SECTION AT
AUTOMATIC TRANSAXLE

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PFP:00000

Alphabetical & P No. Index for DTC

ECS005VU

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- *1: These numbers are prescribed by SAE J2012.
- *2: When the fail-safe operation occurs, the MIL illuminates.
- *3: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.

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- *1: These numbers are prescribed by SAE J2012.
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- *3: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

ECS005VV

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI 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 SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

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

ECS005VW

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.

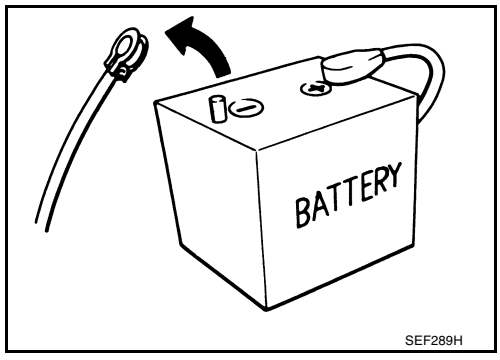
CAUTION:

- **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.**

Precautions

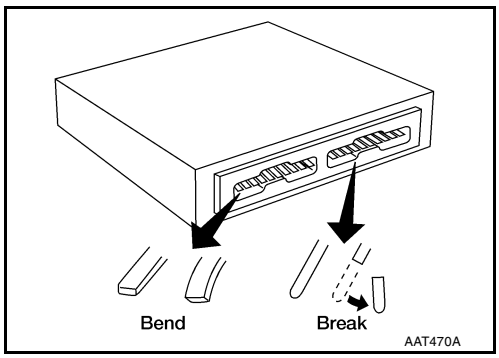
ECS005VX

- **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.**

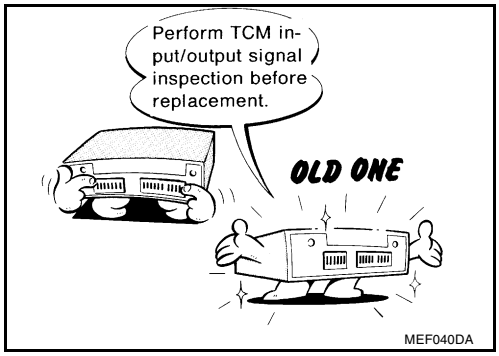


SEF289H

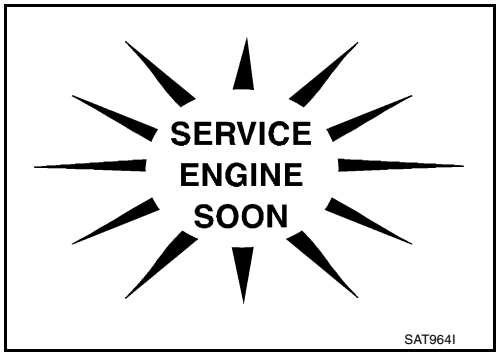
- **When connecting or disconnecting pin connectors into or from TCM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on TCM pin terminal, when connecting pin connectors.



- **Before replacing TCM, perform TCM input/output signal inspection and make sure whether TCM functions properly or not. See page AT-109 .**



- **After performing each TROUBLE DIAGNOSIS, perform "DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE".**
  The DTC should not be displayed in the "DTC CONFIRMATION PROCEDURE" if the repair is completed.
- Before proceeding with disassembly, thoroughly clean the outside of the transaxle. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transaxle.



- Place disassembled parts in order for easier and proper assembly.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transaxle is disassembled.
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place disassembled valve body parts in order for easier and proper assembly. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed valves, sleeves, plugs, etc. will slide along bores in valve body under their own weight.
- Before assembly, apply a coat of recommended ATF to all parts. Apply petroleum jelly to protect O-rings and seals, or hold bearings and washers in place during assembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to AT-11, "ATF COOLER SERVICE" .
- 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. Refer to MA-31, "Changing A/T Fluid" .

Service Notice or Precautions

ECS005VY

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-51, "TCM Self-diagnostic Procedure (No Tools)" .]
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-60, "Work Flow" .
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.
Refer to CO-13, "RADIATOR" .

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-54, "Judgement of Self-diagnosis Code" for the indicator used to display each self-diagnostic result.
- The self-diagnostic results indicated by the MIL are automatically stored in the ECM and TCM memories. **Always perform the procedure “HOW TO ERASE DTC” on page AT-40 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.

– PNP switch

*: For details of OBD-II, refer to EC-58, "ON BOARD DIAGNOSTIC (OBD) SYSTEM" [QG18DE (ULEV)] or EC-630, "ON BOARD DIAGNOSTIC (OBD) SYSTEM" [QG18DE (SULEV)].

- **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 PG-47, "HARNESS CONNECTOR (SLIDE-LOCKING TYPE)" .

Wiring Diagrams and Trouble Diagnosis

ECS005VZ

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams".
- PG-2, "POWER SUPPLY ROUTING".

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES".
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident".

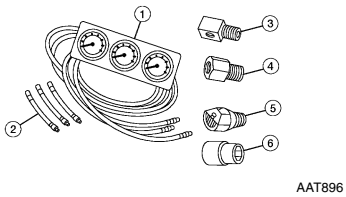
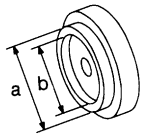
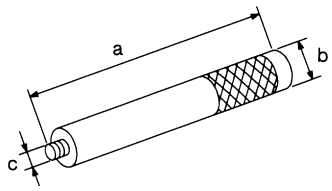
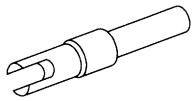
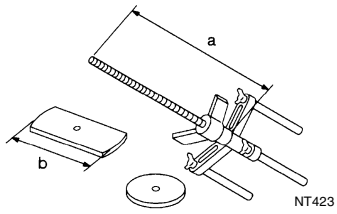
PREPARATION

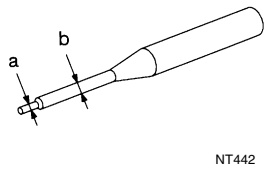
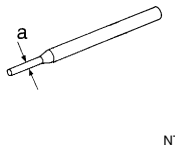
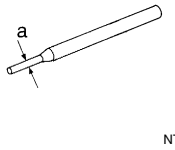
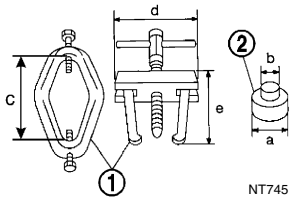
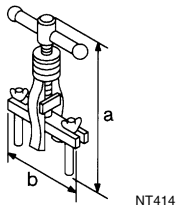
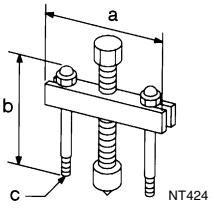
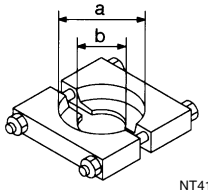
PFP:00002

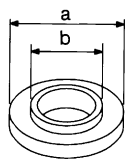
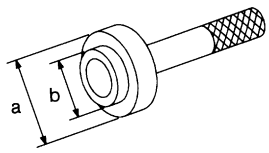
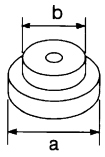
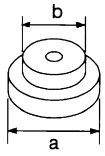
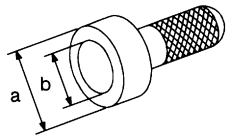
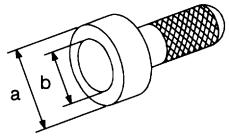
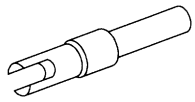
Special Service Tools

ECS005W0

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

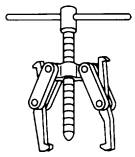
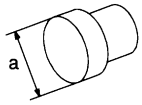
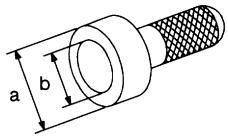
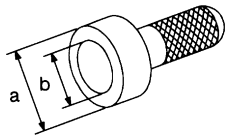
Tool number (Kent-Moore No.) Tool name	Description
(J34301-C) Oil pressure gauge set 1 (J34301-1) Oil pressure gauge 2 (J34301-2) Hoses 3 (J34298) Adapter 4 (J34282) Adapter 5 (790-301-1230-A) 60° Adapter 6 (J34301-15) Square socket  AAT896	Measuring line pressure
KV31103000 (J38982) Drift  NT105	Installing differential oil seal (Use with ST35325000.) **a: 59 mm (2.32 in) dia.** **b: 49 mm (1.93 in) dia.**
ST35325000 (—) Drift  NT417	Installing differential oil seal (Use with KV31103000.) **a: 215 mm (8.46 in)** **b: 25 mm (0.98 in) dia.** **c: M12 x 1.5P**
KV38107700 (J39027) Preload adapter  NT087	● Measuring turning torque of final drive assembly ● Measuring clearance between side gear and differential case with washer ● Selecting differential side bearing adjusting shim
KV31103200 (J34285-A and J34285-87) Clutch spring compressor  NT423	Removing and installing clutch return spring **a: 320 mm (12.60 in)** **b: 174 mm (6.85 in)**

Tool number (Kent-Moore No.) Tool name	Description
ST23540000 (J25689-A) Pin punch 	Removing and installing parking rod plate, manual plate and differential pinion mate shaft retaining pins **a: 2.3 mm (0.091 in) dia.** **b: 4 mm (0.16 in) dia.**
KV32101000 (J25689-A) Pin punch 	Installing throttle lever and manual shaft retaining pins **a: 4 mm (0.16 in) dia.**
ST25710000 (—) Pin punch 	Aligning groove of manual shaft and hole of transmission case **a: 2 mm (0.08 in) dia.**
ST3306S001 (J22888-D) Differential side bearing puller set 1 ST33051001 (J22888-D) Puller 2 ST33061000 (J8107-2) Adapter 	Removing differential side bearing inner race **a: 39 mm (1.54 in) dia.** **b: 29.5 mm (1.161 in) dia.** **c: 130 mm (5.12 in)** **d: 135 mm (5.31 in)** **e: 120 mm (4.72 in)**
KV381054S0 (J34286) Puller 	● Removing idler gear bearing outer race ● Removing differential side oil seals ● Removing differential side bearing outer race ● Removing needle bearing from bearing retainer **a: 250 mm (9.84 in)** **b: 160 mm (6.30 in)**
ST27180001 (J25726-B) Puller 	● Removing idler gear **a: 100 mm (3.94 in)** **b: 110 mm (4.33 in)** **c: M8 x 1.25P**
ST30031000 (J22912-O1) Puller 	Removing reduction gear bearing inner race **a: 90 mm (3.54 in) dia.** **b: 50 mm (1.97 in) dia.**

Tool number (Kent-Moore No.) Tool name		Description
ST35272000 (J26092) Drift	 NT426	● Installing reduction gear bearing inner race ● Installing idler gear bearing inner race **a: 72 mm (2.83 in) dia.** **b: 35.5 mm (1.398 in) dia.**
ST37830000 (—) Drift	 NT427	Installing idler gear bearing outer race **a: 62 mm (2.44 in) dia.** **b: 39 mm (1.54 in) dia.**
ST35321000 (—) Drift	 NT073	Installing output shaft bearing **a: 49 mm (1.93 in) dia.** **b: 41 mm (1.61 in) dia.**
ST30633000 (—) Drift	 NT073	Installing differential side bearing outer race **a: 67 mm (2.64 in) dia.** **b: 49 mm (1.93 in) dia.**
ST35271000 (J26091) Drift	 NT115	● Installing idler gear **a: 72 mm (2.83 in) dia.** **b: 63 mm (2.48 in) dia.**
ST33400001 (J26082) Drift	 NT115	● Installing oil pump housing oil seal **a: 60 mm (2.36 in) dia.** **b: 47 mm (1.85 in) dia.**
KV38105710 (—)	 NT087	● Measuring clearance between side gear and differential case

Commercial Service Tools

ECS005W1

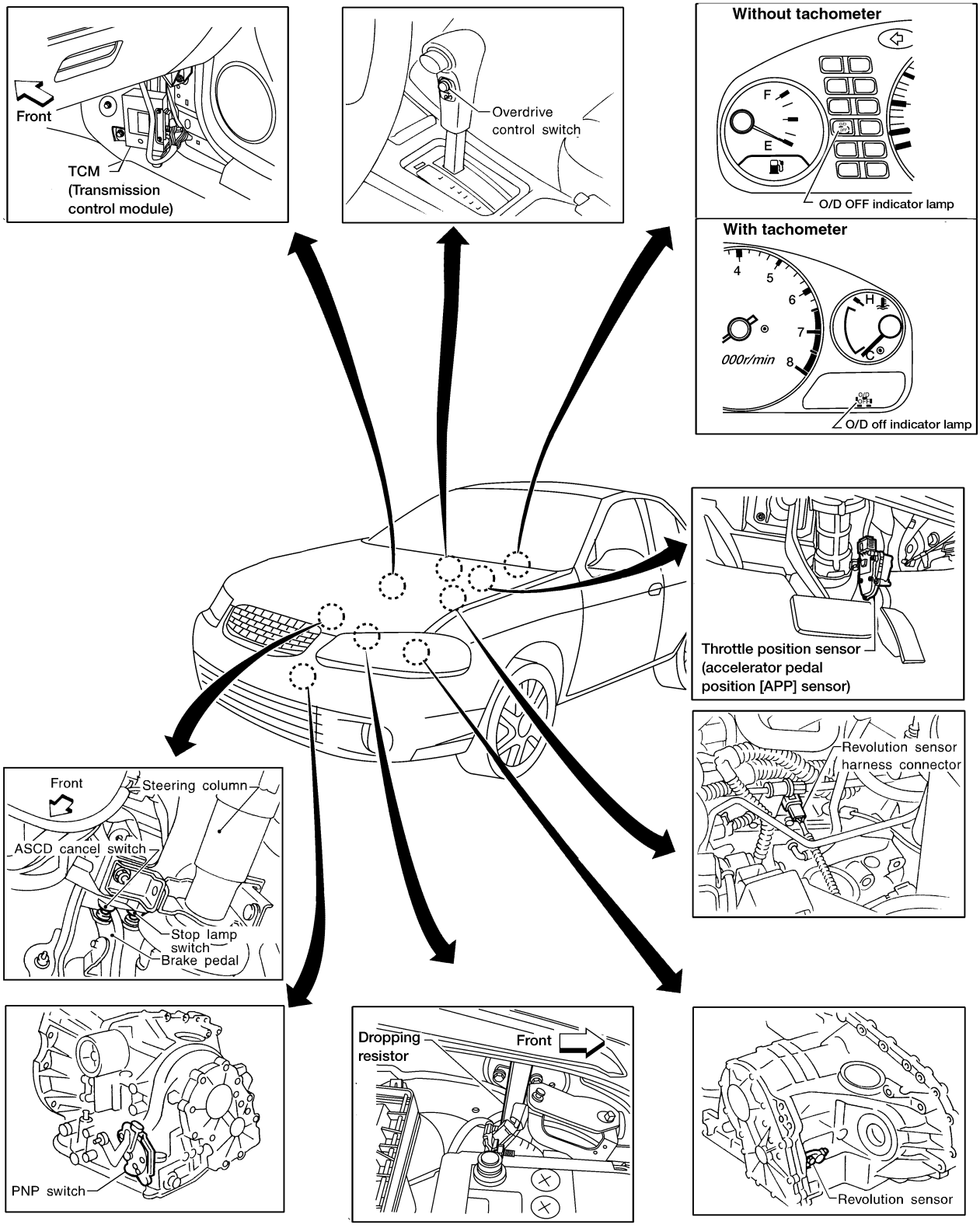
Tool name	Description
Puller  NT077	● Removing idler gear bearing inner race ● Removing and installing band servo piston snap ring
Drift  NT109	Removing idler gear bearing inner race **a: 34 mm (1.34 in) dia.**
Drift  NT115	Installing differential left side bearing **a: 86 mm (3.39 in) dia.** **b: 80 mm (3.15 in) dia.**
Drift  NT115	Installing differential right side bearing **a: 46 mm (1.81 in) dia.** **b: 40 mm (1.57 in) dia.**

OVERALL SYSTEM

PFP:00000

A/T Electrical Parts Location

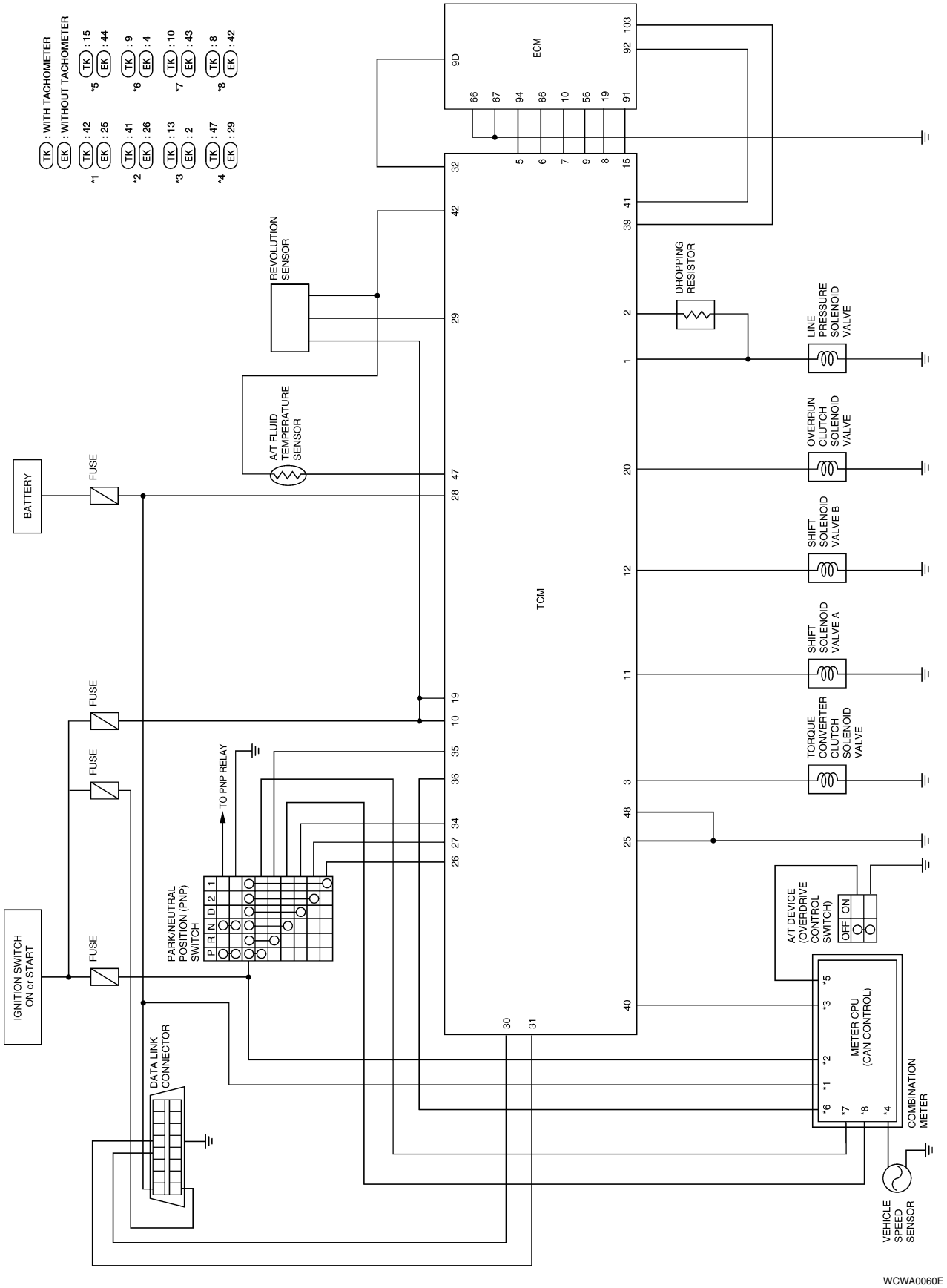
ECS005W2



WCIA0162E

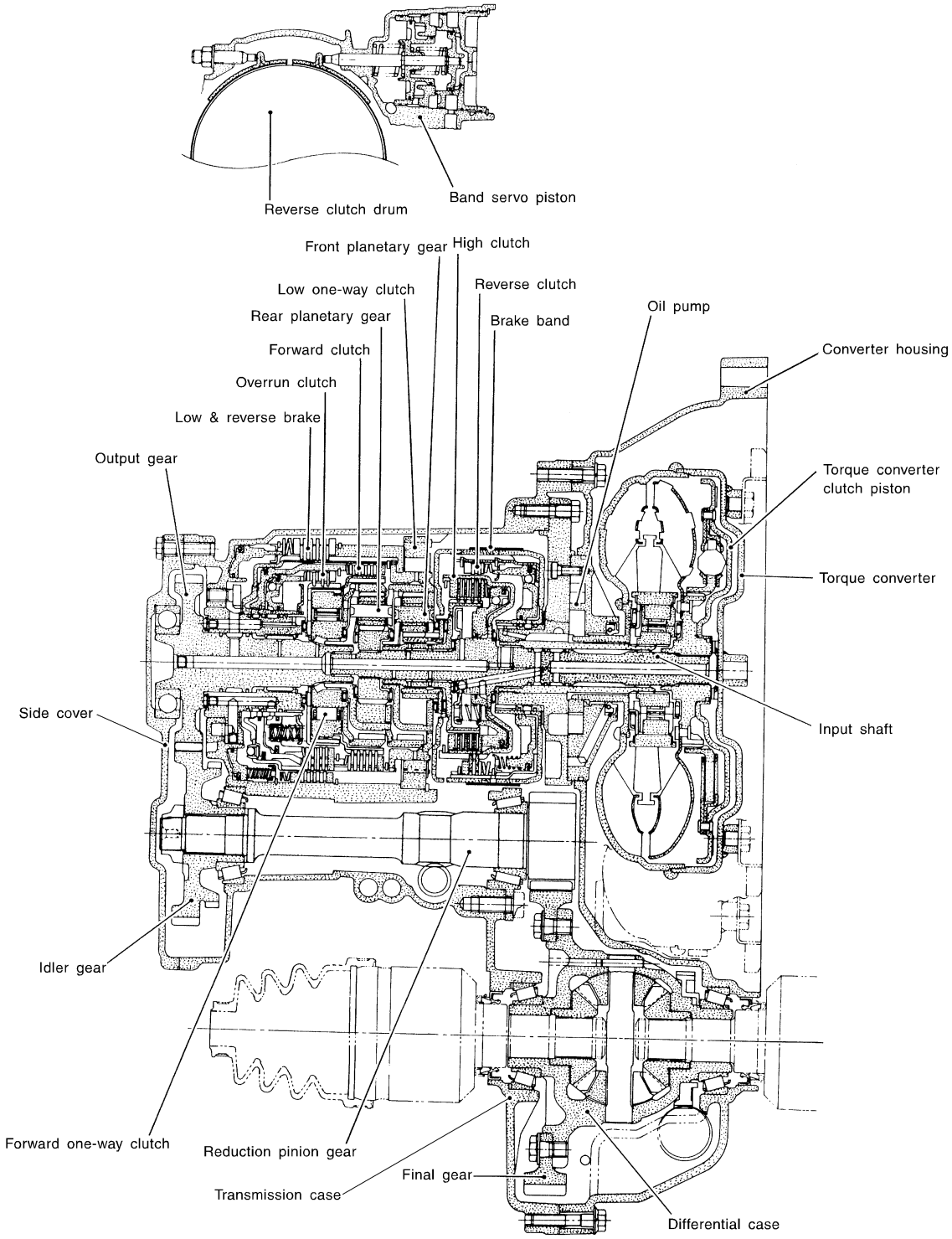
Circuit Diagram

ECS005W3



Cross-sectional View

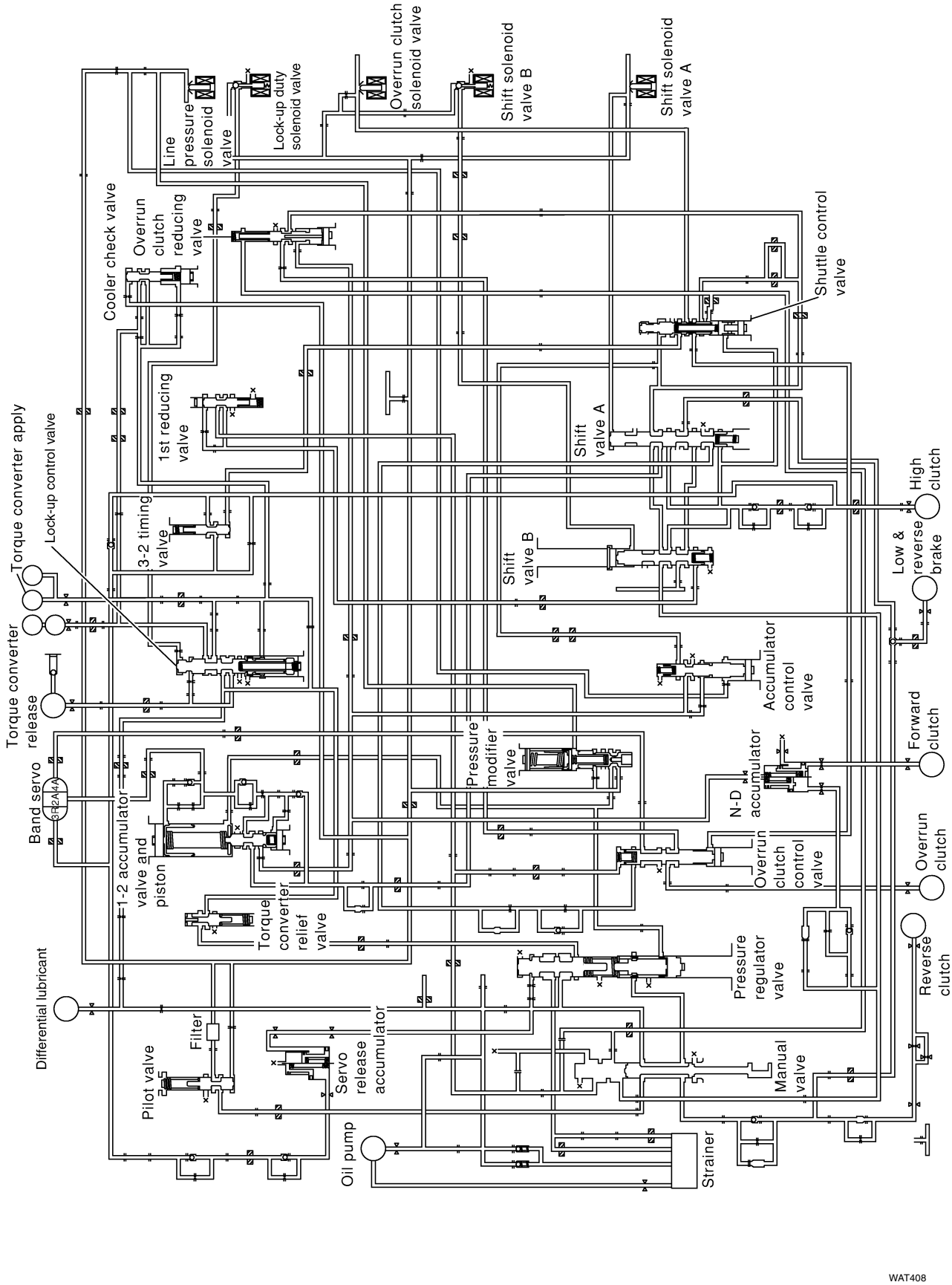
ECS005W4



SAT842J

Hydraulic Control Circuit

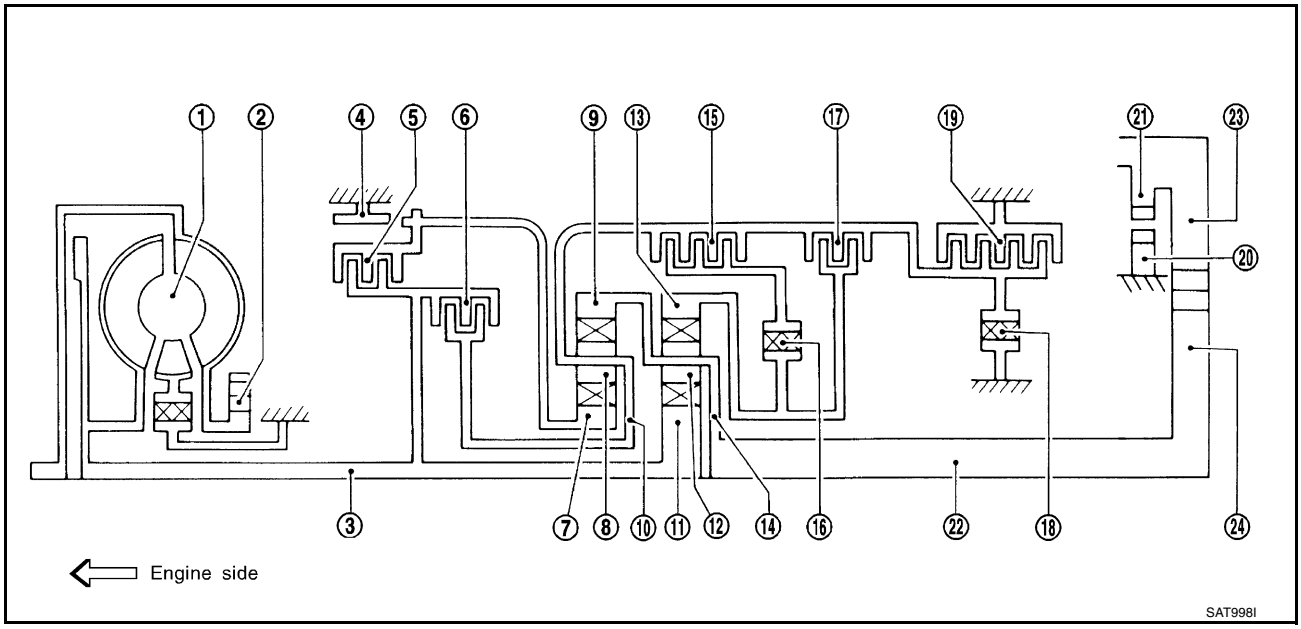
ECS005W5



Shift Mechanism

ECS005W6

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** .

CLUTCH AND BAND CHART

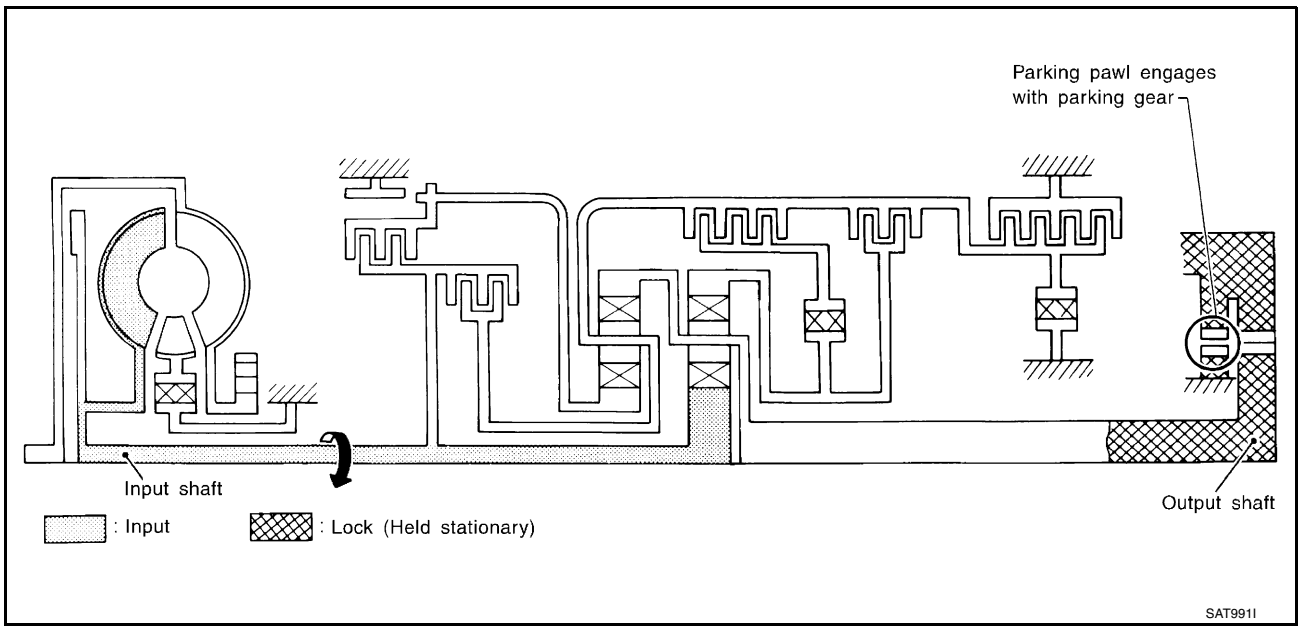
Shift position		Reverse clutch **5**	High clutch **6**	For-ward clutch **15**	Over-run clutch **17**	Band servo			Forward one-way clutch **16**	Low one-way clutch **18**	Low & reverse brake **19**	Lock-up	Remarks
						2nd apply	3rd release	4th apply					
P													PARK POSITION
R		O									O		REVERSE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

- *1: Operates when overdrive control switch is set in “OFF” position.
- *2: Oil pressure is applied to both 2nd “apply” side and 3rd “release” side of band servo piston. However, brake band does not contract because oil pressure area on the “release” side is greater than that on the “apply” side.
- *3: Oil pressure is applied to 4th “apply” side in condition *2 above, and brake band contracts.
- *4: A/T will not shift to 4th when overdrive control switch is set in “OFF” position.
- O: Operates.
- A: Operates when throttle opening is less than 3/16, activating engine brake.
- B: Operates during “progressive” acceleration.
- C: Operates but does not affect power transmission.
- D: Operates when throttle opening is less than 3/16, but does not affect engine brake.

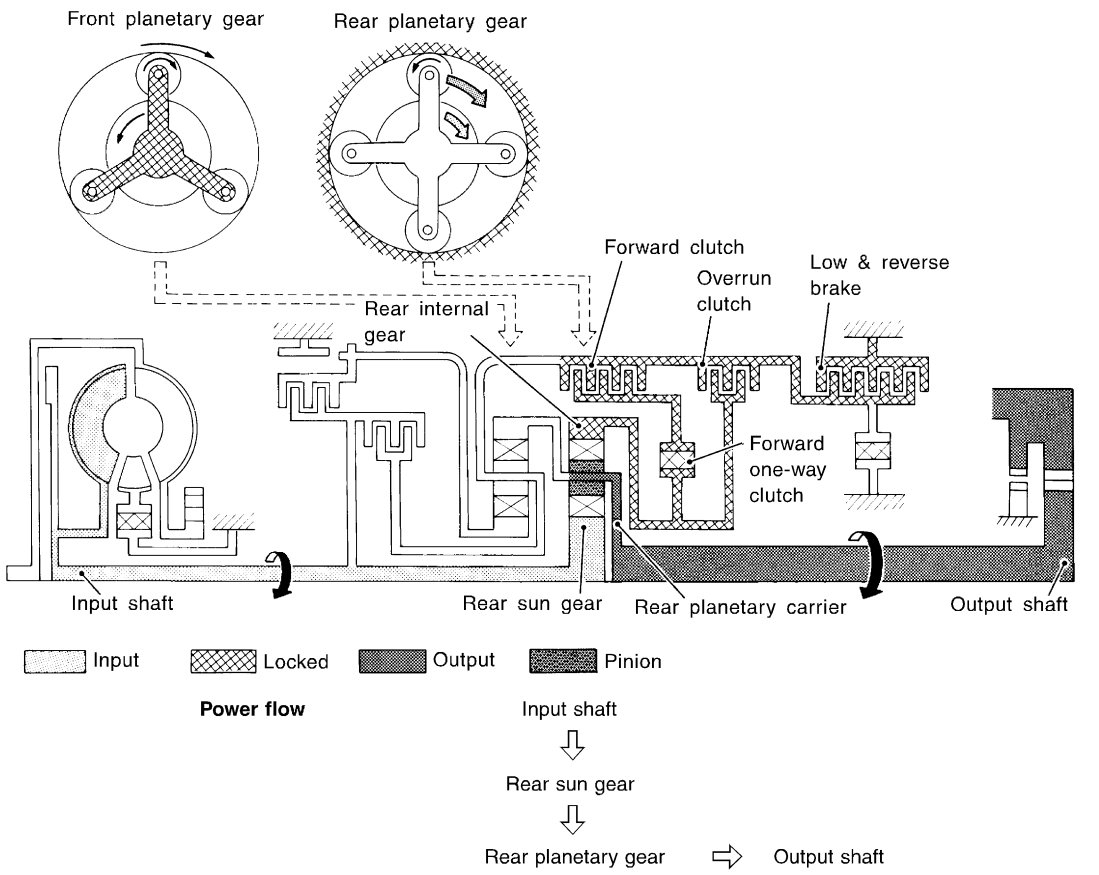
POWER TRANSMISSION

“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 powertrain is locked.

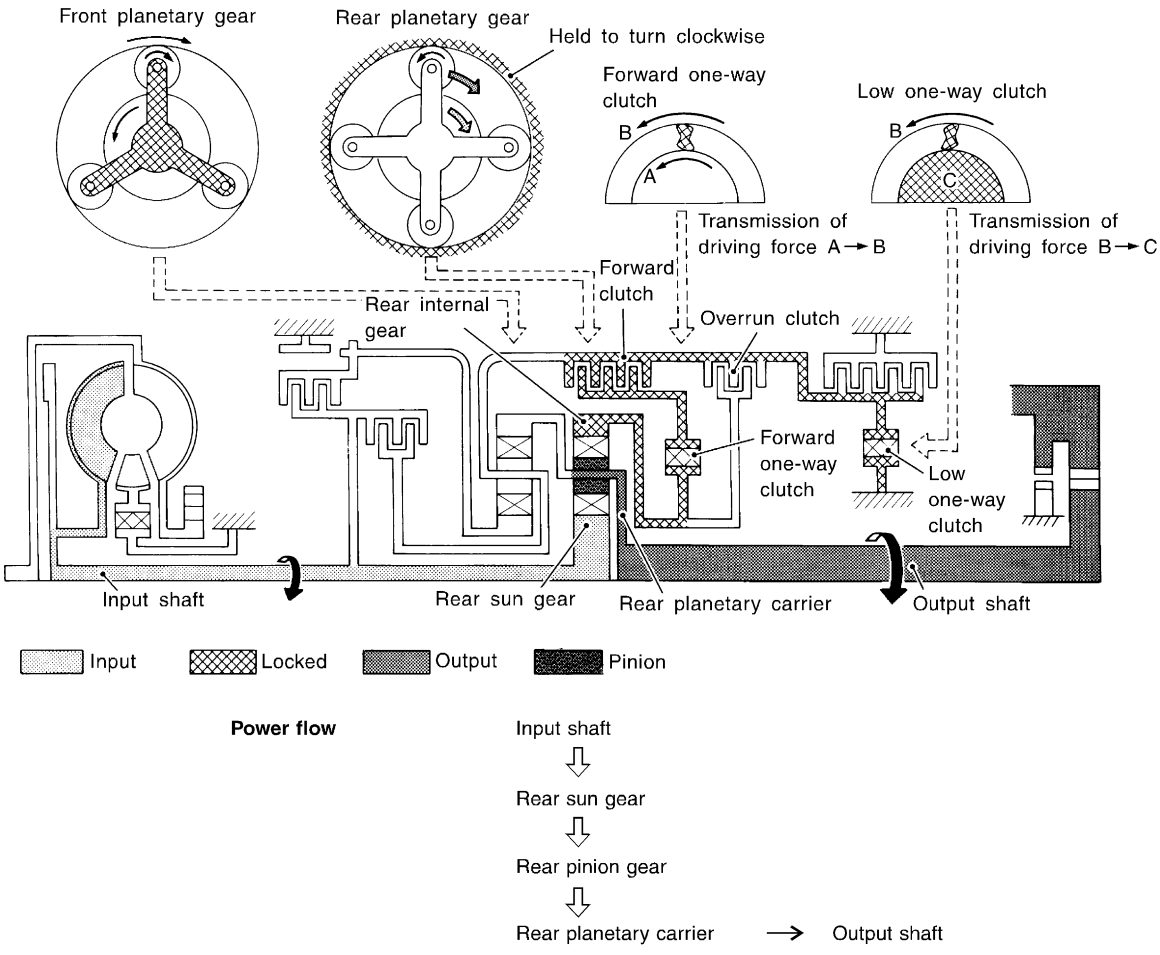


"1$_1$" Position



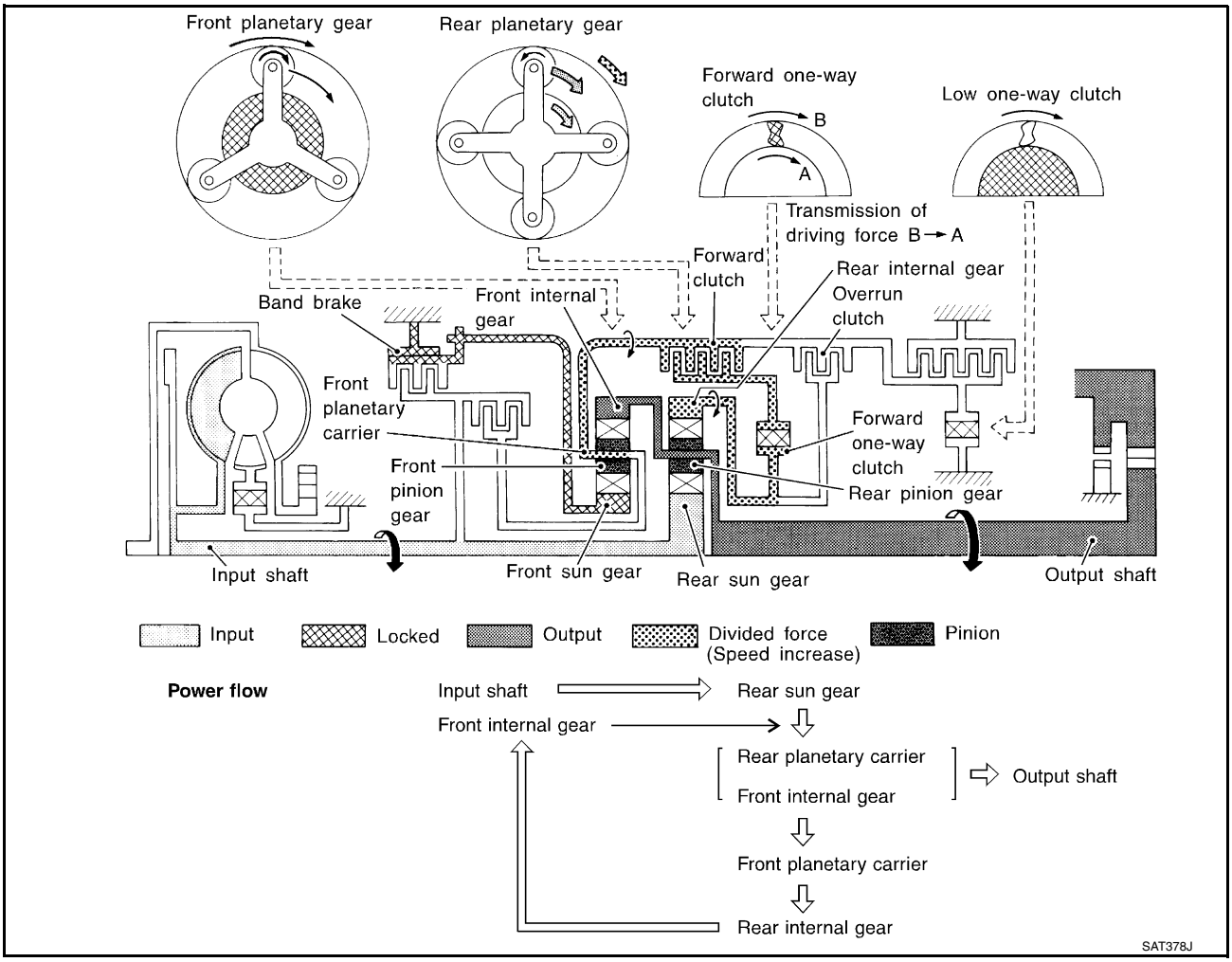
● **Forward clutch** ● **Forward one-way clutch** ● **Overrun clutch** ● **Low and reverse brake**	As overrun clutch engages, rear internal gear is locked by the operation of low and reverse brake. This is different from that of D$_1$ and 2$_1$.
Engine brake	Overrun clutch always engages, therefore engine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

"D1 " and "21 " Positions



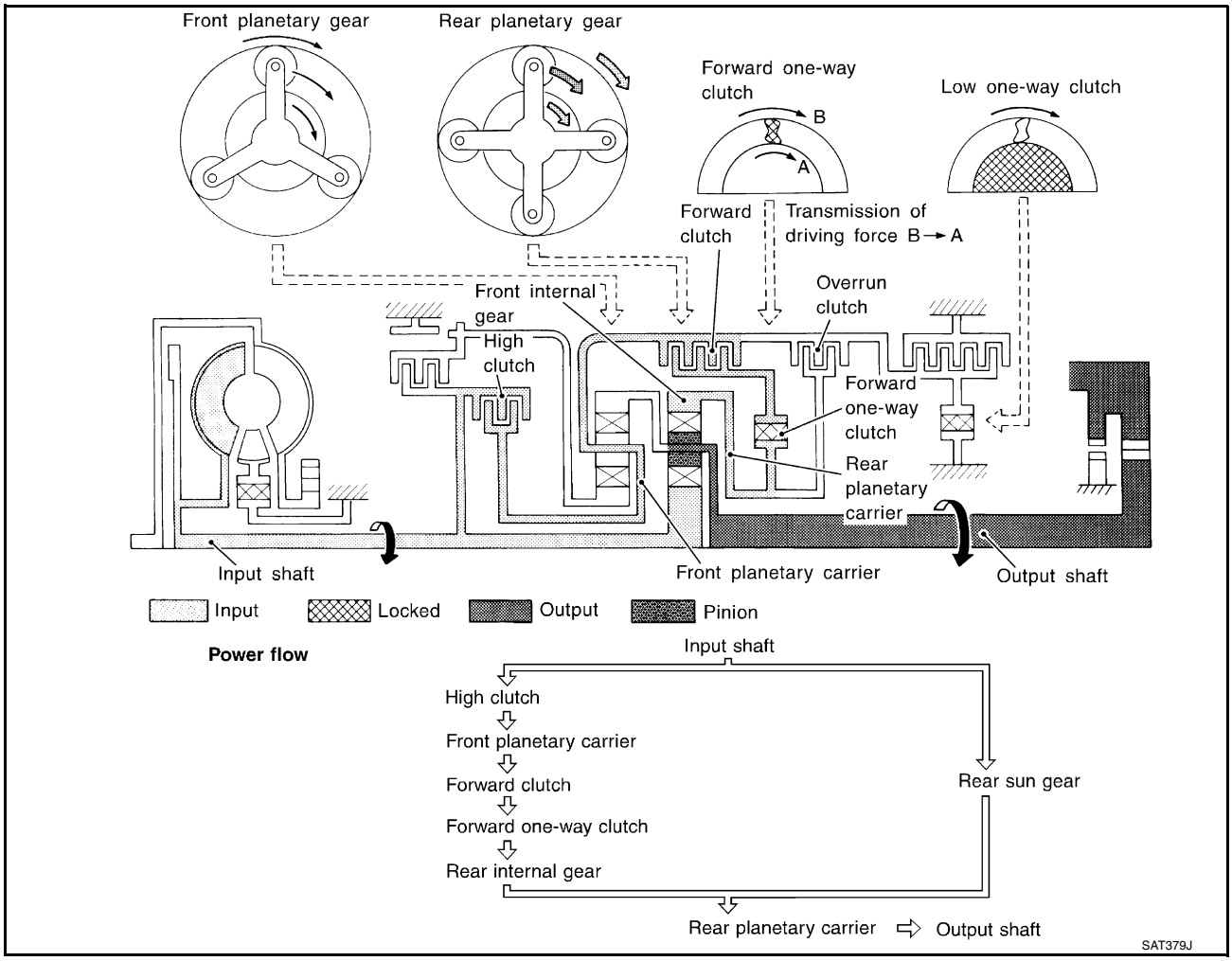
• **Forward one-way clutch** • **Forward clutch** • **Low one-way clutch**	Rear internal gear is locked to rotate counterclockwise because of the functioning of these three clutches.
Overrun clutch engagement conditions (Engine brake)	D1 : Overdrive control switch "OFF" and throttle opening is less than 3/16 21 : Always engaged At D1 and 21 positions, engine brake is not activated due to free turning of low one-way clutch.

"D2 ", "22 " and "12 " Positions



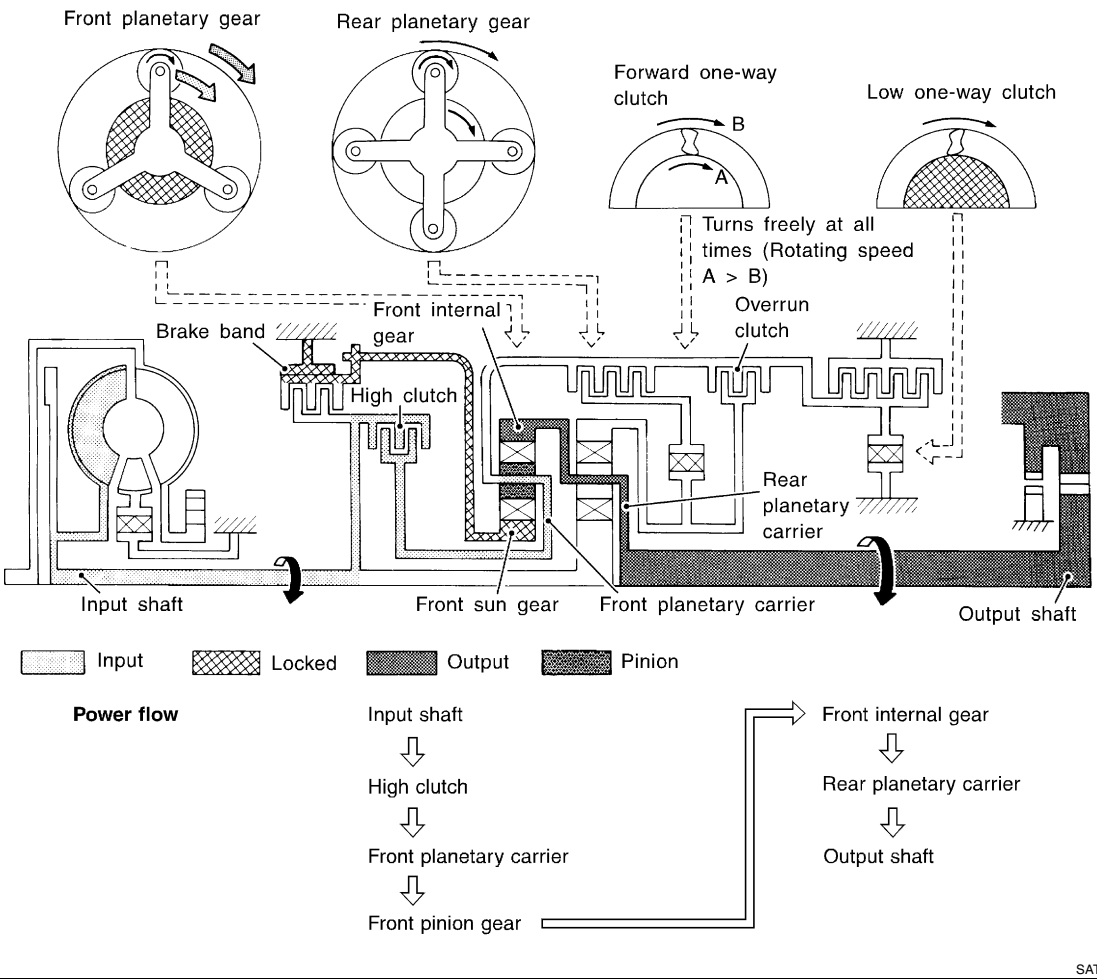
• **Forward clutch** • **Forward one-way clutch** • **Brake band**	Rear sun gear drives rear planetary carrier and combined front internal gear. Front internal gear now rotates around front sun gear accompanying front planetary carrier. As front planetary carrier transfers the power to rear internal 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	D2 : Overdrive control switch "OFF" and throttle opening is less than 3/16 22 and 12 : Always engaged

"D3 " "23 " and "13 " Positions



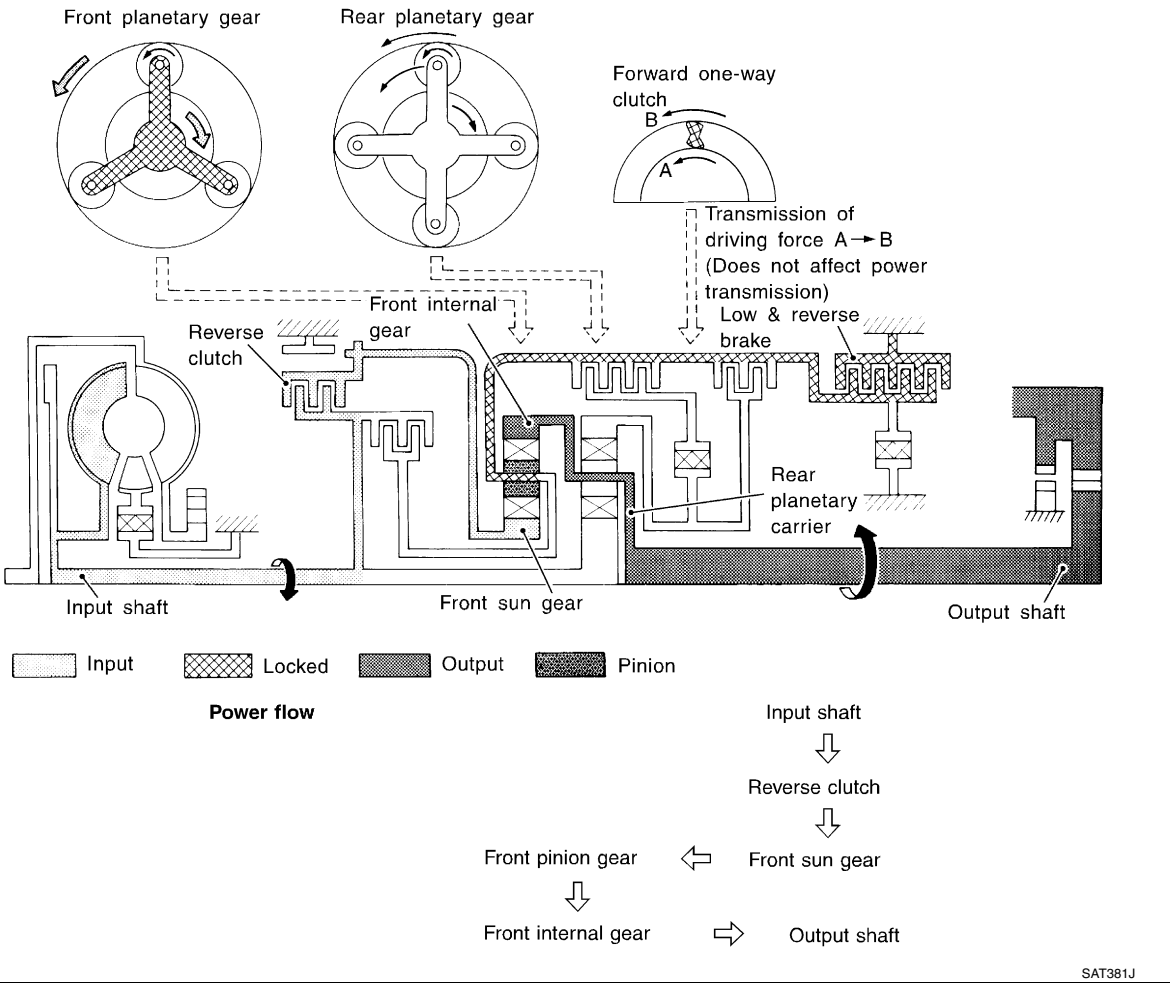
• **High clutch** • **Forward clutch** • **Forward one-way clutch**	Input power is transmitted to front planetary carrier through high clutch. And front planetary carrier is connected to rear internal gear by operation of forward clutch and forward one-way clutch. This rear internal gear rotation and another input (the rear sun gear) accompany rear planetary carrier to turn at the same speed.
Overrun clutch engagement conditions	D3 : Overdrive control switch "OFF" and throttle opening is less than 3/16 23 and 13 : Always engaged

"D4 " (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 D4 position, there is no one-way clutch in the power transmission line and engine brake can be obtained when decelerating.

"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.

Control System

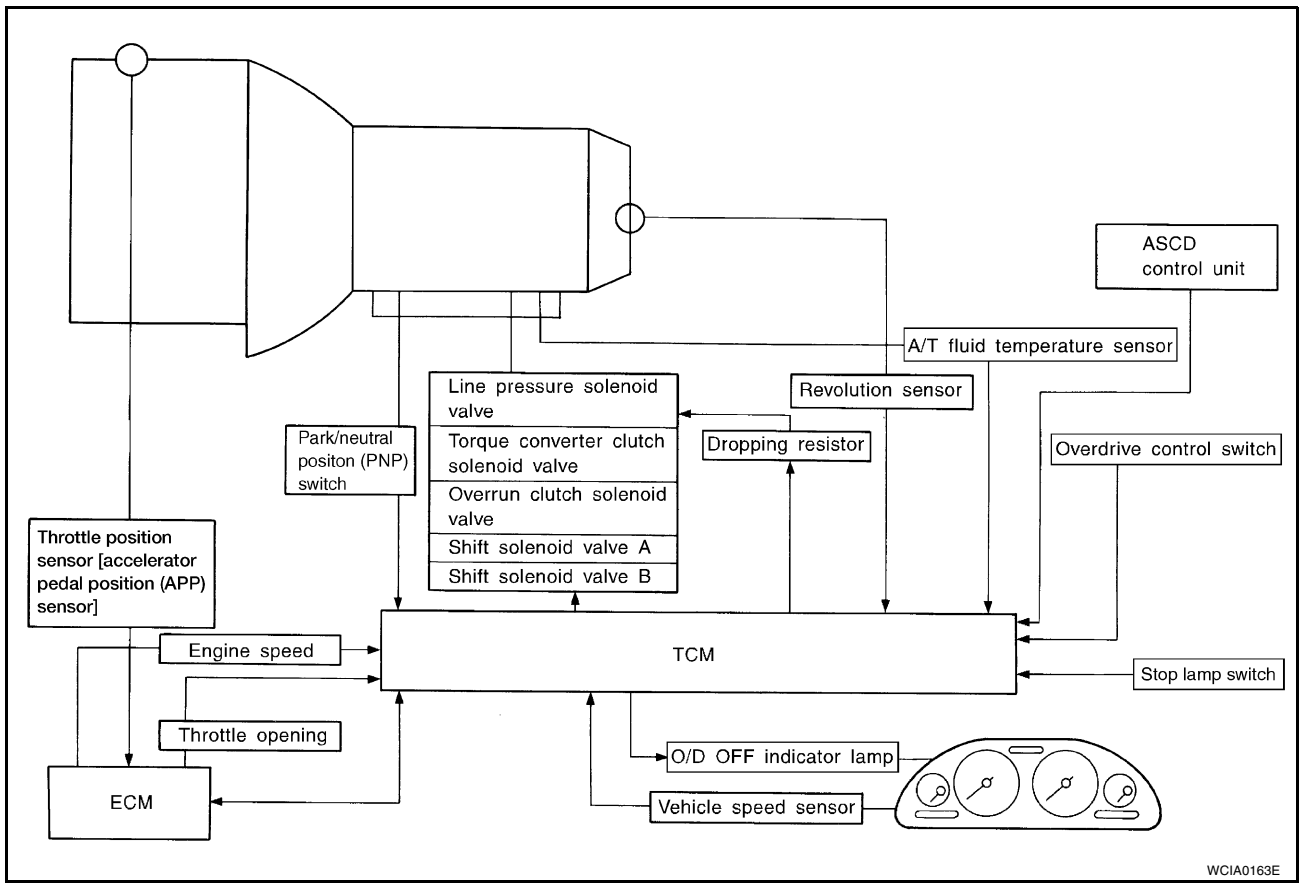
ECS005W7

OUTLINE

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

SWITCHES & SENSORS		TCM		ACTUATORS
Park/neutral position (PNP) switch Throttle position sensor [accelerator pedal position (APP) sensor] Engine speed signal A/T fluid temperature sensor Revolution sensor Vehicle speed sensor Overdrive control switch ASCD control unit Stop lamp switch Turbine revolution sensor		Shift control Line pressure solenoid Lock-up control Overrun clutch control Timing control Fail-safe control Self-diagnosis CONSULT-II communication line 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



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, switches and solenoid valves	Function
Input	PNP switch	Detects select lever position and sends a signal to TCM.
	Throttle position sensor [accelerator pedal position (APP) sensor]	Detects accelerator pedal position and requested throttle opening 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 “D4 ” (overdrive) position, to the TCM.
	ASCD control unit	Sends the cruise signal and “D4 ” (overdrive) cancellation signal from ASCD control unit to TCM.
	Stop lamp switch	Releases lock-up system when depressing pedal in lock-up condition.
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.

CAN Communication

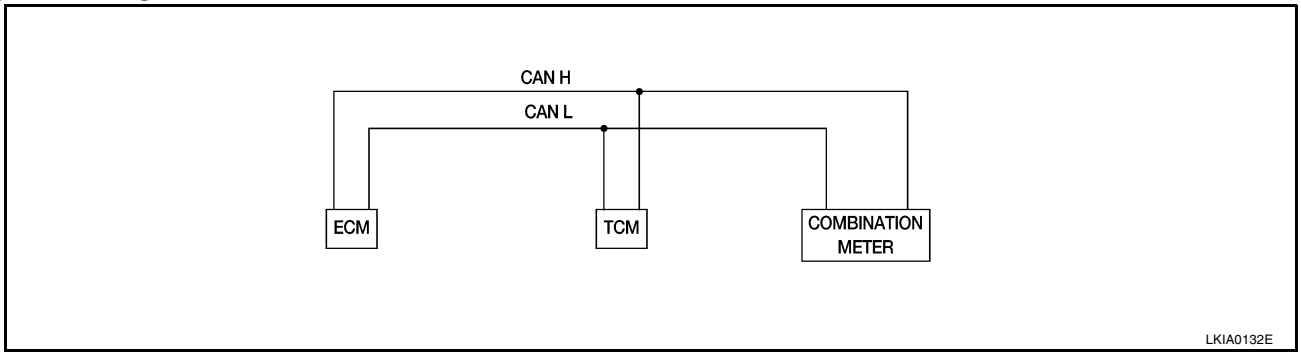
ECS006H7

SYSTEM DESCRIPTION

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

CAN COMMUNICATION UNIT

System diagram



Input/output signal chart

T: Transmit R: Receive

Signals	ECM	TCM	Combination Meter
Accelerator pedal position signal	T	R	
Output shaft revolution signal	R	T	
A/T self-diagnosis signal	R	T	
Closed throttle position signal	T	R	
Wide open throttle position signal	T	R	
Stop lamp switch signal		R	T
Overdrive control switch signal		R	T
O/D OFF indicator signal		T	R
Engine speed signal	T		R
Engine coolant temperature signal	T		R
Vehicle speed signal	R		T
Fuel level sensor signal	R		T
Malfunction indicator lamp signal	T		R
ASCD SET lamp signal	T		R
ASCD CRUISE lamp signal	T		R

Control Mechanism

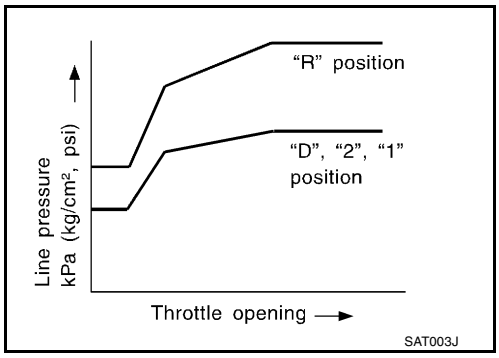
ECS005W8

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.

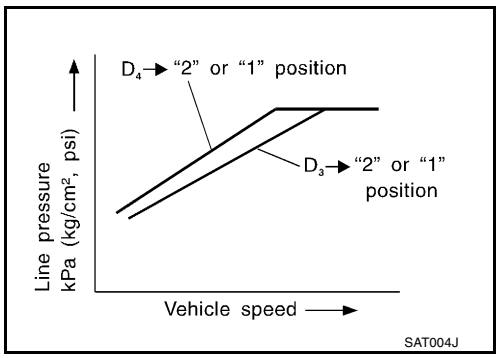
Normal Control

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



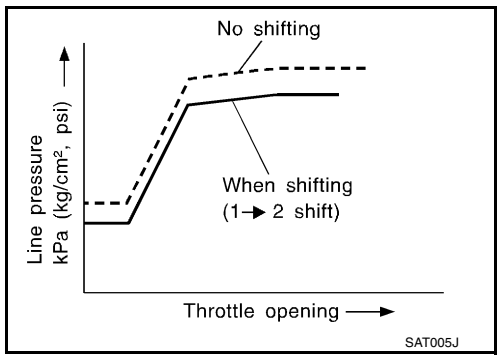
Back-up Control (Engine brake)

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.



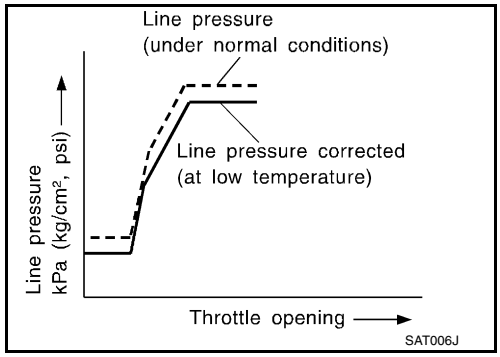
During Shift Change

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.

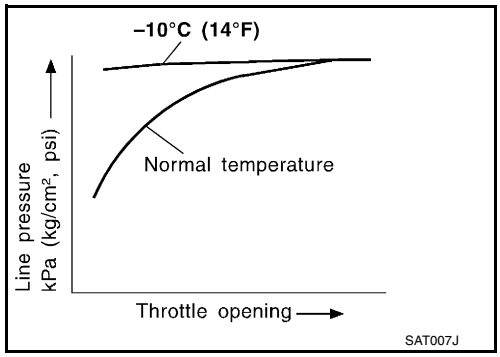


At Low Fluid Temperature

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



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

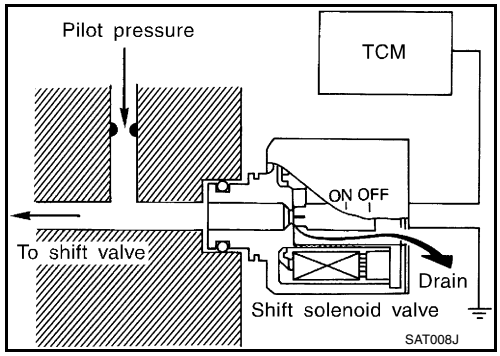


SHIFT CONTROL

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 [accelerator pedal position (APP) sensor]. This results in improved acceleration performance and fuel economy.

Control of Shift Solenoid Valves A and B

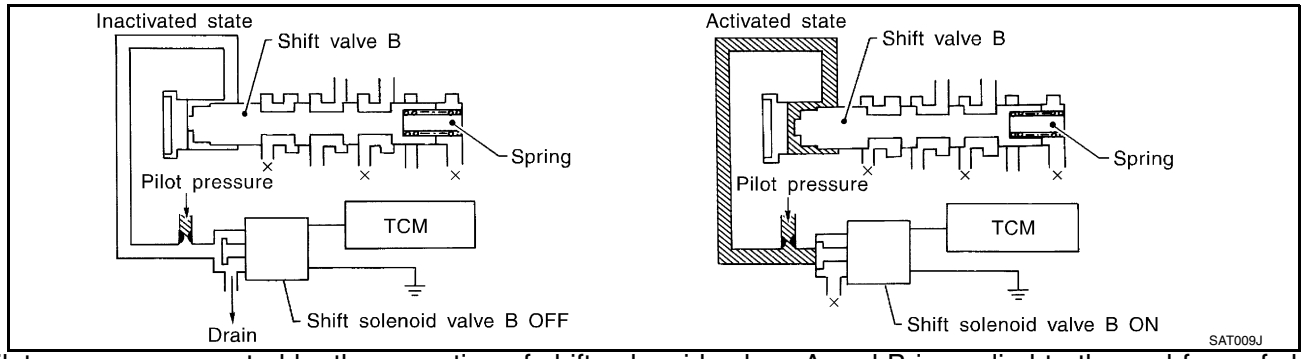
The TCM activates shift solenoid valves A and B according to signals from the throttle position sensor [accelerator pedal position (APP) sensor] and revolution sensor to select the optimum gear position on the basis of the shift schedule memorized in the TCM.
The shift solenoid valve performs simple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



Relation Between Shift Solenoid Valves A and B and Gear Positions

Shift solenoid valve	Gear position				
	D_1 , 2_1 , 1_1	D_2 , 2_2 , 1_2	D_3	D_4 (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 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 torque converter clutch piston in the torque converter is locked to eliminate torque converter slip to increase power transmission efficiency. The solenoid valve is controlled by an ON-OFF duty signal sent from the TCM. The signal is converted to an oil pressure signal which controls the torque converter clutch piston.

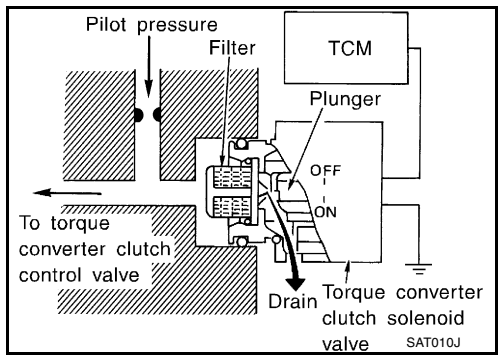
Conditions for Lock-up Operation

When vehicle is driven in 3rd and 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.

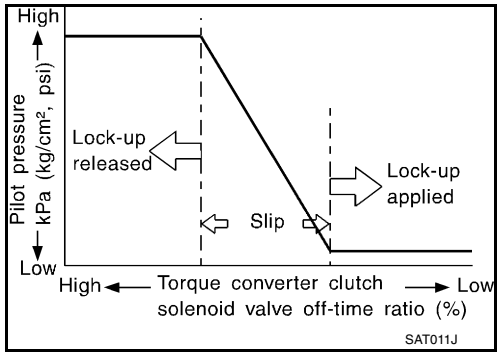
Overdrive control switch	ON	OFF
Selector lever	“D” position	
Gear position	D_4	D_3
Vehicle speed sensor	More than set value	
Throttle position sensor [accelerator pedal position (APP) sensor]	Less than set opening	
A/T fluid temperature sensor	More than 40°C (104°F)	

Torque Converter Clutch Solenoid Valve Control

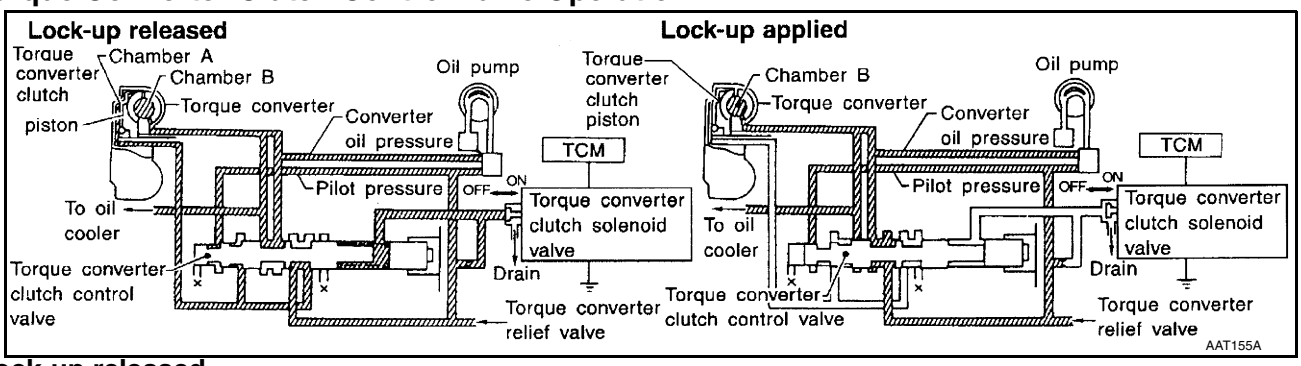
The torque converter clutch solenoid valve is controlled by the TCM. The plunger closes the drain circuit during the “OFF” period, and opens the circuit during the “ON” period. If the percentage of OFF-time increases in one cycle, the pilot pressure drain time is reduced and pilot pressure remains high.



The torque converter clutch piston is designed to slip to adjust the ratio of ON-OFF, thereby reducing lock-up shock.
OFF-time INCREASING
↓
Amount of drain DECREASING
↓
Pilot pressure HIGH
↓
Lock-up RELEASING



Torque Converter Clutch Control Valve Operation



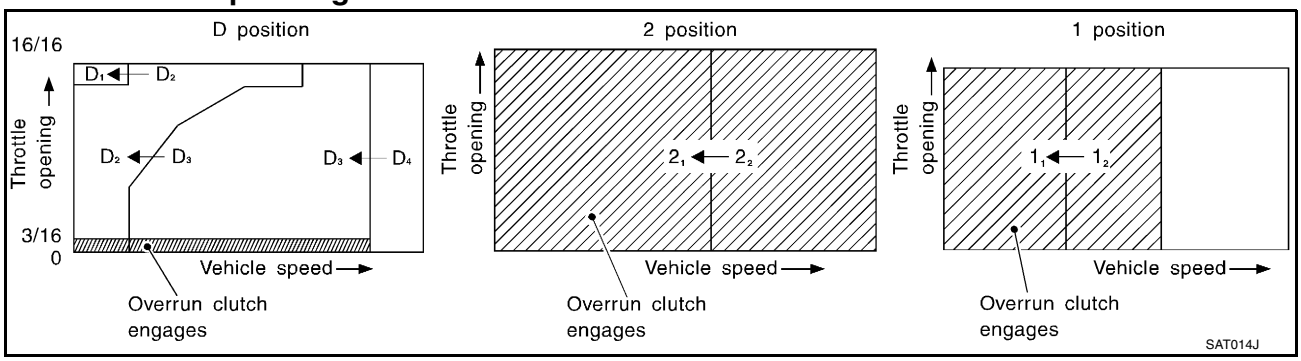
Lock-up released
The OFF-duration of the torque converter clutch solenoid valve is long, and pilot pressure is high. The pilot pressure pushes the end face of the torque converter clutch control valve in combination with spring force to move the valve to the left. As a result, converter pressure is applied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

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

OVERRUN CLUTCH CONTROL (ENGINE BRAKE CONTROL)

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.

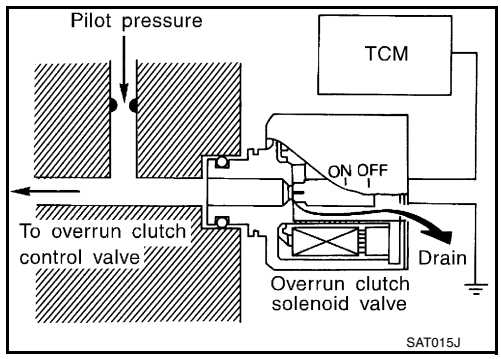
Overrun Clutch Operating Conditions



Selector lever position	Gear position	Throttle opening
"D" position	D1 , D2 , D3 gear position	Less than 3/16
"2" position	21 , 22 gear position	
"1" position	11 , 12 gear position	At any position

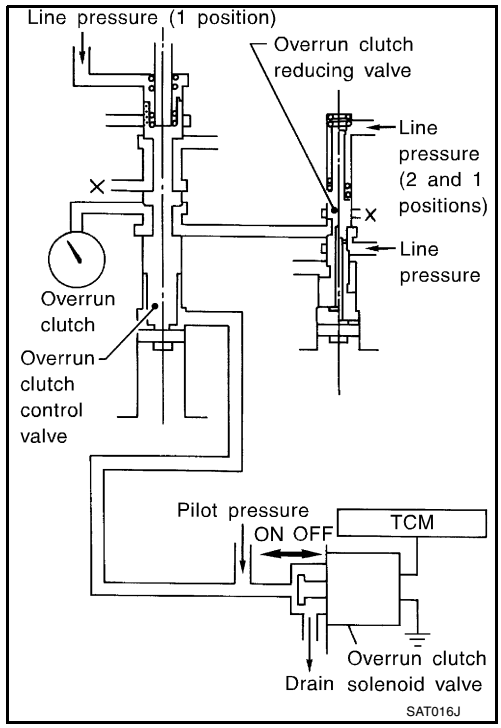
Overrun Clutch Solenoid Valve Control

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 valve is “OFF”, pilot pressure is not generated. At this point, the overrun clutch control valve moves downward by spring force. As a result, overrun clutch operation pressure is provided by the overrun clutch reducing valve. This causes the overrun clutch to engage.
In the 1 position, the overrun clutch control valve remains pushed down so that the overrun clutch is engaged at all times.



Control Valve

ECS005W9

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.

Valve name	Function
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.
3-2 timing valve	Switches oil pressure with 3-2 timing valve according to throttle opening.
Shuttle control valve	Reduces shock when down-shifting from 3rd to 2nd and regulates overrun clutch.
Cooler check valve	Regulates oil pressure which causes lock-up when driving at low speeds.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

PFP:00000

Introduction

ECS005WA

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 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-43, "SELF-DIAGNOSTIC RESULT TEST MODE" .

OBD-II Function for A/T System

ECS005WB

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

ECS005WC

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	X	
Shift solenoid valve B — DTC: P0755	X	
Throttle position sensor [accelerator pedal position (APP) sensor] or switch — DTC: P1705	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)

ECS005WD

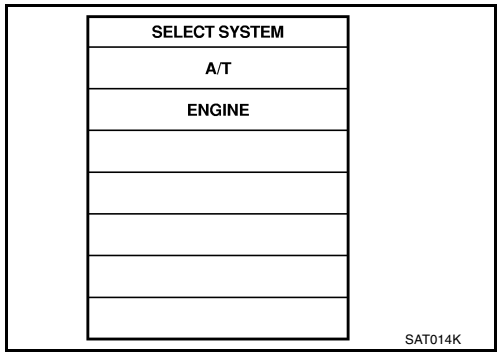
HOW TO READ DTC AND 1ST TRIP DTC

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

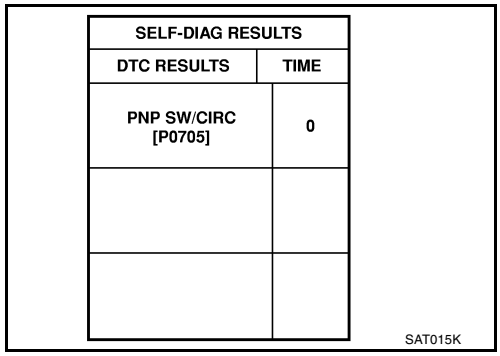
(with CONSULT-II or GST) CONSULT-II or GST (Generic Scan Tool) Examples: P0705, P0710, P0720, P0725, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

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

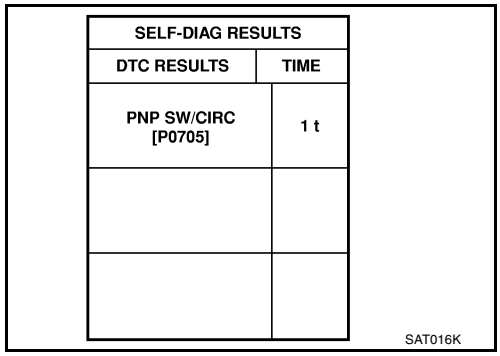
A sample of CONSULT-II display for DTC and 1st trip DTC is shown. DTC or 1st trip DTC of a malfunction is displayed in SELF DIAGNOSIS mode for “ENGINE” with CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.



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 “1t”.



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-62, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" [QG18DE (ULEV Model) or EC-634, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" (SULEV Model)].
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 - P0304 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
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 follows.

- **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-71, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" [QG18DE (ULEV)] or EC-642, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" [QG18DE (SULEV)].

- **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**

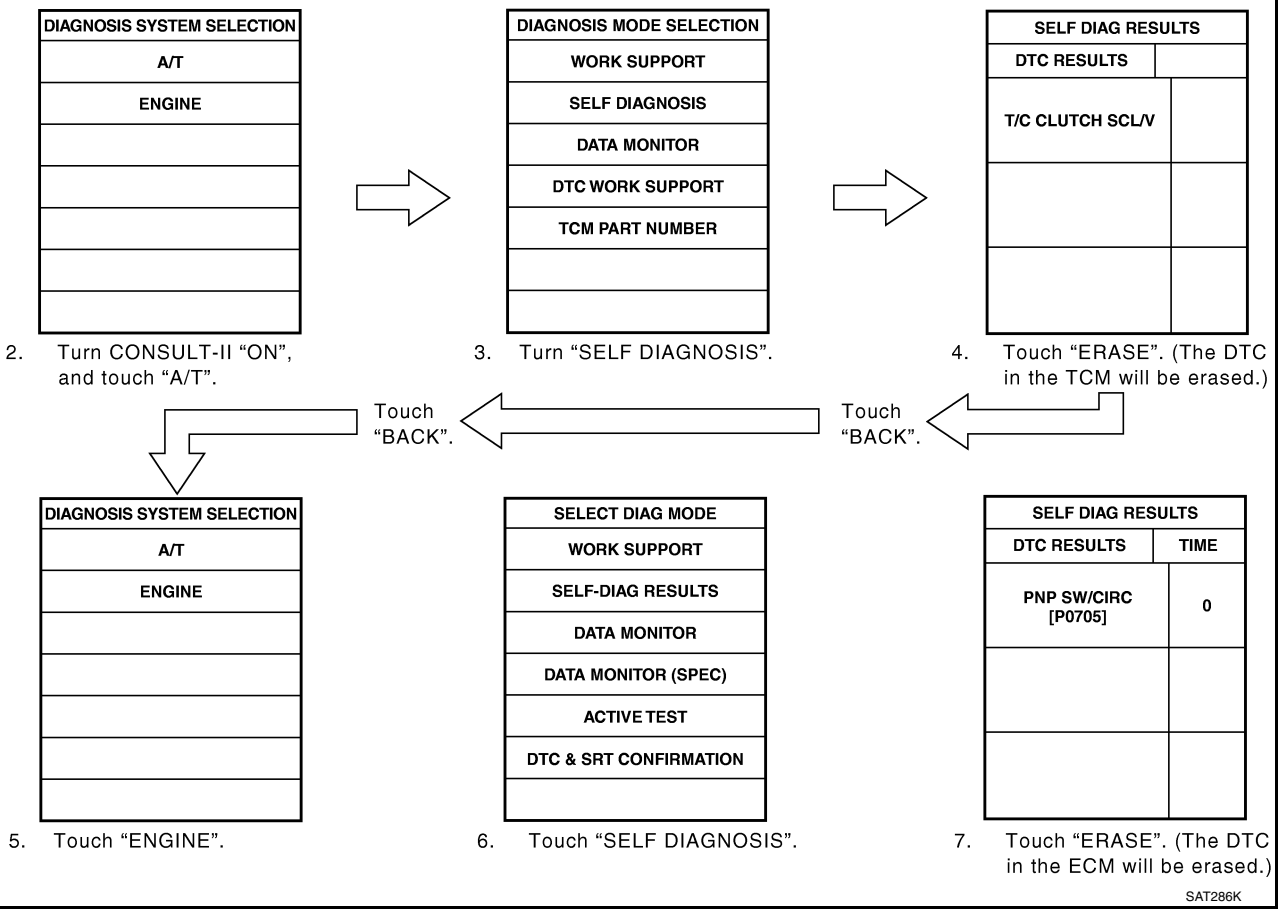
HOW TO ERASE DTC (WITH CONSULT-II)

- **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 10 seconds and then turn it “ON” (engine stopped) again.
2. Turn CONSULT-II “ON” and touch “A/T”.
3. Touch “SELF DIAGNOSIS”.
4. Touch “ERASE”. (The DTC in the TCM will be erased.) Then touch “BACK” twice.
5. Touch “ENGINE”.
6. Touch “SELF DIAGNOSIS”.
7. Touch “ERASE”. (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

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



HOW TO ERASE DTC (WITH GST)

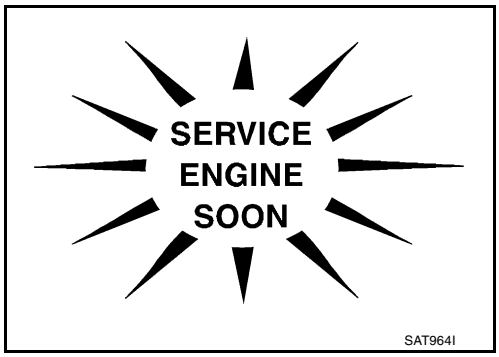
1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 5 seconds and then turn it “ON” (engine stopped) again.
2. Perform TCM Self-diagnostic Procedure. Refer to AT-51, "TCM Self-diagnostic Procedure (No Tools)" . (The engine warm-up step can 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-71, "How to Erase DTC (With GST)" [QG18DE (ULEV)] or EC-643, "How to Erase DTC (With GST)" [QG18DE (SULEV)].

HOW TO ERASE DTC (NO TOOLS)

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 5 seconds and then turn it “ON” (engine stopped) again.
2. Perform TCM Self-diagnostic Procedure. Refer to AT-51, "TCM Self-diagnostic Procedure (No Tools)" . (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Perform OBD-II Self-diagnostic Procedure. Refer to AT-51, "TCM Self-diagnostic Procedure (No Tools)" .

Malfunction Indicator Lamp (MIL)

ECS005WE



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 DI-27, "WARNING LAMPS" .
     (Or see MIL & CONSULT-II in EC section. Refer to EC-72, "Malfunction Indicator Lamp (MIL)" [QG18DE (ULEV)] or EC-644, "Malfunction Indicator Lamp (MIL)" [QG18DE (SULEV)], and EC-113, "CONSULT-II Function" [QG18DE (ULEV)] or EC-685, "CONSULT-II Function" [QG18DE (SULEV)].
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-59, "Emission-related Diagnostic Information" [QG18DE (ULEV)] or EC-631, "Emission-related Diagnostic Information" [QG18DE (SULEV)].

CONSULT-II

ECS005WF

After performing “SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)” (AT-42, "SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)"), place check marks for results on the “DIAGNOSTIC WORKSHEET”, (AT-57, "DIAGNOSTIC WORKSHEET"). Reference pages are provided following the items.

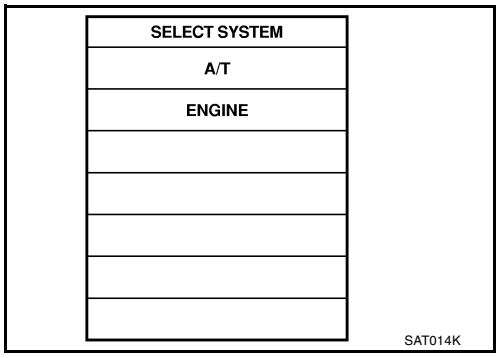
NOTICE:

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

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

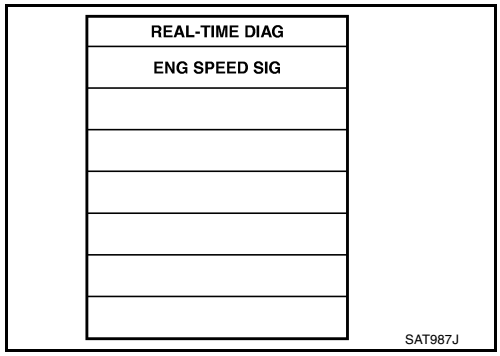
3. Shift solenoid valve “A” or “B” is displayed on CONSULT-II at the start of shifting. Gear position is displayed upon completion of shifting (which is computed by TCM).
4. Additional CONSULT-II information can be found in the Operation Manual supplied with the CONSULT-II unit.

SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)



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-112, "TROUBLE DIAGNOSIS FOR POWER SUPPLY" . If result is NG, refer to PG-2, "POWER SUPPLY ROUTING" .

2. Touch “SELF DIAG RESULTS”.
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.



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)
“A/T”	“ENGINE”		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
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 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 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 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 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	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			

Detected items (Screen terms for CONSULT-II, "SELF DIAGNOSIS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
"A/T"	"ENGINE"		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
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-72, "Malfunction Indicator Lamp (MIL)" [QG18DE (ULEV)] or EC-644, "Malfunction Indicator Lamp (MIL)" [QG18DE (SULEV)].

DATA MONITOR MODE (A/T)

Item	Display	Monitor item		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-II data may not indicate 0 km/h (0 mph).
Vehicle speed sensor 2 (Meter)	VHCL/S SE·MTR [km/h] or [mph]	X	—	● Vehicle speed computed from signal of vehicle speed sensor is displayed.	Vehicle speed display may not be accurate under approx. 10 km/h (6 mph). It may not indicate 0 km/h (0 mph) when vehicle is stationary.
Throttle position sensor [accelerator pedal position (APP) sensor]	THRTL POS SEN [V]	X	—	● Throttle position sensor [accelerator pedal position (APP) 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.

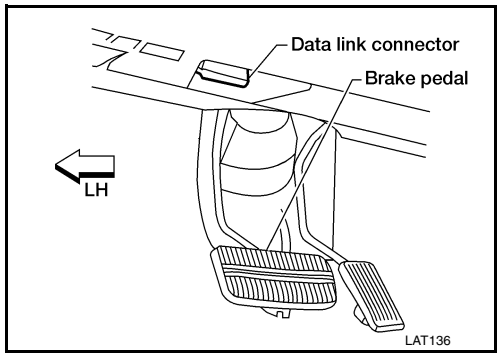
Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
ASCD OD cut signal	ASCD OD CUT [ON/OFF]	X	—	● Status of ASCD OD release signal is displayed. ON ... OD released OFF ... OD not released	● This is displayed even when no ASCD is mounted.
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of kickdown SW, is displayed.	● This is displayed even when no kickdown switch is equipped.
Gear position	GEAR	—	X	● Gear position data used for computation by TCM, is displayed.	
Selector lever position	SLCT LVR POSI	—	X	● Selector lever position data, used for computation by TCM, is displayed.	● A specific value used for control is displayed if fail-safe is activated due to error.
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	● Vehicle speed data, used for computation by TCM, is displayed.	
Stop lamp switch	BRAKE SW [ON/OFF]	X	—	● ON/OFF status are displayed. ON: Brake pedal is depressed. OFF: Brake pedal is released.	
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

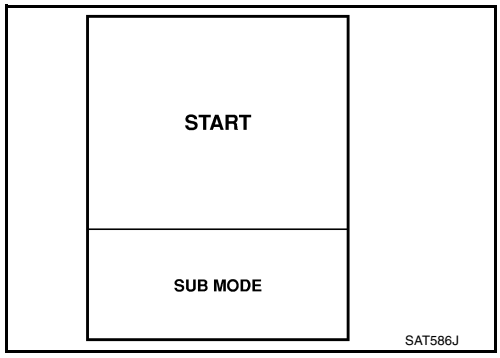
DTC WORK SUPPORT MODE WITH CONSULT-II

CONSULT-II Setting Procedure

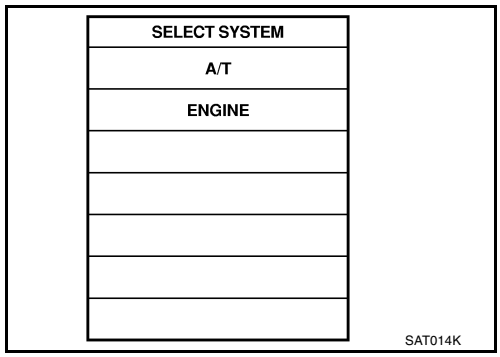
1. Turn ignition switch “OFF”.
2. Connect CONSULT-II to Data link connector which is located in left side lower dash panel.



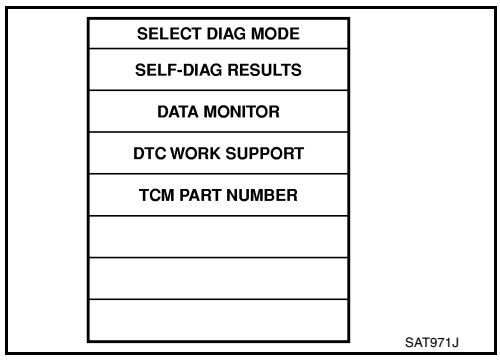
3. Turn ignition switch “ON”.
4. Touch “START”.



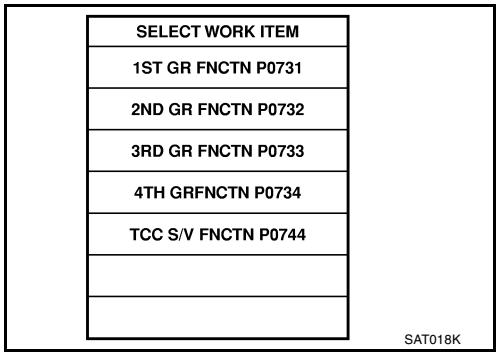
5. Touch “A/T”.



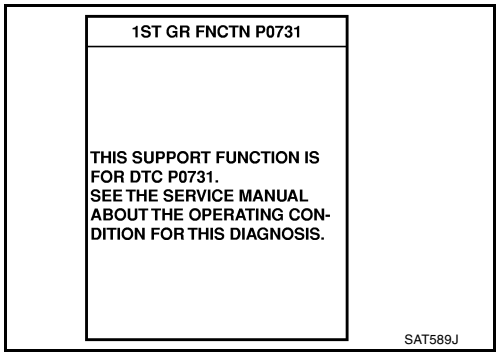
6. Touch “DTC WORK SUPPORT”.



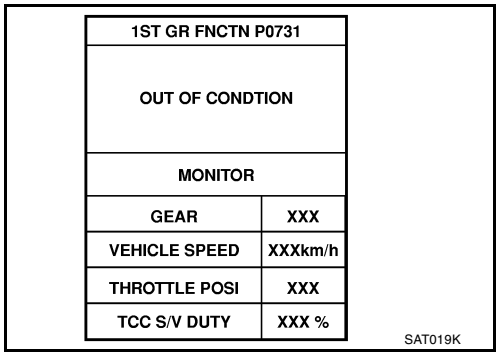
7. Touch select item menu (1ST, 2ND, etc.).



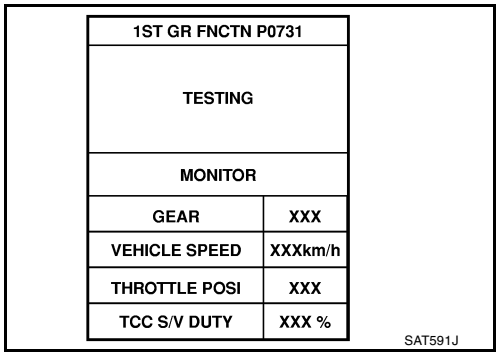
8. Touch “START”.



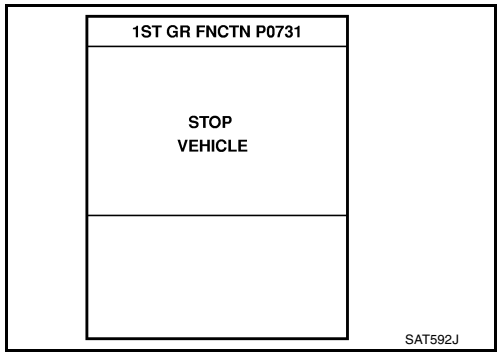
9. Perform driving test according to “DTC CONFIRMATION PROCEDURE” in “TROUBLE DIAGNOSIS FOR DTC”.

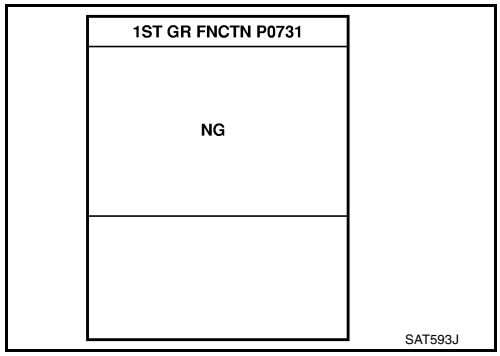


- **When testing conditions are satisfied, CONSULT-II screen changes from “OUT OF CONDITION” to “TESTING”.**

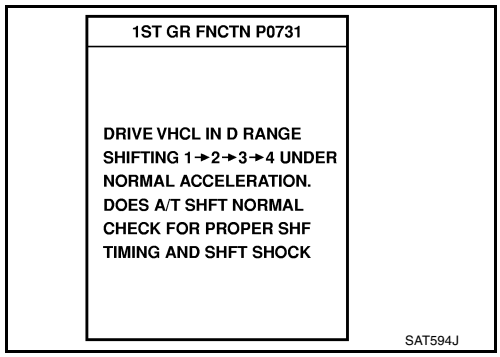


10. Stop vehicle. If “NG” appears on the screen, malfunction may exist. Go to “DIAGNOSTIC PROCEDURE”.

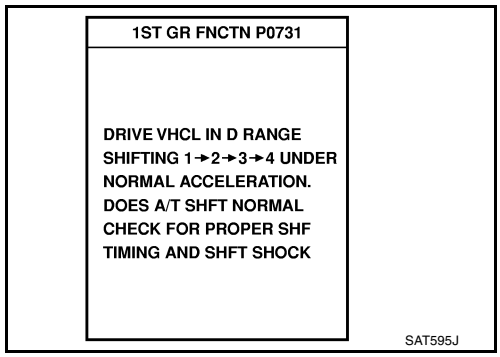




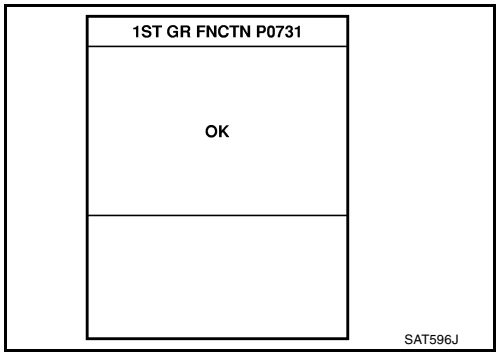
11. Perform test drive to check gear shift feeling in accordance with instructions displayed.

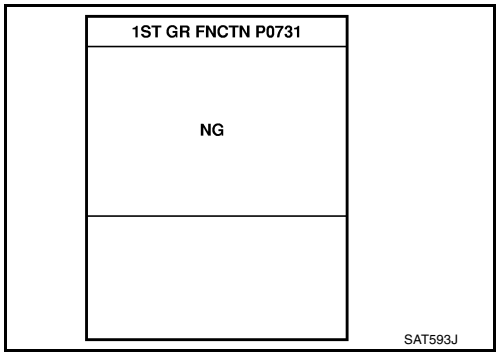


12. Touch “YES” or “NO”.



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 ● 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-126, "Generic Scan Tool (GST) Function" [QG18DE (ULEV)], EC-700, "Generic Scan Tool (GST)" [QG18DE (SULEV)].

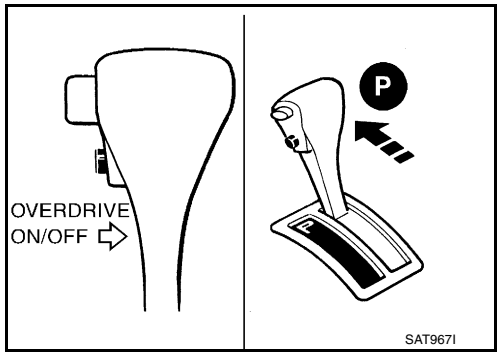
OBD-II Self-diagnostic Procedure (No Tools)

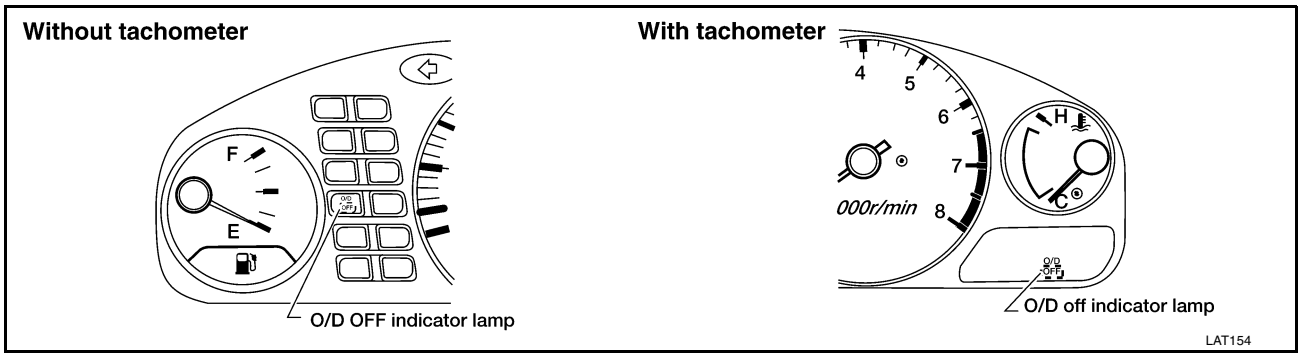
Refer to EC-72, "Malfunction Indicator Lamp (MIL)" [QG18DE (ULEV)] or EC-644, "Malfunction Indicator Lamp (MIL)" [QG18DE (SULEV)].

TCM Self-diagnostic Procedure (No Tools)

1. CHECK O/D OFF INDICATOR LAMP

1. Move A/T selector lever to “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?



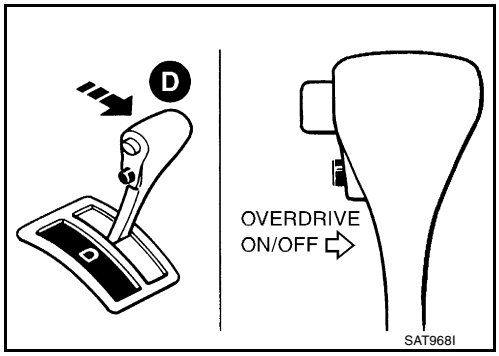


Yes or No

Yes >> GO TO 2.
No >> GO TO AT-220, "1. O/D OFF Indicator Lamp Does Not Come On" .

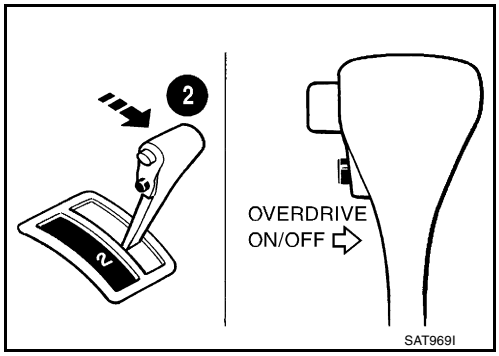
2. JUDGEMENT PROCEDURE STEP 1

1. Turn ignition switch to “OFF” position.
2. Turn ignition switch to “ACC” position.
3. Move A/T 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 (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 AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" .
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.
10. Move A/T selector lever to “2” position.
11. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be “ON”).



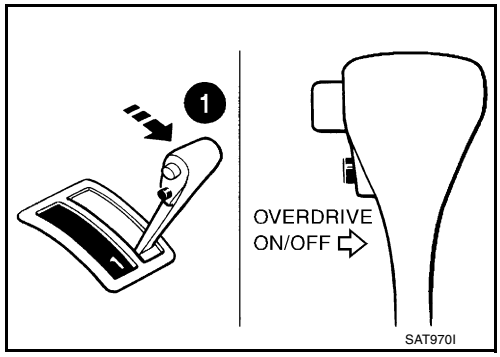
12. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be “OFF”) until directed to release the switch.

>> GO TO 3.



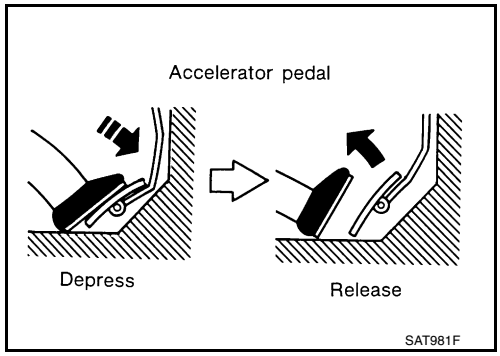
3. JUDGEMENT PROCEDURE STEP 2

1. Move A/T 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.



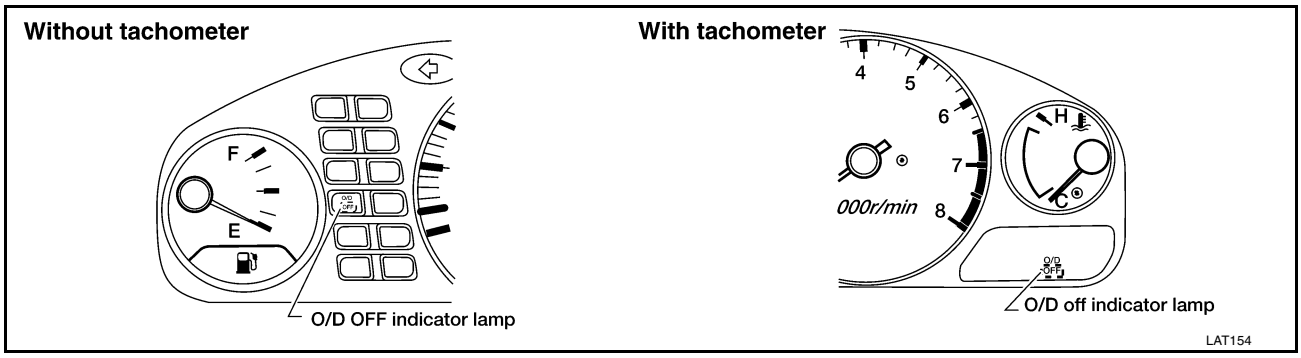
6. Depress accelerator pedal fully and release.
7. Release the overdrive control switch (the O/D OFF indicator lamp will begin to flash “ON” and “OFF”).

>> GO TO 4.



4. CHECK SELF-DIAGNOSIS CODE

Check O/D OFF indicator lamp. Refer to AT-54, "Judgement of Self-diagnosis Code" .

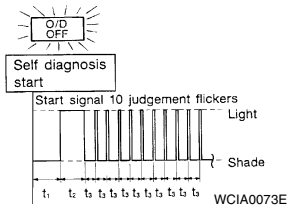


>> **DIAGNOSIS END**

Judgement of Self-diagnosis Code

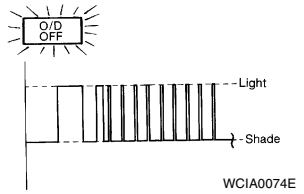
O/D OFF indicator lamp:

All judgement flickers are the same.



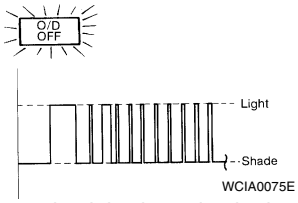
All circuits that can be confirmed by self-diagnosis are OK.

1st judgement flicker is longer than others.



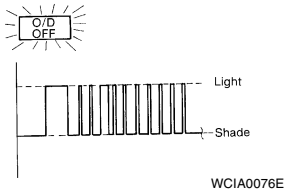
Revolution sensor circuit is short-circuited or disconnected.
⇒ **Go to** AT-126, "DTC P0720 VEVICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" .

2nd judgement flicker is longer than others.



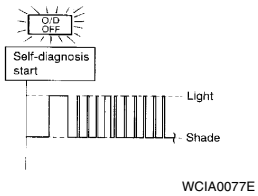
Vehicle speed sensor circuit is short-circuited or disconnected.
⇒ **Go to** AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" .

3rd judgement flicker is longer than others.



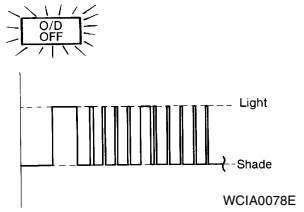
Throttle position sensor [accelerator pedal position (APP) sensor] circuit is short-circuited or disconnected.
⇒ **Go to** AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" .

4th judgement flicker is longer than others.



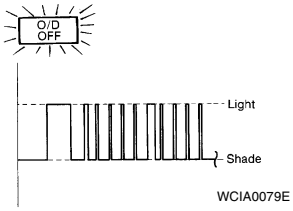
Shift solenoid valve A circuit is short-circuited or disconnected.
⇒ **Go to** AT-179, "DTC P0750 SHIFT SOLENOID VALVE A" .

5th judgement flicker is longer than others.



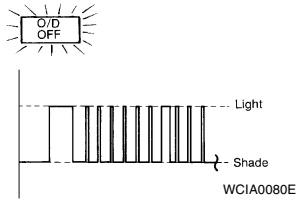
Shift solenoid valve B circuit is short-circuited or disconnected.
⇒ **Go to** AT-183, "DTC P0755 SHIFT SOLENOID VALVE B" .

6th judgement flicker is longer than others.



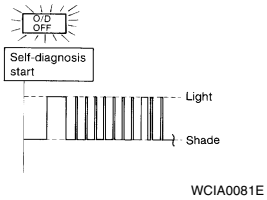
Overrun clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to** AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" .

7th judgement flicker is longer than others.



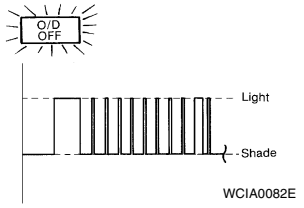
Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to** AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" .

8th judgement flicker is longer than others.

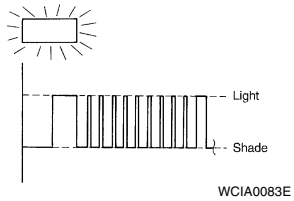
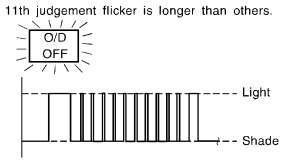
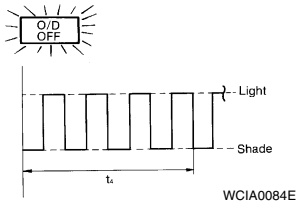
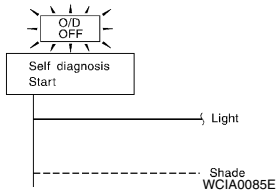


A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged.
⇒ **Go to** AT-197, "DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)" .

9th judgement flicker is longer than others.



Engine speed signal circuit is short-circuited or disconnected.
⇒ **Go to** AT-131, "DTC P0725 ENGINE SPEED SIGNAL" .

O/D OFF indicator lamp:	
10th judgement flicker is longer than others.  WCIA0083E Line pressure solenoid valve circuit is short-circuited or disconnected. ⇒ **Go to** AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE" .	11th judgement flicker is longer than others.  SAT599J The ECM-A/T communication line is open or shorted. ⇒ **Go to** AT-208, "DTC U1000 CAN COMMUNICATION LINE" .
Flickers as shown below.  WCIA0084E 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.)	Lamp comes on.  WCIA0085E PNP switch, overdrive control switch or throttle position switch circuit is disconnected or TCM is damaged. ⇒ **Go to** AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" .

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

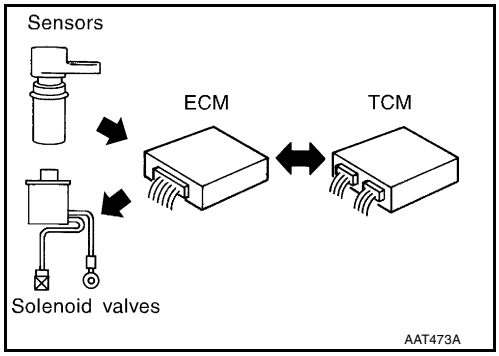
TROUBLE DIAGNOSIS — INTRODUCTION

PFP:00000

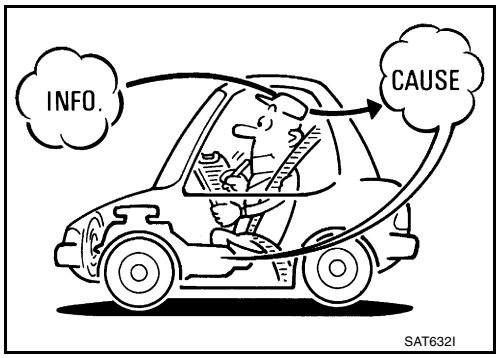
Introduction

ECS005WG

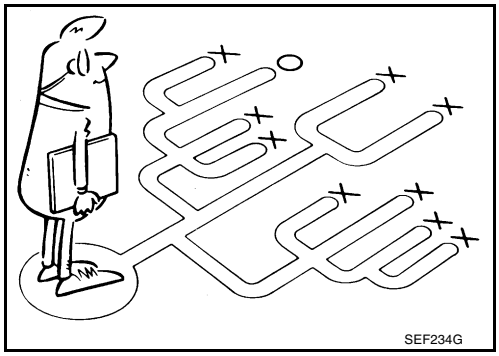
The TCM receives a signal from the vehicle speed sensor, throttle position sensor [accelerator pedal position (APP) sensor] or PNP switch and provides shift control or lock-up control via A/T solenoid valves.
The TCM also communicates with the ECM by means of a signal sent from sensing elements used 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-60, "Work Flow" .



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-58, "Diagnostic Worksheet") 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

1.	❑ Read the “FAIL-SAFE” and listen to customer complaints.			AT-11, "FAIL-SAFE"
2.	❑ CHECK A/T FLUID			AT-63, "A/T Fluid Check"
		❑ Leakage (Follow specified procedure) ❑ Fluid condition ❑ Fluid level		
3.	❑ Perform STALL TEST and LINE PRESSURE TEST.			AT-63, "Stall Test", AT-67, "Line Pressure Test"
		❑ 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-68, "Road Test"
	4-1.	Check before engine is started.		AT-70, "1. CHECK BEFORE ENGINE IS STARTED"
		❑ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.		
			❑ PNP switch, AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" . ❑ A/T fluid temperature sensor, AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" . ❑ Vehicle speed sensor·A/T (Revolution sensor), AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" . ❑ Engine speed signal, AT-131, "DTC P0725 ENGINE SPEED SIGNAL" . ❑ Torque converter clutch solenoid valve, . ❑ Line pressure solenoid valve, AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE" . ❑ Shift solenoid valve A, AT-179, "DTC P0750 SHIFT SOLENOID VALVE A" . ❑ Shift solenoid valve B, AT-183, "DTC P0755 SHIFT SOLENOID VALVE B" . ❑ Throttle position sensor [accelerator pedal position (APP) sensor], AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" . ❑ Overrun clutch solenoid valve, AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" . ❑ PNP, overdrive control and throttle position sensor [accelerator pedal position (APP) sensor], AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" . ❑ A/T fluid temperature sensor and TCM power source, AT-197, "DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)" . ❑ Vehicle speed sensor·MTR, AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" . ❑ Control unit (RAM), control unit (ROM), AT-211, "DTC CONTROL UNIT (RAM), CONTROL UNIT (ROM)" . ❑ Control unit (EEP ROM), AT-213, "DTC CONTROL UNIT (EEP ROM)" . ❑ Battery ❑ Others	
	4-2.	Check at idle		AT-71, "2. CHECK AT IDLE"
		❑ 1. O/D OFF Indicator Lamp Does Not Come On, AT-220, "1. O/D OFF Indicator Lamp Does Not Come On" . ❑ 2. Engine Cannot Be Started In “P” And “N” Position, AT-222, "2. Engine Cannot Be Started In “P” and “N” Position" . ❑ 3. In “P” Position, Vehicle Moves Forward Or Backward When Pushed, AT-223, "3. In “P” Position, Vehicle Moves Forward Or Backward When Pushed" . ❑ 4. In “N” Position, Vehicle Moves, AT-224, "4. In “N” Position, Vehicle Moves" . ❑ 5. Large Shock. “N” → “R” Position, AT-225, "5. Large Shock. “N” → “R” Position" . ❑ 6. Vehicle Does Not Creep Backward In “R” Position, AT-226, "6. Vehicle Does Not Creep Backward In “R” Position" . ❑ 7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position, AT-228, "7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position" .		

4. (cont'd)	4-3 (cont'd)	Cruise test Part-1 ❑ 8. Vehicle Cannot Be Started From D_1 , AT-230, "8. Vehicle Cannot Be Started From D_1" . ❑ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-233, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$" . ❑ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-235, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" . ❑ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-237, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$" . ❑ 12. A/T Does Not Perform Lock-up, AT-239, "12. A/T Does Not Perform Lock-up" . ❑ 13. A/T Does Not Hold Lock-up Condition, AT-240, "13. A/T Does Not Hold Lock-up Condition" . ❑ 14. Lock-up Is Not Released, AT-242, "14. Lock-up Is Not Released" . ❑ 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$), AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" .	AT-73, "3. CRUISE TEST" AT-77, "Cruise Test — Part 1"
		Part-2 ❑ 16. Vehicle Does Not Start From D_1 , AT-244, "16. Vehicle Does Not Start From D_1" . ❑ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-233, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$" . ❑ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-235, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" . ❑ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-237, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$" .	AT-80, "Cruise Test — Part 2"
4. (cont'd)	4-3 . (cont'd)	Part-3 ❑ 17. A/T Does Not Shift: $D_4 \rightarrow D_3$ When Overdrive Control Switch “ON” → “OFF”, AT-246, "17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch “ON” → “OFF”" . ❑ 15. Engine Speed Does Not Return To Idle (Engine Brake In D_3), AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" . ❑ 18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever “D” → “2” Position, AT-247, "18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever “D” → “2” Position" . ❑ 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_2$), AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" . ❑ 19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever “2” → “1” Position, AT-248, "19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever “2” → “1” Position" . ❑ 20. Vehicle Does Not Decelerate By Engine Brake, AT-249, "20. Vehicle Does Not Decelerate By Engine Brake" . ❑ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.	AT-82, "Cruise Test — Part 3"
			❑ PNP switch, AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" . ❑ A/T fluid temperature sensor, AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" . ❑ Vehicle speed sensor·A/T (Revolution sensor), AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" . ❑ Engine speed signal, AT-131, "DTC P0725 ENGINE SPEED SIGNAL" . ❑ Torque converter clutch solenoid valve, AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" . ❑ Line pressure solenoid valve, AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE" . ❑ Shift solenoid valve A, AT-179, "DTC P0750 SHIFT SOLENOID VALVE A" . ❑ Shift solenoid valve B, AT-183, "DTC P0755 SHIFT SOLENOID VALVE B" . ❑ Throttle position sensor [accelerator pedal position (APP) sensor], AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" . ❑ Overrun clutch solenoid valve, AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" . ❑ PNP, overdrive control and throttle position sensor [accelerator pedal position (APP) sensor], AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" . ❑ A/T fluid temperature sensor and TCM power source, AT-197, "DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)" . ❑ Vehicle speed sensor·MTR, AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" . ❑ Control unit (RAM), control unit (ROM), AT-211, "DTC CONTROL UNIT (RAM), CONTROL UNIT (ROM)" . ❑ Control unit (EEP ROM), AT-213, "DTC CONTROL UNIT (EEP ROM)" . ❑ Battery ❑ Others	

5.	❏ For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.	AT-43, "SELF-DIAGNOSTIC RESULT TEST MODE"
6.	❏ Perform all ROAD TEST and re-mark required procedures.	AT-68, "Road Test"
7.	❏ Perform DTC CONFIRMATION PROCEDURE for following MIL indicating items and check out NG items. Refer to EC-124, "DTC & SRT CONFIRMATION MODE" [QG18DE (ULEV)] or EC-697, "DTC & SRT CONFIRMATION MODE" [QG18DE (SULEV)].	EC section
	❏ DTC (P0731), AT-135, "DTC P0731 A/T 1ST GEAR FUNCTION" . ❏ DTC (P0732), AT-140, "DTC P0732 A/T 2ND GEAR FUNCTION" . ❏ DTC (P0733), AT-145, "DTC P0733 A/T 3RD GEAR FUNCTION" . ❏ DTC (P0734), AT-150, "DTC P0734 A/T 4TH GEAR FUNCTION" . ❏ DTC (P0744), AT-163, "DTC P0744 A/T TCC S/V FUNCTION (LOCK-UP)" .	
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-43, "SELF-DIAGNOSTIC RESULT TEST MODE" AT-84, "Symptom Chart"
9.	❏ Erase DTC from TCM and ECM memories.	AT-40, "HOW TO ERASE DTC"

Work Flow

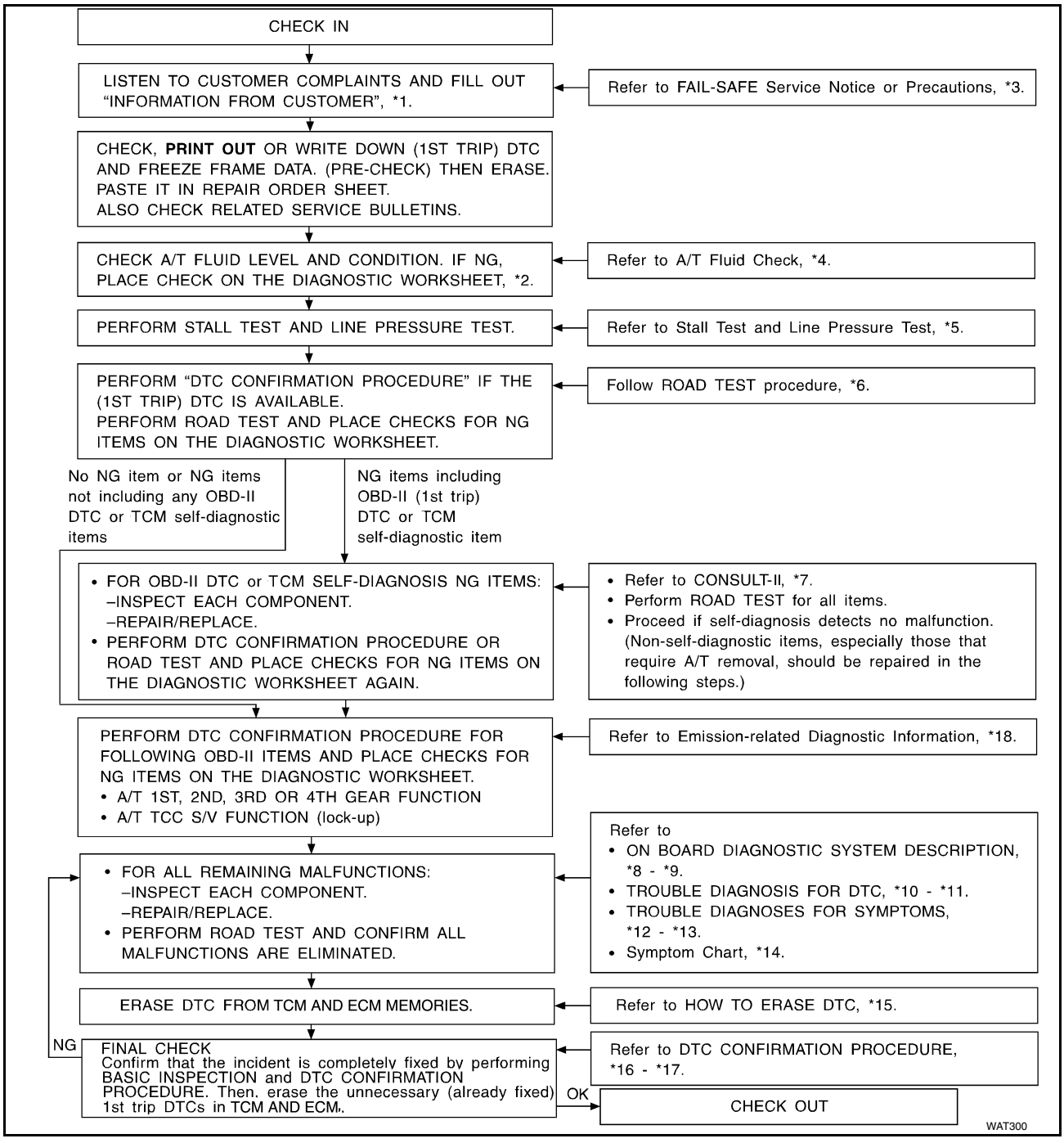
ECS005WH

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-57, "Information from Customer") and “Diagnostic Worksheet” (AT-58, "Diagnostic Worksheet"), to perform the best troubleshooting possible.

WORK FLOW CHART



*1 AT-57, "Information from Customer"	*2 AT-58, "Diagnostic Worksheet"	*3 AT-11, "FAIL-SAFE"
*4 AT-63, "A/T Fluid Check"	*5 AT-63, "Stall Test", AT-67, "Line Pressure Test"	*6 AT-68, "Road Test"
*7 AT-42, "CONSULT-II"	*8 AT-38, "Introduction"	*9 AT-54, "Judgement of Self-diagnosis Code"
*10 AT-115, "Description"	*11 AT-213, "Description"	*12 AT-220, "1. O/D OFF Indicator Lamp Does Not Come On"

*13	AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}"	*14	AT-84, "Symptom Chart"	*15	AT-40, "HOW TO ERASE DTC"
*16	AT-115, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE"	*17	AT-213, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE"	*18	EC-59, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" [QG18DE (ULEV)] or EC-631, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" [QG18DE (SULEV)].

TROUBLE DIAGNOSIS — BASIC INSPECTION

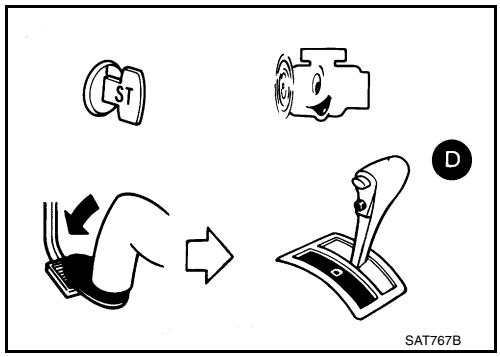
PFP:00000

A/T Fluid Check

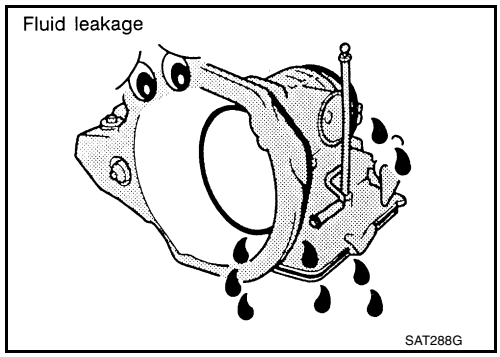
ECS005WI

FLUID LEAKAGE CHECK

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

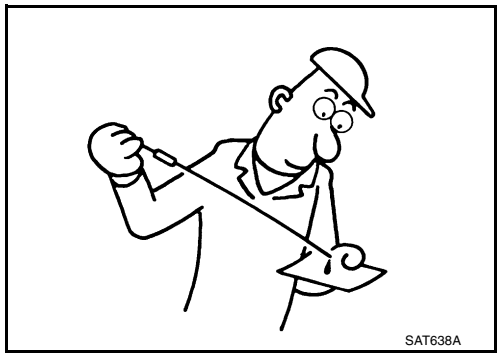


4. Check for fresh leakage.



FLUID CONDITION CHECK

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



FLUID LEVEL CHECK

Refer to MA-30, "Checking A/T Fluid" .

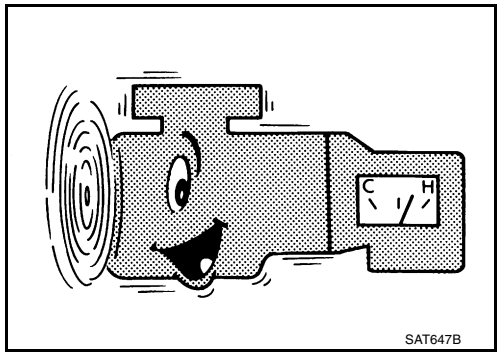
Stall Test

ECS005WJ

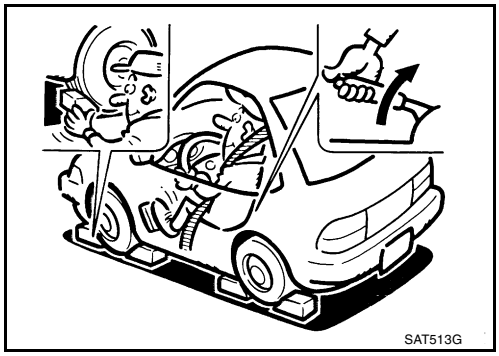
STALL TEST PROCEDURE

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

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



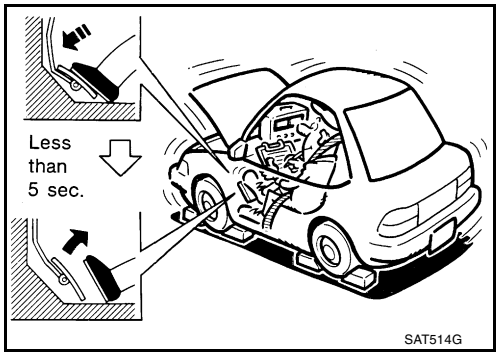
3. Set parking brake and block wheels.
4. Install a tachometer where it can be seen by driver during test.
   - **It is good practice to mark the point of specified engine rpm on indicator.**



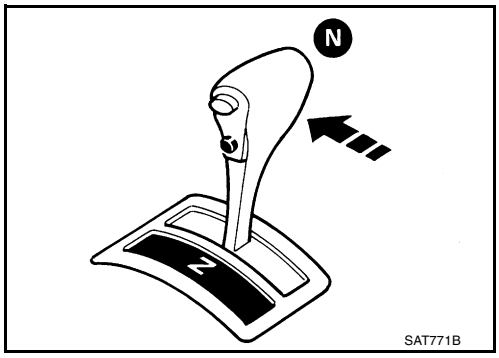
5. Start engine, apply foot brake, and place selector lever in "D" position.
6. Accelerate to wide open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.
   - **During test, never hold throttle wide open for more than 5 seconds.**

Stall revolution

QG18DE : 2,350 - 2,800 rpm



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 that follow.

In order to pinpoint the possible damaged components, follow the “Work Flow” shown in AT-60, "Work Flow" .

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”..... Overrun clutch slippage

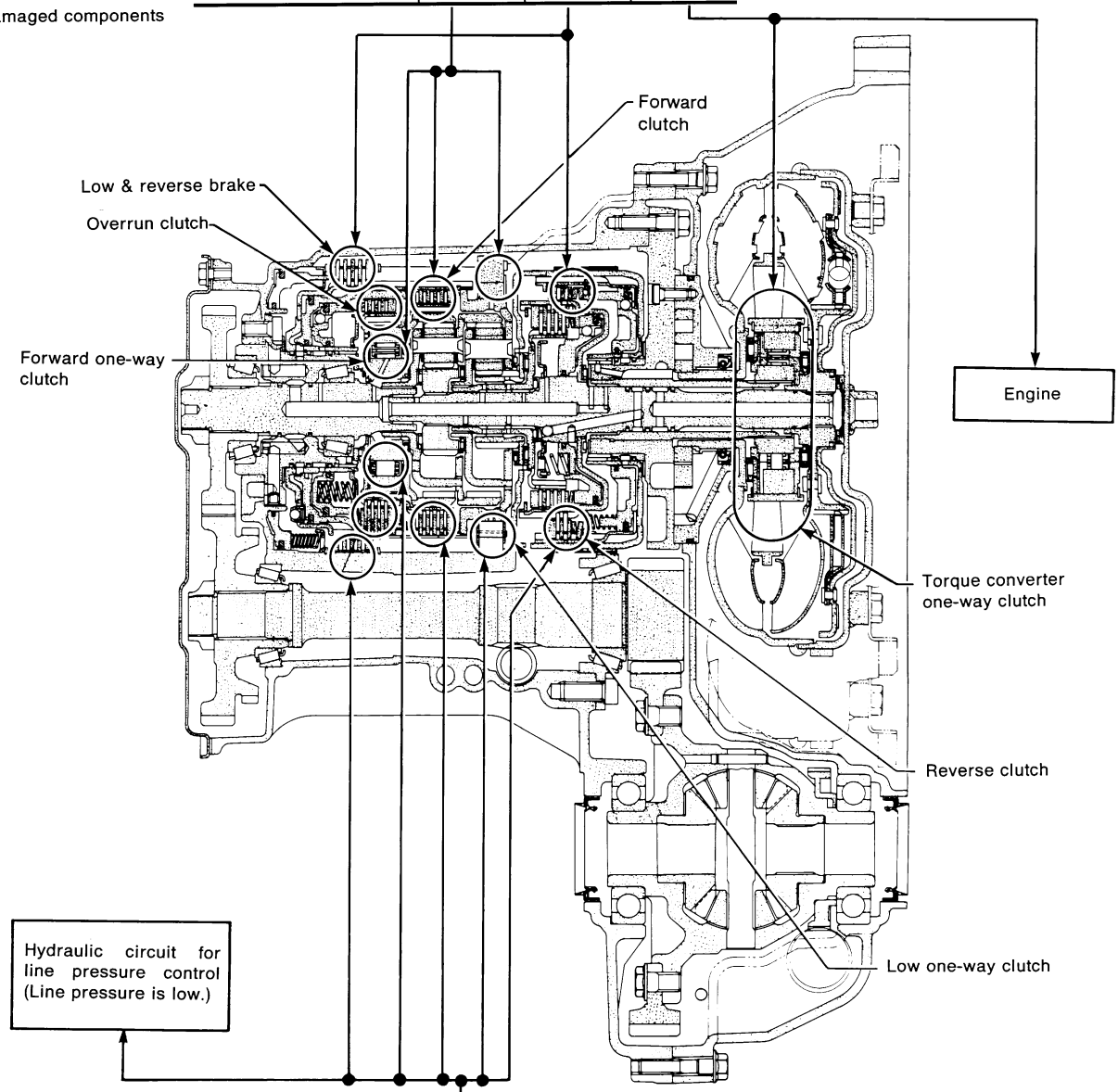
Stall revolution less than specifications:

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

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

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

Damaged components



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

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

SAT871HA

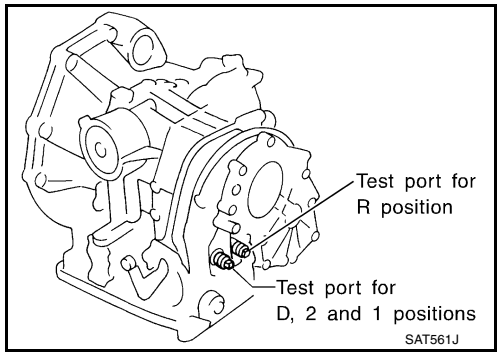
Line Pressure Test

ECS005WK

LINE PRESSURE TEST PORTS

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

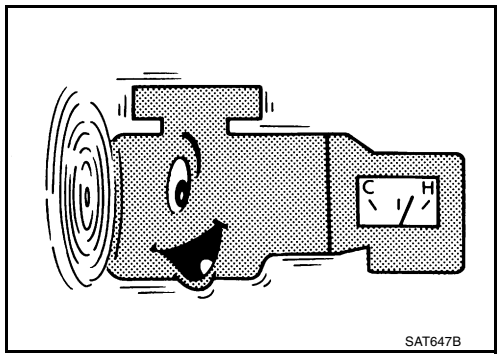
- **Always replace pressure plugs as they are self-sealing bolts.**



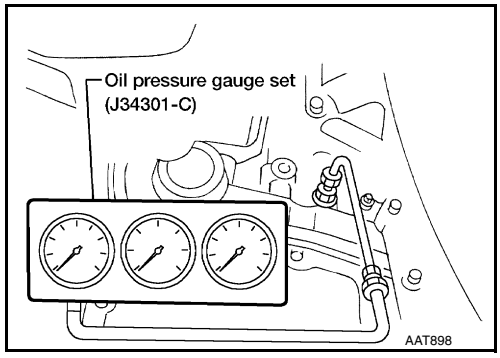
LINE PRESSURE TEST PROCEDURE

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

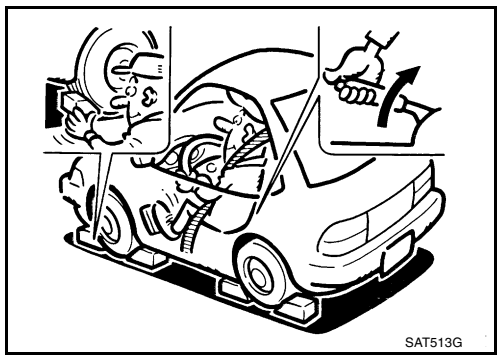
   ATF operating temperature : 50 - 80°C (122 - 176°F)



3. Install pressure gauge to corresponding line pressure port.

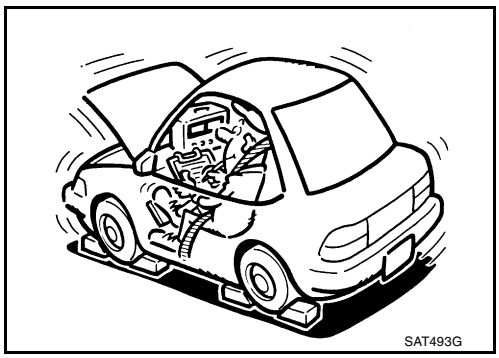


4. Set parking brake and block wheels.
   - **Continue to depress brake pedal fully while line pressure test is being performed at stall speed.**



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

Refer to AT-67, "Line Pressure Test" .


SAT493G

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 AT-22, "CLUTCH AND BAND CHART" .
	Line pressure is high.	● Maladjustment of throttle position sensor [accelerator pedal position (APP) 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 [accelerator pedal position (APP) 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

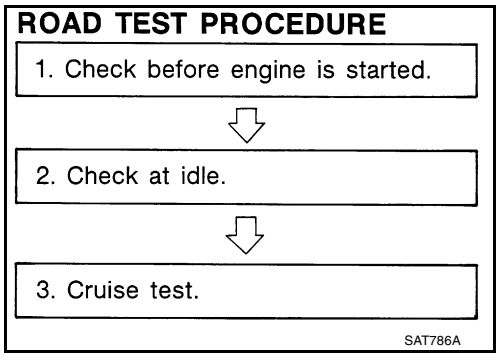
Road Test

ECS005WL

DESCRIPTION

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

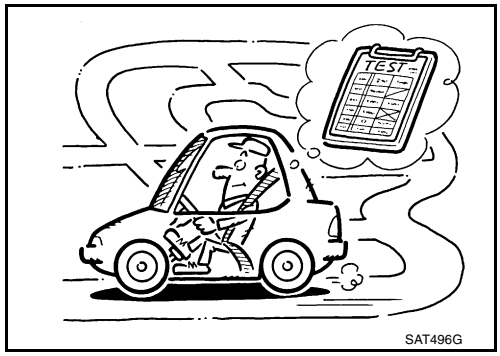
1. Check before engine is started
2. Check at idle



SAT786A

3. Cruise test

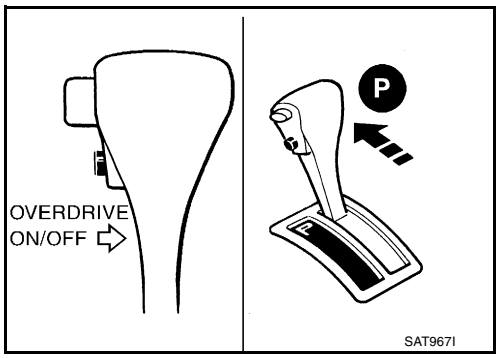
- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items until specified symptom is found. Troubleshoot items which check out No Good after road test. Refer to AT-38, "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" and AT-215, "TROUBLE DIAGNOSES FOR SYMPTOMS" .

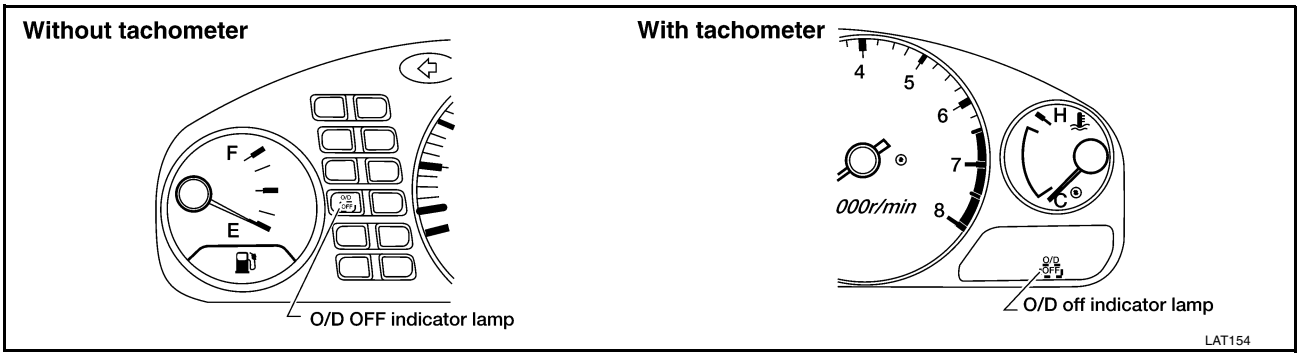


1. CHECK BEFORE ENGINE IS STARTED

1. CHECK O/D OFF INDICATOR LAMP

1. Park vehicle on flat surface.
2. Move A/T 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?





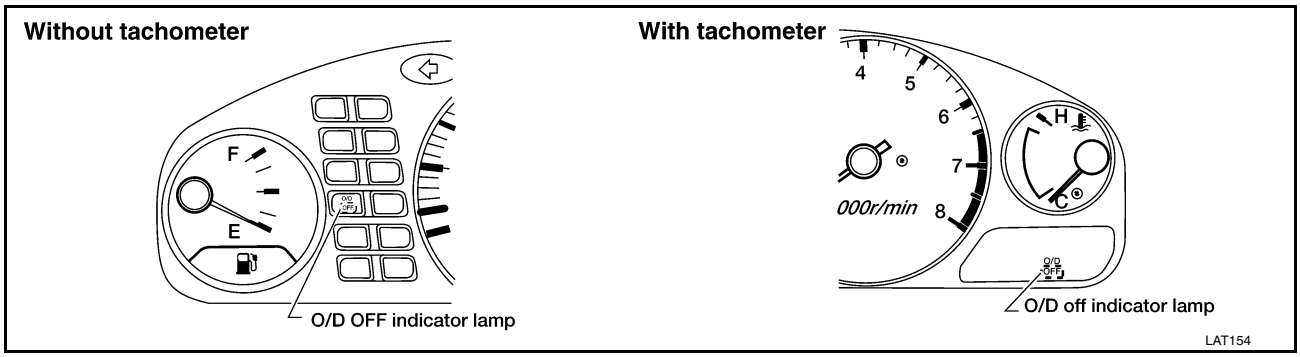
Yes or No

Yes >> GO TO 2.

No >> Stop ROAD TEST. Go to AT-220, "1. O/D OFF Indicator Lamp Does Not Come On" .

2. CHECK O/D OFF INDICATOR LAMP

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



Yes or No

Yes >> TCM is in fail-safe mode. Perform self-diagnosis and check NG items on the AT-58, "Diagnostic Worksheet" . Refer to AT-51, "TCM Self-diagnostic Procedure (No Tools)" .

No >> 1. Turn ignition switch to “OFF” position.

2. Perform self-diagnosis and note NG items.
Refer to AT-51, "TCM Self-diagnostic Procedure (No Tools)" .

3. Go to AT-71, "2. CHECK AT IDLE" .

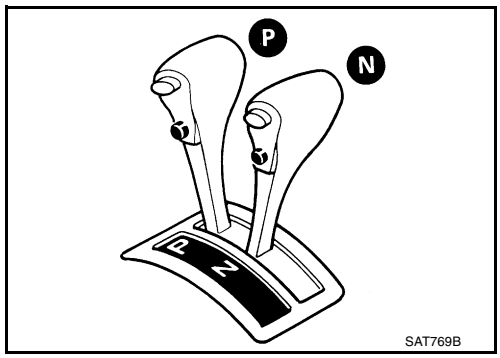
2. CHECK AT IDLE

1. CHECK ENGINE START

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

Yes or No

Yes >> GO TO 2.
No >> Stop ROAD TEST. Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-222, "2. Engine Cannot Be Started In “P” and “N” Position" .

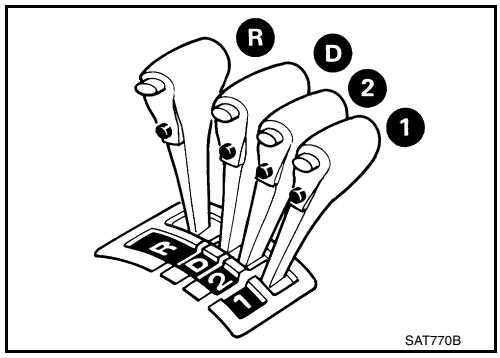


2. CHECK ENGINE START

1. Turn ignition switch to “ACC” position.
2. Move A/T selector lever to “D”, “1”, “2” or “R” position.
3. Turn ignition switch to “START” position.
4. Is engine started?

Yes or No

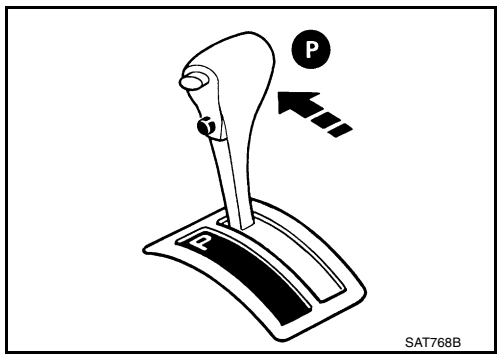
Yes >> Stop ROAD TEST. Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-222, "2. Engine Cannot Be Started In “P” and “N” Position" .
No >> GO TO 3.



3. CHECK VEHICLE MOVE

1. Move A/T selector lever to “P” position.
2. Turn ignition switch to “OFF” position.
3. Release parking brake.

>> GO TO 4.



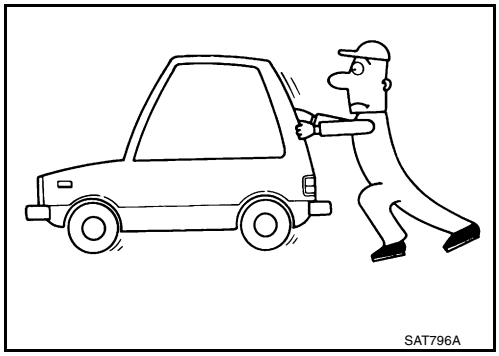
4. CHECK VEHICLE MOVE

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

Yes or No

Yes >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-223, "3. In “P” Position, Vehicle Moves Forward Or Backward When Pushed" . Continue ROAD TEST.

No >> GO TO 5.



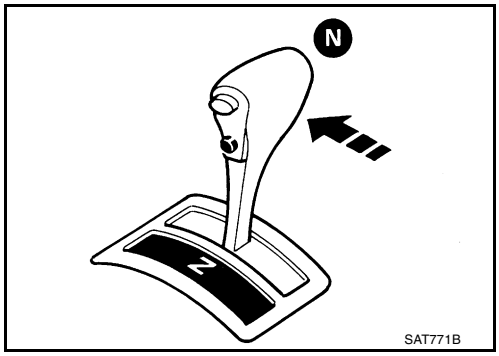
5. CHECK VEHICLE MOVE

1. Start engine.
2. Move A/T selector lever to “N” position.
3. Release parking brake.
4. Does vehicle move forward or backward?

Yes or No

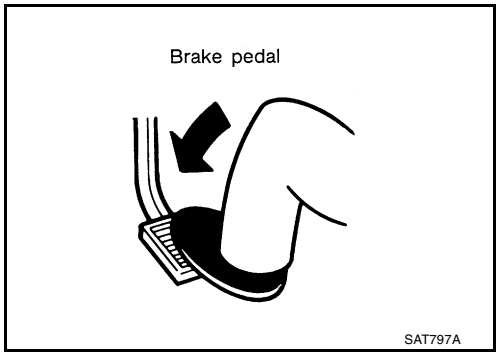
Yes >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-224, "4. In “N” Position, Vehicle Moves" . Continue ROAD TEST.

No >> GO TO 6.



6. CHECK SHIFT SHOCK

1. Apply foot brake.

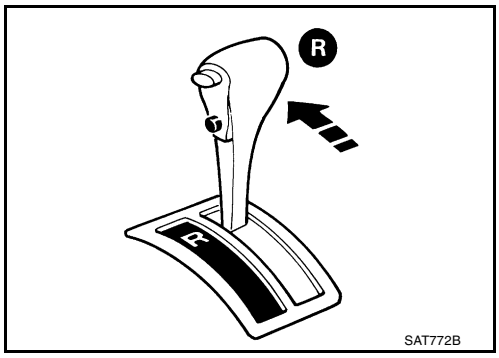


2. Move A/T selector lever to “R” position.
3. Is there large shock when changing from “N” to “R” position?

Yes or No

Yes >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-225, "5. Large Shock. “N” → “R” Position" . Continue ROAD TEST.

No >> GO TO 7.

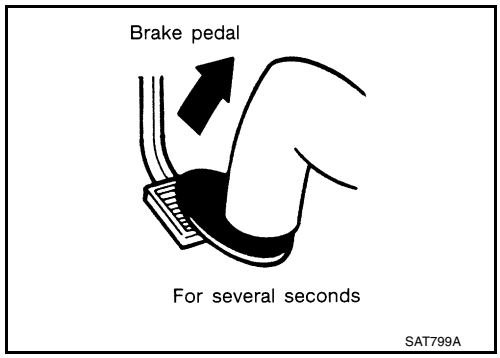


7. CHECK VEHICLE MOVE

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

Yes or No

Yes >> GO TO 8.
No >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-226, "6. Vehicle Does Not Creep Backward In “R” Position" . Continue ROAD TEST.

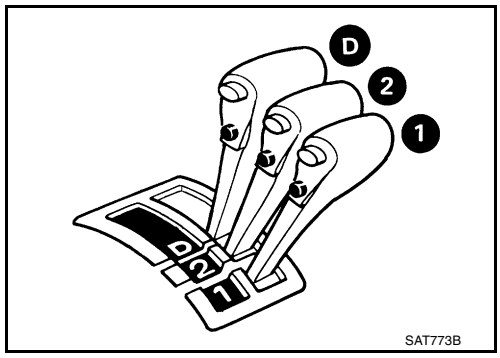


8. CHECK VEHICLE MOVE

1. Move A/T selector lever to “D”, “2” and “1” positions and check if vehicle creeps forward.
2. Does vehicle creep forward in all three positions?

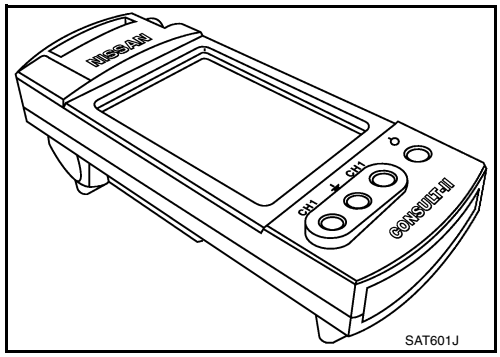
Yes or No

Yes >> Go to AT-73, "3. CRUISE TEST" .
No >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-228, "7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position" . Continue ROAD TEST.



3. CRUISE TEST

- Check all items listed in Parts 1 through 3 of Diagnostic Worksheet.

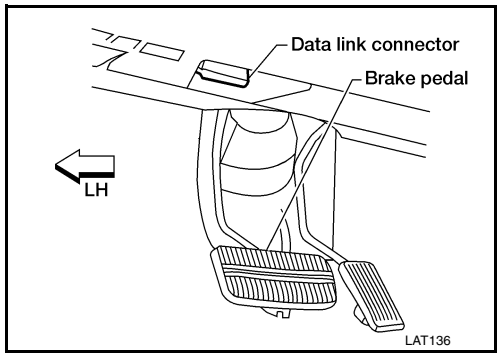


With CONSULT-II

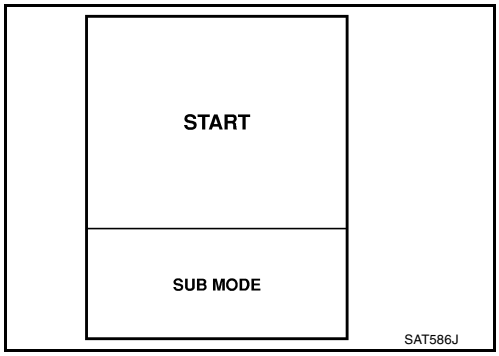
- Using CONSULT-II, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per Shift Schedule.

CONSULT-II Setting Procedure

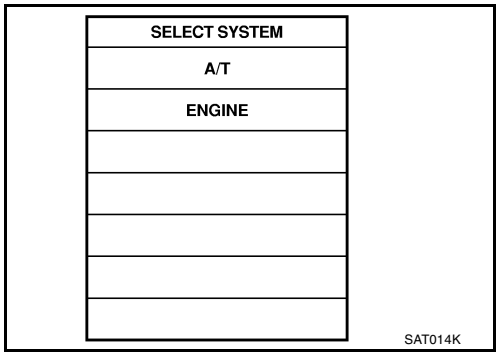
1. Turn ignition switch “OFF”.
2. Connect CONSULT-II to Data link connector which is located in left side lower dash panel.



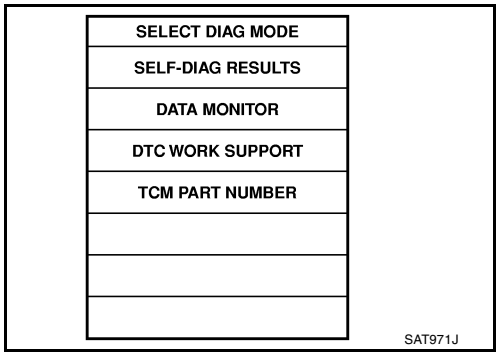
3. Turn ignition switch “ON”.
4. Touch “START”.



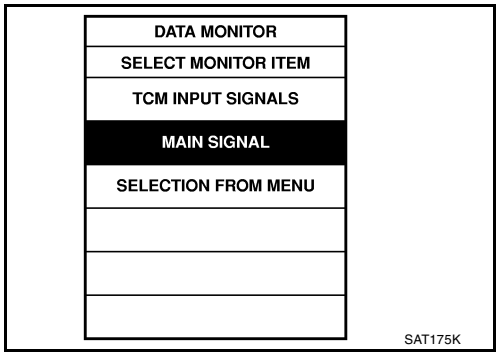
5. Touch “A/T”.



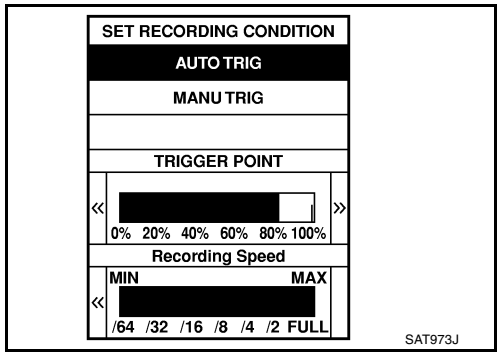
6. Touch “DATA MONITOR”.



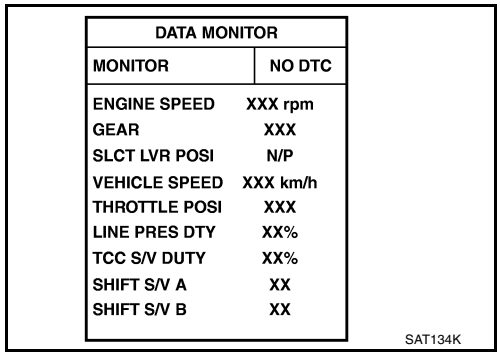
7. Touch “MAIN SIGNALS” or “TCM INPUT SIGNALS”.
8. See “Numerical Display”, “Barchart Display” or “Line Graph Display”.



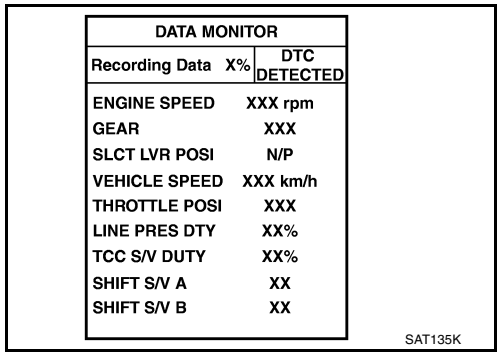
9. Touch “SETTING” to recording condition (“AUTO TRIG” or “MANU TRIG”) and touch “BACK”.
10. Touch “START”.



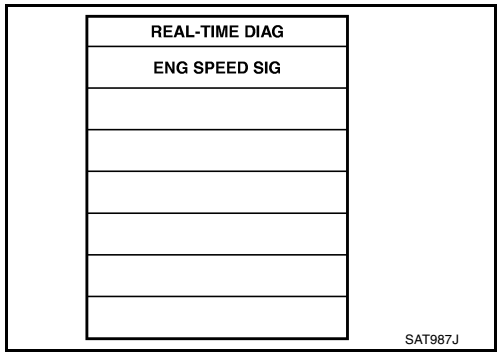
11. When performing cruise test, touch “RECORD”.

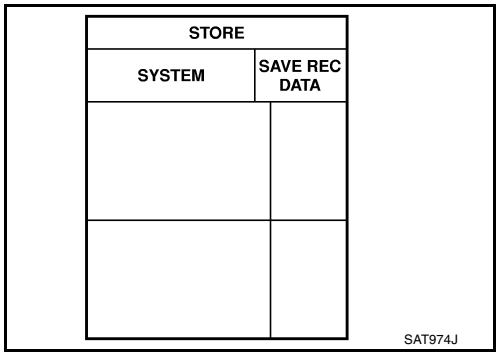


12. After finishing cruise test part 1, touch “STOP”.

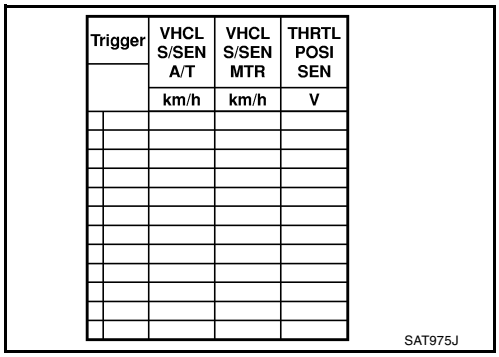


13. Touch “STORE” and touch “BACK”.



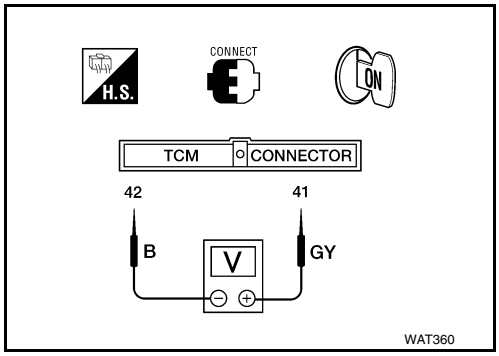


14. Touch “DISPLAY”.
15. Touch “PRINT”.
16. Check the monitor data printed out.
17. Continue cruise test part 2 and 3.



Without CONSULT-II

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



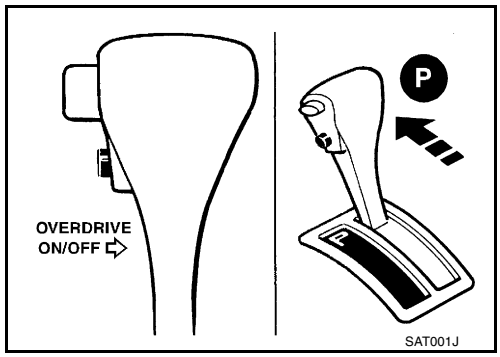
Cruise Test — Part 1

1. CHECK STARTING GEAR (D_1) POSITION

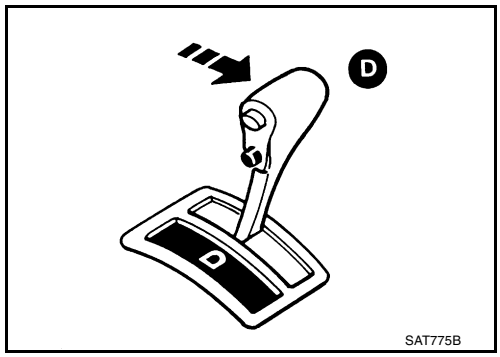
1. Drive vehicle for approx. 10 minutes to warm engine oil and ATF up to operating temperature.

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

2. Park vehicle on flat surface.
3. Set overdrive control switch to “ON” position.
4. Move A/T selector lever to “P” position.
5. Start engine.



6. Move A/T selector lever to “D” position.

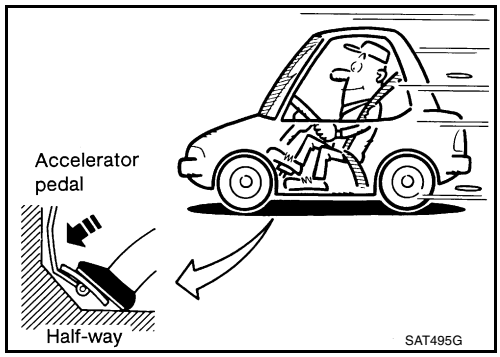


7. Accelerate vehicle by constantly depressing accelerator pedal halfway.
8. Does vehicle start from D_1 ?

   Read gear position.

Yes or No

Yes >> GO TO 2.
No >> Go to AT-230, "8. Vehicle Cannot Be Started From D_1" . Continue ROAD TEST.

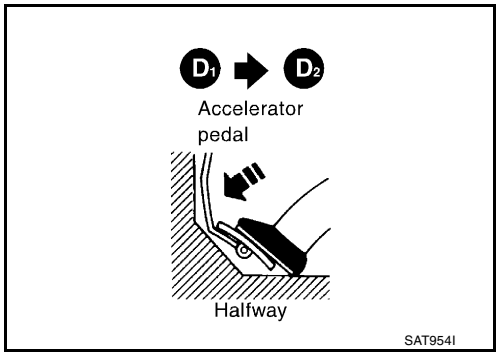


2. CHECK SHIFT UP (D_1 TO D_2)

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

Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_1 to D_2 : **Refer to AT-385, "Shift Schedule"** .



Yes or No

Yes >> GO TO 3.

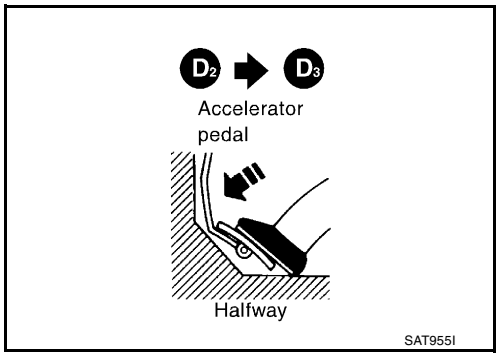
No >> Go to AT-233, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$" . Continue ROAD TEST.

3. CHECK SHIFT UP (D_2 TO D_3)

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

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_2 to D_3 : **Refer to AT-385, "Shift Schedule"** .



Yes or No

Yes >> GO TO 4.

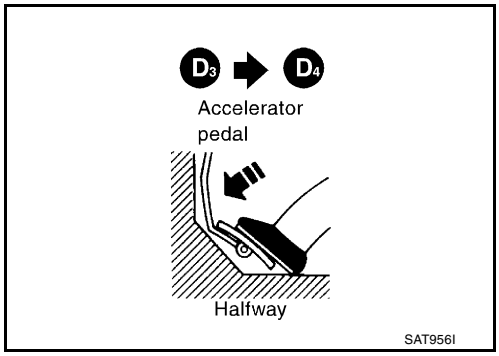
No >> Go to AT-235, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" . Continue ROAD TEST.

4. CHECK SHIFT UP (D_3 TO D_4)

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

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_3 to D_4 : **Refer to AT-385, "Shift Schedule"** .



Yes or No

Yes >> GO TO 5.

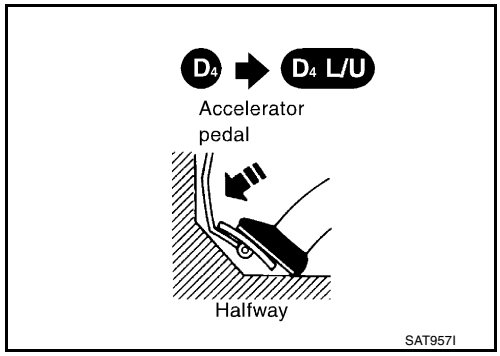
No >> Go to AT-237, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$" . Continue ROAD TEST.

5. CHECK LOCK-UP (D4 TO D4 L/U)

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

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

Specified speed when lock-up occurs : Refer to AT-385, "Shift Schedule" .



Yes or No

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

6. CHECK HOLD LOCK-UP

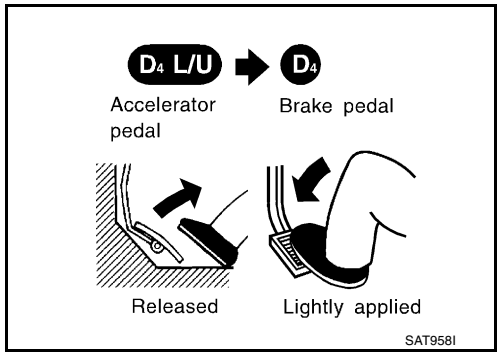
Does A/T hold lock-up condition for more than 30 seconds?

Yes or No

Yes >> GO TO 7.
No >> Go to AT-240, "13. A/T Does Not Hold Lock-up Condition" .

7. CHECK SHIFT DOWN (D4 L/U TO D4)

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



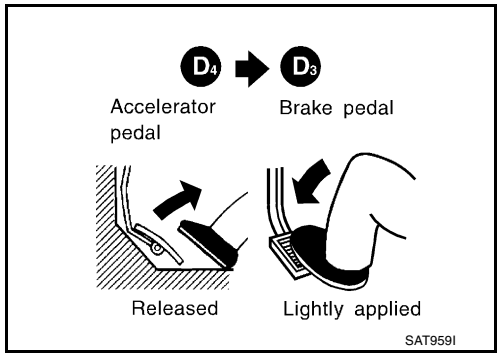
Yes or No

Yes >> GO TO 8.
No >> Go to AT-242, "14. Lock-up Is Not Released" . Continue ROAD TEST.

8. CHECK SHIFT DOWN (D4 TO D3)

1. Decelerate vehicle by applying foot brake lightly.
2. Does engine speed return to idle smoothly when A/T is shifted from D4 to D3 ?

Read gear position and engine speed.



Yes or No

Yes >> 1. Stop vehicle.
2. Go toAT-80, "Cruise Test — Part 2" .
No >> Go to AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking D4 → D3)" . Continue ROAD TEST.

Cruise Test — Part 2

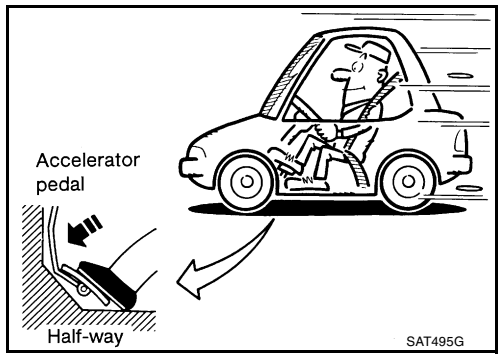
1. CHECK STARTING GEAR (D_1) POSITION

1. Confirm overdrive control switch is in “ON” position.
2. Confirm A/T selector lever is in “D” position.
3. Accelerate vehicle by half throttle again.
4. Does vehicle start from D_1 ?

Read gear position.

Yes or No

Yes >> GO TO 2.
No >> Go to AT-244, "16. Vehicle Does Not Start From D_1" . Continue ROAD TEST.



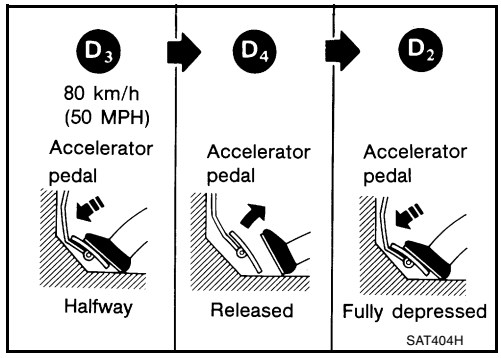
2. CHECK SHIFT UP AND SHIFT DOWN (D_3 TO D_4 TO D_2)

1. Accelerate vehicle to 80 km/h (50 MPH) as shown in illustration.
2. Release accelerator pedal and then quickly depress it fully.
3. Does A/T shift from D_4 to D_2 as soon as accelerator pedal is depressed fully?

Read gear position and throttle position.

Yes or No

Yes >> GO TO 3.
No >> Go to AT-233, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$" . Continue ROAD TEST.



3. CHECK SHIFT UP (D_2 TO D_3)

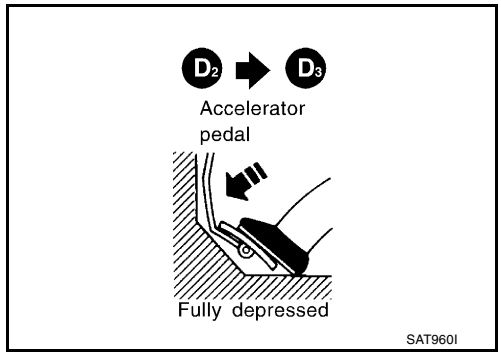
Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_2 to D_3 : **Refer to AT-385, "Shift Schedule" .**

Yes or No

Yes >> GO TO 4.
No >> Go to AT-235, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" . Continue ROAD TEST.



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

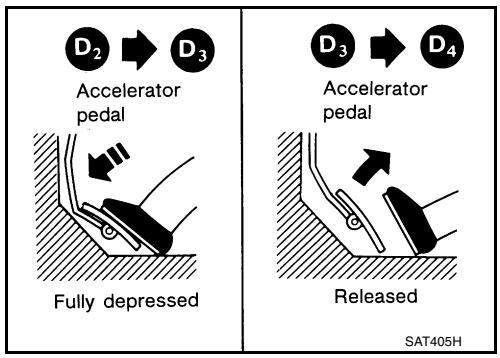
Release accelerator pedal after shifting from D_2 to D_3.
Does A/T shift from D_3 to D_4 and does vehicle decelerate by engine brake?

Read gear position, throttle position and vehicle speed.

Yes or No

Yes >> 1. Stop vehicle.
2. Go to AT-82, "Cruise Test — Part 3".

No >> Go to AT-237, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$". Continue ROAD TEST.

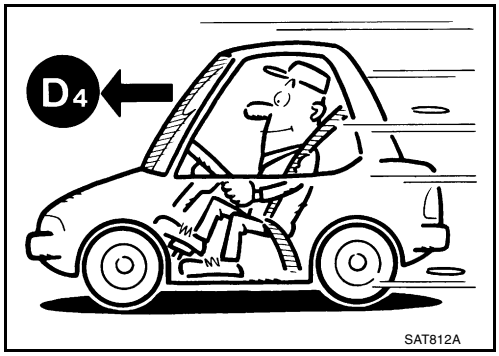


Cruise Test — Part 3

1. VEHICLE SPEED D_4 POSITION

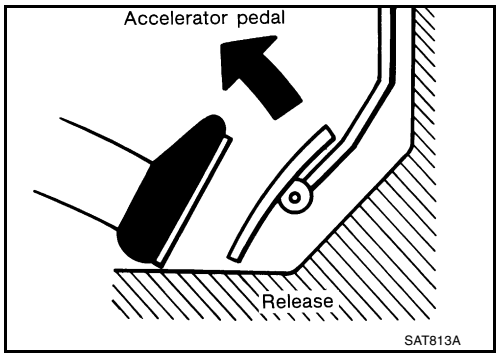
1. Confirm overdrive control switch is in “ON” position.
2. Confirm selector lever is in “D” position.
3. Accelerate vehicle using half-throttle to D_4 .

>> GO TO 2.



2. CHECK SHIFT DOWN (D_4 TO D_3)

1. Release accelerator pedal.
2. Set overdrive control switch to “OFF” position while driving in D_4 .
3. Does A/T shift from D_4 to D_3 (O/D OFF)?

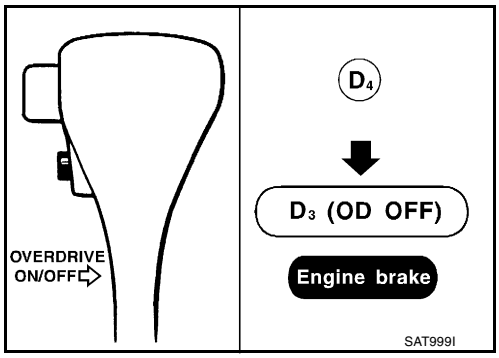


Read gear position and vehicle speed.

Yes or No

Yes >> GO TO 3.

No >> Go to AT-246, "17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch “ON” → “OFF”" . Continue ROAD TEST.



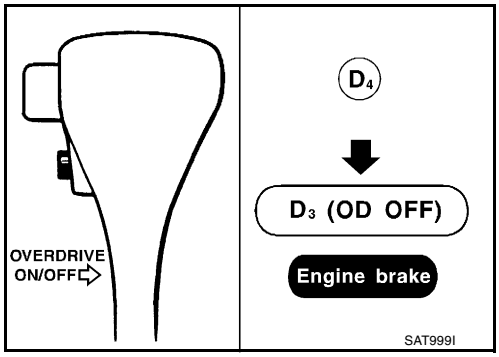
3. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> GO TO 4.

No >> Go to AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" . Continue ROAD TEST.



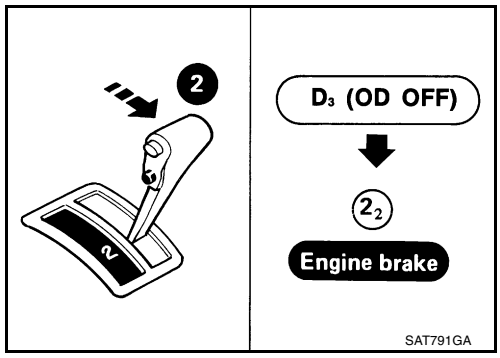
4. CHECK SHIFT DOWN (D_3 TO D_2)

1. Move A/T selector lever from “D” to “2” position while driving in D_3 (O/D OFF).
2. Does A/T shift from D_3 (O/D OFF) to D_2 ?

Read gear position.

Yes or No

Yes >> GO TO 5.
No >> Go to AT-247, "18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever “D” → “2” Position" . Continue ROAD TEST.

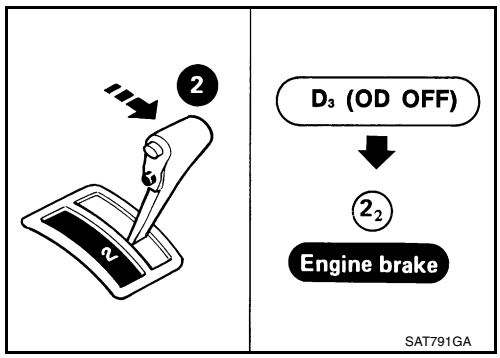


5. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> GO TO 6.
No >> Go to AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" . Continue ROAD TEST.



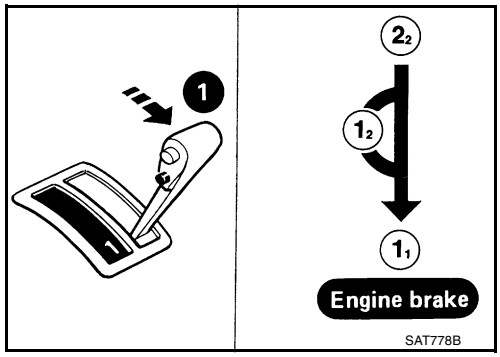
6. CHECK SHIFT DOWN

1. Move A/T 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.

Yes or No

Yes >> GO TO 7.
No >> Go to AT-248, "19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever “2” → “1” Position" . Continue ROAD TEST.



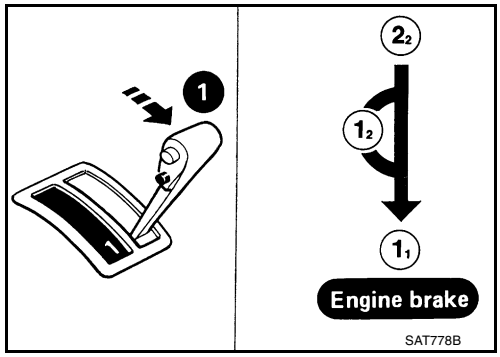
7. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> 1. Stop vehicle.
2. Perform self-diagnosis. Refer to AT-51, "TCM Self-diagnostic Procedure (No Tools)" .

No >> Go to AT-249, "20. Vehicle Does Not Decelerate By Engine Brake" . Continue ROAD TEST.



TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

PFP:00000

Symptom Chart

ECS005WM

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

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	Engine cannot start in “P” and “N” positions. AT-222, "2. Engine Cannot Be Started In “P” and “N” Position"	ON vehicle	1. Ignition switch and starter	PG-2, "POWER SUPPLY ROUTING" and SC-9, "STARTING SYSTEM"	
			2. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			3. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
	Engine starts in position other than “N” and “P” positions. AT-222, "2. Engine Cannot Be Started In “P” and “N” Position"	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			2. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
Not Used	Transaxle noise in “P” and “N” positions.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
		OFF vehicle	5. Oil pump	AT-292, "Components"	
			6. Torque converter	AT-272, "Disassembly"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	Vehicle moves when changing into “P” position, or parking gear does not disengage when shifted out of “P” position. AT-223, "3. In “P” Position, Vehicle Moves Forward Or Backward When Pushed"	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
		OFF vehicle	2. Parking components	AT-267, "Components"	
	Vehicle moves in “N” position. AT-224, "4. In “N” Position, Vehicle Moves"	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
		OFF vehicle	2. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			3. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			4. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
Slips/Will Not Engage	Vehicle will not run in “R” position (but runs in “D”, “2” and “1” positions). Clutch slips. Very poor acceleration. AT-226, "6. Vehicle Does Not Creep Backward In “R” Position"	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			2. Stall test	AT-63, "Stall Test"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			5. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	6. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			7. High clutch	AT-318, "HIGH CLUTCH"	
			8. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			9. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			10. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	Vehicle braked when shifting into “R” position.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	5. High clutch	AT-318, "HIGH CLUTCH"	
			6. Brake band	AT-348, "Components"	
			7. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			8. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
Shift Shock	Sharp shock in shifting from “N” to “D” position.	ON vehicle	1. Engine idling rpm	EC-615, "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment"	EC-43, "Idle Speed/ Ignition Timing/Idle Mixture Ratio Adjustment"
			2.Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. A/T fluid temperature sensor	AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT"	
			5. Engine speed signal	AT-131, "DTC P0725 ENGINE SPEED SIGNAL"	
			6. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			7. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			8. Accumulator N-D	AT-297, "Components"	
		OFF vehicle	9. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Slips/Will Not Engage	Vehicle will not run in “D” and “2” positions (but runs in “1” and “R” positions).	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
		OFF vehicle	2. Low one-way clutch	AT-267, "Components"	
	Vehicle will not run in “D”, “1”, “2” positions (but runs in “R” position). Clutch slips. Very poor acceleration.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Stall test	AT-63, "Stall Test"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			5. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			6. Accumulator N-D	AT-297, "Components"	
		OFF vehicle	7. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			8. High clutch	AT-318, "HIGH CLUTCH"	
			9. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			10. Forward one-way clutch	AT-337, "Components"	
			11. Low one-way clutch	AT-267, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Slips/Will Not Engage	Clutches or brakes slip somewhat in starting.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			3. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			4. Line pressure test	AT-67, "Line Pressure Test"	
			5. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			6. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			7. Accumulator N-D	AT-297, "Components"	
			8. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			9. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			10. Overrun clutch solenoid	AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE"	
			11. Torque converter clutch solenoid valve	AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE"	
		OFF vehicle	12. Forward clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
			13. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			14. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
			15. Oil pump	AT-292, "OIL PUMP"	
			16. Torque converter	AT-267, "Components"	
Not Used	Excessive creep.	ON vehicle	1. Engine idling rpm	EC-615, "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment"	EC-43, "Idle Speed/ Ignition Timing/Idle Mixture Ratio Adjustment"

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Slips/Will Not Engage	No creep at all. AT-226, "6. Vehicle Does Not Creep Backward In “R” Position", AT-228, "7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position"	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	4. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			5. Oil pump	AT-292, "OIL PUMP"	
			6. Torque converter	AT-267, "Components"	
No Up Shift	Failure to change gear from “D_1 ” to “D_2 ”.	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			2. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			5. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
		OFF vehicle	6. Brake band	AT-348, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Up Shift	Failure to change gear from “D_2 ” to “D_3 ”.	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			2. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			5. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
		OFF vehicle	6. High clutch	AT-318, "HIGH CLUTCH"	
			7. Brake band	AT-348, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Up Shift	Failure to change gear from “D_3 ” to “D_4 ”.	ON vehicle	1. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
			2. Overdrive control switch	AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}"	
			3. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			5. A/T fluid temperature sensor	AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT"	
			6. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
		OFF vehicle	7. Brake band	AT-348, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Improper Shift Timing	Too high a gear change point from “D_1 ” to “D_2 ”, from “D_2 ” to “D_3 ”, from “D_3 ” to “D_4 ”. AT-233, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-235, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" , AT-237, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$"	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" or AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)"	
			3. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			4. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
	Gear change directly from “D_1 ” to “D_3 ” occurs.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Accumulator servo release	AT-297, "Components"	
		OFF vehicle	3. Brake band	AT-348, "Components"	
Not Used	Engine stops when shifting lever into “R”, “D”, “2” and “1”.	ON vehicle	1. Engine idling rpm	EC-615, "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment"	EC-43, "Idle Speed/ Ignition Timing/Idle Mixture Ratio Adjustment"
			2. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			3. Torque converter clutch solenoid valve	AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	5. Torque converter	AT-267, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Shift Shock	Too sharp a shock in change from “D_1 ” to “D_2 ”.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Accumulator servo release	AT-297, "Components"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			5. A/T fluid temperature sensor	AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT"	
		OFF vehicle	6. Brake band	AT-348, "Components"	
Shift Shock	Too sharp a shock in change from “D_2 ” to “D_3 ”.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			4. A/T fluid temperature sensor	AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT"	
		OFF vehicle	5. High clutch	AT-318, "HIGH CLUTCH"	
			6. Brake band	AT-348, "Components"	
Shift Shock	Too sharp a shock in change from “D_3 ” to “D_4 ”.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			4. A/T fluid temperature sensor	AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT"	
		OFF vehicle	5. Brake band	AT-348, "Components"	
			6. Forward one-way clutch	AT-324, "Components"	
			7. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Slips/Will Not Engage	Almost no shock or clutches slipping in change from “D_1 ” to “D_2 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Accumulator servo release	AT-297, "Components"	
			5. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	6. Brake band	AT-348, "Components"	
	Almost no shock or slipping in change from “D_2 ” to “D_3 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	5. High clutch	AT-318, "HIGH CLUTCH"	
			6. Brake band	AT-348, "Components"	
Slips/Will Not Engage	Almost no shock or slipping in change from “D_3 ” to “D_4 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2.Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	5. Brake band	AT-348, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	Vehicle braked by gear change from “D_1 ” to “D_2 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
		OFF vehicle	2. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			3. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
			4. High clutch	AT-318, "HIGH CLUTCH"	
			5. Low one-way clutch	AT-267, "Components"	
	Vehicle braked by gear change from “D_2 ” to “D_3 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
		OFF vehicle	2. Brake band	AT-348, "Components"	
	Vehicle braked by gear change from “D_3 ” to “D_4 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
		OFF vehicle	2. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			3. Forward one-way clutch	AT-337, "Components"	
			4. Reverse clutch	AT-313, "REVERSE CLUTCH"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	Maximum speed not attained. Acceleration poor.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
			3. Overdrive control switch	AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}"	
			4. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			5. Vehicle speed sensor · A/T (revolution sensor) and vehicle speed sensor · MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)"	
			6. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			7. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			8. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	9. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			10. High clutch	AT-318, "HIGH CLUTCH"	
			11. Brake band	AT-348, "Components"	
			12. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
			13. Oil pump	AT-292, "OIL PUMP"	
			14. Torque converter	AT-267, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Down Shift	Failure to change gear from “D_4 ” to “D_3 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2.Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Overrun clutch solenoid valve	AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE"	
			4. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			5. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			6. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	7. Brake band	AT-348, "Components"	
			8. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
	Failure to change gear from “D_3 ” to “D_2 ” or from “D_4 ” to “D_2 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			4. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			5. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	6. High clutch	AT-318, "HIGH CLUTCH"	
			7. Brake band	AT-348, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Down Shift	Failure to change gear from “D_2 ” to “D_1 ” or from “D_3 ” to “D_1 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			4. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			5. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	6. Low one-way clutch	AT-267, "Components"	
			7. High clutch	AT-318, "HIGH CLUTCH"	
			8. Brake band	AT-348, "Components"	
Shift Shock	Gear change shock felt during deceleration by releasing accelerator pedal.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Overrun clutch solenoid valve	AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
Improper Shift Timing	Too high a change point from “D_4 ” to “D_3 ”, from “D_3 " to “D_2 ”, from “D_2 ” to “D_1 ”.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Improper Shift Timing	Kickdown does not operate when depressing pedal in “D4 ” within kickdown vehicle speed.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Revolution sensor and vehicle speed sensor	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			3. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			4. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
	Kickdown operates or engine overruns when depressing pedal in “D4 ” beyond kickdown vehicle speed limit.	ON vehicle	1. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			4. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Slips/Will Not Engage	Races extremely fast or slips in changing from “D_4 ” to “D_3 ” when depressing pedal.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			5. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			6. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	7. Brake band	AT-348, "Components"	
			8. Forward clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
	Races extremely fast or slips in changing from “D_4 ” to “D_2 ” when depressing pedal.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			5. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			6. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			7. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	8. Brake band	AT-348, "Components"	
			9. High clutch	AT-318, "HIGH CLUTCH"	
			10. Forward clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Slips/Will Not Engage	Races extremely fast or slips in changing from “D3 ” to “D2 ” when depressing pedal.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			5. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			6. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
		OFF vehicle	7. Brake band	AT-348, "Components"	
			8. High clutch	AT-318, "HIGH CLUTCH"	
	Races extremely fast or slips in changing from “D4 ” or “D3 ” to “D1 ” when depressing pedal.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			5. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			6. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			7. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	8. Forward clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
			9. Forward one-way clutch	AT-337, "Components"	
			10. Low one-way clutch	AT-267, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Slips/Will Not Engage	Vehicle will not run in any position.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
		OFF vehicle	5. Oil pump	AT-292, "OIL PUMP"	
			6. High clutch	AT-318, "HIGH CLUTCH"	
			7. Brake band	AT-348, "Components"	
			8. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
			9. Torque converter	AT-267, "Components"	
			10. Parking components	AT-267, "Components"	
Not Used	Transmission noise in “D”, “2”, “1” and “R” positions.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
		OFF vehicle	2. Torque converter	AT-267, "Components"	
No Down Shift	Failure to change from “D_3” to “2_2” when changing lever into “2” position. AT-247, "18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever “D” → “2” Position"	OFF vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			4. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			5. Brake band	AT-348, "Components"	
Improper Shift Timing	Gear change from “2_2” to “2_3” in “2” position.	ON vehicle	1. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
			2. Control cable adjustment	AT-262, "Control Cable Adjustment"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	Engine brake does not operate in “1” position. AT-248, "19. A/T Does Not Shift: 2$_2$ → 1$_1$, When Selector Lever “2” → “1” Position"	ON vehicle	1. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
			2. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			3. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
Not Used	Engine brake does not operate in “1” position. AT-248, "19. A/T Does Not Shift: 2$_2$ → 1$_1$, When Selector Lever “2” → “1” Position"	ON vehicle	5. Overrun clutch solenoid valve	AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE"	
		OFF vehicle	6. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
			7. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
Improper Shift Timing	Gear change from “1$_1$ ” to “1$_2$ ” in “1” position.	ON vehicle	1. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
			2. Control cable adjustment	AT-262, "Control Cable Adjustment"	
No Down Shift	Does not change from “1$_2$ ” to “1$_1$ ” in “1” position.	ON vehicle	1. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			2. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	4. Low one-way clutch	AT-267, "Components"	
			5. Brake band	AT-348, "Components"	
			6. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
Shift Shock	Large shock changing from “1$_2$ ” to “1$_1$ ” in “1” position.	ON vehicle	1. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	2. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not used	Transaxle overheats.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Engine idling rpm	EC-615, "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment"	EC-43, "Idle Speed/ Ignition Timing/Idle Mixture Ratio Adjustment"
			3. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			4. Line pressure test	AT-67, "Line Pressure Test"	
			5. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			6. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	7. Oil pump	AT-292, "OIL PUMP"	
			8. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			9. High clutch	AT-318, "HIGH CLUTCH"	
			10. Brake band	AT-348, "Components"	
			11. Forward clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
			12. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
			13. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
			14. Torque converter	AT-267, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
		OFF vehicle	2. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			3. High clutch	AT-318, "HIGH CLUTCH"	
			4. Brake band	AT-348, "Components"	
			5. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			6. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			7. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
	Offensive smell at fluid charging pipe.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
		OFF vehicle	2. Torque converter	AT-267, "Components"	
			3. Oil pump	AT-292, "OIL PUMP"	
			4. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			5. High clutch	AT-318, "HIGH CLUTCH"	
			6. Brake band	AT-348, "Components"	
			7. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			8. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			9. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Lockup Engagement/ TCC Inoperative	Torque converter is not locked up.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			3. Engine speed signal	AT-131, "DTC P0725 ENGINE SPEED SIGNAL"	
			4. A/T fluid temperature sensor	AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT"	
			5. Line pressure test	AT-67, "Line Pressure Test"	
			6. Torque converter clutch solenoid valve	AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE"	
			7. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	8. Torque converter	AT-267, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Lockup Engagement/ TCC Inoperative	Torque converter clutch piston slip.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Torque converter clutch solenoid valve	AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE"	
			5. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			6. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	7. Torque converter	AT-267, "Components"	
	Lock-up point is extremely high or low.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			3. Torque converter clutch solenoid valve	AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	

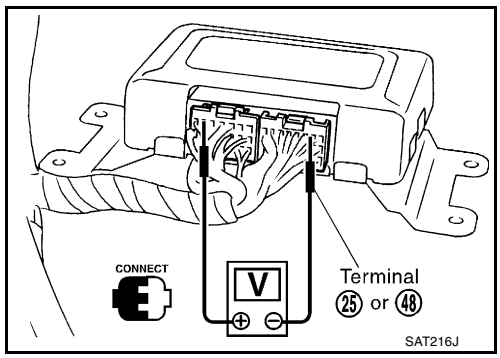
Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Up Shift	A/T does not shift to “D_4 ” when driving with overdrive control switch “ON”.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
			3. Overdrive control switch	AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}"	
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			5. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			6. Overrun clutch solenoid valve	AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE"	
			7. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			8. A/T fluid temperature sensor	AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT"	
			9. Line pressure test	AT-67, "Line Pressure Test"	
		OFF vehicle	10. Brake band	AT-348, "Components"	
			11. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	

TCM Terminals and Reference Value

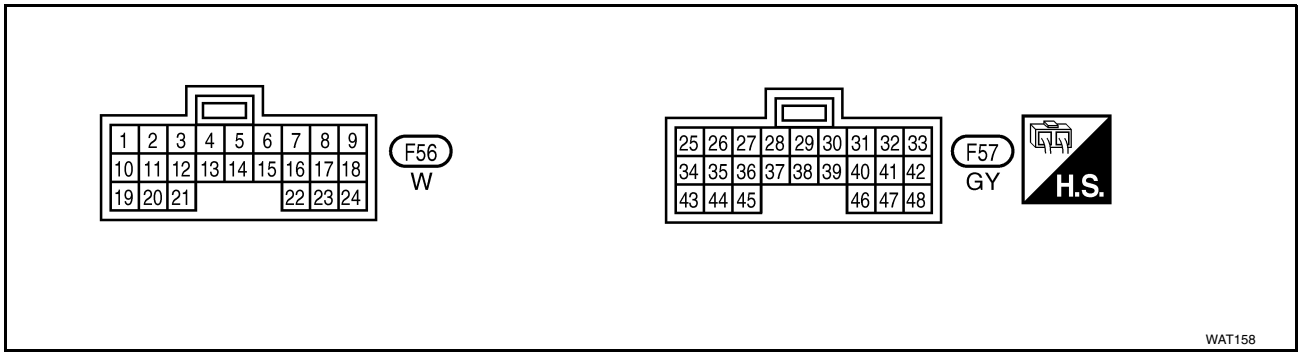
ECS005WN

PREPARATION

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



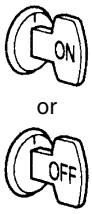
TCM HARNESS CONNECTOR TERMINAL LAYOUT

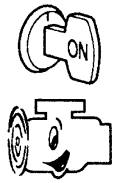


TCM INSPECTION TABLE

(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 - 3.0V
				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.	4 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V
3	Y/G	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	0V
5	L	CAN-H		—	—
6	Y	CAN-L		—	—
10	BR/R	Power source		When turning ignition switch to “ON”.	Battery voltage
				When turning ignition switch to “OFF”.	0V

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
19	PU	OBD-II		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
25	B	Ground		—	0V
26	BR/Y	PNP switch "1" position		When setting selector lever to "1" position.	Battery voltage
				When setting selector lever to other positions.	0V
27	B/R	PNP switch "2" position		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	W	Revolution sensor		When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function.*1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	150Hz
				When vehicle parks.	Under 1.3V or over 4.5V

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
30 **	G/B	Data link connector		—	—
31 **	GY/L	Data link connector		—	—
32	R	Throttle position sensor (Power source)		When turning ignition switch to "ON".	4.5 - 5.5V
				When turning ignition switch to "OFF".	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/Y	PNP switch “R” position		When setting selector lever to “R” position.	Battery voltage
				When setting selector lever to other positions.	0V
36	LG	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
39 *	L/OR	Engine speed signal		Refer to EC-105, "ECM INSPECTION TABLE" [QG18DE (ULEV)] or EC-677, "ECM INSPECTION TABLE" [QG18DE (SULEV)].	—
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 *	GY	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.5 - 0.7V Fully-open throttle: 4V
42	B/W	Throttle position sensor (Ground)		—	0V
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

* : This terminal is connected to the ECM.
** : These terminals are connected to the Data link connector.

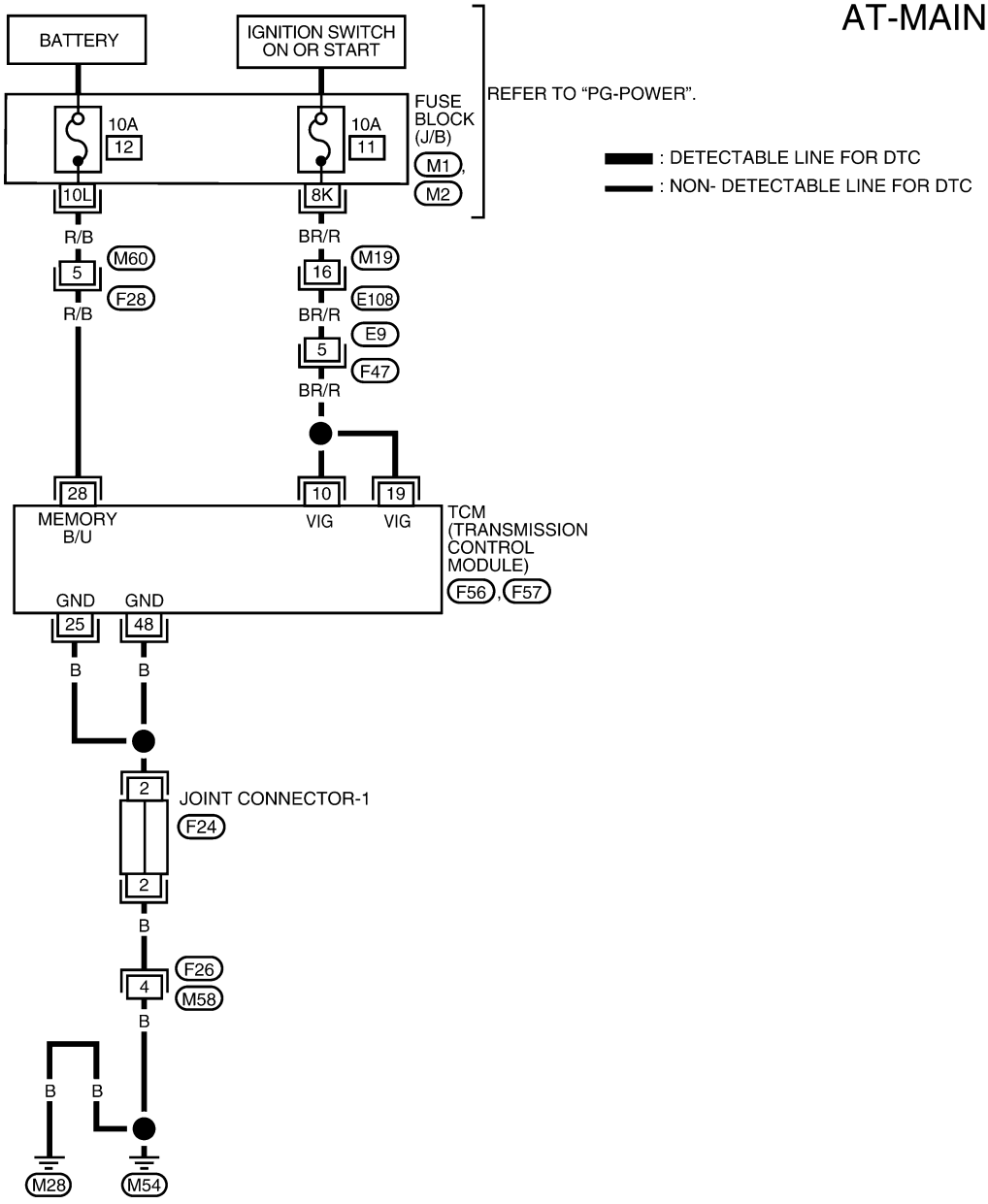
TROUBLE DIAGNOSIS FOR POWER SUPPLY

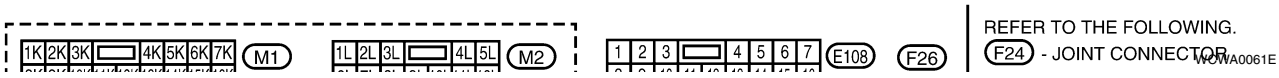
PFP:00000

Wiring Diagram — AT — MAIN

ECS005WO

AT-MAIN-01





TRANSMISSION CONTROL MODULE TERMINALS AND REFERENCE VALUE BETWEEN TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (Approx.)
10	BR/R	POWER SOURCE	WHEN TURNING IGNITION SWITCH TO "ON"	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO "OFF"	0V
19	BR/R	POWER SOURCE	WHEN TURNING IGNITION SWITCH TO "ON"	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO "OFF"	0V
25	B	GROUND	—	0C
28	R/B	POWER SOURCE (MEMORY BACKUP)	WHEN TURNING IGNITION SWITCH TO "OFF"	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO "ON"	BATTERY VOLTAGE
48	B	GROUND	—	0V

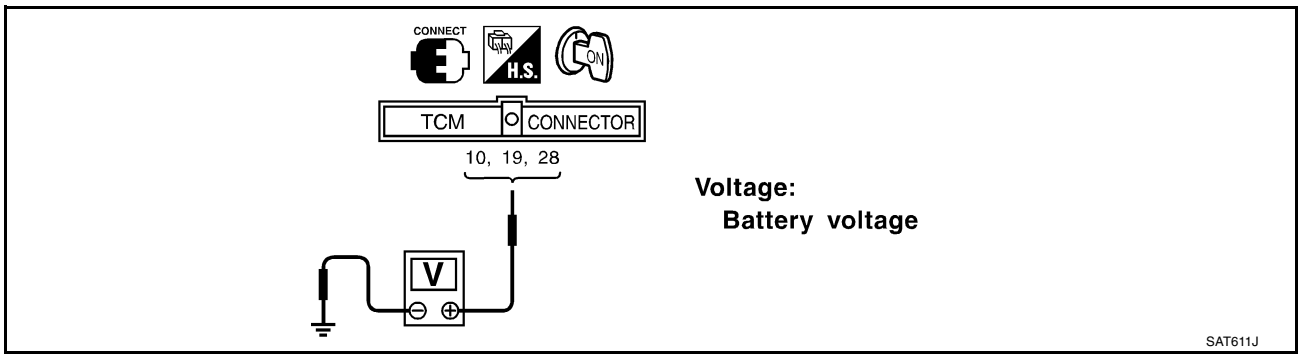
WAT338

Diagnostic Procedure

ECS005WP

1. CHECK TCM POWER SOURCE STEP 1

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

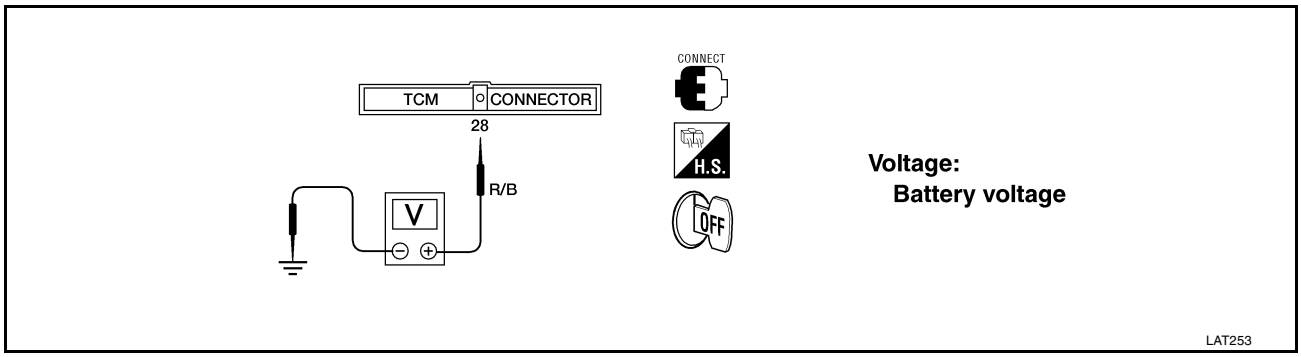


OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK TCM POWER SOURCE STEP 2

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



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING ITEM

- Check the following items:
  - Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness)
  - Fuse
  - Ignition switch
    Refer to PG-2, "POWER SUPPLY ROUTING" .

OK or NG

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

4. 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. Refer to AT-112, "Wiring Diagram — AT — MAIN" .

Continuity should exist.

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

OK or NG

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

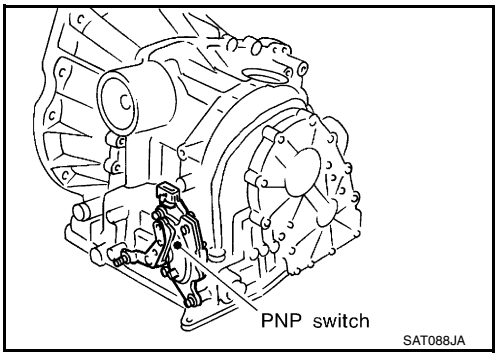
DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH

PFP:32006

Description

ECS005WQ

- 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.



ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: PNP SW/CIRC : P0705	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

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

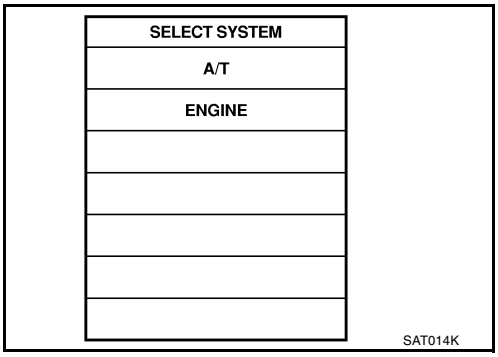
CAUTION:

Always drive vehicle at a safe speed.

NOTE:

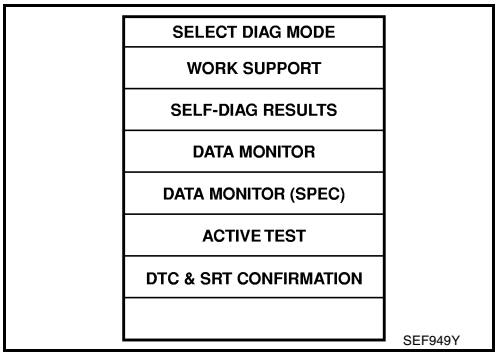
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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



With CONSULT-II

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

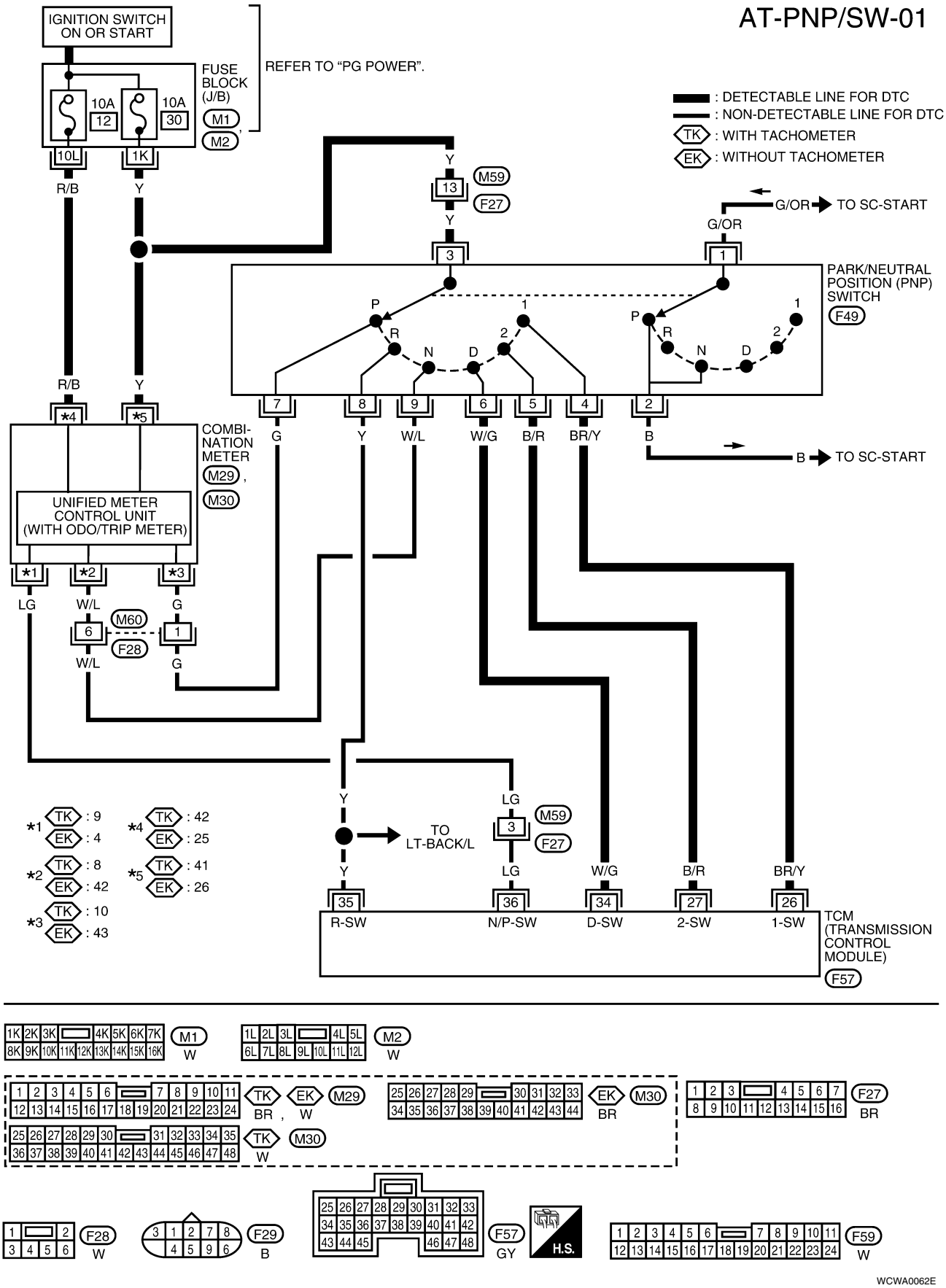


With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — PNP/SW

ECS005WR



WCWA0062E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
26	BR/Y	PNP SWITCH "1" POSITION	WHEN SETTING SELECTOR LEVER TO "1" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V
27	B/R	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/Y	PNP SWITCH "R" POSITION	WHEN SETTING SELECTOR LEVER TO "R" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V
36	LG	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

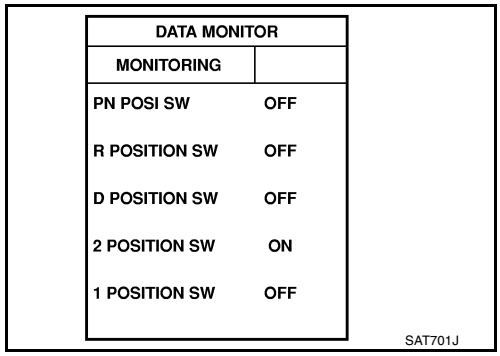
Diagnostic Procedure

ECS005WS

1. CHECK PNP SWITCH CIRCUIT (WITH CONSULT-II)

With CONSULT-II

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 “P/N”, “R”, “D”, “2” and “1” position switches moving selector lever to each position. Check the signal of the selector lever position is indicated properly.



OK or NG

OK >> GO TO 3.

NG >> Check the following items:

- PNP switch
  Refer toAT-119, "Component Inspection" .
- 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 PG-2, "POWER SUPPLY ROUTING" .

2. CHECK PNP SWITCH CIRCUIT (WITHOUT CONSULT-II)

Without CONSULT-II

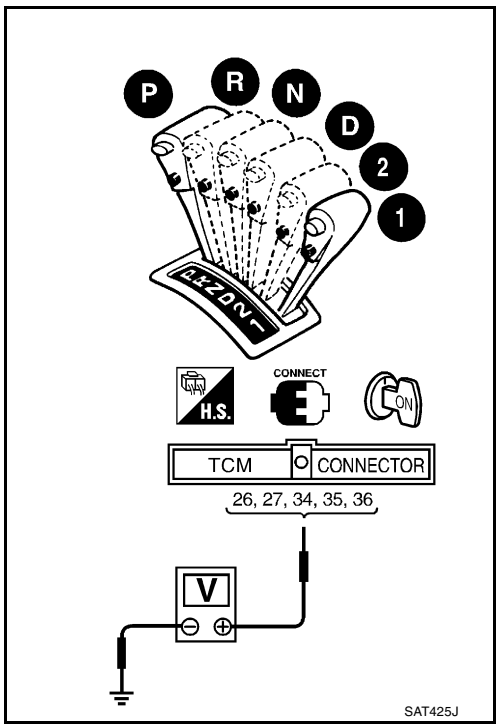
1. Turn ignition switch to “ON” position.
   (Do not start engine.)
2. Check voltage between TCM terminals 26, 27, 34, 35, 36 and ground while moving selector lever through each position.

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

Voltage

B : Battery voltage

0 : 0V



OK or NG

OK >> GO TO 3.

NG >> Check the following items:

- PNP switch
  Refer to AT-119, "Component Inspection" .
- 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 PG-2, "POWER SUPPLY ROUTING" .

3. CHECK DTC

Perform AT-115, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**

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

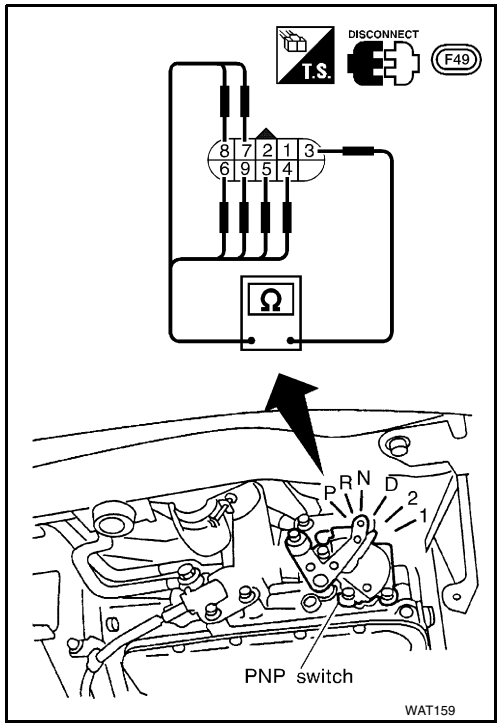
Component Inspection

ECS005WT

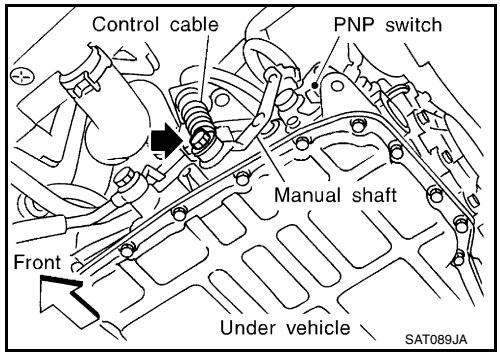
PARK/NEUTRAL POSITION SWITCH

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 control cable disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust control cable. Refer to AT-262, "Control Cable Adjustment" .
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-262, "Park/Neutral Position (PNP) Switch Adjustment" .
6. If NG on step 4, replace PNP switch.



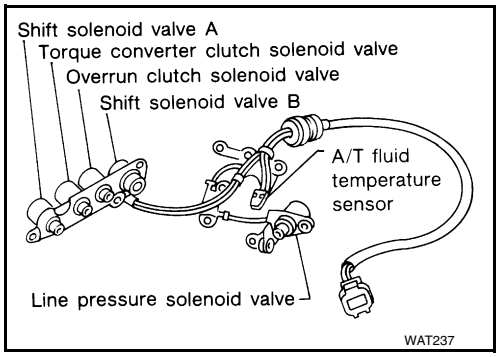
DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

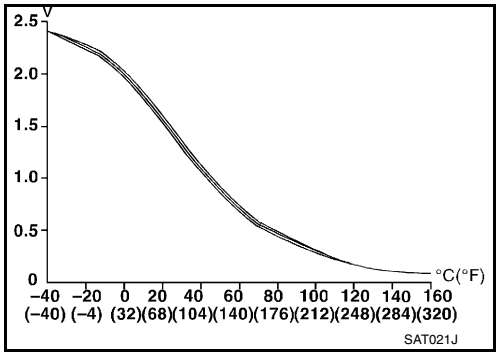
PFP:31940

Description

ECS005WU

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





CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

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

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: ATF TEMP SEN/CIRC : P0710	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

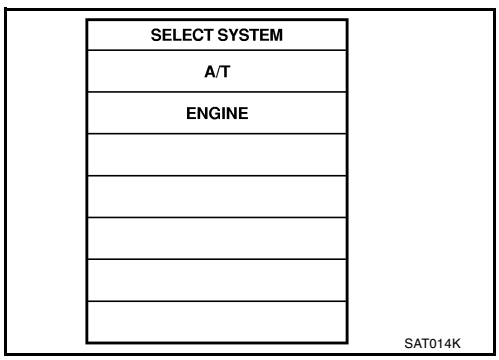
CAUTION:

Always drive vehicle at a safe speed.

