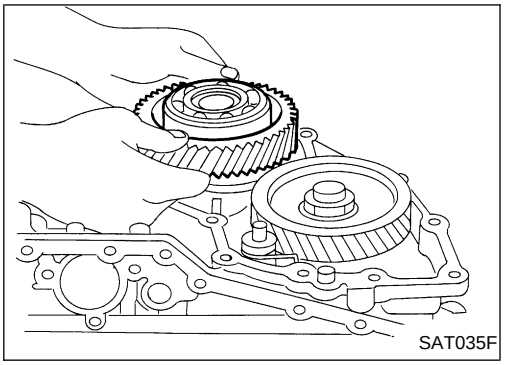


b. Remove side cover by lightly tapping it with a soft hammer.

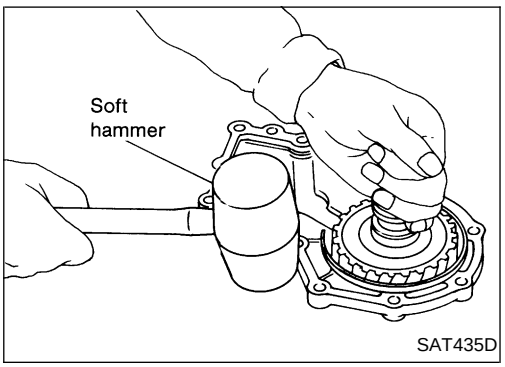
- **Be careful not to drop output shaft assembly. It might come out when removing side cover.**



c. Remove adjusting shim.

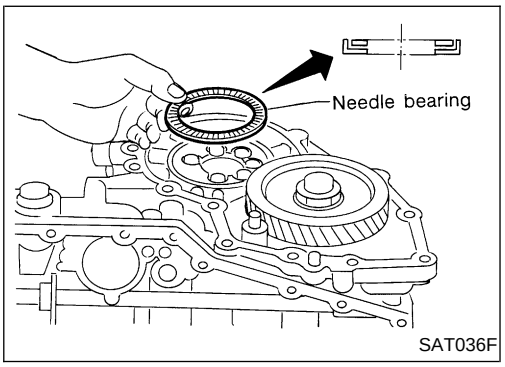

SAT035F

d. Remove output shaft assembly.



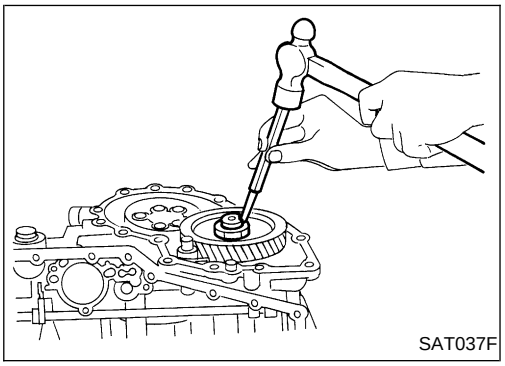
SAT435D

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

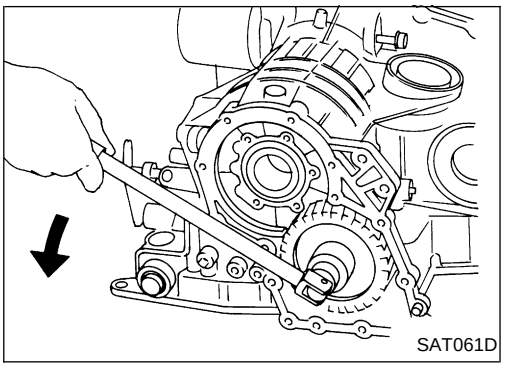


SAT036F

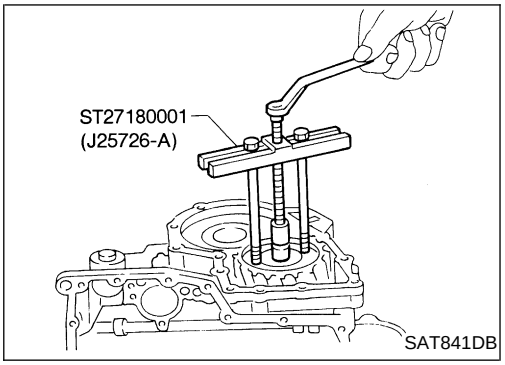
e. Remove needle bearing.


SAT037F

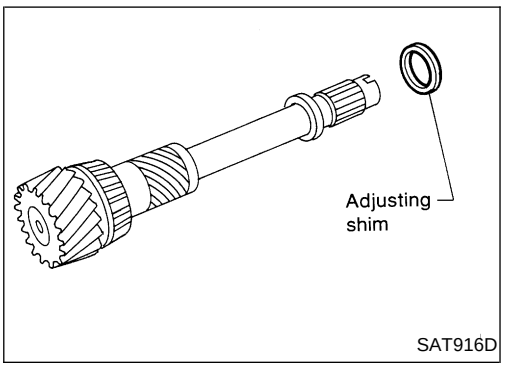
40. Disassemble reduction pinion gear according to the following procedures.
a. Set manual shaft to position ‘‘P’’ to fix idler gear.
b. Unlock idler gear lock nut using a pin punch.


SAT061D

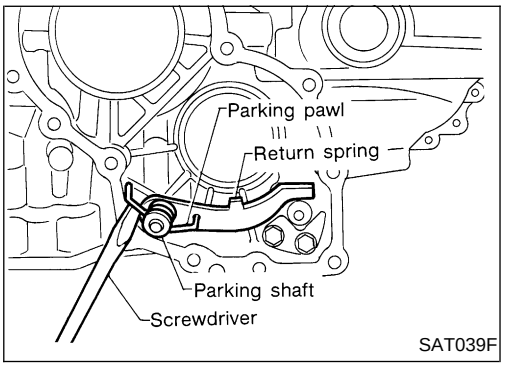
c. Remove idler gear lock nut.
- **Do not reuse idler gear lock nut.**



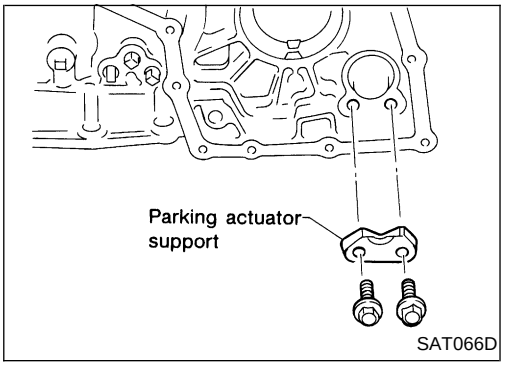
d. Remove idler gear with puller.



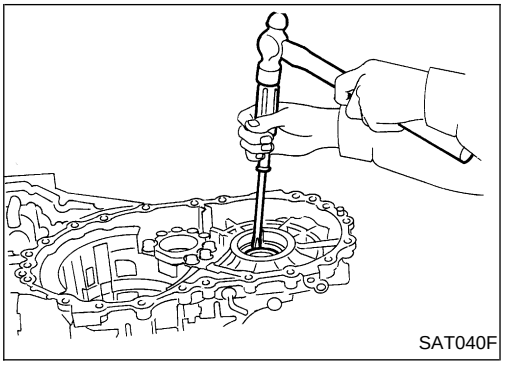
e. Remove reduction pinion gear.
f. Remove adjusting shim from reduction pinion gear.



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.

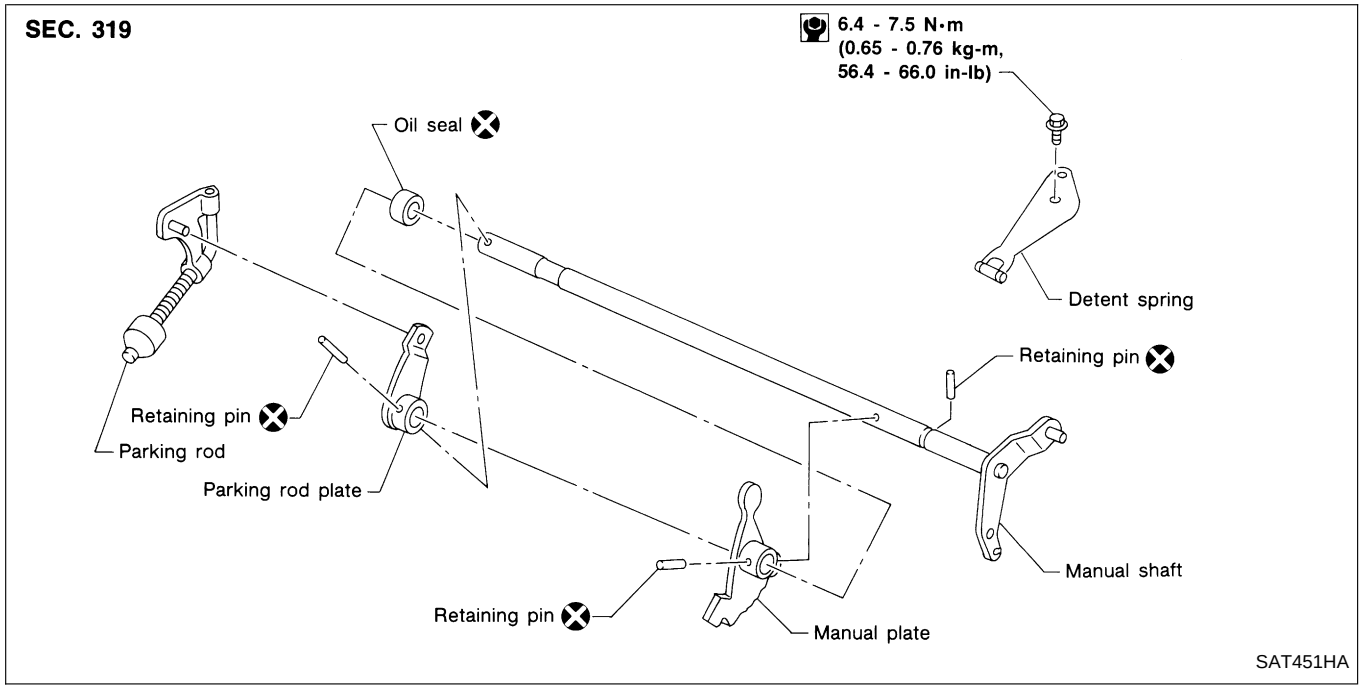


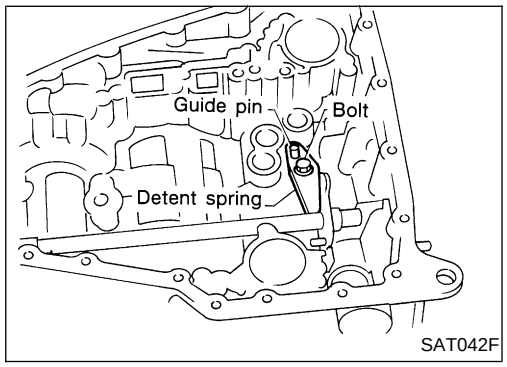
44. Remove parking actuator support from transmission case.
45. Check parking actuator support for damage or wear.



46. Remove side oil seal with screwdriver from transmission case.

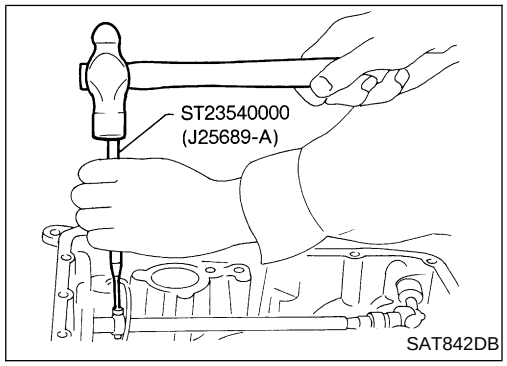
Manual Shaft



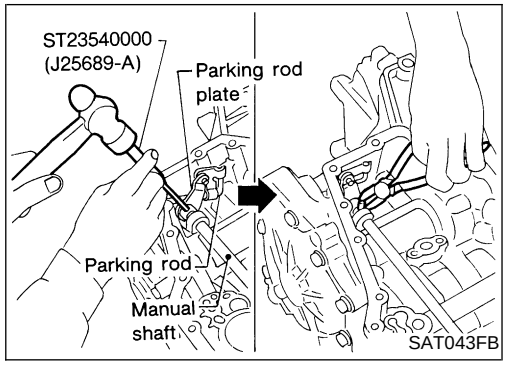


REMOVAL

1. Remove detent spring from transmission case.

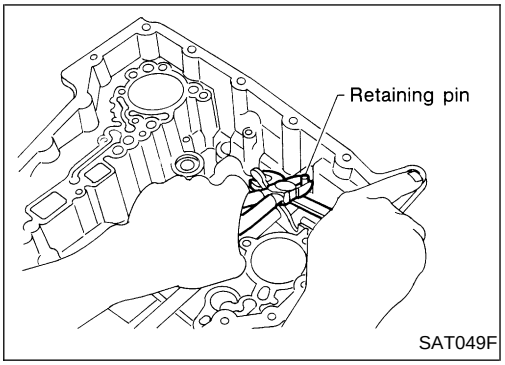


2. Drive out manual plate retaining pin.

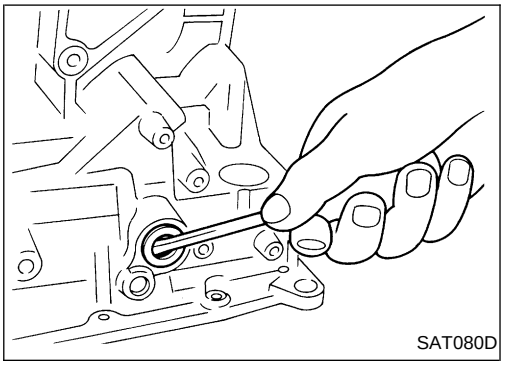


3. Drive and pull out parking rod plate retaining pin.
4. Remove parking rod plate from manual shaft.
5. Draw out parking rod from transmission case.

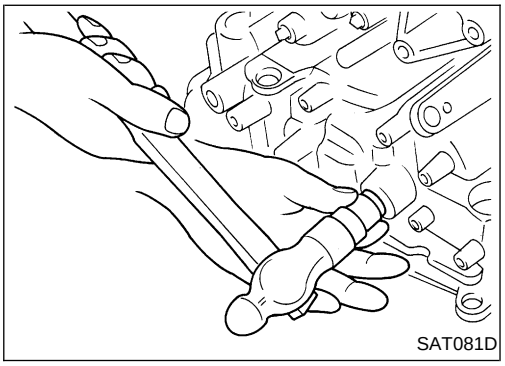
Manual Shaft (Cont'd)



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



8. Remove manual shaft oil seal.

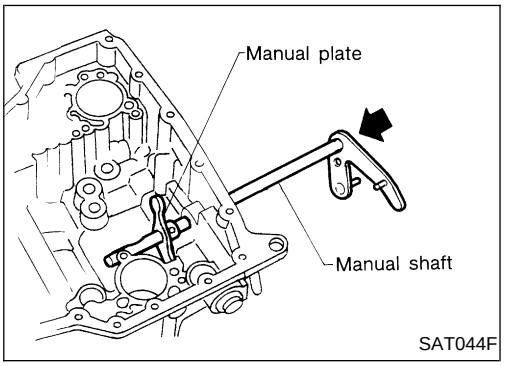


INSPECTION

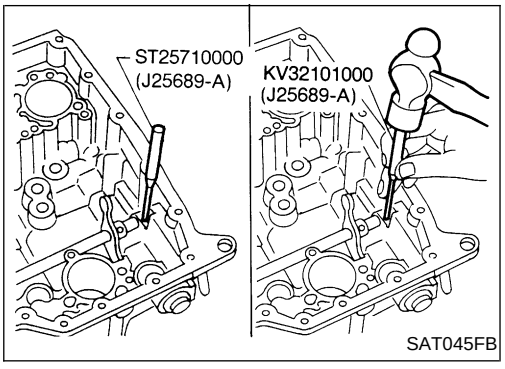
- Check component parts for wear or damage. Replace if necessary.

INSTALLATION

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

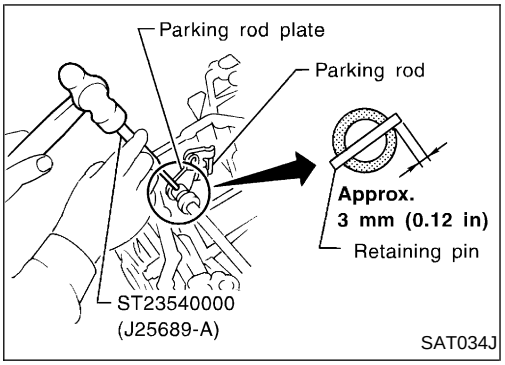


2. Install manual shaft and manual plate.

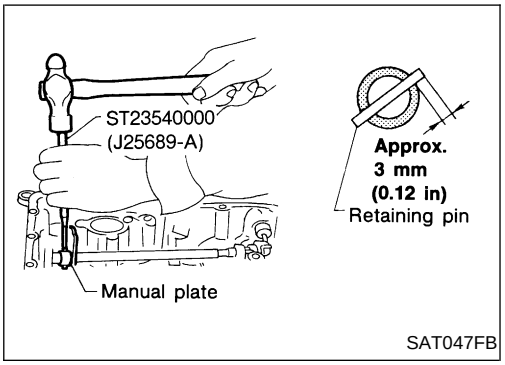


3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin up to bottom of hole.

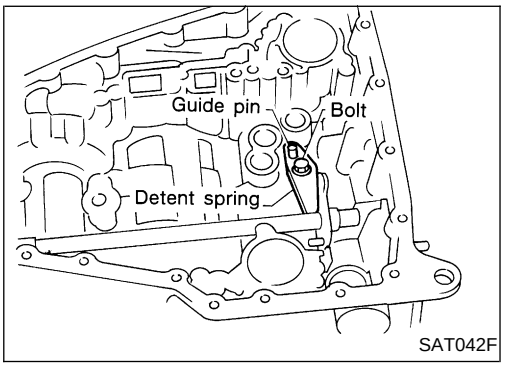
Manual Shaft (Cont'd)



5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft and drive retaining pin.
- **Both ends of pin should protrude.**

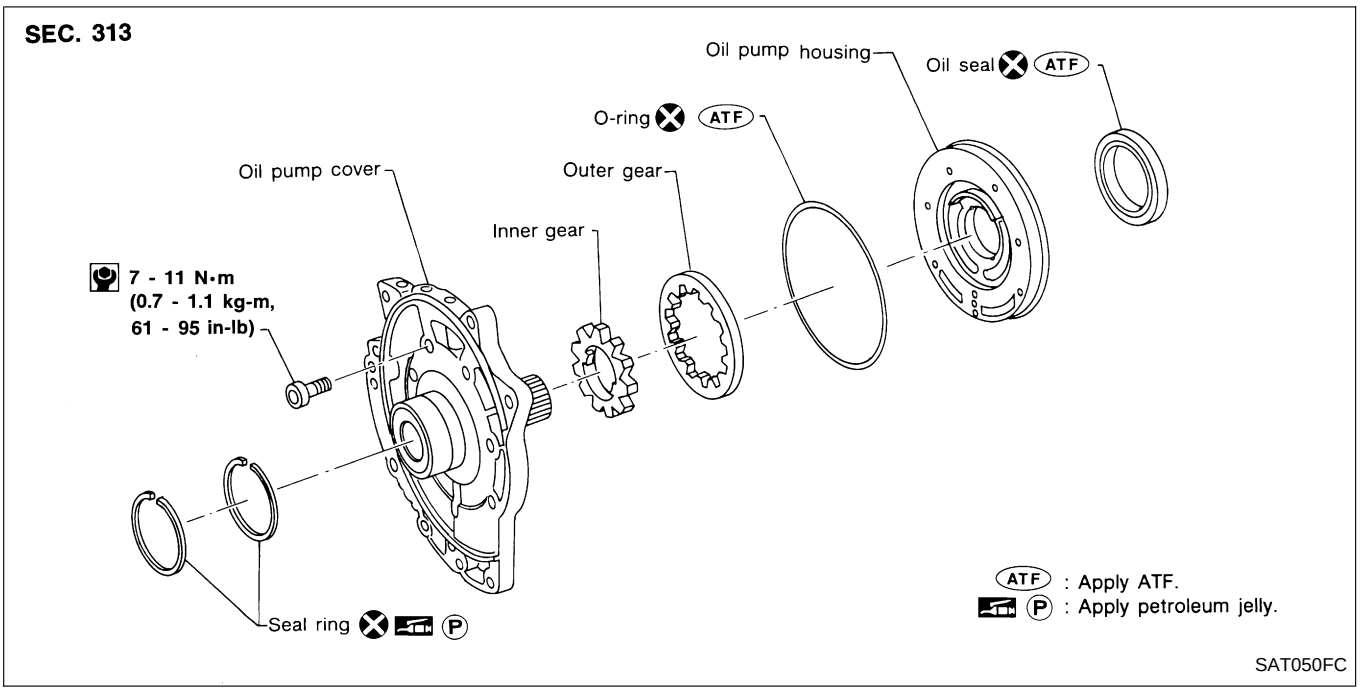


7. Drive manual plate retaining pin.
- **Both ends of pin should protrude.**



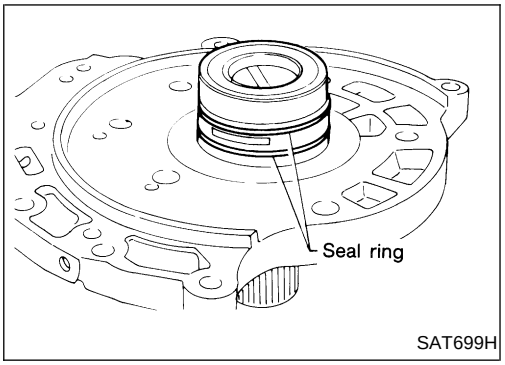
8. Install detent spring.

Oil Pump

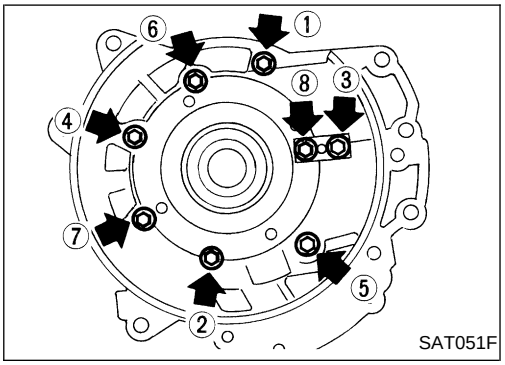


Oil Pump (Cont'd)

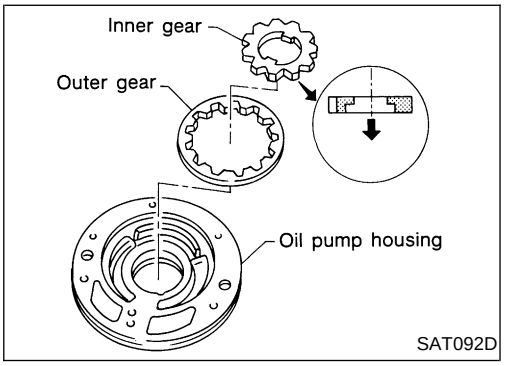
DISASSEMBLY



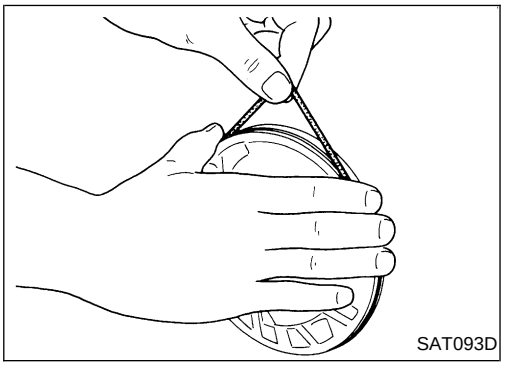
1. Remove seal rings.



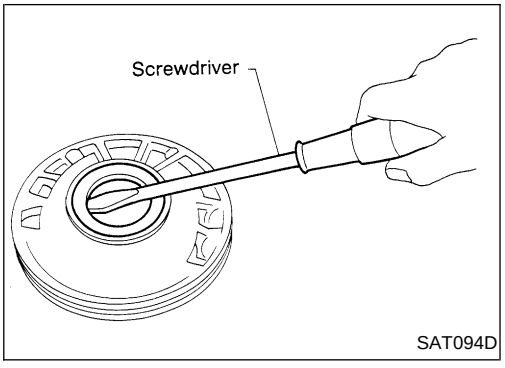
2. Loosen bolts in a crisscross pattern and remove oil pump cover.



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



4. Remove O-ring from oil pump housing.



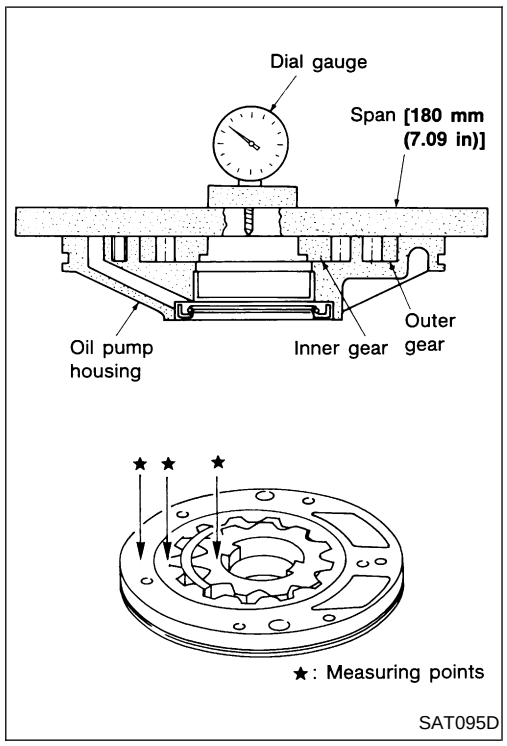
5. Remove oil pump housing oil seal.

Oil Pump (Cont'd)

INSPECTION

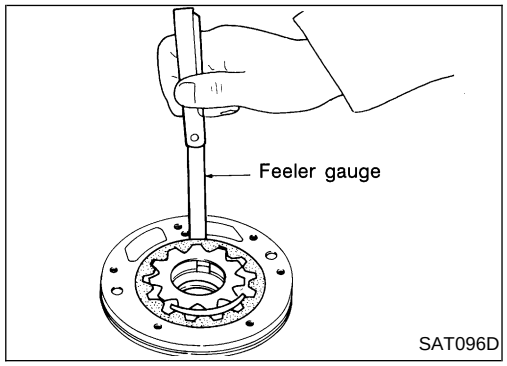
Oil pump housing, oil pump cover, inner gear and outer gear

- Check for wear or damage.

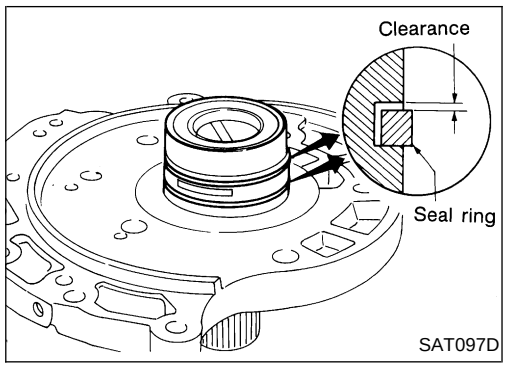


Side clearance

- Measure side clearance of inner and outer gears in at least four places around each outside edge. Maximum measured values should be within specified 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 "PLANETARY CARRIER AND OIL PUMP", AT-306.
- If clearance is more than standard, replace whole oil pump assembly except oil pump cover.



- Measure clearance between outer gear and oil pump housing.
  Standard clearance:
  0.111 - 0.181 mm (0.0044 - 0.0071 in)
  Allowable limit:
  0.181 mm (0.0071 in)
- If not within allowable limit, replace whole oil pump assembly except oil pump cover.

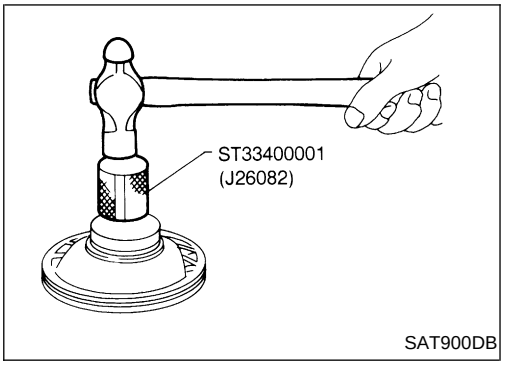


Seal ring clearance

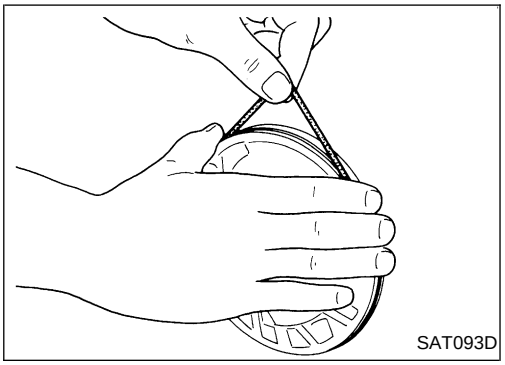
- Measure clearance between seal ring and ring groove.
  Standard clearance:
  0.10 - 0.25 mm (0.0039 - 0.0098 in)
  Allowable limit:
  0.25 mm (0.0098 in)
- If not within allowable limit, replace oil pump cover assembly.

Oil Pump (Cont'd)

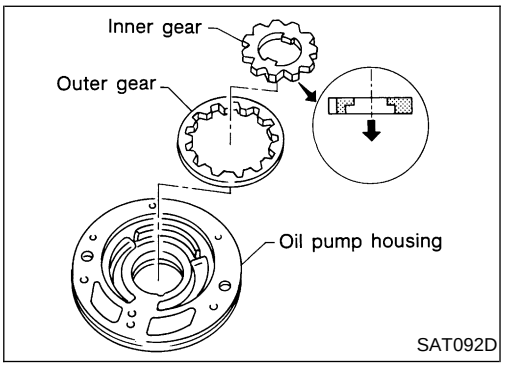
ASSEMBLY



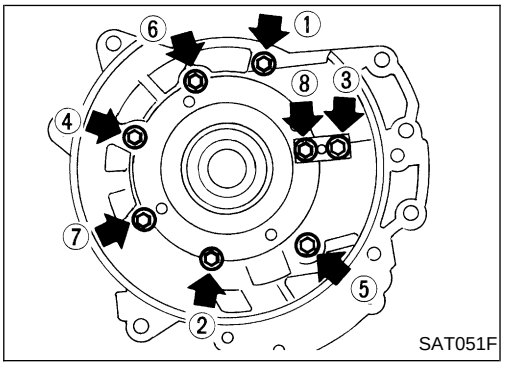
1. Install oil seal on oil pump housing.



2. Install O-ring on oil pump housing.
- **Apply ATF to O-ring.**



3. Install inner and outer gears on oil pump housing.
- **Be careful of direction of inner gear.**

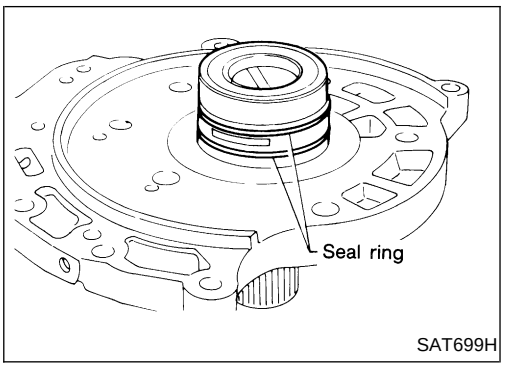


4. Install oil pump cover on oil pump housing.

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.

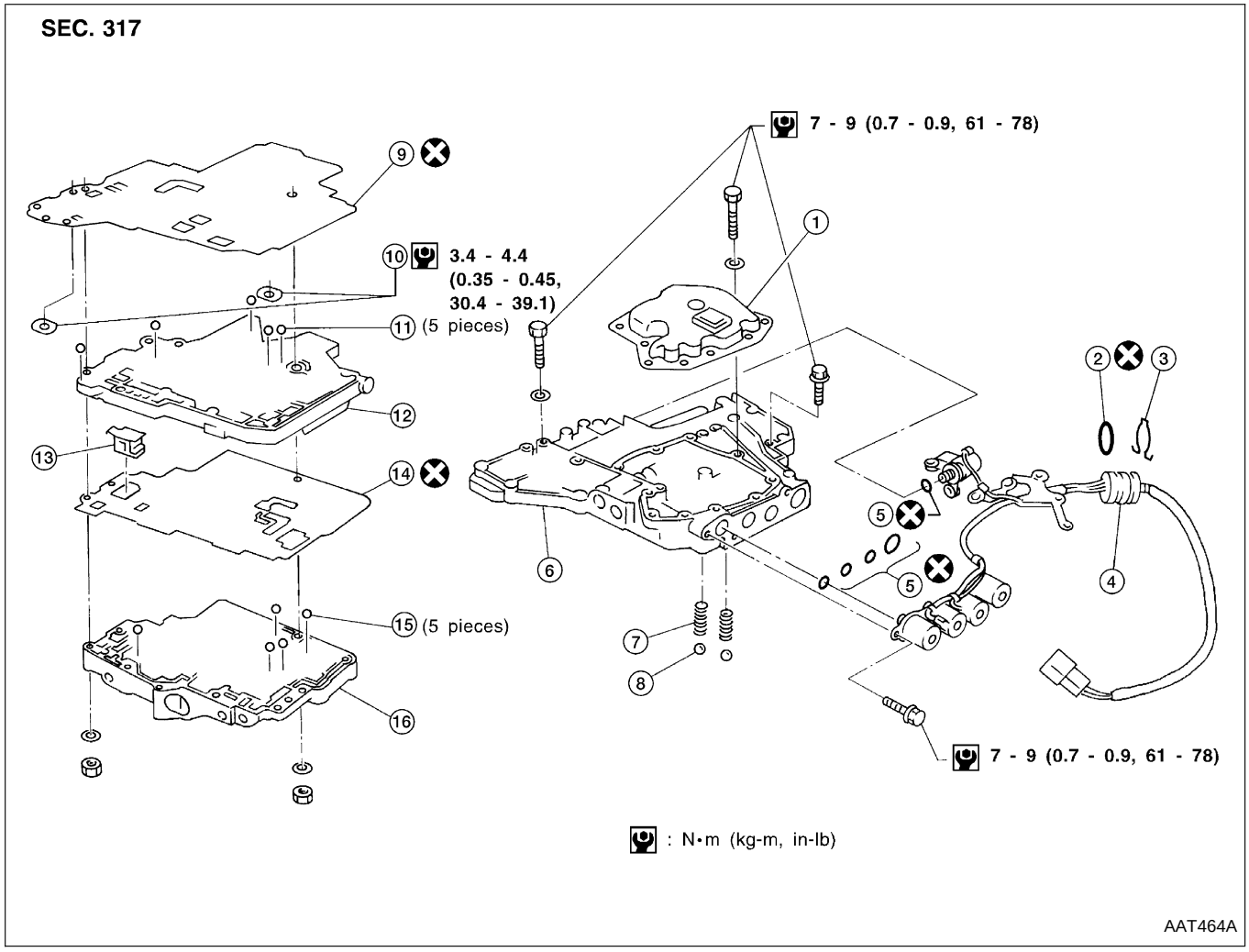
b. Tighten bolts in a crisscross pattern.

: 7 - 11 N·m (0.7 - 1.1 kg-m, 61 - 95 in-lb)



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



① Oil strainer
② O-ring
③ Snap 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

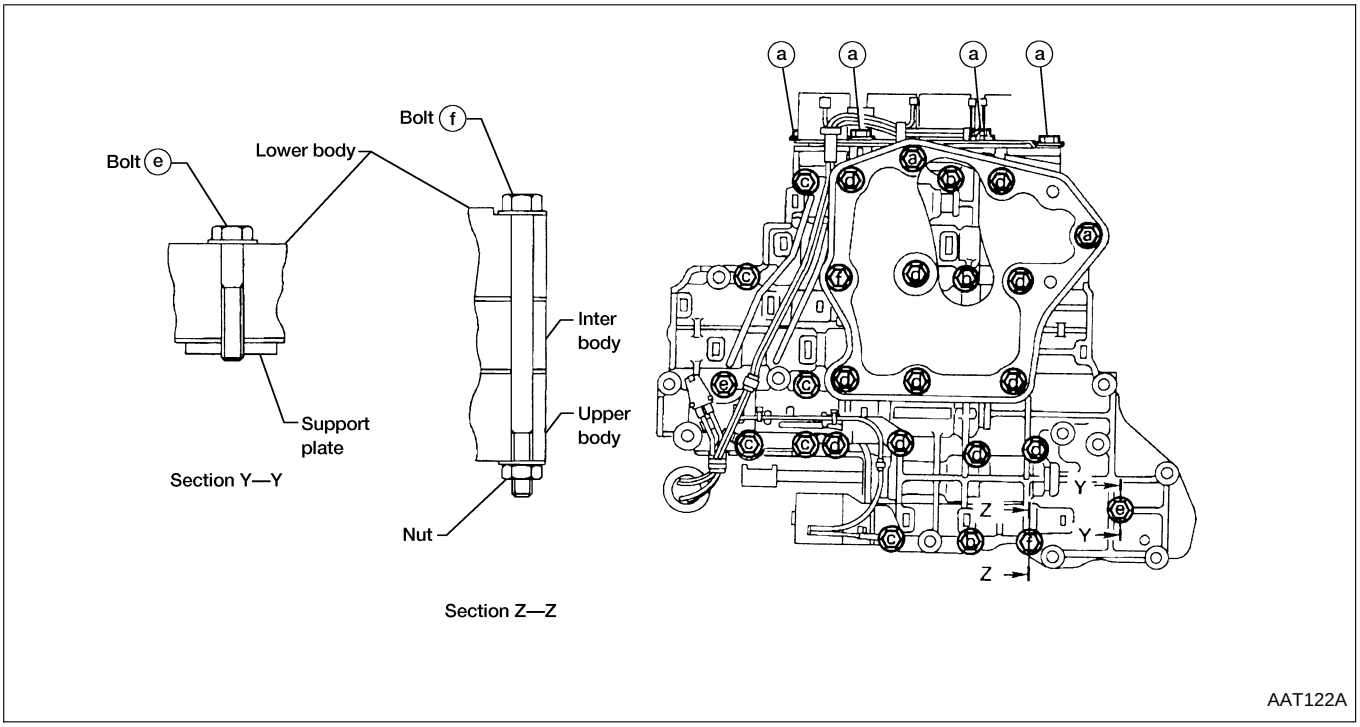
Disassemble upper, inter and lower bodies.

