

# AUTOMATIC TRANSMISSION

## SECTION **AT**

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		HA
		SC
		EL
		IDX

# TROUBLE DIAGNOSIS — INDEX

Alphabetical & P No. Index for DTC

## Alphabetical & P No. Index for DTC

NBAT0179

NBAT0179S01

### ALPHABETICAL INDEX FOR DTC

Items (CONSULT-II screen terms)	DTC	Reference page
	CONSULT-II GST*1	
A/T 1ST GR FNCTN	P0731	AT-120
A/T 2ND GR FNCTN	P0732	AT-126
A/T 3RD GR FNCTN	P0733	AT-132
A/T 4TH GR FNCTN	P0734	AT-138
A/T TCC S/V FNCTN	P0744	AT-153
ATF TEMP SEN/CIRC	P0710	AT-105
ENGINE SPEED SIG	P0725	AT-116
L/PRESS SOL/CIRC	P0745	AT-162
O/R CLTCH SOL/CIRC	P1760	AT-185
PNP SW/CIRC	P0705	AT-99
SFT SOL A/CIRC*2	P0750	AT-168
SFT SOL B/CIRC*2	P0755	AT-172
TCC SOLENOID/CIRC	P0740	AT-148
TP SEN/CIRC A/T*2	P1705	AT-176
VEH SPD SEN/CIR AT*3	P0720	AT-111

\*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.

# TROUBLE DIAGNOSIS — INDEX

Alphabetical & P No. Index for DTC (Cont'd)

## P NO. INDEX FOR DTC

=NBAT0179S02

DTC	Items (CONSULT-II screen terms)	Reference page	
CONSULT-II GST*1			GI
P0705	PNP SW/CIRC	AT-99	MA
P0710	ATF TEMP SEN/CIRC	AT-105	EM
P0720	VEH SPD SEN/CIR AT*3	AT-111	
P0725	ENGINE SPEED SIG	AT-116	LC
P0731	A/T 1ST GR FNCTN	AT-120	
P0732	A/T 2ND GR FNCTN	AT-126	EC
P0733	A/T 3RD GR FNCTN	AT-132	
P0734	A/T 4TH GR FNCTN	AT-138	FE
P0740	TCC SOLENOID/CIRC	AT-148	
P0744	A/T TCC S/V FNCTN	AT-153	<b>AT</b>
P0745	L/PRESS SOL/CIRC	AT-162	
P0750	SFT SOL A/CIRC*2	AT-168	TF
P0755	SFT SOL B/CIRC*2	AT-172	
P1705	TP SEN/CIRC A/T*2	AT-176	PD
P1760	O/R CLTCH SOL/CIRC	AT-185	AX

\*1: These numbers are prescribed by SAE J2012.

\*2: When the fail-safe operation occurs, the MIL illuminates.

\*3: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

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IDX

## PRECAUTIONS

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

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

NBAT0001

The supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to INFINITI QX4 is as follows:

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

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

#### **WARNING:**

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized 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 RS section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.

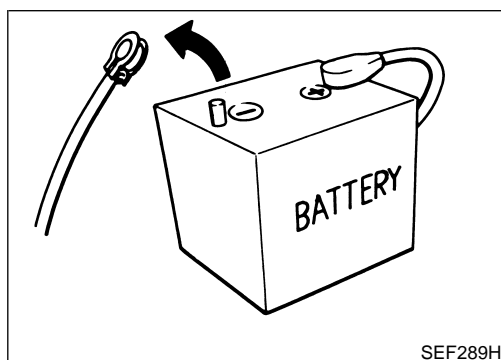
### Precautions for On Board Diagnostic (OBD) System of A/T and Engine

NBAT0002

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

#### **CAUTION:**

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



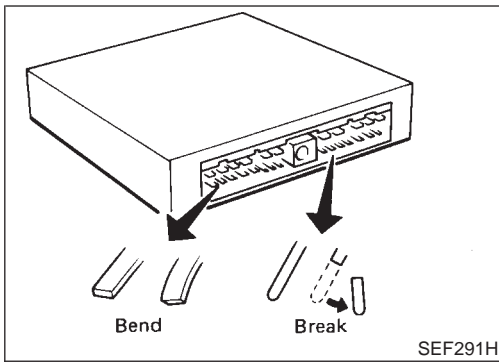
### Precautions

NBAT0003

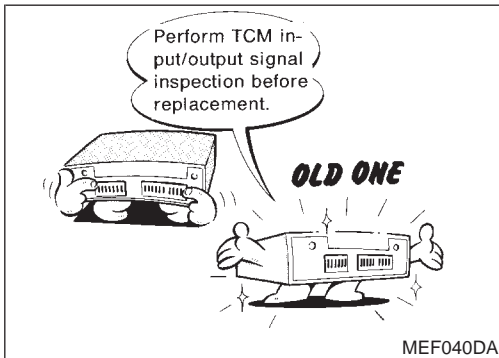
- Before connecting or disconnecting the TCM harness connector, turn ignition switch "OFF" and disconnect negative battery terminal. Failure to do so may damage the TCM. Because battery voltage is applied to TCM even if ignition switch is turned "OFF".

# PRECAUTIONS

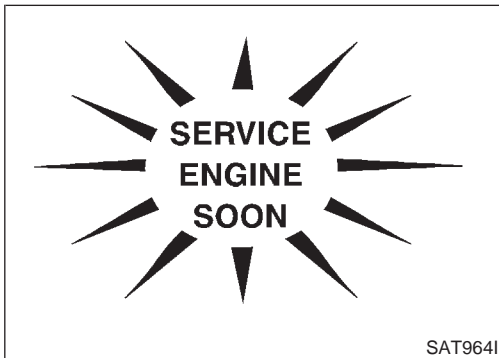
Precautions (Cont'd)



- 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-92.)



- 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.

GI  
MA  
EM  
LC  
EC  
FE  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
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IDX

# PRECAUTIONS

Precautions (Cont'd)

- Before assembly, apply a coat of recommended ATF to all parts. Apply petroleum jelly to protect O-rings and seals, or hold bearings and washers in place during assembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to "ATF COOLER SERVICE", AT-9.
- 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-21, "Changing A/T Fluid".

## Service Notice or Precautions

NBAT0004

### FAIL-SAFE

NBAT0004S01

The TCM has an electronic Fail-Safe (limp home mode). This allows the vehicle to be driven even if a major electrical input/output device circuit is damaged.

Under Fail-Safe, the vehicle always runs in third gear, even with a shift lever position of "1", "2" or "D". The customer may complain of sluggish or poor acceleration.

When the ignition key is turned "ON" following Fail-Safe operation, O/D OFF indicator lamp blinks for about 8 seconds. (For "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", refer to AT-46.)

Fail-Safe may occur without electrical circuit damage if the vehicle is driven under extreme conditions (such as excessive wheel spin followed by sudden braking). To recover normal shift pattern, turn the ignition key "OFF" for 5 seconds, then "ON".

The blinking of the O/D OFF indicator lamp for about 8 seconds will appear only once and be cleared. The customer may resume normal driving conditions.

Always follow the "WORK FLOW" (Refer to AT-57).

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

NBAT0004S04

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.



# PRECAUTIONS

Service Notice or Precautions (Cont'd)

- 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.

GI  
MA

## ATF COOLER SERVICE

NBAT0004S02

Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer.  
Replace radiator lower tank (which includes ATF cooler) with a new one and flush cooler line using cleaning solvent and compressed air. Refer to LC-19, "REMOVAL AND INSTALLATION".

EM  
LC

## OBD-II SELF-DIAGNOSIS

NBAT0004S03

- 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 for the indicator used to display each self-diagnostic result.
- The self-diagnostic results indicated by the MIL are automatically stored in both the ECM and TCM memories.  
**Always perform the procedure "HOW TO ERASE DTC" on AT-35 to complete the repair and avoid unnecessary blinking of the MIL.**
- The following self-diagnostic items can be detected using ECM self-diagnostic results mode\* only when the O/D OFF indicator lamp does not indicate any malfunctions.
  - PNP switch
  - A/T 1st, 2nd, 3rd, or 4th gear function
  - A/T TCC S/V function (lock-up)

EC  
FE

AT

\*: For details of OBD-II, refer to EC-59, "Introduction".

- **Certain systems and components, especially those related to OBD, may use the new style slide-locking type harness connector. For description and how to disconnect, refer to EL-8, "Description".**

TF  
PD

AX

## Wiring Diagrams and Trouble Diagnosis

NBAT0005

When you read wiring diagrams, refer to the following:

- GI-11, "HOW TO READ WIRING DIAGRAMS".
- EL-12, "POWER SUPPLY ROUTING" for power distribution circuit.

SU  
BR

When you perform trouble diagnosis, refer to the following:

- GI-35, "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS".
- GI-24, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

ST  
RS

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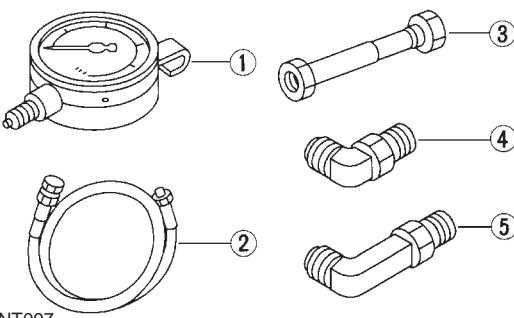
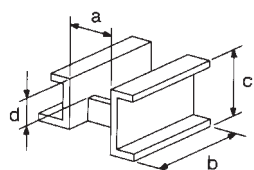
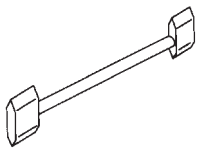
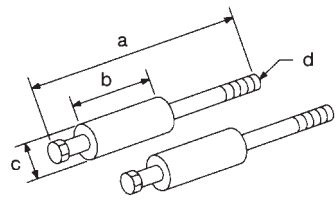
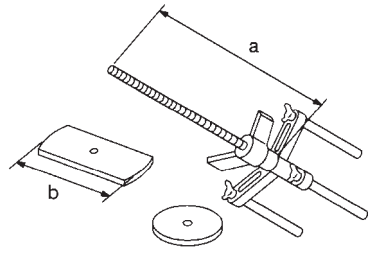
# PREPARATION

Special Service Tools

## Special Service Tools

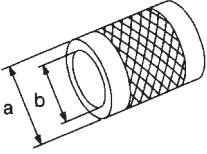
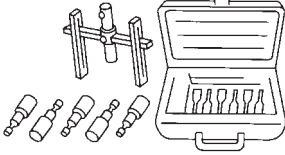
NBAT0006

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	Measuring line pressure  NT097
ST07870000 (J37068) Transmission case stand	Disassembling and assembling A/T <b>a: 182 mm (7.17 in)</b> <b>b: 282 mm (11.10 in)</b> <b>c: 230 mm (9.06 in)</b> <b>d: 100 mm (3.94 in)</b>  NT421
KV31102100 (J37065) Torque converter one-way clutch check tool	Checking one-way clutch in torque converter  NT098
ST25850000 (J25721-A) Sliding hammer	Removing oil pump assembly <b>a: 179 mm (7.05 in)</b> <b>b: 70 mm (2.76 in)</b> <b>c: 40 mm (1.57 in) dia.</b> <b>d: M12 x 1.75P</b>  NT422
KV31102400 (J34285 and J34285-87) Clutch spring compressor	Removing and installing clutch return springs <b>a: 320 mm (12.60 in)</b> <b>b: 174 mm (6.85 in)</b>  NT423

# PREPARATION

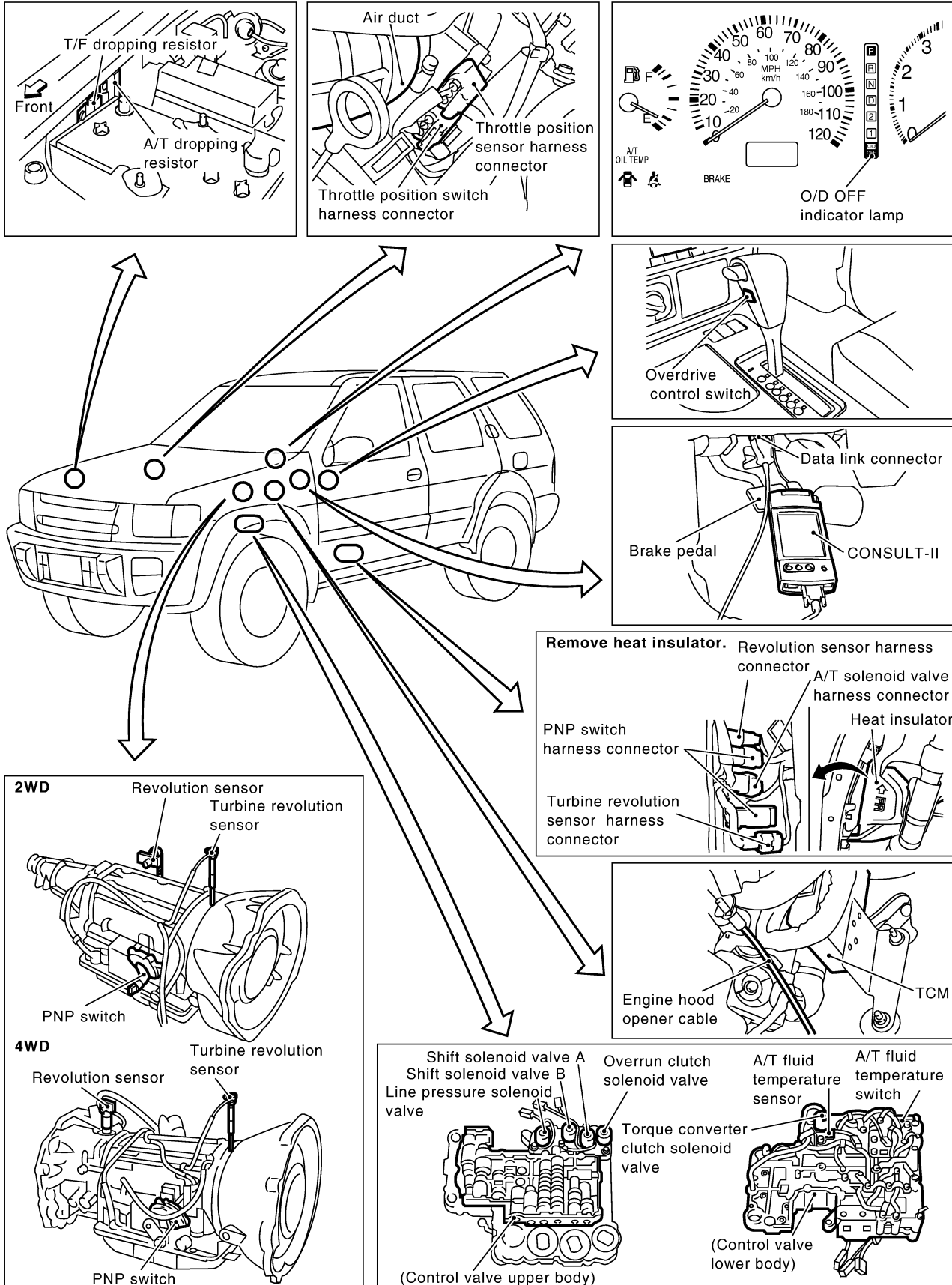
*Special Service Tools (Cont'd)*

Tool number (Kent-Moore No.) Tool name	Description	
ST33200000 (J26082) Drift	 <p style="margin-left: 40px;">a      b</p>	Installing oil pump housing oil seal Installing rear oil seal <b>a: 60 mm (2.36 in) dia.</b> <b>b: 44.5 mm (1.752 in) dia.</b>
(J34291) Shim setting gauge set		Selecting oil pump cover bearing race and oil pump thrust washer
	NT091	GI MA EM LC EC FE
	NT101	<div style="background-color: black; color: white; padding: 2px; text-align: center; font-weight: bold;">AT</div> TF PD AX SU BR ST RS BT HA SC EL IDX

# OVERALL SYSTEM

## A/T Electrical Parts Location

NBAT0007



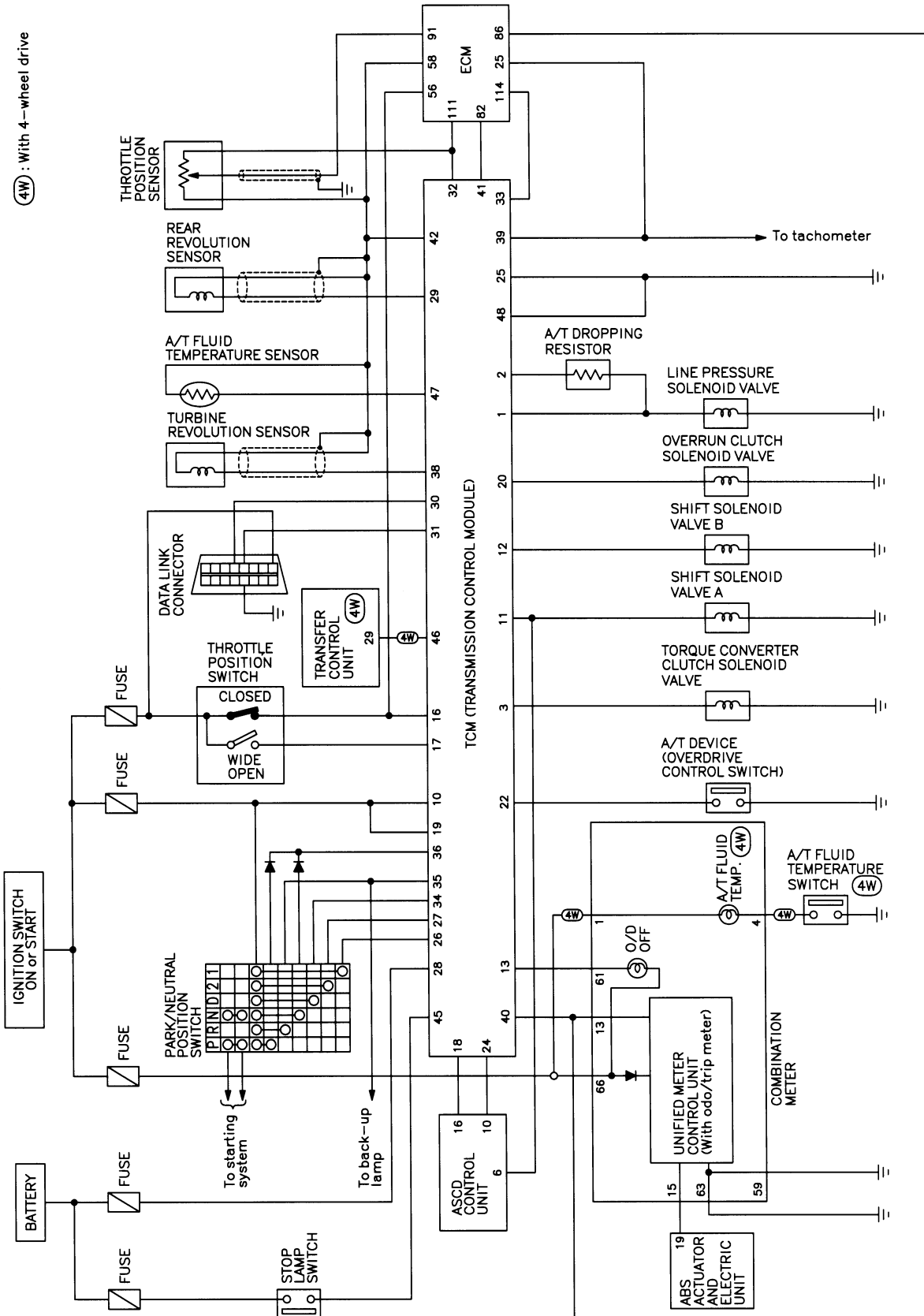
SAT124K

# OVERALL SYSTEM

Circuit Diagram

## Circuit Diagram

NBAT0008



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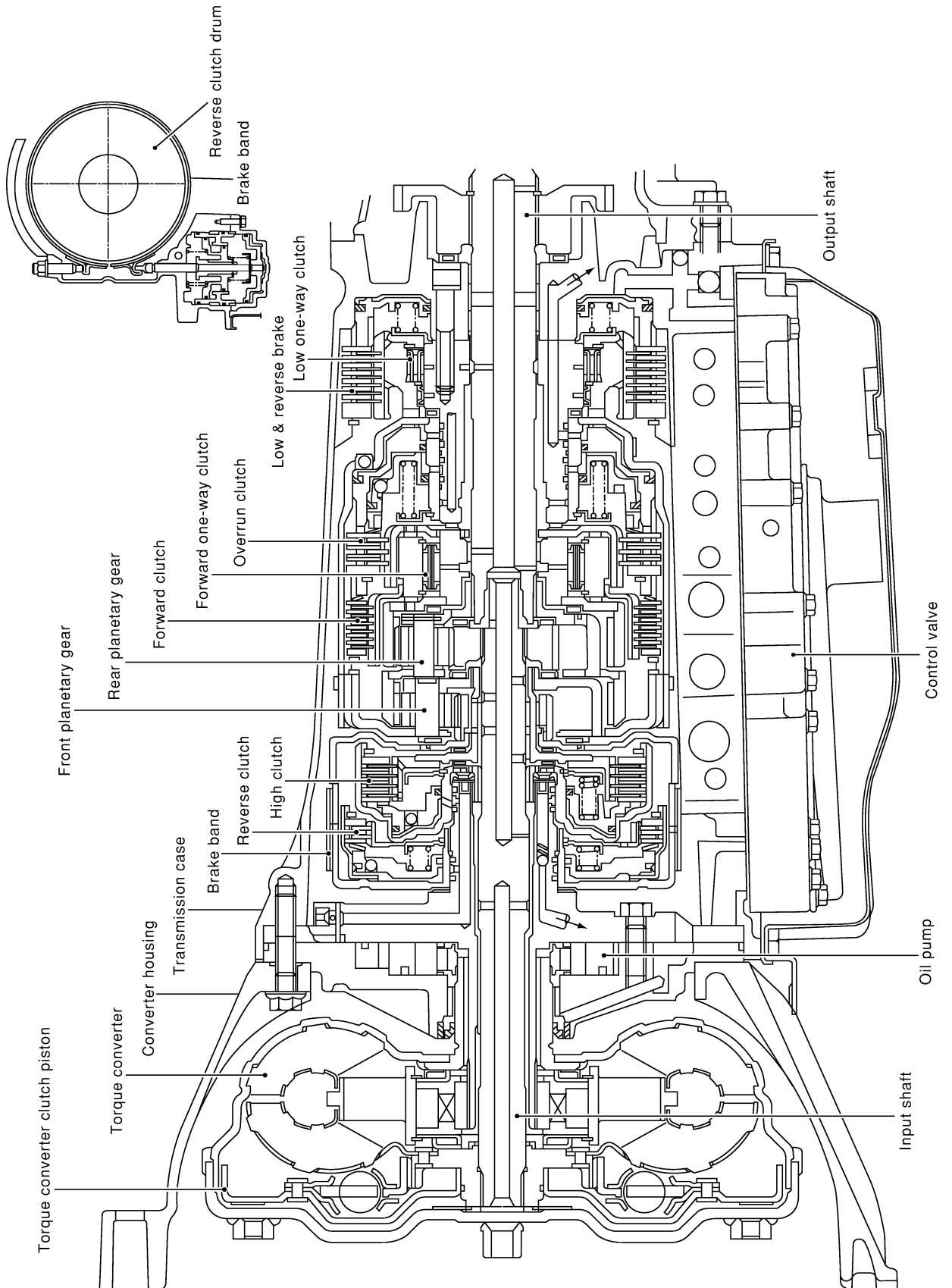
MAT053B

# OVERALL SYSTEM

Cross-sectional View

## Cross-sectional View

NBAT0010



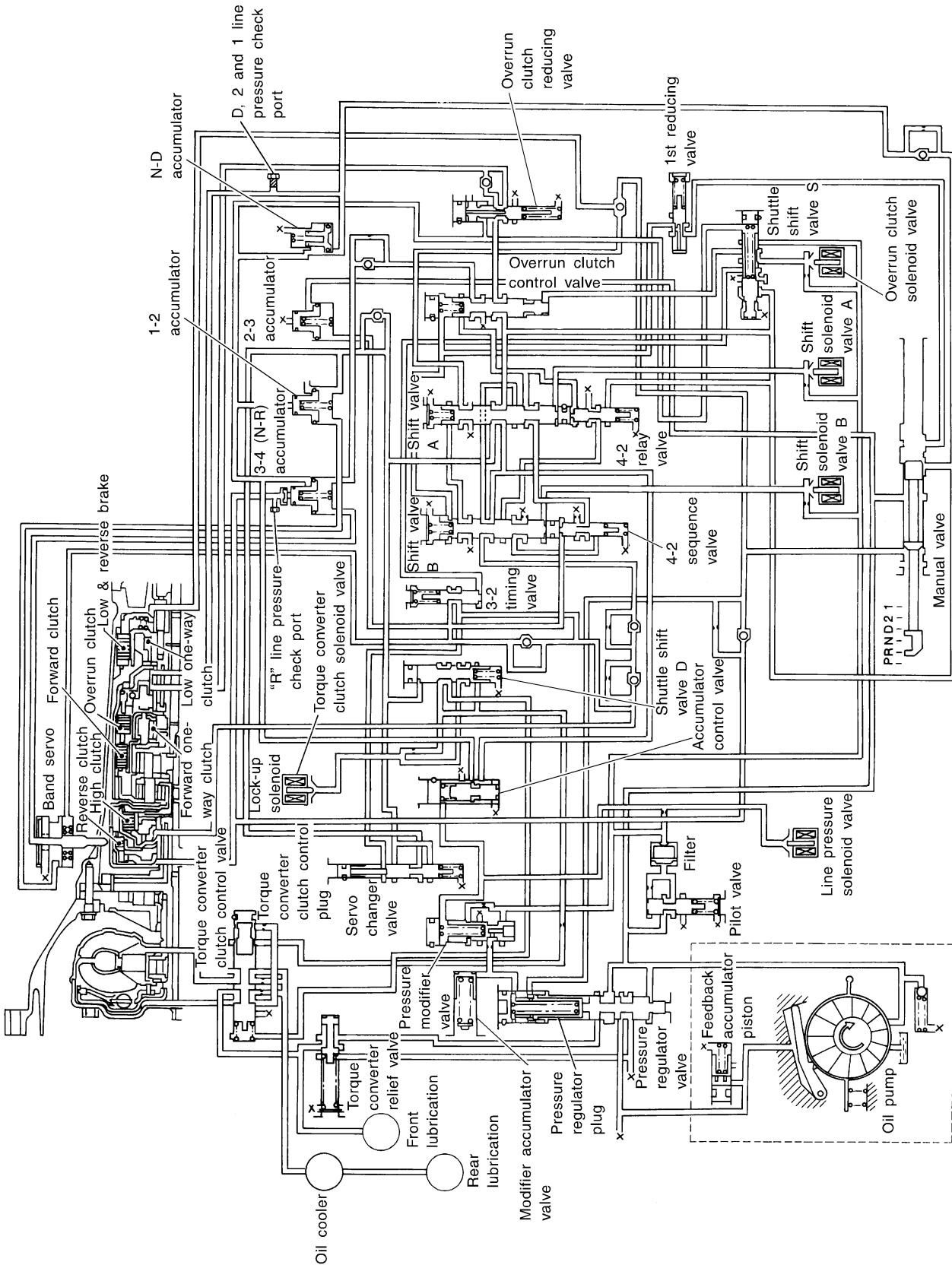
SAT150K

# OVERALL SYSTEM

Hydraulic Control Circuit

## Hydraulic Control Circuit

NBAT0011



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SAT151K

# OVERALL SYSTEM

## Shift Mechanism

NBAT0012

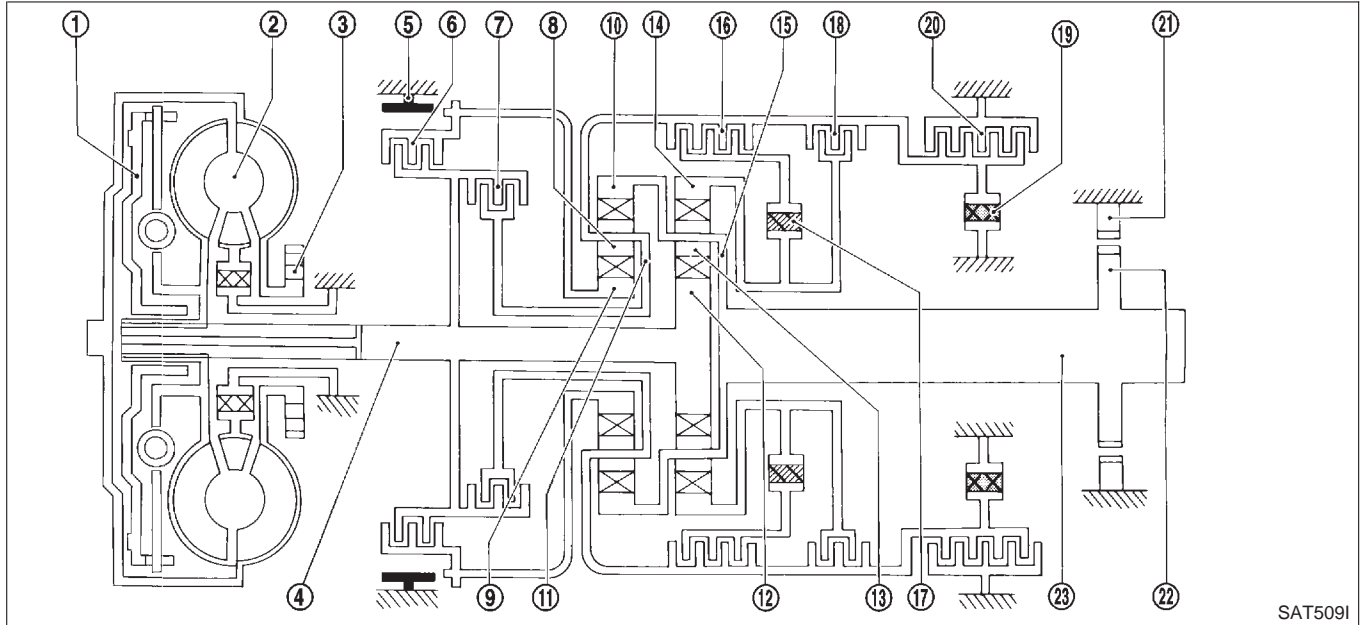
The automatic transmission uses compact, dual planetary gear systems to improve power-transmission efficiency, simplify construction and reduce weight.

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

NBAT0012S01



SAT509I

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

### FUNCTION OF CLUTCH AND BRAKE

NBAT0012S02

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



# OVERALL SYSTEM

Shift Mechanism (Cont'd)

## CLUTCH AND BAND CHART

NBAT0012S03

Shift position	Reverse clutch	High clutch	Forward clutch	Over-run 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				*5○	
	4th		○	C		*3C	C	○				
2	1st		○	D				B	B			Automatic shift 1 ↔ 2
	2nd		○	*1A	○			B				
1	1st		○	○				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.

# OVERALL SYSTEM

Shift Mechanism (Cont'd)

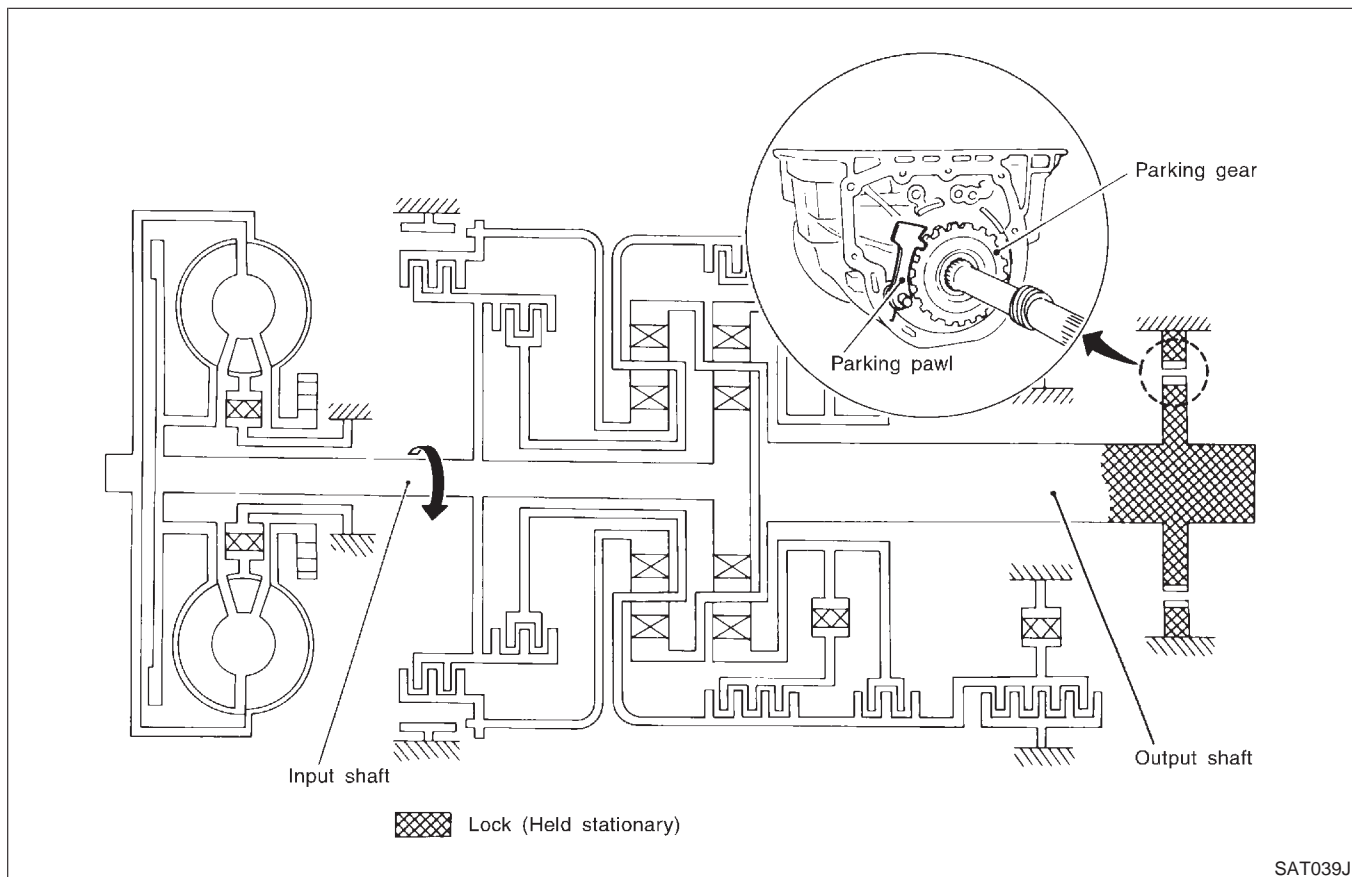
## POWER TRANSMISSION

=NBAT0012S04

NBAT0012S0401

### "N" and "P" Positions

- "N" position  
No control members operate. Power from the input shaft is not transmitted to the output shaft since the clutch does not operate.
- "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.



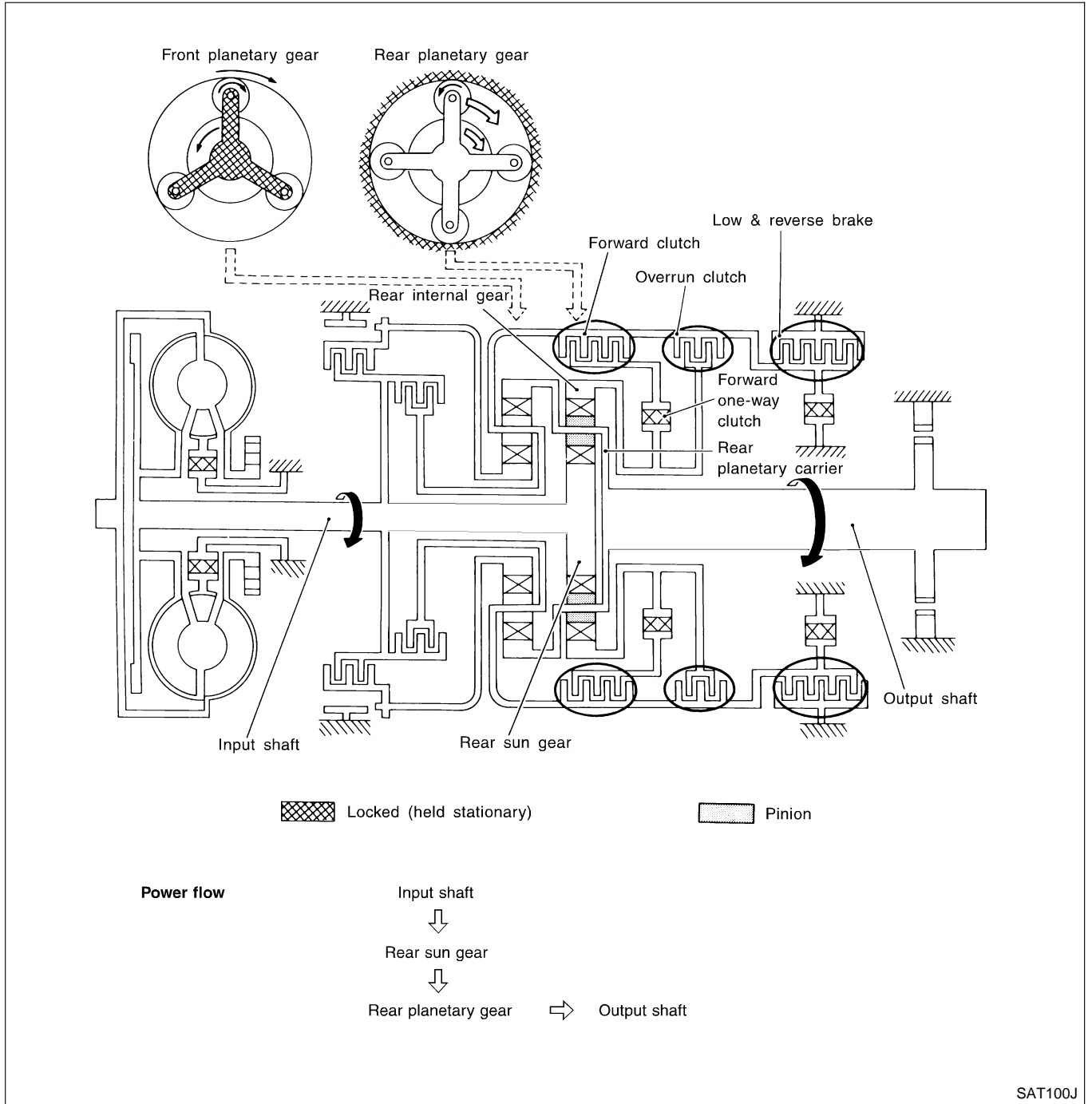
# OVERALL SYSTEM

Shift Mechanism (Cont'd)

## "1<sub>1</sub>" Position

=NBAT0012S0406

<b>Forward clutch</b> <b>Forward one-way clutch</b> <b>Overrun clutch</b> <b>Low and reverse brake</b>	As overrun clutch engages, rear internal gear is locked by the operation of low and reverse brake. This is different from that of D <sub>1</sub> and 2 <sub>1</sub> .	GI
Engine brake	Overrun clutch always engages, therefore engine brake can be obtained when decelerating.	MA



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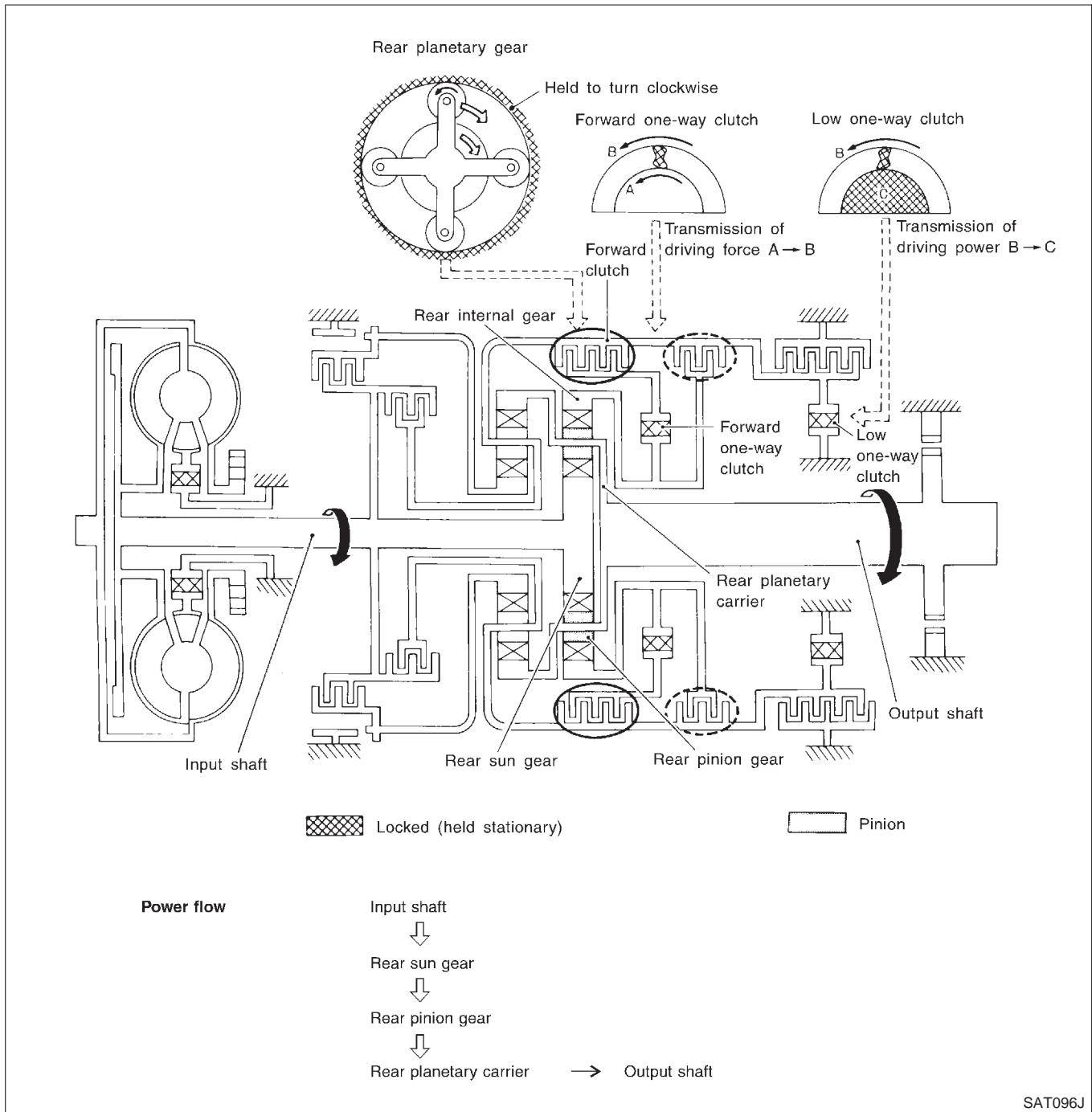
# OVERALL SYSTEM

Shift Mechanism (Cont'd)

## "D<sub>1</sub>" and "2<sub>1</sub>" Positions

=NBAT0012S0402

<p><b>Forward one-way clutch</b>  <b>Forward clutch</b>  <b>Low one-way clutch</b></p>	<p>Rear internal gear is locked to rotate counterclockwise because of the functioning of these three clutches. (Start-up at D<sub>1</sub>)</p>
<p><b>Overrun clutch</b>  engagement conditions  (Engine brake)</p>	<p>D<sub>1</sub>: Overdrive control switch in "OFF"  Throttle opening less than 3/16  2<sub>1</sub>: Throttle opening less than 3/16  At D<sub>1</sub> and 2<sub>1</sub> positions, engine brake is not activated due to free turning of low one-way clutch.</p>



SAT096J

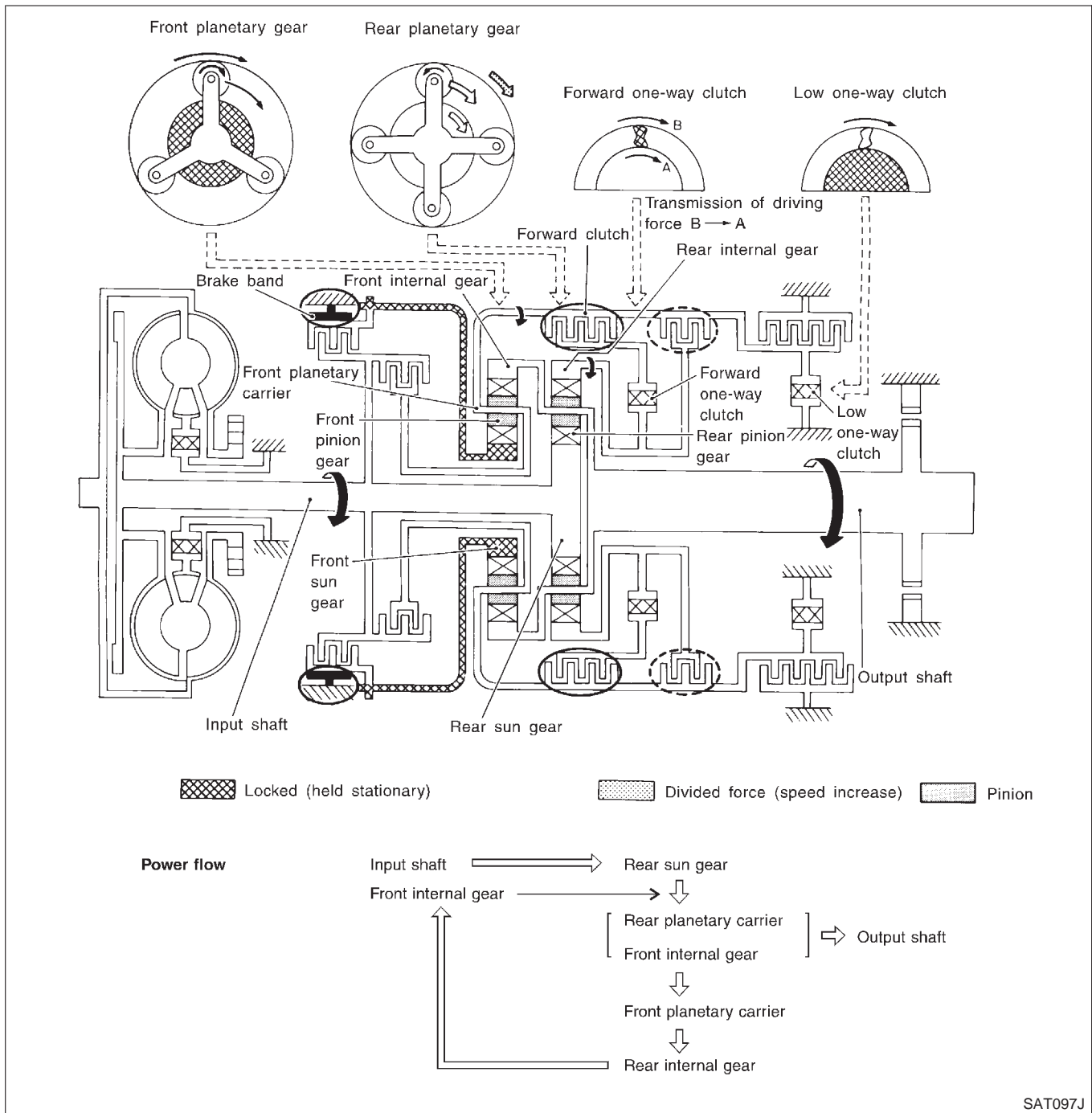
# OVERALL SYSTEM

Shift Mechanism (Cont'd)

## "D<sub>2</sub>", "2<sub>2</sub>" and "1<sub>2</sub>" Positions

=NBAT0012S0403

<p><b>Forward clutch</b>  <b>Forward one-way clutch</b>  <b>Brake band</b></p>	<p>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.</p>
<p><b>Overrun clutch</b>  engagement conditions</p>	<p>D<sub>2</sub>: Overdrive control switch in "OFF"  Throttle opening less than 3/16  2<sub>2</sub>: Throttle opening less than 3/16  1<sub>2</sub>: Always engaged</p>



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SAT097J

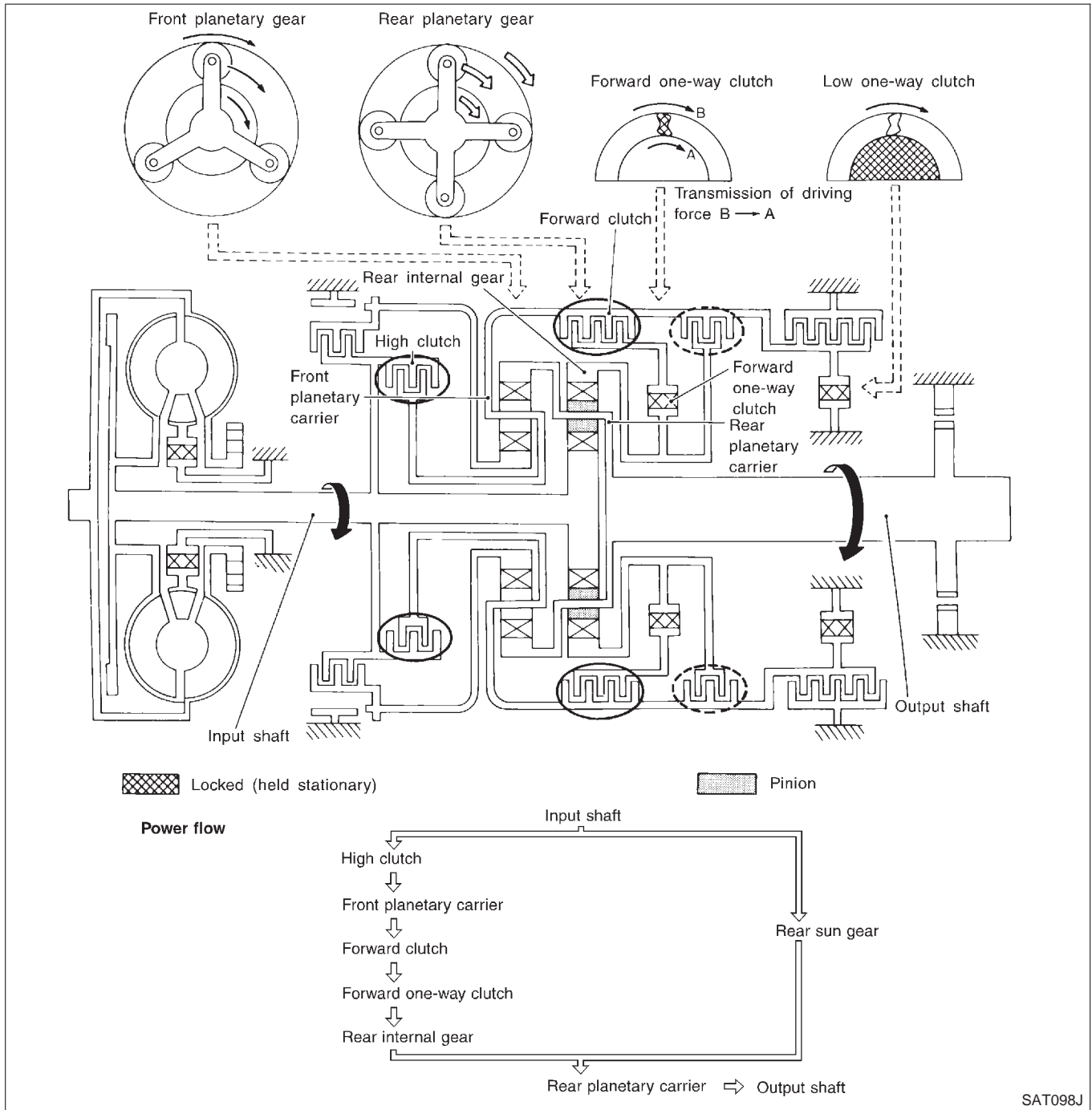
# OVERALL SYSTEM

Shift Mechanism (Cont'd)

## "D<sub>3</sub>" Position

=NBAT0012S0404

<p><b>High clutch</b>  <b>Forward clutch</b>  <b>Forward one-way clutch</b></p>	<p>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.</p>
<p><b>Overrun clutch</b>          engagement conditions</p>	<p>D<sub>3</sub>: Overdrive control switch in "OFF"          Throttle opening less than 3/16</p>



SAT098J

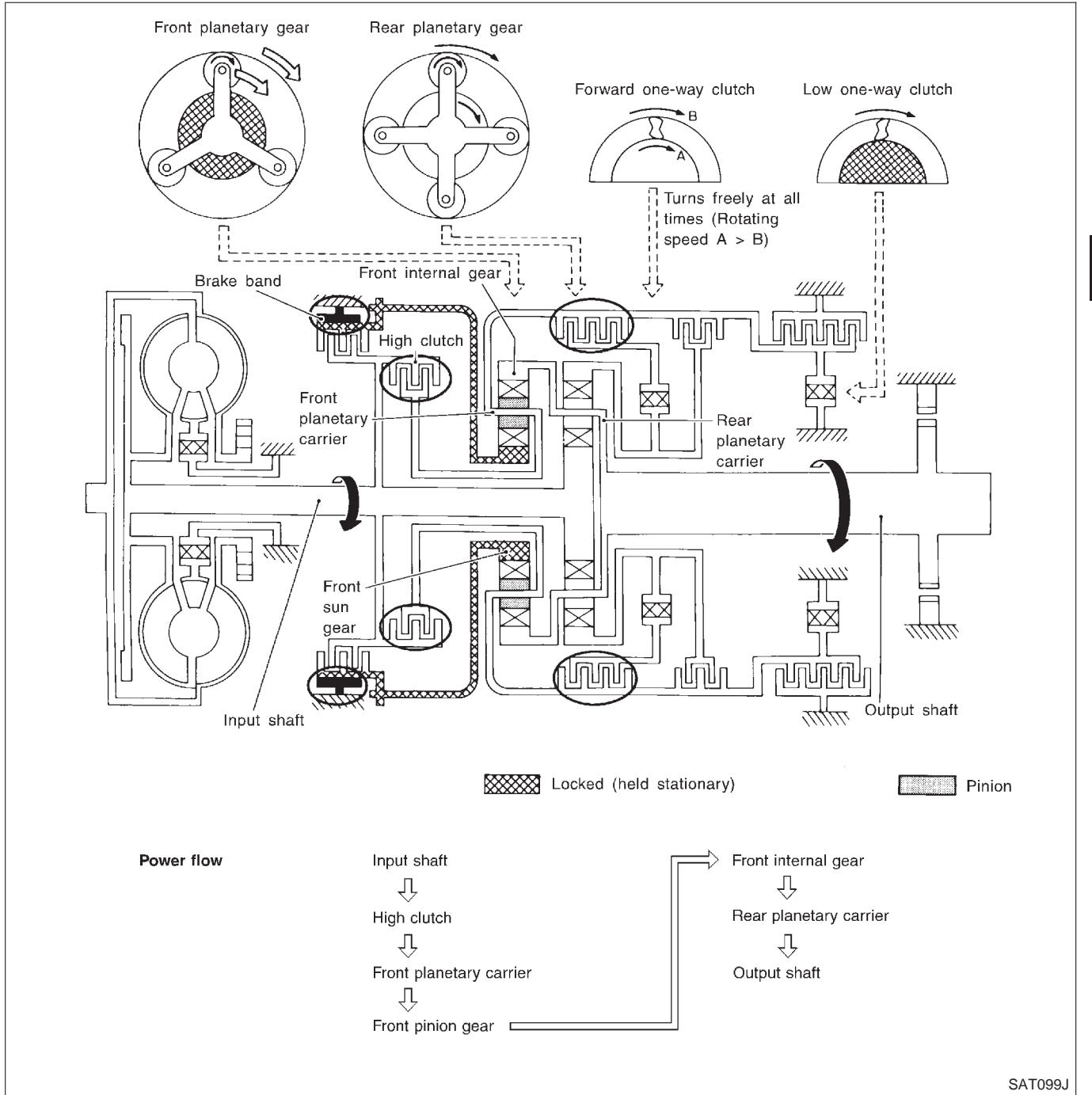
# OVERALL SYSTEM

Shift Mechanism (Cont'd)

## "D<sub>4</sub>" (OD) Position

=NBAT0012S0405

<p><b>High clutch</b>  <b>Brake band</b>  <b>Forward clutch</b>          (Does not affect power transmission)</p>	<p>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.</p>	<p>GI MA EM</p>
<p>Engine brake</p>	<p>At D<sub>4</sub> position, there is no one-way clutch in the power transmission line and engine brake can be obtained when decelerating.</p>	<p>MA EM</p>



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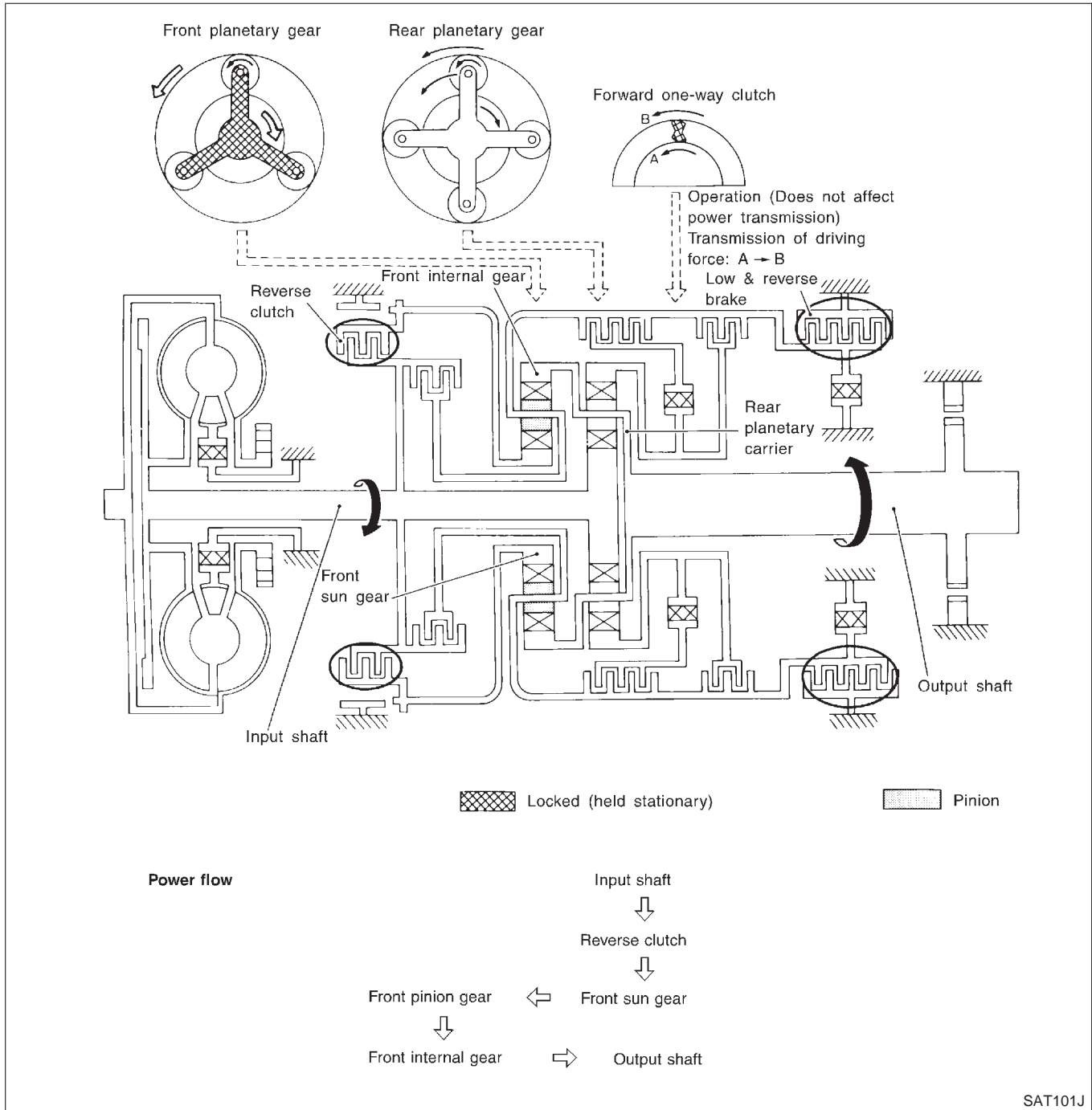
# OVERALL SYSTEM

Shift Mechanism (Cont'd)

## "R" Position

=NBAT0012S0407

<p><b>Reverse clutch</b> <b>Low and reverse brake</b></p>	<p>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.</p>
<p>Engine brake</p>	<p>As there is no one-way clutch in the power transmission line, engine brake can be obtained when decelerating.</p>





# OVERALL SYSTEM

Control System

## Control System

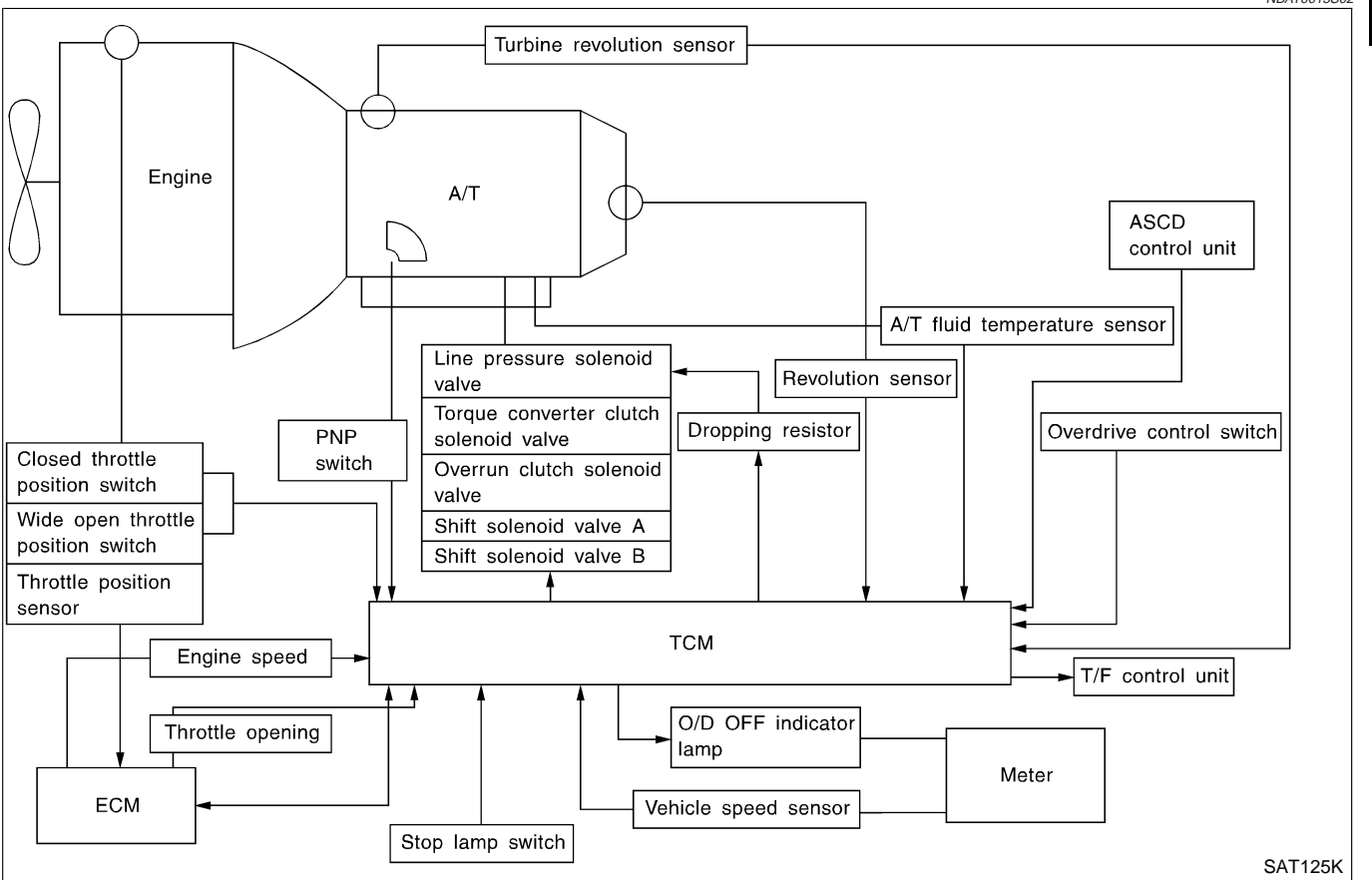
=NBAT0013

### 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 Stop lamp switch Turbine revolution sensor	▶	Shift control Line pressure control Lock-up control Overrun clutch control Timing control Fail-safe control Self-diagnosis CONSULT-II communication line Duet-EU 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 T/F control unit

### CONTROL SYSTEM



# OVERALL SYSTEM

Control System (Cont'd)

## TCM FUNCTION

=NBAT0013S03

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

NBAT0013S04

	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 "D <sub>4</sub> " (overdrive) position, to the TCM.
	ASCD control unit	Sends the cruise signal and "D <sub>4</sub> " (overdrive) cancellation signal from ASCD control unit to TCM.
	Turbine revolution sensor	Sends an input shaft revolution signal.
	Stop lamp switch	Sends the lock-up release signal to the TCM at time of D <sub>4</sub> (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

NBAT0180

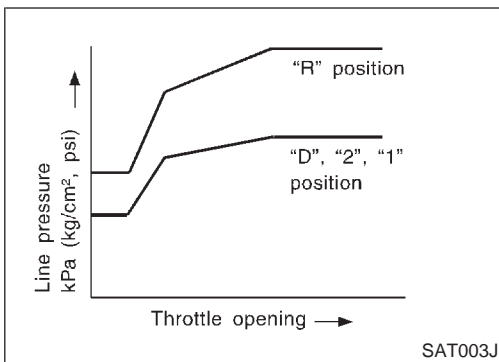
### LINE PRESSURE CONTROL

NBAT0180S01

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

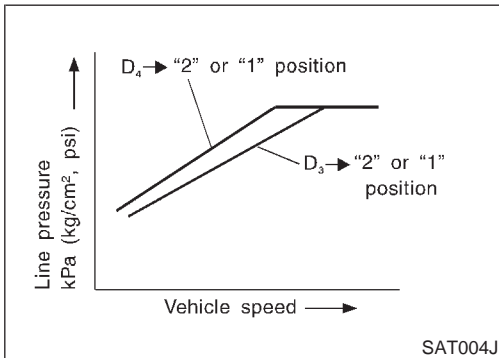
The line pressure to throttle opening characteristics is set for suitable clutch operation. NBAT0180S0101

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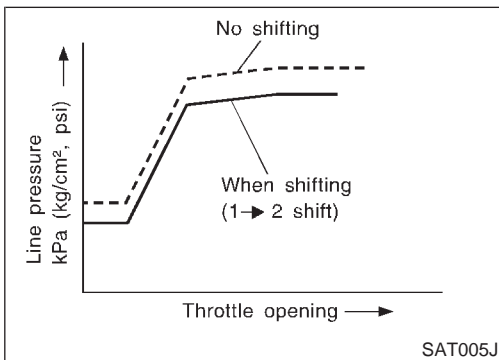
## Back-up Control (Engine brake)

If the selector lever is shifted to "2" position while driving in D<sub>4</sub> (OD) or D<sub>3</sub>, 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. NBAT0180S0102

EC

FE

AT



## 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. NBAT0180S0103

PD

AX

SU

BR

## At Low Fluid Temperature

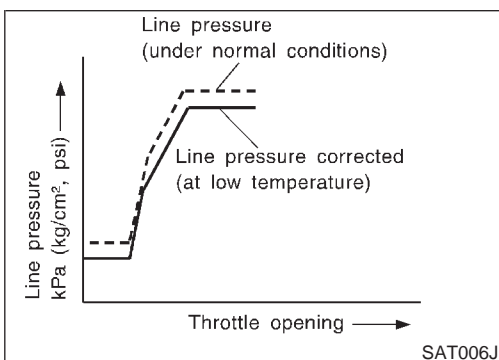
- Fluid viscosity and frictional characteristics of the clutch facing change with fluid temperature. Clutch engaging or band-contacting pressure is compensated for, according to fluid temperature, to stabilize shifting quality. NBAT0180S0104

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- 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.

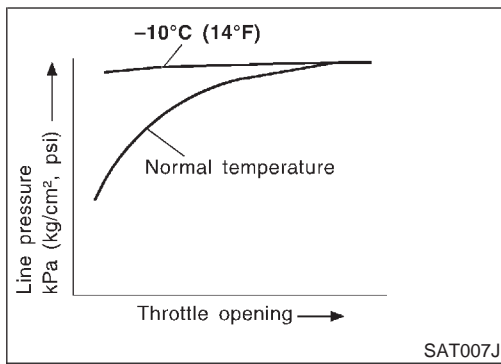
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# OVERALL SYSTEM

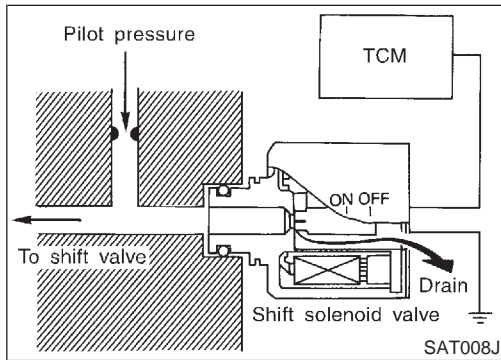
## Control Mechanism (Cont'd)



- Line pressure is increased to a maximum irrespective of the throttle opening when fluid temperature drops to  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ). 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

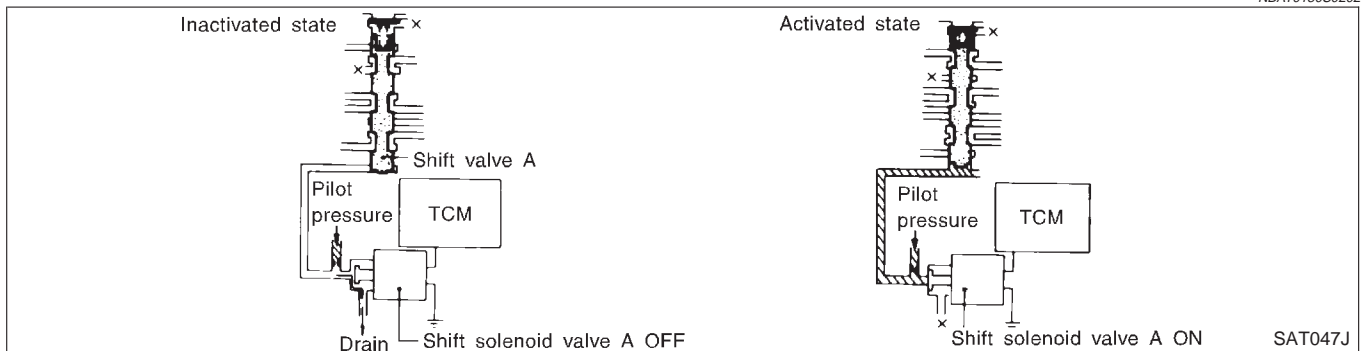
The TCM activates shift solenoid valves A and B according to signals from the throttle position sensor and revolution sensor to select the optimum gear position on the basis of the shift schedule memorized in the TCM.

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 <sub>1</sub> , 2 <sub>1</sub> , 1 <sub>1</sub>	D <sub>2</sub> , 2 <sub>2</sub> , 1 <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub> (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



# OVERALL SYSTEM

Control Mechanism (Cont'd)

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.

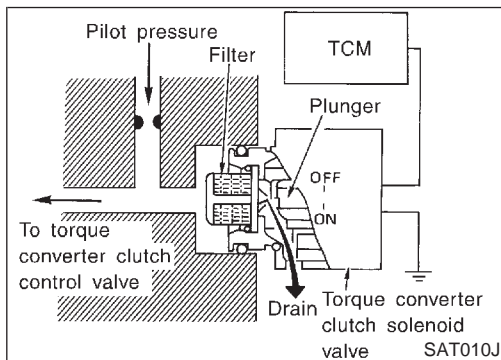
## LOCK-UP CONTROL

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.

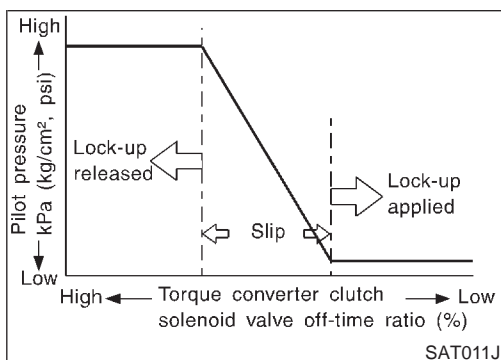
Overdrive control switch	ON	OFF
Selector lever	"D" position	
Gear position	D <sub>4</sub>	D <sub>3</sub>
Vehicle speed sensor	More than set value	
Throttle position sensor	Less than set opening	
Closed throttle position switch	OFF	
A/T fluid temperature sensor	More than 40°C (104°F)	



### 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.



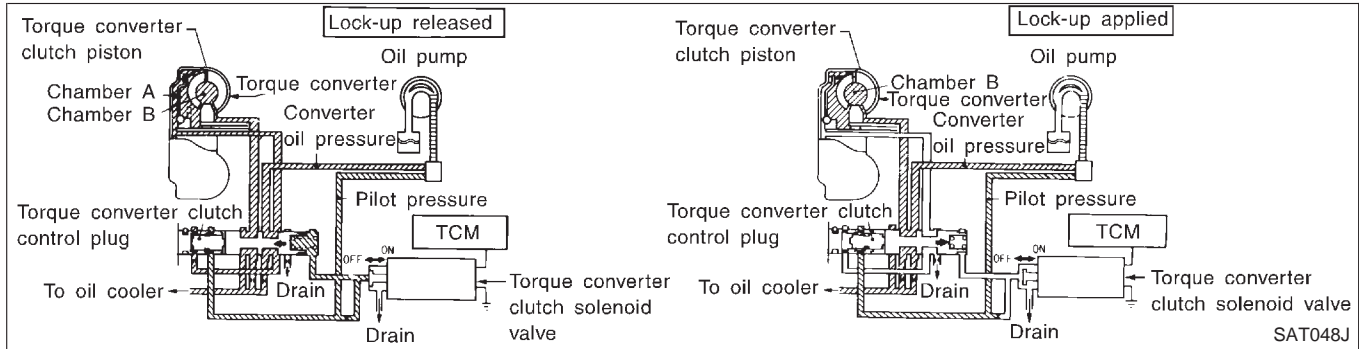
OFF-time INCREASING  
 ↓  
 Amount of drain DECREASING  
 ↓  
 Pilot pressure HIGH  
 ↓  
 Lock-up RELEASING

# OVERALL SYSTEM

Control Mechanism (Cont'd)

## Torque Converter Clutch Control Valve Operation

NBAT0180S0303



### 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)

NBAT0180S04

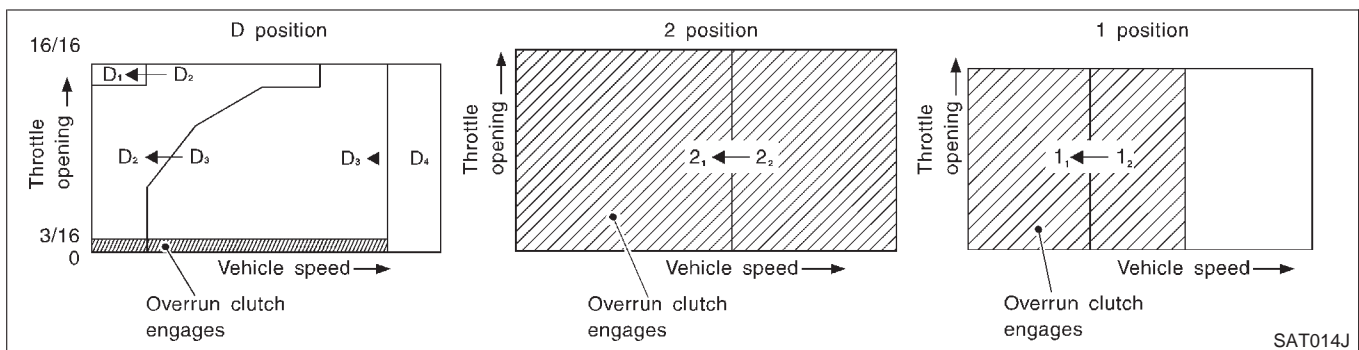
Forward one-way clutch is used to reduce shifting shocks in downshifting operations. This clutch transmits engine torque to the wheels. However, drive force from the wheels is not transmitted to the engine because the one-way clutch rotates idle. This means the engine brake is not effective.

The overrun clutch operates when the engine brake is needed.

### Overrun Clutch Operating Conditions

NBAT0180S0401

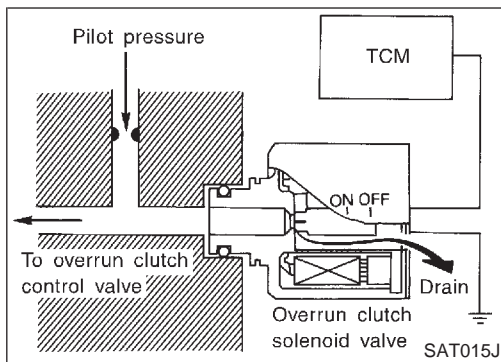
	Gear position	Throttle opening
"D" position	D <sub>1</sub> , D <sub>2</sub> , D <sub>3</sub> gear position	Less than 3/16
"2" position	2 <sub>1</sub> , 2 <sub>2</sub> gear position	
"1" position	1 <sub>1</sub> , 1 <sub>2</sub> gear position	At any position



SAT014J

# OVERALL SYSTEM

Control Mechanism (Cont'd)



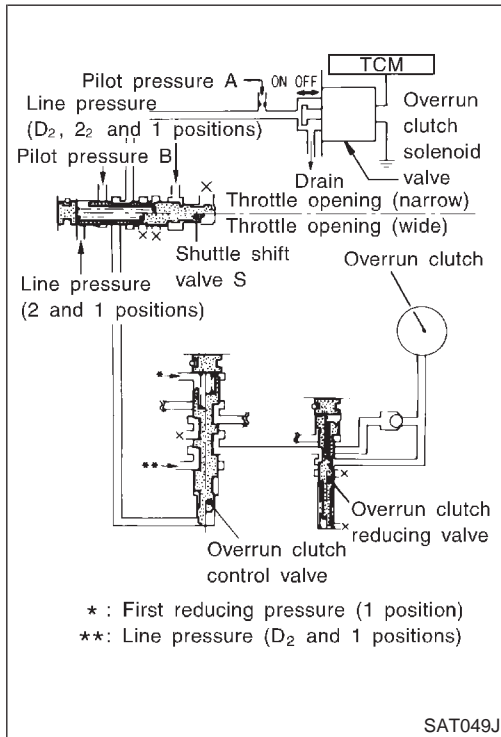
## Overrun Clutch Solenoid Valve Control

NBAT0180S0402

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

NBAT0180S0403

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

NBAT0181

### FUNCTION OF CONTROL VALVE

NBAT0181S01

Valve name	Function
<ul style="list-style-type: none"> <li>● Pressure regulator valve</li> <li>● Pressure regulator plug</li> <li>● Pressure regulator sleeve plug</li> </ul>	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.

# OVERALL SYSTEM

## Control Valve (Cont'd)

Valve name	Function
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 <sub>4</sub> 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 <sub>3</sub> .
"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.
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.) <ul style="list-style-type: none"> <li>● 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.</li> </ul>



## Introduction

NBAT0014

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.

