SECTION AT
AUTOMATIC TRANSMISSION

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TROUBLE DIAGNOSIS — INDEX

PFP:00000

Alphabetical & P No. Index for DTC

ECS005LQ

ALPHABETICAL INDEX FOR DTC

Items (CONSULT-II screen terms)	DTC	Reference page
	CONSULT-II GST*1	
A/T 1ST GR FNCTN	P0731	AT-119
A/T 2ND GR FNCTN	P0732	AT-125
A/T 3RD GR FNCTN	P0733	AT-131
A/T 4TH GR FNCTN	P0734	AT-137
A/T TCC S/V FNCTN	P0744	AT-149
ATF TEMP SEN/CIRC	P0710	AT-105
ENGINE SPEED SIG	P0725	AT-115
L/PRESS SOL/CIRC	P0745	AT-156
O/R CLTCH SOL/CIRC	P1760	AT-178
PNP SW/CIRC	P0705	AT-99
SFT SOL A/CIRC*2	P0750	AT-161
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TCC SOLENOID/CIRC	P0740	AT-144
TP SEN/CIRC A/T*2	P1705	AT-171
VEH SPD SEN/CIR AT*3	P0720	AT-110

- *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-99
P0710	ATF TEMP SEN/CIRC	AT-105
P0720	VEH SPD SEN/CIR AT*3	AT-110
P0725	ENGINE SPEED SIG	AT-115
P0731	A/T 1ST GR FNCTN	AT-119
P0732	A/T 2ND GR FNCTN	AT-125
P0733	A/T 3RD GR FNCTN	AT-131
P0734	A/T 4TH GR FNCTN	AT-137
P0740	TCC SOLENOID/CIRC	AT-144
P0744	A/T TCC S/V FNCTN	AT-149
P0745	L/PRESS SOL/CIRC	AT-156
P0750	SFT SOL A/CIRC*2	AT-161
P0755	SFT SOL B/CIRC*2	AT-166
P1705	TP SEN/CIRC A/T*2	AT-171
P1760	O/R CLTCH SOL/CIRC	AT-178

- *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”

ECS006GH

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. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. 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

ECS005LS

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.

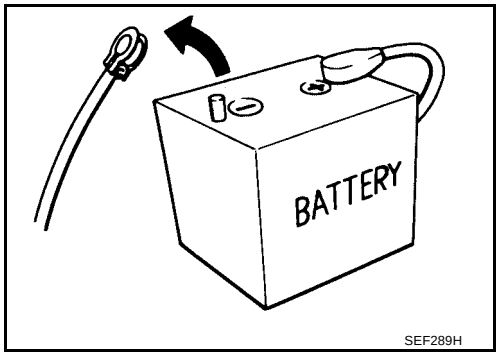
CAUTION:

- **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 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

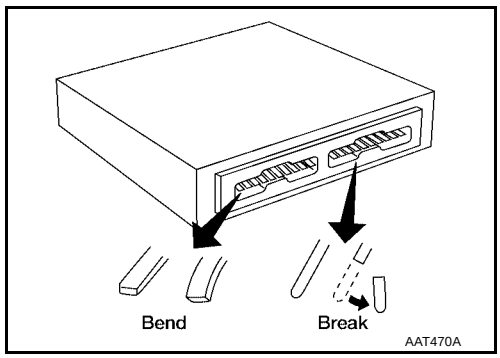
ECS005LT

- **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.**

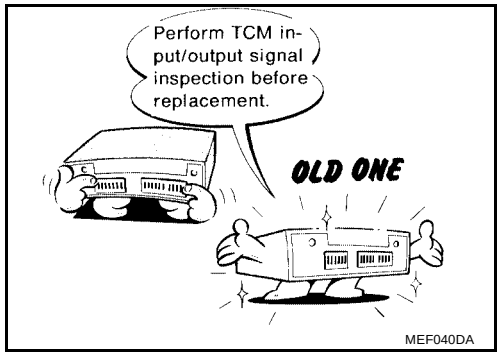


SEF289H

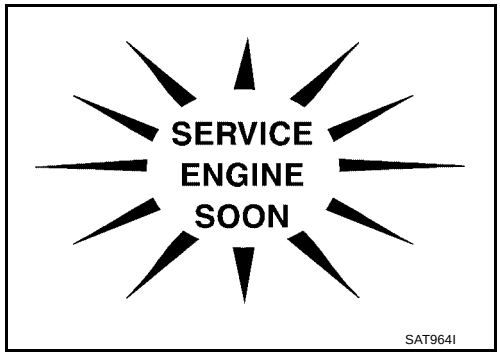
- **When connecting or disconnecting pin connectors into or from TCM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on TCM pin terminal, when connecting pin connectors.



- **Before replacing TCM, perform TCM input/output signal inspection and make sure whether TCM functions properly or not. Refer to AT-93, "TCM INSPECTION TABLE" .**



- **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 transmission. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transmission.
- Place disassembled parts in order for easier and proper assembly.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transmission 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-8, "ATF COOLER SERVICE" .
- After overhaul, refill the transmission with new ATF.
- When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF cooling system.
  Always follow the procedures when changing A/T fluid. Refer to MA-37, "Changing A/T Fluid" .

Service Notice or Precautions

ECS005LU

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. Refer to AT-47, "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 AT-57, "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.
- Transmission failure did not display evidence of damaged or worn internal parts, steel particles or clutch plate lining material in unit and inside the fluid filter.
- Vehicle has been exposed to high mileage (only). The exception may be where the torque converter clutch dampener plate lining has seen excess wear by vehicles operated in heavy and/or constant traffic, such as taxi, delivery or police use.

ATF COOLER SERVICE

Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer.
Replace radiator lower tank (which includes ATF cooler) with a new one and flush cooler line using cleaning solvent and compressed air.

OBD-II SELF-DIAGNOSIS

- A/T self-diagnosis is performed by the TCM in combination with the ECM. The results can be read through the blinking pattern of the O/D OFF indicator or the malfunction indicator lamp (MIL). Refer to the table on AT-38, "SELF-DIAGNOSTIC RESULT TEST MODE" 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 AT-35, "HOW TO ERASE DTC" to complete the repair and avoid unnecessary blinking of the MIL.
- The following self-diagnostic items can be detected using ECM self-diagnostic results mode* only when the O/D OFF indicator lamp does not indicate any malfunctions.

- Park/neutral position (PNP) switch
- A/T 1st, 2nd, 3rd, or 4th gear function

– A/T TCC S/V function (lock-up)

*: For details of OBD-II, refer to EC-610, "ON BOARD DIAGNOSTIC (OBD) SYSTEM" (VG33E only) or EC-1210, "ON BOARD DIAGNOSTIC (OBD) SYSTEM" (VG33ER only).

- **Certain systems and components, especially those related to OBD, may use a slide-locking type harness connector. For description and how to disconnect, refer to PG-5, "HARNESS CONNECTOR (SLIDE-LOCKING TYPE)" .**

Wiring Diagrams and Trouble Diagnosis

ECS005LV

When you read wiring diagrams, refer to the following:

- Refer to GI-13, "How to Read Wiring Diagrams" .
- Refer to PG-8, "POWER SUPPLY ROUTING" for power distribution circuit.

When you perform trouble diagnosis, refer to the following:

- Refer to GI-9, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES" .
- Refer to GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident" .

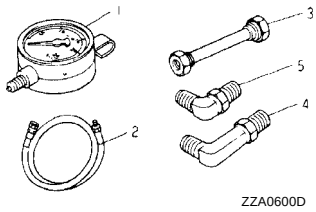
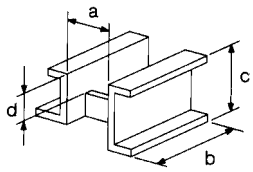
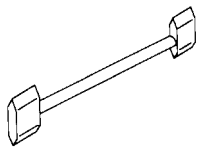
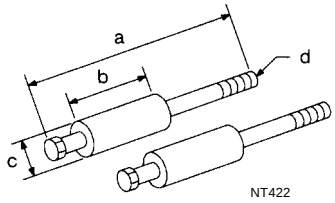
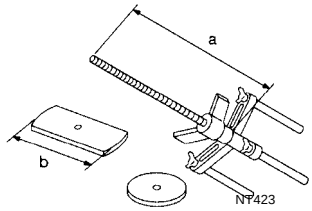
PREPARATION

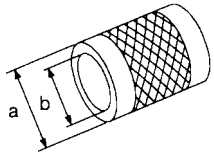
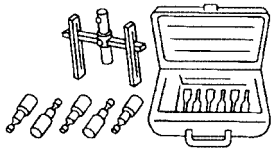
PFP:00002

Special Service Tools

ECS005LW

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
ST2505S001 (J34301-C) Oil pressure gauge set 1 ST25051001 (—) Oil pressure gauge 2 ST25052000 (—) Hose 3 ST25053000 (—) Joint pipe 4 ST25054000 (—) Adapter 5 ST25055000 (—) Adapter  ZZA0600D	Measuring line pressure
ST07870000 (J37068) Transmission case stand  NT421	Disassembling and assembling A/T **a: 182 mm (7.17 in)** **b: 282 mm (11.10 in)** **c: 230 mm (9.06 in)** **d: 100 mm (3.94 in)**
KV31102100 (J37065) Torque converter one-way clutch check tool  NT098	Checking one-way clutch in torque converter
ST25850000 (J25721-A) Sliding hammer  NT422	Removing oil pump assembly **a: 179 mm (7.05 in)** **b: 70 mm (2.76 in)** **c: 40 mm (1.57 in) dia.** **d: M12 x 1.75P**
KV31102400 (J34285 and J34285-87) Clutch spring compressor  NT423	Removing and installing clutch return springs **a: 320 mm (12.60 in)** **b: 174 mm (6.85 in)**

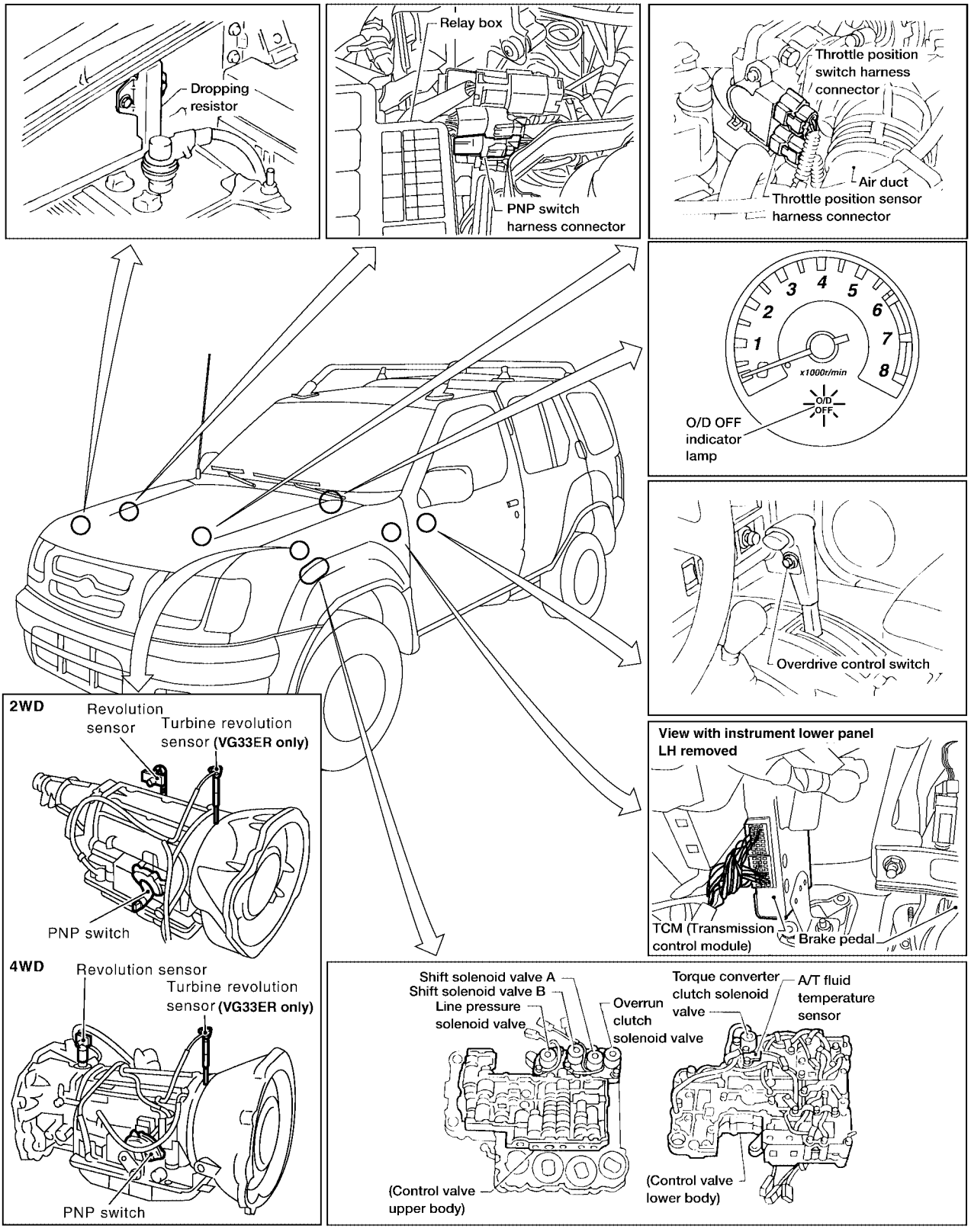
Tool number (Kent-Moore No.) Tool name	Description
ST33200000 (J26082) Drift  NT091	Installing oil pump housing oil seal Installing rear oil seal **a: 60 mm (2.36 in) dia.** **b: 44.5 mm (1.752 in) dia.**
(J34291) Shim setting gauge set  NT101	Selecting oil pump cover bearing race and oil pump thrust washer

OVERALL SYSTEM

PFP:00000

A/T Electrical Parts Location

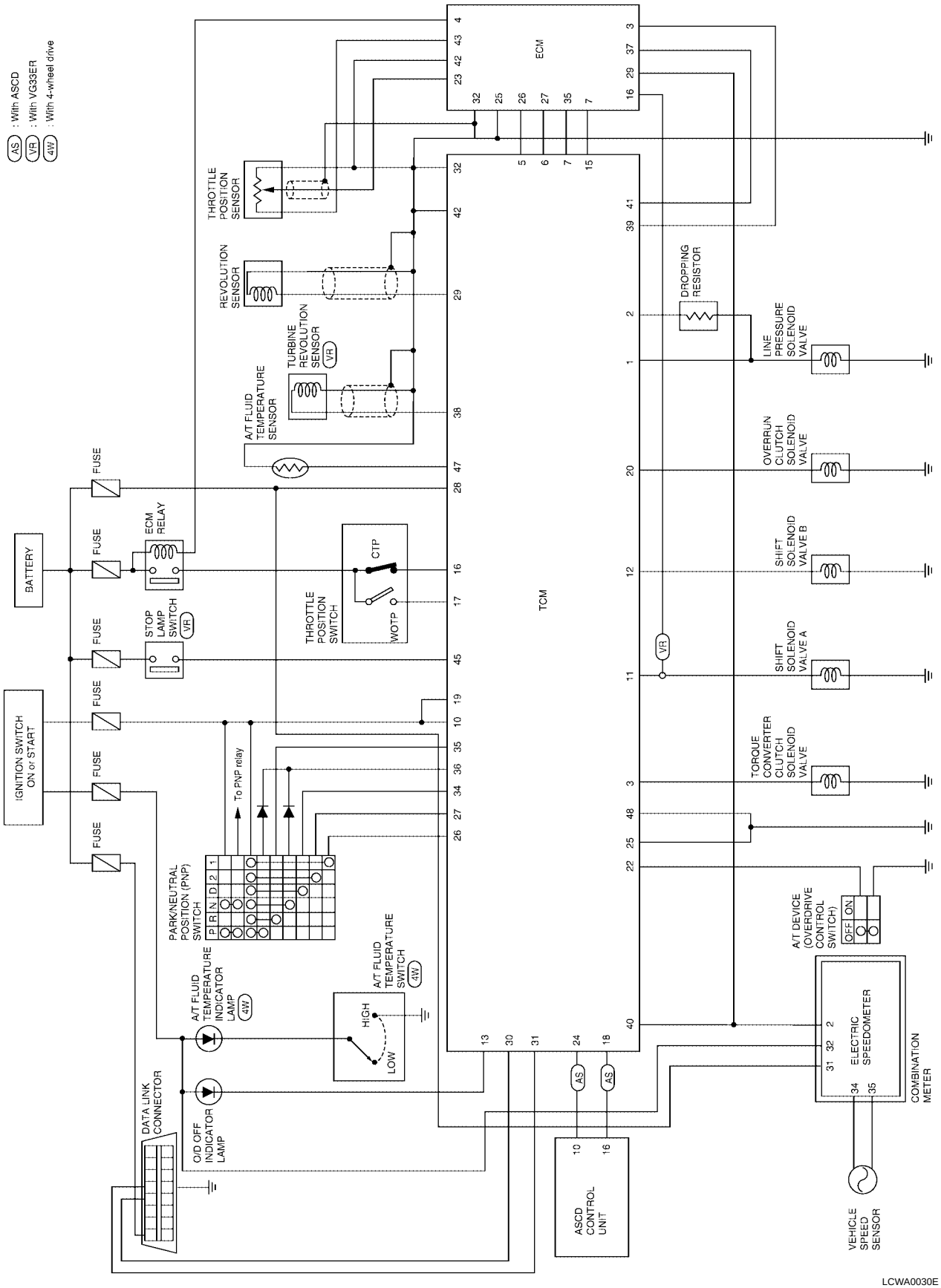
ECS005LX



LCIA0262E

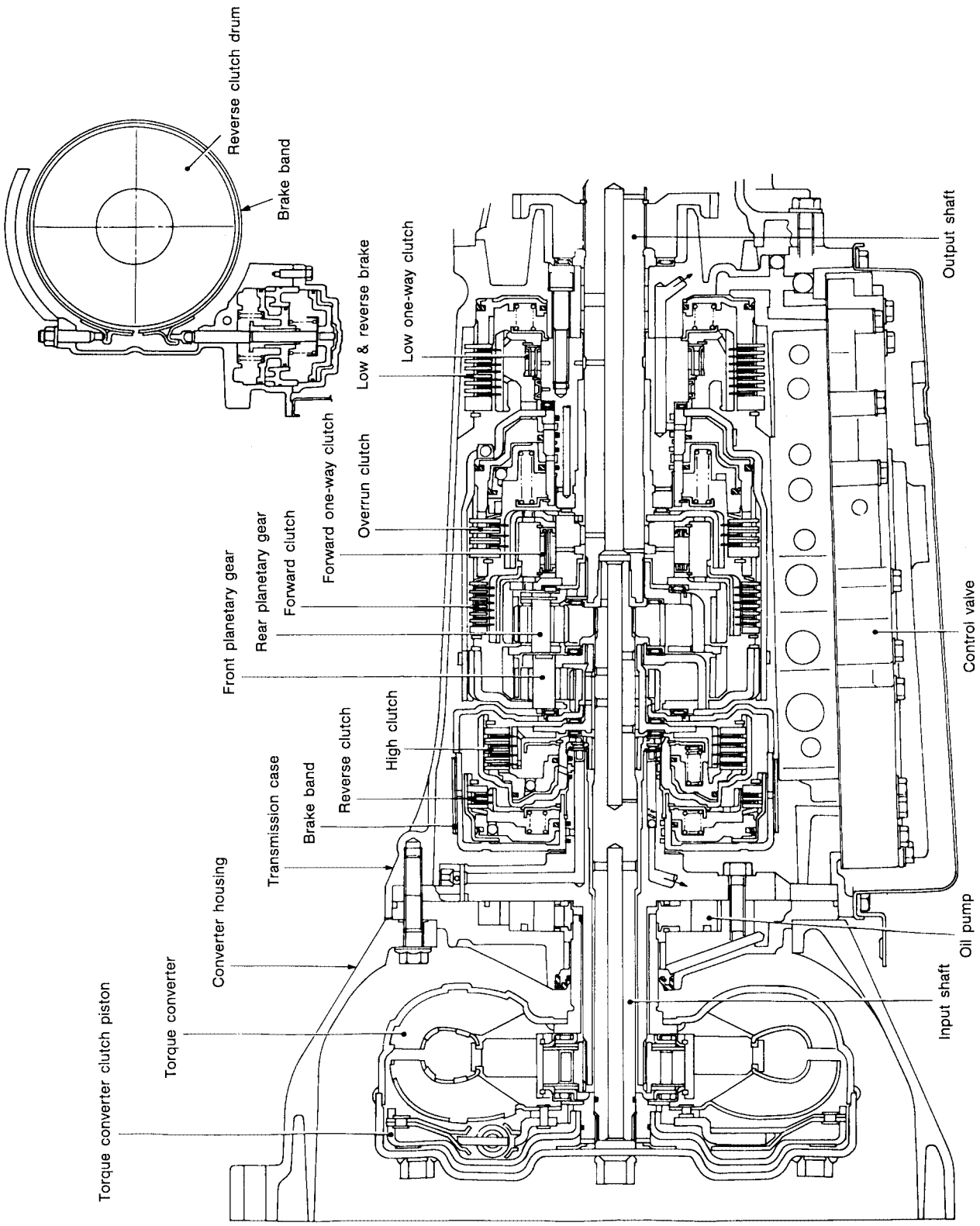
Circuit Diagram

ECS005LY



Cross-sectional View

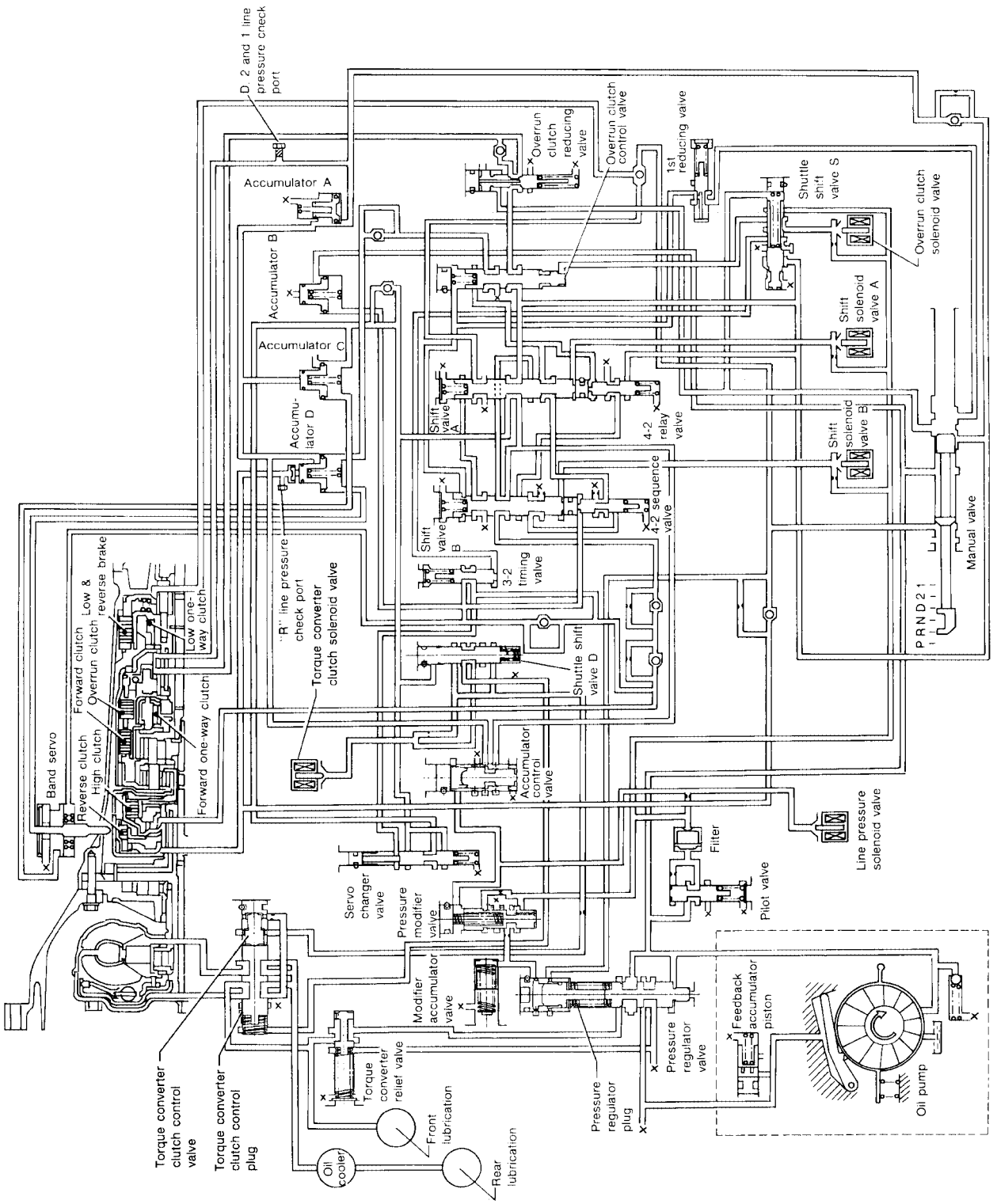
ECS005LZ



LCIA0263E

Hydraulic Control Circuit

ECS005M0



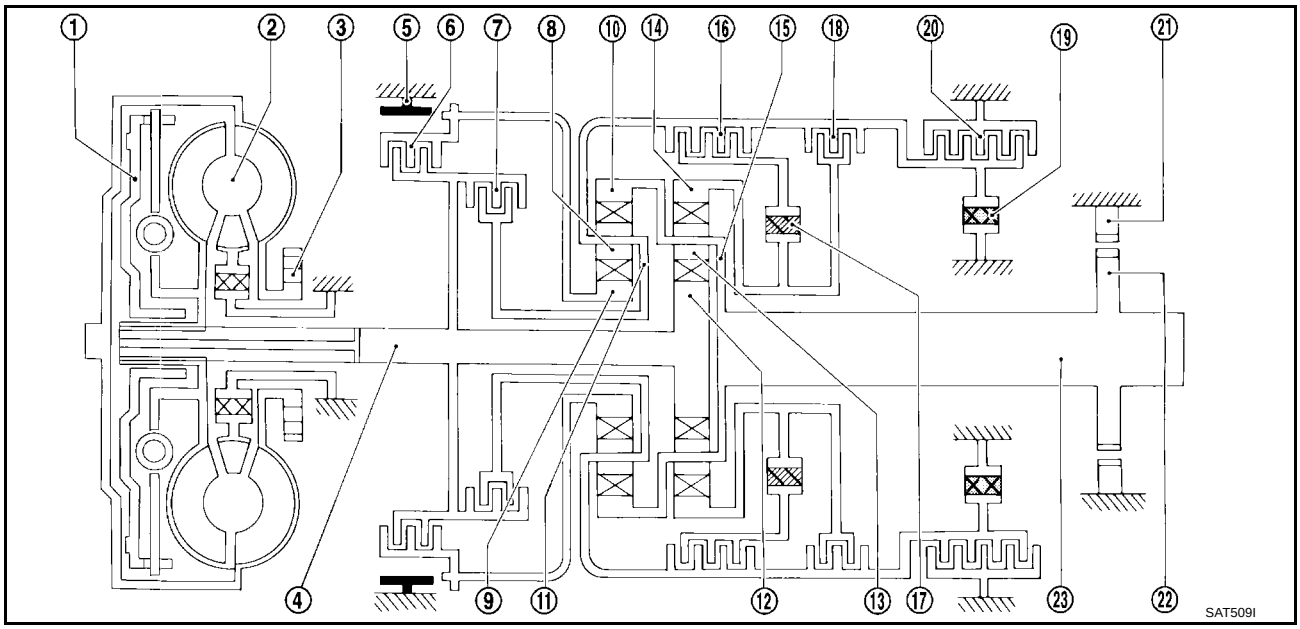
LCIA0264E

Shift Mechanism

ECS005M1

The automatic transmission uses compact, dual planetary gear systems to improve power-transmission efficiency, simplify construction and reduce weight.
It also employs an optimum shift control and superwide gear ratios. They improve starting performance and acceleration during medium and high-speed operation.
Two one-way clutches are also employed: one is used for the forward clutch and the other for the low clutch. These one-way clutches, combined with four accumulators, reduce shifting shock to a minimum.

CONSTRUCTION



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

FUNCTION OF CLUTCH AND BRAKE

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

CLUTCH AND BAND CHART

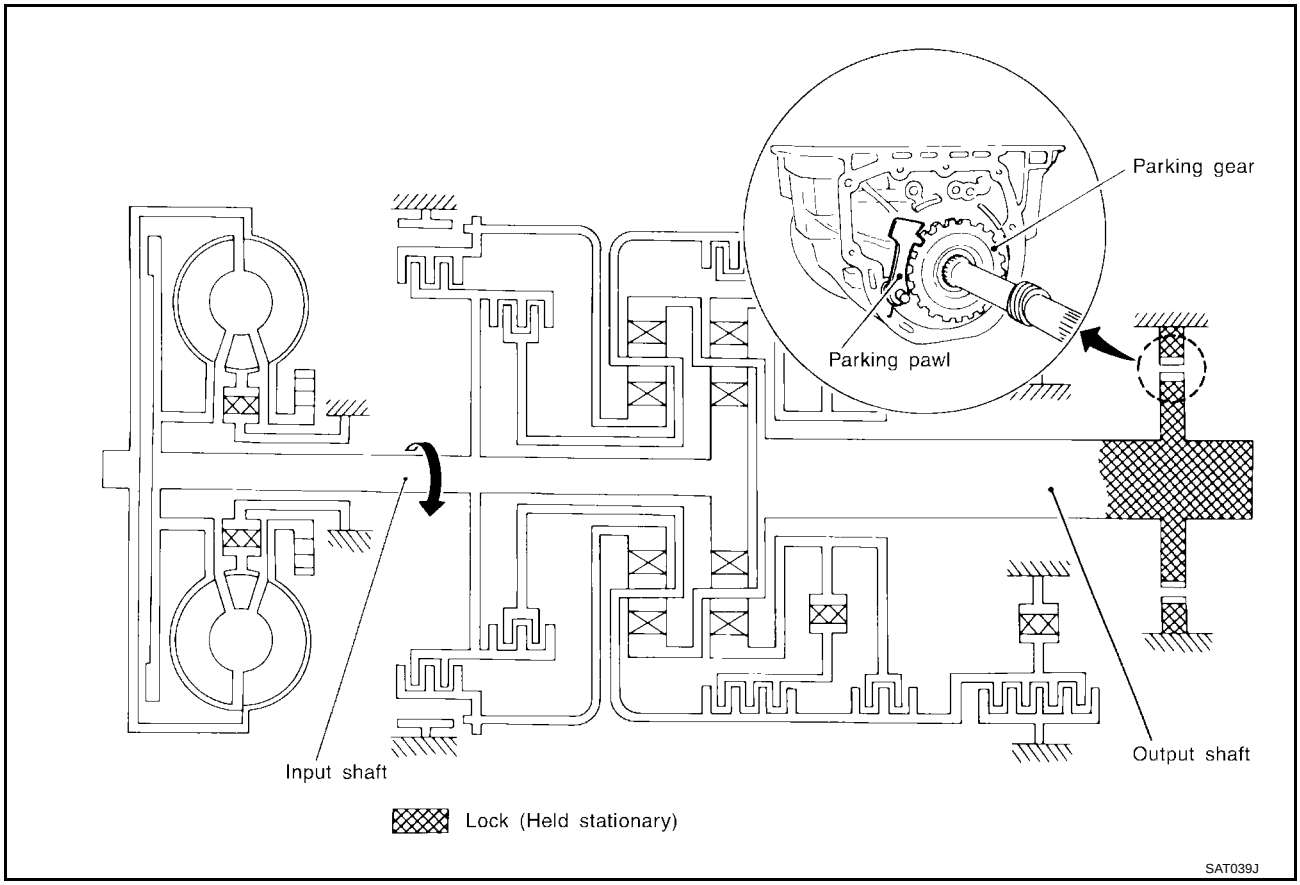
Shift position		Reverse clutch	High clutch	Forward clutch	Overrun clutch	Band servo			Forward one-way clutch	Low one-way clutch	Low & reverse brake	Lock-up	Remarks
						2nd apply	3rd release	4th apply					
P													PARK POSITION
R		○									○		REVERSE POSITION
N													NEUTRAL POSITION
D*4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

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

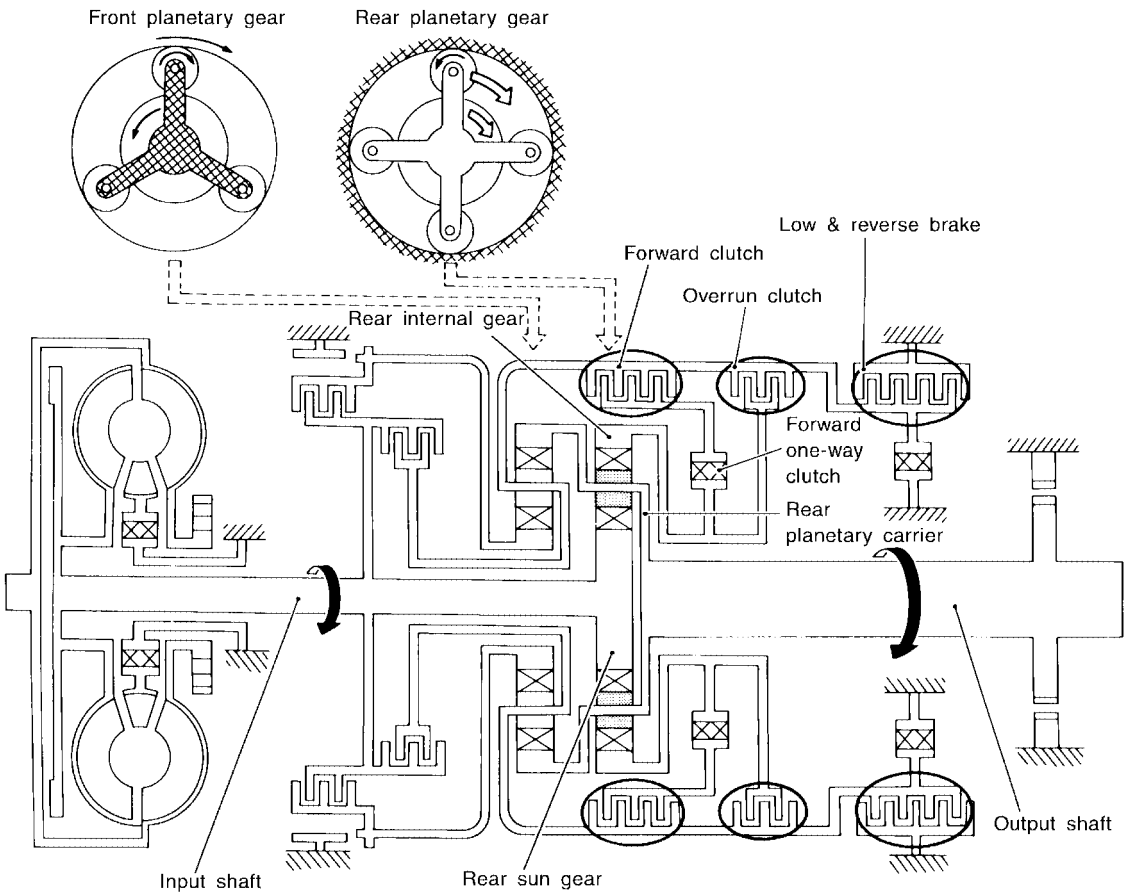
POWER TRANSMISSION

P and N Positions

- P position
  Similar to the N position, no control members operate. The parking pawl interconnected with the select lever engages with the parking gear to mechanically hold the output shaft so that the power train is locked.
- N position
  No control members operate. Power from the input shaft is not transmitted to the output shaft since the clutch does not operate.

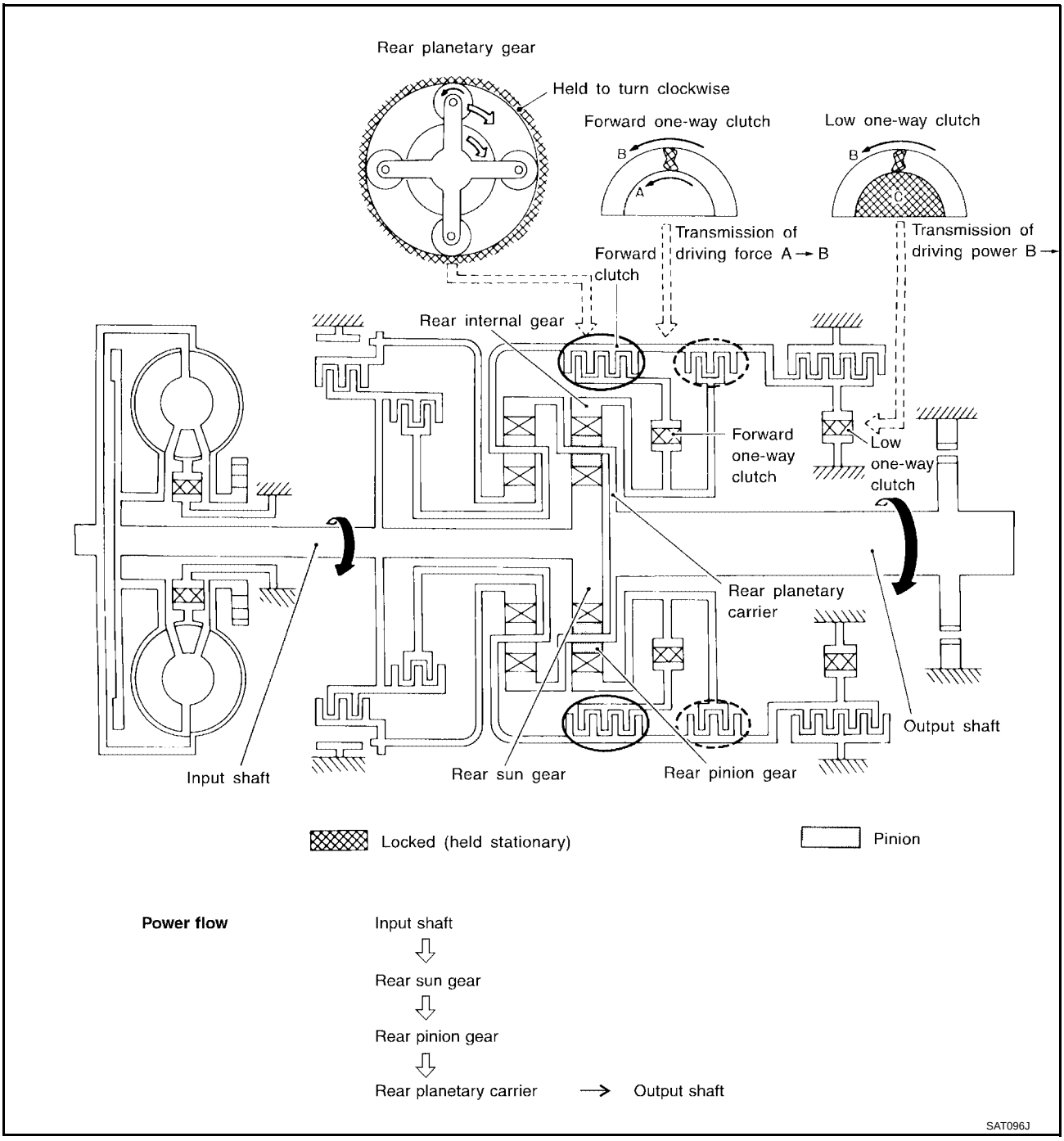


11 Position



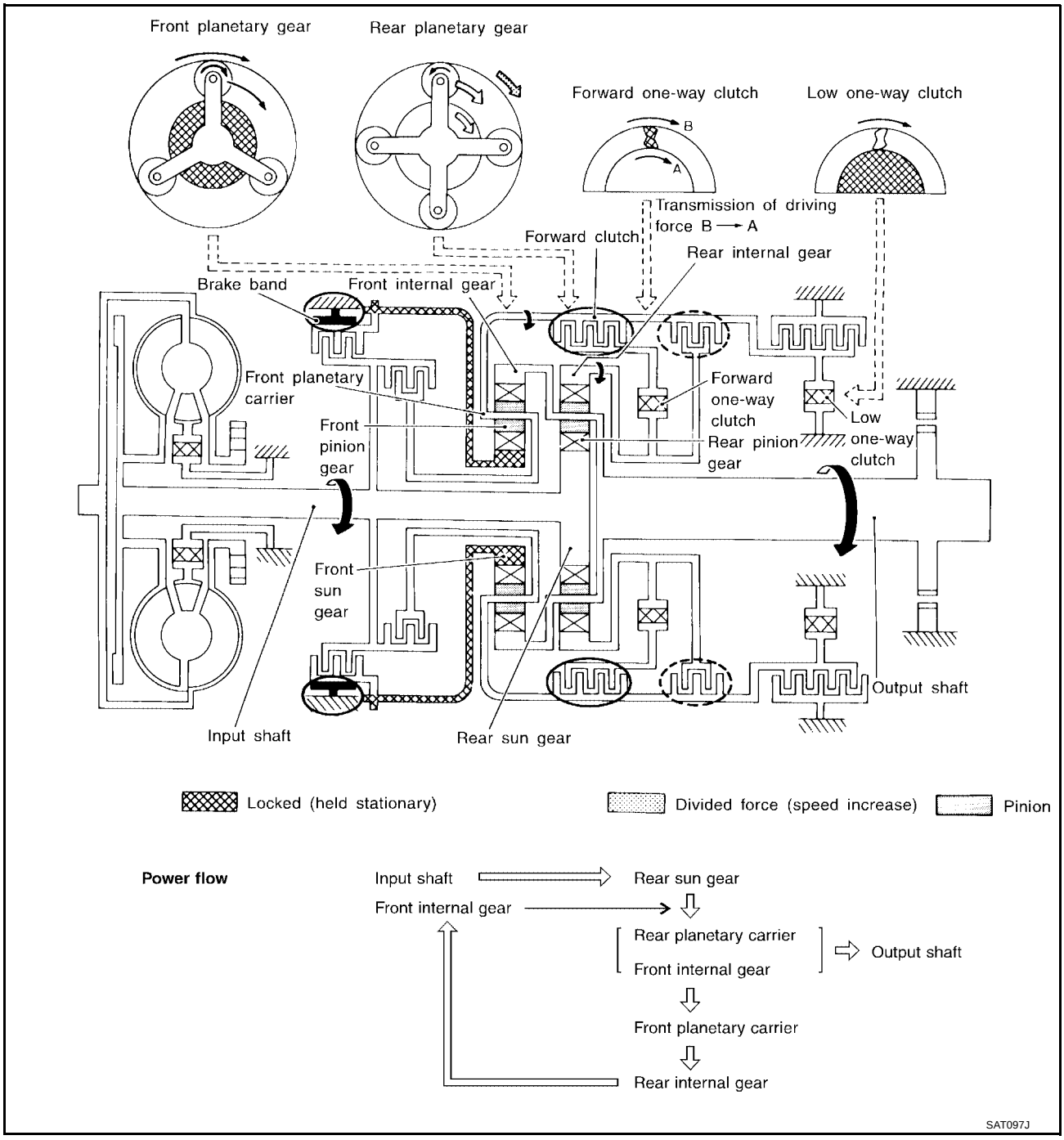
Forward clutch **Forward one-way clutch** **Overrun clutch** **Low and reverse brake**	As overrun clutch engages, rear internal gear is locked by the operation of low and reverse brake. This is different from that of D_1 and 2_1 .
Engine brake	Overrun clutch always engages, therefore engine brake can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

D1 and 21 Positions



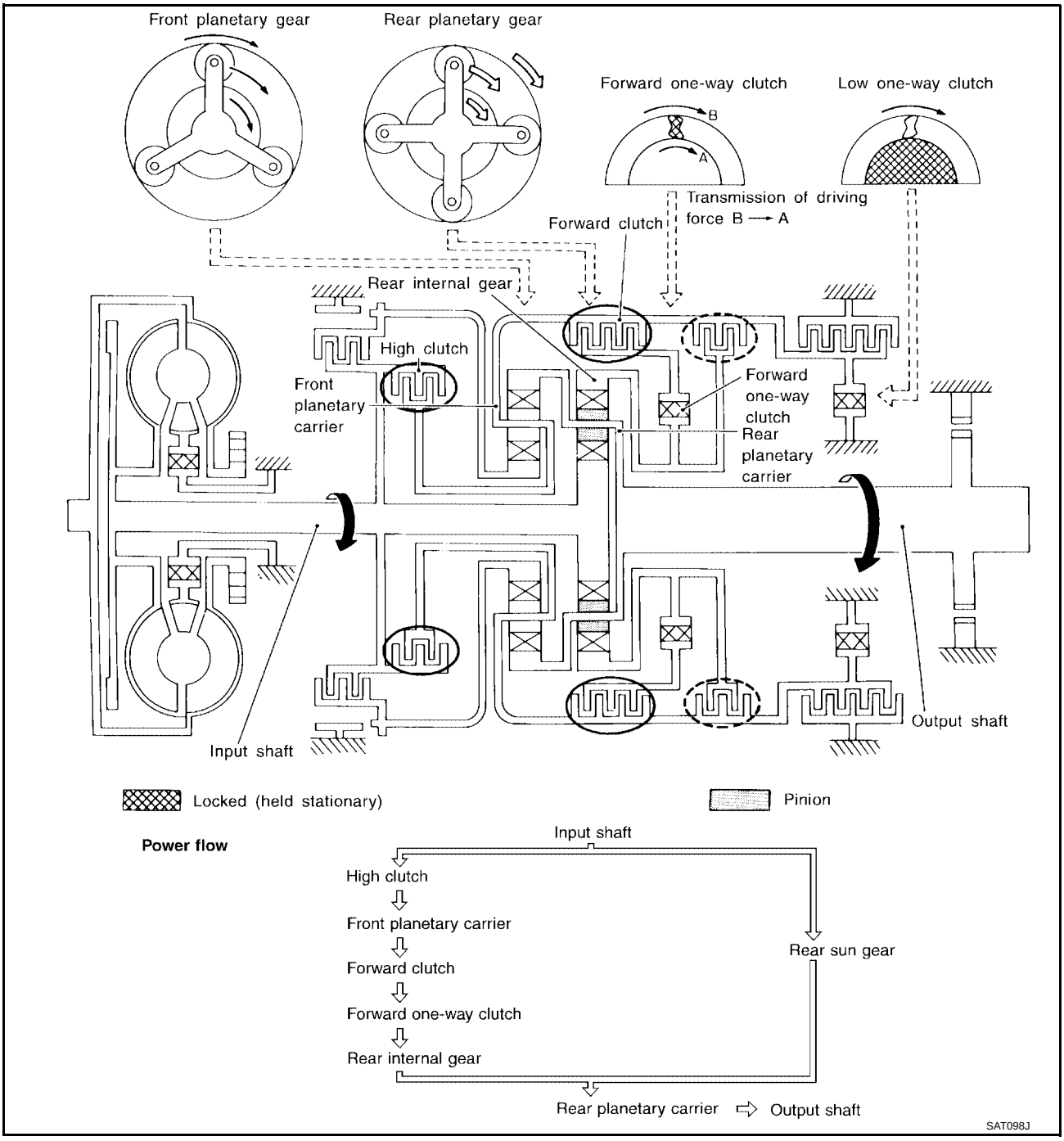
Forward one-way clutch **Forward clutch** **Low one-way clutch**	Rear internal gear is locked to rotate counterclockwise because of the functioning of these three clutches. (Start-up at D1)
Overrun clutch engagement conditions (Engine brake)	D1 : Overdrive control switch in OFF Throttle opening less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

D2 , 22 and 12 Positions



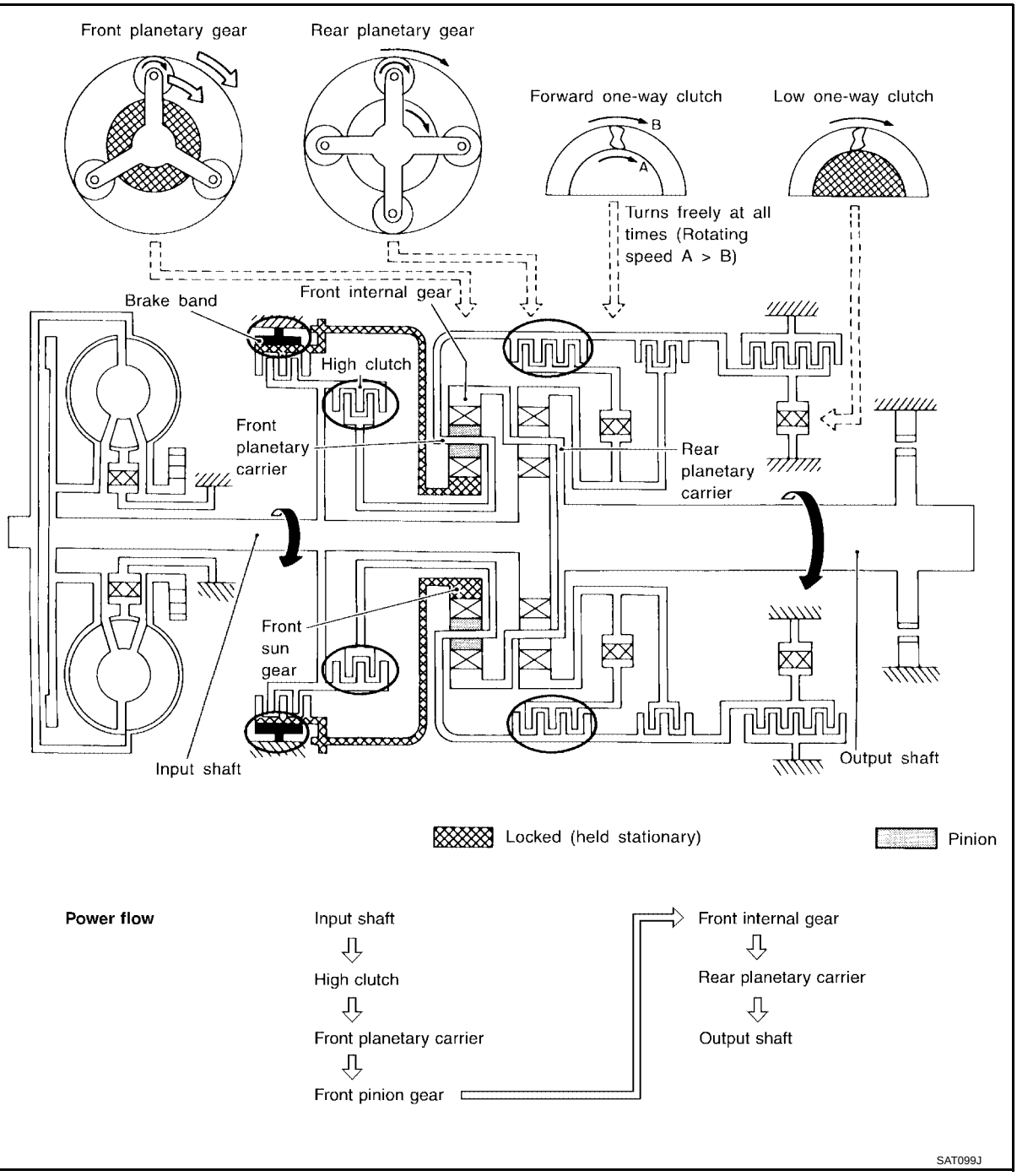
Forward clutch **Forward one-way clutch** **Brake band**	Rear sun gear drives rear planetary carrier and combined front internal gear. Front internal gear now rotates around front sun gear accompanying front planetary carrier. As front planetary carrier transfers the power to rear internal gear through 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 in OFF Throttle opening less than 3/16 22 : Throttle opening less than 3/16 12 : Always engaged

D3 Position



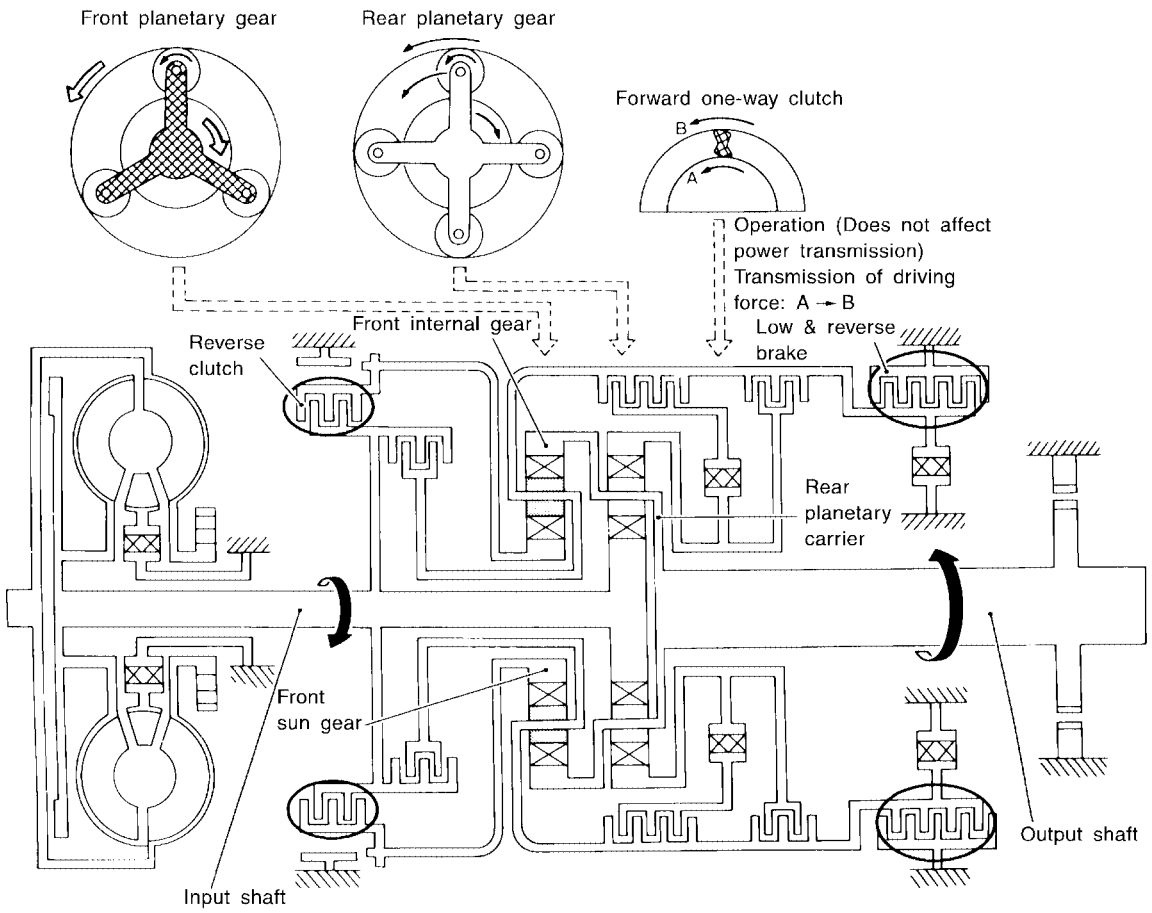
High clutch **Forward clutch** **Forward one-way clutch**	Input power is transmitted to front planetary carrier through high clutch. And front planetary carrier is connected to rear internal gear by operation of forward clutch and forward one-way clutch. This rear internal gear rotation and another input (the rear sun gear) accompany rear planetary carrier to turn at the same speed.
Overrun clutch engagement conditions	D3 : Overdrive control switch in OFF Throttle opening 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 planetary 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

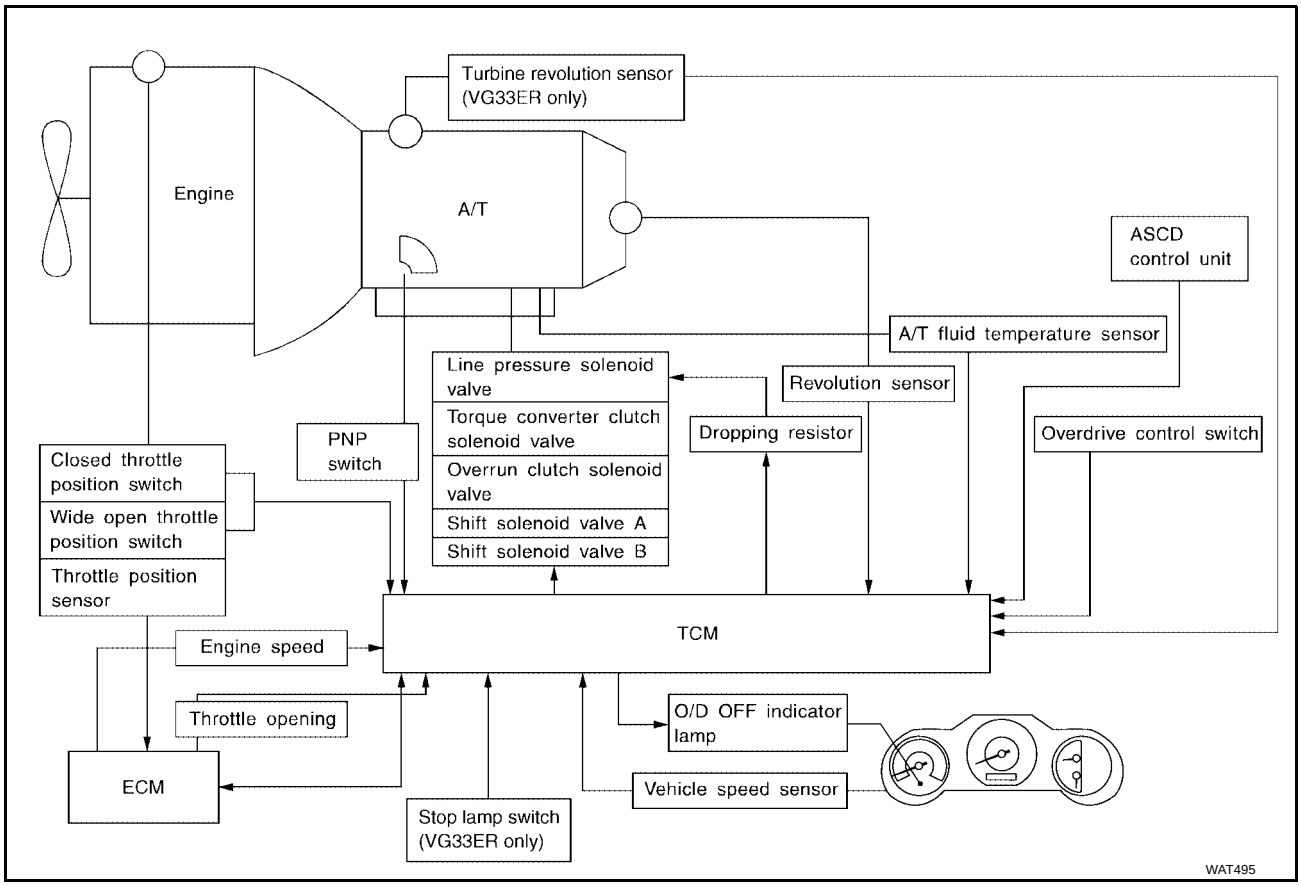
ECS005M2

OUTLINE

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

SENSORS		TCM		ACTUATORS
PNP switch Throttle position sensor Closed throttle position switch Wide open throttle position switch Engine speed signal A/T fluid temperature sensor Revolution sensor Vehicle speed sensor Overdrive control switch ASCD control unit Stoplamp switch (VG33ER only) Turbine revolution sensor (VG33ER only)	▶	Shift control Line pressure control Lock-up control Overrun clutch control Timing control Fail-safe control Self-diagnosis CONSULT-II communication line Duet-EA control	▶	Shift solenoid valve A Shift solenoid valve B Overrun clutch solenoid valve Torque converter clutch solenoid valve Line pressure solenoid valve O/D OFF indicator lamp

CONTROL SYSTEM



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	PNP switch	Detects select lever position and sends a signal to TCM.
	Throttle position sensor	Detects throttle valve position and sends a signal to TCM.
	Closed throttle position switch	Detects throttle valve's fully-closed position and sends a signal to TCM.
	Wide open throttle position switch	Detects a throttle valve position of greater than 1/2 of full throttle and sends a signal to TCM.
	Engine speed signal	From ECM.
	A/T fluid temperature sensor	Detects transmission fluid temperature and sends a signal to TCM.
	Revolution sensor	Detects output shaft rpm and sends a signal to TCM.
	Vehicle speed sensor	Used as an auxiliary vehicle speed sensor. Sends a signal when revolution sensor (installed on transmission) malfunctions.
	Overdrive control switch	Sends a signal, which prohibits a shift to "D4 " (overdrive) position, to the TCM.
	ASCD control unit	Sends the cruise signal and "D4 " (overdrive) cancellation signal from ASCD control unit to TCM.
	Turbine revolution sensor (VG33ER only)	Sends the input shaft revolution signal.
	Stoplamp switch (VG33ER only)	Sends the lock-up release signal to the TCM at the time of D4 (lock-up).
Output	Shift solenoid valve A/B	Selects shifting point suited to driving conditions in relation to a signal sent from TCM.
	Line pressure solenoid valve	Regulates (or decreases) line pressure suited to driving conditions in relation to a signal sent from TCM.
	Torque converter clutch solenoid valve	Regulates (or decreases) lock-up pressure suited to driving conditions in relation to a signal sent from TCM.
	Overrun clutch solenoid valve	Controls an "engine brake" effect suited to driving conditions in relation to a signal sent from TCM.
	O/D OFF indicator lamp	Shows TCM faults, when A/T control components malfunction.

Control Mechanism

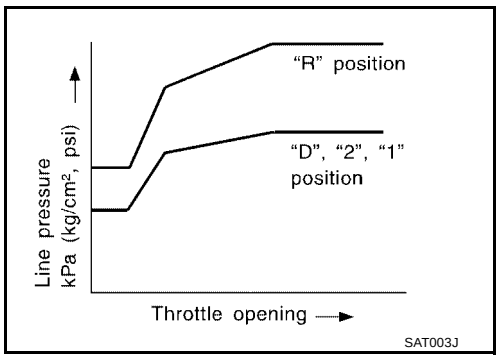
ECS005M3

LINE PRESSURE CONTROL

TCM has the 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.

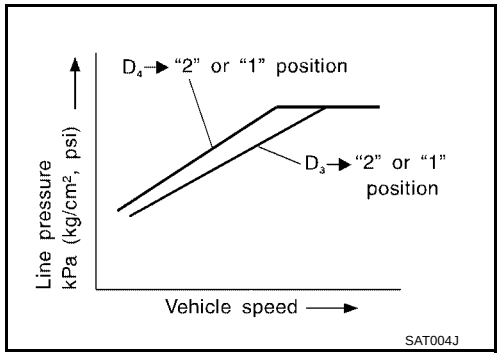
Normal Control

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



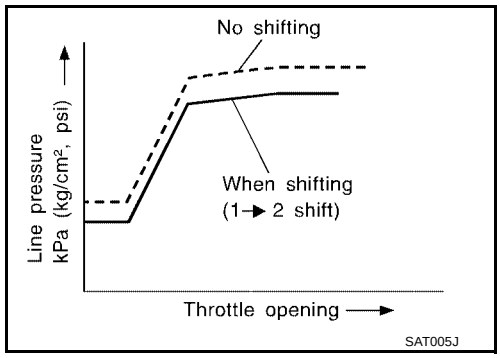
Back-up Control (Engine brake)

If the selector lever is shifted to “2” position while driving in 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.



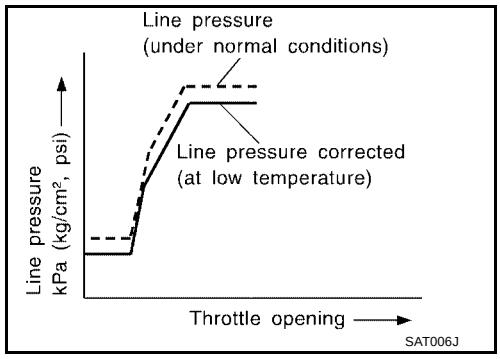
During Shift Change

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.

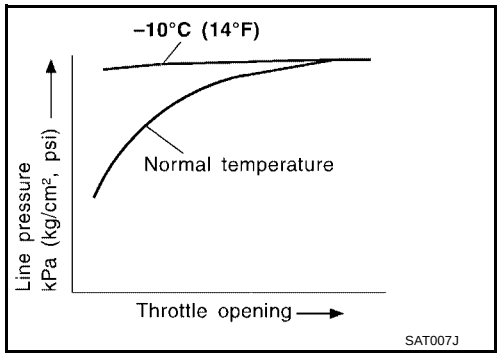


At Low Fluid Temperature

- 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.

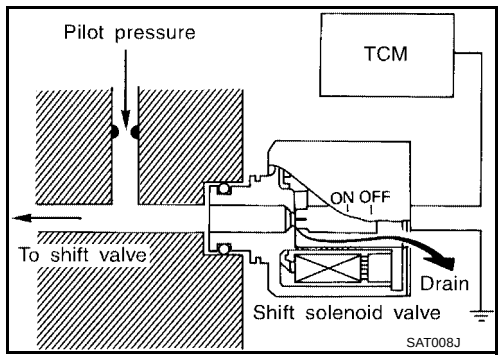


SHIFT CONTROL

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. This results in improved acceleration performance and fuel economy.

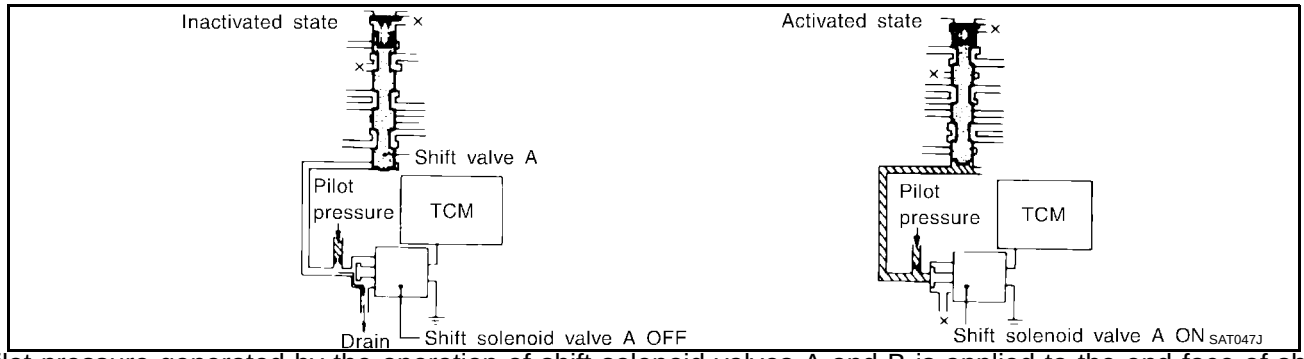
Control of Shift Solenoid Valves A and B

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



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 oil pressure signal which controls the torque converter clutch piston.

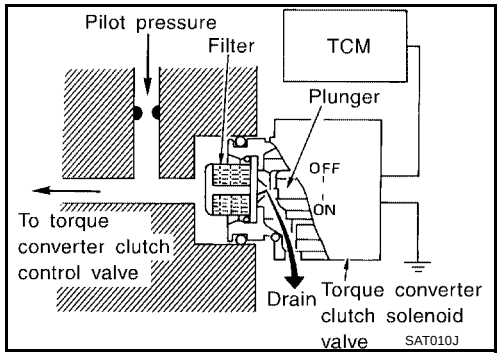
Conditions for Lock-up Operation

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

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

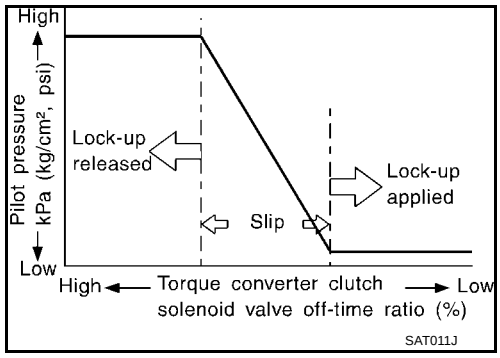
Torque Converter Clutch Solenoid Valve Control

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

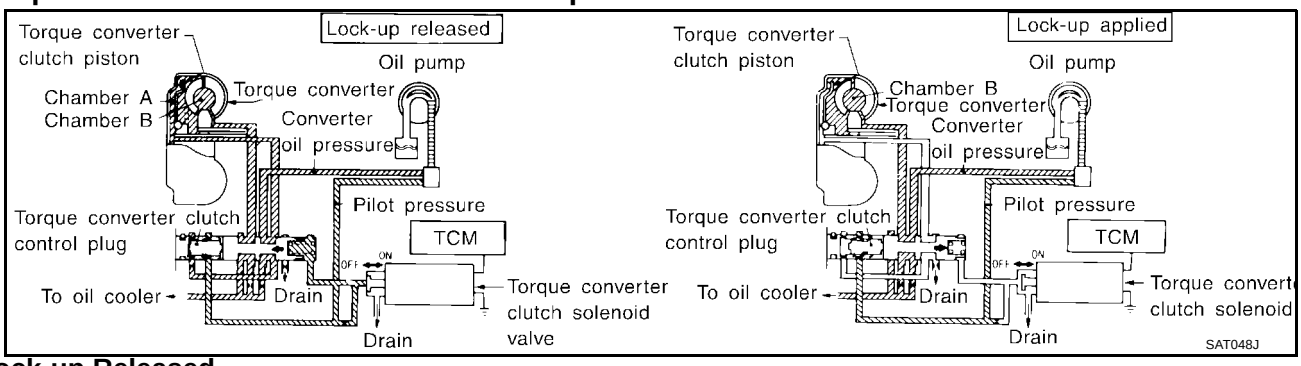


The torque converter clutch piston is designed to slip to adjust the ratio of ON-OFF, thereby reducing lock-up shock.

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.

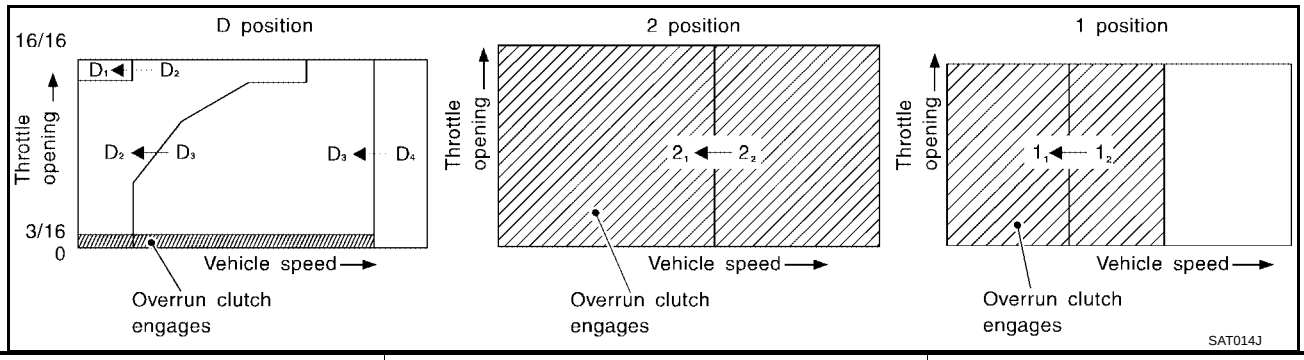
Also smooth lock-up is provided by transient application and release of the lock-up.

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.

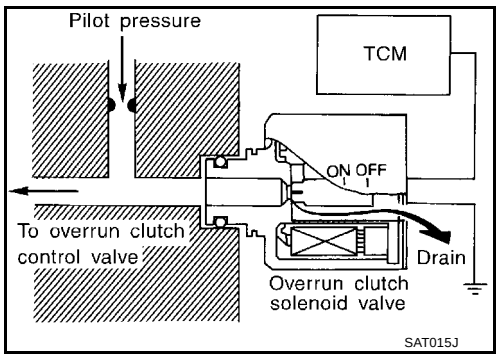
Overrun Clutch Operating Conditions



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

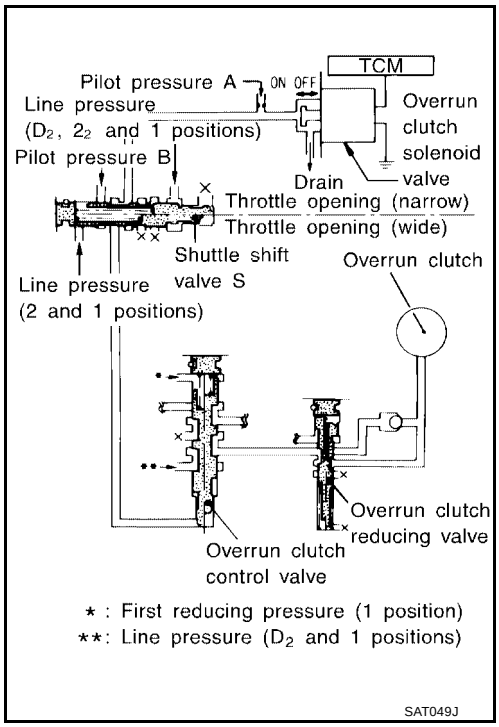
Overrun Clutch Solenoid Valve Control

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 A 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 A 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

ECS005M4

FUNCTION OF CONTROL VALVE

Valve name	Function
● Pressure regulator valve ● Pressure regulator plug ● Pressure regulator sleeve plug	Regulate oil discharged from the oil pump to provide optimum line pressure for all driving conditions.
Pressure modifier valve	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.
Modifier accumulator piston	Smooths hydraulic pressure regulated by the pressure modifier valve to prevent pulsations.
Pilot valve	Regulates line pressure to maintain a constant pilot pressure level which controls lock-up mechanism, overrun clutch, 3-2 timing required for shifting.
Accumulator control valve Accumulator control sleeve	Regulate 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.
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.
Shuttle shift valve S	Switches hydraulic circuits to provide 3-2 timing control and overrun clutch control in relation to the throttle opening. Inactivates the overrun clutch to prevent interlocking in 4th gear when the throttle is wide open.
Overrun clutch control valve	Switches hydraulic circuits to prevent engagement of the overrun clutch simultaneously with application of the brake band in 4th gear. (Interlocking occurs if the overrun clutch engages during D_4 gear operation.)
4-2 relay valve	Memorizes that the transmission is in 4th gear. Prevents the transmission from downshifting from 4th gear to 3rd and then to 2nd in combination with 4-2 sequence valve and shift valves A and B when downshifting from 4th to 2nd gear.
4-2 sequence valve	Prevents band servo pressure from draining before high clutch operating pressure and band servo releasing pressure drain (from the same circuit) during downshifting from 4th to 2nd gear.
Servo charger valve	An accumulator and a one-way orifice are used in the 2nd gear band servo oil circuit to dampen shifting shock when shifting from 1st to 2nd gear. To maintain adequate flow rate when downshifting from 4th or 3rd gear to 2nd gear, the servo charger valve directs 2nd gear band servo hydraulic pressure to the circuit without going through the one-way orifice when downshifting from 3rd or a higher gear.
3-2 timing valve	Prevents a late operation of the brake band when shifting selector lever from D to 1 or 2 position while driving in D_3 .
1 reducing valve	Reduces low & reverse brake pressure to dampen engine-brake shock when downshifting from the 1 position 2nd gear to 1st gear.
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.

Valve name	Function
Torque converter clutch control valve, torque converter clutch control plug and torque converter clutch control sleeve	Activate or inactivate the lock-up function. Also provide smooth lock-up through transient application and release of the lock-up system.
Shuttle shift valve D	Switches hydraulic circuits so that output pressure of the torque converter clutch solenoid valve acts on the lock-up valve in the D position of 2nd, 3rd and 4th gears. (In the D position 1st gear, lock-up is inhibited.) ● Lock-up control is not affected in D position 2nd, 3rd or 4th gears, unless output pressure of the torque converter clutch solenoid valve is generated by a signal from the control unit.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

PFP:00000

Introduction

ECS005M5

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-38, "SELF-DIAGNOSTIC RESULT TEST MODE" .

OBD-II Function for A/T System

ECS005M6

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

ECS005M7

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 was experienced during the first test drive is sensed during the second test drive, the MIL will illuminate. — Second Trip
A/T-related parts for which the MIL illuminates during the first or second test drive are listed below.

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

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

OBD-II Diagnostic Trouble Code (DTC)

ECS005M8

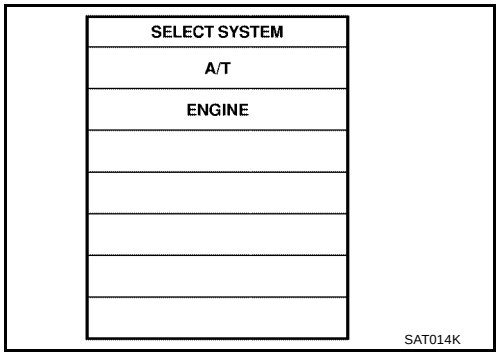
HOW TO READ DTC AND 1ST TRIP DTC

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

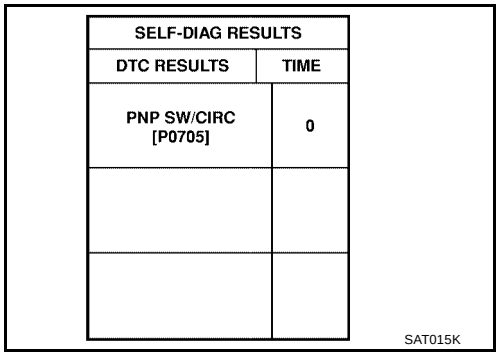
(with CONSULT-II or GST GST) CONSULT-II or GST (Generic Scan Tool) Examples: P0705, P0710, P0720, P0725, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

- **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.

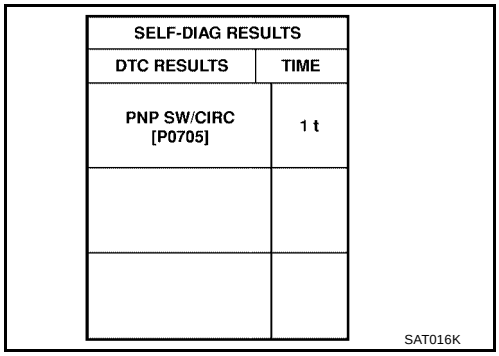
A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode for “ENGINE” with CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.



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-666, "CONSULT-II Function" (VG33E only) or EC-1266, "CONSULT-II Function" (VG33ER only).
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 (0701, 0603 - 0608) Fuel Injection System Function — DTC: P0171 (0115), P0172 (0114), P0174 (0209), P0175 (0210)
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

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

HOW TO ERASE DTC

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

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

The following emission-related diagnostic information is cleared from the ECM memory when erasing DTC related to OBD-II. For details, refer to EC-623, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" (VG33E only) or EC-1223, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" (VG33ER only).

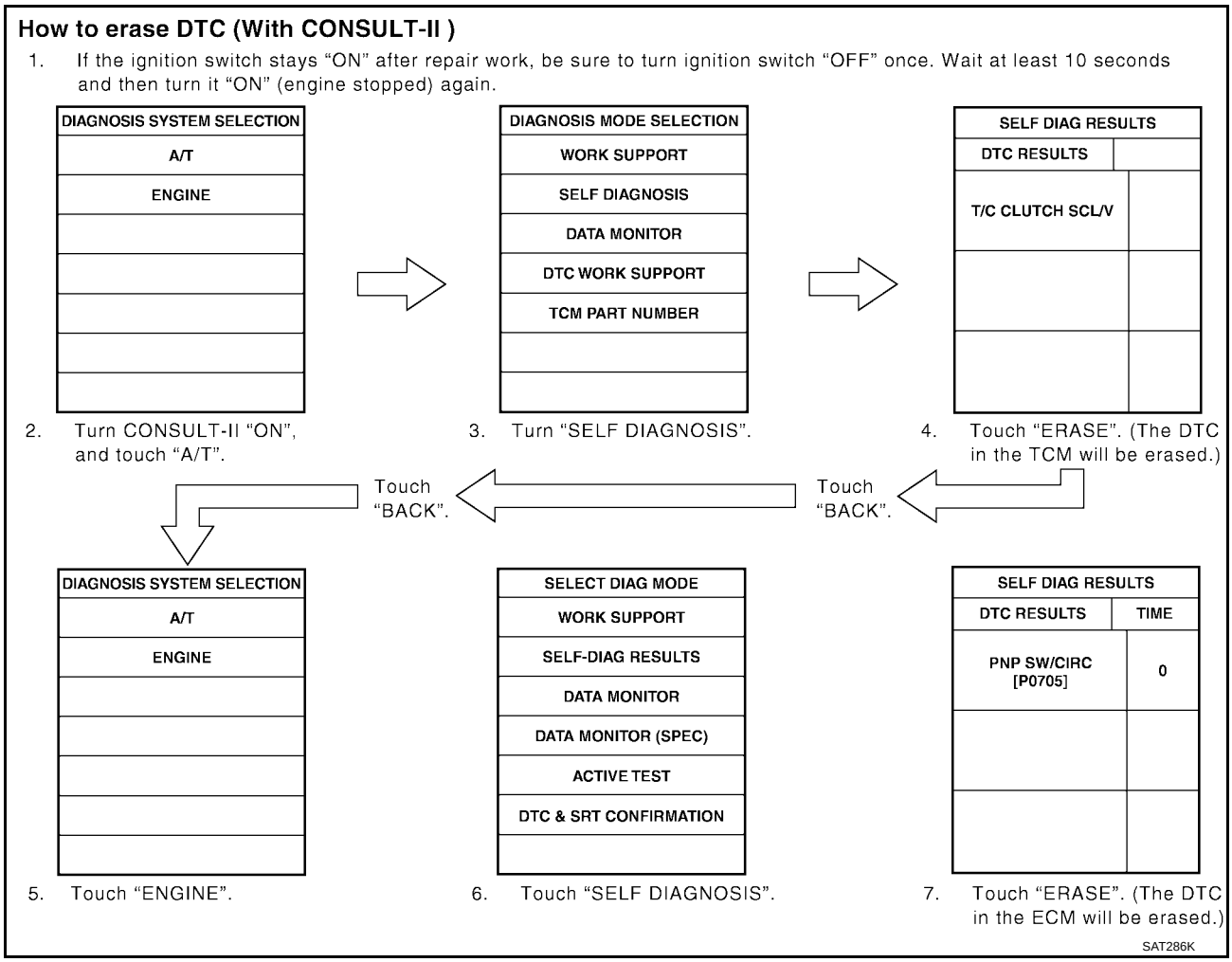
- **Diagnostic trouble codes (DTC)**
- **1st trip diagnostic trouble codes (1st trip DTC)**
- **Freeze frame data**
- **1st trip freeze frame data**
- **System readiness test (SRT) codes**
- **Test values**

HOW TO ERASE DTC (WITH CONSULT-II)

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

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

7. Touch “ERASE”. (The DTC in the ECM will be erased.)



HOW TO ERASE DTC (WITH GST)

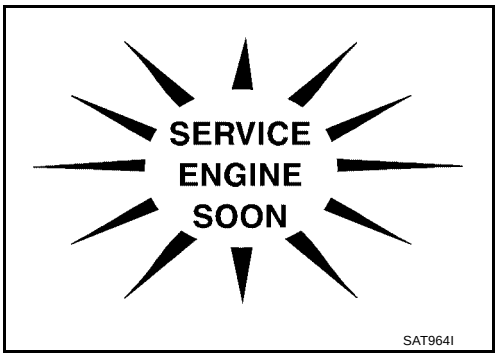
1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Perform “OBD-II SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)”. Refer to AT-47, "OBD-II SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" . (The engine warm-up 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-677, "Generic Scan Tool (GST) Function" (VG33E only) or EC-1276, "Generic Scan Tool (GST) Function" (VG33ER only).

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 (NO TOOLS)”. Refer to AT-47, "TCM 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)

ECS005M9



SAT964I

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-22, "Circuit Diagram" or EC-625, "Malfunction Indicator Lamp (MIL)" (VG33E only) or EC-1225, "Malfunction Indicator Lamp (MIL)" (VG33ER only).
     (Or refer to EC-1156, "MIL AND DATA LINK CONNECTOR" (VG33E only) or EC-1730, "MIL AND DATA LINK CONNECTOR" (VG33ER only).)
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-610, "ON BOARD DIAGNOSTIC (OBD) SYSTEM" (VG33E only) or EC-1210, "ON BOARD DIAGNOSTIC (OBD) SYSTEM" (VG33ER only).

CONSULT-II

ECS005MA

After performing AT-37, "SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)" , place check marks for results on the AT-55, "DIAGNOSTIC WORKSHEET" . Reference pages are provided following the items.

NOTICE:

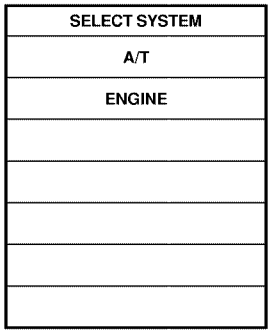
1. The CONSULT-II electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
   Check for time difference between actual shift timing and the CONSULT-II display. If the difference is noticeable, mechanical parts (except solenoids, sensors, etc.) may be malfunctioning. 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.

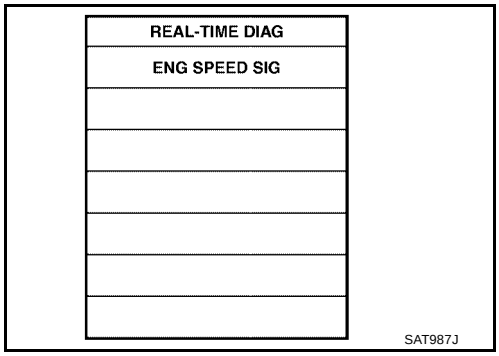
SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)

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-97, "Wiring Diagram — AT — MAIN" . If result is NG, refer to PG-8, "POWER SUPPLY ROUTING" .



SAT014K

2. Touch “SELF-DIAG RESULTS”.
   Display shows malfunction experienced since the last erasing operation.
   CONSULT-II performs REAL-TIME SELF-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-DIAG RESULTS” 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 SERVICE ENGINE SOON or “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 2nd gear function		● A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	—	P0732*1
—	A/T 2ND GR FNCTN			
A/T 3rd gear function		● A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	—	P0733*1
—	A/T 3RD GR FNCTN			
A/T 4th gear function		● A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	—	P0734*1
—	A/T 4TH GR FNCTN			
A/T TCC S/V function (lock-up)		● A/T cannot perform lock-up even if electrical circuit is good.	—	P0744*1
—	A/T TCC S/V FNCTN			
Shift solenoid valve A		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0750
SHIFT SOLENOID/V A	SFT SOL A/CIRC			
Shift solenoid valve B		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0755
SHIFT SOLENOID/V B	SFT SOL B/CIRC			
Overrun clutch solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P1760
OVERRUN CLUTCH S/V	O/R CLUCH SOL/ CIRC			
T/C clutch solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0740
T/C CLUTCH SOL/V	TCC SOLENOID/ CIRC			

Detected items (Screen terms for CONSULT-II, "SELF-DIAG RESULTS" 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 SERVICE ENGINE SOON or "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			
Turbine revolution sensor (VG33ER only)		● TCM does not receive the proper voltage signal from the sensor.	X	—
TURBINE REV	—			
TCM (RAM)		● TCM memory (RAM) is malfunctioning.	—	—
CONTROL UNIT (RAM)	—			
TCM (ROM)		● TCM memory (ROM) is malfunctioning.	—	—
CONTROL UNIT (ROM)	—			
TCM EEPROM		● TCM memory (EEPROM) is malfunctioning.	—	—
CONT UNIT (EEPROM)	—			
Initial start		● This is not a malfunction message (Whenever shutting off a power supply to the control unit, this message appears on the screen.)	X	—
INITIAL START	—			
No failure (NO DTC IS DETECTED 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-625, "DESCRIPTION" (VG33E only) or EC-1225, "DESCRIPTION" (VG33ER only).

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	THRTL POS SEN [V]	X	—	● Throttle position sensor signal voltage is displayed.	
A/T fluid temperature sensor	FLUID TEMP SE [V]	X	—	● A/T fluid temperature sensor signal voltage is displayed. ● Signal voltage lowers as fluid temperature rises.	
Battery voltage	BATTERY VOLT [V]	X	—	● Source voltage of TCM is displayed.	
Engine speed	ENGINE SPEED [rpm]	X	X	● Engine speed, computed from engine speed signal, is displayed.	Engine speed display may not be accurate under approx. 800 rpm. It may not indicate 0 rpm even when engine is not running.
Turbine revolution sensor (VG33ER only)	TURBINE REV [rpm]	X	—	● Turbine revolution computed from signal of turbine revolution sensor is displayed.	Error may occur under approx. 800 rpm and will not indicate 0 rpm even if engine is not running.
Overdrive control switch	OVERDRIVE SW [ON/OFF]	X	—	● ON/OFF state computed from signal of overdrive control SW is displayed.	
P/N position switch	PN POSI SW [ON/OFF]	X	—	● ON/OFF state computed from signal of P/N position SW is displayed.	
R position switch	R POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of R position SW is displayed.	
D position switch	D POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of D position SW is displayed.	
2 position switch	2 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 2 position SW, is displayed.	
1 position switch	1 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 1 position SW, is displayed.	
ASCD cruise signal	ASCD-CRUISE [ON/OFF]	X	—	● Status of ASCD cruise signal is displayed. ON... Cruising state OF ... Normal running state	● This is displayed even when not equipped with ASCD.

Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
ASCD-O/D cut signal	ASCD-O/D CUT [ON/OFF]	X	—	● Status of ASCD O/D release signal is displayed. ON... O/D released OFF... O/D not released	● This is displayed even when not equipped with ASCD.
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of kickdown SW, is displayed.	● This is displayed even when no kickdown switch is equipped.
Closed throttle position switch	CLOSED THL/ SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of closed throttle position SW, is displayed.	
Wide open throttle position switch	W/O THRL/P-SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of wide open throttle position SW, is displayed.	
Stop lamp switch (VG33ER only)	BRAKE SW [ON/OFF]	X	—	● ON/OFF status is displayed ON...Brake pedal switch is depressed. OFF...Brake pedal switch is released.	
Gear position	GEAR	—	X	● Gear position data used for computation by TCM, is displayed.	
Selector lever position	SLCT LVR POSI	—	X	● Selector lever position data, used for computation by TCM, is displayed.	● A specific value used for control is displayed if fail-safe is activated due to error.
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	● Vehicle speed data, used for computation by TCM, is displayed.	
Throttle position	THROTTLE POSI [/8]	—	X	● Throttle position data, used for computation by TCM, is displayed.	● A specific value used for control is displayed if fail-safe is activated due to error.
Line pressure duty	LINE PRES DTY [%]	—	X	● Control value of line pressure solenoid valve, computed by TCM from each input signal, is displayed.	
Torque converter clutch solenoid valve duty	TCC S/V DUTY [%]	—	X	● Control value of torque converter clutch solenoid valve, computed by TCM from each input signal, is displayed.	
Shift solenoid valve A	SHIFT S/V A [ON/OFF]	—	X	● Control value of shift solenoid valve A, computed by TCM from each input signal, is displayed.	Control value of solenoid is displayed even if solenoid circuit is disconnected. The “OFF” signal is displayed if solenoid circuit is shorted.
Shift solenoid valve B	SHIFT S/V B [ON/OFF]	—	X	● Control value of shift solenoid valve B, computed by TCM from each input signal, is displayed.	

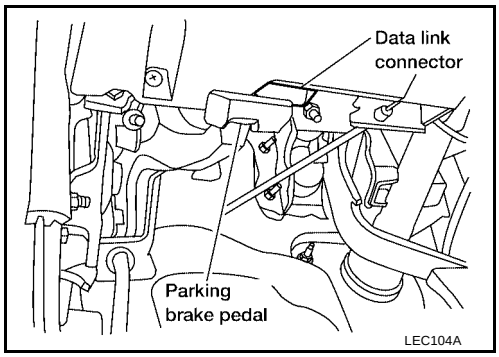
Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
Overrun clutch solenoid valve	OVERRUN/C S/V [ON/OFF]	—	X	● Control value of overrun clutch solenoid valve computed by TCM from each input signal is displayed.	
Self-diagnosis display lamp (O/D OFF indicator lamp)	SELF-D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

X: Applicable
—: Not applicable

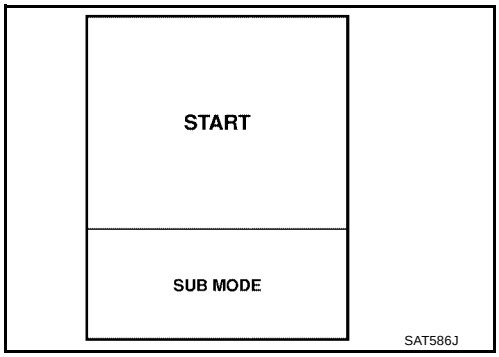
DTC WORK SUPPORT MODE WITH CONSULT-II

CONSULT-II Setting Procedure

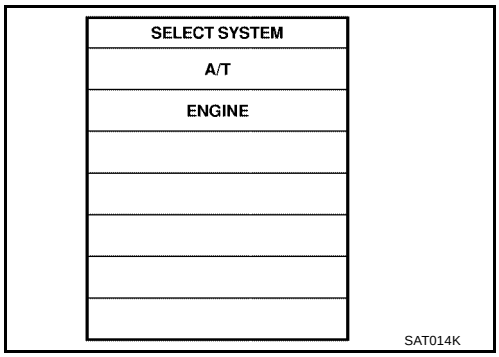
1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector. Data link connector for CONSULT-II is located in the lower instrument panel on driver side.



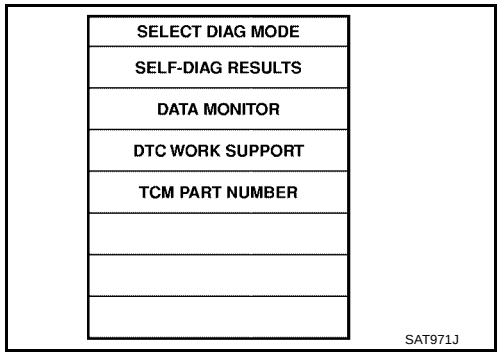
3. Turn ignition switch ON
4. Touch “START”.



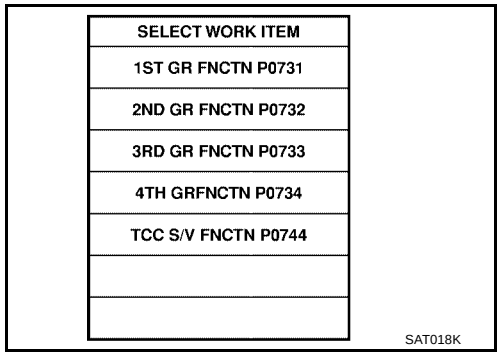
5. Touch “A/T”.



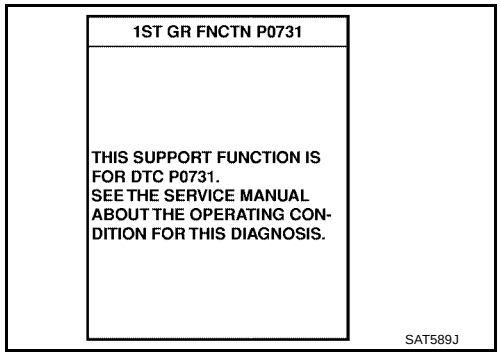
6. Touch “DTC WORK SUPPORT”.



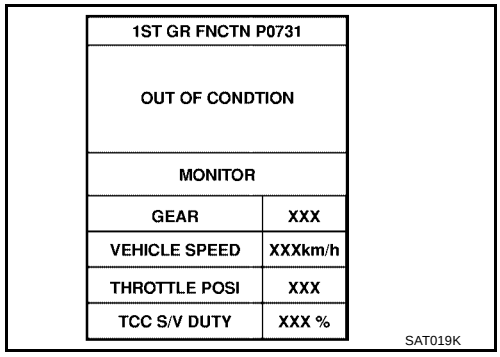
7. Touch select item menu (1ST, 2ND, etc.).



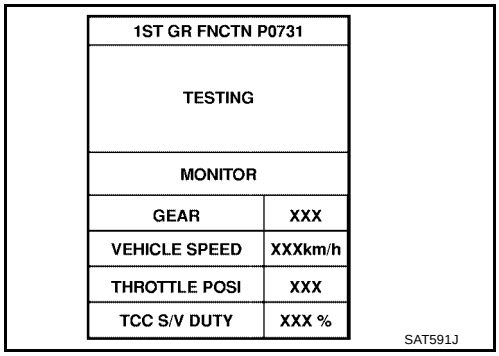
8. Touch “START”.



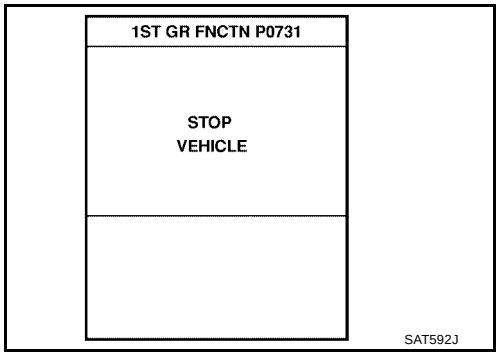
9. Perform driving test according to “DTC CONFIRMATION PROCEDURE” in “TROUBLE DIAGNOSIS FOR DTC”.