NOTE:

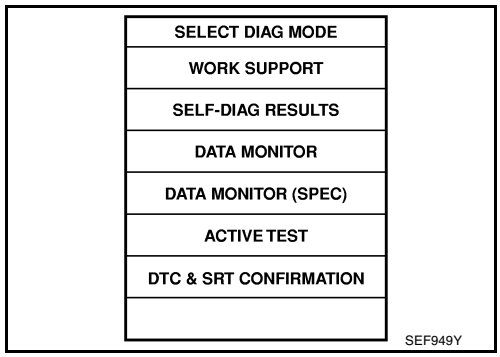
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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



With CONSULT-II

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



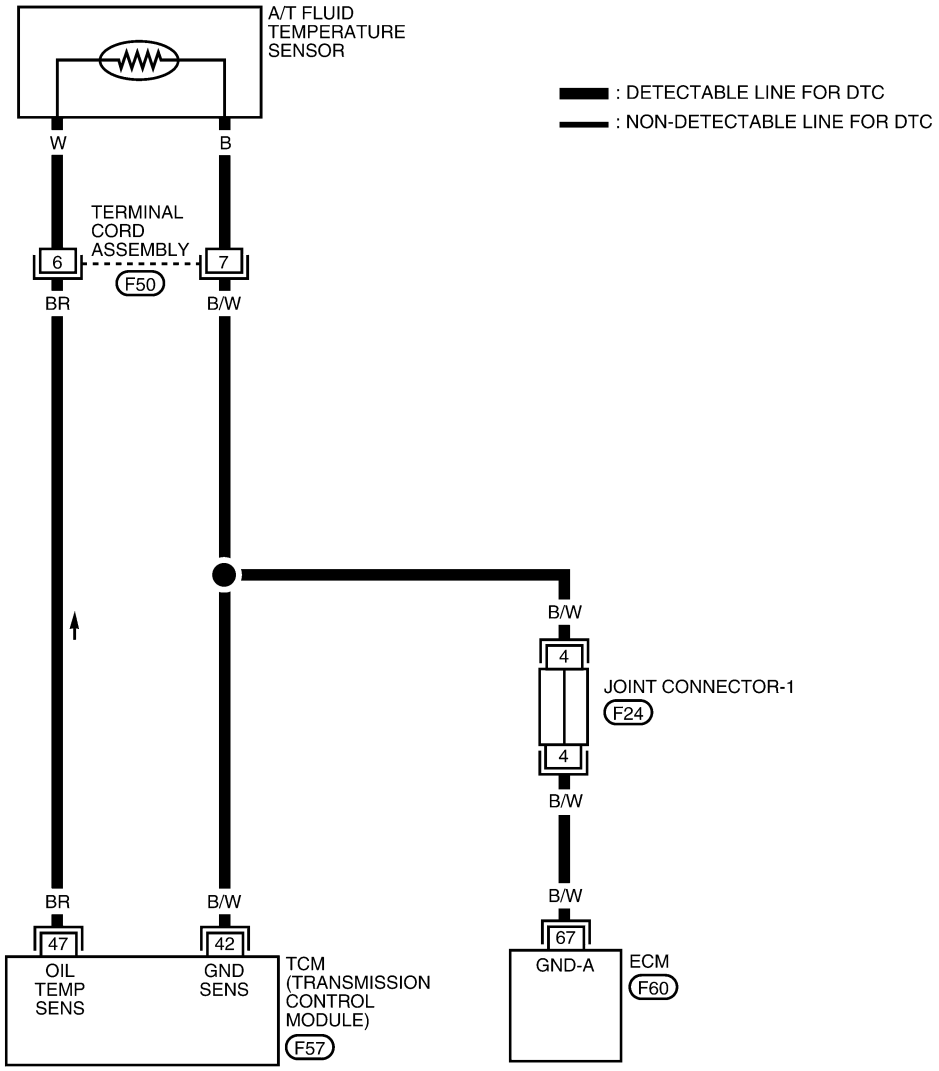
With GST

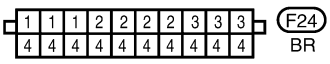
Follow the procedure “With CONSULT-II”.

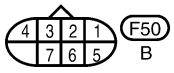
Wiring Diagram — AT — FTS

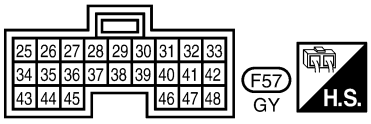
ECS005WV

AT-FTS-01









REFER TO THE FOLLOWING.
F60 - ELECTRICAL UNITS

WCWA0059E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
42	B/W	SENSOR (GROUND)	—	0V
47	BR	A/T FLUID TEMPERATURE SENSOR	WHEN ATF FLUID TEMPERATURE IS 20°C (68°F)	1.5V
			WHEN ATF FLUID TEMPERATURE IS 80°C (176°F)	0.5V

Diagnostic Procedure

ECS005WW

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

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

With CONSULT-II

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

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

SAT614J

Voltage

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

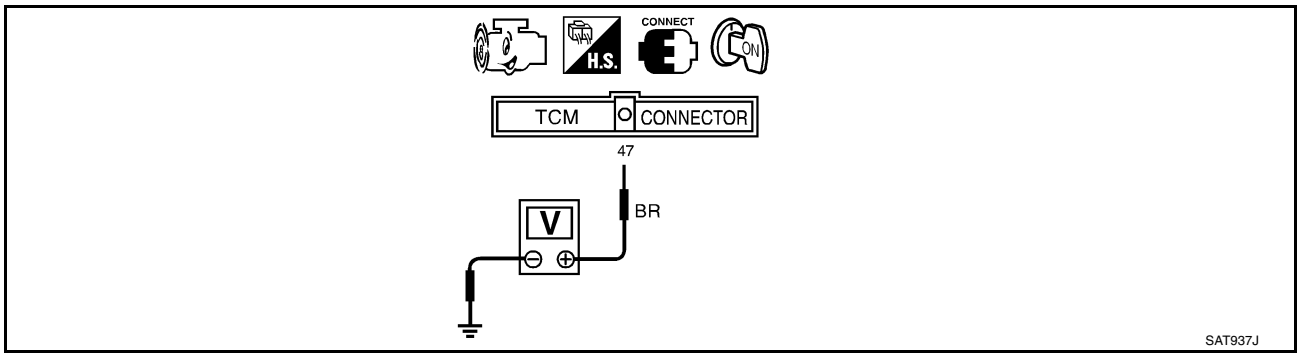
OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

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

Without CONSULT-II

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



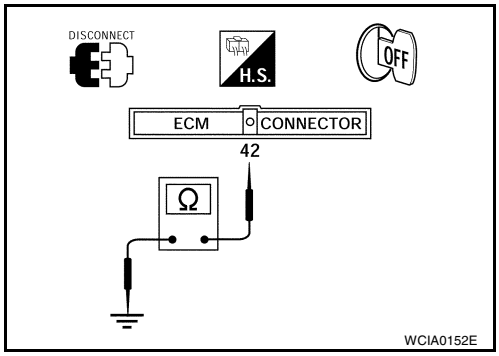
Voltage

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

3. Turn ignition switch to “OFF” position.
4. Disconnect TCM harness connector.
5. Check continuity between TCM harness connector F57 terminal 42 (B/W) and ground.

Continuity should exist.

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



OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK DTC

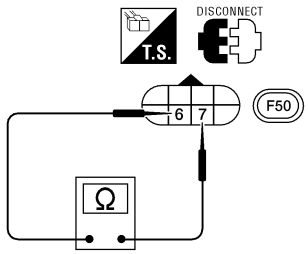
Perform AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" .

OK or NG

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

5. 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

LAT160

4. Reinstall any part removed.

OK or NG

OK (With CONSULT-II)>> GO TO 2.
OK (Without CONSULT-II)>> GO TO 3.
NG >> 1. Remove oil pan.
2. Check the following items:
- A/T fluid temperature sensor
Refer to AT-125, "Component Inspection" .
- Harness of terminal cord assembly for short or open

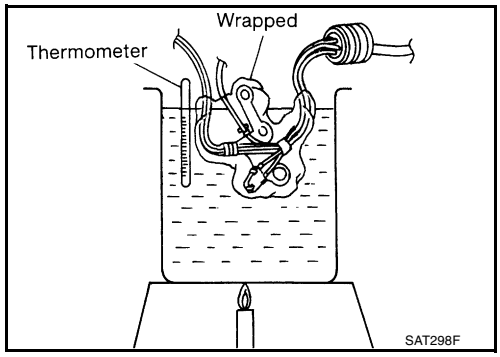
Component Inspection

ECS005WX

A/T FLUID TEMPERATURE SENSOR

- For removal, refer to AT-259, "Control Valve Assembly and Accumulators" .
- Check resistance between two terminals while changing temperature as shown at left.

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



SAT298F

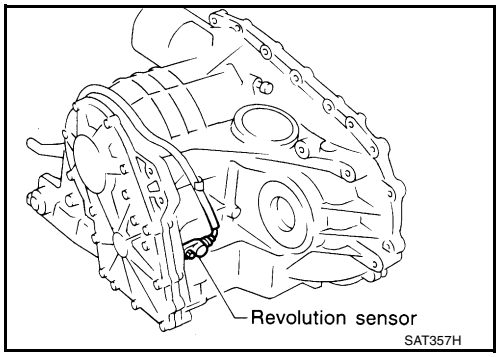
DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)

PFP:32702

Description

ECS005WY

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.



ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when...	Check items (Possible cause)
: VEH SPD SEN/CIR AT : P0720	TCM does not receive the proper voltage signal from the sensor.	● Harness or connectors (The sensor circuit is open or shorted.) ● Revolution sensor

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

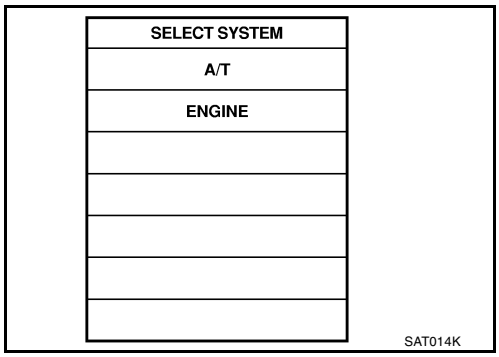
CAUTION:

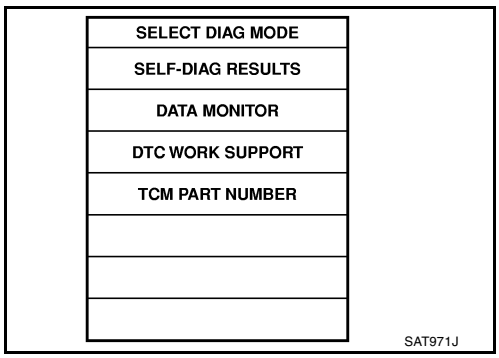
- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

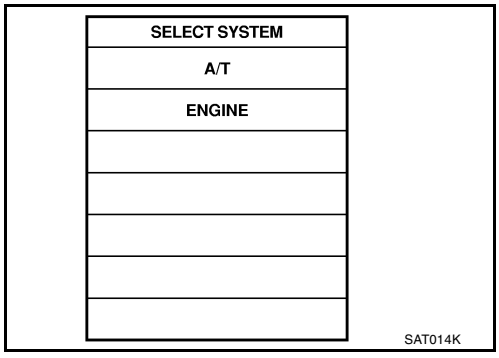
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2. Drive vehicle and check for an increase of "VHCL/S SE·MTR" value increase.
   If the check result is NG, go to AT-126, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .
   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 AT-129, "Diagnostic Procedure" .





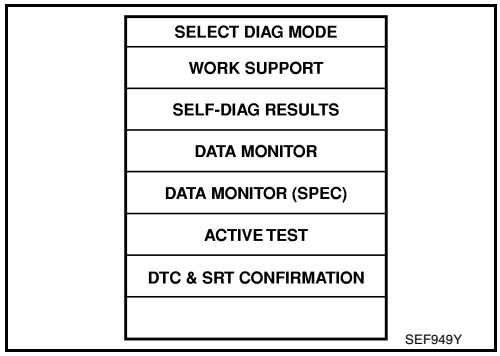


If the check result is OK, go to following step.

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

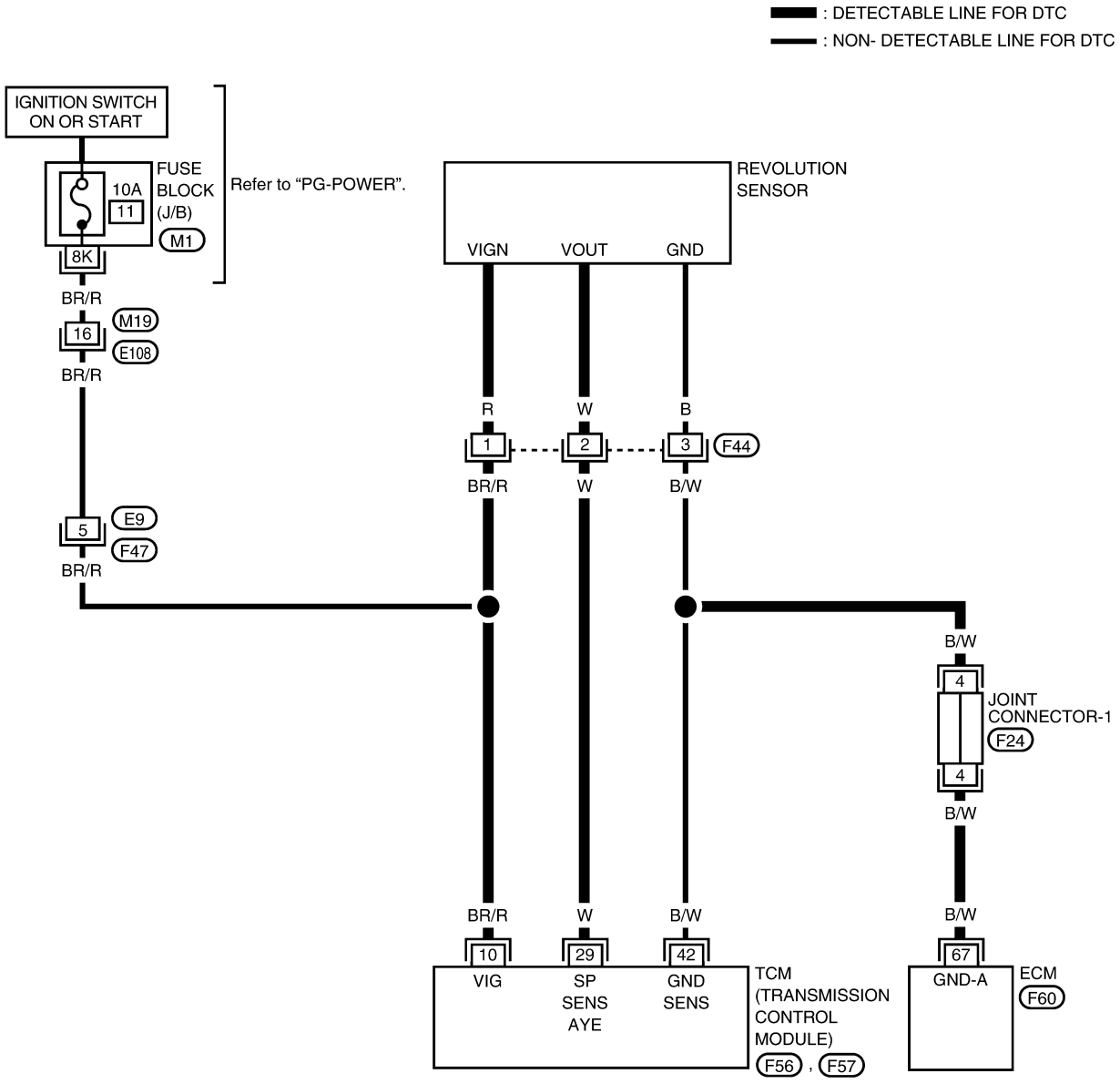
Follow the procedure "With CONSULT-II".

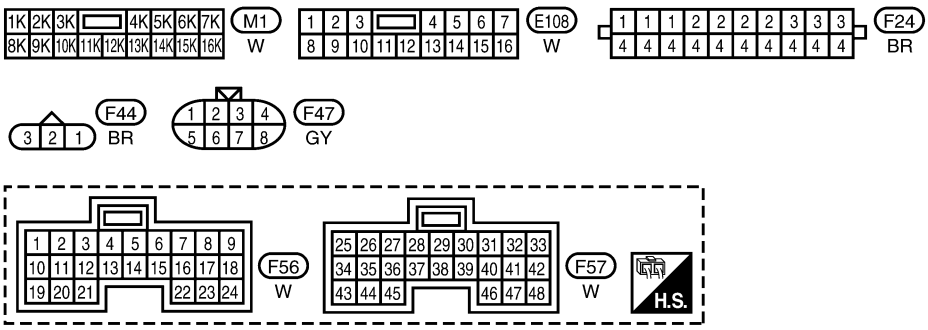


Wiring Diagram — AT — VSSA/T

ECS005WZ

AT-VSSA/T-01





Refer to the following.
F60 - ELECTRICAL UNITS

WCWA0063E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	BR/R	POWER SOURCE	WHEN TURNING IGNITION SWITCH TO "ON"	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO "OFF"	0V
29	W	REVOLUTION SENSOR	WHEN MOVING AT 20 KM/H (12 MPH). USE CONSULT-II PULSE FREQUENCY MEASURING FUNCTION	150 Hz
42	B/W	THROTTLE POSITION SENSOR (GROUND)	—	0V

Diagnostic Procedure

ECS005X0

1. CHECK INPUT SIGNAL (WITH CONSULT-II)

With CONSULT-II

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.

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

SAT614J

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK REVOLUTION SENSOR (WITH CONSULT-II)

With CONSULT-II

1. Start engine.

Condition	Judgement standard (Approx.)
When moving at 20 km/h (12 MPH, use the CONSULT-II pulse frequency measuring function. *1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	150 Hz
When vehicle is not moving	Under 1.3V or over 4.5V

WAT402

- Check harness for short or open between TCM, ECM and revolution sensor. Refer to AT-128, "Wiring Diagram — AT — VSSA/T" .
- Check harness for short or open between ignition switch and revolution sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK DTC

Perform AT-126, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK TCM INSPECTION

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

OK or NG

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

DTC P0725 ENGINE SPEED SIGNAL

PFP:24825

Description

ECS005X1

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

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: ENGINE SPEED SIG : P0725	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.

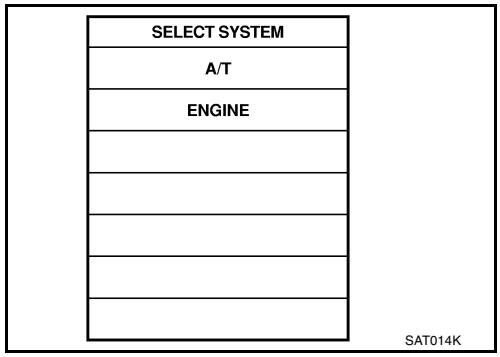
NOTE:

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

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

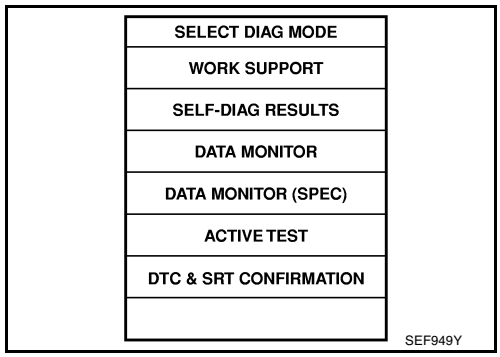
With CONSULT-II

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



With GST

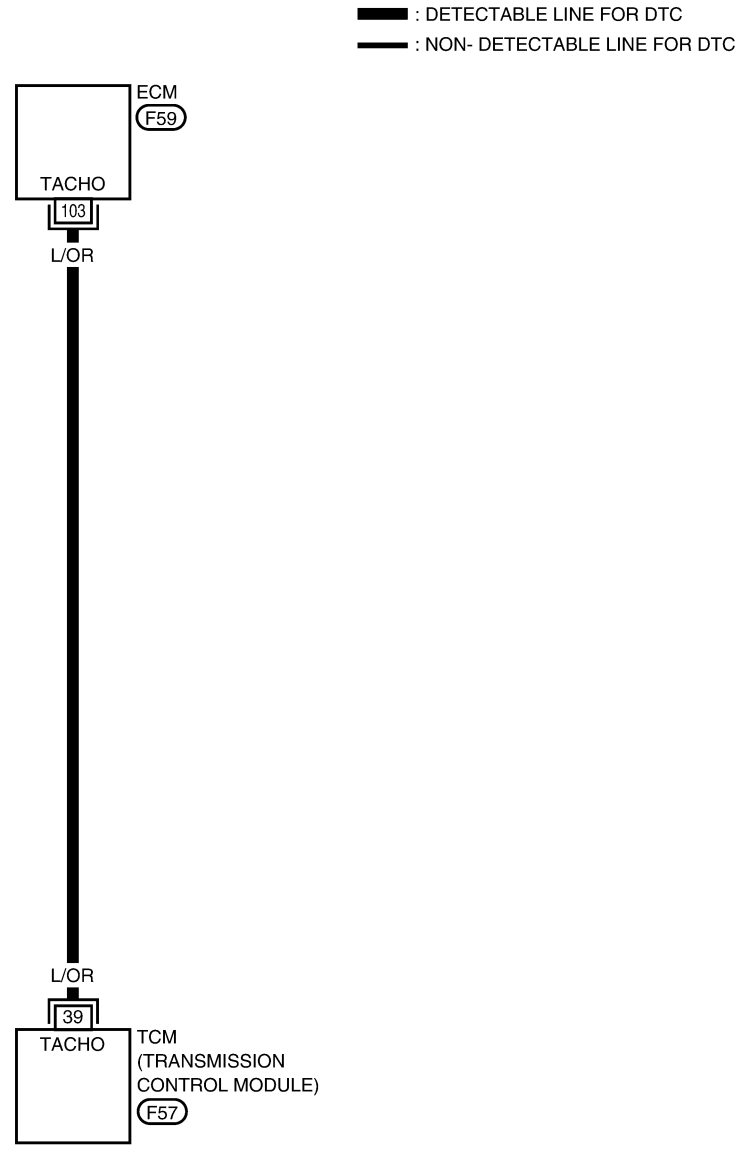
Follow the procedure "With CONSULT-II".

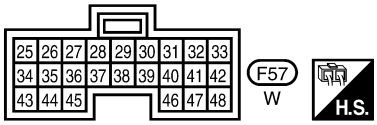


Wiring Diagram — AT — ENGSS

ECS005X2

AT-ENGSS-01





Refer to the following.
F29 - ELECTRICAL UNITS

WCWA0064E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
39	L/OR	ENGINE SPEED SIGNAL	REFER TO ECM TABLE	—

Diagnostic Procedure

ECS005X3

1. CHECK DTC WITH ECM

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

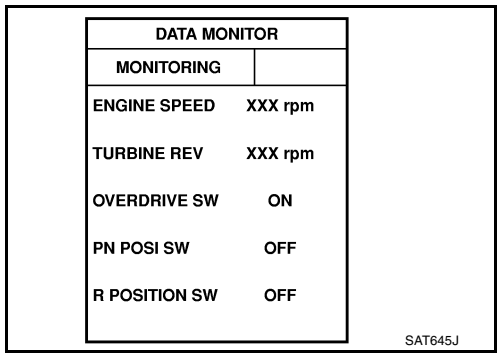
OK or NG

OK (With CONSULT-II)>> GO TO 2.
OK (Without CONSULT-II)>> GO TO 3.
NG >> Check ignition signal circuit for engine control. Refer to EC-38, "INPUT/OUTPUT SIGNAL CHART" [QG18DE (ULEV)] or EC-610, "INPUT/OUTPUT SIGNAL CHART" [QG18DE (SULEV)].

2. CHECK INPUT SIGNAL (WITH CONSULT-II)

With CONSULT-II

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.



OK or NG

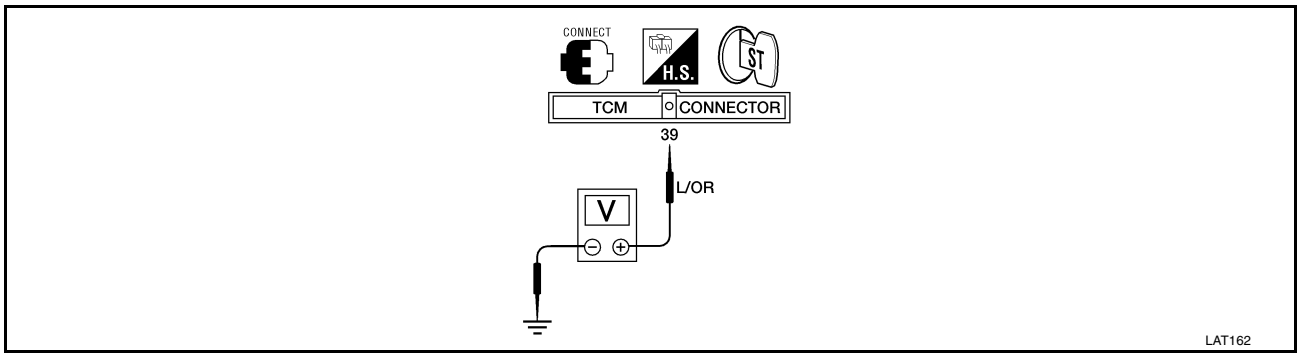
OK >> GO TO 4.
NG >> Check the following items:

- Harness for short or open between TCM and ECM
- Resistor and ignition coil
  Refer to EC-38, "SYSTEM DESCRIPTION" [QG18DE (ULEV) or EC-610, "SYSTEM DESCRIPTION" [QG18DE (SULEV)].

3. CHECK INPUT SIGNAL (WITHOUT CONSULT-II)

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 39 and ground.



Voltage (Idle speed) **: Refer to AT-109, "TCM Terminals and Reference Value" .**

OK or NG

OK >> GO TO 4.
NG >> Check the following items:

- Harness for short or open between TCM and ECM
- Resistor and ignition coil
  Refer to EC-38, "SYSTEM DESCRIPTION" [QG18DE (ULEV)] or EC-610, "SYSTEM DESCRIPTION" [QG18DE (SULEV)].

4. CHECK DTC

Perform AT-131, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

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

DTC P0731 A/T 1ST GEAR FUNCTION

PFP:31940

Description

ECS005X4

- 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)

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.

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.

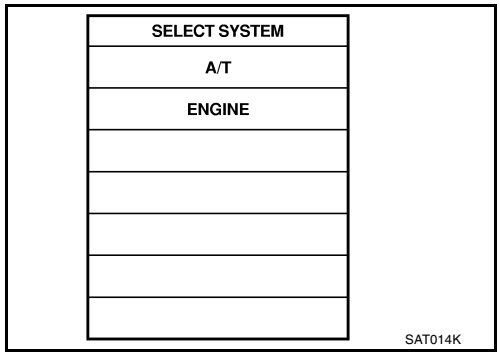
Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 1ST GR FNCTN : P0731	A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	● Shift solenoid valve A ● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

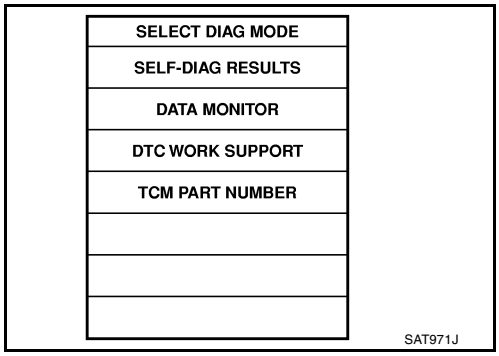
CAUTION:

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

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.

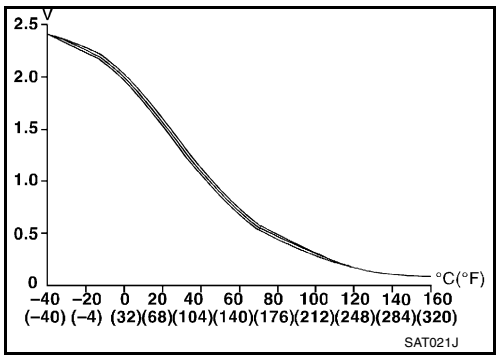


After the repair, perform the following procedure to confirm the malfunction is eliminated.



With CONSULT-II

1. Start engine and select “DATA MONITOR” mode for “A/T” with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3. Select “1ST GR FNCTN P0731” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.
4. Accelerate vehicle to 20 to 25 km/h (12 to 16 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD “ON”)
   - **Check that “GEAR” shows “2” after releasing pedal.**
5. Depress accelerator pedal to WOT (more than 7.0/8 of “THROTTLE POSI”) quickly from a speed of 20 to 25 km/h (12 to 16 MPH) until “TESTING” changes to “STOP VEHICLE” or “COMPLETED”. (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-138, "Diagnostic Procedure" .
   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 AT-138, "Diagnostic Procedure" .
   Refer to AT-385, "Shift Schedule" .

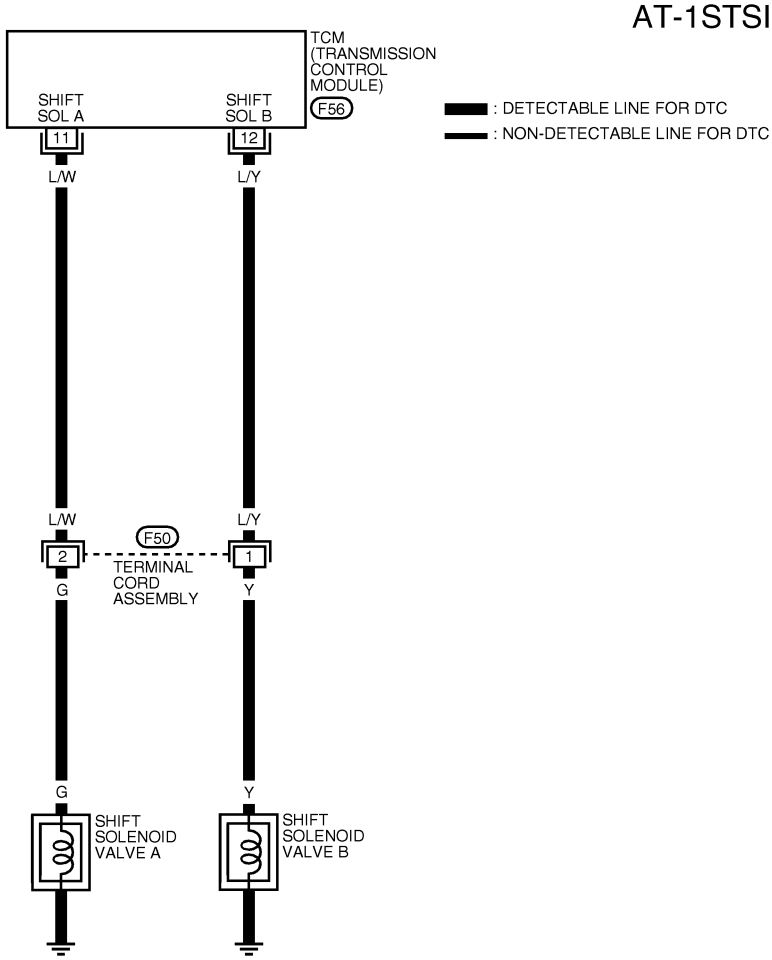
With GST

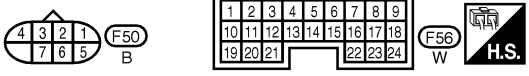
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 1ST

ECS005X5

AT-1STSIG-01





WAT118

TRANSMISSION CONTROL MODULE TERMINALS AND REFERENCE VALUE

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (Approx.)
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A DOES NOT OPERATE	0V
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE B DOES NOT OPERATE	0V

WAT343

Diagnostic Procedure

ECS005X6

1. CHECK SHIFT SOLENOID VALVE

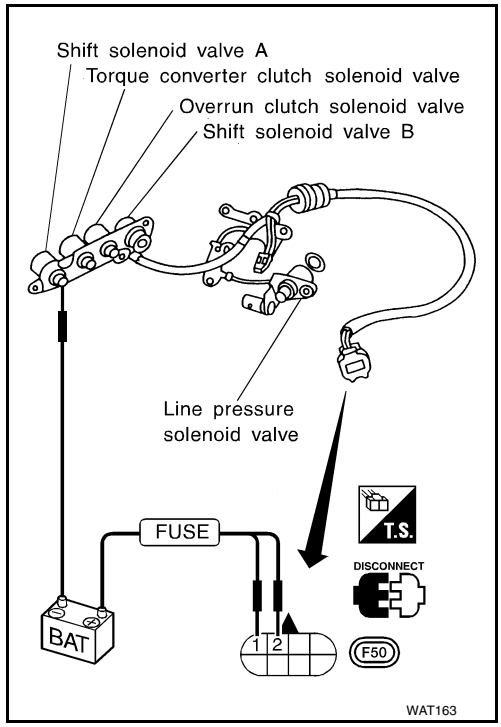
1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check shift solenoid valve operation.

- Shift solenoid valve A
- Shift solenoid valve B

Refer to AT-139, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace shift solenoid valve assembly.



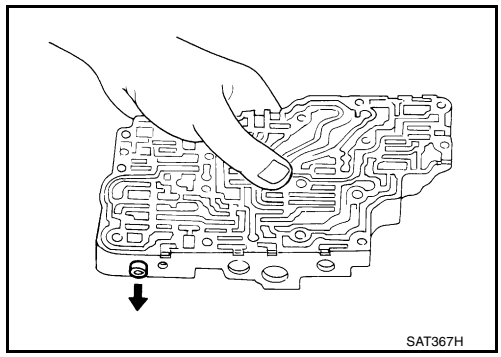
2. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-298, "Disassembly" .
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.

OK or NG

OK >> GO TO 3.
NG >> Repair control valve assembly.



3. CHECK DTC

Perform AT-135, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> Check transaxle internal components (clutch, brake, etc.).

Component Inspection

ECS005X7

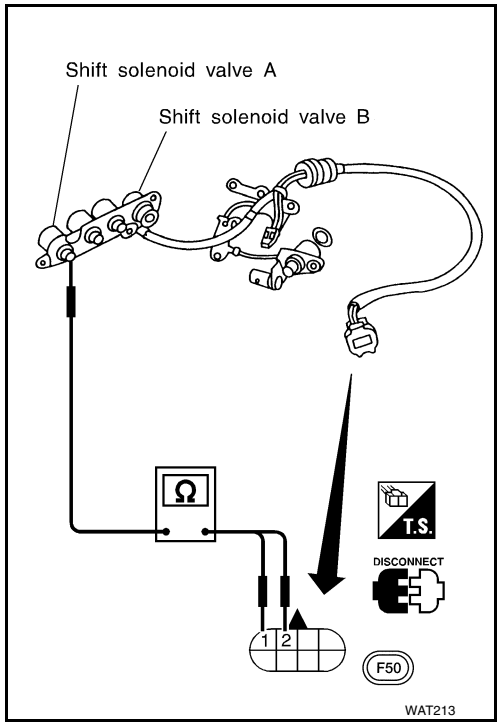
SHIFT SOLENOID VALVE A AND B

- Refer to AT-259, "Control Valve Assembly and Accumulators" .

Resistance Check

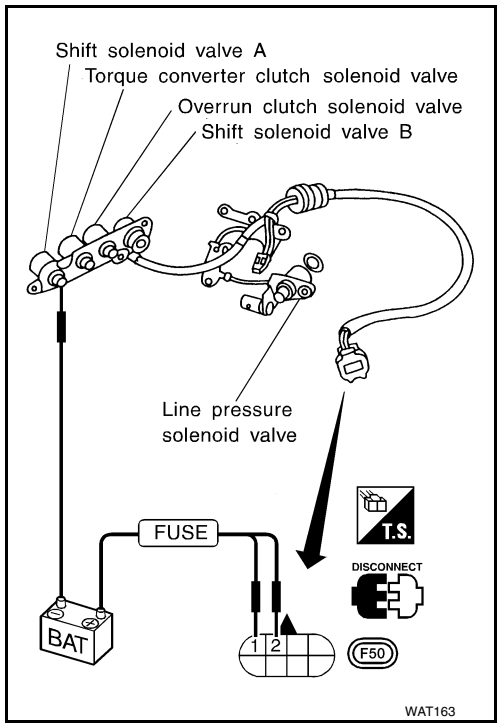
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30Ω
Shift solenoid valve B	1		5 - 20Ω



Operation Check

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



DTC P0732 A/T 2ND GEAR FUNCTION

PFP:31940

Description

ECS005X8

- 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)

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	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
: P0732		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

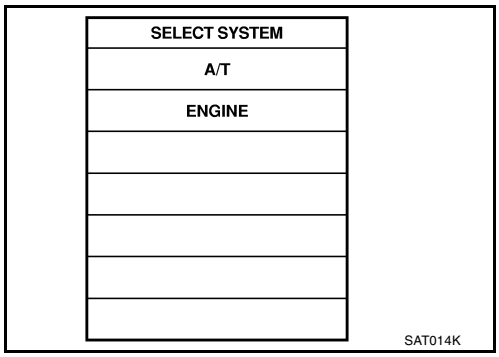
CAUTION:

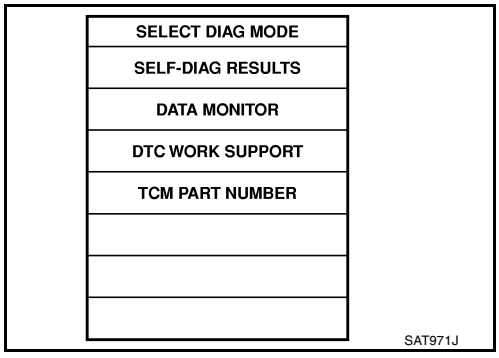
- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

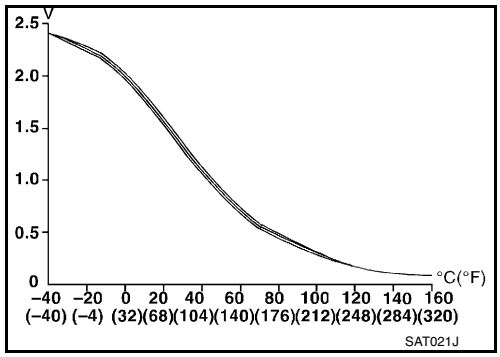
1. Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V





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 50 to 55 km/h (31 to 34 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD “ON”)
   - **Check that “GEAR” shows “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 50 to 55 km/h (31 to 34 MPH) until “TESTING” changes to “STOP VEHICLE” or “COMPLETED”. (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-143, "Diagnostic Procedure" .
   If “STOP VEHICLE” appears on CONSULT-II screen, go to following step.
   - **Check that “GEAR” shows “2” when depressing accelerator pedal to WOT.**
   - **If “TESTING” does not appear on CONSULT-II for a long time, select “SELF-DIAGNOSIS” for “ENGINE”. In case a 1st trip DTC other than P0732 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.**
6. Stop vehicle.
7. Follow the instruction displayed. (Check for normal shifting referring to the table below.)



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

8. Make sure that “OK” is displayed. (If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”.)
   Refer to AT-143, "Diagnostic Procedure" .
   Refer to AT-385, "Shift Schedule" .

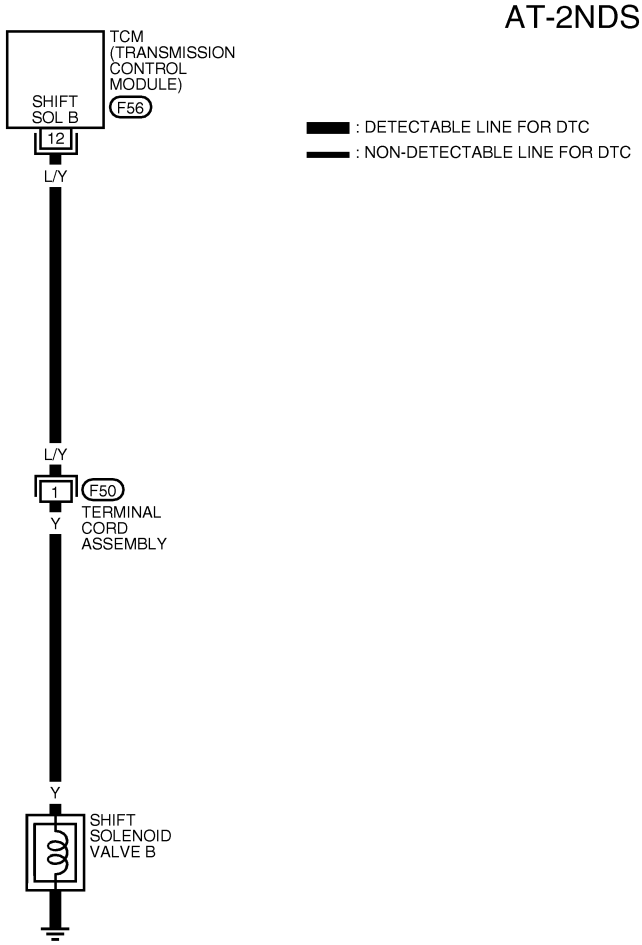
With GST

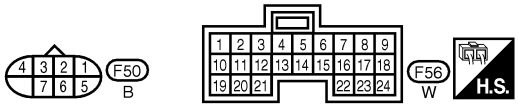
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 2ND

ECS005X9

AT-2NDSIG-01





WAT119

TRANSMISSION CONTROL MODULE TERMINALS AND REFERENCE VALUE BETWEEN TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (Approx.)
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE B DOES NOT OPERATE	0V

WAT344

Diagnostic Procedure

ECS005XA

1. CHECK SHIFT SOLENOID VALVE

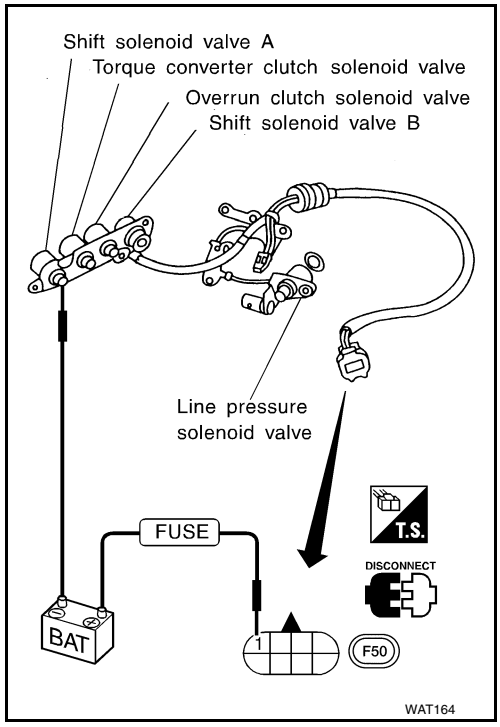
1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check shift solenoid valve operation.

- Shift solenoid valve B

Refer to AT-144, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace shift solenoid valve assembly.



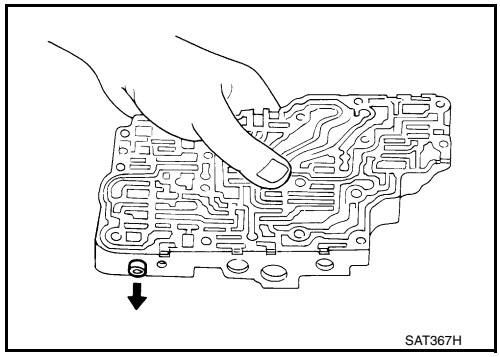
2. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-298, "Disassembly" .
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.

OK or NG

OK >> GO TO 3.
NG >> Repair control valve assembly.



3. CHECK DTC

Perform AT-140, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> Check transaxle internal components (clutch, brake, etc.).

Component Inspection

ECS005XB

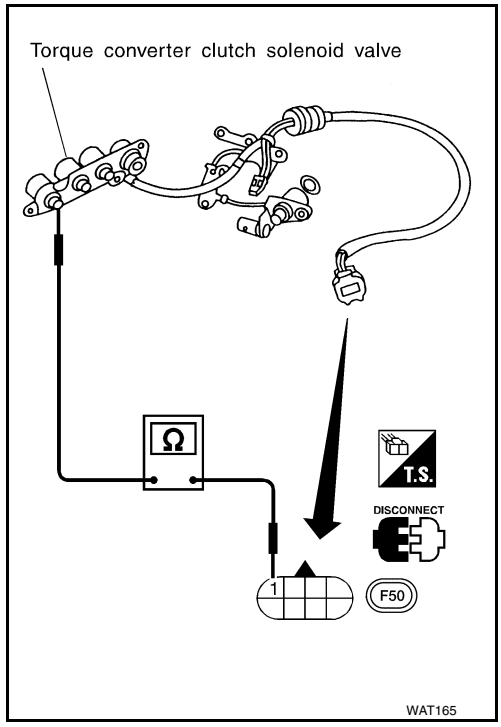
SHIFT SOLENOID VALVE B

- Refer to AT-259, "Control Valve Assembly and Accumulators" .

Resistance Check

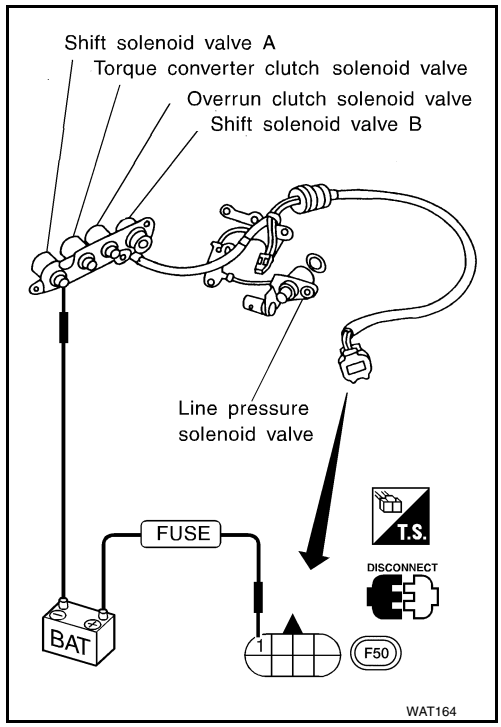
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	1	Ground	5 - 20Ω



Operation Check

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



DTC P0733 A/T 3RD GEAR FUNCTION

PFP:31940

Description

ECS005XC

- 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)

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.

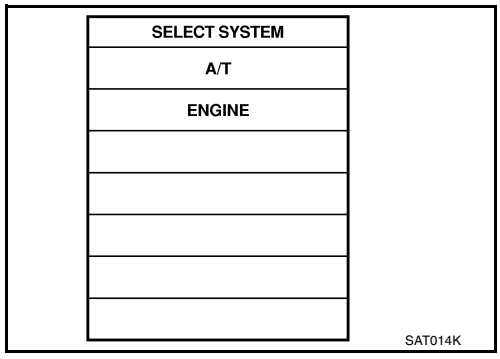
Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 3RD GR FNCTN	A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	• Shift solenoid valve A • Each clutch • Hydraulic control circuit
: P0733		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

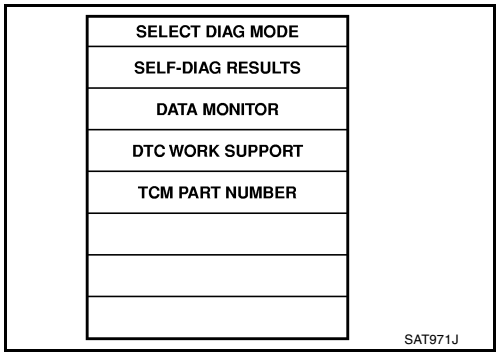
CAUTION:

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

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.

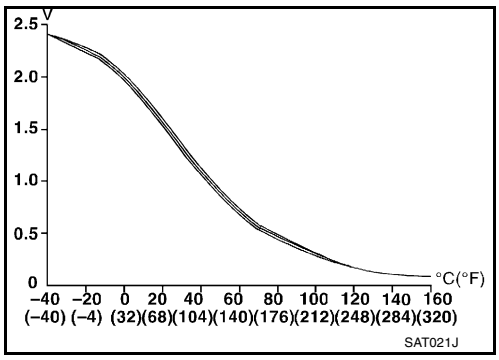


After the repair, perform the following procedure to confirm the malfunction is eliminated.



With CONSULT-II

1. Start engine and select “DATA MONITOR” mode for “A/T” with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3. Select “3RD GR FNCTN P0733” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.
4. Accelerate vehicle to 70 to 85 km/h (43 to 53 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD “ON”)



- **Check that “GEAR” shows “4” after releasing pedal.**

5. Depress accelerator pedal steadily with 3.5/8 - 4.5/8 of “THROTTLE POSI” from a speed of 70 to 85 km/h (43 to 53 MPH) until “TESTING” changes to “STOP VEHICLE” or “COMPLETED”. (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-148, "Diagnostic Procedure" .
   If “STOP VEHICLE” appears on CONSULT-II screen, go to following step.

- **Check that “GEAR” shows “3” when depressing accelerator pedal with 3.5/8 - 4.5/8 of “THROTTLE POSI”.**
- **If “TESTING” does not appear on CONSULT-II for a long time, select “SELF-DIAGNOSIS” for “ENGINE”. In case a 1st trip DTC other than P0733 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.**

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

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

8. Make sure that “OK” is displayed. (If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”.)
   Refer to AT-148, "Diagnostic Procedure" .
   Refer to AT-385, "Shift Schedule" .

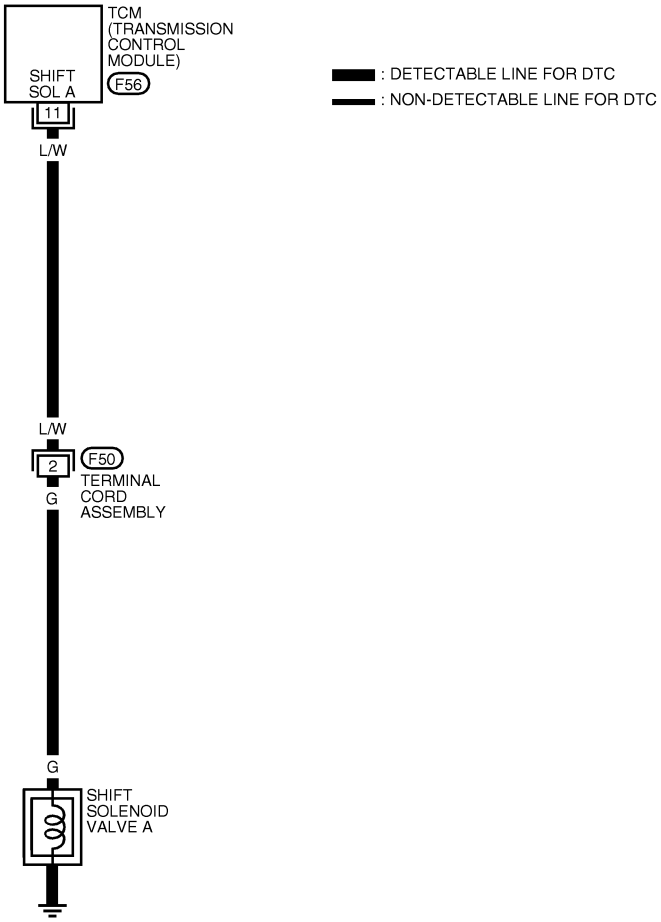
With GST

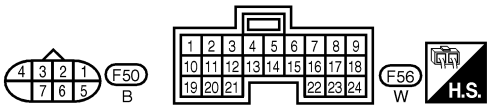
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 3RD

ECS005XD

AT-3RDSIG-01





WAT120

TRANSMISSION CONTROL MODULE TERMINALS AND REFERENCE VALUE BETWEEN TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (Approx.)
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A DOES NOT OPERATE	0V

WAT345

Diagnostic Procedure

ECS005XE

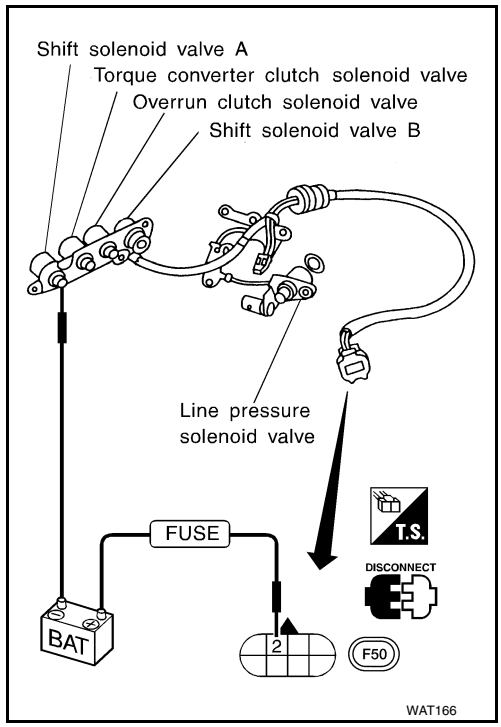
1. CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check shift solenoid valve operation.

- Shift solenoid valve A
  Refer to “Component Inspection”.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace shift solenoid valve assembly.



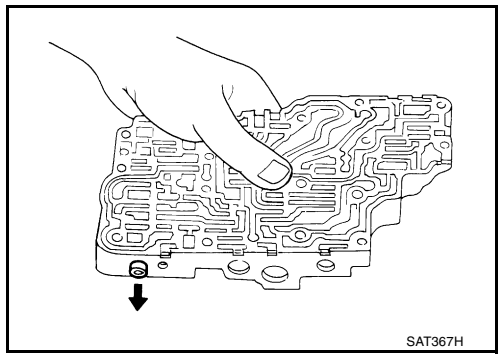
2. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-298, "Disassembly" .
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.

OK or NG

OK >> GO TO 3.
NG >> Repair control valve assembly.



3. CHECK DTC

Perform AT-145, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> Check transaxle internal components (clutch, brake, etc.).

Component Inspection

ECS005XF

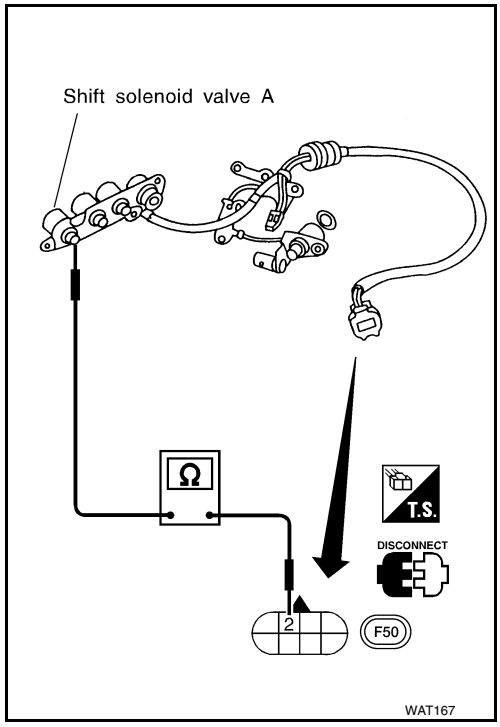
SHIFT SOLENOID VALVE A

- Refer to AT-259, "REMOVAL" .

Resistance Check

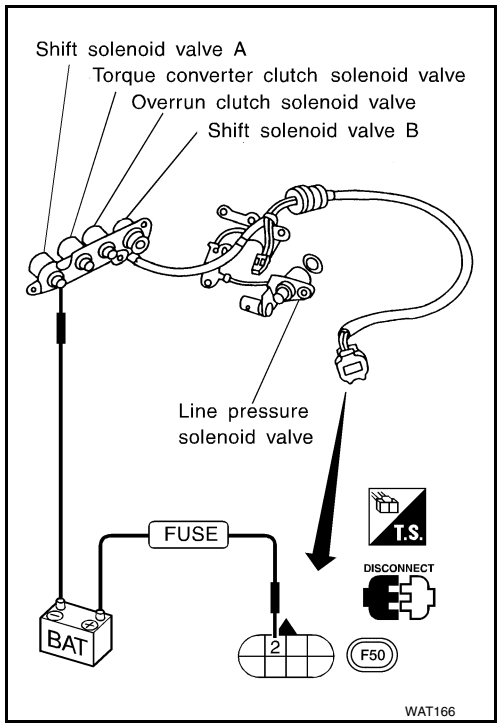
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30Ω



Operation Check

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



DTC P0734 A/T 4TH GEAR FUNCTION

PFP:31940

Description

ECS005XG

- 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 when the line pressure is low. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.

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

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

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%

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	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

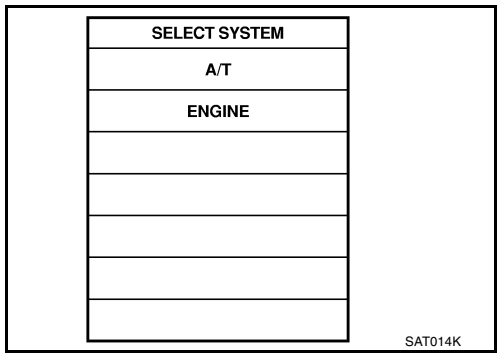
CAUTION:

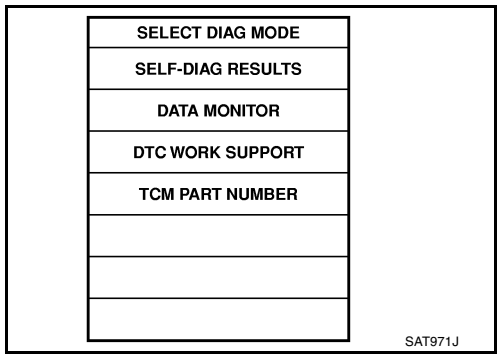
- **Always drive vehicle at a safe speed.**
- **If conducting this "DTC CONFIRMATION PROCEDURE" again, always turn ignition switch "OFF" and wait at least 5 seconds before continuing.**
- **Be careful not to rev engine into the red zone on the tachometer.**

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

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

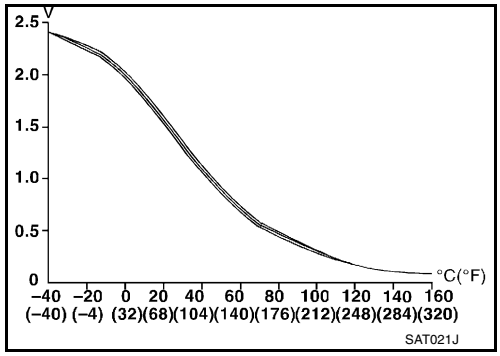
After the repair, perform the following procedure to confirm the malfunction is eliminated.





With CONSULT-II

1. Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).



3. Select "4TH GR FNCTN P0734" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4. Accelerate vehicle to 45 to 55 km/h (28 to 34 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 5.5/8 (at all times during step 4)
   Selector lever: D position (OD "ON")
   - **Check that "GEAR" shows "3" after releasing pedal.**
5. Depress accelerator pedal steadily with 1.0/8 - 2.0/8 of "THROTTLE POSI" from a speed of 45 to 55 km/h (28 to 34 MPH) until "TESTING" has turned to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-154, "Diagnostic Procedure" .
   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 AT-154, "Diagnostic Procedure" .
   Refer to AT-385, "Shift Schedule" .

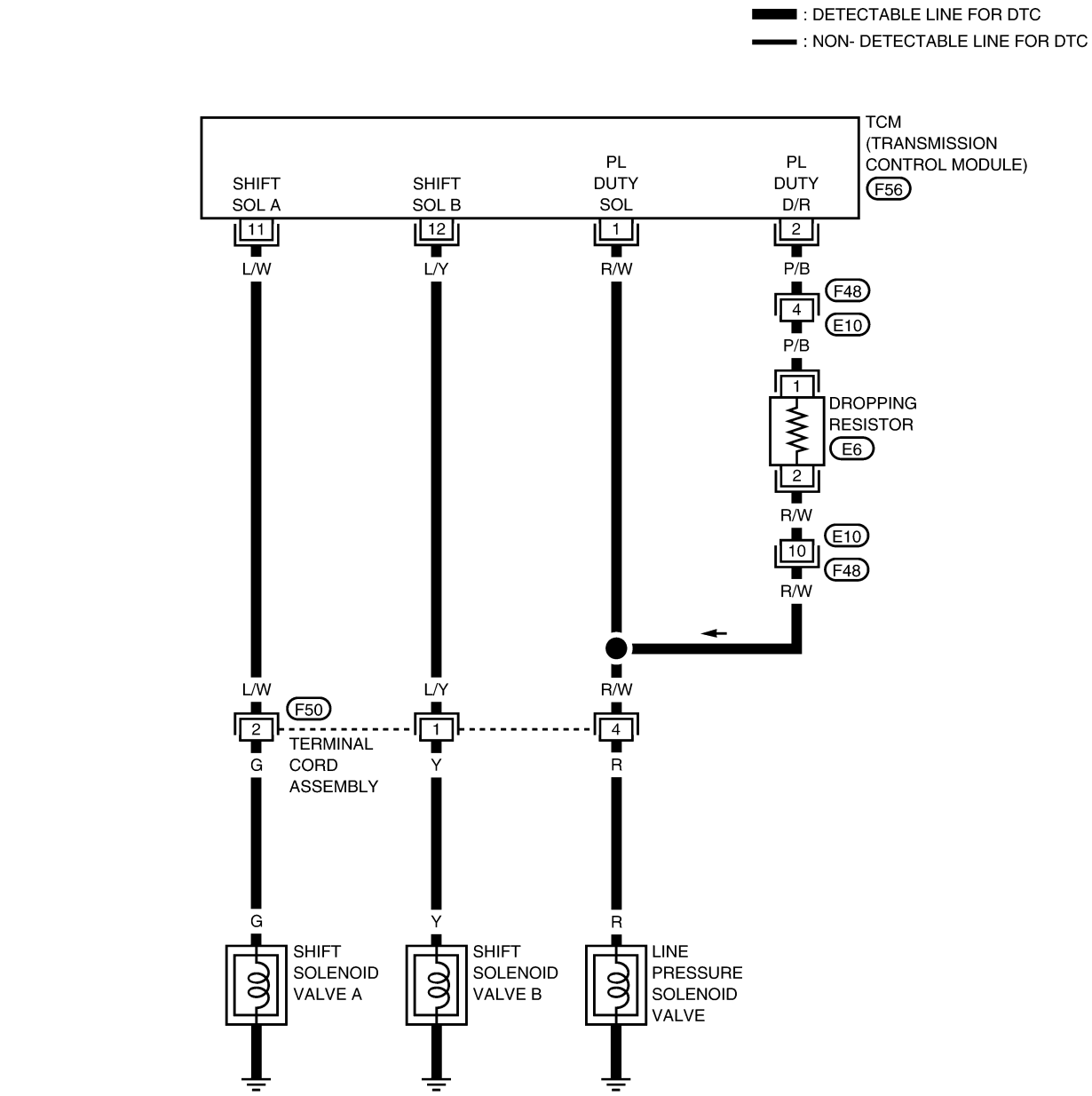
With GST

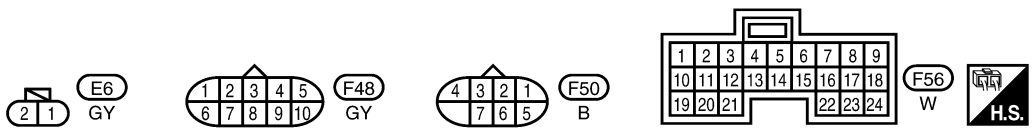
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 4TH

ECS005XH

AT-4THSIG-01





WCWA0065E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	R/W	LINE PRESSURE SOLENOID VALVE	WHEN RELEASING ACCELERATOR PEDAL (ENGINE WARM)	1.5 - 2.5V
			WHEN DEPRESSING ACCELERATOR PEDAL (ENGINE WARM)	0V
2	P/B	LINE PRESSURE SOLENOID VALVE (WITH DROPPING RESISTOR)	WHEN RELEASING ACCELERATOR PEDAL (ENGINE WARM)	5 - 14V
			WHEN DEPRESSING ACCELERATOR PEDAL (ENGINE WARM)	0.5V OR LESS
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A DOES NOT OPERATES	0V
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE B DOES NOT OPERATES	0V

Diagnostic Procedure

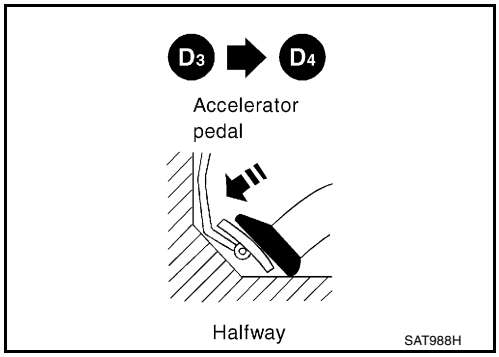
ECS005XI

1. CHECK SHIFT UP (D_3 TO D_4)

During “Cruise Test – Part 1” (AT-77, "Cruise Test — Part 1"), does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 9.
No >> GO TO 2.



2. CHECK LINE PRESSURE

Perform line pressure test.
Refer to AT-67, "Line Pressure Test" .

Engine speed rpm	Line pressure kPa (kg/cm², psi)	
	D, 2 and 1 positions	R position
Idle	500 (5.1, 73)	778 (7.9, 113)
Stall	1,167 (11.9, 169)	1,816 (18.5, 263)

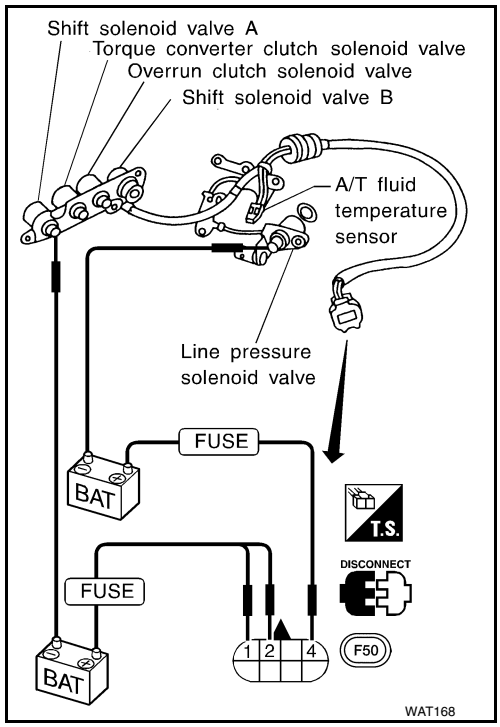
LAT236

OK or NG

OK >> GO TO 3.
NG >> GO TO 6.

3. CHECK SOLENOID VALVES

1. Remove control valve assembly.
   Refer to AT-259, "REMOVAL" .
2. Refer to AT-158, "SOLENOID VALVES" .



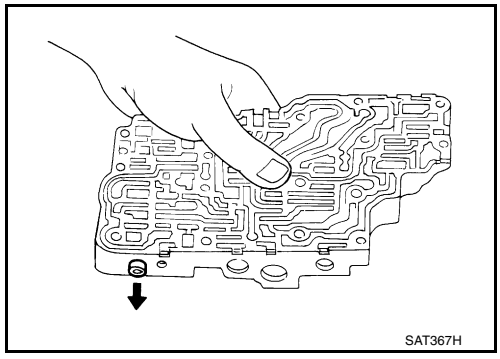
OK or NG

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

4. CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-298, "Disassembly" .
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.



OK or NG

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

5. CHECK SHIFT UP (D_3 TO D_4)

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

OK or NG

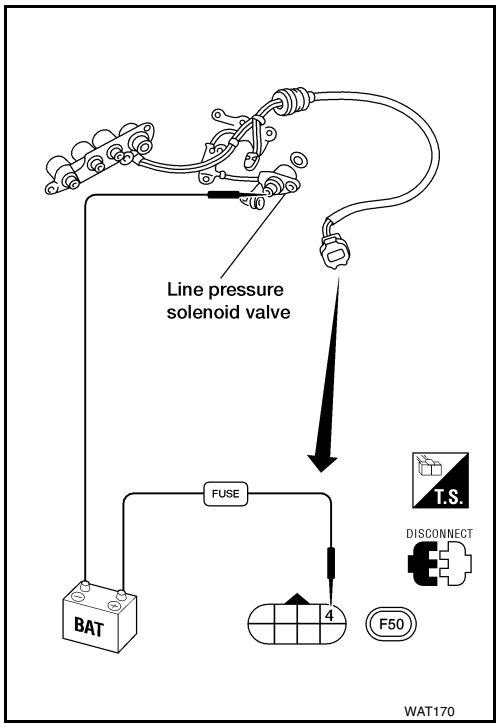
OK >> GO TO 9.
NG >> Check transaxle internal components (clutch, brake, etc.).

6. CHECK LINE PRESSURE SOLENOID VALVE

1. Remove control valve assembly.
   Refer to AT-259, "REMOVAL" .
2. Refer to AT-158, "Component Inspection" .

OK or NG

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



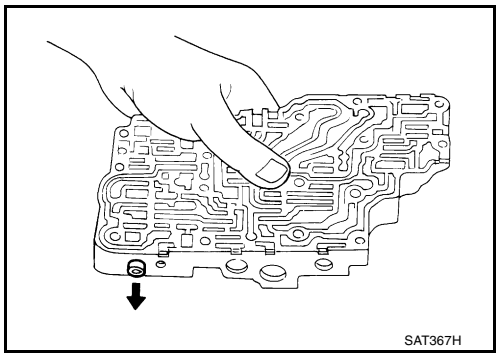
7. CHECK CONTROL VALVE

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

- Pressure regulator valve
- Pilot valve
- Pressure modifier valve

OK or NG

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



8. CHECK SHIFT UP (D_3 TO D_4)

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

Yes or No

Yes >> GO TO 9.
No >> Check transaxle internal components (clutch, brake, etc.).

9. CHECK DTC

Perform AT-151, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**

NG >> Perform “Cruise Test — Part 1” (AT-77, "Cruise Test — Part 1") again and return to the start point of this test group.

Component Inspection

ECS005XJ

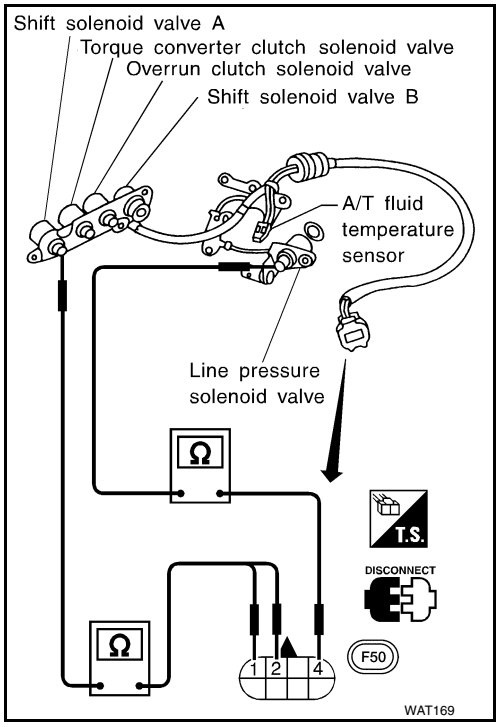
SOLENOID VALVES

- Refer to AT-259, "REMOVAL" .

Resistance Check

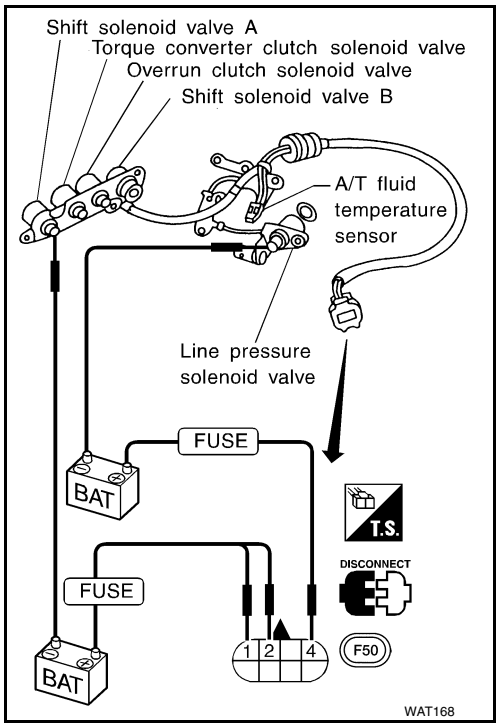
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30Ω
Shift solenoid valve B	1		5 - 20Ω
Line pressure solenoid valve	4		2.5 - 5Ω



Operation Check

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



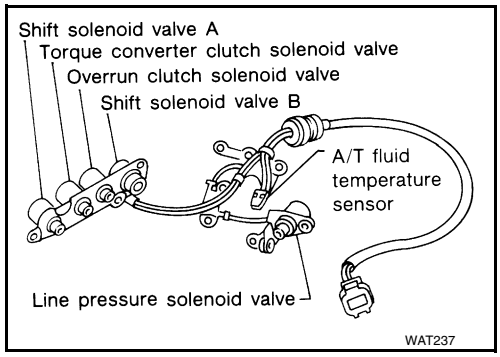
DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

PFP:31940

Description

ECS005XK

The torque converter clutch solenoid valve is activated, with the gear in "D4 ", by the TCM in response to signals sent from the vehicle speed sensor and throttle position sensor [accelerator pedal position (APP) sensor]s. Lock-up piston operation will then be controlled.
Lock-up operation, however, is prohibited when A/T fluid temperature is too low.
When the accelerator pedal is depressed (less than 2/8) in lock-up condition, the engine speed should not change abruptly. If there is a big jump in engine speed, there is no lock-up.



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

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%

ON BOARD DIAGNOSIS LOGIC

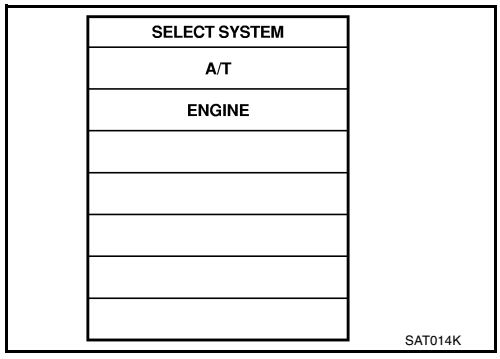
Diagnostic trouble code	Malfunction is detected when...	Check items (Possible cause)
: TCC SOLENOID/CIRC : P0740	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • T/C clutch solenoid valve

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

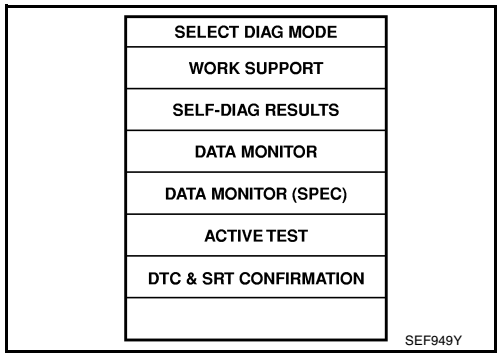
With CONSULT-II

1. Turn ignition switch "ON".



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

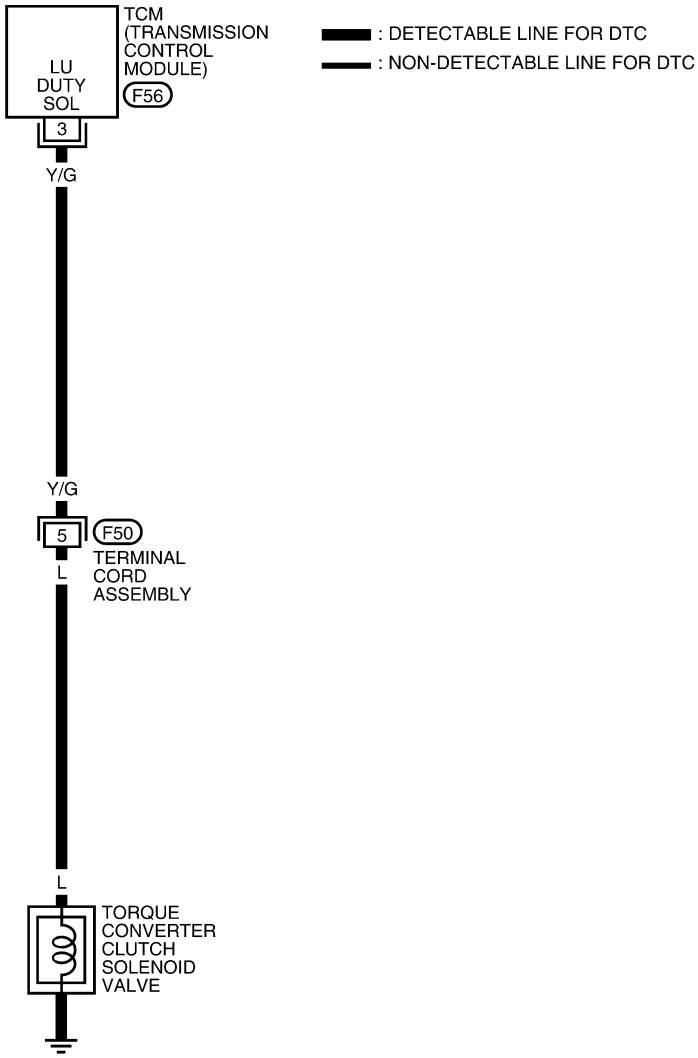
With GST
Follow the procedure "With CONSULT-II".

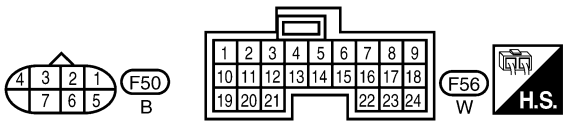


Wiring Diagram — AT — TCV

ECS005XL

AT-TCV-01





WCWA0066E

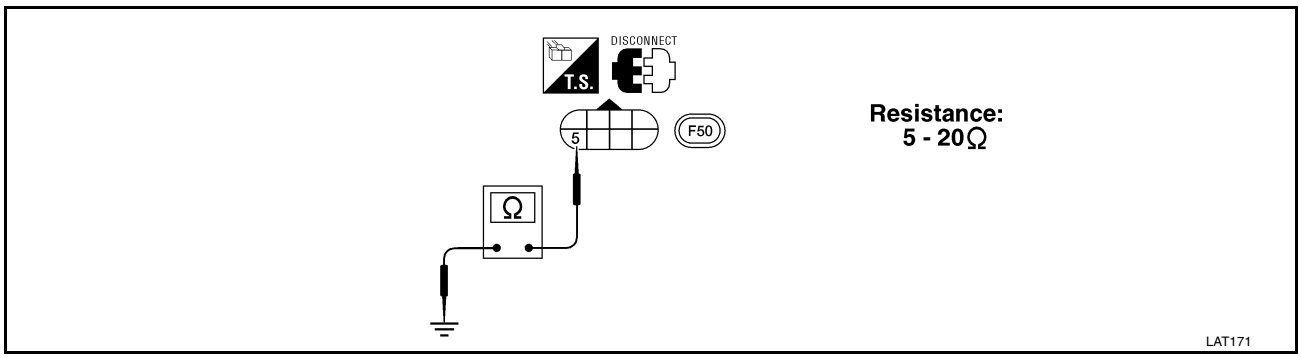
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
3	Y/G	TORQUE CONVERTER CLUTCH SOLENOID VALVE	WHEN A/T PERFORMS LOCK-UP	8 - 15V
			WHEN A/T DOES NOT PERFORM LOCK-UP	0V

Diagnostic Procedure

ECS005XM

1. CHECK VALVE RESISTANCE

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



OK or NG

OK >> GO TO 2.
NG >> 1. Remove oil pan. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Torque converter clutch solenoid valve
Refer to AT-162, "TORQUE CONVERTER CLUTCH SOLENOID VALVE" .
- Harness of terminal cord assembly for short or open

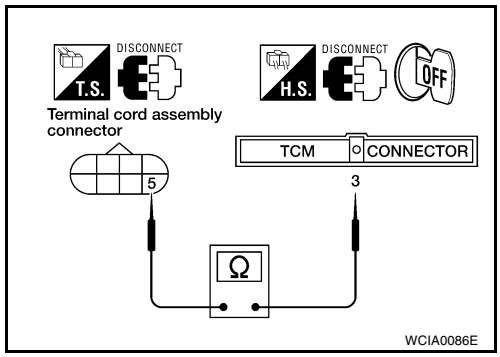
2. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector F56.
3. Check continuity between terminal cord assembly F50 terminal 5 (Y/G) and TCM harness connector terminal 3 (Y/G).

Continuity should exist.

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

4. Reinstall any part removed.



OK or NG

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

3. CHECK DTC

Perform AT-159, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

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

Component Inspection

ECS005XN

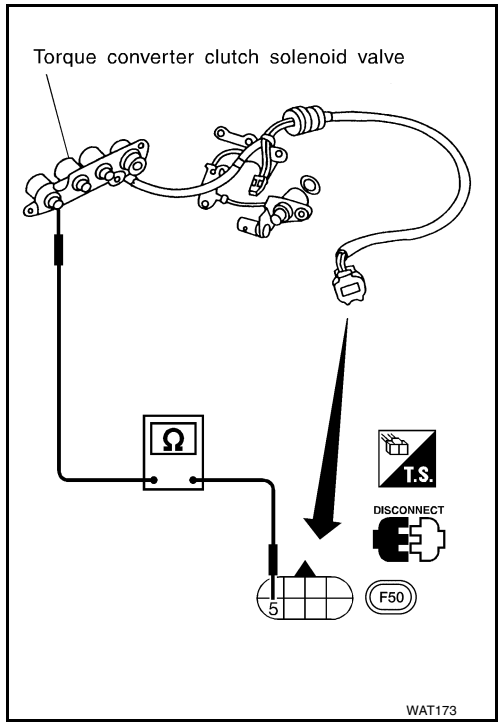
TORQUE CONVERTER CLUTCH SOLENOID VALVE

- Refer to AT-259, "REMOVAL" .

Resistance Check

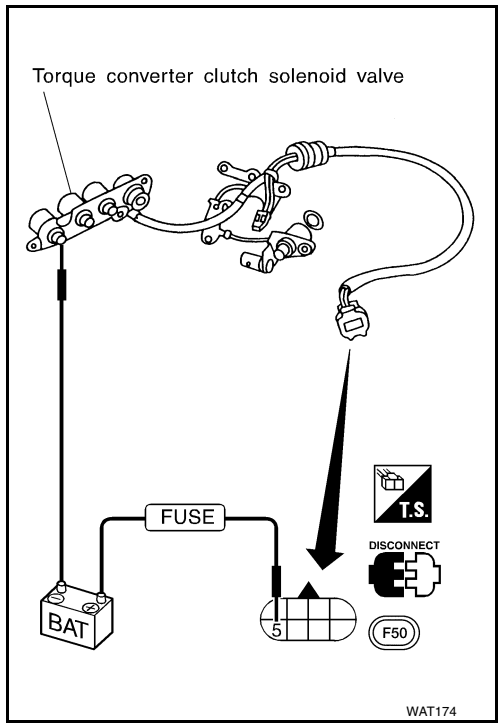
- Check resistance between two terminals.

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



Operation Check

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



DTC P0744 A/T TCC S/V FUNCTION (LOCK-UP)

PFP:31940

Description

ECS005XO

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

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

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%

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	A/T cannot perform lock-up even if electrical circuit is good.	● Torque converter clutch solenoid valve ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit

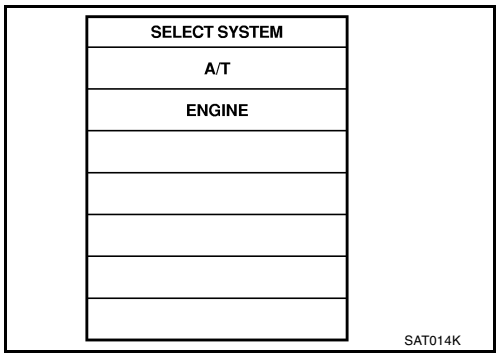
DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

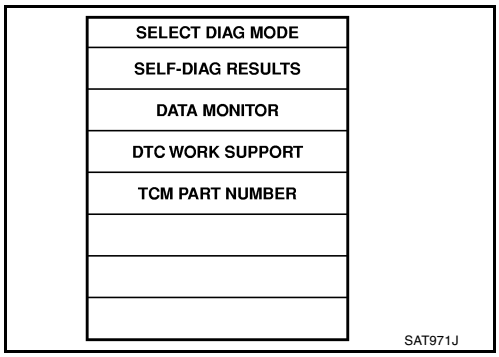
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

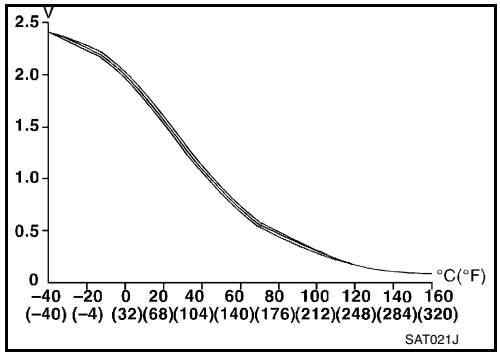
With CONSULT-II

1. Start engine and select "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 "TCC S/V FNCTN P0744" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".





4. Accelerate vehicle to more than 80 km/h (50 MPH) and maintain the following condition continuously until “TESTING” has turned to “COMPLETE”. (It will take approximately 30 seconds after “TESTING” shows.)
THROTTLE POSI: 1.0/8 - 2.0/8 (at all times during step 4)
Selector lever: D position (OD “ON”)
TCC S/V DUTY: More than 94%
VHCL/S SE·A/T: Constant speed of more than 80 km/h (50 MPH)



- **Check that “GEAR” shows “4”.**
- **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”.**

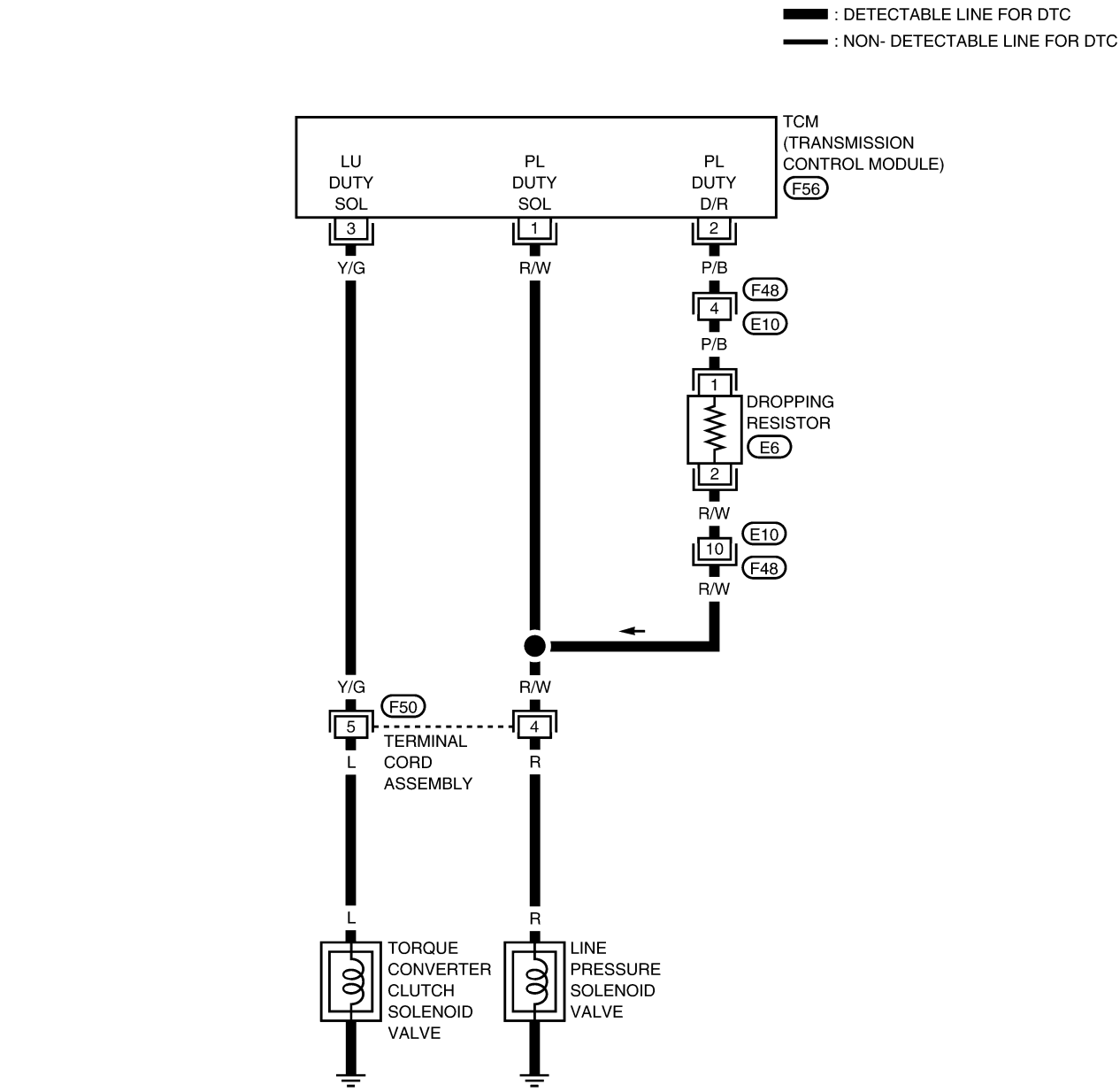
5. Make sure that “OK” is displayed. (If “NG” is displayed, refer to AT-167, "Diagnostic Procedure" .)
Refer to AT-167, "Diagnostic Procedure" .
Refer to AT-385, "Shift Schedule" .

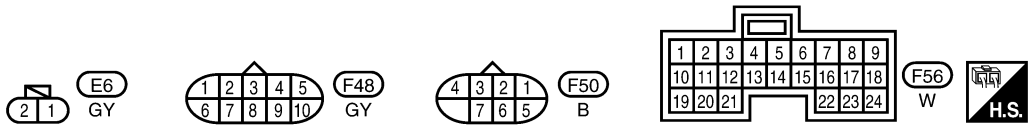
With GST
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — TCCSIG

ECS005XP

AT-TCCSIG-01





WCWA0067E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	R/W	LINE PRESSURE SOLENOID VALVE	WHEN RELEASING ACCELERATOR PEDAL (ENGINE WARM)	1.5 - 2.5V
			WHEN DEPRESSING ACCELERATOR PEDAL (ENGINE WARM)	0.5V OR LESS
2	P/B	LINE PRESSURE SOLENOID VALVE (WITH DROPPING RESISTOR)	WHEN RELEASING ACCELERATOR PEDAL (ENGINE WARM)	5 - 14V
			WHEN DEPRESSING ACCELERATOR PEDAL (ENGINE WARM)	0.5V OR LESS
3	Y/G	TORQUE CONVERTER CLUTCH SOLENOID VALVE	WHEN A/T PERFORMS LOCK-UP	8 - 14V
			WHEN A/T DOES NOT PERFORM LOCK-UP	0V

Diagnostic Procedure

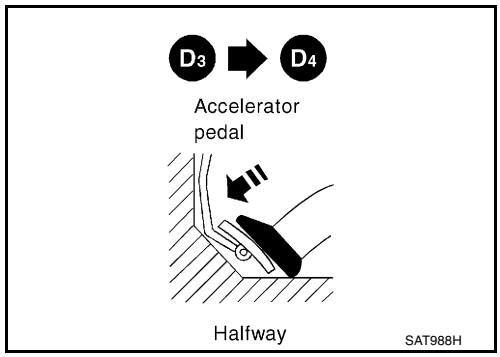
ECS005XQ

1. CHECK SHIFT UP (D_3 TO D_4)

During “Cruise Test – Part 1” (AT-77, "Cruise Test — Part 1"), does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 10.
No >> GO TO 2.



2. CHECK LINE PRESSURE

Perform line pressure test.
Refer to AT-67, "Line Pressure Test" .

Engine speed rpm	Line pressure kPa (kg/cm², psi)	
	D, 2 and 1 positions	R position
Idle	500 (5.1, 73)	778 (7.9, 113)
Stall	1,167 (11.9, 169)	1,816 (18.5, 263)

LAT236

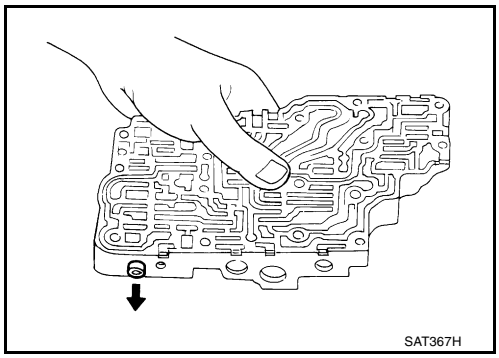
OK or NG

OK >> GO TO 3.
NG >> GO TO 6.

3. CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-298, "Disassembly" .
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.



OK or NG

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

4. CHECK SHIFT UP (D_3 TO D_4)

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

Yes or No

Yes >> GO TO 5.
No >> Check transaxle internal components (clutch, brake, etc.).

5. CHECK DTC

Perform AT-164, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

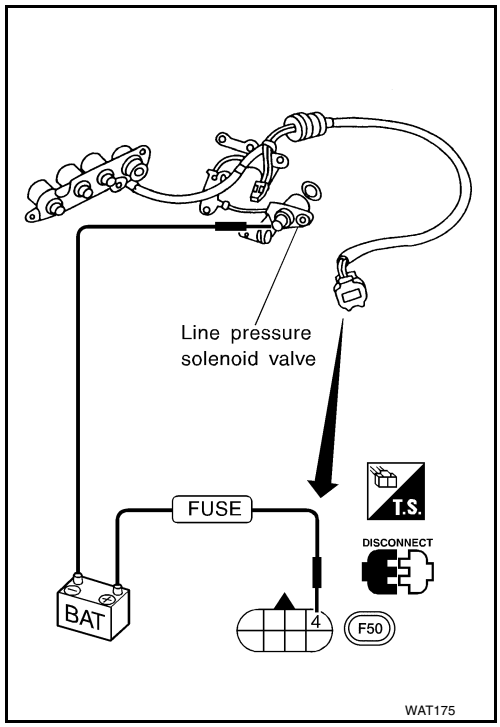
OK >> **INSPECTION END**
NG >> GO TO 10. Check lock-up condition.

6. CHECK LINE PRESSURE SOLENOID VALVE

1. Remove control valve assembly.
   Refer to AT-259, "REMOVAL" .
2. Check line pressure solenoid valve operation.
   Refer to AT-177, "Component Inspection" .

OK or NG

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



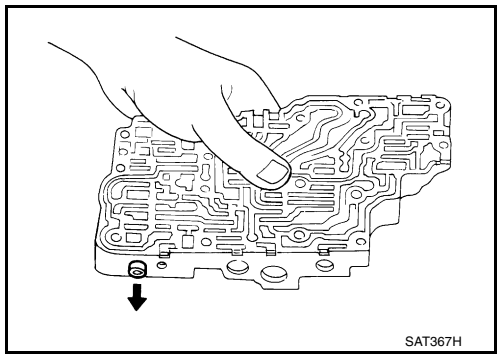
7. CHECK CONTROL VALVE

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

- Pressure regulator valve
- Pilot valve
- Pressure modifier valve

OK or NG

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



8. CHECK SHIFT UP (D_3 TO D_4)

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

Yes or No

Yes >> GO TO 9.
No >> Check transaxle internal components (clutch, brake, etc.).

9. CHECK DTC

Perform AT-164, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

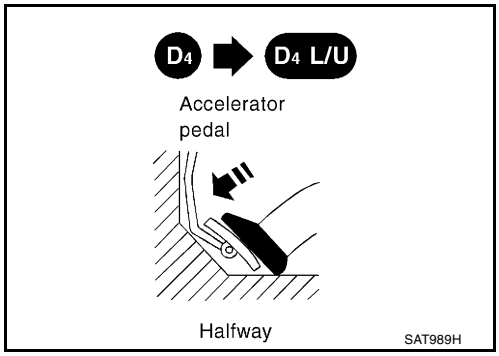
OK >> **INSPECTION END**
NG >> GO TO 10. Check for proper lock-up.

10. CHECK LOCK-UP CONDITION

During “Cruise Test – Part 1” (AT-77, "Cruise Test — Part 1"), does A/T perform lock-up at the specified speed?

Yes or No

Yes >> Perform “Cruise Test – Part 1” (AT-77, "Cruise Test — Part 1") again and return to the start point of this test group.
No >> GO TO 11.

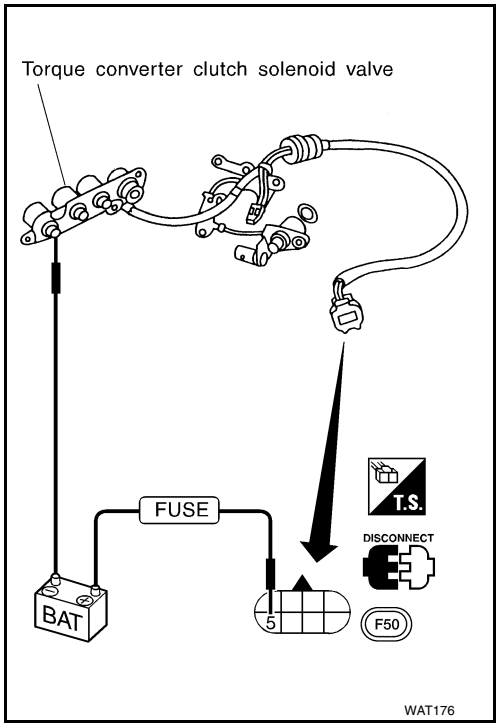


11. CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE

1. Remove control valve assembly.
   Refer to AT-259, "REMOVAL" .
2. Check torque converter clutch solenoid valve operation. Refer to AT-162, "TORQUE CONVERTER CLUTCH SOLENOID VALVE" .

OK or NG

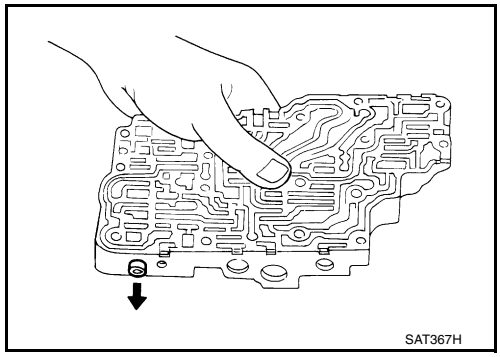
OK >> GO TO 12.
NG >> Replace solenoid valve assembly.



12. CHECK CONTROL VALVE

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

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



OK or NG

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

13. CHECK LOCK-UP CONDITION

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

Yes or No

Yes >> GO TO 14.
No >> Check transaxle internal components (clutch, brake, etc.).

14. CHECK DTC

Perform AT-164, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> Perform “Cruise Test — Part 1” (AT-77, "Cruise Test — Part 1") again and return to the start point of this test group.

Component Inspection

ECS005XR

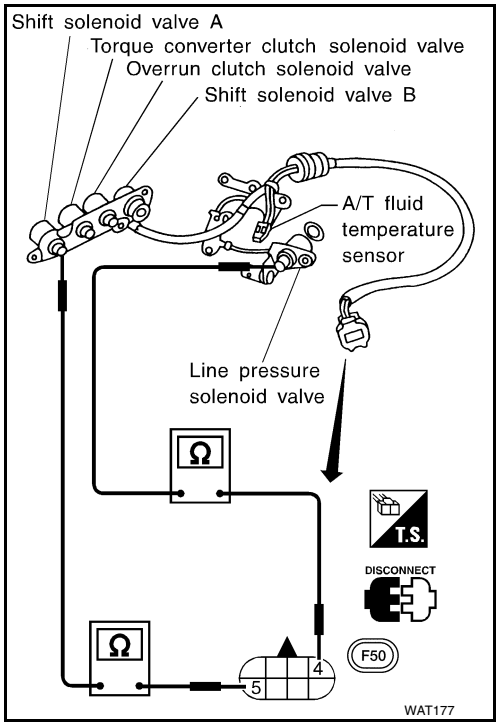
SOLENOID VALVES

- Refer to AT-259, "REMOVAL" .

Resistance Check

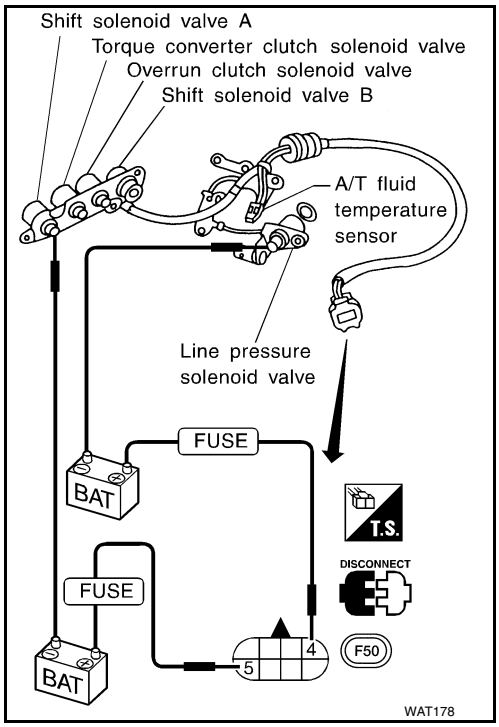
- Check resistance between two terminals.

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



Operation Check

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



DTC P0745 LINE PRESSURE SOLENOID VALVE

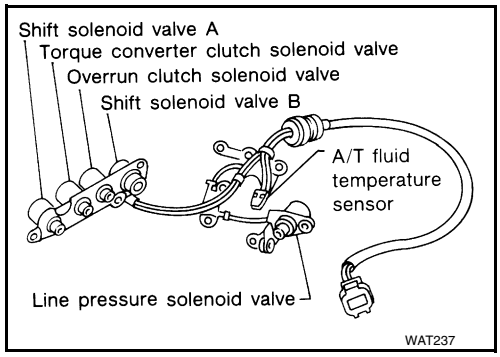
PFP:31940

Description

ECS005XS

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

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



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

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".

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: L/PRESS SOL/CIRC : P0745	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

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

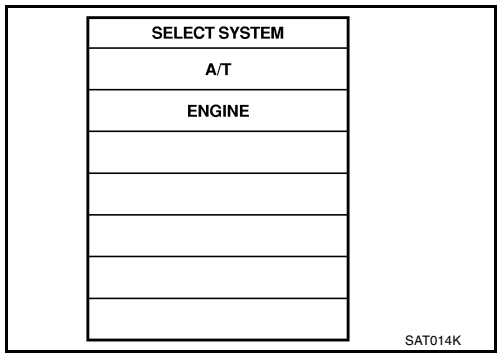
NOTE:

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.

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

With CONSULT-II

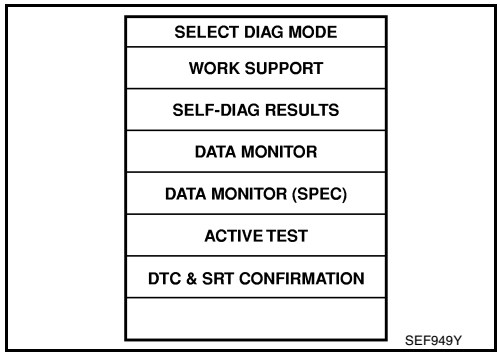
1. Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.



2. Depress accelerator pedal completely and wait at least 5 seconds.

With GST

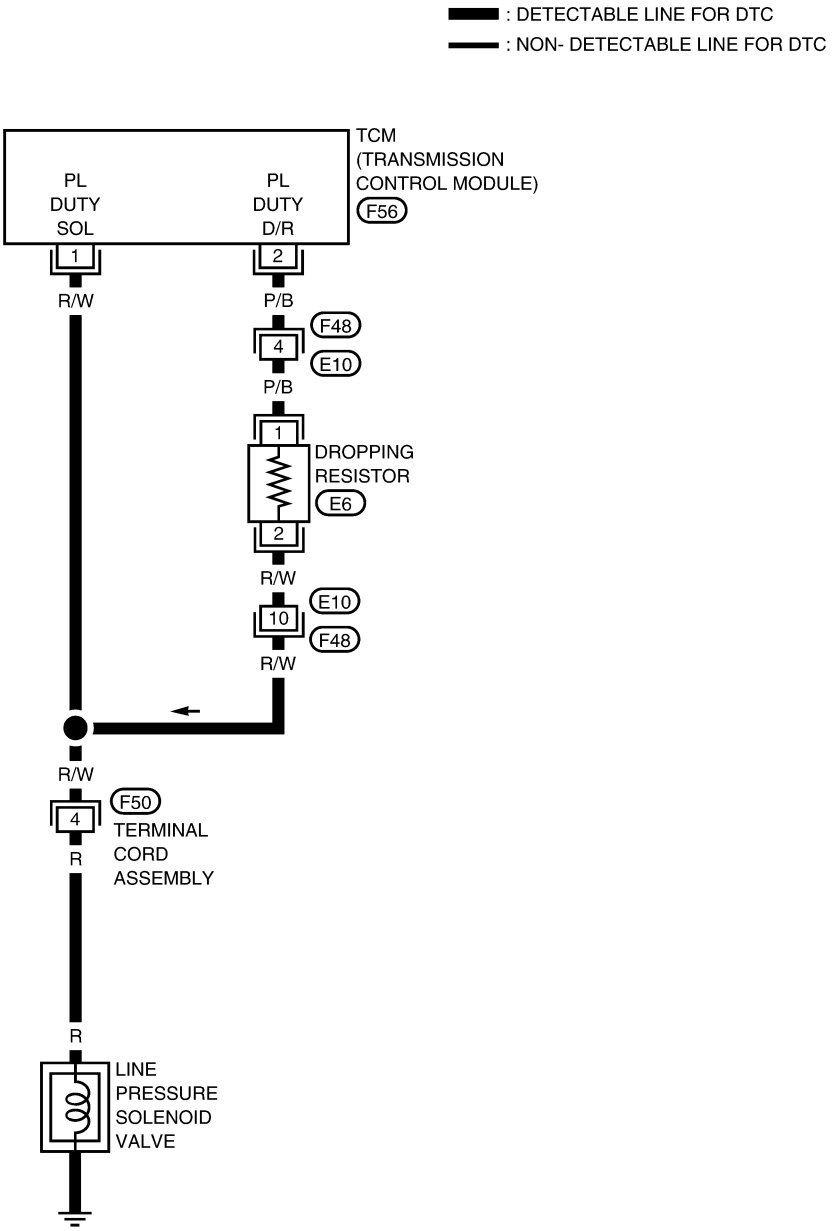
Follow the procedure "With CONSULT-II".

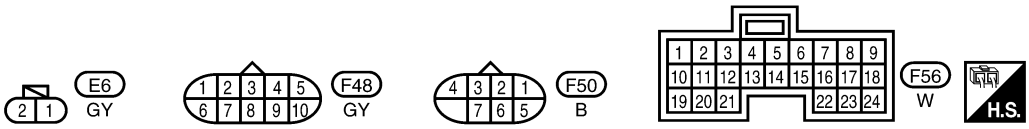


Wiring Diagram — AT — LPSV

ECS005XT

AT-LPSV-01





WCWA0068E

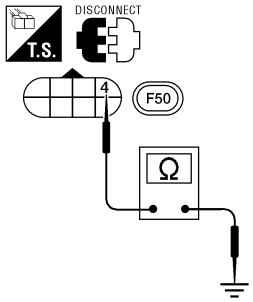
TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	R/W	LINE PRESSURE SOLENOID VALVE	WHEN RELEASING ACCELERATOR PEDAL (ENGINE WARM)	1.5 - 3.0V
			WHEN DEPRESSING ACCELERATOR PEDAL (ENGINE WARM)	0.5V OR LESS
2	P/B	LINE PRESSURE SOLENOID VALVE (WITH DROPPING RESISTOR)	WHEN RELEASING ACCELERATOR PEDAL (ENGINE WARM)	5 - 14v
			WHEN DEPRESSING ACCELERATOR PEDAL (ENGINE WARM)	0.5V OR LESS

Diagnostic Procedure

ECS005XU

1. CHECK VALVE RESISTANCE

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



Resistance:
2.5 - 5Ω

LAT179

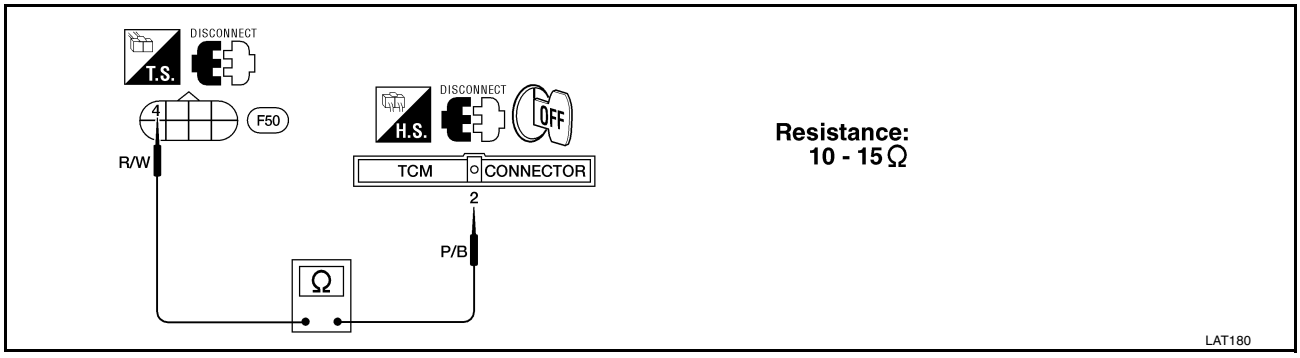
OK or NG

OK >> GO TO 2.

NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Line pressure solenoid valve
  Refer to AT-177, "Component Inspection" .
- Harness of terminal cord assembly for short or open

2. CHECK POWER SOURCE CIRCUIT

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



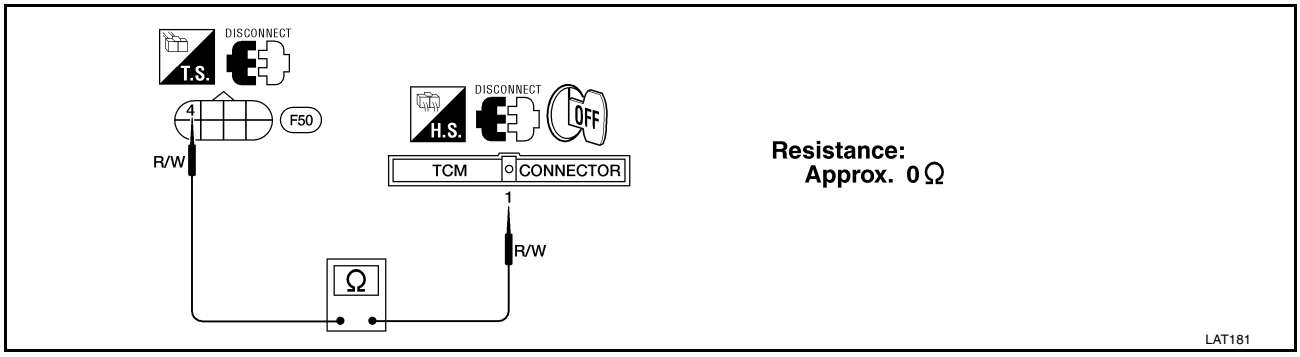
OK or NG

OK >> GO TO 3.
NG >> Check the following items:

- Dropping resistor
  Refer to AT-178, "DROPPING RESISTOR" .
- Harness for short or open between TCM terminal 2 and terminal cord assembly (Main harness)

3. CHECK POWER SOURCE CIRCUIT

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



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

3. Reinstall any part removed.

OK or NG

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

4. CHECK DTC

Perform AT-173, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

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

Component Inspection

ECS005XV

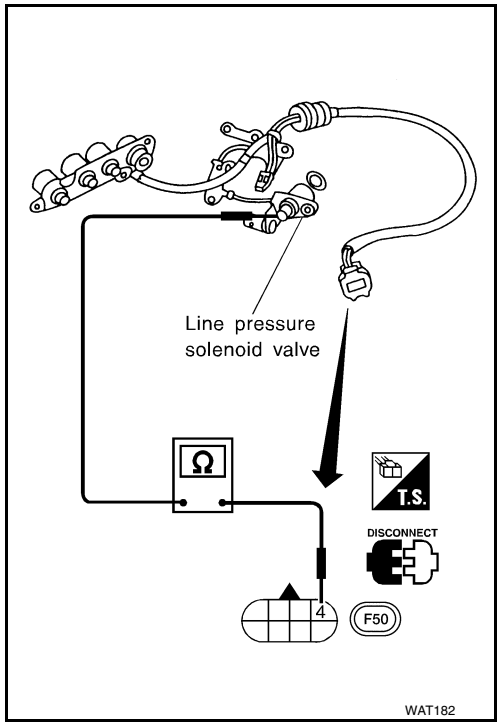
LINE PRESSURE SOLENOID VALVE

- Refer to AT-259, "REMOVAL" .

Resistance Check

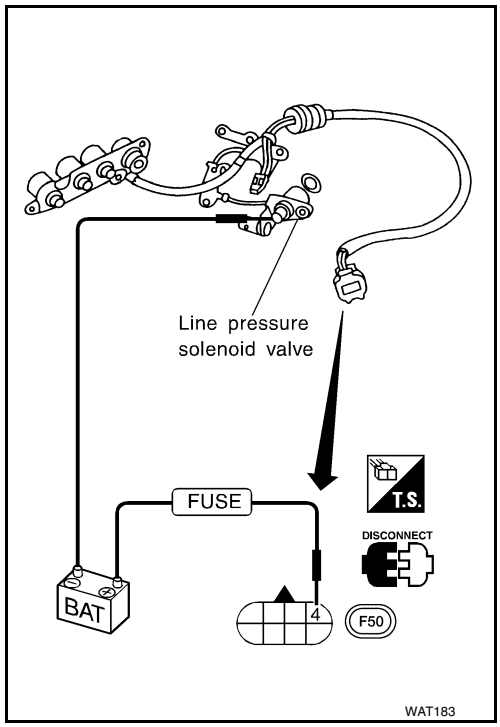
- Check resistance between two terminals.

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



Operation Check

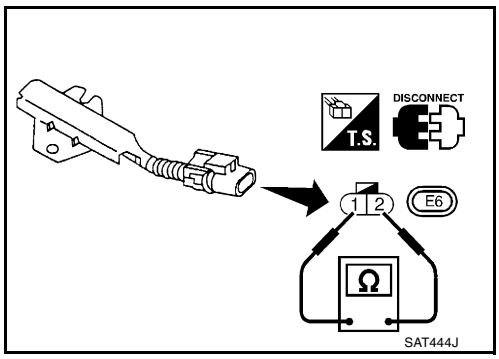
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground.



DROPPING RESISTOR

- Check resistance between two terminals.

Resistance : 10 - 15Ω



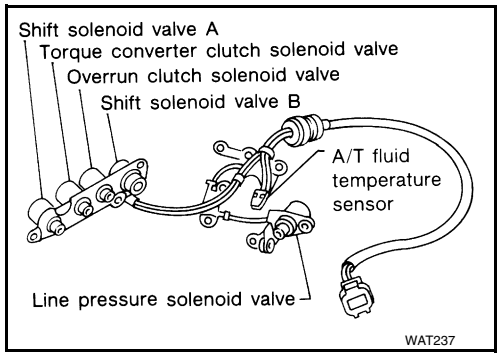
DTC P0750 SHIFT SOLENOID VALVE A

PFP:31940

Description

ECS005XW

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 sensor and throttle position sensor [accelerator pedal position (APP) sensor]. 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)

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: SFT SOL A/CIRC : P0750	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

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

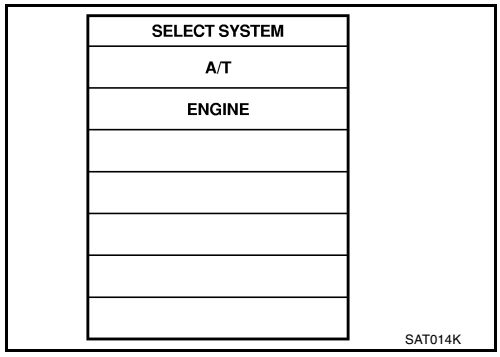
NOTE:

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

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

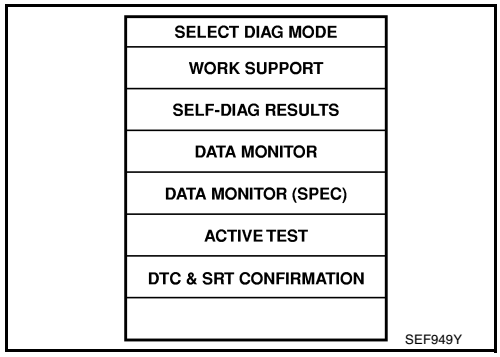
With CONSULT-II

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



With GST

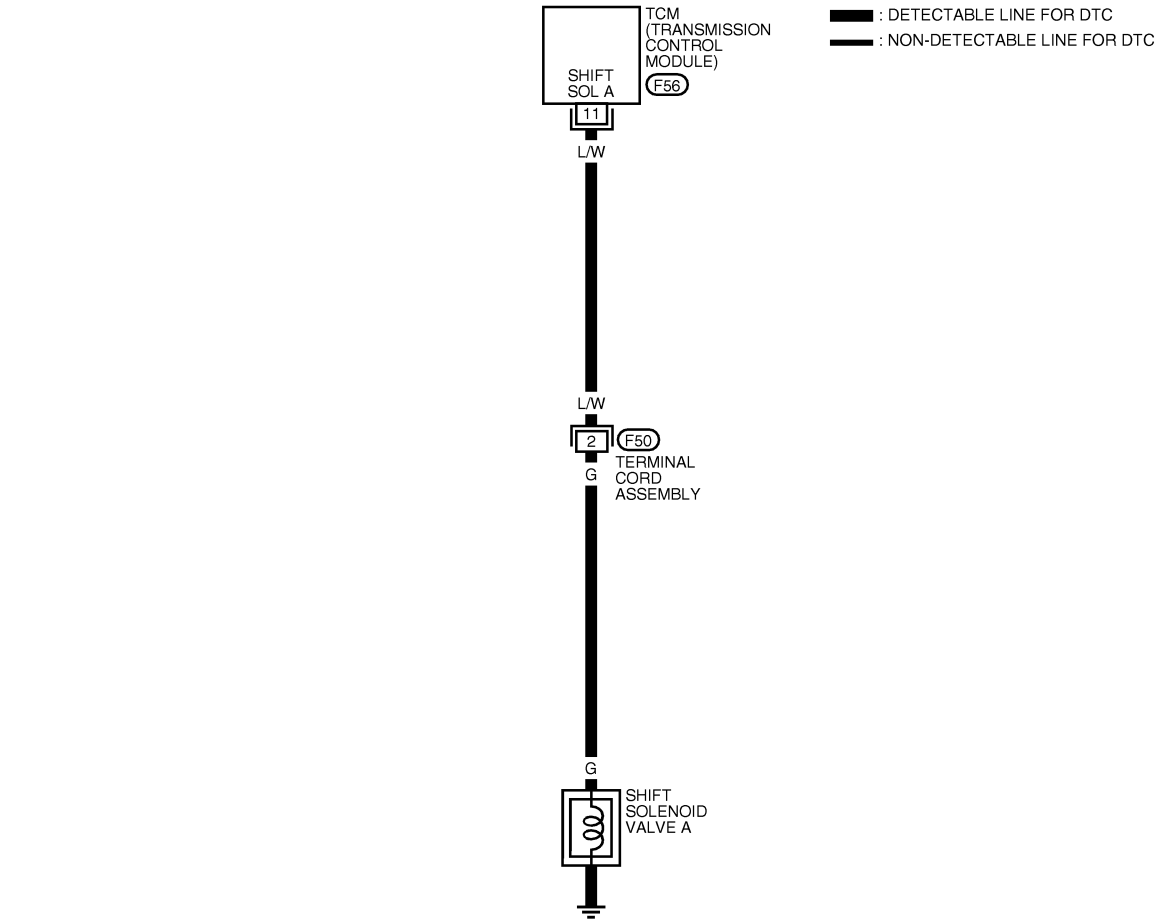
Follow the procedure “With CONSULT-II”.

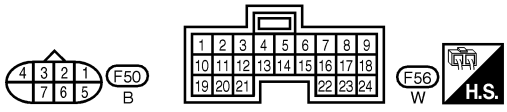


Wiring Diagram — AT — SSV/A

ECS005XX

AT-SSV/A-01





WAT125

TRANSMISSION CONTROL MODULE TERMINALS AND REFERENCE VALUE BETWEEN TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (Approx.)
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A DOES NOT OPERATE	0V

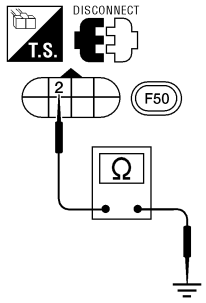
WAT345

Diagnostic Procedure

ECS005XY

1. CHECK VALVE RESISTANCE

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



Resistance:
20 - 30 Ω

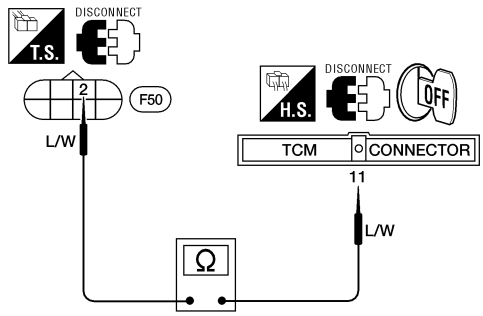
LAT184

OK or NG

OK >> GO TO 2.
NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Shift solenoid valve A
  Refer to AT-182, "Component Inspection" .
- Harness of terminal cord assembly for short or open

2. CHECK POWER SOURCE CIRCUIT

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



Continuity should exist.

LAT185

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

4. Reinstall any part removed.

OK or NG

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

3. CHECK DTC

Perform AT-179, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

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

Component Inspection

ECS005XZ

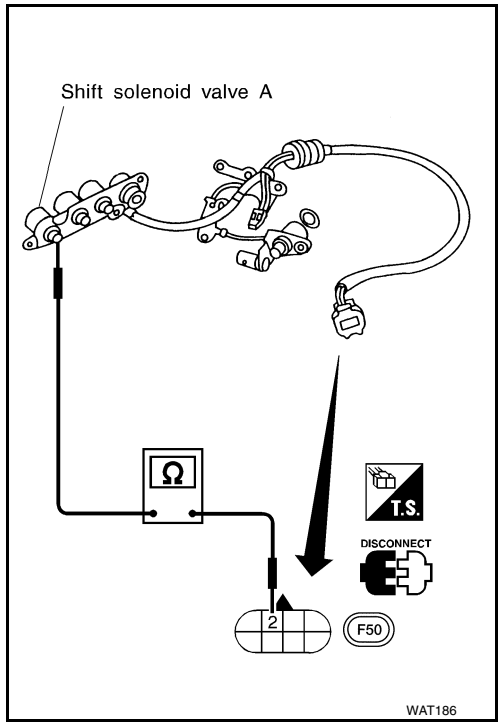
SHIFT SOLENOID VALVE A

- Refer to AT-182, "Component Inspection" .

Resistance Check

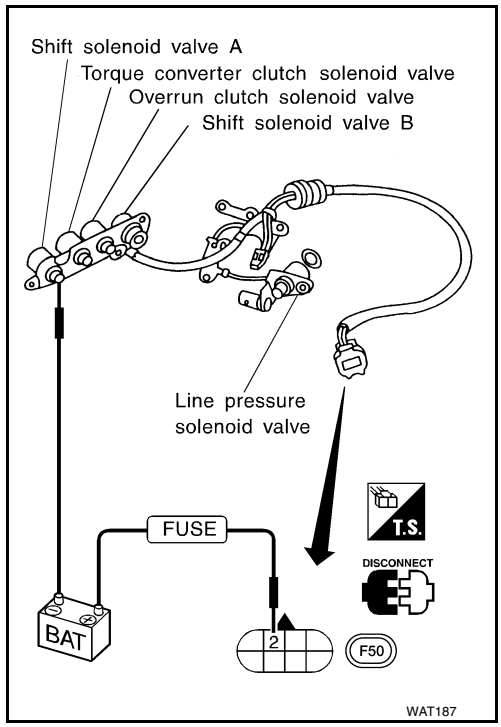
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30Ω



Operation Check

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



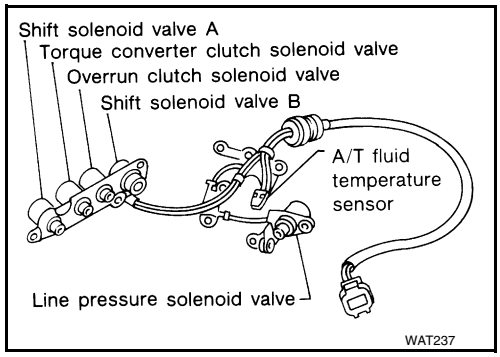
DTC P0755 SHIFT SOLENOID VALVE B

PFP:31940

Description

ECS005Y0

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)

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: SFT SOL B/CIRC : P0755	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

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

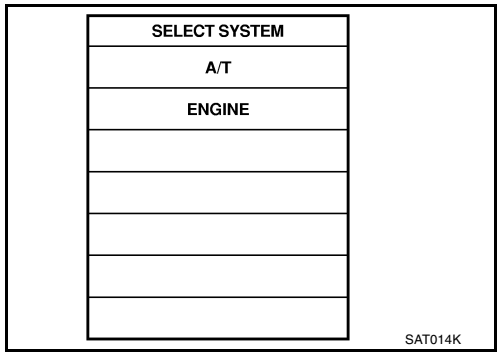
CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

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

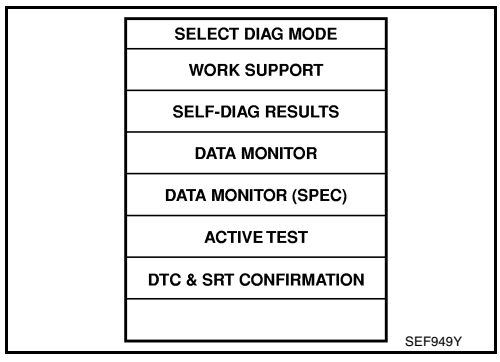


With CONSULT-II

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

With GST

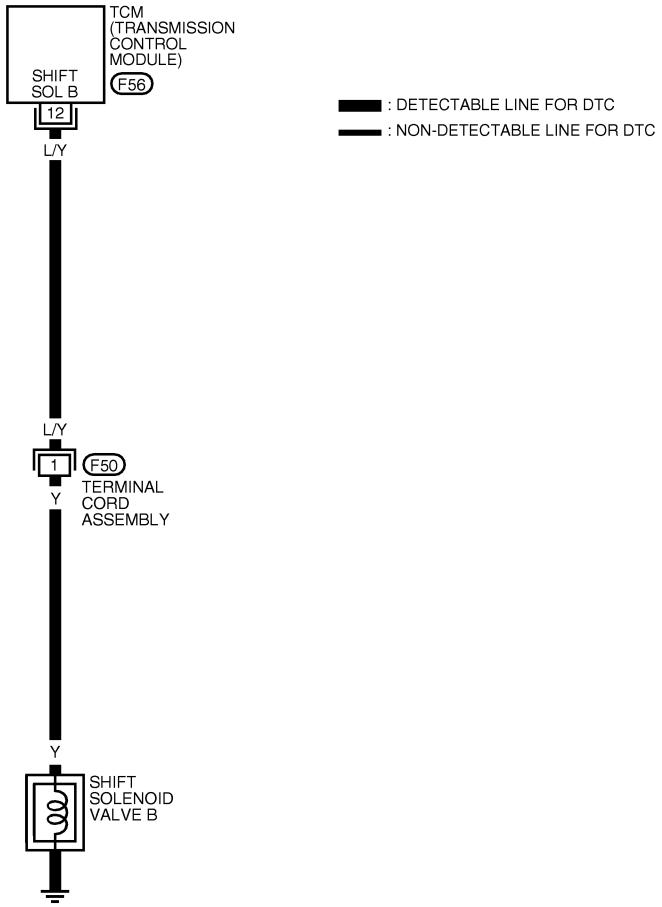
Follow the procedure “With CONSULT-II”.

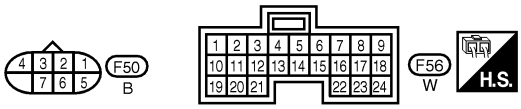


Wiring Diagram — AT — SSV/B

ECS005Y1

AT-SSV/B-01





WAT126

TRANSMISSION CONTROL MODULE TERMINALS AND REFERENCE VALUE BETWEEN TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (Approx.)
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE B DOES NOT OPERATE	0V

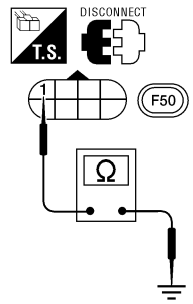
WAT344

Diagnostic Procedure

ECS005Y2

1. CHECK VALVE RESISTANCE

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



Resistance:
5 - 20Ω

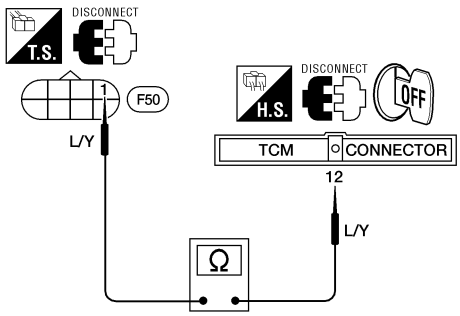
LAT188

OK or NG

OK >> GO TO 2.
NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Shift solenoid valve B
  Refer to AT-186, "Component Inspection" .
- Harness of terminal cord assembly for short or open

2. CHECK POWER SOURCE CIRCUIT

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



Continuity should exist.

LAT189

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

4. Reinstall any part removed.

OK or NG

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

3. CHECK DTC

Perform AT-183, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

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

Component Inspection

ECS005Y3

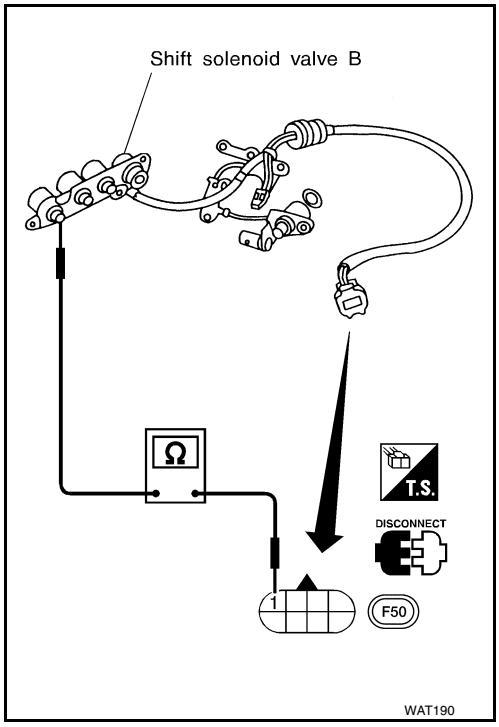
SHIFT SOLENOID VALVE B

- Refer to AT-259, "REMOVAL" .

Resistance Check

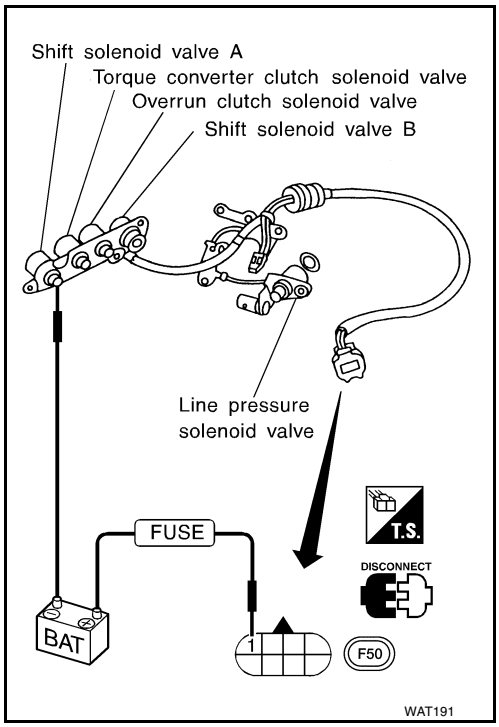
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	1	Ground	5 - 20Ω



Operation Check

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



DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

PFP:22560

Description

ECS006GS

The throttle position sensor [accelerator pedal position (APP) sensor] is part of the system that controls throttle position. This system also uses an electric throttle control actuator which consists of a throttle control motor and throttle position sensors. Accelerator pedal position signal is sent to the ECM.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Throttle position sensor [accelerator pedal position (APP) sensor]	Fully-closed throttle	Approximately 0.5V
	Fully-open throttle	Approximately 4V

On Board Diagnosis Logic

ECS006GT

Diagnostic trouble code TP SEN/CIRC A/T with CONSULT-II or P1705 without CONSULT-II is detected when TCM receives an excessively low or high voltage from the ECM.

Possible Cause

ECS006GU

Check the following items.

- Harness or connectors
  (The sensor circuit is open or shorted.)

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS006GV

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

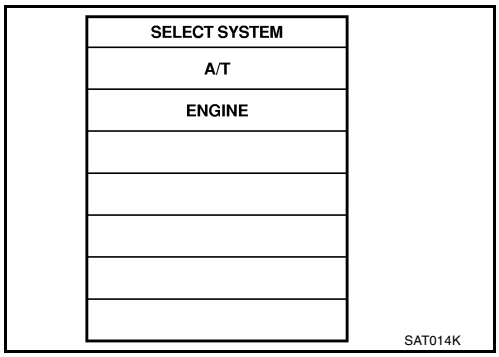
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

WITH CONSULT-II

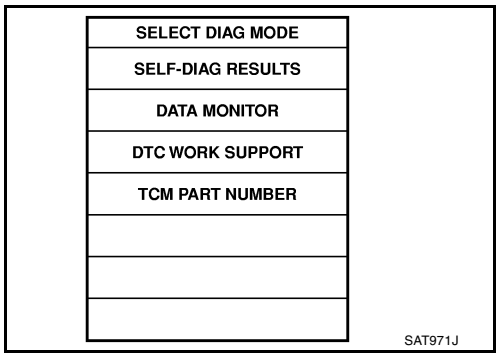
1. Turn ignition switch ON and select “DATA MONITOR” mode for “A/T” with CONSULT-II.

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

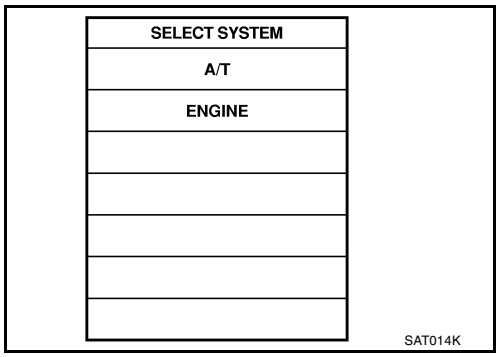


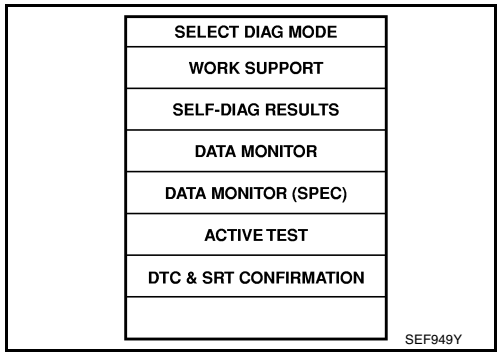
   If the check result is NG, go to AT-191, "Diagnostic Procedure" .
   If the check result is OK, go to following step.

2. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
3. Start engine and maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: Approximately 3V or less
   Selector lever: D position (O/D ON)
   If the check result is NG, go to AT-191, "Diagnostic Procedure" .
   If the check result is OK, go to following step.



4. Maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   Accelerator pedal: Wide open throttle
   Selector lever: D position (O/D ON)





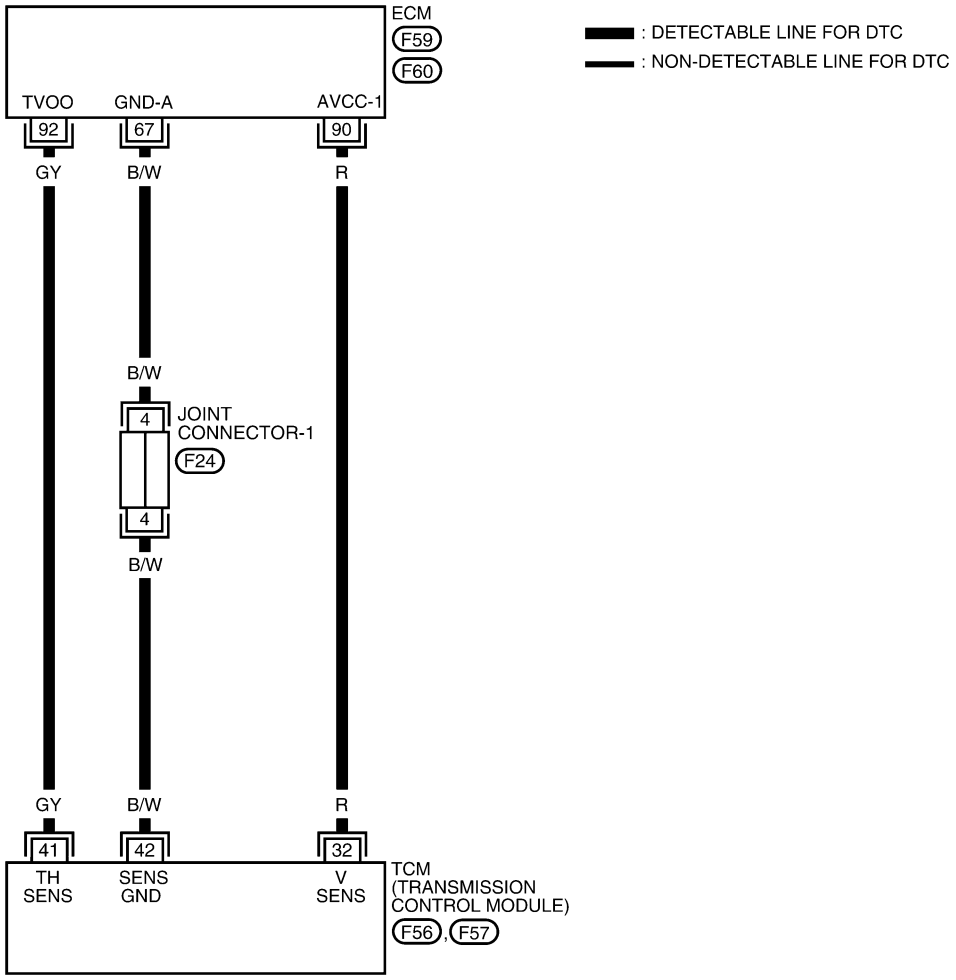
WITH GST

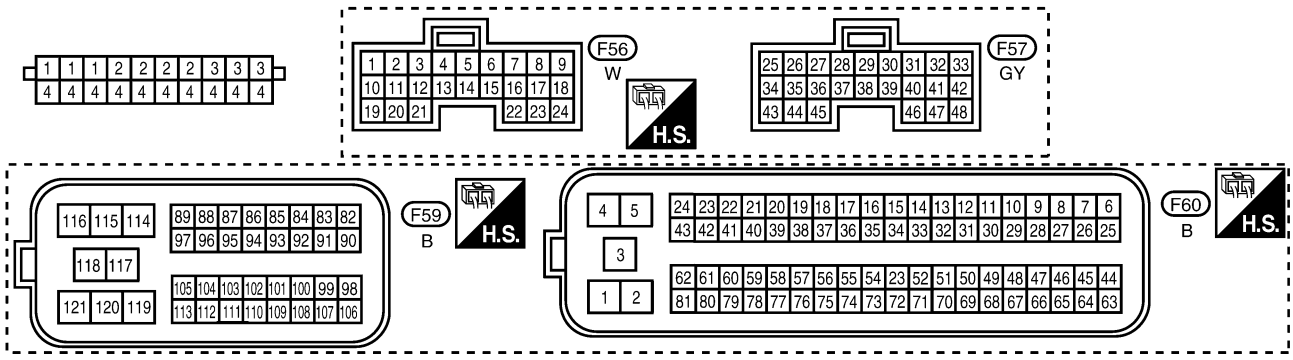
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — TPS

ECS006GW

AT-TPS-01





WCWA0069E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
32	R	SENSOR POWER	IGNITION SWITCH ON	4.5 - 5.5V
			IGNITION SWITCH OFF	0V
41	GY	THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]	IGNITION ON AND ACCELERATOR PEDAL IS DEPRESSED SLOWLY AFTER WARMING UP ENGINE	FULLY CLOSED THROTTLE: 0.5V
				WIDE OPEN THROTTLE: 4.0V
42	B/W	SENSOR GROUND	—	—

Diagnostic Procedure

ECS006GX

1. CHECK DTC WITH ECM

- Check P code with CONSULT-II “ENGINE”.
  Turn ignition switch ON and select “SELF DIAGNOSTIC RESULTS” mode for “ENGINE” with CONSULT-II.

Refer to EC-72, "Malfunction Indicator Lamp (MIL)" [QG18DE (ULEV)] or EC-644, "Malfunction Indicator Lamp (MIL)" [QG18DE (SULEV)].

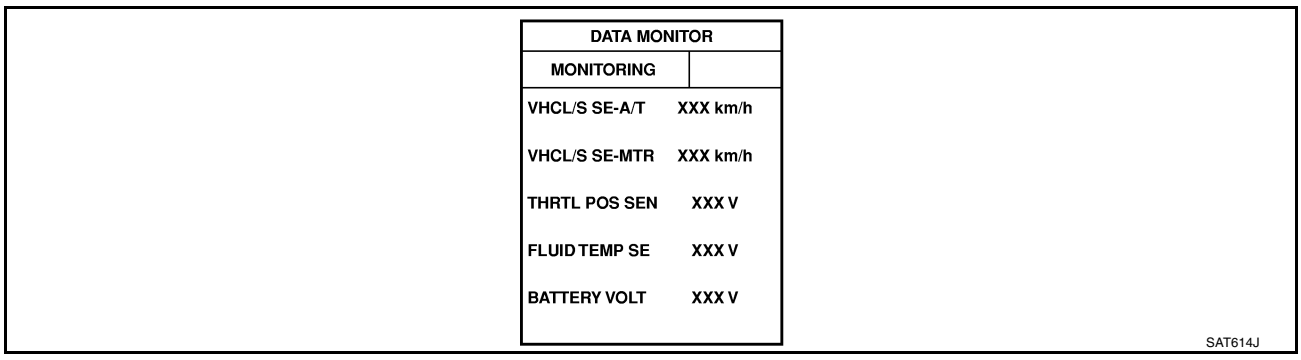
OK or NG

OK (with CONSULT-II)>>GO TO 2.
OK (without CONSULT-II)>>GO TO 3.
NG >> Check throttle position sensor [accelerator pedal position (APP) sensor] circuit for engine control. Refer to EC-260, "DTC P0222, P0223 TP SENSOR" [QG18DE (ULEV)] or EC-808, "DTC P0222, P0223 TP SENSOR" [QG18DE (SULEV)] and EC-501, "DTC P2122, P2123 APP SENSOR" [QG18DE (ULEV)] or EC-1113, "DTC P2122, P2123 APP SENSOR" [QG18DE (SULEV)].

2. CHECK INPUT SIGNAL (WITH CONSULT-II)

With CONSULT-II

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

OK or NG

OK >> GO TO 4.
NG >> Check harness for short or open between ECM and TCM regarding throttle position sensor [accelerator pedal position (APP) sensor] circuit. (Main harness)

3. CHECK INPUT SIGNAL (WITHOUT CONSULT-II)

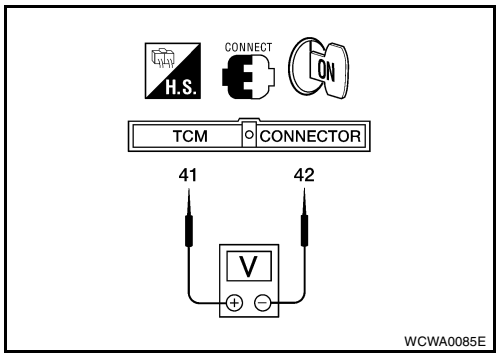
Without CONSULT-II

1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between TCM terminals 41 (GY) and 42 (B/W) 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 or NG

OK >> GO TO 4.
NG >> Check harness for short or open between ECM and TCM regarding throttle position sensor [accelerator pedal position (APP) sensor] circuit. (Main harness)

4. CHECK TCM INSPECTION

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

OK or NG

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

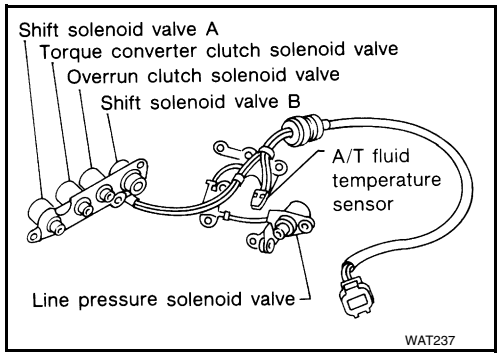
DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

PFP:31940

Description

ECS005Y8

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



ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: O/R CLTCH SOL/CIRC : P1760	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.

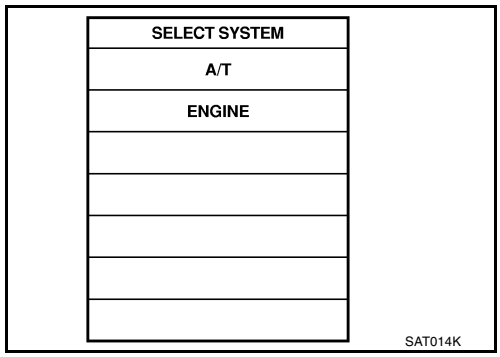
NOTE:

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

TESTING CONDITION:

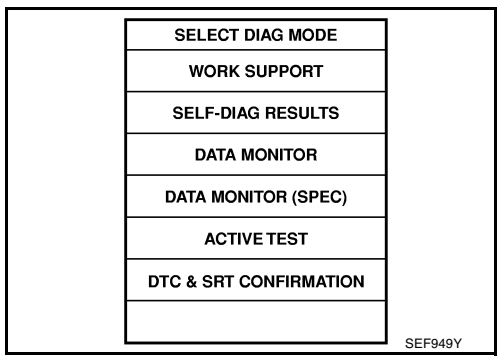
Always drive vehicle on a level road to improve accuracy of test.

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



With CONSULT-II

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



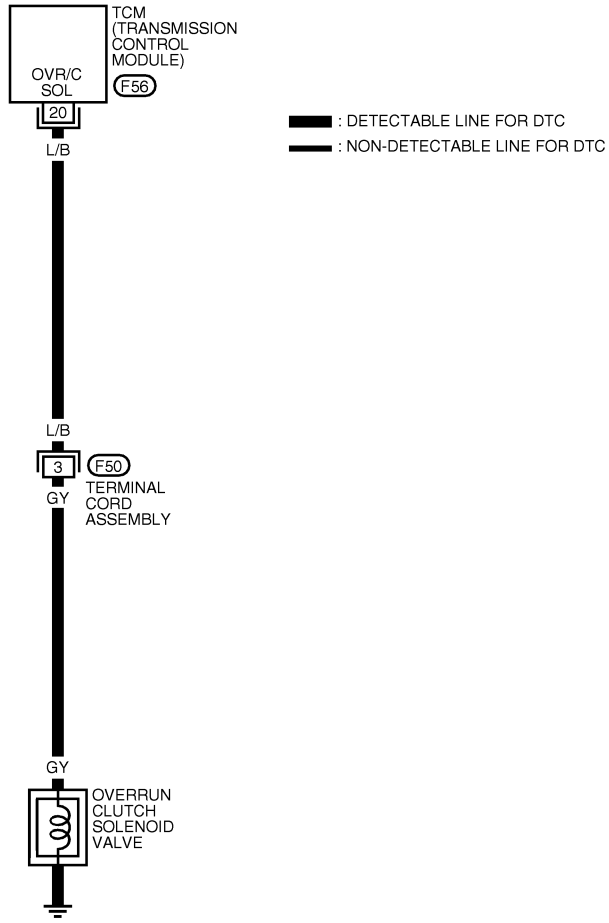
With GST

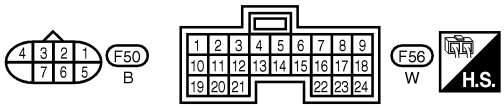
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — OVRCSV

ECS005Y9

AT-OVRCSV-01





WAT128

TRANSMISSION CONTROL MODULE TERMINALS AND REFERENCE VALUE BETWEEN TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (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

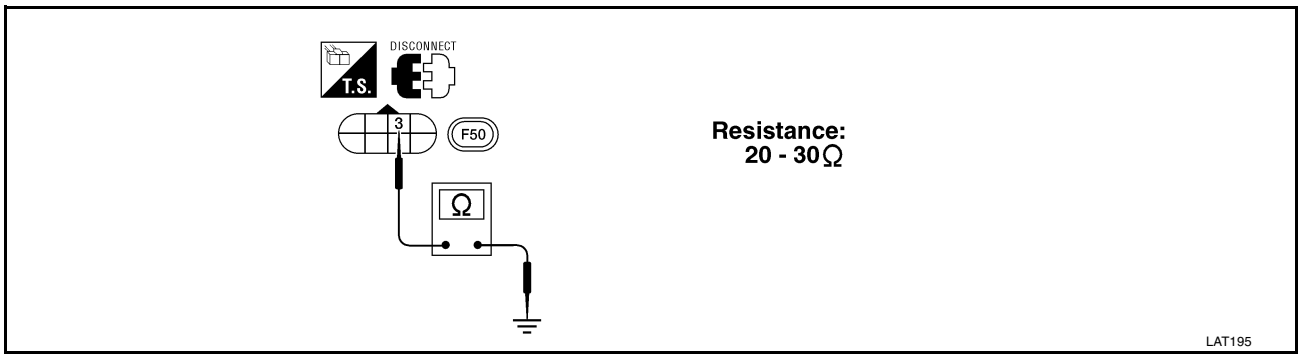
WAT351

Diagnostic Procedure

ECS005YA

1. CHECK VALVE RESISTANCE

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

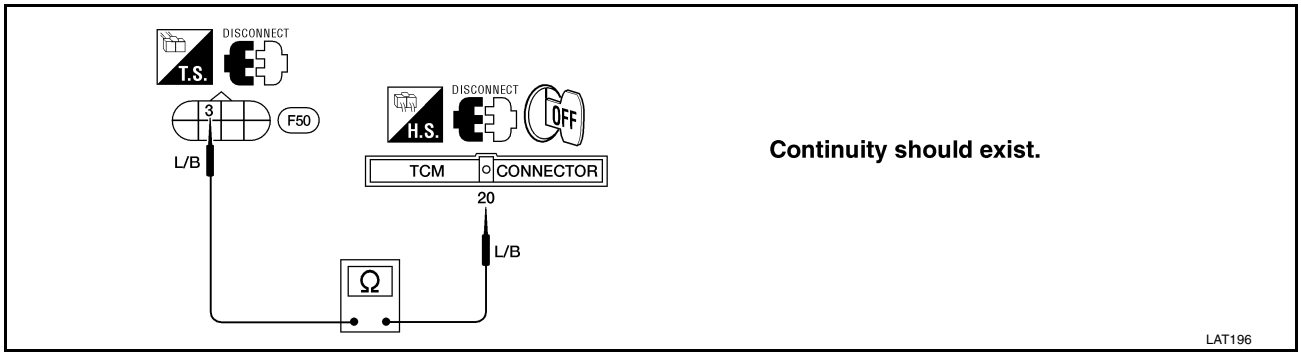


OK or NG

OK >> GO TO 2.
NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Overrun clutch solenoid valve
Refer to AT-196, "Component Inspection" .
- Harness of terminal cord assembly for short or open

2. CHECK POWER SOURCE CIRCUIT

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



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

4. Reinstall any part removed.

OK or NG

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

3. CHECK DTC

Perform AT-193, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

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

Component Inspection

ECS005YB

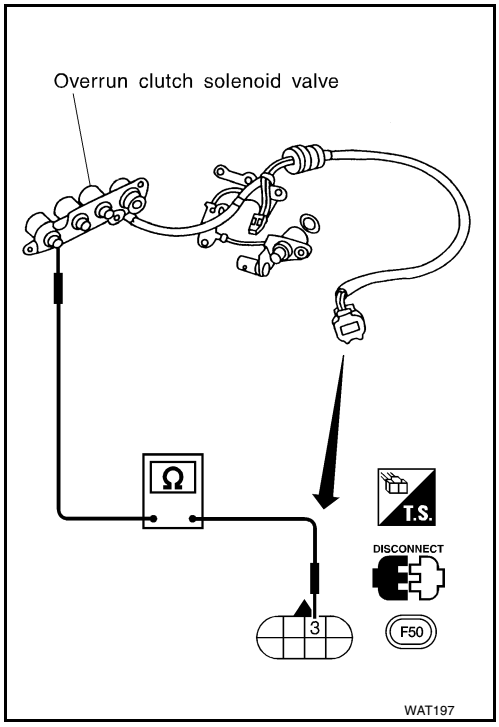
OVERRUN CLUTCH SOLENOID VALVE

- Refer to AT-196, "Component Inspection" .

Resistance Check

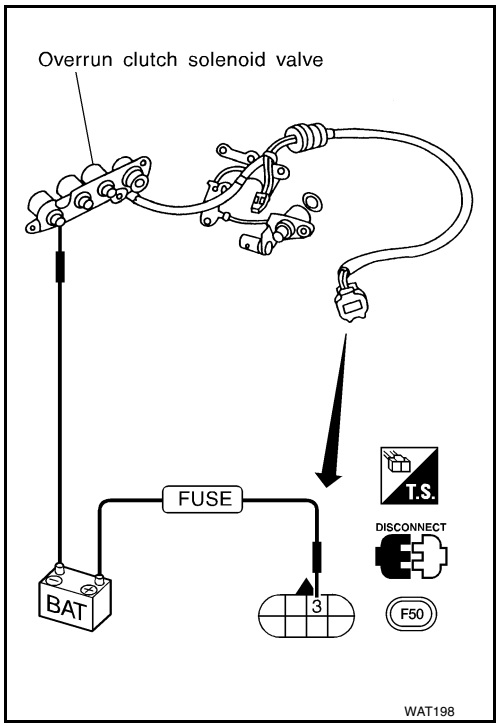
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Overrun clutch solenoid valve	3	Ground	20 - 30Ω



Operation Check

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



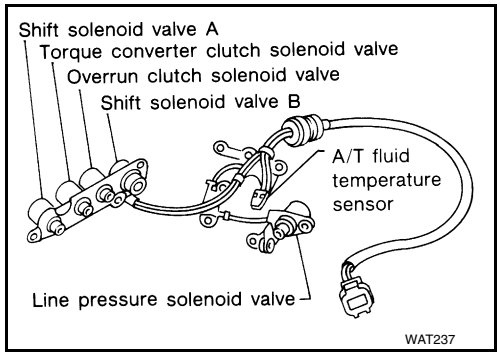
DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)

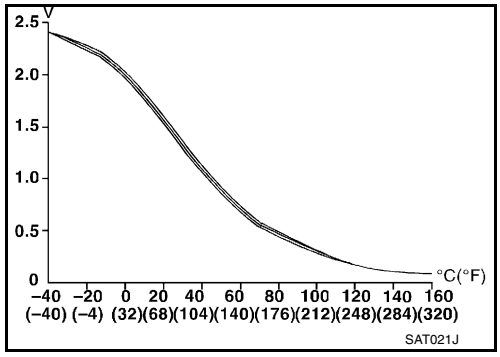
PFP:31940

Description

ECS005YC

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





CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

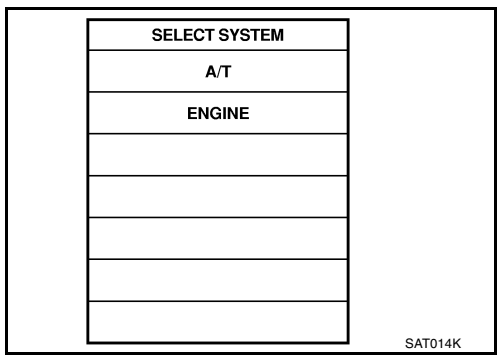
Monitor item	Condition	Specification (Approx.)	
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	1.5V ↓ 0.5V	2.5 kΩ ↓ 0.3 kΩ

ON BOARD DIAGNOSIS LOGIC

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

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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



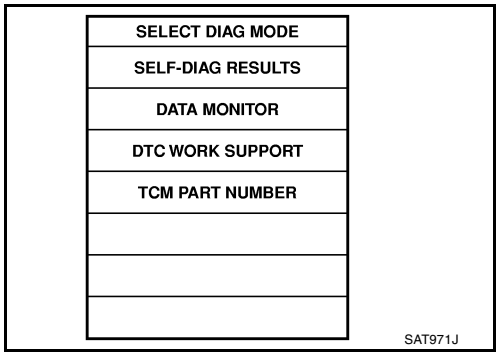
With CONSULT-II

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).

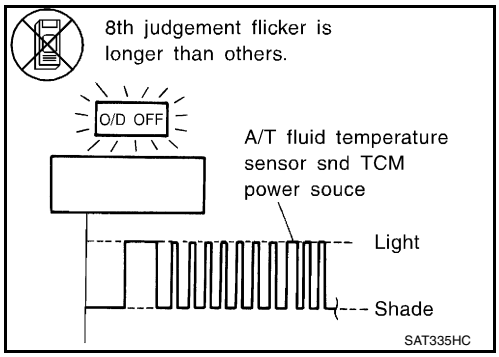
Without CONSULT-II

1. Start engine.

2. Drive vehicle under the following conditions:
   Selector lever in “D”, vehicle speed higher than 20 km/h (12 MPH).



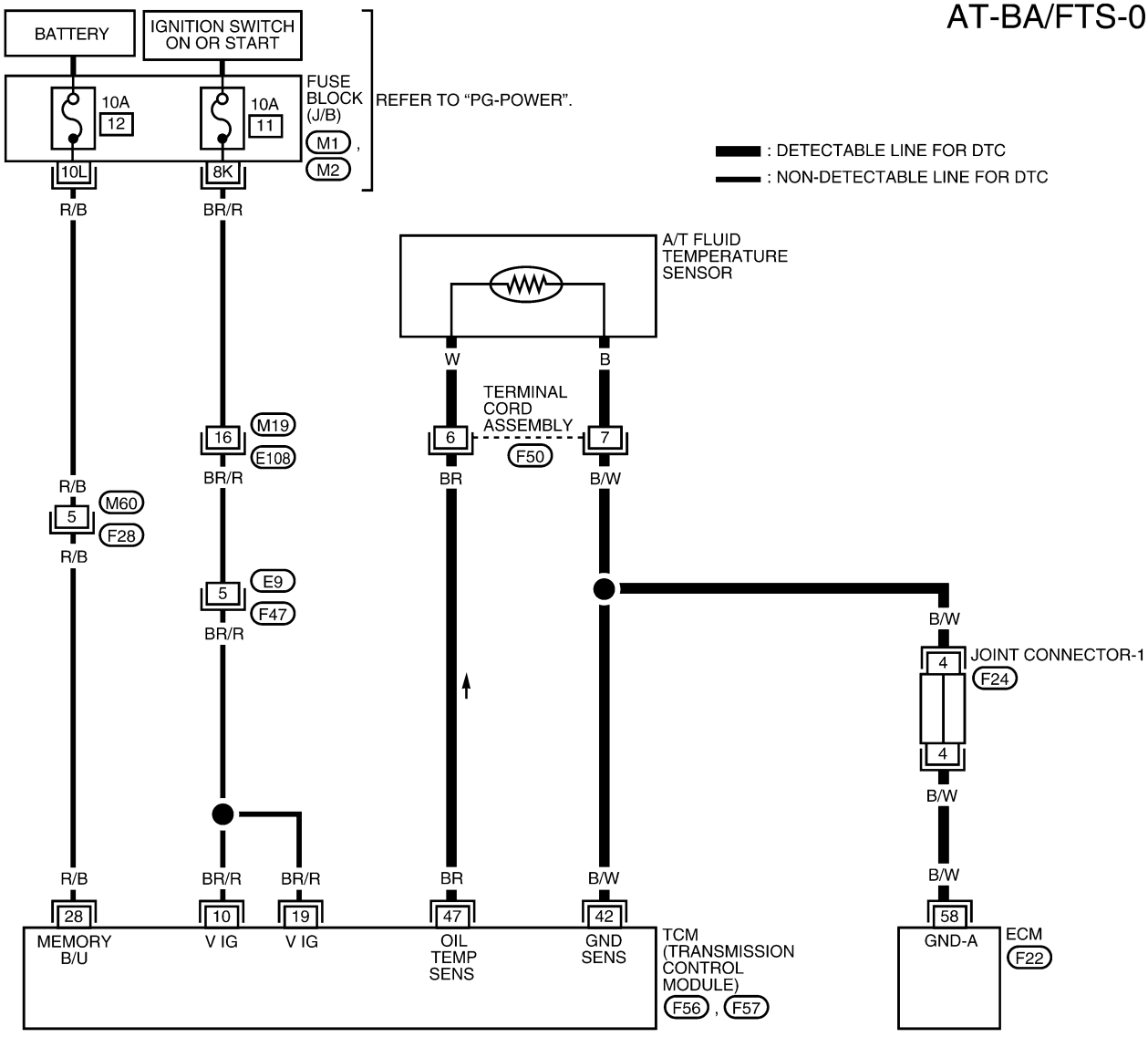
3. Perform self-diagnosis.
   Refer to TCM Self-diagnostic Procedure (No Tools), AT-51, "TCM Self-diagnostic Procedure (No Tools)" .

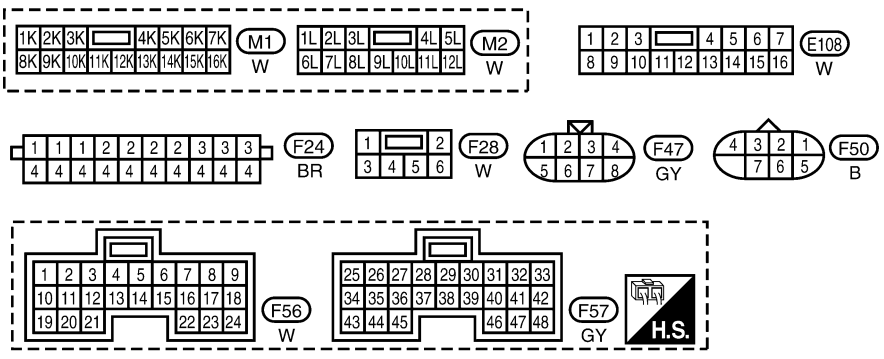


Wiring Diagram — AT — BA/FTS

ECS005YD

AT-BA/FTS-01





REFER TO THE FOLLOWING.
F60 - ELECTRICAL UNITS

WCWA0070E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	BR/R	POWER SOURCE	WHEN TURNING IGNITION SWITCH TO "ON"	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO "OFF"	0V
19	BR/R	POWER SOURCE	WHEN TURNING IGNITION SWITCH TO "ON"	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO "OFF"	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
42	B/W	GROUND (A/T FLUID TEMPERATURE SENSOR)	—	0V
47	BR	A/T FLUID TEMPERATURE SENSOR	WHEN ATF TEMPERATURE IS 20°C (68°F)	APPROX. 1.5V
			WHEN ATF TEMPERATURE IS 80°C (176°F)	APPROX. 0.5V

Diagnostic Procedure

ECS005YE

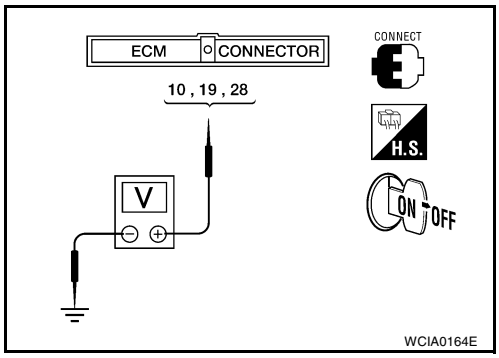
1. CHECK TCM POWER SOURCE

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

Voltage : Battery voltage

3. Turn ignition switch to “OFF” position.
4. Check voltage between TCM terminal 28 and ground.

Voltage : Battery voltage



OK or NG

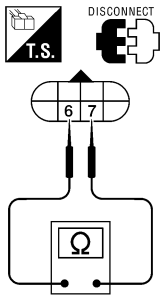
OK >> GO TO 2.

NG >> Check the following items:

- Harness for short or open between ignition switch and TCM (Main harness)
- Harness for short or open between battery and TCM (Main harness)
- Ignition switch and fuse
  Refer to PG-2, "POWER SUPPLY ROUTING" .

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

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector F50 in engine compartment.
3. Check resistance between terminal cord assembly F50 terminals 6 and 7 when A/T is cold.



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

LCIA0027E

4. Reinstall any part removed.

OK or NG

OK (With CONSULT-II)>> GO TO 3.
OK (Without CONSULT-II)>> GO TO 4.
NG >> 1. Remove oil pan.
2. Check the following items:
- A/T fluid temperature sensor
Refer to AT-202, "Component Inspection" .
- Harness of terminal cord assembly for short or open

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

With CONSULT-II

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”.

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

SAT614J

Voltage

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

OK or NG

OK >> GO TO 5.
NG >> Check the following items:
- Harness for short or open between TCM, ECM and terminal cord assembly (Main harness)
- Ground circuit for ECM
Refer to EC-139, "Wiring Diagram" [QG18DE (ULEV)] or EC-712, "Wiring Diagram" [QG18DE (SULEV].

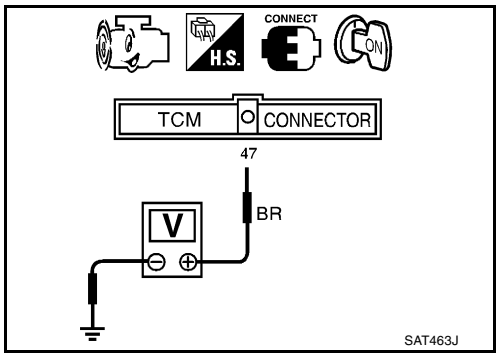
4. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)

Without CONSULT-II

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

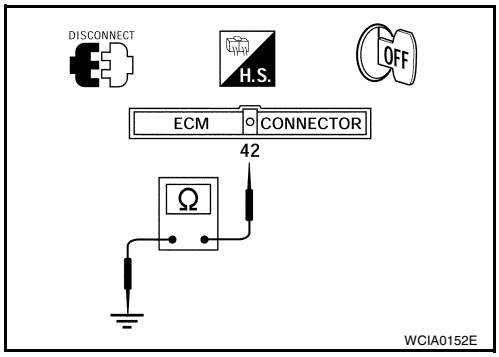
Voltage

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 (B/W) and ground.

Continuity should exist.



OK or NG

OK >> GO TO 5.

NG >> Check the following items:

- Harness for short or open between TCM, ECM and terminal cord assembly (Main harness)
- Ground circuit for ECM

Refer to EC-139, "Wiring Diagram" [QG18DE (ULEV)] or EC-712, "Wiring Diagram" [QG18DE (SULEV)].

5. CHECK DTC

Perform AT-197, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**

NG >> 1. Perform TCM input/output signal inspection.

2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

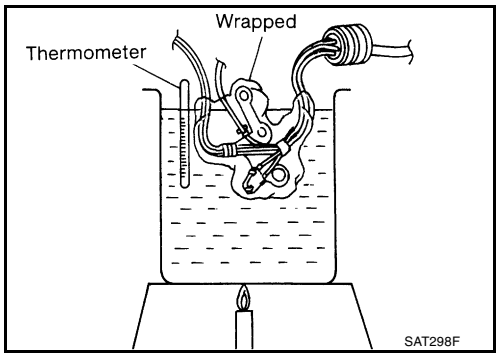
Component Inspection

ECS005YF

A/T FLUID TEMPERATURE SENSOR

- Refer to AT-259, "REMOVAL" .
- Check resistance between two terminals while changing temperature as shown.

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



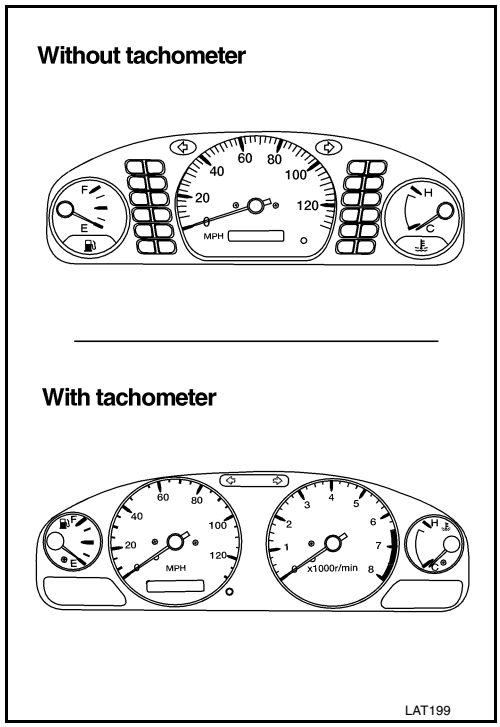
DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR

PFP:24814

Description

ECS005YG

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.



ON BOARD DIAGNOSIS LOGIC

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

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

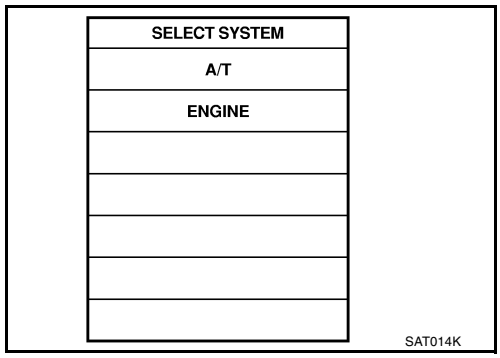
CAUTION:

- **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

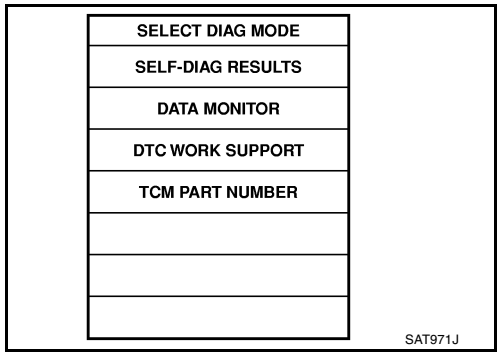
1. Turn ignition switch "ON" and select "DATA MONITOR" mode for "A/T" with CONSULT-II.



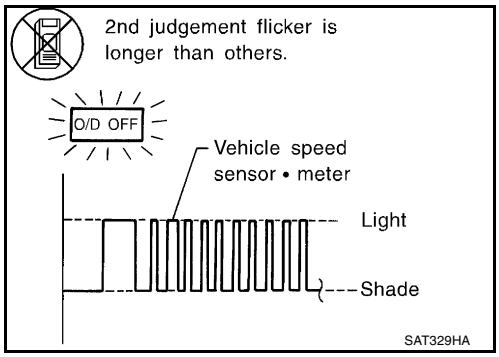
2. Start engine and accelerate vehicle from 0 to 25 km/h (0 to 16 MPH).

Without CONSULT-II

1. Start engine.
2. Drive vehicle under the following conditions:
   Selector lever in "D" and vehicle speed higher than 25 km/h (16 MPH).

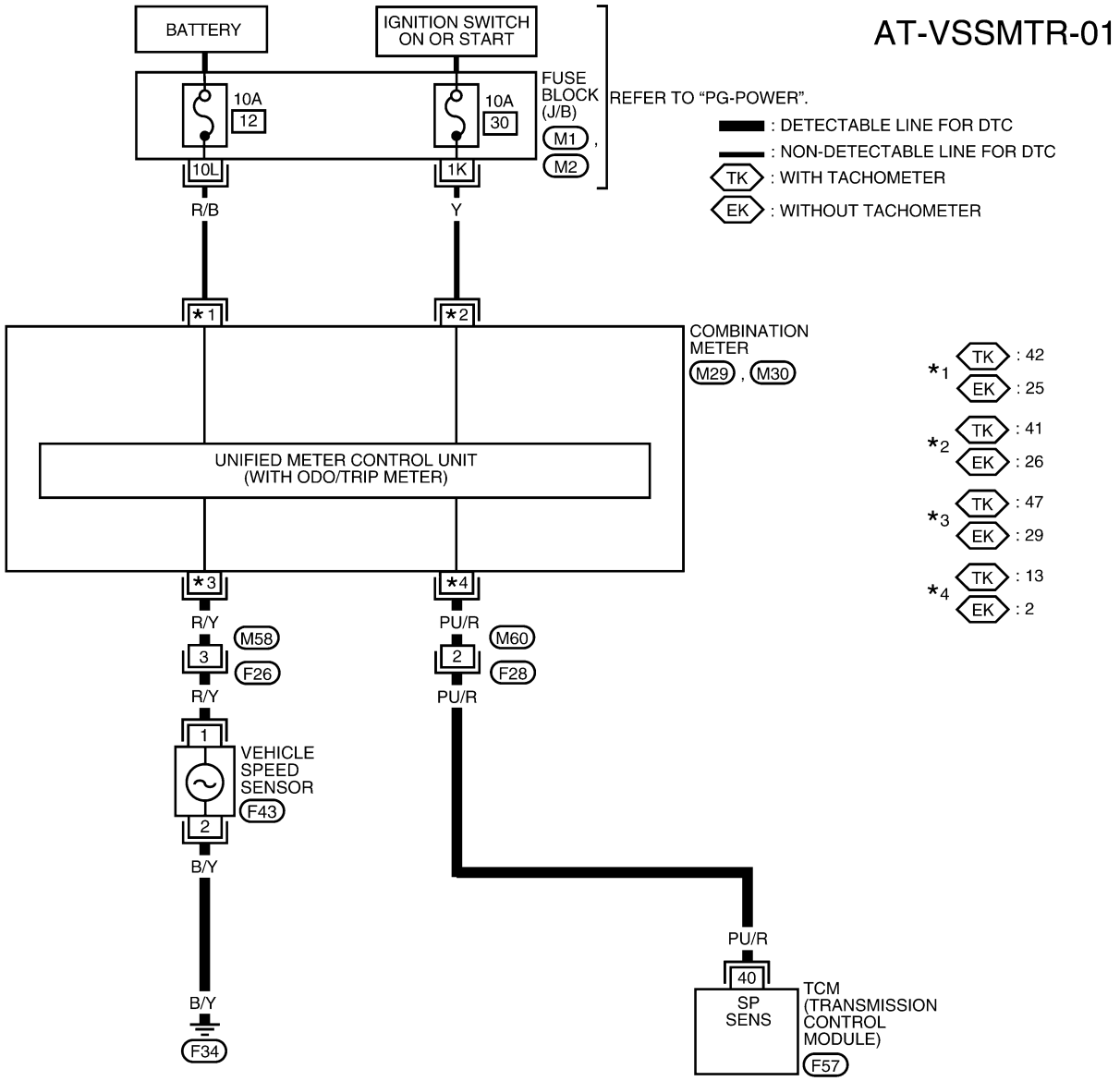


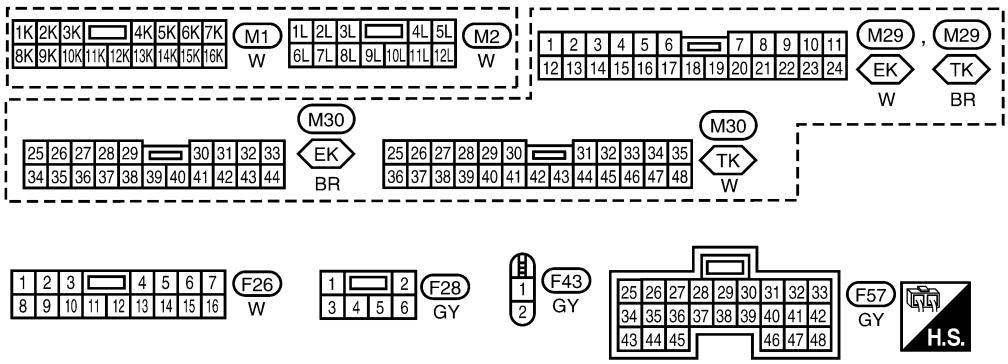
3. Perform self-diagnosis.
   Refer to “TCM Self-diagnostic Procedure (No Tools)”, AT-51, "TCM Self-diagnostic Procedure (No Tools)" .



Wiring Diagram — AT — VSSMTR

ECS005YH





WCWA0071E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
40	PU/R	VEHICLE SPEED SENSOR	WHEN MOVING VEHICLE AT 2 TO 3 KM/H (1 TO 2 MPH) FOR 1 m (3ft) OR MORE	VOLTAGE VARIES FROM GREATER THAN 1V TO LESS THAN 4.5 V

Diagnostic Procedure

ECS005YI

1. CHECK INPUT SIGNAL

With CONSULT-II

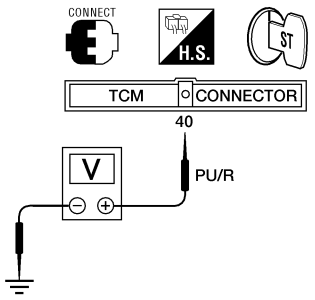
1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “VHCL/S SE·MTR” while driving.
   Check the value changes according to driving speed.

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

SAT614J

Without CONSULT-II

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



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

LAT201

OK or NG

OK >> GO TO 2.
NG >> Check the following items:

- Vehicle speed sensor and ground circuit for vehicle speed sensor
  Refer to DI-26, "VEHICLE SPEED SENSOR SIGNAL CHECK" .
- Harness for short or open between TCM and vehicle speed sensor (Main harness)

2. CHECK DTC

Perform AT-203, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**

NG >> 1. Perform TCM input/output signal inspection.

2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

DTC U1000 CAN COMMUNICATION LINE

PFP:23710

Description

ECS006GM

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

ECS006GN

- This is an OBD-II self-diagnostic item.
- Diagnostic trouble code “CAN COMM CIRCUIT” with CONSULT-II or U1000 without CONSULT-II is detected when TCM cannot communicate to other control unit.

Possible Cause

ECS006GO

Harness or connectors
(CAN communication line is open or shorted.)

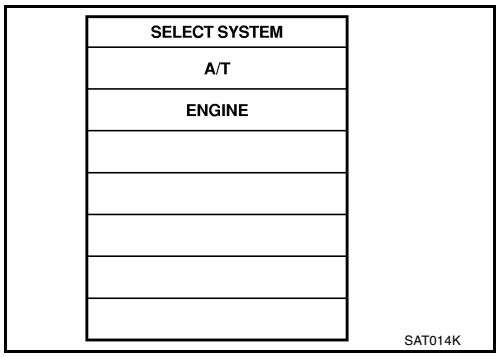
DTC Confirmation Procedure

ECS006GP

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch to ON position. (Do not start engine.)
2. Select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
3. Start engine and wait for at least 6 seconds.
4. If DTC is detected, go to AT-210, "Diagnostic Procedure" .



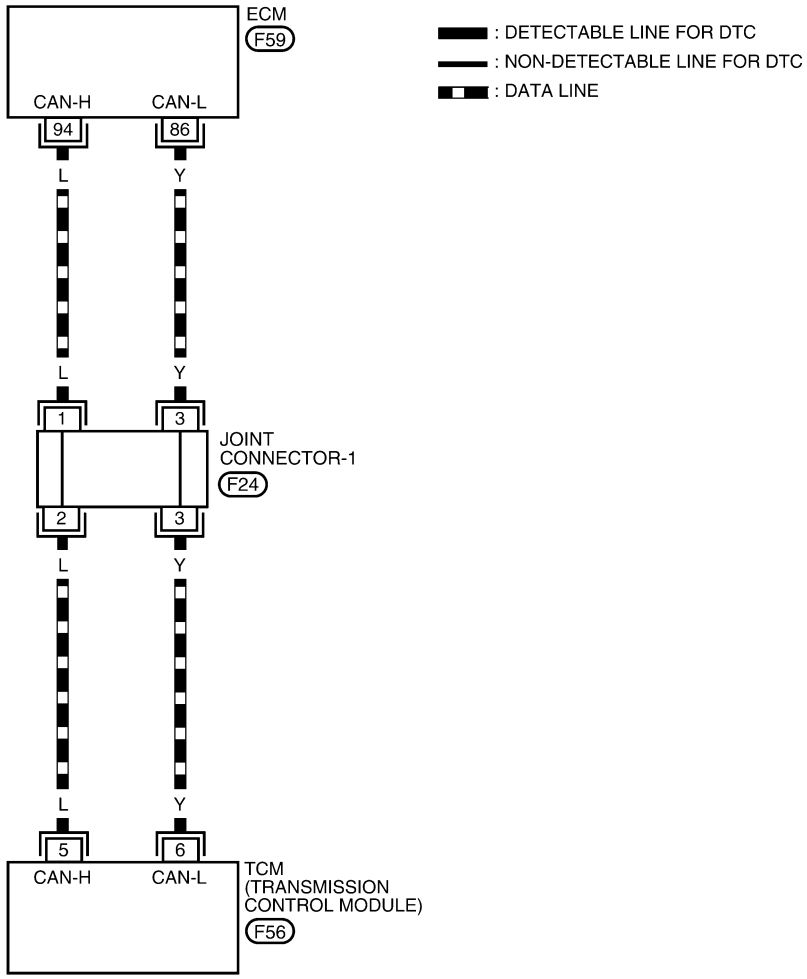
WITH GST

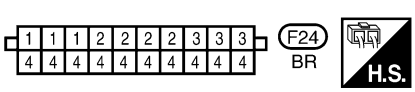
Follow the procedure “WITH CONSULT-II”.

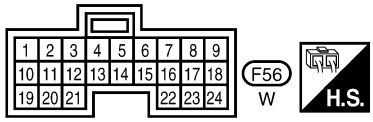
Wiring Diagram — AT — CAN

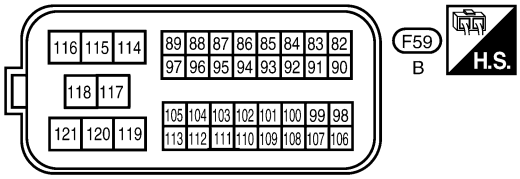
ECS006GQ

AT-CAN-01









WCWA0072E

Diagnostic Procedure

ECS006GR

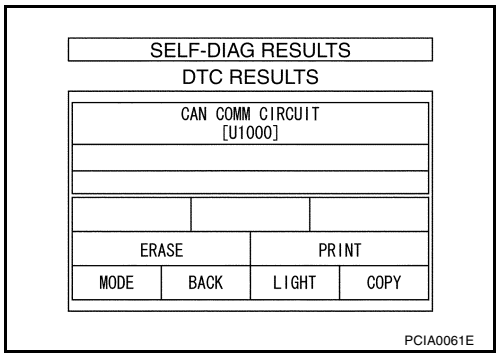
1. CHECK CAN COMMUNICATION CIRCUIT

With CONSULT-II

1. Turn ignition switch to ON position. (Do not start engine.)
2. Select “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. The “CAN COMM CIRCUIT” is detected.

Yes or No

Yes >> Print out CONSULT-II screen, GO TO 2.
No >> **INSPECTION END**.



2. CHECK CAN COMMUNICATION SIGNALS

With CONSULT-II

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

>> Print out CONSULT-II screen, go to AT-31, "CAN Communication" .

CAN COMMUNICATION SIGNALS

Normal conditions	Abnormal conditions (examples)
CAN COMM : OK	CAN COMM : OK
CAN CIRC 1 : OK	CAN CIRC 1 : UNKWN
CAN CIRC 2 : OK	CAN CIRC 2 : UNKWN
CAN CIRC 3 : OK	CAN CIRC 3 : UNKWN
CAN CIRC 4 : OK	CAN CIRC 4 : UNKWN
CAN CIRC 5 : UNKWN	CAN CIRC 5 : UNKWN
CAN CIRC 6 : UNKWN	CAN CIRC 6 : UNKWN

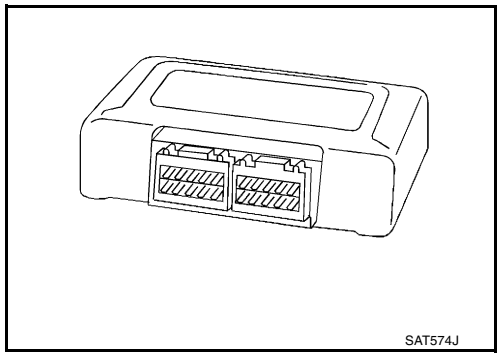
DTC CONTROL UNIT (RAM), CONTROL UNIT (ROM)

PFP:31036

Description

ECS005YJ

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


SAT574J

ON BOARD DIAGNOSIS LOGIC

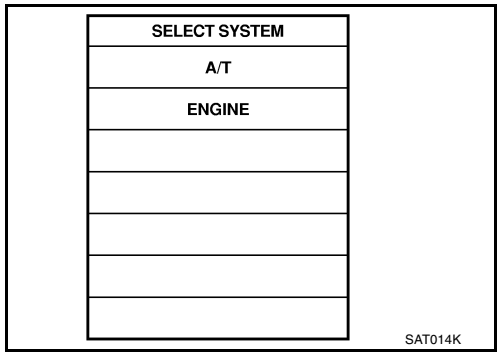
Diagnostic Trouble Code No.	Malfunction is detected when	Check Item (Possible Cause)
: CONTROL UNIT (RAM), CONTROL UNIT (ROM)	TCM memory (RAM) or (ROM) is malfunctioning.	● TCM

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.

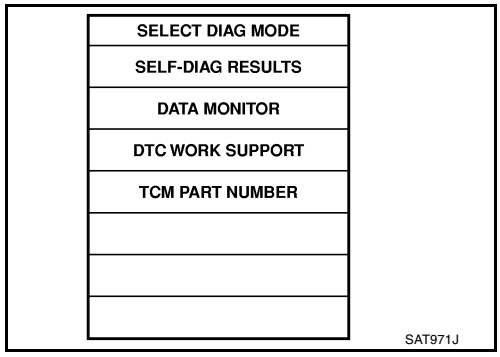
With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode for A/T with CONSULT-II.
2. Start engine.



SAT014K

3. Run engine for at least 2 seconds at idle speed.



SAT971J

Diagnostic Procedure

ECS005YK

1. INSPECTION START (WITH CONSULT-II)

With CONSULT-II

1. Turn ignition switch "ON" and select "SELF DIAGNOSIS" mode for A/T with CONSULT-II.
2. Touch "ERASE".

>> GO TO 2.

2. CHECK DTC

Perform AT-211, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

>> GO TO 3.

3. CHECK DTC AGAIN

Is the “CONTROL UNIT (RAM)” or “CONTROL UNIT (ROM)” displayed again?

Yes or No

Yes >> Replace TCM.
No >> **INSPECTION END**

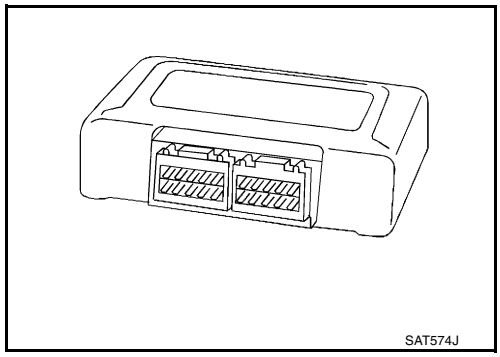
DTC CONTROL UNIT (EEP ROM)

PFP:31036

Description

ECS005YL

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


SAT574J

ON BOARD DIAGNOSIS LOGIC

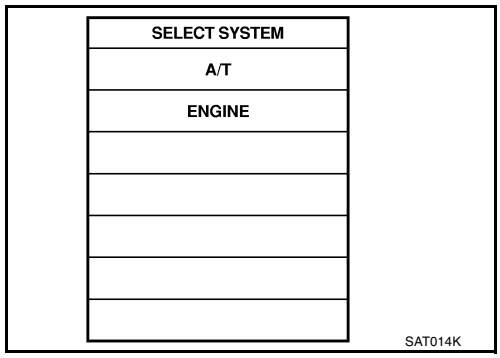
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: CONT UNIT (EEP ROM)	TCM memory (EEP ROM) is malfunctioning.	● TCM

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.

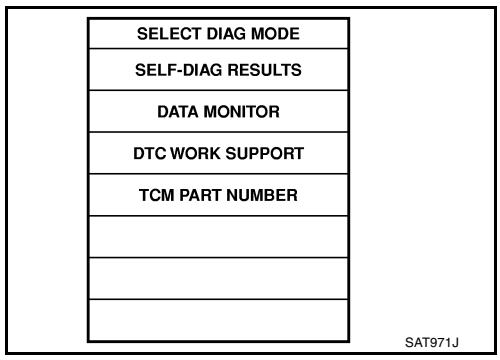
With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode for A/T with CONSULT-II.
2. Start engine.



SAT014K

3. Run engine for at least 2 seconds at idle speed.



SAT971J

Diagnostic Procedure

ECS005YM

1. CHECK DTC

With CONSULT-II

1. Turn ignition switch “ON” and select “SELF DIAGNOSIS” mode for A/T with CONSULT-II.
2. Move selector lever to “R” position.
3. Depress accelerator pedal (Full throttle position).
4. Touch “ERASE”.
5. Turn ignition switch “OFF” position for 10 seconds.

Perform AT-213, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

Is the “CONT UNIT (EEP ROM)” displayed again?

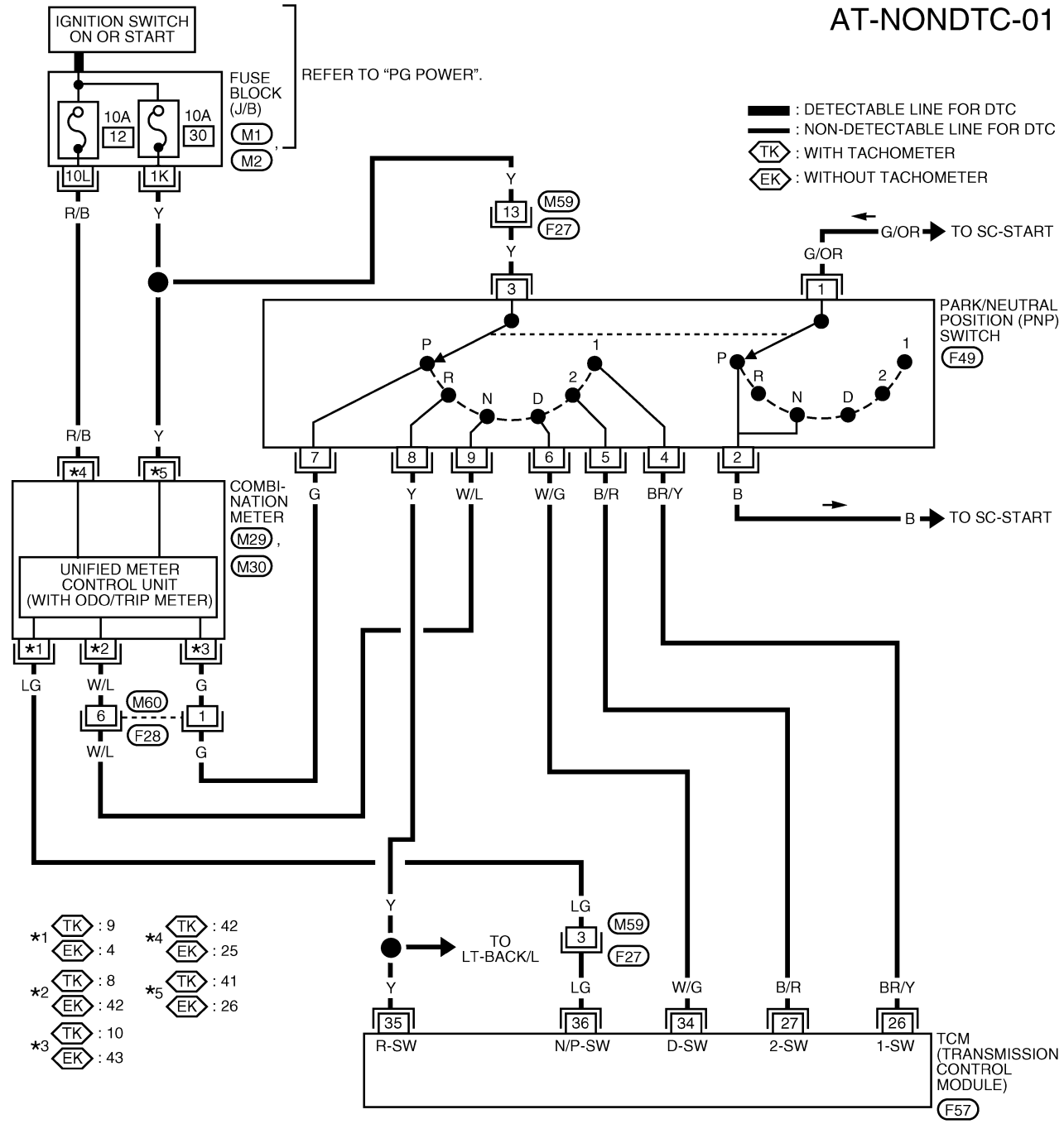
Yes >> Replace TCM.
No >> **INSPECTION END**

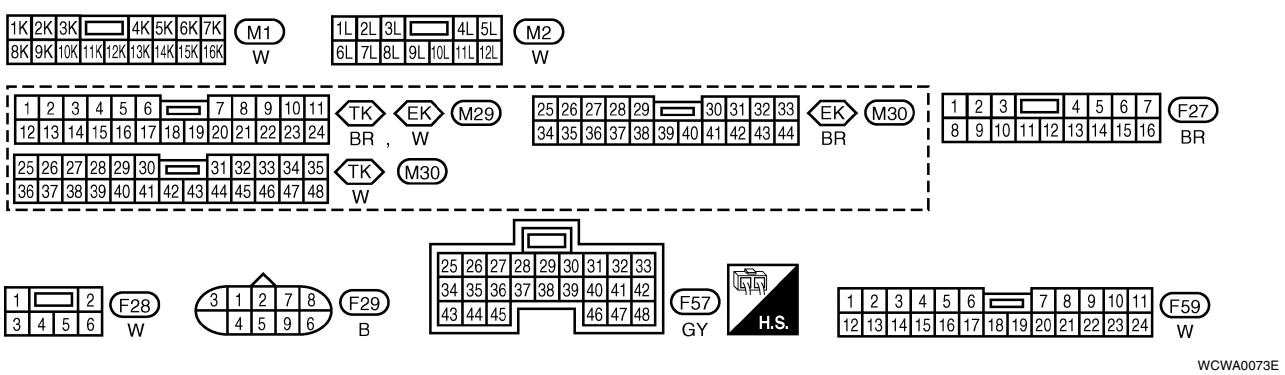
TROUBLE DIAGNOSES FOR SYMPTOMS

PFP:00007

Wiring Diagram — AT — NONDTC

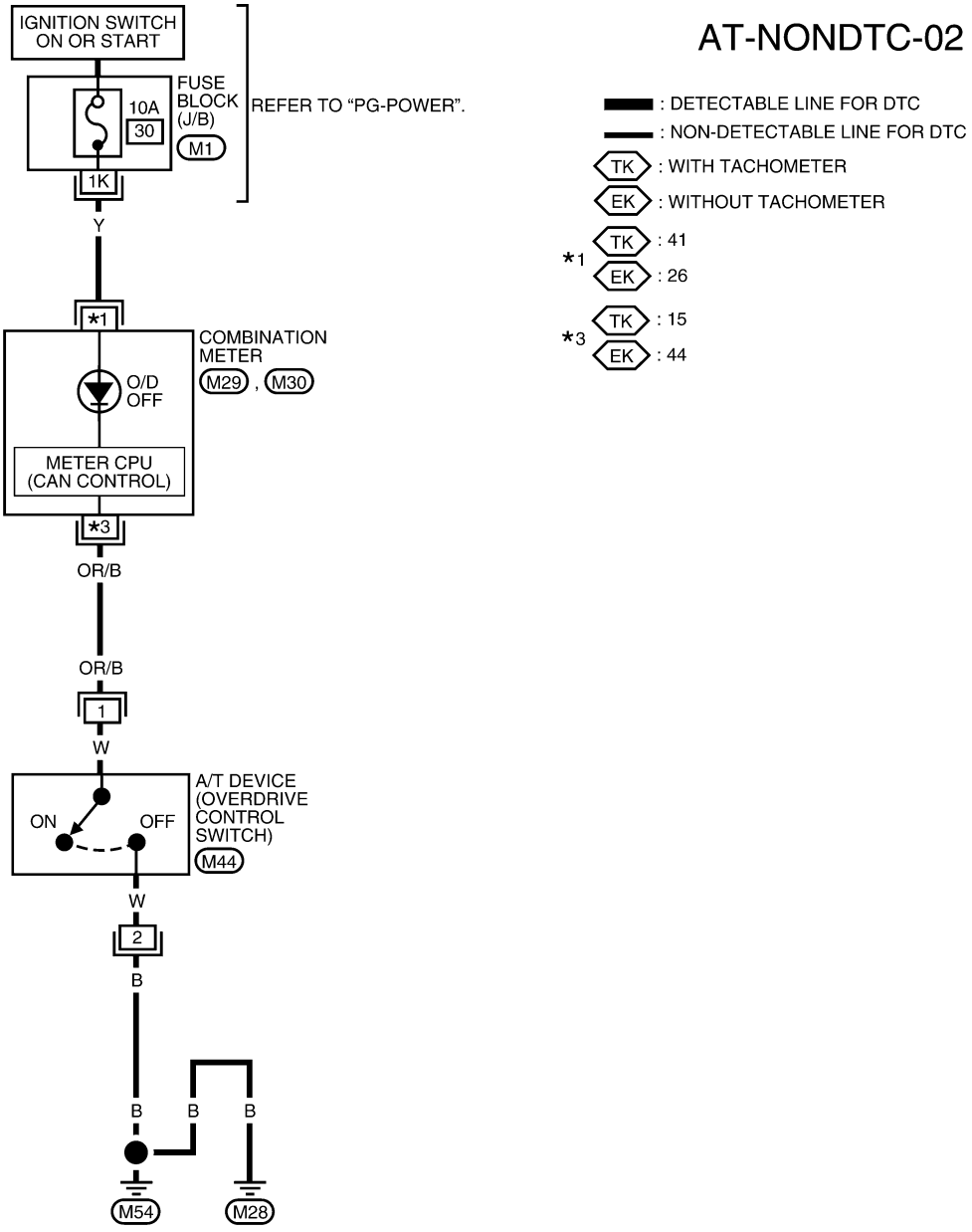
ECS005YN

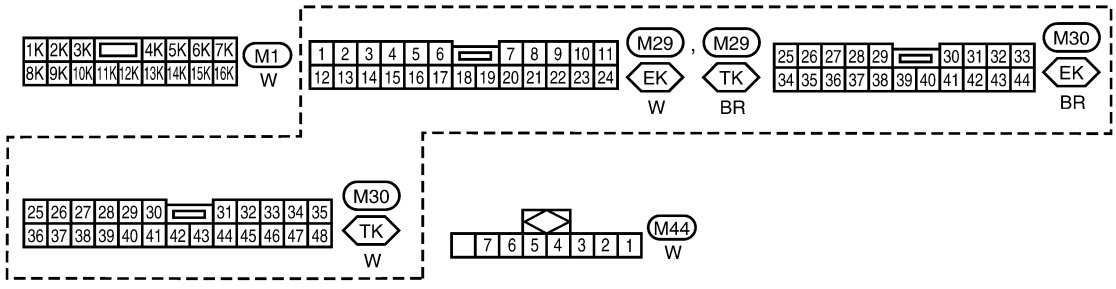




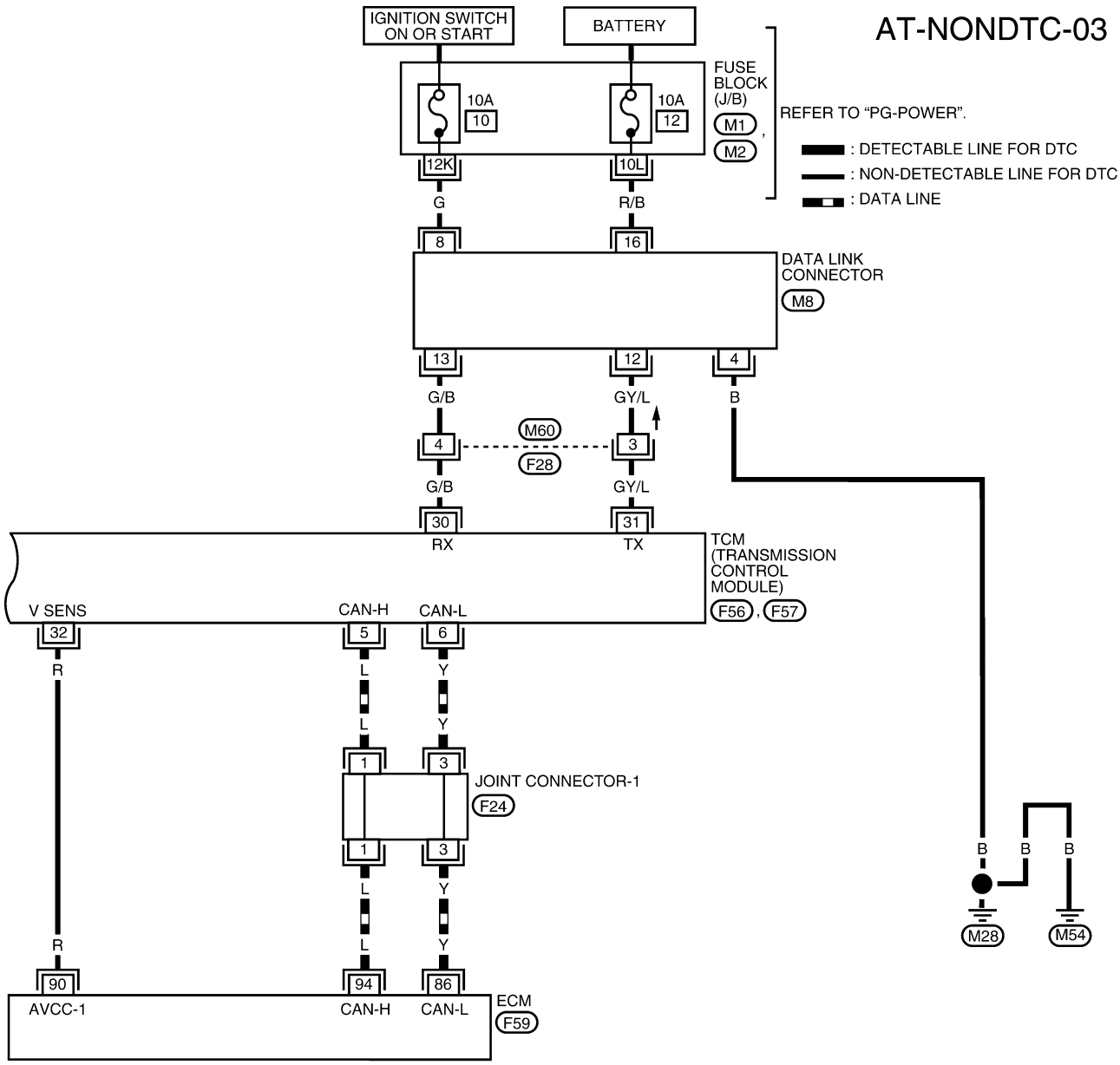
WCWA0073E

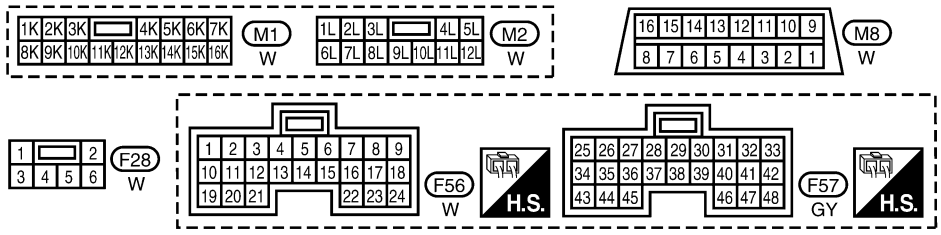
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
26	BR/Y	PNP SWITCH "1" POSITION	WHEN SETTING SELECTOR LEVER TO "1" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V
27	B/R	PNP SWITCH "2" POSITION	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/Y	PNP SWITCH "R" POSITION	WHEN SETTING SELECTOR LEVER TO "R" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V
36	LG	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


AT-NONDTC-02
IGNITION SWITCH ON OR START
FUSE BLOCK (J/B)
10A
30
M1
1K
REFER TO "PG-POWER".
Y
*1
COMBINATION METER
M29 , M30
O/D OFF
METER CPU (CAN CONTROL)
*3
OR/B
OR/B
1
W
A/T DEVICE (OVERDRIVE CONTROL SWITCH)
ON
OFF
M44
W
2
B
B B B
M54
M28
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
TK : WITH TACHOMETER
EK : WITHOUT TACHOMETER
*1 TK : 41
EK : 26
*3 TK : 15
EK : 44


M1
W
M29 , M29
EK
TK
W
BR
M30
EK
BR
M30
TK
W
M44
W

WCWA0074E





REFER TO THE FOLLOWING.
F24 - JOINT CONNECTOR
F59 - ELECTRICAL UNITS

WCWA0075E

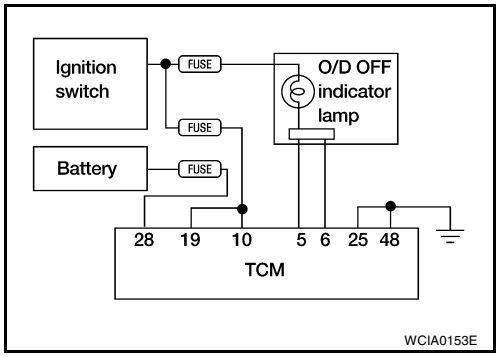
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
5	L	CAN-H	—	—
6	Y	CAN-L	—	—
30	G/B	DATA LINK CONNECTOR (RX)	—	—
31	GY/L	DATA LINK CONNECTOR (TX)	—	—
32	R	SENSOR POWER	IGNITION SWITCH ON	APPROX. 4.5 - 5.5V
			IGNITION SWITCH OFF	APPROX. 0V

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

ECS005YO

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



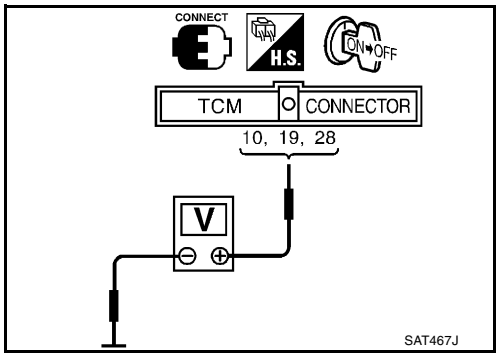
1. CHECK TCM POWER SOURCE

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



OK or NG

OK >> GO TO 2.
NG >> Check the following items:

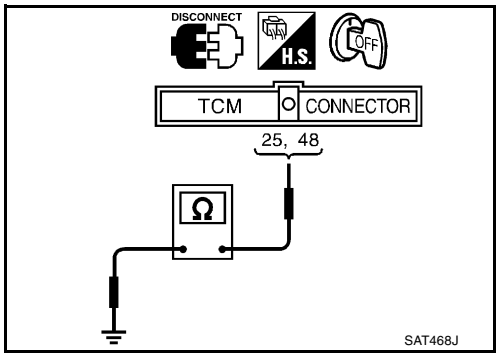
- Harness for short or open between ignition switch and TCM (Main harness). Refer to AT-112, "Wiring Diagram — AT — MAIN" .
- Harness for short or open between battery and TCM (Main harness) Refer to AT-112, "Wiring Diagram — AT — MAIN" .
- Ignition switch and fuse. Refer to PG-2, "POWER SUPPLY ROUTING" .

2. 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.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors. Refer to AT-112, "Wiring Diagram — AT — MAIN" .

3. CHECK SELF-DIAGNOSIS RESULTS

With CONSULT-II
Does "SELECTION FORM MENU" in "DATA MONITOR" show damage to O/D OFF indicator lamp (SELF D DP LMP) signal circuit?

No Tools
Execute the self-diagnosis. Is a malfunction in the CAN communication indicated in the results?

YES or NO

YES >> Check the CAN communication line. Refer to AT-208, "DTC U1000 CAN COMMUNICATION LINE" .
NO >> GO TO 4.

4. CHECK O/D OFF INDICATOR LAMP CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Check the combination meter.
   Refer to DI-8, "Combination Meter"

OK or NG

OK >> GO TO 5.
NG >> Replace the combination meter.

5. CHECK SYMPTOM

Check again.

OK or NG

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

2. Engine Cannot Be Started In “P” and “N” Position

ECS005YP

SYMPTOM:

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

1. CHECK PNP SWITCH CIRCUIT

With CONSULT-II

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

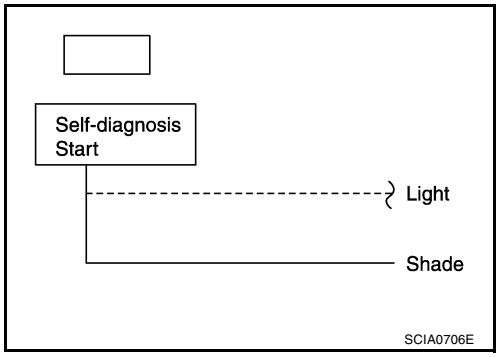
Without CONSULT-II

Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" .

No >> GO TO 2.



2. CHECK PNP SWITCH INSPECTION

Check for short or open of PNP switch harness connector terminals 1 and 2.
Refer to AT-117, "Diagnostic Procedure" .

OK or NG

OK >> GO TO 3.

NG >> Repair or replace PNP switch.

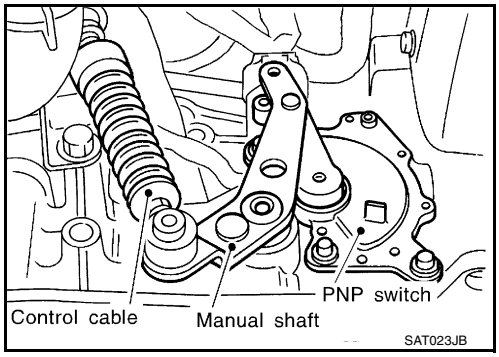
3. CHECK CONTROL CABLE

Check control cable. Refer to AT-262, "Control Cable Adjustment"

OK or NG

OK >> GO TO 4.

NG >> Adjust control cable. Refer to AT-262, "Control Cable Adjustment" .



4. CHECK STARTING SYSTEM

Check starting system. Refer to SC-9, "STARTING SYSTEM" .

OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace damaged parts.

3. In “P” Position, Vehicle Moves Forward Or Backward When Pushed

ECS005YQ

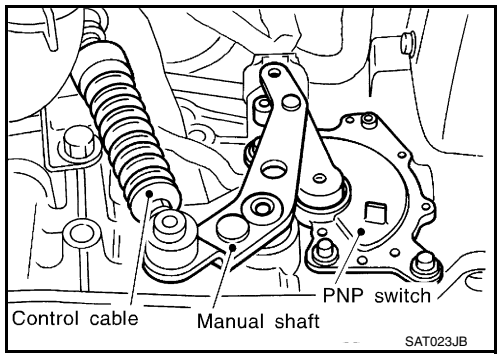
SYMPTOM:
Vehicle moves when it is pushed forward or backward with selector lever in “P” position.

1. CHECK CONTROL CABLE

Check control cable. Refer to AT-262, "Control Cable Adjustment"

OK or NG

OK >> GO TO 2.
NG >> Adjust control cable. Refer to AT-262, "Control Cable Adjustment" .

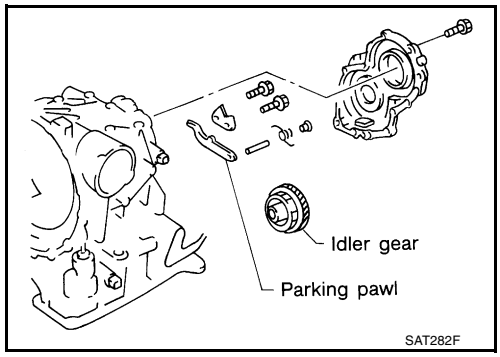


2. CHECK PARKING COMPONENTS

Check parking components. Refer to AT-267, "Components" .

OK or NG

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



4. In “N” Position, Vehicle Moves

ECS005YR

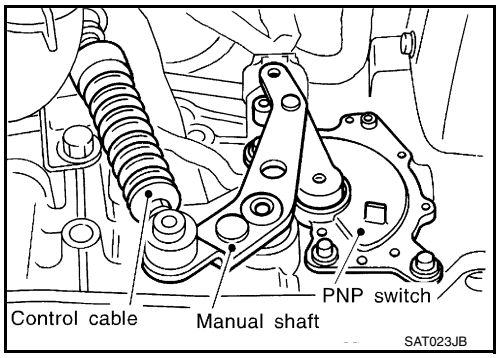
SYMPTOM:
Vehicle moves forward or backward when selecting “N” position.

1. CHECK CONTROL CABLE

Check control cable. Refer to AT-262, "Control Cable Adjustment" .

OK or NG

OK >> GO TO 2.
NG >> Adjust control cable. Refer to AT-262, "Control Cable Adjustment" .

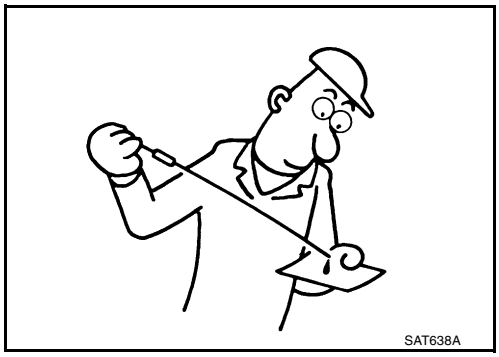


2. CHECK A/T FLUID LEVEL

Check A/T fluid level again.

OK or NG

OK >> GO TO 3.
NG >> Refill ATF.