Bolt length, number and location:

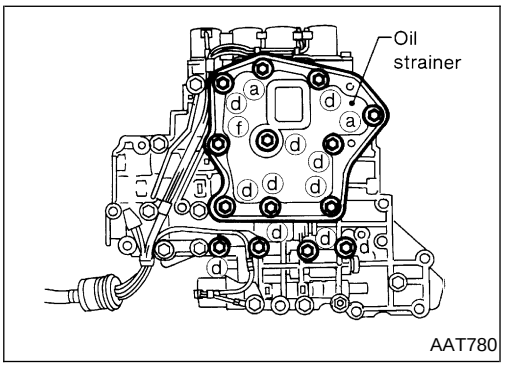
Bolt symbol	ⓐ	ⓑ	ⓒ	ⓓ	ⓔ	ⓕ
Bolt length "ℓ" mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	6	3	6	11	2	2

f: Reamer bolt and nut.

Control Valve Assembly (Cont'd)

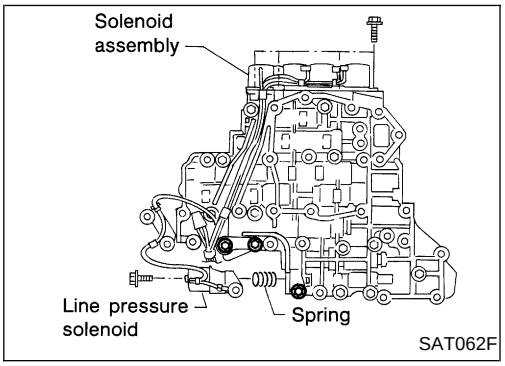


AAT122A



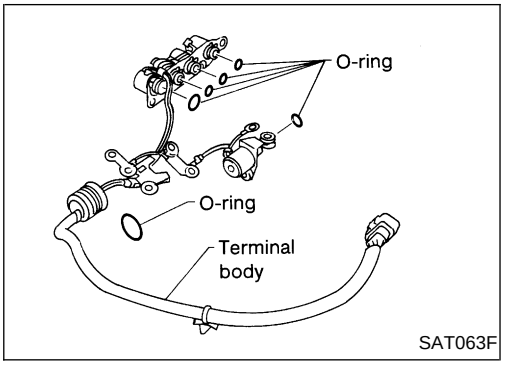
AAT780

a. Remove bolts (a), (d) and (f) and remove oil strainer from control valve assembly.



SAT062F

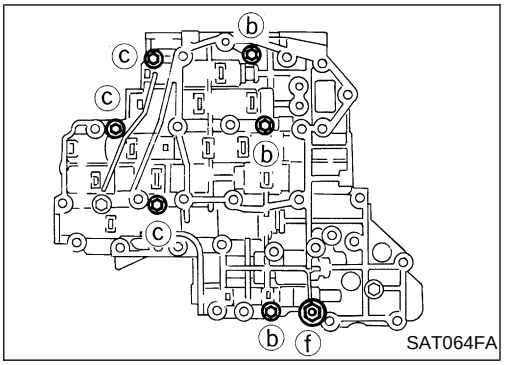
b. Remove solenoid valve assembly and line pressure solenoid valve from control valve assembly.



SAT063F

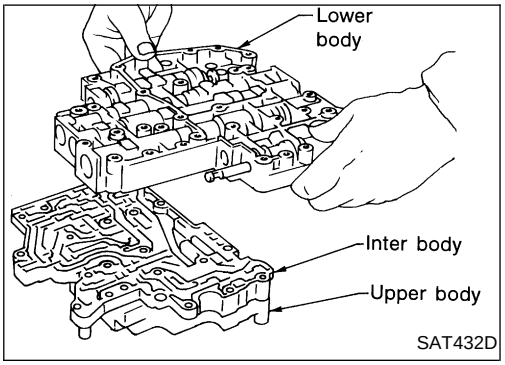
c. Remove O-rings from solenoid valves and terminal body.

Control Valve Assembly (Cont'd)



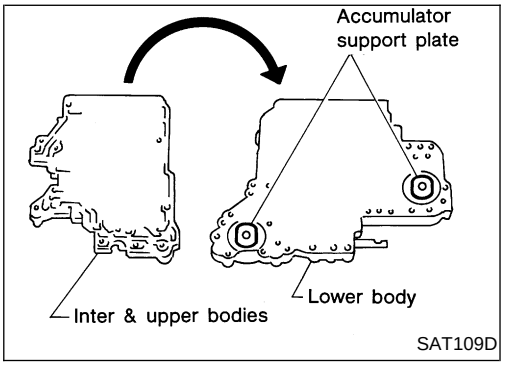
SAT064FA

d. Place upper body facedown, and remove bolts ⓑ, ⓒ and nut ⓕ.



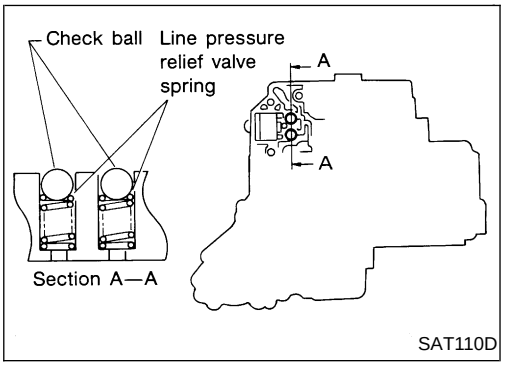
SAT432D

e. Remove inter body from lower body.



SAT109D

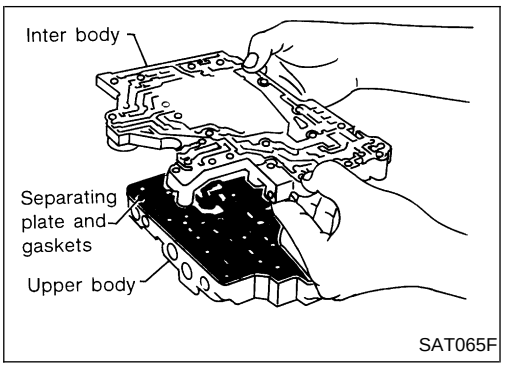
f. Turn over lower body, and remove accumulator support plate.



SAT110D

g. Remove bolts ⓔ, separating plate and separating gasket from lower body.
h. Remove steel balls and relief valve springs from lower body.

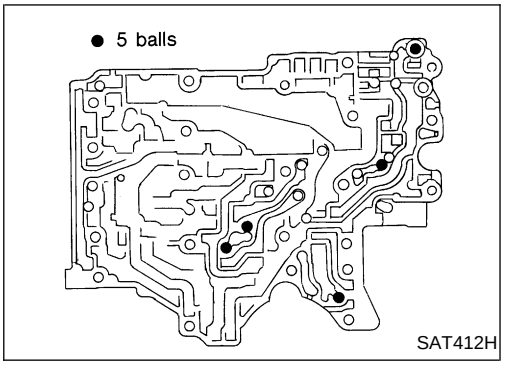
- **Be careful not to lose steel balls and relief valve springs.**



SAT065F

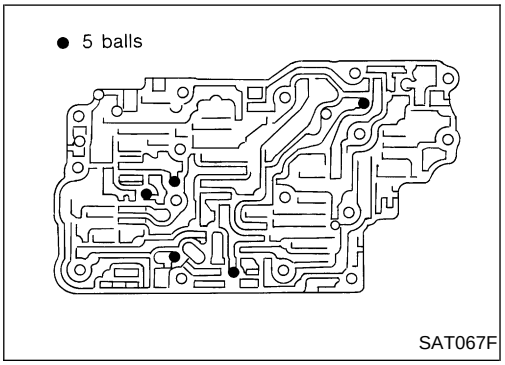
i. Remove inter body from upper body.

Control Valve Assembly (Cont'd)



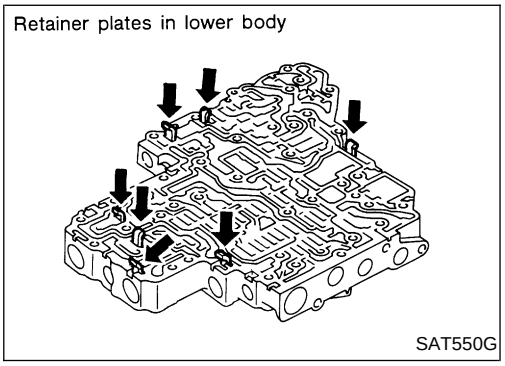
j. Check to see that steel balls are properly positioned in inter body and then remove them.

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



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

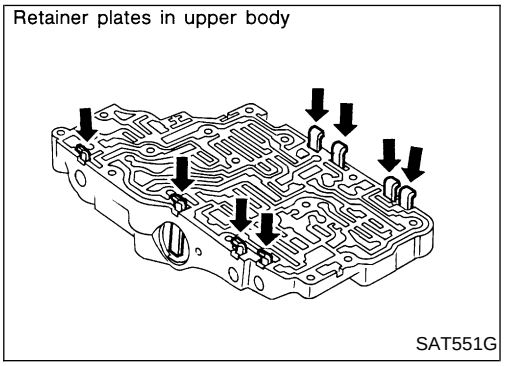
- **Be careful not to lose steel balls.**



INSPECTION

Lower and upper bodies

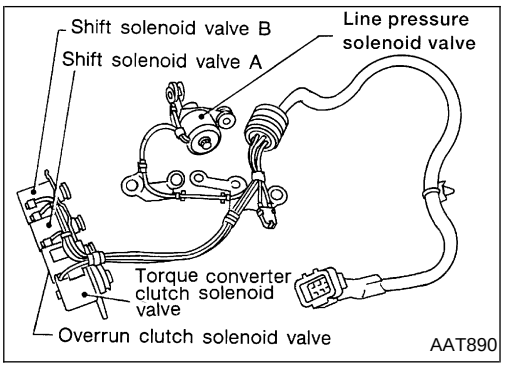
- Check to see that retainer plates are properly positioned in lower body.



- Check to see that retainer plates are properly positioned in upper body.
- **Be careful not to lose these parts.**

Oil strainer

- Check wire netting of oil strainer for damage.



Shift solenoid valves "A" and "B", line pressure solenoid valve, torque converter clutch solenoid valve and overrun clutch solenoid valve

- Measure resistance. Refer to "Components Inspection", AT-119.

Control Valve Assembly (Cont'd)

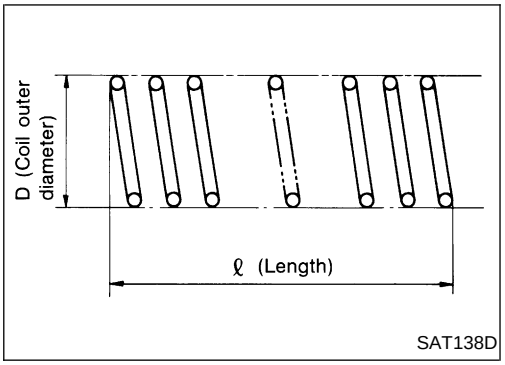
Oil cooler relief valve spring

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

Inspection standard:

Unit: mm (in)

Part No.	ℓ	D
31742-80L12	17.02 (0.6701)	8.0 (0.315)

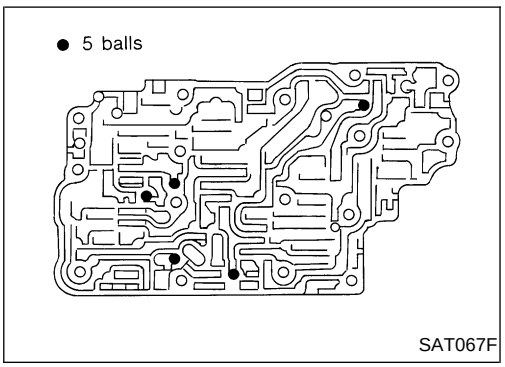


SAT138D

ASSEMBLY

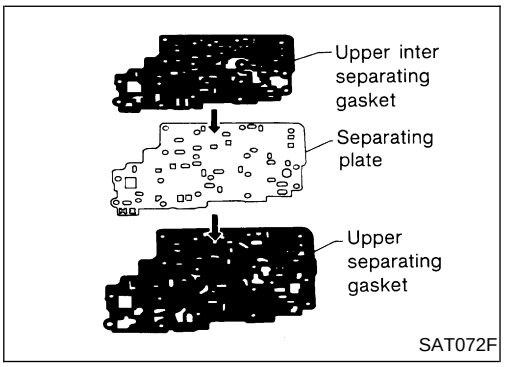
1. Install upper, inter and lower body.

a. Place oil circuit of upper body face up. Install steel balls in their proper positions.



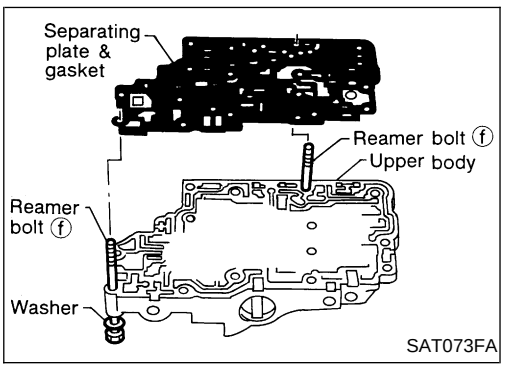
SAT067F

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



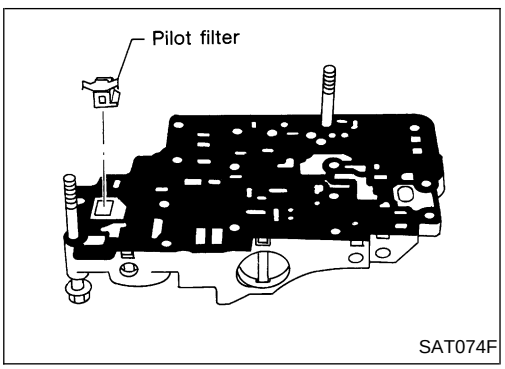
SAT072F

c. Install reamer bolts ⓕ from bottom of upper body. Using reamer bolts as guides, install separating plate and gaskets as a set.



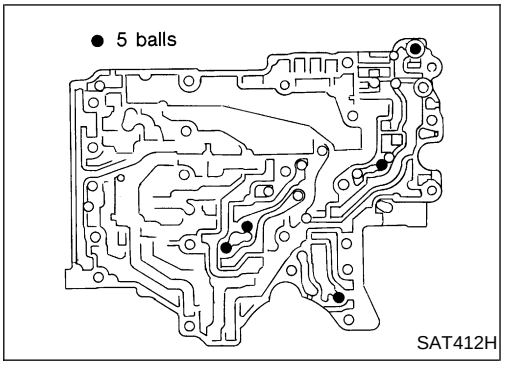
SAT073FA

d. Install pilot filter.

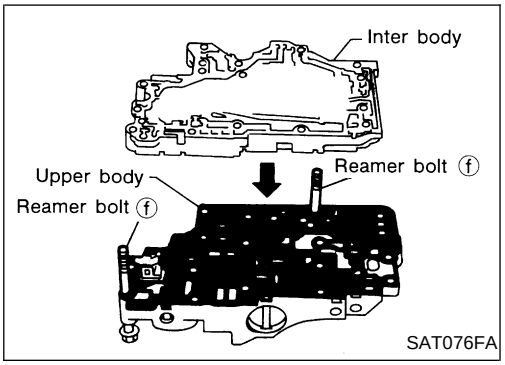


SAT074F

Control Valve Assembly (Cont'd)

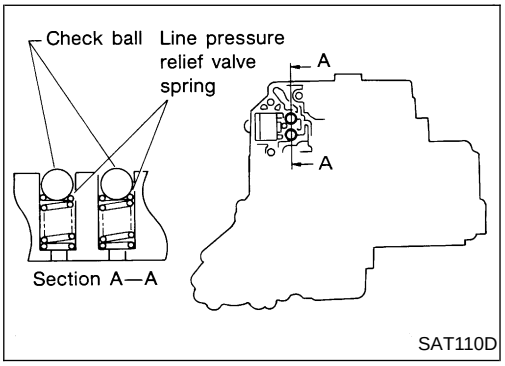


e. Place lower body as shown in illustration (side of inter body face up). Install steel balls in their proper positions.

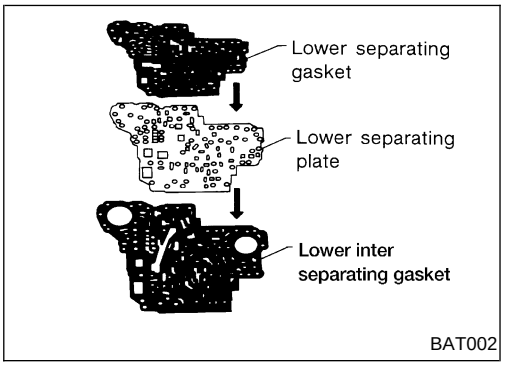


f. Install inter body on upper body using reamer bolts ⓕ as guides.

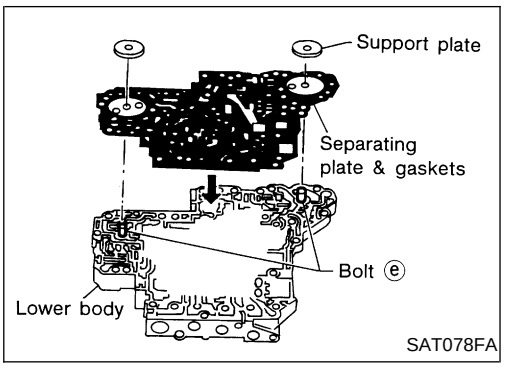
- **Be careful not to dislocate or drop steel balls.**



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

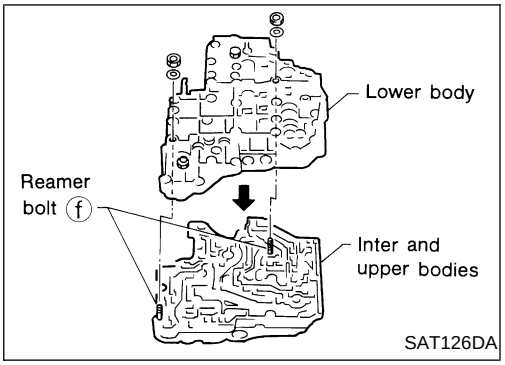


h. Install lower separating gasket, lower inter separating gasket and lower separating plate in order shown in illustration.

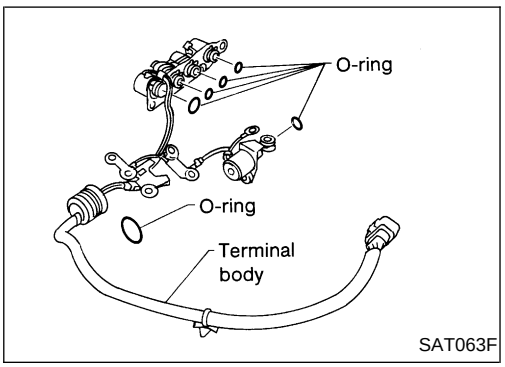


i. Install bolts ⓔ from bottom of lower body. Using bolts ⓔ as guides, install separating plate and gaskets as a set.
j. Temporarily install support plates on lower body.

Control Valve Assembly (Cont'd)



k. Install lower body on inter body using reamer bolts (f) as guides and tighten reamer bolts (f) slightly.



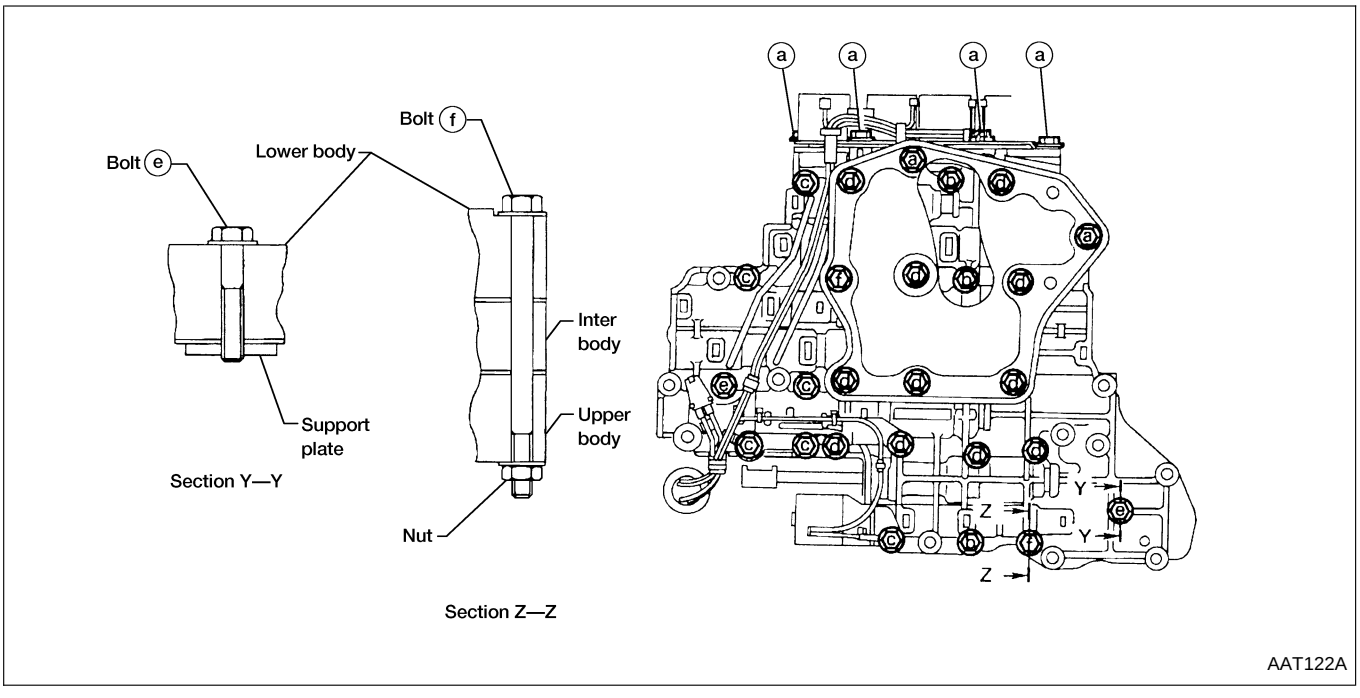
2. Install O-rings to solenoid valves and terminal body.

- **Apply ATF to O-rings.**

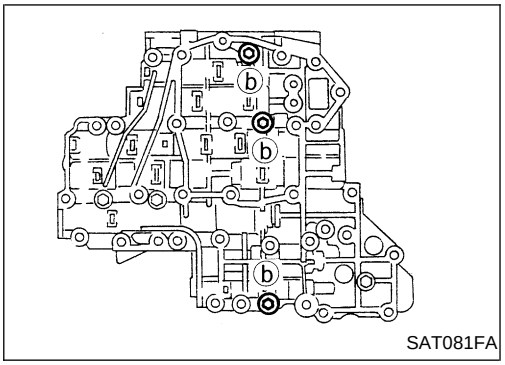
3. Install and tighten bolts.

Bolt length, number and location:

Bolt symbol	(a)	(b)	(c)	(d)	(e)	(f)
Bolt length "ℓ" mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	6	3	6	11	2	2

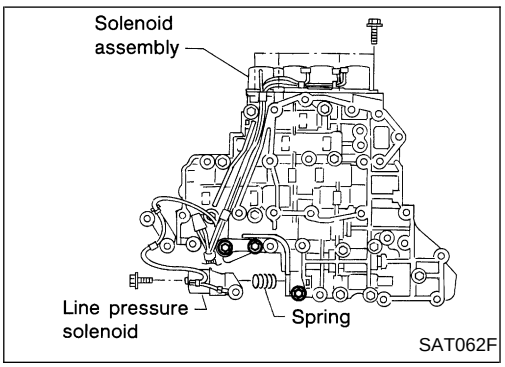


Control Valve Assembly (Cont'd)



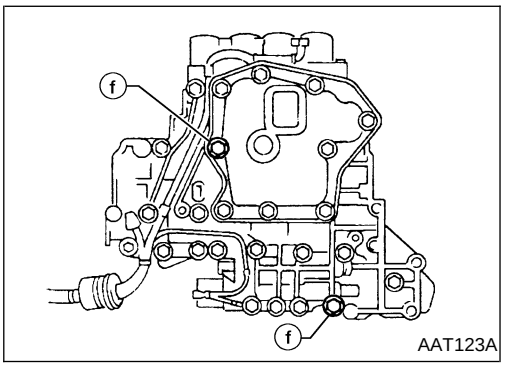
SAT081FA

a. Install and tighten bolts ⓑ to specified torque.
: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



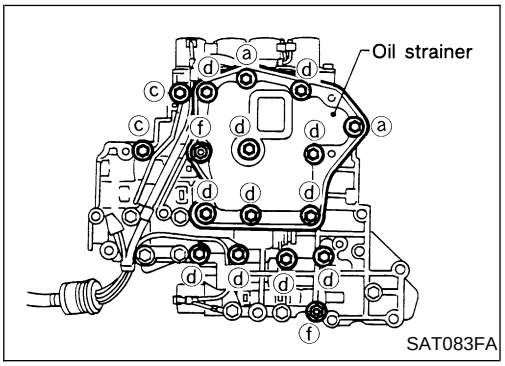
SAT062F

b. Install solenoid valve assembly and line pressure solenoid valve to lower body.



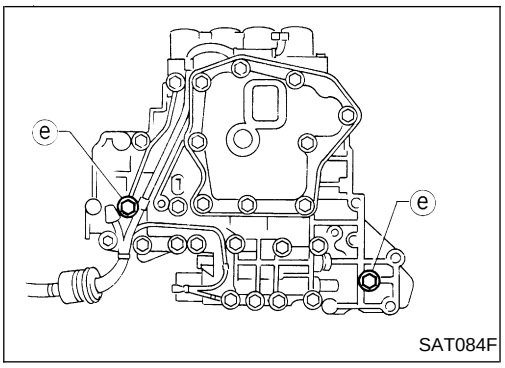
AAT123A

c. Remove reamer bolts ⓕ and set oil strainer on control valve assembly.
d. Reinstall reamer bolts ⓕ from lower body side.



SAT083FA

e. Tighten bolts ⓐ, ⓒ, ⓓ and ⓕ to specified torque.
: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)

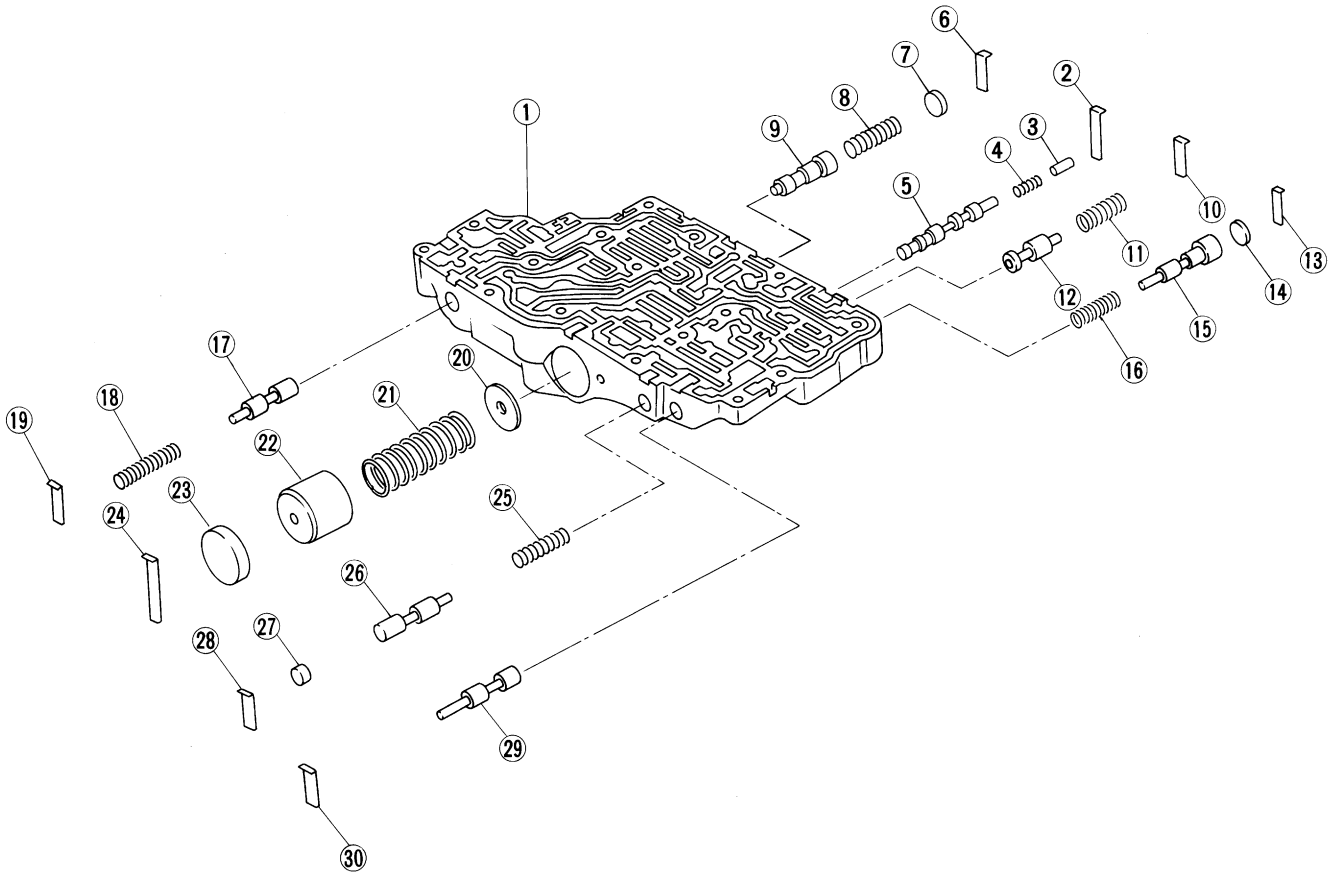


SAT084F

f. Tighten bolts ⓔ 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

SEC. 317



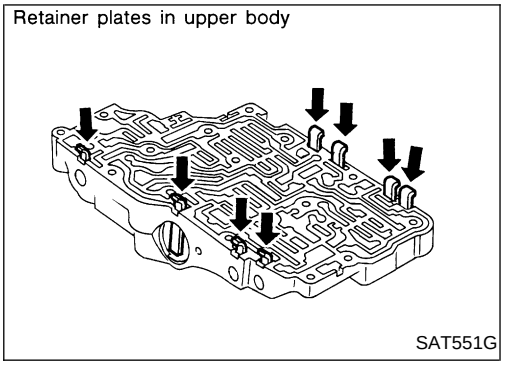
SAT859H

Apply ATF to all components before installation.

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

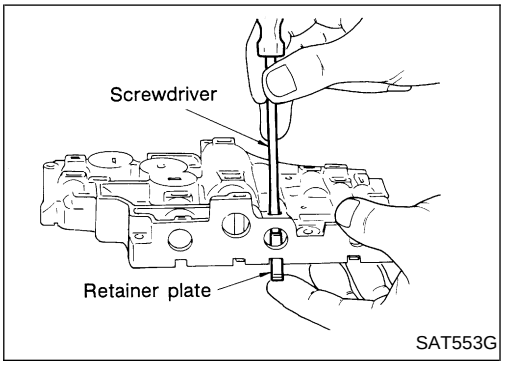
Control Valve Upper Body (Cont'd)

DISASSEMBLY

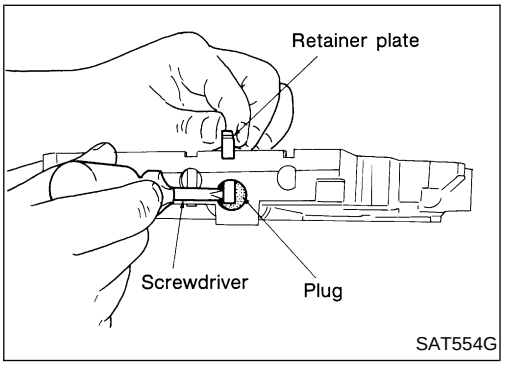


1. Remove valves at retainer plates.

- **Do not use a magnetic pick-up tool.**

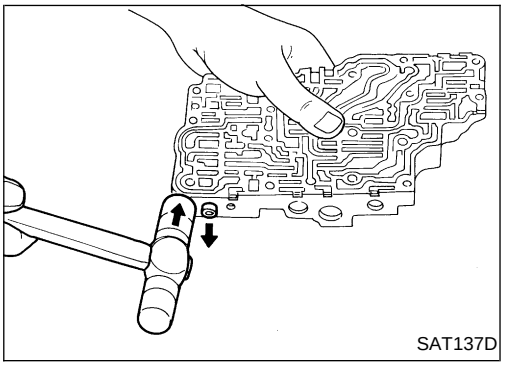


a. Use a screwdriver to remove retainer plates.



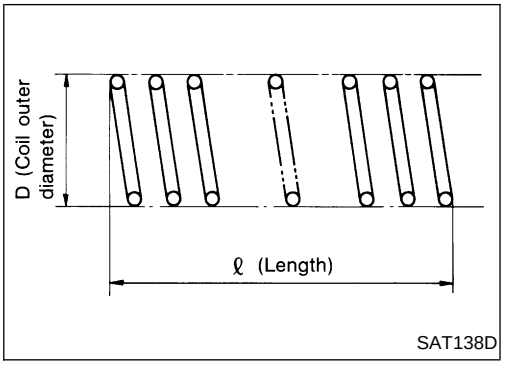
b. Remove retainer plates while holding spring, plugs or sleeves.

- **Remove plugs slowly to prevent internal parts from jumping out.**



c. Place mating surface of valve body face down, and remove internal parts.

- **If a valve is hard to remove, place valve body face down and lightly tap it with a soft hammer.**
- **Be careful not to drop or damage valves and sleeves.**



INSPECTION

Valve spring

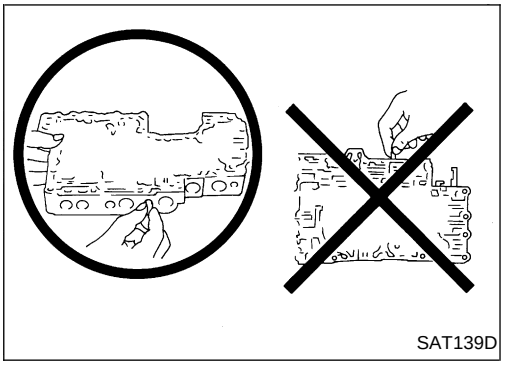
- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.
  Inspection standard:
  Refer to "CONTROL VALVES", AT-303.
- Replace valve springs if deformed or fatigued.

Control valves

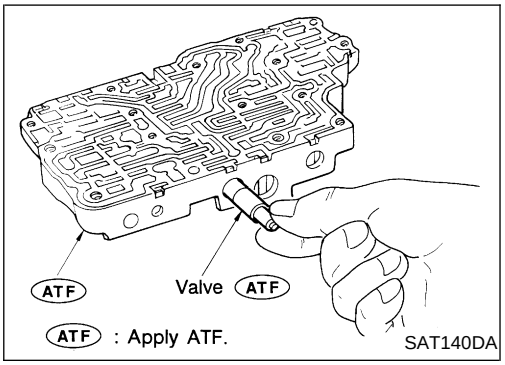
- Check sliding surfaces of valves, sleeves and plugs.