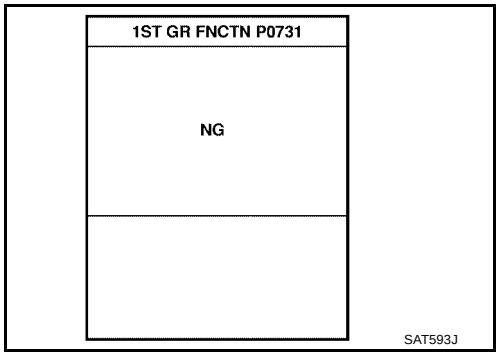


- **When testing conditions are satisfied, CONSULT-II screen changes from “OUT OF CONDITION” to “TESTING”.**

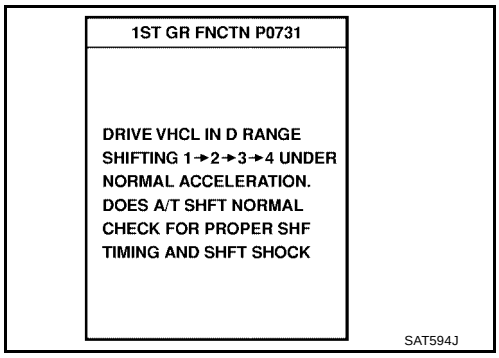


10. Stop vehicle. If “NG” appears on the screen, malfunction may exist. Go to “DIAGNOSTIC PROCEDURE”.

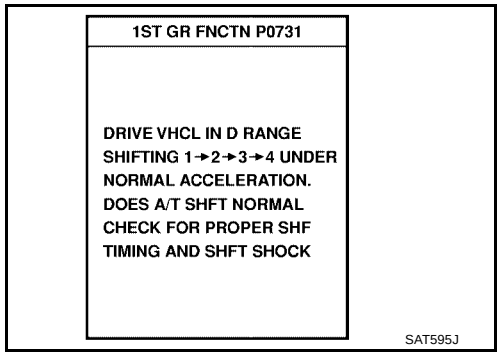




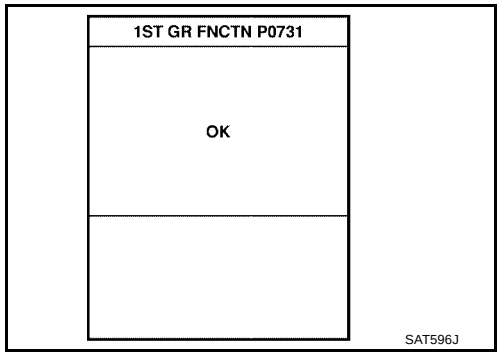
11. Perform test drive to check gear shift feeling in accordance with instructions displayed.

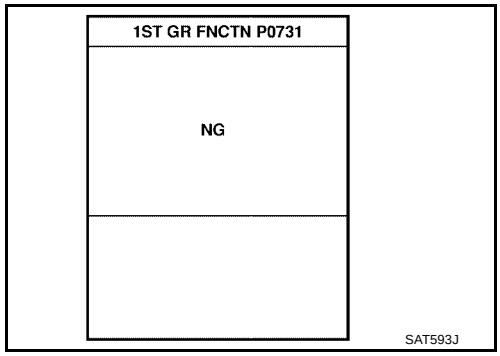


12. Touch “YES” or “NO”.



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

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

Diagnostic Procedure Without CONSULT-II

ECS005MB

OBD-II SELF-DIAGNOSTIC PROCEDURE (WITH GST)

Refer to EC-677, "Generic Scan Tool (GST) Function" (VG33E only) or EC-1276, "Generic Scan Tool (GST) Function" (VG33ER only).

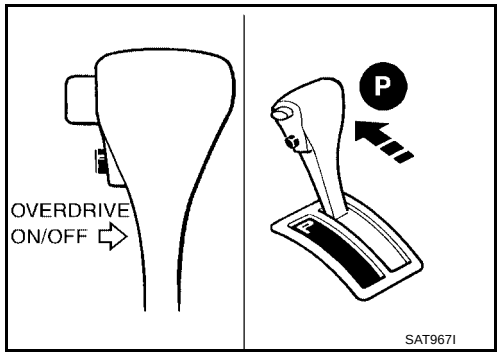
OBD-II SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)

Refer to EC-625, "DESCRIPTION" (VG33E only) or EC-1225, "DESCRIPTION" (VG33ER only).

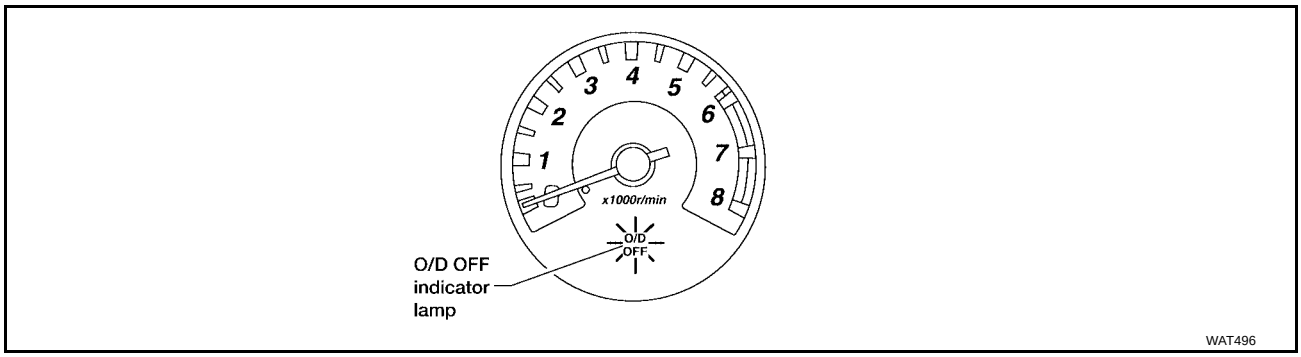
TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)

1. CHECK O/D OFF INDICATOR LAMP

1. Selector lever in P position. Start the engine. Warm engine to normal operating temperature.
2. Turn ignition switch to OFF position.
3. 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

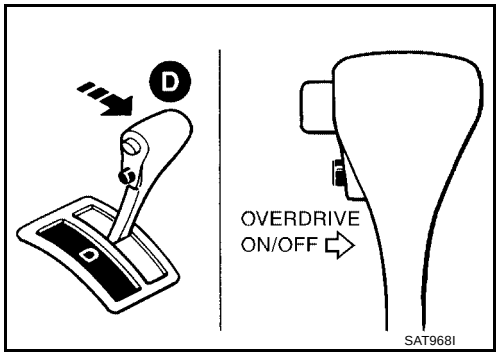
Yes >> GO TO 2
No >> Go to AT-206, "1. O/D OFF Indicator Lamp Does Not Come On" .

2. JUDGEMENT PROCEDURE STEP 1

1. Turn ignition switch to OFF position.
2. Turn ignition switch to ACC position.
3. Move selector lever from P to D position.
4. Turn ignition switch to ON position. Do not start engine.
5. Depress and hold overdrive control switch in OFF position (the O/D OFF indicator lamp will be ON) until directed to release the switch. If O/D OFF indicator lamp does not come on, go to step 3 in test no. 3 AT-239, "DIAGNOSTIC PROCEDURE" .
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).

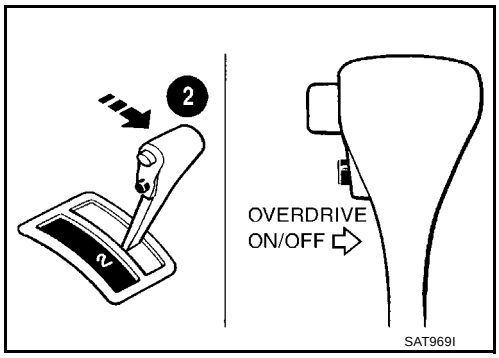
– Wait for more than 2 seconds after ignition switch ON.

9. Move selector lever to 2 position.
10. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be ON).



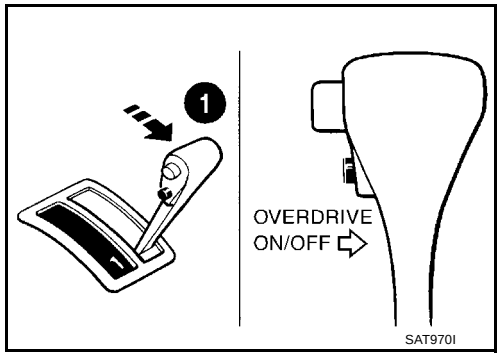
11. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be OFF) until directed to release the switch.

>> GO TO 3



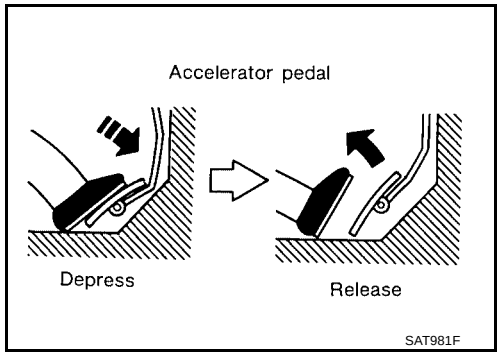
3. JUDGEMENT PROCEDURE STEP 2

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.



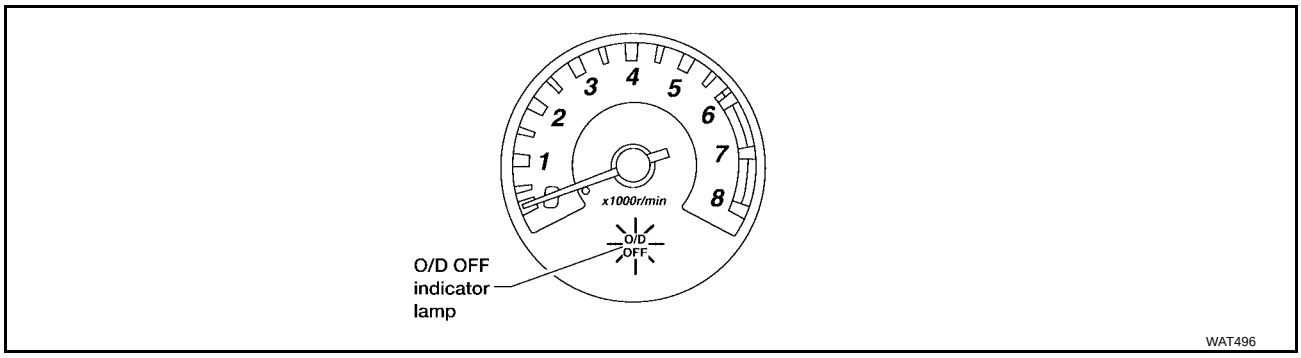
7. Release the overdrive control switch (the O/D OFF indicator lamp will begin to flash ON and OFF).

>> GO TO 4



4. CHECK SELF-DIAGNOSIS CODE

Check O/D OFF indicator lamp.
Refer to AT-50, "JUDGEMENT OF SELF-DIAGNOSIS CODE (VG33E ONLY)" or AT-52, "JUDGEMENT OF SELF-DIAGNOSIS CODE (VG33ER ONLY)" .

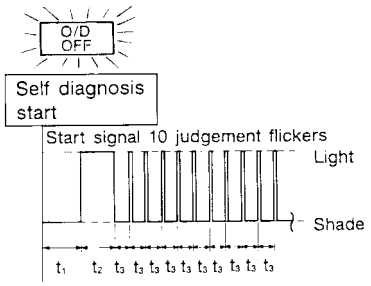


>> **DIAGNOSIS END**

JUDGEMENT OF SELF-DIAGNOSIS CODE (VG33E ONLY)

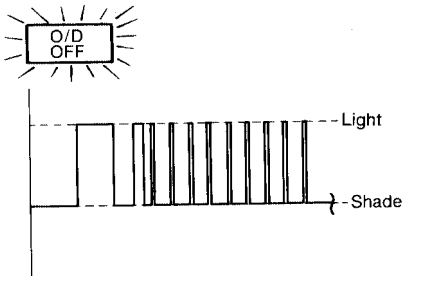
O/D OFF indicator lamp:

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



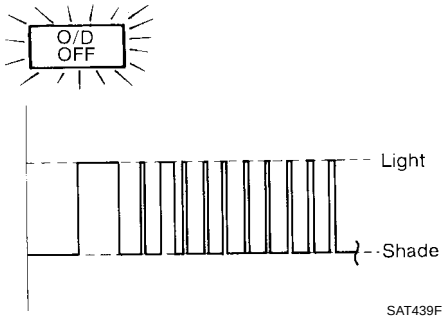
SAT436F

1st judgement flicker is longer than others.
Revolution sensor circuit is short-circuited or disconnected.
⇒ **Go to** AT-110, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" .



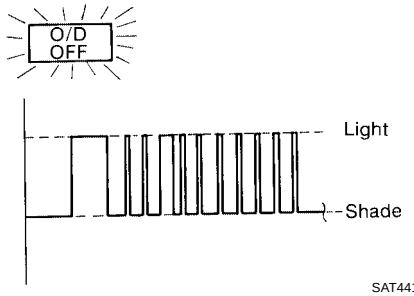
SAT437F

2nd judgement flicker is longer than others.
Vehicle speed sensor circuit is short-circuited or disconnected.
⇒ **Go to** AT-189, "DTC VEHICLE SPEED SENSOR·MTR" .



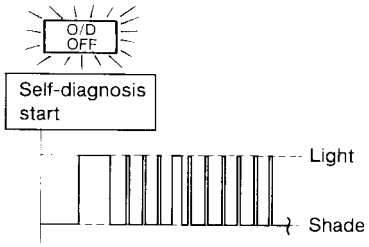
SAT439F

3rd judgement flicker is longer than others.
Throttle position sensor circuit is short-circuited or disconnected.
⇒ **Go to** AT-171, "DTC P1705 THROTTLE POSITION SENSOR" .



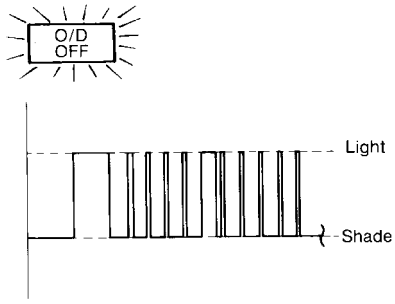
SAT441F

4th judgement flicker is longer than others.
Shift solenoid valve A circuit is short-circuited or disconnected.
⇒ **Go to** AT-161, "DTC P0750 SHIFT SOLENOID VALVE A" .



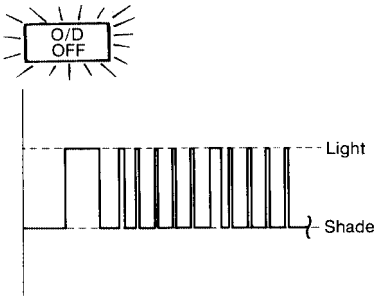
SAT443F

5th judgement flicker is longer than others.
Shift solenoid valve B circuit is short-circuited or disconnected.
⇒ **Go to** AT-166, "DTC P0755 SHIFT SOLENOID VALVE B" .



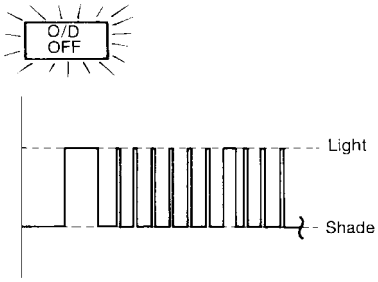
SAT445F

6th judgement flicker is longer than others.
Overrun clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to** AT-178, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" .



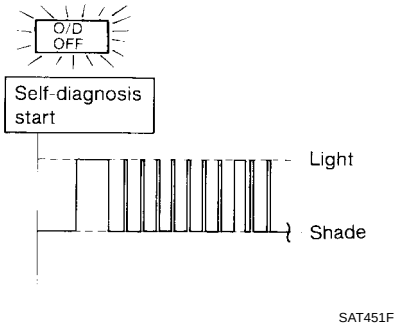
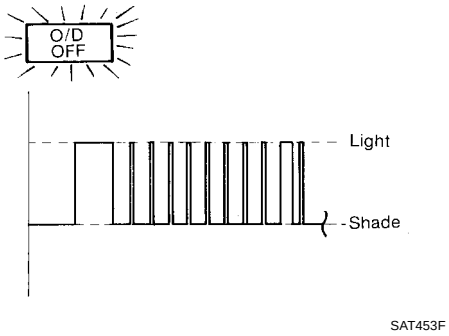
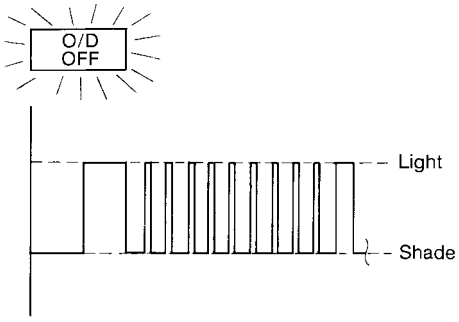
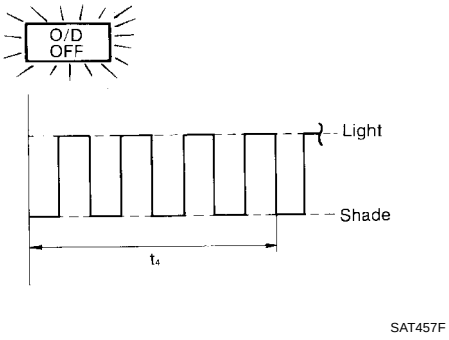
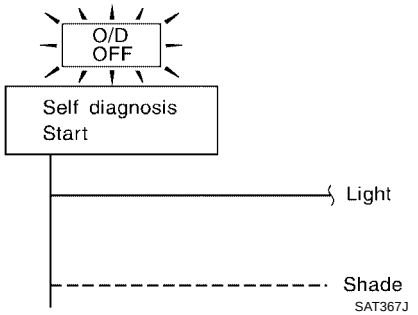
SAT447F

7th judgement flicker is longer than others.
Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to** AT-144, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" .



SAT449F

O/D OFF indicator lamp:

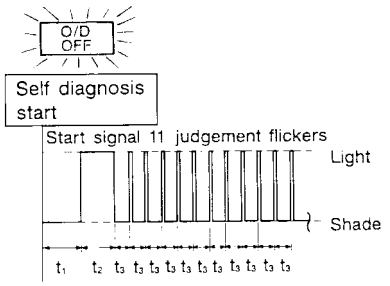
8th judgement flicker is longer than others. A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged. ⇒ **Go to** AT-183, "DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)" .  SAT451F	9th judgement flicker is longer than others. Engine speed signal circuit is short-circuited or disconnected. ⇒ **Go to** AT-115, "DTC P0725 ENGINE SPEED SIGNAL" .  SAT453F
10th judgement flicker is longer than others. Line pressure solenoid valve circuit is short-circuited or disconnected. ⇒ **Go to** AT-156, "DTC P0745 LINE PRESSURE SOLENOID VALVE" .  SAT455F	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.)  SAT457F
Lamp comes on. PNP switch, overdrive control switch or throttle position switch circuit is disconnected or TCM is damaged. ⇒ **Go to** AT-237, "21. TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Throttle Position Switches Circuit Checks)" .  SAT367J	

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

JUDGEMENT OF SELF-DIAGNOSIS CODE (VG33ER ONLY)

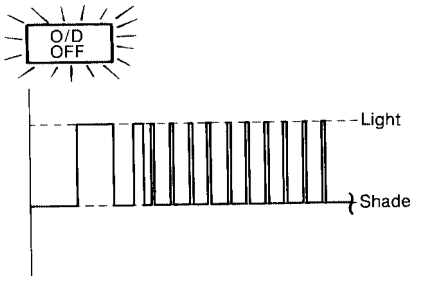
O/D OFF indicator lamp:

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



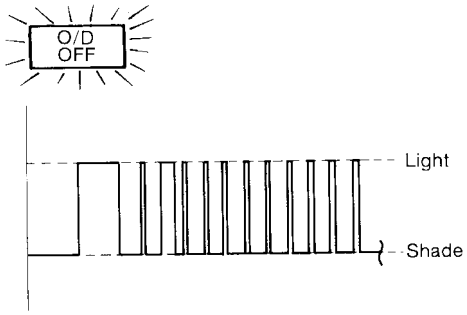
LAT425

1st judgement flicker is longer than others.
Revolution sensor circuit is short-circuited or disconnected.
⇒ **Go to** AT-110, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" .



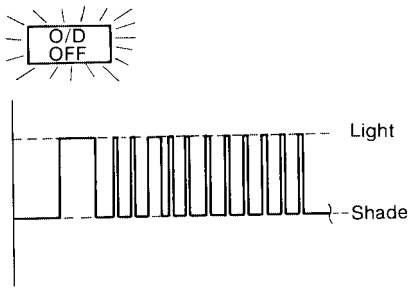
LAT426

2nd judgement flicker is longer than others.
Vehicle speed sensor circuit is short-circuited or disconnected.
⇒ **Go to** AT-189, "DTC VEHICLE SPEED SENSOR·MTR" .



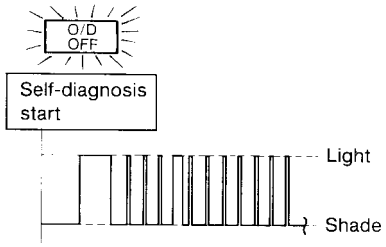
LAT427

3rd judgement flicker is longer than others.
Throttle position sensor circuit is short-circuited or disconnected.
⇒ **Go to** AT-171, "DTC P1705 THROTTLE POSITION SENSOR" .



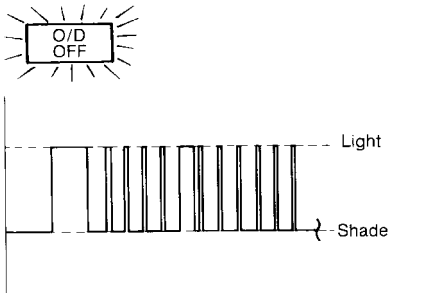
LAT428

4th judgement flicker is longer than others.
Shift solenoid valve A circuit is short-circuited or disconnected.
⇒ **Go to** AT-161, "DTC P0750 SHIFT SOLENOID VALVE A" .



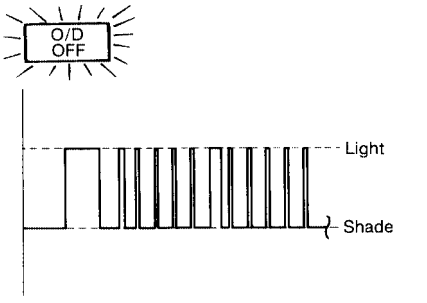
LAT429

5th judgement flicker is longer than others.
Shift solenoid valve B circuit is short-circuited or disconnected.
⇒ **Go to** AT-166, "DTC P0755 SHIFT SOLENOID VALVE B" .



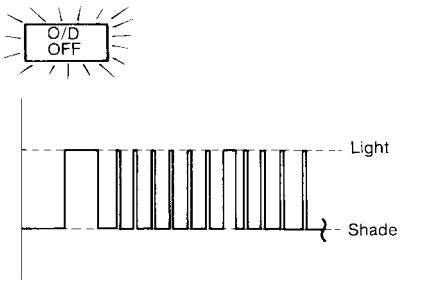
LAT430

6th judgement flicker is longer than others.
Overrun clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to** AT-178, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" .



LAT431

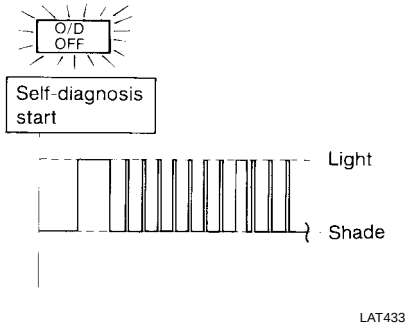
7th judgement flicker is longer than others.
Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to** AT-144, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" .



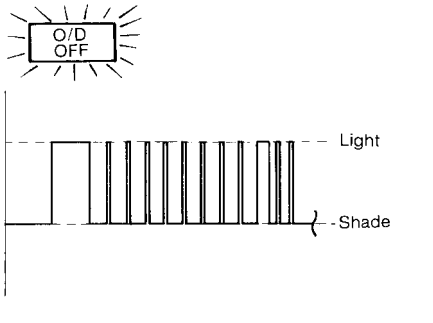
LAT432

O/D OFF indicator lamp:

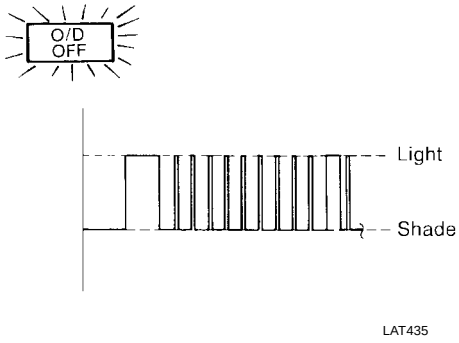
8th judgement flicker is longer than others.
A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged.
⇒ **Go to** **AT-183, "DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)"** **.**



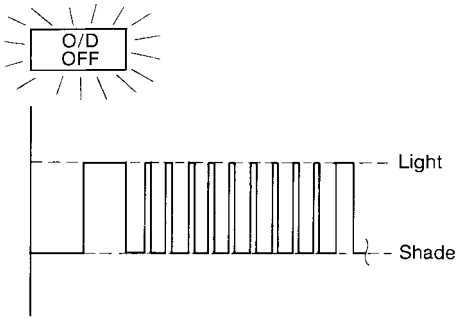
9th judgement flicker is longer than others.
Engine speed signal circuit is short-circuited or disconnected.
⇒ **Go to** **AT-115, "DTC P0725 ENGINE SPEED SIGNAL"** **.**



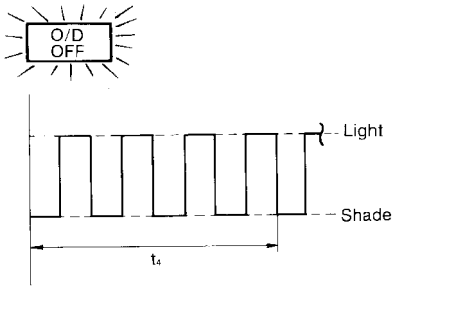
10th judgement flicker is longer than others.
⇒ **Go to** **AT-194, "DTC TURBINE REVOLUTION SENSOR (VG33ER ONLY)"** **.**



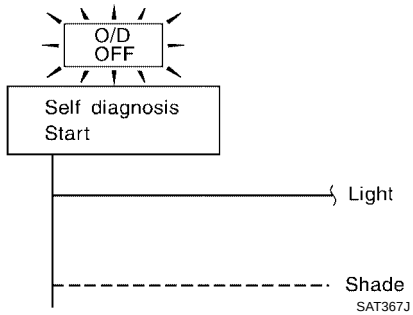
11th judgement flicker is longer than others.
Line pressure solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to** **AT-156, "DTC P0745 LINE PRESSURE SOLENOID VALVE"** **.**



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.)



Lamp comes on.
PNP switch, overdrive control switch or throttle position switch circuit is disconnected or TCM is damaged.
⇒ **Go to** **AT-237, "21. TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Throttle Position Switches Circuit Checks)"** **.**



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

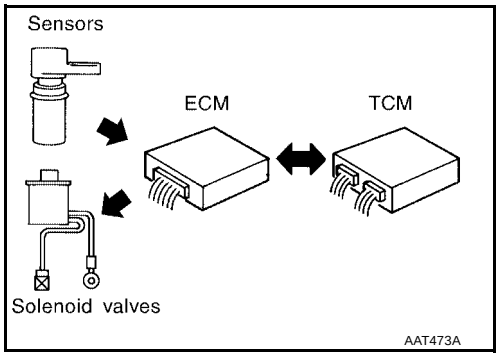
TROUBLE DIAGNOSIS — INTRODUCTION

PFP:00000

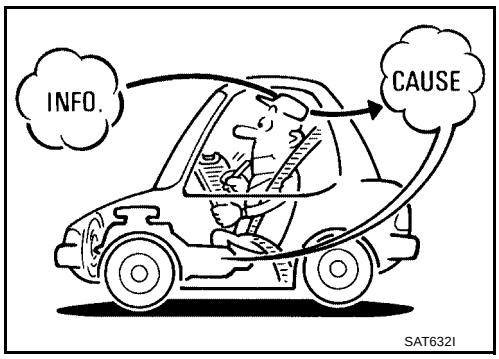
Introduction

ECS005MC

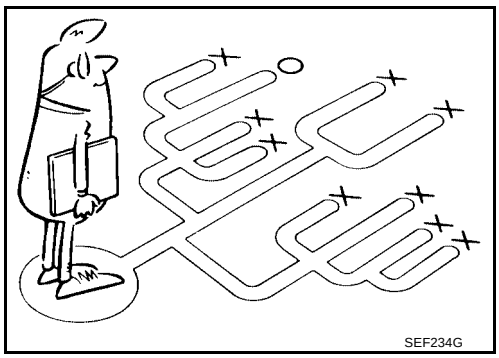
The TCM receives a signal from the vehicle speed sensor, throttle position sensor or PNP switch and provides shift control or lock-up control via A/T solenoid valves.
The TCM also communicates with the ECM by means of a signal sent from sensing elements used with the OBD-related parts of the A/T system for malfunction-diagnostic purposes. The TCM is capable of diagnosing malfunctioning parts while the ECM can store malfunctions in its memory.
Input and output signals must always be correct and stable in the operation of the A/T system. The A/T system must be in good operating condition and be free of valve seizure, solenoid valve malfunction, etc.



It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.
A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow”. Refer to AT-57, "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 should be used. Refer to AT-55, "DIAGNOSTIC WORKSHEET" .
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.



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 Remarks and listen to customer complaints.			AT-8
2.	❑ CHECK A/T FLUID			AT-61
		❑ Leakage (Follow specified procedure) ❑ Fluid condition ❑ Fluid level		
3.	Perform STALL TEST and LINE PRESSURE TEST.			AT-61, AT-64
		❑ 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-66
	4-1.	Check before engine is started.		AT-67
		❑ SELF-DIAGNOSTIC PROCEDURE - Mark detected items.		
			❑ PNP switch, AT-99 . ❑ A/T fluid temperature sensor, AT-105 . ❑ Vehicle speed sensor·A/T (Revolution sensor), AT-110 . ❑ Engine speed signal, AT-115 . ❑ Torque converter clutch solenoid valve, AT-144 . ❑ Line pressure solenoid valve, AT-156 . ❑ Shift solenoid valve A, AT-161 . ❑ Shift solenoid valve B, AT-166 . ❑ Throttle position sensor, AT-171 . ❑ Overrun clutch solenoid valve, AT-178 . ❑ A/T fluid temperature sensor and TCM power source, AT-183 . ❑ PNP, overdrive control and throttle position switches, AT-237 . ❑ Vehicle speed sensor·MTR, AT-189 . ❑ Control unit (RAM), control unit (ROM), AT-199 . ❑ Control unit (EEP ROM), AT-201 . ❑ Battery ❑ Others	
	4-2.	Check at idle		AT-69
		❑ 1. O/D OFF Indicator Lamp Does Not Come On, AT-206 . ❑ 2. Engine Cannot Be Started In P And N Position, AT-208 . ❑ 3. In P Position, Vehicle Moves Forward Or Backward When Pushed, AT-209 . ❑ 4. In N Position, Vehicle Moves, AT-210 . ❑ 5. Large Shock. N → R Position, AT-212 . ❑ 6. Vehicle Does Not Creep Backward In R Position, AT-214 . ❑ 7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position, AT-217 .		

4.	4-3.	Cruise test	AT-70 AT-74
		Part-1	
		❏ 8. Vehicle Cannot Be Started From D_1 , AT-219 . ❏ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-222 . ❏ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-224 . ❏ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-226 . ❏ 12. A/T Does Not Perform Lock-up, AT-228 . ❏ 13. A/T Does Not Hold Lock-up Condition, AT-229 . ❏ 14. Lock-up Is Not Released, AT-231 . ❏ 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$), AT-232 .	
		Part-2	AT-77
		❏ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-222 . ❏ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-224 . ❏ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-226 . ❏ 16. Vehicle Does Not Start From D_1 , AT-233 .	
		Part-3	AT-79
		❏ 17. A/T Does Not Shift: $D_4 \rightarrow D_3$ When Overdrive Control Switch ON → OFF, AT-235 ❏ 15. Engine Speed Does Not Return To Idle (Engine Brake In D_3), AT-232 . ❏ 18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever D → 2 Position, AT-236 . ❏ 15. Engine Speed Does Not Return To Idle (Engine Brake In 2_2), AT-232 . ❏ 19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever 2 → 1 Position, AT-237 . ❏ 20. Vehicle Does Not Decelerate By Engine Brake, AT-237 . ❏ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.	
		❏ PNP switch, AT-99 . ❏ A/T fluid temperature sensor, AT-105 . ❏ Vehicle speed sensor·A/T (Revolution sensor), AT-110 . ❏ Engine speed signal, AT-115 . ❏ Torque converter clutch solenoid valve, AT-144 . ❏ Line pressure solenoid valve, AT-156 . ❏ Shift solenoid valve A, AT-161 . ❏ Shift solenoid valve B, AT-166 . ❏ Throttle position sensor, AT-171 . ❏ Overrun clutch solenoid valve, AT-178 . ❏ A/T fluid temperature sensor and TCM power source, AT-183 . ❏ PNP, overdrive control and throttle position switches, AT-237 . ❏ Vehicle speed sensor·MTR, AT-189 . ❏ Turbine revolution sensor (VG33ER only), AT-194 . ❏ Control unit (RAM), control unit (ROM), AT-199 . ❏ Control unit (EEP ROM), AT-201 . ❏ Battery ❏ Others	
5.	❏ For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.		AT-38
6.	❏ Perform all ROAD TEST and re-mark required procedures.		AT-66
7.	❏ Perform DTC CONFIRMATION PROCEDURE for following MIL indicating items and check out NG items.		EC-611 (VG33E only) or EC-1211 (VG33ER only)
	❏ DTC (P0731, 1103) A/T 1st gear function, AT-119 . ❏ DTC (P0732, 1104) A/T 2nd gear function, AT-125 . ❏ DTC (P0733, 1105) A/T 3rd gear function, AT-131 . ❏ DTC (P0734, 1106) A/T 4th gear function, AT-137 . ❏ DTC (P0744, 1107) A/T TCC S/V function (lock-up), AT-149 .		
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-81
9.	❏ Erase DTC from TCM and ECM memories.		AT-35

Work Flow

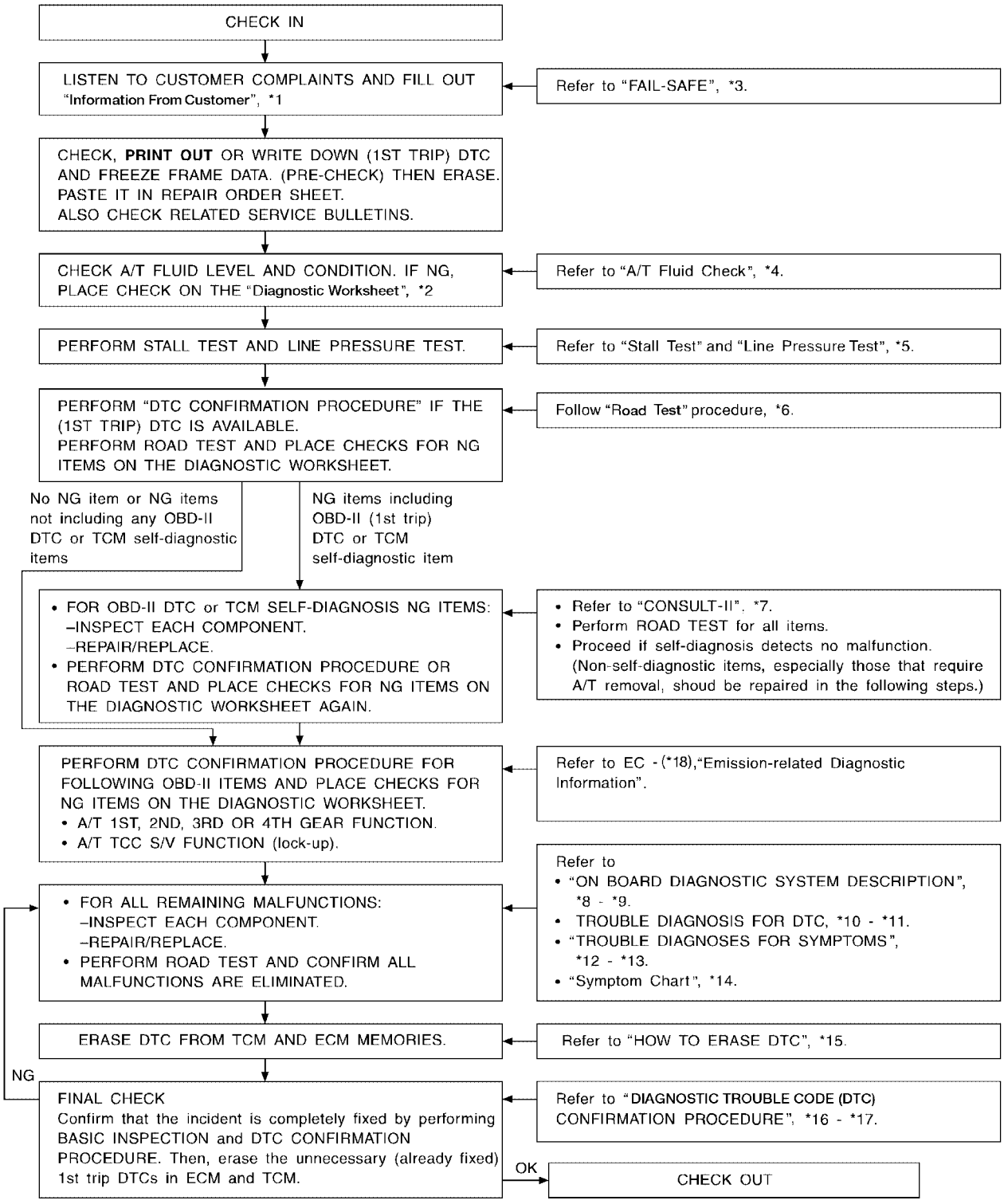
ECS005MD

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. Refer to AT-55, "Information From Customer" and AT-56, "Diagnostic Worksheet" to perform the best troubleshooting possible.

WORK FLOW CHART



LCIA0289E

*1. AT-55 *2. AT-56 *3. AT-8
*4. AT-61 *5. AT-61, AT-64 *6. AT-66
*7. AT-37 *8. AT-33 *9. AT-50
*10. AT-99 *11. AT-201 *12. AT-203

*13: AT-237
*14: AT-81
*15: AT-35
*16: AT-99
*17: AT-201
*18: EC-611 (VG33E), EC-1211 (VG33ER)

TROUBLE DIAGNOSIS — BASIC INSPECTION

PFP:00000

A/T Fluid Check

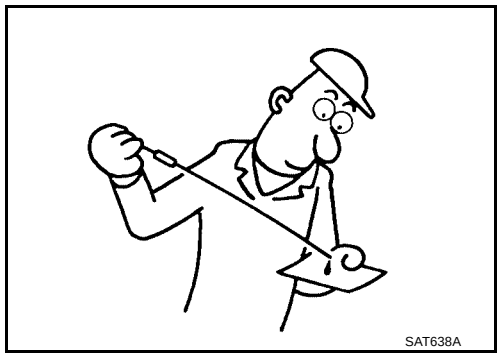
ECS005ME

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


SAT638A

FLUID LEVEL CHECK

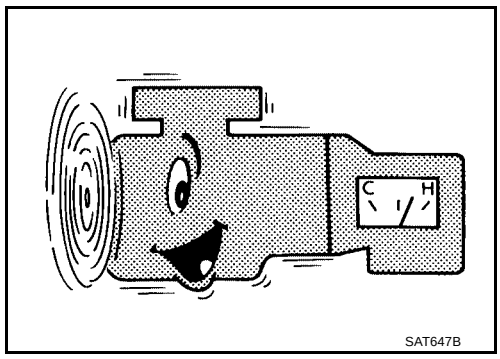
Refer to MA-36, "Checking A/T Fluid" .

Stall Test

ECS005MF

STALL TEST PROCEDURE

1. Check A/T fluid and engine oil levels. If necessary, add fluid and oil.



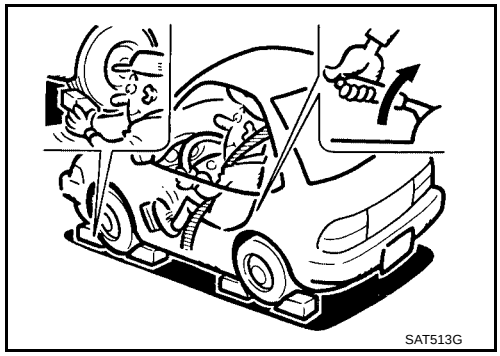
SAT647B

2. Drive vehicle for approx. 10 minutes or until engine oil and ATF reach operating temperature.

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

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

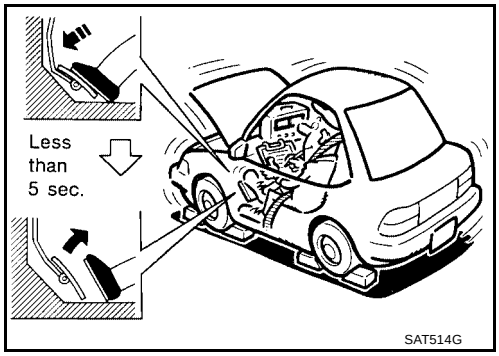
- **It is good practice to put a mark on point of specified engine rpm on indicator.**


SAT513G

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.**

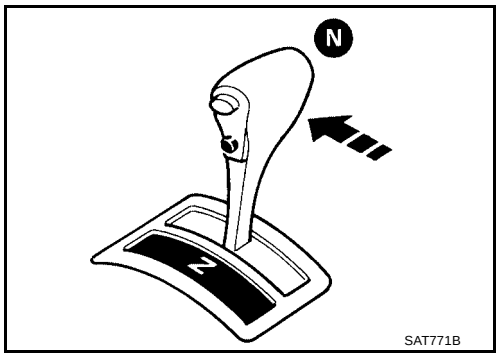
Stall revolution **VG33E : 2,450 - 2,650 rpm**
VG33ER : 2,420 - 2,620 rpm



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 illustration. In order to pinpoint the possible damaged components, follow the “Work Flow” shown in $$$$$:NGAT0020.

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

- Slippage occurs in 1st gear but not in 2nd and 3rd gears. ..... Low one-way clutch slippage
- Slippage occurs at the following gears:
  1st through 3rd gears in D position and engine brake functions.
  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.

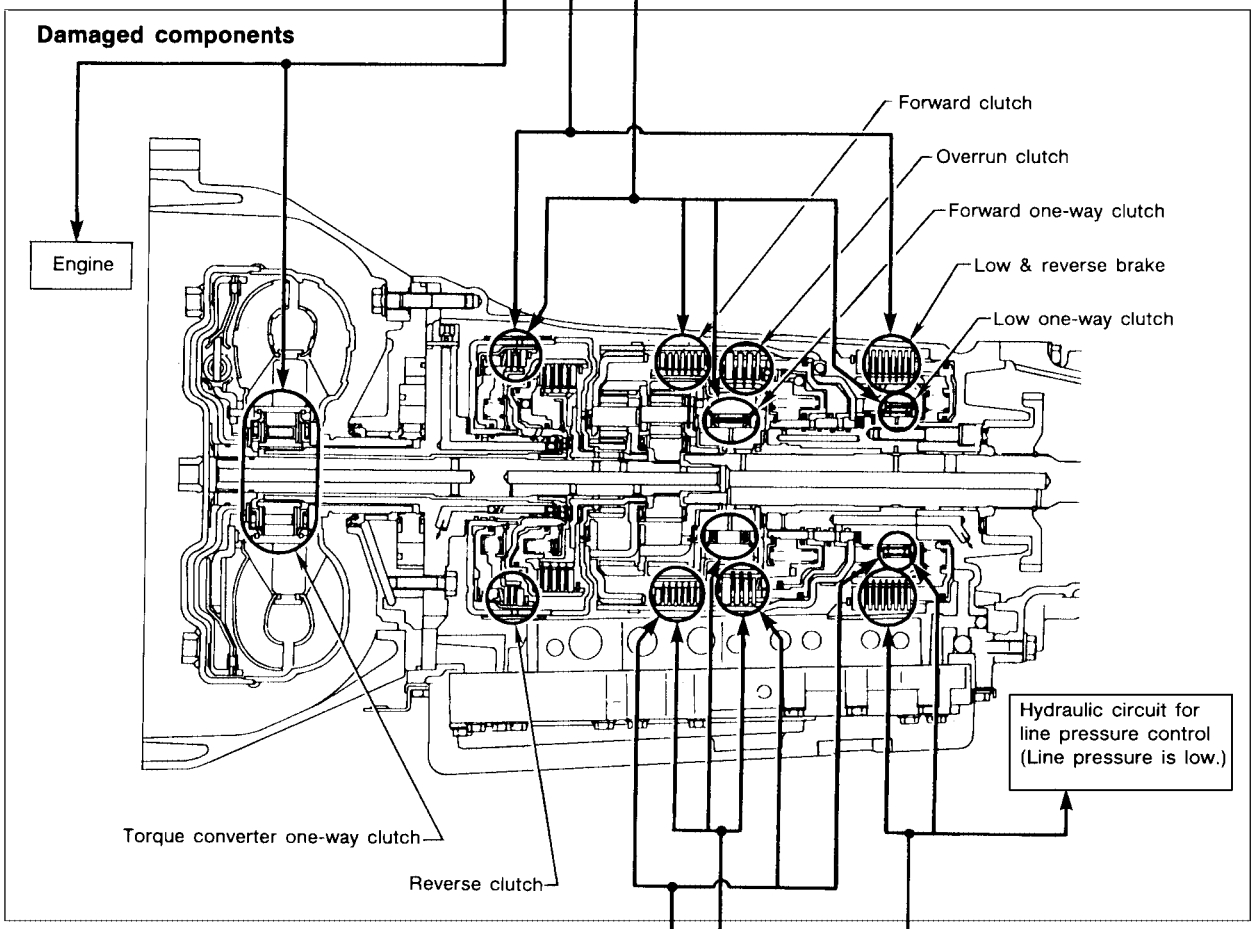
- Slippage occurs in 3rd and 4th gears in D position. ..... High clutch slippage
- Slippage occurs in 2nd and 4th gear in D position. ..... Brake band slippage

Stall revolution less than specifications:

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

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

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



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

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

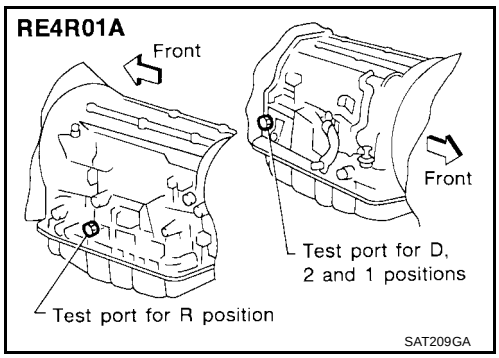
LCIA0265E

Line Pressure Test

ECS005MG

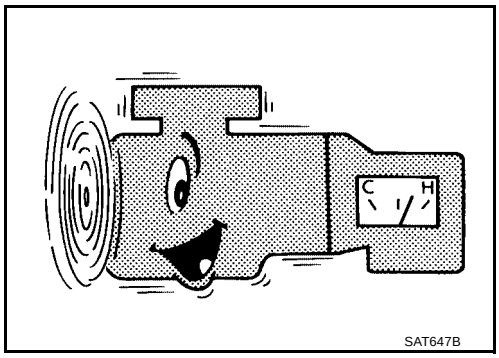
LINE PRESSURE TEST PORTS

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



LINE PRESSURE TEST PROCEDURE

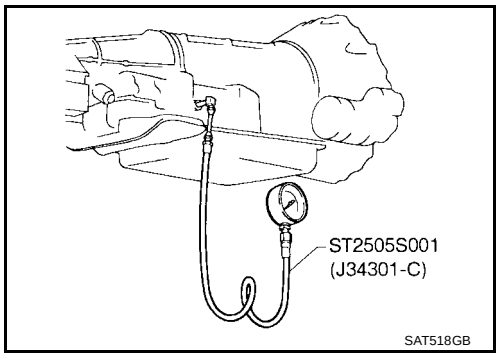
1. Check A/T fluid and engine oil levels. If necessary, add fluid and oil.

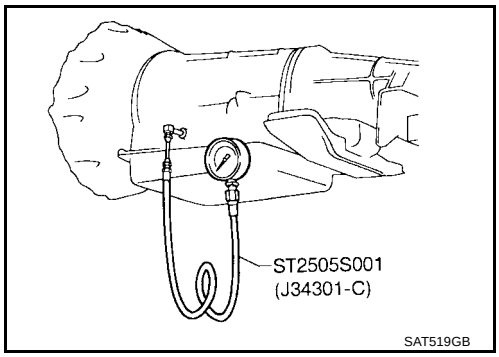


2. Drive vehicle for approx. 10 minutes or until engine oil and ATF reach operating temperature.

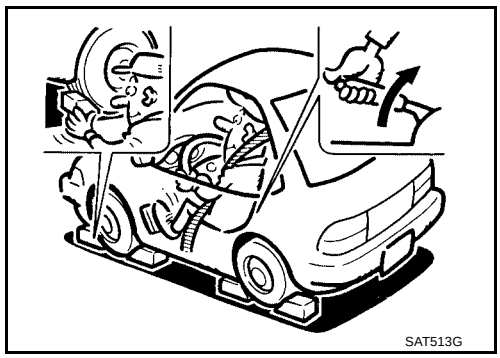
   ATF operating temperature : 50 - 80°C (122 - 176°F)

3. Install pressure gauge to corresponding line pressure port.





4. Set parking brake and block wheels.

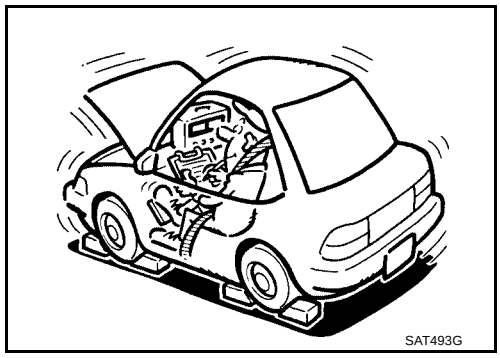


- **Continue to depress brake pedal fully while line pressure test is being performed at stall speed.**

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

- **When measuring line pressure at stall speed, follow the stall test procedure.**

Line pressure : Refer to AT-347, "Line Pressure" .



JUDGEMENT OF LINE PRESSURE TEST

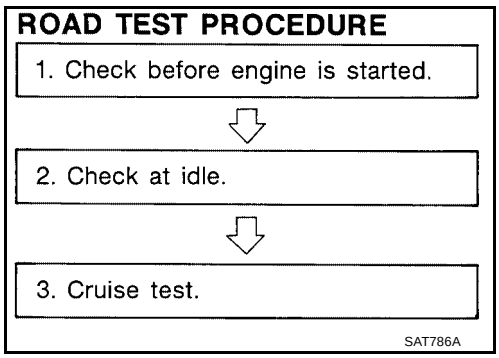
Judgement		Suspected parts
At idle	Line pressure is low in all positions.	● Oil pump wear ● Control piston damage ● Pressure regulator valve or plug sticking ● Spring for pressure regulator valve damaged ● Fluid pressure leakage between oil strainer and pressure regulator valve ● Clogged strainer
	Line 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. Then, fluid leakage exists at or around low and reverse brake circuit. Refer to AT-17, "CLUTCH AND BAND CHART" .
	Line pressure is high.	● Maladjustment of throttle position sensor ● Fluid temperature sensor damaged ● Line pressure solenoid valve sticking ● Short circuit of line pressure solenoid valve circuit ● Pressure modifier valve sticking ● Pressure regulator valve or plug sticking ● Open in dropping resistor circuit
At stall speed	Line pressure is low.	● Maladjustment of throttle position sensor ● Line pressure solenoid valve sticking ● Short circuit of line pressure solenoid valve circuit ● Pressure regulator valve or plug sticking ● Pressure modifier valve sticking ● Pilot valve sticking

Road Test

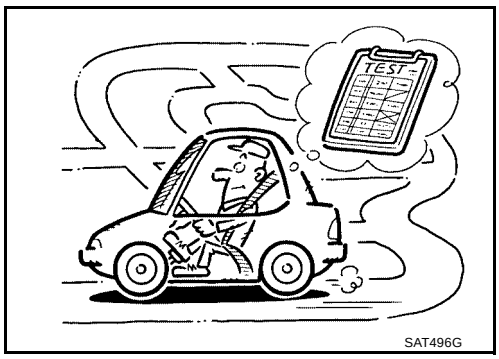
ECS005MH

DESCRIPTION

- The purpose of this test is to determine overall performance of the A/T and analyze causes of problems.



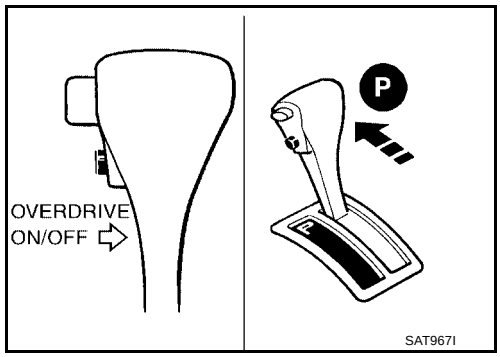
- The road test consists of the following three parts:
  - Check before engine is started
  - Check at idle
  - Cruise test
- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items until specified symptom is found. Troubleshoot items which check out No Good after road test. Refer to “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION” and “TROUBLE DIAGNOSES FOR SYMPTOMS”, AT-33 to AT-52 and AT-203 to AT-237 .



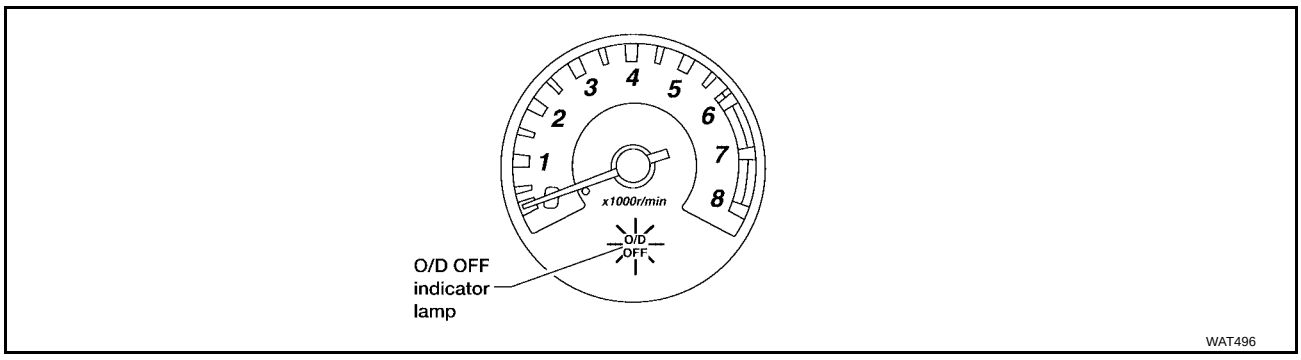
1. CHECK BEFORE ENGINE IS STARTED

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?

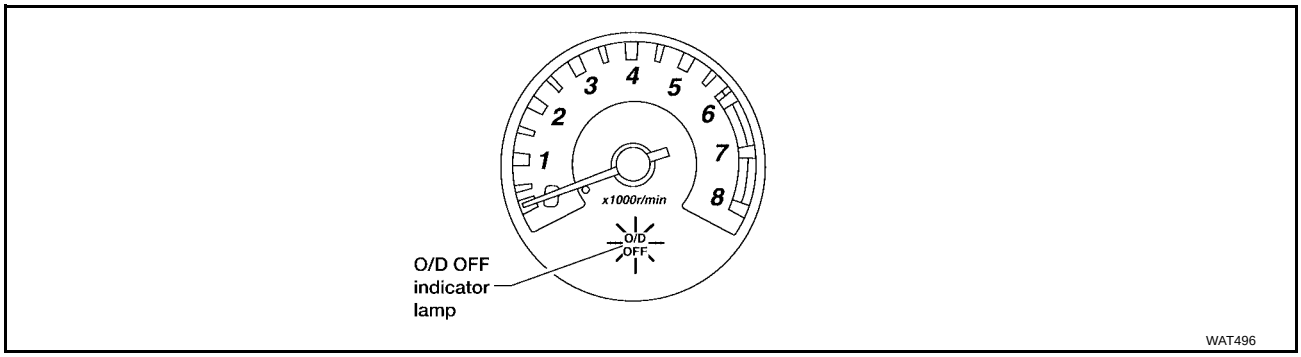


Yes or No

Yes >> GO TO 2
No >> Go to AT-206, "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 >> Perform self-diagnosis. Refer to AT-47, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .
No >> GO TO 3

3. CHECK NG ITEM

1. Turn ignition switch to OFF position.
2. Perform self-diagnosis and note NG items.
   Refer to AT-47, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .

>> Go to AT-69, "2. CHECK AT IDLE" .

2. CHECK AT IDLE

1. CHECK ENGINE START

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

Yes or No

Yes >> GO TO 2
No >> Go to AT-208, "2. Engine Cannot Be Started In P and N Position" .

2. CHECK ENGINE START

1. Turn ignition switch to OFF 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

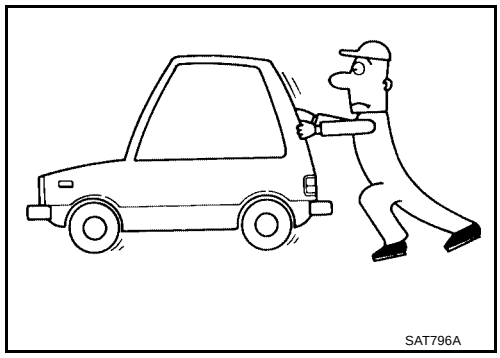
Yes >> Go to AT-208, "2. Engine Cannot Be Started In P and N Position" .
No >> GO TO 3

3. CHECK VEHICLE MOVE

1. Turn ignition switch to OFF position.
2. Move selector lever to P position.
3. Release parking brake.
4. Push vehicle forward or backward.
5. Does vehicle move when it is pushed forward or backward?

Yes or No

Yes >> Go to AT-209, "3. In “P” Position, Vehicle Moves Forward Or Backward When Pushed" .
No >> GO TO 4


SAT796A

4. CHECK VEHICLE MOVE

1. Apply parking brake.
2. Move selector lever to N position.
3. Turn ignition switch to START position and start engine.
4. Release parking brake.
5. Does vehicle move forward or backward?

Yes or No

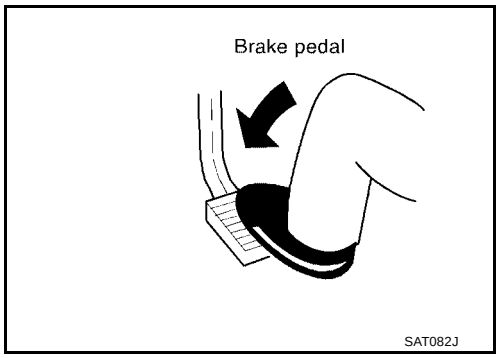
Yes >> Go to AT-210, "4. In N Position, Vehicle Moves" .
No >> GO TO 5

5. CHECK SHIFT SHOCK

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 >> Go to AT-212, "5. Large Shock. N → R Position" .
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 >> Go to AT-214, "6. Vehicle Does Not Creep Backward In R Position" .

7. CHECK VEHICLE MOVE

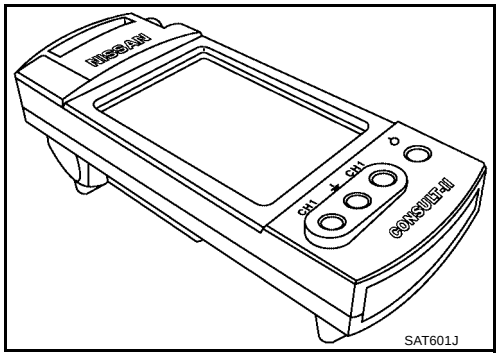
1. Move selector lever to D, 2 and 1 position and check if vehicle creeps forward.
2. Does vehicle creep forward in all three positions?

Yes or No

Yes >> Go to AT-70, "3. CRUISE TEST" .
No >> Go to AT-217, "7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position" .

3. CRUISE TEST

- Check all items listed in Parts 1 through 3.

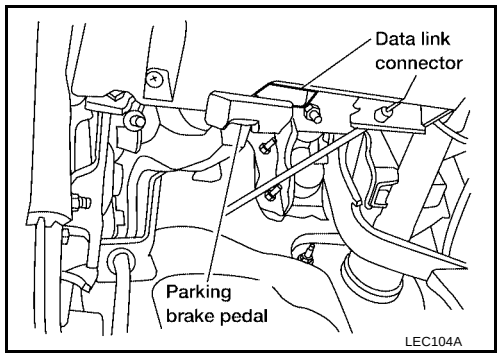


With CONSULT-II

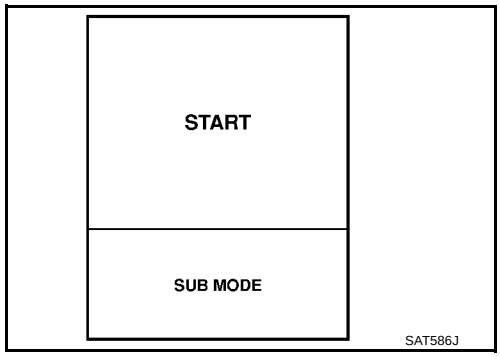
- Using CONSULT-II, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per “Shift Schedule”.

CONSULT-II Setting Procedure

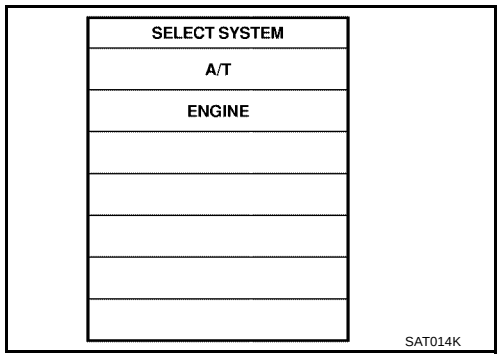
1. Turn ignition switch OFF.
2. Connect “CONSULT-II” to data link connector.
   Data link connector is located in the lower instrument panel on driver side.



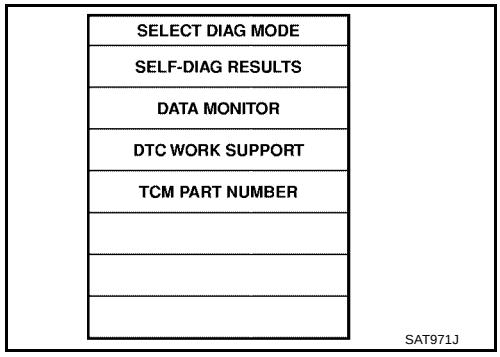
3. Turn ignition switch ON.
4. Touch “START”.



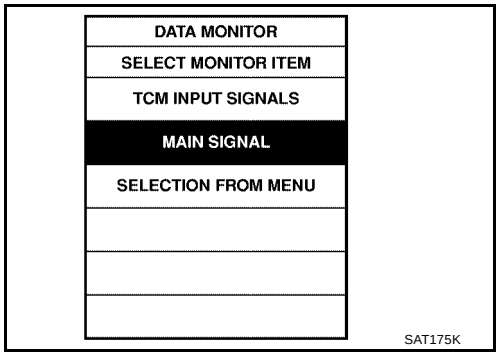
5. Touch “A/T”.



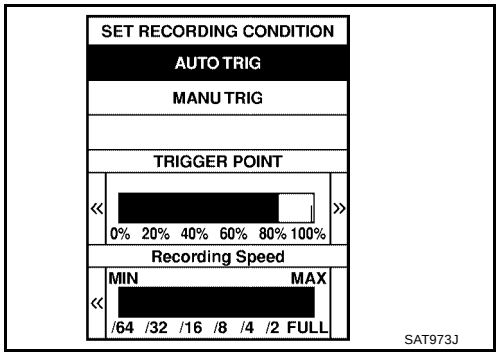
6. Touch “DATA MONITOR”.



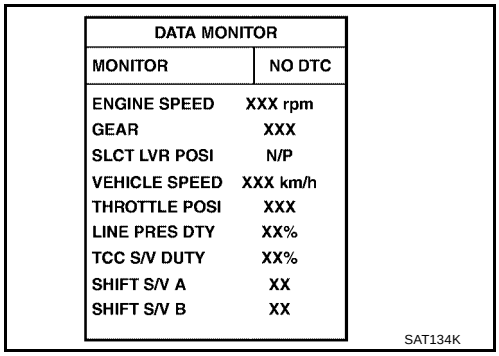
7. Touch “MAIN SIGNALS” or “TCM INPUT SIGNALS”.
8. See “Numerical Display”, “Barchart Display” or “Line Graph Display”.



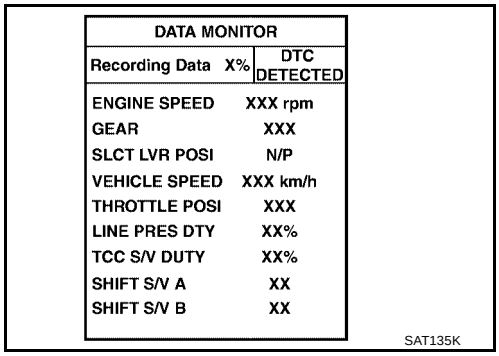
9. Touch “SETTING” to set recording condition (“AUTO TRIG” or “MANU TRIG”) and touch “BACK”.
10. Touch “START”.



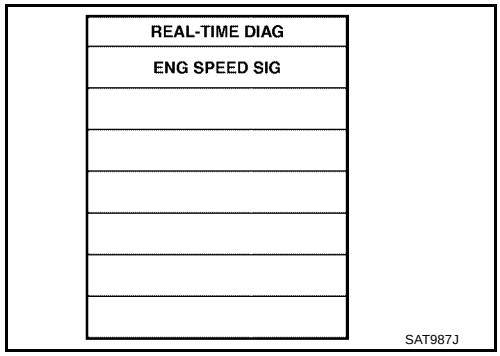
11. When performing cruise test, touch “RECORD”.

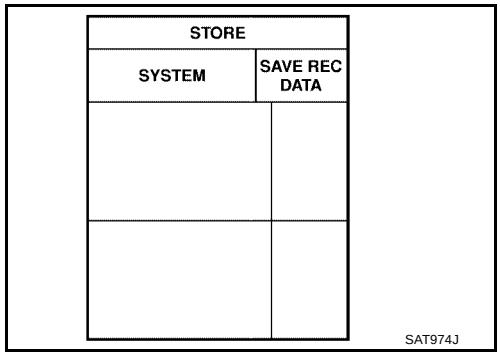


12. After finishing cruise test part 1, touch “STOP”.

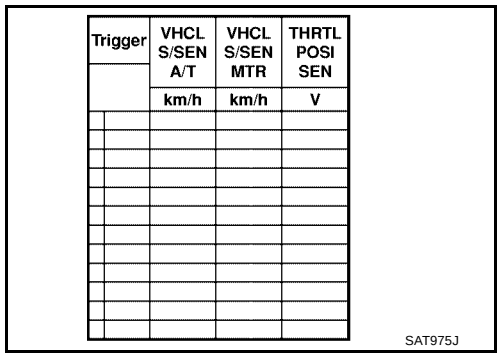


13. Touch “STORE” and touch “BACK”.



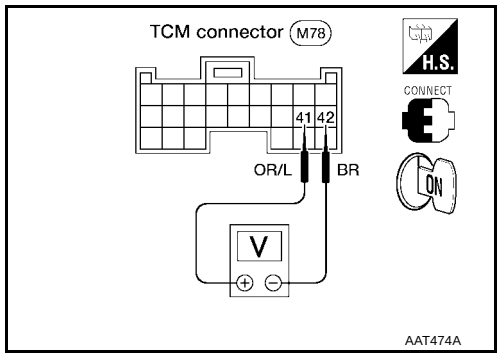


14. Touch “DISPLAY”.
15. Touch “PRINT”.
16. Check the monitor data printed out..
17. Continue cruise test part 2 and 3.



Without CONSULT-II

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



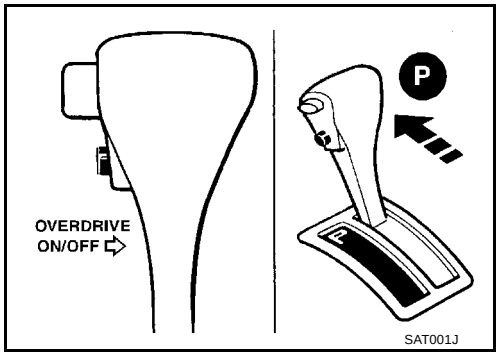
Cruise Test — Part 1

1. CHECK STARTING GEAR (D_1) POSITION

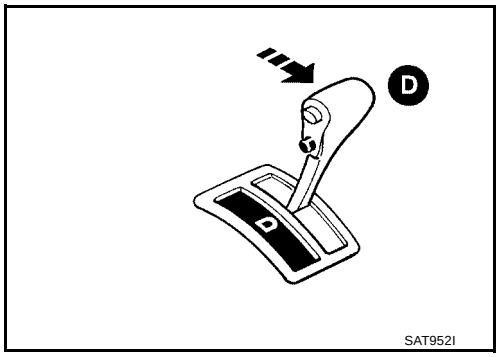
1. Drive vehicle for approx. 10 minutes to warm engine oil and ATF up to operating temperature.

   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 selector lever to P position.

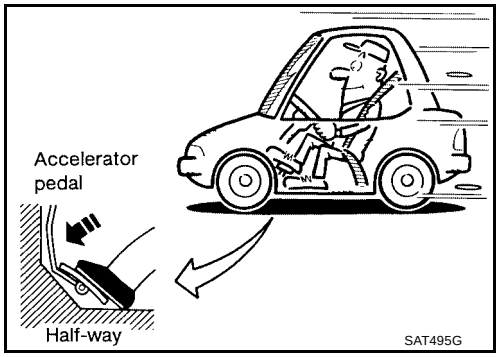


5. Start engine.
6. Move selector lever to D position.



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

   Read gear position.



Yes or No

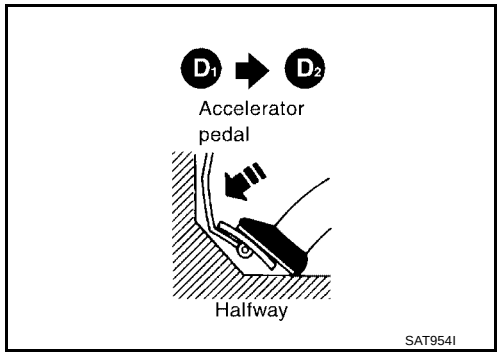
Yes >> GO TO 2
No >> Go to AT-219, "8. Vehicle Cannot Be Started From D_1" .

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-346, "Shift Schedule" .**



Yes or No

Yes >> GO TO 3

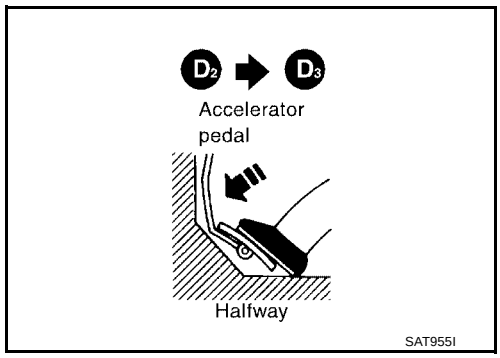
No >> Go to AT-222, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$" .

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-346, "Shift Schedule" .**



Yes or No

Yes >> GO TO 4

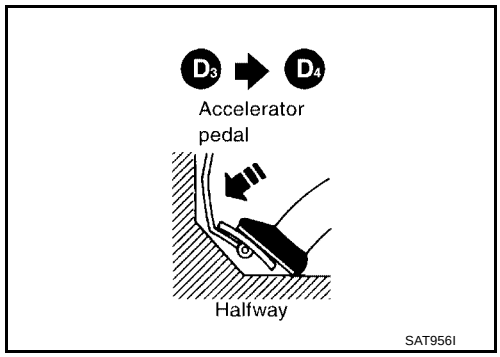
No >> Go to AT-224, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" .

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-346, "Shift Schedule" .**



Yes or No

Yes >> GO TO 5

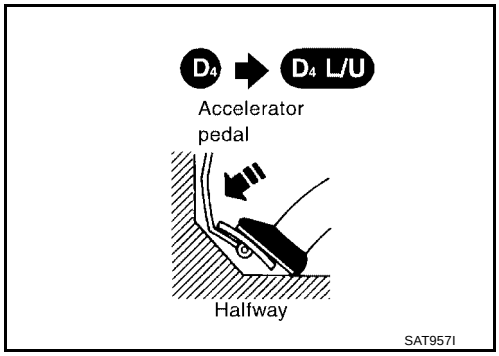
No >> Go to AT-226, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$" .

5. CHECK LOCK-UP (D_4 TO D_4 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-346, "Shift Schedule"** .



Yes or No

Yes >> GO TO 6

No >> Go to AT-228, "12. A/T Does Not Perform Lock-up" .

6. CHECK HOLD LOCK-UP

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

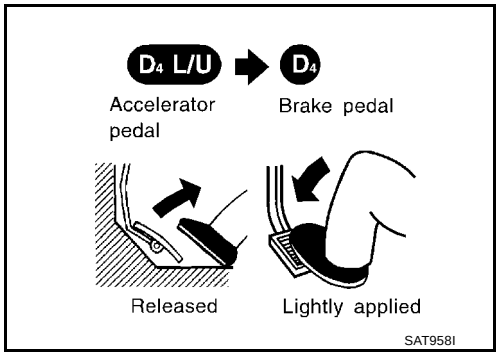
Yes or No

Yes >> GO TO 7

No >> Go to AT-229, "13. A/T Does Not Hold Lock-up Condition" .

7. CHECK LOCK-UP OFF (D_4 L/U TO D_4)

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



Yes or No

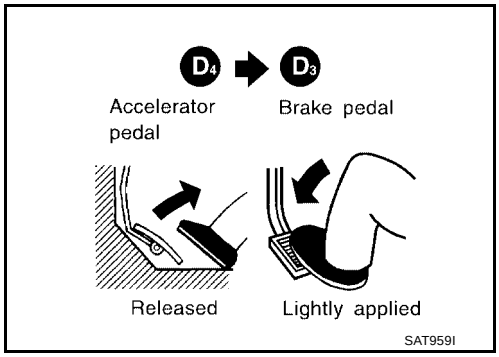
Yes >> GO TO 8

No >> Go to AT-231, "14. Lock-up Is Not Released" .

8. CHECK SHIFT DOWN (D_4 TO D_3)

1. Decelerate vehicle by applying foot brake lightly.
2. Does engine speed return to idle smoothly when A/T is shifted from D_4 to D_3 ?

Read gear position and engine speed.



Yes or No

Yes >> 1. Stop vehicle.
2. Go to AT-77, "Cruise Test — Part 2" .

No >> Go to AT-232, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" .

Cruise Test — Part 2

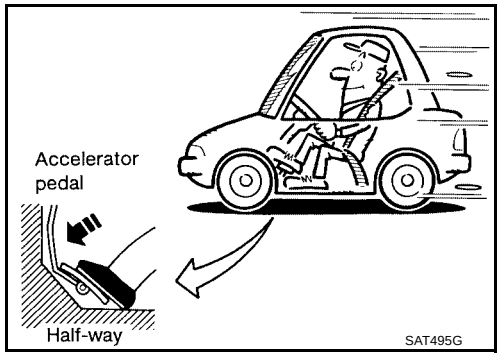
1. CHECK STARTING GEAR (D_1) POSITION

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-233, "16. Vehicle Does Not Start From D_1" .



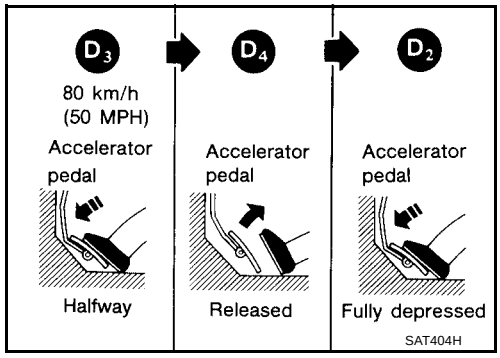
2. CHECK SHIFT UP AND SHIFT DOWN (D_3 TO D_4 TO D_2)

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-222, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$" .



3. CHECK SHIFT UP (D_2 TO D_3)

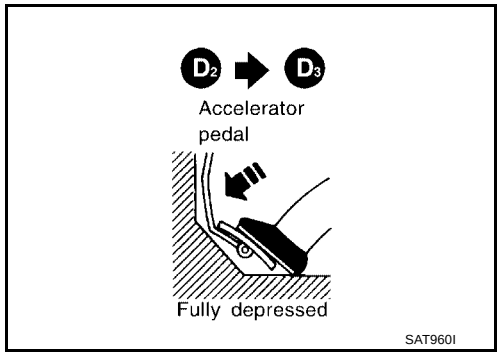
Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_2 to D_3 : **Refer to AT-346, "Shift Schedule" .**

Yes or No

Yes >> GO TO 4
No >> Go to AT-224, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" .



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

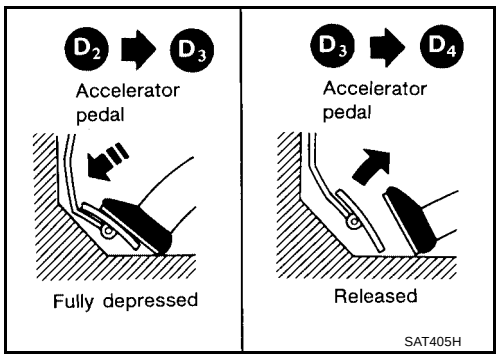
Release accelerator pedal after shifting from D_2 to D_3.
Does A/T shift from D_3 to D_4 and does vehicle decelerate by engine brake?

Read gear position, throttle position and vehicle speed.

Yes or No

Yes >> 1. Stop vehicle.
2. Go to AT-79, "Cruise Test — Part 3".

No >> Go to AT-226, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$".

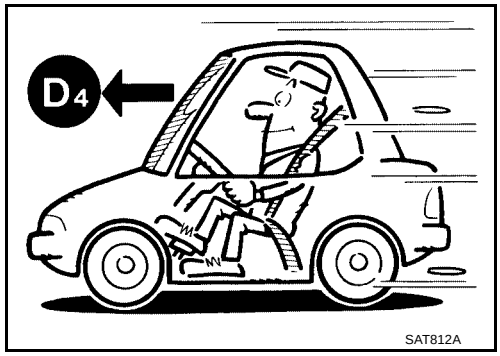


Cruise Test — Part 3

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)

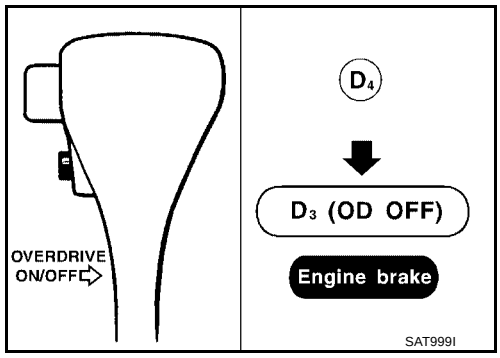
1. Release accelerator pedal.
2. Set overdrive control switch to OFF position while driving in D_4 .
3. Does A/T shift from D_4 to D_3 (O/D OFF)?

Read gear position and vehicle speed.

Yes or No

Yes >> GO TO 3

No >> Go to AT-235, "17. A/T Does Not Shift: D_4 → D_3 , When Overdrive Control Switch ON → OFF" .



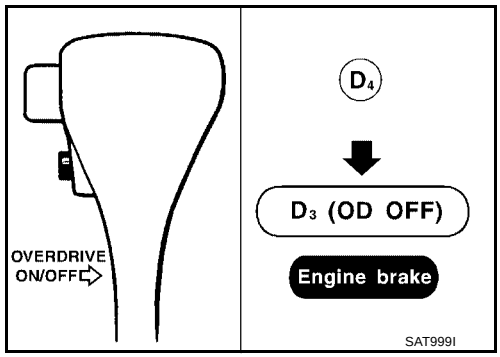
3. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> GO TO 4

No >> Go to AT-232, "15. Engine Speed Does Not Return To Idle (Light Braking D_4 → D_3)" .



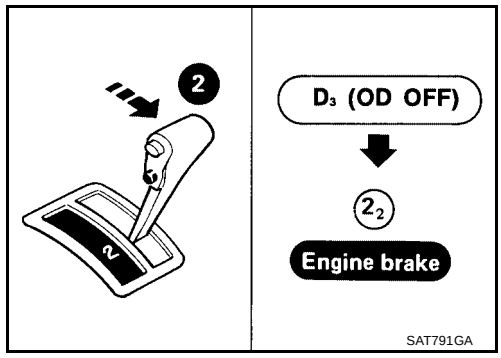
4. CHECK SHIFT DOWN (D_3 TO D_2)

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 5
No >> Go to AT-236, "18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever D → 2 Position" .

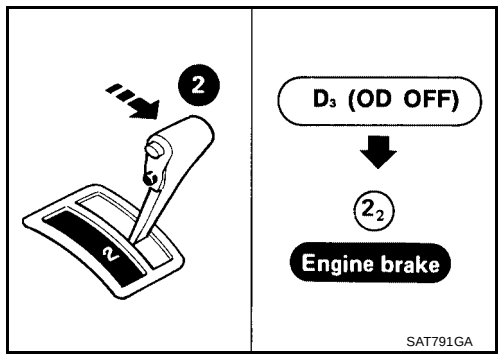


5. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> GO TO 6
No >> Go to AT-232, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" .

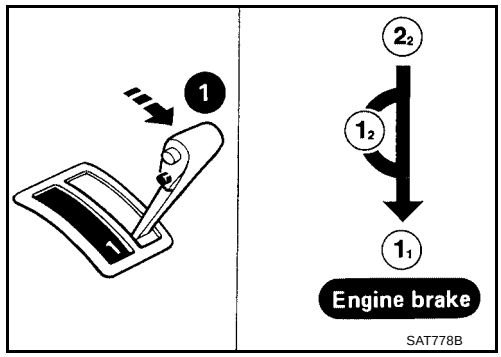


6. CHECK SHIFT DOWN (2_2 TO 1_1)

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?

Yes or No

Yes >> GO TO 7
No >> Go to AT-237, "19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever 2 → 1 Position" .



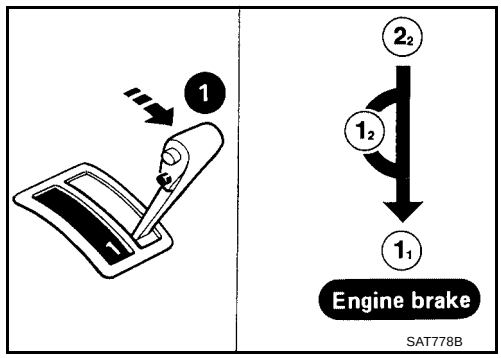
7. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> 1. Stop vehicle.
2. Perform self-diagnosis. Refer to AT-47, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .

No >> Go to AT-237, "20. Vehicle Does Not Decelerate By Engine Brake" .



TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

PFP:00000

Symptom Chart

ECS005MI

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

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				VG33E only	VG33ER only
No Lock-up Engagement/TCC Inoperative	Torque converter is not locked up.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-637	EC-1237
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-110, AT-189	
			3. Park/neutral position (PNP) switch adjustment	AT-256	
			4. Engine speed signal	AT-115	
			5. A/T fluid temperature sensor	AT-105	
			6. Line pressure test	AT-64	
			7. Torque converter clutch solenoid valve	AT-144	
			8. Control valve assembly	AT-253	
		OFF vehicle	9. Torque converter	AT-265	
	Torque converter clutch piston slip.	ON vehicle	1. Fluid level	AT-61	
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Line pressure test	AT-64	
			4. Torque converter clutch solenoid valve	AT-144	
			5. Line pressure solenoid valve	AT-156	
			6. Control valve assembly	AT-253	
		OFF vehicle	7. Torque converter	AT-265	
	Lock-up point is extremely high or low. AT-228	ON vehicle	1. Throttle position sensor (Adjustment)	EC-637	EC-1237
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-110, AT-189	
			3. Torque converter clutch solenoid valve	AT-144	
			4. Control valve assembly	AT-253	
Shift Shock	Sharp shock in shifting from N to D position.	ON vehicle	1. Engine idling rpm	EC-596	EC-1196
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Line pressure test	AT-64	
			4. A/T fluid temperature sensor	AT-105	
			5. Engine speed signal	AT-115	
			6. Line pressure solenoid valve	AT-156	
			7. Control valve assembly	AT-253	
			8. Accumulator N-D	AT-253	
		OFF vehicle	9. Turbine revolution sensor	—	AT-194
			10. Forward clutch	AT-304	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				VG33E only	VG33ER only
Shift Shock	Too sharp a shock in change from D_1 to D_2.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-637	EC-1237
			2. Line pressure test	AT-64	
			3. Accumulator servo release	AT-253	
			4. Control valve assembly	AT-253	
			5. A/T fluid temperature sensor	AT-105	
		OFF vehicle	6. Brake band	AT-339	
	Too sharp a shock in change from D_2 to D_3.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-637	EC-1237
			2. Line pressure test	AT-64	
			3. Control valve assembly	AT-253	
		OFF vehicle	4. High clutch	AT-301	
			5. Brake band	AT-339	
	Too sharp a shock in change from D_3 to D_4.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-637	EC-1237
			2. Line pressure test	AT-64	
			3. Control valve assembly	AT-253	
		OFF vehicle	4. Brake band	AT-339	
			5. Overrun clutch	AT-304	
	Gear change shock felt during decelera-tion by releasing accelerator pedal.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-637	EC-1237
			2. Line pressure test	AT-64	
			3. Overrun clutch solenoid valve	AT-178	
			4. Control valve assembly	AT-253	
	Large shock changing from 1_2 to 1_1 in 1 posi-tion.	ON vehicle	1. Control valve assembly	AT-253	
		ON vehicle	2. Low & reverse brake	AT-309	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				VG33E only	VG33ER only
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-222, AT-224, AT-226	ON vehicle	1. Throttle position sensor (Adjustment)	EC-637	EC-1237
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-110, AT-189	
			3. Shift solenoid valve A	AT-161	
			4. Shift solenoid valve B	AT-166	
	Gear change directly from D_1 to D_3 occurs.	ON vehicle	1. Fluid level	AT-61	
			2. Accumulator servo release	AT-253	
		OFF vehicle	3. Brake band	AT-339	
	Too high a change point from D_4 to D_3, from D_3 to D_2, from D_2 to D_1.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-637	EC-1237
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-110, AT-189	
	Kickdown does not operate when depressing pedal in D_4 within kickdown vehicle speed.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-637	EC-1237
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-110, AT-189	
			3. Shift solenoid valve A	AT-161	
			4. Shift solenoid valve B	AT-166	
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-110, AT-189	
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Shift solenoid valve A	AT-161	
			4. Shift solenoid valve B	AT-166	
	Gear change from 2_2 to 2_3 in 2 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-256	
	Gear change from 1_1 to 1_2 in 1 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-256	
			2. Manual control linkage adjustment	AT-257	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				VG33E only	VG33ER only
No Down Shift	Failure to change gear from D_4 to D_3.	ON vehicle	1. Fluid level	AT-61	
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Overrun clutch solenoid valve	AT-178	
			4. Shift solenoid valve A	AT-161	
			5. Line pressure solenoid valve	AT-156	
			6. Control valve assembly	AT-253	
		OFF vehicle	7. Low & reverse brake	AT-309	
			8. Overrun clutch	AT-304	
	Failure to change gear from D_3 to D_2 or from D_4 to D_2.	ON vehicle	1. Fluid level	AT-61	
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Shift solenoid valve A	AT-161	
			4. Shift solenoid valve B	AT-166	
			5. Control valve assembly	AT-253	
		OFF vehicle	6. High clutch	AT-301	
			7. Brake band	AT-339	
	Failure to change gear from D_2 to D_1 or from D_3 to D_1.	ON vehicle	1. Fluid level	AT-61	
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Shift solenoid valve A	AT-161	
			4. Shift solenoid valve B	AT-166	
			5. Control valve assembly	AT-253	
		OFF vehicle	6. Low one-way clutch	AT-314	
			7. High clutch	AT-301	
			8. Brake band	AT-339	
No Down Shift	Failure to change from D_3 to 2_2 when changing lever into 2 position. AT-232	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-256	
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Overrun clutch solenoid valve	AT-178	
			4. Shift solenoid valve B	AT-166	
			5. Shift solenoid valve A	AT-161	
			6. Control valve assembly	AT-253	
			7. Manual control linkage adjustment	AT-256	
		OFF vehicle	8. Brake band	AT-339	
			9. Overrun clutch	AT-304	
	Does not change from 1_2 to 1_1 in 1 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-256	
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-110, AT-189	
			3. Shift solenoid valve A	AT-161	
			4. Control valve assembly	AT-253	
			5. Overrun clutch solenoid valve	AT-178	
		OFF vehicle	6. Overrun clutch	AT-304	
			7. Low & reverse brake	AT-309	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				VG33E only	VG33ER only
No Up Shift	Failure to change gear from D_1 to D_2 .	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-256	
			2. Manual control linkage adjustment	AT-257	
			3. Shift solenoid valve A	AT-161	
			4. Control valve assembly	AT-253	
			5. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-110, AT-189	
		OFF vehicle	6. Brake band	AT-339	
	Failure to change gear from D_2 to D_3 .	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-256	
			2. Manual control linkage adjustment	AT-257	
			3. Shift solenoid valve B	AT-166	
			4. Control valve assembly	AT-253	
			5. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-110, AT-189	
		OFF vehicle	6. High clutch	AT-301	
			7. Brake band	AT-339	
No Up Shift	Failure to change gear from D_3 to D_4 .	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-256	
			2. Manual control linkage adjustment	AT-257	
			3. Shift solenoid valve A	AT-161	
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-110, AT-189	
			5. A/T fluid temperature sensor	AT-105	
		OFF vehicle	6. Brake band	AT-339	
	A/T does not shift to D_4 when driving with overdrive control switch ON.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-637	EC-1237
			2. Park/neutral position (PNP) switch adjustment	AT-256	
			3. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-110, AT-189	
			4. Shift solenoid valve A	AT-161	
			5. Overrun clutch solenoid valve	AT-178	
			6. Control valve assembly	AT-253	
			7. A/T fluid temperature sensor	AT-105	
			8. Line pressure solenoid valve	AT-156	
		OFF vehicle	9. Brake band	AT-339	
			10. Overrun clutch	AT-304	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				VG33E only	VG33ER only
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-214	ON vehicle	1. Manual control linkage adjustment	AT-257	
			2. Line pressure test	AT-64	
			3. Line pressure solenoid valve	AT-156	
			4. Control valve assembly	AT-253	
		OFF vehicle	5. Reverse clutch	AT-296	
			6. High clutch	AT-301	
			7. Forward clutch	AT-304	
			8. Overrun clutch	AT-304	
			9. Low & reverse brake	AT-309	
	Vehicle will not run in D and 2 positions (but runs in 1 and R positions).	ON vehicle	1. Manual control linkage adjustment	AT-257	
		OFF vehicle	2. Low one-way clutch	AT-314	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				VG33E only	VG33ER only
Slips/Will Not Engage	Vehicle will not run in D, 1, 2 positions (but runs in R position). Clutch slips. Very poor acceleration. AT-217	ON vehicle	1. Fluid level	AT-61	
			2. Line pressure test	AT-64	
			3. Line pressure solenoid valve	AT-156	
			4. Control valve assembly	AT-253	
			5. Accumulator N-D	AT-253	
		OFF vehicle	6. Reverse clutch	AT-296	
			7. High clutch	AT-301	
			8. Forward clutch	AT-304	
			9. Forward one-way clutch	AT-314	
			10. Low one-way clutch	AT-314	
	Clutches or brakes slip somewhat in starting.	ON vehicle	1. Fluid level	AT-61	
			2. Manual control linkage adjustment	AT-257	
			3. Throttle position sensor (Adjustment)	EC-637	EC-1237
			4. Line pressure test	AT-64	
			5. Line pressure solenoid valve	AT-156	
			6. Control valve assembly	AT-253	
			7. Accumulator N-D	AT-253	
		OFF vehicle	8. Forward clutch	AT-304	
			9. Reverse clutch	AT-296	
			10. Low & reverse brake	AT-309	
			11. Oil pump	AT-277	
			12. Torque converter	AT-265	
	No creep at all. AT-214, AT-217	ON vehicle	1. Fluid level	AT-61	
			2. Line pressure test	AT-64	
			3. Control valve assembly	AT-253	
		OFF vehicle	4. Forward clutch	AT-304	
			5. Oil pump	AT-277	
			6. Torque converter	AT-265	
	Almost no shock or clutches slipping in change from D_1 to D_2.	ON vehicle	1. Fluid level		
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Line pressure test	AT-64	
			4. Accumulator servo release	AT-253	
			5. Control valve assembly	AT-253	
		OFF vehicle	6. Brake band	AT-339	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				VG33E only	VG33ER only
Slips/Will Not Engage	Almost no shock or slipping in change from D_2 to D_3.	ON vehicle	1. Fluid level	AT-61	
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Line pressure test	AT-64	
			4. Control valve assembly	AT-253	
		OFF vehicle	5. High clutch	AT-301	
			6. Forward clutch	AT-304	
	Almost no shock or slipping in change from D_3 to D_4.	ON vehicle	1. Fluid level	AT-61	
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Line pressure test	AT-64	
			4. Control valve assembly	AT-253	
		OFF vehicle	5. High clutch	AT-301	
			6. Brake band	AT-339	
	Races extremely fast or slips in changing from D_4 to D_3 when depressing pedal.	ON vehicle	1. Fluid level	AT-61	
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Line pressure test	AT-64	
			4. Line pressure solenoid valve	AT-156	
			5. Control valve assembly	AT-253	
		OFF vehicle	6. High clutch	AT-301	
			7. Forward clutch	AT-304	
	Races extremely fast or slips in changing from D_4 to D_2 when depressing pedal.	ON vehicle	1. Fluid level	AT-61	
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Line pressure test	AT-64	
			4. Line pressure solenoid valve	AT-156	
			5. Shift solenoid valve A	AT-161	
			6. Control valve assembly	AT-253	
		OFF vehicle	7. Brake band	AT-339	
			8. Forward clutch	AT-304	
	Races extremely fast or slips in changing from D_3 to D_2 when depressing pedal.	ON vehicle	1. Fluid level	AT-61	
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Line pressure test	AT-64	
			4. Line pressure solenoid valve	AT-156	
			5. Control valve assembly	AT-253	
			6. A/T fluid temperature sensor	AT-105	
		OFF vehicle	7. Brake band	AT-339	
			8. Forward clutch	AT-304	
			9. High clutch	AT-301	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				VG33E only	VG33ER only
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-61	
			2. Throttle position sensor (Adjustment)	EC-637	EC-1237
			3. Line pressure test	AT-64	
			4. Line pressure solenoid valve	AT-156	
			5. Control valve assembly	AT-253	
		OFF vehicle	6. Forward clutch	AT-304	
			7. Forward one-way clutch	AT-314	
			8. Low one-way clutch	AT-314	
	Vehicle will not run in any position.	ON vehicle	1. Fluid level	AT-61	
			2. Manual control linkage adjustment	AT-257	
			3. Line pressure test	AT-64	
			4. Line pressure solenoid valve		
		OFF vehicle	5. Oil pump	AT-277	
			6. High clutch	AT-301	
			7. Brake band	AT-339	
			8. Low & reverse brake	AT-309	
			9. Torque converter	AT-265	
			10. Parking pawl components	AT-326	
NOT USED	Engine cannot be started in P and N positions. AT-208	ON vehicle	1. Ignition switch and starter	PG-13, SC-9	
			2. Manual control linkage adjustment	AT-257	
			3. Park/neutral position (PNP) switch adjustment	AT-256	
	Engine starts in positions other than P and N. AT-208	ON vehicle	1. Manual control linkage adjustment	AT-257	
			2. Park/neutral position (PNP) switch adjustment	AT-256	
	Transmission noise in P and N positions.	ON vehicle	1. Fluid level	AT-61	
			2. Line pressure test	AT-64	
			3. Throttle position sensor (Adjustment)	EC-637	EC-1237
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-110, AT-189	
			5. Engine speed signal	AT-115	
		OFF vehicle	6. Oil pump	AT-277	
			7. Torque converter	AT-265	
	Vehicle moves when changing into P position or parking gear does not disengage when shifted out of P position. AT-208	ON vehicle	1. Manual control linkage adjustment	AT-257	
		OFF vehicle	2. Parking pawl components	AT-326	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				VG33E only	VG33ER only
NOT USED	Vehicle runs in N position. AT-210	ON vehicle	1. Manual control linkage adjustment	AT-257	
		OFF vehicle	2. Forward clutch	AT-304	
			3. Reverse clutch	AT-296	
			4. Overrun clutch	AT-304	
	Vehicle braked when shifting into R position.	ON vehicle	1. Fluid level	AT-61	
			2. Manual control linkage adjustment	AT-257	
			3. Line pressure test	AT-64	
			4. Line pressure solenoid valve	AT-156	
			5. Control valve assembly	AT-253	
		OFF vehicle	6. High clutch	AT-301	
			7. Brake band	AT-265	
			8. Forward clutch	AT-304	
			9. Overrun clutch	AT-304	
	Excessive creep.	ON vehicle	1. Engine idling rpm	EC-596	EC-1196
	Engine stops when shifting lever into R, D, 2 and 1.	ON vehicle	1. Engine idling rpm	EC-596	EC-1196
			2. Torque converter clutch solenoid valve	AT-144	
			3. Control valve assembly	AT-253	
		OFF vehicle	4. Torque converter	AT-265	
	Vehicle braked by gear change from D_1 to D_2.	ON vehicle	1. Fluid level	AT-61	
		OFF vehicle	2. Reverse clutch	AT-296	
			3. Low & reverse brake	AT-309	
			4. High clutch	AT-301	
			5. Low one-way clutch	AT-314	
	Vehicle braked by gear change from D_2 to D_3.	ON vehicle	1. Fluid level	AT-61	
		OFF vehicle	2. Brake band	AT-265	
	Vehicle braked by gear change from D_3 to D_4.	ON vehicle	1. Fluid level	AT-61	
		OFF vehicle	2. Overrun clutch	AT-304	
			3. Forward one-way clutch	AT-314	
			4. Reverse clutch	AT-296	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				VG33E only	VG33ER only
NOT USED	Maximum speed not attained. Acceleration poor.	ON vehicle	1. Fluid level	AT-61	
			2. Park/neutral position (PNP) switch adjustment	AT-256	
			3. Shift solenoid valve A	AT-161	
			4. Shift solenoid valve B	AT-166	
			5. Control valve assembly	AT-253	
		OFF vehicle	6. Reverse clutch	AT-296	
			7. High clutch	AT-301	
			8. Brake band	AT-339	
			9. Low & reverse brake	AT-309	
			10. Oil pump	AT-277	
			11. Torque converter	AT-265	
	Transmission noise in D, 2, 1 and R positions.	ON vehicle	1. Fluid level	AT-61	
		ON vehicle	2. Torque converter	AT-265	
	Engine brake does not operate in “1” position. AT-233	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-256	
			2. Manual control linkage adjustment	AT-257	
			3. Throttle position sensor (Adjustment)	EC-637	EC-1237
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-110, AT-189	
			5. Shift solenoid valve A	AT-161	
			6. Control valve assembly	AT-253	
			7. Overrun clutch solenoid valve	AT-178	
		OFF vehicle	8. Overrun clutch	AT-304	
			9. Low & reverse brake	AT-309	

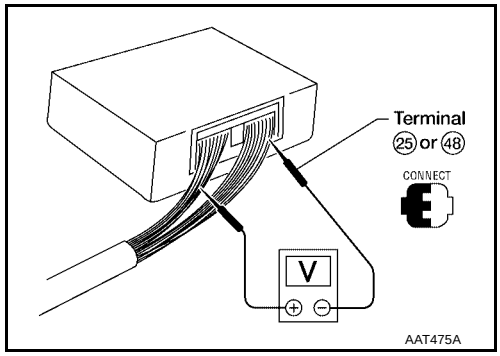
Items	Symptom	Condition	Diagnostic Item	Reference Page	
				VG33E only	VG33ER only
NOT USED	Transmission overheats.	ON vehicle	1. Fluid level	AT-61	
			2. Engine idling rpm	EC-596	EC-1196
			3. Throttle position sensor (Adjustment)	EC-637	EC-1237
			4. Line pressure test		
			5. Line pressure solenoid valve	AT-156	
			6. Control valve assembly	AT-253	
		OFF vehicle	7. Oil pump	AT-277	
			8. Reverse clutch	AT-296	
			9. High clutch	AT-301	
			10. Brake band	AT-339	
			11. Forward clutch	AT-304	
			12. Overrun clutch	AT-304	
			13. Low & reverse brake	AT-309	
			14. Torque converter	AT-265	
	ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	ON vehicle	1. Fluid level	AT-61	
		OFF vehicle	2. Reverse clutch	AT-296	
			3. High clutch	AT-301	
			4. Brake band	AT-339	
			5. Forward clutch	AT-304	
			6. Overrun clutch	AT-304	
			7. Low & reverse brake	AT-309	
	Offensive smell at fluid charging pipe.	ON vehicle	1. Fluid level	AT-61	
		OFF vehicle	2. Torque converter	AT-265	
			3. Oil pump	AT-277	
			4. Reverse clutch	AT-296	
			5. High clutch	AT-301	
			6. Brake band	AT-339	
			7. Forward clutch	AT-304	
			8. Overrun clutch	AT-304	
			9. Low & reverse brake	AT-309	
	Engine is stopped at R, D, 2 and 1 positions.	ON vehicle	1. Fluid level	AT-61	
			2. Torque converter clutch solenoid valve	AT-144	
			3. Shift solenoid valve B	AT-166	
			4. Shift solenoid valve A	AT-161	
			5. Control valve assembly	AT-253	

TCM Terminals and Reference Value

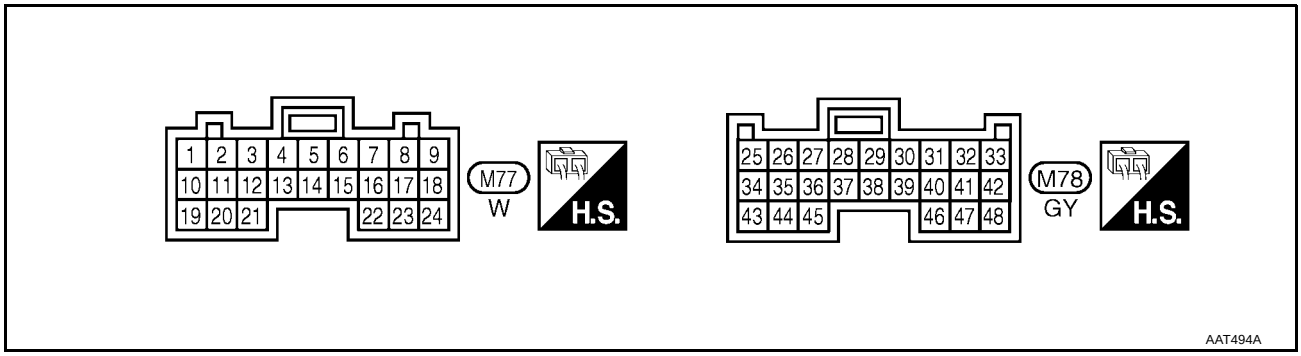
ECS005MJ

PREPARATION

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



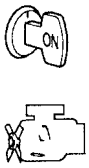
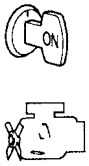
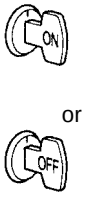
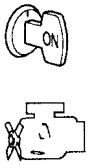
TCM HARNESS CONNECTOR TERMINAL LAYOUT



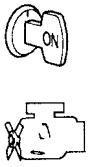
TCM INSPECTION TABLE

(Data are reference values.)