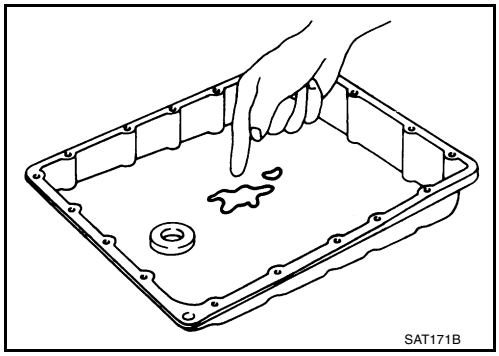


3. CHECK A/T FLUID CONDITION

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

OK or NG

OK >> GO TO 4.
NG >> 1. Disassemble A/T.
2. Check the following items:
- Forward clutch assembly
- Overrun clutch assembly
- Reverse clutch assembly



4. CHECK SYMPTOM

Check again.

OK or NG

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

5. Large Shock. “N” → “R” Position

ECS005YS

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

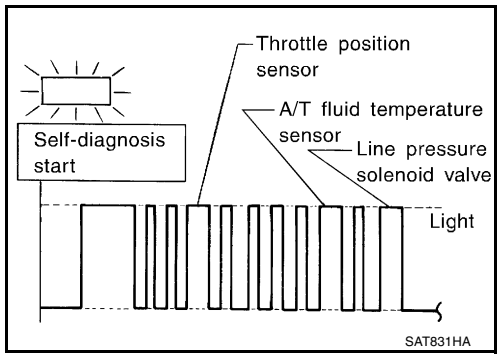
1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to A/T fluid temperature sensor, line pressure solenoid valve or throttle position sensor [accelerator pedal position (APP) sensor] circuit?

Yes or No

Yes >> Check damaged circuit. Refer to AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" , AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE" or AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" .

No >> GO TO 2.



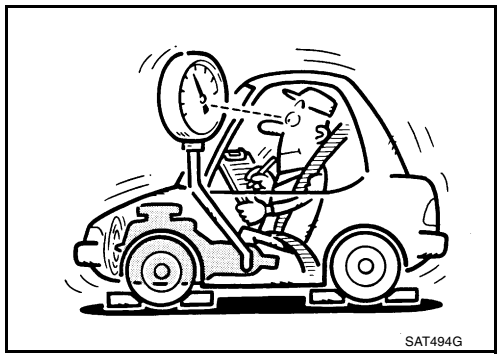
2. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in “D” position. Refer to AT-67, "Line Pressure Test" .

OK or NG

OK >> GO TO 3.

NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
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
- Oil pump assembly



3. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**

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

6. Vehicle Does Not Creep Backward In “R” Position

ECS005YT

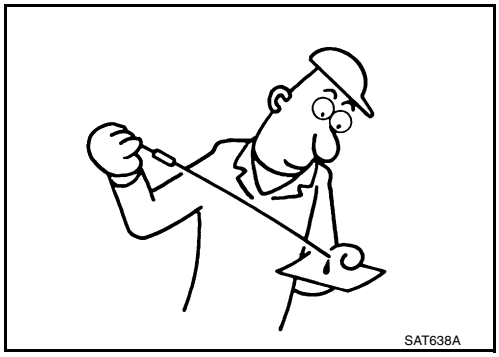
SYMPTOM:
Vehicle does not creep backward when selecting “R” position.

1. CHECK A/T FLUID LEVEL

Check A/T fluid level again.

OK or NG

OK >> GO TO 2.
NG >> Refill ATF.

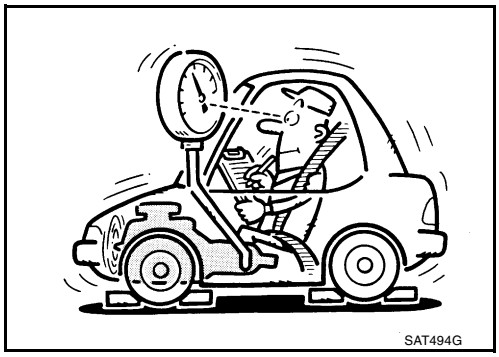

SAT638A

2. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in “R” position. Refer to AT-67, "Line Pressure Test" .

OK or NG

OK >> GO TO 3.
NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
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


SAT494G

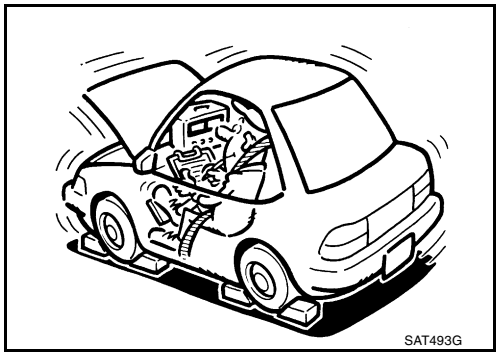
3. CHECK STALL TEST

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

OK or NG

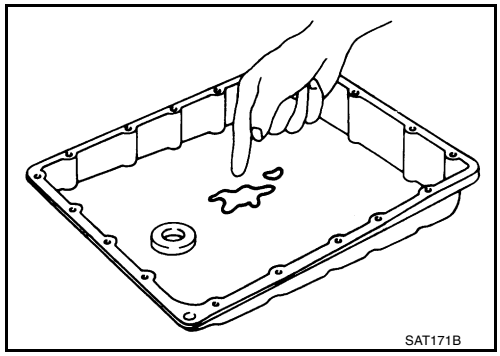
OK >> GO TO 4.
OK in “1” position, NG in “R” position>>1.Disassemble A/T.
2. Check the following items:
- Reverse clutch assembly

NG in both “1” and “R” positions>> GO TO 6.


SAT493G

4. CHECK A/T FLUID CONDITION

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



OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

5. CHECK SYMPTOM

Check again.

OK or NG

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

6. DETECT MALFUNCTIONING ITEM

1. Disassemble A/T.
2. Check the following items:

- Reverse clutch assembly
- High clutch assembly
- Low & reverse brake assembly
- Forward clutch assembly
- Overrun clutch assembly

OK or NG

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

7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position

ECS005YU

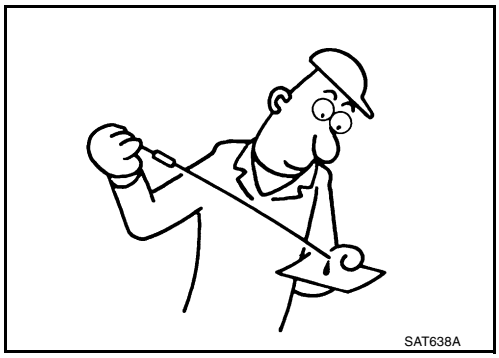
SYMPTOM:
Vehicle does not creep forward when selecting “D”, “2” or “1” position.

1. CHECK A/T FLUID LEVEL

Check A/T fluid level again.

OK or NG

OK >> GO TO 2.
NG >> Refill ATF.

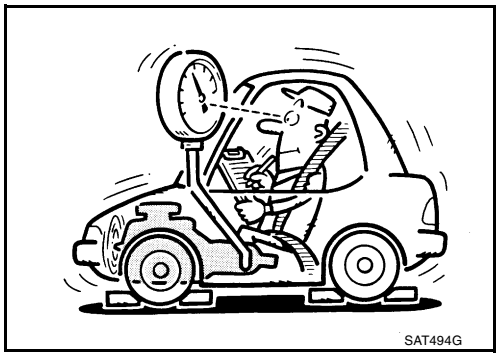

SAT638A

2. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in “D” position. Refer to AT-67, "Line Pressure Test" .

OK or NG

OK >> GO TO 3.
NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
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

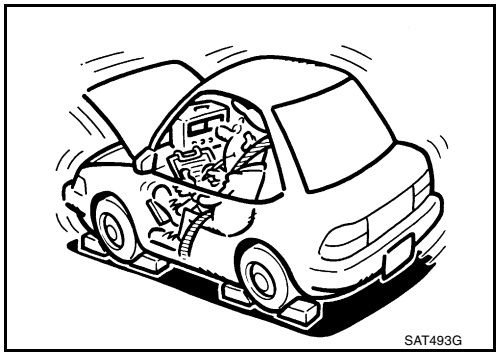

SAT494G

3. CHECK STALL TEST

Check stall revolution with selector lever in “D” position. Refer to AT-63, "Stall Test" .

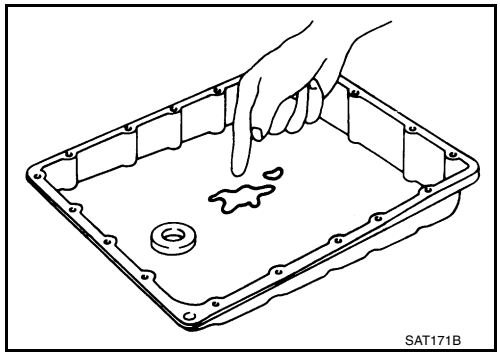
OK or NG

OK >> GO TO 4.
NG >> GO TO 6.


SAT493G

4. CHECK A/T FLUID CONDITION

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



OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

5. CHECK SYMPTOM

Check again.

OK or NG

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

6. DETECT MALFUNCTIONING ITEM

1. Disassemble A/T.
2. Check the following items:

- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- Reverse clutch assembly
- High clutch assembly

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

8. Vehicle Cannot Be Started From D1

ECS005YV

SYMPTOM:
Vehicle cannot be started from D1 on Cruise Test — Part 1.

1. CHECK SYMPTOM

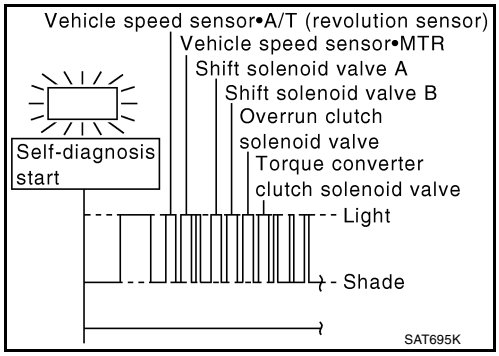
Is “6. Vehicle Does Not Creep Backward In R Position” OK?

Yes or No

Yes >> GO TO 2.
No >> Go to AT-226, "6. Vehicle Does Not Creep Backward In “R” Position" .

2. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), overrun clutch solenoid valve, torque converter clutch solenoid valve, shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test?

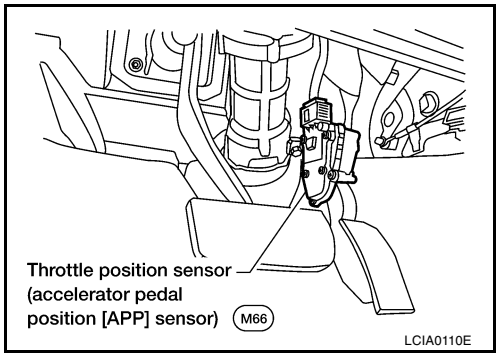


Yes or No

Yes >> Check damaged circuit. Refer to AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" , AT-179, "DTC P0750 SHIFT SOLENOID VALVE A" , AT-183, "DTC P0755 SHIFT SOLENOID VALVE B" , AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" or AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" .
No >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-187, "DTC P0122, P0123 TP SENSOR" [QG18DE (ULEV)] or EC-808, "DTC P0222, P0223 TP SENSOR" [QG18DE (SULEV)].

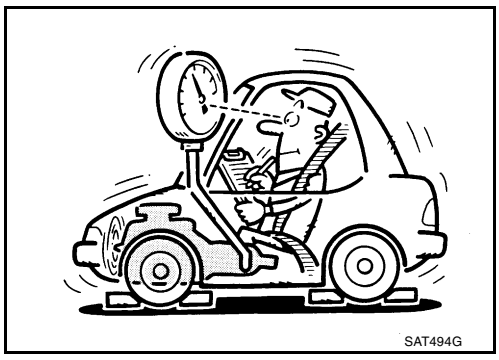


OK or NG

OK >> GO TO 4.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].

4. CHECK LINE PRESSURE

Check line pressure at stall point with selector lever in “D” position. Refer to AT-67, "Line Pressure Test" .

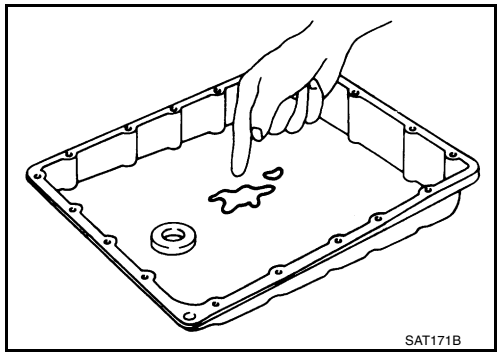


OK or NG

OK >> GO TO 5.
NG >> GO TO 8.

5. CHECK A/T FLUID CONDITION

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



OK or NG

OK >> GO TO 6.
NG >> GO TO 8.

6. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

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

OK or NG

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

7. CHECK SYMPTOM

Check again.

OK or NG

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

8. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
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:
- High clutch assembly
- Torque converter
- Oil pump assembly
- Reverse clutch assembly
- Low and reverse brake assembly

OK or NG

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

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

ECS005YW

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

1. CHECK SYMPTOM

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

Yes or No

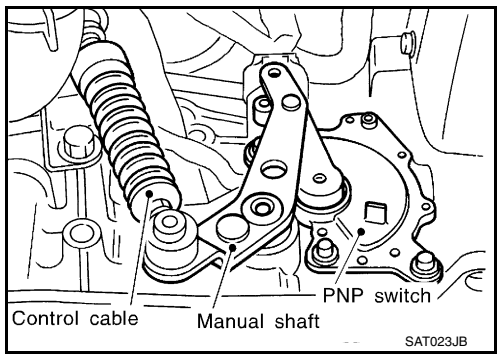
Yes >> GO TO 2.
No >> Go to AT-228, "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" , AT-230, "8. Vehicle Cannot Be Started From D_1" .

2. CHECK CONTROL CABLE

Check control cable. Refer to AT-262, "Control Cable Adjustment"

OK or NG

OK >> GO TO 3.
NG >> Adjust control cable. Refer to AT-262, "Control Cable Adjustment" .



3. CHECK VEHICLE SPEED SENSOR·A/T AND CHECK VEHICLE SPEED SENSOR·MTR CIRCUIT

Check vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuit. Refer to AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" .

OK or NG

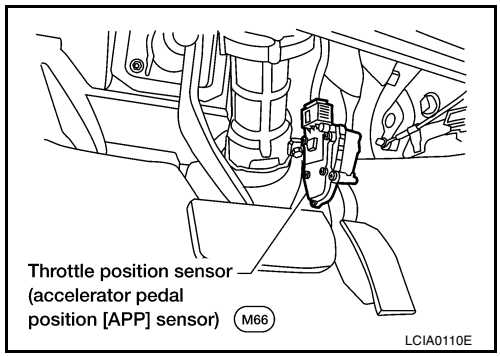
OK >> GO TO 4.
NG >> Repair or replace vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuits.

4. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-187, "DTC P0122, P0123 TP SENSOR" [QG18DE (ULEV)] or EC-756, "DTC P0122, P0123 TP SENSOR" [QG18DE (SULEV)].

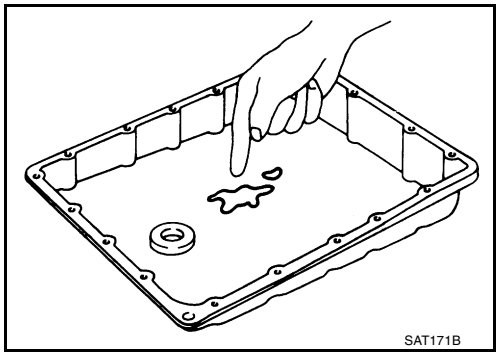
OK or NG

OK >> GO TO 5.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



5. CHECK A/T FLUID CONDITION

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



OK or NG

OK >> GO TO 6.
NG >> GO TO 8.

6. DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-259, "REMOVAL" .
2. Check the following items:

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

OK or NG

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

7. CHECK SYMPTOM

Check again.

OK or NG

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

8. DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-259, "REMOVAL" .
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:

- Servo piston assembly
- Brake band

OK or NG

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

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

ECS005YX

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

1. CHECK SYMPTOM

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

Yes or No

Yes >> GO TO 2.
No >> Go to AT-228, "7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position" , AT-230, "8. Vehicle Cannot Be Started From D_1" .

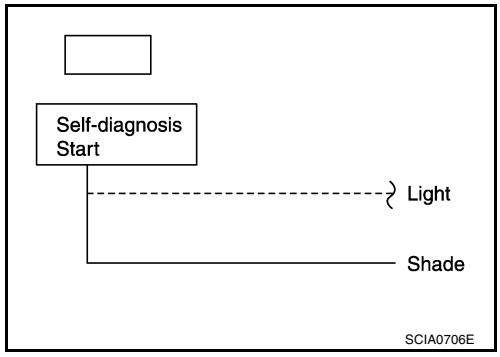
2. CHECK PNP SWITCH CIRCUIT

With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" .
No >> GO TO 3.

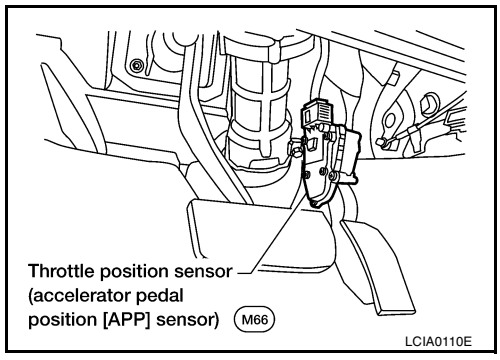


3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-756, "DTC P0122, P0123 TP SENSOR" [QG18DE (ULEV)] or EC-187, "DTC P0122, P0123 TP SENSOR" [QG18DE (SULEV)].

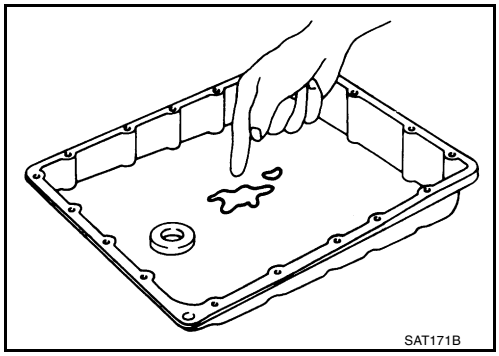
OK or NG

OK >> GO TO 4.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



4. CHECK A/T FLUID CONDITION

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



OK or NG

OK >> GO TO 5.
NG >> GO TO 7.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. CHECK SYMPTOM

Check again.

OK or NG

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

7. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
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
- Brake band

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

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

ECS005YY

SYMPTOM:

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

1. CHECK SYMPTOM

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

Yes or No

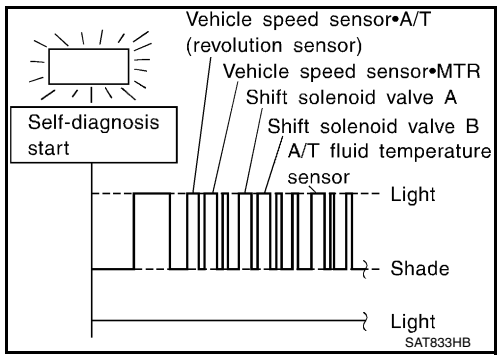
Yes >> GO TO 2.
No >> Go to AT-228, "7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position" , AT-230, "8. Vehicle Cannot Be Started From D_1" .

2. CHECK SELF-DIAGNOSTIC RESULTS

With CONSULT-II

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



Yes or No

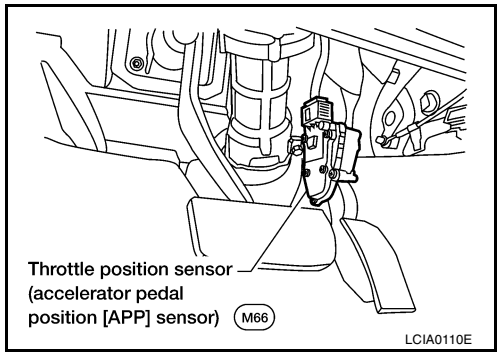
Yes >> Check damaged circuit. Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" , AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" , AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-179, "DTC P0750 SHIFT SOLENOID VALVE A" , AT-183, "DTC P0755 SHIFT SOLENOID VALVE B" , AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" .
No >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-187, "DTC P0122, P0123 TP SENSOR" [QG18DE (ULEV)] or EC-756, "DTC P0122, P0123 TP SENSOR" [QG18DE (SULEV)].

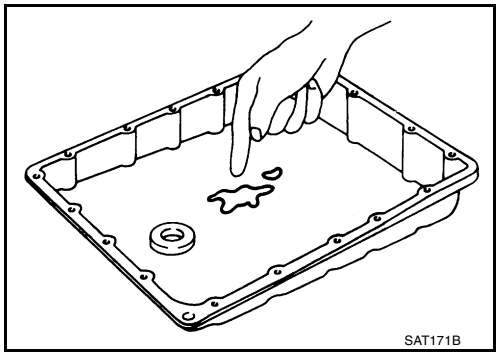
OK or NG

OK >> GO TO 4.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



4. CHECK A/T FLUID CONDITION

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



OK or NG

OK >> GO TO 5.
NG >> GO TO 7.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Shift valve A
- Overrun clutch control valve
- Shift solenoid valve A
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. CHECK SYMPTOM

Check again.

OK or NG

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

7. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Shift valve A
- Overrun clutch control valve
- Shift solenoid valve A
- Pilot valve
- Pilot filter

3. Disassemble A/T.
4. Check the following items:

- Servo piston assembly
- Brake band

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

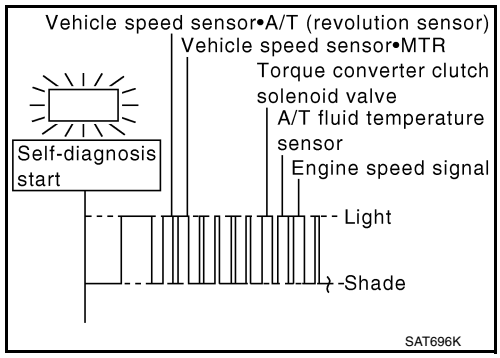
12. A/T Does Not Perform Lock-up

ECS005YZ

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

1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to A/T fluid temperature sensor, vehicle speed sensor·A/T (revolution sensor), engine speed signal, torque converter clutch solenoid valve, or vehicle speed sensor·MTR circuit after cruise test?



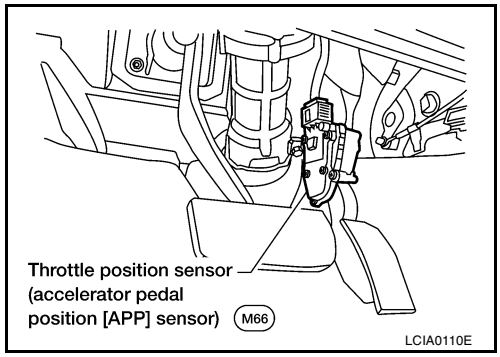
Yes or No

Yes >> Check torque converter clutch solenoid valve circuit. Refer to AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" , AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-131, "DTC P0725 ENGINE SPEED SIGNAL" , AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" , and AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" .

No >> GO TO 2.

2. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-187, "DTC P0122, P0123 TP SENSOR" [QG18DE (ULEV)] or EC-756, "DTC P0122, P0123 TP SENSOR" [QG18DE (SULEV)].



OK or NG

OK >> GO TO 3.

NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].

3. DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Torque converter clutch control valve
- Torque converter relief valve
- Pilot valve
- Pilot filter

3. Remove A/T.
4. Check torque converter.

OK or NG

OK >> GO TO 4.

NG >> Repair or replace damaged parts.

4. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**

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

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

ECS005Z0

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

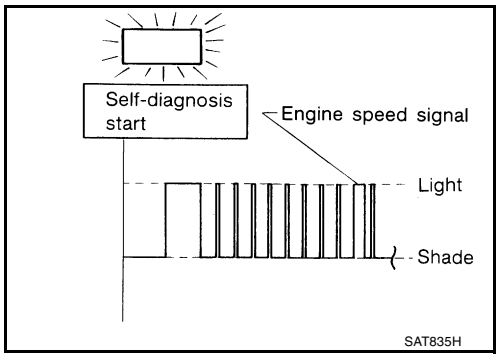
1. CHECK DIAGNOSTIC RESULTS

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

Yes or No

Yes >> Check engine speed signal circuit. Refer to AT-131, "DTC P0725 ENGINE SPEED SIGNAL" .

No >> GO TO 2.



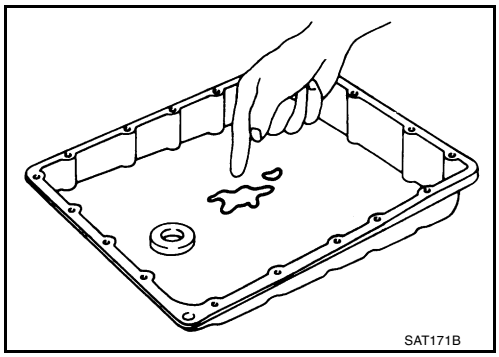
2. CHECK A/T FLUID CONDITION

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

OK or NG

OK >> GO TO 3.

NG >> GO TO 5.



3. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Torque converter clutch control valve
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 4.

NG >> Repair or replace damaged parts.

4. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**

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

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Torque converter clutch control valve
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check torque converter and oil pump assembly.

OK or NG

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

14. Lock-up Is Not Released

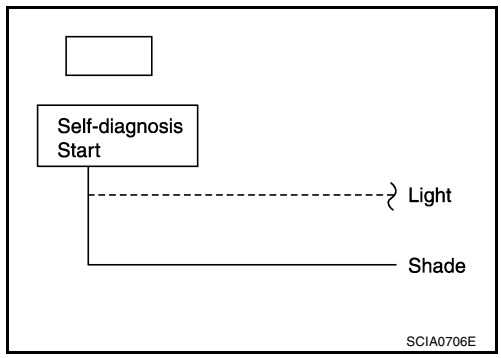
ECS005Z1

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

1. CHECK THROTTLE POSITION SWITCH CIRCUIT

With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to closed throttle position switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to closed throttle position switch circuit?



Yes or No

Yes >> Check closed throttle position switch circuit. Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" .
No >> GO TO 2.

2. CHECK SYMPTOM

Check again.

OK or NG

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

15. Engine Speed Does Not Return To Idle (Light Braking D4 → D3)

ECS005Z2

SYMPTOM:

- **Engine speed does not smoothly return to idle when A/T shifts from D4 to D3 .**
- **Vehicle does not decelerate by engine brake when turning overdrive control switch OFF.**
- **Vehicle does not decelerate by engine brake when shifting A/T from "D" to "2" position.**

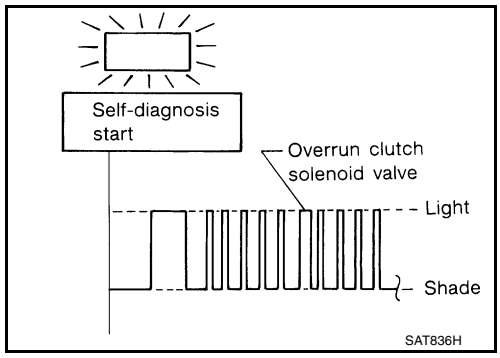
1. CHECK SELF-DIAGNOSTIC RESULTS

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

Yes or No

Yes >> Check overrun clutch solenoid valve circuit. Refer to AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" .

No >> GO TO 2.



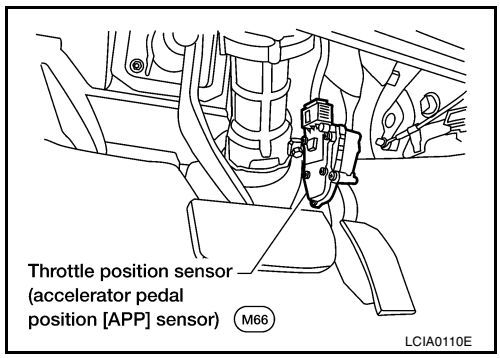
2. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-187, "DTC P0122, P0123 TP SENSOR" [QG18DE (ULEV)] or EC-756, "DTC P0122, P0123 TP SENSOR" [QG18DE (SULEV)].

OK or NG

OK >> GO TO 3.

NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



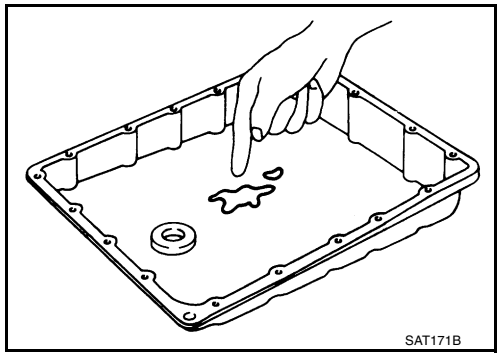
3. CHECK A/T FLUID CONDITION

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

OK or NG

OK >> GO TO 4.

NG >> GO TO 6.



4. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

5. CHECK SYMPTOM

Check again.

OK or NG

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

6. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
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

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

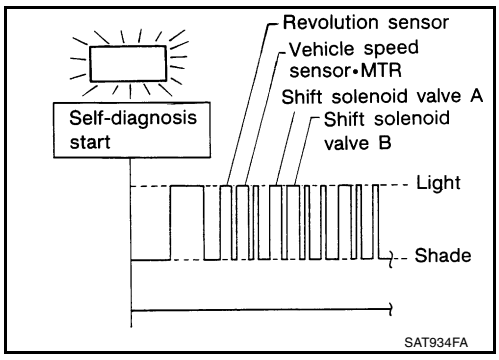
16. Vehicle Does Not Start From D_1

ECS005Z3

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

1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test?



Yes or No

Yes >> Check damaged circuit. Refer to AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-179, "DTC P0750 SHIFT SOLENOID VALVE A" , AT-183, "DTC P0755 SHIFT SOLENOID VALVE B" , AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" .
No >> GO TO 2.

2. CHECK SYMPTOM

Check again.

OK or NG

OK >> Go to AT-230, "8. Vehicle Cannot Be Started From D1" .
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

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

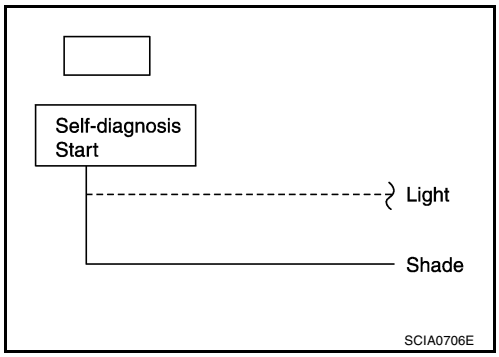
ECS005Z4

SYMPTOM:
A/T does not shift from D_4 to D_3 when changing overdrive control switch to “OFF” position.

1. CHECK OVERDRIVE CONTROL SWITCH CIRCUIT

With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to overdrive control switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to overdrive control switch circuit?



Yes or No

Yes >> Check overdrive control switch circuit. Refer to AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" .

No >> Go to AT-235, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" .

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

ECS005Z5

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

1. CHECK PNP SWITCH CIRCUIT

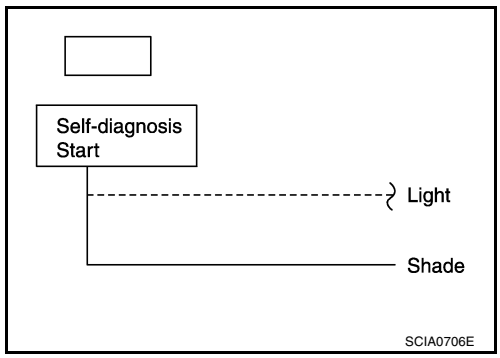
With CONSULT-II
Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH"

No >> Go to AT-233, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$" .



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

ECS005Z6

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

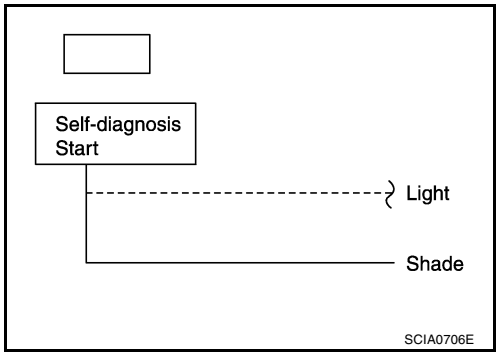
1. CHECK PNP SWITCH CIRCUIT

With CONSULT-II
Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" .
No >> GO TO 2.

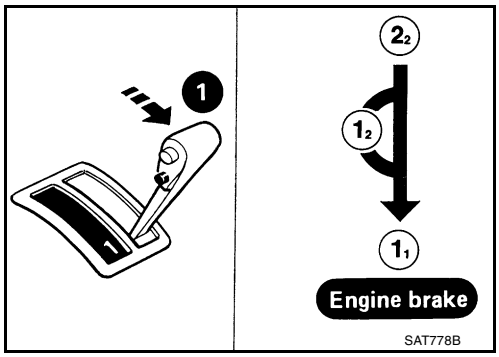


2. CHECK SYMPTOM

Check again.

OK or NG

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



20. Vehicle Does Not Decelerate By Engine Brake

ECS005Z7

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

1. CHECK SYMPTOM

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

Yes or No

Yes >> Go to AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking D$_4$ → D$_3$)".
No >> Go to AT-226, "6. Vehicle Does Not Creep Backward In "R" Position".

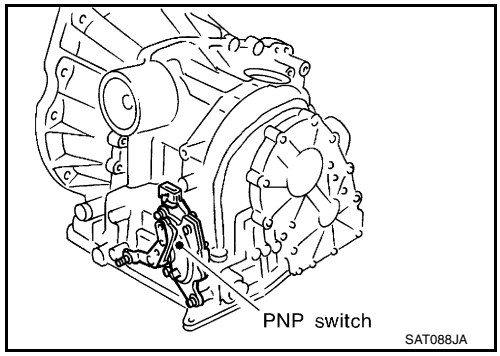
21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}

ECS006GY

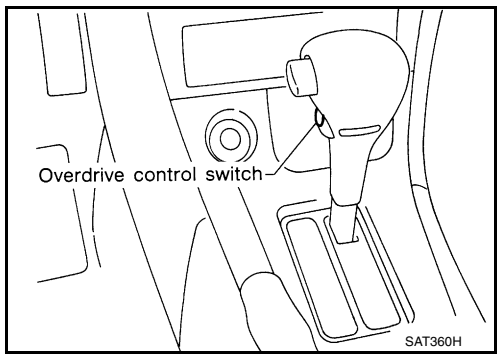
SYMPTOM:
O/D OFF indicator lamp does not come on in TCM self-diagnostic procedure even if the lamp circuit is good.

DESCRIPTION

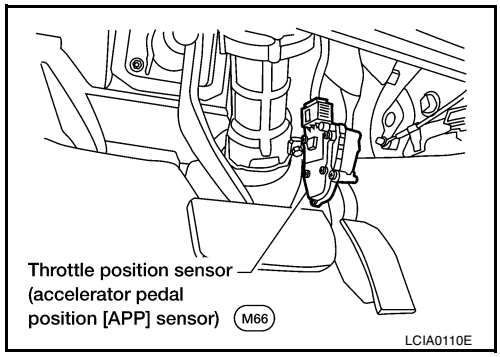
- Park/neutral position (PNP) switch
  The park/neutral (PNP) switch assembly includes a transmission range switch. The transmission range switch detects the selector lever position and sends a signal to the TCM.



- Overdrive control switch
  Detects the overdrive control switch position (ON or OFF) and sends a signal to the TCM.



- Throttle position sensor [accelerator pedal position (APP) sensor]
  The throttle position sensor [accelerator pedal position (APP) sensor] is part of the system that controls the throttle position. This system also uses an electric throttle control actuator, which consists of a throttle control motor and throttle position sensors. Accelerator pedal position signal is sent to the ECM.



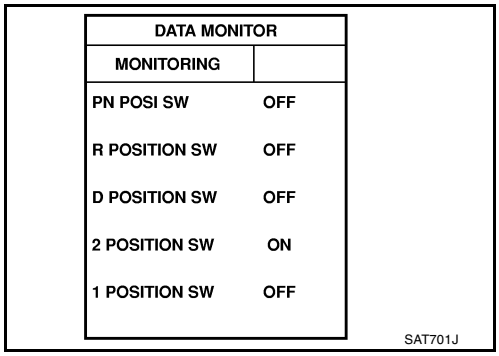
DIAGNOSTIC PROCEDURE

NOTE:
The diagnostic procedure includes inspections for the overdrive control switch circuits.

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

With CONSULT-II

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



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

SAT701J

OK or NG

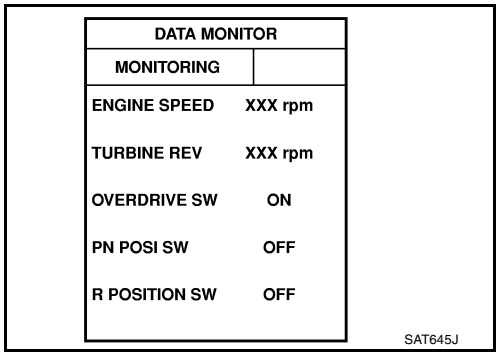
OK >> GO TO 2.
NG >> Check the following items:

- PNP switch (Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH"
- Harness for short or open between ignition switch and PNP switch
- Harness for short or open between PNP switch and TCM

2. CHECK OVERDRIVE CONTROL SWITCH CIRCUIT (WITH CONSULT-II)

With CONSULT-II

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 SW”.
   Check the signal of the overdrive control switch is indicated properly.
   (Overdrive control switch “ON” displayed on CONSULT-II means overdrive “OFF”.)



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

SAT645J

OK or NG

OK >> GO TO 3.
NG >> Check the following items:

- Overdrive control switch (Refer to AT-251, "Overdrive Control Switch"
- Harness for short or open between TCM and overdrive control switch
- Harness of ground for overdrive control switch for short or open

3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

- Perform throttle position sensor [accelerator pedal position (APP) sensor] inspection. Refer to AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" .

OK or NG

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

4. CHECK TCM INSPECTION

1. Perform AT-250, "DIAGNOSTIC PROCEDURE"

OK or NG

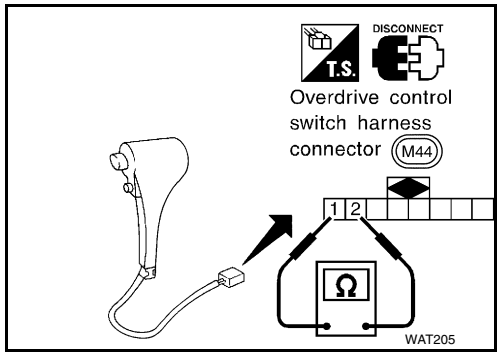
OK >> INSPECTION END.
NG >> ● Perform TCM input/output signal inspection.
● If NG, recheck TCM pin terminals for damage or loose connections with harness connector.

COMPONENT INSPECTION

Overdrive Control Switch

● Check continuity between terminals 1 and 2.

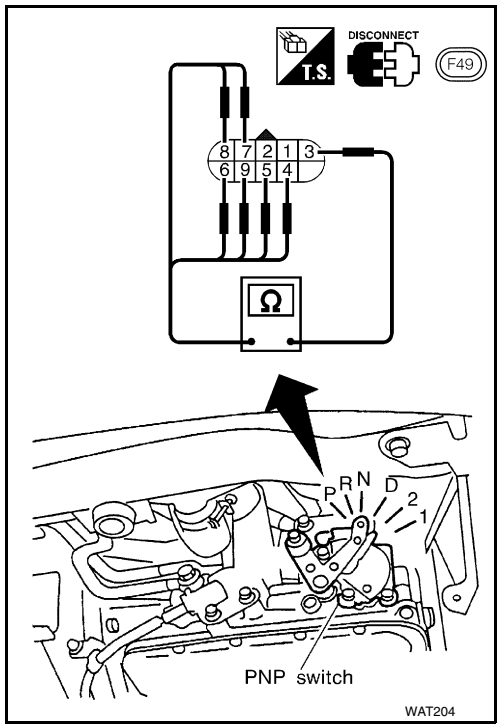
Switch position	Continuity
RELEASED	No
DEPRESSED	Yes



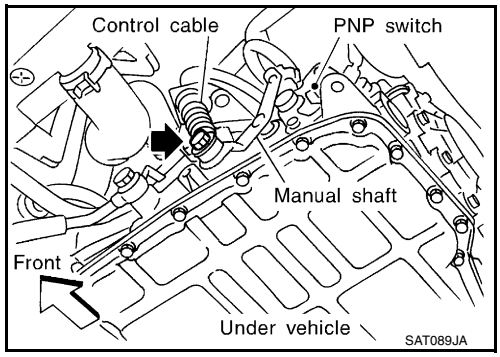
PNP Switch

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-262, "Control Cable Adjustment" .
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-262, "Park/Neutral Position (PNP) Switch Adjustment" .
6. If NG on step 4, replace PNP switch.



A/T SHIFT LOCK SYSTEM

PFP:34950

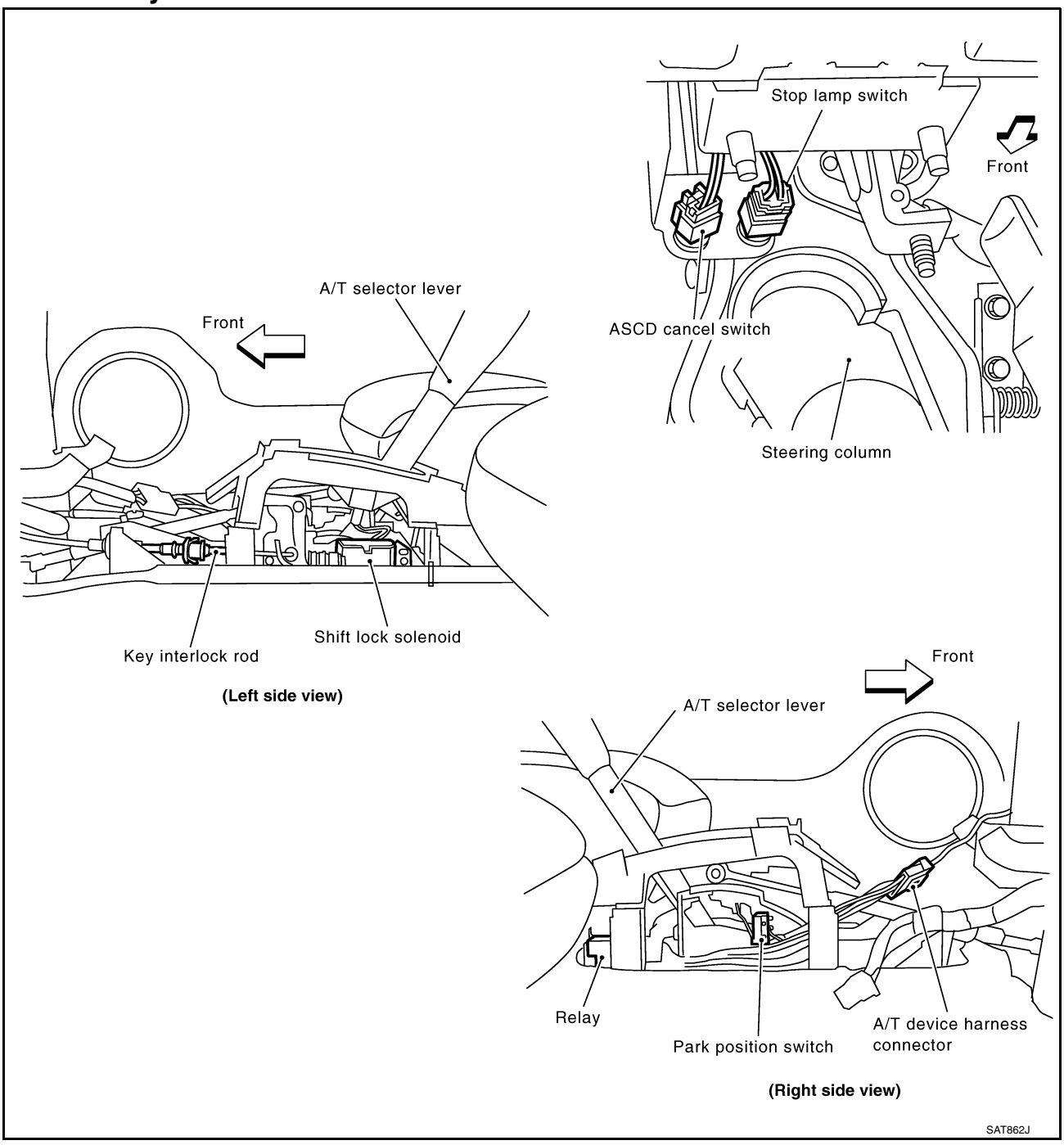
Description

ECS006H0

- 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

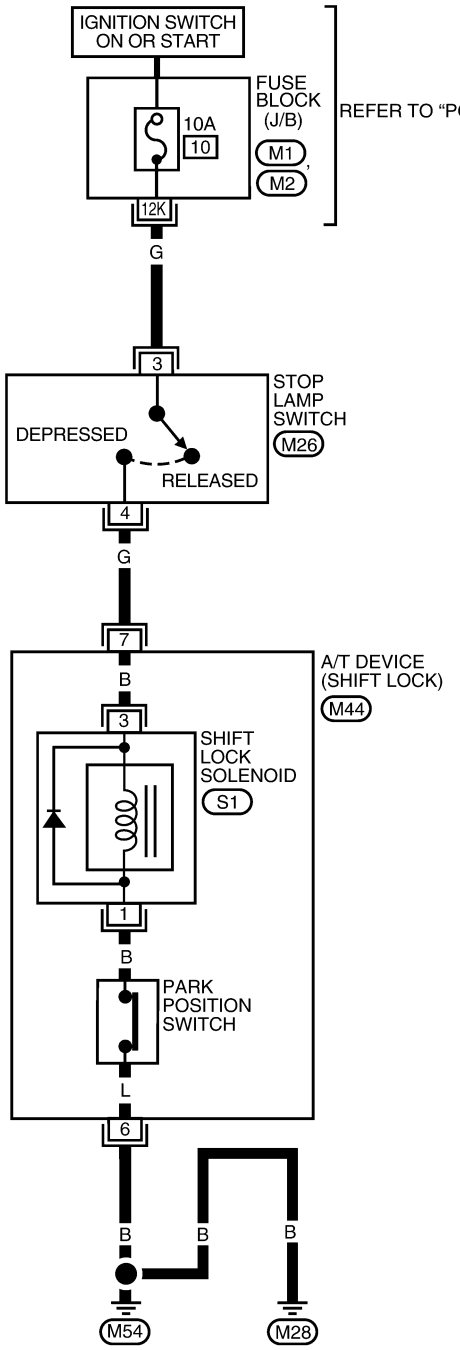
ECS006H1

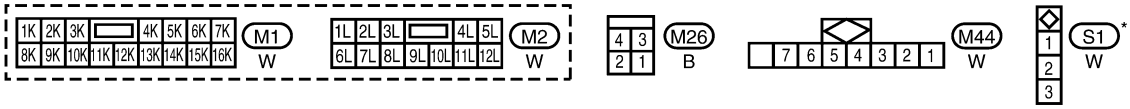


Wiring Diagram — SHIFT —

ECS006H2

AT-SHIFT-01





★: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.

WCWA0076E

Diagnostic Procedure

ECS006H3

SYMPTOM 1:

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

SYMPTOM 2:

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

1. CHECK KEY INTERLOCK CABLE

Check key interlock cable for damage.

OK or NG

OK >> GO TO 2.
NG >> Repair key interlock cable. Refer to AT-640, "Components" .

2. CHECK SELECTOR LEVER POSITION

Check selector lever position for damage.

OK or NG

OK >> GO TO 3.
NG >> Check selector lever. Refer to AT-645, "Control Cable Adjustment" .

3. CHECK POWER SOURCE

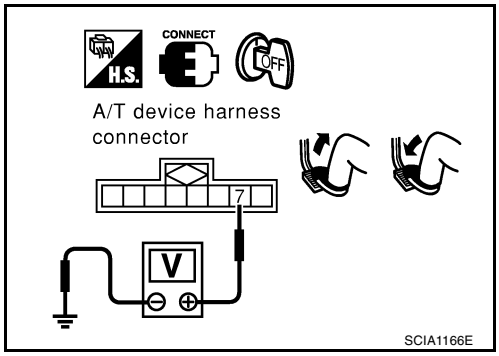
Turn ignition switch to "OFF" position.
(Do not start engine.)

- Check voltage between A/T device harness connector M44 terminal 7 (G) and ground.

Voltage:

Brake pedal depressed: Battery voltage

Brake pedal released: 0V



OK or NG

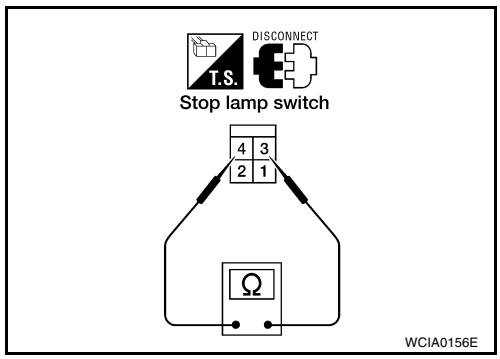
OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING ITEM

Check the following items.

1. Harness for open or short between fuse block (J/B) connector M1 terminal 12K and stop lamp switch harness connector M26 terminal 3.
2. Harness for open or short stop lamp switch harness connector M26 terminal 4 and A/T device harness connector M44 terminal 7 (G).
3. 10A fuse [10, located in the fuse block (J/B)].
4. Check continuity between stop lamp switch harness connector M26 terminals 3 (G) and 4 (G).

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



Check stop lamp switch after adjusting brake pedal —refer to BR-12, "STOP LAMP SWITCH AND ASCD CANCEL SWITCH CLEARANCE"

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

5. CHECK GROUND CIRCUIT

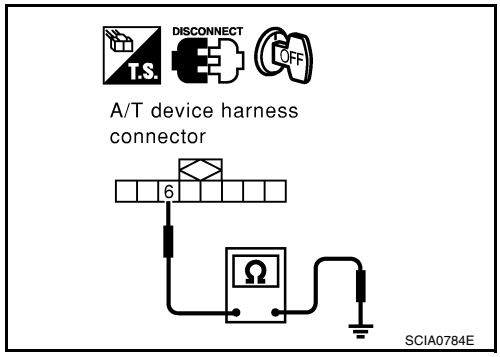
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T device harness connector.
3. Check continuity between A/T device harness M44 terminal 6 (B) and ground.

Continuity should exist

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

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit in harness.



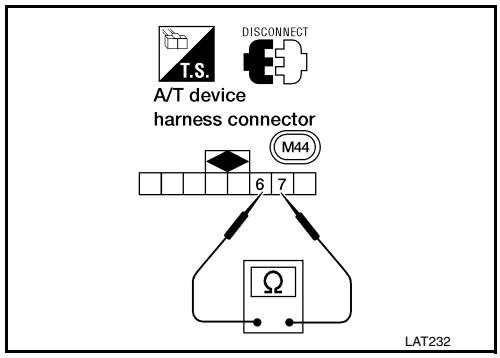
6. CHECK PARK POSITION SWITCH

Check continuity between A/T device harness conector M44 terminals 6 (B) and 7 (G).

Brake pedal	Operation sound
Depressed	No
Released	Yes

OK or NG

OK >> GO TO 7.
NG >> Replace park position switch.



7. CHECK SHIFT LOCK SOLENOID

1. Connect A/T device harness connector.
2. Turn ignition switch to "ON" position.
3. Check operation sound.

Condition	Brake pedal	Operation sound
When ignition switch is turned to "ON" position and selector lever is in the "P" position.	Depressed	Yes
	Released	No

OK or NG

OK >> GO TO 8.
NG >> Replace shift lock solenoid.

8. CHECK SHIFT LOCK OPERATION

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

OK or NG

OK >> INSPECTION END
NG >> GO TO .9

9. CHECK A/T DEVICE INSPECTION

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

OK or NG

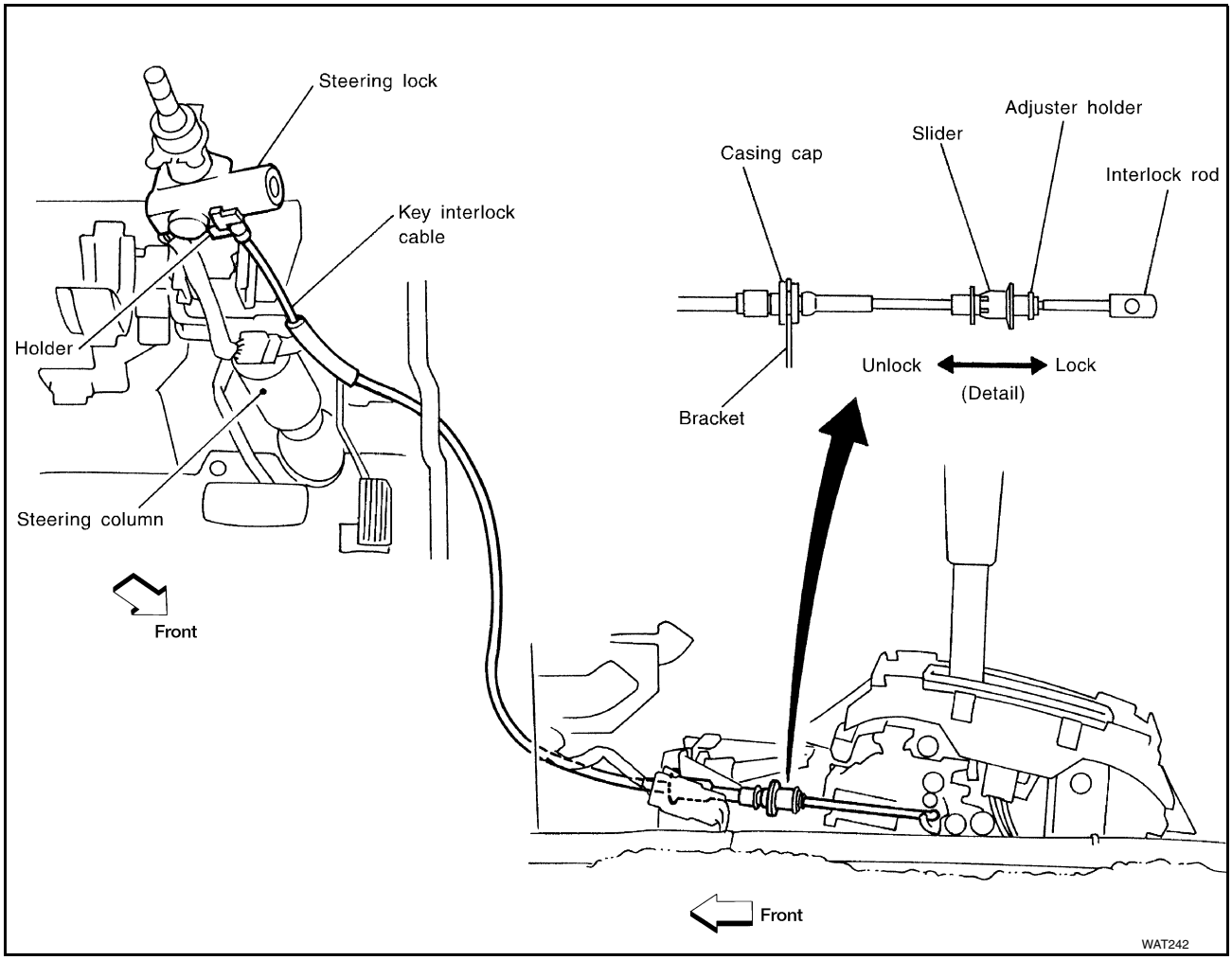
OK >> INSPECTION END
NG >> Repair or replace damaged parts.

KEY INTERLOCK CABLE

PFP:34908

Components

ECS005ZD



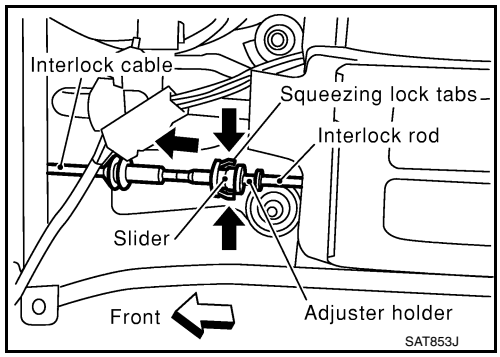
CAUTION:

- **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.**

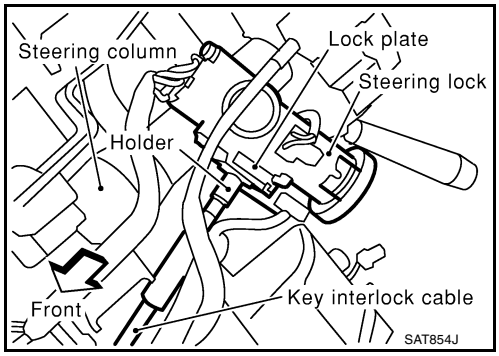
Removal

ECS005ZE

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



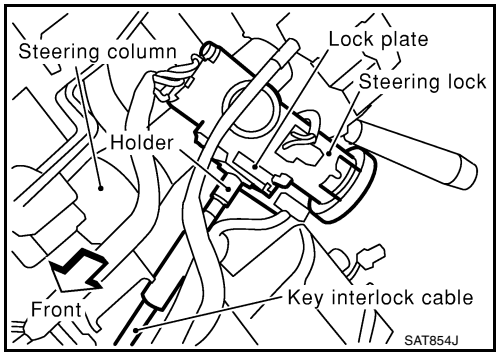
2. Remove lock plate from steering lock assembly and remove key interlock cable.



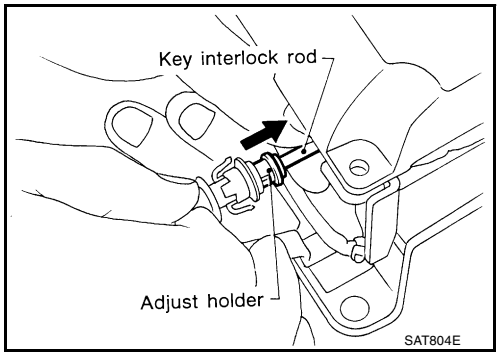
Installation

ECS005ZF

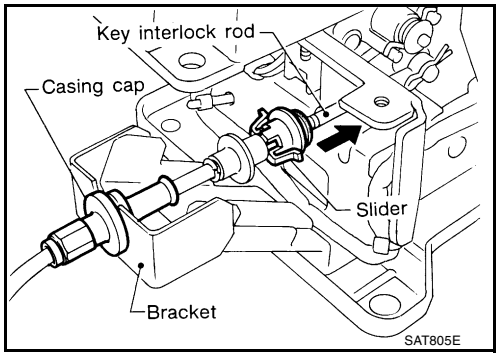
1. Turn ignition key to lock position.
2. Set A/T selector lever to "P" position.
3. Set key interlock cable to steering lock assembly and install lock plate.
4. Clamp cable to steering column and attach to control cable with band.



5. Insert interlock rod into adjuster holder.



6. Install casing cap to bracket.
7. Move slider in order to connect adjuster holder to interlock rod.



ON-VEHICLE SERVICE

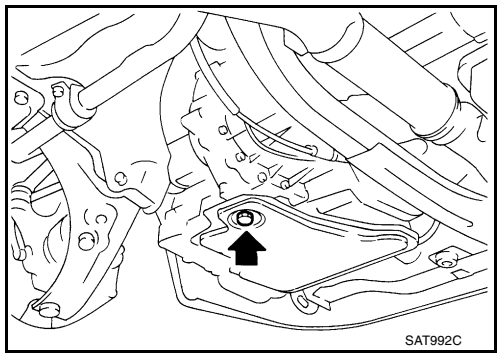
PFP:00000

Control Valve Assembly and Accumulators

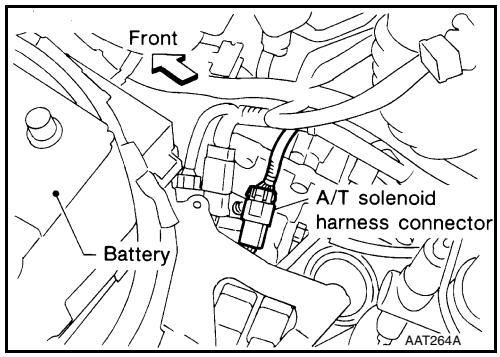
ECS005ZG

REMOVAL

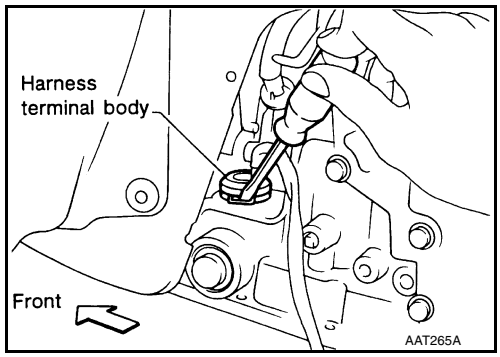
1. Drain ATF from transaxle.
2. Remove oil pan and gasket.
   - **Always replace oil pan bolts as they are self-sealing bolts.**



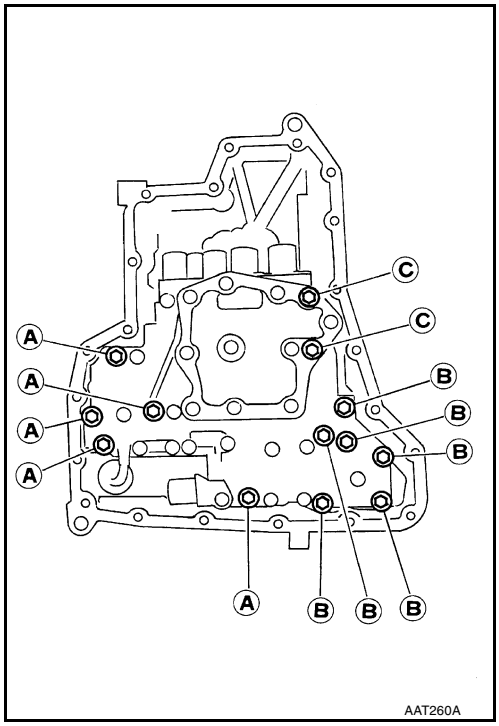
3. Disconnect A/T solenoid valve harness connector.



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



6. Remove control valve assembly mounting bolts A, B and C.

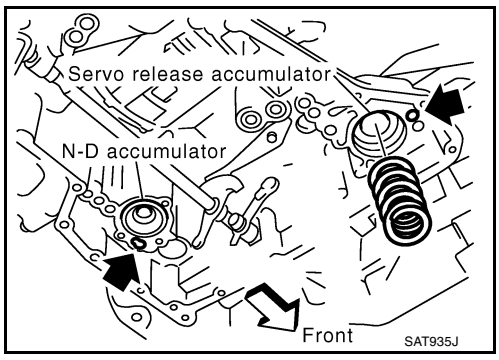


Bolt length, number and location:

Bolt symbol	A	B	C
Bolt length "l" 	40.0 mm (1.575 in)	33.0 mm (1.299 in)	43.5 mm (1.713 in)
Number of bolts	5	6	2

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

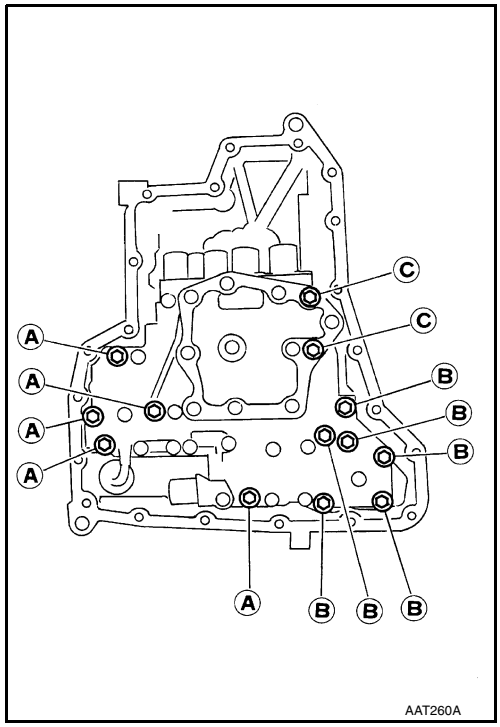
7. Disassemble and inspect control valve assembly if necessary. Refer to AT-297, "Components" .
8. Remove servo release and N-D accumulators by applying compressed air if necessary.
   - **Hold each piston with a clean, lint-free towel.**



INSTALLATION

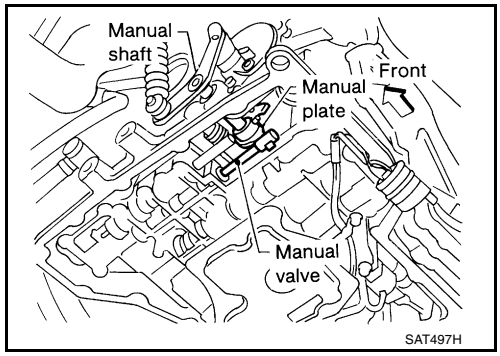
- **Tighten mounting bolts A, B and C to specification.**

: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



AAT260A

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



SAT497H

Control Cable Adjustment

ECS005ZH

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 if the pointer indicating the position is improperly aligned, the control cable needs adjustment.

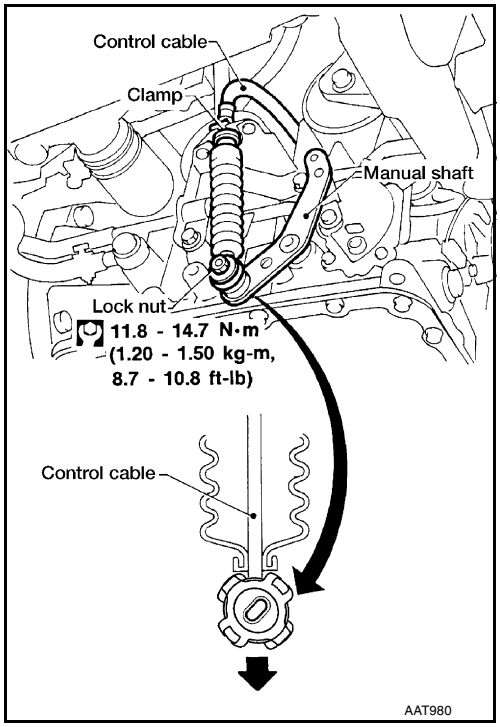
1. Place selector lever in “P” position.
2. Loosen control cable lock nut and place manual shaft in “P” position.
3. Push control cable, by specified force, in the direction of the arrow shown in the illustration.

Specified force : 9.8 N (1.0 kg, 2.2 lb)

4. Release control cable in the opposite direction of the arrow for 1.0 mm (0.039 in).
5. Tighten control cable lock nut by hand.
6. Tighten control cable lock nut.

: 11.8 - 14.7 N·m (1.20 - 1.50 kg-m, 8.7 - 10.8 ft-lb)

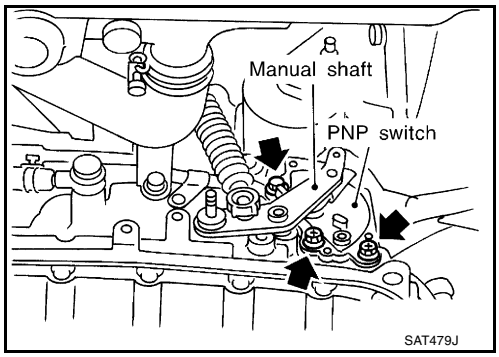
7. Move selector lever from “P” to “1” position again. Make sure that selector lever moves smoothly.
8. Apply grease to contacting areas of selector lever and control cable. Install any part removed.



Park/Neutral Position (PNP) Switch Adjustment

ECS005ZI

1. Remove control cable end from manual shaft.
2. Set manual shaft in “N” position.
3. Loosen PNP switch fixing bolts.

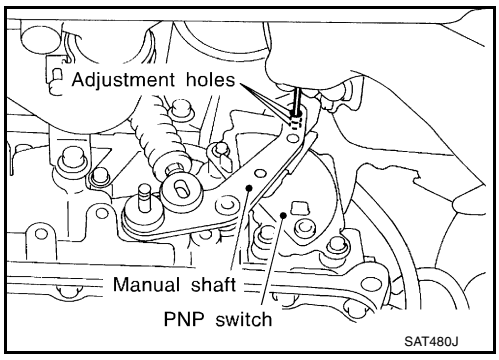


4. Use a 4 mm (0.157 in) pin for this adjustment.

a. Insert the pin straight into the manual shaft adjustment hole.

b. Rotate PNP switch until the pin can also be inserted straight into hole in PNP switch.

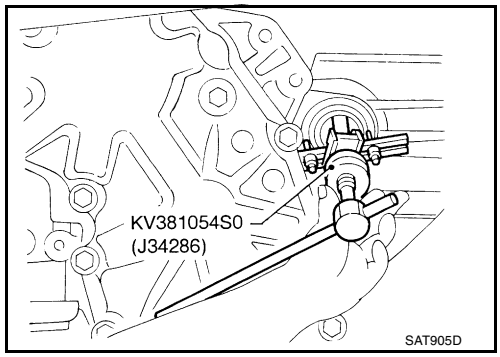
5. Tighten PNP switch fixing bolts.
6. Remove pin from adjustment hole after adjusting PNP switch.
7. Reinstall any part removed.
8. Adjust control cable. Refer to AT-262, "Control Cable Adjustment" .
9. Check continuity of PNP switch. Refer to AT-119, "Component Inspection" .



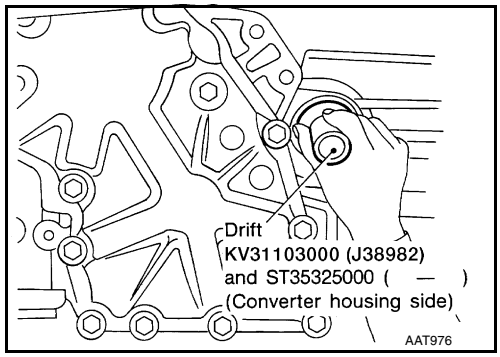
Differential Side Oil Seal Replacement

ECS005ZJ

1. Remove drive shaft assemblies using Tool. Refer to FAX-14, "Removal" .
2. Remove oil seals.



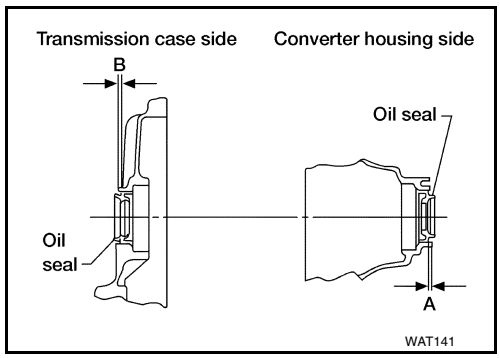
3. Install oil seals using Tool.
   - **Apply ATF to oil seal surface before installing.**



   - **Install oil seals so that dimensions “A” and “B” are within specifications.**

Unit: mm (in)

A	B
5.5 - 6.5 (0.217 - 0.256)	–0.5 to 0.5 (–0.020 to 0.020)



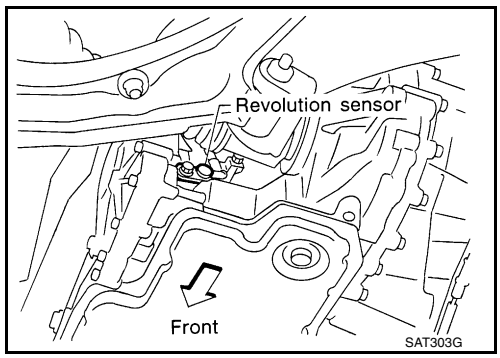
4. Reinstall any part removed.

Revolution Sensor Replacement

ECS005ZK

1. Disconnect revolution sensor harness connector.
2. Remove harness bracket from A/T.
3. Remove revolution sensor from A/T.
4. Reinstall any part removed.

Always use new sealing parts.



REMOVAL AND INSTALLATION

PFP:00000

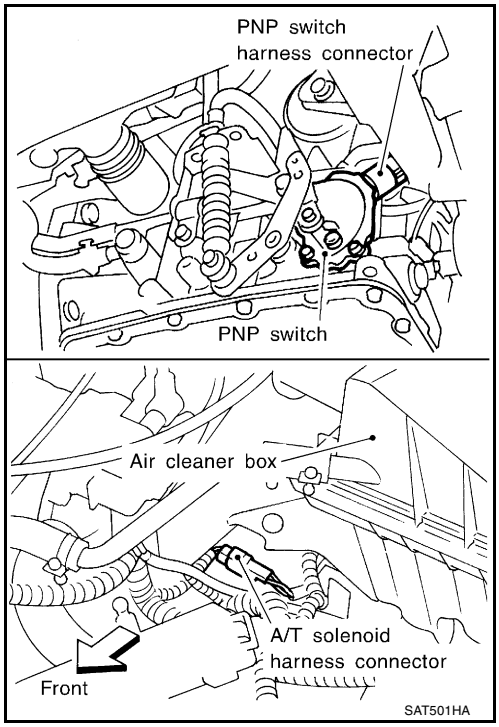
Removal

ECS005ZL

CAUTION:

Before separating transaxle from engine, remove the crankshaft position sensor (OBD) from transaxle. Be careful not to damage sensor.

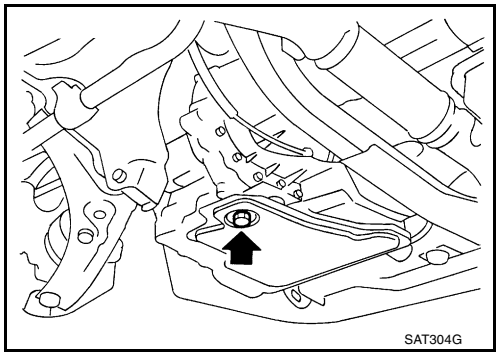
1. Remove battery and bracket.
2. Remove air duct between throttle body and air cleaner.
3. Disconnect terminal cord assembly, PNP switch harness connector and revolution sensor harness connector.



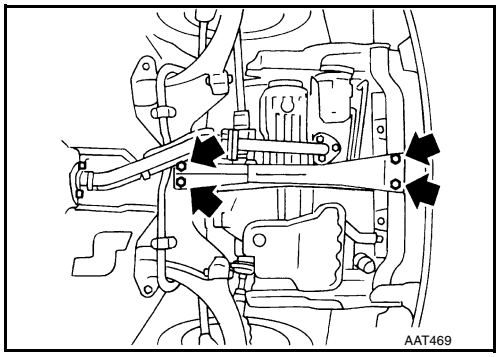
4. Drain ATF from transaxle.
5. Disconnect control cable from transaxle.
6. Disconnect oil cooler hoses.
7. Remove drive shafts. Refer to FAX-14, "Removal" .
8. Remove the intake manifold support bracket. Refer to EM-12, "Removal and Installation" .
9. Remove starter motor from transaxle.

Tighten bolts to specified torque.

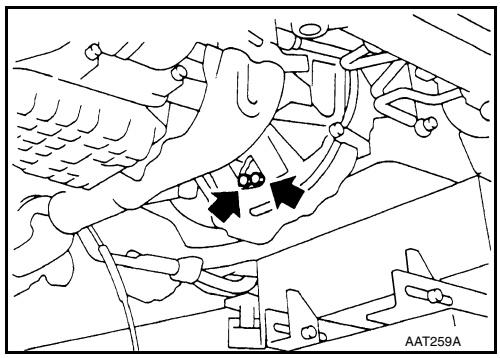
: 33.3 - 46.1 N·m (3.4 - 4.7 kg-m, 25 - 34 ft-lb)



10. Remove upper bolts fixing transaxle to engine.
11. Support transaxle with a jack.
12. Remove center member.
    - Tighten center member fixing bolts to specified torque, Refer to EM-66, "INSTALLATION" .



13. Remove rear plate cover.
14. Remove torque converter bolts.
    Rotate crankshaft to gain access to securing bolts.
15. Remove rear transaxle to engine bracket. Refer to EM-64, "REMOVAL" .
16. Support engine with a jack.
17. Remove rear transaxle mount. Refer to EM-63 .
18. Remove lower bolts fixing transaxle to engine.
19. Lower transaxle while supporting it with a jack.



ECS005ZM

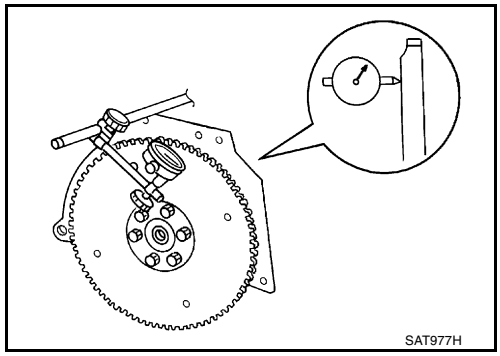
Installation

1. Check drive plate runout.

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

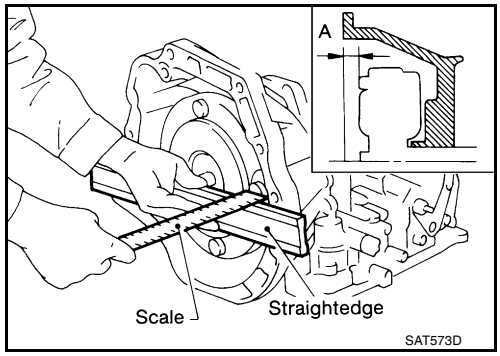
   Maximum allowable runout **:EM-77, "Flywheel Runout" .**

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

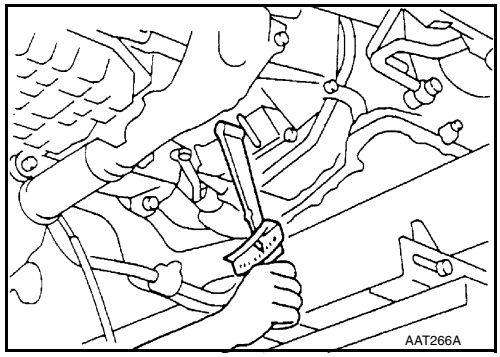


2. When connecting torque converter to transaxle, measure distance “A” to be certain that they are correctly assembled.

   Distance “A” **: 21.1 mm (0.831 in)**

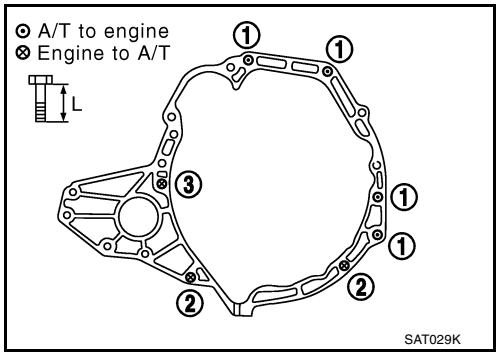


3. Install torque converter to drive plate.
   - **With converter installed, rotate crankshaft several turns to check that transaxle rotates freely without binding.**



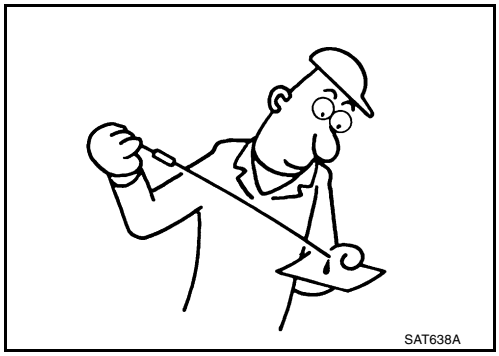
4. Tighten bolts fixing transaxle.

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	Bolt length “l ” mm (in)
1	30 - 40 (3.1 - 4.1, 23 - 29)	50 (1.97)
2	16 - 20 (1.6 - 2.1, 12 - 15)	25 (0.98)
3	31 - 40 (3.1 - 4.1, 23 - 29)	30 (1.18)



SAT029K

5. Reinstall any part removed.
6. Adjust control cable. Refer to AT-262, "Control Cable Adjustment" .
7. Check continuity of PNP switch. Refer to AT-119, "PARK/NEUTRAL POSITION SWITCH" .
8. Refill transaxle with ATF and check fluid level.
9. Move selector lever through all positions to be sure that transaxle operates correctly. With parking brake applied, idle engine. Move selector lever through “N” to “D”, to “2”, to “1” and “R” positions. A slight shock should be felt through the hand gripping the selector each time the transaxle is shifted.
10. Perform road test. Refer to AT-68, "Road Test" .


SAT638A

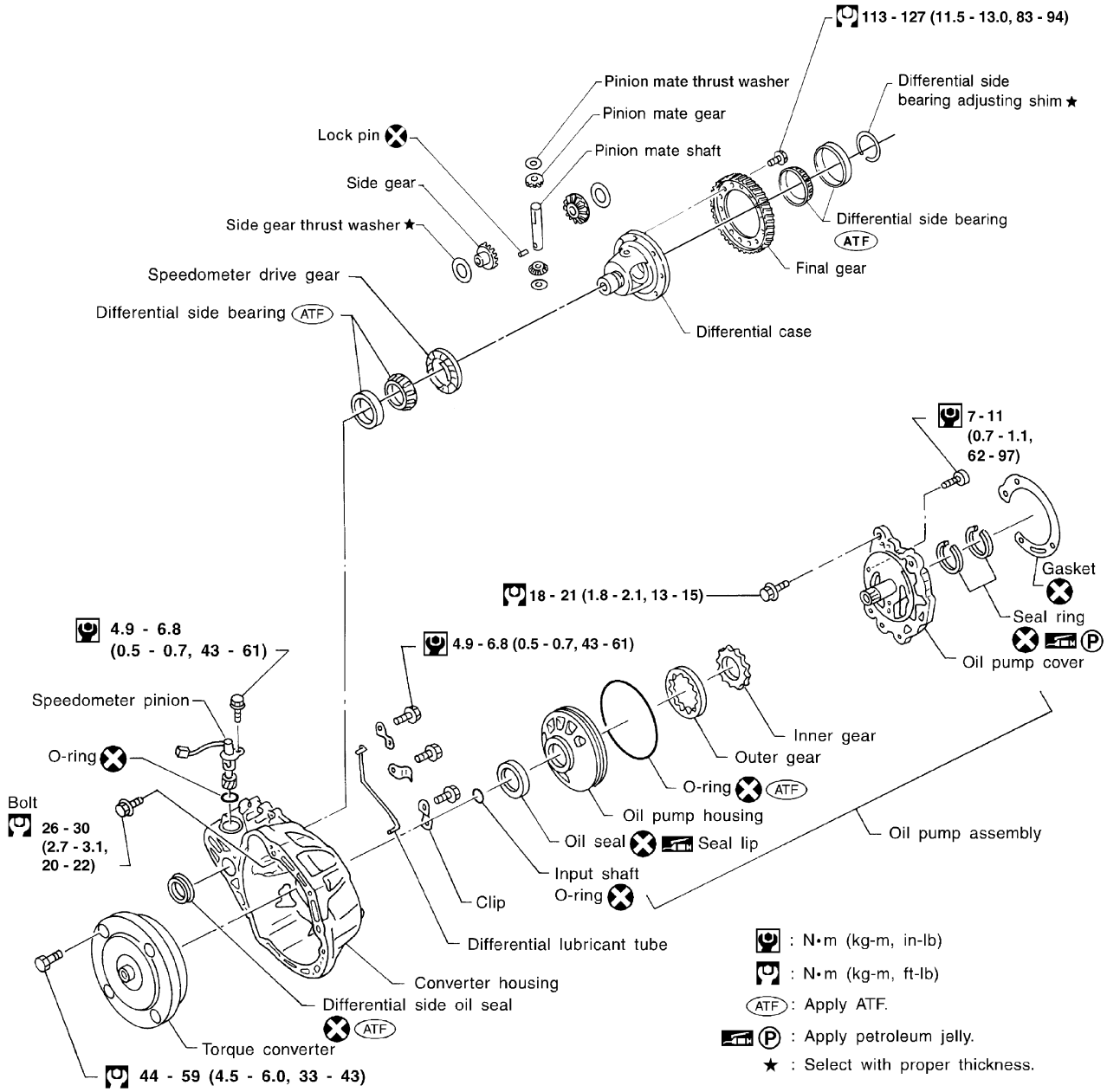
OVERHAUL

PFP:00000

Components

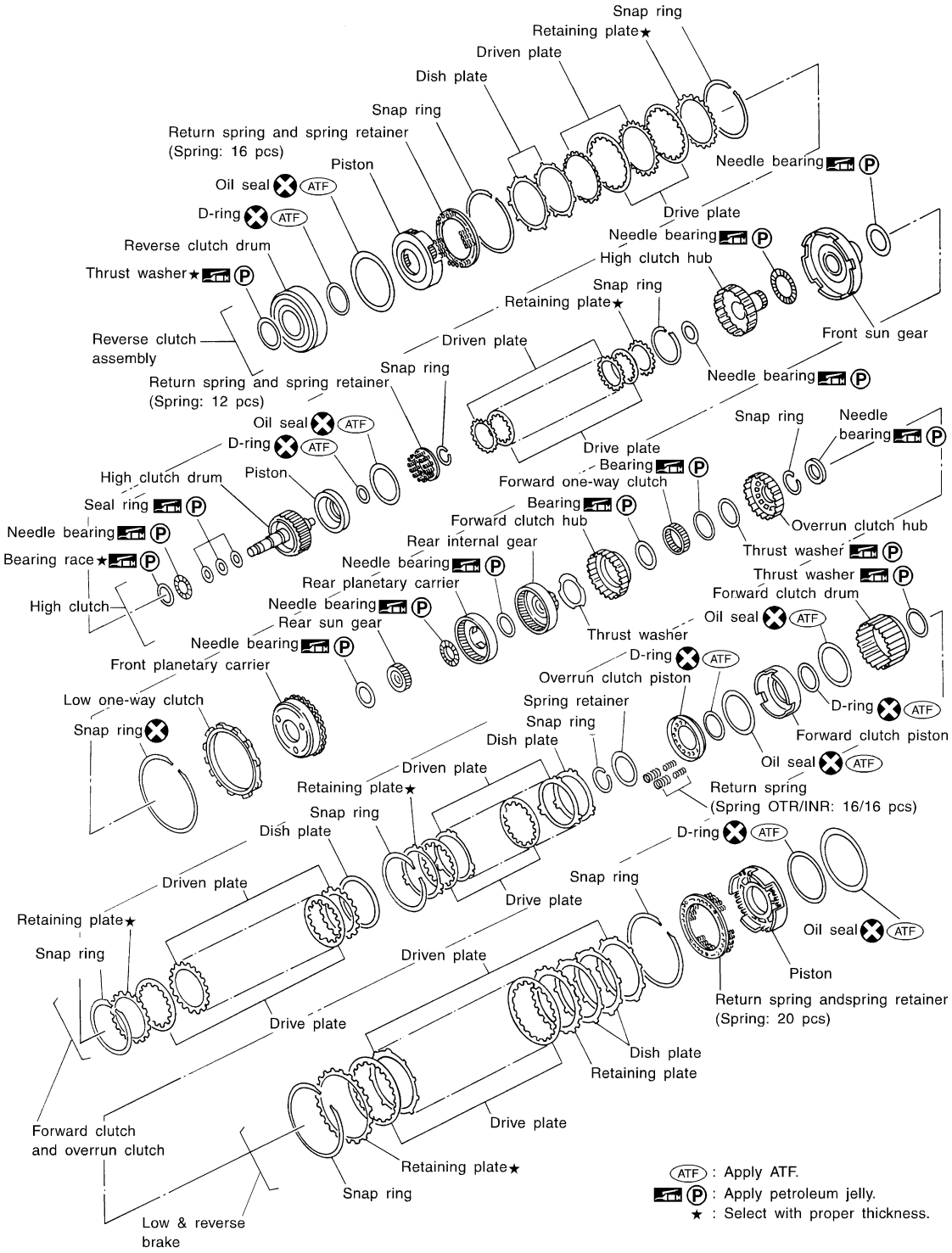
ECS005ZN

SEC. 311•313•327•381



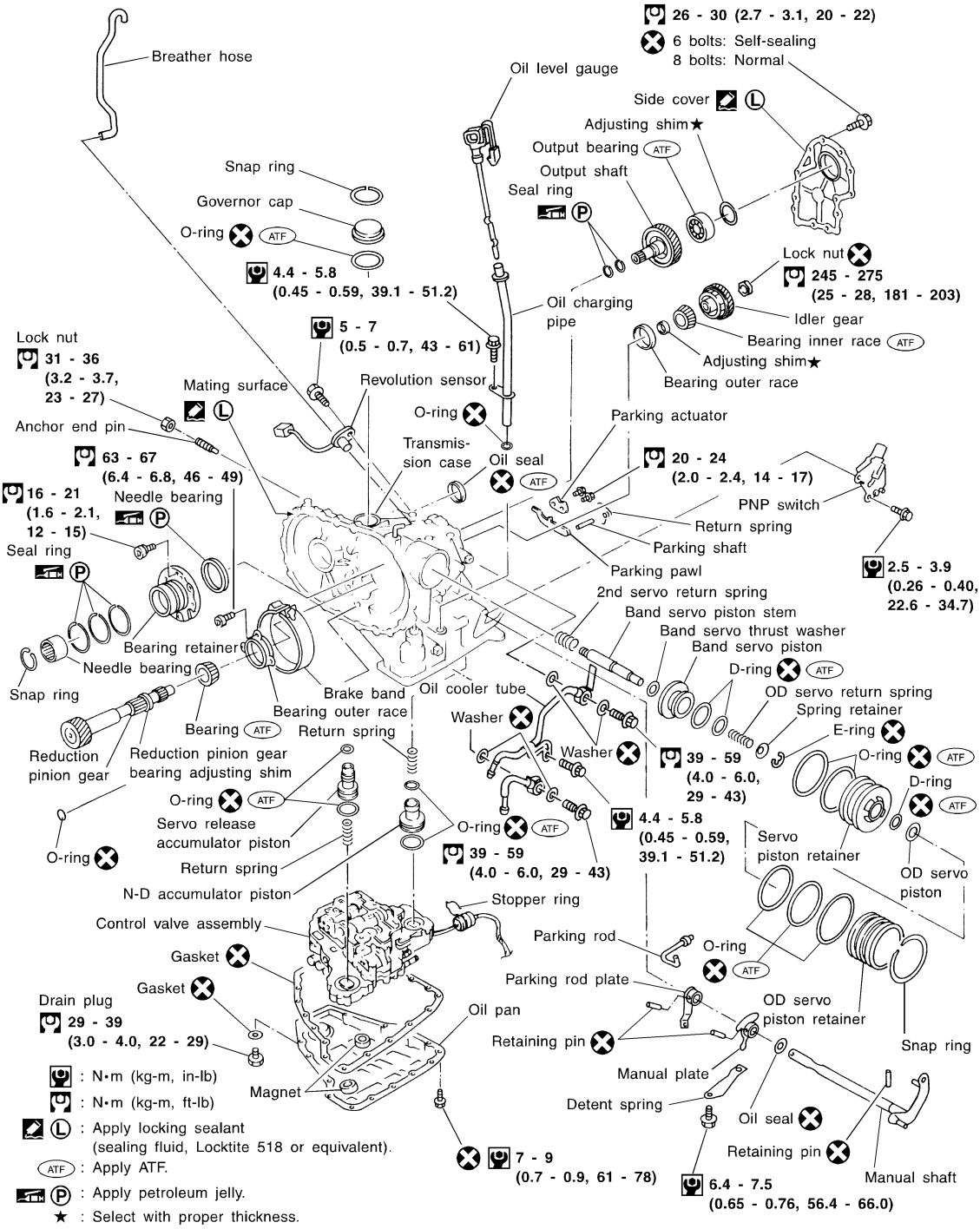
WAT404

SEC. 315



WCIA0218E

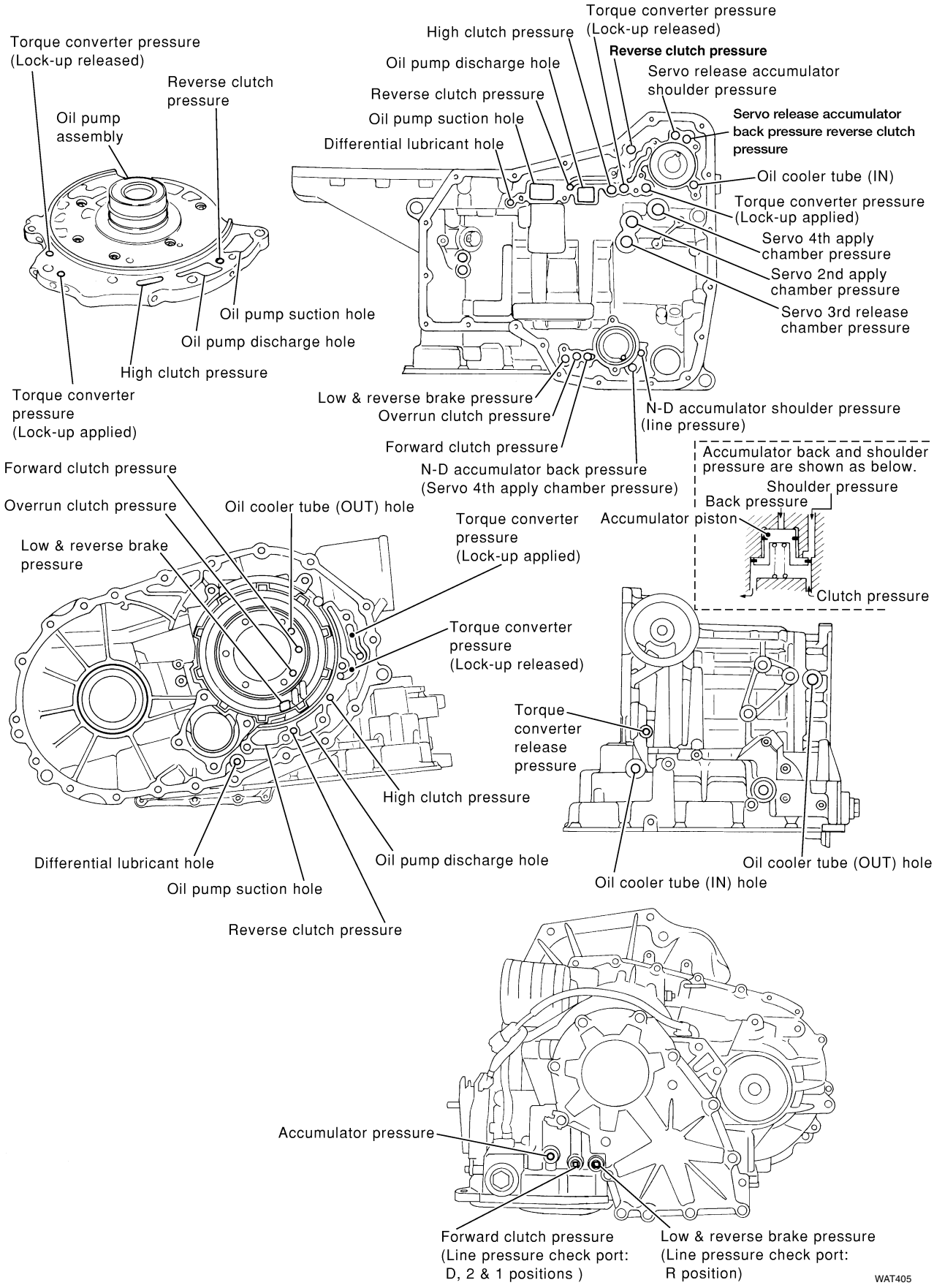
SEC. 310•315•317•319



WCIA0219E

Oil Channel

ECS005ZO



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

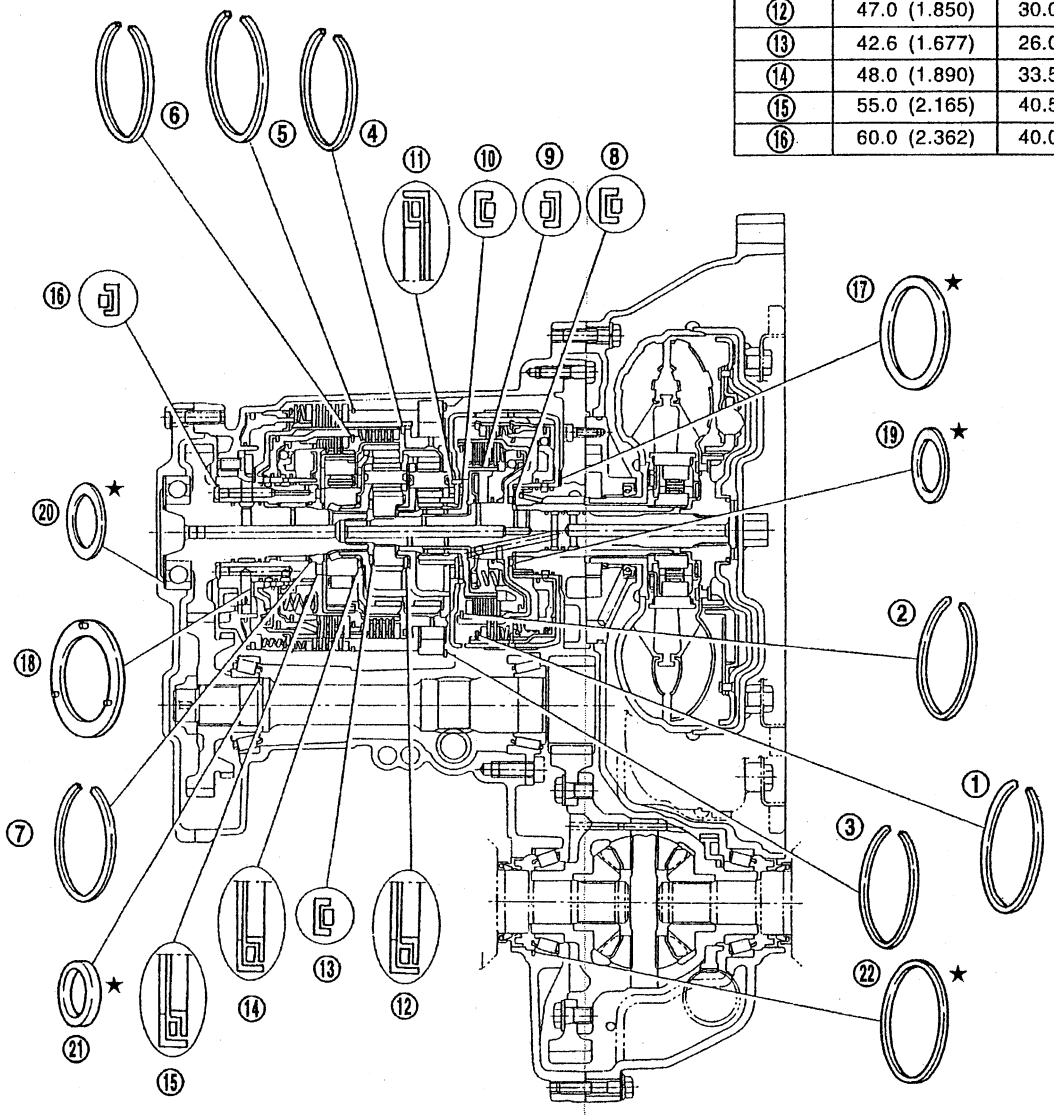
ECS005ZP

Outer diameter and color of thrust washers

Item number	Outer diameter mm (in)	Color
⑰	72.0 (2.835)	Black
⑱	78.5 (3.091)	

Outer and inner diameter of needle bearings

Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑧	47.0 (1.850)	32.0 (1.260)
⑨	35.0 (1.378)	20.1 (0.791)
⑩	60.0 (2.362)	42.0 (1.657)
⑪	60.0 (2.362)	45.0 (1.772)
⑫	47.0 (1.850)	30.0 (1.181)
⑬	42.6 (1.677)	26.0 (1.024)
⑭	48.0 (1.890)	33.5 (1.319)
⑮	55.0 (2.165)	40.5 (1.594)
⑯	60.0 (2.362)	40.0 (1.579)



★ : Select proper thickness.

Outer and inner diameter of bearing race and adjusting shims

Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑲	48.0 (1.890)	33.0 (1.299)
⑳	72.0 (2.835)	61.0 (2.402)
㉑	34.5 (1.358)	26.1 (1.028)
㉒	68.0 (2.677)	60.0 (2.362)

Outer diameter of snap rings

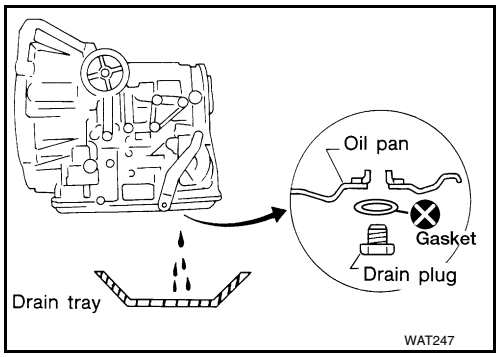
Item number	Outer diameter mm (in)
①	142.0 (5.59)
②	113.0 (4.45)
③	162.4 (6.39)
④	135.4 (5.33)
⑤	162.3 (6.39)
⑥	126.0 (4.96)
⑦	40.5 (1.594)

WAT246

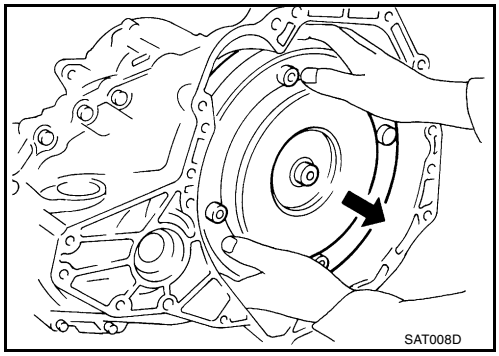
Disassembly

ECS005ZQ

1. Drain ATF through drain plug.



2. Remove torque converter.

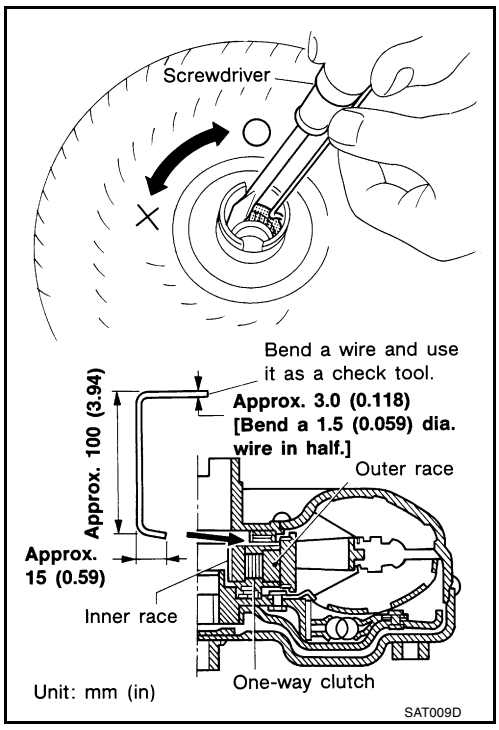


3. Check torque converter one-way clutch using check tool as shown.

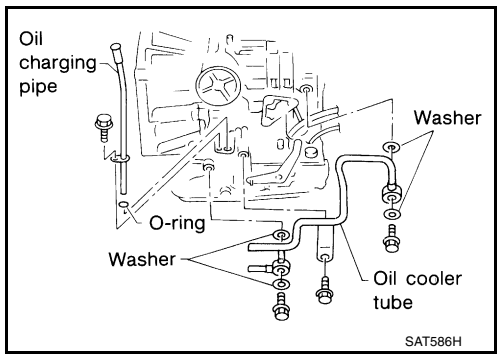
a. Insert check tool into the groove of bearing support built into one-way clutch outer race.

b. While fixing bearing support with check tool, rotate one-way clutch spline using flat-bladed screwdriver.

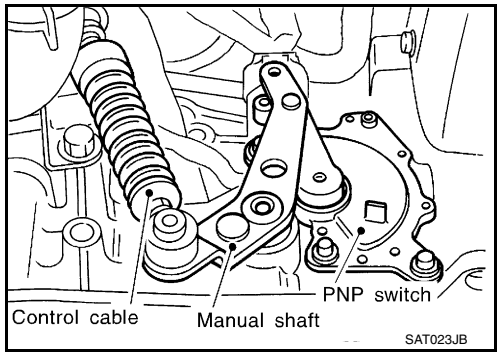
c. Check to make sure the inner race rotates clockwise only. If not, replace torque converter assembly.



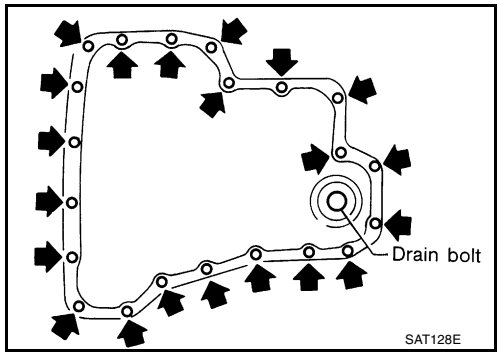
4. Remove oil charging pipe and oil cooler tube.



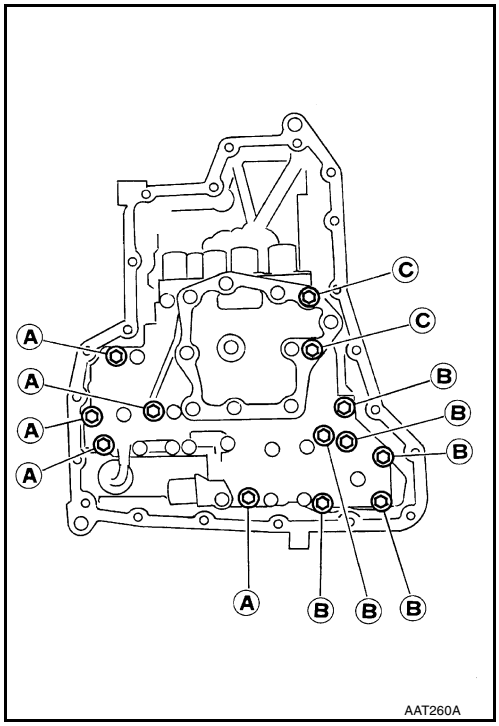
5. Set manual shaft to “P” position.
6. Remove PNP switch.



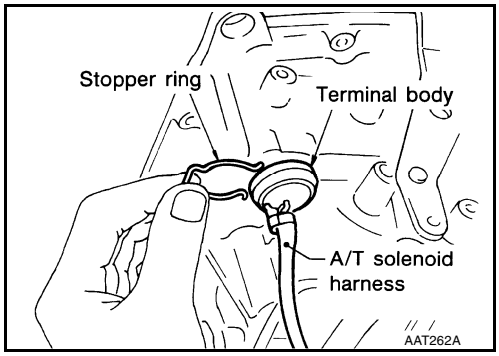
7. Remove oil pan and oil pan gasket.
   - **Always replace oil pan bolts as they are self-sealing bolts.**
8. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves, servo, and clutches to stick and may inhibit pump pressure.
   - **If frictional material is detected, replace radiator after repair of A/T. Refer to CO-13, "Removal and Installation" .**
9. Remove control valve assembly according to the following procedures.



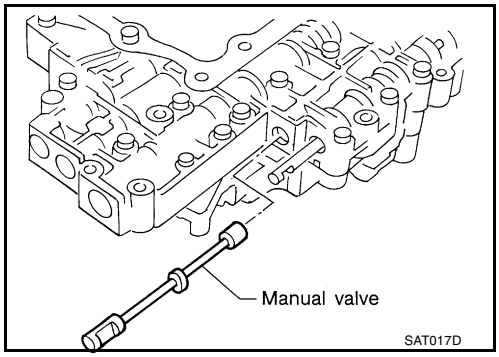
a. Remove control valve assembly mounting bolts A, B and C.



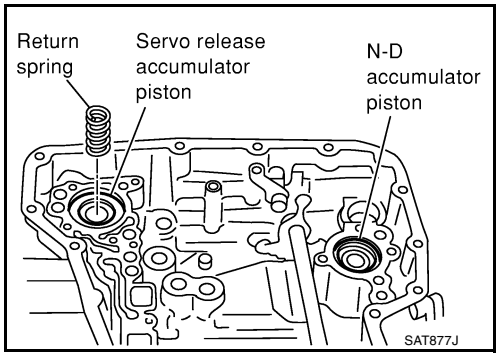
b. Remove stopper ring from terminal body.
c. Push terminal body into transmission case and draw out solenoid harness.



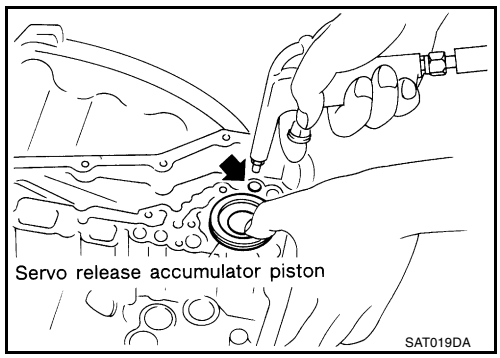
10. Remove manual valve from control valve assembly as a precaution.



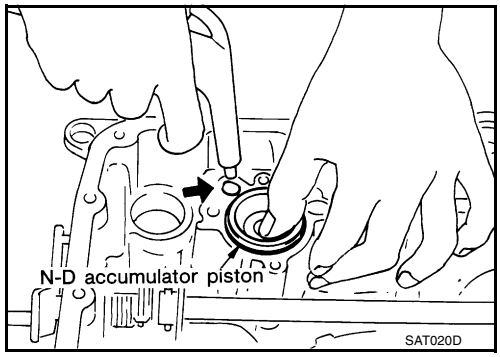
11. Remove return spring from servo release accumulator piston.



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

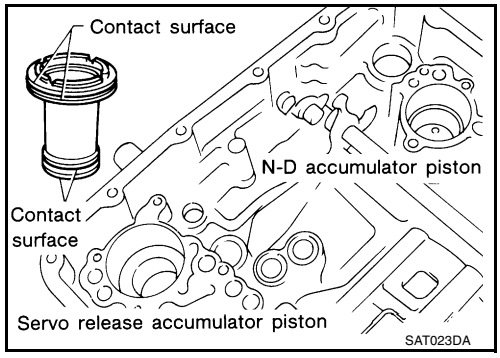


14. Remove N-D accumulator piston and return spring with compressed air.
15. Remove O-rings from N-D accumulator piston.

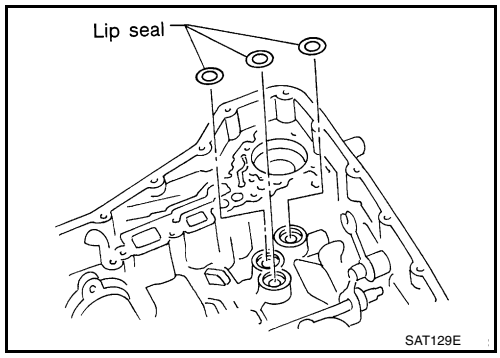


16. Check accumulator pistons and contact surface of transmission case for damage.
17. Check accumulator return springs for damage and free length.

Return springs **: Refer to AT-393, "RETURN SPRING".**

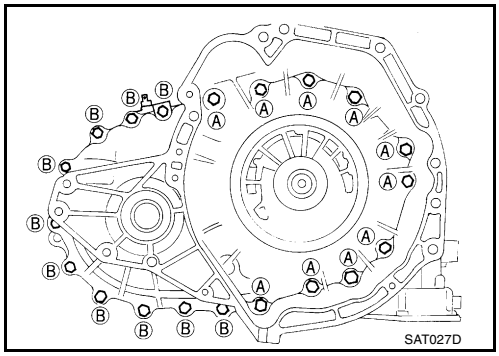


18. Remove lip seals from band servo oil port.

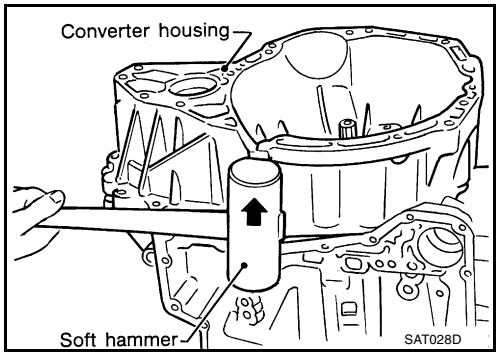


19. Remove converter housing according to the following procedures.

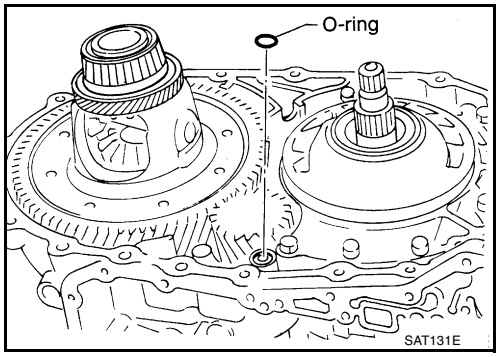
a. Remove converter housing mounting bolts A and B.



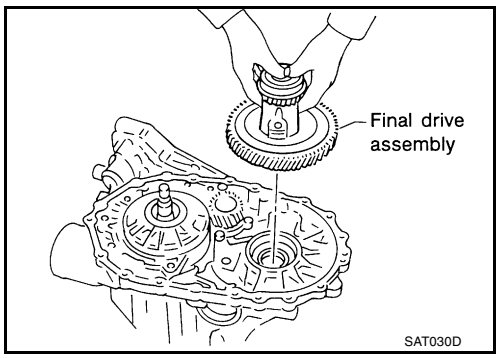
b. Remove converter housing.



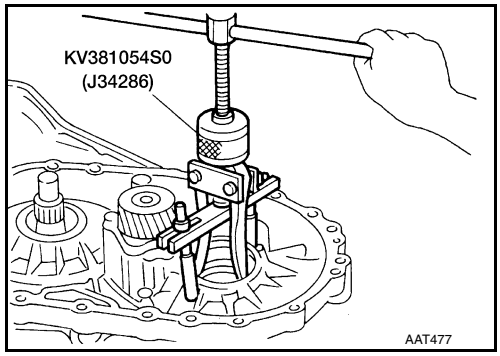
c. Remove O-ring from differential oil port.



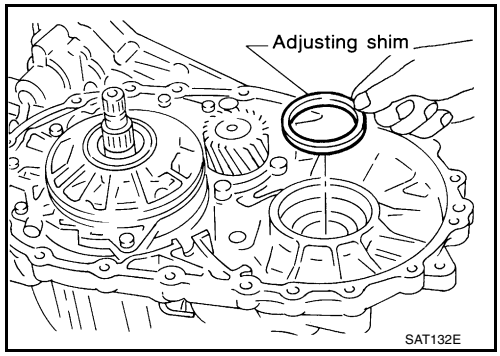
20. Remove final drive assembly from transmission case.



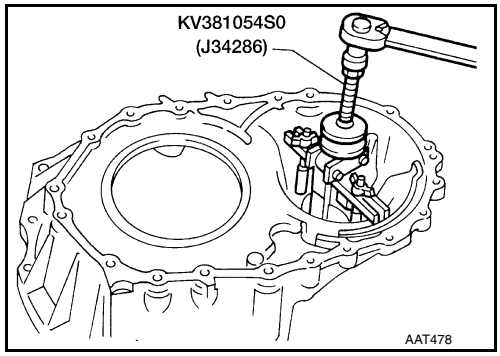
21. Remove differential side bearing outer race from transmission case using Tool.



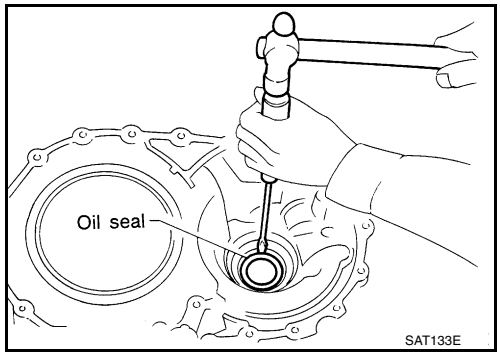
22. Remove differential side bearing adjusting shim from transmission case.



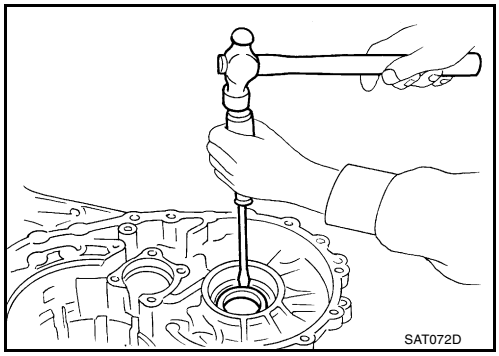
23. Remove differential side bearing outer race from converter housing using Tool.



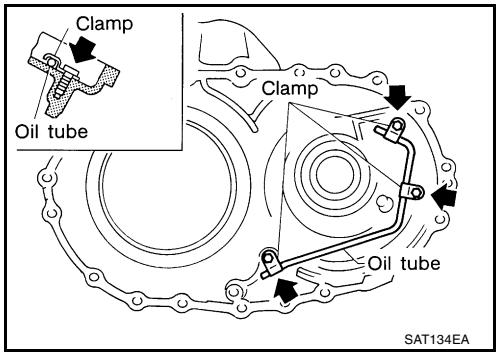
24. Remove oil seal from converter housing using a screwdriver.
    - **Be careful not to damage case.**



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

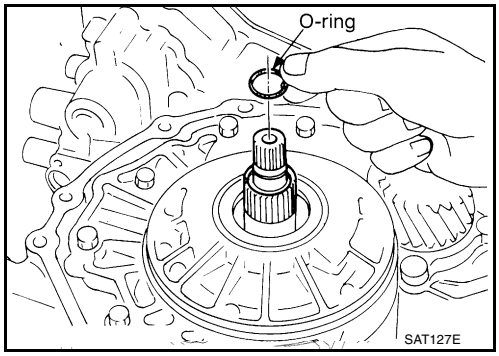


26. Remove oil tube from converter housing.

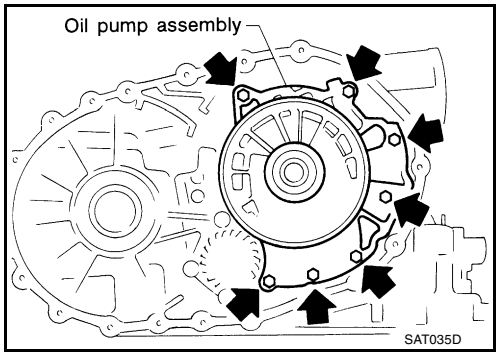


27. Remove oil pump according to the following procedures.

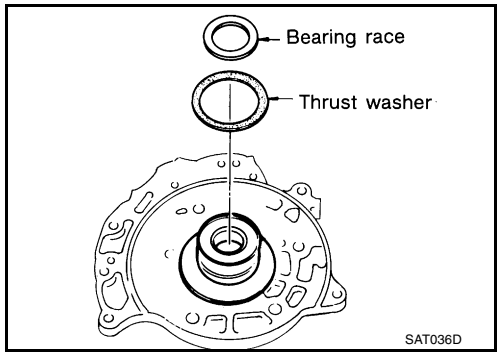
a. Remove O-ring from input shaft.



Remove oil pump assembly from transmission case.



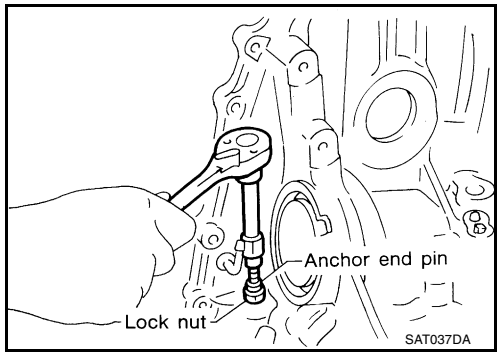
c. Remove thrust washer and bearing race from oil pump assembly.



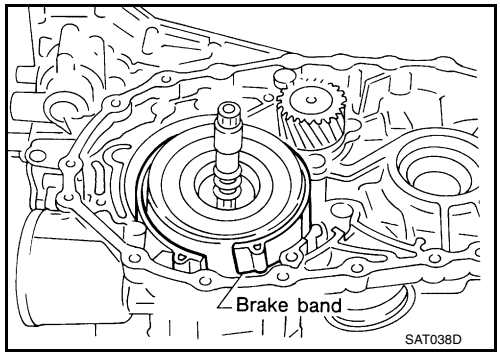
28. Remove brake band according to the following procedures.

a. Loosen lock nut, then back off anchor end pin.

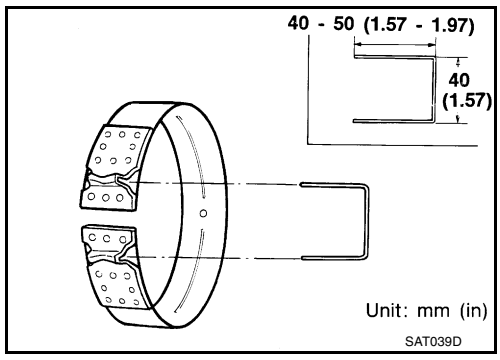
- **Do not reuse anchor end pin.**



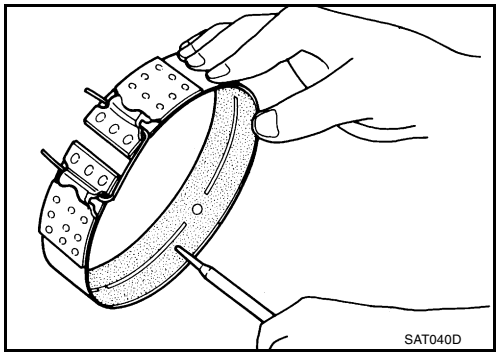
b. Remove brake band from transmission case.



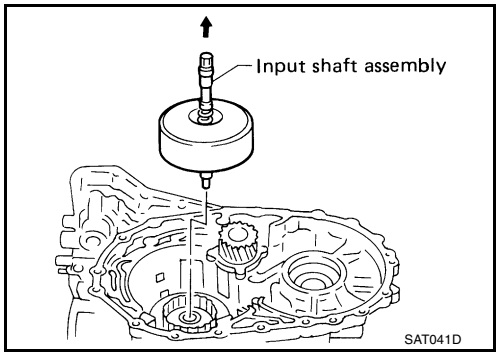
- **To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown. Leave the clip in position after removing the brake band.**



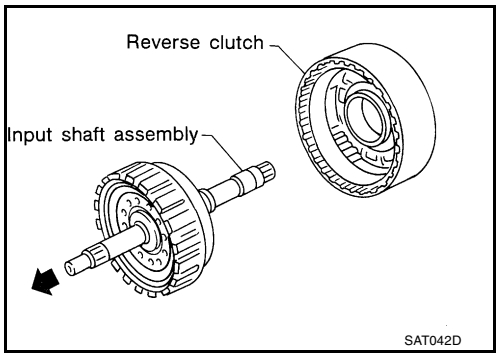
c. Check brake band facing for damage, cracks, wear or burns.



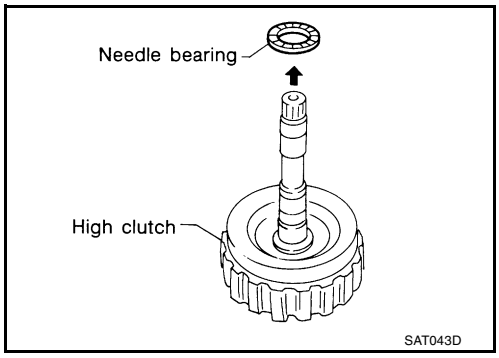
29. Remove input shaft assembly (high clutch) and reverse clutch according to the following procedures.



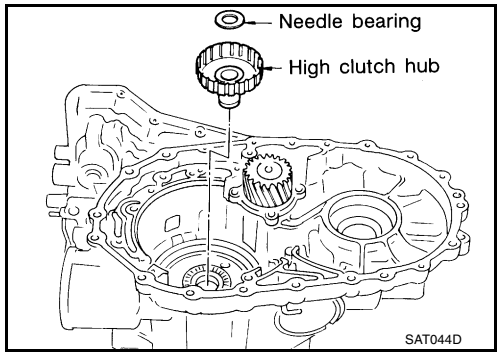
a. Remove input shaft assembly (high clutch) with reverse clutch.
b. Remove input shaft assembly (high clutch) from reverse clutch.



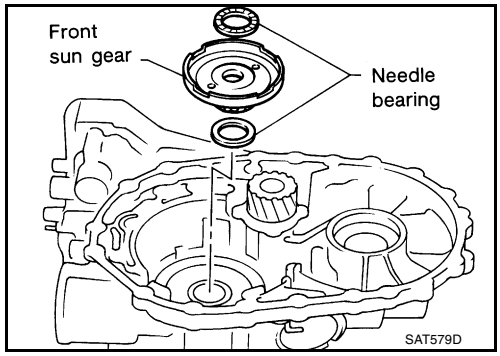
c. Remove needle bearing from high clutch drum.
d. Check input shaft assembly and needle bearing for damage or wear.



30. Remove high clutch hub and needle bearing from transmission case.
31. Check high clutch hub and needle bearing for damage or wear.

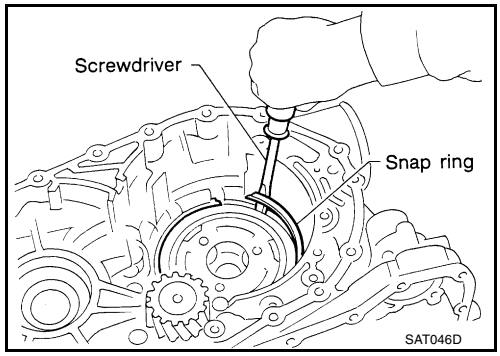


32. Remove front sun gear and needle bearings from transmission case.
33. Check front sun gear and needle bearings for damage or wear.

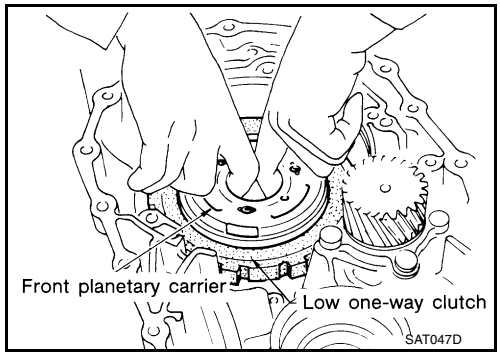


34. Remove front planetary carrier assembly and low one-way clutch according to the following procedures.

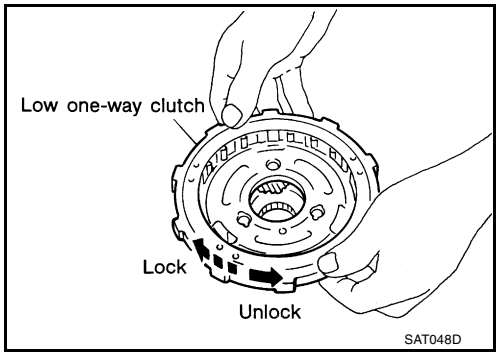
a. Remove snap ring using a screwdriver.
   - **Do not expand snap ring excessively.**



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

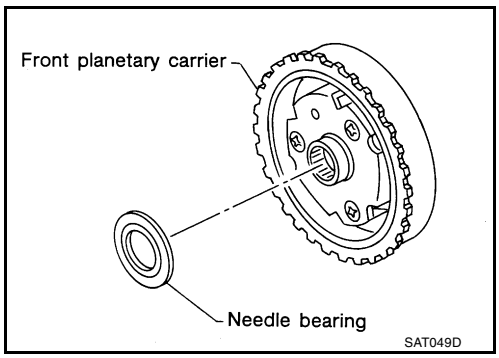


c. Check that low one-way clutch rotates in the direction of the arrow and locks in the opposite direction.



d. Remove low one-way clutch from front planetary carrier by rotating it in the direction of unlock.

e. Remove needle bearing from front planetary carrier.



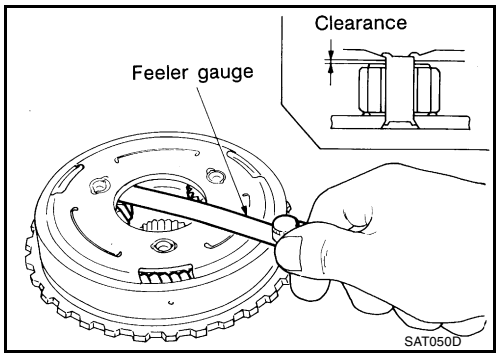
f. Check front planetary carrier, low one-way clutch and needle bearing for damage or wear.

g. Check clearance between pinion washer and planetary carrier using feeler gauge.

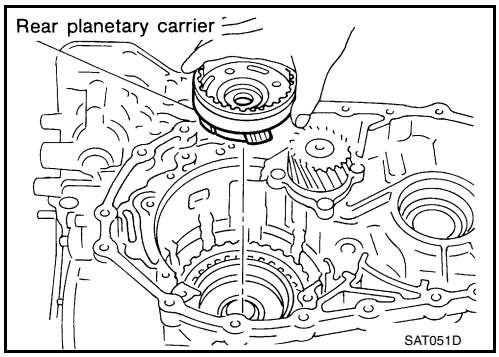
Standard clearance : 0.15 - 0.70 mm (0.0059 - 0.0276 in)

Allowable limit : 0.80 mm (0.0315 in)

Replace front planetary carrier if the clearance exceeds allowable limit.

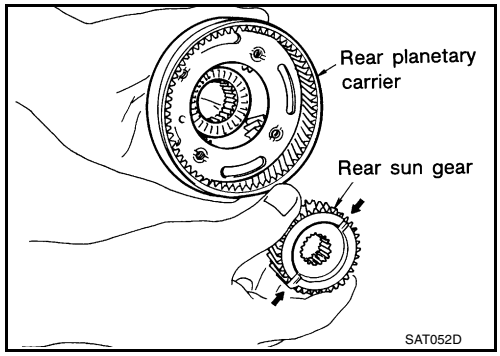


35. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.

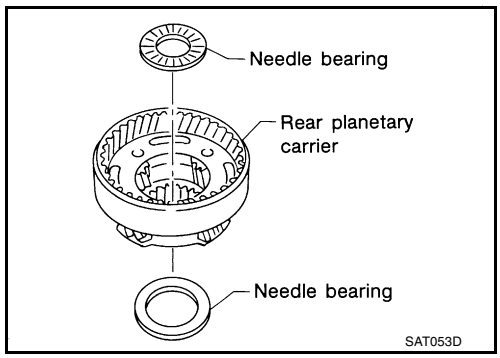


a. Remove rear planetary carrier assembly from transmission case.

b. Remove rear sun gear from rear planetary carrier.



c. Remove needle bearings from rear planetary carrier assembly.



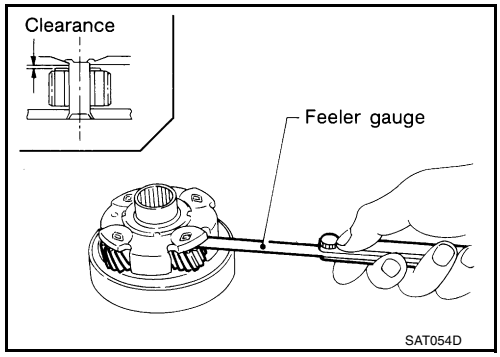
d. Check rear planetary carrier, rear sun gear and needle bearings for damage or wear.

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

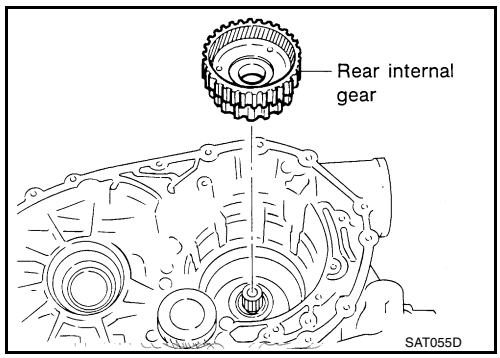
Standard clearance : 0.15 - 0.70 mm (0.0059 - 0.0276 in)

Allowable limit : 0.80 mm (0.0315 in)

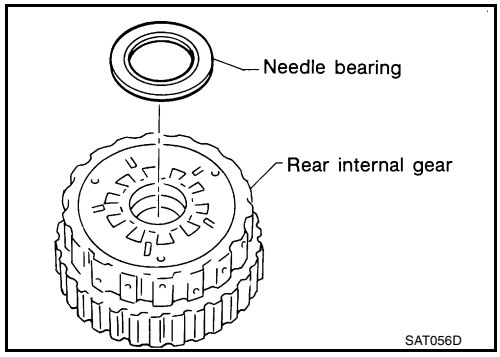
Replace rear planetary carrier if the clearance exceeds allowable limit.



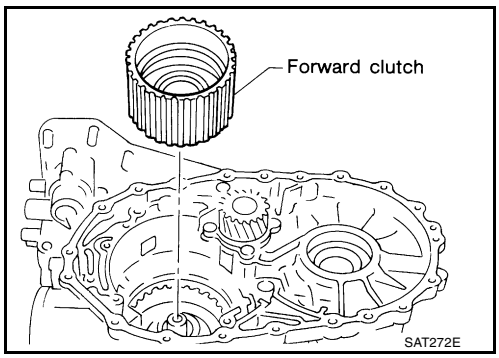
36. Remove rear internal gear from transmission case.



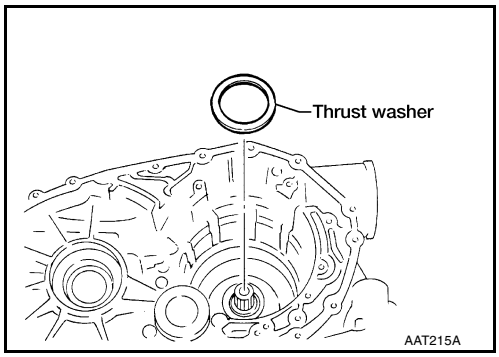
37. Remove needle bearing from rear internal gear.
    - Check needle bearing for damage or wear.



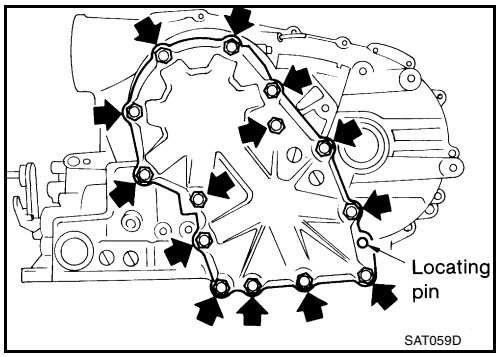
38. Remove forward clutch assembly from transmission case.



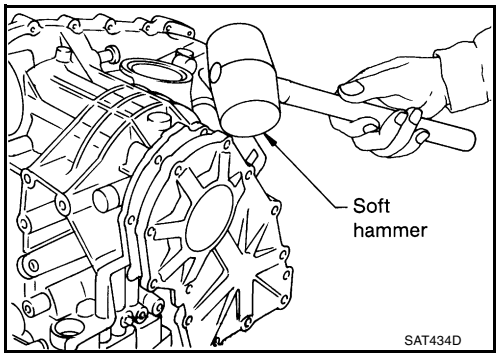
39. Remove thrust washer from transmission case.



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

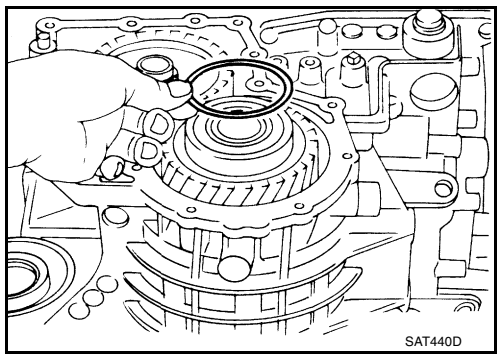


a. Remove side cover bolts.
b. Remove side cover by lightly tapping it with a soft hammer.

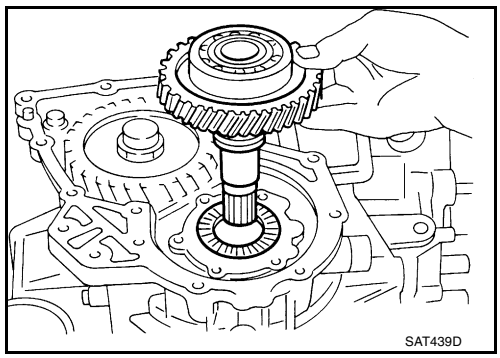


- **Be careful not to drop output shaft assembly. It might come out when removing side cover.**

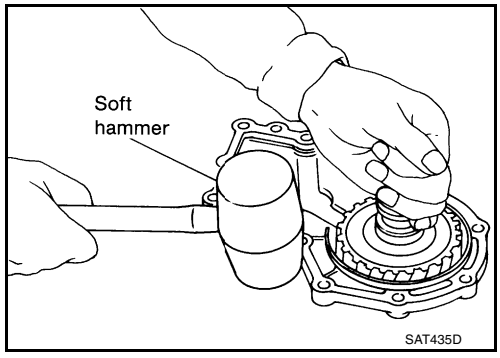
c. Remove adjusting shim.



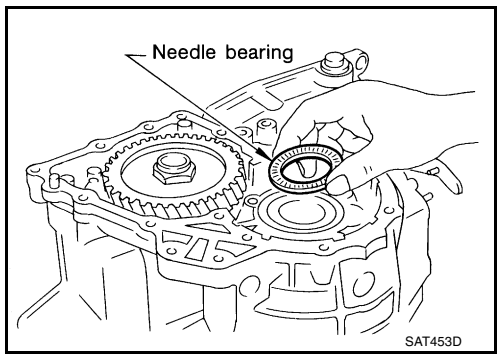
d. Remove output shaft assembly.



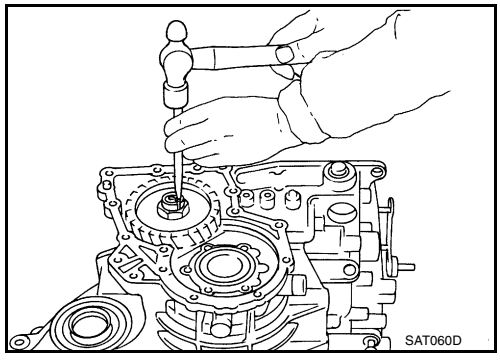
- If output shaft assembly came off with side cover, tap cover with a soft hammer to separate.



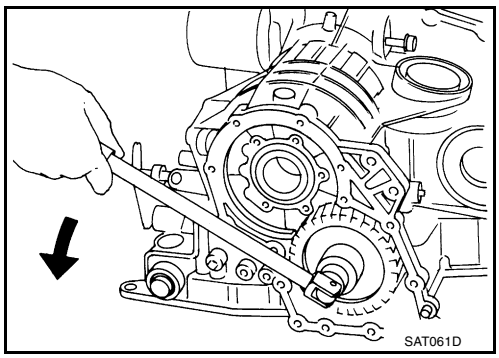
e. Remove needle bearing.



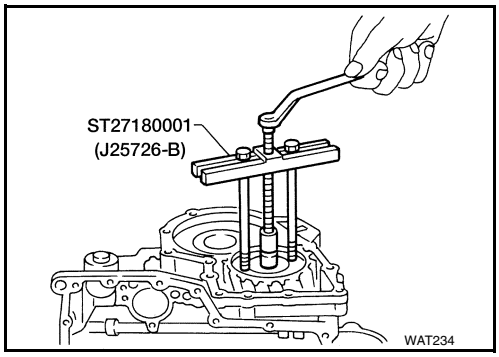
41. Disassemble reduction pinion gear according to the following procedures.



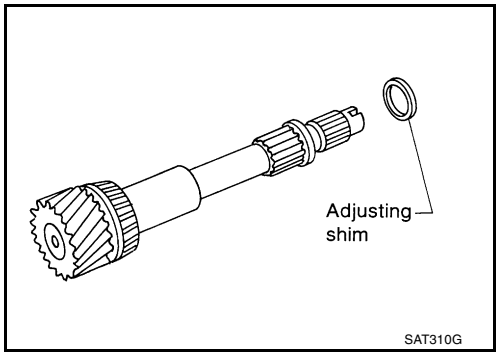
a. Set manual shaft to position “P” to fix idler gear.
b. Unlock idler gear lock nut using a pin punch.
c. Remove idler gear lock nut.
   - **Do not reuse idler gear lock nut.**



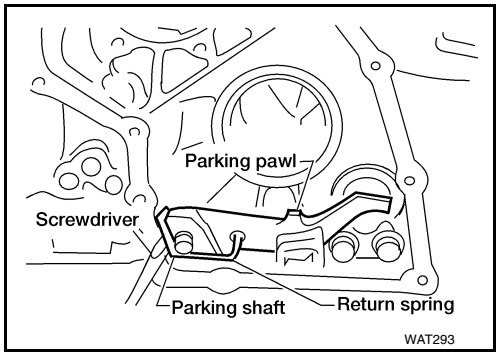
d. Remove idler gear with puller using Tool.



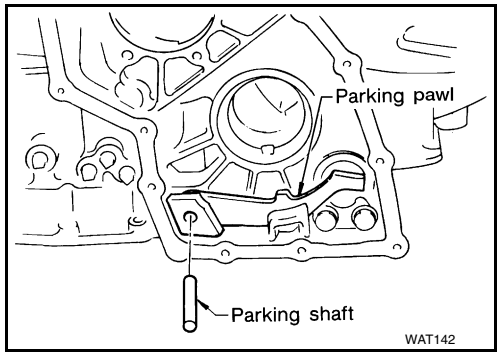
e. Remove reduction pinion gear.
f. Remove adjusting shim from reduction pinion gear.



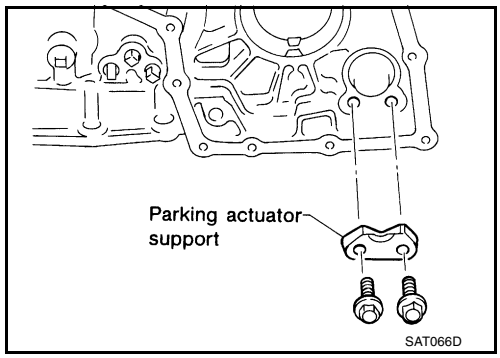
42. Remove return spring from parking shaft using a screwdriver.



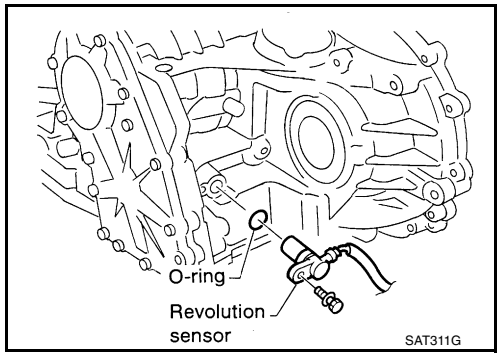
43. Draw out parking shaft and remove parking pawl from transmission case.
44. Check parking pawl and shaft for damage or wear.



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



46. Remove revolution sensor from transmission case.

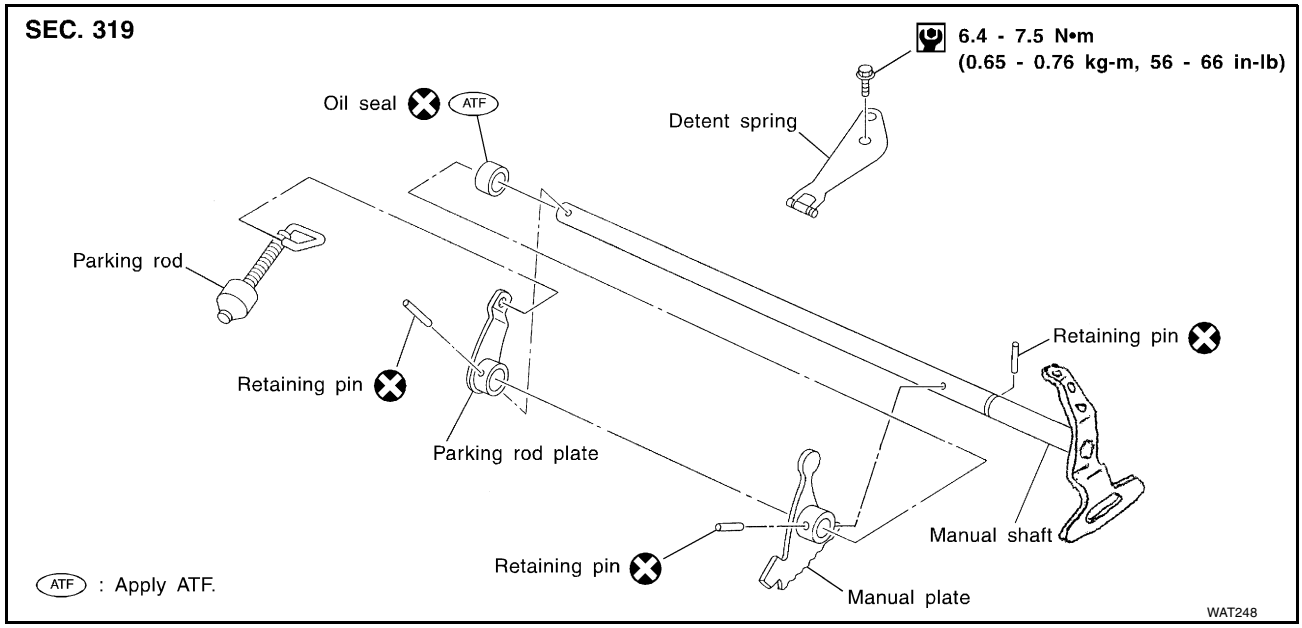


MANUAL SHAFT

PFP:31920

Components

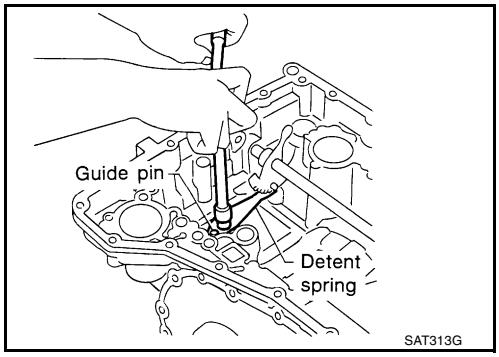
ECS005ZR



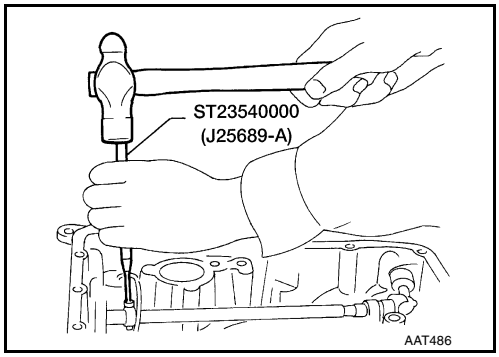
Removal

ECS005ZS

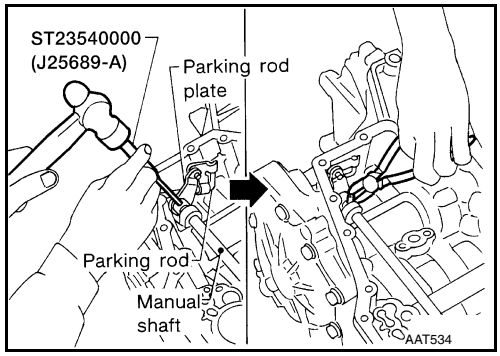
1. Remove detent spring from transmission case.



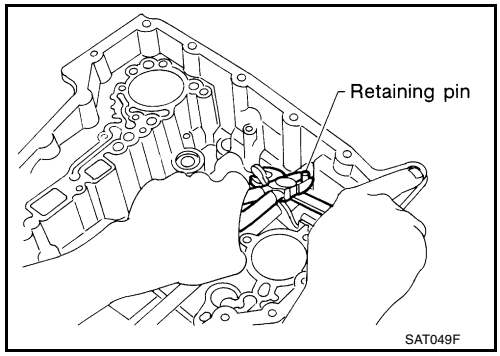
2. Drive out manual plate retaining pin using Tool.



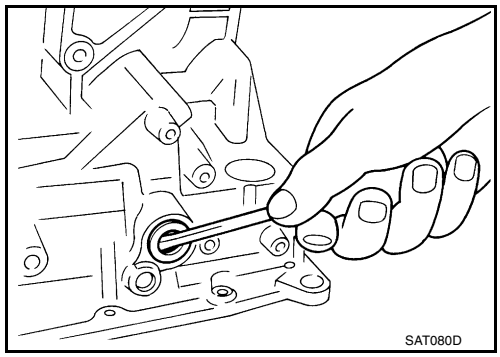
3. Drive and pull out parking rod plate retaining pin using Tool.
4. Remove parking rod plate from manual shaft.
5. Draw out parking rod from transmission case.



6. Pull out manual shaft retaining pin.



7. Remove manual shaft and manual plate from transmission case.
8. Remove manual shaft oil seal.



Inspection

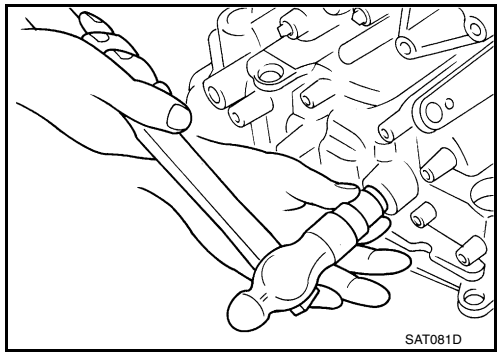
ECS005ZT

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

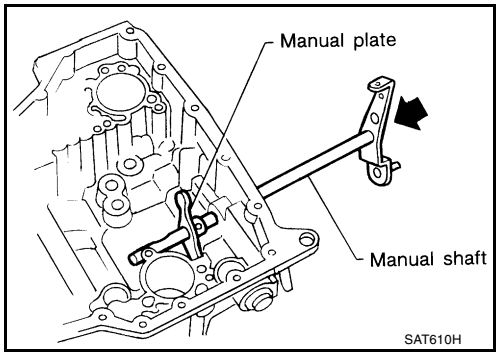
Installation

ECS005ZU

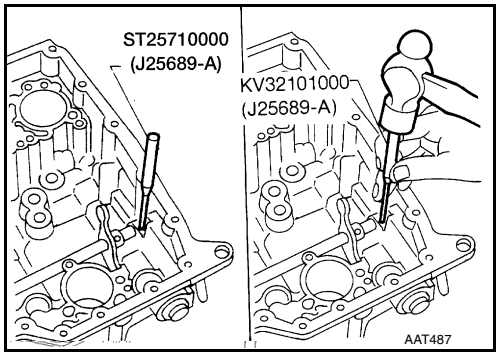
1. Install manual shaft oil seal using a suitable tool.
   - **Apply ATF to outer surface of oil seal.**



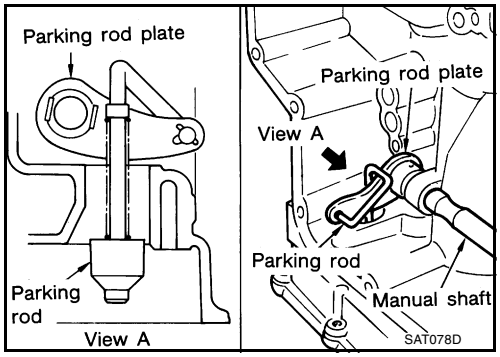
2. Install manual shaft and manual plate.



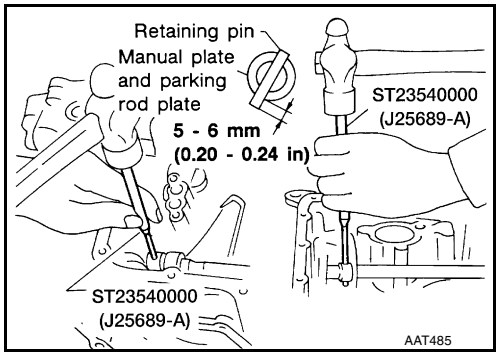
3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin using Tool.



5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft.

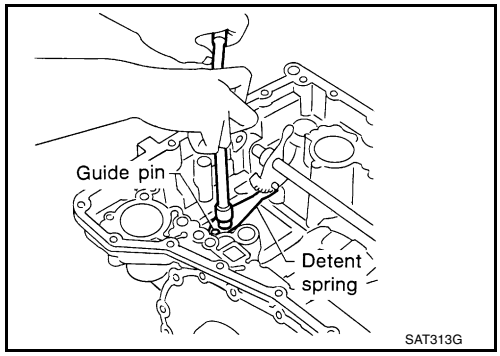


7. Drive in manual plate retaining pin and parking rod plate retaining pin using Tool.



8. Install detent spring.

: 6.4 - 7.5 N·m (0.65 - 0.76 kg-m, 56.4 - 66.0 in-lb)

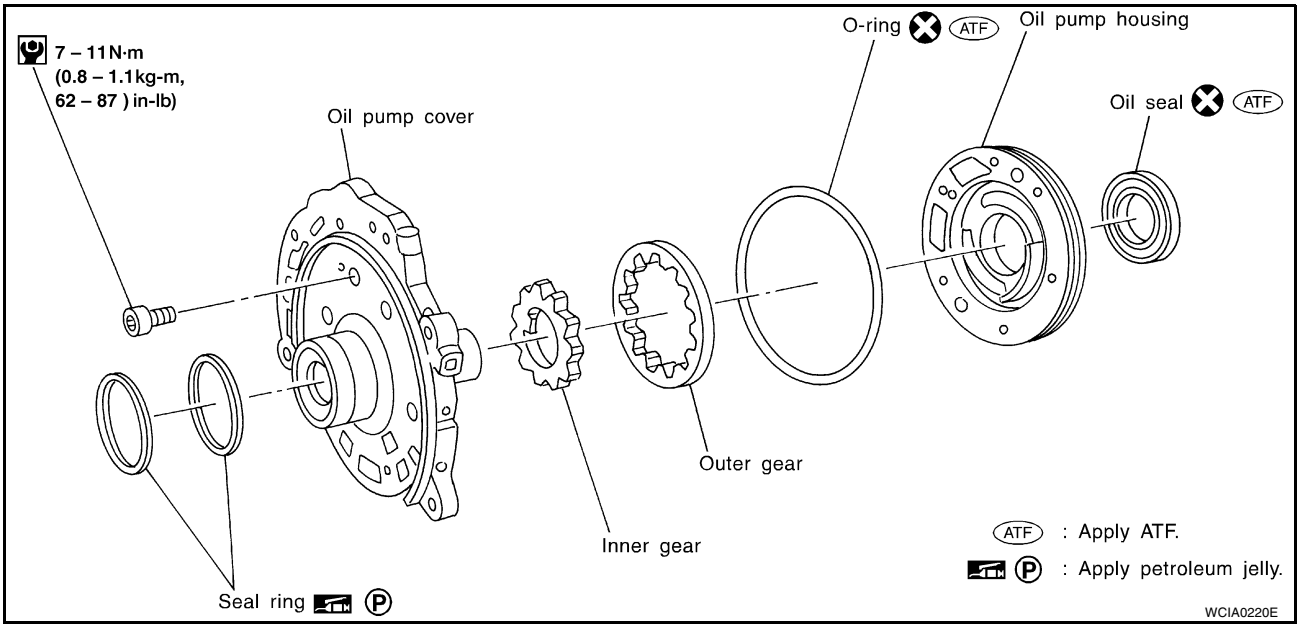


OIL PUMP

PFP:15010

Components

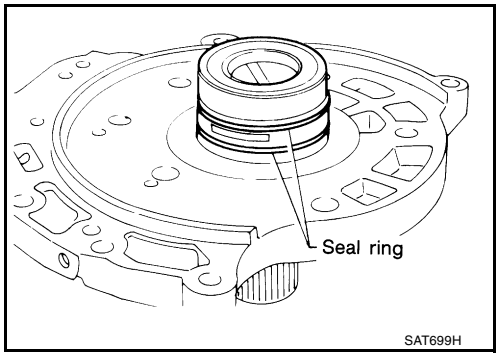
ECS005ZV



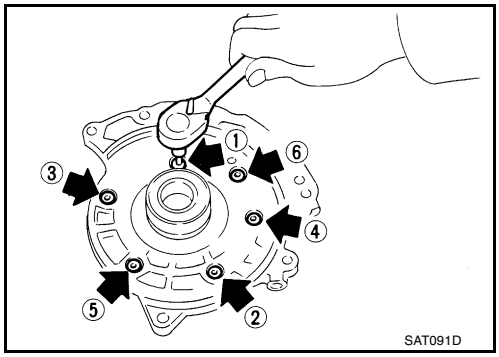
Disassembly

ECS005ZW

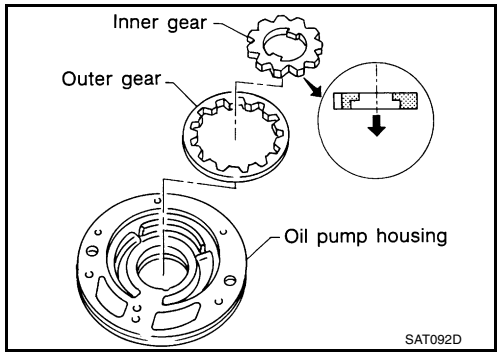
1. Remove seal rings.



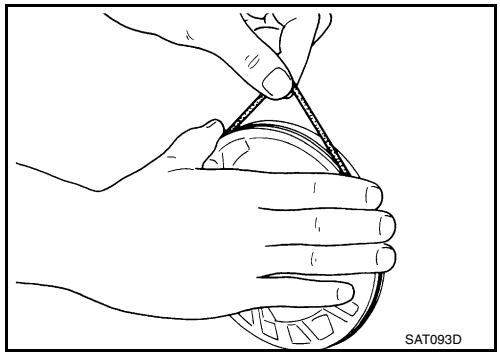
2. Loosen bolts in numerical order and remove oil pump cover.



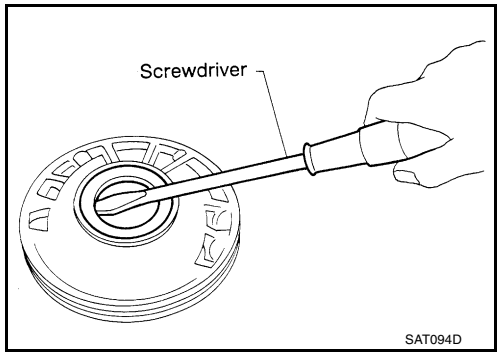
3. Remove inner and outer gear from oil pump housing.



4. Remove O-ring from oil pump housing.



5. Remove oil pump housing oil seal.



Inspection

ECS005ZX

OIL PUMP HOUSING, OIL PUMP COVER, INNER GEAR AND OUTER GEAR

- Check for wear or damage.

SIDE CLEARANCES

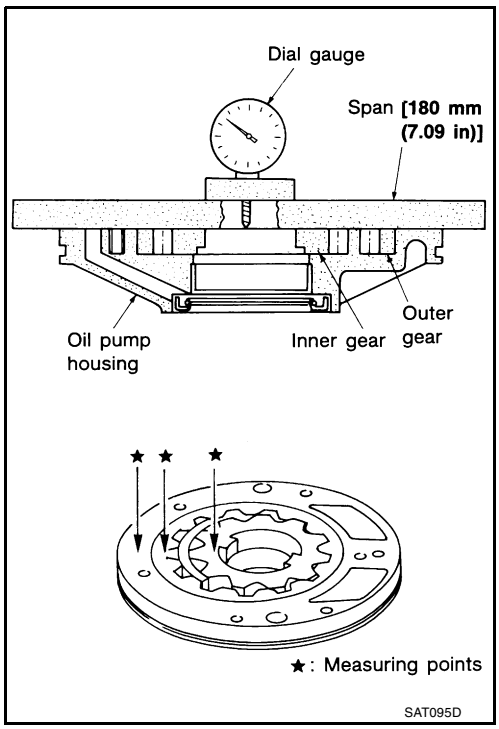
- Measure side clearance of inner and outer gears in at least four places around each outside edge. Maximum measured values should be within specified range.

  Standard clearance : 0.02 - 0.04 mm (0.0008 - 0.0016 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 AT-294, "SIDE CLEARANCES" .

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

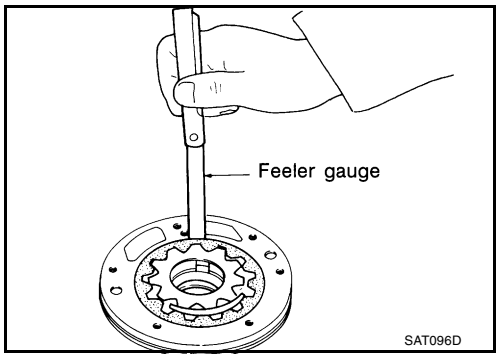


- Measure clearance between outer gear and oil pump housing.

  Standard clearance : 0.08 - 0.15 mm (0.0031 - 0.0059 in)

  Allowable limit : 0.15 mm (0.0059 in)

- If not within allowable limit, replace whole oil pump assembly except oil pump cover.



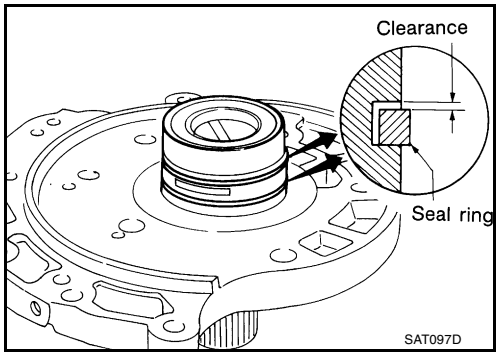
SIDE RING CLEARANCE

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

  Standard clearance : 0.1 - 0.25 mm (0.0039 - 0.0098 in)

  Allowable limit : 0.25 mm (0.0098 in)

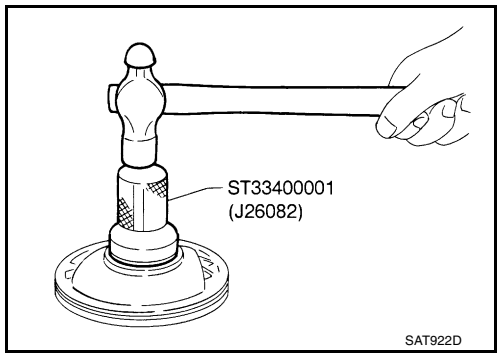
- If not within allowable limit, replace oil pump cover assembly.



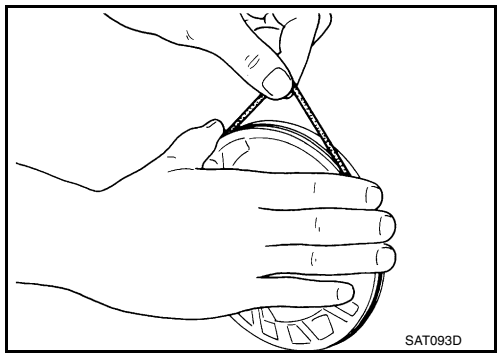
Assembly

ECS005ZY

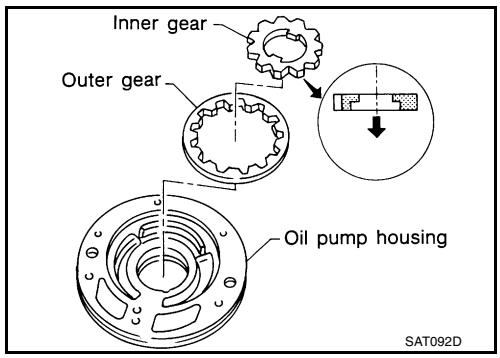
1. Install oil seal on oil pump housing using Tool.



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



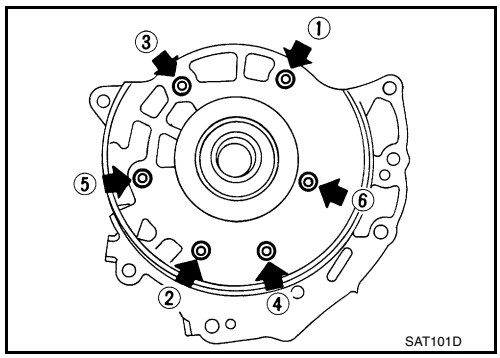
3. Install inner and outer gears on oil pump housing.
   - **Take care with the direction of the inner gear.**



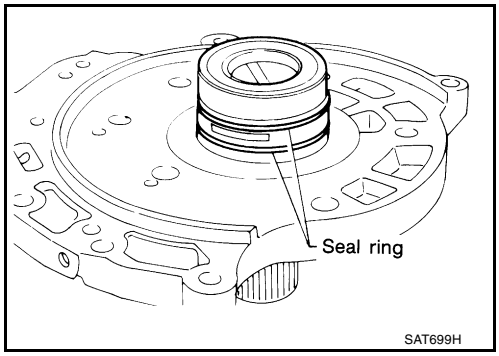
4. Install oil pump cover on oil pump housing.

a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly on oil pump housing assembly, then remove masking tape.

b. Tighten bolts in numerical order.



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

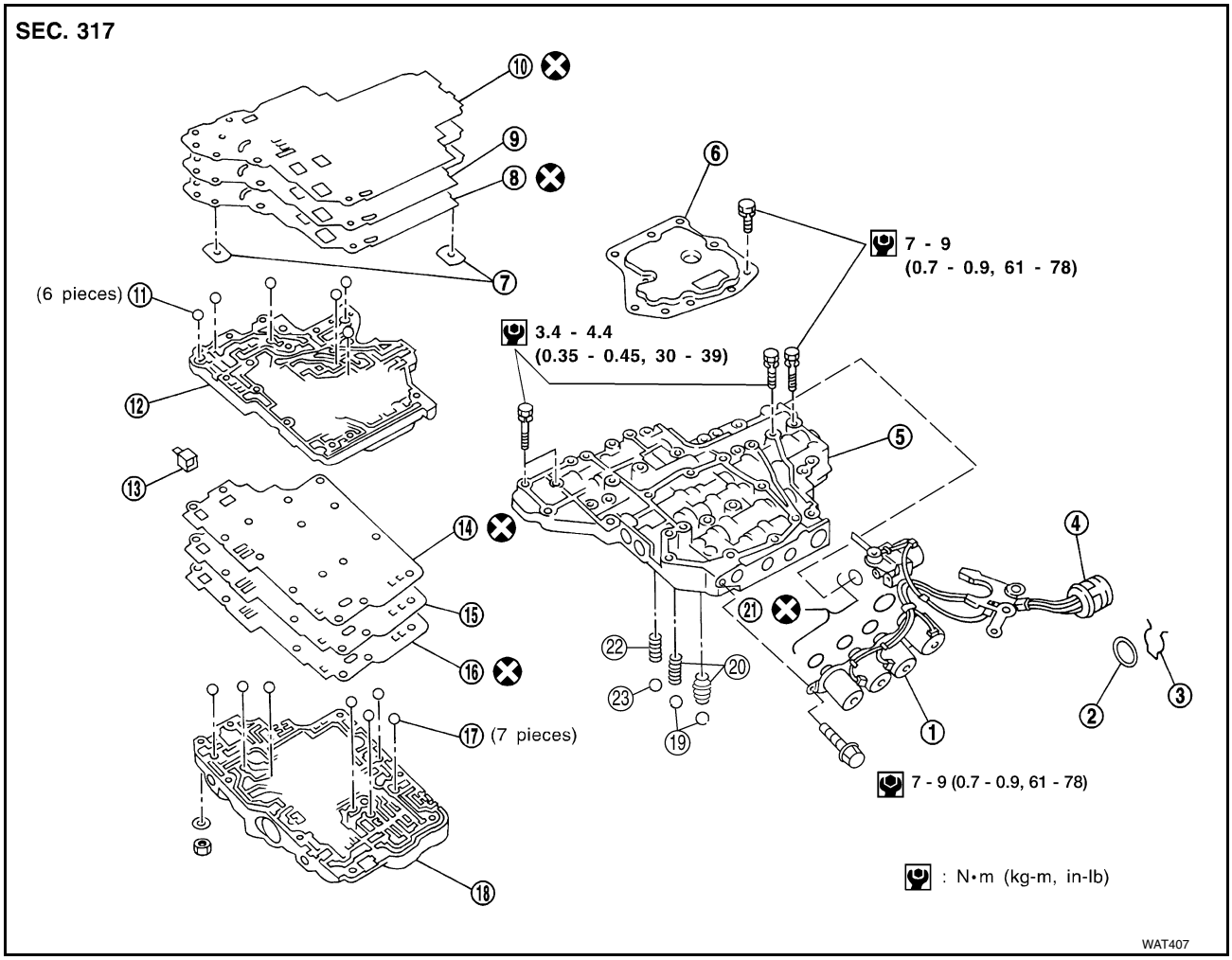


CONTROL VALVE ASSEMBLY

PFP:31705

Components

ECS005ZZ



1. Solenoid valve assembly
2. O-ring
3. Stopper ring
4. Terminal body
5. Control valve lower body
6. Oil strainer
7. Support plate
8. Lower inter separating gasket
9. Separating plate
10. Lower separating gasket
11. Steel ball
12. Control valve inter body
13. Pilot filter
14. Upper inter separating gasket
15. Separating plate
16. Upper separating gasket
17. Steel ball
18. Control valve upper body
19. Check ball
20. Oil cooler relief valve spring
21. O-ring
22. T/C pressure holding spring
23. Check ball

Disassembly

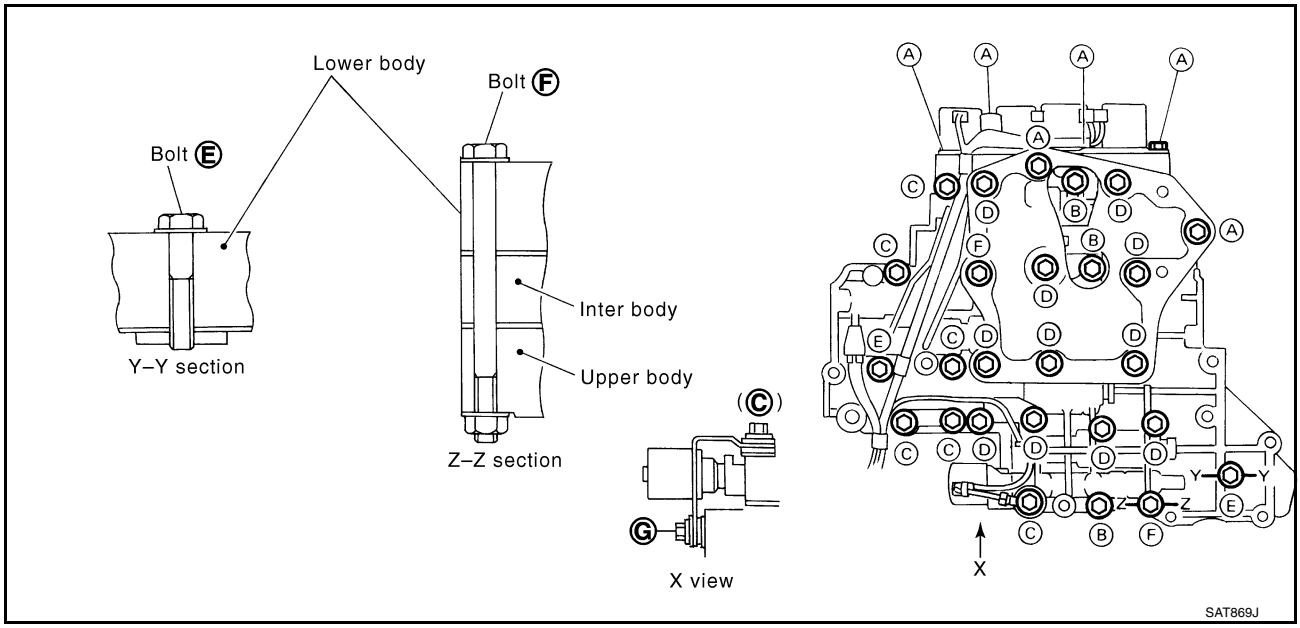
ECS00600

- Disassemble upper, inter and lower bodies.

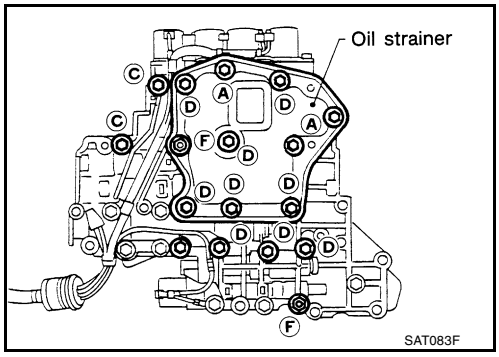
Bolt length, number and location:

Bolt symbol	A	B	C	D	E	F	G
Bolt length "l" 	13.5 mm (0.531 in)	58.0 mm (2.283 in)	40.0 mm (1.575 in)	66.0 mm (2.598 in)	33.0 mm (1.299 in)	78.0 mm (3.071 in)	18.0 mm (0.709 in)
Number of bolts	6	3	6	11	2	2	1

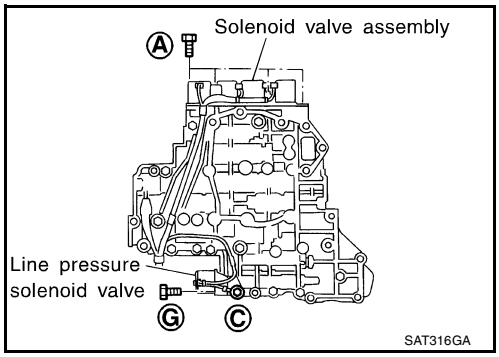
F: Reamer bolt with nut



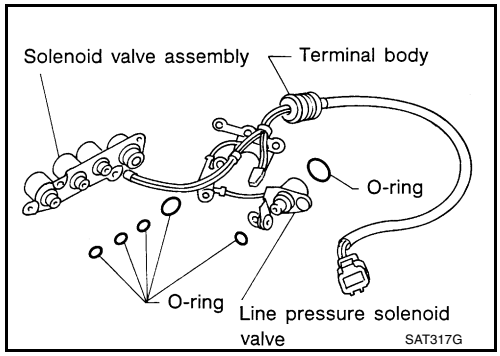
1. Remove bolts A, D and F, and remove oil strainer from control valve assembly.



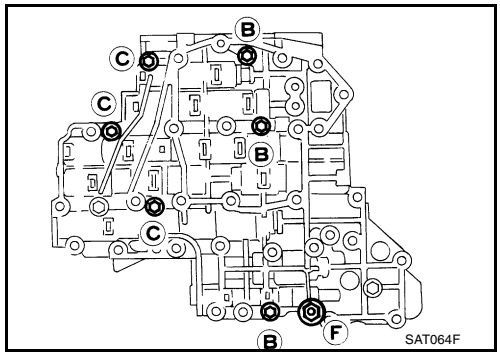
2. Remove solenoid valve assembly and line pressure solenoid valve from control valve assembly.
   - **Be careful not to lose the line pressure solenoid valve spring.**



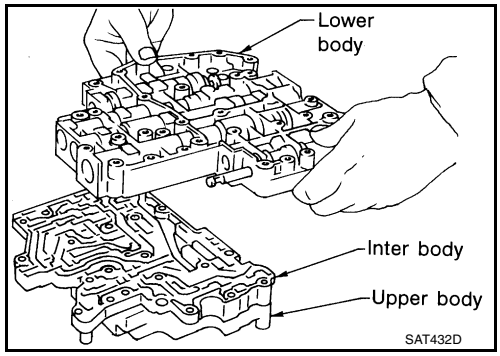
3. Remove O-rings from solenoid valves and terminal body.



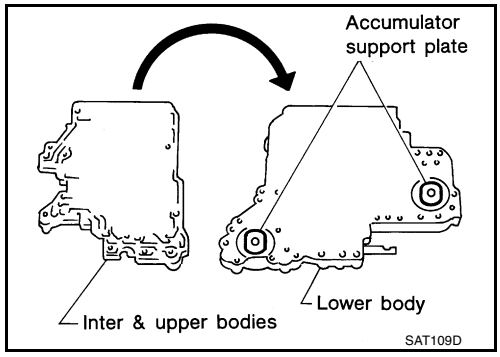
4. Place upper body face down, and remove bolts B, C and F.



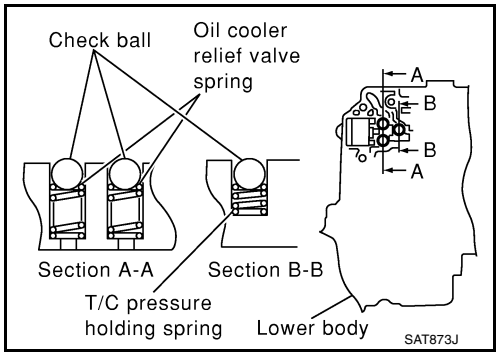
5. Remove lower body from inter body.



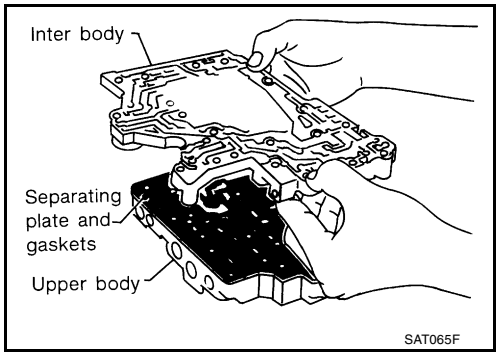
6. Turn over lower body, and accumulator support plates.



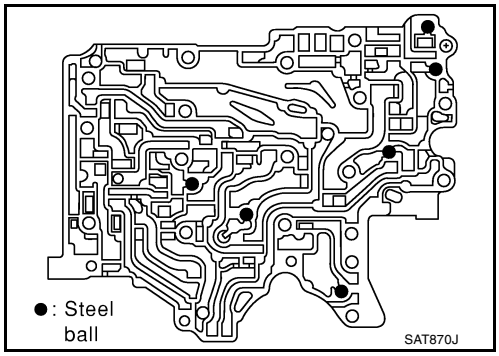
7. Remove bolts E, separating plate and separating gaskets from lower body.
8. Remove check balls, oil cooler relief valve springs and T/C pressure holding spring from lower body.
   - **Be careful not to lose steel balls and relief valve springs.**



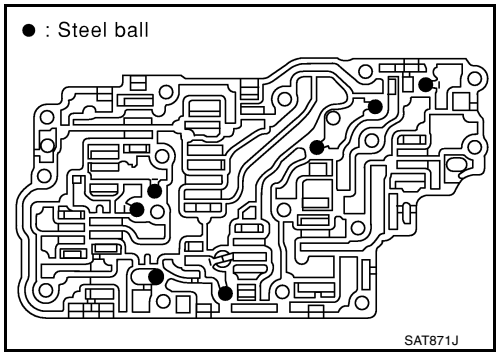
9. Remove inter body from upper body.
10. Remove pilot filter, separating plate and gaskets from upper body.



11. Check to see that steel balls are properly positioned in inter body and then remove them.
    - **Be careful not to lose steel balls.**



12. Check to see that steel balls are properly positioned in upper body and then remove them.
    - **Be careful not to lose steel balls.**

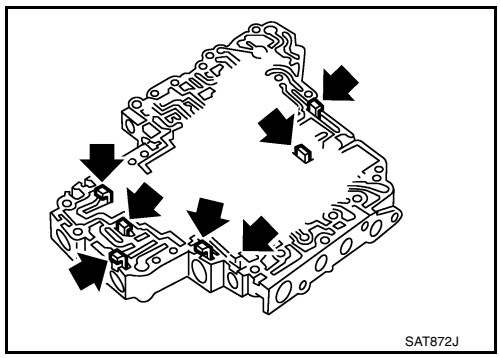


Inspection

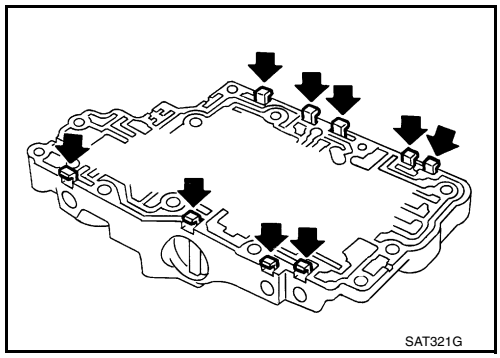
ECS00601

LOWER AND UPPER BODIES

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

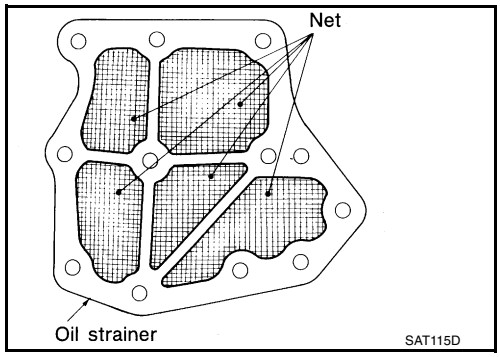


- Check to see that retainer plates are properly positioned in upper body.



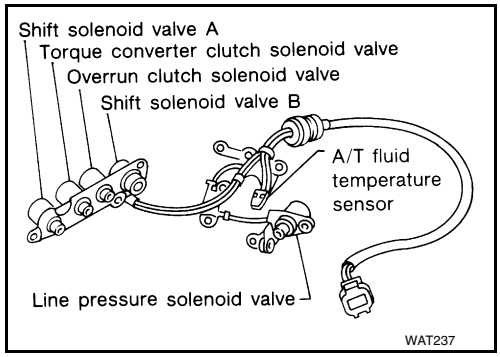
OIL STRAINER

- 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

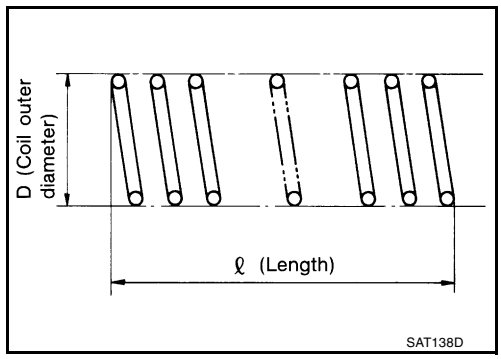
- Refer to AT-182, "SHIFT SOLENOID VALVE A" , AT-186, "SHIFT SOLENOID VALVE B" , AT-177, "LINE PRESSURE SOLENOID VALVE" , AT-177, "LINE PRESSURE SOLENOID VALVE" and AT-196, "OVERRUN CLUTCH SOLENOID VALVE" .



OIL COOLER RELIEF VALVE SPRING

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

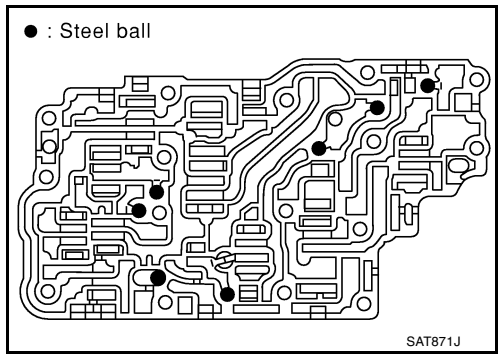
Inspection standard : Refer to AT-388, "Clutch and Brake Return Springs"



Assembly

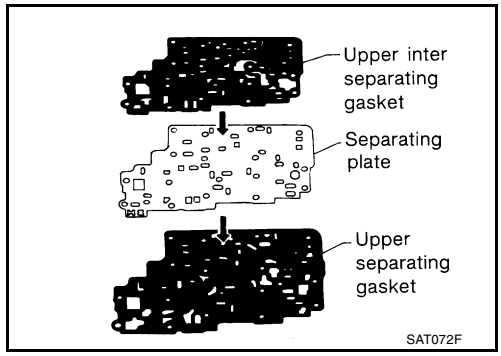
ECS00602

1. Install upper, inter and lower body.



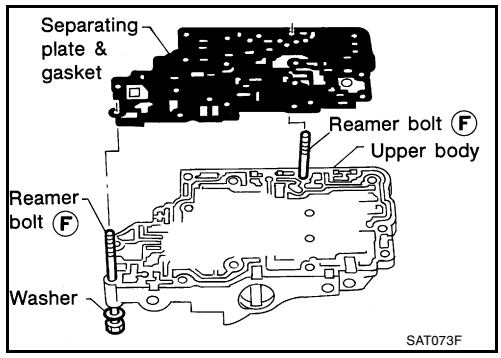
a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

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

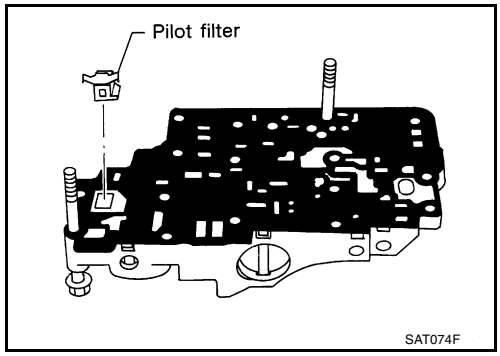


- **Always use new gaskets.**

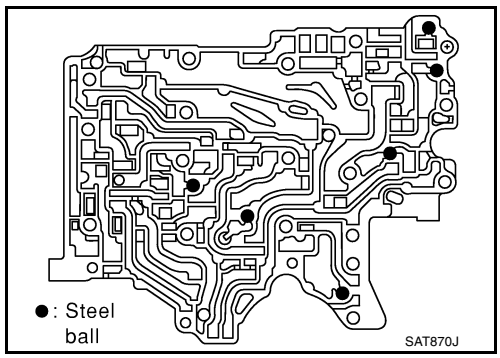
c. Install reamer bolts **F** from bottom of upper body. Using reamer bolts as guides, install separating plate and gaskets as a set.



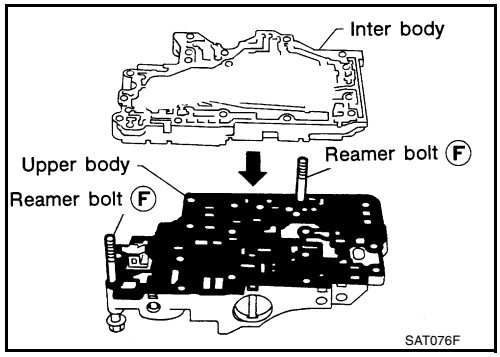
d. Install pilot filter.



e. Place inter body as shown in the illustration. Install steel balls in their proper positions.

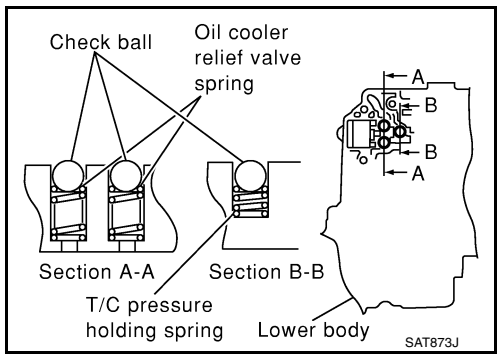


f. Install inter body on upper body using reamer bolts **F** as guides.

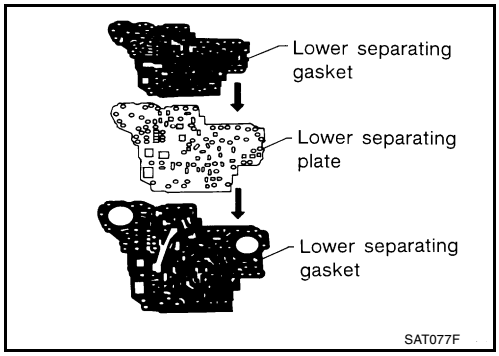


- **Be careful not to dislocate or drop steel balls.**

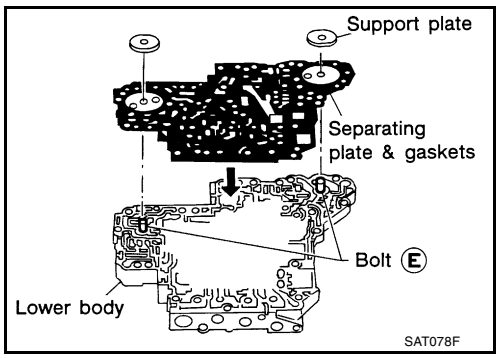
g. Install steel balls, oil cooler relief valve springs and T/C pressure holding spring in their proper positions in lower body.



h. Install lower separating gasket, inter separating gasket and lower separating plate in order shown in the illustration.

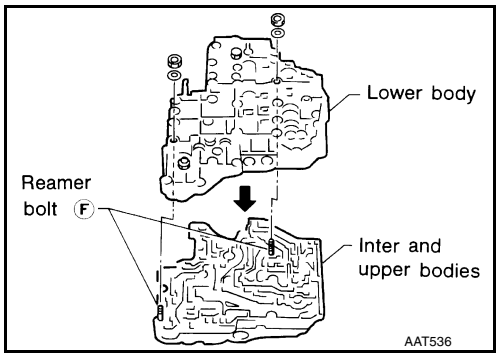


i. Install bolts **E** from bottom of lower body. Using bolts **E** as guides, install separating plate and gaskets as a set.

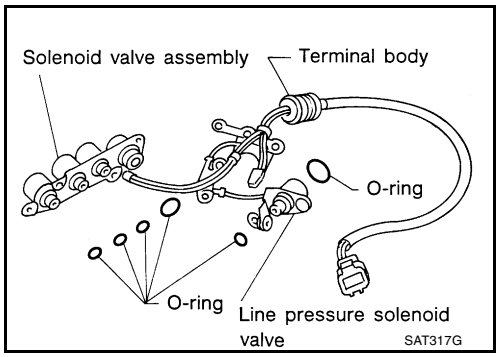


j. Install support plates on lower body.

k. Install lower body on inter body using reamer bolts **F** as guides and tighten reamer bolts **F** slightly.



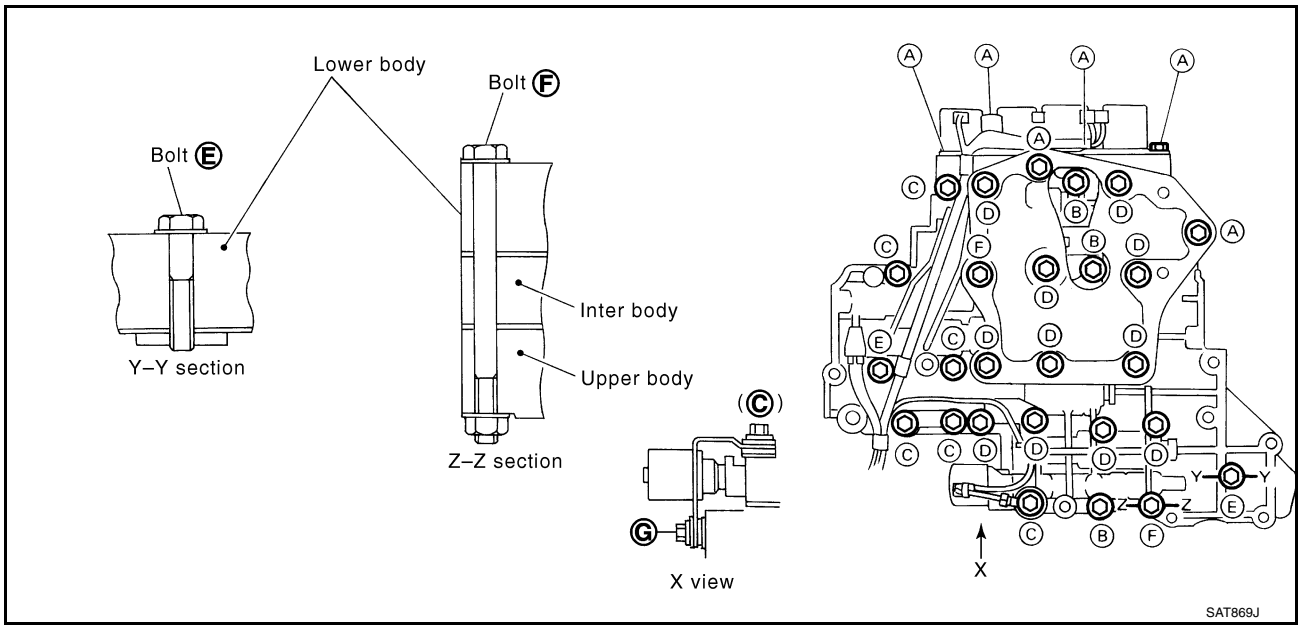
2. Install O-rings to solenoid valves and terminal body.
   - **Apply ATF to O-rings.**
3. Install and tighten bolts.



Bolt length, number and location:

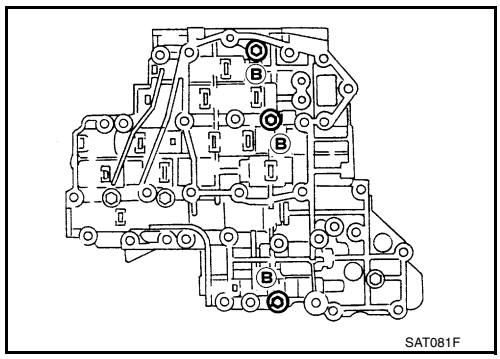
Bolt symbol	A	B	C	D	E	F	G
Bolt length "l" 	13.5 mm (0.531 in)	58.0 mm (2.283 in)	44.0 mm (1.732 in)	66.0 mm (2.598 in)	33.0 mm (1.299 in)	78.0 mm (3.071 in)	18.0 mm (0.709 in)
Number of bolts	6	3	6	11	2	2	1

F: Reamer bolt with nut

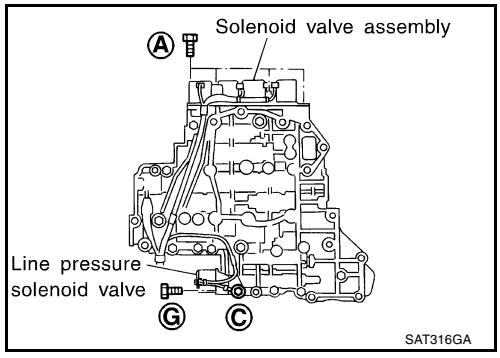


a. Install and tighten bolts **B** to specified torque.

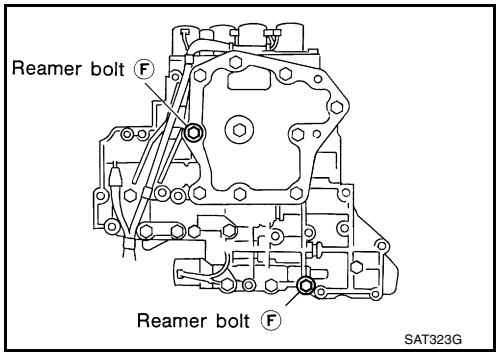
: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



b. Install solenoid valve assembly and line pressure solenoid valve to lower body.



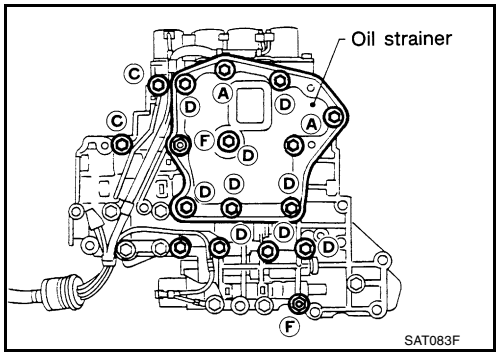
c. Remove reamer bolts **F** and set oil strainer on control valve assembly.



d. Reinstall reamer bolts **F** from lower body side.

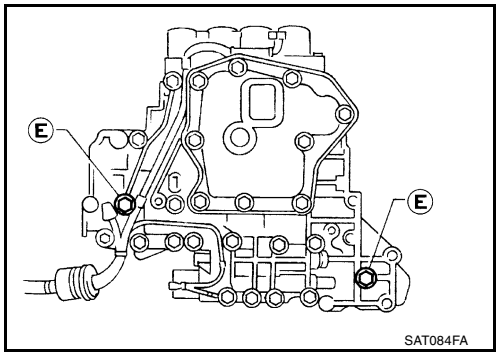
e. Tighten bolts **A** , **C** , **D** and **F** to specified torque.

: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



f. Tighten bolts **E** to specified torque.

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



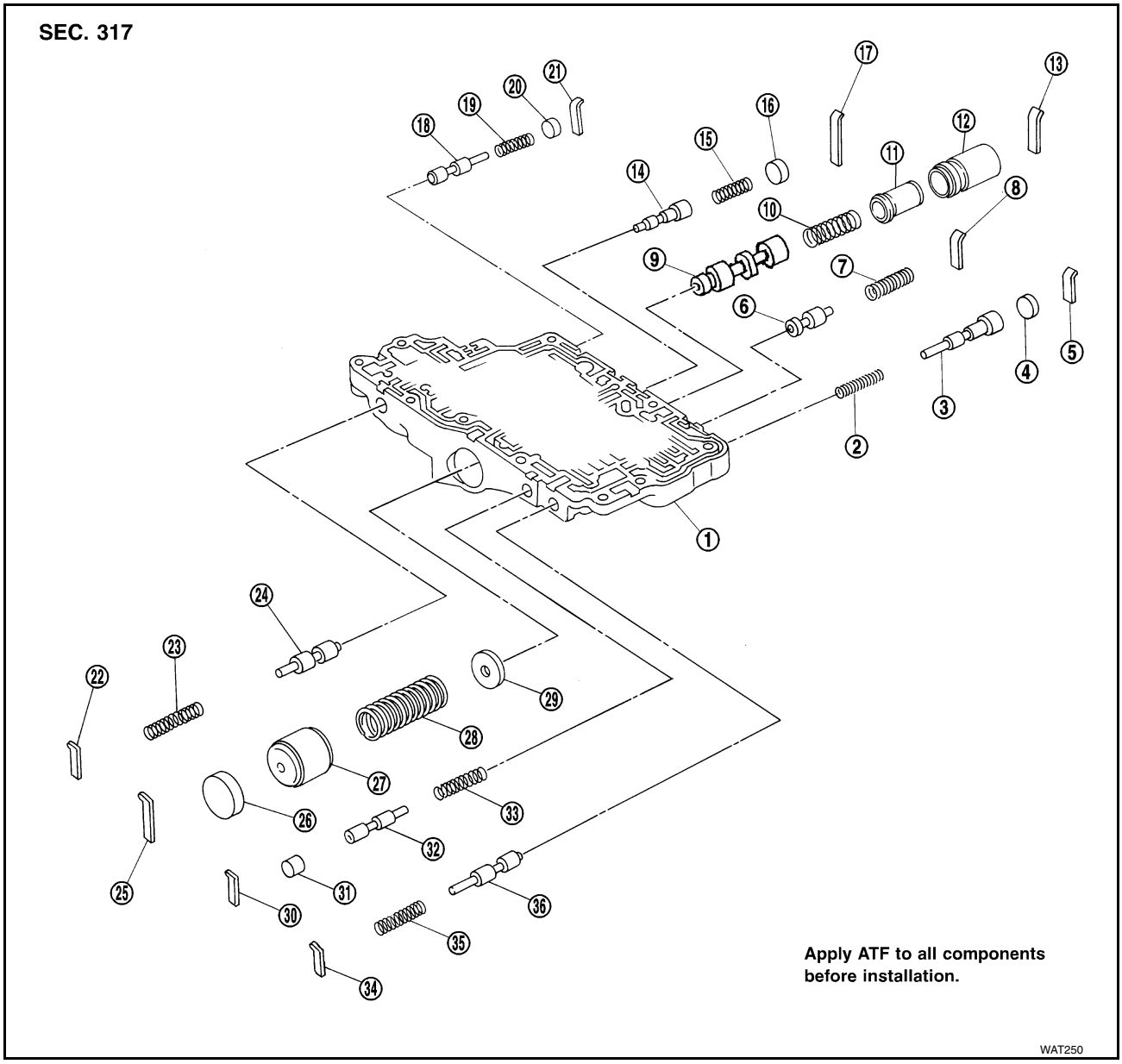
CONTROL VALVE UPPER BODY

PFP:31711

Components

ECS00603

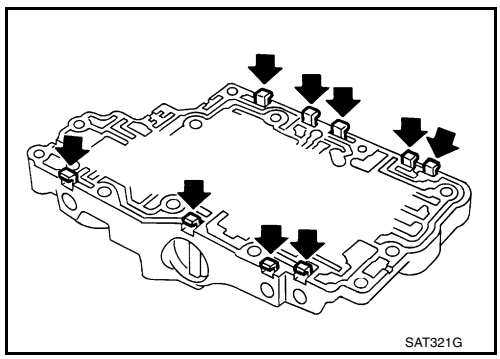
Numbers preceding valve springs correspond with those shown in AT-386, "CONTROL VALVE AND PLUG RETURN SPRINGS" .



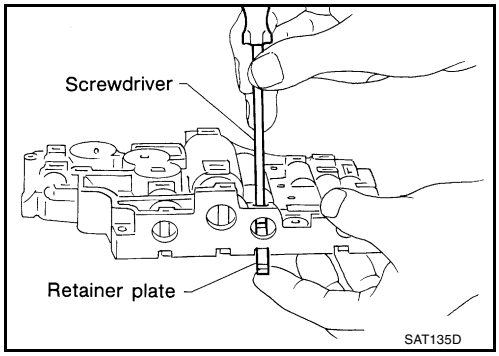
Disassembly

ECS00604

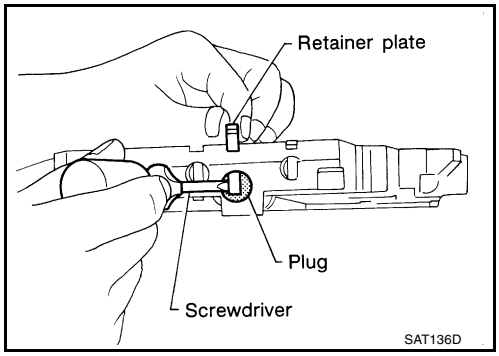
1. Remove valves at retainer plates.
   - **Do not use a magnetic “hand”.**



a. Use a screwdriver to remove retainer plates.

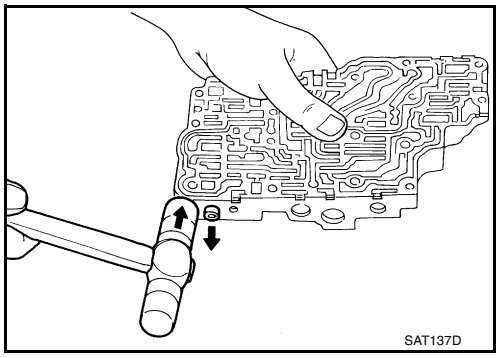


b. Remove retainer plates while holding spring, plugs or sleeves.



- **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

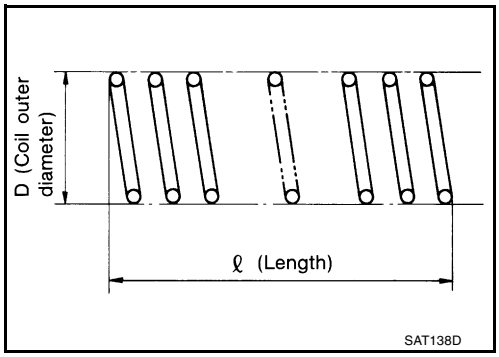
ECS00605

VALVE SPRING

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

  Inspection standard : **Refer to** **AT-386, "CONTROL VALVE AND PLUG RETURN SPRINGS"** **.**

- Replace valve springs if deformed or fatigued.



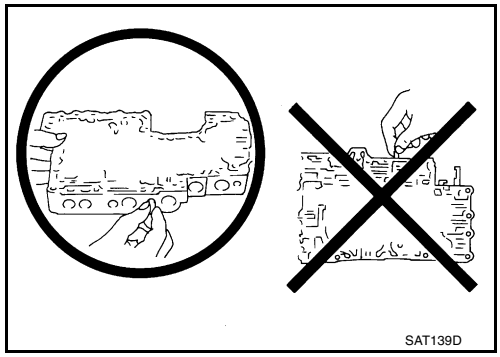
CONTROL VALVES

- Check sliding surfaces of valves, sleeves and plugs.

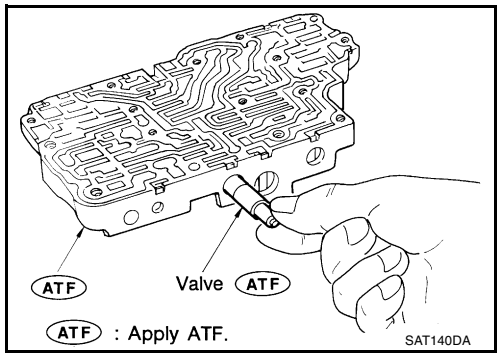
Assembly

ECS00606

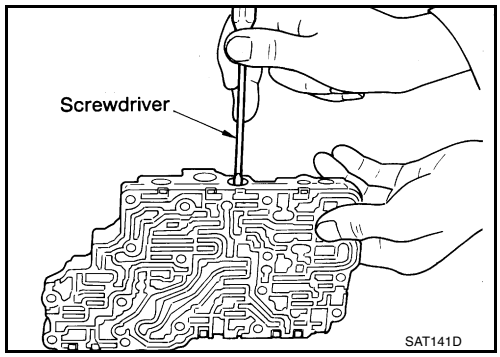
- **Lay control valve body down when installing valves. Do not stand the control valve body upright.**



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

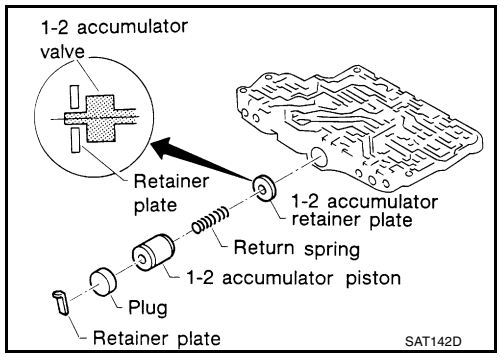


- **Be careful not to scratch or damage valve body.**
- Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.

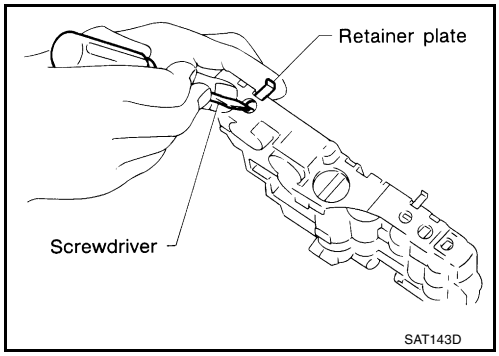


1-2 ACCUMULATOR VALVE

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

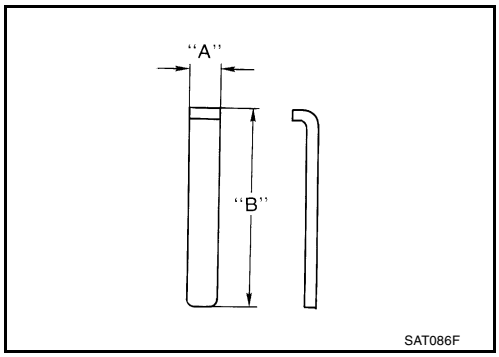


1. Install retainer plates.
   - Install retainer plate while pushing plug or return spring.



RETAINER PLATE (FOR CONTROL VALVE UPPER BODY)

Refer to AT-307, "CONTROL VALVE UPPER BODY" .



Unit: mm (in)

Name of valve and piston	No.	Width A	Length B
Pilot valve	22	6.0 (0.236)	21.5 (0.846)
1-2 accumulator valve	17		40.5 (1.594)
1-2 accumulator piston	25		
1st reducing valve	30		21.5 (0.846)
Overrun clutch reducing valve	5		24.0 (0.945)
Torque converter relief valve	8		21.5 (0.846)
Torque converter clutch control valve	13		28.0 (1.102)
3-2 timing valve	34		21.5 (0.846)
Cooler check valve	21		24.0 (0.945)

- Install proper retainer plates.

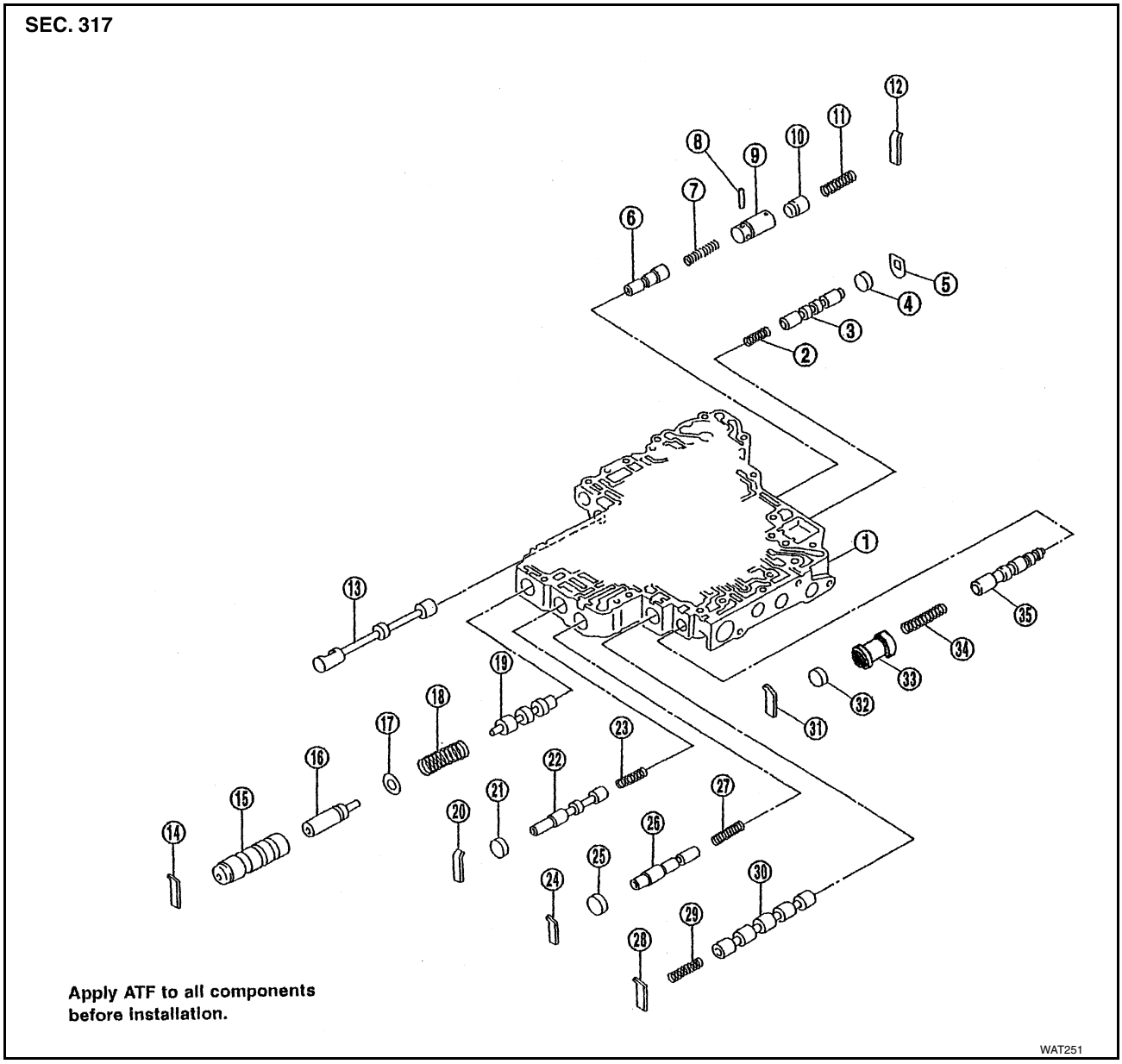
CONTROL VALVE LOWER BODY

PFP:31713

Components

ECS00607

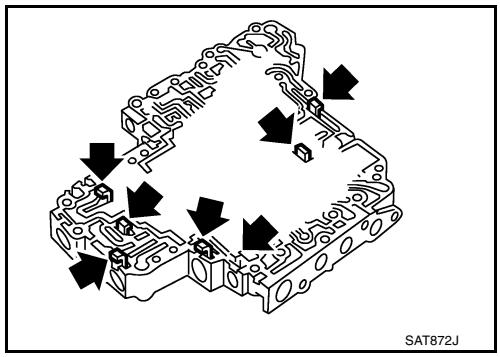
Numbers preceding valve springs correspond with those shown in AT-386, "CONTROL VALVE AND PLUG RETURN SPRINGS" .



Disassembly

ECS00608

Remove valves at retainer plate.
For removal procedures, refer to AT-311, "Disassembly" .



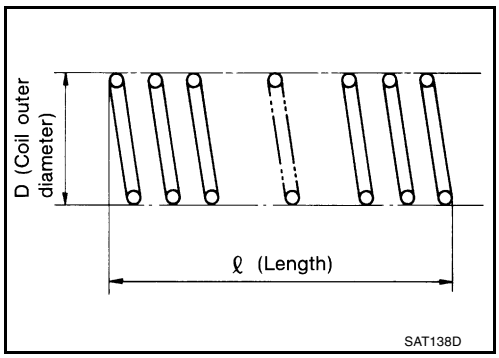
Inspection

ECS00609

VALVE SPRINGS

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

Inspection standard **: Refer to AT-386, "CONTROL VALVE AND PLUG RETURN SPRINGS" .**



- Replace valve springs if deformed or fatigued.

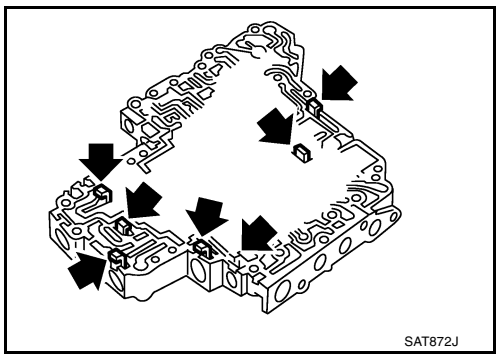
CONTROL VALVES

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

Assembly

ECS0060A

- Install control valves.
  For installation procedures, refer to AT-312, "Assembly" .

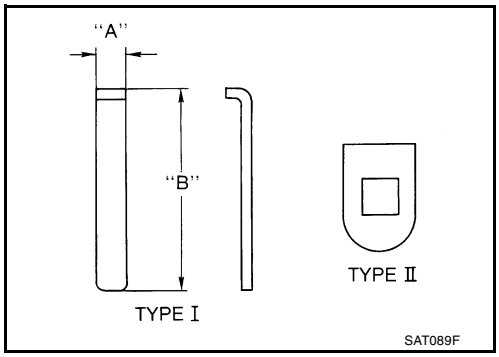


RETAINER PLATE (FOR CONTROL VALVE LOWER BODY)

Refer to AT-311, "CONTROL VALVE LOWER BODY" .