Control Valve Upper Body (Cont'd)

ASSEMBLY

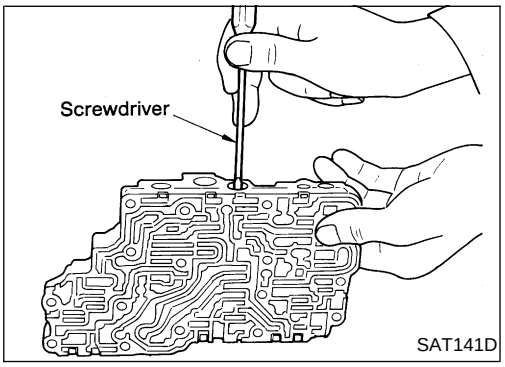

SAT139D

- **Lay control valve body down when installing valves. Do not stand the control valve body upright.**



SAT140DA

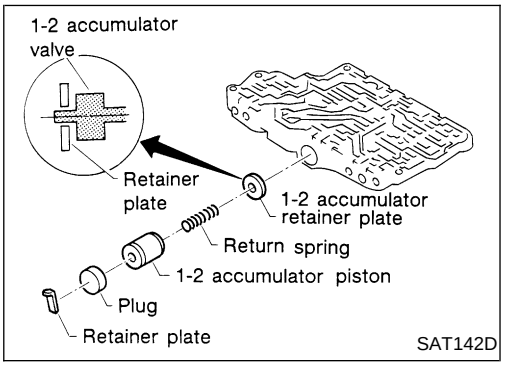
1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.
- **Be careful not to scratch or damage valve body.**



SAT141D

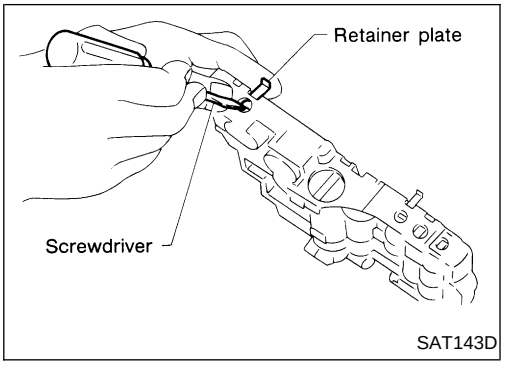
- Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.

1-2 accumulator valve



SAT142D

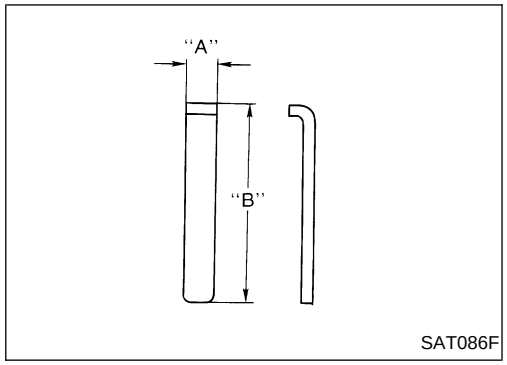
- Install 1-2 accumulator valve. Align 1-2 accumulator retainer plate from opposite side of control valve body.
- Install return spring, 1-2 accumulator piston and plug.



SAT143D

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

Control Valve Upper Body (Cont'd)



Retainer plate

Unit: mm (in)

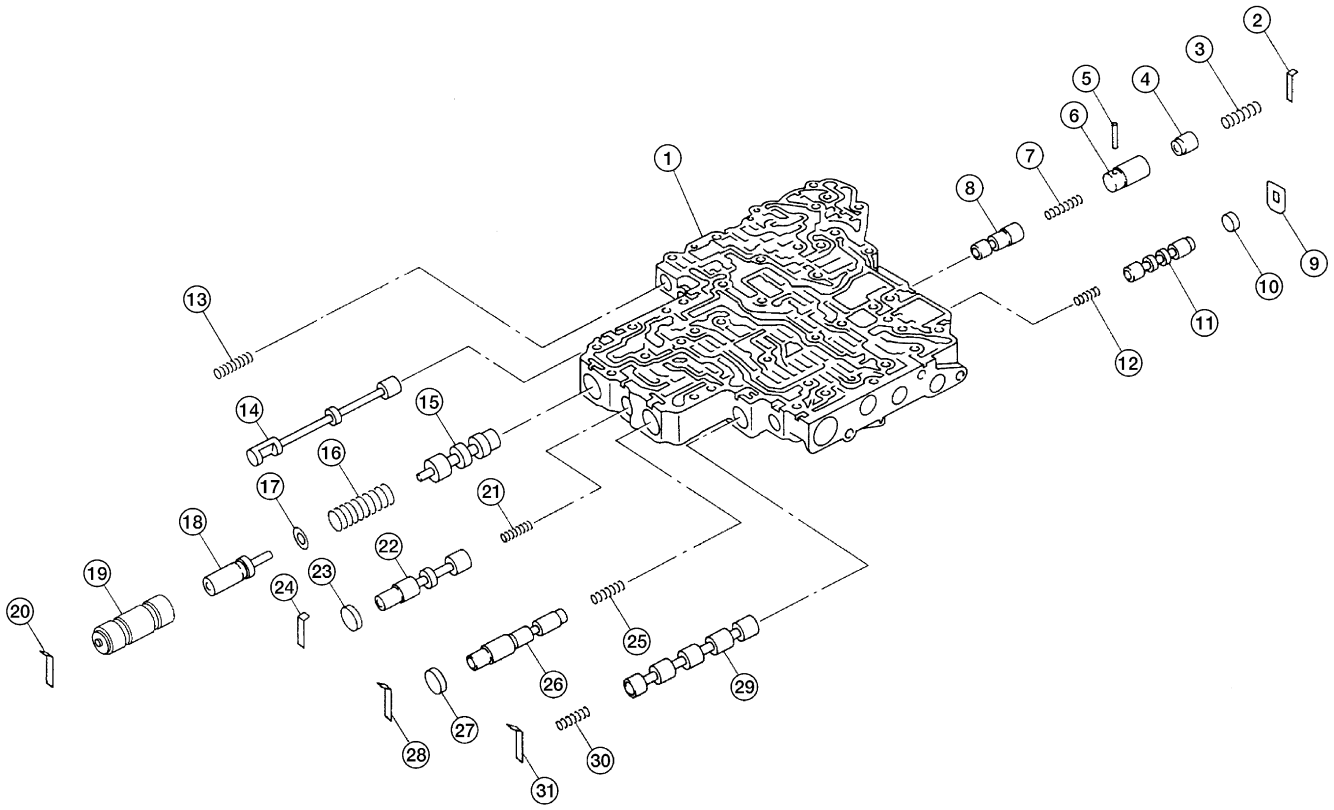
Name of control valve	No.	Length A	Length B
Pilot valve	⑲	6.0 (0.236)	21.5 (0.846)
1st reducing valve	㉘		
Torque converter relief valve	⑩		
Plug	㉚		
1-2 accumulator valve	⑥		38.5 (1.516)
1-2 accumulator piston valve	㉔		
Overrun clutch reducing valve	⑬		24.0 (0.945)
Torque converter clutch control valve	②		28.0 (1.102)

- Install proper retainer plates.

Refer to "Control Valve Upper Body", AT-243.

Control Valve Lower Body

SEC. 317



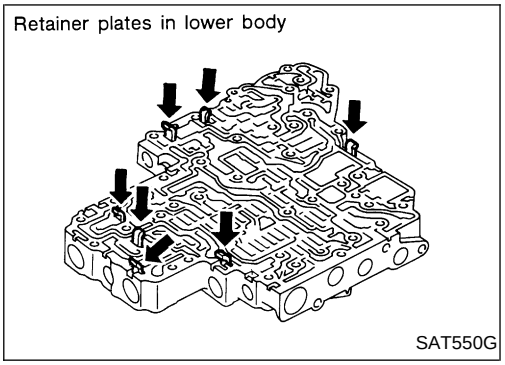
AAT465A

Apply ATF to all components before installation.

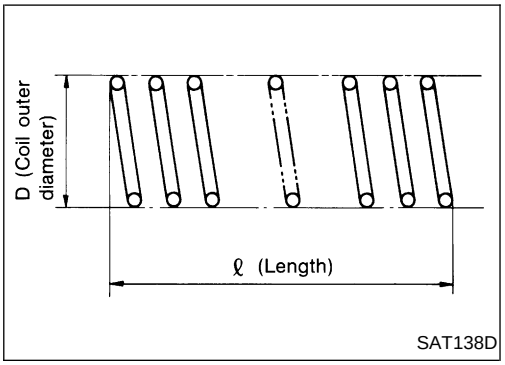
① Lower body
② Retainer plate
③ Return spring
④ Piston
⑤ Parallel pin
⑥ Sleeve
⑦ Return spring
⑧ Pressure modifier valve
⑨ Retainer plate
⑩ Plug
⑪ Shift valve B
⑫ Return spring
⑬ Return spring
⑭ Manual valve
⑮ Pressure regulator valve
⑯ Return spring
⑰ Spring seat
⑱ Plug
⑲ Sleeve
⑳ Retainer plate
㉑ Return 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

Control Valve Lower Body (Cont'd)

DISASSEMBLY



- Remove valves at retainer plate.
  For removal procedures, refer to "DISASSEMBLY", "Control Valve Upper Body", AT-244.



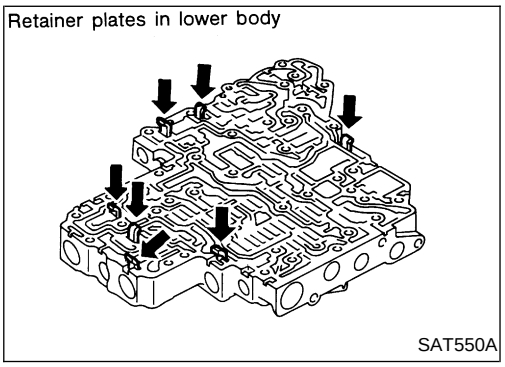
INSPECTION

Valve springs

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.
  Inspection standard:
  Refer to "CONTROL VALVES", AT-303.
- Replace valve springs if deformed or fatigued.

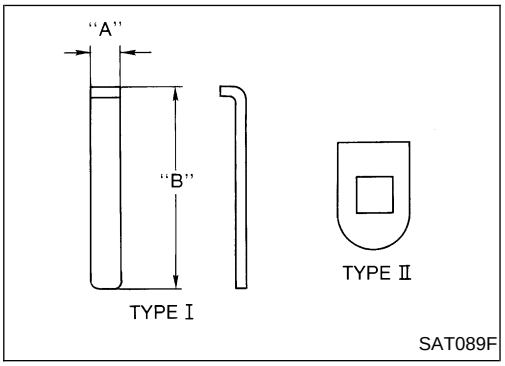
Control valves

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



ASSEMBLY

- Install control valves.
  For installation procedures, refer to "ASSEMBLY", "Control Valve Upper Body", AT-245.



Retainer plate

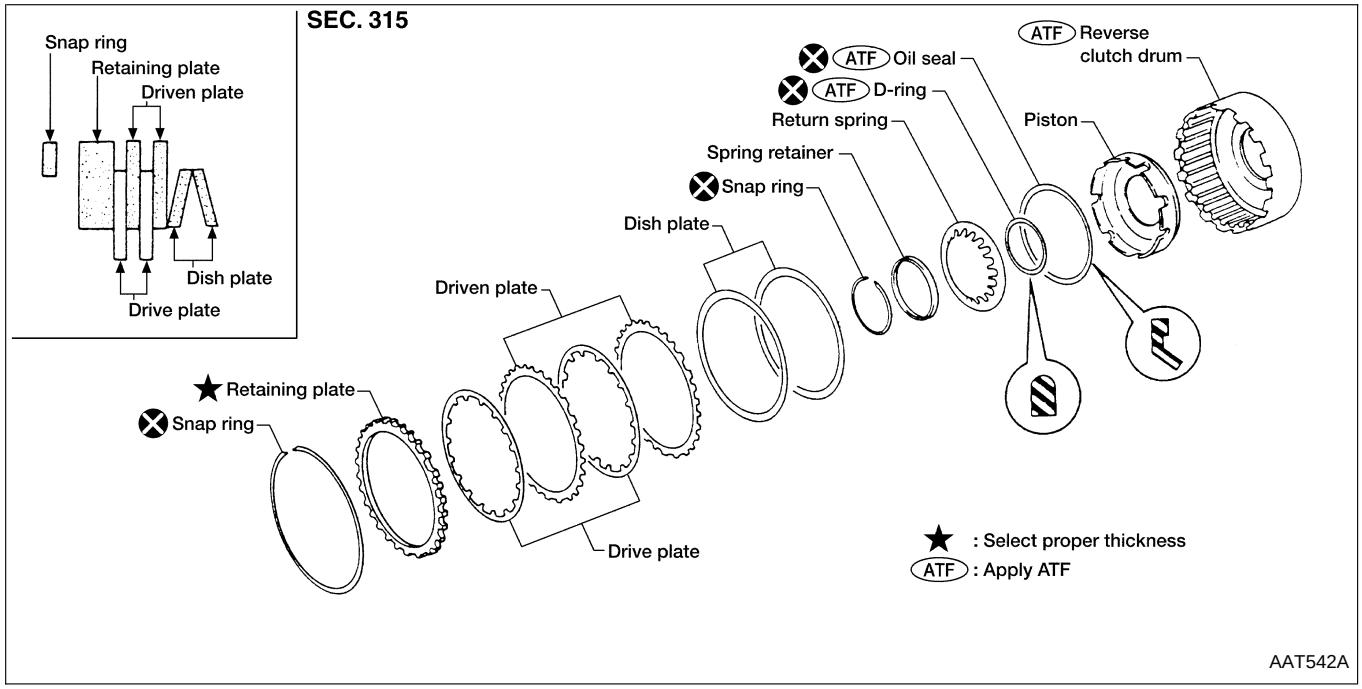
Unit: mm (in)

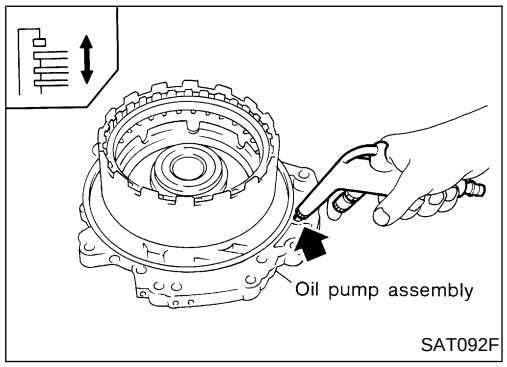
Name of control valve and plug	No.	Length A	Length B	Type
Pressure regulator valve	⑳	6.0 (0.236)	28.0 (1.102)	I
Accumulator control valve	㉘			
Shift valve A	㉛			
Overrun clutch control valve	㉔			
Pressure modifier valve	②			
Shift valve B	⑨	—	—	II

- Install proper retainer plates.

Refer to "Control Valve Lower Body", AT-247.

Reverse Clutch

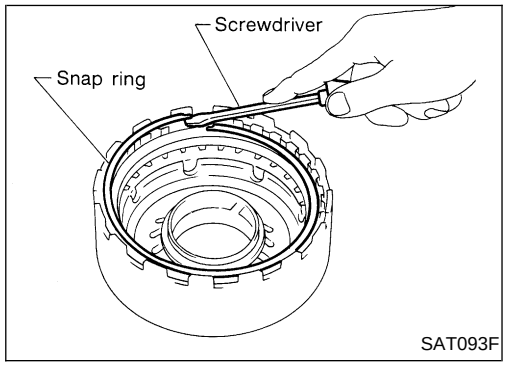




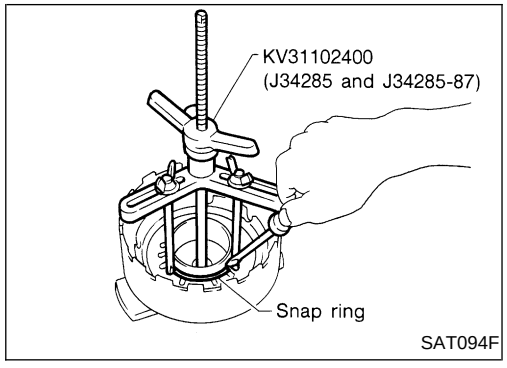
DISASSEMBLY

1. Check operation of reverse clutch
a. Install seal ring onto drum support of oil pump cover and install reverse clutch assembly. Apply compressed air to oil hole.
b. Check to see that retaining plate moves to snap ring.
c. If retaining plate does not contact snap ring:

- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.



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

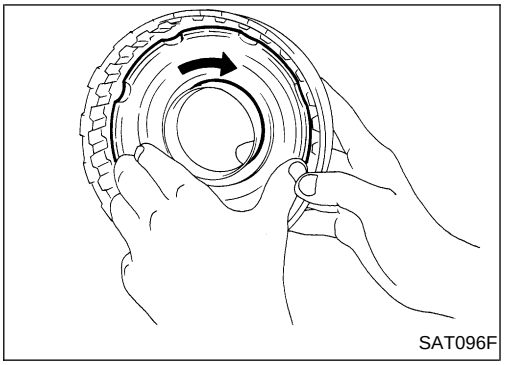


4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.

- **Set Tool directly over springs.**
- **Do not expand snap ring excessively.**

5. Remove spring retainer and return springs.

Reverse Clutch (Cont'd)

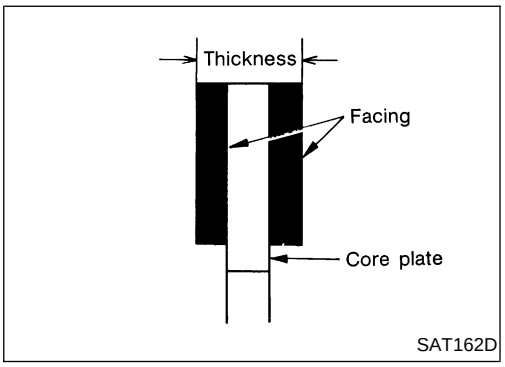

SAT096F

6. Remove piston from reverse clutch drum by turning it.
7. Remove D-ring and lip seal from piston.

INSPECTION

Reverse clutch snap ring, spring retainer and return springs

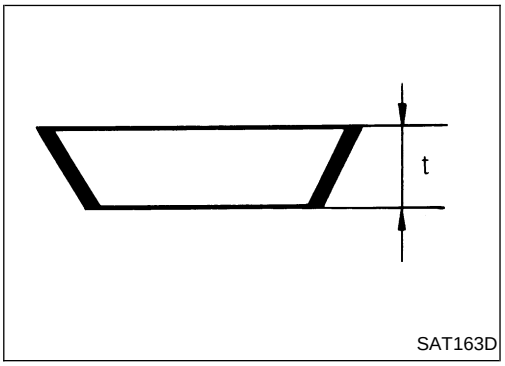
- Check for deformation, fatigue or damage.
  If necessary, replace.



SAT162D

Reverse clutch drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value: 1.6 mm (0.063 in)
  Wear limit: 1.4 mm (0.055 in)
- If not within wear limit, replace.



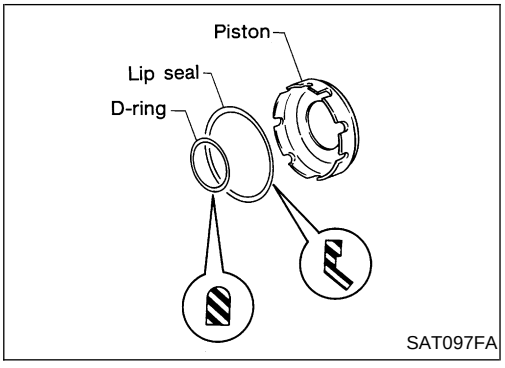
SAT163D

Reverse clutch dish plates

- Check for deformation or damage.
- Measure thickness of dish plate.
  Thickness of dish plate: 3.08 mm (0.1213 in)
- If deformed or fatigued, replace.

Reverse clutch piston

- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. 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.



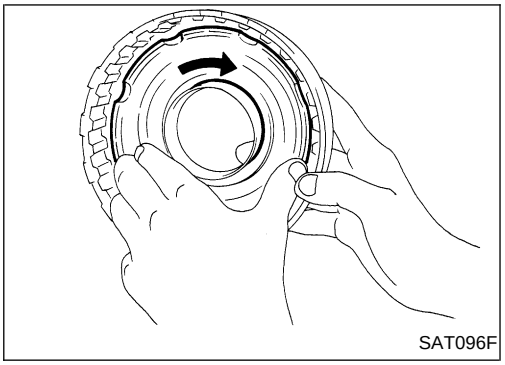
SAT097FA

ASSEMBLY

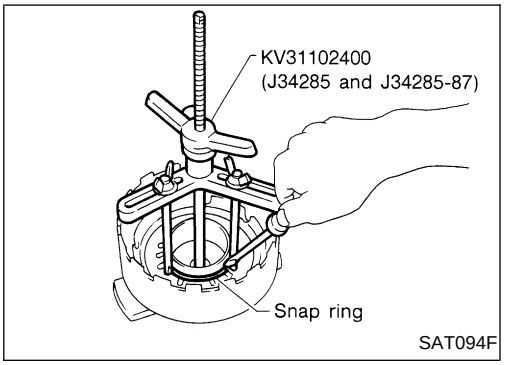
1. Install D-ring and lip seal on piston.

- **Take care with the direction of lip seal.**
- **Apply ATF to both parts.**

Reverse Clutch (Cont'd)

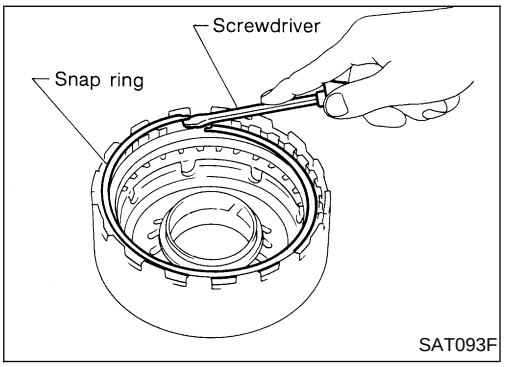

SAT096F

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



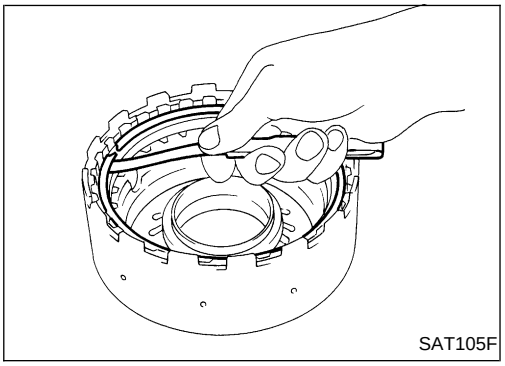
SAT094F

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.**

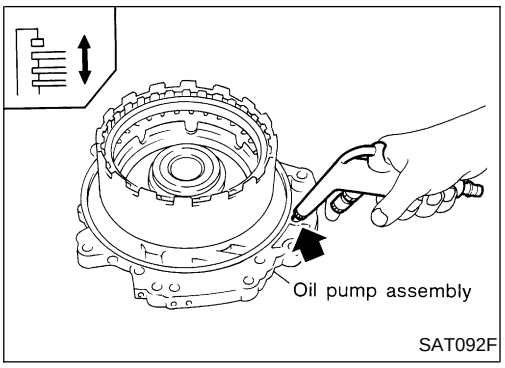


SAT093F

5. Install drive plates, driven plates, retaining plate and dish plates.
- **Take care with order of plates.**
6. Install snap ring.


SAT105F

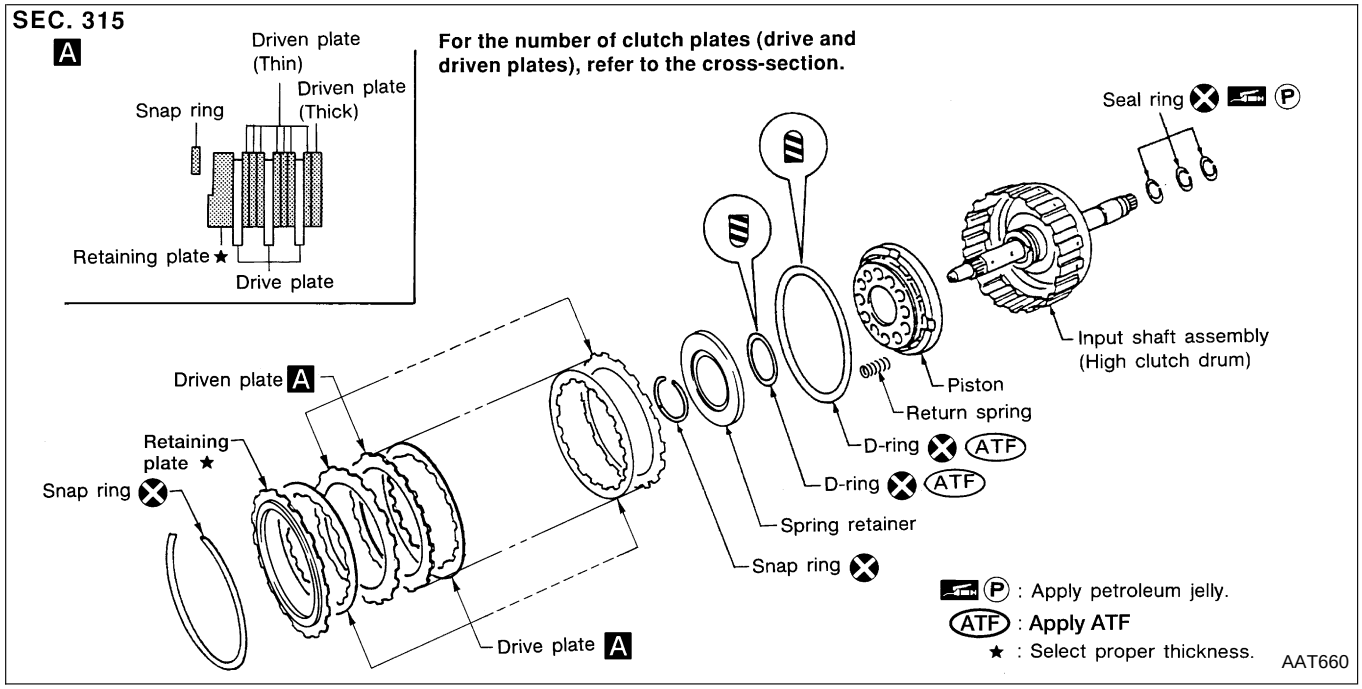
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard 0.5 - 0.8 mm (0.020 - 0.031 in)
   Allowable limit 1.2 mm (0.047 in)
   Retaining plate:
   Refer to SDS, AT-304.

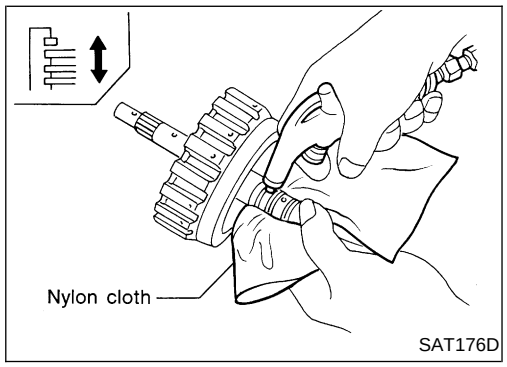


SAT092F

8. Check operation of reverse clutch.
   Refer to ''Reverse Clutch'', AT-249.

High Clutch





DISASSEMBLY

1. Check operation of high clutch.

a. Apply compressed air to oil hole of input shaft with nylon cloth.

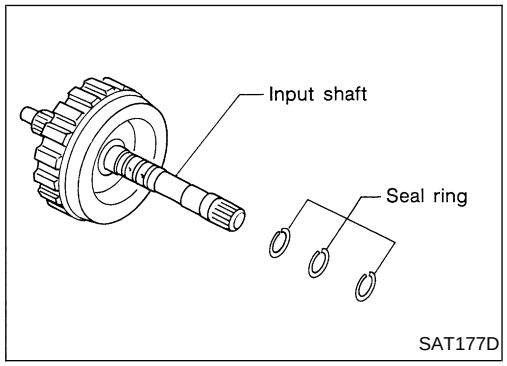
- **Stop up hole on opposite side of input shaft with nylon cloth.**

b. Check to see that retaining plate moves to snap ring.
c. If retaining plate does not contact snap ring:

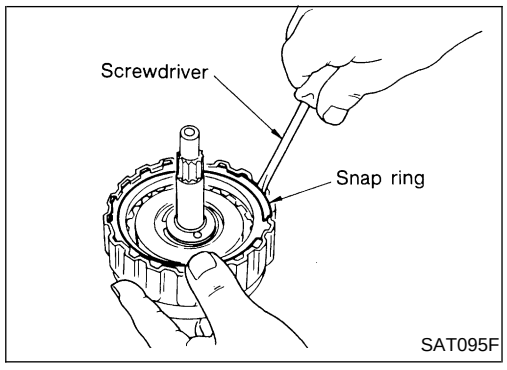
- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.

2. Remove seal rings from input shaft.

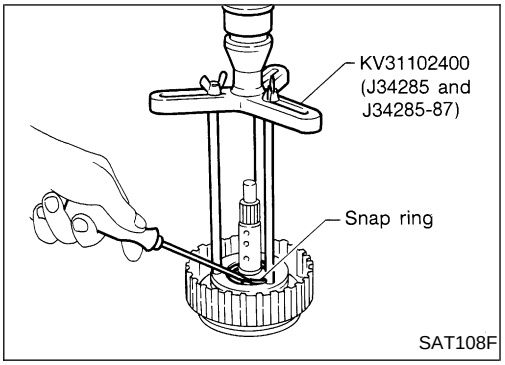
- **Always replace when removed.**



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

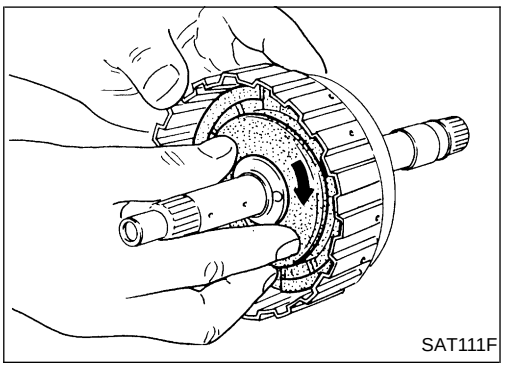


High Clutch (Cont'd)

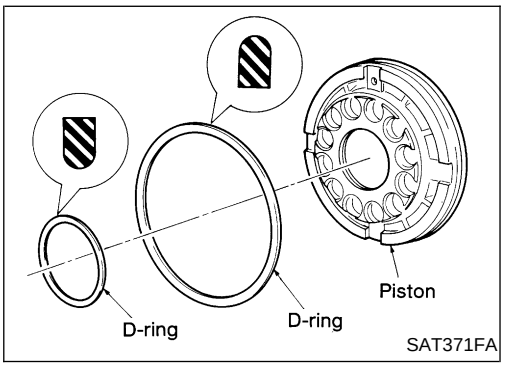


5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.
- **Set Tool directly over springs.**
- **Do not expand snap ring excessively.**

6. Remove spring retainer and return springs.



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

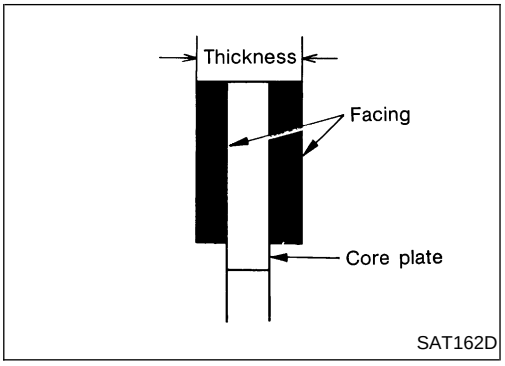


8. Remove D-rings from piston.

INSPECTION

High clutch snap ring, spring retainer and return springs

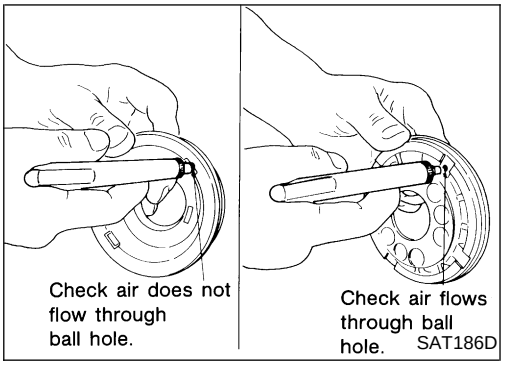
- Check for deformation, fatigue or damage.
  If necessary, replace.
- **When replacing spring retainer and return springs, replace them as a set.**



High clutch drive plates

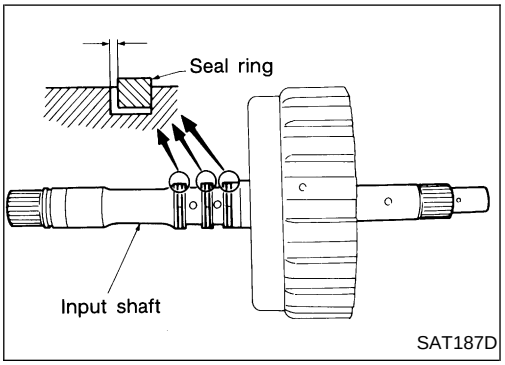
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value 1.6 mm (0.063 in)
  Wear limit 1.4 mm (0.055 in)
- If not within wear limit, replace.

High Clutch (Cont'd)



High clutch piston

- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. 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.



Seal ring clearance

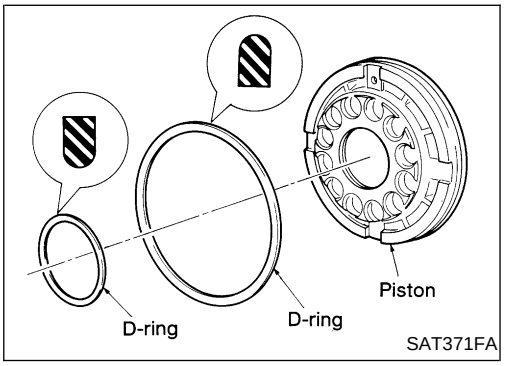
- Install new seal rings onto input shaft.
- Measure clearance between seal ring and ring groove.

  Standard clearance:

  0.08 - 0.23 mm (0.0031 - 0.0091 in)

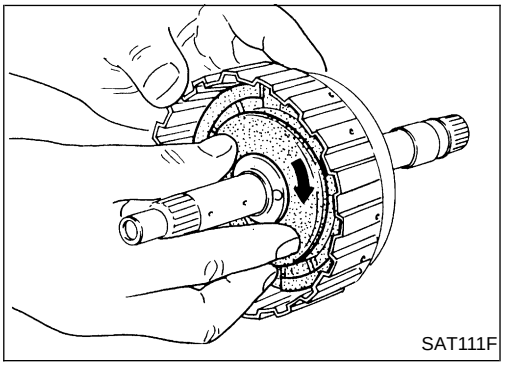
  Allowable limit:

  0.23 mm (0.0091 in)
- If not within allowable limit, replace input shaft assembly.