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	GY/R	Line pressure solenoid valve	 	When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
				When depressing accelerator pedal fully after warming up engine.	0V
2	BR/Y	Line pressure solenoid valve (with dropping resistor		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V
3	G/OR	Torque converter clutch solenoid valve		When A/T performs lock-up	Battery voltage
				When A/T does not performs lock-up	0V
5*1	PU/W	DT1	—	—	—
6*1	P/B	DT2		—	—
7*1	G/R	DT3		—	—
10	W/R	Power source	 or 	When turning ignition ON.	Battery voltage
				When turning ignition 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 operates. (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 operates. (When driving in D_3 or D_4.)	0V
13	Y	O/D OFF indicator lamp		When setting overdrive control switch in OFF position.	0V
				When setting overdrive control switch in ON position.	Battery voltage
15*1	Y/G	OBD-II	—	—	—
16	BR/W	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine.	Battery voltage
				When depressing accelerator pedal after warming up engine.	0V
17	OR/B	Wide open throttle position switch (in throttle position switch)		When depressing accelerator pedal more than half-way after warming up engine.	Battery voltage
				When releasing accelerator pedal after warming up engine.	0V
18	B/Y	ASCD cruise signal		When ASCD cruise is being performed. (“CRUISE ” light comes on.)	Battery voltage
				When ASCD cruise is not being performed. (“CRUISE ” light does not comes on.)	0V
19	W/R	Power source (same as No. 10)	 or	When turning ignition ON.	Battery voltage
				When turning ignition OFF.	0V
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch shift solenoid valve does not operates.	0V
22	R	Overdrive control switch		When setting overdrive control switch in OFF position	0V
				When setting overdrive control switch in ON position	Battery voltage

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
24	GY	ASCD O/D cut signal		When ASCD permits O/D.	5 - 8V
				When ASCD requires O/D to be OFF.	0V
25	B/Y	Ground		—	0V
26	G/B	PNP switch 1 position		When setting selector lever to 1 position.	Battery voltage
				When setting selector lever to other position.	0V
27	G/W	PNP switch 2 position		When setting selector lever to 2 position.	Battery voltage
				When setting selector lever to other position.	0V
28	R/Y	Power source (Memory back-up)	 or 	When turning ignition switch to ON.	Battery voltage
				When turning ignition switch to OFF.	Battery voltage
29	B/R	Revolution sensor (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
				When vehicle parks.	0V
30*2	Y/R	Data link connector data in	—	—	—
31*2	GY/L	Data link connector data out	—	—	—
32	B/W	Throttle position sensor (Power source)	 or 	Ignition switch ON.	4.5 - 5.5V
				Ignition switch OFF.	0V
34	L	PNP switch D position		When setting selector lever to D position.	Battery voltage
				When setting selector lever to other position.	0V
35	Y/R	PNP switch R position		When setting selector lever to R position.	Battery voltage
				When setting selector lever to other position.	0V
36	P	PNP switch P or N position		When setting selector lever to P or N position.	Battery voltage
				When setting selector lever to other position.	0V

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
38*3	Y	Turbine revolution sensor (measured in AC range)		When engine runs at approximately 1,000 rpm.	1.2 V
39	P/L	Engine speed signal		When engine runs at idle speed.	0.5 - 2.5V
40	G/B	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1m (3 ft) or more.	Voltage varies between less than 1V and more than 4.5V
41	OR/L	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.5V Fully-open throttle: 4V
42	BR	Throttle position sensor (Ground)		—	0V
45*3	BR/R	Stoplamp switch		When brake pedal is depressed.	Battery voltage
				When brake pedal is released.	0V
47	R/B	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/Y	Ground (same as No. 25)		—	0V

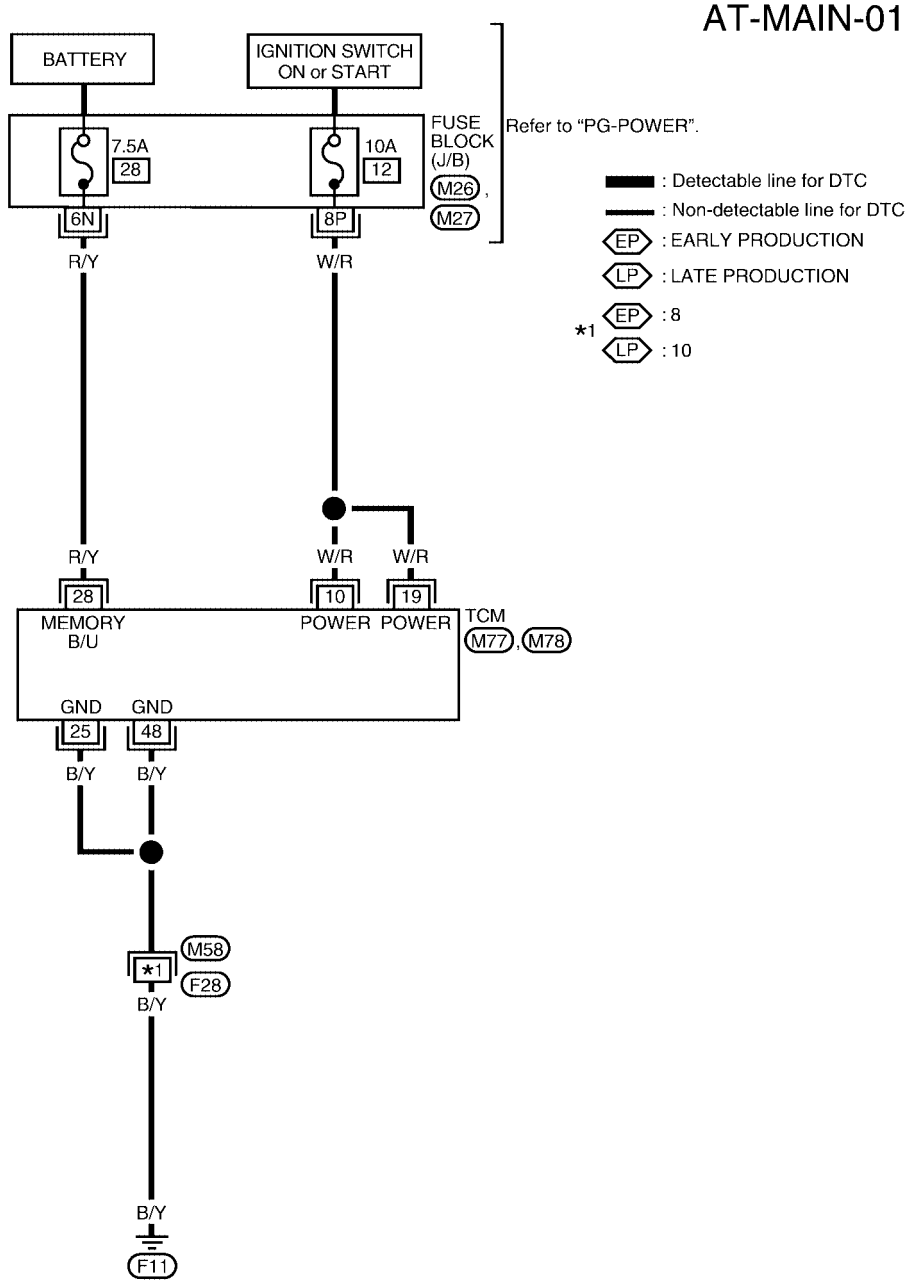
*1: These terminals are connected to the ECM.
*2: These terminals are connected to the data link connector.
*3: VG33ER only.

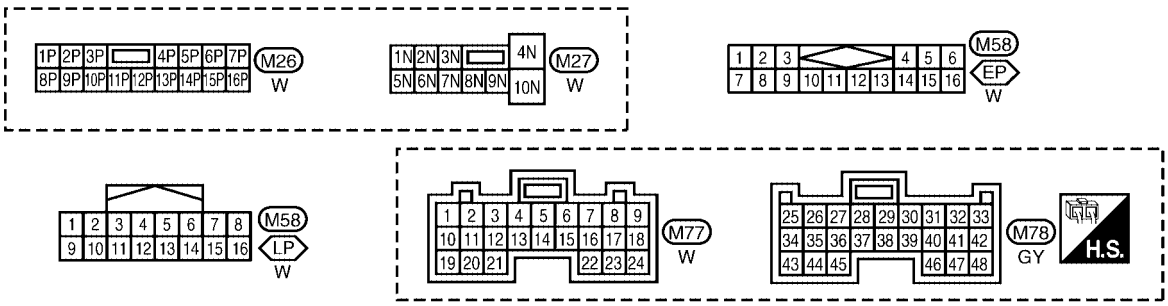
TROUBLE DIAGNOSIS FOR POWER SUPPLY

PFP:00000

Wiring Diagram — AT — MAIN

ECS005MK





LCWA0053E

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

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

Diagnostic Procedure

ECS005ML

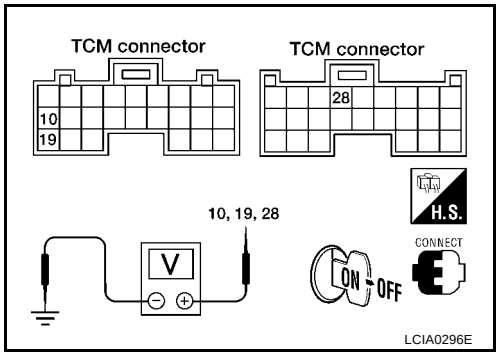
1. CHECK TCM POWER SOURCE

1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between TCM harness connector M77 terminals 10 (W/R), 19 (W/R) and ground.

   Voltage : Battery voltage

3. Turn ignition switch to OFF position.
4. Check voltage between TCM harness connector M78 terminal 28 (R/Y) 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 terminals 10, 19 and 28 (Main harness)
- Ignition switch and fuse. Refer to PG-8, "POWER SUPPLY ROUTING" .

2. CHECK TCM GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between terminals (25, 48) and ground. Refer to AT-97, "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 or connectors.

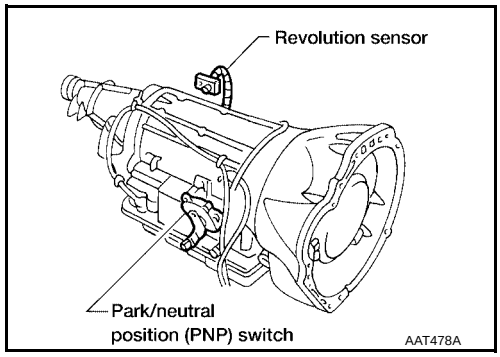
DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH

PFP:32006

Description

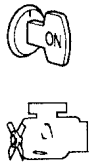
ECS005MM

- The PNP switch assembly includes a transmission range switch.
- The transmission range switch detects the selector position and sends a signal to the TCM.



TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: PNP SW/CIRC	TCM does not receive the correct voltage signal from the switch based on the gear position.	● Harness or connectors (The PNP switch circuit is open or shorted.) ● PNP switch
: P0705		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

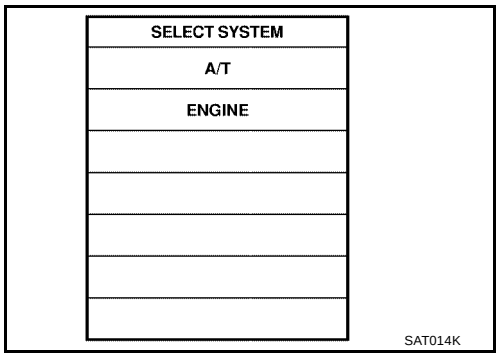
NOTE:

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

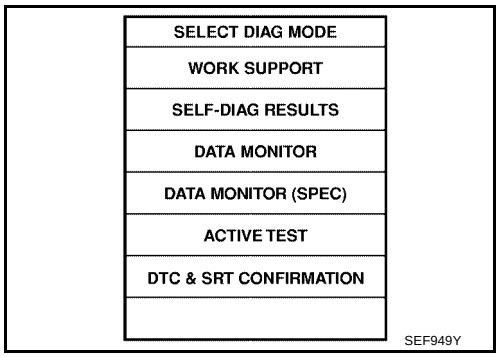
1. Turn ignition switch ON.



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 (O/D ON or OFF)

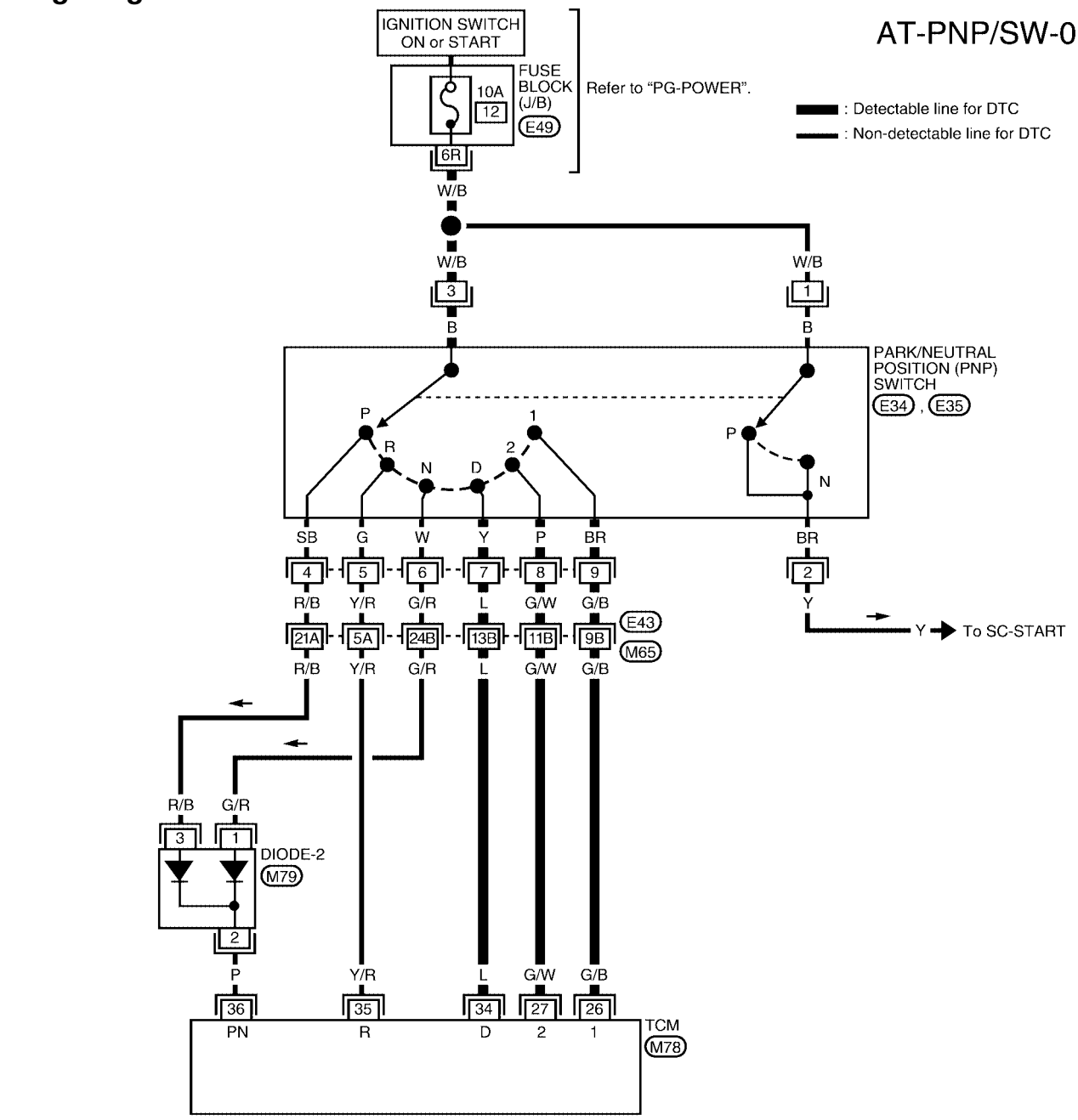
With GST

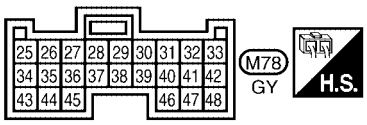
- Follow the procedure “With CONSULT-II”.

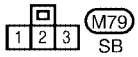


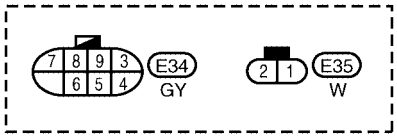
Wiring Diagram — AT — PNP/SW

ECS005MN









Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)

LCWA0032E

Diagnostic Procedure

ECS005MO

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

With CONSULT

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 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

SAT643J

OK or NG

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

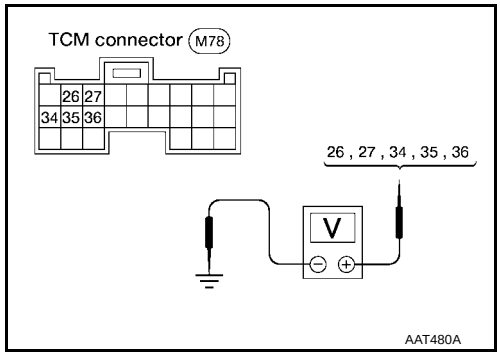
- PNP switch
  Refer to AT-103, "PNP SWITCH" .
- Harness for short or open between ignition switch and PNP switch (Main harness)
- Harness for short or open between PNP switch and TCM (Main harness)
- Diode (P, N positions)

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 connector M78 terminals (26, 27, 34, 35, 36) and ground, while moving selector lever through each position.

Lever position	Terminals				
	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



Does battery voltage exist (B) or non-existent (0)?

Yes >> GO TO 3
No >> Check the following items:

- PNP switch
  Refer to AT-103, "PNP SWITCH" .
- 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)
- Diode (P, N positions)

3. CHECK DTC

Perform AT-99, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

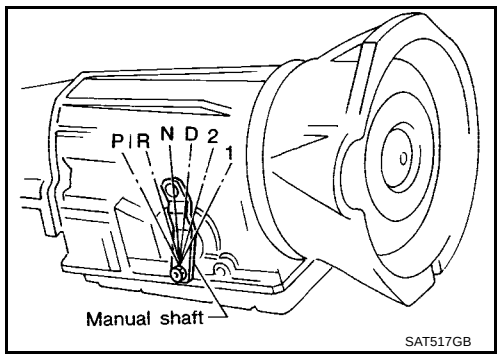
OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

Component Inspection

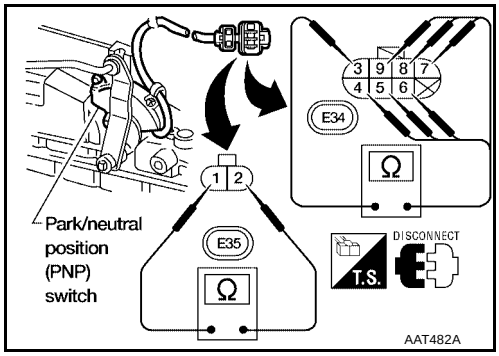
ECS005MP

PNP SWITCH

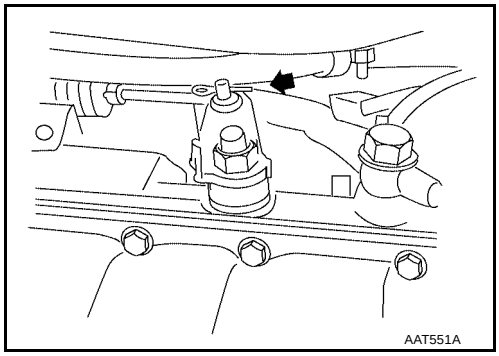
1. Check continuity between terminals 1 and 2 and between terminals 3 and (4, 5, 6, 7, 8, 9) while moving manual shaft through each position.



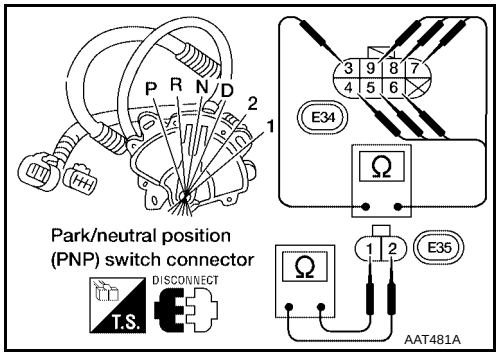
Lever position	P	R	N	D	2	1
Terminal No.	1 - 2	3 - 5	1 - 2	3 - 7	3 - 8	3 - 9
	3 - 4		3 - 6			



2. If NG, check again with manual control linkage disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control linkage. Refer to AT-257, "Manual Control Linkage 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-256, "Park/Neutral Position (PNP) Switch Adjustment" .
6. If NG on step 4, replace PNP switch.



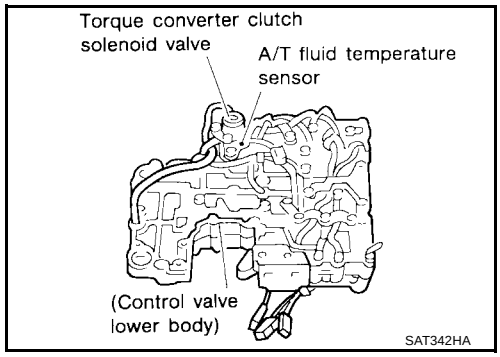
DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

PFP:31940

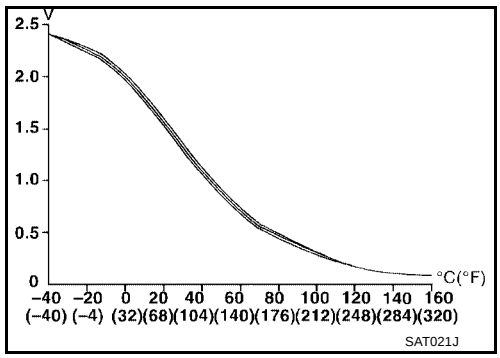
Description

ECS005MQ

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

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: ATF TEMP SEN/CIRC	TCM receives an excessively low or high voltage from the sensor.	● Harness or connectors (The sensor circuit is open or shorted.) ● A/T fluid temperature sensor
: P0710		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

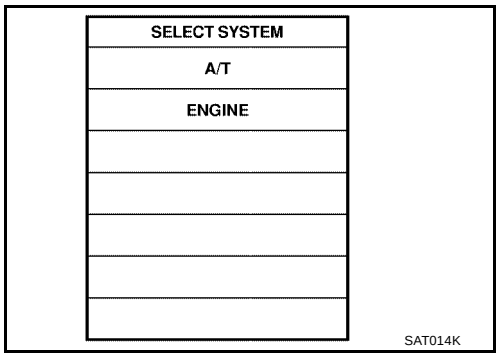
NOTE:

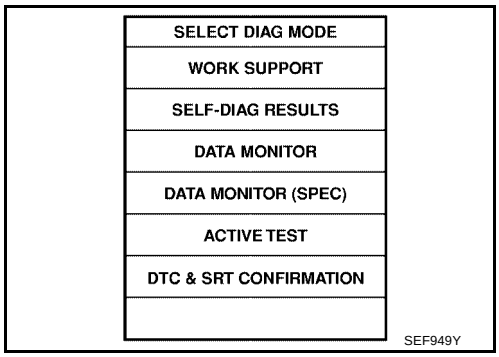
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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 (O/D ON)

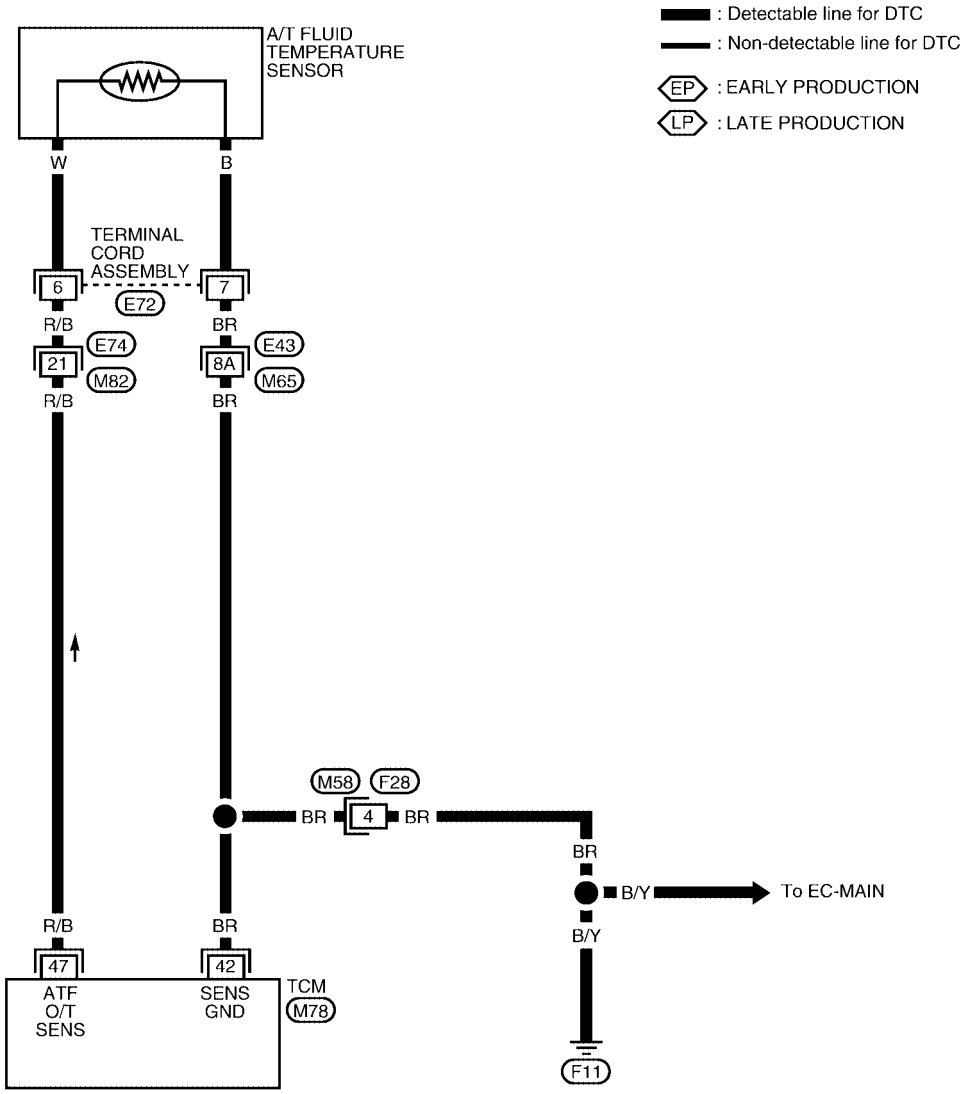
With GST

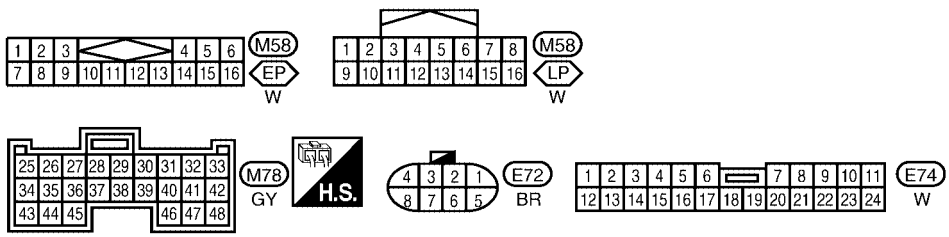
- Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — FTS

ECS005MR

AT-FTS-01





Refer to the following.
(E43) - SUPER MULTIPLE JUNCTION (SMJ)

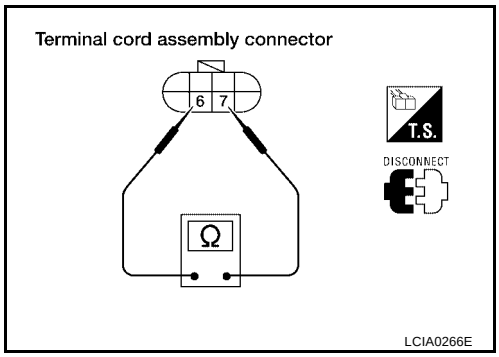
LCWA0054E

Diagnostic Procedure

ECS005MS

1. 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 connector E72 terminals 6 and 7, when A/T is cold [20°C (68°F)].



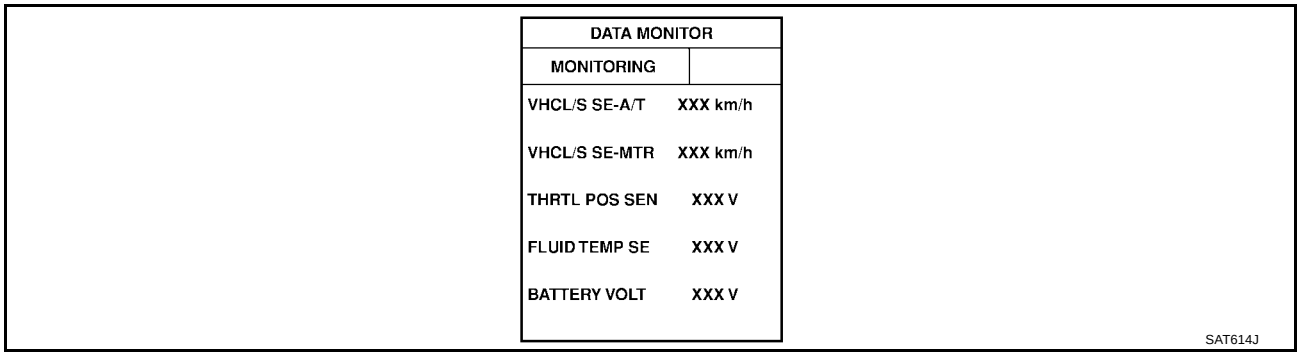
Is resistance approx. 2.5 kΩ?

Yes >> GO TO 2
No >> 1. Remove oil pan.
2. Check the following items:
- A/T fluid temperature sensor
  Refer to AT-109, "A/T FLUID TEMPERATURE SENSOR" .
- Harness of terminal cord assembly for short or open

2. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR

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”.

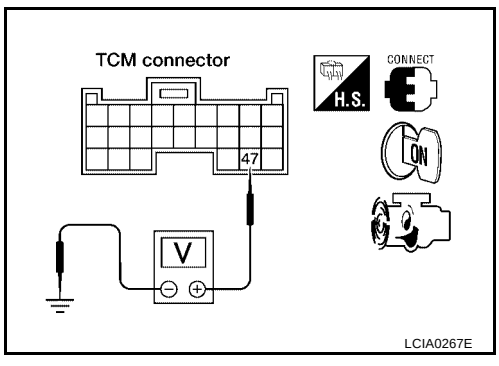


Voltage:

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

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM connector M78 terminal 47 (R/B) and ground while warming up A/T.



Voltage:

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

OK or NG

OK >> GO TO 3
NG >> Check the following item:
- Harness for short or open between TCM and terminal cord assembly (Main harness)

3. CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure. Refer to AT-105, "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.

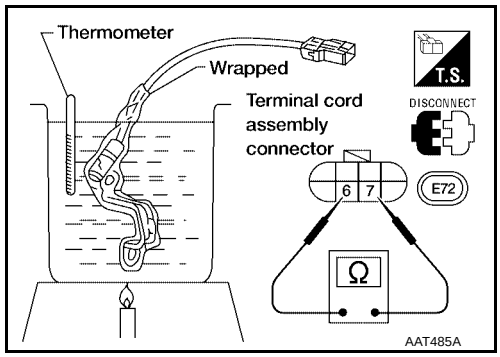
Component Inspection

ECS005MT

A/T FLUID TEMPERATURE SENSOR

- For removal, refer to AT-253, "Control Valve Assembly and Accumulators" .
- Check resistance between terminals 6 and 7 while changing temperature as shown at left.

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



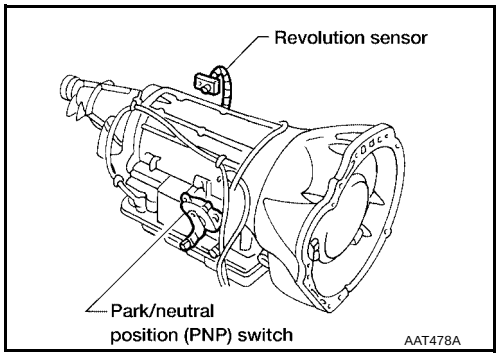
DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)

PFP:32702

Description

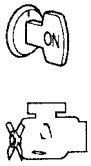
ECS005MU

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



TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

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

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.**

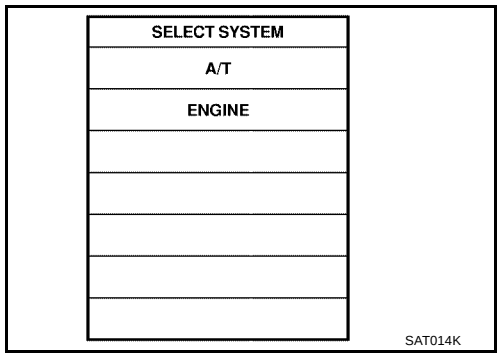
NOTE:

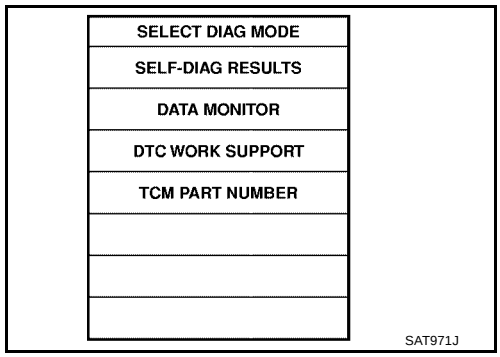
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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.
   If the check result is NG, go to AT-193, "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 condition: 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-174, "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 condition: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.

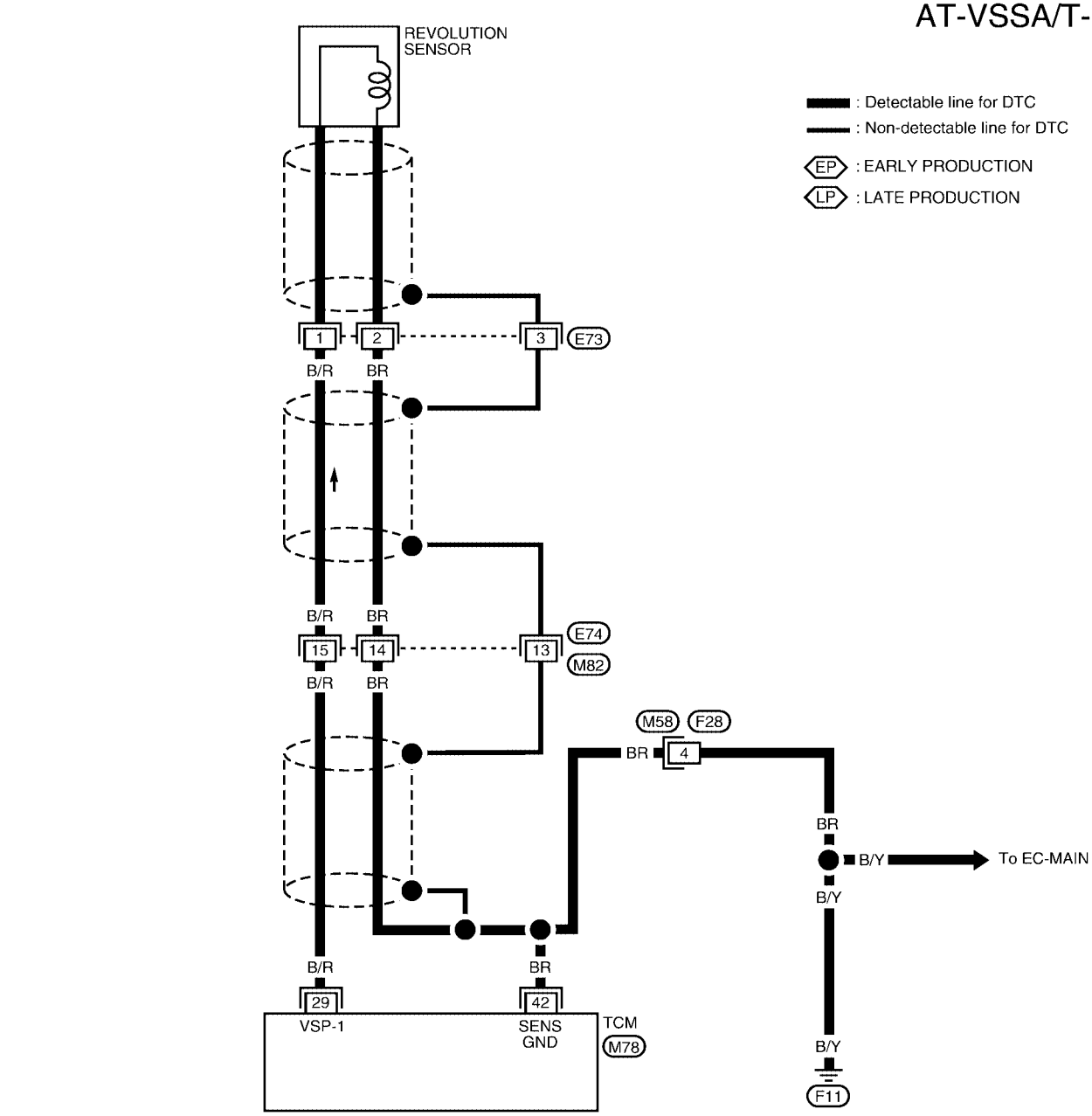
With GST

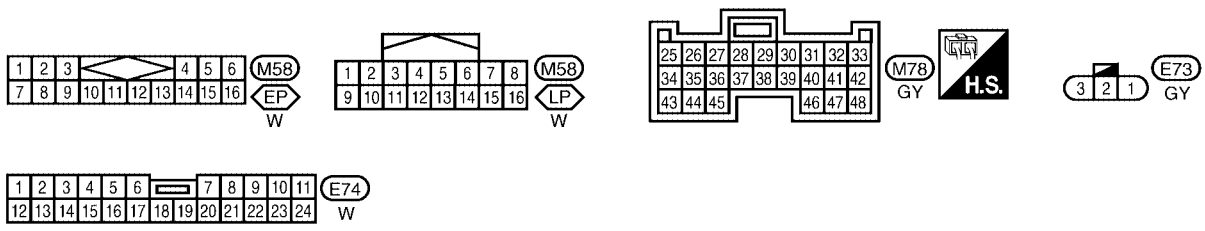
- Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — VSSA/T

ECS005MV

AT-VSSA/T-01





LCWA0055E

Diagnostic Procedure

ECS005MW

1. CHECK REVOLUTION SENSOR

Refer to AT-114, "REVOLUTION SENSOR" .

OK or NG

OK >> GO TO 2
NG >> Repair or replace revolution sensor.

2. 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·A/T” while driving.
   Check the value changes according to driving speed.

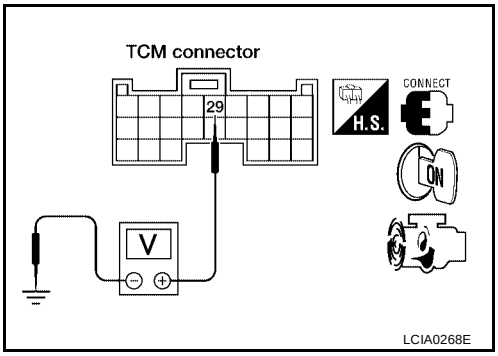
DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM connector M78 terminal 29 (B/R) and ground while driving.
   (Measure with AC range.)

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



LCIA0268E

OK or NG

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

- Harness for short or open between TCM and revolution sensor (Main harness)
- Harness for short or open between revolution sensor and ECM (Main harness)
- Ground circuit for ECM
  Refer to EC-689, "POWER SUPPLY CIRCUIT FOR ECM" (VG33E) or EC-1288, "POWER SUPPLY CIRCUIT FOR ECM" (VG33ER).

3. CHECK DTC

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

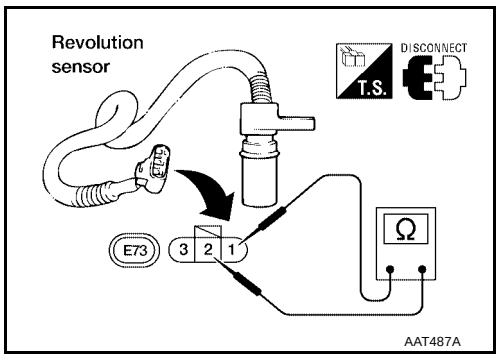
Component Inspection

ECS005MX

REVOLUTION SENSOR

- For removal, refer to AT-254, "Revolution Sensor Replacement" .
- Check resistance between terminals 1 and 2.

Terminal No.		Resistance
1	2	500 - 650Ω



DTC P0725 ENGINE SPEED SIGNAL

PFP:24825

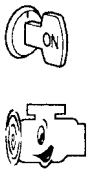
Description

ECS005MY

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

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
39	P/L	Engine speed signal		When engine runs at idle speed.	0.5 - 2.5V

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.

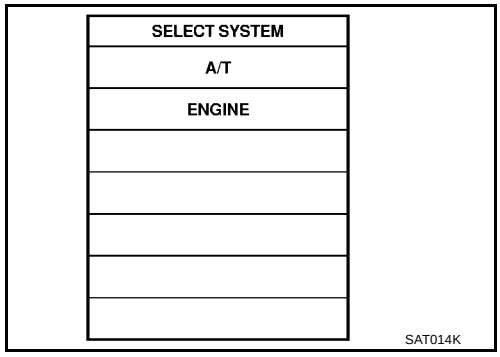
NOTE:

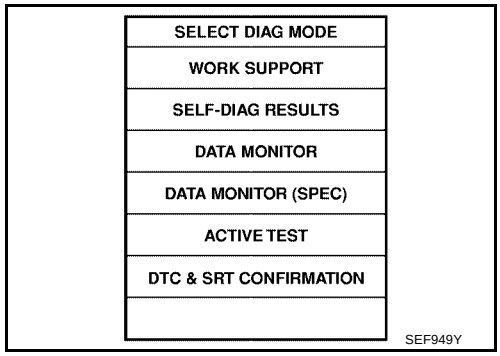
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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 (O/D ON)

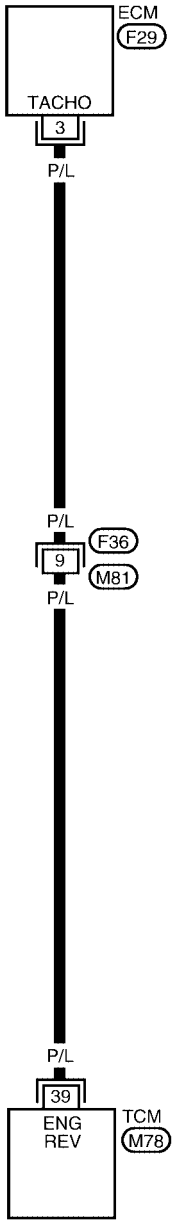
With GST

- Follow the procedure “With CONSULT-II”.

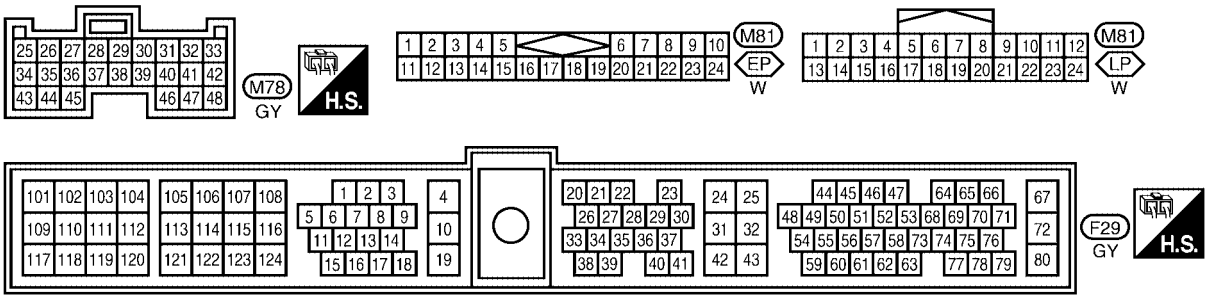
Wiring Diagram — AT — ENGSS

ECS005MZ

AT-ENGSS-0



: Detectable line for DTC
: Non-detectable line for DTC
EP : EARLY PRODUCTION
LP : LATE PRODUCTION



LCWA0056E

Diagnostic Procedure

ECS005N0

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 >> GO TO 2
NG >> Check ignition signal circuit for engine control. Refer to EC-1127, "IGNITION SIGNAL" (VG33E) or EC-1701, "IGNITION SIGNAL" (VG33ER).

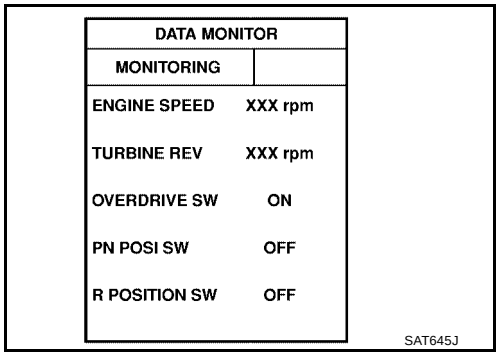
2. CHECK INPUT SIGNAL

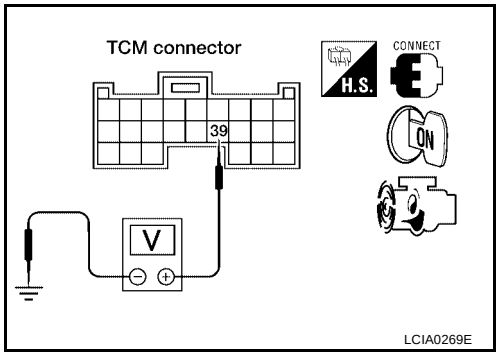
With CONSULT-II

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

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM harness connector M78 terminal 39 (P/L) and ground.





Does battery voltage (idle speed) 0.5 - 2.5V?

Yes >> GO TO 3
No >> Check the following items:

- Harness for short or open between TCM and ECM
- Resistor
- Ignition coil
  Refer to EC-1127, "IGNITION SIGNAL" (VG33E) or EC-1701, "IGNITION SIGNAL" (VG33ER).

3. CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure. Refer to 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.

DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

PFP:31940

Description

ECS005N1

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

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

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS 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 item (Possible cause)
: A/T 1ST GR FNCTN	A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	● Shift solenoid valve A ● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
: P0731		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:

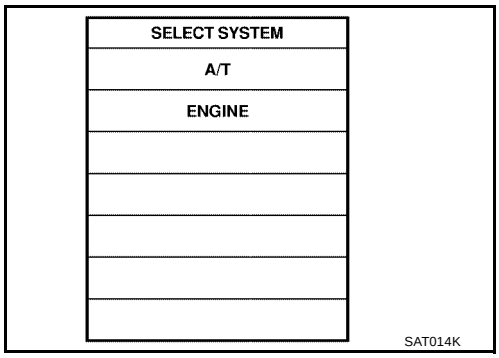
- **Always drive vehicle at a safe speed.**

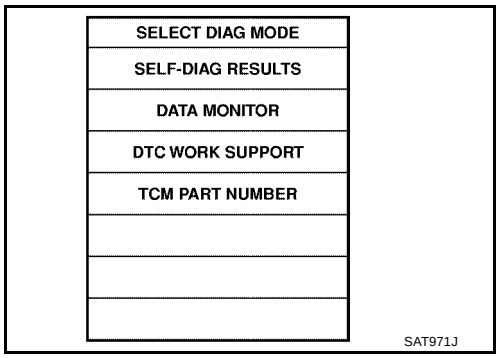
- **Be careful not to rev engine into the red zone on the tachometer.**

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 CONDITIONS:
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.

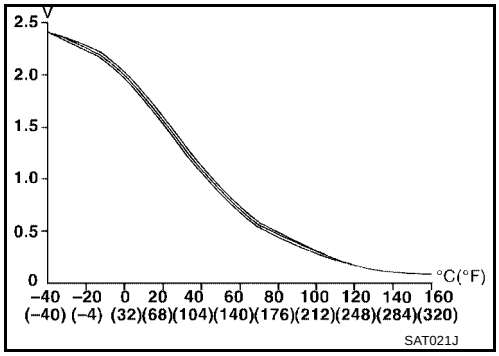
With CONSULT-II

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 17 to 23 km/h (11 to 14 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1/8 (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 7/8 of "THROTTLE POSI") quickly from a speed of 17 to 23 km/h (11 to 14 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-123, "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-123, "Diagnostic Procedure" .
   Refer to AT-346, "Shift Schedule" .

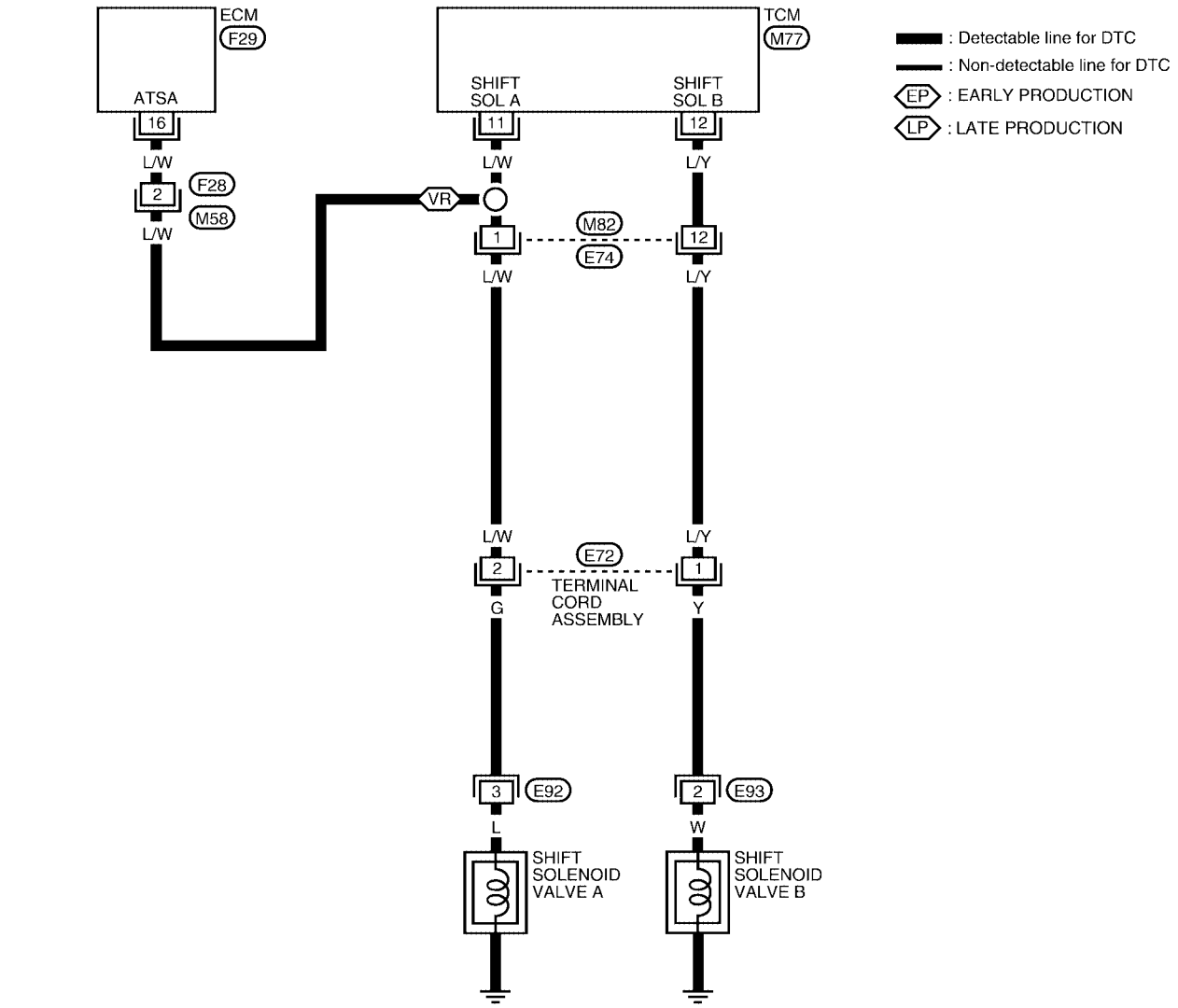
With GST

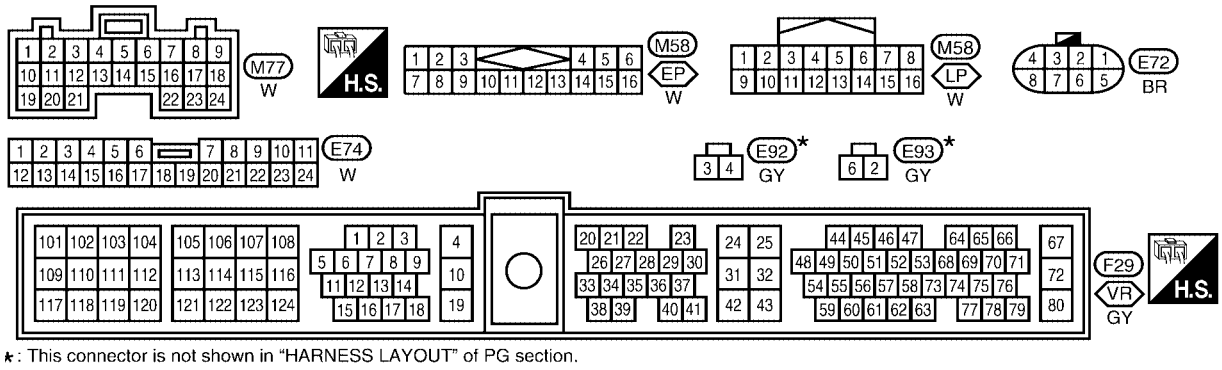
- Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 1ST

ECS005N2

AT-1STSIG-01





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

LCWA0058E

Diagnostic Procedure

ECS005N3

1. CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-253, "REMOVAL" .
2. Check shift solenoid valve operation.

- Shift solenoid valve A
- Shift solenoid valve B

Refer to AT-124, "SHIFT SOLENOID VALVE A AND B" .

OK or NG

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

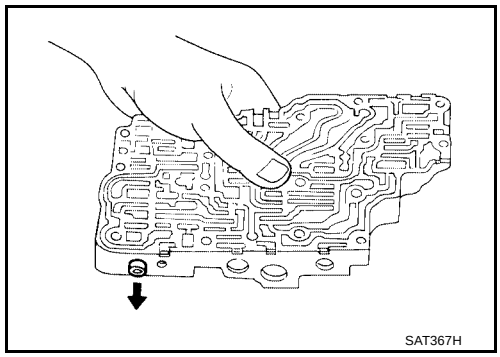
2. CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-283, "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.


SAT367H

3. CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure. Refer to AT-119, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> Check control valve again. Repair or replace control valve assembly.

Component Inspection

ECS005N4

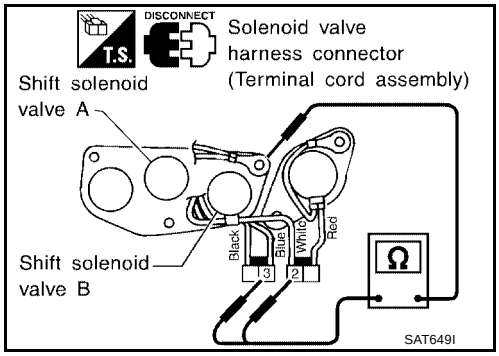
SHIFT SOLENOID VALVE A AND B

- For removal, refer to AT-253, "REMOVAL" .

Resistance Check

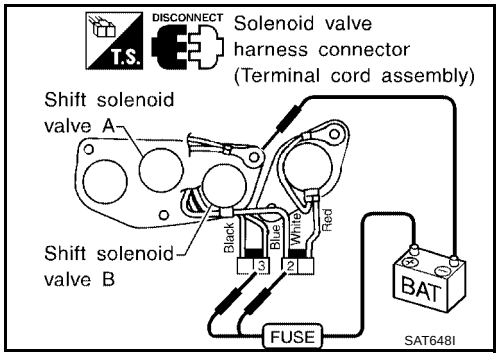
- Check resistance between terminals (3 or 2) and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	3	Ground	20 - 40Ω
Shift solenoid valve B	2		



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminals (3 or 2) and ground.



DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

PFP:31940

Description

ECS005N5

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

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

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS 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 item (Possible cause)
: A/T 2ND SIGNAL	A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.
: P0732		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

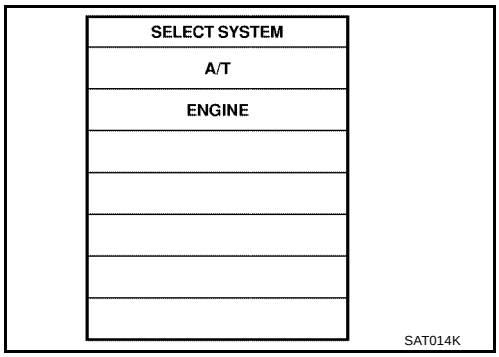
CAUTION:

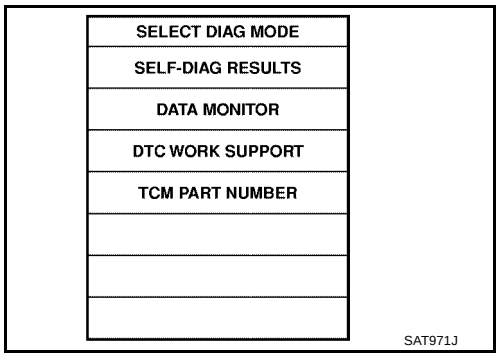
- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

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 CONDITIONS:
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.

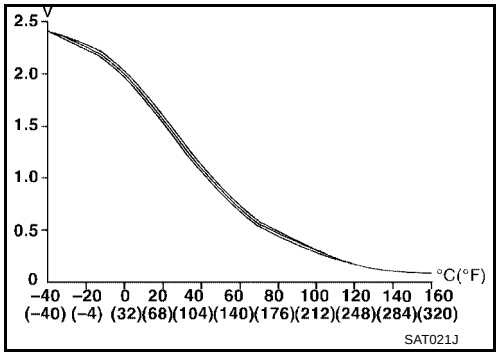
With CONSULT

1. Start engine and select “DATA MONITOR” mode for “A/T” with CONSULT.





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 1/8 (at all times during step 4)
   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 7/8 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-129, "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-129, "Diagnostic Procedure" . Refer to AT-346, "Shift Schedule" .

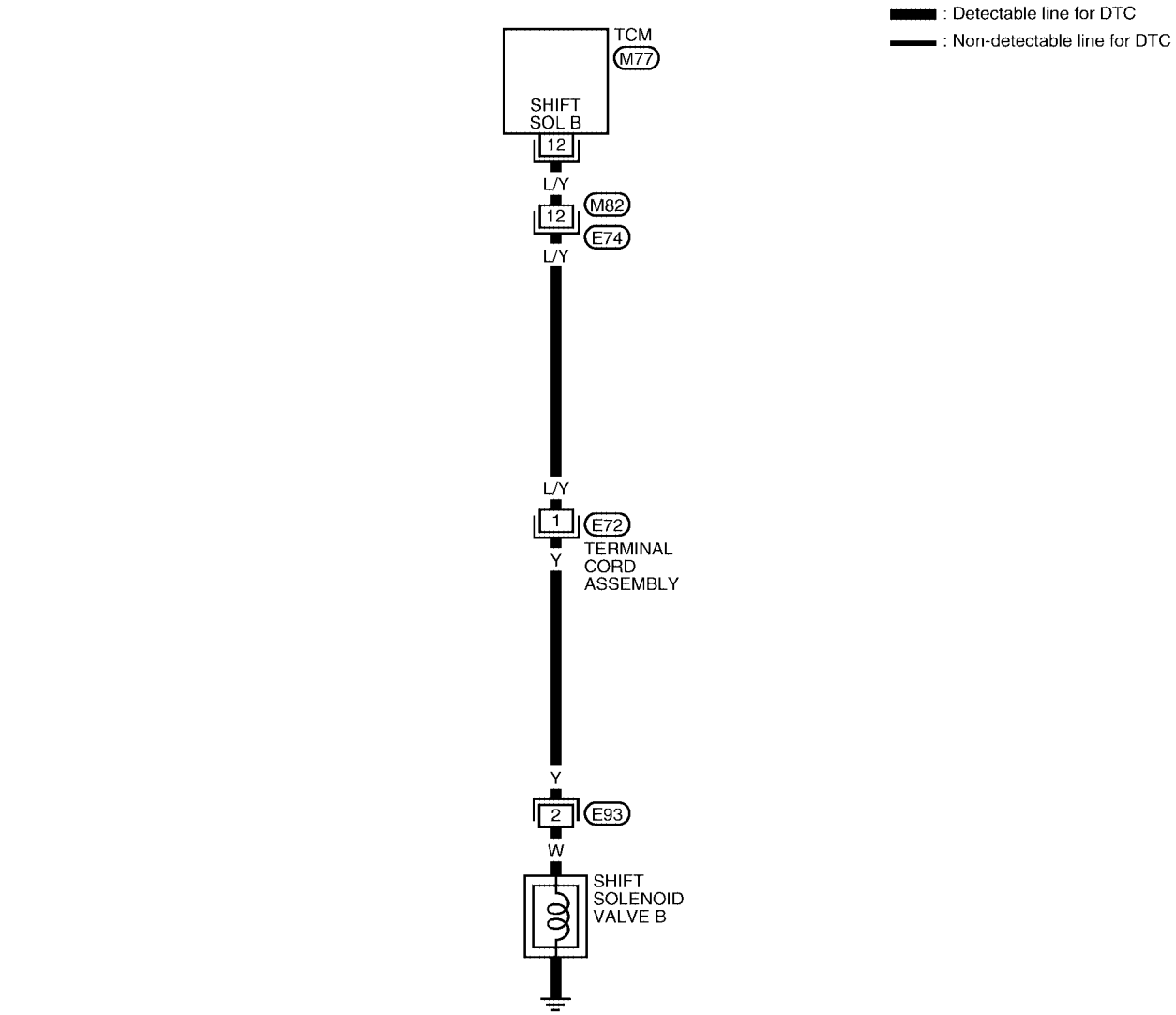
With GST

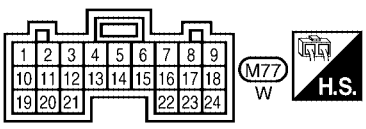
- Follow the procedure “With CONSULT-II”.

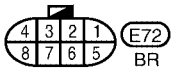
Wiring Diagram — AT — 2ND

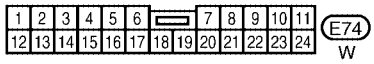
ECS005N6

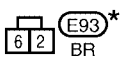
AT-2NDSIG-01











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

LCWA0036E

Diagnostic Procedure

ECS005N7

1. CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-253, "REMOVAL" .
2. Check shift solenoid valve operation.

– Shift solenoid valve B

Refer to AT-129, "SHIFT SOLENOID VALVE B" .

OK or NG

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

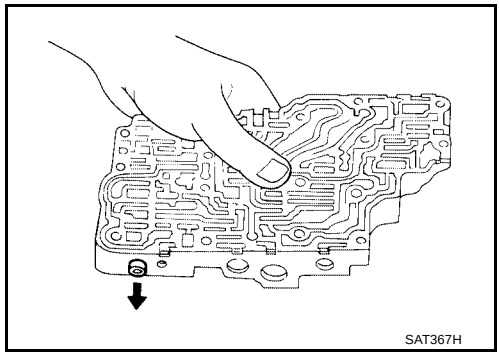
2. CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-283, "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.


SAT367H

3. CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure. Refer to AT-125, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> Check control valve again. Repair or replace control valve assembly.

Component Inspection

ECS005N8

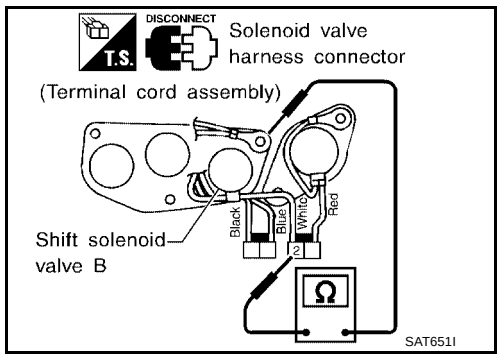
SHIFT SOLENOID VALVE B

- For removal, refer to AT-253, "REMOVAL" .

Resistance Check

- Check resistance between terminal 2 and ground.

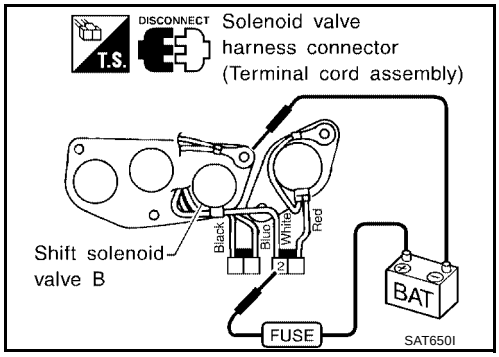
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	2	Ground	20 - 40Ω



SAT651I

Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 2 and ground.



DTC P0733 IMPROPER SHIFTING TO 3RD GEAR POSITION

PFP:31940

Description

ECS005N9

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

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

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS 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 item (Possible cause)
: A/T 3RD GR FNCTN	A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	● Shift solenoid valve A ● Each clutch ● Hydraulic control circuit
: P0733		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

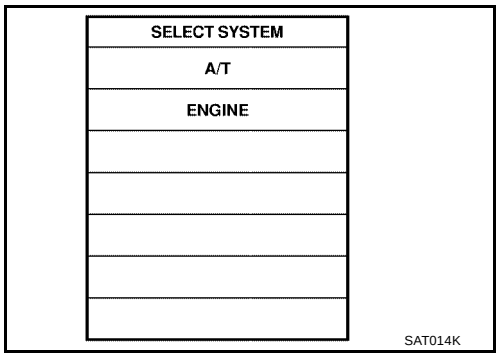
CAUTION:

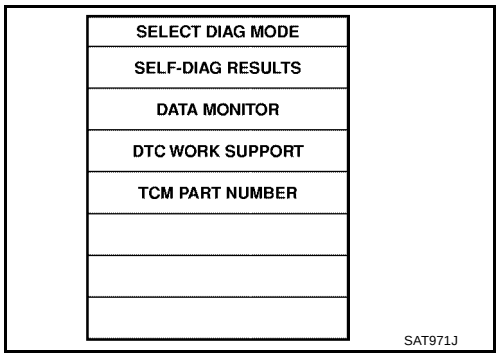
- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

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 CONDITIONS:
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.

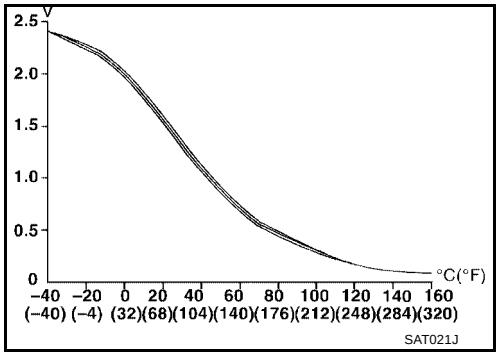
With CONSULT-II

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 1/8 (at all times during step 4)
   Selector lever: D position (O/D 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-135, "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-135, "Diagnostic Procedure" .
   Refer to AT-346, "Shift Schedule" .

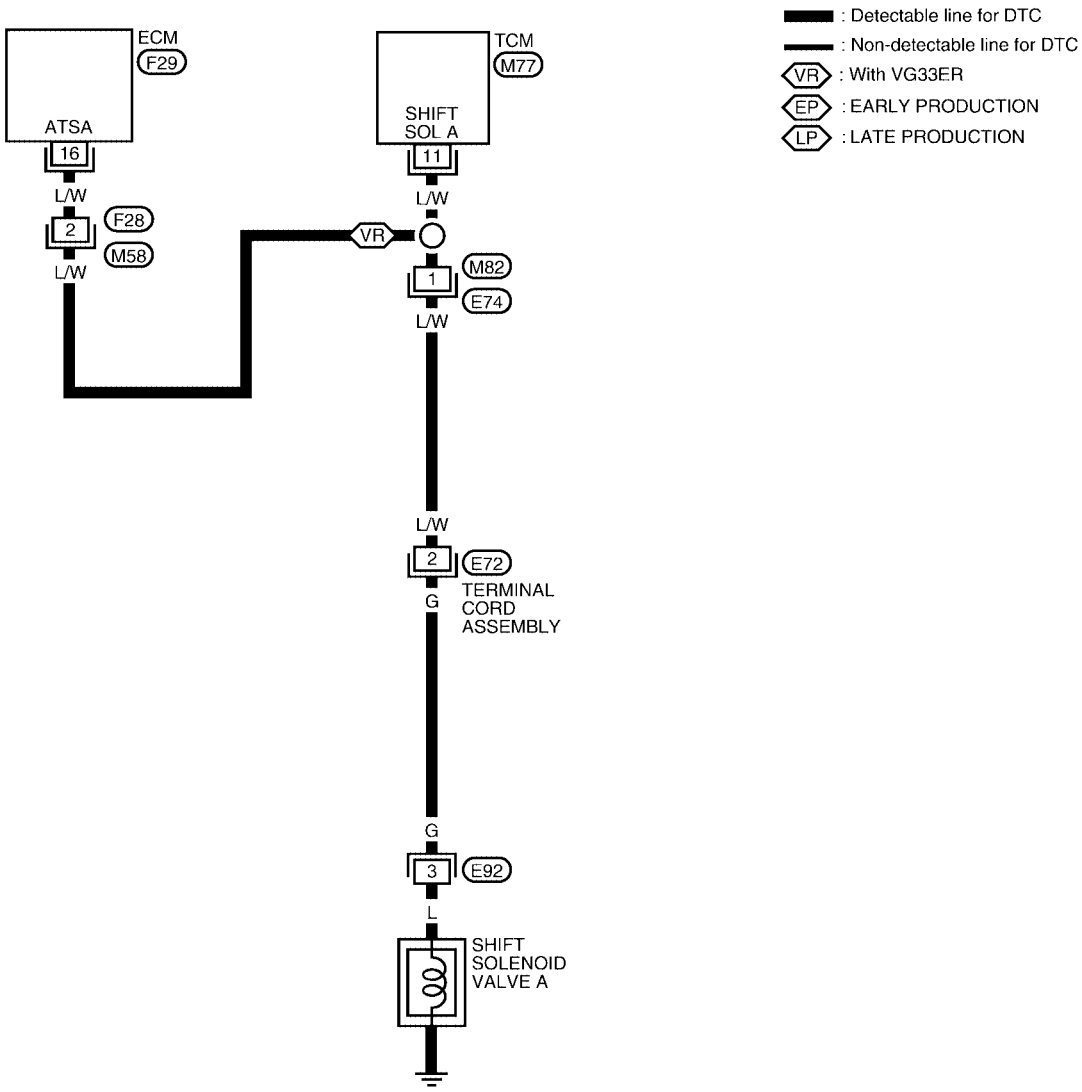
With GST

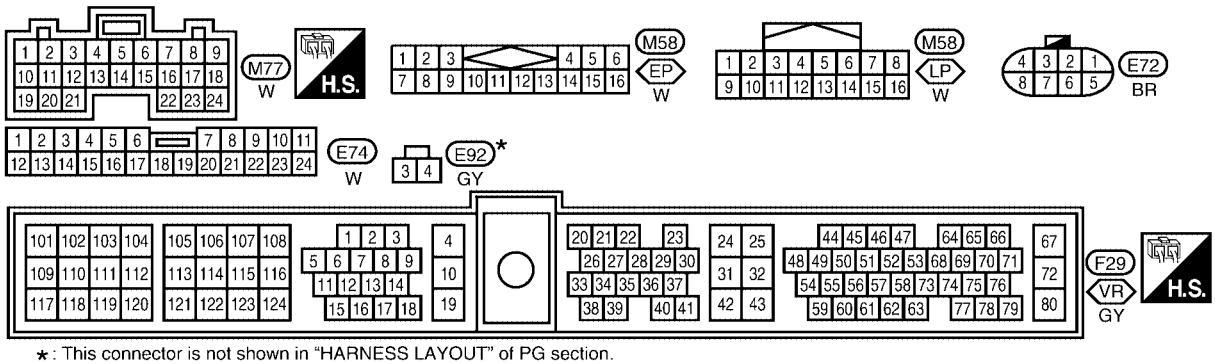
- Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 3RD

ECS005NA

AT-3RDSIG-01





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

LCWA0071E

Diagnostic Procedure

ECS005NB

1. CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-253, "REMOVAL" .
2. Check shift solenoid valve operation.

– Shift solenoid valve A

Refer to AT-136, "SHIFT SOLENOID VALVE A" .

OK or NG

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

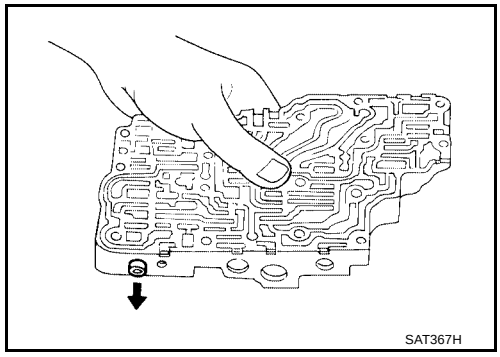
2. CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-283, "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.


SAT367H

3. CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure. Refer to AT-131, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> Check control valve again. Repair or replace control valve assembly.

Component Inspection

ECS005NC

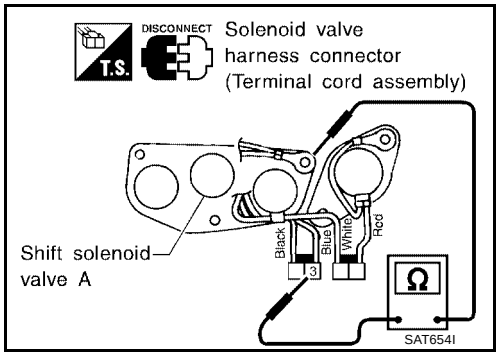
SHIFT SOLENOID VALVE A

- For removal, refer to AT-253, "REMOVAL" .

Resistance Check

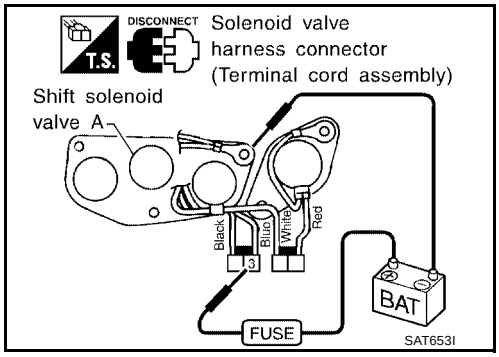
- Check resistance between terminal 3 and ground.

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



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 3 and ground.



DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

PFP:31940

Description

ECS005ND

- 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%
Line pressure solenoid valve duty	Small throttle opening (Low line pressure) ↓ Large throttle opening (High line pressure)	24% ↓ 95%

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

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	GY/R	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
				When depressing accelerator pedal fully after warming up engine.	0V
2	BR/Y	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V
11	L/W	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in D_1 or D_4.)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in D_2 or D_3.)	0V
12	L/Y	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in D_1 or D_2.)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in D_3 or D_4.)	0V

ON BOARD DIAGNOSIS 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 item (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.**
- **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.

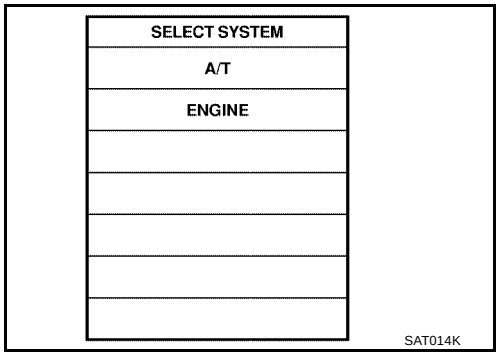
TESTING CONDITIONS:

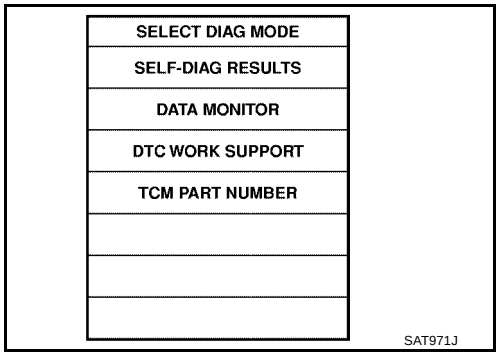
Always drive vehicle on a level road to improve the accuracy of test.

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

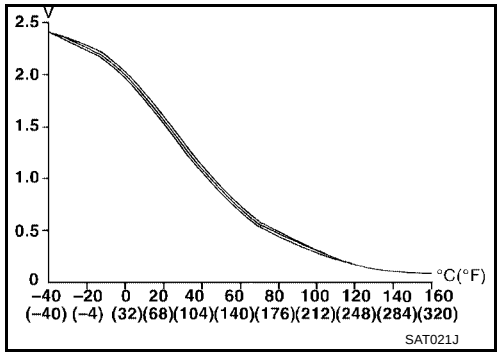
With CONSULT-II

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 50 to 60 km/h (31 to 37 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 1/8 - 2/8 of “THROTTLE POSI” from a speed of 50 to 60 km/h (31 to 37 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-141, "Diagnostic Procedure" .
If “STOP VEHICLE” appears on CONSULT-II screen, go to following step.

– **Check that “GEAR” shows 4 when depressing accelerator pedal with 1/8 - 2/8 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 toAT-141, "Diagnostic Procedure" .
Refer to AT-346, "Shift Schedule" .

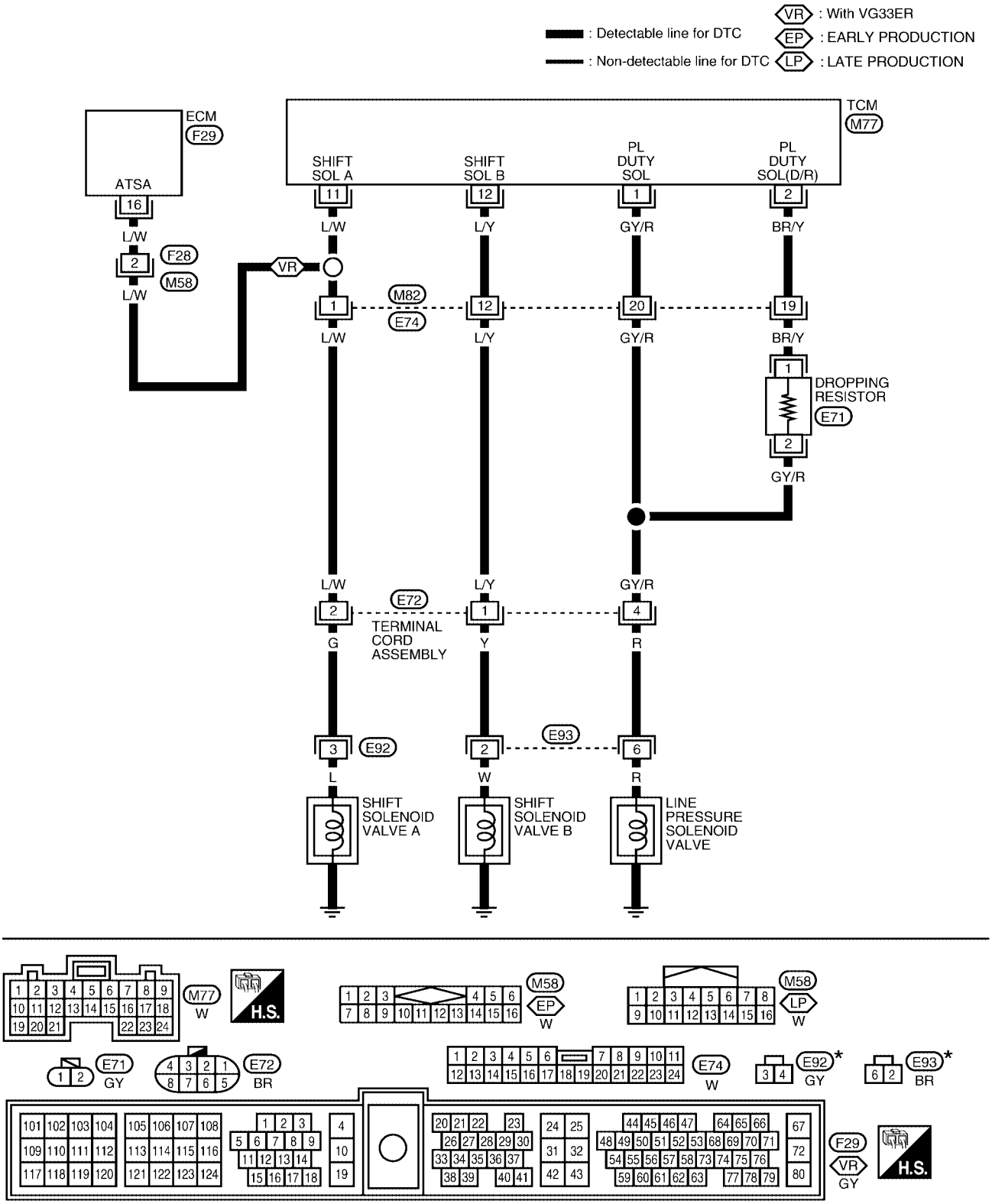
GST With GST

- Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 4TH

ECS005NE

AT-4THSIG-01



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

LCWA0072E

Diagnostic Procedure

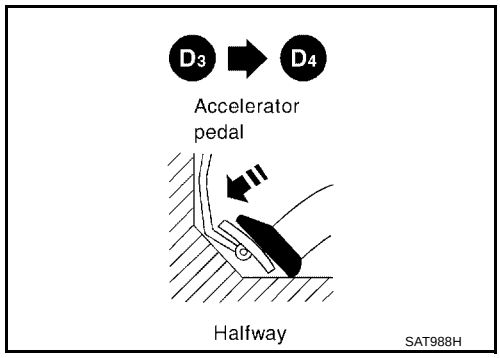
ECS005NF

1. CHECK SHIFT UP (D_3 TO D_4)

Perform AT-74, "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-64, "Line Pressure Test" .

OK or NG

OK >> GO TO 3
NG >> GO TO 7

3. CHECK SOLENOID VALVES

1. Remove control valve assembly. Refer to AT-253, "REMOVAL" .
2. Refer to AT-142, "SOLENOID VALVES" .

OK or NG

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

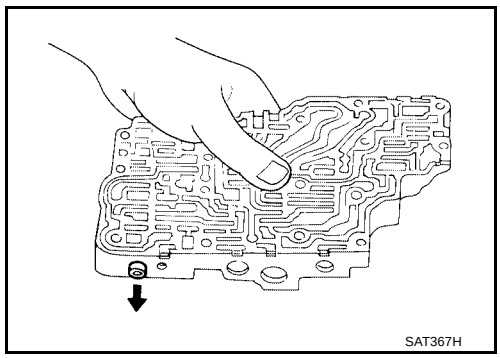
4. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-283, "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?

Yes or No

Yes >> GO TO 9
No >> Check control valve again. Repair or replace control valve assembly.

6. CHECK LINE PRESSURE SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-253, "REMOVAL" .
2. Refer to AT-142, "SOLENOID VALVES" .

OK or NG

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

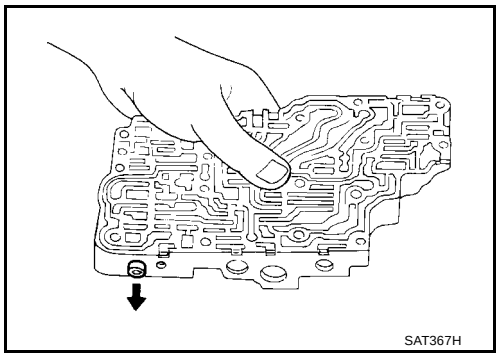
7. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-283, "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?

OK or NG

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

9. CHECK DTC

Perform AT-138, "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 flow chart.

Component Inspection

ECS005NG

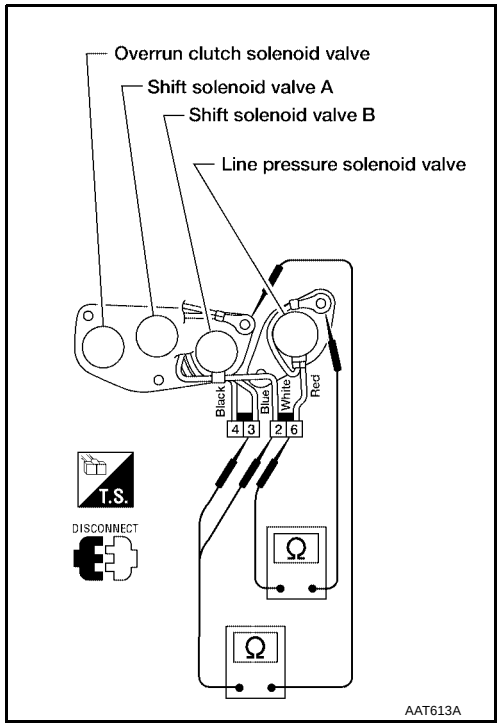
SOLENOID VALVES

- For removal, refer to AT-253, "REMOVAL" .

Resistance Check

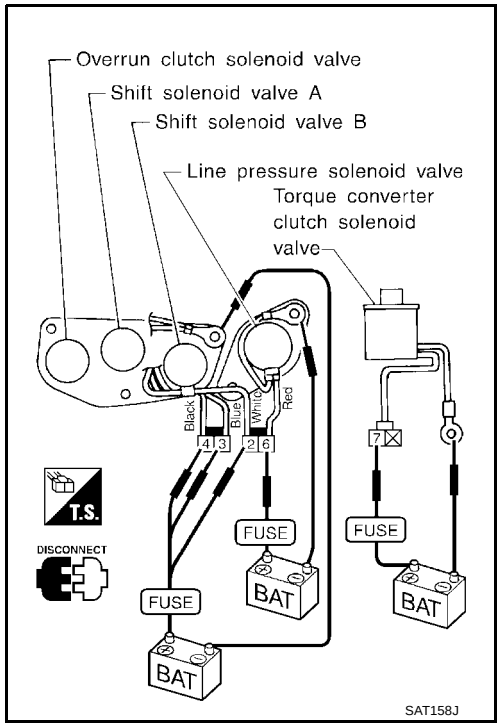
- Check resistance between terminals (3, 2 or 6) and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	3	Ground	20 - 40Ω
Shift solenoid valve B	2		
Line pressure solenoid valve	6		2.5 - 5Ω



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminals (3, 2, 4, 6 or 7) and ground.



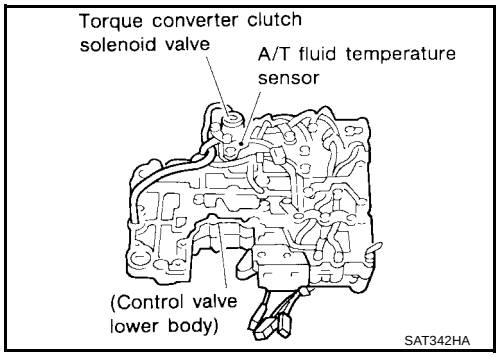
DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

PFP:31940

Description

ECS005NH

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 throttle position sensors. Lock-up piston operation will then be controlled.
Lock-up operation, however, is prohibited when A/T fluid temperature is too low.
When the accelerator pedal is depressed (less than 2/8) in lock-up condition, the engine speed should not change abruptly. If there is a big jump in engine speed, there is no lock-up.



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

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

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

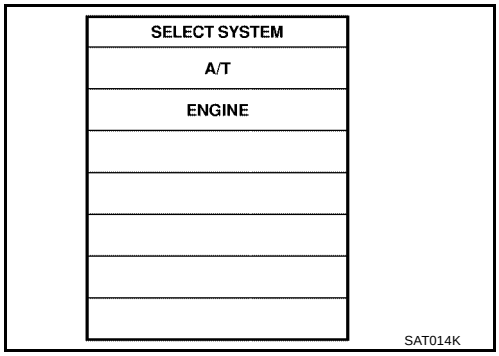
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: TCC SOLENOID/CIRC : P0740	TCM detects an improper voltage drop when it tires to operate the solenoid valve.	● Harness or connectors (The solenoid circuit is open or shorted.) ● T/C clutch solenoid valve

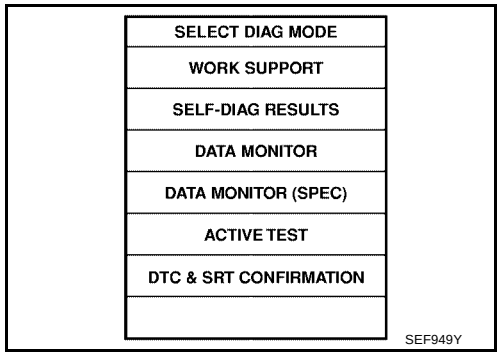
DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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.