Unit: mm (in)

Name of control valve	No.	Width A	Length B	Type
Pressure regulator valve	14	6.0 (0.236)	28.0 (1.102)	I
Accumulator control valve	24			
Shift valve A	28			
Overrun clutch control valve	20			
Pressure modifier valve	12			
Shuttle control valve	31			
Shift valve B	5	—	—	II



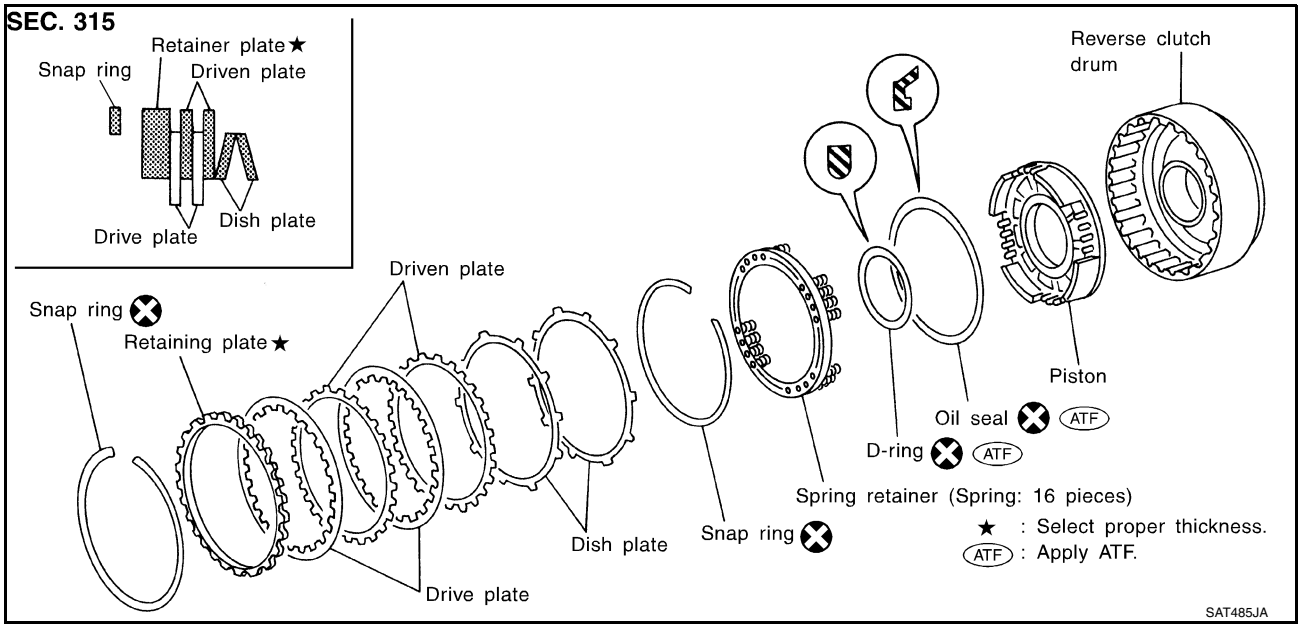
- Install proper retainer plates.

REVERSE CLUTCH

PFP:31510

Components

ECS0060B



Disassembly

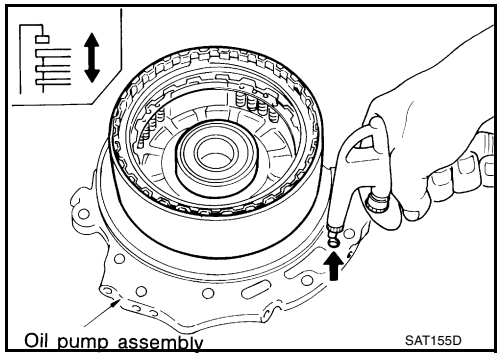
ECS0060C

1. Check operation of reverse clutch.

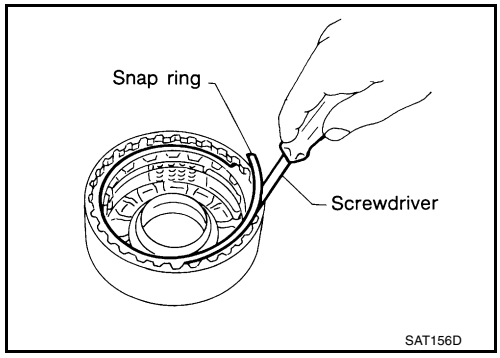
a. Install seal ring onto drum support of oil pump cover and install reverse clutch assembly. Apply compressed air to oil hole.

b. Check to see that retaining plate moves to snap ring.

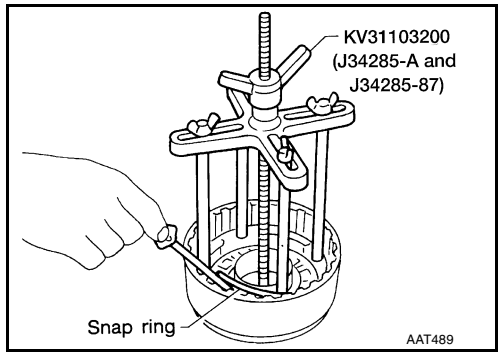
c. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Oil seal might be damaged.
   - Fluid might be leaking past piston check ball.



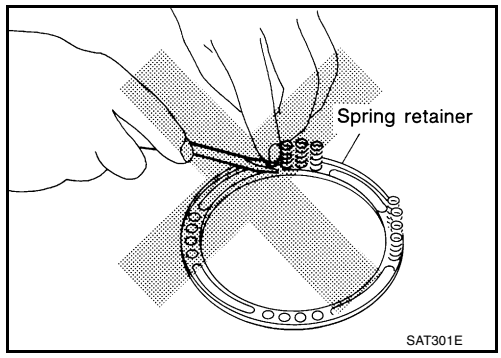
2. Remove snap ring.
   - **Do not expand snap ring excessively.**
3. Remove drive plates, driven plates, retaining plate, and dish plates.



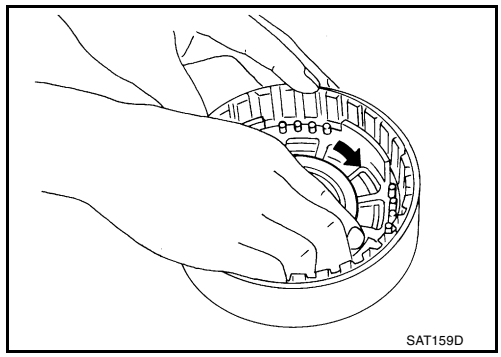
4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.
   - **Set Tool directly above springs.**
   - **Do not expand snap ring excessively.**



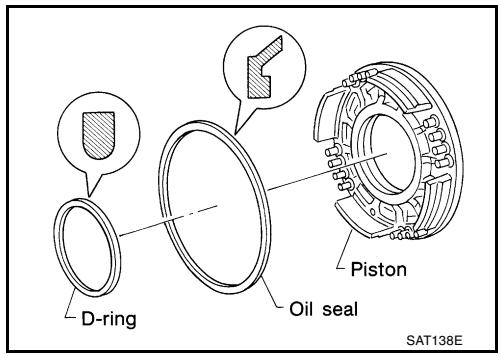
5. Remove spring retainer and return springs.
   - **Do not remove return springs from spring retainer.**



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



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



Inspection

ECS0060D

REVERSE CLUTCH SNAP RING, SPRING RETAINER AND RETURN SPRINGS

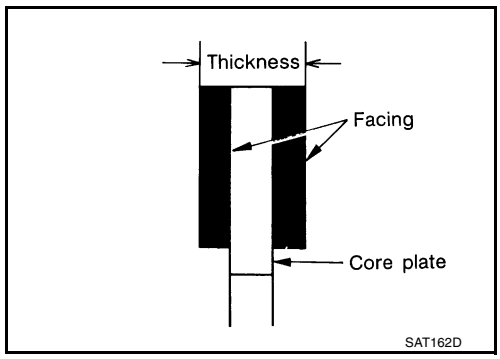
- Check for deformation, fatigue or damage.
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**

REVERSE CLUTCH DRIVE PLATES

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

Thickness of drive plate
Standard value : 2.0 mm (0.079 in)
Wear limit : 1.8 mm (0.071 in)

- If not within wear limit, replace.

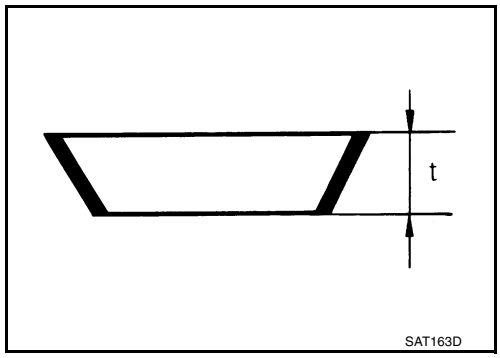


REVERSE CLUTCH DISH PLATES

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

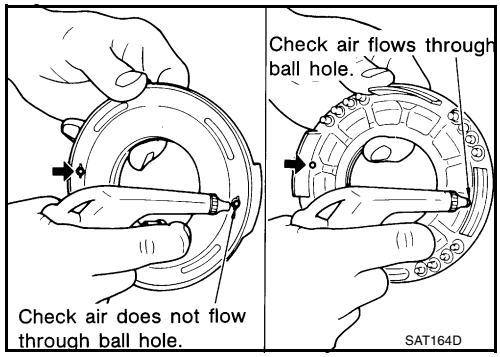
Thickness of dish plate "t" : 2.8 mm (0.110 in)

- If deformed or fatigued, replace.



REVERSE CLUTCH PISTON

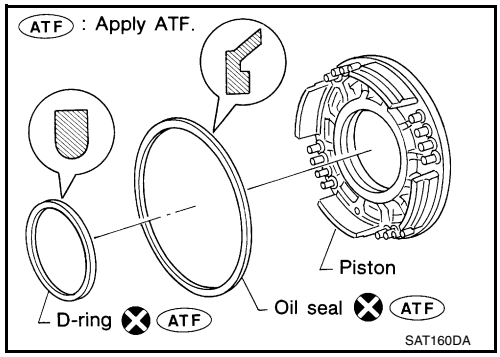
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure that there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure air leaks past ball.



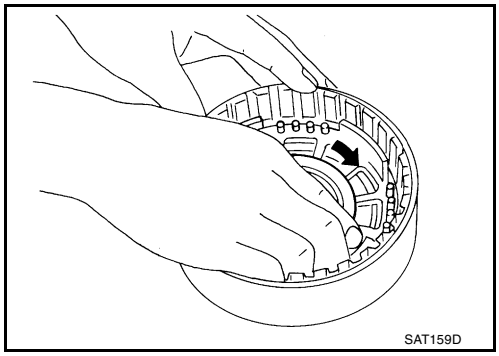
Assembly

ECS0060E

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

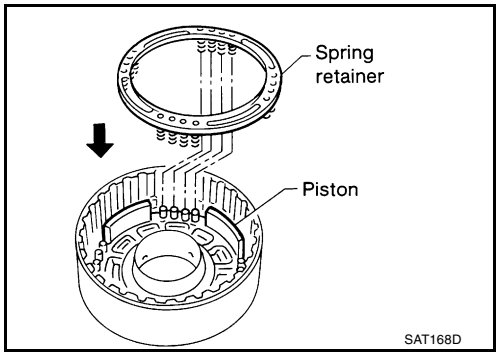


2. Install piston assembly by turning it slowly.
   - **Apply ATF to inner surface of drum.**

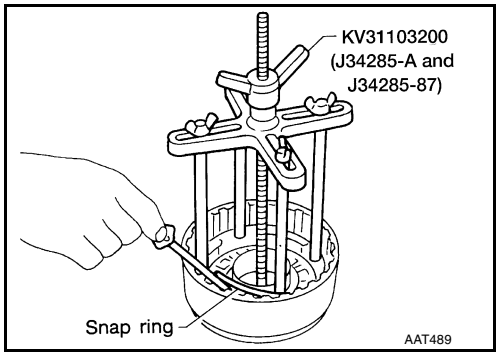


3. Install return springs and spring retainer on piston.

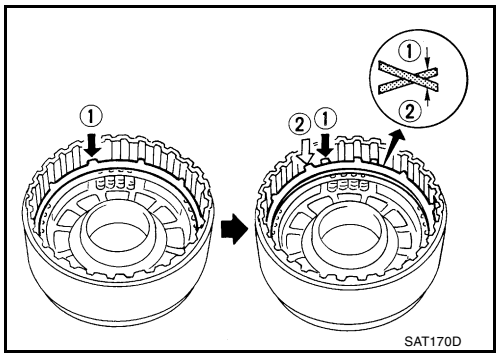
Return spring	**: Refer to AT-388, "Clutch and Brake Return Springs" .**



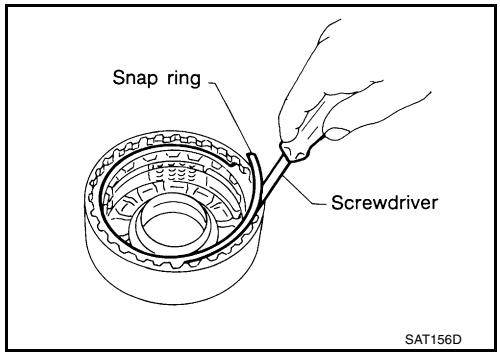
4. Set Tool on spring retainer and install snap ring while compressing return springs.
   - **Set Tool directly above return springs.**



5. Install drive plates, driven plates, retaining plate and dish plates.
   - **Do not align the projections of any two dish plates.**
   - **Take care with the order and direction of plates.**

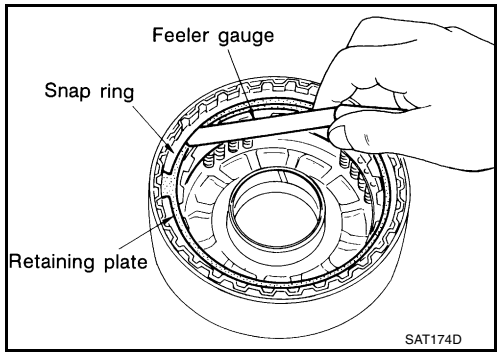


6. Install snap ring.
   - **Do not expand snap ring excessively.**

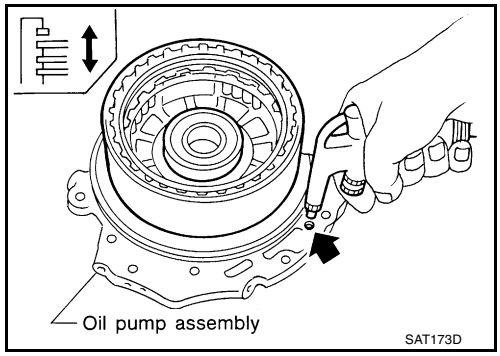


7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

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 AT-386, "REVERSE CLUTCH"



8. Check operation of reverse clutch.
   Refer to AT-313, "Components" .

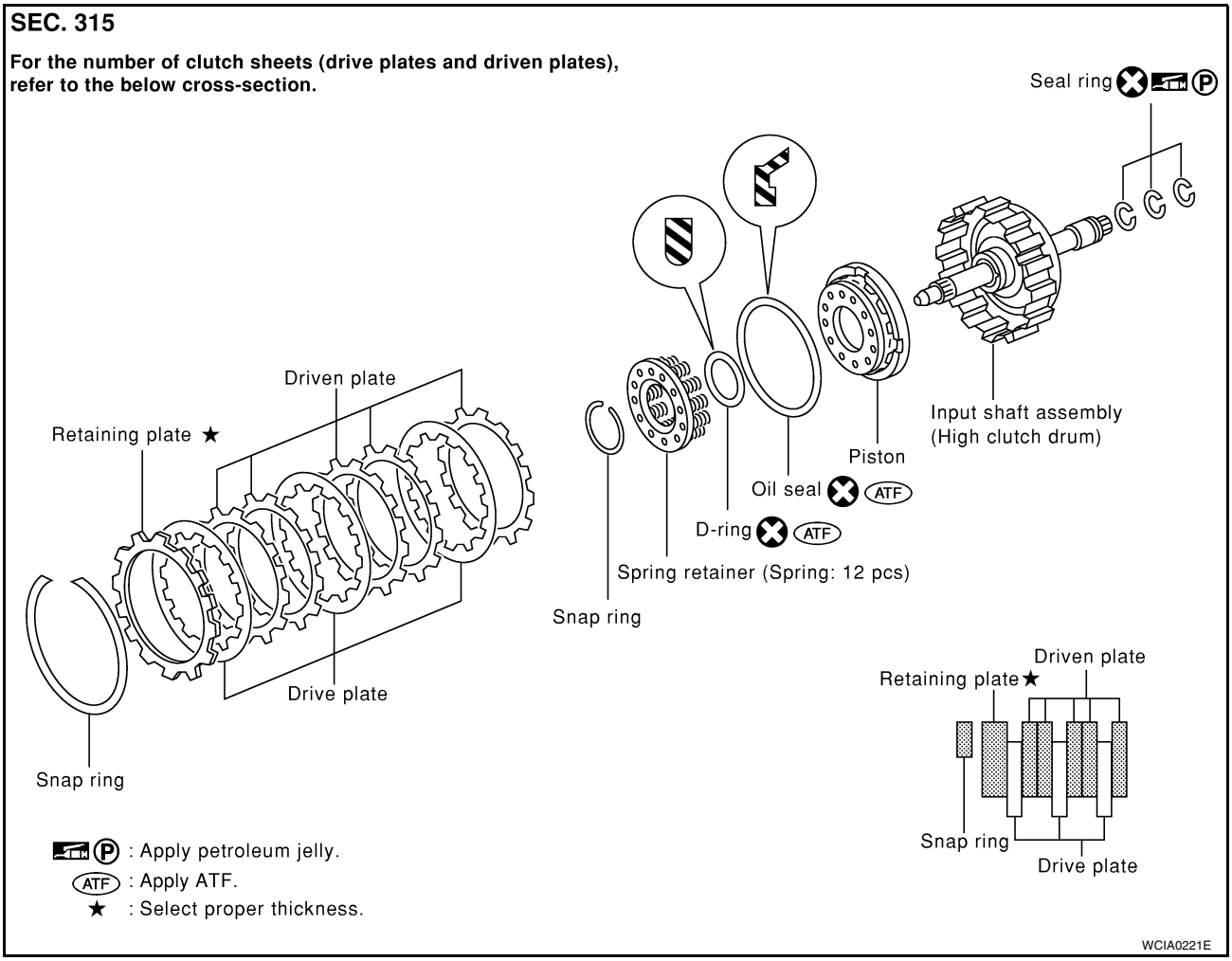


HIGH CLUTCH

PFP:31410

Components

ECS0060F



Disassembly

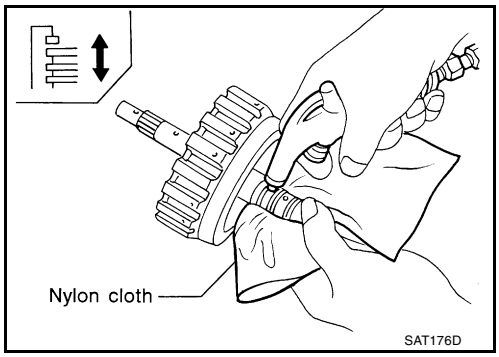
ECS0060G

1. Check operation of high clutch.

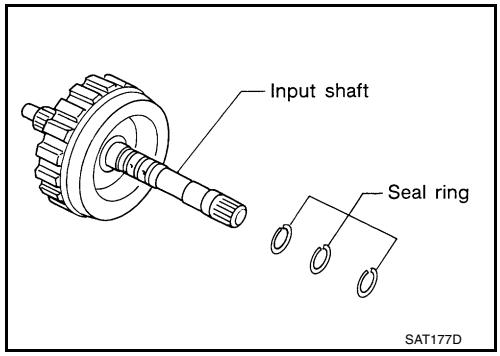
a. Apply compressed air to oil hole of input shaft.
   - **Stop up a hole on opposite side of input shaft.**

b. Check to see that retaining plate moves to snap ring.

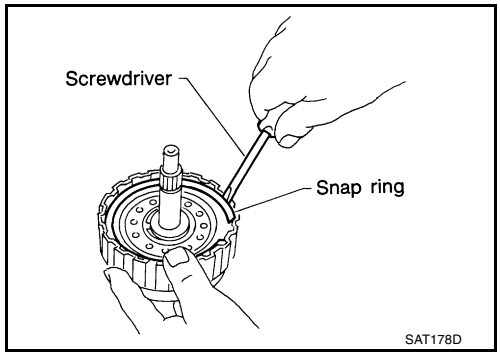
c. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Oil seal might be damaged.
   - Fluid might be leaking past piston check ball.



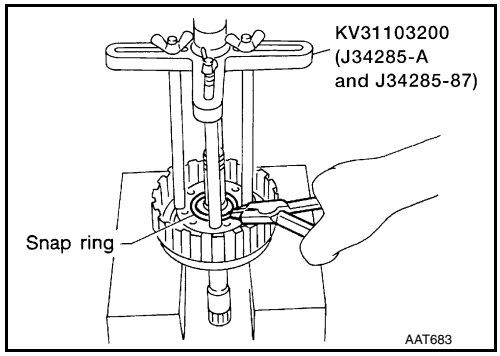
2. Remove seal rings from input shaft.

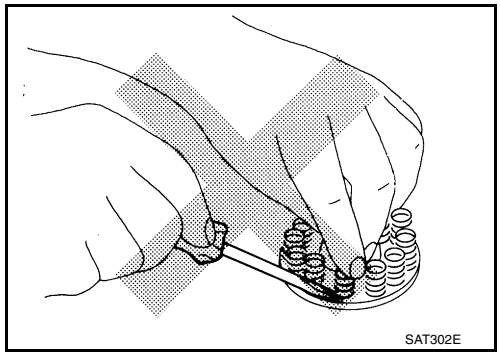


3. Remove snap ring.
   - **Do not expand snap ring excessively.**
4. Remove drive plates, driven plates and retaining plate.

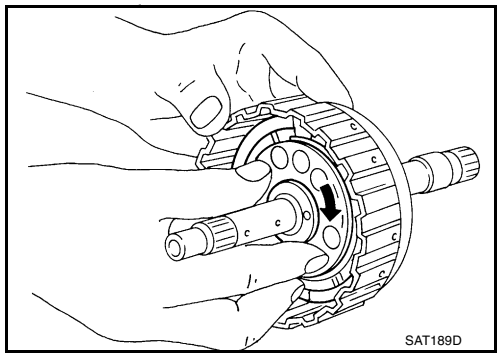


5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.
   - **Set Tool directly above springs.**
   - **Do not expand snap ring excessively.**
6. Remove spring retainer and return springs.
   - **Do not remove return spring from spring retainer.**

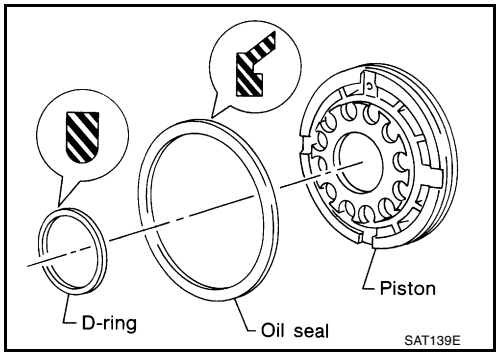




7. Remove piston from high clutch drum by turning it.



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



Inspection

ECS0060H

REVERSE CLUTCH SNAP RING, SPRING RETAINER AND RETURN SPRINGS

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

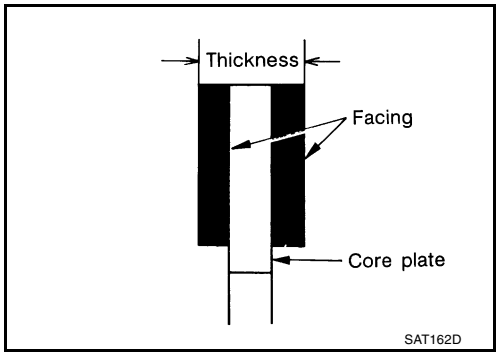
HIGH CLUTCH DRIVE PLATES

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

Thickness of drive plate

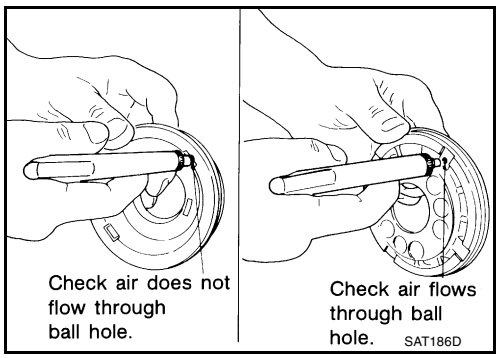
Standard value	**: 2.0 mm (0.079 in)**
Wear limit	**: 1.8 mm (0.071 in)**

- If not within wear limit, replace.



HIGH CLUTCH PISTON

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

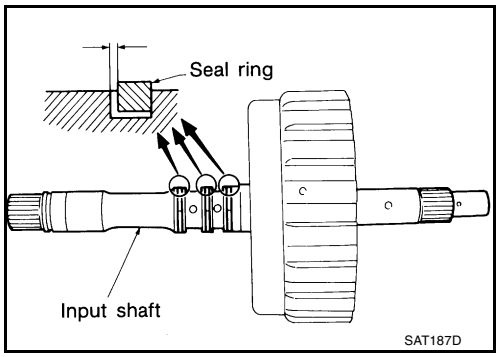


SEAL RING CLEARANCE

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

Standard clearance	**: 0.08 - 0.23 mm (0.0031 - 0.0091 in)**
Allowable limit	**: 0.23 mm (0.0091 in)**

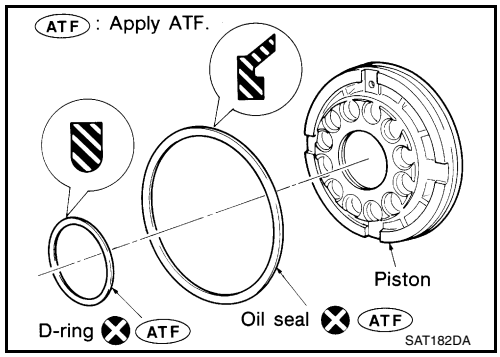
- If not within wear limit, replace input shaft assembly.



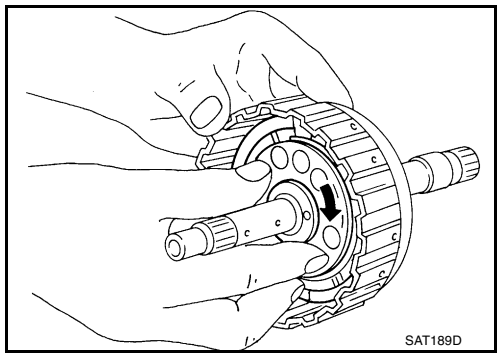
Assembly

ECS0060I

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

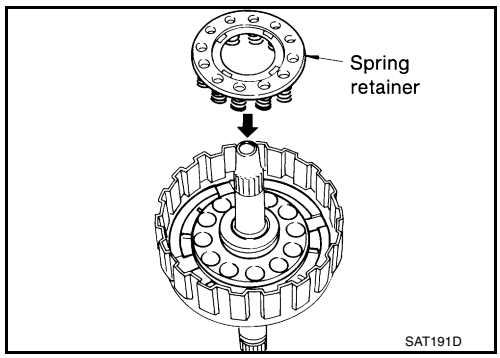


2. Install piston assembly by turning it slowly.
   - **Apply ATF to inner surface of drum.**

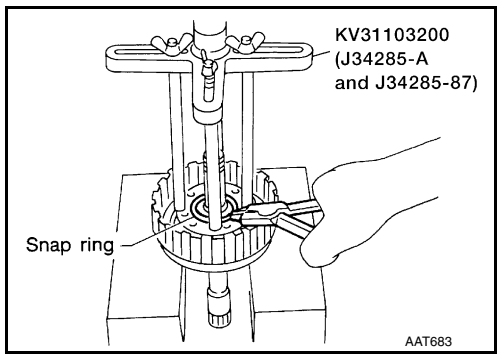


3. Install return springs and spring retainer on piston.

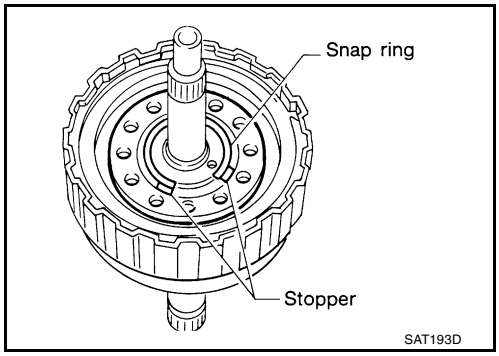
   Return spring **: Refer to AT-388, "Clutch and Brake Return Springs" .**



4. Set Tool on spring retainer and install snap ring while compressing return springs.
   - **Set Tool directly above return springs.**
   - **Do not expand snap ring excessively.**



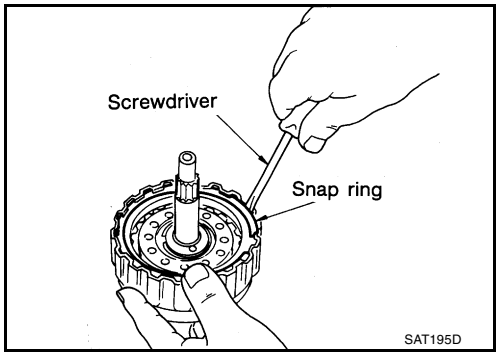
- **Do not align snap ring gap with spring retainer stopper.**



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

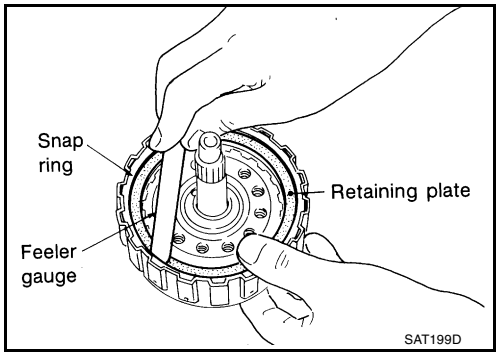
Take care with the order and direction of plates.

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

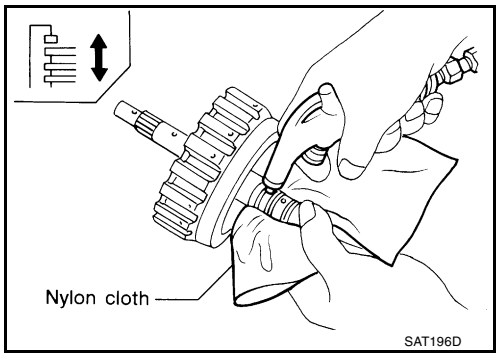


7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

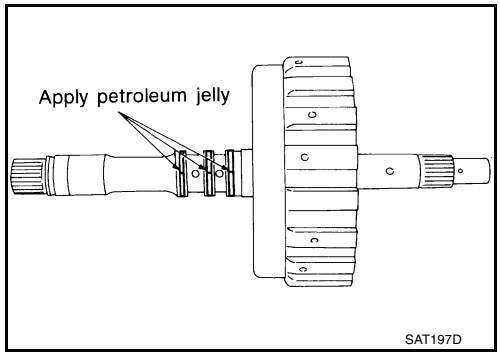
Specified clearance	
Standard	: 1.4 - 1.8 mm (0.055 - 0.071 in)
Allowable limit	: 2.4 mm (0.094 in)
Retaining plate	: Refer to AT-387, "HIGH CLUTCH" .



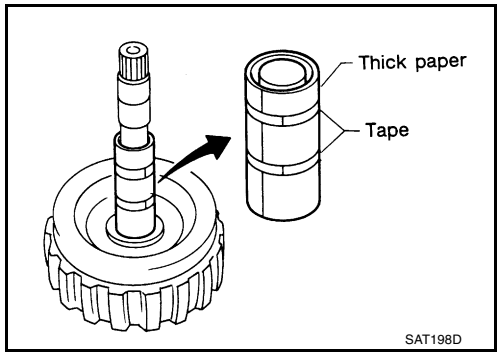
8. Check operation of high clutch.
   Refer to AT-318, "HIGH CLUTCH" .



9. Install seal rings to input shaft.
   - **Apply petroleum jelly to seal rings.**



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

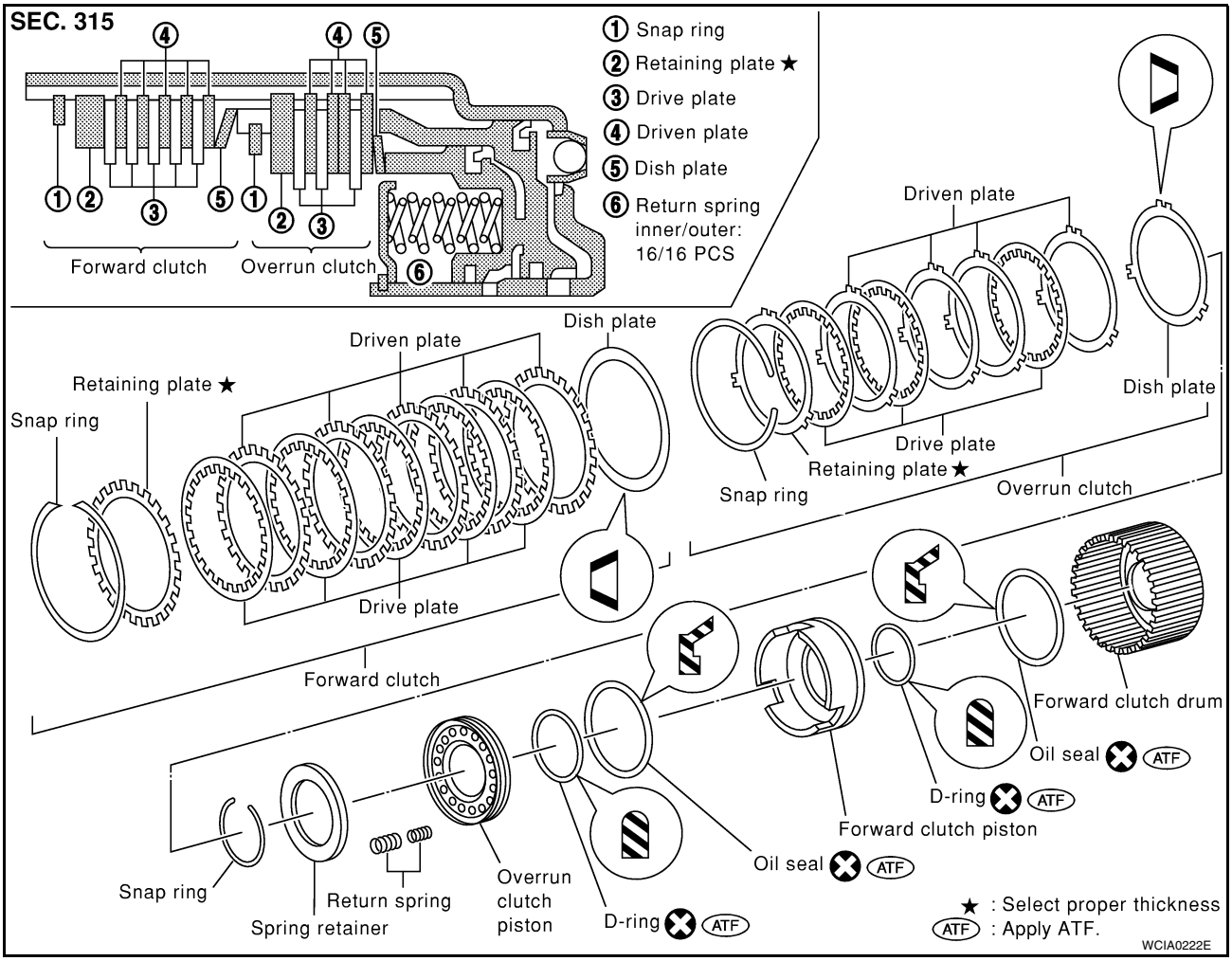


FORWARD CLUTCH AND OVERRUN CLUTCH

PFP:31570

Components

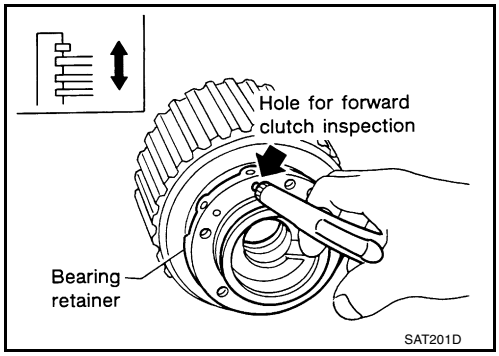
ECS0060J



Disassembly

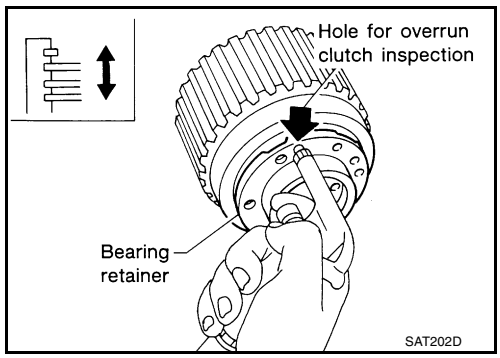
ECS0060K

1. Check operation of forward clutch and overrun clutch.

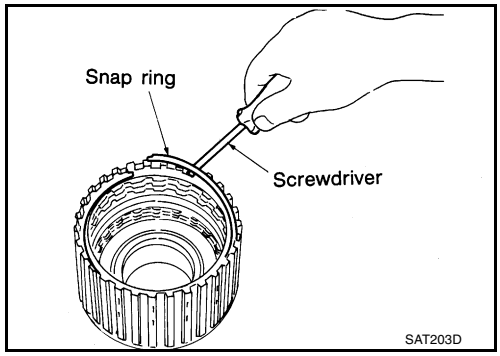


a. Install bearing retainer on forward clutch drum.
b. Apply compressed air to oil hole of forward clutch drum.
c. Check to see that retaining plate moves to snap ring.

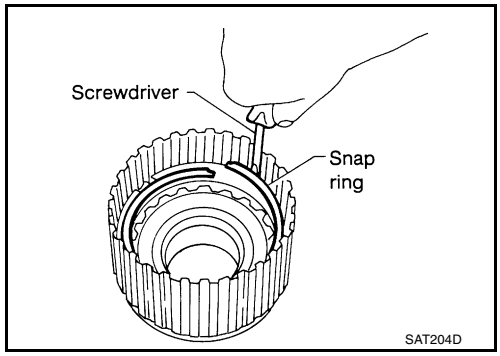
d. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Oil seal might be damaged.
   - Fluid might be leaking past piston check ball.



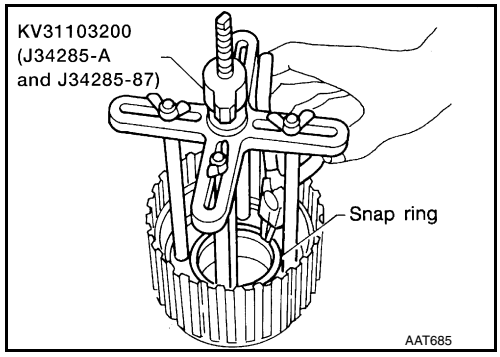
2. Remove snap ring for forward clutch.
   - **Do not expand snap ring excessively.**
3. Remove drive plates, driven plates, retaining plate and dish plate for forward clutch.



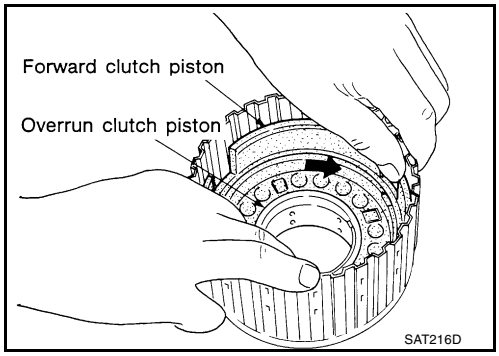
4. Remove snap ring for overrun clutch.
   - **Do not expand snap ring excessively.**
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.



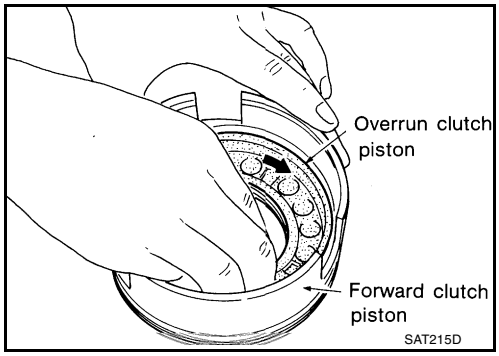
6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.
   - **Set Tool directly above return springs.**
   - **Do not expand snap ring excessively.**
7. Remove spring retainer and return springs.



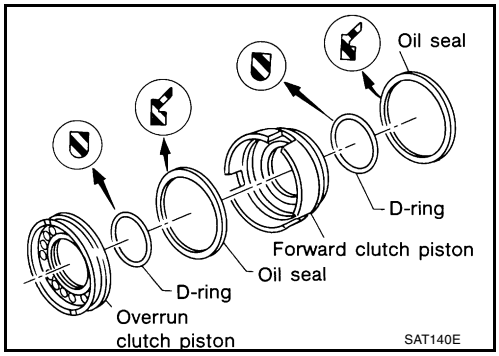
8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.



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



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



Inspection

ECS0060L

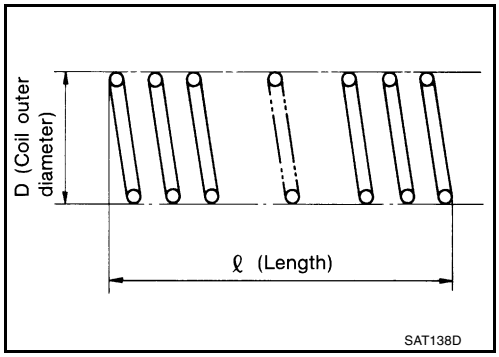
SNAP RINGS AND SPRING RETAINER

- Check for deformation, fatigue or damage.

FORWARD CLUTCH AND OVERRUN CLUTCH RETURN SPRINGS

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

Inspection standard : Refer to AT-388, "Clutch and Brake Return Springs" .

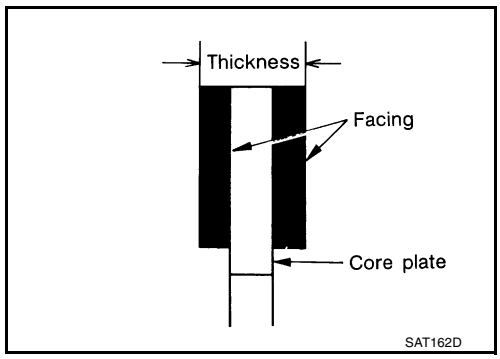


- Replace if deformed or fatigued.

FORWARD CLUTCH AND OVERRUN CLUTCH DRIVE PLATES

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

Thickness of drive plate
Forward clutch
Standard value : 1.8 mm (0.071 in)
Wear limit : 1.6 mm (0.063 in)
Overrun clutch
Standard value : 1.6 mm (0.063 in)
Wear limit : 1.4 mm (0.055 in)

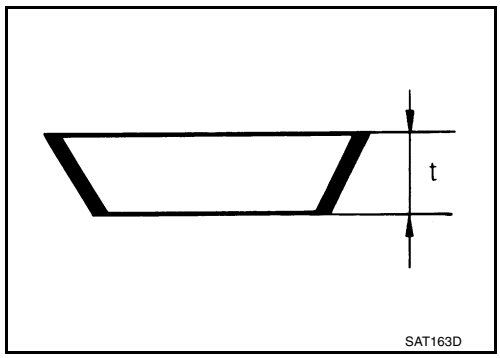


- If not within wear limit, replace.

FORWARD CLUTCH AND OVERRUN CLUTCH DISH PLATES

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

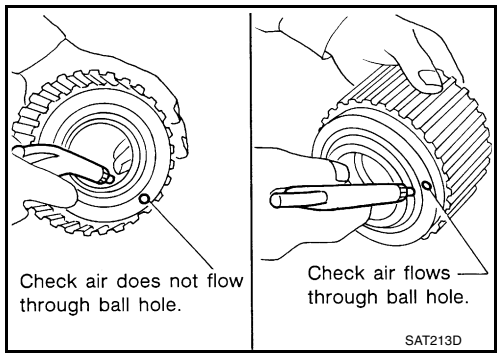
Thickness of dish plate "t"
Forward clutch : 2.5 mm (0.098 in)
Overrun clutch : 2.15 mm (0.0846 in)



- If deformed or fatigued, replace.

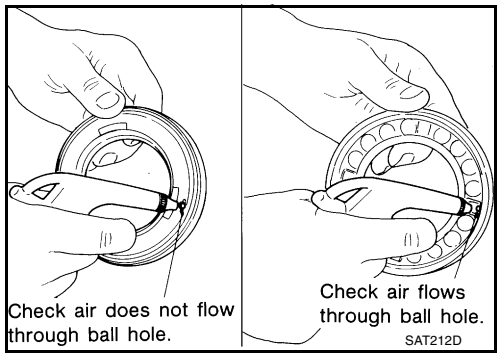
FORWARD CLUTCH DRUM

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



OVERRUN CLUTCH PISTON

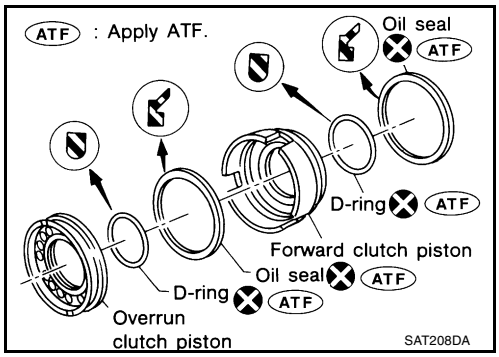
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side. Make sure air leaks past ball.



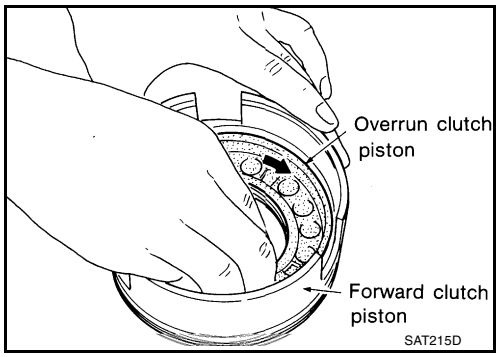
Assembly

ECS0060M

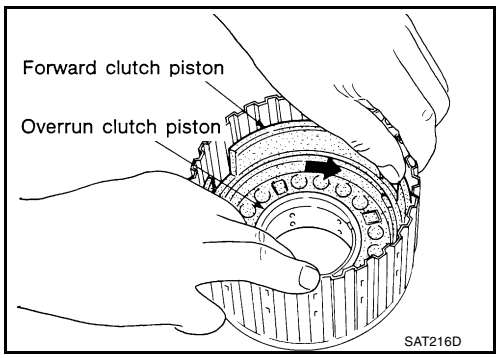
1. Install D-rings and oil seals on forward clutch piston and overrun clutch piston.
   - **Take care with direction of oil seal.**
   - **Apply ATF to both parts.**



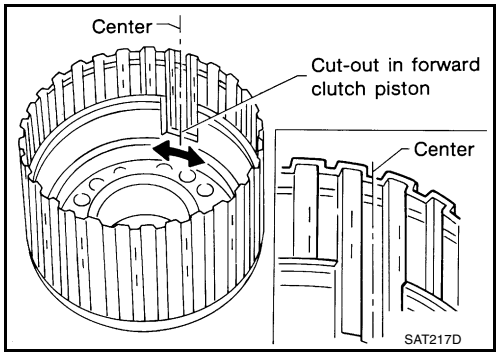
2. Install overrun clutch piston assembly on forward clutch piston while turning it slowly.
   - **Apply ATF to inner surface of forward clutch piston.**



3. Install forward clutch piston assembly on forward clutch drum while turning it slowly.
   - **Apply ATF to inner surface of drum.**

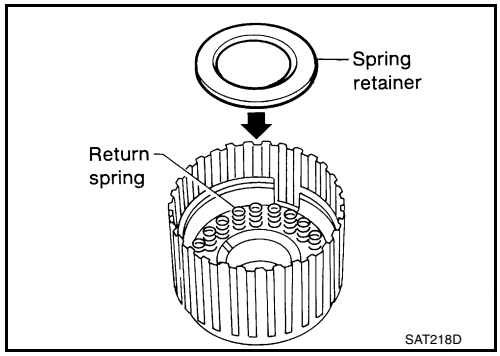


4. Align notch in forward clutch piston with groove in forward clutch drum.

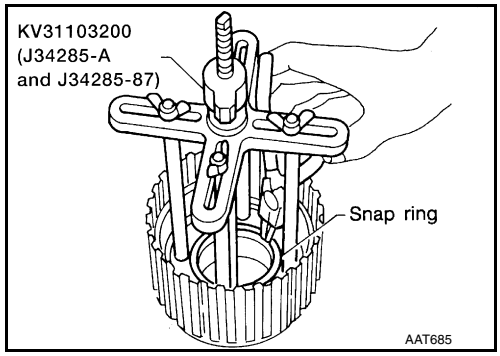


5. Install return spring on piston.
6. Install spring retainer on return springs.

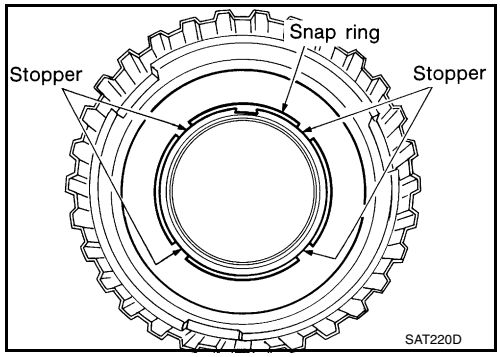
Return spring **: Refer to AT-388, "Clutch and Brake Return Springs" .**



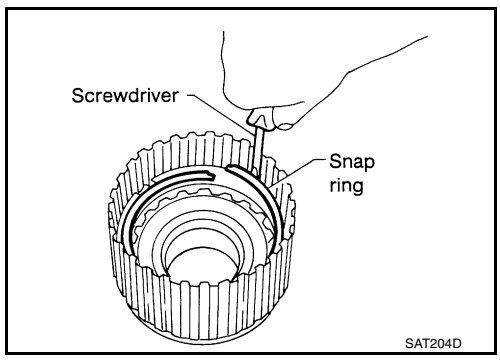
7. Set Tool on spring retainer and install snap ring while compressing return springs.
   - **Set Tool directly above return springs.**
   - **Do not expand snap ring excessively.**



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

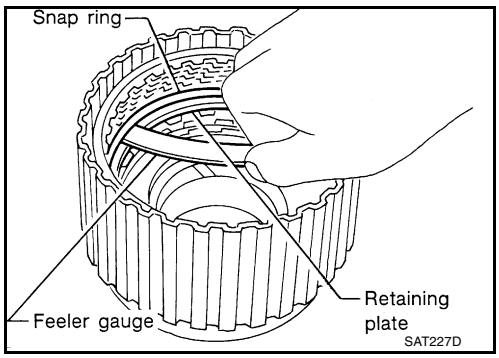


8. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
9. Install snap ring for overrun clutch.
   - Do not expand snap ring excessively.



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

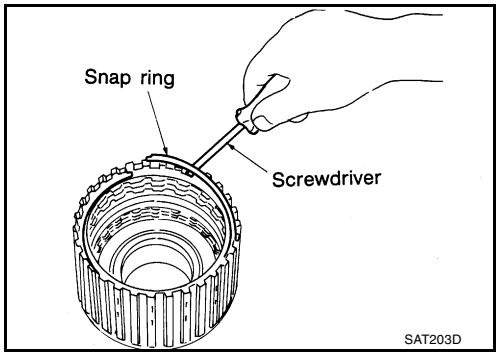
Specified clearance	
Standard	: 1.0 - 1.4 mm (0.039 - 0.055 in)
Allowable limit	: 2.0 mm (0.079 in)
Overrun clutch retaining plate	: Refer to AT-387, "OVERRUN CLUTCH" .



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

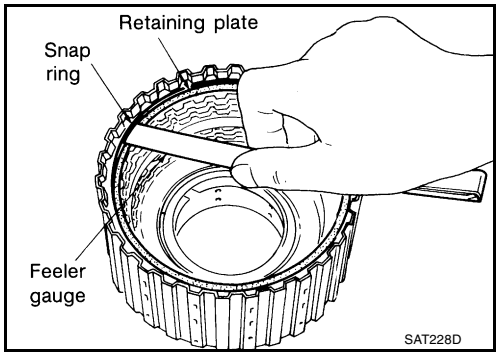
Take care with the order and direction of plates.

12. Install snap ring for forward clutch.
- Do not expand snap ring excessively.

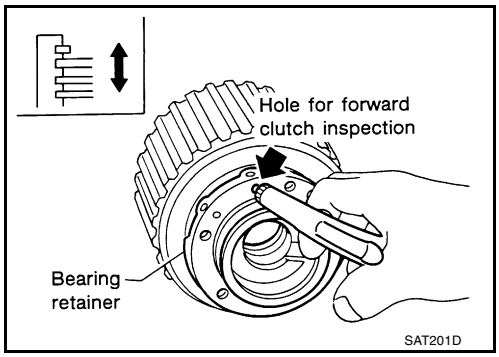


13. Measure clearance between forward clutch retaining plate and snap ring.
If not within allowable limit, select proper retaining plate.

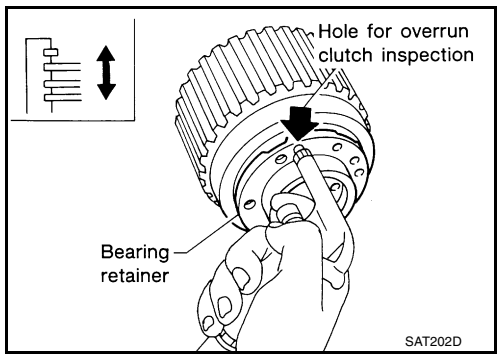
Specified clearance	
Standard	: 0.45 - 0.85 mm (0.0177 - 0.0335 in)
Allowable limit	: 1.85 mm (0.0728 in)
Forward clutch retaining plate	: Refer to AT-387, "FORWARD CLUTCH"



14. Check operation of forward clutch.
Refer to AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH" .



15. Check operation of overrun clutch.
Refer to AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH" .

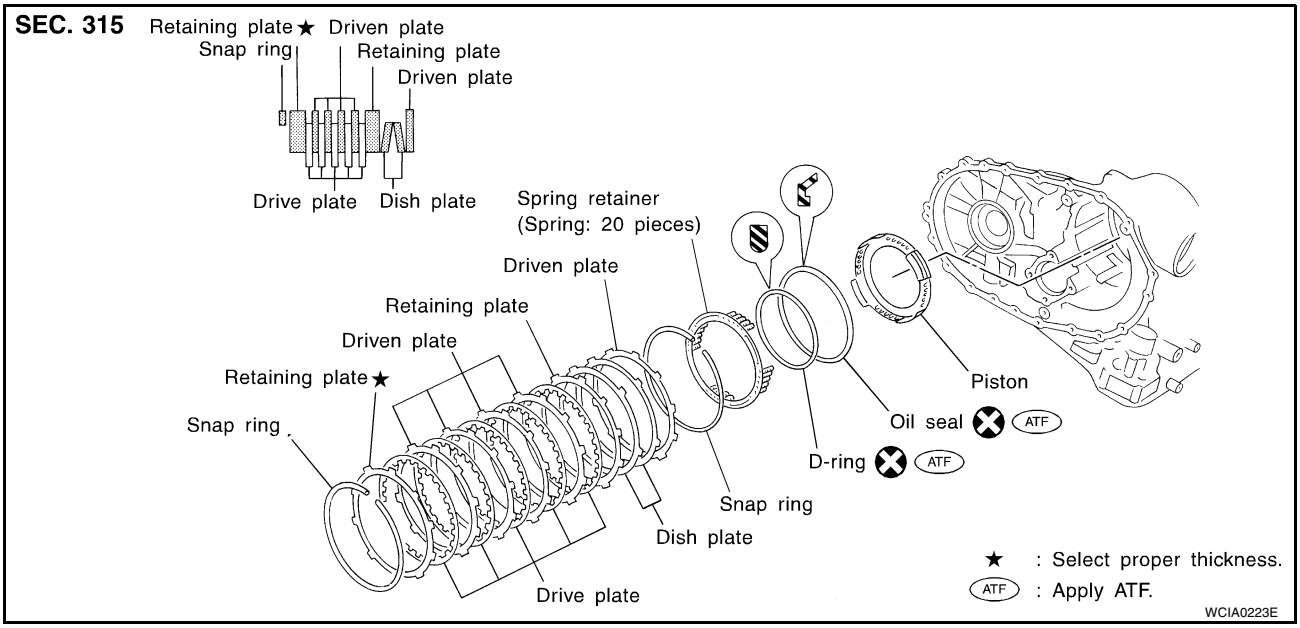


LOW & REVERSE BRAKE

PFP:31645

Components

ECS0060N

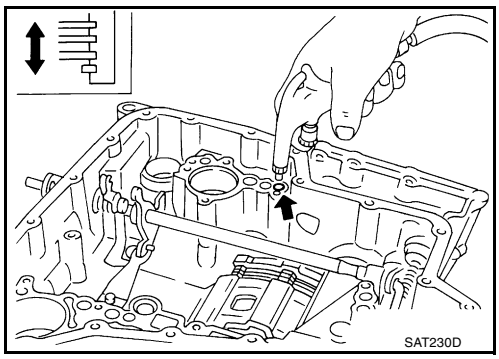


Disassembly

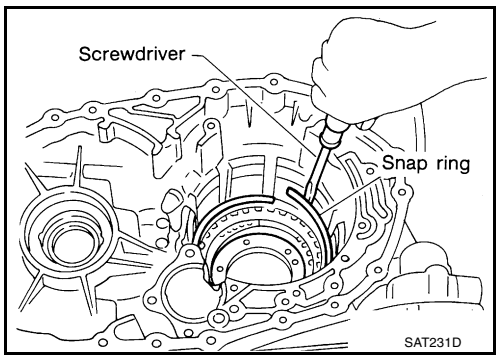
ECS0060O

1. Check operation of low & reverse brake.

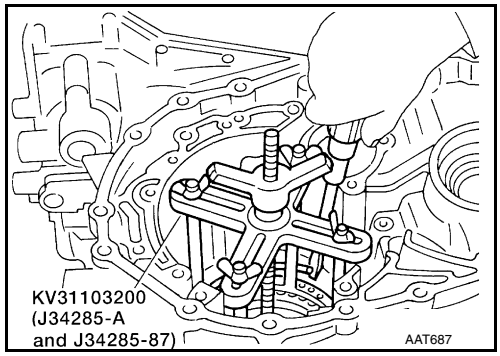
a. Apply compressed air to oil hole of transmission case.
b. Check to see that retaining plate moves to snap ring.
c. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Oil seal might be damaged.
   - Fluid might be leaking past piston check ball.



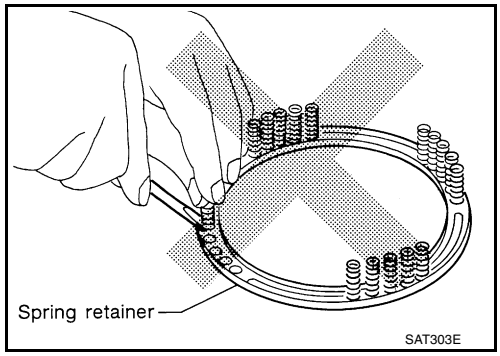
2. Stand transmission case.
3. Remove snap ring.
   - **Do not expand snap ring excessively.**
4. Remove drive plates, driven plates, retaining plate from transmission case.



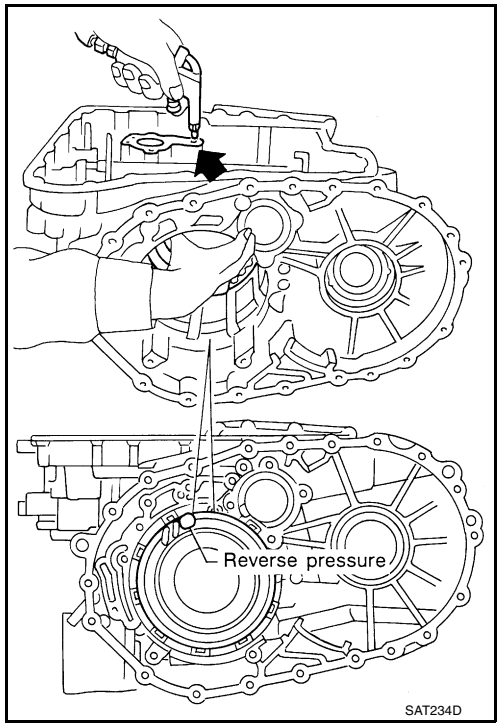
5. Set Tool on spring retainer and remove snap ring while compressing return springs.
   - **Set Tool directly above return springs.**
   - **Do not expand snap ring excessively.**
6. Remove spring retainer and return springs.



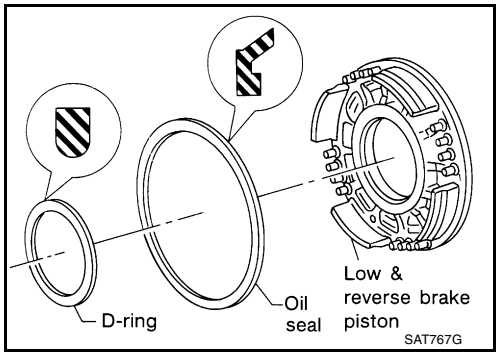
- **Do not remove return springs from spring retainer.**



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



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



Inspection

ECS0060P

LOW & REVERSE CLUTCH SNAP RING, SPRING RETAINER AND RETURN SPRINGS

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

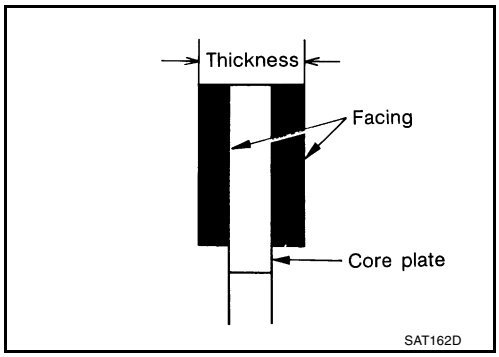
LOW & REVERSE BRAKE DRIVE PLATES

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

Thickness of drive plate

Standard value	**: 2.0 mm (0.079 in)**
Wear limit	**: 1.8 mm (0.071 in)**

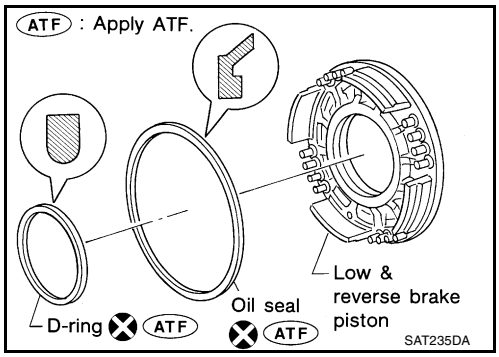
- If not within wear limit, replace.



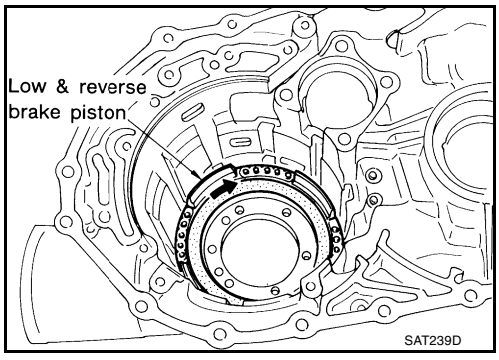
Assembly

ECS0060Q

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

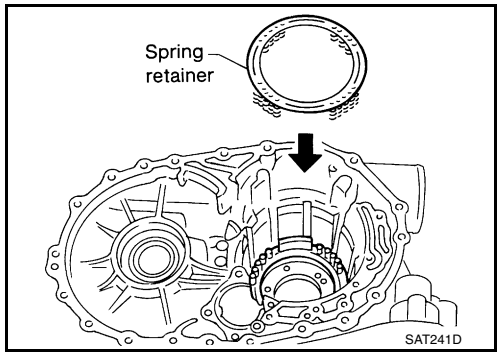


2. Stand transmission case.
3. Install piston assembly on transmission case while turning it slowly.
   - **Apply ATF to inner surface of transmission case.**

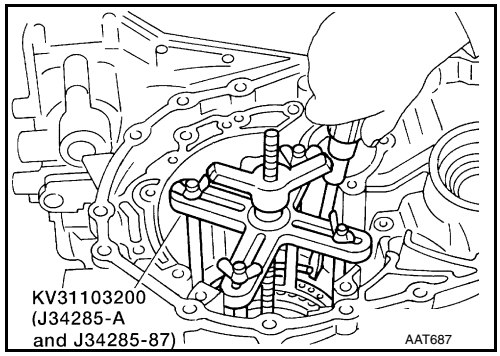


4. Install return springs and spring retainer on piston.

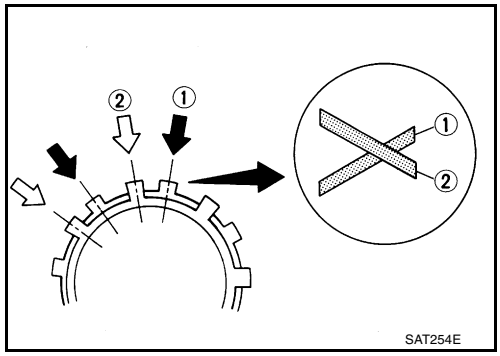
Return spring	**:Refer to AT-388, "Clutch and Brake Return Springs" .**



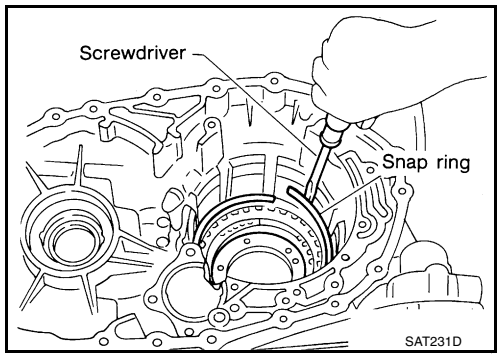
5. Install snap ring while compressing return springs.
   - **Set Tool directly above return springs.**



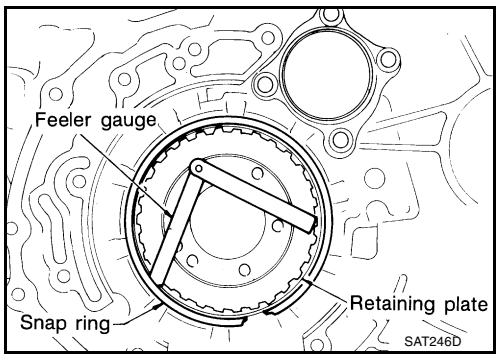
6. Install drive plates, driven plates, retaining plates and dished plates.
   - **Do not align the projections on the two dished plates.**
   - **Make sure to put the plates in the correct order and direction.**



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



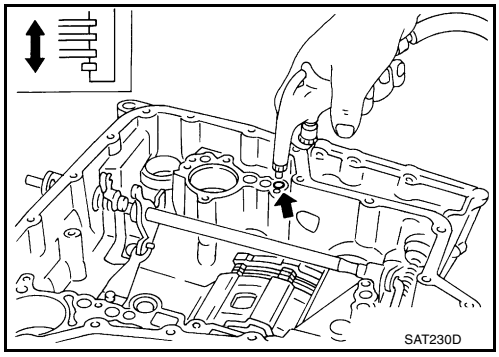
8. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate (front side).



Specified clearance

Standard	**: 1.4 - 1.8 mm (0.055 - 0.071 in)**
Allowable limit	**: 2.8 mm (0.110 in)**
Retaining plate	**: Refer to AT-387, "LOW & REVERSE BRAKE" .**

9. Check operation of low and reverse brake.
Refer to AT-332, "LOW & REVERSE BRAKE" .

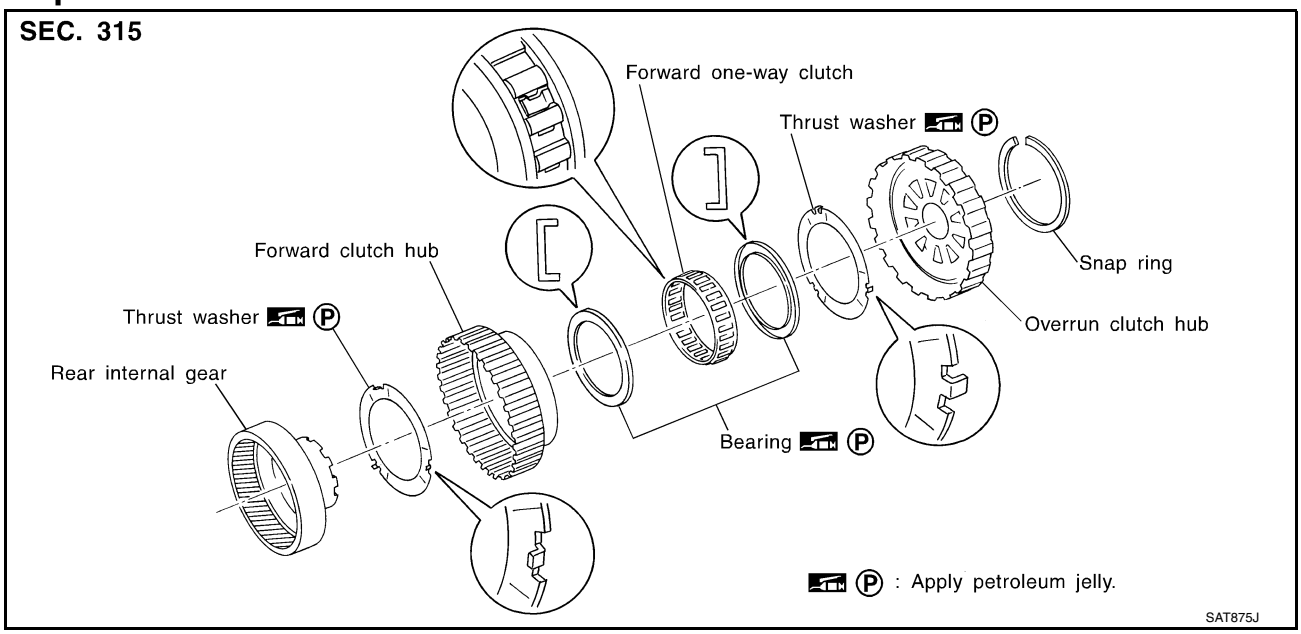


REAR INTERNAL GEAR, FORWARD CLUTCH HUB AND OVERRUN CLUTCH HUB

PFP:31450

Components

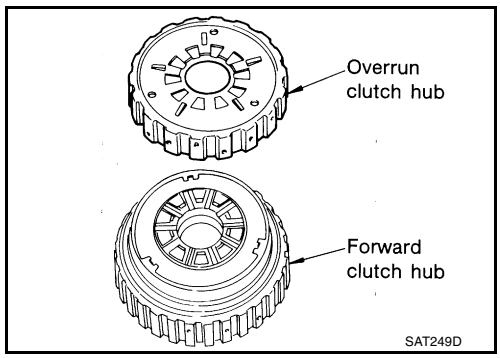
ECS0060R



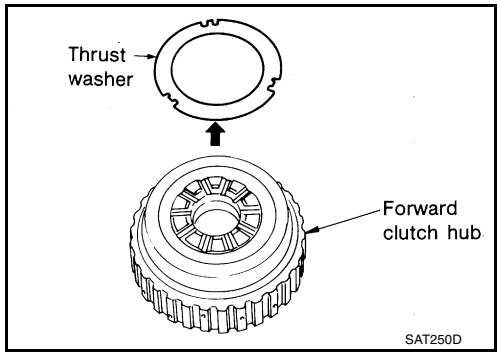
Disassembly

ECS0060S

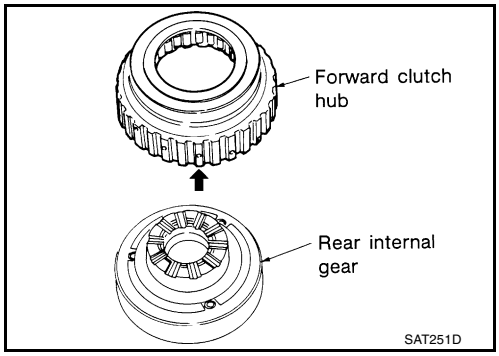
1. Remove snap ring from overrun clutch hub.
2. Remove overrun clutch hub from forward clutch hub.



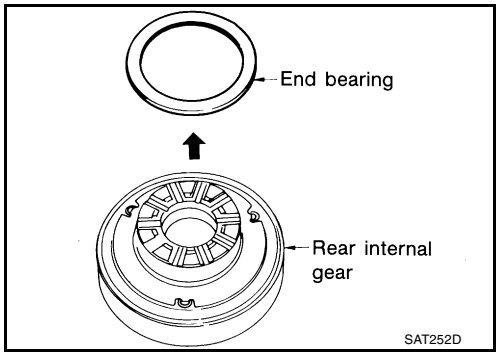
3. Remove thrust washer from forward clutch hub.



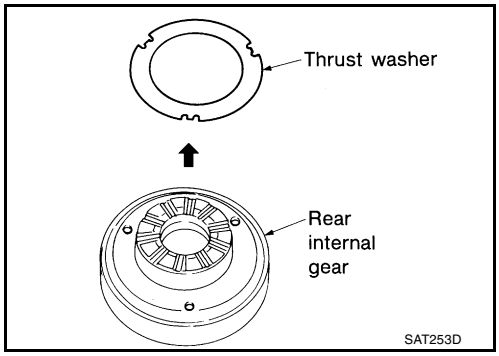
4. Remove forward clutch hub from rear internal gear.



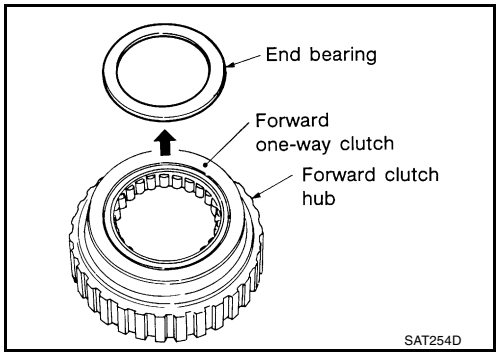
5. Remove end bearing from rear internal gear.



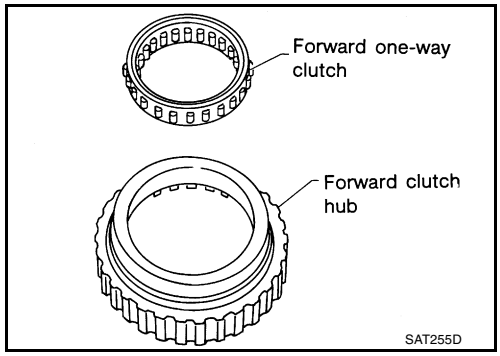
6. Remove thrust washer from rear internal gear.



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



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

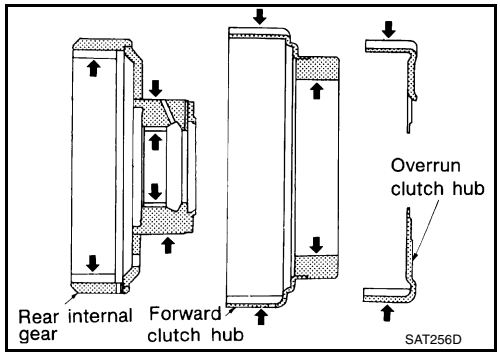


Inspection

ECS0060T

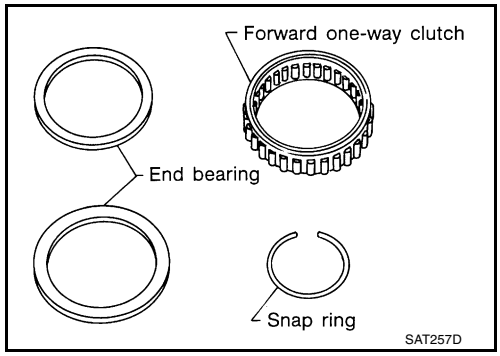
REAR INTERNAL GEAR, FORWARD CLUTCH HUB AND OVERRUN CLUTCH HUB

- Check rubbing surfaces for wear or damage.



SNAP RING, END BEARINGS AND FORWARD ONE-WAY CLUTCH

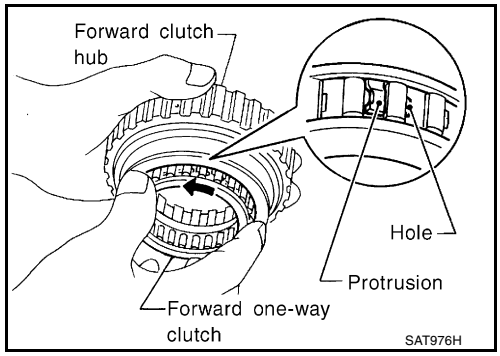
- Check snap ring and end bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.



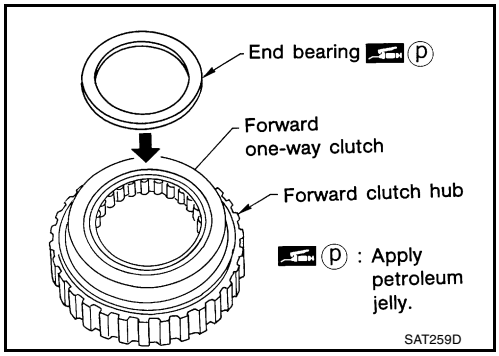
Assembly

ECS0060U

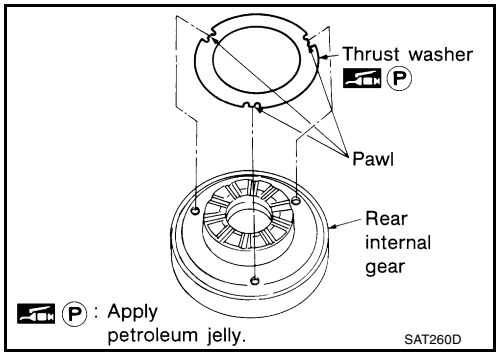
1. Install forward one-way clutch on forward clutch.
   - **Take care with the direction of forward one-way clutch.**



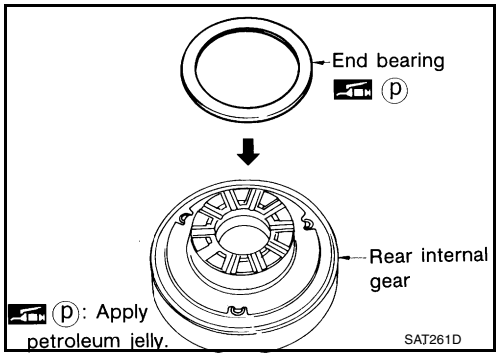
2. Install end bearing on forward one-way clutch.
   - **Apply petroleum jelly to end bearing.**



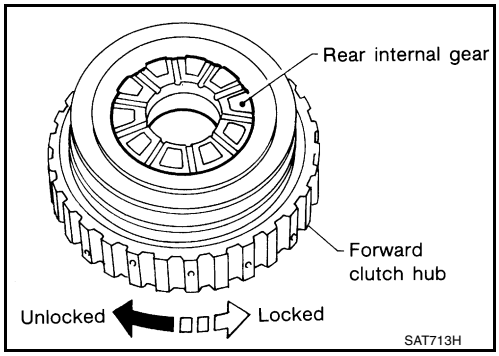
3. Install thrust washer on rear internal gear.
   - **Apply petroleum jelly to thrust washer.**
   - **Align pawls of thrust washer with holes of rear internal gear.**



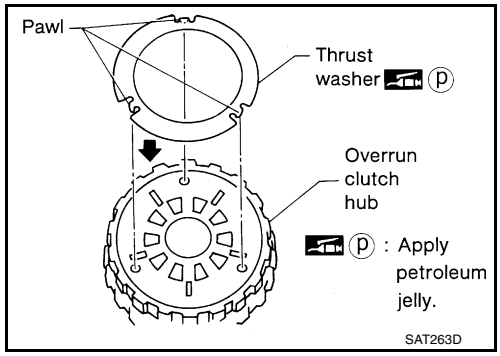
4. Install end bearing on rear internal gear.
   - **Apply petroleum jelly to end bearing.**



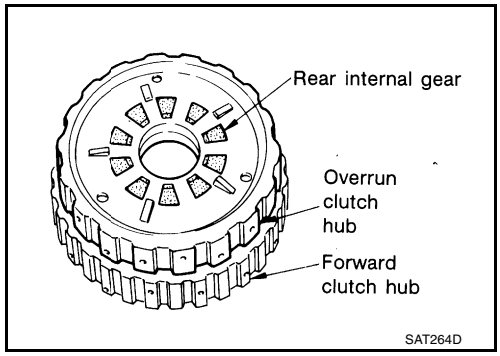
5. Install forward clutch hub on rear internal gear.
   - **Check operation of forward one-way clutch.**
     Hold rear internal gear and turn forward clutch hub. Check forward clutch hub for correct locking and unlocking directions.
   - **If not as shown in illustration, check installation direction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



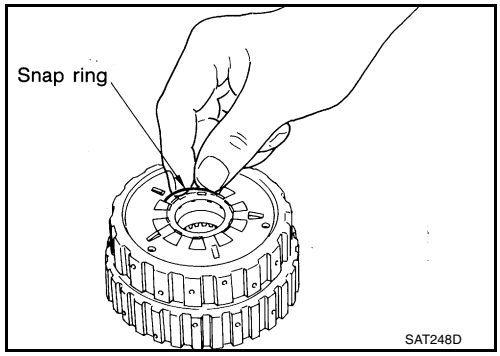
6. Install thrust washer and overrun clutch hub.
   - **Apply petroleum jelly to thrust washer.**
   - **Align pawls of thrust washer with holes of overrun clutch hub.**



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



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

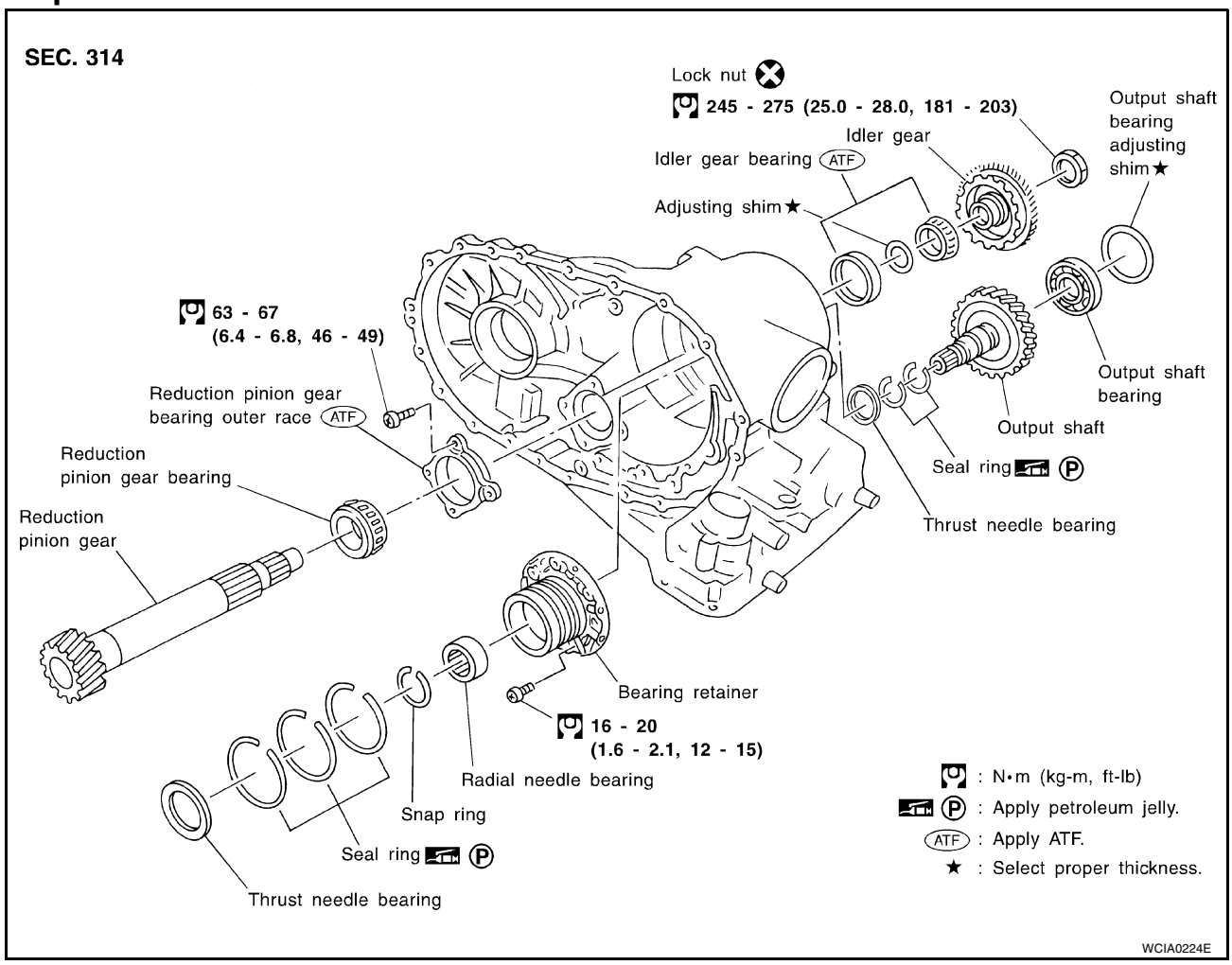


OUTPUT SHAFT, IDLER GEAR, REDUCTION PINION GEAR AND BEARING RETAINER

PFP:31480

Components

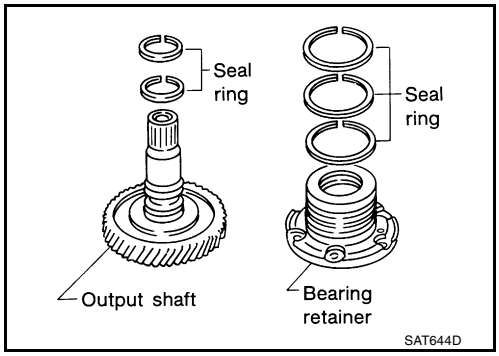
ECS0060V



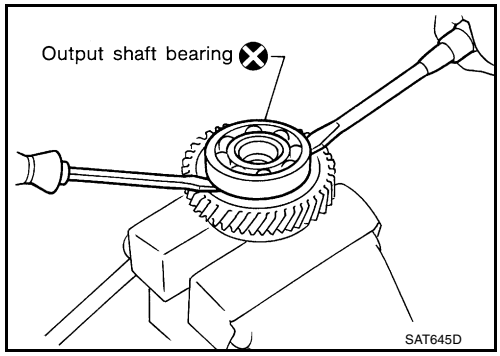
Disassembly

ECS0060W

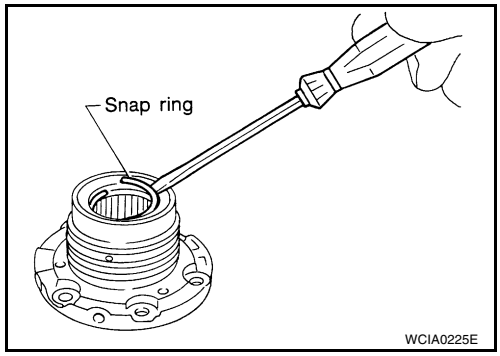
1. Remove seal rings from output shaft and bearing retainer.



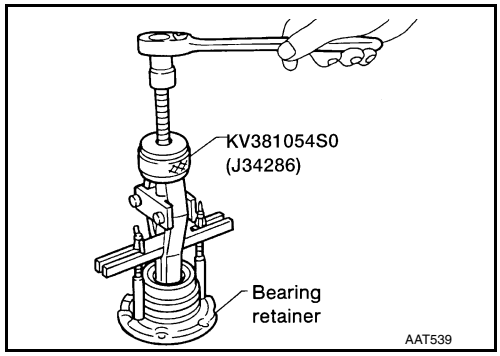
2. Remove output shaft bearing with screwdrivers.
   - **Always replace bearing with a new one when removed.**
   - **Do not damage output shaft.**



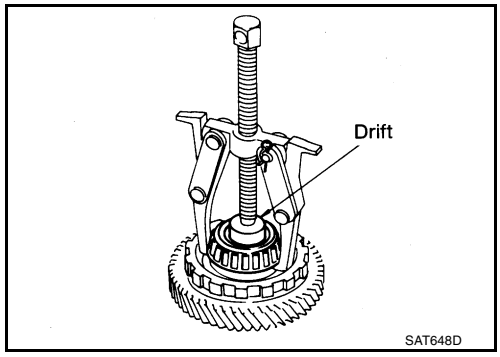
3. Remove snap ring from bearing retainer.
   - **Do not expand snap ring excessively.**



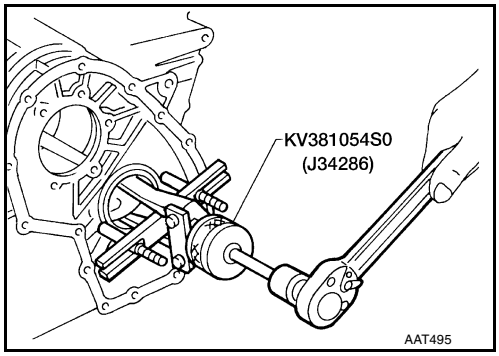
4. Remove needle bearing from bearing retainer.



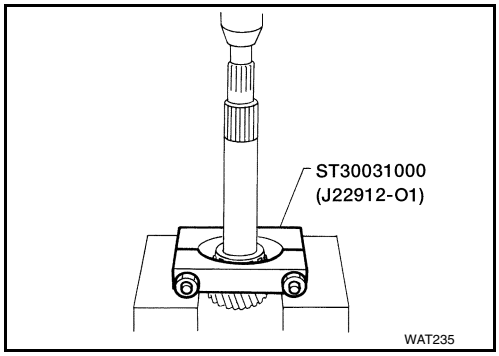
5. Remove idler gear bearing inner race from idler gear.



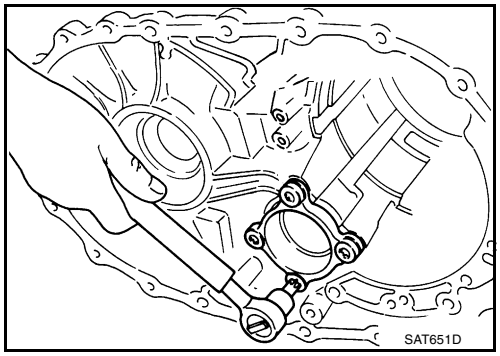
6. Remove idler gear bearing outer race from transmission case.



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



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



Inspection

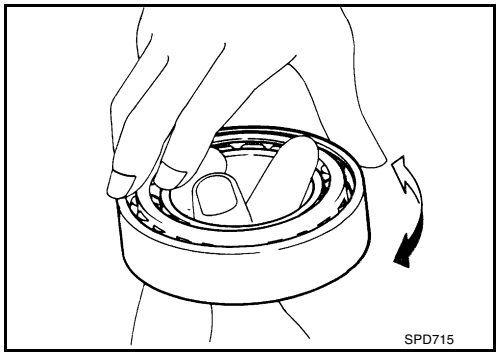
ECS0060X

OUTPUT SHAFT, IDLER GEAR AND REDUCTION PINION GEAR

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

BEARING

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



SEAL RING CLEARANCE

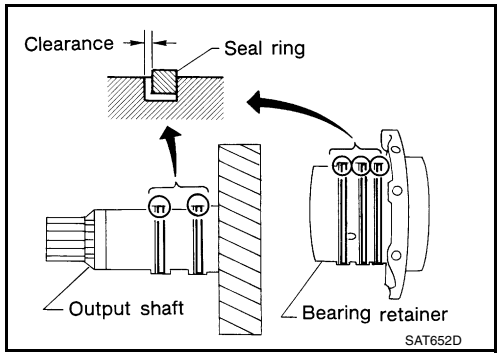
- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.

Standard clearance : 0.10 - 0.25 mm (0.0039 - 0.0098 in)
Allowable limit : 0.25 mm (0.0098 in)

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

Standard clearance : 0.10 - 0.25 mm (0.0039 - 0.0098 in)
Allowable limit : 0.25 mm (0.0098 in)

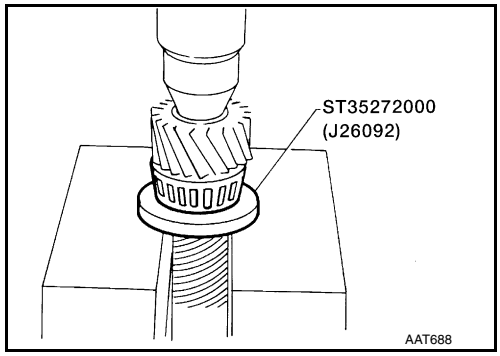
- If not within allowable limit, replace bearing retainer.



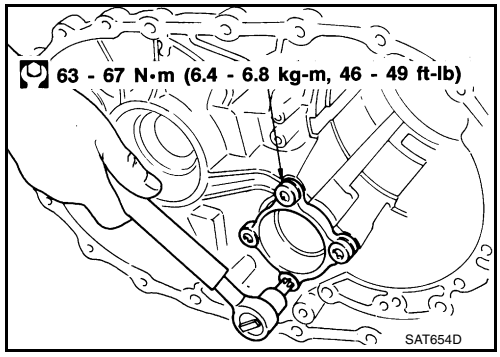
Assembly

ECS0060Y

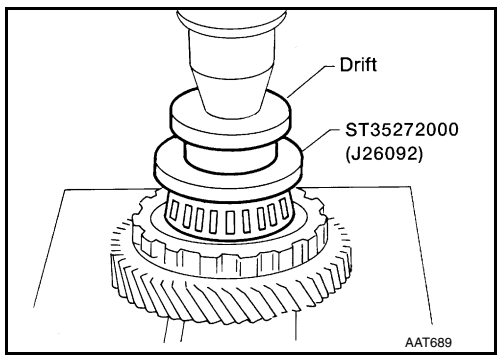
1. Press reduction pinion gear bearing on reduction pinion gear.



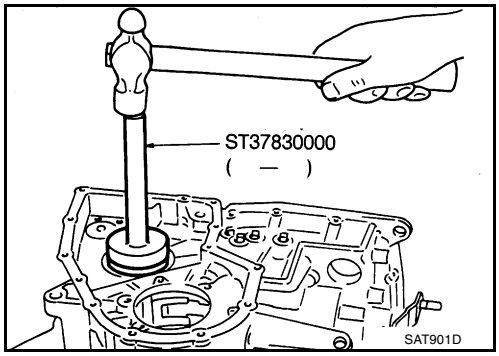
2. Install reduction pinion gear bearing outer race on transmission case.



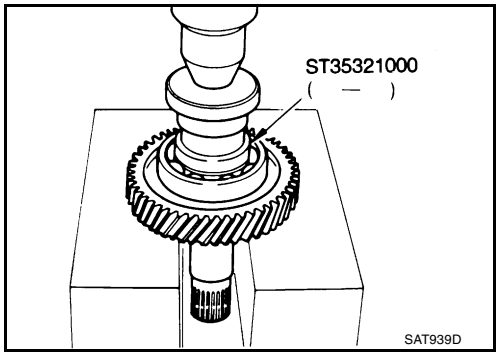
3. Press idler gear bearing inner race on idler gear.



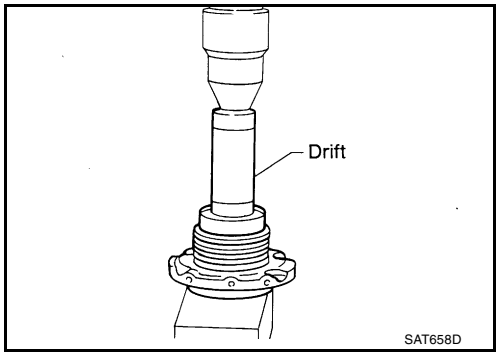
4. Install idler gear bearing outer race on transmission case.



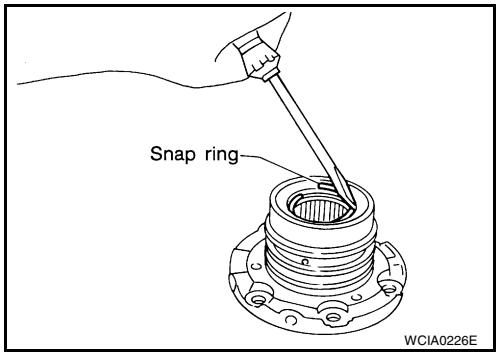
5. Press output shaft bearing on output shaft.



6. Press needle bearing on bearing retainer.

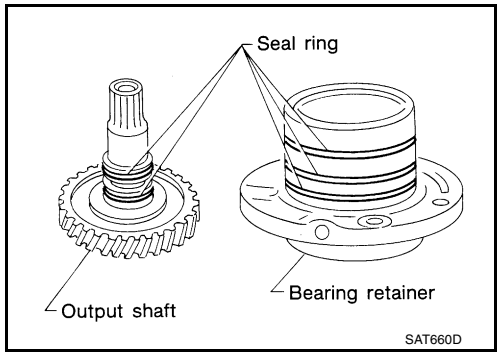


7. Install snap ring to bearing retainer.

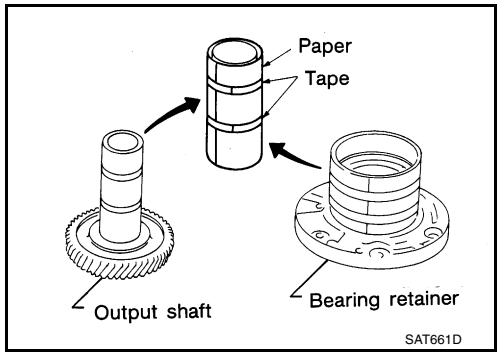


8. After packing ring grooves with petroleum jelly, carefully install new seal rings on output shaft and bearing retainer.

   NOTE:
   Do not align gaps in seal rings.



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

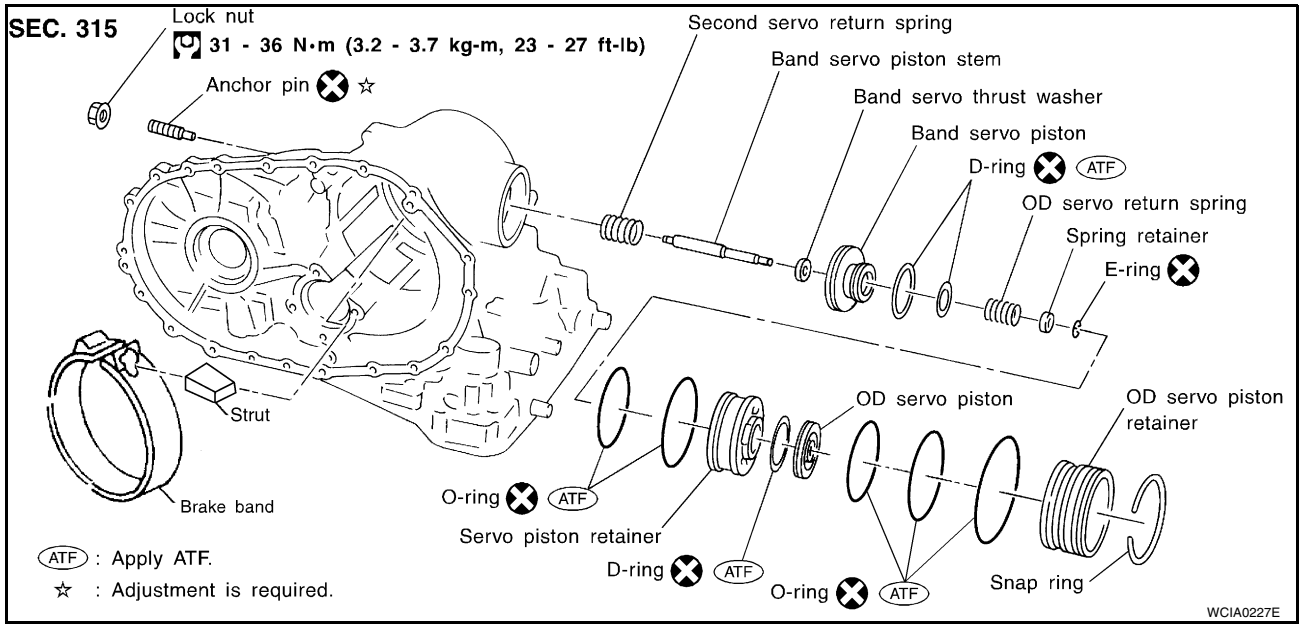


BAND SERVO PISTON ASSEMBLY

PFP:31615

Components

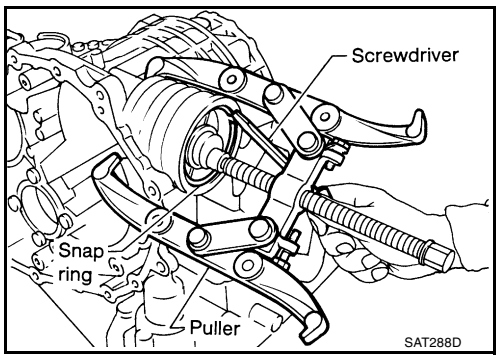
ECS0060Z



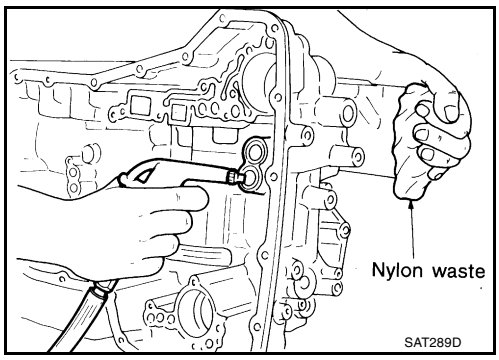
Disassembly

ECS00610

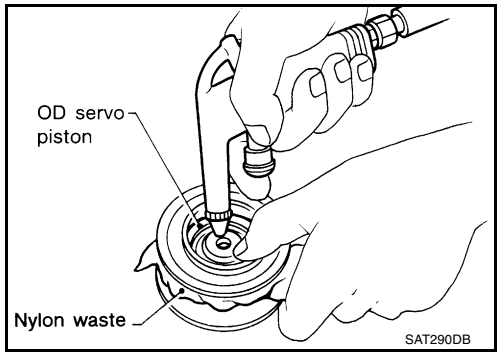
1. Remove band servo piston snap ring.



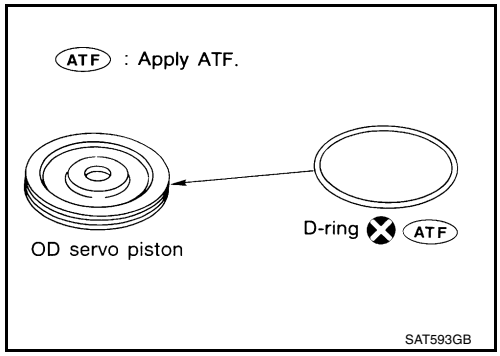
2. Apply compressed air to oil hole in transmission case to remove OD servo piston retainer and band servo piston assembly.
   - **Hold band servo piston assembly with a rag or nylon waste.**



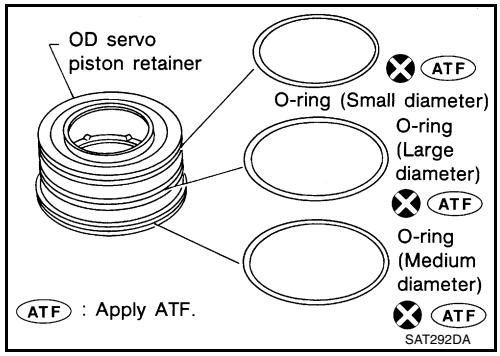
3. Apply compressed air to oil hole in OD servo piston retainer to remove OD servo piston from retainer.
   - **Hold OD servo piston while applying compressed air.**



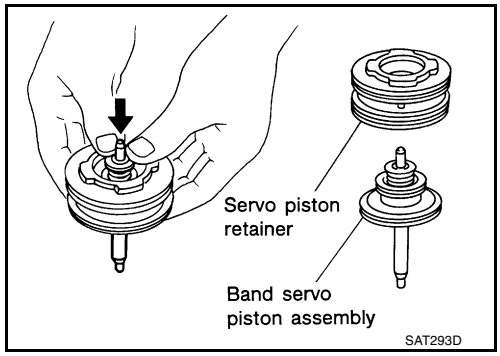
4. Remove D-ring from OD servo piston.



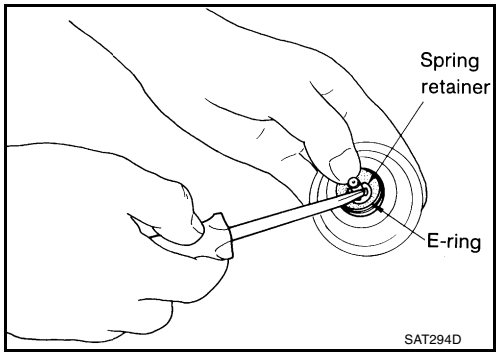
5. Remove O-rings from OD servo piston retainer.



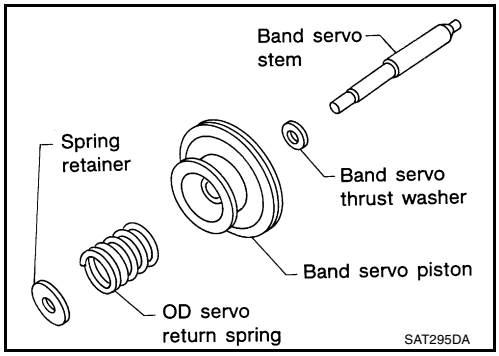
6. Remove band servo piston assembly from servo piston retainer by pushing it forward.



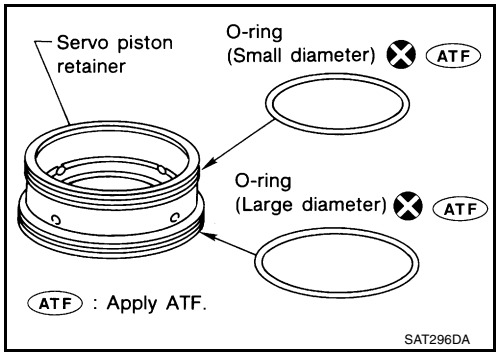
7. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.



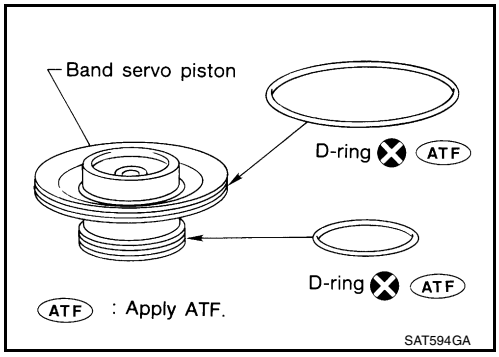
8. Remove OD servo return spring, band servo thrust washer and band servo piston stem from band servo piston.



9. Remove O-rings from servo piston retainer.



10. Remove D-rings from band servo piston.

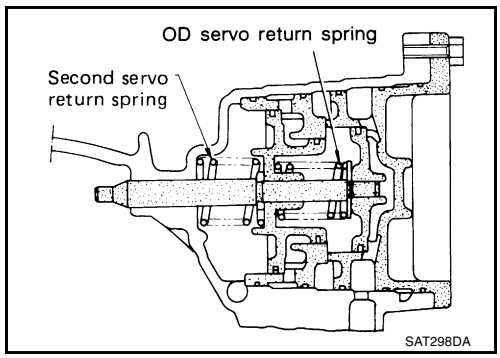


Inspection

ECS00611

PISTONS, RETAINERS AND PISTON STEM

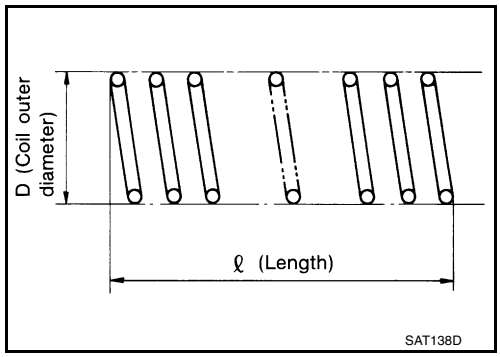
- Check frictional surfaces for abnormal wear or damage.



RETURN SPRINGS

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

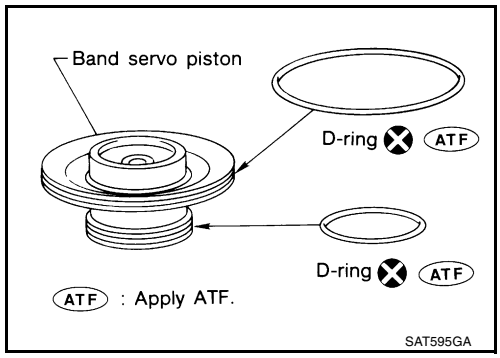
Band servo inspection standard : Refer to AT-393, "RETURN SPRING" .



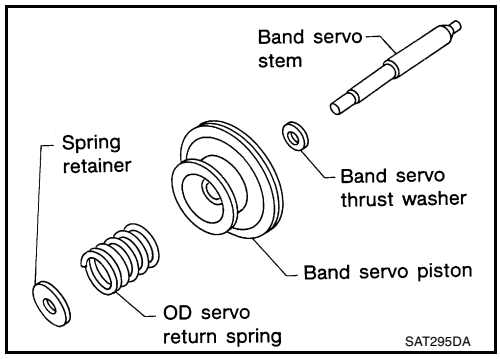
Assembly

ECS00612

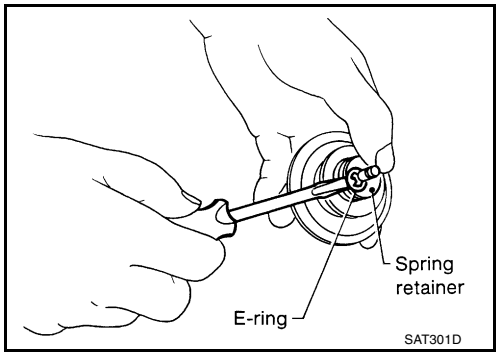
1. Install D-rings to band servo piston retainer.
   - **Apply ATF to D-rings.**
   - **Pay attention to position of each D-ring.**



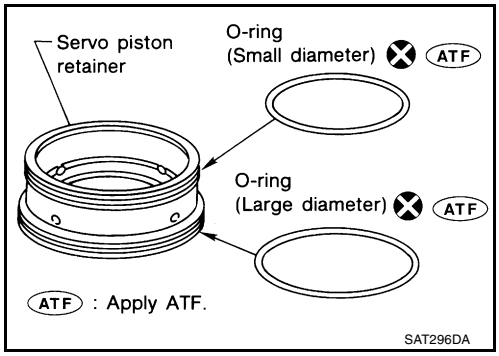
2. Install band servo piston stem, band servo thrust washer, OD servo return spring and spring retainer to band servo piston.



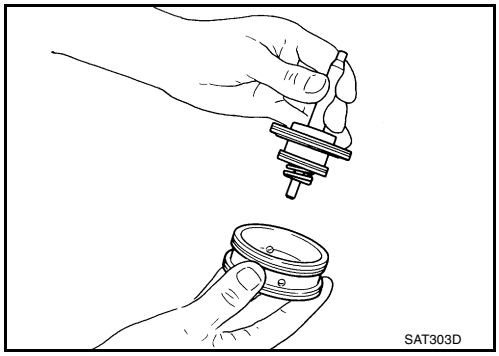
3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



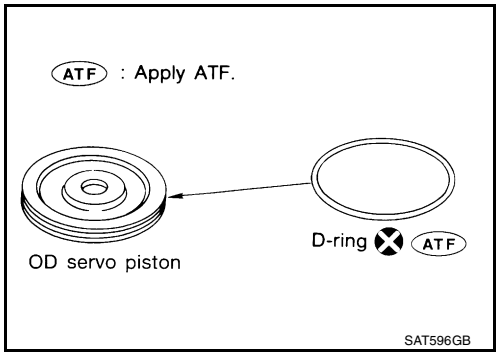
4. Install O-rings to servo piston retainer.
   - **Apply ATF to O-rings.**
   - **Pay attention to the positions of the O-rings.**



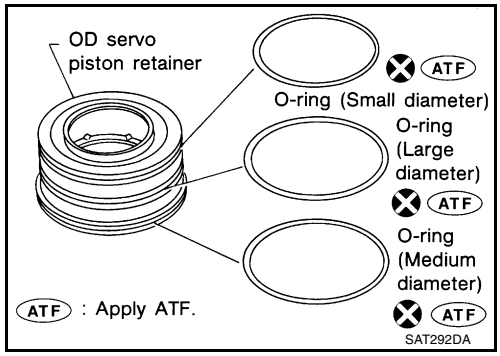
5. Install band servo piston assembly to servo piston retainer by pushing it inward.



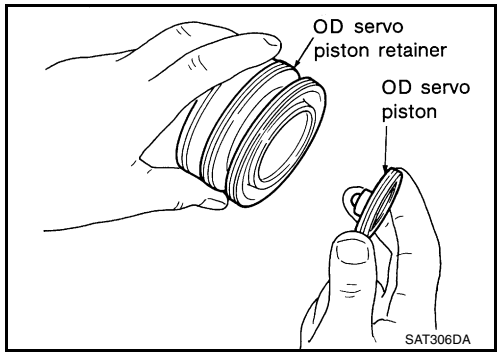
6. Install D-ring to OD servo piston.
   - **Apply ATF to D-ring.**



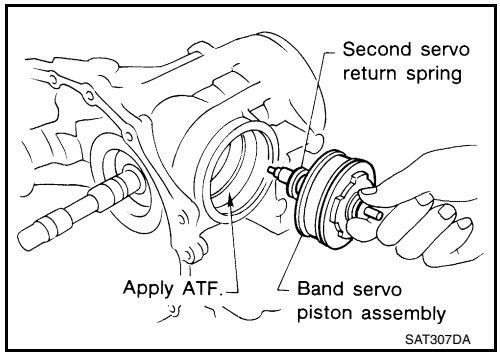
7. Install O-rings to OD servo piston retainer.
   - **Apply ATF to O-rings.**
   - **Pay attention to the positions of the O-rings.**



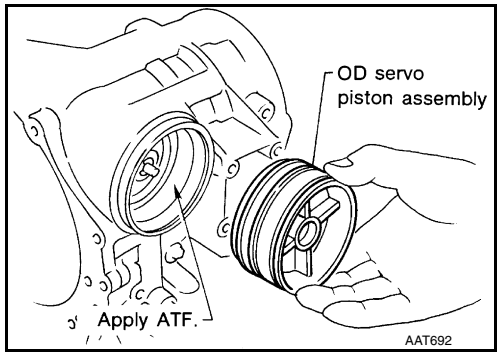
8. Install OD servo piston to OD servo piston retainer.



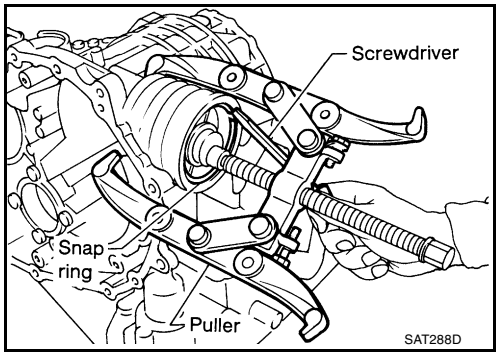
9. Install band servo piston assembly and 2nd servo return spring to transmission case.
   - **Apply ATF to O-ring of band servo piston and transmission case.**



10. Install OD servo piston assembly to transmission case.
    - **Apply ATF to O-ring of band servo piston and transmission case.**



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

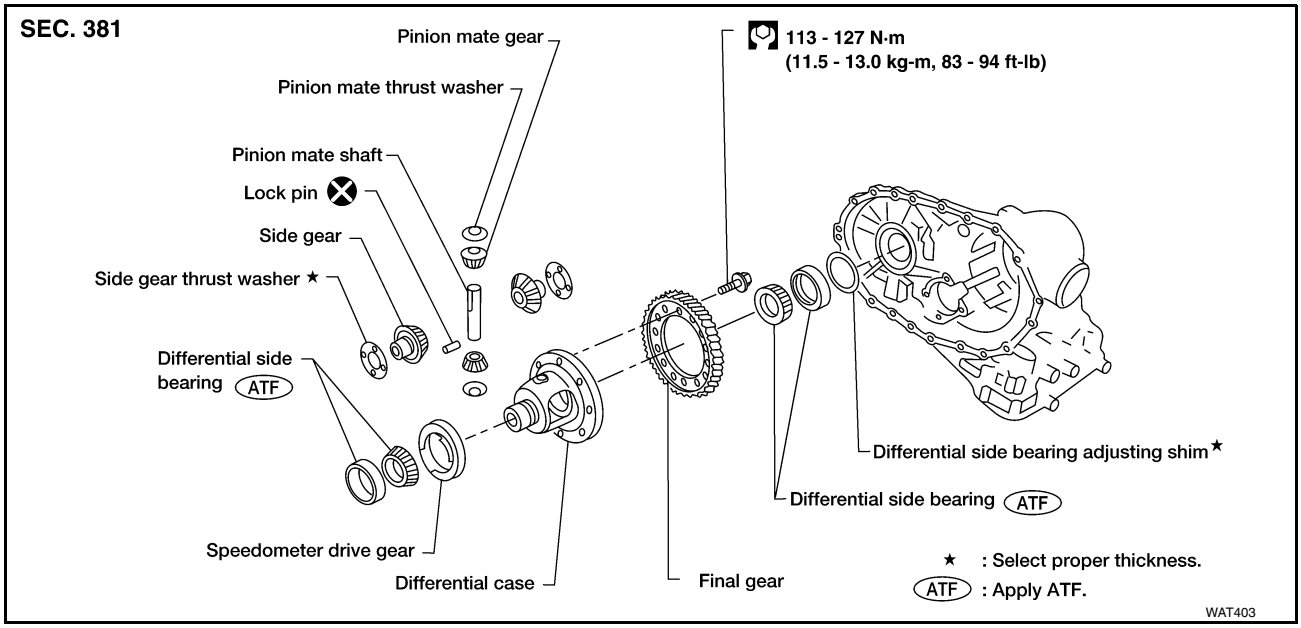


FINAL DRIVE

PFP:38411

Components

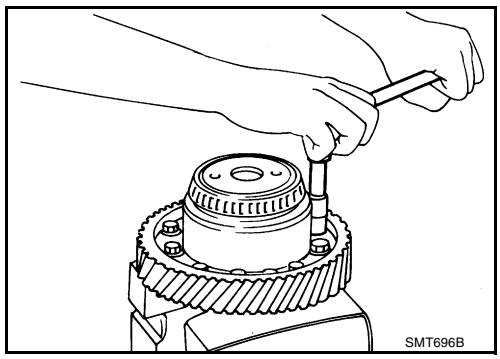
ECS00613



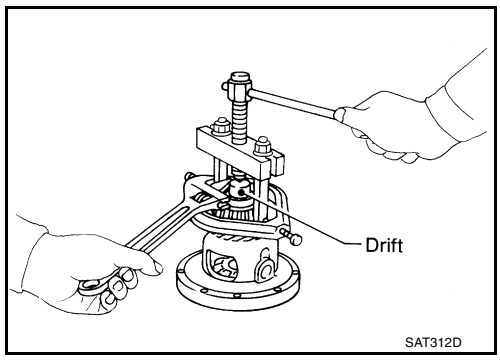
Disassembly

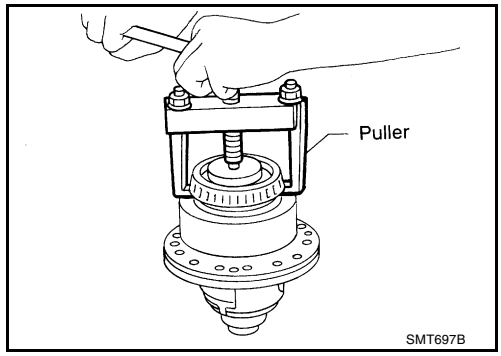
ECS00614

1. Remove final gear.

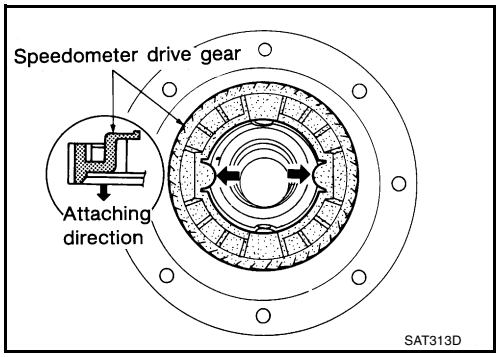


2. Press out differential side bearings.

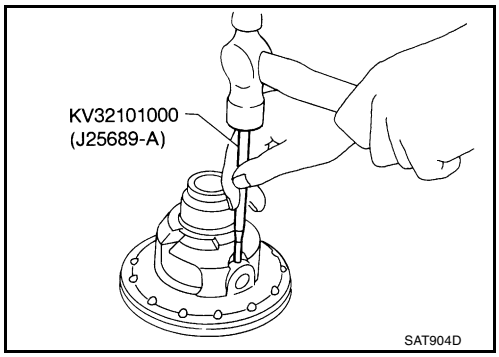




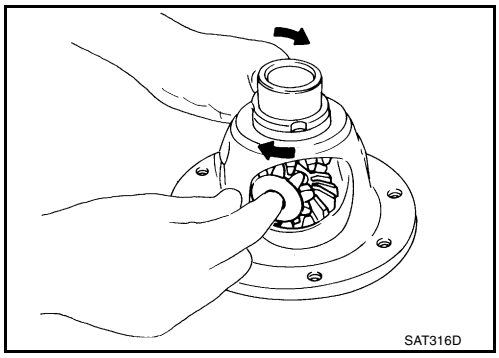
3. Remove speedometer drive gear.



4. Drive out pinion mate shaft lock pin.



5. Draw out pinion mate shaft from differential case.
6. Remove pinion mate gears and side gears.

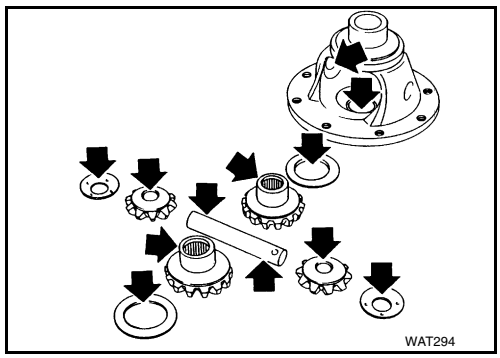


Inspection

ECS00615

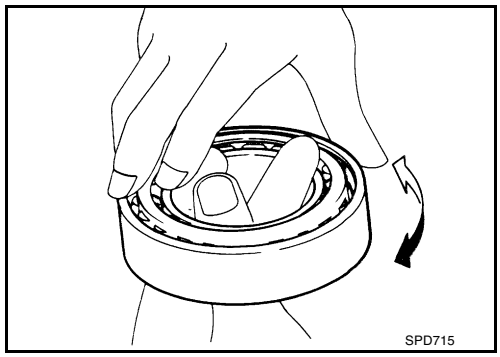
GEAR, WASHER, SHAFT AND CASE

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



BEARINGS

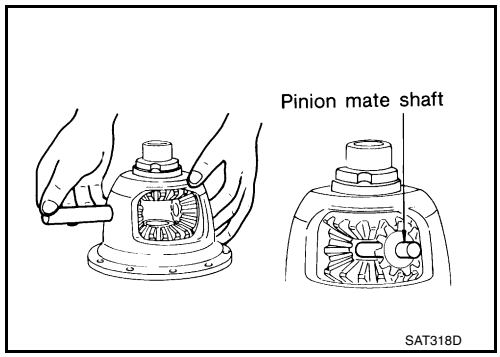
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**



Assembly

ECS00616

1. Install side gear and thrust washers in differential case.
2. Install pinion mate gears and thrust washers in differential case while rotating them.
   - **When inserting, be careful not to damage pinion mate gear washers.**
   - **Apply ATF to any parts.**

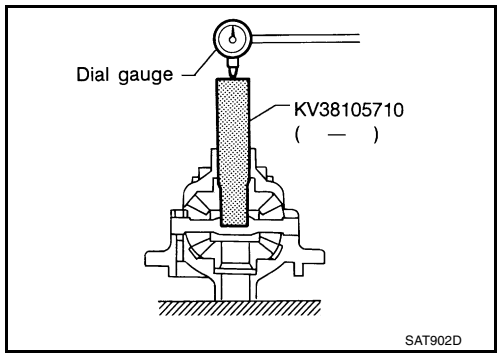


3. Measure clearance between side gear and differential case with washers using the following procedure.

a. Set Tool and dial indicator on side gear.

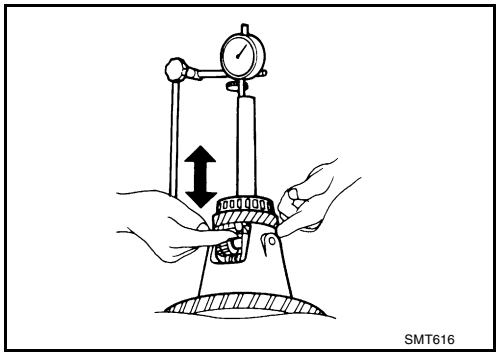
b. Move side gear up and down to measure dial indicator deflection. Always measure indicator deflection on both side gears.

Clearance between side gear and differential case with washers : 0.1 - 0.2 mm (0.004 - 0.008 in)

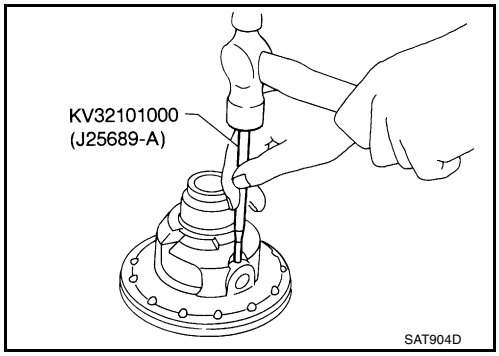


c. If not within specification adjust clearance by changing thickness of side gear thrust washers.

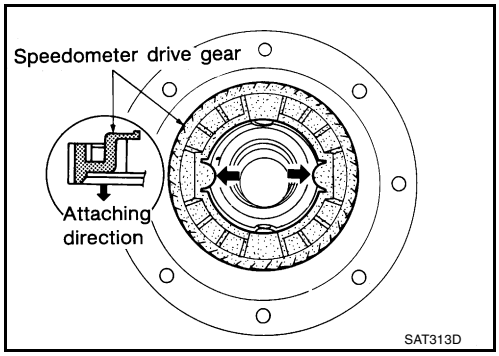
Side gear thrust washer	**: Refer to AT-389, "DIFFERENTIAL SIDE GEAR THRUST WASHERS" .**



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

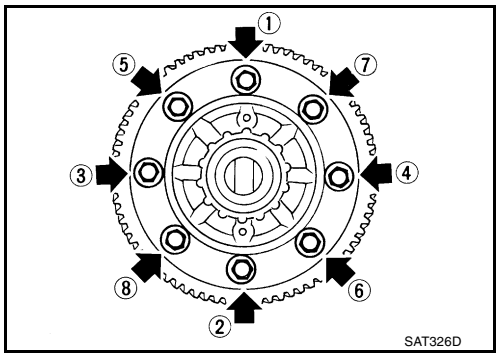


5. Install speedometer drive gear on differential case.
   - **Align the projection of speedometer drive gear with the groove of differential case.**

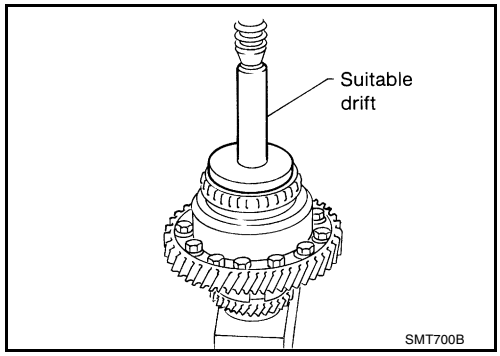


6. Install final gear and tighten fixing bolts in numerical order.

   : 113 - 127 N·m (11.5 - 13.0 kg-m, 83 - 94 ft-lb)



7. Press on differential side bearings.



ASSEMBLY

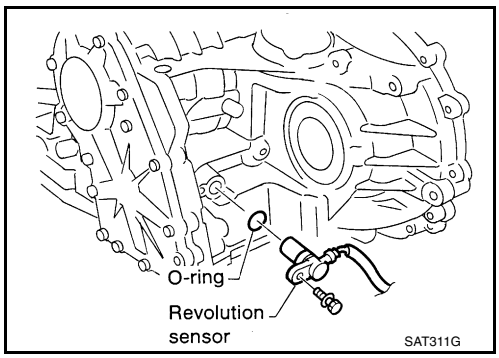
PFP:00000

Assembly (1)

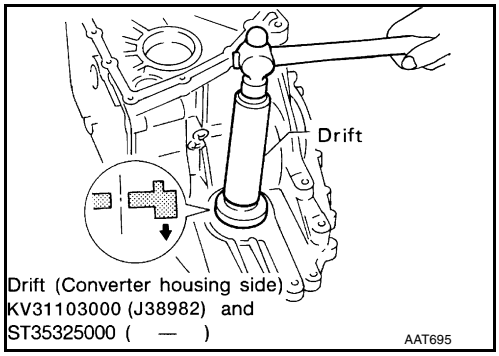
ECS00617

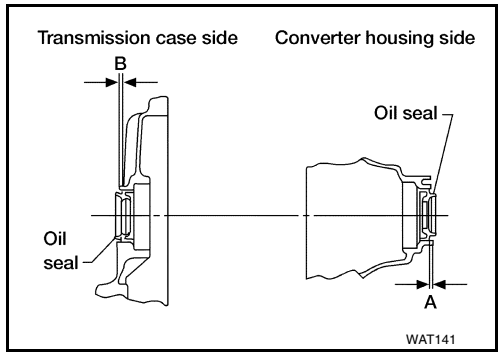
1. Install revolution sensor onto transmission case.

Always use new sealing parts.



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

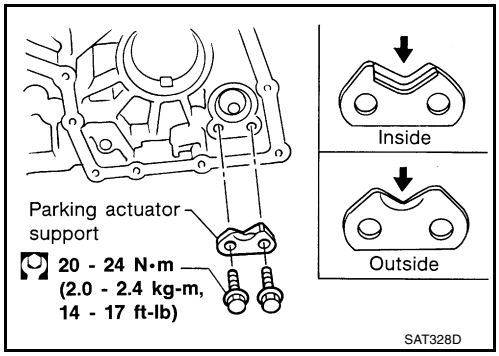




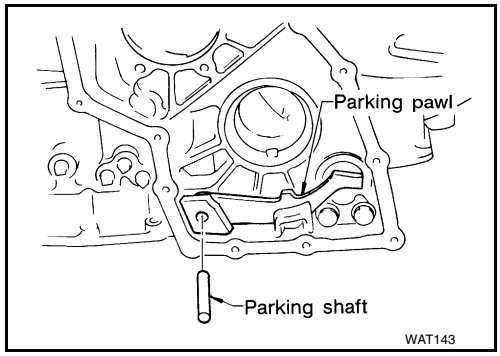
Unit: mm (in)

A	B
5.5 - 6.5 (0.217 - 0.256)	–0.5 to 0.5 (–0.020 to 0.020)

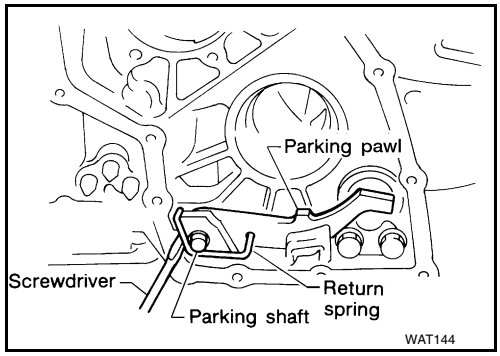
3. Install parking actuator support to transmission case.
   - **Pay attention to direction of parking actuator support.**



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



5. Install return spring.

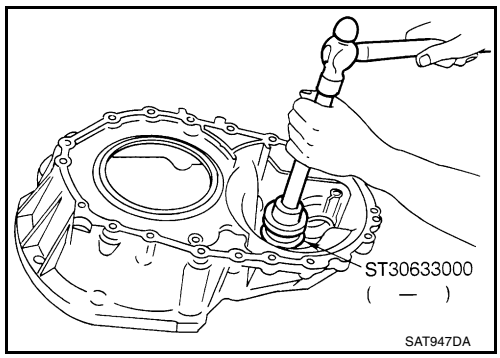


Adjustment (1)

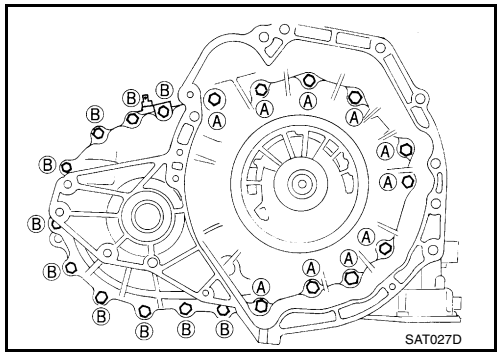
ECS00618

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.



3. Place final drive assembly on transmission case.
4. Install transmission case on converter housing. Tighten transmission case fixing bolts **A** and **B** to the specified torque.

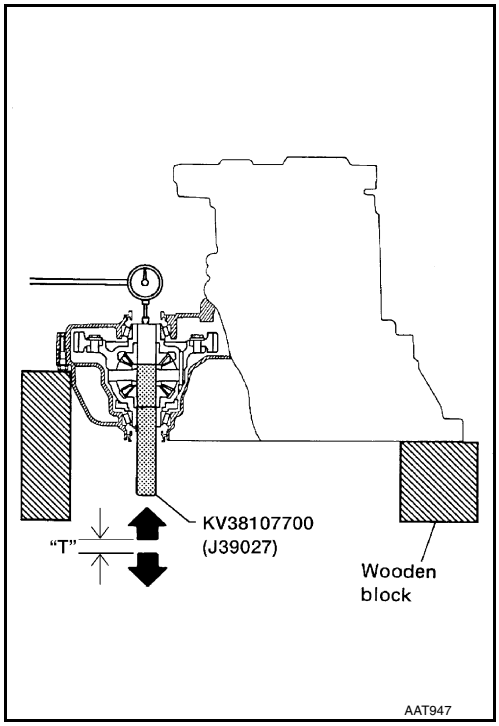


5. Attach dial indicator on differential case at transmission case side.
6. Insert Tool into differential side gear from converter housing.
7. Move Tool up and down and measure dial indicator deflection.

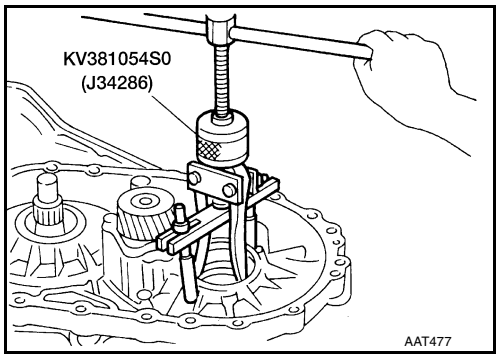
Differential side bearing preload "T" : **0.04 - 0.09 mm (0.0016 - 0.0035 in)**

8. Select proper thickness of differential side bearing adjusting shim(s) using SDS table as a guide.

Differential side bearing adjusting shim : **Refer to AT-389, "DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS" .**



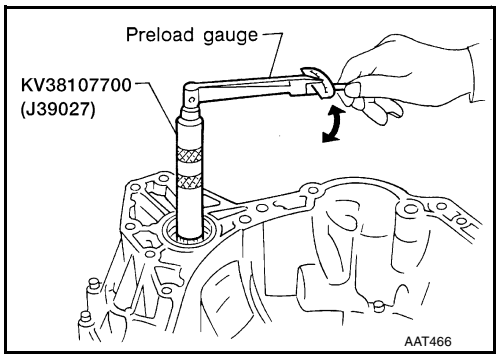
9. Remove converter housing from transmission case.
10. Remove final drive assembly from transmission case.
11. Remove differential side bearing outer race from transmission case.
12. Reinstall differential side bearing outer race and shim(s) selected from SDS table on transmission case.
13. Reinstall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



14. Insert Tool into differential case and measure turning torque of final drive assembly.
    - **Turn final drive assembly in both directions several times to seat bearing rollers correctly.**

Turning torque of final drive assembly (New bearing) : **0.49 - 1.08 N·m (5.0 - 11.0 kg-cm, 4.3 - 9.5 in-lb)**

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

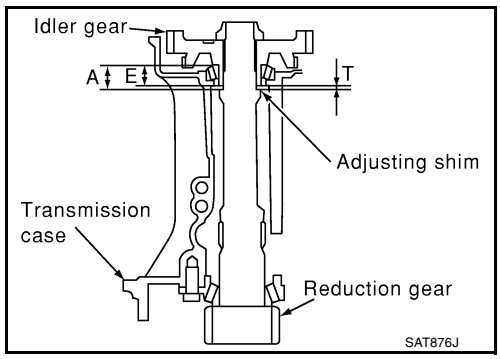


REDUCTION PINION GEAR BEARING PRELOAD

- Be sure to remove final drive assembly before doing this procedure.
- Using caliper and straightedge, calculate a dimension “T” (adjuster shim thickness) using the following formula. Adjust the inspection standard for preload (rotating slide torque) as shown below.

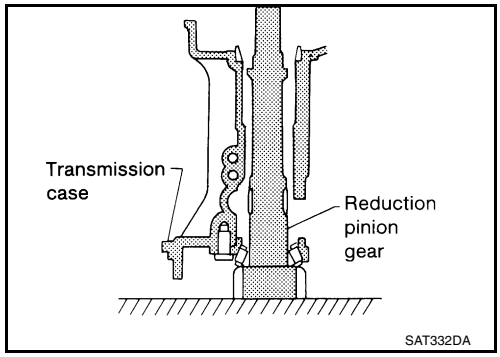
T = A – E

Inspection standard for preload **:0.1 - 0.69 N·m (1.1 - 7.0 kg-cm, 0.95 - 6.08 in-lb)**



1. Remove transmission case and final drive assembly from converter housing.
2. Select proper thickness of reduction pinion gear bearing adjusting shim using the following procedures.

a. Place reduction pinion gear on transmission case as shown.

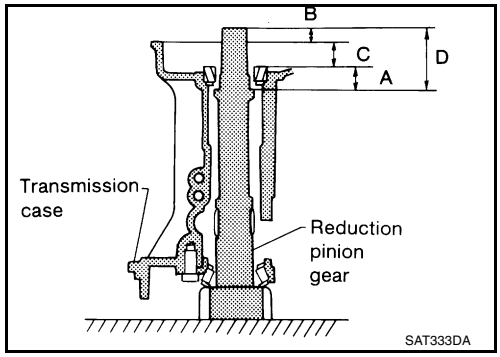


b. Place idler gear bearing on transmission case.

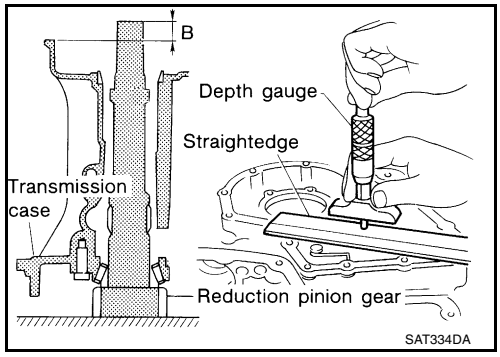
c. Measure dimensions “B”, “C” and “D” and calculate dimension “A”.

A = D – (B + C)

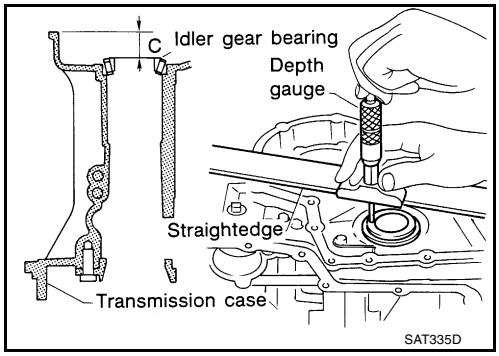
“A” **: Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction pinion gear.**



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

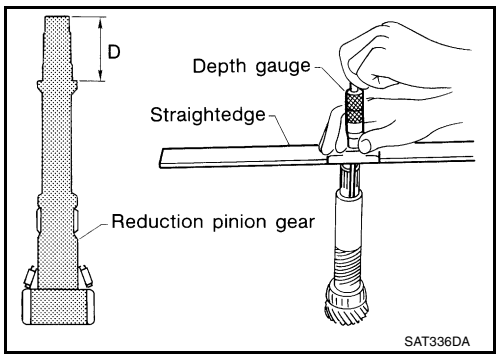


- Measure dimension “C” between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension “C” in at least two places.**



- Measure dimension “D” between the end of reduction pinion gear and the adjusting shim mating surface of reduction pinion gear.
- **Measure dimension “D” in at least two places.**
- Calculate dimension “A”.

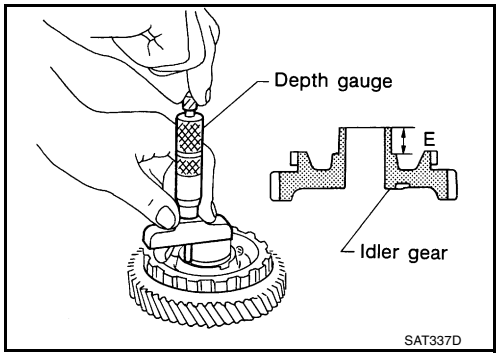
A = D – (B + C)



d. Measure dimension “E” between the end of idler gear and the idler gear bearing inner race mating surface of idler gear.
   - **Measure dimension “E” in at least two places.**
e. Calculate “T” and select proper thickness of reduction pinion gear bearing adjusting shim using SDS table as a guide.

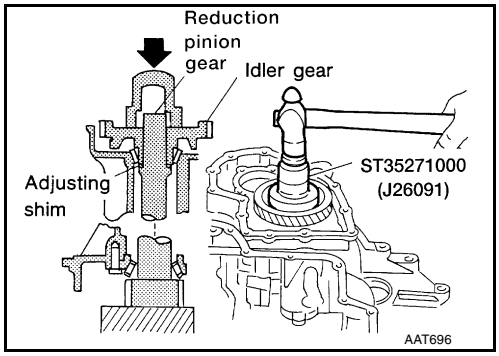
T = A – E – 0.05 mm (0.0020 in)*

Reduction pinion gear bearing adjusting shim	**: Refer to AT-391, "REDUCTION PINION GEAR BEARING ADJUSTING SHIMS" .**

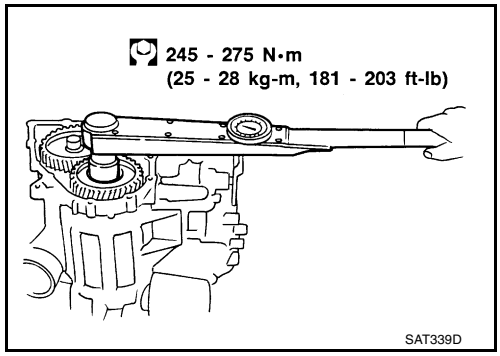


*: Bearing preload

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

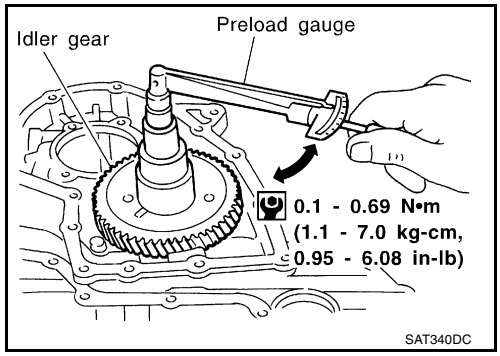


6. Tighten idler gear lock nut to the specified torque.
   - **Lock idler gear with parking pawl when tightening lock nut.**



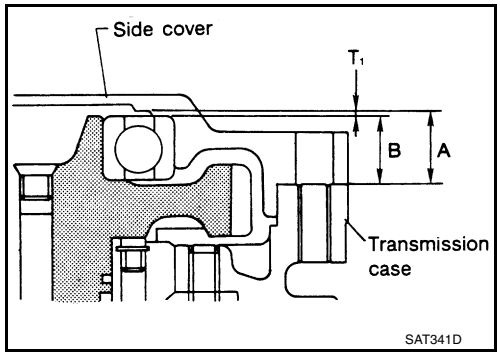
7. Measure turning torque of reduction pinion gear.
   - **When measuring turning torque, turn reduction pinion gear in both directions several times to seat bearing rollers correctly.**

Turning torque of reduction pinion gear	**: 0.1 - 0.69 N·m (1.1 - 7.0 kg-cm, 0.95 - 6.08 in-lb)**

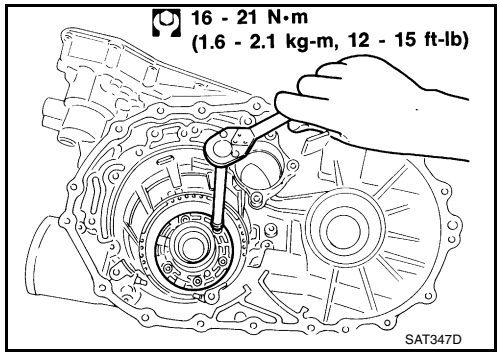


OUTPUT SHAFT END PLAY

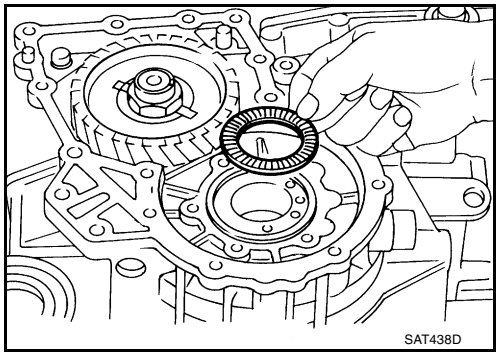
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



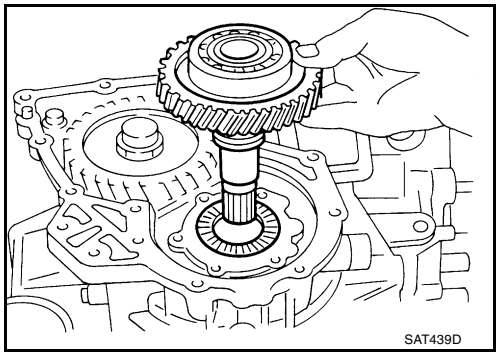
1. Install bearing retainer for output shaft.



2. Install output shaft thrust needle bearing on bearing retainer.



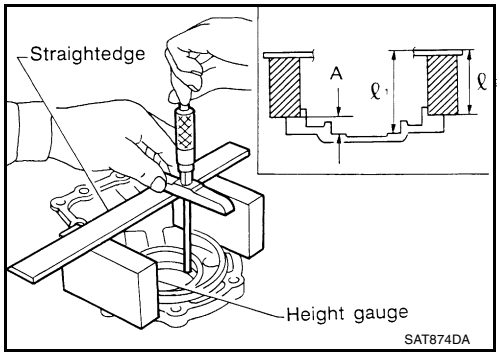
3. Install output shaft on transmission case.



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**

   $A = l_1 - l_2$

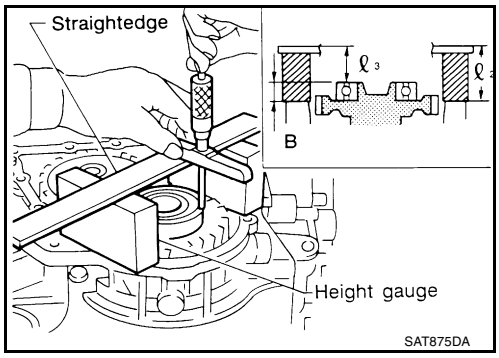
   l_2 : Height of gauge



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

   $B = l_2 - l_3$

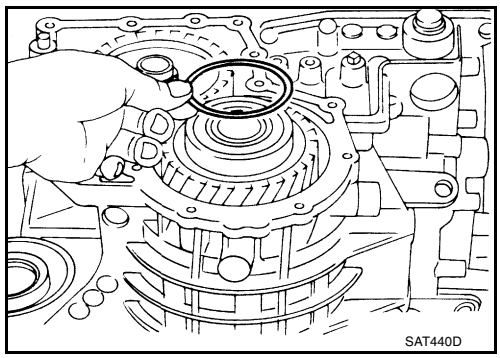
   l_2 : Height of gauge



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

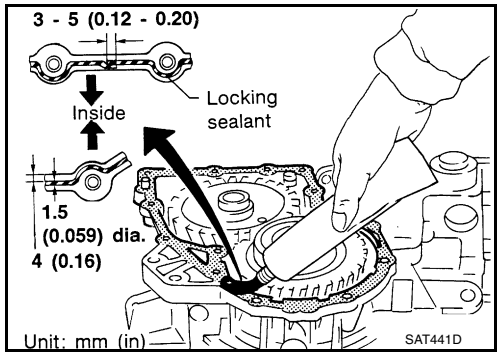
Output shaft end play (A – B) : 0 - 0.5 mm (0 - 0.020 in)

Output shaft end play adjusting shim : Refer to AT-392, "OUTPUT SHAFT END PLAY ADJUSTING SHIMS" .

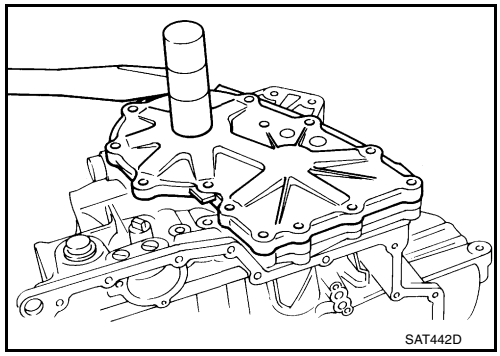


7. Install adjusting shim on output shaft bearing.

8. Apply locking sealant (Loctite 5/8 or equivalent) to transmission case as shown in illustration.



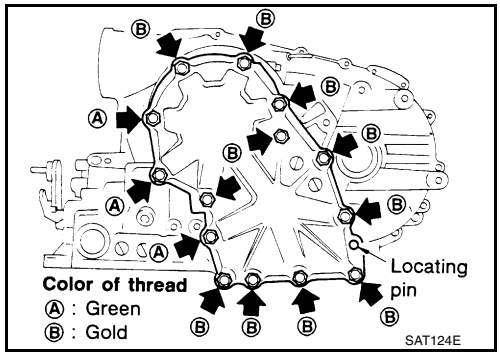
9. Install side cover on transmission case.
   - **Apply locking sealant to the mating surface of transmission case.**



10. Tighten side cover fixing bolts to specified torque.

: 26 - 30 N·m (2.7 - 3.1 kg-m, 20 - 22 ft-lb)

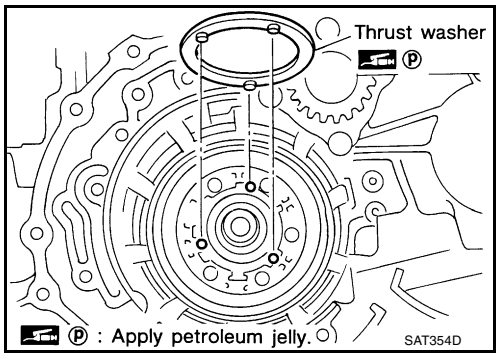
- **Do not mix bolts A and B.**
- **Always replace bolts A as they are self-sealing bolts.**



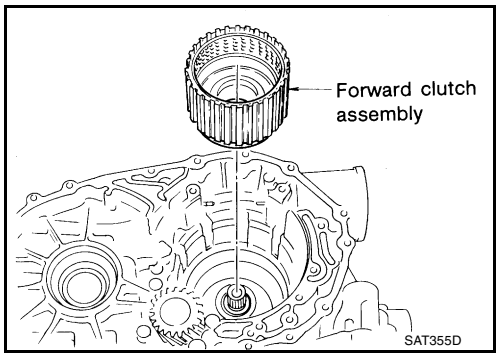
Assembly (2)

ECS00619

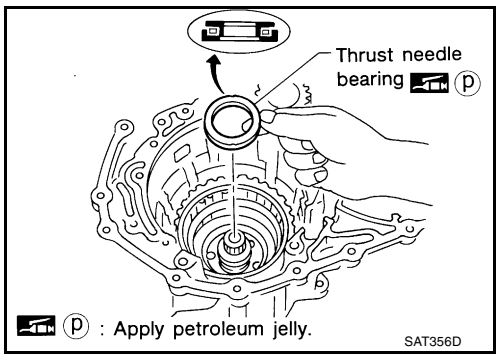
1. Remove paper rolled around bearing retainer.
2. Install thrust washer on bearing retainer.
   - **Apply petroleum jelly to thrust washer.**



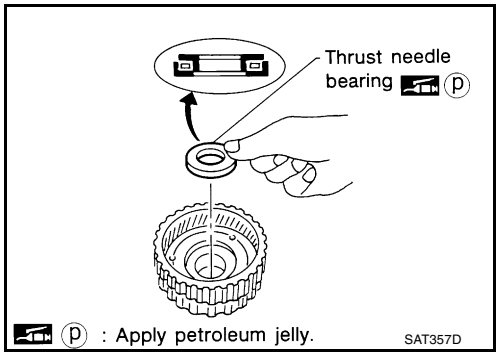
3. Install forward clutch assembly.
   - **Align teeth of low & reverse brake drive plates before installing.**
   - **Make sure that bearing retainer seal rings are not spread.**



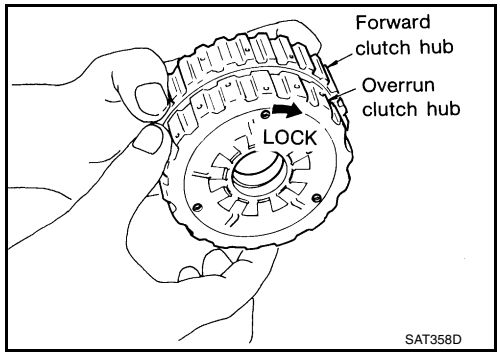
4. Install thrust needle bearing on bearing retainer.
   - **Apply petroleum jelly to thrust bearing.**
   - **Pay attention to direction of thrust needle bearing.**



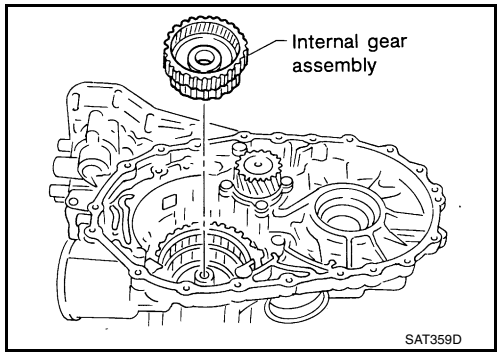
5. Install thrust needle bearing on rear internal gear.
   - **Apply petroleum jelly to thrust needle bearing.**
   - **Pay attention to direction of thrust needle bearing.**



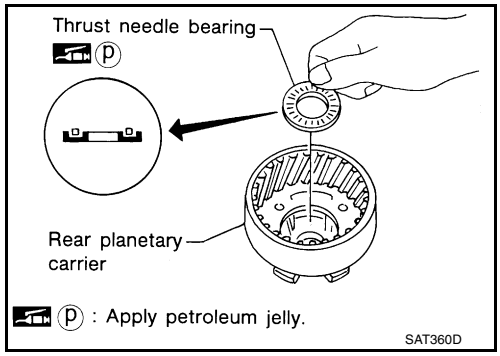
6. Hold forward clutch hub and turn overrun clutch hub.
   Check overrun clutch hub for directions of lock and unlock.
   - If not as shown in illustration, check installed direction of forward one-way clutch.



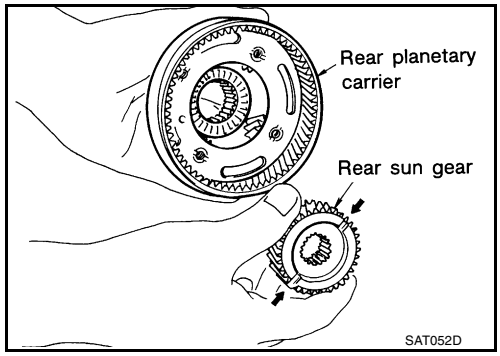
7. Install rear internal gear assembly.
   - **Align teeth of forward clutch and overrun clutch drive plate.**



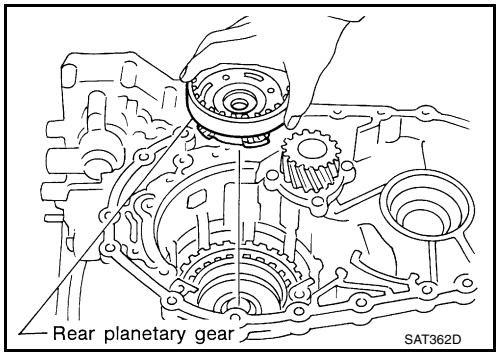
8. Install needle bearing on rear planetary carrier.
   - **Apply petroleum jelly to needle bearing.**
   - **Pay attention to direction of needle bearing.**



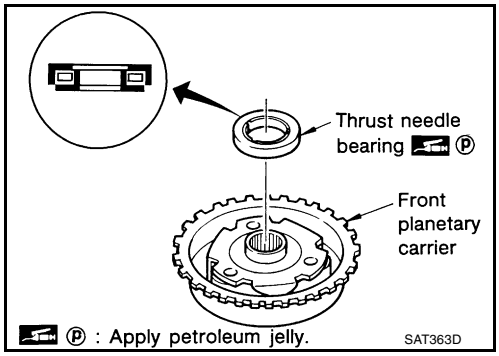
9. Install rear sun gear on rear planetary carrier.
   - **Pay attention to direction of rear sun gear.**



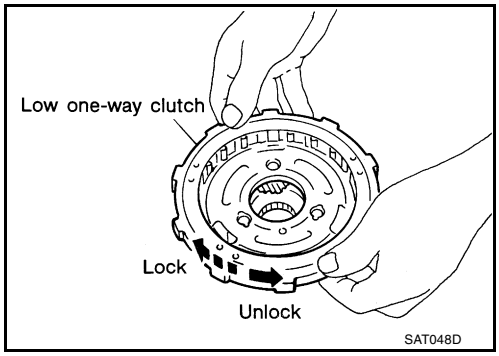
10. Install rear planetary carrier on transmission case.



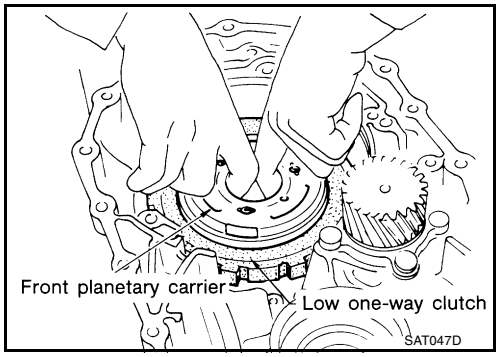
11. Install thrust needle bearing on front planetary carrier.
    - **Apply petroleum jelly to thrust needle bearing.**
    - **Pay attention to direction of thrust needle bearing.**



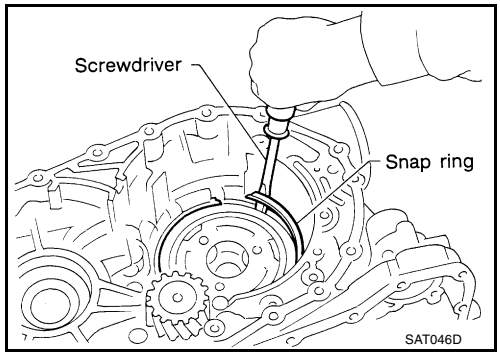
12. Install low one-way clutch to front planetary carrier by turning it in the direction of the arrow as shown.
13. While holding front planetary carrier, turn low one-way clutch. Check low one-way clutch for correct directions of lock and unlock.



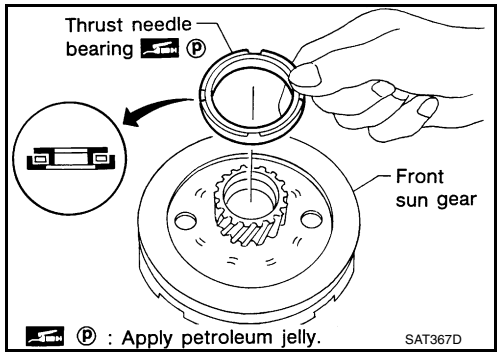
14. Install front planetary carrier assembly on transmission case.



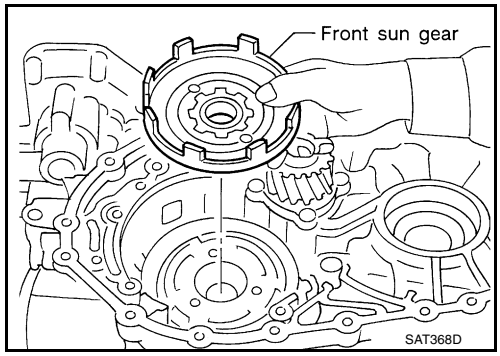
15. Install snap ring with screwdriver.
    - **Forward clutch and bearings must be correctly installed for snap ring to fit groove of transmission case.**



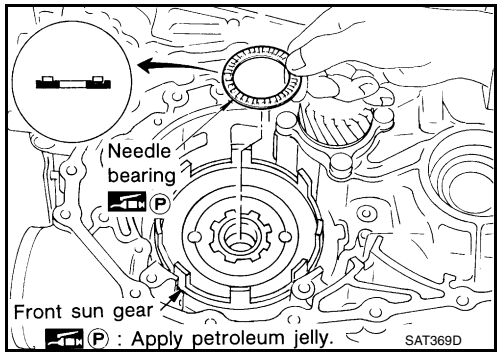
16. Install needle bearing on front sun gear.
    - **Apply petroleum jelly to needle bearing.**
    - **Pay attention to direction of needle bearing.**



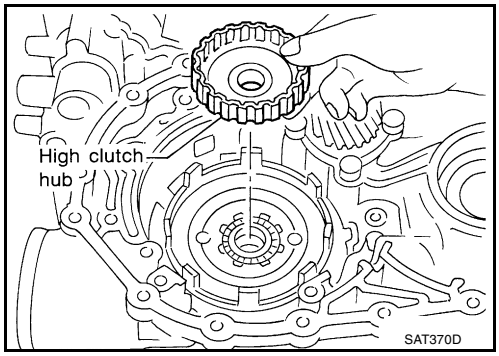
17. Install front sun gear on front planetary carrier.



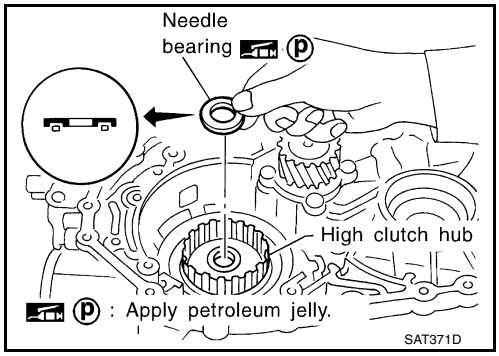
18. Install needle bearing on front sun gear.
    - **Apply petroleum jelly to needle bearing.**
    - **Pay attention to direction of needle bearing.**



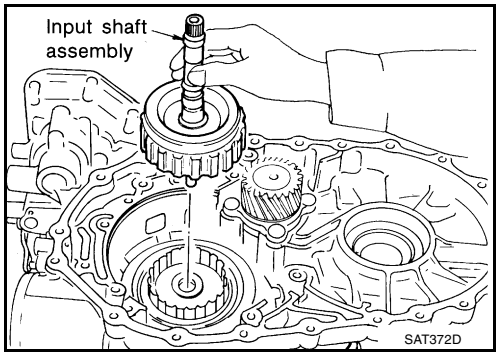
19. Install high clutch hub on front sun gear.



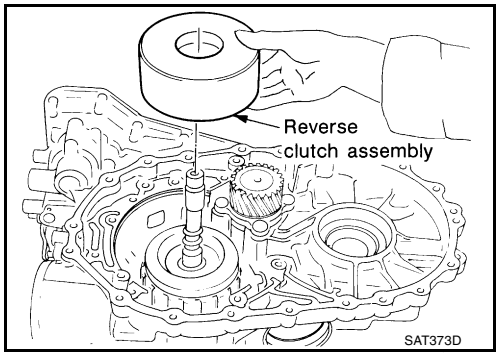
20. Install needle bearing on high clutch hub.
    - **Apply petroleum jelly to needle bearing.**
    - **Pay attention to direction of needle bearing.**



21. Remove paper rolled around input shaft.
22. Install input shaft assembly.
    - **Align teeth of high clutch drive plates before installing.**



23. Install reverse clutch assembly.
    - **Align teeth of reverse clutch drive plates before installing.**



Adjustment (2)

ECS0061A

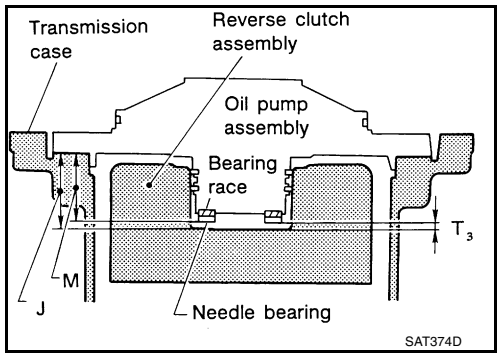
When any parts listed below are replaced, adjust total end play and reverse clutch end play.

Part name	Total end play	Reverse clutch end play
Transmission case	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●

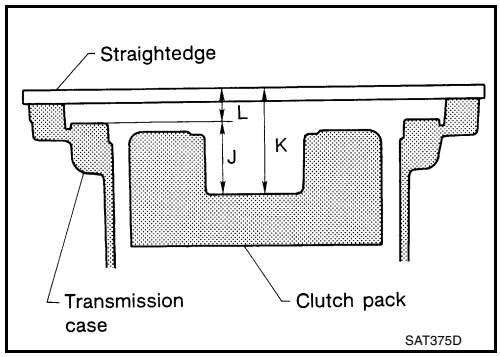
Part name	Total end play	Reverse clutch end play
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●	●
Reverse clutch drum	—	●

TOTAL END PLAY

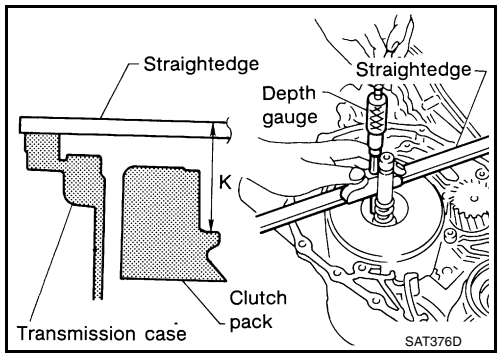
- Measure clearance between reverse clutch drum and needle bearing for oil pump cover.
- Select proper thickness of bearing race so that end play is within specifications.



1. Measure dimensions “K” and “L” and then calculate dimension “J”.



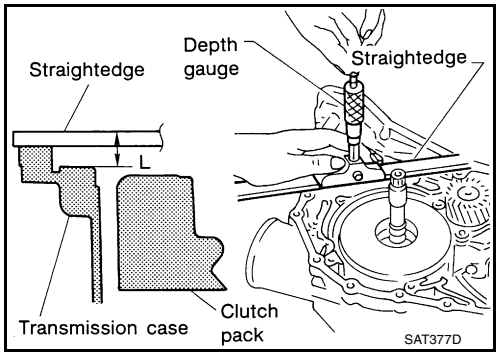
a. Measure dimension “K”.



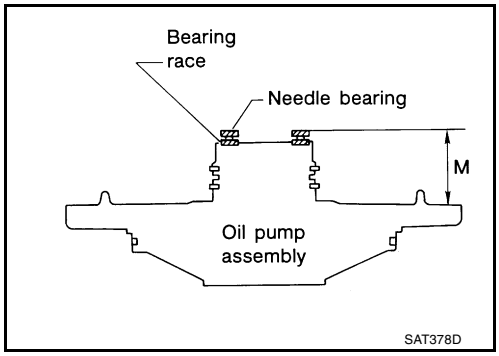
b. Measure dimension “L”.

c. Calculate dimension “J”.
“J”: Distance between oil pump fitting surface of transmission case and needle bearing mating surface of high clutch drum

J = K − L

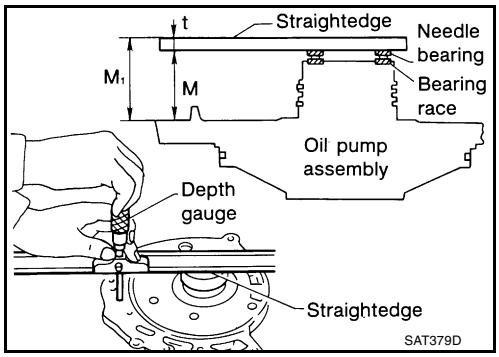


2. Measure dimension “M”.



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

b. Measure dimension “M”.
“M”: Distance between transmission case fitting surface and needle bearing on oil pump cover
“M_1 ”: Indication of gauge



c. Measure thickness of straightedge “t”.

M = M_1 − t

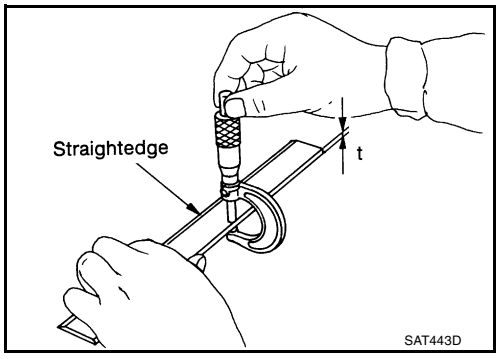
3. Adjust total end play “T_3 ”.

T_3 = J − M

Total end play “T_3 ” : 0.25 - 0.55 mm (0.0098 - 0.0217 in)

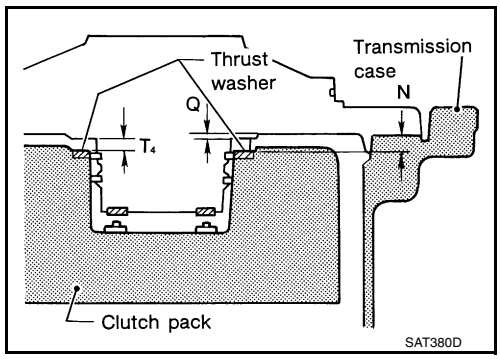
- Select proper thickness of bearing race so that total end play is within specifications.

Bearing races **: Refer to AT-393, "BEARING RACE FOR ADJUSTING TOTAL END PLAY"**

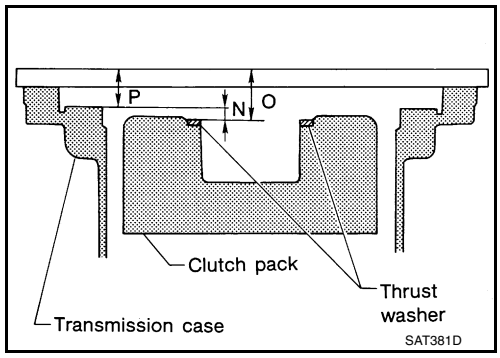


REVERSE CLUTCH END PLAY

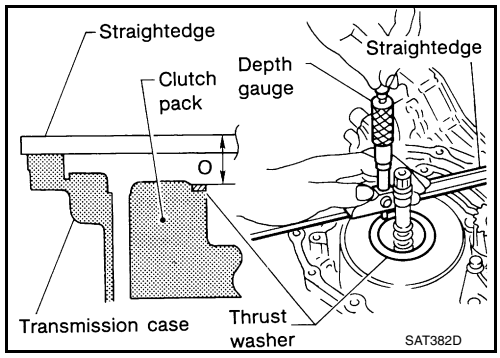
- Measure clearance between oil pump cover and thrust washer for reverse clutch drum.
- Select proper thickness of thrust washer so that end play is within specifications.



1. Measure dimensions “O” and “P” and then calculate dimension “N”.



a. Place thrust washer on reverse clutch drum.

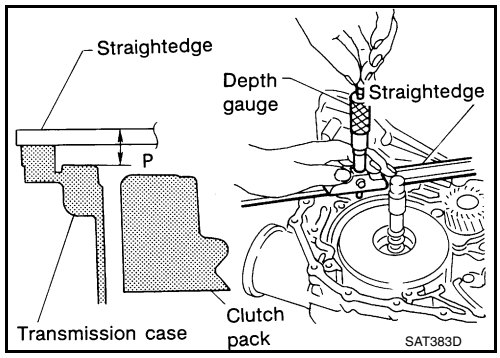


b. Measure dimension “O”.

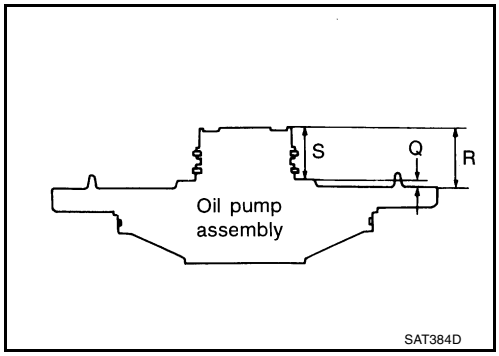
c. Measure dimension “P”.

d. Calculate dimension “N”.
“N”: Distance between oil pump fitting surface of transmission case and thrust washer on reverse clutch drum

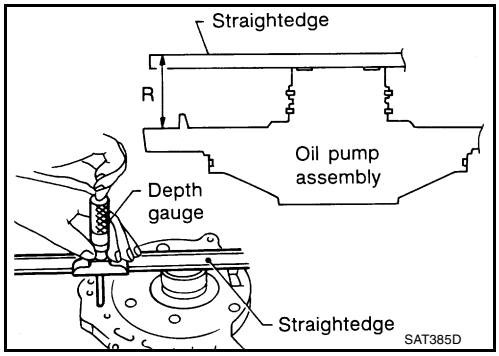
N = O – P



2. Measure dimensions “R” and “S” and then calculate dimension “Q”.



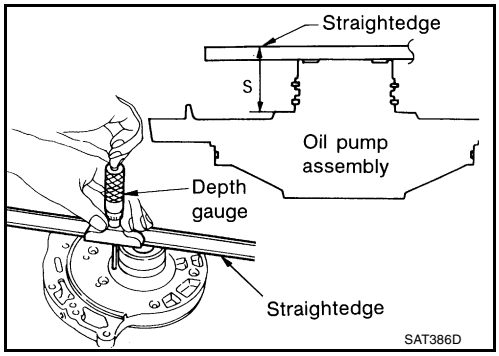
a. Measure dimension “R”.



b. Measure dimension “S”.

c. Calculate dimension “Q”.
“Q”: Distance between transmission case fitting surface and thrust washer mating surface

Q = R – S



3. Adjust reverse clutch end play “T_4 ”.

T_4 = N – Q

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

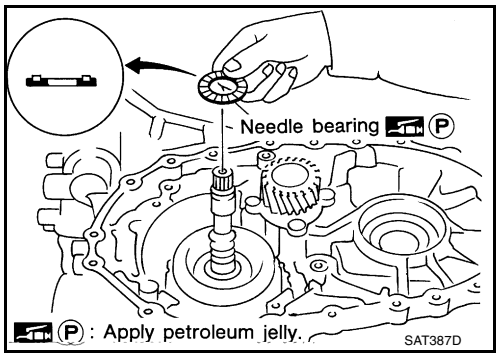
- Select proper thickness of thrust washer so that reverse clutch end play is within specifications.

Thrust washer : Refer to AT-393, "THRUST WASHERS FOR ADJUSTING REVERSE CLUTCH END PLAY"

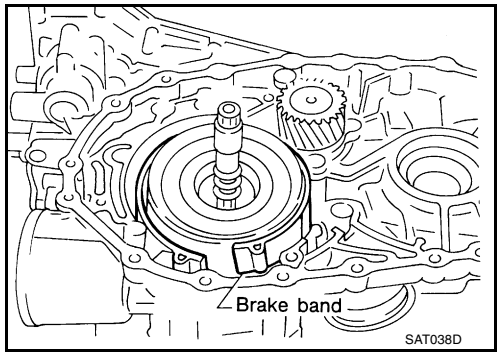
Assembly (3)

ECS0061B

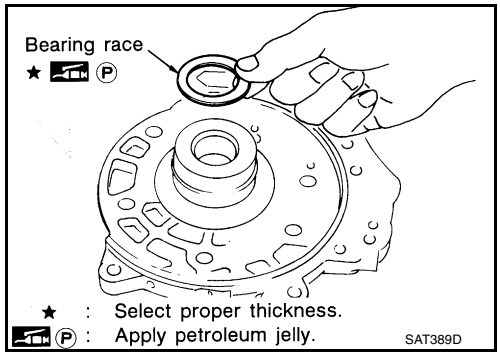
1. Remove reverse clutch assembly and install needle bearing on high clutch assembly.
   - **Pay attention to direction of needle bearing.**
2. Install reverse clutch assembly.



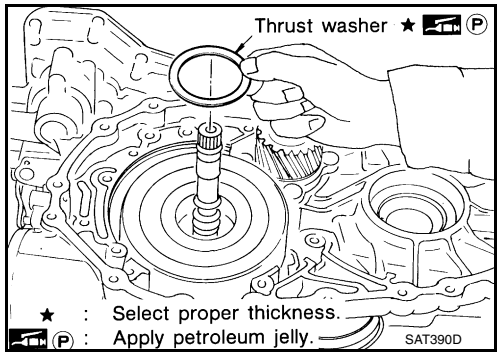
3. Install anchor end pin and lock nut on transmission case.
4. Place brake band on outside of reverse clutch drum. Tighten anchor end pin just enough so that brake band is evenly fitted on reverse clutch drum.



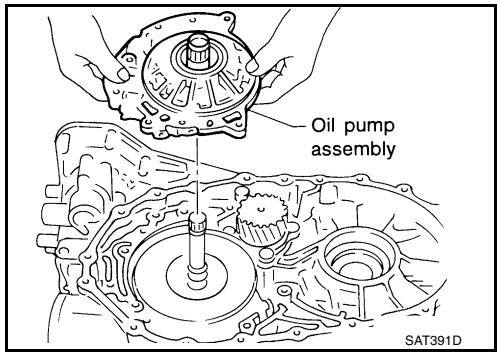
5. Place bearing race selected in total end play adjustment step on oil pump cover.
   - **Apply petroleum jelly to bearing race.**



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

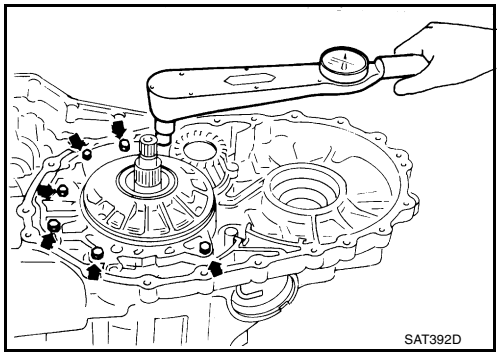


7. Install oil pump assembly on transmission case.

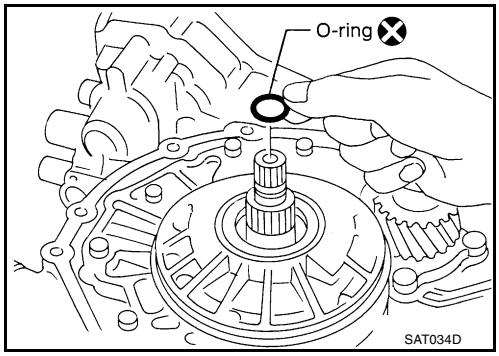


8. Tighten oil pump fixing bolts to specified torque.

: 18 - 21 N·m (1.8 - 2.1 kg-m, 13 - 15 ft-lb)



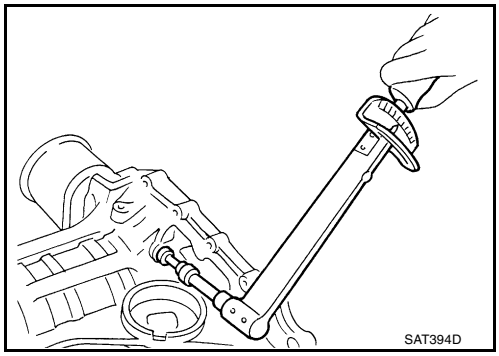
9. Install O-ring to input shaft.
   - **Apply ATF to O-ring.**



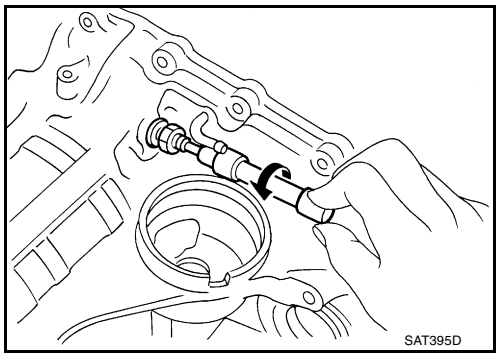
10. Adjust brake band.

a. Tighten anchor end pin to specified torque.

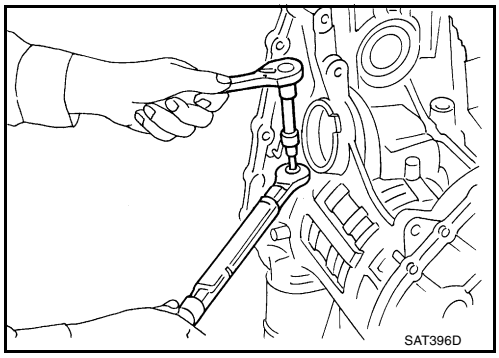
Anchor end pin	**: 3.9 - 5.9 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)**



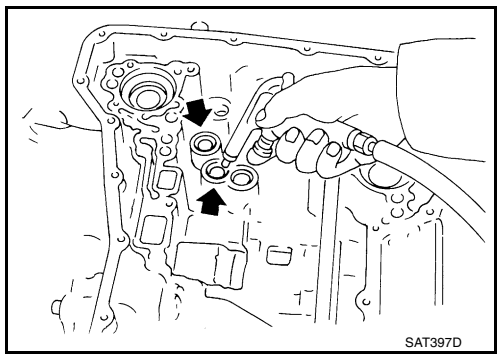
b. Back off anchor end pin two and a half turns.



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



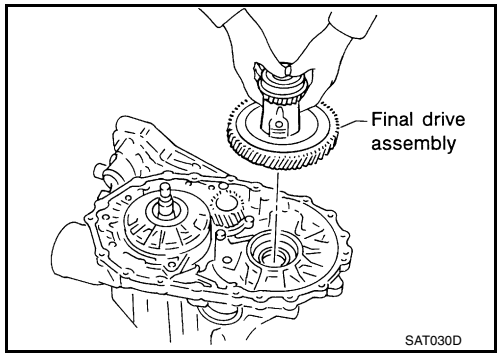
11. Apply compressed air to oil holes of transmission case and check operation of brake band.



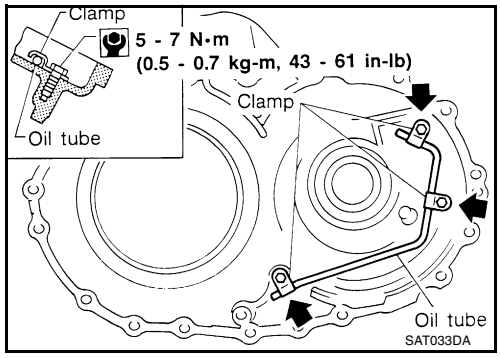
Assembly (4)

ECS0061C

1. Install final drive assembly on transmission case.

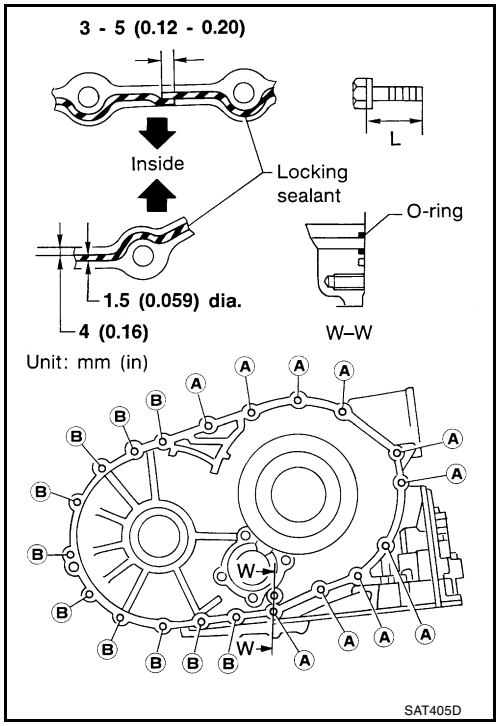


2. Install oil tube on converter housing.



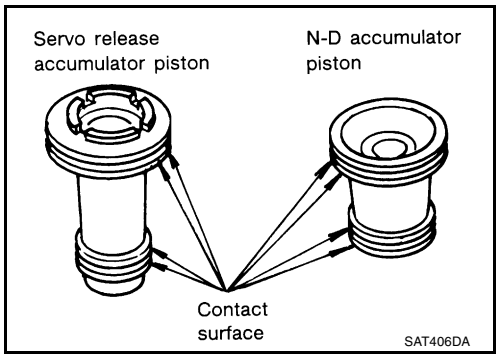
3. Install O-ring on differential oil port of transmission case.
4. Install converter housing on transmission case.
   - **Apply locking sealant to mating surface of converter housing.**

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



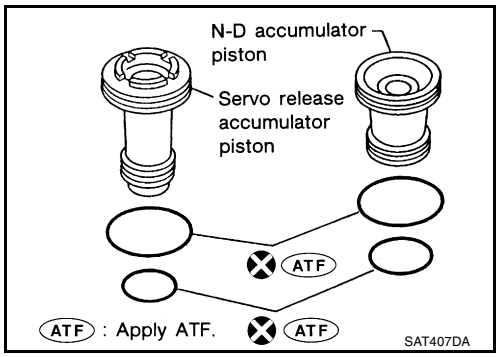
5. Install accumulator piston.

a. Check contact surface of accumulator piston for damage.



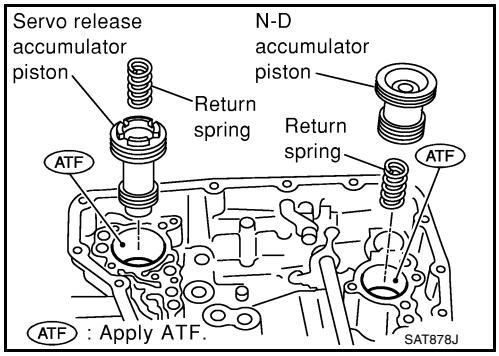
b. Install O-rings on accumulator piston.
   - Apply ATF to O-rings.

   Accumulator piston O-rings **: Refer to AT-393, "O-RING" .**

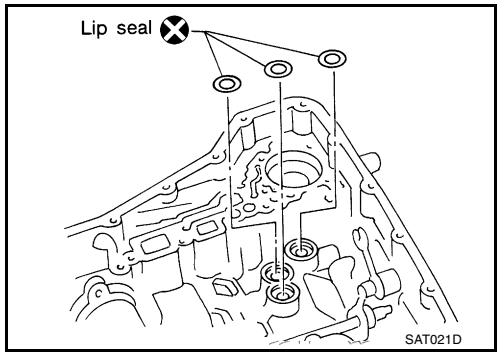


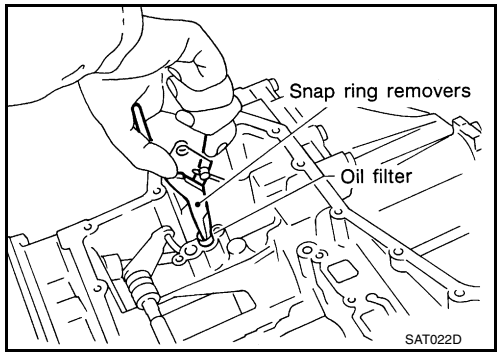
c. Install accumulator pistons and return springs on transmission case.
   - **Apply ATF to inner surface of transmission case.**

   Return springs **: Refer to AT-393, "RETURN SPRING" .**



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



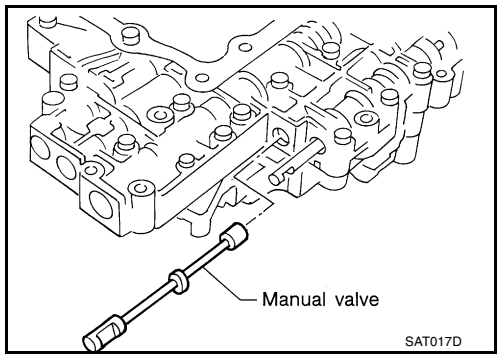


- **Apply petroleum jelly to lip seals.**

7. Install control valve assembly.

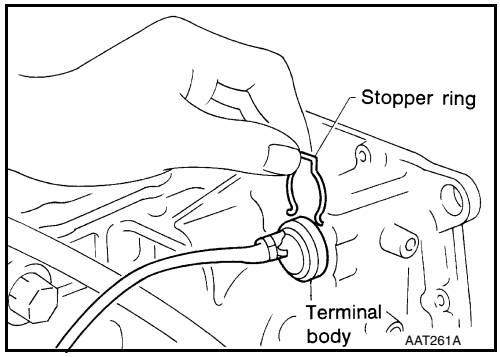
a. Insert manual valve into control valve assembly.

- **Apply ATF to manual valve.**



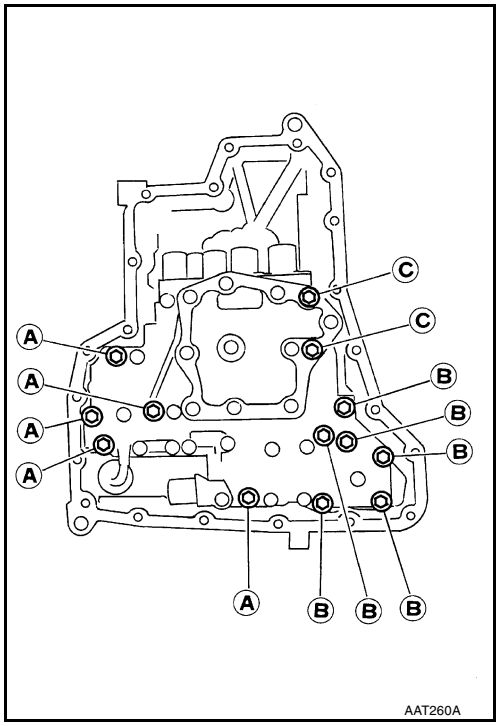
b. Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.

c. Install stopper ring to terminal body.



d. Tighten bolts **A** , **B** and **C** .

: **7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)**



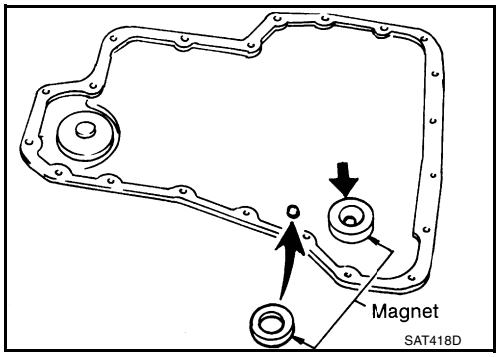
AAT260A

Bolt length, number and location

Bolt symbol	A	B	C
Bolt length “l”	40.0 mm (1.575 in)	33.0 mm (1.299 in)	43.5 mm (1.713 in)
Number of bolts	5	6	2

8. Install oil pan.

a. Attach magnet to oil pan.



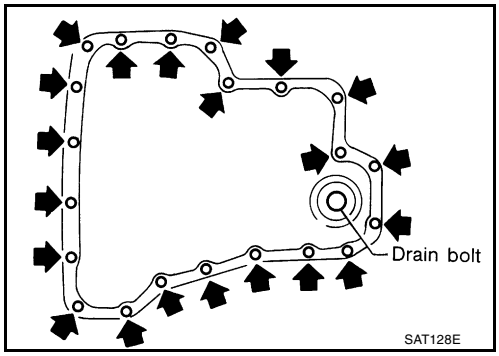
SAT418D

b. Install new oil pan gasket on transmission case.

c. Install oil pan on transmission case.

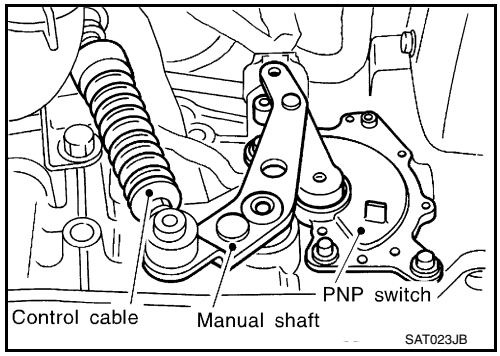
- **Always replace oil pan bolts as they are self-sealing bolts.**
- **Tighten the bolts in a criss-cross pattern to prevent dislocation of gasket.**

d. Tighten drain plug to specified torque.

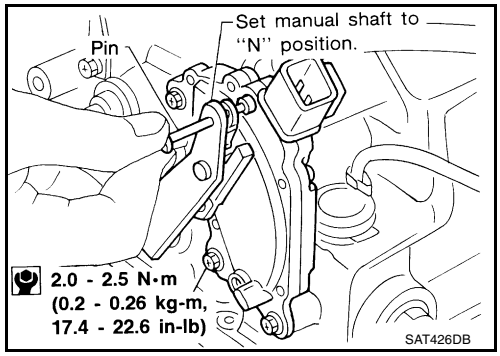


SAT128E

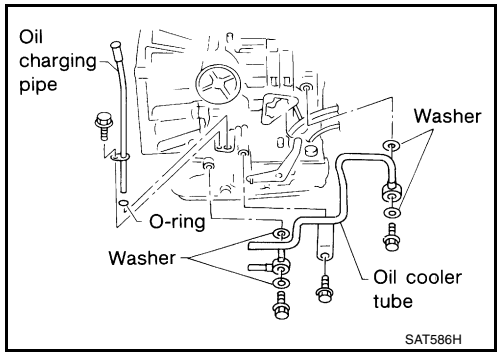
9. Install PNP switch.
a. Set manual shaft in “P” position.
b. Temporarily install PNP switch on manual shaft.
c. Move selector lever to “N” position.



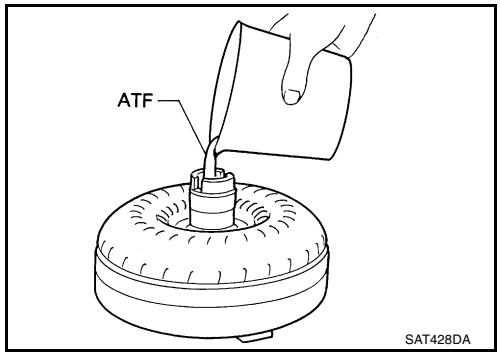
d. Use a 4 mm (0.157 in) pin for this adjustment.
   1. Insert the pin straight into the manual shaft adjustment hole.
   2. Rotate PNP switch until the pin can also be inserted straight into hole in PNP switch.
e. Tighten PNP switch fixing bolts.
f. Remove pin from adjustment hole after adjusting PNP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



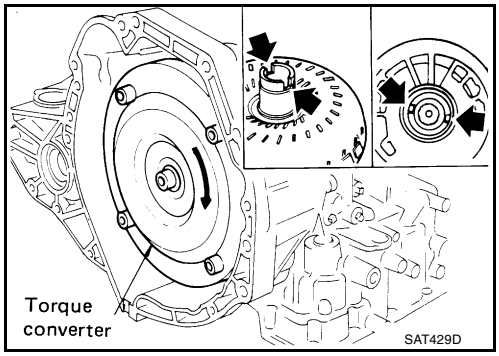
10. Install oil charging pipe and oil cooler tube to transmission case.



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

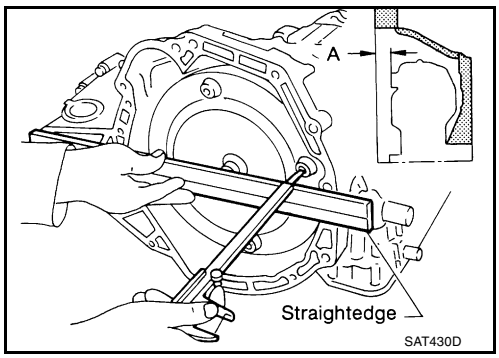


b. Install torque converter while aligning notches of torque converter with notches of oil pump.



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

Distance “A” : 21.1 mm (0.831 in)



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

ECS0061D

Engine		QG18DE
Automatic transaxle model		RE4F03B
Automatic transaxle assembly	Model code number	3AX60
Transaxle gear ratio	1st	2.861
	2nd	1.562
	3rd	1.000
	4th	0.698
	Reverse	2.230
	Final drive	3.827
Recommended fluid		Nissan Matic “D” (Continental U.S. and Alaska) or Genuine Nissan Automatic Transmission Fluid (Canada)*1
Fluid capacity		7.0l (7-3/8 US qt, 6-1/8 Imp qt)

*1: Refer to MA-13, "Fluids and Lubricants" .

Shift Schedule

ECS0061E

VEHICLE SPEED WHEN SHIFTING GEARS

QG18DE (Calif. CA Model)

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	54 - 62 (34 - 39)	103 - 111 (64 - 69)	163 - 171 (101 - 106)	159 - 167 (99 - 104)	93 - 101 (58 - 63)	41 - 49 (25 - 30)	54 - 62 (34 - 39)
Half throttle	Comfort	32 - 40 (20 - 25)	60 - 68 (37 - 42)	124 - 132 (77 - 82)	70 - 78 (43 - 48)	35 - 43 (22 - 27)	25 - 33 (16 - 21)	54 - 62 (34 - 39)

QG18DE (Except Calif. CA Model)

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	52 - 60 (32 - 37)	100 - 108 (62 - 67)	158 - 166 (98 - 103)	154 - 162 (96 - 101)	70 - 98 (56 - 61)	41 - 49 (25 - 30)	52 - 60 (32 - 37)
Half throttle	Comfort	31 - 39 (19 - 24)	58 - 66 (36 - 41)	119 - 127 (74 - 79)	68 - 76 (42 - 47)	34 - 42 (21 - 26)	24 - 32 (15 - 20)	52 - 60 (32 - 37)

VEHICLE SPEED WHEN PERFORMING LOCK-UP

QG18DE (Calif. CA Model)

Throttle opening	OD switch	Shift pattern	Vehicle speed km/h (MPH)	
			Lock-up ON	Lock-up OFF
2/8	ON (D_4)	Comfort	97 - 105 (60 - 65)	63 - 71 (39 - 44)
	OFF (D_3)	Comfort	86 - 94 (53 - 58)	83 - 91 (52 - 57)

QG18DE (Except Calif. CA Model)

Throttle opening	OD switch	Shift pattern	Vehicle speed km/h (MPH)	
			Lock-up ON	Lock-up OFF
2/8	ON (D_4)	Comfort	94 - 102 (58 - 63)	61 - 69 (38 - 43)
	OFF (D_3)	Comfort	86 - 94 (53 - 58)	83 - 91 (52 - 57)

Stall Revolution

ECS0061F

Engine model	Stall revolution rpm
QG18DE	2,350 - 2,800

Line Pressure

ECS0061G

Engine speed rpm	Line pressure kPa (kg/cm^2 , psi)			
	R position	D position	2 position	1 position
Idle	778 (7.9, 113)	500 (5.1, 73)	500 (5.1, 73)	500 (5.1, 73)
Stall	1,816 (18.5, 263)	1,167 (11.9, 169)	1,167 (11.9, 169)	1,167 (11.9, 169)

Control Valves

ECS0061H

CONTROL VALVE AND PLUG RETURN SPRINGS

Unit: mm (in)

	No.	Parts	Part No.*	Free length	Outer diameter
Upper body Refer to AT-307, "CONTROL VALVE UPPER BODY" .	35	3-2 timing valve spring	31736-01X00	23.29 (0.917)	6.65 (0.2618)
	19	Cooler check valve spring	31742-3AX05	28.04 (1.1039)	7.15 (0.2815)
	23	Pilot valve spring	31742-3AX03	38.98 (1.5346)	8.9 (0.350)
	15	1-2 accumulator valve spring	31742-3AX00	20.5 (0.807)	6.95 (0.2736)
	28	1-2 accumulator piston spring	31742-3AX09	55.66 (2.1913)	19.5 (0.7677)
	33	1st reducing valve spring	31742-80X05	27.0 (1.063)	7.0 (0.276)
	2	Overrun clutch reducing valve spring	31742-80X06	37.5 (1.476)	7.0 (0.276)
	7	Torque converter relief valve spring	31742-3AX04	33.3 (1.3110)	9.0 (0.354)
	10	Torque converter clutch control valve spring	31742-3AX02	53.01 (2.0870)	6.5 (0.256)
Lower body Refer to AT-311, "CONTROL VALVE LOWER BODY" .	34	Shuttle control valve spring	31762-41X04	51.0 (2.0079)	5.65 (0.2224)
	18	Pressure regulator valve spring	31742-80X13	45.0 (1.772)	15.0 (0.591)
	23	Overrun clutch control valve spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	27	Accumulator control valve spring	31742-80X02	22.0 (0.866)	6.5 (0.256)
	29	Shift valve A spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	2	Shift valve B spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	11	Pressure modifier valve spring	31742-41X15	30.5 (1.201)	9.8 (0.386)
	7	Pressure modifier valve spring	31742-80X16	32.0 (1.260)	6.9 (0.272)
	—	Oil cooler relief valve spring	31872-31X00	17.02 (0.6701)	8.0 (0.315)
	—	T/C pressure spring	31742-3AX11	9.0 (0.354)	7.3 (0.287)

*: Always check with the Parts Department for the latest parts information.

Clutch, Brake and Brake Band

ECS0061I

REVERSE CLUTCH

Number of drive plates		2	
Number of driven plates		2	
Drive plate thickness mm (in)	Standard	2.0 (0.079)	
	Allowable limit	1.8 (0.071)	
Clearance mm (in)	Standard	0.5 - 0.8 (0.020 - 0.031)	
	Allowable limit	1.2 (0.047)	
Thickness of retaining plates		Thickness mm (in)	Part number*
		4.4 (0.173)	31537-31X00
		4.6 (0.181)	31537-31X01
		4.8 (0.189)	31537-31X02
		5.0 (0.197)	31537-31X03
		5.2 (0.205)	31537-31X04

*: Always check with the Parts Department for the latest parts information.

HIGH CLUTCH

Number of drive plates		3	
Number of driven plates		5	
Drive plate thickness mm (in)	Standard	2.0 (0.079)	
	Allowable limit	1.8 (0.071)	
Clearance mm (in)	Standard	1.4 - 1.8 (0.055 - 0.071)	
	Allowable limit	2.4 (0.094)	
Thickness of retaining plates		Thickness mm (in)	Part number*
		4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213) 5.6 (0.220) 5.8 (0.228) 6.0 (0.236)	31537-32X05 31537-32X06 31537-32X07 31537-32X08 31537-32X09 31537-32X10 31537-32X11

*: Always check with the Parts Department for the latest parts information.

FORWARD CLUTCH

Number of drive plates		5	
Number of driven plates		5	
Drive plate thickness mm (in)	Standard	1.8 (0.071)	
	Allowable limit	1.6 (0.063)	
Clearance mm (in)	Standard	0.45 - 0.85 (0.0177 - 0.0335)	
	Allowable limit	1.85 (0.0728)	
Thickness of retaining plate		Thickness mm (in)	Part number*
		3.6 (0.142) 3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181)	31537-31X60 31537-31X61 31537-31X62 31537-31X63 31537-31X64 31537-31X65

*: Always check with the Parts Department for the latest parts information.

OVERRUN CLUTCH

Number of drive plates		3	
Number of driven plates		4	
Drive plate thickness mm (in)	Standard	1.6 (0.063)	
	Allowable limit	1.4 (0.055)	
Clearance mm (in)	Standard	1.0 - 1.4 (0.039 - 0.055)	
	Allowable limit	2.0 (0.079)	
Thickness of retaining plate		Thickness mm (in)	Part number*
		3.6 (0.142) 3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173)	31567-31X79 31567-31X80 31567-31X81 31567-31X82 31567-31X83

*: Always check with the Parts Department for the latest parts information.

LOW & REVERSE BRAKE

Number of drive plates	5
Number of driven plates	4 + 1

Drive plate thickness mm (in)	Standard	2.0 (0.079)	
	Allowable limit	1.8 (0.071)	
Clearance mm (in)	Standard	1.4 - 1.8 (0.055 - 0.071)	
	Allowable limit	2.8 (0.110)	
Thickness of retaining plate		Thickness mm (in)	Part number*
		3.6 (0.142) 3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181)	31667-31X16 31667-31X17 31667-31X18 31667-31X19 31667-31X20 31667-31X21

*: Always check with the Parts Department for the latest parts information.

BRAKE BAND

Anchor end pin tightening torque	3.5 - 5.9 N-m (0.35 - 0.6 kg-m, 31 - 52 in-lb)
Number of returning revolutions for anchor end pin	2.5±0.125
Lock nut tightening torque	31 - 36 N-m (3.2 - 3.7 kg-m, 23 - 27 ft-lb)

Clutch and Brake Return Springs

ECS0061J

Unit: mm (in)

Parts		Free length	Outer diameter	Part number*
Forward clutch (Overrun clutch)	Outer (16 pcs)	26.6 (1.047)	10.6 (0.417)	31505-31X02
	Inner (16 pcs)	26.3 (1.035)	7.7 (0.303)	31505-31X03
Reverse clutch (16 pcs)		18.6 (0.732)	8.0 (0.315)	31505-31X00
High clutch (12 pcs)		19.7 (0.776)	11.1 (0.437)	31505-31X01
Low reverse brake (20 pcs)		25.1 (0.988)	7.6 (0.299)	31505-31X04

*: Always check with the Parts Department for the latest parts information.

Oil Pump

ECS0061K

Oil pump side clearance mm (in)		0.02 - 0.04 (0.0008 - 0.0016)	
Thickness of inner gears and outer gears		Inner gear	
		Thickness mm (in)	Part number*
		9.99 - 10.00 (0.3933 - 0.3937) 9.98 - 9.99 (0.3929 - 0.3933) 9.97 - 9.98 (0.3925 - 0.3929)	31346-31X00 31346-31X01 31346-31X02
		Outer gear	
		Thickness mm (in)	Part number*
		9.99 - 10.00 (0.3933 - 0.3937) 9.98 - 9.99 (0.3929 - 0.3933) 9.97 - 9.98 (0.3925 - 0.3929)	31347-31X00 31347-31X01 31347-31X02
Clearance between oil pump housing and outer gear mm (in)	Standard	0.08 - 0.15 (0.0031 - 0.0059)	
	Allowable limit	0.15 (0.0059)	
Oil pump cover seal ring clearance mm (in)	Standard	0.1 - 0.25 (0.0039 - 0.0098)	
	Allowable limit	0.25 (0.0098)	

*: Always check with the Parts Department for the latest parts information.

Input Shaft

ECS0061L

Unit: mm (in)

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

Planetary Carrier

ECS0061M

Unit: mm (in)

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

Final Drive

ECS0061N

DIFFERENTIAL SIDE GEAR CLEARANCE

Clearance between side gear and differential case with washer	0.1 - 0.2 mm (0.004 - 0.008 in)

DIFFERENTIAL SIDE GEAR THRUST WASHERS

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

*: Always check with the Parts Department for the latest parts information.

BEARING PRELOAD

Differential side bearing preload “T”	0.04 - 0.09 mm (0.0016 - 0.0035 in)

TURNING TORQUE

Turning torque of final drive assembly	0.49 - 1.08 N-m (5.0 - 11.0 kg-cm, 4.3 - 9.5 in-lb)

DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS

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

*: Always check with the Parts Department for the latest parts information.

TABLE FOR SELECTING DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS

Unit: mm (in)

Dial indicator deflection	Suitable shim(s)
0.31 - 0.35 (0.0122 - 0.0138)	0.40 (0.0157)
0.35 - 0.39 (0.0138 - 0.0154)	0.44 (0.0173)
0.39 - 0.43 (0.0154 - 0.0169)	0.48 (0.0189)
0.43 - 0.47 (0.0169 - 0.0185)	0.52 (0.0205)
0.47 - 0.51 (0.0185 - 0.0201)	0.56 (0.0220)
0.51 - 0.55 (0.0201 - 0.0217)	0.60 (0.0236)
0.55 - 0.59 (0.0217 - 0.0232)	0.64 (0.0252)
0.59 - 0.63 (0.0232 - 0.0248)	0.68 (0.0268)
0.63 - 0.67 (0.0248 - 0.0264)	0.72 (0.0283)
0.67 - 0.71 (0.0264 - 0.0280)	0.76 (0.0299)
0.71 - 0.75 (0.0280 - 0.0295)	0.80 (0.0315)
0.75 - 0.79 (0.0295 - 0.0311)	0.84 (0.0331)
0.79 - 0.83 (0.0311 - 0.0327)	0.88 (0.0346)
0.83 - 0.87 (0.0327 - 0.0343)	0.92 (0.0362)
0.87 - 0.91 (0.0343 - 0.0358)	0.48 (0.0189) + 0.48 (0.0189)
0.91 - 0.95 (0.0358 - 0.0374)	0.48 (0.0189) + 0.52 (0.0205)
0.95 - 0.99 (0.0374 - 0.0390)	0.52 (0.0205) + 0.52 (0.0205)
0.99 - 1.03 (0.0390 - 0.0406)	0.52 (0.0205) + 0.56 (0.0220)
1.03 - 1.07 (0.0406 - 0.0421)	0.56 (0.0220) + 0.56 (0.0220)
1.07 - 1.11 (0.0421 - 0.0437)	0.56 (0.0220) + 0.60 (0.0236)
1.11 - 1.15 (0.0437 - 0.0453)	0.60 (0.0236) + 0.60 (0.0236)
1.15 - 1.19 (0.0453 - 0.0469)	0.60 (0.0236) + 0.64 (0.0252)
1.19 - 1.23 (0.0469 - 0.0484)	0.64 (0.0252) + 0.64 (0.0252)
1.23 - 1.27 (0.0484 - 0.0500)	0.64 (0.0252) + 0.68 (0.0268)
1.27 - 1.31 (0.0500 - 0.0516)	0.68 (0.0268) + 0.68 (0.0268)
1.31 - 1.35 (0.0516 - 0.0531)	0.68 (0.0268) + 0.72 (0.0283)
1.35 - 1.39 (0.0531 - 0.0547)	1.44 (0.0567)
1.39 - 1.43 (0.0547 - 0.0563)	0.72 (0.0283) + 0.76 (0.0299)
1.43 - 1.47 (0.0563 - 0.0579)	0.76 (0.0299) + 0.76 (0.0299)
1.47 - 1.51 (0.0579 - 0.0594)	0.76 (0.0299) + 0.80 (0.0315)
1.51 - 1.55 (0.0594 - 0.0610)	0.80 (0.0315) + 0.80 (0.0315)
1.55 - 1.59 (0.0610 - 0.0626)	0.80 (0.0315) + 0.84 (0.0331)
1.59 - 1.63 (0.0626 - 0.0642)	0.84 (0.0331) + 0.84 (0.0331)
1.63 - 1.67 (0.0642 - 0.0657)	0.84 (0.0331) + 0.88 (0.0346)
1.67 - 1.71 (0.0657 - 0.0673)	0.88 (0.0346) + 0.88 (0.0346)
1.71 - 1.75 (0.0673 - 0.0689)	0.88 (0.0346) + 0.92 (0.0362)
1.75 - 1.79 (0.0689 - 0.0705)	0.92 (0.0362) + 0.92 (0.0362)
1.79 - 1.83 (0.0705 - 0.0720)	0.92 (0.0362) + 0.96 (0.0378)
1.83 - 1.87 (0.0720 - 0.0736)	0.96 (0.0378) + 0.96 (0.0378)
1.87 - 1.91 (0.0736 - 0.0752)	0.52 (0.0205) + 1.44 (0.0567)
1.91 - 1.95 (0.0752 - 0.0768)	0.56 (0.0220) + 1.44 (0.0567)

Reduction Pinion Gear

ECS0061O

BEARING PRELOAD

Reduction pinion gear bearing preload	0.05 mm (0.0020 in)

TURNING TORQUE

Turning torque of reduction pinion gear	0.1 - 0.69 N-m (1.1 - 7.0 kg-cm, 0.95 - 6.08 in-lb)

REDUCTION PINION GEAR BEARING ADJUSTING SHIMS

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

*: Always check with the Parts Department for the latest parts information.

TABLE FOR SELECTING REDUCTION PINION GEAR BEARING ADJUSTING SHIM

Unit: mm (in)

Dimension "T"	Suitable shim(s)
1.77 - 1.81 (0.0697 - 0.0713)	1.74 (0.0685)
1.81 - 1.85 (0.0713 - 0.0728)	1.78 (0.0701)
1.85 - 1.89 (0.0728 - 0.0744)	1.82 (0.0717)
1.89 - 1.93 (0.0744 - 0.0760)	1.86 (0.0732)
1.93 - 1.96 (0.0760 - 0.0772)	1.90 (0.0748)
1.96 - 1.98 (0.0772 - 0.0780)	1.92 (0.0756)
1.98 - 2.00 (0.0780 - 0.0787)	1.94 (0.0764)
2.00 - 2.02 (0.0787 - 0.0795)	1.96 (0.0772)
2.02 - 2.04 (0.0795 - 0.0803)	1.98 (0.0780)
2.04 - 2.06 (0.0803 - 0.0811)	2.00 (0.0787)
2.06 - 2.08 (0.0811 - 0.0819)	2.02 (0.0795)
2.08 - 2.10 (0.0819 - 0.0827)	2.04 (0.0803)
2.10 - 2.12 (0.0827 - 0.0835)	2.06 (0.0811)
2.12 - 2.14 (0.0835 - 0.0843)	2.08 (0.0819)
2.14 - 2.16 (0.0843 - 0.0850)	2.10 (0.0827)
2.16 - 2.18 (0.0850 - 0.0858)	2.12 (0.0835)
2.18 - 2.20 (0.0858 - 0.0866)	2.14 (0.0843)
2.20 - 2.22 (0.0866 - 0.0874)	2.16 (0.0850)
2.22 - 2.24 (0.0874 - 0.0888)	2.18 (0.0858)
2.24 - 2.26 (0.0882 - 0.0890)	2.20 (0.0866)
2.26 - 2.28 (0.0890 - 0.0898)	2.22 (0.0874)
2.28 - 2.30 (0.0898 - 0.0906)	2.24 (0.0882)
2.30 - 2.32 (0.0906 - 0.0913)	2.26 (0.0890)
2.32 - 2.34 (0.0913 - 0.0921)	2.28 (0.0898)
2.34 - 2.37 (0.0921 - 0.0933)	2.30 (0.0906)
2.37 - 2.41 (0.0933 - 0.0949)	2.34 (0.0921)
2.41 - 2.45 (0.0949 - 0.0965)	2.38 (0.0937)
2.45 - 2.49 (0.0965 - 0.0980)	2.42 (0.0953)
2.49 - 2.53 (0.0980 - 0.0996)	2.46 (0.0969)
2.53 - 2.57 (0.0996 - 0.1012)	2.50 (0.0984)
2.57 - 2.61 (0.1012 - 0.1028)	2.54 (0.1000)
2.61 - 2.65 (0.1028 - 0.1043)	2.58 (0.1016)
2.65 - 2.69 (0.1043 - 0.1059)	2.62 (0.1031)
2.69 - 2.73 (0.1059 - 0.1075)	2.66 (0.1047)

Output Shaft

ECS0061P

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)

END PLAY

Output shaft end play	0 - 0.5 mm (0 - 0.020 in)

OUTPUT SHAFT END PLAY ADJUSTING SHIMS

Thickness mm (in)	Part number*
0.56 (0.0220)	31438-31X46
0.96 (0.0378)	31438-31X47
1.36 (0.0535)	31438-31X48

*: Always check with the Parts Department for the latest parts information.