## OBD-II Function for A/T System

NBAT0182

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

NBAT0015

### ONE TRIP DETECTION LOGIC

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

### TWO TRIP DETECTION LOGIC

When a malfunction is sensed during the first test drive, it is stored in the ECM memory as a 1st trip DTC (diagnostic trouble code) or 1st trip freeze frame data. At this point, the MIL will not illuminate. — First Trip  
If the same malfunction as that experienced during the first test drive is sensed during the second test drive, the MIL will illuminate. — Second Trip

A/T-related parts for which the MIL illuminates during the first or second test drive are listed below.

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

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

## OBD-II Diagnostic Trouble Code (DTC)

NBAT0016

### HOW TO READ DTC AND 1ST TRIP DTC

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

**(CONSULT-II or GST) CONSULT-II or GST (Generic Scan Tool)** Examples: P0705, P0710, P0720, P0725, etc.

These DTCs are prescribed by SAE J2012.

(CONSULT-II also displays the malfunctioning component or system.)

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

A sample of CONSULT-II display for DTC and 1st trip DTC is shown on the next page. 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.

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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

SELECT SYSTEM
A/T
ENGINE

SAT014K

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

SELF-DIAG RESULTS	
DTC RESULTS	TIME
PNP SW/CIRC [P0705]	0

SAT015K

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

SELF-DIAG RESULTS	
DTC RESULTS	TIME
PNP SW/CIRC [P0705]	1 t

SAT016K

## 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. NBAT0016S0101

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-81, "CONSULT-II".

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

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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

Priority	Items		
1	Freeze frame data	Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175	GI
2		Except the above items (Includes A/T related items)	MA
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. EM

## HOW TO ERASE DTC

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

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

The following emission-related diagnostic information is cleared from the ECM memory when erasing DTC related to OBD-II. For details, refer to EC-60, "Emission-related Diagnostic Information".

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

## Ⓟ HOW TO ERASE DTC (WITH CONSULT-II)

- If a DTC is displayed for both ECM and TCM, it needs to be erased for both ECM and TCM. AX
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. SU
  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. BR
  5. Touch "ENGINE".
  6. Touch "SELF-DIAG RESULTS".
  7. Touch "ERASE". (The DTC in the ECM will be erased.) ST

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

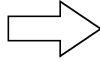
# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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

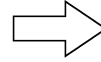
## How to erase DTC (With CONSULT-II)

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

SELECT SYSTEM
A/T
ENGINE



SELECT DIAG MODE
SELF-DIAG RESULTS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

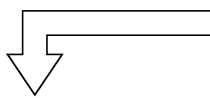


SELF-DIAG RESULTS
DTC RESULTS
T/C CLUTCH SOL/V

2. Turn CONSULT-II "ON", and touch "A/T".

3. Turn "SELF-DIAG RESULTS".

4. Touch "ERASE". (The DTC in the TCM will be erased.)



Touch "BACK".



Touch "BACK".

SELECT SYSTEM
A/T
ENGINE

5. Touch "ENGINE".

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
ACTIVE TEST
DTC & SRT CONFIRMATION
ECM PART NUMBER

6. Touch "SELF-DIAG RESULTS".

SELF-DIAG RESULTS	
DTC RESULTS	TIME
TCC SOLENOID/CIRC [P0740]	0

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

SAT017K

## HOW TO ERASE DTC (WITH GST)

NBAT0016S04

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-46. (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-95, "DESCRIPTION".

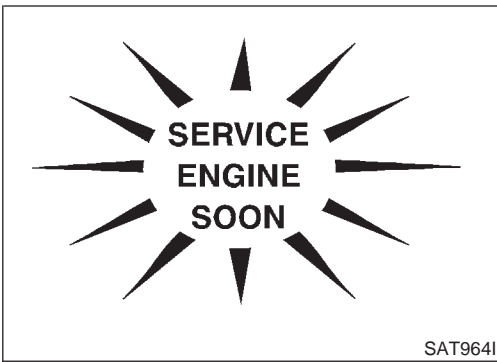
## HOW TO ERASE DTC (NO TOOLS)

NBAT0016S05

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-46. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Malfunction Indicator Lamp (MIL)



## Malfunction Indicator Lamp (MIL)

=NBAT0183

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
  - If the MIL does not light up, refer to EL-118, "Schematic". (Or refer to EC-638, "Wiring Diagram".)
2. When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction. For detail, refer to EC-59, "Introduction".

GI  
MA  
EM  
LC

## CONSULT-II

NBAT0184

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

EC  
FE

AT

TF

PD

AX

SU

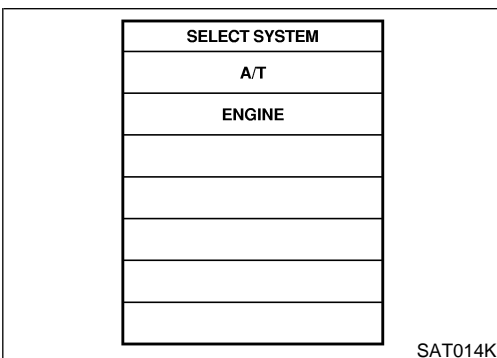
BR

ST

RS

BT

HA



## Ⓜ SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)

NBAT0184S01

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-92. If result is NG, refer to EL-12, "Schematic".

SC

EL

IDX

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)



REAL-TIME DIAG
ENG SPEED SIG

SAT987J

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

NBAT0184S02

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, "ENGINE" on CON- SULT-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			

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

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, "ENGINE" on CON- SULT-II or GST	
Overrun clutch solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P1760	GI
OVERRUN CLUTCH S/V	O/R CLUCH SOL/CIRC				MA
T/C clutch solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0740	EM
T/C CLUTCH SOL/V	TCC SOLENOID/CIRC				EC
Line pressure solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0745	FE
LINE PRESSURE S/V	L/PRESS SOL/CIRC				<b>AT</b>
Throttle position sensor Throttle position switch		● TCM receives an excessively low or high voltage from the sensor.	X	P1705	TF
THROTTLE POSI SEN	TP SEN/CIRC A/T				PD
Engine speed signal		● TCM does not receive the proper voltage signal from the ECM.	X	P0725	AX
ENGINE SPEED SIG					SU
A/T fluid temperature sensor		● TCM receives an excessively low or high voltage from the sensor.	X	P0710	BR
BATT/FLUID TEMP SEN	ATF TEMP SEN/CIRC				ST
Engine control		● The ECM-AT communication line is open or shorted.	X	EC-431, EC-592	RS
A/T COMM LINE	—				BT
Turbine revolution sensor		● TCM does not receive the proper voltage signal from the sensor.	X	—	HA
TURBINE REV	—				SC
TCM (RAM)		● TCM memory (RAM) is malfunctioning.	—	—	EL
CONTROL UNIT (RAM)	—				IDX
TCM (ROM)		● TCM memory (ROM) is malfunctioning.	—	—	
CONTROL UNIT (ROM)	—				
TCM (EEP ROM)		● TCM memory (EEP ROM) is malfunctioning.	—	—	
CONTROL UNIT (EEP ROM)	—				
Initial start		● This is not a malfunction message (Whenever shutting off a power supply to the TCM, this message appears on the screen.)	X	—	
INITIAL START	—				
No failure (NO DTC IS DETECTED FURTHER TESTING MAY BE REQUIRED)		● No failure has been detected.	X	X	

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

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-74, "DESCRIPTION".

## DATA MONITOR MODE (A/T)

NBAT0184S03

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	—	<ul style="list-style-type: none"> <li>Vehicle speed computed from signal of revolution sensor is displayed.</li> </ul>	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	—	<ul style="list-style-type: none"> <li>Vehicle speed computed from signal of vehicle speed sensor is displayed.</li> </ul>	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	—	<ul style="list-style-type: none"> <li>Throttle position sensor signal voltage is displayed.</li> </ul>	
A/T fluid temperature sensor	FLUID TEMP SE [V]	X	—	<ul style="list-style-type: none"> <li>A/T fluid temperature sensor signal voltage is displayed.</li> <li>Signal voltage lowers as fluid temperature rises.</li> </ul>	
Battery voltage	BATTERY VOLT [V]	X	—	<ul style="list-style-type: none"> <li>Source voltage of TCM is displayed.</li> </ul>	
Engine speed	ENGINE SPEED [rpm]	X	X	<ul style="list-style-type: none"> <li>Engine speed, computed from engine speed signal, is displayed.</li> </ul>	Engine speed display may not be accurate under approx. 800 rpm. It may not indicate 0 rpm even when engine is not running.
Turbine revolution sensor	TURBINE REV [rpm]	X	—	<ul style="list-style-type: none"> <li>Turbine revolution computed from signal of turbine revolution sensor is displayed.</li> </ul>	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	—	<ul style="list-style-type: none"> <li>ON/OFF state computed from signal of overdrive control SW is displayed.</li> </ul>	
PN position switch	PN POSI SW [ON/OFF]	X	—	<ul style="list-style-type: none"> <li>ON/OFF state computed from signal of PN position SW is displayed.</li> </ul>	
R position switch	R POSITION SW [ON/OFF]	X	—	<ul style="list-style-type: none"> <li>ON/OFF state computed from signal of R position SW is displayed.</li> </ul>	
D position switch	D POSITION SW [ON/OFF]	X	—	<ul style="list-style-type: none"> <li>ON/OFF state computed from signal of D position SW is displayed.</li> </ul>	
2 position switch	2 POSITION SW [ON/OFF]	X	—	<ul style="list-style-type: none"> <li>ON/OFF status, computed from signal of 2 position SW, is displayed.</li> </ul>	



# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Item	Display	Monitor item		Description	Remarks	
		TCM input signals	Main signals			
1 position switch	1 POSITION SW [ON/OFF]	X	—	<ul style="list-style-type: none"> <li>ON/OFF status, computed from signal of 1 position SW, is displayed.</li> </ul>		GI MA EM LC EC FE
ASCD cruise signal	ASCD-CRUISE [ON/OFF]	X	—	<ul style="list-style-type: none"> <li>Status of ASCD cruise signal is displayed.</li> <li>ON ... Cruising state</li> <li>OFF ... Normal running state</li> </ul>	<ul style="list-style-type: none"> <li>This is displayed even when no ASCD is mounted.</li> </ul>	
ASCD OD cut signal	ASCD-OD CUT [ON/OFF]	X	—	<ul style="list-style-type: none"> <li>Status of ASCD OD release signal is displayed.</li> <li>ON ... OD released</li> <li>OFF ... OD not released</li> </ul>	<ul style="list-style-type: none"> <li>This is displayed even when no ASCD is mounted.</li> </ul>	
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	<ul style="list-style-type: none"> <li>ON/OFF status, computed from signal of kickdown SW, is displayed.</li> </ul>	<ul style="list-style-type: none"> <li>This is displayed even when no kickdown switch is equipped.</li> </ul>	AT
Closed throttle position switch	CLOSED THL/SW [ON/OFF]	X	—	<ul style="list-style-type: none"> <li>ON/OFF status, computed from signal of closed throttle position SW, is displayed.</li> </ul>		TF PD
Wide open throttle position switch	W/O THRL/P-SW [ON/OFF]	X	—	<ul style="list-style-type: none"> <li>ON/OFF status, computed from signal of wide open throttle position SW, is displayed.</li> </ul>		AX
Stop lamp switch	BRAKE SW [ON/OFF]	X	—	<ul style="list-style-type: none"> <li>ON/OFF status is displayed.</li> <li>ON ... Brake pedal is depressed.</li> <li>OFF ... Brake pedal is released.</li> </ul>		SU BR
Gear position	GEAR	—	X	<ul style="list-style-type: none"> <li>Gear position data used for computation by TCM, is displayed.</li> </ul>		ST RS
Selector lever position	SLCT LVR POSI	—	X	<ul style="list-style-type: none"> <li>Selector lever position data, used for computation by TCM, is displayed.</li> </ul>	<ul style="list-style-type: none"> <li>A specific value used for control is displayed if fail-safe is activated due to error.</li> </ul>	BT
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	<ul style="list-style-type: none"> <li>Vehicle speed data, used for computation by TCM, is displayed.</li> </ul>		HA
Throttle position	THROTTLE POSI [°]	—	X	<ul style="list-style-type: none"> <li>Throttle position data, used for computation by TCM, is displayed.</li> </ul>	<ul style="list-style-type: none"> <li>A specific value used for control is displayed if fail-safe is activated due to error.</li> </ul>	SC EL
Line pressure duty	LINE PRES DTY [%]	—	X	<ul style="list-style-type: none"> <li>Control value of line pressure solenoid valve, computed by TCM from each input signal, is displayed.</li> </ul>		IDX

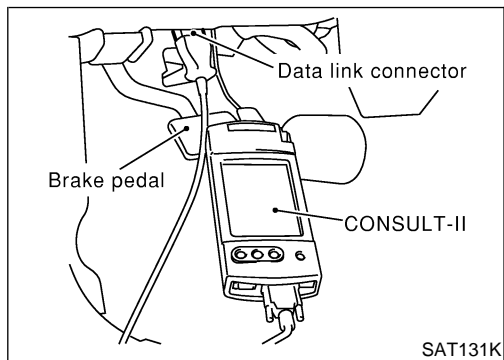
# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
Torque converter clutch solenoid valve duty	TCC S/V DUTY [%]	—	X	● Control value of torque converter clutch solenoid valve, computed by TCM from each input signal, is displayed.	
Shift solenoid valve A	SHIFT S/V A [ON/OFF]	—	X	● Control value of shift solenoid valve A, computed by TCM from each input signal, is displayed.	Control value of solenoid is displayed even if solenoid circuit is disconnected. The "OFF" signal is displayed if solenoid circuit is shorted.
Shift solenoid valve B	SHIFT S/V B [ON/OFF]	—	X	● Control value of shift solenoid valve B, computed by TCM from each input signal, is displayed.	
Overrun clutch solenoid valve	OVERRUN/C S/V [ON/OFF]	—	X	● Control value of overrun clutch solenoid valve computed by TCM from each input signal is displayed.	
Self-diagnosis display lamp (O/D OFF indicator lamp)	SELF-D DP LMP [ON/OFF]	—	X	● Control status of O/D OFF indicator lamp is displayed.	

X: Applicable

—: Not applicable

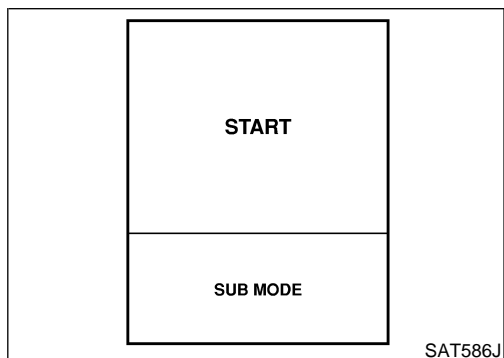


## DTC WORK SUPPORT MODE WITH CONSULT-II CONSULT-II Setting Procedure

NBAT0184S04

NBAT0184S0401

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



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



# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

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

SAT591J

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

1ST GR FNCTN P0731	
STOP VEHICLE	

SAT592J

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

1ST GR FNCTN P0731	
NG	

SAT593J

1ST GR FNCTN P0731	
DRIVE VHCL IN D RANGE SHIFTING 1→2→3→4 UNDER NORMAL ACCELERATION. DOES A/T SHFT NORMAL CHECK FOR PROPER SHF TIMING AND SHFT SHOCK	

SAT594J

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

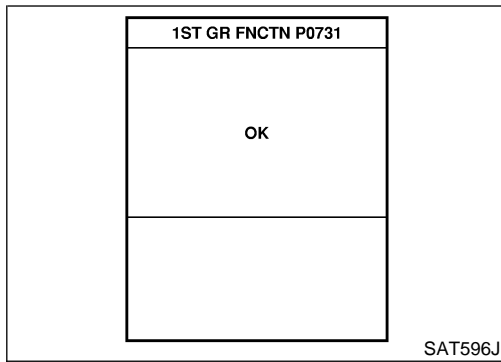
1ST GR FNCTN P0731	
DRIVE VHCL IN D RANGE SHIFTING 1→2→3→4 UNDER NORMAL ACCELERATION. DOES A/T SHFT NORMAL CHECK FOR PROPER SHF TIMING AND SHFT SHOCK	

SAT595J

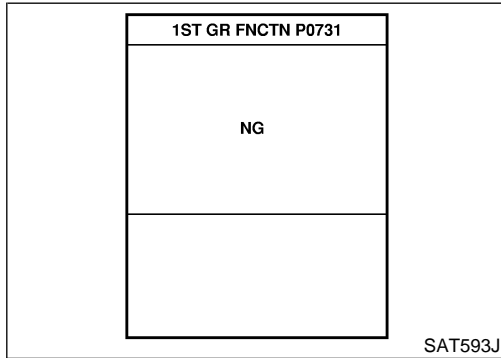
- Touch "YES" or "NO".

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)



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



GI

MA

EM

LC

EC

FE

**AT**

TF

## DTC WORK SUPPORT MODE

NBAT0184S05

DTC work support item	Description	Check item
1ST GR FNCTN P0731	Following items for "A/T 1st gear function (P0731)" can be confirmed. <ul style="list-style-type: none"> <li>Self-diagnosis status (whether the diagnosis is being conducted or not)</li> <li>Self-diagnosis result (OK or NG)</li> </ul>	<ul style="list-style-type: none"> <li>Shift solenoid valve A</li> <li>Shift solenoid valve B</li> <li>Each clutch</li> <li>Hydraulic control circuit</li> </ul>
2ND GR FNCTN P0732	Following items for "A/T 2nd gear function (P0732)" can be confirmed. <ul style="list-style-type: none"> <li>Self-diagnosis status (whether the diagnosis is being conducted or not)</li> <li>Self-diagnosis result (OK or NG)</li> </ul>	<ul style="list-style-type: none"> <li>Shift solenoid valve B</li> <li>Each clutch</li> <li>Hydraulic control circuit</li> </ul>
3RD GR FNCTN P0733	Following items for "A/T 3rd gear function (P0733)" can be confirmed. <ul style="list-style-type: none"> <li>Self-diagnosis status (whether the diagnosis is being conducted or not)</li> <li>Self-diagnosis result (OK or NG)</li> </ul>	<ul style="list-style-type: none"> <li>Shift solenoid valve A</li> <li>Each clutch</li> <li>Hydraulic control circuit</li> </ul>
4TH GR FNCTN P0734	Following items for "A/T 4th gear function (P0734)" can be confirmed. <ul style="list-style-type: none"> <li>Self-diagnosis status (whether the diagnosis is being conducted or not)</li> <li>Self-diagnosis result (OK or NG)</li> </ul>	<ul style="list-style-type: none"> <li>Shift solenoid valve A</li> <li>Shift solenoid valve B</li> <li>Overrun clutch solenoid valve</li> <li>Line pressure solenoid valve</li> <li>Each clutch</li> <li>Hydraulic control circuit</li> </ul>
TCC S/V FNCTN P0744	Following items for "A/T TCC S/V function (lock-up) (P0744)" can be confirmed. <ul style="list-style-type: none"> <li>Self-diagnosis status (whether the diagnosis is being conducted or not)</li> <li>Self-diagnosis result (OK or NG)</li> </ul>	<ul style="list-style-type: none"> <li>Torque converter clutch solenoid valve</li> <li>Each clutch</li> <li>Hydraulic control circuit</li> </ul>

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

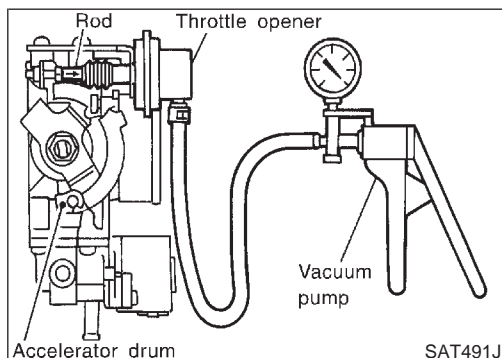
# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Procedure Without CONSULT-II

## Diagnostic Procedure Without CONSULT-II

 **OBD-II SELF-DIAGNOSTIC PROCEDURE (WITH GST)** NBAT0206  
NBAT0206S01  
Refer to EC-95, "DESCRIPTION".

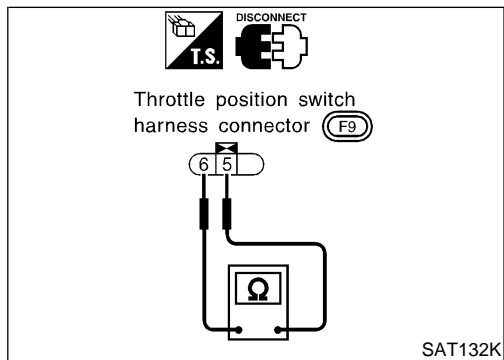
 **OBD-II SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)**  
Refer to EC-74, "DESCRIPTION". NBAT0206S02



 **TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)** NBAT0206S03  
NBAT0206S0301

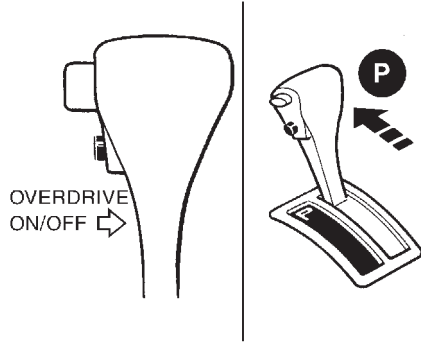
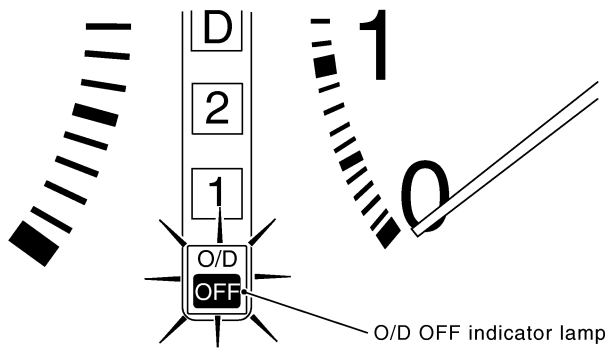
### Preparation

1. Turn ignition switch to "OFF" position.
2. Connect the handy type vacuum pump to the throttle opener and apply vacuum  $-25.3$  kPa ( $-190$  mmHg,  $-7.48$  inHg).
3. Disconnect the throttle position switch harness connector.
4. Turn ignition switch to "ON" position.
5. Check continuity of the closed throttle position switch. **Continuity should exist.**  
**(If continuity does not exist, check throttle opener and closed throttle position switch. Then increase vacuum until closed throttle position switch shows continuity.)**
6. Go to "DIAGOSIS START" on next page.



# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Procedure Without CONSULT-II (Cont'd)

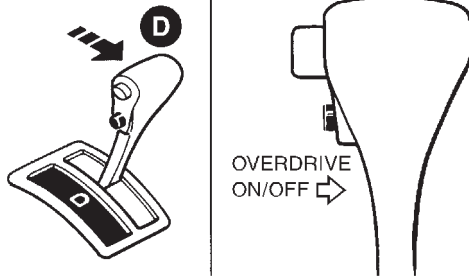
<b>1</b>	<b>CHECK O/D OFF INDICATOR LAMP</b>	<p>1. Start the engine with selector lever in "P" position. Warm engine to normal operating temperature.</p> <p>2. Turn ignition switch to "OFF" position.</p> <p>3. Wait 5 seconds.</p> <div style="text-align: center;">  <p>OVERDRIVE ON/OFF →</p> </div> <p>4. Turn ignition switch to "ON" position. (Do not start engine.)</p> <p>5. Does O/D OFF indicator lamp come on for about 2 seconds?</p> <div style="text-align: center;">  <p>O/D OFF indicator lamp</p> </div> <p style="text-align: center;"><b>Yes or No</b></p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>SAT967I</p> <p>FE</p> <p><b>AT</b></p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
Yes	▶	GO TO 2.	
No	▶	Go to "1. O/D OFF Indicator Lamp Does Not Come On", AT-218.	

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Procedure Without CONSULT-II (Cont'd)

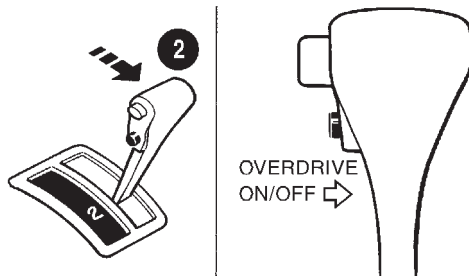
## 2 JUDGEMENT PROCEDURE STEP 1

1. Turn ignition switch to "OFF" position.
2. Push shift lock release button.
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 5 on AT-257.)
6. Turn ignition switch to "OFF" position.



SAT968I

7. Turn ignition switch to "ON" position (Do not start engine.).
8. Release the overdrive control switch (the O/D OFF indicator lamp will be "OFF").
9. Wait 2 seconds.
10. Move selector lever to "2" position.
11. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be "ON").
12. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be "OFF") until directed to release the switch.



SAT969I

▶ GO TO 3.



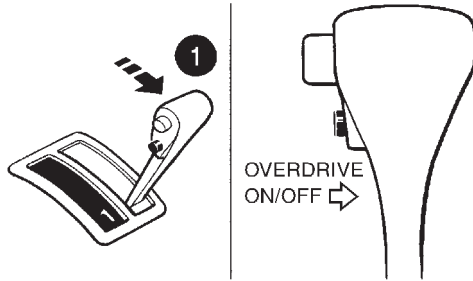
# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Procedure Without CONSULT-II (Cont'd)

GI  
MA  
EM  
LC  
EC  
FE  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

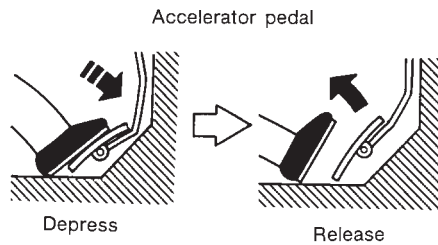
## 3 JUDGEMENT PROCEDURE STEP 2

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.



SAT970I

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

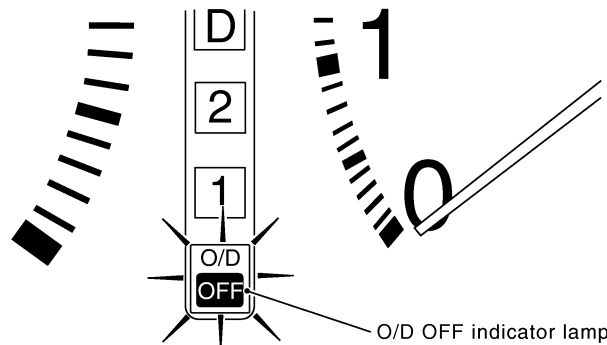


SAT981F

▶ GO TO 4.

## 4 CHECK SELF-DIAGNOSIS CODE

Check O/D OFF indicator lamp.  
Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE, AT-50.



SAT133K

▶ DIAGNOSIS END

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

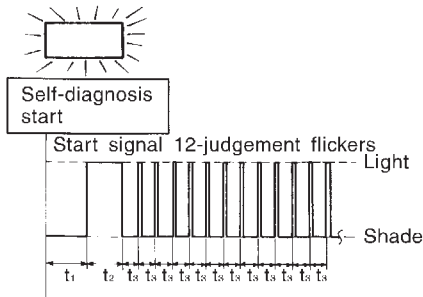
Diagnostic Procedure Without CONSULT-II (Cont'd)

## JUDGEMENT OF SELF-DIAGNOSIS CODE

NBAT0206S04

O/D OFF indicator lamp:

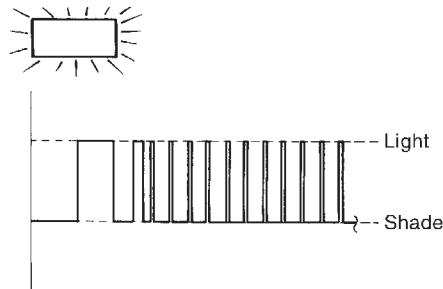
All judgement flickers are same.



SAT666I

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

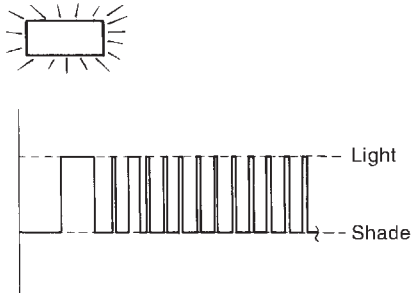
1st judgement flicker is longer than others.



SAT667I

Revolution sensor circuit is short-circuited or disconnected.  
⇒ Go to DTC P0720 VEHICLE SPEED SENSOR-A/T (REVOLUTION SENSOR), AT-111.

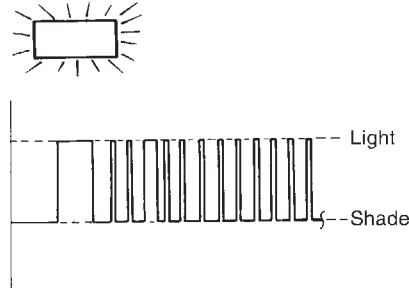
2nd judgement flicker is longer than others.



SAT668I

Vehicle speed sensor circuit is short-circuited or disconnected.  
⇒ Go to DTC VEHICLE SPEED SENSOR-MTR, AT-197.

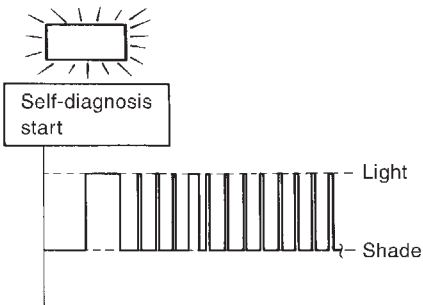
3rd judgement flicker is longer than others.



SAT669I

Throttle position sensor circuit is short-circuited or disconnected.  
⇒ Go to DTC P1705 THROTTLE POSITION SENSOR, AT-176.

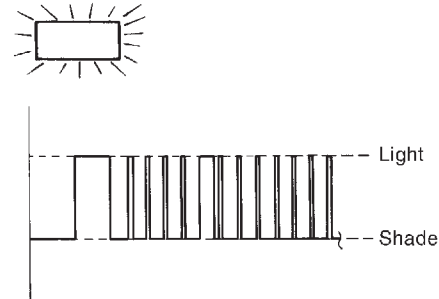
4th judgement flicker is longer than others.



SAT670I

Shift solenoid valve A circuit is short-circuited or disconnected.  
⇒ Go to DTC P0750 SHIFT SOLENOID VALVE A, AT-168.

5th judgement flicker is longer than others.



SAT671I

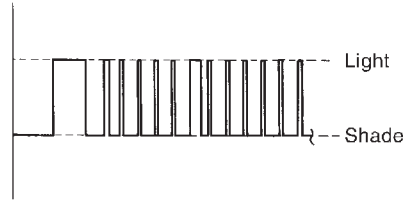
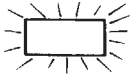
Shift solenoid valve B circuit is short-circuited or disconnected.  
⇒ Go to DTC P0755 SHIFT SOLENOID VALVE B, AT-172.

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Procedure Without CONSULT-II (Cont'd)

O/D OFF indicator lamp:

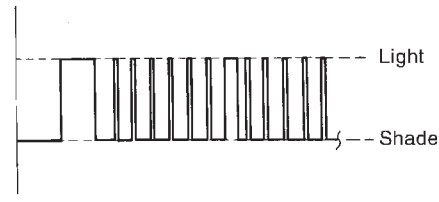
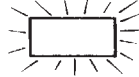
6th judgement flicker is longer than others.



SAT672I

Overrun clutch solenoid valve circuit is short-circuited or disconnected.  
 ⇒ Go to DTC P1760 OVERRUN CLUTCH SOLENOID VALVE, AT-185.

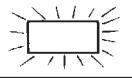
7th judgement flicker is longer than others.



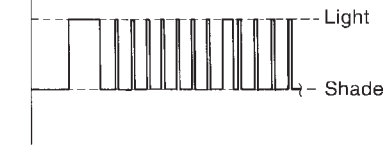
SAT673I

Torque converter clutch solenoid valve circuit is short-circuited or disconnected.  
 ⇒ Go to DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE, AT-148.

8th judgement flicker is longer than others.



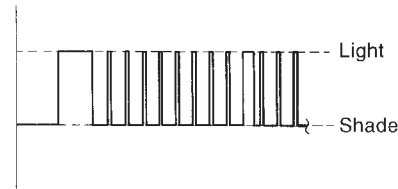
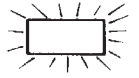
Self-diagnosis start



SAT674I

A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged.  
 ⇒ Go to DTC BATT/FLUID TEMP SEN (A/T FLUID TEMPERATURE SENSOR AND TCM POWER SOURCE), AT-190.

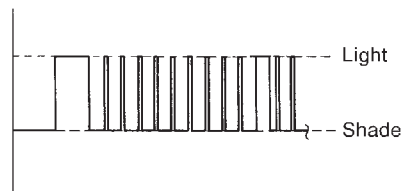
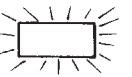
9th judgement flicker is longer than others.



SAT675I

Engine speed signal circuit is short-circuited or disconnected.  
 ⇒ Go to DTC P0725 ENGINE SPEED SIGNAL, AT-116.

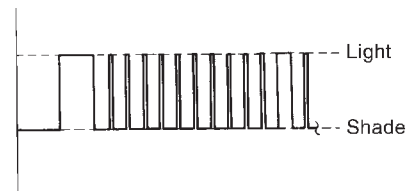
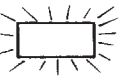
10th judgement flicker is longer than others.



SAT676I

Turbine revolution sensor circuit is short-circuited or disconnected.  
 ⇒ Go to DTC Turbine Revolution Sensor, AT-202.

11th judgement flicker is longer than others.



SAT677I

Line pressure solenoid valve circuit is short-circuited or disconnected.  
 ⇒ Go to DTC P0745 LINE PRESSURE SOLENOID VALVE, AT-162.

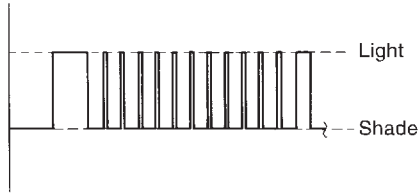
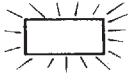
GI  
 MA  
 EM  
 LC  
 EC  
 FE  
**AT**  
 TF  
 PD  
 AX  
 SU  
 BR  
 ST  
 RS  
 BT  
 HA  
 SC  
 EL  
 IDX

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

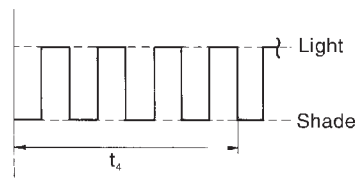
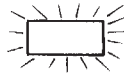
Diagnostic Procedure Without CONSULT-II (Cont'd)

O/D OFF indicator lamp:

12th judgement flicker is longer than others.



Flickers as shown below.



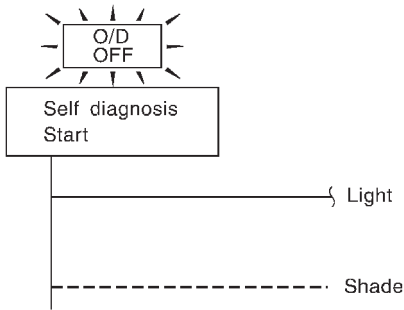
SAT678I

SAT679I

The ECM-A/T communication line is open or shorted.  
 ⇒ **Go to DTC A/T Communication Line, AT-207.**

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.

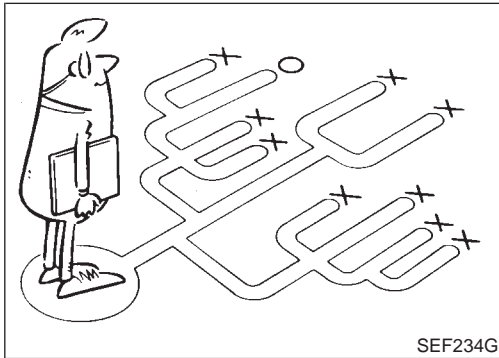
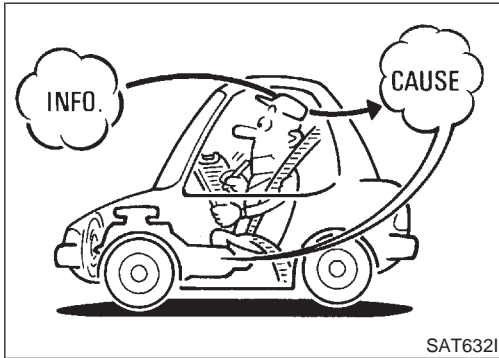
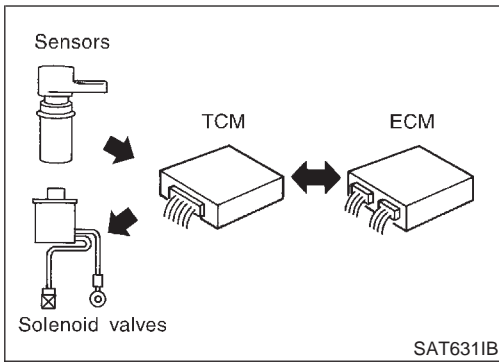


SAT367J

PNP switch, overdrive control switch or throttle position switch circuit is disconnected or TCM is damaged.  
 ⇒ **Go to 21. TCM Self-diagnosis Does Not Activate (PNP, OVERDRIVE CONTROL AND THROTTLE POSITION SWITCHES), AT-257.**

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

NBAT0019



## Introduction

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

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

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

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

A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the "Work Flow". Refer to AT-57.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic Worksheet" like the example (AT-55) should be used.

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

Also check related Service bulletins.

GI

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EM

LC

EC

FE

AT

TF

PD

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SC

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IDX



# TROUBLE DIAGNOSIS — INTRODUCTION

Introduction (Cont'd)

## Diagnostic Worksheet

=NBAT0019S0102

1.	<input type="checkbox"/> Read the Fail-safe Remarks and listen to customer complaints.	AT-8	GI		
2.	<input type="checkbox"/> CHECK A/T FLUID	AT-59			
	<input type="checkbox"/> Leakage (Follow specified procedure) <input type="checkbox"/> Fluid condition <input type="checkbox"/> Fluid level		MA		
3.	Perform STALL TEST and LINE PRESSURE TEST.	AT-59, AT-62	EM		
	<input type="checkbox"/> Stall test — Mark possible damaged components/others.				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Torque converter one-way clutch  <input type="checkbox"/> Reverse clutch  <input type="checkbox"/> Forward clutch  <input type="checkbox"/> Overrun clutch  <input type="checkbox"/> Forward one-way clutch                 </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Low &amp; reverse brake  <input type="checkbox"/> Low one-way clutch  <input type="checkbox"/> Engine  <input type="checkbox"/> Line pressure is low  <input type="checkbox"/> Clutches and brakes except high clutch and brake band are OK                 </td> </tr> </table>	<input type="checkbox"/> Torque converter one-way clutch <input type="checkbox"/> Reverse clutch <input type="checkbox"/> Forward clutch <input type="checkbox"/> Overrun clutch <input type="checkbox"/> Forward one-way clutch	<input type="checkbox"/> Low & reverse brake <input type="checkbox"/> Low one-way clutch <input type="checkbox"/> Engine <input type="checkbox"/> Line pressure is low <input type="checkbox"/> Clutches and brakes except high clutch and brake band are OK		LC
<input type="checkbox"/> Torque converter one-way clutch <input type="checkbox"/> Reverse clutch <input type="checkbox"/> Forward clutch <input type="checkbox"/> Overrun clutch <input type="checkbox"/> Forward one-way clutch	<input type="checkbox"/> Low & reverse brake <input type="checkbox"/> Low one-way clutch <input type="checkbox"/> Engine <input type="checkbox"/> Line pressure is low <input type="checkbox"/> Clutches and brakes except high clutch and brake band are OK				
	<input type="checkbox"/> Pressure test — Suspected parts:		EC		
			FE		
4.	<input type="checkbox"/> Perform all ROAD TEST and mark required procedures.	AT-63	<b>AT</b>		
4-1.	Check before engine is started.	AT-64			
	<input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE - Mark detected items.		TF		
	<input type="checkbox"/> DTC P0705 PNP switch, AT-99. <input type="checkbox"/> DTC P0710 A/T fluid temperature sensor, AT-105. <input type="checkbox"/> DTC P0720 Vehicle speed sensor-A/T (Revolution sensor), AT-111. <input type="checkbox"/> DTC P0725 Engine speed signal, AT-116. <input type="checkbox"/> DTC P0740 Torque converter clutch solenoid valve, AT-148. <input type="checkbox"/> DTC P0745 Line pressure solenoid valve, AT-162. <input type="checkbox"/> DTC P0750 Shift solenoid valve A, AT-168. <input type="checkbox"/> DTC P0755 Shift solenoid valve B, AT-172. <input type="checkbox"/> DTC P1705 Throttle position sensor, AT-176. <input type="checkbox"/> DTC P1760 Overrun clutch solenoid valve, AT-185. <input type="checkbox"/> DTC BATT/FLUID TEMP SEN (A/T fluid temperature sensor and TCM power source), AT-190. <input type="checkbox"/> DTC Vehicle speed sensor-MTR, AT-197. <input type="checkbox"/> DTC Turbine revolution sensor, AT-202. <input type="checkbox"/> DTC A/T communication line, AT-207. <input type="checkbox"/> DTC Control unit (RAM), control unit (ROM), AT-211. <input type="checkbox"/> DTC Control unit (EEP ROM), AT-213. <input type="checkbox"/> PNP, overdrive control and throttle position switches, AT-257. <input type="checkbox"/> Battery <input type="checkbox"/> Others		PD		
			AX		
			SU		
			BR		
			ST		
			RS		
4-2.	Check at idle	AT-66			
	<input type="checkbox"/> 1. O/D OFF Indicator Lamp Does Not Come On, AT-218. <input type="checkbox"/> 2. Engine Cannot Be Started In "P" And "N" Position, AT-221. <input type="checkbox"/> 3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed, AT-222. <input type="checkbox"/> 4. In "N" Position, Vehicle Moves, AT-223. <input type="checkbox"/> 5. Large Shock. "N" → "R" Position, AT-225. <input type="checkbox"/> 6. Vehicle Does Not Creep Backward In "R" Position, AT-227. <input type="checkbox"/> 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position, AT-230.		BT		
			HA		
			SC		

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# TROUBLE DIAGNOSIS — INTRODUCTION

Introduction (Cont'd)

4.	4-3.	Cruise test	AT-67 AT-71
		Part-1	
		<input type="checkbox"/> 8. Vehicle Cannot Be Started From D <sub>1</sub> , AT-233. <input type="checkbox"/> 9. A/T Does Not Shift: D <sub>1</sub> → D <sub>2</sub> Or Does Not Kickdown: D <sub>4</sub> → D <sub>2</sub> , AT-236. <input type="checkbox"/> 10. A/T Does Not Shift: D <sub>2</sub> → D <sub>3</sub> , AT-239. <input type="checkbox"/> 11. A/T Does Not Shift: D <sub>3</sub> → D <sub>4</sub> , AT-242. <input type="checkbox"/> 12. A/T Does Not Perform Lock-up, AT-245. <input type="checkbox"/> 13. A/T Does Not Hold Lock-up Condition, AT-247. <input type="checkbox"/> 14. Lock-up Is Not Released, AT-249. <input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Light Braking D <sub>4</sub> → D <sub>3</sub> ), AT-250.	
		Part-2	AT-75
		Part-3	AT-77
		<input type="checkbox"/> 17. A/T Does Not Shift: D <sub>4</sub> → D <sub>3</sub> When Overdrive Control Switch "ON" → "OFF", AT-253 <input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Engine Brake In D <sub>3</sub> ), AT-250. <input type="checkbox"/> 18. A/T Does Not Shift: D <sub>3</sub> → 2 <sub>2</sub> , When Selector Lever "D" → "2" Position, AT-254. <input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Engine Brake In 2 <sub>2</sub> ), AT-250. <input type="checkbox"/> 19. A/T Does Not Shift: 2 <sub>2</sub> → 1 <sub>1</sub> , When Selector Lever "2" → "1" Position, AT-255. <input type="checkbox"/> 20. Vehicle Does Not Decelerate By Engine Brake, AT-256. <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items.	
		<input type="checkbox"/> DTC P0705 PNP switch, AT-99. <input type="checkbox"/> DTC P0710 A/T fluid temperature sensor, AT-105. <input type="checkbox"/> DTC P0720 Vehicle speed sensor-A/T (Revolution sensor), AT-111. <input type="checkbox"/> DTC P0725 Engine speed signal, AT-116. <input type="checkbox"/> DTC P0740 Torque converter clutch solenoid valve, AT-148. <input type="checkbox"/> DTC P0745 Line pressure solenoid valve, AT-162. <input type="checkbox"/> DTC P0750 Shift solenoid valve A, AT-168. <input type="checkbox"/> DTC P0755 Shift solenoid valve B, AT-172. <input type="checkbox"/> DTC P1705 Throttle position sensor, AT-176. <input type="checkbox"/> DTC P1760 Overrun clutch solenoid valve, AT-185. <input type="checkbox"/> DTC BATT/FLUID TEMP SEN (A/T fluid temperature sensor and TCM power source), AT-190. <input type="checkbox"/> DTC Vehicle speed sensor-MTR, AT-197. <input type="checkbox"/> DTC Turbine revolution sensor, AT-202. <input type="checkbox"/> DTC A/T communication line, AT-207. <input type="checkbox"/> DTC Control unit (RAM), control unit (ROM), AT-211. <input type="checkbox"/> DTC Control unit (EEP ROM), AT-213. <input type="checkbox"/> PNP, overdrive control and throttle position switches, AT-257. <input type="checkbox"/> Battery <input type="checkbox"/> Others	
5.		<input type="checkbox"/> For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.	AT-38
6.		<input type="checkbox"/> Perform all ROAD TEST and re-mark required procedures.	AT-63
7.		<input type="checkbox"/> Perform DTC CONFIRMATION PROCEDURE for following MIL indicating items and check out NG items. Refer to EC-60, "Emission-related Diagnostic Information".	EC-60
		<input type="checkbox"/> DTC (P0731, 1103) A/T 1st gear function, AT-120. <input type="checkbox"/> DTC (P0732, 1104) A/T 2nd gear function, AT-126. <input type="checkbox"/> DTC (P0733, 1105) A/T 3rd gear function, AT-132. <input type="checkbox"/> DTC (P0734, 1106) A/T 4th gear function, AT-138. <input type="checkbox"/> DTC (P0744, 1107) A/T TCC S/V function (lock-up), AT-153.	
8.		<input type="checkbox"/> 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-92 AT-97
9.		<input type="checkbox"/> Erase DTC from TCM and ECM memories.	AT-35



## Work Flow

### HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

NBAT0020

NBAT0020S01

A good understanding of the malfunction conditions can make troubleshooting faster and more accurate. In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

Make good use of the two sheets provided, "INFORMATION FROM CUSTOMER" (AT-54) and "DIAGNOSTIC WORKSHEET" (AT-55), to perform the best troubleshooting possible.

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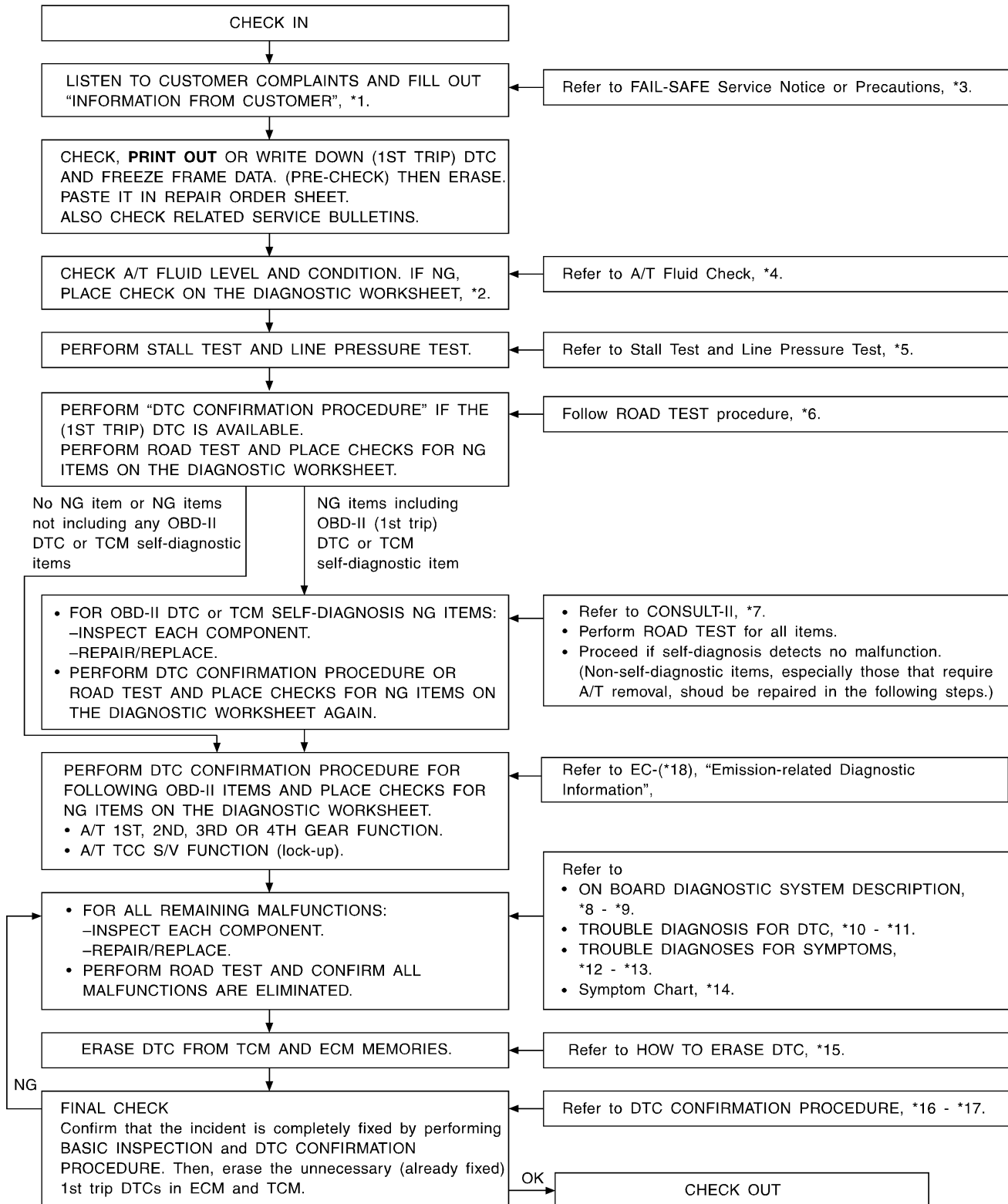
IDX

# TROUBLE DIAGNOSIS — INTRODUCTION

Work Flow (Cont'd)

## WORK FLOW CHART

NBAT0020S02



SAT086JF

\*1: AT-54

\*2: AT-55

\*3: AT-8

\*4: AT-59

\*5: AT-59, 62

\*6: AT-63

\*7: AT-37

\*8: AT-33

\*9: AT-50

\*10: AT-99

\*11: AT-213

\*12: AT-215

\*13: AT-257

\*14: AT-81

\*15: AT-35

\*16: AT-100

\*17: AT-213

\*18: EC-60

## A/T Fluid Check

NBAT0021

### FLUID LEAKAGE CHECK

NBAT0021S01

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.

GI

MA

EM

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SAT638A

### FLUID CONDITION CHECK

NBAT0021S02

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

EC

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### FLUID LEVEL CHECK

NBAT0021S03

Refer to MA-21, “Checking A/T Fluid”.

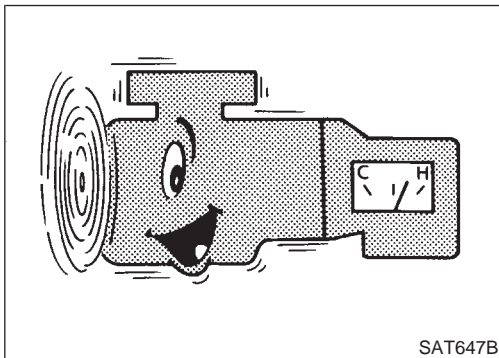
TF

PD

AX

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BR



SAT647B

### Stall Test

NBAT0022

#### STALL TEST PROCEDURE

NBAT0022S01

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

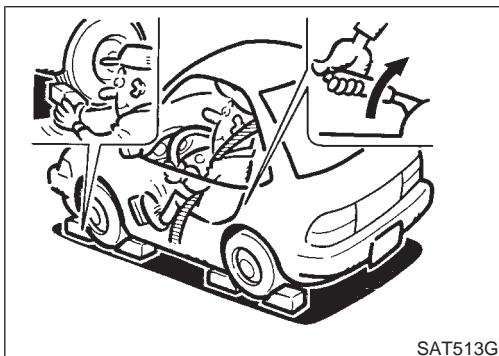
**ATF operating temperature:  
50 - 80°C (122 - 176°F)**

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SAT513G

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

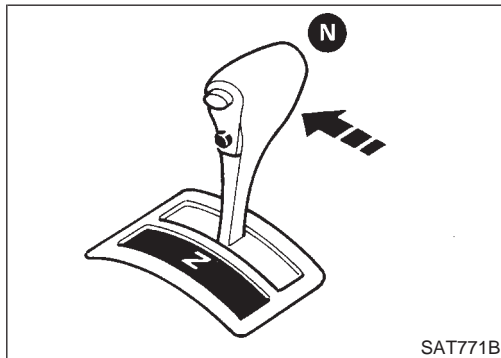
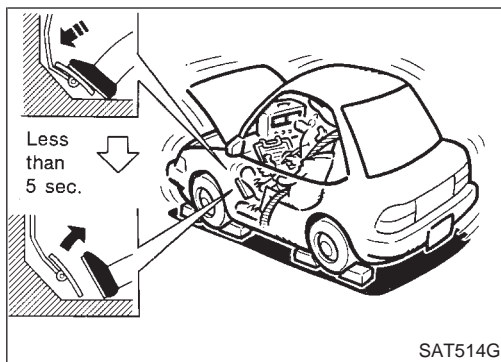
SC

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# TROUBLE DIAGNOSIS — BASIC INSPECTION

## Stall Test (Cont'd)



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:**
    - Refer to SDS, AT-356.**
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

NBAT0022S02

The test result and possible damaged components relating to each result are shown in the illustration. In order to pinpoint the possible damaged components, refer to “Work Flow”, AT-57.

#### 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:

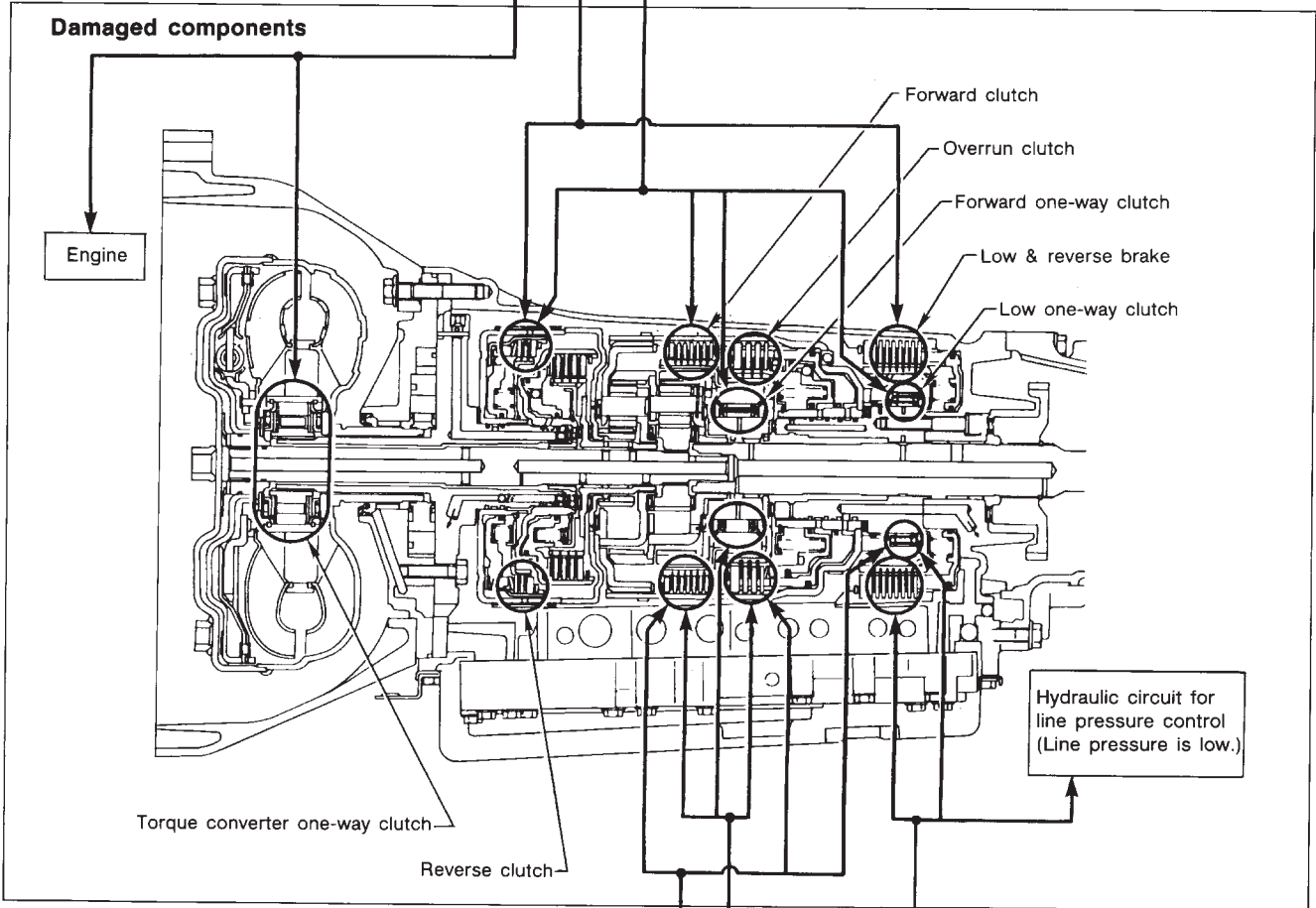
- Poor acceleration during starts. .... One-way clutch seizure in torque converter

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Stall Test (Cont'd)

Selector lever position	Judgement		
	L	O	H
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.



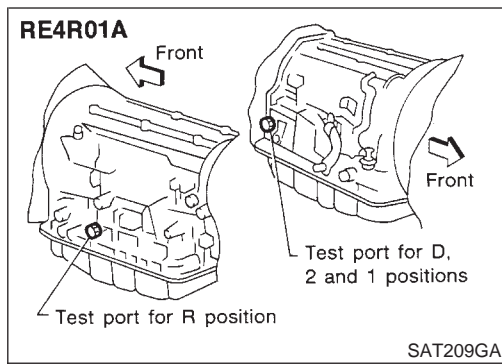
D	H	H	H	O
2	H	H	H	O
1	O	H	H	O
R	O	O	H	O
Selector lever position	Judgement			

GI  
 MA  
 EM  
 LC  
 EC  
 FE  
**AT**  
 TF  
 PD  
 AX  
 SU  
 BR  
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SAT392H

# TROUBLE DIAGNOSIS — BASIC INSPECTION

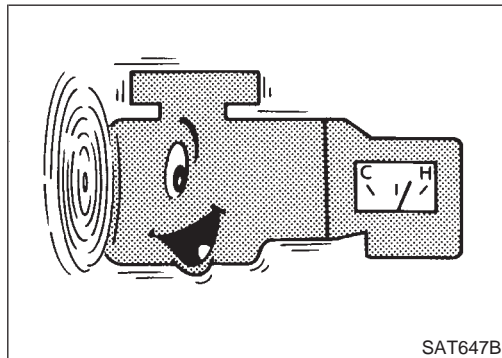
## Line Pressure Test



## Line Pressure Test

NBAT0023

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

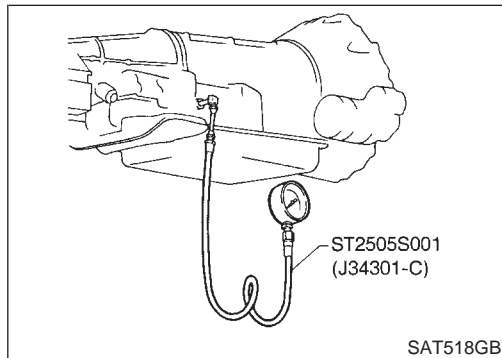


## LINE PRESSURE TEST PROCEDURE

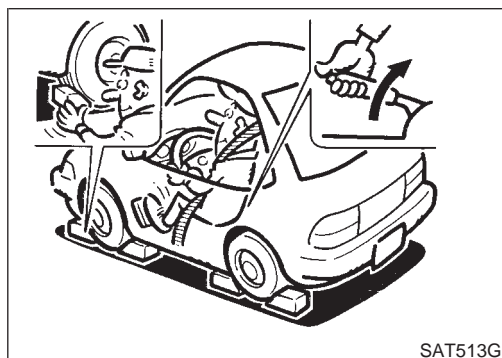
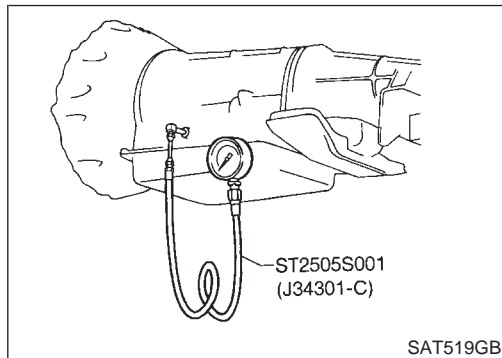
NBAT0023S01

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

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



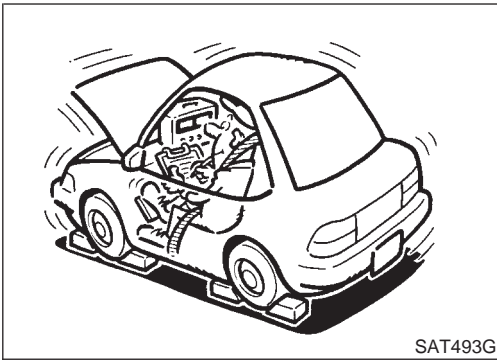
3. Install pressure gauge to corresponding line pressure port.



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

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Line Pressure Test (Cont'd)



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

**Line pressure:**  
Refer to SDS, AT-356.

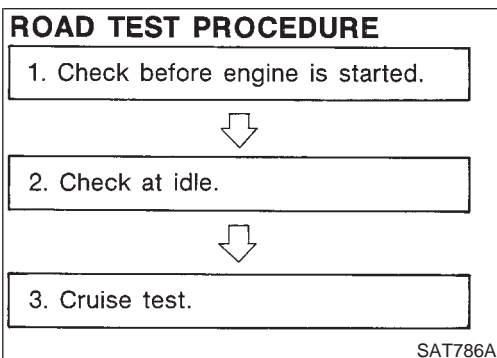
GI  
MA  
EM  
LC

## JUDGEMENT OF LINE PRESSURE TEST

NBAT0023S02

Judgement	Suspected parts
At idle	Line pressure is low in all positions. <ul style="list-style-type: none"> <li>● Oil pump wear</li> <li>● Control piston damage</li> <li>● Pressure regulator valve or plug sticking</li> <li>● Spring for pressure regulator valve damaged</li> <li>● Fluid pressure leakage between oil strainer and pressure regulator valve</li> <li>● Clogged strainer</li> </ul>
	Line pressure is low in particular position. <ul style="list-style-type: none"> <li>● Fluid pressure leakage between manual valve and particular clutch</li> <li>● For example, line pressure is:                             <ul style="list-style-type: none"> <li>— Low in "R" and "1" positions, but</li> <li>— Normal in "D" and "2" positions.</li> </ul>                             Then, fluid leakage exists at or around low and reverse brake circuit. Refer to "CLUTCH AND BAND CHART", AT-17.                         </li> </ul>
	Line pressure is high. <ul style="list-style-type: none"> <li>● Mal-adjustment of throttle position sensor</li> <li>● Fluid temperature sensor damaged</li> <li>● Line pressure solenoid valve sticking</li> <li>● Short circuit of line pressure solenoid valve circuit</li> <li>● Pressure modifier valve sticking</li> <li>● Pressure regulator valve or plug sticking</li> <li>● Open in dropping resistor circuit</li> </ul>
At stall speed	Line pressure is low. <ul style="list-style-type: none"> <li>● Mal-adjustment of throttle position sensor</li> <li>● Line pressure solenoid valve sticking</li> <li>● Short circuit of line pressure solenoid valve circuit</li> <li>● Pressure regulator valve or plug sticking</li> <li>● Pressure modifier valve sticking</li> <li>● Pilot valve sticking</li> </ul>

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## Road Test DESCRIPTION

NBAT0024

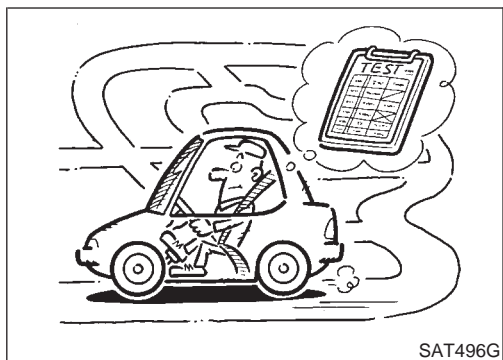
NBAT0024S01

- The purpose of the test is to determine overall performance of A/T and analyze causes of problems.
- The road test consists of the following three parts:
  1. Check before engine is started
  2. Check at idle
  3. Cruise test

SC  
EL  
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# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)



- 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 - AT-50 and AT-215 - AT-257.

## 1. CHECK BEFORE ENGINE IS STARTED

NBAT0024S02

<b>1</b>	<b>CHECK O/D OFF INDICATOR LAMP</b>
<p>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.</p>	
<p>4. Turn ignition switch to "ON" position. (Do not start engine.)                  5. Does O/D OFF indicator lamp come on for about 2 seconds?</p>	
<b>Yes or No</b>	
Yes	▶ GO TO 2.
No	▶ Go to "1. O/D OFF Indicator Lamp Does Not Come On", AT-218.

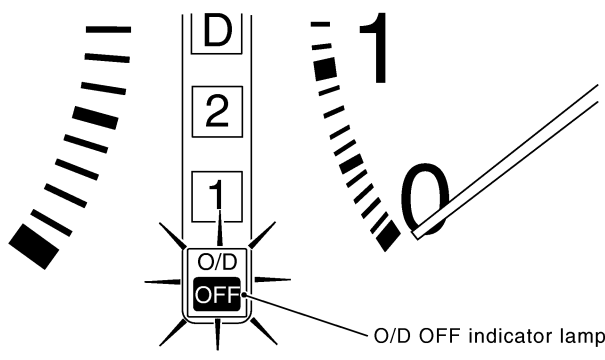
SAT967I

SAT133K



# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

<b>2</b>	<b>CHECK O/D OFF INDICATOR LAMP</b>	
Does O/D OFF indicator lamp flicker for about 8 seconds?		
 <p style="text-align: right; margin-right: 50px;">O/D OFF indicator lamp</p> <p style="text-align: right;">SAT133K</p>		
<b>Yes or No</b>		
Yes	▶	Perform self-diagnosis. Refer to TCM SELF-DIAGNOSIS PROCEDURE (No Tools), AT-46.
No	▶	GO TO 3.

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 EL  
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<b>3</b>	<b>CHECK NG ITEM</b>	
1. Turn ignition switch to "OFF" position. 2. Perform self-diagnosis and note NG items. Refer to TCM SELF-DIAGNOSIS PROCEDURE (No Tools), AT-46.		
▶ Go to "2. Check at idle", AT-66.		

# TROUBLE DIAGNOSIS — BASIC INSPECTION

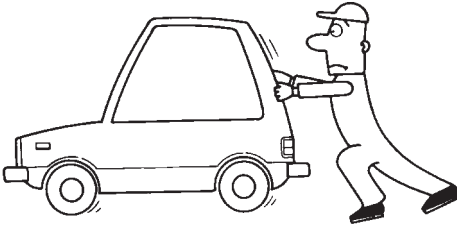
Road Test (Cont'd)

## 2. CHECK AT IDLE

=NBAT0024S03

<b>1</b>	<b>CHECK ENGINE START</b>	
<ol style="list-style-type: none"> <li>1. Park vehicle on flat surface.</li> <li>2. Turn ignition switch to "OFF" position.</li> <li>3. Move selector lever to "P" or "N" position.</li> <li>4. Turn ignition switch to start position.</li> <li>5. Is engine started?</li> </ol>		
<b>Yes or No</b>		
Yes	▶	GO TO 2.
No	▶	Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-221.

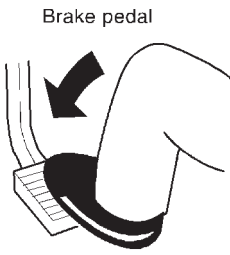
<b>2</b>	<b>CHECK ENGINE START</b>	
<ol style="list-style-type: none"> <li>1. Turn ignition switch to "OFF" position.</li> <li>2. Move selector lever to "D", "1", "2" or "R" position.</li> <li>3. Turn ignition switch to start position.</li> <li>4. Is engine started?</li> </ol>		
<b>Yes or No</b>		
Yes	▶	Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-221.
No	▶	GO TO 3.

<b>3</b>	<b>CHECK VEHICLE MOVE</b>	
<ol style="list-style-type: none"> <li>1. Turn ignition switch to "OFF" position.</li> <li>2. Move selector lever to "P" position.</li> <li>3. Release parking brake.</li> <li>4. Push vehicle forward or backward.</li> <li>5. Does vehicle move when it is pushed forward or backward?</li> </ol>		
		
SAT796A		
<b>Yes or No</b>		
Yes	▶	Go to "3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed", AT-222.
No	▶	GO TO 4.

<b>4</b>	<b>CHECK VEHICLE MOVE</b>	
<ol style="list-style-type: none"> <li>1. Apply parking brake.</li> <li>2. Move selector lever to "N" position.</li> <li>3. Turn ignition switch to "START" position and start engine.</li> <li>4. Release parking brake.</li> <li>5. Does vehicle move forward or backward?</li> </ol>		
<b>Yes or No</b>		
Yes	▶	Go to "4. In "N" Position, Vehicle Moves", AT-223.
No	▶	GO TO 5.

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

<b>5</b>	<b>CHECK SHIFT SHOCK</b>	
1. Apply foot brake. 2. Move selector lever to "R" position. 3. Is there large shock when changing from "N" to "R" position?		
		
SAT082J		
<b>Yes or No</b>		
Yes	▶	Go to "5. Large Shock. "N" → "R" Position", AT-225.
No	▶	GO TO 6.

GI  
MA  
EM  
LC  
EC  
FE

**AT**

<b>6</b>	<b>CHECK VEHICLE MOVE</b>	
1. Release foot brake for several seconds. 2. Does vehicle creep backward when foot brake is released?		
<b>Yes or No</b>		
Yes	▶	GO TO 7.
No	▶	Go to "6. Vehicle Does Not Creep Backward In "R" Position", AT-227.

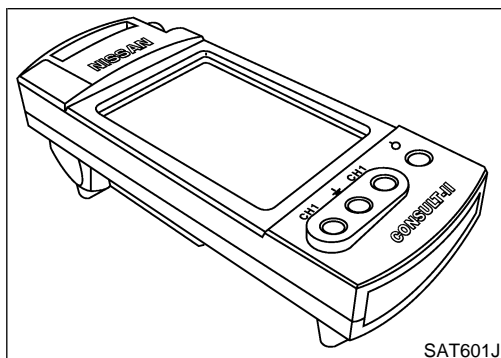
TF  
PD  
AX

<b>7</b>	<b>CHECK VEHICLE MOVE</b>	
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?		
<b>Yes or No</b>		
Yes	▶	Go to "3. Cruise test", AT-67.
No	▶	Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position", AT-230.

SU  
BR  
ST  
RS

BT

HA



SAT601J

## 3. CRUISE TEST

- Check all items listed in Parts 1 through 3.

NBAT0024S04

### With CONSULT-II

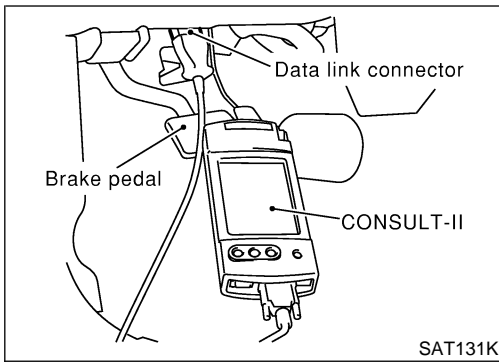
- Using CONSULT-II, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per "Shift Schedule".

NBAT0024S0401

SC  
EL  
IDX

# TROUBLE DIAGNOSIS — BASIC INSPECTION

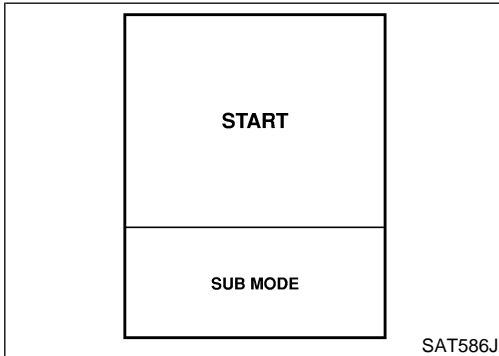
Road Test (Cont'd)



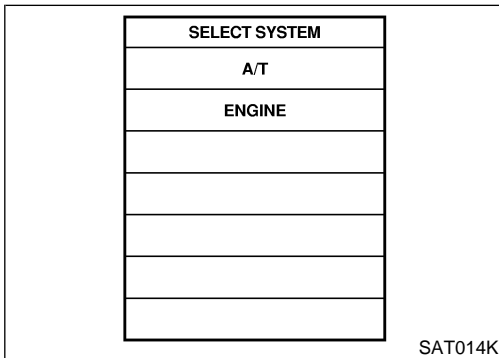
## CONSULT-II Setting Procedure

NBAT0024S0402

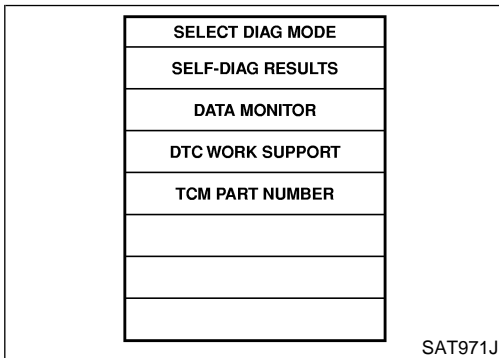
1. Turn ignition switch "OFF".
2. Connect CONSULT-II to data link connector, which is located in instrument lower panel on driver side.



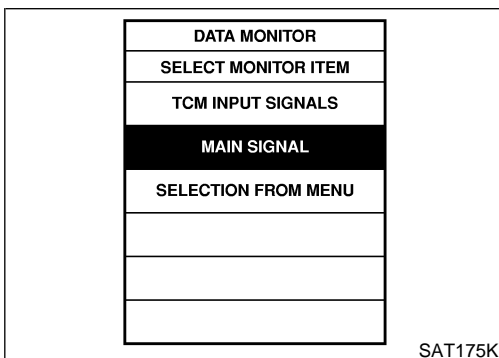
3. Turn ignition switch "ON".
4. Touch "START".



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".

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

SET RECORDING CONDITION		
AUTO TRIG		
MANU TRIG		
TRIGGER POINT		
<<	0% 20% 40% 60% 80% 100%	>>
Recording Speed		
<<	MIN MAX	>>
/64 /32 /16 /8 /4 /2 FULL		

SAT973J

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

GI

MA

EM

LC

DATA MONITOR	
MONITOR	NO DTC
ENGINE SPEED	XXX rpm
GEAR	XXX
SLCT LVR POSI	N/P
VEHICLE SPEED	XXX km/h
THROTTLE POSI	XXX
LINE PRES DTY	XX%
TCC S/V DUTY	XX%
SHIFT S/V A	XX
SHIFT S/V B	XX

SAT134K

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

EC

FE

AT

DATA MONITOR		
Recording Data	X%	DTC
		DETECTED
ENGINE SPEED	XXX rpm	
GEAR	XXX	
SLCT LVR POSI	N/P	
VEHICLE SPEED	XXX km/h	
THROTTLE POSI	XXX	
LINE PRES DTY	XX%	
TCC S/V DUTY	XX%	
SHIFT S/V A	XX	
SHIFT S/V B	XX	

SAT135K

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

PD

AX

SU

BR

REAL-TIME DIAG	
ENG SPEED SIG	

SAT987J

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

ST

RS

BT

HA

STORE	
SYSTEM	SAVE REC DATA

SAT974J

SC

EL

IDX



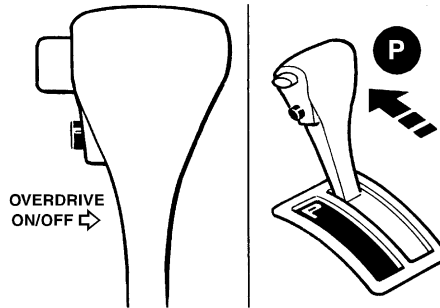
## Cruise Test — Part 1

=NBAT0024S0404

<b>1</b>	<b>CHECK STARTING GEAR (D<sub>1</sub>) POSITION</b>
----------	---

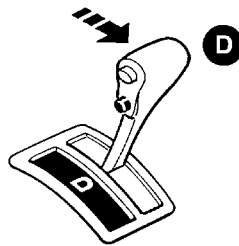
GI  
MA  
EM  
LC  
EC  
FE  
**AT**  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

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.



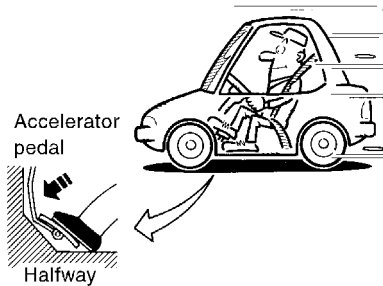
SAT001J

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



SAT952I

7. Accelerate vehicle by constantly depressing accelerator pedal halfway.



SAT953I

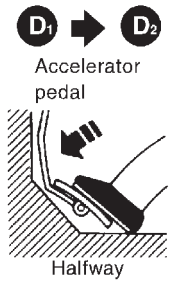
8. Does vehicle start from D<sub>1</sub>?  
 **Read gear position.**

Yes or No

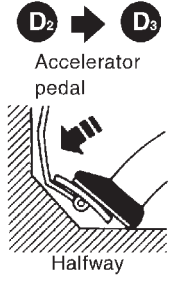
Yes	▶	GO TO 2.
No	▶	Go to "8. Vehicle Cannot Be Started From D <sub>1</sub> ", AT-233.

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

<b>2</b>	<b>CHECK SHIFT UP (D<sub>1</sub> TO D<sub>2</sub>)</b>	
Does A/T shift from D <sub>1</sub> to D <sub>2</sub> at the specified speed? <input type="checkbox"/> <b>Read gear position, throttle opening and vehicle speed.</b> Specified speed when shifting from D <sub>1</sub> to D <sub>2</sub> : Refer to Shift schedule, AT-356.		
		
<b>Yes or No</b>		
Yes	▶	GO TO 3.
No	▶	Go to "9. A/T Does Not Shift: D <sub>1</sub> → D <sub>2</sub> or Does Not Kickdown: D <sub>4</sub> → D <sub>2</sub> ", AT-236.

SAT954I

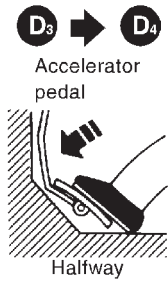
<b>3</b>	<b>CHECK SHIFT UP (D<sub>2</sub> TO D<sub>3</sub>)</b>	
Does A/T shift from D <sub>2</sub> to D <sub>3</sub> at the specified speed? <input type="checkbox"/> <b>Read gear position, throttle opening and vehicle speed.</b> Specified speed when shifting from D <sub>2</sub> to D <sub>3</sub> : Refer to Shift schedule, AT-356.		
		