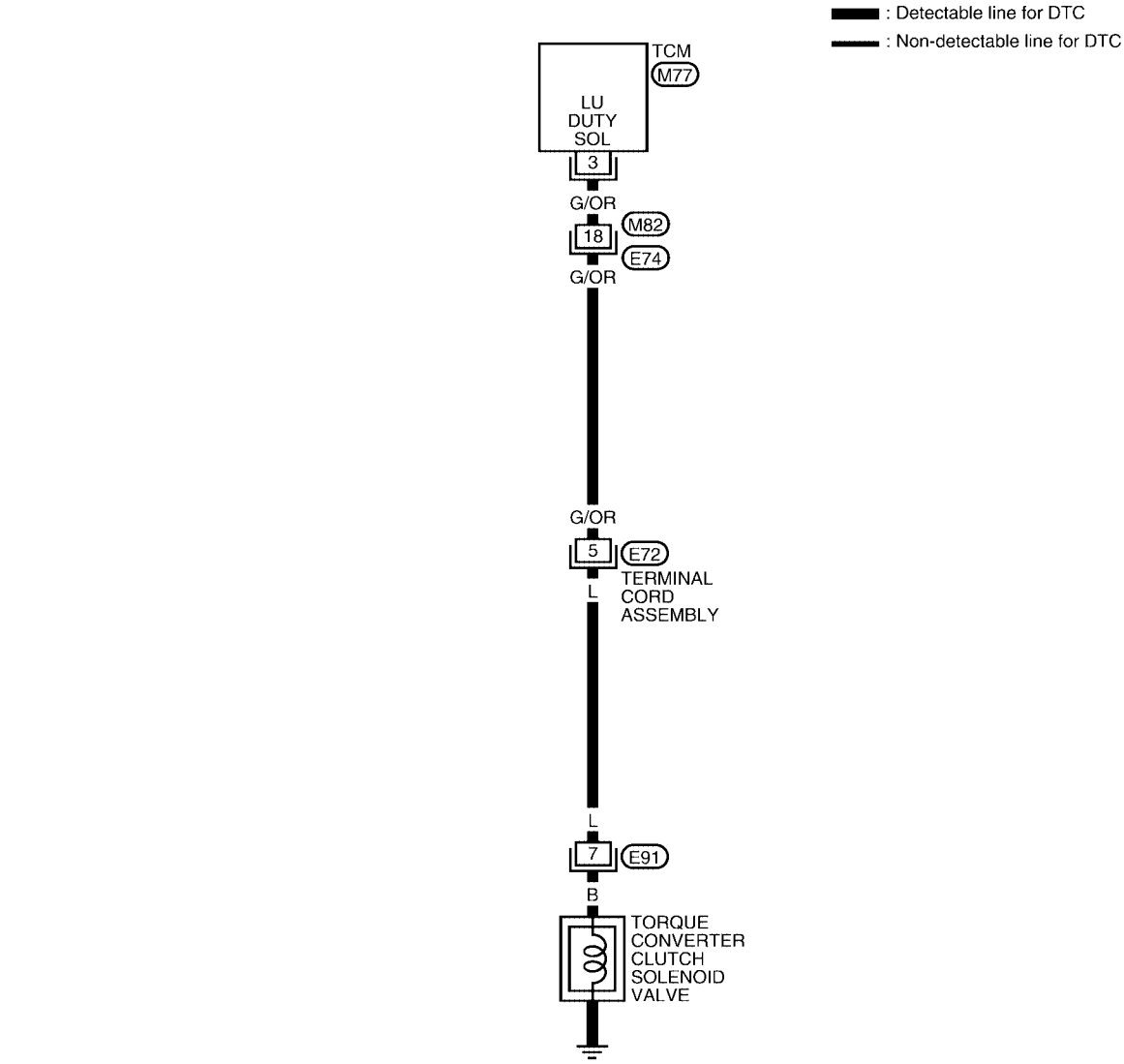
With GST

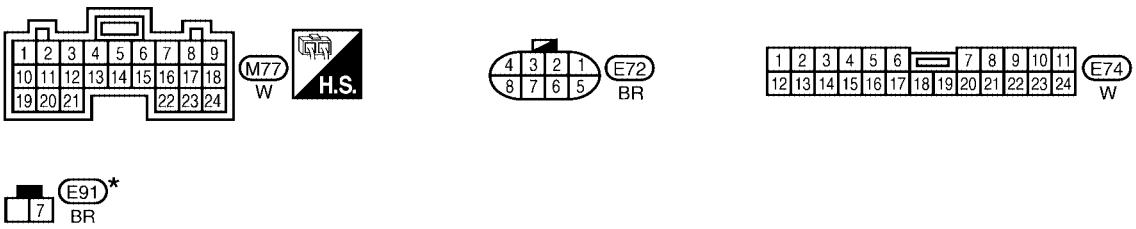
- Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — TCV

ECS005NI

AT-TCV-01





★: This connector is not shown in "HARNESS LAYOUT" of PG section.

LCWA0039E

Diagnostic Procedure

ECS005NJ

1. CHECK GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly connector E72 terminal 5 and ground. Refer to wiring diagram.

Is resistance approx. 10 - 20 Ω?

Yes >> GO TO 2
No >> 1. Remove oil pan. Refer to AT-253, "REMOVAL" .
2. Check the following items:
- Torque converter clutch solenoid valve
  Refer to AT-148, "TORQUE CONVERTER CLUTCH SOLENOID VALVE" .
- Harness of terminal cord assembly for short or open

2. CHECK RESISTANCE

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal cord assembly connector E72 terminal 5 and TCM harness connector M77 terminal 3. Refer to wiring diagram.

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

Is resistance approx. 0Ω?

Yes >> GO TO 3
No >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK DTC

Perform AT-144, "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

ECS005NK

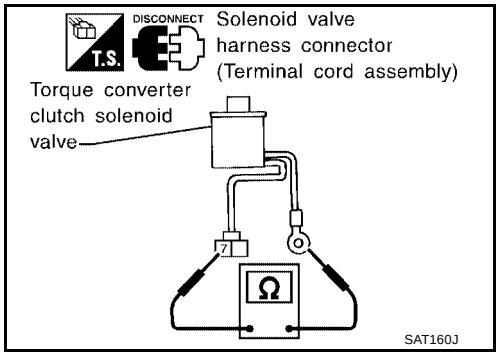
TORQUE CONVERTER CLUTCH SOLENOID VALVE

- For removal, refer to AT-253, "REMOVAL" .

Resistance Check

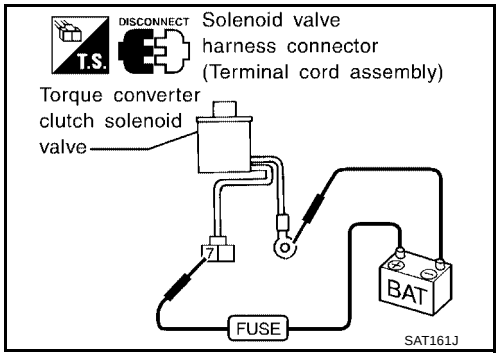
- Check resistance between terminal 7 and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Torque converter clutch solenoid valve	7	Ground	10 - 20Ω



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 7 and ground.



DTC P0744 IMPROPER LOCK-UP OPERATION

PFP:31940

Description

ECS005NL

- 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%

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	GY/R	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
				When depressing accelerator pedal fully after warming up engine.	0V
2	BR/Y	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V
3	G/OR	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock- up.	0V

ON BOARD DIAGNOSIS LOGIC

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 item (Possible cause)
: A/T TCC S/V FNCTN	A/T cannot perform lock-up even if electrical circuit is good.	● Line pressure solenoid valve ● Torque converter clutch solenoid valve ● Each clutch ● Hydraulic control circuit
: P0744		

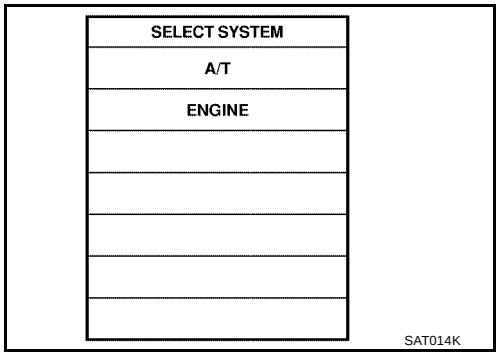
DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

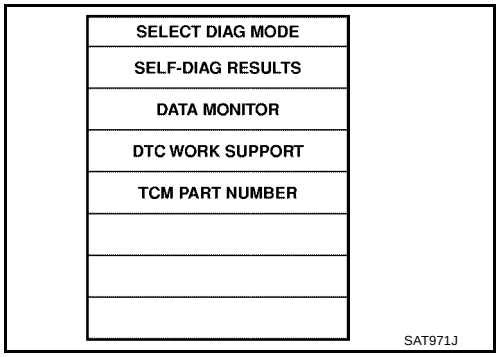
CAUTION:
Always drive vehicle at a safe speed.

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.

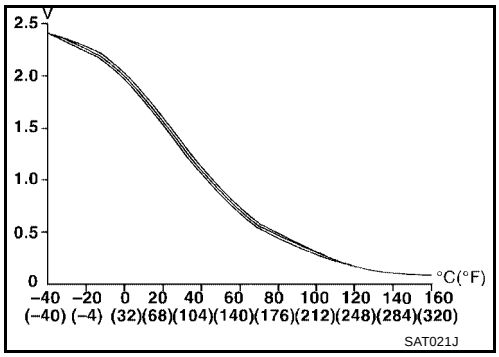
With CONSULT-II

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 70 km/h (43 MPH) and maintain the following condition continuously until "TESTING" has turned to "COMPLETED". (It will take approximately 30 seconds after "TESTING" shows.)
   THROTTLE POSI: 1/8 - 2/8 (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-346, "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-152, "Diagnostic Procedure" .
   Refer to AT-346, "Shift Schedule" .

With GST

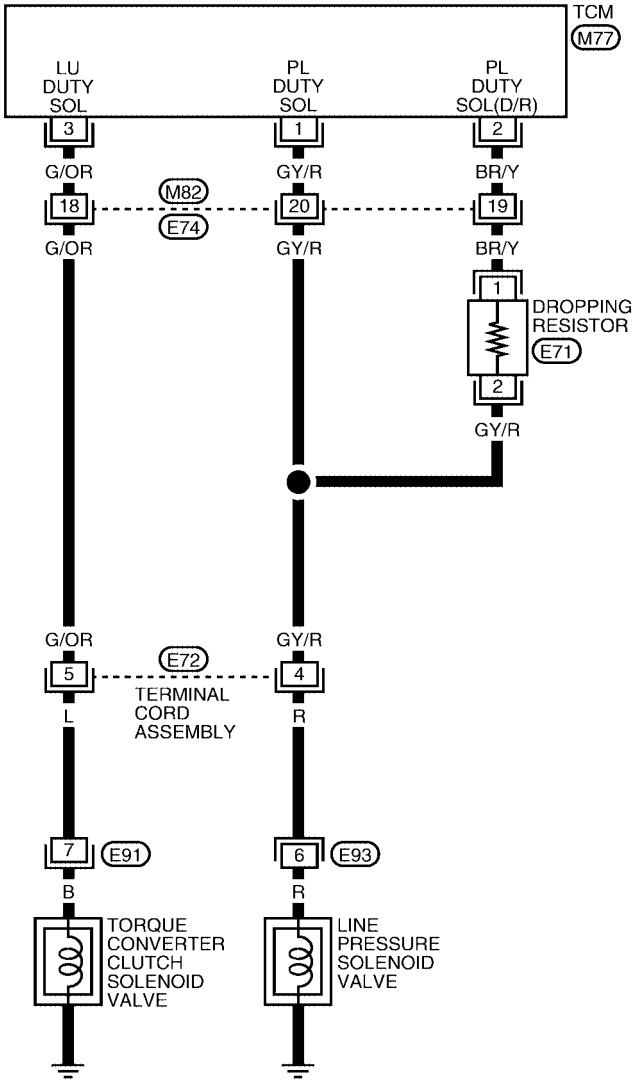
- Follow the procedure "With CONSULT-II".

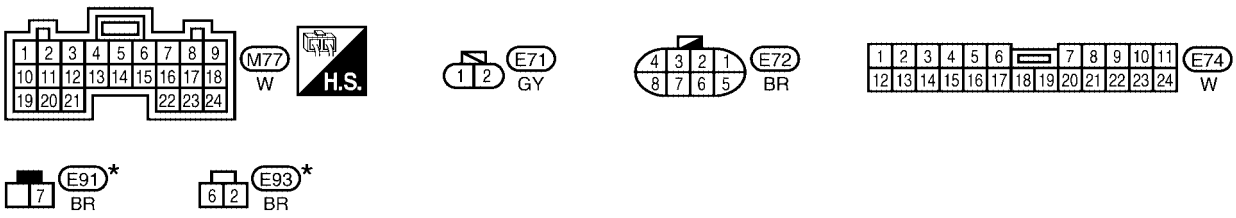
Wiring Diagram — AT — TCCSIG

ECS005NM

AT-TCCSIG-01

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





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

LCWA0040E

Diagnostic Procedure

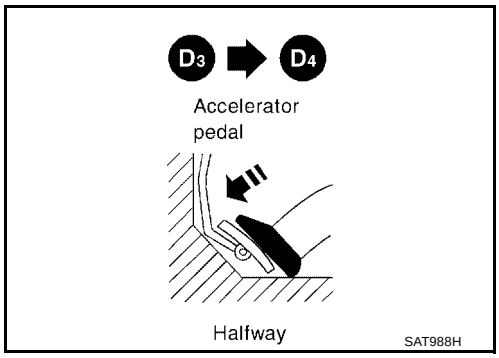
ECS005NN

1. CHECK SHIFT UP (D_3 TO D_4)

Perform AT-74, "Cruise Test — Part 1" .
Does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> Check for proper lock-up. GO TO 10
No >> GO TO 2



2. CHECK LINE PRESSURE

Perform line pressure test. Refer to AT-64, "Line Pressure Test" .

OK or NG

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

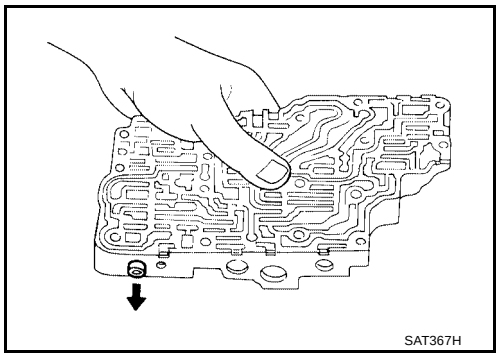
3. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-283, "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 Diagnostic Trouble Code (DTC) confirmation procedure. Refer to AT-150, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

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

6. CHECK LINE PRESSURE SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-253, "REMOVAL" .
2. Check line pressure solenoid valve operation. Refer to AT-154, "SOLENOID VALVES" .

OK or NG

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

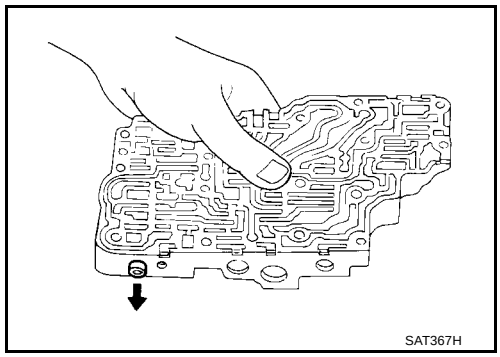
7. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-283, "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 control valve again. Repair or replace control valve assembly.

9. CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure. Refer to AT-150, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

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

10. CHECK LOCK-UP CONDITION

Perform AT-74, "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 flow chart.
No >> GO TO 11

11. CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-253, "REMOVAL" .
2. Check torque converter clutch solenoid valve operation.
   Refer to AT-154, "SOLENOID VALVES" .

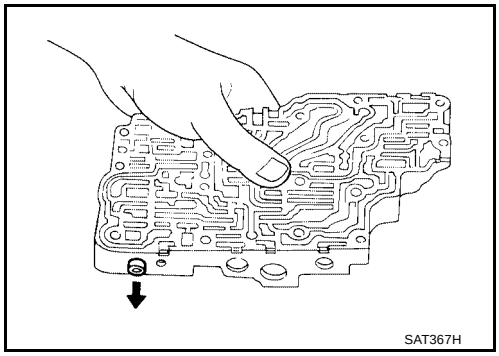
OK or NG

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

12. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-283, "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 control valve again. Repair or replace control valve assembly.

14. CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure. Refer to AT-150, "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 flow chart.

Component Inspection

ECS005NO

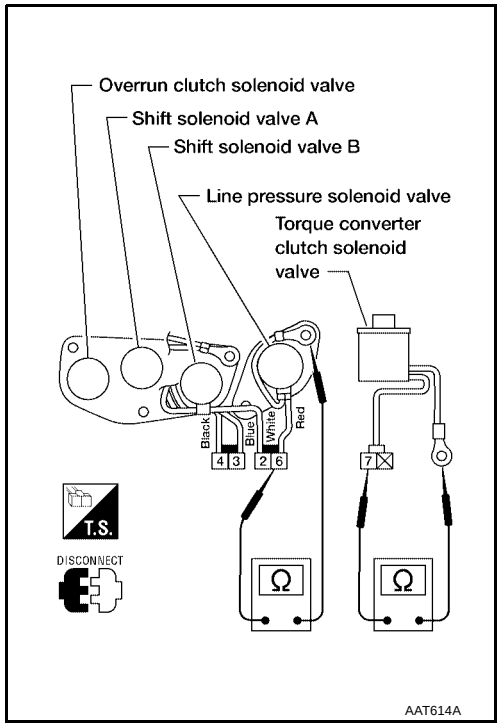
SOLENOID VALVES

- For removal, refer to AT-253, "REMOVAL" .

Resistance Check

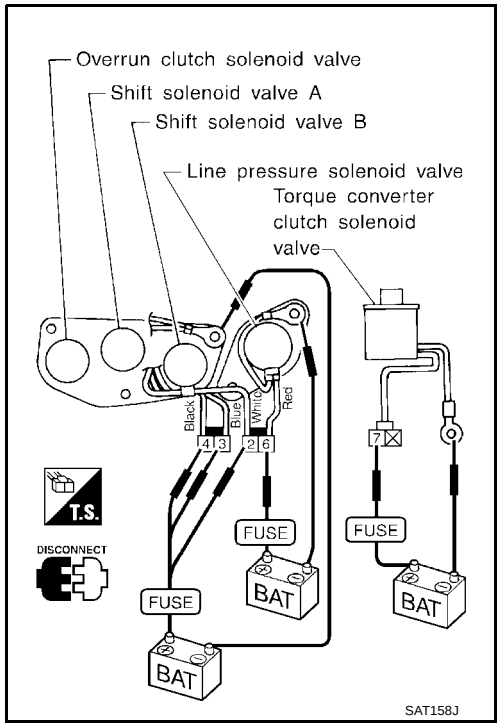
- Check resistance between terminals (6 or 7) and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	6	Ground	2.5 - 5Ω
Torque converter clutch solenoid valve	7		10 - 20Ω



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminals (2, 3, 4, 6 or 7) and ground.



DTC P0745 LINE PRESSURE SOLENOID VALVE

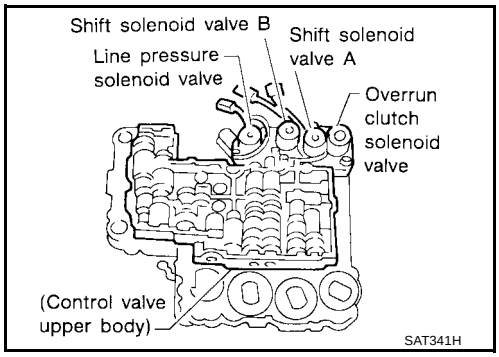
PFP:31940

Description

ECS005NP

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.

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	GY/R	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
				When depressing accelerator pedal fully after warming up engine.	0V
2	BR/Y	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: L/PRESS SOL/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	● Harness or connectors (The solenoid circuit is open or shorted.) ● Line pressure solenoid valve
: P0745		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

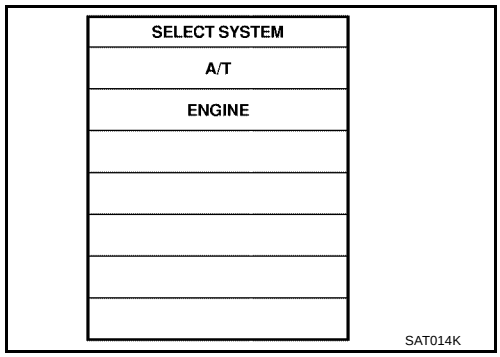
NOTE:

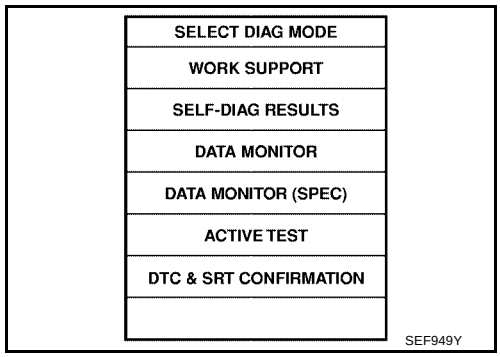
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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 1 second.

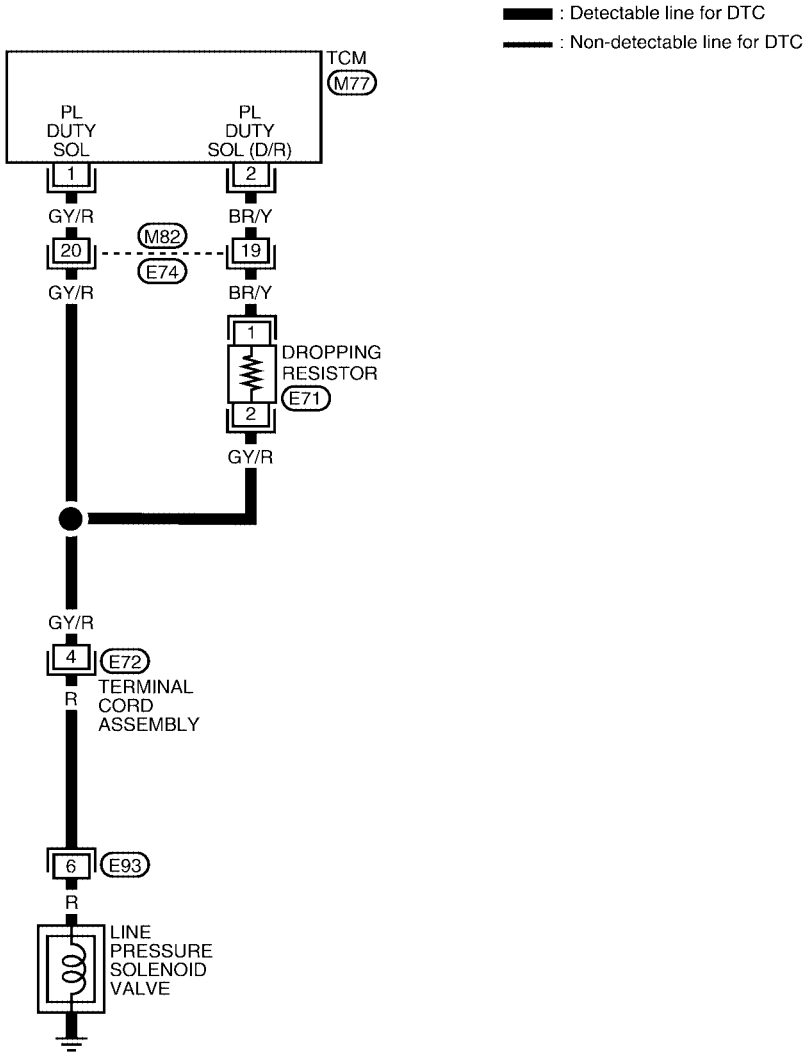
With GST

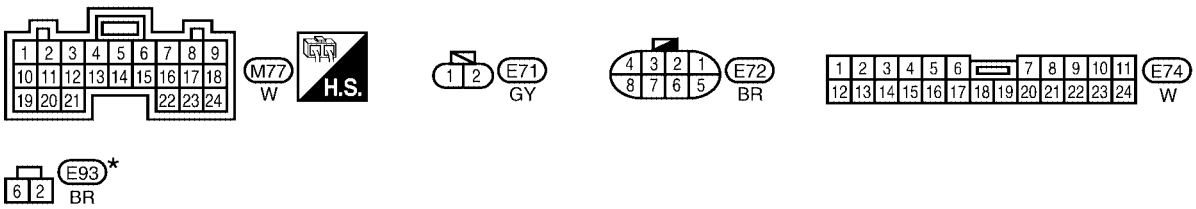
- Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — LPSV

ECS005NQ

AT-LPSV-01





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

LCWA0041E

Diagnostic Procedure

ECS005NR

1. CHECK GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly connector E72 terminal 4 and ground. Refer to AT-158, "Wiring Diagram — AT — LPSV" .

Is resistance approx. 2.5 - 5Ω?

Yes >> GO TO 2

No >> 1. Remove control valve assembly.
Refer to AT-253, "REMOVAL" .
2. Check the following items:
- Line pressure solenoid valve
Refer to AT-160, "LINE PRESSURE 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.
3. Check resistance between terminal cord assembly connector E72 terminal 4 and TCM harness connector M77 terminal 2. Refer to AT-158, "Wiring Diagram — AT — LPSV" .

Is resistance approx. 12Ω?

Yes >> GO TO 3

No >> Check the following items:
- Dropping resistor
Refer to AT-160, "DROPPING RESISTOR" .
- Harness for short or open between TCM connector M77 terminal 2 and terminal cord assembly.

3. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Check resistance between terminal cord assembly connector E72 terminal 4 and TCM connector M77 terminal 1. Refer to AT-158, "Wiring Diagram — AT — LPSV" .

Is resistance approx. 0Ω?

Yes >> GO TO 4

No >> Repair or replace harness between TCM connector and terminal cord assembly connector.

4. CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure. Refer to AT-156, "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

ECS005NS

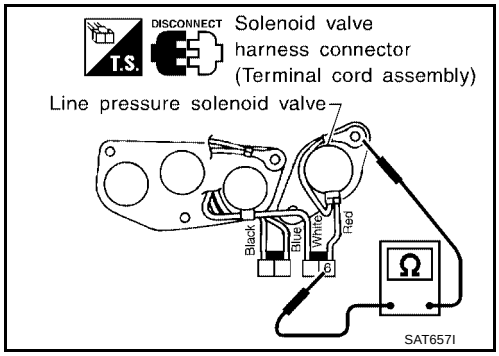
LINE PRESSURE SOLENOID VALVE

- For removal, refer to AT-253, "REMOVAL" .

Resistance Check

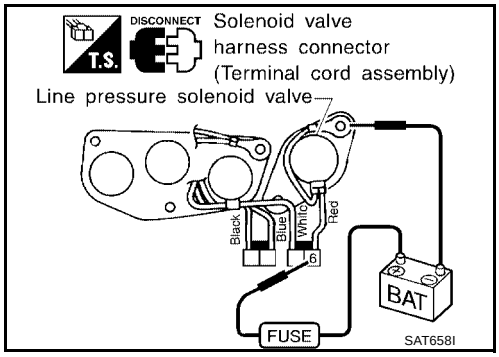
- Check resistance between terminal 6 and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	6	Ground	2.5 - 5Ω



Operation Check

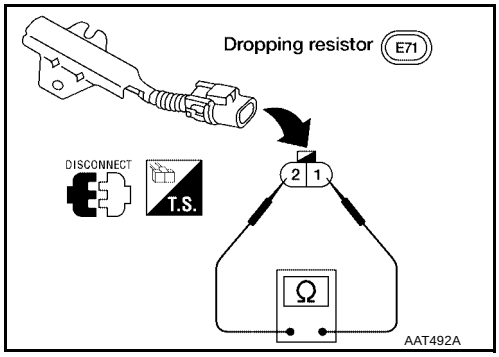
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 6 and ground.



DROPPING RESISTOR

- Check resistance between terminals 1 and 2.

Resistance12Ω : Approx.



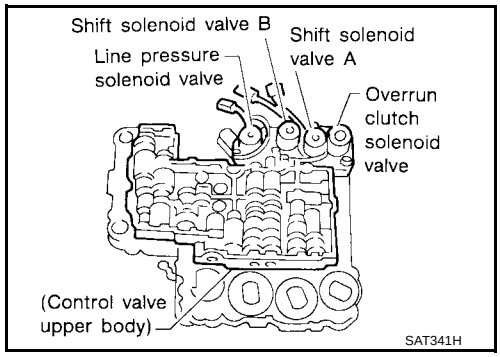
DTC P0750 SHIFT SOLENOID VALVE A

PFP:31940

Description

ECS005NT

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



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

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: SFT SOL A/CIRC : P0750	TCM detects an improper voltage drop when it tires 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.

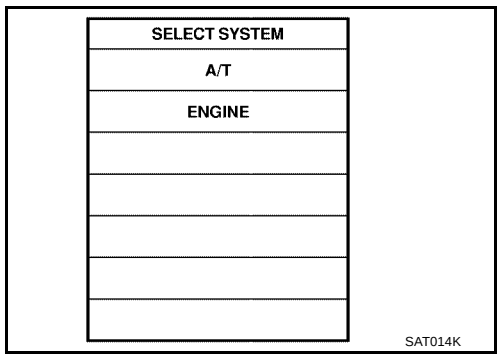
NOTE:

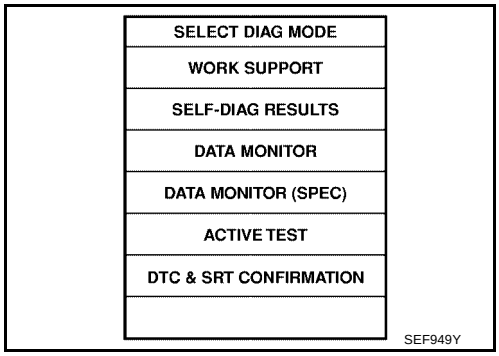
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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.





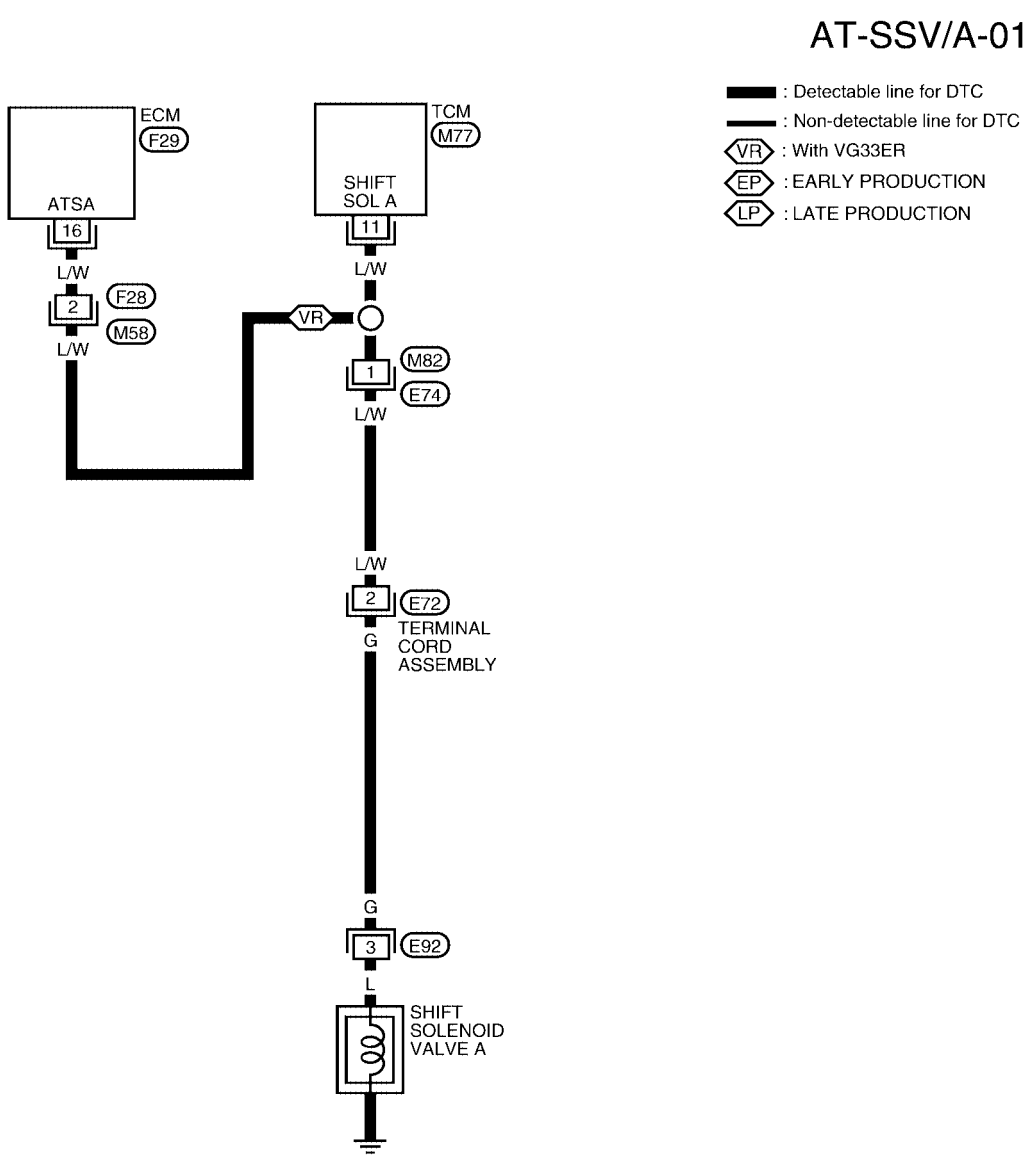
2. Start engine.
3. Drive vehicle in D position and allow the transmission to shift 1 → 2 (“GEAR”).

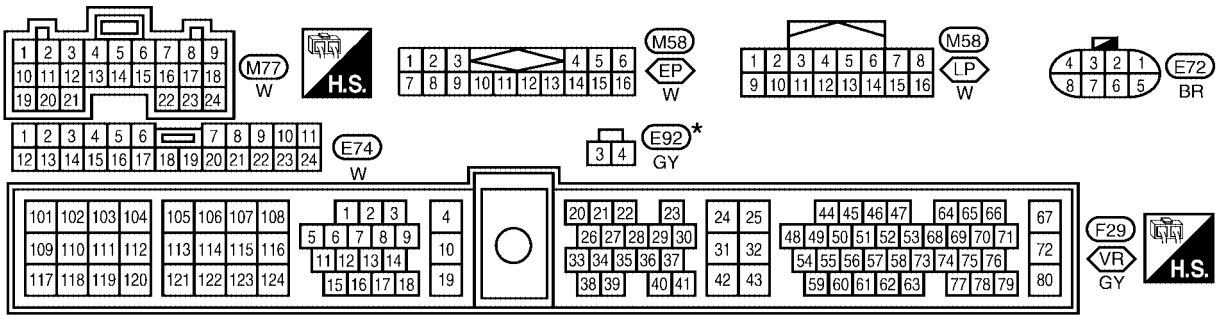
GST With GST

- Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — SSV/A

ECS005NU





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

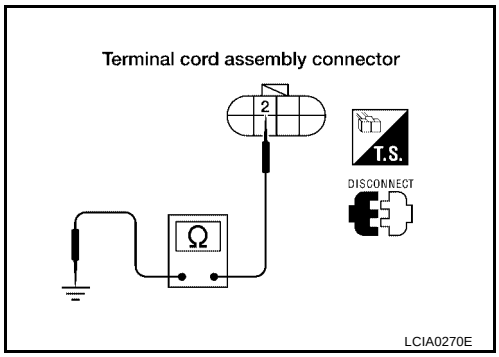
LCWA0073E

Diagnostic Procedure

ECS005NV

1. CHECK GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly connector E72 terminal 2 and ground.



Is resistance approx. 20 - 40Ω?

Yes >> GO TO 2
No >> 1. Remove control valve assembly.
Refer to AT-253, "REMOVAL" .
2. Check the following items:
- Shift solenoid valve A
Refer to AT-165, "SHIFT SOLENOID VALVE A" .
- 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 cord assembly connector terminal 2 and TCM harness connector M77 terminal 11. Refer to wiring diagram.

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

Is resistance approx. 0Ω?

Yes >> GO TO 3
No >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure. Refer to AT-161, "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

ECS005NW

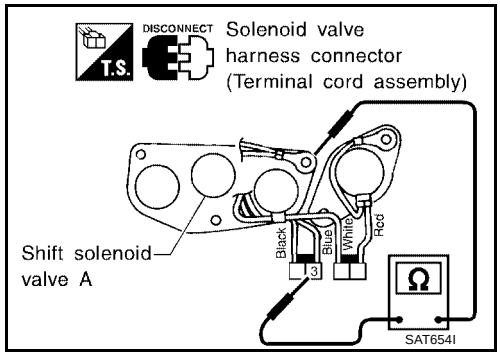
SHIFT SOLENOID VALVE A

- For removal, refer to AT-253, "REMOVAL" .

Resistance Check

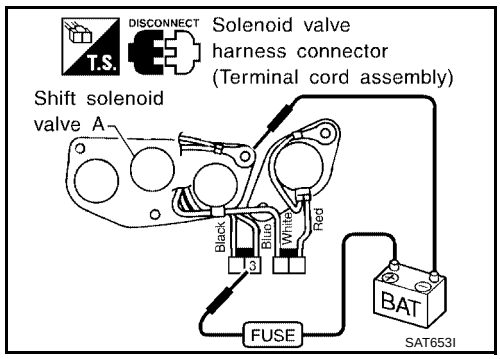
- Check resistance between terminal 3 and ground.

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



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 3 and ground.



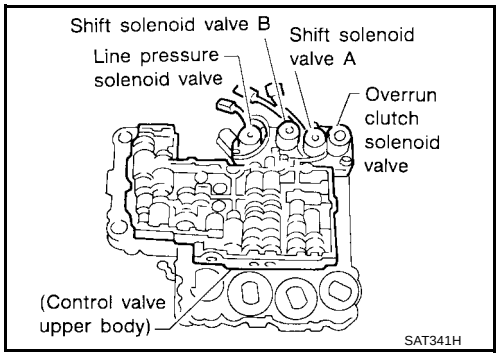
DTC P0755 SHIFT SOLENOID VALVE B

PFP:31940

Description

ECS005NX

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



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

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: SFT SOL B/CIRC : P0755	TCM detects an improper voltage drop when it tires 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.

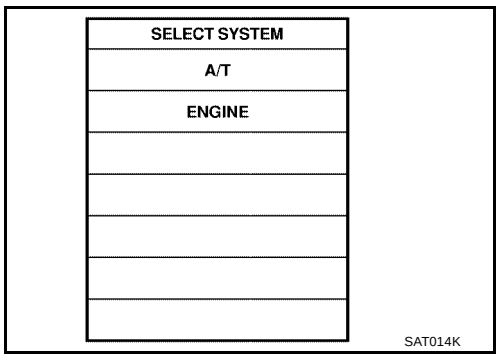
NOTE:

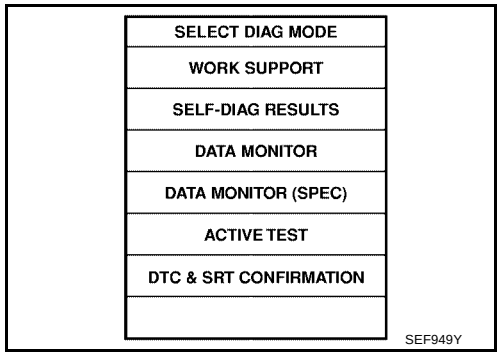
If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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. Drive vehicle in D position and allow the transmission to shift 1 → 2 → 3 (“GEAR”).

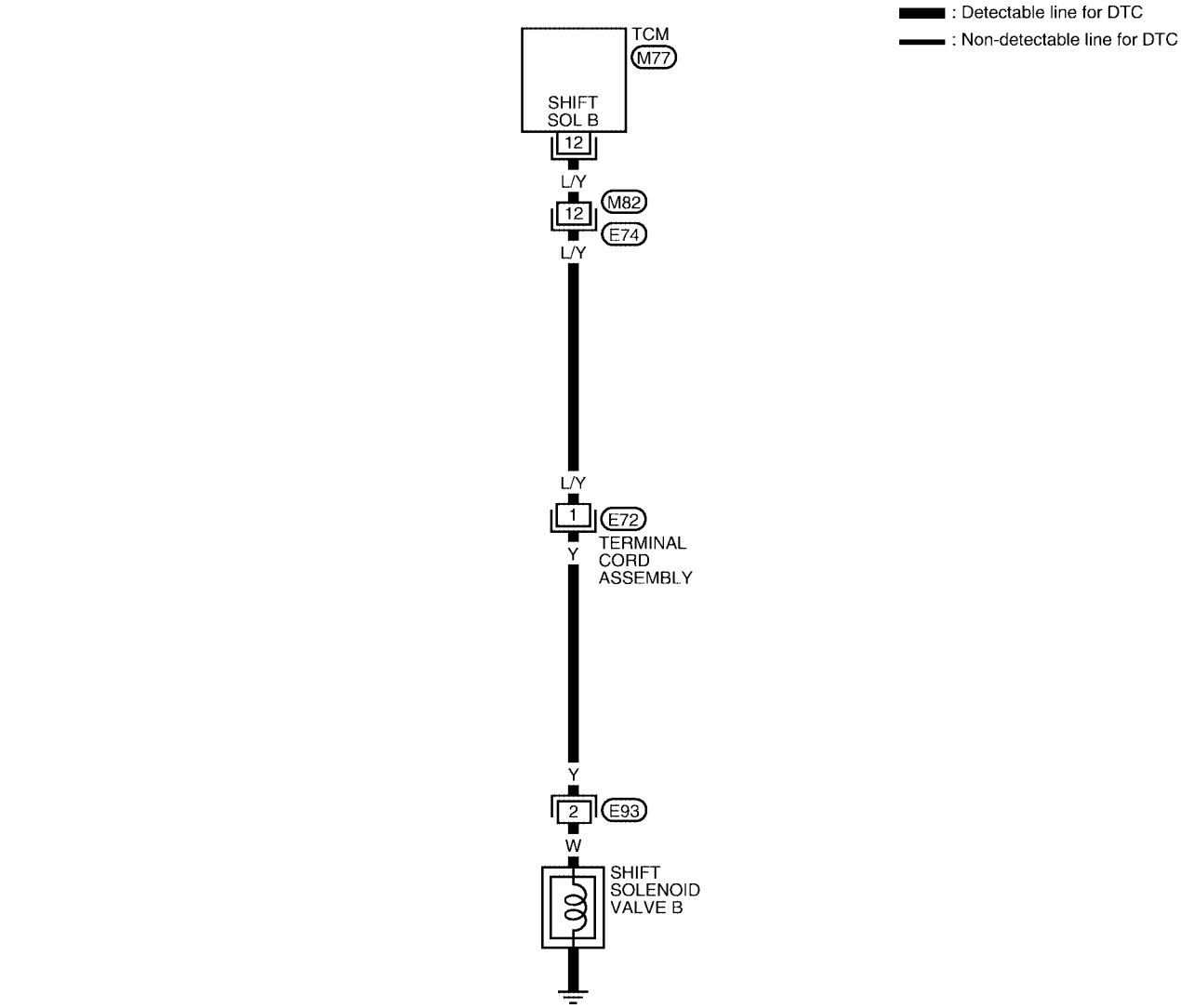
With GST

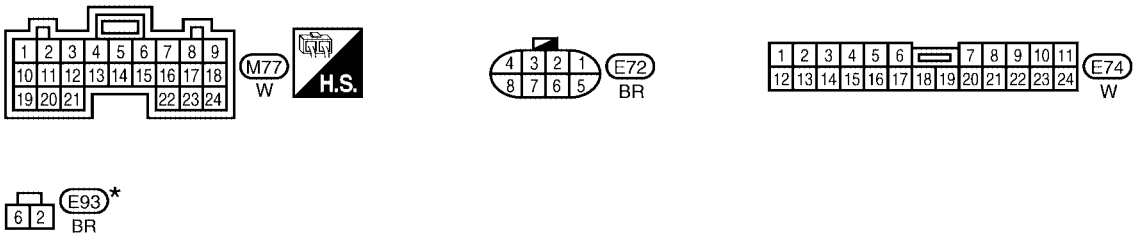
- Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — SSV/B

ECS005NY

AT-SSV/B-01





★: This connector is not shown in "HARNESS LAYOUT" of PG section.

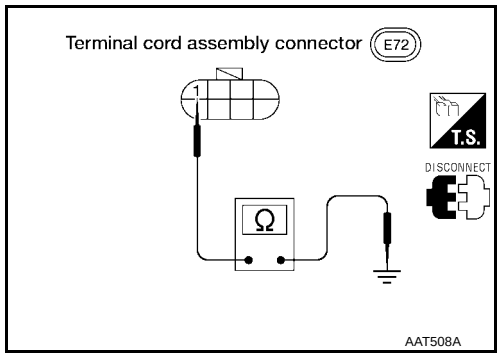
LCWA0043E

Diagnostic Procedure

ECS005NZ

1. CHECK GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly connector E72 terminal 1 and ground.



Is resistance approx. 20 - 40Ω?

Yes >> GO TO 2

No >> 1. Remove control valve assembly.
Refer to AT-253, "REMOVAL" .
2. Check the following items:
- Shift solenoid valve B
Refer to AT-170, "SHIFT SOLENOID VALVE B" .
- 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 cord assembly connector E72 terminal 1 and TCM harness connector M77 terminal 12. Refer to wiring diagram.

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

Is resistance approx. 0Ω?

Yes >> GO TO 3

No >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure. Refer to AT-166, "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

ECS005O0

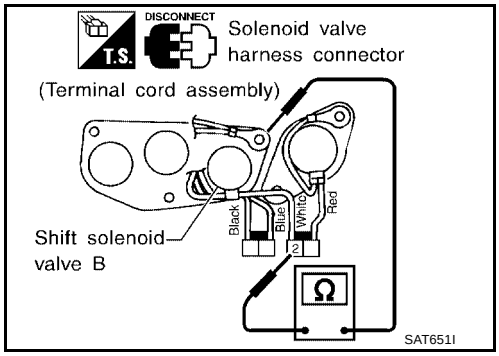
SHIFT SOLENOID VALVE B

- For removal, refer to AT-253, "REMOVAL" .

Resistance Check

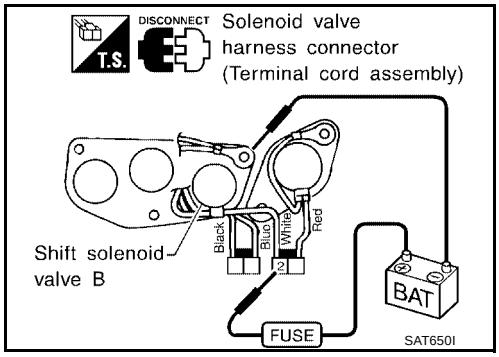
- Check resistance between terminal 2 and ground.

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



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 2 and ground.



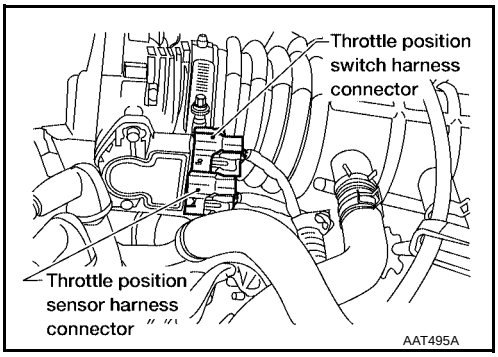
DTC P1705 THROTTLE POSITION SENSOR

PFP:22620

Description

ECS005O1

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



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

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

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
16	BR/W	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine.	Battery voltage
				When depressing accelerator pedal after warming up engine.	0V
17	OR/B	Wide open throttle position switch (in throttle position switch)		When depressing accelerator pedal more than half-way after warming up engine.	Battery voltage
				When releasing accelerator pedal after warming up engine.	0V
32	B/W	Throttle position sensor (Power source)	 or 	Ignition switch ON.	4.5 - 5.5V
				Ignition switch OFF.	0V
41	OR/L	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.5V Fully-open throttle: 4V
42	BR	Throttle position sensor (Ground)		—	0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: TP SEN/CIRC A/T	TCM receives an excessively low or high voltage from the sensor.	● Harness or connectors (The solenoid circuit is open or shorted.) ● Throttle position sensor ● Throttle position switch
: P1705		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

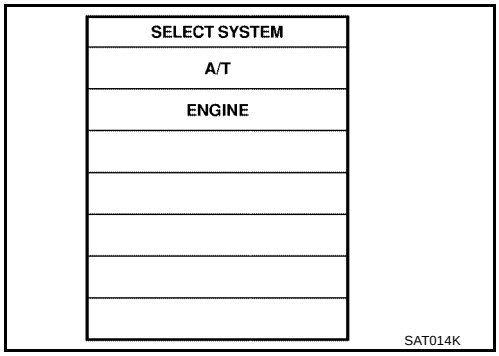
NOTE:

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

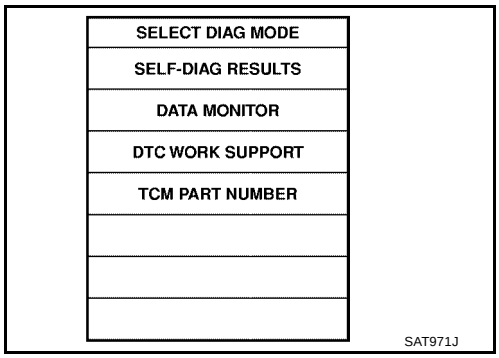
1. Turn ignition switch ON and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2. Apply vacuum to the throttle opener, then check the following. Refer to step 1 and step 2 of "Preparation", AT-47, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .



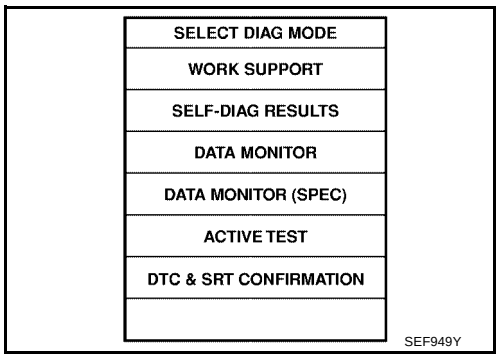
Accelerator pedal condition	THRTL POS SEN	CLOSED THL/SW	W/O THRL/P·SW
Fully released	Less than 4.7V	ON	OFF
Partially depressed	0.1 - 4.6V	OFF	OFF
Fully depressed	More than 1.9 - 4.6V	OFF	ON

If the check result is NG, go to AT-174, "Diagnostic Procedure" .
If the check result is OK, go to following step.

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



4. Start engine and maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: Approximately 3V or less
   Selector lever: D position (O/D ON)
   If the check result is NG, go to AT-174, "Diagnostic Procedure" .
   If the check result is OK, go to following step.
5. Maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   Accelerator pedal: Wide open throttle
   Selector lever: D position (O/D ON)

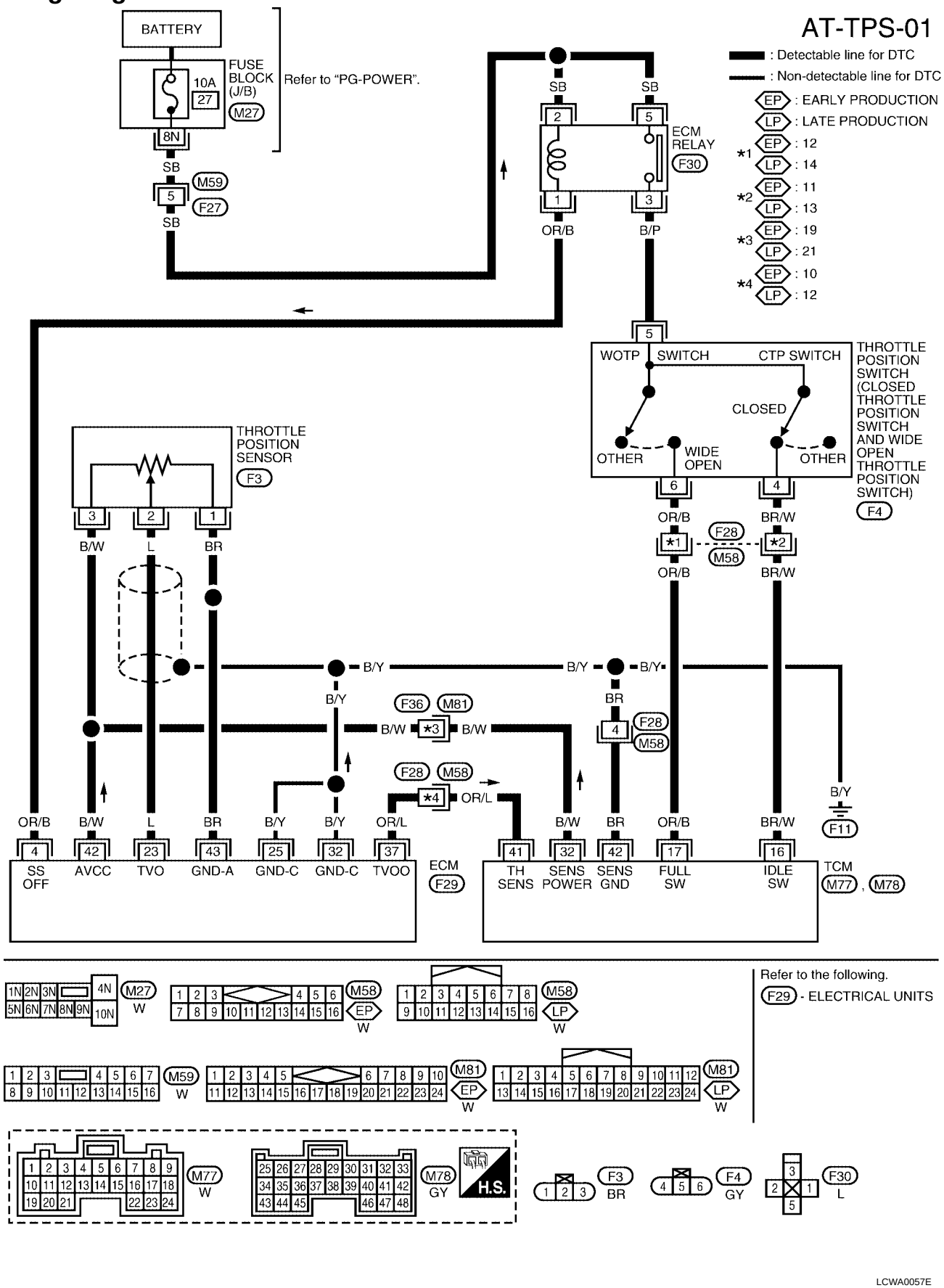


With GST

- Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — TPS

ECS005O2



LCWA0057E

Diagnostic Procedure

ECS005O3

1. CHECK DTC WITH ECM

Check P code CONSULT-II “ENGINE”.
Turn ignition switch “ON” and select “SELF-DIAG RESULTS” mode for “ENGINE” with CONSULT-II.
Refer to EC-668, "CONSULT-II INSPECTION PROCEDURE" (VG33E) or EC-1268, "CONSULT-II INSPECTION PROCEDURE" (VG33ER).

OK or NG

OK >> GO TO 2
NG >> Check throttle position sensor circuit for engine control. Refer to EC-739, "Diagnostic Procedure" (VG33E) or EC-1344, "Diagnostic Procedure" (VG33ER).

2. CHECK INPUT SIGNAL

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”.

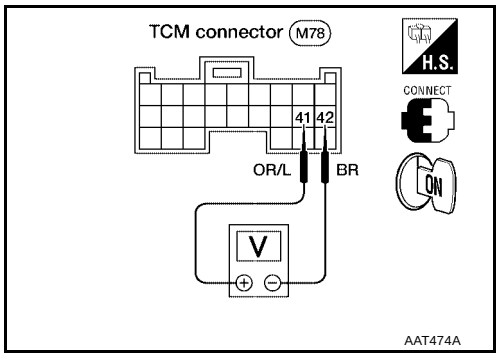
DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

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

Without CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM connector M78 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

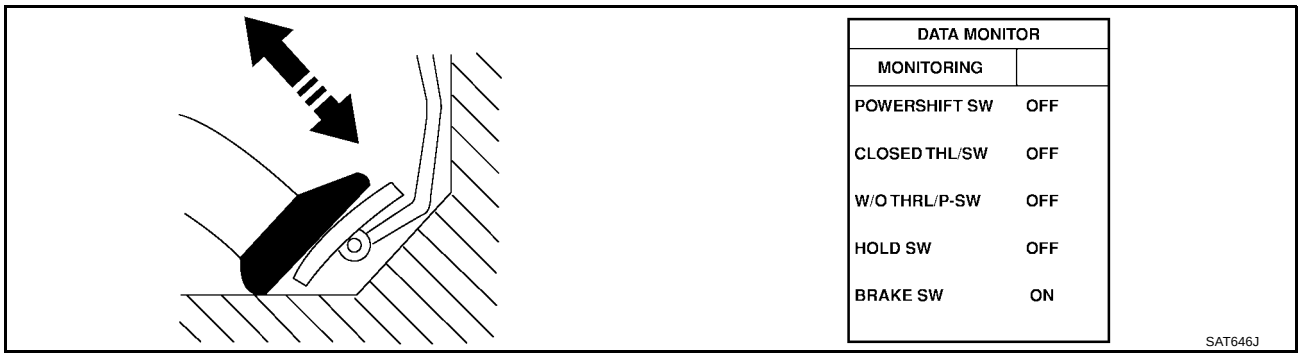
OK (With CONSULT-II)>>GO TO 3
OK (Without CONSULT-II)>>GO TO 4
NG >> Check harness for short or open between ECM and TCM regarding throttle position sensor circuit. (Main harness)

3. CHECK THROTTLE POSITION 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 “CLOSED THL/SW” and “W/O THRL/P-SW” depressing and releasing accelerator pedal.
   Check the signal of throttle position switch is indicated properly.

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



OK or NG

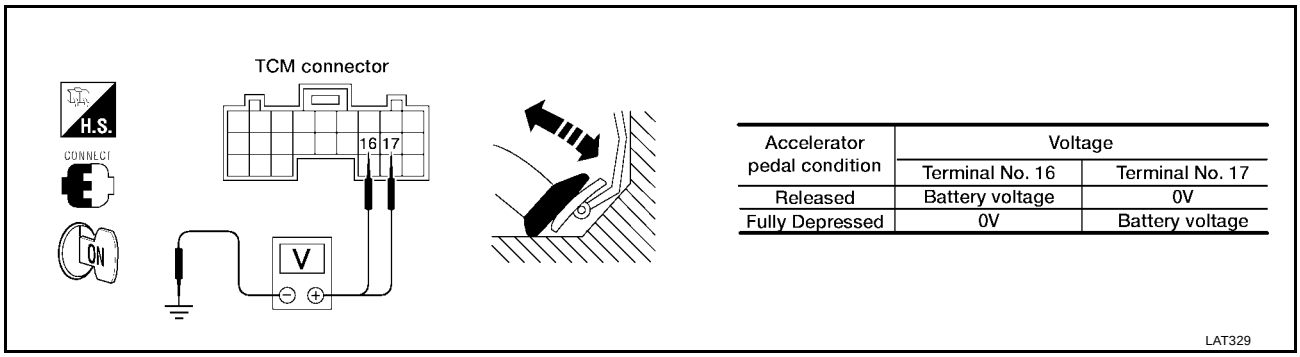
OK >> GO TO 5
NG >> Check the following items:

- Throttle position switch
  Refer to AT-177, "THROTTLE POSITION SWITCH" .
- Harness for short or open between ignition switch and throttle position switch (Main harness)
- Harness for short or open between throttle position switch and TCM (Main harness)

4. CHECK THROTTLE POSITION SWITCH CIRCUIT (WITHOUT CONSULT-II)

Without CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM connector M77 terminals [16 (BR/W), 17 (OR/B)] and ground while depressing, and releasing accelerator pedal slowly. (after warming up engine)



Accelerator pedal condition	Voltage	
	Terminal No. 16	Terminal No. 17
Released	Battery voltage	0V
Fully Depressed	0V	Battery voltage

OK or NG

OK >> GO TO 5
NG >> Check the following items:

- Throttle position switch
  Refer to AT-177, "THROTTLE POSITION SWITCH" .
- Harness for short or open between ignition switch and throttle position switch (Main harness)
- Harness for short or open between throttle position switch and TCM (Main harness)

5. CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure. Refer to AT-172, "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

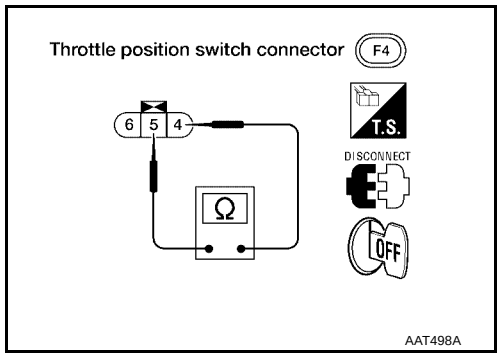
ECS005O4

THROTTLE POSITION SWITCH

Closed Throttle Position Switch (Idle position)

- Check continuity between terminals 4 and 5.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

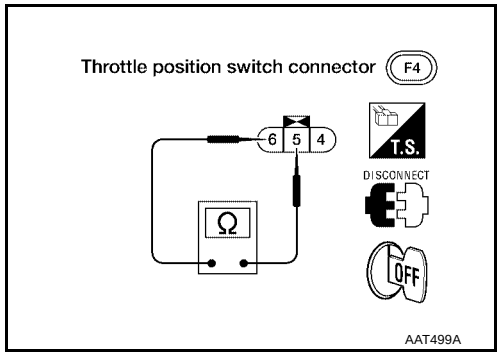


- To adjust closed throttle position switch, refer to EC-637, "Basic Inspection" (VG33E) or EC-1237, "Basic Inspection" (VG33ER).

Wide Open Throttle Position Switch

- Check continuity between terminals 5 and 6.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes



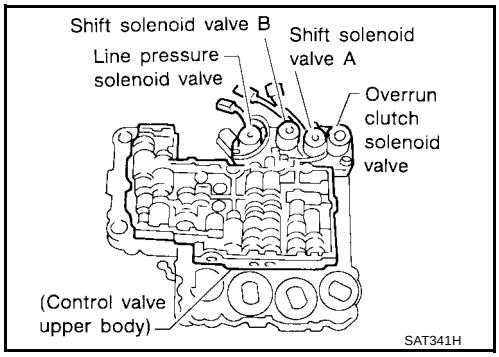
DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

PFP:31940

Description

ECS005O5

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



TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: O/R CLTCH SOL/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	● Harness or connectors (The solenoid circuit is open or shorted.) ● Overrun clutch solenoid valve
: P1760		

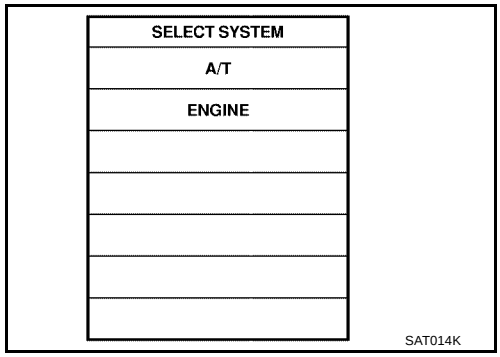
DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

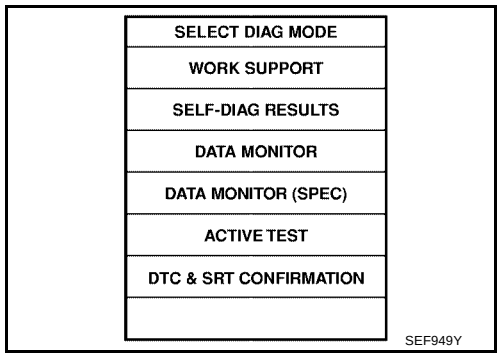
CAUTION:
Always drive vehicle at a safe speed.

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 (6MPH) in D position (O/D ON).
4. Release accelerator pedal completely in D position (O/D OFF).

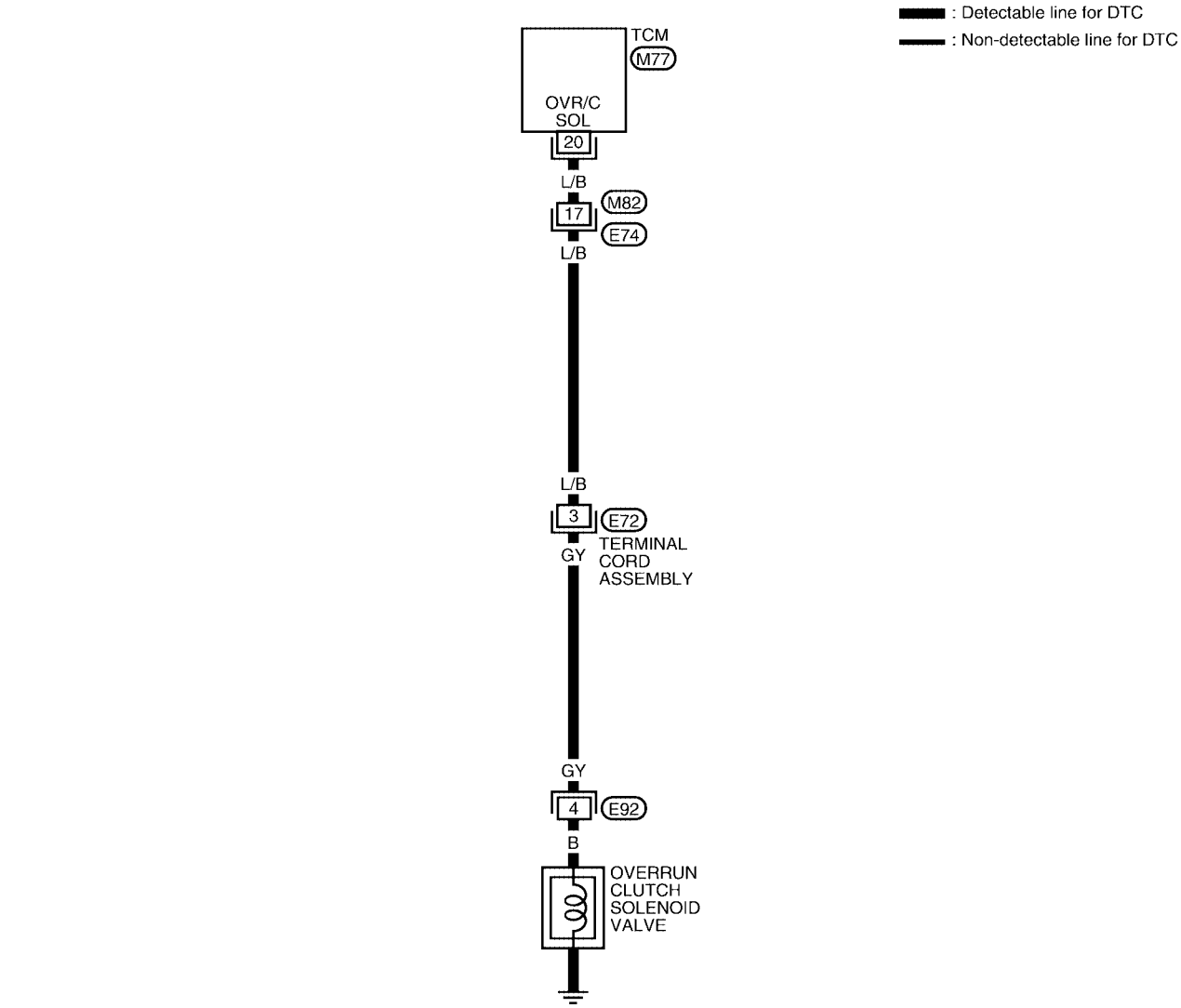
With GST

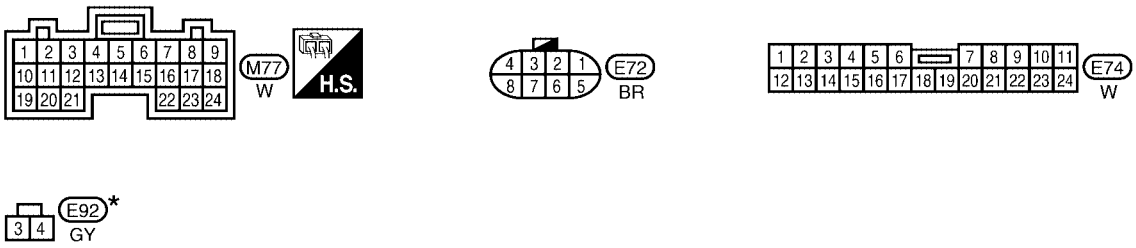
- Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — OVRCSV

ECS005O6

AT-OVRCSV-01





★: This connector is not shown in "HARNESS LAYOUT" of PG section.

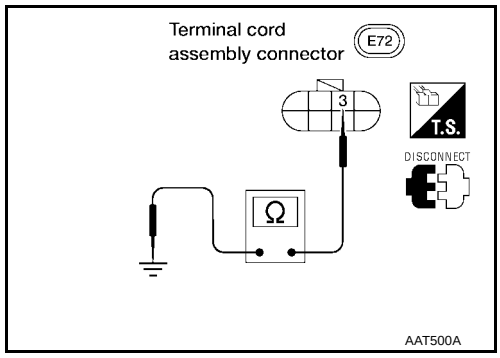
LCWA0045E

Diagnostic Procedure

ECS005O7

1. CHECK GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly connector E72 terminal 3 and ground.



Is resistance approx. 20 - 40Ω?

Yes >> GO TO 2

No >> 1. Remove control valve assembly.
Refer to AT-253, "REMOVAL" .
2. Check the following items:
- Overrun clutch solenoid valve
Refer to AT-182, "OVERRUN 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.
3. Check resistance between terminal cord assembly connector E72 terminal 3 and TCM harness connector M77 terminal 20. Refer to AT-180, "Wiring Diagram — AT — OVRCSV" .

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

Is resistance approx 0Ω?

Yes >> GO TO 3

No >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure. Refer to 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

ECS005O8

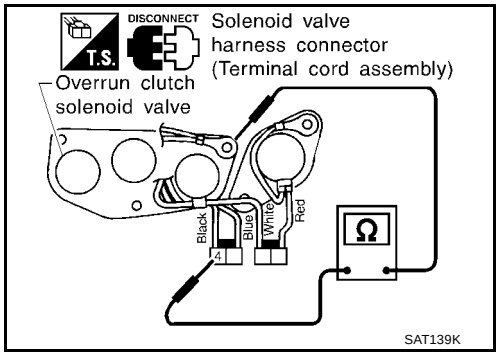
OVERRUN CLUTCH SOLENOID VALVE

- For removal, refer to AT-253, "REMOVAL" .

Resistance Check

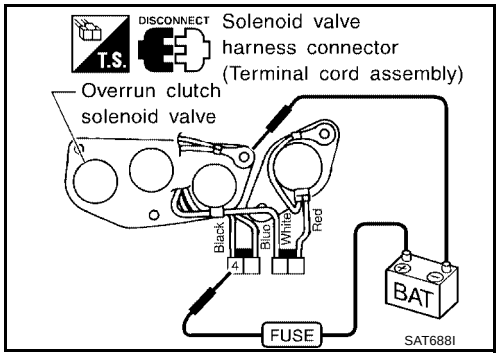
- Check resistance between terminal 4 and ground.

Solenoid valve	Terminal No.		Resistance (Approx.)
Overrun clutch solenoid valve	4	Ground	20 - 40Ω



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 4 and ground.



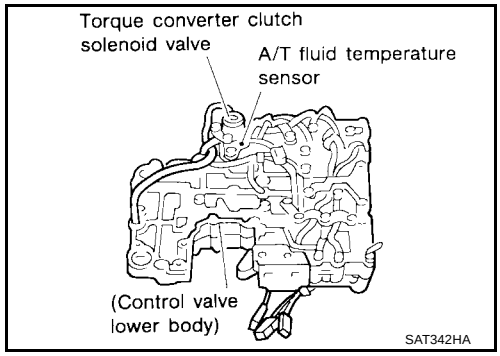
DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)

PFP:31940

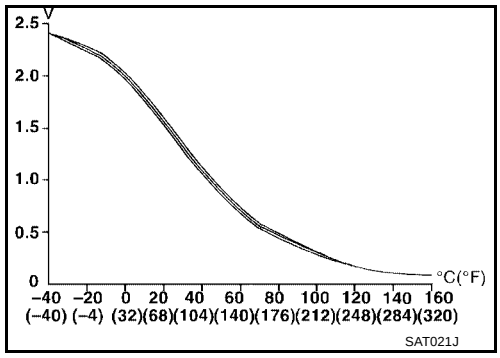
Description

ECS005O9

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

TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
10	W/R	Power source		When turning ignition switch to ON.	Battery voltage
				When turning ignition switch to OFF.	0V
19	W/R	Power source (same as No. 10)		Same as No. 10	
28	R/Y	Power source (Memory back-up)	 or 	When turning ignition switch to OFF.	Battery voltage
				When turning ignition switch to ON.	Battery voltage
42	BR	Throttle position sensor (Ground)		—	0V
47	R/B	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

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

ON BOARD DIAGNOSIS LOGIC

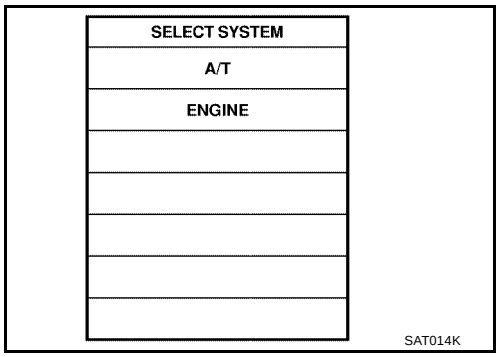
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: BATT/FLUID TEMP SEN : 8th judgement flicker	TCM receives an excessively low or high voltage from the sensor.	● Harness or connectors (The sensor circuit is open or shorted.) ● A/T fluid temperature sensor

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

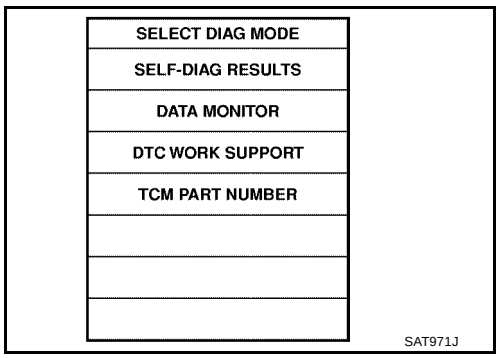
After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

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

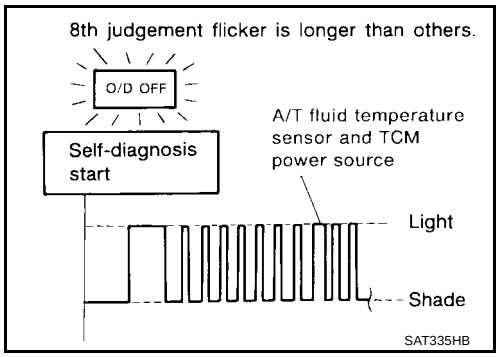


3. Drive vehicle under the following conditions:
   Selector lever in D position, vehicle speed higher than 20 km/h (12 MPH).



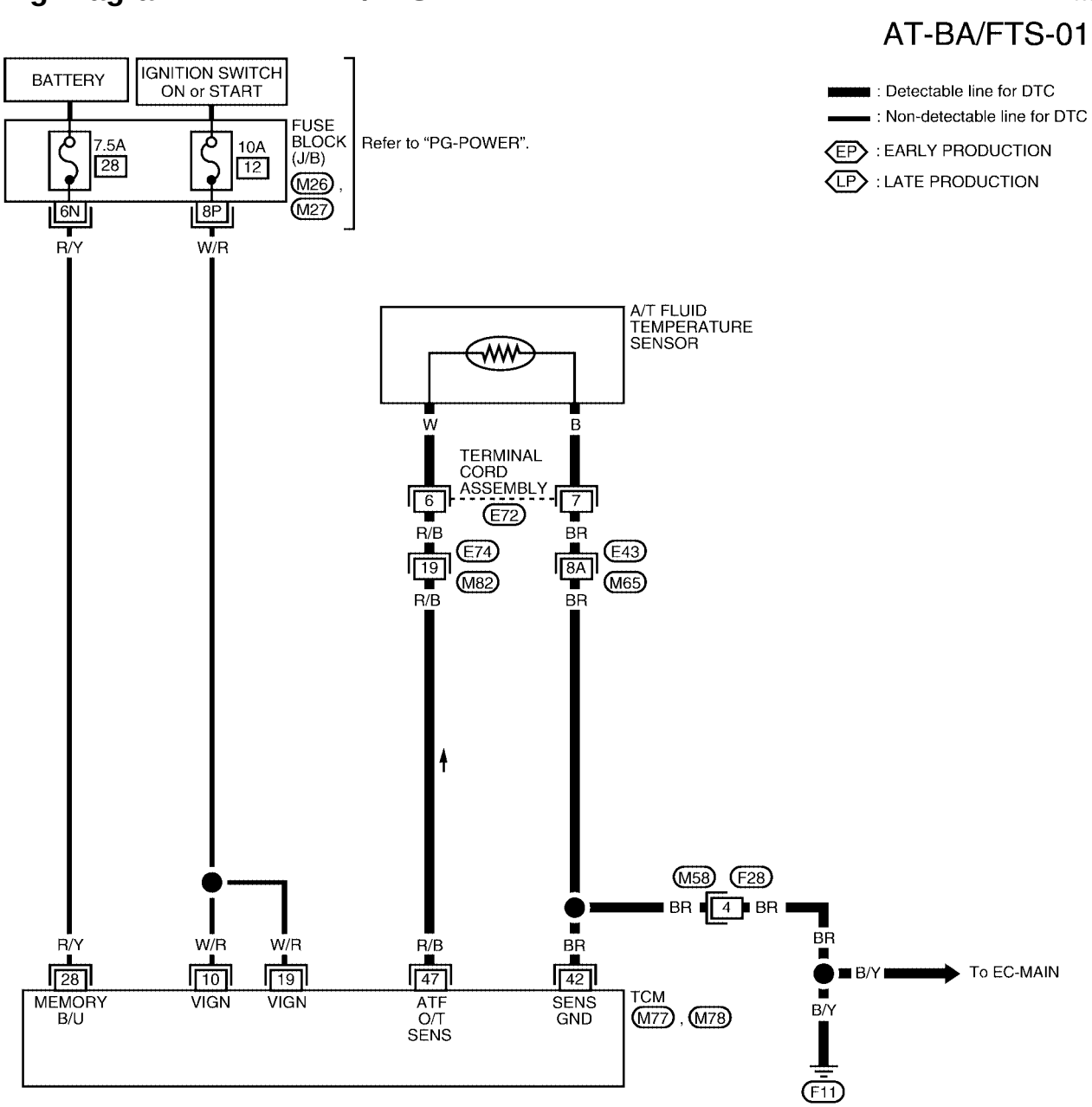
Without CONSULT-II

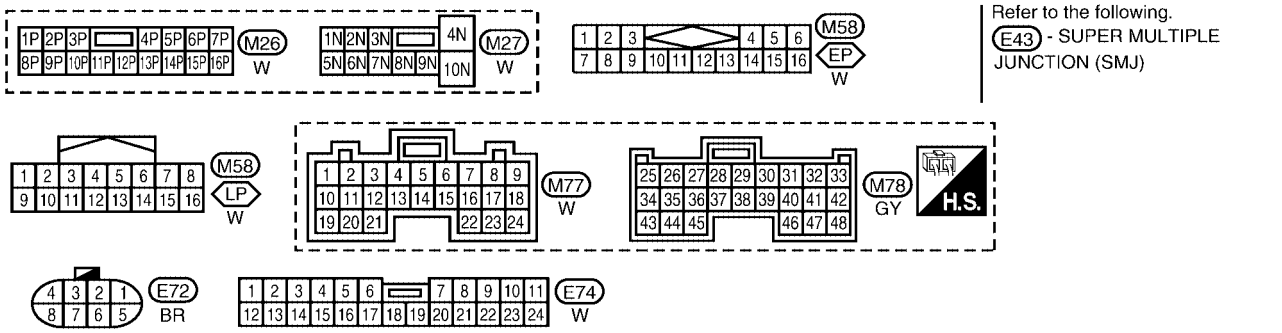
1. Start engine.
2. Drive vehicle under the following conditions:
   Selector lever in D position, vehicle speed higher than 20 km/h (12 MPH).
3. Perform self-diagnosis.
   Refer to AT-47, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .



Wiring Diagram — AT — BA/FTS

ECS005OA





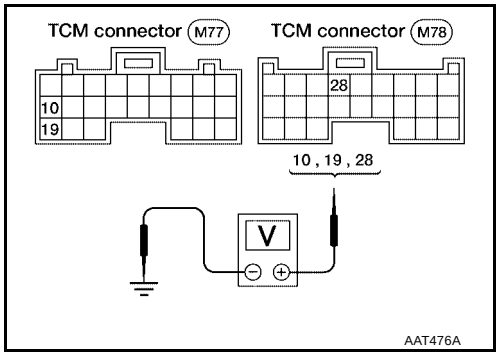
LCWA0059E

Diagnostic Procedure

ECS005OB

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

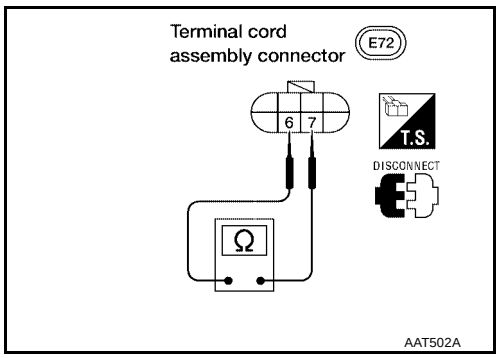
OK or NG

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

- Harness for short or open between ignition switch and TCM terminals (10, 19 and 28) (Main harness)
- Ignition switch and fuse
  Refer to PG-8, "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 in engine compartment.
3. Check resistance between terminal cord assembly connector E72 terminals 6 and 7 when A/T is cold [20°C (68°F)].



Is resistance approx. 2.5kΩ?

Yes >> GO TO 3
No >> 1. Remove oil pan.
2. Check the following items:

- A/T fluid temperature sensor
  Refer to AT-188, "A/T FLUID TEMPERATURE SENSOR" .
- Harness of terminal cord assembly for short or open

3. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR

With CONSULT

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

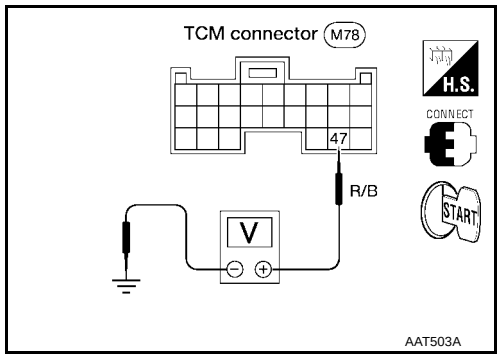
SAT614J

Voltage:

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

Without CONSULT

1. Start engine.
2. Check voltage between TCM connector M78 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

OK or NG

OK >> GO TO 4
NG >> Check the following item:

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

4. CHECK DTC

Perform AT-184, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

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

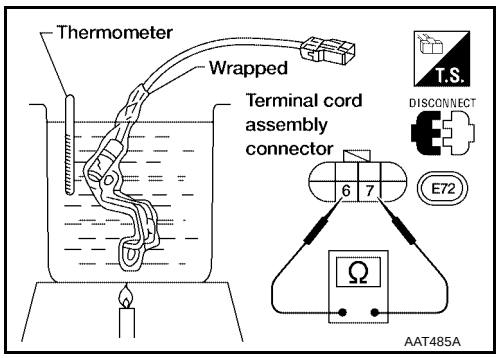
Component Inspection

ECS005OC

A/T FLUID TEMPERATURE SENSOR

- For removal, refer to AT-253, "REMOVAL" .
- Check resistance between terminals 6 and 7 while changing temperature as shown at left.

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



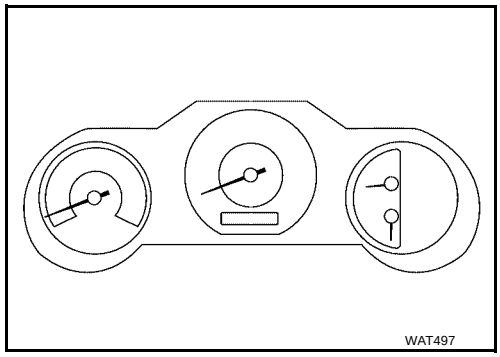
DTC VEHICLE SPEED SENSOR·MTR

PFP:24814

Description

ECS005OD

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



TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

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

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

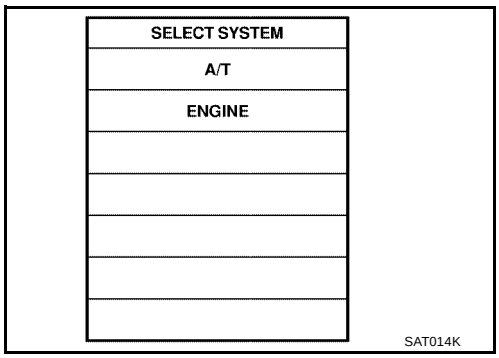
CAUTION:

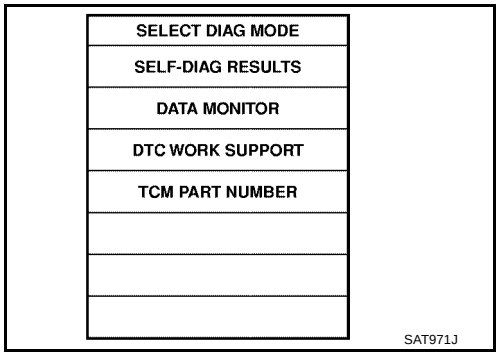
- **Always drive vehicle at a safe speed.**
- **If conducting this "DTC CONFIRMATION PROCEDURE" again, always turn ignition switch OFF and wait at least 5 seconds before continuing.**

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 6 MPH).

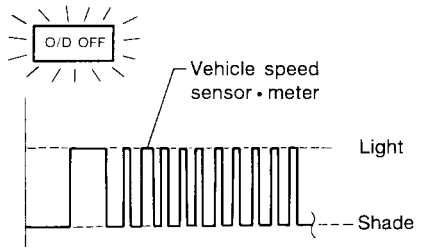
Without CONSULT-II

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

3. Perform self-diagnosis.
Refer to AT-47, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .

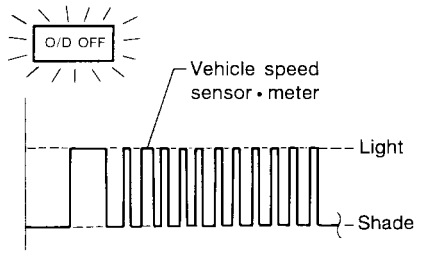
VG33E

2nd judgement flicker is longer than others.



VG33ER

2nd judgement flicker is longer than others.

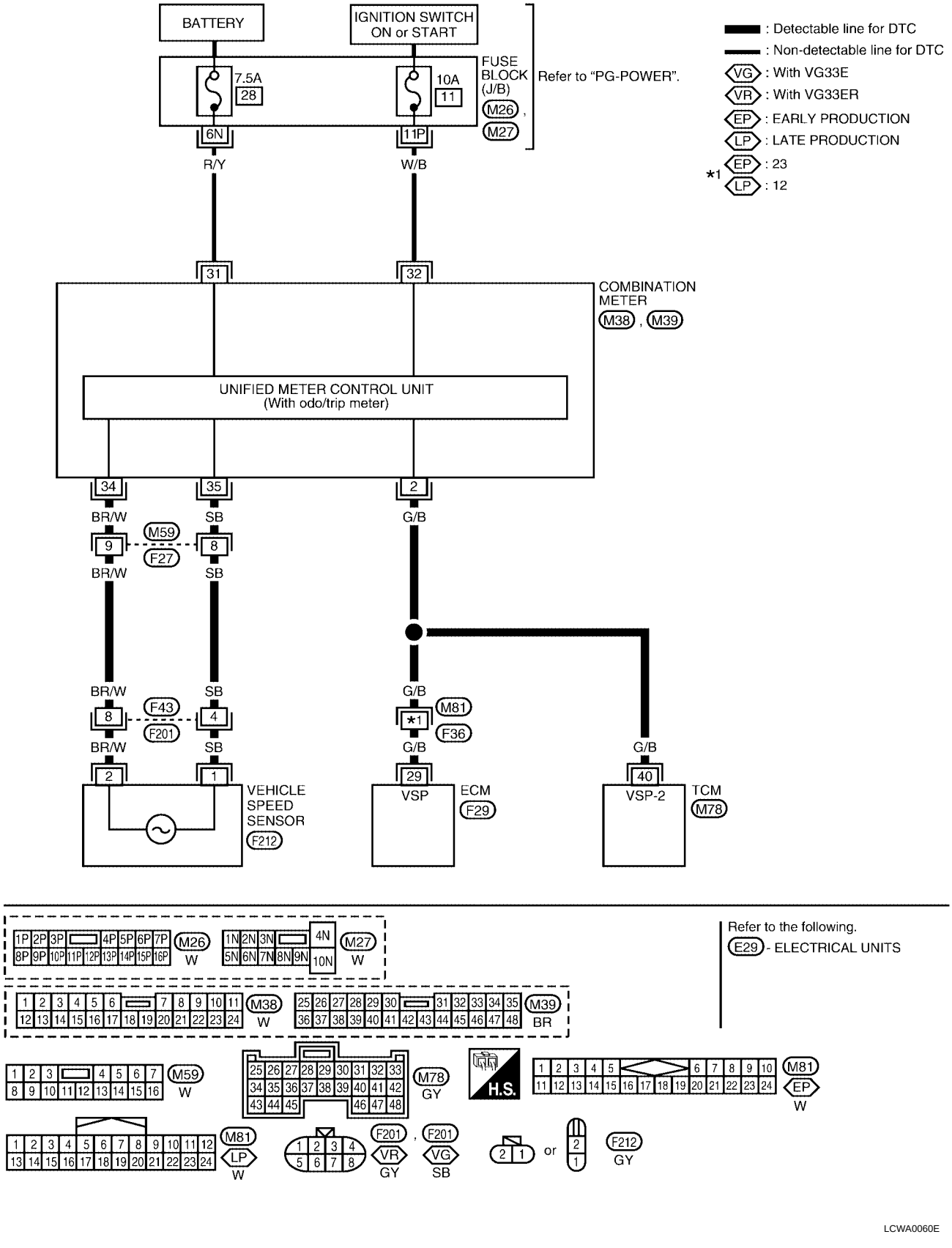


LAT436

Wiring Diagram — AT — VSSMTR

ECS005OE

AT-VSSMTR-01



LCWA0060E

Diagnostic Procedure

ECS005OF

1. CHECK INPUT SIGNAL.

With CONSULT-II

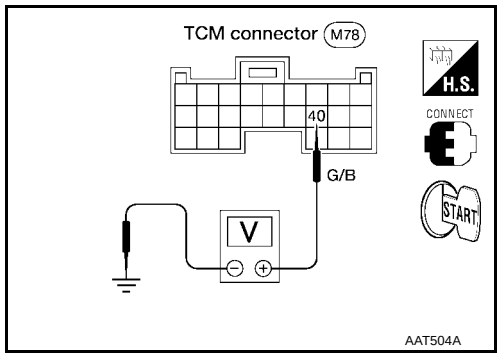
DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

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 connector M78 terminal 40 and ground while driving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.



Does battery voltage vary between less than 1V and more than 4.5V?

Yes >> GO TO 2
No >> Check the following items:

- Vehicle speed sensor and ground circuit for vehicle speed sensor. Refer to DI-17, "VEHICLE SPEED SENSOR SIGNAL CHECK" .
- Harness for short or open between TCM and vehicle speed sensor (Main harness)

2. CHECK DTC

Perform AT-190, "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.

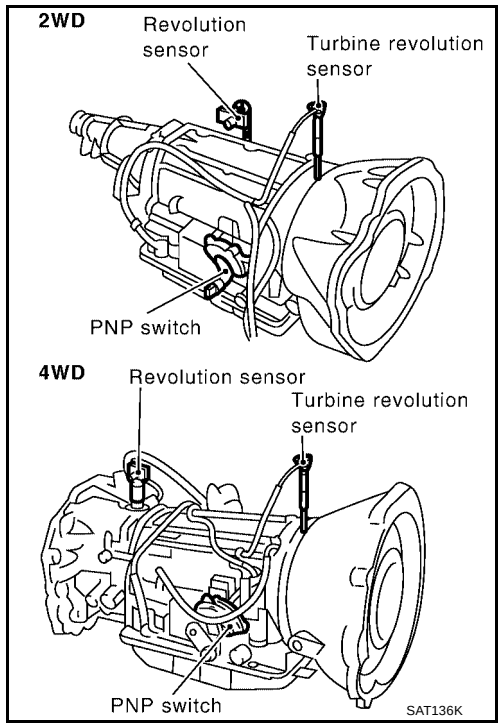
DTC TURBINE REVOLUTION SENSOR (VG33ER ONLY)

PFP:31935

Description

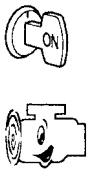
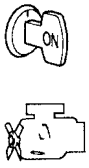
ECS005OG

The turbine revolution sensor detects input shaft rpm (revolutions per minute). It is located on the input side of the automatic transmission. The vehicle speed sensor A/T (Revolution sensor) is located on the output side of the automatic transmission. With the two sensors, input and output shaft rpms are accurately detected. The result is optimal shift timing during deceleration and improved shifting.



TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
38	Y	Turbine revolution sensor (Measure in AC range)		When engine is running at 1,000 rpm	1.2V Voltage rises gradually in response to engine speed.
42	BR	Throttle position sensor (Ground)		—	0V

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: TURBINE REV	TCM does not receive the proper voltage signal from the sensor.	● Harness or connectors (The sensor circuit is open or shorted.) ● Turbine revolution sensor
: 10th judgement flicker		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

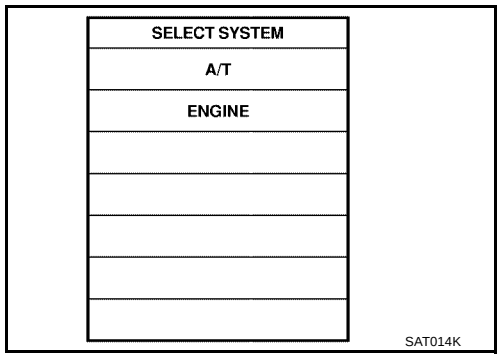
CAUTION:

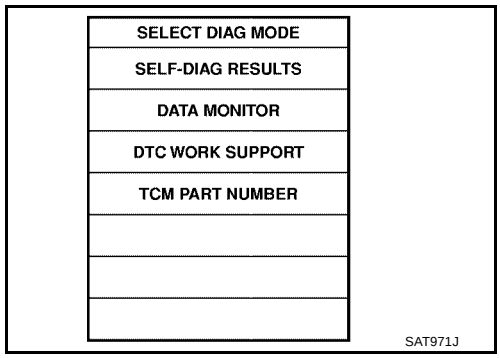
- **Always drive vehicle at a safe speed.**
- **If conducting this "DTC CONFIRMATION PROCEDURE" again, always turn ignition switch "OFF" and wait at least 5 seconds before continuing.**

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

With CONSULT-II

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

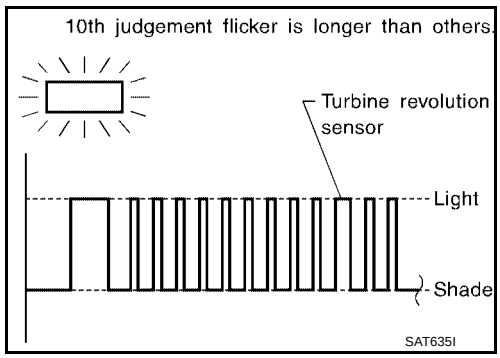




3. Drive vehicle under the following conditions:
   Selector lever in “D”, vehicle speed higher than 40 km/h (25 MPH), engine speed higher than 1,500 rpm, throttle opening greater than 1.0/8 of the full throttle position and driving for more than 5 seconds.

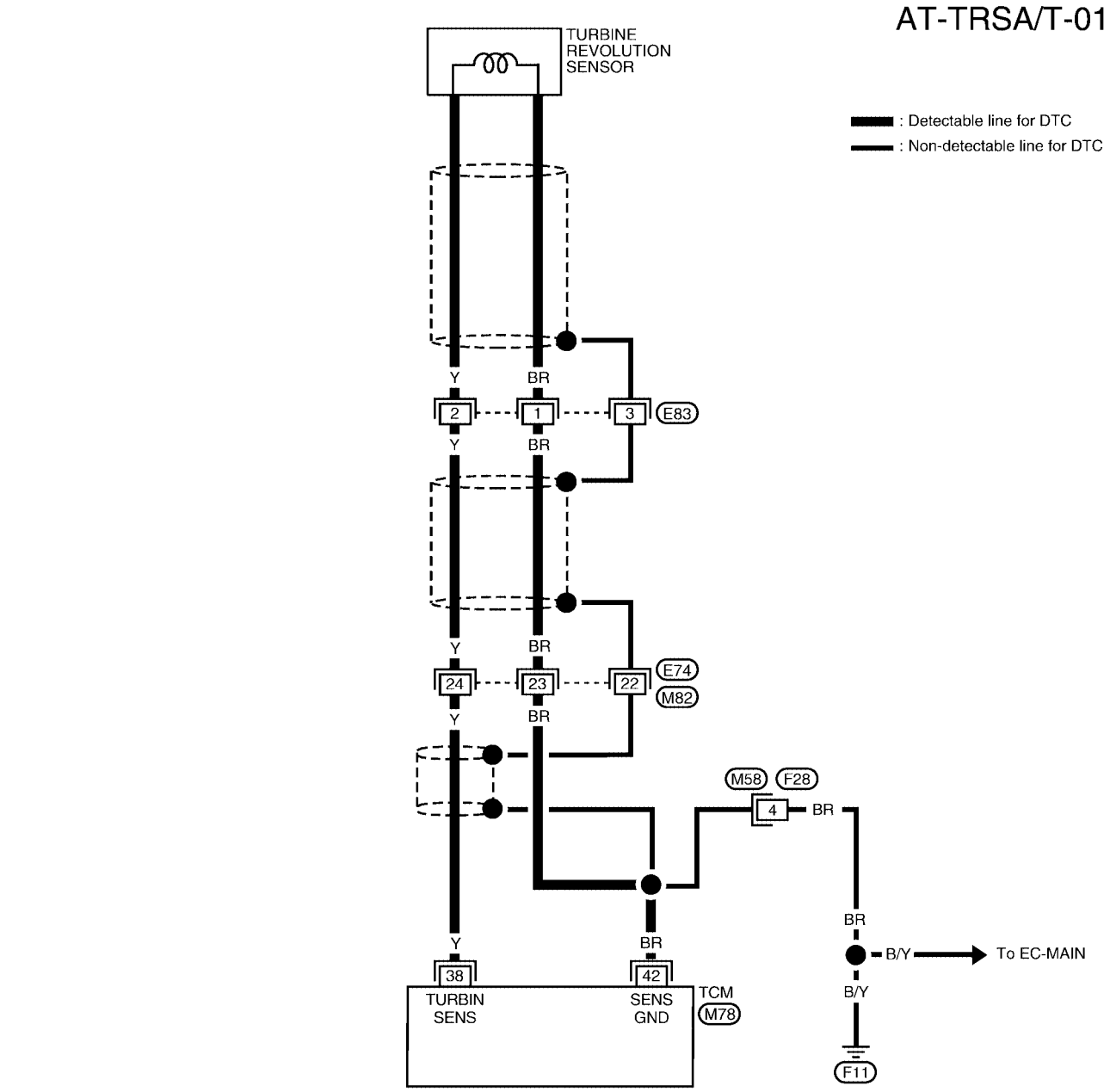
No Tools

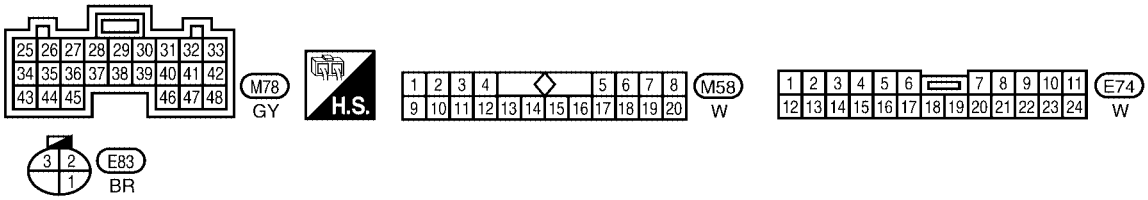
1. Start engine.
2. Drive vehicle under the following conditions:
   Selector lever in “D”, vehicle speed higher than 40 km/h (25 MPH), engine speed higher than 1,500 rpm, throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.
3. Perform self-diagnosis.
   Refer to AT-47, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .



Wiring Diagram — AT — TRSA/T

ECS005OH





LCWA0048E

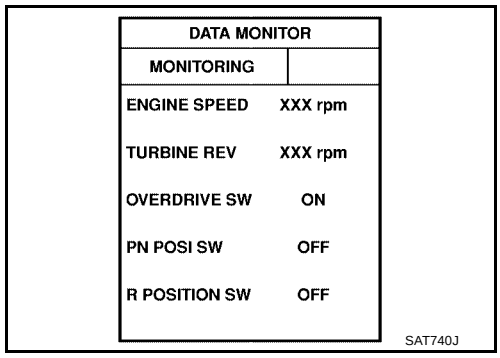
Diagnostic Procedure

ECS005OI

1. CHECK INPUT SIGNAL

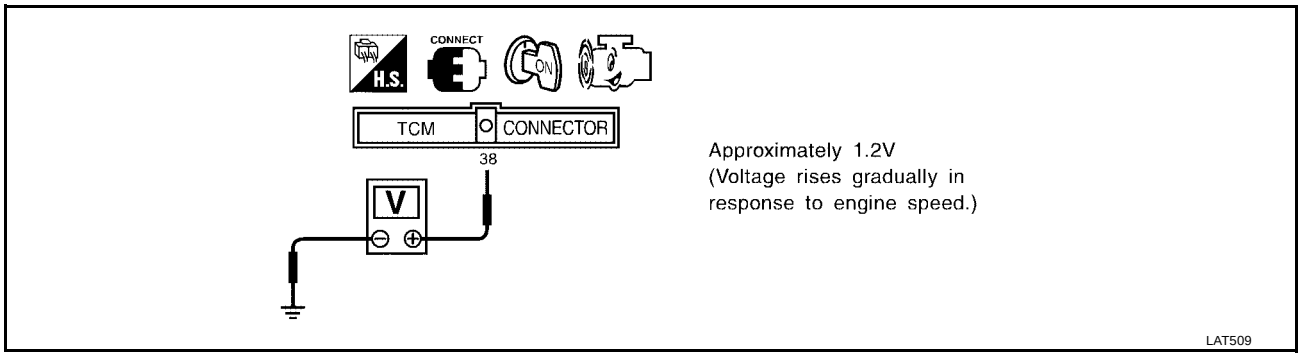
With CONSULT-II

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 REV”. Check the value changes according to engine speed.



Without CONSULT-II

1. Start engine.
2. Check voltage between TCM harness connector M78 terminal 38 (Y) 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 AT-194, "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.

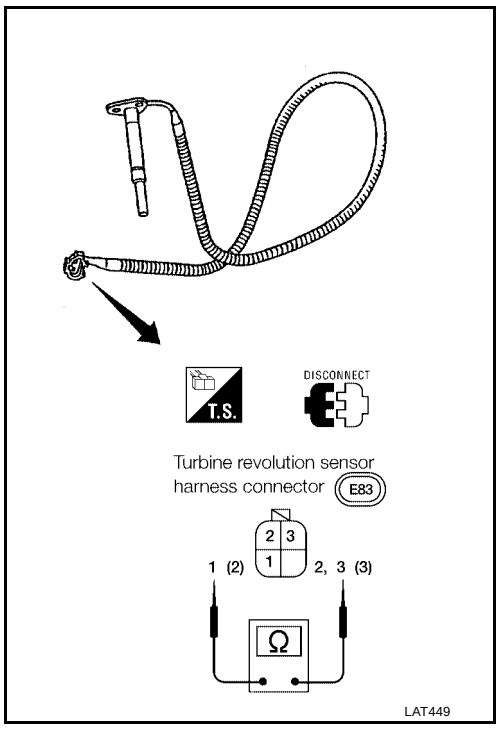
Component Inspection

ECS005OJ

TURBINE REVOLUTION SENSOR

- Check resistance between terminals 1, 2 and 3.

Terminal No.		Resistance (Approx.)
1	2	2.4 - 2.8 kΩ
1	3	No continuity
2	3	No continuity



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

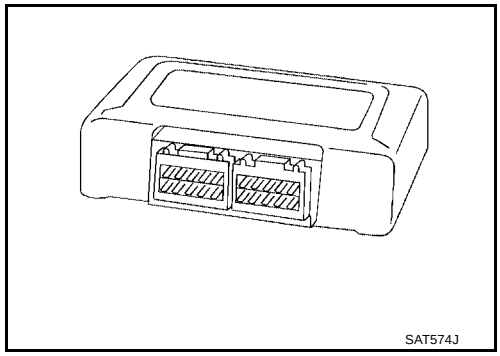
PFP:31036

DTC Control Unit (RAM), Control Unit (ROM)

ECS005OK

DESCRIPTION

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

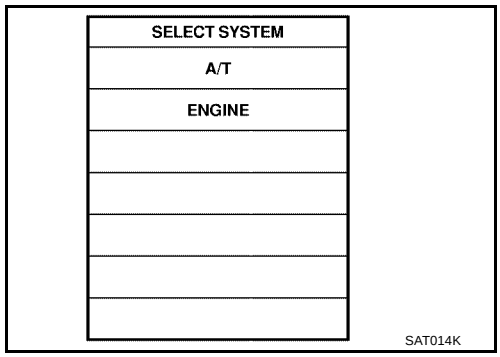
Diagnostic trouble code	Malfunction is detected when ...	Check Items (Possible Cause)
: CONTROL UNIT (RAM) : CONTROL UNIT (ROM)	● TCM memory (RAM) or (ROM) is malfunctioning.	● TCM

Diagnostic Trouble Code (DTC) Confirmation Procedure

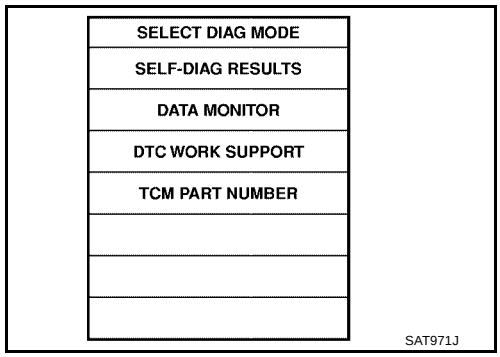
NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

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



SAT014K



SAT971J

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

DIAGNOSTIC PROCEDURE

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON and select “SELF DIAG RESULTS” mode for A/T with CONSULT-II.
2. Touch “ERASE”.
3. **Perform** **AT-199, "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)

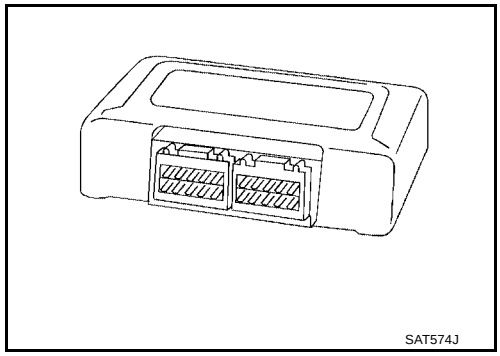
PFP:31036

DTC Control Unit (EEP ROM)

ECS005OL

DESCRIPTION

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



On Board Diagnosis Logic

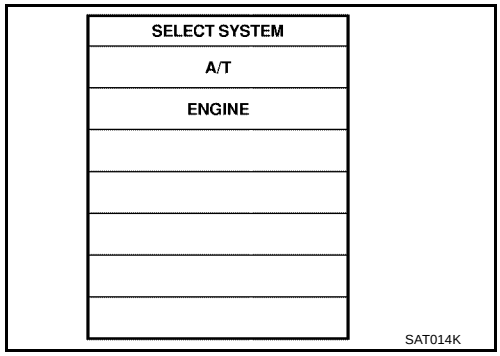
Diagnostic trouble code	Malfunction is detected when ...	Check item (possible cause)
: CONT UNIT (EEP ROM)	TCM memory (EEP ROM) is malfunctioning.	TCM

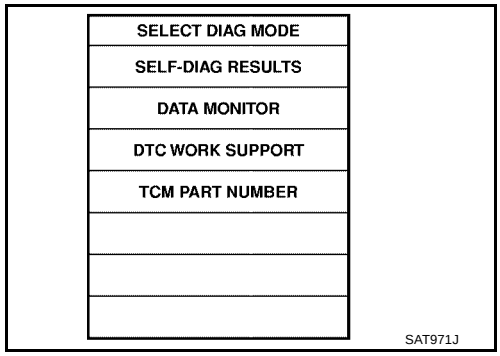
Diagnostic Trouble Code (DTC) Confirmation Procedure

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

DIAGNOSTIC PROCEDURE

1. CHECK DTC

With CONSULT-II

1. Turn ignition switch ON and select “SELF DIAG RESULTS” mode for A/T with CONSULT-II.
2. Move selector lever to “R” position.
3. Depress accelerator pedal (Full throttle position).
4. Touch “ERASE”.
5. Turn ignition switch OFF for 10 seconds.
   Perform AT-201, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

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

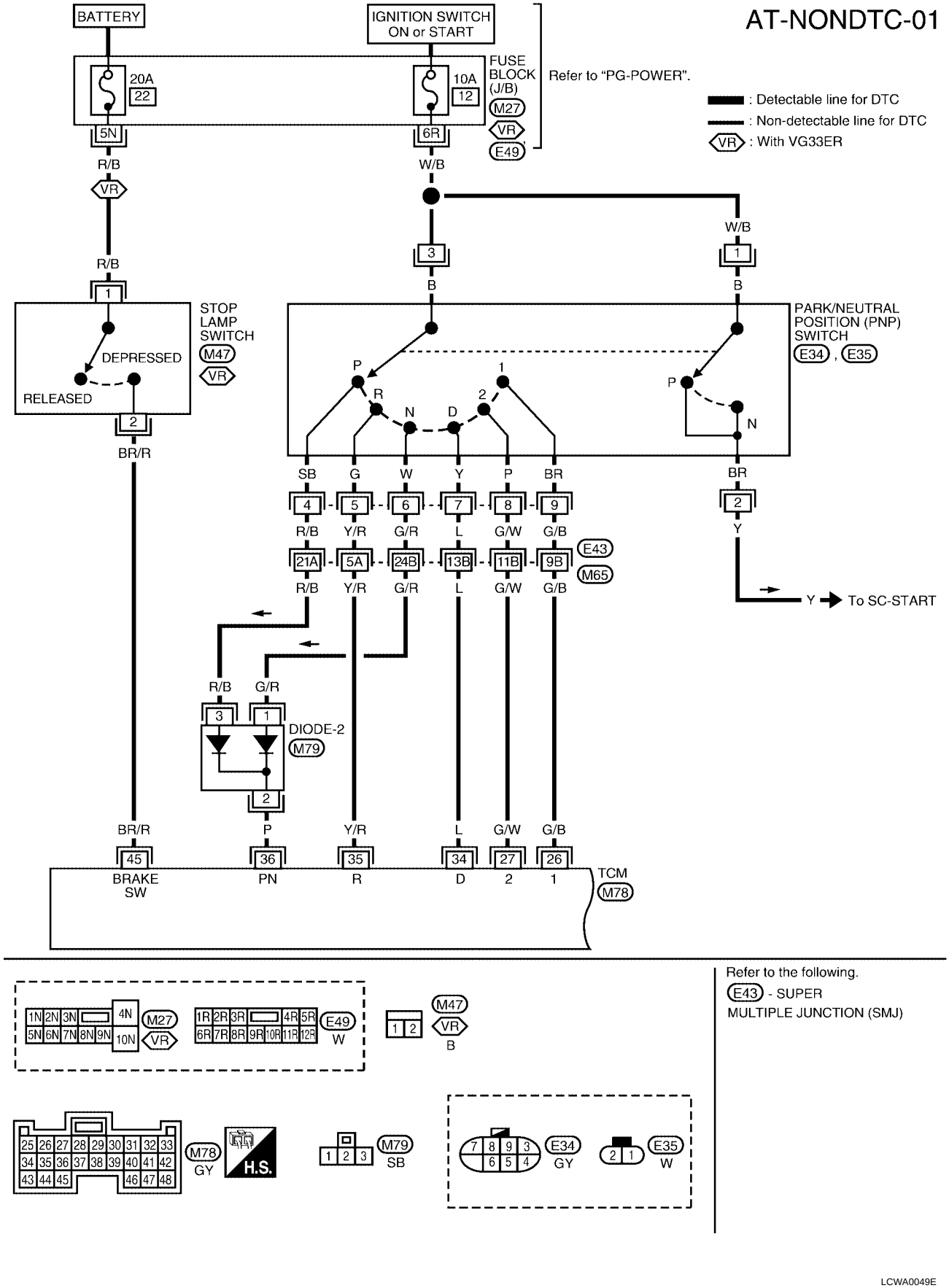
Yes >> Replace TCM
No >> **INSPECTION END**

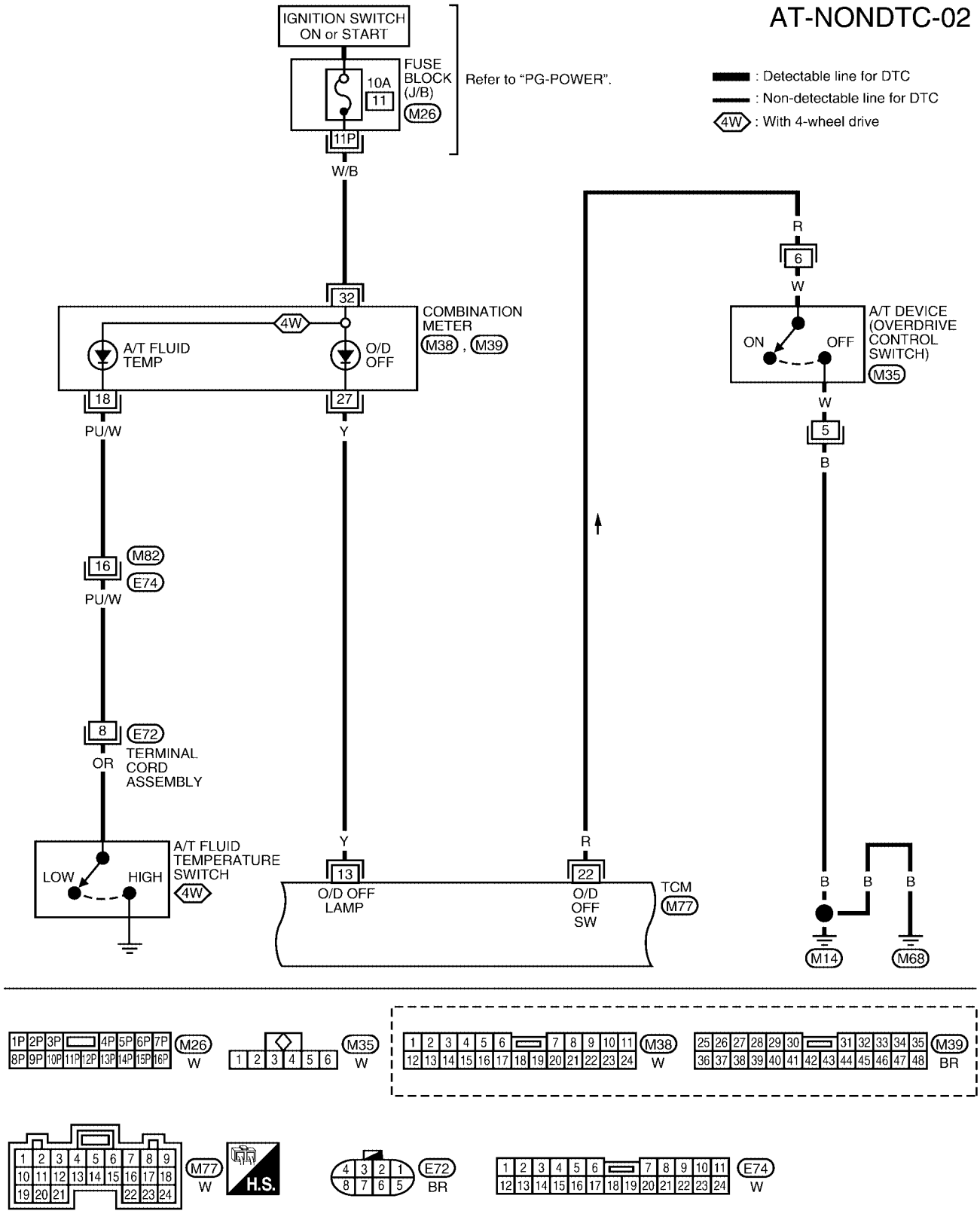
TROUBLE DIAGNOSES FOR SYMPTOMS

PFP:00007

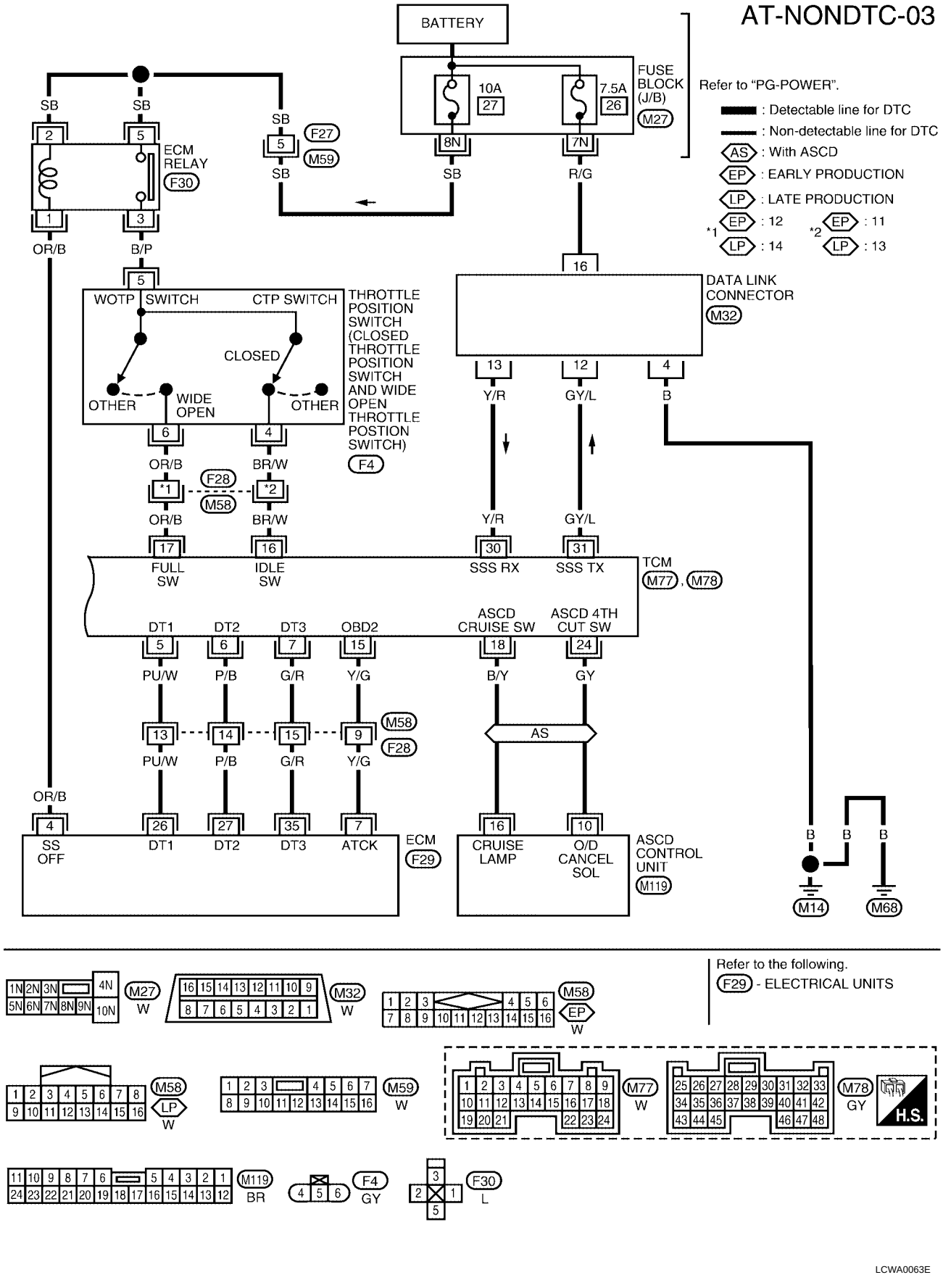
Wiring Diagram — AT — NONDTC

ECS005OM




AT-NONDTC-02
IGNITION SWITCH ON or START
FUSE BLOCK (J/B)
10A
11
M26
11P
W/B
Refer to "PG-POWER".
: Detectable line for DTC
: Non-detectable line for DTC
4W : With 4-wheel drive
32
4W
COMBINATION METER
M38 , M39
A/T FLUID TEMP
O/D OFF
18
27
PU/W
Y
R
6
W
A/T DEVICE (OVERDRIVE CONTROL SWITCH)
ON
OFF
M35
W
5
B
16
M82
E74
PU/W
8
E72
OR
TERMINAL CORD ASSEMBLY
A/T FLUID TEMPERATURE SWITCH
LOW
HIGH
4W
Y
13
O/D OFF LAMP
R
22
O/D OFF SW
TCM
M77
B
B
B
M14
M68
M26
W
M35
W
M38
W
M39
BR
M77
W
H.S.
E72
BR
E74
W

LCWA0050E


AT-NONDTC-03
BATTERY
FUSE BLOCK (J/B) M27
10A 27
7.5A 26
8N
7N
SB
R/G
Refer to "PG-POWER".
: Detectable line for DTC
: Non-detectable line for DTC
AS : With ASCD
EP : EARLY PRODUCTION
LP : LATE PRODUCTION
*1 EP : 12 LP : 14
*2 EP : 11 LP : 13
ECM RELAY F30
SB F27 M59
OR/B
B/P
THROTTLE POSITION SWITCH (CLOSED THROTTLE POSITION SWITCH AND WIDE OPEN THROTTLE POSTION SWITCH) F4
WOTP SWITCH
CTP SWITCH
CLOSED
OTHER
WIDE OPEN
OTHER
BR/W
F28 M58
DATA LINK CONNECTOR M32
Y/R
GY/L
B
FULL SW
IDLE SW
SSS RX
SSS TX
TCM M77, M78
DT1
DT2
DT3
OBD2
ASCD CRUISE SW
ASCD 4TH CUT SW
PU/W
P/B
G/R
Y/G
B/Y
GY
AS
SS OFF
ATCK
ECM F29
CRUISE LAMP
O/D CANCEL SOL
ASCD CONTROL UNIT M119
M14
M68
Refer to the following.
F29 - ELECTRICAL UNITS
M27 W
M32 W
M58 EP W
M58 LP W
M59 W
M77 W
M78 GY
H.S.
M119 BR
F4 GY
F30 L

LCWA0063E

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

ECS005ON

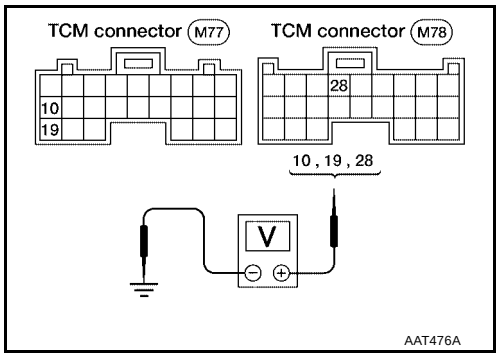
SYMPTOM:

- **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-97, "Wiring Diagram — AT — MAIN" .
- Ignition switch and fuse
  Refer to PG-8, "POWER SUPPLY ROUTING" .

2. CHECK TCM GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check resistance between TCM terminals (25, 48) and ground. Refer to AT-97, "Wiring Diagram — AT — MAIN" .

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

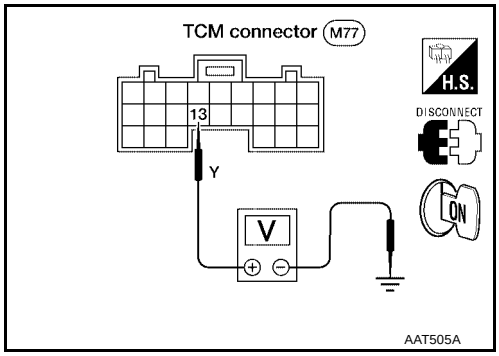
Is resistance approx. 0Ω?

Yes >> GO TO 3
No >>
- Repair open circuit or short to ground or short to power in harness or connectors.
- Refer to AT-97, "Wiring Diagram — AT — MAIN" .

3. CHECK LAMP CIRCUIT

1. Turn ignition switch to ON position.
2. Set overdrive control switch to ON position.
3. Check voltage between TCM connector M77 terminal 13 and ground.

Does battery voltage exist?



Yes >> GO TO 4
No >> Check the following items.

- Fuse
- O/D OFF indicator lamp
  Refer to DI-22, "WARNING LAMPS" .
- Harness for short or open between ignition switch and O/D OFF indicator lamp (Main harness)
- Refer to PG-8, "POWER SUPPLY ROUTING" .
- Harness for short or open between O/D OFF indicator lamp and TCM

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.

2. Engine Cannot Be Started In P and N Position

ECS005OO

SYMPTOM:

- **Engine cannot be started with selector lever in P or N position.**
- **Engine cannot be started with selector lever in P. 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?

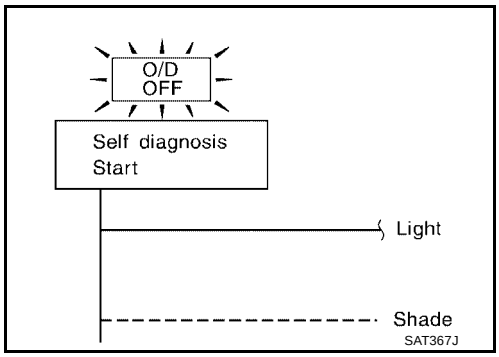
Without CONSULT-II

Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-99, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" .

No >> GO TO 2



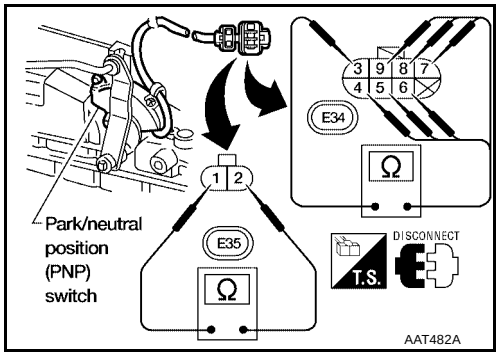
2. CHECK PNP SWITCH INSPECTION

Check for short or open of PNP switch 2-pin connector. Refer to AT-103, "PNP SWITCH" .

OK or NG

OK >> GO TO 3

NG >> Repair or replace 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

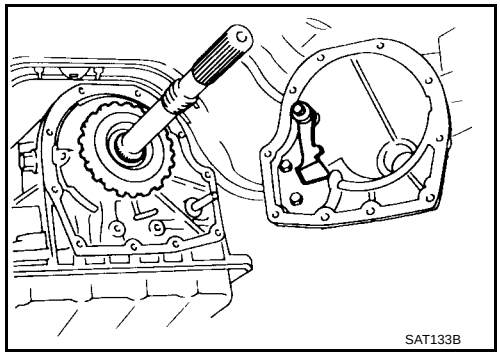
ECS005OP

SYMPTOM:

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

1. CHECK PARKING COMPONENTS

Check parking components.
Refer toAT-326, "PARKING PAWL COMPONENTS" .



OK or NG

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

4. In N Position, Vehicle Moves

ECS005OQ

SYMPTOM:

- **Vehicle moves forward or backward when selecting N position.**

1. CHECK PNP SWITCH CIRCUIT

With CONSULT-II

Does “TCM INPUT SIGNALS” in Data Monitor show damage to PNP switch circuit?

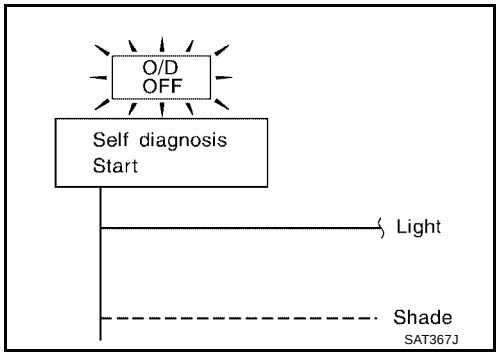
Without CONSULT-II

Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-99, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" .

No >> GO TO 2



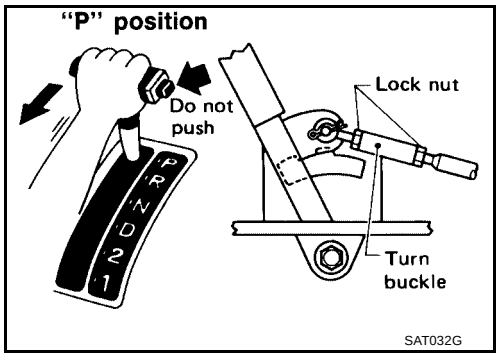
2. CHECK CONTROL LINKAGE

Check control linkage. Refer to AT-257, "Manual Control Linkage Adjustment" .

OK or NG

OK >> GO TO 3

NG >> Adjust control linkage. Refer to AT-257, "Manual Control Linkage Adjustment" .



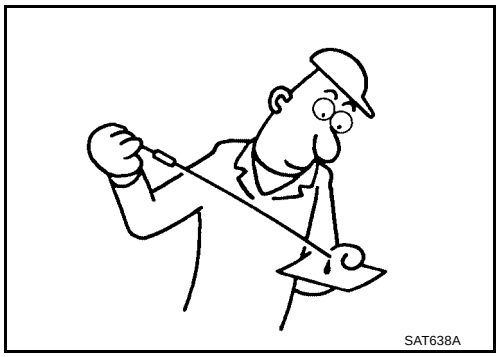
3. CHECK A/T FLUID LEVEL

Check A/T fluid level again.

OK or NG

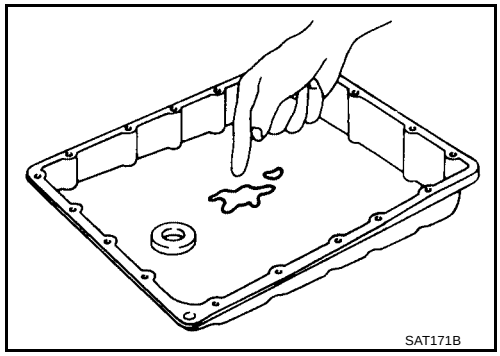
OK >> GO TO 4

NG >> Refill ATF.



4. CHECK A/T FLUID CONDITION

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



OK or NG

OK >> GO TO 5
NG >> 1. Disassemble A/T.
2. Check the following items:
- Forward clutch assembly
- Overrun clutch assembly
- Reverse clutch assembly

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.

5. Large Shock. N → R Position

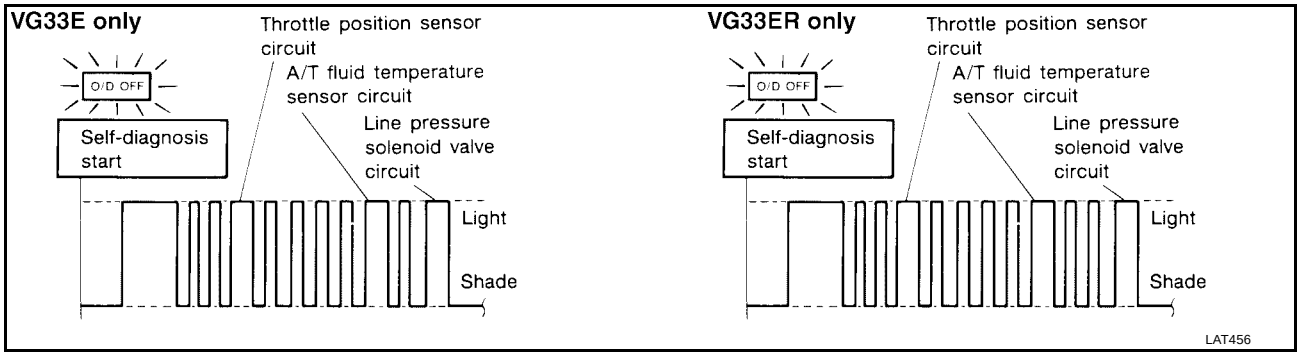
ECS005OR

SYMPTOM:

- **There is large shock when changing from N to R position.**

1. CHECK SELF-DIAGNOSTIC RESULTS

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



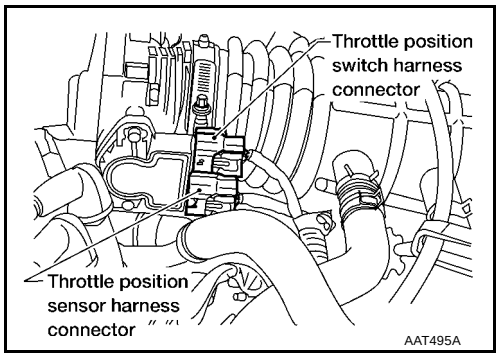
Yes or No

Yes >> Check damaged circuit. Refer to AT-105, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" , AT-156, "DTC P0745 LINE PRESSURE SOLENOID VALVE" or AT-171, "DTC P1705 THROTTLE POSITION SENSOR" .

No >> GO TO 2

2. CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-735, "DTC P0121 TP SENSOR" (VG33E) or EC-1340, "DTC P0121 TP SENSOR" (VG33ER).



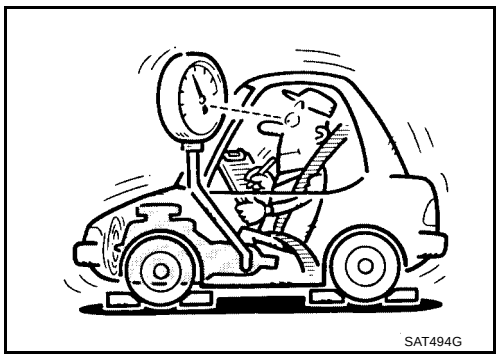
OK or NG

OK >> GO TO 3

NG >> Repair or replace throttle position sensor.

3. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in D position. Refer to AT-64, "Line Pressure Test" .



OK or NG

OK >> GO TO 4

NG >> 1. Remove control valve assembly. Refer to AT-253, "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

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.

6. Vehicle Does Not Creep Backward In R Position

ECS005OS

SYMPTOM:

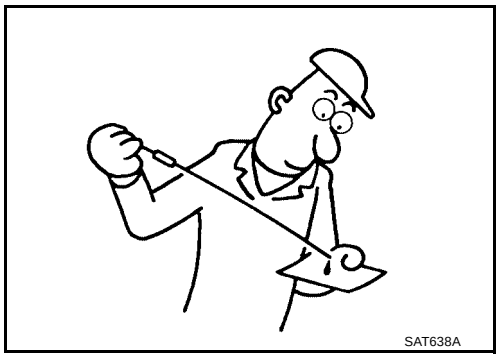
- **Vehicle does not creep backward when selecting R position.**

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 STALL TEST

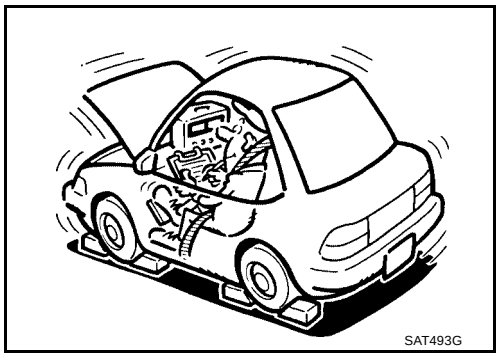
Check stall revolution with selector lever in 1 and R positions.
Refer to AT-61, "Stall Test" .

OK or NG

OK >> GO TO 3
OK in “1” position, NG in R position>>1.Remove control valve assembly. Refer to AT-253, "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

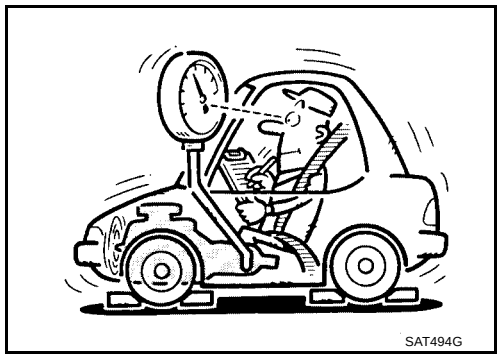
3. Disassemble A/T.
4. Check the following items:
- Oil pump assembly
- Torque converter
- Reverse clutch assembly
- High clutch assembly

NG in both 1 and R positions>>GO TO 6


SAT493G

3. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in R position. Refer to AT-64, "Line Pressure Test" .



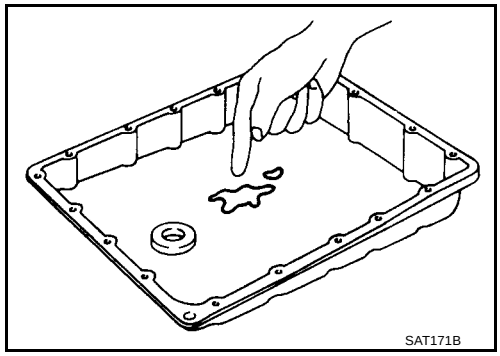
OK or NG

OK >> GO TO 4

NG >> 1. Remove control valve assembly. Refer to AT-253, "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

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. Remove control valve assembly. Refer to AT-253, "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

>> Repair or replace damaged parts.

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

ECS005OT

SYMPTOM:

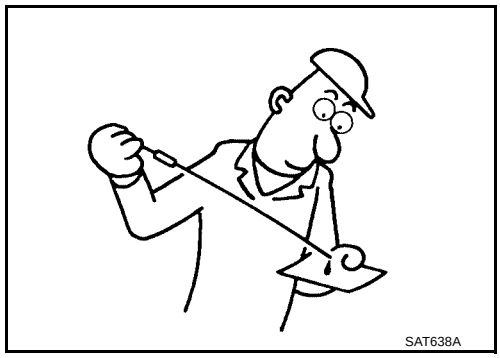
- **Vehicle does not creep forward when selecting D, 2 or 1 position.**

1. CHECK A/T FLUID LEVEL

Check A/T fluid level again.

OK or NG

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

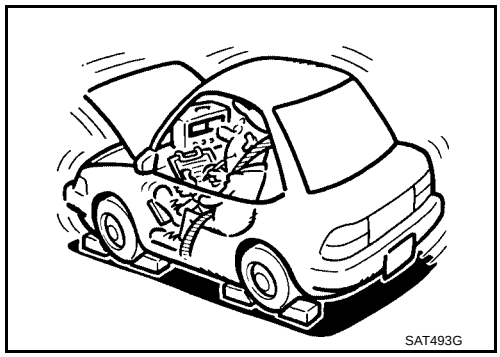

SAT638A

2. CHECK STALL TEST

Check stall revolution with selector lever in D position.
Refer to AT-61, "Stall Test" .

OK or NG

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


SAT493G

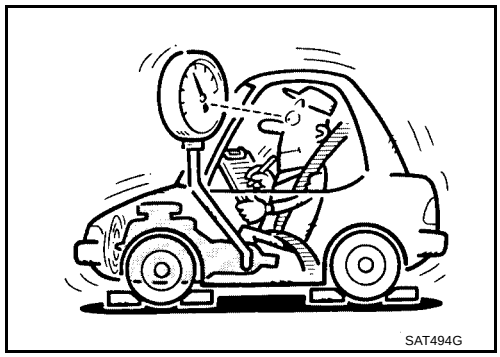
3. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in R position.
Refer to AT-64, "Line Pressure Test" .

OK or NG

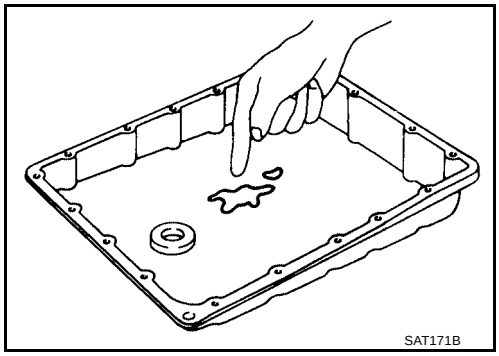
OK >> GO TO 4
NG >> 1. Remove control valve assembly.
Refer to AT-253, "REMOVAL" .
2. Check the following items:
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T.
4. Check the following items:
- Oil pump assembly


SAT494G

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. Remove control valve assembly. Refer to AT-253, "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

>> Repair or replace damaged parts.

8. Vehicle Cannot Be Started From D1

ECS005OU

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-214, "6. Vehicle Does Not Creep Backward In R Position" .

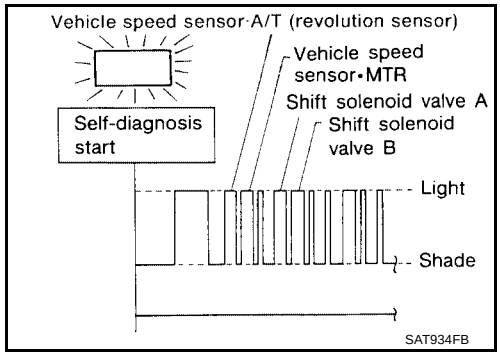
2. CHECK SELF-DIAGNOSTIC RESULTS

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-110, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-161, "DTC P0750 SHIFT SOLENOID VALVE A" , AT-166, "DTC P0755 SHIFT SOLENOID VALVE B" or AT-189, "DTC VEHICLE SPEED SENSOR·MTR" .

No >> GO TO 3



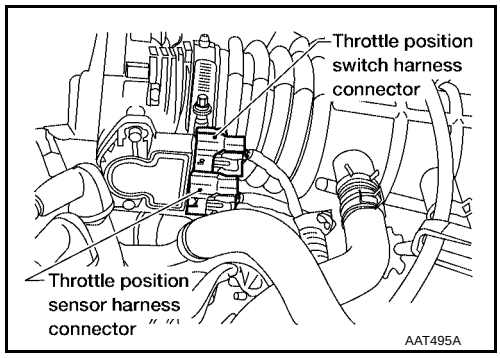
3. CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-735, "DTC P0121 TP SENSOR" (VG33E) or EC-1340, "DTC P0121 TP SENSOR" (VG33ER).

OK or NG

OK >> GO TO 4

NG >> Repair or replace throttle position sensor.



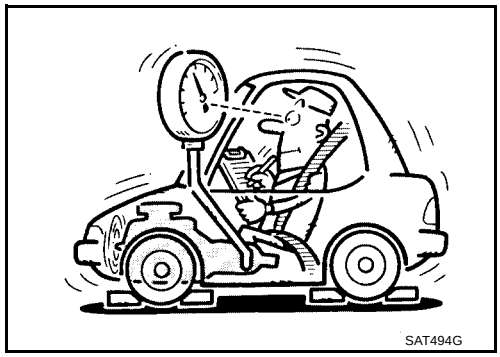
4. CHECK LINE PRESSURE

Check line pressure at stall point with selector lever in D position.
Refer to AT-64, "Line Pressure Test" .

OK or NG

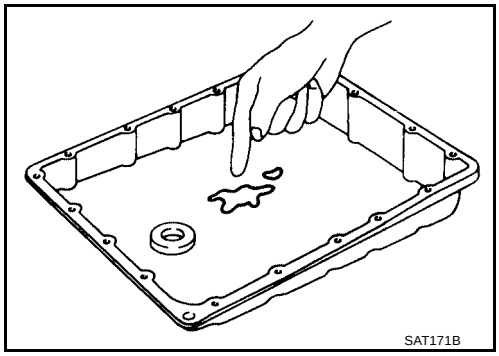
OK >> GO TO 5

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-253, "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-253, "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 7
NG >> Repair or replace damaged parts.

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

ECS005OV

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-217, "7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position" .

2. CHECK PNP SWITCH CIRCUIT

With CONSULT-II

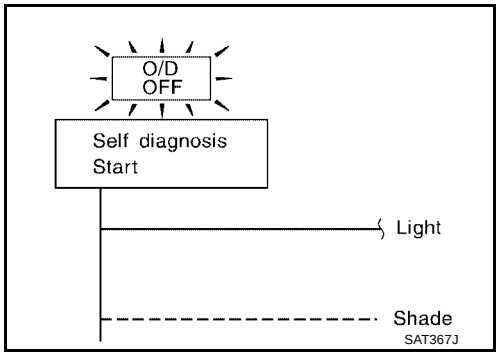
Does “TCM INPUT SIGNALS” in Data Monitor show damage to PNP switch circuit?

Without CONSULT-II

Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-102, "Diagnostic Procedure" .
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-110, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" and AT-189, "DTC VEHICLE SPEED SENSOR·MTR" .

OK or NG

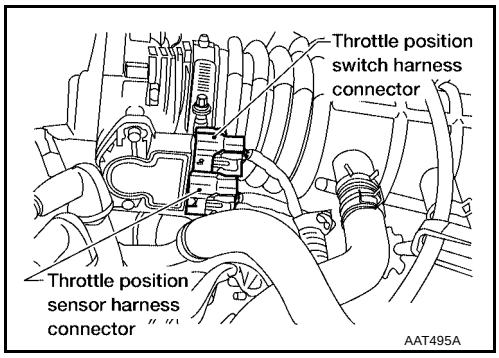
OK >> GO TO 4
NG >> Repair or replace vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuits.

4. CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-735, "DTC P0121 TP SENSOR" (VG33E) or EC-1340, "DTC P0121 TP SENSOR" (VG33ER).

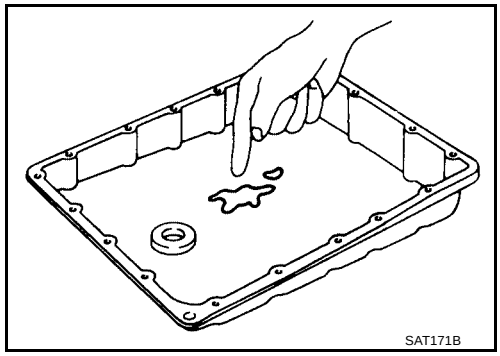
OK or NG

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



5. CHECK A/T FLUID CONDITION

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



OK or NG

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

6. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-253, "REMOVAL" .
2. Check the following items:

- Shift valve A
- Shift solenoid valve A
- 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-253, "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 7
NG >> Repair or replace damaged parts.

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

ECS005OW

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-217, "7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position" and AT-219, "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?

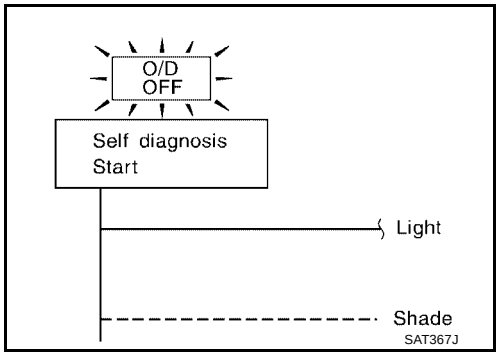
Without CONSULT-II

Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-113, "Diagnostic Procedure" .

No >> GO TO 3



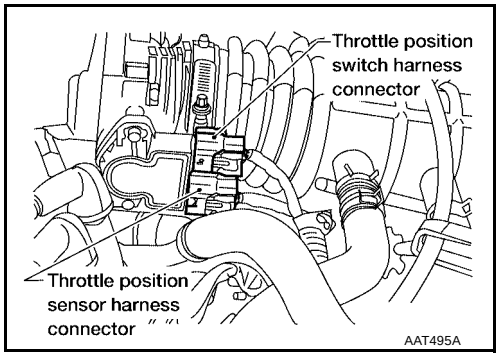
3. CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-735, "DTC P0121 TP SENSOR" (VG33E) or EC-1340, "DTC P0121 TP SENSOR" (VG33ER).

OK or NG

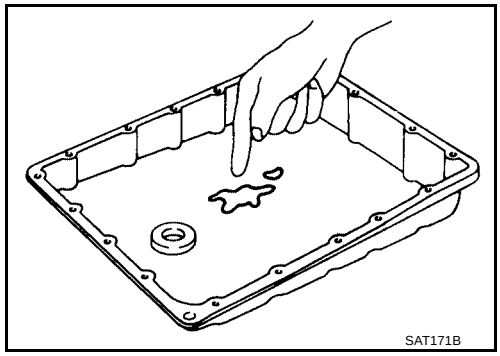
OK >> GO TO 4

NG >> Repair or replace throttle position sensor.



4. CHECK A/T FLUID CONDITION

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



OK or NG

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

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-253, "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-253, "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 6
NG >> Repair or replace damaged parts.

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

ECS005OX

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

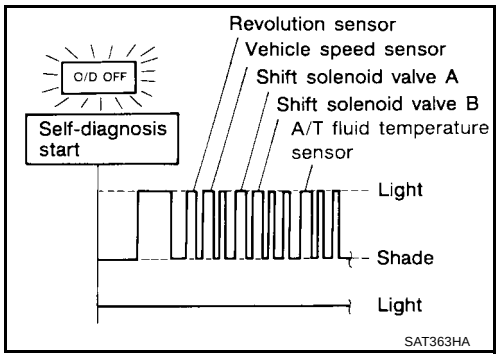
No >> Go to AT-217, "7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position" and AT-219, "8. Vehicle Cannot Be Started From D_1" .

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
- Revolution sensor
- Shift solenoid valve A or B
- Vehicle speed sensor



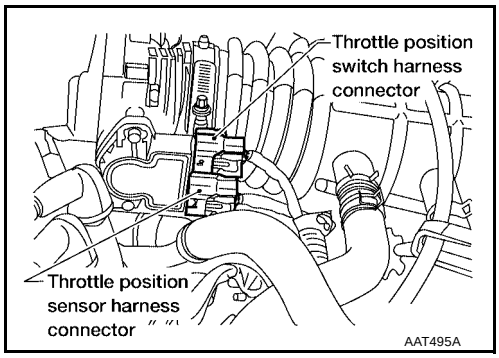
Yes or No

Yes >> Check damaged circuit. Refer to AT-99, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" , AT-105, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" , AT-110, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-161, "DTC P0750 SHIFT SOLENOID VALVE A" , AT-166, "DTC P0755 SHIFT SOLENOID VALVE B" , or AT-189, "DTC VEHICLE SPEED SENSOR·MTR" .

No >> GO TO 3

3. CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-735, "DTC P0121 TP SENSOR" (VG33E) or EC-1340, "DTC P0121 TP SENSOR" (VG33ER).



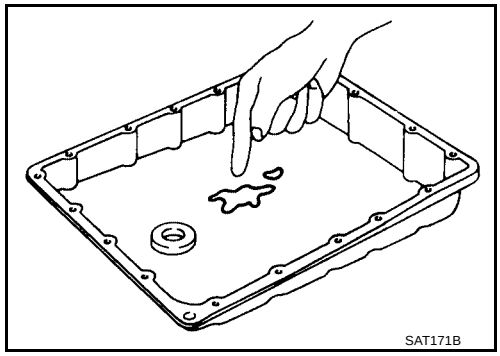
OK or NG

OK >> GO TO 4

NG >> Repair or replace throttle position sensor.

4. CHECK A/T FLUID CONDITION

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



OK or NG

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

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-253, "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 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-253, "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 6
NG >> Repair or replace damaged parts.

12. A/T Does Not Perform Lock-up

ECS005OY

SYMPTOM:

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

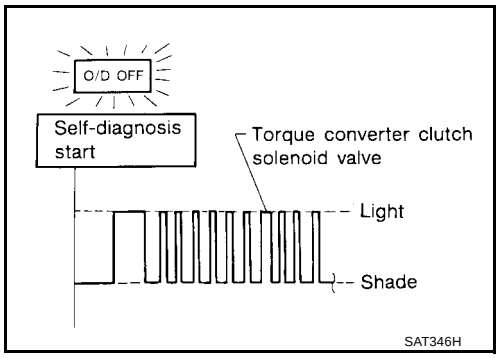
1. CHECK SELF-DIAGNOSTIC RESULTS

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-147, "Diagnostic Procedure" .

No >> GO TO 2



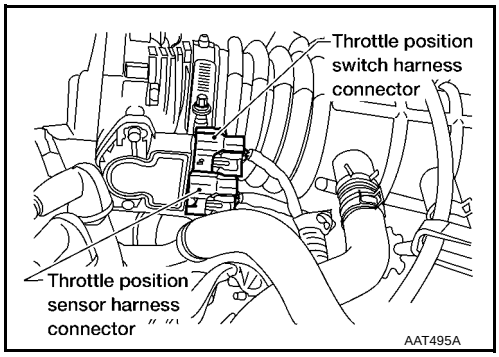
2. CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-735, "DTC P0121 TP SENSOR" (VG33E) or EC-1340, "DTC P0121 TP SENSOR" (VG33ER).

OK or NG

OK >> GO TO 3

NG >> Repair or replace throttle position sensor.



3. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-253, "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 >> 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

ECS005OZ

SYMPTOM:

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

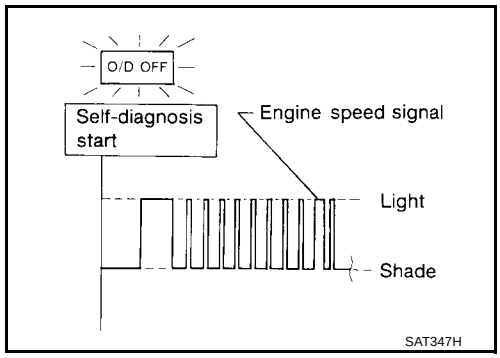
1. CHECK DIAGNOSTIC RESULTS

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-118, "Diagnostic Procedure" .

No >> GO TO 2



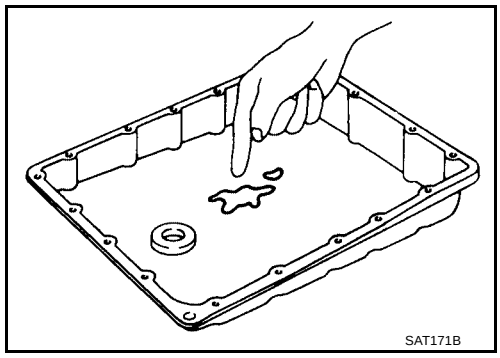
2. CHECK A/T FLUID CONDITION

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-253, "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-253, "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

ECS005P0

SYMPTOM:

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

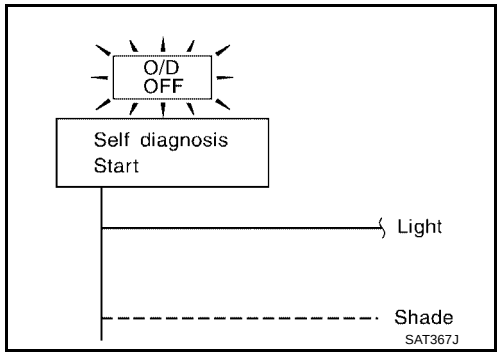
1. CHECK THROTTLE POSITION SWITCH CIRCUIT

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-171, "DTC P1705 THROTTLE POSITION SENSOR" .

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)

ECS005P1

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.**

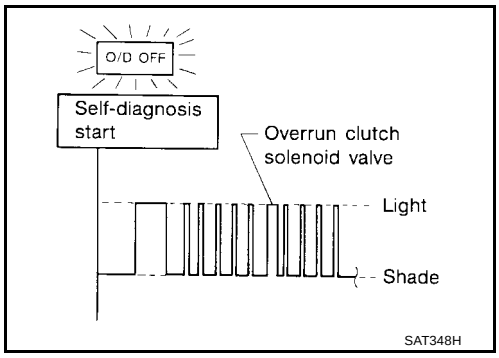
1. CHECK SELF-DIAGNOSTIC RESULTS

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-181, "Diagnostic Procedure" .

No >> GO TO 2



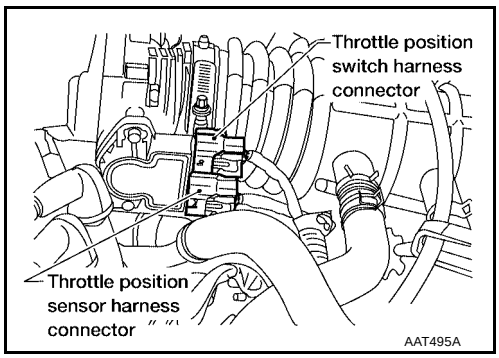
2. CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-735, "DTC P0121 TP SENSOR" (VG33E) or EC-1340, "DTC P0121 TP SENSOR" (VG33ER).

OK or NG

OK >> GO TO 3

NG >> Repair or replace throttle position sensor.



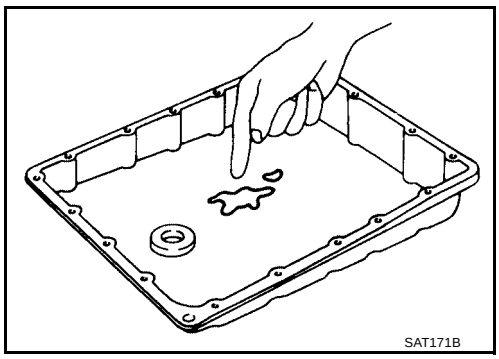
3. CHECK A/T FLUID CONDITION

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

OK or NG

OK >> GO TO 4

NG >> GO TO 6



4. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-253, "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-253, "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 5
NG >> Repair or replace damaged parts.

16. Vehicle Does Not Start From D_1

ECS005P2

SYMPTOM:

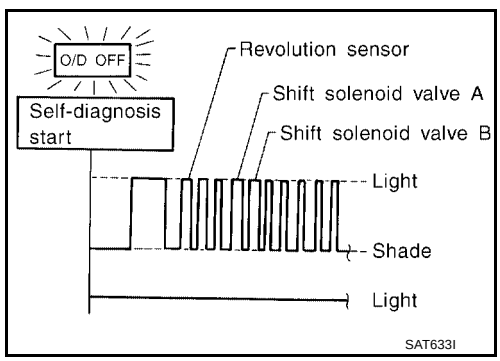
- **Vehicle does not start from D_1 on Cruise test — Part 2.**

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-110, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-161, "DTC P0750 SHIFT SOLENOID VALVE A" , AT-166, "DTC P0755 SHIFT SOLENOID VALVE B" , or AT-189, "DTC VEHICLE SPEED SENSOR·MTR" .
No >> GO TO 2



2. CHECK SYMPTOM

Check again.

OK or NG

OK >> Go to AT-219, "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

ECS005P3

SYMPTOM:

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

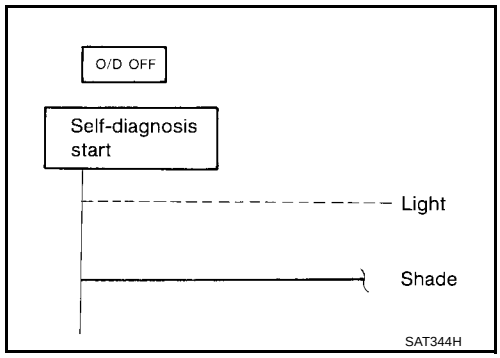
1. CHECK OVERDRIVE CONTROL SWITCH CIRCUIT

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-239, "DIAGNOSTIC PROCEDURE" .

No >> Go to AT-224, "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

ECS005P4

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?

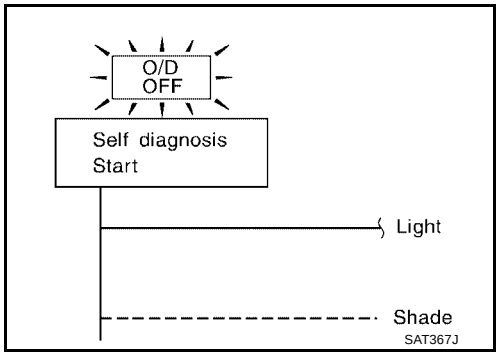
Without CONSULT-II

Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-102, "Diagnostic Procedure" .

No >> Go to AT-222, "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

ECS005P5

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?

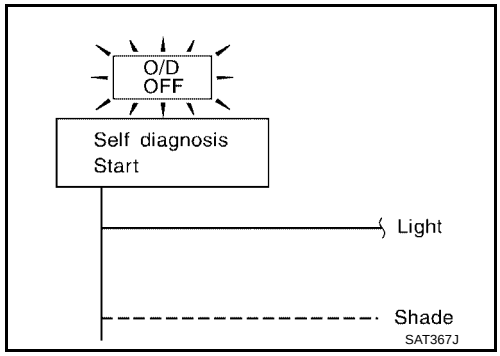
Without CONSULT-II

Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-102, "Diagnostic Procedure" .

No >> GO TO 2



2. CHECK SYMPTOM

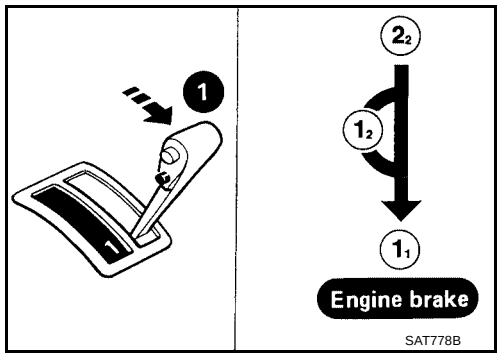
Check again.

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

ECS005P6

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-232, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" .

No >> Go to AT-214, "6. Vehicle Does Not Creep Backward In R Position" .

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

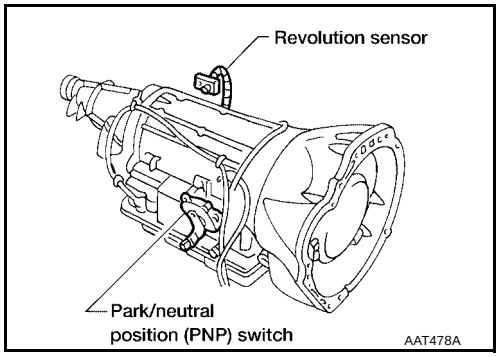
ECS005P7

SYMPTOM:

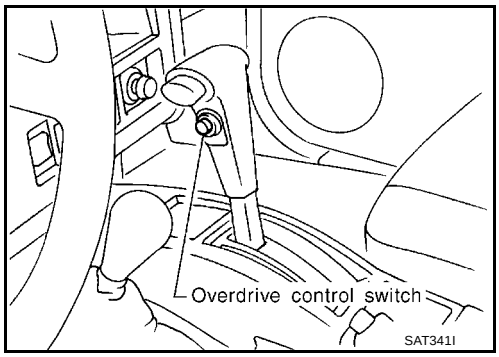
- **O/D OFF indicator lamp does not come on in TCM self-diagnostic procedure even the lamp circuit is good.**

DESCRIPTION

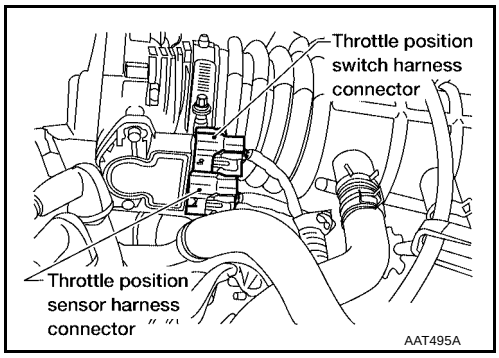
- PNP switch
  The PNP switch assembly includes a transmission range switch. The transmission range switch detects the selector position and sends a signal to the TCM.



- Overdrive control switch
  Detects the overdrive control switch position (ON or OFF) and sends a signal to the TCM.



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



DIAGNOSTIC PROCEDURE

NOTE:
The diagnostic procedure includes inspections for the overdrive control and throttle position switch circuits.

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

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

SAT643J

OK or NG

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

- PNP switch
  Refer to AT-103, "PNP SWITCH" .
- 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)

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 harness connector M78terminals (26, 27, 34, 35, 36) and ground while moving selector lever through each position.

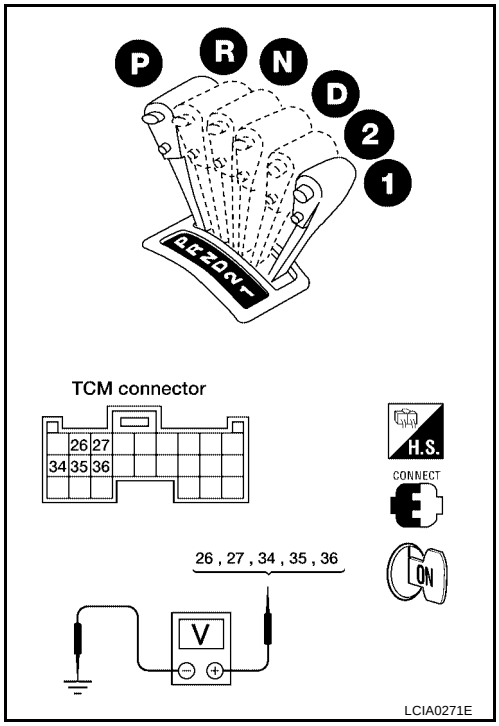
Lever position	Terminals				
	36	35	34	27	26
P, N	B	0	0	0	0
R	0	B	0	0	0
D	0	0	B	0	0
2	0	0	0	B	0
1	0	0	0	0	B

Does battery voltage exist (B) or non-existent (0)?

Yes >> GO TO 3

No >> Check the following items:

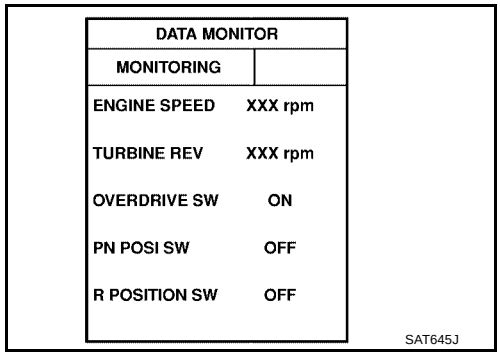
- PNP switch
  Refer to AT-103, "PNP SWITCH" .
- Harness for short or open between ignition switch and PNP switch (Main harness)
- Harness for short or open between PNP switch and TCM (Main harness)



3. CHECK OVERDRIVE CONTROL SWITCH CIRCUIT

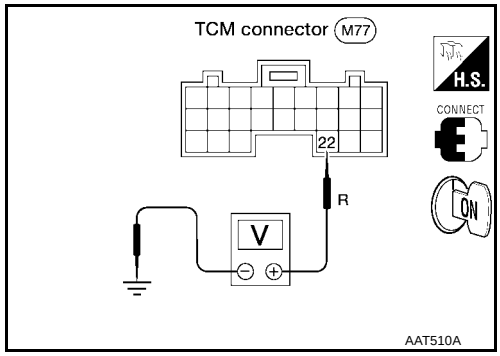
With CONSULT-II

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 SWITCH”. Check the signal of the overdrive control switch is indicated properly.
   (Overdrive control switch ON displayed on CONSULT-II means overdrive OFF.)



Without CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminal 22 and ground when overdrive control switch is ON and OFF.



Voltage:

Switch position ON : Battery voltage

Switch position OFF : 1V or less

OK or NG

OK (With CONSULT-II)>>GO TO 4
OK (Without CONSULT-II)>>GO TO 5
NG >> Check the following items:

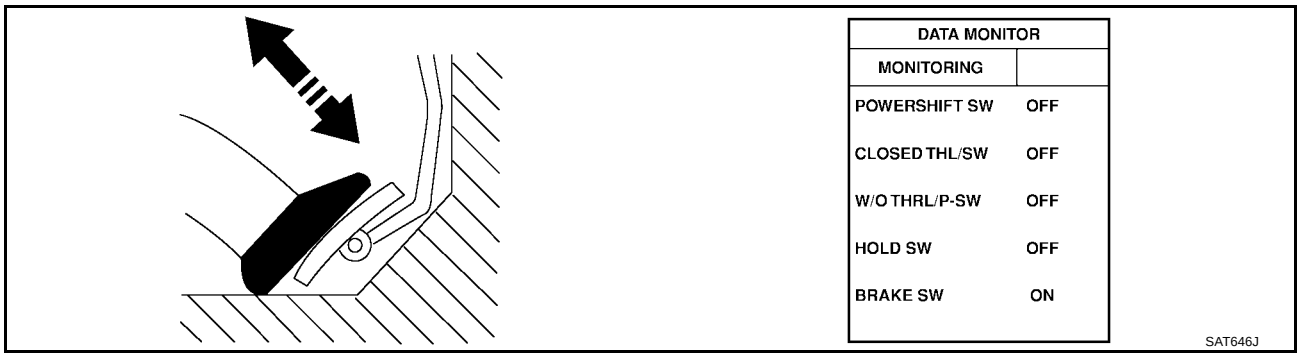
- Overdrive control switch
  Refer to AT-243, "Overdrive Control Switch" .
- Harness for short or open between TCM and overdrive control switch (Main harness)
- Harness for short or open of ground circuit for overdrive control switch (Main harness)

4. CHECK THROTTLE POSITION SWITCH CIRCUIT (WITH CONSULT-II)

With CONSULT-II

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

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



OK or NG

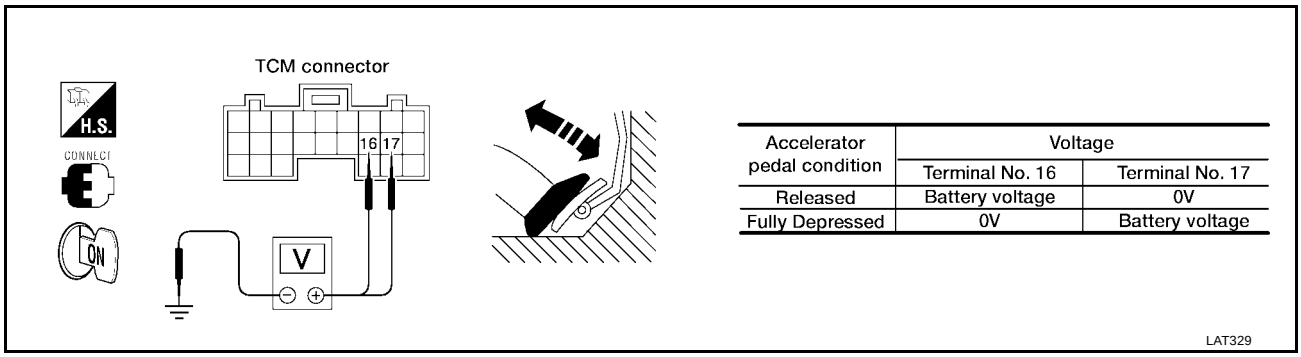
OK >> GO TO 6
NG >> Check the following items:

- Throttle position switch
  Refer to AT-245, "Throttle Position Switch" .
- Harness for short or open between ignition switch and throttle position switch (Main harness)
- Harness for short or open between throttle position switch and TCM (Main harness)

5. CHECK THROTTLE POSITION SWITCH CIRCUIT (WITHOUT CONSULT-II)

Without CONSULT-II

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



Accelerator pedal condition	Voltage	
	Terminal No. 16	Terminal No. 17
Released	Battery voltage	0V
Fully Depressed	0V	Battery voltage

OK or NG

OK >> GO TO 6
NG >> Check the following items:

- Throttle position switch
  Refer to AT-245, "Throttle Position Switch" .
- Harness for short or open between ignition switch and throttle position switch (Main harness)
- Harness for short or open between throttle position switch and TCM (Main harness)

6. CHECK DTC

Perform AT-239, "DIAGNOSTIC PROCEDURE" .

OK or NG

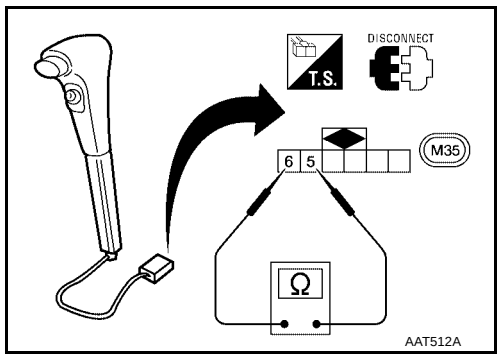
OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

COMPONENT INSPECTION

Overdrive Control Switch

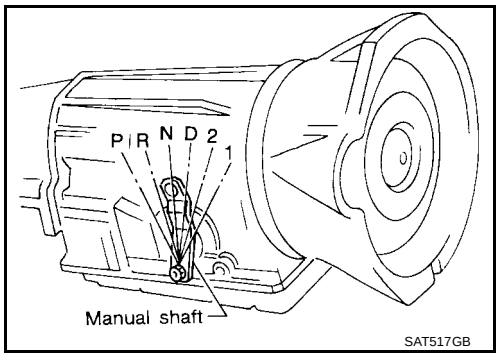
- Check continuity between terminals 5 and 6.

Continuity:
Switch position ON : No
Switch position OFF : Yes

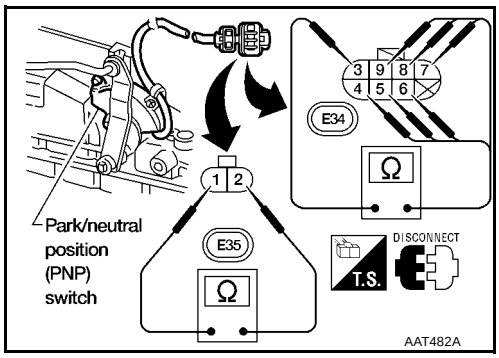


PNP Switch

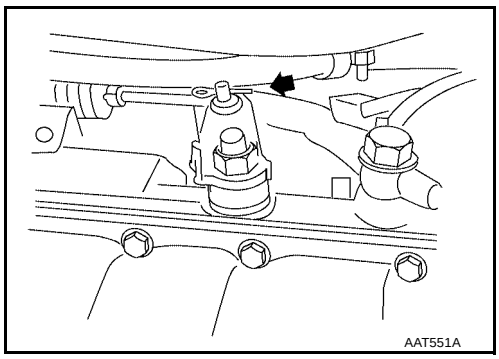
1. Check continuity between terminals 1 and 2 and between terminals 3 and (4, 5, 6, 7, 8, 9) while moving manual shaft through each position.



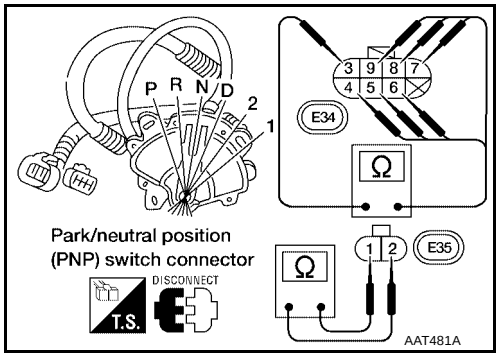
Lever position	Terminal No.	
P	1 - 2	3 - 4
R		3 - 5
N	1 - 2	3 - 6
D		3 - 7
2		3 - 8
1		3 - 9



2. If NG, check again with manual control linkage disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control linkage. Refer to AT-257, "Manual Control Linkage 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-256, "Park/Neutral Position (PNP) Switch Adjustment" .
6. If NG on step 4, replace PNP switch.

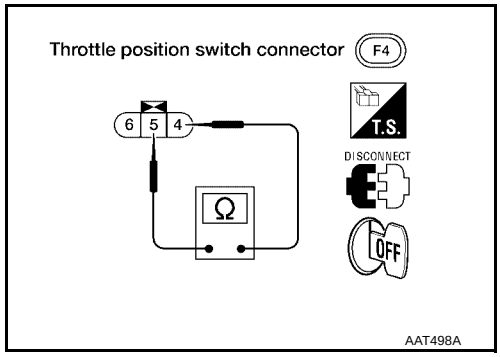


Throttle Position Switch

Closed Throttle Position Switch (Idle Position)

- Check continuity between terminals 4 and 5.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

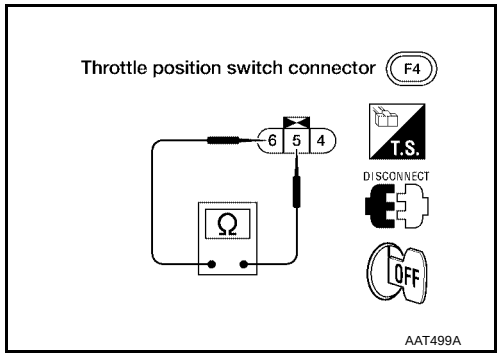


- To adjust closed throttle position switch, refer to EC-637, "Basic Inspection" (VG33E) or EC-1237, "Basic Inspection" (VG33ER).

Wide Open Throttle Position Switch

- Check continuity between terminals 5 and 6.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes



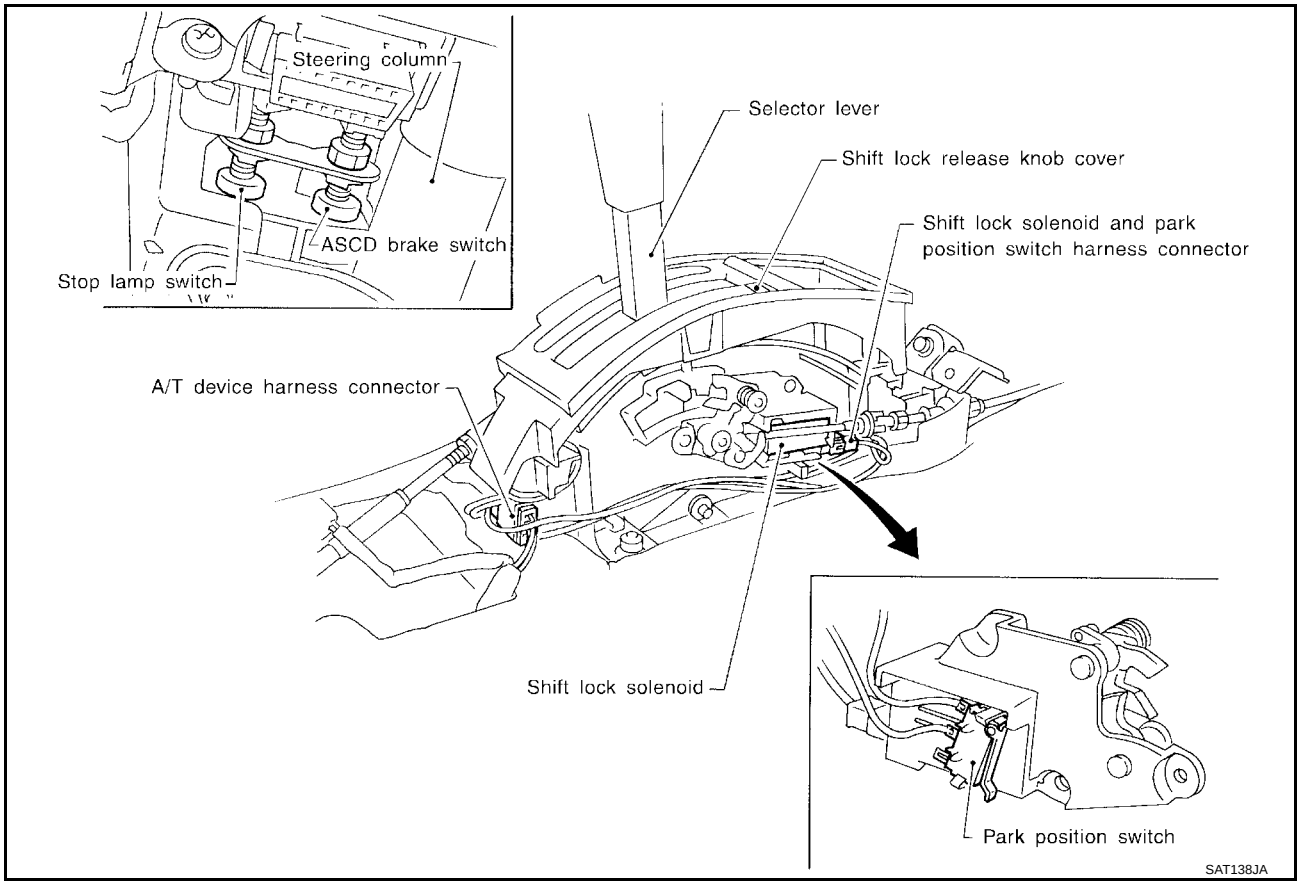
A/T SHIFT LOCK SYSTEM

PFP:34950

Description

ECS005P8

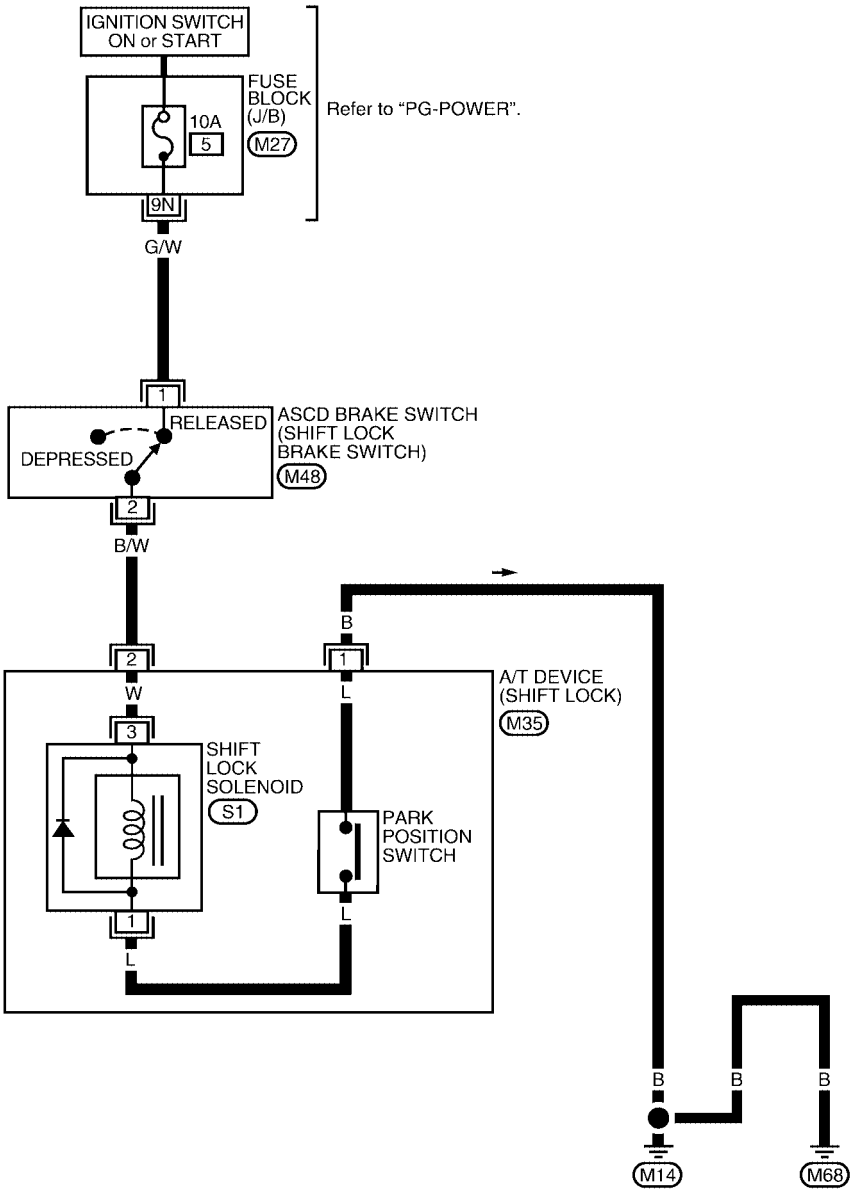
- The mechanical key interlock mechanism also operates as a shift lock:
  With the key switch turned to ON, the selector lever cannot be shifted from P (park) to any other position unless the brake pedal is depressed.
  With the key removed, the selector lever cannot be shifted from P to any other position.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

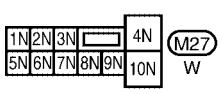


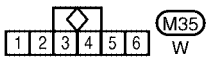
Wiring Diagram — SHIFT —

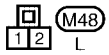
ECS005P9

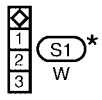
AT-SHIFT-01











★: This connector is not shown in "HARNESS LAYOUT" of PG section.

LCWA0052E

Diagnostic Procedure

ECS005PA

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-251, "KEY INTERLOCK CABLE" .

2. CHECK SELECTOR LEVER POSITION

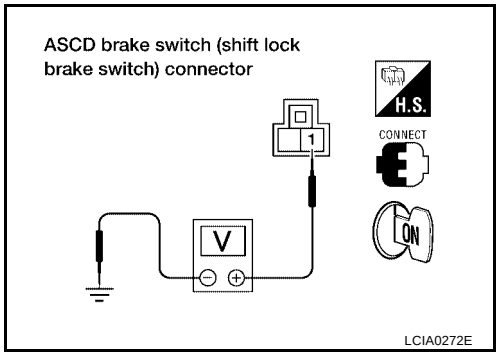
Check selector lever position for damage.

OK or NG

OK >> GO TO 3
NG >> Check selector lever. Refer to AT-256, "Park/Neutral Position (PNP) Switch Adjustment" and AT-257, "Manual Control Linkage Adjustment" .

3. CHECK POWER SOURCE

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between ASCD brake switch (shift lock brake switch) harness connector M48 terminal 1 G/W and ground.



Does battery voltage exist?

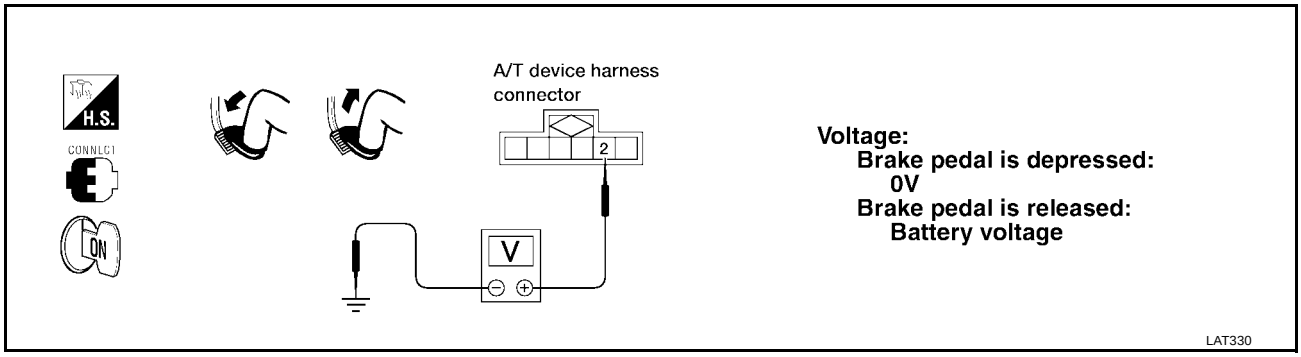
Yes >> GO TO 4
No >> Check the following items:

- Harness for short or open between battery and ASCD brake switch (shift lock brake switch) harness terminal 1
- Fuse
- Ignition switch
  Refer to PG-8, "POWER SUPPLY ROUTING" .

4. CHECK INPUT SIGNAL (BRAKE SWITCH)

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

- Check voltage between A/T device harness connector M35 terminal 2 (B/W) and ground.



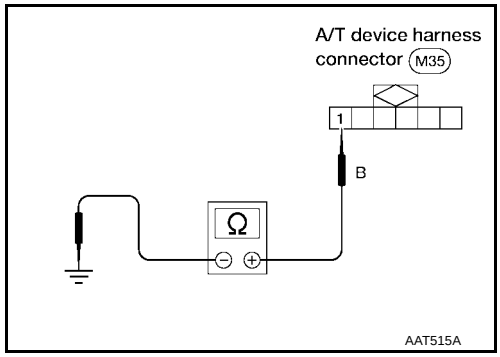
OK or NG

OK >> GO TO 5
NG >> Check the following items:

- Harness for short or open between A/T device harness connector 2 and ASCD brake switch (shift lock brake switch) harness connector 2
- ASCD brake switch (shift lock brake switch)
  Refer to AT-250, "ASCD BRAKE SWITCH (SHIFT LOCK BRAKE SWITCH)" .

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 terminal 1 and ground.



OK or NG

OK >> GO TO 6
NG >> Repair harness or connector.

6. CHECK PARK POSITION SWITCH

Refer to AT-250, "PARK POSITION SWITCH" .

OK or NG

OK >> GO TO 7
NG >> Replace park position switch.

7. CHECK SHIFT LOCK SOLENOID

Refer to AT-250, "SHIFT LOCK SOLENOID" .

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

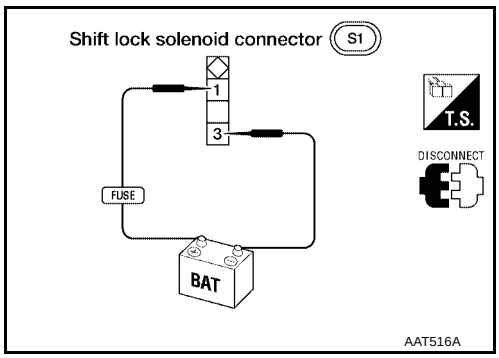
OK >> **INSPECTION END**
NG >> 1. Perform A/T device input/output signal inspection test.
2. If NG, recheck harness connector connection.

Component Check

ECS005PB

SHIFT LOCK SOLENOID

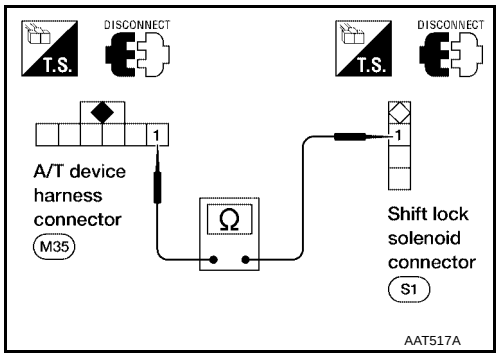
- Check operation by applying battery voltage between shift lock solenoid connector terminals 1 and 3.



PARK POSITION SWITCH

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

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

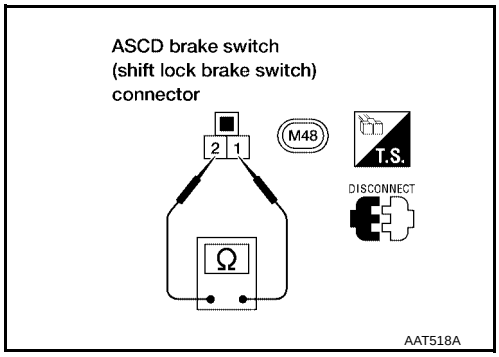


ASCD BRAKE SWITCH (SHIFT LOCK BRAKE SWITCH)

- Check continuity between ASCD brake switch (shift lock brake switch) harness connector terminals 1 and 2.

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

Check ASCD brake switch (shift lock brake switch) after adjusting brake pedal — refer to BR-7, "Adjustment" .

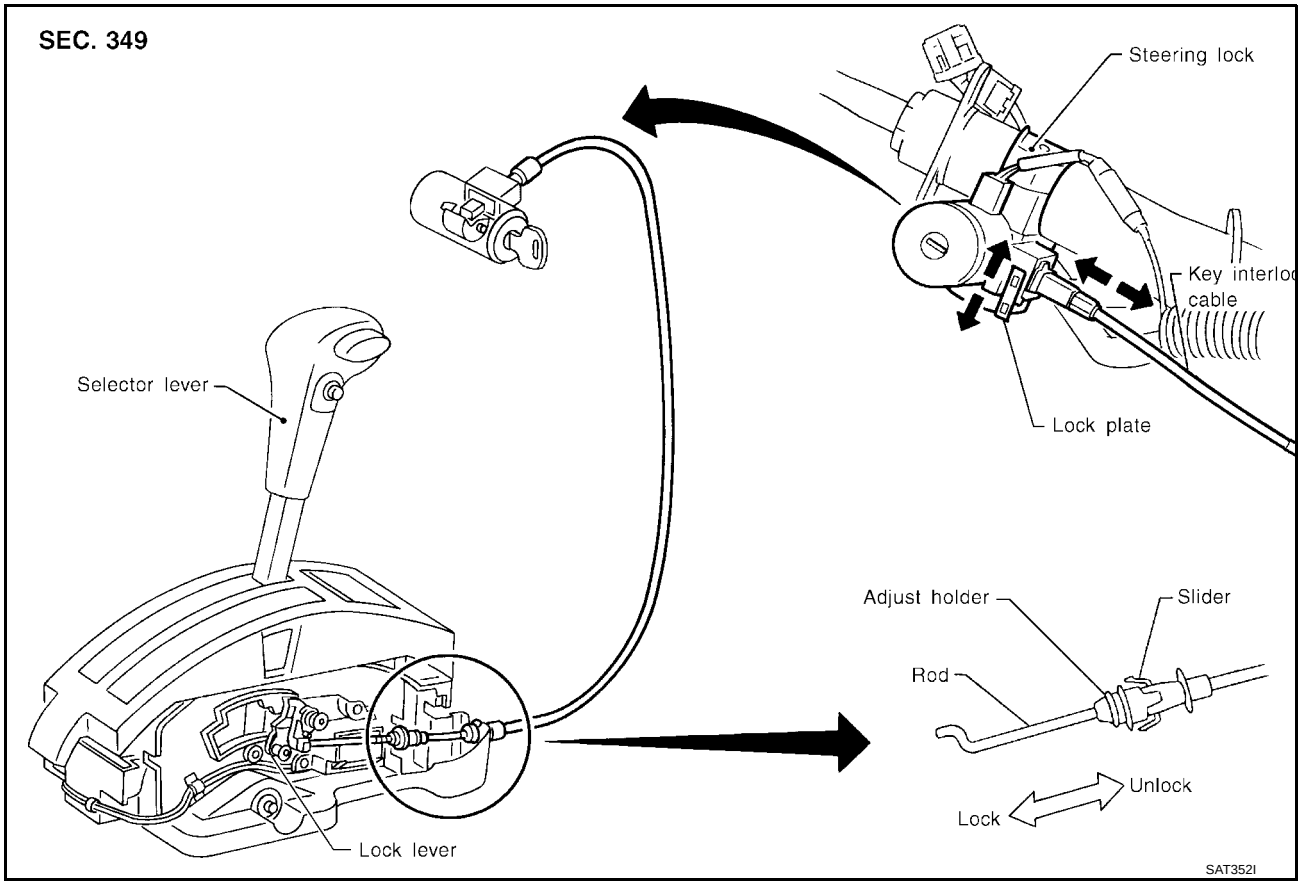


KEY INTERLOCK CABLE

PFP:34908

Components

ECS005PC



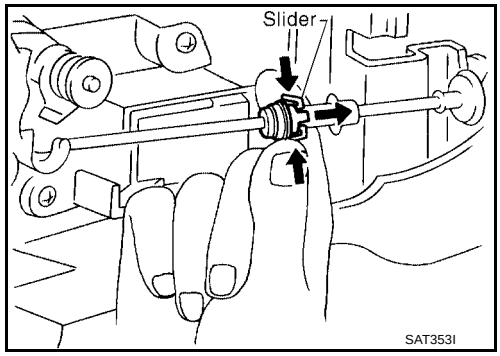
CAUTION:

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

Removal

ECS005PD

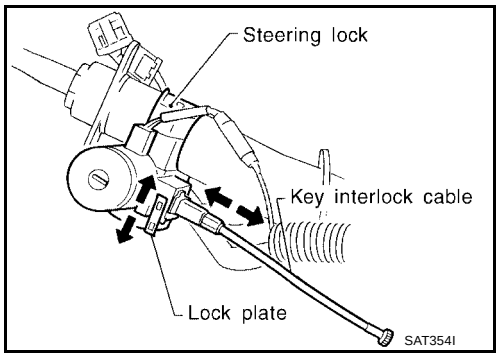
Unlock slider from adjuster holder and remove rod from cable.