Bearing Retainer

ECS0061Q

SEAL RING CLEARANCE

Unit: mm (in)

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

Total End Play

ECS0061R

Total end play "T_3 "	0.25 - 0.55 mm (0.0098 - 0.0217 in)

BEARING RACE FOR ADJUSTING TOTAL END PLAY

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

*: Always check with the Parts Department for the latest parts information.

Reverse Clutch End Play

ECS0061S

Reverse clutch end play "T_4 "	0.65 - 1.00 mm (0.0256 - 0.0394 in)

THRUST WASHERS FOR ADJUSTING REVERSE CLUTCH END PLAY

Thickness mm (in)	Part number*
0.65 (0.0256)	31508-31X10
0.80 (0.0315)	31508-31X11
0.95 (0.0374)	31508-31X12
1.10 (0.0433)	31508-31X13
1.25 (0.0492)	31508-31X14
1.40 (0.0551)	31508-31X15

*: Always check with the Parts Department for the latest parts information.

Accumulator

ECS0061T

O-RING

Unit: mm (in)

Accumulator	Diameter (Small)	Part number*	Diameter (Large)	Part number*
Servo release accumulator	26.9 (1.059)	31526-41X03	44.2 (1.740)	31526-41X02
N-D accumulator	34.6 (1.362)	31526-31X08	39.4 (1.551)	31672-21X00

*: Always check with the Parts Department for the latest parts information.

RETURN SPRING

Unit: mm (in)

Accumulator	Free length	Outer diameter	Part number*
Servo release accumulator spring	52.5 (2.067)	20.1 (0.791)	31605-80X00
N-D accumulator spring	45.0 (1.772)	27.6 (1.087)	31605-33X01

*: Always check with the Parts Department for the latest parts information.

Band Servo

ECS0061U

RETURN SPRING

Unit: mm (in)

Return spring	Free length	Outer diameter	Part number*
2nd servo return spring	32.5 (1.280)	25.9 (1.020)	31605-31X20
OD servo return spring	38.52 (1.5165)	22.0 (0.866)	31605-31X21

*: Always check with the Parts Department for the latest parts information.

Removal and Installation

ECS0061V

Unit: mm (in)

Distance between end of converter housing and torque converter	21.1 (0.831)

Shift Solenoid Valves

ECS0061W

Gear	Solenoid A	Solenoid B
1st	ON	ON
2nd	OFF	ON
3rd	OFF	OFF
4th	ON	OFF

Solenoid Valve

ECS0061X

Solenoid valve	Resistance (Approx.)	Terminal number
Shift solenoid A	20 - 30Ω	2
Shift solenoid B	5 - 20Ω	1
Ovr. clutch sol.	20 - 30Ω	3
Line pres. sol.	2.5 - 5Ω	4
T/conv. clutch sol.	5 - 20Ω	5

A/T Fluid Temperature Sensor

ECS0061Y

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

Revolution Sensor

ECS0061Z

Condition	Judgement standard
When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function. *1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	Approximately 150 Hz
When vehicle not moving.	Under 1.3V or over 4.5V

Dropping Resistor

ECS00620

Resistance	10 - 15Ω

TROUBLE DIAGNOSIS - INDEX

PFP:00000

Alphabetical & P No. Index for DTC

ECS00621

ALPHABETICAL INDEX FOR DTC

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	CONSULT-II GST*1	
A/T 1ST GR FNCTN	P0731	AT-510
A/T 2ND GR FNCTN	P0732	AT-515
A/T 3RD GR FNCTN	P0733	AT-520
A/T 4TH GR FNCTN	P0734	AT-525
A/T TCC S/V FNCTN	P0744	AT-537
ATF TEMP SEN/CIRC	P0710	AT-495
ENGINE SPEED SIG	P0725	AT-506
L/PRESS SOL/CIRC	P0745	AT-545
O/R CLTCH SOL/CIRC	P1760	AT-566
PNP SW/CIRC	P0705	AT-489
SFT SOL A/CIRC*2	P0750	AT-551
SFT SOL B/CIRC*2	P0755	AT-556
TCC SOLENOID/CIRC	P0740	AT-532
TP SEN/CIRC A/T*2	P1705	AT-561
VEH SPD SEN/CIR AT*3	P0720	AT-501
CAN COMM CIRCUIT	U1000	AT-588

*1: These numbers are prescribed by SAE J2012.
*2: When the fail-safe operation occurs, the MIL illuminates.
*3: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.

P NO. INDEX FOR DTC

DTC CONSULT-II GST*1	Items (CONSULT-II screen terms)	Reference page
P0705	PNP SW/CIRC	AT-489
P0710	ATF TEMP SEN/CIRC	AT-495
P0720	VEH SPD SEN/CIR AT*3	AT-501
P0725	ENGINE SPEED SIG	AT-506
P0731	A/T 1ST GR FNCTN	AT-510
P0732	A/T 2ND GR FNCTN	AT-515
P0733	A/T 3RD GR FNCTN	AT-520
P0734	A/T 4TH GR FNCTN	AT-525
P0740	TCC SOLENOID/CIRC	AT-532
P0744	A/T TCC S/V FNCTN	AT-537
P0745	L/PRESS SOL/CIRC	AT-545
P0750	SFT SOL A/CIRC*2	AT-551
P0755	SFT SOL B/CIRC*2	AT-556
P1705	TP SEN/CIRC A/T*2	AT-561
P1760	O/R CLTCH SOL/CIRC	AT-566
U1000	CAN COMM CIRCUIT	AT-588

*1: These numbers are prescribed by SAE J2012.
*2: When the fail-safe operation occurs, the MIL illuminates.
*3: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

ECS00622

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI 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 SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

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

ECS00623

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

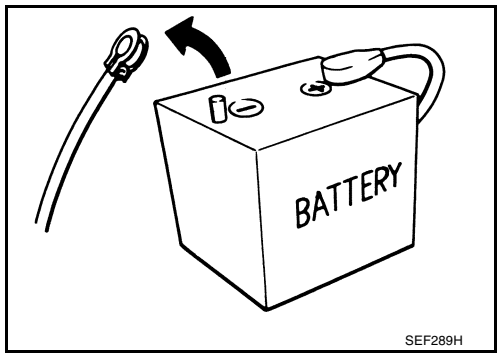
CAUTION:

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

Precautions

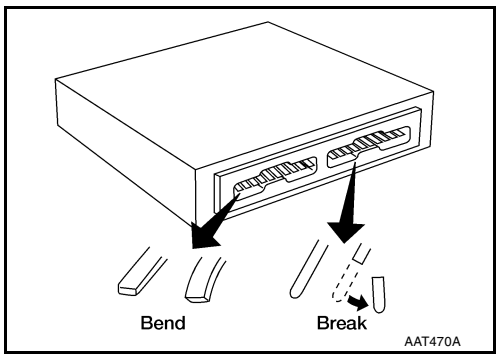
ECS00624

- **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.**

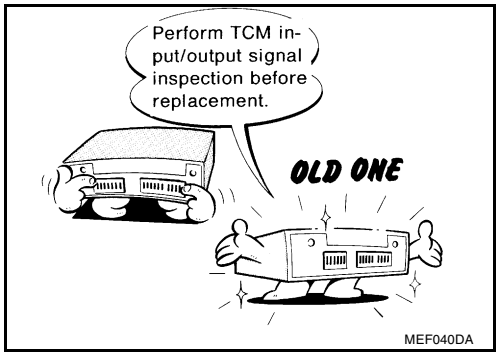


SEF289H

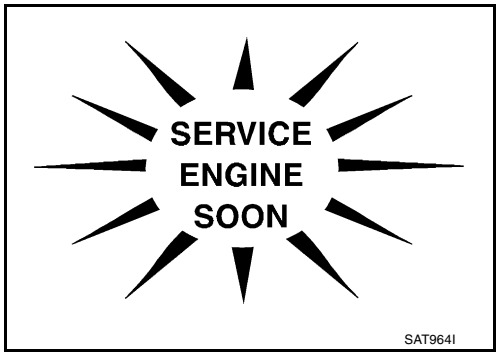
- **When connecting or disconnecting pin connectors into or from TCM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on TCM pin terminal, when connecting pin connectors.



- **Before replacing TCM, perform TCM input/output signal inspection and verify whether TCM functions properly or not. Refer to AT-419, "INPUT/OUTPUT SIGNAL OF TCM".**



- **After performing each TROUBLE DIAGNOSIS, perform "DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE".**
  The DTC should not be displayed in the "DTC CONFIRMATION PROCEDURE" if the repair is completed.
- Before proceeding with disassembly, thoroughly clean the outside of the transaxle. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transaxle.



- Place disassembled parts in order for easier and proper assembly.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transaxle is disassembled.
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place disassembled valve body parts in order for easier and proper assembly. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed valves, sleeves, plugs, etc. will slide along bores in valve body under their own weight.
- Before assembly, apply a coat of recommended ATF to all parts. Apply petroleum jelly to protect O-rings and seals, or hold bearings and washers in place during assembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to AT-399, "ATF COOLER SERVICE" .
- 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 when changing A/T fluid. Refer to MA-31, "Changing A/T Fluid" .

Service Notice or Precautions

ECS00625

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. [Or, refer to AT-440, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)"].
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-448, "Work Flow" .
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

If A/T fluid contains frictional material (clutches, bands, etc.), replace radiator and flush cooler line using cleaning solvent and compressed air after repair of A/T. Refer to CO-30, "RADIATOR" .

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-432 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-429 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

*: For details of OBD-II, refer to EC-1244, "ON BOARD DIAGNOSTIC (OBD) SYSTEM" .

- **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 GI-23, "How to Check Terminal" .

Wiring Diagrams and Trouble Diagnosis

ECS00626

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-2, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"

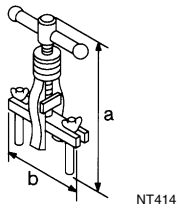
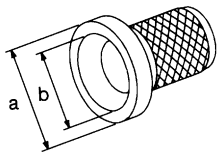
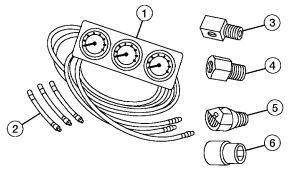
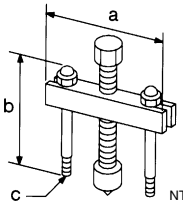
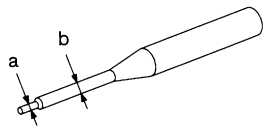
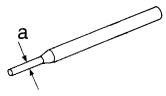
PREPARATION

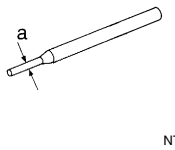
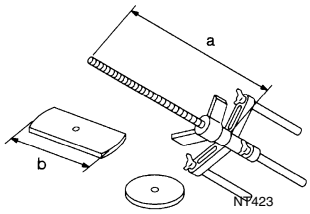
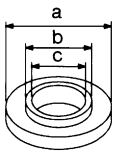
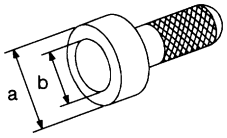
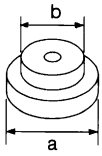
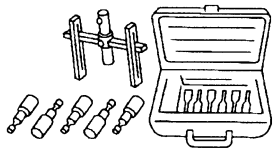
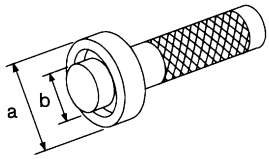
PFP:00002

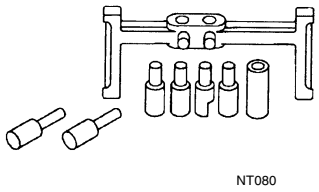
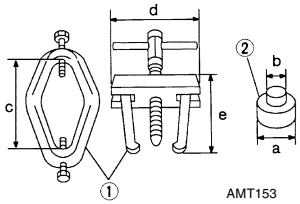
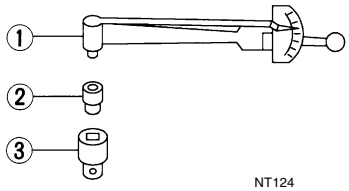
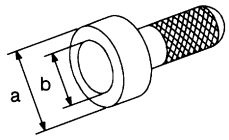
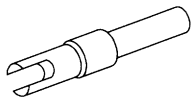
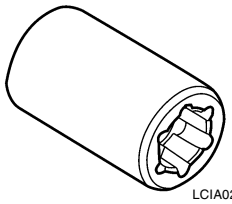
Special Service Tools

ECS00627

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

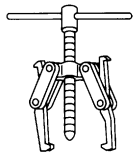
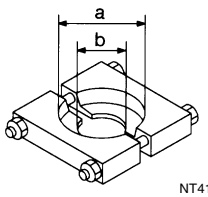
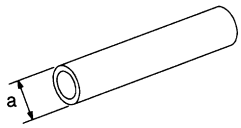
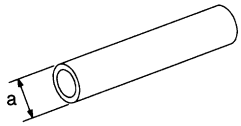
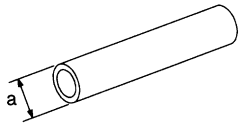
Tool number (Kent-Moore No.) Tool name	Description
KV381054S0 (J34286) Puller  NT414	● Removing differential side oil seals ● Removing differential side bearing outer race ● Removing idler gear bearing outer race **a: 250 mm (9.84 in)** **b: 160 mm (6.30 in)**
ST33400001 (J26082) Drift  NT086	● Installing differential side oil seal F04B and F04W (RH side) ● Installing oil seal on oil pump housing **a: 60 mm (2.36 in) dia.** **b: 47 mm (1.85 in) dia.**
(J34301-C) Oil pressure gauge set 1 (J34301-1) Oil pressure gauge 2 (J34301-2) Hoses 3 (J34298) Adapter 4 (J34282-2) Adapter 5 (790-301-1230-A) 60° Adapter 6 (J34301-15) Square socket  AAT896	● Measuring line pressure
ST27180001 (J25726-A) Puller  NT424	● Removing idler gear **a: 100 mm (3.94 in)** **b: 110 mm (4.33 in)** **c: M8 x 1.25P**
ST23540000 (J25689-A) Pin punch  NT442	● Removing and installing parking rod plate and manual plate pins **a: 2.3 mm (0.091 in) dia.** **b: 4 mm (0.16 in) dia.**
ST25710000 (J25689-A) Pin punch  NT410	● Aligning groove of manual shaft and hole of transmission case **a: 2 mm (0.08 in) dia.**

Tool number (Kent-Moore No.) Tool name	Description
KV32101000 (J25689-A) Pin punch  NT410	● Removing and installing manual shaft retaining pin ● Removing and installing pinion mate shaft lock 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 inner race (RH side) **a: 51 mm (2.01 in) dia.** **b: 28.5 mm (1.122 in) dia.**

Tool number (Kent-Moore No.) Tool name	Description
(J34290) Shim selecting tool set  NT080	● Selecting differential side bearing adjusting shim
ST3306S001 (J22888-D) Differential side bearing puller set 1 ST33051001 (J22888-D) Puller 2 ST33061000 (J8107-2) Adapter  AMT153	● Removing differential side bearing inner race **a: 38 mm (1.50 in) dia.** **b: 28.5 mm (1.122 in) dia.** **c: 130 mm (5.12 in)** **d: 135 mm (5.31 in)** **e: 100 mm (3.94 in)**
ST3127S000 (J25765-A) Preload gauge 1 GG91030000 (J25765-A) Torque wrench 2 HT62940000 (—) Socket adapter 3 HT62900000 (—) Socket adapter  NT124	● Checking differential side bearing preload
ST35271000 (J26091) Drift  NT115	● Installing idler gear **a: 72 mm (2.83 in) dia.** **b: 63 mm (2.48 in) dia.**
(J39713) Preload adapter  NT087	● Selecting differential side bearing adjusting shim ● Checking differential side bearing preload
J45816 E20 TORX socket  LCIA0258E	● Removing flex plate bolts on vehicles equipped with QR25DE engines

Commercial Service Tools

ECS00628

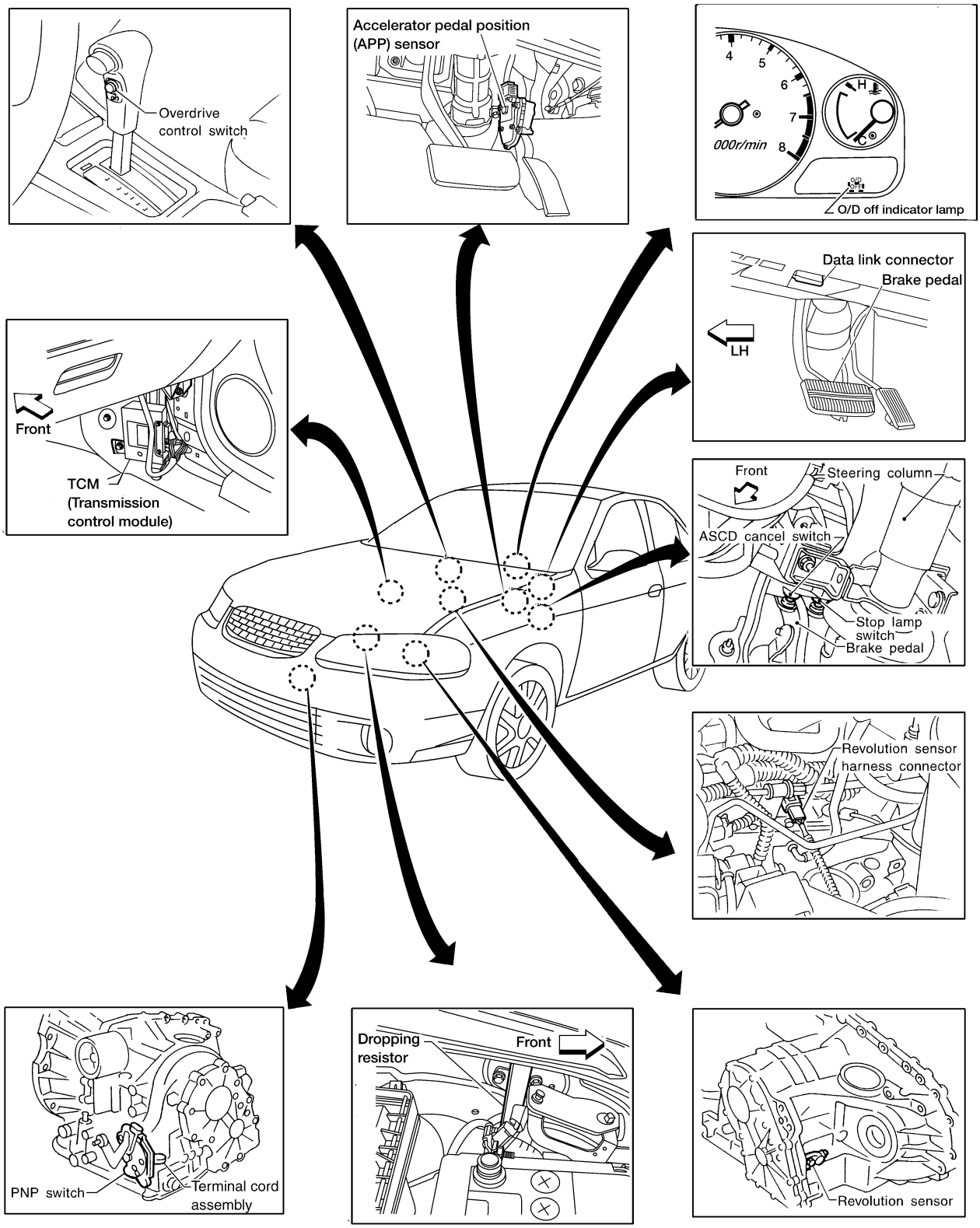
Tool name	Description
Puller  NT077	● Removing idler gear bearing inner race ● Removing and installing band servo piston snap ring
Puller  NT411	● Removing reduction gear bearing inner race **a: 60 mm (2.36 in) dia.** **b: 35 mm (1.38 in) dia.**
Drift  NT083	● Installing needle bearing on bearing retainer **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 (RH side) **a: 75 mm (2.95 in) dia.**

OVERALL SYSTEM

PFP:00000

A/T Electrical Parts Location

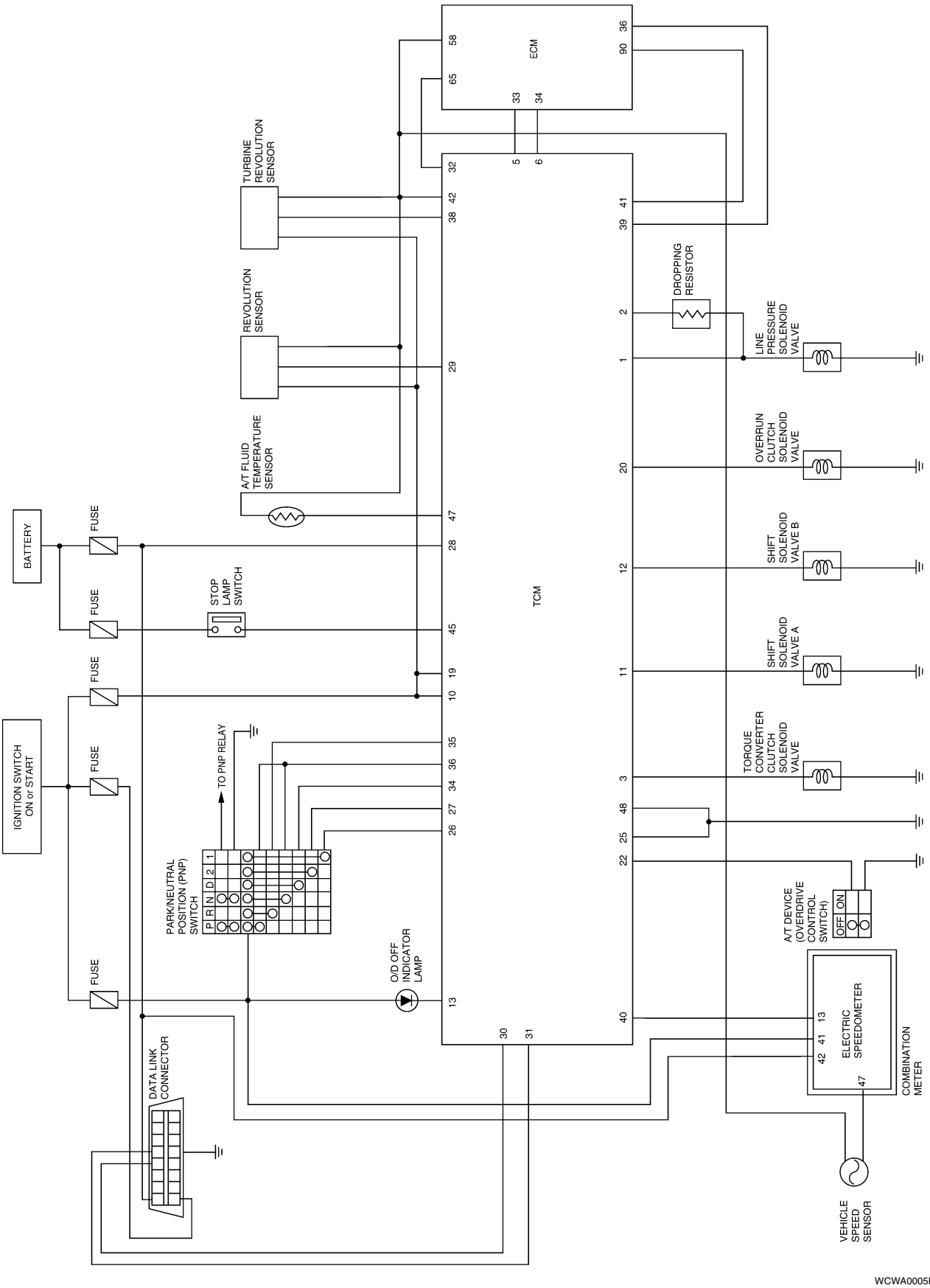
ECS00629



WCIA0131E

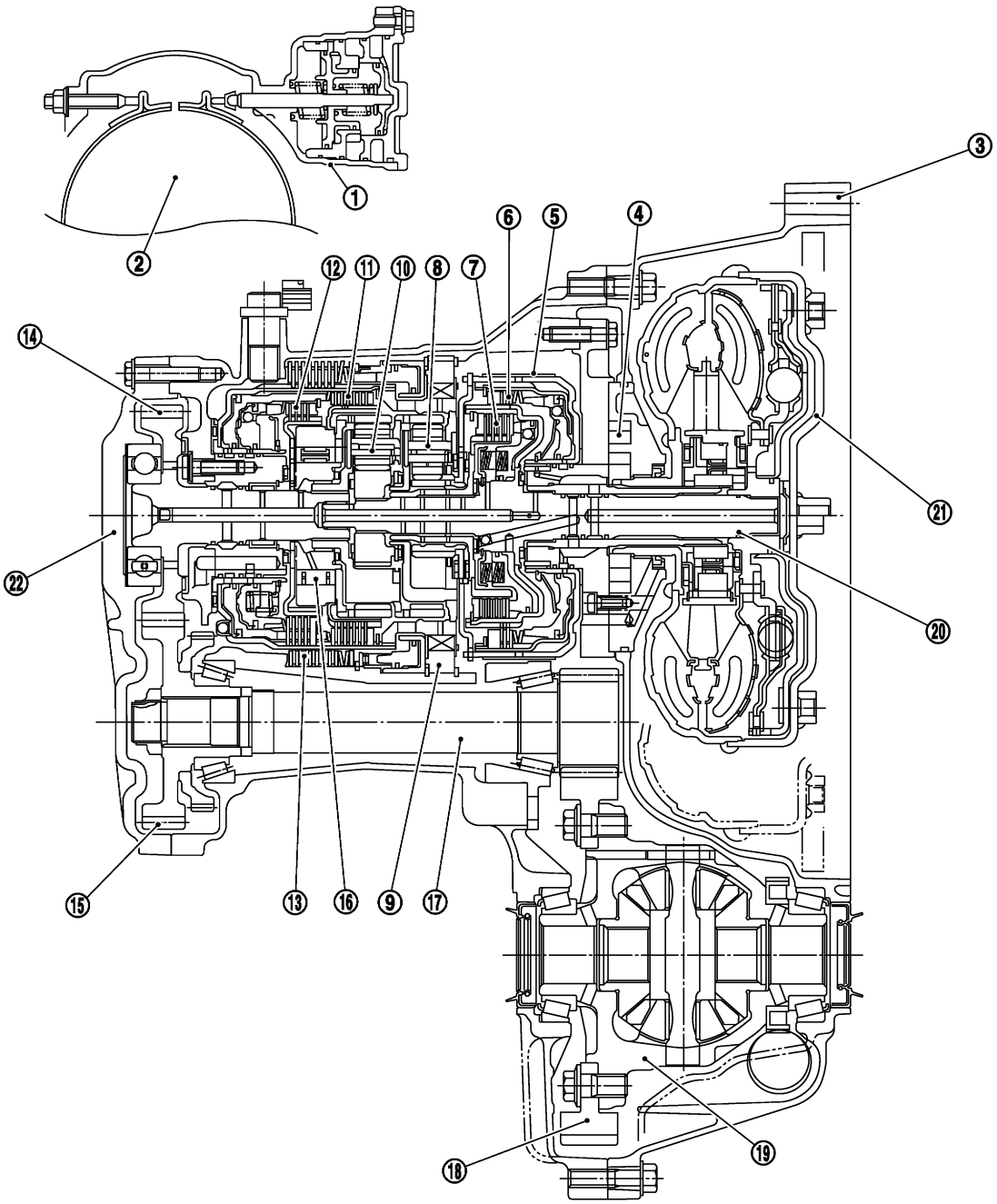
Circuit Diagram

ECS0062A



Cross-sectional View

ECS0062B

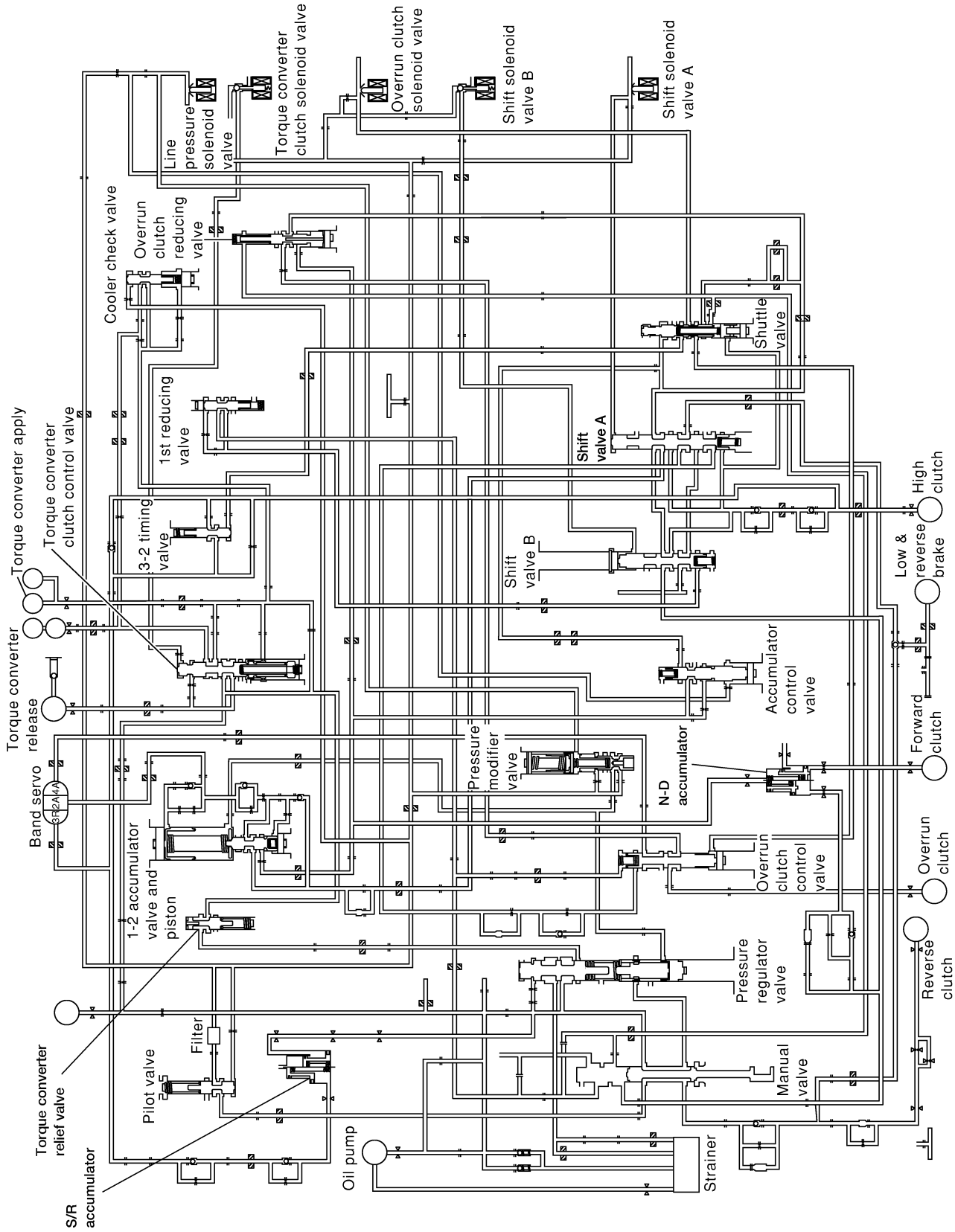


SAT488K

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

Hydraulic Control Circuit

ECS0062C

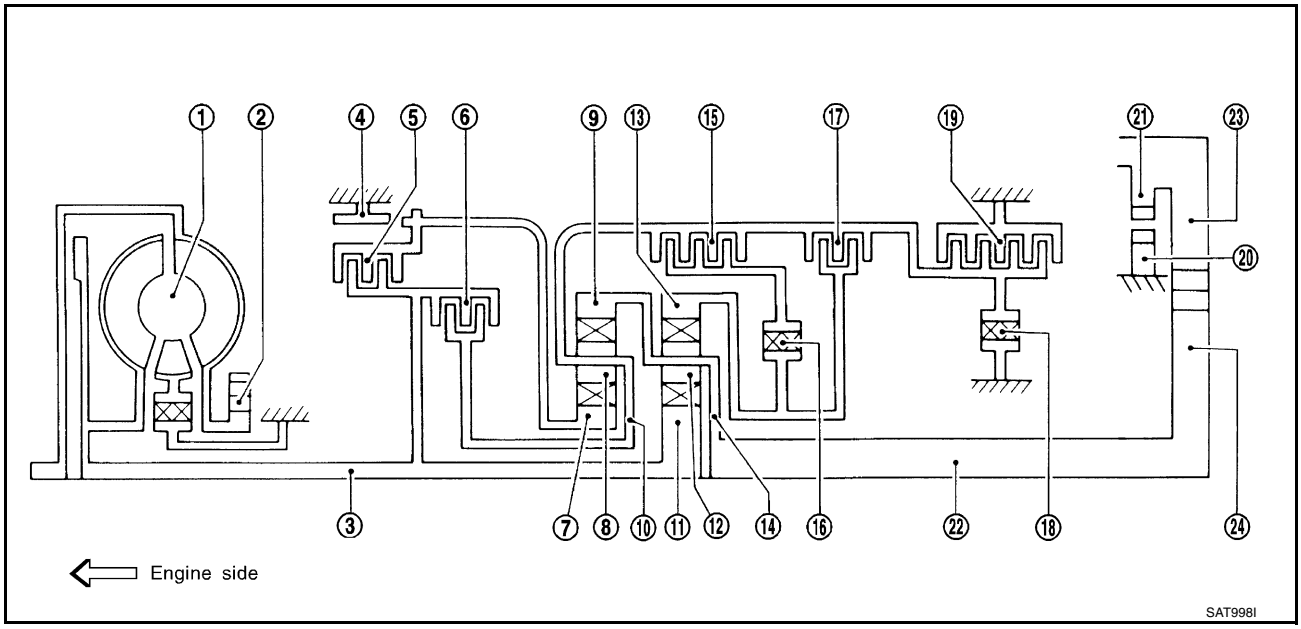


LCIA0040E

Shift Mechanism

ECS0062D

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

CLUTCH AND BAND CHART

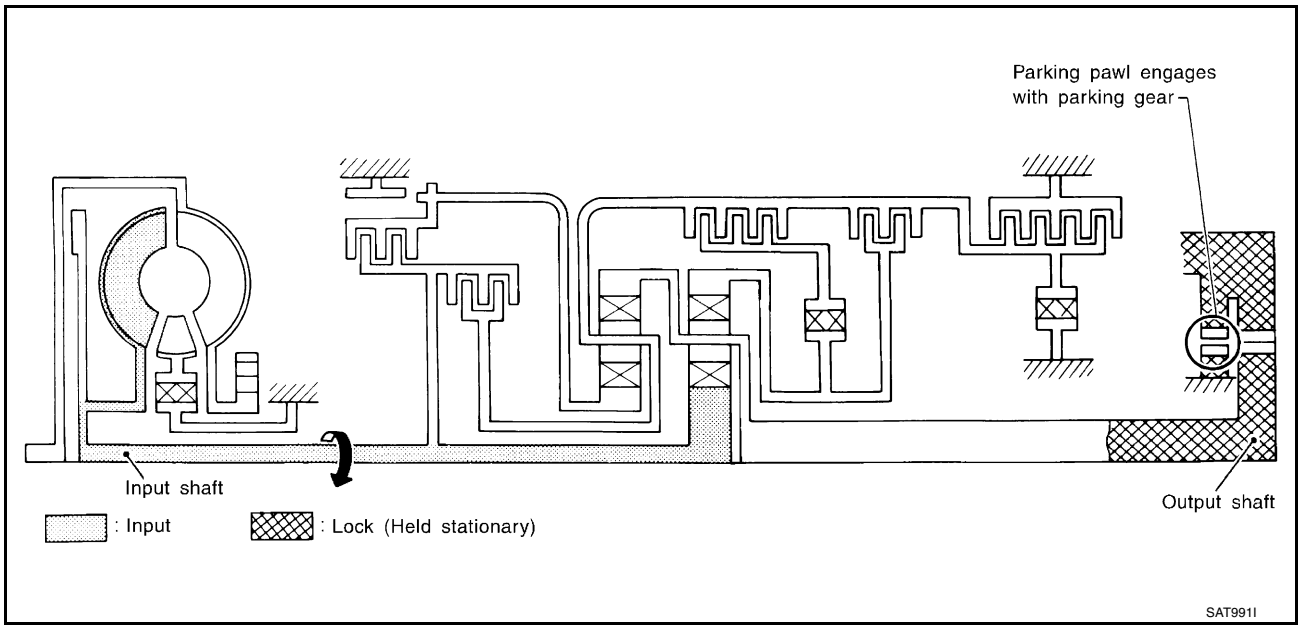
Shift position		Reverse clutch **5**	High clutch **6**	For-ward clutch **15**	Over-run clutch **17**	Band servo			For-ward one-way clutch **16**	Low one-way clutch **18**	Low & reverse brake **19**	Lock-up	Remarks
						2nd apply	3rd release	4th apply					
P													PARK POSITION
R		O									O	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

*1: Operates when overdrive control switch is set in OFF position.
*2: Oil pressure is applied to both 2nd “apply” side and 3rd “release” side of band servo piston. However, brake band does not contract because oil pressure area on the “release” side is greater than that on the “apply” side.
*3: Oil pressure is applied to 4th “apply” side in condition *2 above, and brake band contracts.
*4: A/T will not shift to 4th when overdrive control switch is set in OFF position.
O: Operates
A: Operates when throttle opening is less than 3/16, activating engine brake.
B: Operates during “progressive” acceleration.
C: Operates but does not affect power transmission.
D: Operates when throttle opening is less than 3/16, but does not affect engine brake.

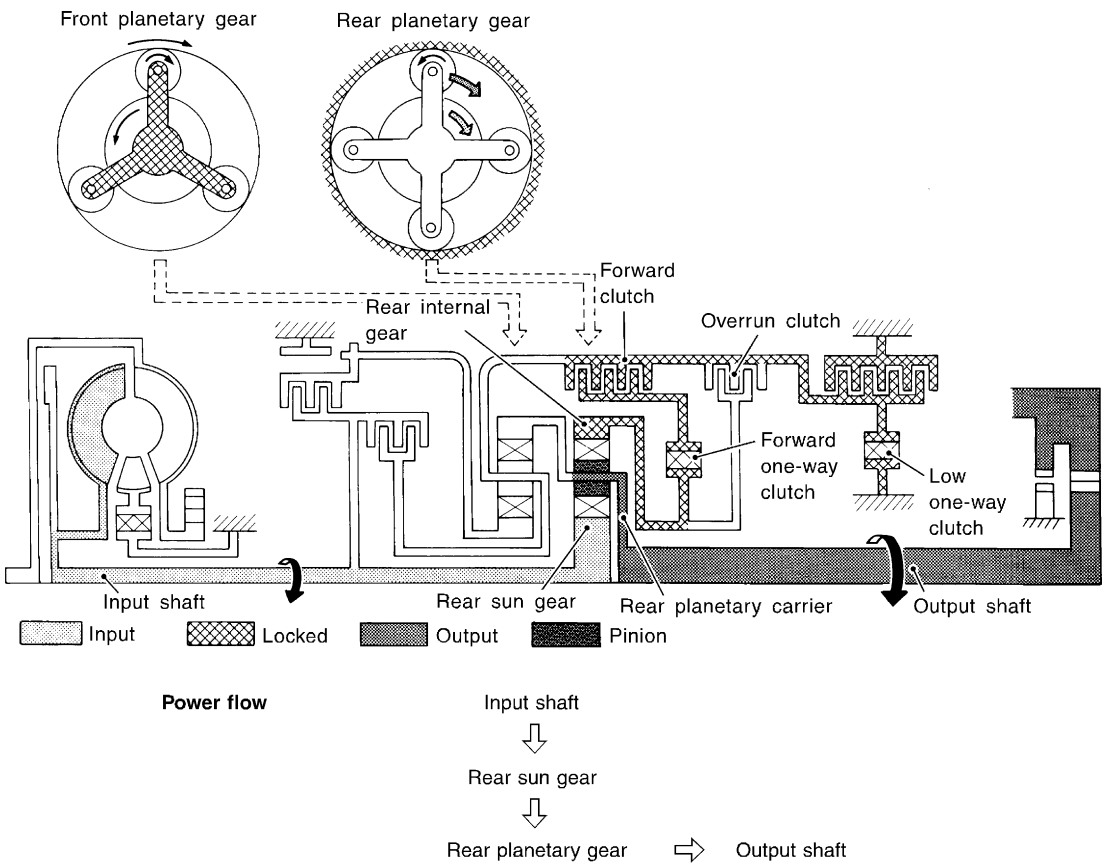
POWER TRANSMISSION

P and N Positions

- 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 powertrain is locked.
- N position
  Power from the input shaft is not transmitted to the output shaft because the clutches do not operate.

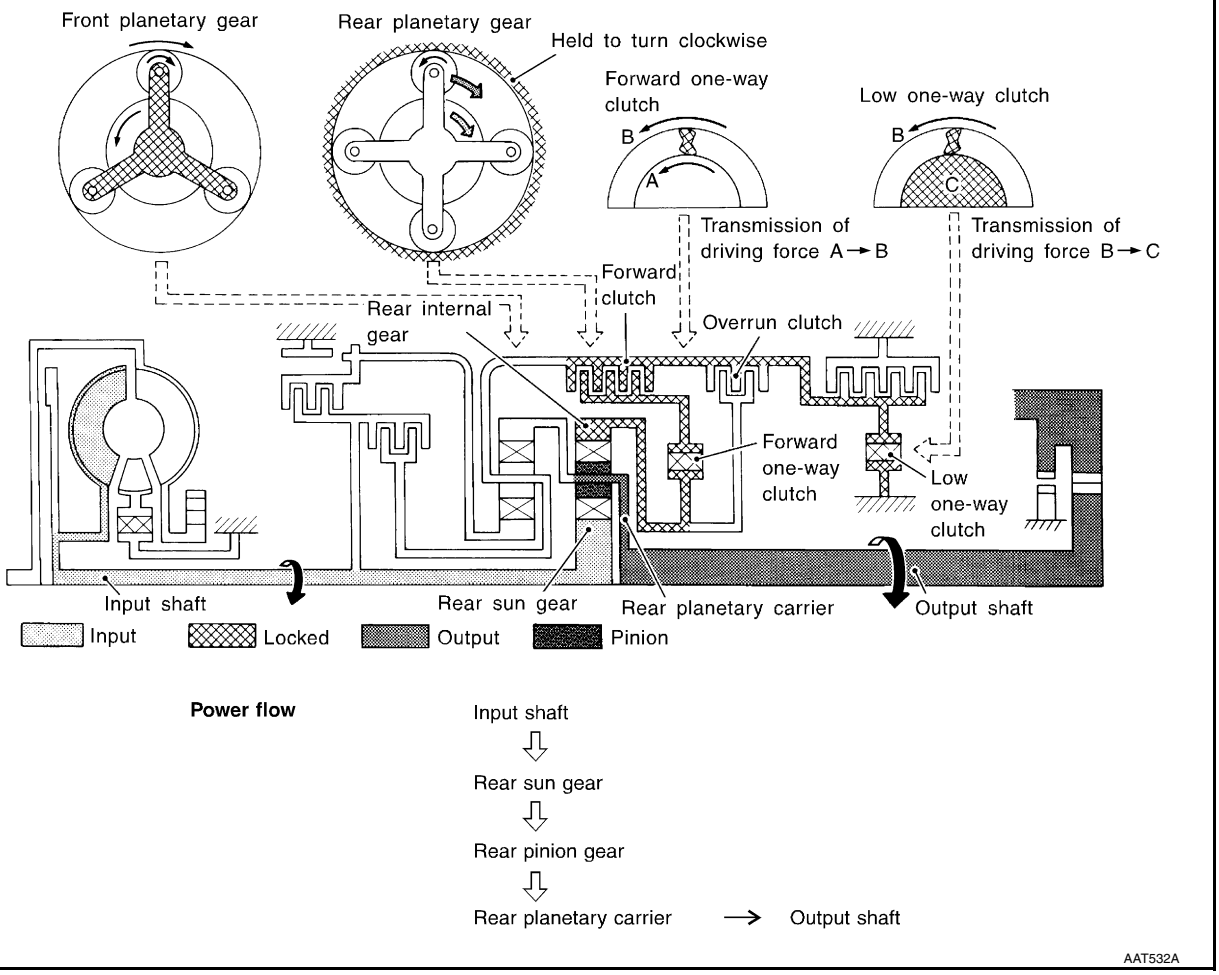


11 Position



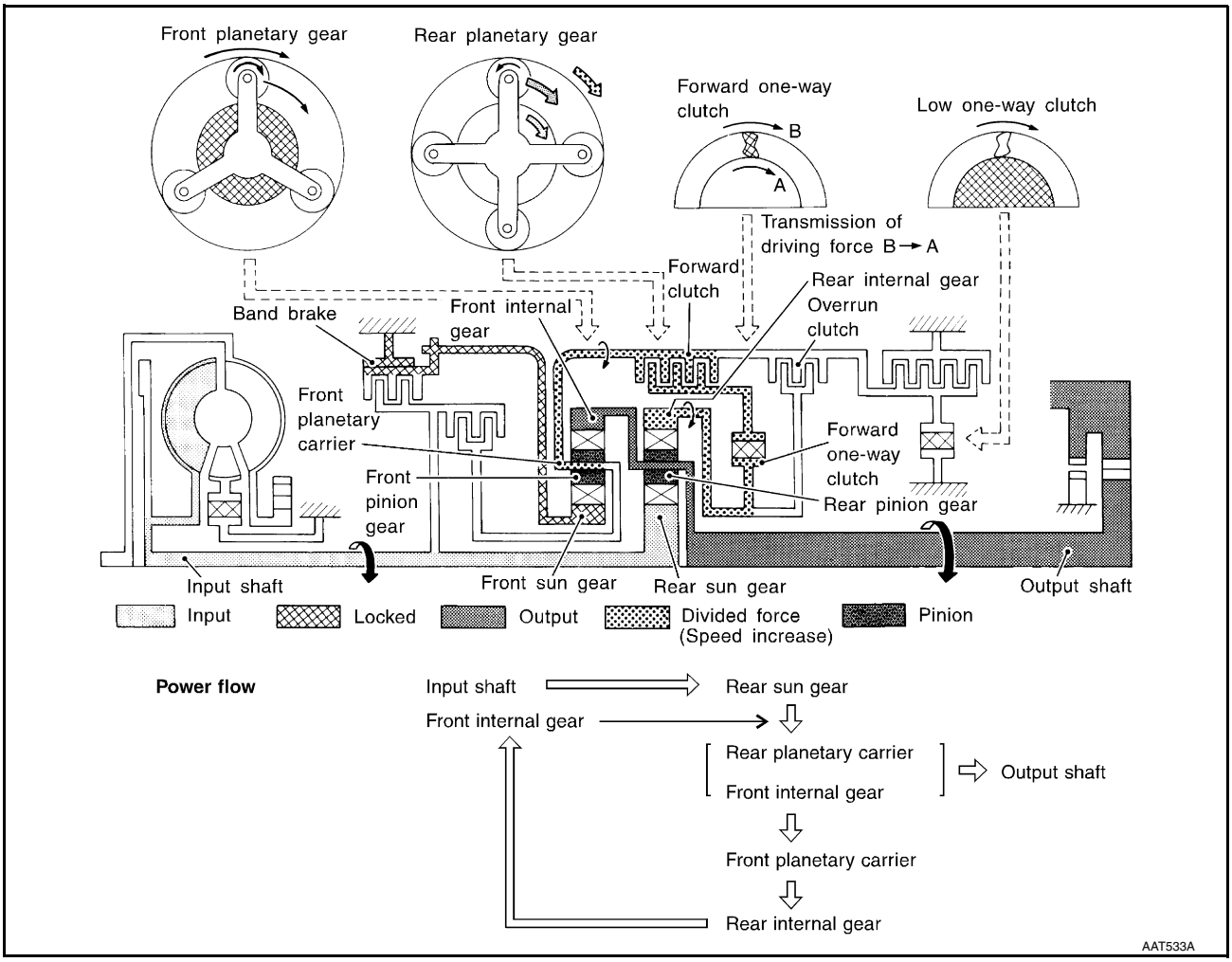
● **Forward clutch** ● **Forward one-way clutch** ● **Overrun clutch** ● **Low and reverse brake**	As overrun clutch engages, rear internal gear is locked by the operation of low and reverse brake. This is different from that of D_1 and 2_1 .
Engine brake	Overrun clutch always engages, therefore engine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

D_1 and 2_1 Positions



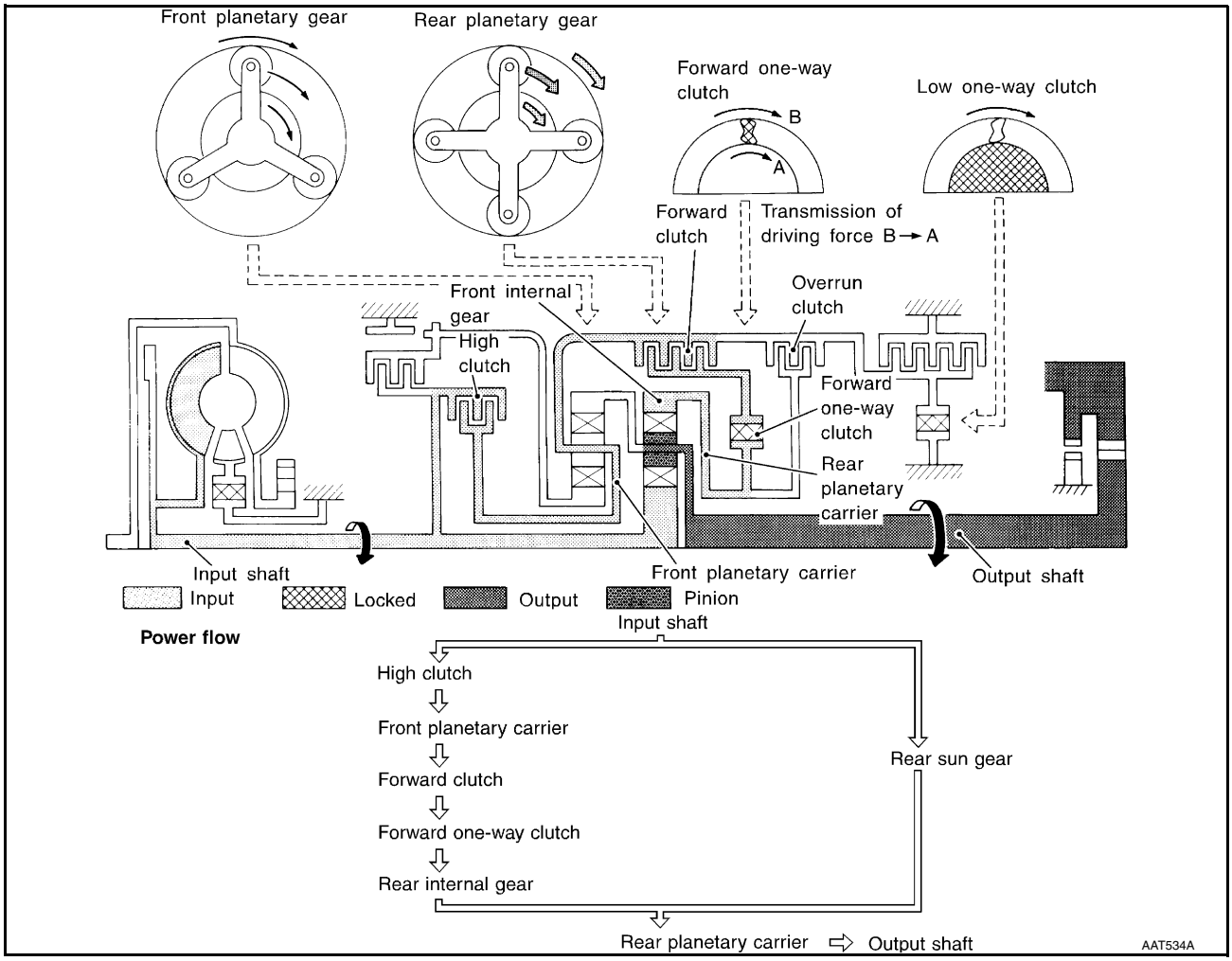
● **Forward one-way clutch** ● **Forward clutch** ● **Low one-way clutch**	Rear internal gear is locked to rotate counterclockwise because of the functioning of these three clutches.
Overrun clutch engagement conditions (Engine brake)	D_1 : Overdrive control switch OFF and throttle opening is less than 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.

D2 , 32 , 22 and 12 Positions



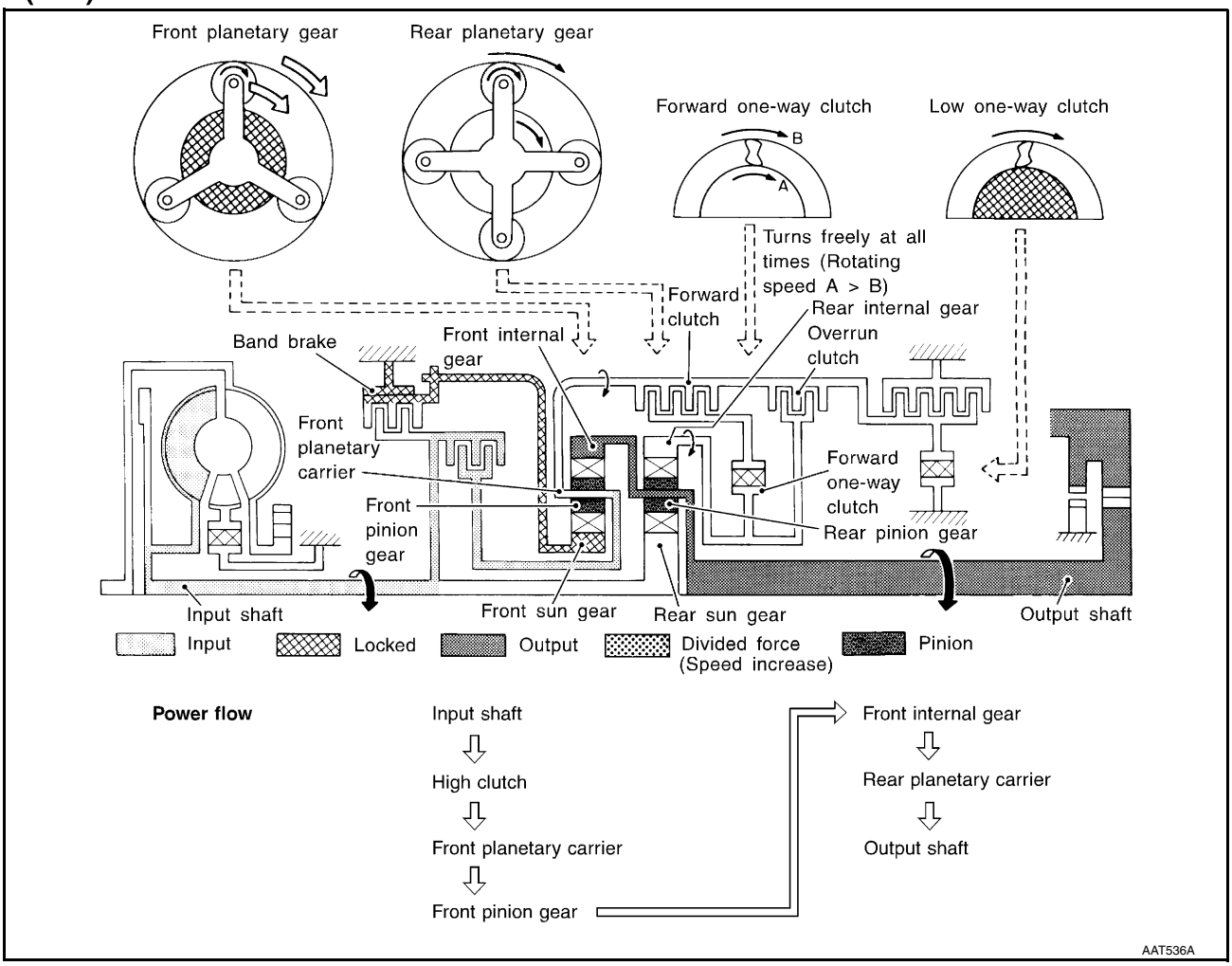
• **Forward clutch** • **Forward one-way clutch** • **Brake band**	Rear sun gear drives rear planetary carrier and combined front internal gear. Front internal gear now rotates around front sun gear accompanying front planetary carrier. As front planetary carrier transfers the power to rear internal 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	D2 : Overdrive control switch OFF and throttle opening is less than 3/16 22 and 12 : Always engaged

D3 and 33 Positions



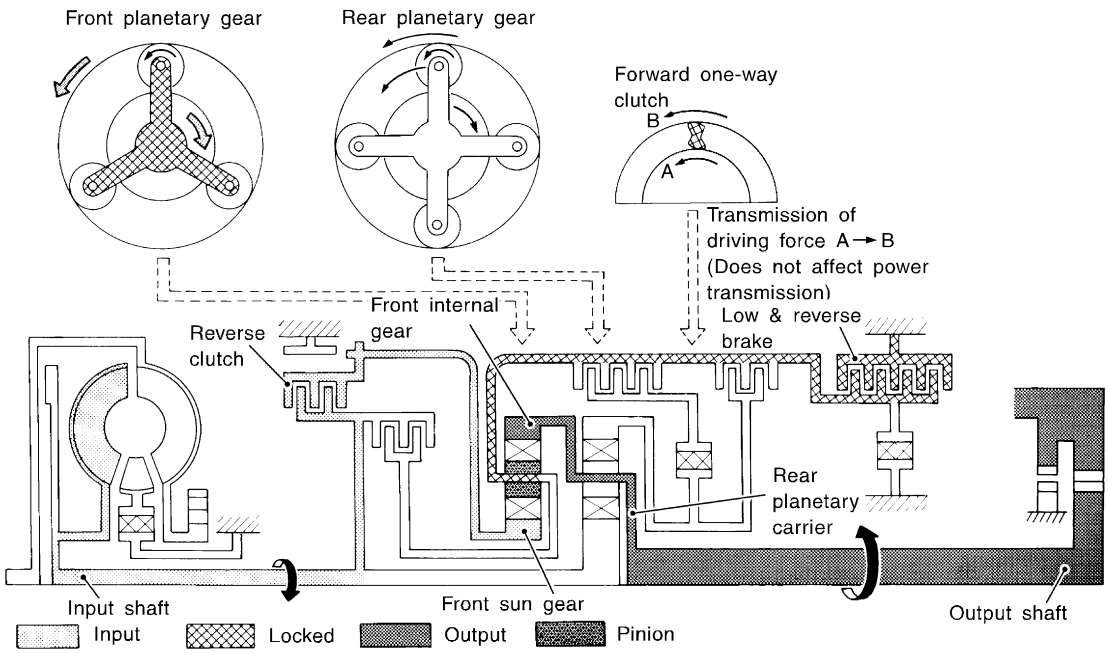
• **High clutch** • **Forward clutch** • **Forward one-way clutch**	Input power is transmitted to front planetary carrier through high clutch. And front planetary carrier is connected to rear internal gear by operation of forward clutch and forward one-way clutch. This rear internal gear rotation and another input (the rear sun gear) accompany rear planetary carrier to turn at the same speed.
Overrun clutch engagement conditions	D3 : Overdrive control switch OFF and throttle opening is less than 3/16

D4 (O/D) 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 D4 position, there is no one-way clutch in the power transmission line and engine brake can be obtained when decelerating.

R Position



Power flow

Input shaft
⇩
Reverse clutch
⇩
Front pinion gear ⇦ Front sun gear
⇩
Front internal gear ⇨ Output shaft

AAT535A

● **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.

Control System

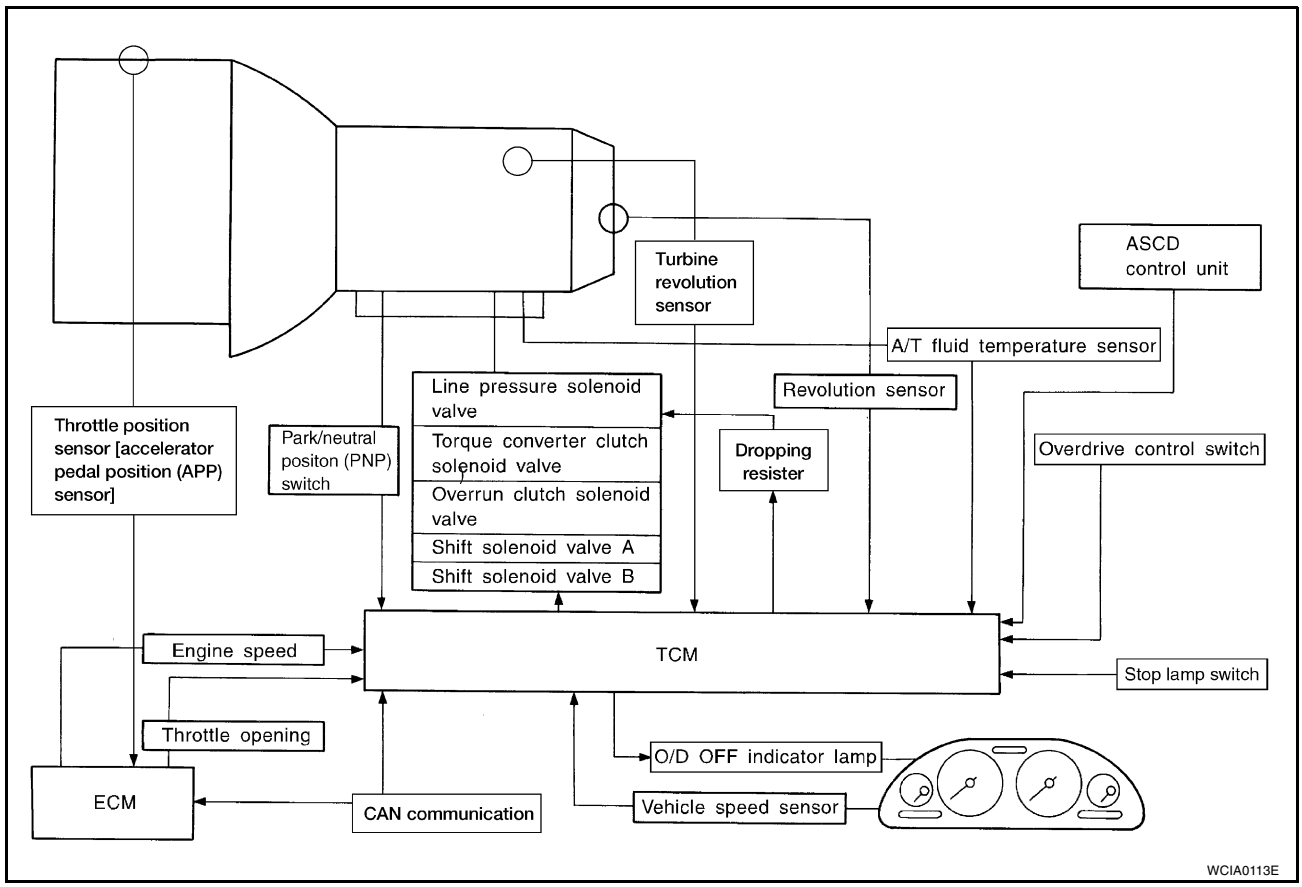
ECS0062E

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 [accelerator pedal position (APP) sensor] Engine speed signal A/T fluid temperature sensor Revolution sensor Vehicle speed sensor Overdrive control switch ASCD control unit Stop lamp switch Turbine revolution sensor	▶	Shift control Line pressure control Lock-up control Overrun clutch control Timing control Fail-safe control Self-diagnosis CONSULT-II communication line 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



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 [accelerator pedal position (APP) sensor]	Detects accelerator pedal position and requested throttle opening and sends a signal to TCM.
	Engine speed signal	Receives signal from ECM and controls lock-up control solenoid valve.
	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 which is used if revolution sensor (installed on transmission) malfunctions.
	Overdrive control switch	Sends a signal to the TCM which prohibits a shift to D_4 (overdrive) position.
	ASCD control unit	Sends the cruise signal and D_4 (overdrive) cancellation signal from ASCD control unit to TCM.
	Stop lamp switch	Send the lock-up release signal to the TCM at time of D_4 (lock-up).
	CAN communication	Control units are connected to two communication lines (CAN H and CAN L) allowing a high rate of information transmission.
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 line pressure suited to driving conditions in relation to a signal sent from TCM.
	Torque converter clutch solenoid valve	Regulates 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.
	CAN communication	Control units are connected to two communication lines (CAN H and CAN L) allowing a high rate of information transmission.

CAN Communication

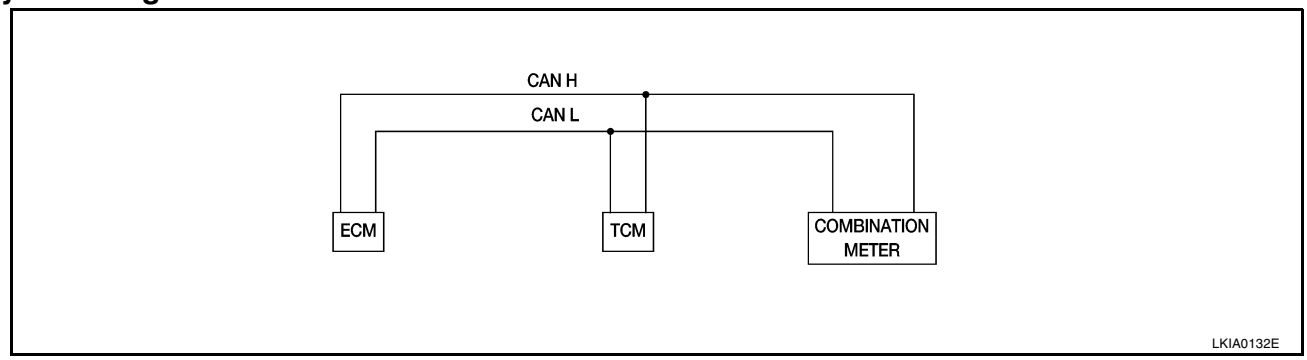
ECS006H8

SYSTEM DESCRIPTION

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

CAN COMMUNICATION UNIT

System diagram



Input/output signal chart

T: Transmit R: Receive

Signals	ECM	TCM
Accelerator pedal position signal	T	R
Output shaft revolution signal	R	T
A/T self-diagnosis signal	R	T
Wide open throttle position signal	T	R
Overdrive cancel signal	T	R

Control Mechanism

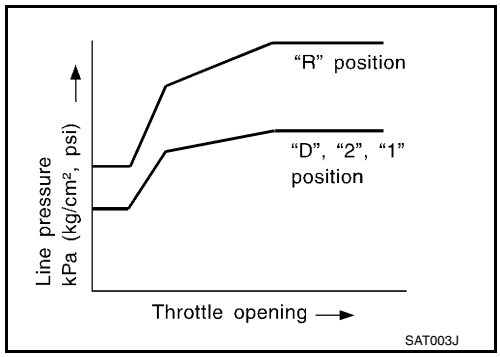
ECS0062F

LINE PRESSURE CONTROL

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

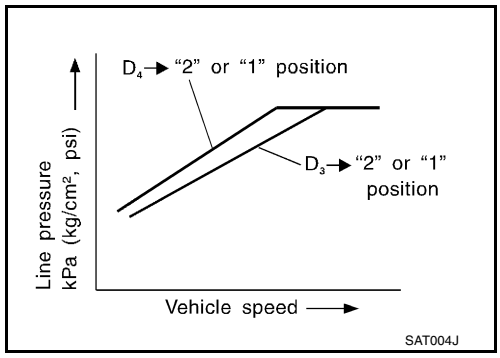
Normal Control

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



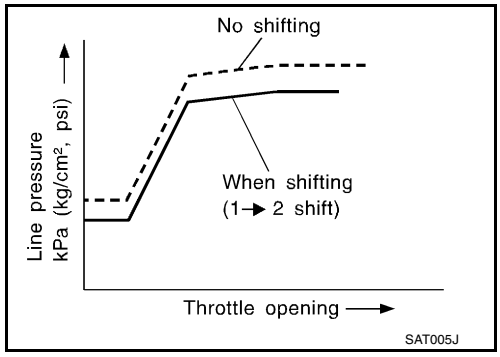
Back-up Control (Engine brake)

If the selector lever is shifted to 2 position while driving in D4 (O/D) or D3 , 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

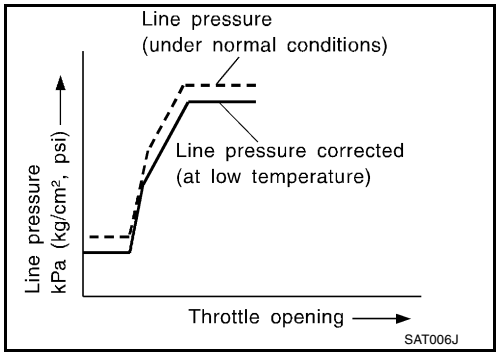
The line pressure is temporarily reduced corresponding to a change in engine torque when shifting gears (that is, when the shift solenoid valve is switched for clutch operation) to reduce shifting shock.



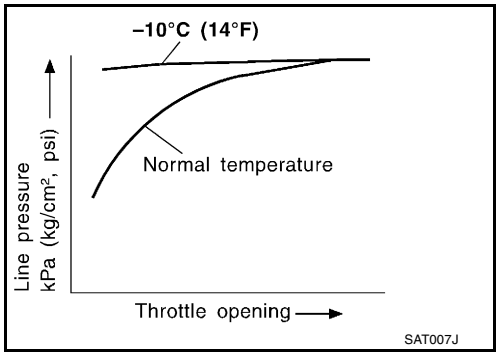
At Low Fluid Temperature

- 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.

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



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

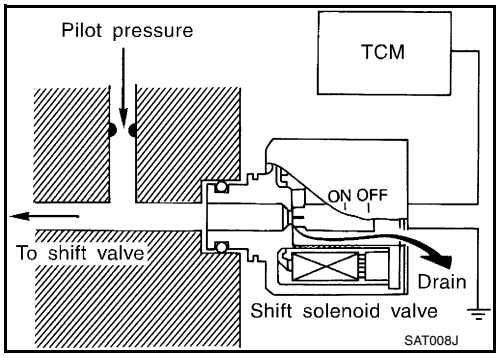


SHIFT CONTROL

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 the ECM (throttle opening). This results in improved acceleration performance and fuel economy.

Control of Shift Solenoid Valves A and B

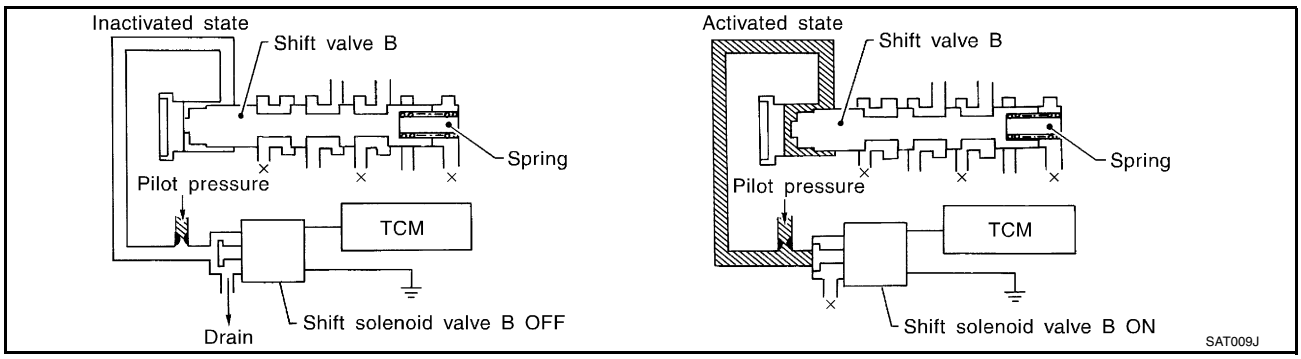
The TCM activates shift solenoid valves A and B according to signals from the ECM (throttle opening) and revolution sensor to select the optimum gear position on the basis of the shift schedule memorized in the TCM.
The shift solenoid valve performs simple ON-OFF operation. When set to ON, the drain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



Relation between shift solenoid valves A and B and gear positions

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

Control of Shift Valves A and B



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

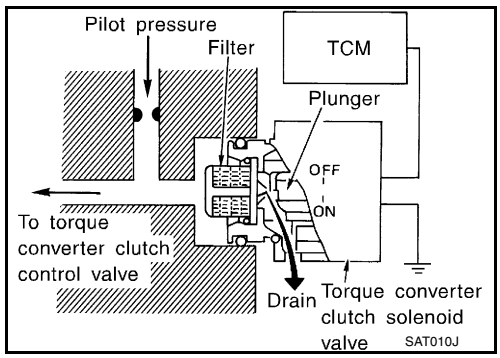
Conditions for Lock-up Operation

When vehicle is driven in 3rd and 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 occurs.

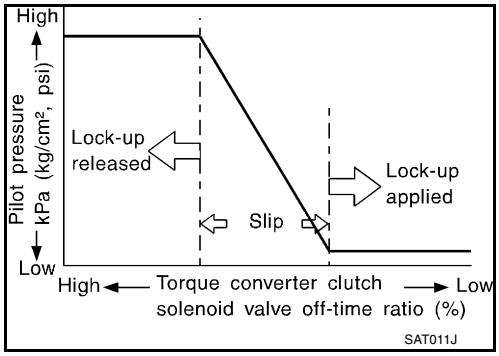
Overdrive control switch	ON	OFF
Selector lever	D position	
Gear position	D_4	D_3
Vehicle speed sensor	More than set value	
ECM (throttle opening)	Less than set opening	
A/T fluid temperature sensor	More than 40°C (104°F)	

Torque Converter Clutch Solenoid Valve Control

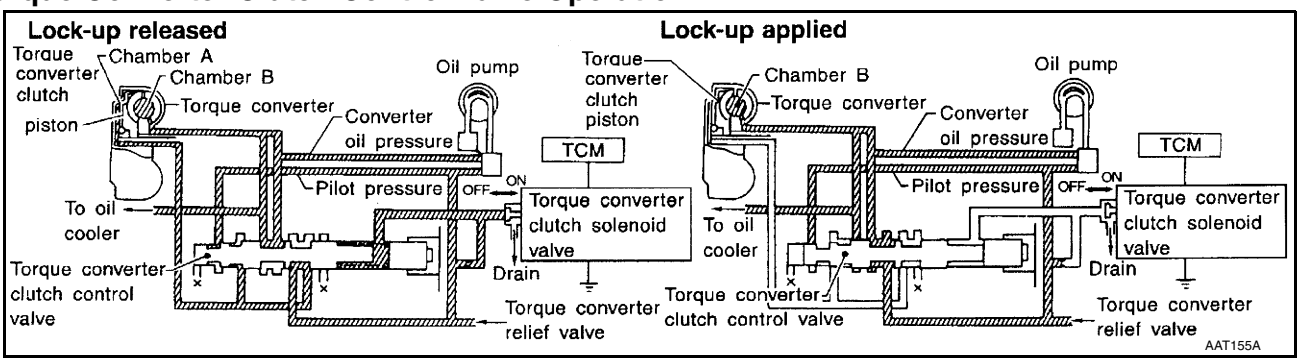
The torque converter clutch solenoid valve is controlled by the TCM. The plunger closes the drain circuit during the OFF period, and opens the circuit during the ON period. If the percentage of OFF-time increases in one cycle, the pilot pressure drain time is reduced and pilot pressure remains high.



The torque converter clutch piston is designed to slip to adjust the ratio of ON-OFF, thereby reducing lock-up shock.
OFF-time INCREASING
↓
Amount of drain DECREASING
↓
Pilot pressure HIGH
↓
Lock-up RELEASING



Torque Converter Clutch Control Valve Operation



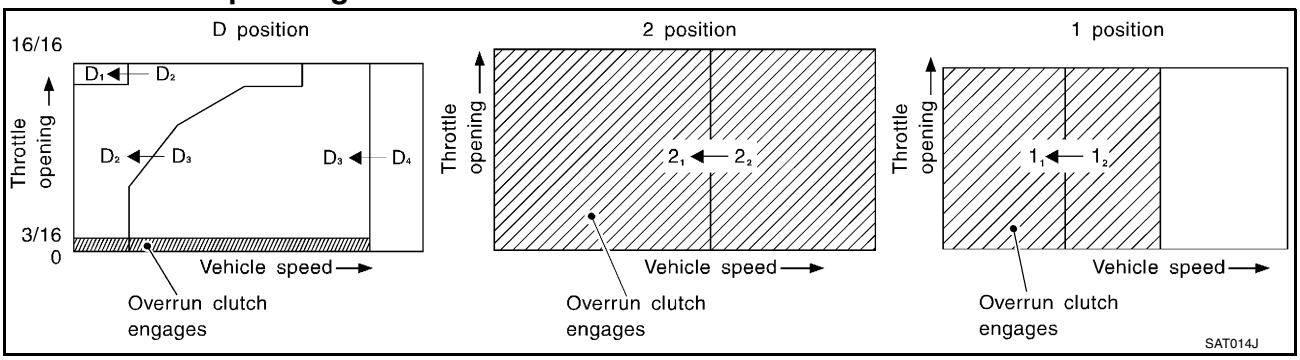
Lock-up released
The OFF-duration of the torque converter clutch solenoid valve is long, and pilot pressure is high. The pilot pressure pushes the end face of the torque converter clutch control valve in combination with spring force to move the valve to the left. As a result, converter pressure is applied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

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

OVERRUN CLUTCH CONTROL (ENGINE BRAKE CONTROL)

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.

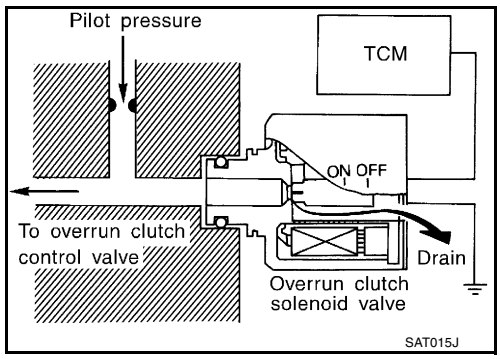
Overrun Clutch Operating Conditions



	Gear position	Throttle opening
D position	D1 , D2 , D3 gear position	Less than 3/16
2 position	21 , 22 gear position	
1 position	11 , 12 gear position	At any position

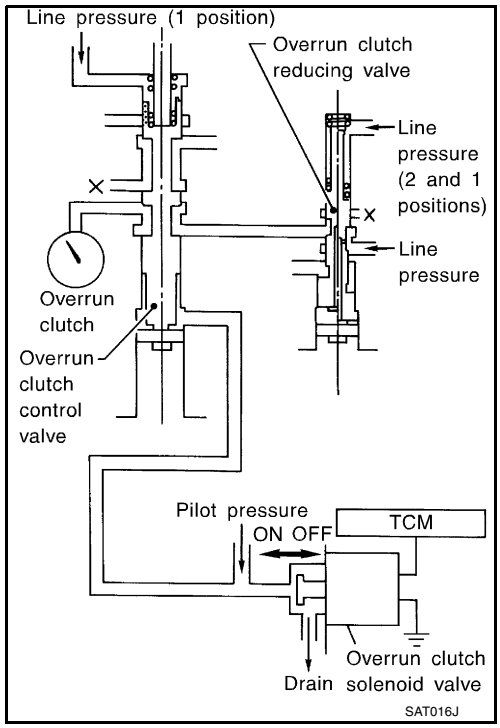
Overrun Clutch Solenoid Valve Control

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 valve is OFF, pilot pressure is not generated. At this point, the overrun clutch control valve moves downward by spring force. As a result, overrun clutch operation pressure is provided by the overrun clutch reducing valve. This causes the overrun clutch to engage.
In the 1 position, the overrun clutch control valve remains pushed down so that the overrun clutch is engaged at all times.



Control Valve

ECS0062G

FUNCTION OF CONTROL VALVES

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

Valve name	Function
Shift valve B	Simultaneously switches two oil circuits using output pressure of shift solenoid valve B in relation to driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve A.
Overrun clutch control valve	Switches hydraulic circuits to prevent engagement of the overrun clutch simultaneously with application of the brake band in D_4 . (Interlocking occurs if the overrun clutch engages during D_4 .)
“1” reducing valve	Reduces low & reverse brake pressure to dampen engine-brake shock when 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.
3-2 timing valve	Switches the pace that oil pressure is released depending on vehicle speed; maximizes the high clutch release timing, and allows for soft down shifting.
Shuttle valve	Determines if the overrun clutch solenoid valve should control the 3-2 timing valve or the overrun clutch control valve and switches between the two.
Cooler check valve	At low speeds and with a small load when little heat is generated, saves the volume of cooler flow, and stores the oil pressure for lock up.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

PFP:00000

Introduction

ECS0062H

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 details, refer to AT-427, "OBD-II Function for A/T System" .

OBD-II Function for A/T System

ECS0062I

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

ECS0062J

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	X	
Shift solenoid valve B — DTC: P0755	X	
Throttle position sensor [accelerator pedal position (APP) sensor] — DTC: P1705	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)

ECS0062K

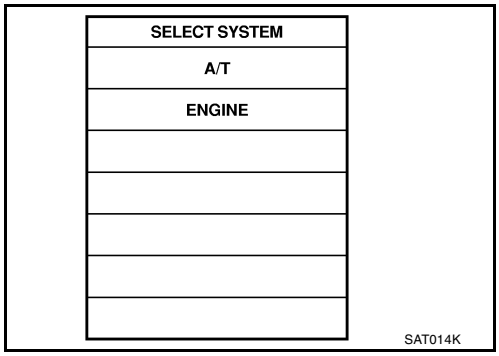
HOW TO READ DTC AND 1ST TRIP DTC

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

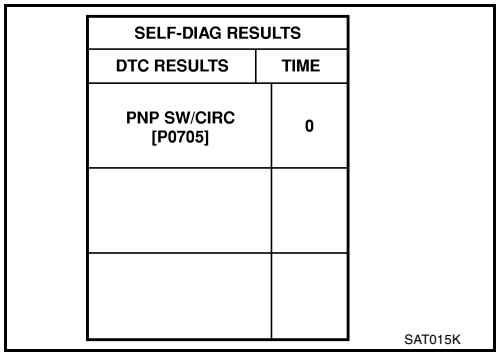
(With CONSULT-II or GST) GST) CONSULT-II or GST (Generic Scan Tool) Examples: P0705, P0710, P0720, P0725, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

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

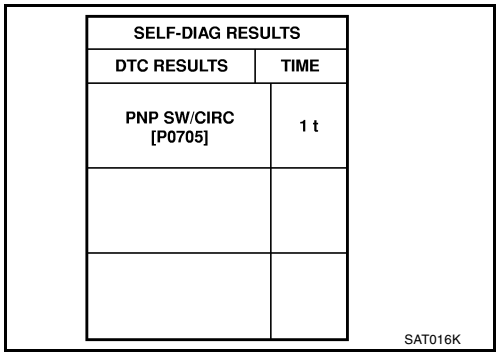
A sample of CONSULT-II display for DTC and 1st trip DTC is shown in the following page. DTC or 1st trip DTC of a malfunction is displayed in “SELF DIAGNOSIS” mode for “ENGINE” with CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.



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 “1t”.



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-1248, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
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 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
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 in the 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-1245, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" .

- **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)

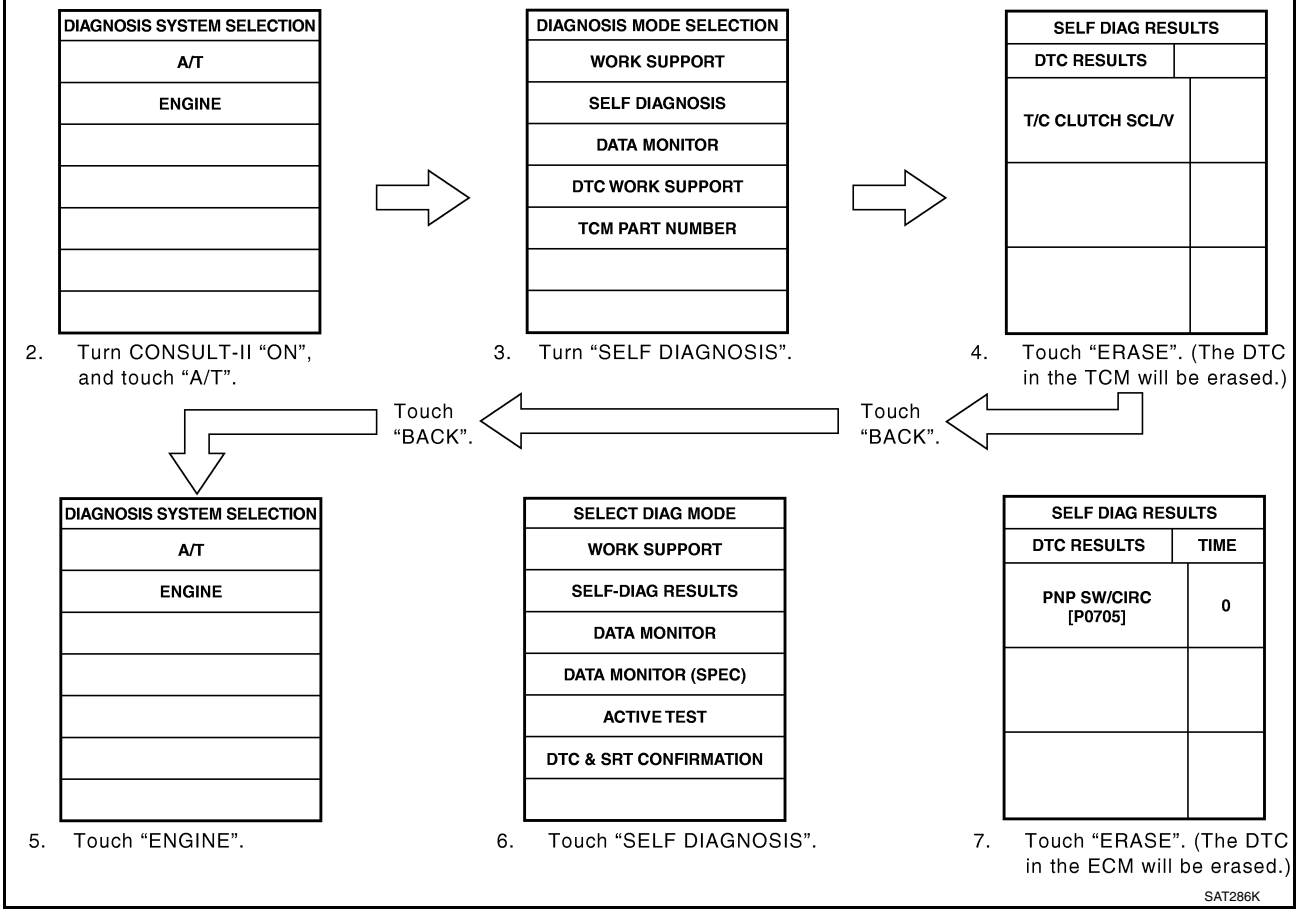
- **If a DTC is displayed for both ECM and TCM, it needs to be erased for both ECM and TCM.**

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 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 DIAGNOSIS”.

7. Touch “ERASE”. (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

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



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 10 seconds and then turn it ON (engine stopped) again.
2. Perform TCM self-diagnostic procedure. Refer to AT-440, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" . (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-1258, "How to Erase DTC (With GST)" .

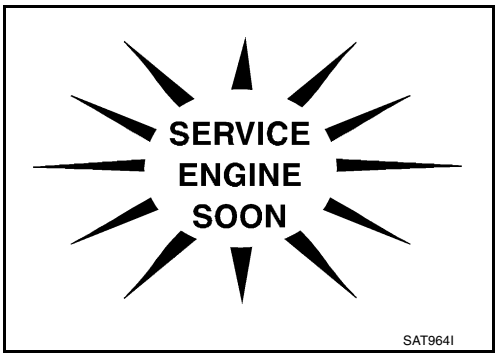
HOW TO ERASE DTC (NO TOOLS)

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.
2. Perform TCM self-diagnostic procedure. Refer to AT-440, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" . (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Perform OBD-II self-diagnostic procedure. Refer to AT-439, "OBD-II SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" . (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)

Malfunction Indicator Lamp (MIL)

ECS0062L

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 DI-27, "WARNING LAMPS" .
     (Or see AT-431, "Malfunction Indicator Lamp (MIL)" .)
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 details, refer to AT-427, "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" .



CONSULT-II

ECS0062M

After performing AT-431, "SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)" , place check marks for results on the AT-445, "DIAGNOSTIC WORKSHEET" . Reference pages are provided following the items.

NOTICE:

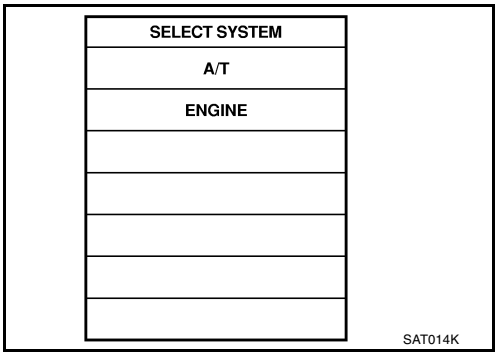
1. The CONSULT-II electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
   Check for time difference between actual shift timing and the CONSULT-II display. If the difference is noticeable, mechanical parts (except solenoids, sensors, etc.) may be malfunctioning.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

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

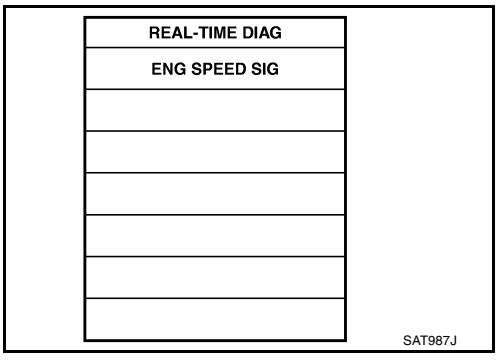
3. Shift solenoid valve “A” or “B” is displayed on CONSULT-II at the start of shifting. Gear position is displayed upon completion of shifting (which is computed by TCM).
4. Additional CONSULT-II information can be found in the Operation Manual supplied with the CONSULT-II unit.

SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)

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-486, "TROUBLE DIAGNOSIS FOR POWER SUPPLY" . If result is NG, refer to PG-2, "POWER SUPPLY ROUTING" .



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



SELF-DIAGNOSTIC RESULT TEST MODE

Detected items (Screen terms for CONSULT-II, "SELF DIAGNOSIS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
"A/T"	"ENGINE"		Available by O/D OFF indicator lamp or "A/T" on CONSULT-II	Available by malfunction indicator lamp*2, "ENGINE" on CONSULT-II or GST
Park/neutral position (PNP) switch circuit		● TCM does not receive the correct voltage signal (based on the gear position) from the switch.	—	P0705
—	PNP SW/CIRC			
Revolution sensor		● TCM does not receive the proper voltage signal from the sensor.	X	P0720
VHCL SPEED SEN·A/T	VEH SPD SEN/ CIR AT			
Vehicle speed sensor (Meter)		● TCM does not receive the proper voltage signal from the sensor.	X	—
VHCL SPEED SEN·MTR	—			
A/T 1st gear function		● A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	—	P0731*1
A/T 1ST GR FNCTN	A/T 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 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 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 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	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 [accelerator pedal position (APP) sensor] signal		● TCM receives an excessively low or high voltage from this 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				

Detected items (Screen terms for CONSULT-II, "SELF DIAGNOSIS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
"A/T"	"ENGINE"		Available by O/D OFF indicator lamp or "A/T" on CONSULT-II	Available by malfunction indicator lamp*2, "ENGINE" on CONSULT-II or GST
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			
Engine control		● The ECM-A/T communication line is open or shorted.	X	U1000
A/T COMM LINE	—			
Turbine revolution sensor		● TCM does not receive the proper voltage signal from the sensor.	X	P0710
TURBINE REV				
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-1259, "Malfunction Indicator Lamp (MIL)" .

DATA MONITOR MODE (A/T)

Item	Display	Monitor item		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 with vehicle stationary, CONSULT-II data may not indicate 0 km/h (0 mph).
Vehicle speed sensor 2 (Meter)	VHCL/S SE·MTR [km/h] or [mph]	X	—	● Vehicle speed computed from signal of vehicle speed sensor is displayed.	Vehicle speed display may not be accurate under approx. 10 km/h (6 mph). It may not indicate 0 km/h (0 mph) when vehicle is stationary.
Throttle position sensor [accelerator pedal position (APP) sensor]	THRTL POS SEN [V]	X	—	● Throttle position sensor signal voltage is displayed.	

Item	Display	Monitor item		Description	Remarks
		TCM Input signals	Main signals		
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.
Turbine revolution sensor	TURBINE REV	X	—	● Checks changing speed then performs oil pressure control and torque down control.	
Overdrive control switch	OVERDRIVE SW [ON/OFF]	X	—	● ON/OFF state computed from signal of overdrive control SW is displayed.	
PN position (PNP) 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.
Gear position	GEAR	—	X	● Gear position data used for computation by TCM, is displayed.	
Selector lever position	SLCT LVR POSI	—	X	● Selector lever position data, used for computation by TCM, is displayed.	● A specific value used for control is displayed if fail-safe is activated due to error.

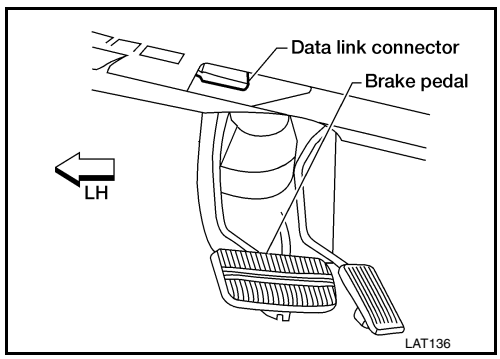
Item	Display	Monitor item		Description	Remarks
		TCM Input signals	Main signals		
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	● Vehicle speed data, used for computation by TCM, is displayed.	
Throttle position sensor [accelerator pedal position (APP) sensor]	THROTTLE POSI [/8]	—	X	● Throttle position data, used for computation by TCM, is displayed.	● A specific value used for control is displayed if fail-safe is activated due to error.
Stop lamp switch	BRAKE SW [ON/OFF]	X	—	● ON/OFF status is displayed. ON ... Brake pedal is depressed. OFF ... Brake pedal is released.	
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

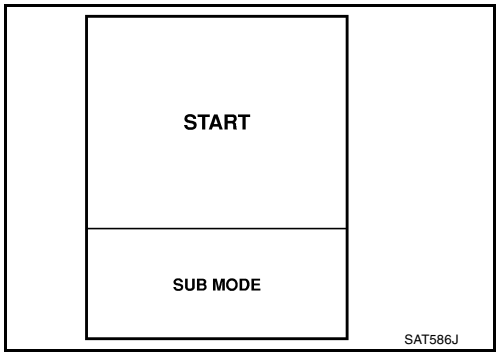
DTC WORK SUPPORT MODE WITH CONSULT-II

CONSULT-II Setting Procedure

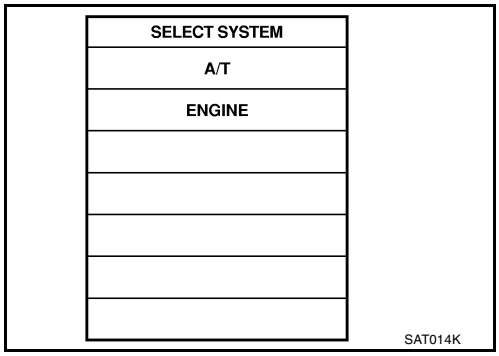
1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector, which is located in left side dash panel.



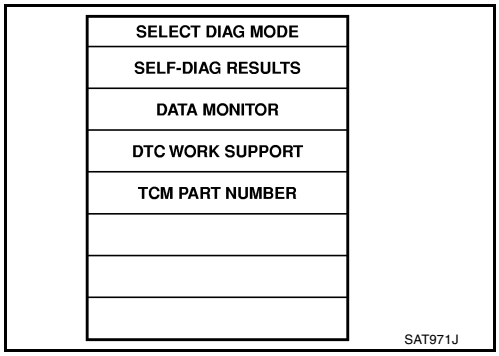
3. Turn ignition switch ON.
4. Touch “START”.



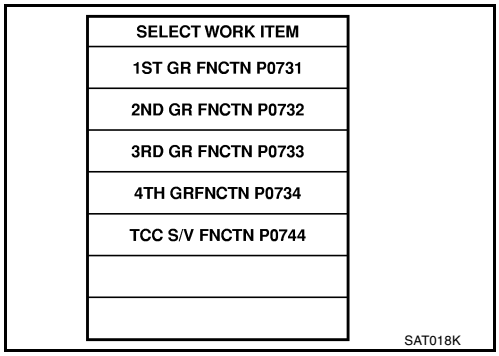
5. Touch “A/T”.



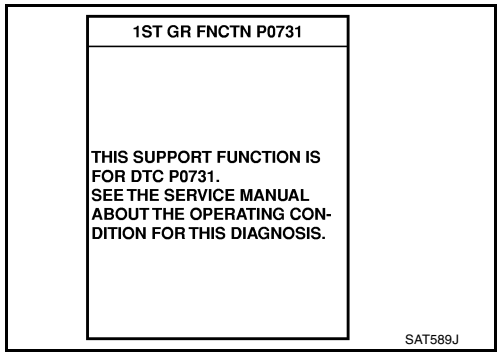
6. Touch “DTC WORK SUPPORT”.



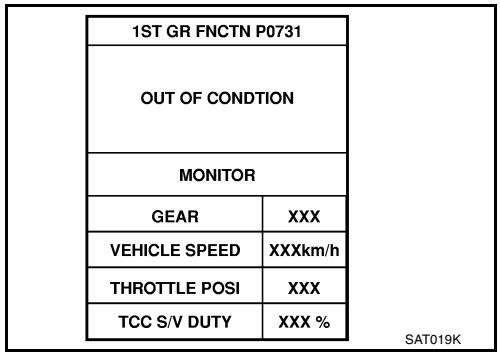
7. Touch select item menu (1ST, 2ND, etc.).



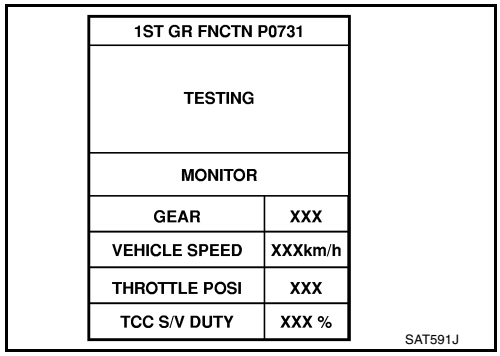
8. Touch “START”.



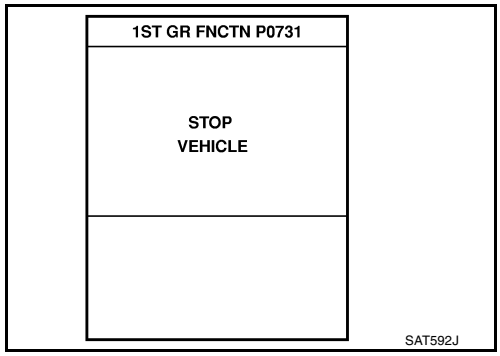
9. Perform driving test according to “DTC CONFIRMATION PROCEDURE” in “TROUBLE DIAGNOSIS FOR DTC”.

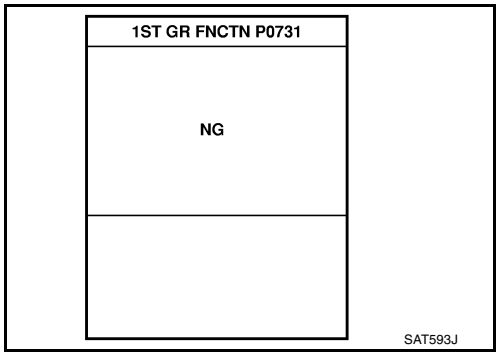


- **When testing conditions are satisfied, CONSULT-II screen changes from “OUT OF CONDITION” to “TESTING”.**

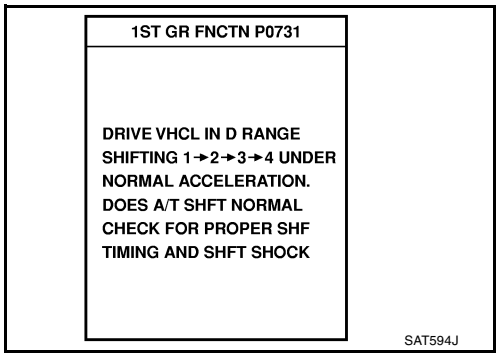


10. Stop vehicle. If “NG” appears on the screen, malfunction may exist. Go to “DIAGNOSTIC PROCEDURE”.

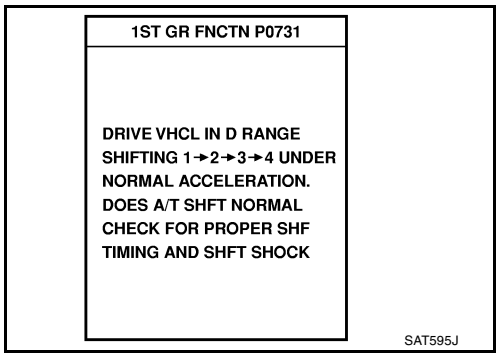




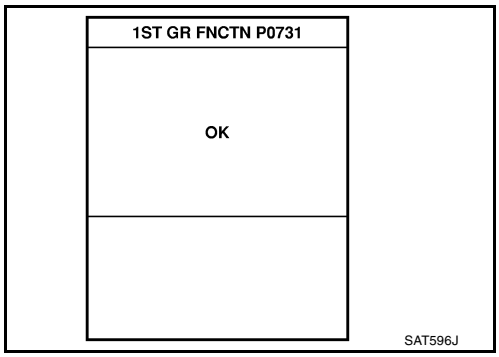
11. Perform test drive to check gear shift feeling in accordance with instructions displayed.

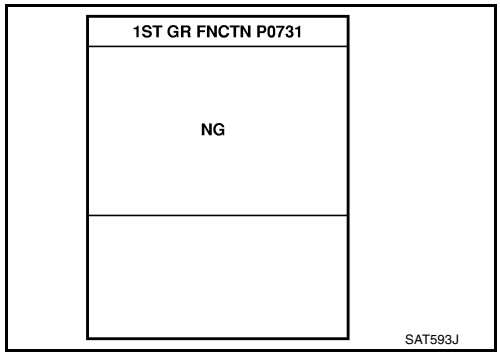


12. Touch “YES” or “NO”.



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 item
1ST GR FNCTN P0731	Following items for “A/T 1st gear function (P0731)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
2ND GR FNCTN P0732	Following items for “A/T 2nd gear function (P0732)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
3RD GR FNCTN P0733	Following items for “A/T 3rd gear function (P0733)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Each clutch ● Hydraulic control circuit
4TH GR FNCTN P0734	Following items for “A/T 4th gear function (P0734)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Shift solenoid valve B ● 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

ECS0062N

OBD-II SELF-DIAGNOSTIC PROCEDURE (WITH GST)

Refer to EC-1313, "Generic Scan Tool (GST) Function" .

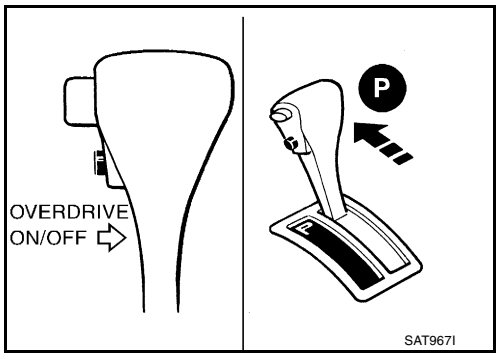
OBD-II SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)

Refer to EC-1259, "Malfunction Indicator Lamp (MIL)" .

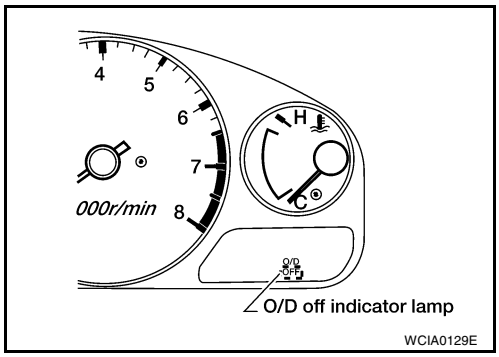
TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)

1. CHECK O/D OFF INDICATOR LAMP

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



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

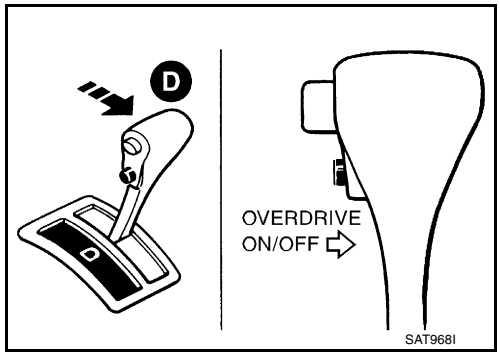


Yes or No

Yes >> GO TO 2.
No >> Stop procedure. Perform AT-600, "1. O/D OFF Indicator Lamp Does Not Come On" before proceeding.

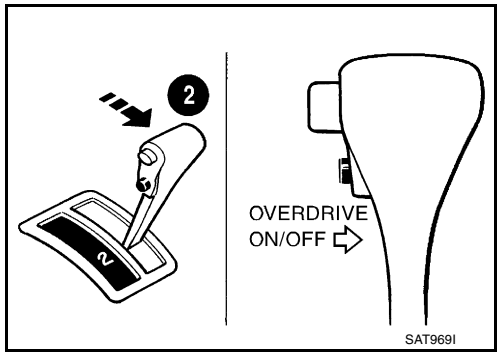
2. JUDGEMENT PROCEDURE STEP 1

1. Turn ignition switch to OFF position.
2. Turn ignition switch to ACC position.
3. Move selector lever from P to D position.
4. Turn ignition switch to ON position.
   (Do not start engine.)
5. Depress and hold overdrive control switch in OFF position (the O/D OFF indicator lamp will be ON) until directed to release the switch. (If O/D OFF indicator lamp does not come on, refer to “Steps 3 and 4” in AT-600, "1. O/D OFF Indicator Lamp Does Not Come On").
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.
10. Move selector lever to 2 position.
11. Depress and release overdrive control switch in ON position until next step is completed (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.

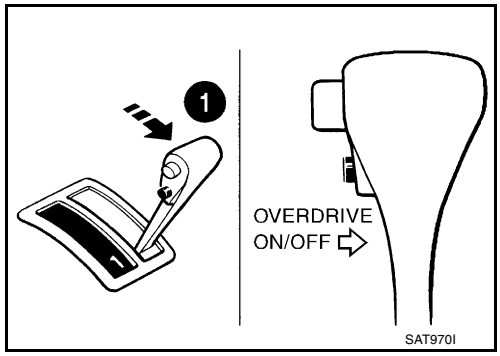
    >> GO TO 3.



3. JUDGEMENT PROCEDURE STEP 2

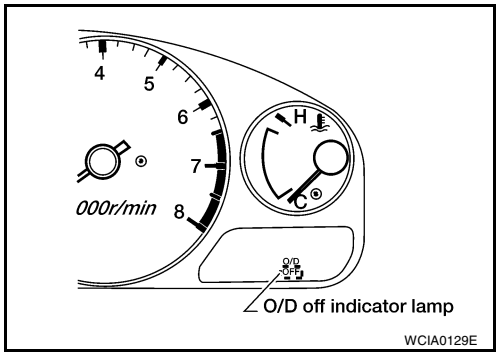
1. Move selector lever to 1 position.
2. Release the overdrive control switch.
3. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be ON).
4. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be OFF).
5. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be ON) until directed to release the switch.
6. Depress accelerator pedal fully and release it.
7. Release the overdrive control switch (the O/D OFF indicator lamp will begin to flash ON and OFF).

    >> GO TO 4.



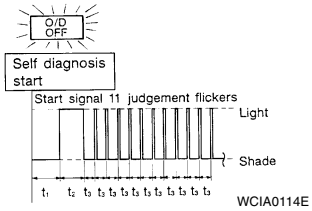
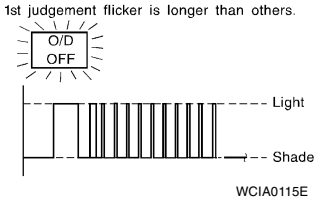
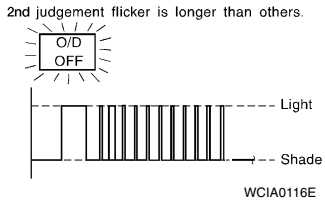
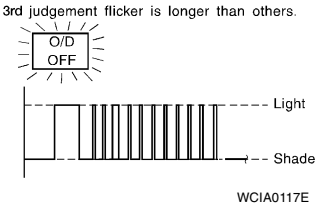
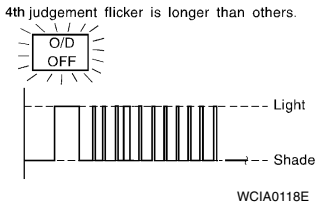
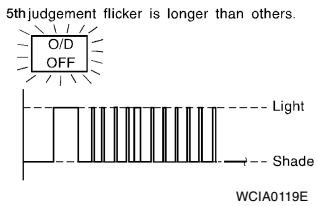
4. CHECK SELF-DIAGNOSTIC CODE

Check O/D OFF indicator lamp.
Refer to AT-442, "JUDGEMENT OF SELF-DIAGNOSIS CODE" .

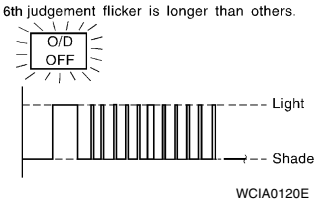
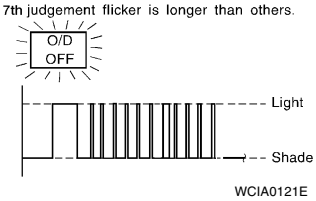
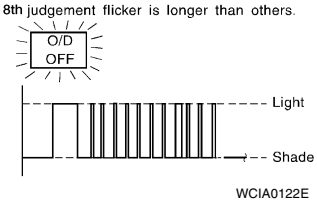
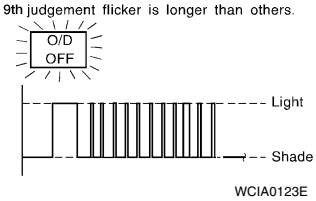
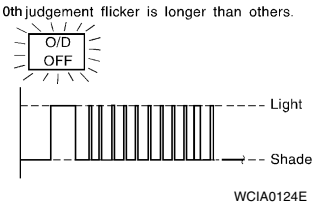
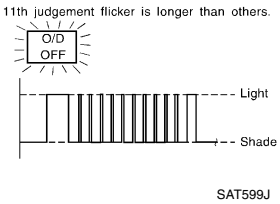
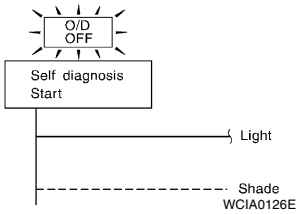
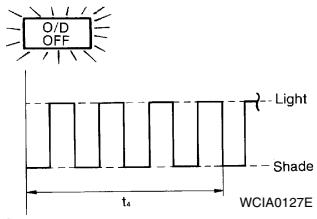


>> **DIAGNOSIS END**

JUDGEMENT OF SELF-DIAGNOSIS CODE

O/D OFF indicator lamp:	
All judgement flickers are the same.  All circuits that can be confirmed by self-diagnosis are OK.	1st judgement flicker is longer than others.  Revolution sensor circuit is short-circuited or disconnected. ⇒ **Go to** **AT-501, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)"** **.**
2nd judgement flicker is longer than others.  Vehicle speed sensor circuit is short-circuited or disconnected. ⇒ **Go to** **AT-578, "DTC VEHICLE SPEED SENSOR MTR"** **.**	3rd judgement flicker is longer than others.  Throttle position sensor [accelerator pedal position (APP) sensor] circuit is short-circuited or disconnected. ⇒ **Go to** **AT-561, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"** **.**
4th judgement flicker is longer than others.  Shift solenoid valve A circuit is short-circuited or disconnected. ⇒ **Go to** **AT-551, "DTC P0750 SHIFT SOLENOID VALVE A"** **.**	5th judgement flicker is longer than others.  Shift solenoid valve B circuit is short-circuited or disconnected. ⇒ **Go to** **AT-556, "DTC P0755 SHIFT SOLENOID VALVE B"** **.**

O/D OFF indicator lamp:

6th judgement flicker is longer than others.  Overrun clutch solenoid valve circuit is short-circuited or disconnected. ⇒ **Go to** AT-566, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" .	7th judgement flicker is longer than others.  Torque converter clutch solenoid valve circuit is short-circuited or disconnected. ⇒ **Go to** AT-532, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" .
8th judgement flicker is longer than others.  A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged. ⇒ **Go to** AT-495, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" .	9th judgement flicker is longer than others.  Engine speed signal circuit is short-circuited or disconnected. ⇒ **Go to** AT-506, "DTC P0725 ENGINE SPEED SIGNAL" .
10th judgement flicker is longer than others.  Line pressure solenoid valve circuit is short-circuited or disconnected. ⇒ **Go to** AT-545, "DTC P0745 LINE PRESSURE SOLENOID VALVE" .	11th judgement flicker is longer than others.  The ECM-A/T communication line is open or shorted. ⇒ **Go to** AT-588, "DTC U1000 CAN COMMUNICATION LINE" .
Lamp comes on.  Park/neutral position (PNP) switch, overdrive control switch or throttle position switch circuit is disconnected or TCM is damaged. ⇒ **Go to** AT-630, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" .	Flickers as shown below.  Battery power is low. Battery has been disconnected for a long time. Battery is connected conversely. (When reconnecting TCM connectors. — This is not a problem.)

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

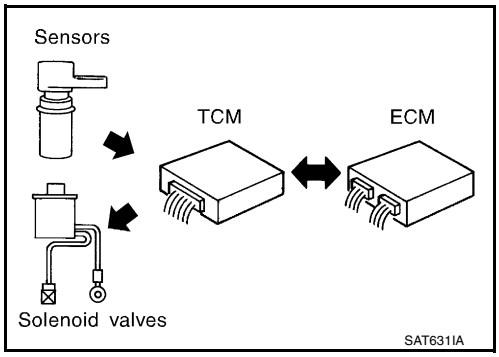
TROUBLE DIAGNOSIS - INTRODUCTION

PFP:00000

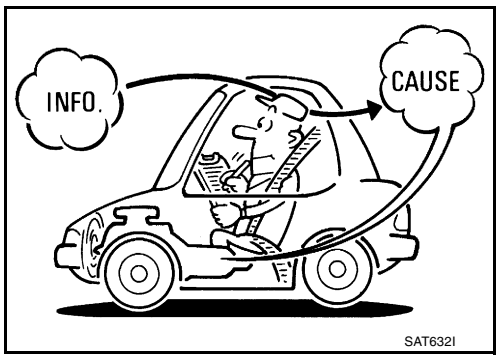
Introduction

ECS0062O

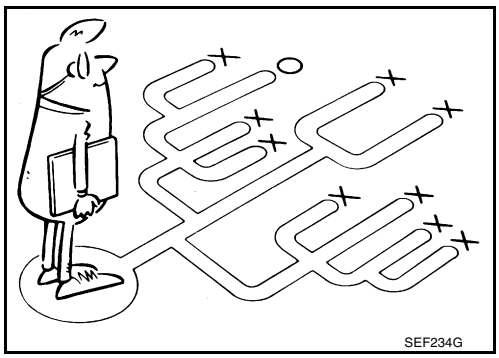
The TCM receives a signal from the vehicle speed sensor, ECM (throttle opening) or park/neutral position (PNP) switch and provides shift control or lock-up control via A/T solenoid valves.
The TCM also communicates with the ECM by means of a signal sent from sensing elements used with the OBD-related parts of the A/T system for malfunction-diagnostic purposes. The TCM is capable of diagnosing malfunctioning parts while the ECM can store malfunctions in its memory.
Input and output signals must always be correct and stable in the operation of the A/T system. The A/T system must be in good operating condition and be free of valve seizure, solenoid valve malfunction, etc.



It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.
A visual check only, may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow”. Refer to AT-448, "Work Flow"
.



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 referenced at AT-445 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

1.	❑ Read the Fail-safe and listen to customer complaints.			AT-399
2.	❑ CHECK A/T FLUID			AT-450
		❑ Leakage (Follow specified procedure) ❑ Fluid condition ❑ Fluid level		
3.	❑ Perform STALL TEST and PRESSURE TEST.			AT-450, AT-454
		❑ Stall test — Mark possible damaged components/others.		
			❑ Torque converter one-way clutch ❑ Reverse clutch ❑ Forward clutch ❑ Overrun clutch ❑ Forward one-way clutch	❑ Low & reverse brake ❑ Low one-way clutch ❑ Engine ❑ Line pressure is low ❑ Clutches and brakes except high clutch and brake band are OK
		❑ Pressure test — Suspected parts:		
4.	❑ Perform all ROAD TEST and mark required procedures.			AT-455
	4-1.	Check before engine is started.		AT-457
		❑ SELF-DIAGNOSTIC PROCEDURE - Mark detected items.		
			❑ Park/neutral position (PNP) switch, AT-489 . ❑ A/T fluid temperature sensor, AT-571 . ❑ Vehicle speed sensor·A/T (Revolution sensor), AT-501 . ❑ Engine speed signal, AT-506 . ❑ Turbine revolution sensor, AT-583 . ❑ Torque converter clutch solenoid valve, AT-532 . ❑ Line pressure solenoid valve, AT-545 . ❑ Shift solenoid valve A, AT-551 . ❑ Shift solenoid valve B, AT-556 . ❑ Throttle position sensor [accelerator pedal position (APP) sensor, AT-561 . ❑ Overrun clutch solenoid valve, AT-566 . ❑ Park/neutral position (PNP), overdrive control and throttle position sensor [accelerator pedal position (APP) sensor] circuit checks, AT-630 . ❑ A/T fluid temperature sensor and TCM power source, AT-486 . ❑ Vehicle speed sensor·MTR, AT-578 . ❑ A/T communication line, AT-588 . ❑ Control unit (RAM), Control unit (ROM), AT-591 . ❑ Control unit (EEP ROM), AT-593 . ❑ Battery ❑ Others	

4.	4-2.	Check at idle	AT-457
		❏ 1. O/D OFF Indicator Lamp Does Not Come On, AT-600 . ❏ 2. Engine Cannot Be Started In P and N Position, AT-602 . ❏ 3. In P Position, Vehicle Moves Forward or Backward When Pushed, AT-603 . ❏ 4. In N Position, Vehicle Moves, AT-603 . ❏ 5. Large Shock. N → R Position, AT-605 . ❏ 6. Vehicle Does Not Creep Backward In R Position, AT-607 . ❏ 7. Vehicle Does Not Creep Forward In D, 2 or 1 Position, AT-610 .	
	4-3.	Cruise test	AT-460 AT-463
		Part-1	
		❏ 8. Vehicle Cannot Be Started From D_1 , AT-612 . ❏ 9. A/T Does Not Shift: D_1 → D_2 or Does Not Kickdown: D_4 → D_2 , AT-615 . ❏ 10. A/T Does Not Shift: D_2 → D_3 , AT-617 . ❏ 11. A/T Does Not Shift: D_3 → D_4 , AT-620 . ❏ 12. A/T Does Not Perform Lock-up, AT-622 . ❏ 13. A/T Does Not Hold Lock-up Condition, AT-623 . ❏ 14. Lock-up Is Not Released, AT-624 . ❏ 15. Engine Speed Does Not Return To Idle (Light Braking D_4 → D_3), AT-625 .	
		Part-2	AT-466
		❏ 16. Vehicle Does Not Start From D_1 , AT-627 . ❏ 9. A/T Does Not Shift: D_1 → D_2 or Does Not Kickdown: D_4 → D_2 , AT-615 . ❏ 10. A/T Does Not Shift: D_2 → D_3 , AT-617 . ❏ 11. A/T Does Not Shift: D_3 → D_4 , AT-620 .	
		Part-3	AT-468
		❏ 17. A/T Does Not Shift: D_4 → D_3 When Overdrive Control Switch ON → OFF, AT-628 . ❏ 15. Engine Speed Does Not Return To Idle (Engine Brake In D_3), AT-625 . ❏ 18. A/T Does Not Shift: D_3 → 2_2 , When Selector Lever D → 2 Position, AT-628 . ❏ 15. Engine Speed Does Not Return To Idle (Engine Brake In 2_2), AT-625 . ❏ 19. A/T Does Not Shift: 2_2 → 1_1 , When Selector Lever 2 → 1 Position, AT-629 . ❏ 20. Vehicle Does Not Decelerate By Engine Brake, AT-630 . ❏ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.	
		❏ Park/neutral position (PNP) switch, AT-489 . ❏ A/T fluid temperature sensor, AT-495 . ❏ Vehicle speed sensor·A/T (Revolution sensor), AT-501 . ❏ Engine speed signal, AT-506 . ❏ Turbine revolution sensor, AT-583 . ❏ Torque converter clutch solenoid valve, AT-532 . ❏ Line pressure solenoid valve, AT-545 . ❏ Shift solenoid valve A, AT-551 . ❏ Shift solenoid valve B, AT-556 . ❏ Throttle position sensor [accelerator pedal position (APP) sensor], AT-561 . ❏ Overrun clutch solenoid valve, AT-566 . ❏ Park/neutral position (PNP), overdrive control and throttle position sensor [accelerator pedal position (APP) sensor] circuit checks, AT-630 . ❏ A/T fluid temperature sensor and TCM power source, AT-486 . ❏ Vehicle speed sensor·MTR, AT-578 . ❏ A/T communication line, AT-588 . ❏ Control unit (RAM), Control unit (ROM), AT-591 . ❏ Control unit (EEP ROM), AT-593 . ❏ Battery ❏ Others	
5.	❏ For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.		AT-642
6.	❏ Perform all ROAD TEST and re-mark required procedures.		AT-455
7.	❏ Perform DTC CONFIRMATION PROCEDURE for following MIL indicating items and check out NG items. Refer to EC-1245 , “Emission-related Diagnostic Information”.		EC-1245
	❏ DTC (P0731) A/T 1st gear function, AT-510 . ❏ DTC (P0732) A/T 2nd gear function, AT-515 . ❏ DTC (P0733) A/T 3rd gear function, AT-520 . ❏ DTC (P0734) A/T 4th gear function, AT-525 . ❏ DTC (P0744) A/T TCC S/V function (lock-up), AT-537 .		

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-431 AT-439
9.	❑ Erase DTC from TCM and ECM memories.	AT-429

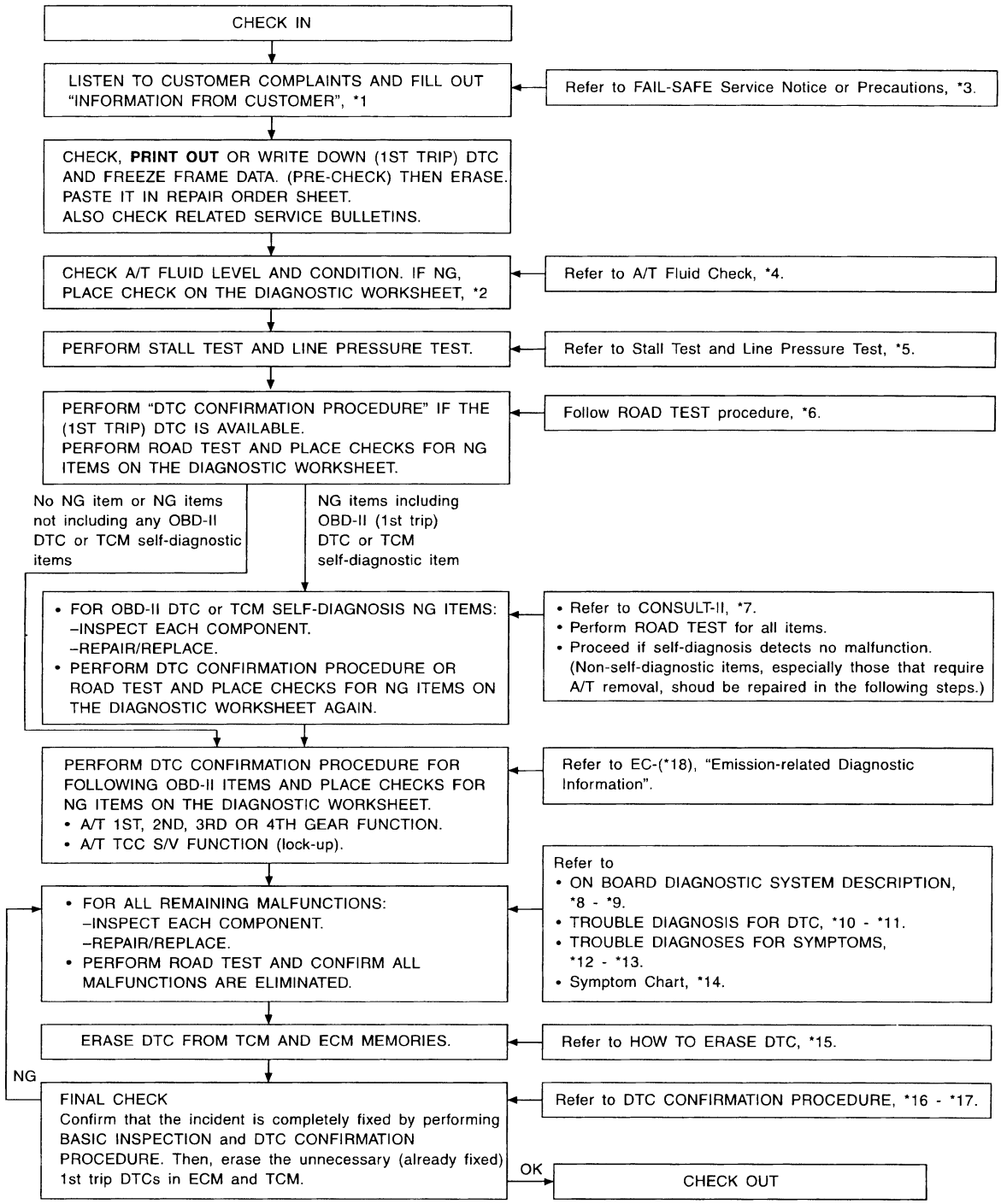
Work Flow

ECS0062P

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, AT-445, "Information from Customer" and AT-446, "Diagnostic Worksheet" , to perform the best troubleshooting possible.

WORK FLOW CHART



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*1: AT-445 *2: AT-446 *3: AT-399
*4: AT-450 *5: AT-450, AT-454 *6: AT-455
*7: AT-431 *8: AT-427 *9: AT-444
*10: AT-489 *11: AT-595 *12: AT-595
*13: AT-635 *14: AT-471 *15: AT-429
*16: AT-489 *17: AT-591 *18: EC-1245

TROUBLE DIAGNOSIS - BASIC INSPECTION

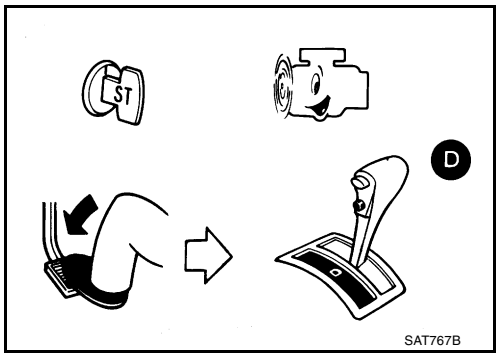
PFP:00000

A/T Fluid Check

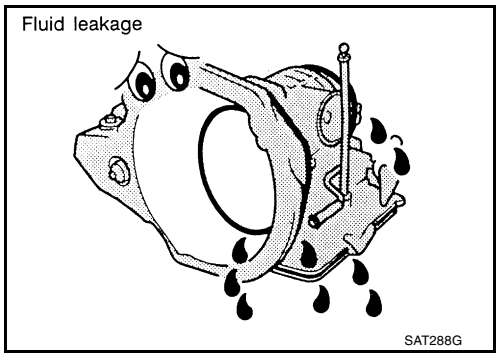
ECS0062Q

FLUID LEAKAGE CHECK

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

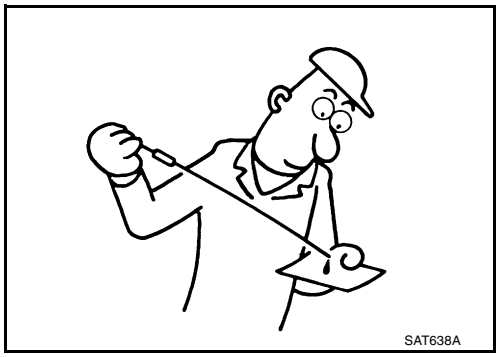


4. Check for fresh leakage.



FLUID CONDITION CHECK

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



FLUID LEVEL CHECK

Refer to MA-30, "Checking A/T Fluid" .

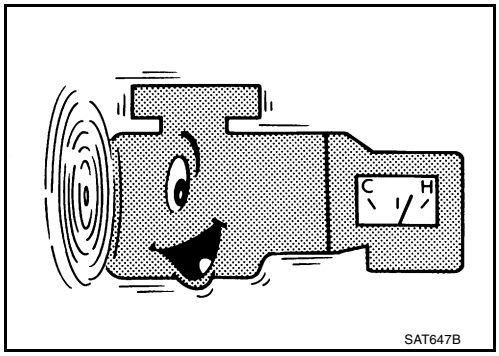
Stall Test

ECS0062R

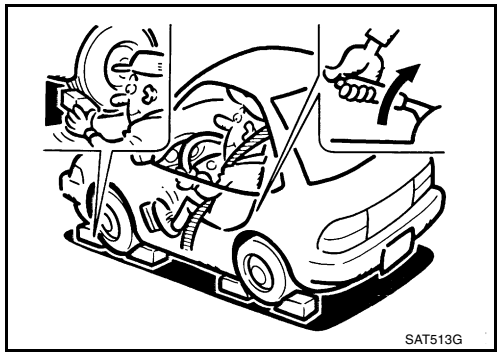
STALL TEST PROCEDURE

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)

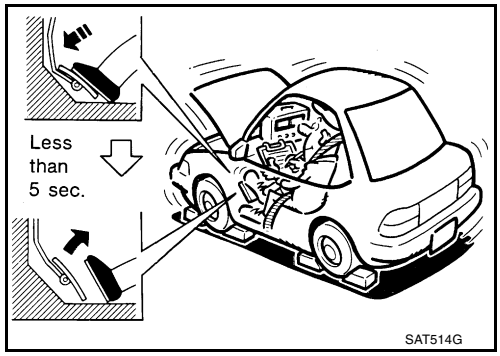


3. Set parking brake and block wheels.
4. Install a tachometer where it can be seen by driver during test.
   - **It is good practice to mark the point of specified engine rpm on indicator.**

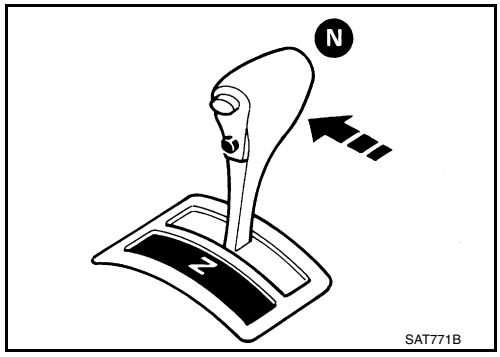


5. Start engine, apply foot brake, and place selector lever in D position.
6. Accelerate to wide open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.
   - **During test, never hold throttle wide open for more than 5 seconds.**

   Stall revolution :2,350 - 2,800 rpm



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 procedure shown in AT-449, "WORK FLOW CHART" .

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. ..... Overrun clutch slippage

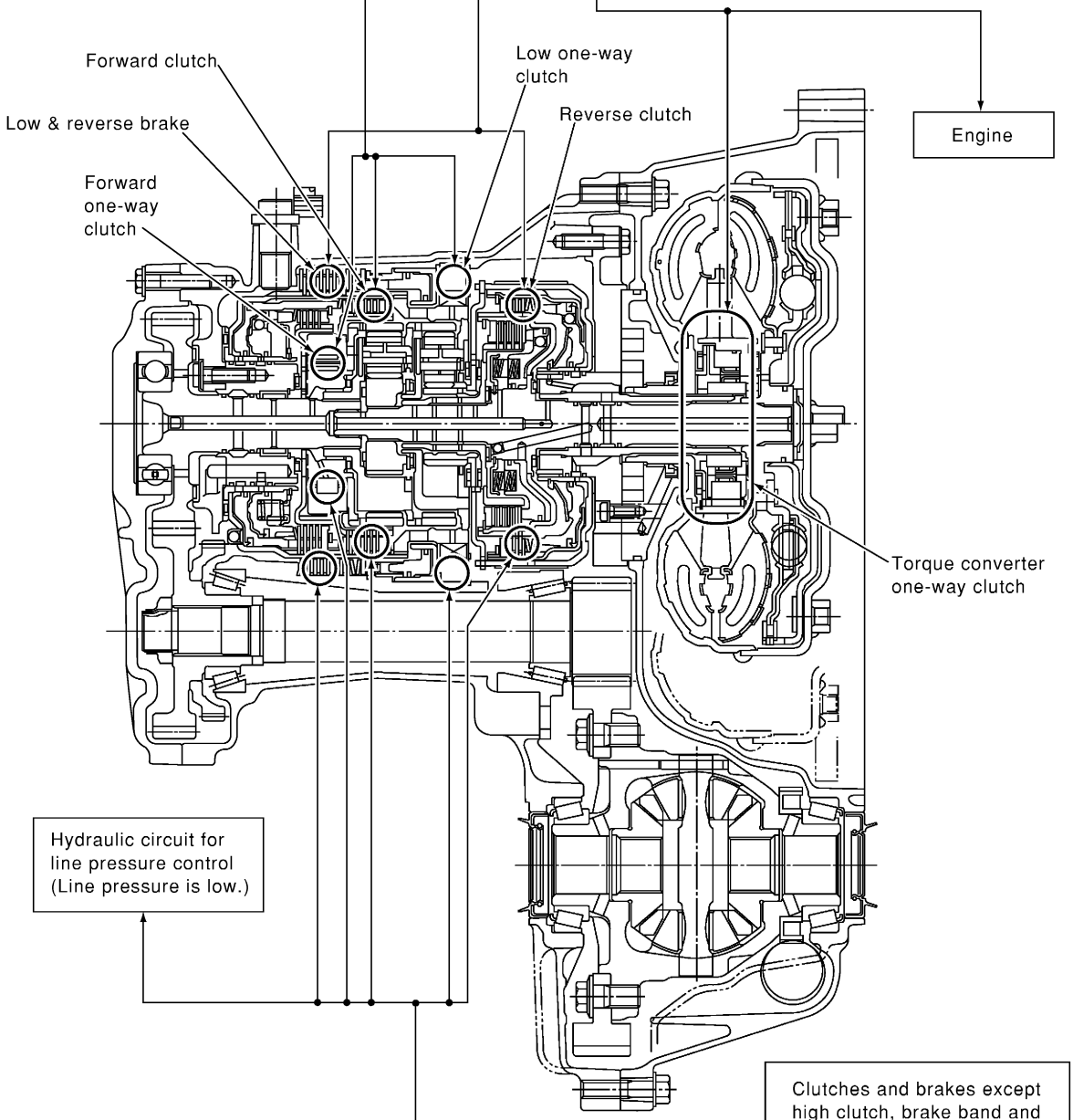
Stall revolution less than specifications:

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

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

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

Damaged components



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

SAT499K

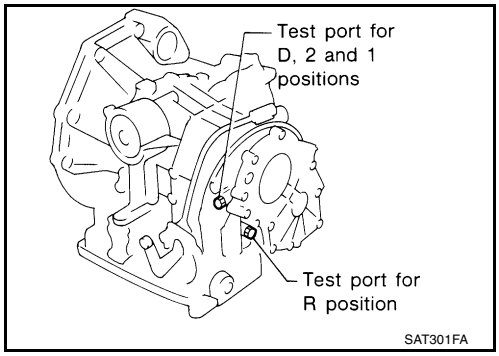
Line Pressure Test

ECS0062S

LINE PRESSURE TEST PORTS

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

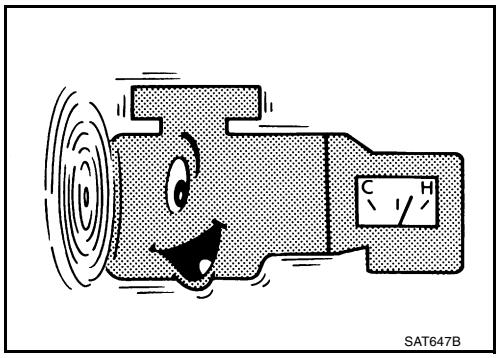
- **Always replace pressure plugs as they are self-sealing bolts.**



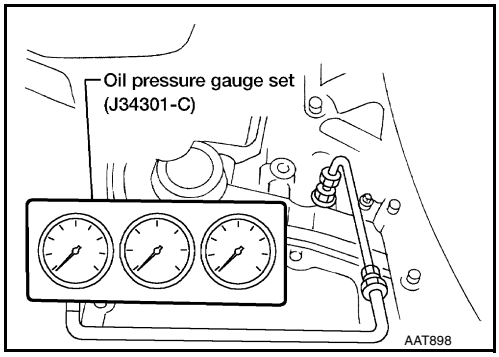
LINE PRESSURE TEST PROCEDURE

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.

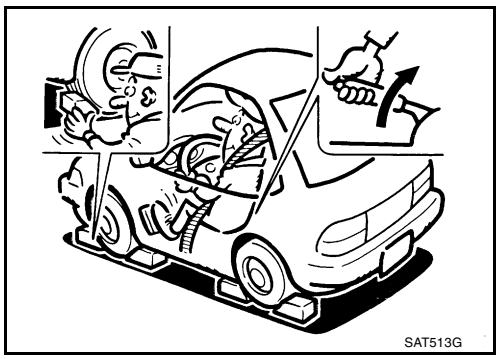
   ATF operating temperature :50 - 80°C (122 - 176°F)



3. Install pressure gauge to corresponding line pressure port.

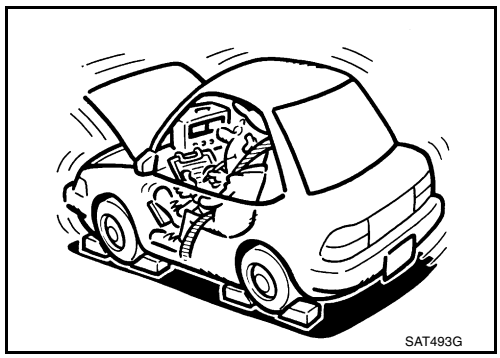


4. Set parking brake and block wheels.
   - **Continue to depress brake pedal fully while line pressure test is being performed at stall speed.**



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

AT-454, "Line Pressure Test" : Refer to SDS, AT-751, "Line Pressure"


SAT493G

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 AT-410, "CLUTCH AND BAND CHART" .
	Line pressure is high.	● 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.	● 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

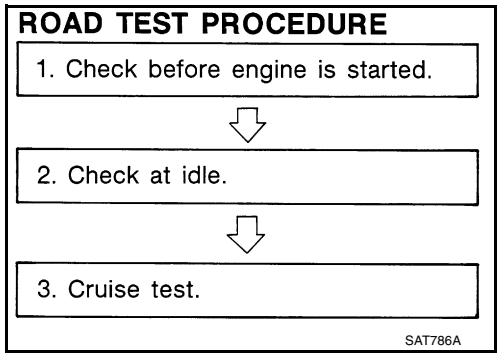
Road Test

ECS0062T

DESCRIPTION

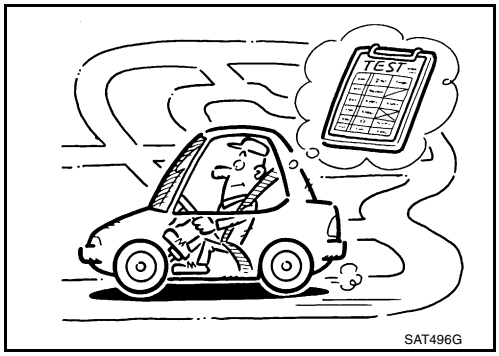
- The purpose of the test is to determine overall performance of A/T and analyze causes of problems.
- The road test consists of the following three parts:

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



SAT786A

- 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 AT-427, "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" and AT-595, "TROUBLE DIAGNOSIS FOR SYMPTOMS" .



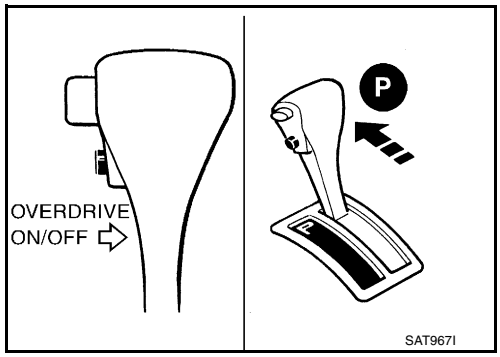
1. CHECK BEFORE ENGINE IS STARTED

1. CHECK O/D OFF INDICATOR LAMP

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?

Yes or No

Yes >> GO TO 2.
No >> Stop ROAD TEST. Go to AT-600, "1. O/D OFF Indicator Lamp Does Not Come On" .

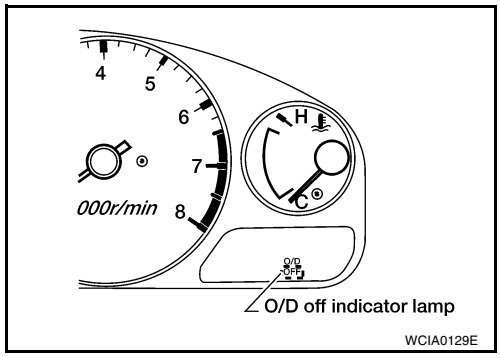


2. CHECK O/D OFF INDICATOR LAMP

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

Yes or No

Yes >> TCM is in fail-safe mode. Perform self-diagnosis and check NG items on the DIAGNOSTIC WORKSHEET, AT-446 . Refer to AT-440, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .
No >> 1. Turn ignition switch to OFF position.
2. Perform self-diagnosis and note NG items. Refer to AT-440, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .
3. Go to AT-457, "2. CHECK AT IDLE" .



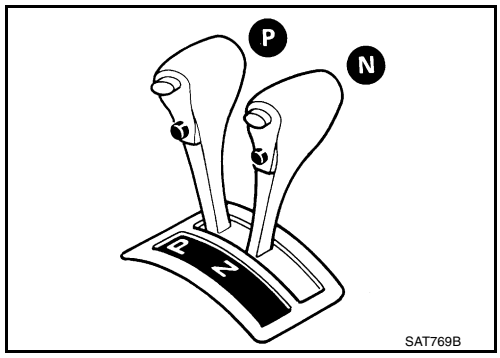
2. CHECK AT IDLE

1. CHECK ENGINE START

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?

Yes or No

Yes >> Stop ROAD TEST.
No >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-602, "2. Engine Cannot Be Started In P and N Position" .



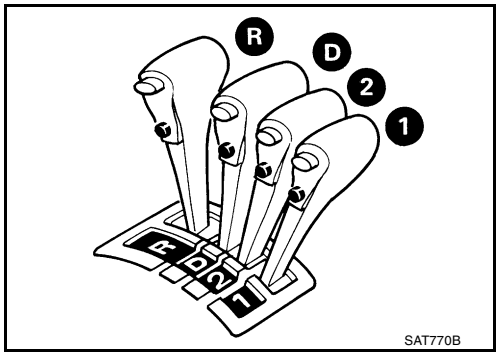
2. CHECK ENGINE START

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

Yes or No

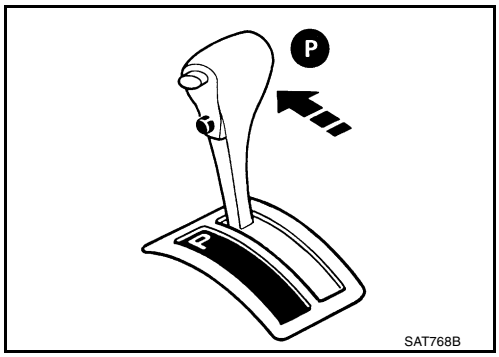
Yes >> Stop ROAD TEST. Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-602, "2. Engine Cannot Be Started In P and N Position" .

No >> GO TO 3.



3. CHECK VEHICLE MOVE

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

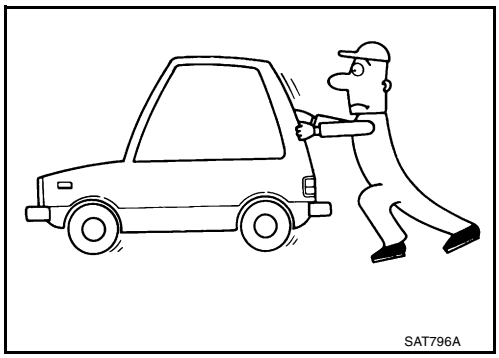


4. Push vehicle forward or backward.
5. Does vehicle move when it is pushed forward or backward?
6. Apply parking brake.

Yes or No

Yes >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-603, "3. In P Position, Vehicle Moves Forward or Backward When Pushed" . Continue ROAD TEST.

No >> GO TO 4.



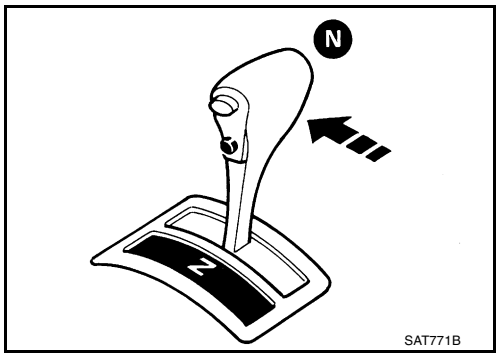
4. CHECK VEHICLE MOVE

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

Yes or No

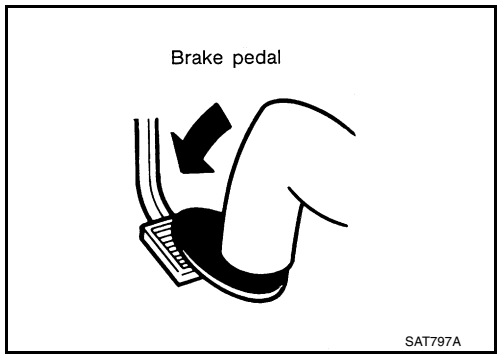
Yes >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-603, "4. In N Position, Vehicle Moves" . Continue ROAD TEST.

No >> GO TO 5.



5. CHECK SHIFT LOCK

1. Apply foot brake.

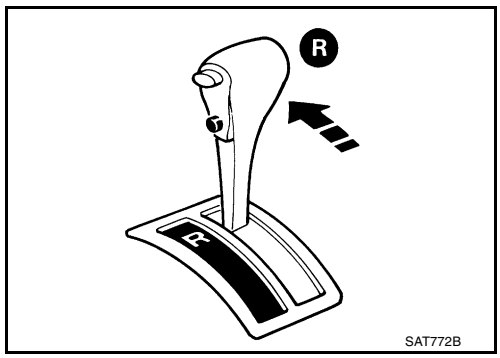


2. Move selector lever to R position.
3. Is there large shock when changing from N to R position?

Yes or No

Yes >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-605, "5. Large Shock N → R Position" . Continue ROAD TEST.

No >> GO TO 6.



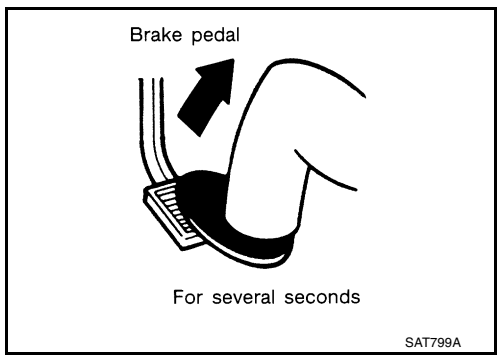
6. CHECK VEHICLE MOVE

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

Yes or No

Yes >> GO TO 7.

No >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-607, "6. Vehicle Does Not Creep Backward In R Position" . Continue ROAD TEST.



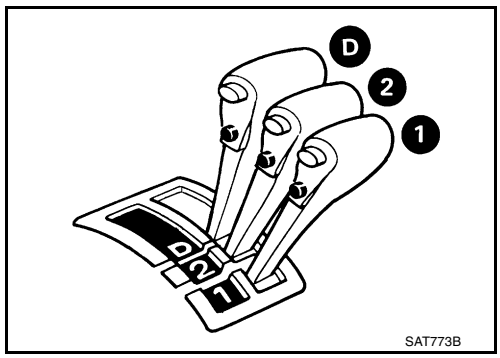
7. CHECK VEHICLE MOVE

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?

Yes or No

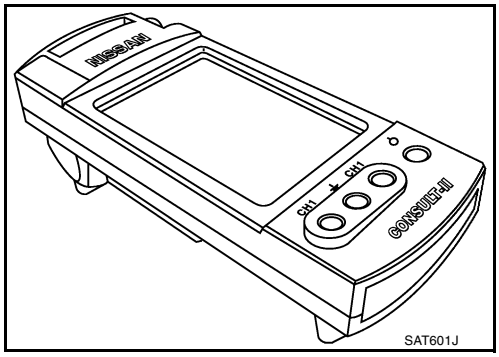
Yes >> Go to AT-460, "3. CRUISE TEST" .

No >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-610, "7. Vehicle Does Not Creep Forward in D, 2 or 1 Position" . Continue ROAD TEST.



3. CRUISE TEST

- Check all items listed in Parts 1 through 3.

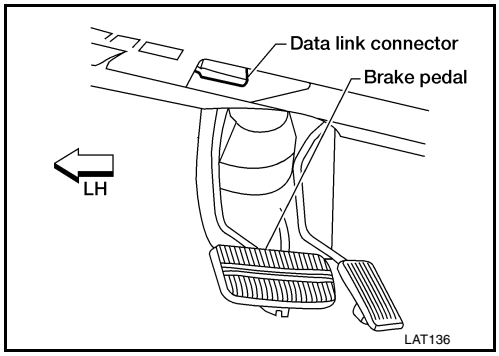


With CONSULT-II

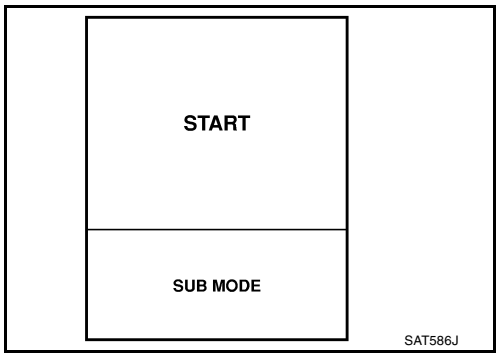
- Using CONSULT-II, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per Shift Schedule. Refer to AT-750, "Shift Schedule"

CONSULT-II Setting Procedure

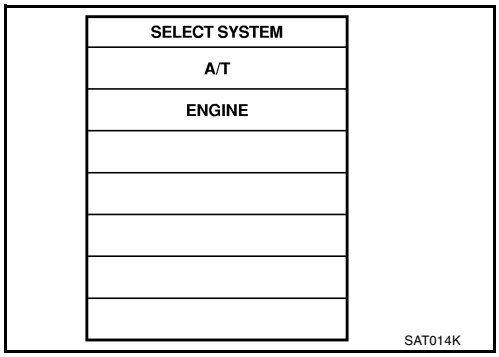
1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector, which is located in left side dash panel.
3. Turn ignition switch ON.



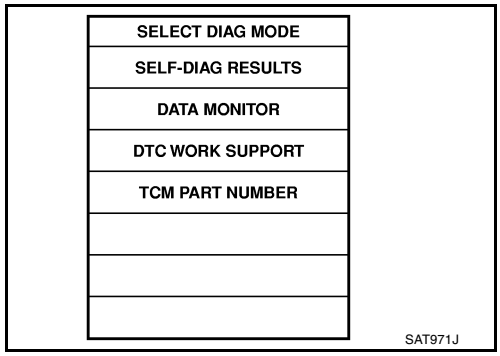
4. Touch “START”.



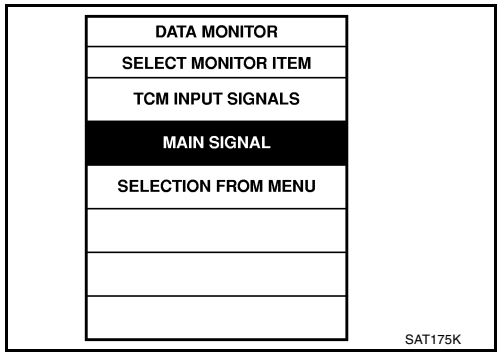
5. Touch “A/T”.



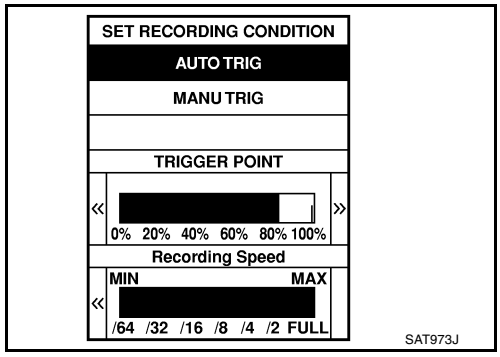
6. Touch “DATA MONITOR”.



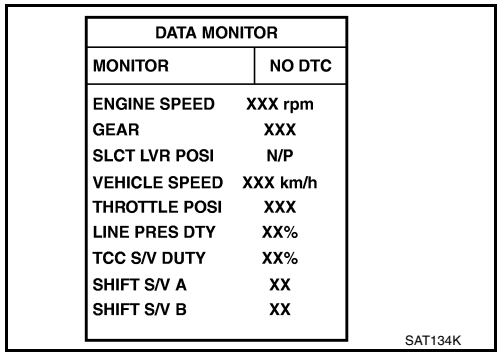
7. Touch “MAIN SIGNAL” or “TCM INPUT SIGNALS”.
8. See “NUMERICAL DISPLAY”, “BARCHART DISPLAY” or “LINE GRAPH DISPLAY”.



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”.

DATA MONITOR		
Recording Data	X%	DTC DETECTED
ENGINE SPEED	XXX rpm	
GEAR	XXX	
SLCT LVR POSI	N/P	
VEHICLE SPEED	XXX km/h	
THROTTLE POSI	XXX	
LINE PRES DTY	XX%	
TCC S/V DUTY	XX%	
SHIFT S/V A	XX	
SHIFT S/V B	XX	

SAT135K

13. Touch “STORE” and touch “BACK”.

REAL-TIME DIAG
ENG SPEED SIG

SAT987J

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

Trigger		VHCL S/SEN A/T	VHCL S/SEN MTR	THRTL POSI SEN
		km/h	km/h	V

SAT975J

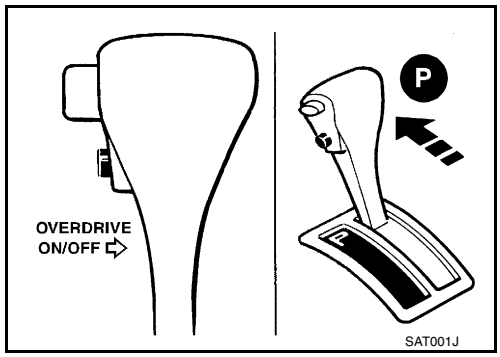
Cruise Test — Part 1

1. CHECK STARTING GEAR (D_1) POSITION

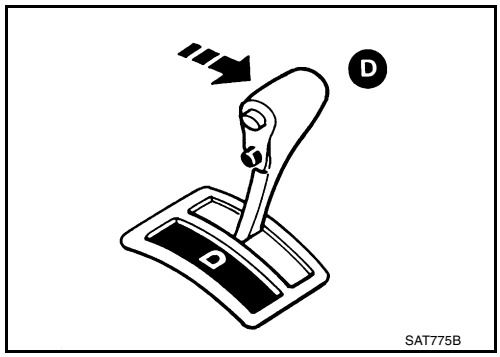
1. Drive vehicle for approx. 10 minutes to warm engine oil and ATF up to operating temperature.

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

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



6. Move selector lever to D position.

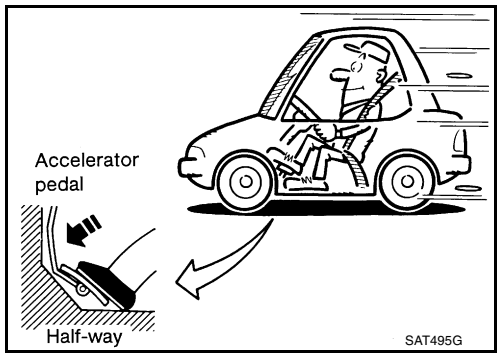


7. Accelerate vehicle by constantly depressing accelerator pedal half-way.
8. Does vehicle start from D_1 ?

Read gear position.

Yes or No

Yes >> GO TO 2.
No >> Go to AT-612, "8. Vehicle Cannot Be Started From D_1" . Continue ROAD TEST.



2. CHECK SHIFT UP (D_1 TO D_2)

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

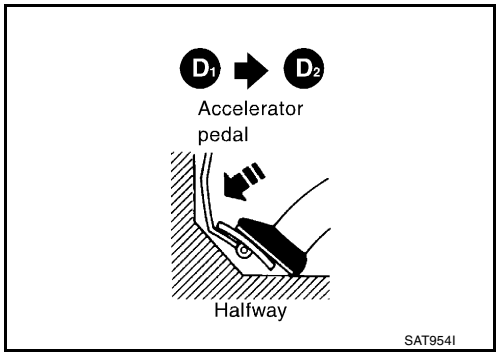
Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_1 to D_2 **:Refer to AT-750, "Shift Schedule" .**

Yes or No

Yes >> GO TO 3.

No >> Go to AT-615, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ or Does Not Kickdown: $D_4 \rightarrow D_2$" . Continue ROAD TEST.



3. CHECK SHIFT UP (D_2 TO D_3)

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

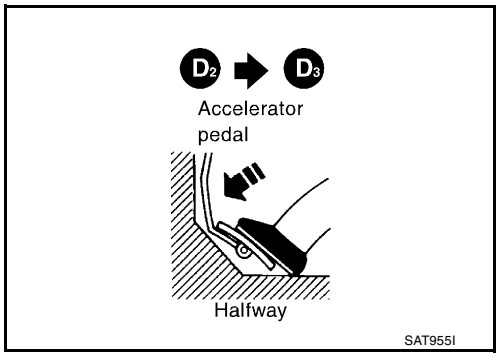
Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_2 to D_3 **:Refer to AT-750, "Shift Schedule" .**

Yes or No

Yes >> GO TO 4.

No >> Go to AT-617, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" . Continue ROAD TEST.



4. CHECK SHIFT UP (D_3 TO D_4)

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

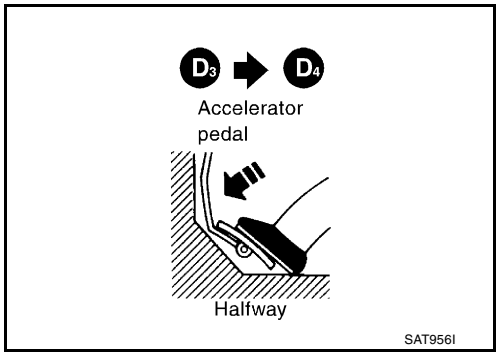
Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_3 to D_4 **:Refer to AT-750, "Shift Schedule" .**

Yes or No

Yes >> GO TO 5.

No >> Go to AT-620, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$" . Continue ROAD TEST.

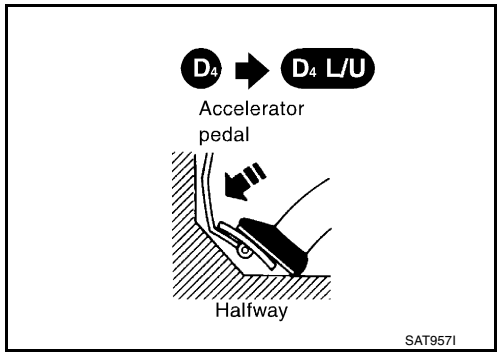


5. CHECK LOCK-UP (D4 TO D4 L/U)

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

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

Specified speed when lock-up occurs :Refer to AT-750, "Shift Schedule" .



Yes or No

Yes >> GO TO 6.
No >> Go to AT-622, "12. A/T Does Not Perform Lock-up" . Continue ROAD TEST.

6. CHECK HOLD LOCK-UP

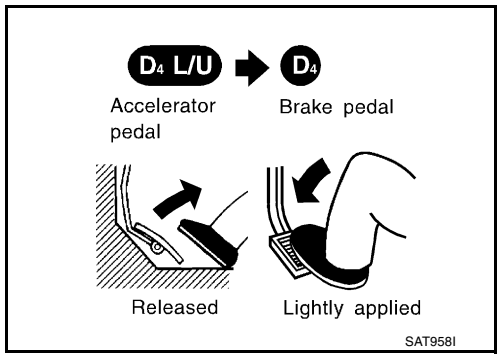
Does A/T hold lock-up condition for more than 30 seconds?

Yes or No

Yes >> GO TO 7.
No >> Go to AT-623, "13. A/T Does Not Hold Lock-up Condition" .

7. CHECK SHIFT DOWN (D4 L/U TO D4)

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



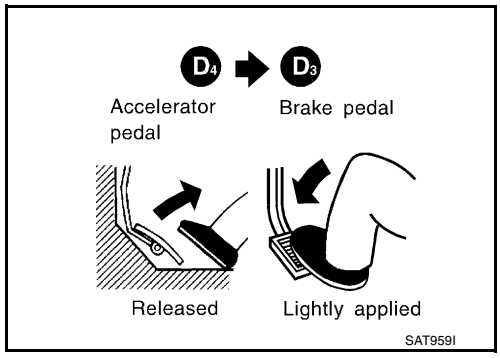
Yes or No

Yes >> GO TO 8.
No >> Go to AT-624, "14. Lock-up Is Not Released" . Continue ROAD TEST.

8. CHECK SHIFT DOWN (D4 TO D3)

1. Decelerate vehicle by applying foot brake lightly.
2. Does engine speed return to idle smoothly when A/T is shifted from D4 to D3 ?

Read gear position and engine speed.



Yes or No

Yes >> 1. Stop vehicle.
2. Go to AT-466, "Cruise Test — Part 2" .
No >> Go to AT-625, "15. Engine Speed Does Not Return To Idle (Light Braking D4 → D3)" . Continue ROAD TEST.

Cruise Test — Part 2

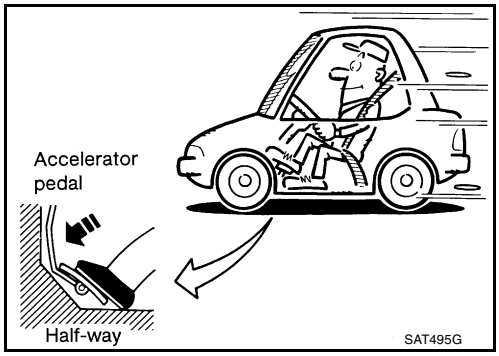
1. CHECK STARTING GEAR (D_1) POSITION

1. Confirm overdrive control switch is in ON position.
2. Confirm selector lever is in D position.
3. Accelerate vehicle by half throttle again.
4. Does vehicle start from D_1 ?

Read gear position.

Yes or No

Yes >> GO TO 2.
No >> Go to AT-627, "16. Vehicle Does Not Start From D_1" . Continue ROAD TEST.



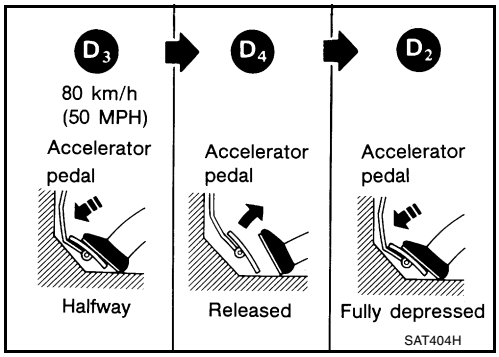
2. CHECK SHIFT UP AND SHIFT DOWN (D_3 TO D_4 TO D_2)

1. Accelerate vehicle to 80 km/h (50 MPH) as shown in illustration.
2. Release accelerator pedal and then quickly depress it fully.
3. Does A/T shift from D_4 to D_2 as soon as accelerator pedal is depressed fully?

Read gear position and throttle opening.

Yes or No

Yes >> GO TO 3.
No >> Go to AT-615, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ or Does Not Kickdown: $D_4 \rightarrow D_2$" . Continue ROAD TEST.



3. CHECK SHIFT UP (D_2 TO D_3)

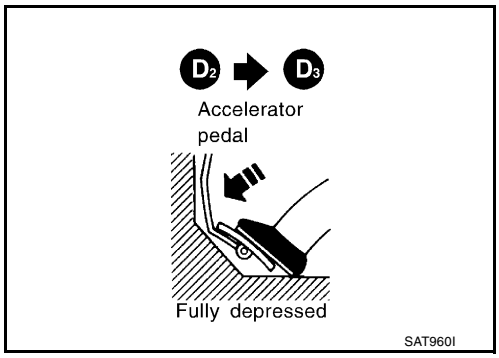
Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_2 to D_3 **:Refer to AT-750, "Shift Schedule" .**

Yes or No

Yes >> GO TO 4.
No >> Go to AT-617, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" . Continue ROAD TEST.



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

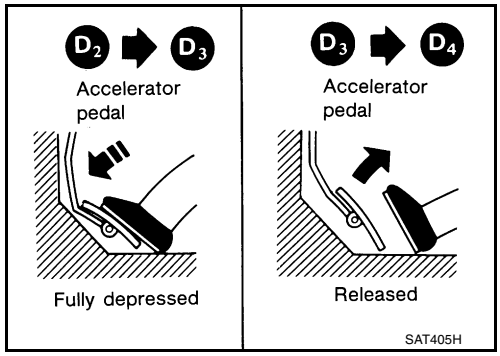
Release accelerator pedal after shifting from D_2 to D_3.
Does A/T shift from D_3 to D_4 and does vehicle decelerate by engine brake?

Read gear position, throttle opening and vehicle speed.

Yes or No

Yes >> 1. Stop vehicle.
2. Go to AT-468, "Cruise Test — Part 3".

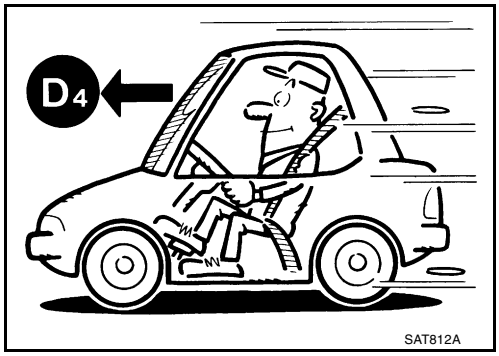
No >> Go to AT-620, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$". Continue ROAD TEST.



Cruise Test — Part 3

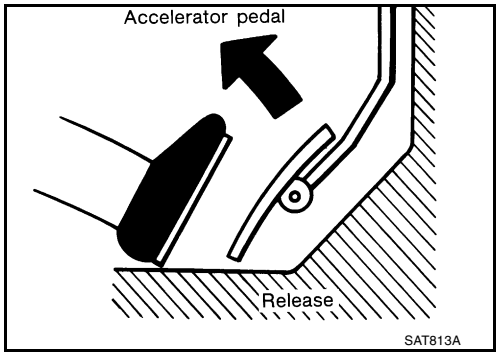
1. VEHICLE SPEED (D_4) POSITION

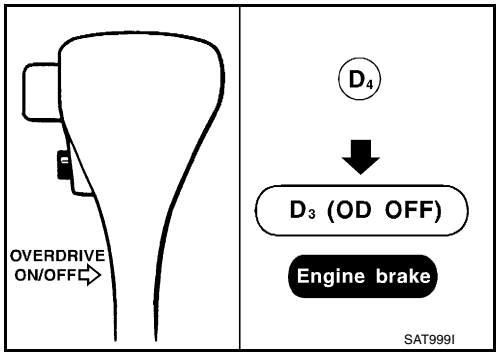
1. Confirm overdrive control switch is in ON position.
2. Confirm selector lever is in D position.
3. Accelerate vehicle using half-throttle to D_4.



4. Release accelerator pedal.
5. Set overdrive control switch to OFF position while driving in D_4.
6. Does A/T shift from D_4 to D_3 (O/D OFF)?

Read gear position and vehicle speed.





Yes or No

Yes >> GO TO 2.

No >> Go to AT-628, "17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch ON → OFF". Continue ROAD TEST.

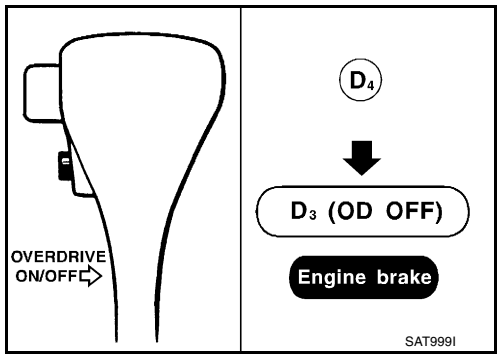
2. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> GO TO 3.

No >> Go to AT-625, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" . Continue ROAD TEST.



3. CHECK SHIFT DOWN (D_3 TO D_2)

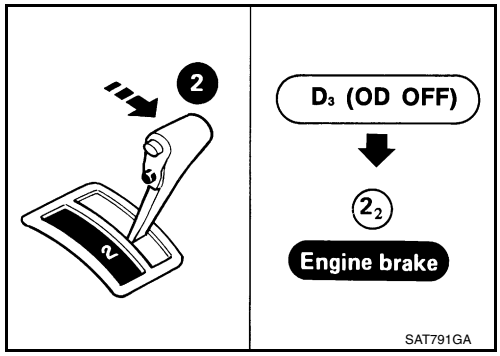
1. Move selector lever from D to 2 position while driving in D_3 (O/D OFF).
2. Does A/T shift from D_3 (O/D OFF) to 2_2 ?

Read gear position.

Yes or No

Yes >> GO TO 4.

No >> Go to AT-628, "18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever D → 2 Position" . Continue ROAD TEST.



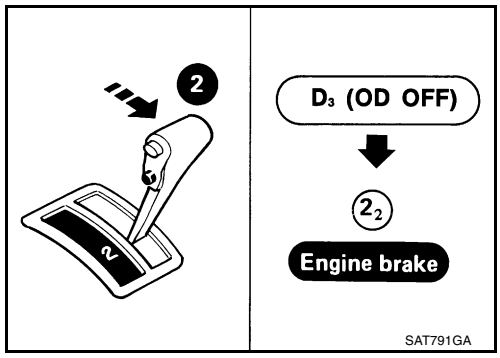
4. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> GO TO 5.

No >> Go to AT-625, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" . Continue ROAD TEST.



5. CHECK SHIFT DOWN (2_2 TO 1_1)

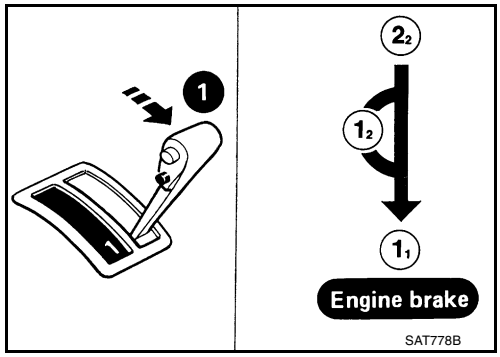
1. Move selector lever from 2 to 1 position while driving in 2_2 .
2. Does A/T shift from 2_2 to 1_1 position?

Read gear position.

Yes or No

Yes >> GO TO 6.

No >> Go to AT-629, "19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever 2 → 1 Position" . Continue ROAD TEST.



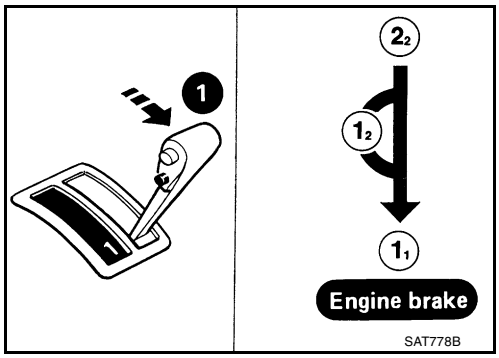
6. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> 1. Stop vehicle.
2. Perform self-diagnosis. Refer to AT-440, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .

No >> Go to AT-630, "20. Vehicle Does Not Decelerate By Engine Brake" . Continue ROAD TEST.



TROUBLE DIAGNOSIS - GENERAL DESCRIPTION

PFP:00000

Symptom Chart

ECS0062U

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

Items	Symptom	Condition	Diagnostic Item	Reference Page
No Lock-up Engagement/ TCC Inoperative	Torque converter is not locked up.	ON vehicle	1. Throttle position sensor {accelerator pedal position (APP) sensor]	AT-561
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-501, AT-578
			3. Engine speed signal	AT-506
			4. A/T fluid temperature sensor	AT-571
			5. Line pressure test	AT-454
			6. Torque converter clutch solenoid valve	AT-532
			7. Control valve assembly	AT-642
		OFF vehicle	8. Torque converter	AT-655
	Torque converter clutch piston slip.	ON vehicle	1. Fluid level	AT-450
			2. Throttle position sensor {accelerator pedal position (APP) sensor]	AT-561
			3. Line pressure test	AT-454
			4. Torque converter clutch solenoid valve	AT-532
			5. Line pressure solenoid valve	AT-545
			6. Control valve assembly	AT-642
		OFF vehicle	7. Torque converter	AT-655
	Lock-up point is extremely high or low.	ON vehicle	1. Throttle position sensor {accelerator pedal position (APP) sensor]	AT-561
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-501, AT-578
			3. Torque converter clutch solenoid valve	AT-532
			4. Control valve assembly	AT-642
Shift Shock	Sharp shock in shifting from N to D position.	ON vehicle	1. Engine idling rpm	EC-1228
			2. Throttle position sensor {accelerator pedal position (APP) sensor]	AT-561
			3. Line pressure test	AT-454
			4. A/T fluid temperature sensor	AT-571
			5. Engine speed signal	AT-506
			6. Line pressure solenoid valve	AT-545
			7. Control valve assembly	AT-642
			8. Accumulator N-D	AT-655
		OFF vehicle	9. Forward clutch	AT-700

Items	Symptom	Condition	Diagnostic Item	Reference Page
Shift Shock	Too sharp a shock in change from D_1 to D_2.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-561
			2. Line pressure test	AT-454
			3. Accumulator servo release	AT-655
			4. Control valve assembly	AT-642
			5. A/T fluid temperature sensor	AT-571
		OFF vehicle	6. Brake band	AT-655
	Too sharp a shock in change from D_2 to D_3.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-561
			2. Line pressure test	AT-454
			3. Control valve assembly	AT-642
			4. A/T fluid temperature sensor	AT-495
		OFF vehicle	5. High clutch	AT-695
			6. Brake band	AT-655
	Too sharp a shock in change from D_3 to D_4.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-561
			2. Line pressure test	AT-454
			3. Control valve assembly	AT-642
			4. A/T fluid temperature sensor	AT-495
		OFF vehicle	5. Brake band	AT-655
			6. Overrun clutch	AT-700
			7. Forward one-way clutch	AT-655###############
	Gear change shock felt during deceleration by releasing accelerator pedal.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			2. Line pressure test	AT-454
			3. Overrun clutch solenoid valve	AT-566
			4. Control valve assembly	AT-642
	Large shock changing from 1_2 to 1_1 in 1 position.	ON vehicle	1. Control valve assembly	AT-642
		ON vehicle	2. Low & reverse brake	AT-706

Items	Symptom	Condition	Diagnostic Item	Reference Page
Improper Shift Timing	Too high a gear change point from D_1 to D_2, from D_2 to D_3, from D_3 to D_4.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-501, AT-578
			3. Shift solenoid valve A	AT-551
			4. Shift solenoid valve B	AT-556
	Gear change directly from D_1 to D_3 occurs.	ON vehicle	1. Fluid level	AT-450
			2. Accumulator servo release	AT-655
		OFF vehicle	3. Brake band	AT-655
	Too high a change point from D_4 to D_3, from D_3 to D_2, from D_2 to D_1.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-501, AT-578
	Kickdown does not operate when depressing pedal in D_4 within kick-down vehicle speed.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-501, AT-578
			3. Shift solenoid valve A	AT-551
			4. Shift solenoid valve B	AT-556
Improper Shift Timing	Kickdown operates or engine overruns when depressing pedal in D_4 beyond kickdown vehicle speed limit.	ON vehicle	1. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-501, AT-578
			2. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			3. Shift solenoid valve A	AT-551
			4. Shift solenoid valve B	AT-556
	Gear change from 2_2 to 2_3 in 2 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-644
	Gear change from 1_1 to 1_2 in 1 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-644
			2. Control cable adjustment	AT-645

Items	Symptom	Condition	Diagnostic Item	Reference Page
No Down Shift	Failure to change gear from D_4 to D_3.	ON vehicle	1. Fluid level	AT-450
			2. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			3. Overrun clutch solenoid valve	AT-566
			4. Shift solenoid valve A	AT-551
			5. Line pressure solenoid valve	AT-545
			6. Control valve assembly	AT-642
		OFF vehicle	7. Low & reverse brake	AT-706
			8. Overrun clutch	AT-700
	Failure to change gear from D_3 to D_2 or from D_4 to D_2.	ON vehicle	1. Fluid level	AT-450
			2. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			3. Shift solenoid valve A	AT-551
			4. Shift solenoid valve B	AT-556
			5. Control valve assembly	AT-642
		OFF vehicle	6. High clutch	AT-695
			7. Brake band	AT-655
	Failure to change gear from D_2 to D_1 or from D_3 to D_1.	ON vehicle	1. Fluid level	AT-450
			2. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			3. Shift solenoid valve A	AT-551
			4. Shift solenoid valve B	AT-556
			5. Control valve assembly	AT-642
		OFF vehicle	6. Low one-way clutch	AT-655
			7. High clutch	AT-695
			8. Brake band	AT-655
No Down Shift	Failure to change from D_3 to 2_2 when changing lever into 2 position. AT-628	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-644
			2. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			3. Overrun clutch solenoid valve	AT-566
			4. Shift solenoid valve B	AT-556
			5. Shift solenoid valve A	AT-551
			6. Control valve assembly	AT-642
			7. Control cable adjustment	AT-645
		OFF vehicle	8. Brake band	AT-655
			9. Overrun clutch	AT-700
	Does not change from 1_2 to 1_1 in 1 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-644
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-501, AT-578
			3. Shift solenoid valve A	AT-551
			4. Control valve assembly	AT-642
			5. Overrun clutch solenoid valve	AT-566
		OFF vehicle	6. Overrun clutch	AT-700
			7. Low & reverse brake	AT-706

Items	Symptom	Condition	Diagnostic Item	Reference Page
No Up Shift	Failure to change gear from D_1 to D_2.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-644
			2. Control cable adjustment	AT-645
			3. Shift solenoid valve A	AT-551
			4. Control valve assembly	AT-642
			5. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-501, AT-578
		OFF vehicle	6. Brake band	AT-655
	Failure to change gear from D_2 to D_3.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-644
			2. Control cable adjustment	AT-645
			3. Shift solenoid valve B	AT-556
			4. Control valve assembly	AT-642
			5. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-501, AT-578
		OFF vehicle	6. High clutch	AT-695
			7. Brake band	AT-655
No Up Shift	Failure to change gear from D_3 to D_4.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-644
			2. Control cable adjustment	AT-645
			3. Shift solenoid valve A	AT-551
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-501, AT-578
			5. A/T fluid temperature sensor	AT-571
		OFF vehicle	6. Brake band	AT-655
	A/T does not shift to D_4 when driving with overdrive control switch ON.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			2. Park/neutral position (PNP) switch adjustment	AT-644
			3. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-501, AT-578
			4. Shift solenoid valve A	AT-551
			5. Overrun clutch solenoid valve	AT-566
			6. Control valve assembly	AT-642
			7. A/T fluid temperature sensor	AT-571
			8. Line pressure solenoid valve	AT-545
		OFF vehicle	9. Brake band	AT-655
			10. Overrun clutch	AT-700

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Vehicle will not run in R position (but runs in D, 2 and 1 positions). Clutch slips. Very poor acceleration. AT-607	ON vehicle	1. Control cable adjustment	AT-645
			2. Line pressure test	AT-454
			3. Line pressure solenoid valve	AT-545
			4. Control valve assembly	AT-642
		OFF vehicle	5. Reverse clutch	AT-692
			6. High clutch	AT-695
			7. Forward clutch	AT-700
			8. Overrun clutch	AT-700
			9. Low & reverse brake	AT-706
	Vehicle will not run in D and 2 positions (but runs in 1 and R positions).	ON vehicle	1. Control cable adjustment	AT-645
		OFF vehicle	2. Low one-way clutch	AT-655

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Vehicle will not run in D, 1, 2 positions (but runs in R position). Clutch slips. Very poor acceleration. AT-610	ON vehicle	1. Fluid level	AT-450
			2. Line pressure test	AT-454
			3. Line pressure solenoid valve	AT-545
			4. Control valve assembly	AT-642
			5. Accumulator N-D	AT-655
		OFF vehicle	6. Reverse clutch	AT-692
			7. High clutch	AT-695
			8. Forward clutch	AT-700
			9. Forward one-way clutch	AT-655
			10. Low one-way clutch	AT-655
	Clutches or brakes slip somewhat in starting.	ON vehicle	1. Fluid level	AT-450
			2. Control cable adjustment	AT-645
			3. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			4. Line pressure test	AT-454
			5. Line pressure solenoid valve	AT-545
			6. Control valve assembly	AT-642
			7. Accumulator N-D	AT-655
		OFF vehicle	8. Forward clutch	AT-700
			9. Reverse clutch	AT-692
			10. Low & reverse brake	AT-706
			11. Oil pump	AT-673
			12. Torque converter	AT-655
	No creep at all. AT-607, AT-610	ON vehicle	1. Fluid level	AT-450
			2. Line pressure test	AT-454
			3. Control valve assembly	AT-642
		OFF vehicle	4. Forward clutch	AT-700
			5. Oil pump	AT-673
			6. Torque converter	AT-655
	Almost no shock or clutches slipping in change from D_1 to D_2.	ON vehicle	1. Fluid level	AT-450
			2. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			3. Line pressure test	AT-454
			4. Accumulator servo release	AT-655
			5. Control valve assembly	AT-642
		OFF vehicle	6. Brake band	AT-655

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Almost no shock or slipping in change from D_2 to D_3 .	ON vehicle	1. Fluid level	AT-450
			2. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			3. Line pressure test	AT-454
			4. Control valve assembly	AT-642
		OFF vehicle	5. High clutch	AT-695
			6. Forward clutch	AT-700
	Almost no shock or slipping in change from D_3 to D_4 .	ON vehicle	1. Fluid level	AT-450
			2. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			3. Line pressure test	AT-454
			4. Control valve assembly	AT-642
		OFF vehicle	5. High clutch	AT-695
			6. Brake band	AT-655
	Races extremely fast or slips in changing from D_4 to D_3 when depressing pedal.	ON vehicle	1. Fluid level	AT-450
			2. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			3. Line pressure test	AT-454
			4. Line pressure solenoid valve	AT-545
			5. Control valve assembly	AT-642
		OFF vehicle	6. High clutch	AT-695
			7. Forward clutch	AT-700
	Races extremely fast or slips in changing from D_4 to D_2 when depressing pedal.	ON vehicle	1. Fluid level	AT-450
			2. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			3. Line pressure test	AT-454
			4. Line pressure solenoid valve	AT-545
			5. Shift solenoid valve A	AT-551
			6. Control valve assembly	AT-642
		OFF vehicle	7. Brake band	AT-655
			8. Forward clutch	AT-700
	Races extremely fast or slips in changing from D_3 to D_2 when depressing pedal.	ON vehicle	1. Fluid level	AT-450
			2. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			3. Line pressure test	AT-454
			4. Line pressure solenoid valve	AT-545
			5. Control valve assembly	AT-642
			6. A/T fluid temperature sensor	AT-571
		OFF vehicle	7. Brake band	AT-655
			8. Forward clutch	AT-700
			9. High clutch	AT-695

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Races extremely fast or slips in changing from D_4 or D_3 to D_1 when depressing pedal.	ON vehicle	1. Fluid level	AT-450
			2. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			3. Line pressure test	AT-454
			4. Line pressure solenoid valve	AT-545
			5. Control valve assembly	AT-642
		OFF vehicle	6. Forward clutch	AT-700
			7. Forward one-way clutch	AT-655
			8. Low one-way clutch	AT-655
	Vehicle will not run in any position.	ON vehicle	1. Fluid level	AT-450
			2. Control cable adjustment	AT-645
			3. Line pressure test	AT-454
			4. Line pressure solenoid valve	AT-545
		OFF vehicle	5. Oil pump	AT-673
			6. High clutch	AT-695
			7. Brake band	AT-655
			8. Low & reverse brake	AT-706
			9. Torque converter	AT-655
			10. Parking components	AT-670
NOT USED	Engine cannot be started in P and N positions. AT-602	ON vehicle	1. Ignition switch and starter	PG-2, SC-9
			2. Control cable adjustment	AT-645
			3. Park/neutral position (PNP) switch adjustment	AT-644
	Engine starts in positions other than P and N. AT-602	ON vehicle	1. Control cable adjustment	AT-645
			2. Park/neutral position (PNP) switch adjustment	AT-644
	Transaxle noise in P and N positions.	ON vehicle	1. Fluid level	AT-450
			2. Line pressure test	AT-454
			3. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-501, AT-578
			5. Engine speed signal	AT-506
		OFF vehicle	6. Oil pump	AT-673
			7. Torque converter	AT-655
	Vehicle moves when changing into P position or parking gear does not disengage when shifted out of P position. AT-603	ON vehicle	1. Control cable adjustment	AT-645
		OFF vehicle	2. Parking components	AT-670

Items	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	Vehicle runs in N position. AT-603	ON vehicle	1. Control cable adjustment	AT-645
		OFF vehicle	2. Forward clutch	AT-700
			3. Reverse clutch	AT-692
			4. Overrun clutch	AT-700
	Vehicle braked when shifting into R position.	ON vehicle	1. Fluid level	AT-450
			2. Control cable adjustment	AT-645
			3. Line pressure test	AT-454
			4. Line pressure solenoid valve	AT-545
			5. Control valve assembly	AT-642
		OFF vehicle	6. High clutch	AT-695
			7. Brake band	AT-655
			8. Forward clutch	AT-700
			9. Overrun clutch	AT-700
	Excessive creep.	ON vehicle	1. Engine idling rpm	EC-1228
	Engine stops when shifting lever into R, D, 2 and 1.	ON vehicle	1. Engine idling rpm	EC-1228
			2. Torque converter clutch solenoid valve	AT-532
			3. Control valve assembly	AT-642
		OFF vehicle	4. Torque converter	AT-655
	Vehicle braked by gear change from D_1 to D_2.	ON vehicle	1. Fluid level	AT-450
		OFF vehicle	2. Reverse clutch	AT-692
			3. Low & reverse brake	AT-706
			4. High clutch	AT-695
			5. Low one-way clutch	AT-655
	Vehicle braked by gear change from D_2 to D_3.	ON vehicle	1. Fluid level	AT-450
		OFF vehicle	2. Brake band	AT-655
	Vehicle braked by gear change from D_3 to D_4.	ON vehicle	1. Fluid level	AT-450
		OFF vehicle	2. Overrun clutch	AT-700
			3. Forward one-way clutch	AT-655
			4. Reverse clutch	AT-692

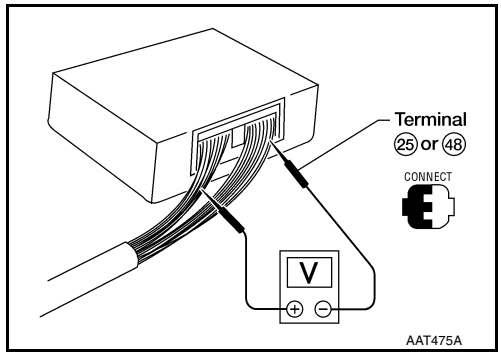
Items	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	Maximum speed not attained. Acceleration poor.	ON vehicle	1. Fluid level	AT-450
			2. Park/neutral position (PNP) switch adjustment	AT-644
			3. Shift solenoid valve A	AT-551
			4. Shift solenoid valve B	AT-556
			5. Control valve assembly	AT-642
		OFF vehicle	6. Reverse clutch	AT-692
			7. High clutch	AT-695
			8. Brake band	AT-655
			9. Low & reverse brake	AT-706
			10. Oil pump	AT-673
			11. Torque converter	AT-655
	Transaxle noise in D, 2, 1 and R positions.	ON vehicle	1. Fluid level	AT-450
		ON vehicle	2. Torque converter	AT-655
	Engine brake does not operate in “1” position. AT-630	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-644
			2. Control cable adjustment	AT-645
			3. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-501, AT-578
			5. Shift solenoid valve A	AT-551
			6. Control valve assembly	AT-642
			7. Overrun clutch solenoid valve	AT-566
		OFF vehicle	8. Overrun clutch	AT-700
			9. Low & reverse brake	AT-706
	Transaxle overheats.	ON vehicle	1. Fluid level	AT-450
			2. Engine idling rpm	EC-1228
			3. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-1239
			4. Line pressure test	AT-454
			5. Line pressure solenoid valve	AT-545
			6. Control valve assembly	AT-642
		OFF vehicle	7. Oil pump	AT-673
			8. Reverse clutch	AT-692
			9. High clutch	AT-695
			10. Brake band	AT-655
			11. Forward clutch	AT-700
			12. Overrun clutch	AT-700
			13. Low & reverse brake	AT-706
			14. Torque converter	AT-655

Items	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	ON vehicle	1. Fluid level	AT-450
		OFF vehicle	2. Reverse clutch	AT-692
			3. High clutch	AT-695
			4. Brake band	AT-655
			5. Forward clutch	AT-700
			6. Overrun clutch	AT-700
			7. Low & reverse brake	AT-706
	Offensive smell at fluid charging pipe.	ON vehicle	1. Fluid level	AT-450
		OFF vehicle	2. Torque converter	AT-655
			3. Oil pump	AT-673
			4. Reverse clutch	AT-692
			5. High clutch	AT-695
			6. Brake band	AT-655
			7. Forward clutch	AT-700
			8. Overrun clutch	AT-700
			9. Low & reverse brake	AT-706
	Engine is stopped at R, D, 2 and 1 positions.	ON vehicle	1. Fluid level	AT-450
			2. Torque converter clutch solenoid valve	AT-532
			3. Shift solenoid valve B	AT-556
			4. Shift solenoid valve A	AT-551
			5. Control valve assembly	AT-642

TCM Terminals and Reference Value

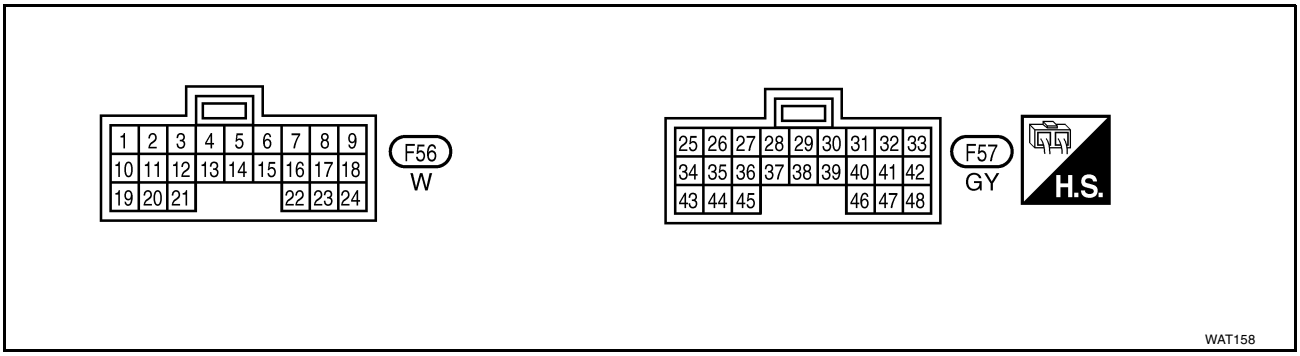
ECS0062V

PREPARATION



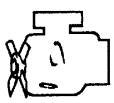
- Measure voltage between each terminal and terminal 25 or 48 by following “TCM INSPECTION TABLE”.

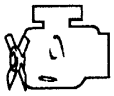
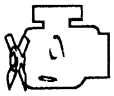
TCM HARNESS CONNECTOR TERMINAL LAYOUT



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 - 3.0V
				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.	4 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V
3	GY/R	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	0V
5*	L	CAN-H	—	—	—
6*	Y	CAN-L	—	—	—
10	BR/R	Power source		When turning ignition switch to ON.	Battery voltage
				When turning ignition switch to OFF.	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
13	G/R	O/D OFF indicator lamp		When setting overdrive control switch in OFF position.	0V
				When setting overdrive control switch in ON position.	Battery voltage
19	BR/R	Power source		With ignition switch ON.	Battery voltage
				With ignition switch 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
22	OR/B	Overdrive control switch		When setting overdrive control switch in ON position.	Battery voltage
				When setting overdrive control switch in OFF position.	0V
25	B	Ground	—	—	—

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
26	OR	PNP switch 1 position		When setting selector lever to 1 position.	Battery voltage
				When setting selector lever to other positions.	0V
27	L	PNP switch 2 position		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)		With ignition switch OFF.	Battery voltage
				With ignition switch ON.	Battery voltage
29	W	Revolution sensor		When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function.*1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	450 Hz
				When vehicle is parked.	Under 1.3V or over 4.5V
30**	G/B	Data link connector (RX)		—	—
31**	GY/L	Data link connector (TX)		—	—
32	R	Sensor power		Ignition switch ON.	4.5 - 5.5V
				Ignition switch OFF.	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/W	PNP switch R position		When setting selector lever to R position.	Battery voltage
				When setting selector lever to other positions.	0V
36	BR/W	PNP switch P or N position		When setting selector lever to P or N position.	Battery voltage
				When setting selector lever to other positions.	0V
38	G	Turbine revolution sensor		When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function.*1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	240 Hz
				When vehicle is parked.	Under 1.3V or over 4.5V

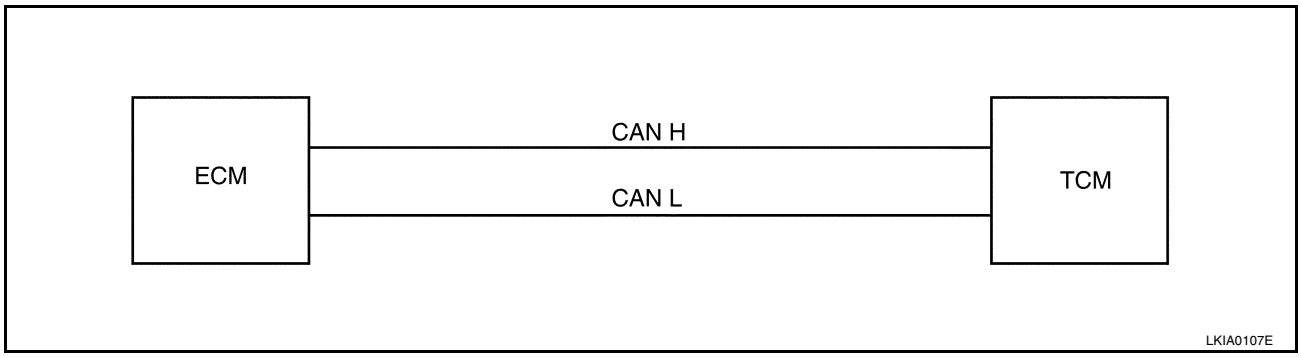
Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
39	L/OR	Engine speed signal		Refer to EC-1292, "ECM INSPECTION TABLE" .	
40	PU/R	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1V and more than 4.5V
41	S/B	Throttle position sensor [accelerator pedal position (APP) 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	Sensor ground	—	—	—
45	R/G	Stop lamp switch		With brake pedal depressed	Battery voltage
				With brake pedal released	0V
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	—	—	—

*: These terminals are connected to the ECM.
**: These terminals are connected to the Data link connector.

System Description

ECS0062W

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.



INPUT/OUTPUT SIGNAL CHART

T: Transmit R: Receive

Signals	ECM	TCM
Accelerator pedal position signal	T	R
Output shaft revolution signal	R	T
A/T self-diagnosis signal	R	T

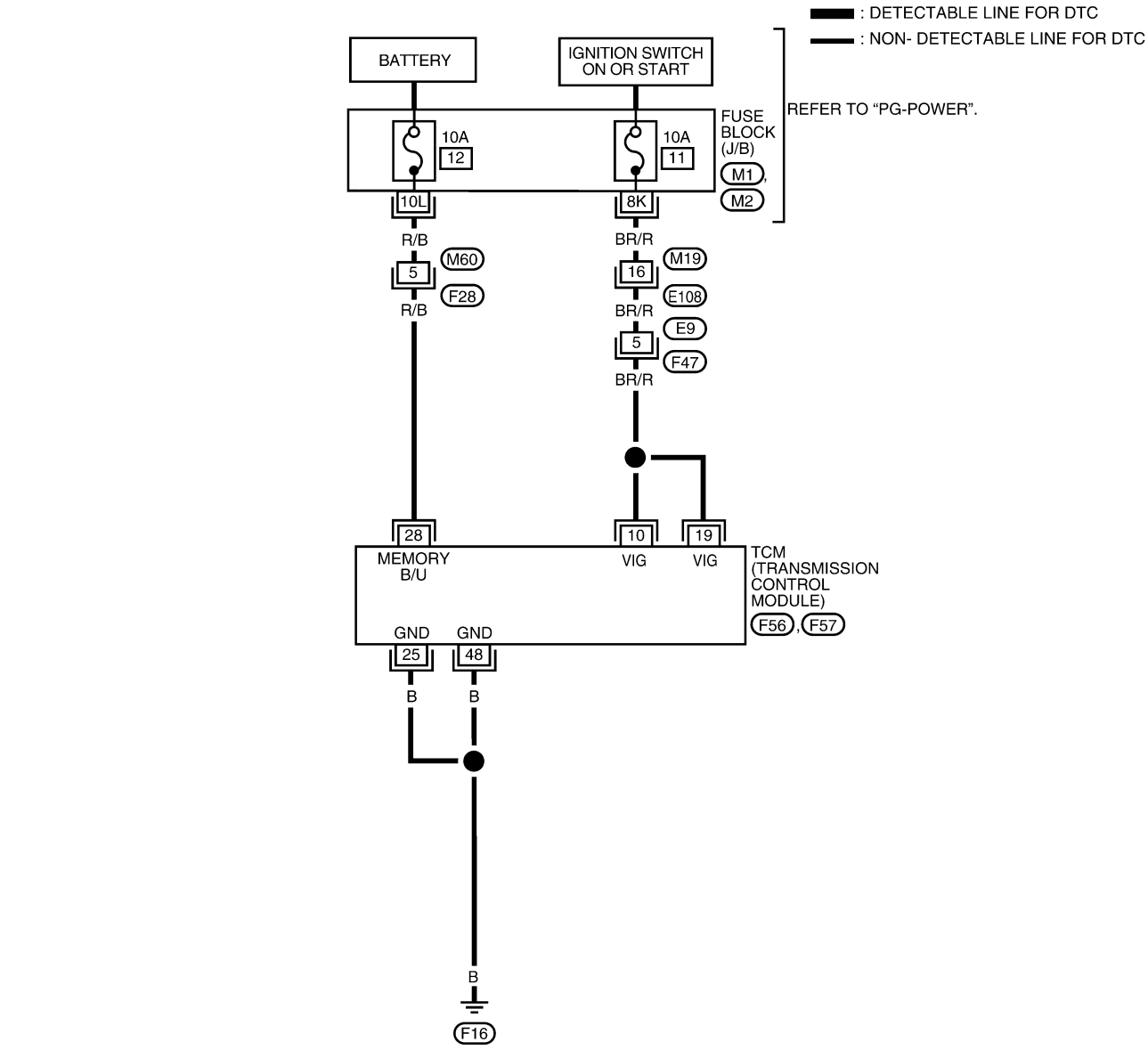
TROUBLE DIAGNOSIS FOR POWER SUPPLY

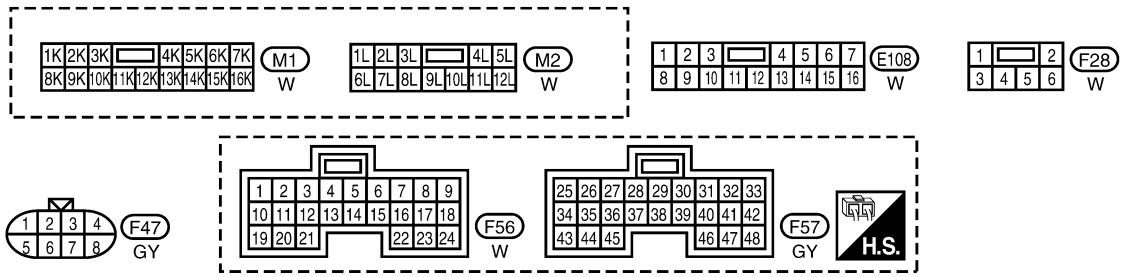
PFP:00000

Wiring Diagram — AT — MAIN

ECS0062X

AT-MAIN-01





WCWA0011E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)

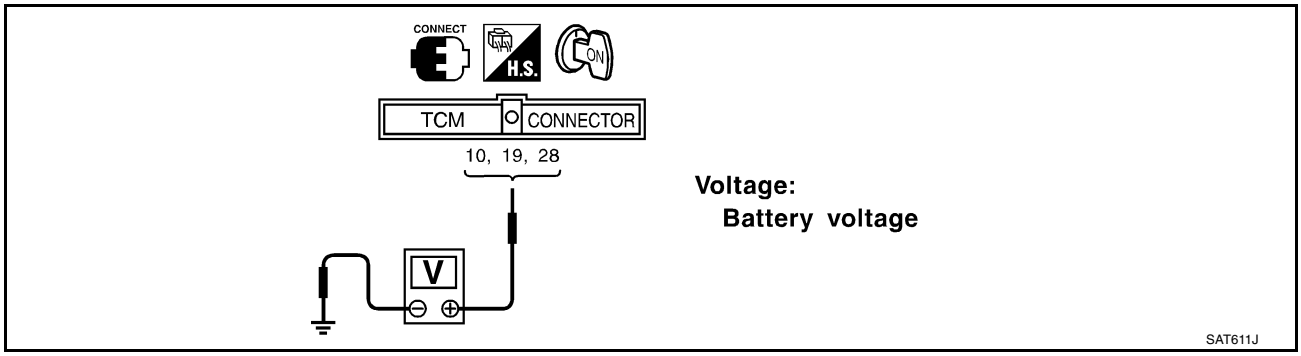
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	BR/R	POWER SOURCE	IGNITION ON	BATTERY VOLTAGE
			IGNITION OFF	APPROX. 0V
19	BR/R	POWER SOURCE	IGNITION ON	BATTERY VOLTAGE
			IGNITION OFF	APPROX. 0V
25	B	GROUND	—	—
28	R/B	POWER SOURCE (MEMORY BACKUP)	IGNITION ON	BATTERY VOLTAGE
			IGNITION OFF	BATTERY VOLTAGE
48	B	GROUND	—	—

Diagnostic Procedure

ECS0062Y

1. CHECK TCM POWER SOURCE STEP 1

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

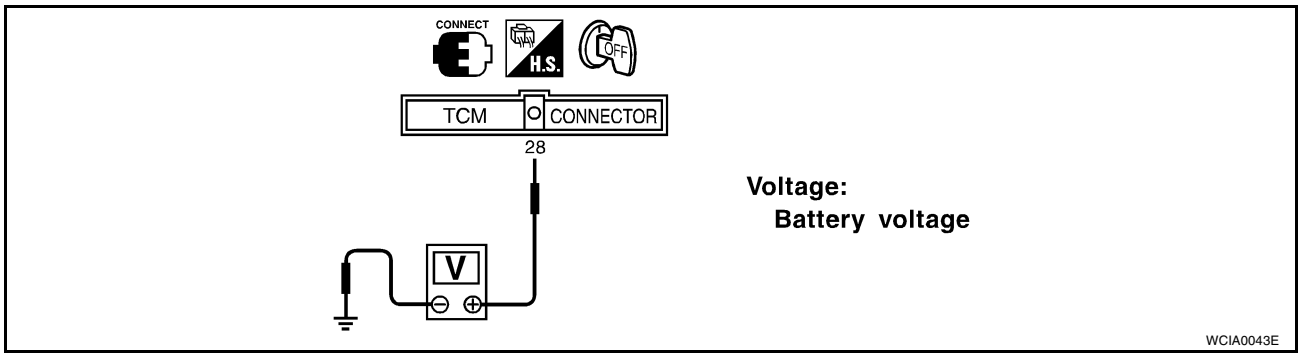


OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK TCM POWER SOURCE STEP 2

1. Turn ignition switch to OFF position.
2. Check voltage between TCM terminal 28 (R/B) and ground.



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness)
- Fuse
- Ignition switch
  Refer to PG-2, "POWER SUPPLY ROUTING" .

OK or NG

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

4. 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. Refer to AT-486, "Wiring Diagram — AT — MAIN" .

Continuity should exist.

OK or NG

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

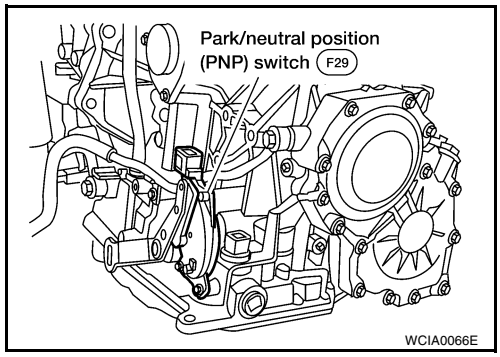
DTC P0705 PARK/NEUTRAL POSITION SWITCH

PFP:32006

Description

ECS0062Z

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



On Board Diagnosis Logic

ECS00630

Diagnostic trouble code PNP SW/CIRC with CONSULT-II or P0705 without CONSULT-II is detected when TCM does not receive the correct voltage signal from the switch based on the gear position.

Possible Cause

ECS00631

Check the following items.

- Harness or connectors
  (The park/neutral position (PNP) switch circuit is open or shorted.)
- Park/neutral position (PNP) switch

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00632

CAUTION:

Always drive vehicle at a safe speed.

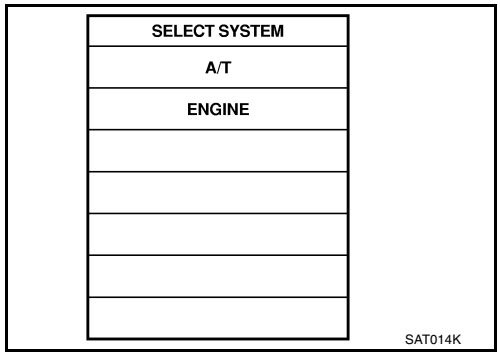
NOTE:

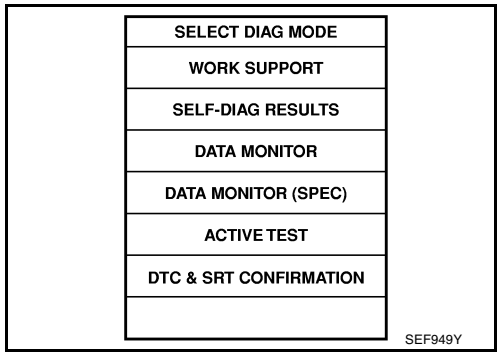
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

WITH CONSULT-II

1. Turn ignition switch ON.





2. Select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.

3. Start engine and maintain the following conditions for at least 5 consecutive seconds.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.3V
   Selector lever: D position (O/D ON or OFF)

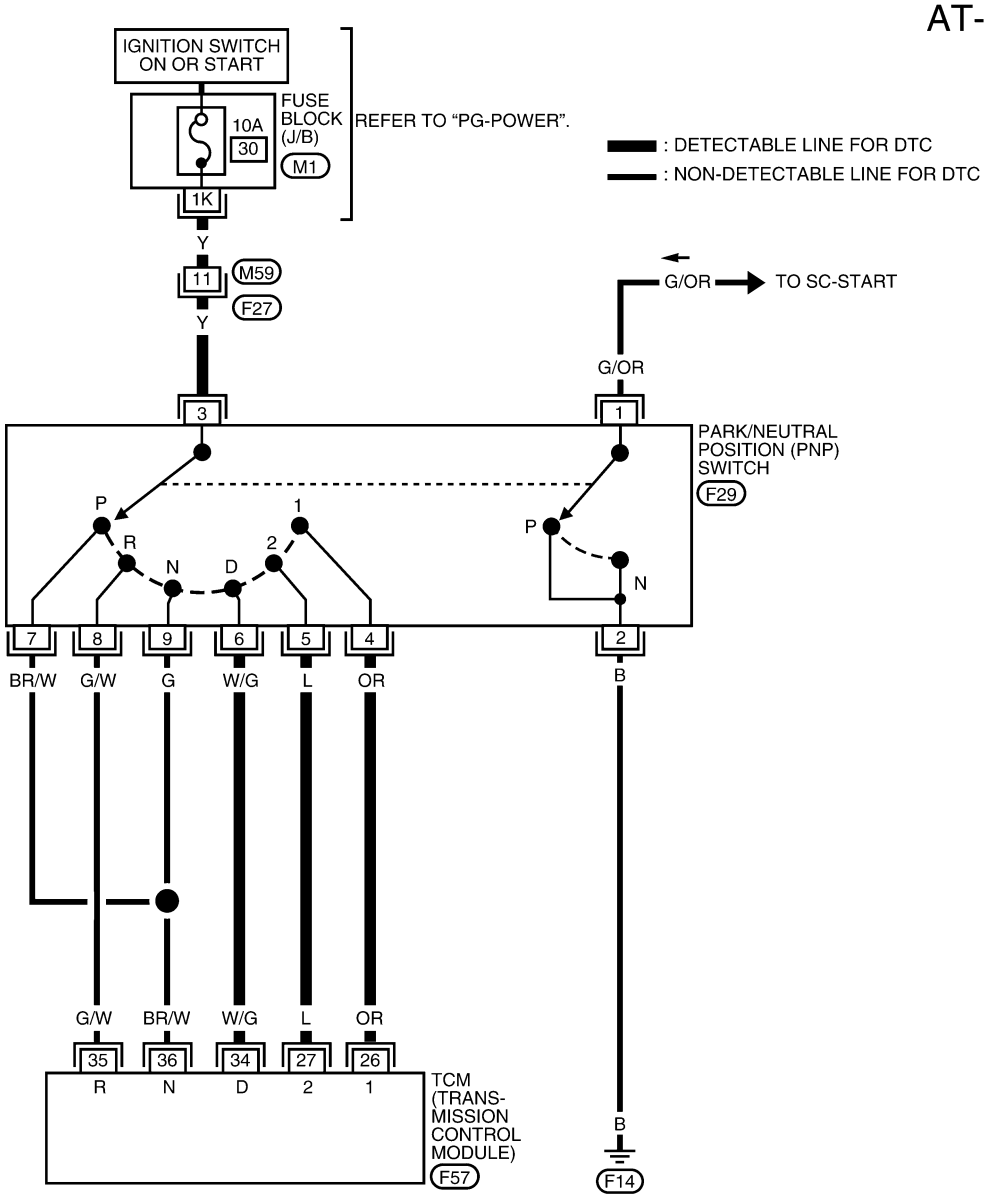
WITH GST

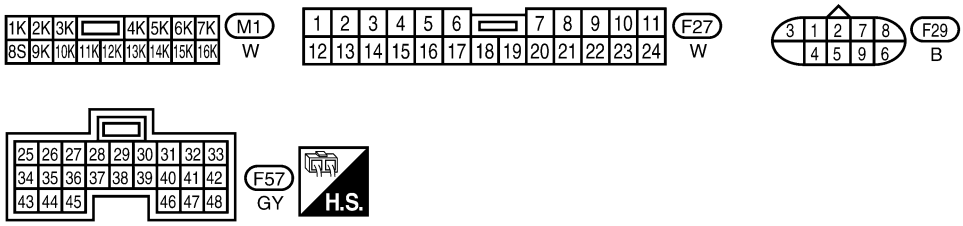
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — PNP/SW

ECS00633

AT-PNP/SW-01





WCWA0077E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
26	OR	PNP SWITCH 1 POSITION	IGNITION ON AND SELECTOR LEVER IN 1 POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
27	L	PNP SWITCH 2 POSITION	IGNITION ON AND SELECTOR LEVER IN 2 POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
34	W/G	PNP SWITCH D POSITION	IGNITION ON AND SELECTOR LEVER IN D POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
35	G/W	PNP SWITCH R POSITION	IGNITION ON AND SELECTOR LEVER IN R POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
36	BR/W	PNP SWITCH P OR N POSITION	IGNITION ON AND SELECTOR LEVER IN P OR N POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V

Diagnostic Procedure

ECS00634

1. INSPECTION START

Do you have CONSULT-II?