<b>Yes or No</b>		
Yes	▶	GO TO 4.
No	▶	Go to "10. A/T Does Not Shift: D <sub>2</sub> → D <sub>3</sub> ", AT-239.

SAT955I



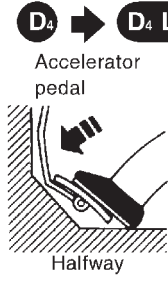
# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

<b>4</b>	<b>CHECK SHIFT UP (D<sub>3</sub> TO D<sub>4</sub>)</b>	
Does A/T shift from D <sub>3</sub> to D <sub>4</sub> at the specified speed? <input type="checkbox"/> <b>Read gear position, throttle opening and vehicle speed.</b> <b>Specified speed when shifting from D<sub>3</sub> to D<sub>4</sub>:</b> <b>Refer to Shift schedule, AT-356.</b>		
		
<b>Yes or No</b>		
Yes	▶	GO TO 5.
No	▶	Go to "11. A/T Does Not Shift: D <sub>3</sub> → D <sub>4</sub> ", AT-242.

GI  
 MA  
 EM  
 LC  
 EC  
 FE

AT

<b>5</b>	<b>CHECK LOCK-UP (D<sub>4</sub> TO D<sub>4</sub> L/U)</b>	
Does A/T perform lock-up at the specified speed? <input type="checkbox"/> <b>Read vehicle speed, throttle position when lock-up duty becomes 94%.</b> <b>Specified speed when lock-up occurs:</b> <b>Refer to Shift schedule, AT-356.</b>		
		
<b>Yes or No</b>		
Yes	▶	GO TO 6.
No	▶	Go to "12. A/T Does Not Perform Lock-up", AT-245.

TF  
 PD  
 AX  
 SU  
 BR  
 ST  
 RS

<b>6</b>	<b>CHECK HOLD LOCK-UP</b>	
Does A/T hold lock-up condition for more than 30 seconds? <p style="text-align: center;"><b>Yes or No</b></p>		
Yes	▶	GO TO 7.
No	▶	Go to "13. A/T Does Not Hold Lock-up Condition", AT-247.

BT  
 HA  
 SC  
 EL  
 IDX

# TROUBLE DIAGNOSIS — BASIC INSPECTION

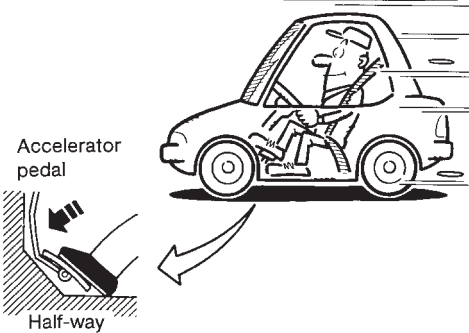
Road Test (Cont'd)

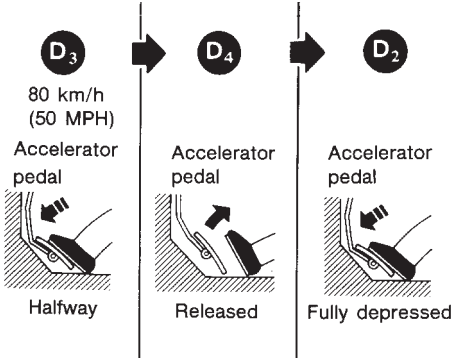
<b>7</b>	<b>CHECK LOCK-UP OFF (D<sub>4</sub> L/U TO D<sub>4</sub>)</b>	
<p>1. Release accelerator pedal. 2. Is lock-up released when accelerator pedal is released?</p> <div style="text-align: center;"> <p style="text-align: center;">Released      Lightly applied</p> </div> <p style="text-align: right;">SAT958I</p>		
<b>Yes or No</b>		
Yes	▶	GO TO 8.
No	▶	Go to "14. Lock-up Is Not Released", AT-249.

<b>8</b>	<b>CHECK SHIFT DOWN (D<sub>4</sub> TO D<sub>3</sub>)</b>	
<p>1. Decelerate vehicle by applying foot brake lightly. 2. Does engine speed return to idle smoothly when A/T is shifted from D<sub>4</sub> to D<sub>3</sub>?</p> <p> <b>Read gear position and engine speed.</b></p> <div style="text-align: center;"> <p style="text-align: center;">Released      Lightly applied</p> </div> <p style="text-align: right;">SAT959I</p>		
<b>Yes or No</b>		
Yes	▶	1. Stop vehicle. 2. Go to "Cruise test — Part 2", AT-75.
No	▶	Go to "15. Engine Speed Does Not Return To Idle (Light Braking D <sub>4</sub> → D <sub>3</sub> )", AT-250.

## Cruise Test — Part 2

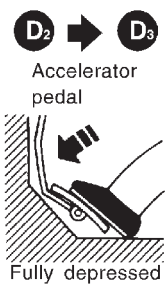
=NBAT0024S0405

<b>1</b>	<b>CHECK STARTING GEAR (D<sub>1</sub>) POSITION</b>	<ol style="list-style-type: none"> <li>1. Confirm overdrive control switch is in "ON" position.</li> <li>2. Confirm selector lever is in "D" position.</li> <li>3. Accelerate vehicle by half throttle again.</li> <li>4. Does vehicle start from D<sub>1</sub>?</li> </ol> <p> <b>Read gear position.</b></p> <div style="text-align: center;">  <p style="margin-top: 10px;"><b>Yes or No</b></p> </div>	GI MA EM LC EC FE <b>AT</b>
Yes		▶ GO TO 2.	
No		▶ Go to "16. Vehicle Does Not Start From D <sub>1</sub> ", AT-252.	TF

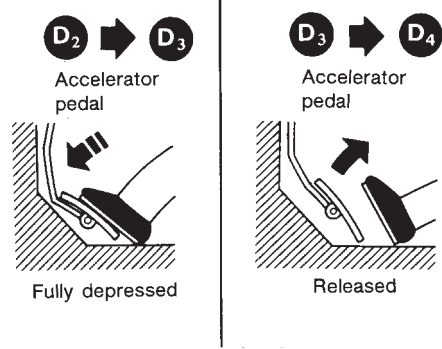
<b>2</b>	<b>CHECK SHIFT UP AND SHIFT DOWN (D<sub>3</sub> TO D<sub>4</sub> TO D<sub>2</sub>)</b>	<ol style="list-style-type: none"> <li>1. Accelerate vehicle to 80 km/h (50 MPH) as shown in illustration.</li> <li>2. Release accelerator pedal and then quickly depress it fully.</li> <li>3. Does A/T shift from D<sub>4</sub> to D<sub>2</sub> as soon as accelerator pedal is depressed fully?</li> </ol> <p> <b>Read gear position and throttle position.</b></p> <div style="text-align: center;">  <p style="margin-top: 10px;"><b>Yes or No</b></p> </div>	PD AX SU BR ST RS <b>BT</b>
Yes		▶ GO TO 3.	
No		▶ Go to "9. A/T Does Not Shift: D <sub>3</sub> → D <sub>4</sub> Or Does Not Kickdown: D <sub>4</sub> → D <sub>2</sub> ", AT-236.	HA

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

<b>3</b>	<b>CHECK SHIFT UP (D<sub>2</sub> TO D<sub>3</sub>)</b>		
Does A/T shift from D <sub>2</sub> to D <sub>3</sub> at the specified speed? <input type="checkbox"/> <b>Read gear position, throttle position and vehicle speed.</b> Specified speed when shifting from D <sub>2</sub> to D <sub>3</sub> : Refer to Shift schedule, AT-356.			
			
<b>Yes or No</b>			
Yes	▶	GO TO 4.	
No	▶	Go to "10. A/T Does Not Shift: D <sub>2</sub> → D <sub>3</sub> ", AT-239.	

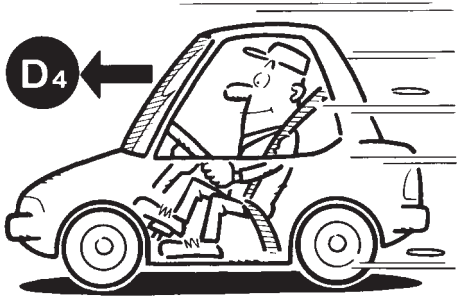
SAT960I

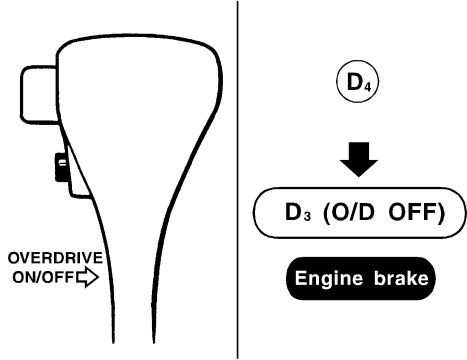
<b>4</b>	<b>CHECK SHIFT UP (D<sub>3</sub> TO D<sub>4</sub>) AND ENGINE BRAKE</b>		
Release accelerator pedal after shifting from D <sub>2</sub> to D <sub>3</sub> . Does A/T shift from D <sub>3</sub> to D <sub>4</sub> and does vehicle decelerate by engine brake? <input type="checkbox"/> <b>Read gear position, throttle position and vehicle speed.</b>			
			
<b>Yes or No</b>			
Yes	▶	1. Stop vehicle. 2. Go to "Cruise test — Part 3", AT-77.	
No	▶	Go to "11. A/T Does Not Shift: D <sub>3</sub> → D <sub>4</sub> ", AT-242.	

SAT405H

## Cruise Test — Part 3

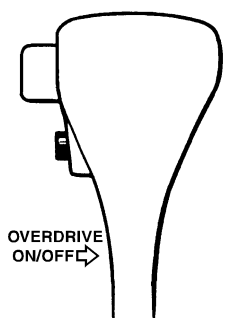
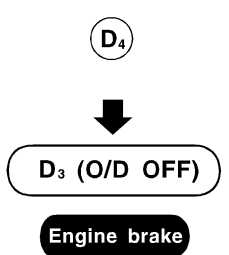
=NBAT0024S0406

<b>1</b>	<b>VEHICLE SPEED D<sub>4</sub> POSITION</b>	<ol style="list-style-type: none"> <li>1. Confirm overdrive control switch is in "ON" position.</li> <li>2. Confirm selector lever is in "D" position.</li> <li>3. Accelerate vehicle using half-throttle to D<sub>4</sub>.</li> </ol> <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: right;">SAT812A</p>	GI MA EM LC EC FE
▶ GO TO 2.			AT

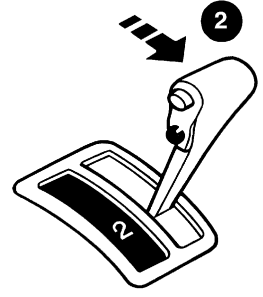
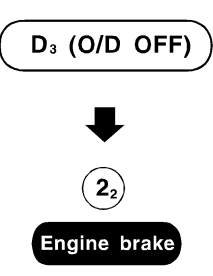
<b>2</b>	<b>CHECK SHIFT DOWN (D<sub>4</sub> TO D<sub>3</sub>)</b>	<ol style="list-style-type: none"> <li>1. Release accelerator pedal.</li> <li>2. Set overdrive control switch to "OFF" position while driving in D<sub>4</sub>.</li> <li>3. Does A/T shift from D<sub>4</sub> to D<sub>3</sub> (O/D OFF)?</li> </ol> <p><input type="checkbox"/> Read gear position and vehicle speed.</p> <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: center;">Yes or No</p>	TF PD AX SU BR ST RS
Yes	▶	GO TO 3.	
No	▶	Go to "17. A/T Does Not Shift: D <sub>4</sub> → D <sub>3</sub> , When Overdrive Control Switch "ON" → "OFF", AT-253.	BT HA SC EL IDX

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

3	<b>CHECK ENGINE BRAKE</b>		
Does vehicle decelerate by engine brake?			
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>			
Yes or No			
Yes	▶	GO TO 4.	
No	▶	Go to "15. Engine Speed Does Not Return To Idle (Light Braking D <sub>4</sub> → D <sub>3</sub> )", AT-250.	

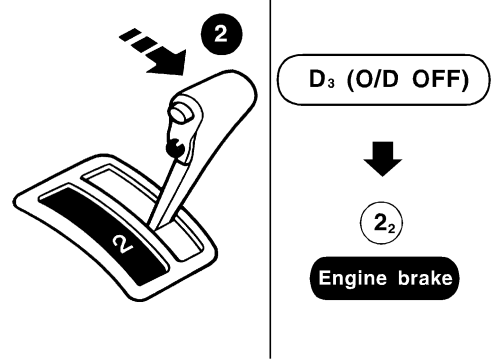
SAT999IA

4	<b>CHECK SHIFT DOWN (D<sub>3</sub> TO D<sub>2</sub>)</b>		
1. Move selector lever from "D" to "2" position while driving in D <sub>3</sub> (O/D OFF). 2. Does A/T shift from D <sub>3</sub> (O/D OFF) to 2 <sub>2</sub> ? (📖) <b>Read gear position.</b>			
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>			
Yes or No			
Yes	▶	GO TO 5.	
No	▶	Go to "18. A/T Does Not Shift: D <sub>3</sub> → D <sub>2</sub> , When Selector Lever "D" → "2" Position", AT-254.	

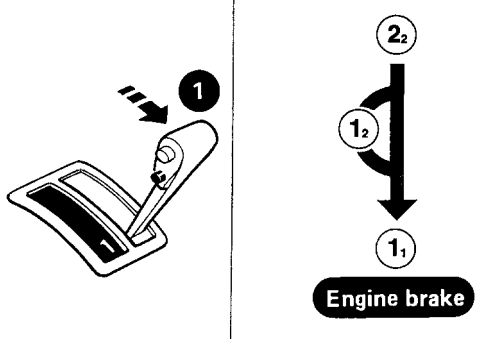
SAT791GB

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

<b>5</b>	<b>CHECK ENGINE BRAKE</b>
Does vehicle decelerate by engine brake?	
	
SAT791GB	
Yes or No	
Yes	▶ GO TO 6.
No	▶ Go to "15. Engine Speed Does Not Return To Idle (Light Braking D <sub>4</sub> → D <sub>3</sub> )", AT-250.

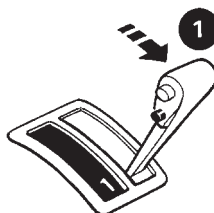
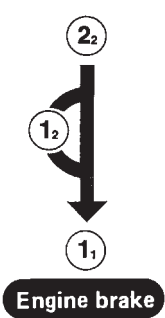
GI  
MA  
EM  
LC  
EC  
FE

<b>6</b>	<b>CHECK SHIFT DOWN (2<sub>2</sub> TO 1<sub>1</sub>)</b>
1. Move selector lever from "2" to "1" position while driving in 2 <sub>2</sub> . 2. Does A/T shift from 2 <sub>2</sub> to 1 <sub>1</sub> position?	
	
SAT778B	
Yes or No	
Yes	▶ GO TO 7.
No	▶ Go to "19. A/T Does Not Shift: 2 <sub>2</sub> → 1 <sub>1</sub> , When Selector lever "2" → "1" Position", AT-255.

AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

<b>7</b>	<b>CHECK ENGINE BRAKE</b>	
Does vehicle decelerate by engine brake?		
<div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p style="text-align: center; margin-top: 10px;">Yes or No</p>		
SAT778B		
Yes	▶	<ol style="list-style-type: none"> <li>1. Stop vehicle.</li> <li>2. Perform self-diagnosis. Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.</li> </ol>
No	▶	Go to “20. Vehicle Does Not Decelerate By Engine Brake”, AT-256.



# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart

## Symptom Chart

NBAT0233

Numbers are arranged in order of inspection.

Perform inspections starting with number one and work up.

Items	Symptom	Condition	Diagnostic Item	Reference Page	
No Lock-up Engagement/TCC Inoperative	Torque converter is not locked up.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-167	GI
			2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-111, 197	MA
			3. Park/neutral position (PNP) switch adjustment	AT-276	EM
			4. Engine speed signal	AT-116	LC
			5. A/T fluid temperature sensor	AT-105	EC
			6. Line pressure test	AT-62	FE
			7. Torque converter clutch solenoid valve	AT-148	AT
			8. Control valve assembly	AT-273	
		OFF vehicle	9. Torque converter	AT-286	
	Torque converter clutch piston slip.	ON vehicle	1. Fluid level	AT-59	TF
			2. Throttle position sensor (Adjustment)	EC-167	
			3. Line pressure test	AT-62	PD
			4. Torque converter clutch solenoid valve	AT-148	AX
			5. Line pressure solenoid valve	AT-162	
			6. Control valve assembly	AT-273	SU
			OFF vehicle	7. Torque converter	AT-286
	Lock-up point is extremely high or low. AT-245	ON vehicle	1. Throttle position sensor (Adjustment)	EC-167	ST
			2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-111, 197	
			3. Torque converter clutch solenoid valve	AT-148	RS
			4. Control valve assembly	AT-273	BT
	Shift Shock	ON vehicle	1. Engine idling rpm	EC-423	HA
2. Throttle position sensor (Adjustment)			EC-167	SC	
3. Line pressure test			AT-62		
4. A/T fluid temperature sensor			AT-105	EL	
5. Engine speed signal			AT-116		
6. Line pressure solenoid valve			AT-162	EL	
7. Control valve assembly			AT-273		
8. Accumulator N-D			AT-273	EL	
		OFF vehicle	9. Turbine revolution sensor	EC-360	
			10. Forward clutch	AT-320	IDX

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
Shift Shock	Too sharp a shock in change from D <sub>1</sub> to D <sub>2</sub> .	ON vehicle	1. Throttle position sensor (Adjustment)	EC-167
			2. Line pressure test	AT-62
			3. Accumulator servo release	AT-273
			4. Control valve assembly	AT-273
			5. A/T fluid temperature sensor	AT-105
		OFF vehicle	6. Brake band	AT-333
	Too sharp a shock in change from D <sub>2</sub> to D <sub>3</sub> .	ON vehicle	1. Throttle position sensor (Adjustment)	EC-167
			2. Line pressure test	AT-62
			3. Control valve assembly	AT-273
		OFF vehicle	4. High clutch	AT-317
			5. Brake band	AT-333
	Too sharp a shock in change from D <sub>3</sub> to D <sub>4</sub> .	ON vehicle	1. Throttle position sensor (Adjustment)	EC-167
			2. Line pressure test	AT-62
			3. Control valve assembly	AT-273
		OFF vehicle	4. Brake band	AT-333
			5. Overrun clutch	AT-320
Gear change shock felt during deceleration by releasing accelerator pedal.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-167	
		2. Line pressure test	AT-62	
		3. Overrun clutch solenoid valve	AT-185	
		4. Control valve assembly	AT-273	
Large shock changing from 1 <sub>2</sub> to 1 <sub>1</sub> in 1 position.	ON vehicle	1. Control valve assembly	AT-273	
	ON vehicle	2. Low & reverse brake	AT-324	
Improper Shift Timing	Too high a gear change point from D <sub>1</sub> to D <sub>2</sub> , from D <sub>2</sub> to D <sub>3</sub> , from D <sub>3</sub> to D <sub>4</sub> . AT-236, 239, 242	ON vehicle	1. Throttle position sensor (Adjustment)	EC-167
			2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-111, 197
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172
	Gear change directly from D <sub>1</sub> to D <sub>3</sub> occurs.	ON vehicle	1. Fluid level	AT-59
		OFF vehicle	2. Accumulator servo release	AT-273
	Too high a change point from D <sub>4</sub> to D <sub>3</sub> , from D <sub>3</sub> to D <sub>2</sub> , from D <sub>2</sub> to D <sub>1</sub> .	ON vehicle	3. Brake band	AT-333
			1. Throttle position sensor (Adjustment)	EC-167
	Kickdown does not operate when depressing pedal in D <sub>4</sub> within kickdown vehicle speed.	ON vehicle	2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-111, 197
			1. Throttle position sensor (Adjustment)	EC-167
			2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-111, 197
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*Symptom Chart (Cont'd)*

Items	Symptom	Condition	Diagnostic Item	Reference Page	
Improper Shift Timing	Kickdown operates or engine overruns when depressing pedal in D <sub>4</sub> beyond kick-down vehicle speed limit.	ON vehicle	1. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-111, 197	GI
			2. Throttle position sensor (Adjustment)	EC-167	MA
			3. Shift solenoid valve A	AT-168	
			4. Shift solenoid valve B	AT-172	EM
	Gear change from 2 <sub>2</sub> to 2 <sub>3</sub> in 2 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276	LC
			2. Manual control linkage adjustment	AT-276	EC
No Down Shift	Failure to change gear from D <sub>4</sub> to D <sub>3</sub> .	ON vehicle	1. Fluid level	AT-59	FE
			2. Throttle position sensor (Adjustment)	EC-167	
			3. Overrun clutch solenoid valve	AT-185	<b>AT</b>
			4. Shift solenoid valve A	AT-168	
			5. Line pressure solenoid valve	AT-162	TF
			6. Control valve assembly	AT-273	
		OFF vehicle	7. Low & reverse brake	AT-324	PD
			8. Overrun clutch	AT-320	
	Failure to change gear from D <sub>3</sub> to D <sub>2</sub> or from D <sub>4</sub> to D <sub>2</sub> .	ON vehicle	1. Fluid level	AT-59	AX
			2. Throttle position sensor (Adjustment)	EC-167	
			3. Shift solenoid valve A	AT-168	SU
			4. Shift solenoid valve B	AT-172	
			5. Control valve assembly	AT-273	BR
		OFF vehicle	6. High clutch	AT-317	ST
			7. Brake band	AT-333	
	Failure to change gear from D <sub>2</sub> to D <sub>1</sub> or from D <sub>3</sub> to D <sub>1</sub> .	ON vehicle	1. Fluid level	AT-59	RS
			2. Throttle position sensor (Adjustment)	EC-167	
			3. Shift solenoid valve A	AT-168	BT
4. Shift solenoid valve B			AT-172		
5. Control valve assembly			AT-273	HA	
OFF vehicle		6. Low one-way clutch	AT-328		
		7. High clutch	AT-317	SC	
		8. Brake band	AT-333		

EL

IDX

## TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

### Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
No Down Shift	Failure to change from D <sub>3</sub> to 2 <sub>2</sub> when changing lever into 2 position. AT-250	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276
			2. Throttle position sensor (Adjustment)	EC-167
			3. Overrun clutch solenoid valve	AT-185
			4. Shift solenoid valve B	AT-172
			5. Shift solenoid valve A	AT-168
			6. Control valve assembly	AT-273
			7. Manual control linkage adjustment	AT-276
	OFF vehicle	8. Brake band	AT-333	
		9. Overrun clutch	AT-320	
	Does not change from 1 <sub>2</sub> to 1 <sub>1</sub> in 1 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276
2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR			AT-111, 197	
3. Shift solenoid valve A			AT-168	
4. Control valve assembly			AT-273	
5. Overrun clutch solenoid valve			AT-185	
OFF vehicle		6. Overrun clutch	AT-320	
		7. Low & reverse brake	AT-324	
No Up Shift	Failure to change gear from D <sub>1</sub> to D <sub>2</sub> .	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276
			2. Manual control linkage adjustment	AT-276
			3. Shift solenoid valve A	AT-168
			4. Control valve assembly	AT-273
			5. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-111, 197
		OFF vehicle	6. Brake band	AT-333
	Failure to change gear from D <sub>2</sub> to D <sub>3</sub> .	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276
			2. Manual control linkage adjustment	AT-276
			3. Shift solenoid valve B	AT-172
			4. Control valve assembly	AT-273
5. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-111, 197			
OFF vehicle	6. High clutch	AT-317		
	7. Brake band	AT-333		

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*Symptom Chart (Cont'd)*

Items	Symptom	Condition	Diagnostic Item	Reference Page		
No Up Shift	Failure to change gear from D <sub>3</sub> to D <sub>4</sub> .	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276	GI	
			2. Manual control linkage adjustment	AT-276	MA	
			3. Shift solenoid valve A	AT-168	EM	
			4. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-111, 197	EM	
			5. A/T fluid temperature sensor	AT-105	LC	
		OFF vehicle	6. Brake band	AT-333		
	A/T does not shift to D <sub>4</sub> when driving with overdrive control switch ON.		ON vehicle	1. Throttle position sensor (Adjustment)	EC-167	EC
				2. Park/neutral position (PNP) switch adjustment	AT-276	FE
				3. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-111, 197	AT
				4. Shift solenoid valve A	AT-168	TF
5. Overrun clutch solenoid valve				AT-185	PD	
6. Control valve assembly				AT-273	AX	
7. A/T fluid temperature sensor				AT-105		
8. Line pressure solenoid valve				AT-162		
			OFF vehicle	9. Brake band	AT-333	
				10. Overrun clutch	AT-320	
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-227	ON vehicle	1. Manual control linkage adjustment	AT-276	SU	
			2. Line pressure test	AT-62	BR	
			3. Line pressure solenoid valve	AT-162	ST	
			4. Control valve assembly	AT-273	RS	
			OFF vehicle	5. Reverse clutch	AT-314	BT
		6. High clutch		AT-317		
		7. Forward clutch		AT-320		
		8. Overrun clutch		AT-320		
		9. Low & reverse brake		AT-324		
		ON vehicle	1. Manual control linkage adjustment	AT-276	HA	
Vehicle will not run in D and 2 positions (but runs in 1 and R positions).	OFF vehicle	2. Low one-way clutch	AT-328	SC		

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Vehicle will not run in D, 1, 2 positions (but runs in R position). Clutch slips. Very poor acceleration. AT-230	ON vehicle	1. Fluid level	AT-59
			2. Line pressure test	AT-62
			3. Line pressure solenoid valve	AT-162
			4. Control valve assembly	AT-273
			5. Accumulator N-D	AT-273
		OFF vehicle	6. Reverse clutch	AT-314
			7. High clutch	AT-317
			8. Forward clutch	AT-320
			9. Forward one-way clutch	AT-330
			10. Low one-way clutch	AT-328
	Clutches or brakes slip somewhat in starting.	ON vehicle	1. Fluid level	AT-59
			2. Manual control linkage adjustment	AT-276
			3. Throttle position sensor (Adjustment)	EC-167
			4. Line pressure test	AT-62
			5. Line pressure solenoid valve	AT-162
			6. Control valve assembly	AT-273
			7. Accumulator N-D	AT-273
		OFF vehicle	8. Forward clutch	AT-320
			9. Reverse clutch	AT-314
			10. Low & reverse brake	AT-324
			11. Oil pump	AT-297
			12. Torque converter	AT-286
	No creep at all. AT-227, 230	ON vehicle	1. Fluid level	AT-59
			2. Line pressure test	AT-62
3. Control valve assembly			AT-273	
OFF vehicle		4. Forward clutch	AT-320	
		5. Oil pump	AT-297	
		6. Torque converter	AT-286	
Almost no shock or clutches slipping in change from D <sub>1</sub> to D <sub>2</sub> .	ON vehicle	1. Fluid level	AT-59	
		2. Throttle position sensor (Adjustment)	EC-167	
		3. Line pressure test	AT-62	
		4. Accumulator servo release	AT-273	
		5. Control valve assembly	AT-273	
	OFF vehicle	6. Brake band	AT-333	

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*Symptom Chart (Cont'd)*

Items	Symptom	Condition	Diagnostic Item	Reference Page	
Slips/Will Not Engage	Almost no shock or slipping in change from D <sub>2</sub> to D <sub>3</sub> .	ON vehicle	1. Fluid level	AT-59	GI
			2. Throttle position sensor (Adjustment)	EC-167	
			3. Line pressure test	AT-62	MA
			4. Control valve assembly	AT-273	
		OFF vehicle	5. High clutch	AT-317	EM
			6. Forward clutch	AT-320	
	Almost no shock or slipping in change from D <sub>3</sub> to D <sub>4</sub> .	ON vehicle	1. Fluid level	AT-59	LC
			2. Throttle position sensor (Adjustment)	EC-167	
			3. Line pressure test	AT-62	EC
			4. Control valve assembly	AT-273	
		OFF vehicle	5. High clutch	AT-317	FE
			6. Brake band	AT-333	<b>AT</b>
	Races extremely fast or slips in changing from D <sub>4</sub> to D <sub>3</sub> when depressing pedal.	ON vehicle	1. Fluid level	AT-59	
			2. Throttle position sensor (Adjustment)	EC-167	TF
			3. Line pressure test	AT-62	
			4. Line pressure solenoid valve	AT-162	PD
		OFF vehicle	5. Control valve assembly	AT-273	
			6. High clutch	AT-317	AX
	Races extremely fast or slips in changing from D <sub>4</sub> to D <sub>2</sub> when depressing pedal.	ON vehicle	7. Forward clutch	AT-320	
			1. Fluid level	AT-59	SU
			2. Throttle position sensor (Adjustment)	EC-167	
			3. Line pressure test	AT-62	BR
			4. Line pressure solenoid valve	AT-162	
			5. Shift solenoid valve A	AT-168	ST
OFF vehicle	6. Control valve assembly	AT-273			
	7. Brake band	AT-333	RS		
Races extremely fast or slips in changing from D <sub>3</sub> to D <sub>2</sub> when depressing pedal.	ON vehicle	8. Forward clutch	AT-320	BT	
		1. Fluid level	AT-59		
		2. Throttle position sensor (Adjustment)	EC-167	HA	
		3. Line pressure test	AT-62		
		4. Line pressure solenoid valve	AT-162	SC	
		5. Control valve assembly	AT-273		
OFF vehicle	6. A/T fluid temperature sensor	AT-105	EL		
	7. Brake band	AT-333			
	8. Forward clutch	AT-320	IDX		
			9. High clutch	AT-317	

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Races extremely fast or slips in changing from D <sub>4</sub> or D <sub>3</sub> to D <sub>1</sub> when depressing pedal.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor (Adjustment)	EC-167
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
		OFF vehicle	5. Control valve assembly	AT-273
			6. Forward clutch	AT-320
			7. Forward one-way clutch	AT-330
			8. Low one-way clutch	AT-328
	Vehicle will not run in any position.	ON vehicle	1. Fluid level	AT-59
			2. Manual control linkage adjustment	AT-276
3. Line pressure test			AT-62	
4. Line pressure solenoid valve			AT-162	
OFF vehicle		5. Oil pump	AT-297	
		6. High clutch	AT-317	
		7. Brake band	AT-333	
		8. Low & reverse brake	AT-324	
		9. Torque converter	AT-286	
		10. Parking pawl components	AT-337	
NOT USED	Engine cannot be started in P and N positions. AT-221	ON vehicle	1. Ignition switch and starter	EL-12, and SC-10
			2. Manual control linkage adjustment	AT-276
			3. Park/neutral position (PNP) switch adjustment	AT-276
	Engine starts in positions other than P and N. AT-221	ON vehicle	1. Manual control linkage adjustment	AT-276
			2. Park/neutral position (PNP) switch adjustment	AT-276
	Transmission noise in P and N positions.	ON vehicle	1. Fluid level	AT-59
			2. Line pressure test	AT-62
			3. Throttle position sensor (Adjustment)	EC-167
			4. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-111, 197
			5. Engine speed signal	AT-116
OFF vehicle		6. Oil pump	AT-297	
		7. Torque converter	AT-286	
Vehicle moves when changing into P position or parking gear does not disengage when shifted out of P position. AT-222	ON vehicle	1. Manual control linkage adjustment	AT-276	
	OFF vehicle	2. Parking pawl components	AT-337	



# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*Symptom Chart (Cont'd)*

Items	Symptom	Condition	Diagnostic Item	Reference Page	
NOT USED	Vehicle runs in N position. AT-223	ON vehicle	1. Manual control linkage adjustment	AT-276	GI
		OFF vehicle	2. Forward clutch	AT-320	MA
			3. Reverse clutch	AT-314	
			4. Overrun clutch	AT-320	
	Vehicle braked when shifting into R position.	ON vehicle	1. Fluid level	AT-59	EM
			2. Manual control linkage adjustment	AT-276	LC
			3. Line pressure test	AT-62	EC
			4. Line pressure solenoid valve	AT-162	
			5. Control valve assembly	AT-273	
		OFF vehicle	6. High clutch	AT-317	FE
			7. Brake band	AT-333	AT
			8. Forward clutch	AT-320	
			9. Overrun clutch	AT-320	
	Excessive creep.	ON vehicle	1. Engine idling rpm	EC-423	TF
	Engine stops when shifting lever into R, D, 2 and 1.	ON vehicle	1. Engine idling rpm	EC-423	PD
			2. Torque converter clutch solenoid valve	AT-148	
		3. Control valve assembly	AT-273	AX	
	OFF vehicle	4. Torque converter	AT-286		
	Vehicle braked by gear change from D <sub>1</sub> to D <sub>2</sub> .	ON vehicle	1. Fluid level	AT-59	SU
		OFF vehicle	2. Reverse clutch	AT-314	BR
			3. Low & reverse brake	AT-324	
			4. High clutch	AT-317	
			5. Low one-way clutch	AT-328	
Vehicle braked by gear change from D <sub>2</sub> to D <sub>3</sub> .	ON vehicle	1. Fluid level	AT-59	ST	
	OFF vehicle	2. Brake band	AT-333	RS	
Vehicle braked by gear change from D <sub>3</sub> to D <sub>4</sub> .	ON vehicle	1. Fluid level	AT-59	BT	
	OFF vehicle	2. Overrun clutch	AT-320	HA	
		3. Forward one-way clutch	AT-330		
		4. Reverse clutch	AT-314		

SC  
EL  
IDX

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	Maximum speed not attained. Acceleration poor.	ON vehicle	1. Fluid level	AT-59
			2. Park/neutral position (PNP) switch adjustment	AT-276
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172
			5. Control valve assembly	AT-273
		OFF vehicle	6. Reverse clutch	AT-314
			7. High clutch	AT-317
			8. Brake band	AT-333
			9. Low & reverse brake	AT-324
			10. Oil pump	AT-297
			11. Torque converter	AT-286
	Transmission noise in D, 2, 1 and R positions.	ON vehicle	1. Fluid level	AT-59
		ON vehicle	2. Torque converter	AT-286
	Engine brake does not operate in "1" position. AT-252	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-276
			2. Manual control linkage adjustment	AT-276
			3. Throttle position sensor (Adjustment)	EC-167
			4. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-111, 197
			5. Shift solenoid valve A	AT-168
			6. Control valve assembly	AT-273
			7. Overrun clutch solenoid valve	AT-185
		OFF vehicle	8. Overrun clutch	AT-320
			9. Low & reverse brake	AT-324
	Transmission overheats.	ON vehicle	1. Fluid level	AT-59
2. Engine idling rpm			EC-423	
3. Throttle position sensor (Adjustment)			EC-167	
4. Line pressure test			AT-62	
5. Line pressure solenoid valve			AT-162	
6. Control valve assembly			AT-273	
OFF vehicle		7. Oil pump	AT-297	
		8. Reverse clutch	AT-314	
		9. High clutch	AT-317	
		10. Brake band	AT-333	
		11. Forward clutch	AT-320	
		12. Overrun clutch	AT-320	
		13. Low & reverse brake	AT-324	
		14. Torque converter	AT-286	

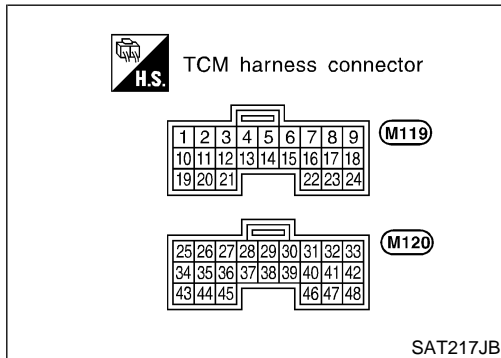
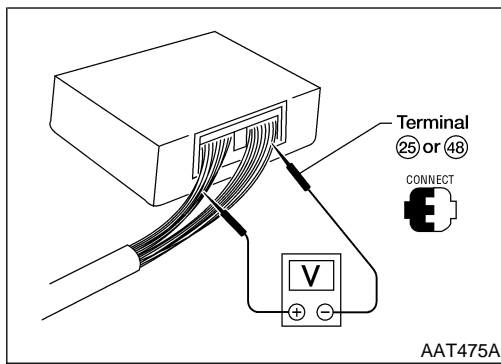
# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*Symptom Chart (Cont'd)*

Items	Symptom	Condition	Diagnostic Item	Reference Page	
NOT USED	ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	ON vehicle	1. Fluid level	AT-59	GI
		OFF vehicle	2. Reverse clutch	AT-314	MA
			3. High clutch	AT-317	EM
			4. Brake band	AT-333	LC
			5. Forward clutch	AT-320	EC
			6. Overrun clutch	AT-320	FE
			7. Low & reverse brake	AT-324	AT
	Offensive smell at fluid charging pipe.	ON vehicle	1. Fluid level	AT-59	TF
		OFF vehicle	2. Torque converter	AT-286	PD
			3. Oil pump	AT-297	AX
			4. Reverse clutch	AT-314	SU
			5. High clutch	AT-317	BR
			6. Brake band	AT-333	ST
			7. Forward clutch	AT-320	RS
			8. Overrun clutch	AT-320	BT
	Engine is stopped at R, D, 2 and 1 positions.	ON vehicle	9. Low & reverse brake	AT-324	HA
			1. Fluid level	AT-59	SC
			2. Torque converter clutch solenoid valve	AT-148	EL
			3. Shift solenoid valve B	AT-172	IDX
			4. Shift solenoid valve A	AT-168	
5. Control valve assembly	AT-273				

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

## TCM Terminals and Reference Value



## TCM Terminals and Reference Value

=NBAT0027

### PREPARATION

NBAT0027S01

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

## TCM HARNESS CONNECTOR TERMINAL LAYOUT

NBAT0027S02

### TCM INSPECTION TABLE










NBAT0027S03

(Data are reference values.)

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)	
1	GY	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	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
4	—	—	—	—	
5	—	—	—	—	
6	—	—	—	—	
7	—	—	—	—	
8	—	—	—	—	
9	—	—	—	—	
10	W/R	Power source		When turning ignition switch to "ON".	Battery voltage
				When turning ignition switch to "OFF".	0V


















# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*TCM Terminals and Reference Value (Cont'd)*

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 <sub>1</sub> " or "D <sub>4</sub> ".)	Battery voltage	GI
				When shift solenoid valve A does not operate. (When driving in "D <sub>2</sub> " or "D <sub>3</sub> ".)	0V	MA
12	L/R	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D <sub>1</sub> " or "D <sub>2</sub> ".)	Battery voltage	EM
				When shift solenoid valve B does not operate. (When driving in "D <sub>3</sub> " or "D <sub>4</sub> ".)	0V	LC
13	GY	O/D OFF indicator lamp		When setting overdrive control switch in "ON" position.	Battery voltage	EC
				When setting overdrive control switch in "OFF" position.	0V	FE
14	—	—	—	—		
15	—	—	—	—	<b>AT</b>	
16	OR/W	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine. Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.	Battery voltage	TF
				When depressing accelerator pedal after warming up engine. Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.	0V	PD
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	AX
				When releasing accelerator pedal after warming up engine.	0V	SU
18	B/Y	ASCD cruise signal		When ASCD cruise is being performed. ("CRUISE" light comes on.)	Battery voltage	BR
				When ASCD cruise is not being performed. ("CRUISE" light does not comes on.)	0V	ST
19	W/R	Power source		Same as No. 10	RS	
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage	BT
				When overrun clutch solenoid valve does not operate.	0V	HA
21	—	—	—	—	SC	
22	GY	Overdrive control switch		When setting overdrive control switch in "ON" position	Battery voltage	EL
				When setting overdrive control switch in "OFF" position	0V	IDX
23	—	—	—	—		






# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

TCM Terminals and Reference Value (Cont'd)

Terminal No.	Wire color	Item		Condition	Judgement standard (Approx.)
24	W/G	ASCD OD cut signal		When "ACCEL" set switch on ASCD cruise is released.	5 - 10V
				When "ACCEL" set switch on ASCD cruise is applied.	Less than 2V
25	B	Ground		—	0V
26	G	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
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
29	W	Revolution sensor (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
				When vehicle parks.	0V
30*2	W	(RX)	 	—	—
31*2	L	(TX)		—	—
32	P/B	Throttle position sensor (Power source)		Ignition switch "ON".	4.5 - 5.5V
			Ignition switch "OFF".	0V	
33*1	G/R	LAN		—	—
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 "N" or "P" position	 	When setting selector lever to "N" or "P" position.	Battery voltage
				When setting selector lever to other positions.	0V
37	—	—		—	—
38	W	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.

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*TCM Terminals and Reference Value (Cont'd)*

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)			
39	W/B	Engine speed signal		Refer to EC-124, "ECM INSPECTION TABLE".	—	GI MA EM	
40	W/L	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 1.0V and more than 4.5V.	LC EC	
41	P	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 - 0.7V Fully-open throttle: 4V	FE <b>AT</b>	
42	B	Throttle position sensor (Ground)		—	0V	TF	
45	G/Y	Stop lamp switch			When depressing brake pedal	Battery voltage	PD
					When releasing brake pedal	0V	
46	W	Transfer control unit		—	—	—	AX
47	R	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.5V	—	SU
				When ATF temperature is 80°C (176°F).	0.5V	—	
48	B	Ground			—	0V	BR

\*1: These terminals are connected to the ECM.

\*2: These terminals are connected to the Data link connector for CONSULT-II.

GI  
MA  
EM  
LC  
EC  
FE  
**AT**  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

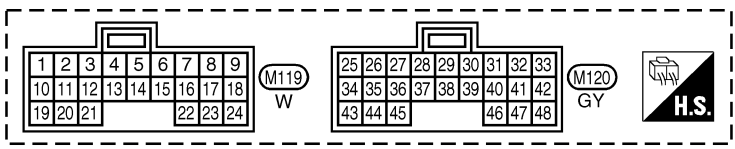
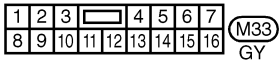
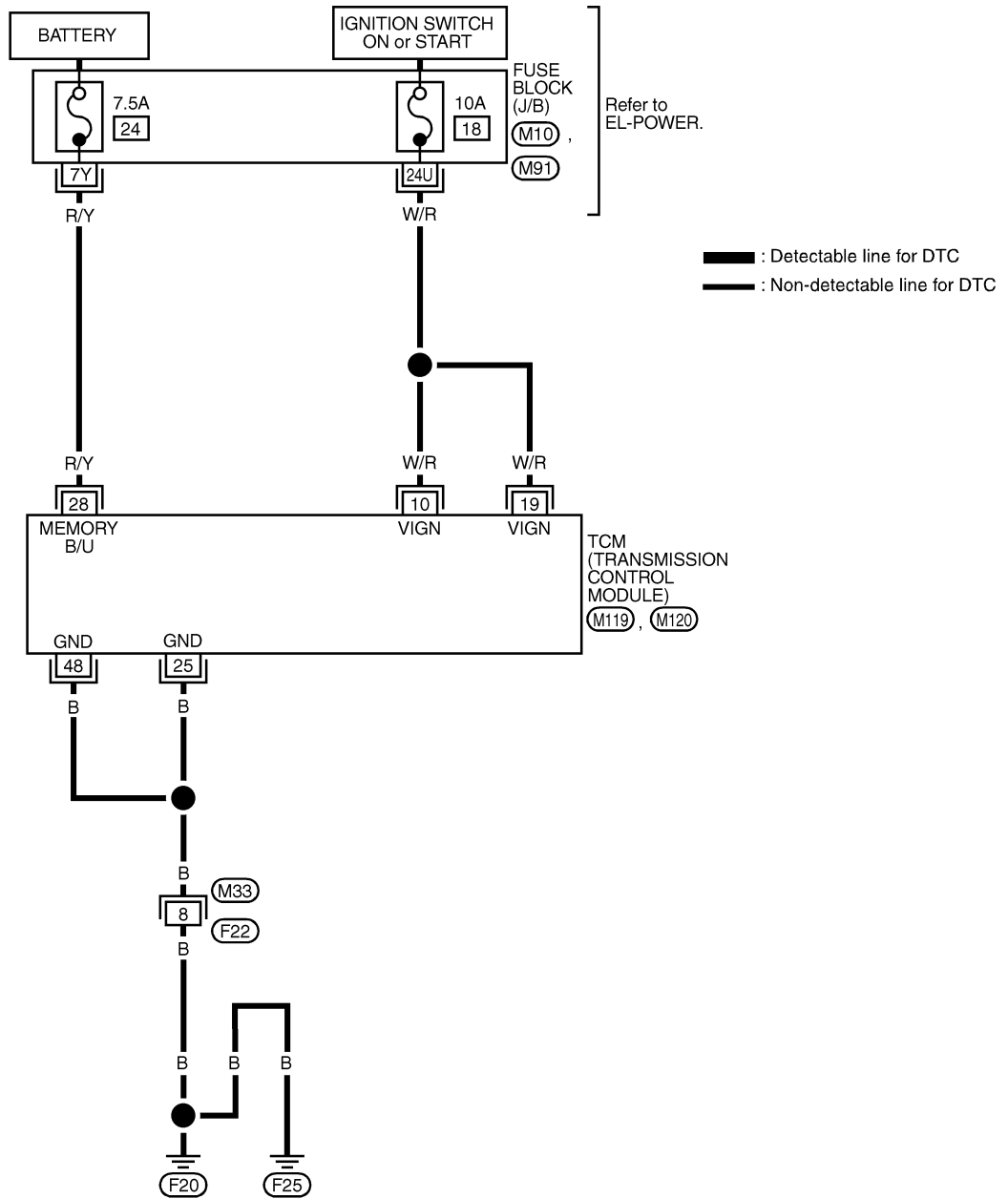
# TROUBLE DIAGNOSIS FOR POWER SUPPLY

Wiring Diagram — AT — MAIN

## Wiring Diagram — AT — MAIN

NBAT0185

AT-MAIN-01



REFER TO THE FOLLOWING.  
 (M10), (M91) - FUSE BLOCK-  
 JUNCTION BOX (J/B)

MAT907A







# TROUBLE DIAGNOSIS FOR POWER SUPPLY

Wiring Diagram — AT — MAIN (Cont'd)

## TCM TERMINALS AND REFERENCE VALUE

NBAT0185S01

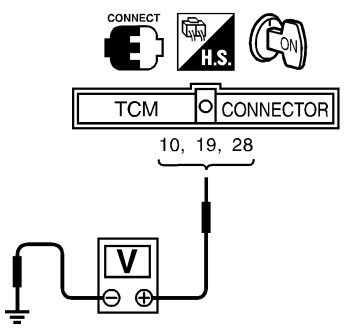
Remarks: Specification data are reference values.

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		
25	B	Ground	—	0V	
28	R/Y	Power source (Memory back-up)		When turning ignition switch to "OFF".	Battery voltage
			or 	When turning ignition switch to "ON".	Battery voltage
48	B	Ground	—	0V	

GI  
MA  
EM  
LC  
EC  
FE  
**AT**  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

## Diagnostic Procedure

NBAT0223

<b>1</b>	<b>CHECK TCM POWER SOURCE STEP 1</b>
<p>1. Turn ignition switch to ON position. (Do not start engine.)</p> <p>2. Check voltage between TCM terminals 10, 19, 28 and ground.</p> <div style="text-align: center;">  <p style="margin-left: 100px;"><b>Voltage:</b> <b>Battery voltage</b></p> </div> <p style="text-align: center; margin-top: 10px;"><b>OK or NG</b></p>	
OK	▶ GO TO 2.
NG	▶ GO TO 3.

SAT611J

# TROUBLE DIAGNOSIS FOR POWER SUPPLY

Diagnostic Procedure (Cont'd)

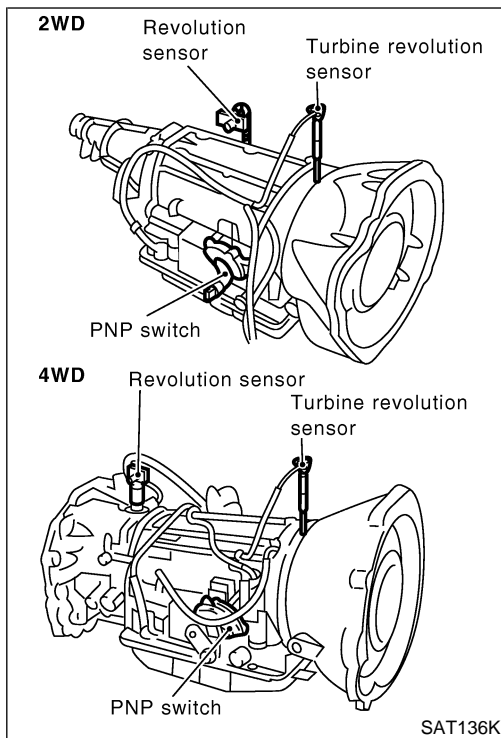
<b>2</b>	<b>CHECK TCM POWER SOURCE STEP 2</b>	
<p>1. Turn ignition switch to OFF position.                  2. Check voltage between TCM terminal 28 and ground.</p> <div style="text-align: center;"> </div> <p style="text-align: right;"><b>Voltage:</b> <b>Battery voltage</b></p> <p style="text-align: right;">SAT612JC</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 4.
NG	▶	GO TO 3.

<b>3</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p>Check the following items:</p> <ul style="list-style-type: none"> <li>● Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness)</li> <li>● Ignition switch and 10A or 7.5A fuse [No. 18 or 24, located in the fuse block (J/B)]                      Refer to EL-12, "Schematic".</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

<b>4</b>	<b>CHECK TCM GROUND CIRCUIT</b>	
<p>1. Turn ignition switch to OFF position.                  2. Disconnect TCM harness connector.                  3. Check continuity between TCM terminals 25, 48 and ground. Refer to wiring diagram — AT — MAIN.  <b>Continuity should exist.</b>                  If OK, check harness for short to ground and short to power.</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	<b>INSPECTION END</b>
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

# DTC P0705 PARK/NEUTRAL POSITION SWITCH

Description



## Description

NBAT0028

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

GI

MA

EM

LC

EC

FE

AT

TF

## TCM TERMINALS AND REFERENCE VALUE

NBAT0028S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)
26	G	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 "N" or "P" position	When setting selector lever to "N" or "P" position.	Battery voltage
			When setting selector lever to other positions.	0V

PD

AX

SU

BR

ST

RS

BT

HA

SC

## ON BOARD DIAGNOSIS LOGIC

NBAT0028S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
P0705 : PNP SW/CIRC P0705 : P0705	TCM does not receive the correct voltage signal from the switch based on the gear position.	<ul style="list-style-type: none"> <li>• Harness or connectors (The PNP switch circuit is open or shorted.)</li> <li>• PNP switch</li> </ul>

EL

IDX

# DTC P0705 PARK/NEUTRAL POSITION SWITCH

Description (Cont'd)

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
ACTIVE TEST
DTC & SRT CONFIRMATION
ECM PART NUMBER

SAT020K

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0028S01

### CAUTION:

Always drive vehicle at a safe speed.

### NOTE:

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

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

### With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
- 3) Start engine and maintain the following conditions for at least 5 consecutive seconds.

**VHCL SPEED SE: 10 km/h (6 MPH) or more**

**THRTL POS SEN: More than 1.3V**

**Selector lever: D position (OD "ON" or "OFF")**

### With GST

Follow the procedure "With CONSULT-II".

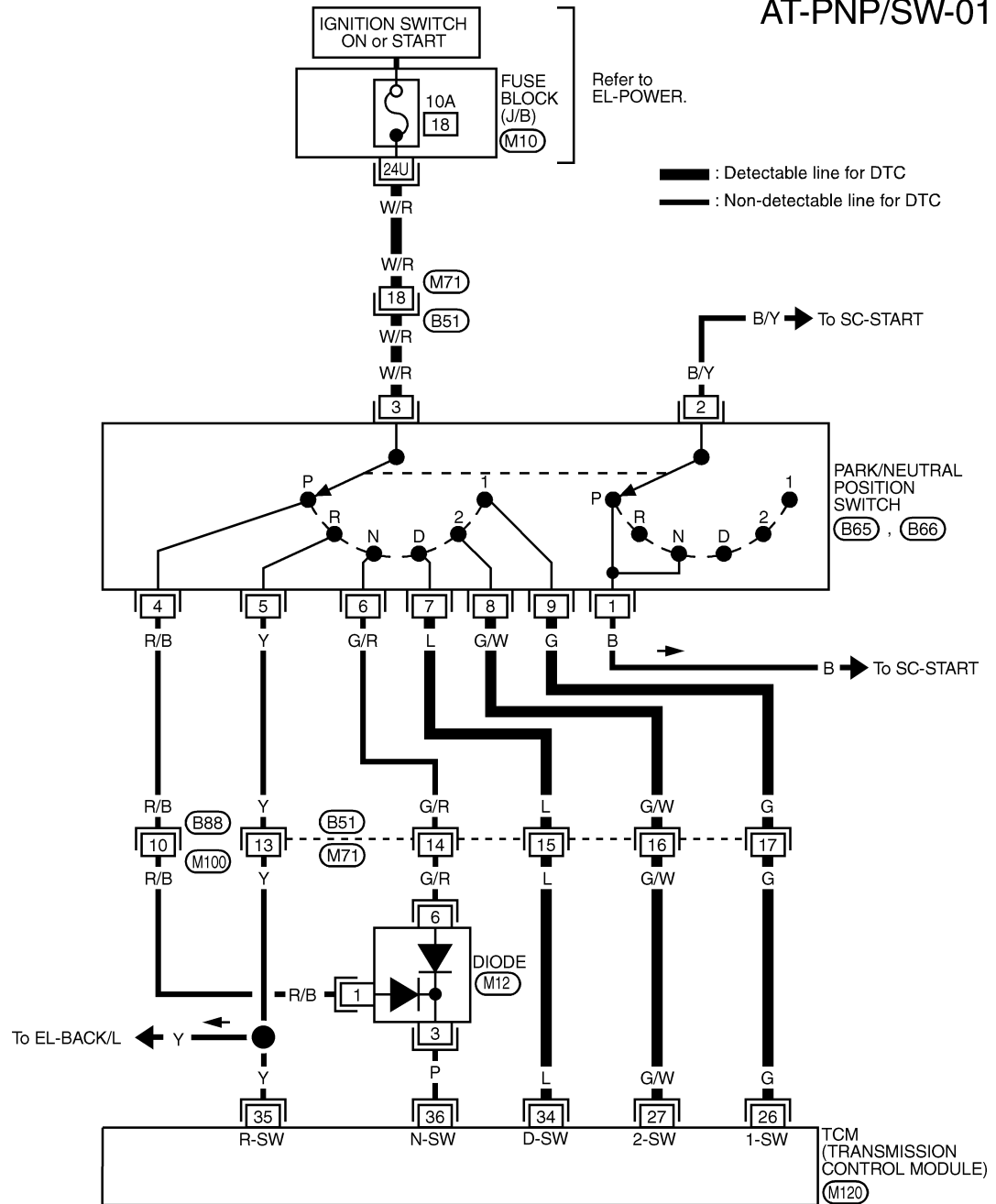
# DTC P0705 PARK/NEUTRAL POSITION SWITCH

Wiring Diagram — AT — PNP/SW

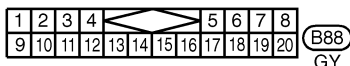
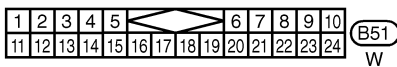
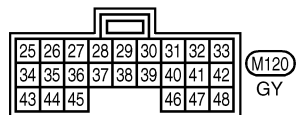
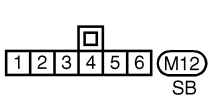
## Wiring Diagram — AT — PNP/SW

NBAT0186

### AT-PNP/SW-01



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



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK-  
 JUNCTION BOX (J/B)

GI

MA

EM

LC

EC

FE

**AT**

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL


IDX


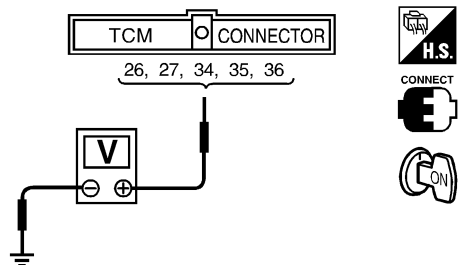
# DTC P0705 PARK/NEUTRAL POSITION SWITCH

Diagnostic Procedure

## Diagnostic Procedure

NBAT0029

<b>1</b>	<b>CHECK PNP SWITCH CIRCUIT (WITH CONSULT-II)</b>														
<p> <b>With CONSULT-II</b></p> <ol style="list-style-type: none"> <li>Turn ignition switch to "ON" position. (Do not start engine.)</li> <li>Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</li> <li>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.</li> </ol>															
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th></th> </tr> </thead> <tbody> <tr> <td>PN POSI SW</td> <td>OFF</td> </tr> <tr> <td>R POSITION SW</td> <td>OFF</td> </tr> <tr> <td>D POSITION SW</td> <td>OFF</td> </tr> <tr> <td>2 POSITION SW</td> <td>ON</td> </tr> <tr> <td>1 POSITION SW</td> <td>OFF</td> </tr> </tbody> </table>		DATA MONITOR		MONITORING		PN POSI SW	OFF	R POSITION SW	OFF	D POSITION SW	OFF	2 POSITION SW	ON	1 POSITION SW	OFF
DATA MONITOR															
MONITORING															
PN POSI SW	OFF														
R POSITION SW	OFF														
D POSITION SW	OFF														
2 POSITION SW	ON														
1 POSITION SW	OFF														
SAT643J															
<b>OK or NG</b>															
OK	▶ GO TO 4.														
NG	▶ GO TO 3.														

<b>2</b>	<b>CHECK PNP SWITCH CIRCUIT (WITHOUT CONSULT-II)</b>																																									
<p> <b>Without CONSULT-II</b></p> <ol style="list-style-type: none"> <li>Turn ignition switch to "ON" position. (Do not start engine.)</li> <li>Check voltage between TCM terminals 26, 27, 34, 35, 36 and ground while moving selector lever through each position.</li> </ol>																																										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Lever position</th> <th colspan="5">Terminals</th> </tr> <tr> <th>36</th> <th>35</th> <th>34</th> <th>27</th> <th>26</th> </tr> </thead> <tbody> <tr> <td>P, N</td> <td><b>B</b></td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>R</td> <td>0</td> <td><b>B</b></td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>D</td> <td>0</td> <td>0</td> <td><b>B</b></td> <td>0</td> <td>0</td> </tr> <tr> <td>2</td> <td>0</td> <td>0</td> <td>0</td> <td><b>B</b></td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td><b>B</b></td> </tr> </tbody> </table>		Lever position	Terminals					36	35	34	27	26	P, N	<b>B</b>	0	0	0	0	R	0	<b>B</b>	0	0	0	D	0	0	<b>B</b>	0	0	2	0	0	0	<b>B</b>	0	1	0	0	0	0	<b>B</b>
Lever position	Terminals																																									
	36	35	34	27	26																																					
P, N	<b>B</b>	0	0	0	0																																					
R	0	<b>B</b>	0	0	0																																					
D	0	0	<b>B</b>	0	0																																					
2	0	0	0	<b>B</b>	0																																					
1	0	0	0	0	<b>B</b>																																					
MTBL0205																																										
																																										
SAT517J																																										
<b>Does battery voltage exist (B) or non-existent (0)?</b>																																										
Yes	▶ GO TO 4.																																									
No	▶ GO TO 3.																																									

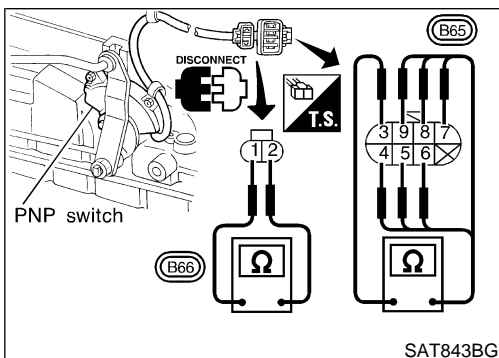
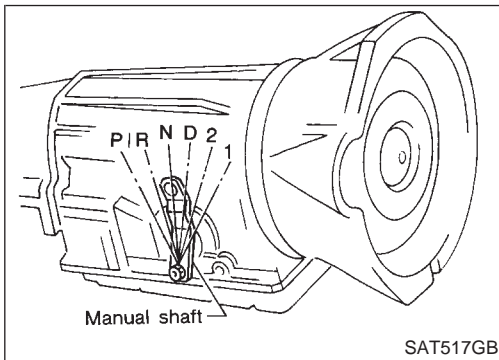
# DTC P0705 PARK/NEUTRAL POSITION SWITCH

Diagnostic Procedure (Cont'd)

<b>3</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● PNP switch Refer to "Component Inspection", AT-103.</li> <li>● Harness for short or open between ignition switch and PNP switch (Main harness)</li> <li>● Harness for short or open between PNP switch and TCM (Main harness)</li> <li>● Diode (P, N position)</li> <li>● Ignition switch and 10A fuse [No. 18, located in the fuse block (J/B)] Refer to EL-12, "Schematic".</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

<b>4</b>	<b>CHECK DTC</b>	
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-100.</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	<b>INSPECTION END</b>
NG	▶	GO TO 5.

<b>5</b>	<b>CHECK TCM INSPECTION</b>	
<p>1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	<b>INSPECTION END</b>
NG	▶	Repair or replace damaged parts.



## Component Inspection PARK/NEUTRAL POSITION SWITCH

NBAT0030

NBAT0030S02

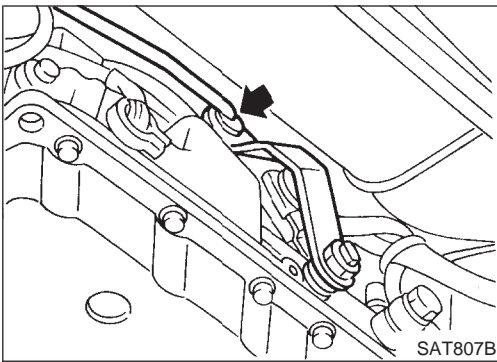
1. Check continuity between terminals 1 and 2 and between terminals 3 and 4, 5, 6, 7, 8, 9 while moving manual shaft through each position.

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	

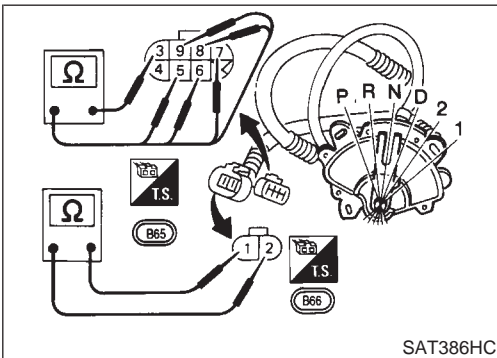
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MA  
EM  
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SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

## DTC P0705 PARK/NEUTRAL POSITION SWITCH

Component Inspection (Cont'd)



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-276.

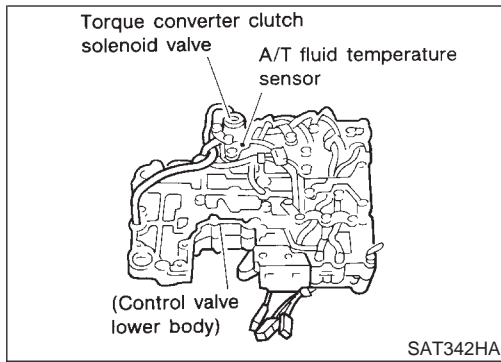


4. If NG on step 2, remove PNP switch from A/T and check continuity of PNP switch terminals. Refer to step 1.
5. If OK on step 4, adjust PNP switch. Refer to AT-276.
6. If NG on step 4, replace PNP switch.



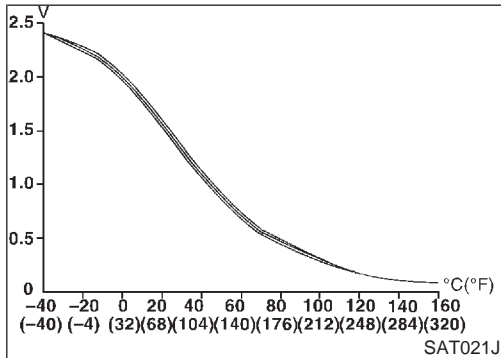
# DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Description



## Description

The A/T fluid temperature sensor detects the A/T fluid temperature and sends a signal to the TCM. NBAT0031



## CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

NBAT0031S04

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

## TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values.

NBAT0031S02

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)
42	B	Throttle position sensor (Ground)		0V
47	R	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F). When ATF temperature is 80°C (176°F).

## ON BOARD DIAGNOSIS LOGIC

NBAT0031S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
P0710 : ATF TEMP SEN/CIRC P0710 : P0710	TCM receives an excessively low or high voltage from the sensor.	<ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>A/T fluid temperature sensor</li> </ul>

GI  
MA  
EM  
LC  
EC  
FE  
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PD  
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BT  
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SC  
EL  
IDX

# DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Description (Cont'd)

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
ACTIVE TEST
DTC & SRT CONFIRMATION
ECM PART NUMBER

SAT020K

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0031S01

### CAUTION:

Always drive vehicle at a safe speed.

### NOTE:

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

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

### With CONSULT-II

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
- 2) Start engine and maintain the following conditions for at least 10 minutes (Total). (It is not necessary to maintain continuously.)

**CMPS-RPM (REF): 450 rpm or more**

**VHCL SPEED SE: 10 km/h (6 MPH) or more**

**THRTL POS SEN: More than 1.2V**

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

### With GST

Follow the procedure "With CONSULT-II".

# DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Wiring Diagram — AT — FTS

## Wiring Diagram — AT — FTS

NBAT0187

AT-FTS-01

GI

MA

EM

LC

EC

FE

**AT**

TF

PD

AX

SU

BR

ST

RS

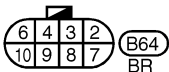
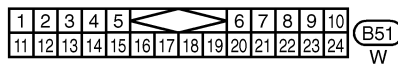
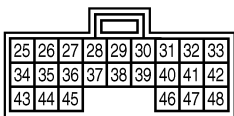
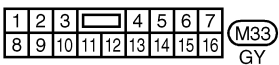
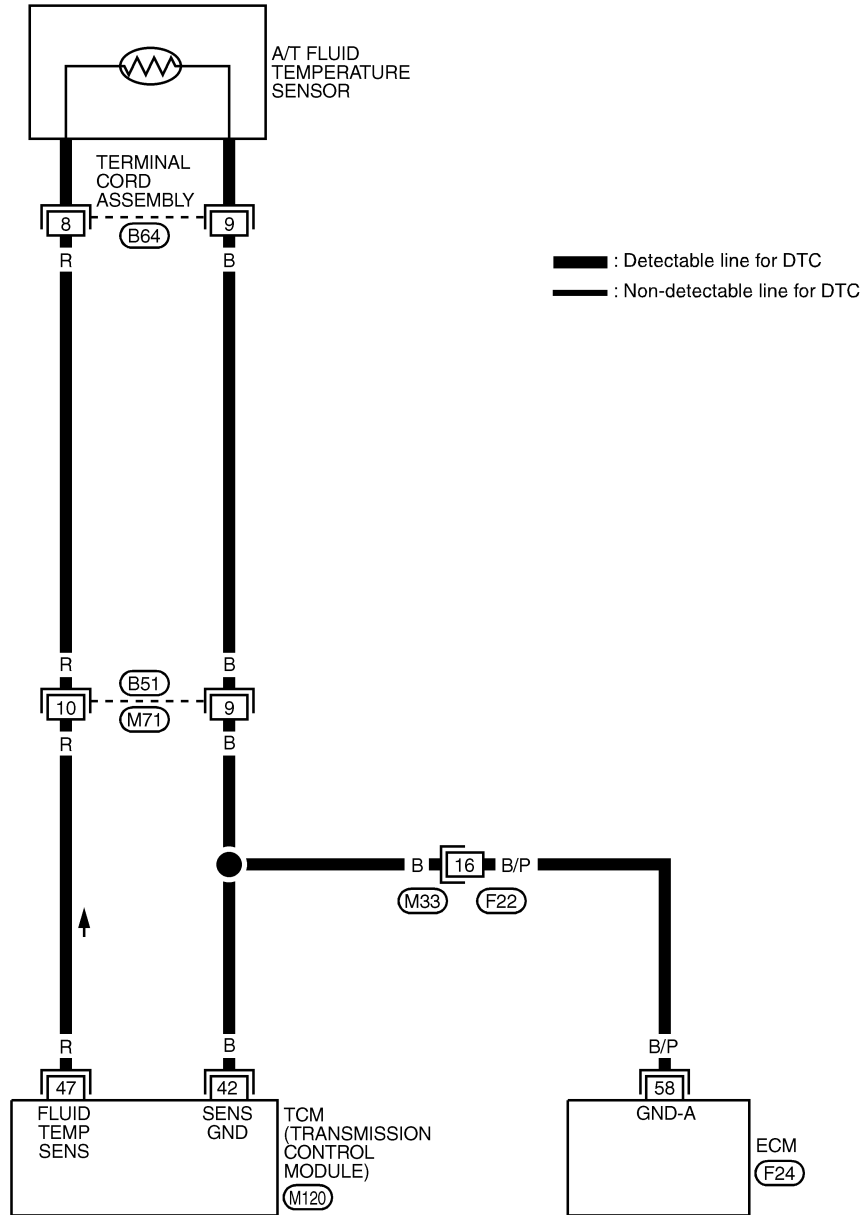
BT

HA

SC

EL

IDX



REFER TO THE FOLLOWING.  
 (F24) - ELECTRICAL UNITS

MAT909A


# DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Diagnostic Procedure

## Diagnostic Procedure

NBAT0032

<b>1</b>	<b>INSPECTION START</b>
Do you have CONSULT-II?	
Yes or No	
Yes	▶ GO TO 2.
No	▶ GO TO 6.

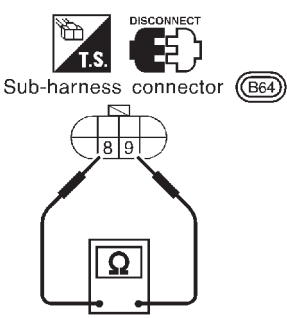
<b>2</b>	<b>CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II)</b>														
 <b>With CONSULT-II</b>															
1. Start engine.															
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.															
3. Read out the value of "FLUID TEMP SE".															
<b>Voltage:</b>															
<b>Cold [20°C (68°F)] → Hot [80°C (176°F)]:</b>															
<b>Approximately 1.5V → 0.5V</b>															
<table border="1"><thead><tr><th colspan="2">DATA MONITOR</th></tr><tr><th colspan="2">MONITORING</th></tr></thead><tbody><tr><td>VHCL/S SE-A/T</td><td>XXX km/h</td></tr><tr><td>VHCL/S SE-MTR</td><td>XXX km/h</td></tr><tr><td>THRTL POS SEN</td><td>XXX V</td></tr><tr><td>FLUID TEMP SE</td><td>XXX V</td></tr><tr><td>BATTERY VOLT</td><td>XXX V</td></tr></tbody></table>		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
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														
OK or NG															
OK	▶ GO TO 4.														
NG	▶ GO TO 3.														

SAT614J

<b>3</b>	<b>DETECT MALFUNCTIONING ITEM</b>
<b>Check the following item:</b>	
● Harness for short to ground or short to power or open between TCM, ECM and terminal cord assembly (Main harness)	
● Ground circuit for ECM.	
Refer to EC-139, "Wiring Diagram".	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace damaged parts.

# DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT


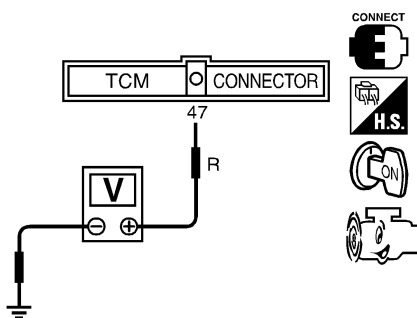
Diagnostic Procedure (Cont'd)

<b>4</b>	<b>CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY</b>
<p>1. Turn ignition switch to "OFF" position.                  2. Disconnect terminal cord assembly connector on the right side of transfer assembly.                  3. Check resistance between terminals 8 and 9 when A/T is cold [20°C (68°F)].</p>	
 <p>Sub-harness connector (B64)</p>	
SAT697I	
<b>Is resistance approx. 2.5 kΩ?</b>	
Yes	▶ GO TO 7.
No	▶ GO TO 5.

GI  
MA  
EM  
LC  
EC  
FE  
**AT**

<b>5</b>	<b>DETECT MALFUNCTIONING ITEM</b>
<p>1. Remove oil pan.                  2. Check the following items:</p> <ul style="list-style-type: none"> <li>● A/T fluid temperature sensor Refer to "Component Inspection", AT-110.</li> <li>● Harness of terminal cord assembly for short or open</li> </ul>	
<b>OK or NG</b>	
OK	▶ GO TO 7.
NG	▶ Repair or replace damaged parts.

TF  
PD  
AX  
SU

<b>6</b>	<b>CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)</b>
<p> <b>Without CONSULT-II</b></p> <p>1. Start engine.                  2. Check voltage between TCM terminal 47 and ground while warming up A/T.</p> <p><b>Voltage:</b>  <b>Cold [20°C (68°F)] → Hot [80°C (176°F)]:</b>  <b>Approximately 1.5V → 0.5V</b></p>	
	
SAT518J	
<b>OK or NG</b>	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

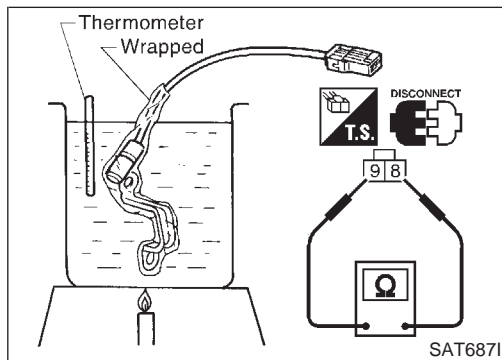
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Diagnostic Procedure (Cont'd)

<b>7</b>	<b>CHECK DTC</b>
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-106.	
<b>OK or NG</b>	
OK	▶ <b>INSPECTION END</b>
NG	▶ GO TO 8.

<b>8</b>	<b>CHECK TCM INSPECTION</b>
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.	
<b>OK or NG</b>	
OK	▶ <b>INSPECTION END</b>
NG	▶ Repair or replace damaged parts.



## Component Inspection A/T FLUID TEMPERATURE SENSOR

NBAT0033

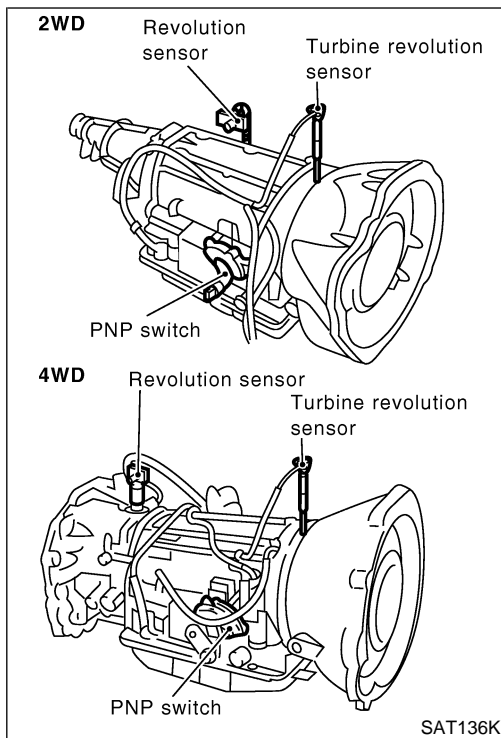
NBAT0033S01

- For removal, refer to AT-273.
- Check resistance between terminals 8 and 9 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)

Description



## Description

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.

NBAT0034

GI

MA

EM

LC

EC

FE



**AT**

TF

## TCM TERMINALS AND REFERENCE VALUE

NBAT0034S02

Remarks: Specification data are reference values.

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

PD

AX

SU



BR

ST

RS

## ON BOARD DIAGNOSIS LOGIC

NBAT0034S03

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.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted.)</li> <li>• Revolution sensor</li> </ul>
 : P0720		

BT

HA

SC

EL

IDX

# DTC P0720 VEHICLE SPEED SENSOR-A/T (REVOLUTION SENSOR)

Description (Cont'd)

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
SELF-DIAG RESULTS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT971J

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
ACTIVE TEST
DTC & SRT CONFIRMATION
ECM PART NUMBER

SAT020K

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0034S01

### 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 "DIAGNOSTIC PROCEDURE", AT-200.  
If the check result is OK, go to following step.
- 3) Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.

- 4) Start engine and maintain the following conditions for at least 5 consecutive seconds.

**VHCL SPEED SE: 30 km/h (19 MPH) or more**

**THRTL POS SEN: More than 1.2V**

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

Driving pattern: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.

If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-114.

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

- 5) Maintain the following conditions for at least 5 consecutive seconds.

**CMPS-RPM (REF): 3,500 rpm or more**

**THRTL POS SEN: More than 1.2V**

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

Driving pattern: 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".



# DTC P0720 VEHICLE SPEED SENSOR-A/T (REVOLUTION SENSOR)

Wiring Diagram — AT — VSSA/T

## Wiring Diagram — AT — VSSA/T

NBAT0188

AT-VSSA/T-01

GI

MA

EM

LC

EC

FE

**AT**

TF

PD

AX

SU

BR

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RS

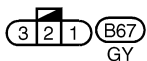
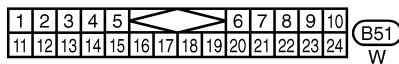
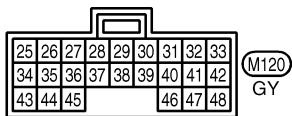
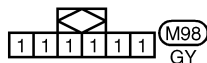
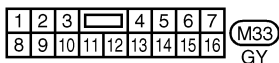
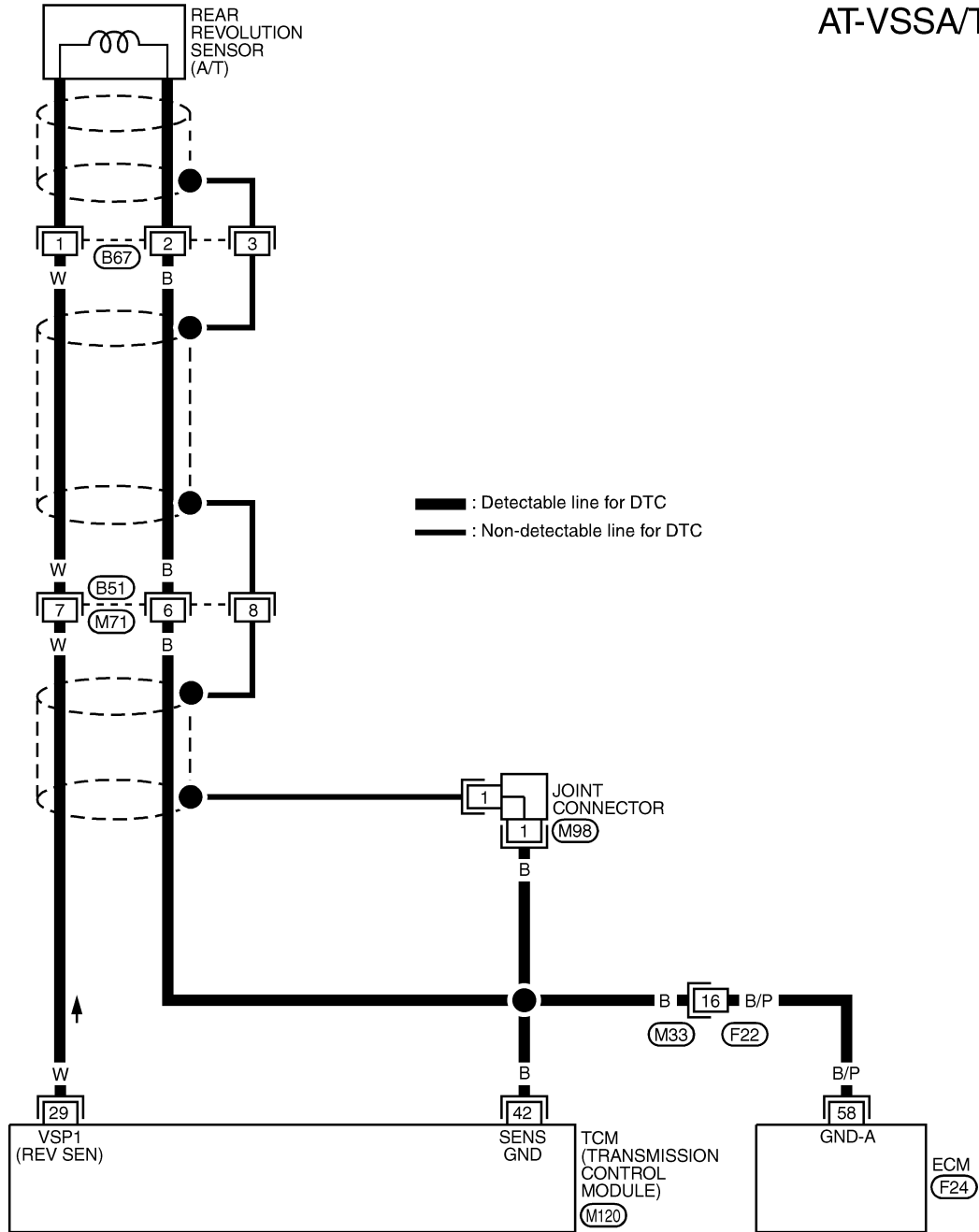
BT

HA

SC

EL

IDX



REFER TO THE FOLLOWING.  
 (F24) -ELECTRICAL UNITS

MAT910A


# DTC P0720 VEHICLE SPEED SENSOR-A/T (REVOLUTION SENSOR)

Diagnostic Procedure

## Diagnostic Procedure

NBAT0035

<b>1</b>	<b>INSPECTION START</b>	
Do you have CONSULT-II?		
Yes or No		
Yes (With CONSULT-II) ▶	GO TO 2.	
No (Without CONSULT-II) ▶	GO TO 5.	