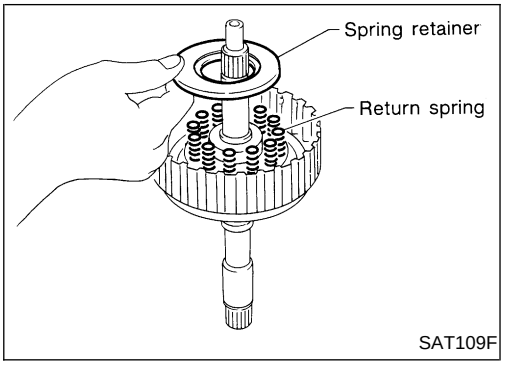


ASSEMBLY

1. Install D-rings on piston.
- **Apply ATF to both parts.**

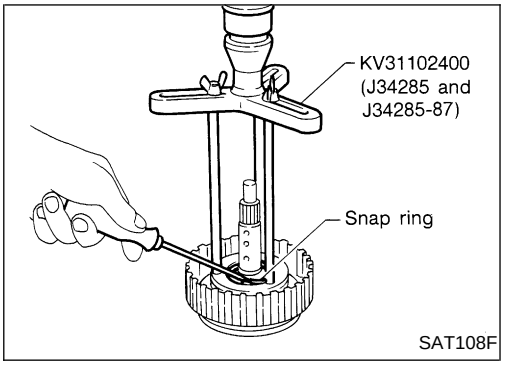


2. Install piston assembly by turning it slowly.
- **Apply ATF to inner surface of drum.**

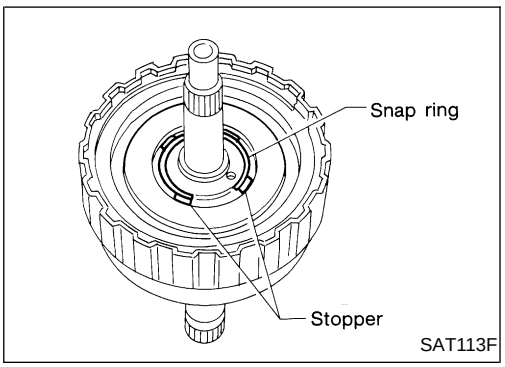


3. Install return springs and spring retainer on piston.

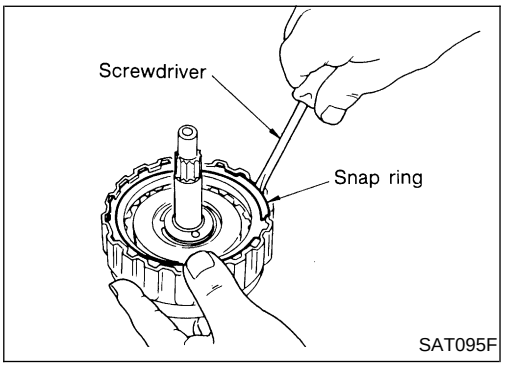
High Clutch (Cont'd)



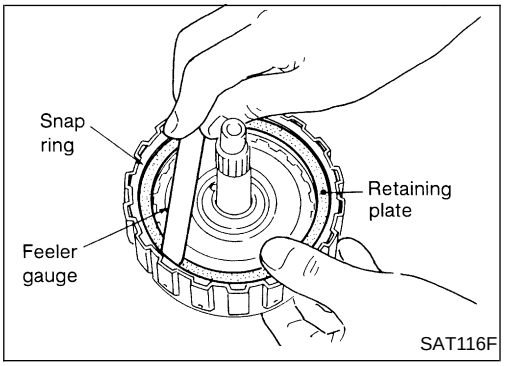
4. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly over return springs.**



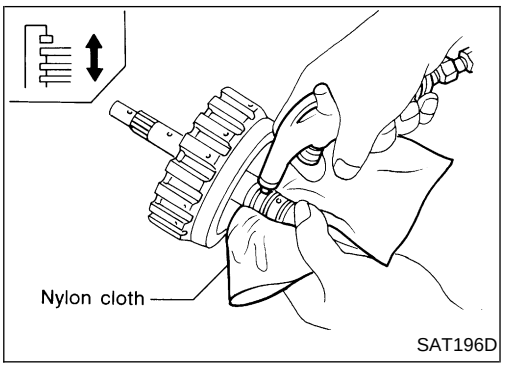
- **Do not align snap ring gap with spring retainer stopper.**



5. Install drive plates, driven plates and retaining plate.
- **Take care with the order and direction of plates.**
6. Install snap ring.

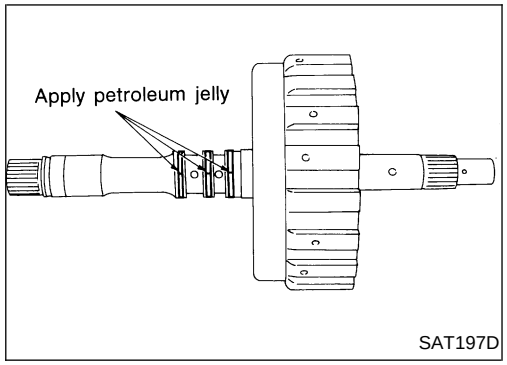


7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard 1.8 - 2.2 mm (0.071 - 0.087 in)
   Allowable limit 2.8 mm (0.110 in)
   Retaining plate:
   Refer to "CLUTCHES AND BRAKES", AT-304.



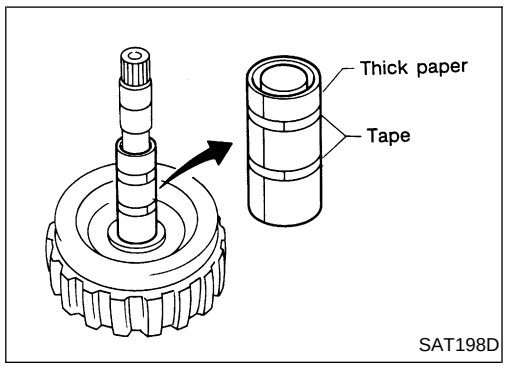
8. Check operation of high clutch.
   Refer to "High Clutch", AT-252.

High Clutch (Cont'd)



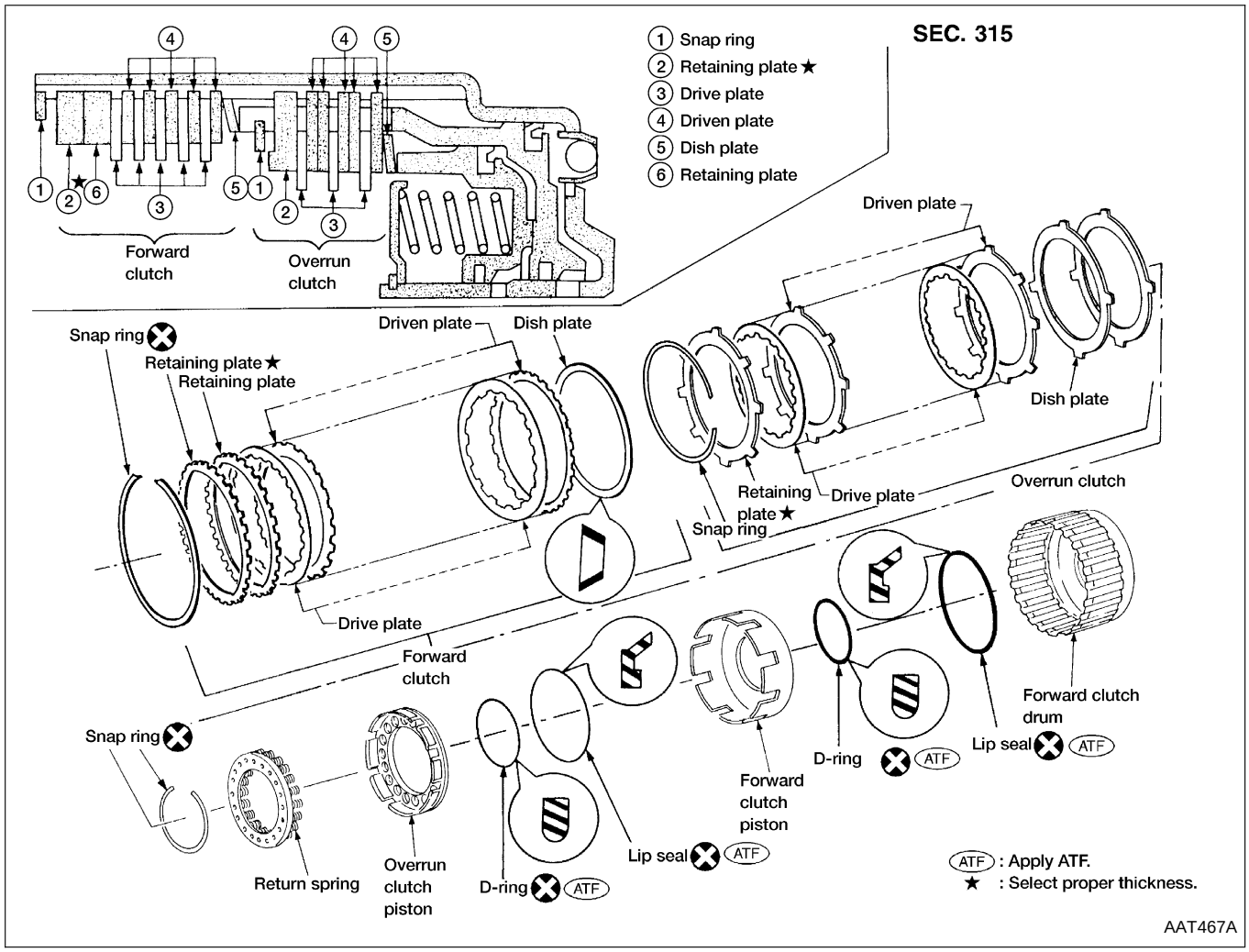
9. Install seal rings to input shaft.

- **Apply petroleum jelly to seal rings.**
- **Always replace when removed.**



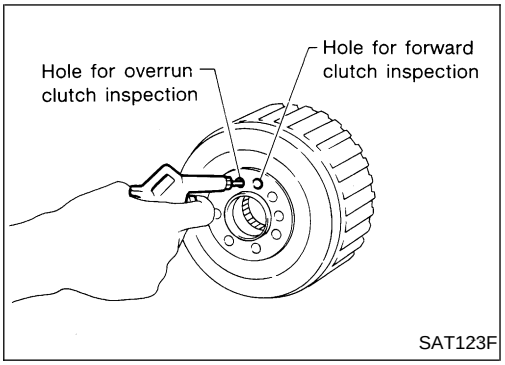
- **Roll paper around seal rings to prevent seal rings from spreading.**

Forward Clutch and Overrun Clutch

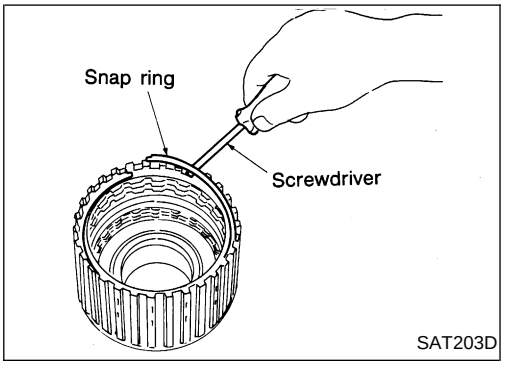


Forward Clutch and Overrun Clutch (Cont'd)

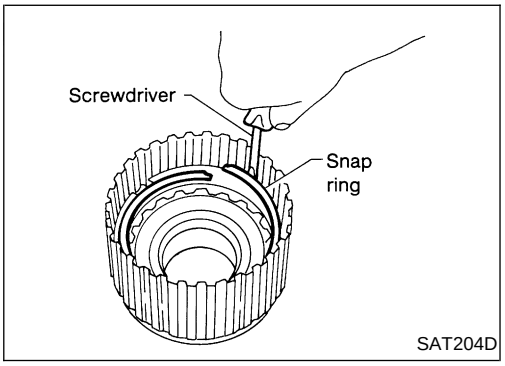
DISASSEMBLY



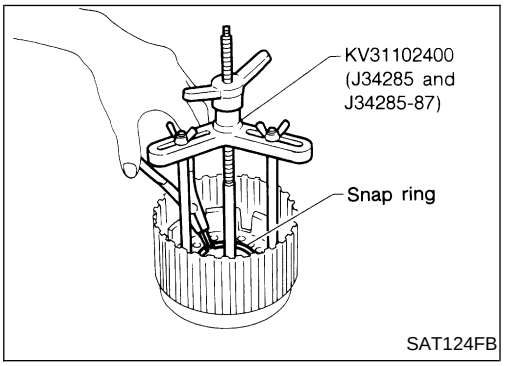
1. Check operation of forward clutch and overrun clutch.
a. Install bearing retainer on forward clutch drum.
b. Apply compressed air to oil hole of forward clutch drum.
c. Check to see that retaining plate moves to snap ring.
d. If retaining plate does not contact snap ring:
- D-ring might be damaged.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



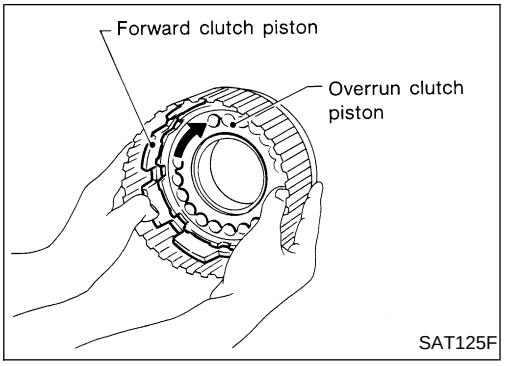
2. Remove snap ring for forward clutch.
3. Remove drive plates, driven plates, retaining plate and dish plate for forward clutch.



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

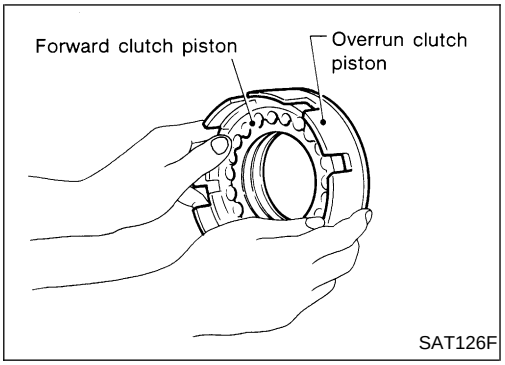


6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.
- **Set Tool directly over return springs.**
- **Do not expand snap ring excessively.**
7. Remove spring retainer and return springs.
- **Do not remove return springs from spring retainer.**

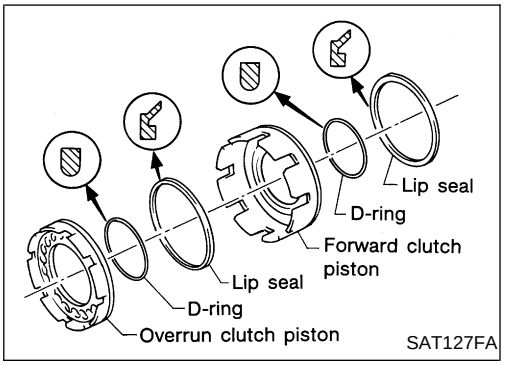


8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.

Forward Clutch and Overrun Clutch (Cont'd)



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

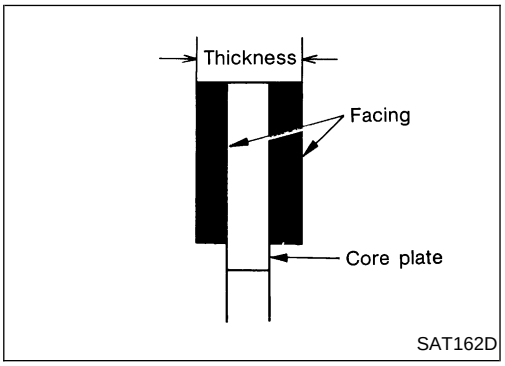


10. Remove D-rings and lip seals from forward clutch piston and overrun clutch piston.

INSPECTION

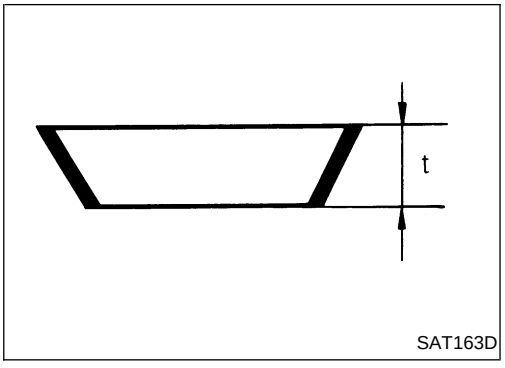
Snap rings, spring retainer and return springs

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



Forward clutch and overrun clutch drive plates

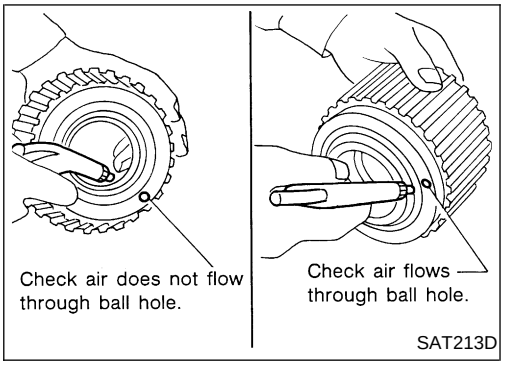
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Forward clutch
  Standard value: 1.6 mm (0.063 in)
  Wear limit: 1.4 mm (0.055 in)
  Overrun clutch
  Standard value: 1.6 mm (0.063 in)
  Wear limit: 1.4 mm (0.055 in)
- If not within wear limit, replace.



Forward clutch and overrun clutch dish plates

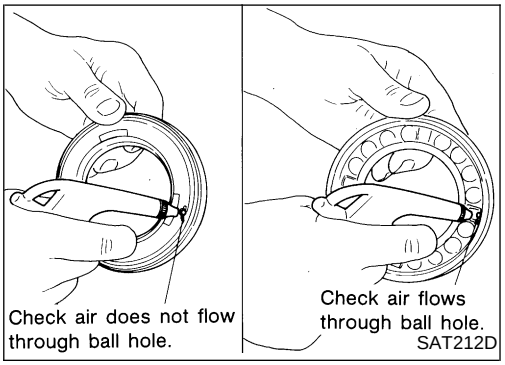
- Check for deformation or damage.
- Measure thickness of dish plate.
  Thickness of dish plate:
  Forward clutch 2.7 mm (0.106 in)
  Overrun clutch 2.7 mm (0.106 in)
- If deformed or fatigued, replace.

Forward Clutch and Overrun Clutch (Cont'd)



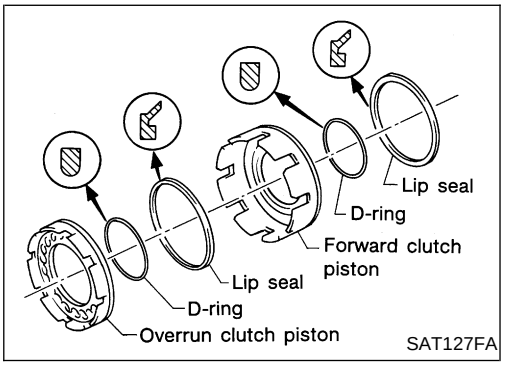
Forward clutch drum

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



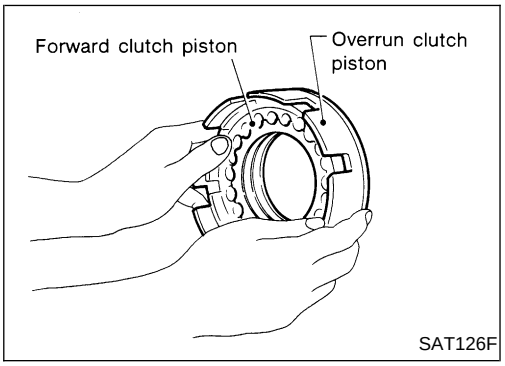
Overrun clutch piston

- Make sure 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.

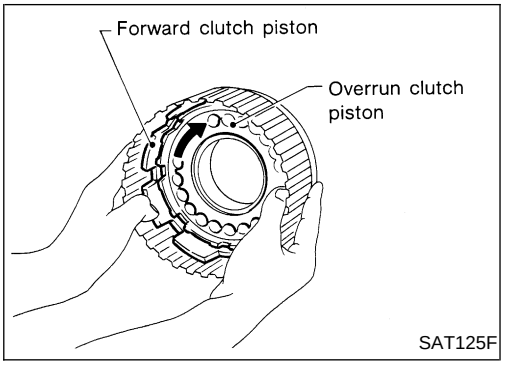


ASSEMBLY

1. Install D-rings and lip seals on forward clutch piston and overrun clutch piston.
- **Take care with direction of lip seal.**
- **Apply ATF to both parts.**

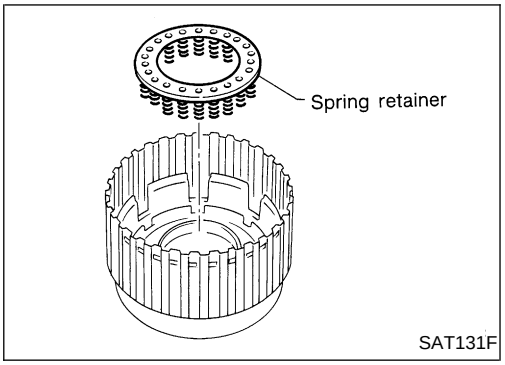


2. Install overrun clutch piston assembly on forward clutch piston by turning it slowly.
- **Apply ATF to inner surface of forward clutch piston.**

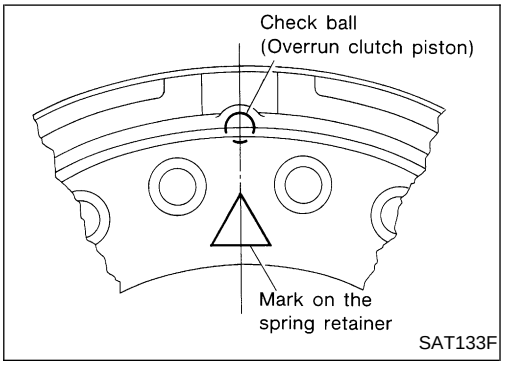


3. Install forward clutch piston assembly on forward clutch drum by turning it slowly.
- **Apply ATF to inner surface of drum.**

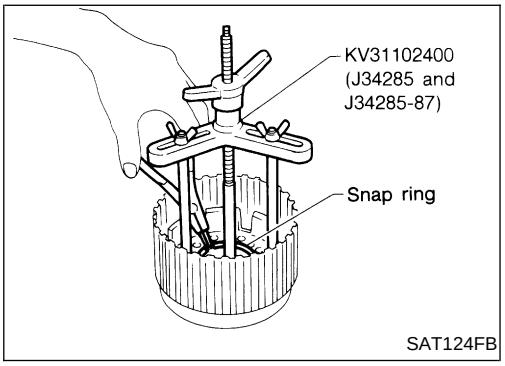
Forward Clutch and Overrun Clutch (Cont'd)



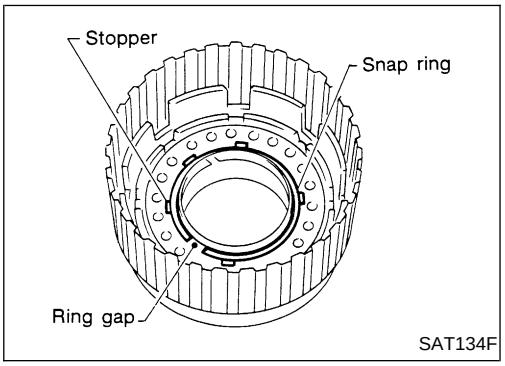
4. Install return spring on overrun clutch piston.



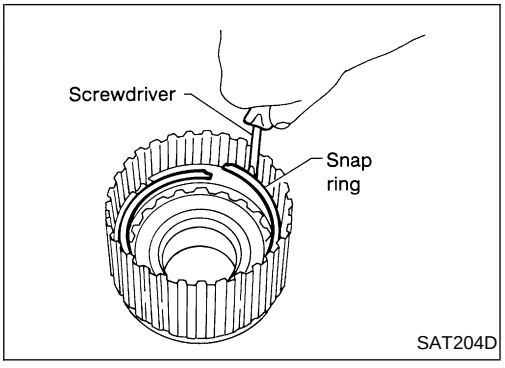
- Align the mark on spring retainer with check ball in overrun clutch piston.



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

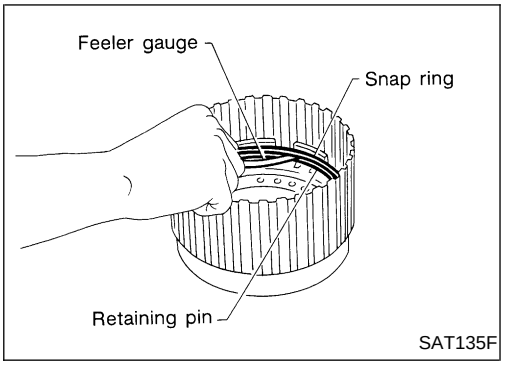


- **Do not align snap ring gap with spring retainer stopper.**

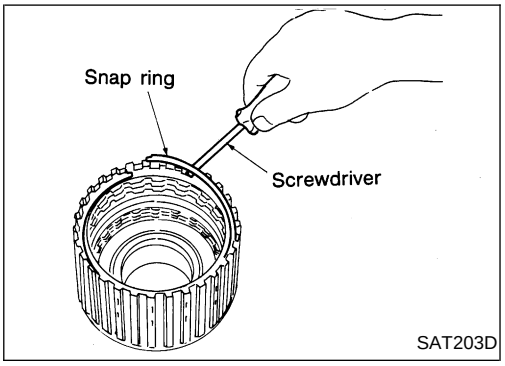


6. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
- **Take care with order of plates.**
7. Install snap ring for overrun clutch.

Forward Clutch and Overrun Clutch (Cont'd)

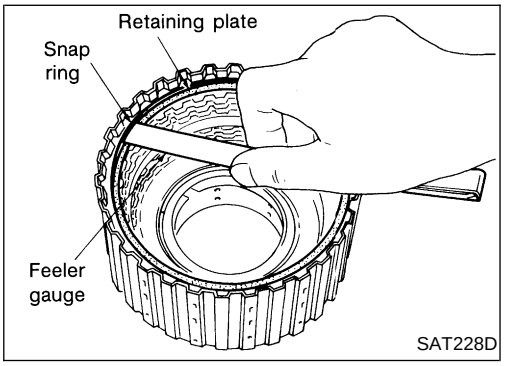


8. Measure clearance between overrun clutch retaining plate and snap ring.
   If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard 0.7 - 1.1 mm (0.028 - 0.043 in)
   Allowable limit 1.7 mm (0.067 in)
   Overrun clutch retaining plate:
   Refer to "CLUTCHES AND BRAKES", AT-304.

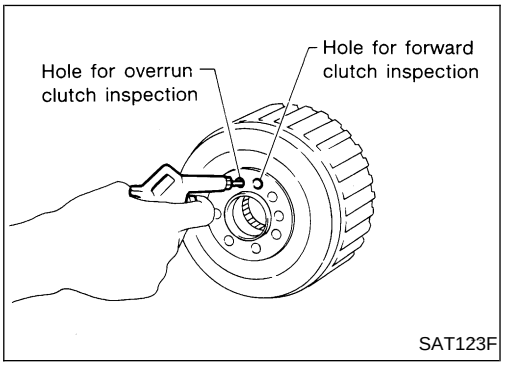


9. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.
- **Take care with order of plates.**

10. Install snap ring for forward clutch.

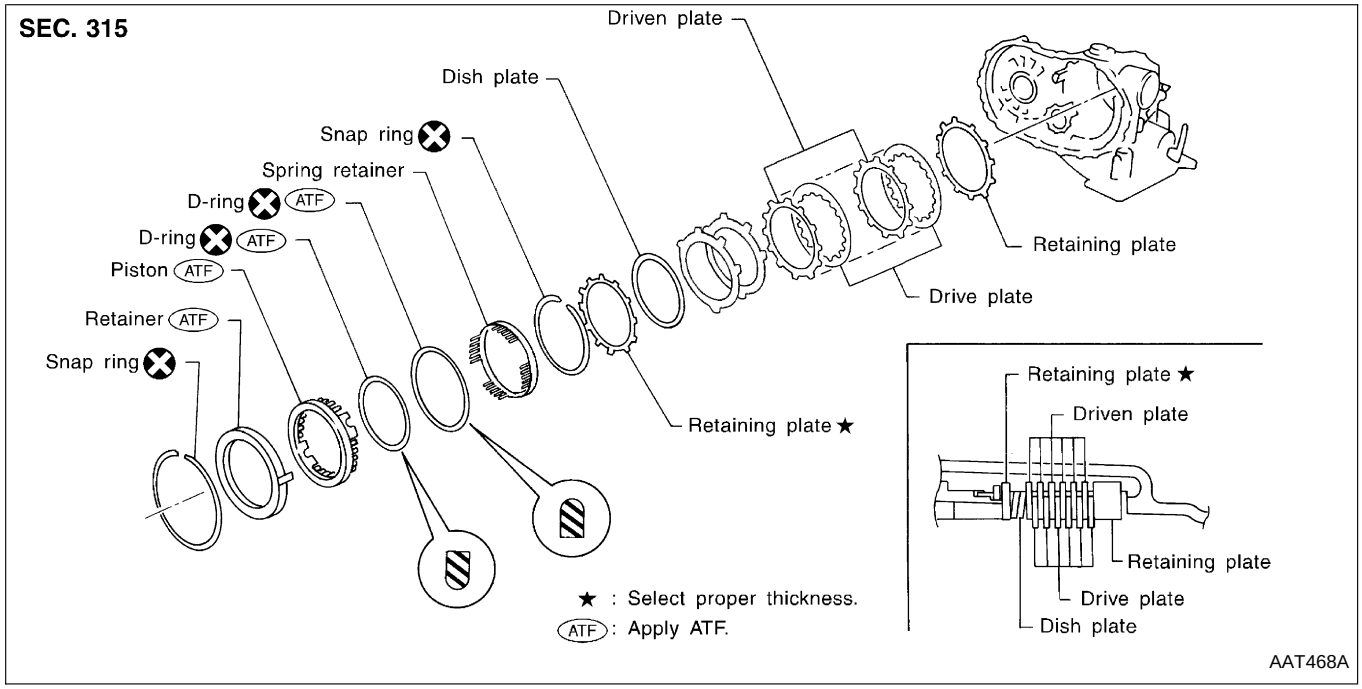


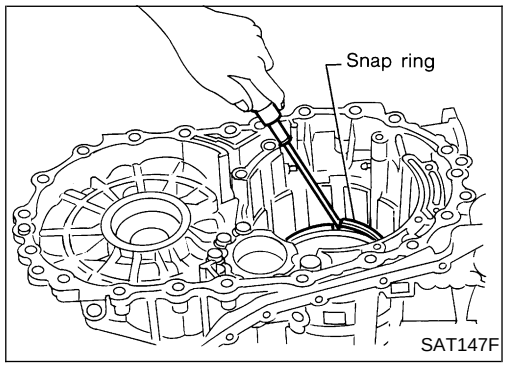
11. Measure clearance between forward clutch retaining plate and snap ring.
    If not within allowable limit, select proper retaining plate.
    Specified clearance:
    Standard 0.45 - 0.85 mm (0.0177 - 0.0335 in)
    Allowable limit 1.85 mm (0.0728 in)
    Forward clutch retaining plate:
    Refer to "CLUTCHES AND BRAKES", AT-304.



12. Check operation of forward clutch.
    Refer to "Forward Clutch and Overrun Clutch", AT-257.
13. Check operation of overrun clutch.
    Refer to "Forward Clutch and Overrun Clutch", AT-257.

Low & Reverse Brake



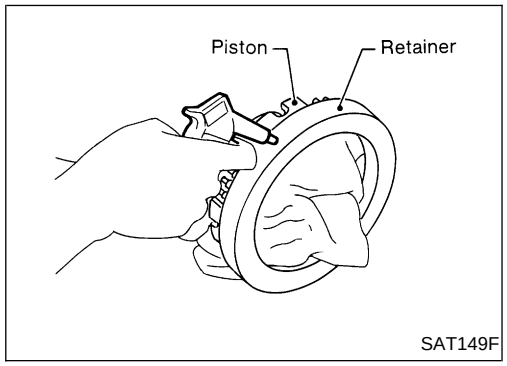


DISASSEMBLY

1. Check operation of low & reverse brake.

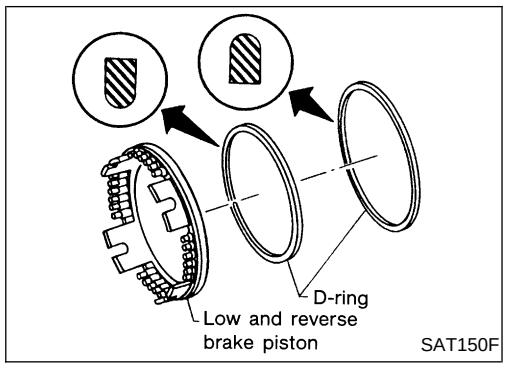
a. Apply compressed air to oil hole of transmission case.
b. Check to see that retaining plate moves to snap ring.
c. If retaining plate does not contact snap ring:

- D-ring might be damaged.
- 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.**



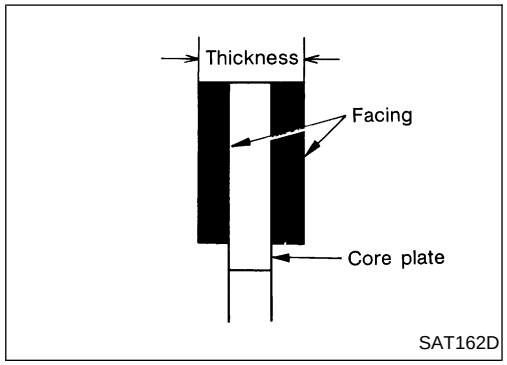
3. Remove D-rings from piston.

Low & Reverse Brake (Cont'd)

INSPECTION

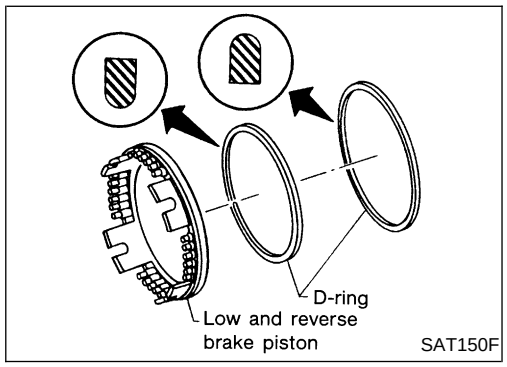
Low & reverse clutch snap ring, spring retainer and return springs

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



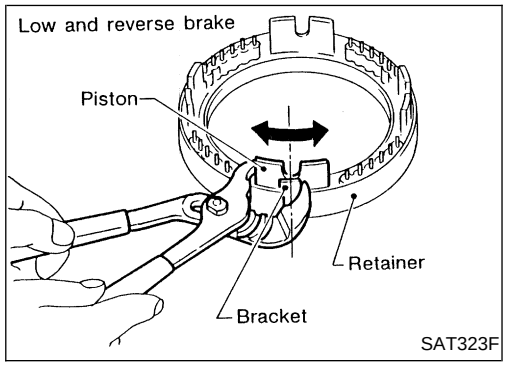
Low & reverse brake drive plate

- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value 1.8 mm (0.071 in)
  Wear limit 1.6 mm (0.063 in)
- If not within wear limit, replace.

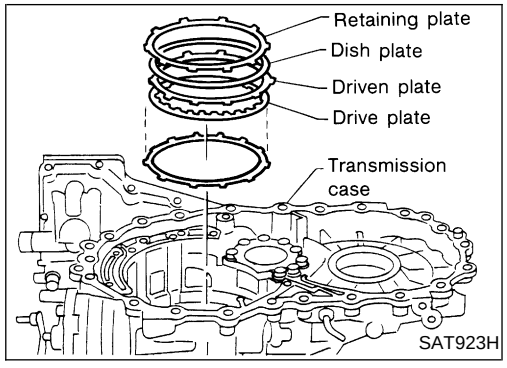


ASSEMBLY

1. Install D-rings on piston.
- **Apply ATF to both parts.**

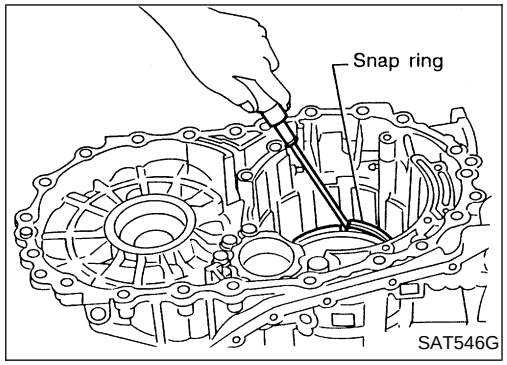


2. Set and align piston with retainer.
- **This operation is required in order to engage the protrusions of piston to return springs correctly. Further procedures are given in "ASSEMBLY".**

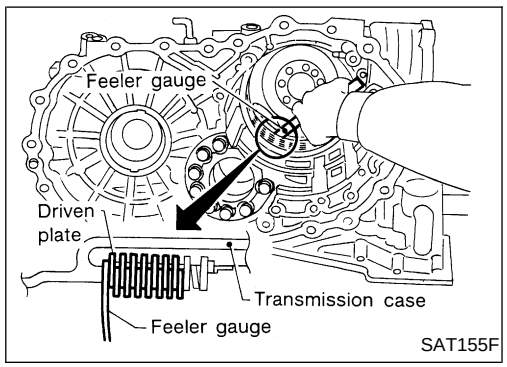


3. Install driven plates, drive plates, retaining plate and dish plate on transmission case.
- **Take care with order of plates and direction of dish plate.**

Low & Reverse Brake (Cont'd)



4. Install snap ring.



5. Measure clearance between driven plate and transmission case. If not within allowable limit, select proper retaining plate. (front side)

Specified clearance:

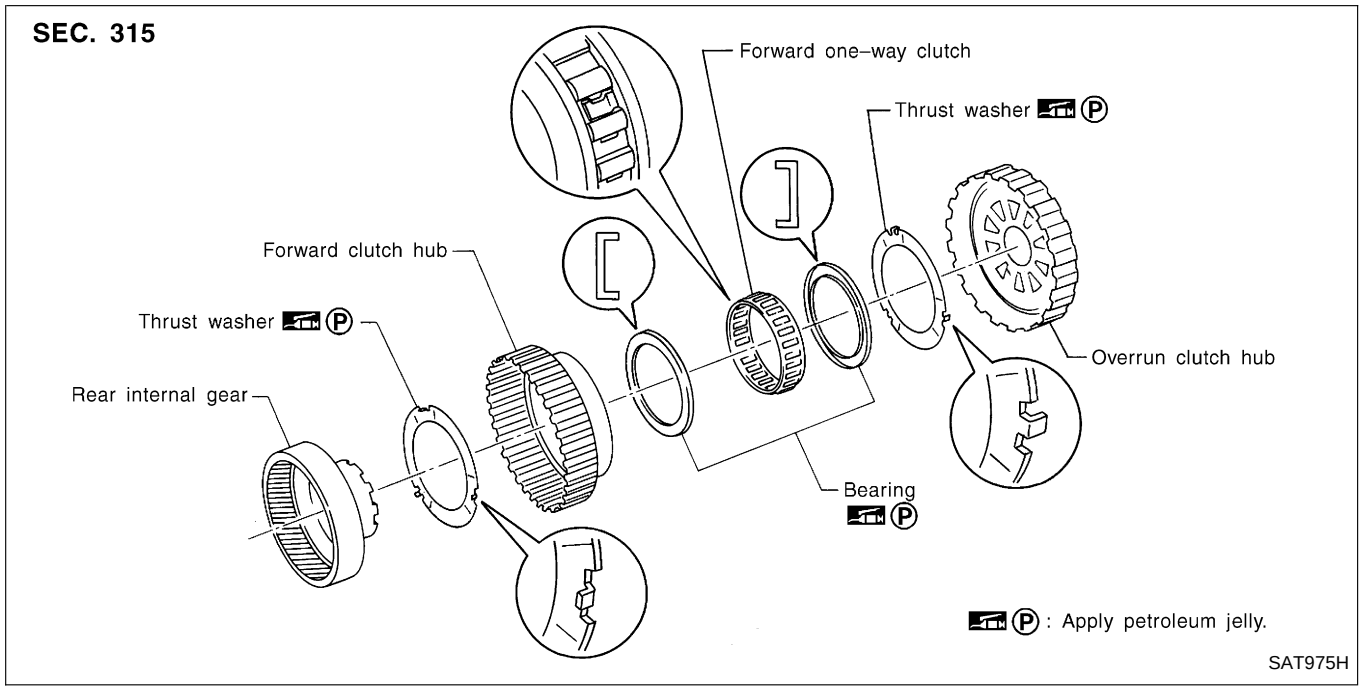
Standard 1.7 - 2.1 mm (0.067 - 0.083 in)

Allowable limit 3.3 mm (0.130 in)

Retaining plate:

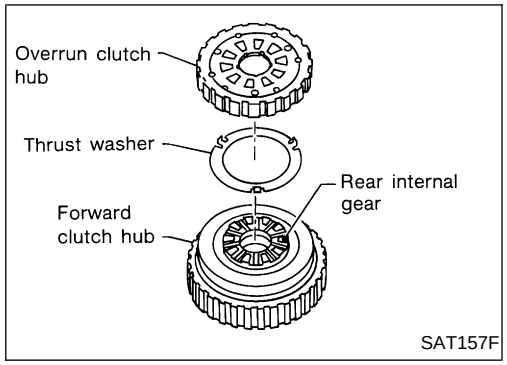
Refer to "CLUTCHES AND BRAKES", AT-304.