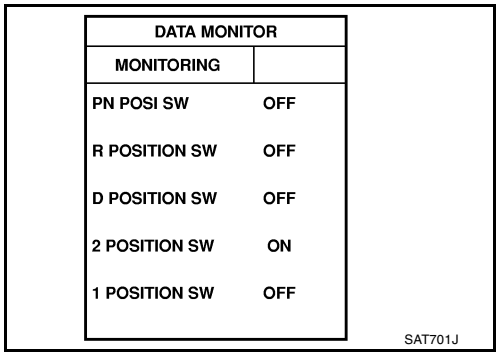
Yes or No

Yes >> GO TO 2.
No >> GO TO 6.

2. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT (WITH CONSULT-II)

With CONSULT-II

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



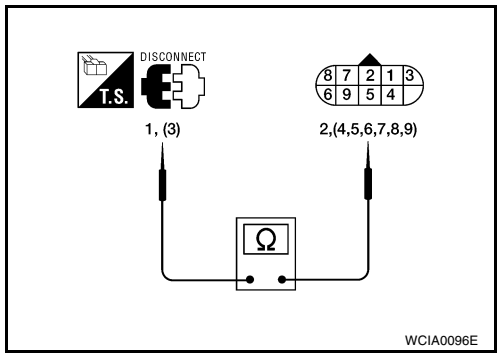
OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING ITEM

Check the following item:

- Park/neutral position (PNP) switch
  Check continuity between park/neutral position (PNP) switch F29 terminals 1 (G/OR) and 2 (B) and between terminals 3 (Y) and 4 (OR), 5 (L), 6 (W/G), 7 (BR/W), 8 (G/W) and 9 (G) 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	

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK MANUAL CONTROL CABLE ADJUSTMENT

Check PNP switch again with manual control cable disconnected from manual shaft of A/T assembly. Refer to test group 1.

OK or NG

OK >> Adjust manual control cable. Refer to AT-645, "Control Cable Adjustment" .
NG >> Repair or replace PNP switch.

5. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short or open between ignition switch and park/neutral position (PNP) switch (Main harness)
- Harness for short or open between park/neutral position (PNP) switch and TCM (Main harness)
- Fuse
- Ignition switch
  Refer to PG-2, "POWER SUPPLY ROUTING" .

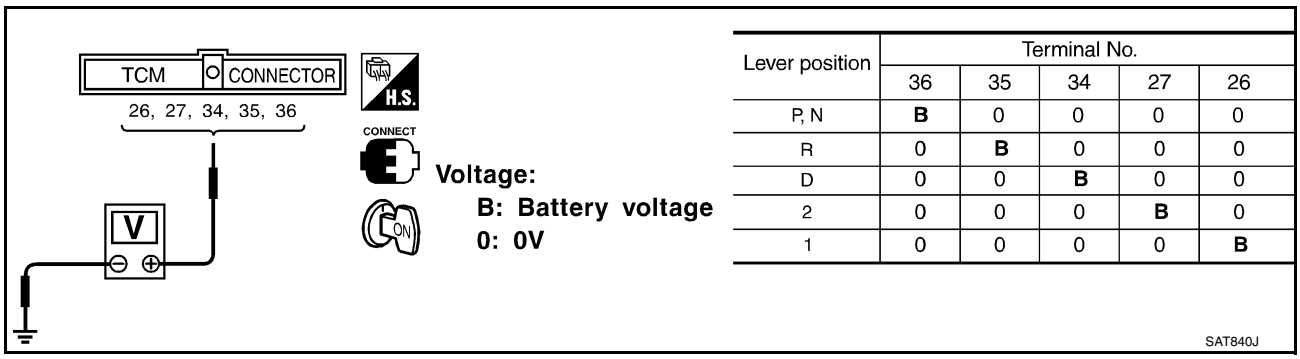
OK or NG

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

6. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT (WITHOUT CONSULT-II)

Without CONSULT-II

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



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 or NG

OK >> GO TO 7.
NG >> GO TO 5.

7. CHECK DTC

Perform AT-489, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

8. CHECK TCM INSPECTION

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

OK or NG

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

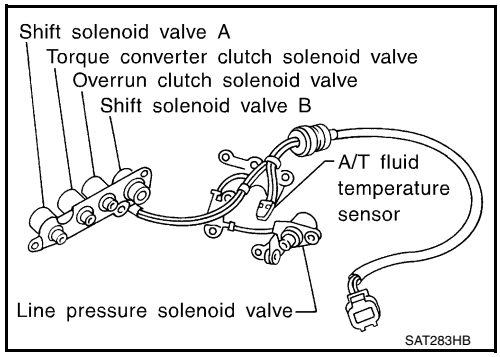
DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

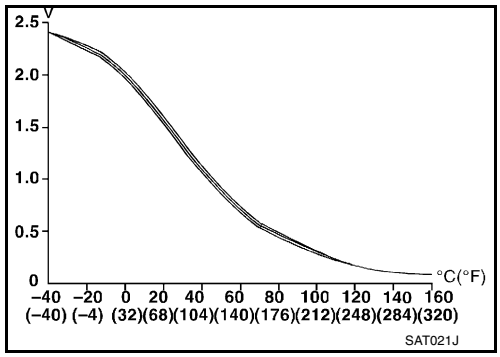
PFP:31940

Description

ECS00635

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





CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approximately)	
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

On Board Diagnosis Logic

ECS00636

Diagnostic trouble code ATF TEMP SEN/CIRC with CONSULT-II or P0710 without CONSULT-II is detected when TCM receives an excessively low or high voltage from the sensor.

Possible Cause

ECS00637

Check the following items.

- Harness or connectors
  (The sensor circuit is open or shorted.)
- A/T fluid temperature sensor

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00638

CAUTION:

Always drive vehicle at a safe speed.

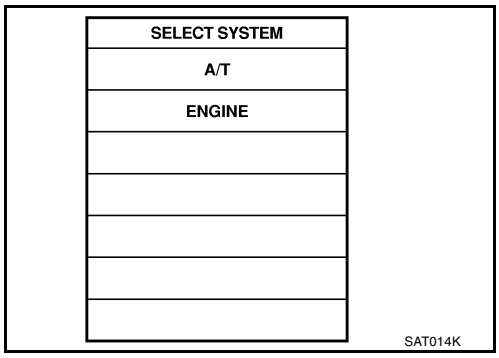
NOTE:

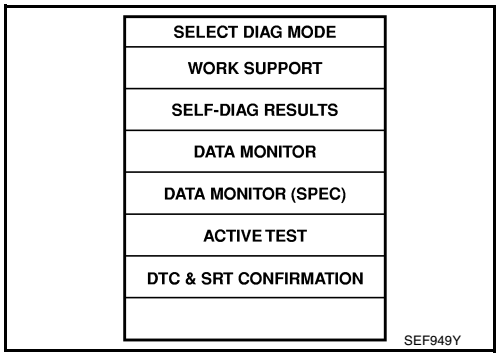
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.





2. Start engine and maintain the following conditions for at least 10 minutes (Total). (It is not necessary to maintain continuously.)
   CMPS·RPM (REF): 450 rpm or more
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (O/D ON)

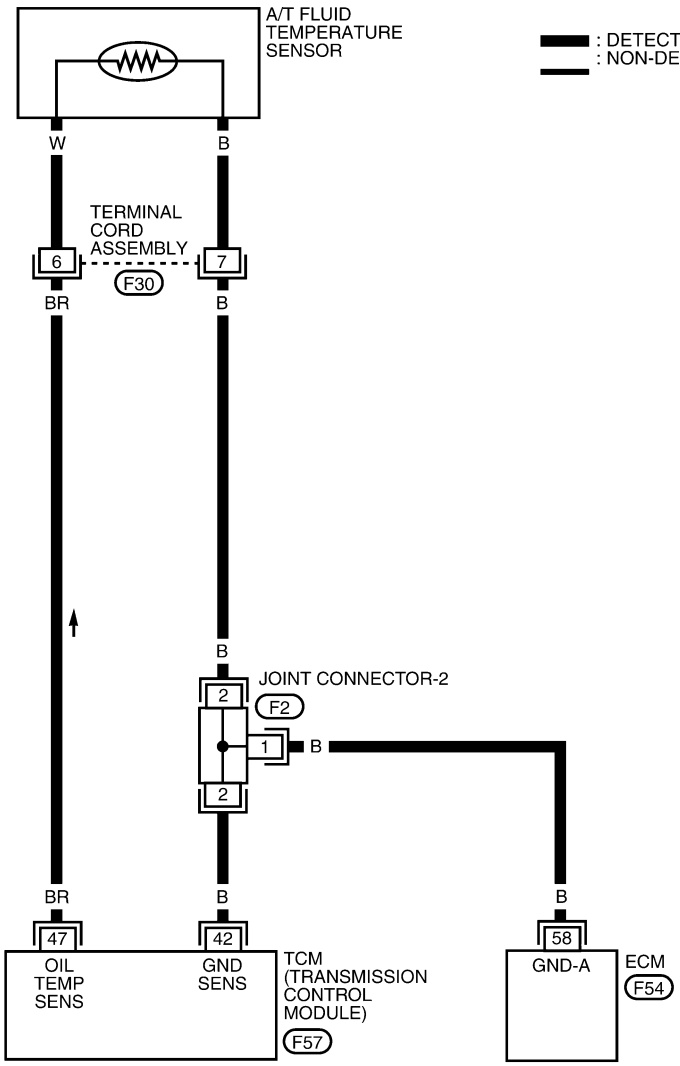
WITH GST

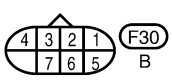
Follow the procedure “With CONSULT-II”.

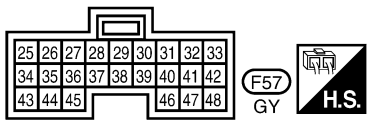
Wiring Diagram — AT — FTS

ECS00639

AT-FTS-01







REFER TO THE FOLLOWING.
F2 - JOINT CONNECTOR
F54 - ELECTRICAL UNITS

WCWA0014E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
42	B	SENSOR GROUND	—	—
47	BR	A/T FLUID TEMPERATURE SENSOR	IGNITION ON AND ATF TEMPERATURE IS 20°C (68°F)	APPROX. 1.5V
			IGNITION ON AND ATF TEMPERATURE IS 80°C (176°F)	APPROX. 0.5V

Diagnostic Procedure

ECS0063A

1. INSPECTION START

Do you have CONSULT-II?

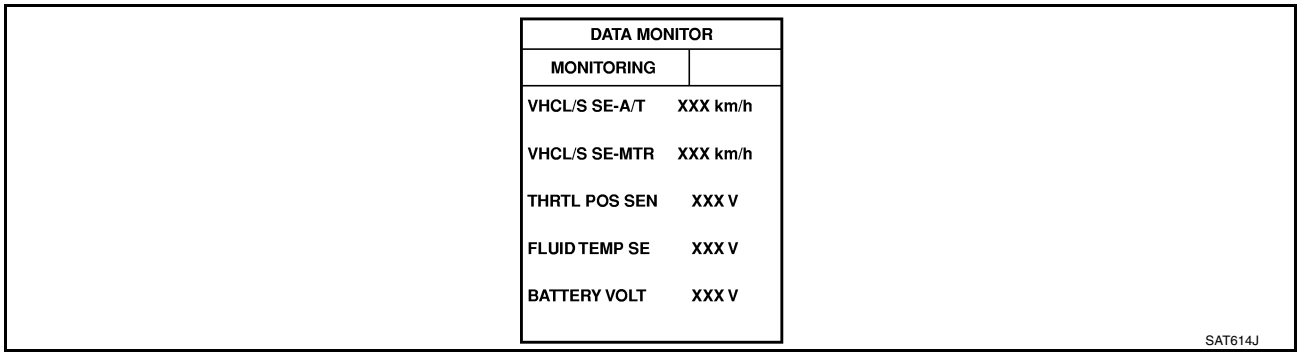
Yes or No

Yes >> GO TO 2.
No >> GO TO 6.

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

With CONSULT-II

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”.



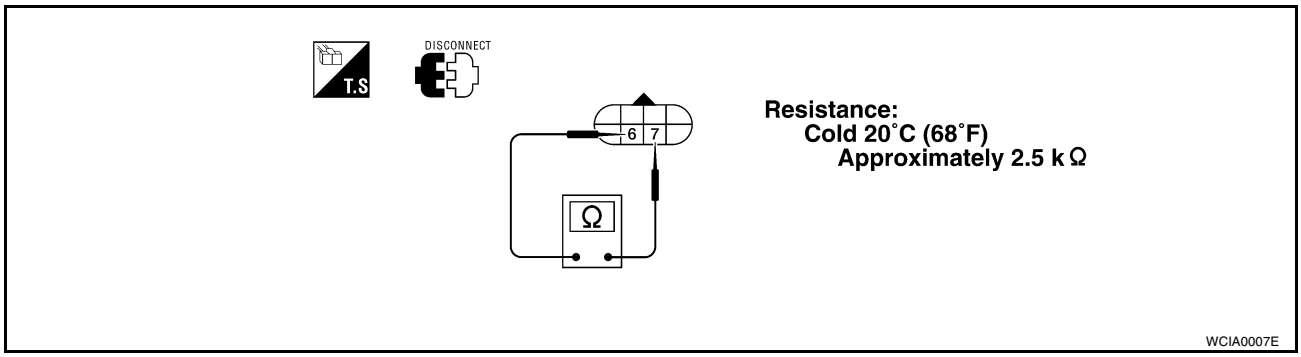
Voltage :Cold [20°C (68°F)] → Hot [80°C (176°F)]
:Approximately 1.5V → 0.5V

OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. 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 terminal cord assembly F30 terminals 6 and 7 (component side) when A/T is cold.



4. Reinstall any part removed.

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. DETECT MALFUNCTIONING ITEM

Check the following items:

- 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 AT-486, "TROUBLE DIAGNOSIS FOR POWER SUPPLY" .

OK or NG

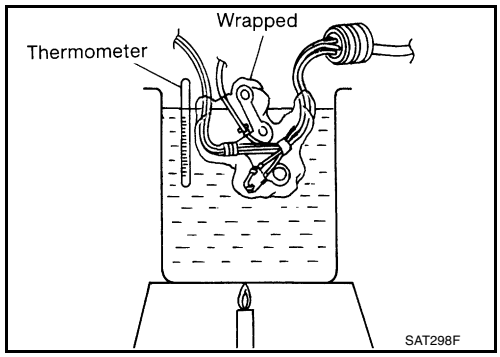
OK >> GO TO 7.
NG >> Repair or replace damaged parts.

5. DETECT MALFUNCTIONING ITEM

1. Remove oil pan.
2. Check the following items:

– A/T fluid temperature sensor
  Check resistance between two terminals while changing temperature as shown in figure.

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



– Harness of terminal cord assembly for short or open

OK or NG

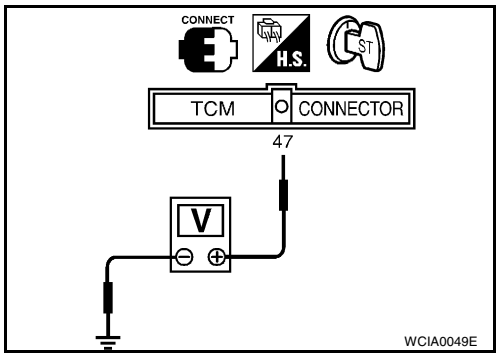
OK >> GO TO 7.
NG >> Repair or replace damaged parts.

6. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM connector F57 terminal 47 (BR) and ground while warming up A/T.

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



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

7. CHECK DTC

Perform AT-495, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

8. CHECK TCM INSPECTION

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

OK or NG

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

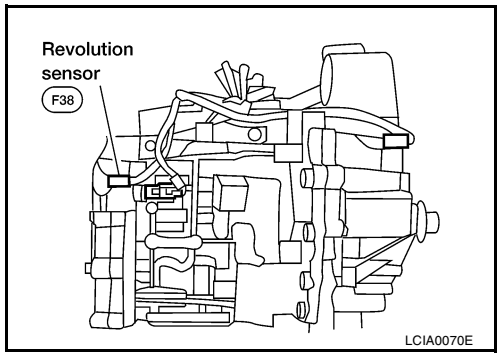
DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)

PFP:32702

Description

ECS0063B

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.



On Board Diagnosis Logic

ECS0063C

Diagnostic trouble code VEH SPD SEN/CIR AT with CONSULT-II or P0720 without CONSULT-II is detected when TCM does not receive the proper voltage signal from the sensor.

Possible Cause

ECS0063D

Check the following items.

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Revolution sensor

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0063E

CAUTION:

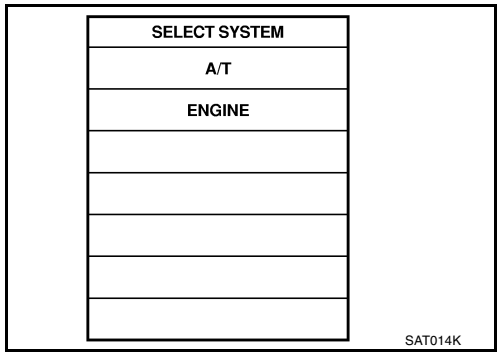
- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

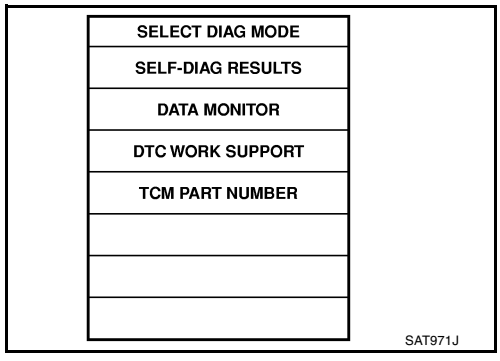
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

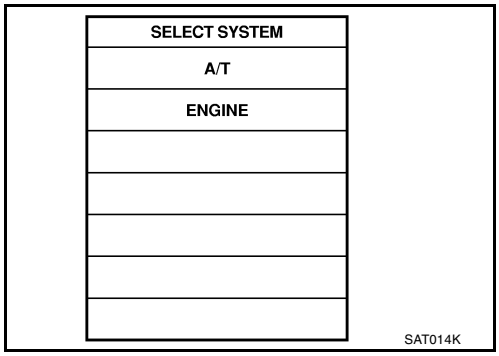
WITH CONSULT-II

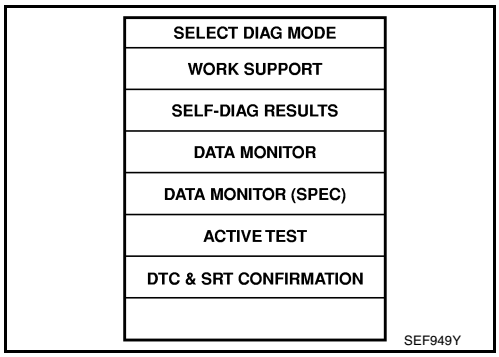
1. Turn ignition switch ON and select “DATA MONITOR” mode for “A/T” with CONSULT-II.





2. Drive vehicle and check for an increase of “VHCL/S SE·MTR” value.
   If the check result is NG, go to AT-504, "Diagnostic Procedure" .
   If the check result is OK, go to following step.
3. Select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.





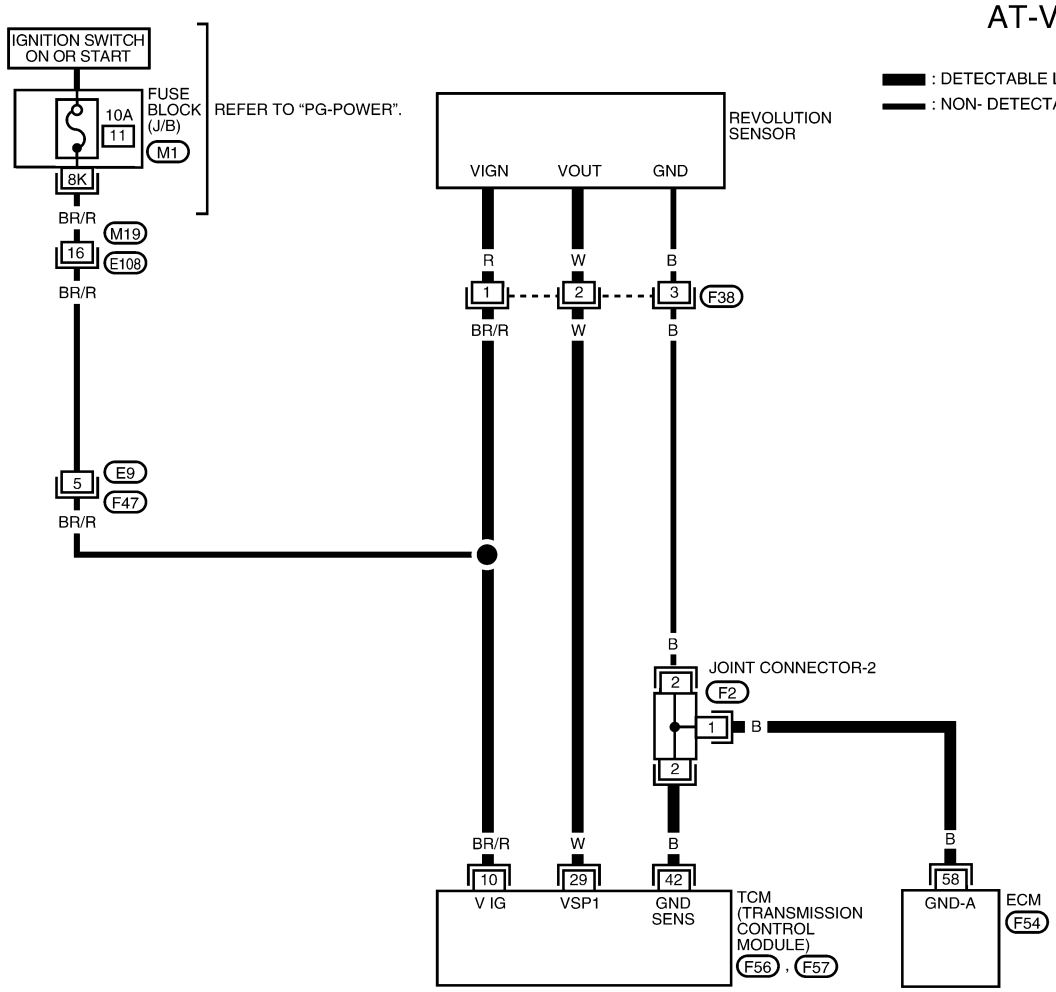
4. Start engine and maintain the following conditions for at least 5 consecutive seconds.
   VHCL SPEED SE: 30 km/h (19 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (O/D ON)
   Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.
   If the check result is NG, go to AT-504, "Diagnostic Procedure" .
   If the check result is OK, go to following step.
5. Maintain the following conditions for at least 5 consecutive seconds.
   CMPS·RPM (REF): 3,500 rpm or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (O/D ON)
   Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.

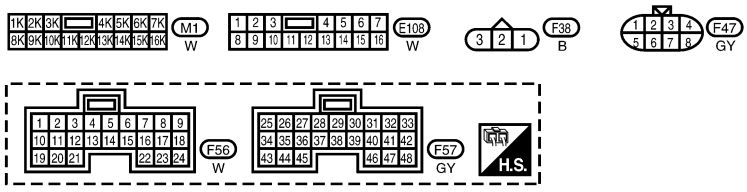
WITH GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — VSSA/T

ECS0063F





REFER TO THE FOLLOWING.
F2 - JOINT CONNECTOR
F54 - ELECTRICAL UNITS

WCWA0016E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
29	W	REVOLUTION SENSOR	VEHICLE MOVING AT 20 KM/H (12 MPH). USE THE CONSULT-II PULSE FREQUENCY MEASURING FUNCTION. A CIRCUIT TESTER CANNOT BE USED TO TEST THIS ITEM. CAUTION: CONNECT THE DIAGNOSIS DATA LINK CABLE TO THE VEHICLE DIAGNOSIS CONNECTOR.	450 HZ
			VEHICLE NOT MOVING.	LESS THAN 1.3V OR GREATER THAN 4.5V
42	B	SENSOR GROUND	—	—

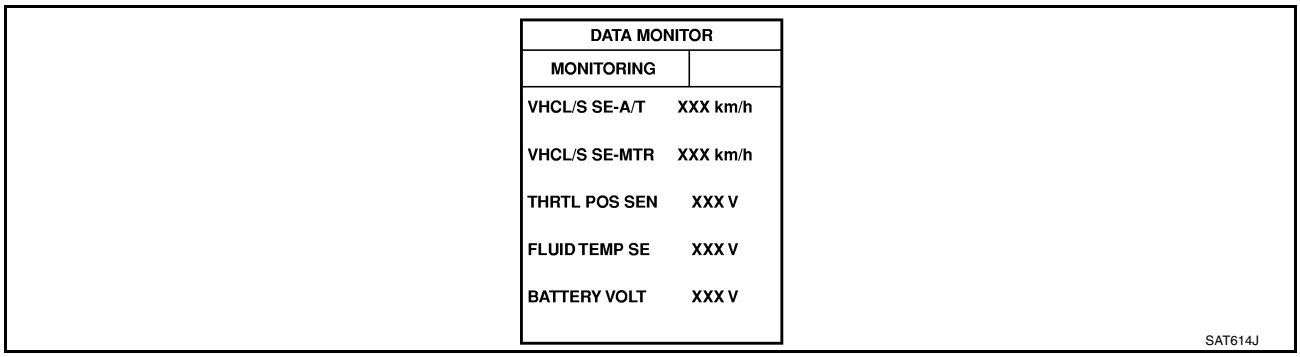
Diagnostic Procedure

ECS0063G

1. CHECK INPUT SIGNAL (WITH CONSULT-II)

With CONSULT-II

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.



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK REVOLUTION SENSOR (WITH CONSULT-II)

With CONSULT-II

1. Start engine.

Condition	Judgement standard (Approx.)
When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function. *1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	450 Hz
When vehicle parks.	Under 1.3V or over 4.5V

MTBL0594

- Harness for short or open between TCM, ECM and revolution sensor (Main harness)

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK DTC

Perform AT-501, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK TCM INSPECTION

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

OK or NG

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

DTC P0725 ENGINE SPEED SIGNAL

PFP:24825

Description

ECS0063H

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

On Board Diagnosis Logic

ECS0063I

Diagnostic trouble code ENGINE SPEED SIG with CONSULT-II or P0725 without CONSULT-II is detected when TCM does not receive the proper voltage signal from ECM.

Possible Cause

ECS0063J

Check harness or connectors. (The sensor circuit is open or shorted.)

Diagnostic Trouble Code (DTC) Confirmation Procedure

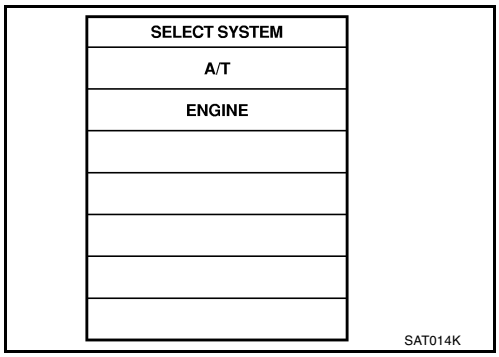
ECS0063K

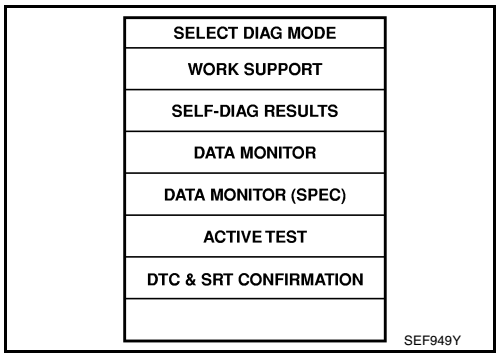
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.





2. Start engine and maintain the following conditions for at least 10 consecutive seconds.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (O/D ON)

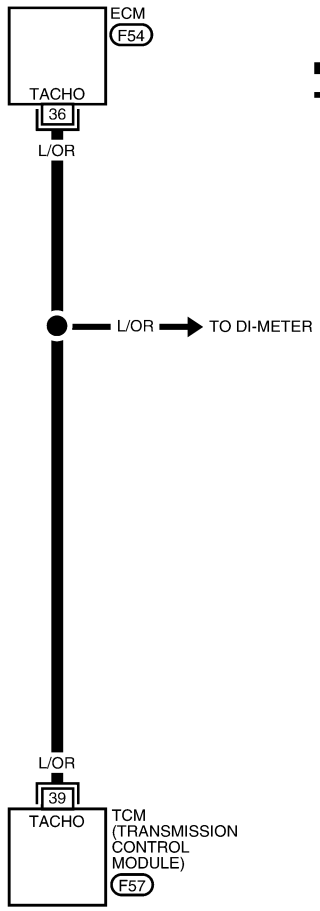
WITH GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — ENGSS

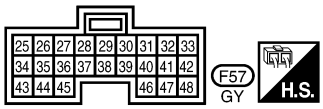
ECS0063L

AT-ENGSS-01



: DETECTABLE LINE FOR DTC

: NON-DETECTABLE LINE FOR DTC



REFER TO THE FOLLOWING.
F54 - ELECTRICAL UNITS

WCWA0017E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
39	L/OR	ENGINE SPEED SIGNAL	WITH ENGINE RUNNING AT IDLE SPEED	APPROX. 0.6V
			WITH ENGINE RUNNING AT 3,000 RPM	APPROX. 2.2V

Diagnostic Procedure

ECS0063M

1. CHECK DTC WITH ECM

- Check P code with CONSULT-II “ENGINE”.
  Turn ignition switch ON and select “SELF-DIAGNOSTIC RESULTS” mode for “ENGINE” with CONSULT-II.
  Refer to EC-1259, "Malfunction Indicator Lamp (MIL)" .

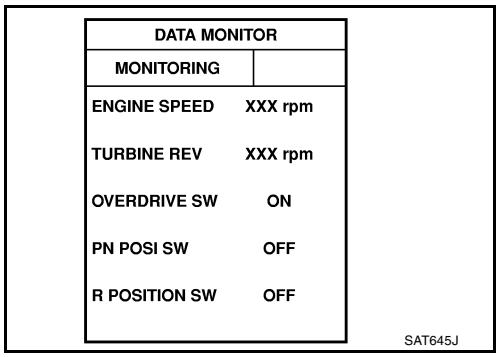
OK or NG

OK (with CONSULT-II)>>GO TO 2.
OK (without CONSULT-II)>>GO TO 4.
NG >> Check ignition signal circuit for engine control. Refer to EC-1761, "IGNITION SIGNAL" .

2. CHECK INPUT SIGNAL (WITH CONSULT-II)

With CONSULT-II

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.



OK or NG

OK >> GO TO 6.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short or open between TCM and ECM
- Resistor and ignition coil
  Refer to EC-1761, "IGNITION SIGNAL" .

OK or NG

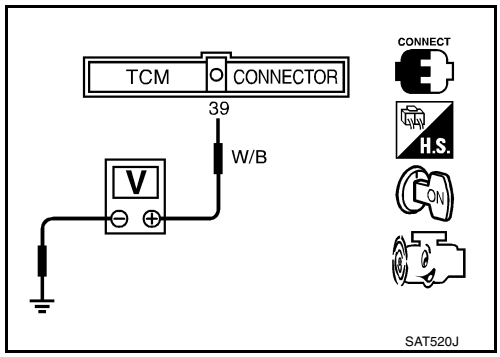
OK >> GO TO 6.
NG >> Repair or replace damaged parts.

4. CHECK INPUT SIGNAL (WITHOUT CONSULT-II)

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM connector F57 terminal 39 and ground.

Voltage :0.6 (Idle speed) - 2.2V (3,000 rpm)



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short or open between TCM and ECM
- Resistor and ignition coil
  Refer to EC-1761, "IGNITION SIGNAL" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. CHECK DTC

Perform AT-506, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. CHECK TCM INSPECTION

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

OK or NG

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

DTC P0731 A/T 1ST GEAR FUNCTION

PFP:31940

Description

ECS0063N

- 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)

On Board Diagnosis Logic

ECS0063O

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (1st) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when either shift solenoid valve A is stuck open or shift solenoid valve B is stuck open.
Gear positions supposed by TCM are as follows.
In case of gear position with no malfunctions: **1** , 2, 3 and 4 positions
In case of gear position with shift solenoid valve A stuck open: **2*** , 2, 3 and 3 positions
In case of gear position with shift solenoid valve B stuck open: **4*** , 3, 3 and 4 positions to each gear position above
*: P0731 is detected.
Diagnostic trouble code A/T 1ST GR FNCTN with CONSULT-II or P0731 without CONSULT-II is detected when A/T cannot be shifted to the 1st gear position even if electrical circuit is good.

Possible Cause

ECS0063P

Check the following items.

- Shift solenoid valve A
- Shift solenoid valve B
- Each clutch
- Hydraulic control circuit

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0063Q

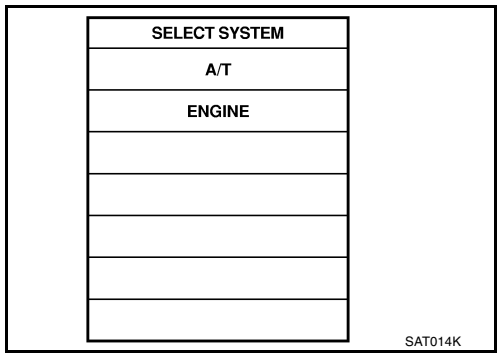
CAUTION:

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

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

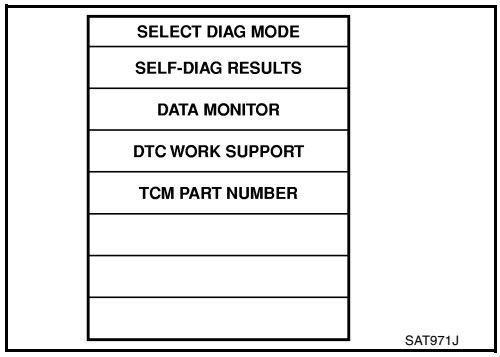
1. Start engine and select “DATA MONITOR” mode for “A/T” with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3. Select “1ST GR FNCTN P0731” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.



4. Accelerate vehicle to 20 to 25 km/h (12 to 16 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (O/D ON)

– **Check that “GEAR” shows “2” after releasing pedal.**

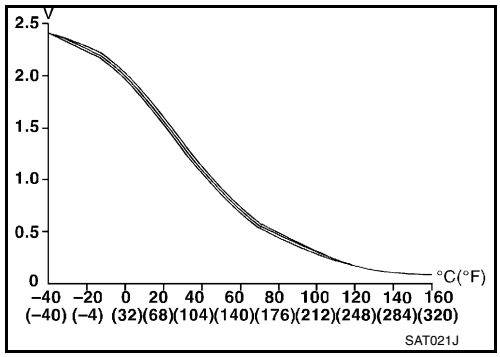
5. Depress accelerator pedal to WOT (more than 7.0/8 of “THROTTLE POSI”) quickly from a speed of 20 to 25 km/h (12 to 16 MPH) until “TESTING” changes to “STOP VEHICLE” or “COMPLETED”. (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-513, "Diagnostic Procedure" .
   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-DIAG RESULTS” 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 AT-513, "Diagnostic Procedure" .
   Refer to AT-750, "Shift Schedule" .

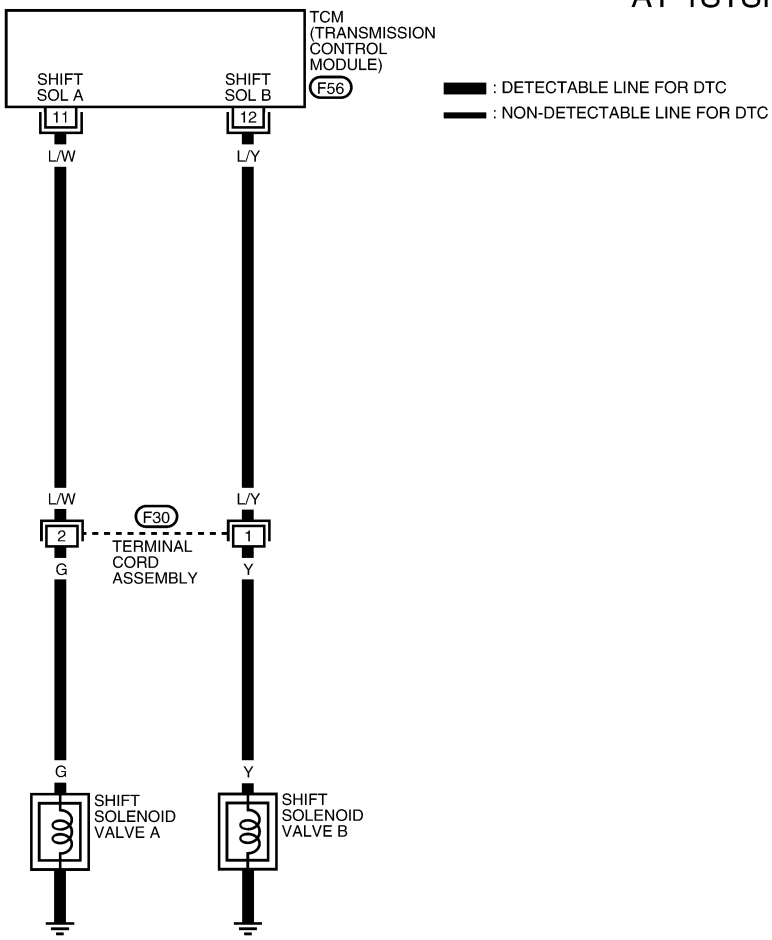
WITH GST

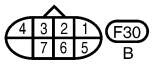
Follow the procedure “With CONSULT-II”.

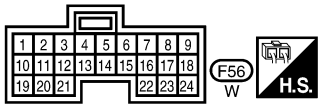
Wiring Diagram — AT — 1ST

ECS0063R

AT-1STSIG-01







WCWA0021E

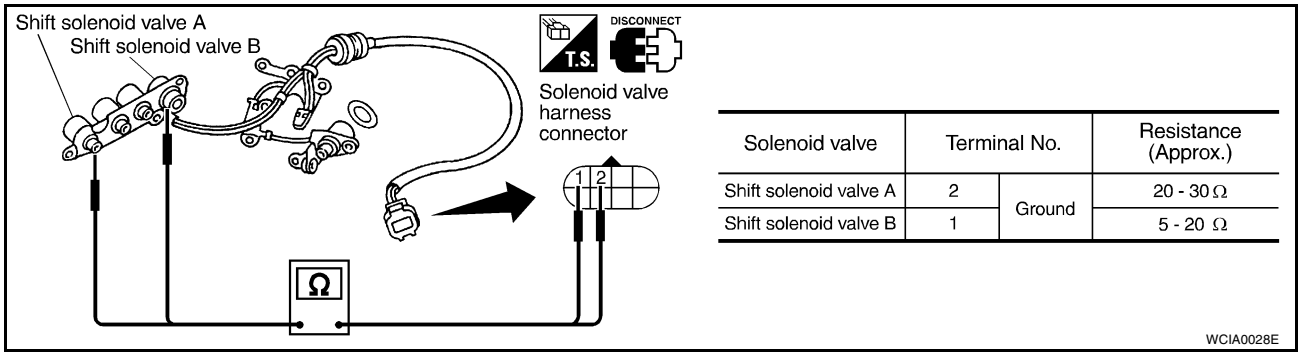
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A IS OPERATING (DRIVING IN D1 OR D4)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A IS NOT OPERATING (DRIVING IN D2 OR D3)	APPROX. 0V
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B IS OPERATING (DRIVING IN D1 OR D2)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE B IS NOT OPERATING (DRIVING IN D3 OR D4)	APPROX. 0V

Diagnostic Procedure

ECS0063S

1. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
- Shift solenoid valve A
- Shift solenoid valve B
2. Check resistance between terminal cord assembly F30 terminals 1 and 2, and ground.



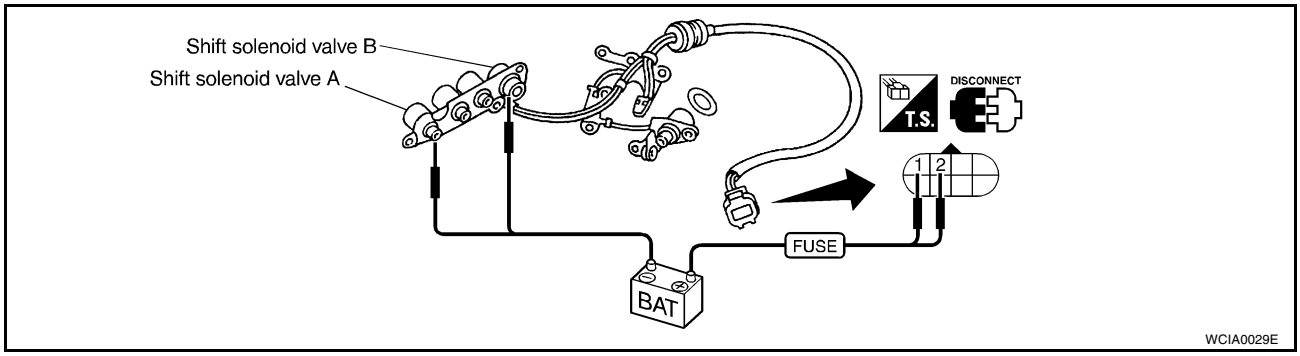
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30 Ω
Shift solenoid valve B	1		5 - 20 Ω

OK or NG

OK >> GO TO 2.
NG >> Repair or replace damaged parts.

2. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
- Shift solenoid valve A
- Shift solenoid valve B
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.

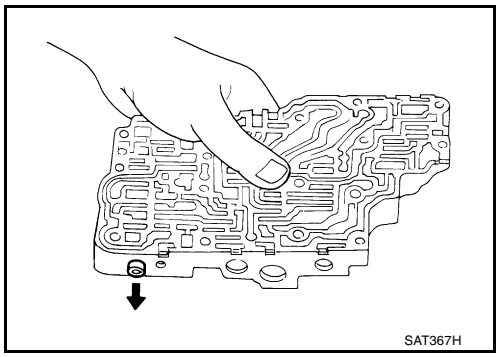


OK or NG

OK >> GO TO 3.
NG >> Repair or replace shift solenoid valve assembly.

3. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-677, "DISASSEMBLY" .
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.



OK or NG

OK >> GO TO 4.
NG >> Repair control valve assembly.

4. CHECK DTC

Perform AT-510, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> Check control valve again. Repair or replace control valve assembly.

DTC P0732 A/T 2ND GEAR FUNCTION

PFP:31940

Description

ECS0063T

- 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)

On Board Diagnosis Logic

ECS0063U

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 positions supposed by TCM are as follows.
In case of gear position with no malfunctions: 1, **2** , 3 and 4 positions
In case of gear position with shift solenoid valve B stuck open: 4, **3*** , 3 and 4 positions to each gear position above
*: P0732 is detected.
Diagnostic trouble code A/T 2ND GR FNCTN with CONSULT-II or P0732 without CONSULT-II is detected when A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.

Possible Cause

ECS0063V

Check the following items.

- Shift solenoid valve B
- Each clutch
- Hydraulic control circuit

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0063W

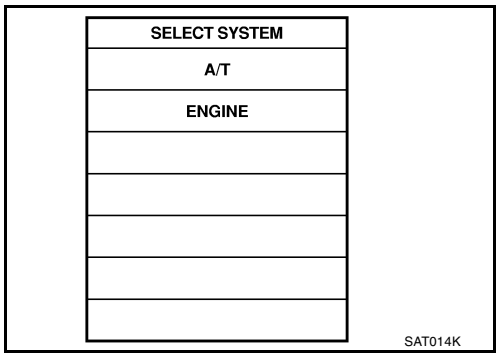
CAUTION:

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

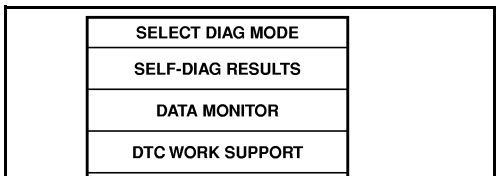
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

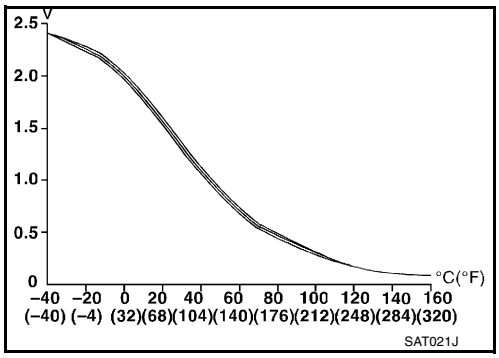
WITH CONSULT-II

1. Start engine and select “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 63 to 68 km/h (39 to 42 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8
   Selector lever: D position (O/D ON)
   - **Check that “GEAR” shows “3” or “4” after releasing pedal.**
5. Depress accelerator pedal to WOT (more than 7.0/8 of “THROTTLE POSI”) quickly from a speed of 63 to 68 km/h (39 to 42 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 AT-518, "Diagnostic Procedure" .
   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-DIAG RESULTS” for “ENGINE”. In case a 1st trip DTC other than P0732 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.**
6. Stop vehicle.
7. Follow the instruction displayed. (Check for normal shifting referring to the table below.)





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

8. Make sure that “OK” is displayed. (If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”.)
   Refer to AT-518, "Diagnostic Procedure" .
   Refer to AT-750, "Shift Schedule" .

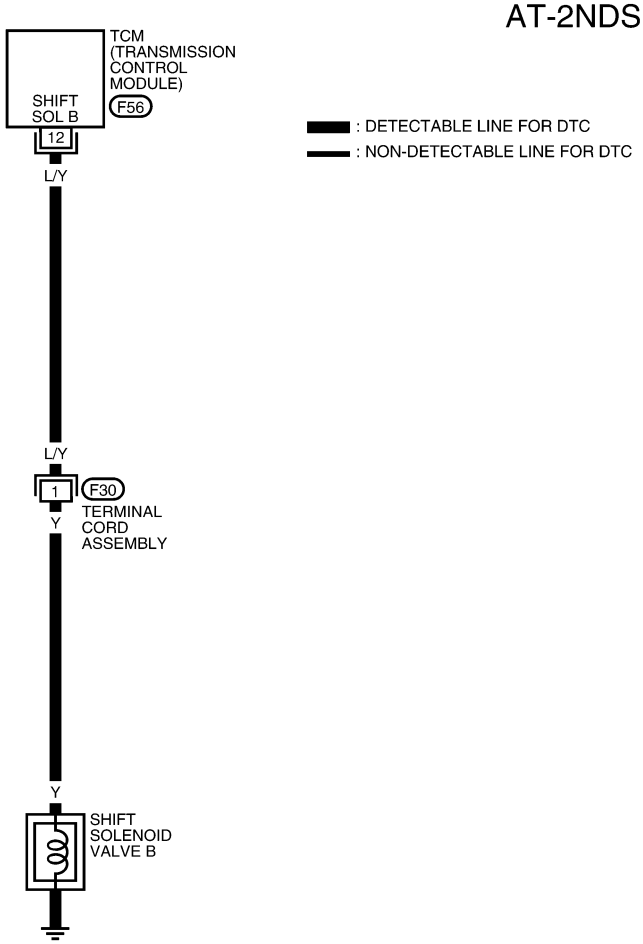
WITH GST

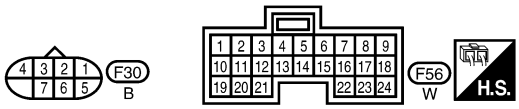
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 2ND

ECS0063X

AT-2NDSIG-01





WCWA0022E

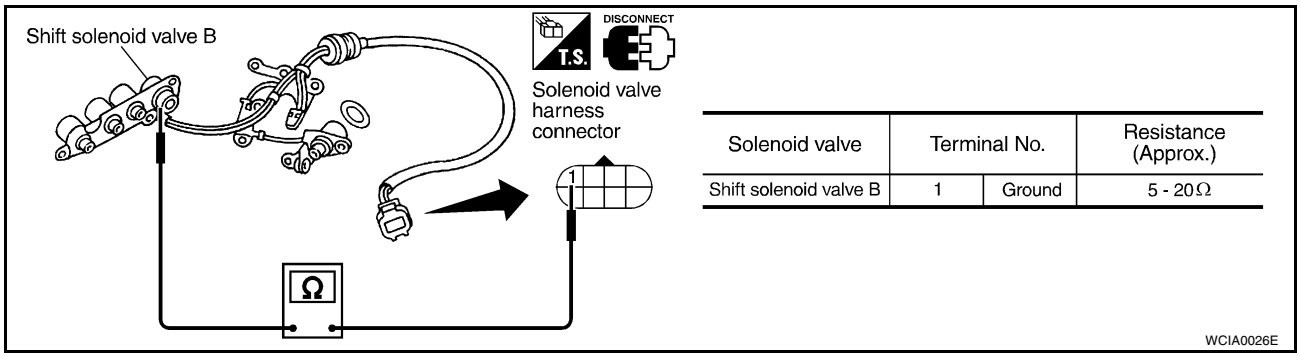
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B IS OPERATING (DRIVING IN D1 OR D2)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE B IS NOT OPERATING (DRIVING IN D3 OR D4)	APPROX. 0V

Diagnostic Procedure

ECS0063Y

1. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
- Shift solenoid valve B
2. Check resistance between terminal cord assembly F30 terminal 1 and ground.



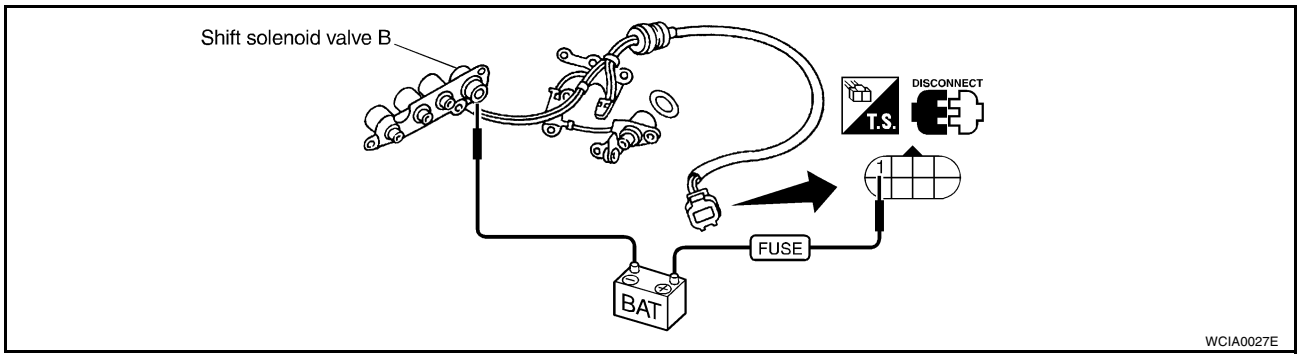
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	1	Ground	5 - 20Ω

OK or NG

OK >> GO TO 2.
NG >> Repair or replace shift solenoid valve assembly.

2. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
- Shift solenoid valve B
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.



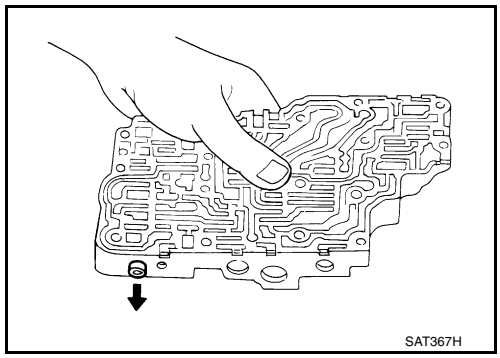
OK or NG

OK >> GO TO 3.
NG >> Repair or replace shift solenoid valve assembly.

3. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-677, "DISASSEMBLY" .
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.



OK or NG

OK >> GO TO 4.
NG >> Repair control valve assembly.

4. CHECK DTC

Perform AT-515, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> Check control valve again. Repair or replace control valve assembly.

DTC P0733 A/T 3RD GEAR FUNCTION

PFP:31940

Description

ECS0063Z

- 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)

On Board Diagnosis Logic

ECS00640

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 positions supposed by TCM are as follows.
In case of gear position with no malfunctions: 1, 2, **3** and 4 positions
In case of gear position with shift solenoid valve A stuck closed: 1, 1, **4*** and 4 positions to each gear position above
*: P0733 is detected.
Diagnostic trouble code A/T 3RD GR FNCTN with CONSULT-II or P0733 without CONSULT-II is detected when A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.

Possible Cause

ECS00641

Check the following items.

- Shift solenoid valve A
- Each clutch
- Hydraulic control circuit

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00642

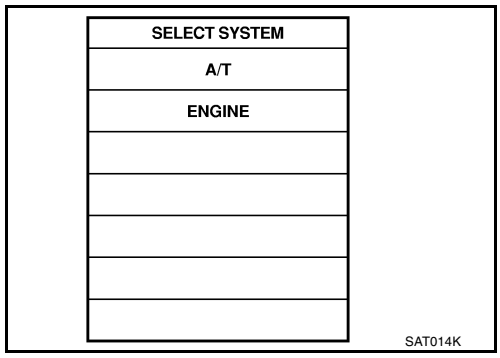
CAUTION:

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

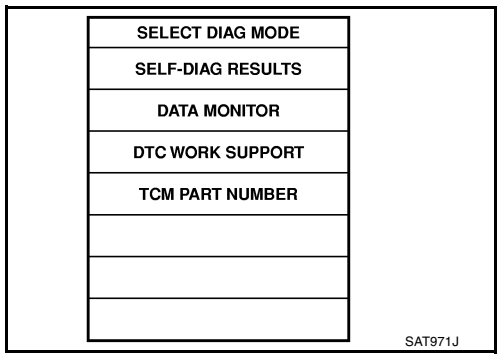
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

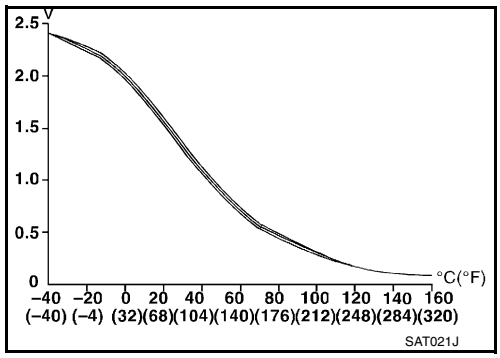
WITH CONSULT-II

1. Start engine and select “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 80 to 95 km/h (50 to 59 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD “ON”)
   - **Check that “GEAR” shows “4” after releasing pedal.**
5. Depress accelerator pedal steadily with 3.5/8 - 4.5/8 of “THROTTLE POSI” from a speed of 80 to 95 km/h (50 to 59 MPH) until “TESTING” changes to “STOP VEHICLE” or “COMPLETED”. (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-523, "Diagnostic Procedure" .
   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-DIAG RESULTS” for “ENGINE”. In case a 1st trip DTC other than P0733 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.**
6. Stop vehicle.
7. Follow the instruction displayed. (Check for normal shifting referring to the table below.)





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

8. Make sure that “OK” is displayed. (If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”.)
   Refer to AT-523, "Diagnostic Procedure" .
   Refer to AT-750, "Shift Schedule" .

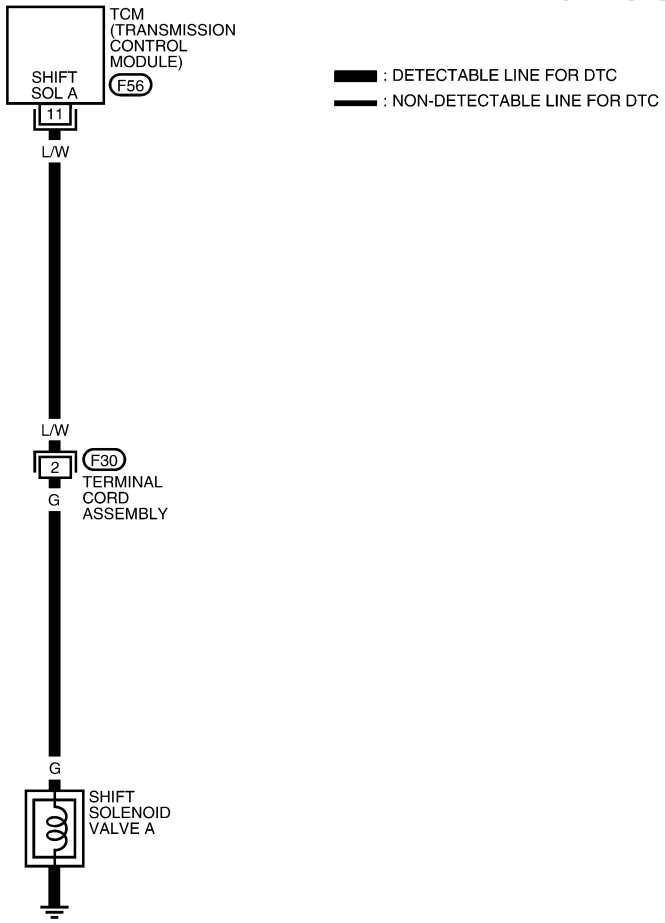
WITH GST

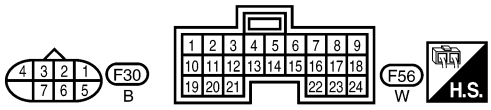
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 3RD

ECS00643

AT-3RDSIG-01





WCWA0023E

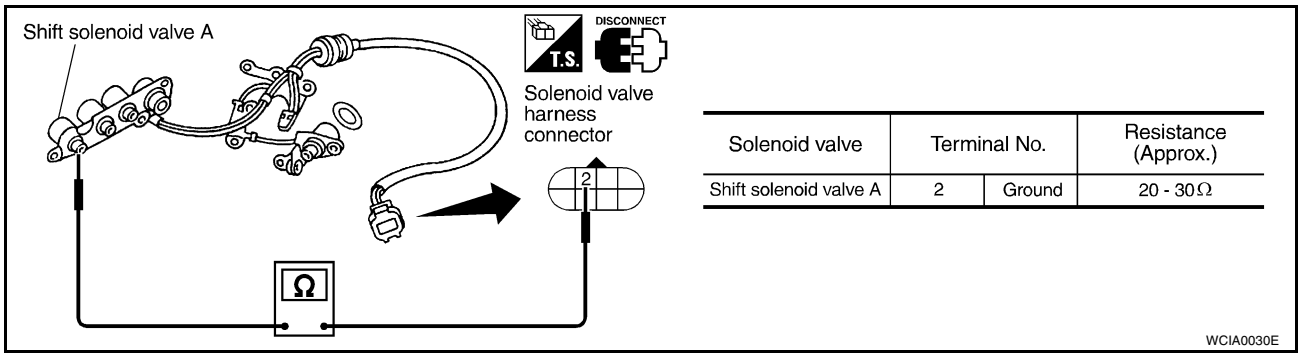
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A IS OPERATING (DRIVING IN D1 OR D4)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A IS NOT OPERATING (DRIVING IN D2 OR D3)	APPROX. 0V

Diagnostic Procedure

ECS00644

1. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
- Shift solenoid valve A
2. Check resistance between terminal cord assembly F30 terminal 2 and ground.



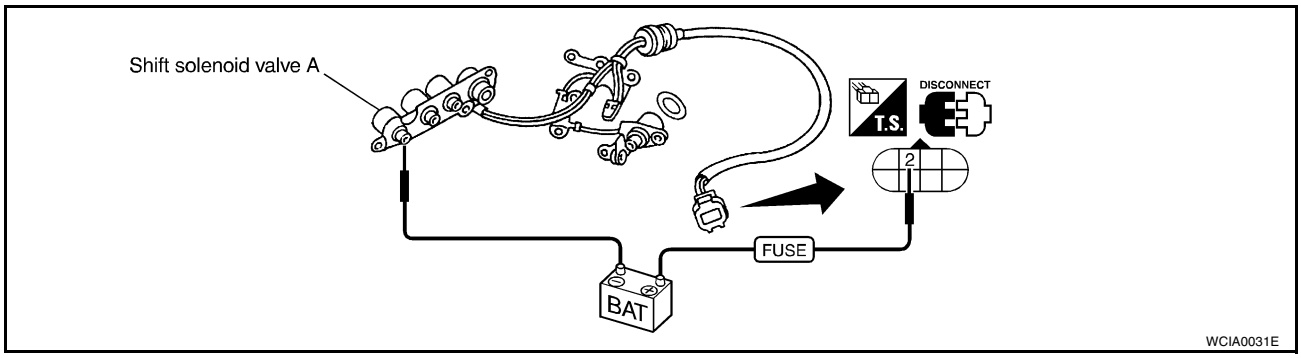
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30Ω

OK or NG

OK >> GO TO 2.
NG >> Repair or replace shift solenoid valve assembly.

2. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
- Shift solenoid valve A
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground ot the solenoid.



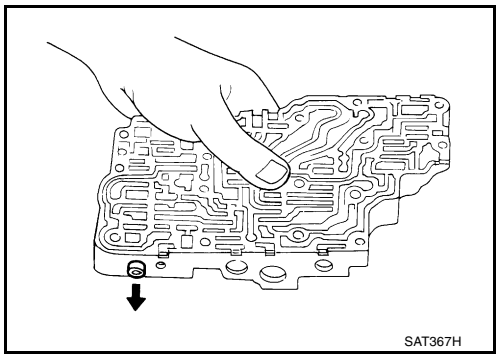
OK or NG

OK >> GO TO 3.
NG >> Repair or replace shift solenoid valve assembly.

3. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-677, "DISASSEMBLY" .
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.



OK or NG

OK >> GO TO 4.
NG >> Repair control valve assembly.

4. CHECK DTC

Perform AT-520, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> Check control valve again. Repair or replace control valve assembly.

DTC P0734 A/T 4TH GEAR FUNCTION

PFP:31940

Description

ECS00645

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

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

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

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

On Board Diagnosis Logic

ECS00646

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 positions supposed by TCM are as follows.
In case of gear position with no malfunctions: 1, 2, 3 and **4** positions
In case of gear position with shift solenoid valve B stuck closed: 1, 2, 2 and **1*** positions to each gear position above
*: P0734 is detected.
Diagnostic trouble code A/T 4TH GR FNCTN with CONSULT-II or P0734 without CONSULT-II is detected when A/T cannot be shifted to the 4th gear position even if electrical circuit is good.

Possible Cause

ECS00647

Check the following items.

- Shift solenoid valve A
- Shift solenoid valve B
- Line pressure solenoid valve
- Each clutch
- Hydraulic control circuit

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00648

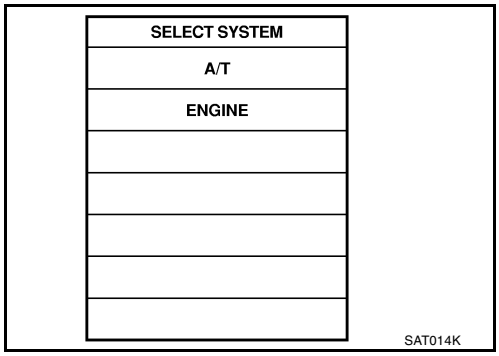
CAUTION:

- **Always drive vehicle at a safe speed.**
- **If conducting this "DTC CONFIRMATION PROCEDURE" again, always turn ignition switch OFF and wait at least 10 seconds before continuing.**
- **Be careful not to rev engine into the red zone on the tachometer.**

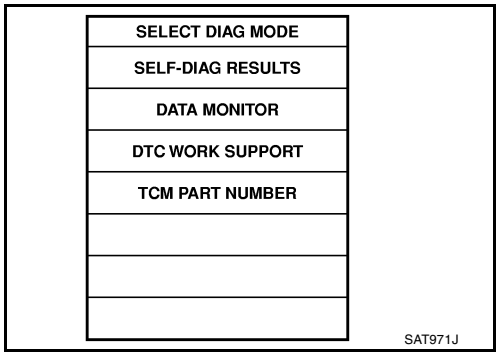
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

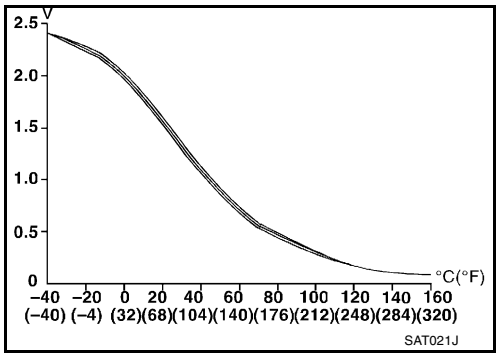
1. Start engine and select “DATA MONITOR” mode for “A/T” with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3. Select “4TH GR FNCTN P0734” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.



4. Accelerate vehicle to 60 to 70 km/h (37 to 43 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 5.5/8 (at all times during step 4)
   Selector lever: D position (O/D ON)
   - **Check that “GEAR” shows “3” after releasing pedal.**
5. Depress accelerator pedal steadily with 1.0/8 - 2.0/8 of “THROTTLE POSI” from a speed of 60 to 70 km/h (37 to 43 MPH) until “TESTING” has turned to “STOP VEHICLE” or “COMPLETED”. (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-528, "Diagnostic Procedure" .
   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-DIAG RESULTS” 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 AT-528, "Diagnostic Procedure" .
   Refer to AT-750, "Shift Schedule" .

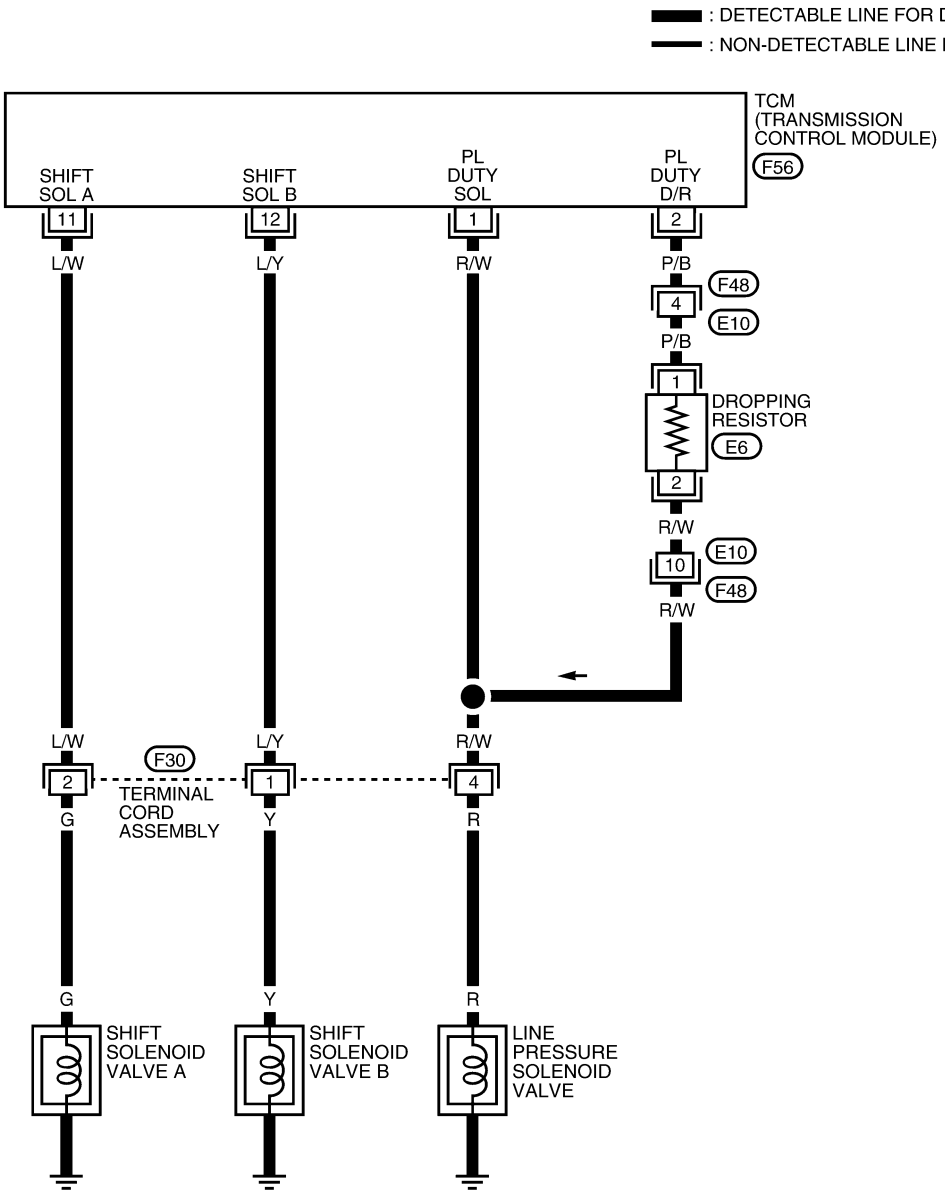
WITH GST

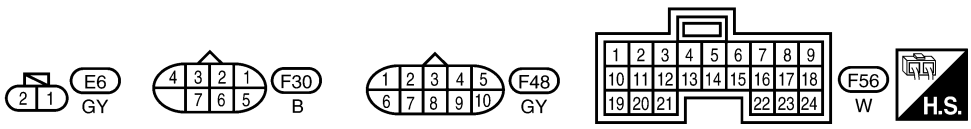
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 4TH

ECS00649

AT-4THSIG-01





WCWA0024E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	R/W	LINE PRESSURE SOLENOID VALVE	WHEN ACCELERATOR PEDAL IS RELEASED WHILE DRIVING	APPROX. 1.5 - 3.0V
			WHEN ACCELERATOR PEDAL IS DEPRESSED WHILE DRIVING	APPROX. 0V
2	P/B	LINE PRESSURE SOLENOID VALVE (DROPPING RESISTOR)	WHEN ACCELERATOR PEDAL IS RELEASED WHILE DRIVING	APPROX. 4 - 14V
			WHEN ACCELERATOR PEDAL IS DEPRESSED WHILE DRIVING	APPROX. 0V
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A IS OPERATING (DRIVING IN D_1 OR D_4)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A IS NOT OPERATING (DRIVING IN D_2 OR D_3)	APPROX. 0V
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B IS OPERATING (DRIVING IN D_1 OR D_2)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE BE IS NOT OPERATING (DRIVING IN D_3 OR D_4)	APPROX. 0V

Diagnostic Procedure

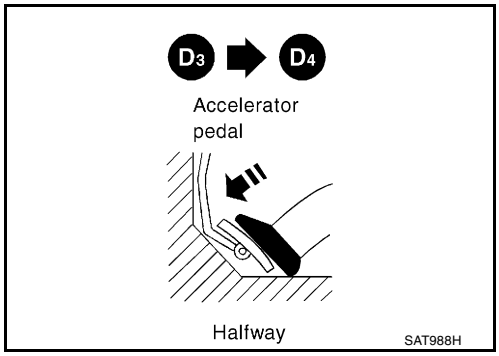
ECS0064A

1. CHECK SHIFT UP (D_3 TO D_4)

During AT-463, "Cruise Test — Part 1" , does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 11.
No >> GO TO 2.



2. CHECK LINE PRESSURE

Perform line pressure test.

Engine Speed RPM	Line Pressure kPa (kg/cm^2 , psi)	
	D, 2 and 1 Position	R Position
Idle	500 (5.1, 73)	778 (7.9, 113)
Stall	1,223 (12.6, 179)	1,918 (19.6, 278)

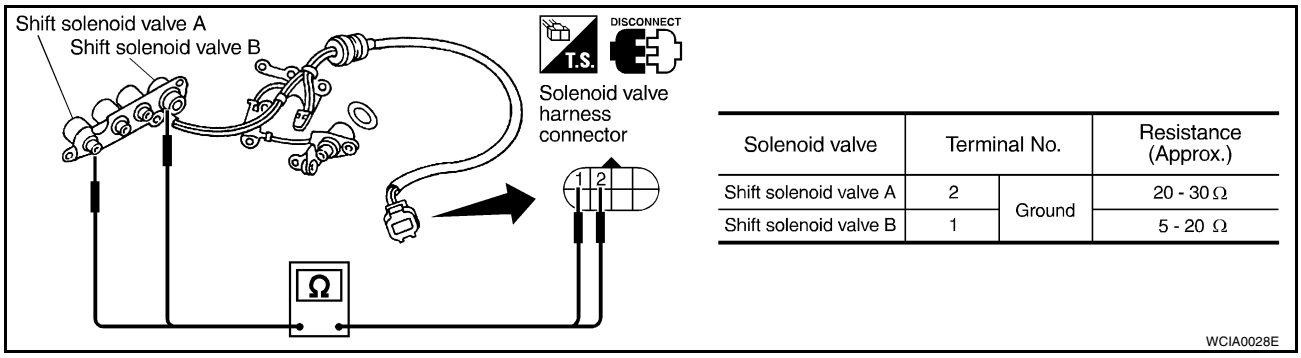
Refer to AT-454, "Line Pressure Test" .

OK or NG

OK >> GO TO 3.
NG >> GO TO 7.

3. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
- Shift solenoid valve A
- Shift solenoid valve B
2. Check resistance between terminal cord assembly connector F30 terminals 1 and 2 and ground.



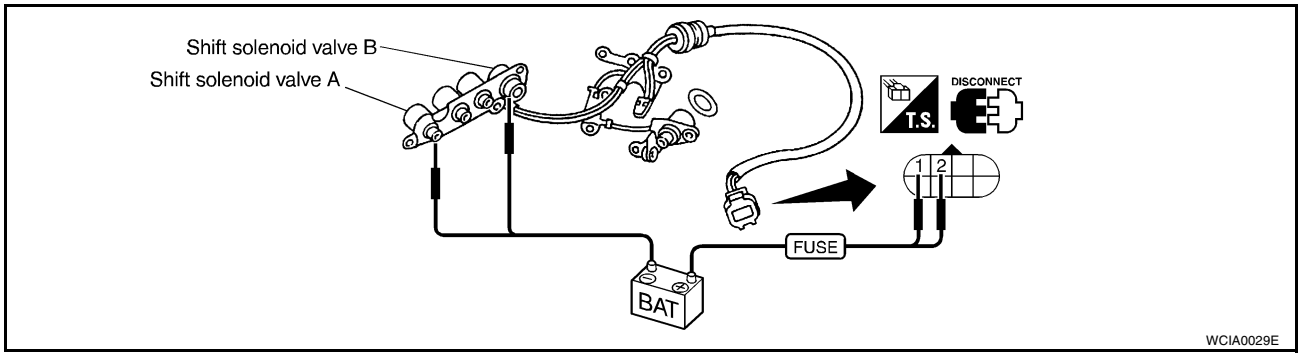
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30 Ω
Shift solenoid valve B	1		5 - 20 Ω

OK or NG

OK >> GO TO 5.
NG >> Replace solenoid valve assembly.

4. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
- Shift solenoid valve A
- Shift solenoid valve B
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.



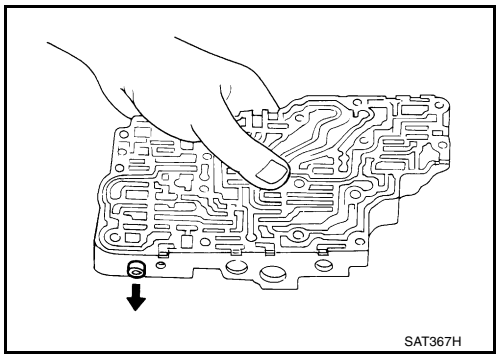
OK or NG

OK >> GO TO 5.
NG >> Replace solenoid valve assembly.

5. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-677, "DISASSEMBLY" .
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.



OK or NG

OK >> GO TO 6.
NG >> Repair control valve.

6. CHECK SHIFT UP (D_3 TO D_4)

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

Yes or No

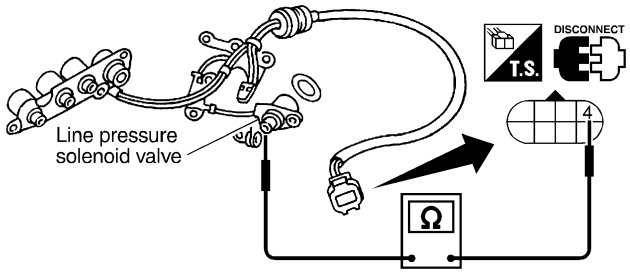
Yes >> GO TO 11.
No >> Check control valve again. Repair or replace control valve assembly.

7. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .

- Line pressure solenoid valves

2. Check resistance between the terminal cord assembly connector F30 terminal 4 and ground.



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

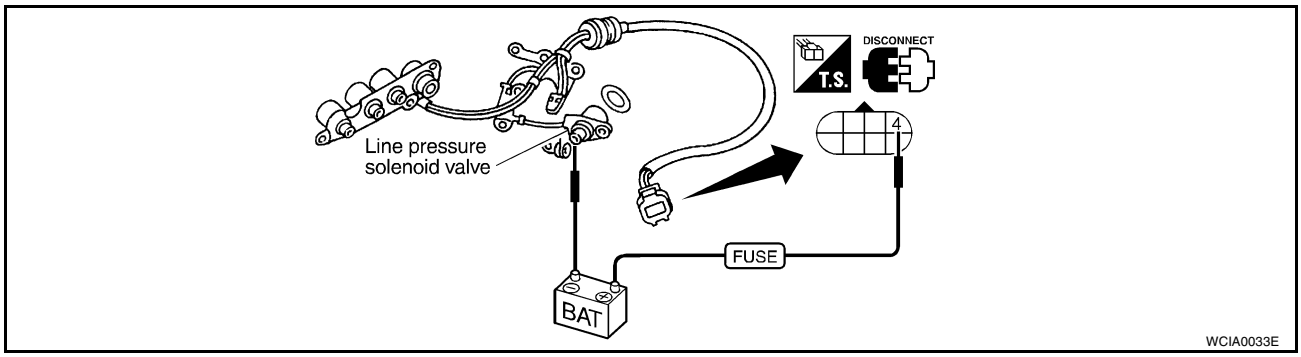
WCIA0032E

OK or NG

OK >> GO TO 9.
NG >> Replace solenoid valve assembly.

8. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
- Line pressure solenoid valves
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.

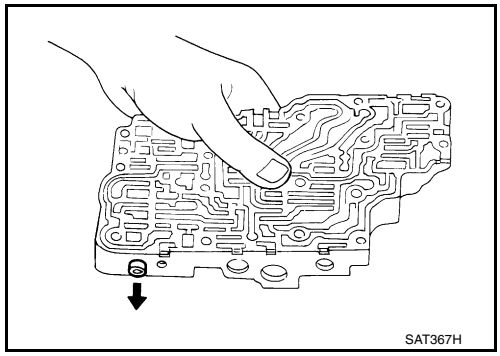


OK or NG

OK >> GO TO 9.
NG >> Replace solenoid valve assembly.

9. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-677, "DISASSEMBLY" .
2. Check line pressure circuit valves for sticking.
- Pressure regulator valve
- Pilot valve
- Pressure modifier valve



OK or NG

OK >> GO TO 10.
NG >> Repair control valve.

10. CHECK SHIFT UP (D_3 TO D_4)

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

Yes or No

Yes >> GO TO 11.
No >> Check control valve again. Repair or replace control valve assembly.

11. CHECK DTC

Perform AT-525, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> Perform “Cruise test — Part 1” again and return to the start point of this test group.

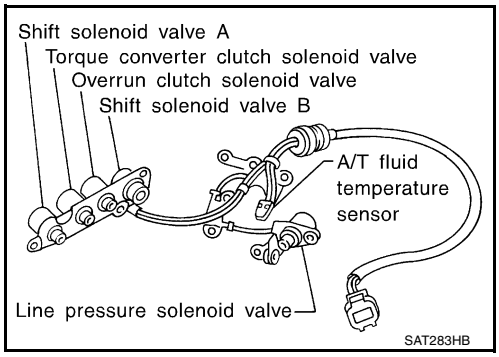
DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

PFP:31940

Description

ECS0064B

The torque converter clutch solenoid valve is activated, with the gear in D4 , by the TCM in response to signals sent from the vehicle speed and the ECM (throttle opening). Lock-up piston operation will then be controlled.
Lock-up operation, however, is prohibited when A/T fluid temperature is too low.
When the accelerator pedal is depressed (less than 2/8) in lock-up condition, the engine speed should not change abruptly. If there is a big jump in engine speed, there is no lock-up.



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

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

On Board Diagnosis Logic

ECS0064C

Diagnostic trouble code TCC SOLENOID/CIRC with CONSULT-II or P0740 without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve.

Possible Cause

ECS0064D

Check the following items.

- Torque converter clutch solenoid valve
- Harness or connectors
  (The solenoid circuit is open or shorted.)

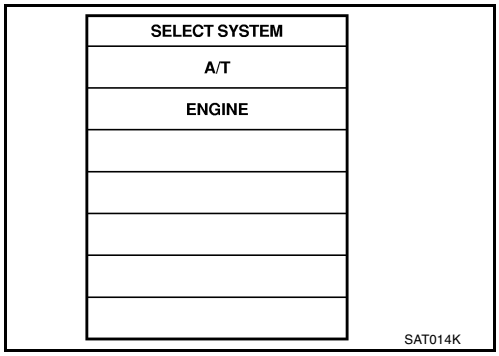
Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0064E

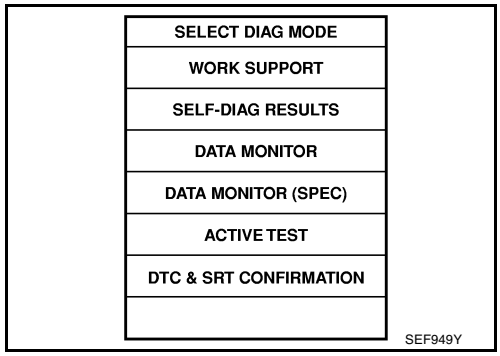
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON.



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



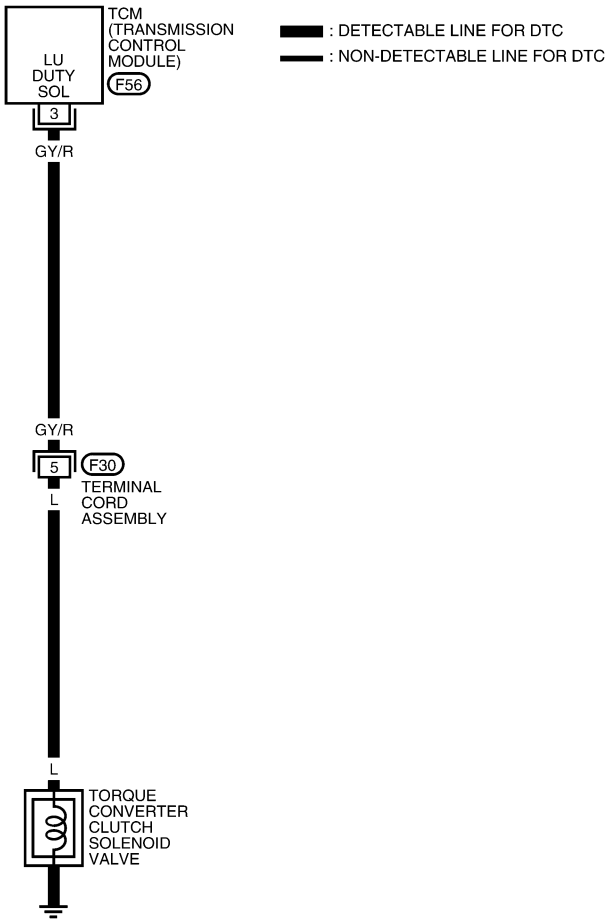
WITH GST

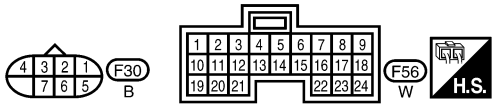
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — TCV

ECS0064F

AT-TCV-01





WCWA0025E

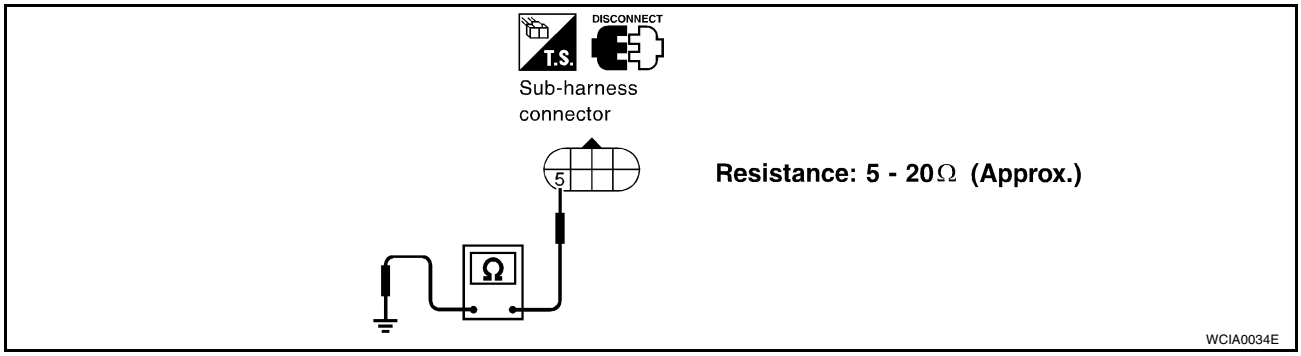
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
3	GY/R	TORQUE CONVERTER CLUTCH SOLENOID VALVE	WITH TORQUE CONVERTER LOCK-UP	APPROX. 8 - 15V
			WITHOUT TORQUE CONVERTER LOCK-UP	APPROX. 0V

Diagnostic Procedure

ECS0064G

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly connector F30 terminal 5 and ground.



OK or NG

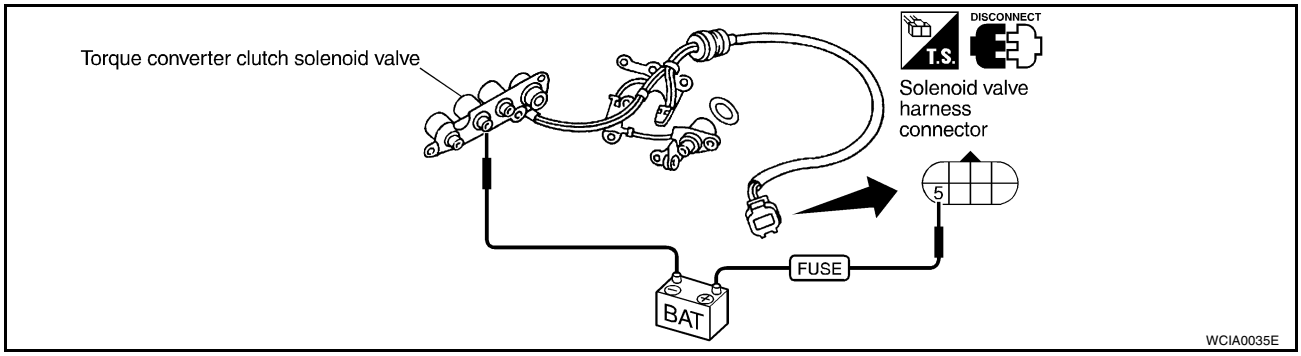
OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK VALVE OPERATION

1. Remove oil pan.
2. Check the following items:

– Torque converter clutch solenoid valve

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



– Harness of terminal cord assembly for short or open

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal cord assembly harness connector F30 terminal 5 and TCM harness connector F56 terminal 3. Refer to AT-534, "Wiring Diagram — AT — TCV" .

   Continuity should exist.

4. Reinstall any part removed.

OK or NG

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

4. CHECK DTC

Perform AT-532, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 5.

5. CHECK TCM INSPECTION

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

OK or NG

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

DTC P0744 A/T TCC S/V FUNCTION (LOCK-UP)

PFP:31940

Description

ECS0064H

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

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

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

On Board Diagnosis Logic

ECS0064I

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 positions supposed by TCM are as follows.
In case of gear position with no malfunctions: 1, 2, 3 and 4 positions
In case of gear position with shift solenoid valve B stuck closed: 1, 2, 2 and 1* positions to each gear position above
*: P0744 is detected.
Diagnostic trouble code A/T TCC S/V FNCTN with CONSULT-II or P0744 without CONSULT-II is detected when A/T cannot perform lock-up even if electrical circuit is good.

Possible Cause

ECS0064J

Check the following items.

- Line pressure solenoid valve
- Torque converter clutch solenoid valve
- Each clutch
- Hydraulic control circuit

Diagnostic Trouble Code (DTC) Confirmation Procedure

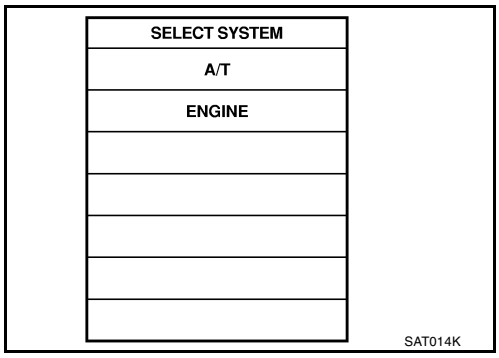
ECS0064K

CAUTION:
Always drive vehicle at a safe speed.

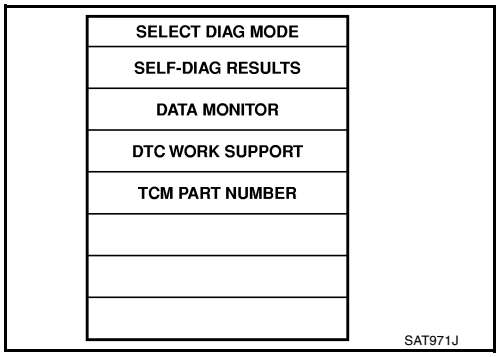
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Start engine and select “DATA MONITOR” mode for “A/T” with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive vehicle to decrease voltage (warm up the fluid) or stop engine to increase voltage (cool down the fluid).
3. Select “TCC S/V FNCTN P0744” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.

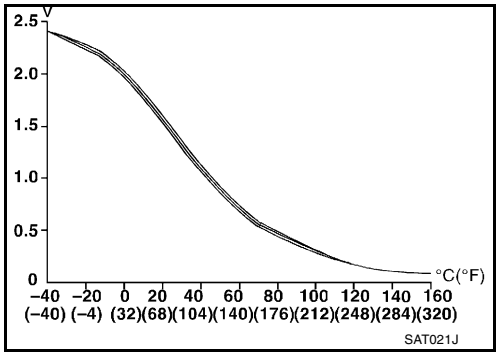


4. Accelerate vehicle to more than 70 km/h (43 MPH) and maintain the following condition continuously until “TESTING” has turned to “COMPLETE”. (It will take approximately 30 seconds after “TESTING” shows.)
   THROTTLE POSI: 1.0/8 - 2.0/8 (at all times during step 4)
   Selector lever: D position (O/D ON)
   TCC S/V DUTY: More than 94%
   VHCL/S SE·A/T: Constant speed of more than 70 km/h (43 MPH)



- **Check that “GEAR” shows “4”.**
- **For shift schedule, refer to AT-750, "Shift Schedule" .**
- **If “TESTING” does not appear on CONSULT-II for a long time, select “SELF-DIAG RESULTS”. 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 AT-540, "Diagnostic Procedure" .
   Refer to AT-750, "Shift Schedule" .

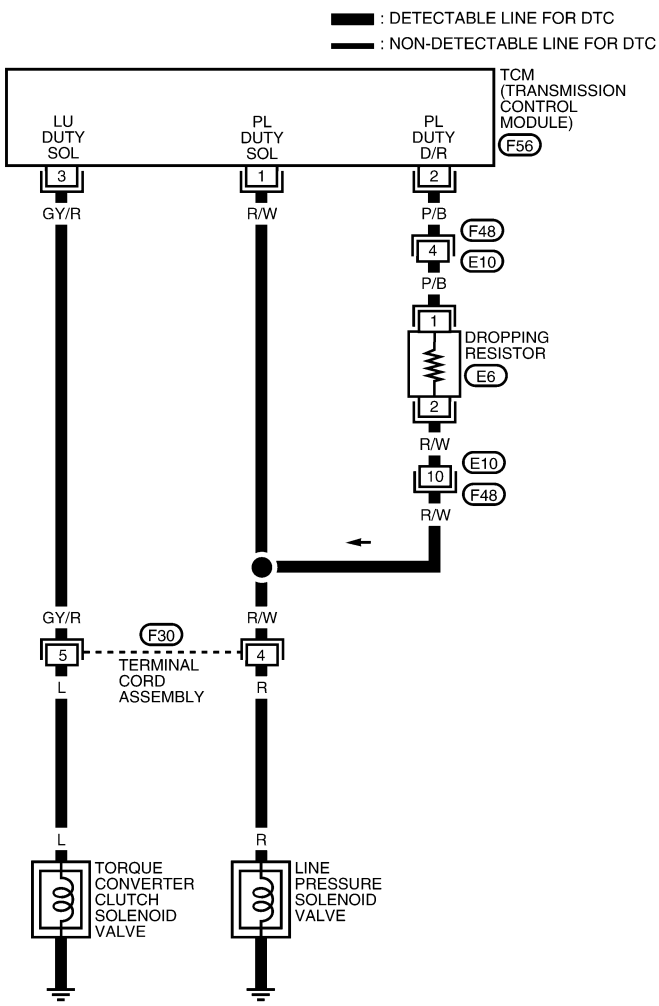


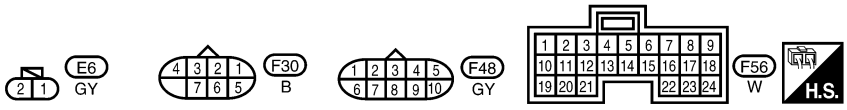
WITH GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — TCCSIG

ECS0064L





WCWA0026E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	R/W	LINE PRESSURE SOLENOID VALVE	WHEN ACCELERATOR PEDAL IS RELEASED WHILE DRIVING	APPROX. 1.5 - 3.0V
			WHEN ACCELERATOR PEDAL IS DEPRESSED WHILE DRIVING	APPROX. 0V
2	P/B	LINE PRESSURE SOLENOID VALVE (DROPPING RESISTOR)	WHEN ACCELERATOR PEDAL IS RELEASED WHILE DRIVING	APPROX. 4 - 14V
			WHEN ACCELERATOR PEDAL IS DEPRESSED WHILE DRIVING	APPROX. 0V
3	GY/R	TORQUE CONVERTER CLUTCH SOLENOID VALVE	WITH TORQUE CONVERTER LOCK-UP	APPROX. 8 - 15V
			WITHOUT TORQUE CONVERTER LOCK-UP	APPROX. 0V

Diagnostic Procedure

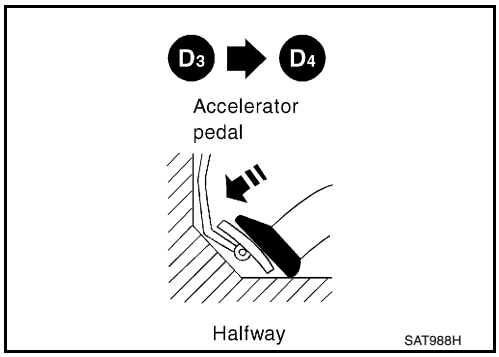
ECS0064M

1. CHECK SHIFT UP (D_3 TO D_4)

During AT-463, "Cruise Test — Part 1" , does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 11.
No >> GO TO 2.



2. CHECK LINE PRESSURE

Perform line pressure test.

Engine Speed RPM	Line Pressure kPa (kg/cm^2, psi)	
	D, 2 and 1 Position	R Position
Idle	500 (5.1, 73)	778 (7.9, 113)
Stall	1,223 (12.6, 179)	1,918 (19.6, 278)

Refer to AT-454, "Line Pressure Test" .

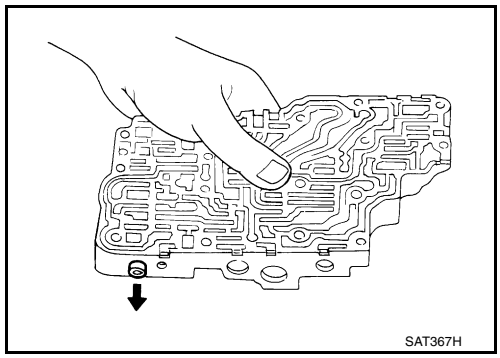
OK or NG

OK >> GO TO 3.
NG >> GO TO 6.

3. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-677, "DISASSEMBLY" .
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.



OK or NG

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

4. CHECK SHIFT UP (D_3 TO D_4)

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

Yes or No

Yes >> GO TO 5.
No >> Check control valve again. Repair or replace control valve assembly.

5. CHECK DTC

Perform AT-537, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

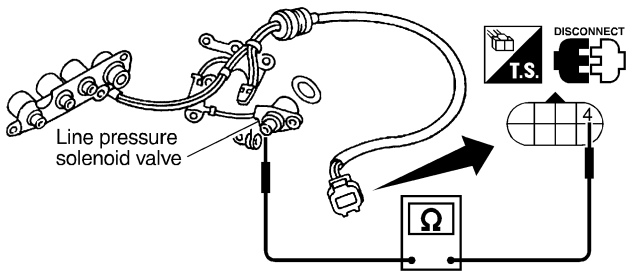
OK >> **INSPECTION END**
NG >> GO TO 11. Check for proper lock-up.

6. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .

- Line pressure solenoid valve

2. Check resistance to the terminal and ground.



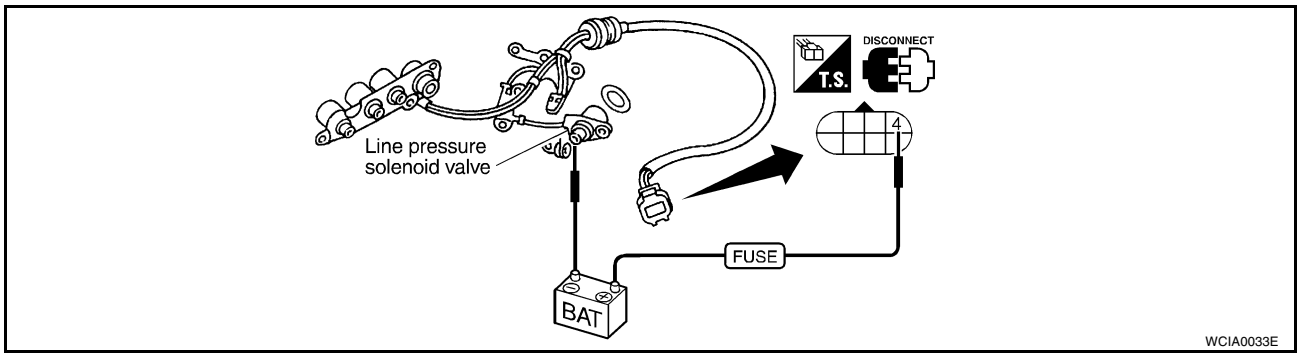
Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	4	Ground	2.5 - 5Ω

OK or NG

OK >> GO TO 8.
NG >> Replace solenoid valve assembly.

7. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
- Line pressure solenoid valve
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.

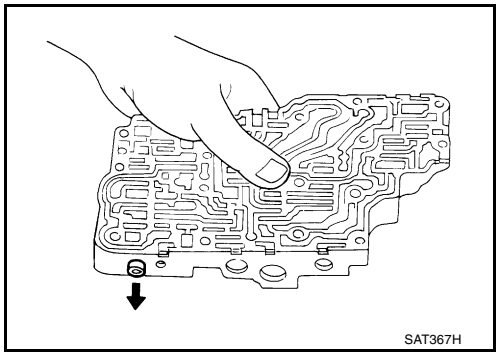


OK or NG

OK >> GO TO 8.
NG >> Replace solenoid valve assembly.

8. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-677, "DISASSEMBLY" .
2. Check line pressure circuit valves for sticking.
- Pressure regulator valve
- Pilot valve
- Pressure modifier valve



OK or NG

OK >> GO TO 9.
NG >> Repair control valve.

9. CHECK SHIFT UP (D_3 TO D_4)

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

Yes or No

Yes >> GO TO 10.
No >> Check control valve again. Repair or replace control valve assembly.

10. CHECK DTC

Perform AT-537, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11. Check for proper lock-up.

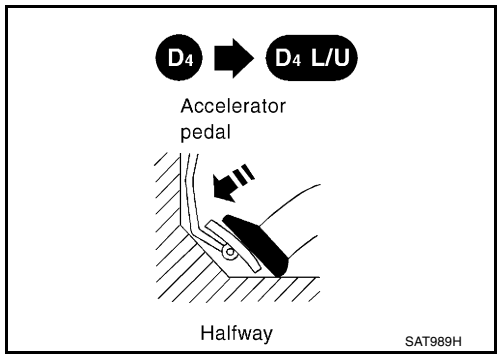
11. CHECK LOCK-UP

During AT-463, "Cruise Test — Part 1" , does A/T perform lock-up at the specified speed?

Yes or No

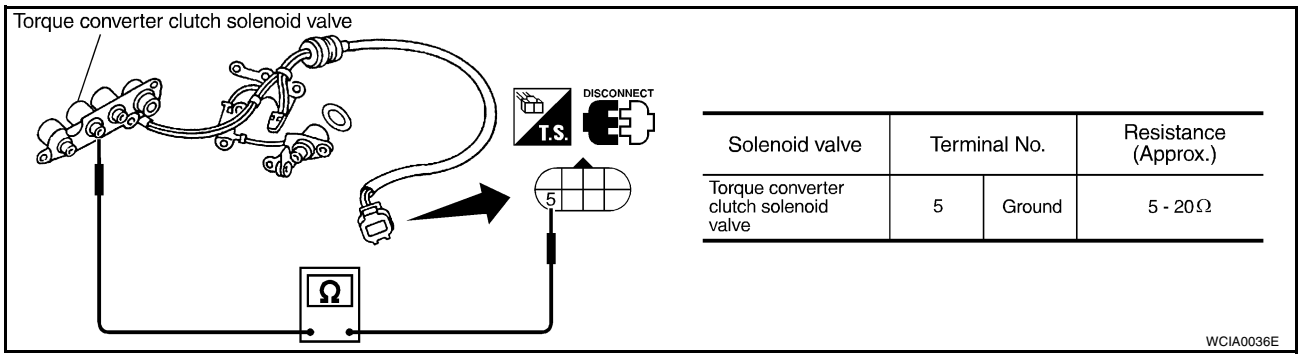
Yes >> Perform “Cruise test — Part 1” again and return to the start point of this test group.

No >> GO TO 12.



12. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
- Torque converter clutch solenoid valve
2. Check resistance between terminal cord assembly connector F30 terminal 5 and ground.



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

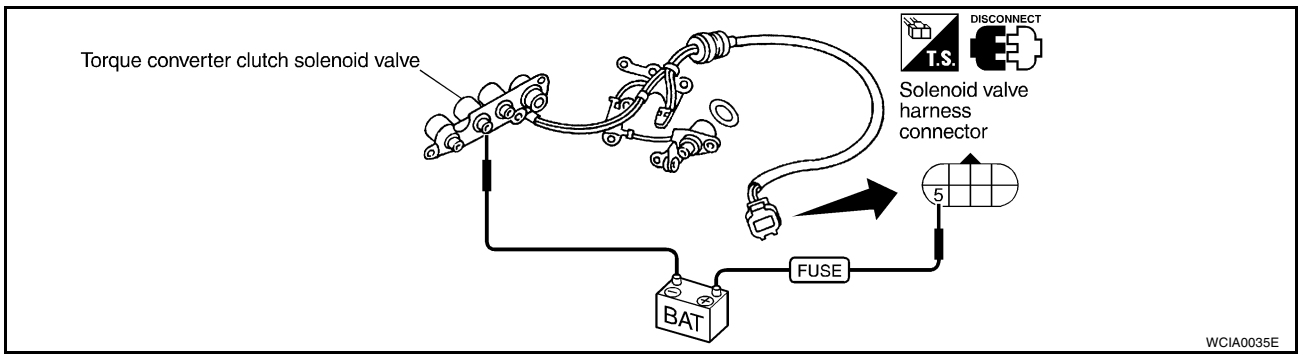
OK or NG

OK >> GO TO 14.

NG >> Replace solenoid valve assembly.

13. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
- Torque converter clutch solenoid valve
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.



OK or NG

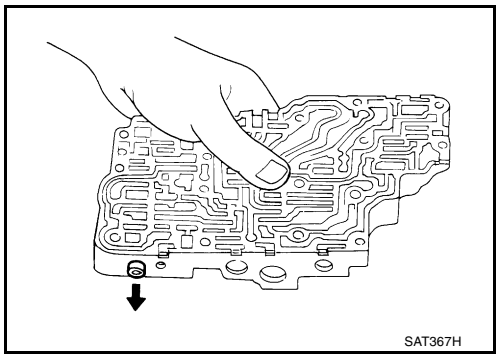
OK >> GO TO 14.

NG >> Replace solenoid valve assembly.

14. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-677, "DISASSEMBLY" .
2. Check control valves for sticking.

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



OK or NG

OK >> GO TO 15.
NG >> Repair control valve.

15. CHECK LOCK-UP

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

Yes or No

Yes >> GO TO 16.
No >> Check control valve again. Repair or replace control valve assembly.

16. CHECK DTC

Perform AT-537, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> Perform “Cruise test — Part 1” again and return to the start point of this test group.

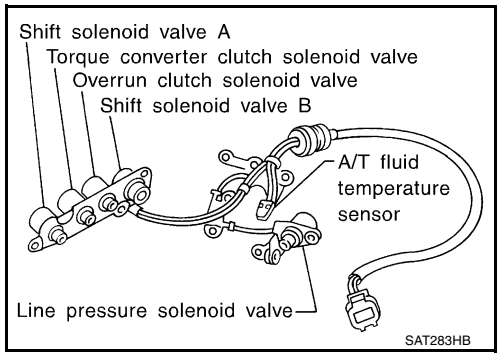
DTC P0745 LINE PRESSURE SOLENOID VALVE

PFP:31940

Description

ECS0064N

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.



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

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

On Board Diagnosis Logic

ECS0064O

Diagnostic trouble code L/PRESS SOL/CIRC with CONSULT-II or P0745 without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve.

Possible Cause

ECS0064P

Check the following items.

- Harness or connectors
  (The solenoid circuit is open or shorted.)
- Line pressure solenoid valve

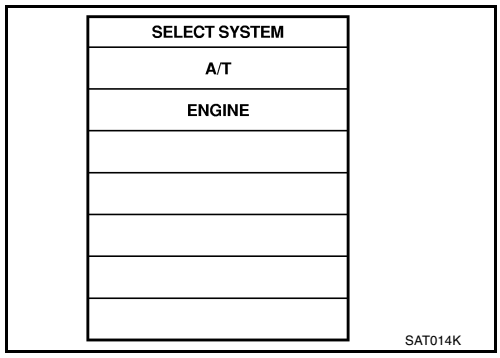
Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0064Q

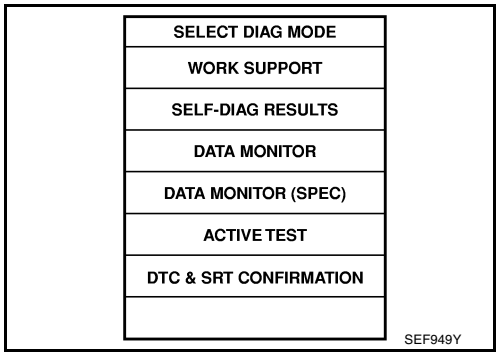
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.



2. Depress accelerator pedal completely and wait at least 1 second.



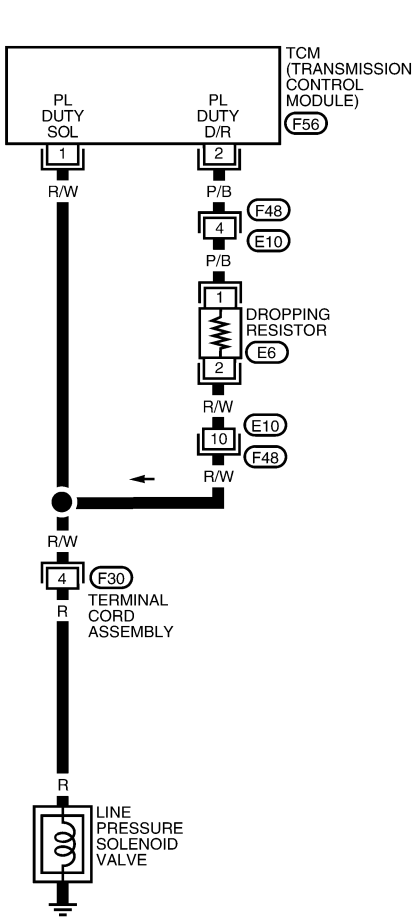
WITH GST

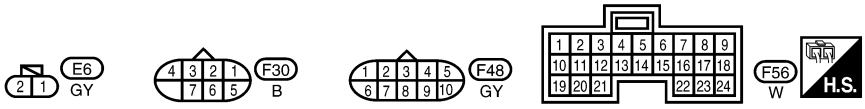
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — LPSV

ECS0064R

AT-LPSV-01





WCWA0027E

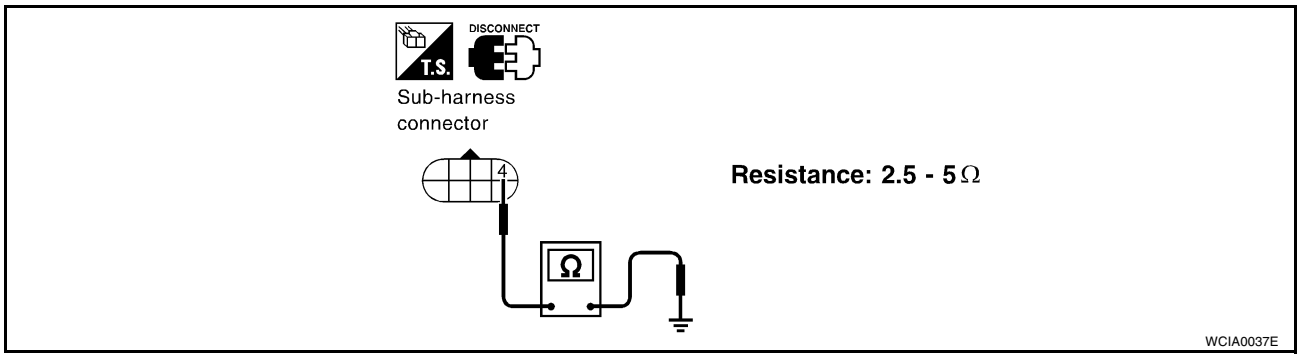
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	R/W	LINE PRESSURE SOLENOID VALVE	WHEN ACCELERATOR PEDAL IS RELEASED WHILE DRIVING	APPROX. 1.5 - 3.0V
			WHEN ACCELERATOR PEDAL IS DEPRESSED WHILE DRIVING	APPROX. 0V
2	P/B	LINE PRESSURE SOLENOID VALVE (DROPPING RESISTOR)	WHEN ACCELERATOR PEDAL IS RELEASED WHILE DRIVING	APPROX. 4 - 14V
			WHEN ACCELERATOR PEDAL IS DEPRESSED WHILE DRIVING	APPROX. 0V

Diagnostic Procedure

ECS0064S

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly connector F30 terminal 4 and ground.



OK or NG

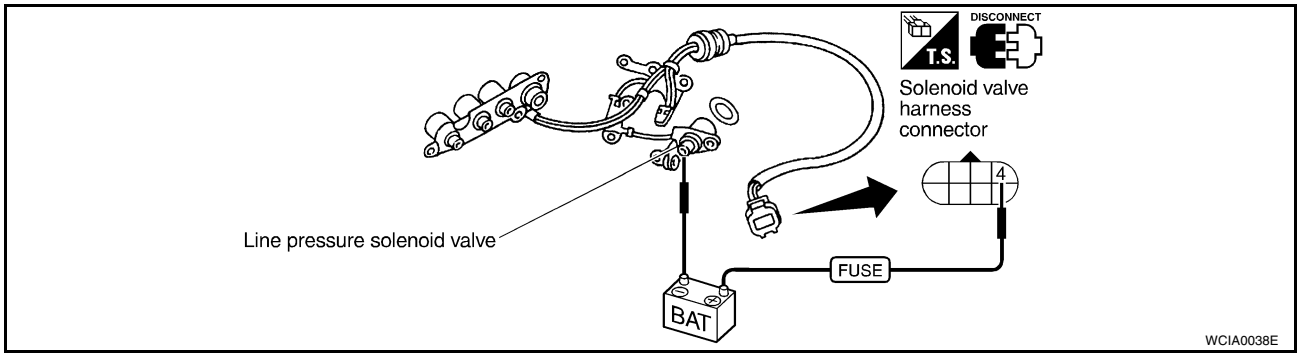
OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:

– Line pressure solenoid valve

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



– Harness of terminal cord assembly for short or open

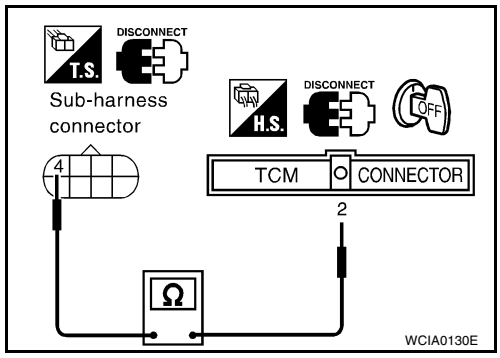
OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK POWER SOURCE AND DROPPING RESISTOR CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal cord assembly harness connector F30 terminal 4 and TCM harness connector F56 terminal 2.

Resistance : Approximately 12Ω



OK or NG

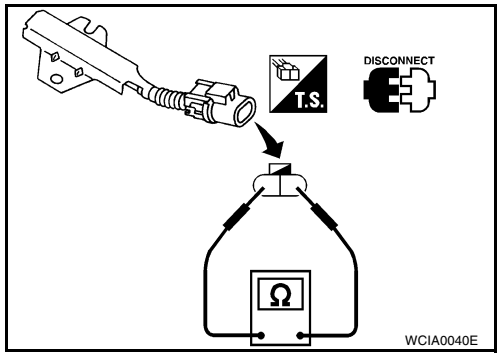
OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING ITEM

Check the following items:

- Dropping resistor
- Check resistance between two terminals.

Resistance : Approximately 12Ω



- Harness for short or open between TCM terminal 2 and terminal cord assembly (Main harness)

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

5. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Check continuity between terminal cord assembly connector F30 terminal 4 and TCM harness connector F56 terminal 1. Refer to AT-547, "Wiring Diagram — AT — LPSV" .

Continuity should exist.

3. Reinstall any part removed.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK DTC

Perform AT-545, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. CHECK TCM INSPECTION

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

OK or NG

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

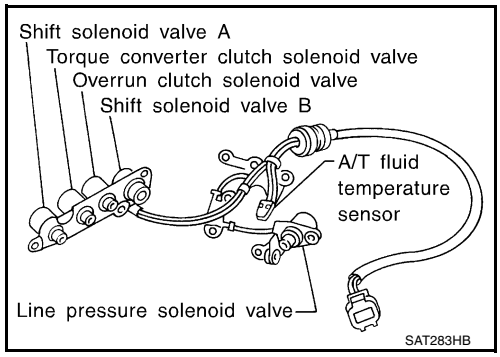
DTC P0750 SHIFT SOLENOID VALVE A

PFP:31940

Description

ECS0064T

Shift solenoid valves A and B are turned ON or OFF by the TCM in response to signals sent from the park/neutral position (PNP) switch, vehicle speed and ECM (throttle opening). 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)

On Board Diagnosis Logic

ECS0064U

Diagnostic trouble code SFT SOL A/CIRC with CONSULT-II or P0750 without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve.

Possible Cause

ECS0064V

Check the following items.

- Harness or connectors
  (The solenoid circuit is open or shorted.)
- Shift solenoid valve A

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0064W

CAUTION:

Always drive vehicle at a safe speed.

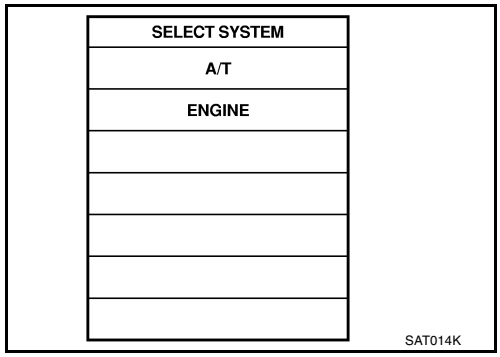
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

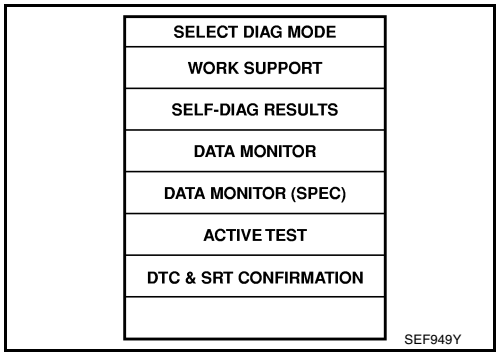
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.



2. Start engine.
3. Drive vehicle in D position and allow the transmission to shift 1 → 2 (“GEAR”).



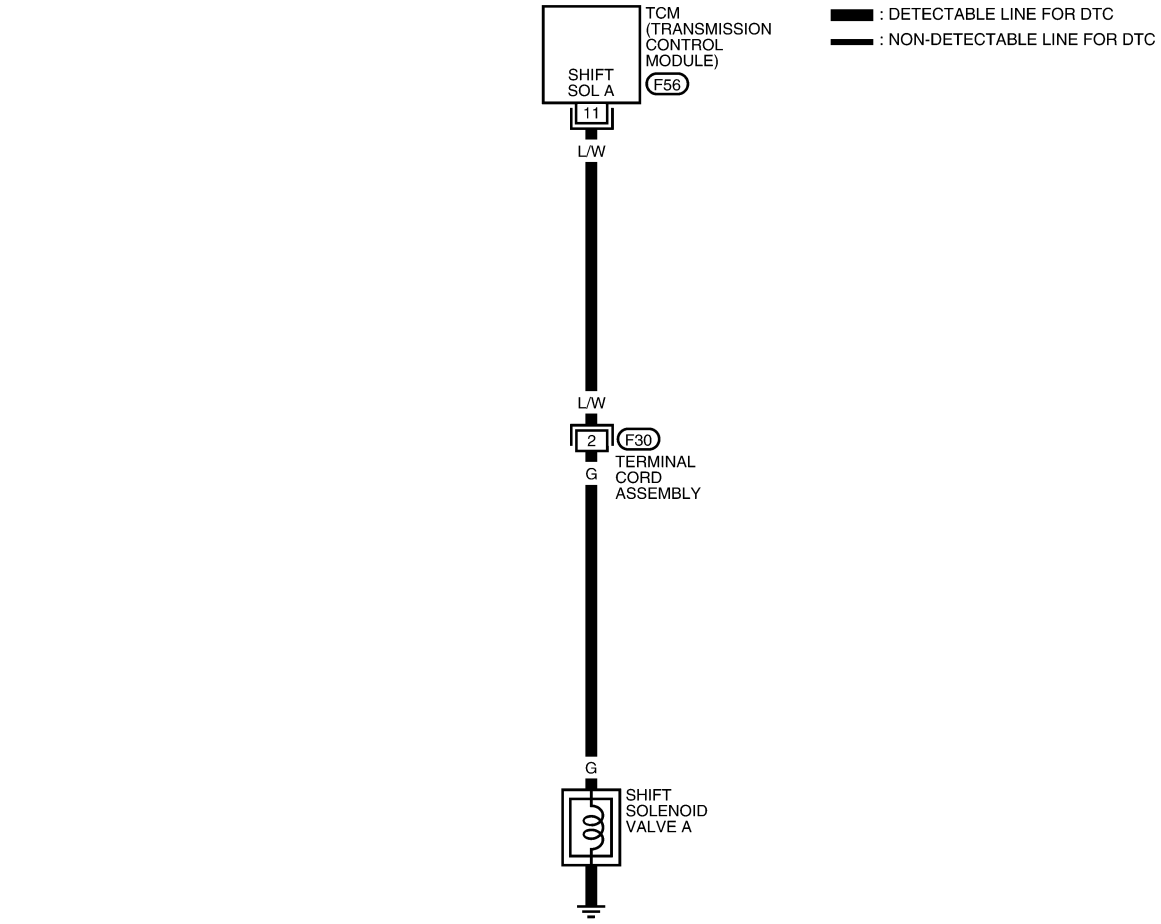
WITH GST

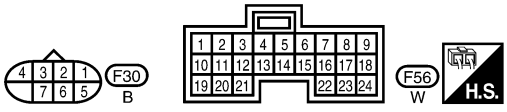
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — SSV/A

ECS0064X

AT-SSV/A-01





WCWA0028E

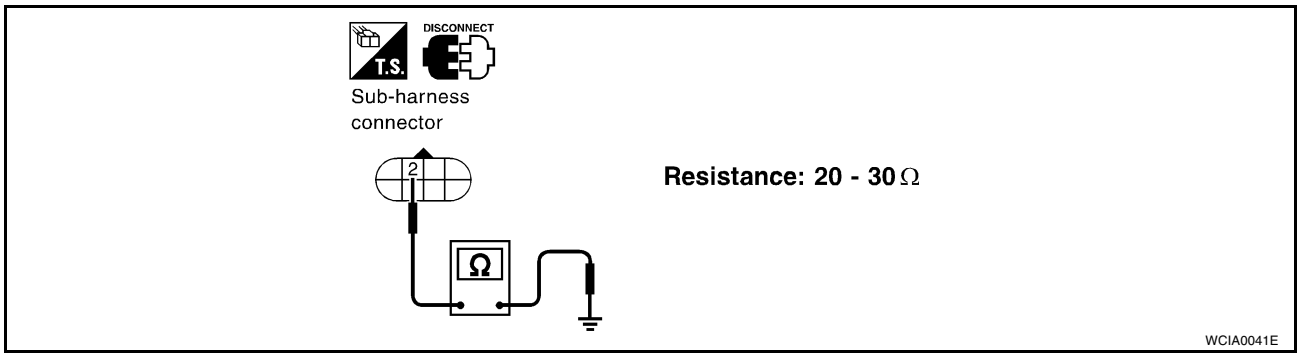
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A IS OPERATING (DRIVING IN D1 OR D4)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A IS NOT OPERATING (DRIVING IN D2 OR D3)	APPROX. 0V

Diagnostic Procedure

ECS0064Y

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly connector F30 terminal 2 and ground.



OK or NG

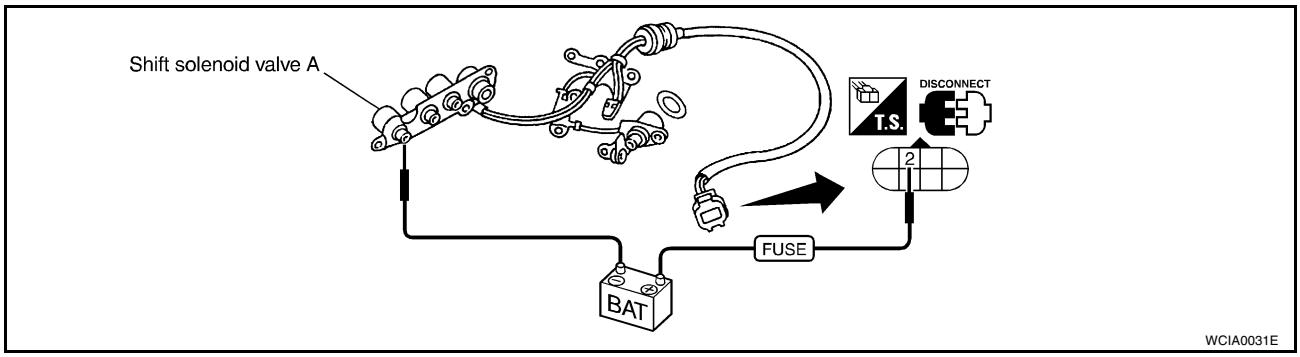
OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:

- Shift solenoid valve A
- Operation check

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



- Harness of terminal cord assembly for short or open

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal cord assembly harness connector F30 terminal 2 and TCM harness connector F56 terminal 11. Refer to AT-553, "Wiring Diagram — AT — SSV/A" .

Continuity should exist.

4. Reinstall any part removed.

OK or NG

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

4. CHECK DTC

Perform AT-551, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 5.

5. CHECK TCM INSPECTION

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

OK or NG

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

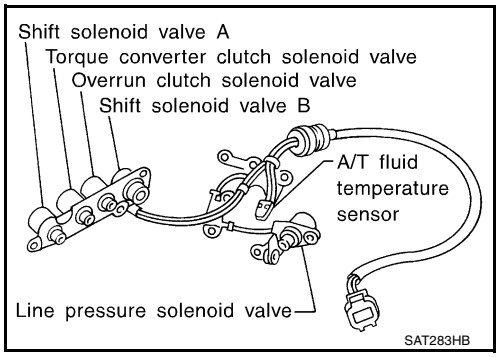
DTC P0755 SHIFT SOLENOID VALVE B

PFP:31940

Description

ECS0064Z

Shift solenoid valves A and B are turned ON or OFF by the TCM in response to signals sent from the park/neutral position (PNP) switch, vehicle speed and ECM (throttle opening). 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)

On Board Diagnosis Logic

ECS00650

Diagnostic trouble code SFT SOL B/CIRC with CONSULT-II or P0755 without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve.

Possible Cause

ECS00651

Check the following items.

- Harness or connectors
  (The solenoid circuit is open or shorted.)
- Shift solenoid valve B

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00652

CAUTION:

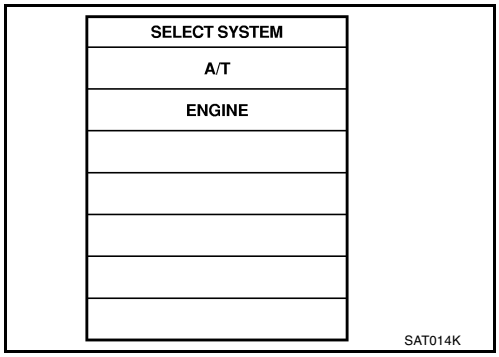
Always drive vehicle at a safe speed.

NOTE:

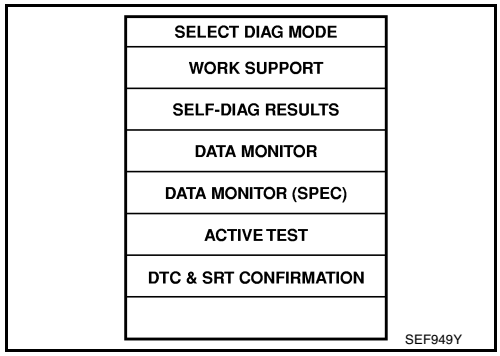
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.



2. Start engine.
3. Drive vehicle in D position and allow the transmission to shift 1 → 2 → 3 (“GEAR”).



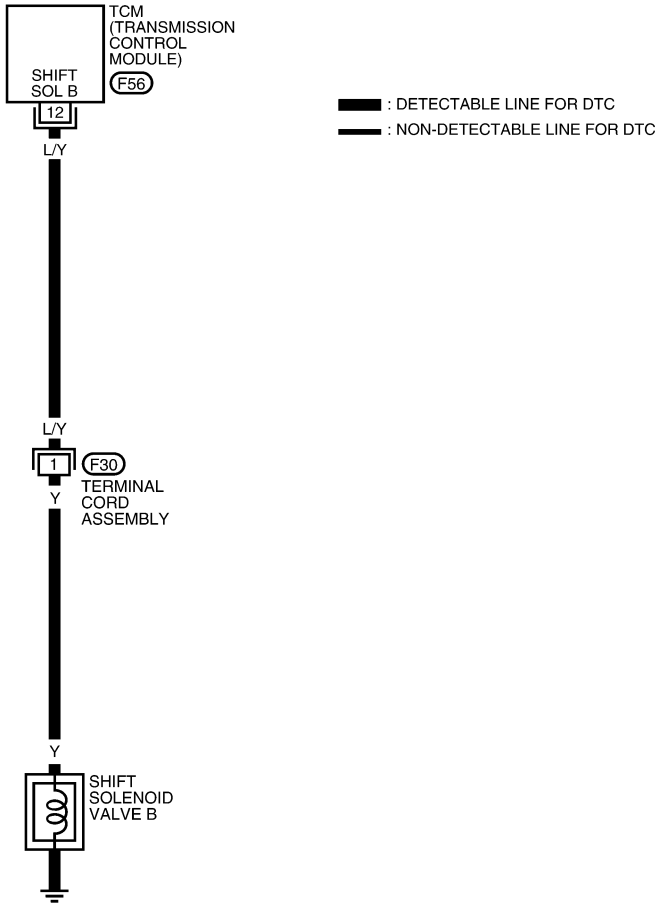
WITH GST

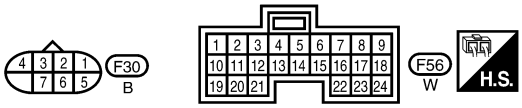
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — SSV/B

ECS00653

AT-SSV/B-01





WCWA0029E

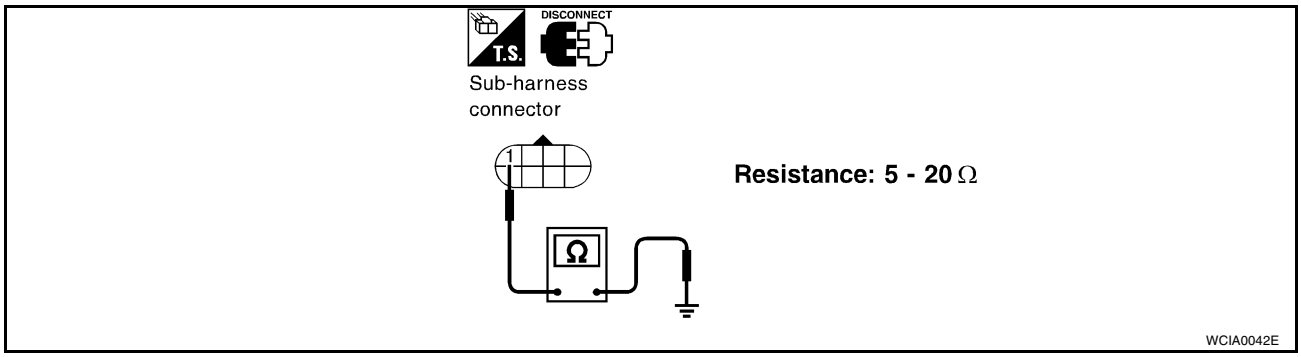
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B IS OPERATING (DRIVING IN D1 OR D2)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE BE IS NOT OPERATING (DRIVING IN D3 OR D4)	APPROX. OV

Diagnostic Procedure

ECS00654

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly connector F30 terminal 1 and ground.



OK or NG

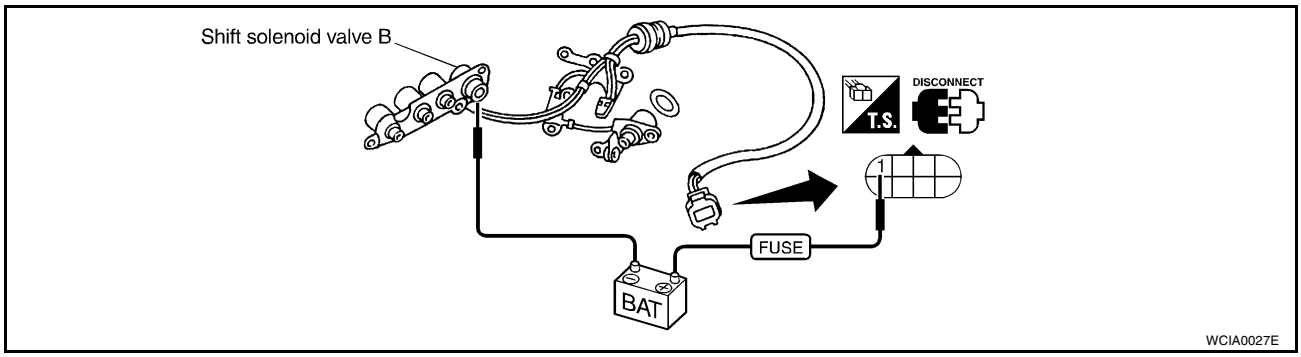
OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:

- Shift solenoid valve B
- Operation check

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



- Harness of terminal cord assembly for short or open

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal cord assembly harness connector F30 terminal 1 and TCM harness connector F56 terminal 12. Refer to AT-558, "Wiring Diagram — AT — SSV/B" .

   Continuity should exist.

4. Reinstall any part removed.

OK or NG

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

4. CHECK DTC

Perform AT-556, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 5.

5. CHECK TCM INSPECTION

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

OK or NG

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

DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

PFP:22560

Description

ECS00655

The throttle position sensor [accelerator pedal position (APP) sensor] is part of the system that controls throttle position. This system also uses an electric throttle control actuator which consists of a throttle control motor and throttle position sensors. Accelerator pedal position signal is sent to the ECM.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Throttle position sensor [accelerator pedal position (APP) sensor]	Fully-closed throttle	Approximately 0.5V
	Fully-open throttle	Approximately 4V

On Board Diagnosis Logic

ECS00656

Diagnostic trouble code TP SEN/CIRC A/T with CONSULT-II or P1705 without CONSULT-II is detected when TCM receives an excessively low or high voltage from the ECM.

Possible Cause

ECS00657

Check the following items.

- Harness or connectors
  (The sensor circuit is open or shorted.)

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00658

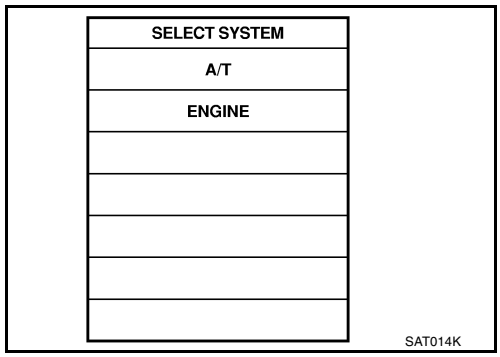
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

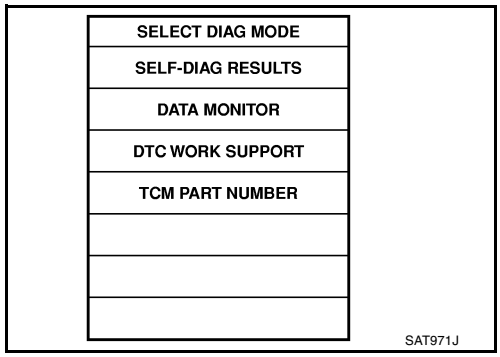
1. Turn ignition switch ON and select “DATA MONITOR” mode for “A/T” with CONSULT-II.

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



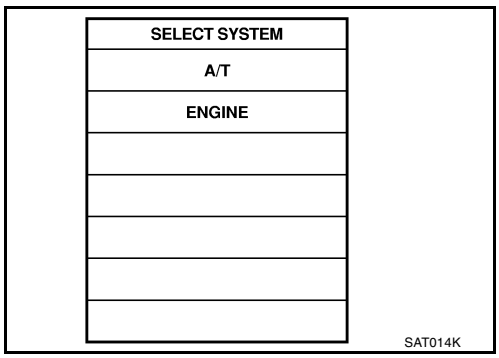
   If the check result is NG, go to AT-564, "Diagnostic Procedure" .
   If the check result is OK, go to following step.

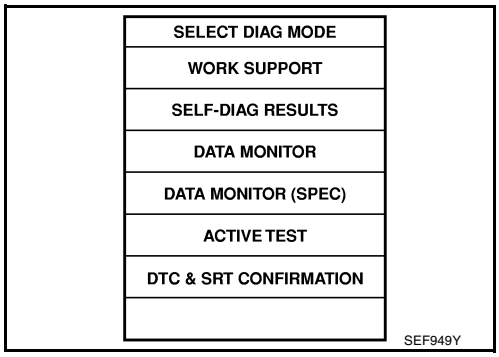
2. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
3. Start engine and maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: Approximately 3V or less
   Selector lever: D position (O/D ON)
   If the check result is NG, go to AT-564, "Diagnostic Procedure" .
   If the check result is OK, go to following step.



4. Maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.

VHCL SPEED SE: 10 km/h (6 MPH) or more
Accelerator pedal: Wide open throttle
Selector lever: D position (O/D ON)





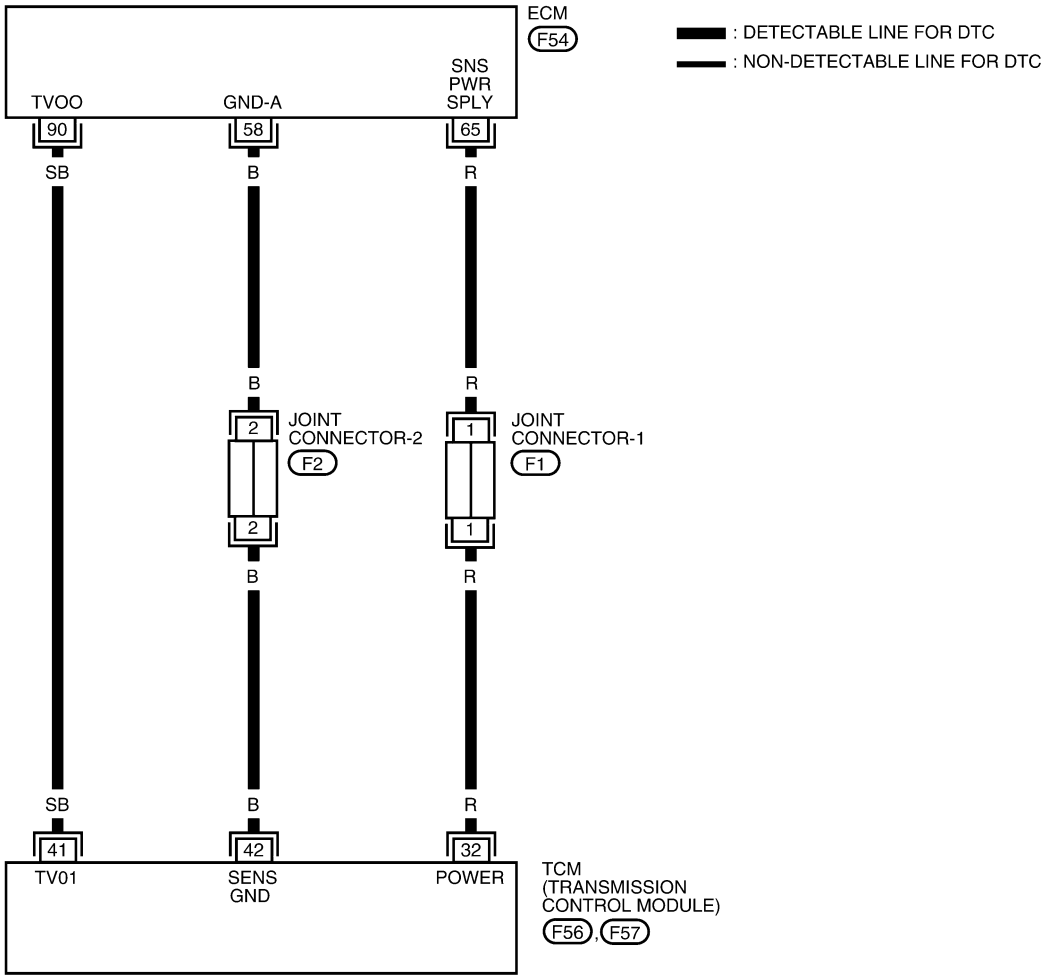
WITH GST

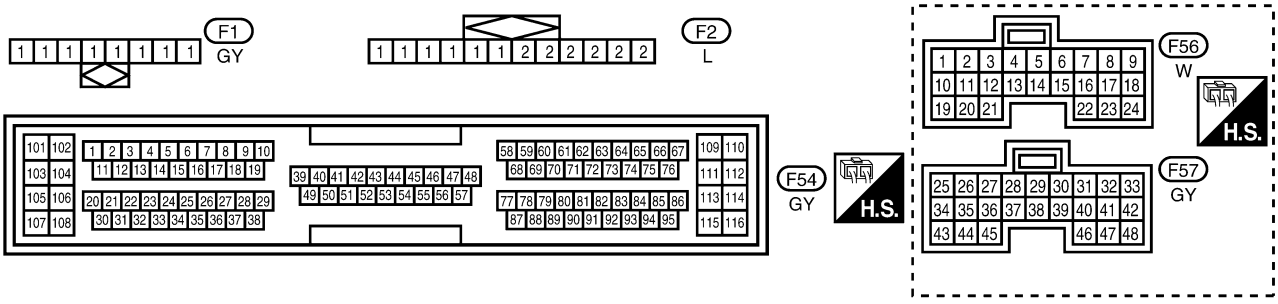
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — TPS

ECS00659

AT-TPS-01





WCWA0079E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
32	R	SENSOR POWER	IGNITION SWITCH ON	4.5 - 5.5V
			IGNITION SWITCH OFF	0V
41	SB	THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]	IGNITION ON AND ACCELERATOR PEDAL IS DEPRESSED SLOWLY AFTER WARMING UP ENGINE	FULLY CLOSED THROTTLE: 0.5V
				WIDE OPEN THROTTLE: 4.0V
42	B	SENSOR GROUND	—	—

Diagnostic Procedure

ECS0065A

1. CHECK DTC WITH ECM

- Check P code with CONSULT-II “ENGINE”.
  Turn ignition switch ON and select “SELF DIAGNOSTIC RESULTS” mode for “ENGINE” with CONSULT-II.

Refer to EC-1259, "Malfunction Indicator Lamp (MIL)" .

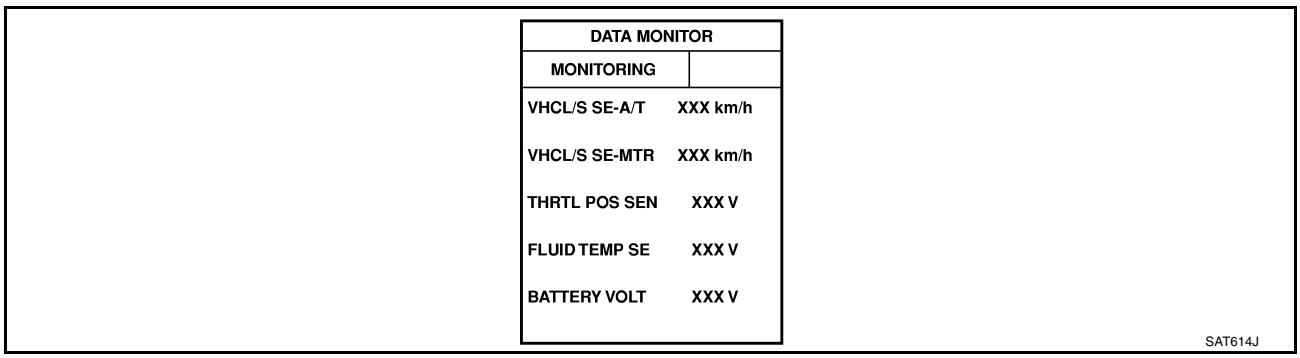
OK or NG

OK (with CONSULT-II)>>GO TO 2.
OK (without CONSULT-II)>>GO TO 3.
NG >> Check throttle position sensor [accelerator pedal position (APP) sensor] circuit for engine control. Refer to EC-1459, "DTC P0222, P0223 TP SENSOR" and EC-1754, "DTC P2138 APP SENSOR" .

2. CHECK INPUT SIGNAL (WITH CONSULT-II)

With CONSULT-II

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

OK or NG

OK >> GO TO 4.
NG >> Check harness for short or open between ECM and TCM regarding throttle position sensor [accelerator pedal position (APP) sensor] circuit. (Main harness)

3. CHECK INPUT SIGNAL (WITHOUT CONSULT-II)

Without CONSULT-II

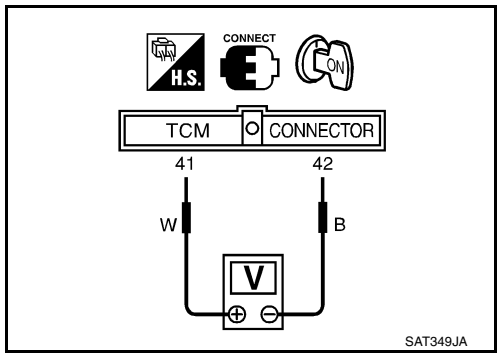
1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between TCM terminals 41 and 42 while accelerator pedal is depressed slowly.

Voltage:

Fully-closed throttle valve **:Approximately 0.5V**

Fully-open throttle valve **:Approximately 4V**

(Voltage rises gradually in response to throttle position.)



OK or NG

OK >> GO TO 4.

NG >> Check harness for short or open between ECM and TCM regarding throttle position sensor [accelerator pedal position (APP) sensor] circuit. (Main harness)

4. CHECK TCM INSPECTION

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

OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace damaged parts.

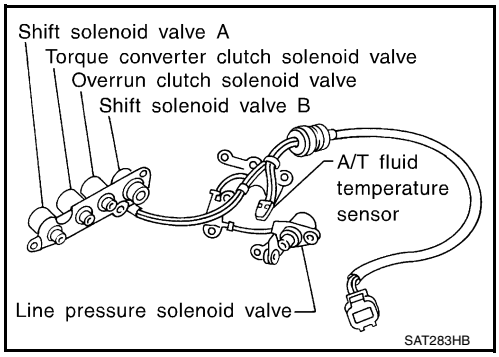
DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

PFP:31940

Description

ECS0065B

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



On Board Diagnosis Logic

ECS0065C

Diagnostic trouble code O/R CLTCH SOL/CIRC with CONSULT-II or P1760 without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve.

Possible Cause

ECS0065D

Check the following items.

- Harness or connectors
  (The solenoid circuit is open or shorted.)
- Overrun clutch solenoid valve

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0065E

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

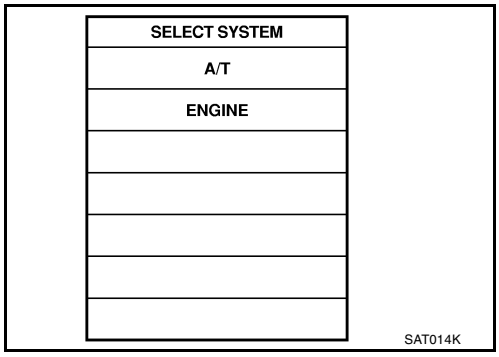
TESTING CONDITION:

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

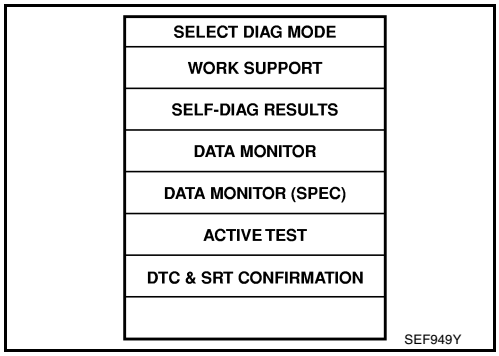
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

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



4. Release accelerator pedal completely with D position (O/D OFF).



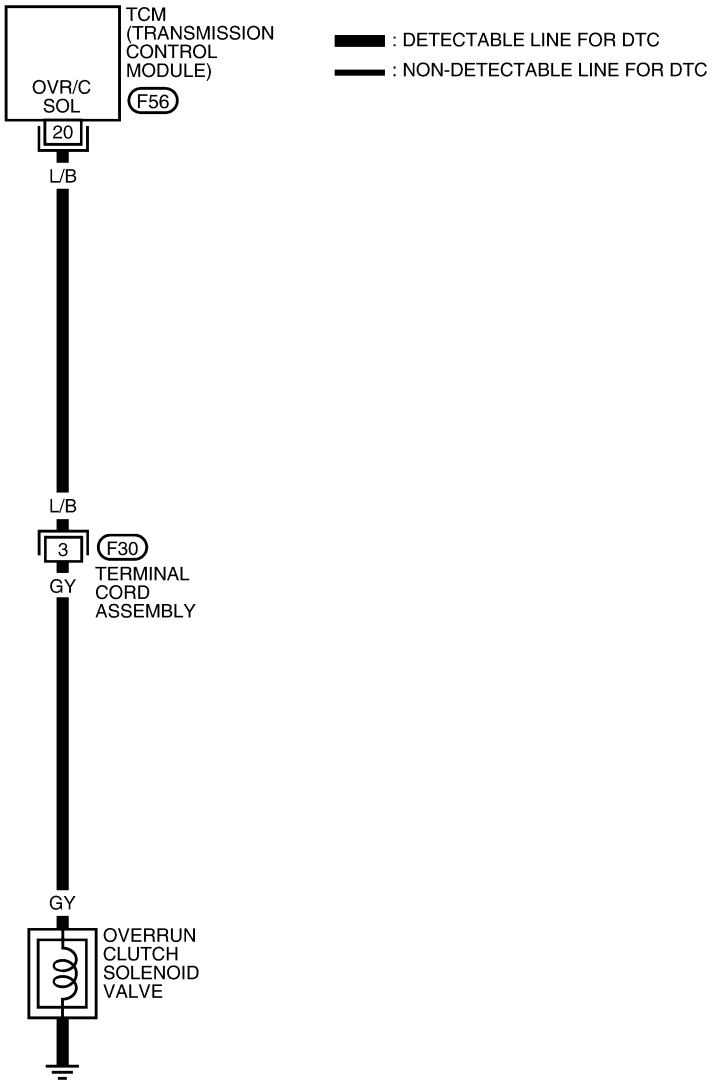
WITH GST

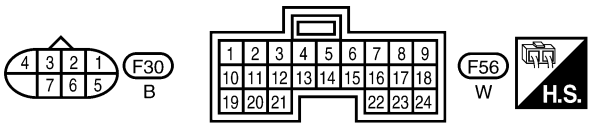
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — OVRCSV

ECS0065F

AT-OVRCSV-01





WCWA0031E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
20	L/B	OVERRUN CLUTCH SOLENOID VALVE	WHEN OVERRUN CLUTCH SOLENOID VALVE OPERATES	BATTERY VOLTAGE
			WHEN OVERRUN CLUTCH SOLENOID VALVE DOES NOT OPERATE	APPROX. 0V

Diagnostic Procedure

ECS0065G

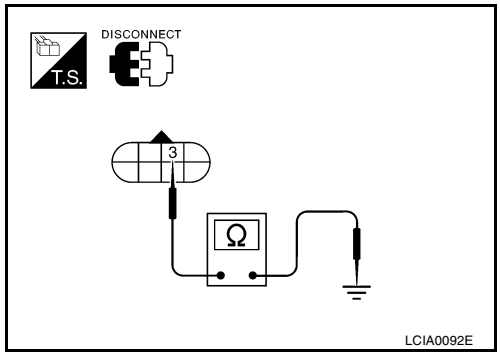
1. CHECK VALVE RESISTANCE

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly F30 terminal 3 (component side) and ground.

Resistance : 20 - 30Ω

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. CHECK VALVE OPERATION

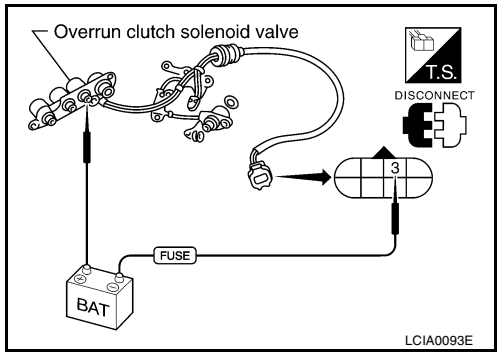
1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:

- Overrun clutch solenoid valve
- Operation check

- Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.
- Harness of terminal cord assembly for short or open

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.



3. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal cord assembly connector F30 terminal 3 and TCM harness connector F56 terminal 20. Refer to AT-568, "Wiring Diagram — AT — OVRCSV" .

Continuity should exist.

4. Reinstall any part removed.

OK or NG

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

4. CHECK DTC

Perform AT-566, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 5.

5. CHECK TCM INSPECTION

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

OK or NG

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

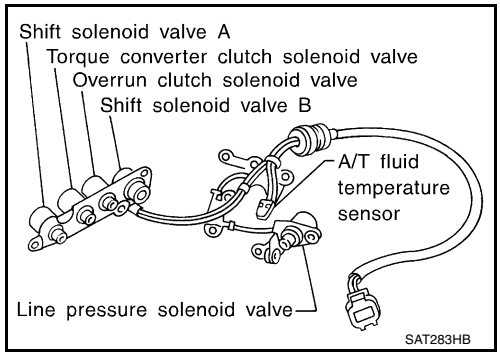
DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)

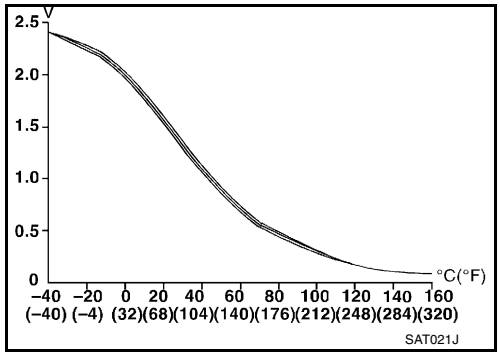
PFP:31940

Description

ECS0065H

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





CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approximately)	
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

On Board Diagnosis Logic

ECS0065I

Diagnostic trouble code BATT/FLUID TEMP SEN with CONSULT-II or 8th judgement flicker without CONSULT-II is detected when TCM receives an excessively low or high voltage from the sensor.

Possible Cause

ECS0065J

Check the following items.

- Harness or connectors
  (The sensor circuit is open or shorted.)
- A/T fluid temperature sensor

Diagnostic Trouble Code (DTC) Confirmation Procedure

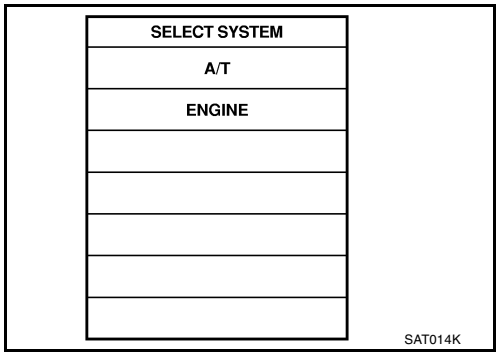
ECS0065K

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

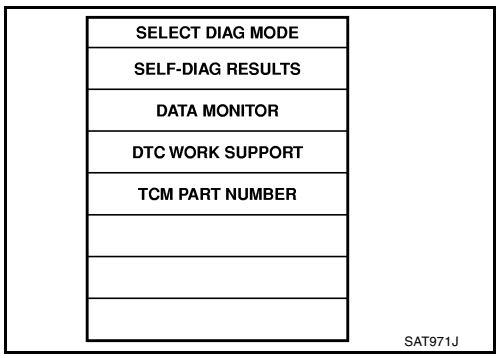
WITH CONSULT-II

1. Start engine.

2. Select “DATA MONITOR” mode for “A/T” with CONSULT-II.

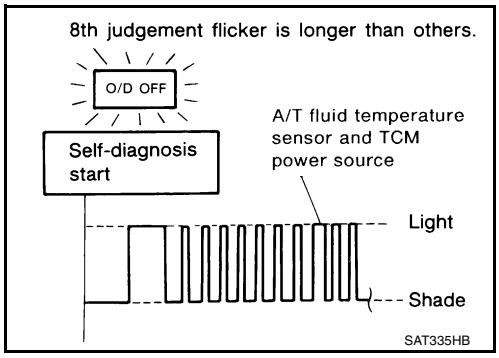


3. Drive vehicle under the following conditions:
   Selector lever in D, vehicle speed higher than 20 km/h (12 MPH).



WITHOUT CONSULT-II

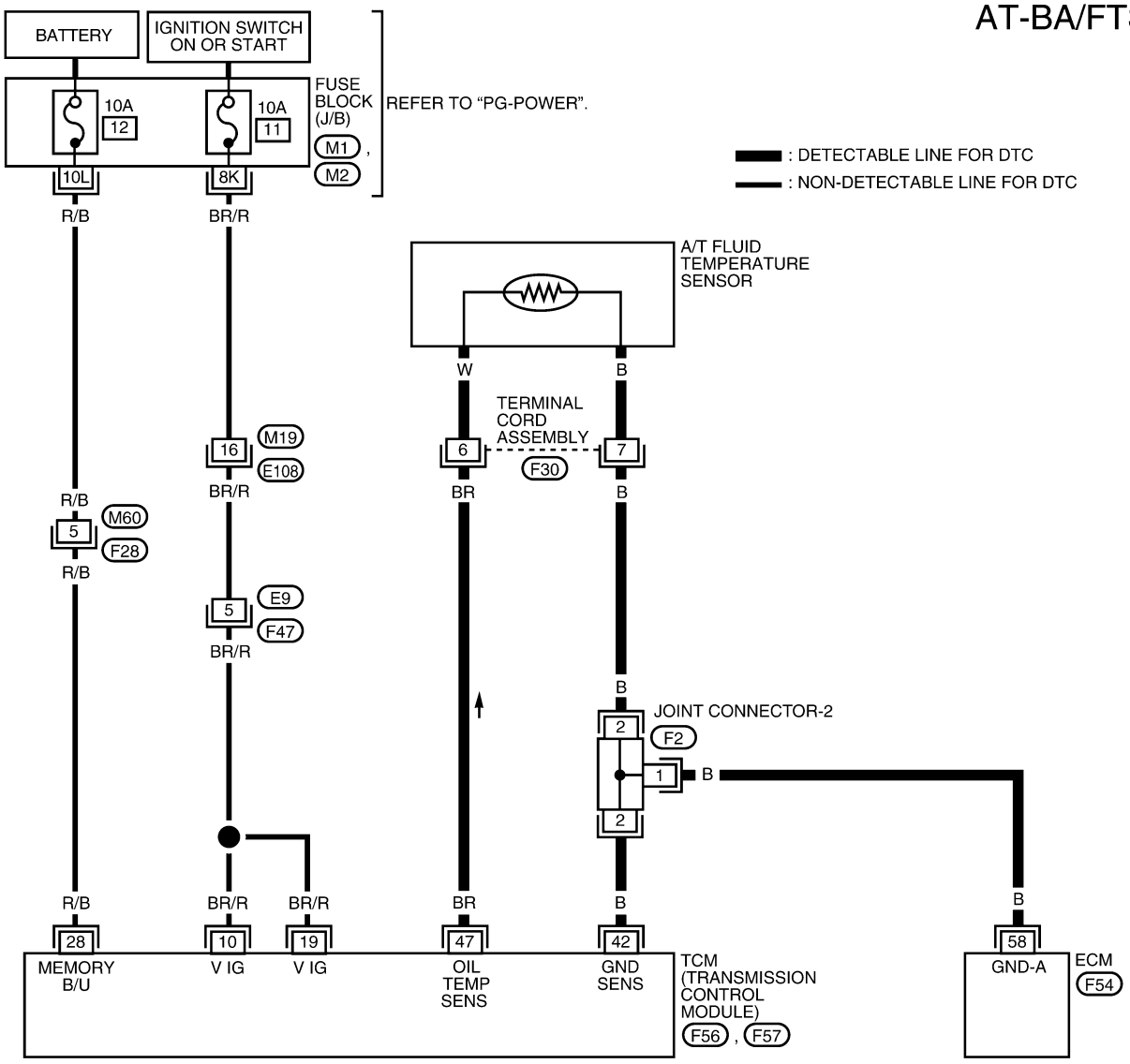
1. Start engine.
2. Drive vehicle under the following conditions:
   Selector lever in D, vehicle speed higher than 20 km/h (12 MPH).
3. Perform self-diagnosis.
   Refer to AT-440, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .

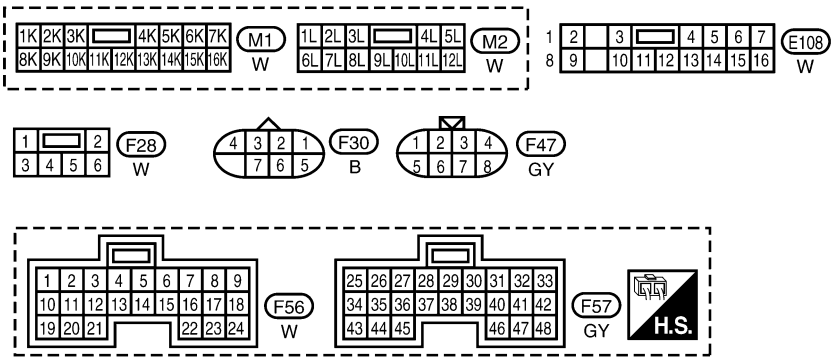


Wiring Diagram — AT — BA/FTS

ECS0065L

AT-BA/FTS-01





REFER TO THE FOLLOWING.
F2 - JOINT CONNECTOR
F54 - ELECTRICAL UNITS

WCWA0080E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	BR/R	POWER SOURCE	IGNITION ON	BATTERY VOLTAGE
			IGNITION OFF	APPROX. 0V
19	BR/R	POWER SOURCE	IGNITION ON	BATTERY VOLTAGE
			IGNITION OFF	APPROX. 0V
28	R/B	POWER SOURCE (MEMORY BACKUP)	IGNITION ON	BATTERY VOLTAGE
			IGNITION OFF	BATTERY VOLTAGE
42	B	SENSOR GROUND	—	—
47	BR	A/T FLUID TEMPERATURE SENSOR	IGNITION ON WITH ATF TEMPERATURE AT 20°C (68°F)	APPROX. 1.5V
			IGNITION ON WITH ATF TEMPERATURE AT 80°C (176°F)	APPROX. 0.5V

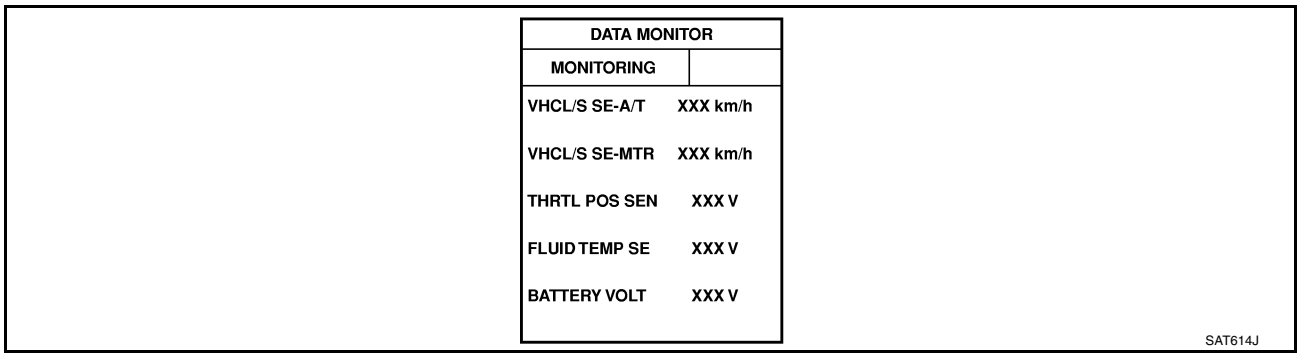
Diagnostic Procedure

ECS0065M

1. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II)

With CONSULT-II

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

OK or NG

OK >> GO TO 9.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING ITEM

Check the following items:

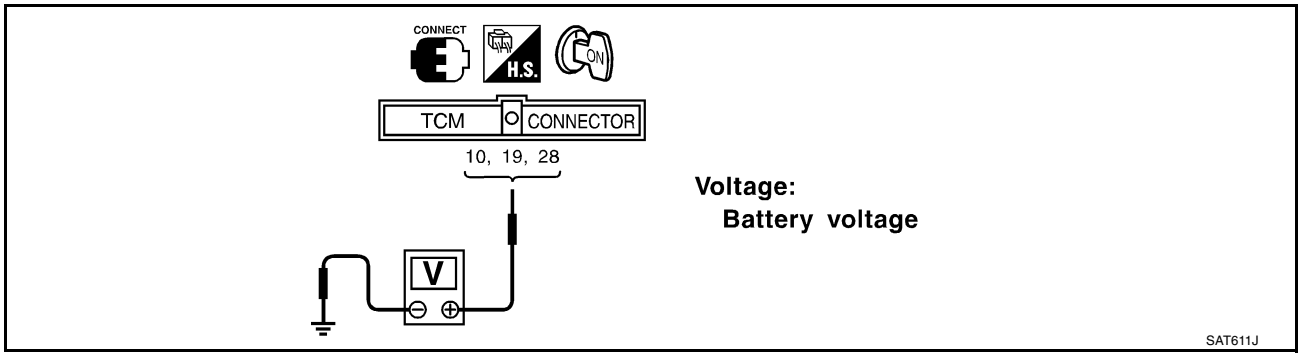
- Harness for short or open between TCM, ECM and terminal cord assembly (Main harness)
- Harness for short or open between battery and TCM (Main harness)
- Ground circuit for ECM
  Refer to EC-1326, "POWER SUPPLY CIRCUIT FOR ECM" .

OK or NG

OK >> GO TO 9.
NG >> Repair or replace damaged parts.

3. CHECK TCM POWER SOURCE STEP 1

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

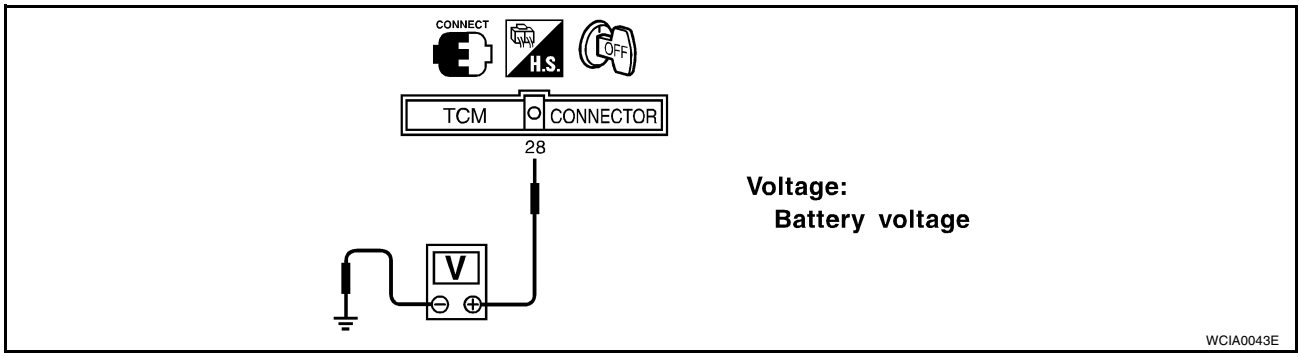


OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK TCM POWER SOURCE STEP 2

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



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING ITEM

Check the following items:

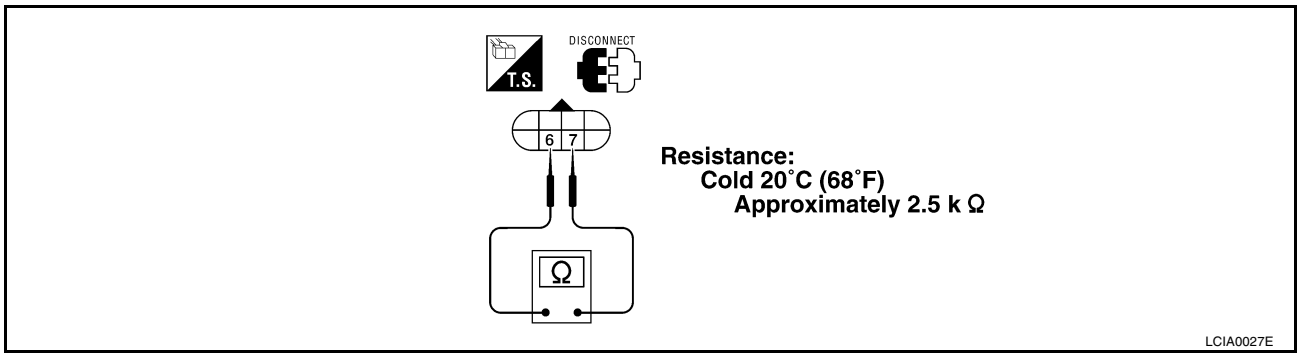
- Harness for short or open between ignition switch and TCM (Main harness)
- Harness for short or open between battery and TCM (Main harness)
- Ignition switch and fuse
  Refer to PG-2, "POWER SUPPLY ROUTING" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. 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 terminal cord assembly F30 terminals 6 and 7 (component side) when A/T is cold.



4. Reinstall any part removed.

OK or NG

OK (without CONSULT-II) >> GO TO 8.
NG >> GO TO 7.

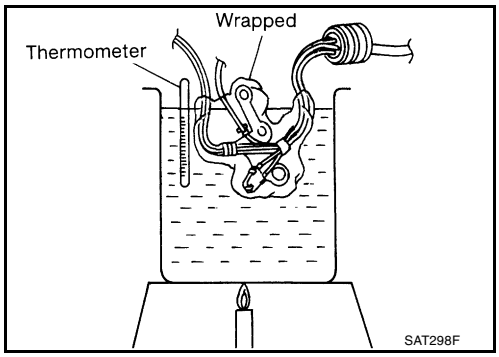
7. DETECT MALFUNCTIONING ITEM

1. Remove oil pan.
2. Check the following items:

- A/T fluid temperature sensor

- Check resistance between two terminals while changing temperature as shown.

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



- Harness of terminal cord assembly for short or open

OK or NG

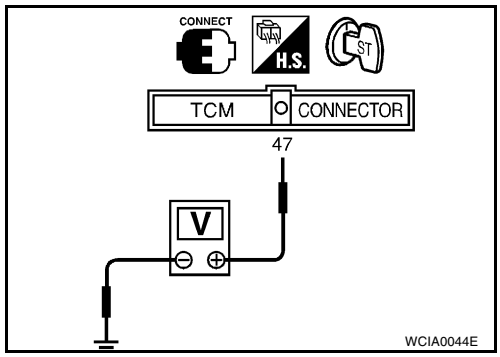
OK (without CONSULT-II) >> GO TO 8.
NG >> Repair or replace damaged parts.

8. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)

Without CONSULT-II

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

   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 TCM harness connector terminal 42 and ground. Refer to AT-573, "Wiring Diagram — AT — BA/FTS" .

   Continuity should exist.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short or open between TCM, ECM and terminal cord assembly (Main harness)
- Ground circuit for ECM
  Refer to PG-2, "POWER SUPPLY ROUTING" .

OK or NG

OK >> GO TO 10.
NG >> Repair or replace damaged parts.

10. CHECK DTC

Perform AT-571, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

11. CHECK TCM INSPECTION

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

OK or NG

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

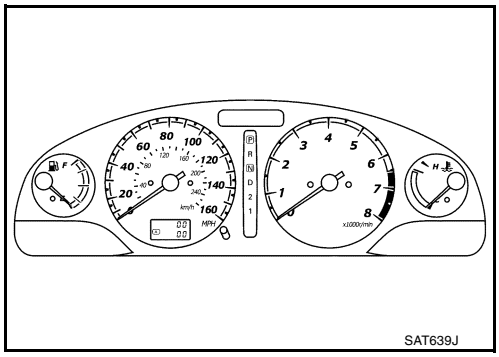
DTC VEHICLE SPEED SENSOR MTR

PFP:24814

Description

ECS0065N

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.



On Board Diagnosis Logic

ECS0065O

Diagnostic trouble code VHCL SPEED SEN·MTR with CONSULT-II or 2nd judgement flicker without CONSULT-II is detected when TCM does not receive the proper voltage signal from the sensor.

Possible Cause

ECS0065P

Check the following items.

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Vehicle speed sensor

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0065Q

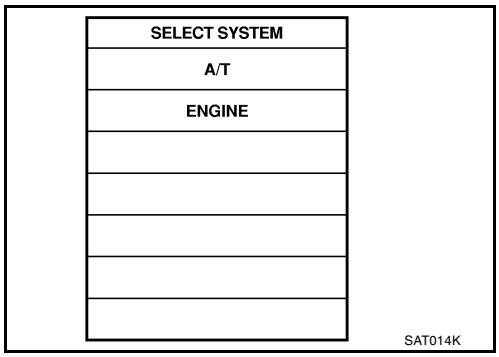
CAUTION:

- **Always drive vehicle at a safe speed.**
- **If conducting this "DTC Confirmation Procedure" again, always turn ignition switch OFF and wait at least 10 seconds before continuing.**

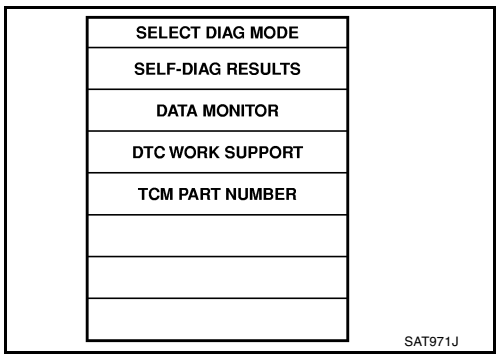
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON and select "DATA MONITOR" mode for "A/T" with CONSULT-II.



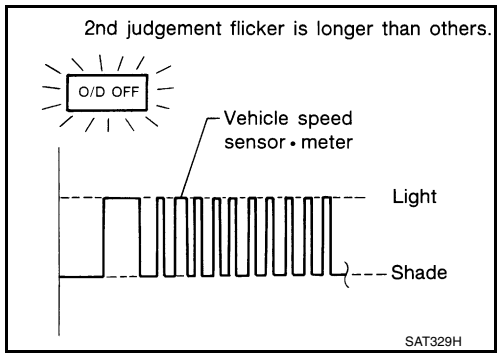
2. Start engine and accelerate vehicle from 0 to 25 km/h (0 to 16 MPH).



WITHOUT CONSULT-II

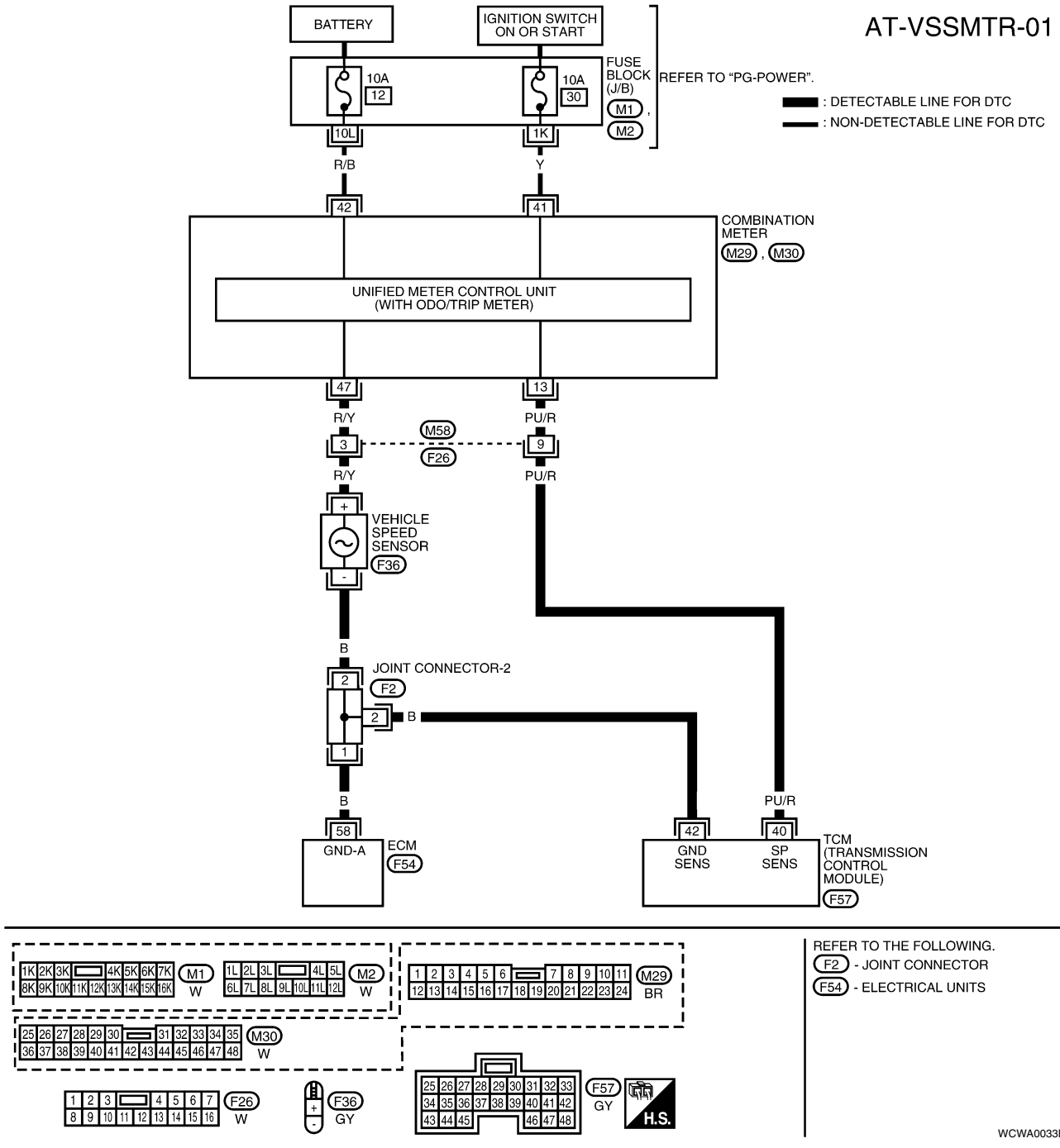
1. Start engine.

2. Drive vehicle under the following conditions:
   Selector lever in D and vehicle speed higher than 25 km/h (16 MPH).
3. Perform self-diagnosis.
   Refer to AT-440, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .



Wiring Diagram — AT — VSSMTR

ECS0065R



TCM TERMINALS AND REFERENCE VALUE (MEASURED BETWEEN EACH TERMINALS AND 25 OR 48 (TCM GROUND)

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (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)	VOLTAGE VARIES BETWEEN LESS THAN 1V AND MORE THAN 4.5 V

SAT313K

Diagnostic Procedure

ECS0065S

1. CHECK INPUT SIGNAL

With CONSULT-II

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

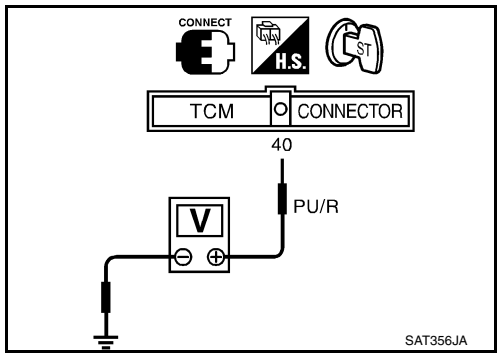
SAT614J

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.

Without CONSULT-II

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

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



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING ITEM

Check the following items:

- Vehicle speed sensor and ground circuit for vehicle speed sensor
  Refer to DI-3, "METERS AND GAUGES" .
- Harness for short or open between TCM and vehicle speed sensor (Main harness)

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK DTC

Perform AT-578, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK TCM INSPECTION

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

OK or NG

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

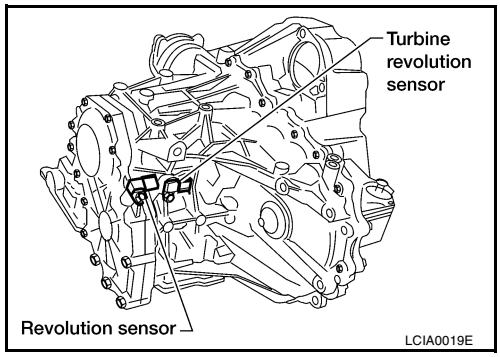
DTC TURBINE REVOLUTION SENSOR

PFP:31935

Description

ECS0065T

The turbine revolution sensor detects input shaft rpm (revolutions per minute). It is located on the input side of the automatic transaxle. The vehicle speed sensor A/T (Revolution sensor) is located on the output side of the automatic transaxle. With the two sensors, input and output shaft rpms are accurately detected. The result is optimal shift timing during deceleration and improved shifting.



ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when...	Check items (Possible cause)
: TURBINE REV : 10th judgement flicker	TCM does not receive the proper voltage signal from the sensor.	● Harness or connectors (The sensor circuit is open or shorted.) ● Turbine revolution sensor

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

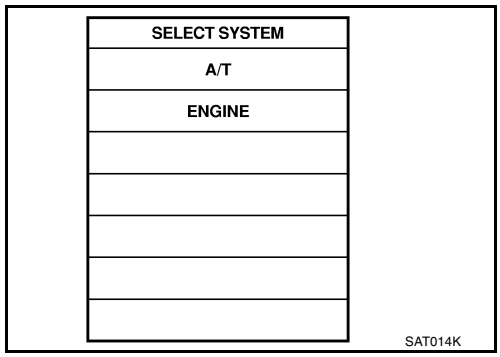
CAUTION:

- **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.**

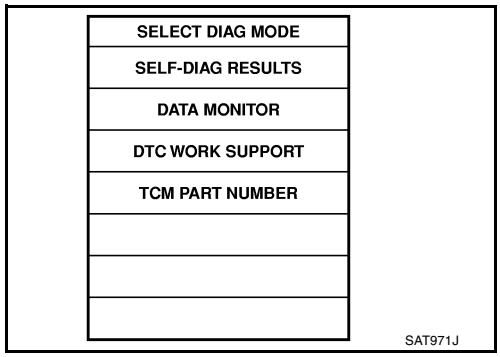
After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1. Start engine.



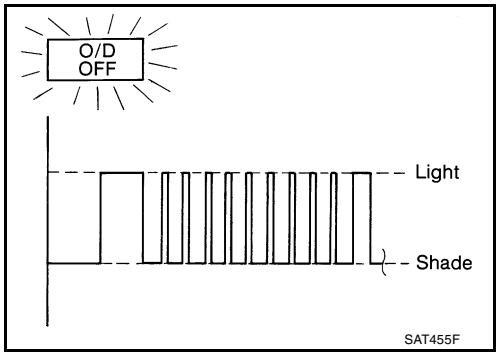
2. Select "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Drive vehicle under the following conditions:
   Selector lever in D, vehicle speed higher than 40 km/h (25 MPH), engine speed higher than 1,500 rpm, throttle opening greater than 1.0/8 of the full throttle position and driving for more than 5 seconds.



Without CONSULT-II

1. Start engine.
2. Drive vehicle under the following conditions:
   Selector lever in "D" and vehicle speed higher than 40 km/h (25 MPH), engine speed higher than 1,500 rpm, throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.

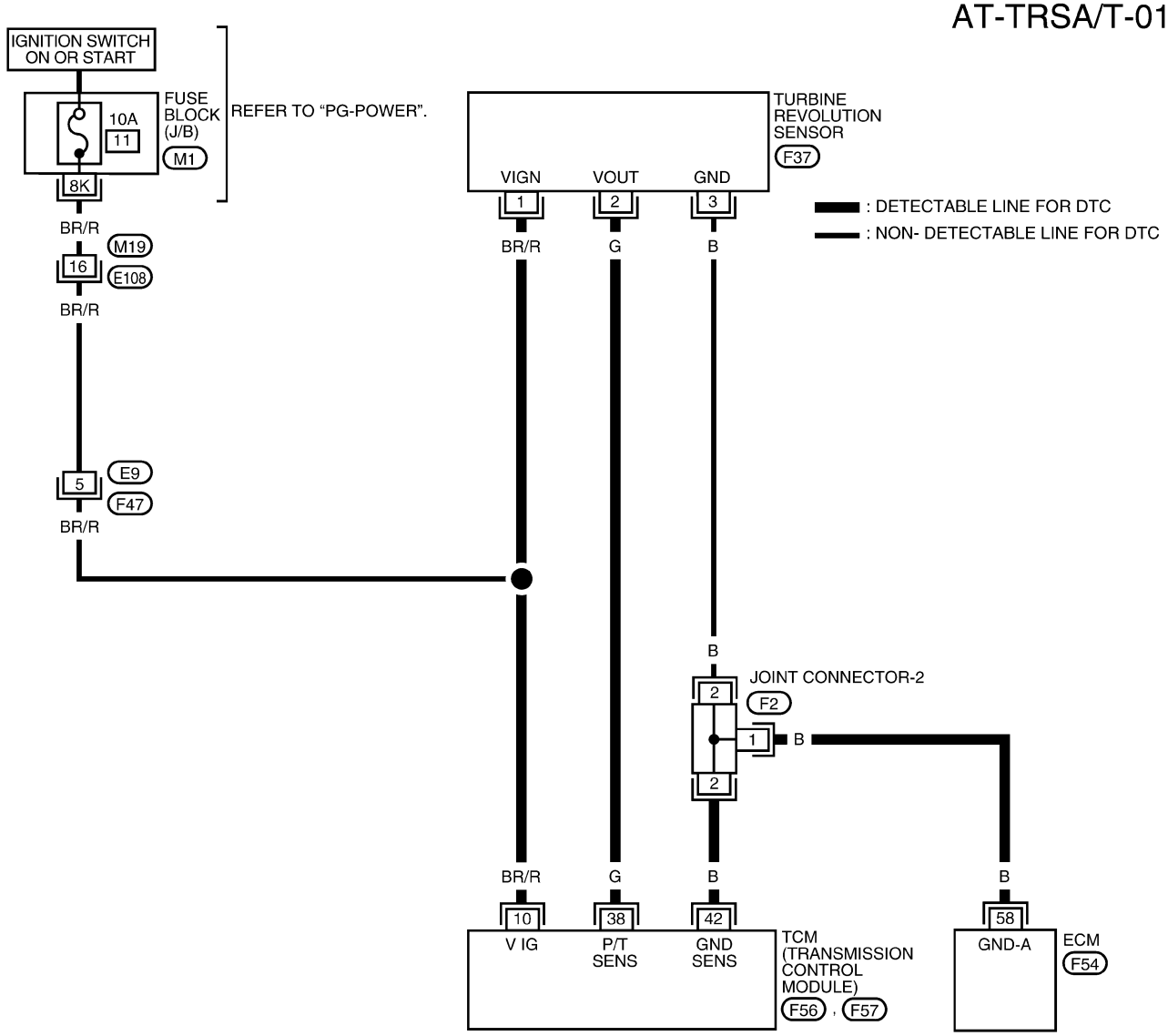
3. Perform self-diagnosis.
   Refer to AT-440, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .

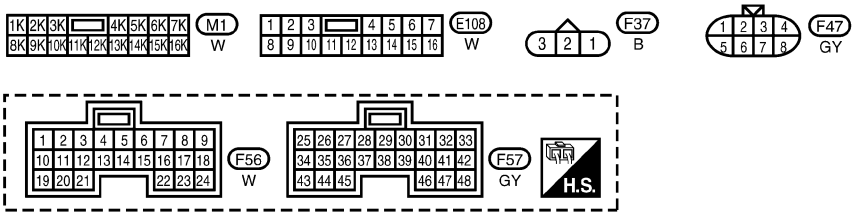


Wiring Diagram — AT — TRSA/T

ECS0065U

AT-TRSA/T-01





REFER TO THE FOLLOWING.
F2 - JOINT CONNECTOR
F54 - ELECTRICAL UNITS

LCWA0003E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	BR/R	TURBINE REVOLUTION SENSOR (POWER)	IGNITION ON	BATTERY VOLTAGE
38	G	TURBINE REVOLUTION SENSOR (SIGNAL)	WITH ENGINE RUNNING AT 1,000 RPM	APPROX. 1.2V VOLTAGE SHOULD INCREASE WITH ENGINE RPM
42	B	SENSOR GROUND	—	—

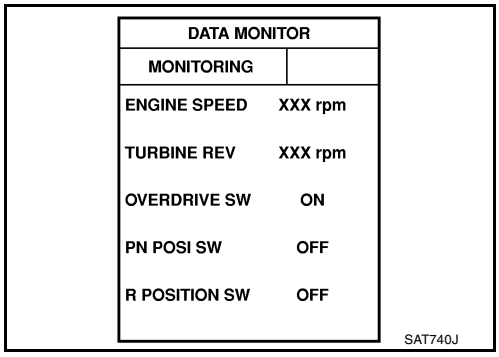
Diagnostic Procedure

ECS0065V

1. CHECK INPUT SIGNAL

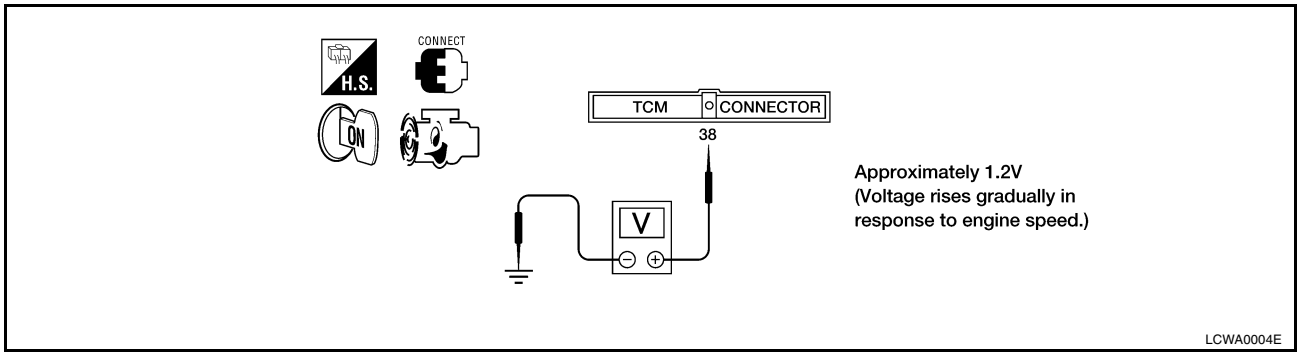
With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “TURBINE REF” while driving.
   Check the value changes according to driving speed.



Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 38 and ground (measure in AC range).



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING ITEM

Check harness for short or open between TCM and turbine revolution sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK DTC

Perform "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION, AT-583, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END.**
NG >> GO TO 4.

4. CHECK TCM INSPECTION

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

OK or NG

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

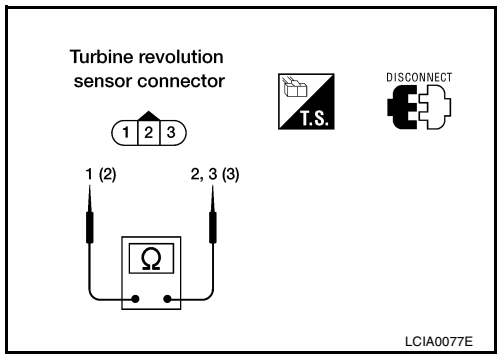
Component Inspection

ECS0065W

TURBINE REVOLUTION SENSOR

- Check resistance between terminals 1, 2 and 3.

Terminal No.		Resistance (Approx.)
1	2	2.4 - 2.8kΩ
1	3	No continuity
2	3	No continuity



DTC U1000 CAN COMMUNICATION LINE

PFP:23710

Description

ECS0065X

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

ECS0065Y

- This is an OBD-II self-diagnostic item.
- Diagnostic trouble code “CAN COMM CIRCUIT” with CONSULT-II or U1000 without CONSULT-II is detected when TCM cannot communicate to other control unit.

Possible Cause

ECS0065Z

Harness or connectors
(CAN communication line is open or shorted.)

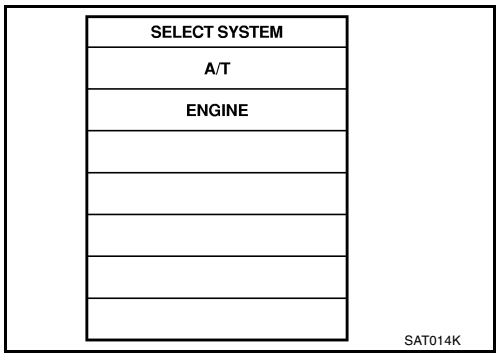
DTC Confirmation Procedure

ECS00660

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch to ON position. (Do not start engine.)
2. Select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
3. Start engine and wait for at least 6 seconds.
4. If DTC is detected, go to AT-590, "Diagnostic Procedure" .



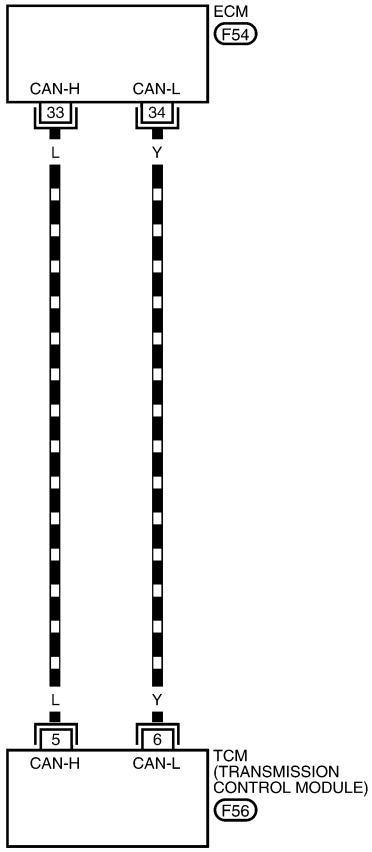
WITH GST

Follow the procedure “WITH CONSULT-II”.

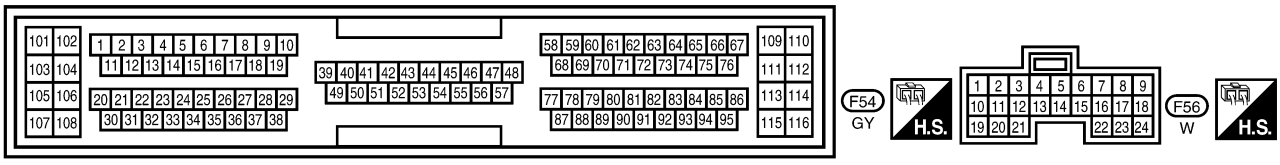
Wiring Diagram — AT — CAN

ECS00661

AT-CAN-01



: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
: DATA LINE



LCWA0002E

Diagnostic Procedure

ECS00662

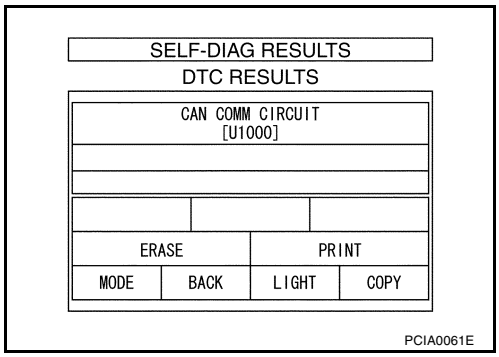
1. CHECK CAN COMMUNICATION CIRCUIT

With CONSULT-II

1. Turn ignition switch to ON position. (Do not start engine.)
2. Select “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. The “CAN COMM CIRCUIT” is detected.

Yes or No

Yes >> Print out CONSULT-II screen, GO TO 2.
No >> **INSPECTION END**.



2. CHECK CAN COMMUNICATION SIGNALS

With CONSULT-II

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

>> Print out CONSULT-II screen, go to AT-419, "CAN Communication" .

CAN COMMUNICATION SIGNALS

Normal conditions	Abnormal conditions (examples)
CAN COMM : OK	CAN COMM : OK
CAN CIRC 1 : OK	CAN CIRC 1 : UNKWN
CAN CIRC 2 : OK	CAN CIRC 2 : UNKWN
CAN CIRC 3 : OK	CAN CIRC 3 : UNKWN
CAN CIRC 4 : OK	CAN CIRC 4 : UNKWN
CAN CIRC 5 : UNKWN	CAN CIRC 5 : UNKWN
CAN CIRC 6 : UNKWN	CAN CIRC 6 : UNKWN

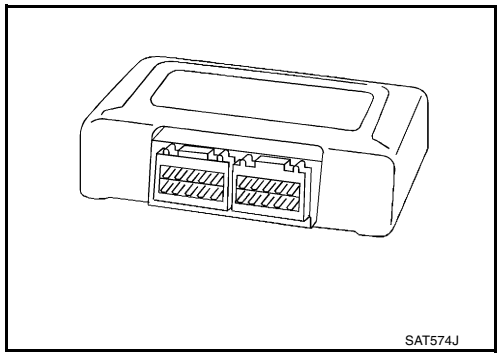
DTC CONTROL UNIT (RAM), CONTROL UNIT (ROM)

PFP:31036

Description

ECS00663

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


SAT574J

On Board Diagnosis Logic

ECS00664

Diagnostic trouble code CONTROL UNIT (RAM), CONTROL UNIT (ROM) with CONSULT-II is detected when TCM memory (RAM) or (ROM).

Possible Cause

ECS00665

Check TCM.

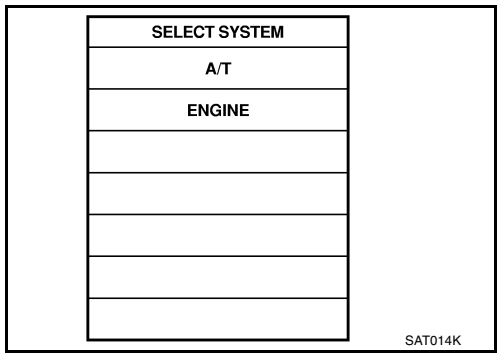
Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00666

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

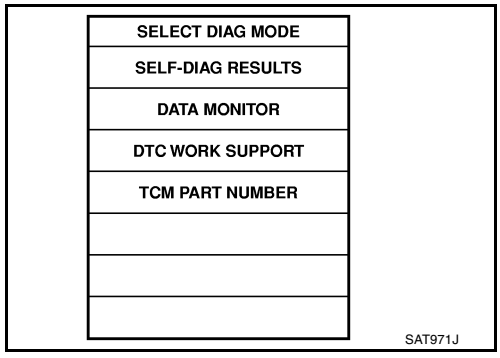
WITH CONSULT-II

1. Turn ignition switch ON and select "DATA MONITOR" mode for A/T with CONSULT-II.
2. Start engine.



SAT014K

3. Run engine for at least 2 seconds at idle speed.



SAT971J

Diagnostic Procedure

ECS00667

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON and select “SELF DIAGNOSIS” mode for A/T with CONSULT-II.
2. Touch “ERASE”.
3. Perform AT-591, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .
4. Is the “CONTROL UNIT (RAM)” or “CONTROL UNIT (ROM)” displayed again?

Yes or No

Yes >> Replace TCM.
No >> **INSPECTION END**

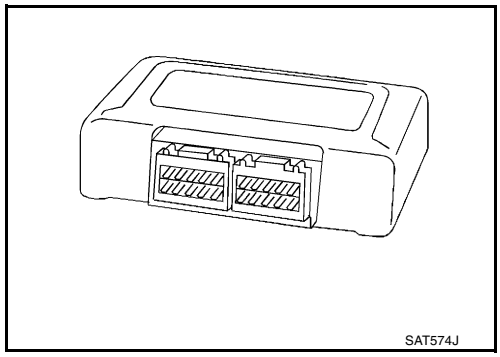
DTC CONTROL UNIT (EEP ROM)

PFP:31036

Description

ECS00668

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


SAT574J

ON BOARD DIAGNOSIS LOGIC

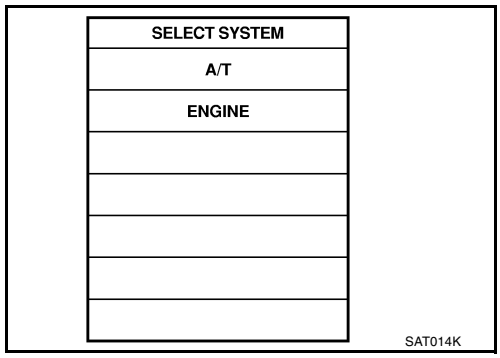
Diagnostic trouble code	Malfunction is detected when...	Check item (Possible cause)
: CONT UNIT (EEP ROM)	TCM memory (EEP ROM) is malfunctioning.	● TCM

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.

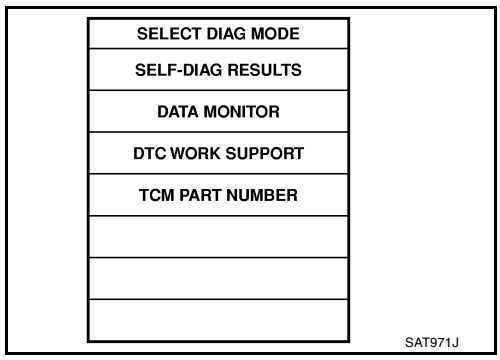
With CONSULT-II

1. Turn ignition switch ON and select "DATA MONITOR" mode for A/T with CONSULT-II.
2. Start engine.



SAT014K

3. Run engine for at least 2 seconds at idle speed.



SAT971J

Diagnostic Procedure

ECS00669

1. CHECK DTC

With CONSULT-II

1. Turn ignition switch ON and select “SELF DIAGNOSIS” mode for A/T with CONSULT-II.
2. Move selector lever to “R” position.
3. Depress accelerator pedal (Full throttle position).
4. Touch “ERASE”.
5. Turn ignition switch OFF position for 10 seconds.

Perform AT-593, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

Is the “CONT UNIT (EEP ROM)” displayed again?

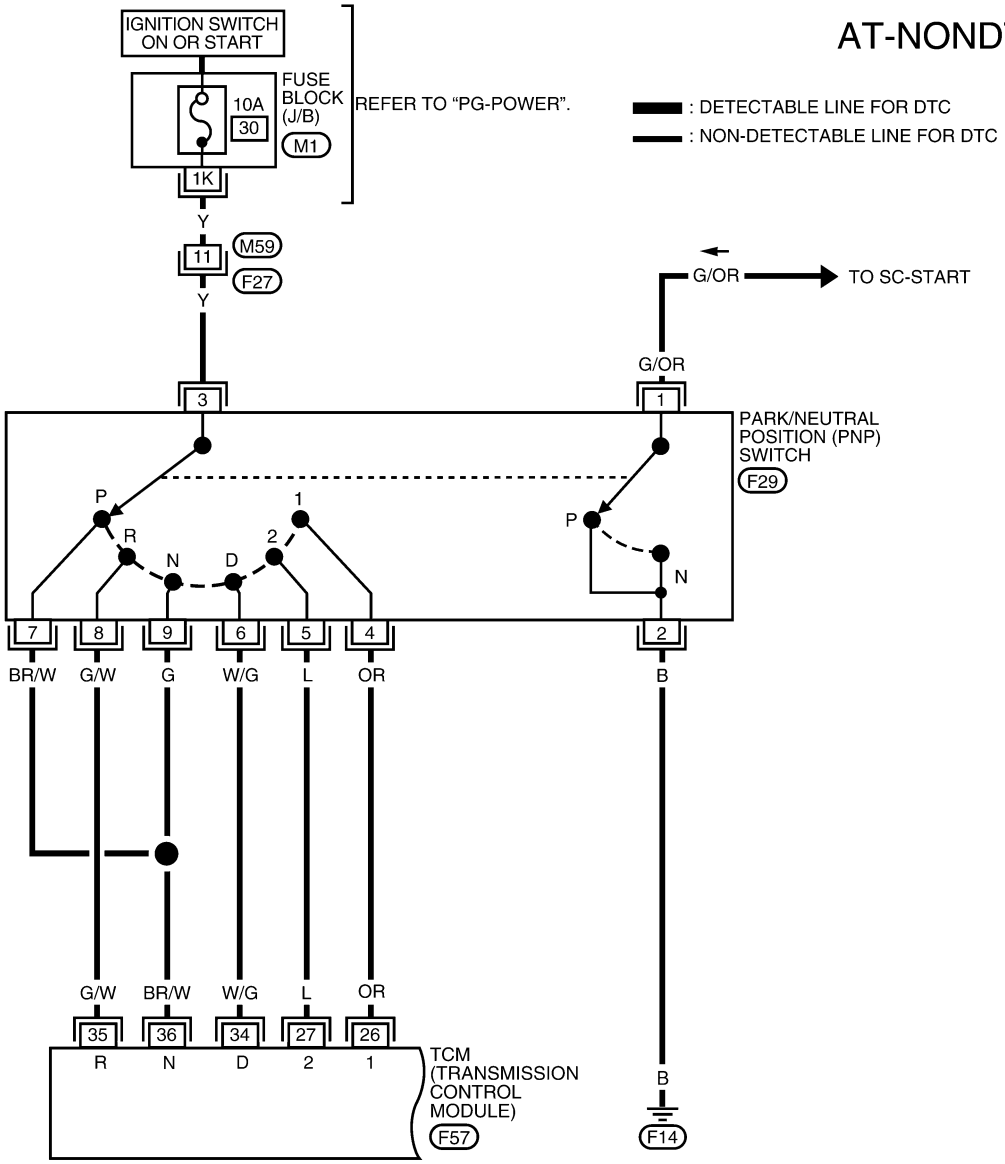
Yes >> Replace TCM.
No >> **INSPECTION END**

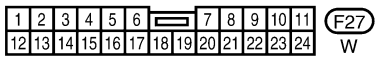
TROUBLE DIAGNOSIS FOR SYMPTOMS

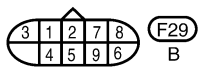
PFP:00007

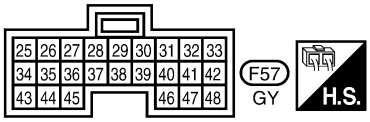
Wiring Diagram — AT — NONDTC

ECS0066A





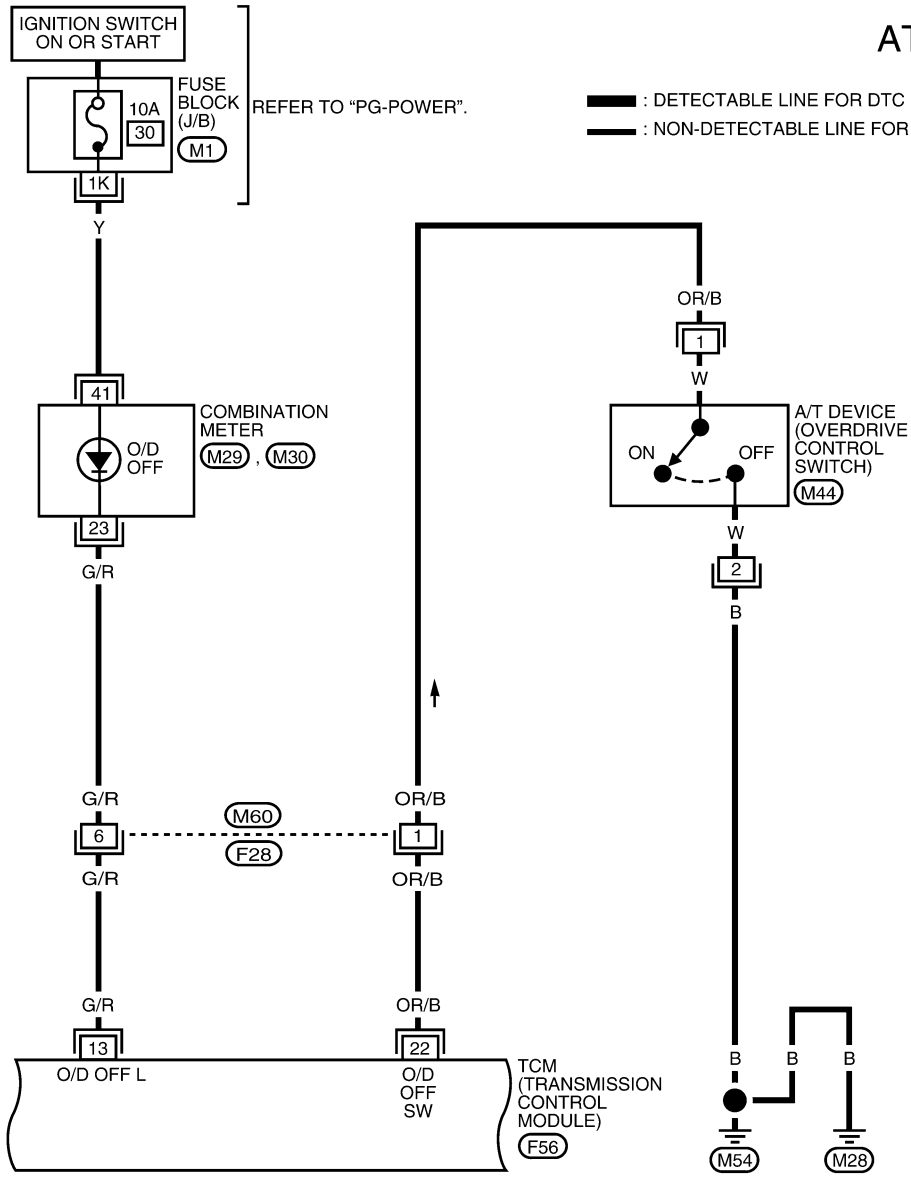


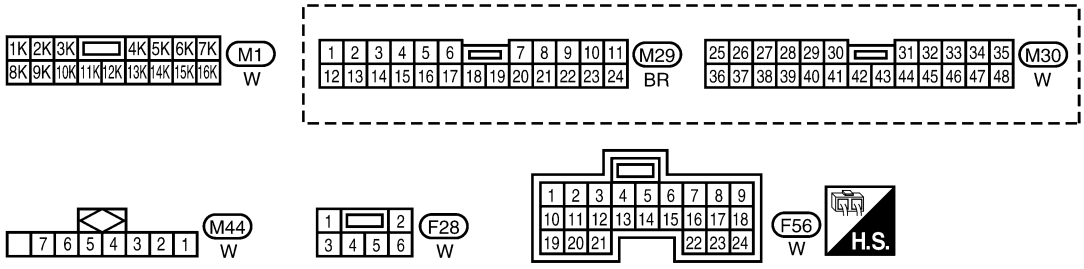


WCWA0081E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
26	OR	PNP SWITCH 1 POSITION	IGNITION ON AND SELECTOR LEVER IN 1 POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
27	L	PNP SWITCH 2 POSITION	IGNITION ON AND SELECTOR LEVER IN 2 POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
34	W/G	PNP SWITCH D POSITION	IGNITION ON AND SELECTOR LEVER IN D POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
35	G/W	PNP SWITCH R POSITION	IGNITION ON AND SELECTOR LEVER IN R POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
36	BR/W	PNP SWITCH P OR N POSITION	IGNITION ON AND SELECTOR LEVER IN P OR N POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V

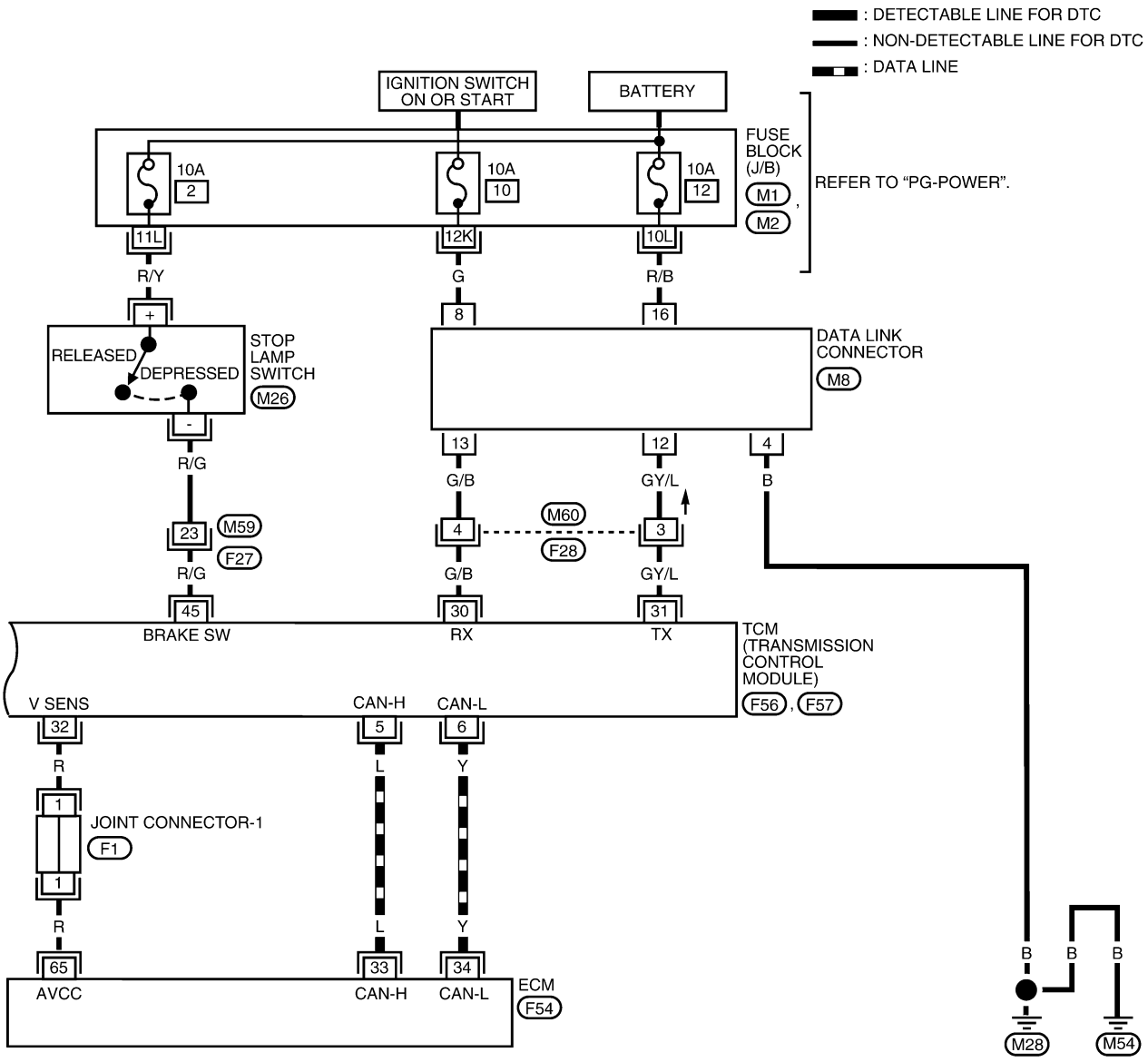

AT-NONDTC-02
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
IGNITION SWITCH ON OR START
FUSE BLOCK (J/B)
10A
30
M1
1K
REFER TO "PG-POWER".
Y
41
COMBINATION METER
O/D OFF
M29 , M30
23
G/R
OR/B
1
W
A/T DEVICE (OVERDRIVE CONTROL SWITCH)
ON
OFF
M44
W
2
B
G/R
6
M60
F28
OR/B
1
G/R
OR/B
G/R
13
O/D OFF L
OR/B
22
O/D OFF SW
TCM (TRANSMISSION CONTROL MODULE)
F56
B
B
B
M54
M28

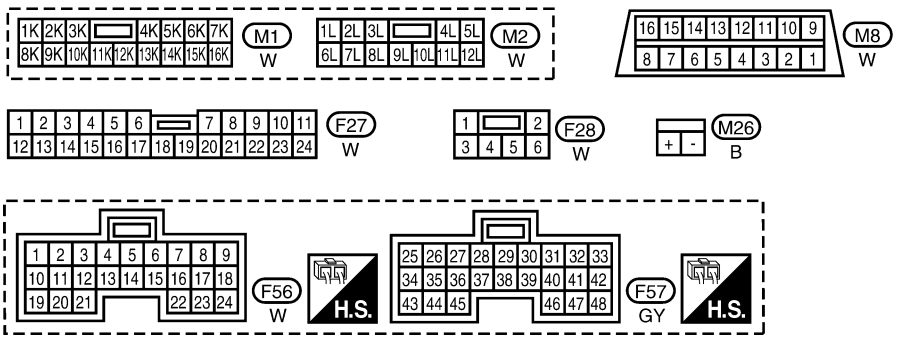

1K 2K 3K 4K 5K 6K 7K
8K 9K 10K 11K 12K 13K 14K 15K 16K
M1
W
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22 23 24
M29
BR
25 26 27 28 29 30 31 32 33 34 35
36 37 38 39 40 41 42 43 44 45 46 47 48
M30
W
7 6 5 4 3 2 1
M44
W
1 2
3 4 5 6
F28
W
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18
19 20 21 22 23 24
F56
W
H.S.