<b>2</b>	<b>CHECK INPUT SIGNAL (WITH CONSULT-II)</b>															
<p> <b>With CONSULT-II</b></p> <ol style="list-style-type: none"> <li>Start engine.</li> <li>Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</li> <li>Read out the value of "VHCL/S SE-A/T" while driving. Check the value changes according to driving speed.</li> </ol>																
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th></th> </tr> </thead> <tbody> <tr> <td>VHCL/S SE-A/T</td> <td>XXX km/h</td> </tr> <tr> <td>VHCL/S SE-MTR</td> <td>XXX km/h</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>FLUID TEMP SE</td> <td>XXX V</td> </tr> <tr> <td>BATTERY VOLT</td> <td>XXX V</td> </tr> </tbody> </table>			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
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															
OK or NG																
OK ▶	GO TO 3.															
NG ▶	GO TO 4.															

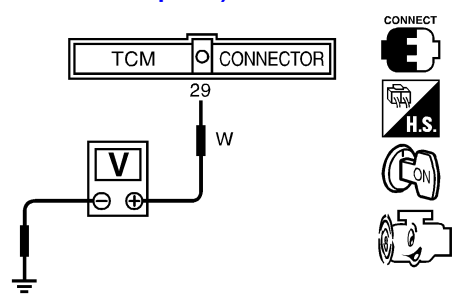
SAT614J

<b>3</b>	<b>CHECK REVOLUTION SENSOR</b>	
Refer to "Component Inspection", AT-115.		
OK or NG		
OK ▶	GO TO 6.	
NG ▶	Repair or replace revolution sensor.	

<b>4</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● Harness for short or open between TCM and revolution sensor (Main harness)</li> <li>● Harness for short or open between revolution sensor and ECM (Main harness)</li> <li>● Ground circuit for ECM</li> </ul> <p>Refer to EC-139, "WIRING DIAGRAM".</p>		
OK or NG		
OK ▶	GO TO 6.	
NG ▶	GO TO 3.	

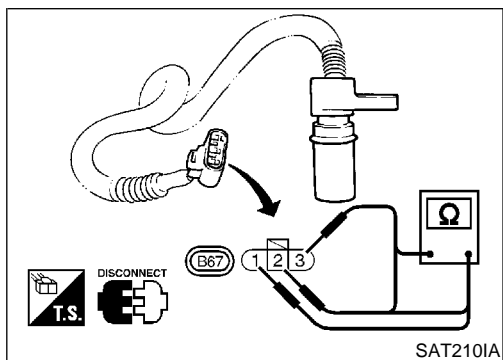
# DTC P0720 VEHICLE SPEED SENSOR-A/T (REVOLUTION SENSOR)

Diagnostic Procedure (Cont'd)

<b>5</b>	<b>CHECK INPUT SIGNAL (WITHOUT CONSULT-II)</b>	<p>⊗ <b>Without CONSULT-II</b></p> <ol style="list-style-type: none"> <li>1. Start engine.</li> <li>2. Check voltage between TCM terminal 29 and ground while driving. (Measure with AC range.)</li> </ol> <p><b>Voltage:</b></p> <p style="padding-left: 20px;"><b>At 0 km/h (0 MPH):</b> 0V</p> <p style="padding-left: 20px;"><b>At 30 km/h (19 MPH):</b> 1V or more</p> <p><b>(Voltage rises gradually in response to vehicle speed.)</b></p> <div style="text-align: center; margin-top: 10px;">  </div> <p style="text-align: right; margin-top: 10px;">SAT519J</p>	GI MA EM LC EC FE <b>AT</b>
		<b>OK or NG</b>	
OK	▶	GO TO 3.	TF
NG	▶	GO TO 4.	PD

<b>6</b>	<b>CHECK DTC</b>	<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-112.</p> <p style="text-align: center;"><b>OK or NG</b></p>	AX SU BR
OK	▶	<b>INSPECTION END</b>	ST
NG	▶	GO TO 7.	RS

<b>7</b>	<b>CHECK TCM INSPECTION</b>	<ol style="list-style-type: none"> <li>1. Perform TCM input/output signal inspection.</li> <li>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</li> </ol> <p style="text-align: center;"><b>OK or NG</b></p>	BT HA SC EL IDX
OK	▶	<b>INSPECTION END</b>	
NG	▶	Repair or replace damaged parts.	



## Component Inspection REVOLUTION SENSOR

NBAT0036

NBAT0036S01

- For removal, refer to AT-273.
- Check resistance between terminals 1, 2 and 3.

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

# DTC P0725 ENGINE SPEED SIGNAL

Description


## Description

The engine speed signal is sent from the ECM to the TCM. NBAT0037

## TCM TERMINALS AND REFERENCE VALUE



NBAT0037S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)
39	W/B	Engine speed signal	 <p>Refer to EC-124, "ECM INSPECTION TABLE".</p>	—

## ON BOARD DIAGNOSIS LOGIC

NBAT0037S03

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.	<ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> </ul>

SELECT SYSTEM
A/T
ENGINE

SAT014K

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0037S01

### 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

- Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
- Start engine and maintain the following conditions for at least 10 consecutive seconds.

**VHCL SPEED SE: 10 km/h (6 MPH) or more**

**THRTL POS SEN: More than 1.2V**

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

### With GST

Follow the procedure "With CONSULT-II".

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
ACTIVE TEST
DTC & SRT CONFIRMATION
ECM PART NUMBER

SAT020K

# DTC P0725 ENGINE SPEED SIGNAL

Wiring Diagram — AT — ENGSS

## Wiring Diagram — AT — ENGSS

NBAT0189

AT-ENGSS-01

GI

MA

EM

LC

EC

FE

**AT**

TF

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BR

ST

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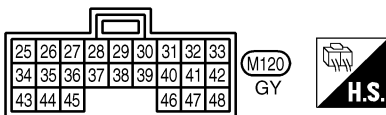
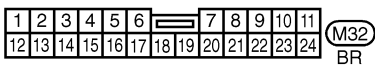
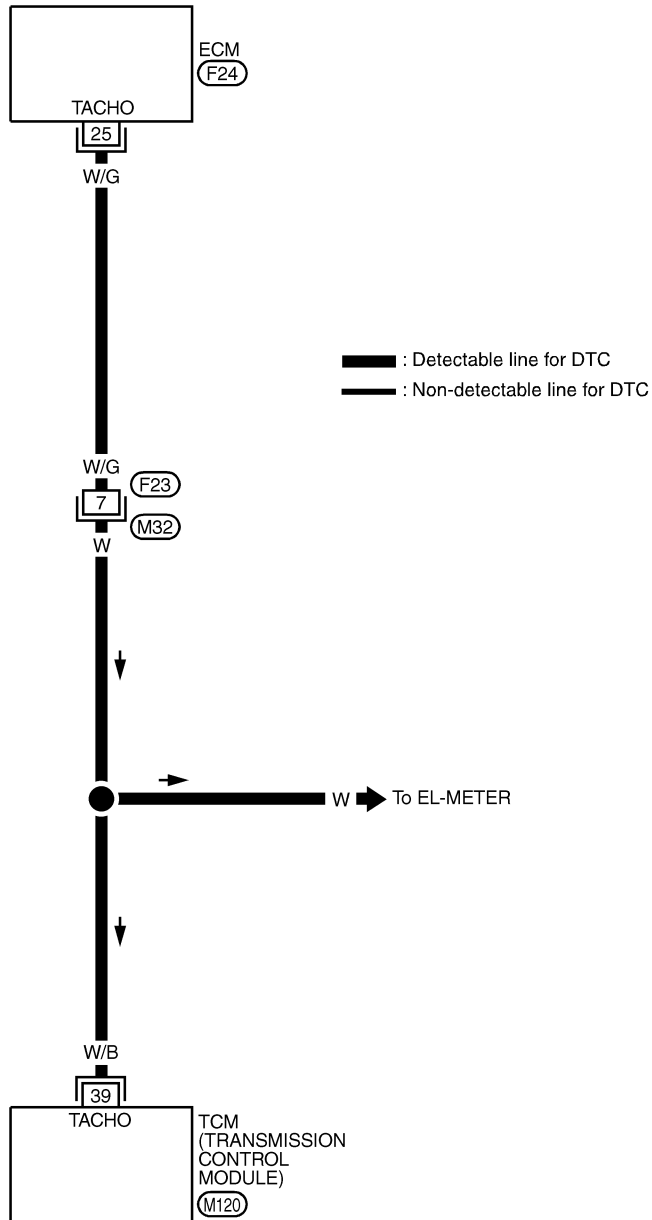
BT

HA

SC

EL

IDX



REFER TO THE FOLLOWING.  
 (F24) - ELECTRICAL UNITS

MAT911A

# DTC P0725 ENGINE SPEED SIGNAL

Diagnostic Procedure

## Diagnostic Procedure

NBAT0038

<b>1</b>	<b>CHECK DTC WITH ECM</b>	
<ul style="list-style-type: none"> <li>● Check P code with CONSULT-II. Turn ignition switch "ON" and select "SELF-DIAG RESULTS" mode for "ENGINE" with CONSULT-II. Refer to EC-74, "DESCRIPTION".</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>		
	OK (With CONSULT-II) ▶	GO TO 2.
	OK (Without CONSULT-II) ▶	GO TO 4.
	NG ▶	Check ignition signal circuit for engine control. Refer to EC-489, "Component Description".

<b>2</b>	<b>CHECK INPUT SIGNAL (WITH CONSULT-II)</b>															
<p> <b>With CONSULT-II</b></p> <ol style="list-style-type: none"> <li>1. Start engine.</li> <li>2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</li> <li>3. Read out the value of "ENGINE SPEED". Check engine speed changes according to throttle position.</li> </ol>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th></th> </tr> </thead> <tbody> <tr> <td>ENGINE SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>TURBINE REV</td> <td>XXX rpm</td> </tr> <tr> <td>OVERDRIVE SW</td> <td>ON</td> </tr> <tr> <td>PN POSI SW</td> <td>OFF</td> </tr> <tr> <td>R POSITION SW</td> <td>OFF</td> </tr> </tbody> </table>			DATA MONITOR		MONITORING		ENGINE SPEED	XXX rpm	TURBINE REV	XXX rpm	OVERDRIVE SW	ON	PN POSI SW	OFF	R POSITION SW	OFF
DATA MONITOR																
MONITORING																
ENGINE SPEED	XXX rpm															
TURBINE REV	XXX rpm															
OVERDRIVE SW	ON															
PN POSI SW	OFF															
R POSITION SW	OFF															
Refer to EC-124, "ECM INSPECTION TABLE".																
	Yes ▶	GO TO 5.														
	No ▶	GO TO 3.														

SAT645J

<b>3</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● Harness for short or open between TCM and ECM</li> <li>● Resistor</li> <li>● Ignition coil</li> </ul> <p>Refer to EC-489, "Component Description".</p> <p style="text-align: center;"><b>OK or NG</b></p>		
	OK ▶	GO TO 5.
	NG ▶	Repair or replace damaged parts.

# DTC P0725 ENGINE SPEED SIGNAL

Diagnostic Procedure (Cont'd)

<b>4</b>	<b>CHECK INPUT SIGNAL (WITHOUT CONSULT-II)</b>		
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> <li>Start engine.</li> <li>Check voltage between TCM terminal 39 and ground.</li> </ol>			
SAT520J			
<b>Refer to EC-124, "ECM INSPECTION TABLE".</b>			
Yes	▶	GO TO 4.	
No	▶	GO TO 3.	

GI  
MA  
EM  
LC  
EC  
FE

<b>5</b>	<b>CHECK DTC</b>		
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-116.			
<b>OK or NG</b>			
OK	▶	<b>INSPECTION END</b>	
NG	▶	GO TO 6.	

**AT**  
TF

<b>6</b>	<b>CHECK TCM INSPECTION</b>		
<ol style="list-style-type: none"> <li>Perform TCM input/output signal inspection.</li> <li>If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</li> </ol>			
<b>OK or NG</b>			
OK	▶	<b>INSPECTION END</b>	
NG	▶	Repair or replace damaged parts.	

AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

## Description

### Description

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NBAT0039
- 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.

NBAT0039S02

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 <sub>1</sub> " or "D <sub>4</sub> ".)	Battery voltage
			When shift solenoid valve A does not operate. (When driving in "D <sub>2</sub> " or "D <sub>3</sub> ".)	0V
12	L/R	Shift solenoid valve B	When shift solenoid valve B operates. (When driving in "D <sub>1</sub> " or "D <sub>2</sub> ".)	Battery voltage
			When shift solenoid valve B does not operate. (When driving in "D <sub>3</sub> " or "D <sub>4</sub> ".)	0V



### ON BOARD DIAGNOSIS LOGIC

NBAT0039S03

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.	<ul style="list-style-type: none"> <li>• Shift solenoid valve A</li> <li>• Shift solenoid valve B</li> <li>• Each clutch</li> <li>• Hydraulic control circuit</li> </ul>
: P0731		



# DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

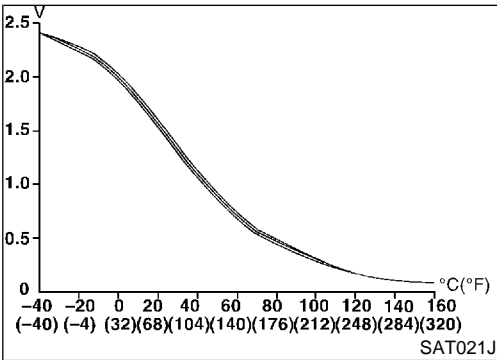
Description (Cont'd)

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
SELF-DIAG RESULTS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT971J



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0039S01

### 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.

### ④ 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 10 to 20 km/h (6 to 12 MPH) under the following condition and release the accelerator pedal completely.

**THROTTLE POSI: Less than 1.0/8 (at all times during step 4)**

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

- Check that "GEAR" shows "2" after releasing pedal.
- 5) Depress accelerator pedal to WOT (more than 7.0/8 of "THROTTLE POSI") quickly from a speed of 10 to 20 km/h (6 to 12 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)  
If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-124.  
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

GI  
MA  
EM  
LC  
EC  
FE  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

Description (Cont'd)

Malfunction for P0731 exists.	2 → 2 → 3 → 3
	4 → 3 → 3 → 4

- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)  
Refer to "DIAGNOSTIC PROCEDURE", AT-124.  
Refer to shift schedule, AT-356.



**With GST**

Follow the procedure "With CONSULT-II".

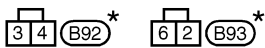
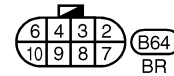
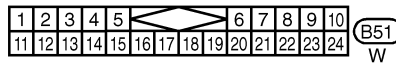
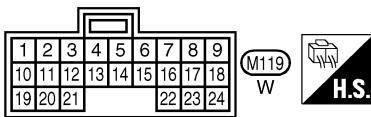
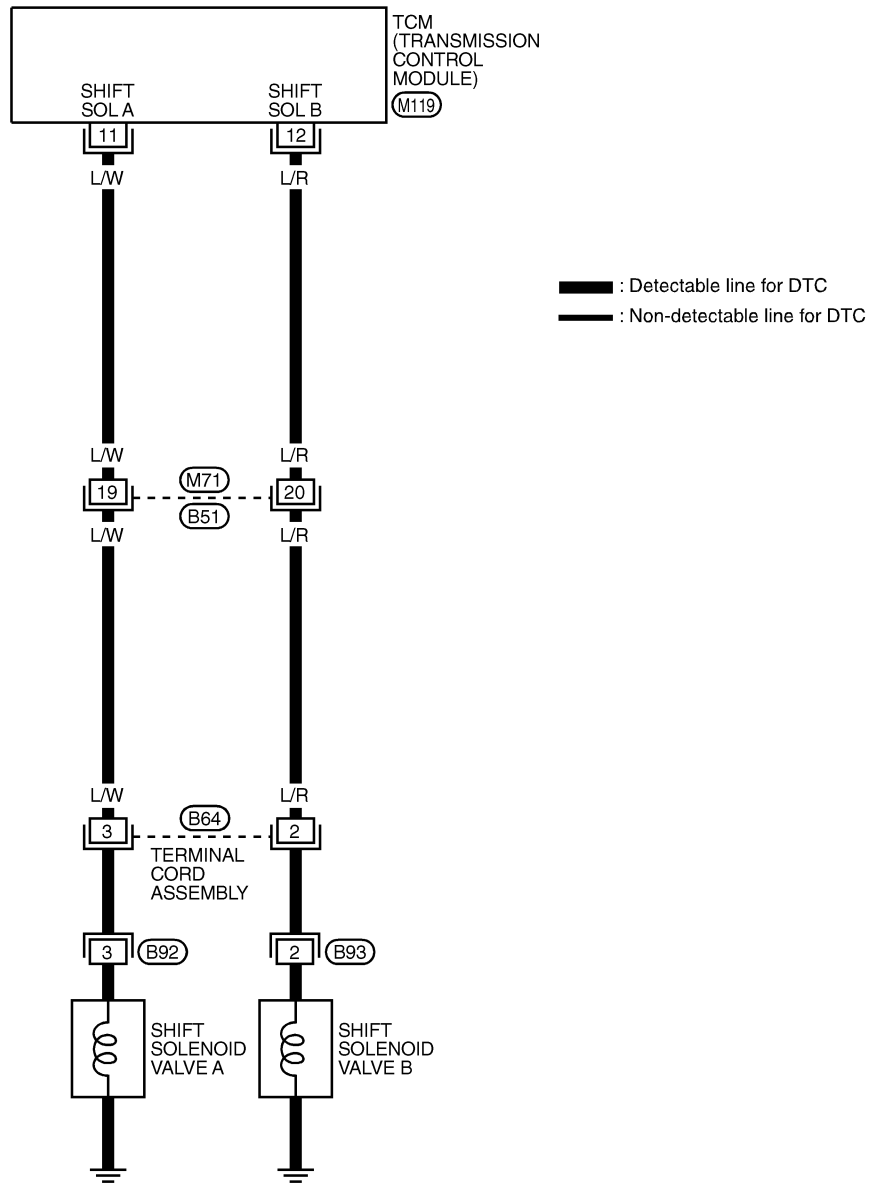
# DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

Wiring Diagram — AT — 1ST

## Wiring Diagram — AT — 1ST

NBAT0190

AT-1STSIG-01 GI



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

MA

EM

LC

EC

FE

**AT**

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

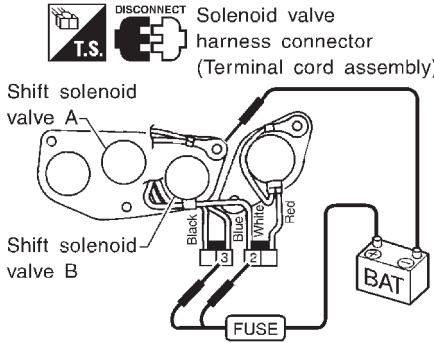
IDX

# DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

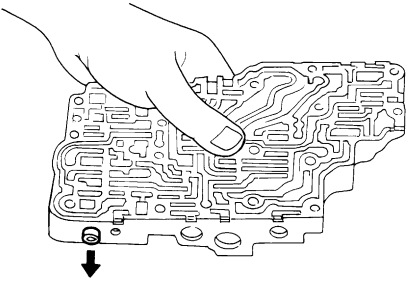
Diagnostic Procedure

## Diagnostic Procedure

NBAT0040

<b>1</b>	<b>CHECK SHIFT SOLENOID VALVE</b>
<p>1. Remove control valve assembly. Refer to AT-273.                  2. Check shift solenoid valve operation.</p> <ul style="list-style-type: none"> <li>● Shift solenoid valve A</li> <li>● Shift solenoid valve B</li> </ul> <p>Refer to "Component Inspection", AT-125.</p> <div style="text-align: center;">  <p>OK or NG</p> </div>	
OK	▶ GO TO 2.
NG	▶ Repair or replace shift solenoid valve assembly.

SAT648I

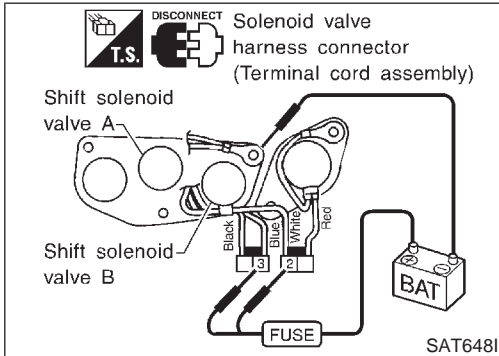
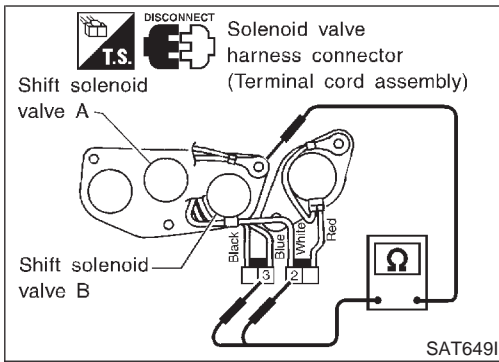
<b>2</b>	<b>CHECK CONTROL VALVE</b>
<p>1. Disassemble control valve assembly.                  Refer to "Control Valve Assembly", AT-301.</p> <p>2. Check to ensure that:</p> <ul style="list-style-type: none"> <li>● Valve, sleeve and plug slide along valve bore under their own weight.</li> <li>● Valve, sleeve and plug are free from burrs, dents and scratches.</li> <li>● Control valve springs are free from damage, deformation and fatigue.</li> <li>● Hydraulic line is free from obstacles.</li> </ul> <div style="text-align: center;">  <p>OK or NG</p> </div>	
OK	▶ GO TO 3.
NG	▶ Repair control valve assembly.

SAT367H

<b>3</b>	<b>CHECK DTC</b>
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-121.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ <b>INSPECTION END</b>
NG	▶ Check control valve again. Repair or replace control valve assembly.

# DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

Component Inspection



## Component Inspection

### SHIFT SOLENOID VALVE A AND B

=NBAT0041

NBAT0041S01

- For removal, refer to AT-273.

### Resistance Check

NBAT0041S0101

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

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

### Operation Check

NBAT0041S0102

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

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

# DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

Description

## Description


- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NBAT0042
- 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

NBAT0042S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)
12	L/R	Shift solenoid valve B	 When shift solenoid valve B operates. (When driving in "D <sub>1</sub> " or "D <sub>2</sub> ".)	Battery voltage
			When shift solenoid valve B does not operate. (When driving in "D <sub>3</sub> " or "D <sub>4</sub> ".)	0V

## ON BOARD DIAGNOSIS LOGIC

NBAT0042S03

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 GR FNCTN	A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	<ul style="list-style-type: none"> <li>• Shift solenoid valve B</li> <li>• Each clutch</li> <li>• Hydraulic control circuit</li> </ul>
 : P0732		

# DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

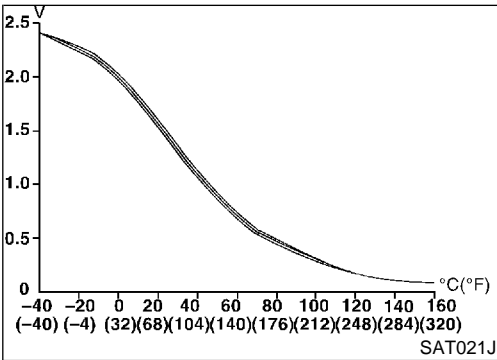
Description (Cont'd)

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
SELF-DIAG RESULTS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT971J



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0042S01

### 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.

### ④ With CONSULT-II

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

**FLUID TEMP SEN: 0.4 - 1.5V**

If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).

- 3) Select "2ND GR FNCTN P0732" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
- 4) Accelerate vehicle to 25 to 30 km/h (16 to 19 MPH) under the following condition and release the accelerator pedal completely.

**THROTTLE POSI: Less than 1.0/8 (at all times during step 4)**

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

- Check that "GEAR" shows "3" or "4" after releasing pedal.
- 5) Depress accelerator pedal to WOT (more than 7.0/8 of "THROTTLE POSI") quickly from a speed of 25 to 30 km/h (16 to 19 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)  
If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-130.  
If "STOP VEHICLE" appears on CONSULT-II screen, go to 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

GI  
MA  
EM  
LC  
EC  
FE  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

## DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

Description (Cont'd)

---

- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".) Refer to "DIAGNOSTIC PROCEDURE", AT-130. Refer to shift schedule, AT-356.



### **With GST**

Follow the procedure "With CONSULT-II".



# DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

Wiring Diagram — AT — 2ND

## Wiring Diagram — AT — 2ND

NBAT0191

AT-2NDSIG-01

GI

MA

EM

LC

EC

FE

**AT**

TF

PD

AX

SU

BR

ST

RS

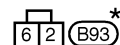
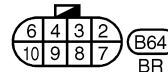
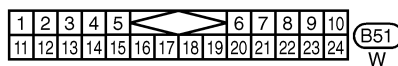
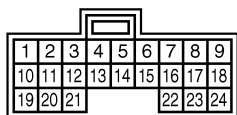
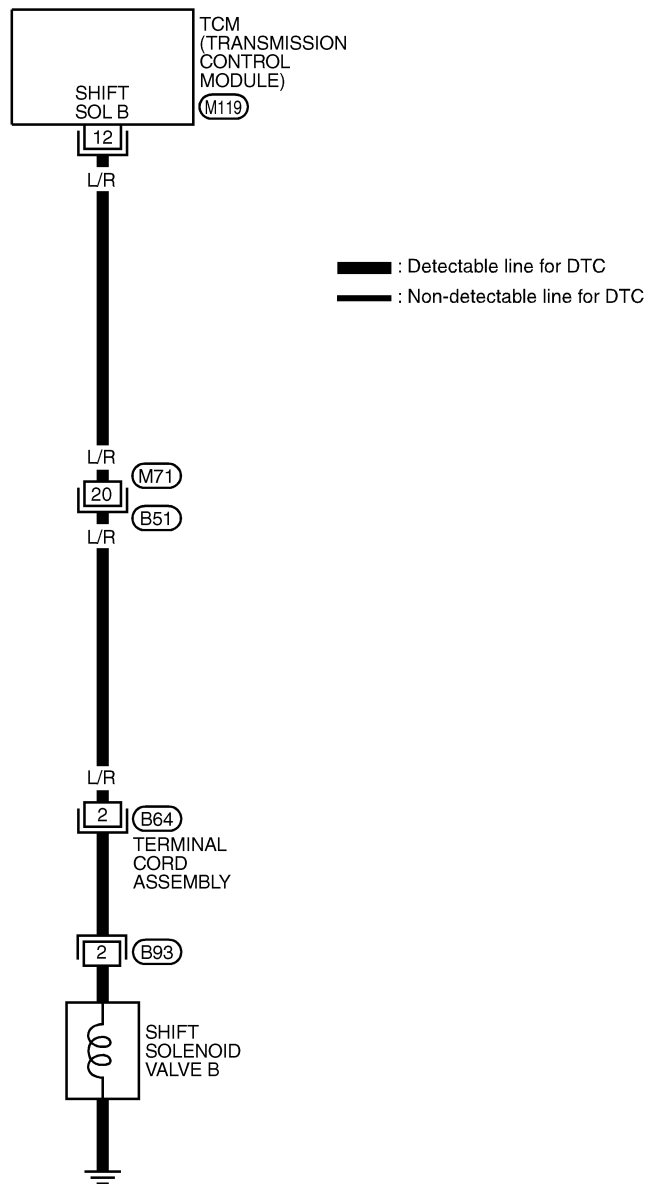
BT

HA

SC

EL

IDX



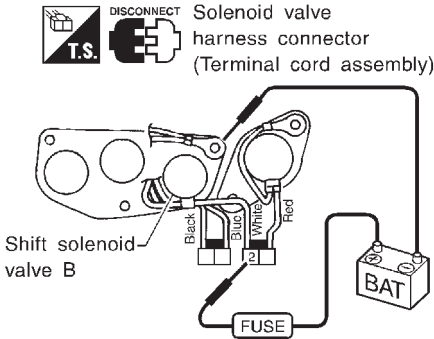
★ : This connector is not shown in "HARNES LAYOUT" in EL section.

# DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

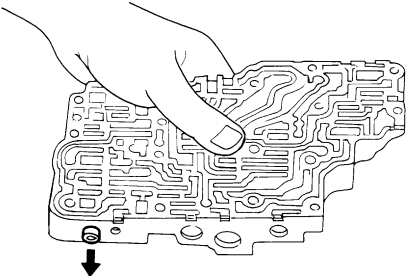
Diagnostic Procedure

## Diagnostic Procedure

NBAT0043

<b>1</b>	<b>CHECK SHIFT SOLENOID VALVE</b>
<p>1. Remove control valve assembly. Refer to AT-273.                  2. Check shift solenoid valve operation.</p> <ul style="list-style-type: none"> <li>● Shift solenoid valve B</li> </ul> <p>Refer to "Component Inspection", AT-131.</p>	
 <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶ GO TO 2.
NG	▶ Repair or replace shift solenoid valve assembly.

SAT650I

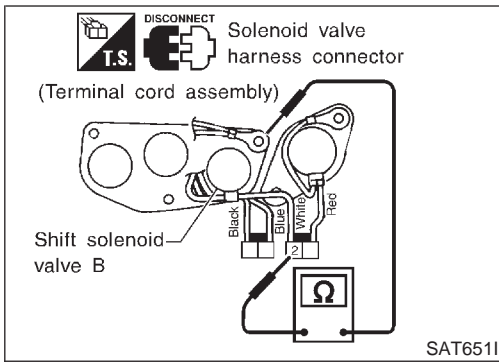
<b>2</b>	<b>CHECK CONTROL VALVE</b>
<p>1. Disassemble control valve assembly.                  Refer to "Control Valve Assembly", AT-301.</p> <p>2. Check to ensure that:</p> <ul style="list-style-type: none"> <li>● Valve, sleeve and plug slide along valve bore under their own weight.</li> <li>● Valve, sleeve and plug are free from burrs, dents and scratches.</li> <li>● Control valve springs are free from damage, deformation and fatigue.</li> <li>● Hydraulic line is free from obstacles.</li> </ul>	
 <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶ GO TO 3.
NG	▶ Repair control valve assembly.

SAT367H

<b>3</b>	<b>CHECK DTC</b>
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-127.</p> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶ <b>INSPECTION END</b>
NG	▶ Check control valve again. Repair or replace control valve assembly.

# DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

Component Inspection



## Component Inspection SHIFT SOLENOID VALVE B

NBAT0044

NBAT0044S01

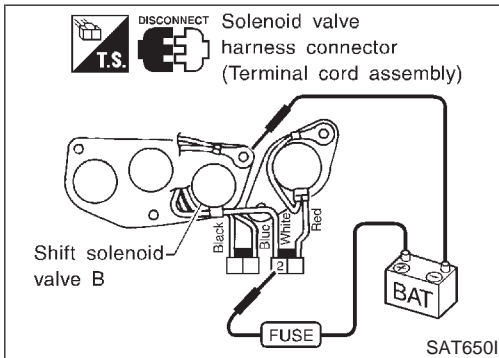
- For removal, refer to AT-273.

## Resistance Check

NBAT0044S0101

- Check resistance between terminal 2 and ground.

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



## Operation Check

NBAT0044S0102

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

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

# DTC P0733 IMPROPER SHIFTING TO 3RD GEAR POSITION

Description

## Description


- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NBAT0045
- 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

NBAT0045S02

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 <sub>1</sub> " or "D <sub>4</sub> ".)	Battery voltage
			When shift solenoid valve A does not operate. (When driving in "D <sub>2</sub> " or "D <sub>3</sub> ".)	0V

## ON BOARD DIAGNOSIS LOGIC

NBAT0045S03

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.	<ul style="list-style-type: none"> <li>• Shift solenoid valve A</li> <li>• Each clutch</li> <li>• Hydraulic control circuit</li> </ul>
 : P0733		

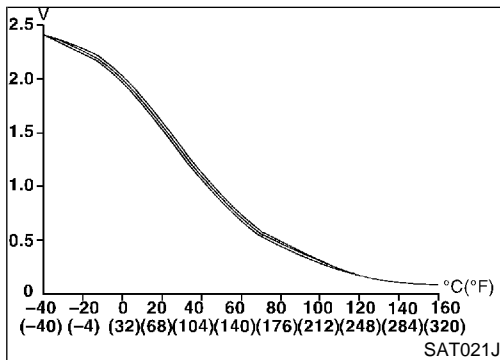
NBAT0045S01

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
SELF-DIAG RESULTS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT971J



## 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

- Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
- 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).

- Select "3RD GR FNCTN P0733" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
- Accelerate vehicle to 35 to 45 km/h (22 to 28 MPH) under the following condition and release the accelerator pedal completely.

**THROTTLE POSI: Less than 1.0/8 (at all times during step 4)**

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

- Check that "GEAR" shows "4" after releasing pedal.
- Depress accelerator pedal steadily with 3.5/8 - 4.5/8 of "THROTTLE POSI" from a speed of 35 to 45 km/h (22 to 28 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)

If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-136.

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".
- Stop vehicle.
  - 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

GI  
MA  
EM  
LC  
EC  
FE  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

## DTC P0733 IMPROPER SHIFTING TO 3RD GEAR POSITION

Description (Cont'd)

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- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".) Refer to "DIAGNOSTIC PROCEDURE", AT-136.  
Refer to shift schedule, AT-356.



**With GST**

Follow the procedure "With CONSULT-II".

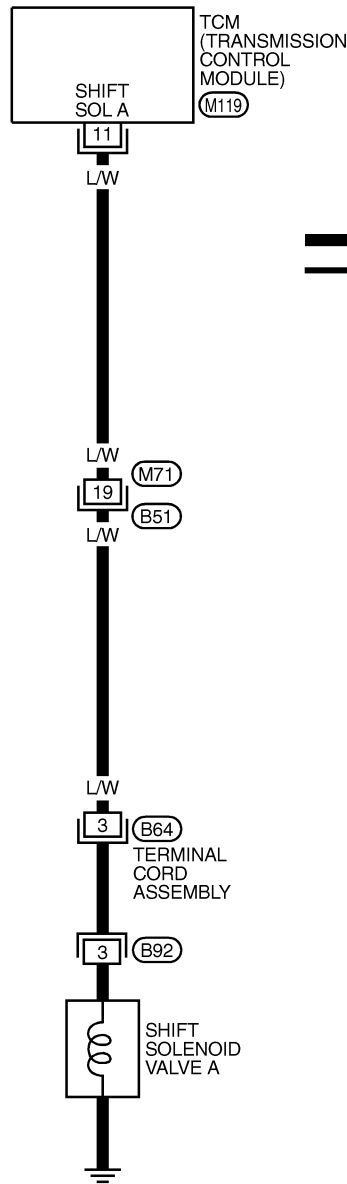
# DTC P0733 IMPROPER SHIFTING TO 3RD GEAR POSITION

Wiring Diagram — AT — 3RD

## Wiring Diagram — AT — 3RD

NBAT0192

AT-3RDSIG-01 GI



MA

EM

LC

EC

FE

**AT**

TF

PD

AX

SU

BR

ST

RS

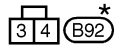
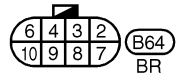
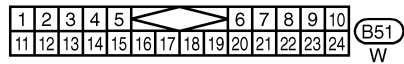
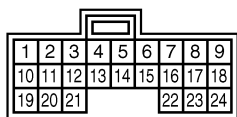
BT

HA

SC

EL

IDX



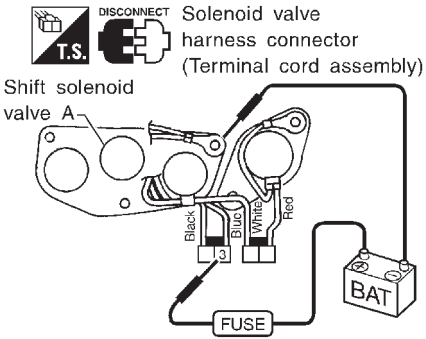
\* : This connector is not shown in "HARNESS LAYOUT" in EL section.

# DTC P0733 IMPROPER SHIFTING TO 3RD GEAR POSITION

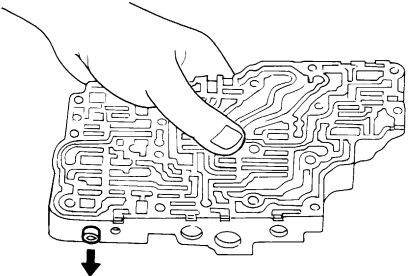
Diagnostic Procedure

## Diagnostic Procedure

NBAT0046

<b>1</b>	<b>CHECK SHIFT SOLENOID VALVE</b>
<p>1. Remove control valve assembly. Refer to AT-273.                  2. Check shift solenoid valve operation.</p> <ul style="list-style-type: none"> <li>● Shift solenoid valve A</li> </ul> <p>Refer to "Component Inspection", AT-137.</p>	
 <p><b>OK or NG</b></p>	
OK	▶ GO TO 2.
NG	▶ Repair or replace shift solenoid valve assembly.

SAT653I

<b>2</b>	<b>CHECK CONTROL VALVE</b>
<p>1. Disassemble control valve assembly.                  Refer to "Control Valve Assembly", AT-301.</p> <p>2. Check to ensure that:</p> <ul style="list-style-type: none"> <li>● Valve, sleeve and plug slide along valve bore under their own weight.</li> <li>● Valve, sleeve and plug are free from burrs, dents and scratches.</li> <li>● Control valve springs are free from damage, deformation and fatigue.</li> <li>● Hydraulic line is free from obstacles.</li> </ul>	
 <p><b>OK or NG</b></p>	
OK	▶ GO TO 3.
NG	▶ Repair control valve assembly.

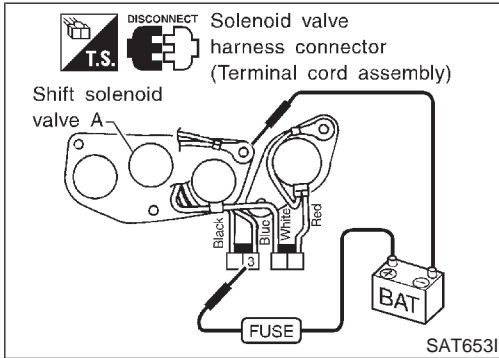
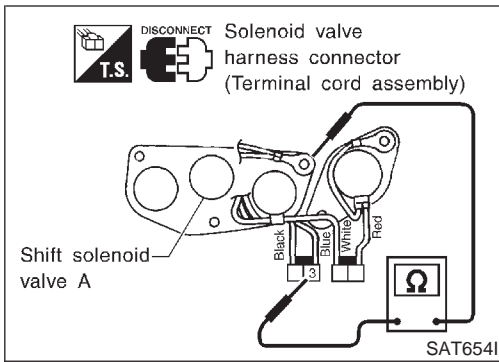
SAT367H

<b>3</b>	<b>CHECK DTC</b>
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-133.</p> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶ <b>INSPECTION END</b>
NG	▶ Check control valve again. Repair or replace control valve assembly.



# DTC P0733 IMPROPER SHIFTING TO 3RD GEAR POSITION

Component Inspection



## Component Inspection SHIFT SOLENOID VALVE A

NBAT0047

NBAT0047S01

- For removal, refer to AT-273.

### Resistance Check

NBAT0047S0101

- Check resistance between terminal 3 and ground.

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

### Operation Check

NBAT0047S0102

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

GI  
MA  
EM  
LC  
EC  
FE  
**AT**  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Description

## Description

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NBAT0048
- 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

NBAT0048S04

Remarks: Specification data are reference values.





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

NBAT0048S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)	
1	GY	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	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 <sub>1</sub> " or "D <sub>4</sub> ".)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in "D <sub>2</sub> " or "D <sub>3</sub> ".)	0V
12	L/R	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D <sub>1</sub> " or "D <sub>2</sub> ".)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in "D <sub>3</sub> " or "D <sub>4</sub> ".)	0V

# DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Description (Cont'd)

## ON BOARD DIAGNOSIS LOGIC

=NBAT0048S03

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	A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	<ul style="list-style-type: none"> <li>● Shift solenoid valve A</li> <li>● Shift solenoid valve B</li> <li>● Line pressure solenoid valve</li> <li>● Each clutch</li> <li>● Hydraulic control circuit</li> </ul>
 : P0734		

# DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

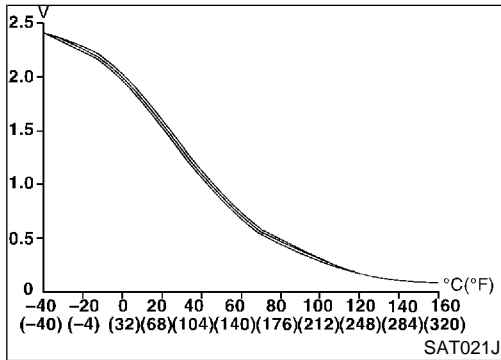
Description (Cont'd)

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
SELF-DIAG RESULTS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT971J



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0048S01

### 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.

### ⑤ 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 55 to 65 km/h (34 to 40 MPH) under the following condition and release the accelerator pedal completely.

**THROTTLE POSI: Less than 5.5/8 (at all times during step 4)**

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

- Check that "GEAR" shows "3" after releasing pedal.
- 5) Depress accelerator pedal steadily with 1.0/8 - 2.0/8 of "THROTTLE POSI" from a speed of 55 to 65 km/h (34 to 40 MPH) until "TESTING" has turned to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)

If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-143.

If "STOP VEHICLE" appears on CONSULT-II screen, go to following step.

- Check that "GEAR" shows "4" when depressing accelerator pedal with 1.0/8 - 2.0/8 of "THROTTLE POSI".
  - If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0734 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".
- 6) Stop vehicle.
  - 7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists	1 → 2 → 3 → 4
Malfunction for P0734 exists.	1 → 2 → 2 → 1

# DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Description (Cont'd)

- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".) Refer to "DIAGNOSTIC PROCEDURE", AT-143.  
Refer to shift schedule, AT-356.



## With GST

Follow the procedure "With CONSULT-II".

GI

MA

EM

LC

EC

FE

**AT**

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

# DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

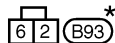
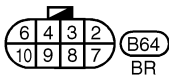
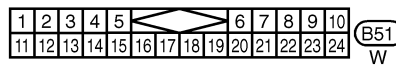
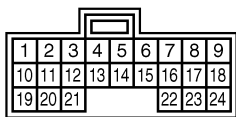
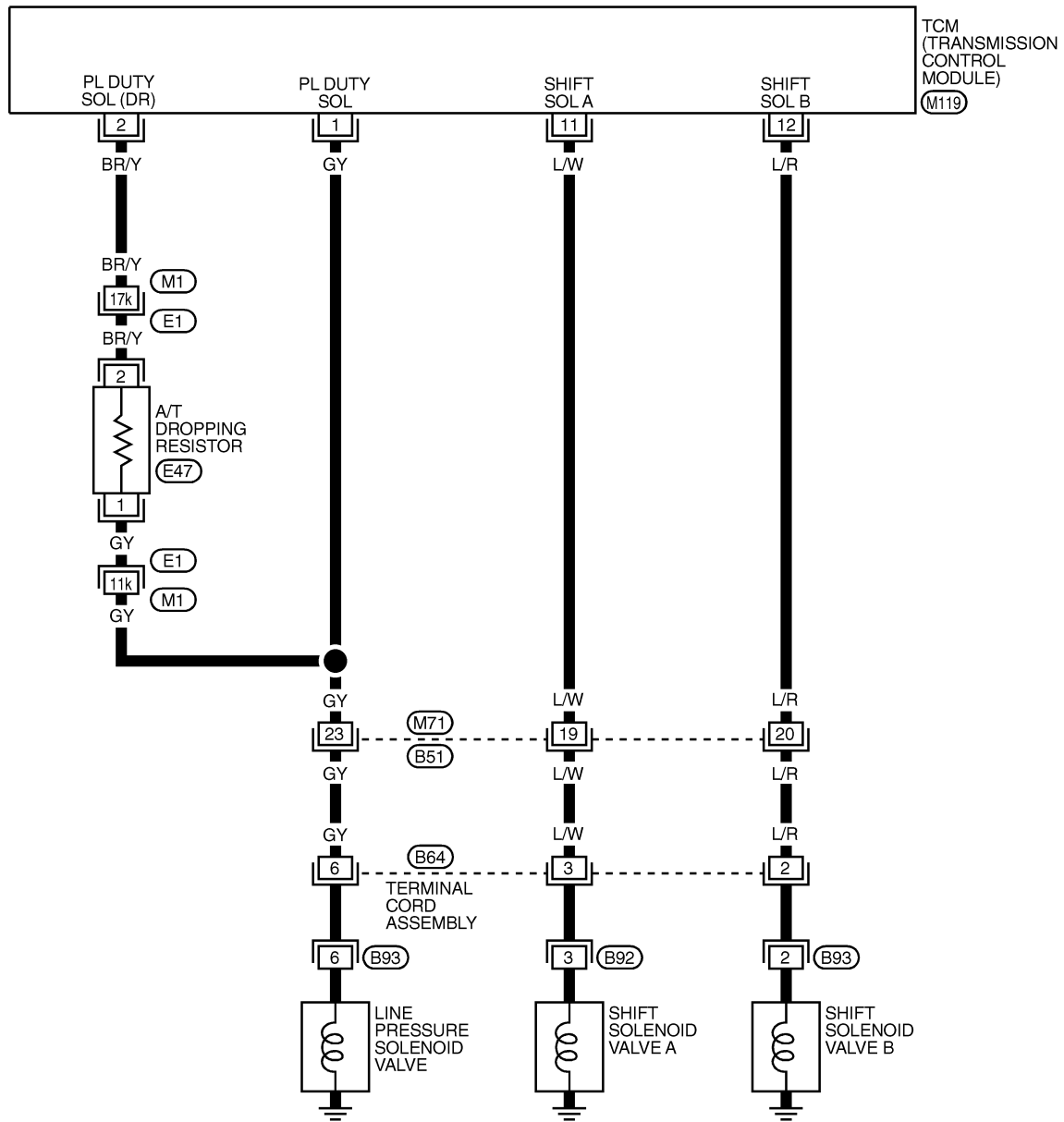
Wiring Diagram — AT — 4TH

## Wiring Diagram — AT — 4TH

NBAT0193

AT-4THSIG-01

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



REFER TO THE FOLLOWING.

(E1) -SUPER MULTIPLE JUNCTION (SMJ)

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

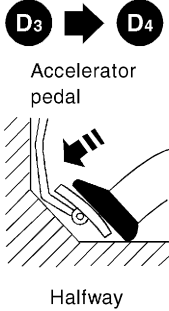
MAT912A

# DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Diagnostic Procedure

## Diagnostic Procedure

NBAT0049

<b>1</b>	<b>CHECK SHIFT UP (D<sub>3</sub> TO D<sub>4</sub>)</b>	
During "Cruise test – Part 1", AT-71. Does A/T shift from D <sub>3</sub> to D <sub>4</sub> at the specified speed?		
 <p style="text-align: center;">Accelerator pedal</p> <p style="text-align: center;">Halfway</p>		
<b>Yes or No</b>		
Yes	▶	GO TO 9.
No	▶	GO TO 2.

GI

MA

EM

LC

EC

FE

**AT**

<b>2</b>	<b>CHECK LINE PRESSURE</b>	
Perform line pressure test. Refer to AT-62.		
<b>OK or NG</b>		
OK	▶	GO TO 3.
NG	▶	GO TO 6.

TF

PD

AX

SU

BR

ST

RS

BT

HA

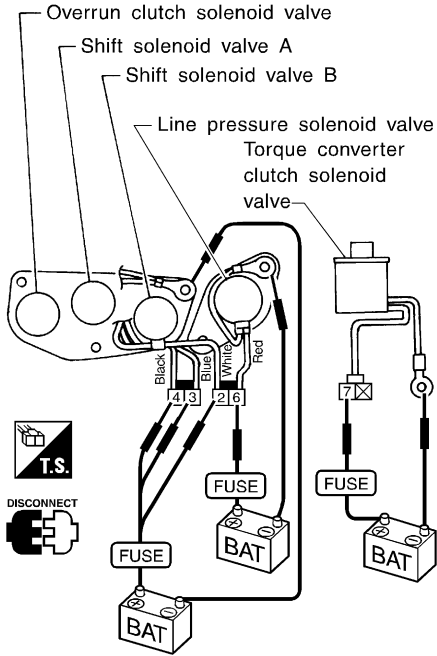
SC

EL

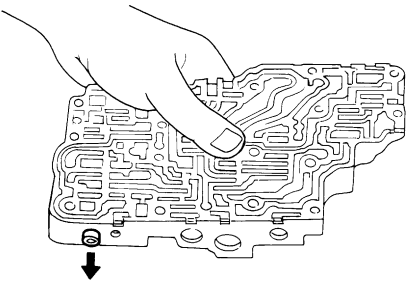
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# DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Diagnostic Procedure (Cont'd)

<b>3</b>	<b>CHECK SOLENOID VALVES</b>	<p>1. Remove control valve assembly. Refer to AT-273.                  2. Refer to "Component Inspection", AT-147.</p> <div style="text-align: center;">  <p style="text-align: center;"><b>OK or NG</b></p> </div>	
OK	▶	GO TO 4.	
NG	▶	Replace solenoid valve assembly.	

SAT158J

<b>4</b>	<b>CHECK CONTROL VALVE</b>	<p>1. Disassemble control valve assembly. Refer to AT-301.                  2. Check to ensure that:</p> <ul style="list-style-type: none"> <li>● Valve, sleeve and plug slide along valve bore under their own weight.</li> <li>● Valve, sleeve and plug are free from burrs, dents and scratches.</li> <li>● Control valve springs are free from damage, deformation and fatigue.</li> <li>● Hydraulic line is free from obstacles.</li> </ul> <div style="text-align: center;">  <p style="text-align: center;"><b>OK or NG</b></p> </div>	
OK	▶	GO TO 5.	
NG	▶	Repair control valve.	

SAT367H



# DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Diagnostic Procedure (Cont'd)

<b>5</b>	<b>CHECK SHIFT UP (D<sub>3</sub> TO D<sub>4</sub>)</b>	
Does A/T shift from D <sub>3</sub> to D <sub>4</sub> at the specified speed?		
<b>Yes or No</b>		
Yes	▶	GO TO 9.
No	▶	Check control valve again. Repair or replace control valve assembly.

GI

MA

EM

<b>6</b>	<b>CHECK LINE PRESSURE SOLENOID VALVE</b>	
<ol style="list-style-type: none"> <li>Remove control valve assembly. Refer to AT-273.</li> <li>Refer to "Component Inspection", AT-147.</li> </ol>		
<b>OK or NG</b>		
OK	▶	GO TO 7.
NG	▶	Replace solenoid valve assembly.

LC

EC

FE

**AT**

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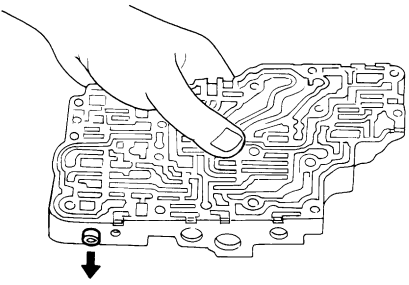
SC

EL

IDX

# DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Diagnostic Procedure (Cont'd)

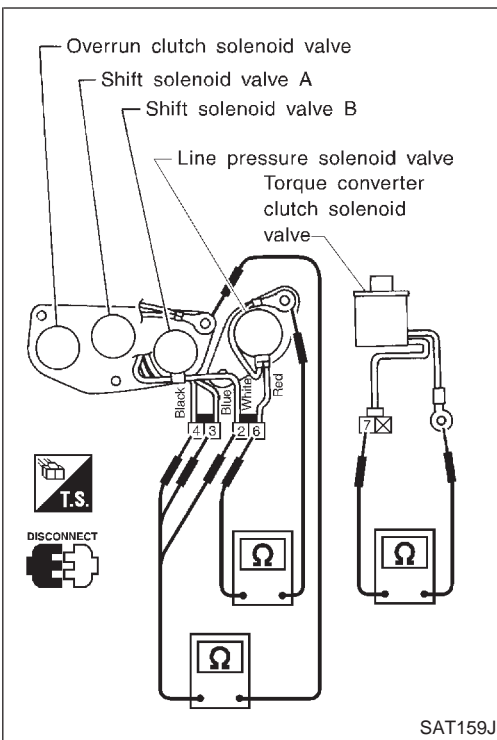
7	CHECK CONTROL VALVE
<p>1. Disassemble control valve assembly. Refer to AT-301.</p> <p>2. Check line pressure circuit valves for sticking.</p> <ul style="list-style-type: none"><li>● Pressure regulator valve</li><li>● Pilot valve</li><li>● Pressure modifier valve</li></ul> <div data-bbox="609 378 1015 661" style="text-align: center;"></div> <p style="text-align: right;">SAT367H</p> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶ GO TO 8.
NG	▶ Repair control valve.

8	CHECK SHIFT UP (D <sub>3</sub> TO D <sub>4</sub> )
<p>Does A/T shift from D<sub>3</sub> to D<sub>4</sub> at the specified speed?</p> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶ GO TO 9.
NG	▶ Check control valve again. Repair or replace control valve assembly.

9	CHECK DTC
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-140.</p> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶ <b>INSPECTION END</b>
NG	▶ Perform "Cruise test — Part 1" again and return to the start point of this flow chart.

# DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Component Inspection



## Component Inspection

NBAT0050

### SOLENOID VALVES

NBAT0050S01

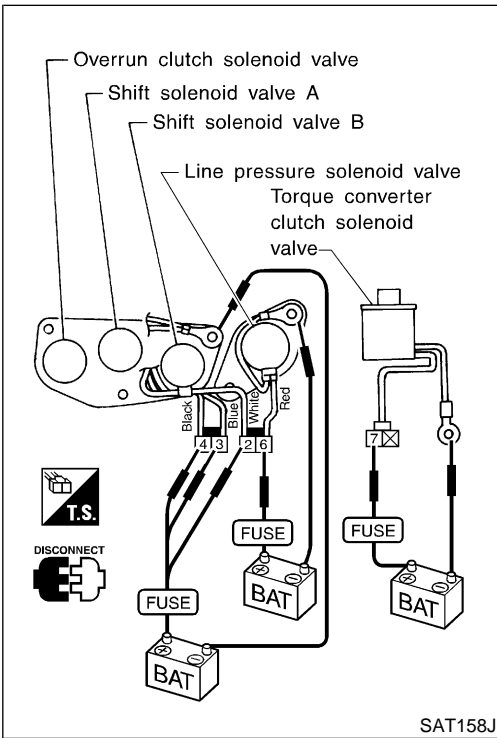
- For removal, refer to AT-273.

### Resistance Check

NBAT0050S0101

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

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



## Operation Check

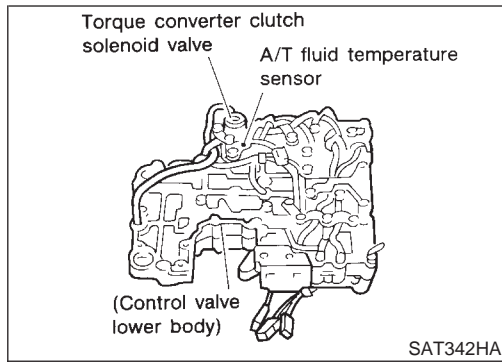
NBAT0050S0102

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

GI  
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IDX

# DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

## Description



## Description

NBAT0051

The torque converter clutch solenoid valve is activated, with the gear in "D<sub>4</sub>", 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

NBAT0051S02


Remarks: Specification data are reference values.

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

## TCM TERMINALS AND REFERENCE VALUE

NBAT0051S03

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

NBAT0051S04

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
(P) : TCC SOLENOID/CIRC (GST) : P0740	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> <li>• Harness or connectors (The solenoid circuit is open or shorted.)</li> <li>• Torque converter clutch solenoid valve</li> </ul>

# DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Description (Cont'd)

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
ACTIVE TEST
DTC & SRT CONFIRMATION
ECM PART NUMBER

SAT020K

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0051S01

### 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".

GI  
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HA  
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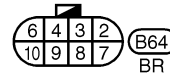
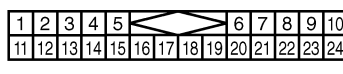
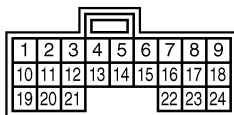
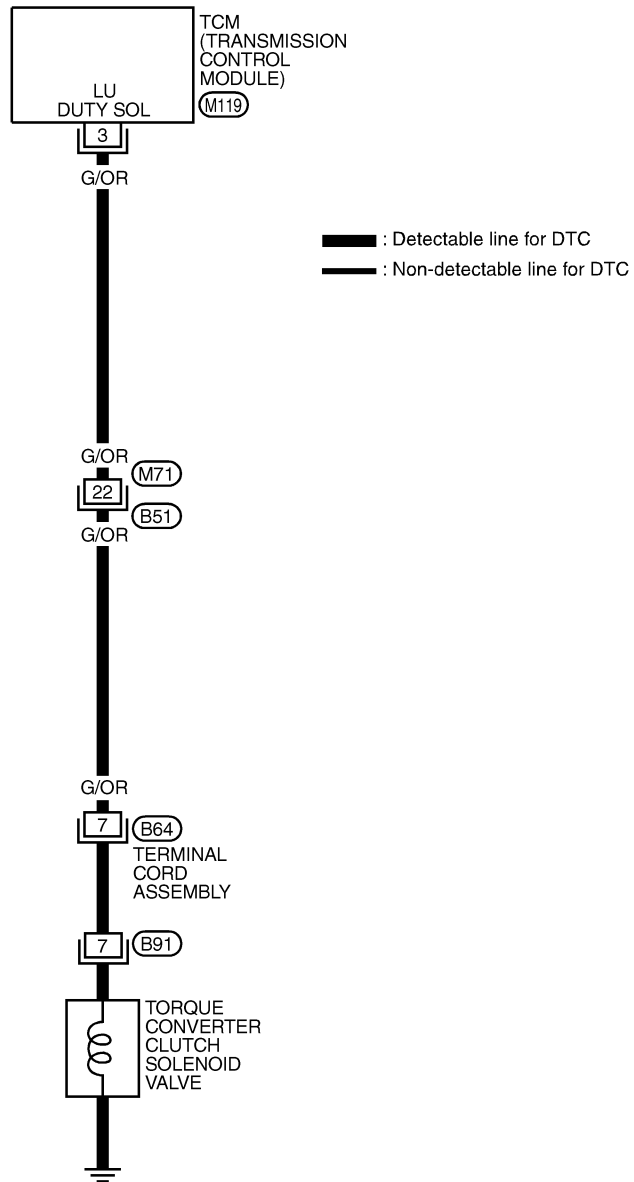
# DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Wiring Diagram — AT — TCV

## Wiring Diagram — AT — TCV

NBAT0194

AT-TCV-01

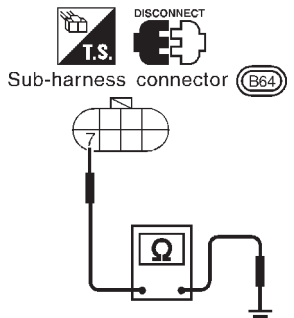


\* : This connector is not shown in "HARNESS LAYOUT" in EL section.

MAT735A

## Diagnostic Procedure

NBAT0052

<b>1</b>	<b>CHECK VALVE RESISTANCE</b>		
		<ol style="list-style-type: none"> <li>1. Turn ignition switch to "OFF" position.</li> <li>2. Disconnect terminal cord assembly connector on the right side of transfer assembly.</li> <li>3. Check resistance between terminal 7 and ground.</li> </ol>	<div style="font-size: small; text-align: right;">GI MA EM LC EC FE</div>
			SAT156J
		<b>Is resistance approx. 10 - 20Ω?</b>	
Yes	▶	GO TO 3.	<b>AT</b>
No	▶	GO TO 2.	

<b>2</b>	<b>CHECK VALVE OPERATION</b>		
		<ol style="list-style-type: none"> <li>1. Remove oil pan. Refer to AT-273.</li> <li>2. Check the following items: <ul style="list-style-type: none"> <li>● Torque converter clutch solenoid valve Refer to "Component Inspection", AT-152.</li> <li>● Harness of terminal cord assembly for short or open</li> </ul> </li> </ol>	<div style="font-size: small; text-align: right;">TF PD AX SU BR</div>
		<b>OK or NG</b>	
OK	▶	GO TO 3.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

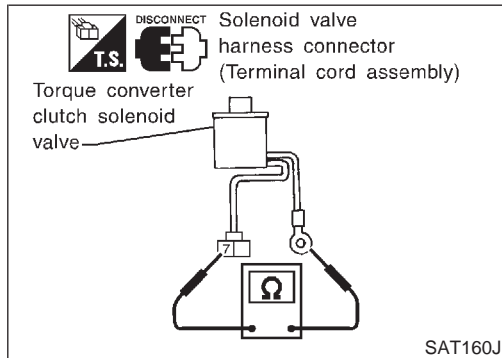
<b>3</b>	<b>CHECK RESISTANCE</b>		
		<ol style="list-style-type: none"> <li>1. Turn ignition switch to "OFF" position.</li> <li>2. Disconnect TCM harness connector.</li> <li>3. Check resistance between terminal 7 and TCM harness connector terminal 3. Refer to wiring diagram — AT — TCV. <b>Continuity should exist.</b> If OK, check harness for short to ground and short to power.</li> <li>4. Reinstall any part removed.</li> </ol>	<div style="font-size: small; text-align: right;">ST RS BT HA</div>
		<b>OK or NG</b>	
OK	▶	GO TO 4.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

<b>4</b>	<b>CHECK DTC</b>		
		Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-149.	<div style="font-size: small; text-align: right;">SC EL IDX</div>
		<b>OK or NG</b>	
OK	▶	<b>INSPECTION END</b>	
NG	▶	GO TO 5.	

# DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Diagnostic Procedure (Cont'd)

<b>5</b>	<b>CHECK TCM INSPECTION</b>	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	Repair or replace damaged parts.



## Component Inspection

### TORQUE CONVERTER CLUTCH SOLENOID VALVE

NBAT0053

NBAT0053S01

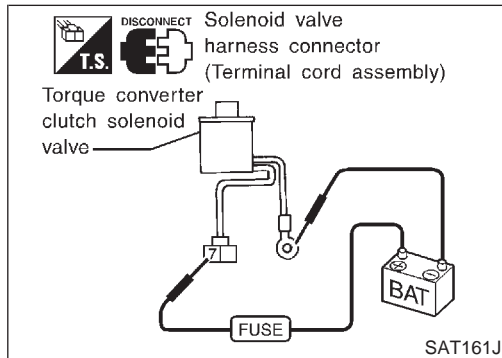
- For removal, refer to AT-273.

### Resistance Check

NBAT0053S0101

- Check resistance between terminal 7 and ground.

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



### Operation Check

NBAT0053S0102

- 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

Description

## Description

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NBAT0054
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction. GI
- 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. MA  
EM  
LC

## CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NBAT0054S02




Remarks: Specification data are reference values.

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

## TCM TERMINALS AND REFERENCE VALUE

NBAT0054S03

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)	
1	GY	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	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

NBAT0054S04

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. SC  
EL  
IDX

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

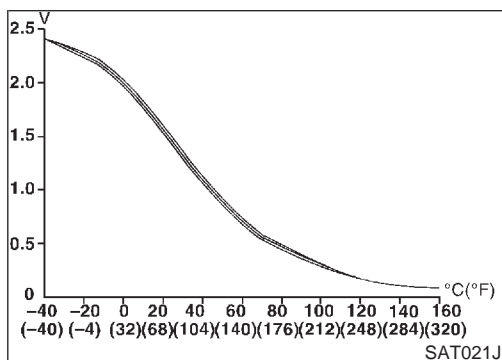
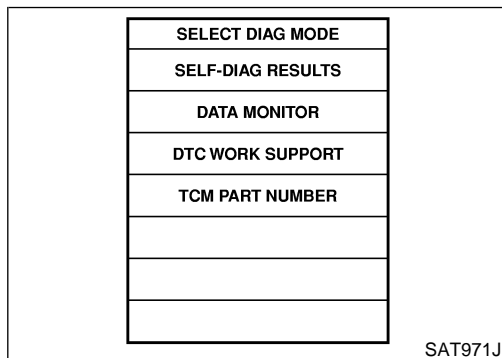
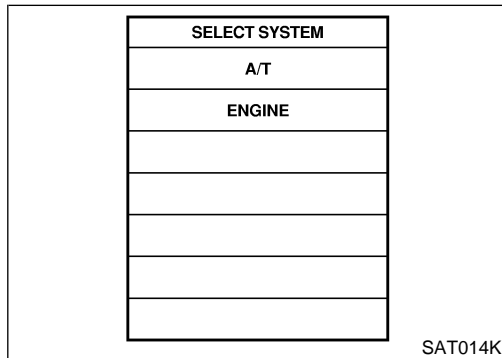
# DTC P0744 IMPROPER LOCK-UP OPERATION

Description (Cont'd)

Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve 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.	<ul style="list-style-type: none"> <li>● Line pressure solenoid valve</li> <li>● Torque converter clutch solenoid valve</li> <li>● Each clutch</li> <li>● Hydraulic control circuit</li> </ul>
: P0744		



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0054S01

### 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 67 to 100 km/h (42 to 62 MPH) and maintain the following condition continuously until “TESTING” has turned to “COMPLETED”. (It will take approximately 30 seconds after “TESTING” shows.)

**THROTTLE POSI: 1.0/8 - 2.0/8 (at all times during step 4)**

**Selector lever: D position (OD “ON”)**

**TCC S/V DUTY: More than 94%**

**VHCL/S SE-A/T: Constant speed of more than 67 to 100 km/h (42 to 62 MPH)**

- Check that “GEAR” shows “4”.
- For shift schedule, refer to SDS, AT-356.

# DTC P0744 IMPROPER LOCK-UP OPERATION

Description (Cont'd)

- 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”.

GI

- 5) Make sure that “OK” is displayed. (If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”.)

MA

Refer to “DIAGNOSTIC PROCEDURE”, AT-157.

Refer to shift schedule, AT-356.

EM

## With GST

Follow the procedure “With CONSULT-II”.

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**AT**

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ST

RS

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HA

SC

EL

IDX

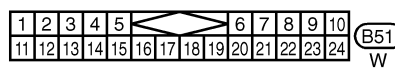
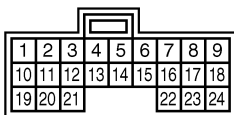
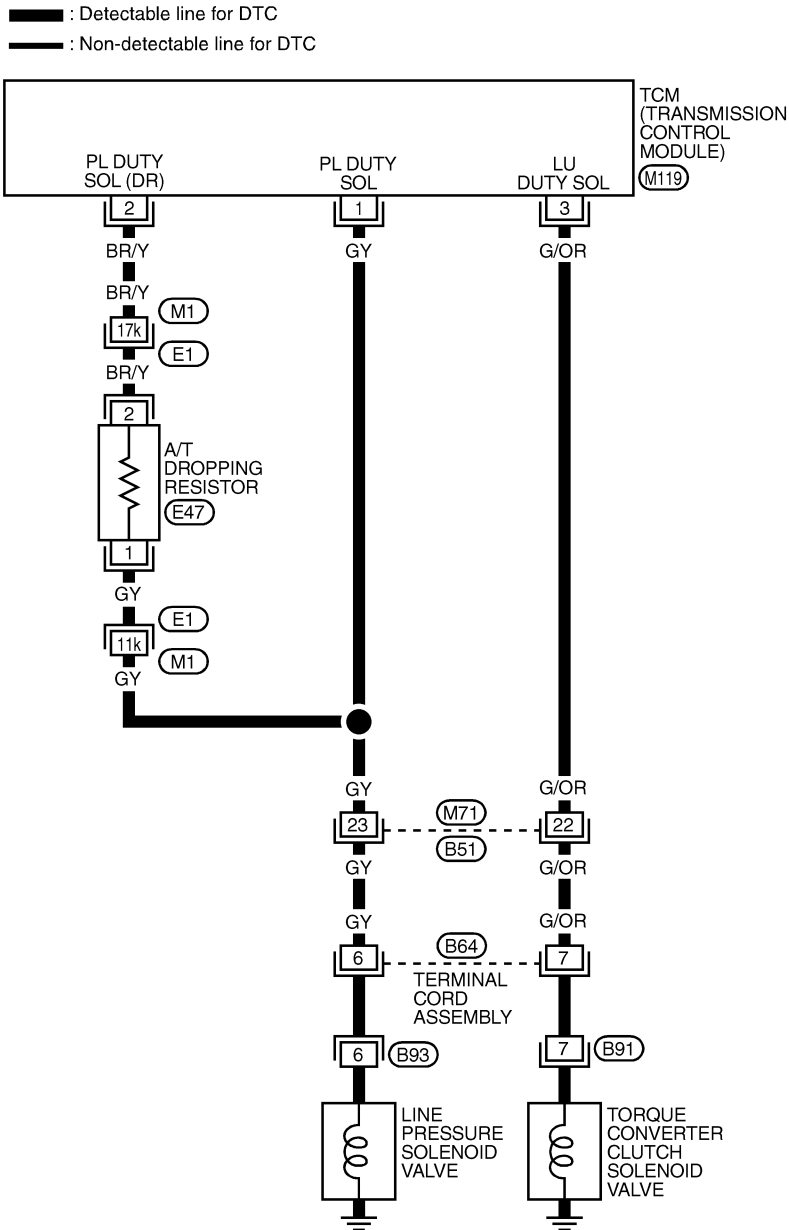
# DTC P0744 IMPROPER LOCK-UP OPERATION

Wiring Diagram — AT — TCCSIG

## Wiring Diagram — AT — TCCSIG

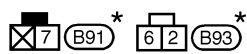
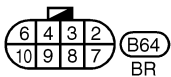
NBAT0195

AT-TCCSIG-01



REFER TO THE FOLLOWING.

(E1) -SUPER MULTIPLE JUNCTION (SMJ)

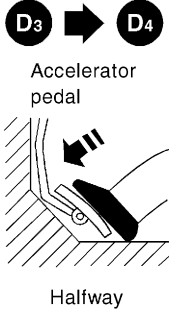


★ : This connector is not shown in "HARNESS LAYOUT" in EL section.

MAT913A

## Diagnostic Procedure

=NBAT0055

<b>1</b>	<b>CHECK SHIFT UP (D<sub>3</sub> TO D<sub>4</sub>)</b>	
During "Cruise test – Part 1", AT-71. Does A/T shift from D <sub>3</sub> to D <sub>4</sub> at the specified speed?		
 <p>Accelerator pedal</p> <p>Halfway</p>		
<b>Yes or No</b>		
Yes	▶	<ul style="list-style-type: none"> <li>● GO TO 10.</li> <li>● And check for proper lock-up.</li> </ul>
No	▶	GO TO 2.

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**AT**

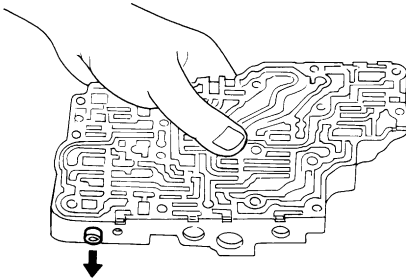
TF

<b>2</b>	<b>CHECK LINE PRESSURE</b>	
Perform line pressure test. Refer to AT-62.		
<b>OK or NG</b>		
OK	▶	GO TO 3.
NG	▶	GO TO 6.

PD

AX

SU

<b>3</b>	<b>CHECK CONTROL VALVE</b>	
1. Disassemble control valve assembly. Refer to AT-301. 2. Check to ensure that: <ul style="list-style-type: none"> <li>● Valve, sleeve and plug slide along valve bore under their own weight.</li> <li>● Valve, sleeve and plug are free from burrs, dents and scratches.</li> <li>● Control valve springs are free from damage, deformation and fatigue.</li> <li>● Hydraulic line is free from obstacles.</li> </ul>		
		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	Repair control valve.

BR

ST

RS

BT

HA

SC

EL

IDX

# DTC P0744 IMPROPER LOCK-UP OPERATION

Diagnostic Procedure (Cont'd)

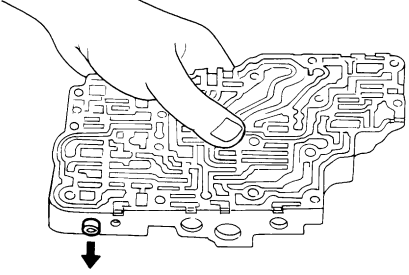
<b>4</b>	<b>CHECK SHIFT UP (D<sub>3</sub> TO D<sub>4</sub>)</b>
Does A/T shift from D <sub>3</sub> to D <sub>4</sub> at the specified speed?	
<b>Yes or No</b>	
Yes	▶ GO TO 5.
No	▶ Check control valve again. Repair or replace control valve assembly.

<b>5</b>	<b>CHECK DTC</b>
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-154.	
<b>OK or NG</b>	
OK	▶ <b>INSPECTION END</b>
NG	▶ <ul style="list-style-type: none"> <li>● GO TO 10.</li> <li>● And check for proper lock-up.</li> </ul>

<b>6</b>	<b>CHECK LINE PRESSURE SOLENOID VALVE</b>
<ol style="list-style-type: none"> <li>1. Remove control valve assembly. Refer to AT-273.</li> <li>2. Check line pressure solenoid valve operation. Refer to AT-161.</li> </ol>	
<b>OK or NG</b>	
OK	▶ GO TO 7.
NG	▶ Replace solenoid valve assembly.

# DTC P0744 IMPROPER LOCK-UP OPERATION

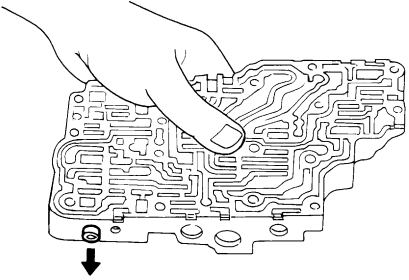
Diagnostic Procedure (Cont'd)

<b>7</b>	<b>CHECK CONTROL VALVE</b>	<p>1. Disassemble control valve assembly. Refer to AT-301.</p> <p>2. Check line pressure circuit valves for sticking.</p> <ul style="list-style-type: none"> <li>● Pressure regulator valve</li> <li>● Pilot valve</li> <li>● Pressure modifier valve</li> </ul> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT367H</p>	
<b>OK or NG</b>			
OK	▶	GO TO 8.	
NG	▶	Repair control valve.	
<b>8</b>	<b>CHECK SHIFT UP (D<sub>3</sub> TO D<sub>4</sub>)</b>		
		Does A/T shift from D <sub>3</sub> to D <sub>4</sub> at the specified speed?	
<b>Yes or No</b>			
Yes	▶	GO TO 9.	
No	▶	Check control valve again. Repair or replace control valve assembly.	
<b>9</b>	<b>CHECK DTC</b>		
		Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-154.	
<b>OK or NG</b>			
OK	▶	<b>INSPECTION END</b>	
NG	▶	<ul style="list-style-type: none"> <li>● GO TO 10.</li> <li>● And check for proper lock-up.</li> </ul>	
<b>10</b>	<b>CHECK LOCK-UP CONDITION</b>		
		During "Cruise test – Part 1", AT-71.	
		Does A/T perform lock-up at the specified speed?	
<b>Yes or No</b>			
Yes	▶	Perform "Cruise test – Part 1" again and return to the start point of this flow chart.	
No	▶	GO TO 11.	
<b>11</b>	<b>CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE</b>		
		1. Remove control valve assembly. Refer to AT-273.	
		2. Check torque converter clutch solenoid valve operation.	
		Refer to AT-161.	
<b>OK or NG</b>			
OK	▶	GO TO 12.	
NG	▶	Replace solenoid valve assembly.	

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# DTC P0744 IMPROPER LOCK-UP OPERATION

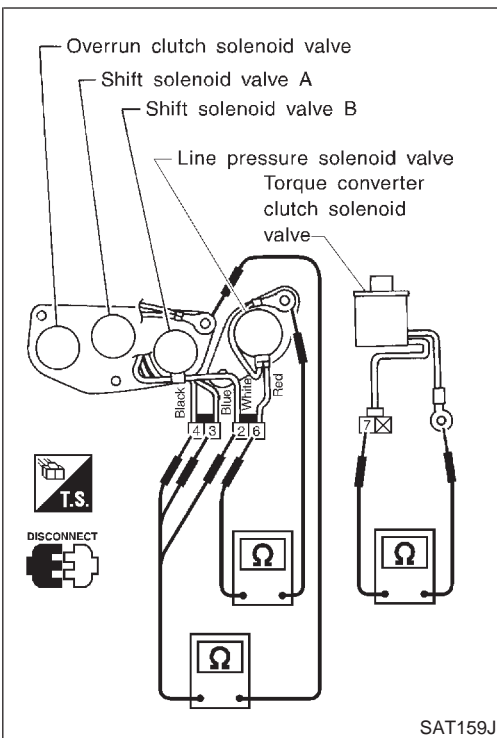
Diagnostic Procedure (Cont'd)

12		CHECK CONTROL VALVE
1. Disassemble control valve assembly. Refer to AT-301. 2. Check control valves for sticking. <ul style="list-style-type: none"><li>● Torque converter clutch control valve</li><li>● Torque converter clutch relief valve</li></ul>		
		
SAT367H		
<b>OK or NG</b>		
OK	▶	GO TO 13.
NG	▶	Repair control valve

13		CHECK LOCK-UP CONDITION
Does A/T perform lock-up at the specified speed?		
<b>Yes or No</b>		
Yes	▶	GO TO 14.
No	▶	Check control valve again. Repair or replace control valve assembly.

14		CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-154.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	Perform "Cruise test — Part 1" again and return to the start point of this flow chart.