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

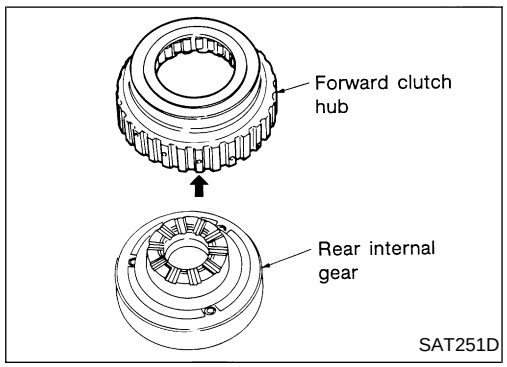


Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)

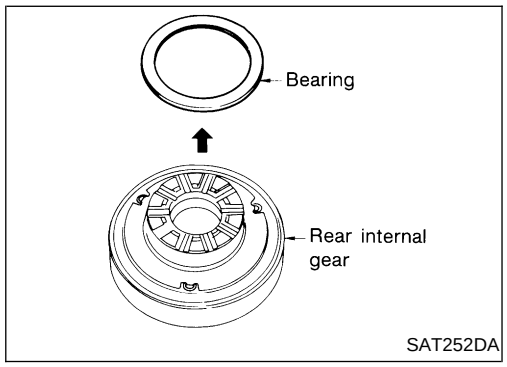
DISASSEMBLY



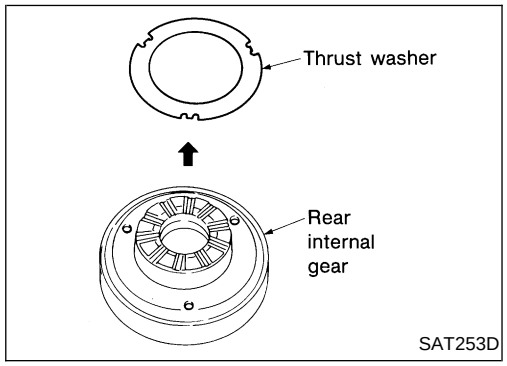
1. Remove overrun clutch hub and thrust washer from forward clutch hub.



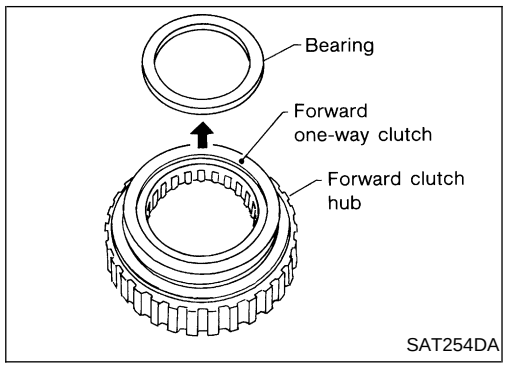
2. Remove forward clutch hub from rear internal gear.



3. Remove bearing from rear internal gear.

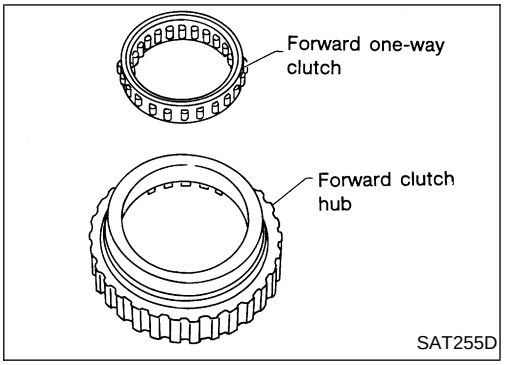


4. Remove thrust washer from rear internal gear.



5. Remove bearing from forward one-way clutch.

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

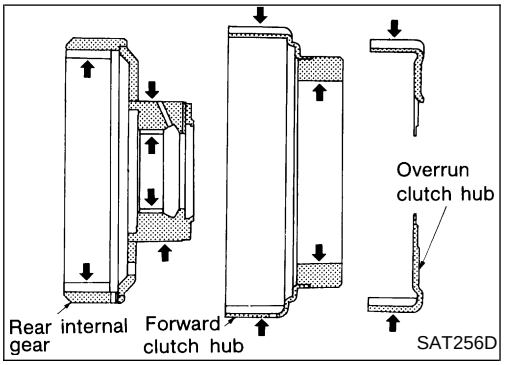


6. Remove forward one-way clutch from forward clutch hub.

INSPECTION

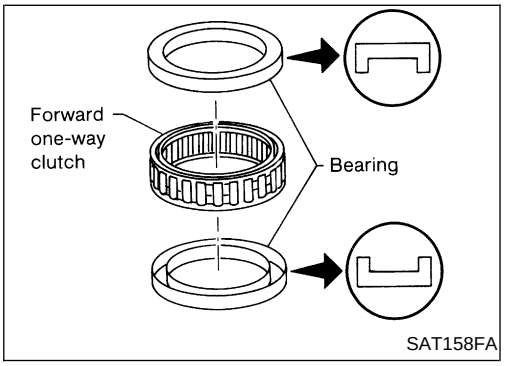
Rear internal gear, forward clutch hub and overrun clutch hub

- Check rubbing surfaces for wear or damage.



Bearings and forward one-way clutch

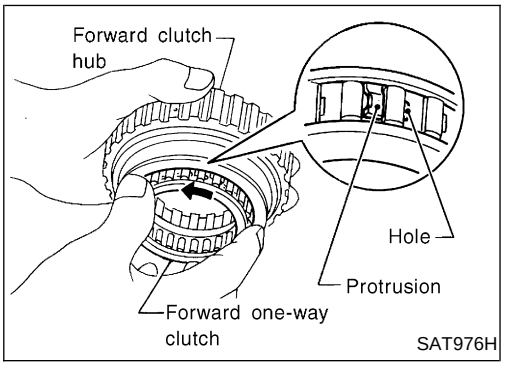
- Check bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.



ASSEMBLY

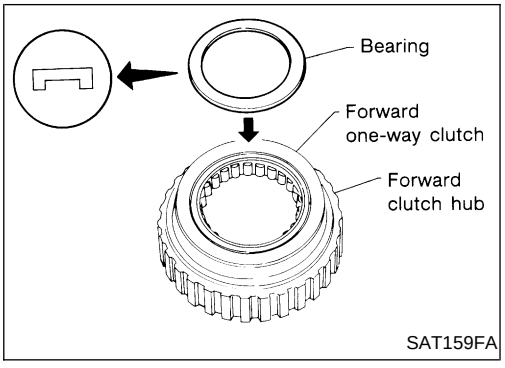
1. Install forward one-way clutch on forward clutch.

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

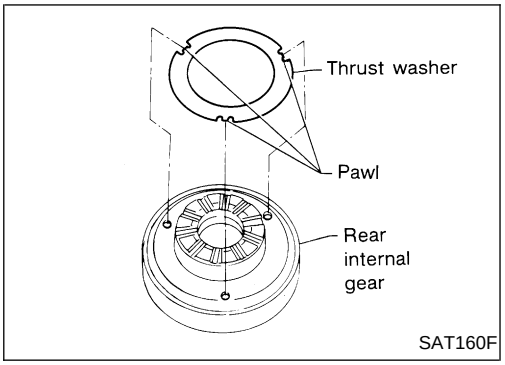


2. Install bearing on forward one-way clutch.

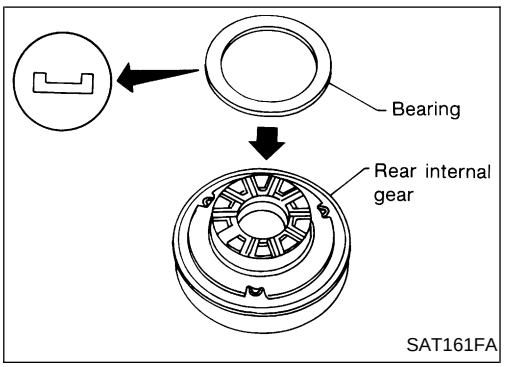
- **Apply petroleum jelly to bearing.**



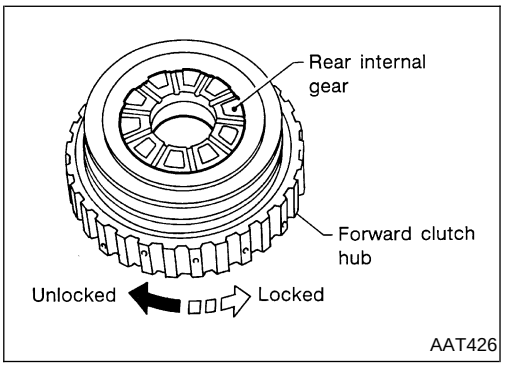
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



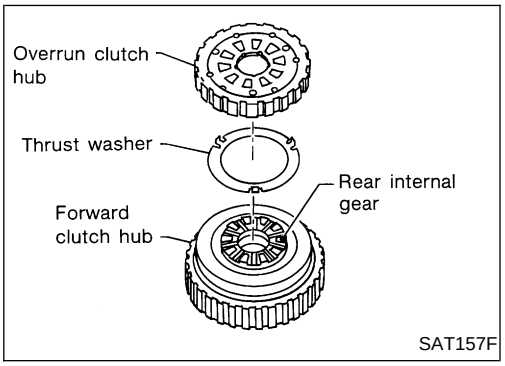
3. Install thrust washer on rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Align hooks of thrust washer with holes of rear internal gear.**



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



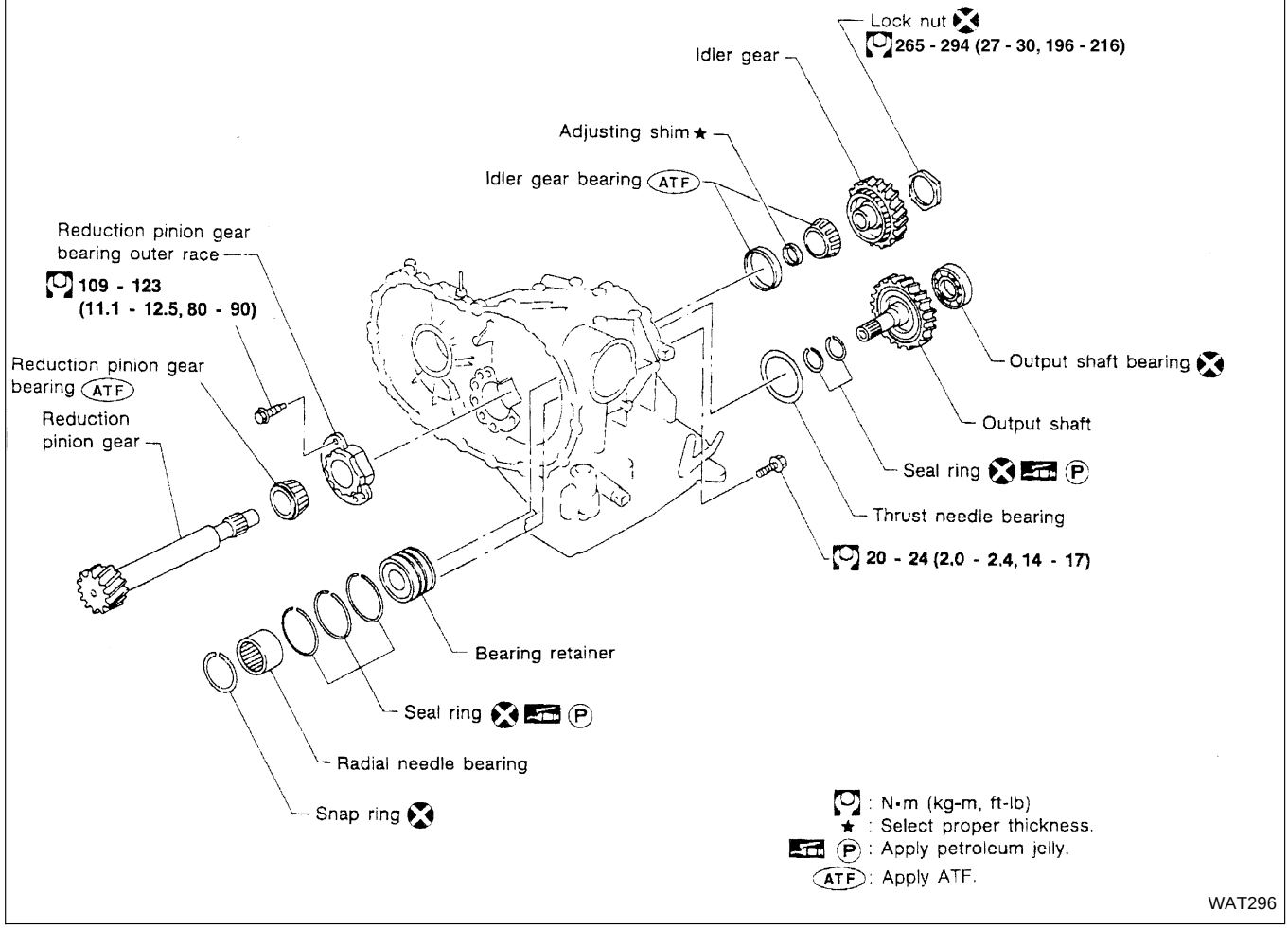
5. Install forward clutch hub on rear internal gear.
- **Check operation of forward one-way clutch.**
  Hold rear internal gear and turn forward clutch hub. Check forward clutch hub for correct locking and unlocking directions.
- **If not as shown in illustration, check installation direction of forward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

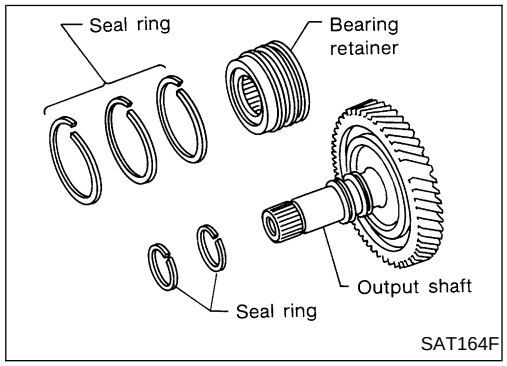


6. Install thrust washer and overrun clutch hub.
- **Apply petroleum jelly to thrust washer.**
- **Align hooks of thrust washer with holes of overrun clutch hub.**
- **Align projections of rear internal gear with holes of overrun clutch hub.**

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer

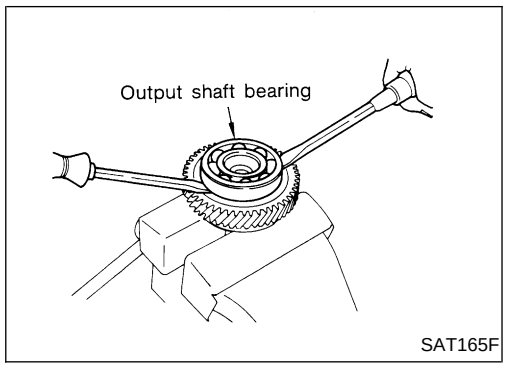
SEC. 314





DISASSEMBLY

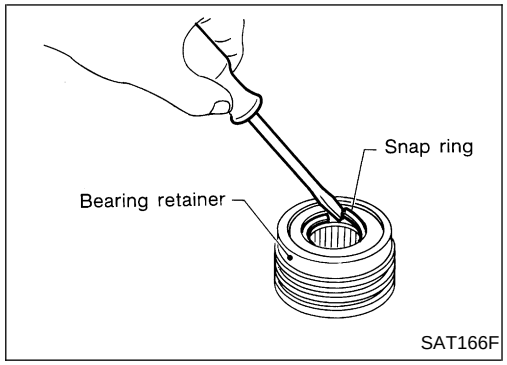
1. Remove seal rings from output shaft and bearing retainer.



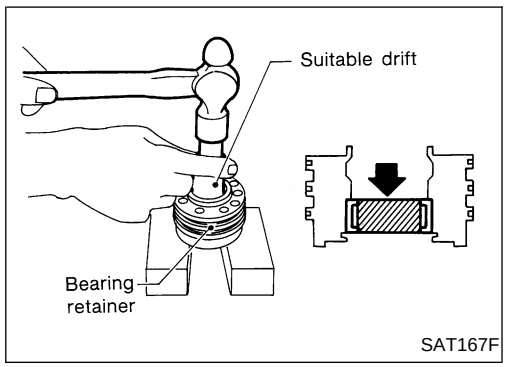
2. Remove output shaft bearing with screwdrivers.

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

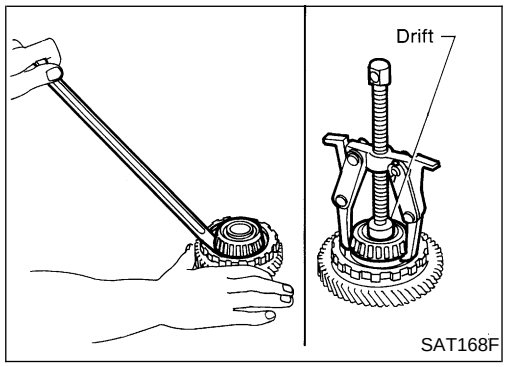
Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)



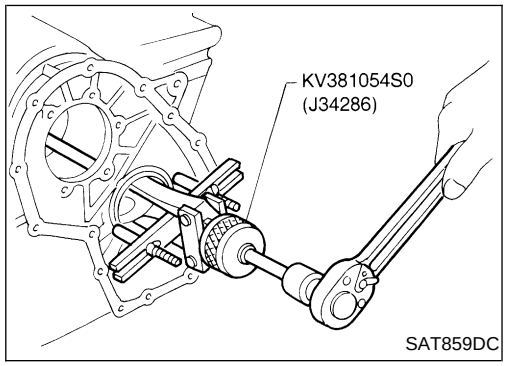
3. Remove snap ring from bearing retainer.



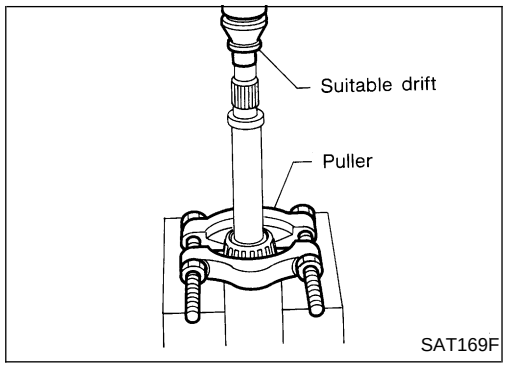
4. Remove needle bearing from bearing retainer.



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

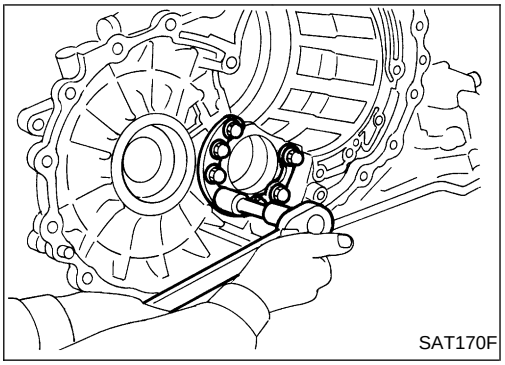


6. Remove idler gear bearing outer race from transmission case.



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

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)

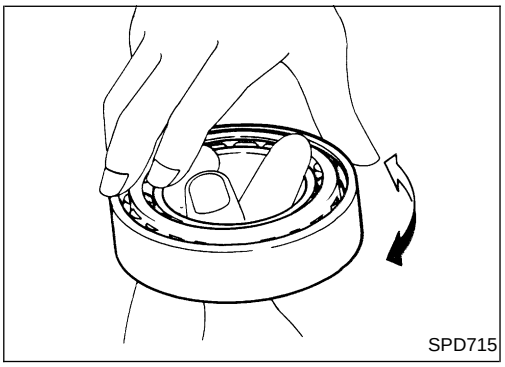

SAT170F

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

INSPECTION

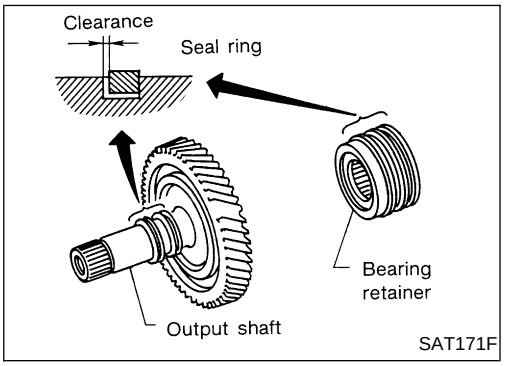
Output shaft, idler gear and reduction pinion gear

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


SPD715

Bearing

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



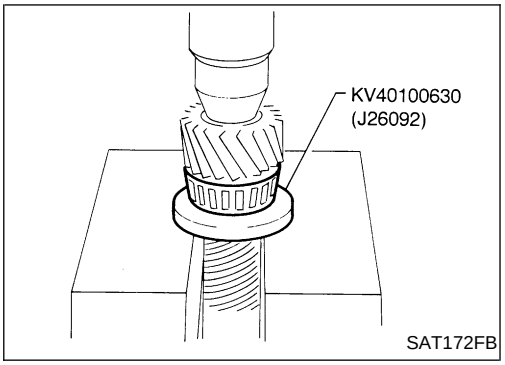
SAT171F

Seal ring clearance

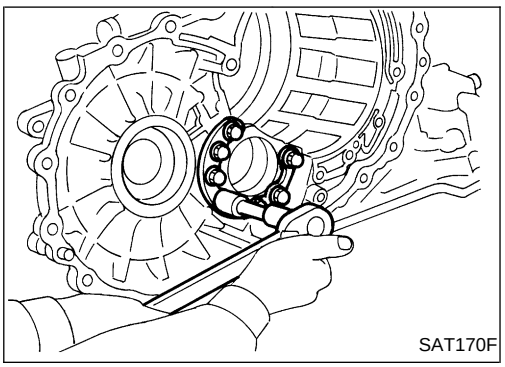
- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.
  Standard clearance:
  0.10 - 0.25 mm (0.0039 - 0.0098 in)
  Allowable limit:
  0.25 mm (0.0098 in)
- If not within allowable limit, replace output shaft.
- Install new seal rings to bearing retainer.
- Measure clearance between seal ring and ring groove of bearing retainer.
  Standard clearance:
  0.10 - 0.30 mm (0.0039 - 0.0118 in)
  Allowable limit:
  0.30 mm (0.0118 in)
- If not within allowable limit, replace bearing retainer.

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)

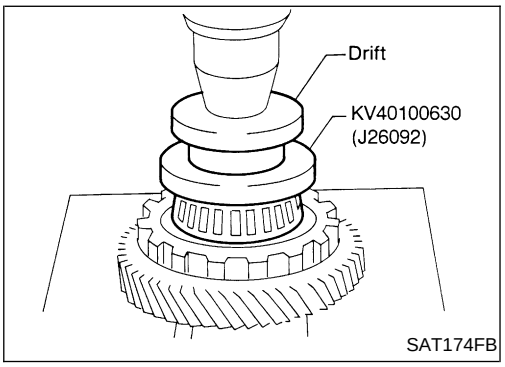
ASSEMBLY



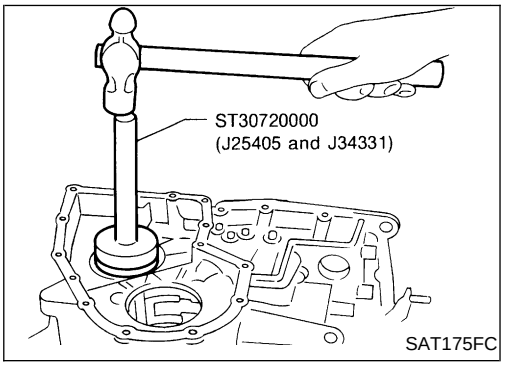
1. Press reduction pinion gear bearing inner race on reduction pinion gear.



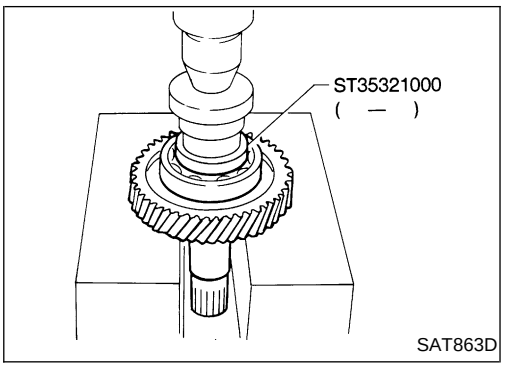
2. Install reduction pinion gear bearing outer race on transmission case.
   : 109 - 123 N·m (11.1 - 12.5 kg-m, 80 - 90 ft-lb)



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

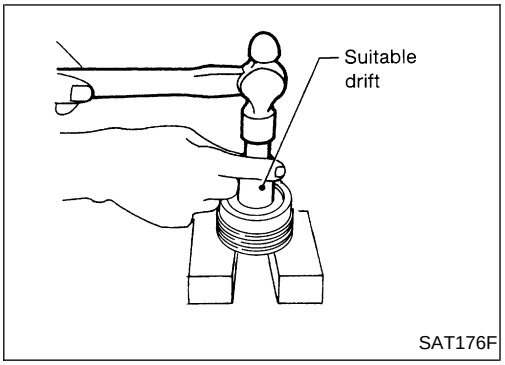


4. Install idler gear bearing outer race on transmission case.

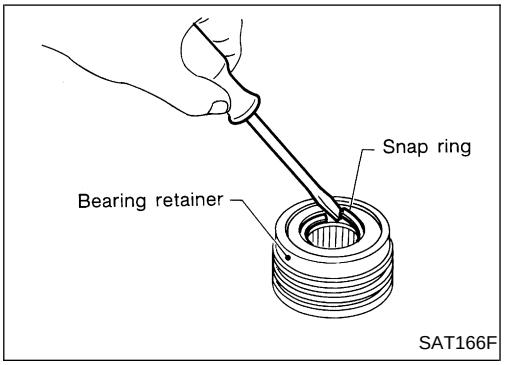


5. Press output shaft bearing on output shaft.

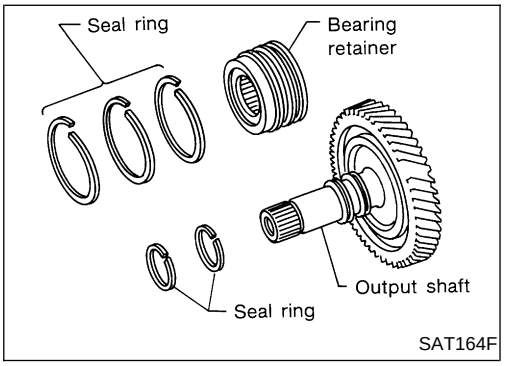
Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)



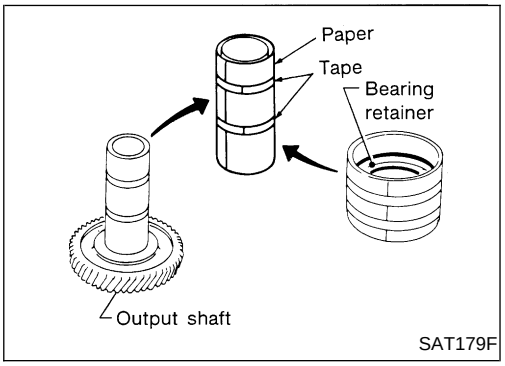
6. Press needle bearing on bearing retainer.



7. Install snap ring to bearing retainer.

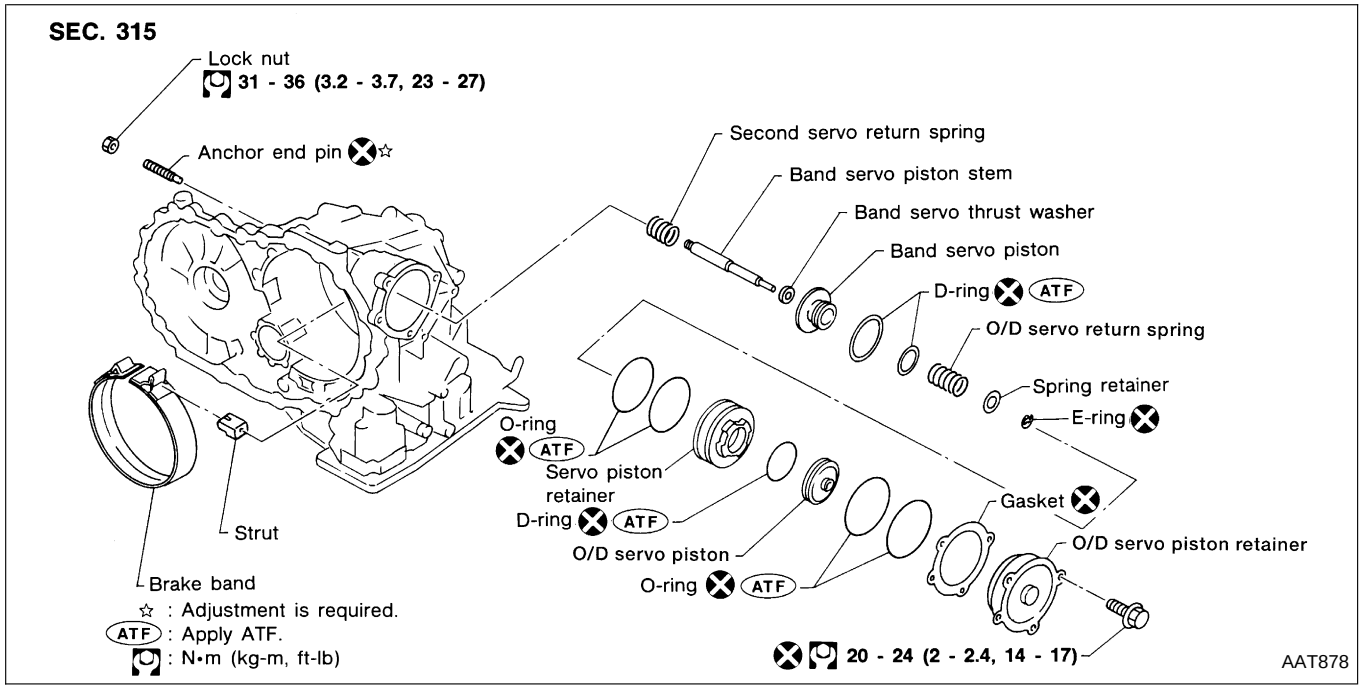


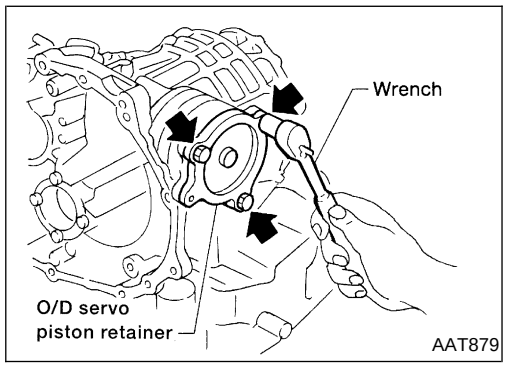
8. After packing ring grooves with petroleum jelly, carefully install new seal rings on output shaft and bearing retainer.



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

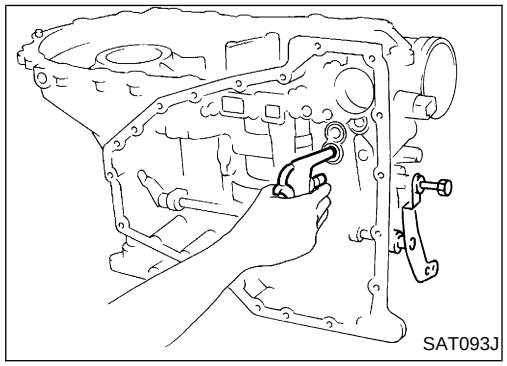
Band Servo Piston Assembly



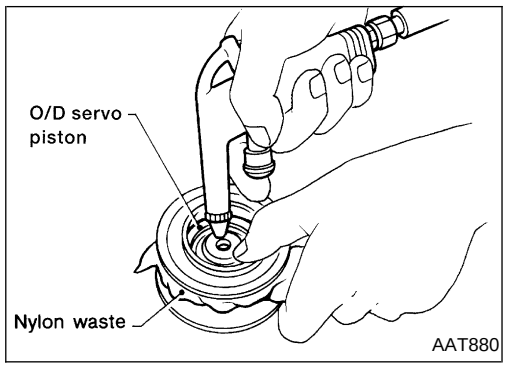


DISASSEMBLY

1. Remove band servo piston fixing bolts.

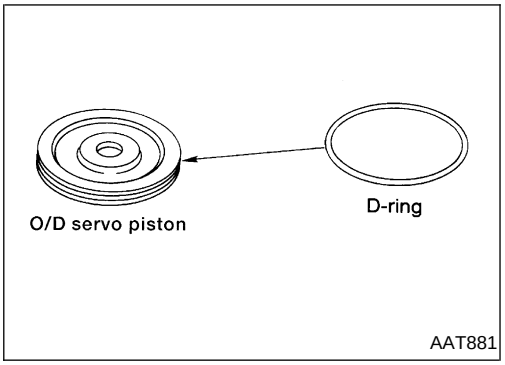


2. Apply compressed air to oil hole in transmission case to remove O/D servo piston retainer and band servo piston assembly.
- **Hold band servo piston assembly with a rag or nylon waste.**

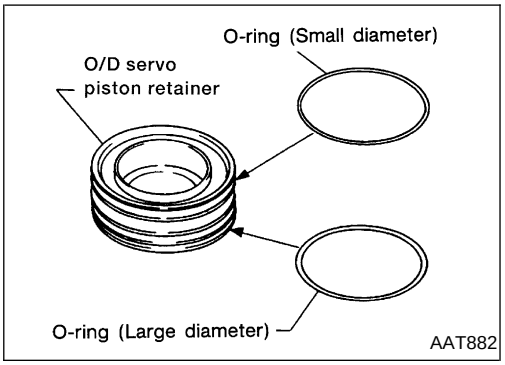


3. Apply compressed air to oil hole in O/D servo piston retainer to remove O/D servo piston from retainer.
- **Hold O/D band servo piston while applying compressed air.**

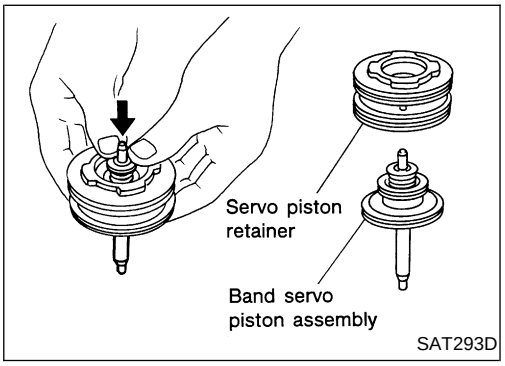
Band Servo Piston Assembly (Cont'd)



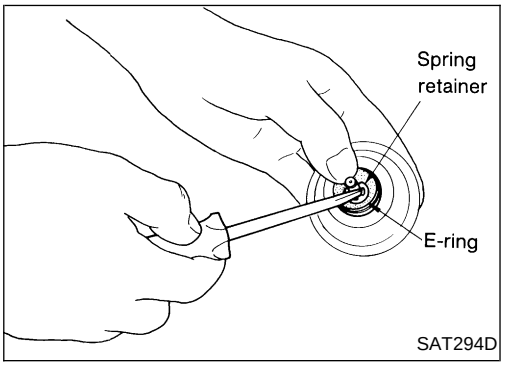
4. Remove D-ring from O/D servo piston.