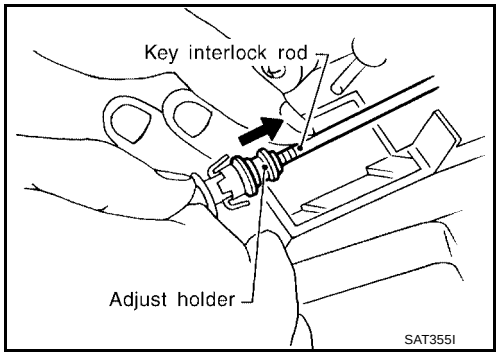
Installation

ECS006GI

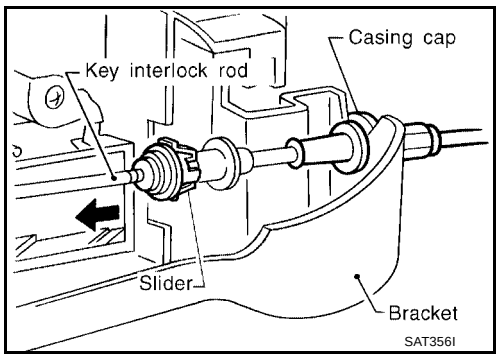
1. Set key interlock cable to steering lock assembly and install lock plate.
2. Clamp cable to steering column and fix to control cable with band.
3. Set selector lever to P position.



4. Insert interlock rod into adjuster holder.



5. Install casing cap to bracket.
6. Move slider in order to fix adjuster holder to interlock rod.



ON-VEHICLE SERVICE

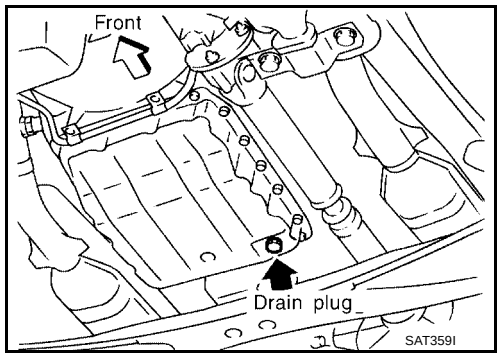
PFP:00000

Control Valve Assembly and Accumulators

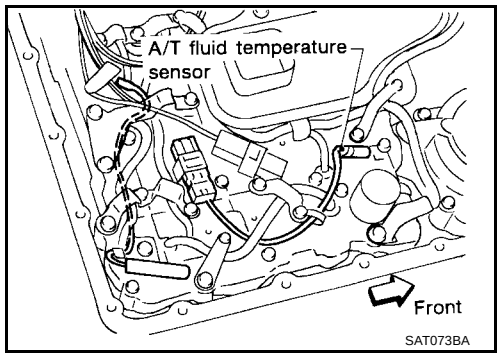
ECS005PF

REMOVAL

1. Drain ATF through drain plug.
2. Remove exhaust front tube.
3. Remove oil pan and gasket.
   - **Always replace oil pan bolts as they are self-sealing bolts.**



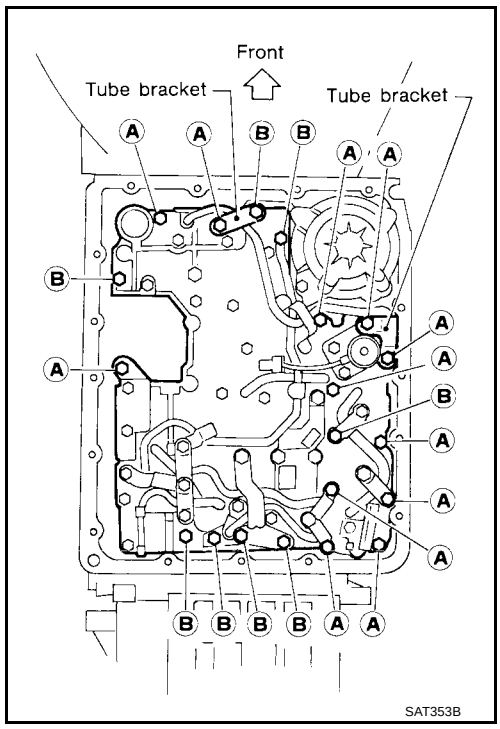
4. Remove A/T fluid temperature sensor if necessary.
5. Remove oil strainer.



6. Remove control valve assembly by removing fixing bolts and disconnecting harness connector.

Bolt length and location

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



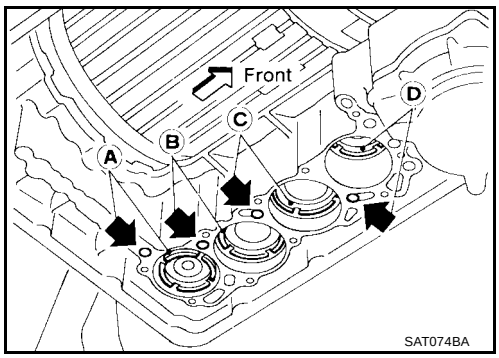
7. Remove solenoids and valves from valve body if necessary.
8. Remove terminal cord assembly if necessary.

9. Remove accumulator **A, B, C** and **D** by applying compressed air if necessary.

- **Hold each piston with rag.**

10. Reinstall any part removed.

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

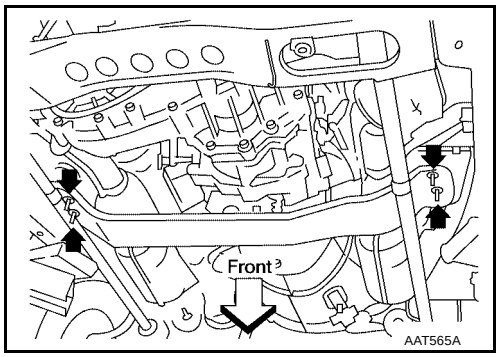


Revolution Sensor Replacement

ECS005PG

—4WD MODEL—

1. Remove rear engine mounting member from side member while supporting A/T with transfer case with jack. Tighten rear engine mounting member to the specified torque. Refer to EM-127, "Removal and Installation" .

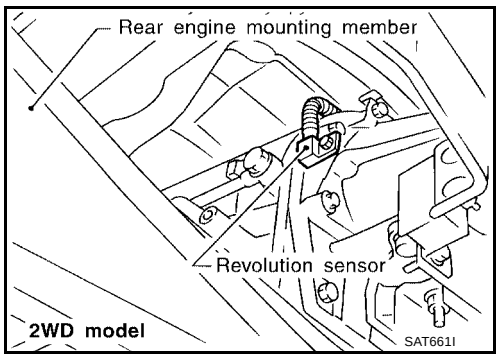


2. Lower A/T with transfer case as much as possible.
3. Remove revolution sensor from A/T.
4. Reinstall any part removed.

- **Always use new sealing parts.**

—2WD MODEL—

- Remove revolution sensor from A/T.
- **Always use new sealing parts.**

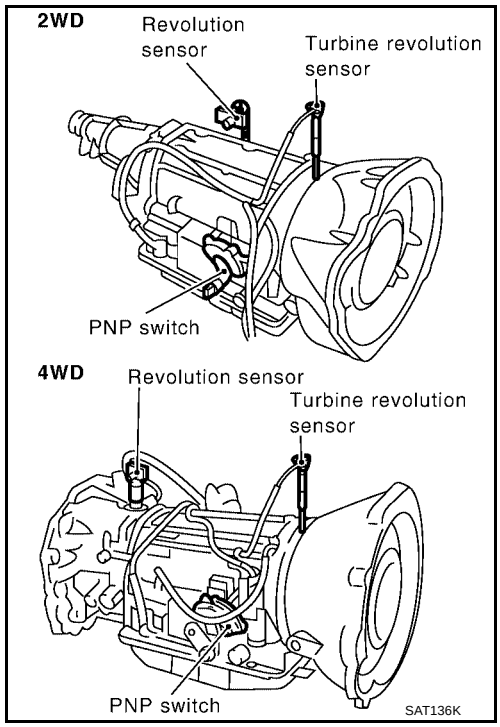


Turbine Revolution Sensor Replacement (VG33ER only)

ECS005PH

1. Remove A/T assembly. Refer to AT-258, "Removal" .
2. Remove turbine revolution sensor from A/T assembly upper side.
3. Reinstall any part removed.

- **Always use new sealing parts.**



Rear Oil Seal Replacement

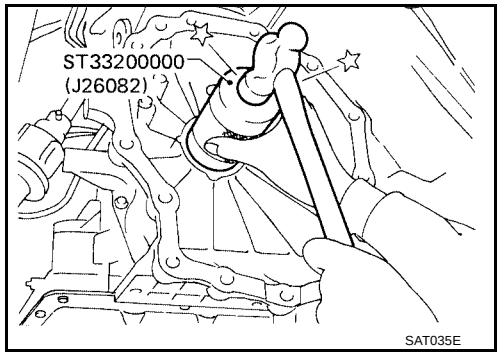
ECS005PI

—4WD MODEL—

1. Remove transfer case from vehicle. Refer to TF-11, "Removal" .
2. Remove rear oil seal.
3. Install rear oil seal.

- **Apply ATF before installing.**

4. Reinstall any part removed.

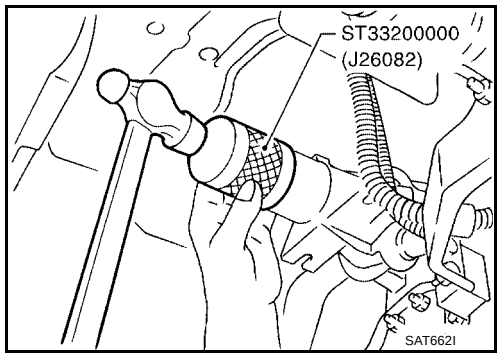


—2WD MODEL—

1. Remove propeller shaft from vehicle. Refer to PR-8, "Removal and Installation" .
2. Remove rear oil seal.
3. Install rear oil seal.

- **Apply ATF before installing.**

4. Reinstall any part removed.



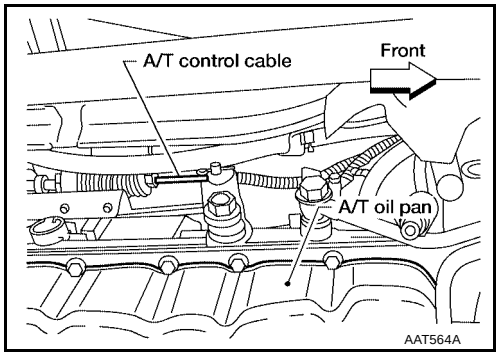
Parking Components Inspection

ECS005PJ

—4WD MODEL—

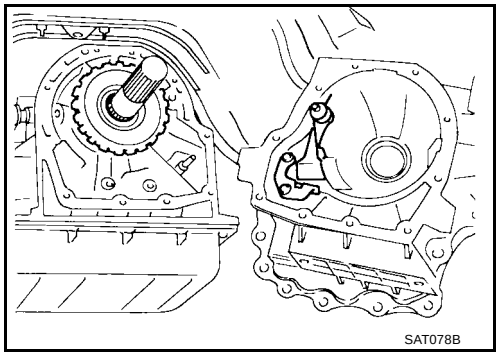
1. Remove propeller shaft. Refer to PR-8, "Removal and Installation" .

2. Remove transfer case from vehicle. Refer to TF-11, "Removal" .
3. Remove A/T control cable bracket from transmission case.



4. Support A/T assembly with a jack.
5. Remove adapter case from transmission case.
6. Replace parking components if necessary.
7. Reinstall any part removed.

- **Always use new sealing parts.**



—2WD MODEL—

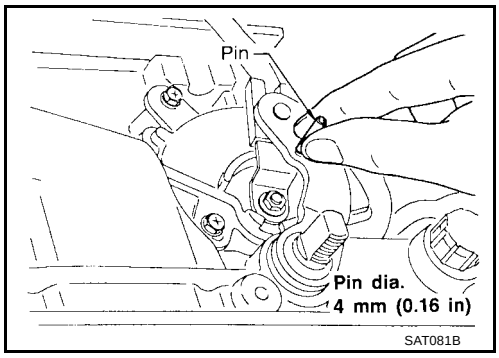
1. Remove propeller shaft from vehicle. Refer to PR-8, "Removal and Installation" .
2. Support A/T assembly with jack.
3. Remove rear engine mounting member. Tighten rear engine mounting member to the specified torque. Refer to EM-127, "Removal and Installation" .
4. Remove rear extension from transmission case.
5. Replace parking components if necessary.
6. Reinstall any part removed.

- **Always use new sealing parts.**

Park/Neutral Position (PNP) Switch Adjustment

ECS005PK

1. Remove manual control linkage from manual shaft of A/T assembly.
2. Set manual shaft of A/T assembly 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 of A/T assembly as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of park/neutral position (PNP) switch. Refer to AT-103, "PNP SWITCH" .

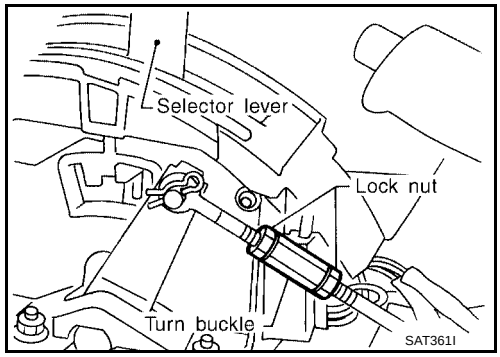


Manual Control Linkage Adjustment

ECS006GJ

Move selector lever from P position to 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 linkage needs adjustment.

1. Place selector lever in P position.
2. Loosen lock nuts.

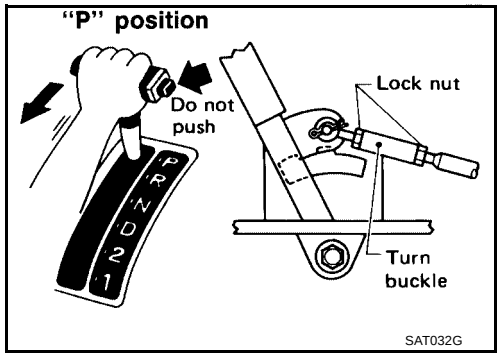


3. Tighten turn buckle until aligns with inner cable, pulling selector lever toward R position side without pushing button.
4. Back off turn buckle 1 turn and tighten lock nuts to the specified torque.

Lock nut :

: 4.4 - 5.9 N·m (0.45 - 0.60 kg-m, 39.1 - 52.1 in-lb)

5. Move selector lever from P position to 1 position. Make sure that selector lever can move smoothly.



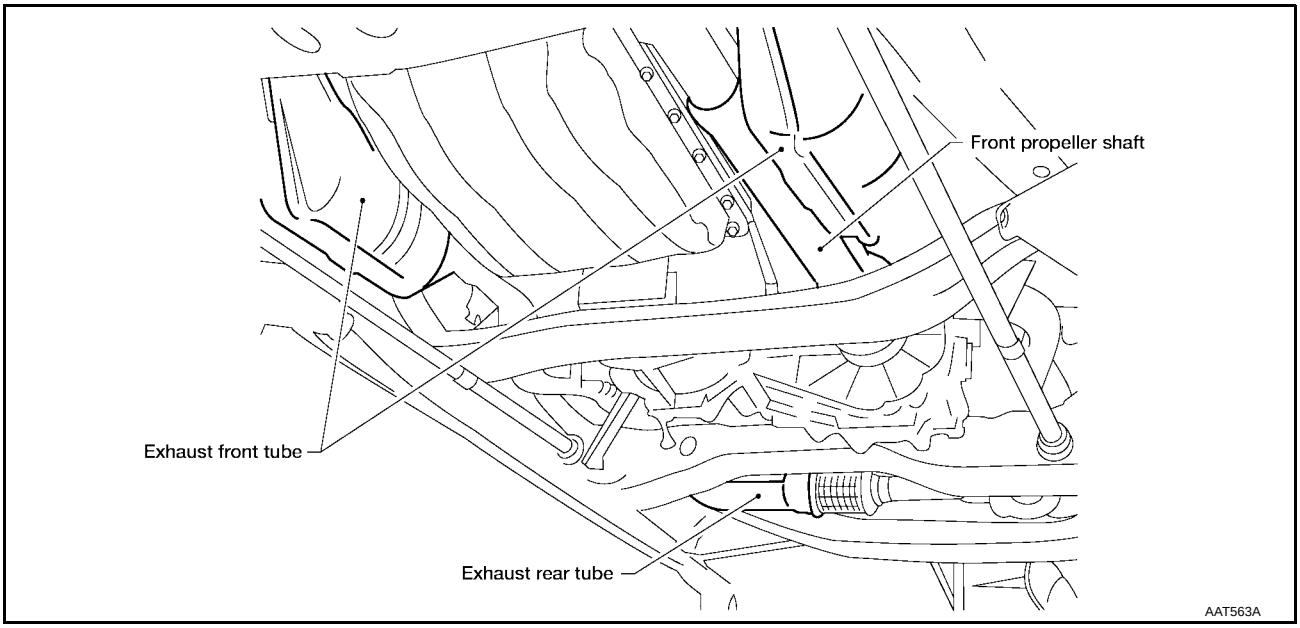
REMOVAL AND INSTALLATION

PFP:00000

Removal

ECS005PM

—4WD MODEL—

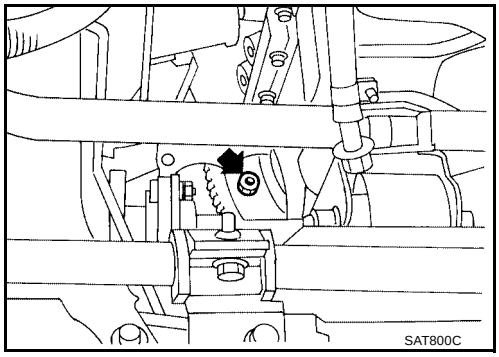


CAUTION:

When removing the A/T assembly from engine, first remove the crankshaft position sensor (OBD) from the A/T assembly upper side.
Be careful not to damage sensor edge.

1. Remove battery negative terminal.
2. Remove exhaust front and rear tubes.
3. Remove fluid charging pipe from A/T assembly.
4. Remove oil cooler pipe from A/T assembly.
5. Plug up openings such as the fluid charging pipe hole, etc.
6. Remove propeller shaft. Refer to PR-8, "Removal and Installation" .
7. Remove transfer control linkage from transfer. Refer to TF-11, "Removal" .
   - **Insert plug into rear oil seal after removing rear propeller shaft.**
   - **Be careful not to damage spline, sleeve yoke and rear oil seal.**
8. Remove A/T control cable from A/T assembly.
9. Disconnect A/T turbine revolution sensor (VG33ER) and vehicle speed sensor harness connectors.
10. Remove starter motor.

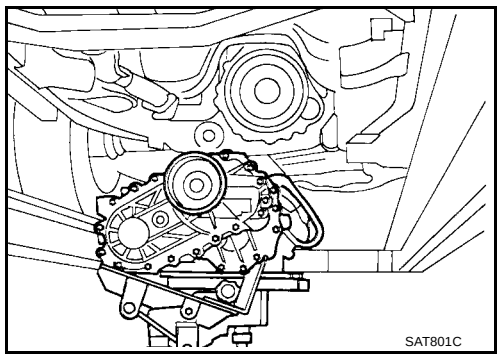
Tightening torque : Refer to SC-23, "VG33E AND VG33ER MODELS" .



11. Remove gusset and rear plate cover securing engine to A/T assembly.
12. Remove bolts securing torque converter to drive plate.

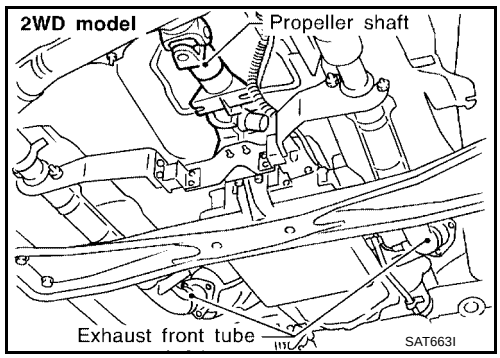
- **Remove the bolts by turning crankshaft.**

13. Support A/T and transfer assembly with a jack.
14. Remove rear engine mounting member from body and A/T assembly. Tighten rear engine mounting member to the specified torque. Refer to EM-127, "Removal and Installation" .
15. Remove bolts securing A/T assembly to engine.
16. Lower A/T assembly with transfer.



—2WD MODEL—

1. Remove battery negative terminal.
2. Remove exhaust front and rear tubes.
3. Remove fluid charging pipe from A/T assembly.
4. Remove oil cooler pipe from A/T assembly.
5. Plug up openings such as the fluid charging pipe hole, etc.
6. Remove propeller shaft. Refer to PR-8, "Removal and Installation" .
   - **Insert plug into rear oil seal after removing rear propeller shaft.**
   - **Be careful not to damage spline, sleeve yoke and rear oil seal**.



7. Remove A/T control cable from A/T assembly.
8. Disconnect A/T turbine revolution sensor (VG33ER) and vehicle speed sensor harness connectors.
9. Remove starter motor.

Tightening torque : Refer to SC-23, "VG33E AND VG33ER MODELS" .

10. Remove gusset and rear plate cover securing engine to A/T assembly.
11. Remove bolts securing torque converter to drive plate.
    - **Remove the bolts by turning crankshaft.**
12. Support A/T assembly with a jack.
13. Remove rear engine mounting member from body and A/T assembly. Tighten rear engine mounting member to the specified torque. Refer to EM-127, "Removal and Installation" .
14. Remove bolts securing A/T assembly to engine.
15. Pull A/T assembly backwards.
    - **Secure torque converter to prevent it from dropping.**
    - **Secure A/T assembly to a jack.**
16. Lower A/T assembly.

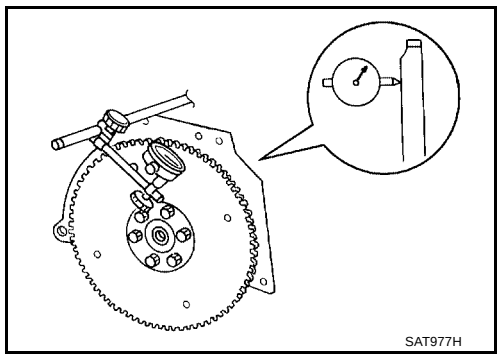
Installation

ECS005PN

- Drive plate runout

Maximum allowable runout : Refer to EM-140, "FLYWHEEL/DRIVE PLATE RUNOUT" .

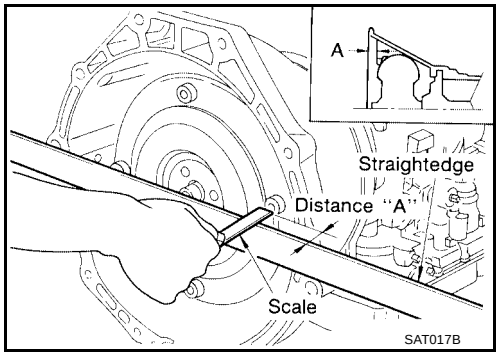
If this runout is out of specification, replace drive plate with ring gear.



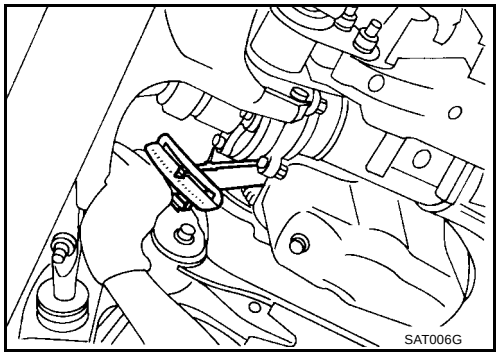
- When connecting torque converter to transmission, measure distance “A” to be certain that they are correctly assembled.

Distance “A”

VG33E	**: 26.0 mm (1.024 in) or more**
VG33ER	**: 25.0 mm (0.984 in) or more**

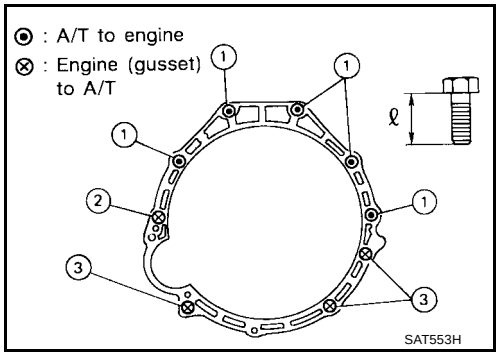


- Install converter to drive plate.
- **After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.**



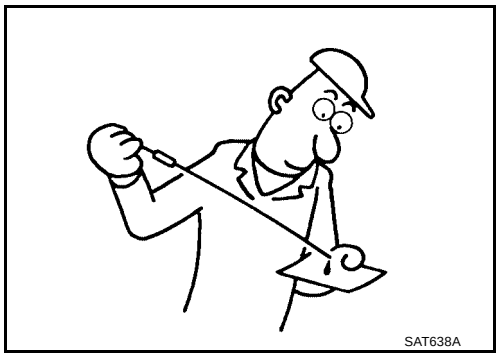
- Tighten bolts securing transmission.

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	Bolt length ℓ mm (in)
1	39 - 49 (4.0 - 5.0, 29 - 36)	47.5 (1.870)
2	39 - 49 (4.0 - 5.0, 29 - 36)	58.0 (2.283)
3	29 - 39 (3.0 - 4.0, 22 - 29)	25.0 (0.984)
Gusset to engine	29 - 39 (3.0 - 4.0, 22 - 29)	20.0 (0.787)



- Reinstall any part removed.

- Check fluid level in transmission.
- Move selector lever through all positions to be sure that transmission operates correctly.
  With parking brake applied, rotate engine at idling. Move selector lever through N to D, to 2, to 1 and to R positions. A slight shock should be felt by hand gripping selector each time transmission is shifted.
- Perform road test. Refer to AT-66, "Road Test" .



OVERHAUL

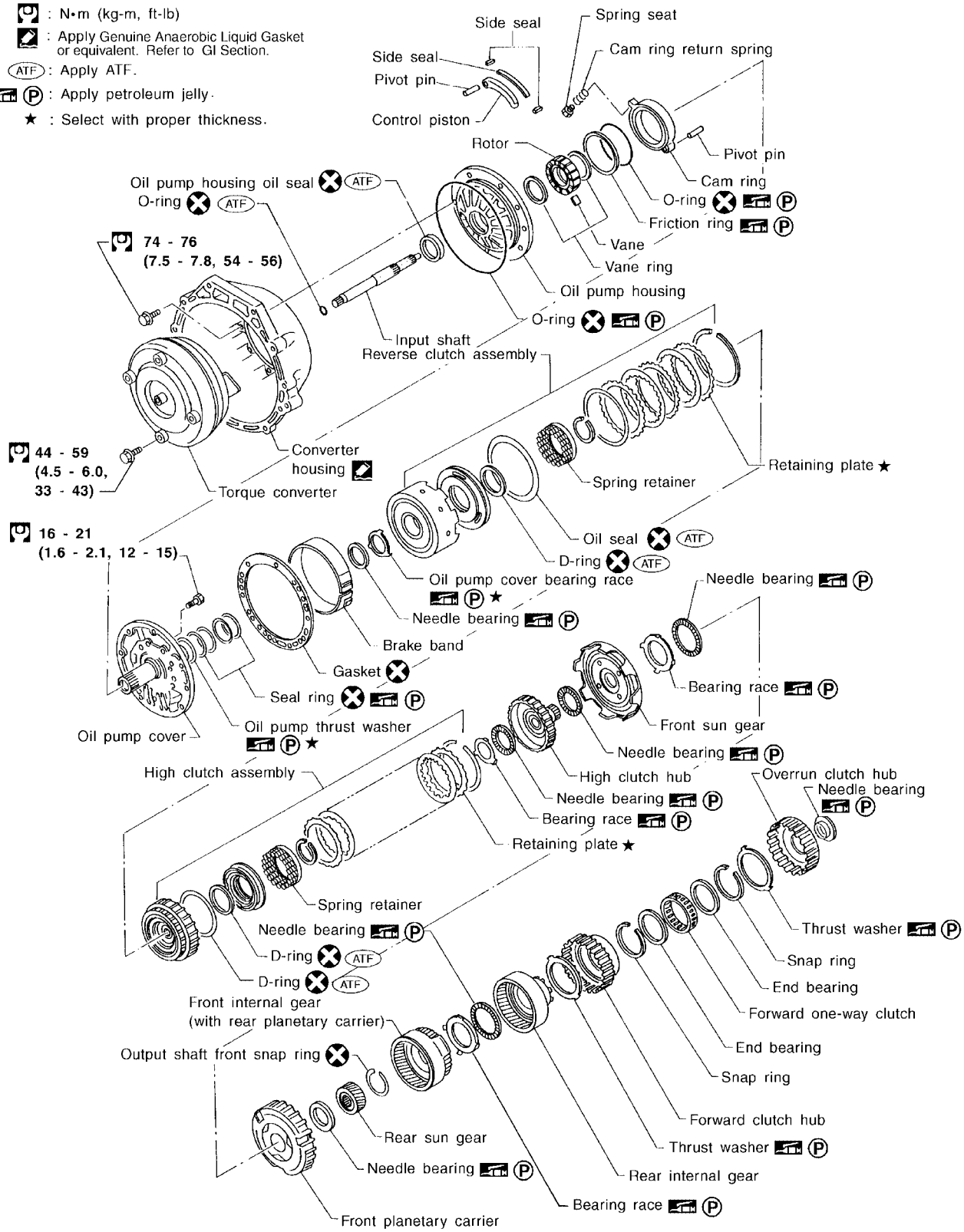
PFP:00000

Components

ECS005PO

SEC. 311•313•315

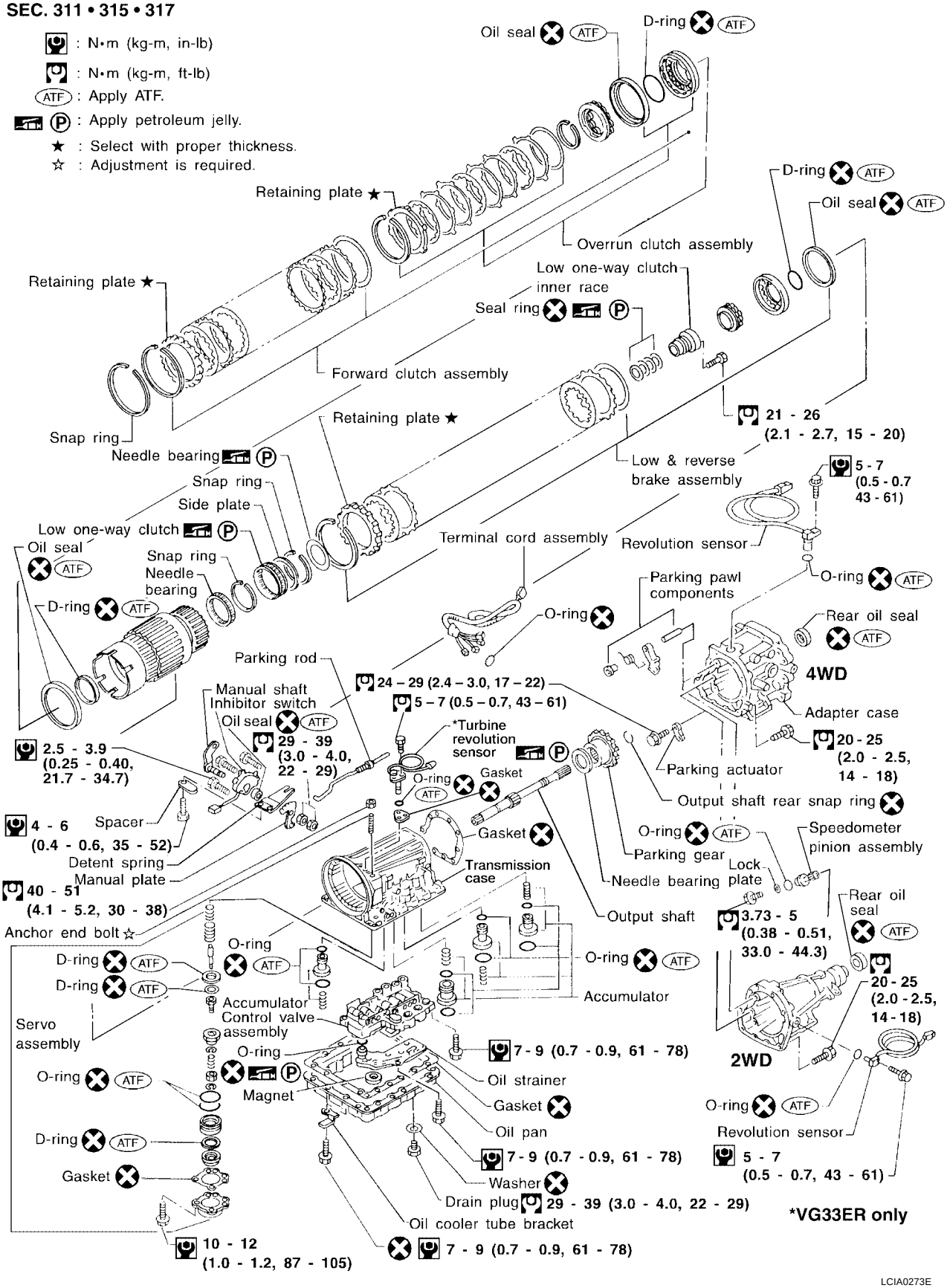
: N•m (kg-m, ft-lb)
: Apply Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI Section.
(ATF) : Apply ATF.
(P) : Apply petroleum jelly.
★ : Select with proper thickness.



WAT515

SEC. 311 • 315 • 317

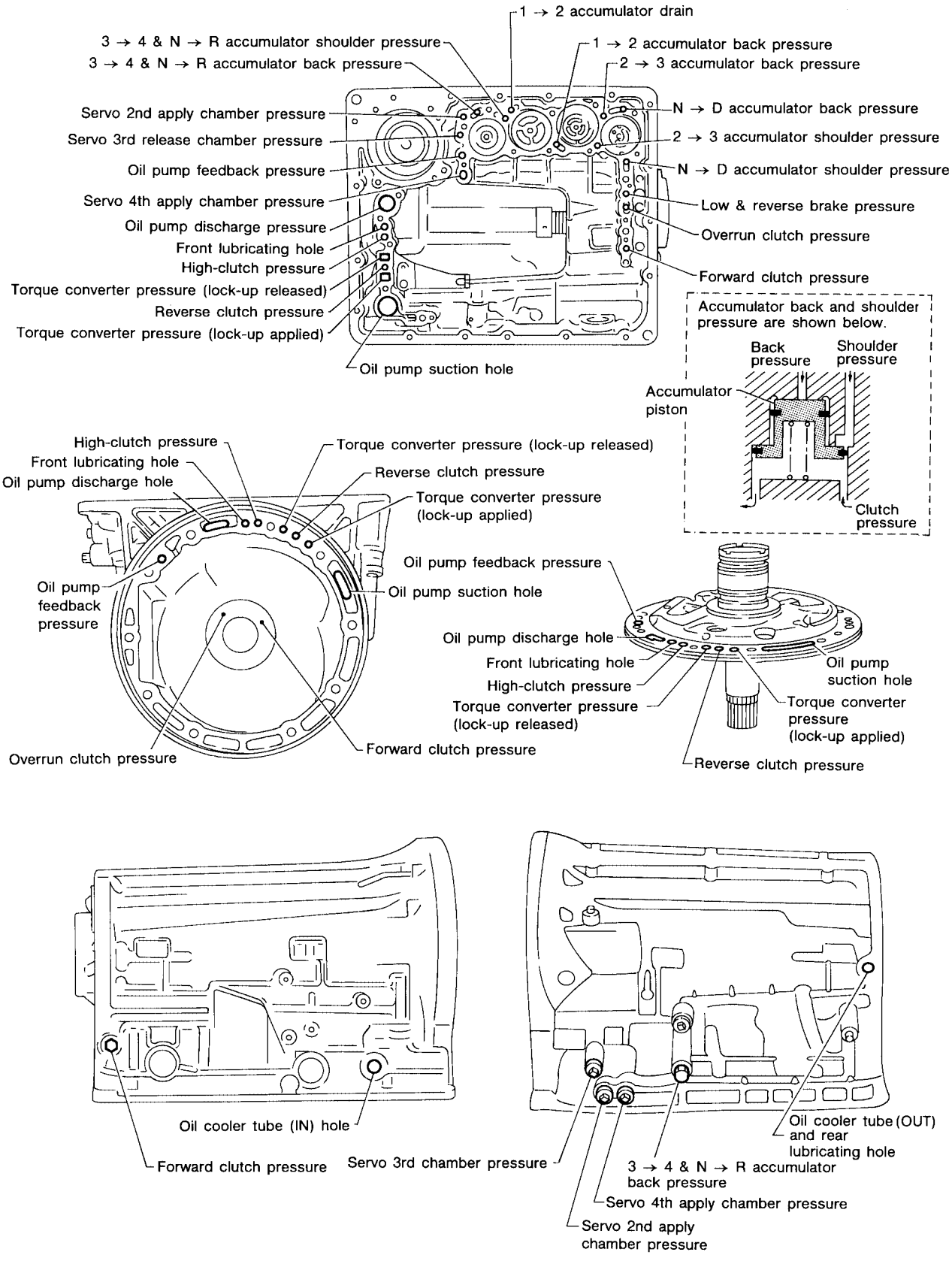
: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)
ATF : Apply ATF.
Ⓟ : Apply petroleum jelly.
★ : Select with proper thickness.
☆ : Adjustment is required.



LCIA0273E

Oil Channel

ECS005PP



LCIA0274E

Locations of Needle Bearings, Thrust Washers and Snap Rings

ECS005PQ

Outer diameter of snap rings

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

Thrust washers

Item number	Color
①	Black
⑤	White

Outer diameter of needle bearings

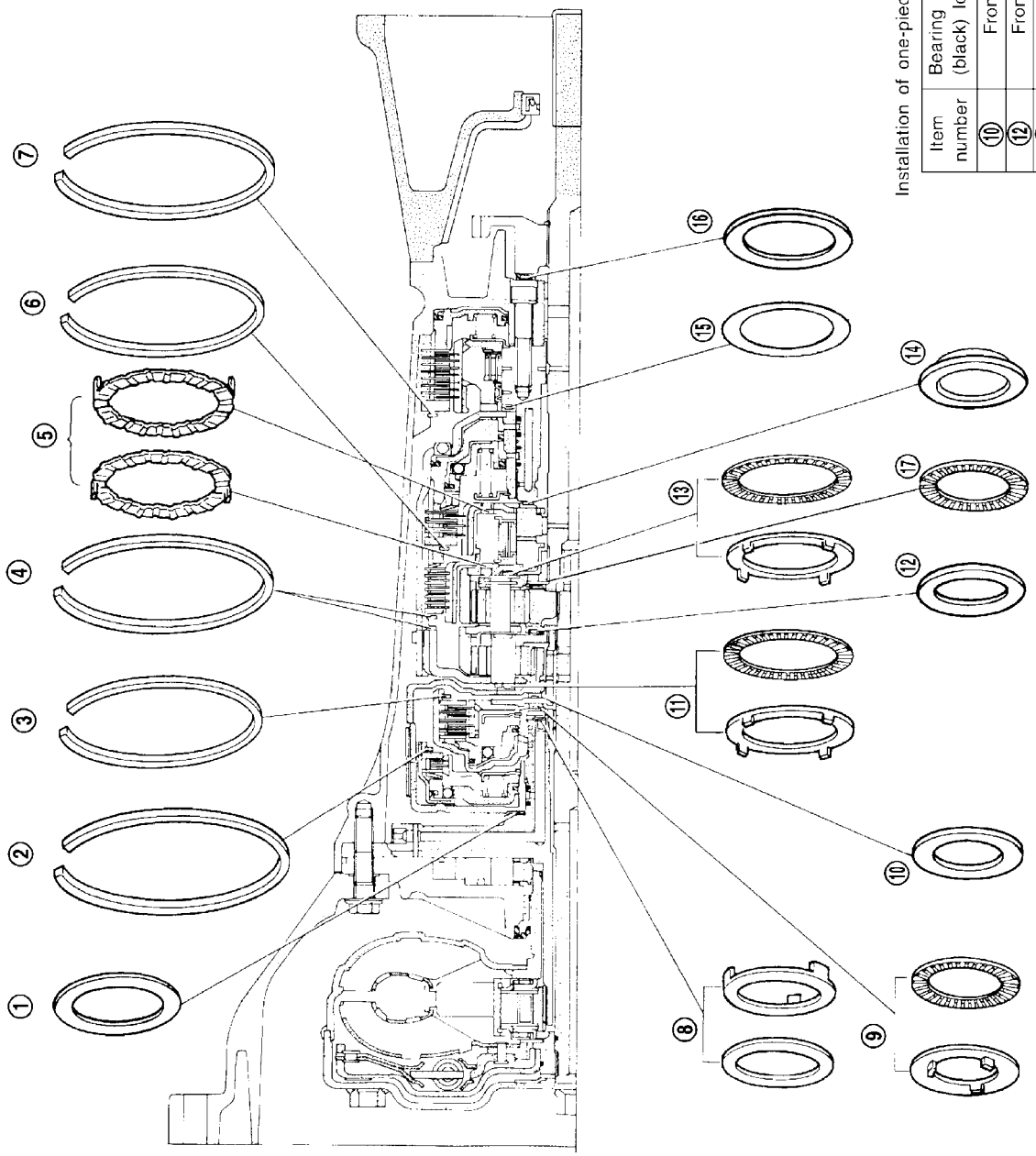
Item number	Outer diameter mm (in)
⑧	47 (1.85)
⑨	53 (2.09)
⑪	78 (3.07)
⑫	53 (2.09)
⑬	78 (3.07)
⑭	57 (2.24)
⑮	78.1 (3.075)
⑯	64 (2.52)
⑰	53 (2.09)

Installation of one-piece bearings

Item number	Bearing race (black) location
⑩	Front
⑫	Front
⑮	Rear side
⑯	Rear side

Inner diameter of bearing races

Item number	Outer diameter mm (in)
⑪	58 (2.315)
⑬	58 (2.315)



WAT378

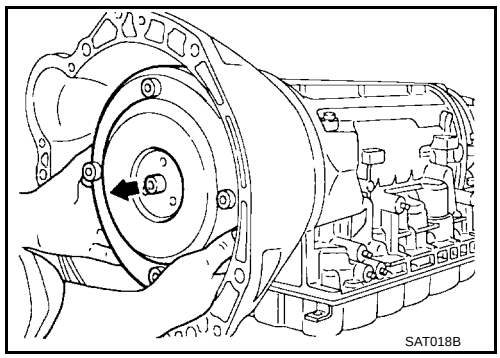
DISASSEMBLY

PFP:31020

Disassembly

ECS006GK

1. Drain ATF through drain plug.
2. Remove turbine revolution sensor (VG33ER).
3. Remove torque converter by holding it firmly and turning while pulling straight out.

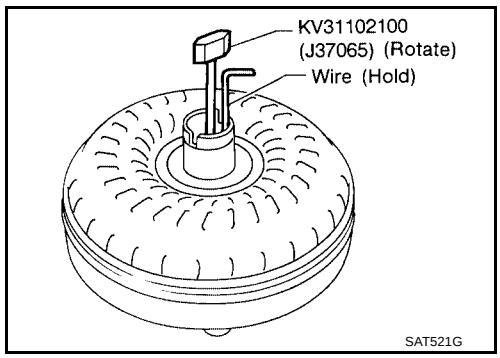


4. Check torque converter one-way clutch.

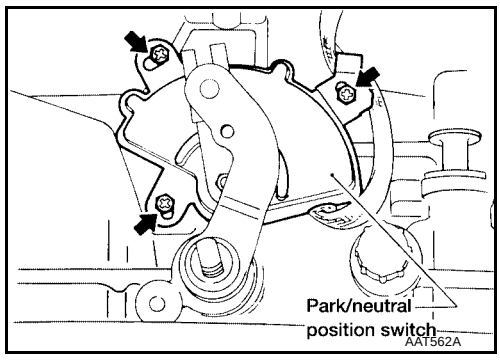
a. Insert Tool into spline of one-way clutch inner race.

b. Hook bearing support unitized with one-way clutch outer race with suitable wire.

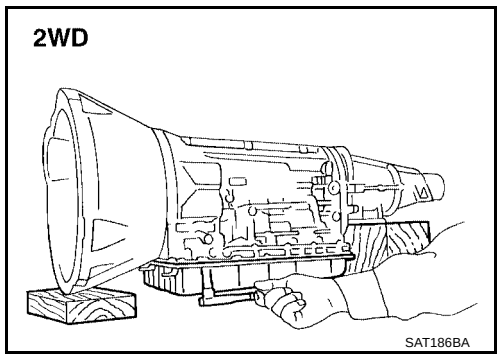
c. Check that one-way clutch inner race rotates only clockwise with Tool while holding bearing support with wire.

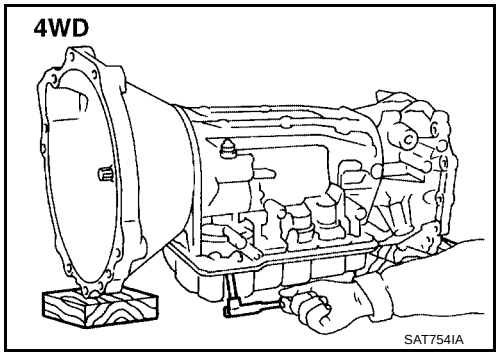


5. Remove park/neutral position (PNP) switch from transmission case.

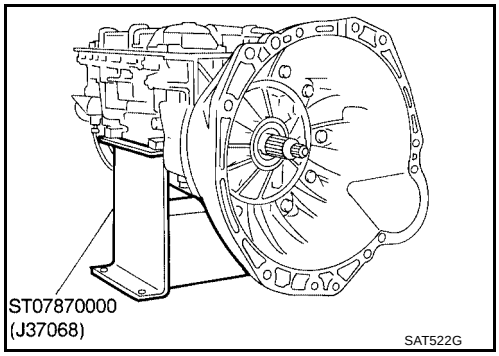


6. Remove oil pan.
   - **Always place oil pan straight down so that foreign particles inside will not move.**
   - **Always replace oil pan bolts as they are self-sealing bolts.**



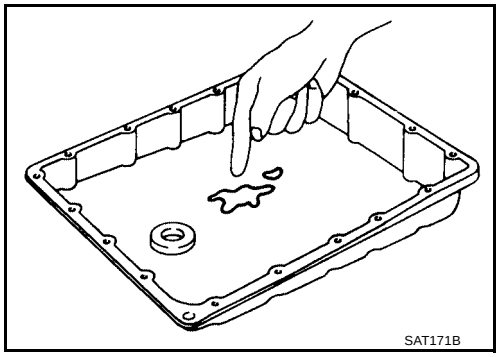


7. Place transmission into Tool with the control valve facing up.



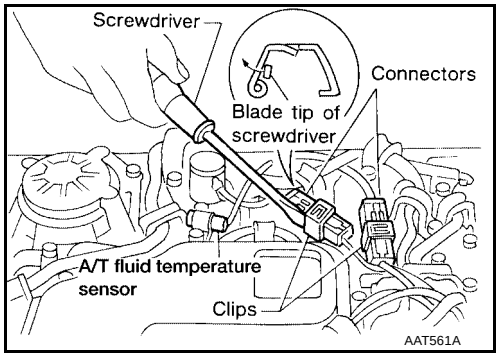
8. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves, 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-30, "RADIATOR" .**



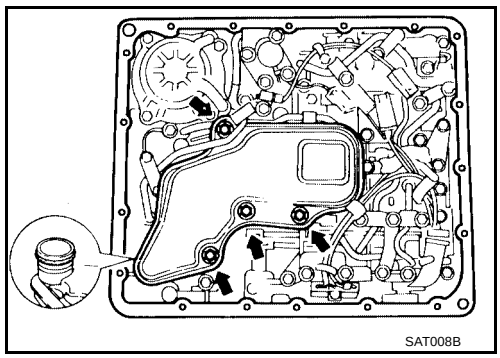
9. Remove torque converter clutch solenoid valve and A/T fluid temperature sensor connectors.

- **Be careful not to damage connector.**

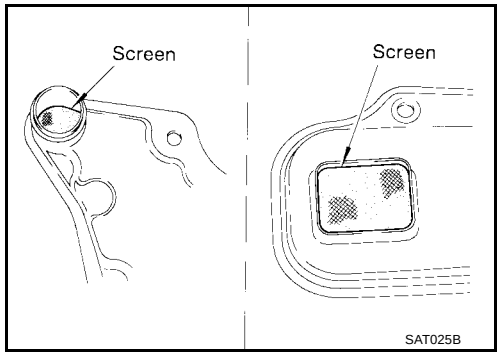


10. Remove oil strainer.

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

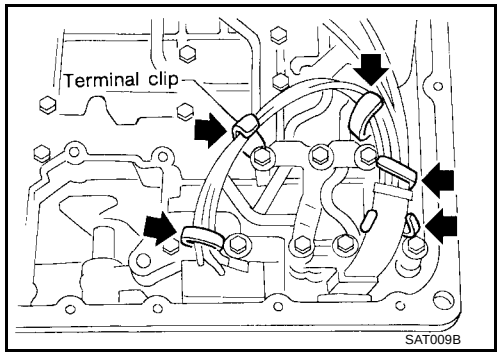


b. Check oil strainer screen for damage.



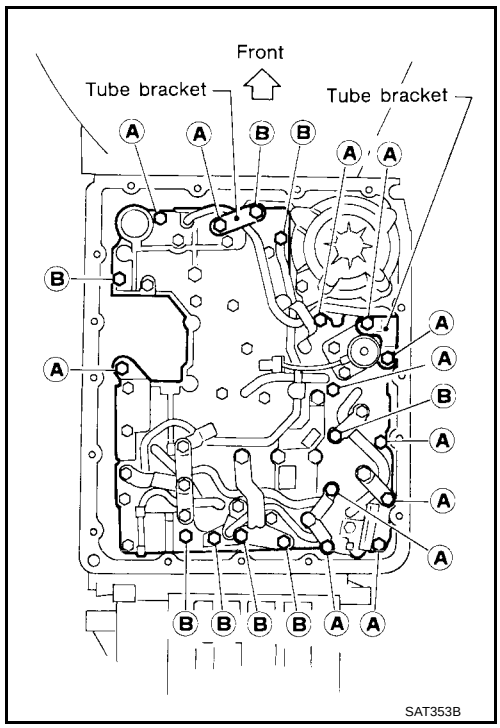
11. Remove control valve assembly.

a. Straighten terminal clips to free terminal cords then remove terminal clips.

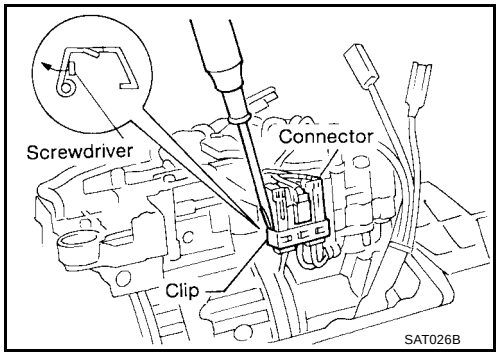


b. Remove bolts A and B, and remove control valve assembly from transmission.

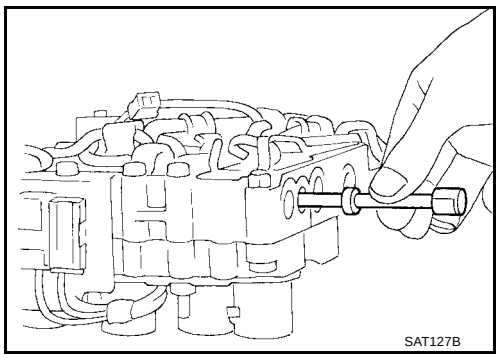
Bolt symbol	Length mm (in)
A	33 (1.30)
B	45 (1.77)



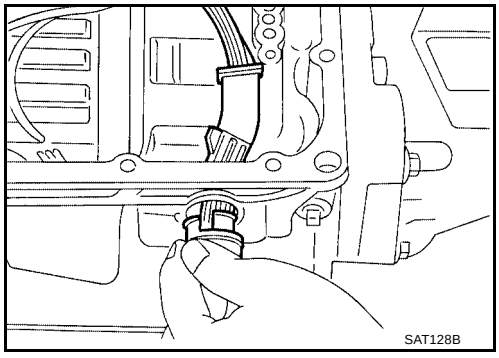
c. Remove solenoid connector.
- **Be careful not to damage connector.**



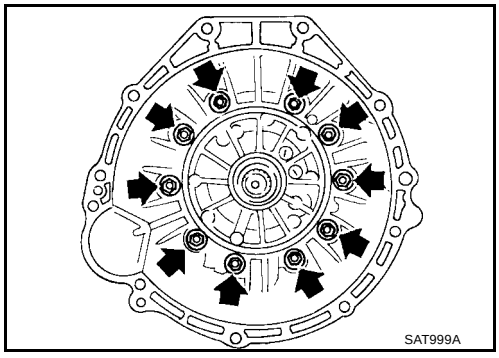
d. Remove manual valve from control valve assembly.



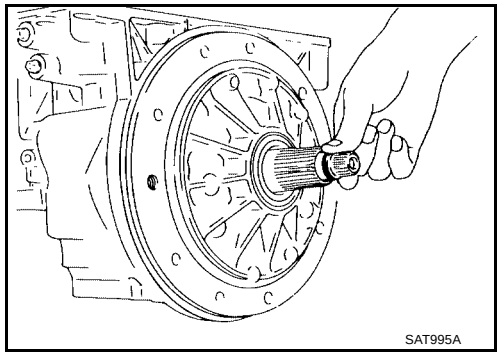
12. Remove terminal cord assembly from transmission case while pushing on stopper.
- **Be careful not to damage cord.**
- **Do not remove terminal cord assembly unless it is damaged.**



13. Remove converter housing from transmission case.
- **Be careful not to scratch converter housing.**

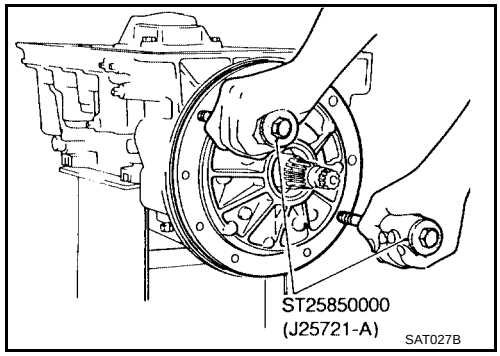


14. Remove O-ring from input shaft.



15. Remove oil pump assembly.

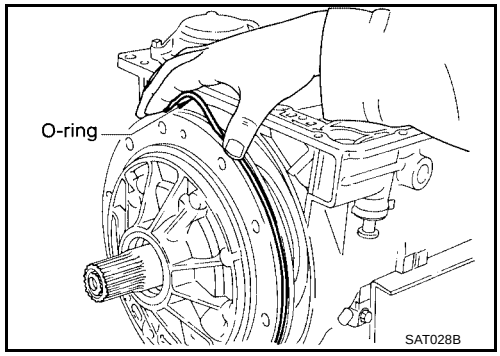
a. Attach Tool to oil pump assembly and extract it evenly from transmission case.



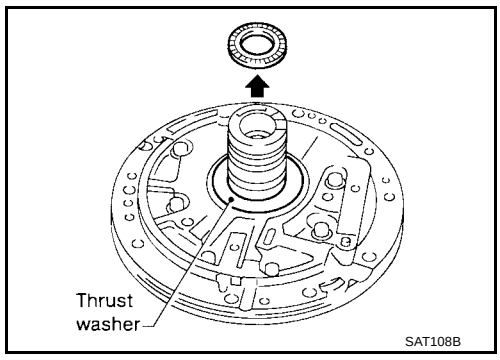
b. Remove O-ring from oil pump assembly.

c. Remove traces of sealant from oil pump housing.

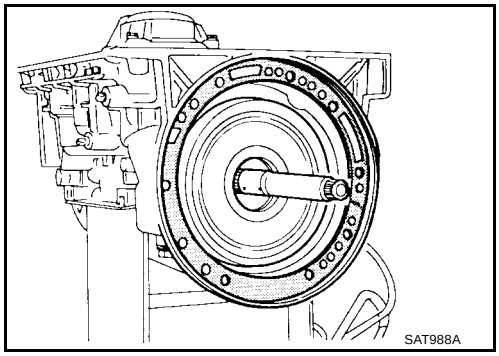
- **Be careful not to scratch pump housing.**



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

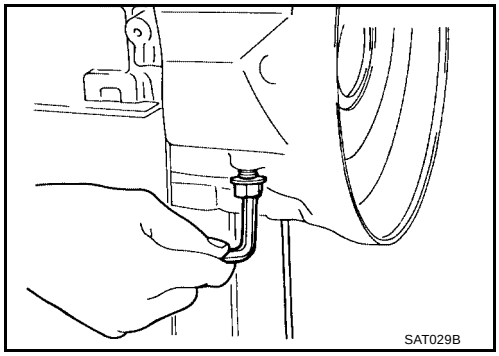


16. Remove input shaft and oil pump gasket.

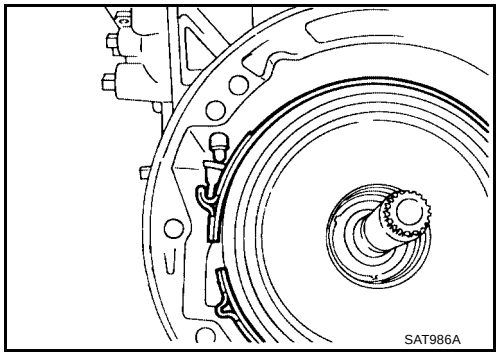


17. Remove brake band and band strut.

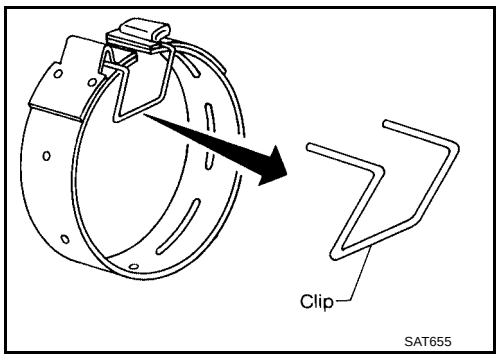
a. Loosen lock nut and remove band servo anchor end pin from transmission case.



b. Remove brake band and band strut from transmission case.

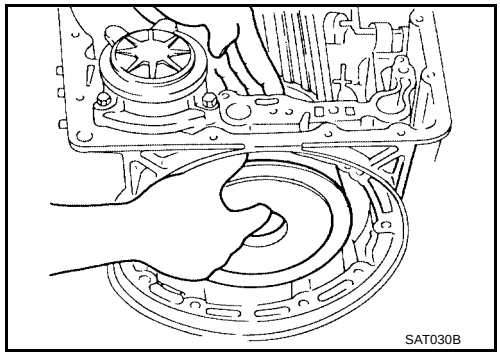


c. Hold brake band in a circular shape with clip.



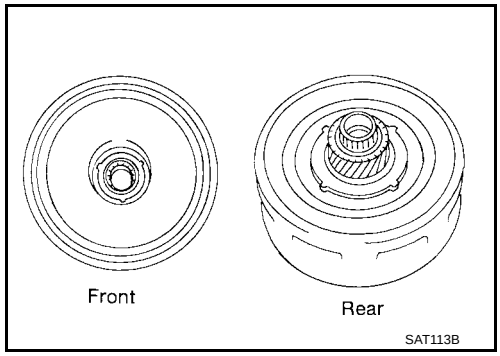
18. Remove front side clutch and gear components.

a. Remove clutch pack (reverse clutch, high clutch and front sun gear) from transmission case.

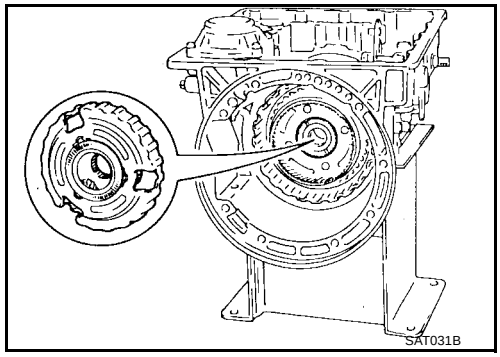


b. Remove front bearing race from clutch pack.

c. Remove rear bearing race from clutch pack.

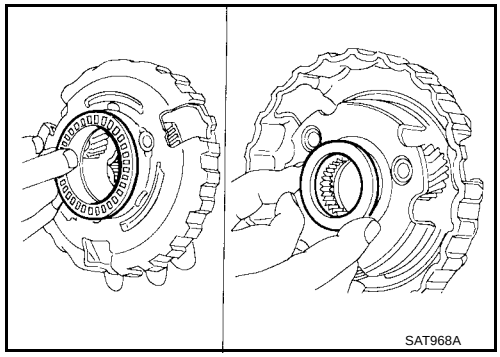


d. Remove front planetary carrier from transmission case.

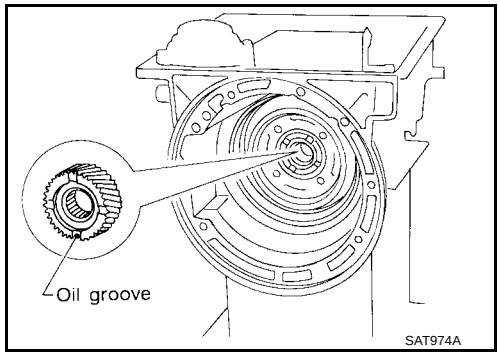


e. Remove front needle bearing from front planetary carrier.

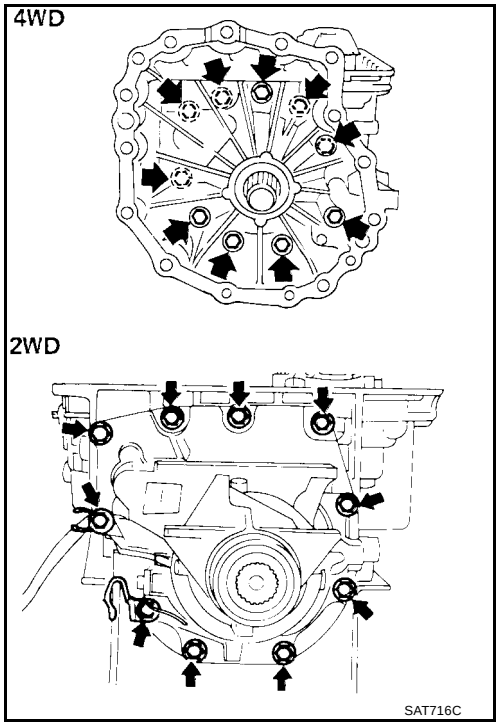
f. Remove rear bearing from front planetary carrier.



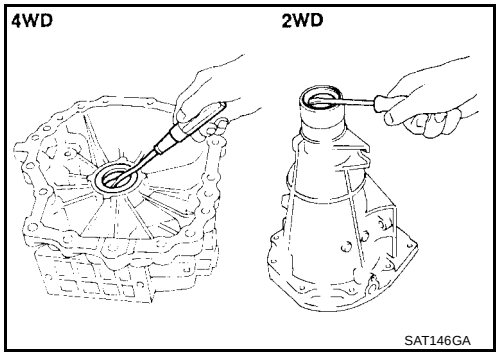
g. Remove rear sun gear from transmission case.



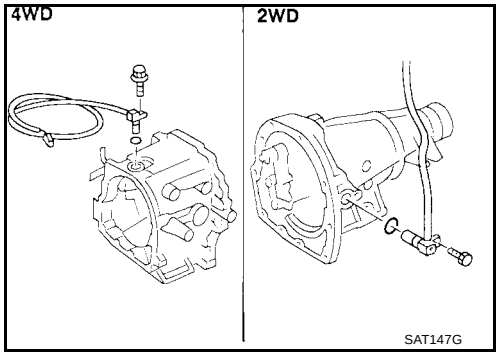
19. Remove rear extension or adapter case.
a. Remove rear extension or adapter case from transmission case.
b. Remove rear extension or adapter case gasket from transmission case.



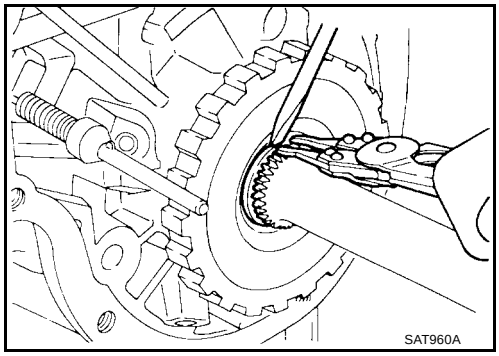
c. Remove oil seal from adapter case or rear extension.
- **Do not remove oil seal unless it is to be replaced.**



d. Remove revolution sensor from adapter case or rear extension.
e. Remove O-ring from revolution sensor.

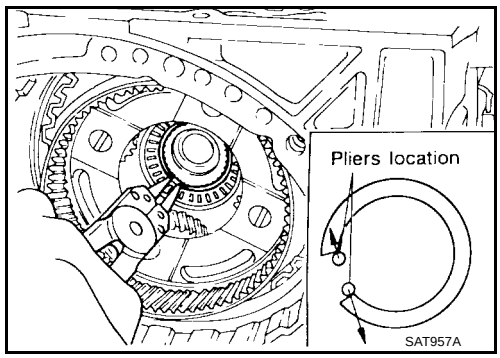


20. Remove output shaft and parking gear.
a. Remove rear snap ring from output shaft.



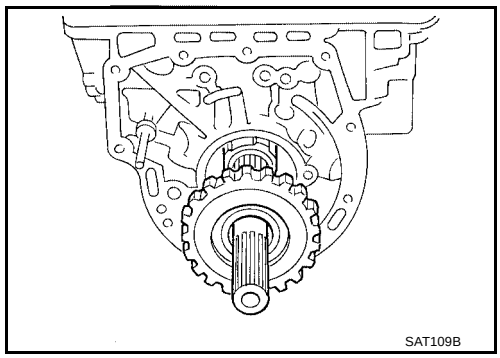
b. Slowly push output shaft all the way forward.
   - **Do not use excessive force.**

c. Remove snap ring from output shaft.

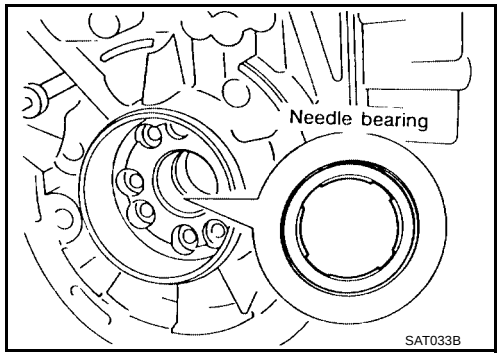


d. Remove output shaft and parking gear as a unit from transmission case.

e. Remove parking gear from output shaft.

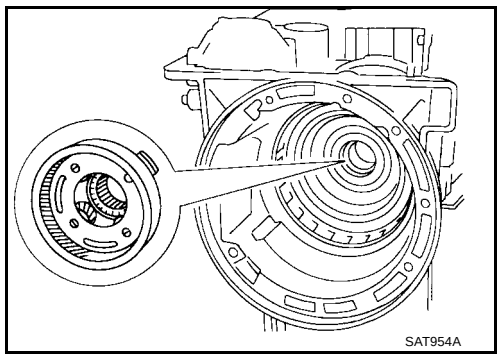


f. Remove needle bearing from transmission case.

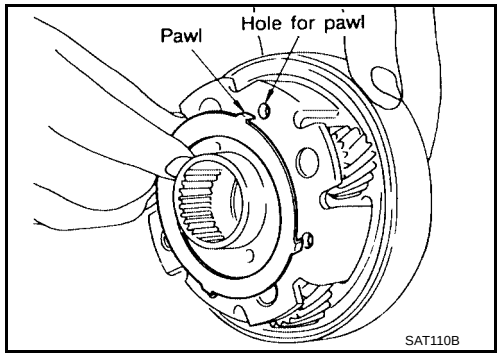


21. Remove rear side clutch and gear components.

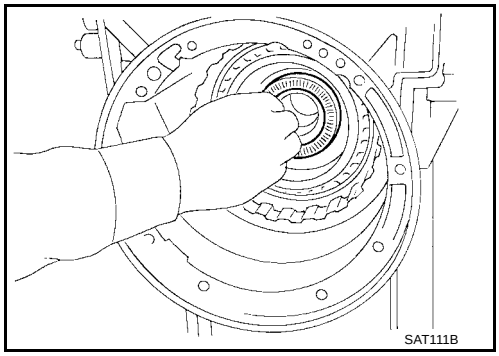
a. Remove front internal gear.



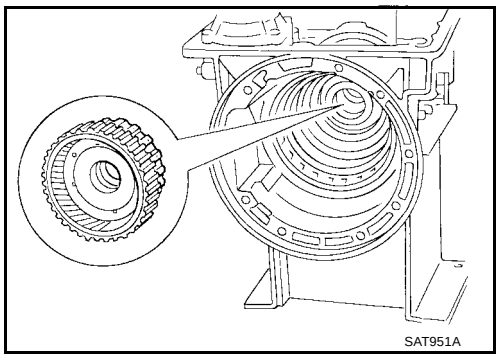
b. Remove bearing race from front internal gear.



c. Remove needle bearing from rear internal gear.

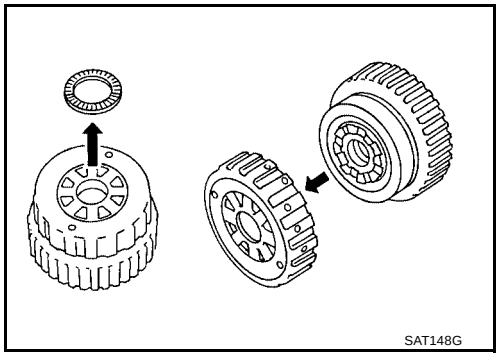


d. Remove rear internal gear, forward clutch hub and overrun clutch hub as a set from transmission case.

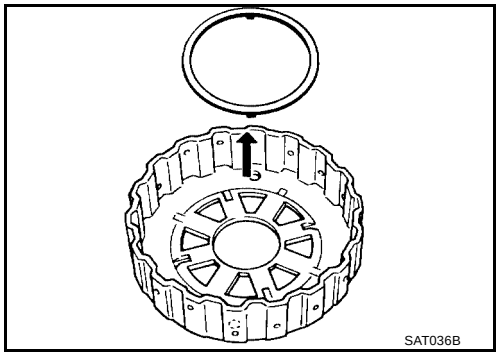


e. Remove needle bearing from overrun clutch hub.

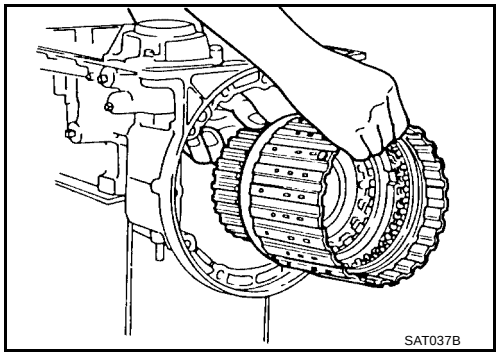
f. Remove overrun clutch hub from rear internal gear and forward clutch hub.



g. Remove thrust washer from overrun clutch hub.

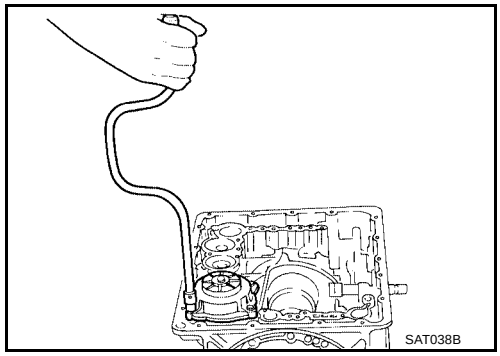


h. Remove forward clutch assembly from transmission case.



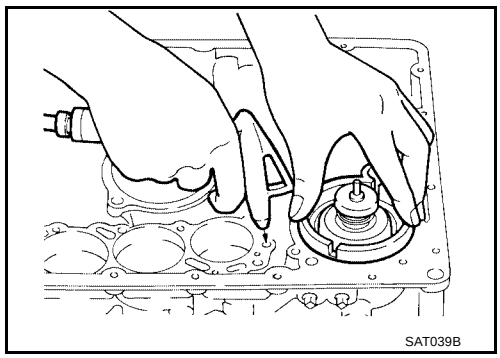
22. Remove band servo and accumulator components.

a. Remove band servo retainer from transmission case.



b. Apply compressed air to oil hole until band servo piston comes out of transmission case.
   - **Hold piston with a rag and gradually direct air to oil hole.**

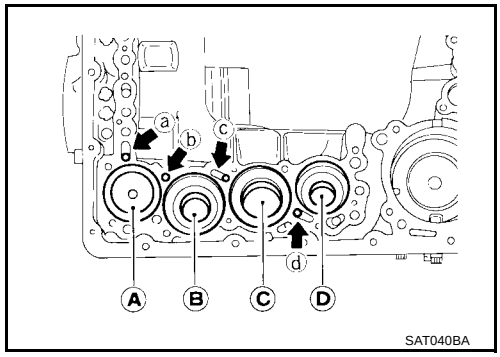
c. Remove return springs.



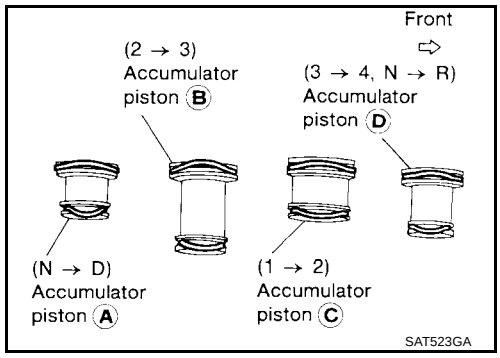
d. Remove springs from accumulator pistons B, C and D.

e. Apply compressed air to each oil hole until piston comes out.
   - **Hold piston with a rag and gradually direct air to oil hole.**

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

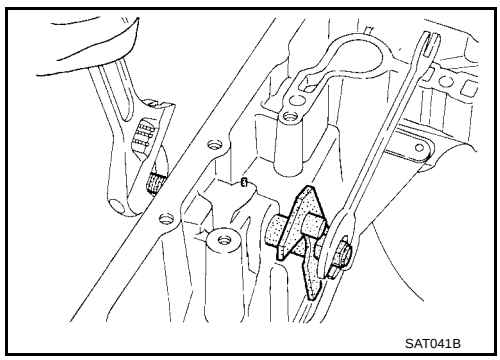


f. Remove O-ring from each piston.

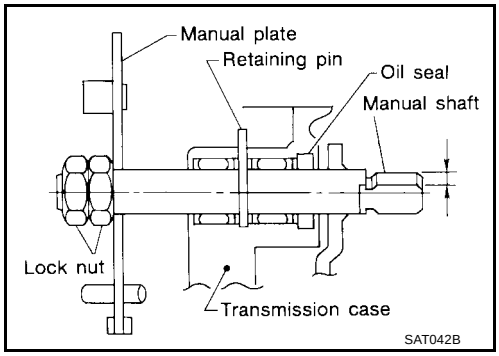


23. Remove manual shaft components, if necessary.

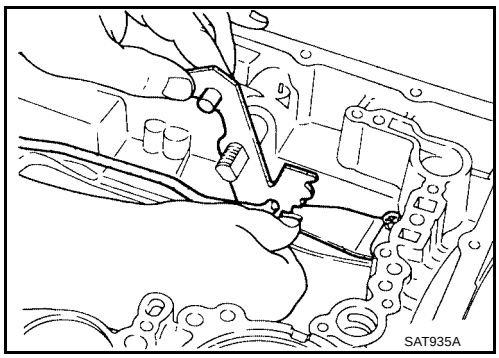
a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.



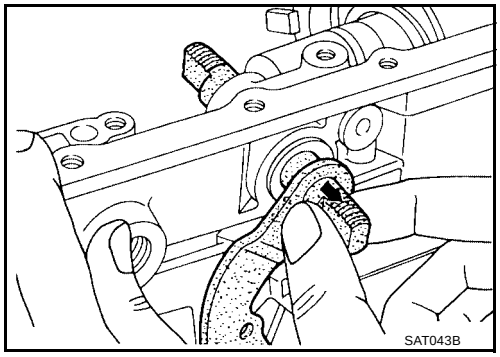
b. Remove retaining pin from transmission case.



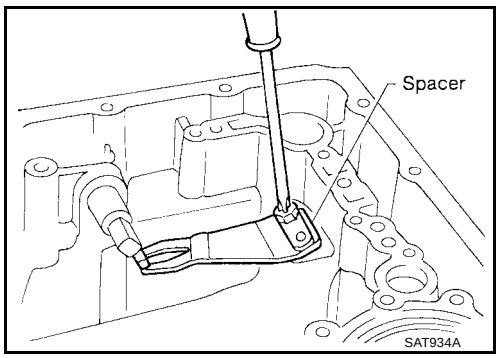
c. While pushing detent spring down, remove manual plate and parking rod from transmission case.



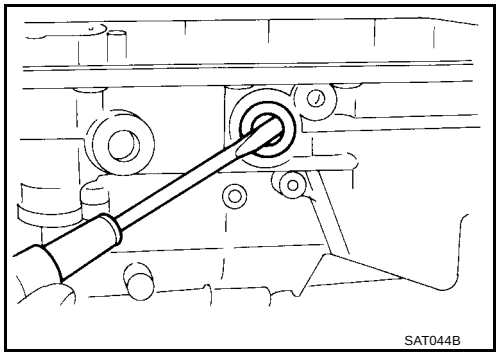
d. Remove manual shaft from transmission case.



e. Remove spacer and detent spring from transmission case.



f. Remove oil seal from transmission case.

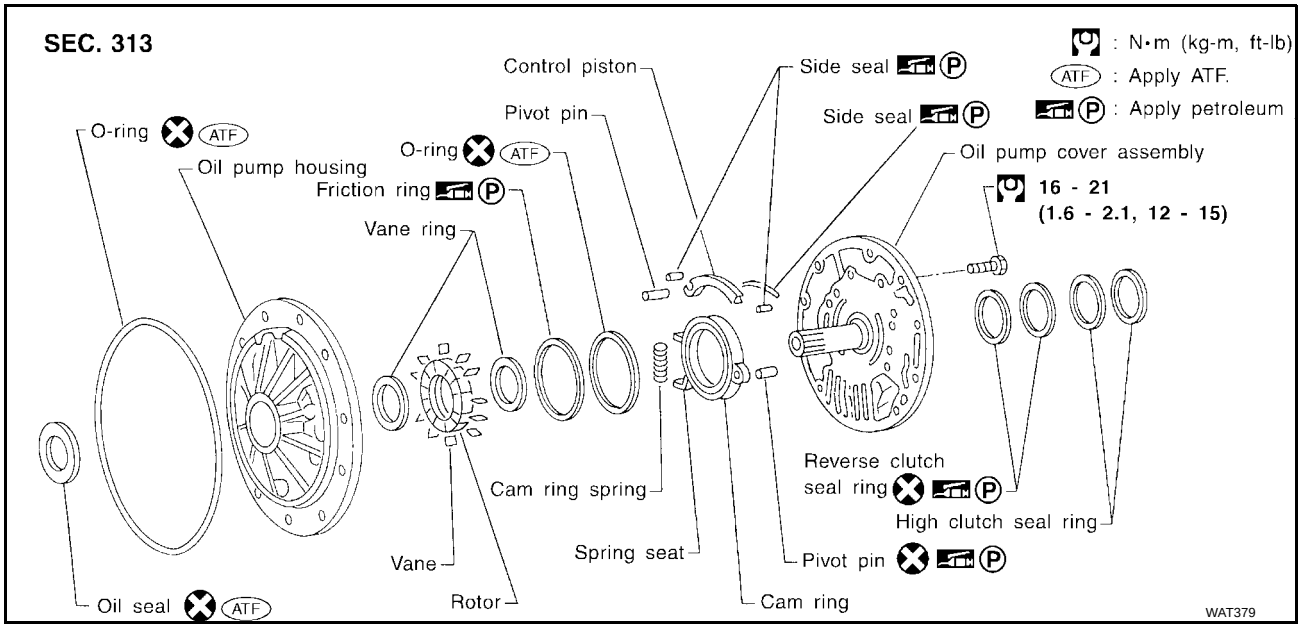


OIL PUMP

PFP:15010

Components

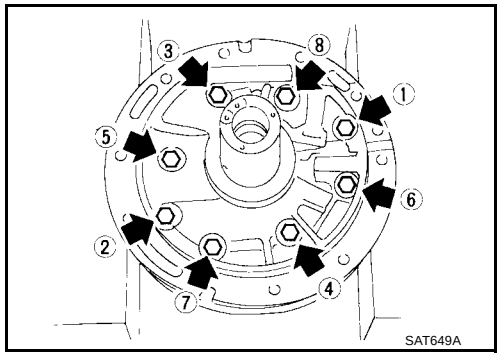
ECS005PS



Disassembly

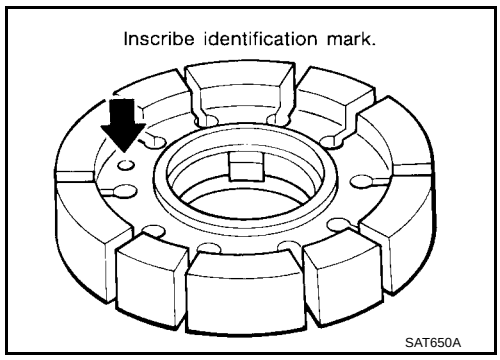
ECS006GL

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

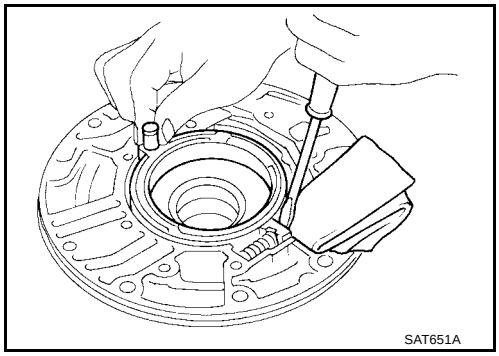


2. Remove rotor, vane rings and vanes.

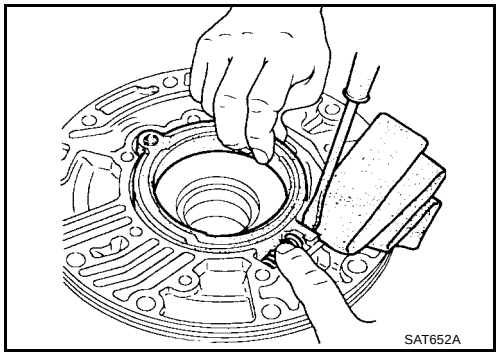
- **Inscribe a mark on back of rotor for identification of fore-aft direction when reassembling rotor. Then remove rotor.**



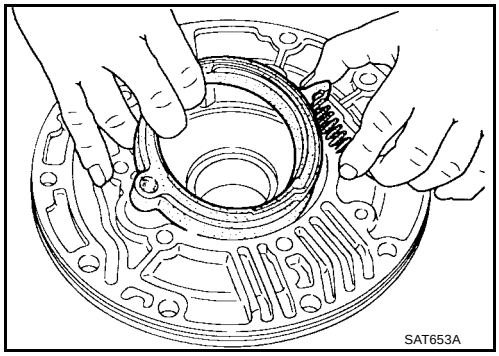
3. While pushing on cam ring remove pivot pin.
- **Be careful not to scratch oil pump housing.**


SAT651A

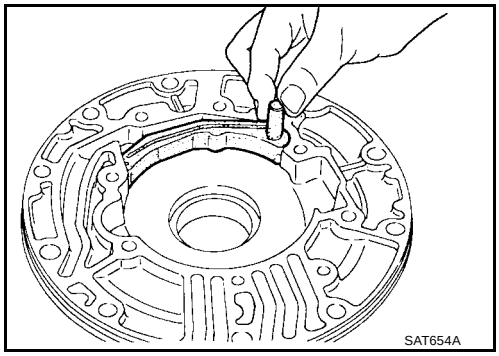
4. While holding cam ring and spring lift out cam ring spring.
- **Be careful not to damage oil pump housing.**
- **Hold cam ring spring to prevent it from jumping.**


SAT652A

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

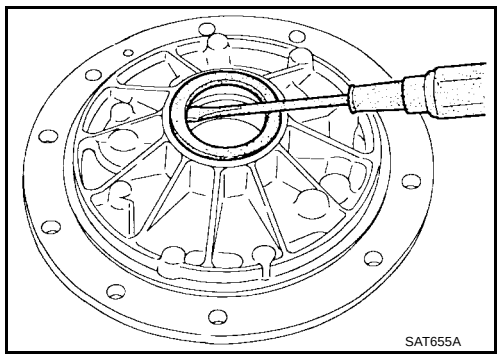

SAT653A

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


SAT654A

7. Remove oil seal from oil pump housing.

- **Be careful not to scratch oil pump housing.**

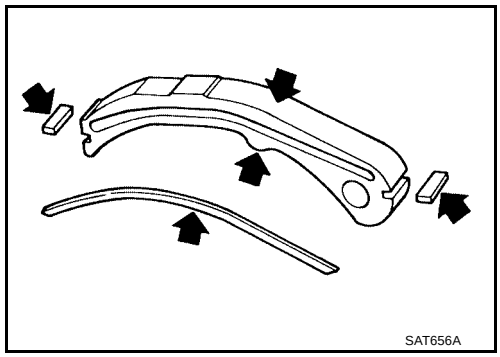

SAT655A

Inspection

ECS005PU

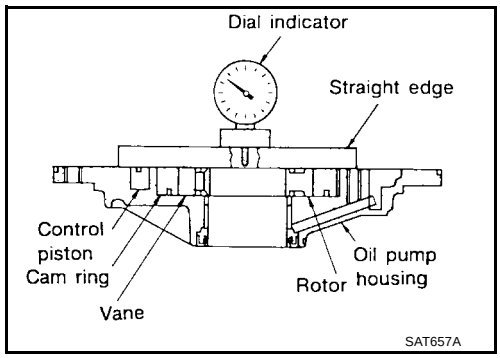
OIL PUMP COVER, ROTOR, VANES, CONTROL PISTON, SIDE SEALS, CAM RING AND FRICTION RING

- Check for wear or damage.


SAT656A

SIDE CLEARANCES

- Measure side clearances between end of oil pump housing and cam ring, rotor, vanes and control piston. Measure in at least four places along their circumferences. Maximum measured values should be within specified positions.

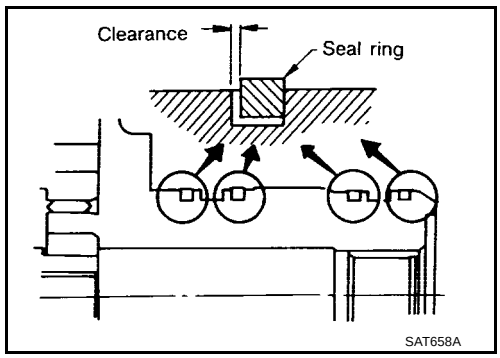


SAT657A

- **Before measurement, check that friction rings, O-ring, control piston side seals and cam ring spring are removed.**

Standard clearance (Cam ring, rotor, vanes and control piston)	**: Refer to AT-350, "Oil Pump and Low One-way Clutch" .**

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



SAT658A

SEAL RING CLEARANCE

- Measure clearance between seal ring and ring groove.

Standard clearance	**: 0.10 - 0.25 mm (0.0039 - 0.0098 in)**
Wear limit	**: 0.25 mm (0.0098 in)**

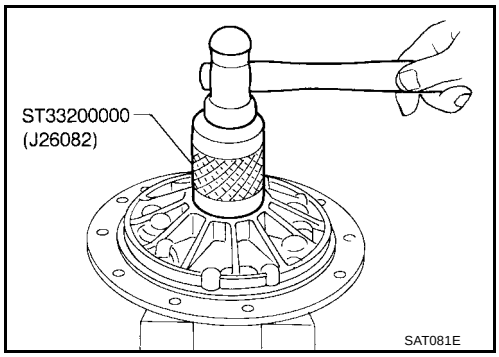
- If not within wear limit, replace oil pump cover assembly.

Assembly

ECS005PV

1. Drive oil seal into oil pump housing.

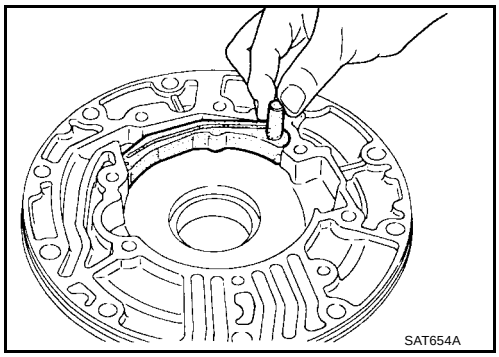
- **Apply ATF to outer periphery and lip surface.**



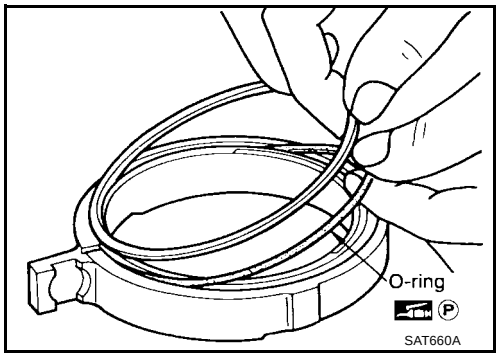
2. Install cam ring in oil pump housing by the following

a. Install side seal on control piston.
   - **Pay attention to its direction — Black surface goes toward control piston.**
   - **Apply petroleum jelly to side seal.**

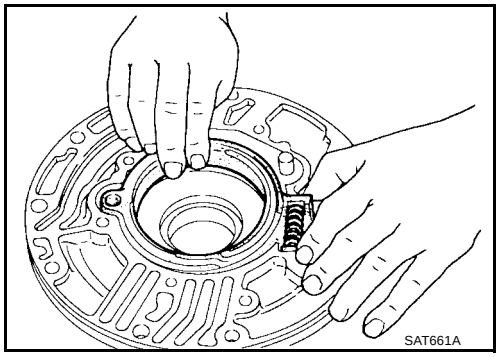
b. Install control piston on oil pump.



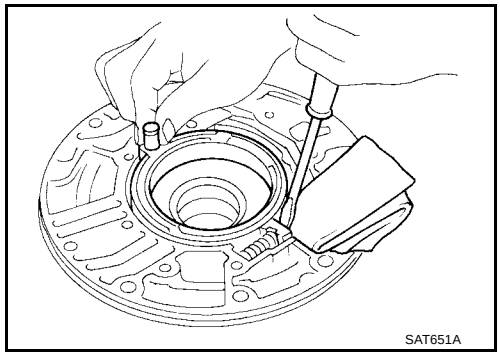
c. Install O-ring and friction ring on cam ring.
   - **Apply petroleum jelly to O-ring.**



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

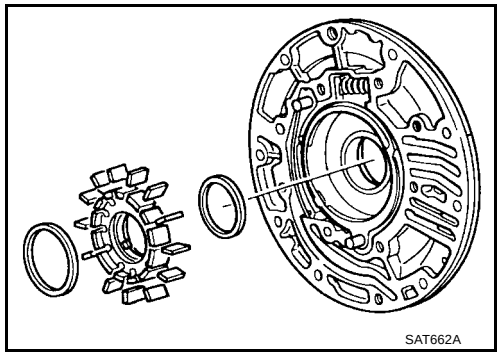


e. While pushing on cam ring install pivot pin.


SAT651A

3. Install rotor, vanes and vane rings.

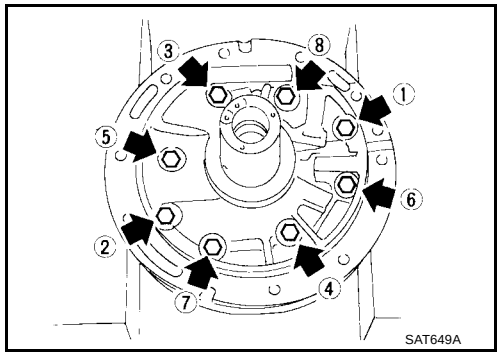
- **Pay attention to direction of rotor.**


SAT662A

4. Install oil pump housing and oil pump cover.

a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly in oil pump housing assembly, then remove masking tape.

b. Tighten bolts in a criss-cross pattern.



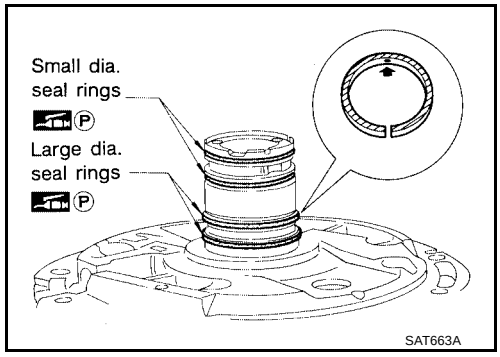
SAT649A

5. Install new seal rings carefully after packing ring grooves with petroleum jelly. Press rings down into jelly to a close fit.

- **Seal rings come in two different diameters. Check fit carefully in each groove.**

Small dia. seal ring	**: No mark**
Large dia. seal ring	**: Yellow mark in area shown by arrow**

- **Do not spread gap of seal ring excessively while installing. It may deform ring.**



SAT663A

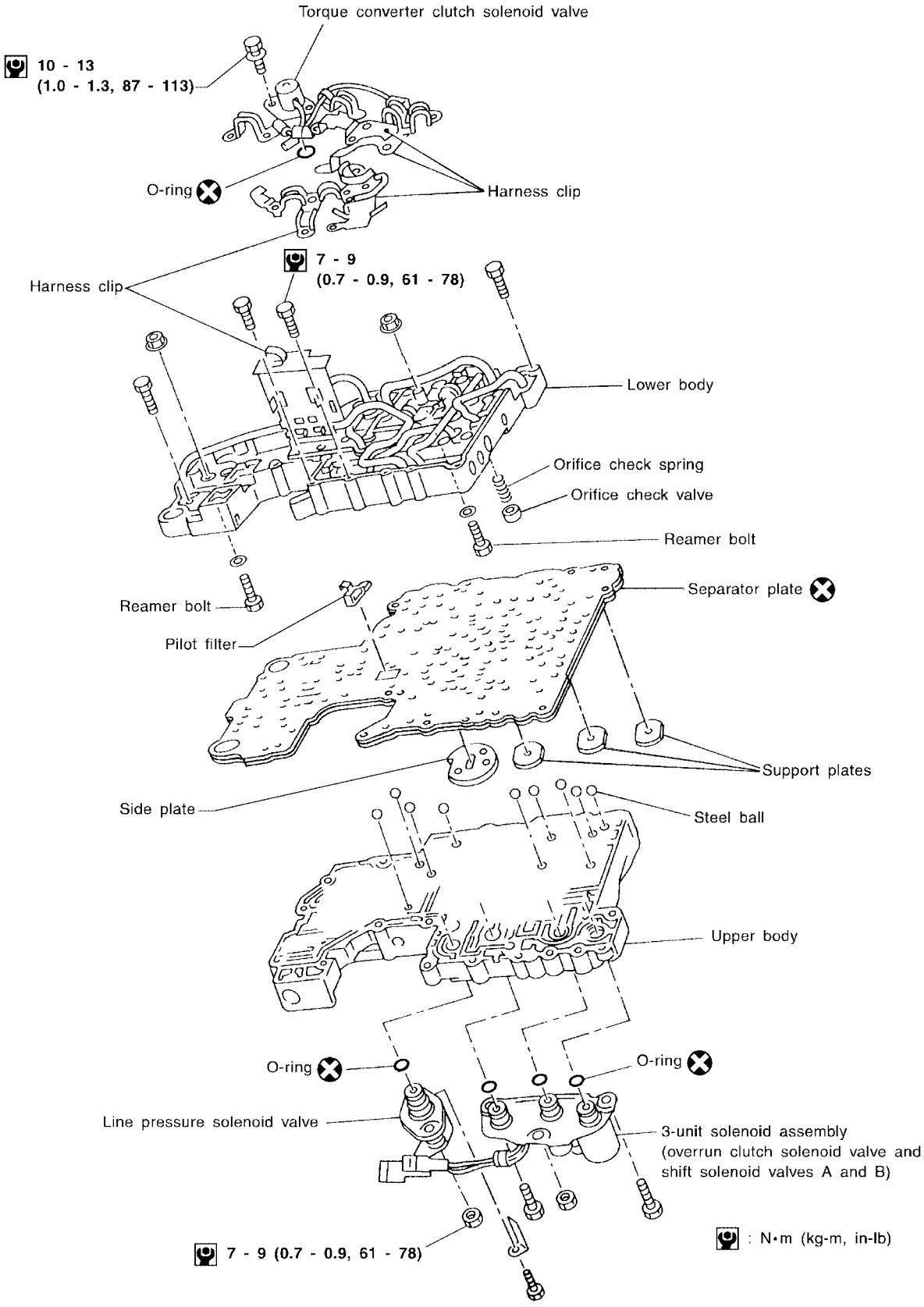
CONTROL VALVE ASSEMBLY

PFP:31705

Components

ECS005PW

SEC. 317



LCIA0275E

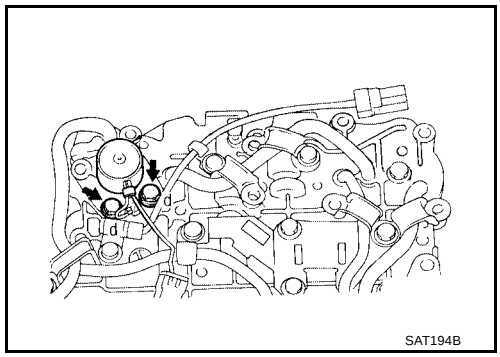
Disassembly

ECS005PX

1. Remove solenoids.

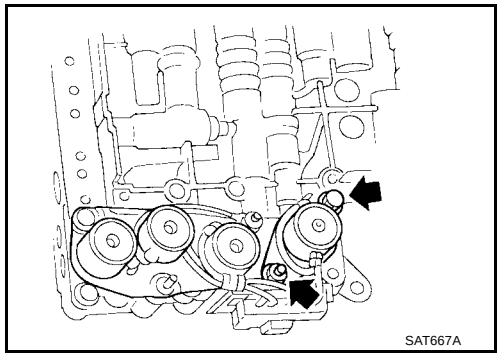
a. Remove torque converter clutch solenoid valve and side plate from lower body.

b. Remove O-ring from solenoid.