## Component Inspection

NBAT0056

### SOLENOID VALVES

NBAT0056S01

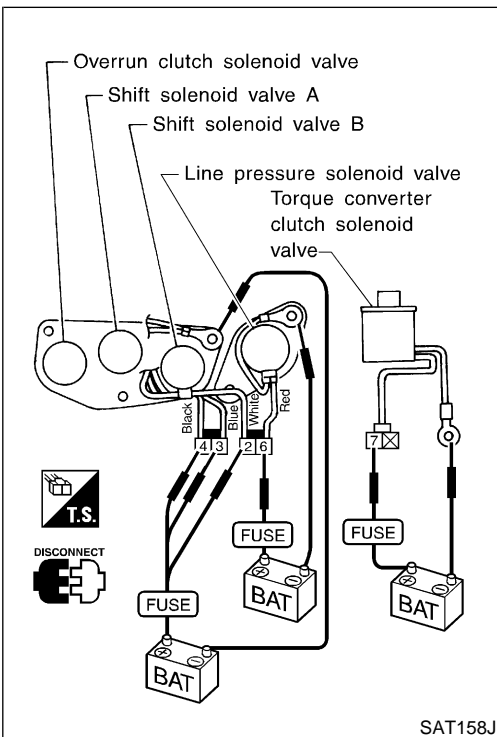
- For removal, refer to AT-273.

### Resistance Check

NBAT0056S0101

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

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



### Operation Check

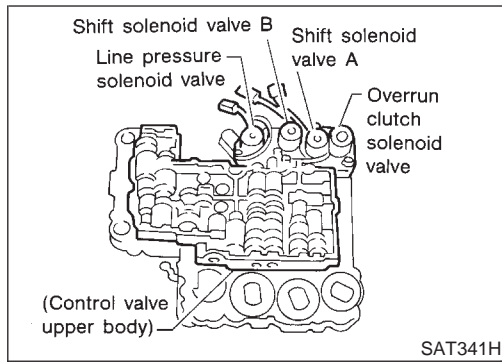
NBAT0056S0102

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

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# DTC P0745 LINE PRESSURE SOLENOID VALVE

## Description



## Description

NBAT0057

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

NBAT0057S02

Remarks: Specification data are reference values.

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



### NOTE:

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

## TCM TERMINALS AND REFERENCE VALUE



NBAT0057S03

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)	
1	GY	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	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

NBAT0057S04

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.	<ul style="list-style-type: none"> <li>• Harness or connectors (The solenoid circuit is open or shorted.)</li> <li>• Line pressure solenoid valve</li> </ul>
 : P0745		

# DTC P0745 LINE PRESSURE SOLENOID VALVE

Description (Cont'd)

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
ACTIVE TEST
DTC & SRT CONFIRMATION
ECM PART NUMBER

SAT020K

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0057S01

### 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".

GI  
MA  
EM  
LC  
EC  
FE  
**AT**  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

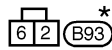
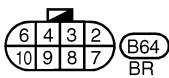
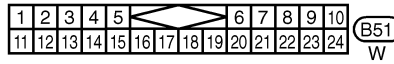
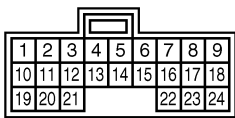
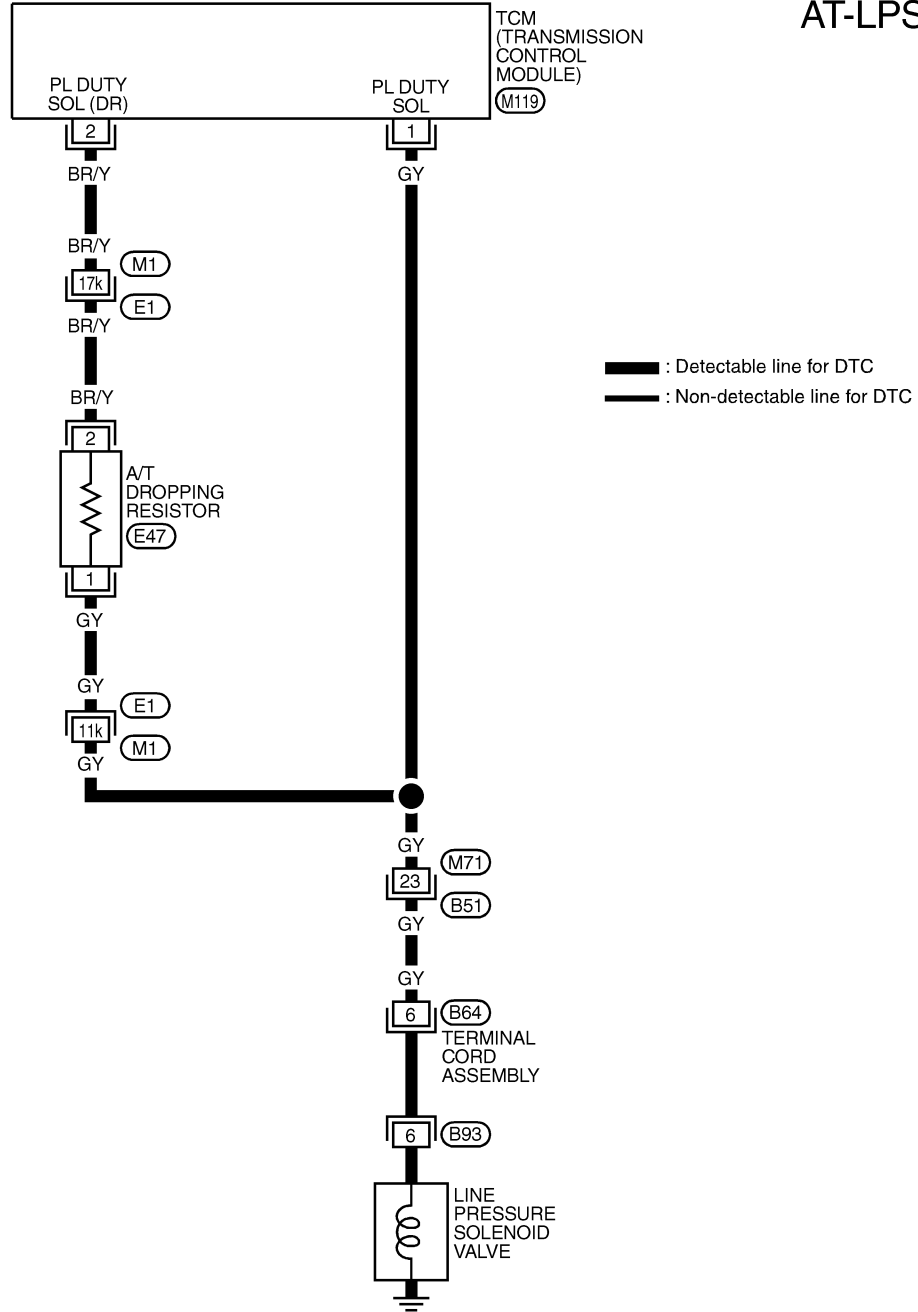
# DTC P0745 LINE PRESSURE SOLENOID VALVE

Wiring Diagram — AT — LPSV

## Wiring Diagram — AT — LPSV

NBAT0196

AT-LPSV-01



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

REFER TO THE FOLLOWING.

(E1) -SUPER MULTIPLE JUNCTION (SMJ)

MAT914A

# DTC P0745 LINE PRESSURE SOLENOID VALVE

Diagnostic Procedure

## Diagnostic Procedure

NBAT0058

<b>1</b>	<b>CHECK VALVE RESISTANCE</b>	
<p>1. Turn ignition switch to "OFF" position.                  2. Disconnect terminal cord assembly connector on the right side of transfer assembly.                  3. Check resistance between terminal 6 and ground.</p> <div style="text-align: center;"> <p>Sub-harness connector (B64)</p> </div> <p style="text-align: right;">SAT162J</p> <p style="text-align: center;"><b>Is resistance approx. 2.5 - 5Ω?</b></p>		
Yes	▶	GO TO 3.
No	▶	GO TO 2.

<b>2</b>	<b>CHECK VALVE OPERATION</b>	
<p>1. Remove control valve assembly.                  Refer to AT-273.</p> <p>2. Check the following items:</p> <ul style="list-style-type: none"> <li>● Line pressure solenoid valve                      Refer to "Component Inspection", AT-167.</li> <li>● Harness of terminal cord assembly for short or open</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 3.
NG	▶	Repair or replace damaged parts.

GI  
MA  
EM  
LC  
EC  
FE  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# DTC P0745 LINE PRESSURE SOLENOID VALVE

Diagnostic Procedure (Cont'd)

<b>3</b>	<b>CHECK POWER SOURCE AND DROPPING RESISTOR CIRCUIT</b>
<p>1. Turn ignition switch to "OFF" position.                  2. Disconnect TCM harness connector.                  3. Check resistance between terminal 6 and TCM harness connector terminal 2.</p>	
SAT522J	
<b>Is resistance approx. 11.2 - 12.8Ω?</b>	
Yes	▶ GO TO 5.
No	▶ GO TO 4.

<b>4</b>	<b>DETECT MALFUNCTIONING ITEM</b>
<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● Dropping resistor Refer to "Component Inspection", AT-167.</li> <li>● Harness for short or open between TCM terminal 2 and terminal cord assembly (Main harness)</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶ GO TO 5.
NG	▶ Repair or replace damaged parts.

<b>5</b>	<b>CHECK POWER SOURCE CIRCUIT</b>
<p>1. Turn ignition switch to "OFF" position.                  2. Check continuity between terminal 6 and TCM harness connector terminal 1. Refer to wiring diagram — AT — LPSV.  <b>Continuity should exist.</b>                  If OK, check harness for short to ground or to power.                  3. Reinstall any part removed.</p>	
Yes	▶ GO TO 6.
No	▶ Repair or replace harness between TCM terminal 1 and terminal cord assembly.

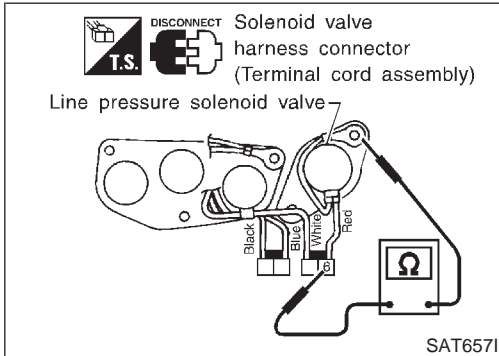
<b>6</b>	<b>CHECK DTC</b>
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-163.</p> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶ <b>INSPECTION END</b>
NG	▶ GO TO 7.

# DTC P0745 LINE PRESSURE SOLENOID VALVE

Diagnostic Procedure (Cont'd)

<b>7</b>	<b>CHECK TCM INSPECTION</b>	
	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.	
	<b>OK or NG</b>	
OK	▶	<b>INSPECTION END</b>
NG	▶	Repair or replace damaged parts.

GI  
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FE  
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TF  
PD  
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BT  
HA  
SC  
EL  
IDX



## Component Inspection LINE PRESSURE SOLENOID VALVE

NBAT0059

NBAT0059S01

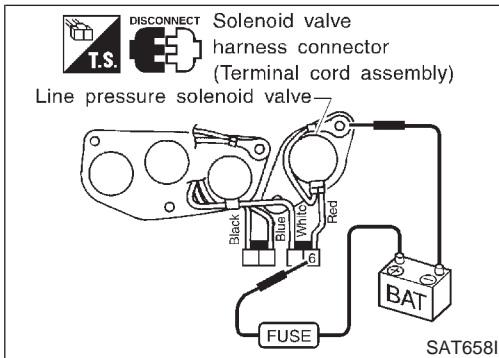
- For removal, refer to AT-273.

### Resistance Check

NBAT0059S0101

- Check resistance between terminal 6 and ground.

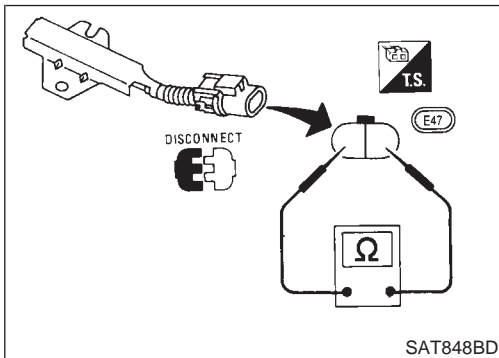
Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	6	Ground	2.5 - 5Ω



### Operation Check

NBAT0059S0102

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



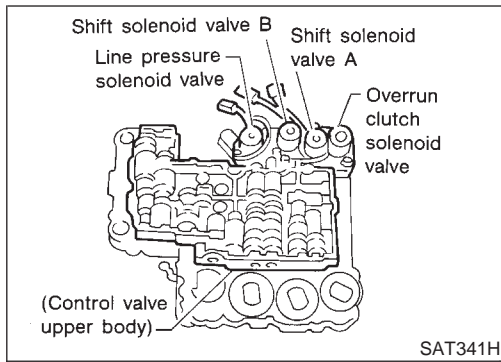
### DROPPING RESISTOR

NBAT0059S02

- Check resistance between two terminals.  
**Resistance: 11.2 - 12.8Ω**

# DTC P0750 SHIFT SOLENOID VALVE A

## Description



## Description

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


NBAT0060

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



NBAT0060S02

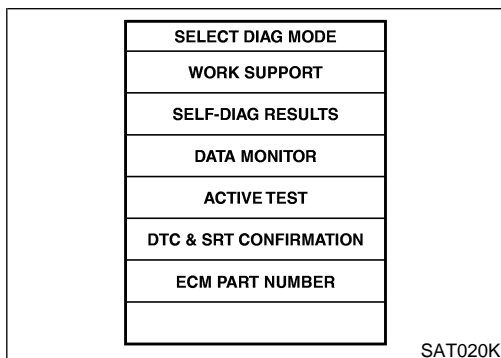
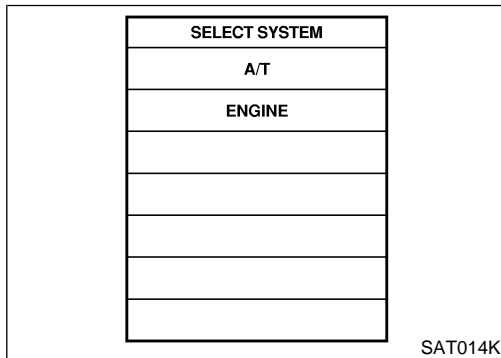
Remarks: Specification data are reference values.

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 <sub>1</sub> " or "D <sub>4</sub> ".)	Battery voltage
			When shift solenoid valve A does not operate. (When driving in "D <sub>2</sub> " or "D <sub>3</sub> ".)	0V

## ON BOARD DIAGNOSIS LOGIC

NBAT0060S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 : SFT SOL A/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> <li>• Harness or connectors (The solenoid circuit is open or shorted.)</li> <li>• Shift solenoid valve A</li> </ul>
 : P0750		



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0060S01

### CAUTION:

Always drive vehicle at a safe speed.

### NOTE:

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

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

### With CONSULT-II

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

### With GST

Follow the procedure "With CONSULT-II".



# DTC P0750 SHIFT SOLENOID VALVE A

Wiring Diagram — AT — SSV/A

## Wiring Diagram — AT — SSV/A

NBAT0197

AT-SSV/A-01

GI

MA

EM

LC

EC

FE

**AT**

TF

PD

AX

SU

BR

ST

RS

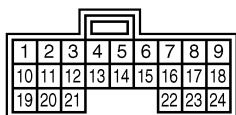
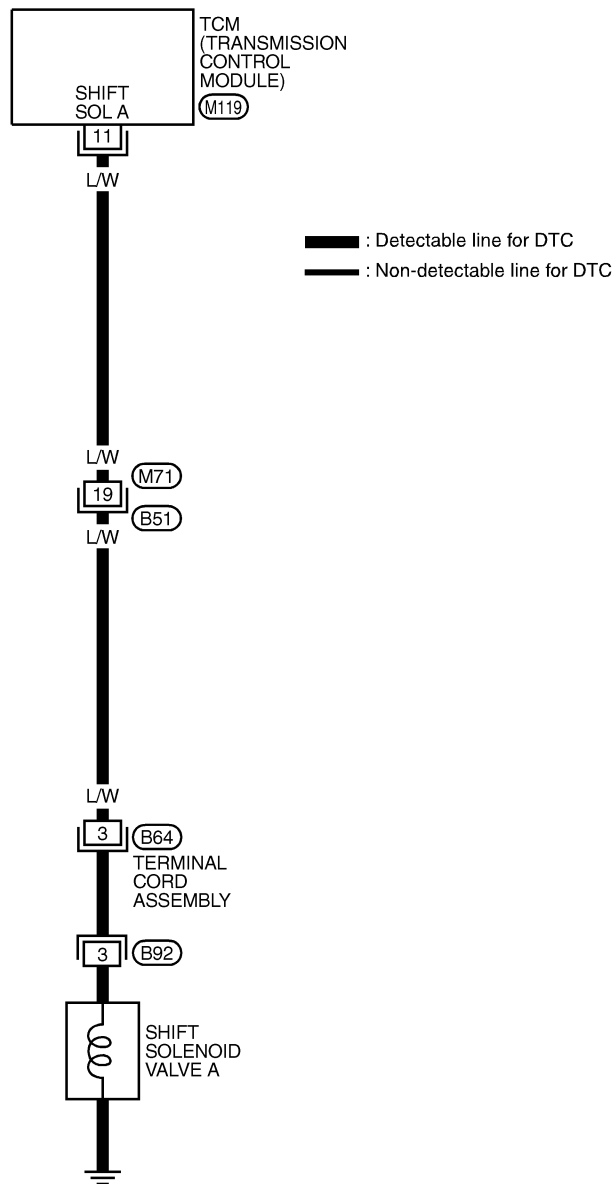
BT

HA

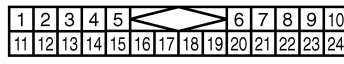
SC

EL

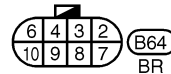
IDX



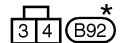
M119  
W



B51  
W



B64  
BR



3 4 B92\*

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

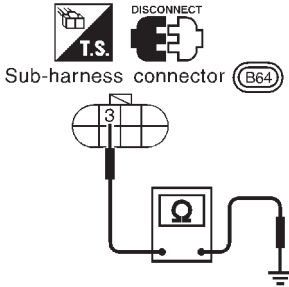
MAT738A

# DTC P0750 SHIFT SOLENOID VALVE A

Diagnostic Procedure

## Diagnostic Procedure

NBAT0061

<b>1</b>	<b>CHECK VALVE RESISTANCE</b>	
<ol style="list-style-type: none"> <li>Turn ignition switch to "OFF" position.</li> <li>Disconnect terminal cord assembly connector on the right side of transfer assembly.</li> <li>Check resistance between terminal 3 and ground.</li> </ol>		
 <p>Sub-harness connector (B64)</p>		
<p><b>Is resistance approx. 20 - 40Ω?</b></p>		
Yes	▶	GO TO 3.
No	▶	GO TO 2.

SAT164J

<b>2</b>	<b>CHECK VALVE OPERATION</b>	
<ol style="list-style-type: none"> <li>Remove control valve assembly. Refer to AT-273.</li> <li>Check the following items: <ul style="list-style-type: none"> <li>Shift solenoid valve A Refer to "Component Inspection", AT-171.</li> <li>Harness of terminal cord assembly for short or open</li> </ul> </li> </ol>		
<b>OK or NG</b>		
OK	▶	GO TO 3.
NG	▶	Repair or replace damaged parts.

<b>3</b>	<b>CHECK POWER SOURCE CIRCUIT</b>	
<ol style="list-style-type: none"> <li>Turn ignition switch to "OFF" position.</li> <li>Disconnect TCM harness connector.</li> <li>Check resistance between terminal 3 and TCM harness connector terminal 11. Refer to wiring diagram — AT — SSV/A. <b>Continuity should exist.</b> If OK, check harness for short to ground and short to power.</li> <li>Reinstall any part removed.</li> </ol>		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

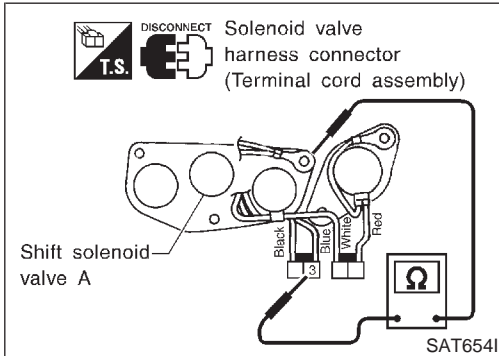
<b>4</b>	<b>CHECK DTC</b>	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-168.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	GO TO 5.

# DTC P0750 SHIFT SOLENOID VALVE A

Diagnostic Procedure (Cont'd)

<b>5</b>	<b>CHECK TCM INSPECTION</b>	
	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.	
	<b>OK or NG</b>	
OK	▶	<b>INSPECTION END</b>
NG	▶	Repair or replace damaged parts.

GI  
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LC  
EC  
FE  
AT  
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PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX



## Component Inspection SHIFT SOLENOID VALVE A

NBAT0062

NBAT0062S01

- For removal, refer to AT-273.

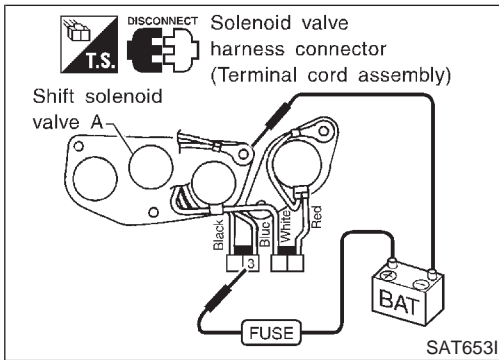
### Resistance Check

NBAT0062S0101

- Check resistance between terminal 3 and ground.

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

AT



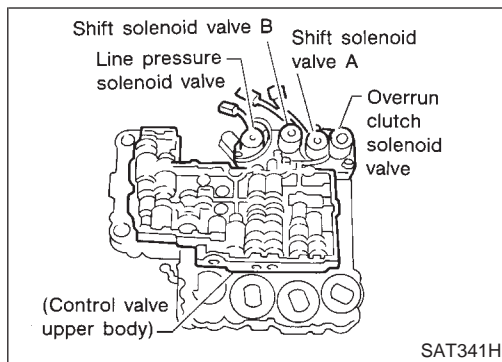
### Operation Check

NBAT0062S0102

- 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

## Description



## Description

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


NBAT0063

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



NBAT0063S02

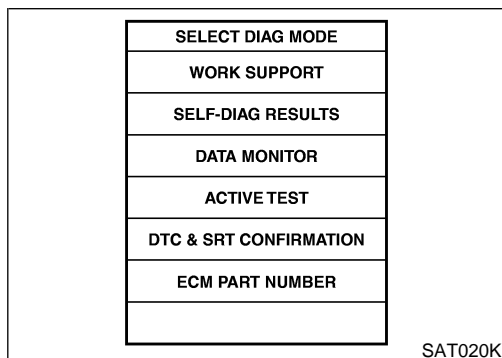
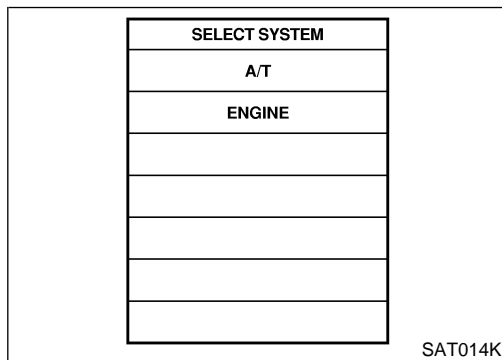
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)
12	L/R	Shift solenoid valve B	 When shift solenoid valve B operates. (When driving in "D <sub>1</sub> " or "D <sub>2</sub> ".)	Battery voltage
			When shift solenoid valve B does not operate. (When driving in "D <sub>3</sub> " or "D <sub>4</sub> ".)	0V

## ON BOARD DIAGNOSIS LOGIC

NBAT0063S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 : SFT SOL B/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> <li>• Harness or connectors (The solenoid circuit is open or shorted.)</li> <li>• Shift solenoid valve B</li> </ul>
 : P0755		



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0063S01

### 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".

# DTC P0755 SHIFT SOLENOID VALVE B

Wiring Diagram — AT — SSV/B

## Wiring Diagram — AT — SSV/B

NBAT0198

AT-SSV/B-01

GI

MA

EM

LC

EC

FE

**AT**

TF

PD

AX

SU

BR

ST

RS

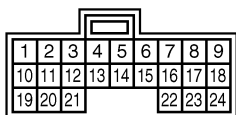
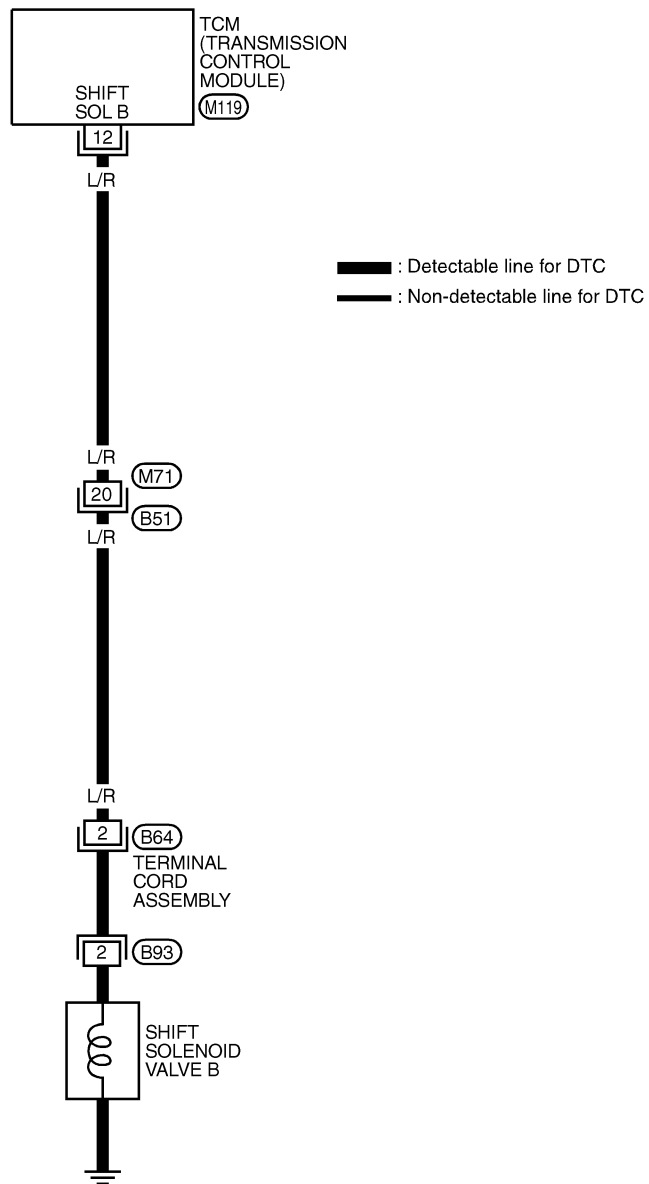
BT

HA

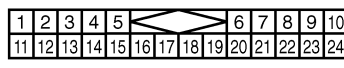
SC

EL

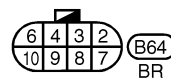
IDX



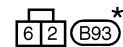
(M119)  
W



(B51)  
W



(B64)  
BR



(B93)\*

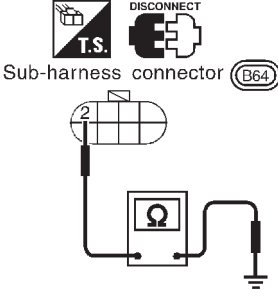
\* : This connector is not shown in "HARNESS LAYOUT" in EL section.

# DTC P0755 SHIFT SOLENOID VALVE B

Diagnostic Procedure

## Diagnostic Procedure

NBAT0064

<b>1</b>	<b>CHECK VALVE RESISTANCE</b>	
<p>1. Turn ignition switch to "OFF" position.                  2. Disconnect terminal cord assembly connector on the right side of transfer assembly.                  3. Check resistance between terminal 2 and ground.</p> <div style="text-align: center;">  <p>Sub-harness connector (B64)</p> </div> <p style="text-align: right;">SAT166J</p>		
<b>Is resistance approx. 20 - 40Ω?</b>		
Yes	▶	GO TO 3.
No	▶	GO TO 2.

<b>2</b>	<b>CHECK VALVE OPERATION</b>	
<p>1. Remove control valve assembly.                  Refer to AT-273.                  2. Check the following items:</p> <ul style="list-style-type: none"> <li>● Shift solenoid valve B                      Refer to "Component Inspection", AT-175.</li> <li>● Harness of terminal cord assembly for short or open</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 3.
NG	▶	Repair or replace damaged parts.

<b>3</b>	<b>CHECK POWER SOURCE CIRCUIT</b>	
<p>1. Turn ignition switch to "OFF" position.                  2. Disconnect TCM harness connector.                  3. Check resistance between terminal 2 and TCM harness connector terminal 12. Refer to wiring diagram — AT — SSV/B.  <b>Continuity should exist.</b>                  If OK, check harness for short to ground and short to power.                  4. Reinstall any part removed.</p> <p style="text-align: center;"><b>Is resistance approx. 0Ω?</b></p>		
Yes	▶	GO TO 4.
No	▶	Repair open circuit or short to ground or short to power in harness or connectors.

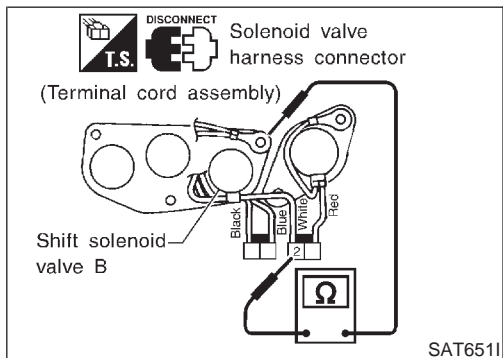
<b>4</b>	<b>CHECK DTC</b>	
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-172.</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	<b>INSPECTION END</b>
NG	▶	GO TO 5.

# DTC P0755 SHIFT SOLENOID VALVE B

Diagnostic Procedure (Cont'd)

<b>5</b>	<b>CHECK TCM INSPECTION</b>	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	Repair or replace damaged parts.

GI  
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PD  
AX  
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BR  
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SC  
EL  
IDX



## Component Inspection SHIFT SOLENOID VALVE B

NBAT0065

- For removal, refer to AT-273.

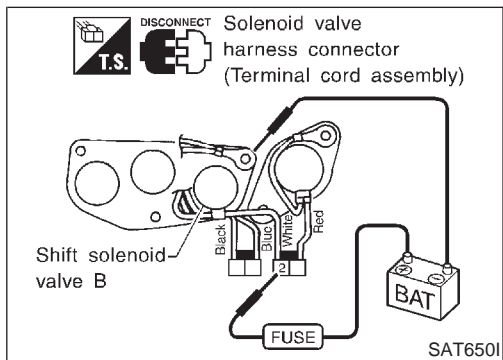
NBAT0065S01

### Resistance Check

NBAT0065S0101

- Check resistance between terminal 2 and ground.

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



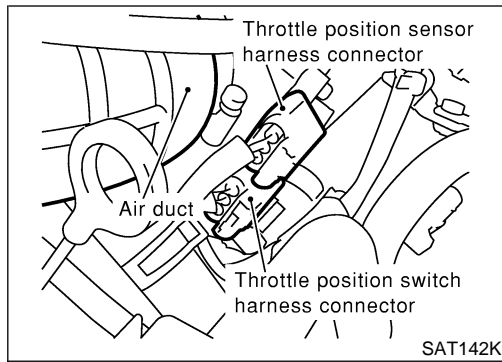
### Operation Check

NBAT0065S0102

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

# DTC P1705 THROTTLE POSITION SENSOR

## Description



## Description

NBAT0066

- 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

NBAT0066S02

Remarks: Specification data are reference values.

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

## TCM TERMINALS AND REFERENCE VALUE

NBAT0066S03

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)
16	OR/W	Closed throttle position switch (in throttle position switch)	When releasing accelerator pedal after warming up engine. [Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.]	Battery voltage
			When depressing accelerator pedal after warming up engine. [Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.]	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	P/B	Throttle position sensor (Power source)	Ignition switch "ON".	4.5 - 5.5V
			Ignition switch "OFF".	0V
41	P	Throttle position sensor	When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.5 - 0.7V Fully-open throttle: 4V
42	B	Throttle position sensor (Ground)	—	—





# DTC P1705 THROTTLE POSITION SENSOR

Description (Cont'd)

## ON BOARD DIAGNOSIS LOGIC

NBAT0066S04

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: TP SEN/CIRC A/T : P1705	TCM receives an excessively low or high voltage from the sensor.	<ul style="list-style-type: none"> <li>• Harness or connectors (The solenoid circuit is open or shorted.)</li> <li>• Throttle position sensor</li> <li>• Throttle position switch</li> </ul>

GI

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BR

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IDX

SELECT SYSTEM
A/T
ENGINE

SAT014K

### DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0066S01

#### 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 steps 1 and 2 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.

SELECT DIAG MODE
SELF-DIAG RESULTS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT971J

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

SELECT SYSTEM
A/T
ENGINE

SAT014K

If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-180.

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 (OD "ON")**

If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-180.

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 (OD "ON")**

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
ACTIVE TEST
DTC & SRT CONFIRMATION
ECM PART NUMBER

SAT020K

## DTC P1705 THROTTLE POSITION SENSOR

*Description (Cont'd)*

---



**With GST**

Follow the procedure "With CONSULT-II".

# DTC P1705 THROTTLE POSITION SENSOR

Wiring Diagram — AT — TPS

## Wiring Diagram — AT — TPS

NBAT0199

AT-TPS-01

GI

MA

EM

LC

EC

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**AT**

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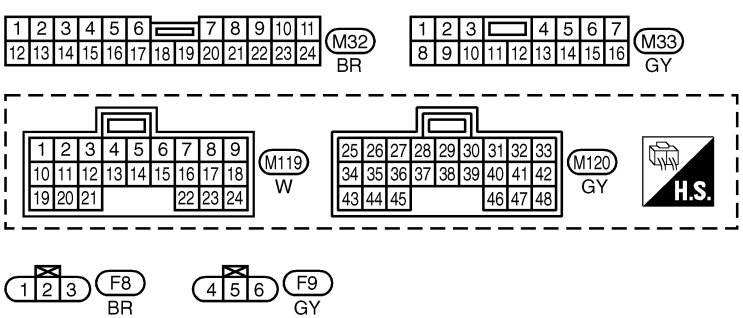
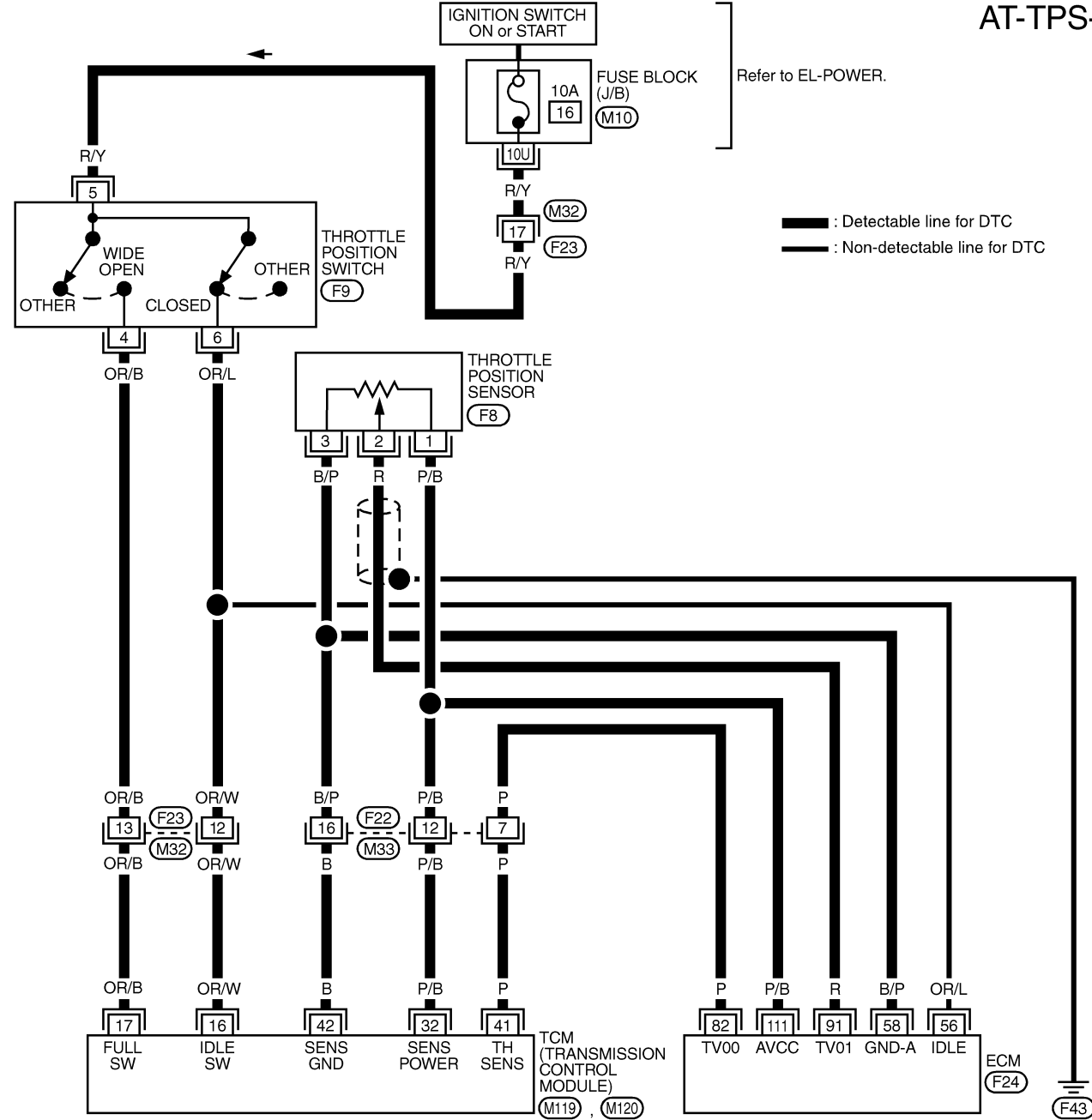
BT

HA

SC

EL

IDX



REFER TO THE FOLLOWING.

(M10) - FUSE BLOCK - JUNCTION BOX (J/B)

(F24) - ELECTRICAL UNITS

# DTC P1705 THROTTLE POSITION SENSOR

Diagnostic Procedure

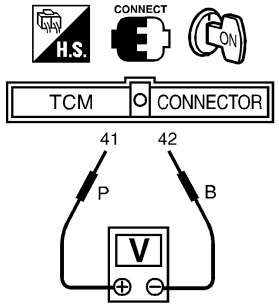
## Diagnostic Procedure

NBAT0067

<b>1</b>	<b>CHECK DTC WITH ECM</b>
<ul style="list-style-type: none"><li>● Check P code CONSULT-II "ENGINE". Turn ignition switch "ON" and select "SELF-DIAG RESULTS" mode for "ENGINE" with CONSULT-II. Refer to EC-74, "DESCRIPTION".</li></ul> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶ GO TO 2.
NG	▶ Check throttle position sensor circuit for engine control. Refer to EC-167, "Description".

# DTC P1705 THROTTLE POSITION SENSOR

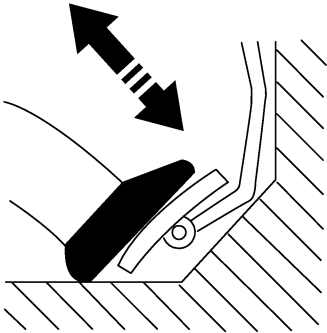
Diagnostic Procedure (Cont'd)

2	CHECK INPUT SIGNAL														
	<p><b>With CONSULT-II</b></p> <ol style="list-style-type: none"> <li>Turn ignition switch to "ON" position. (Do not start engine.)</li> <li>Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</li> <li>Read out the value of "THRTL POS SEN".</li> </ol> <p><b>Voltage:</b>  <b>Fully-closed throttle:</b>                      Approximately 0.5 - 0.7V  <b>Fully-open throttle:</b>                      Approximately 4V</p> <table border="1" data-bbox="682 504 941 829"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th colspan="2">MONITORING</th> </tr> </thead> <tbody> <tr> <td>VHCL/S SE-A/T</td> <td>XXX km/h</td> </tr> <tr> <td>VHCL/S SE-MTR</td> <td>XXX km/h</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>FLUID TEMP SE</td> <td>XXX V</td> </tr> <tr> <td>BATTERY VOLT</td> <td>XXX V</td> </tr> </tbody> </table> <p style="text-align: right;">SAT614J</p>	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
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														
	<p><b>Without CONSULT-II</b></p> <ol style="list-style-type: none"> <li>Turn ignition switch to "ON" position. (Do not start engine.)</li> <li>Check voltage between TCM terminals 41 and 42 while accelerator pedal is depressed slowly.</li> </ol> <p><b>Voltage:</b>  <b>Fully-closed throttle valve:</b>                      Approximately 0.5 - 0.7V  <b>Fully-open throttle valve:</b>                      Approximately 4V                      (Voltage rises gradually in response to throttle position.)</p>  <p style="text-align: center;"><b>OK or NG</b></p> <p style="text-align: right;">SAT513J</p>														
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)														

GI  
MA  
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**AT**  
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PD  
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SC  
EL  
IDX

# DTC P1705 THROTTLE POSITION SENSOR

Diagnostic Procedure (Cont'd)

<b>3</b>	<b>CHECK THROTTLE POSITION SWITCH CIRCUIT (With CONSULT-II)</b>															
<p><b>With CONSULT-II</b></p> <ol style="list-style-type: none"> <li>1. Turn ignition switch to "ON" position. (Do not start engine.)</li> <li>2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</li> <li>3. Apply vacuum to the throttle opener, then check the following. Refer to steps 1 and 2 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.</li> <li>4. 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.</li> </ol>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th rowspan="2">Accelerator pedal condition</th> <th colspan="2">Data monitor</th> </tr> <tr> <th>CLOSED THL/SW</th> <th>W/O THRL/P-SW</th> </tr> <tr> <td>Released</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>Fully depressed</td> <td style="text-align: center;">OFF</td> <td style="text-align: center;">ON</td> </tr> </table>			Accelerator pedal condition	Data monitor		CLOSED THL/SW	W/O THRL/P-SW	Released	ON	OFF	Fully depressed	OFF	ON			
Accelerator pedal condition	Data monitor															
	CLOSED THL/SW	W/O THRL/P-SW														
Released	ON	OFF														
Fully depressed	OFF	ON														
<p>MTBL0011</p>																
<div style="display: flex; justify-content: space-around; align-items: center;">  <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th></th> </tr> </thead> <tbody> <tr> <td>POWERSHIFT SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>CLOSED THL/SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>W/OTHRL/P-SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>HOLD SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>BRAKE SW</td> <td style="text-align: center;">ON</td> </tr> </tbody> </table> </div>			DATA MONITOR		MONITORING		POWERSHIFT SW	OFF	CLOSED THL/SW	OFF	W/OTHRL/P-SW	OFF	HOLD SW	OFF	BRAKE SW	ON
DATA MONITOR																
MONITORING																
POWERSHIFT SW	OFF															
CLOSED THL/SW	OFF															
W/OTHRL/P-SW	OFF															
HOLD SW	OFF															
BRAKE SW	ON															
<p><b>OK or NG</b></p>																
OK	▶	GO TO 6.														
NG	▶	GO TO 4.														

<b>4</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● Throttle position switch Refer to "Component Inspection", AT-184.</li> <li>● Harness for short or open between ignition switch and throttle position switch (Main harness)</li> <li>● Harness for short or open between throttle position switch and TCM (Main harness)</li> </ul>		
<p><b>OK or NG</b></p>		
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

# DTC P1705 THROTTLE POSITION SENSOR

Diagnostic Procedure (Cont'd)

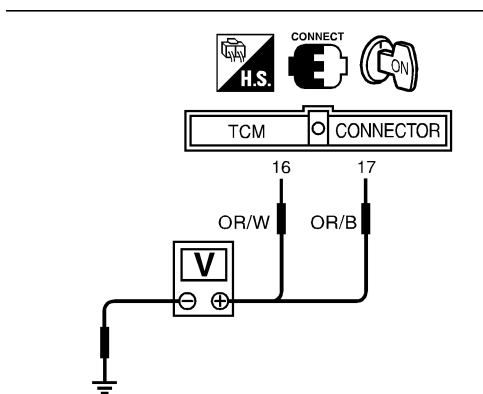
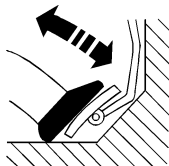
## 5 CHECK THROTTLE POSITION SWITCH CIRCUIT (Without CONSULT-II)

**⊗ Without CONSULT-II**

1. Turn ignition switch to "ON" position.  
(Do not start engine.)
2. Check voltage between TCM terminals 16, 17 and ground while depressing, and releasing accelerator pedal slowly.  
(after warming up engine)  
[Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.]

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

MTBL0519



SAT526J

**OK or NG**

OK	▶	GO TO 6.
NG	▶	GO TO 4.

## 6 CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-177.

**OK or NG**

OK	▶	<b>INSPECTION END</b>
NG	▶	GO TO 7.

## 7 CHECK TCM INSPECTION

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

**OK or NG**

OK	▶	<b>INSPECTION END</b>
NG	▶	Repair or replace damaged parts.

GI

MA

EM

LC

EC

FE

**AT**

TF

PD

AX

SU

BR

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RS

BT

HA

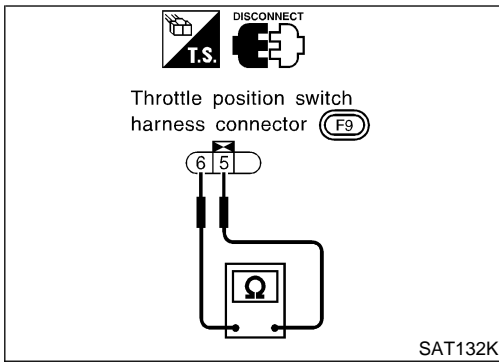
SC

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# DTC P1705 THROTTLE POSITION SENSOR

## Component Inspection



## Component Inspection

### THROTTLE POSITION SWITCH

NBAT0205

NBAT0205S01

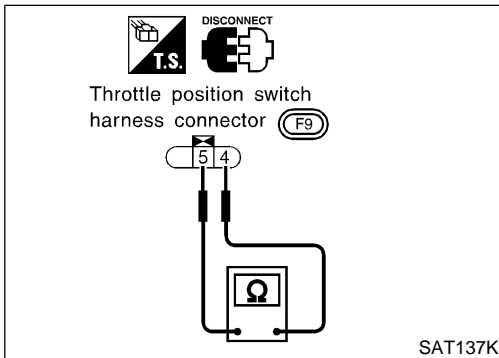
NBAT0205S0101

#### Closed Throttle Position Switch (Idle position)

- Check continuity between terminals 5 and 6.  
[Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.]

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

- To adjust closed throttle position switch, refer to EC-151, "System Description".



#### Wide Open Throttle Position Switch

NBAT0205S0102

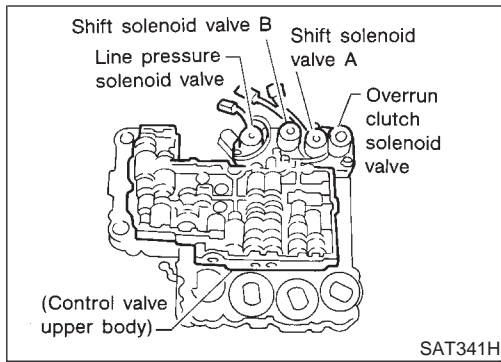
- Check continuity between terminals 4 and 5.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes



# DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Description



## Description

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

NBAT0068

GI

MA


EM

LC

## TCM TERMINALS AND REFERENCE VALUE

NBAT0068S02

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

EC



FE

AT

TF

## ON BOARD DIAGNOSIS LOGIC

NBAT0068S03

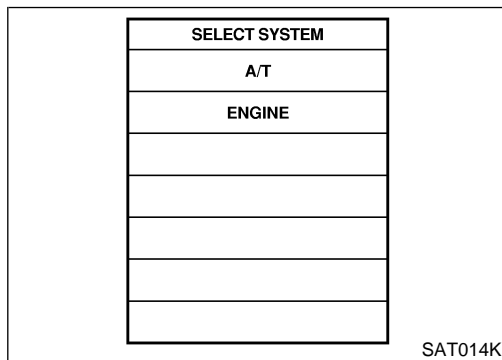
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 : O/R CLTCH SOL/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> <li>● Harness or connectors (The solenoid circuit is open or shorted.)</li> <li>● Overrun clutch solenoid valve</li> </ul>
 : P1760		

PD

AX

SU

BR



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0068S01

### 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 (OD "ON").
- 4) Release accelerator pedal completely in "D" position (OD "OFF").

ST

RS

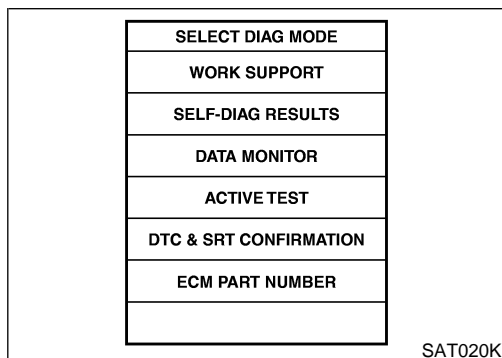
BT

HA

SC

EL

IDX



## DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

*Description (Cont'd)*

---



**With GST**

Follow the procedure "With CONSULT-II".

# DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Wiring Diagram — AT — OVRCSV

## Wiring Diagram — AT — OVRCSV

NBAT0200

AT-OVRCSV-01

GI

MA

EM

LC

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**AT**

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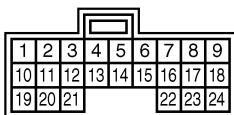
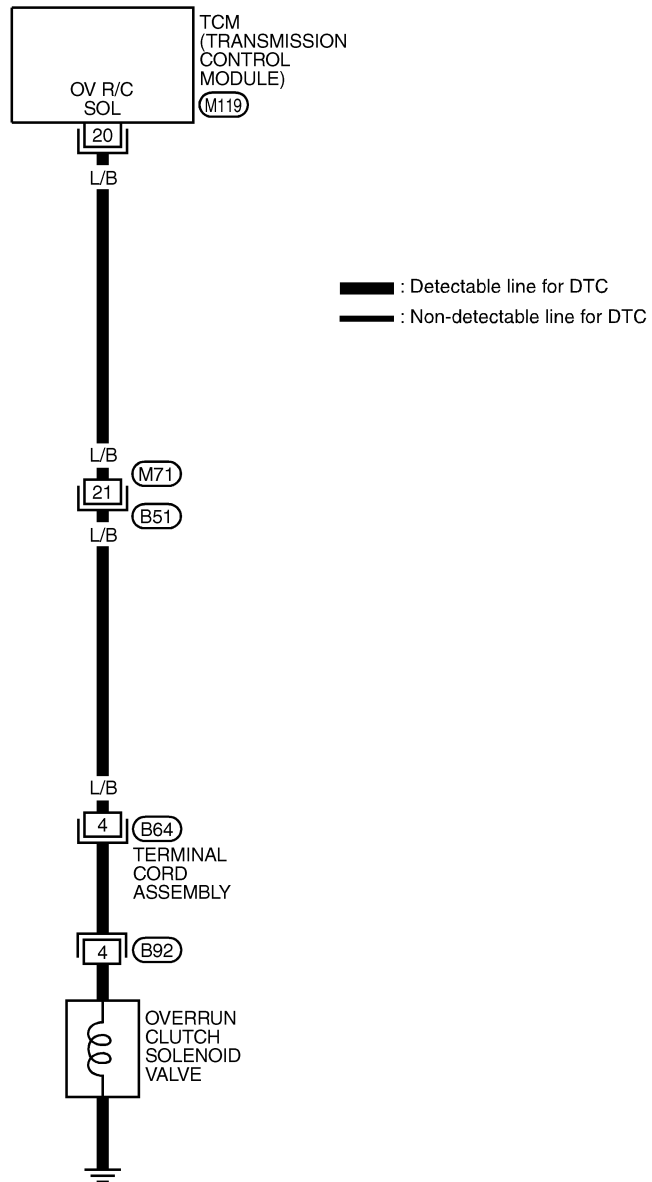
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HA

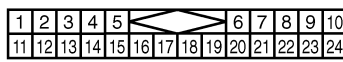
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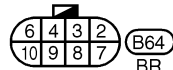
IDX



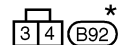
(M119)  
W



(B51)  
W



(B64)  
BR



(B92)  
\*

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

MAT741A

# DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Diagnostic Procedure

## Diagnostic Procedure

NBAT0069

<b>1</b>	<b>CHECK VALVE RESISTANCE</b>	
<p>1. Turn ignition switch to "OFF" position.                  2. Disconnect terminal cord assembly connector on the right side of transfer assembly.                  3. Check resistance between terminal 4 and ground.</p> <div style="text-align: center;"> <p>Sub-harness connector (B64)</p> </div> <p style="text-align: right;">SAT170J</p>		
<b>Is resistance approx. 20 - 40Ω?</b>		
Yes	▶	GO TO 3.
No	▶	GO TO 2.

<b>2</b>	<b>CHECK VALVE OPERATION</b>	
<p>1. Remove control valve assembly.                  Refer to AT-273.</p> <p>2. Check the following items:</p> <ul style="list-style-type: none"> <li>● Overrun clutch solenoid valve                      Refer to "Component Inspection", AT-189.</li> <li>● Harness of terminal cord assembly for short or open</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 3.
NG	▶	Repair or replace damaged parts.

<b>3</b>	<b>CHECK POWER SOURCE CIRCUIT</b>	
<p>1. Turn ignition switch to "OFF" position.                  2. Disconnect TCM harness connector.                  3. Check resistance between terminal 4 and TCM harness connector terminal 20. Refer to wiring diagram — AT — OVRCSV.  <b>Continuity should exist.</b>                  If OK, check harness for short to ground and short to power.                  4. Reinstall any part removed.</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

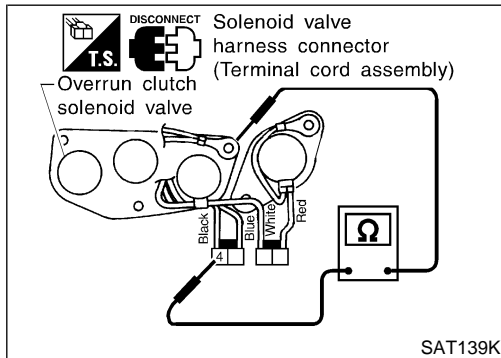
<b>4</b>	<b>CHECK DTC</b>	
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-185.</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	<b>INSPECTION END</b>
NG	▶	GO TO 5.

# DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Diagnostic Procedure (Cont'd)

<b>5</b>	<b>CHECK TCM INSPECTION</b>
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.	
<b>OK or NG</b>	
OK	▶ <b>INSPECTION END</b>
NG	▶ Repair or replace damaged parts.

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IDX



## Component Inspection OVERRUN CLUTCH SOLENOID VALVE

NBAT0070

NBAT0070S01

- For removal, refer to AT-273.

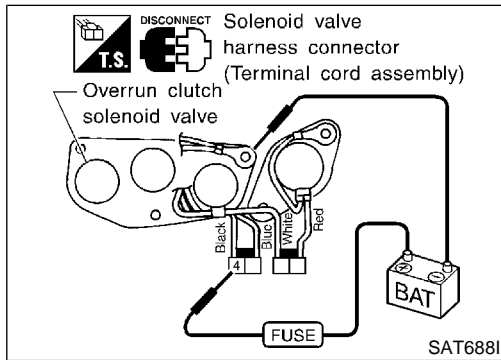
### Resistance Check

NBAT0070S0101

- Check resistance between terminal 4 and ground.

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

AT



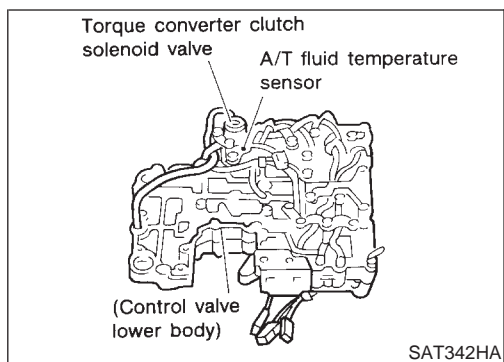
### Operation Check

NBAT0070S0102

- 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)

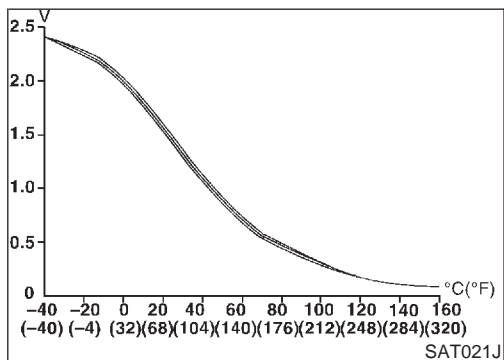
## Description



## Description

NBAT0172

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

NBAT0172S02

Remarks: Specification data are reference values.

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

## TCM TERMINALS AND REFERENCE VALUE

NBAT0172S03

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	
28	R/Y	Power source (Memory back-up)	When turning ignition switch to "OFF".	Battery voltage
			When turning ignition switch to "ON".	Battery voltage
42	B	Throttle position sensor (Ground)	—	0V
47	R	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)

Description (Cont'd)

## ON BOARD DIAGNOSIS LOGIC

NBAT0172S04

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
(P) : BATT/FLUID TEMP SEN (NO TOOLS) : 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

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

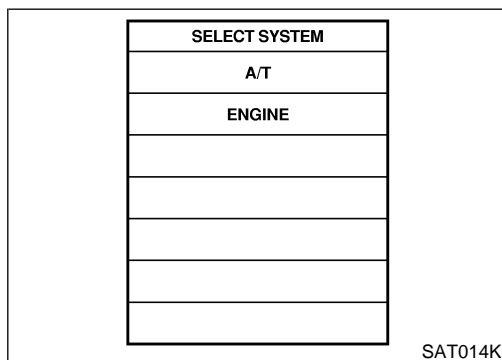
BT

HA

SC

EL

IDX



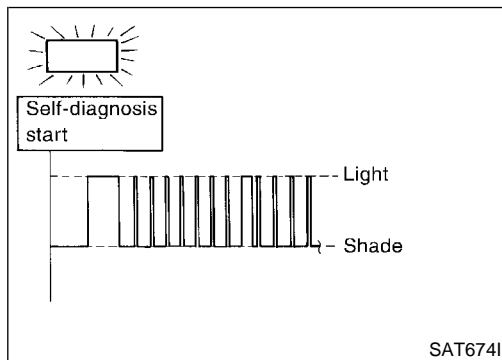
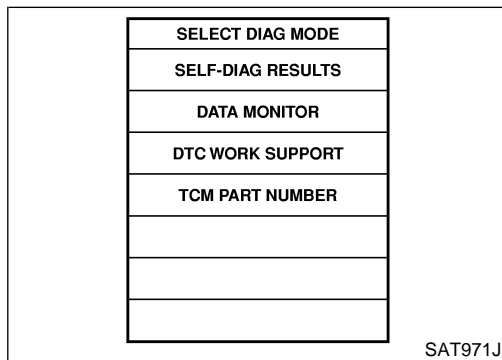
### DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0172S01

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

#### (P) 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).



#### (NO TOOLS) No Tools

- 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 TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.

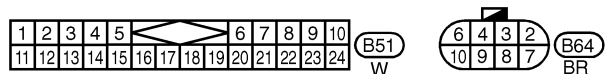
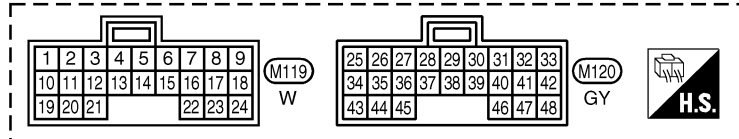
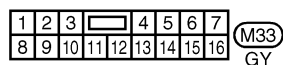
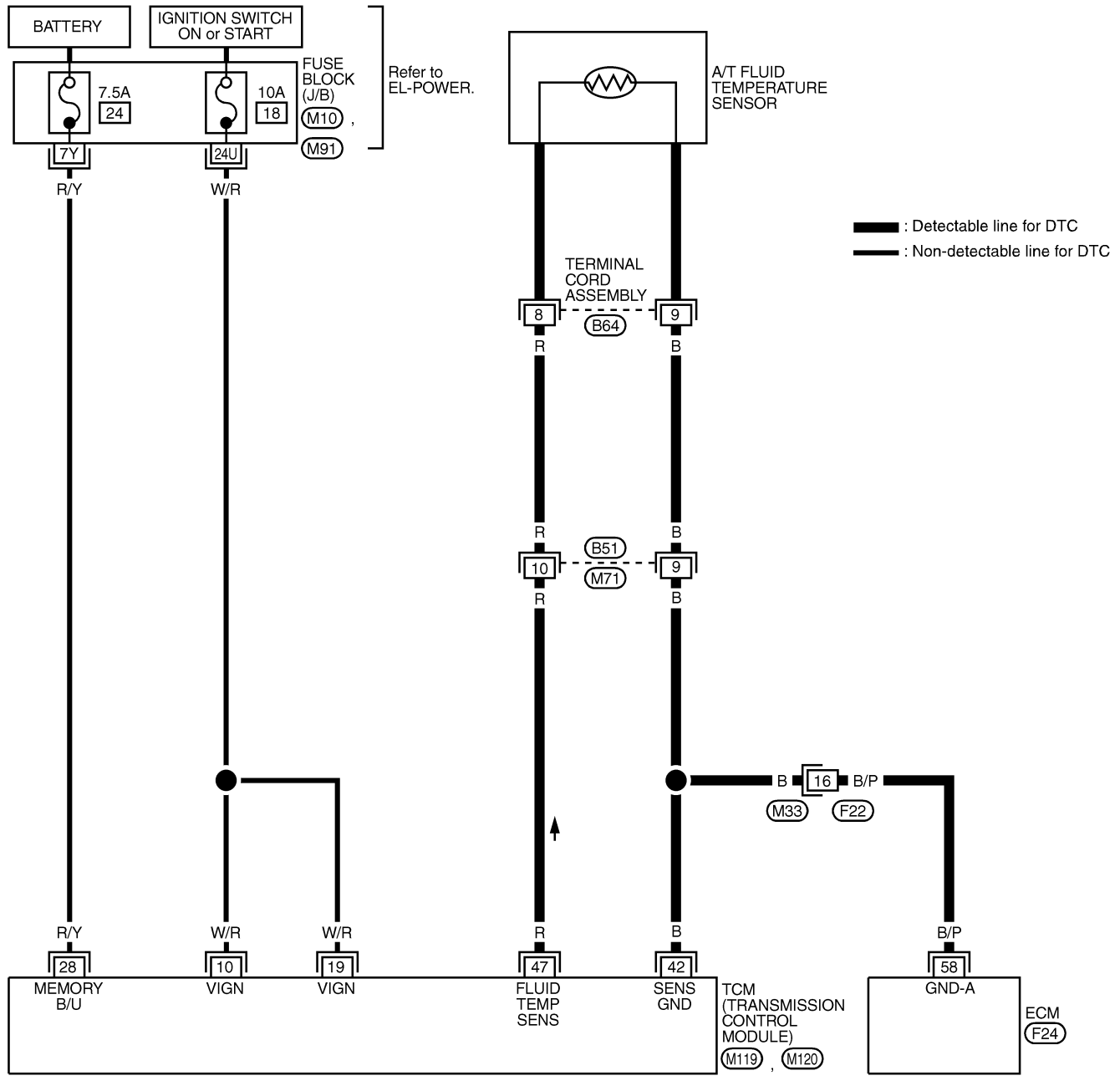
# DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)

Wiring Diagram — AT — BA/FTS

## Wiring Diagram — AT — BA/FTS

NBAT0201

AT-BA/FTS-01



REFER TO THE FOLLOWING.  
 (M10), (M91) - FUSE BLOCK -  
 JUNCTION BOX (J/B)  
 (F24) - ELECTRICAL UNITS

MAT916A



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

Diagnostic Procedure

## Diagnostic Procedure

NBAT0173

<b>1</b>	<b>INSPECTION START</b>	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 6.

GI  
MA  
EM

<b>2</b>	<b>CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II)</b>															
<p> <b>With CONSULT-II</b></p> <ol style="list-style-type: none"> <li>1. Start engine.</li> <li>2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</li> <li>3. Read out the value of "FLUID TEMP SE".</li> </ol> <p style="margin-left: 20px;"><b>Voltage:</b> Cold [20°C (68°F)] → Hot [80°C (176°F)]: Approximately 1.5V → 0.5V</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th colspan="2">MONITORING</th> </tr> </thead> <tbody> <tr> <td>VHCL/S SE-A/T</td> <td>XXX km/h</td> </tr> <tr> <td>VHCL/S SE-MTR</td> <td>XXX km/h</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>FLUID TEMP SE</td> <td>XXX V</td> </tr> <tr> <td>BATTERY VOLT</td> <td>XXX V</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">SAT614J</p> <p style="text-align: center;">OK or NG</p>			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
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															
OK	▶	GO TO 4.														
NG	▶	GO TO 3.														

LC  
EC  
FE

AT

TF  
PD  
AX

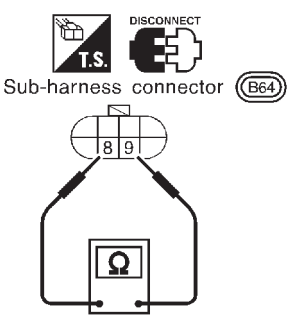
SU  
BR

<b>3</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● Harness for short to ground or short to power or open between TCM, ECM and terminal cord assembly (Main harness)</li> <li>● Ground circuit for ECM.</li> </ul> <p style="margin-left: 20px;">Refer to EC-167, "Wiring Diagram".</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.


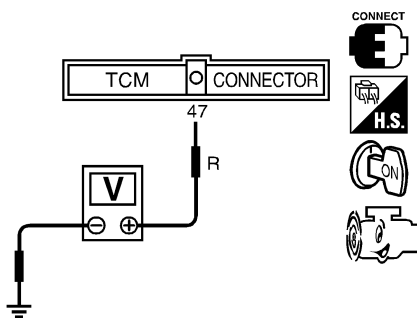
ST  
RS  
BT  
HA  
SC  
EL  
IDX

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

Diagnostic Procedure (Cont'd)

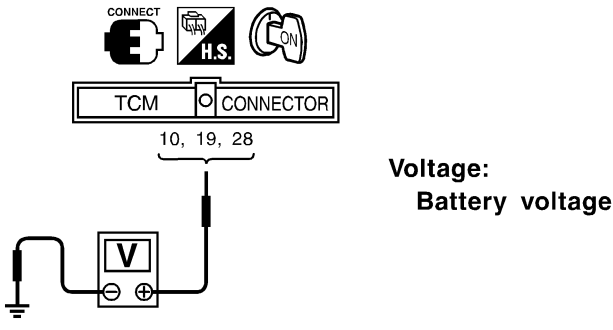
<b>4</b>	<b>CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY</b>	
<ol style="list-style-type: none"> <li>Turn ignition switch to "OFF" position.</li> <li>Disconnect terminal cord assembly connector on the right side of transfer assembly.</li> <li>Check resistance between terminals 8 and 9 when A/T is cold [20°C (68°F)].</li> </ol>		
 <p>Sub-harness connector (B64)</p>		
SAT697I		
<b>Is resistance approx. 2.5 kΩ?</b>		
Yes	▶	GO TO 7.
No	▶	GO TO 5.

<b>5</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<ol style="list-style-type: none"> <li>Remove oil pan.</li> <li>Check the following items: <ul style="list-style-type: none"> <li>A/T fluid temperature sensor Refer to "Component Inspection", AT-110.</li> <li>Harness of terminal cord assembly for short or open</li> </ul> </li> </ol>		
<b>OK or NG</b>		
OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

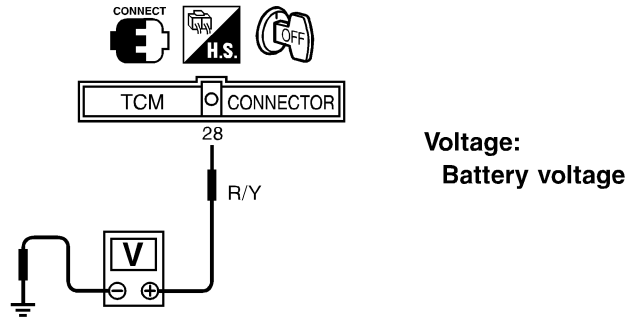
<b>6</b>	<b>CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)</b>	
<p> <b>Without CONSULT-II</b></p> <ol style="list-style-type: none"> <li>Start engine.</li> <li>Check voltage between TCM terminal 47 and ground while warming up A/T.</li> </ol> <p><b>Voltage:</b>  <b>Cold [20°C (68°F)] → Hot [80°C (176°F)]:</b>  <b>Approximately 1.5V → 0.5V</b></p>		
		
SAT518J		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	GO TO 3.

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

Diagnostic Procedure (Cont'd)

<b>7</b>	<b>CHECK TCM POWER SOURCE STEP 1</b>	<p>1. Turn ignition switch to ON position. (Do not start engine.)</p> <p>2. Check voltage between TCM terminals 10, 19, 28 and ground.</p> <div style="text-align: center;">  </div> <p style="text-align: center;"><b>OK or NG</b></p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p>
OK	▶	GO TO 8.	
NG	▶	GO TO 9.	

**AT**

<b>8</b>	<b>CHECK TCM POWER SOURCE STEP 2</b>	<p>1. Turn ignition switch to OFF position.</p> <p>2. Check voltage between TCM terminal 28 and ground.</p> <div style="text-align: center;">  </div> <p style="text-align: center;"><b>OK or NG</b></p>	<p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p>
OK	▶	GO TO 10.	
NG	▶	GO TO 9.	

**RS**

<b>9</b>	<b>DETECT MALFUNCTIONING ITEM</b>	<p>Check the following items:</p> <ul style="list-style-type: none"> <li>● Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness)</li> <li>● Ignition switch and 10A or 7.5A fuse [No. 18 or 24, located in the fuse block (J/B)] Refer to EL-12, "Schematic".</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>	<p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p>
OK	▶	GO TO 10.	
NG	▶	Repair or replace damaged parts.	

**IDX**

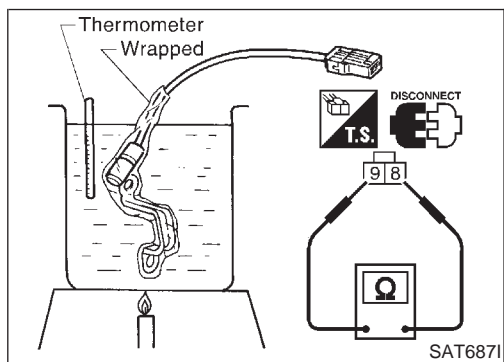
# DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)

Diagnostic Procedure (Cont'd)

<b>10</b>	<b>CHECK TCM GROUND CIRCUIT</b>	
1. Turn ignition switch to OFF position. 2. Disconnect TCM harness connector. 3. Check continuity between TCM terminals 25, 48 and ground. Refer to wiring diagram — AT — MAIN. <b>Continuity should exist.</b> If OK, check harness for short to ground and short to power. <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 11.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

<b>11</b>	<b>CHECK DTC</b>	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-106. <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	<b>INSPECTION END</b>
NG	▶	GO TO 12.

<b>12</b>	<b>CHECK TCM INSPECTION</b>	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	<b>INSPECTION END</b>
NG	▶	Repair or replace damaged parts.



## Component Inspection A/T FLUID TEMPERATURE SENSOR

NBAT0174

NBAT0174S01

- For removal, refer to AT-273.
- Check resistance between terminals 8 and 9 while changing temperature as shown at left.

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

# DTC VEHICLE SPEED SENSOR-MTR

Description

## Description

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

NBAT0071

GI

MA


EM

LC

## TCM TERMINALS AND REFERENCE VALUE

NBAT0071S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)
40	W/L	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

EC



FE

AT

TF

## ON BOARD DIAGNOSIS LOGIC

NBAT0071S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 : VHCL SPEED SEN-MTR	TCM does not receive the proper voltage signal from the sensor.	<ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Vehicle speed sensor</li> </ul>
 : 2nd judgement flicker		

PD

AX

SU

BR

SELECT SYSTEM
A/T
ENGINE

SAT014K

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0071S01

### 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.

ST

RS

BT

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

HA

### 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).

SC

EL

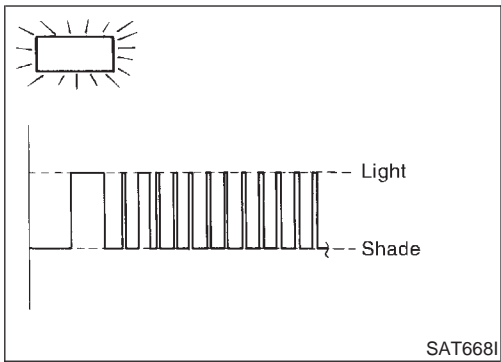
SELECT DIAG MODE
SELF-DIAG RESULTS
DATA MONITOR
DTC WORK SUPPORT
TCM PART NUMBER

SAT971J

IDX

## DTC VEHICLE SPEED SENSOR-MTR

Description (Cont'd)



### No Tools

- 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 TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.

# DTC VEHICLE SPEED SENSOR-MTR

Wiring Diagram — AT — VSSMTR

## Wiring Diagram — AT — VSSMTR

NBAT0202

AT-VSSMTR-01

GI

MA

EM

LC

EC

FE

**AT**

TF

PD

AX

SU

BR

ST

RS

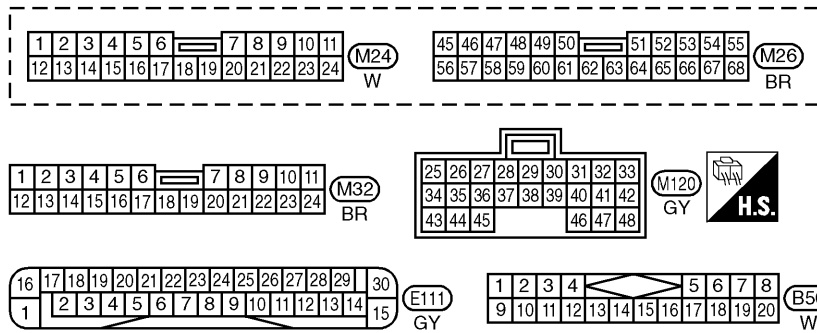
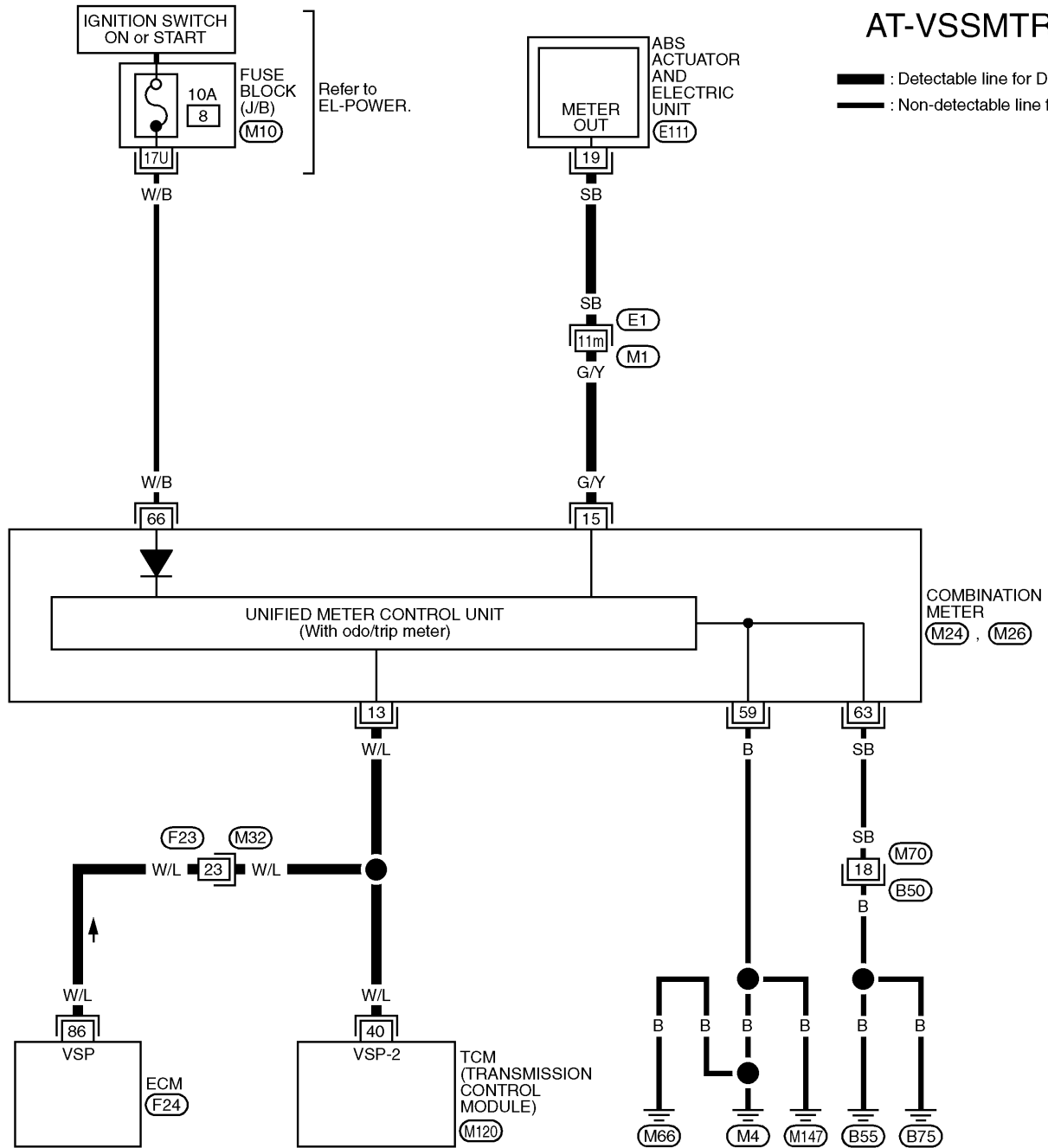
BT

HA

SC

EL

IDX



REFER TO THE FOLLOWING.

- (E1) -SUPER MULTIPLE JUNCTION (SMJ)
- (M10) -FUSE BLOCK-JUNCTION BOX (J/B)
- (F24) -ELECTRICAL UNITS

MAT031B

# DTC VEHICLE SPEED SENSOR-MTR

Diagnostic Procedure

## Diagnostic Procedure

NBAT0072

### 1 CHECK INPUT SIGNAL.

#### With CONSULT-II

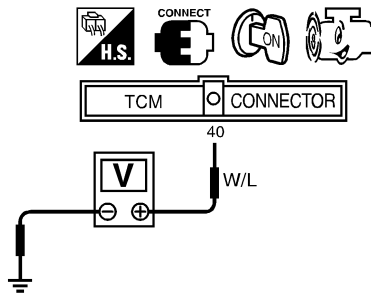
1. Start engine.
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out the value of "VHCL/S SE-MTR" while driving.  
Check the value changes according to driving speed.

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

SAT614J

#### Without CONSULT-II

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



SAT528J

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

- |     |   |          |
|-----|---|----------|
| Yes | ▶ | GO TO 3. |
| No  | ▶ | GO TO 2. |

### 2 DETECT MALFUNCTIONING ITEM

#### Check the following items:

- Vehicle speed sensor and ground circuit for vehicle speed sensor  
Refer to EL-99, "Component Parts and Harness Connector Location".
- Harness for short or open between TCM and vehicle speed sensor (Main harness)
- Harness for short or open between ABS actuator and electrical unit and combination meter

OK or NG

- |    |   |                                  |
|----|---|----------------------------------|
| OK | ▶ | GO TO 3.                         |
| NG | ▶ | Repair or replace damaged parts. |

### 3 CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-197.

OK or NG

- |    |   |                |
|----|---|----------------|
| OK | ▶ | INSPECTION END |
| NG | ▶ | GO TO 4.       |



# DTC VEHICLE SPEED SENSOR-MTR

Diagnostic Procedure (Cont'd)

<b>4</b>	<b>CHECK TCM INSPECTION</b>	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	Repair or replace damaged parts.