WCWA0082E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
13	G/R	O/D OFF INDICATOR LAMP	WHEN SETTING OVERDRIVE CONTROL SWITCH "OFF"	0V
			WHEN SETTING OVERDRIVE CONTROL SWITCH "ON"	BATTERY VOLTAGE
22	OR/B	OVERDRIVE CONTROL SWITCH	WHEN SETTING OVERDRIVE CONTROL SWITCH "ON"	BATTERY VOLTAGE
			WHEN SETTING OVERDRIVE CONTROL SWITCH "OFF"	0V

AT-NONDTC-03





REFER TO THE FOLLOWING.
F1 - JOINT CONNECTOR
F54 - ELECTRICAL UNITS

WCWA0083E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
5	L	CAN-H	—	—
6	Y	CAN-L	—	—
30	G/B	DATA LINK CONNECTOR (RX)	—	—
31	GY/L	DATA LINK CONNECTOR (TX)	—	—
32	R	SENSOR POWER	IGNITION SWITCH ON	APPROX. 4.5 - 5.5v
			IGNITION SWITCH OFF	APPROX. 0V
45	R/G	STOP LAMP SWITCH	BRAKE PEDAL DEPRESSED	BATTERY VOLTAGE
			BRAKE PEDAL RELEASED	APPROX. 0V

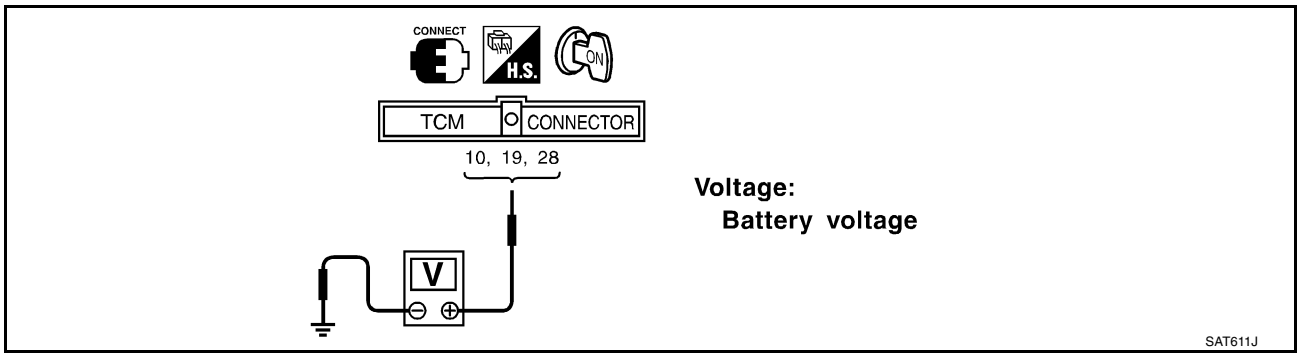
1. O/D OFF Indicator Lamp Does Not Come On

ECS0066B

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

1. CHECK TCM POWER SOURCE

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

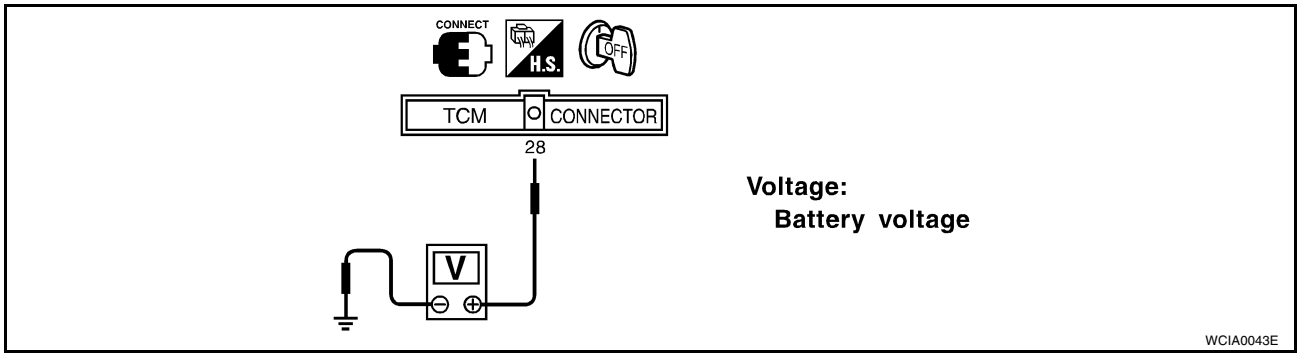


OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK POWER SOURCE STEP 2

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



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short or open between ignition switch and TCM (Main harness)
  Refer to AT-486, "Wiring Diagram — AT — MAIN" .
- Harness for short or open between battery and TCM (Main harness)
  Refer to AT-486, "Wiring Diagram — AT — MAIN" .
- Ignition switch and fuse
  Refer to PG-2, "POWER SUPPLY ROUTING" .

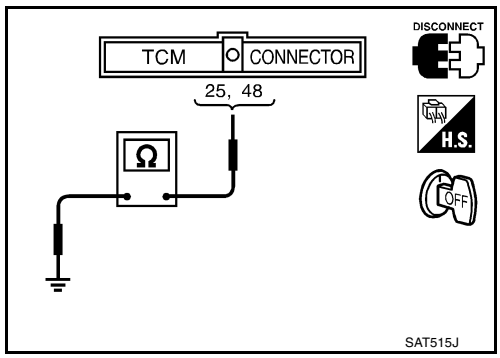
OK or NG

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

4. 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.



OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors. Refer to AT-486, "Wiring Diagram — AT — MAIN" .

5. CHECK LAMP CIRCUIT

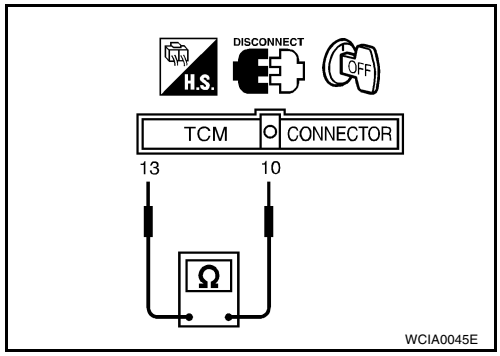
1. Turn ignition switch to OFF position.
2. Check resistance between TCM terminals 10 and 13.

Resistance :50 - 100Ω

3. Reinstall any part removed.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.



6. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness and fuse for short or open between ignition switch and O/D OFF indicator lamp (Main harness)
  Refer to PG-2, "POWER SUPPLY ROUTING" .
- Harness for short or open between O/D OFF indicator lamp and TCM.

OK or NG

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

7. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

8. CHECK TCM INSPECTION

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

OK or NG

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

2. Engine Cannot Be Started In P and N Position

ECS0066C

SYMPTOM:

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

1. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT

With CONSULT-II

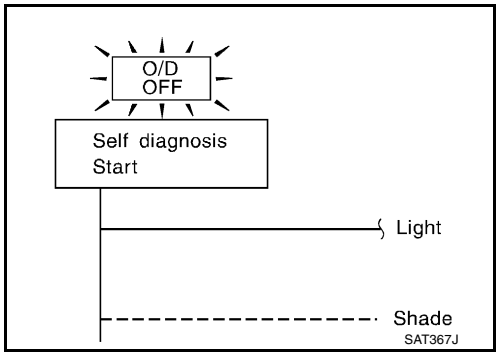
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?

Without CONSULT-II

Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?

Yes or No

Yes >> Check park/neutral position (PNP) switch circuit. Refer to AT-489, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .
No >> GO TO 2.



2. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Check for short or open of park/neutral position (PNP) switch harness connector terminals 1 and 2. Refer to AT-491, "Wiring Diagram — AT — PNP/SW" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace park/neutral position (PNP) switch.

3. CHECK STARTING SYSTEM

Check starting system. Refer to SC-9, "STARTING SYSTEM" .

OK or NG

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

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

ECS0066D

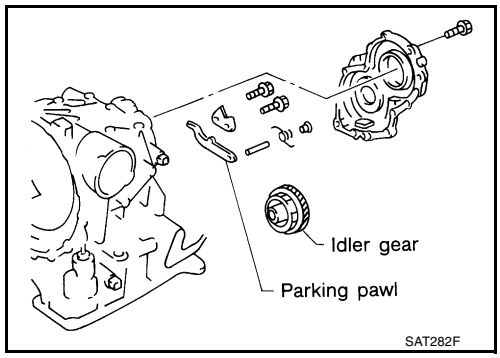
SYMPTOM:
Vehicle moves when it is pushed forward or backward with selector lever in P position.

1. CHECK PARKING COMPONENTS

Check parking components. Refer to AT-650, "OVERHAUL" and AT-727, "ASSEMBLY" .

OK or NG

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



4. In N Position, Vehicle Moves

ECS0066E

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

1. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT

With CONSULT-II

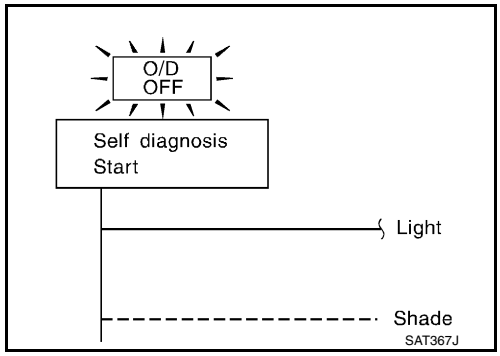
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?

Without CONSULT-II

Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?

Yes or No

Yes >> Check park/neutral position (PNP) switch circuit. Refer to AT-489, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .
No >> GO TO 2.



2. CHECK CONTROL LINKAGE

Check control cable.

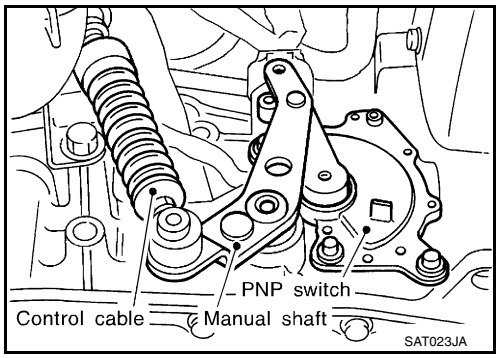
OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. ADJUST CONTROL CABLE

Adjust control cable.

>> Refer to AT-645, "Control Cable Adjustment" .

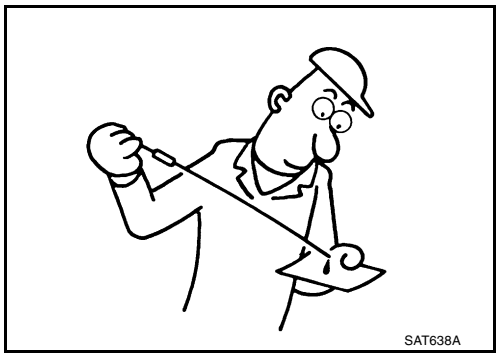


4. CHECK A/T FLUID LEVEL

Check A/T fluid level.

OK or NG

OK >> GO TO 5.
NG >> Refill ATF.

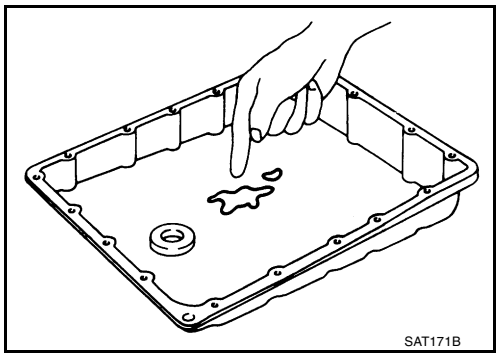


5. CHECK A/T FLUID CONDITION

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

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.



6. DETECT MALFUNCTIONING ITEM

1. Disassemble A/T.
2. Check the following items:

- Forward clutch assembly
- Overrun clutch assembly
- Reverse clutch assembly

OK or NG

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

7. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

8. CHECK TCM INSPECTION

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

OK or NG

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

5. Large Shock N → R Position

ECS0066F

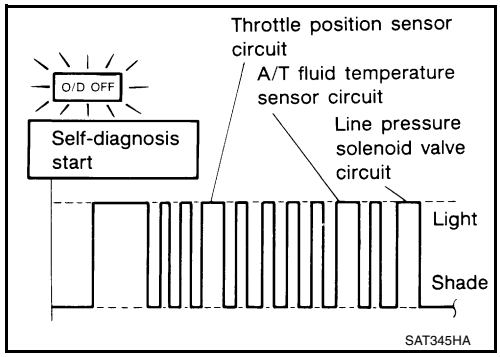
SYMPTOM:
There is large shock when changing from N to R position.

1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to A/T fluid temperature sensor, line pressure solenoid valve or throttle position sensor [accelerator pedal position (APP) sensor] circuit?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.



2. CHECK DAMAGED CIRCUIT

Check damaged circuit.

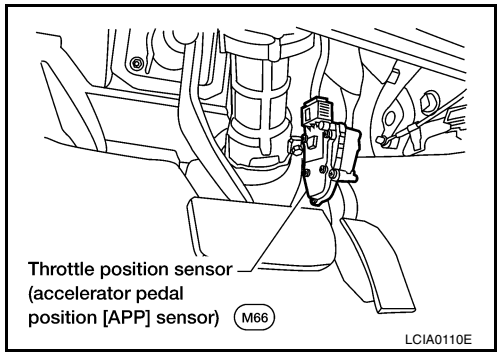
>> Refer to AT-495, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" , AT-545, "DTC P0745 LINE PRESSURE SOLENOID VALVE" , and AT-561, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" .

3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor. Refer to EC-1459, "DTC P0222, P0223 TP SENSOR" , and EC-1735, "DTC P2122, P2123 APP SENSOR" .

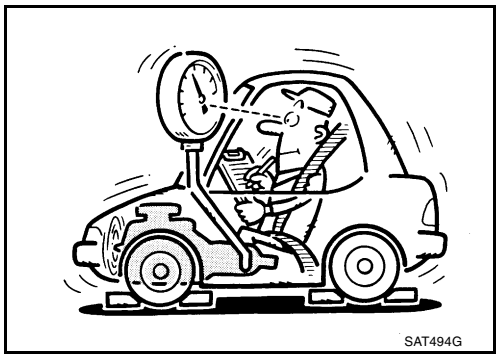
OK or NG

OK >> GO TO 4.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



4. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in D position. Refer to AT-454, "Line Pressure Test" .



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
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 or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. CHECK TCM INSPECTION

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

OK or NG

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

6. Vehicle Does Not Creep Backward In R Position

ECS0066G

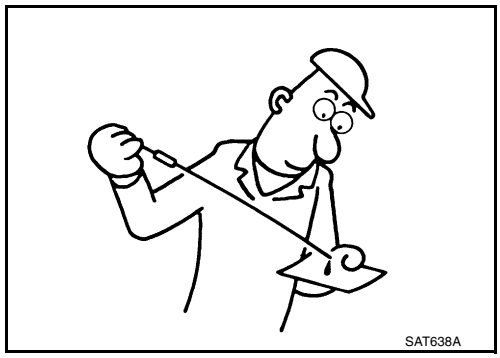
SYMPTOM:
Vehicle does not creep backward when selecting R position.

1. CHECK A/T FLUID LEVEL

Check A/T fluid level.

OK or NG

OK >> GO TO 2.
NG >> Refill ATF.

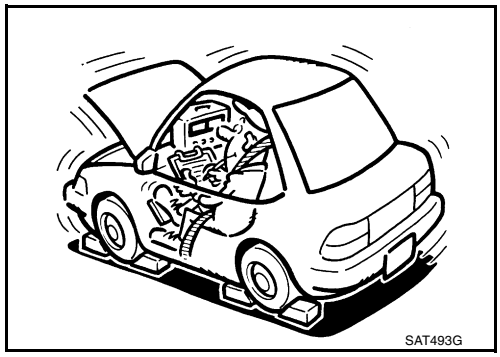

SAT638A

2. CHECK STALL REVOLUTION

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

OK or NG

OK >> GO TO 5.
OK in 1 position, NG in R position>>GO TO 3.
NG in both 1 and R positions>>GO TO 4.


SAT493G

3. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
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

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

4. DETECT MALFUNCTIONING ITEM

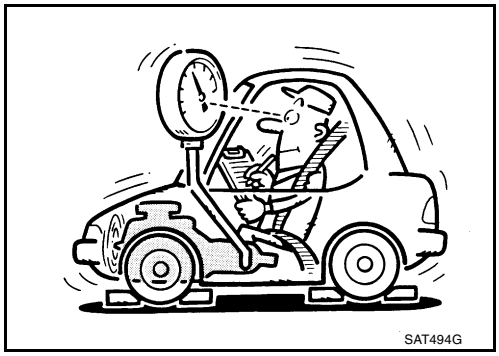
1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve
3. Disassemble A/T.
4. Check the following items:
- Oil pump assembly
- Torque converter
- Reverse clutch assembly
- High clutch assembly
- Low & reverse brake assembly
- Low one-way clutch

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

5. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in R position. Refer to AT-454, "Line Pressure Test" .



OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING ITEM

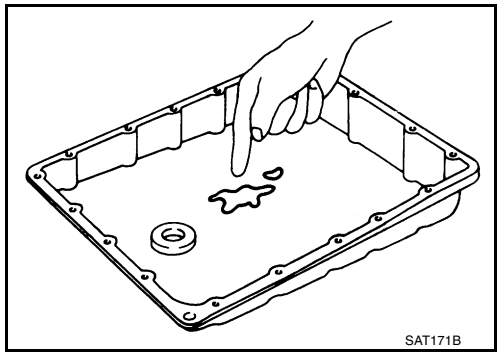
1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve
3. Disassemble A/T.
4. Check the following item:
- Oil pump assembly

OK or NG

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

7. CHECK A/T FLUID CONDITION

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



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
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 or NG

OK >> GO TO 9.
NG >> Repair or replace damaged parts.

9. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

10. CHECK TCM INSPECTION

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

OK or NG

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

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

ECS0066H

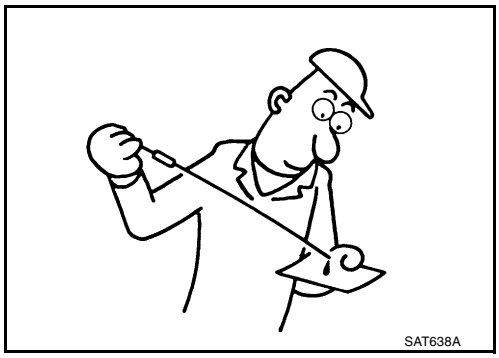
SYMPTOM:
Vehicle does not creep forward when selecting D, 2 or 1 position.

1. CHECK A/T FLUID LEVEL

Check A/T fluid level.

OK or NG

OK >> GO TO 2.
NG >> Refill ATF.

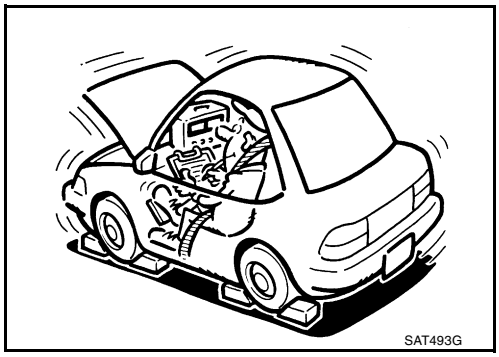

SAT638A

2. CHECK STALL REVOLUTION

Check stall revolution with selector lever in D position. Refer to AT-450, "Stall Test" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.


SAT493G

3. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
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:

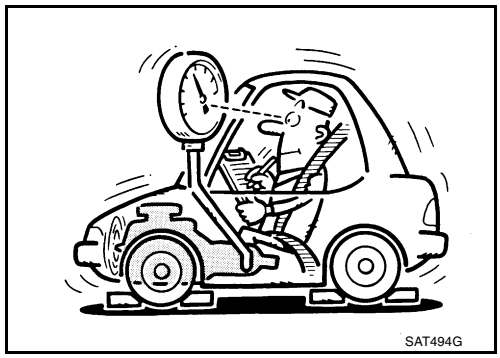
- Oil pump assembly
- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- Low & reverse brake assembly
- Torque converter

OK or NG

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

4. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in D position. Refer to AT-454, "Line Pressure Test" .



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
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:

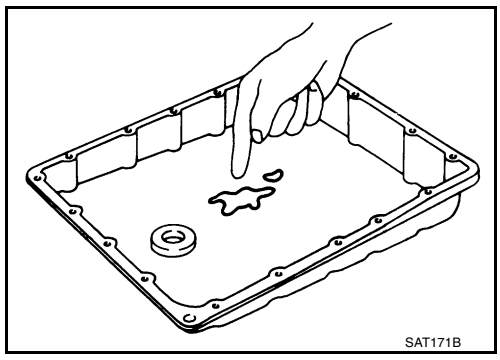
- Oil pump assembly

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. CHECK A/T FLUID CONDITION

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



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
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 or NG

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

8. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9. CHECK TCM INSPECTION

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

OK or NG

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

8. Vehicle Cannot Be Started From D_1

ECS0066I

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

1. CHECK SYMPTOM

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

Yes or No

Yes >> GO TO 2.
No >> Go to AT-607, "6. Vehicle Does Not Creep Backward In R Position" .

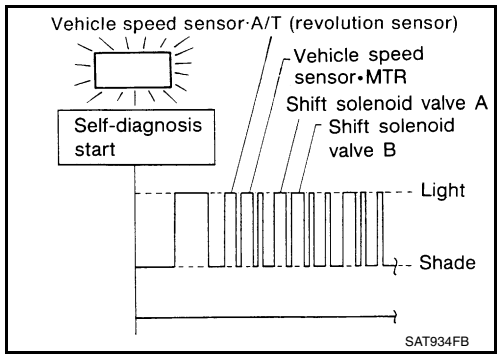
2. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test?

Yes or No

Yes >> Check damaged circuit. Refer to AT-501, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-551, "DTC P0750 SHIFT SOLENOID VALVE A" , or AT-556, "DTC P0755 SHIFT SOLENOID VALVE B" .

No >> GO TO 3.



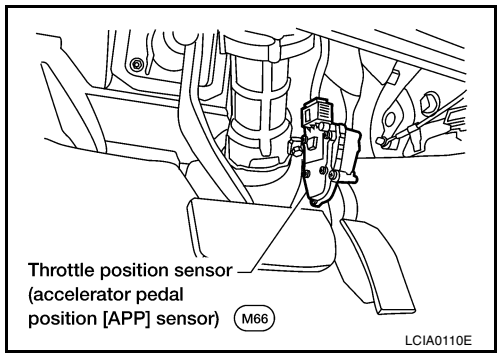
3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-1375, "DTC P0122, P0123 TP SENSOR" and EC-1735, "DTC P2122, P2123 APP SENSOR" .

OK or NG

OK >> GO TO 4.

NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



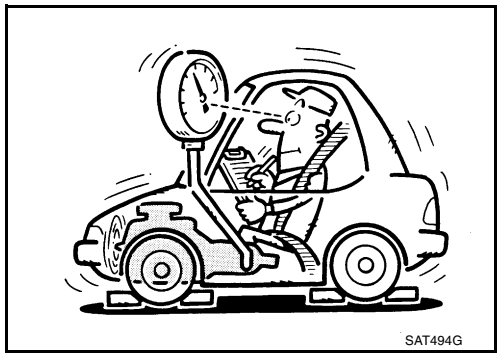
4. CHECK LINE PRESSURE

Check line pressure at stall point with selector lever in D position. Refer to AT-454, "Line Pressure Test" .

OK or NG

OK >> GO TO 6.

NG >> GO TO 5.



5. DETECT MALFUNCTIONING ITEM

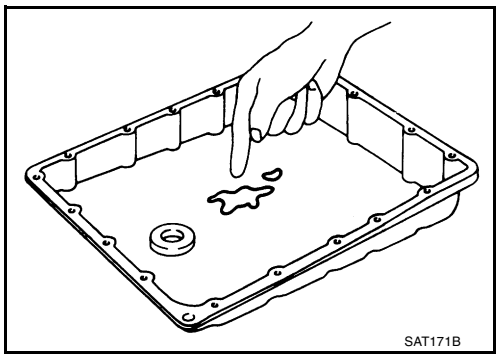
1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:
- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check the following items:
- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- High clutch assembly
- Torque converter
- Oil pump assembly

OK or NG

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

6. CHECK A/T FLUID CONDITION

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



OK or NG

OK >> GO TO 7.
NG >> GO TO 5.

7. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:
- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

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

8. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9. CHECK TCM INSPECTION

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

OK or NG

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

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

ECS0066J

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

1. CHECK SYMPTOM

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

Yes or No

Yes >> GO TO 2.
No >> Go to AT-610, "7. Vehicle Does Not Creep Forward in D, 2 or 1 Position" and AT-612, "8. Vehicle Cannot Be Started From D_1" .

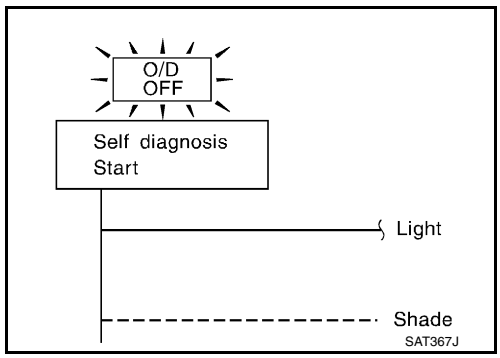
2. CHECK SELF-DIAGNOSTIC RESULTS

With CONSULT-II
Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to park/neutral position (PNP) switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?

Yes or No

Yes >> Check park/neutral position (PNP) switch circuit. Refer to AT-489, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .
No >> GO TO 3.



3. CHECK VEHICLE SPEED SENSOR·A/T AND VEHICLE SPEED SENSOR·MTR CIRCUIT

Check vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuit. Refer to AT-501, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" and AT-578, "DTC VEHICLE SPEED SENSOR MTR" .

OK or NG

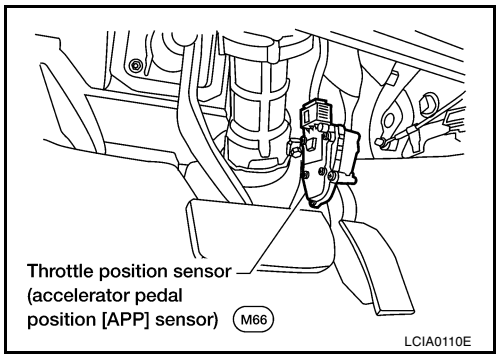
OK >> GO TO 4.
NG >> Repair or replace vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuits.

4. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-1375, "DTC P0122, P0123 TP SENSOR" and EC-1735, "DTC P2122, P2123 APP SENSOR" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].

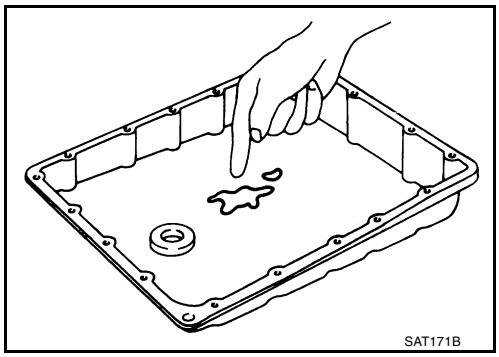


5. CHECK A/T FLUID CONDITION

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

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.



6. DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-642, "REMOVAL" .
2. Check the following items:

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

3. Disassemble A/T.
4. Check the following items:

- Servo piston assembly
- Brake band
- Oil pump assembly

OK or NG

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

7. DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-642, "REMOVAL" .
2. Check the following items:

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

OK or NG

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

8. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9. CHECK TCM INSPECTION

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

OK or NG

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

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

ECS0066K

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

1. CHECK SYMPTOM

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

Yes or No

Yes >> GO TO 2.
No >> Go to AT-610, "7. Vehicle Does Not Creep Forward in D, 2 or 1 Position" and AT-612, "8. Vehicle Cannot Be Started From D_1" .

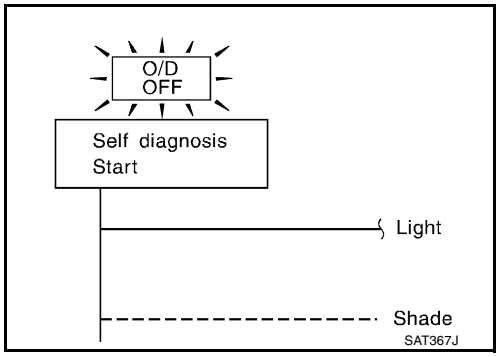
2. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT

With CONSULT-II

Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?

Without CONSULT-II

Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?



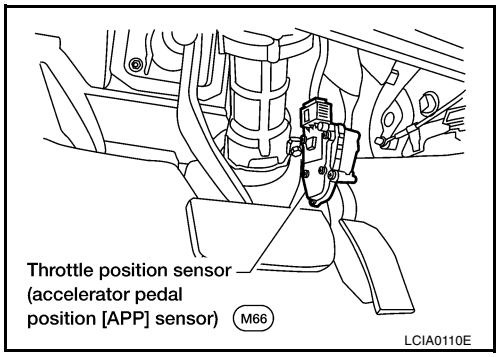
Yes or No

Yes >> Check park/neutral position (PNP) switch circuit. Refer to AT-489, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .

No >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-1375, "DTC P0122, P0123 TP SENSOR" and EC-1735, "DTC P2122, P2123 APP SENSOR" .



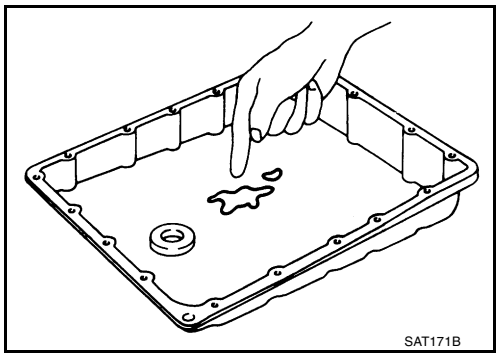
OK or NG

OK >> GO TO 4.

NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].

4. CHECK A/T FLUID CONDITION

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



OK or NG

OK >> GO TO 6.

NG >> GO TO 5.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:
- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check the following items:
- Servo piston assembly
- High clutch assembly
- Oil pump assembly

OK or NG

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

6. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:
- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

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

7. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

8. CHECK TCM INSPECTION

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

OK or NG

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

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

ECS0066L

SYMPTOM:

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

1. CHECK SYMPTOM

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

Yes or No

Yes >> GO TO 2.
No >> Go to AT-610, "7. Vehicle Does Not Creep Forward in D, 2 or 1 Position" and AT-612, "8. Vehicle Cannot Be Started From D_1" .

2. CHECK SELF-DIAGNOSTIC RESULTS

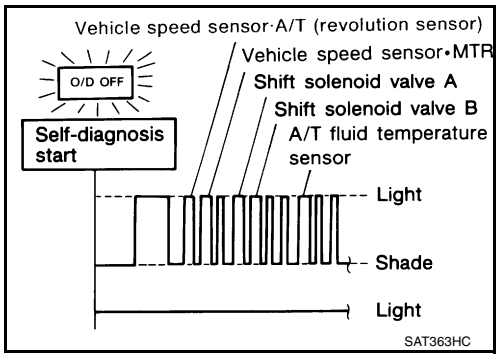
With CONSULT-II

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

- Park/neutral position (PNP) switch
- Overdrive control switch
- A/T fluid temperature sensor
- Vehicle speed sensor·A/T (revolution sensor)
- Shift solenoid valve A or B
- Vehicle speed sensor·MTR

Yes or No

Yes >> Check damaged circuit. Refer to AT-489, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" , AT-495, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" , AT-501, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-551, "DTC P0750 SHIFT SOLENOID VALVE A" , AT-556, "DTC P0755 SHIFT SOLENOID VALVE B" , or AT-578, "DTC VEHICLE SPEED SENSOR MTR" .
No >> GO TO 3.

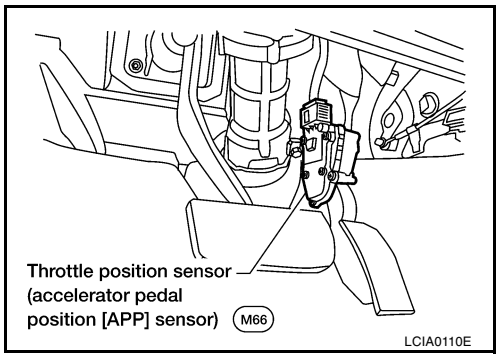


3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-1375, "DTC P0122, P0123 TP SENSOR" and EC-1754, "DTC P2138 APP SENSOR" .

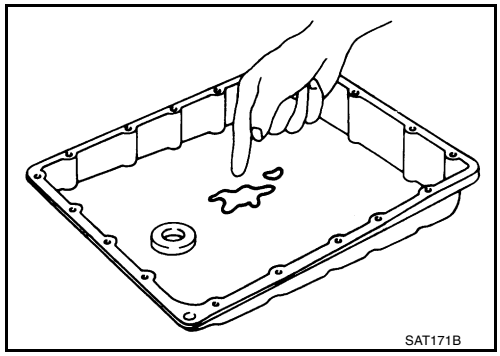
OK or NG

OK >> GO TO 4.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



4. CHECK A/T FLUID CONDITION

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



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:

- Shift valve B
- Overrun clutch control valve
- Shift solenoid valve B
- Pilot valve
- Pilot filter

3. Disassemble A/T.
4. Check the following items:

- Servo piston assembly
- Brake band
- Torque converter
- Oil pump assembly

OK or NG

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

6. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:

- Shift valve B
- Overrun clutch control valve
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

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

7. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

8. CHECK TCM INSPECTION

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

OK or NG

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

12. A/T Does Not Perform Lock-up

ECS0066M

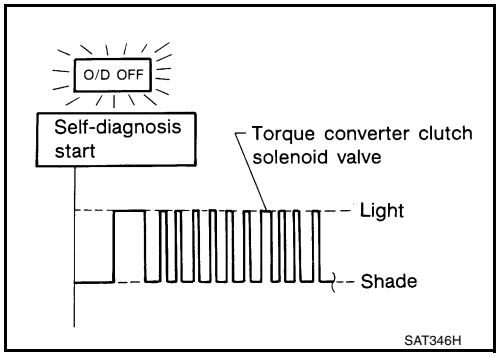
SYMPTOM:
A/T does not perform lock-up at the specified speed.

1. CHECK SELF-DIAGNOSTIC RESULTS

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

Yes or No

Yes >> Check torque converter clutch solenoid valve circuit. Refer to AT-532, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" .
No >> GO TO 2.

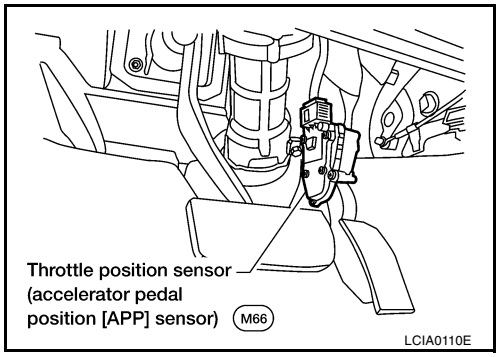


2. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-1459, "DTC P0222, P0223 TP SENSOR" and EC-1754, "DTC P2138 APP SENSOR" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



3. DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-642, "REMOVAL" .
2. Check following items:

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

OK or NG

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

4. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 5.

5. CHECK TCM INSPECTION

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

OK or NG

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

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

ECS0066N

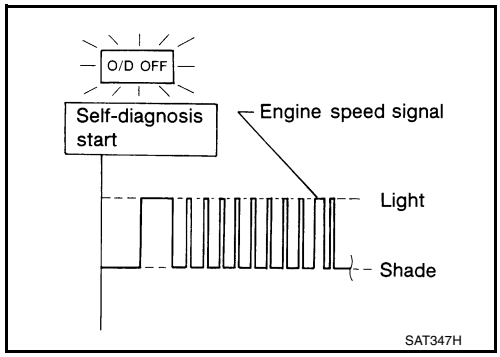
SYMPTOM:
A/T does not hold lock-up condition for more than 30 seconds.

1. CHECK SELF-DIAGNOSTIC RESULTS

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

Yes or No

Yes >> Check engine speed signal circuit. Refer to AT-506, "DTC P0725 ENGINE SPEED SIGNAL" .
No >> GO TO 2.

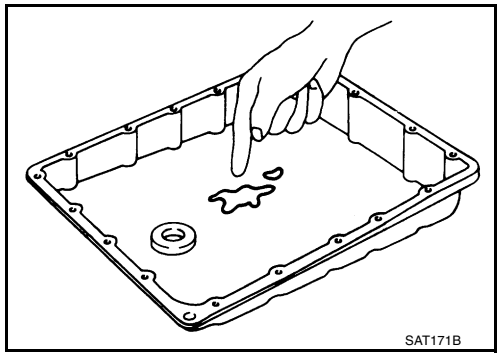


2. CHECK A/T FLUID CONDITION

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

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:
- Torque converter clutch control valve
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check torque converter and oil pump assembly.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

4. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:
- Torque converter clutch control valve
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

5. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 6.

6. CHECK TCM INSPECTION

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

OK or NG

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

14. Lock-up Is Not Released

ECS0066O

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

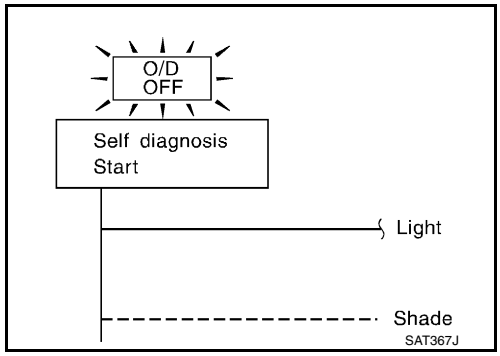
1. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR] CIRCUIT

With CONSULT-II

Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to the throttle position switch [accelerator pedal position (APP) sensor] circuit?

Without CONSULT-II

Does self-diagnosis show damage to the throttle position sensor [accelerator pedal position (APP) sensor] circuit?



Yes or No

Yes >> Check the throttle position switch [accelerator pedal position (APP) sensor circuit. Refer to EC-1375, "DTC P0122, P0123 TP SENSOR" and EC-1754, "DTC P2138 APP SENSOR" .

No >> GO TO 2.

2. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 3.

3. CHECK TCM INSPECTION

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

OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace damaged parts.

15. Engine Speed Does Not Return To Idle (Light Braking D4 → D3)

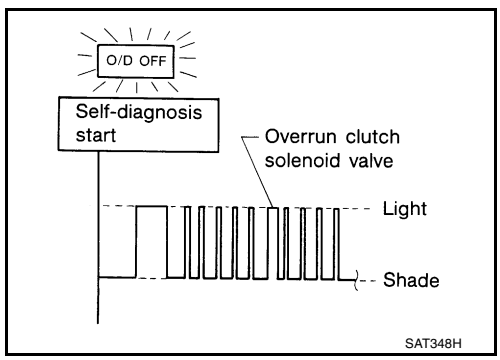
ECS0066P

SYMPTOM:

- **Engine speed does not smoothly return to idle when A/T shifts from D4 to D3 .**
- **Vehicle does not decelerate by engine brake when turning overdrive control switch OFF.**
- **Vehicle does not decelerate by engine brake when shifting A/T from D to 2 position.**

1. CHECK SELF-DIAGNOSTIC RESULTS

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



Yes or No

Yes >> Check overrun clutch solenoid valve circuit. Refer to AT-566, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" .

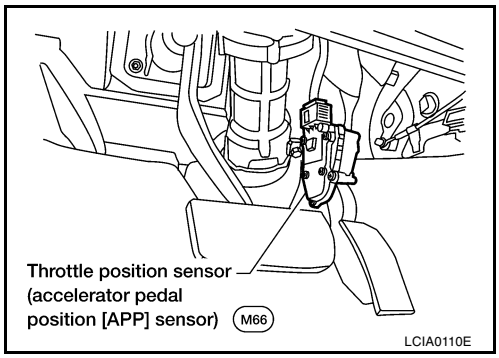
No >> GO TO 2.

2. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-1375, "DTC P0122, P0123 TP SENSOR" and EC-1754, "DTC P2138 APP SENSOR" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].

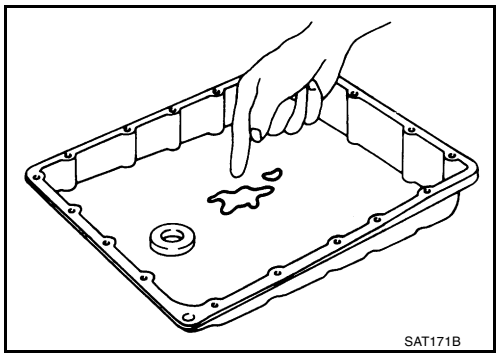


3. CHECK A/T FLUID CONDITION

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

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:

- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

3. Disassemble A/T.
4. Check the following items:

- Overrun clutch assembly
- Oil pump assembly

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-642, "REMOVAL" .
2. Check the following items:

- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. CHECK TCM INSPECTION

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

OK or NG

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

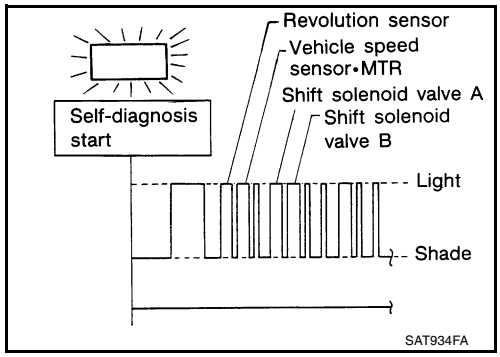
16. Vehicle Does Not Start From D1

ECS0066Q

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

1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test?



Yes or No

Yes >> Check damaged circuit. Refer to AT-501, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-551, "DTC P0750 SHIFT SOLENOID VALVE A" , AT-556, "DTC P0755 SHIFT SOLENOID VALVE B" or AT-578, "DTC VEHICLE SPEED SENSOR MTR" .
No >> GO TO 2.

2. CHECK SYMPTOM

Check again.

OK or NG

OK >> Go to AT-612, "8. Vehicle Cannot Be Started From D1" .
NG >> GO TO 3.

3. CHECK TCM INSPECTION

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

OK or NG

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

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

ECS0066R

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

1. CHECK OVERDRIVE SWITCH CIRCUIT

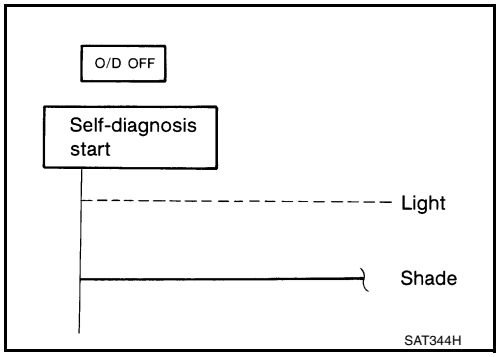
With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to overdrive control switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to overdrive control switch circuit?

Yes or No

Yes >> Check overdrive control switch circuit. Refer to AT-630, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" .

No >> Go to AT-617, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" .



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

ECS0066S

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

1. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT

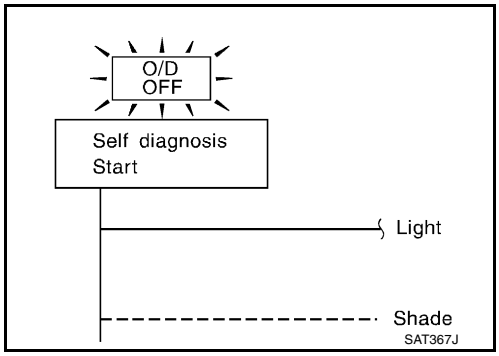
With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?

Yes or No

Yes >> Check park/neutral position (PNP) switch circuit. Refer to AT-489, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .

No >> Go to AT-615, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ or Does Not Kickdown: $D_4 \rightarrow D_2$" .



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

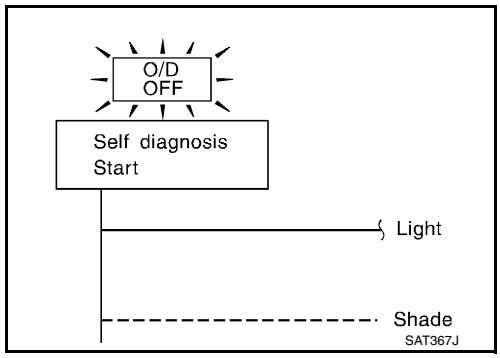
ECS0066T

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

1. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT

With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?

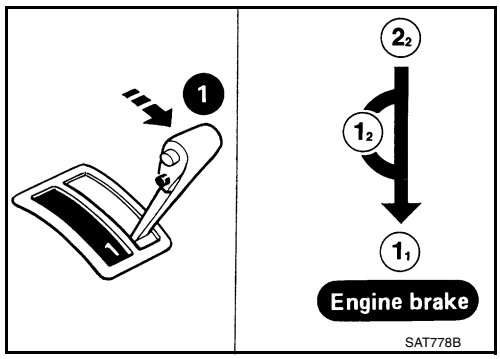


Yes or No

Yes >> Check park/neutral position (PNP) switch circuit. Refer to AT-489, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .
No >> GO TO 2.

2. CHECK SYMPTOM

Check again.



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

3. CHECK TCM INSPECTION

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

OK or NG

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

20. Vehicle Does Not Decelerate By Engine Brake

ECS0066U

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

1. CHECK SYMPTOM

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

Yes or No

Yes >> Go to AT-625, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)".
No >> Go to AT-607, "6. Vehicle Does Not Creep Backward In R Position".

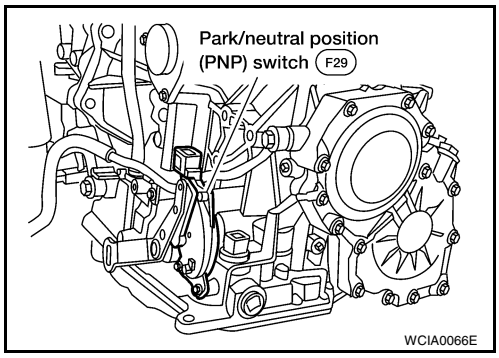
21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}

ECS0066V

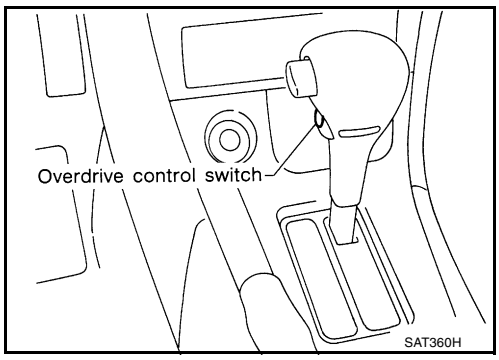
SYMPTOM:
O/D OFF indicator lamp does not come on in TCM self-diagnostic procedure even if the lamp circuit is good.

DESCRIPTION

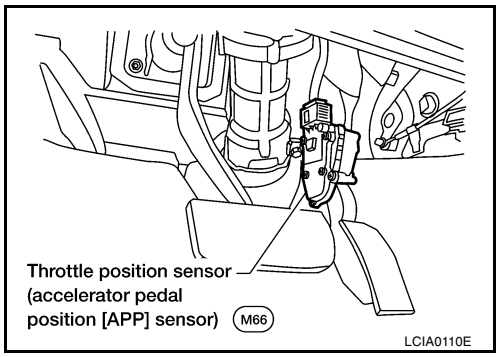
- Park/neutral position (PNP) switch
  The park/neutral (PNP) switch assembly includes a transmission range switch. The transmission range switch detects the selector lever position and sends a signal to the TCM.



- Overdrive control switch
  Detects the overdrive control switch position (ON or OFF) and sends a signal to the TCM.



- Throttle position sensor [accelerator pedal position (APP) sensor]
  The throttle position sensor [accelerator pedal position (APP) sensor] is part of the system that controls the throttle position. This system also uses an electric throttle control actuator, which consists of a throttle control motor and throttle position sensors. Accelerator pedal position signal is sent to the ECM.



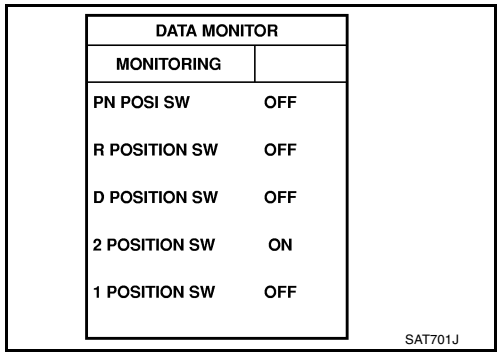
DIAGNOSTIC PROCEDURE

NOTE:
The diagnostic procedure includes inspections for the overdrive control switch circuits.

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

With CONSULT-II

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



OK or NG

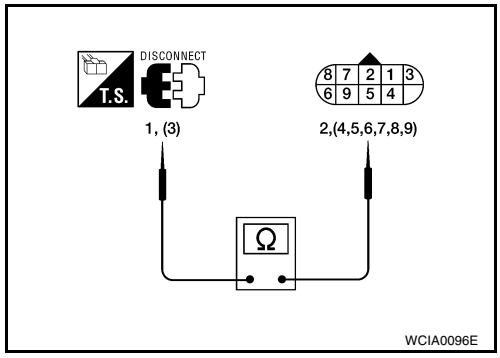
OK >> GO TO 5.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING ITEM

Check the following items:

- Park/neutral position (PNP) switch

– Check continuity between park/neutral position (PNP) switch F29 terminals 1 (G/OR) and 2 (B) and between terminals 3 (Y) and 4 (OR), 5 (L), 6 (W/G), 7 (BR/W), 8 G/W), 9 (G) 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	

– If NG, check again with manual control cable disconnected from manual shaft of A/T assembly. Refer to step a.
– If OK on step b, adjust manual control cable. Refer to AT-645, "Control Cable Adjustment" .
– If NG on step b, remove park/neutral position (PNP) switch from A/T and check continuity of park/neutral position (PNP) switch terminals. Refer to step a.
– If OK on step d, adjust park/neutral position (PNP) switch. Refer to AT-644, "Park/Neutral Position (PNP) Switch Adjustment" .
– If NG on step d, replace park/neutral position (PNP) switch.

- Harness for short or open between ignition switch and park/neutral position (PNP) switch (Main harness)
- Harness for short or open between park/neutral position (PNP) switch and TCM (Main harness)

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

3. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT (WITHOUT CONSULT-II)

Without CONSULT-II

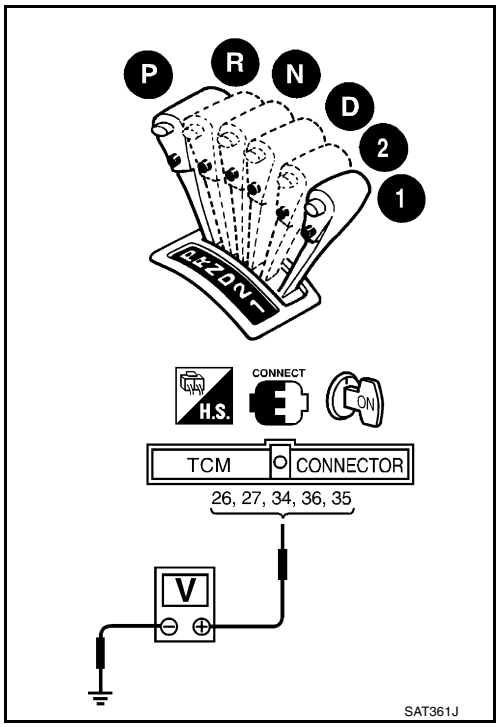
1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between TCM terminals 26 (OR), 27 (L), 34 (W/G), 35 (G/W), 36 (BR/W) and ground while moving selector lever through each position.

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

Voltage:

B : Battery voltage

0 : 0V



OK or NG

OK >> GO TO 6.
NG >> GO TO 4.

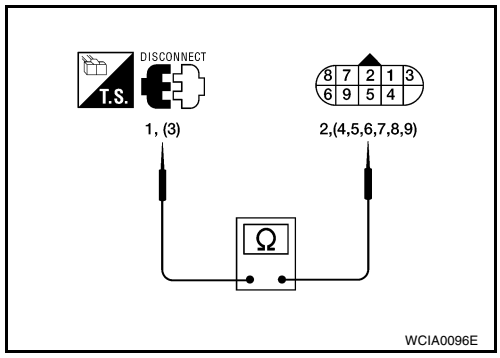
4. DETECT MALFUNCTIONING ITEM

Check the following items:

- Park/neutral position (PNP) switch

– Check continuity between park/neutral position (PNP) switch F29 terminals 1 (G/OR) and 2 (B) and between terminals 3 (Y) and 4 (OR), 5 (L), 6 (W/G), 7 (BR/W), 8 G/W), 9 (G) 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	



– If NG, check again with manual control cable disconnected from manual shaft of A/T assembly. Refer to step a.
– If OK on step b, adjust manual control cable. Refer to AT-645, "Control Cable Adjustment" .
– If NG on step b, remove park/neutral position (PNP) switch from A/T and check continuity of park/neutral position (PNP) switch terminals. Refer to step a.
– If OK on step d, adjust park/neutral position (PNP) switch. Refer to AT-644, "Park/Neutral Position (PNP) Switch Adjustment" .
– If NG on step d, replace park/neutral position (PNP) switch.

- Harness for short or open between ignition switch and park/neutral position (PNP) switch (Main harness)
- Harness for short or open between park/neutral position (PNP) switch and TCM (Main harness)

OK or NG

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

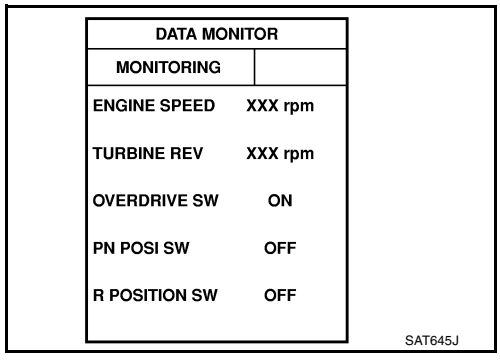
5. CHECK OVERDRIVE CONTROL SWITCH CIRCUIT (WITH CONSULT-II)

With CONSULT-II

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 SW”.
   Check the signal of the overdrive control switch is indicated properly.
   (Overdrive control switch “ON” displayed on CONSULT-II means overdrive “OFF”.)

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

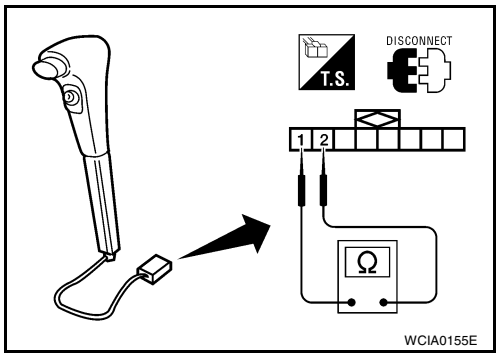


6. DETECT MALFUNCTIONING ITEM

Check the following items:

- Overdrive control switch M44.
- Check continuity between terminals 1 and 2.

Switch position	Continuity
ON	No
OFF	Yes



- 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

OK or NG

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

7. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

- Perform throttle position sensor [accelerator pedal position (APP) sensor] inspection. Refer to AT-561, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" .

OK or NG

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

8. CHECK TCM INSPECTION

1. Perform TCM input/output inspection. Refer to AT-485, "Input/Output Signal Chart" .

OK or NG

OK >> INSPECTION END.
NG >> Inspect TCM terminals and related wiring harnesses for damage or loose connections. Repair or replace damaged parts.

A/T SHIFT LOCK SYSTEM

PFP:34950

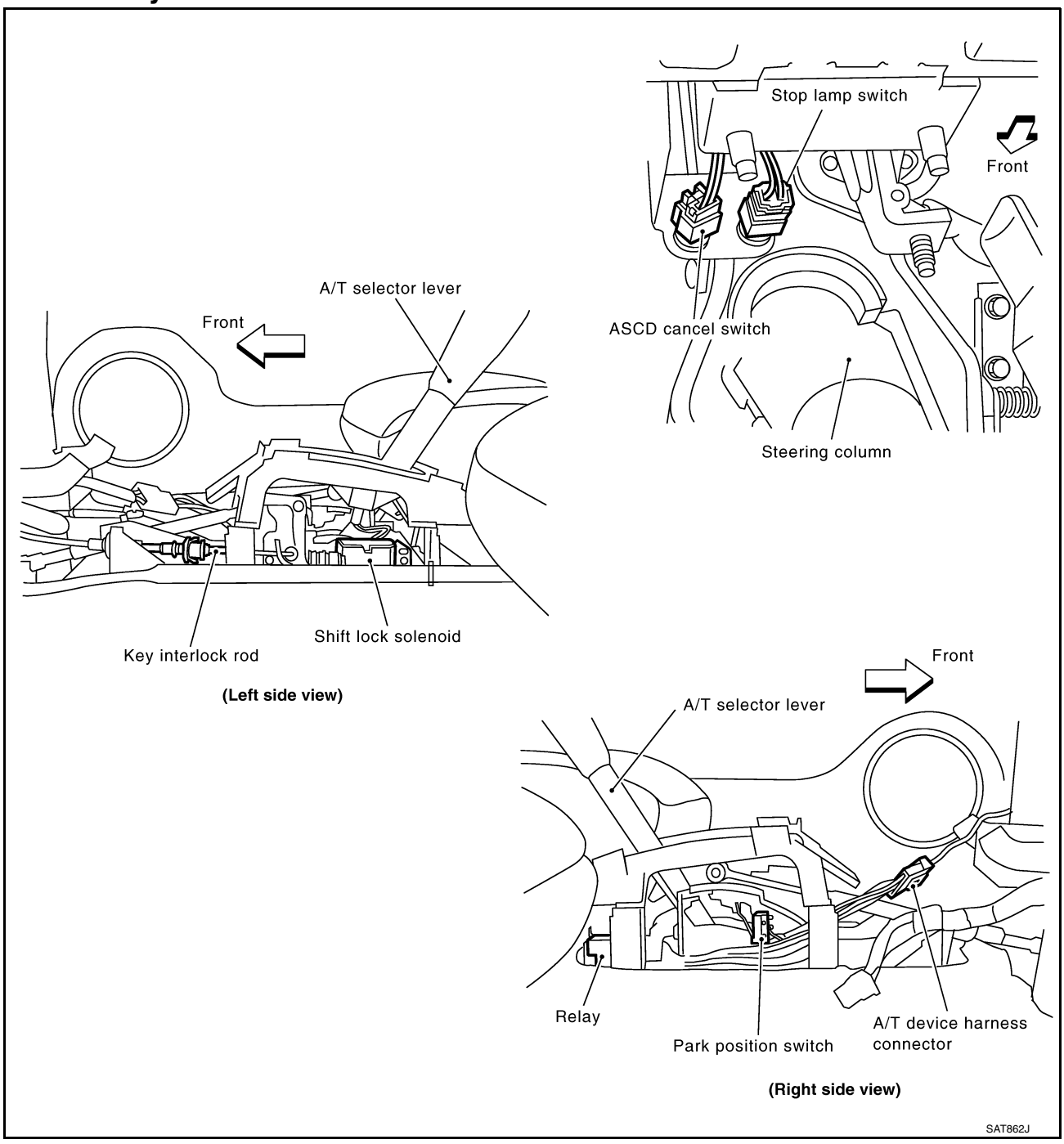
Description

ECS0066W

- 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

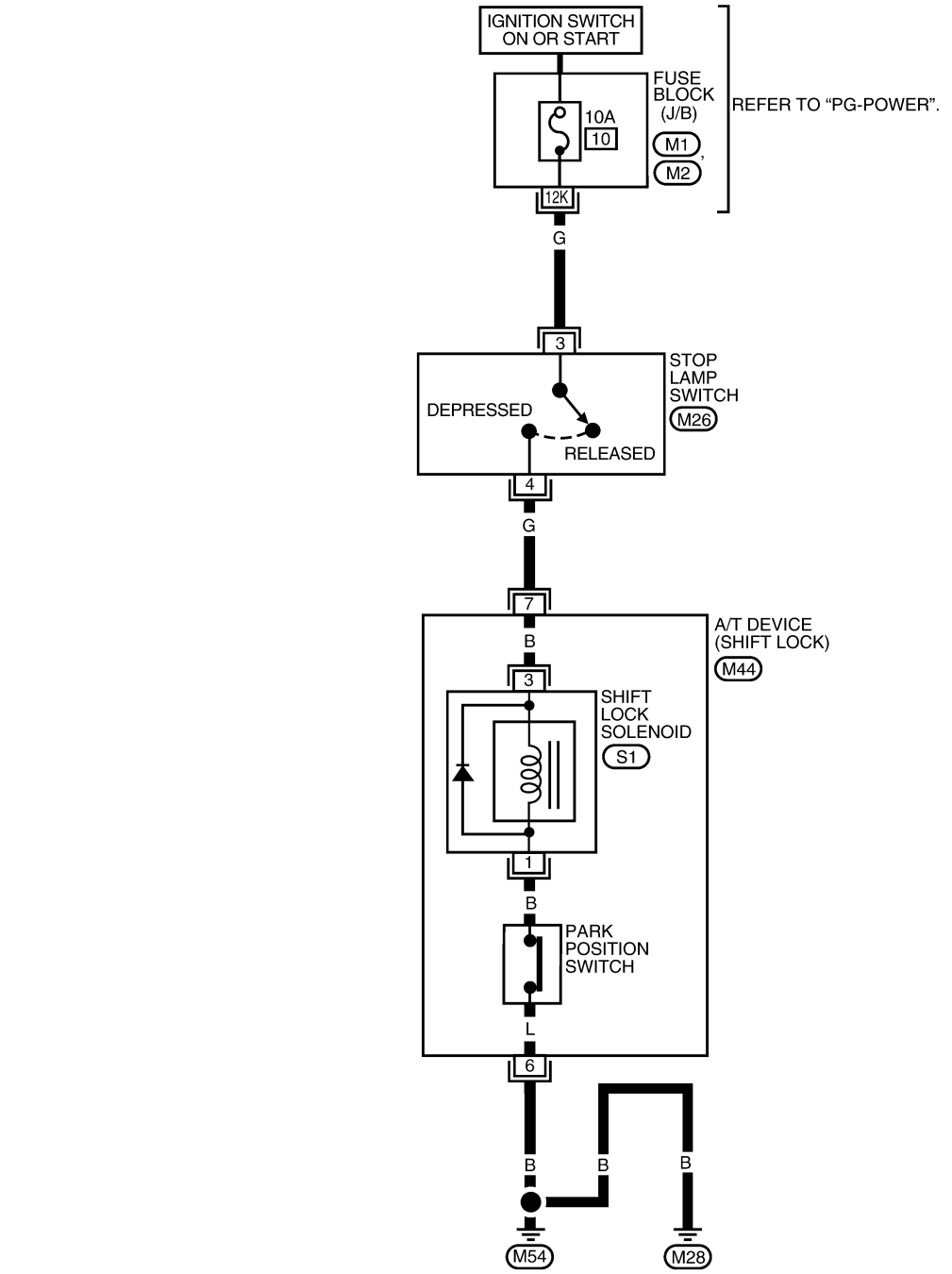
ECS0066X

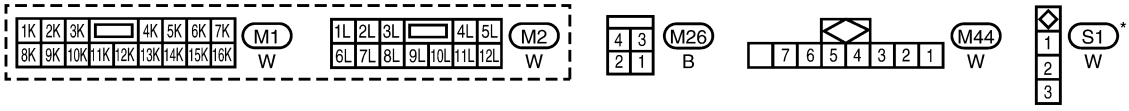


Wiring Diagram — SHIFT —

ECS0066Y

AT-SHIFT-01





★: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.

WCWA0076E

Diagnostic Procedure

ECS0066Z

SYMPTOM 1:

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

SYMPTOM 2:

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

1. CHECK KEY INTERLOCK CABLE

Check key interlock cable for damage.

OK or NG

OK >> GO TO 2.
NG >> Repair key interlock cable. Refer to AT-640, "Components" .

2. CHECK SELECTOR LEVER POSITION

Check selector lever position for damage.

OK or NG

OK >> GO TO 3.
NG >> Check selector lever. Refer to AT-645, "Control Cable Adjustment" .

3. CHECK POWER SOURCE

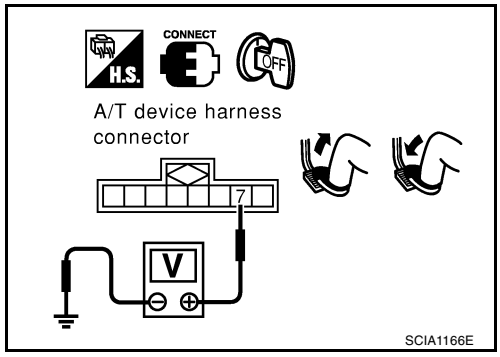
Turn ignition switch to “OFF” position.
(Do not start engine.)

- Check voltage between A/T device harness connector M44 terminal 7 (G) and ground.

Voltage:

Brake pedal depressed: Battery voltage

Brake pedal released: 0V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

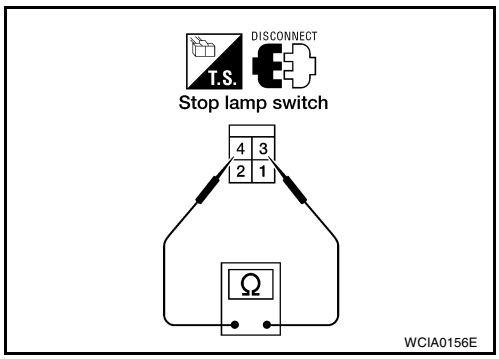
4. DETECT MALFUNCTIONING ITEM

Check the following items.

1. Harness for open or short between fuse block (J/B) connector M1 terminal 12K and stop lamp switch harness connector M26 terminal 3.
2. Harness for open or short stop lamp switch harness connector M26 terminal 4 and A/T device harness connector M44 terminal 7 (G).
3. 10A fuse [10, located in the fuse block (J/B)].
4. Check continuity between stop lamp switch harness connector M26 terminals 3 (G) and 4 (G).

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

Check stop lamp switch after adjusting brake pedal —refer to BR-12, "STOP LAMP SWITCH AND ASCD CANCEL SWITCH CLEARANCE"



OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

5. CHECK GROUND CIRCUIT

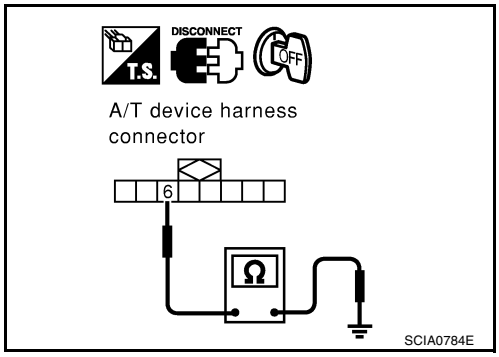
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T device harness connector.
3. Check continuity between A/T device harness M44 terminal 6 (B) and ground.

Continuity should exist

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

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit in harness.



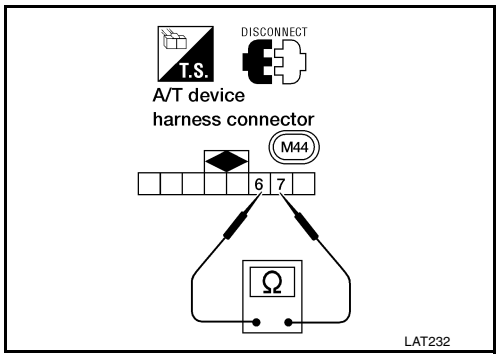
6. CHECK PARK POSITION SWITCH

Check continuity between A/T device harness conector M44 terminals 6 (B) and 7 (G).

Brake pedal	Operation sound
Depressed	No
Released	Yes

OK or NG

OK >> GO TO 7.
NG >> Replace park position switch.



7. CHECK SHIFT LOCK SOLENOID

1. Connect A/T device harness connector.
2. Turn ignition switch to "ON" position.
3. Check operation sound.

Condition	Brake pedal	Operation sound
When ignition switch is turned to "ON" position and selector lever is in the "P" position.	Depressed	Yes
	Released	No

OK or NG

OK >> GO TO 8.
NG >> Replace shift lock solenoid.

8. CHECK SHIFT LOCK OPERATION

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

OK or NG

OK >> INSPECTION END
NG >> GO TO 9.

9. CHECK A/T DEVICE INSPECTION

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

OK or NG

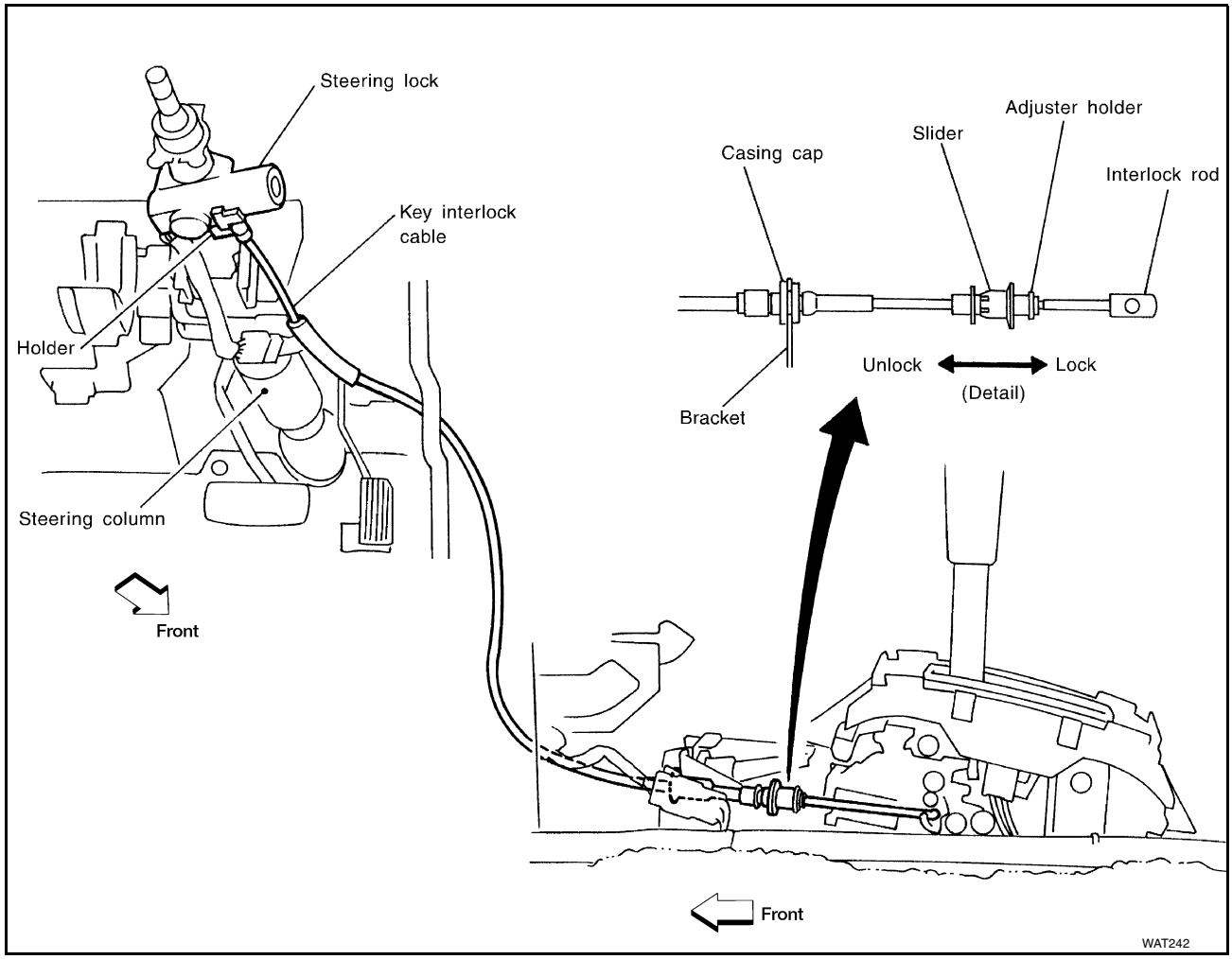
OK >> INSPECTION END
NG >> Repair or replace damaged parts.

KEY INTERLOCK CABLE

PFP:34908

Components

ECS00670



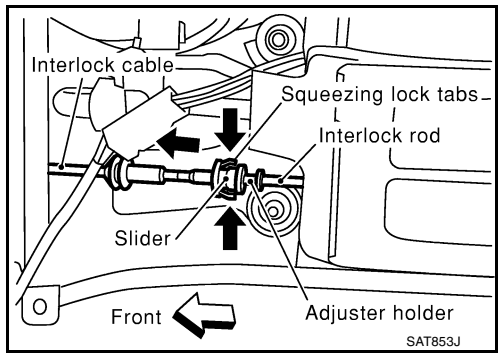
CAUTION:

- **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.**

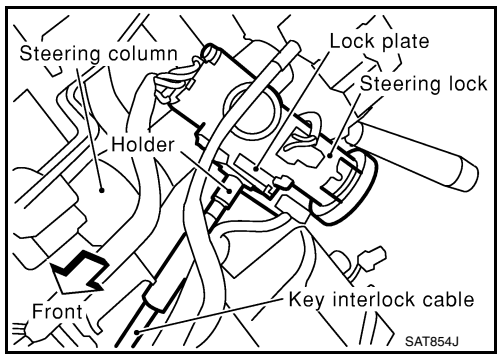
Removal

ECS00671

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



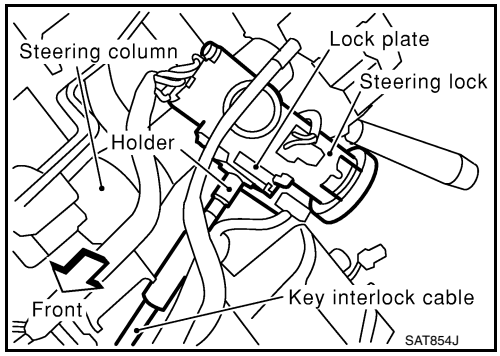
2. Remove lock plate from steering lock assembly and remove key interlock cable.



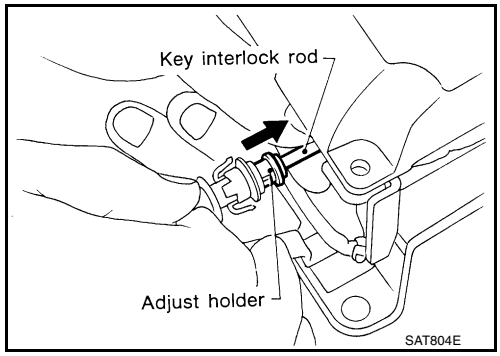
Installation

ECS00672

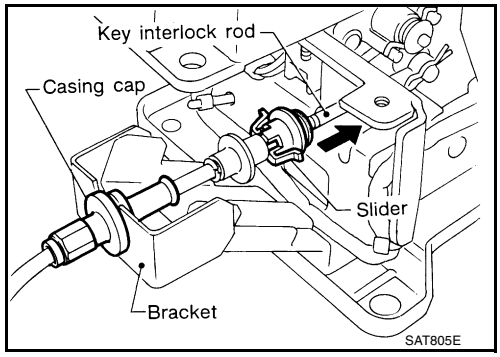
1. Turn ignition key to lock position.
2. Set A/T selector lever to P position.
3. Set key interlock cable to steering lock assembly and install lock plate.
4. Clamp cable to steering column and attach to control cable with band.



5. Insert interlock rod into adjuster holder.



6. Install casing cap to bracket.
7. Move slider in order to connect adjuster holder to interlock rod.



ON-VEHICLE SERVICE

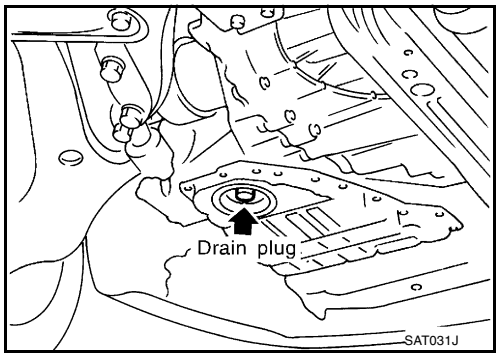
PFP:00000

Control Valve Assembly and Accumulators

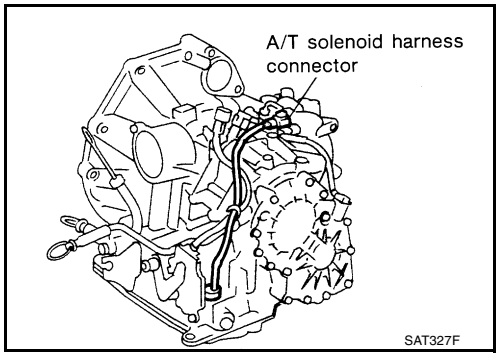
ECS00673

REMOVAL

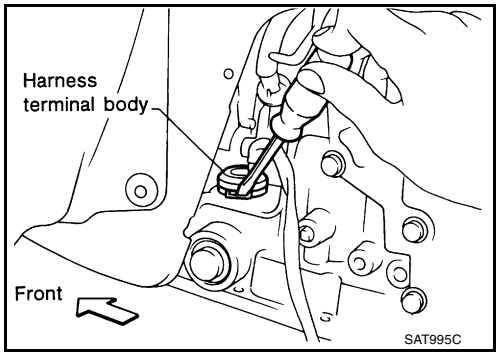
1. Drain ATF from transaxle.
2. Remove oil pan and gasket.
   - **Always replace oil pan bolts as they are self-sealing bolts.**



3. Disconnect A/T solenoid harness connector.



4. Remove snap ring from terminal cord assembly harness terminal body.
5. Remove terminal cord assembly harness from transmission case by pushing on terminal body.

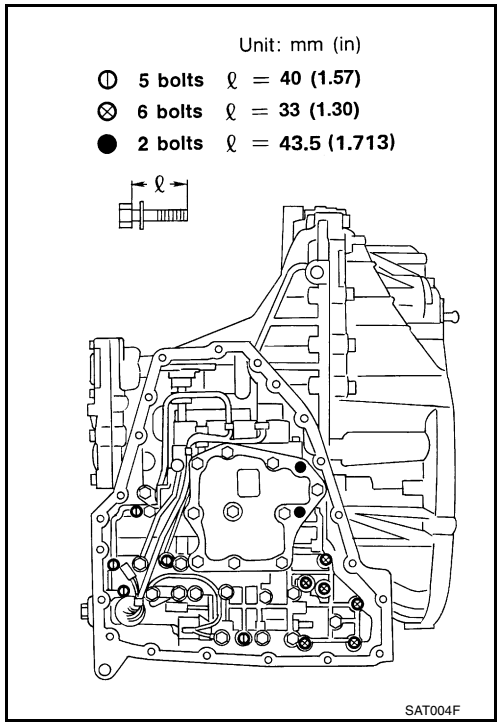


6. Remove control valve assembly by removing fixing bolts **I** , **X** and ●.

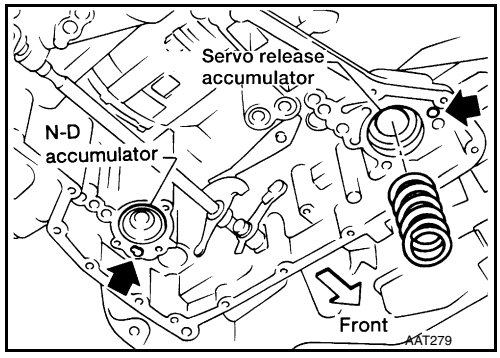
Bolt length, number and location are shown in the illustration.

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

7. Disassemble and inspect control valve assembly if necessary. Refer to AT-677, "Control Valve Assembly" .

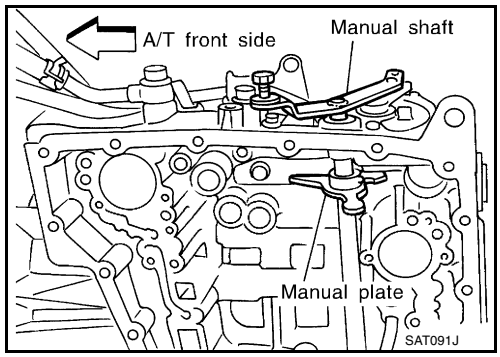


8. Remove servo release and N-D accumulators by applying compressed air if necessary.
   - **Hold each piston with a rag.**



INSTALLATION

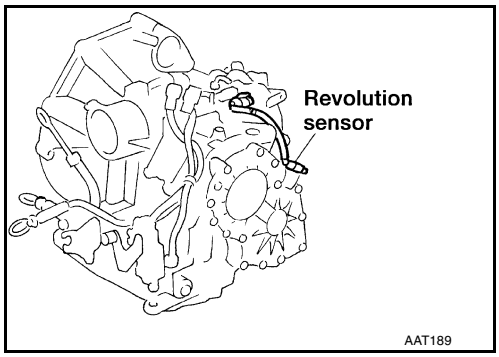
- **Set manual shaft in Neutral, then align manual plate with groove in manual valve.**
- **After installing control valve assembly, make sure that selector lever can be moved to all positions.**



Revolution Sensor Replacement

ECS00674

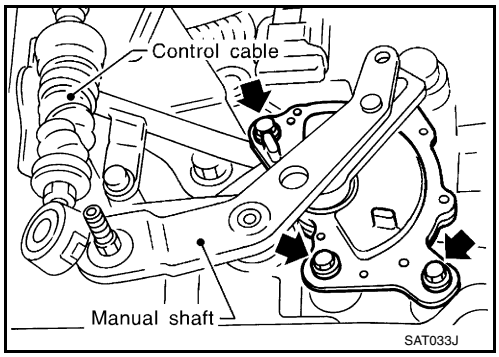
1. Remove under cover.
2. Remove revolution sensor from A/T.
3. Reinstall any part removed.
   - **Always use new sealing parts.**



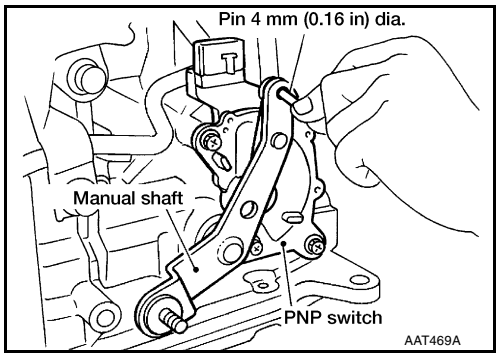
Park/Neutral Position (PNP) Switch Adjustment

ECS00675

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-492, "Diagnostic Procedure" .



Control Cable Adjustment

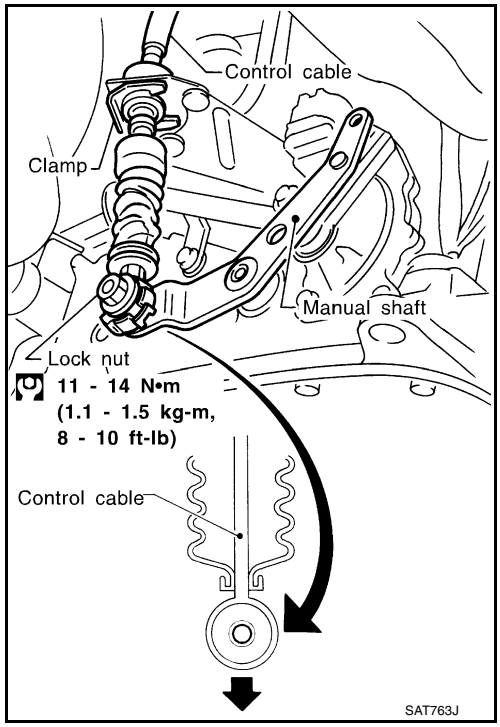
ECS00676

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

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

   CAUTION:
   Turn wheels more than 1/4 rotations and apply the park lock.
3. Push control cable in the direction of the arrow shown in the illustration by specified force.

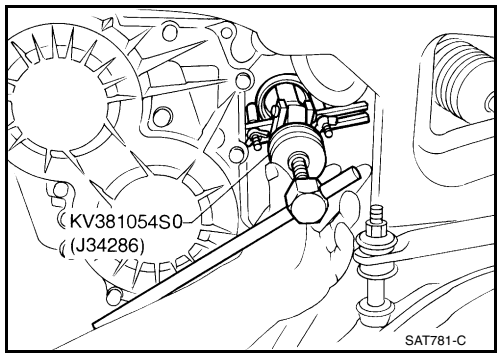
   Specified force : 4.9 - 9.8 N (0.5 - 1.0 kg, 1.1 - 2.2 lb)
4. Tighten control cable lock nut.
5. Move selector lever from P to 1 position again. Make sure that selector lever moves smoothly.
   - **Make sure that the starter operates when the selector lever is placed in the N or P position.**
   - **Make sure that the transmission is locked properly when the selector lever is placed in the P position.**



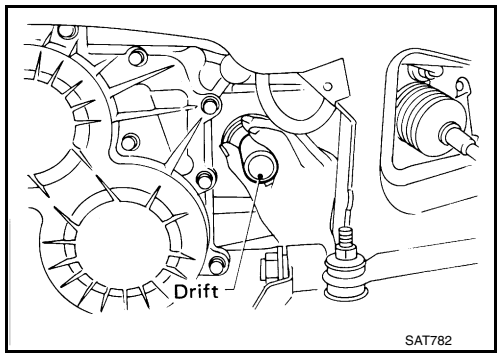
Differential Side Oil Seal Replacement

ECS00677

1. Remove drive shaft assembly. Refer to FAX-14, "Removal" .
2. Remove oil seal.



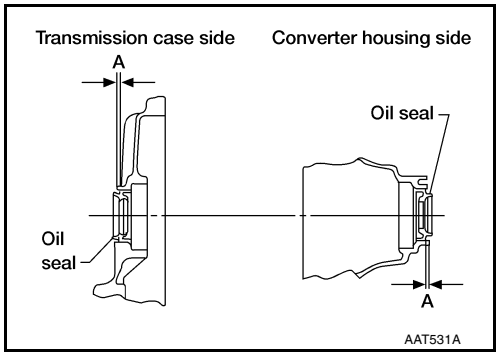
3. Install oil seal.
   - **Apply ATF before installing.**



- **Install oil seals so dimension A is within specification**

  A : –0.5 mm (–0.02 in) to 0.5 mm (0.02 in)

4. Reinstall any part removed.



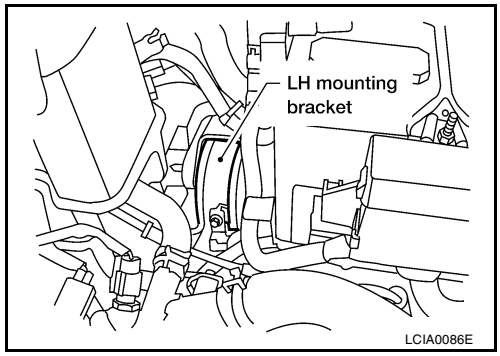
REMOVAL AND INSTALLATION

PFP:00000

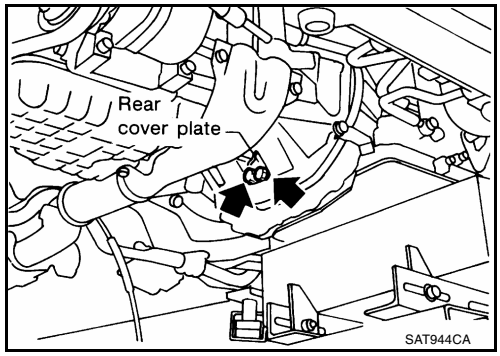
Removal

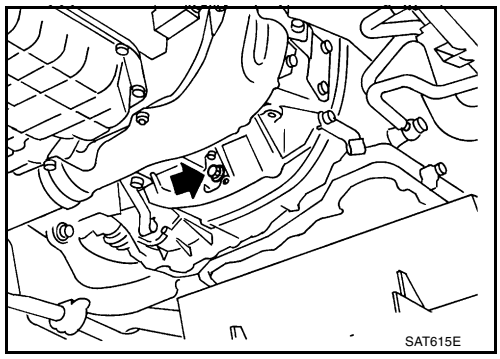
ECS00678

1. Remove battery and bracket.
2. Remove air duct and air cleaner assembly, refer to EM-101, "REMOVAL" .
3. Disconnect terminal cord assembly harness connector and park/neutral position (PNP) switch harness connectors.
4. Disconnect harness connectors of mass air flow sensor, intake air temperature sensor, revolution sensor, turbine revolution sensor, vehicle speed sensor and ground cable.
5. Remove LH mounting bracket from transaxle and body.
6. Disconnect control cable at transaxle side.
7. Remove drive shafts, refer to FAX-14, "Removal" .
8. Drain ATF.
9. Remove push clips and engine undercover.
10. Disconnect fluid cooler piping.
11. Disconnect and remove starter motor from transaxle, refer to SC-21, "Removal" .

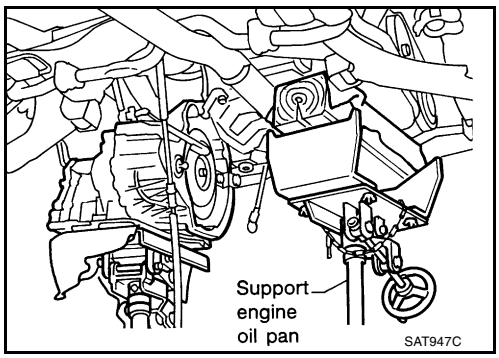


12. Support engine by placing a jack under oil pan.
    - **Do not place jack under oil pan drain plug.**
13. Remove center member.
14. Remove rear cover plate and bolts securing torque converter to drive plate.
    - **Rotate crankshaft for access to securing bolts.**





15. Support transaxle with a jack.
16. Remove bolts fixing A/T to engine.
17. Lower transaxle while supporting it with a jack.



Installation

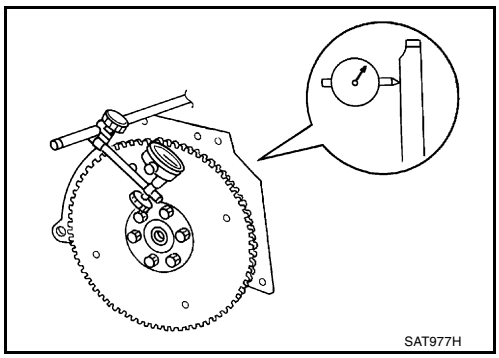
ECS00679

- Drive plate runout

  CAUTION:
  Do not allow any magnetic materials to contact the ring gear teeth.

  Maximum allowable runout:

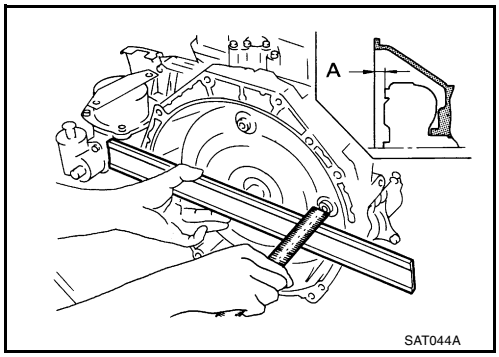
  EM-184, "SERVICE DATA AND SPECIFICATIONS (SDS)".



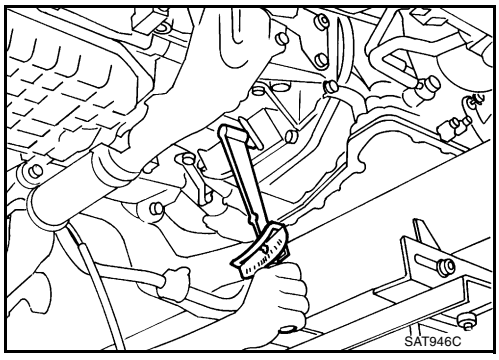
- If this runout is out of allowance, replace drive plate and ring gear.

- When connecting torque converter to transaxle, measure distance “A” to be certain that they are correctly assembled.

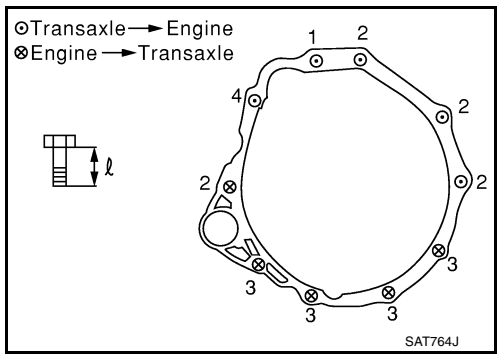
  Distance “A” : 14 mm (0.55 in) or more



- Install bolts fixing converter to drive plate.
- **With converter installed, rotate crankshaft several turns to check that transaxle rotates freely without binding.**

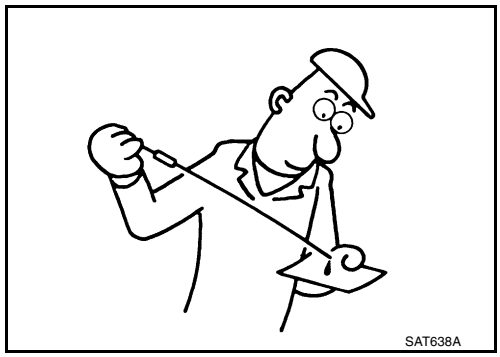


- Tighten bolts securing transaxle.
- Tighten LH mounting bracket bolts to the specified torque. Refer to EM-154, "Removal and Installation" .
- Tighten center member bolts to the specified torque. Refer to EM-154, "Removal and Installation" .
- Tighten rear plate cover bolts to the specified torque. Refer to EM-110, "OIL PAN AND OIL STRAINER" .



Bolt No.	Tightening torque N-m (kg-m, ft-lb)	l mm (in)
1	70 - 79 (7.1 - 8.1, 52 - 58)	65 (2.56)
2	70 - 79 (7.1 - 8.1, 52 - 58)	52 (2.05)
3	70 - 79 (7.1 - 8.1, 52 - 58)	40 (1.57)
4	78 - 98 (7.9 - 10.0, 58 - 72)	124 (4.88)

- Reinstall any part removed.
- 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-455, "Road Test" .



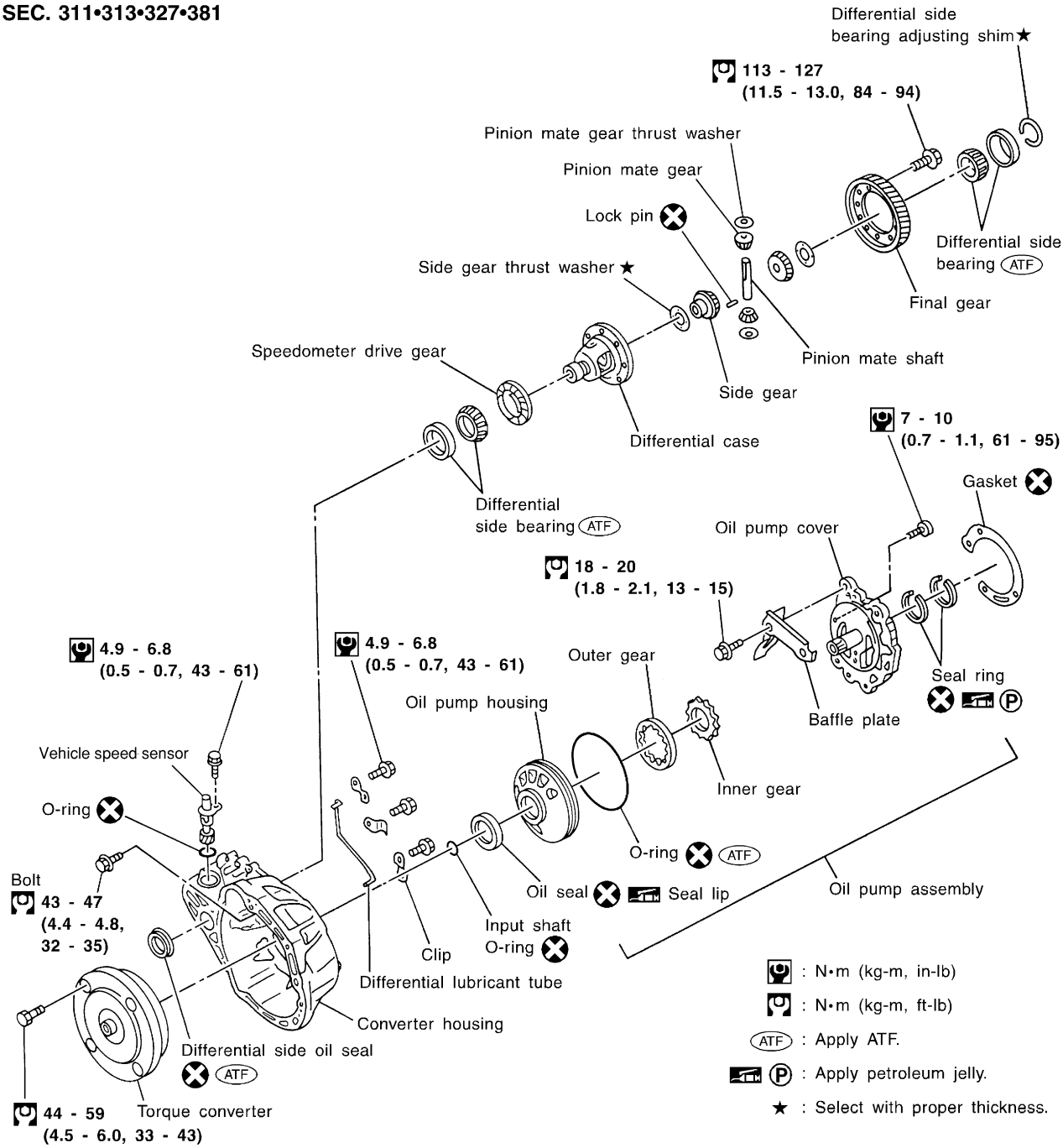
OVERHAUL

PFP:00000

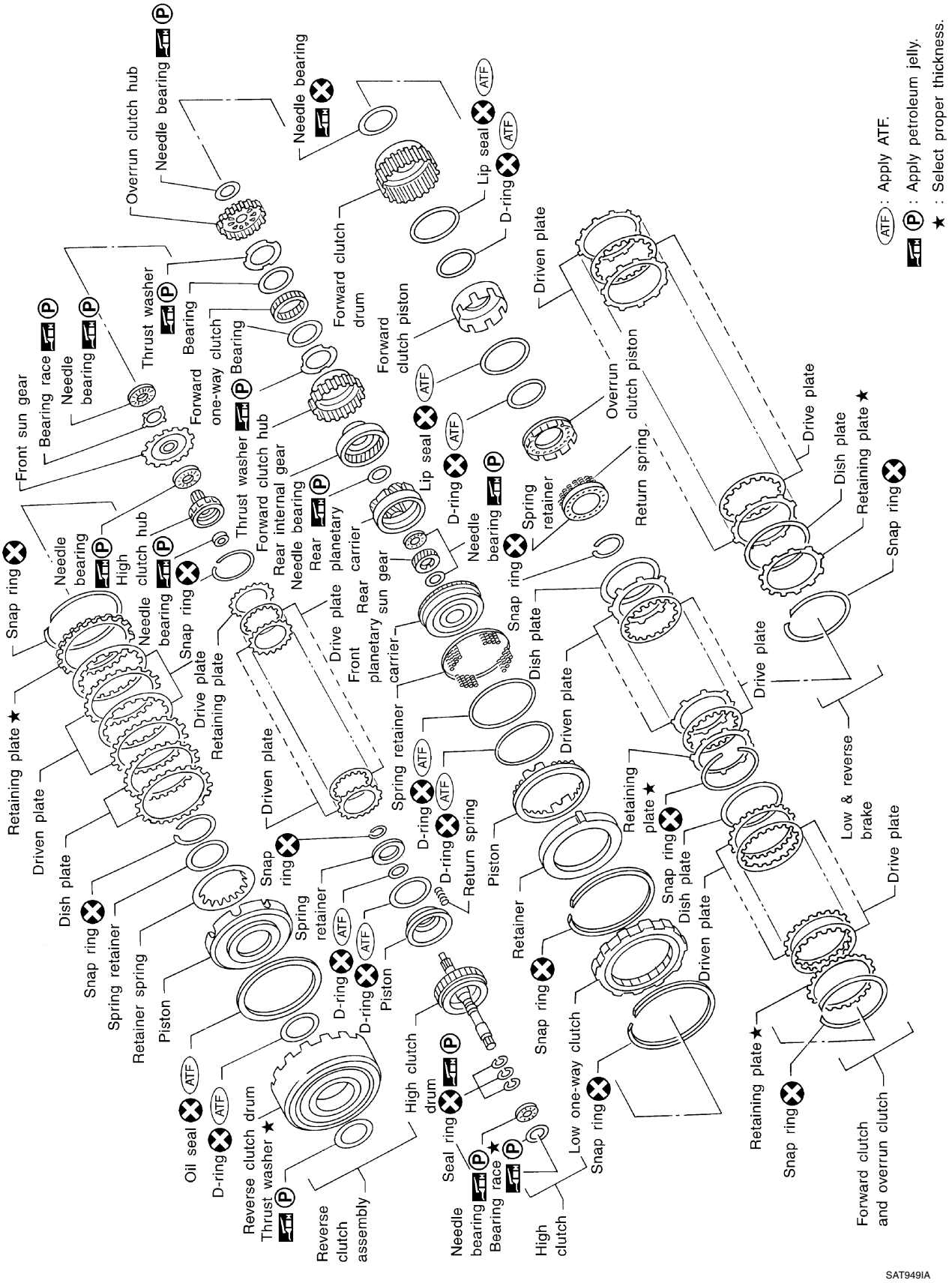
Components

ECS0067A

SEC. 311•313•327•381

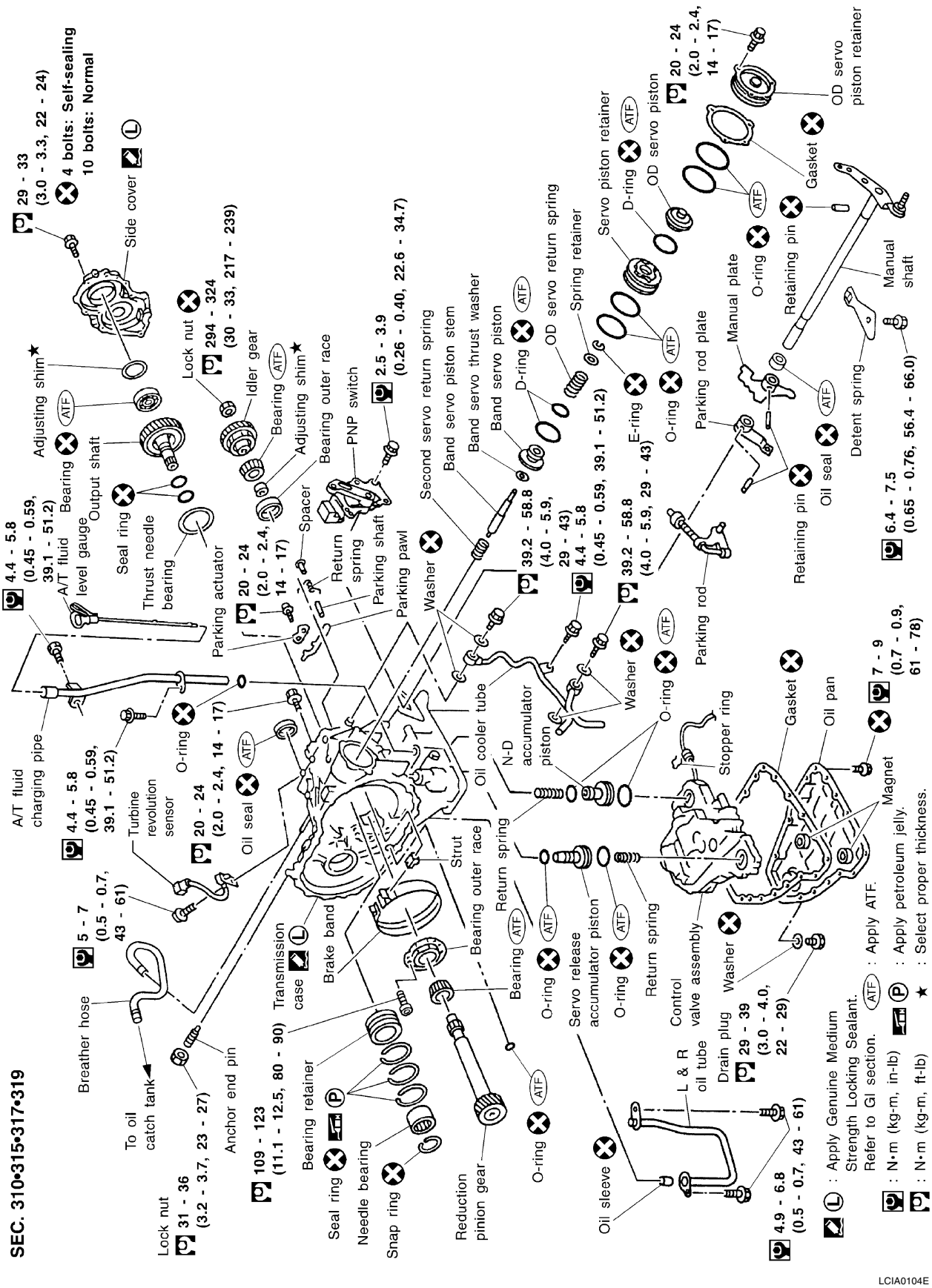


LCIA0103E



SAT949IA

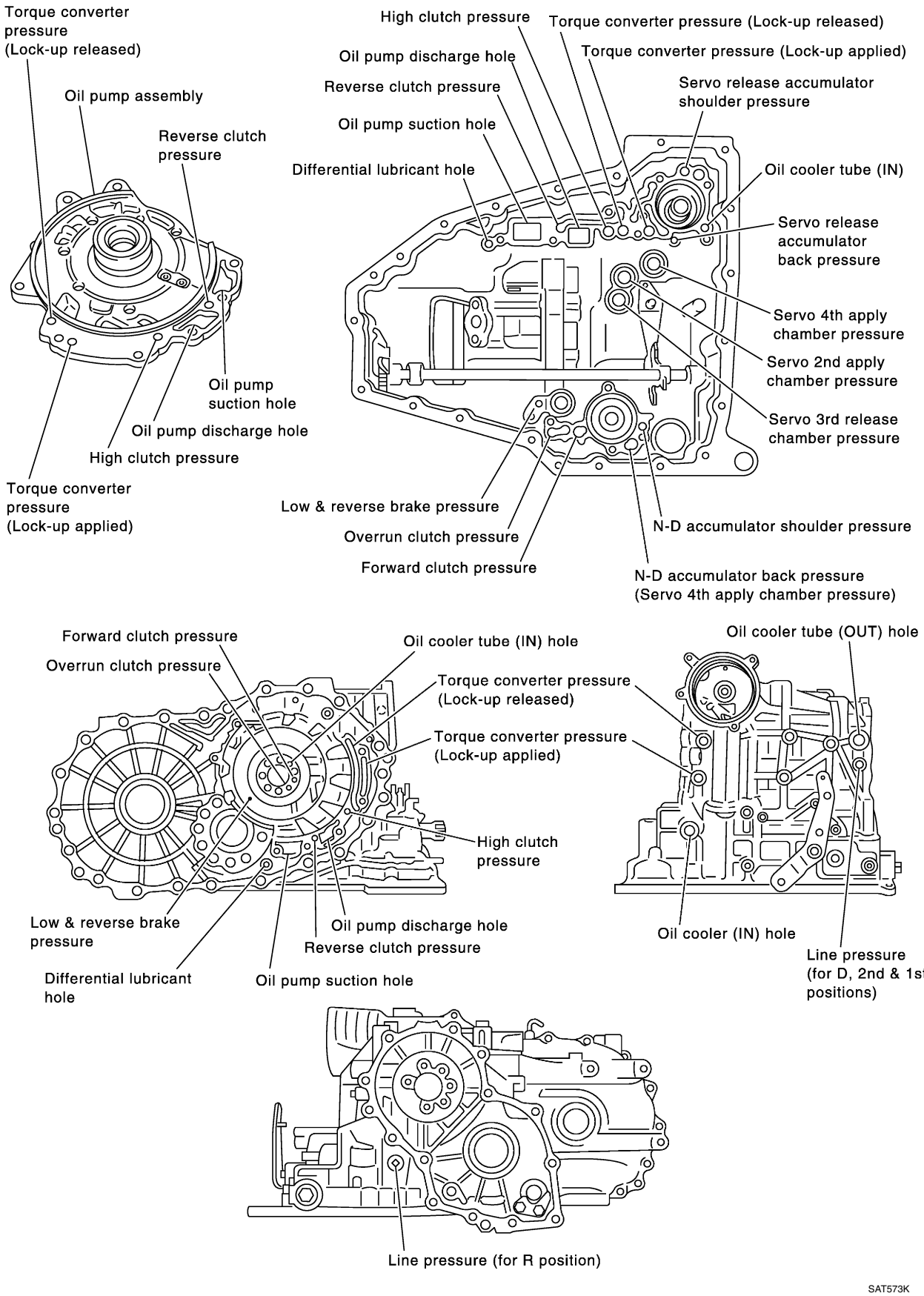
SEC. 315


SEC. 310•315•317•319
29 - 33 (3.0 - 3.3, 22 - 24)
4 bolts: Self-sealing
10 bolts: Normal
Side cover
Adjusting shim
Bearing
A/T fluid level gauge
Output shaft
Seal ring
Thrust needle bearing
Parking actuator
Lock nut 294 - 324 (30 - 33, 217 - 239)
Idler gear
Bearing
Adjusting shim
Bearing outer race
PNP switch
2.5 - 3.9 (0.26 - 0.40, 22.6 - 34.7)
Spacer
Return spring
Parking shaft
Parking pawl
Second servo return spring
Band servo piston stem
Band servo thrust washer
Band servo piston
D-ring
OD servo return spring
Spring retainer
Servo piston retainer
D-ring
OD servo piston
20 - 24 (2.0 - 2.4, 14 - 17)
OD servo piston retainer
Gasket
Manual plate
O-ring
Retaining pin
Manual shaft
Detent spring
Oil seal
Parking rod plate
Parking rod
E-ring
Washer
39.2 - 58.8 (4.0 - 5.9, 29 - 43)
4.4 - 5.8 (0.45 - 0.59, 39.1 - 51.2)
N-D accumulator piston
Oil cooler tube
Stopper ring
Oil pan
7 - 9 (0.7 - 0.9, 61 - 78)
6.4 - 7.5 (0.65 - 0.76, 56.4 - 66.0)
A/T fluid charging pipe
Turbine revolution sensor
Oil seal
Strut
Bearing outer race
Return spring
Bearing
Servo release accumulator piston
Control valve assembly
L & R oil tube
Drain plug
29 - 39 (3.0 - 4.0, 22 - 29)
Washer
Magnet
Oil sleeve
4.9 - 6.8 (0.5 - 0.7, 43 - 61)
Breather hose
To oil catch tank
5 - 7 (0.5 - 0.7, 43 - 61)
Lock nut 31 - 36 (3.2 - 3.7, 23 - 27)
Anchor end pin
109 - 123 (11.1 - 12.5, 80 - 90)
Transmission case
Bearing retainer
Seal ring
Needle bearing
Snap ring
Reduction pinion gear
Ⓛ : Apply Genuine Medium Strength Locking Sealant. Refer to GI section.
ATF : Apply ATF.
Ⓟ : Apply petroleum jelly.
★ : Select proper thickness.
: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)

LCIA0104E

Oil Channel

ECS0067B



Locations of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings

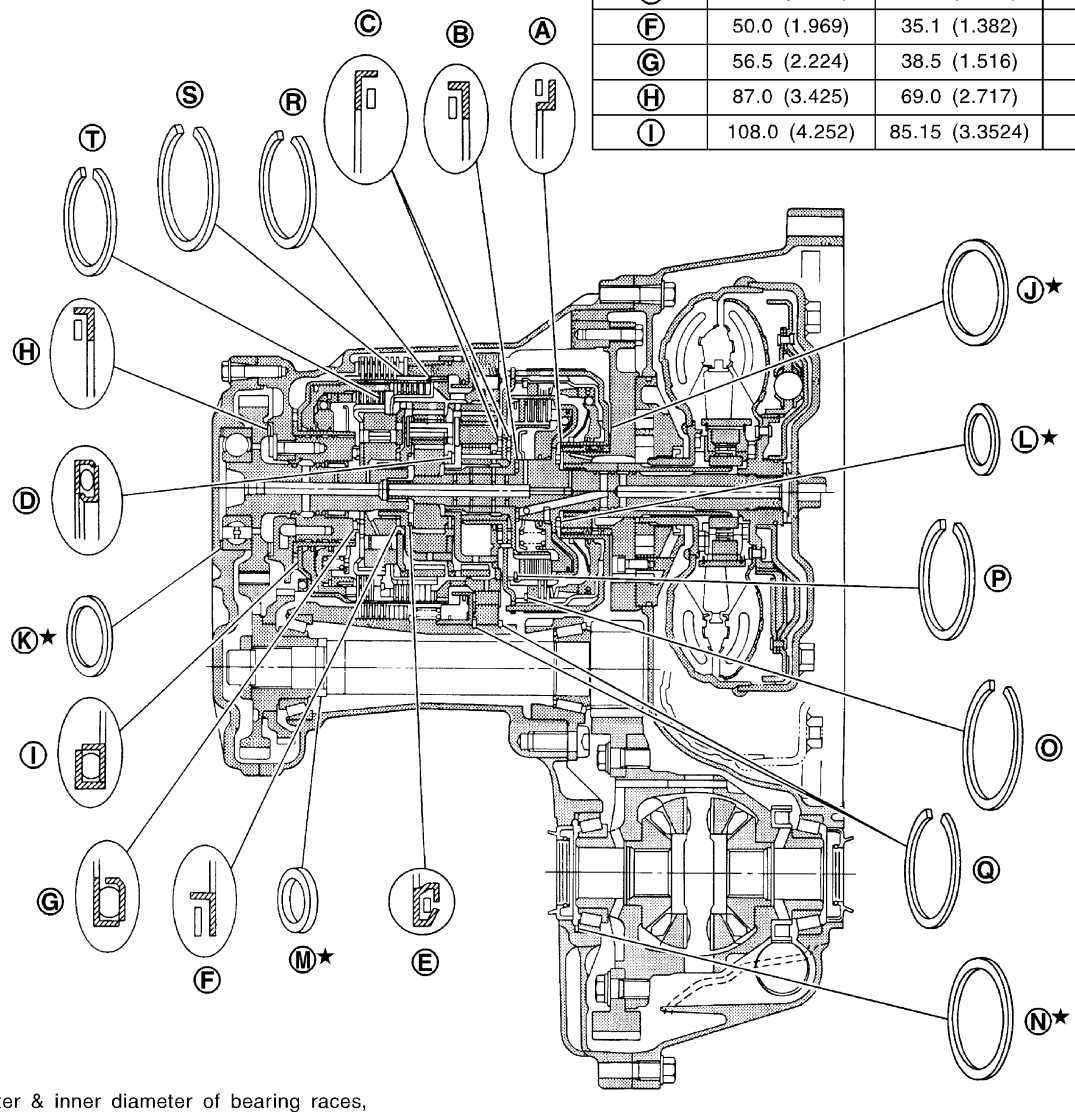
ECS0067C

Outer diameter of thrust washers

Item number	Outer diameter mm (in)	Parts number*
Ⓙ★	76.0 (2.992)	31508 80X13 - 31508 80X20
Ⓚ★	80.0 (3.150)	31438 80X60 - 31438 80X70

Outer and inner diameter of needle bearings

Item number	Outer diameter mm (in)	Inner diameter mm (in)	Parts number*
Ⓐ	50.0 (1.969)	35.1 (1.382)	31407 80X10
Ⓑ	42.0 (1.654)	23.7 (0.933)	31407 80X01
Ⓒ	70.0 (2.756)	50.0 (1.969)	31407 80X09
Ⓓ	51.0 (2.008)	33.1 (1.303)	31407 80X02
Ⓔ	48.0 (1.890)	30.0 (1.181)	31407 80X03
Ⓕ	50.0 (1.969)	35.1 (1.382)	31407 80X10
Ⓖ	56.5 (2.224)	38.5 (1.516)	31407 80X08
Ⓗ	87.0 (3.425)	69.0 (2.717)	31407 80X07
Ⓘ	108.0 (4.252)	85.15 (3.3524)	31407 80X06



Outer & inner diameter of bearing races, adjusting shims and adjusting spacer

Item number	Outer diameter mm (in)	Inner diameter mm (in)	Parts number*
Ⓛ★	51.0 (2.008)	36.0 (1.417)	31435 80X00 - 31439 80X14
Ⓜ★	38.0 (1.496)	28.1 (1.106)	31439 85X01 - 31439 85X06 31439 83X11 - 31439 83X24 31439 81X00 - 31439 81X24 31439 81X46 - 31439 81X49 31439 81X60 - 31439 81X74
Ⓝ★	75.0 (2.953)	67.0 (2.638)	31438 80X00 - 31439 80X11

★ : Select proper thickness.

* : Always check with the Parts Department for the latest parts information.

Outer diameter of snap rings

Item number	Outer diameter mm (in)	Parts number*
Ⓞ	150 (5.91)	31506 80X13
Ⓟ	119.1 (4.689)	31506 80X06
Ⓠ	182.8 (7.197)	31506 80X08
Ⓡ	144.8 (5.701)	31506 80X03
Ⓢ	173.8 (6.843)	31506 80X09
Ⓣ	133.9 (5.272)	31506 80X01

SAT565K

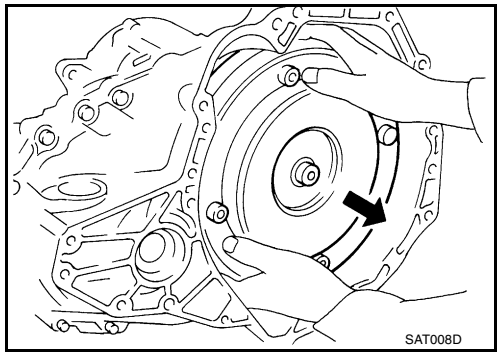
DISASSEMBLY

PFP:31020

Disassembly

ECS0067D

1. Drain ATF through drain plug.
2. Remove torque converter.

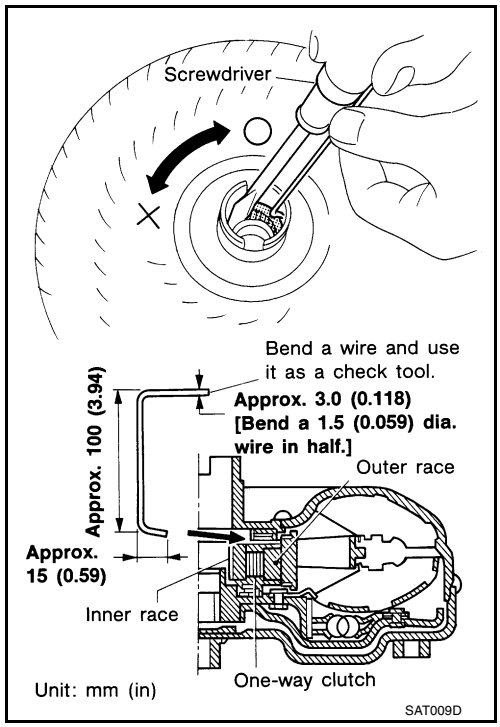


3. Check torque converter one-way clutch using check tool.

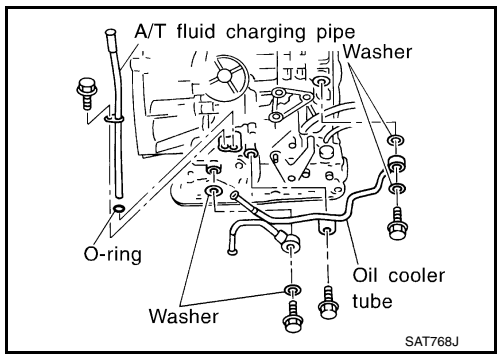
a. Insert check tool into the groove of bearing support built into one-way clutch outer race.

b. When fixing bearing support with check tool, rotate one- way clutch spline using screwdriver.

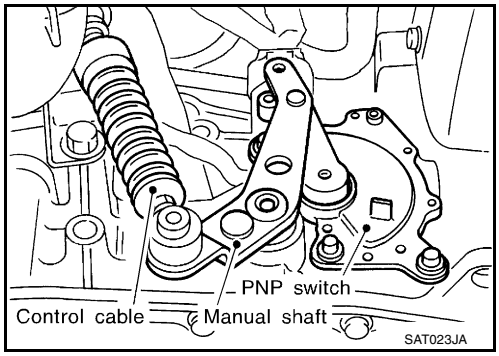
c. Check that inner race rotates clockwise only. If not, replace torque converter assembly.



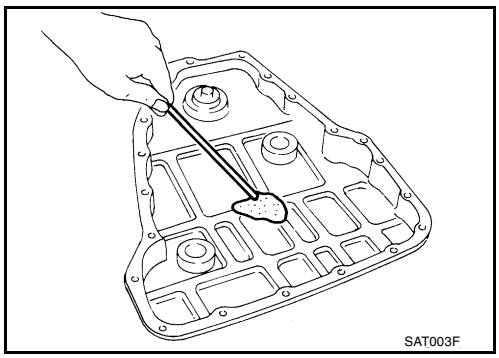
4. Remove A/T fluid charging pipe and fluid cooler tube.



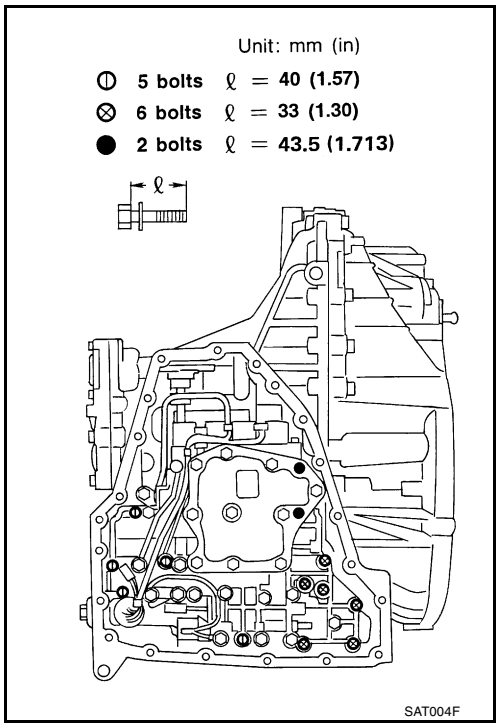
5. Set manual shaft to position P.
6. Remove park/neutral position (PNP) switch.



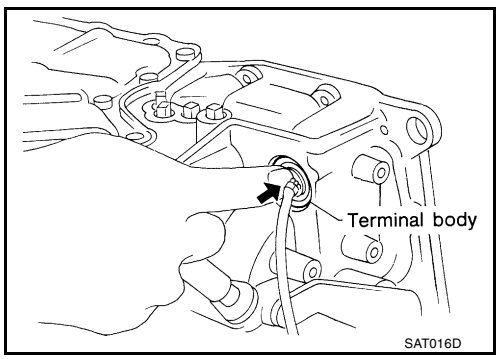
7. Remove oil pan and oil pan gasket.
   - **Always replace oil pan bolts as they are self-sealing bolts.**
8. Check foreign materials in oil pan to help determine causes of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) 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 CO-30, "RADIATOR" .**
9. Remove control valve assembly according to the following procedures.



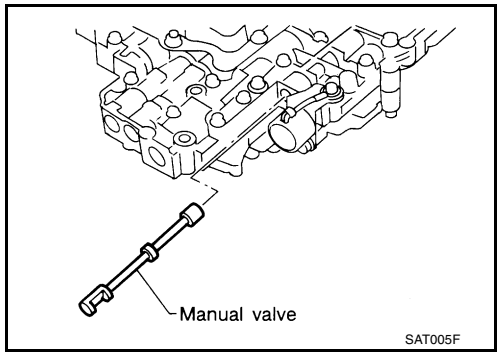
a. Remove control valve assembly mounting bolts **I** , **X** and ●.
b. Remove snap ring from terminal cord assembly connector.



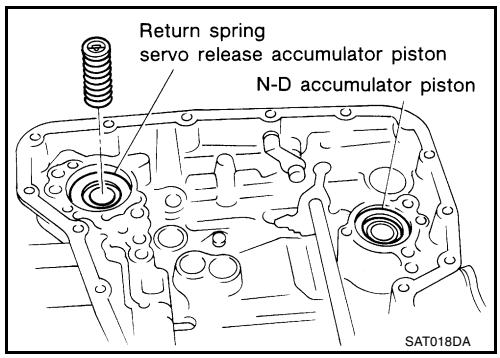
c. Push terminal body into transmission case and draw out solenoid harness.



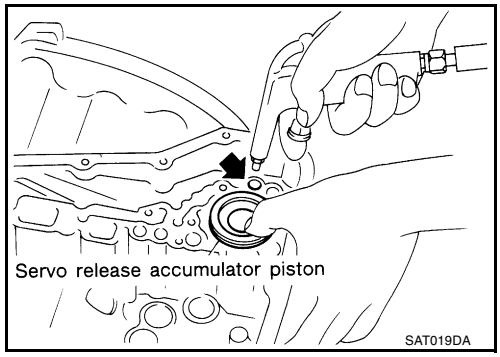
10. Remove manual valve from control valve assembly.



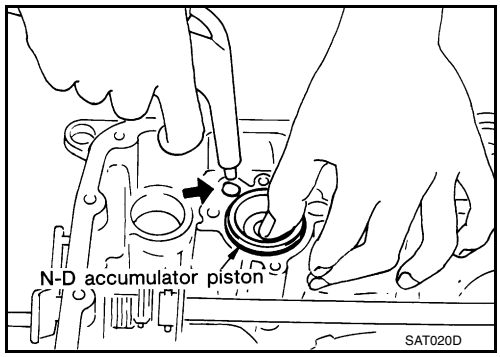
11. Remove return spring from servo release accumulator piston.



12. Remove servo release accumulator piston with compressed air.

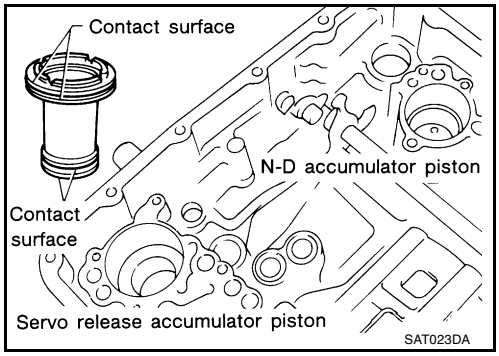


13. Remove O-rings from servo release accumulator piston.
14. Remove N-D accumulator piston and return spring with compressed air.

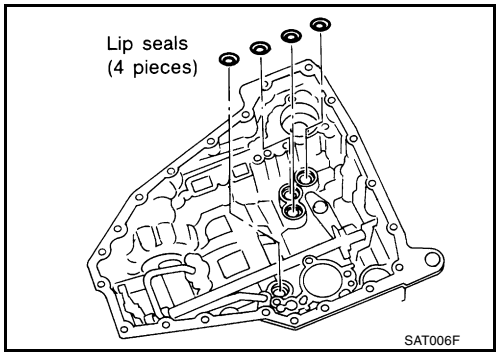


15. Remove O-rings from N-D accumulator piston.

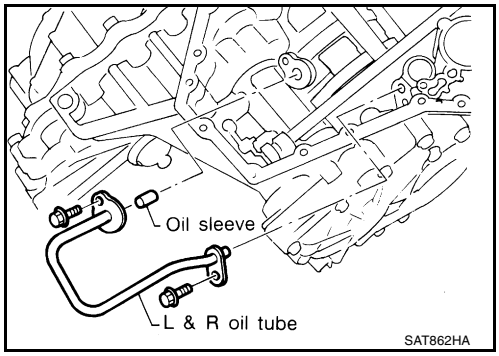
16. Check accumulator pistons and contact surface of transmission case for damage.



17. Check accumulator return springs for damage and free length.
18. Remove lip seals.

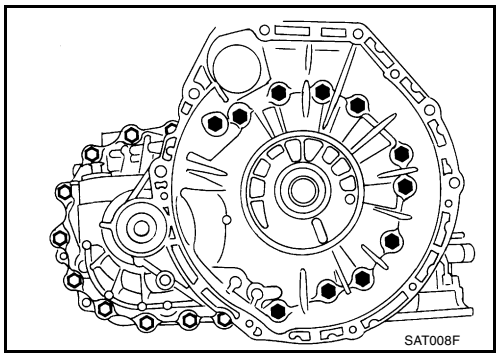


19. Remove L & R oil tube and oil sleeve.

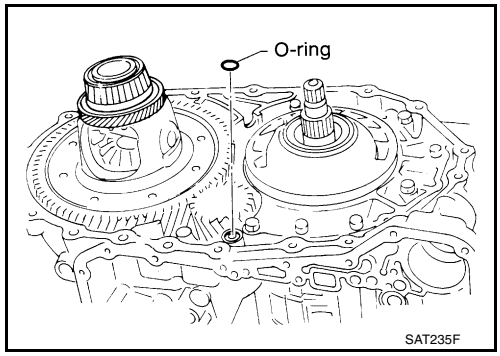


20. Remove converter housing according to the following procedures.

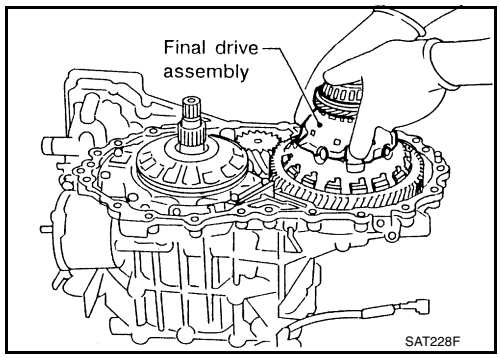
a. Remove converter housing mounting bolts.
b. Remove converter housing by tapping it lightly.



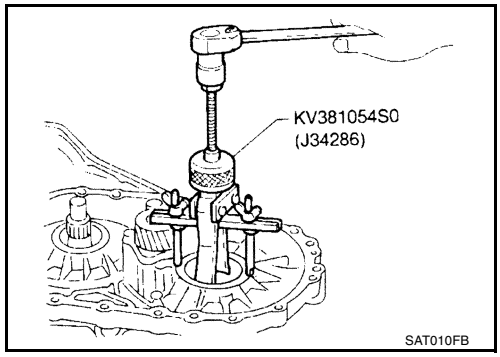
c. Remove O-ring from differential oil port.



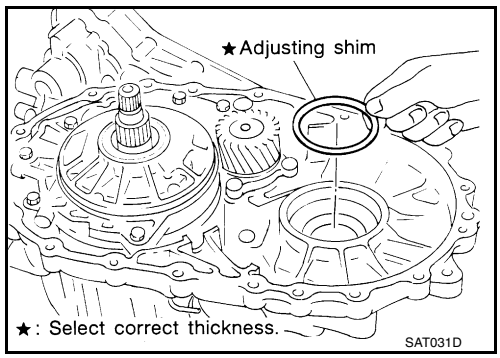
21. Remove final drive assembly from transmission case.



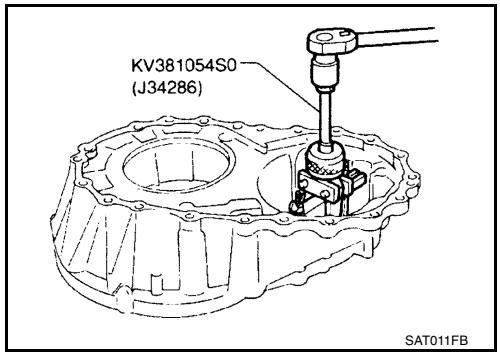
22. Remove differential side bearing outer race and side bearing adjusting shim from transmission case.



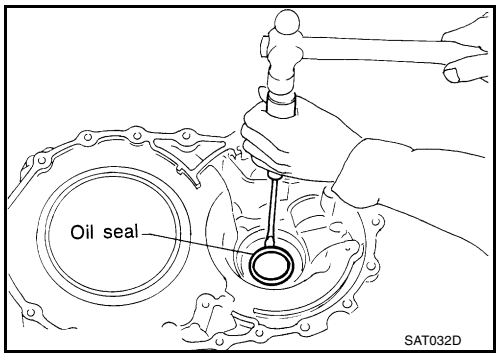
23. Remove differential side bearing adjusting shim from transmission case.



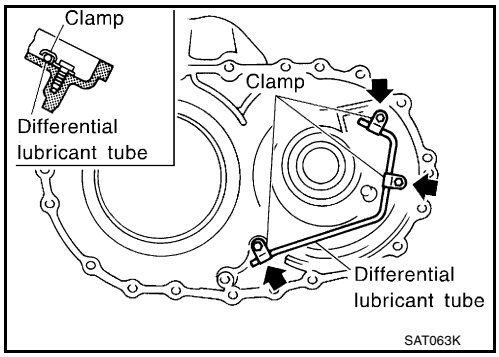
24. Remove differential side bearing outer race from converter housing.



25. Remove oil seal with screwdriver from converter housing.
    - **Be careful not to damage case.**

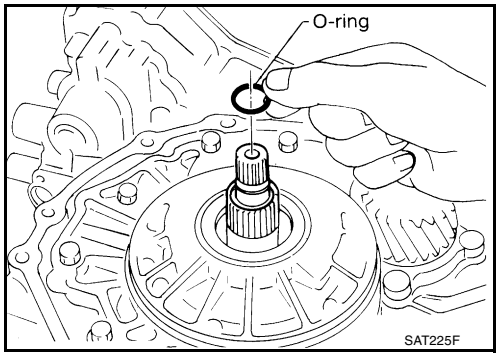


26. Remove differential lubricant tube from converter housing.

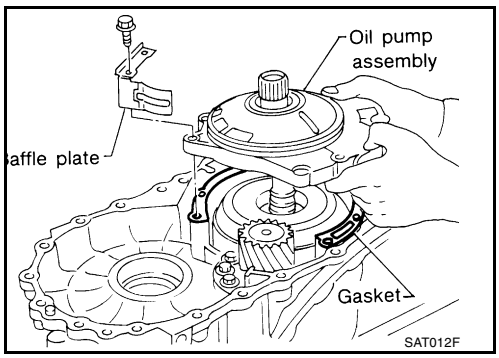


27. Remove oil pump according to the following procedures.

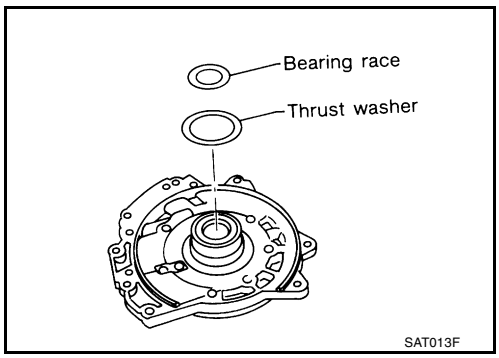
a. Remove O-ring from input shaft.



b. Remove oil pump assembly, baffle plate and gasket from transmission case.



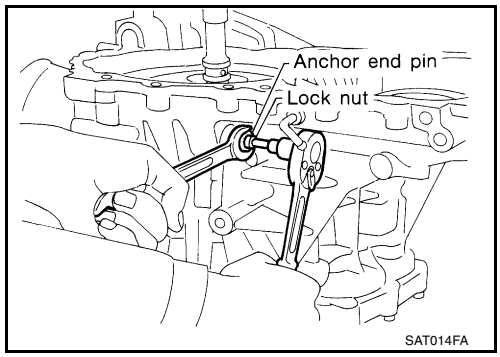
c. Remove thrust washer and bearing race from oil pump assembly.



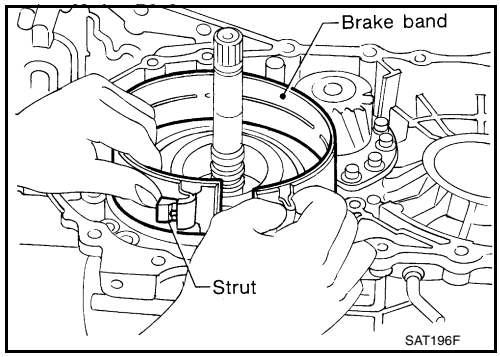
28. Remove brake band according to the following procedures.

a. Loosen lock nut, then back off anchor end pin.

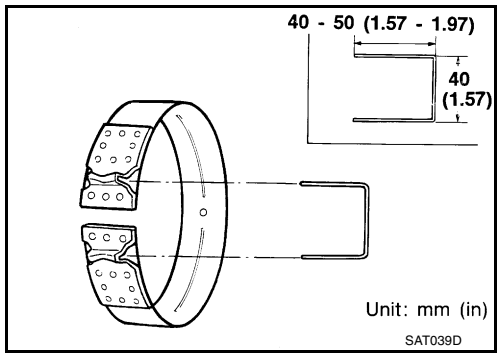
- **Do not reuse anchor end pin.**



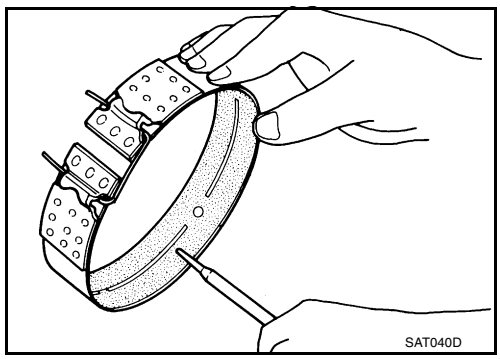
b. Remove brake band and strut from transmission case.



- **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. Leave the clip in position after removing the brake band.**

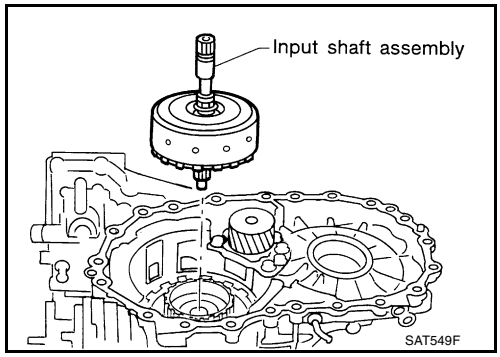


c. Check brake band facing for damage, cracks, wear or burns.

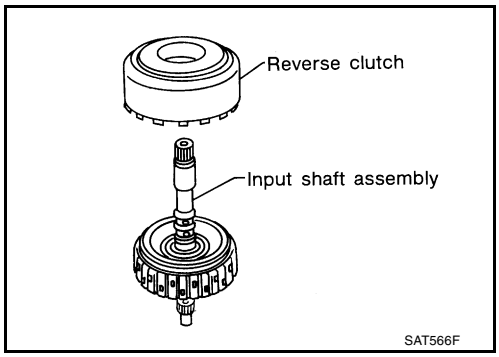


29. Remove input shaft assembly (high clutch) and reverse clutch according to the following procedures.

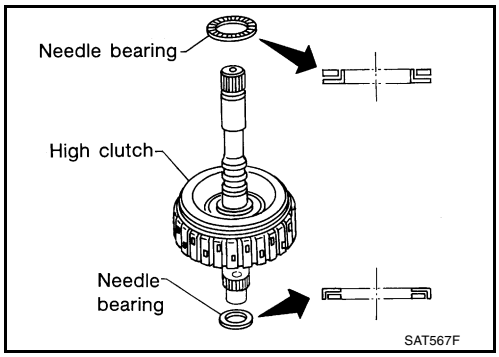
a. Remove input shaft assembly (high clutch) with reverse clutch.



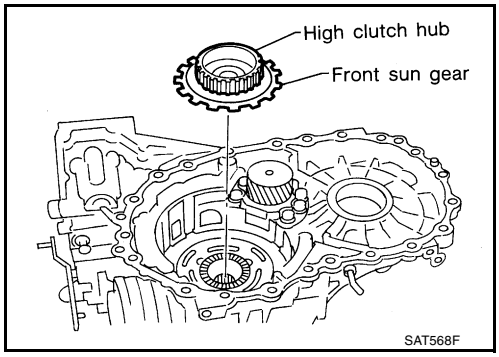
b. Remove input shaft assembly (high clutch) from reverse clutch.



c. Remove needle bearings from high clutch drum and check for damage or wear.

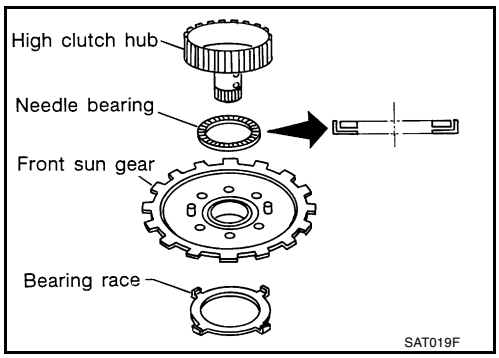


d. Remove high clutch hub and front sun gear from transmission case.

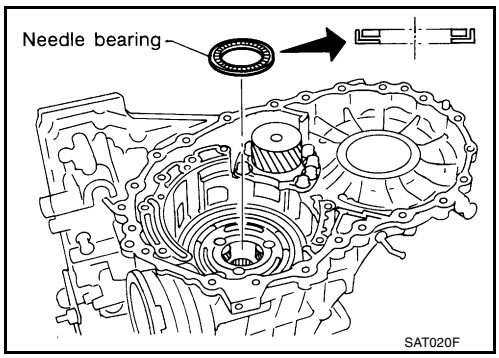


e. Remove front sun gear and needle bearing from high clutch hub and check for damage or wear.

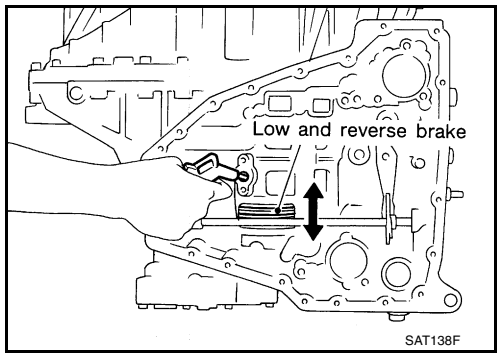
f. Remove bearing race from front sun gear and check for damage or wear.



30. Remove needle bearing from transmission case and check for damage or wear.

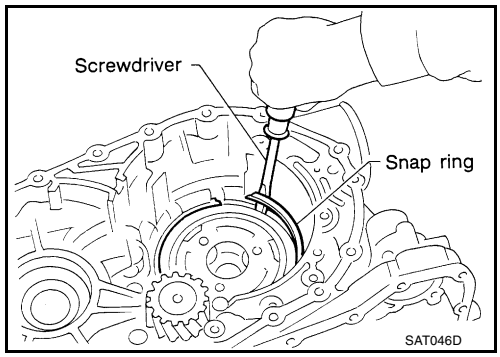


31. Apply compressed air and check to see that low and reverse brake operates.

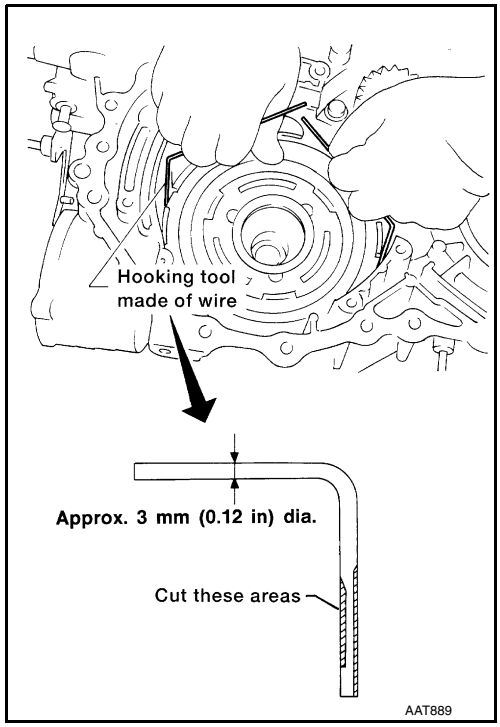


32. Remove low one-way clutch and front planetary carrier assembly according to the following procedures.

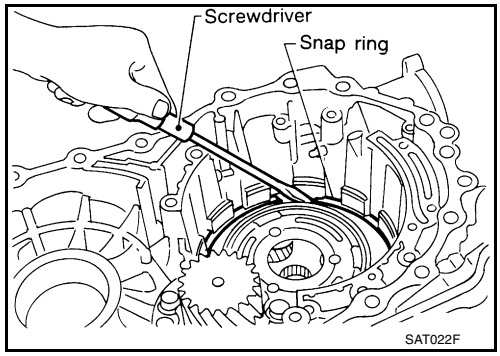
a. Remove snap ring with flat-bladed screwdriver.



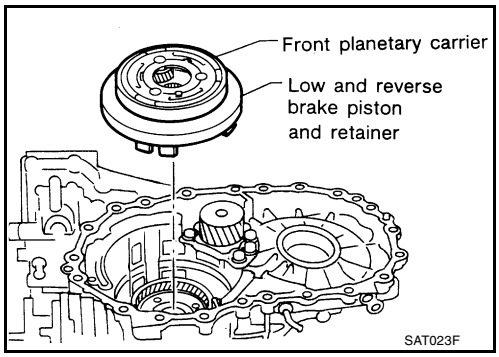
b. Remove low one-way clutch with a hook made of wire.



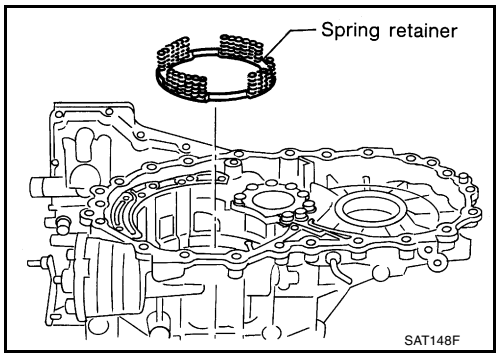
c. Remove snap ring with flat-bladed screwdriver.



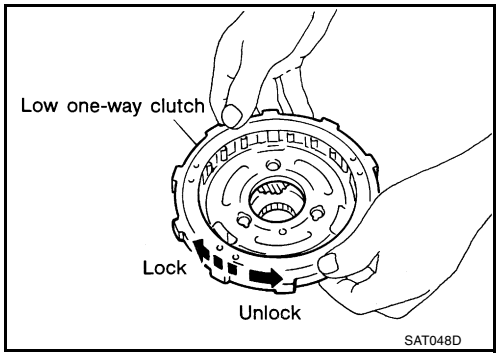
d. Remove front planetary carrier with low and reverse brake piston and retainer.



e. Remove low and reverse brake spring retainer.
- **Do not remove return springs from spring retainer.**

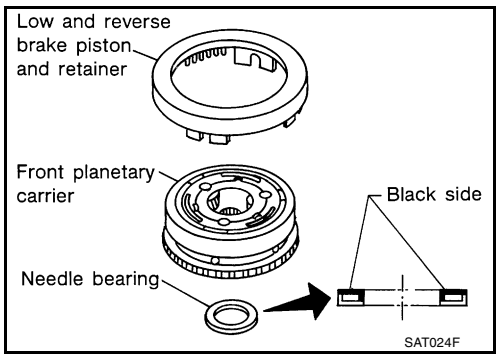


f. Check that low one-way clutch rotates in the direction of the arrow and locks in the opposite direction.



g. Remove needle bearing, low and reverse brake piston and retainer from front planetary carrier.

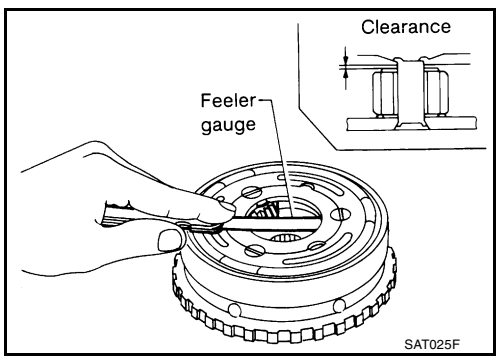
h. Check front planetary carrier, low one-way clutch and needle bearing for damage or wear.



i. Check clearance between planetary gears and planetary carrier with feeler gauge.

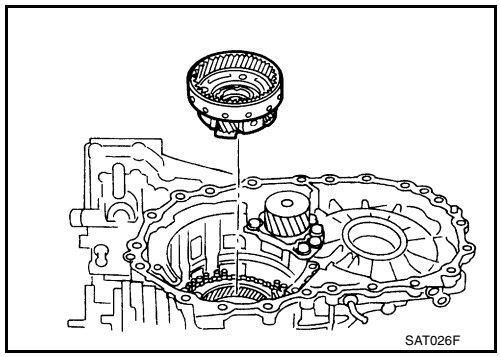
Standard clearance	**: 0.20 - 0.70 mm (0.0079 - 0.0276 in)**
Allowable limit	**: 0.80 mm (0.0315 in)**

Replace front planetary carrier if the clearance exceeds allowable limit.

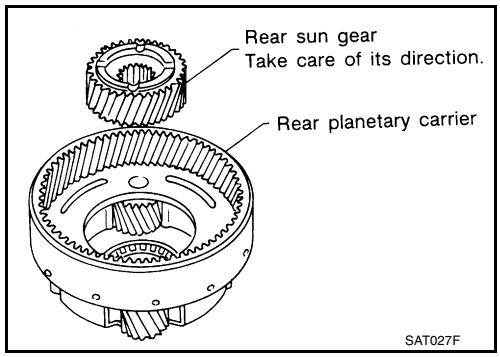


33. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.

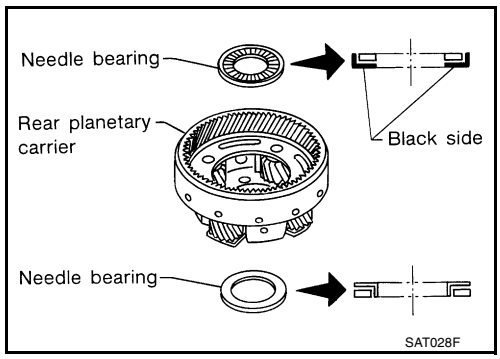
a. Remove rear planetary carrier assembly from transmission case.



b. Remove rear sun gear from rear planetary carrier.



c. Remove needle bearings from rear planetary carrier assembly.

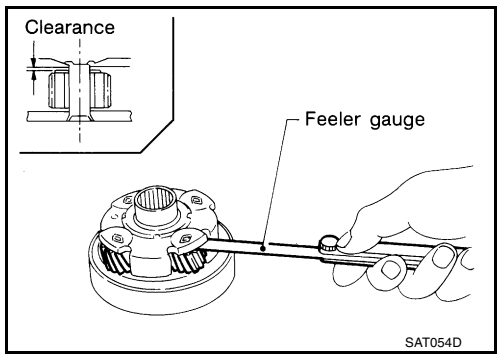


d. Check rear planetary carrier, rear sun gear and needle bearings for damage or wear.

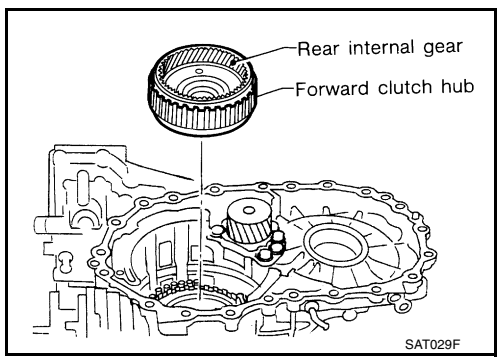
e. Check clearance between pinion washer and rear planetary carrier with feeler gauge.

Standard clearance	**: 0.20 - 0.70 mm (0.0079 - 0.0276 in)**
Allowable limit	**: 0.80 mm (0.0315 in)**

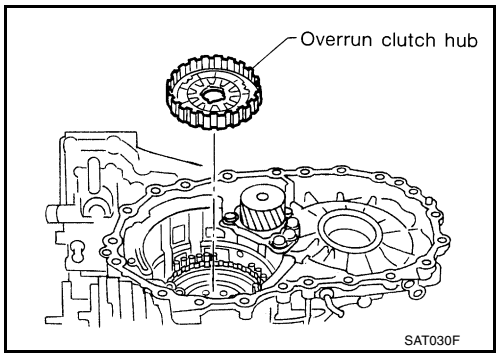
Replace rear planetary carrier if the clearance exceeds allowable limit.



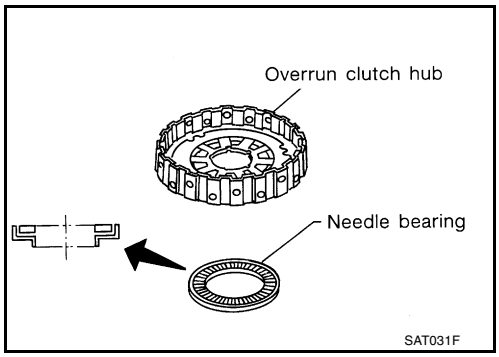
34. Remove rear internal gear and forward clutch hub from transmission case.



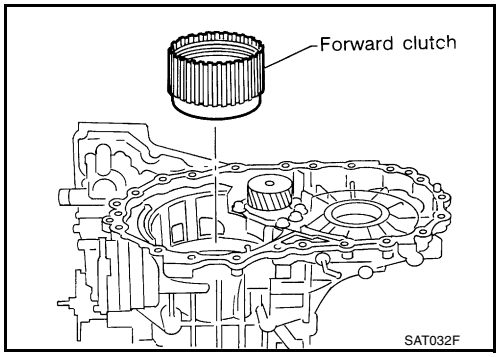
35. Remove overrun clutch hub from transmission case.



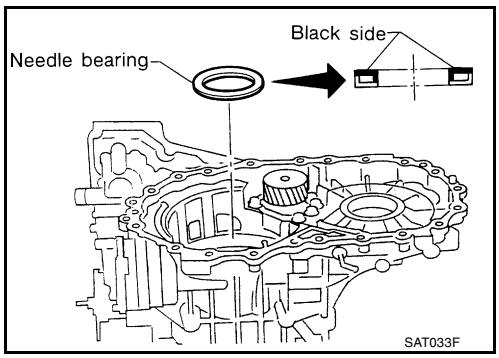
36. Remove needle bearing from overrun clutch hub and check for damage or wear.



37. Remove forward clutch assembly from transmission case.



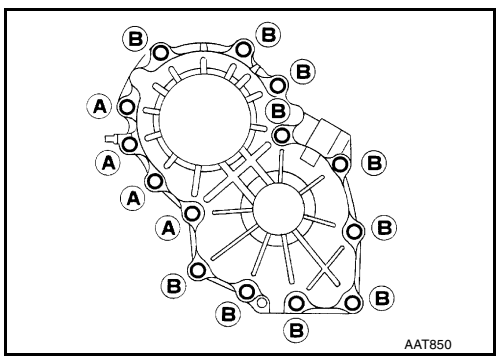
38. Remove needle bearing from transmission case.



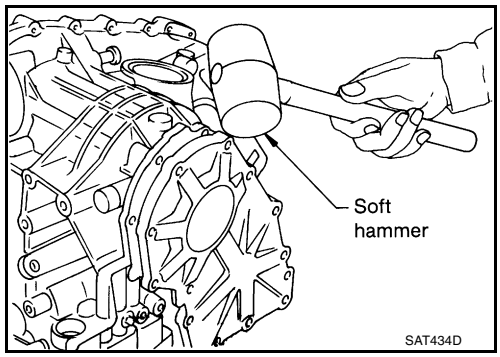
39. Remove output shaft assembly according to the following procedures.

a. Remove side cover bolts.

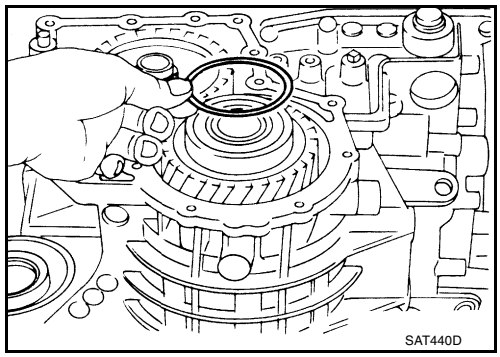
- **Do not mix bolts A and B.**
- **Always replace bolts A as they are self-sealing bolts.**



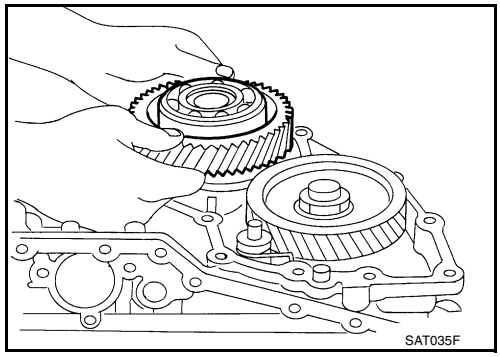
b. Remove side cover by lightly tapping it with a soft hammer.
   - **Be careful not to drop output shaft assembly. It might come out when removing side cover.**



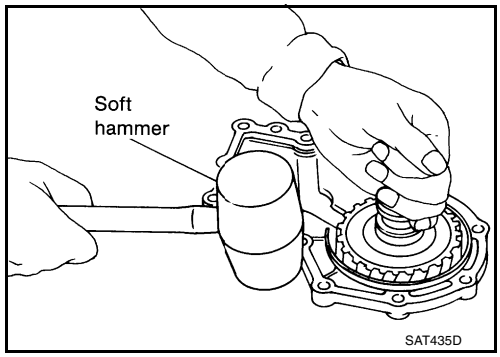
c. Remove adjusting shim.



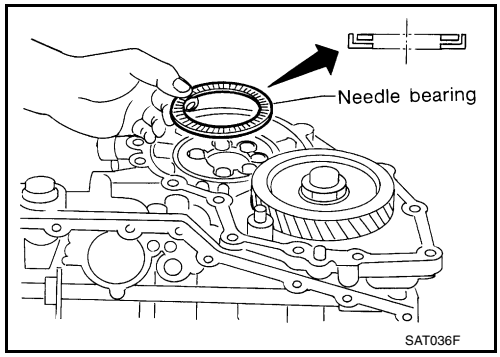
d. Remove output shaft assembly.



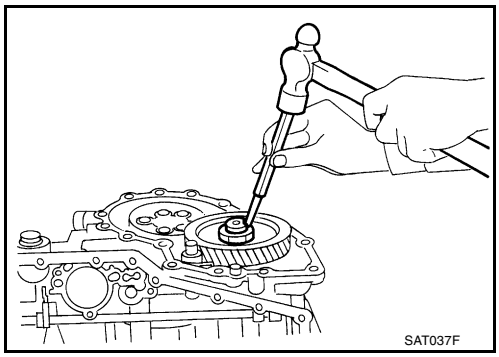
   - If output shaft assembly came off with side cover, tap cover with a soft hammer to separate.



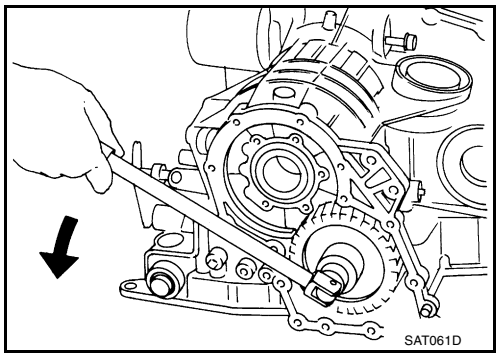
e. Remove needle bearing.



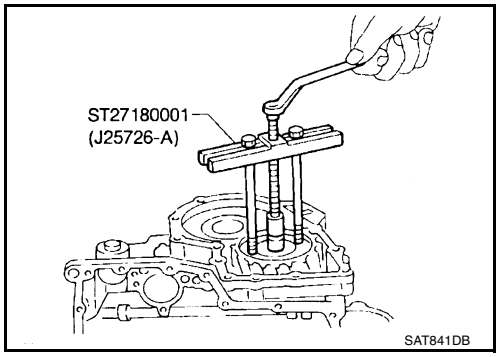
40. Disassemble reduction pinion gear according to the following procedures.
a. Set manual shaft to position P to fix idler gear.
b. Unlock idler gear lock nut using a pin punch.



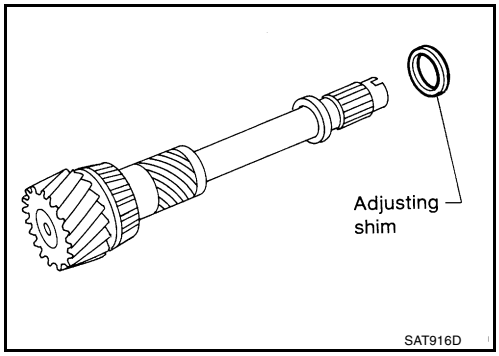
c. Remove idler gear lock nut.
- **Do not reuse idler gear lock nut.**



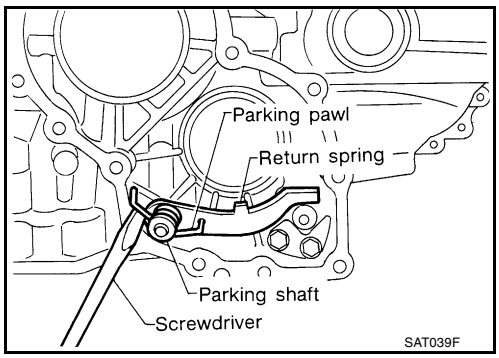
d. Remove idler gear with puller.



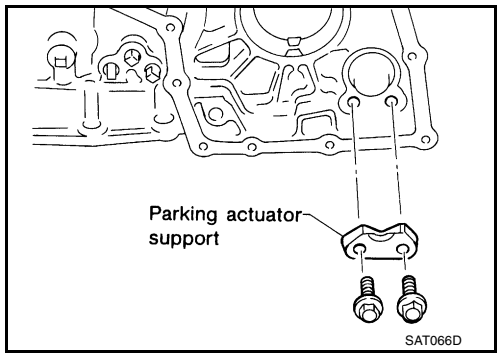
e. Remove reduction pinion gear.
f. Remove adjusting shim from reduction pinion gear.



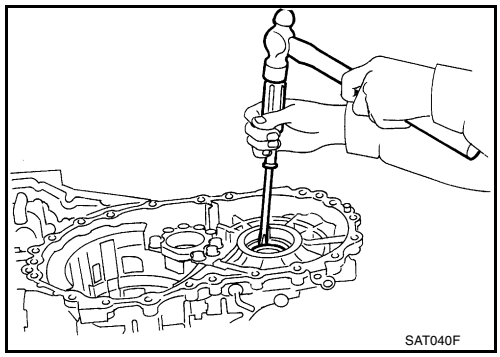
41. Remove return spring from parking shaft with screwdriver.
42. Draw out parking shaft and remove parking pawl from transmission case.
43. Check parking pawl and shaft for damage or wear.



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.



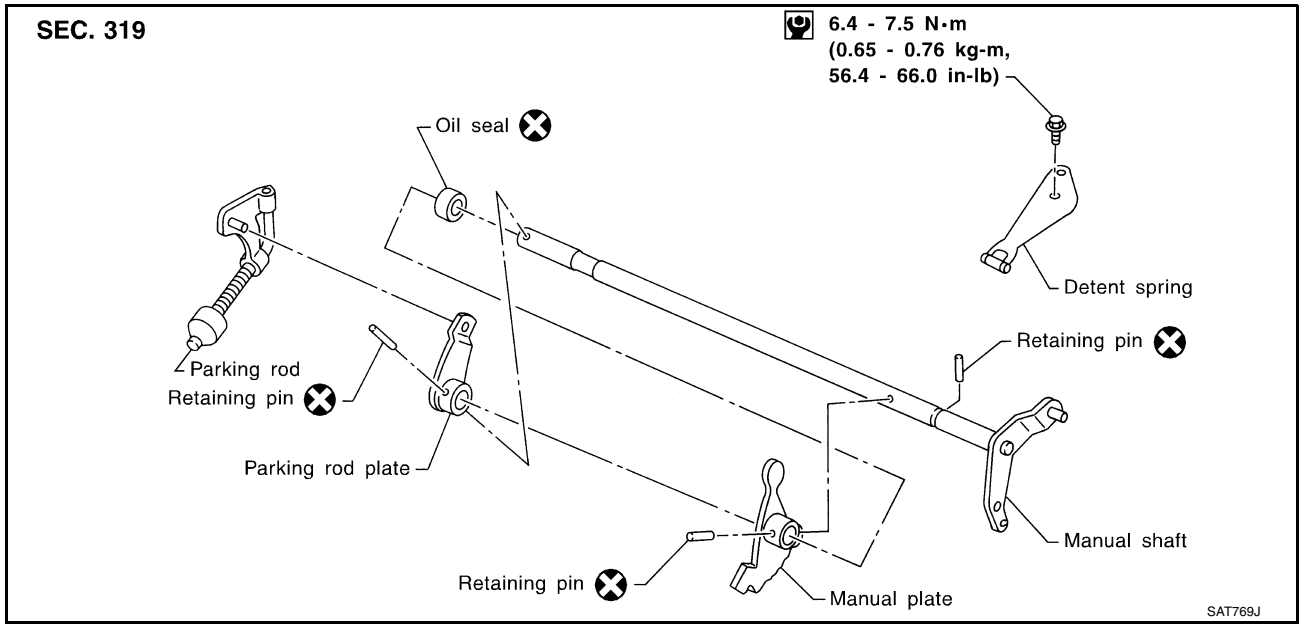
REPAIR FOR COMPONENT PARTS

PFP:00000

Manual Shaft

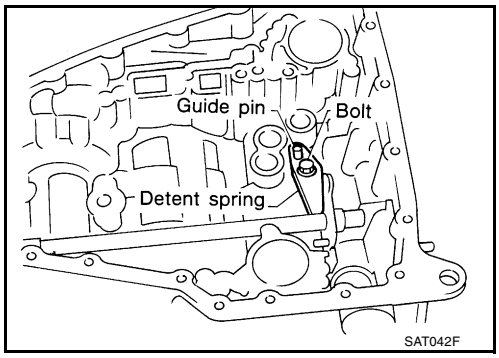
ECS0067E

COMPONENTS

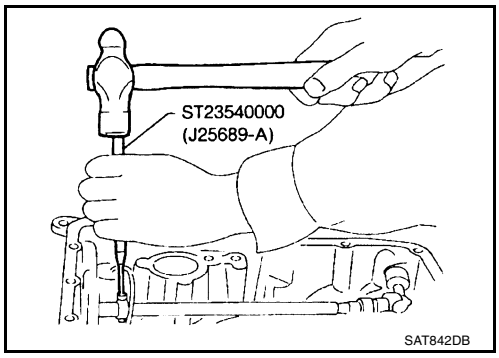


REMOVAL

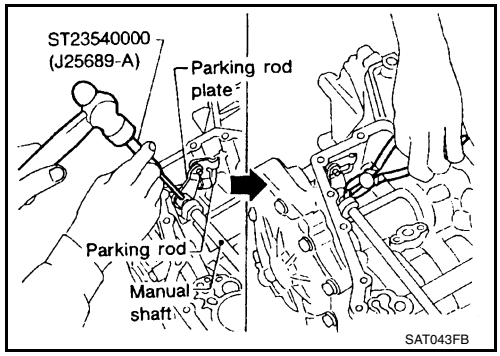
1. Remove detent spring from transmission case.



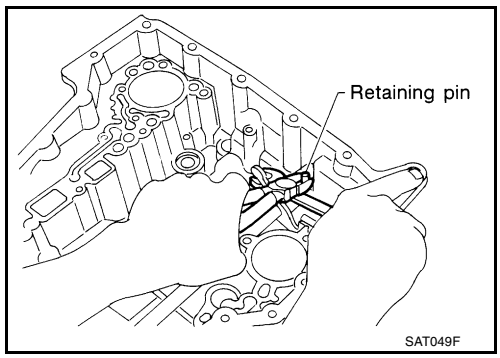
2. Drive out manual plate retaining pin.



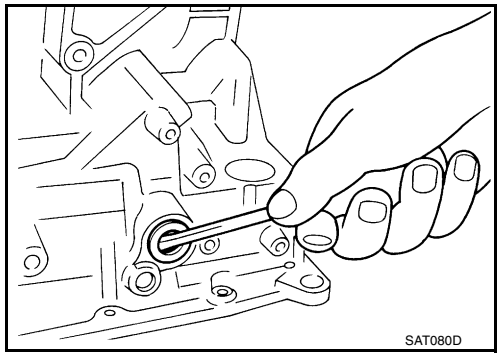
3. Drive and pull out parking rod plate retaining pin.
4. Remove parking rod plate from manual shaft.
5. Draw out parking rod from transmission case.



6. Pull out manual shaft retaining pin.
7. Remove manual shaft and manual plate from transmission case.



8. Remove manual shaft oil seal.

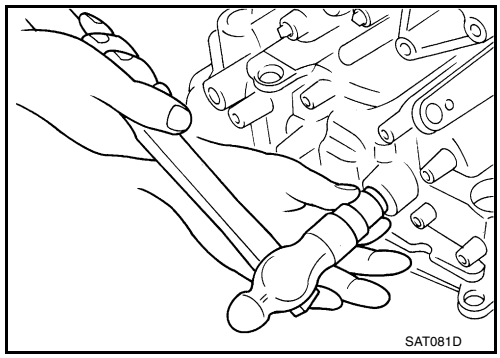


INSPECTION

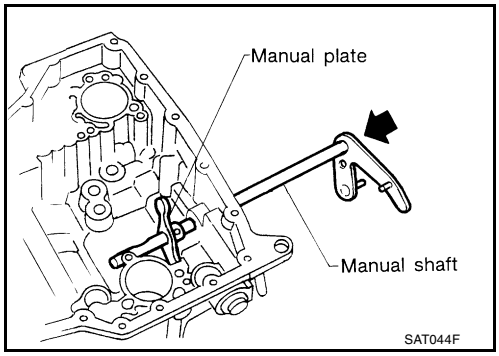
- Check component parts for wear or damage. Replace if necessary.

INSTALLATION

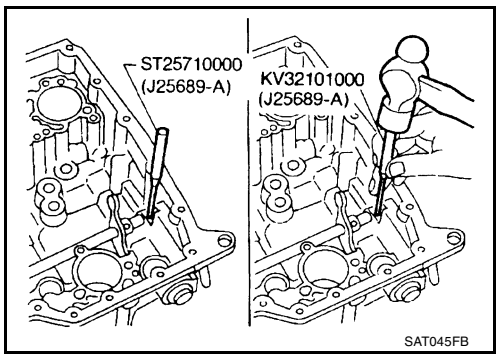
1. Install manual shaft oil seal.
   - **Apply ATF to outer surface of oil seal.**



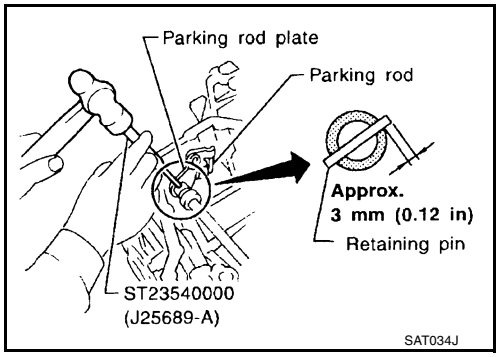
2. Install manual shaft and manual plate.



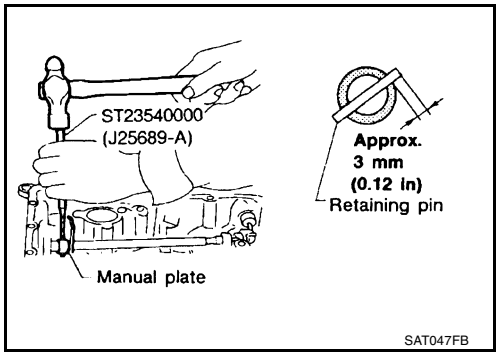
3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin up to bottom of hole.



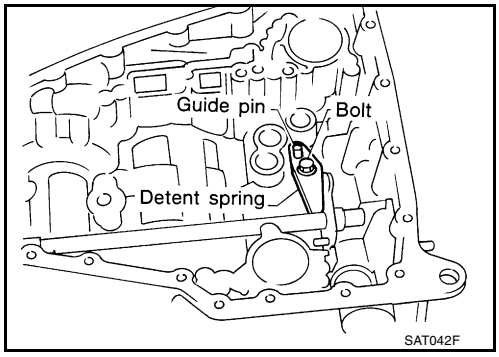
5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft and drive retaining pin.
   - **Both ends of pin should protrude.**



7. Drive manual plate retaining pin.
   - **Both ends of pin should protrude.**



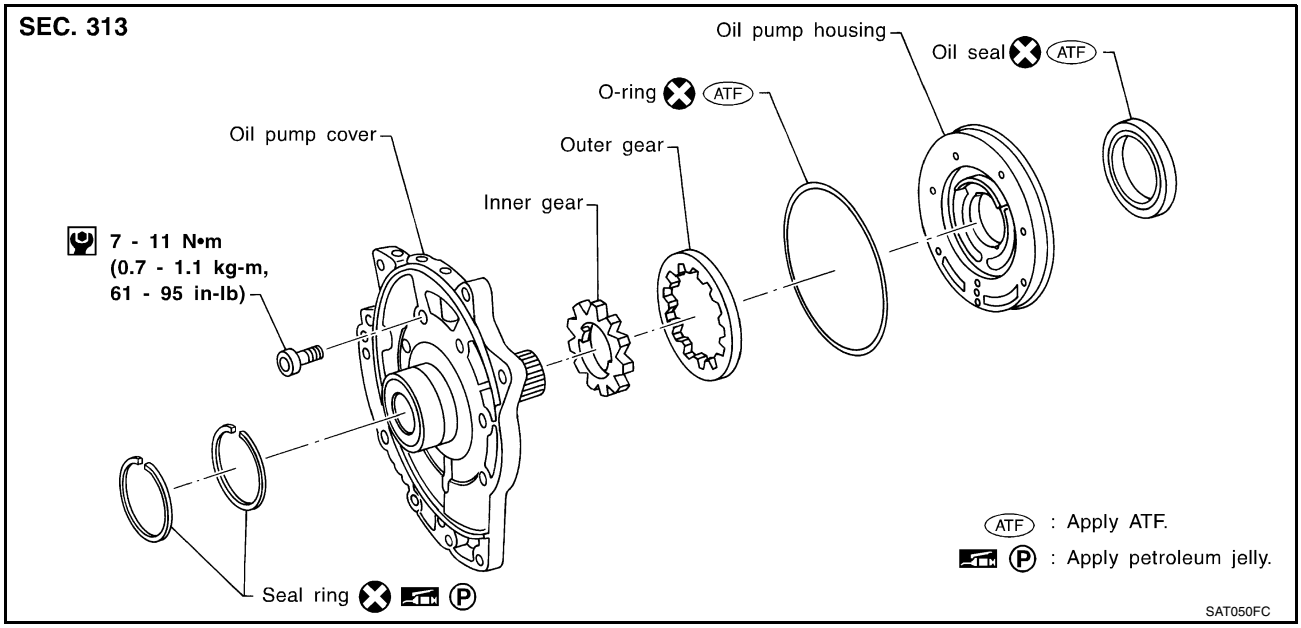
8. Install detent spring. Tighten detent spring bolts to the specified torque. Refer to AT-670, "COMPONENTS" .



Oil Pump

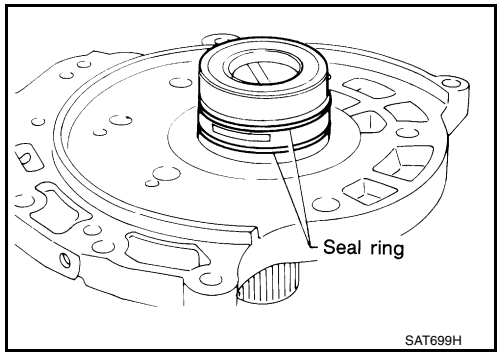
ECS0067F

COMPONENTS

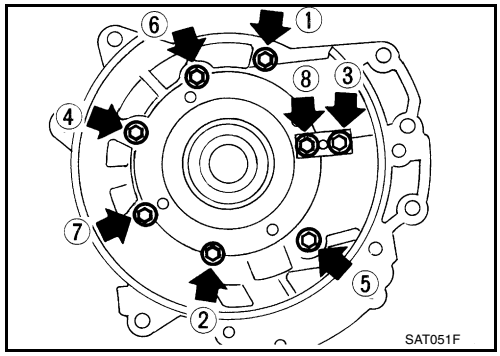


DISASSEMBLY

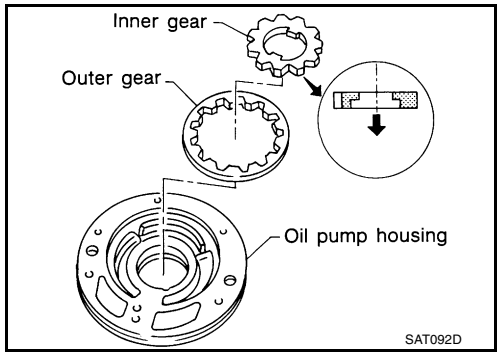
1. Remove seal rings.



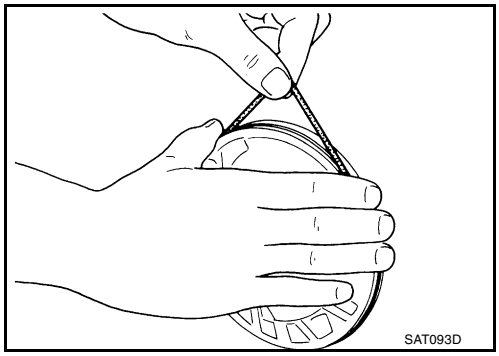
2. Loosen bolts in a crisscross pattern and remove oil pump cover.



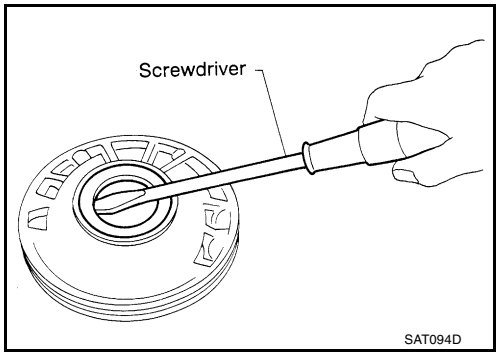
3. Remove inner and outer gear from oil pump housing.



4. Remove O-ring from oil pump housing.



5. Remove oil pump housing oil seal.



INSPECTION

Oil Pump Housing, Oil Pump Cover, Inner Gear and Outer Gear

- Check for wear or damage.

Side Clearances

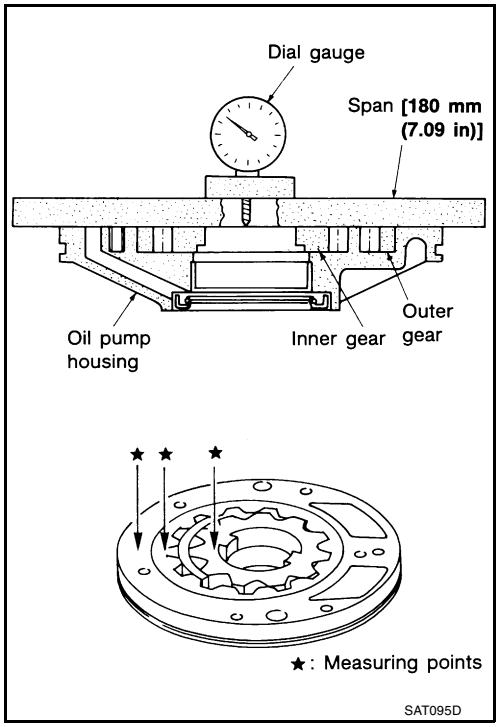
- Measure side clearance of inner and outer gears in at least four places around each outside edge. Maximum measured values should be within specified positions.

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 AT-755, "OIL PUMP" .**

- If clearance is more than standard, replace whole oil pump assembly except oil pump cover.

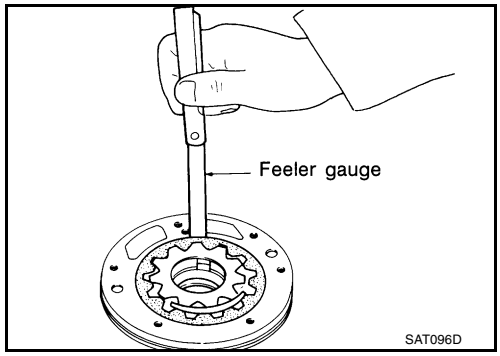


- Measure clearance between outer gear and oil pump housing.

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.



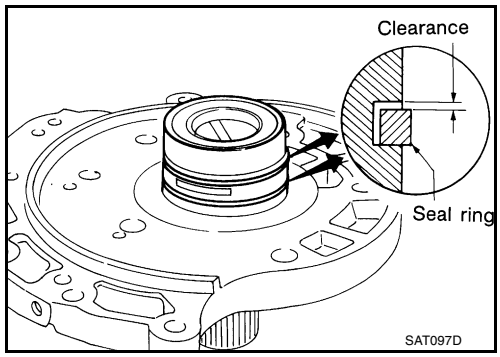
SEAL RING CLEARANCE

- Measure clearance between seal ring and ring groove.

Standard clearance : **0.1 - 0.25 mm (0.0039 - 0.0098 in)**

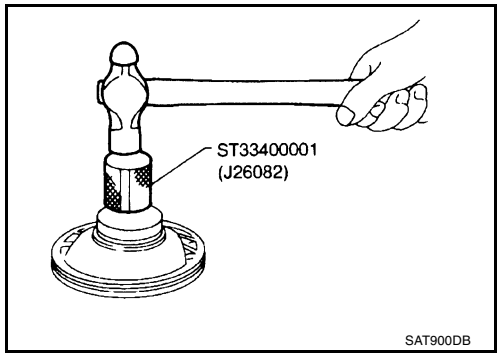
Allowable limit : **0.25 mm (0.0098 in)**

- If not within allowable limit, replace oil pump cover assembly.

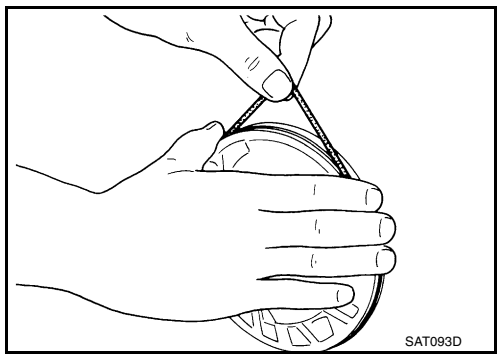


ASSEMBLY

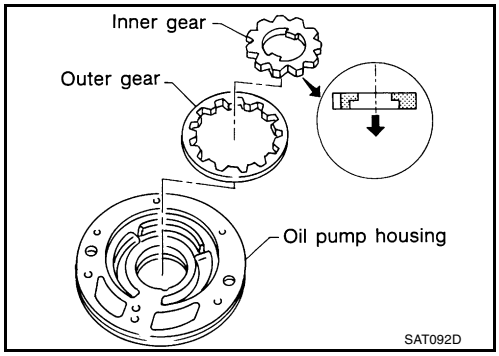
1. Install oil seal on oil pump housing.



2. Install O-ring on oil pump housing.
   - **Apply ATF to O-ring.**



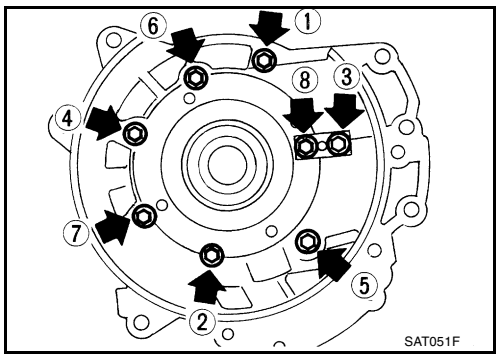
3. Install inner and outer gears on oil pump housing.
   - **Be careful of direction of inner gear.**



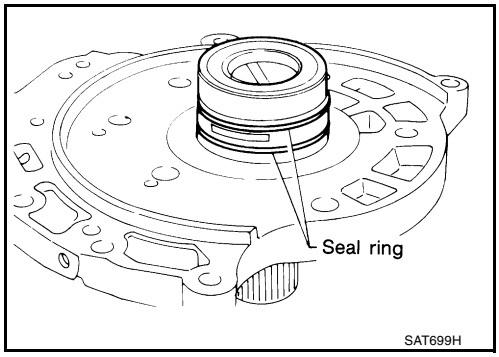
4. Install oil pump cover on oil pump housing.

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. Tighten oil pump cover bolts to the specified torque. Refer to AT-673, "COMPONENTS" .



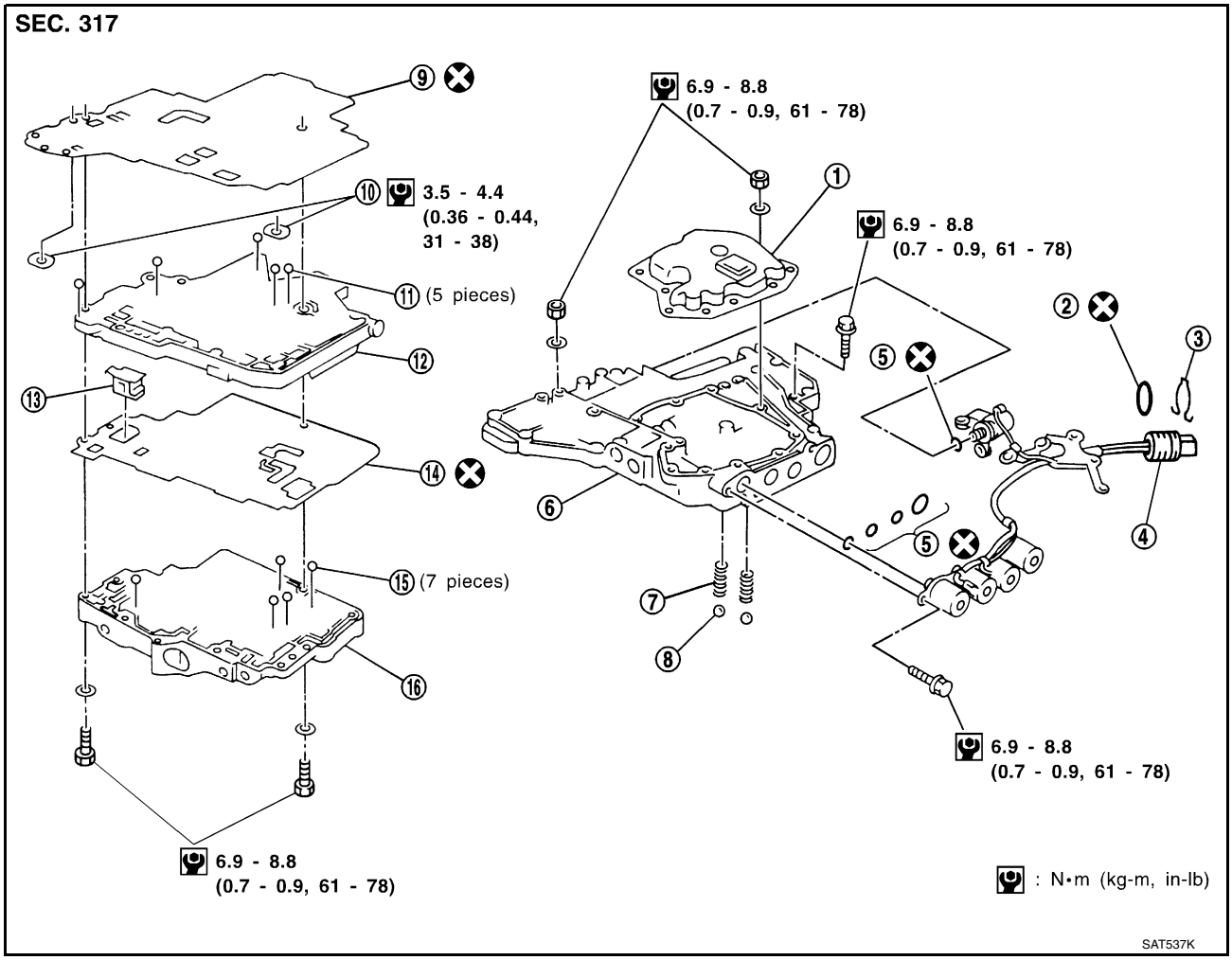
5. Install new seal rings carefully after packing ring groove with petroleum jelly.
   - **Do not spread gap of seal ring excessively while installing. The ring may be deformed.**



Control Valve Assembly

ECS0067G

COMPONENTS



1.	Oil strainer	2.	O-ring	3.	Snap ring
	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				

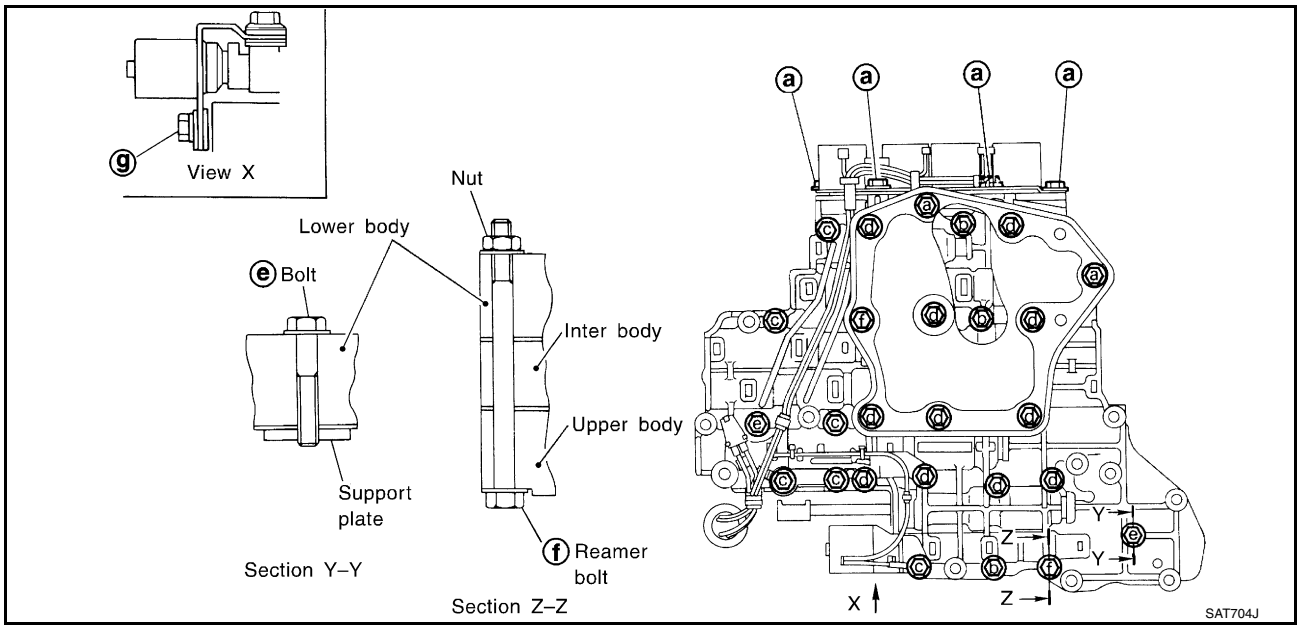
DISASSEMBLY

Disassemble upper, inter and lower bodies.

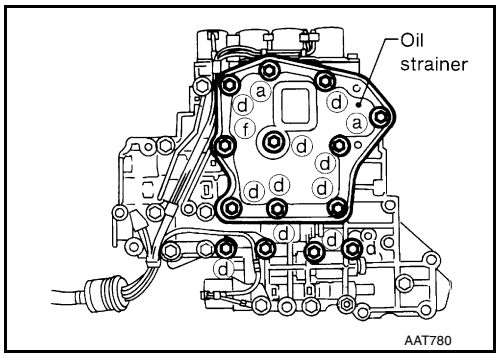
Bolt length, number and location:

Bolt symbol	a	b	c	d	e	f	g
Bolt length "ℓ" mm (in) 	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)	18.0 (0.709)
Number of bolts	6	3	6	11	2	2	1

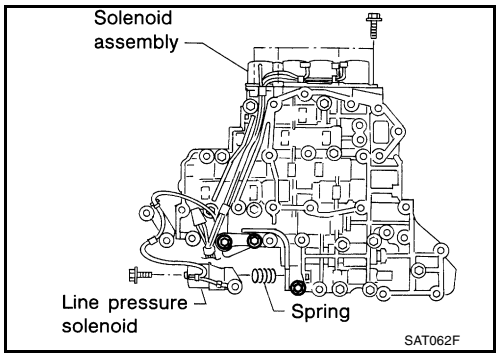
f: Reamer bolt and nut.



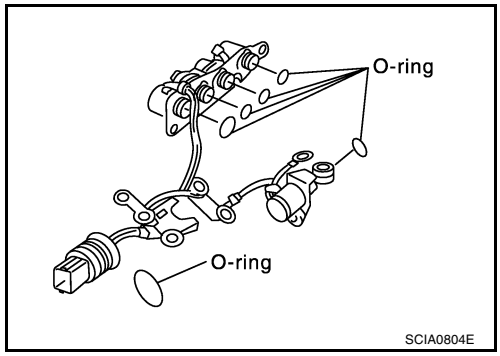
1. Remove bolts **a** , **d** and nut **f** and remove oil strainer from control valve assembly.



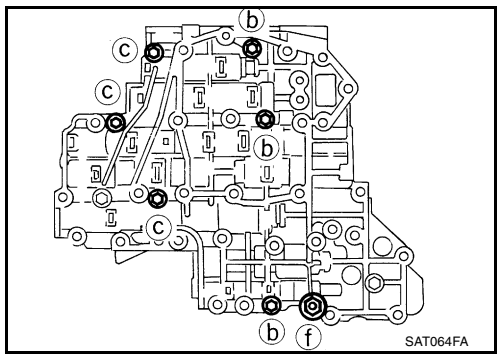
2. Remove solenoid valve assembly and line pressure solenoid valve from control valve assembly.



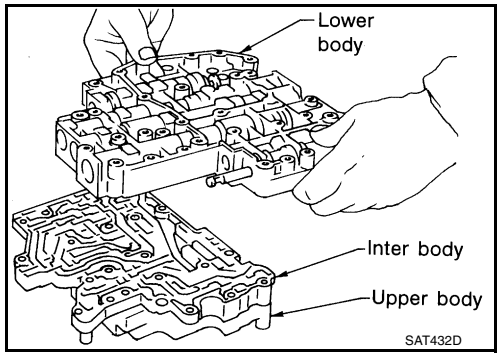
3. Remove O-rings from solenoid valves and terminal body.



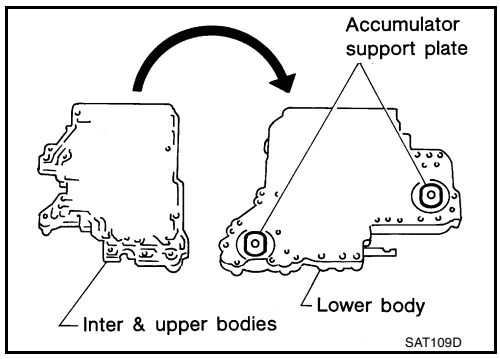
4. Place upper body facedown, and remove bolts **b** , **c** and nut **f** .



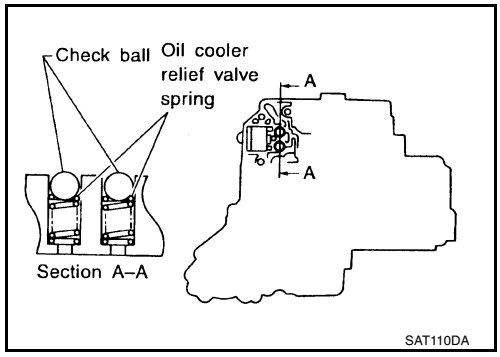
5. Remove inter body from lower body.



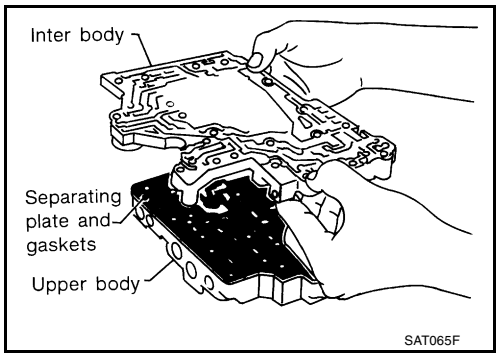
6. Turn over lower body, and remove accumulator support plate.



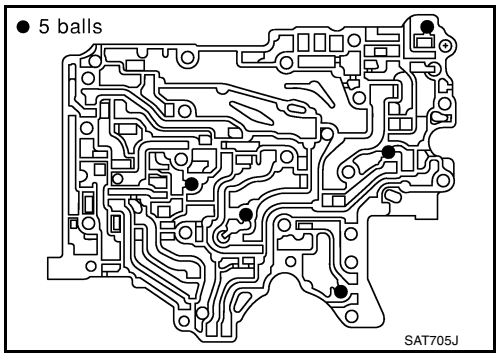
7. Remove bolts **e** , separating plate and separating gasket from lower body.
8. Remove check balls and oil cooler relief valve springs from lower body.
   - **Be careful not to lose check balls and oil cooler relief valve springs.**



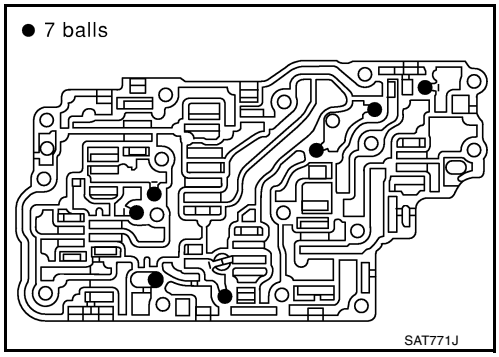
9. Remove inter body from upper body.



10. Check to see that steel balls are properly positioned in inter body and then remove them.
    - **Be careful not to lose steel balls.**



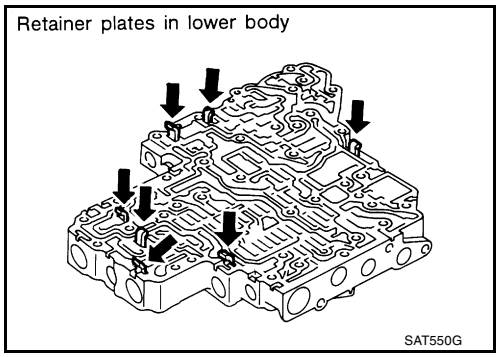
11. Check to see that steel balls are properly positioned in upper body and then remove them.
    - **Be careful not to lose steel balls.**



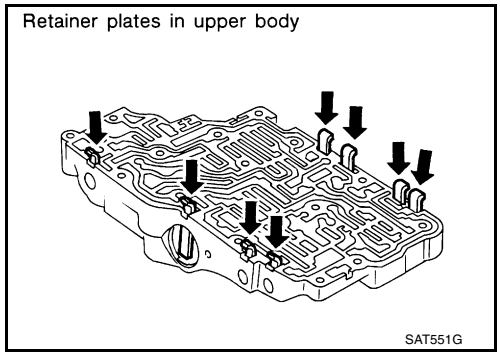
INSPECTION

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.**

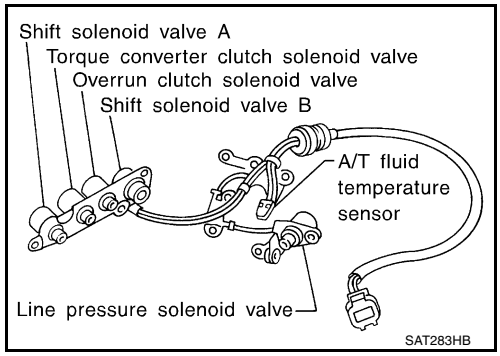


Oil Strainer

- 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

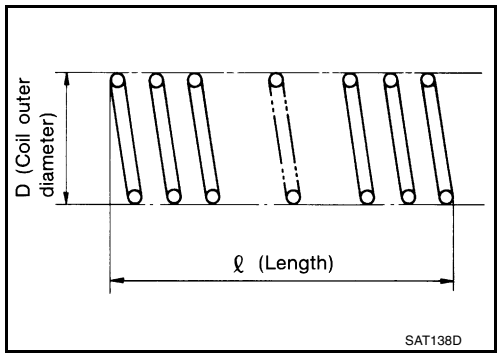
- Measure resistance.
- For shift solenoid valve A, refer to AT-554 .
- For shift solenoid valve B, refer to AT-559 .
- For line pressure solenoid valve, refer to AT-548 .
- For torque converter clutch solenoid valve, refer to AT-535 .
- For overrun clutch solenoid valve, refer to AT-569 .



Oil Cooler Relief Valve Spring

- Check springs for damage or deformation.
- Measure free length and outer diameter.

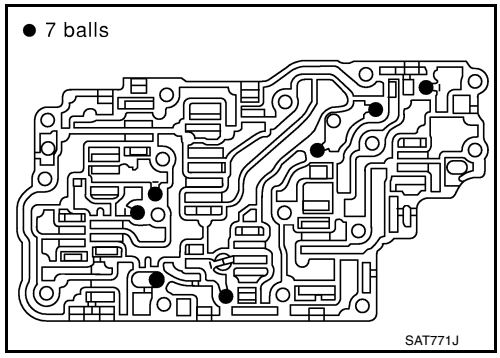
Inspection standard : Refer to AT-751, "CONTROL VALVE AND PLUG RETURN SPRINGS" .



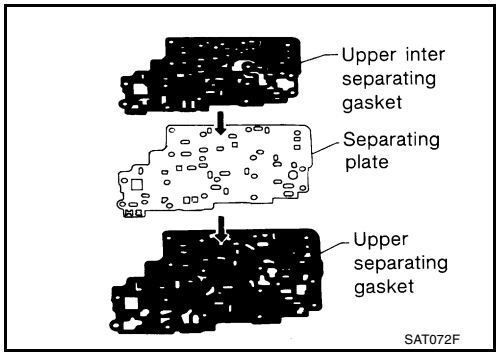
ASSEMBLY

1. Install upper, inter and lower body.

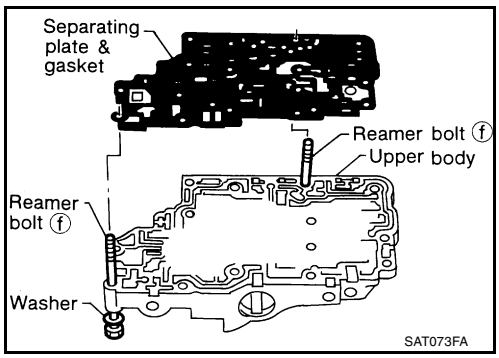
a. Place oil circuit of upper body face up. Install steel balls in their proper positions.



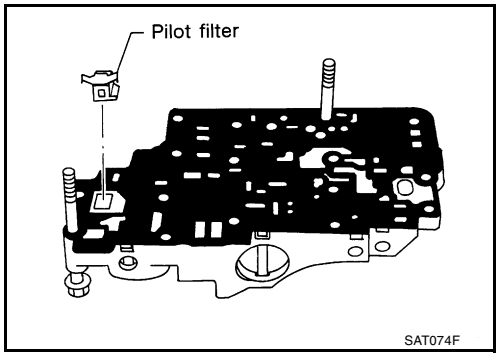
b. Install upper separating gasket, upper inter separating gasket and upper separating plate in order shown in illustration.



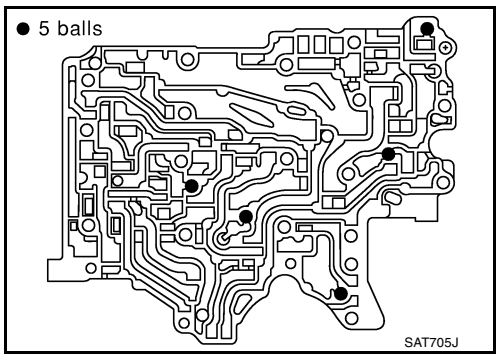
c. Install reamer bolts **f** from bottom of upper body. Using reamer bolts as guides, install separating plate and gaskets as a set.



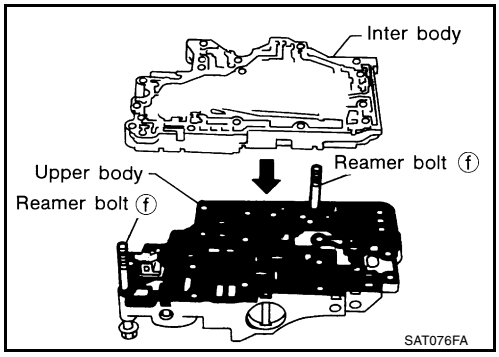
d. Install pilot filter.



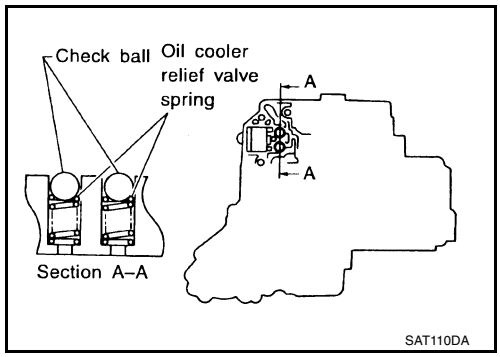
e. Place lower body as shown in illustration (side of inter body face up). Install steel balls in their proper positions.



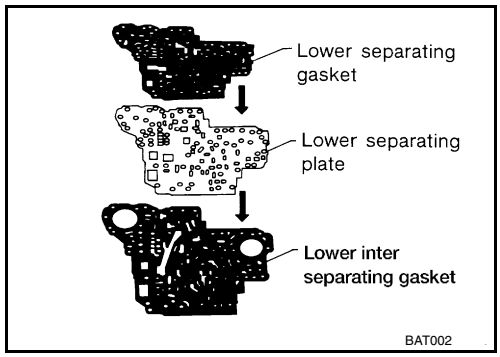
f. Install inter body on upper body using reamer bolts **f** as guides.
   - **Be careful not to dislocate or drop steel balls.**



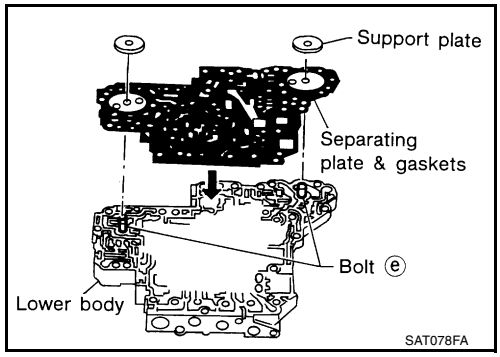
g. Install check balls and oil cooler relief valve springs in their proper positions in lower body.



h. Install lower separating gasket, lower inter separating gasket and lower separating plate in order shown in illustration.

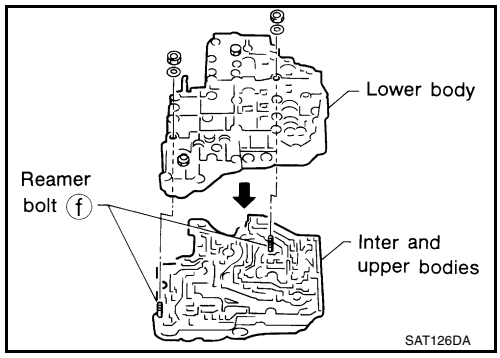


i. Install bolts **e** from bottom of lower body. Using bolts **e** as guides, install separating plate and gaskets as a set.

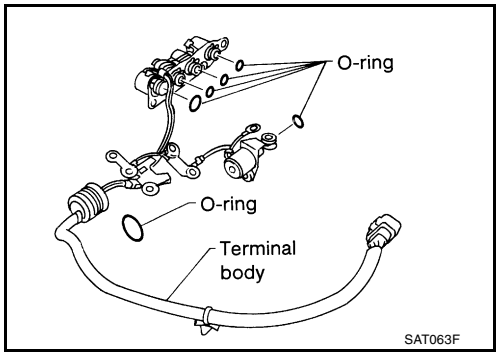


j. Temporarily install support plates on lower body.

k. Install lower body on inter body using reamer bolts **f** as guides and tighten reamer bolts **f** slightly.



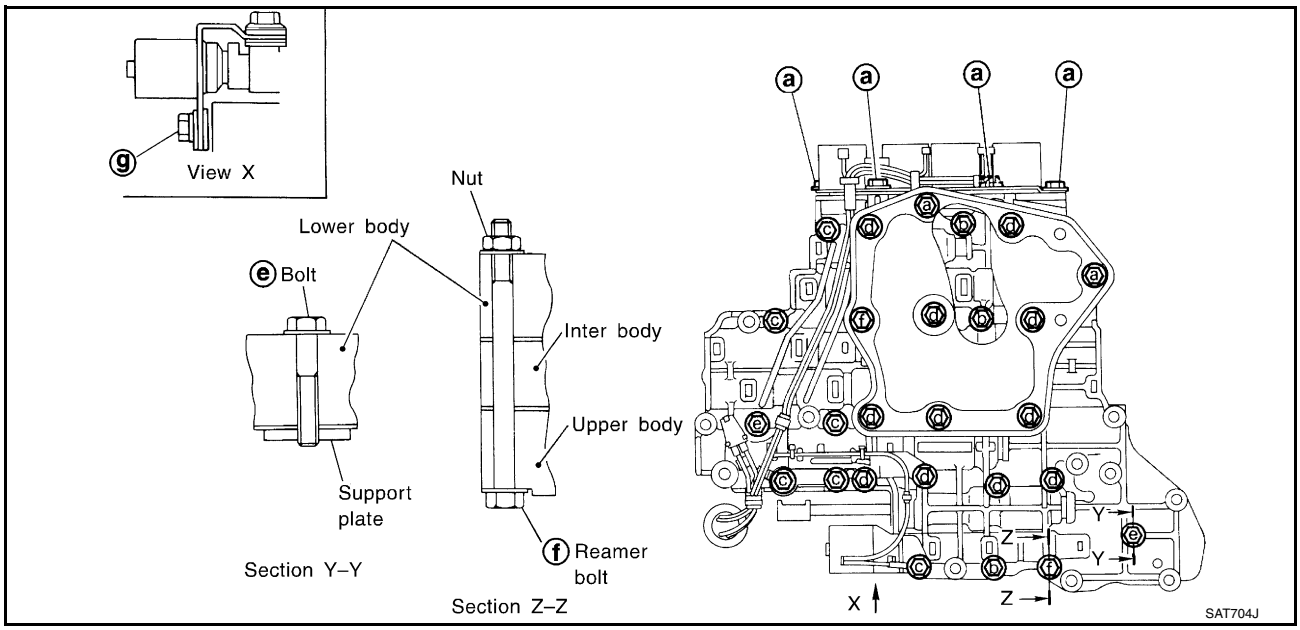
2. Install O-rings to solenoid valves and terminal body.
   - **Apply ATF to O-rings.**



3. Install and tighten bolts.

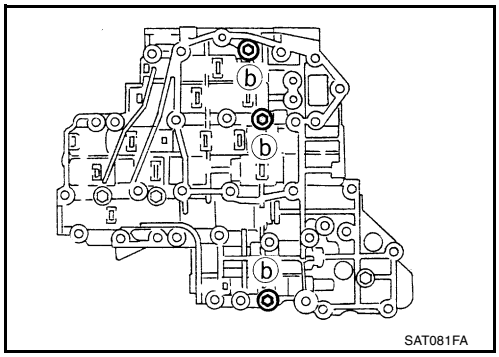
Bolt length, number and location:

Bolt symbol	a	b	c	d	e	f	g
Bolt length "ℓ" mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)	18.0 (0.709)
Number of bolts	6	3	6	11	2	2	1

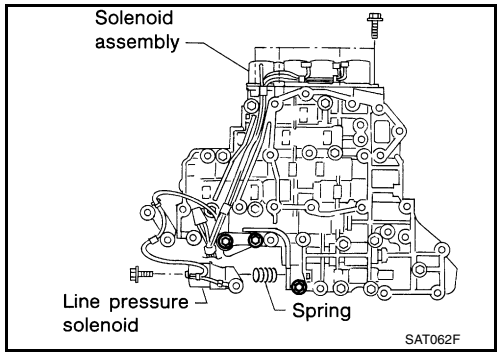


a. Install and tighten bolts **b** to specified torque.

: **7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)**

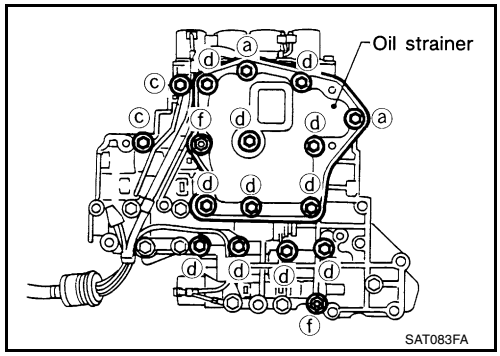


b. Install solenoid valve assembly and line pressure solenoid valve to lower body.



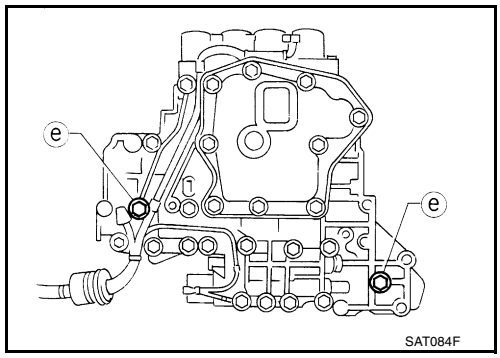
c. Set oil strainer, then tighten bolts **a** , **c** , **d** and nuts **f** to specified torque.

: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



d. Tighten bolts **e** to specified torque.