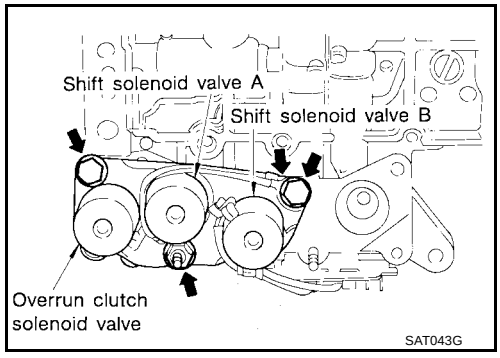
c. Remove line pressure solenoid valve from upper body.

d. Remove O-ring from solenoid.



e. Remove 3-unit solenoid assembly from upper body.

f. Remove O-rings from solenoids.

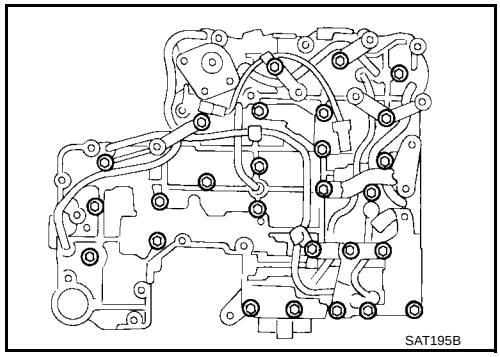


2. Disassemble upper and lower bodies.

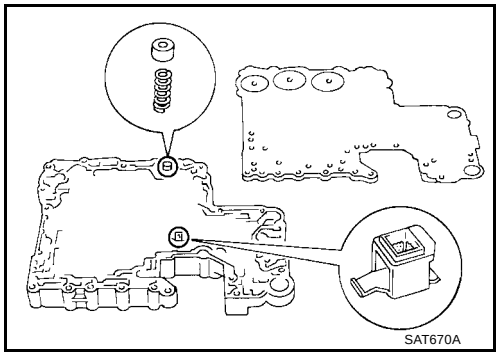
a. Place upper body facedown, and remove bolts, reamer bolts, side plate and support plates.

b. Remove lower body and separator plate as a unit from upper body.

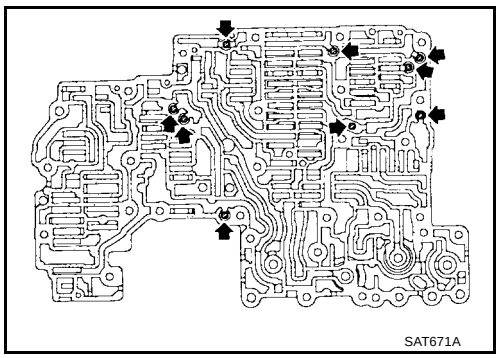
- **Be careful not to drop pilot filter, orifice check valve, spring and steel balls.**



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


SAT670A

e. Check to see that steel balls are properly positioned in upper body. Then remove them from upper body.

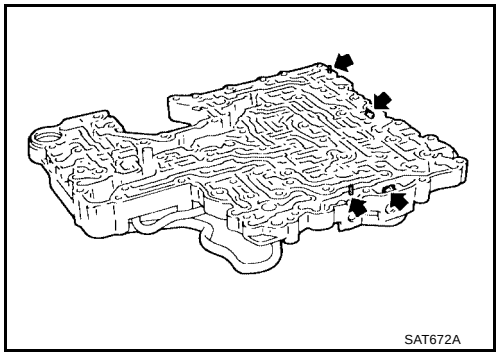

SAT671A

Inspection

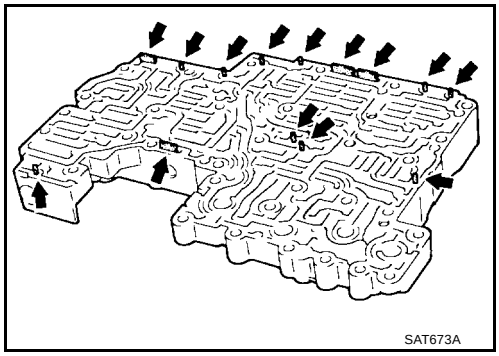
ECS005PY

LOWER AND UPPER BODIES

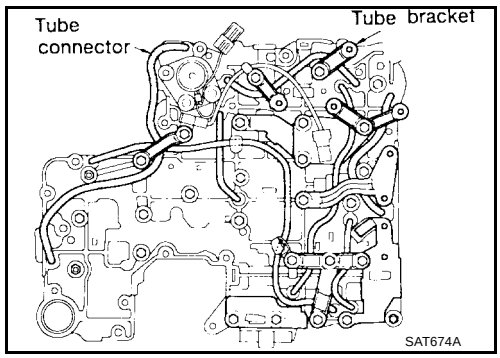
- Check to see that there are pins and retainer plates in lower body.


SAT672A

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

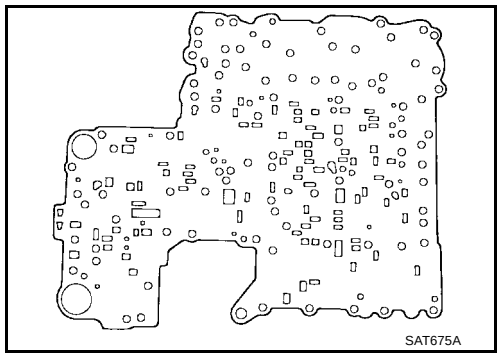

SAT673A

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



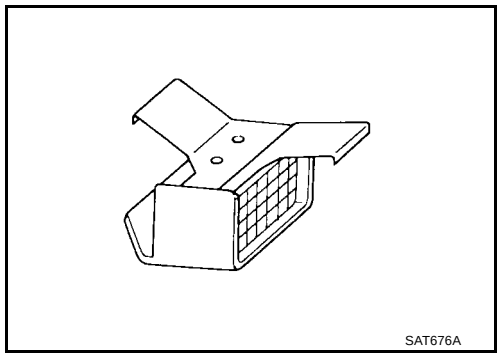
SEPARATOR PLATE

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



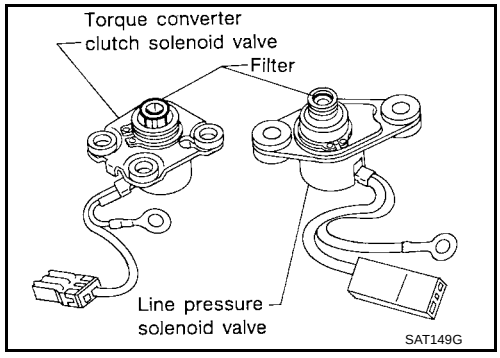
PILOT FILTER

- Check to make sure that filter is not clogged or damaged.



TORQUE CONVERTER CLUTCH SOLENOID VALVE

- Check that filter is not clogged or damaged.
- Measure resistance. Refer to AT-148, "TORQUE CONVERTER CLUTCH SOLENOID VALVE" .

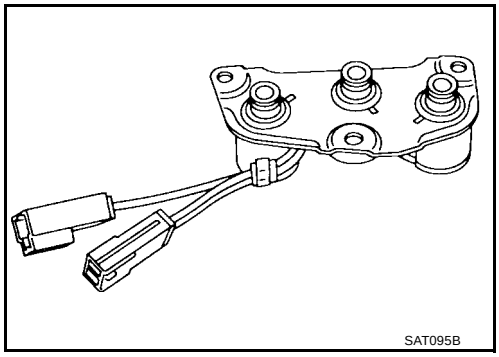


LINE PRESSURE SOLENOID VALVE

- Check that filter is not clogged or damaged.
- Measure resistance. Refer to AT-160, "LINE PRESSURE SOLENOID VALVE" .

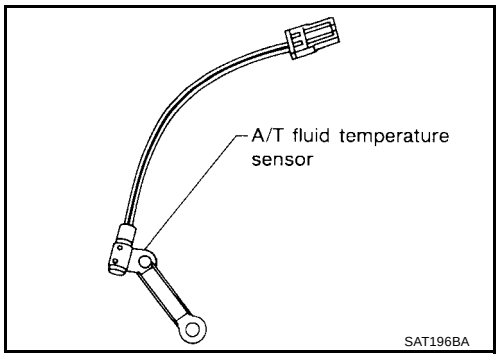
3-UNIT SOLENOID ASSEMBLY (OVERRUN CLUTCH SOLENOID VALVE AND SHIFT SOLENOID VALVES A AND B)

- Measure resistance of each solenoid. Refer to AT-182, "OVERRUN CLUTCH SOLENOID VALVE" , AT-165, "SHIFT SOLENOID VALVE A" , and AT-170, "SHIFT SOLENOID VALVE B" .



A/T FLUID TEMPERATURE SENSOR

- Measure resistance. Refer to AT-109, "A/T FLUID TEMPERATURE SENSOR" .

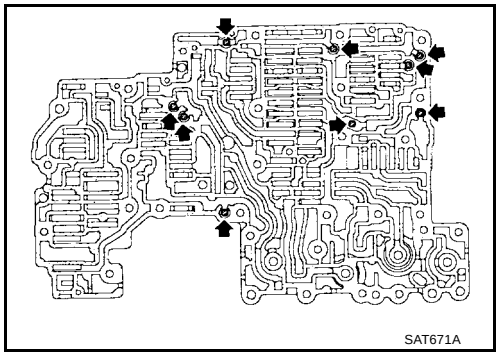


Assembly

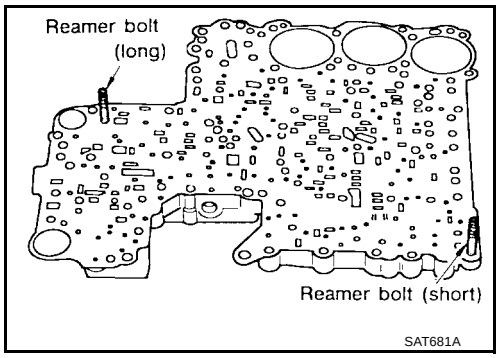
ECS005PZ

1. Install upper and lower bodies.

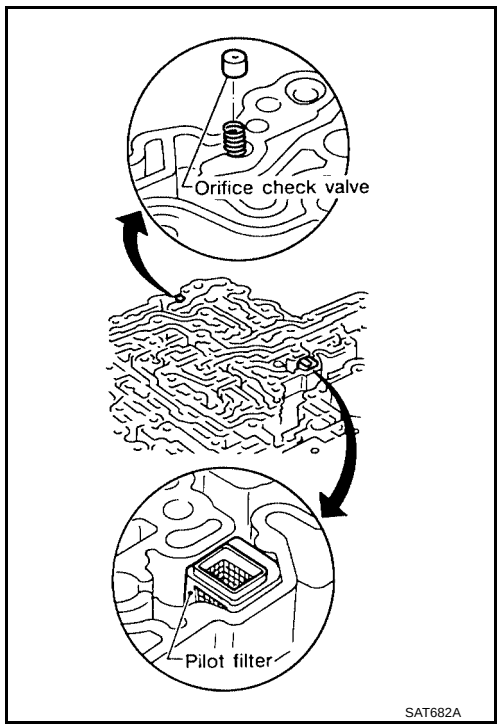
a. Place oil circuit of upper body face up. Install steel balls in their proper positions.



b. Install reamer bolts from bottom of upper body.

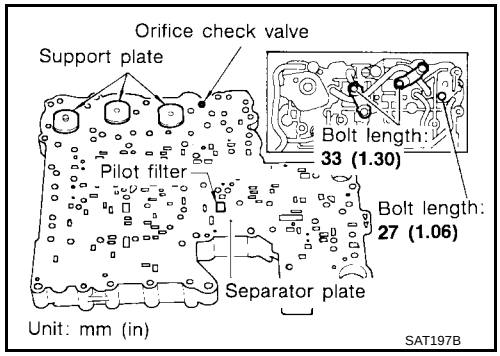


c. Place oil circuit of lower body face up. Install orifice check spring, orifice check valve and pilot filter.



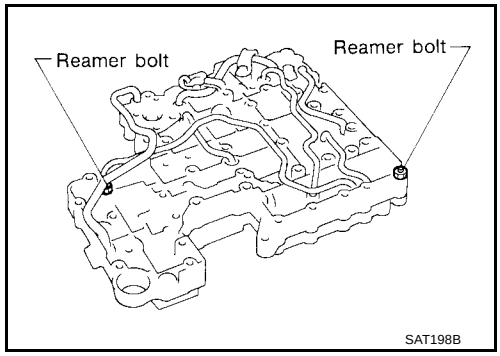
d. Install separator plate on lower body.

e. Install and temporarily tighten support plates, fluid temperature sensor and tube brackets.

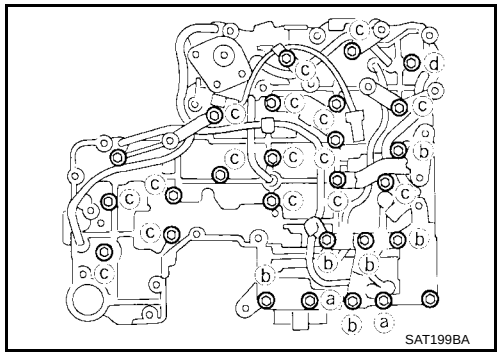


f. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.

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



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

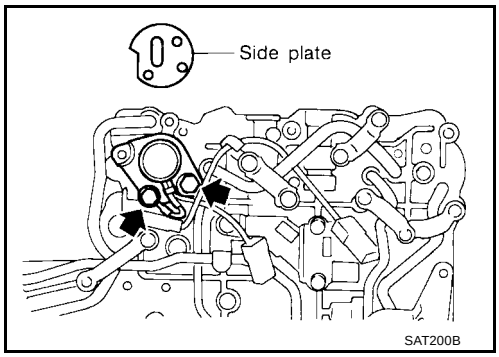


Bolt length and location:

Bolt symbol	a	b	c	d
Bolt length mm (in)	70 (2.76)	50 (1.97)	33 (1.30)	27 (1.06)

2. Install solenoids.

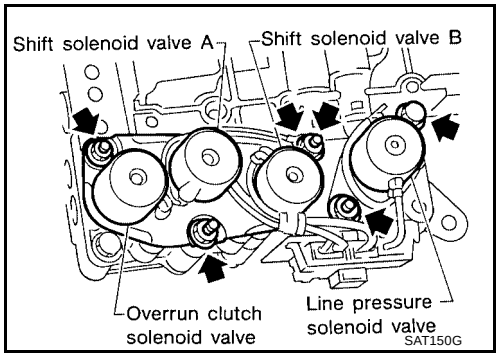
a. Attach O-ring and install torque converter clutch solenoid valve and side plates onto lower body.



b. Attach O-rings and install 3-unit solenoids assembly onto upper body.

c. Attach O-ring and install line pressure solenoid valve onto upper body.

3. Tighten all bolts.

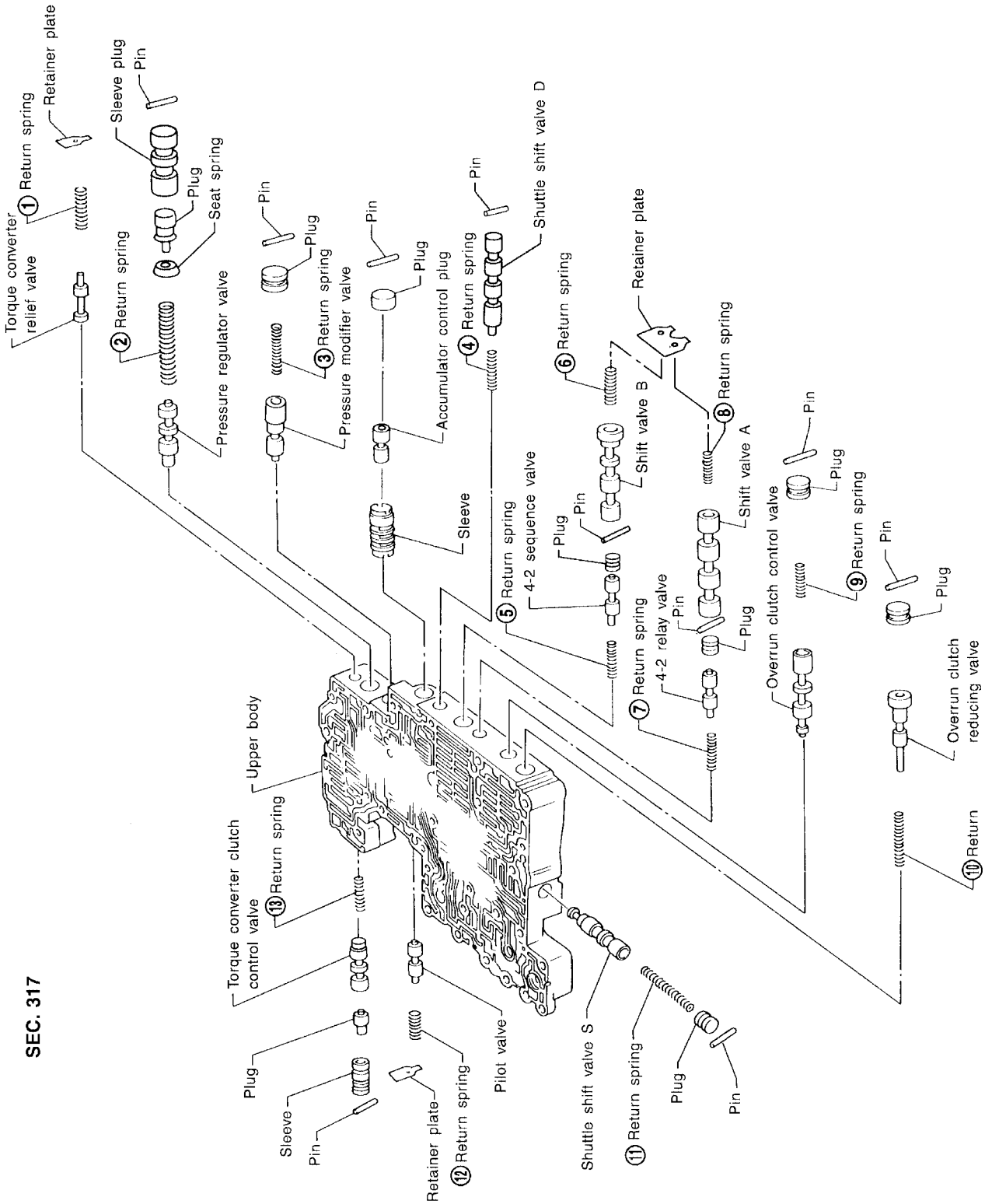


CONTROL VALVE UPPER BODY

PFP:31711

Components

ECS005Q0



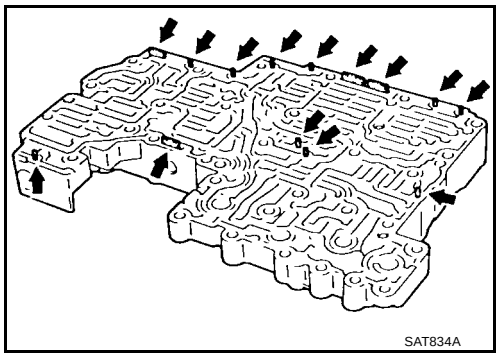
Apply ATF to all components before their installation.

Numbers preceding valve springs correspond with those shown in AT-347, "Return Springs" .

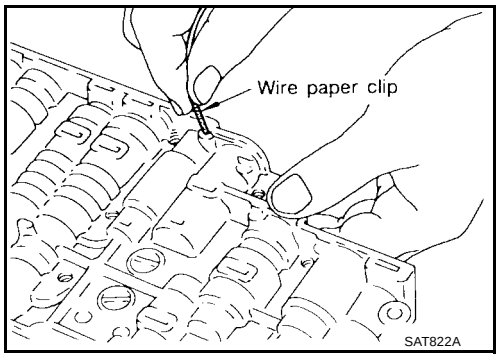
Disassembly

ECS005Q1

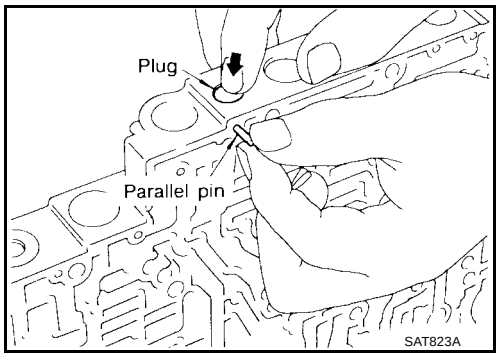
1. Remove valves at parallel pins.
   - **Do not use a magnetic hand.**



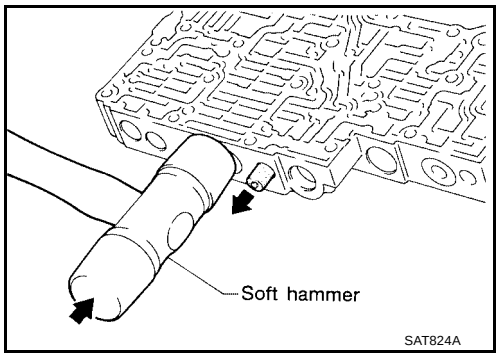
a. Use a wire paper clip to push out parallel pins.



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

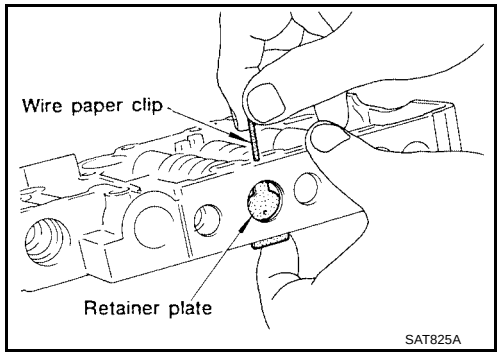


c. Place mating surface of valve facedown, and remove internal parts.
   - **If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer.**
   - **Be careful not to drop or damage valves and sleeves.**

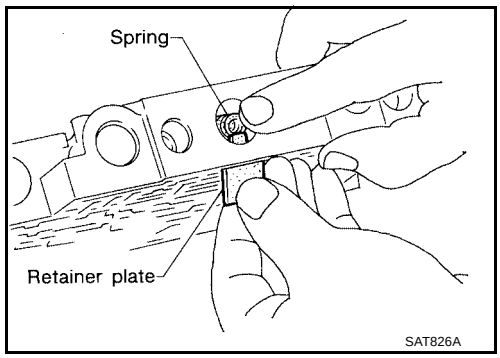


2. Remove valves at retainer plates.

a. Pry out retainer plate with wire paper clip.

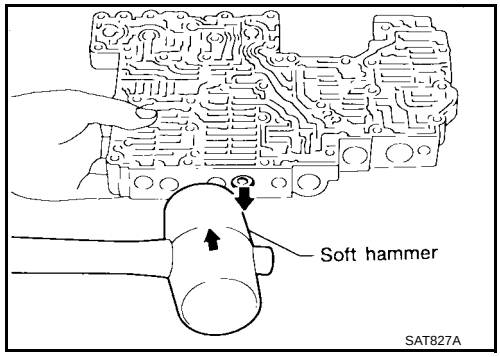


b. Remove retainer plates while holding spring.

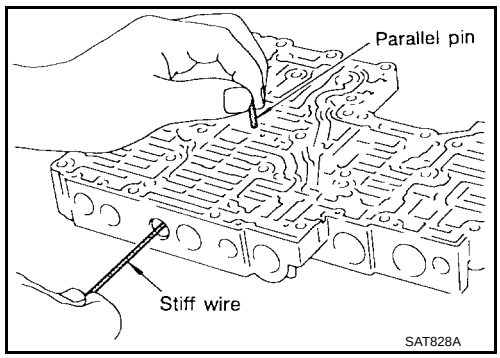


c. Place mating surface of valve facedown, and remove internal parts.

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

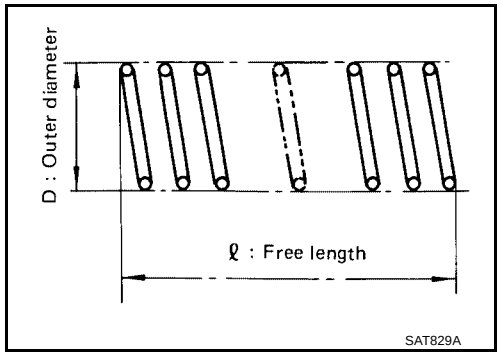


- 4-2 sequence valve and relay valve are located far back in upper body. If they are hard to remove, carefully push them out using stiff wire.
- **Be careful not to scratch sliding surface of valve with wire.**



Inspection

ECS005Q2



VALVE SPRINGS

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

Inspection standard : Refer to AT-347, "Return Springs" .

- Replace valve springs if deformed or fatigued.

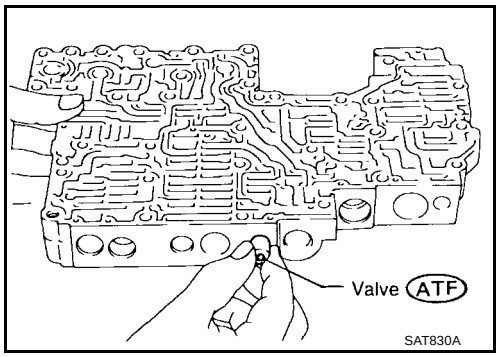
CONTROL VALVES

- Check sliding surfaces of valves, sleeves and plugs.

Assembly

ECS005Q3

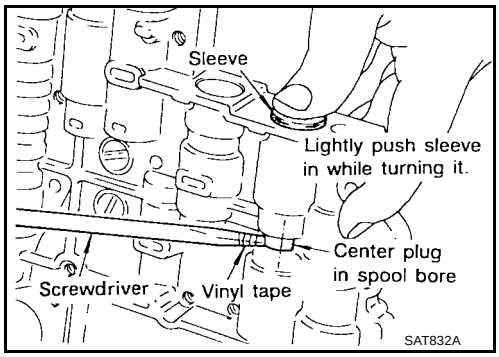
1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.
   - **Be careful not to scratch or damage valve body.**



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

Pressure regulator valve

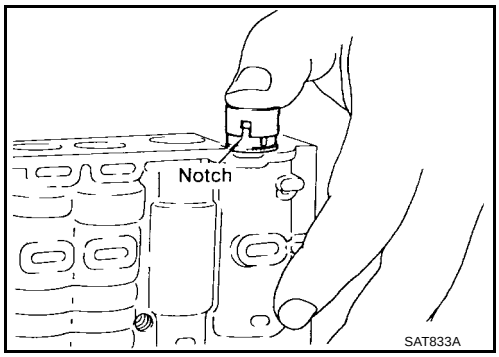
- If pressure regulator plug is not centered properly, sleeve cannot be inserted into bore in upper body. If this happens, use vinyl tape wrapped screwdriver to center sleeve until it can be inserted.



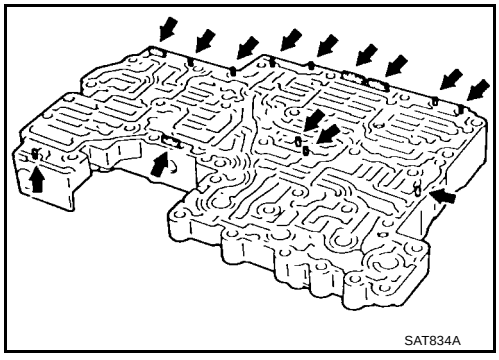
- Turn sleeve slightly while installing.

Accumulator control plug

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



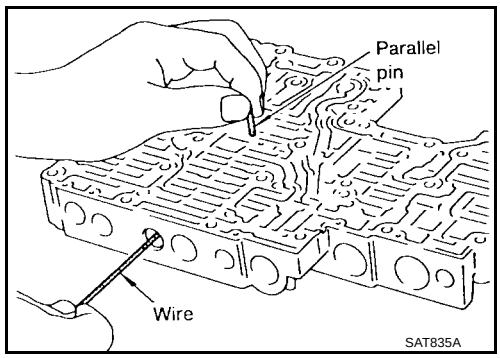
2. Install parallel pins and retainer plates.



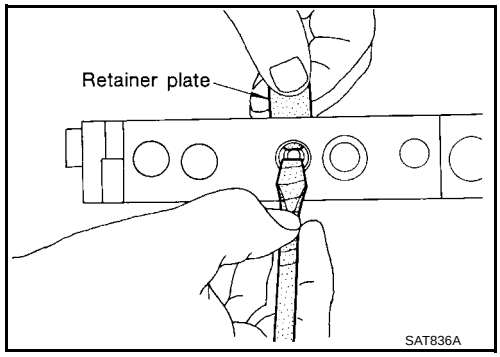
- **While pushing plug, install parallel pin.**

4-2 sequence valve and relay valve

- Push 4-2 sequence valve and relay valve with wire wrapped in vinyl tape to prevent scratching valve body. Install parallel pins.



- Insert retainer plate while pushing spring.

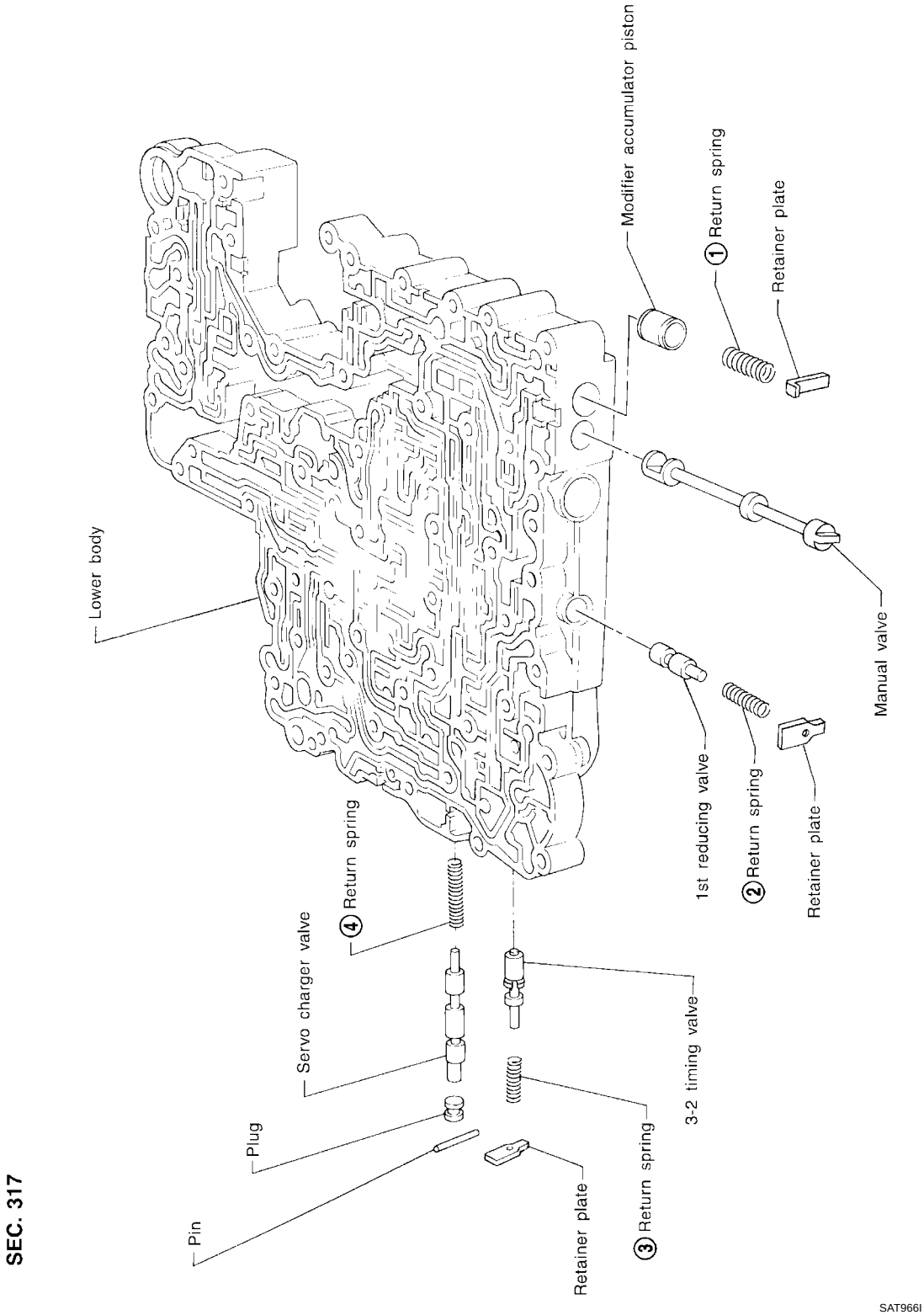


CONTROL VALVE LOWER BODY

PFP:31713

Components

ECS005Q4

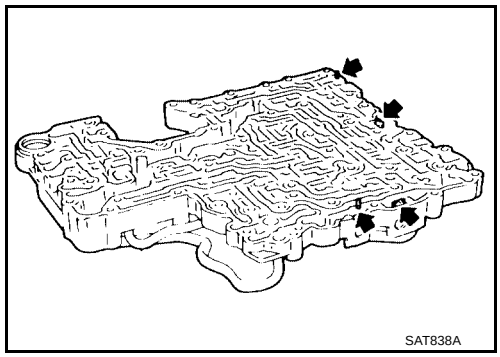


Apply ATF to all components before their installation.
Numbers preceding valve springs correspond with those shown in AT-347, "Return Springs" .

Disassembly

ECS005Q5

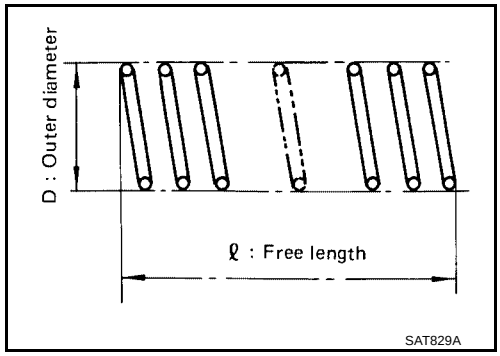
1. Remove valves at parallel pins.
2. Remove valves at retainer plates.
   For removal procedures, refer to AT-283, "Disassembly" .


SAT838A

Inspection

ECS005Q6

VALVE SPRINGS



SAT829A

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

Inspection standard **: Refer to AT-347, "Return Springs" .**

- Replace valve springs if deformed or fatigued.

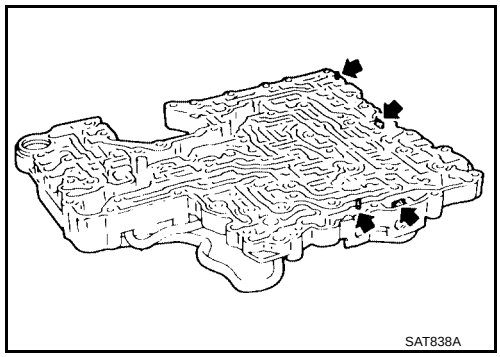
CONTROL VALVES

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

Assembly

ECS005Q7

- Install control valves.
  For installation procedures, refer to AT-286, "Assembly" .

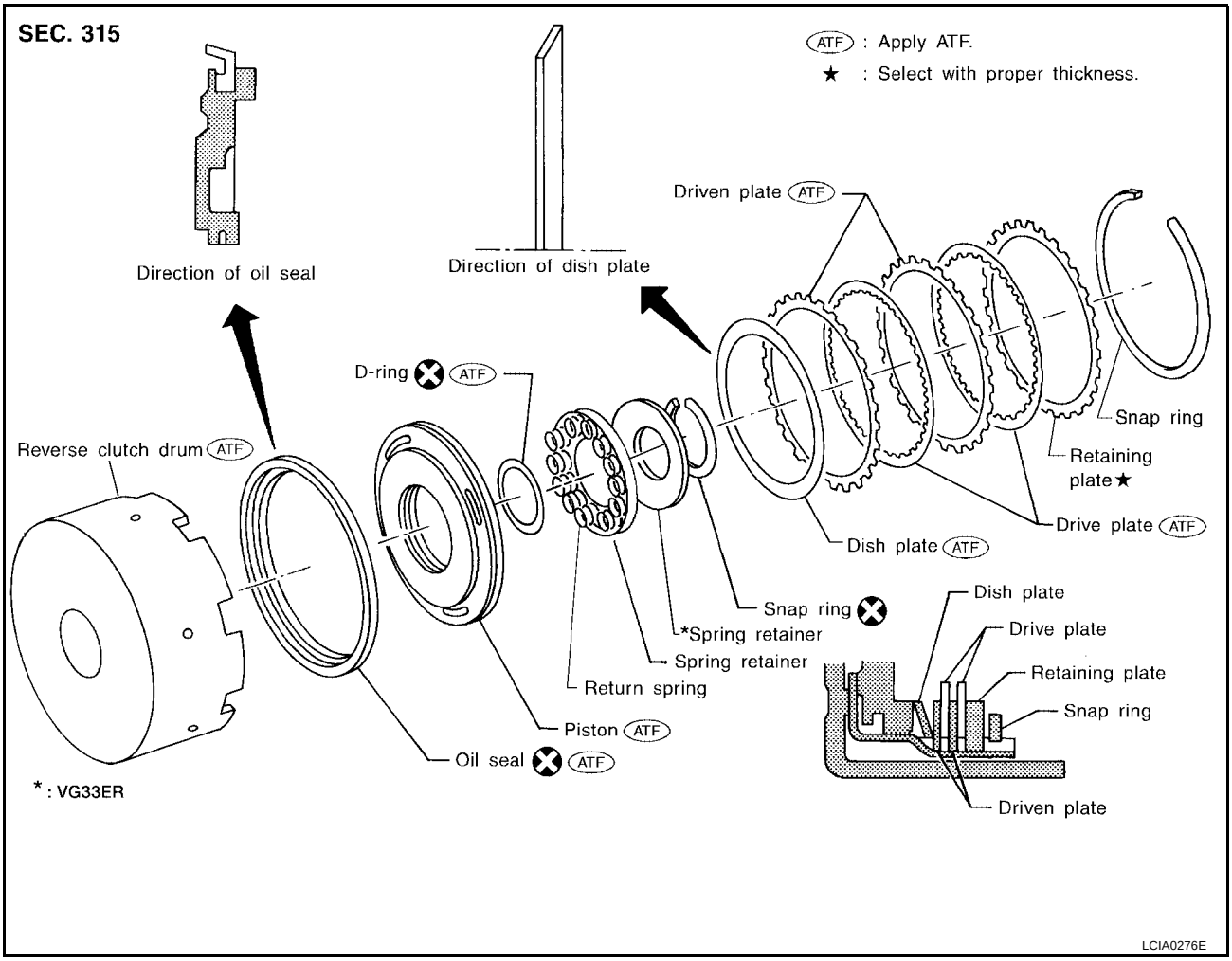

SAT838A

REVERSE CLUTCH

PFP:31510

Components

ECS005Q8



Disassembly

ECS005Q9

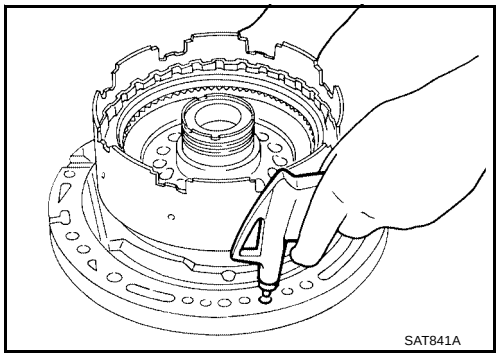
1. Check operation of reverse clutch.

a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.

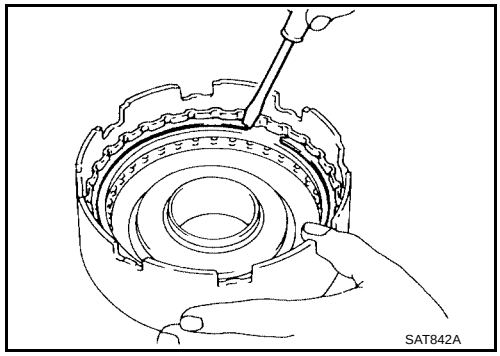
b. Check to see that retaining plate moves to snap ring.

c. If retaining plate does not contact snap ring,

- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.



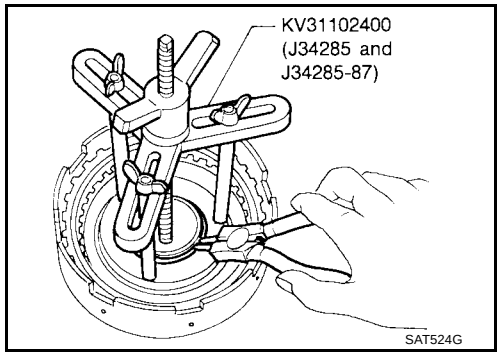
2. Remove drive plates, driven plates, retaining plate, dish plate and snap ring.



3. Remove snap ring from clutch drum while compressing clutch springs.

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

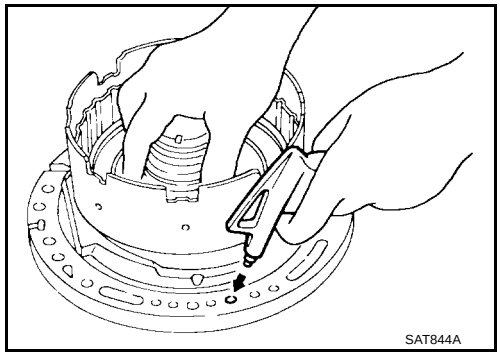
4. Remove spring retainer and return spring.



5. Install seal ring onto oil pump cover and install reverse clutch drum. While holding piston, gradually apply compressed air to oil hole until piston is removed.

- **Do not apply compressed air abruptly.**

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



Inspection

ECS005QA

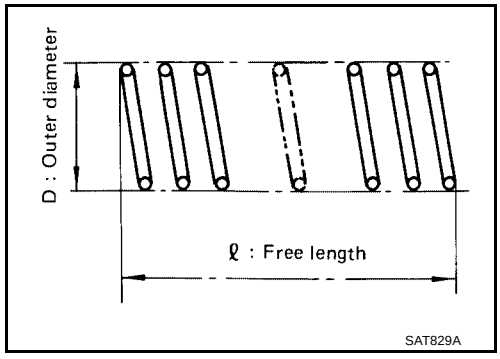
REVERSE CLUTCH SNAP RING AND SPRING RETAINER

- Check for deformation, fatigue or damage.

REVERSE CLUTCH RETURN SPRINGS (VG33E ONLY)

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

Inspection standard **: Refer to AT-347, "Return Springs" .**

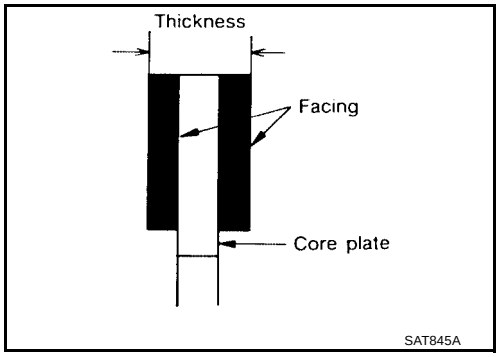


REVERSE CLUTCH DRIVE PLATES

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

Thickness of drive plate
Standard value : 1.90 - 2.05 mm (0.0748 - 0.0807 in)
Wear limit : 1.80 mm (0.0709 in)

- If not within wear limit, replace.

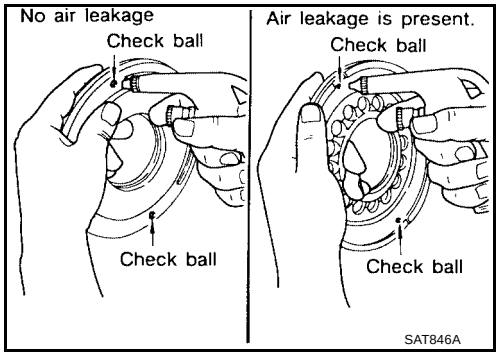


REVERSE CLUTCH DISH PLATE

- Check for deformation or damage.

REVERSE CLUTCH PISTON

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

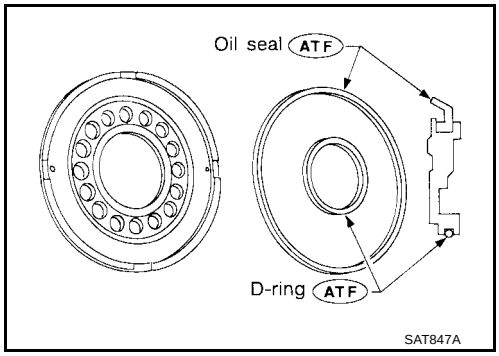


Assembly

ECS005QB

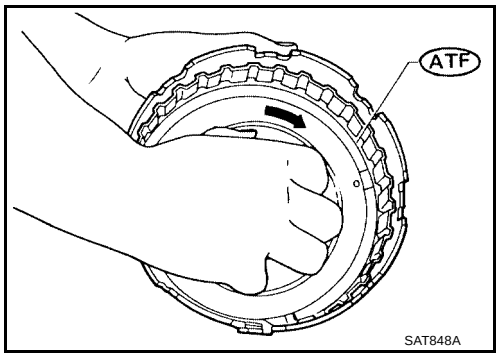
1. Install D-ring and oil seal on piston.

- **Apply ATF to both parts.**

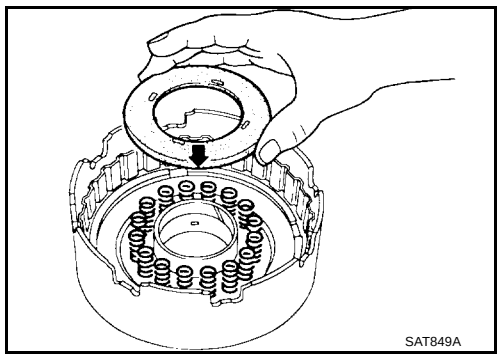


2. Install piston assembly by turning it slowly and evenly.

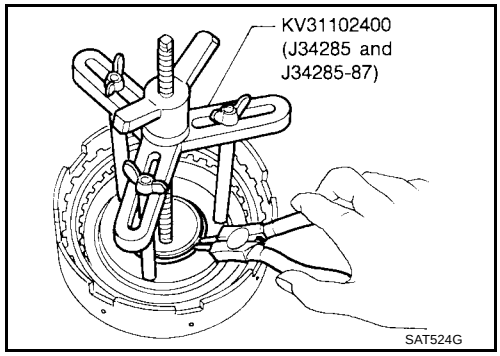
- **Apply ATF to inner surface of drum.**

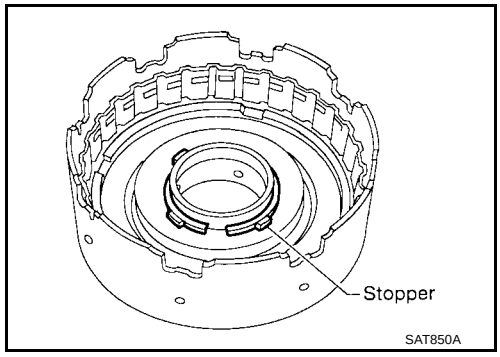


3. Install return springs and spring retainer (VG33E) or spring retainer (VG33ER).



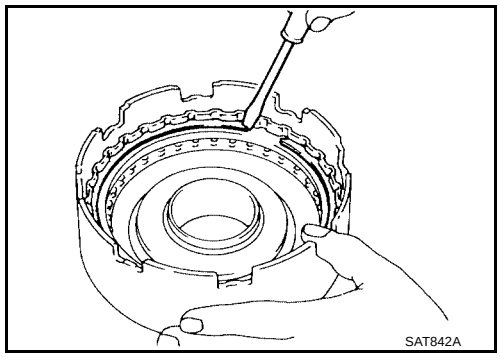
4. Install snap ring while compressing clutch springs.



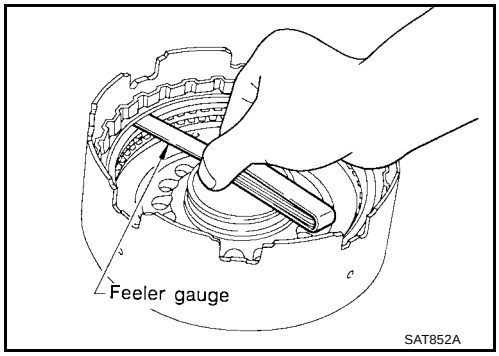


- **Do not align snap ring gap with spring retainer stopper.**

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



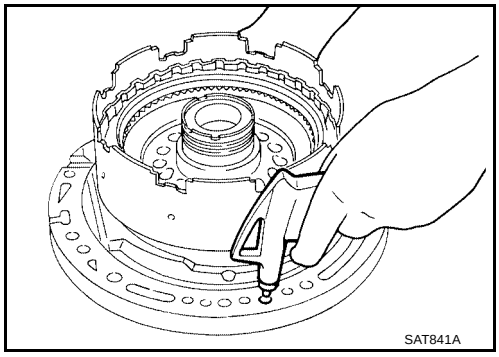
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.



Specified clearance

Standard	**: 0.5 - 0.8 mm (0.020 - 0.031 in)**
Allowable limit	**: 1.2 mm (0.047 in)**
Retaining plate	**: Refer to AT-348, "REVERSE CLUTCH" .**

8. Check operation of reverse clutch.
Refer to AT-296, "Disassembly" .

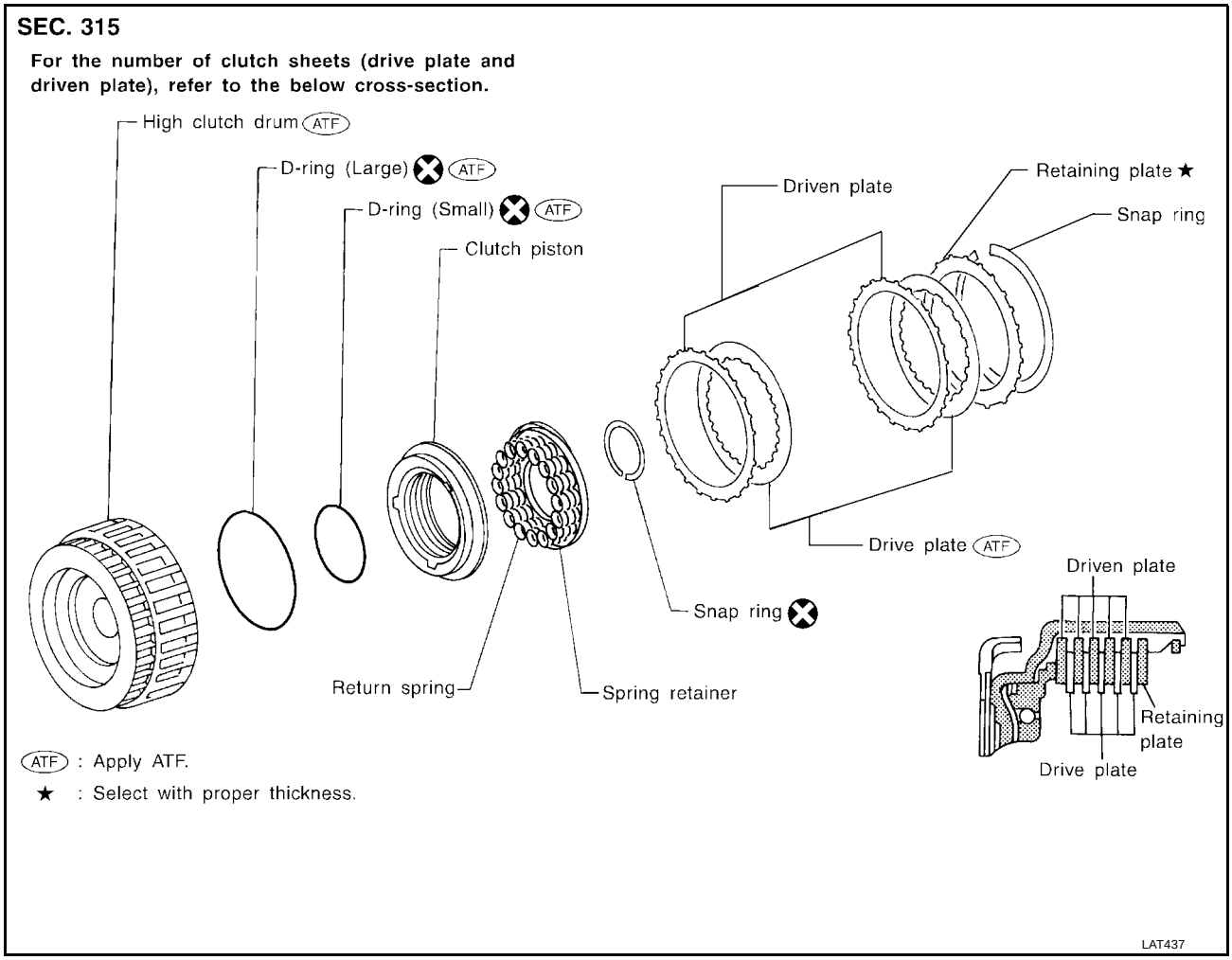


HIGH CLUTCH

PFP:31410

Components

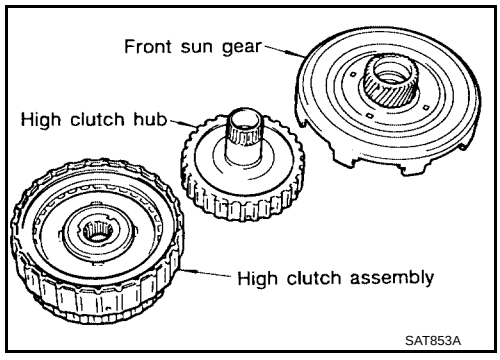
ECS005QC



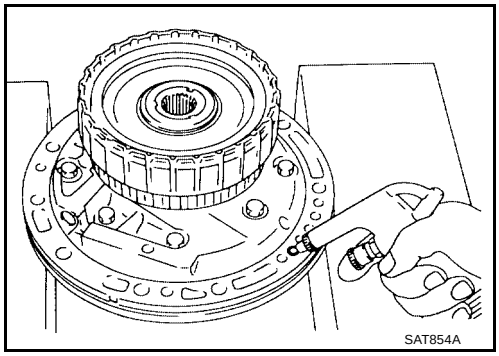
Disassembly and Assembly

ECS005QD

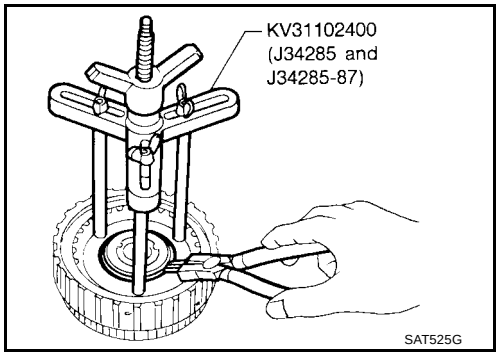
Service procedures for high clutch are essentially the same as those for reverse clutch, with the following exception:



- Check of high clutch operation

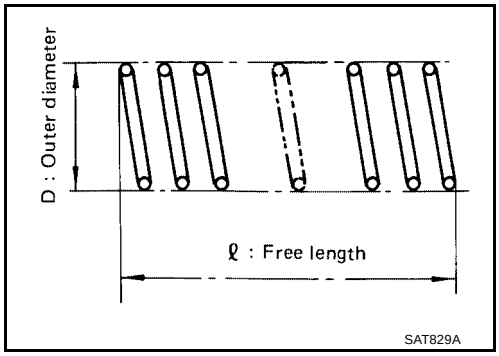


- Removal and installation of return spring



- Inspection of high clutch return springs

  Inspection standard : **AT-347, "Return Springs"**

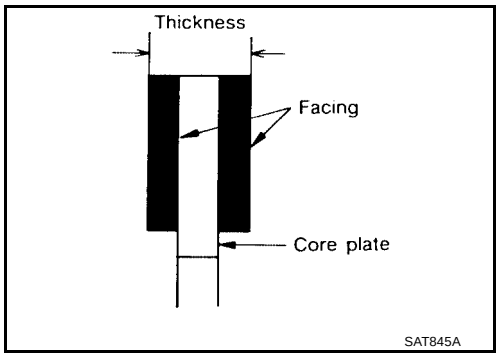


- Inspection of high clutch drive plate

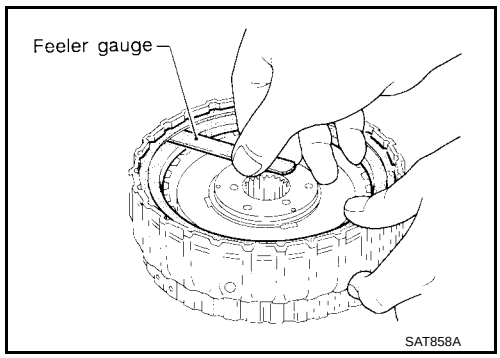
  Thickness of drive plate:

  Standard : **1.52 - 1.67 mm (0.0598 - 0.0657 in)**

  Wear limit : **1.40 mm (0.0551 in)**



- Measurement of clearance between retaining plate and snap ring



Specified clearance:

Standard	**: 1.8 - 2.2 mm (0.071 - 0.087 in)**
Allowable limit:	
VG33E	**: 2.8 mm (0.110 in)**
VG33ER	**: 2.2 mm (0.087 in)**
Retaining plate	**: Refer to AT-348, "HIGH CLUTCH" .**

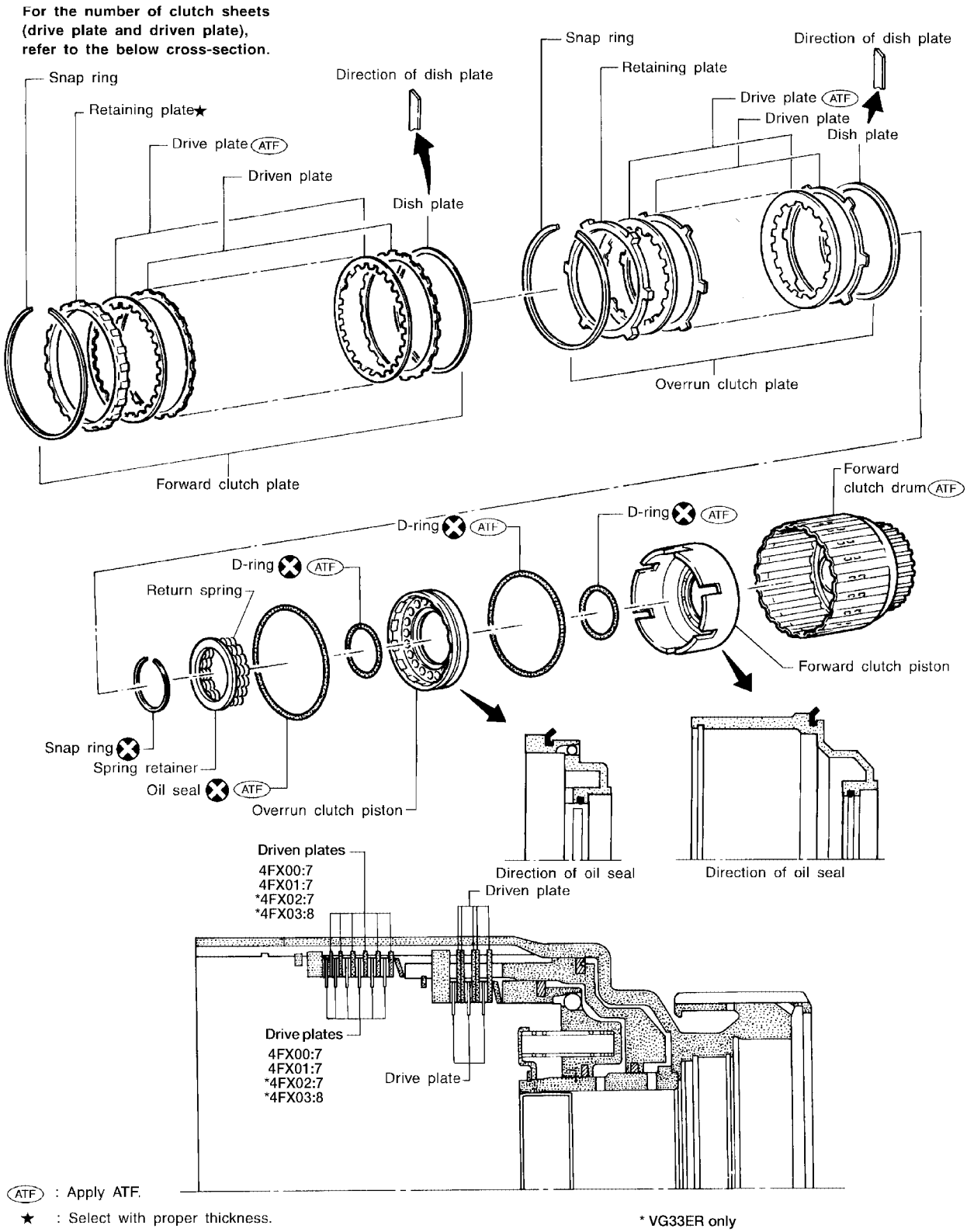
FORWARD AND OVERRUN CLUTCHES

PFP:31570

Components

ECS005QE

SEC. 315



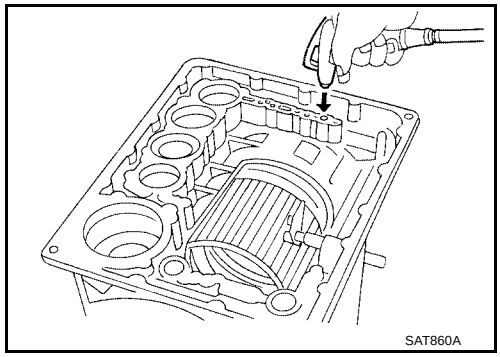
LCIA0261E

Disassembly and Assembly

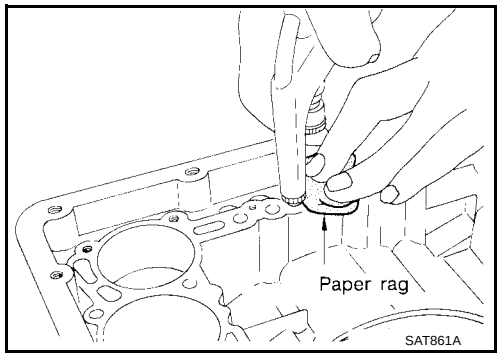
ECS005QF

Forward and overrun clutches are serviced essentially the same way as reverse clutch is serviced. However, note the following exceptions.

- Check of forward clutch operation

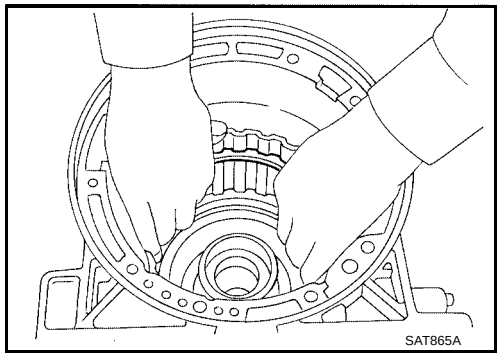

SAT860A

- Check of overrun clutch operation

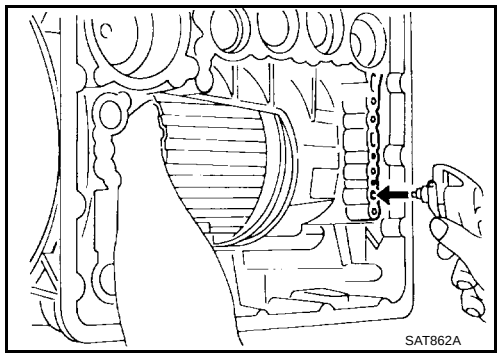


SAT861A

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

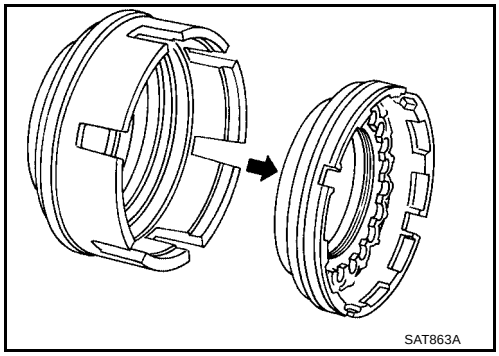

SAT865A

- Removal of forward clutch and overrun clutch pistons

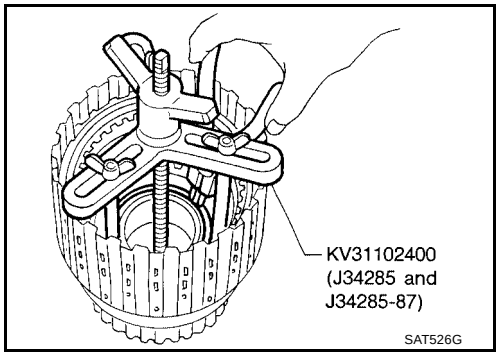

SAT862A

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

– Remove overrun clutch from forward clutch.

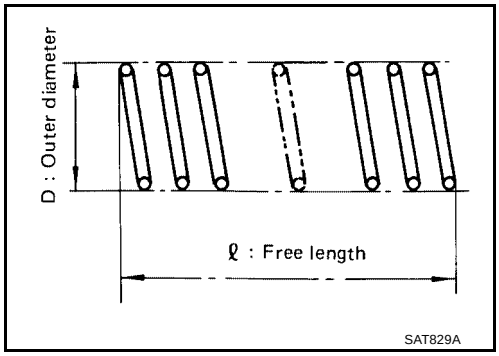


- Removal and installation of return springs



- Inspection of forward clutch and overrun clutch return springs

Inspection standard — **Refer to AT-347, "Return Springs" .**

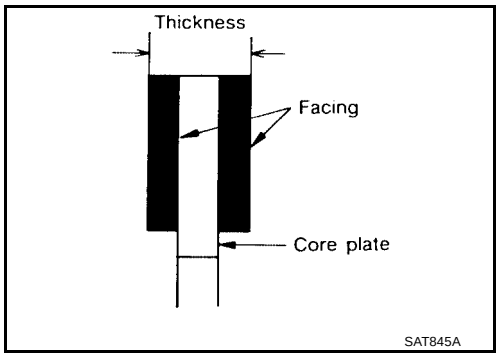


- Inspection of forward clutch drive plates

Thickness of drive plate:

Standard — **: 1.52 - 1.67 mm (0.0598 - 0.0657 in)**

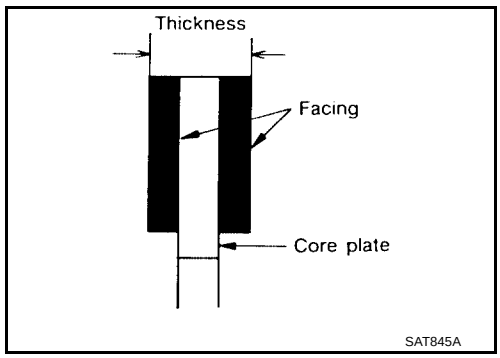
Wear limit — **: 1.40 mm (0.0551 in)**



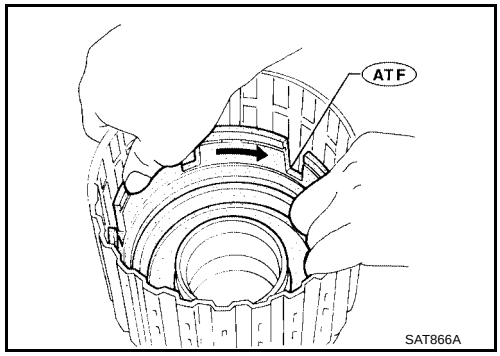
- Inspection of overrun clutch drive plates

Thickness of drive plate:

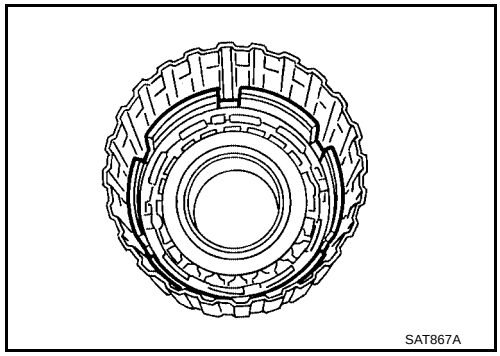
Standard	**: 1.90 - 2.05 mm (0.0748 - 0.0807 in)**
Wear limit	**: 1.80 mm (0.0709 in)**



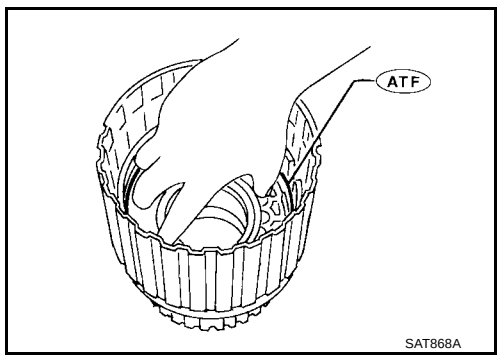
- Installation of forward clutch piston and overrun clutch piston
  - Install forward clutch piston by turning it slowly and evenly.
  - **Apply ATF to inner surface of clutch drum.**



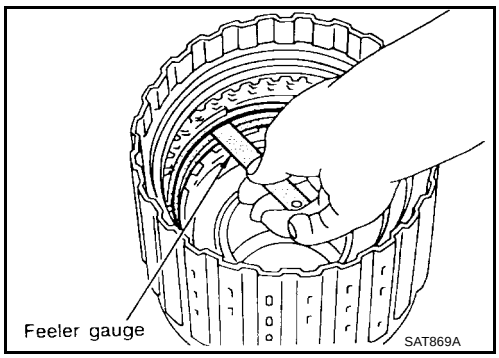
- **Align notch in forward clutch piston with groove in forward clutch drum.**



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



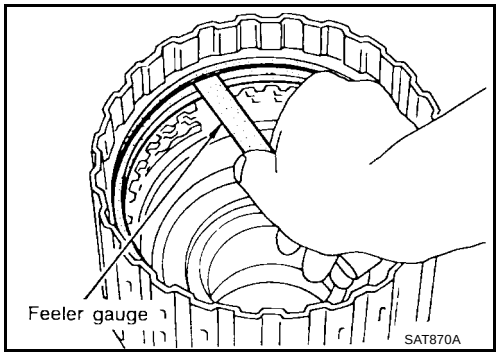
- Measurement of clearance between retaining plate and snap ring of overrun clutch



Specified clearance:

Standard	**: 1.0 - 1.4 mm (0.039 - 0.055 in)**
Allowable limit	**: 2.4 mm (0.094 in)**
Retaining plate	**: Refer to AT-349, "FORWARD CLUTCH" .**

- Measurement of clearance between retaining plate and snap ring of forward clutch



Specified clearance:

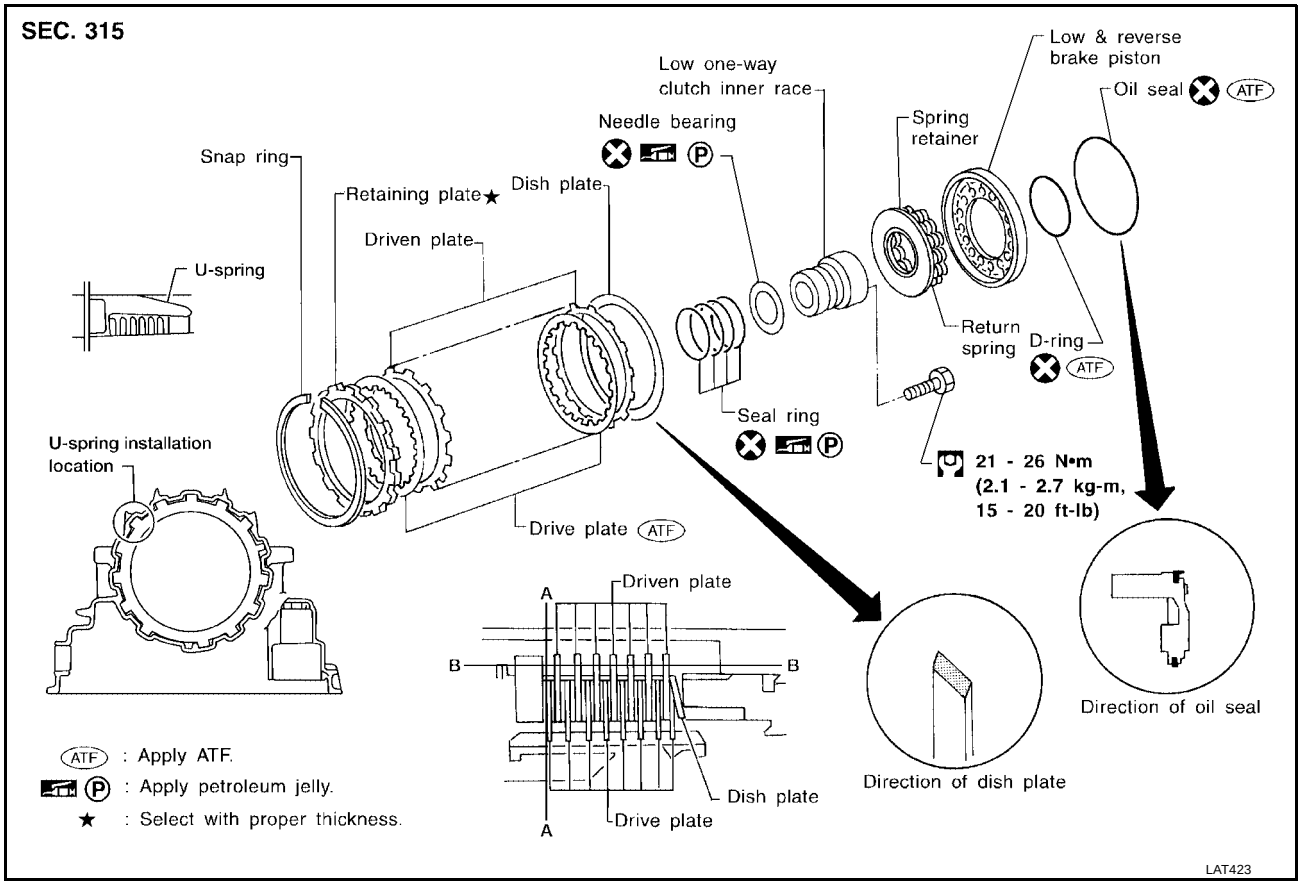
Standard	**: 0.35 - 0.75 mm (0.0138 - 0.0295 in)**
Allowable limit:	
VG33E	**: Model 4FX00 (2WD) 2.15 mm (0.085 in)**
VG33E	**: Model 4FX01 (4WD) 2.15 mm (0.085 in)**
VG33ER	**: Model 4FX02 (2WD) 2.15 mm (0.085 in)**
VG33ER	**: Model 4FX03 (4WD) 2.35 mm (0.093 in)**
Retaining plate	**: Refer to AT-349, "FORWARD CLUTCH" .**

LOW & REVERSE BRAKE

PFP:31645

Components

ECS005QG



Disassembly

ECS005QH

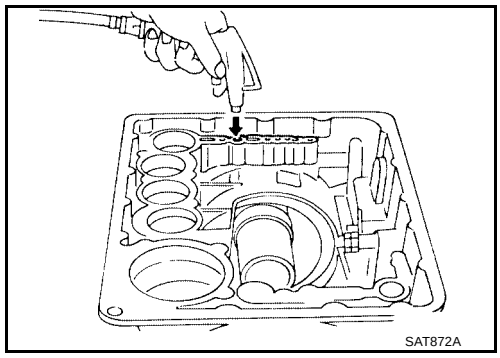
1. Check operation of low and reverse brake.

a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.

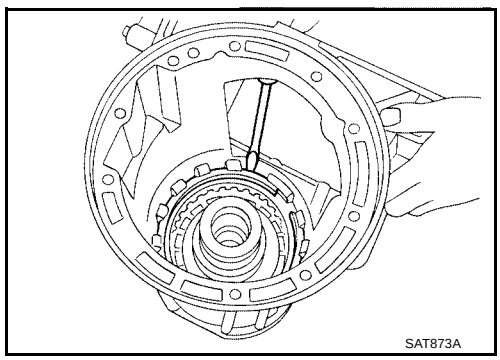
b. Check to see that retaining plate moves to snap ring.

c. If retaining plate does not contact snap ring,

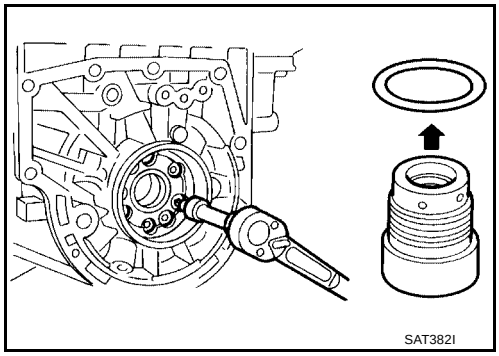
- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.



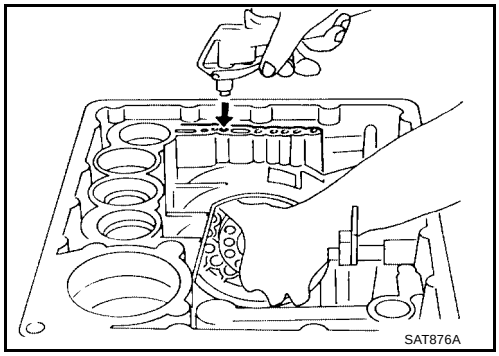
2. Remove snap ring, low and reverse brake drive plates, driven plates and dish plate.



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



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



Inspection

ECS005QI

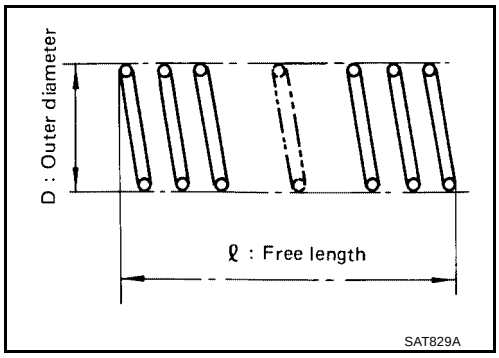
LOW AND REVERSE BRAKE SNAP RING AND SPRING RETAINER

- Check for deformation, or damage.

LOW AND REVERSE BRAKE RETURN SPRINGS

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

Inspection standard : Refer to AT-347, "Return Springs" .



LOW AND REVERSE BRAKE DRIVE PLATES

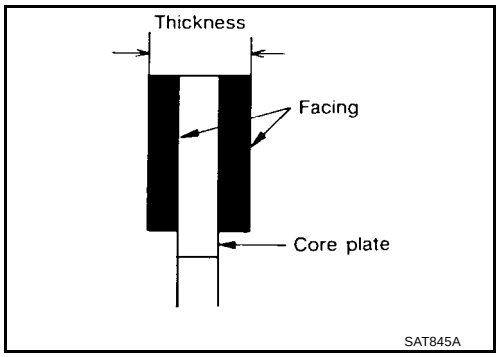
- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

Standard value : 1.52 - 1.67 mm (0.0598 - 0.0657 in)

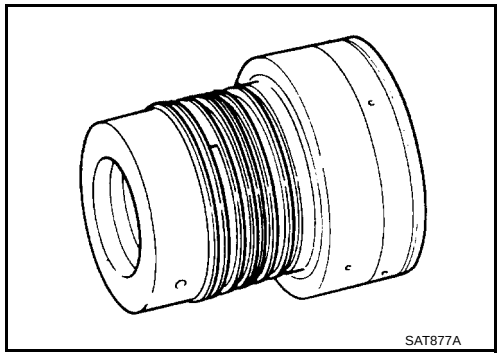
Wear limit : 1.40 mm (0.0551 in)

- If not within wear limit, replace.



LOW ONE-WAY CLUTCH INNER RACE

- Check frictional surface of inner race for wear or damage.

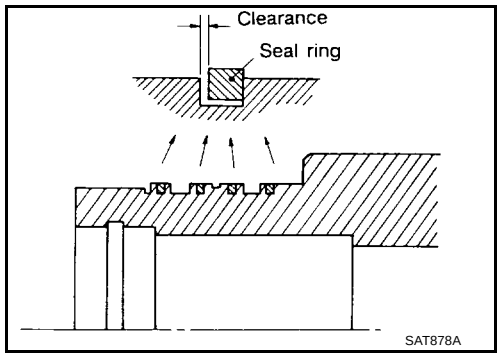


- Install a new seal rings onto low one-way clutch inner race.
- **Be careful not to expand seal ring gap excessively.**
- Measure seal ring-to-groove clearance.

Inspection standard:

Standard value	**: 0.10 - 0.25 mm (0.0039 - 0.0098 in)**
Allowable limit	**: 0.25 mm (0.0098 in)**

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

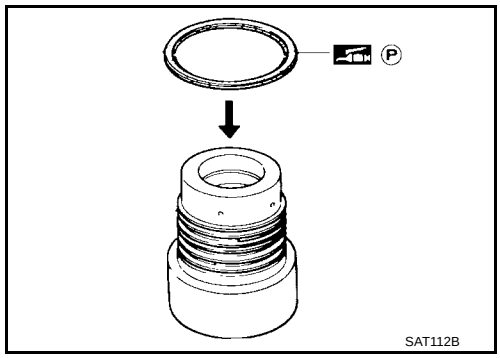


Assembly

ECS005QJ

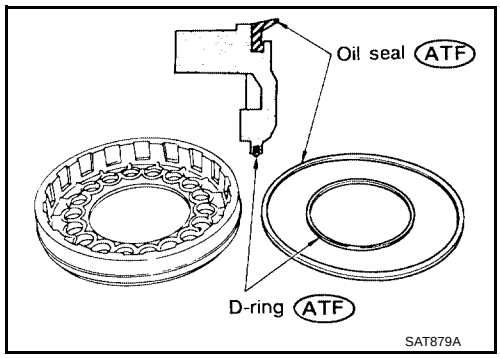
1. Install needle bearing onto one-way clutch inner race.

- **Pay attention to its direction — Black surface goes to rear side.**
- **Apply petroleum jelly to needle bearing.**

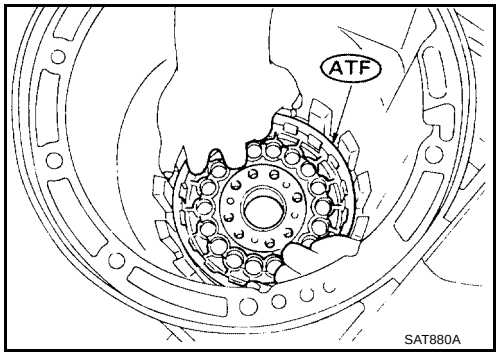


2. Install oil seal and D-ring onto piston.

- **Apply ATF to oil seal and D-ring.**

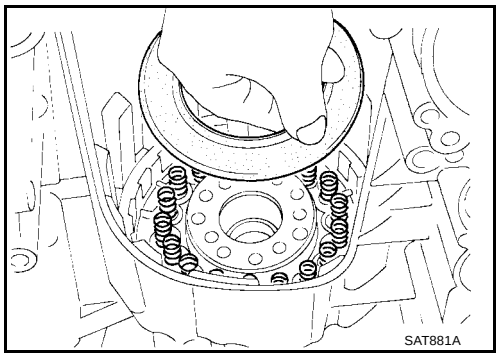


3. Install piston by rotating it slowly and evenly.

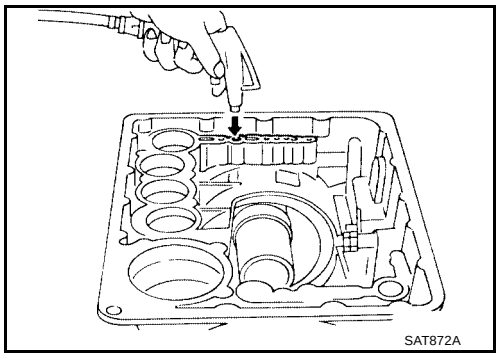


- **Apply ATF to inner surface of transmission case.**

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



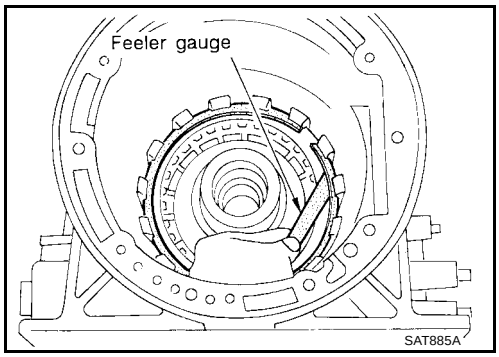
7. Check operation of low and reverse brake clutch piston. Refer to AT-309, "Disassembly" .



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

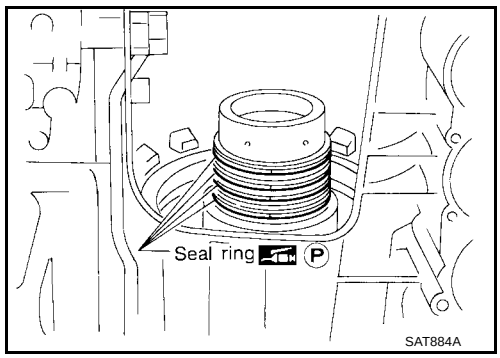
Specified clearance:

Standard	**: 0.8 - 1.1 mm (0.031 - 0.043 in)**
Allowable limit:	
VG33E	**: 2.5 mm (0.098 in)**
VG33ER	**: 2.7 mm (0.106 in)**
Retaining plate	**: Refer to AT-350, "LOW & REVERSE BRAKE" .**



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

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

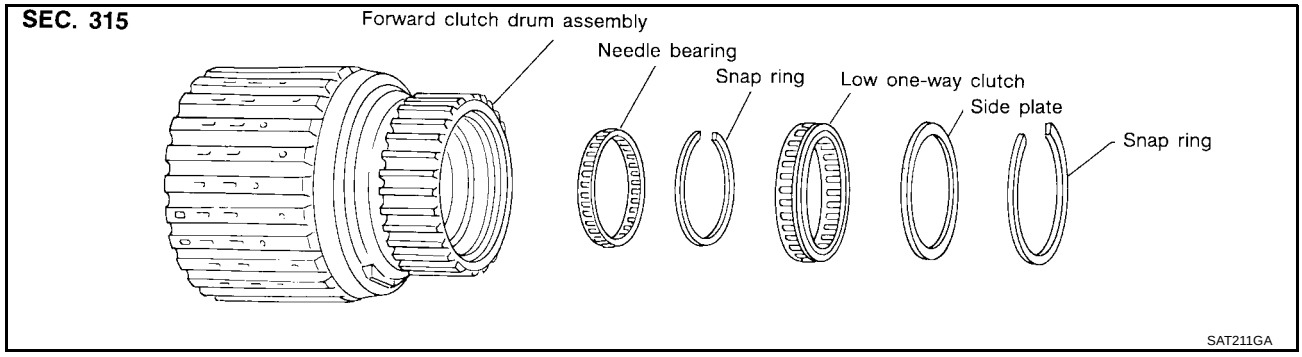


FORWARD CLUTCH DRUM ASSEMBLY

PFP:31571

Components

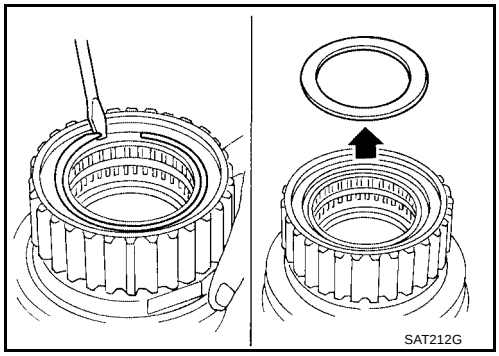
ECS005QK



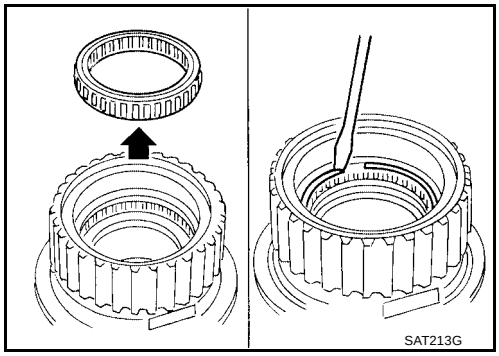
Disassembly

ECS005QL

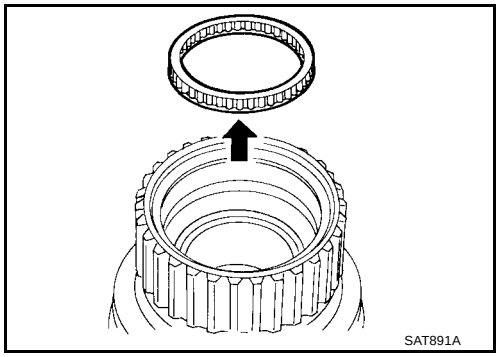
1. Remove snap ring from forward clutch drum.
2. Remove side plate from forward clutch drum.



3. Remove low one-way clutch from forward clutch drum.
4. Remove snap ring from forward clutch drum.



5. Remove needle bearing from forward clutch drum.

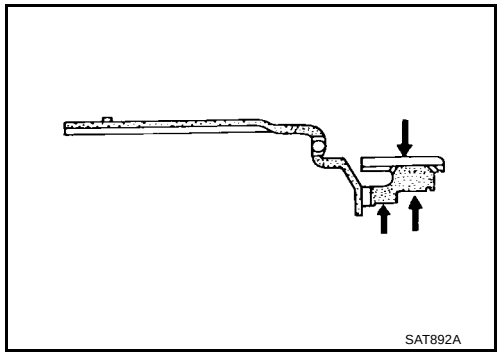


Inspection

ECS005QM

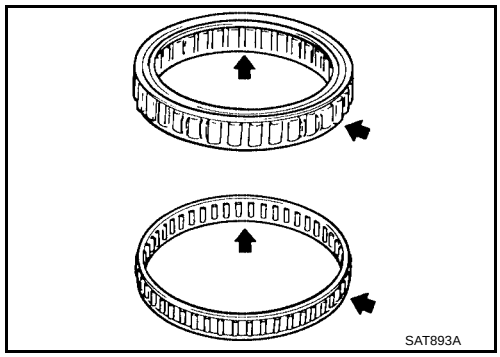
FORWARD CLUTCH DRUM

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



NEEDLE BEARING AND LOW ONE-WAY CLUTCH

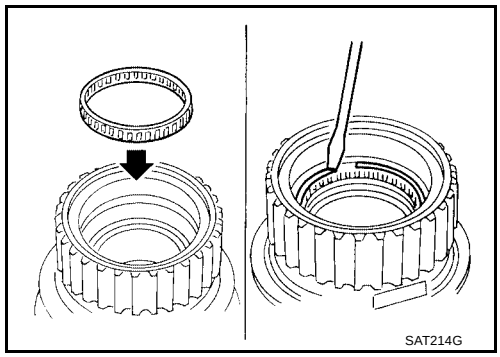
- Check frictional surface for wear or damage.



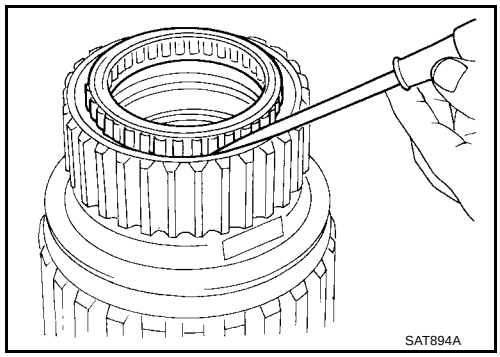
Assembly

ECS005QN

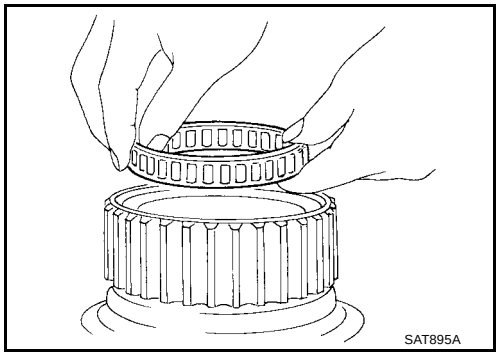
1. Install needle bearing in forward clutch drum.
2. Install snap ring onto forward clutch drum.



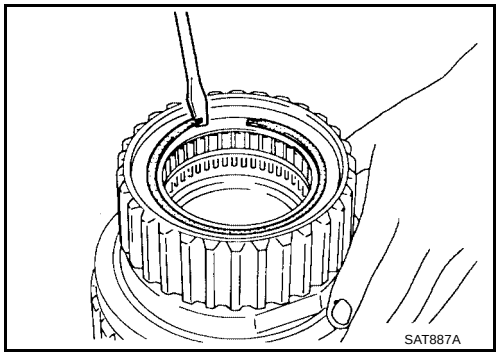
3. Install low one-way clutch onto forward clutch drum by pushing the roller in evenly.



- **Install low one-way clutch with flange facing rearward.**



4. Install side plate onto forward clutch drum.
5. Install snap ring onto forward clutch drum.

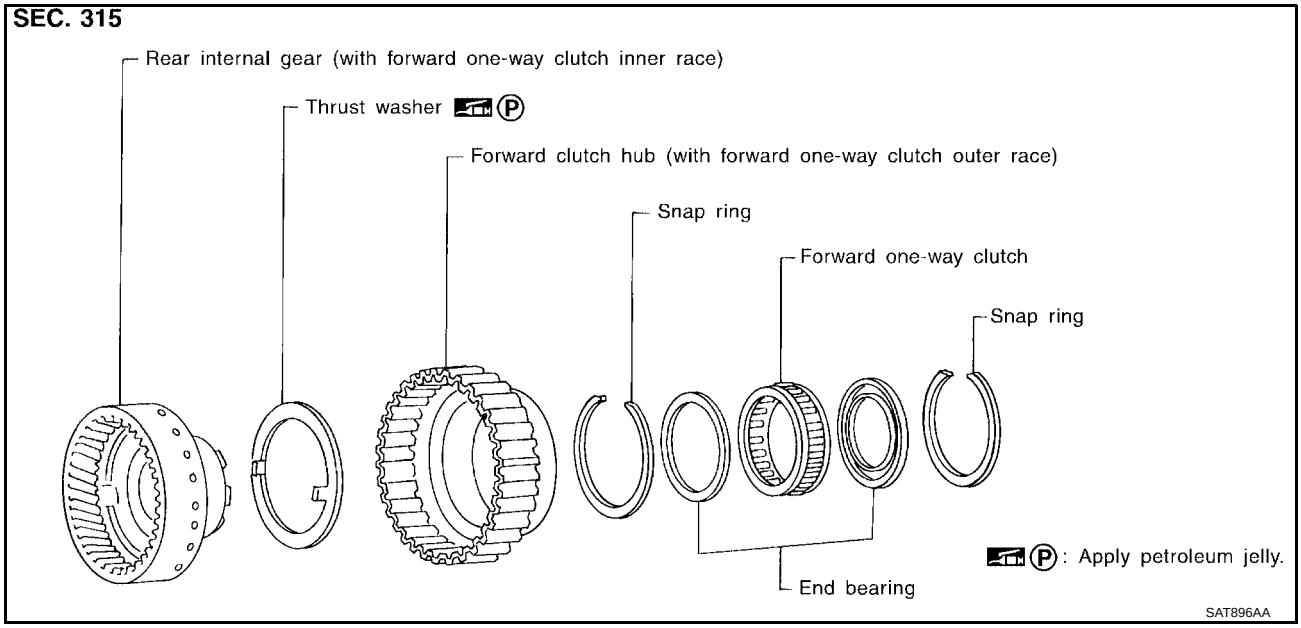


REAR INTERNAL GEAR AND FORWARD CLUTCH HUB

PFP:31450

Components

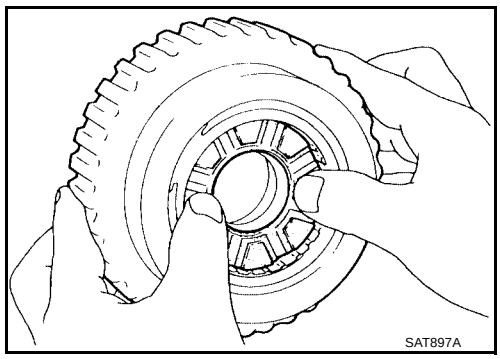
ECS005QO



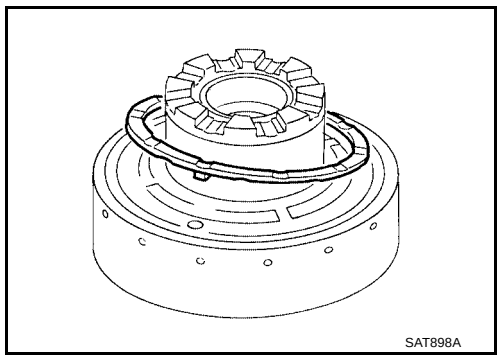
Disassembly

ECS005QP

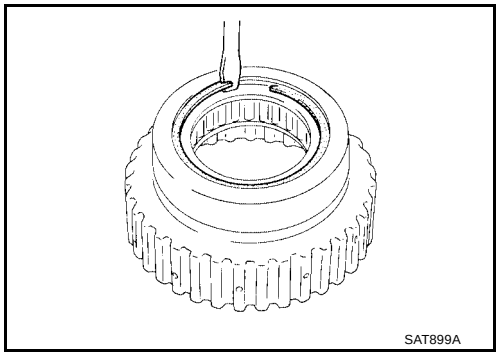
1. Remove rear internal gear by pushing forward clutch hub forward.