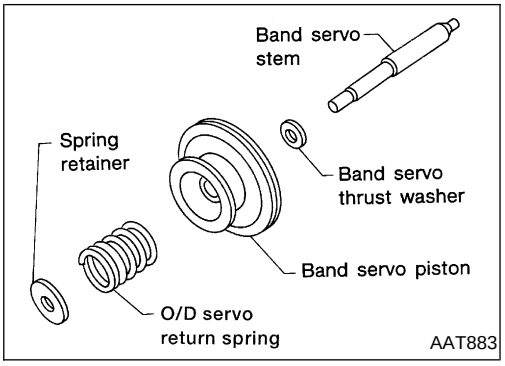
5. Remove O-rings from O/D servo piston retainer.



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

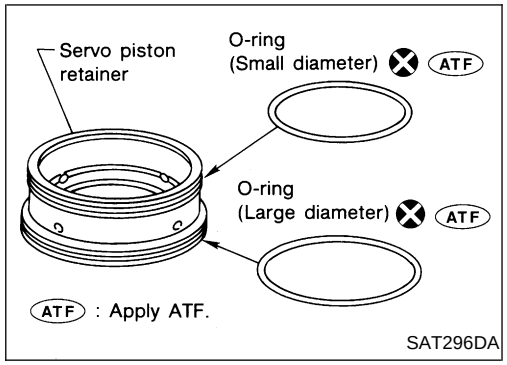


7. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

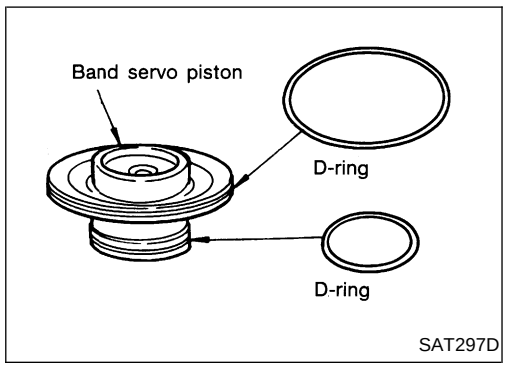


8. Remove O/D servo return spring, band servo thrust washer and band servo piston stem from band servo piston.

Band Servo Piston Assembly (Cont'd)



9. Remove O-rings from servo piston retainer.

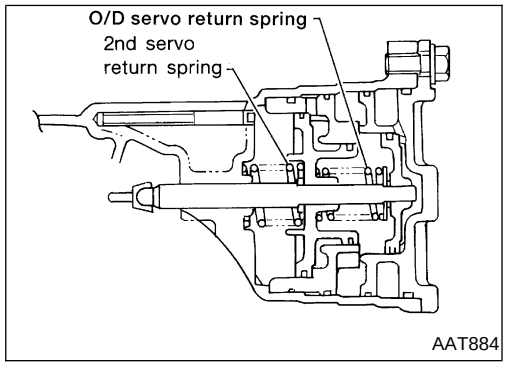


10. Remove D-rings from band servo piston.

INSPECTION

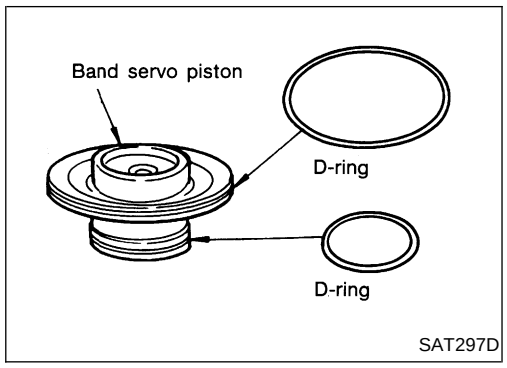
Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.



Return springs

- Check for deformation or damage.
- Measure free length and outer diameter.
  Inspection standard:
  Refer to "Return spring", AT-307.

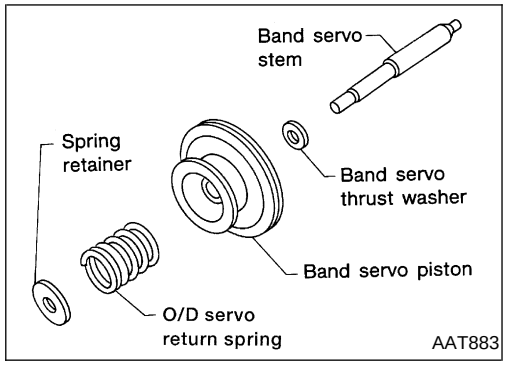


ASSEMBLY

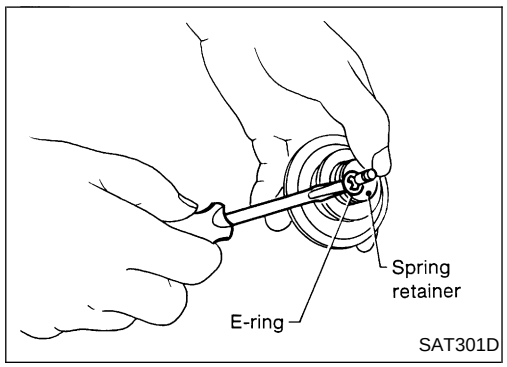
1. Install D-rings to servo piston retainer.

- **Apply ATF to D-rings.**
- **Pay attention to position of each O-ring.**

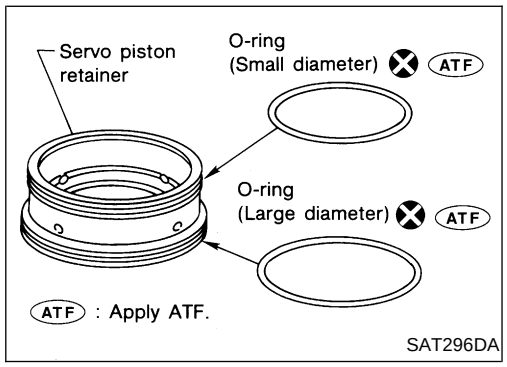
Band Servo Piston Assembly (Cont'd)



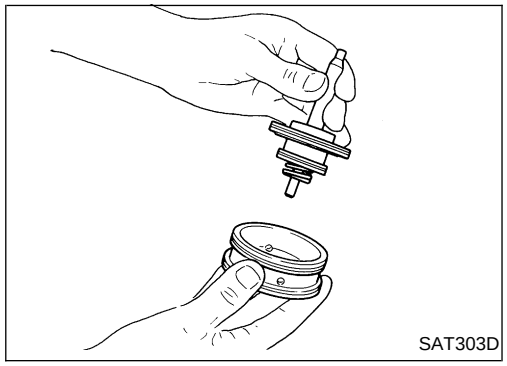
2. Install band servo piston stem, band servo thrust washer, O/D servo return spring and spring retainer to band servo piston.



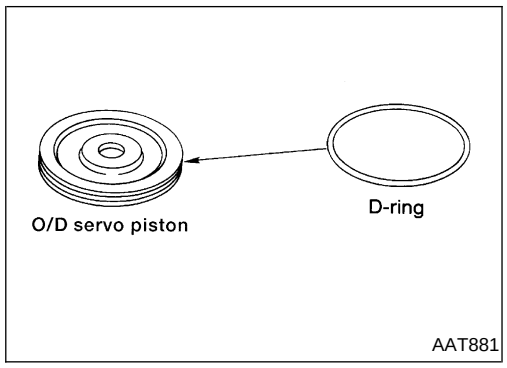
3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



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

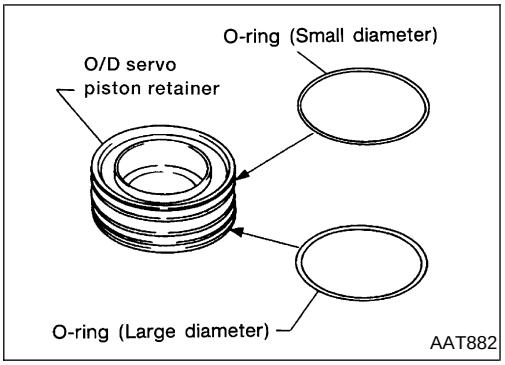


5. Install band servo piston assembly to servo piston retainer by pushing it inward.

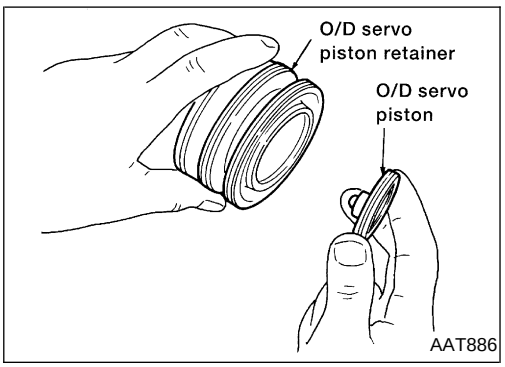


6. Install D-ring to O/D servo piston.
- **Apply ATF to D-ring.**

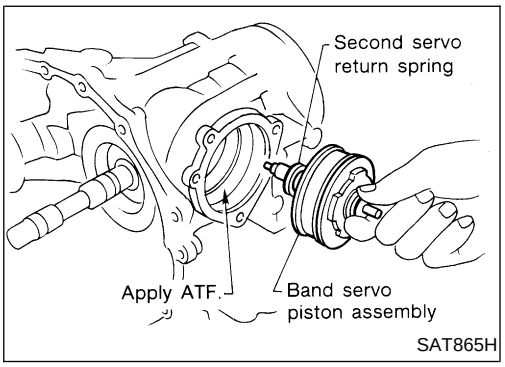
Band Servo Piston Assembly (Cont'd)



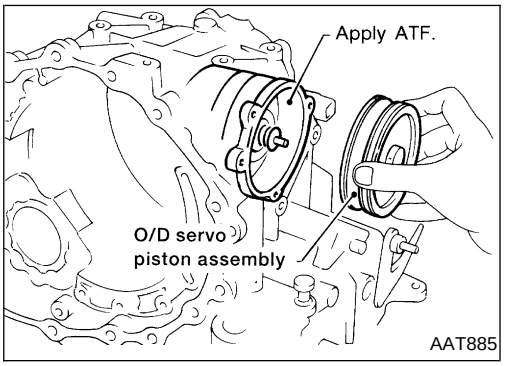
7. Install O-rings to O/D servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**



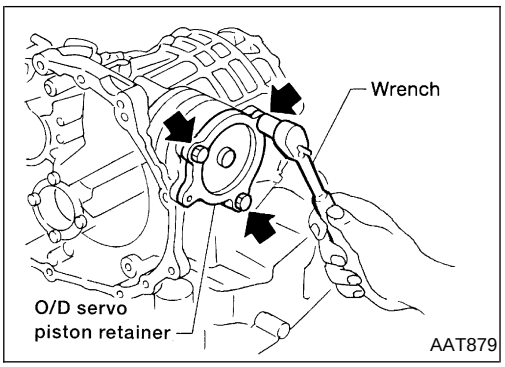
8. Install O/D servo piston to O/D servo piston retainer.



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.**

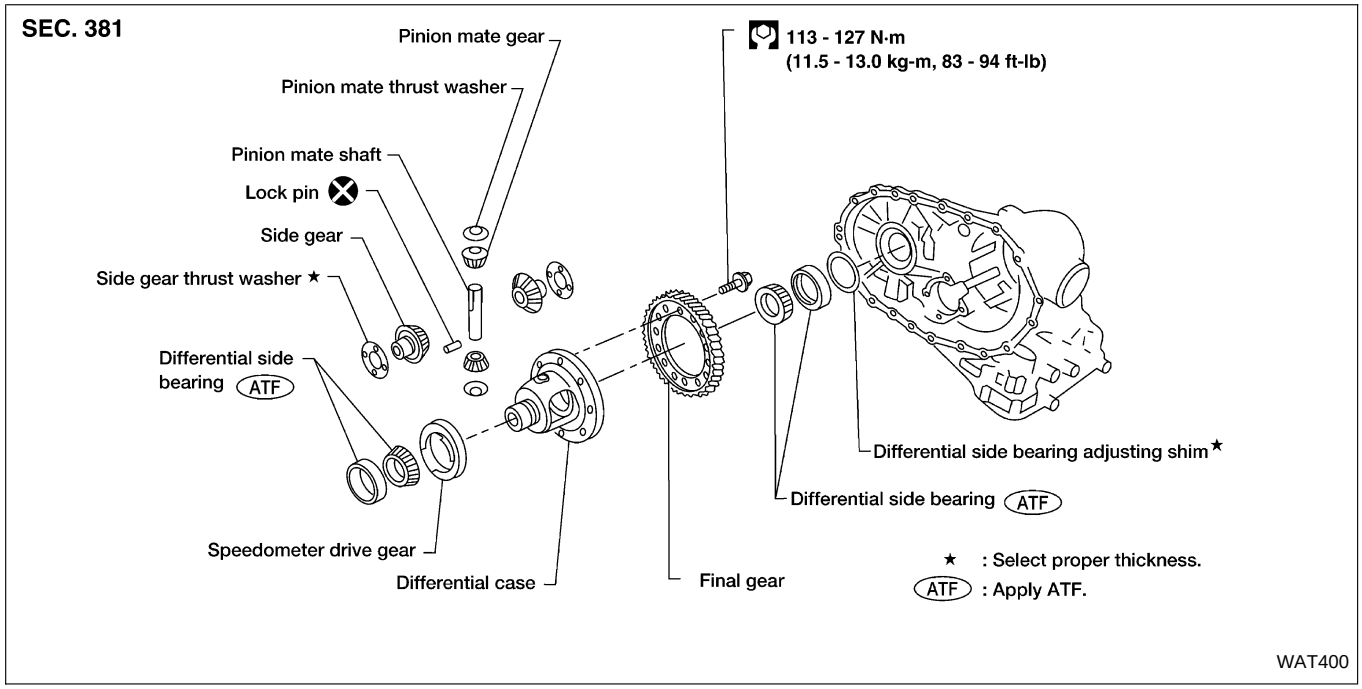


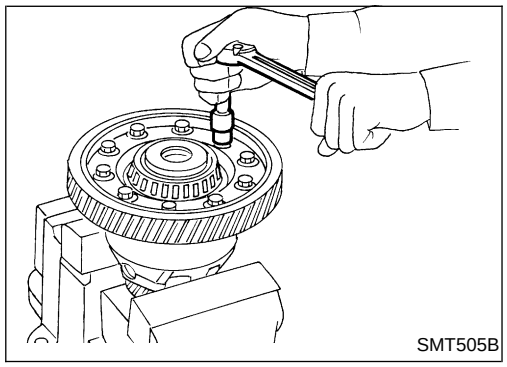
10. Install O/D servo piston assembly to transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**



11. Install O/D servo piston retainer to transmission case.
: 20 - 24 N·m (2 - 2.4 kg-m, 14 - 17 ft-lb)

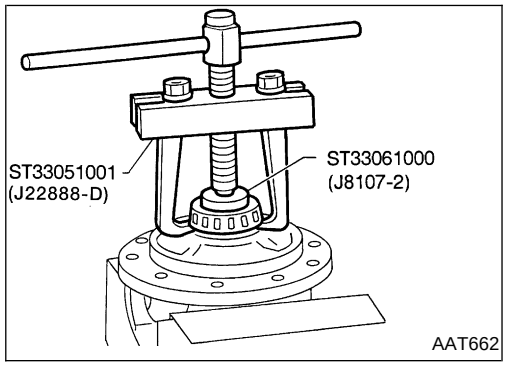
Final Drive





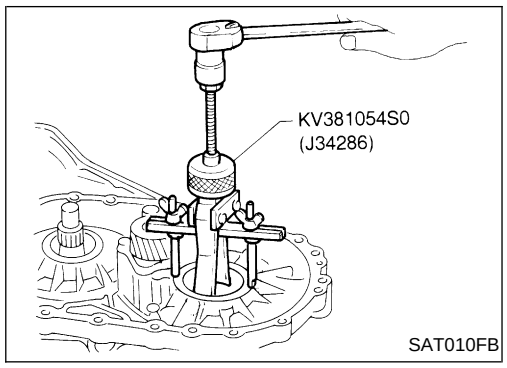
DISASSEMBLY

1. Remove final gear.



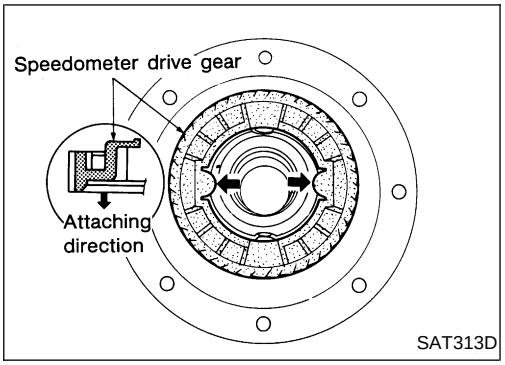
2. Press out differential side bearings.

- **Be careful not to mix up the right and left bearings.**

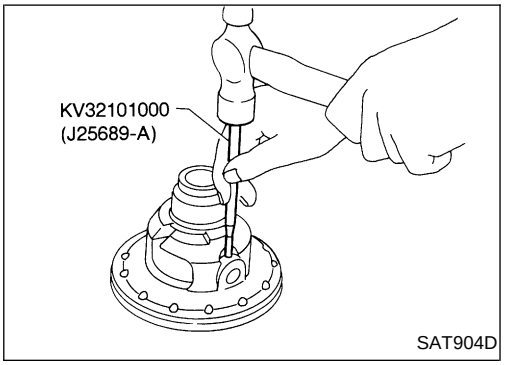


3. Remove differential side bearing outer race, and side bearing adjusting shim from transmission case.

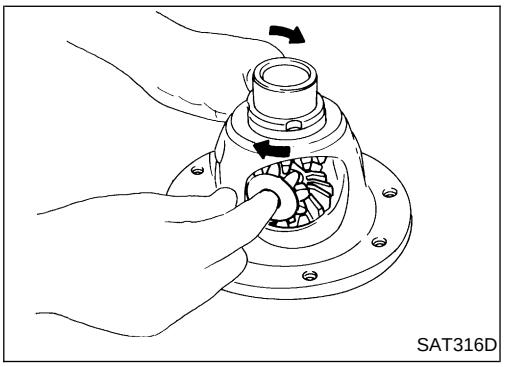
Final Drive (Cont'd)



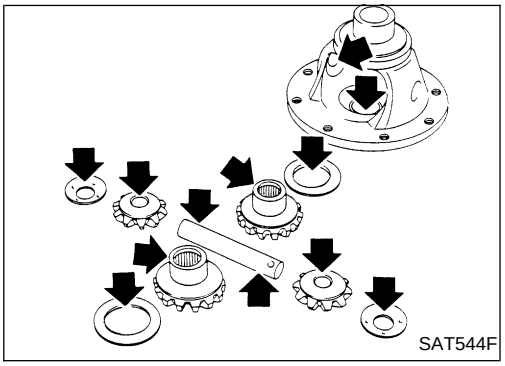
4. Remove speedometer drive gear.



5. Drive out pinion mate gear shaft lock pin.



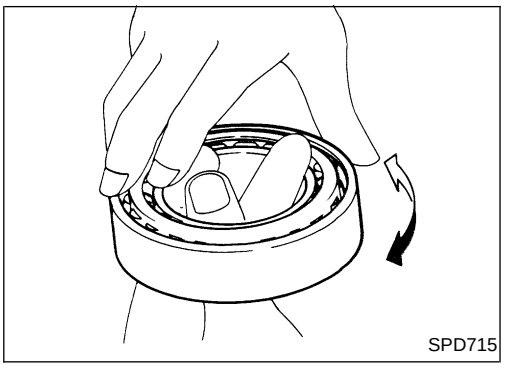
6. Draw out pinion mate gear shaft lock pin.
7. Remove pinion mate gears and side gears.



INSPECTION

Gear, washer, shaft and case

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

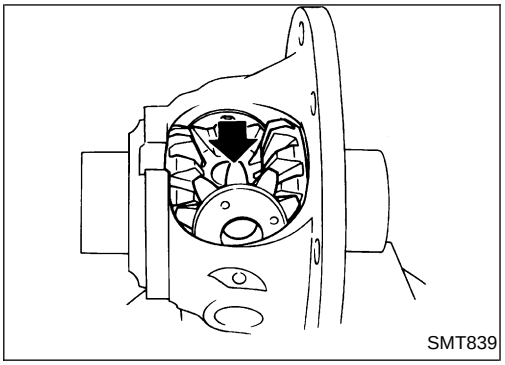


Bearings

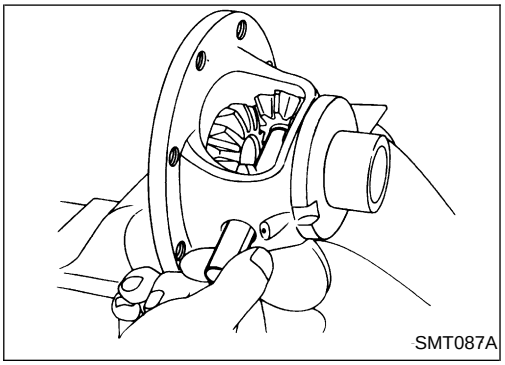
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**

Final Drive (Cont'd)

ASSEMBLY

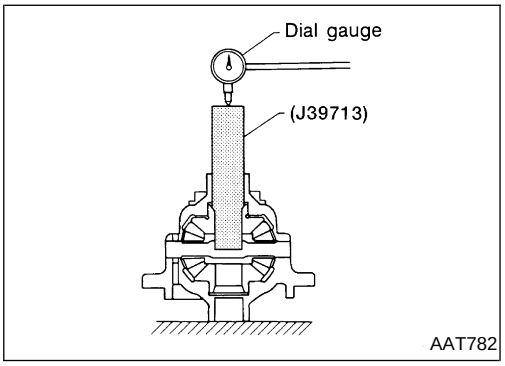

SMT839

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.

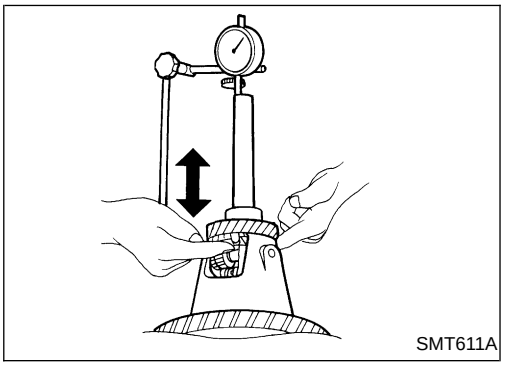
- **When inserting, be careful not to damage pinion mate gear thrust washers.**



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:

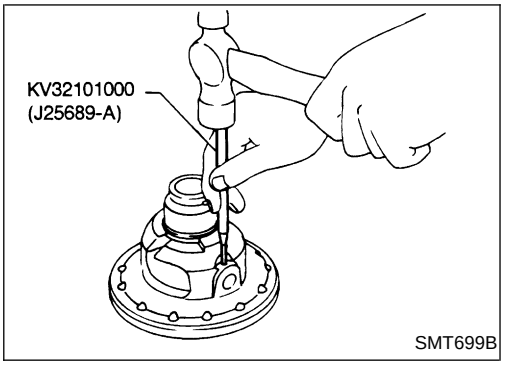
0.1 - 0.2 mm (0.004 - 0.008 in)

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

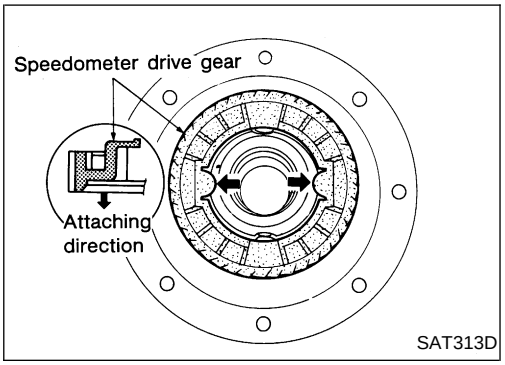
Differential side gear thrust washers:

Refer to "Differential side gear thrust washers", AT-305.

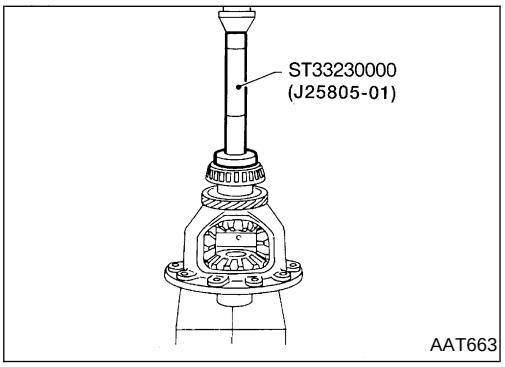
Final Drive (Cont'd)



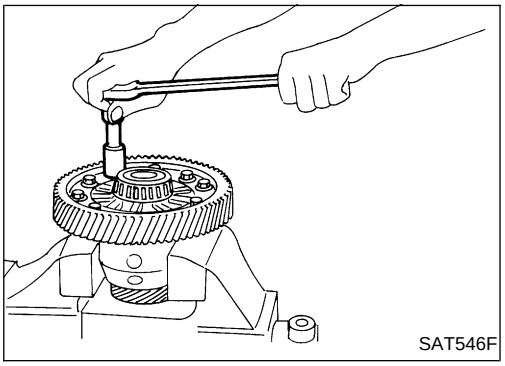
4. Install lock pin.
- **Make sure that lock pin is flush with case.**



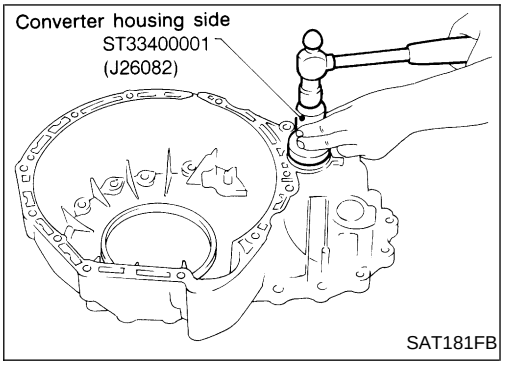
5. Install speedometer drive gear on differential case.
- **Align the projection of speedometer drive gear with the groove of differential case.**



6. Press on differential side bearings.

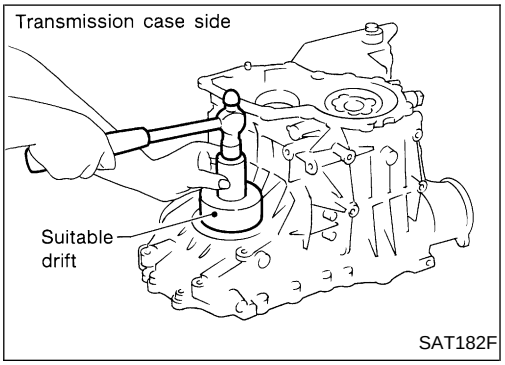


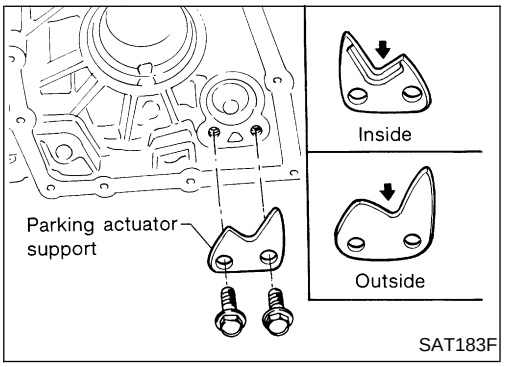
7. Install final gear and tighten fixing bolts in a crisscross pattern.
   : 113 - 127 N·m (11.5 - 13.0 kg-m, 83 - 94 ft-lb)



Assembly 1

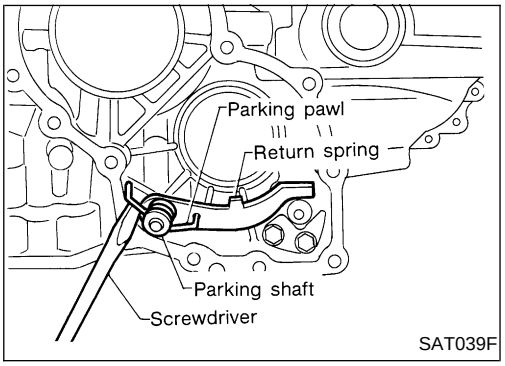
1. Install differential side oil seals on transmission case and converter housing.



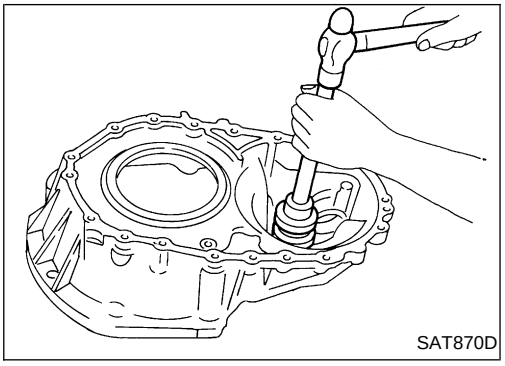


2. Install parking actuator support to transmission case.

- **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.

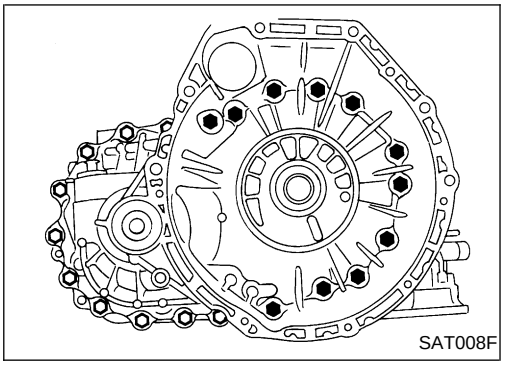


Adjustment 1

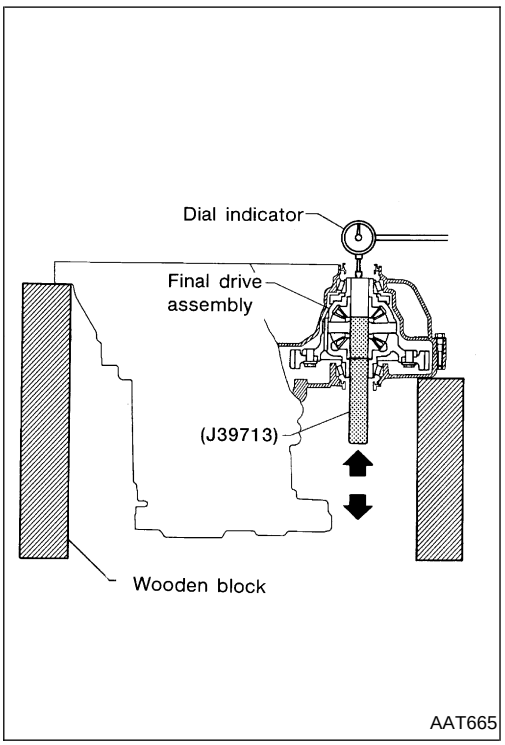
DIFFERENTIAL SIDE BEARING PRELOAD

1. Install differential side bearing outer race without adjusting shim on transmission case.
2. Install differential side bearing outer race on converter housing.

Adjustment 1 (Cont'd)


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-210.



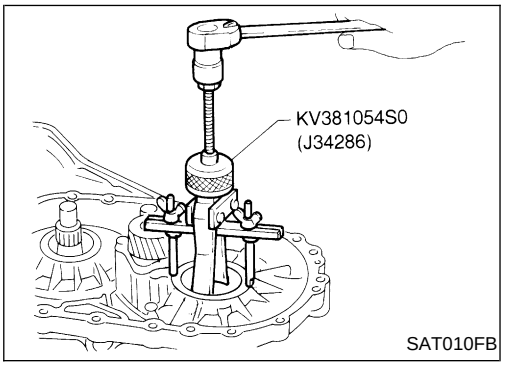
AAT665

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

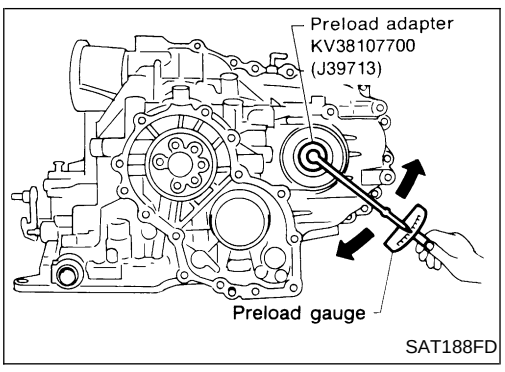
Differential side bearing preload adjusting shims:
Refer to SDS, AT-305.

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-210.



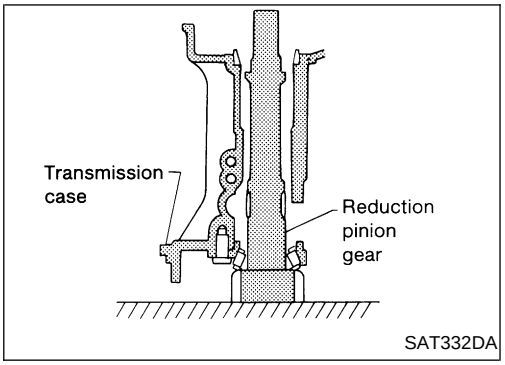
SAT188FD

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.**

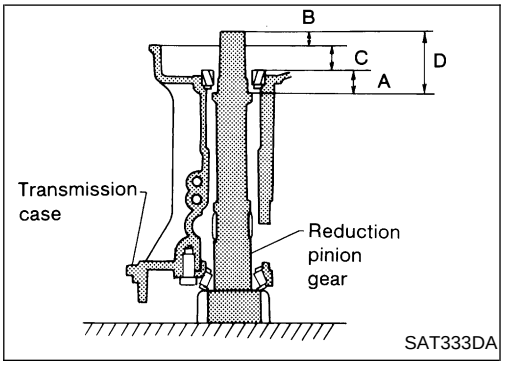
Adjustment 1 (Cont'd)

REDUCTION PINION GEAR BEARING PRELOAD



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.

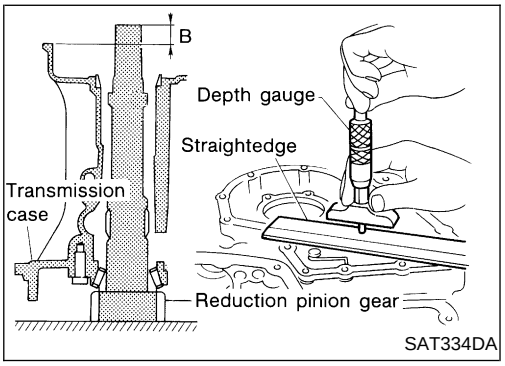
a. Place reduction pinion gear on transmission case as shown.



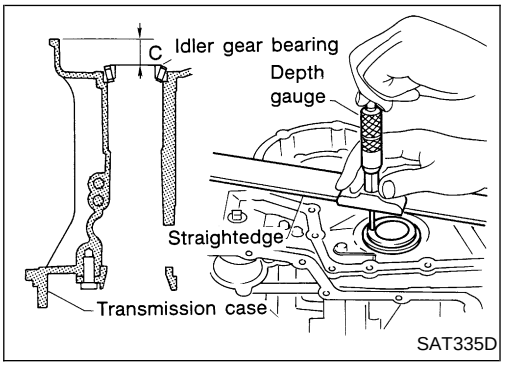
b. Place idler gear bearing on transmission case.
c. Measure dimensions "B" "C" and "D" and calculate dimension "A".

A = D − (B + C)

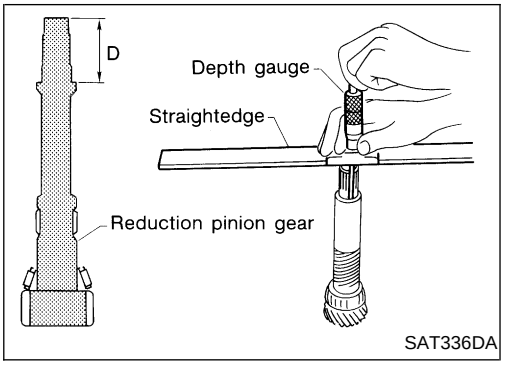
"A": Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction pinion gear.