GI

MA

EM

LC

EC

FE

**AT**

TF

PD

AX

SU

BR

ST

RS

BT

HA

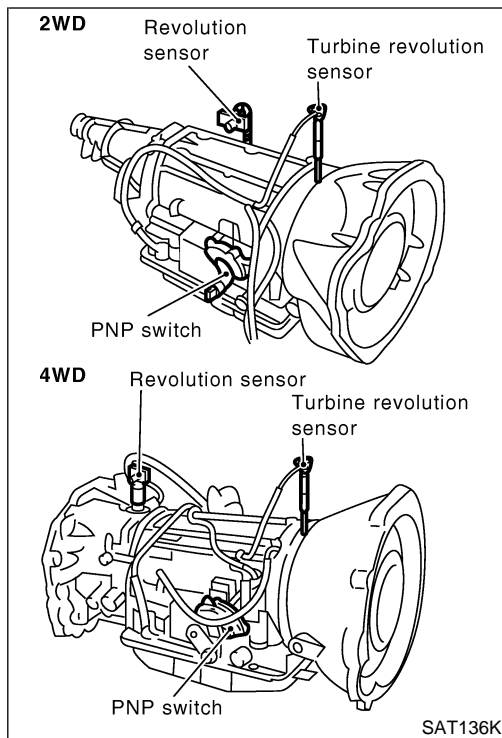
SC

EL

IDX

# DTC TURBINE REVOLUTION SENSOR

## Description



## Description



NBAT0224

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



NBAT0224S01

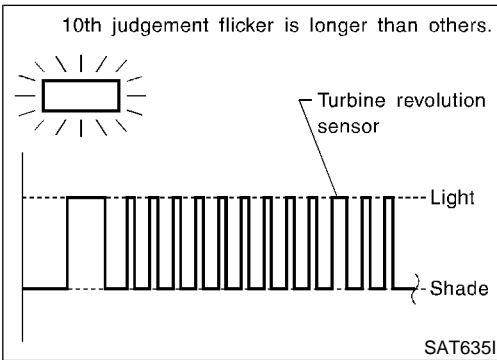
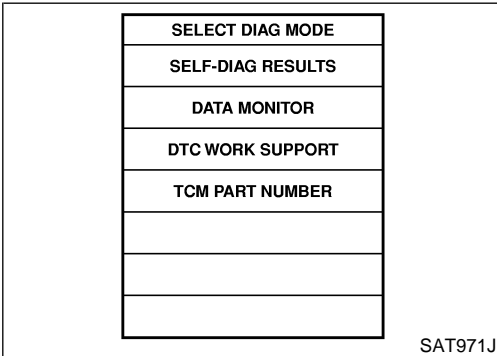
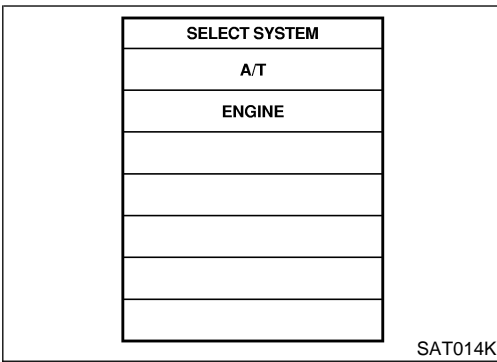
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)
38	W	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	B	Throttle position sensor (Ground)	 —	0V

## ON BOARD DIAGNOSIS LOGIC

NBAT0224S02

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 : TURBINE REV	TCM does not receive the proper voltage signal from the sensor.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted.)</li> <li>• Turbine revolution sensor</li> </ul>
 : 10th judgement flicker		



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0224S03

### 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 TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.

GI  
MA  
EM  
LC  
EC  
FE  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

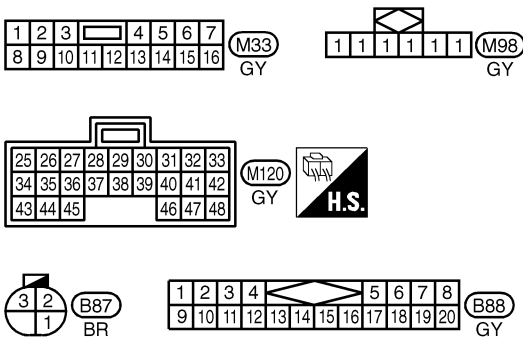
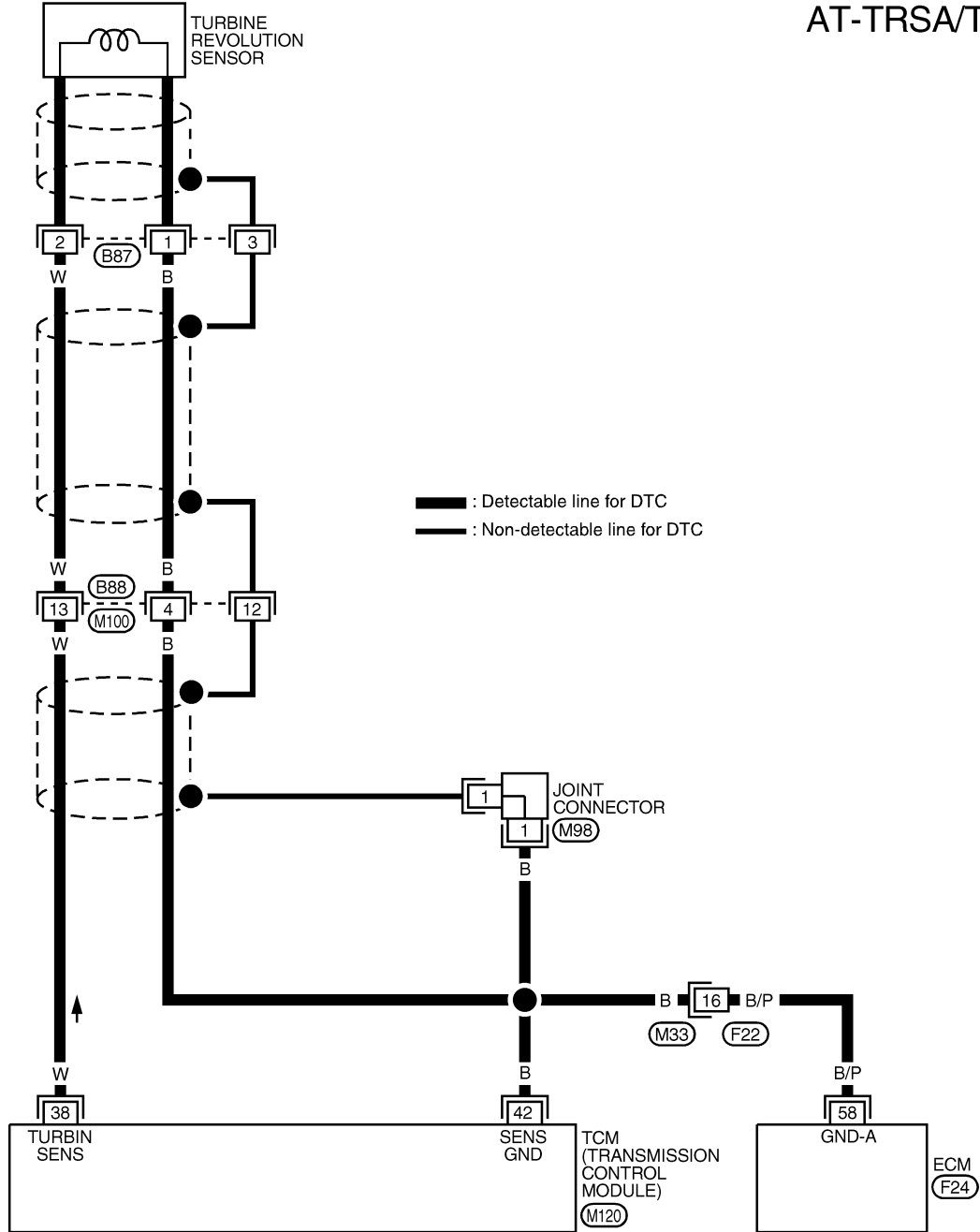
# DTC TURBINE REVOLUTION SENSOR

Wiring Diagram — AT — TRSA/T

## Wiring Diagram — AT — TRSA/T

NBAT0225

AT-TRSA/T-01

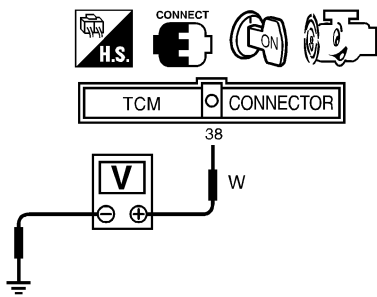


REFER TO THE FOLLOWING.  
F24 - ELECTRICAL UNITS

MAT923A

## Diagnostic Procedure

NBAT0226

<b>1</b>	<b>CHECK INPUT SIGNAL</b>	<p><b>With CONSULT-II</b></p> <ol style="list-style-type: none"> <li>1. Start engine.</li> <li>2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</li> <li>3. Read out the value of "TURBINE REV". Check the value changes according to engine speed.</li> </ol> <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th></th> </tr> </thead> <tbody> <tr> <td>ENGINE SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>TURBINE REV</td> <td>XXX rpm</td> </tr> <tr> <td>OVERDRIVE SW</td> <td>ON</td> </tr> <tr> <td>PN POSI SW</td> <td>OFF</td> </tr> <tr> <td>R POSITION SW</td> <td>OFF</td> </tr> </tbody> </table> </div> <p style="text-align: right;">SAT740J</p>	DATA MONITOR		MONITORING		ENGINE SPEED	XXX rpm	TURBINE REV	XXX rpm	OVERDRIVE SW	ON	PN POSI SW	OFF	R POSITION SW	OFF	GI MA EM LC EC FE
DATA MONITOR																	
MONITORING																	
ENGINE SPEED	XXX rpm																
TURBINE REV	XXX rpm																
OVERDRIVE SW	ON																
PN POSI SW	OFF																
R POSITION SW	OFF																
		<p><b>Without CONSULT-II</b></p> <ol style="list-style-type: none"> <li>1. Start engine.</li> <li>2. Check voltage between TCM terminal 38 and ground. (Measure in AC range.)</li> </ol> <div style="text-align: center; margin: 10px 0;">  <p style="margin-left: 20px;">Approximately 1.2V (Voltage rises gradually in response to engine speed.)</p> </div> <p style="text-align: center;">OK or NG</p> <p style="text-align: right;">SAT140K</p>	AT TF PD AX SU BR														
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> <tr> <td>NG</td> <td>▶</td> <td>GO TO 2.</td> </tr> </table>	OK	▶	GO TO 3.	NG	▶	GO TO 2.	ST								
OK	▶	GO TO 3.															
NG	▶	GO TO 2.															

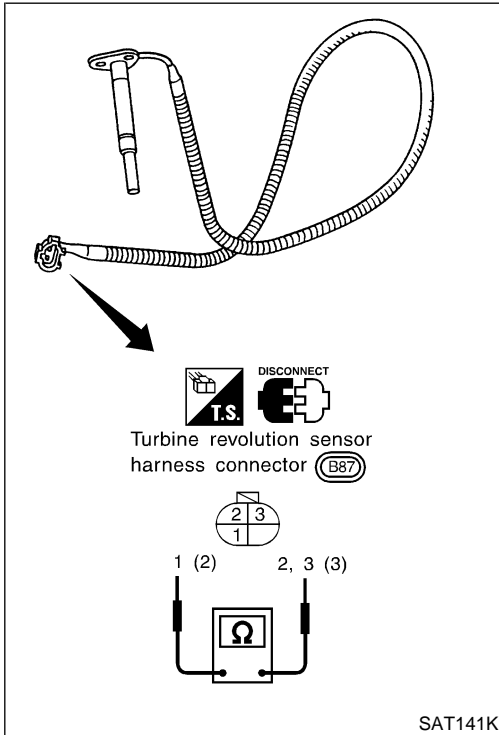
<b>2</b>	<b>DETECT MALFUNCTIONING ITEM</b>	<p>Check harness for short or open between TCM and turbine revolution sensor.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> <tr> <td>NG</td> <td>▶</td> <td>Repair or replace damaged parts.</td> </tr> </table>	OK	▶	GO TO 3.	NG	▶	Repair or replace damaged parts.	RS BT HA
OK	▶	GO TO 3.							
NG	▶	Repair or replace damaged parts.							

<b>3</b>	<b>CHECK DTC</b>	<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-203.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td><b>INSPECTION END</b></td> </tr> <tr> <td>NG</td> <td>▶</td> <td>GO TO 4.</td> </tr> </table>	OK	▶	<b>INSPECTION END</b>	NG	▶	GO TO 4.	SC EL IDX
OK	▶	<b>INSPECTION END</b>							
NG	▶	GO TO 4.							

# DTC TURBINE REVOLUTION SENSOR

Diagnostic Procedure (Cont'd)

<b>4</b>	<b>CHECK TCM INSPECTION</b>	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminal for damage or loose connection with harness connector.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	Repair or replace damaged parts.



## Component Inspection TURBINE REVOLUTION SENSOR

NBAT0227

NBAT0227S01

- 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 A/T COMMUNICATION LINE

Description

## Description


The ECM and TCM provide mutual communication in relation to engine output control signal (ignition timing retard signal) during rapid standing starts/acceleration. With this consistent real-time control, the shifting feel is substantially improved.

NBAT0228

## TCM TERMINALS AND REFERENCE VALUE

NBAT0228S01



Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)
33	G/R	LAN		—

\*: This terminal is connected to the ECM.

## ON BOARD DIAGNOSIS LOGIC

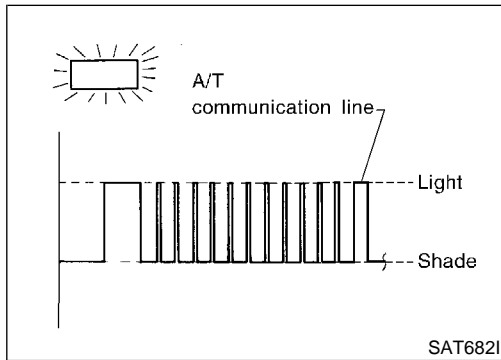
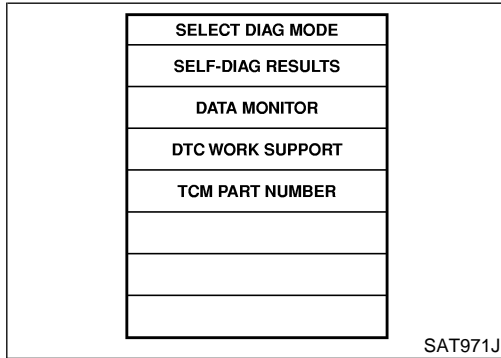
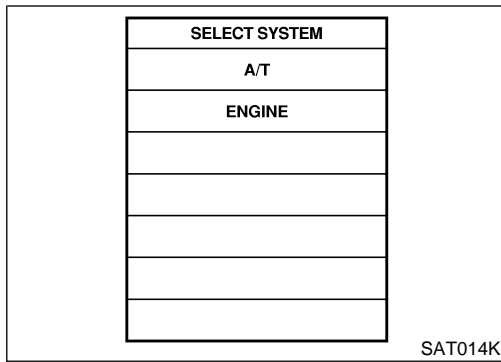
NBAT0228S02

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 : A/T COMM LINE	The ECM-A/T communication line is open or shorted.	● Harness or connector
 : 12th judgement flicker		

GI  
MA  
EM  
LC  
EC  
FE  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# DTC A/T COMMUNICATION LINE

Description (Cont'd)



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0228S03

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 "A/T" with CONSULT-II.
- 3) Wait at least 6 seconds or start engine and wait for at least 6 seconds.

### No Tools

- 1) Turn ignition switch "ON".
- 2) Wait at least 6 seconds or start engine and wait for at least 6 seconds.
- 3) Perform self-diagnosis.  
Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.



# DTC A/T COMMUNICATION LINE

Wiring Diagram — AT — LAN

## Wiring Diagram — AT — LAN

NBAT0229

### AT-LAN-01

GI

MA

EM

LC

EC

FE

**AT**

TF

PD

AX

SU

BR

ST

RS

BT

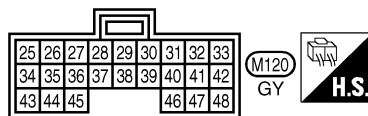
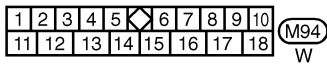
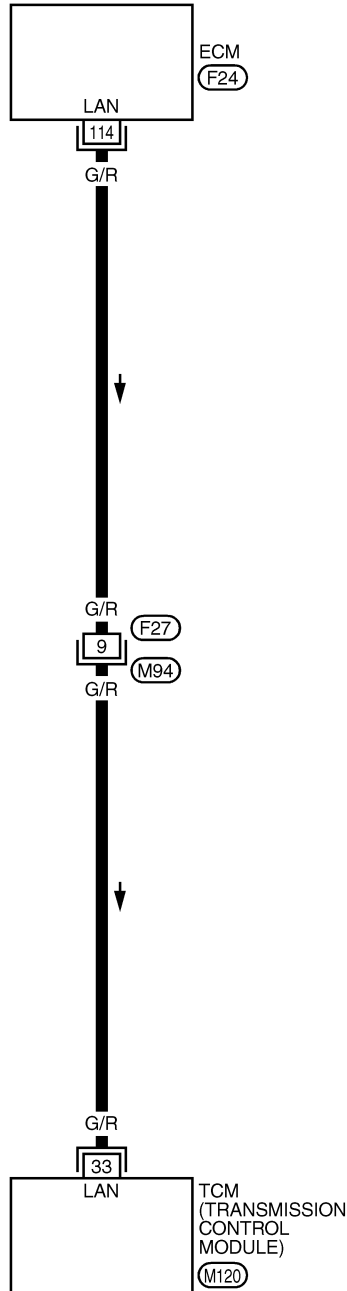
HA

SC

EL

IDX

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



REFER TO THE FOLLOWING.  
 (F24) - ELECTRICAL UNITS

MAT922A

# DTC A/T COMMUNICATION LINE

Diagnostic Procedure

## Diagnostic Procedure

NBAT0230

<b>1</b>	<b>CHECK CIRCUIT BETWEEN TCM AND ECM</b>		
<p>1. Turn ignition switch to OFF position. 2. Check continuity between TCM terminal 33 and ECM terminal 114.</p>			
			<b>Continuity should exist.</b>
SAT640JA			
<b>OK or NG</b>			
OK	▶	GO TO 2.	
NG	▶	Repair or replace harness and connector between TCM and ECM.	

<b>2</b>	<b>CHECK DTC WITH ECM STEP 1</b>		
Perform self-diagnosis for engine control. Refer to EC-74, "DESCRIPTION".			
<b>OK or NG</b>			
OK	▶	GO TO 4.	
NG	▶	GO TO 3.	

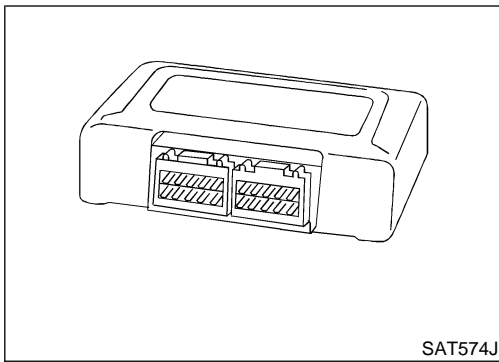
<b>3</b>	<b>CHECK DTC WITH ECM STEP 2</b>		
Check ECM. Refer to EC-431 and EC-592, "System Description" and "Component Description".			
<b>OK or NG</b>			
OK	▶	GO TO 4.	
NG	▶	Repair or replace damaged parts.	

<b>4</b>	<b>CHECK DTC</b>		
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-208.			
<b>OK or NG</b>			
OK	▶	<b>INSPECTION END</b>	
NG	▶	GO TO 5.	

<b>5</b>	<b>CHECK TCM INSPECTION</b>		
If NG, recheck TCM pin terminals for damage or loose connection with harness connector.			
<b>OK or NG</b>			
OK	▶	<b>INSPECTION END</b>	
NG	▶	Repair or replace damaged parts.	

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

Description



## Description

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

NBAT0207

GI

MA

EM

LC

## ON BOARD DIAGNOSIS LOGIC

NBAT0207S01

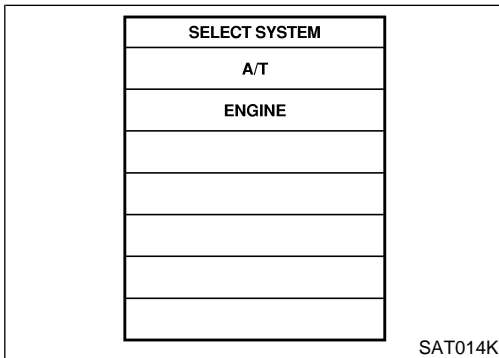
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
ⓐ : CONTROL UNIT (RAM) ⓑ : CONTROL UNIT (ROM)	TCM memory (RAM) or (ROM) is malfunctioning.	TCM

EC

FE

**AT**

TF



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0207S02

### 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.

PD

AX

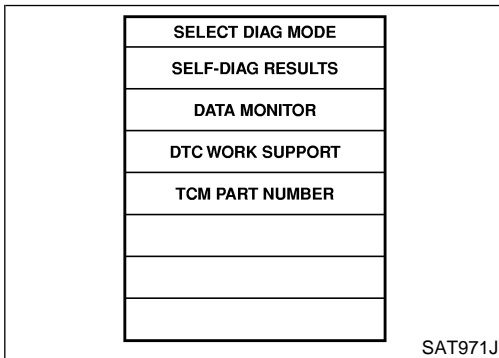
SU

### ⓐ 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.

BR

ST



RS

BT

HA

SC

EL


IDX

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

Diagnostic Procedure

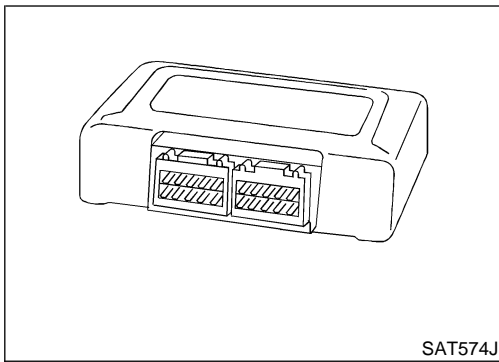
## Diagnostic Procedure

=NBAT0208

1	<b>CHECK DTC</b>
 <b>With CONSULT-II</b> 1. Turn ignition switch "ON" and select "SELF DIAG RESULTS" mode for A/T with CONSULT-II. 2. Touch "ERASE". PERFORM DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE. See previous page.	
<b>Is the "CONTROL UNIT (RAM) or CONTROL UNIT (ROM)" displayed again?</b>	
Yes	▶ Replace TCM.
No	▶ <b>INSPECTION END</b>

# DTC CONTROL UNIT (EEP ROM)

Description



## Description

The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the A/T. <sup>NBAT0215</sup>

GI

MA

EM

LC

## ON BOARD DIAGNOSIS LOGIC

NBAT0215S01

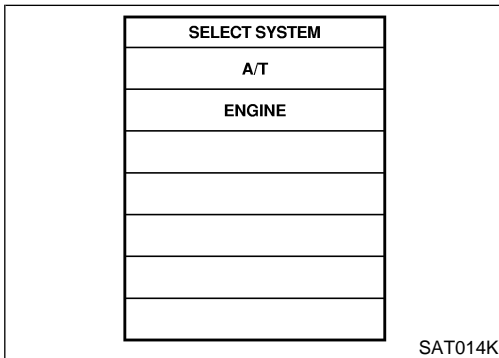
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
Ⓟ : CONT UNIT (EEP ROM)	TCM memory (EEP ROM) is malfunctioning.	TCM

EC

FE

**AT**

TF



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0215S02

### 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.

PD

AX

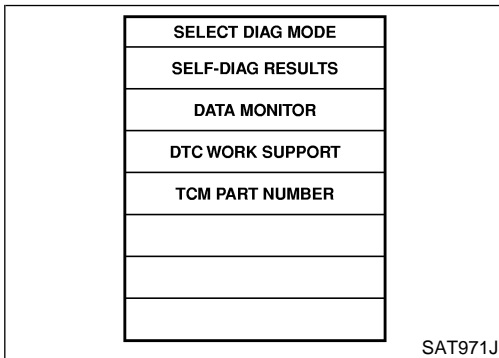
SU

### Ⓟ 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.

BR

ST



RS

BT

HA

SC

EL


IDX

# DTC CONTROL UNIT (EEP ROM)

Diagnostic Procedure

## Diagnostic Procedure

=NBAT0216

<b>1</b>	<b>CHECK DTC</b>
<p> <b>With CONSULT-II</b></p> <ol style="list-style-type: none"><li>1. Turn ignition switch "ON" and select "SELF DIAG RESULTS" mode for A/T with CONSULT-II.</li><li>2. Move selector lever to "R" position.</li><li>3. Depress accelerator pedal (Full throttle position).</li><li>4. Touch "ERASE".</li><li>5. Turn ignition switch "OFF" position for 10 seconds.</li></ol> <p>PERFORM DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE. See previous page.</p> <p style="text-align: center;"><b>Is the "CONTROL UNIT (EEP ROM)" displayed again?</b></p>	
Yes	▶ Replace TCM.
No	▶ <b>INSPECTION END</b>

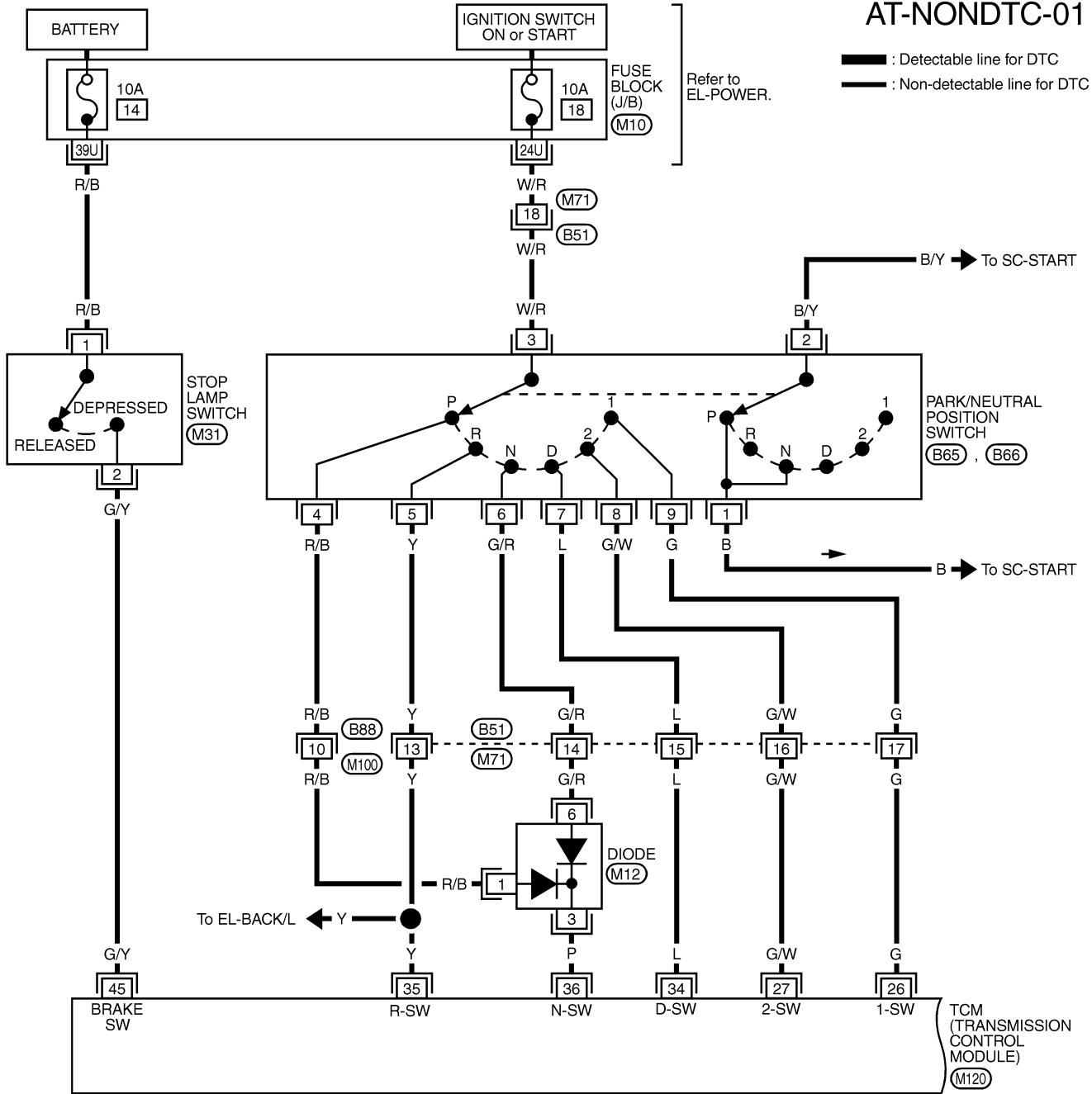
# TROUBLE DIAGNOSES FOR SYMPTOMS

Wiring Diagram — AT — NONDTC

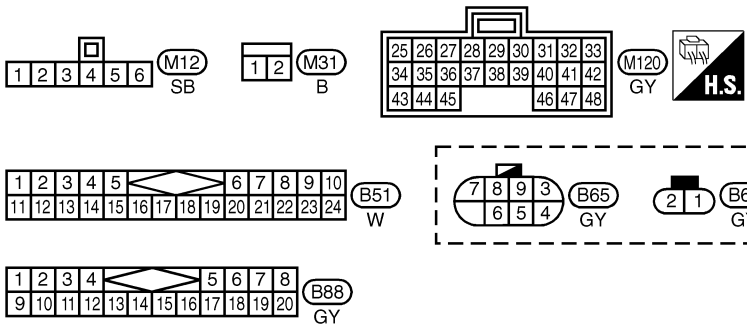
## Wiring Diagram — AT — NONDTC

NBAT0203

### AT-NONDTC-01



GI  
MA  
EM  
LC  
EC  
FE  
**AT**  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX



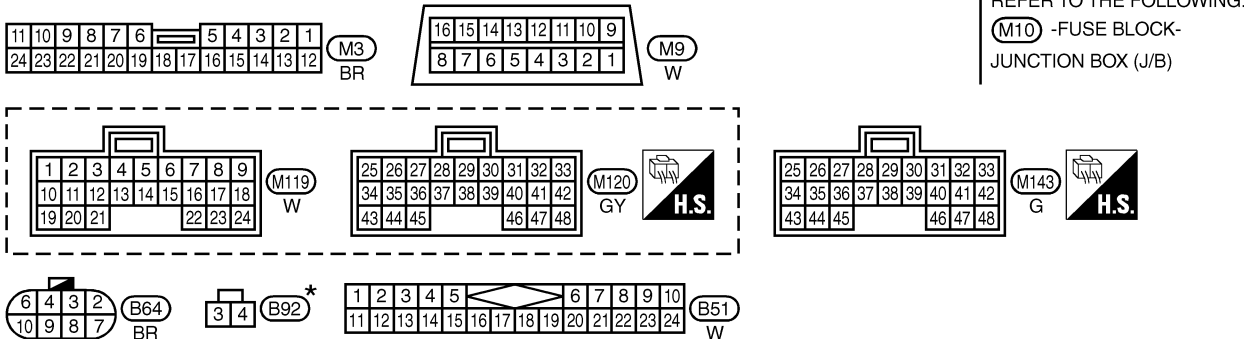
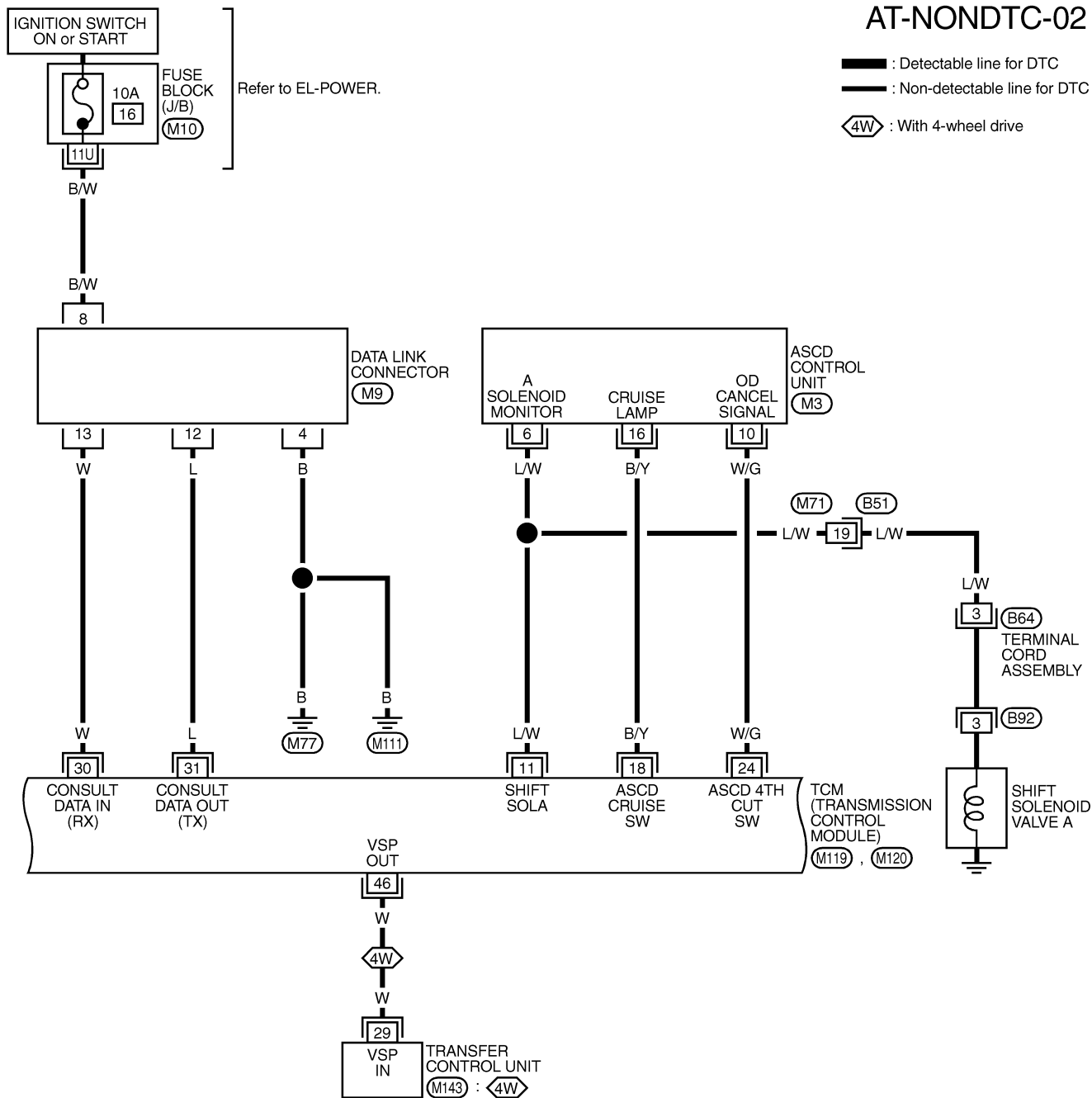
REFER TO THE FOLLOWING.  
 (M10) - FUSE BLOCK - JUNCTION BOX (J/B)

# TROUBLE DIAGNOSES FOR SYMPTOMS

Wiring Diagram — AT — NONDTC (Cont'd)

## AT-NONDTC-02

- : Detectable line for DTC
- : Non-detectable line for DTC
- : With 4-wheel drive



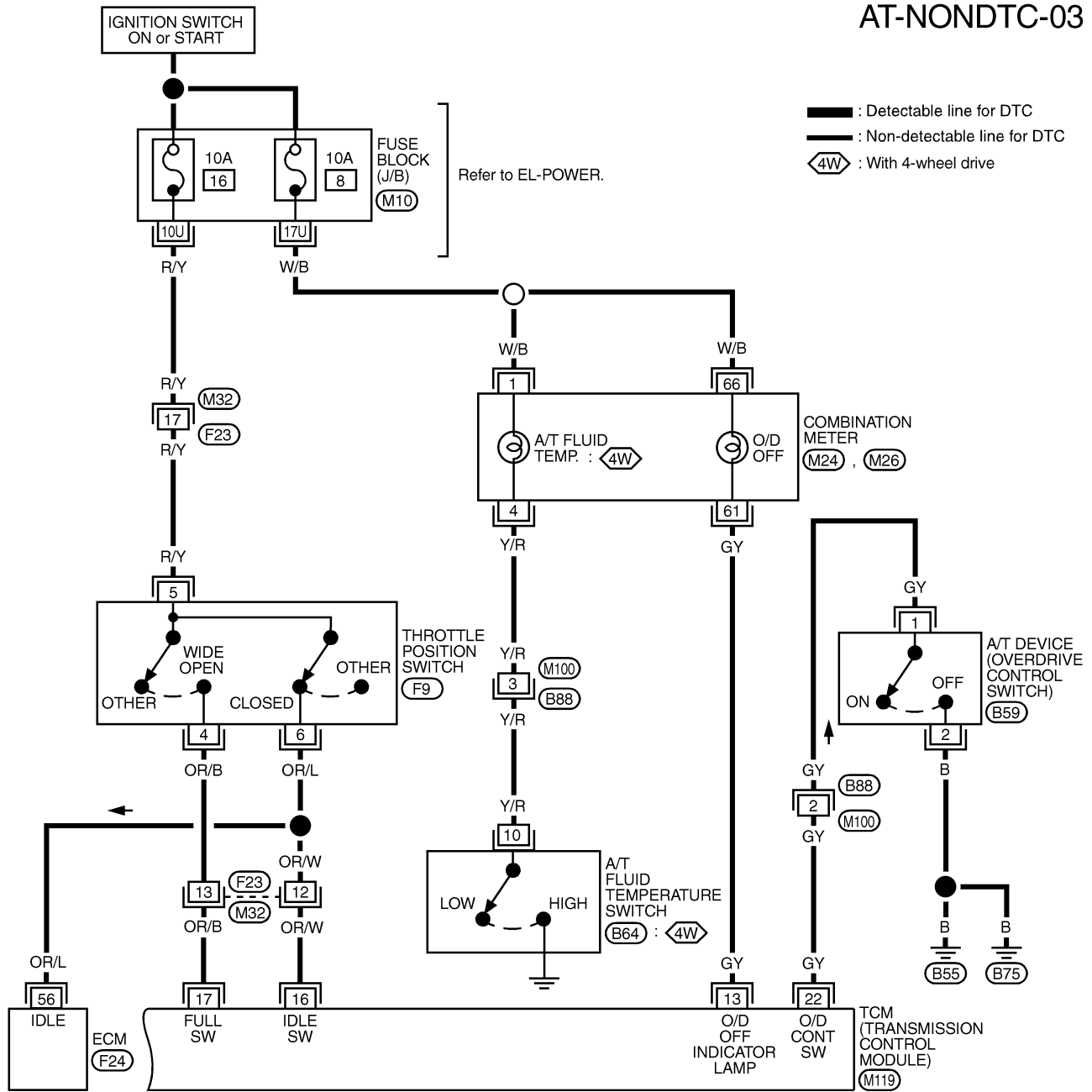
\* : This connector is not shown in "HARNESS LAYOUT", EL section.



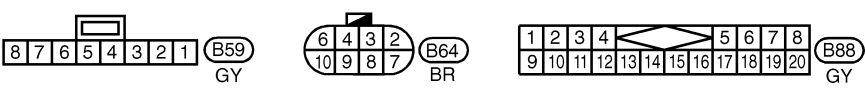
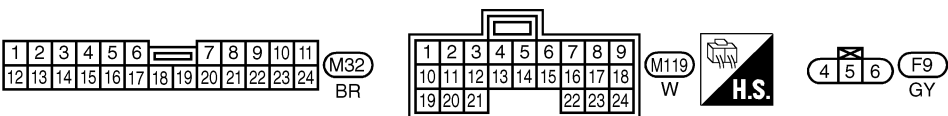
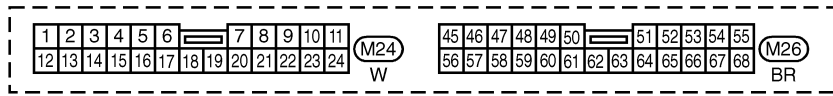
# TROUBLE DIAGNOSES FOR SYMPTOMS

Wiring Diagram — AT — NONDTC (Cont'd)

## AT-NONDTC-03



GI  
 MA  
 EM  
 LC  
 EC  
 FE  
**AT**  
 TF  
 PD  
 AX  
 SU  
 BR  
 ST  
 RS  
 BT  
 HA  
 SC  
 EL  
 IDX



REFER TO THE FOLLOWING.

- (M10) - FUSE BLOCK - JUNCTION BOX (J/B)
- (F24) - ELECTRICAL UNITS

MAT920A

# TROUBLE DIAGNOSES FOR SYMPTOMS

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

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

NBAT0073

**SYMPTOM:**

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

<b>1</b>	<b>CHECK TCM POWER SOURCE STEP 1</b>		
<p>1. Turn ignition switch to ON position. (Do not start engine.)</p> <p>2. Check voltage between TCM terminals 10, 19, 28 and ground.</p>			
<b>OK or NG</b>			
OK	▶	GO TO 2.	
NG	▶	GO TO 3.	

<b>2</b>	<b>CHECK TCM POWER SOURCE STEP 2</b>		
<p>1. Turn ignition switch to OFF position.</p> <p>2. Check voltage between TCM terminal 28 and ground.</p>			
<b>OK or NG</b>			
OK	▶	GO TO 4.	
NG	▶	GO TO 3.	

<b>3</b>	<b>DETECT MALFUNCTIONING ITEM</b>		
<p>Check the following items:</p> <ul style="list-style-type: none"> <li>● Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness)</li> <li>● Ignition switch and 10A or 7.5A fuse [No. 18 or 24, located in the fuse block (J/B)] Refer to EL-12, "Schematic".</li> </ul>			
<b>OK or NG</b>			
OK	▶	GO TO 4.	
NG	▶	Repair or replace damaged parts.	

# TROUBLE DIAGNOSES FOR SYMPTOMS

1. O/D OFF Indicator Lamp Does Not Come On (Cont'd)

<b>4</b>	<b>CHECK TCM GROUND CIRCUIT</b>	
	<p>1. Turn ignition switch to OFF position.                  2. Disconnect TCM harness connector.                  3. Check continuity between TCM terminals 25, 48 and ground. Refer to wiring diagram — AT — MAIN.  <b>Continuity should exist.</b>                  If OK, check harness for short to ground and short to power.</p> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

<b>5</b>	<b>CHECK LAMP CIRCUIT</b>	
	<p>1. Turn ignition switch to "ON" position.                  2. Set overdrive control switch to "ON" position.                  3. Check voltage between TCM terminals 13 and ground.</p> <div style="text-align: center;"> <p style="text-align: right;">SAT529J</p> </div> <p style="text-align: center;"><b>Does battery voltage exist?</b></p>	
Yes	▶	GO TO 7.
No	▶	GO TO 6.

<b>6</b>	<b>CHECK MALFUNCTIONING ITEM</b>	
	<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● Fuse</li> <li>● O/D OFF indicator lamp</li> <li>● Harness for short or open between ignition switch and O/D OFF indicator lamp (Main harness)</li> <li>● Refer to EL-12, "Schematic".</li> <li>● Harness for short or open between O/D OFF indicator lamp and TCM</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

<b>7</b>	<b>CHECK SYMPTOM</b>	
	<p>Check again.</p> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶	<b>INSPECTION END</b>
NG	▶	GO TO 8.

GI  
MA  
EM  
LC  
EC  
FE  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
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SC  
EL  
IDX

## TROUBLE DIAGNOSES FOR SYMPTOMS

1. O/D OFF Indicator Lamp Does Not Come On (Cont'd)

<b>8</b>	<b>CHECK TCM INSPECTION</b>
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.	
<b>OK or NG</b>	
OK	▶ <b>INSPECTION END</b>
NG	▶ Repair or replace damaged parts.

# TROUBLE DIAGNOSES FOR SYMPTOMS

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



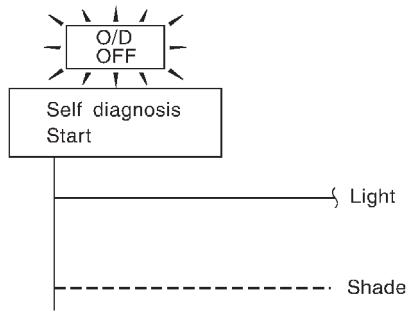
## 2. Engine Cannot Be Started In "P" and "N" Position

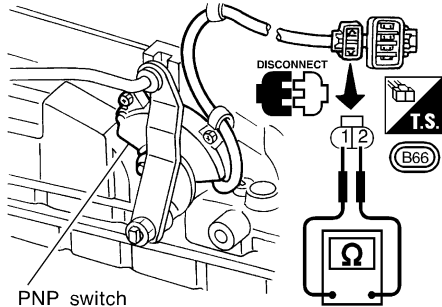
=NBAT0074

### 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.

<b>1</b>	<b>CHECK PNP SWITCH CIRCUIT</b>	
<p> <b>With CONSULT-II</b> Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?</p>		
<p> <b>Without CONSULT-II</b> Does self-diagnosis show damage to PNP switch circuit?</p>		
		
SAT367J		
<b>Yes or No</b>		
Yes	▶	Check PNP switch circuit. Refer to "DTC P0705", AT-99.
No	▶	GO TO 2.

<b>2</b>	<b>CHECK PNP SWITCH INSPECTION</b>	
Check for short or open of PNP switch 2-pin connector. Refer to "Components Inspection", AT-103.		
		
SAT838BB		
<b>OK or NG</b>		
OK	▶	GO TO 3.
NG	▶	Repair or replace PNP switch.

<b>3</b>	<b>CHECK STARTING SYSTEM</b>	
Check starting system. Refer to SC-10, "System Description".		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	Repair or replace damaged parts.

GI  
MA  
EM  
LC  
EC  
FE  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# TROUBLE DIAGNOSES FOR SYMPTOMS

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

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

=NBAT0075

### SYMPTOM:

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

1	<b>CHECK PARKING COMPONENTS</b>
<p>Check parking components. Refer to "Parking Pawl Components", AT-337.</p> <div data-bbox="565 457 1031 772" data-label="Image"></div>	
<b>OK or NG</b>	
OK	▶ <b>INSPECTION END</b>
NG	▶ Repair or replace damaged parts.

# TROUBLE DIAGNOSES FOR SYMPTOMS



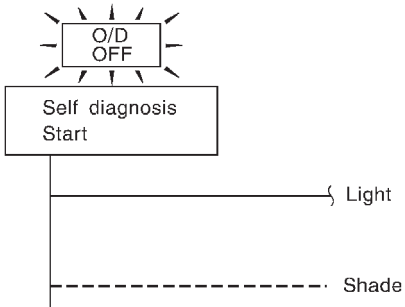
4. In "N" Position, Vehicle Moves

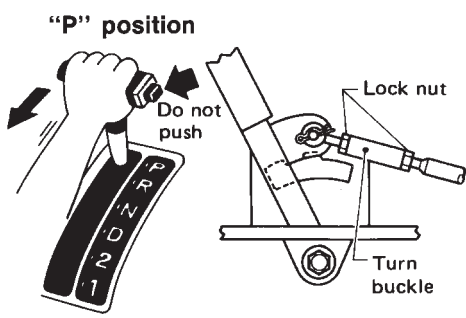
## 4. In "N" Position, Vehicle Moves

=NBAT0076

### SYMPTOM:

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


<b>1</b>	<b>CHECK PNP SWITCH CIRCUIT</b>
<p> <b>With CONSULT-II</b> Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?</p>	
<p> <b>Without CONSULT-II</b> Does self-diagnosis show damage to PNP switch circuit?</p>	
	
SAT367J	
<b>Yes or No</b>	
Yes	▶ Check PNP switch circuit. Refer to "DTC P0705", AT-99.
No	▶ GO TO 2.

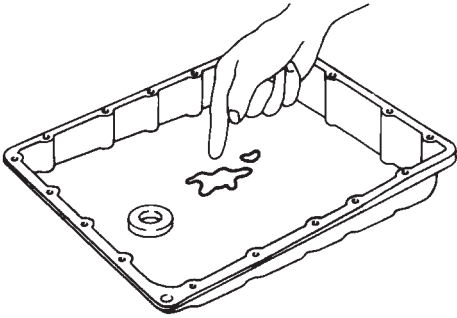
<b>2</b>	<b>CHECK CONTROL LINKAGE</b>
Check control linkage. Refer to AT-276.	
<p><b>"P" position</b></p> 	
SAT032G	
<b>OK or NG</b>	
OK	▶ GO TO 3.
NG	▶ Adjust control linkage. Refer to AT-276.

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## TROUBLE DIAGNOSES FOR SYMPTOMS

4. In "N" Position, Vehicle Moves (Cont'd)

<b>3</b>	<b>CHECK A/T FLUID LEVEL</b>	
Check A/T fluid level again.		
		
SAT638A		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	Refill ATF.

<b>4</b>	<b>CHECK A/T FLUID CONDITION</b>	
<ol style="list-style-type: none"> <li>1. Remove oil pan.</li> <li>2. Check A/T fluid condition.</li> </ol>		
		
SAT171B		
<b>OK or NG</b>		
OK	▶	GO TO 5.
NG	▶	<ol style="list-style-type: none"> <li>1. Disassemble A/T.</li> <li>2. Check the following items: <ul style="list-style-type: none"> <li>● Forward clutch assembly</li> <li>● Overrun clutch assembly</li> <li>● Reverse clutch assembly</li> </ul> </li> </ol>

<b>5</b>	<b>CHECK SYMPTOM</b>	
Check again.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	<ol style="list-style-type: none"> <li>1. Perform TCM input/output signal inspection.</li> <li>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</li> </ol>



# TROUBLE DIAGNOSES FOR SYMPTOMS

5. Large Shock. "N" → "R" Position

## 5. Large Shock. "N" → "R" Position

=NBAT0077

### SYMPTOM:

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

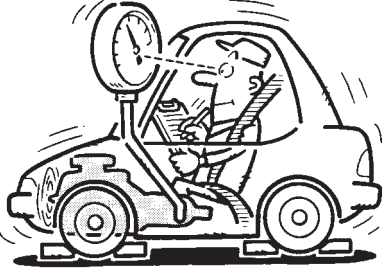
<b>1</b>	<b>CHECK SELF-DIAGNOSTIC RESULTS</b>	
Does self-diagnosis show damage to A/T fluid temperature sensor, line pressure solenoid valve or throttle position sensor circuit?		
SAT579I		
<b>Yes or No</b>		
Yes	▶	Check damaged circuit. Refer to "DTC P0710, DTC P0745 or DTC P1705", AT-105, 162 or 176.
No	▶	GO TO 2.

<b>2</b>	<b>CHECK THROTTLE POSITION SENSOR</b>	
Check throttle position sensor. Refer to EC-167, "Description".		
SAT142K		
<b>OK or NG</b>		
OK	▶	GO TO 3.
NG	▶	Repair or replace throttle position sensor.

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## TROUBLE DIAGNOSES FOR SYMPTOMS

5. Large Shock. "N" → "R" Position (Cont'd)

<b>3</b>	<b>CHECK LINE PRESSURE</b>	
Check line pressure at idle with selector lever in "D" position. Refer to "LINE PRESSURE TEST", AT-62.		
		
SAT494G		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	<ol style="list-style-type: none"> <li>1. Remove control valve assembly. Refer to AT-273.</li> <li>2. Check the following items: <ul style="list-style-type: none"> <li>● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)</li> <li>● Line pressure solenoid valve</li> </ul> </li> </ol>

<b>4</b>	<b>CHECK SYMPTOM</b>	
Check again.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	<ol style="list-style-type: none"> <li>1. Perform TCM input/output signal inspection.</li> <li>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</li> </ol>

# TROUBLE DIAGNOSES FOR SYMPTOMS


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

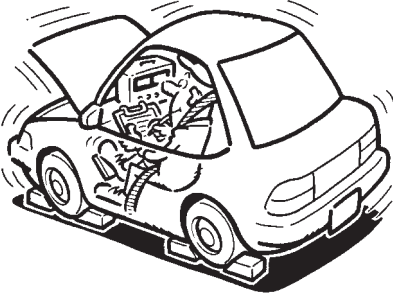
## 6. Vehicle Does Not Creep Backward In "R" Position

=NBAT0078

### SYMPTOM:

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

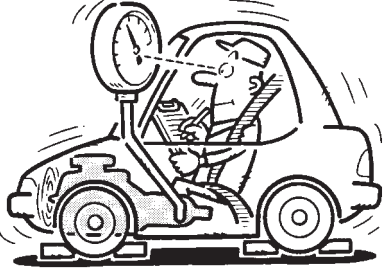
<b>1</b>	<b>CHECK A/T FLUID LEVEL</b>	<p>Check A/T fluid level again.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT638A</p> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶	GO TO 2.	
NG	▶	Refill ATF.	

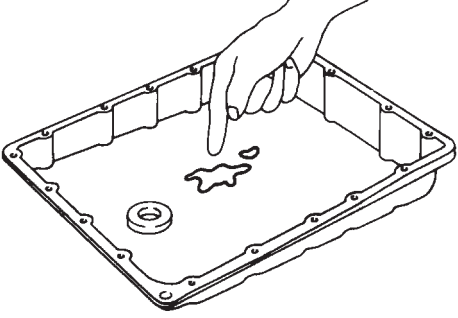
<b>2</b>	<b>CHECK STALL TEST</b>	<p>Check stall revolution with selector lever in "1" and "R" positions. Refer to AT-356.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT493G</p> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶	GO TO 3.	
OK in "1" position, NG in "R" position	▶	<ol style="list-style-type: none"> <li>1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-273.</li> <li>2. Check the following items: <ul style="list-style-type: none"> <li>● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)</li> <li>● Line pressure solenoid valve</li> </ul> </li> <li>3. Disassemble A/T.</li> <li>4. Check the following items: <ul style="list-style-type: none"> <li>● Oil pump assembly</li> <li>● Torque converter</li> <li>● Reverse clutch assembly</li> <li>● High clutch assembly</li> </ul> </li> </ol>	
NG in both "1" and "R" positions	▶	GO TO 6.	

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## TROUBLE DIAGNOSES FOR SYMPTOMS

### 6. Vehicle Does Not Creep Backward In "R" Position (Cont'd)

<b>3</b>	<b>CHECK LINE PRESSURE</b>	<p>Check line pressure at idle with selector lever in "R" position. Refer to "LINE PRESSURE TEST", AT-62.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT494G</p> <p style="text-align: center;"><b>OK or NG</b></p>
OK	▶	GO TO 4.
NG	▶	<ol style="list-style-type: none"> <li>1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-273.</li> <li>2. Check the following items: <ul style="list-style-type: none"> <li>● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)</li> <li>● Line pressure solenoid valve</li> </ul> </li> <li>3. Disassemble A/T.</li> <li>4. Check the following items: <ul style="list-style-type: none"> <li>● Oil pump assembly</li> </ul> </li> </ol>

<b>4</b>	<b>CHECK A/T FLUID CONDITION</b>	<ol style="list-style-type: none"> <li>1. Remove oil pan.</li> <li>2. Check A/T fluid condition.</li> </ol> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT171B</p> <p style="text-align: center;"><b>OK or NG</b></p>
OK	▶	GO TO 5.
NG	▶	GO TO 6.

<b>5</b>	<b>CHECK SYMPTOM</b>	<p>Check again.</p> <p style="text-align: center;"><b>OK or NG</b></p>
OK	▶	<b>INSPECTION END</b>
NG	▶	<ol style="list-style-type: none"> <li>1. Perform TCM input/output signal inspection.</li> <li>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</li> </ol>

# TROUBLE DIAGNOSES FOR SYMPTOMS

6. Vehicle Does Not Creep Backward In "R" Position (Cont'd)

<b>6</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
	<ol style="list-style-type: none"> <li>1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-273.</li> <li>2. Check the following items: <ul style="list-style-type: none"> <li>● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)</li> <li>● Line pressure solenoid valve</li> </ul> </li> <li>3. Disassemble A/T.</li> <li>4. Check the following items: <ul style="list-style-type: none"> <li>● Oil pump assembly</li> <li>● Torque converter</li> <li>● Reverse clutch assembly</li> <li>● High clutch assembly</li> <li>● Low &amp; reverse brake assembly</li> <li>● Low one-way clutch</li> </ul> </li> </ol>	GI  MA  EM  LC  EC
	▶	FE  <b>AT</b>  TF  PD  AX  SU  BR  ST  RS  BT  HA  SC  EL  IDX
	▶	EC  FE  <b>AT</b>  TF  PD  AX  SU  BR  ST  RS  BT  HA  SC  EL  IDX

# TROUBLE DIAGNOSES FOR SYMPTOMS


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

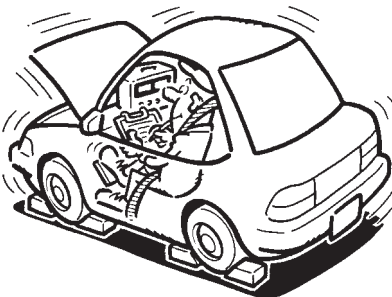
### 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position

=NBAT0079

#### SYMPTOM:

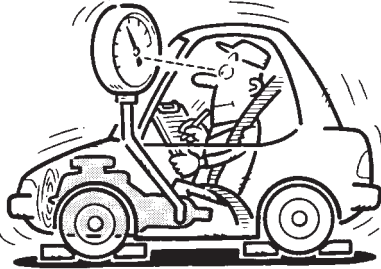
Vehicle does not creep forward when selecting "D", "2" or "1" position.

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

<b>2</b>	<b>CHECK STALL TEST</b>
Check stall revolution with selector lever in "D" position. Refer to "STALL TEST", AT-59.	
	
SAT493G	
OK or NG	
OK	▶ GO TO 3.
NG	▶ GO TO 6.

# TROUBLE DIAGNOSES FOR SYMPTOMS

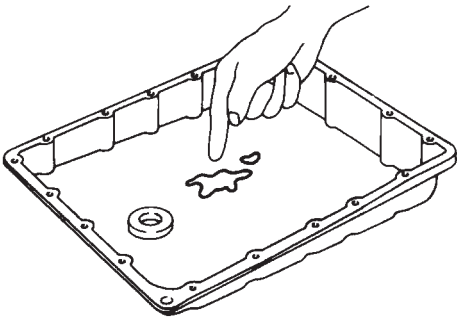
7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position (Cont'd)

<b>3</b>	<b>CHECK LINE PRESSURE</b>	
<p>Check line pressure at idle with selector lever in "R" position. Refer to "LINE PRESSURE TEST", AT-62.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT494G</p>		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	<ol style="list-style-type: none"> <li>1. Remove control valve assembly. Refer to AT-273.</li> <li>2. Check the following items: <ul style="list-style-type: none"> <li>● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)</li> <li>● Line pressure solenoid valve</li> </ul> </li> <li>3. Disassemble A/T.</li> <li>4. Check the following items: <ul style="list-style-type: none"> <li>● Oil pump assembly</li> </ul> </li> </ol>

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<b>4</b>	<b>CHECK A/T FLUID CONDITION</b>	
<ol style="list-style-type: none"> <li>1. Remove oil pan.</li> <li>2. Check A/T fluid condition.</li> </ol> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT171B</p>		
<b>OK or NG</b>		
OK	▶	GO TO 5.
NG	▶	GO TO 6.

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<b>5</b>	<b>CHECK SYMPTOM</b>	
<p>Check again.</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	<b>INSPECTION END</b>
NG	▶	<ol style="list-style-type: none"> <li>1. Perform TCM input/output signal inspection.</li> <li>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</li> </ol>

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## TROUBLE DIAGNOSES FOR SYMPTOMS

### 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position (Cont'd)

<b>6</b>	<b>DETECT MALFUNCTIONING ITEM</b>
<ol style="list-style-type: none"><li>1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-273.</li><li>2. Check the following items:<ul style="list-style-type: none"><li>● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)</li><li>● Line pressure solenoid valve</li></ul></li><li>3. Disassemble A/T.</li><li>4. Check the following items:<ul style="list-style-type: none"><li>● Oil pump assembly</li><li>● Forward clutch assembly</li><li>● Forward one-way clutch</li><li>● Low one-way clutch</li><li>● Low &amp; reverse brake assembly</li><li>● Torque converter</li></ul></li></ol>	
▶	Repair or replace damaged parts.



# TROUBLE DIAGNOSES FOR SYMPTOMS

8. Vehicle Cannot Be Started From D<sub>1</sub>

## 8. Vehicle Cannot Be Started From D<sub>1</sub>

=NBAT0080

### SYMPTOM:

Vehicle cannot be started from D<sub>1</sub> on Cruise test — Part 1.

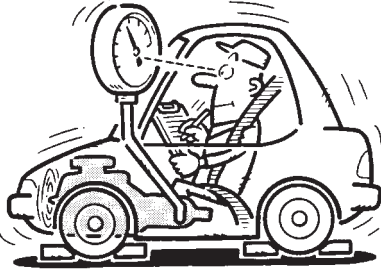
<b>1</b>	<b>CHECK SYMPTOM</b>	
Is "6. Vehicle Does Not Creep Backward In "R" Position" OK?		
<b>Yes or No</b>		
Yes	▶	GO TO 2.
No	▶	Go to "6. Vehicle Does Not Creep Backward In "R" Position", AT-227.

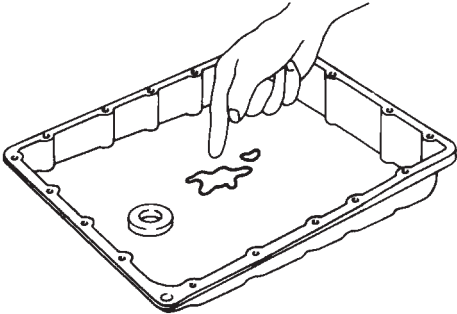
<b>2</b>	<b>CHECK SELF-DIAGNOSTIC RESULTS</b>	
Does self-diagnosis show damage to vehicle speed sensor-A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor-MTR after cruise test?		
<p>The diagram shows a self-diagnostic start sequence. A box labeled "Self-diagnosis start" is connected to a series of vertical bars representing a light/shade pattern. The pattern consists of a series of bars of varying heights and widths. Labels indicate the following components: Vehicle speed sensor • MTR circuit, Shift solenoid valve A circuit, Shift solenoid valve B circuit, Vehicle speed sensor • A/T (revolution sensor) circuit, Light, and Shade. The SAT686I code is located at the bottom right of the diagram area.</p>		
<b>Yes or No</b>		
Yes	▶	Check damaged circuit. Refer to "DTC P0720, DTC P0750, DTC P0755 or VEHICLE SPEED SENSOR. MTR", AT-111, 168, 172 or 197.
No	▶	GO TO 3.

<b>3</b>	<b>CHECK THROTTLE POSITION SENSOR</b>	
Check throttle position sensor. Refer to EC-167, "Description".		
<p>The diagram shows the throttle position sensor assembly. Labels indicate the Throttle position sensor harness connector, Air duct, and Throttle position switch harness connector. The SAT142K code is located at the bottom right of the diagram area.</p>		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	Repair or replace throttle position sensor.

## TROUBLE DIAGNOSES FOR SYMPTOMS

### 8. Vehicle Cannot Be Started From D<sub>1</sub> (Cont'd)

<b>4</b>	<b>CHECK LINE PRESSURE</b>	
<p>Check line pressure at stall point with selector lever in "D" position. Refer to "LINE PRESSURE TEST", AT-62.</p>		
		
SAT494G		
<b>OK or NG</b>		
OK	▶	GO TO 5.
NG	▶	GO TO 8.

<b>5</b>	<b>CHECK A/T FLUID CONDITION</b>	
<p>1. Remove oil pan. 2. Check A/T fluid condition.</p>		
		
SAT171B		
<b>OK or NG</b>		
OK	▶	GO TO 6.
NG	▶	GO TO 8.

<b>6</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p>1. Remove control valve assembly. Refer to AT-273.</p> <p>2. Check the following items:</p> <ul style="list-style-type: none"> <li>● Shift valve A</li> <li>● Shift valve B</li> <li>● Shift solenoid valve A</li> <li>● Shift solenoid valve B</li> <li>● Pilot valve</li> <li>● Pilot filter</li> </ul>		
<b>OK or NG</b>		
OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

# TROUBLE DIAGNOSES FOR SYMPTOMS

8. Vehicle Cannot Be Started From D<sub>1</sub> (Cont'd)

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

GI

MA

EM

<b>8</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
1. Remove control valve assembly. Refer to AT-273.		
2. Check the following items: <ul style="list-style-type: none"> <li>● Shift valve A</li> <li>● Shift valve B</li> <li>● Shift solenoid valve A</li> <li>● Shift solenoid valve B</li> <li>● Pilot valve</li> <li>● Pilot filter</li> </ul>		
3. Disassemble A/T.		
4. Check the following items: <ul style="list-style-type: none"> <li>● Forward clutch assembly</li> <li>● Forward one-way clutch</li> <li>● Low one-way clutch</li> <li>● High clutch assembly</li> <li>● Torque converter</li> <li>● Oil pump assembly</li> </ul>		
<b>OK or NG</b>		
OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

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## TROUBLE DIAGNOSES FOR SYMPTOMS

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

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

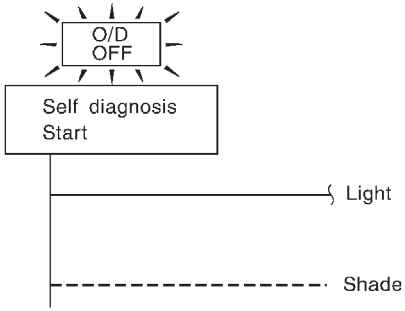
=NBAT0081

#### 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.

<b>1</b>	<b>CHECK SYMPTOM</b>	
Are "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "8. Vehicle Cannot Be Started From $D_1$ " OK?		
<b>Yes or No</b>		
Yes	▶	GO TO 2.
No	▶	Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "8. Vehicle Cannot Be Started From $D_1$ ", AT-230, 233.

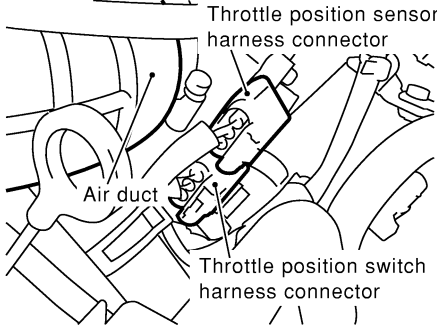
<b>2</b>	<b>CHECK PNP SWITCH CIRCUIT</b>	
<input type="checkbox"/> <b>With CONSULT-II</b> Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?		
<input checked="" type="checkbox"/> <b>Without CONSULT-II</b> Does self-diagnosis show damage to PNP switch circuit?		
		
<b>Yes or No</b>		
Yes	▶	Check PNP switch circuit. Refer to "DTC P0705", AT-99.
No	▶	GO TO 3.

SAT367J

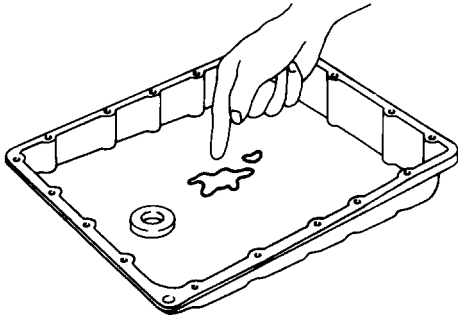
<b>3</b>	<b>CHECK VEHICLE SPEED SENSOR-A/T AND VEHICLE SPEED SENSOR-MTR CIRCUIT</b>	
Check vehicle speed sensor-A/T (revolution sensor) and vehicle speed sensor-MTR circuit. Refer to "DTC P0720 and VEHICLE SPEED SENSOR-MTR", AT-111, 197.		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	Repair or replace vehicle speed sensor-A/T (revolution sensor) and vehicle speed sensor-MTR circuits.

# TROUBLE DIAGNOSES FOR SYMPTOMS

9. A/T Does Not Shift: D<sub>1</sub> → D<sub>2</sub> Or Does Not Kickdown: D<sub>4</sub> → D<sub>2</sub> (Cont'd)

<b>4</b>	<b>CHECK THROTTLE POSITION SENSOR</b>	
<p>Check throttle position sensor. Refer to EC-167, "Description".</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT142K</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 5.
NG	▶	Repair or replace throttle position sensor.

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FE

<b>5</b>	<b>CHECK A/T FLUID CONDITION</b>	
<p>1. Remove oil pan. 2. Check A/T fluid condition.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT171B</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 6.
NG	▶	GO TO 8.

AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS

<b>6</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p>1. Remove control valve. Refer to AT-273. 2. Check the following items:</p> <ul style="list-style-type: none"> <li>● Shift valve A</li> <li>● Shift solenoid valve A</li> <li>● Pilot valve</li> <li>● Pilot filter</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

BT  
HA  
SC  
EL  
IDX

## TROUBLE DIAGNOSES FOR SYMPTOMS

9. A/T Does Not Shift:  $D_1 \rightarrow D_2$  Or Does Not Kickdown:  $D_4 \rightarrow D_2$  (Cont'd)

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

<b>8</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
1. Remove control valve. Refer to AT-273. 2. Check the following items: <ul style="list-style-type: none"> <li>● Shift valve A</li> <li>● Shift solenoid valve A</li> <li>● Pilot valve</li> <li>● Pilot filter</li> </ul> 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> <li>● Servo piston assembly</li> <li>● Brake band</li> <li>● Oil pump assembly</li> </ul>		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

# TROUBLE DIAGNOSES FOR SYMPTOMS

10. A/T Does Not Shift: D<sub>2</sub> → D<sub>3</sub>

## 10. A/T Does Not Shift: D<sub>2</sub> → D<sub>3</sub>

=NBAT0082

### SYMPTOM:

A/T does not shift from D<sub>2</sub> to D<sub>3</sub> at the specified speed.

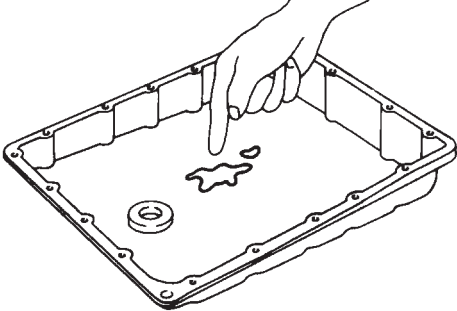
<b>1</b>	<b>CHECK SYMPTOM</b>
Are "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "8. Vehicle Cannot Be Started From D <sub>1</sub> " OK?	
<b>Yes or No</b>	
Yes	▶ GO TO 2.
No	▶ Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "8. Vehicle Cannot Be Started From D <sub>1</sub> ", AT-230, 233.

<b>2</b>	<b>CHECK PNP SWITCH CIRCUIT</b>
<input type="checkbox"/> <b>With CONSULT-II</b> Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?	
<input checked="" type="checkbox"/> <b>Without CONSULT-II</b> Does self-diagnosis show damage to PNP switch circuit?	
SAT367J	
<b>Yes or No</b>	
Yes	▶ Check PNP switch circuit. Refer to "DTC P0705", AT-99.
No	▶ GO TO 3.

<b>3</b>	<b>CHECK THROTTLE POSITION SENSOR</b>
Check throttle position sensor. Refer to EC-167, "Description".	
SAT142K	
<b>OK or NG</b>	
OK	▶ GO TO 4.
NG	▶ Repair or replace throttle position sensor.

## TROUBLE DIAGNOSES FOR SYMPTOMS

10. A/T Does Not Shift: D<sub>2</sub> → D<sub>3</sub> (Cont'd)

<b>4</b>	<b>CHECK A/T FLUID CONDITION</b>	
<p>1. Remove oil pan. 2. Check A/T fluid condition.</p>		
		
SAT171B		
<b>OK or NG</b>		
OK	▶	GO TO 5.
NG	▶	GO TO 7.

<b>5</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p>1. Remove control valve Assembly. Refer to AT-273. 2. Check the following items:</p> <ul style="list-style-type: none"> <li>● Shift valve B</li> <li>● Shift solenoid valve B</li> <li>● Pilot valve</li> <li>● Pilot filter</li> </ul>		
<b>OK or NG</b>		
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

<b>6</b>	<b>CHECK SYMPTOM</b>	
Check again.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	<p>1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</p>



# TROUBLE DIAGNOSES FOR SYMPTOMS

10. A/T Does Not Shift: D<sub>2</sub> → D<sub>3</sub> (Cont'd)

<b>7</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
	<p>1. Remove control valve Assembly. Refer to AT-273.</p> <p>2. Check the following items:</p> <ul style="list-style-type: none"> <li>● Shift valve B</li> <li>● Shift solenoid valve B</li> <li>● Pilot valve</li> <li>● Pilot filter</li> </ul> <p>3. Disassemble A/T.</p> <p>4. Check the following items:</p> <ul style="list-style-type: none"> <li>● Servo piston assembly</li> <li>● High clutch assembly</li> <li>● Oil pump assembly</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

GI

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**AT**

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# TROUBLE DIAGNOSES FOR SYMPTOMS

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

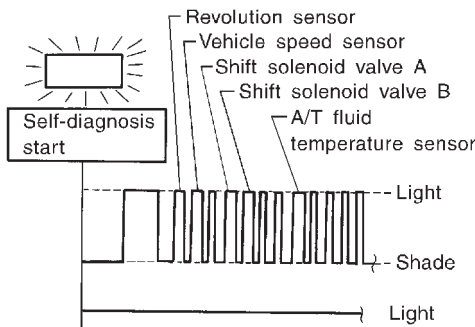
## 11. A/T Does Not Shift: $D_3 \rightarrow D_4$

=NBAT0083

### 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.

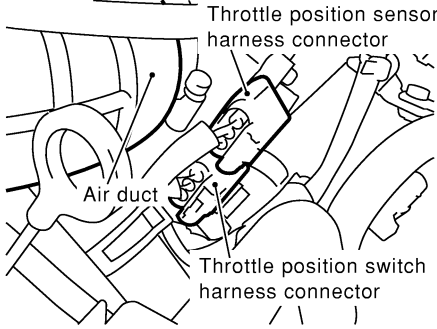
<b>1</b>	<b>CHECK SYMPTOM</b>	
Are "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "8. Vehicle Cannot Be Started From $D_1$ " OK?		
<b>Yes or No</b>		
Yes	▶	GO TO 2.
No	▶	Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "8. Vehicle Cannot Be Started From $D_1$ ", AT-230, 233.

<b>2</b>	<b>CHECK SELF-DIAGNOSTIC RESULTS</b>	
<p>Ⓟ <b>With CONSULT-II</b>                  Does self-diagnosis, after cruise test, show damage to any of the following circuits?</p> <ul style="list-style-type: none"> <li>● Inhibitor switch</li> <li>● Overdrive control switch</li> <li>● A/T fluid temperature sensor</li> <li>● Revolution sensor</li> <li>● Shift solenoid valve A or B</li> <li>● Vehicle speed sensor</li> </ul>		
		
<b>Yes or No</b>		
Yes	▶	Check damaged circuit. Refer to "DTC P0705, P0710, P0720, P0750, P0755 or VHCL SPEED SEN-MTR", AT-99, 105, 111, 168, 172 or 197.
No	▶	GO TO 3.

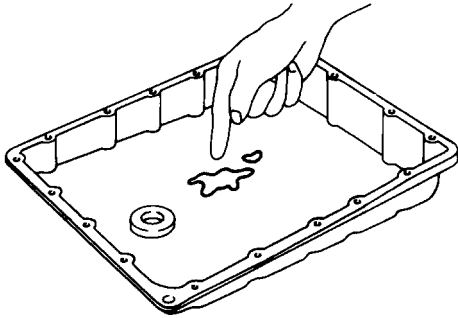
SAT580I

# TROUBLE DIAGNOSES FOR SYMPTOMS

11. A/T Does Not Shift: D<sub>3</sub> → D<sub>4</sub> (Cont'd)

<b>3</b>	<b>CHECK THROTTLE POSITION SENSOR</b>	
<p>Check throttle position sensor. Refer to EC-167, "Description".</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT142K</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 4.
NG	▶	Repair or replace throttle position sensor.

GI  
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LC  
EC  
FE

<b>4</b>	<b>CHECK A/T FLUID CONDITION</b>	
<p>1. Remove oil pan. 2. Check A/T fluid condition.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT171B</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 5.
NG	▶	GO TO 7.

AT  
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RS

<b>5</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p>1. Remove control valve Assembly. Refer to AT-273. 2. Check the following items:</p> <ul style="list-style-type: none"> <li>● Shift valve B</li> <li>● Overrun clutch control valve</li> <li>● Shift solenoid valve B</li> <li>● Pilot valve</li> <li>● Pilot filter</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

BT  
HA  
SC  
EL  
IDX

## TROUBLE DIAGNOSES FOR SYMPTOMS

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

<b>6</b>	<b>CHECK SYMPTOM</b>	
Check again.		
OK or NG		
OK	▶	<b>INSPECTION END</b>
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

<b>7</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
1. Remove control valve Assembly. Refer to AT-273. 2. Check the following items: <ul style="list-style-type: none"> <li>● Shift valve B</li> <li>● Overrun clutch control valve</li> <li>● Shift solenoid valve B</li> <li>● Pilot valve</li> <li>● Pilot filter</li> </ul> 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> <li>● Servo piston assembly</li> <li>● Brake band</li> <li>● Torque converter</li> <li>● Oil pump assembly</li> </ul>		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

# TROUBLE DIAGNOSES FOR SYMPTOMS

12. A/T Does Not Perform Lock-up

## 12. A/T Does Not Perform Lock-up

=NBAT0084

### SYMPTOM:

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

<b>1</b>	<b>CHECK SELF-DIAGNOSTIC RESULTS</b>	
Does self-diagnosis show damage to torque converter clutch solenoid valve circuit after cruise test?		
SAT581I		
<b>Yes or No</b>		
Yes	▶	Check torque converter clutch solenoid valve circuit. Refer to "DTC P0740", AT-148.
No	▶	GO TO 2.

<b>2</b>	<b>CHECK THROTTLE POSITION SENSOR</b>	
Check throttle position sensor. Refer to EC-167, "Description".		
SAT142K		
<b>OK or NG</b>		
OK	▶	GO TO 3.
NG	▶	Repair or replace throttle position sensor.

<b>3</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
1. Remove control valve. Refer to AT-273. 2. Check following items: <ul style="list-style-type: none"> <li>● Torque converter clutch control valve</li> <li>● Torque converter relief valve</li> <li>● Torque converter clutch solenoid valve</li> <li>● Pilot valve</li> <li>● Pilot filter</li> </ul>		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

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IDX

## TROUBLE DIAGNOSES FOR SYMPTOMS

### 12. A/T Does Not Perform Lock-up (Cont'd)

<b>4</b>	<b>CHECK SYMPTOM</b>
Check again.	
OK or NG	
OK	▶ <b>INSPECTION END</b>
NG	▶ 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

# TROUBLE DIAGNOSES FOR SYMPTOMS

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

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

=NBAT0085

### SYMPTOM:

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

<b>1</b>	<b>CHECK DIAGNOSTIC RESULTS</b>	
Does self-diagnosis show damage to engine speed signal circuit after cruise test?		
SAT582I		
<b>Yes or No</b>		
Yes	▶	Check engine speed signal circuit. Refer to "DTC P0725", AT-116.
No	▶	GO TO 2.