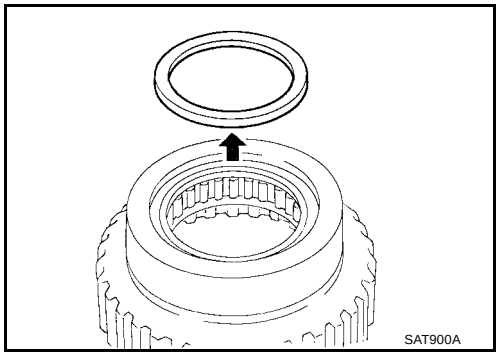
2. Remove thrust washer from rear internal gear.



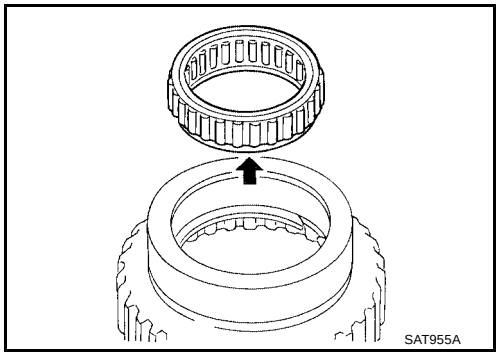
3. Remove snap ring from forward clutch hub.



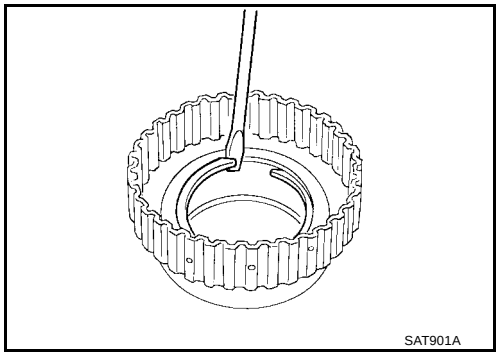
4. Remove end bearing.



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



6. Remove snap ring from forward clutch hub.

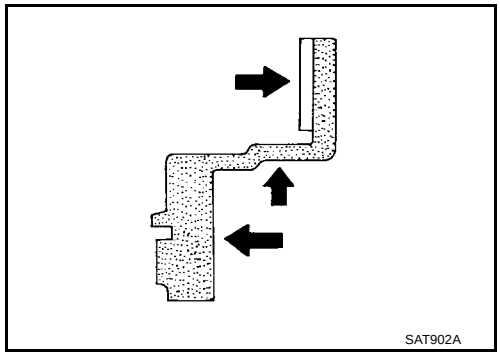


Inspection

ECS005QQ

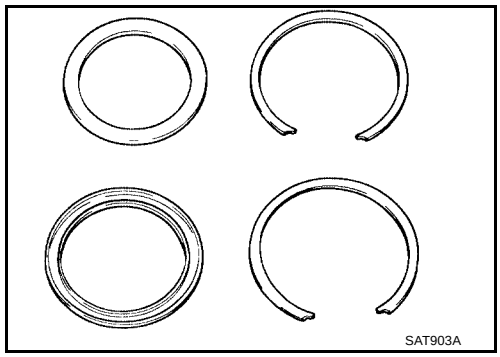
REAR INTERNAL GEAR AND FORWARD CLUTCH HUB

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


SAT902A

SNAP RING AND END BEARING

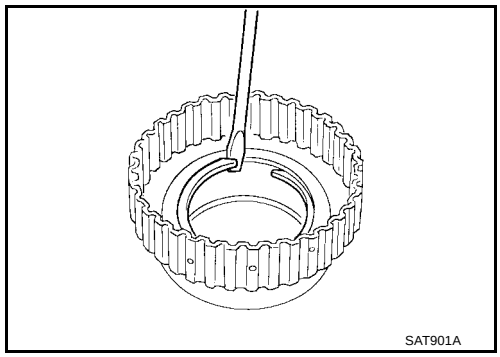
- Check for deformation or damage.


SAT903A

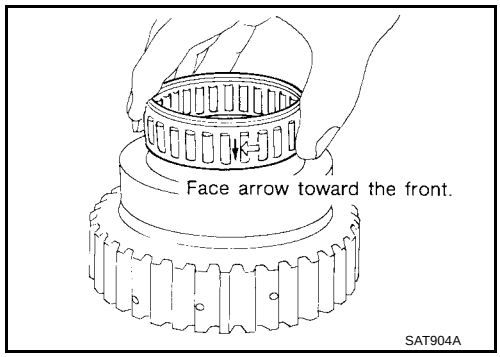
Assembly

ECS005QR

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

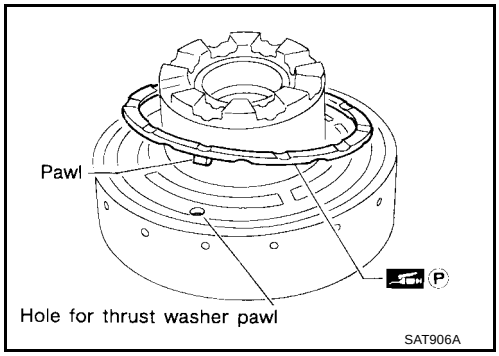

SAT901A

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

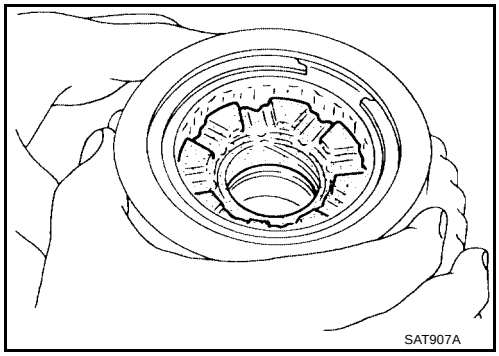


SAT904A

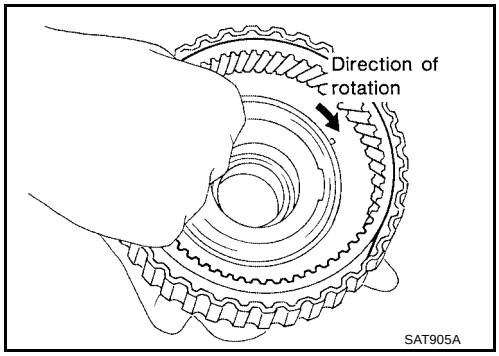
6. Install thrust washer onto rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Securely insert pawls of thrust washer into holes in rear internal gear.**



7. Position forward clutch hub in rear internal gear.



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

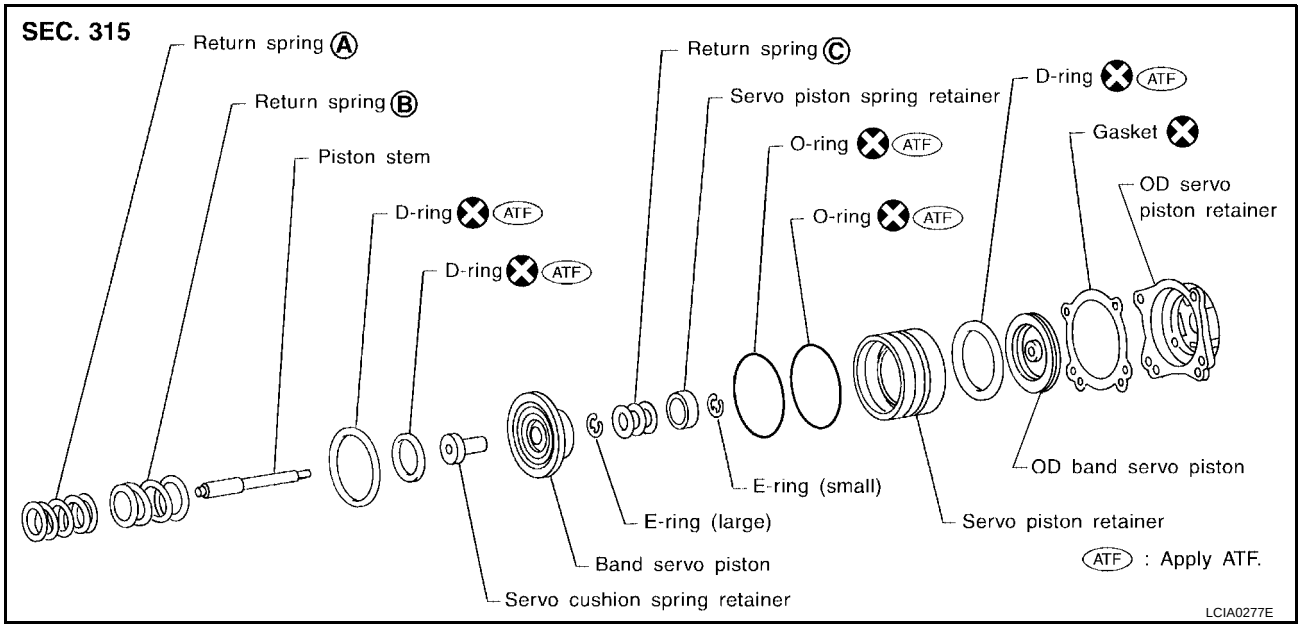


BAND SERVO PISTON ASSEMBLY

PFP:31615

Components

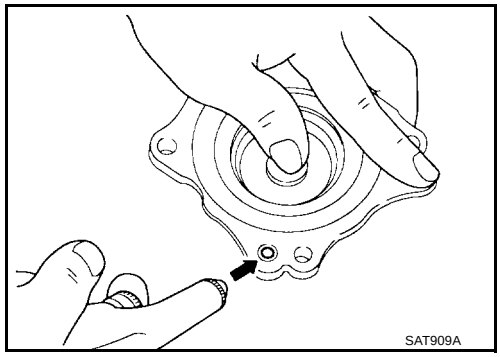
ECS005QS



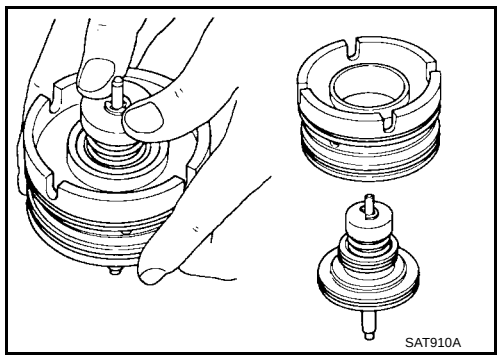
Disassembly

ECS005QT

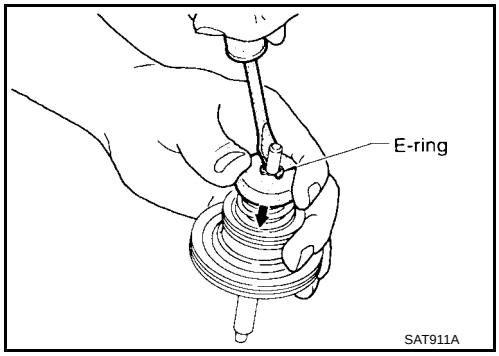
1. Block one oil hole in OD servo piston retainer and the center hole in OD band servo piston.
2. Apply compressed air to the other oil hole in piston retainer to remove OD band servo piston from retainer.
3. Remove D-ring from OD band servo piston.



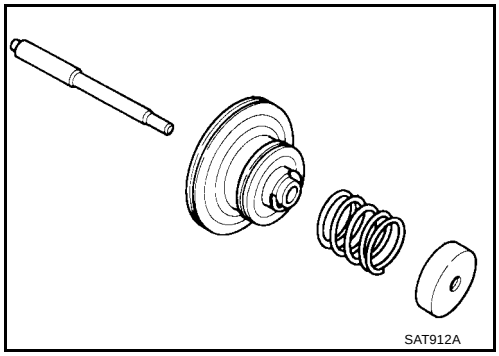
4. Remove band servo piston assembly from servo piston retainer by pushing it forward.



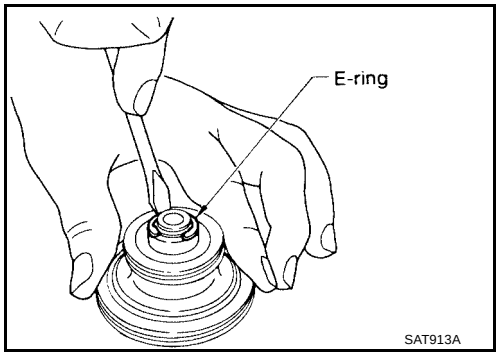
5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.



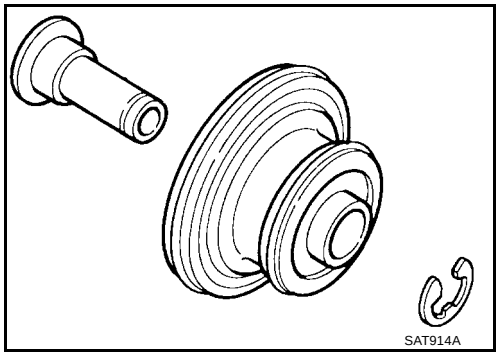
6. Remove servo piston spring retainer, return spring C and piston stem from band servo piston.



7. Remove E-ring from band servo piston.



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

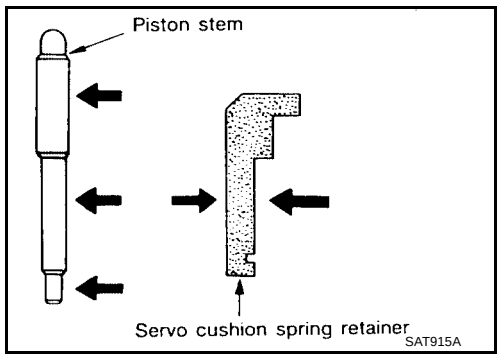


Inspection

ECS005QU

PISTONS, RETAINERS AND PISTON STEM

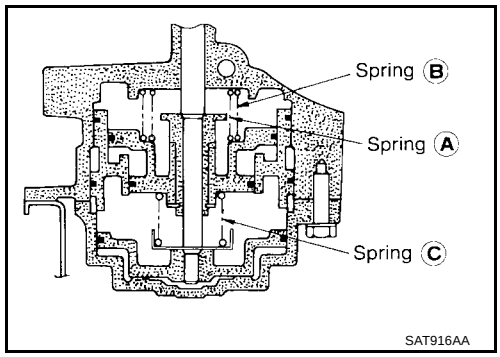
- Check frictional surfaces for abnormal wear or damage.



RETURN SPRINGS

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

Inspection standard **: Refer to AT-347, "Return Springs" .**

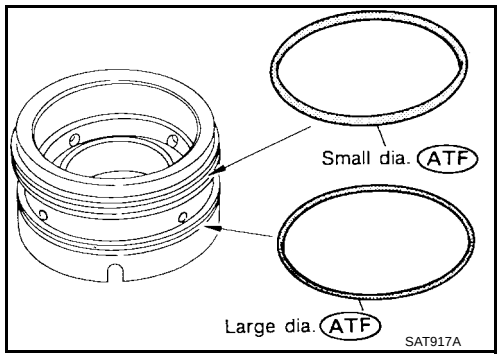


Assembly

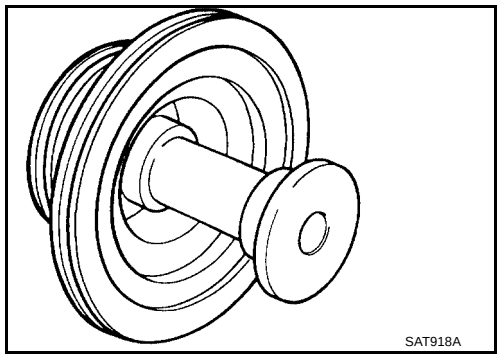
ECS005QV

1. Install O-rings onto servo piston retainer.

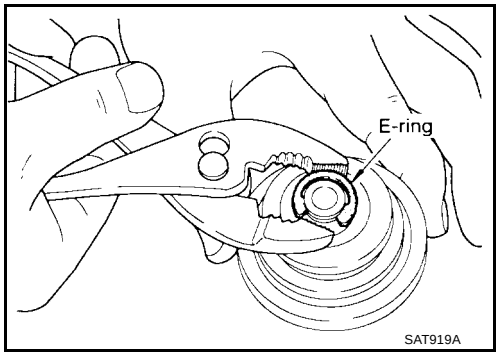
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**



2. Install servo cushion spring retainer onto band servo piston.

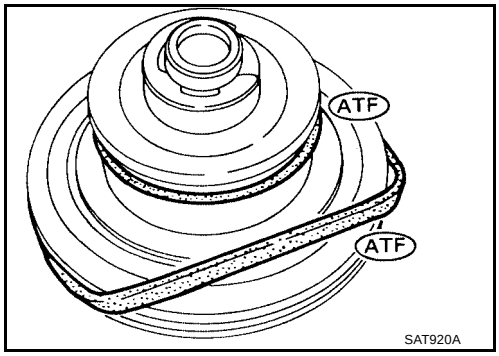


3. Install E-ring onto servo cushion spring retainer.

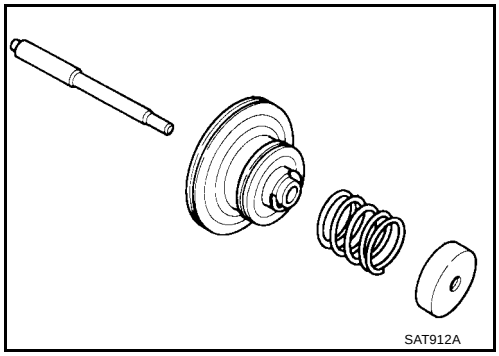


4. Install D-rings onto band servo piston.

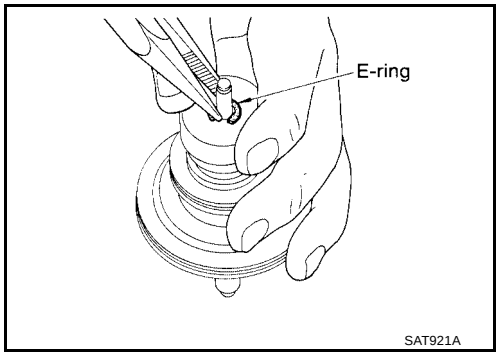
- **Apply ATF to D-rings.**



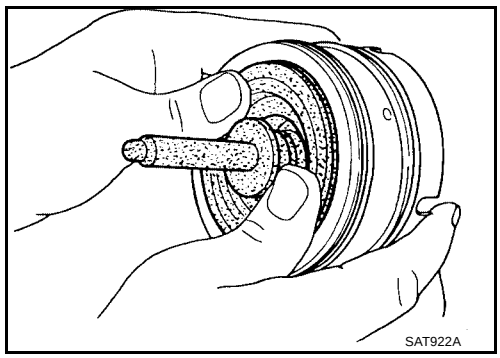
5. Install servo piston spring retainer, return spring C and piston stem onto band servo piston.



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

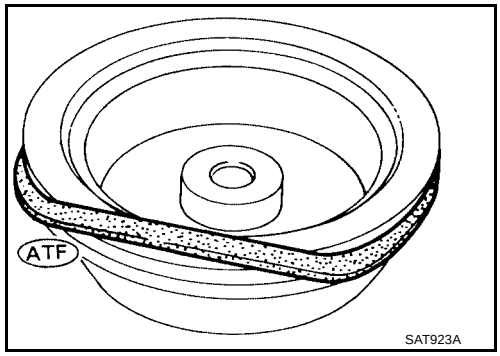


7. Install band servo piston assembly onto servo piston retainer by pushing it inward.


SAT922A

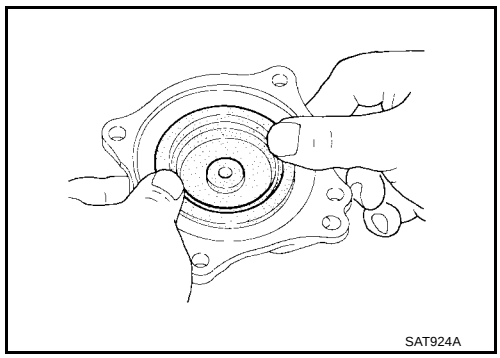
8. Install D-ring on OD band servo piston.

- **Apply ATF to D-ring.**



SAT923A

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

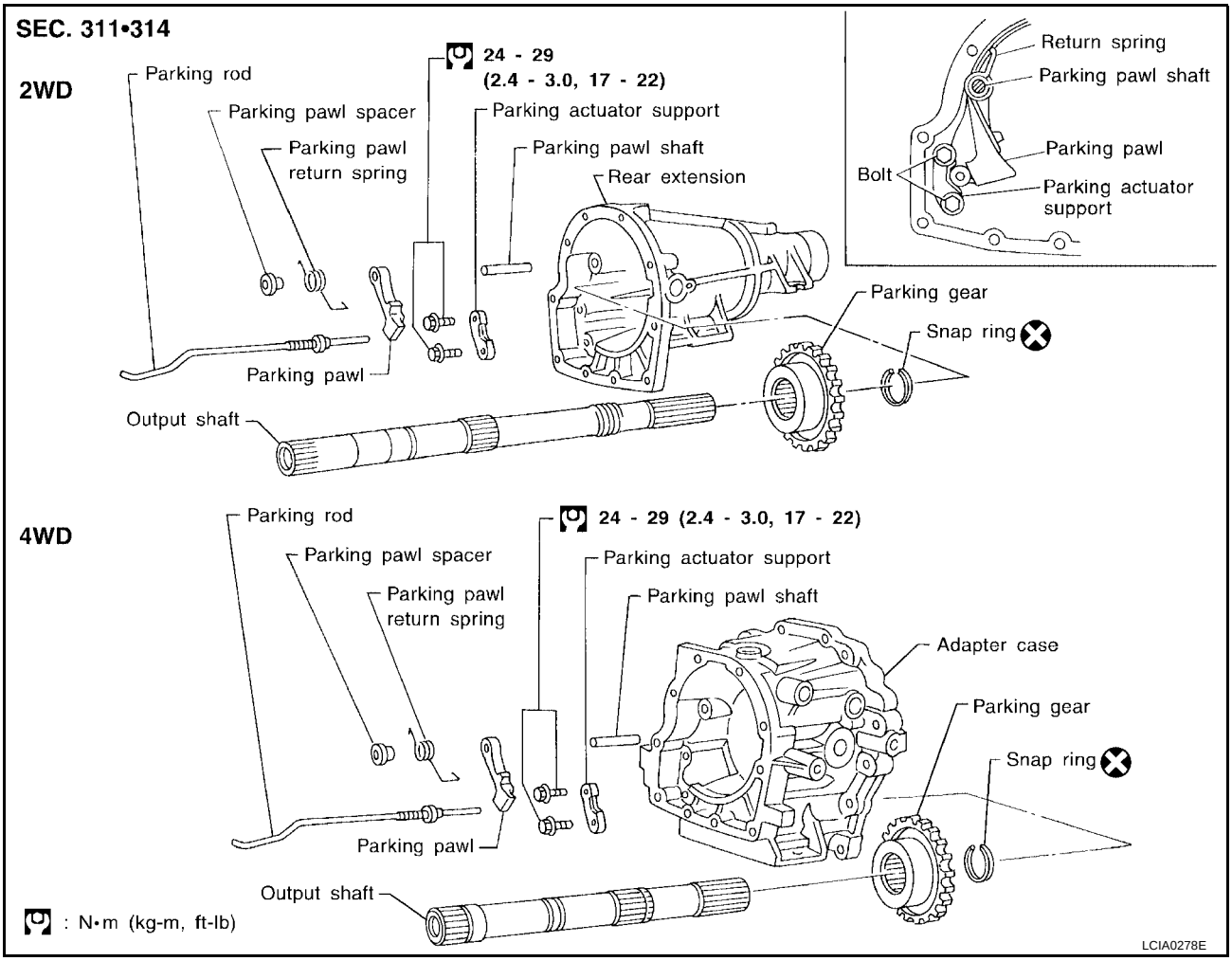

SAT924A

PARKING PAWL COMPONENTS

PFP:31991

Components

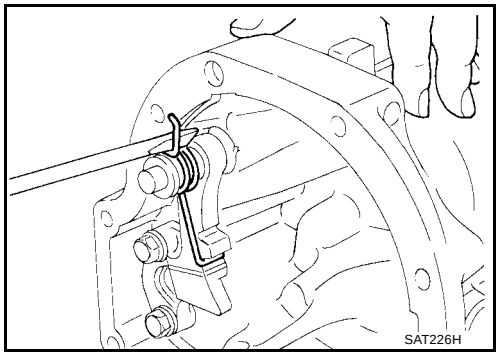
ECS005QW



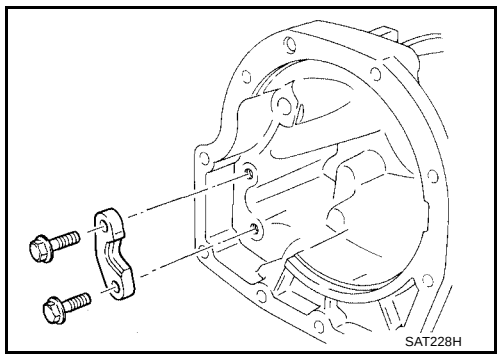
Disassembly

ECS005QX

1. Slide return spring to the front of adapter case or rear extension flange.
2. Remove return spring, pawl spacer and parking pawl from adapter case or rear extension.
3. Remove parking pawl shaft from adapter case or rear extension.



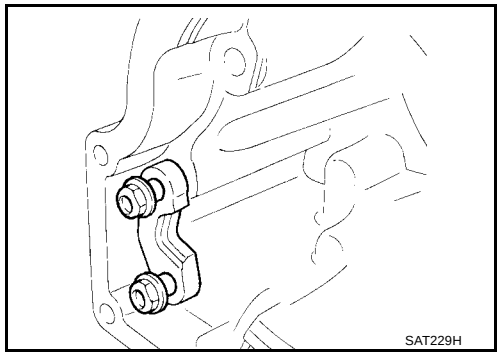
4. Remove parking actuator support from adapter case or rear extension.



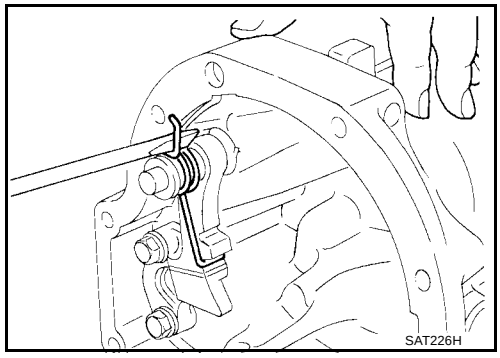
Assembly

ECS005QY

1. Install parking actuator support onto adapter case or rear extension.
2. Insert parking pawl shaft into adapter case or rear extension.
3. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.



4. Bend return spring upward and install it onto adapter case or rear extension.



ASSEMBLY

PFP:00000

Assembly (1)

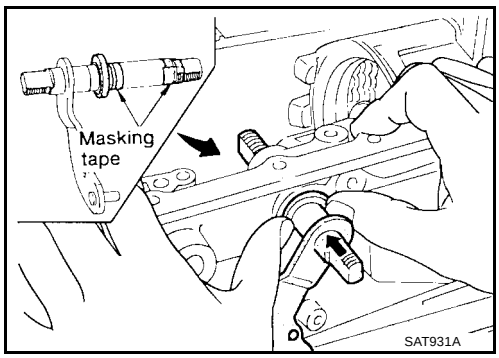
ECS005QZ

1. Install manual shaft components.

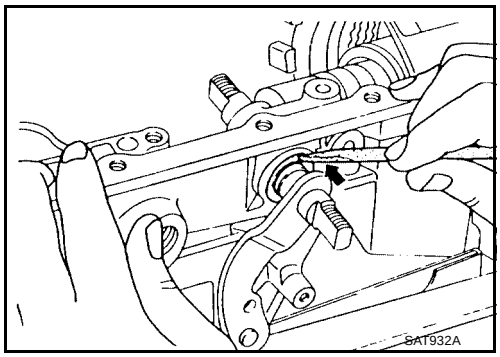
a. Install oil seal onto manual shaft.
   - **Apply ATF to oil seal.**
   - **Wrap threads of manual shaft with masking tape.**

b. Insert manual shaft and oil seal as a unit into transmission case.

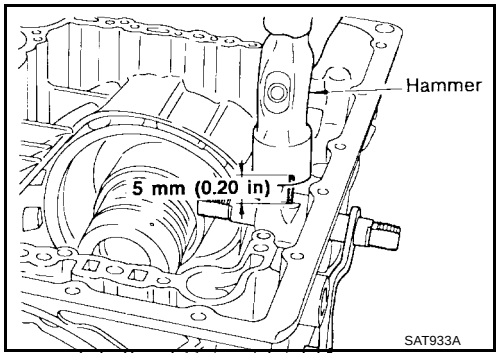
c. Remove masking tape.



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

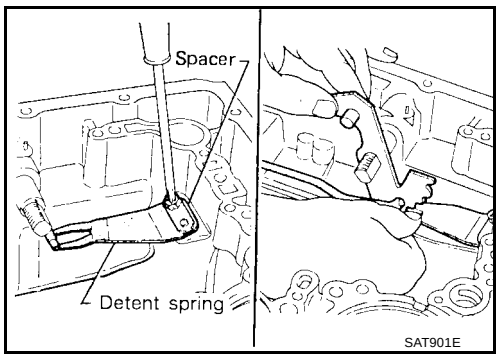


e. Align groove in shaft with drive pin hole, then drive pin into position as shown in figure at left.

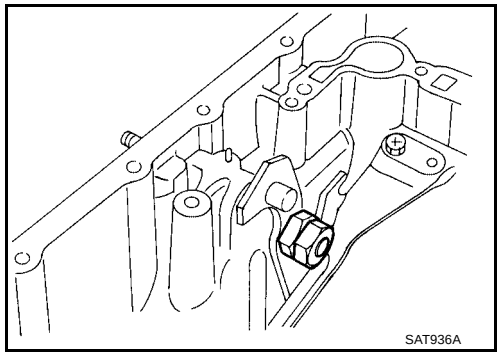


f. Install detent spring and spacer.

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



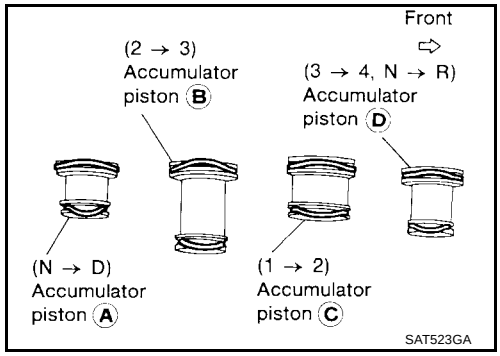
h. Install lock nuts onto manual shaft.



2. Install accumulator piston.

a. Install O-rings onto accumulator piston.

- **Apply ATF to O-rings.**



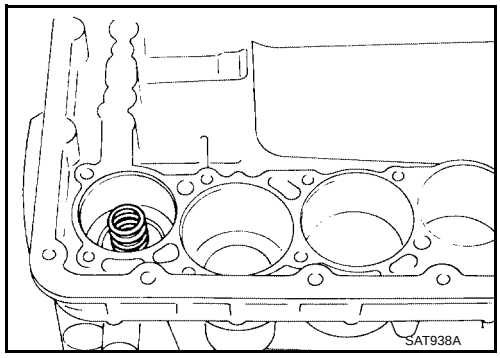
Accumulator piston O-rings

Unit: mm (in)

Accumulator	A	B	C	D
Small diameter end	29 (1.14)	32 (1.26)	45 (1.77)	29 (1.14)
Large diameter end	45 (1.77)	50 (1.97)	50 (1.97)	45 (1.77)

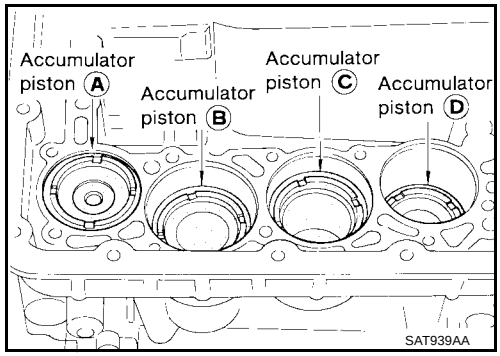
b. Install return spring for accumulator A onto transmission case.

Free length of return spring **: Refer to AT-347, "Return Springs" .**

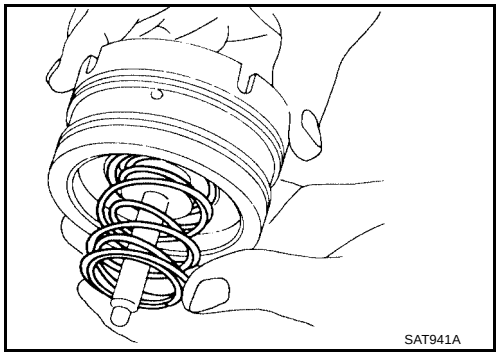


c. Install accumulator pistons A, B, C and D.

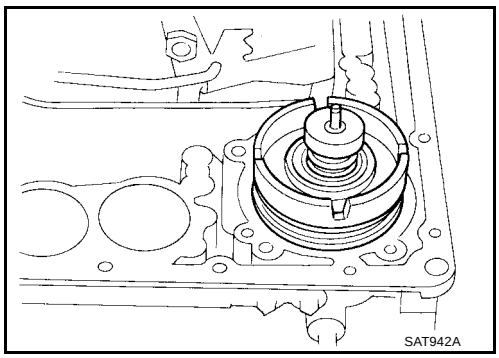
- **Apply ATF to transmission case.**



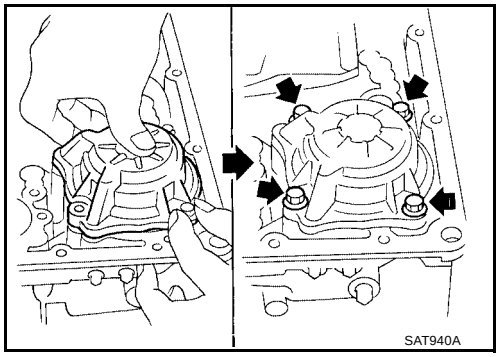
3. Install band servo piston.
a. Install return springs onto servo piston.



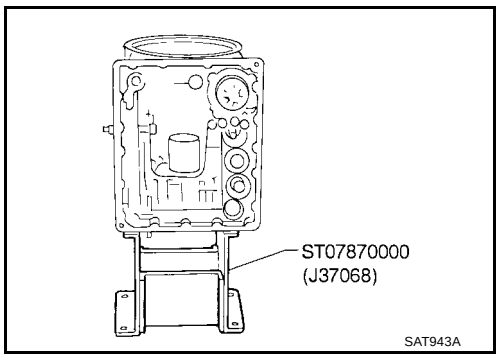
b. Install band servo piston onto transmission case.
   - **Apply ATF to O-ring of band servo piston and transmission case.**
c. Install gasket for band servo onto transmission case.



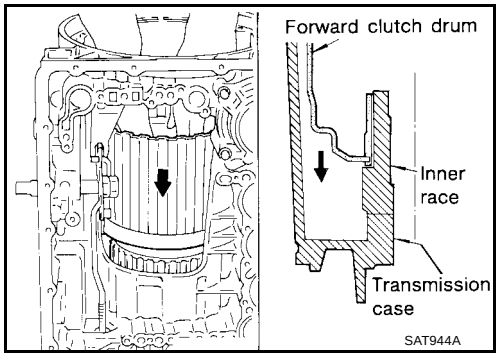
d. Install band servo retainer onto transmission case.



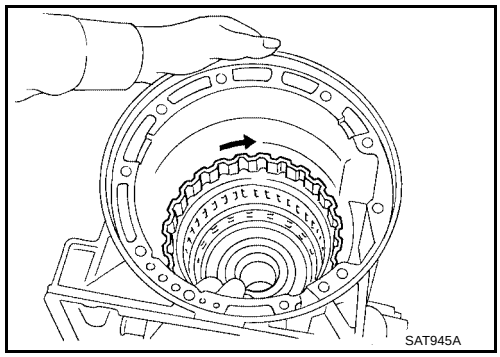
4. Install rear side clutch and gear components.
a. Place transmission case in vertical position.



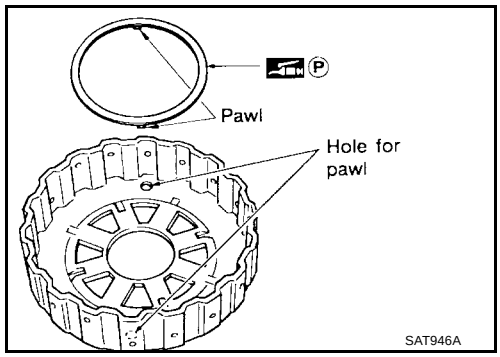
b. Slightly lift forward clutch drum assembly. Then slowly rotate it clockwise until its hub passes fully over clutch inner race inside transmission case.



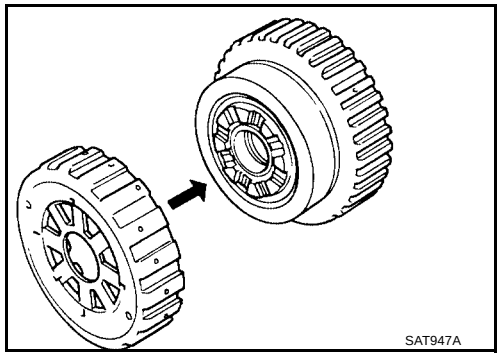
c. Check to be sure that rotation direction of forward clutch assembly is correct.



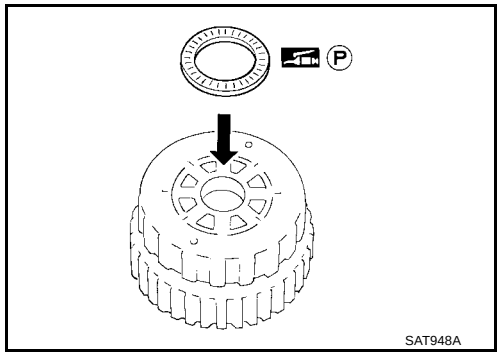
d. Install thrust washer onto front of overrun clutch hub.
- **Apply petroleum jelly to the thrust washer.**
- **Insert pawls of thrust washer securely into holes in overrun clutch hub.**



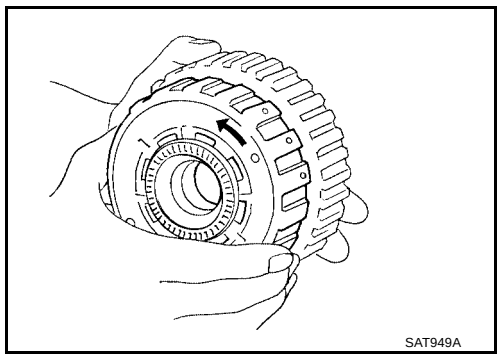
e. Install overrun clutch hub onto rear internal gear assembly.



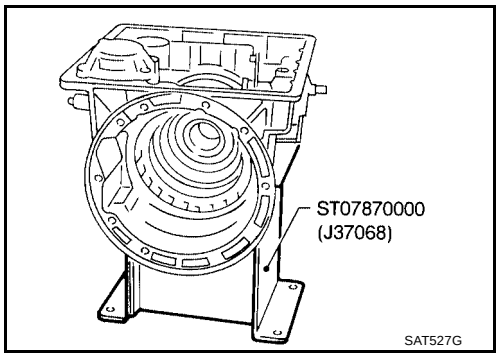
f. Install needle bearing onto rear of overrun clutch hub.
- **Apply petroleum jelly to needle bearing.**



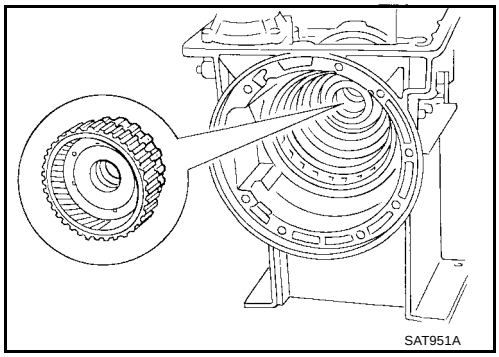
g. Check that overrun clutch hub rotates as shown while holding forward clutch hub.



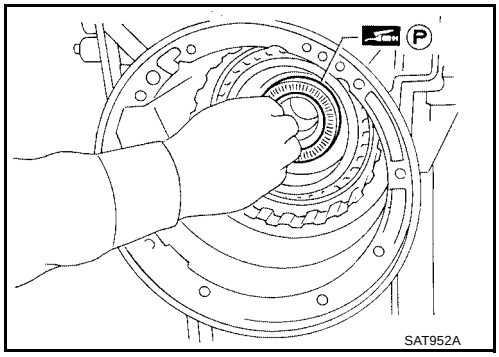
h. Place transmission case into horizontal position.



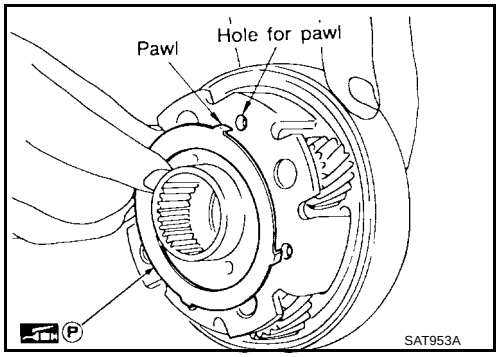
i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.



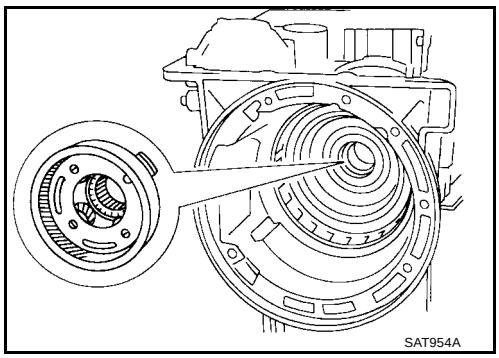
j. Install needle bearing onto rear internal gear.
- **Apply petroleum jelly to needle bearing.**



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

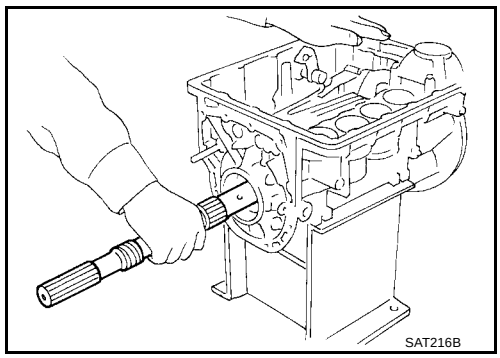


l. Install front internal gear on transmission case.

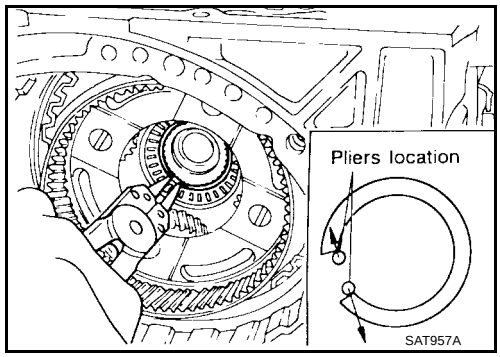


5. Install output shaft and parking gear.

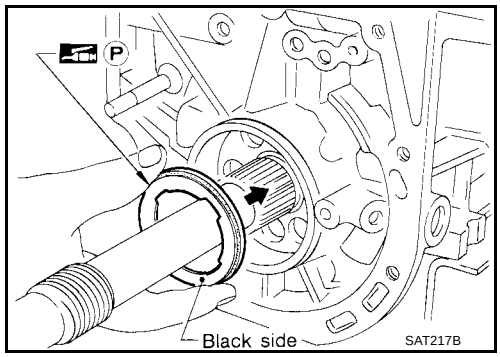
a. Insert output shaft from rear of transmission case while slightly lifting front internal gear.
   - **Do not force output shaft against front of transmission case.**



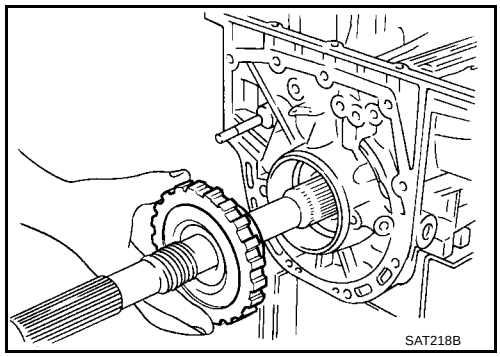
b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.
   - **Check to be sure output shaft cannot be removed in rear direction.**



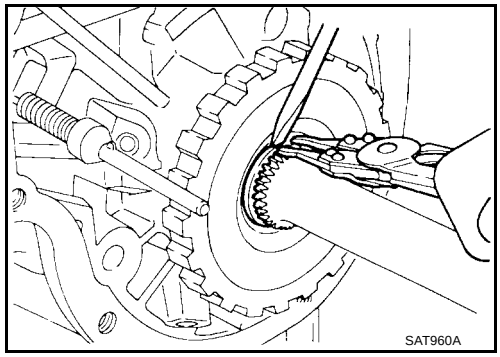
c. Install needle bearing on transmission case.
   - **Pay attention to its direction — Black side goes to rear.**
   - **Apply petroleum jelly to needle bearing.**



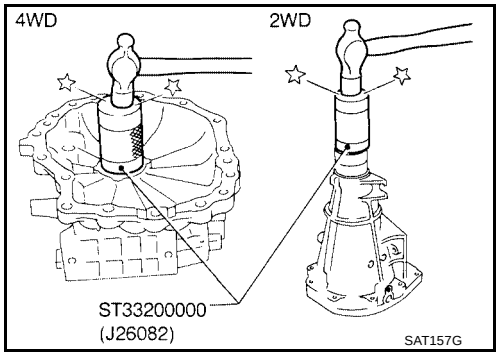
d. Install parking gear on transmission case.



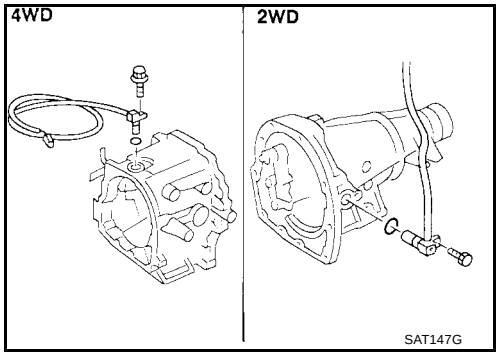
e. Install snap ring on rear of output shaft.
   - **Check to be sure output shaft cannot be removed in forward direction.**



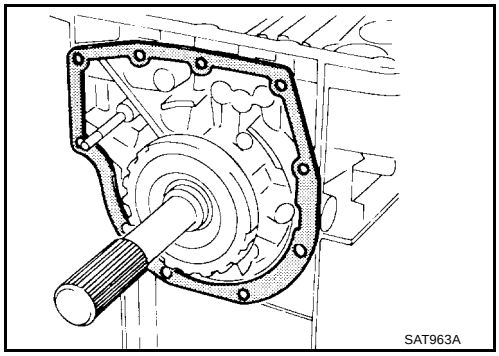
6. Install adapter case or rear extension.
a. Install oil seal on adapter case or rear extension.
   - **Apply ATF to oil seal.**



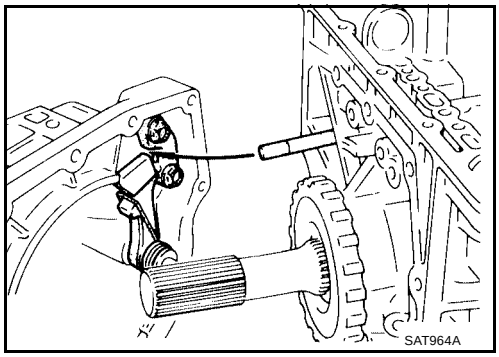
b. Install O-ring on revolution sensor.
   - **Apply ATF to O-ring.**
c. Install revolution sensor on adapter case or rear extension.



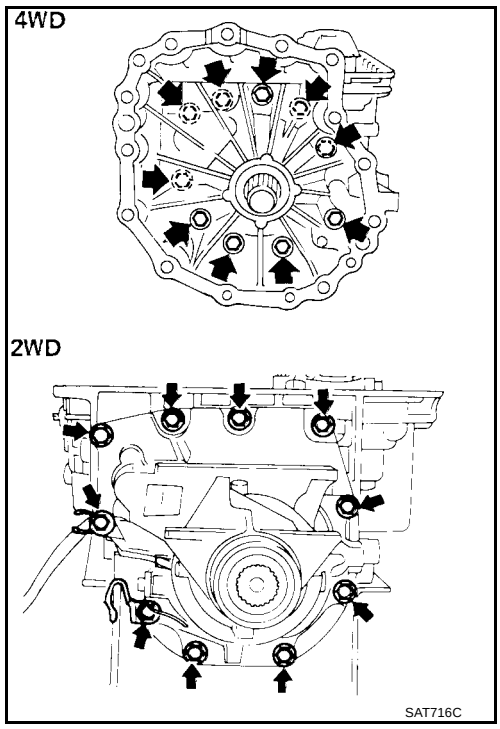
d. Install rear extension gasket on transmission case.



e. Install parking rod on transmission case.

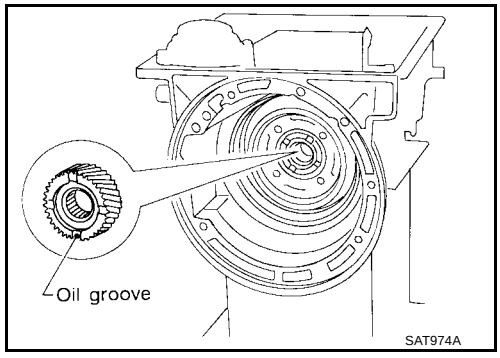


f. Install rear extension or adapter case on transmission case.



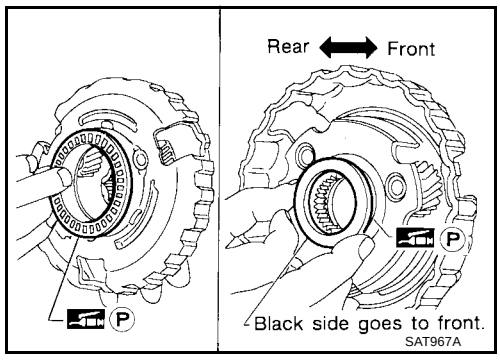
7. Install front side clutch and gear components.

a. Install rear sun gear on transmission case.
   - **Pay attention to its direction.**

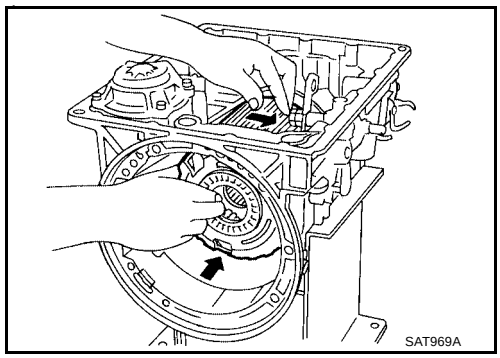


b. Make sure needle bearing is on front of front planetary carrier.
   - **Apply petroleum jelly to needle bearing.**

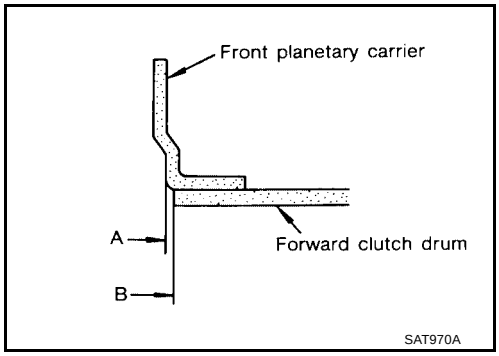
c. Make sure needle bearing is on rear of front planetary carrier.
   - **Apply petroleum jelly to bearing.**
   - **Pay attention to its direction — Black side goes to front.**



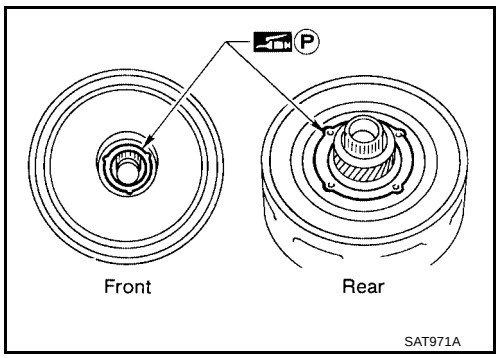
d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.



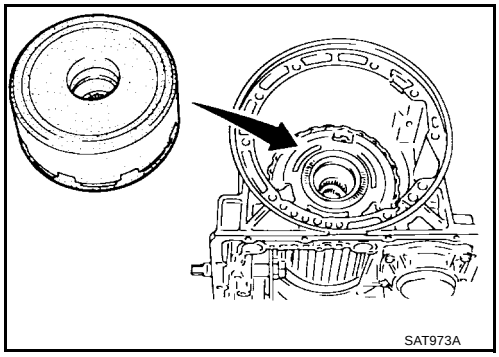
- **Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.**



e. Make sure bearing races are on front and rear of clutch pack.
   - **Apply petroleum jelly to bearing races.**
   - **Securely engage pawls of bearing races with holes in clutch pack.**



f. Install clutch pack into transmission case.



Adjustment

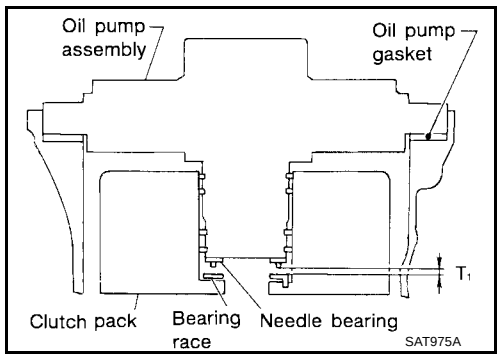
ECS005R0

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

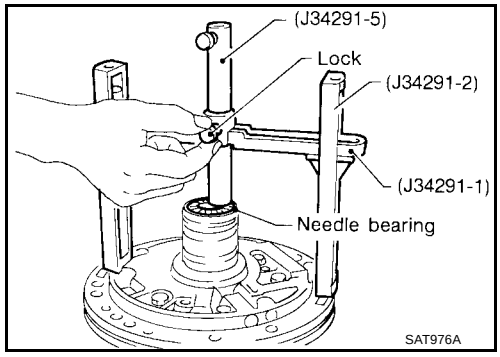
Part name	Total end play	Reverse clutch end play
Transmission case	●	●
Low one-way clutch inner race	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●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

1. Adjust total end play.

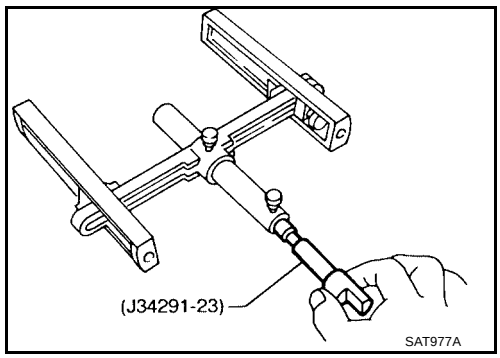
Total end play "T_1 " **: 0.25 - 0.55 mm (0.0098 - 0.0217 in)**



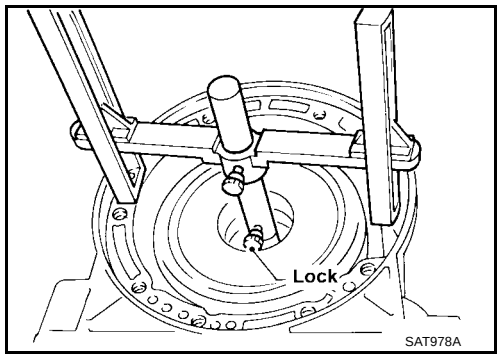
a. With needle bearing installed, place J34291-1 (bridge), J34291-2 (legs) and the J34291-5 (gauging cylinder) onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly. The gauging cylinder should rest on top of the needle bearing. Lock gauging cylinder in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



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



c. Install original bearing race inside reverse clutch drum. Place shim selecting gauge with its legs on machined surface of transmission case (no gasket). Allow gauging plunger to rest on bearing race. Lock gauging plunger in place with set screw.

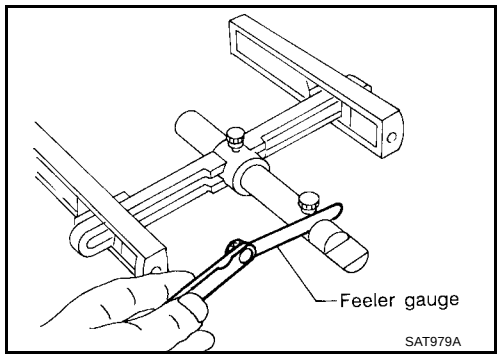


d. Remove Tool and use feeler gauge to measure gap between gauging cylinder and gauging plunger. This measurement should give exact total end play.

Total end play "T_1 " **: 0.25 - 0.55 mm (0.0098 - 0.0217 in)**

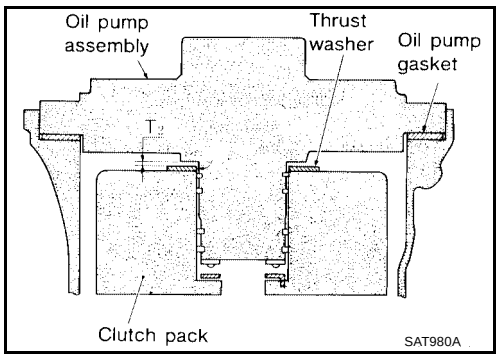
- If end play is out of specification, decrease or increase thickness of oil pump cover bearing race as necessary.

Available oil pump cover bearing race **: Refer to AT-350, "Total End Play" .**

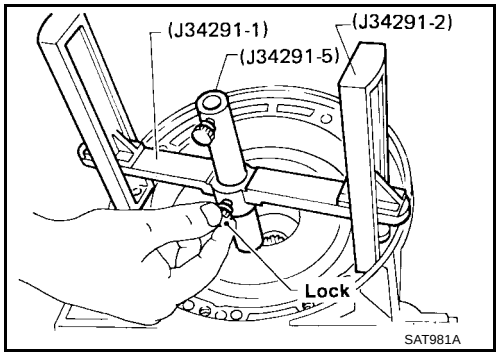


2. Adjust reverse clutch drum end play.

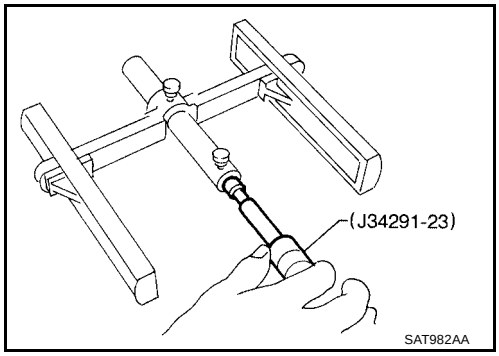
Reverse clutch drum end play "T_2 "	**: 0.55 - 0.90 mm (0.0217 - 0.0354 in)**



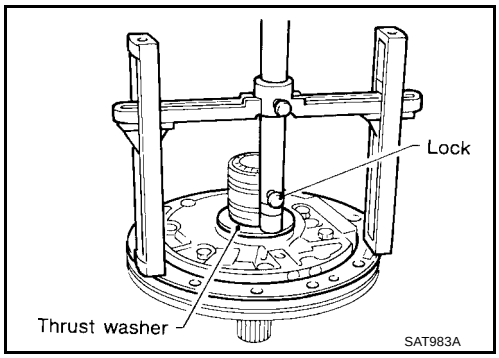
a. Place J34291-1 (bridge), J34291-2 (legs) and J34291-5 (gauging cylinder) on machined surface of transmission case (no gasket). Allow gauging cylinder to rest on front thrust surface of reverse clutch drum. Lock cylinder in place with set screw.



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



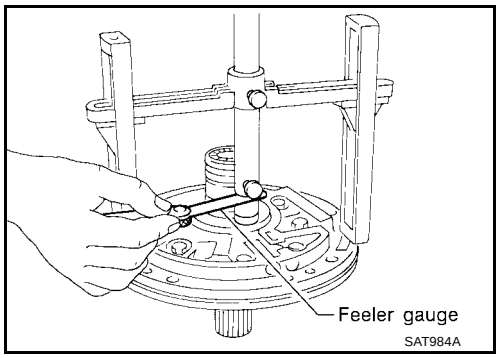
c. Install original thrust washer on oil pump. Place shim setting gauge legs onto machined surface of oil pump assembly. Allow gauging plunger to rest on thrust washer. Lock plunger in place with set screw.



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

Reverse clutch drum end play "T_2 "	**: 0.55 - 0.90 mm (0.0217 - 0.0354 in)**

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



Available oil pump thrust washer	**: Refer to AT-350, "Reverse Clutch Drum End Play" .**

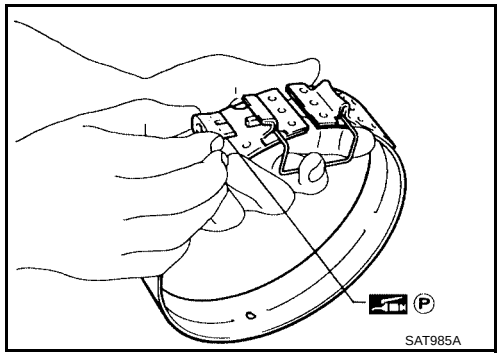
Assembly (2)

ECS005R1

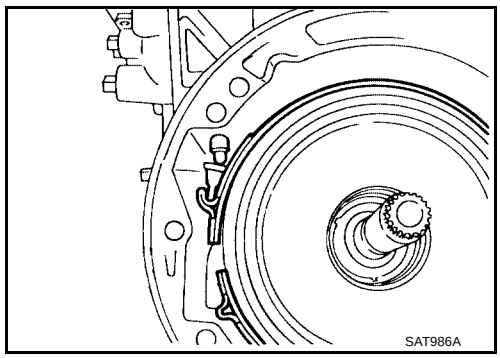
1. Install brake band and band strut.

a. Install band strut on brake band.

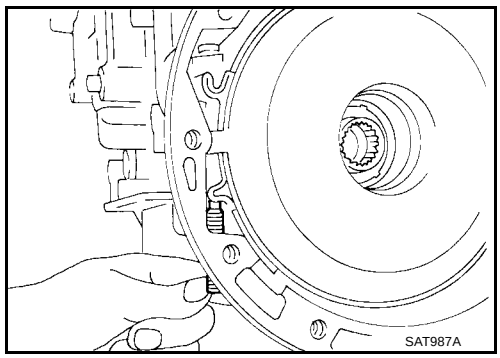
- **Apply petroleum jelly to band strut.**



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



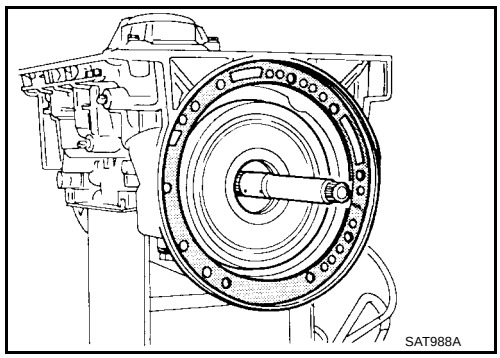
c. Install anchor end pin on transmission case. Then, tighten anchor end pin just enough so that reverse clutch drum (clutch pack) will not tilt forward.



2. Install input shaft on transmission case.

- **Pay attention to its direction — O-ring groove side is front.**

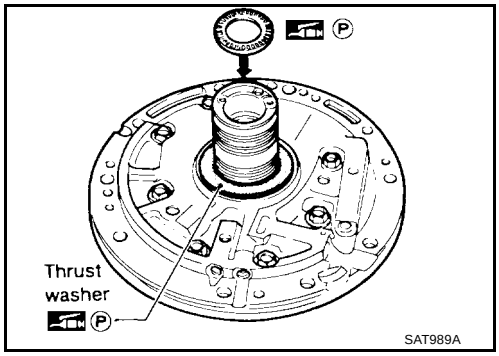
3. Install gasket on transmission case.



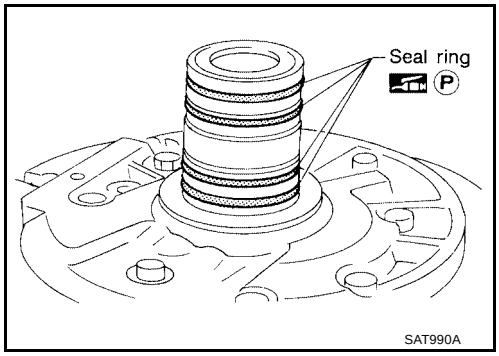
4. Install oil pump assembly.

a. Install needle bearing on oil pump assembly.
   - **Apply petroleum jelly to the needle bearing.**

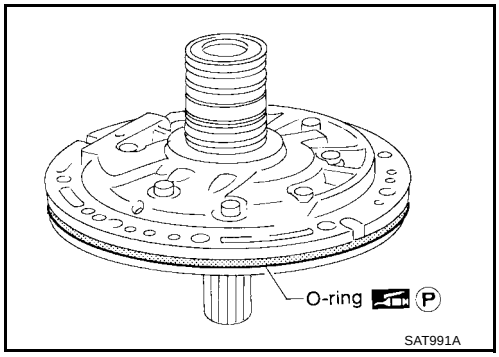
b. Install selected thrust washer on oil pump assembly.
   - **Apply petroleum jelly to thrust washer.**



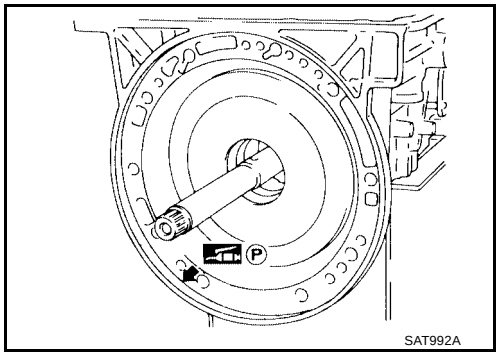
c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit.



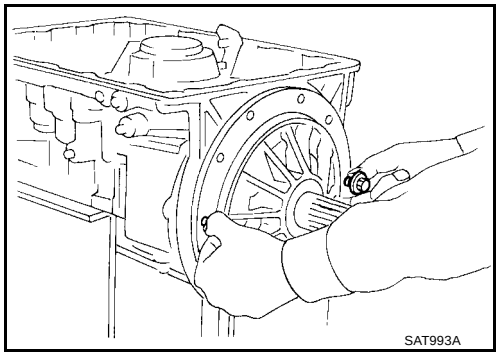
d. Install O-ring on oil pump assembly.
   - **Apply petroleum jelly to O-ring.**



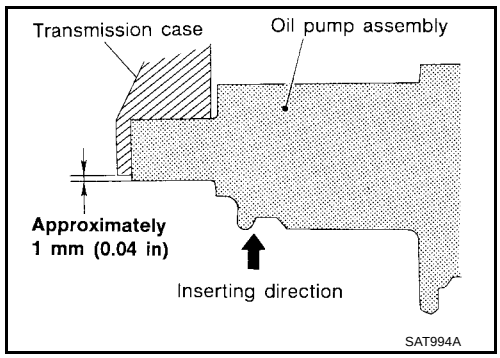
e. Apply petroleum jelly to mating surface of transmission case and oil pump assembly.



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

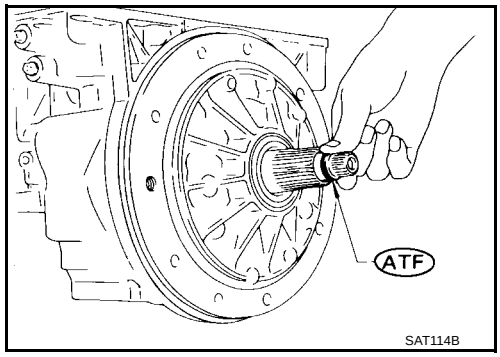


- **Insert oil pump assembly to the specified position in transmission, as shown.**



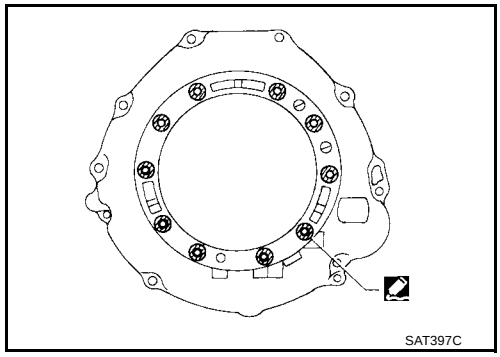
5. Install O-ring on input shaft.

- **Apply ATF to O-rings.**



6. Install converter housing.

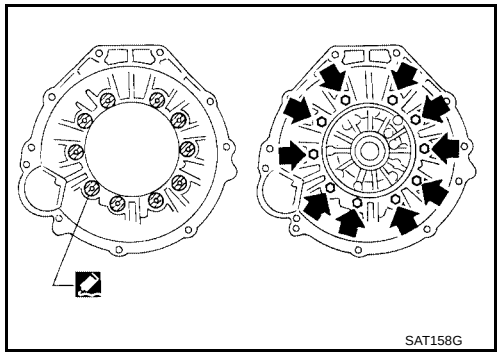
a. Apply sealant to outer periphery of bolt holes in converter housing.
   - Use Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI-42, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .
   - **Do not apply too much sealant.**



b. Apply sealant to seating surfaces of bolts that secure front cover of converter housing.
   - Use Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI-42, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

c. Install converter housing on transmission case.

7. Install turbine revolution sensor (VG33ER).



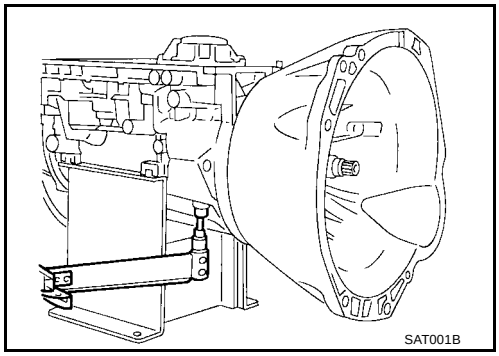
8. Adjust brake band.

a. Tighten anchor end bolt to specified torque.

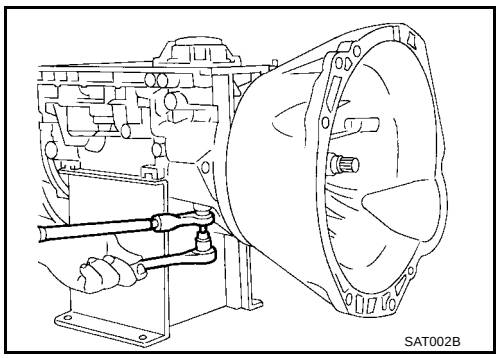
Anchor end bolt:

: 4 - 6 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)

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



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

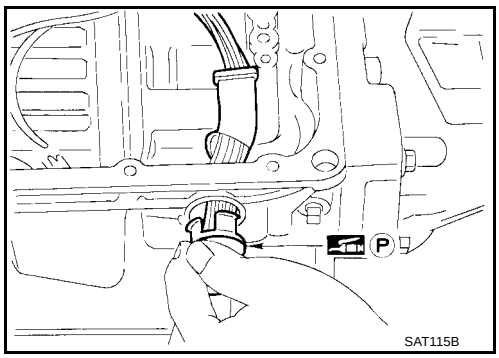


9. Install terminal cord assembly.

a. Install O-ring on terminal cord assembly.

- **Apply petroleum jelly to O-ring.**

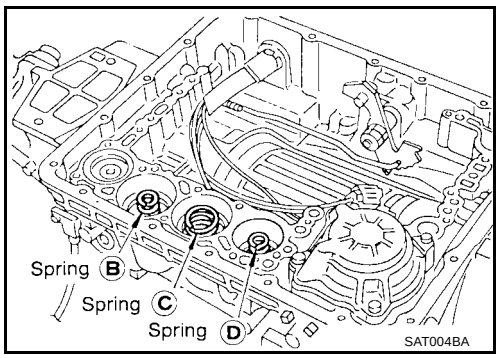
b. Compress terminal cord assembly stopper and install terminal cord assembly on transmission case.



10. Install control valve assembly.

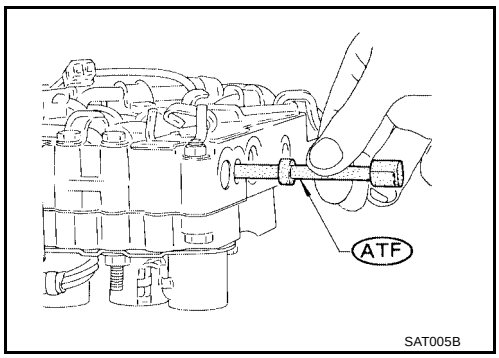
a. Install accumulator piston return springs B, C and D.

Free length of return springs **: Refer to AT-347, "Return Springs" .**



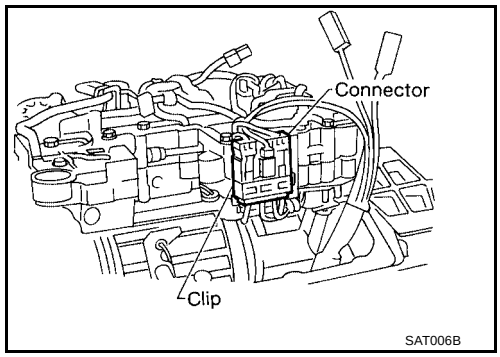
b. Install manual valve on control valve.

- **Apply ATF to manual valve.**



c. Place control valve assembly on transmission case. Connect solenoid connector for upper body.

d. Install connector clip.

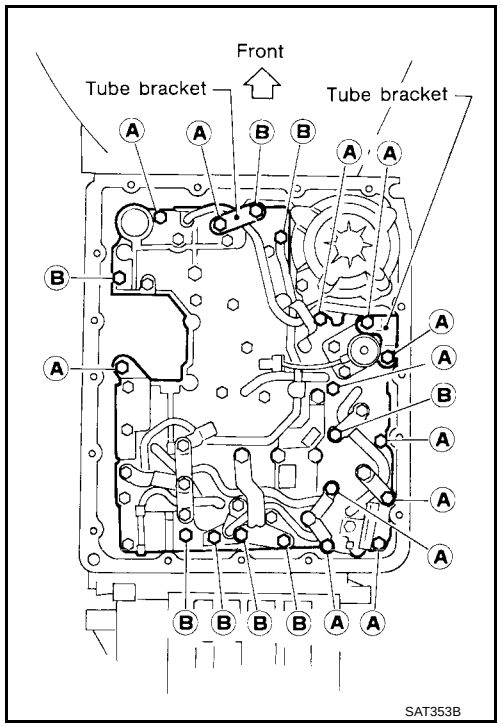


e. Install control valve assembly on transmission case.

f. Install connector tube brackets and tighten bolts A and B.

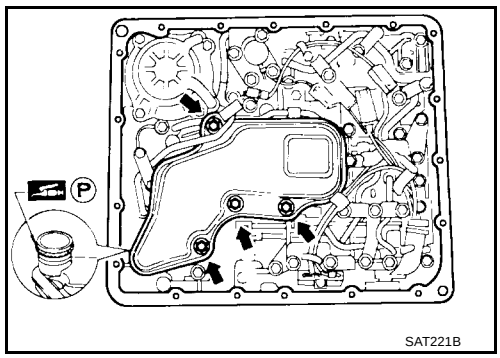
- **Check that terminal assembly does not catch.**

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



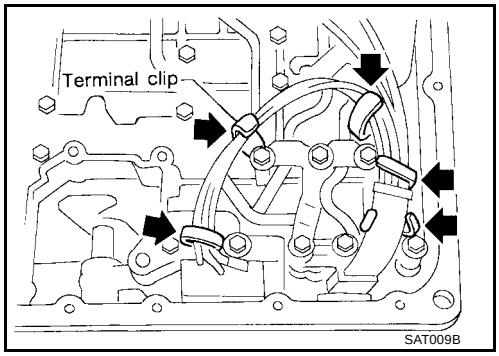
Install O-ring on oil strainer.

- **Apply petroleum jelly to O-ring.**

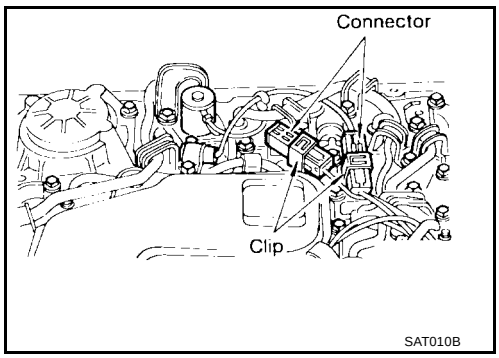


h. Install oil strainer on control valve.

i. Securely fasten terminal harness with clips.

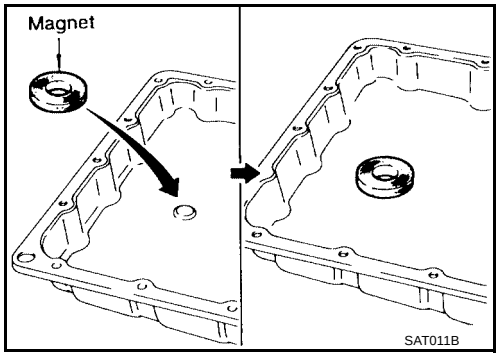


j. Install torque converter clutch solenoid valve and fluid temperature sensor connectors.



11. Install oil pan.

a. Attach a magnet to oil pan.

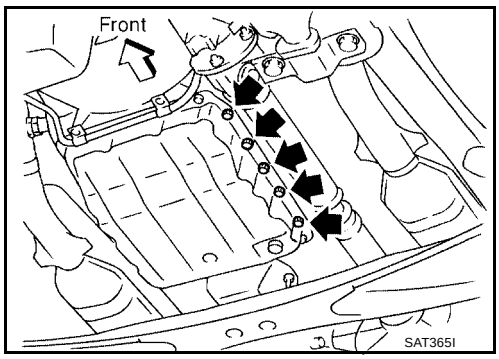


b. Install new oil pan gasket on transmission case.

c. Install oil pan and bracket on transmission case.

- **Always replace oil pan bolts as they are self-sealing bolts.**
- **Before installing bolts, remove traces of sealant and oil from mating surface and thread holes.**
- **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**

d. Tighten drain plug.

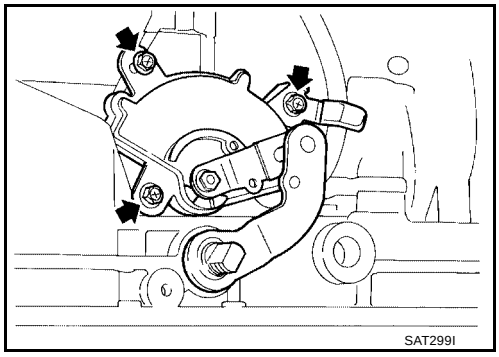


12. Install park/neutral position (PNP) switch.

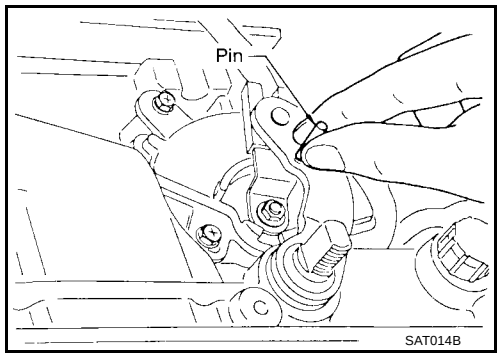
a. Check that manual shaft is in 1 position.

b. Temporarily install park/neutral position (PNP) switch on manual shaft.

c. Move manual shaft to N.



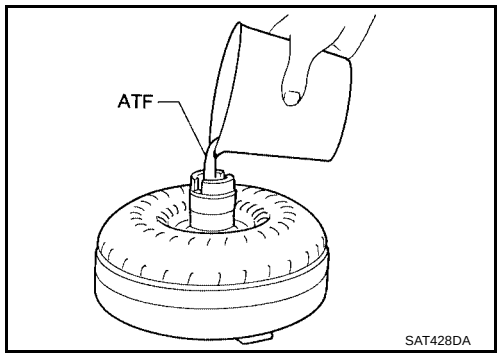
d. Tighten bolts while inserting 4.0 mm (0.157 in) dia. pin vertically into locating holes in park/neutral position (PNP) switch and manual shaft.



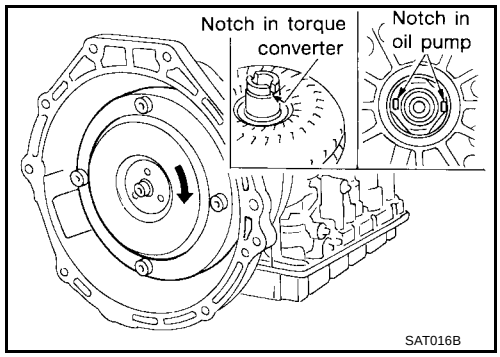
13. Install torque converter.

a. Pour ATF into torque converter.

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



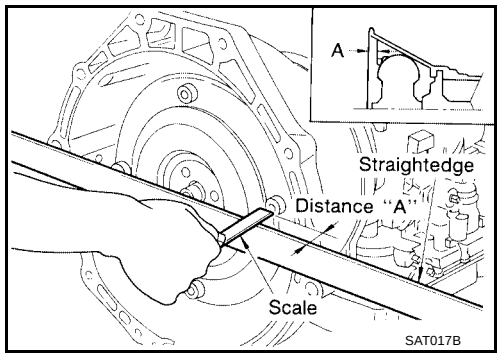
b. Install torque converter while aligning notches and oil pump.



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

Distance "A":

VG33E	**: 26.0 mm (1.024 in) or more**
VG33ER	**: 25.0 mm (0.984 in) or more**



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

ECS005R2

Applied model		VG33E engine		VG33ER engine	
		2WD	4WD	2WD	4WD
Automatic transmission model		RE4R01A			
Transmission model code number		4FX00	4FX01	4FX02	4FX03
Stall torque ratio		2.0 : 1			
Transmission gear ratio	1st	2.785			
	2nd	1.545			
	Top	1.000			
	O/D	0.694			
	Reverse	2.272			
Recommended fluid		Nissan Matic “D” (Continental U.S. and Alaska) or Genuine Nissan Automatic Transmission Fluid (Canada)*1			
Fluid capacity		8.3 ℓ (8-3/4 US qt, 7-1/4 Imp qt)	8.5 ℓ (9 US qt, 7-1/2 Imp qt)	8.3 ℓ (8-3/4 US qt, 7-1/4 Imp qt)	8.5 ℓ (9 US qt, 7-1/2 Imp qt)

*1: Refer to GI-42, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

Shift Schedule

ECS005R3

VEHICLE SPEED WHEN SHIFTING GEARS THROTTLE POSITION

Throttle position		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	VG33E	47 - 51 (29 - 32)	92 - 100 (57 - 62)	146 - 156 (91 - 97)	141 - 151 (88 - 94)	87 - 95 (54 - 59)	42 - 46 (26 - 29)	43 - 47 (27 - 29)
	VG33ER	49 - 53 (30 - 33)	94 - 102 (58 - 63)	151 - 161 (94 - 100)	147 - 157 (91 - 98)	87 - 95 (54 - 59)	43 - 47 (27 - 29)	54 - 58 (34 - 36)
Half throttle	VG33E	34 - 38 (21 - 24)	68 - 74 (42 - 46)	132 - 140 (82 - 87)	59 - 67 (37 - 42)	31 - 37 (19 - 23)	10 - 14 (6 - 9)	43 - 47 (27 - 29)
	VG33ER	41 - 45 (25 - 28)	68 - 74 (42 - 46)	121 - 129 (75 - 80)	76 - 84 (47 - 52)	41 - 47 (25 - 29)	11 - 15 (7 - 9)	54 - 58 (34 - 36)

VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

Throttle position		Overdrive control switch [Shift position]	Vehicle speed km/h (MPH)	
			Lock-up “ON”	Lock-up “OFF”
Full throttle	VG33E	ON [D_4]	147 - 155 (91 - 96)	142 - 150 (88 - 93)
		OFF [D_3]	74 - 82 (46 - 51)	71 - 79 (44 - 49)
	VG33ER	ON [D_4]	152 - 160 (94 - 99)	148 -156 (92 - 97)
		OFF [D_3]	86 - 94 (53 - 58)	83 - 91 (52 - 57)
Half throttle	VG33E	ON [D_4]	139 - 147 (86 - 91)	84 - 92 (52 - 57)
		OFF [D_3]	74 - 82 (46 - 51)	71 - 79 (44 - 49)
	VG33ER	ON [D_4]	134 - 142 (83 - 88)	103 - 111 (64 - 69)
		OFF [D_3]	86 - 94 (53 - 58)	83 - 91 (52 - 57)

Stall Revolution

ECS005R4

Engine	Stall revolution rpm
VG33E	2,450 - 2,650
VG33ER	2,420 - 2,620

Line Pressure

ECS005R5

Engine speed rpm	Line pressure kPa (kg/cm^2 , psi)	
	D, 2 and 1 positions	R position
Idle	422 - 461 (4.3 - 4.7, 61 - 67)	667 - 706 (6.8 - 7.2, 97 - 102)
Stall	1,020 - 1,098 (10.4 - 11.2, 148 - 159)	1,422 - 1,500 (14.5 - 15.3, 206 - 218)

Return Springs

ECS005R6

Unit: mm (in)

Parts				Item		
				Part No.*	Free length	Outer diameter
Control valve	Upper body	1	Torque converter relief valve spring	31742-41X23	38.0 (1.496)	9.0 (0.354)
		2	Pressure regulator valve spring	31742-41X24	44.02 (1.7331)	14.0 (0.551)
		3	Pressure modifier valve spring	31742-41X19	31.95 (1.2579)	6.8 (0.268)
		—	Accumulator control valve spring	—	—	—
		4	Shuttle shift valve D spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
		5	4-2 sequence valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
		6	Shift valve B spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
		7	4-2 relay valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
		8	Shift valve A spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
		9	Overrun clutch control valve spring	31762-41X03	23.6 (0.929)	7.0 (0.276)
		10	Overrun clutch reducing valve spring	31762-41X14 (VG33ER) 31742-41X20 (VG33E)	38.9 (1.531) (VG33ER) 32.5 (1.280) (VG33E)	7.0 (0.276)
		11	Shuttle shift valve S spring	31762-41X04	51.0 (2.008)	5.65 (0.2224)
		12	Pilot valve spring	31742-41X13	25.7 (1.012)	9.0 (0.354)
		13	Lock-up control valve spring	31742-41X22	18.5 (0.728)	13.0 (0.512)
	Lower body	1	Modifier accumulator piston spring	31742-27X70	31.4 (1.236)	9.8 (0.386)
		2	1st reducing valve spring	31756-41X05 (VG33E) 31756-60X00 (VG33ER)	25.4 (1.000) (VG33E) 29.5 (1.161) (VG33ER)	6.75 (0.2657) (VG33E) 7.00 (0.2756) (VG33ER)
		3	3-2 timing valve spring	31742-41X06	23.0 (0.906)	6.7 (0.264)
		4	Servo charger valve spring	31742-41X06	23.0 (0.906)	6.7 (0.264)
Reverse clutch			16 pcs (VG33E) 1 pc (VG33ER)	31521-41X02 (Assembly) (VG33E) 31505-41X07 (Assembly) (VG33ER)	19.7 (0.7756) (VG33E) — (VG33ER)	11.6 (0.457) (VG33E) — (VG33ER)
High clutch			10 pcs	31521-41X03 (Assembly)	24.2 (0.9528)	11.6 (0.457)
Forward clutch (Overrun clutch)			20 pcs	31521-41X04 (Assembly)	35.77 (1.4083)	9.7 (0.382)
Low & reverse brake			18 pcs	31655-41X00 (Assembly)	22.3 (0.878)	11.2 (0.441)

Parts			Item		
			Part No.*	Free length	Outer diameter
Band servo		Spring A	31605-41X05 (VG33E) 31605-41X14 (VG33ER)	45.6 (1.795) (VG33E) 47.6 (1.874) (VG33ER)	34.3 (1.350) (VG33E) 26.5 (1.043) (VG33ER)
		Spring B	31605-41X00 (VG33E)	53.8 (2.118) (VG33E)	40.3 (1.587) (VG33E)
		Spring C	31605-41X01	29.7 (1.169)	27.6 (1.087)
Accumulator		Accumulator A	31605-41X02	43.0 (1.693)	18.0 (0.709)
		Accumulator B	31605-41X10 (VG33E) 31605-4AX03 (VG33ER)	66.0 (2.598)	20.0 (0.787)
		Accumulator C	31605-41X09	45.0 (1.772)	29.3 (1.154)
		Accumulator D	31605-41X06	58.4 (2.299)	17.3 (0.681)

*: Always check with the Parts Department for the latest parts information.

Accumulator O-ring

ECS005R7

Accumulator	Diameter mm (in)			
	A	B	C	D
Small diameter end	29 (1.14)	32 (1.26)	45 (1.77)	29 (1.14)
Large diameter end	45 (1.77)	50 (1.97)	50 (1.97)	45 (1.77)

Clutches and Brakes

ECS005R8

REVERSE CLUTCH

Code number		4FX00 (VG33E)	4FX01 (VG33E)	4FX02 (VG33ER)	4FX03 (VG33ER)
Number of drive plates		2			
Number of driven plates		2			
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)			
	Wear limit	1.80 (0.0709)			
Clearance mm (in)	Standard	0.5 - 0.8 (0.020 - 0.031)			
	Allowable limit	1.2 (0.047)			
Thickness of retaining plate		Thickness mm (in)	Part No.*	Thickness mm (in)	Part No.*
		4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213) 5.6 (0.220)	31537-42X02 31537-42X03 31537-42X04 31537-42X05 31537-42X06	4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213)	31537-42X20 31537-42X21 31537-42X22 31537-42X23 31537-42X24

*: Always check with the Parts Department for the latest parts information.

HIGH CLUTCH

Code number		4FX00 (VG33E)	4FX01 (VG33E)	4FX02 (VG33ER)	4FX03 (VG33ER)
Number of drive plates		5			
Number of driven plates		5		6	
Thickness of drive plate mm (in)	Standard	1.52 - 1.67 (0.0598 - 0.0657)			
	Wear limit	1.40 (0.0551)			
Clearance mm (in)	Standard	1.8 - 2.2 (0.071 - 0.087)			
	Allowable limit	3.2 (0.126)		2.2 (0.087)	

	Thickness mm (in)	Part No.*	Thickness mm (in)	Part No.*
Thickness of retaining plate	3.4 (0.134) 3.6 (0.142) 3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189)	31537-41X71 31537-41X61 31537-41X62 31537-41X63 31537-41X64 31537-41X65 31537-41X66 31537-41X67	4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197)	31537-41X63 31537-41X64 31537-41X65 31537-41X66 31537-41X67 31537-41X68

*: Always check with the Parts Department for the latest parts information.

FORWARD CLUTCH

Code number		4FX00 (VG33E)		4FX01 (VG33E)		4FX02 (VG33ER)		4FX03 (VG33ER)	
Number of drive plates		7		7		7		8	
Number of driven plates		7		7		7		8	
Thickness of drive plate mm (in)	Standard	1.52 - 1.67 (0.0598 - 0.0657)							
	Wear limit	1.40 (0.0551)							
Clearance mm (in)	Standard	0.35 - 0.75 (0.0138 - 0.0295)							
	Allowable limit	2.15 (0.0846)		2.15 (0.0846)		2.15 (0.0846)		2.35 (0.0925)	
Thickness of retaining plate		Thickness mm (in)	Part No.*	Thickness mm (in)	Part No.*	Thickness mm (in)	Part No.*	Thickness mm (in)	Part No.*
		4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213) 5.6 (0.220) 5.8 (0.228)	31537-42X13 31537-42X14 31537-42X15 31537-4AX00 31537-4AX01 31537-4AX02 31537-4AX03	4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213) 5.6 (0.220) 5.8 (0.228)	31537-42X13 31537-42X14 31537-42X15 31537-4AX00 31537-4AX01 31537-4AX02 31537-4AX03	4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213) 5.6 (0.220) 5.8 (0.228)	31537-42X13 31537-42X14 31537-42X15 31537-4AX00 31537-4AX01 31537-4AX02 31537-4AX03	4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213)	31537-42X10 31537-42X11 31537-42X12 31537-42X13 31537-42X14 31537-42X15 31537-4AX00 31537-4AX01

*: Always check with the Parts Department for the latest parts information.

OVERRUN CLUTCH

Code number		4FX00 (VG33E)	4FX01 (VG33E)	4FX02 (VG33ER)	4FX03 (VG33ER)
Number of drive plates		3			
Number of driven plates		5			
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)			
	Wear limit	1.80 (0.0709)			
Clearance mm (in)	Standard	1.0 - 1.4 (0.039 - 0.055)			
	Allowable limit	2.4 (0.094)			
Thickness of retaining plate		Thickness mm (in)		Part No.*	
		4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197)		31537-41X80 31537-41X81 31537-41X82 31537-41X83 31537-41X84	

*: Always check with the Parts Department for the latest parts information.

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LOW & REVERSE BRAKE

Code number		4FX00 (VG33E)	4FX01 (VG33E)	4FX02 (VG33ER)	4FX03 (VG33ER)
Number of drive plates		7		8	
Number of driven plates		7		8	
Thickness of drive plate mm (in)	Standard	1.52 - 1.67 (0.0598 - 0.0657)			
	Wear limit	1.40 (0.0551)			
Clearance mm (in)	Standard	0.8 - 1.1 (0.031 - 0.043)			
	Allowable limit	2.5 (0.098)		2.7 (0.106)	
Thickness of retaining plate		Thickness mm (in)	Part No.*	Thickness mm (in)	Part No.*
		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) 8.0 (0.315) 8.2 (0.323) 8.4 (0.331) 8.6 (0.339) 8.8 (0.346) 9.0 (0.354)	31667-41X17 31667-41X11 31667-41X12 31667-41X13 31667-41X14 31667-41X07 31667-41X08 31667-41X00 31667-41X01 31667-41X02 31667-41X03 31667-41X04 31667-41X05	7.6 (0.299) 7.8 (0.307) 8.0 (0.315) 8.2 (0.323) 8.4 (0.331) 8.6 (0.339) 8.8 (0.346) 9.0 (0.354) 9.2 (0.362) 9.4 (0.370) 9.6 (0.378)	31667-41X07 31667-41X08 31667-41X00 31667-41X01 31667-41X02 31667-41X03 31667-41X04 31667-41X05 31667-41X06 31667-41X09 31667-41X10

*: Always check with the Parts Department for the latest parts information.

BRAKE BAND

Anchor end bolt tightening torque	4 - 6 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)
Number of returning revolution for anchor end bolt	2.5

Oil Pump and Low One-way Clutch

ECS005R9

Unit: mm (in)

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

Total End Play

ECS005RA

Total end play “T_1”	0.25 - 0.55 mm (0.0098 - 0.0217 in)	
Thickness of oil pump cover bearing race	Thickness mm (in)	Part No.*
	0.8 (0.031) 1.0 (0.039) 1.2 (0.047) 1.4 (0.055) 1.6 (0.063) 1.8 (0.071) 2.0 (0.079)	31435-41X01 31435-41X02 31435-41X03 31435-41X04 31435-41X05 31435-41X06 31435-41X07

*: Always check with the Parts Department for the latest parts information.

Reverse Clutch Drum End Play

ECS005RB

Reverse clutch drum end play “T_2”	0.55 - 0.90 mm (0.0217 - 0.0354 in)

	Thickness mm (in)	Part No.*
Thickness of oil pump thrust washer	0.9 (0.035) 1.1 (0.043) 1.3 (0.051) 1.5 (0.059) 1.7 (0.067) 1.9 (0.075)	31528-21X01 31528-21X02 31528-21X03 31528-21X04 31528-21X05 31528-21X06

*: Always check with the Parts Department for the latest parts information.

Removal and Installation

ECS005RC

Manual control linkage	Number of returning revolutions for lock nut	2
	Lock nut tightening torque	4.4 - 5.9 N·m (0.45 - 0.60 kg-m, 39.1 - 52.1 in-lb)
Distance between end of clutch housing and torque converter		26.0 mm (1.024 in) or more (VG33E) 25.0 mm (0.984 in) or more (VG33ER)

Shift Solenoid Valves

ECS005RD

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

ECS005RE

Solenoid valves	Resistance (Approx.) Ω	Terminal No.
Shift solenoid valve A	20 - 40	3
Shift solenoid valve B	20 - 40	2
Overrun clutch solenoid valve	20 - 40	4
Line pressure solenoid valve	2.5 - 5	6
Torque converter clutch solenoid valve	10 - 20	7

A/T Fluid Temperature Sensor

ECS005RF

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

Turbine Revolution Sensor

ECS005RG

Terminal No.		Resistance (Approx.)
1	2	2.4 - 2.8 KΩ
1	3	No continuity
2	3	No continuity

Revolution Sensor

ECS005RH

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

Dropping Resistor

ECS005RI

Resistance	Approx. 12Ω