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



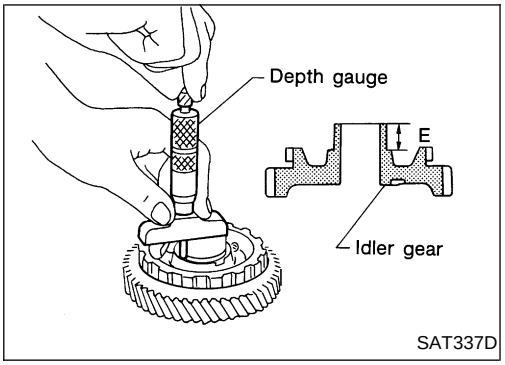
- Measure dimension "C" between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension "C" in at least two places.**



- 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)

Adjustment 1 (Cont'd)



d. Measure dimension "E" between the end of idler gear and the idler gear bearing inner race mating surface of idler gear.

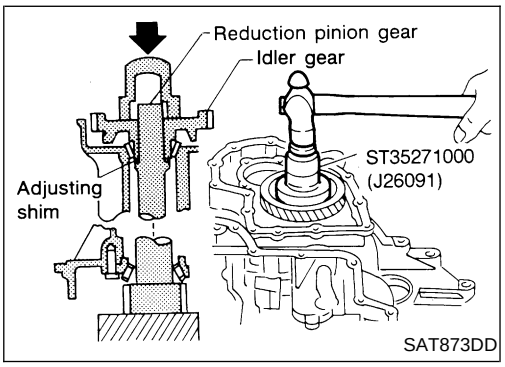
- **Measure dimension "E" in at least two places.**

e. Select proper thickness of reduction pinion gear bearing adjusting shim.

Proper shim thickness = A − E − 0.05 mm (0.0020 in)*

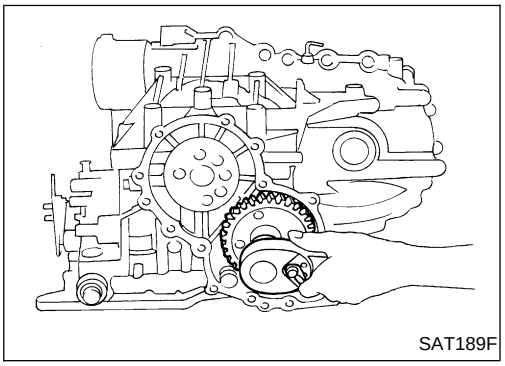
(* ... Bearing preload)

Refer to "Reduction pinion gear bearing adjusting shims": AT-306.



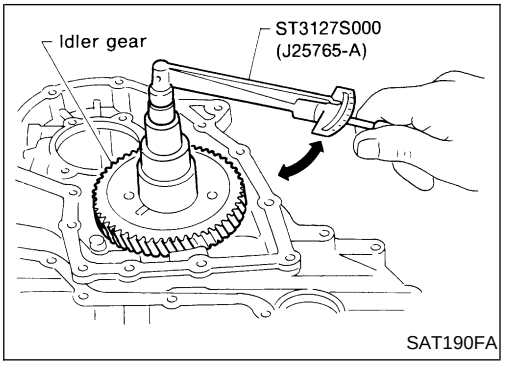
3. Install reduction gear and reduction gear bearing adjusting shim selected in step 2-e on transmission case.
4. Press idler gear bearing inner race on idler gear.
5. Press idler gear on reduction gear.

- **Press idler gear until idler gear fully contacts adjusting shim.**



6. Tighten idler gear lock nut to the specified torque. Refer to AT-268.

- **Lock idler gear with parking pawl when tightening lock nut.**



7. Measure turning torque of reduction pinion gear.

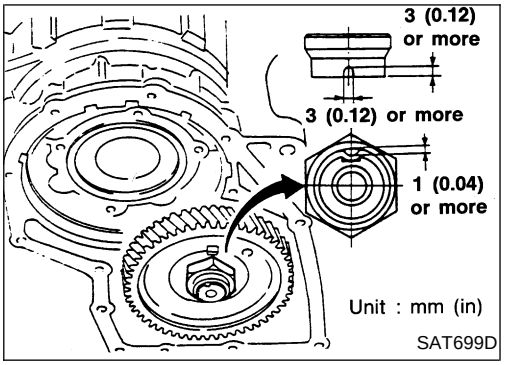
- **When measuring turning torque, turn reduction pinion gear in both directions several times to seat bearing rollers correctly.**

Turning torque of reduction pinion gear:

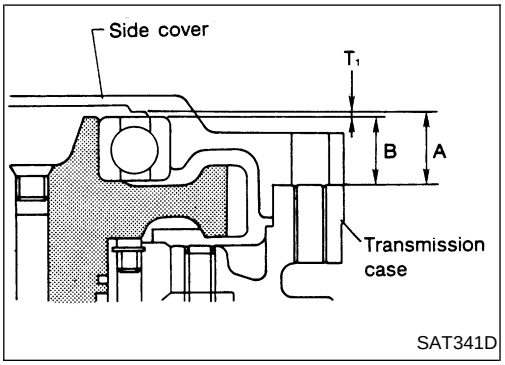
0.05 - 0.39 N·m (0.5 - 4.0 kg-cm, 0.43 - 3.47 in-lb)

- **If turning torque is out of specification, decrease or increase thickness of reduction pinion gear bearing adjusting shim.**

Adjustment 1 (Cont'd)

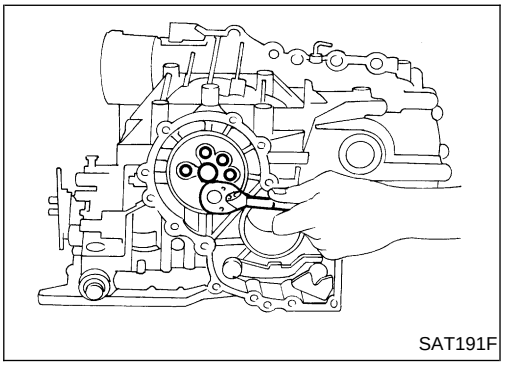


8. After properly adjusting turning torque, clinch idler gear lock nut as shown.

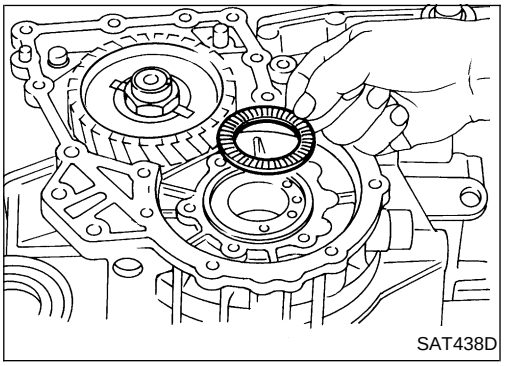


OUTPUT SHAFT END PLAY

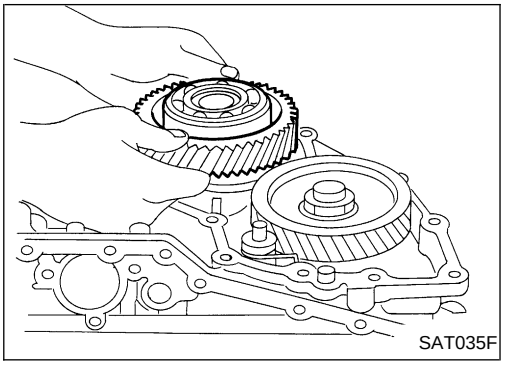
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



1. Install bearing retainer for output shaft.

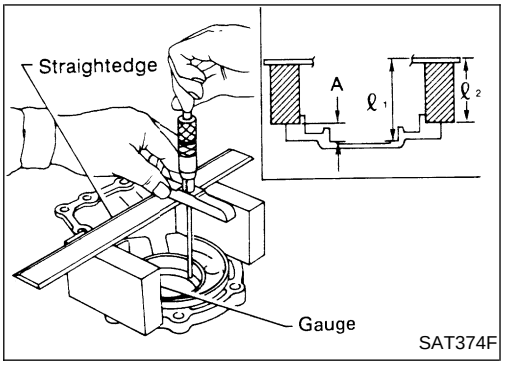


2. Install output shaft thrust needle bearing on bearing retainer.



3. Install output shaft on transmission case.

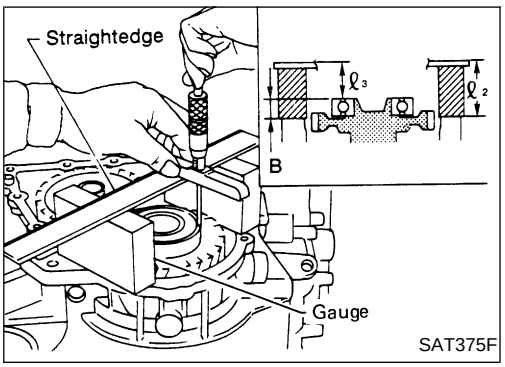
Adjustment 1 (Cont'd)



4. Measure dimensions "ℓ_1" and "ℓ_2" at side cover and then calculate dimension "A".

- **Measure dimension "ℓ_1" and "ℓ_2" in at least two places.**

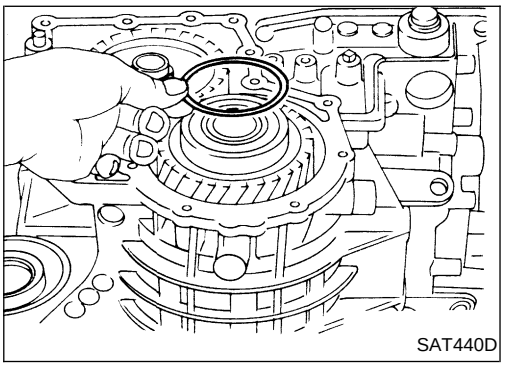
"A": Distance between transmission case fitting surface and adjusting shim mating surface.
A = ℓ_1 − ℓ_2 ℓ_2: Height of gauge



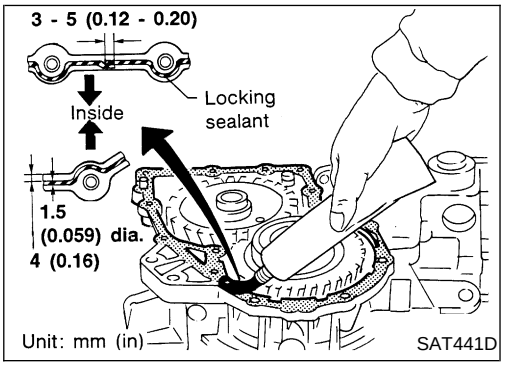
5. Measure dimensions "ℓ_2" and "ℓ_3" and then calculate dimension "B".

- **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 = ℓ_2 − ℓ_3 ℓ_2: Height of gauge

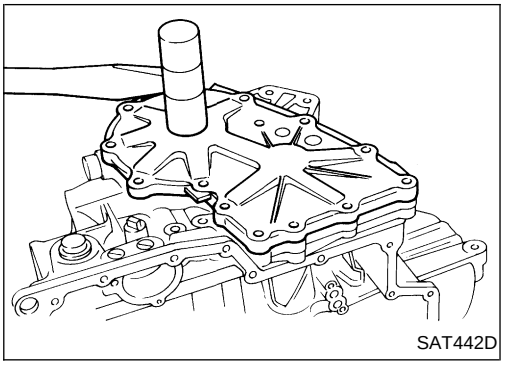


6. Select proper thickness of adjusting shim so that output shaft end play (clearance between side cover and output shaft bearing) is within specifications.
Output shaft end play (A − B):
0 - 0.15 mm (0 - 0.0059 in)
Refer to "Output shaft end play adjusting shims" AT-308.
7. Install adjusting shim on output shaft bearing.



Assembly 2

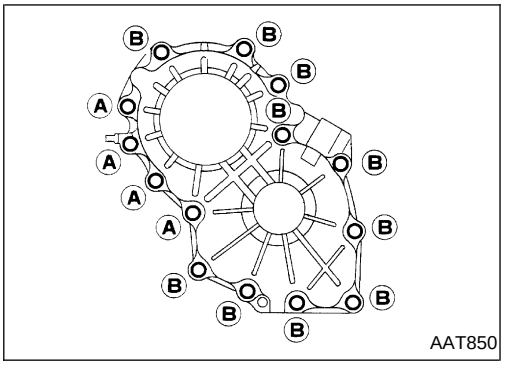
1. Apply locking sealant (Loctite #518) to transmission case as shown in illustration.



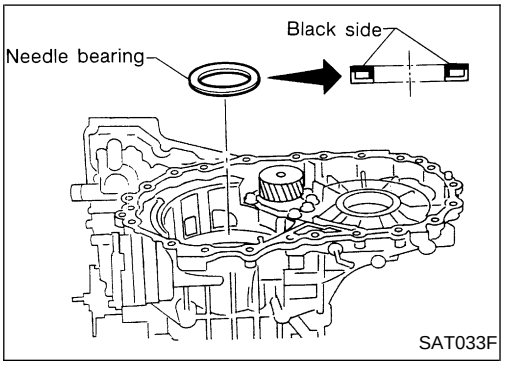
2. Set side cover on transmission case.

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

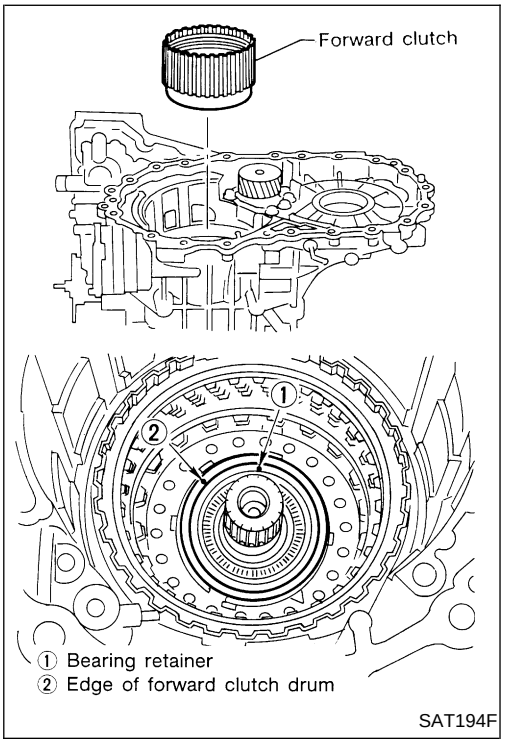
Assembly 2 (Cont'd)



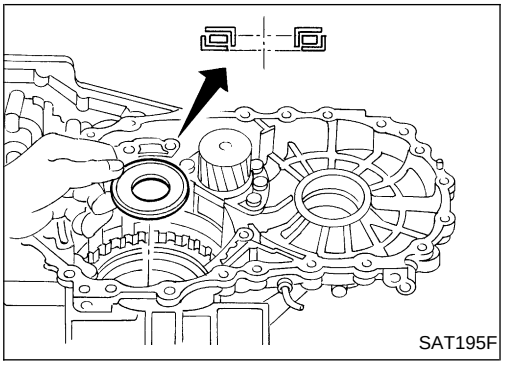
3. Tighten side cover fixing bolts to specified torque.
   : 3.0 - 3.4 N·m (0.31 - 0.35 kg-m, 26.9 - 30.4 in-lb)
- **Do not mix bolts Ⓐ and Ⓑ.**
- **Always replace bolts Ⓐ as they are self-sealing bolts.**



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

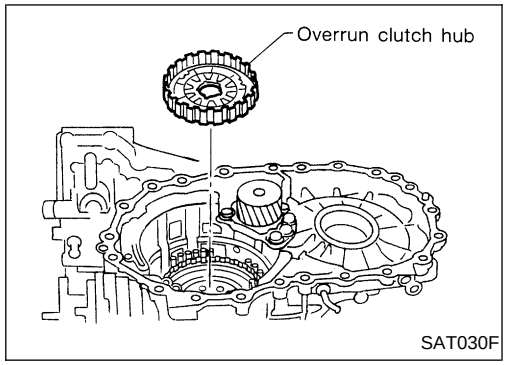


6. Install forward clutch assembly.
- **Align teeth of low & reverse brake drive plates before installing.**
- **Make sure that bearing retainer seal rings are not spread.**
- **If forward clutch assembly is correctly seated, points ① and ② are at almost same level.**

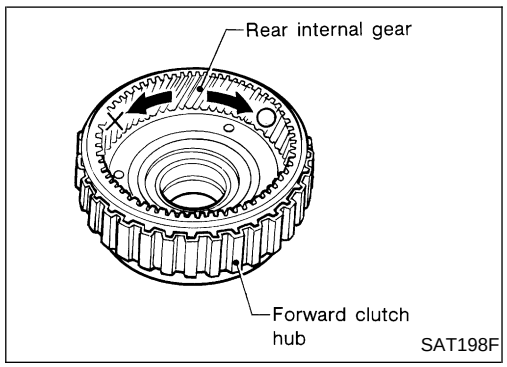


7. Install thrust needle bearing on bearing retainer.
- **Apply petroleum jelly to thrust needle bearing.**
- **Pay attention to direction of thrust needle bearing.**

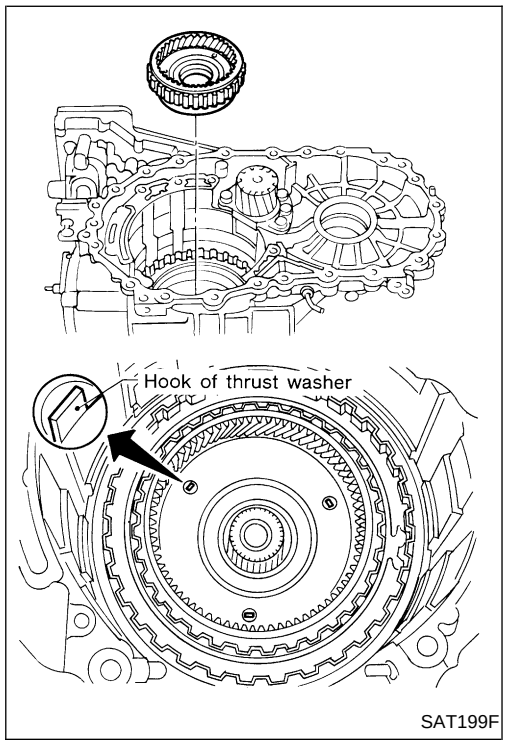
Assembly 2 (Cont'd)



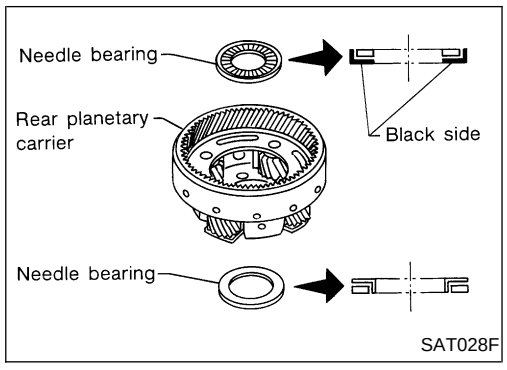
8. Install overrun clutch hub.
- **Apply petroleum jelly to thrust washers.**
- **Align teeth of overrun clutch drive plates before installing.**



9. Hold forward clutch hub and turn rear internal gear. Check overrun clutch hub for correct directions of lock and unlock.
- **If not shown as illustrated, check installed direction of forward one-way clutch.**



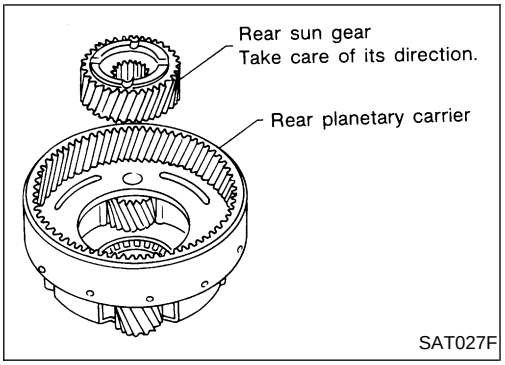
10. Install forward clutch hub and rear internal gear assembly.
- **Align teeth of forward clutch drive plates before installing.**
- **Check that three hooks of thrust washer are correctly aligned after installing.**



11. Install rear planetary carrier assembly and rear sun gear according to the following procedures.

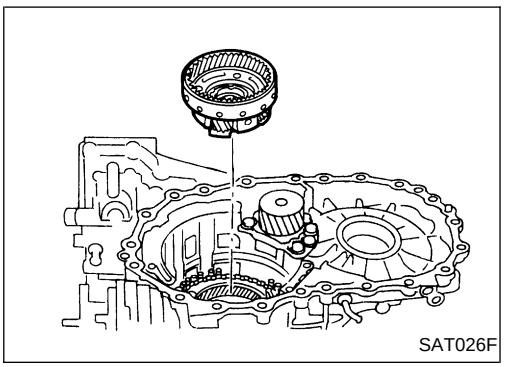
a. Install needle bearings on rear planetary carrier.
- **Apply petroleum jelly to needle bearings.**
- **Pay attention to direction of needle bearings.**

Assembly 2 (Cont'd)

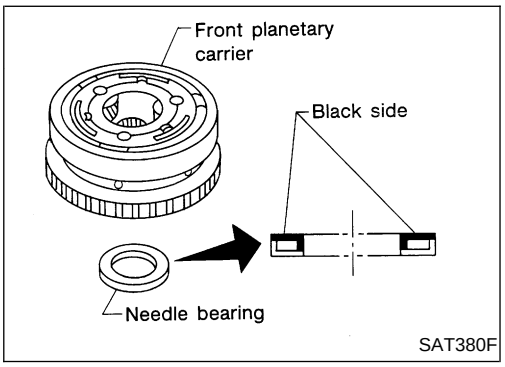


b. Install rear sun gear on rear planetary carrier.

- **Pay attention to direction of rear sun gear.**

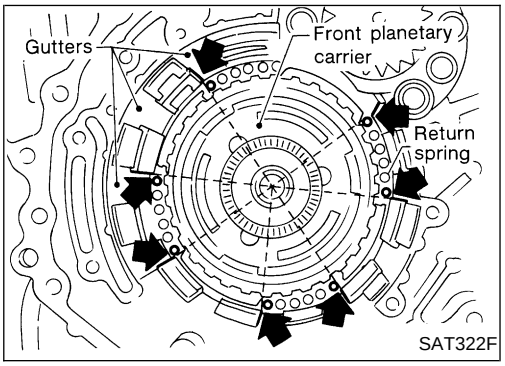


c. Install rear planetary carrier on transmission case.



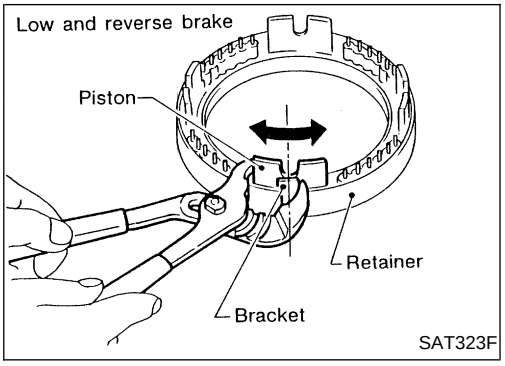
12. Install thrust needle bearing on front planetary carrier, then install them together on transmission case.

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



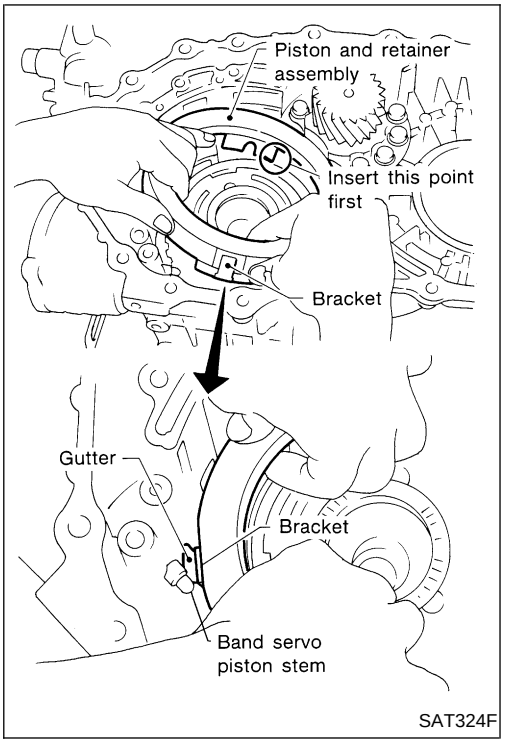
13. Install low and reverse brake piston according to the following procedures.

a. Set and align return springs to transmission case gutters as shown in illustration.



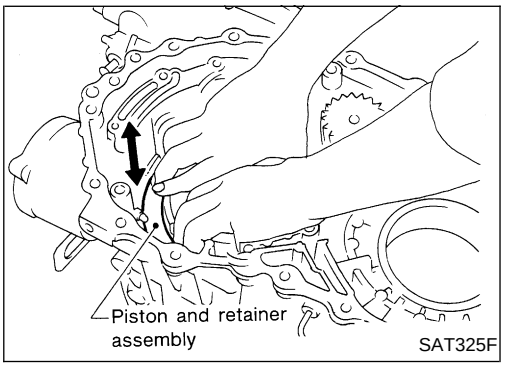
b. Set and align piston with retainer.

Assembly 2 (Cont'd)



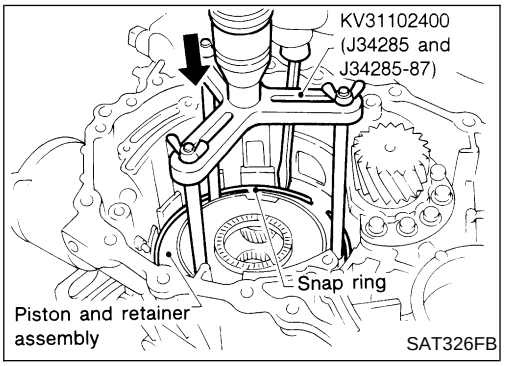
c. Install piston and retainer assembly on the transmission case.

- **Align bracket to specified gutter as indicated in illustration.**

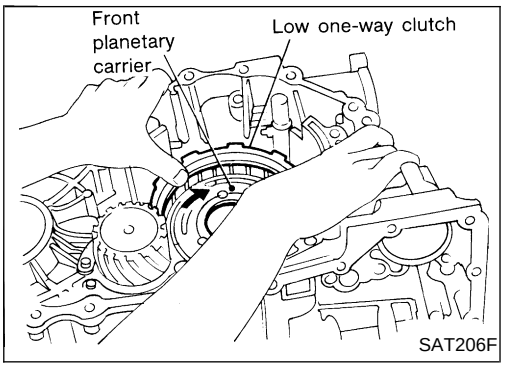


d. Check that each protrusion of piston is correctly set to corresponding return spring as follows.

- **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".**

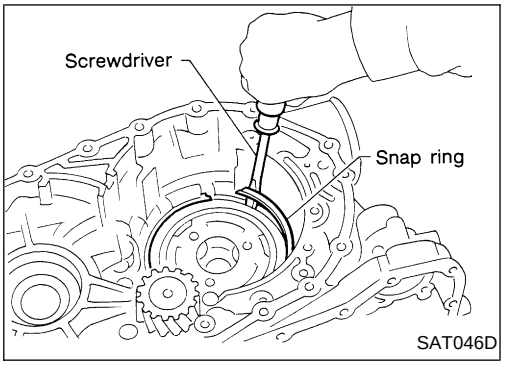


e. Push down piston and retainer assembly and install snap ring.

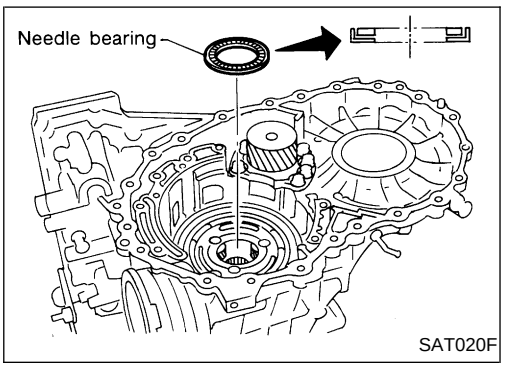


14. Install low one-way clutch to front planetary carrier by turning carrier in the direction of the arrow shown.

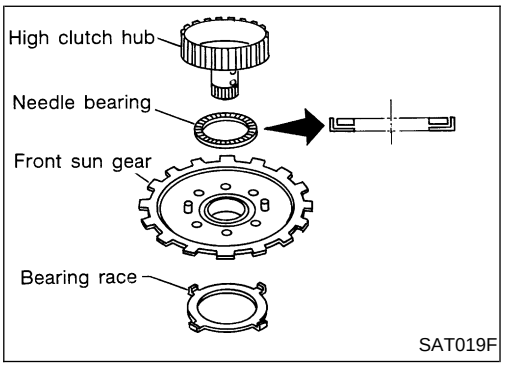
Assembly 2 (Cont'd)



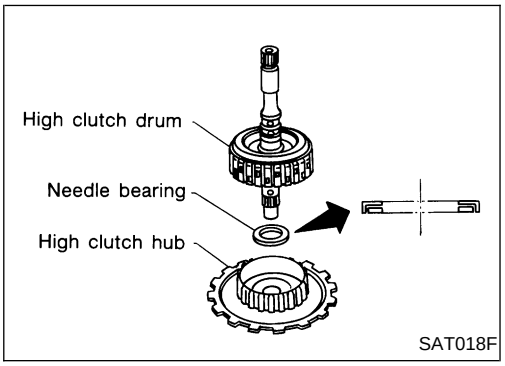
15. Install snap ring with screwdriver.
- **Forward clutch and bearing must be correctly installed for snap ring to fit into groove of transmission case.**



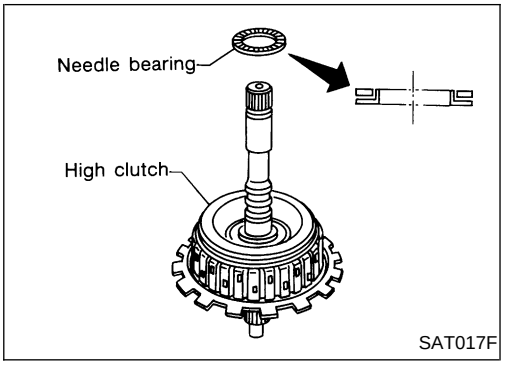
16. Install needle bearing on transmission case.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



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.**

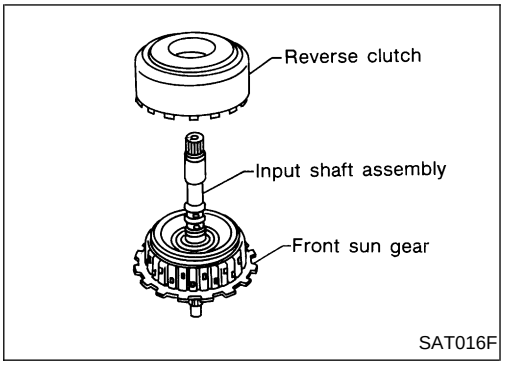


18. Install needle bearing and high clutch drum on high clutch hub.

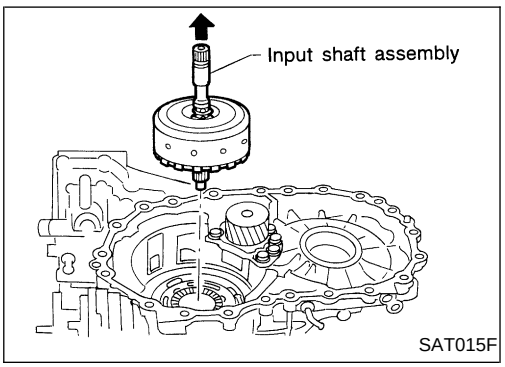


19. Install needle bearing on high clutch drum.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**

Assembly 2 (Cont'd)



20. Remove paper rolled around input shaft.
21. Install input shaft assembly in reverse clutch.
- **Align teeth of reverse clutch drive plates before installing.**

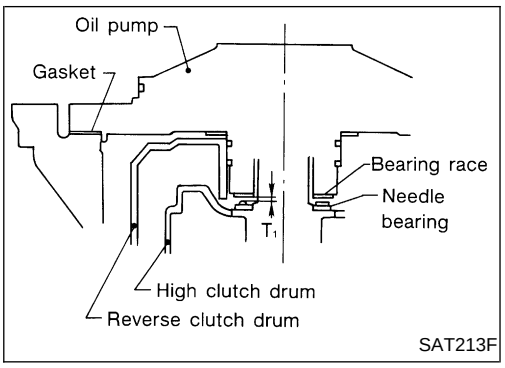


22. Install reverse clutch assembly on transmission case.
- **Align teeth of high clutch drive plates before installing.**

Adjustment 2

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

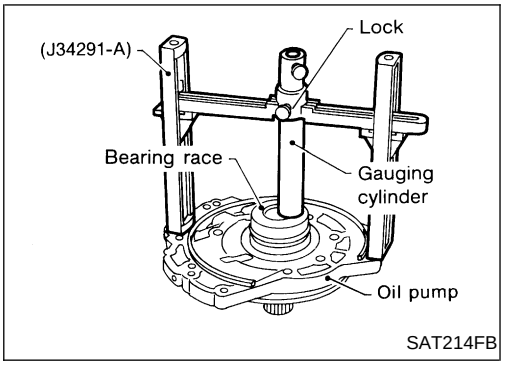
Part name	Total end play	Reverse clutch end play
Transmission case	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●	●
Reverse clutch drum	—	●



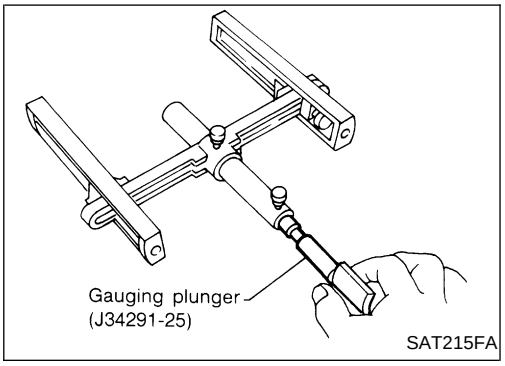
TOTAL END PLAY

1. Adjust total end play "T_1".

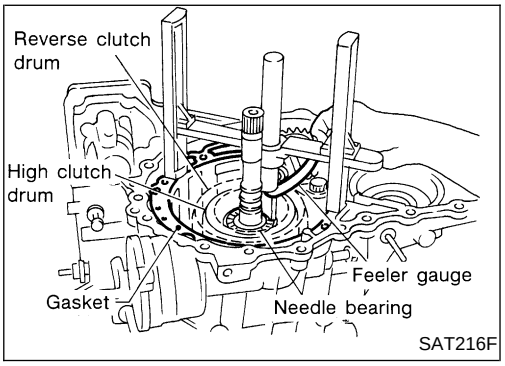
Adjustment 2 (Cont'd)



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.

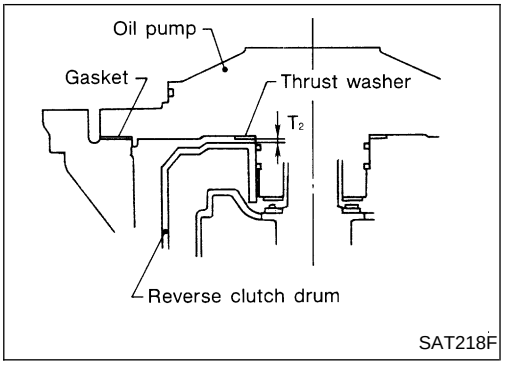
Total end play "T_1":

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.

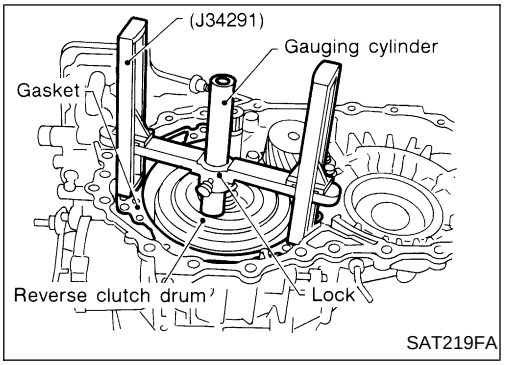
Available bearing race:

Refer to "Bearing race for adjusting total end play", AT-308.

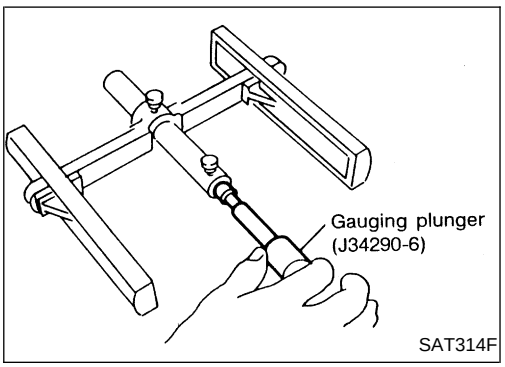


2. Adjust reverse clutch drum end play "T_2".

Adjustment 2 (Cont'd)

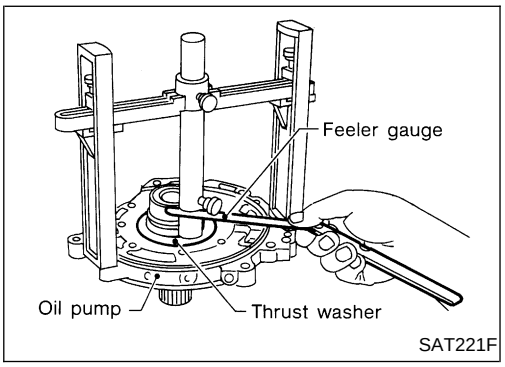


a. Place Tool on machined surface of transmission case (with gasket). Then allow gauging cylinder to rest on reverse clutch drum. Lock cylinder in place with set screw.