<b>2</b>	<b>CHECK A/T FLUID CONDITION</b>	
<ol style="list-style-type: none"> <li>1. Remove oil pan.</li> <li>2. Check A/T fluid condition.</li> </ol>		
SAT171B		
<b>OK or NG</b>		
OK	▶	GO TO 3.
NG	▶	GO TO 5.

<b>3</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<ol style="list-style-type: none"> <li>1. Remove control valve assembly. Refer to AT-273.</li> <li>2. Check the following items: <ul style="list-style-type: none"> <li>● Torque converter clutch control valve</li> <li>● Pilot valve</li> <li>● Pilot filter</li> </ul> </li> </ol>		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

GI  
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SC  
EL  
IDX

## TROUBLE DIAGNOSES FOR SYMPTOMS

### 13. A/T Does Not Hold Lock-up Condition (Cont'd)

<b>4</b>	<b>CHECK SYMPTOM</b>	
Check again.		
OK or NG		
OK	▶	<b>INSPECTION END</b>
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

<b>5</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
1. Remove control valve assembly. Refer to AT-273. 2. Check the following items: <ul style="list-style-type: none"> <li>● Torque converter clutch control valve</li> <li>● Pilot valve</li> <li>● Pilot filter</li> </ul> 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.



# TROUBLE DIAGNOSES FOR SYMPTOMS

14. Lock-up Is Not Released



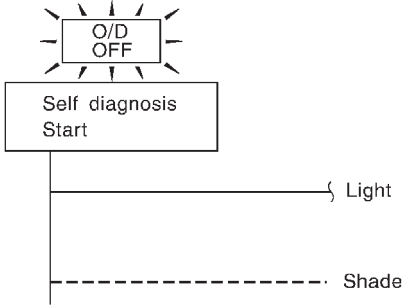
## 14. Lock-up Is Not Released

=NBAT0086

### SYMPTOM:

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

GI  
MA  
EM  
LC  
EC  
FE  
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PD  
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BR  
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BT  
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SC  
EL  
IDX

<b>1</b>	<b>CHECK THROTTLE POSITION SWITCH CIRCUIT</b>	
<p> <b>With CONSULT-II</b> Does "TCM INPUT SIGNALS" in Data Monitor show damage to closed throttle position switch circuit?</p>		
<p> <b>Without CONSULT-II</b> Does self-diagnosis show damage to closed throttle position switch circuit?</p>		
		
SAT367J		
<b>Yes or No</b>		
Yes	▶	Check closed throttle position switch circuit. Refer to "DTC P1705", AT-176.
No	▶	GO TO 2.

<b>2</b>	<b>CHECK SYMPTOM</b>	
Check again.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	<ol style="list-style-type: none"> <li>1. Perform TCM input/output signal inspection.</li> <li>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</li> </ol>

# TROUBLE DIAGNOSES FOR SYMPTOMS

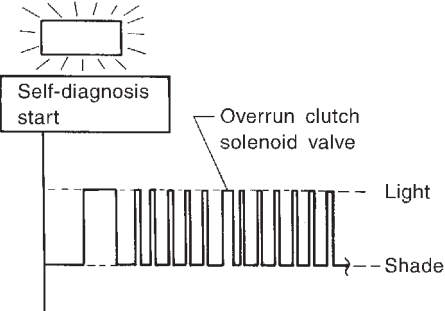
## 15. Engine Speed Does Not Return To Idle (Light Braking D<sub>4</sub> → D<sub>3</sub>)

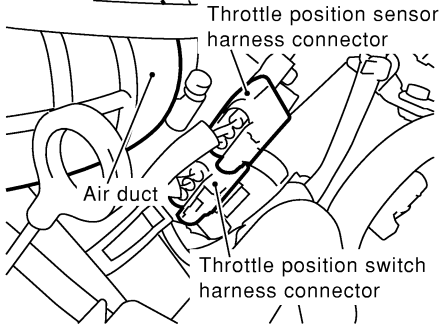
=NBAT0087

### 15. Engine Speed Does Not Return To Idle (Light Braking D<sub>4</sub> → D<sub>3</sub>)

**SYMPTOM:**

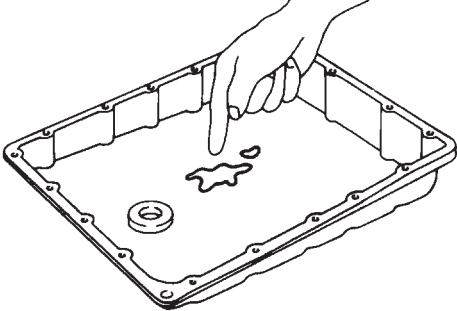
- Engine speed does not smoothly return to idle when A/T shifts from D<sub>4</sub> to D<sub>3</sub>.
- Vehicle does not decelerate by engine brake when turning overdrive control switch OFF.
- Vehicle does not decelerate by engine brake when shifting A/T from “D” to “2” position.

<b>1</b>	<b>CHECK SELF-DIAGNOSTIC RESULTS</b>		
Does self-diagnosis show damage to overrun clutch solenoid valve circuit after cruise test?			
			
SAT583I			
<b>Yes or No</b>			
Yes	▶	Check overrun clutch solenoid valve circuit. Refer to “DTC P1760”, AT-185.	
No	▶	GO TO 2.	

<b>2</b>	<b>CHECK THROTTLE POSITION SENSOR</b>		
Check throttle position sensor. Refer to EC-167, “Description”.			
			
SAT142K			
<b>OK or NG</b>			
OK	▶	GO TO 3.	
NG	▶	Repair or replace throttle position sensor.	

# TROUBLE DIAGNOSES FOR SYMPTOMS

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

<b>3</b>	<b>CHECK A/T FLUID CONDITION</b>	
<p>1. Remove oil pan. 2. Check A/T fluid condition.</p> <div style="text-align: center;">  <p>SAT171B</p> </div> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 4.
NG	▶	GO TO 6.

GI  
MA  
EM  
LC  
EC  
FE

**AT**

<b>4</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p>1. Remove control valve assembly. Refer to AT-273. 2. Check the following items:</p> <ul style="list-style-type: none"> <li>● Overrun clutch control valve</li> <li>● Overrun clutch reducing valve</li> <li>● Overrun clutch solenoid valve</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

TF  
PD  
AX

<b>5</b>	<b>CHECK SYMPTOM</b>	
<p>Check again.</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	<b>INSPECTION END</b>
NG	▶	<p>1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</p>

BR  
ST  
RS

<b>6</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p>1. Remove control valve assembly. Refer to AT-273. 2. Check the following items:</p> <ul style="list-style-type: none"> <li>● Overrun clutch control valve</li> <li>● Overrun clutch reducing valve</li> <li>● Overrun clutch solenoid valve</li> </ul> <p>3. Disassemble A/T. 4. Check the following items:</p> <ul style="list-style-type: none"> <li>● Overrun clutch assembly</li> <li>● Oil pump assembly</li> </ul> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

BT  
HA  
SC  
EL  
IDX

# TROUBLE DIAGNOSES FOR SYMPTOMS

16. Vehicle Does Not Start From D<sub>1</sub>

## 16. Vehicle Does Not Start From D<sub>1</sub>

NBAT0088

### SYMPTOM:

Vehicle does not start from D<sub>1</sub> on Cruise test — Part 2.

<b>1</b>	<b>CHECK SELF-DIAGNOSTIC RESULTS</b>	
<p>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?</p>		
SAT686I		
<b>Yes or No</b>		
Yes	▶	Check damaged circuit. Refer to "DTC P0720, P0750, P0755 or VHCL SPEED SEN-MTR", AT-111, 176, 172 or 197.
No	▶	GO TO 2.

<b>2</b>	<b>CHECK SYMPTOM</b>	
Check again.		
<b>OK or NG</b>		
OK	▶	Go to "8. Vehicle Cannot Be Started From D <sub>1</sub> ", AT-233.
NG	▶	<ol style="list-style-type: none"> <li>1. Perform TCM input/output signal inspection.</li> <li>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</li> </ol>

# TROUBLE DIAGNOSES FOR SYMPTOMS

17. A/T Does Not Shift: D<sub>4</sub> → D<sub>3</sub>, When Overdrive Control Switch "ON" → "OFF"

## 17. A/T Does Not Shift: D<sub>4</sub> → D<sub>3</sub>, When Overdrive Control Switch "ON" → "OFF"

=NBAT0089

### SYMPTOM:

A/T does not shift from D<sub>4</sub> to D<sub>3</sub> when changing overdrive control switch to "OFF" position.

<b>1</b>	<b>CHECK OVERDRIVE CONTROL SWITCH CIRCUIT</b>	
<p><input type="checkbox"/> <b>With CONSULT-II</b> Does "TCM INPUT SIGNALS" in Data Monitor show damage to overdrive control switch circuit?</p>		
<p><input checked="" type="checkbox"/> <b>Without CONSULT-II</b> Does self-diagnosis show damage to overdrive control switch circuit?</p>		
<pre> graph TD     A[O/D OFF] --&gt; B[Self-diagnosis start]     B -.-&gt; C[Light]     B --&gt; D[Shade]                     </pre>		
SAT344H		
<b>Yes or No</b>		
Yes	▶	Check overdrive control switch circuit. Refer to AT-257.
No	▶	Go to "10. A/T Does Not Shift: D <sub>2</sub> → D <sub>3</sub> ", AT-239.

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SC  
EL  
IDX

# TROUBLE DIAGNOSES FOR SYMPTOMS

18. A/T Does Not Shift: D<sub>3</sub> → 2<sub>2</sub>, When Selector Lever "D" → "2" Position

## 18. A/T Does Not Shift: D<sub>3</sub> → 2<sub>2</sub>, When Selector Lever "D" → "2" Position

=NBAT0090

### SYMPTOM:

A/T does not shift from D<sub>3</sub> to 2<sub>2</sub> when changing selector lever from "D" to "2" position.

<b>1</b>	<b>CHECK PNP SWITCH CIRCUIT</b>
<p><input type="checkbox"/> <b>With CONSULT-II</b> Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?</p>	
<p><input checked="" type="checkbox"/> <b>Without CONSULT-II</b> Does self-diagnosis show damage to PNP switch circuit?</p> <div style="text-align: center; margin: 20px 0;"> <pre> graph TD     Start[Self diagnosis Start] --- Light[Light]     Start -.- Shade[Shade]             </pre> </div> <p style="text-align: right;">SAT367J</p>	
<b>Yes or No</b>	
Yes	▶ Check PNP switch circuit. Refer to "DTC P0705", AT-99.
No	▶ Go to "9. A/T Does Not Shift: D <sub>1</sub> → D <sub>2</sub> Or Does Not Kickdown: D <sub>4</sub> → D <sub>2</sub> ", AT-236.

# TROUBLE DIAGNOSES FOR SYMPTOMS



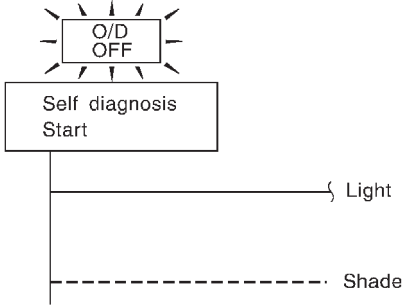
19. A/T Does Not Shift: 2<sub>2</sub> → 1<sub>1</sub>, When Selector Lever "2" → "1" Position

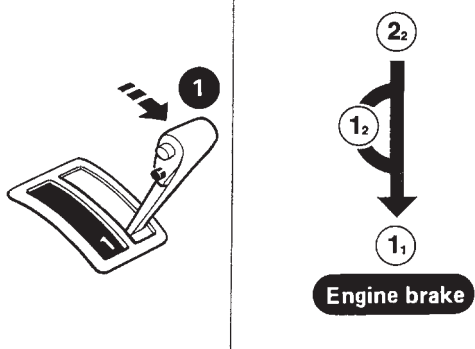
## 19. A/T Does Not Shift: 2<sub>2</sub> → 1<sub>1</sub>, When Selector Lever "2" → "1" Position

=NBAT0091

### SYMPTOM:

A/T does not shift from 2<sub>2</sub> to 1<sub>1</sub> when changing selector lever from "2" to "1" position.

<b>1</b>	<b>CHECK PNP SWITCH CIRCUIT</b>
<p> <b>With CONSULT-II</b> Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?</p>	
<p> <b>Without CONSULT-II</b> Does self-diagnosis show damage to PNP switch circuit?</p>	
	
SAT367J	
<b>Yes or No</b>	
Yes	▶ Check PNP switch circuit. Refer to "DTC P0705", AT-99.
No	▶ GO TO 2.

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

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# TROUBLE DIAGNOSES FOR SYMPTOMS

20. Vehicle Does Not Decelerate By Engine Brake

## 20. Vehicle Does Not Decelerate By Engine Brake

NBAT0092

### SYMPTOM:

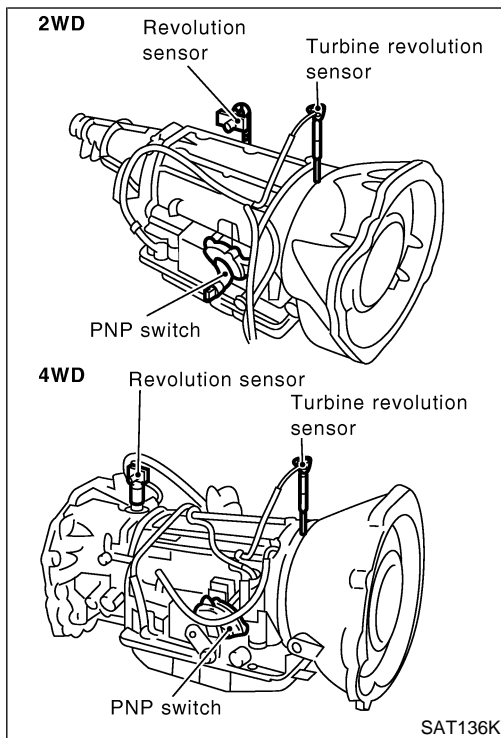
Vehicle does not decelerate by engine brake when shifting from 2<sub>2</sub> (1<sub>2</sub>) to 1<sub>1</sub>.

1	<b>CHECK SYMPTOM</b>
Is "6. Vehicle Does Not Creep Backward In "R" Position" OK?	
<b>Yes or No</b>	
Yes	▶ Go to "15. Engine Speed Does Not Return To Idle (Light Braking D <sub>4</sub> → D <sub>3</sub> )", AT-250.
No	▶ Go to "6. Vehicle Does Not Creep Backward In "R" Position", AT-227.



# TROUBLE DIAGNOSES FOR SYMPTOMS

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



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

NBAT0204

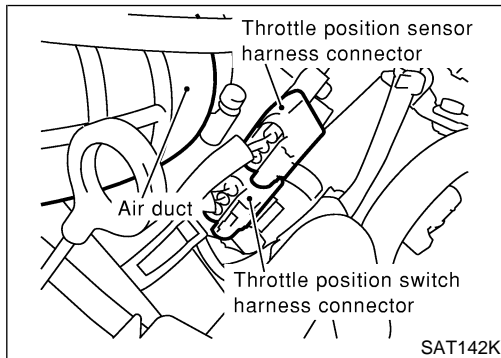
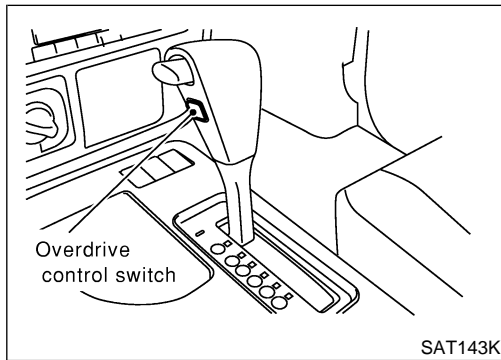
#### SYMPTOM:

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

#### DESCRIPTION

NBAT0204S01

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



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# TROUBLE DIAGNOSES FOR SYMPTOMS

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

## DIAGNOSTIC PROCEDURE

=NBAT0204S03

**NOTE:**

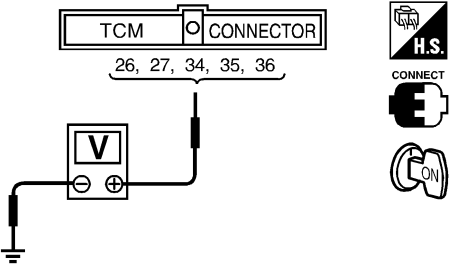
The diagnostic procedure includes inspections for the overdrive control and throttle position switch circuits.

<b>1</b>	<b>INSPECTION START</b>	
Do you have CONSULT-II?		
Yes or No		
Yes (With CONSULT-II) ▶	GO TO 2.	
No (Without CONSULT-II) ▶	GO TO 3.	

<b>2</b>	<b>CHECK PNP SWITCH CIRCUIT (With CONSULT-II)</b>															
<p>Ⓜ <b>With CONSULT-II</b></p> <ol style="list-style-type: none"> <li>1. Turn ignition switch to "ON" position. (Do not start engine.)</li> <li>2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</li> <li>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.</li> </ol>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th></th> </tr> </thead> <tbody> <tr> <td>PN POSI SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>R POSITION SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>D POSITION SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>2 POSITION SW</td> <td style="text-align: center;">ON</td> </tr> <tr> <td>1 POSITION SW</td> <td style="text-align: center;">OFF</td> </tr> </tbody> </table>			DATA MONITOR		MONITORING		PN POSI SW	OFF	R POSITION SW	OFF	D POSITION SW	OFF	2 POSITION SW	ON	1 POSITION SW	OFF
DATA MONITOR																
MONITORING																
PN POSI SW	OFF															
R POSITION SW	OFF															
D POSITION SW	OFF															
2 POSITION SW	ON															
1 POSITION SW	OFF															
SAT643J																
<b>OK or NG</b>																
OK ▶	GO TO 5.															
NG ▶	GO TO 4.															

# TROUBLE DIAGNOSES FOR SYMPTOMS

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

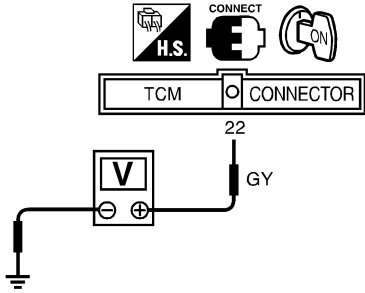
<b>3</b>	<b>CHECK PNP SWITCH CIRCUIT (Without CONSULT-II)</b>																																									
<p>⊗ <b>Without CONSULT-II</b></p> <p>1. Turn ignition switch to "ON" position. (Do not start engine.)</p> <p>2. Check voltage between TCM terminals 26, 27, 34, 35, 36 and ground while moving selector lever through each position.</p>																																										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Lever position</th> <th colspan="5">Terminals</th> </tr> <tr> <th>36</th> <th>35</th> <th>34</th> <th>27</th> <th>26</th> </tr> </thead> <tbody> <tr> <td>P, N</td> <td style="text-align: center;"><b>B</b></td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>R</td> <td style="text-align: center;">0</td> <td style="text-align: center;"><b>B</b></td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>D</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;"><b>B</b></td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>2</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;"><b>B</b></td> <td style="text-align: center;">0</td> </tr> <tr> <td>1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;"><b>B</b></td> </tr> </tbody> </table>		Lever position	Terminals					36	35	34	27	26	P, N	<b>B</b>	0	0	0	0	R	0	<b>B</b>	0	0	0	D	0	0	<b>B</b>	0	0	2	0	0	0	<b>B</b>	0	1	0	0	0	0	<b>B</b>
Lever position	Terminals																																									
	36	35	34	27	26																																					
P, N	<b>B</b>	0	0	0	0																																					
R	0	<b>B</b>	0	0	0																																					
D	0	0	<b>B</b>	0	0																																					
2	0	0	0	<b>B</b>	0																																					
1	0	0	0	0	<b>B</b>																																					
																																										
MTBL0205																																										
SAT517J																																										
<b>Does battery voltage exist (B) or non-existent (0)?</b>																																										
Yes	▶ GO TO 5.																																									
No	▶ GO TO 4.																																									

<b>4</b>	<b>DETECT MALFUNCTIONING ITEM</b>
<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● PNP switch Refer to "Component Inspection", AT-263.</li> <li>● Harness for short or open between ignition switch and PNP switch (Main harness)</li> <li>● Harness for short or open between PNP switch and TCM (Main harness)</li> </ul>	
<b>OK or NG</b>	
OK	▶ GO TO 5.
NG	▶ Repair or replace damaged parts.

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# TROUBLE DIAGNOSES FOR SYMPTOMS

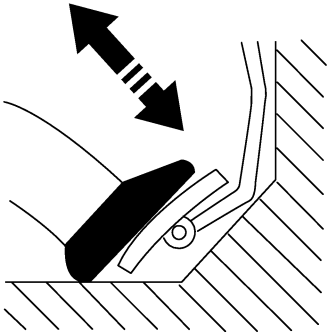
21. TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Throttle Position Switches Circuit Checks) (Cont'd)

5	CHECK OVERDRIVE CONTROL SWITCH CIRCUIT														
<p><b>④ With CONSULT-II</b></p> <ol style="list-style-type: none"> <li>Turn ignition switch to "ON" position. (Do not start engine.)</li> <li>Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</li> <li>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".)</li> </ol>															
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th colspan="2">MONITORING</th> </tr> </thead> <tbody> <tr> <td>ENGINE SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>TURBINE REV</td> <td>XXX rpm</td> </tr> <tr> <td>OVERDRIVE SW</td> <td>ON</td> </tr> <tr> <td>PN POSI SW</td> <td>OFF</td> </tr> <tr> <td>R POSITION SW</td> <td>OFF</td> </tr> </tbody> </table>		DATA MONITOR		MONITORING		ENGINE SPEED	XXX rpm	TURBINE REV	XXX rpm	OVERDRIVE SW	ON	PN POSI SW	OFF	R POSITION SW	OFF
DATA MONITOR															
MONITORING															
ENGINE SPEED	XXX rpm														
TURBINE REV	XXX rpm														
OVERDRIVE SW	ON														
PN POSI SW	OFF														
R POSITION SW	OFF														
SAT645J															
<p><b>⊗ Without CONSULT-II</b></p> <ol style="list-style-type: none"> <li>Turn ignition switch to "ON" position. (Do not start engine.)</li> <li>Check voltage between TCM terminal 22 and ground when overdrive control switch is "ON" and "OFF".</li> </ol> <p style="color: blue;"><b>Voltage:</b></p> <p style="color: blue;"><b>Switch position "ON":</b> Battery voltage</p> <p style="color: blue;"><b>Switch position "OFF":</b> 1V or less</p>															
															
OK or NG															
OK (With CONSULT-II)	▶ GO TO 7.														
OK (Without CONSULT-II)	▶ GO TO 9.														
NG	▶ GO TO 6.														

6	DETECT MALFUNCTIONING ITEM
<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>Overdrive control switch Refer to "Component Inspection", AT-263.</li> <li>Harness for short or open between TCM and overdrive control switch (Main harness)</li> <li>Harness for short or open of ground circuit for overdrive control switch (Main harness)</li> </ul>	
OK or NG	
OK (With CONSULT-II)	▶ GO TO 7.
OK (Without CONSULT-II)	▶ GO TO 9.
NG	▶ Repair or replace damaged parts.

# TROUBLE DIAGNOSES FOR SYMPTOMS

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


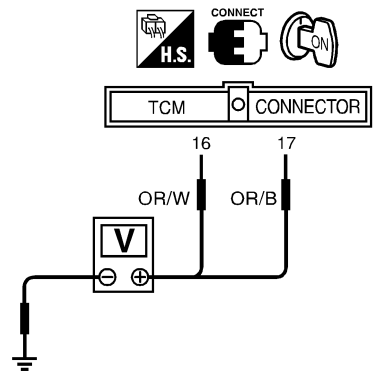
<b>7</b>	<b>CHECK THROTTLE POSITION SWITCH CIRCUIT (With CONSULT-II)</b>															
<p><b>Ⓟ With CONSULT-II</b></p> <ol style="list-style-type: none"> <li>1. Turn ignition switch to "ON" position. (Do not start engine.)</li> <li>2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</li> <li>3. Apply vacuum to the throttle opener, then check the following. Refer to steps 1 and 2 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.</li> <li>4. 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.</li> </ol>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Accelerator pedal condition</th> <th colspan="2">Data monitor</th> </tr> <tr> <th>CLOSED THL/SW</th> <th>W/O THRL/P-SW</th> </tr> </thead> <tbody> <tr> <td>Released</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>Fully depressed</td> <td style="text-align: center;">OFF</td> <td style="text-align: center;">ON</td> </tr> </tbody> </table>			Accelerator pedal condition	Data monitor		CLOSED THL/SW	W/O THRL/P-SW	Released	ON	OFF	Fully depressed	OFF	ON			
Accelerator pedal condition	Data monitor															
	CLOSED THL/SW	W/O THRL/P-SW														
Released	ON	OFF														
Fully depressed	OFF	ON														
<div style="display: flex; justify-content: space-around; align-items: center;">  <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th></th> </tr> </thead> <tbody> <tr> <td>POWERSHIFT SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>CLOSED THL/SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>W/OTHRL/P-SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>HOLD SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>BRAKE SW</td> <td style="text-align: center;">ON</td> </tr> </tbody> </table> </div>			DATA MONITOR		MONITORING		POWERSHIFT SW	OFF	CLOSED THL/SW	OFF	W/OTHRL/P-SW	OFF	HOLD SW	OFF	BRAKE SW	ON
DATA MONITOR																
MONITORING																
POWERSHIFT SW	OFF															
CLOSED THL/SW	OFF															
W/OTHRL/P-SW	OFF															
HOLD SW	OFF															
BRAKE SW	ON															
<p>MTBL0011</p> <p>SAT646J</p>																
<b>OK or NG</b>																
OK	▶	GO TO 10.														
NG	▶	GO TO 8.														

<b>8</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● Throttle position switch Refer to "Component Inspection", AT-264.</li> <li>● Harness for short or open between ignition switch and throttle position switch (Main harness)</li> <li>● Harness for short or open between throttle position switch and TCM (Main harness)</li> </ul>		
<b>OK or NG</b>		
OK	▶	GO TO 10.
NG	▶	Repair or replace damaged parts.

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# TROUBLE DIAGNOSES FOR SYMPTOMS

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

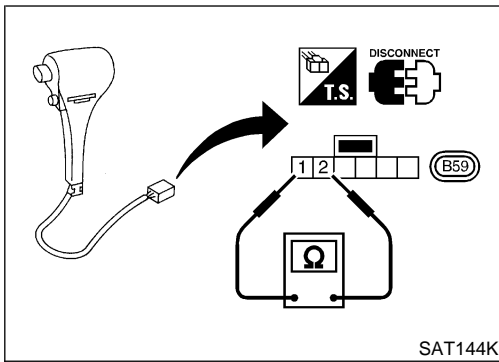
<b>9</b>	<b>CHECK THROTTLE POSITION SWITCH CIRCUIT (Without CONSULT-II)</b>											
<p>⊗ <b>Without CONSULT-II</b></p> <p>1. Turn ignition switch to "ON" position. (Do not start engine.)</p> <p>2. Check voltage between TCM terminals 16, 17 and ground while depressing, and releasing accelerator pedal slowly. (after warming up engine) [Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.]</p>												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Accelerator pedal condition</th> <th colspan="2">Voltage</th> </tr> <tr> <th>Terminal No. 16</th> <th>Terminal No. 17</th> </tr> </thead> <tbody> <tr> <td>Released</td> <td>Battery voltage</td> <td>0V</td> </tr> <tr> <td>Fully depressed</td> <td>0V</td> <td>Battery voltage</td> </tr> </tbody> </table>		Accelerator pedal condition	Voltage		Terminal No. 16	Terminal No. 17	Released	Battery voltage	0V	Fully depressed	0V	Battery voltage
Accelerator pedal condition	Voltage											
	Terminal No. 16	Terminal No. 17										
Released	Battery voltage	0V										
Fully depressed	0V	Battery voltage										
MTBL0519												
												
												
SAT526J												
<b>OK or NG</b>												
OK	▶	GO TO 10.										
NG	▶	GO TO 8.										

<b>10</b>	<b>CHECK DTC</b>	
Perform Diagnostic procedure, AT-258.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	GO TO 11.

<b>11</b>	<b>CHECK TCM INSPECTION</b>	
<p>1. Perform TCM input/output signal inspection.</p> <p>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</p>		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	Repair or replace damaged parts.

# TROUBLE DIAGNOSES FOR SYMPTOMS

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



### COMPONENT INSPECTION

#### Overdrive Control Switch

NBAT0204S04

NBAT0204S0401

- Check continuity between two terminals.

#### Continuity:

Switch position "ON":

No

Switch position "OFF":

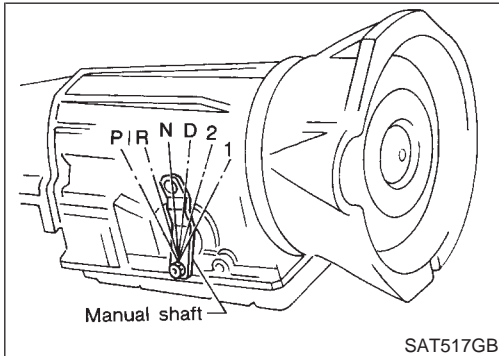
Yes

GI

MA

EM

LC



#### Park/Neutral Position Switch

NBAT0204S0402

- 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	

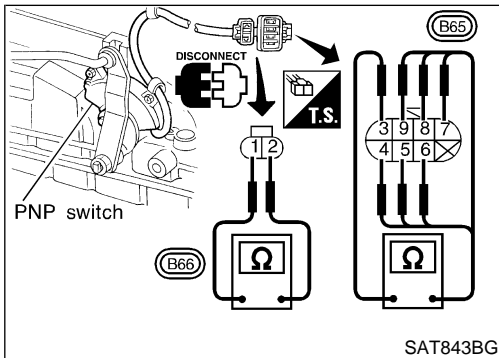
EC

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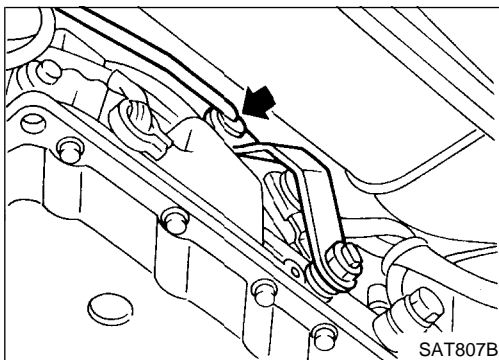
PD



AX

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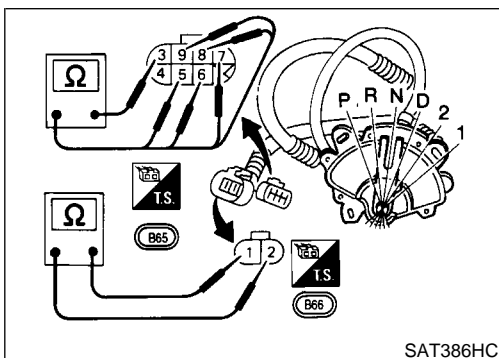
- If NG, check again with manual control linkage disconnected from manual shaft of A/T assembly. Refer to step 1.
- If OK on step 2, adjust manual control linkage. Refer to AT-276.

ST

RS

BT

HA



- If NG on step 2, remove PNP switch from A/T and check continuity of PNP switch terminals. Refer to step 1.
- If OK on step 4, adjust PNP switch. Refer to AT-276.
- If NG on step 4, replace PNP switch.

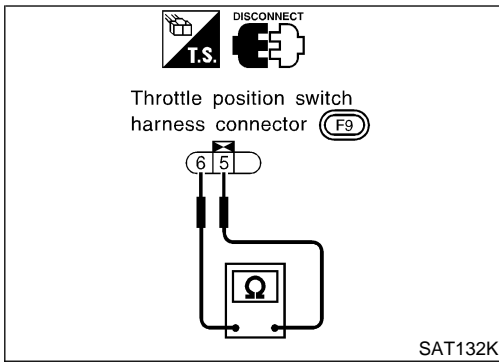
SC

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# TROUBLE DIAGNOSES FOR SYMPTOMS

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



## Throttle Position Switch

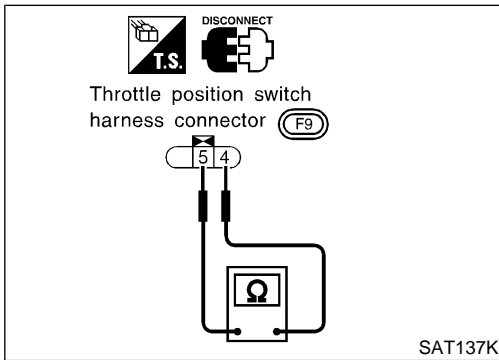
NBAT0204S0403

### Closed Throttle Position Switch (Idle Position)

- Check continuity between terminals 5 and 6. [Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.]

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

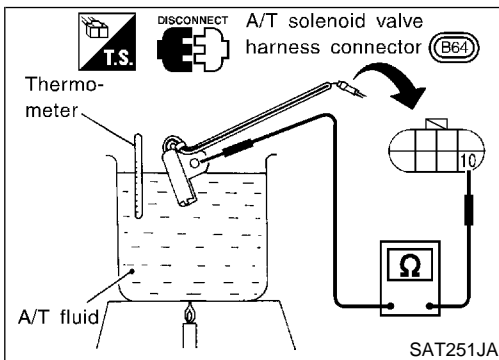
- To adjust closed throttle position switch, refer to EC-423, "System Description".



### Wide Open Throttle Position Switch

- Check continuity between terminals 4 and 5.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes



### A/T Fluid Temperature Switch

NBAT0204S0404

- Make sure the A/T fluid warning lamp lights when the key is inserted and turned to "ON".
- Make sure the A/T fluid warning lamp goes off when turning the ignition switch to "ON".
- Check resistance between terminal 10 and ground while changing temperature as shown at left.

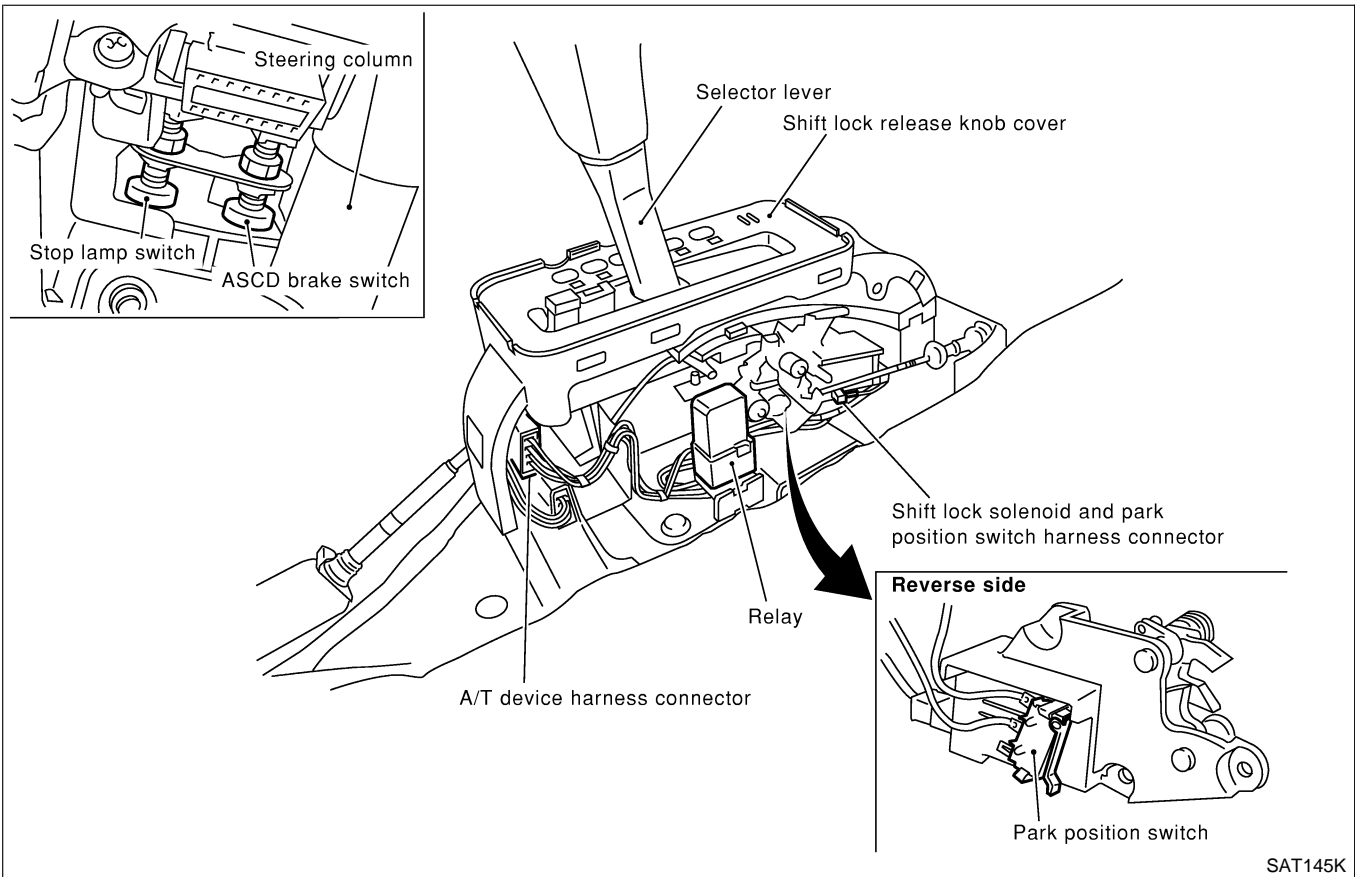
Temperature °C (°F)	Resistance
140 (284) or more	Yes
140 (284) or less	No



## Description

NBAT0093

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



SAT145K

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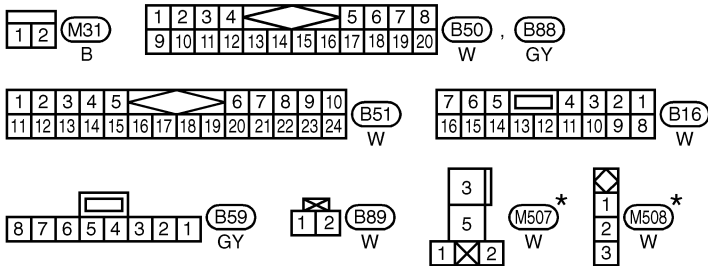
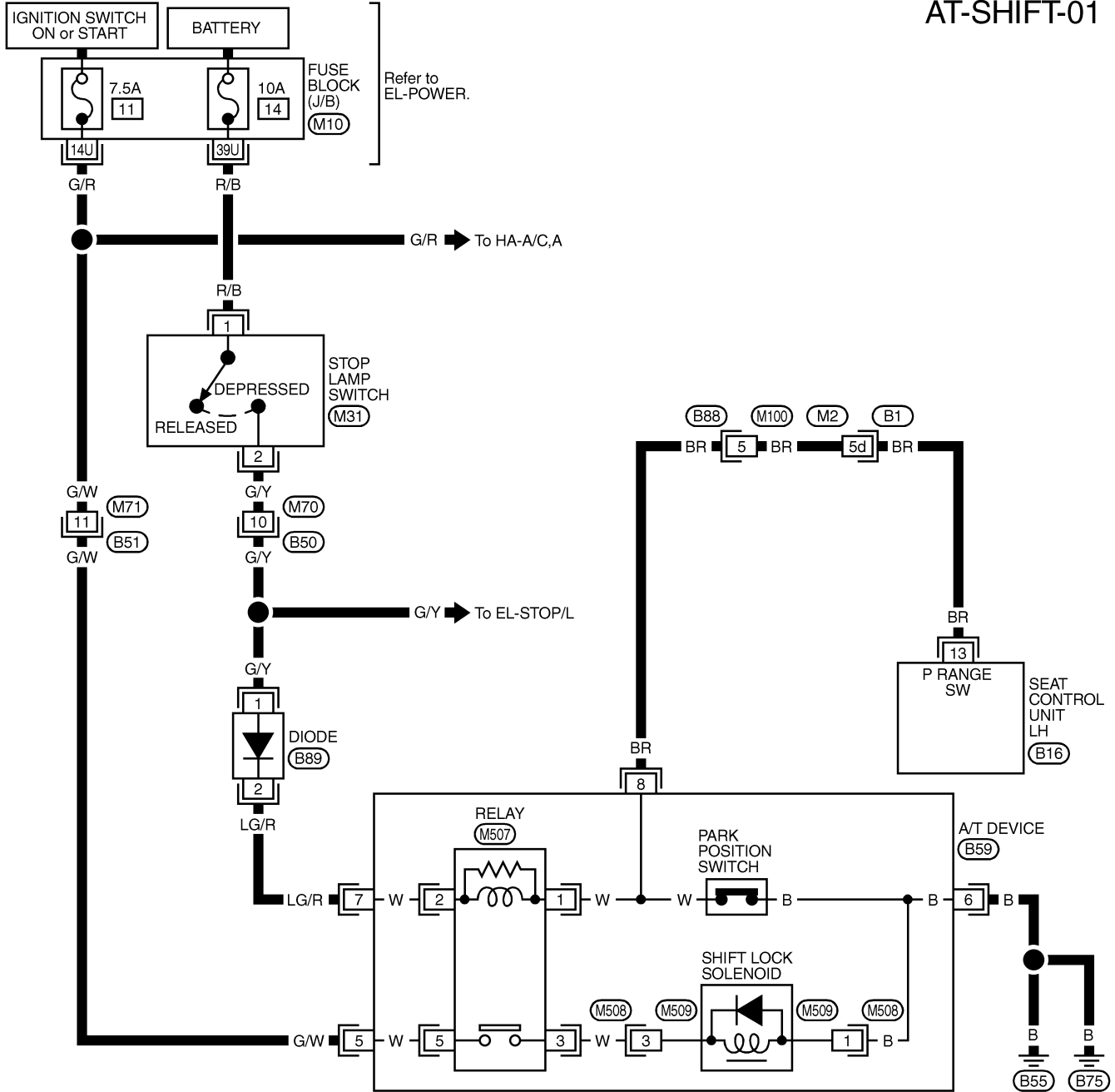
# A/T SHIFT LOCK SYSTEM

Wiring Diagram — SHIFT —

## Wiring Diagram — SHIFT —

NBAT0094

AT-SHIFT-01



\* : This connector is not shown in "HARNESS LAYOUT", EL section.

REFER TO THE FOLLOWING.

- (B1) -SUPER MULTIPLE JUNCTION (SMJ)
- (M10) -FUSE BLOCK-JUNCTION BOX (J/B)

MAT921A

# A/T SHIFT LOCK SYSTEM

Diagnostic Procedure

## Diagnostic Procedure

NBAT0095

### 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”.

<b>1</b>	<b>CHECK KEY INTERLOCK CABLE</b>
Check key interlock cable for damage.	
<b>OK or NG</b>	
OK	▶ GO TO 2.
NG	▶ Repair key interlock cable. Refer to “Key Interlock Cable”, AT-271.

<b>2</b>	<b>CHECK SELECTOR LEVER POSITION</b>
Check selector lever position for damage.	
<b>OK or NG</b>	
OK	▶ GO TO 3.
NG	▶ Check selector lever. Refer to “ON-VEHICLE SERVICE — PNP Switch and Manual Control Linkage Adjustment”, AT-276 and AT-276.

<b>3</b>	<b>CHECK POWER SOURCE</b>
<p>1. Turn ignition switch to ON position. (Do not start engine.)</p> <p>2. Check voltage between A/T device harness terminal 5 and ground.</p>	
SAT758JA	
<b>OK or NG</b>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

# A/T SHIFT LOCK SYSTEM

Diagnostic Procedure (Cont'd)

<b>4</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p>Check the following items:</p> <ol style="list-style-type: none"> <li>1. Harness for short or open between ignition switch and A/T device harness terminal 5</li> <li>2. 7.5A fuse [No. 11, located in the fuse block (J/B)]</li> <li>3. Ignition switch (Refer to EL-12, "Schematic".)</li> </ol>		
<b>OK or NG</b>		
OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

<b>5</b>	<b>CHECK INPUT SIGNAL A/T DEVICE</b>							
<p>Turn ignition switch to OFF position.</p> <ul style="list-style-type: none"> <li>• Check voltage between A/T device harness terminal 7 and ground.</li> </ul>								
<table border="1"> <thead> <tr> <th>Brake pedal</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Depressed</td> <td>Battery voltage</td> </tr> <tr> <td>Released</td> <td>0V</td> </tr> </tbody> </table>			Brake pedal	Voltage	Depressed	Battery voltage	Released	0V
Brake pedal	Voltage							
Depressed	Battery voltage							
Released	0V							
SAT179K								
<b>OK or NG</b>								
OK	▶	GO TO 7.						
NG	▶	GO TO 6.						

<b>6</b>	<b>DETECT MALFUNCTIONING ITEM</b>							
<p>Check the following items:</p> <ol style="list-style-type: none"> <li>1. Harness for short or open between battery and stop lamp switch harness connector 1</li> <li>2. Harness for short or open between stop lamp switch harness connector 2 and A/T device harness connector 7</li> <li>3. Diode</li> <li>4. 10A fuse [No. 14, located in the fuse block (J/B)]</li> <li>5. Stop lamp switch             <ol style="list-style-type: none"> <li>a. Check continuity between terminals 1 and 2.</li> </ol> </li> </ol>								
<table border="1"> <thead> <tr> <th>Condition</th> <th>Continuity</th> </tr> </thead> <tbody> <tr> <td>When brake pedal is depressed</td> <td>Yes</td> </tr> <tr> <td>When brake pedal is released</td> <td>No</td> </tr> </tbody> </table>			Condition	Continuity	When brake pedal is depressed	Yes	When brake pedal is released	No
Condition	Continuity							
When brake pedal is depressed	Yes							
When brake pedal is released	No							
SAT146K								
<b>Check stop lamp switch after adjusting brake pedal — refer to BR-15, "Adjustment".</b>								
<b>OK or NG</b>								
OK	▶	GO TO 7.						
NG	▶	Repair or replace damaged parts.						

# A/T SHIFT LOCK SYSTEM

Diagnostic Procedure (Cont'd)

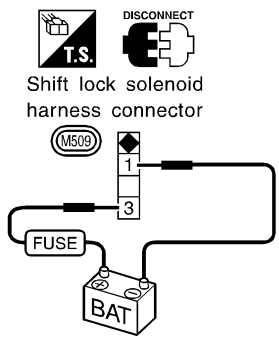
<b>7</b>	<b>CHECK GROUND CIRCUIT</b>	<p>1. Turn ignition switch to OFF position.</p> <p>2. Disconnect A/T device harness connector.</p> <p>3. Check continuity between A/T device harness terminal 6 and ground. Refer to wiring diagram — SHIFT —.</p> <p style="color: blue;"><b>Continuity should exist.</b></p> <p>If OK, check harness for short to ground and short to power.</p> <p style="text-align: center;"><b>OK or NG</b></p>	GI MA EM LC
OK	▶	GO TO 8.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

<b>8</b>	<b>CHECK RELAY CIRCUIT</b>	<p>1. Turn ignition switch to ON and OFF position.</p> <ul style="list-style-type: none"> <li>Check continuity between terminals 1, 2, 3 and 5.</li> </ul> <div style="display: flex; align-items: center;"> <div style="flex: 1;"> </div> <div style="flex: 2;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Condition</th> <th style="width: 15%;">Terminal No.</th> <th style="width: 20%;">Ignition SW</th> <th style="width: 35%;">Continuity</th> </tr> </thead> <tbody> <tr> <td rowspan="2">When selector lever is set in "P" position and brake pedal depressed</td> <td rowspan="2">1 - 2</td> <td>ON or OFF</td> <td>Approx. 100±25Ω</td> </tr> <tr> <td>ON</td> <td>Yes</td> </tr> <tr> <td></td> <td>3 - 5</td> <td>OFF</td> <td>No</td> </tr> </tbody> </table> </div> </div> <p style="text-align: right; margin-top: 10px;">SAT775J</p> <p style="text-align: center;"><b>Yes or No</b></p>	Condition	Terminal No.	Ignition SW	Continuity	When selector lever is set in "P" position and brake pedal depressed	1 - 2	ON or OFF	Approx. 100±25Ω	ON	Yes		3 - 5	OFF	No	EC FE <b>AT</b> TF PD AX SU
Condition	Terminal No.	Ignition SW	Continuity														
When selector lever is set in "P" position and brake pedal depressed	1 - 2	ON or OFF	Approx. 100±25Ω														
		ON	Yes														
	3 - 5	OFF	No														
Yes	▶	GO TO 9.															
No	▶	Replace relay.															

<b>9</b>	<b>CHECK PARK POSITION SWITCH</b>	<ul style="list-style-type: none"> <li>Check continuity between A/T device harness terminal 6 and relay (park position switch) harness terminal 1.</li> </ul> <div style="display: flex; align-items: center;"> <div style="flex: 1;"> </div> <div style="flex: 2;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;">Condition</th> <th style="width: 30%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>When selector lever is set in "P" position and selector lever button is released</td> <td>Yes</td> </tr> <tr> <td>Except above</td> <td>No</td> </tr> </tbody> </table> </div> </div> <p style="text-align: right; margin-top: 10px;">SAT180K</p> <p style="text-align: center;"><b>OK or NG</b></p>	Condition	Continuity	When selector lever is set in "P" position and selector lever button is released	Yes	Except above	No	BR ST RS BT HA SC EL IDX
Condition	Continuity								
When selector lever is set in "P" position and selector lever button is released	Yes								
Except above	No								
OK	▶	GO TO 10.							
NG	▶	Replace park position switch.							

# A/T SHIFT LOCK SYSTEM

Diagnostic Procedure (Cont'd)

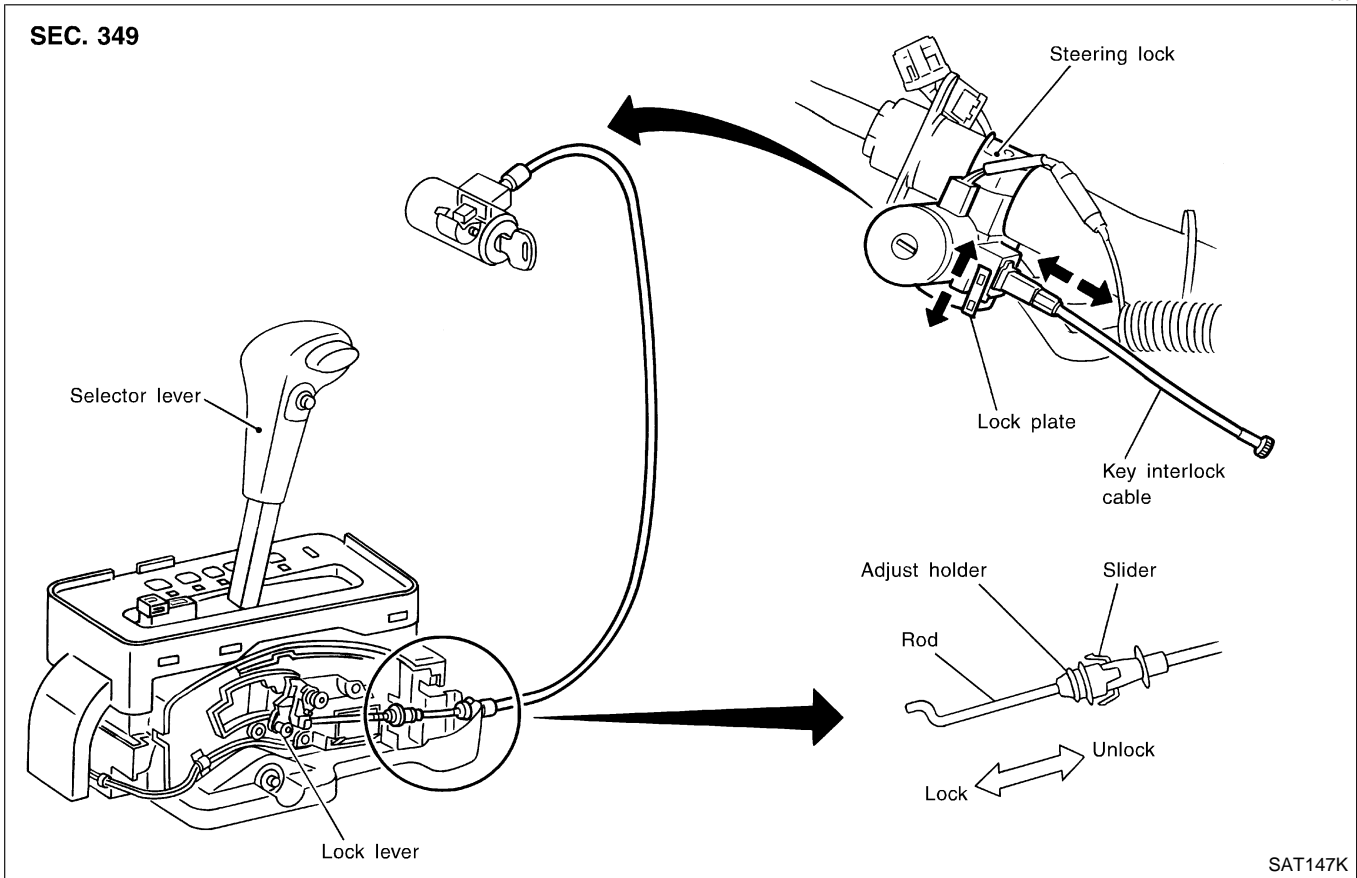
<b>10</b>	<b>CHECK SHIFT LOCK SOLENOID</b>	
<ul style="list-style-type: none"> <li>Check operation by applying battery voltage shift lock solenoid harness terminals 1 and 3.</li> </ul>		
 <p>Shift lock solenoid harness connector</p> <p>OK or NG</p>		
SAT762J		
OK	▶	GO TO 11.
NG	▶	Replace shift lock solenoid.

<b>11</b>	<b>CHECK SHIFT LOCK OPERATION</b>	
<ol style="list-style-type: none"> <li>Reconnect shift lock harness connector.</li> <li>Turn ignition switch from OFF to ON position. (Do not start engine.)</li> <li>Recheck shift lock operation.</li> </ol>		
OK or NG		
OK	▶	<b>INSPECTION END</b>
NG	▶	GO TO 12.

<b>12</b>	<b>CHECK A/T DEVICE INSPECTION</b>	
<ol style="list-style-type: none"> <li>Perform A/T device input/output signal inspection test.</li> <li>If NG, recheck harness connector connection.</li> </ol>		
OK or NG		
OK	▶	<b>INSPECTION END</b>
NG	▶	Repair or replace damaged parts.

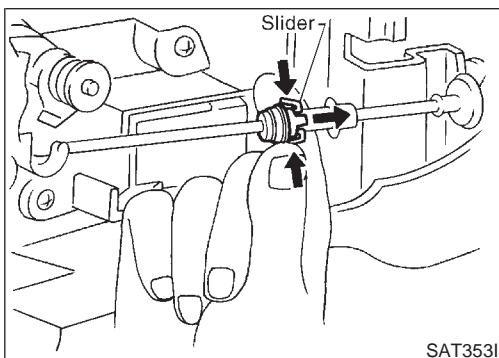
## Components

NBAT0097



### CAUTION:

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



### Removal

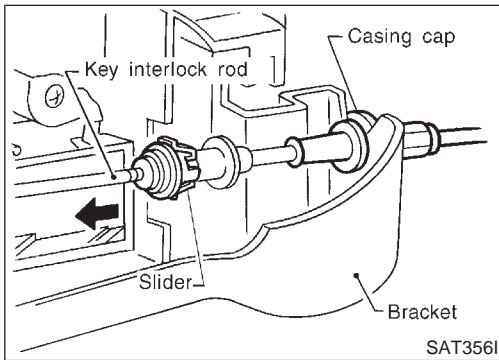
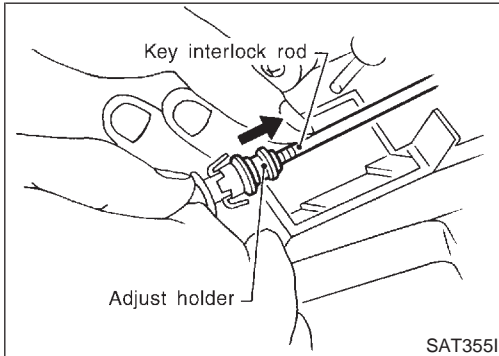
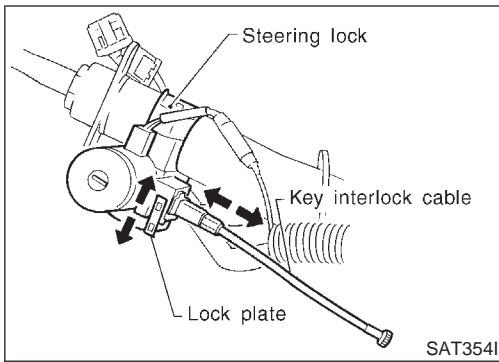
Unlock slider from adjuster holder and remove rod from cable.

NBAT0098

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# KEY INTERLOCK CABLE

## Installation

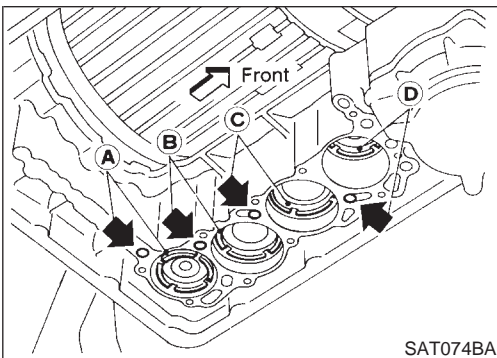
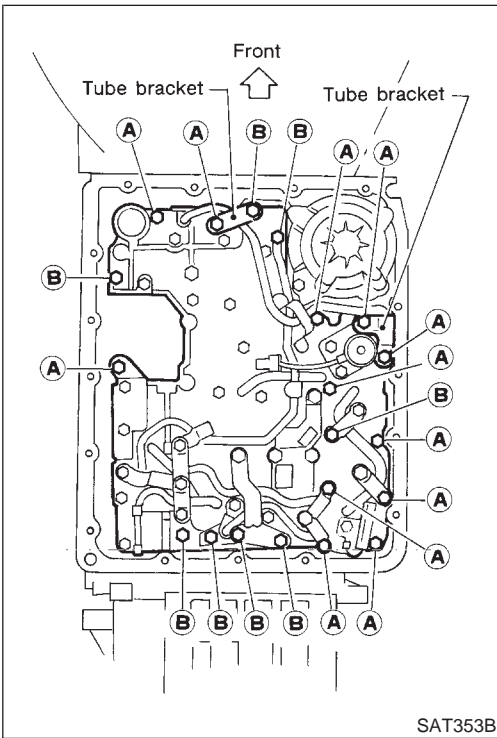
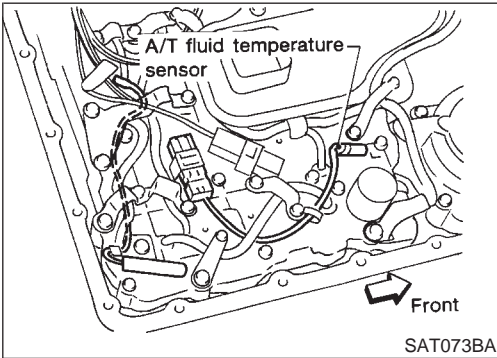
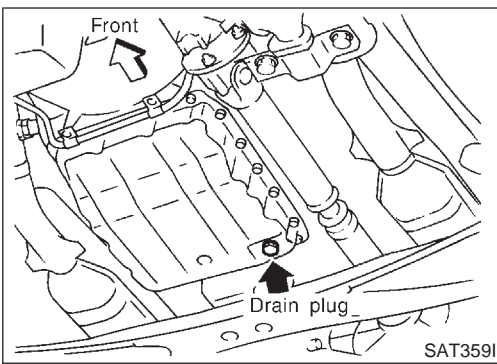


## Installation

NBAT0099

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.





## Control Valve Assembly and Accumulators

NBAT0100

### REMOVAL

NBAT0100S01

1. Remove exhaust front tube.
2. Remove oil pan and gasket and drain ATF.
3. Remove A/T fluid temperature sensor if necessary.
4. Remove oil strainer.
5. 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)

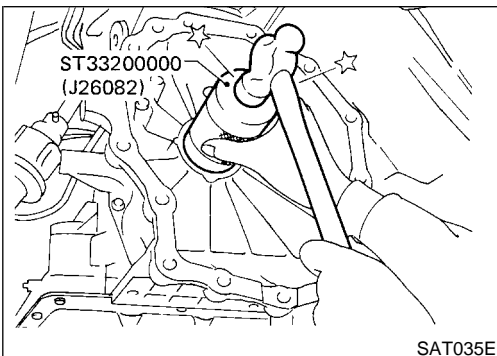
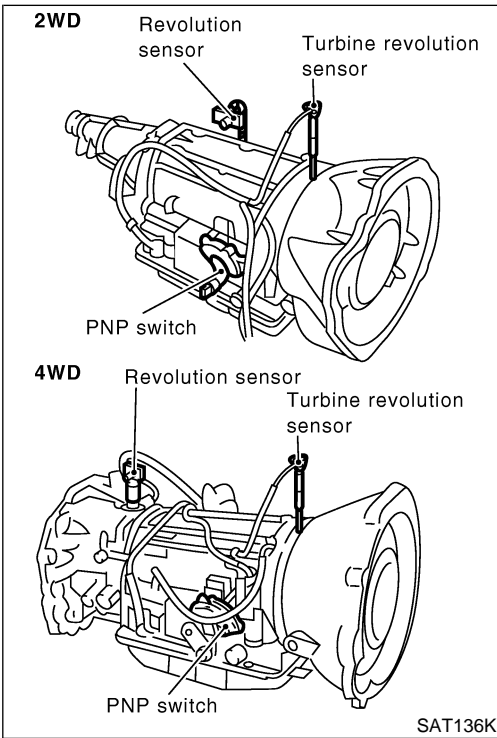
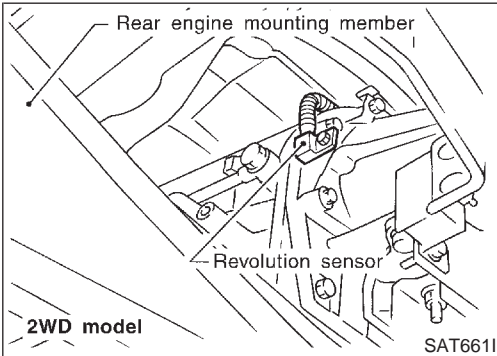
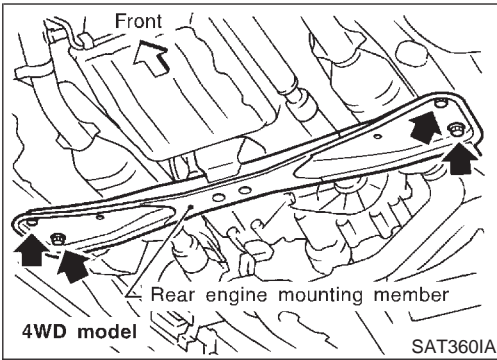
6. Remove solenoids and valves from valve body if necessary.
7. Remove terminal cord assembly if necessary.
8. Remove accumulator **A**, **B**, **C** and **D** by applying compressed air if necessary.

- **Hold each piston with rag.**
- 9. Reinstall any part removed.
- **Always use new sealing parts.**

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# ON-VEHICLE SERVICE

## Revolution Sensor Replacement



## Revolution Sensor Replacement

NBAT0210

### — 4WD MODEL —

NBAT0210S01

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-59, "Rear Engine Mounting".
  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 —

NBAT0210S02

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

## Turbine Revolution Sensor Replacement

NBAT0231

1. Remove A/T assembly, Refer to "Removal", AT-277.
  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

NBAT0211

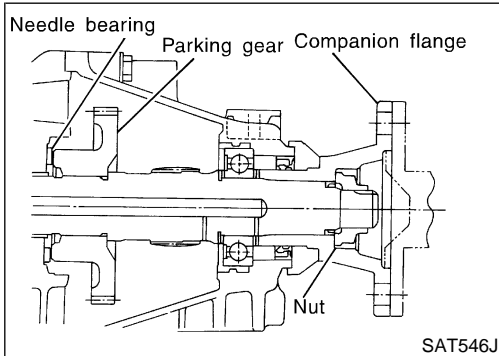
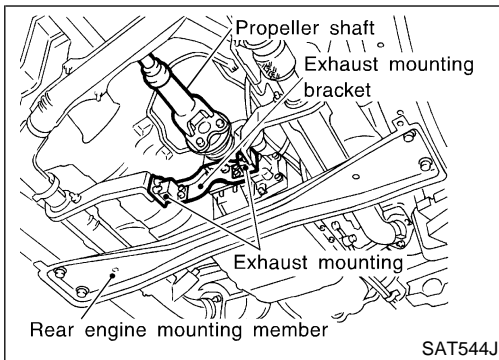
### — 4WD MODEL —

NBAT0211S01

1. Remove transfer case from vehicle. Refer to TF-119, "Removal".
  2. Remove rear oil seal.
- **Do not remove oil seal unless it is to be replaced.**
  - 3. Install rear oil seal.
  - **Apply ATF before installing.**
  - 4. Reinstall any part removed.

# ON-VEHICLE SERVICE

Rear Oil Seal and Companion Flange Oil Seal Replacement



## Rear Oil Seal and Companion Flange Oil Seal Replacement

— 2WD MODEL —

NBAT0212

NBAT0212S01

### NOTE:

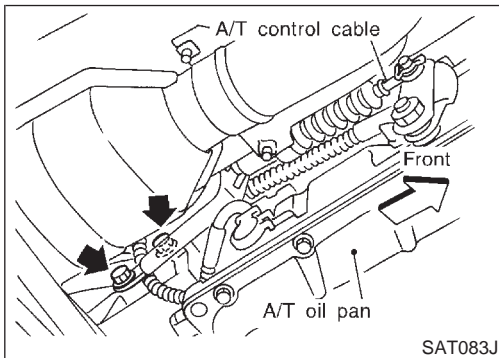
Replace rear extension assembly as a single unit because it cannot be disassembled.

1. Remove propeller shaft. Refer to PD-4, "Components".
2. Remove exhaust mounting and mounting bracket.
3. Disconnect revolution and speedometer sensor harness connector.
4. Support A/T assembly with a jack.
5. Remove rear engine mounting member. Tighten rear engine mounting member to the specified torque. Refer to EM-59, "Rear Engine Mounting".
6. Remove rear extension assembly.
  - a. Remove parking gear and needle bearing.

### CAUTION:

Insert your hand between rear extension and transmission case. Detach rear extension assembly while holding parking gear and needle bearing by hand.

7. Reinstall any part removed.
- Always use new sealing parts.



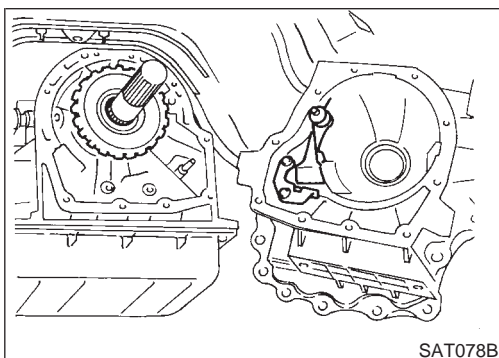
## Parking Components Inspection

— 4WD MODEL —

NBAT0213

NBAT0213S01

1. Remove propeller shaft. Refer to PD-4, "Components".
2. Remove transfer case from vehicle. Refer to TF-119, "Removal".
3. Remove A/T control cable bracket from transmission case.

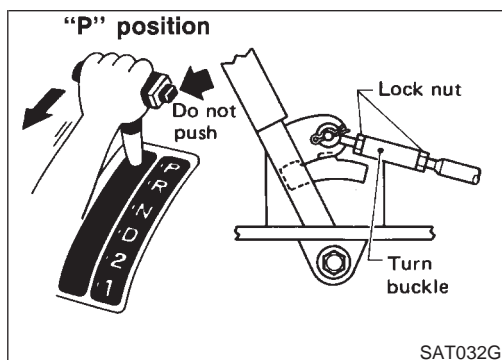
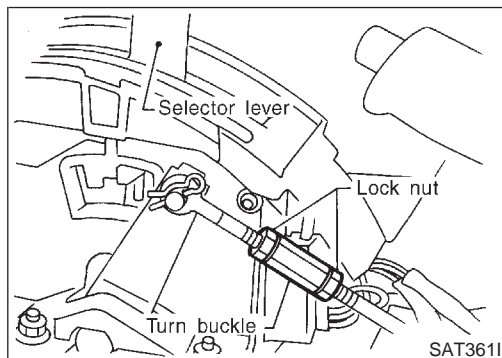
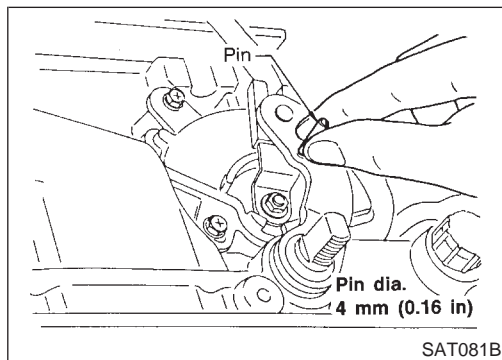
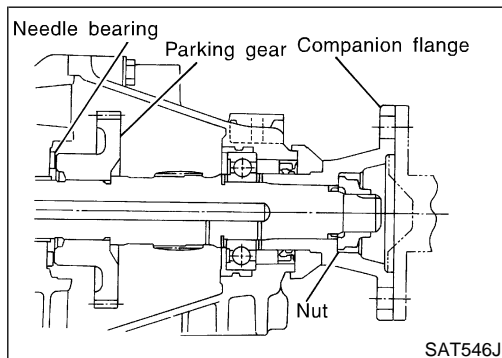
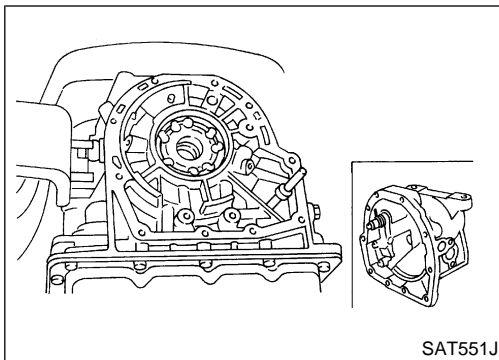


4. Support A/T assembly with a jack.
  5. Remove adapter case from transmission case.
  6. Replace parking components if necessary.
  7. Reinstall any part removed.
- Always use new sealing parts.

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# ON-VEHICLE SERVICE

## Parking Components Inspection (Cont'd)



### — 2WD MODEL —

1. Remove propeller shaft from vehicle. Refer to PD-4, "Components". <sup>NBAT0213S02</sup>
2. Support A/T assembly with a jack.
3. Remove rear engine mounting member. Tighten rear engine mounting member to the specified torque. Refer to EM-59, "Rear Engine Mounting".

4. Remove rear extension assembly.
  - a. Remove parking gear and needle bearing.

#### **CAUTION:**

**Insert your hand between rear extension and transmission case. Detach rear extension assembly while holding parking gear and needle bearing by hand.**

5. Replace parking components if necessary.
6. Reinstall any part removed.
- **Always use new sealing parts.**

## Park/Neutral Position Switch Adjustment

1. Remove manual control linkage from manual shaft of A/T assembly. <sup>NBAT0104</sup>
2. Set manual shaft of A/T assembly in "N" position.
3. Loosen PNP switch fixing bolts.
4. Insert pin into adjustment holes in both PNP switch and manual shaft of A/T assembly as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of PNP switch. Refer to "Components Inspection", AT-103.

## Manual Control Linkage Adjustment

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. <sup>NBAT0105</sup>

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.

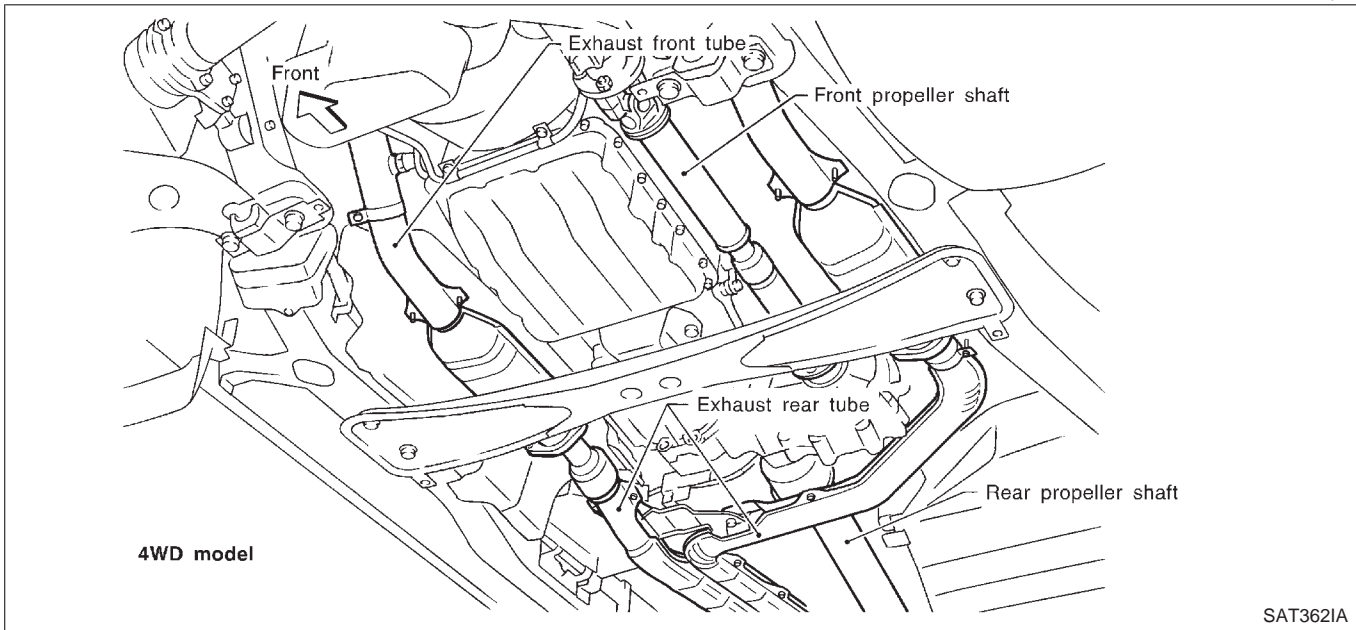
#### **Lock nut:**

**⚙️ : 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

NBAT0214



SAT3621A

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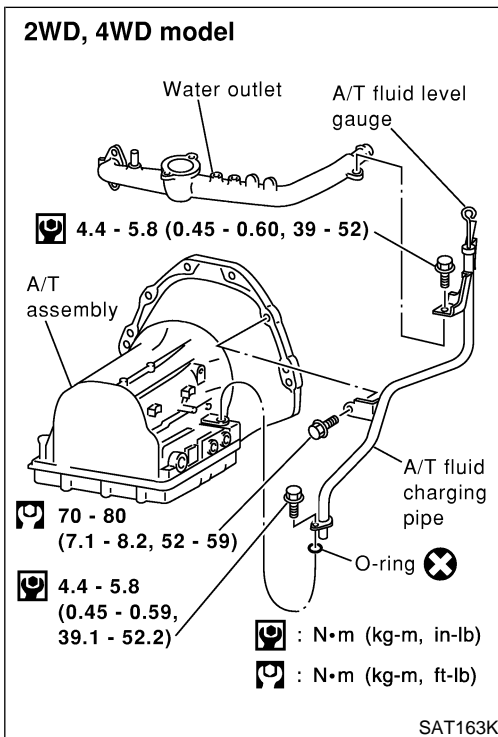
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### CAUTION:

When removing the A/T assembly from engine, first remove the crankshaft position sensor (OBD) from the A/T assembly lower side.

Be careful not to damage sensor edge.

### — 4WD 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 PD-4, "Components".
7. Remove transfer control linkage from transfer. Refer to TF-119, "Removal".

● Insert plug into rear oil seal after removing rear propeller shaft.

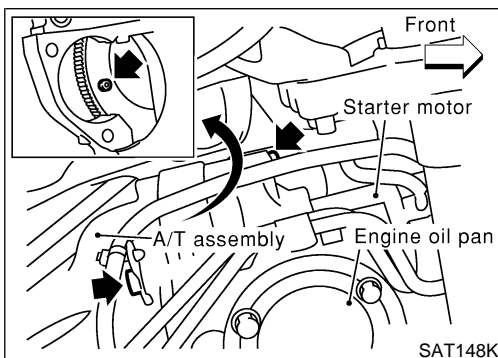
● Be careful not to damage spline, sleeve yoke and rear oil seal.

8. Remove A/T control cable from A/T assembly.
9. Disconnect A/T solenoid, PNP switch, turbine revolution, revolution and speedometer sensor harness connectors.

10. Remove starter motor. Refer to SC-18, "Removal and Installation".

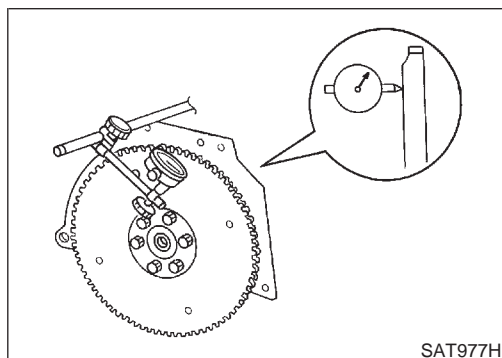
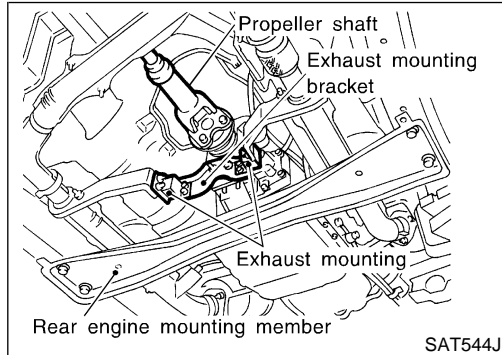
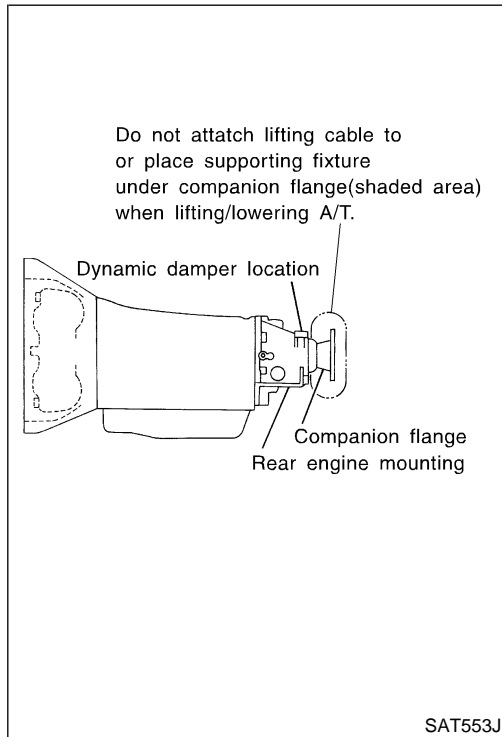
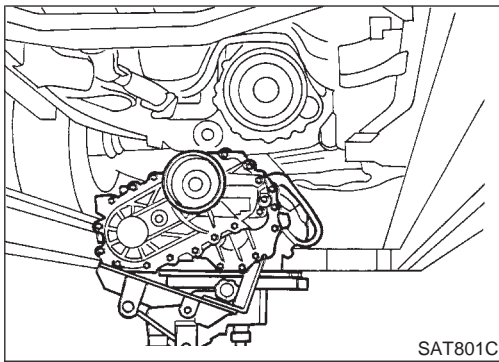
11. Remove bolts securing torque converter to drive plate.

● Remove the bolts by turning crankshaft.