: 3.4 - 4.4 N·m (0.35 - 0.45 kg-m, 30.4 - 39.1 in-lb)



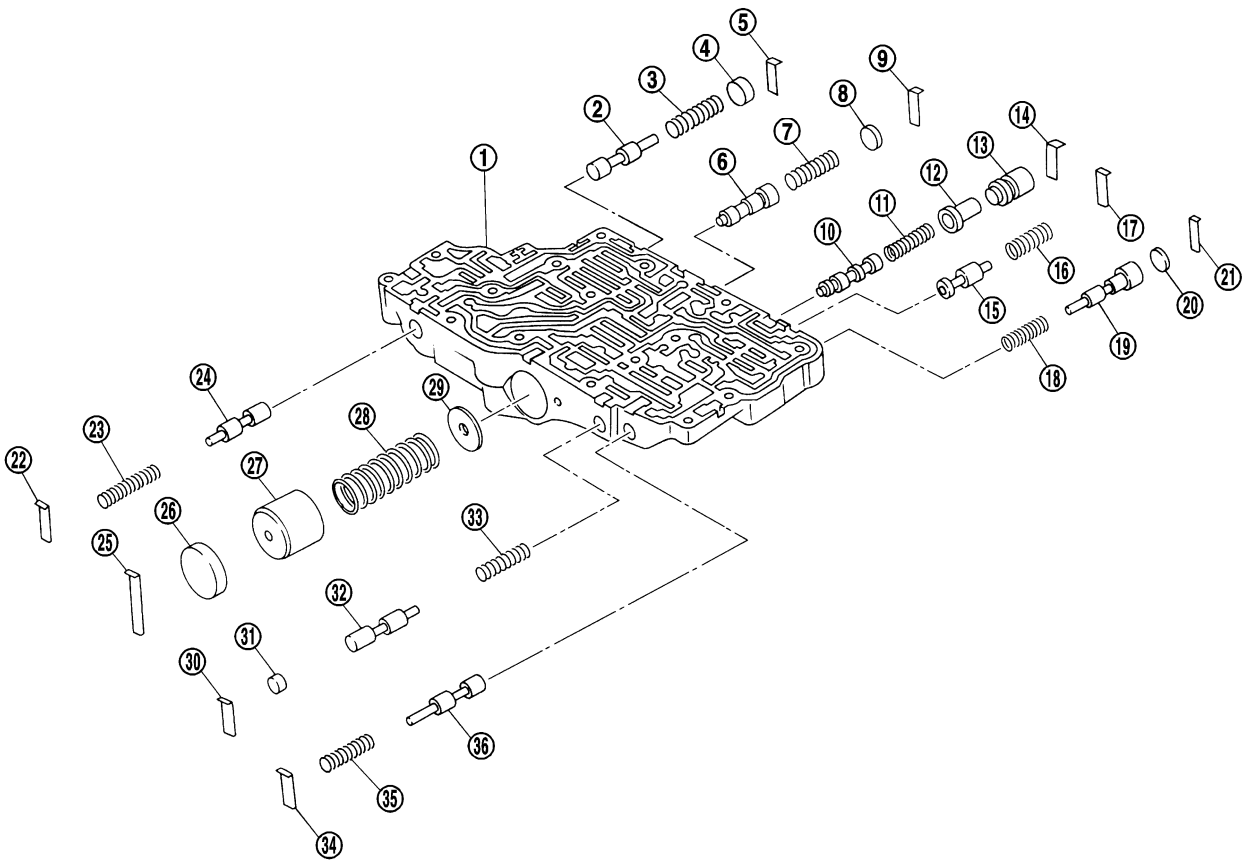
Control Valve Upper Body

ECS0067H

COMPONENTS

Apply ATF to all components before installation.

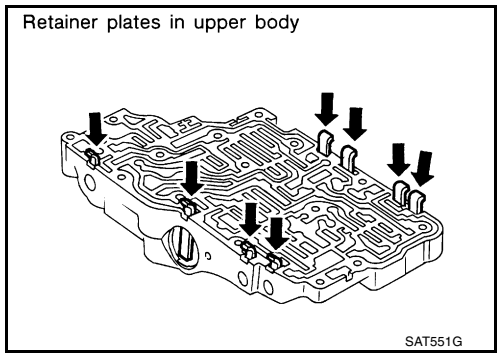
SEC. 317



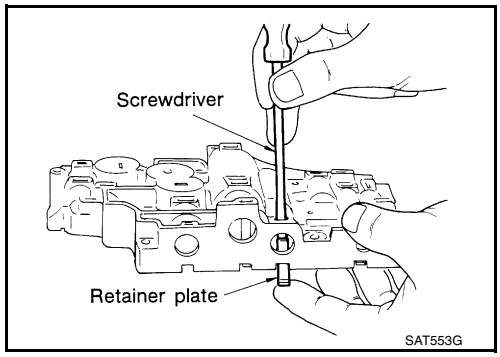
1. Upper body	2. Cooler check valve	3. Return spring
4. Plug	5. Retainer plate	6. 1-2 accumulator valve
7. Return spring	8. Plug	9. Retainer plate
10. Torque converter clutch control valve	11. Return spring	12. Torque converter clutch control plug
13. Torque converter clutch control sleeve	14. Retainer plate	15. Torque converter relief valve
16. Return spring	17. Retainer plate	18. Return spring
19. Overrun clutch reducing valve	20. Plug	21. Retainer plate
22. Retainer plate	23. Return spring	24. Pilot valve
25. Retainer plate	26. Plug	27. 1-2 accumulator piston
28. Return spring	29. 1-2 accumulator retainer plate	30. Retainer plate
31. Plug	32. 1st reducing valve	33. Return spring
34. Retainer plate	35. Return spring	36. 3-2 timing valve

DISASSEMBLY

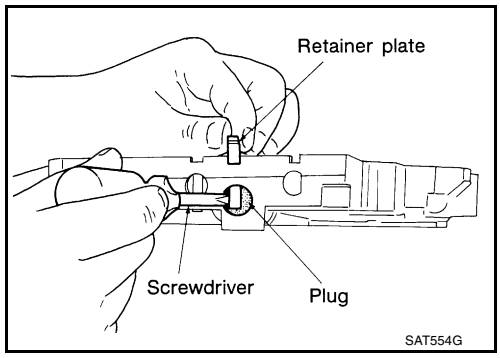
1. Remove valves at retainer plates.
   - **Do not use a magnetic pick-up tool.**



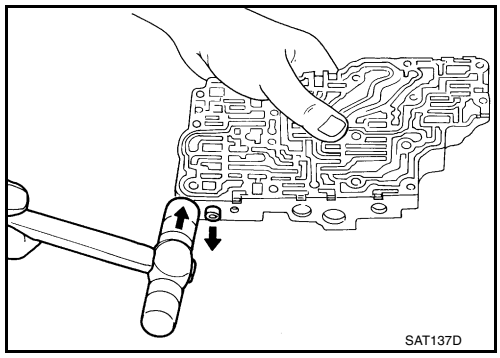
a. Use a screwdriver to remove retainer plates.



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.**

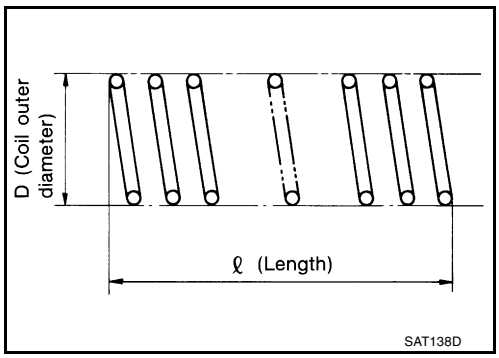


INSPECTION

Valve Spring

- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.

  Inspection standard : Refer to AT-751, "CONTROL VALVE AND PLUG RETURN SPRINGS" .



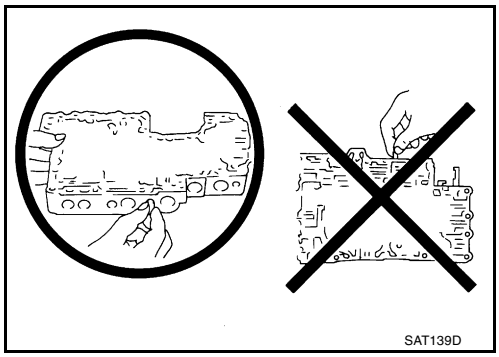
- Replace valve springs if deformed or fatigued.

Control Valves

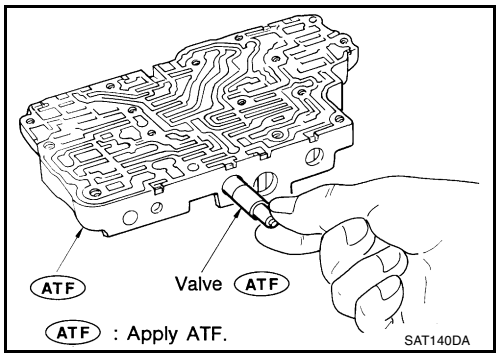
- Check sliding surfaces of valves, sleeves and plugs.

ASSEMBLY

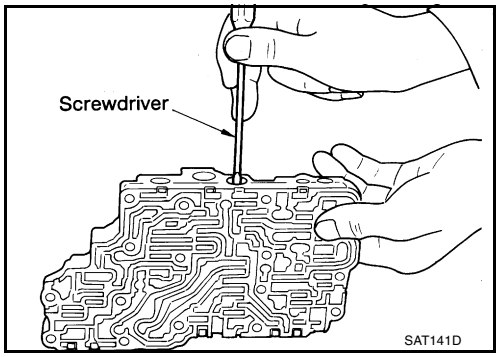
- **Lay control valve body down when installing valves. Do not stand the control valve body upright.**



1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.
   - **Be careful not to scratch or damage valve body.**

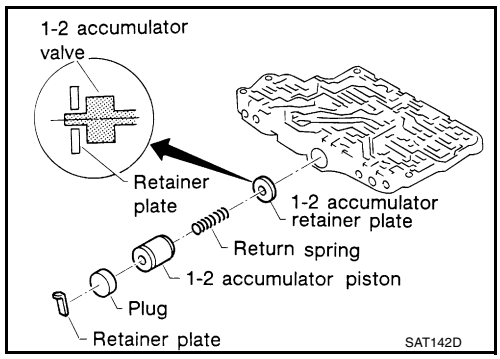


   - Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.

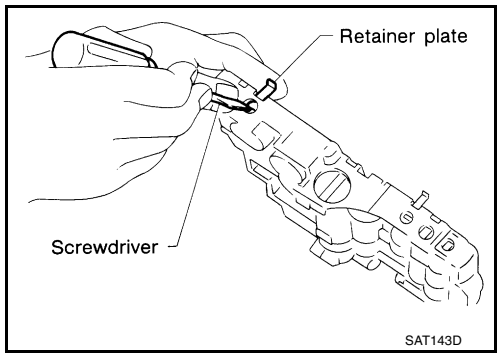


1-2 Accumulator Valve

- Install 1-2 accumulator valve. Align 1-2 accumulator retainer plate from opposite side of control valve body.
- Install return spring, 1-2 accumulator piston and plug.



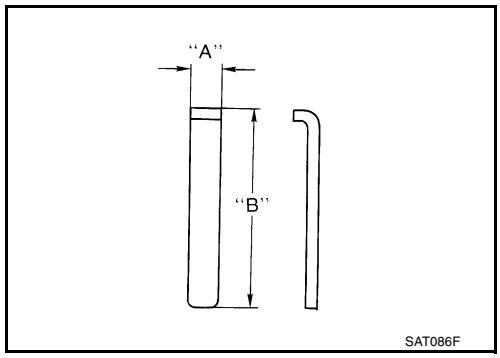
1. Install retainer plates.
   - While pushing plug or return spring, install retainer plate.



Retainer Plate (Upper Body)

Unit: mm (in)

No.	Name of control valve	Width A	Length B
22	Pilot valve	6.0 (0.236)	21.5 (0.846)
30	1st reducing valve		
34	3-2 timing valve		
17	Torque converter relief valve		
9	1-2 accumulator valve		38.5 (1.516)
25	1-2 accumulator piston valve		
21	Overrun clutch reducing valve		24.0 (0.945)
5	Cooler check valve		
14	Torque converter clutch control valve		28.0 (1.102)



- Install proper retainer plates.
  Refer to AT-685, "Control Valve Upper Body" .

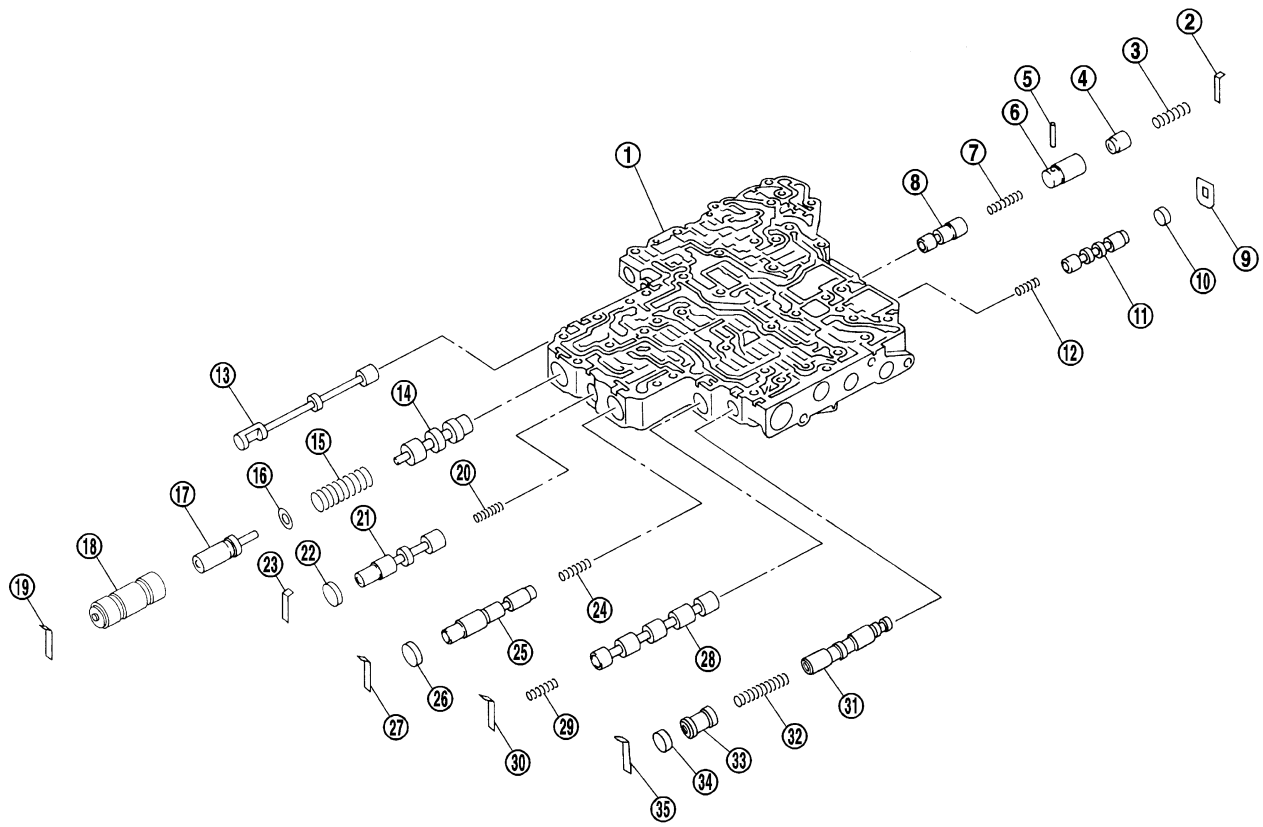
Control Valve Lower Body

ECS0067I

COMPONENTS

Apply ATF to all components before installation.

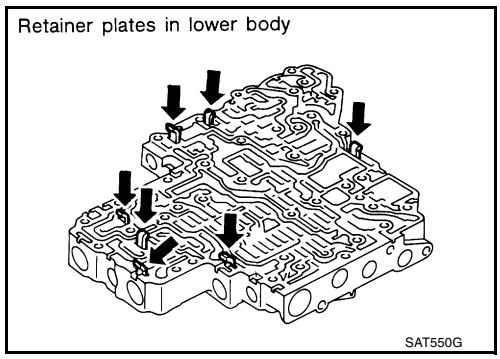
SEC. 317



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. Manual valve
14. Pressure regulator valve
15. Return spring
16. Spring seat
17. Plug
18. Sleeve
19. Retainer plate
20. Return spring
21. Overrun clutch control valve
22. Plug
23. Retainer plate
24. Return spring
25. Accumulator control valve
26. Plug
27. Retainer plate
28. Shift valve A
29. Return spring
30. Retainer plate
31. Shuttle valve
32. Return spring
33. Plug
34. Plug
35. Retainer plate

DISASSEMBLY

- Remove valves at retainer plate.
  For removal procedures, refer to AT-687, "DISASSEMBLY" .



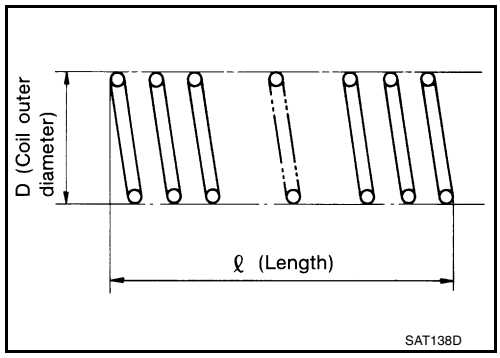
INSPECTION

Valve Springs

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.

  Inspection standard : Refer to AT-751, "CONTROL VALVE AND PLUG RETURN SPRINGS" .

- Replace valve springs if deformed or fatigued.

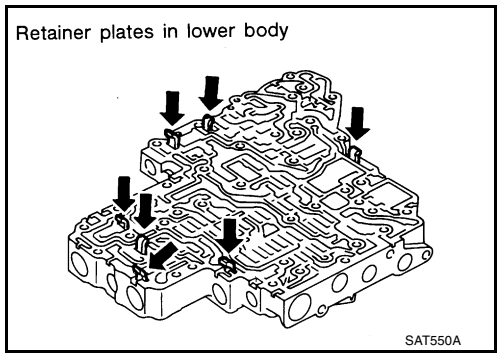


Control Valves

- Check sliding surfaces of control valves, sleeves and plugs for damage.

ASSEMBLY

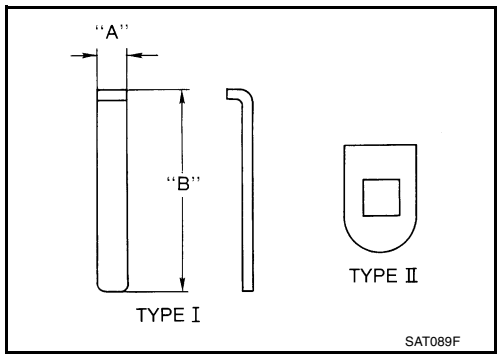
- Install control valves.
  For installation procedures, refer to AT-688, "ASSEMBLY" .



Retainer Plate (Lower Body)

Unit: mm (in)

No.	Name of control valve and plug	Width A	Length B	Type
19	Pressure regulator valve	6.0 (0.236)	28.0 (1.102)	I
27	Accumulator control valve			
30	Shift valve A			
23	Overrun clutch control valve			
2	Pressure modifier valve			
35	Shuttle valve			
9	Shift valve B	—	—	II

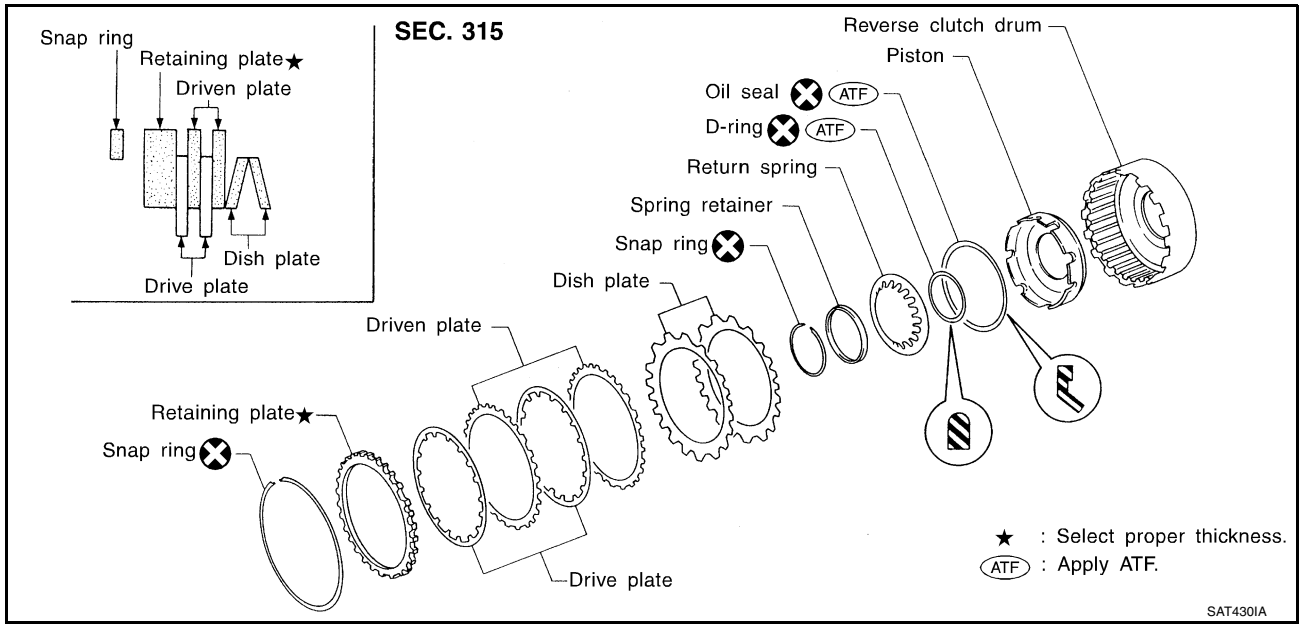


- Install proper retainer plates.
  Refer to AT-689, "Control Valve Lower Body" .

Reverse Clutch

ECS0067J

COMPONENTS



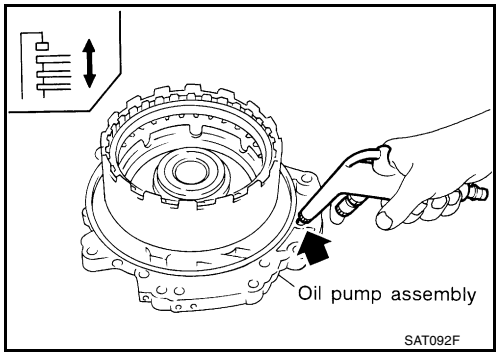
DISASSEMBLY

1. Check operation of reverse clutch

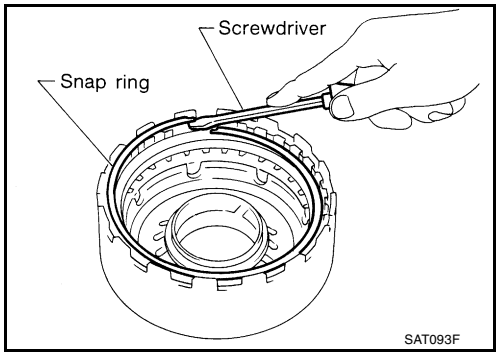
a. Install seal ring onto drum support of oil pump cover and install reverse clutch assembly. Apply compressed air to oil hole.

b. Check to see that retaining plate moves to snap ring.

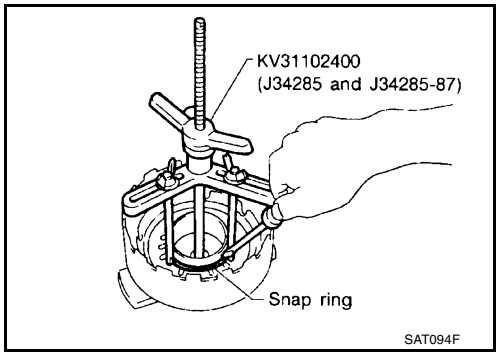
c. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Oil seal might be damaged.
   - Fluid might be leaking past piston check ball.



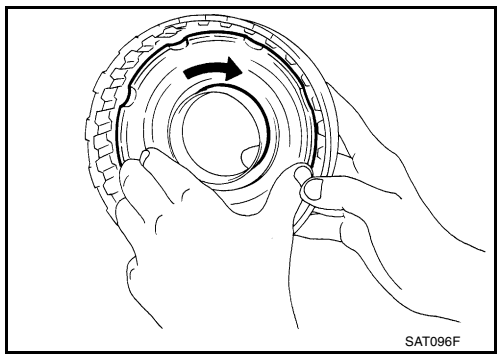
2. Remove snap ring.
3. Remove drive plates, driven plates, retaining plate, and dish plates.



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.



6. Remove piston from reverse clutch drum by turning it.
7. Remove D-ring and oil seal from piston.


SAT096F

INSPECTION

Reverse Clutch Snap Ring, Spring Retainer and Return Springs

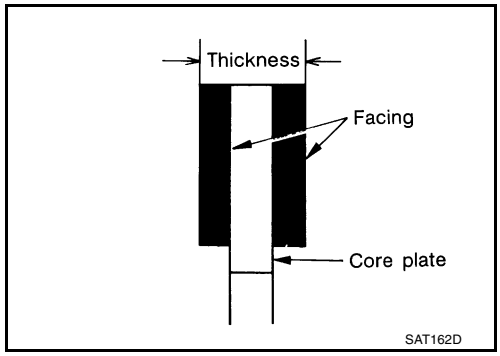
- Check for deformation, fatigue or damage.
  If necessary, replace.

Reverse Clutch Drive Plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:
Standard value : 1.6 mm (0.063 in)
Wear limit : 1.4 mm (0.055 in)

- If not within wear limit, replace.



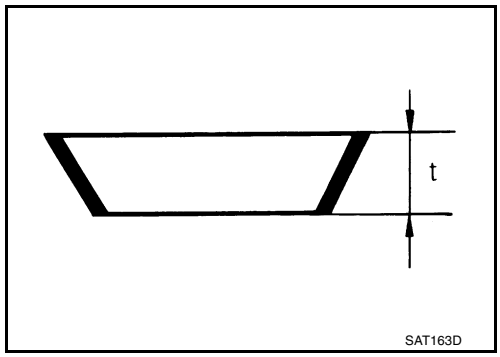
SAT162D

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.



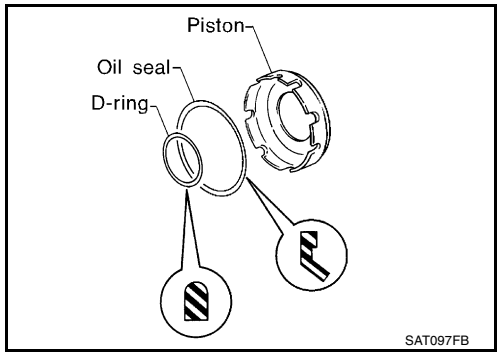
SAT163D

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.

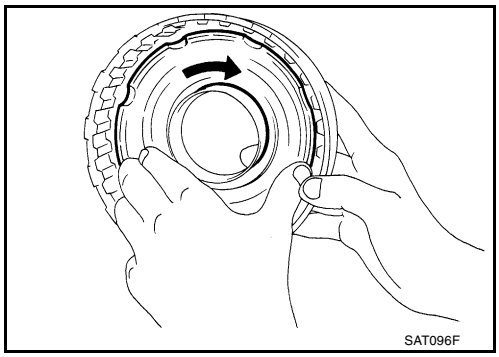
ASSEMBLY

1. Install D-ring and oil seal on piston.
   - **Take care with the direction of oil seal.**
   - **Apply ATF to both parts.**

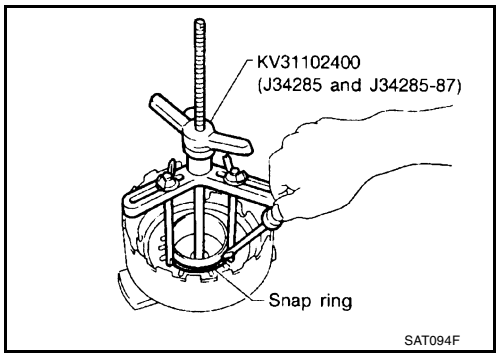


SAT097FB

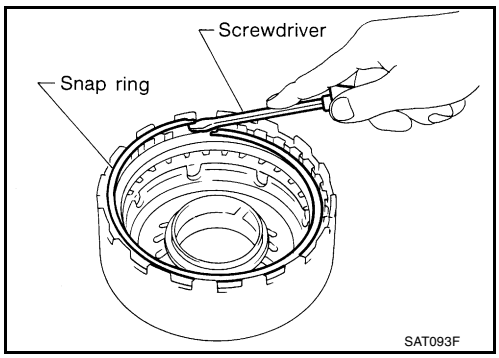
2. Install piston assembly by turning it slowly.
   - **Apply ATF to inner surface of drum.**



3. Install return springs and spring retainer on piston.

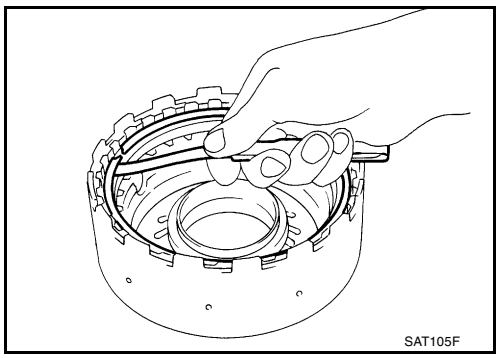


4. Set Tool on spring retainer and install snap ring while compressing return springs.
   - **Set Tool directly over return springs.**
5. Install drive plates, driven plates, retaining plate and dish plates.
   - **Take care with order of plates.**
6. Install snap ring.

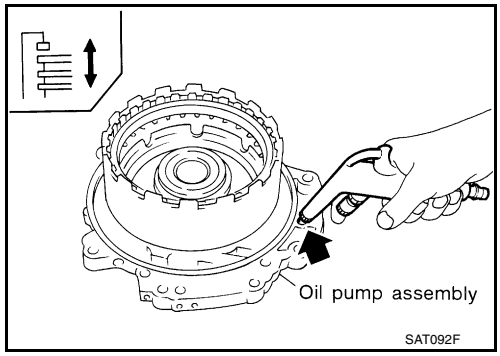


7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

Specified clearance	
Standard	**: 0.5 - 0.8 mm (0.020 - 0.031 in)**
Allowable limit	**: 1.2 mm (0.047 in)**
Retaining plate	**: Refer to AT-752, "REVERSE CLUTCH" .**



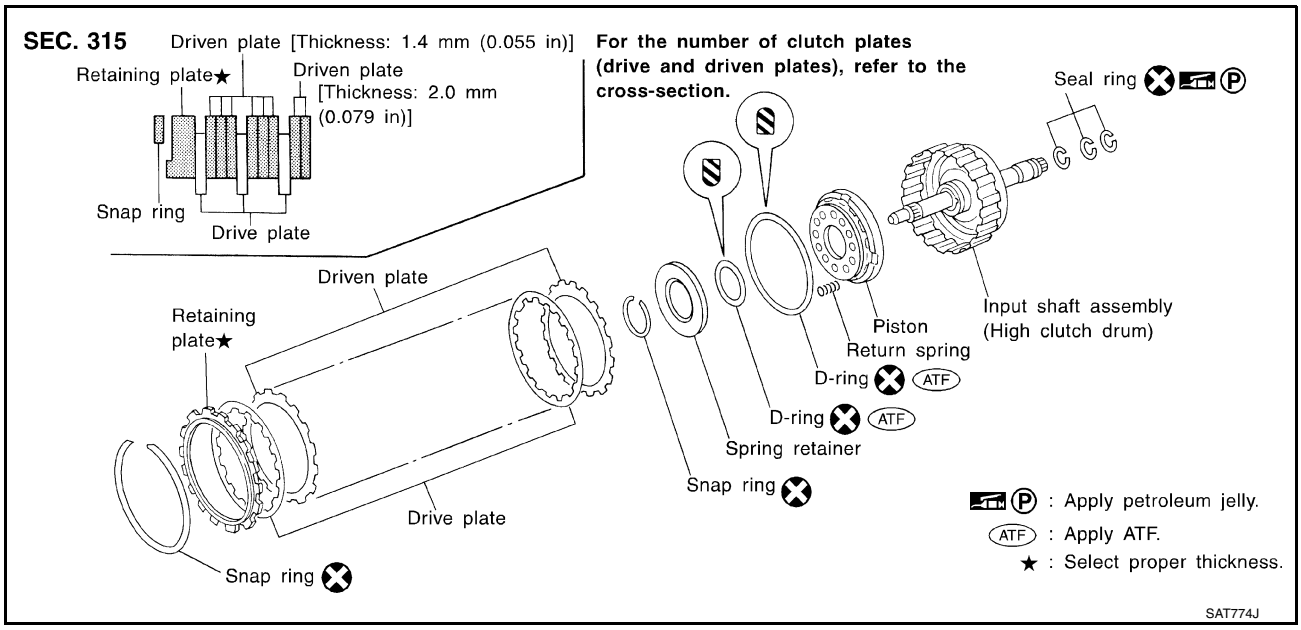
8. Check operation of reverse clutch.
Refer to AT-692, "DISASSEMBLY" .



High Clutch

ECS0067K

COMPONENTS



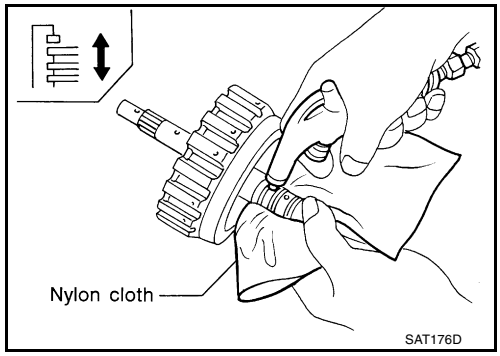
DISASSEMBLY

1. Check operation of high clutch.

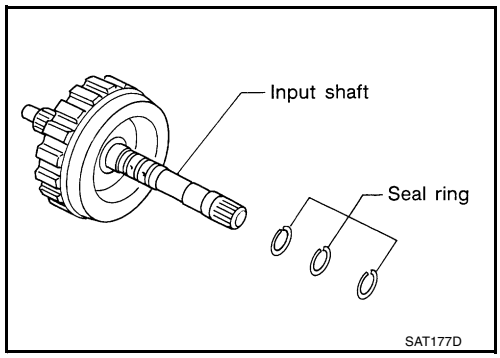
a. Apply compressed air to oil hole of input shaft with nylon cloth.
- **Stop up hole on opposite side of input shaft with nylon cloth.**

b. Check to see that retaining plate moves to snap ring.

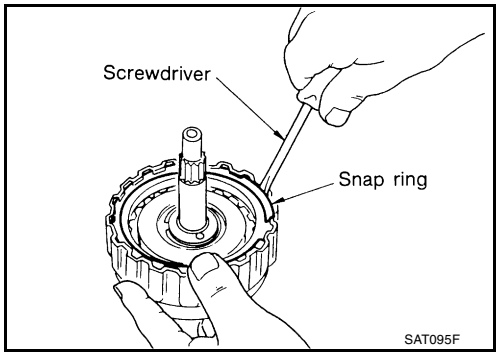
c. If retaining plate does not contact snap ring:
- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.



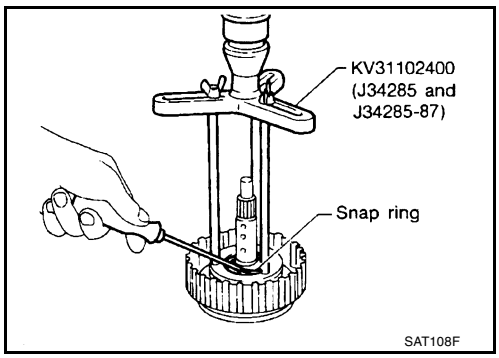
2. Remove seal rings from input shaft.
- **Always replace when removed.**



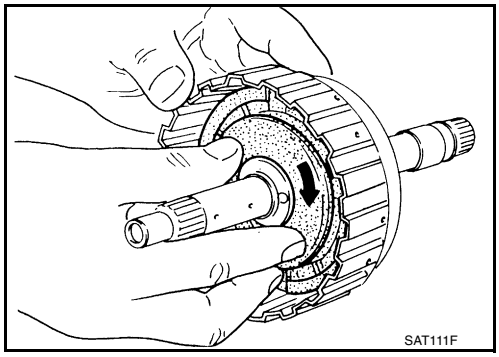
3. Remove snap ring.
4. Remove drive plates, driven plates and retaining plate.



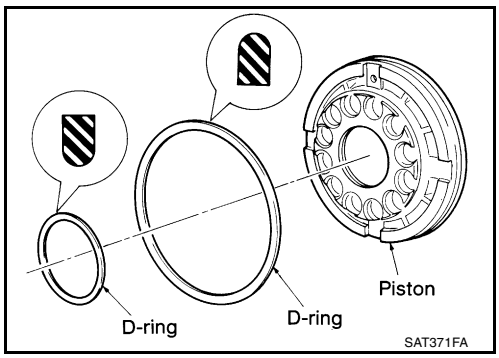
5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.
   - **Set Tool directly over springs.**
   - **Do not expand snap ring excessively.**
6. Remove spring retainer and return springs.



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.**

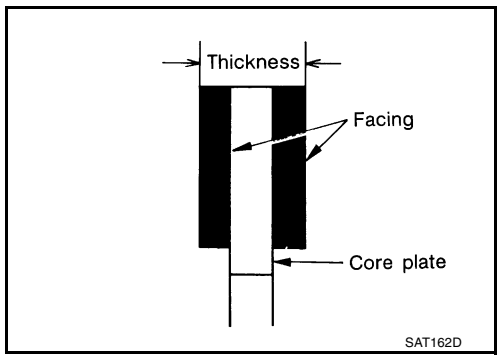
High Clutch Drive Plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

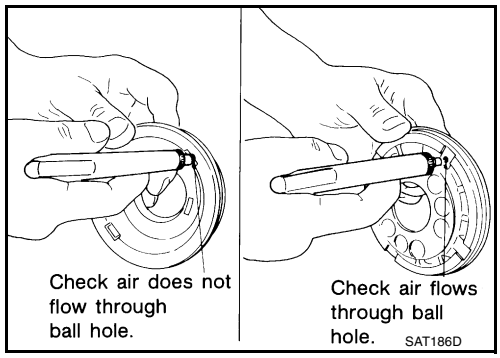
Standard value	**: 1.6 mm (0.063 in)**
Wear limit	**: 1.4 mm (0.055 in)**

- If not within wear limit, replace.



High Clutch 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.

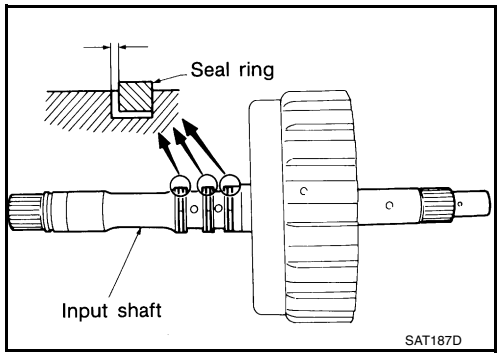


Seal Ring Clearance

- Install new seal rings onto input shaft.
- Measure clearance between seal ring and ring groove.

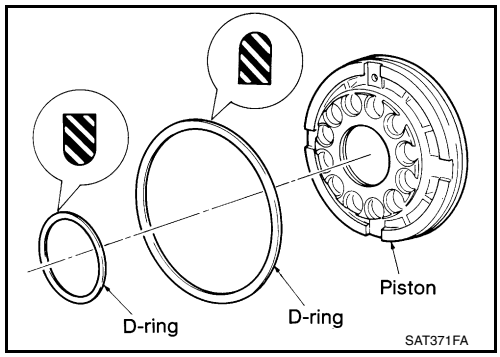
Standard clearance	**: 0.08 - 0.23 mm (0.0031 - 0.0091 in)**
Allowable limit	**: 0.23 mm (0.0091 in)**

- If not within allowable limit, replace input shaft assembly.

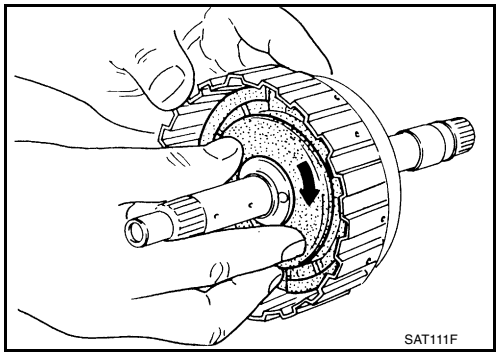


ASSEMBLY

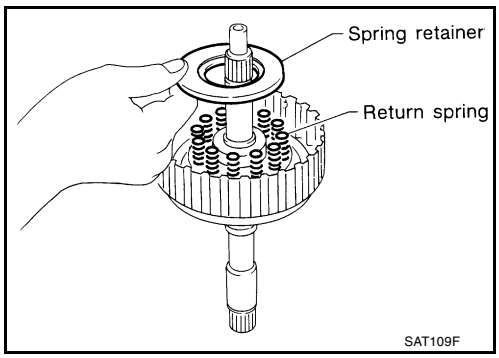
1. Install D-rings on piston.
   - **Apply ATF to both parts.**



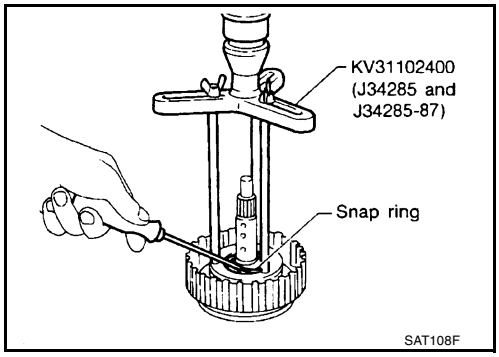
2. Install piston assembly by turning it slowly.
   - **Apply ATF to inner surface of drum.**



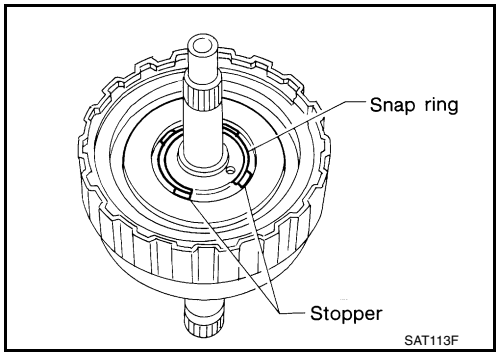
3. Install return springs and spring retainer on piston.



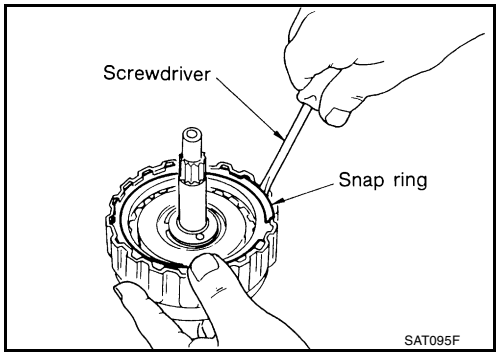
4. Set Tool on spring retainer and install snap ring while compressing return springs.
   - **Set Tool directly over return springs.**



   - **Do not align snap ring gap with spring retainer stopper.**



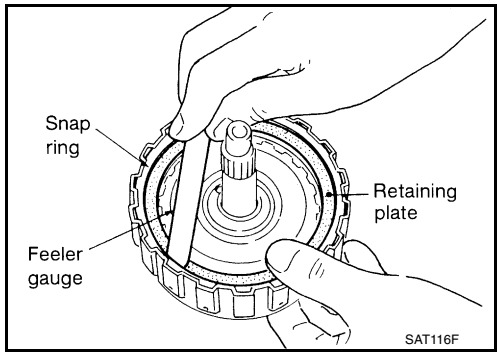
5. Install drive plates, driven plates and retaining plate.
   - **Take care with the order and direction of plates.**



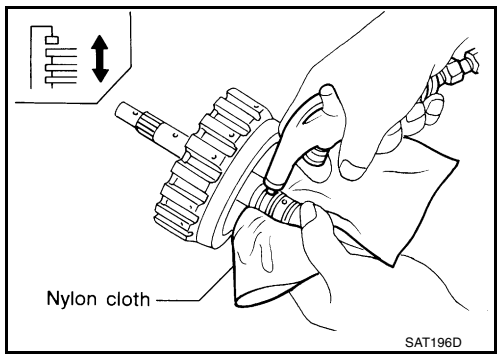
6. Install snap ring.
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

Specified clearance

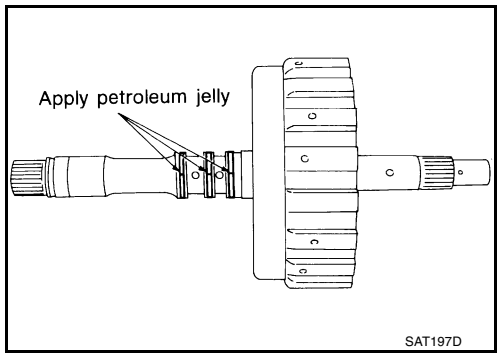
Standard	**: 1.8 - 2.2 mm (0.071 - 0.087 in)**
Allowable limit	**: 2.8 mm (0.110 in)**
Retaining plate	**: Refer to AT-752, "HIGH CLUTCH" .**



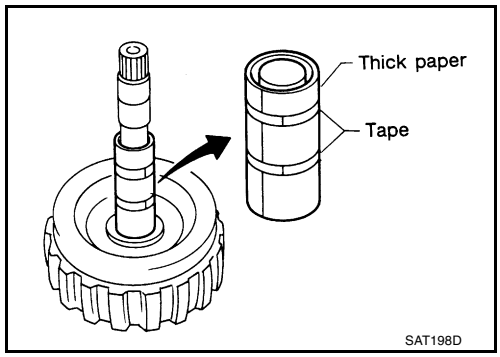
8. Check operation of high clutch.
Refer to AT-695, "DISASSEMBLY" .



9. Install seal rings to input shaft.
   - **Apply petroleum jelly to seal rings.**
   - **Always replace when removed.**



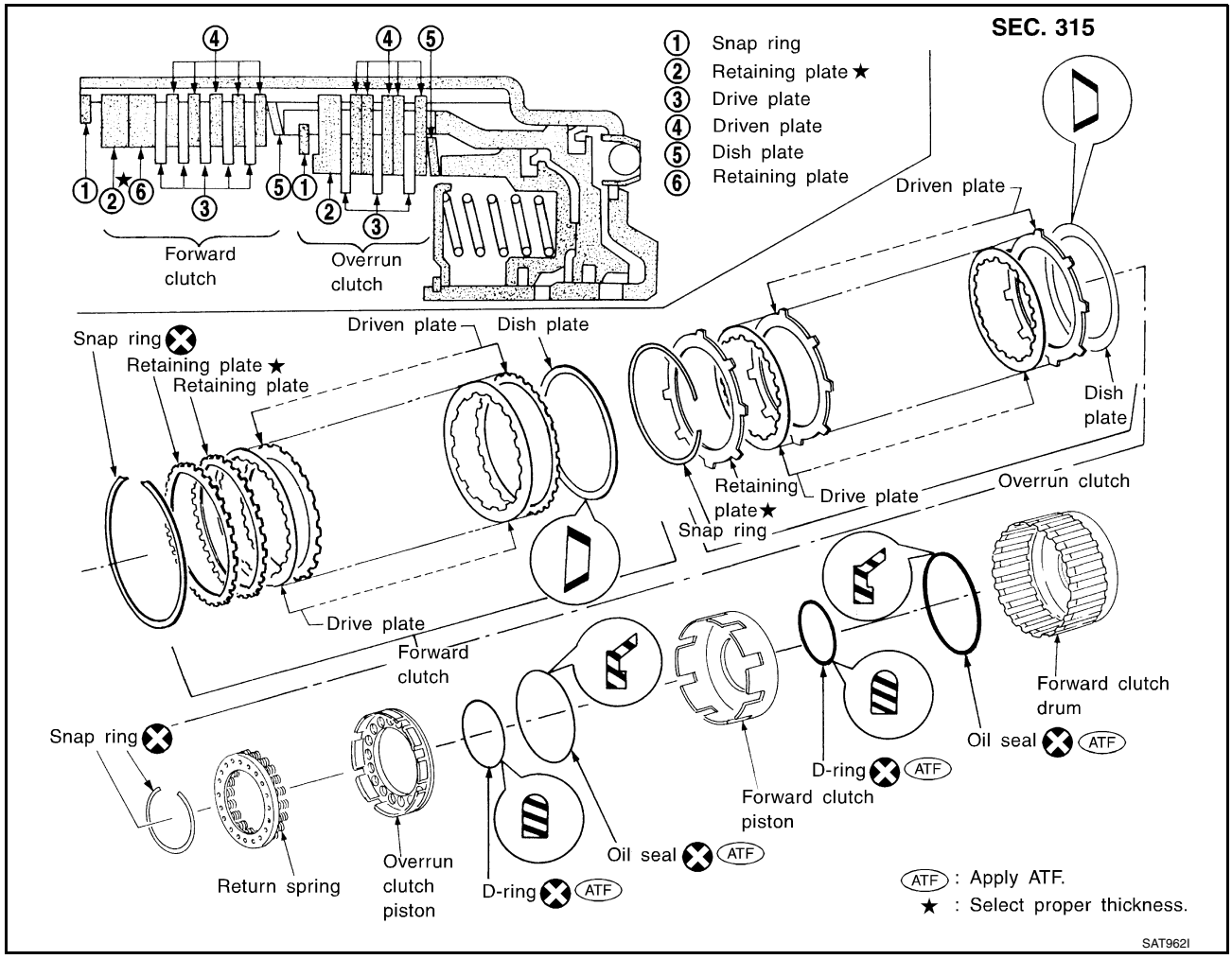
   - **Roll paper around seal rings to prevent seal rings from spreading.**



Forward And Overrun Clutches

ECS0067L

COMPONENTS



DISASSEMBLY

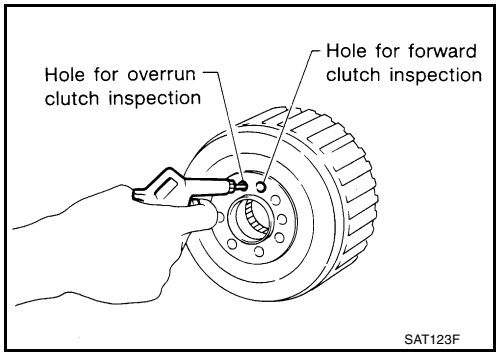
1. Check operation of forward clutch and overrun clutch.

a. Install bearing retainer on forward clutch drum.

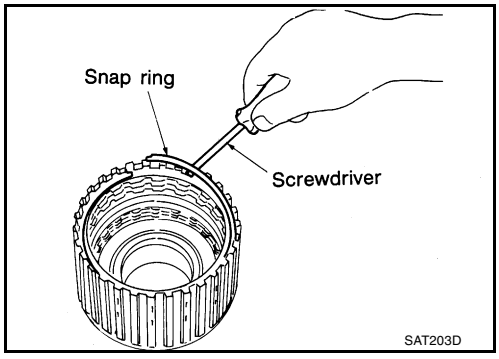
b. Apply compressed air to oil hole of forward clutch drum.

c. Check to see that retaining plate moves to snap ring.

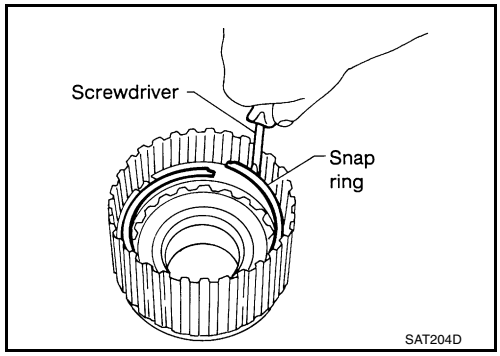
d. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Oil seal might be damaged.
   - Fluid might be leaking past piston check ball.



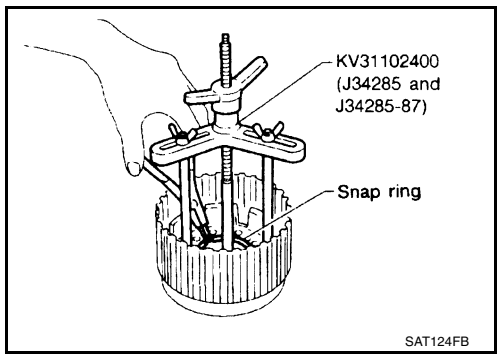
2. Remove snap ring for forward clutch.
3. Remove drive plates, driven plates, retaining plate and dish plate for forward clutch.



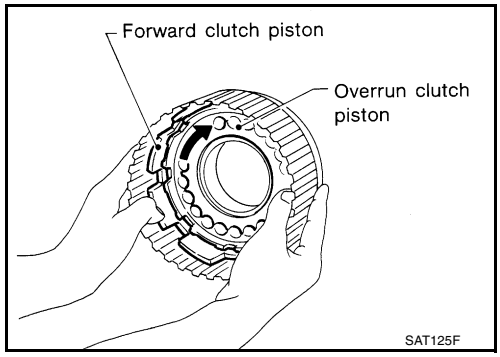
4. Remove snap ring for overrun clutch.
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.



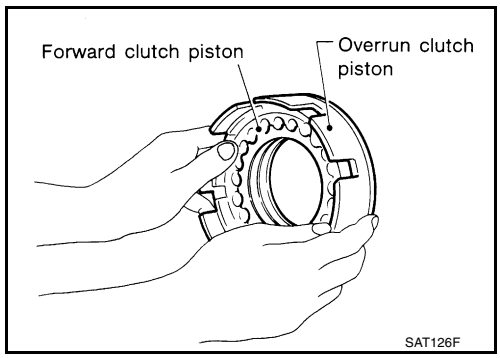
6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.
   - **Set Tool directly over return springs.**
   - **Do not expand snap ring excessively.**
7. Remove spring retainer and return springs.
   - **Do not remove return springs from spring retainer.**



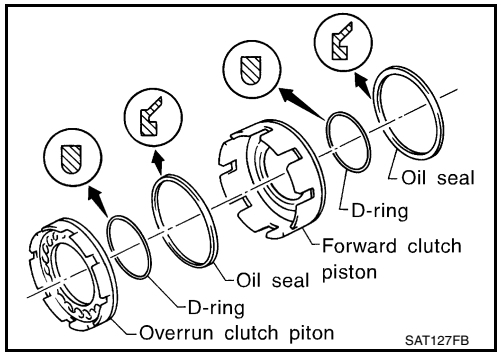
8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.



9. Remove overrun clutch piston from forward clutch piston by turning it.



10. Remove D-rings and oil seals from forward clutch piston and overrun clutch piston.



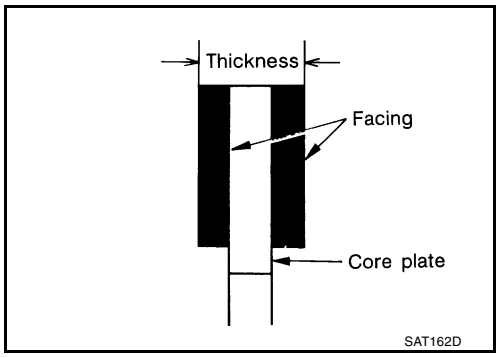
INSPECTION

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.



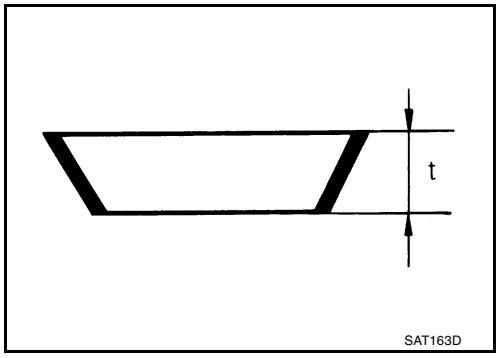
Thickness of drive plate:

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.



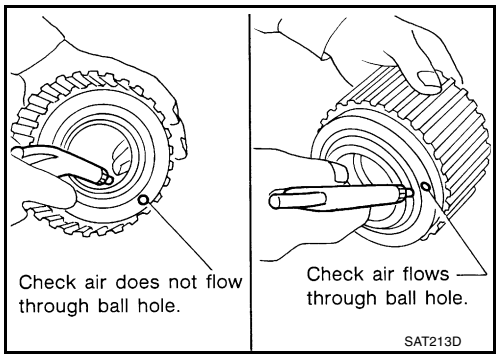
Thickness of dish plate

Forward clutch	**: 2.7 mm (0.106 in)**
Overrun clutch	**: 2.7 mm (0.106 in)**

- If deformed or fatigued, replace.

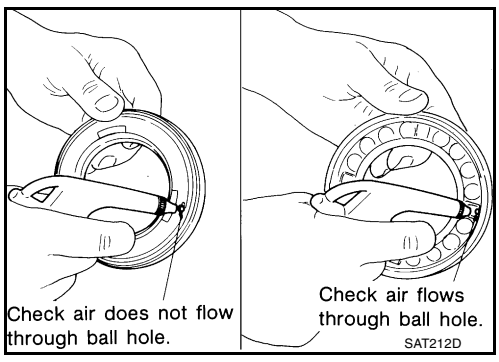
Forward Clutch Drum

- 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.



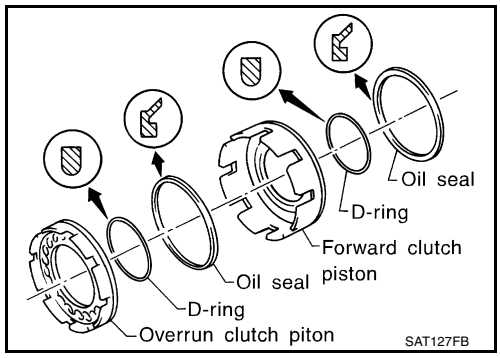
Overrun Clutch Piston

- 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.

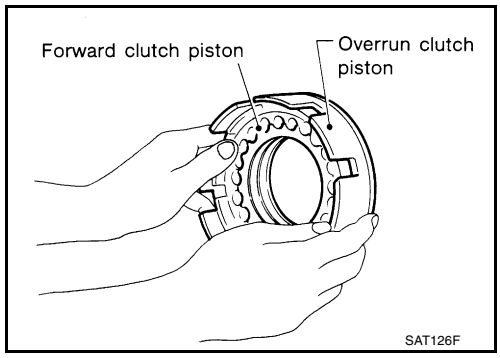


ASSEMBLY

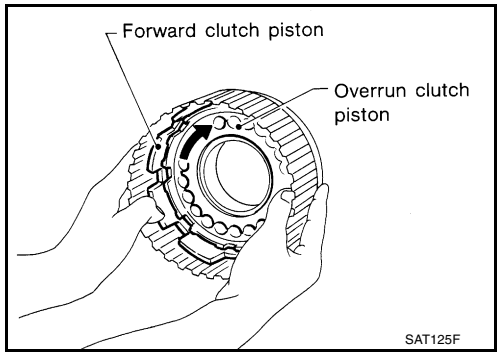
1. Install D-rings and oil seals on forward clutch piston and overrun clutch piston.
   - **Take care with direction of oil seal.**
   - **Apply ATF to both parts.**



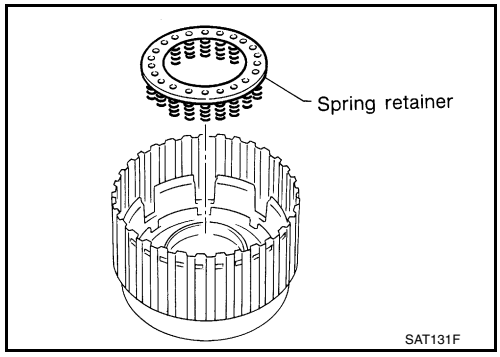
2. Install overrun clutch piston assembly on forward clutch piston by turning it slowly.
   - **Apply ATF to inner surface of forward clutch piston.**



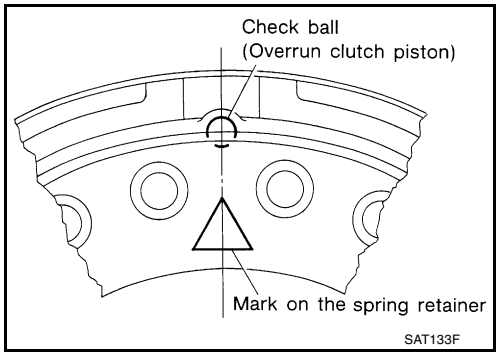
3. Install forward clutch piston assembly on forward clutch drum by turning it slowly.
   - **Apply ATF to inner surface of drum.**



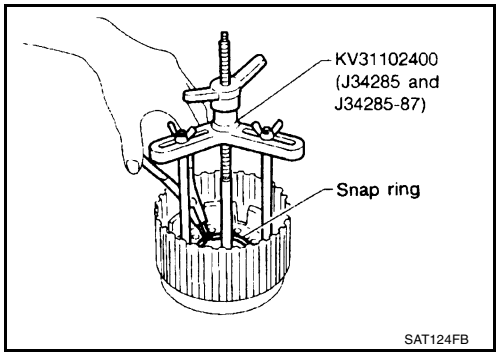
4. Install return spring on overrun clutch piston.



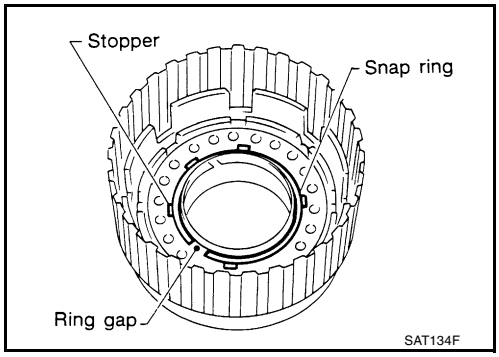
- Align the mark on spring retainer with check ball in overrun clutch piston.



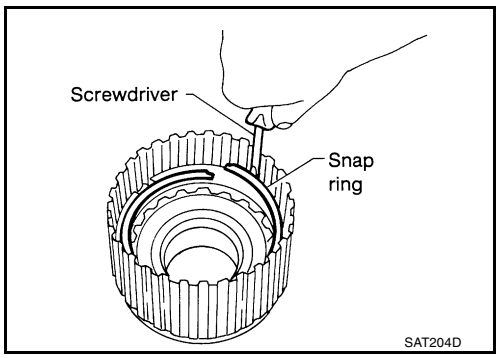
5. Set Tool on spring retainer and install snap ring while compressing return springs.
   - **Set Tool directly over return springs.**



   - **Do not align snap ring gap with spring retainer stopper.**



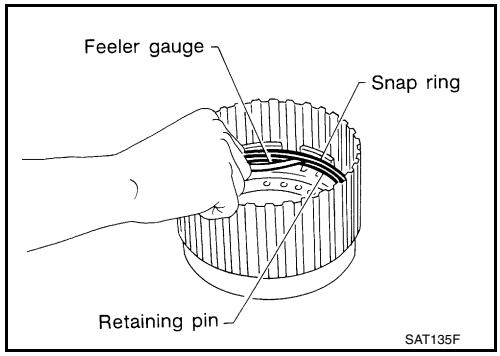
6. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
   - **Take care with order of plates.**



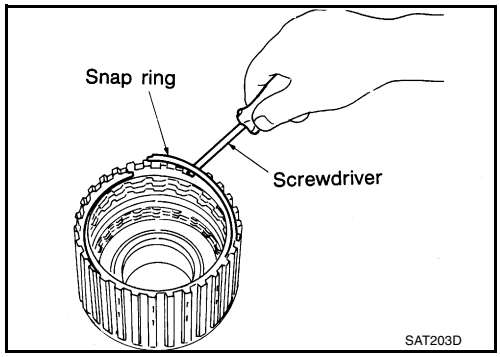
7. Install snap ring for overrun clutch.

8. Measure clearance between overrun clutch retaining plate and snap ring.
If not within allowable limit, select proper retaining plate.

Specified clearance	
Standard	**: 0.7 - 1.1 mm (0.028 - 0.043 in)**
Allowable limit	**: 1.7 mm (0.067 in)**
Overrun clutch retaining plate	**Refer to AT-753, "OVERRUN CLUTCH" .**

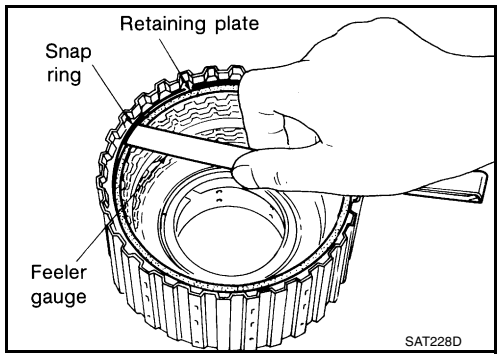


9. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.
   - **Take care with order of plates.**
10. Install snap ring for forward clutch.

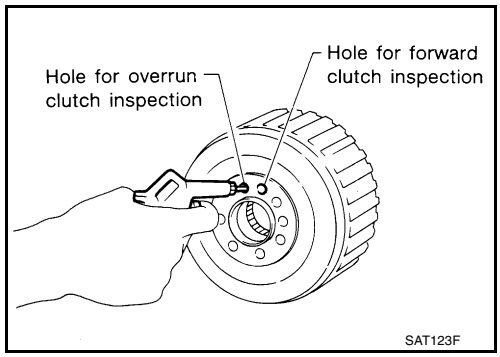


11. Measure clearance between forward clutch retaining plate and snap ring.
If not within allowable limit, select proper retaining plate.

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 AT-752, "FORWARD CLUTCH" .**



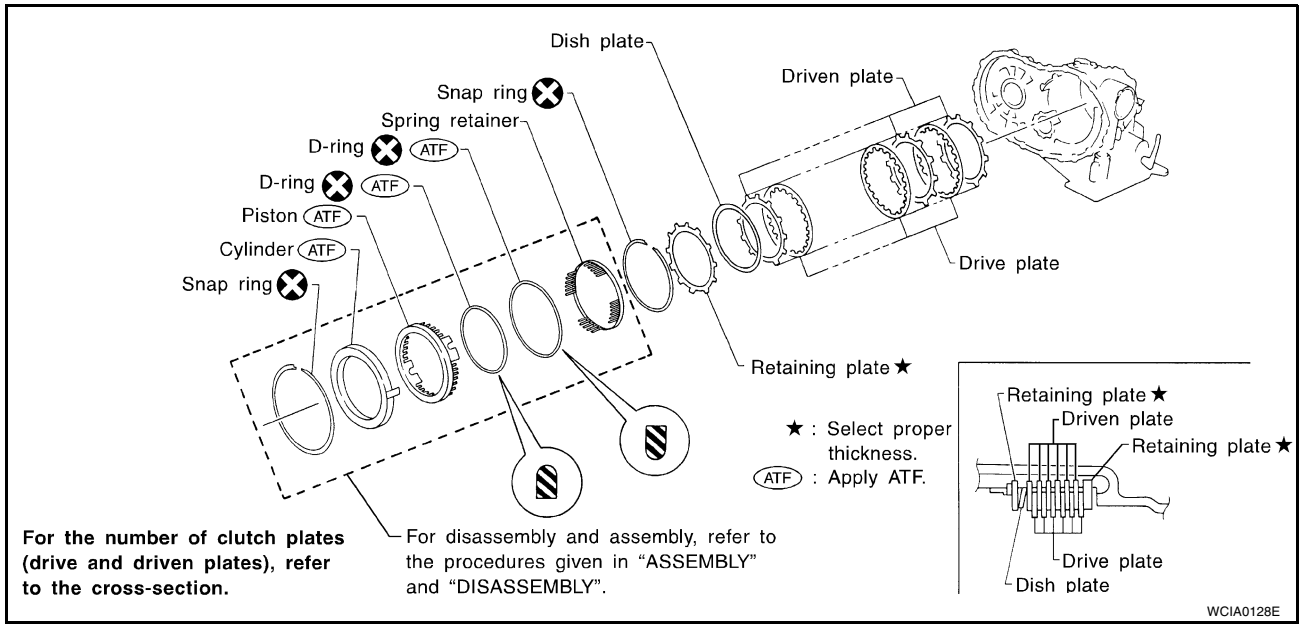
12. Check operation of forward clutch.
Refer to AT-700, "DISASSEMBLY" .
13. Check operation of overrun clutch.
Refer to AT-700, "DISASSEMBLY" .



Low & Reverse Brake

ECS0067M

COMPONENTS



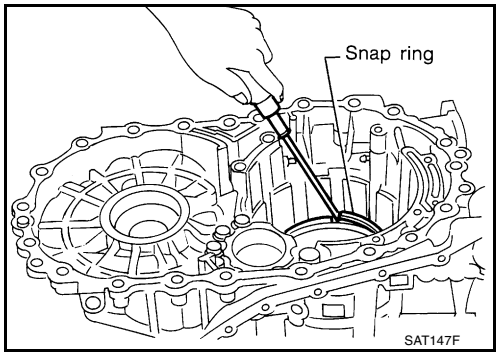
DISASSEMBLY

1. Check operation of low & reverse brake.

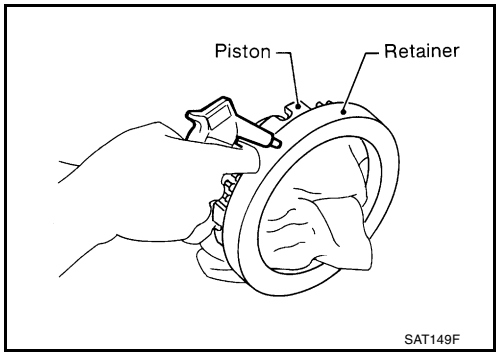
a. Apply compressed air to oil hole of transmission case.

b. Check to see that retaining plate moves to snap ring.

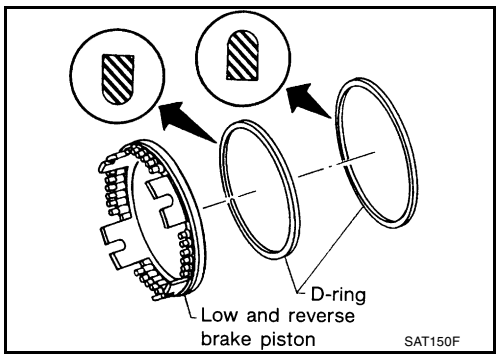
c. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Fluid might be leaking past piston check ball.



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.



INSPECTION

Low and Reverse Brake 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.**

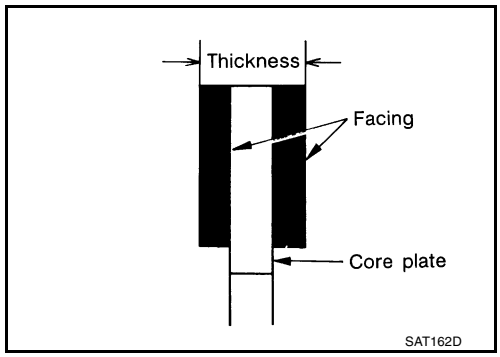
Low and Reverse Brake Drive Plate

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate

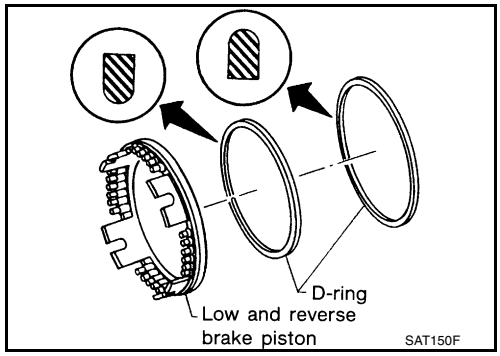
Standard value	**: 1.8 mm (0.071 in)**
Wear limit	**: 1.6 mm (0.063 in)**

- If not within wear limit, replace.

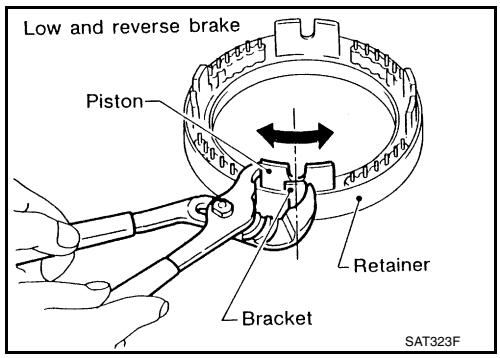


ASSEMBLY

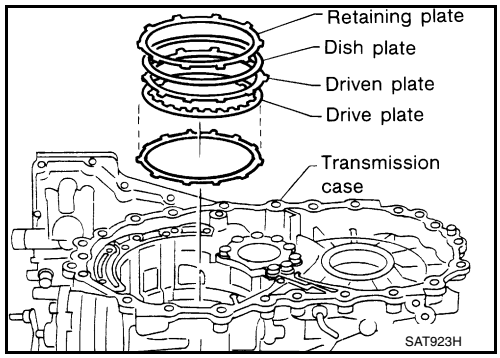
1. Install D-rings on piston.
   - **Apply ATF to both parts.**



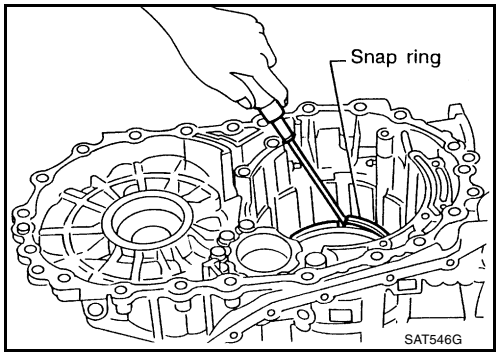
2. Set and align piston with retainer.
   - **This operation is required in order to engage the protrusions of piston to return springs correctly.**
     Further procedures are given in "ASSEMBLY". Refer to AT-727, "ASSEMBLY" .



3. Install driven plates, drive plates, retaining plate and dish plate on transmission case.
   - **Take care with order of plates and direction of dish plate.**

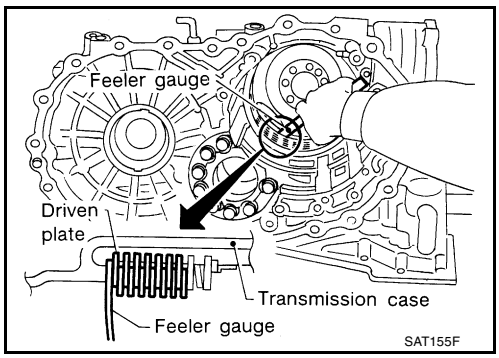


4. Install snap ring.



5. Measure clearance between driven plate and transmission case. If not within allowable limit, select proper retaining plate. (front side)

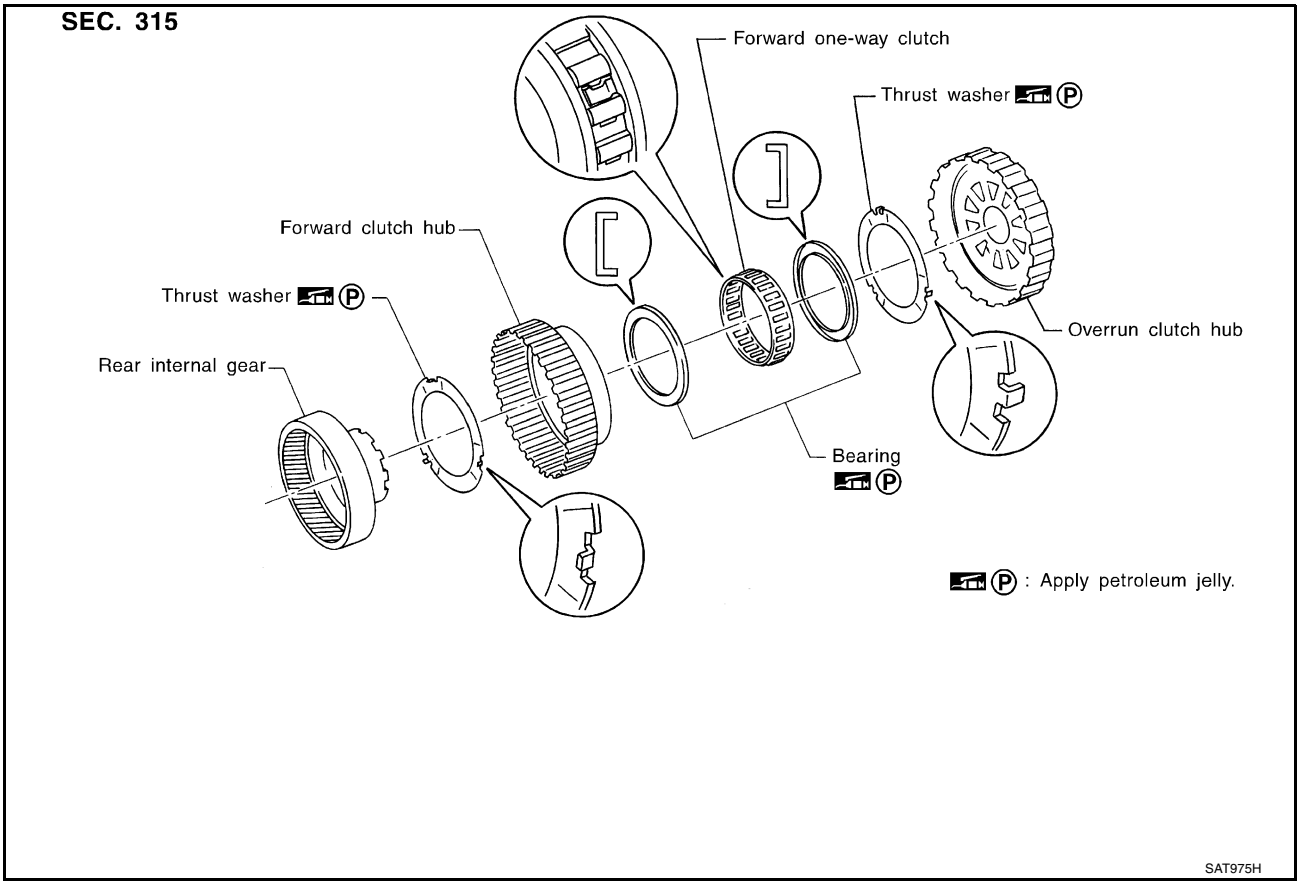
Specified clearance	
Standard	**: 1.7 - 2.1 mm (0.067 - 0.083 in)**
Allowable limit	**: 3.3 mm (0.130 in)**
Retaining plate	**Refer to AT-753, "LOW & REVERSE BRAKE" .**



Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

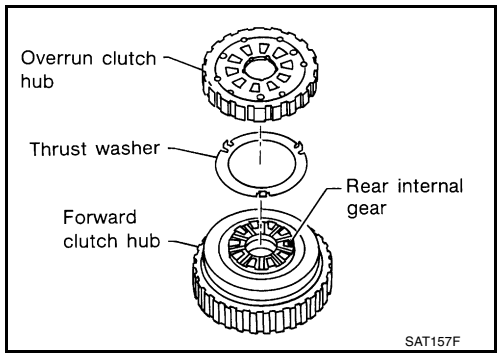
ECS0067N

COMPONENTS

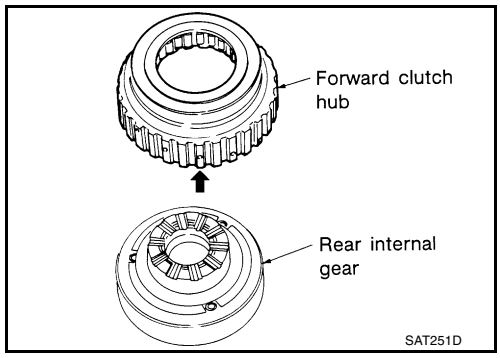


DISASSEMBLY

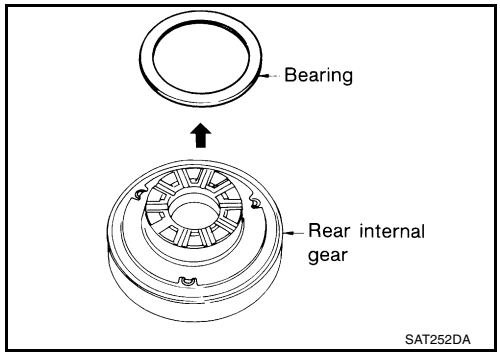
1. Remove overrun clutch hub and thrust washer from forward clutch hub.



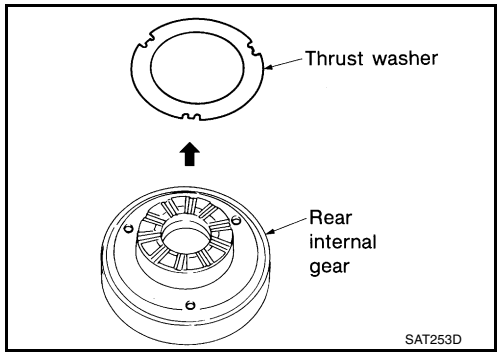
2. Remove forward clutch hub from rear internal gear.



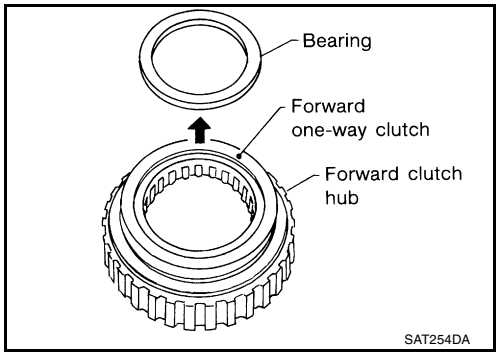
3. Remove bearing from rear internal gear.



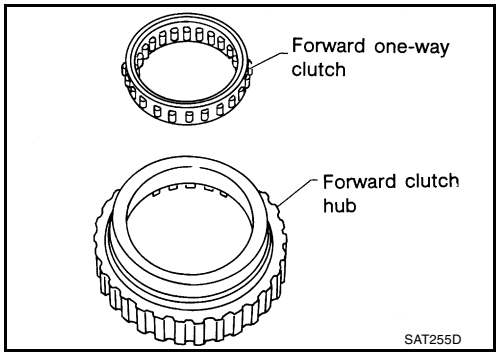
4. Remove thrust washer from rear internal gear.



5. Remove bearing from forward one-way clutch.



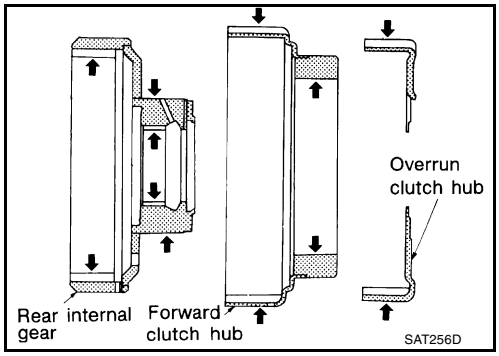
6. Remove forward one-way clutch from forward clutch hub.



INSPECTION

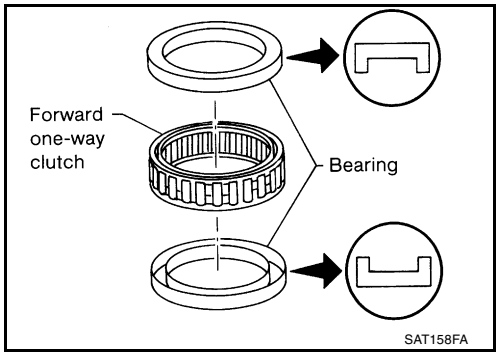
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

- Check rubbing surfaces for wear or damage.



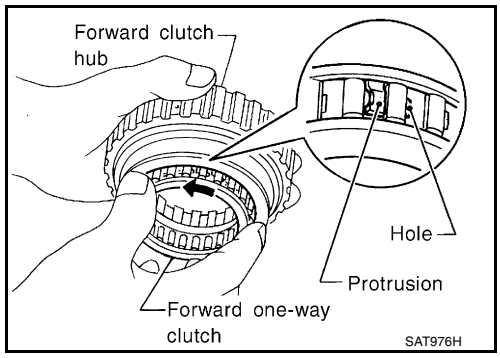
Bearings and Forward One-Way Clutch

- Check bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.

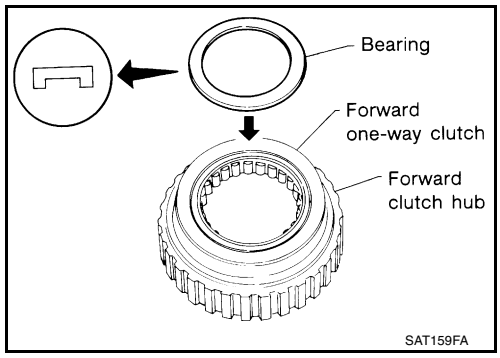


ASSEMBLY

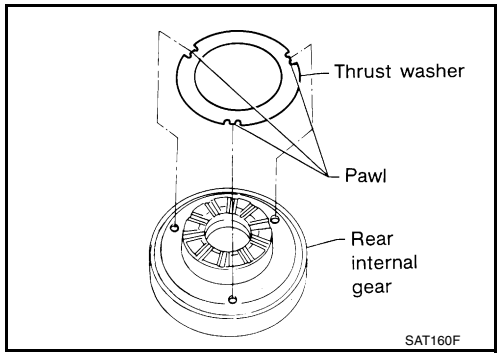
1. Install forward one-way clutch on forward clutch.
   - **Take care with the direction of forward one-way clutch.**



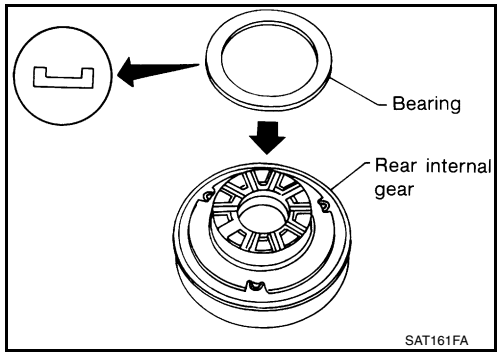
2. Install bearing on forward one-way clutch.
   - **Apply petroleum jelly to bearing.**



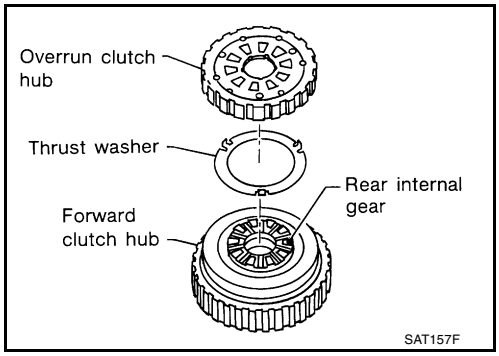
3. Install thrust washer on rear internal gear.
   - **Apply petroleum jelly to thrust washer.**
   - **Align hooks of thrust washer with holes of rear internal gear.**



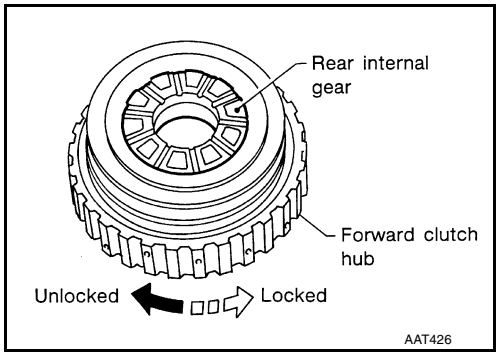
4. Install bearing on rear internal gear.
   - **Apply petroleum jelly to bearing.**



5. Install 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.**



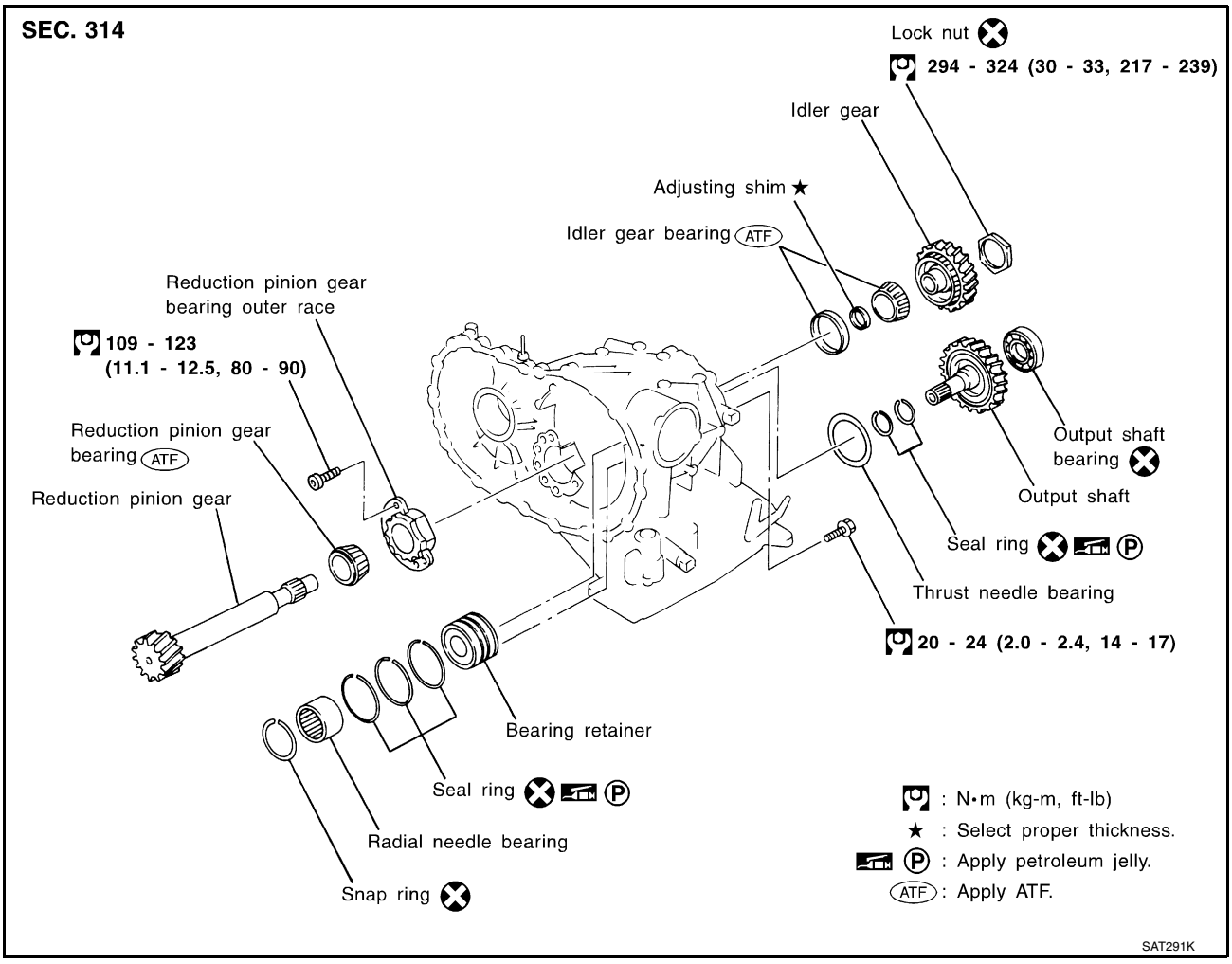
6. Install forward clutch hub on rear internal gear.
   - **Check operation of forward one-way clutch.**
     Hold rear internal gear and turn forward clutch hub.
     Check forward clutch hub for correct locking and unlocking directions.
   - **If not as shown in illustration, check installation direction of forward one-way clutch.**



Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer

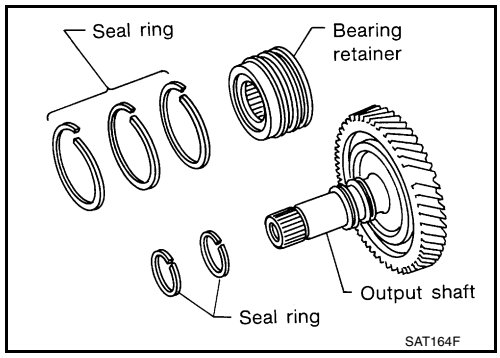
ECS0067O

COMPONENTS

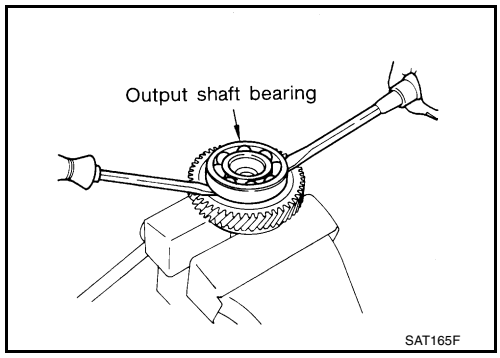


DISASSEMBLY

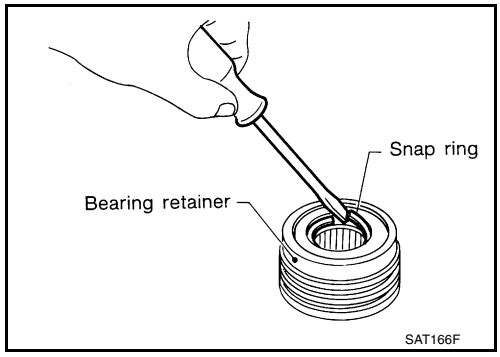
1. Remove seal rings from output shaft and bearing retainer.



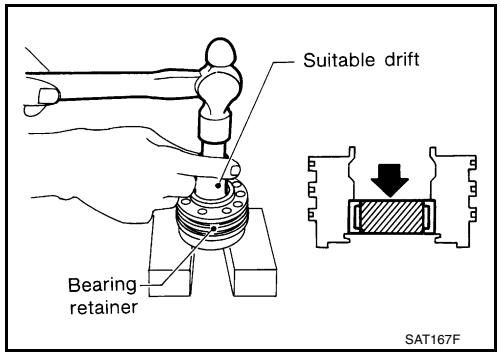
2. Remove output shaft bearing with screwdrivers.
   - **Always replace bearing with a new one when removed.**
   - **Do not damage output shaft.**



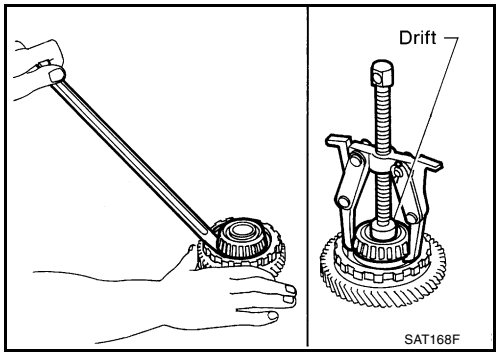
3. Remove snap ring from bearing retainer.



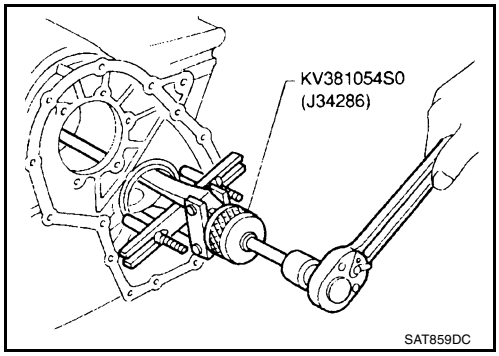
4. Remove needle bearing from bearing retainer.



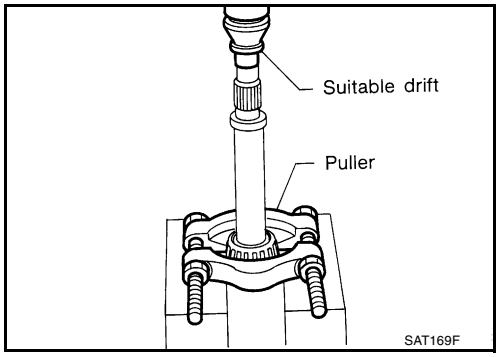
5. Remove idler gear bearing inner race from idler gear.



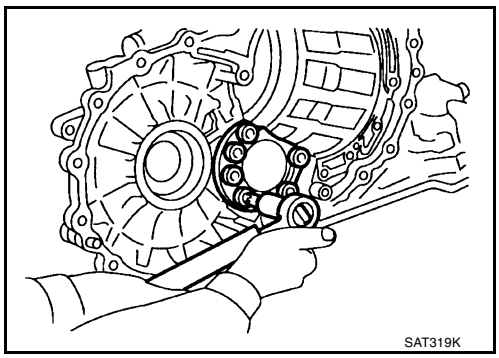
6. Remove idler gear bearing outer race from transmission case.



7. Press out reduction pinion gear bearing inner race from reduction pinion gear.



8. Remove reduction pinion gear bearing outer race from transmission case.



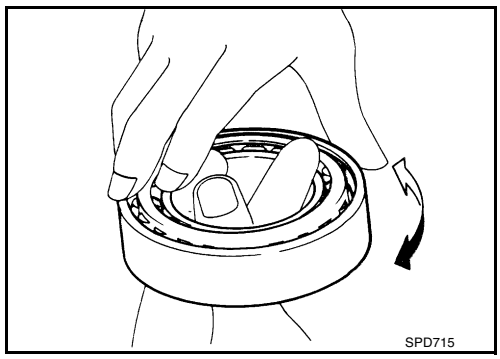
INSPECTION

Output Shaft, Idler Gear and Reduction Pinion Gear

- Check shafts for cracks, wear or bending.
- Check gears for wear, chips and cracks.

Bearing

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**

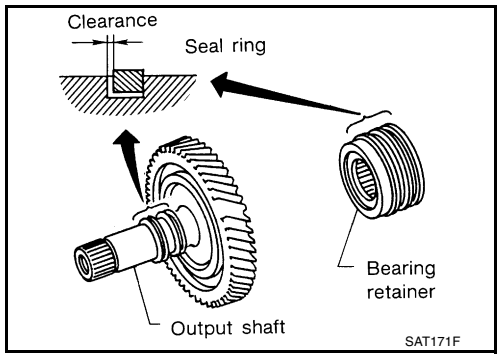


Seal Ring Clearance

- 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.

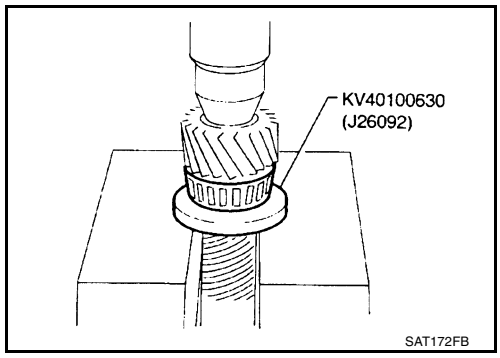
Standard clearance : **0.10 - 0.30 mm (0.0039 - 0.0118 in)**

Allowable limit : **0.30 mm (0.0118 in)**

- If not within allowable limit, replace bearing retainer.

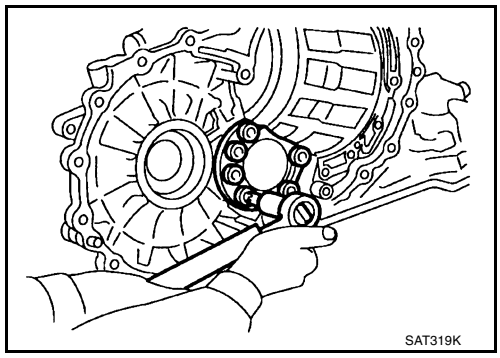
ASSEMBLY

1. Press reduction pinion gear bearing inner race on reduction pinion gear.

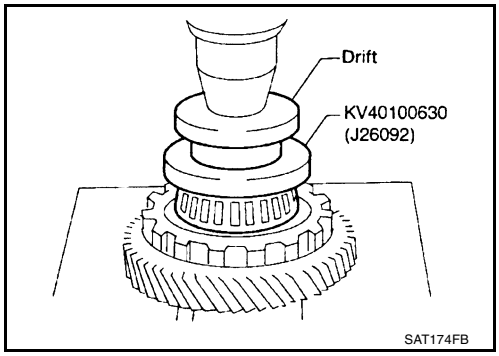


2. Install reduction pinion gear bearing outer race on transmission case.

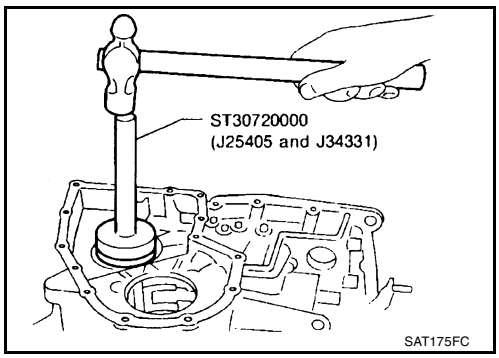
: **109 - 123 N·m (11.1 - 12.5 kg-m, 80 - 90 ft-lb)**



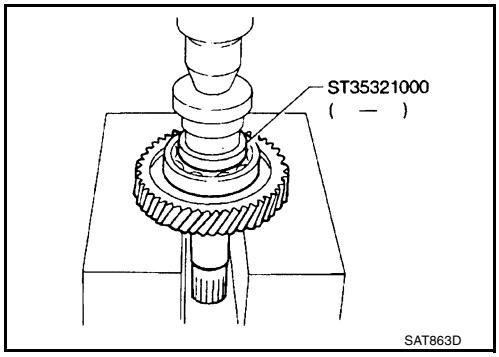
3. Press idler gear bearing inner race on idler gear.



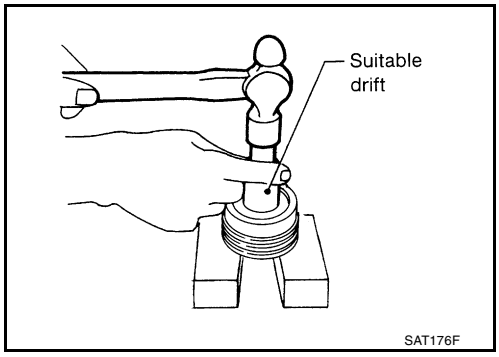
4. Install idler gear bearing outer race on transmission case.



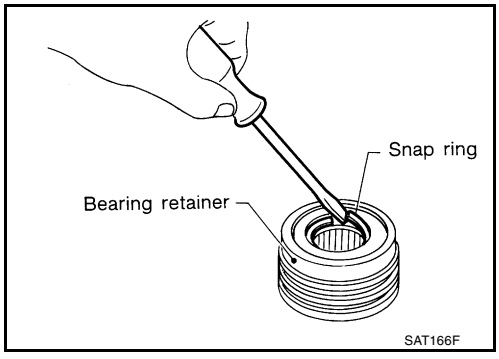
5. Press output shaft bearing on output shaft.



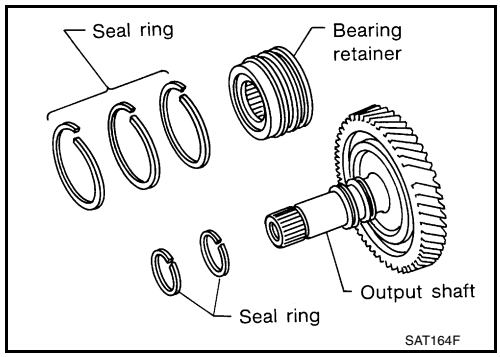
6. Press needle bearing on bearing retainer.



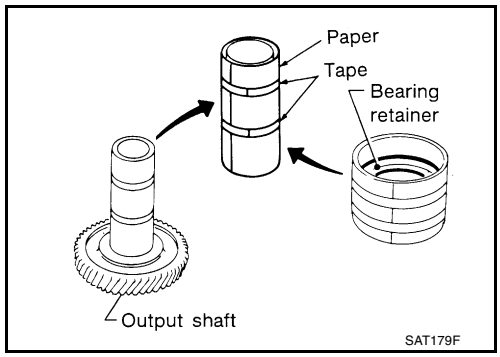
7. Install snap ring to bearing retainer.



8. After packing ring grooves with petroleum jelly, carefully install new seal rings on output shaft and bearing retainer.



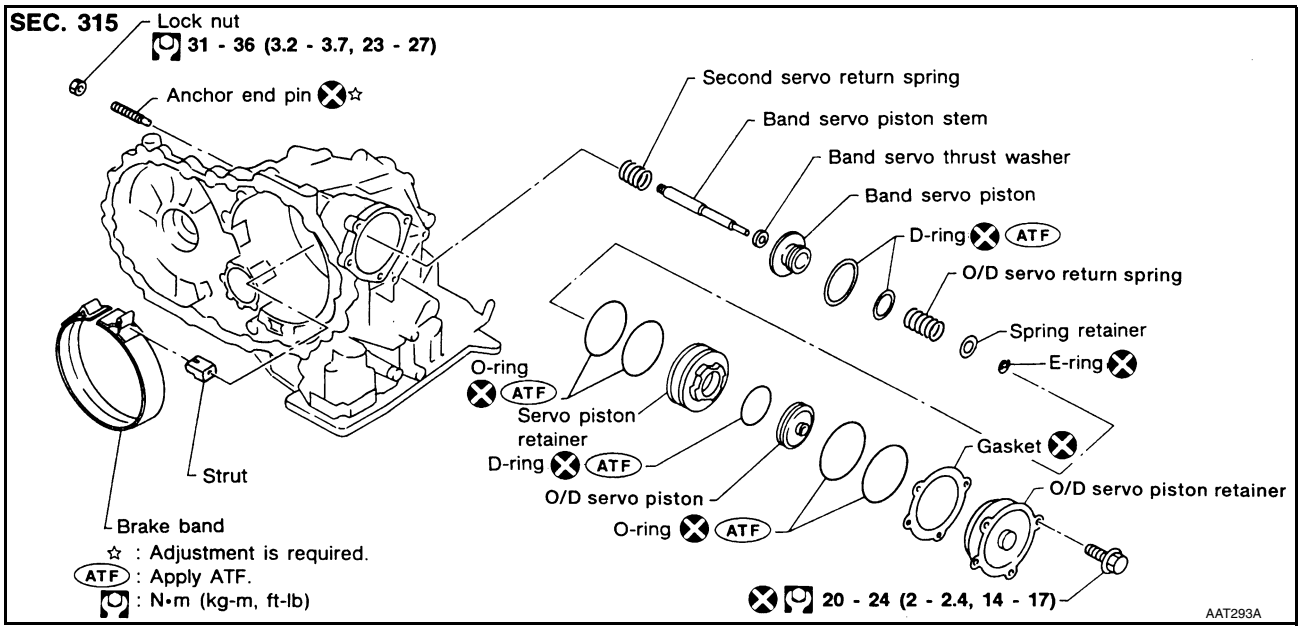
- **Roll paper around seal rings to prevent seal rings from spreading.**



Band Servo Piston Assembly

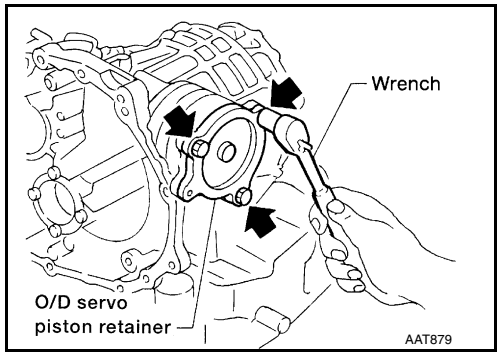
ECS0067P

COMPONENTS

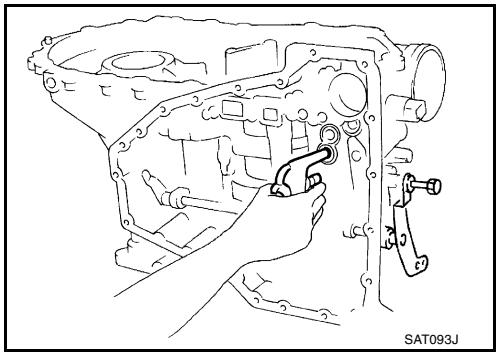


DISASSEMBLY

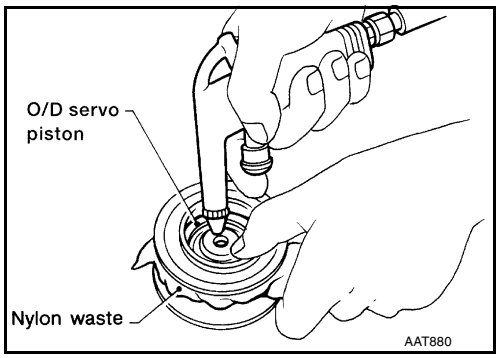
1. Remove band servo piston fixing bolts.



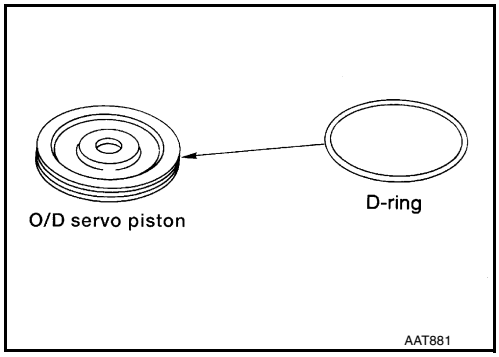
2. Apply compressed air to oil hole in transmission case to remove O/D servo piston retainer and band servo piston assembly.
   - **Hold band servo piston assembly with a rag or nylon waste.**



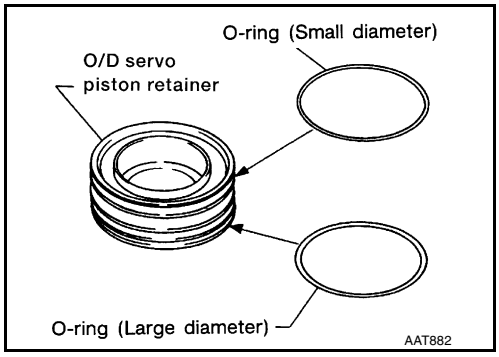
3. Apply compressed air to oil hole in O/D servo piston retainer to remove O/D servo piston from retainer.
   - **Hold O/D band servo piston while applying compressed air.**



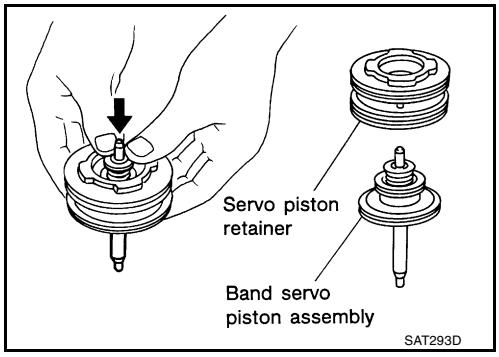
4. Remove D-ring from O/D servo piston.



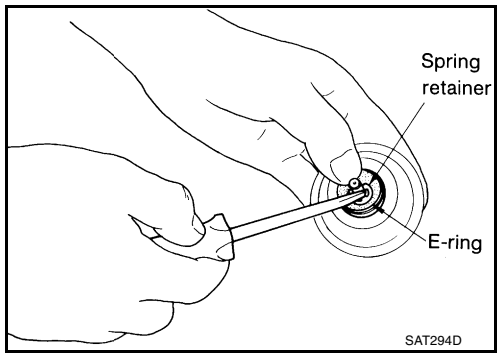
5. Remove O-rings from O/D servo piston retainer.



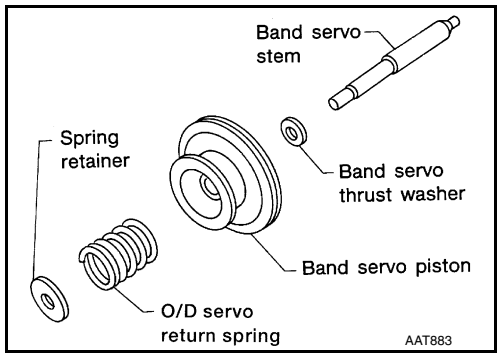
6. Remove band servo piston assembly from servo piston retainer by pushing it forward.



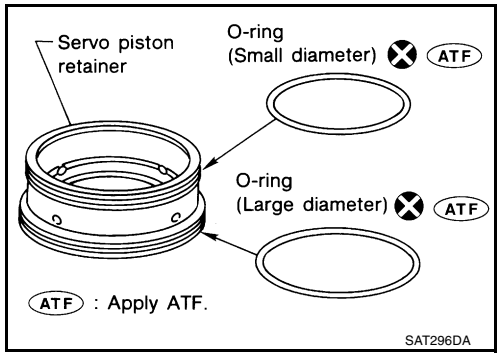
7. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.



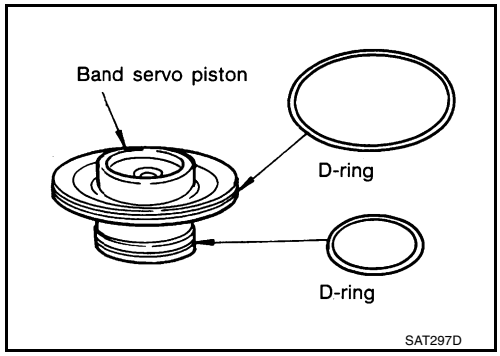
8. Remove O/D servo return spring, band servo thrust washer and band servo piston stem from band servo piston.



9. Remove O-rings from servo piston retainer.



10. Remove D-rings from band servo piston.



INSPECTION

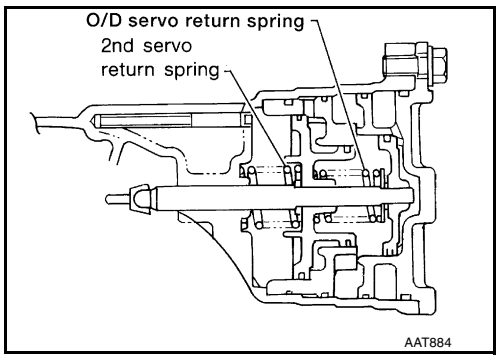
Pistons, Retainers and Piston Stem

- Check frictional surfaces for abnormal wear or damage.

Return Springs

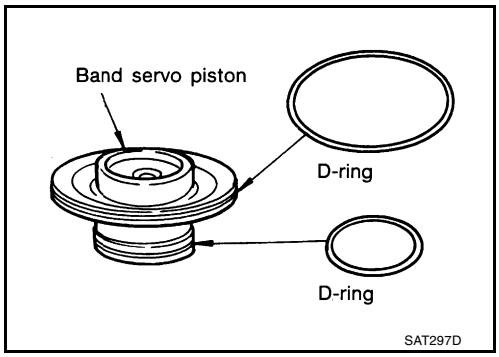
- Check for deformation or damage.
- Measure free length and outer diameter.

Inspection standard : Refer to AT-756, "RETURN SPRING" .

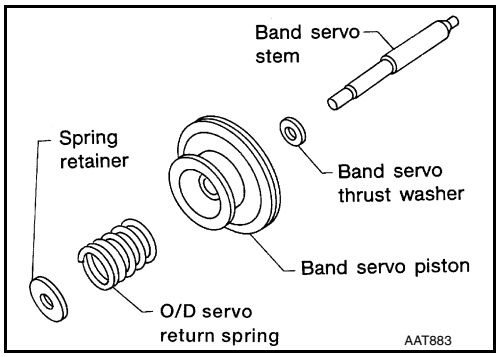


ASSEMBLY

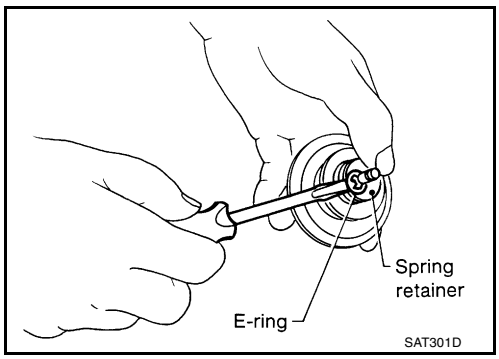
1. Install D-rings to servo piston retainer.
   - **Apply ATF to D-rings.**
   - **Pay attention to position of each O-ring.**



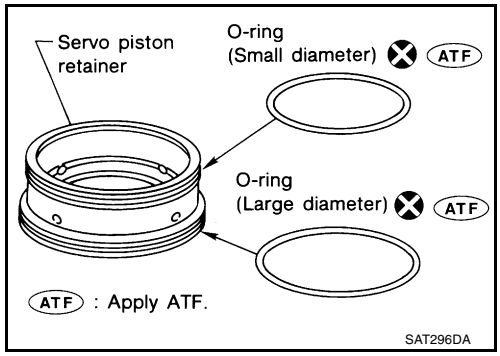
2. Install band servo piston stem, band servo thrust washer, O/D servo return spring and spring retainer to band servo piston.



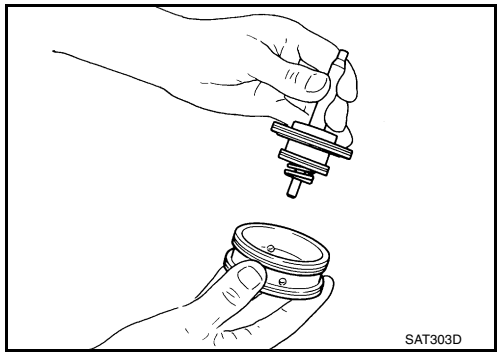
3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



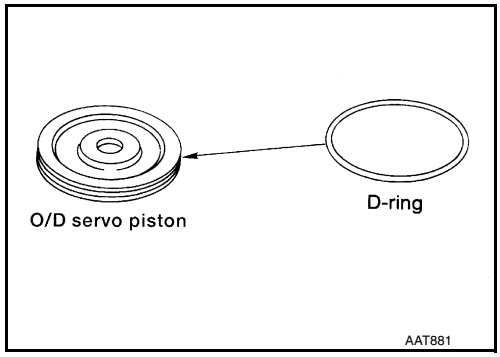
4. Install O-rings to servo piston retainer.
   - **Apply ATF to O-rings.**
   - **Pay attention to position of each O-ring.**



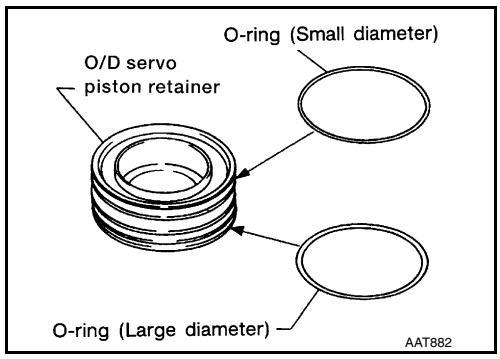
5. Install band servo piston assembly to servo piston retainer by pushing it inward.



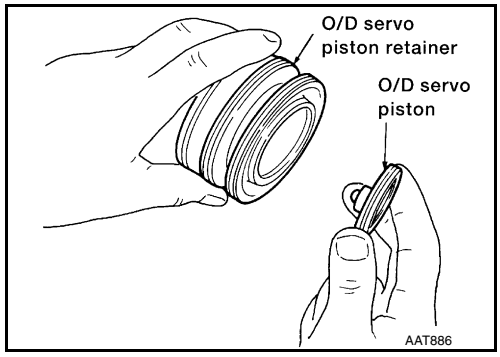
6. Install D-ring to O/D servo piston.
   - **Apply ATF to D-ring.**



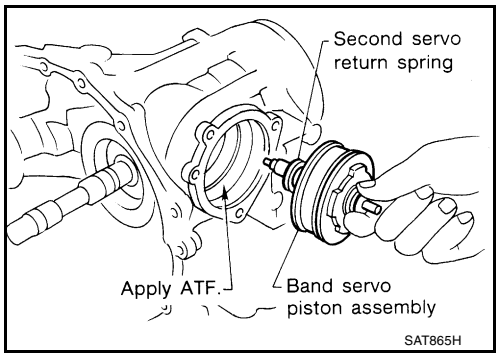
7. Install O-rings to O/D servo piston retainer.
   - **Apply ATF to O-rings.**
   - **Pay attention to position of each O-ring.**



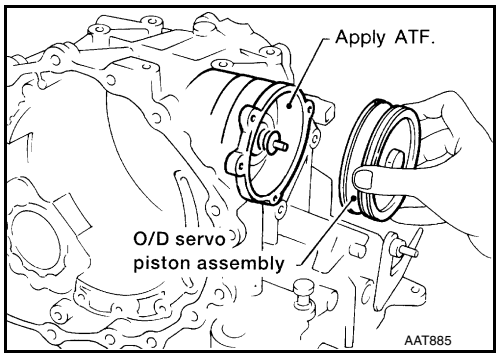
8. Install O/D servo piston to O/D servo piston retainer.



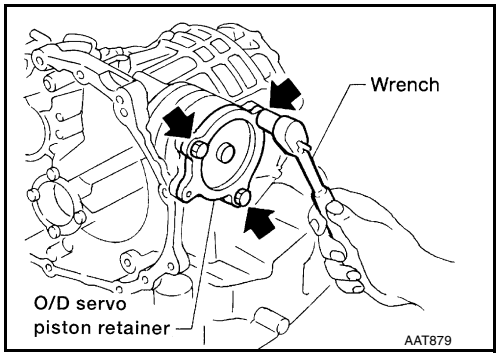
9. Install band servo piston assembly and 2nd servo return spring to transmission case.
   - **Apply ATF to O-ring of band servo piston and transmission case.**



10. Install O/D servo piston assembly to transmission case.
    - **Apply ATF to O-ring of band servo piston and transmission case.**



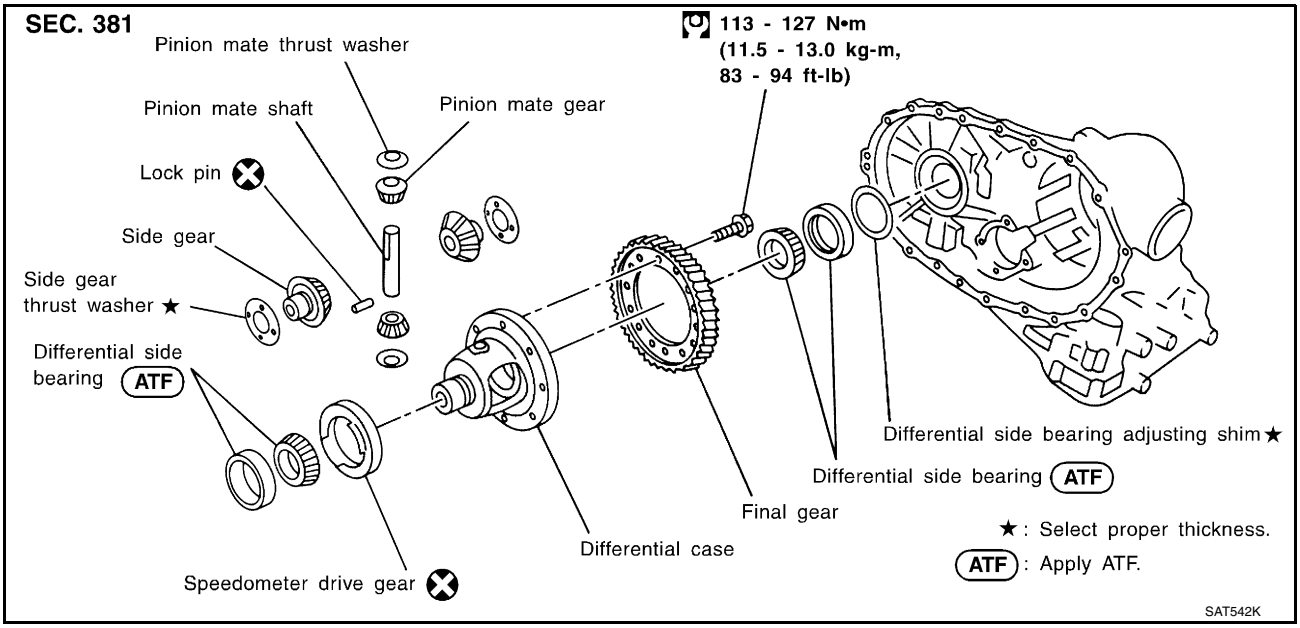
11. Install O/D servo piston retainer to transmission case. Refer to AT-720, "ASSEMBLY" .



Final Drive

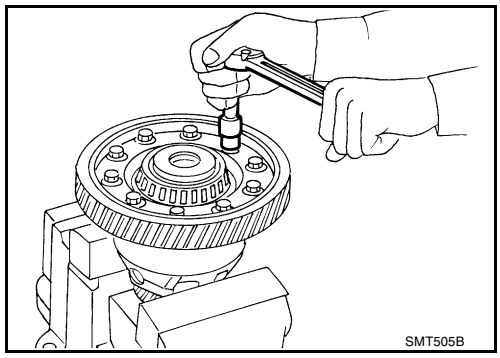
ECS0067Q

COMPONENTS

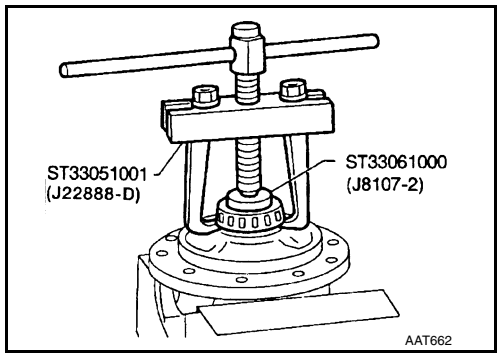


DISASSEMBLY

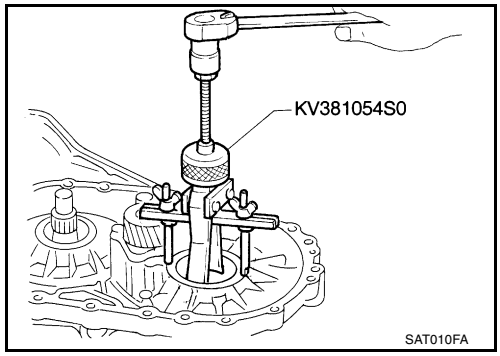
1. Remove final gear.



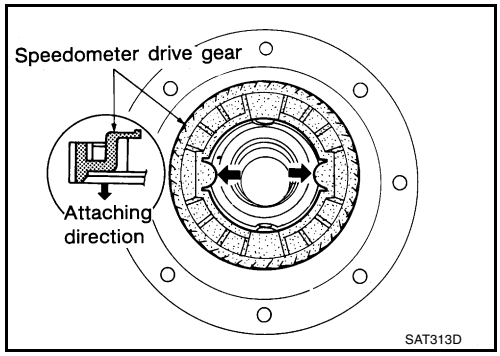
2. Press out differential side bearings.
   - **Be careful not to mix up the right and left bearings.**



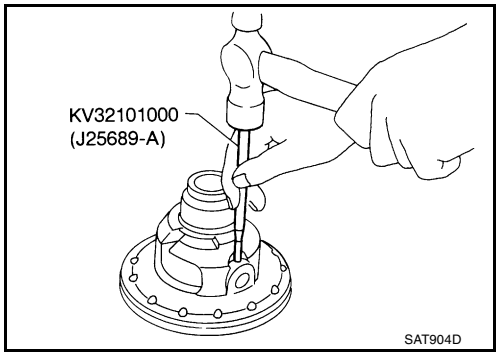
3. Remove differential side bearing outer race and side bearing adjusting shim from transaxle case.



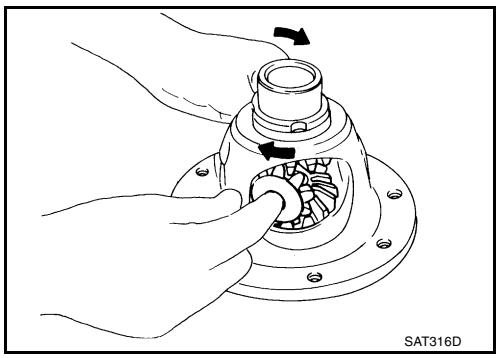
4. Remove speedometer drive gear.



5. Drive out pinion mate shaft lock pin.



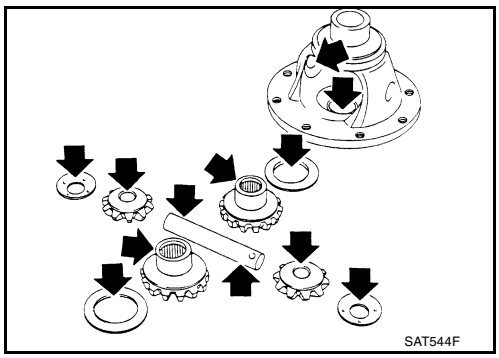
6. Draw out pinion mate shaft lock pin.
7. Remove pinion mate gears and side gears.



INSPECTION

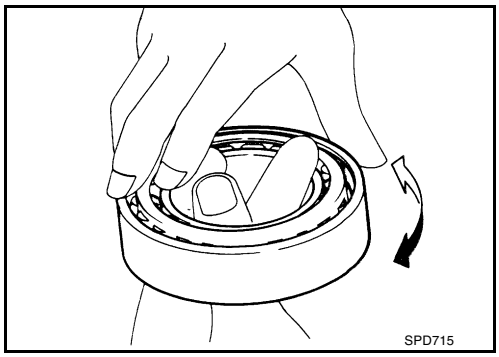
Gear, Washer, Shaft and Case

- Check mating surfaces of differential case, side gears and pinion mate gears.
- Check washers for wear.



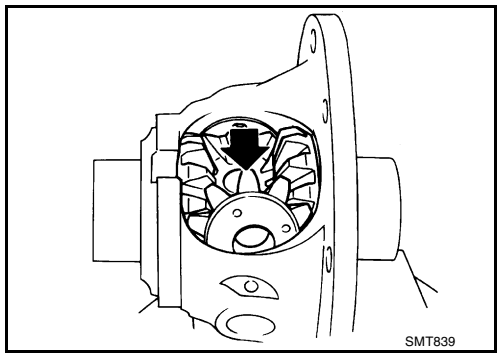
Bearings

- 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.**

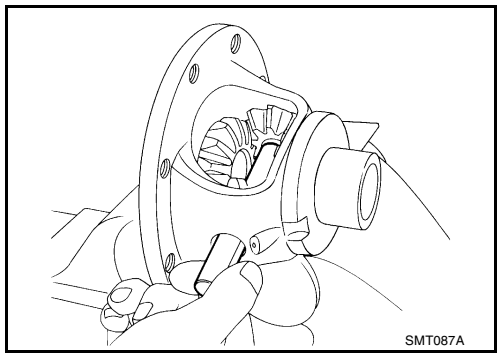


ASSEMBLY

1. Attach side gear thrust washers to side gears, then install pinion mate thrust washers and pinion mate gears in place.
   - **Apply ATF to any parts.**

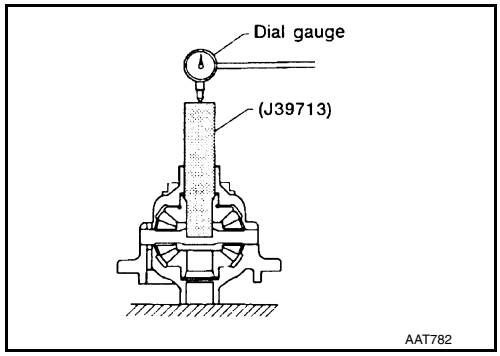


2. Insert pinion mate shaft.
   - **When inserting, be careful not to damage pinion mate thrust washers.**



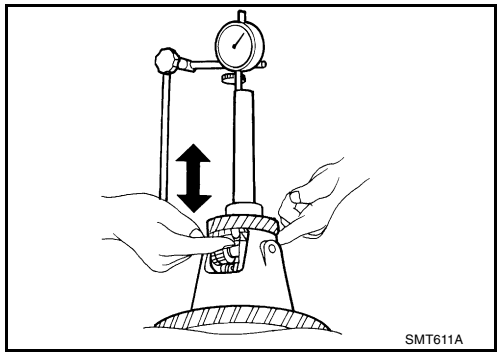
3. Measure clearance between side gear and differential case with washers following the procedure below:

a. Set Tool and dial indicator on side gear.



b. Move side gear up and down to measure dial indicator deflection. Always measure indicator deflection on both side gears.

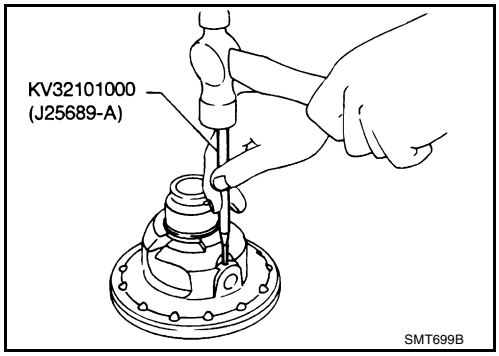
Clearance between side gear and differential case with washer	**: 0.1 - 0.2 mm (0.004 - 0.008 in)**



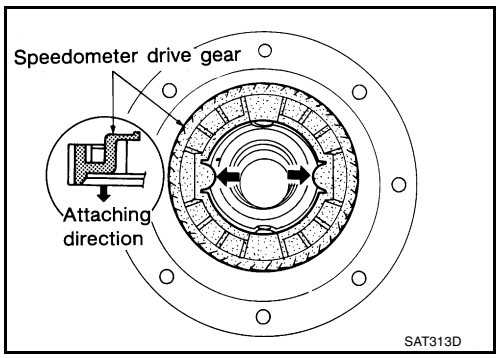
c. If not within specification, adjust clearance by changing thickness of differential side gear thrust washers.

Differential side gear thrust washers	**: Refer to AT-754, "DIFFERENTIAL SIDE GEAR THRUST WASHERS" .**

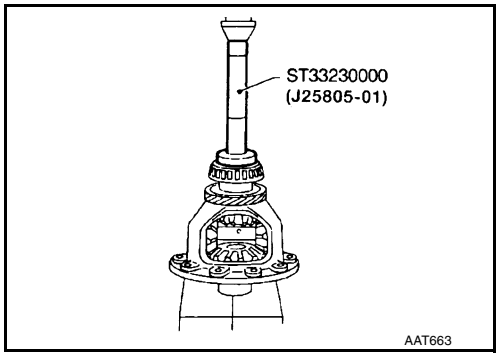
4. Install lock pin.
   - **Make sure that lock pin is flush with case.**



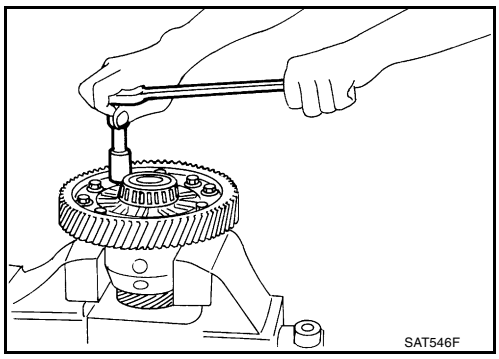
5. Install speedometer drive gear on differential case.
   - **Align the projection of speedometer drive gear with the groove of differential case.**



6. Press on differential side bearings.



7. Install final gear and tighten fixing bolts in a crisscross pattern. Tighten final gear bolts to the specified torque. Refer to AT-722, "COMPONENTS" .



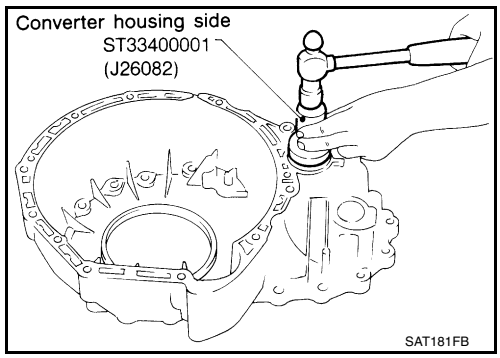
ASSEMBLY

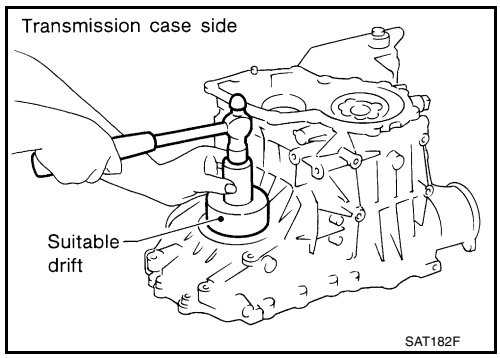
PFP:00000

Assembly (1)

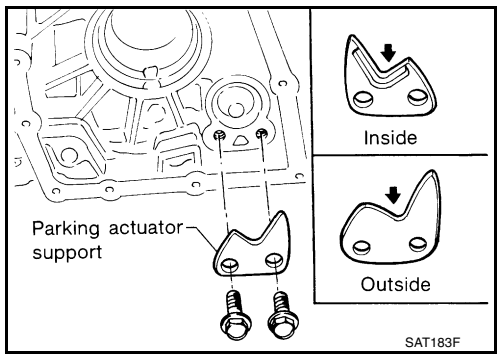
ECS0067R

1. Install differential side oil seals on transmission case and converter housing.

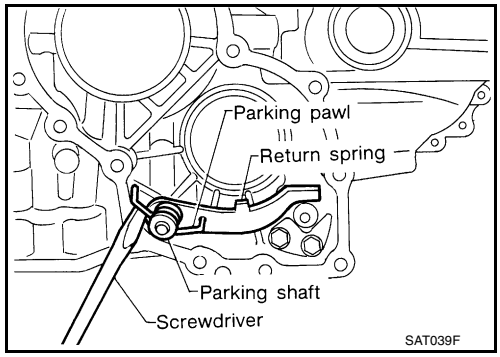




2. Install parking actuator support to transmission case. Tighten parking actuator support bolts to the specified torque. Refer to AT-650, "OVERHAUL" .
   - **Pay attention to direction of parking actuator support.**



3. Install parking pawl on transmission case and fix it with parking shaft.
4. Install return spring.

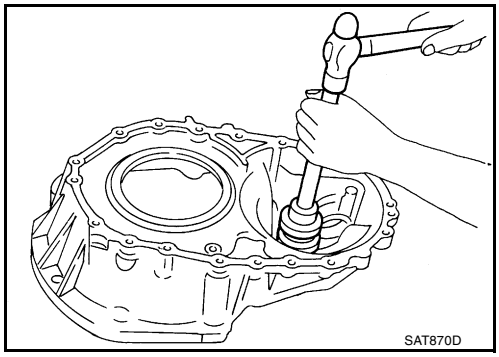


Adjustment (1)

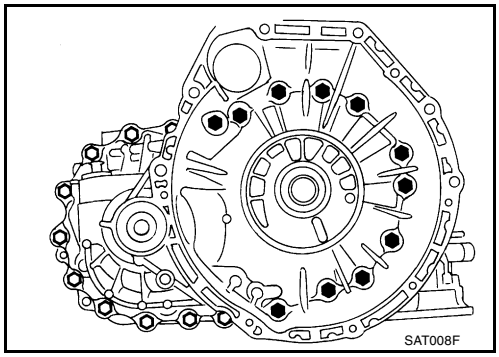
ECS0067S

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.

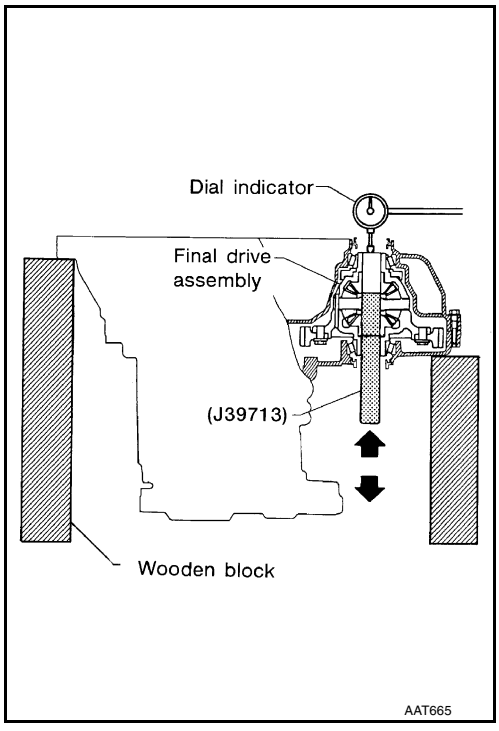


3. Place final drive assembly on transmission case.
4. Install transmission case on converter housing. Tighten transmission case fixing bolts to the specified torque. Refer to AT-650, "OVERHAUL" .

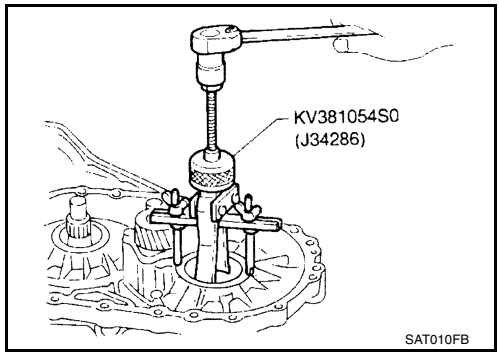


5. Attach dial indicator on differential case at converter housing side.
6. Insert Tool into differential side gear from transmission case side.
7. Move Tool up and down and measure dial indicator deflection.
8. Select proper thickness of differential side bearing adjusting shim(s).
   Suitable shim thickness = Dial indicator deflection + Specified bearing preload

Differential side bearing preload adjusting shim	**: Refer to AT-754, "DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTING SHIMS" .**
Bearing preload	**: 0.05 - 0.09 mm (0.0020 - 0.0035 in)**



9. Remove converter housing from transmission case.
10. Remove final drive assembly from transmission case.
11. Remove differential side bearing outer race from transmission case.
12. Reinstall differential side bearing outer race and shim(s) selected from SDS table on transmission case.
13. Reinstall converter housing on transmission case and tighten transmission case fixing bolts to the specified torque. Refer to AT-650, "OVERHAUL" .

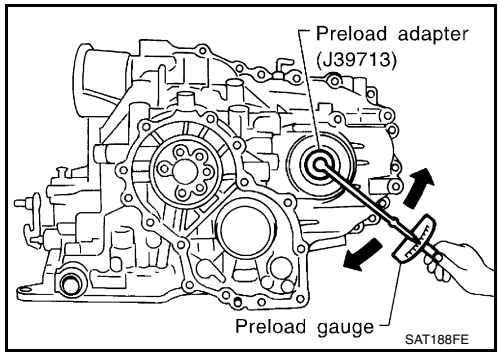


14. Insert Tool and measure turning torque of final drive assembly.
    - **Turn final drive assembly in both directions several times to seat bearing rollers correctly.**

      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.**

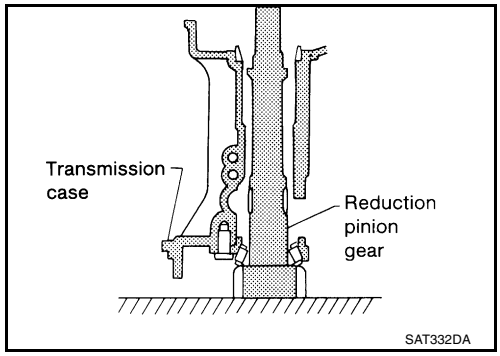
      Preload adapter: J39713



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.

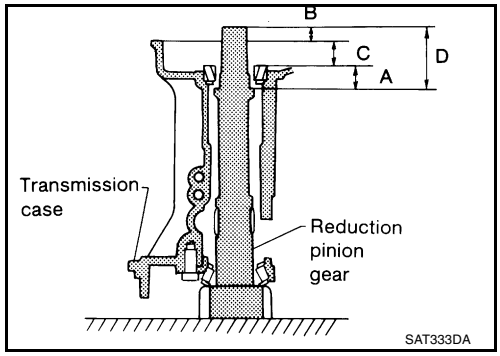
a. Place reduction pinion gear on transmission case as shown.



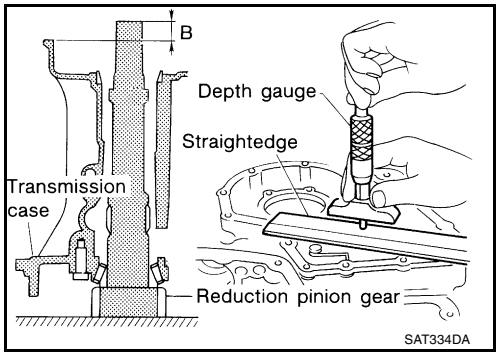
b. Place idler gear bearing on transmission case.
c. Measure dimensions “B” “C” and “D” and calculate dimension “A”.

A = D − (B + C)

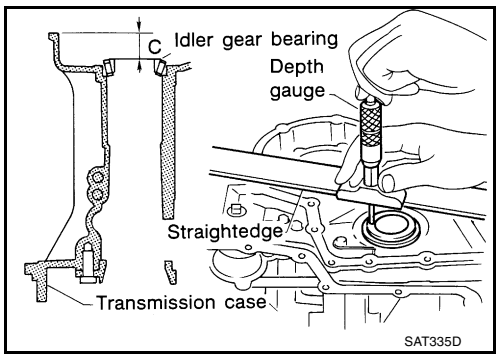
“A”: Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction pinion gear.



- Measure dimension “B” between the end of reduction pinion gear and the surface of transmission case.
- **Measure dimension “B” in at least two places.**

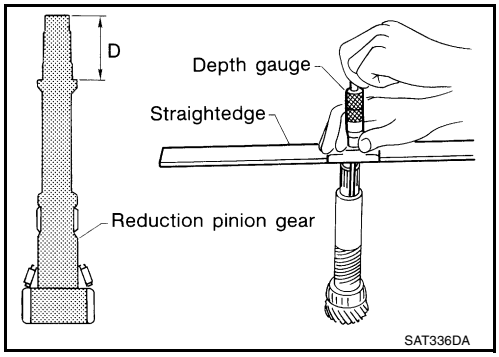


- Measure dimension “C” between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension “C” in at least two places.**



- 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)



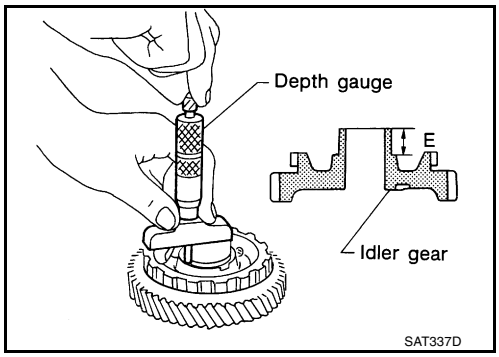
d. Measure dimension “E” between the end of idler gear and the idler gear bearing inner race mating surface of idler gear.
   - **Measure dimension “E” in at least two places.**

e. Select proper thickness of reduction pinion gear bearing adjusting shim.

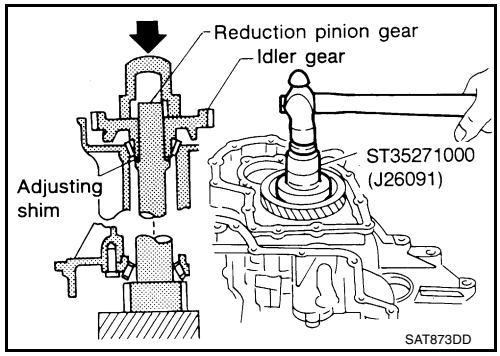
Proper shim thickness = A − E − 0.05 mm (0.0020 in)*

(*: Bearing preload)

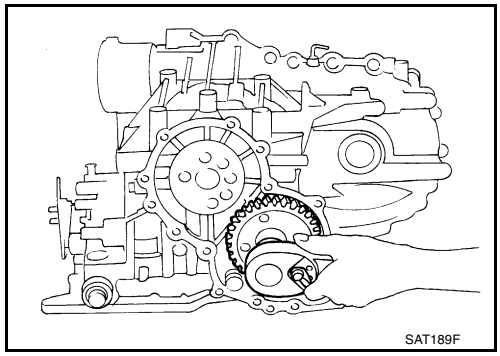
Reduction pinion gear bearing adjusting shim : **Refer to AT-755, "REDUCTION PINION GEAR BEARING ADJUSTING SHIMS".**



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.**



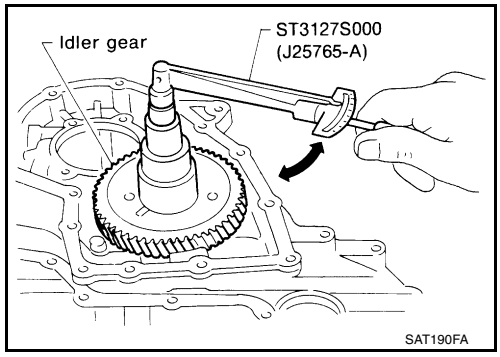
6. Tighten idler gear lock nut to the specified torque. Refer to AT-650, "OVERHAUL" .
   - **Lock idler gear with parking pawl when tightening lock nut.**



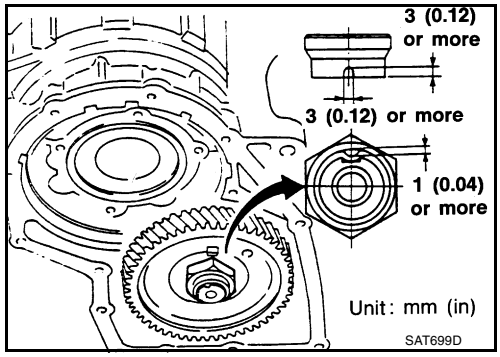
7. Measure turning torque of reduction pinion gear.
   - **When measuring turning torque, turn reduction pinion gear in both directions several times to seat bearing rollers correctly.**

     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.**

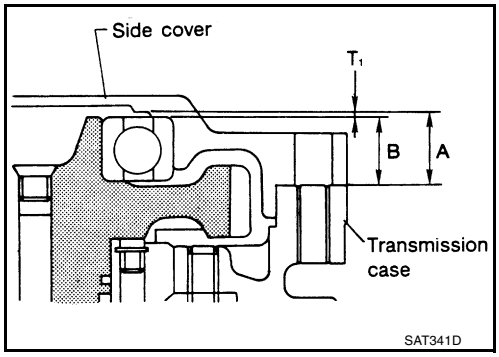


8. After properly adjusting turning torque, clinch idler gear lock nut as shown.

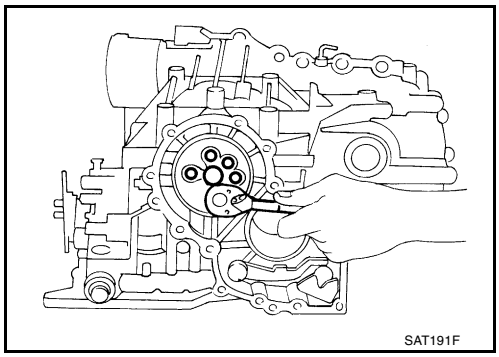


OUTPUT SHAFT END PLAY

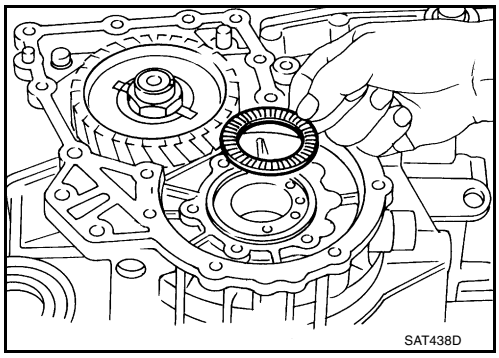
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



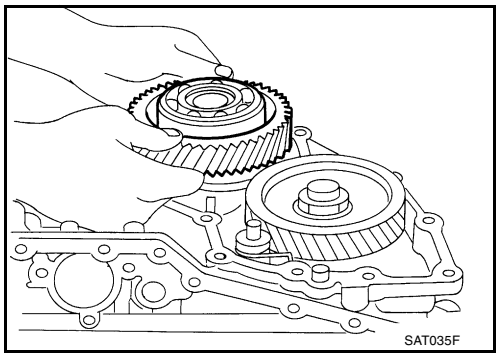
1. Install bearing retainer for output shaft.



2. Install output shaft thrust needle bearing on bearing retainer.



3. Install output shaft on transmission case.

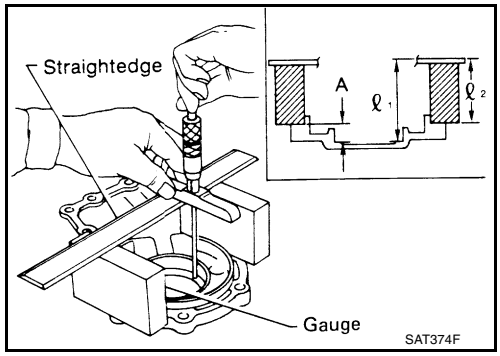


4. Measure dimensions "ℓ_1" and "ℓ_2" at side cover and then calculate dimension "A".
   - Measure dimension "**ℓ_1**" **and "ℓ_2" in at least two places.**

   "A" : **Distance between transmission case fitting surface and adjusting shim mating surface.**

   $A = \ell_1 - \ell_2$

   ℓ_2 : **Height of gauge**

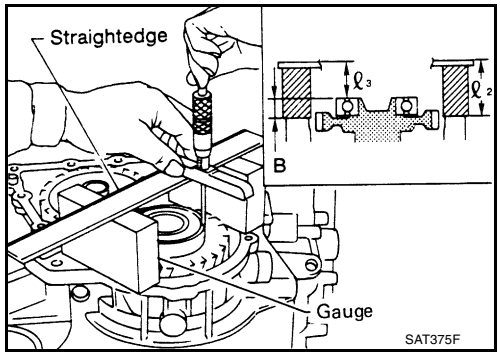


5. Measure dimensions "ℓ_2" and "ℓ_3" and then calculate dimension "B".
   - Measure "**ℓ_2**" **and "ℓ_3" in at least two places.**

   "B" : **Distance between the end of output shaft bearing outer race and the side cover fitting surface of transmission case.**

   $B = \ell_2 - \ell_3$

   ℓ_2 : **Height of gauge**

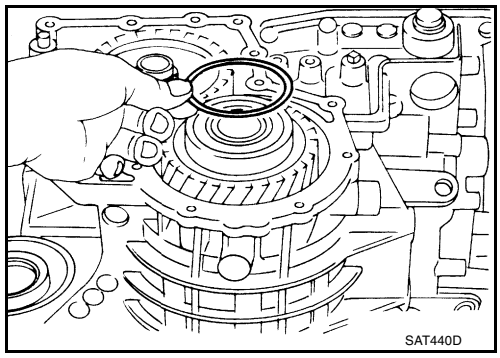


6. Select proper thickness of adjusting shim so that output shaft end play (clearance between side cover and output shaft bearing) is within specifications.

   Output shaft end play (A – B) : **0 - 0.15 mm (0 - 0.0059 in)**

   Output shaft end play adjusting shims : **Refer to AT-757, "OUTPUT SHAFT ADJUSTING SHIMS" .**

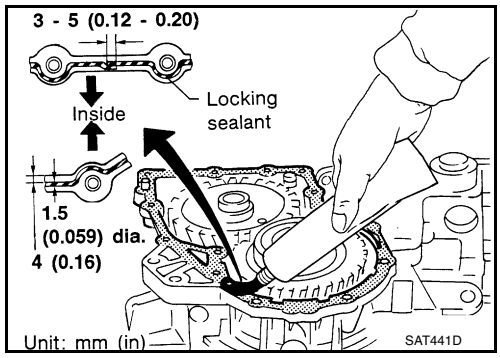
7. Install adjusting shim on output shaft bearing.



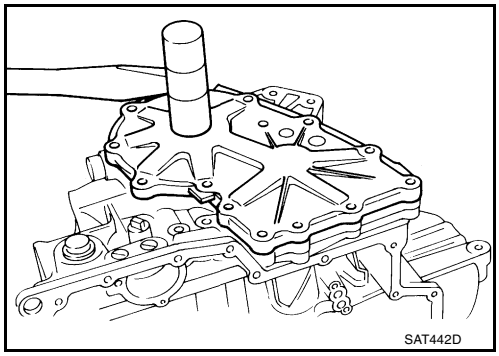
Assembly (2)

ECS0067T

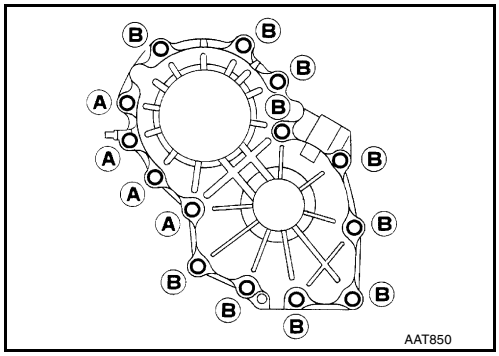
1. Apply anaerobic liquid gasket to transmission case as shown in illustration. Refer to GI-44, "Recommended Chemical Products and Sealants"



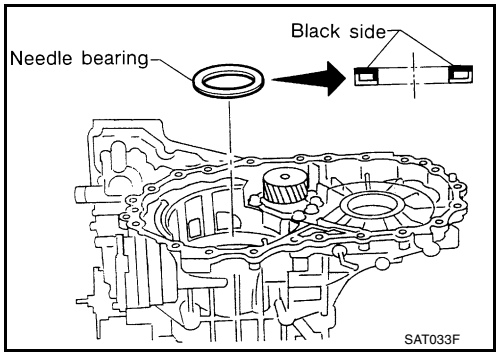
2. Set side cover on transmission case.
   - **Apply locking sealant to the mating surface of transmission case.**



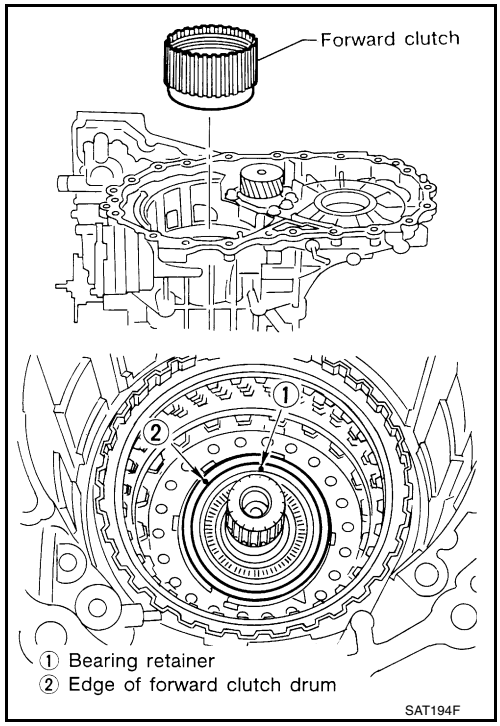
3. Tighten side cover fixing bolts to specified torque. Refer to AT-650, "OVERHAUL" .
   - **Do not mix bolts A and B.**
   - **Always replace bolts A as they are self-sealing bolts.**



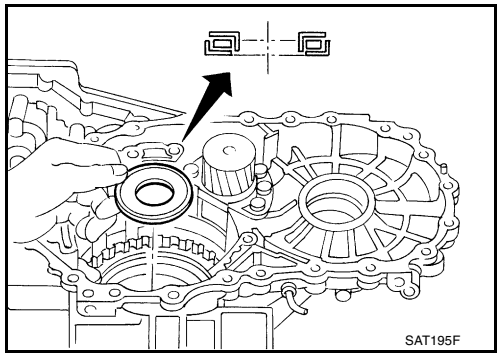
4. Remove paper rolled around bearing retainer.
5. Install thrust washer on bearing retainer.
   - **Apply petroleum jelly to thrust washer.**



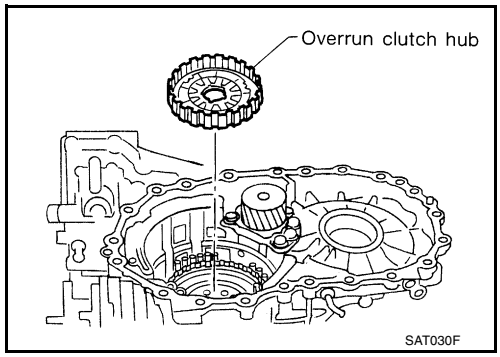
6. Install forward clutch assembly.
   - **Align teeth of low & reverse brake drive plates before installing.**
   - **Make sure that bearing retainer seal rings are not spread.**
   - **If forward clutch assembly is correctly seated, points 1 and 2 are at almost same level.**



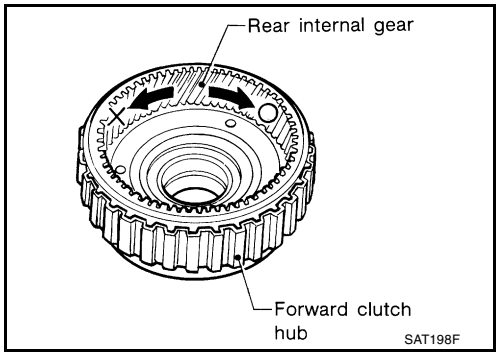
7. Install thrust needle bearing on bearing retainer.
   - **Apply petroleum jelly to thrust needle bearing.**
   - **Pay attention to direction of thrust needle bearing.**



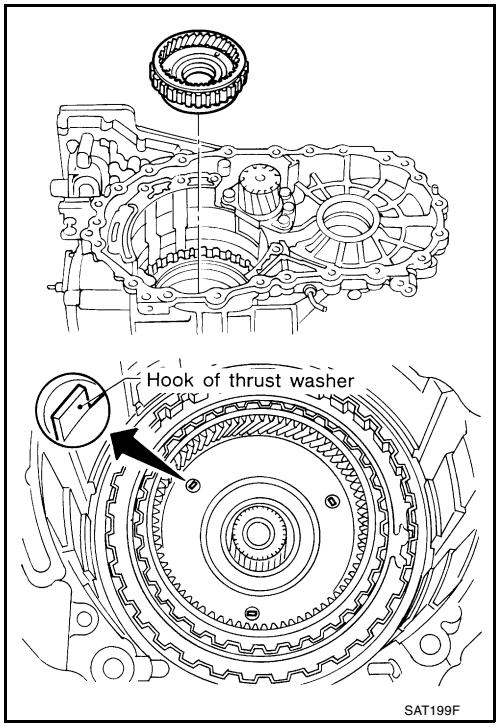
8. Install overrun clutch hub.
   - **Apply petroleum jelly to thrust washers.**
   - **Align teeth of overrun clutch drive plates before installing.**



9. Hold forward clutch hub and turn rear internal gear.
   Check overrun clutch hub for correct directions of lock and unlock.
   - **If not shown as illustrated, check installed direction of forward one-way clutch.**

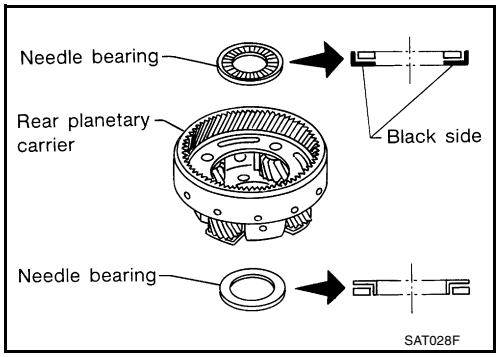


10. Install forward clutch hub and rear internal gear assembly.
    - **Align teeth of forward clutch drive plates before installing.**
    - **Check that three hooks of thrust washer are correctly aligned after installing.**

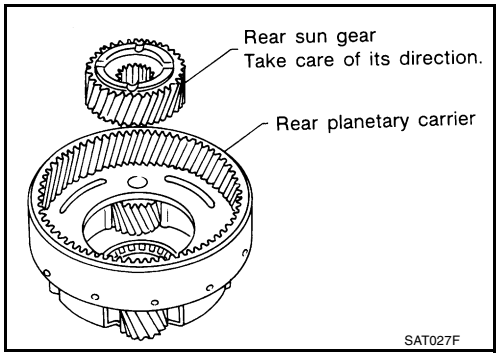


11. Install rear planetary carrier assembly and rear sun gear according to the following procedures.

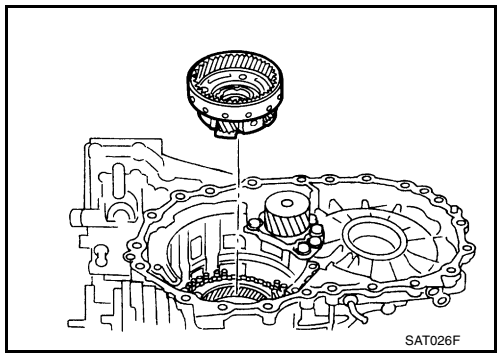
a. Install needle bearings on rear planetary carrier.
   - **Apply petroleum jelly to needle bearings.**
   - **Pay attention to direction of needle bearings.**



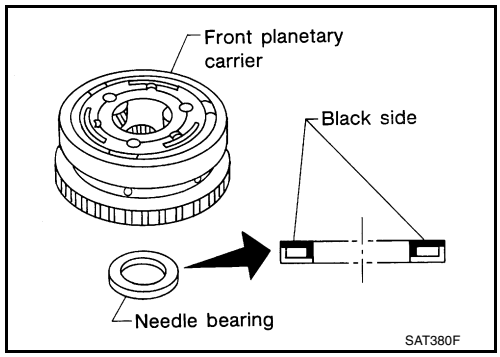
b. Install rear sun gear on rear planetary carrier.
   - **Pay attention to direction of rear sun gear.**



c. Install rear planetary carrier on transmission case.

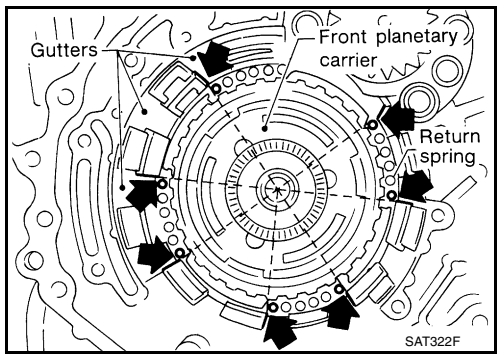


12. Install thrust needle bearing on front planetary carrier, then install them together on transmission case.
    - **Apply petroleum jelly to thrust needle bearing.**
    - **Pay attention to direction of thrust needle bearing.**

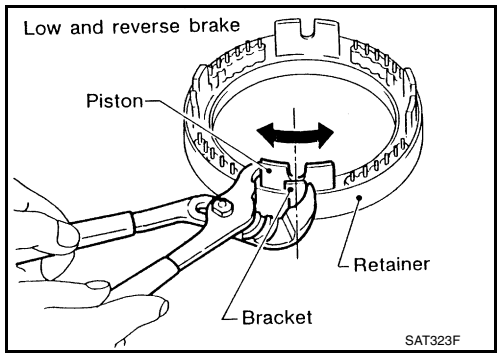


13. Install low and reverse brake piston according to the following procedures.

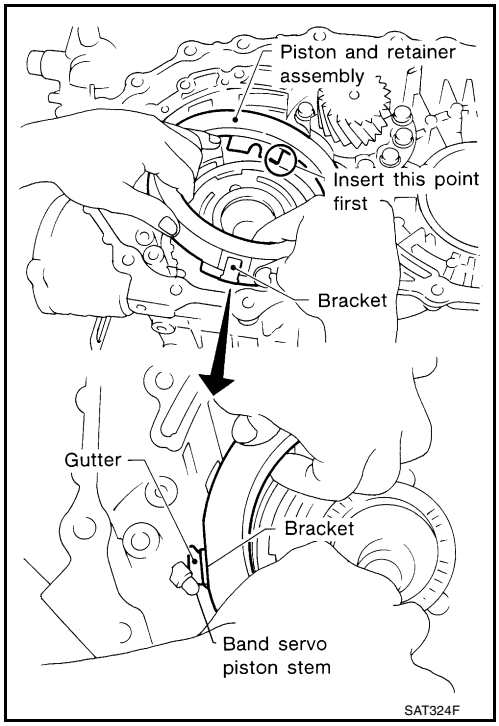
a. Set and align return springs to transmission case gutters as shown in illustration.



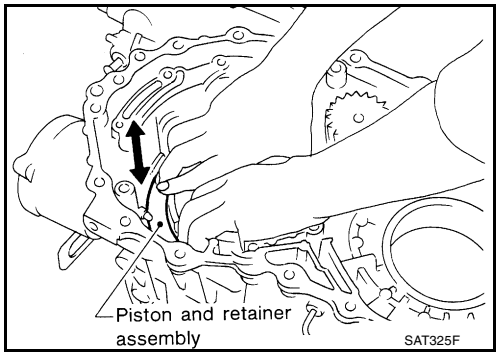
b. Set and align piston with retainer.



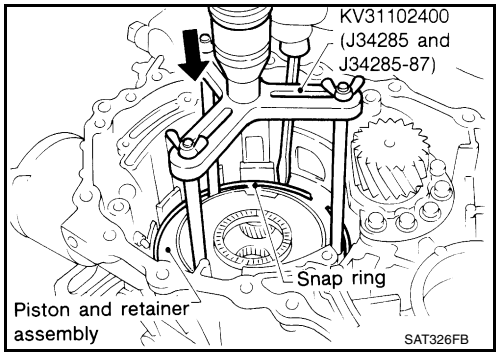
c. Install piston and retainer assembly on the transmission case.
   - **Align bracket to specified gutter as indicated in illustration.**



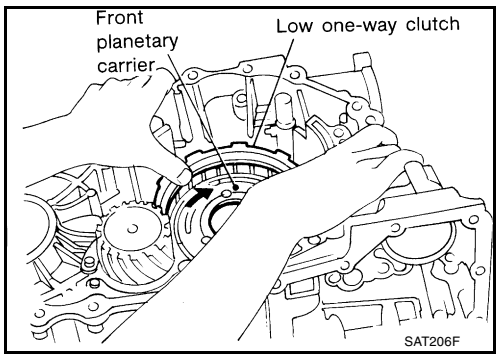
d. Check that each protrusion of piston is correctly set to corresponding return spring as follows.
   - **Push piston and retainer assembly evenly and confirm they move smoothly.**
   - **If they can not move smoothly, remove piston and retainer assembly and align return spring correctly as instructed in step "a".**



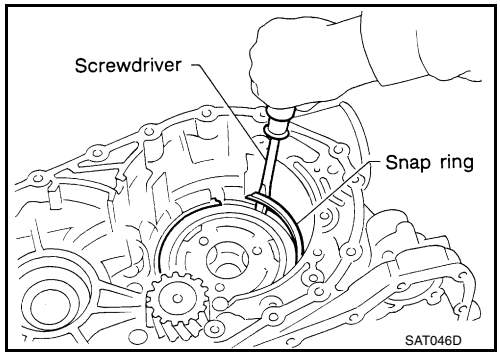
e. Push down piston and retainer assembly and install snap ring.



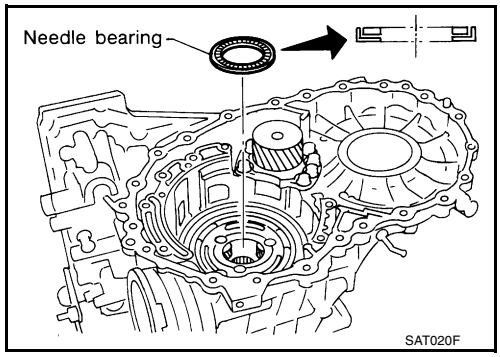
14. Install low one-way clutch to front planetary carrier by turning carrier in the direction of the arrow shown.



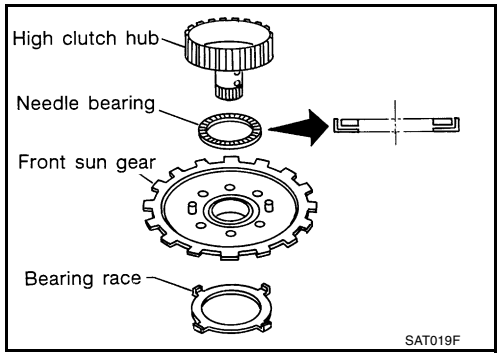
15. Install snap ring with screwdriver.
    - **Forward clutch and bearing must be correctly installed for snap ring to fit into groove of transmission case.**



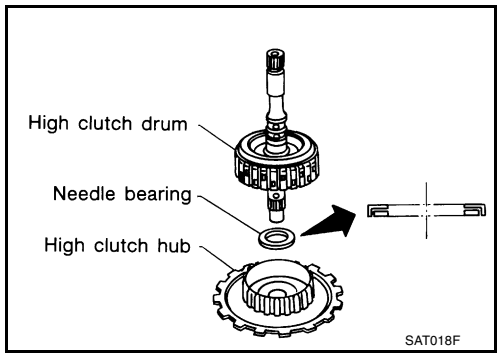
16. Install needle bearing on transmission case.
    - **Apply petroleum jelly to needle bearing.**
    - **Pay attention to direction of needle bearing.**



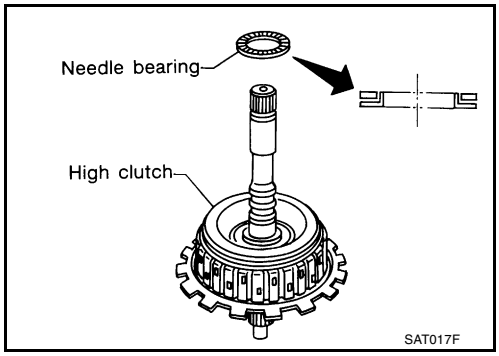
17. Install bearing race, needle bearing and high clutch hub on front sun gear.
    - **Apply petroleum jelly to needle bearing.**
    - **Pay attention to direction of needle bearing.**



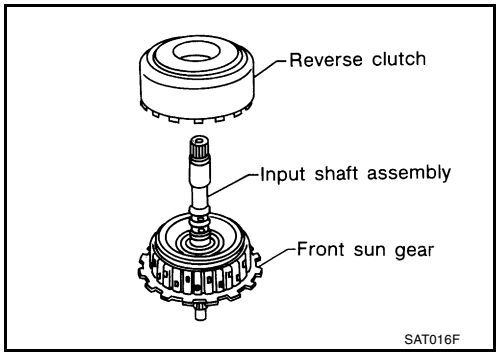
18. Install needle bearing and high clutch drum on high clutch hub.



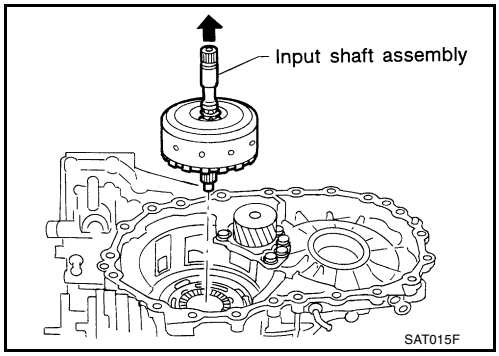
19. Install needle bearing on high clutch drum.
    - **Apply petroleum jelly to needle bearing.**
    - **Pay attention to direction of needle bearing.**



20. Remove paper rolled around input shaft.
21. Install input shaft assembly in reverse clutch.
    - **Align teeth of reverse clutch drive plates before installing.**



22. Install reverse clutch assembly on transmission case.
    - **Align teeth of high clutch drive plates before installing.**



Adjustment (2)

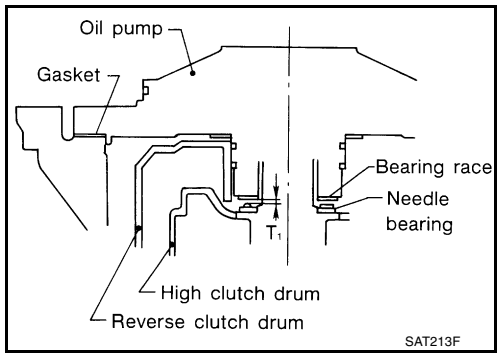
ECS0067U

When any parts listed below are replaced, adjust total end play and reverse clutch end play.

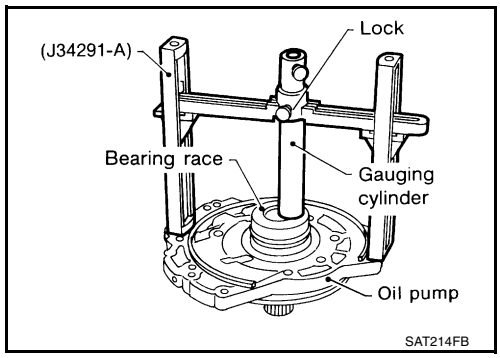
Part name	Total end play	Reverse clutch end play
Transmission case	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●	●
Reverse clutch drum	—	●

TOTAL END PLAY

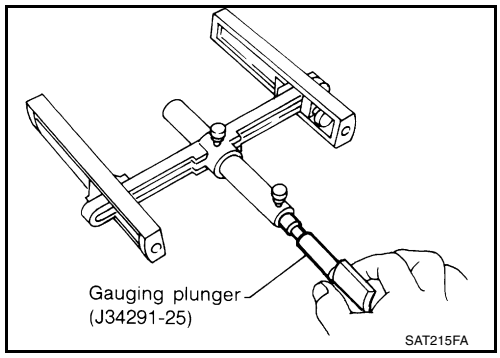
1. Adjust total end play "T_1 ".



a. With original bearing race installed, place Tool onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly. The gauging cylinder should rest on top of bearing race. Lock gauging cylinder in place with set screw.



b. Install gauging plunger into cylinder.



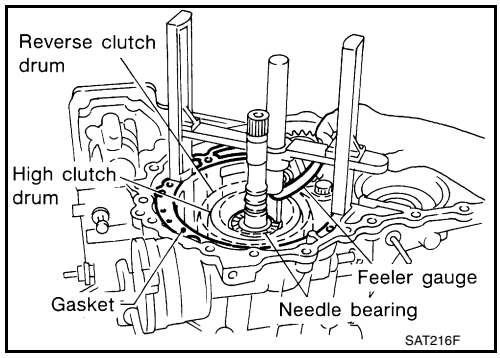
c. With needle bearing installed on high clutch drum, place Tool legs on machined surface of transmission case (with gasket). Then allow plunger to rest on needle bearing.

d. Measure gap between cylinder and plunger. This measurement should give exact total end play.

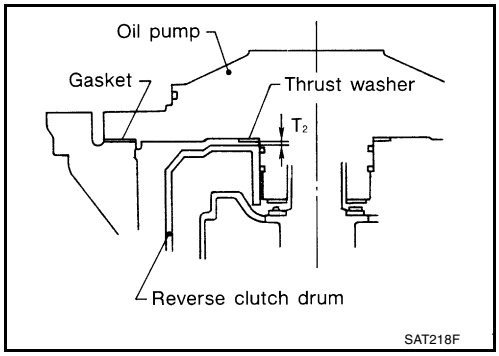
Total end play "T_1 " **: 0.25 - 0.55 mm (0.0098 - 0.0217 in)**

- If end play is out of specification, decrease or increase thickness of bearing race as necessary.

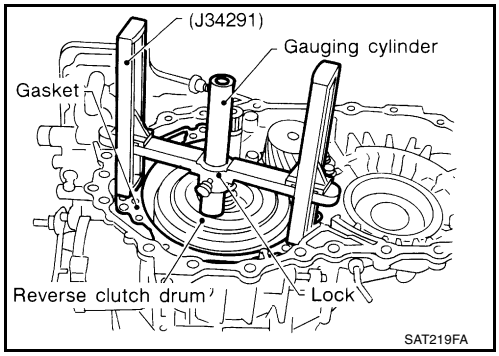
Available bearing race for adjusting total end play **: Refer to AT-757, "BEARING RACE FOR ADJUSTING TOTAL END PLAY" .**



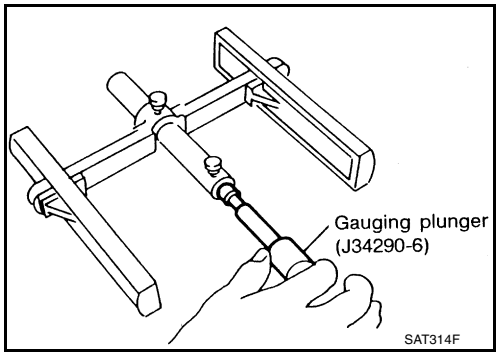
2. Adjust reverse clutch drum end play “T_2 ”.

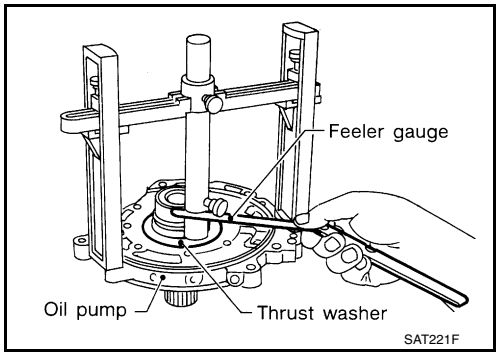


a. Place Tool on machined surface of transmission case (with gasket). Then allow gauging cylinder to rest on reverse clutch drum. Lock cylinder in place with set screw.



b. Install gauging plunger into cylinder.





c. With original thrust washer installed on oil pump, place Tool legs onto machined surface of oil pump assembly. Then allow plunger to rest on thrust washer.

d. Measure gap between cylinder and plunger with feeler gauge. This measurement should give exact reverse clutch drum end play.

Reverse clutch drum end play “T_2 ” **: 0.55 - 0.90 mm (0.0217 - 0.0354 in)**

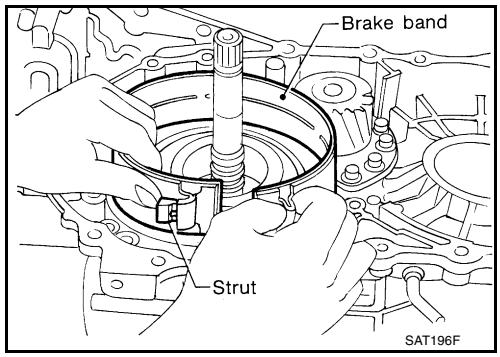
- If end play is out of specification, decrease or increase thickness of thrust washer as necessary.

Available thrust washer for adjusting reverse clutch drum end play	**: Refer to AT-757, "THRUST WASHERS FOR ADJUSTING REVERSE CLUTCH DRUM END PLAY" .**

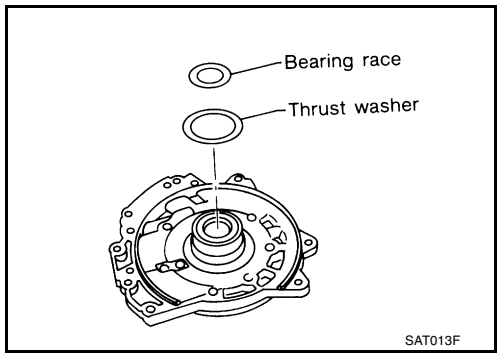
Assembly (3)

ECS0067V

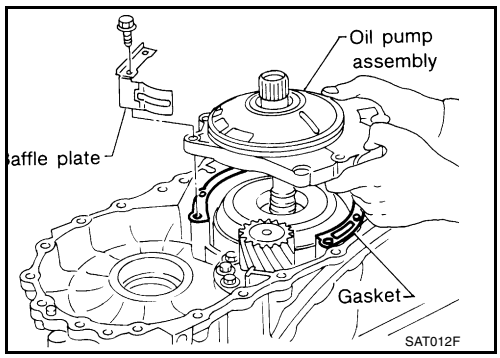
1. Install anchor end pin and lock nut on transmission case.
2. Place brake band on outside of reverse clutch drum. Tighten anchor end pin just enough so that brake band is evenly fitted on reverse clutch drum.



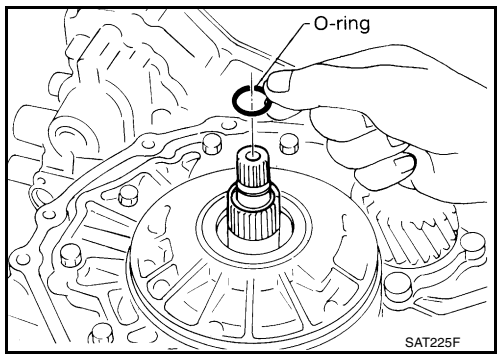
3. Place bearing race selected in total end play adjustment step on oil pump cover.
   - **Apply petroleum jelly to bearing race.**
4. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.
   - **Apply petroleum jelly to thrust washer.**



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.

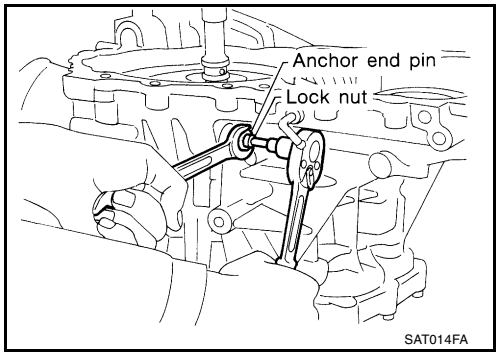
a. Tighten anchor end pin to the specified torque.

Anchor end pin	**: Refer to AT-754, "BRAKE BAND" .**

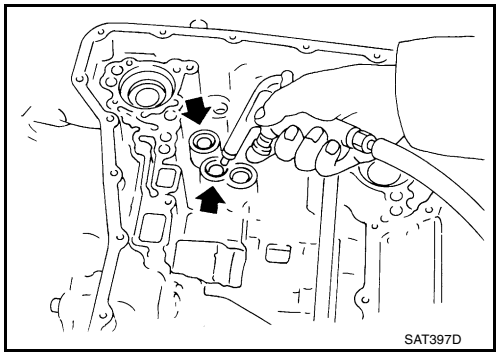
b. Back off anchor end pin two and a half turns.

c. While holding anchor end pin, tighten lock nut.

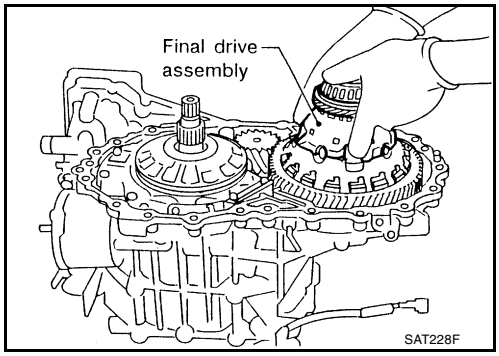
Lock nut	**: Refer to AT-754, "BRAKE BAND" .**



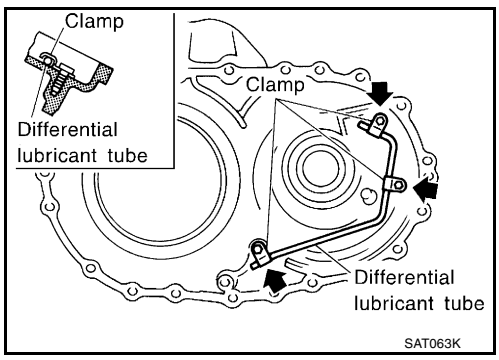
9. Apply compressed air to oil holes of transmission case and check operation of brake band.



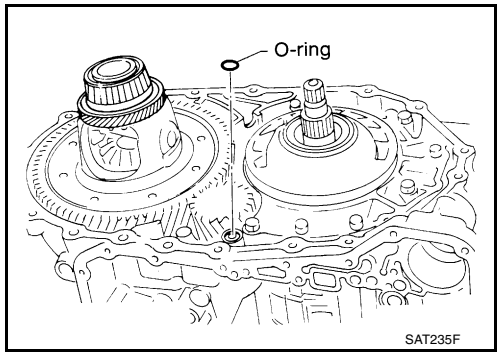
10. Install final drive assembly on transmission case.



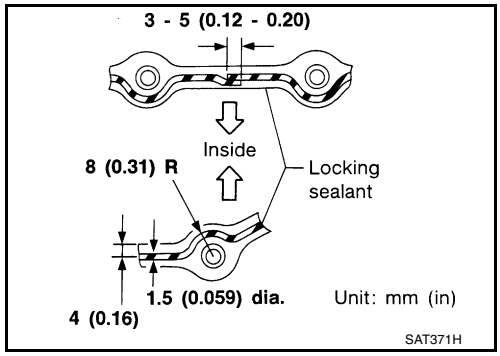
11. Install differential lubricant tube on converter housing. Tighten differential lubricant tube bolts to the specified torque. Refer to AT-650, "OVERHAUL" .



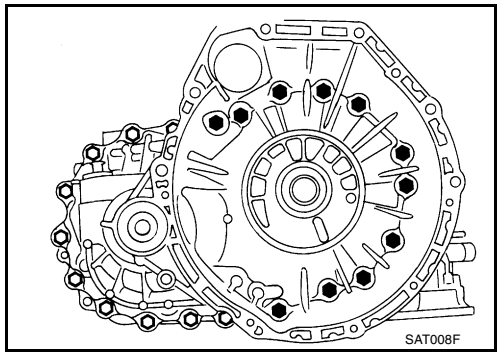
12. Install O-ring on differential oil port of transmission case.



13. Install converter housing on transmission case.
    - **Apply locking sealant to mating surface of converter housing.**

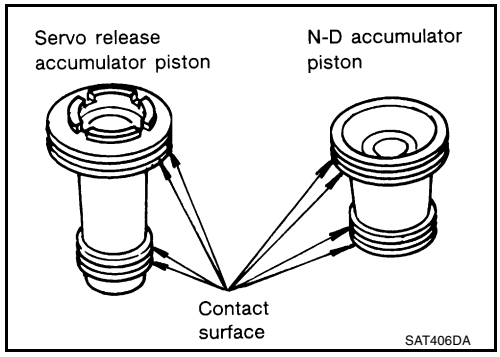


    - **Tighten converter housing bolts to the specified torque. Refer to AT-650, "OVERHAUL" .**



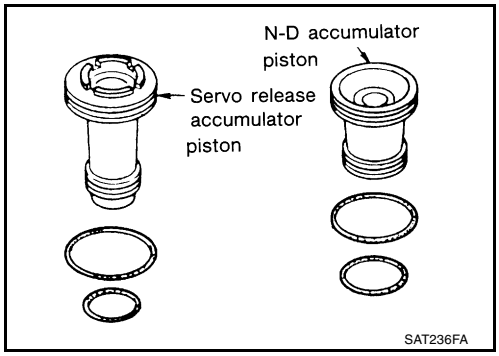
14. Install accumulator piston.

a. Check contact surface of accumulator piston for damage.



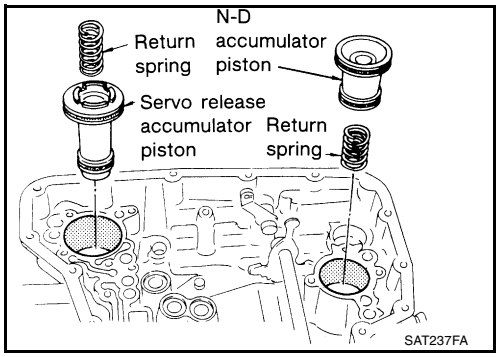
b. Install O-rings on accumulator piston.
- **Apply ATF to O-rings.**

Accumulator piston O-rings : Refer to AT-751, "O-RING"

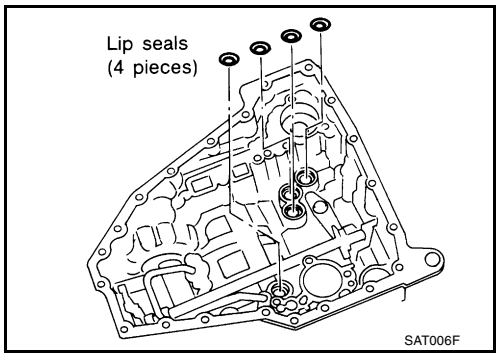


c. Install accumulator pistons and return springs on transmission case.
- **Apply ATF to inner surface of transmission case.**

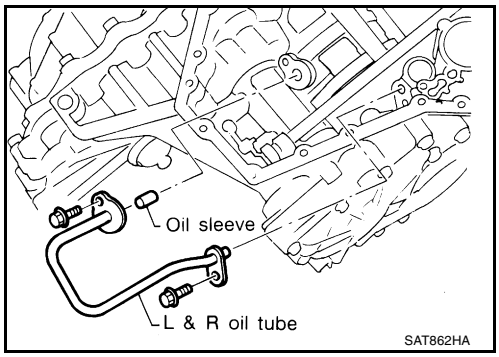
Return springs : Refer to AT-752, "RETURN SPRING" .



15. Install lip seals for band servo oil holes on transmission case.
- **Apply petroleum jelly to lip seals.**

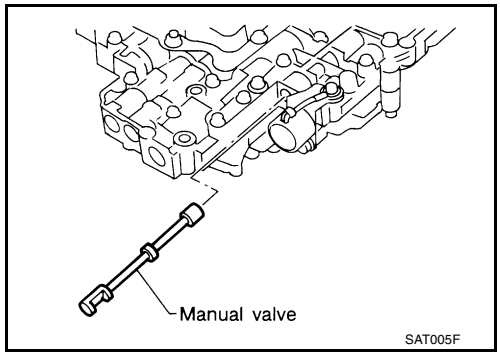


16. Install L & R oil tube and oil sleeve. Tighten L & R oil tube bolts to the specified torque. Refer to AT-650, "OVERHAUL" .



17. Install control valve assembly.

a. Insert manual valve into control valve assembly.
   - **Apply ATF to manual valve.**

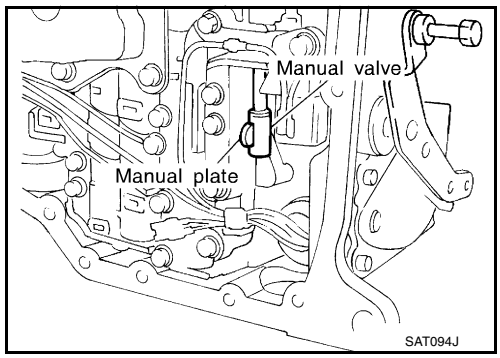


b. Set manual shaft in Neutral position.

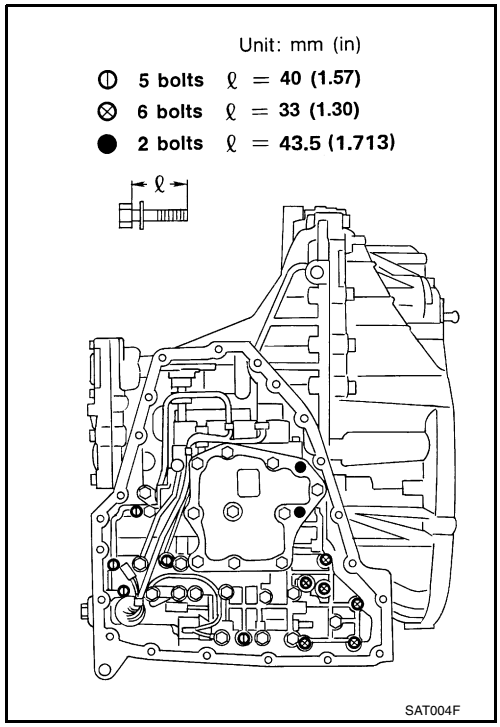
c. Install control valve assembly on transmission case while aligning manual valve with manual plate.

d. Pass terminal cord assembly connector through transmission case and install terminal body on transmission case by pushing it.

e. Install snap ring to terminal cord assembly connector.



f. Tighten bolts **I** , **X** and ●.



Bolt length, number and location:

Bolt	I	X	●
Bolt length "ℓ" mm (in)	40 (1.57)	33 (1.30)	43.5 (1.713)
Number of bolts	5	6	2

18. Install oil pan.

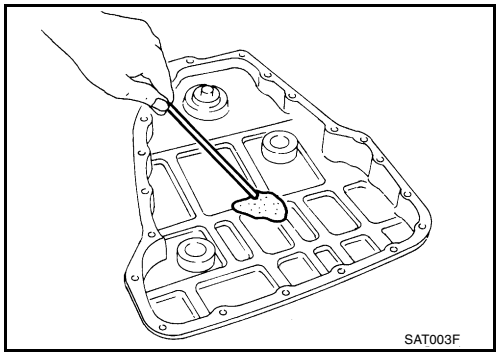
a. Attach a magnet to oil pan.

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-650, "OVERHAUL" .

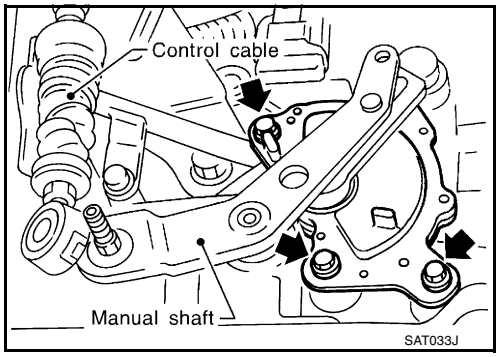


19. Install park/neutral position (PNP) switch.

a. Set manual shaft in P position.

b. Temporarily install park/neutral position (PNP) switch on manual shaft.

c. Move selector lever to N position.



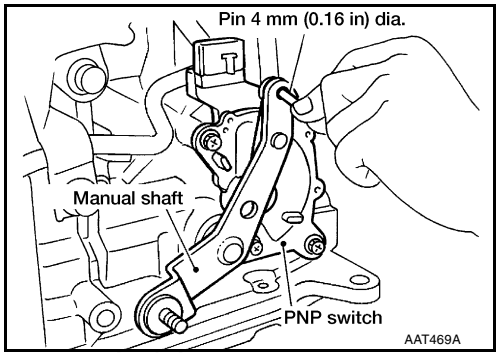
d. Use a 4 mm (0.16 in) pin for this adjustment.

i. Insert the pin straight into the manual shaft adjustment hole.

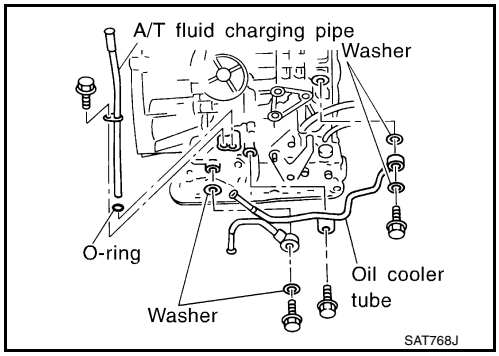
ii. Rotate park/neutral position (PNP) switch until the pin can also be inserted straight into hole in park/neutral position (PNP) switch.

e. Tighten park/neutral position (PNP) switch fixing bolts. Refer to AT-650, "OVERHAUL" .

f. Remove pin from adjustment hole after adjusting park/neutral position (PNP) switch.



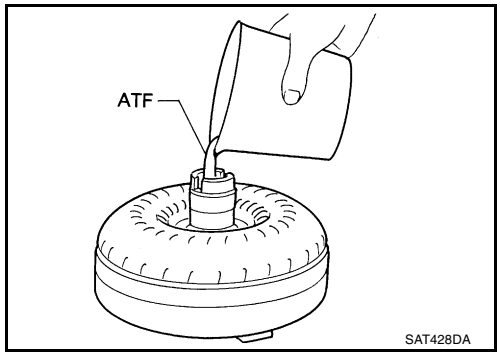
20. Install A/T fluid charging pipe and fluid cooler tube to transmission case. Tighten A/T fluid charging pipe and fluid cooler tube bolts to the specified torque. Refer to AT-650, "OVERHAUL" .



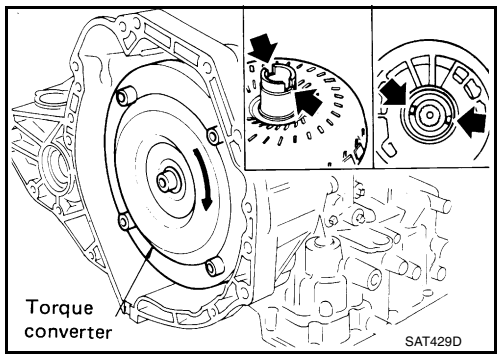
21. Install torque converter.

a. Pour ATF into torque converter.

- **Approximately 1 liter (1-1/8 US qt, 7/8 Imp qt) of fluid is required for a new torque converter.**
- **When reusing old torque converter, add the same amount of fluid as was drained.**

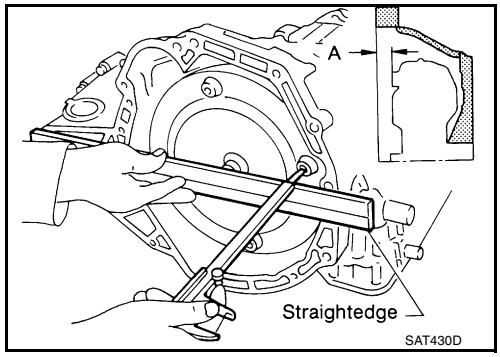


b. Install torque converter while aligning notches of torque converter with notches of oil pump.



c. Measure distance “A” to check that torque converter is in proper position.

Distance A : 14 mm (0.55 in) or more



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

ECS0067W

Engine		QR25DE
Automatic transaxle model		RE4F04B
Automatic transaxle assembly	Model code number	85X63
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)		8.5 (9, 7.5)

*: Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .

Shift Schedule

ECS0067X

VEHICLE SPEED WHEN SHIFTING GEARS THROTTLE POSITION

Throttle position	Shift pattern	Vehicle speed km/h (MPH)					
		$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$
Full throttle	Comfort	52 - 60 (32 - 37)	97 - 105 (60 - 66)	153 - 161 (95 - 100)	149 - 157 (93 - 98)	87 - 95 (41 - 54)	41 - 49 (25 - 30)
	Auto power	52 - 60 (32 - 37)	97 - 105 (60 - 66)	153 - 161 (95 - 100)	149 - 157 (93 - 98)	87 - 95 (41 - 54)	41 - 49 (25 - 30)
Half throttle	Comfort	37 - 45 (23 - 28)	67 - 75 (42 - 47)	119 - 127 (74 - 79)	90 - 98 (56 - 61)	39 - 47 (24 - 27)	24 - 32 (15 - 20)
	Auto power	39 - 47 (24 - 29)	73 - 81 (45 - 50)	119 - 127 (74 - 79)	90 - 98 (56 - 61)	46 - 54 (26 - 34)	24 - 32 (15 - 20)

VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

Unit: km/h (MPH)

Selector lever position	D_4 (O/D ON) position		D_3 (O/D OFF) position	
Shift pattern	Comfort	Auto power	Comfort	Auto power
Lock-up "ON"	62 - 70 (38 - 43)	62 - 70 (38 - 43)	86 - 94 (53 - 58)	86 - 94 (53 - 58)
Lock-up "OFF"	51 - 59 (31 - 36)	51 - 59 (31 - 36)	83 - 91 (52 - 57)	83 - 91 (52 - 57)

NOTE:

- Lock-up vehicle speed indicates the speed in D_4 (O/D ON) position.
- Perform lock-up inspection after warming up engine.
- Lock-up vehicle speed may vary depending on the driving conditions and circumstances.

Stall Revolution

ECS0067Y

Engine	Stall revolution rpm
QR25DE	2,350 - 2,800

Line Pressure

ECS0067Z

Engine speed rpm	Line pressure kPa (kg/cm^2 , psi)	
	D, 2 and 1 positions	R position
Idle	500 (5.1, 73)	778 (7.9, 113)
Stall	1,223 (12.6, 179)	1,918 (19.6, 278)

Control Valves

ECS00680

CONTROL VALVE AND PLUG RETURN SPRINGS

Unit: mm (in)

Parts			Item		
			Part No.*	Free length	Outer diameter
Upper body	23	Pilot valve spring	31742-80L13	38.98 (1.535)	8.9 (0.350)
	7	1-2 accumulator valve spring	31742-80L15	20.5 (0.807)	6.95 (0.274)
	28	1-2 accumulator piston spring	31742-80L14	55.26 (2.176)	19.6 (0.772)
	33	1st reducing valve spring	31742-80L08	27.0 (1.063)	7.0 (0.276)
	35	3-2 timing valve spring	31736-01X00	23.0 (0.906)	6.65 (0.262)
	18	Overrun clutch reducing valve spring	31742-80L09	37.5 (1.476)	6.9 (0.272)
	16	Torque converter relief valve spring	31742-80L10	31.0 (1.220)	9.0 (0.354)
	11	Torque converter clutch control valve	31742-80L16	56.98 (2.243)	6.5 (0.256)
	3	Cooler check valve spring	31742-85X01	29.4 (1.157)	6.0 (0.236)
Lower body	15	Pressure regulator valve spring	31742-80L01	45.0 (1.772)	15.0 (0.591)
	20	Overrun clutch control valve spring	31762-80L00	21.7 (0.854)	7.0 (0.276)
	24	Accumulator control valve spring	31742-80L02	22.0 (0.866)	6.5 (0.256)
	29	Shift valve A spring	31762-80L00	21.7 (0.854)	7.0 (0.276)
	32	Shuttle valve spring	31762-41X04	51.0 (2.008)	5.65 (0.222)
	12	Shift valve B spring	31762-80L00	21.7 (0.854)	7.0 (0.276)
	7	Pressure modifier valve spring	31742-80L13	30.5 (1.201)	9.8 (0.386)
	3		31742-80L04	32.0 (1.260)	6.9 (0.272)
	—	Oil cooler relief valve spring	31742-80L12	17.02 (0.670)	8.0 (0.315)

*: Always check with the Parts Department for the latest parts information.

Accumulator

ECS00681

O-RING

Unit: mm (in)

Accumulator	Part No.*	Inner diameter (Small)	Part No.*	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	31605-85X00	62.8 (2.473)	21 (0.827)
N-D accumulator	31605-80L03	43.5 (1.713)	28.0 (1.102)

*: Always check with the Parts Department for the latest parts information.

Clutch and Brakes

ECS00682

REVERSE CLUTCH

Model code number		85X63	
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)	
Driven plate thickness mm (in)	Standard	1.8 (0.070)	
Clearance mm (in)	Standard	0.5 - 0.8 (0.020 - 0.031)	
	Allowable limit	1.2 (0.047)	
Thickness of retaining plates		Thickness mm (in)	Part number*
		6.6 (0.260) 6.8 (0.268) 7.0 (0.276) 7.2 (0.283) 7.4 (0.291) 7.6 (0.299) 7.8 (0.307)	31537-80L00 31537-80L01 31537-80L02 31537-80L03 31537-80L04 31537-80L05 31537-80L06

*: Always check with the Parts Department for the latest parts information.

HIGH CLUTCH

Model code number		85X63	
Number of drive plates		3	
Number of driven plates		7*2 + 1*3	
Drive plate thickness mm (in)	Standard	1.6 (0.063)	
	Allowable limit	1.4 (0.055)	
Driven plate thickness mm (in)	Standard	*2	*3
		1.4 (0.055)	2.0 (0.079)
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) 3.4 (0.134) 3.6 (0.142) 3.8 (0.150) 4.0 (0.157)	31537-80L20 31537-80L21 31537-80L22 31537-80L23 31537-80L24

*: Always check with the Parts Department for the latest parts information.

FORWARD CLUTCH

Model code number		85X63
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)

Driven plate thickness mm (in)	Standard	1.8 (0.071)	
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*
		3.2 (0.126)	31537-80L18
		3.4 (0.134)	31537-80L17
		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

*: Always check with the Parts Department for the latest parts information.

OVERRUN CLUTCH

Model code number		85X63	
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)	
Driven plate thickness mm (in)	Standard	1.8 (0.071)	
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.

LOW & REVERSE BRAKE

Model code number		85X63	
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)	
Driven plate thickness mm (in)	Standard	1.8 (0.071)	
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

*: 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 (10 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.

BRAKE BAND

Anchor end pin tightening torque N-m (kg-m, in-lb)	4.0 - 5.8 (0.4 - 0.6, 36 - 52)
Number of returning revolutions for anchor end pin	2.5
Lock nut tightening torque N-m (kg-m, ft-lb)	31 - 36 (3.2 - 3.7, 23 - 27)

Final Drive

ECS00683

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.

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.

BEARING PRELOAD

Differential side bearing preload mm (in)	0.05 - 0.09 (0.0020 - 0.0035)

TURNING TORQUE

Turning torque of final drive assembly N-m (kg-cm, in-lb)	0.78 - 1.37 (8.0 - 14.0, 6.9 - 12.2)

Planetary Carrier and Oil Pump

ECS00684

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) 11.98 - 11.99 (0.4717 - 0.4720) 11.97 - 11.98 (0.4713 - 0.4717)	31346-80L00 31346-80L01 31346-80L02
		Outer gear	
		Thickness mm (in)	Part number*
		11.99 - 12.0 (0.4720 - 0.4724) 11.98 - 11.99 (0.4717 - 0.4720) 11.97 - 11.98 (0.4713 - 0.4717)	31347-80L00 31347-80L01 31347-80L02
Clearance between oil pump housing and outer gear mm (in)	Standard	0.111 - 0.181 (0.0044 - 0.0071)	
	Allowable limit	0.181 (0.0071)	
Oil pump cover seal ring clearance mm (in)	Standard	0.1 - 0.25 (0.0039 - 0.0098)	
	Allowable limit	0.25 (0.0098)	

*: Always check with the Parts Department for the latest parts information.

Input Shaft

ECS00685

SEAL RING CLEARANCE

Input shaft seal ring clearance mm (in)	Standard	0.08 - 0.23 (0.0031 - 0.0091)
	Allowable limit	0.23 (0.0091)

SEAL RING

Outer diameter mm (in)	Inner diameter mm (in)	Width mm (in)	Part number*
26 (1.024)	22.4 (0.882)	1.971 (0.078)	31525-80X02

*: Always check with the Parts Department for the latest parts information.

Reduction Pinion Gear

ECS00686

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

NO.	Thickness mm (in)	Part number	NO.	Thickness mm (in)	Part number*
1	5.00 (0.1969)	31439-81X00	18	5.34 (0.2102)	31439-81X17
2	5.02 (0.1976)	31439-81X01	19	5.36 (0.2110)	31439-81X18
3	5.04 (0.1984)	31439-81X02	20	5.38 (0.2118)	31439-81X19
4	5.06 (0.1992)	31439-81X03	21	5.40 (0.2126)	31439-81X20
5	5.08 (0.2000)	31439-81X04	22	5.42 (0.2134)	31439-81X21
6	5.10 (0.2008)	31439-81X05	23	5.44 (0.2142)	31439-81X22
7	5.12 (0.2016)	31439-81X06	24	5.46 (0.2150)	31439-81X23
8	5.14 (0.2024)	31439-81X07	25	5.48 (0.2157)	31439-81X24
9	5.16 (0.2031)	31439-81X08	26	5.50 (0.2165)	31439-81X46
10	5.18 (0.2039)	31439-81X09	27	5.52 (0.2173)	31439-81X47
11	5.20 (0.2047)	31439-81X10	28	5.54 (0.2181)	31439-81X48
12	5.22 (0.2055)	31439-81X11	29	5.56 (0.2189)	31439-81X49
13	5.24 (0.2063)	31439-81X12	30	5.58 (0.2197)	31439-81X60
14	5.26 (0.2071)	31439-81X13	31	5.60 (0.2205)	31439-81X61
15	5.28 (0.2079)	31439-81X14	32	5.62 (0.2213)	31439-81X62

NO.	Thickness mm (in)	Part number	NO.	Thickness mm (in)	Part number*
16	5.30 (0.2087)	31439-81X15	33	5.64 (0.2220)	31439-81X63
17	5.32 (0.2094)	31439-81X16	34	5.66 (0.2228)	31439-81X64
35	5.68 (0.2236)	31439-81X65	50	4.70 (0.1850)	31439-83X10
36	5.70 (0.2244)	31439-81X66	51	4.72 (0.1858)	31439-83X11
37	5.72 (0.2252)	31439-81X67	52	4.74 (0.1866)	31439-83X12
38	5.74 (0.2260)	31439-81X68	53	4.76 (0.1874)	31439-83X13
39	5.76 (0.2268)	31439-81X69	54	4.78 (0.1882)	31439-83X14
40	5.78 (0.2276)	31439-81X70	55	4.80 (0.1890)	31439-83X15
41	5.80 (0.2283)	31439-81X71	56	4.82 (0.1898)	31439-83X16
42	5.82 (0.2291)	31439-81X72	57	4.84 (0.1906)	31439-83X17
43	5.84 (0.2299)	31439-81X73	58	4.86 (0.1913)	31439-83X18
44	5.86 (0.2307)	31439-81X74	59	4.88 (0.1921)	31439-83X19
45	4.60 (0.1811)	31439-85X05	60	4.90 (0.1929)	31439-83X20
46	4.62 (0.1819)	31439-85X06	61	4.92 (0.1937)	31439-83X21
47	4.64 (0.1827)	31439-85X07	62	4.94 (0.1945)	31439-83X22
48	4.66 (0.1835)	31439-85X08	63	4.96 (0.1953)	31439-83X23
49	4.68 (0.1843)	31439-85X09	64	4.98 (0.1961)	31439-83X24

*: Always check with the Parts Department for the latest parts information.

Band Servo

ECS00687

RETURN SPRING

Unit: mm (in)

Return spring	Part number*	Free length	Outer diameter
2nd servo return spring	31605-80L05	32.5 (1.280)	25.9 (1.020)
OD servo return spring	31605-80L06	62.6 (2.465)	21.7 (0.854)

*: Always check with the Parts Department for the latest parts information.

Output Shaft

ECS00688

SEAL RING CLEARANCE

Output shaft seal ring clearance mm (in)	Standard	0.10 - 0.25 (0.0039 - 0.0098)
	Allowable limit	0.25 (0.0098)

SEAL RING

Outer diameter mm (in)	Inner diameter mm (in)	Width mm (in)	Part number*
33.71 (1.327)	30.25 (1.191)	1.95 (0.077)	31525-80809

*: Always check with the Parts Department for the latest parts information.

END PLAY

Output shaft end play mm (in)	0 - 0.15 (0 - 0.0059)

OUTPUT SHAFT ADJUSTING SHIMS

Thickness mm (in)	Part number*
0.80 (0.0315)	31438-80X60
0.84 (0.0331)	31438-80X61
0.88 (0.0346)	31438-80X62
0.92 (0.0362)	31438-80X63
0.96 (0.0378)	31438-80X64
1.00 (0.0394)	31438-80X65
1.04 (0.0409)	31438-80X66
1.08 (0.0425)	31438-80X67
1.12 (0.0441)	31438-80X68
1.16 (0.0457)	31438-80X69
1.20 (0.0472)	31438-80X70

*: Always check with the Parts Department for the latest parts information.

Bearing Retainer

ECS00689

SEAL RING CLEARANCE

Bearing retainer seal ring clearance mm (in)	Standard	0.10 - 0.30 (0.0039 - 0.0118)
	Allowable limit	0.30 (0.0118)

Total End Play

ECS0068A

Total end play 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.

Reverse Clutch End Play

ECS0068B

Reverse clutch end play 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.

Removal and Installation

ECS0068C

Unit: mm (in)

Distance between end of converter housing and torque converter	14 (0.55)

Shift Solenoid Valves

ECS0068D

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)

Solenoid Valves

ECS0068E

Solenoid valves	Resistance (Approx.) Ω	Terminal No.
Shift solenoid valve A	20 - 30	2
Shift solenoid valve B	5 - 20	1
Overrun clutch solenoid valve	20 - 30	3
Line pressure solenoid valve	2.5 - 5	4
Torque converter clutch solenoid valve	5 - 20	5

A/T Fluid Temperature Sensor

ECS0068F

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approximately)	
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

Revolution Sensor

ECS0068G

Condition	Judgement standard
When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function.*1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	450 Hz (Approx.)
When vehicle is parked.	0V

Dropping Resistor

ECS0068H

Resistance	Approx. 12Ω

Turbine Revolution Sensor

ECS0068I

Condition	Judgement standard
When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function.*1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	240 Hz (Approx.)
When vehicle is parked.	Under 1.3V or over 4.5V