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.

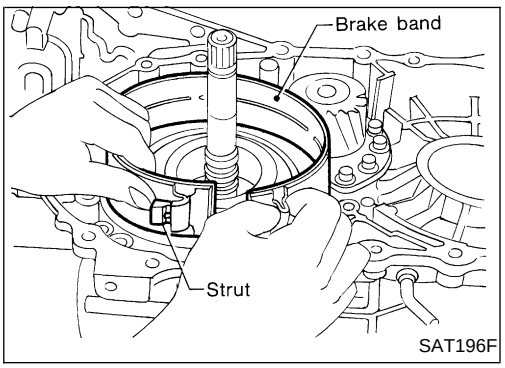
Reverse clutch drum end play "T_2":
0.55 - 0.90 mm (0.0217 - 0.0354 in)



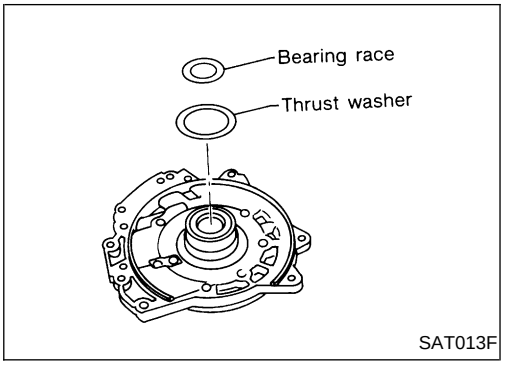
- If end play is out of specification, decrease or increase thickness of thrust washer as necessary.

Available thrust washer:
Refer to "Thrust washers for adjusting reverse clutch drum end play", AT-307.

Assembly 3

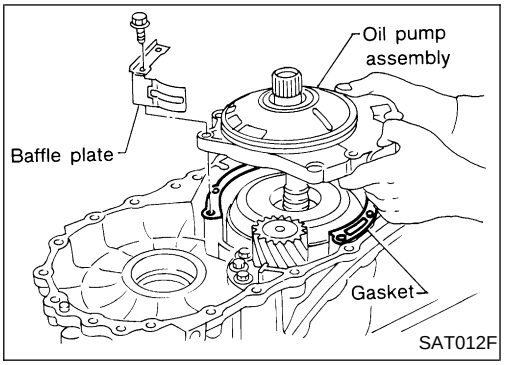


1. Install anchor end pin and lock nut on transmission case.
2. Place brake band on outside of reverse clutch drum. Tighten anchor end pin just enough so that brake band is evenly fitted on reverse clutch drum.

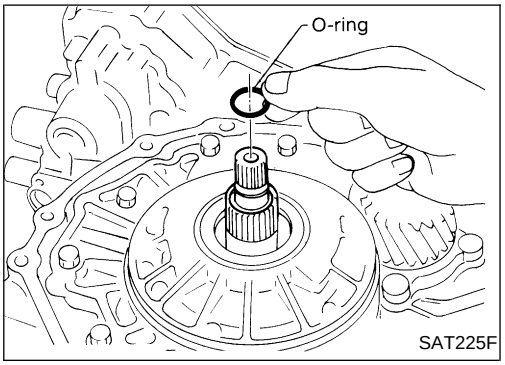


3. Place bearing race selected in total end play adjustment step on oil pump cover.
- **Apply petroleum jelly to bearing race.**
4. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.
- **Apply petroleum jelly to thrust washer.**

Assembly 3 (Cont'd)

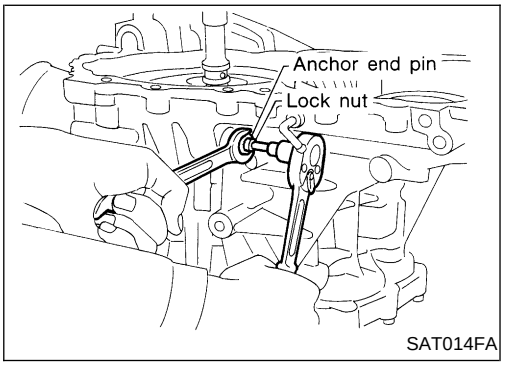


5. Install oil pump assembly, baffle plate and gasket on transmission case.
6. Tighten oil pump fixing bolts to the specified torque.



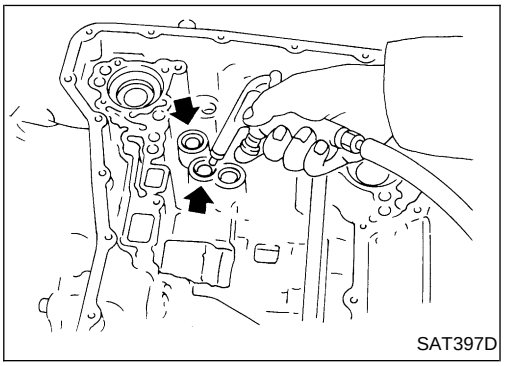
7. Install O-ring to input shaft.

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

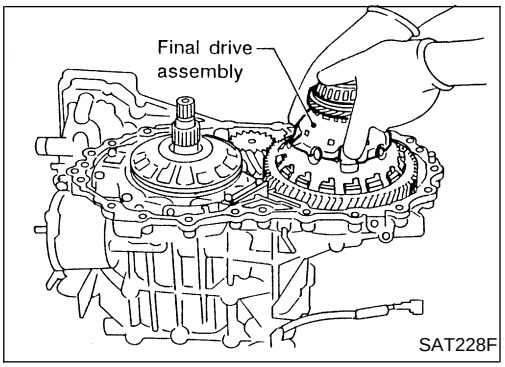


8. Adjust brake band.

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)

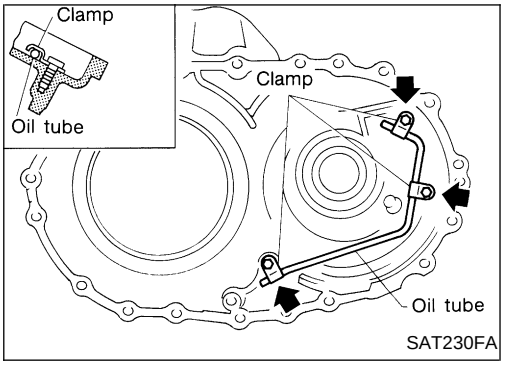


9. Apply compressed air to oil holes of transmission case and check operation of brake band.

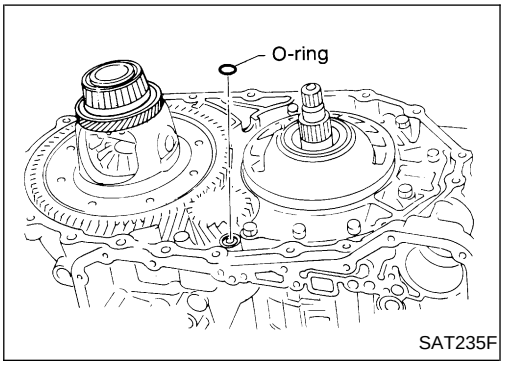


10. Install final drive assembly on transmission case.

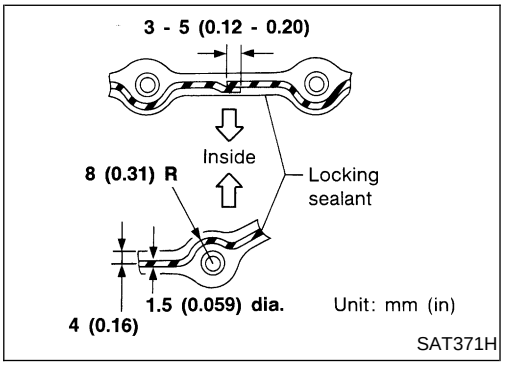
Assembly 3 (Cont'd)



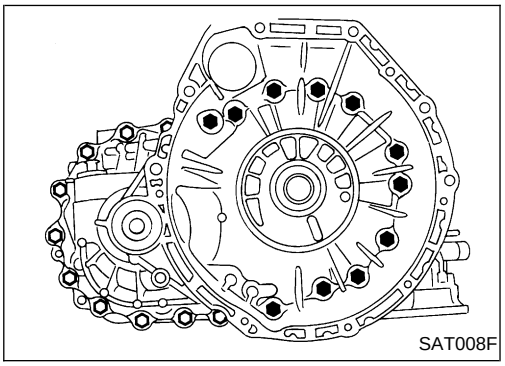
11. Install oil tube on converter housing.

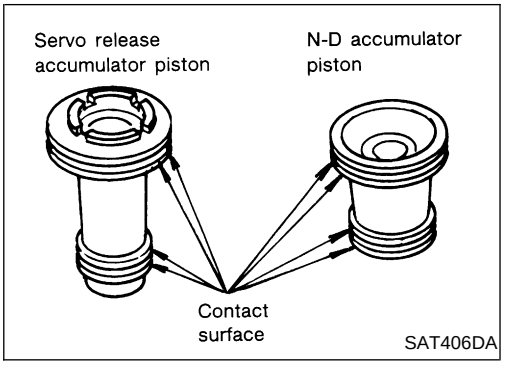


12. Install O-ring on differential oil port of transmission case.



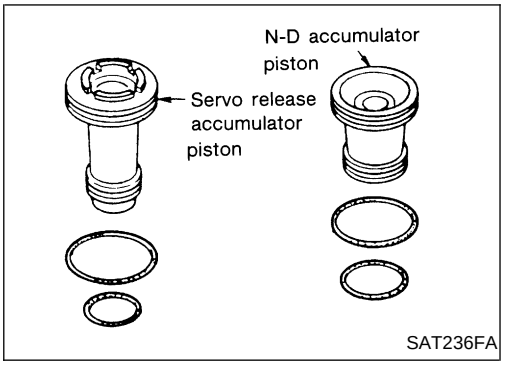
13. Install converter housing on transmission case.
- **Apply locking sealant (Loctite #518) to mating surface of converter housing.**





14. Install accumulator piston.
a. Check contact surface of accumulator piston for damage.

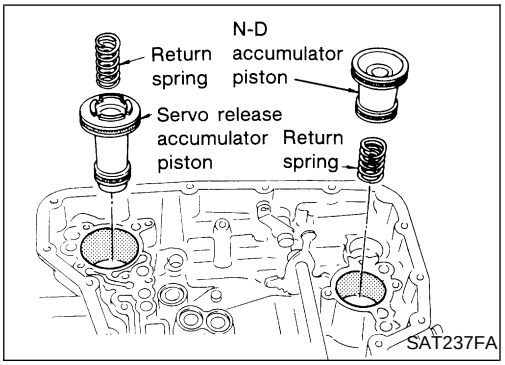
Assembly 3 (Cont'd)



b. Install O-rings on accumulator piston.

- **Apply ATF to O-rings.**

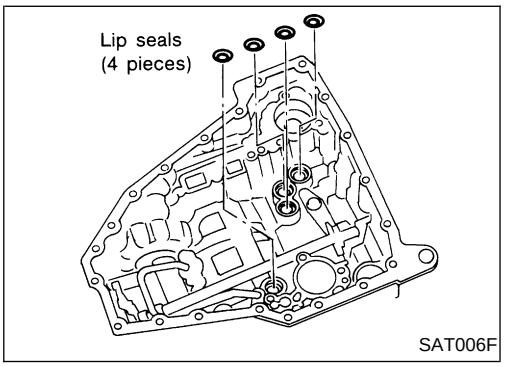
Accumulator piston O-rings:
Refer to "O-ring", AT-307.



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

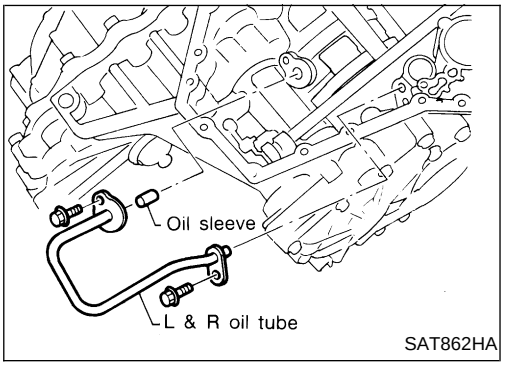
- **Apply ATF to inner surface of transmission case.**

Return springs:
Refer to "Return springs", AT-307.

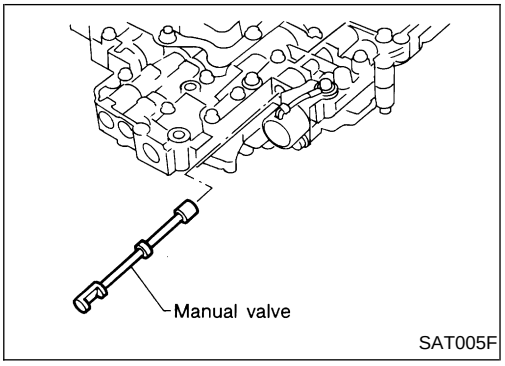


15. Install lip seals for band servo oil holes on transmission case.

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



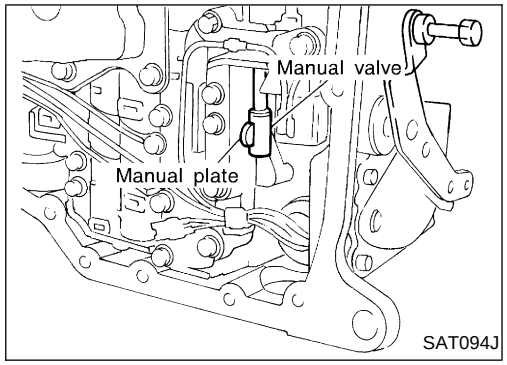
16. Install L & R oil tube and oil sleeve.
: 5 - 7 N·m (0.5 - 0.7 kg-m, 43 - 61 in-lb)



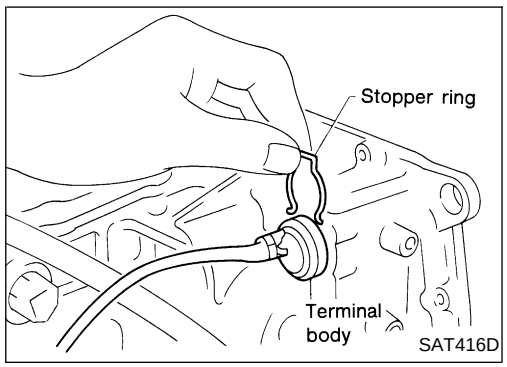
17. Install control valve assembly.
a. Insert manual valve into control valve assembly.

- **Apply ATF to manual valve.**

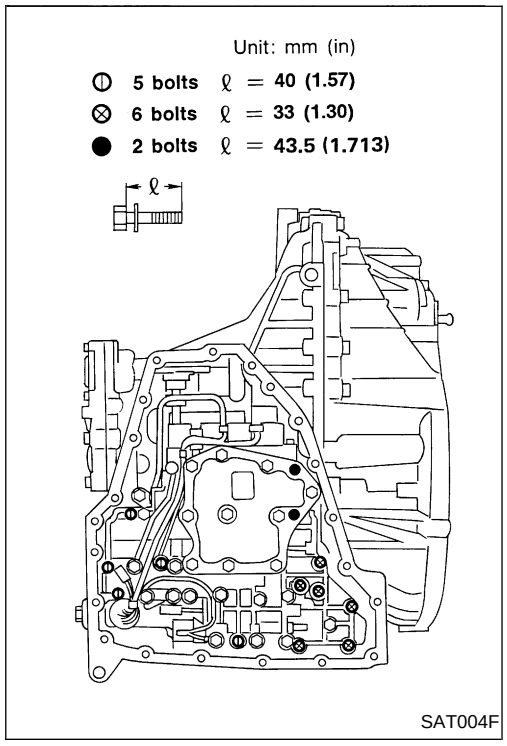
Assembly 3 (Cont'd)



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



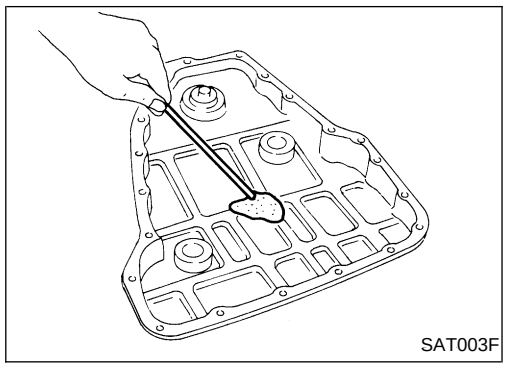
d. Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.
e. Install stopper ring to terminal body.



f. Tighten bolts Ⓘ, Ⓧ and ● .

Bolt length, number and location:

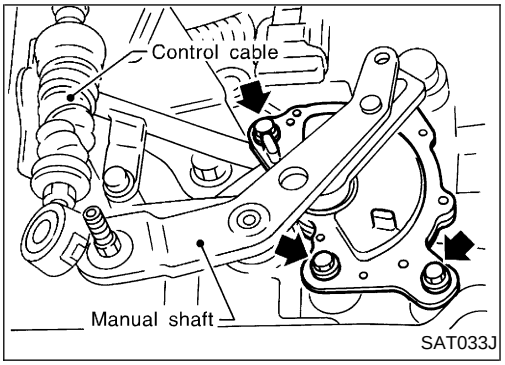
Bolt	Ⓘ	Ⓧ	●
Bolt length "ℓ" ℓ mm (in)	40.0 (1.575)	33.0 (1.299)	43.5 (1.713)
Number of bolts	5	6	2



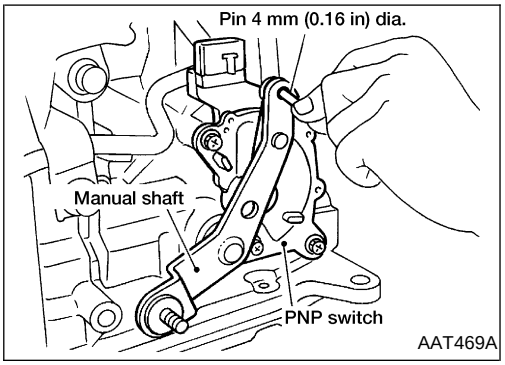
18. Install oil pan.
a. Attach a magnet to oil pan.
b. Install new oil pan gasket on transmission case.
c. Install oil pan on transmission case.
- **Always replace oil pan bolts as they are self-sealing bolts.**
- **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**

d. Tighten oil pan bolts and drain plug to the specified torque. Refer to AT-212.

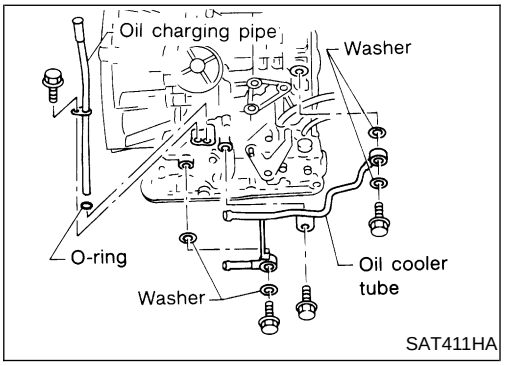
Assembly 3 (Cont'd)



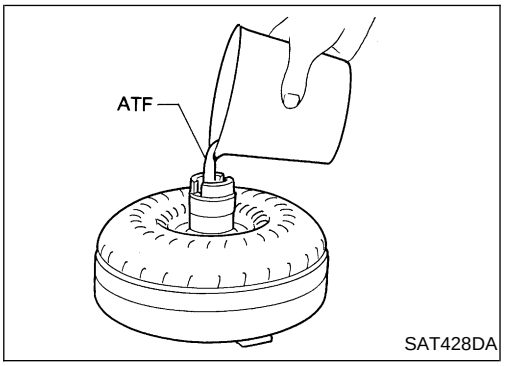
19. Install park/neutral position (PNP) switch.
a. Set manual shaft in ''P'' position.
b. Temporarily install park/neutral position (PNP) switch on manual shaft.
c. Move selector lever to ''N'' position.



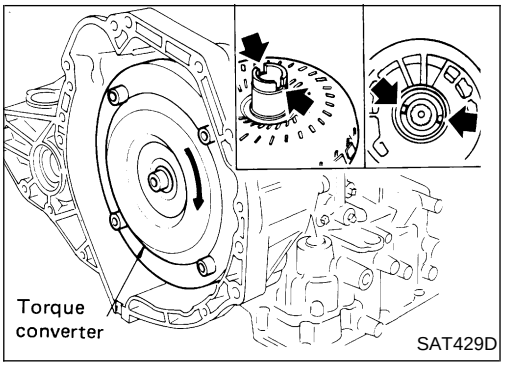
d. Use a 4 mm (0.16 in) pin for this adjustment.
1) Insert the pin straight into the manual shaft adjustment hole.
2) Rotate park/neutral position (PNP) switch until the pin can also be inserted straight into hole in park/neutral position (PNP) switch.
e. Tighten park/neutral position (PNP) switch fixing bolts. Refer to AT-212.
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.

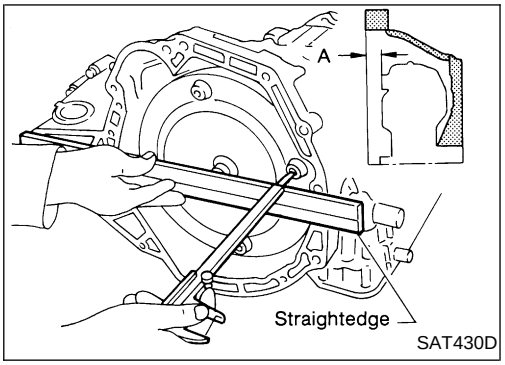


21. Install torque converter.
a. Pour ATF into torque converter.
- **Approximately 1 liter (1-1/8 US qt, 7/8 Imp qt) of fluid is required for a new torque converter.**
- **When reusing old torque converter, add the same amount of fluid as was drained.**



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

Assembly 3 (Cont'd)



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

Distance A: 19 mm (0.75 in) or more

General Specifications

Engine	KA24DE
Automatic transaxle model	RE4F04A
Automatic transaxle assembly	
Model code number	80L02
Transaxle gear ratio	
1st	2.785
2nd	1.545
3rd	1.000
4th	0.694
Reverse	2.272
Final drive	4.087
Recommended fluid	Nissan Matic D (Continental U.S. and Alaska) or Canada NISSAN Automatic Transmission Fluid*
Fluid capacity ℓ (US qt, Imp qt)	9.4 (10, 8-1/4)

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

Specifications and Adjustments

SHIFT SCHEDULE

Vehicle speed when shifting gears

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	50 - 58 (31 - 39)	93 - 101 (58 - 63)	147 - 155 (91 - 96)	143 - 151 (89 - 94)	83 - 91 (52 - 57)	41 - 49 (25 - 30)	50 - 58 (31 - 39)
Half throttle	Comfort	29 - 37 (18 - 23)	53 - 61 (33 - 38)	119 - 127 (74 - 79)	71 - 79 (44 - 49)	37 - 45 (23 - 28)	5 - 13 (3 - 8)	50 - 58 (31 - 39)

Vehicle speed when performing lock-up

Throttle position	Shift pattern	O/D switch	Gear position	Vehicle speed km/h (MPH)	
				Lock-up ON	Lock-up OFF
2/8	Comfort	ON	D_4	92 - 100 (57 - 62)	75 - 83 (47 - 52)
		OFF	D_3	86 - 94 (53 - 58)	83 - 91 (52 - 57)

STALL REVOLUTION

Engine	Stall revolution rpm
KA24DE	2,800 - 3,100

LINE PRESSURE

Engine speed rpm	Line pressure kPa (kg/cm^2, psi)	
	D, 2 and 1 positions	R position
Idle	500 (5.1, 73)	775 (7.9, 112)
Stall	1,128 (11.5 - 164)	1,756 (17.9 - 255)

CONTROL VALVES

Control valve and plug return springs

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	31742-80L06	20.5 (0.807)	7.0 (0.276)
	㉑	1-2 accumulator piston spring	31742-80L07	49.25 (1.939)	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)
	㉑	Overrun clutch control valve spring	31762-80L00	21.7 (0.854)	7.0 (0.276)
	㉕	Accumulator control valve spring	31742-80L02	22.0 (0.866)	6.5 (0.256)
	㉚	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)
	③	Pressure modifier valve spring	31742-80L03	30.5 (1.201)	9.8 (0.386)
	⑦		31742-80L04	32.0 (1.260)	6.9 (0.272)
	⑬	Plug spring	31742-80L00	17.0 (0.669)	10.7 (0.421)
	—	Oil cooler relief valve spring	31742-80L12	17.02 (0.6701)	8.0 (0.315)

*: Always check with the Parts Department for the latest parts information.

CLUTCHES AND BRAKES

Reverse clutch		
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)	31537-80L00
	6.8 (0.268)	31537-80L01
	7.0 (0.276)	31537-80L02
	7.2 (0.283)	31537-80L03
	7.4 (0.291)	31537-80L04
	7.6 (0.299)	31537-80L05
	7.8 (0.307)	31537-80L06

High clutch		
Number of drive plates	3	
Number of driven plates	7 + 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	2.8 (0.110)	
Thickness of retaining plates	Thickness mm (in)	Part number*
	3.2 (0.126)	31537-80L20
	3.4 (0.134)	31537-80L21
	3.6 (0.142)	31537-80L22
	3.8 (0.150)	31537-80L23
	4.0 (0.157)	31537-80L24

Forward clutch		
Number of drive plates	5	
Number of driven plates	5	
Drive plate thickness mm (in)		
Standard	1.6 (0.063)	
Allowable limit	1.4 (0.055)	
Clearance mm (in)		
Standard	0.45 - 0.85 (0.0177 - 0.0335)	
Allowable limit	1.85 (0.0728)	
Thickness of retaining plates	Thickness mm (in)	Part number*
	3.6 (0.142)	31537-80L12
	3.8 (0.150)	31537-80L13
	4.0 (0.157)	31537-80L14
	4.2 (0.165)	31537-80L15
	4.4 (0.173)	31537-80L16
	3.4 (0.134)	31537-80L17
	3.2 (0.126)	31537-80L18

Overrun clutch		
Number of drive plates	3	
Number of driven plates	5	
Drive plate thickness mm (in)		
Standard	1.6 (0.063)	
Allowable limit	1.4 (0.055)	
Clearance mm (in)		
Standard	0.7 - 1.1 (0.028 - 0.043)	
Allowable limit	1.7 (0.067)	
Thickness of retaining plates	Thickness mm (in)	Part number*
	3.0 (0.118)	31537-80L07
	3.2 (0.126)	31537-80L08
	3.4 (0.134)	31537-80L09
	3.6 (0.142)	31537-80L10
	3.8 (0.150)	31537-80L11

*:Always check with the Parts Department for the latest parts information.

Specifications and Adjustments (Cont'd)

Low & reverse brake		
Number of drive plates	6	
Number of driven plates	6	
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	3.3 (0.130)	
Thickness of retaining plates	Thickness mm (in)	Part number*
	2.0 (0.079)	31667-80L00
	2.2 (0.087)	31667-80L01
	2.4 (0.094)	31667-80L02
	2.6 (0.102)	31667-80L03
	2.8 (0.110)	31667-80L04
	3.0 (0.118)	31667-80L05
	3.2 (0.126)	31667-80L06
	3.4 (0.134)	31667-80L07
Brake band		
Anchor end pin tightening torque N·m (kg-m, in-lb)	3.9 - 5.9 (0.4 - 0.6, 35 - 52)	
Number of returning revolutions for anchor end pin	2.5	
Lock nut tightening torque N·m (kg-m, ft-lb)	31 - 36 (3.2 - 3.7, 23 - 27)	

*:Always check with the Parts Department for the latest parts information.

FINAL DRIVE

Differential side gear clearance

Clearance between side gear and differential case with washer mm (in)	0.1 - 0.2 (0.004 - 0.008)

Differential side gear thrust washers

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.

Bearing preload

Differential side bearing preload mm (in)	0.05 - 0.09 (0.0020 - 0.0035)

Turning torque

Turning torque of final drive assembly (New bearing) N·m (kg-cm, in-lb)	0.78 - 1.37 (8.0 - 14.0, 6.9 - 12.2)

Differential side bearing preload adjusting shims

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.

Clutch and brake return springs

Unit: mm (in)

Parts	Part number*	Free length	Outer diameter
Forward clutch (Overrun clutch) (22 pcs)	31505 80L00	21.4 (0.843)	10.3 (0.406)
High clutch (12 pcs)	31505 80L02	22.5 (0.886)	10.8 (0.425)
Low & Reverse brake (24 pcs)	31505 80L01	24.1 (0.949)	6.6 (0.260)

*:Always check with the Parts Department for the latest parts information.

PLANETARY CARRIER AND OIL PUMP

Planetary carrier		
Clearance between planetary carrier and pinion washer mm (in)		
Standard		0.20 - 0.70 (0.0079 - 0.0276)
Allowable limit		0.80 (0.0315)
Oil pump		
Oil pump side clearance mm (in)		0.030 - 0.050 (0.0012 - 0.0020)
Thickness of inner gears and outer gears	Inner gear	
	Thickness mm (in)	Part number*
	11.99 - 12.0 (0.4720 - 0.4724)	31346-80L00
	11.98 - 11.99 (0.4717 - 0.4720)	31346-80L01
	11.97 - 11.98 (0.4713 - 0.4717)	31346-80L02
	Outer gear	
	Thickness mm (in)	Part number*
	11.99 - 12.0 (0.4720 - 0.4724)	31347-80L00
	11.98 - 11.99 (0.4717 - 0.4720)	31347-80L01
	11.97 - 11.98 (0.4713 - 0.4717)	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		0.10 - 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

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

Turning torque

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

Thickness mm (in)	Part number*
4.50 (0.1772)	31439-83X00
4.52 (0.1780)	31439-83X01
4.54 (0.1787)	31439-83X02
4.56 (0.1795)	31439-83X03
4.58 (0.1803)	31439-83X04
4.60 (0.1811)	31439-83X05
4.62 (0.1819)	31439-83X06
4.64 (0.1827)	31439-83X07
4.66 (0.1835)	31439-83X08
4.68 (0.1843)	31439-83X09
4.70 (0.1850)	31439-83X10
4.72 (0.1858)	31439-83X11
4.74 (0.1866)	31439-83X12
4.76 (0.1874)	31439-83X13
4.78 (0.1882)	31439-83X14
4.80 (0.1890)	31439-83X15
4.82 (0.1898)	31439-83X16
4.84 (0.1906)	31439-83X17
4.86 (0.1913)	31439-83X18
4.88 (0.1921)	31439-83X19
4.90 (0.1929)	31439-83X20
4.92 (0.1937)	31439-83X21
4.94 (0.1945)	31439-83X22
4.96 (0.1953)	31439-83X23
4.98 (0.1961)	31439-83X24
5.00 (0.1969)	31439-81X00
5.02 (0.1976)	31439-81X01
5.04 (0.1984)	31439-81X02
5.06 (0.1992)	31439-81X03
5.08 (0.2000)	31439-81X04
5.10 (0.2008)	31439-81X05
5.12 (0.2016)	31439-81X06
5.14 (0.2024)	31439-81X07
5.16 (0.2031)	31439-81X08
5.18 (0.2039)	31439-81X09
5.20 (0.2047)	31439-81X10
5.22 (0.2055)	31439-81X11
5.24 (0.2063)	31439-81X12
5.26 (0.2071)	31439-81X13
5.28 (0.2079)	31439-81X14
5.30 (0.2087)	31439-81X15
5.32 (0.2094)	31439-81X16
5.34 (0.2102)	31439-81X17
5.36 (0.2110)	31439-81X18
5.38 (0.2118)	31439-81X19
5.40 (0.2126)	31439-81X20
5.42 (0.2134)	31439-81X21
5.44 (0.2142)	31439-81X22
5.46 (0.2150)	31439-81X23
5.48 (0.2157)	31439-81X24
5.50 (0.2165)	31439-81X46
5.52 (0.2173)	31439-81X47
5.54 (0.2181)	31439-81X48
5.56 (0.2189)	31439-81X49

5.58 (0.2197)	31439-81X60
5.60 (0.2205)	31439-81X61
5.62 (0.2213)	31439-81X62
5.64 (0.2220)	31439-81X63
5.66 (0.2228)	31439-81X64
5.68 (0.2236)	31439-81X65
5.70 (0.2244)	31439-81X66
5.72 (0.2252)	31439-81X67
5.74 (0.2260)	31439-81X68
5.76 (0.2268)	31439-81X69
5.78 (0.2276)	31439-81X70
5.80 (0.2283)	31439-81X71
5.82 (0.2291)	31439-81X72
5.84 (0.2299)	31439-81X73
5.86 (0.2307)	31439-81X74
5.88 (0.2315)	31439-81X75
5.90 (0.2323)	31439-81X76
5.92 (0.2331)	31439-81X77
5.94 (0.2339)	31439-81X78
5.96 (0.2346)	31439-81X79
5.98 (0.2354)	31439-81X80
6.00 (0.2362)	31439-81X81

*:Always check with the Parts Department for the latest parts information.

REVERSE CLUTCH DRUM END PLAY

Reverse clutch drum end play ("T_2") mm (in)	0.55 - 0.90 (0.0217 - 0.0354)

Thrust washers for adjusting reverse clutch drum end play

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.

ACCUMULATOR

O-ring

Unit: mm (in)

Accumulator	Part number*	Inner diameter (Small)	Part number*	Inner diameter (Large)
Servo release accumulator	31526 41X03	26.9 (1.059)	31526 41X02	44.2 (1.740)
N-D accumulator	31526 31X08	34.6 (1.362)	31672 21X00	39.4 (1.551)

*:Always check with the Parts Department for the latest parts information.

Return spring

Unit: mm (in)

Accumulator	Part number*	Free length	Outer diameter
Servo release accumulator	31605 80L02	52.5 (2.067)	20.4 (0.803)
N-D accumulator	31605 80L03	43.5 (1.713)	28.0 (1.102)

*:Always check with the Parts Department for the latest parts information.

BAND SERVO

Return spring

Unit: mm (in)

Return spring	Part number*	Free length	Outer diameter
2nd servo return spring	31605 80L00	32.5 (1.280)	25.9 (1.020)
O/D servo return spring	31605 80L01	31.0 (1.220)	21.7 (0.854)

*:Always check with the Parts Department for the latest parts information.

REMOVAL AND INSTALLATION

Unit: mm (in)

Distance between end of converter housing and torque converter	19 (0.75)

OUTPUT SHAFT

Seal ring clearance

Unit: mm (in)

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

Specifications and Adjustments (Cont'd)

End play

Output shaft end play	mm (in)	0 - 0.15 (0 - 0.0059)

Output shaft end play adjusting shims

Thickness mm (in)	Part number*
0.80 (0.0315)	31438-80X60
0.84 (0.0331)	31438-80X61
0.88 (0.0346)	31438-80X62
0.92 (0.0362)	31438-80X63
0.96 (0.0378)	31438-80X64
1.00 (0.0394)	31438-80X65
1.04 (0.0409)	31438-80X66
1.08 (0.0425)	31438-80X67
1.12 (0.0441)	31438-80X68
1.16 (0.0457)	31438-80X69
1.20 (0.0472)	31438-80X70

*:Always check with the Parts Department for the latest parts information.

BEARING RETAINER

Seal ring clearance

Unit: mm (in)

Bearing retainer seal ring clearance	
Standard	0.10 - 0.30 (0.0039 - 0.0118)
Allowable limit	0.30 (0.0118)

TOTAL END PLAY

Total end play ("T_1")	mm (in)	0.25 - 0.55 (0.0098 - 0.0217)

Bearing race for adjusting total end play

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.

Shift Solenoid Valves

Gear	Solenoid A	Solenoid B
1st	ON	ON
2nd	OFF	ON
3rd	OFF	OFF
4th	ON	OFF

Resistance

Solenoid valve	Resistance (Approx.)	Terminal Number
Shift Solenoid A	20 - 40 Ω	2
Shift Solenoid B	20 - 40 Ω	1
Ovr. Clutch Sol.	20 - 40 Ω	3
Line Pres. Sol.	2.5 - 5 Ω	4
T/Conv. Clutch Sol.	10 - 20 Ω	5

ATF Temp sensor

Monitor Item	Temperature	Specification (Approx.)	
A/T fluid temperature sensor	Cold [68°F (20°C)]	1.5 V ↓ 0.5 V	2.5 K Ω ↓ 0.3 K Ω
	Hot [176°F (80°C)]		

Revolution sensor

Resistance	500 - 650 Ω

Dropping resistor

Resistance (Approx.)	12 Ω

NOTES