# REMOVAL AND INSTALLATION

Removal (Cont'd)



12. Support A/T and transfer 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-59, "Rear Engine Mounting".
14. Remove bolts securing A/T assembly to engine.
  - **Secure torque converter to prevent it from dropping.**
  - **Secure A/T assembly to a jack.**
15. Lower A/T assembly with transfer.

## — 2WD MODEL —

NBAT0214S02

### CAUTION:

- **Do not attach lifting cable to or place supporting fixture under companion flange at rear of A/T (shown in the figure at left) when lifting/lowering A/T.**
- **Be sure to attach lifting cable to rear engine mounting or dynamic damper location when lifting/lowering A/T.**

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 PD-4, "Components".
7. Remove A/T control cable from A/T assembly.
8. Disconnect A/T and speedometer sensor harness connectors.
9. Remove starter motor. Refer to SC-18, "Removal and Installation".
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-59, "Rear Engine Mounting".
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

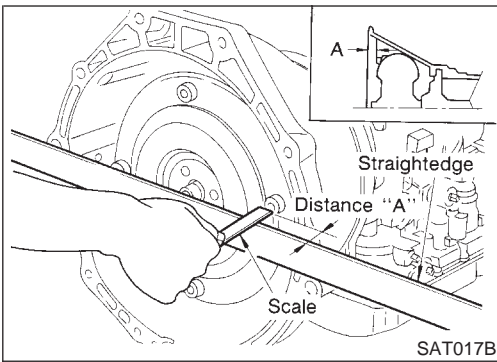
NBAT0107

- Drive plate runout
  - Maximum allowable runout:  
**Refer to EM-70, "FLYWHEEL/DRIVE PLATE RUNOUT".**

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

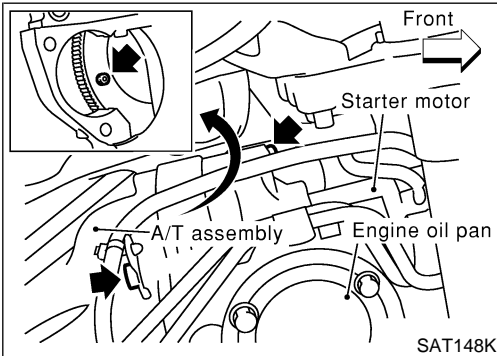
# REMOVAL AND INSTALLATION

Installation (Cont'd)

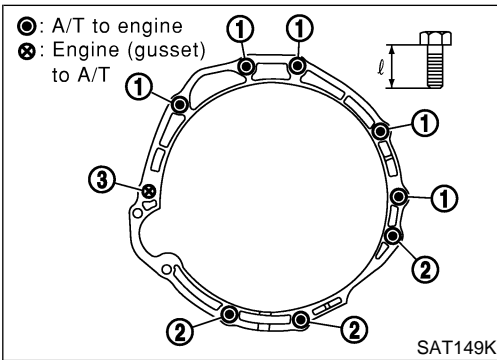


- When connecting torque converter to transmission, measure distance "A" to be certain that they are correctly assembled.

**Distance "A":**  
**25.0 mm (0.984 in) or more**

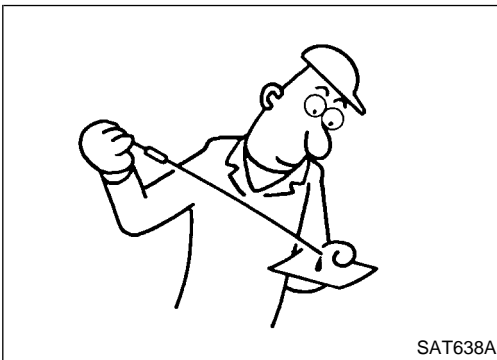


- Install converter to drive plate.
- After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.**



- Tighten bolts securing transmission.

Bolt No.	Tightening torque N-m (kg-m, ft-lb)	Bolt length "ℓ" mm (in)
1	70 - 80 (7.1 - 8.2, 52 - 59)	65 (2.56)
2	70 - 80 (7.1 - 8.2, 52 - 59)	55 (2.17)
3	29 - 39 (3.0 - 4.0, 22 - 29)	40 (1.57)



- 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 "ROAD TEST", AT-63.

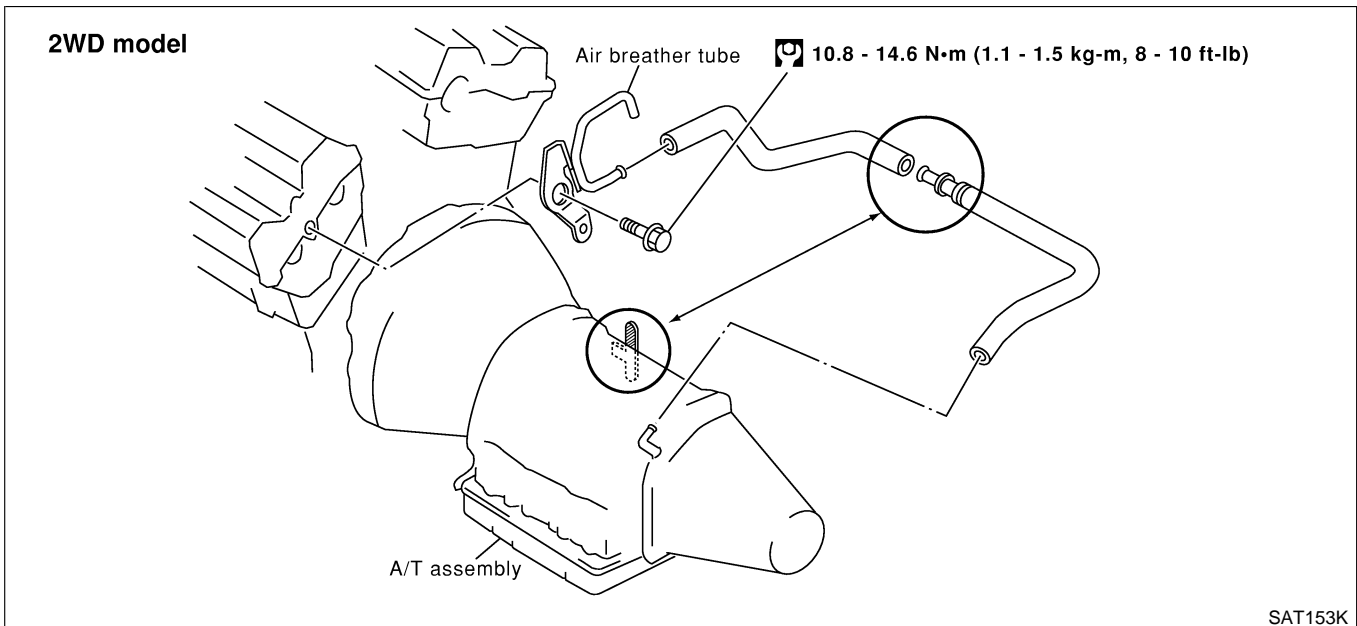
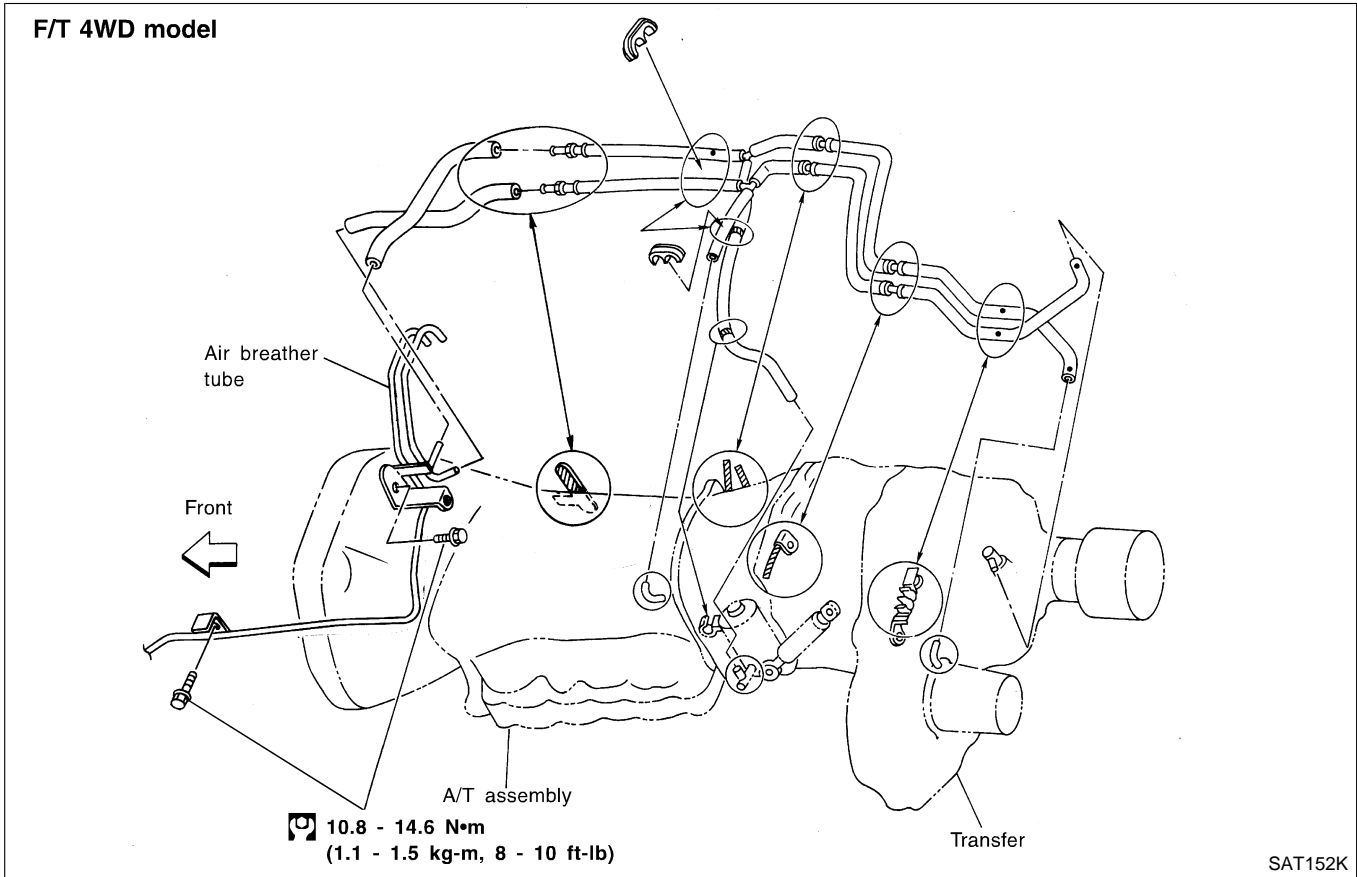
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# REMOVAL AND INSTALLATION

Installation (Cont'd)

## AIR BREATHING HOSE

NBAT0107S01





## Components

### SEC. 311•313•315

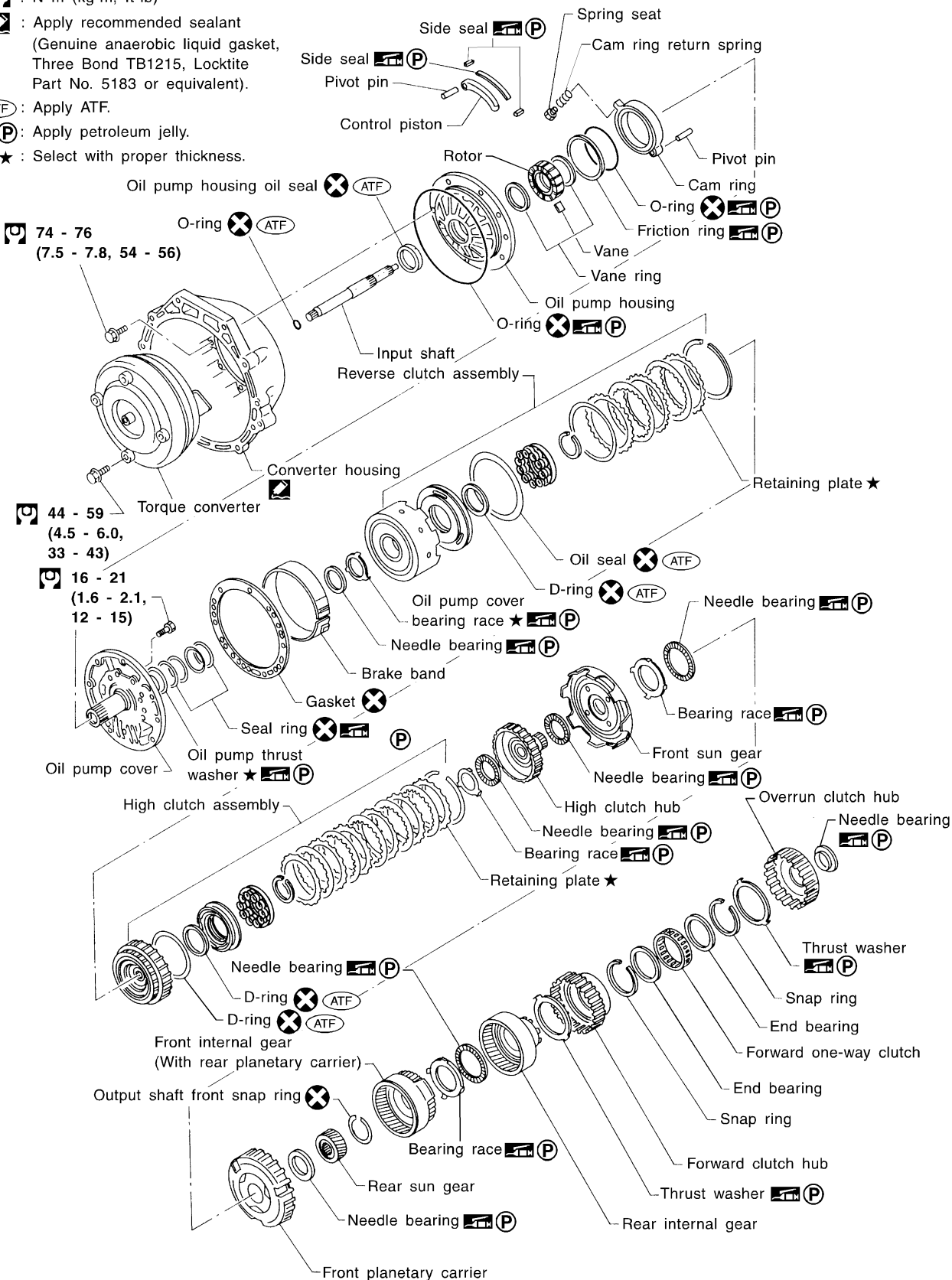
: N•m (kg-m, ft-lb)

: Apply recommended sealant  
(Genuine anaerobic liquid gasket,  
Three Bond TB1215, Loctite  
Part No. 5183 or equivalent).

: Apply ATF.

: Apply petroleum jelly.

★ : Select with proper thickness.



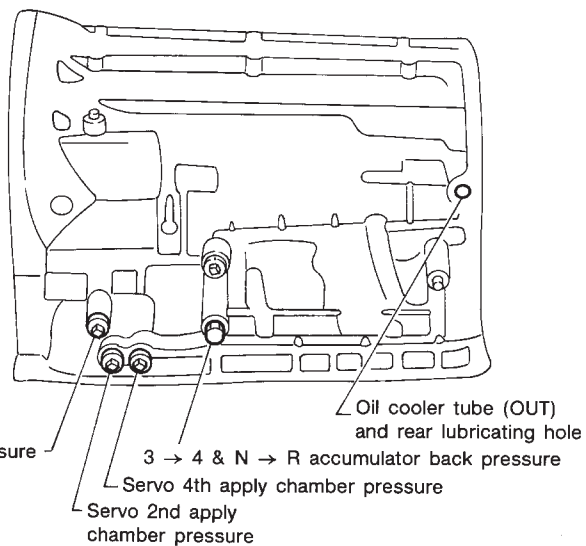
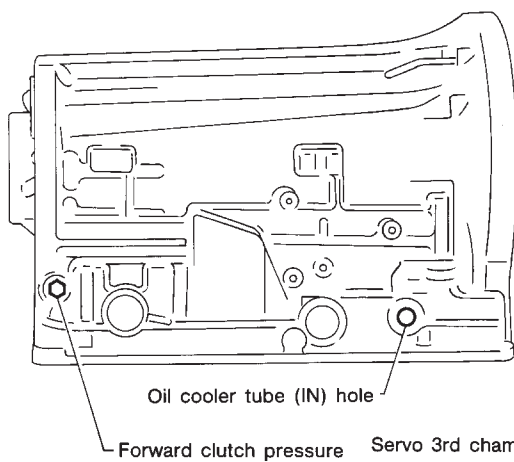
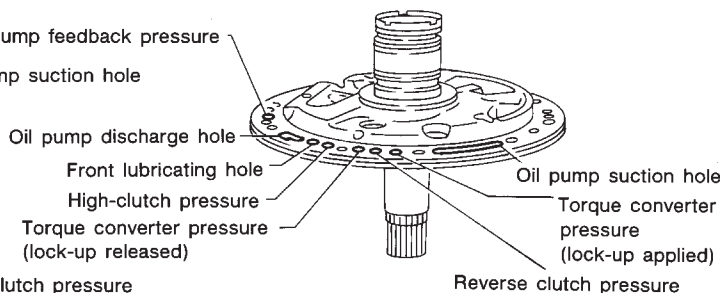
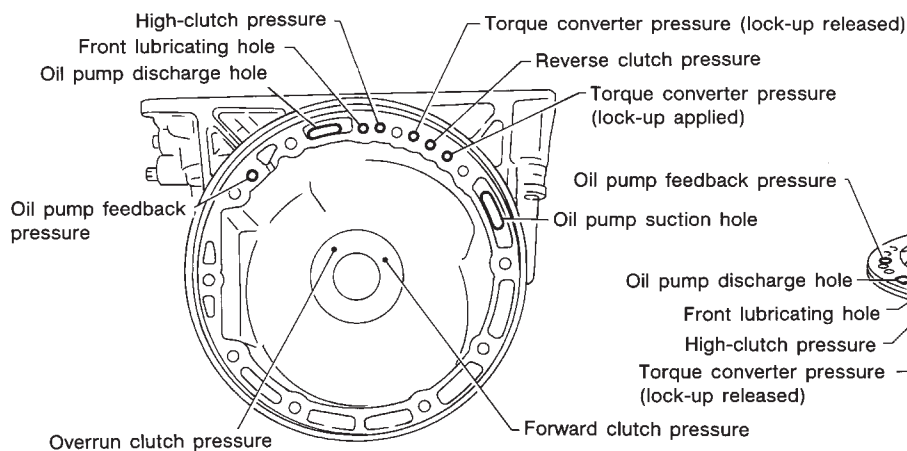
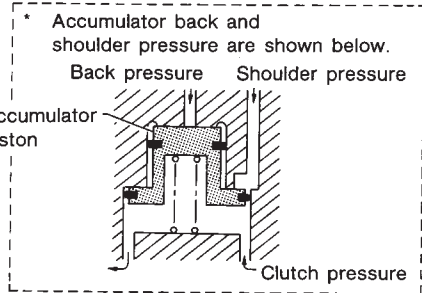
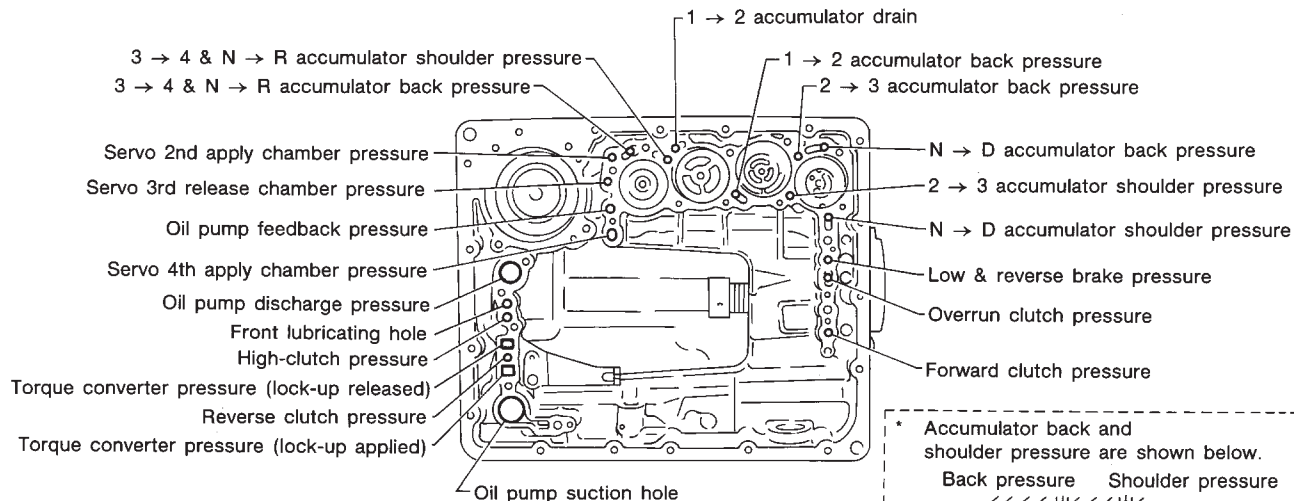
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# OVERHAUL

## Oil Channel



# OVERHAUL

Locations of Needle Bearings, Thrust Washers and Snap Rings

## Locations of Needle Bearings, Thrust Washers and Snap Rings

NBAT0110

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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

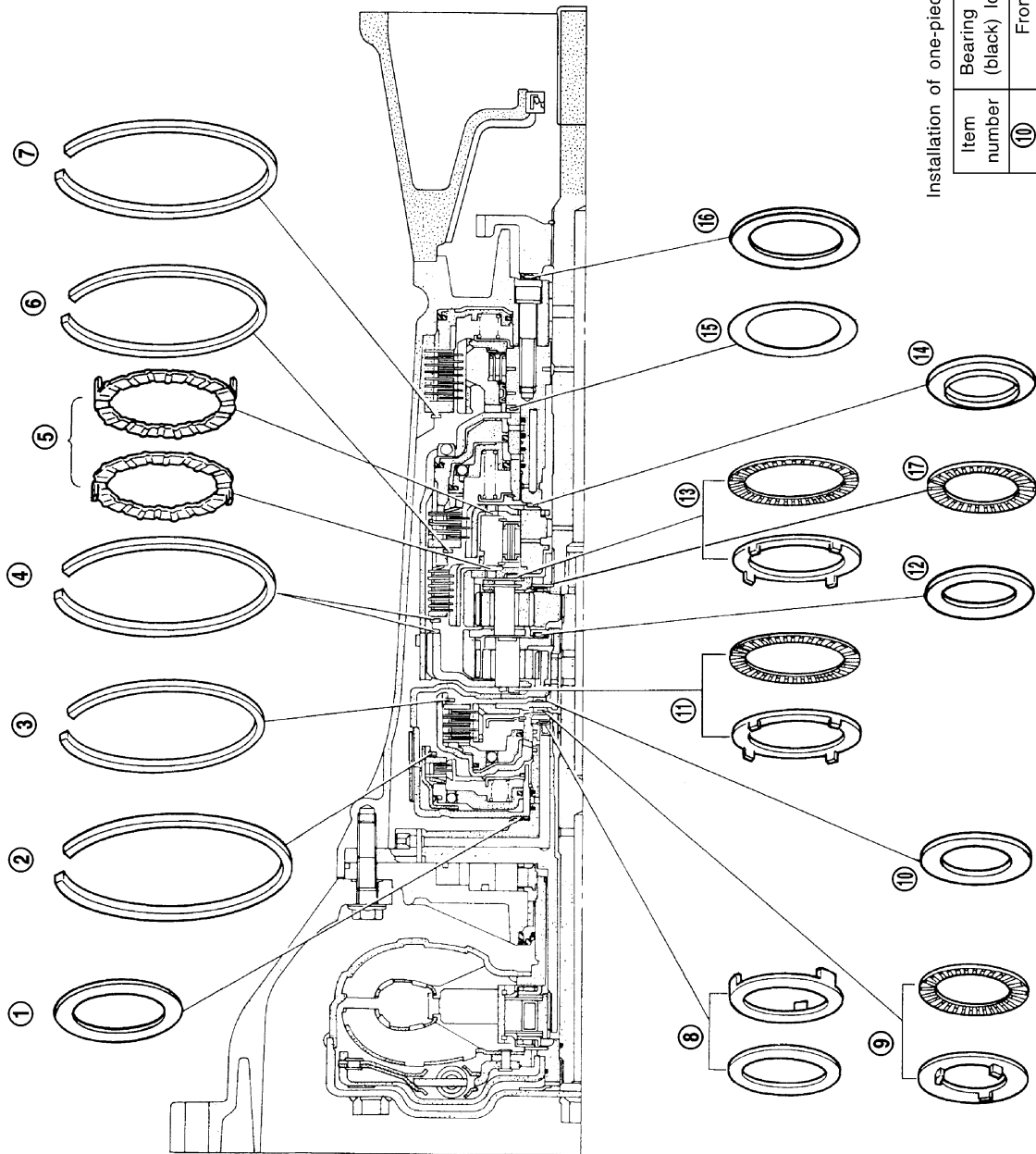
Item number	Color
①	Black
⑤	White

Outer diameter of needle bearings

Item number	Outer diameter mm (in)
⑧	47 (1.85)
⑨	53 (2.09)
⑪	75 (2.95)
⑫	53 (2.09)
⑬	75 (2.95)
⑭	57 (2.24)
⑮	78.1 (3.075)
⑯	64 (2.52)
⑰	53 (2.09)

Inner diameter of bearing races

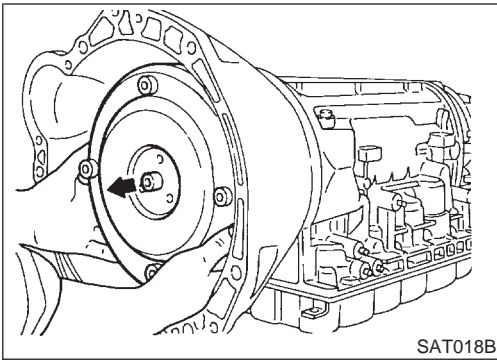
Item number	Outer diameter mm (in)
⑪	58.8 (2.315)
⑬	58.8 (2.315)



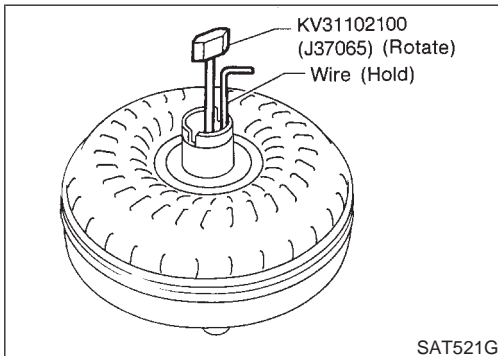
Installation of one-piece bearings

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

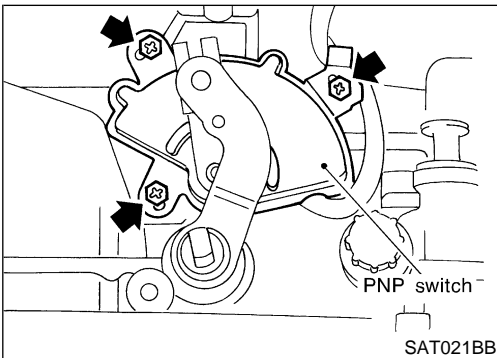
## DISASSEMBLY



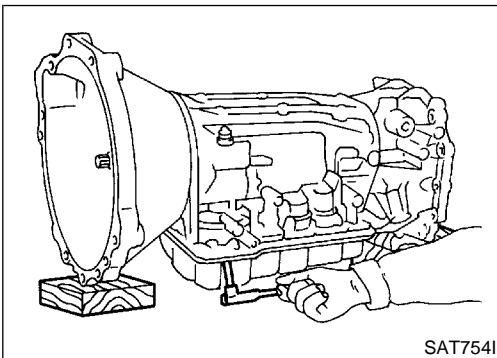
1. Drain ATF through drain plug.
2. Remove turbine revolution sensor.
3. Remove torque converter by holding it firmly and turning while pulling straight out.



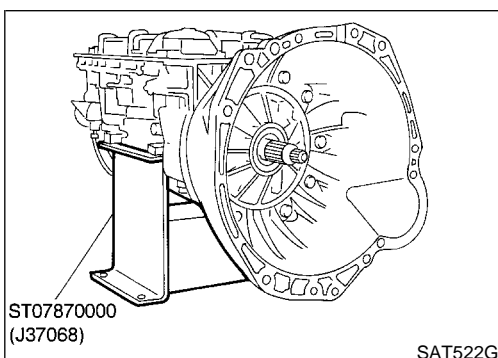
4. Check torque converter one-way clutch.
  - a. Insert Tool into spline of one-way clutch inner race.
  - b. Hook bearing support unitized with one-way clutch outer race with suitable wire.
  - c. Check that one-way clutch inner race rotates only clockwise with Tool while holding bearing support with wire.



5. Remove PNP switch from transmission case.

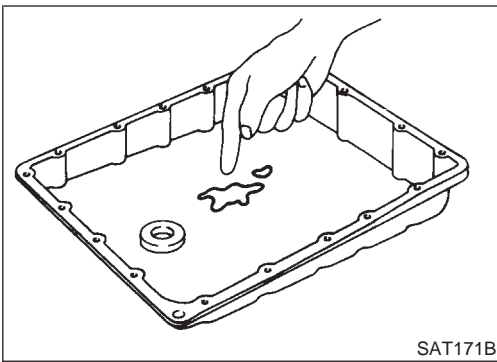


6. Remove oil pan.
  - Always place oil pan straight down so that foreign particles inside will not move.



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

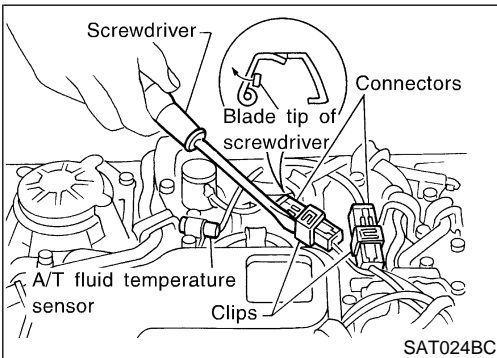
# DISASSEMBLY



SAT171B

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.

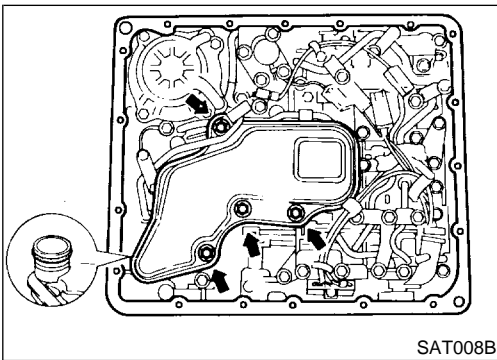
- **If frictional material is detected, replace radiator after repair of A/T. Refer to LC-19, "REMOVAL AND INSTALLATION".**



SAT024BC

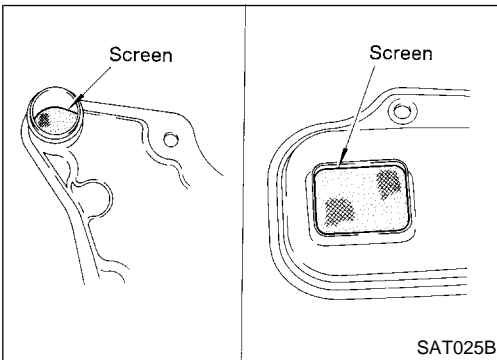
9. Remove torque converter clutch solenoid valve and A/T fluid temperature sensor connectors.

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



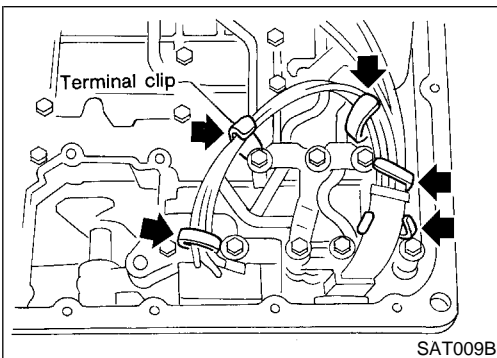
SAT008B

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



SAT025B

- b. Check oil strainer screen for damage.

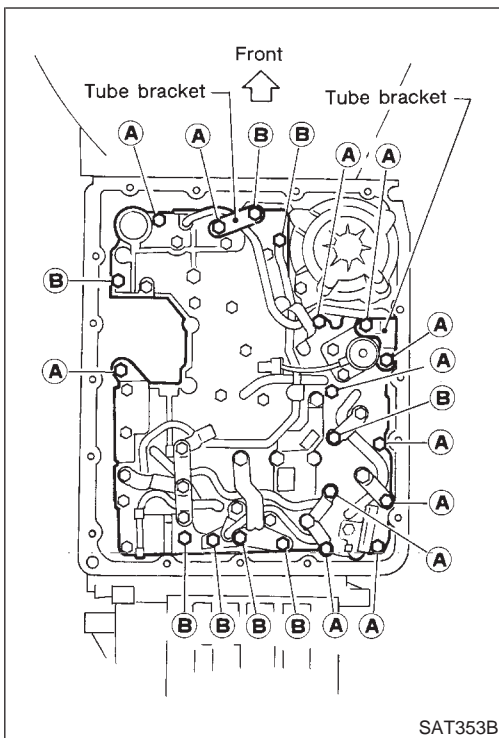


SAT009B

11. Remove control valve assembly.
  - a. Straighten terminal clips to free terminal cords then remove terminal clips.

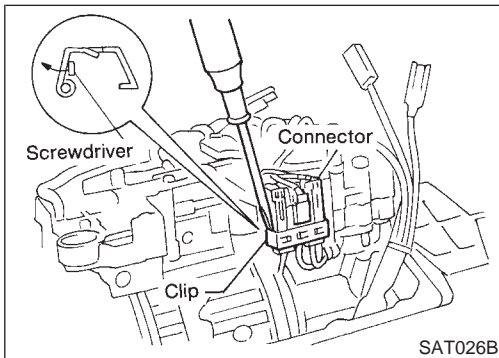
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## DISASSEMBLY

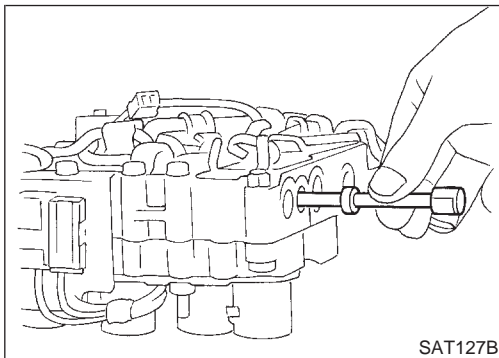


- b. Remove bolts A and B, and remove control valve assembly from transmission.

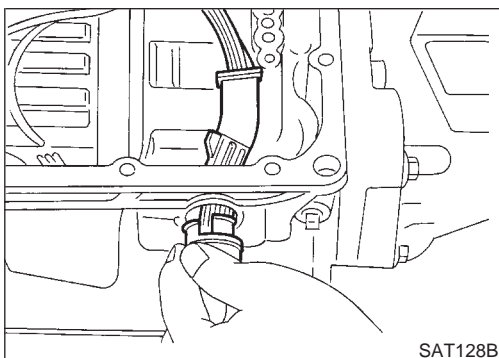
Bolt symbol	Length mm (in)
A	33 (1.30)
B	45 (1.77)



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



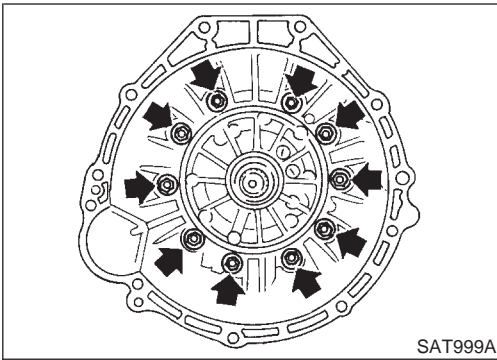
- d. Remove manual valve from control valve assembly.



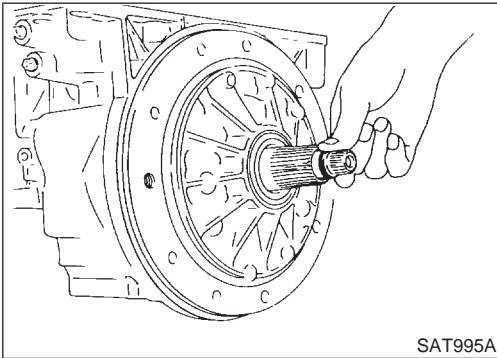
12. Remove terminal cord assembly from transmission case while pushing on stopper.  
 ● **Be careful not to damage cord.**  
 ● **Do not remove terminal cord assembly unless it is damaged.**



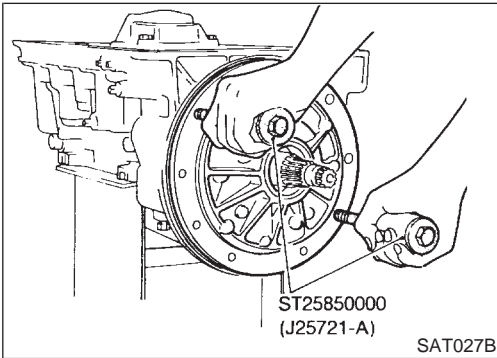
# DISASSEMBLY



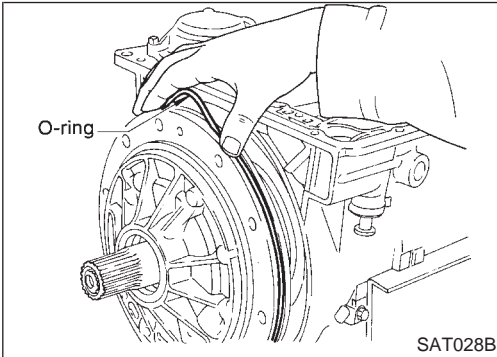
13. Remove converter housing from transmission case.
- **Be careful not to scratch converter housing.**



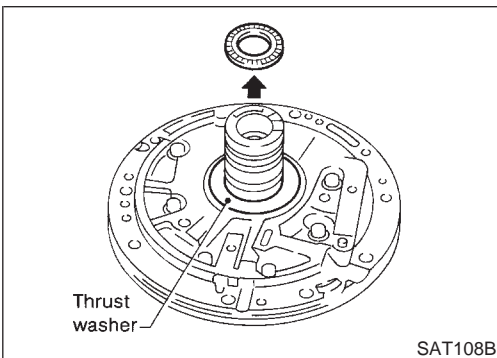
14. Remove O-ring from input shaft.



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



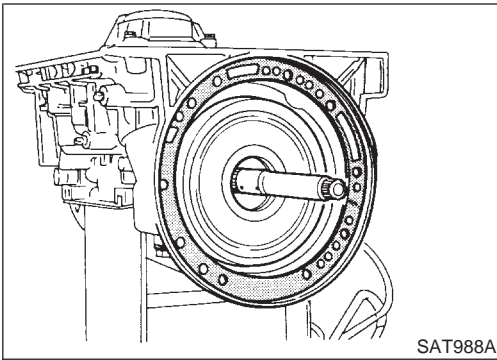
- b. Remove O-ring from oil pump assembly.
- c. Remove traces of sealant from oil pump housing.
- **Be careful not to scratch pump housing.**



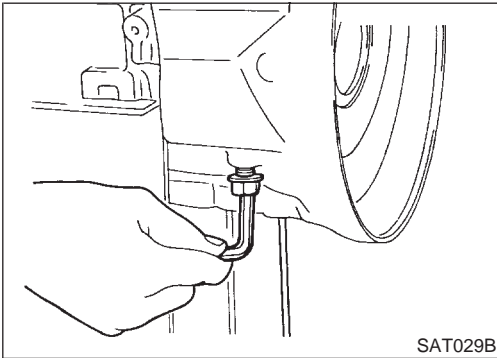
- d. Remove needle bearing and thrust washer from oil pump assembly.

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## DISASSEMBLY

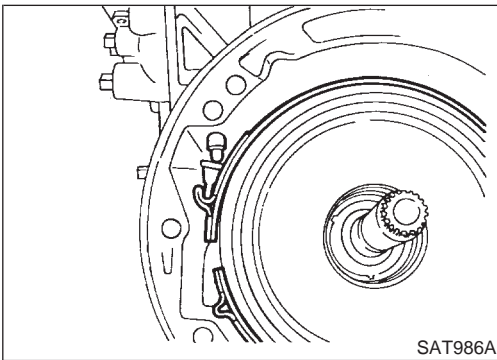


16. Remove input shaft and oil pump gasket.

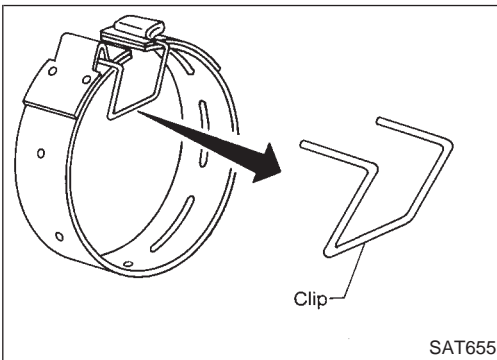


17. Remove brake band and band strut.

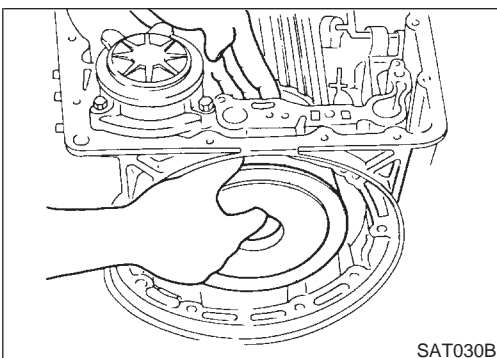
a. Loosen lock nut and remove band servo anchor end pin from transmission case.



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



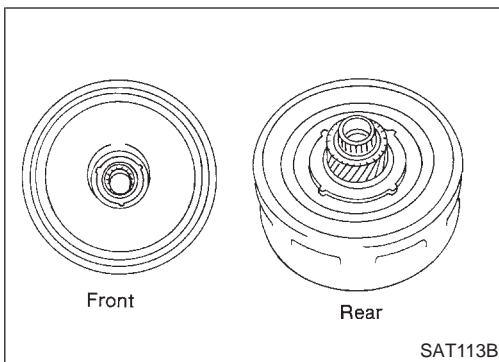
c. Hold brake band in a circular shape with clip.



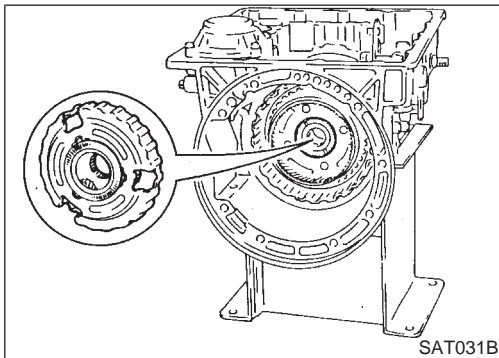
18. Remove front side clutch and gear components.

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

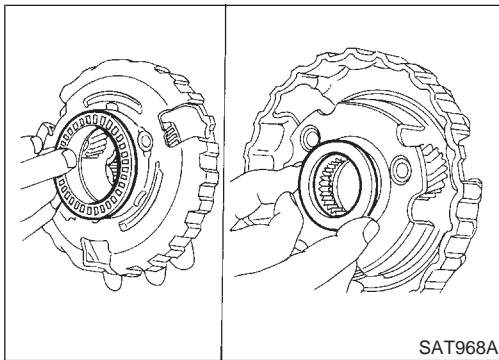
# DISASSEMBLY



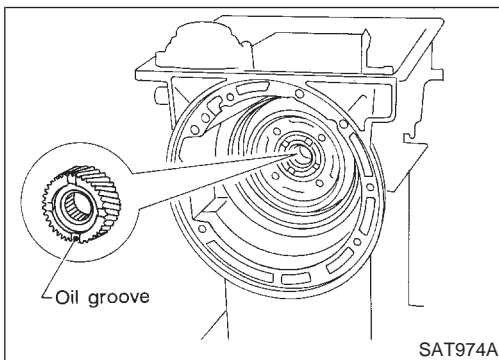
- b. Remove front bearing race from clutch pack.
- c. Remove rear bearing race from clutch pack.



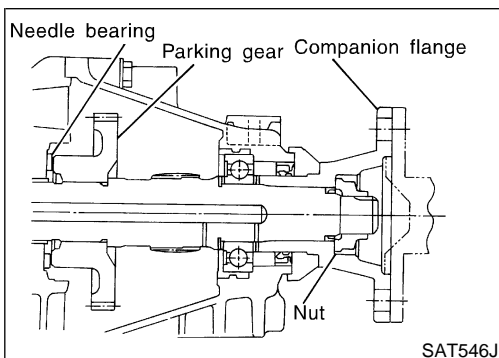
- d. Remove front planetary carrier from transmission case.



- 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 assembly (2WD model only).

- a. Remove rear extension assembly.
- b. Remove parking gear and needle bearing.

**CAUTION:**  
 Insert your hand between rear extension and transmission case. Detach rear extension assembly while holding parking gear and needle bearing by hand.

- c. Remove rear extension gasket.

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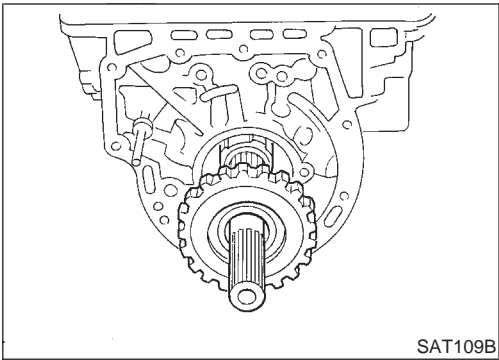
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# DISASSEMBLY



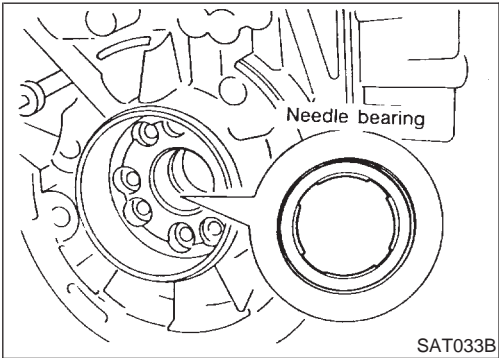
- d. Remove output shaft and parking gear as a unit from transmission case.
- e. Remove parking gear from output shaft.

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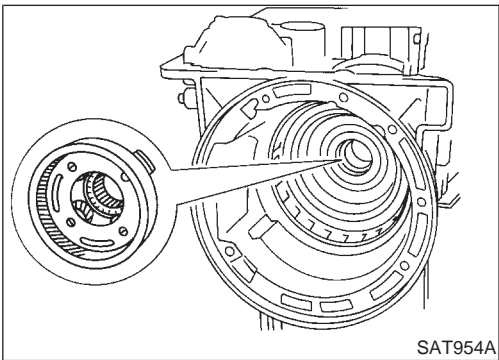
- f. Remove needle bearing from transmission case.

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- 23. Remove rear side clutch and gear components.

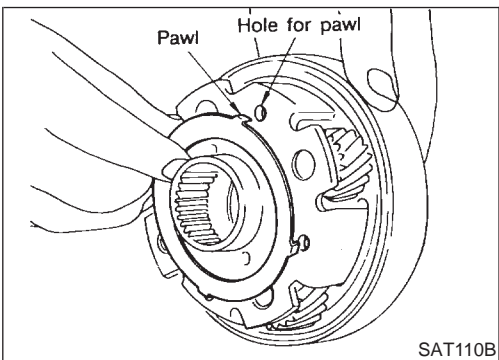
- a. Remove front internal gear.

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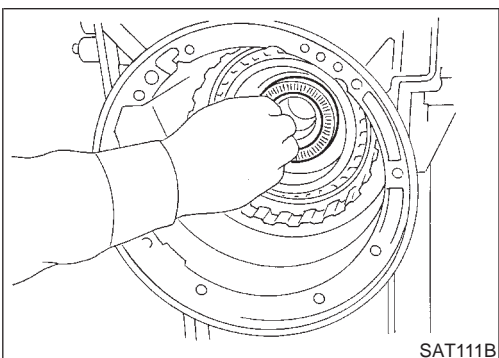
- b. Remove bearing race from front internal gear.

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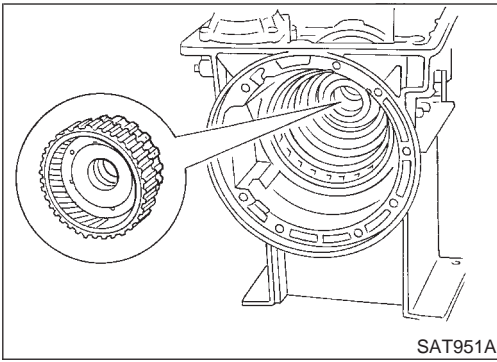
- c. Remove needle bearing from rear internal gear.

SC

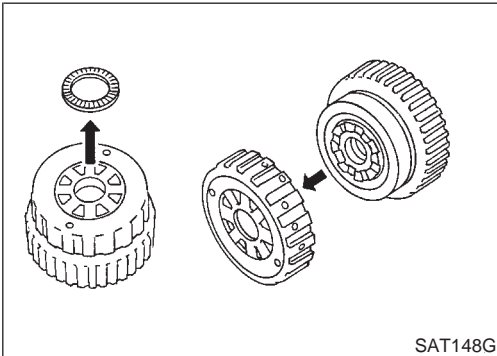
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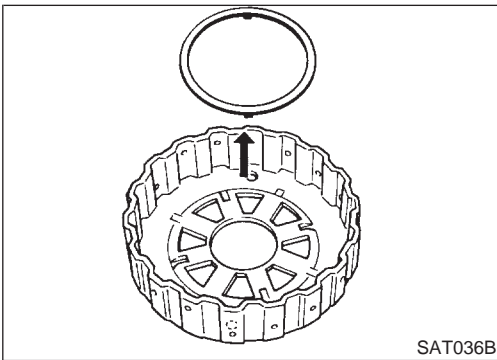
## DISASSEMBLY



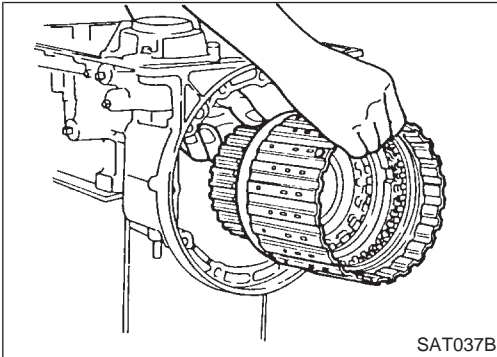
- d. Remove rear internal gear, forward clutch hub and overrun clutch hub as a set from transmission case.



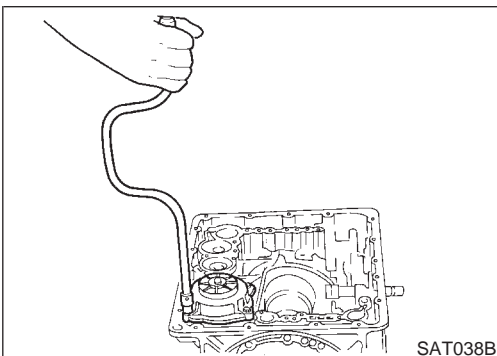
- e. Remove needle bearing from overrun clutch hub.  
f. Remove overrun clutch hub from rear internal gear and forward clutch hub.



- g. Remove thrust washer from overrun clutch hub.

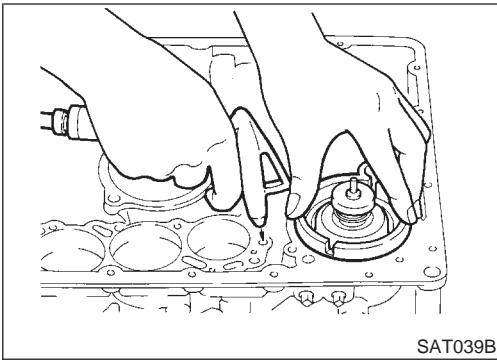


- h. Remove forward clutch assembly from transmission case.



24. Remove band servo and accumulator components.  
a. Remove band servo retainer from transmission case.

# DISASSEMBLY



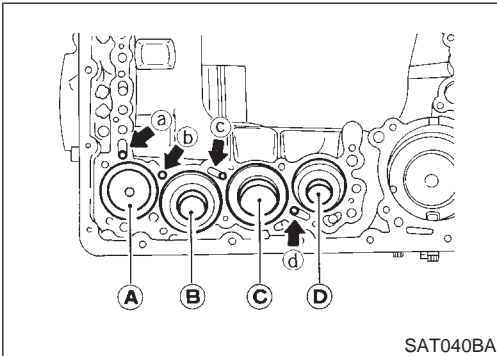
- b. Apply compressed air to oil hole until band servo piston comes out of transmission case.
- **Hold piston with a rag and gradually direct air to oil hole.**
- c. Remove return springs.

GI

MA

EM

LC



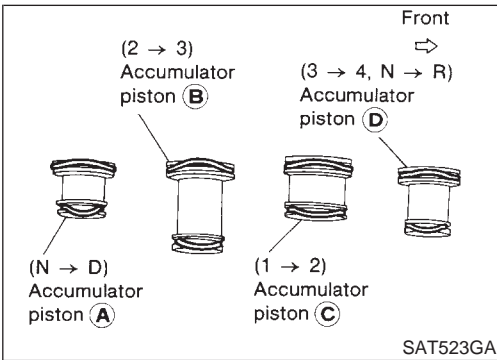
- d. Remove springs from accumulator pistons B, C and D.
- e. Apply compressed air to each oil hole until piston comes out.
- **Hold piston with a rag and gradually direct air to oil hole.**

EC

FE

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

AT



- f. Remove O-ring from each piston.

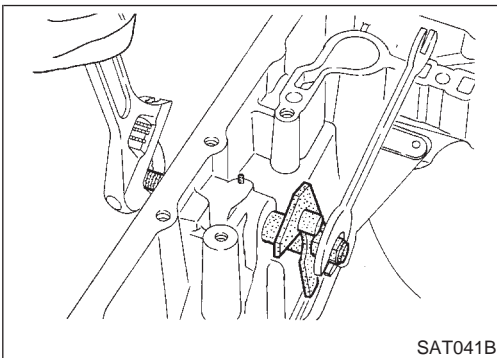
TF

PD

AX

SU

BR



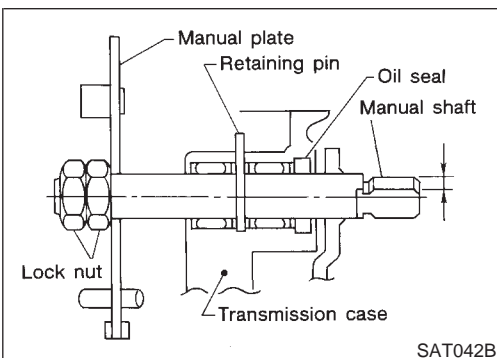
- 25. Remove manual shaft components, if necessary.
- a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.

ST

RS

BT

HA



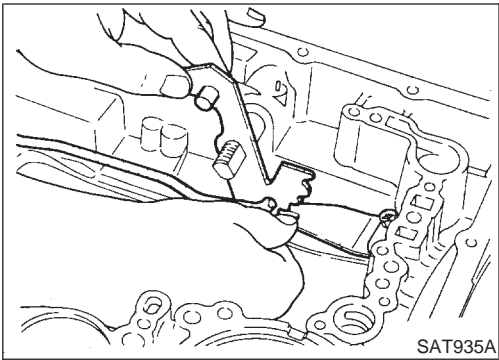
- b. Remove retaining pin from transmission case.

SC

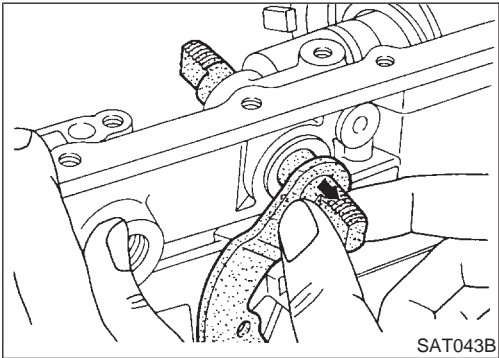
EL

IDX

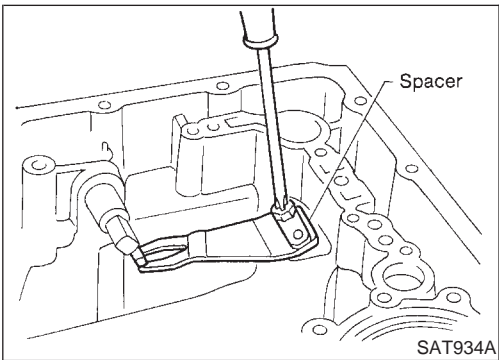
## DISASSEMBLY



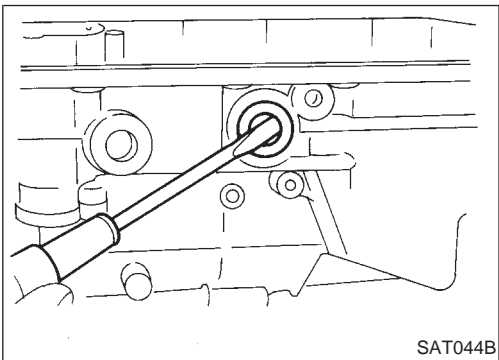
- c. While pushing detent spring down, remove manual plate and parking rod from transmission case.



- d. Remove manual shaft from transmission case.



- e. Remove spacer and detent spring from transmission case.

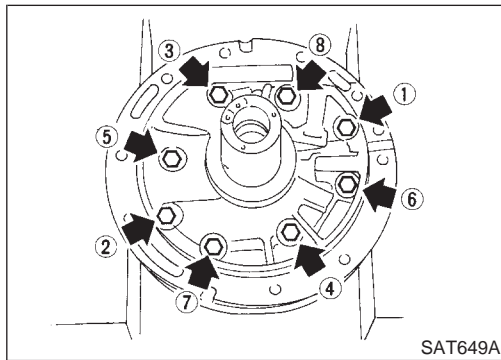
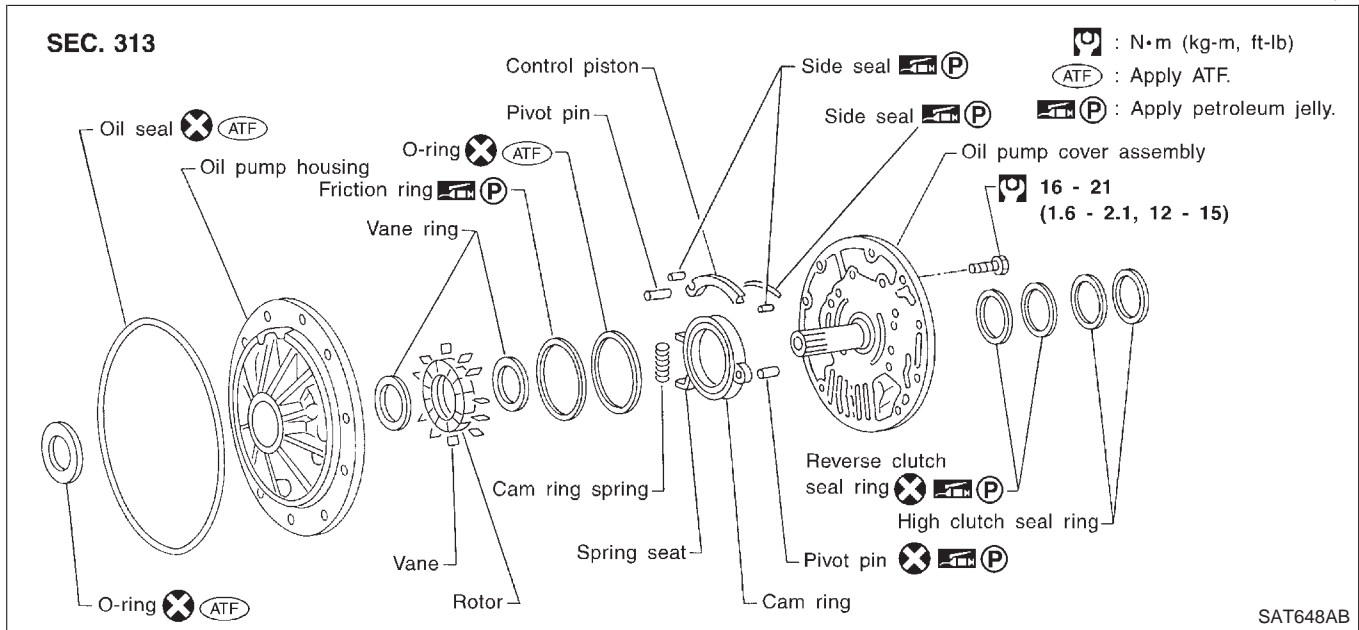


- f. Remove oil seal from transmission case.



Oil Pump  
COMPONENTS

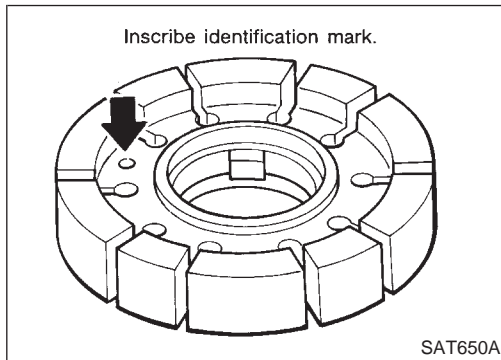
NBAT0112



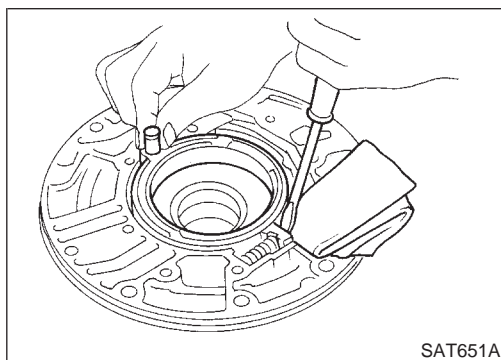
DISASSEMBLY

NBAT0113

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.

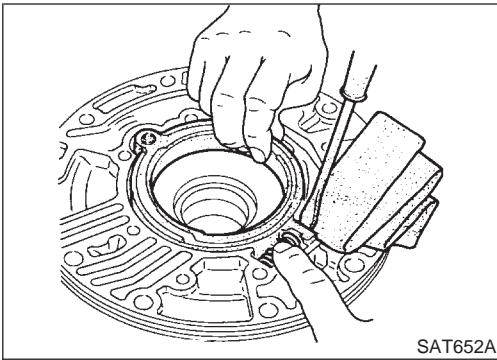


3. While pushing on cam ring remove pivot pin.
  - Be careful not to scratch oil pump housing.

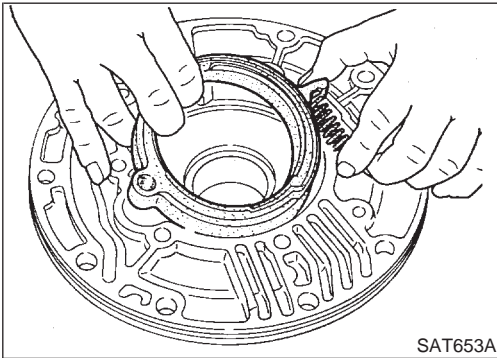
GI  
MA  
EM  
LC  
EC  
FE  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# REPAIR FOR COMPONENT PARTS

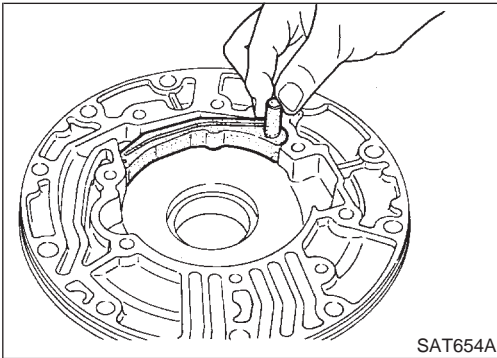
## Oil Pump (Cont'd)



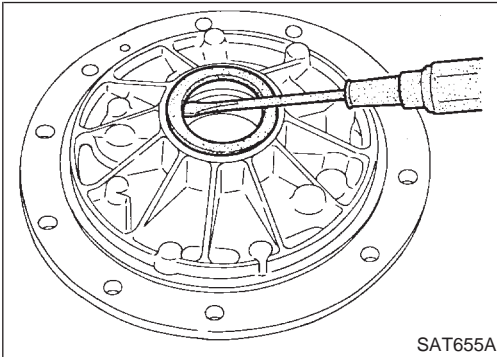
4. While holding cam ring and spring lift out cam ring spring.
  - Be careful not to damage oil pump housing.
  - Hold cam ring spring to prevent it from jumping.



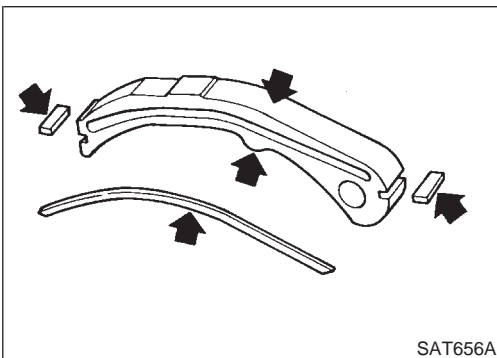
5. Remove cam ring and cam ring spring from oil pump housing.



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



7. Remove oil seal from oil pump housing.
  - Be careful not to scratch oil pump housing.



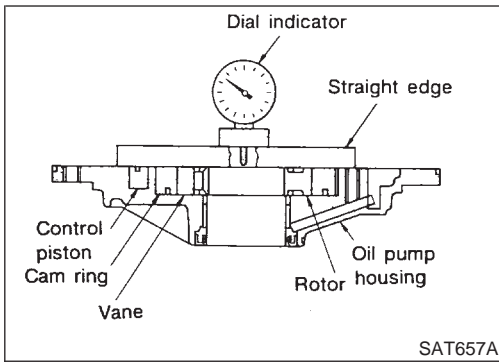
### INSPECTION

Oil Pump Cover, Rotor, Vanes, Control Piston, Side

NBAT0114

- Check for wear or damage.

NBAT0114S01



## 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.

- **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 SDS, AT-360.**

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

## Seal Ring Clearance

- Measure clearance between seal ring and ring groove.

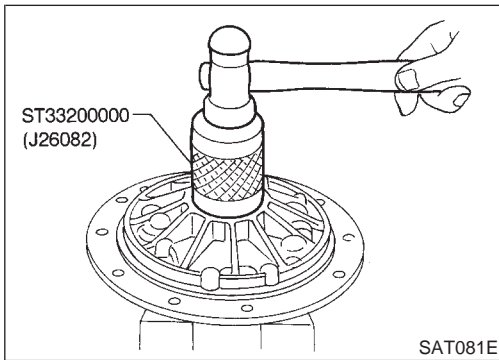
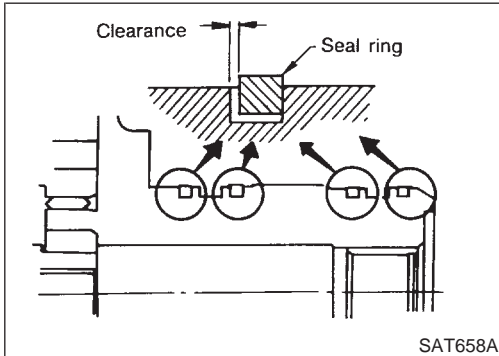
**Standard clearance:**

**0.10 - 0.25 mm (0.0039 - 0.0098 in)**

**Wear limit:**

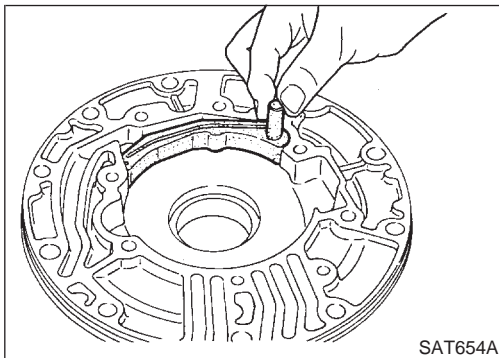
**0.25 mm (0.0098 in)**

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

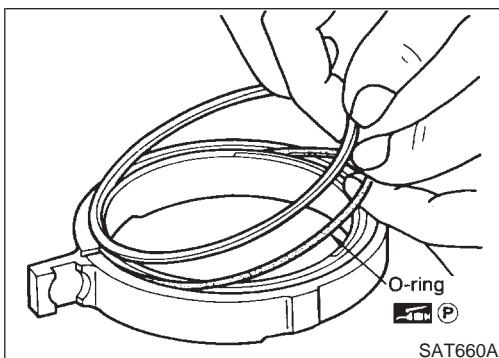


## ASSEMBLY

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.

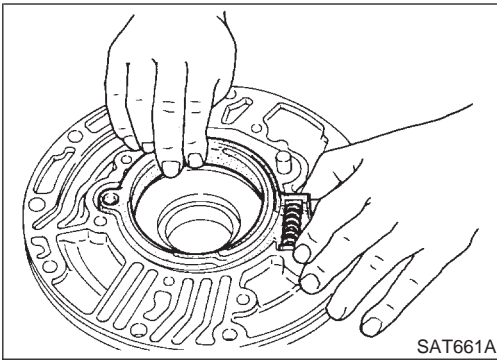


- c. Install O-ring and friction ring on cam ring.
  - **Apply petroleum jelly to O-ring.**

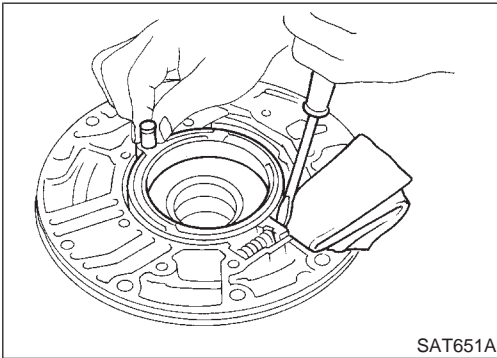
GI  
MA  
EM  
LC  
EC  
FE  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# REPAIR FOR COMPONENT PARTS

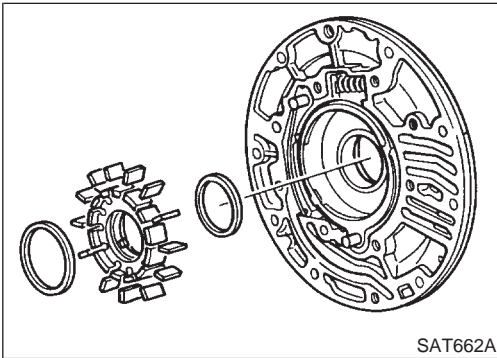
## Oil Pump (Cont'd)



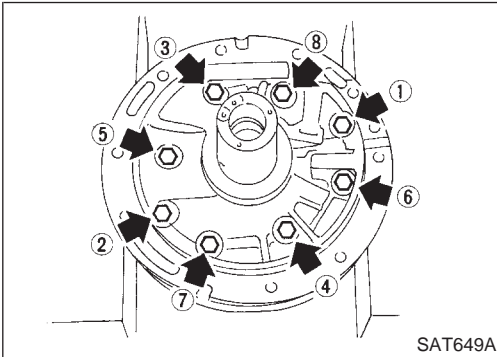
- d. Assemble cam ring, cam ring spring and spring seat. Install spring by pushing it against pump housing.



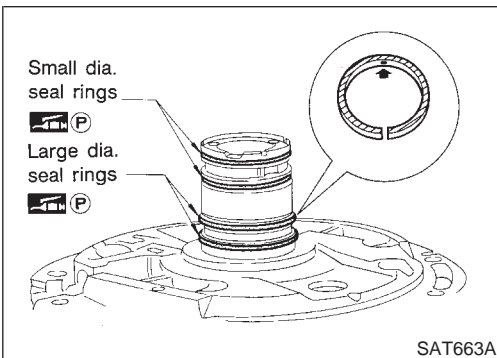
- e. While pushing on cam ring install pivot pin.



3. Install rotor, vanes and vane rings.
  - **Pay attention to direction of rotor.**



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.



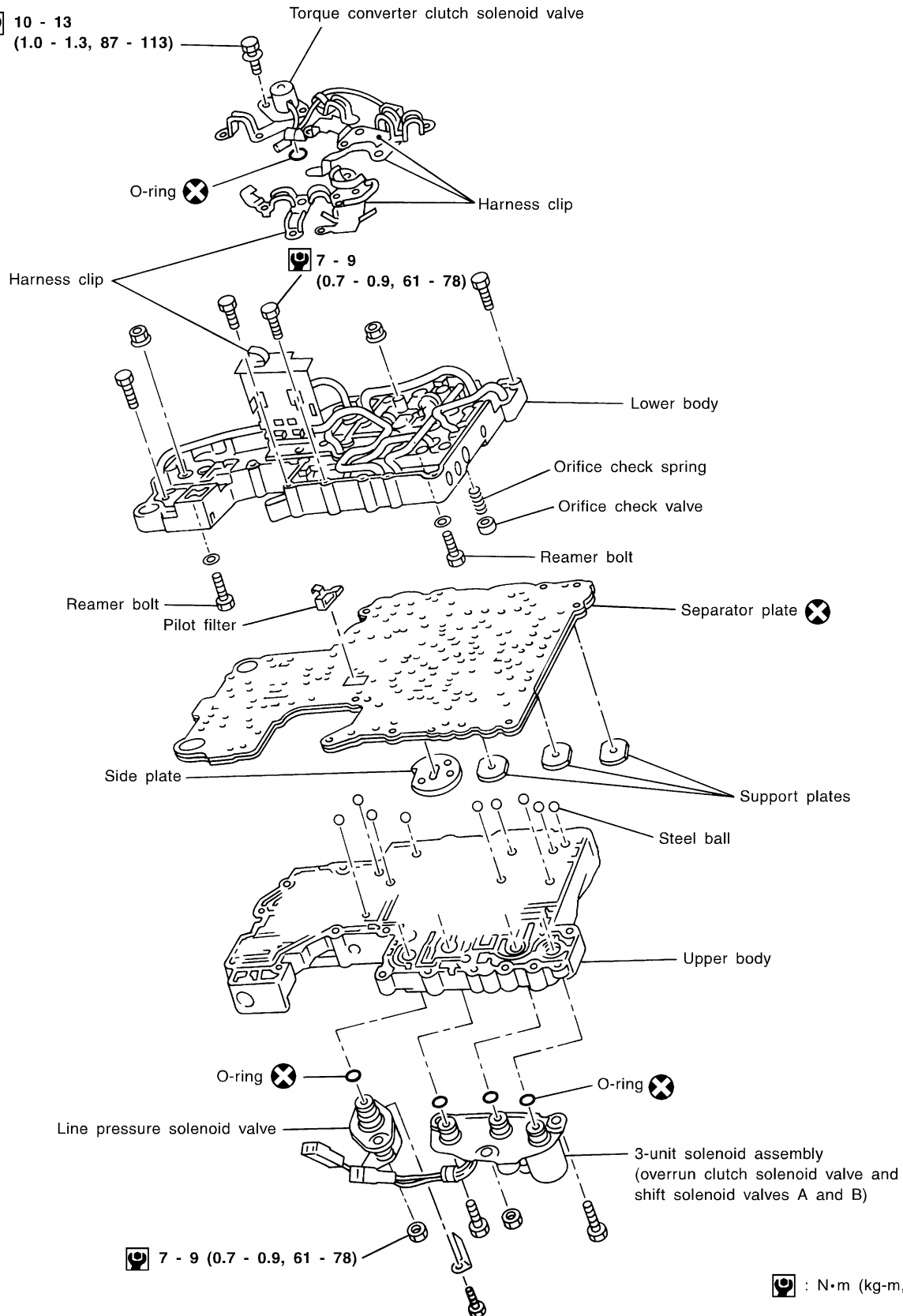
5. Install new seal rings carefully after packing ring grooves with petroleum jelly. Press rings down into jelly to a close fit.
  - **Seal rings come in two different diameters. Check fit carefully in each groove.**
    - Small dia. seal ring:**  
No mark
    - Large dia. seal ring:**  
Yellow mark in area shown by arrow
  - **Do not spread gap of seal ring excessively while installing. It may deform ring.**

## Control Valve Assembly COMPONENTS

NBAT0116

### SEC. 317

10 - 13  
(1.0 - 1.3, 87 - 113)



7 - 9 (0.7 - 0.9, 61 - 78)

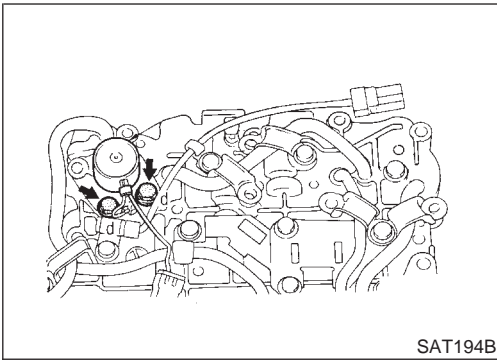
: N·m (kg-m, in-lb)

GI  
MA  
EM  
LC  
EC  
FE  
**AT**  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# REPAIR FOR COMPONENT PARTS

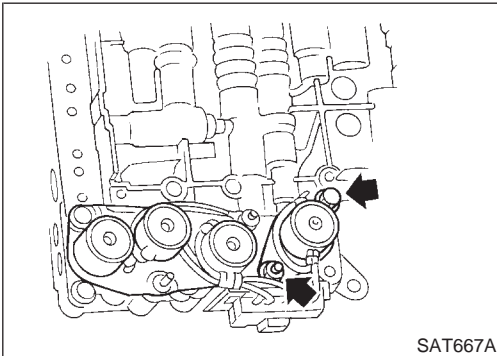
## Control Valve Assembly (Cont'd)

NBAT0117

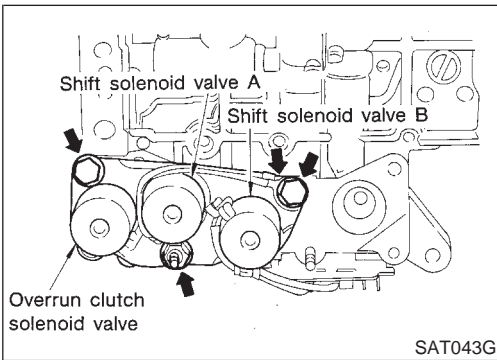


### DISASSEMBLY

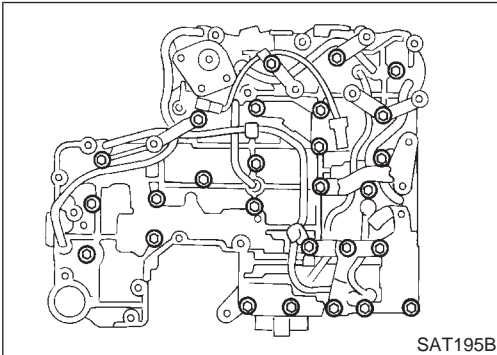
1. Remove solenoids.
  - a. Remove torque converter clutch solenoid valve and side plate from lower body.
  - b. Remove O-ring from solenoid.



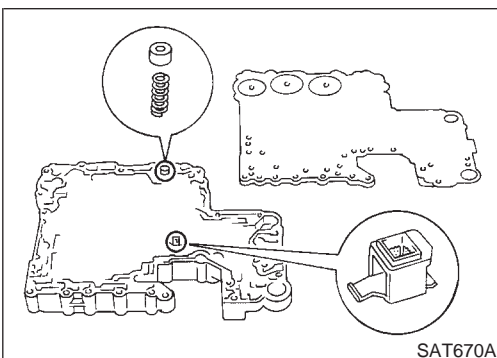
- c. Remove line pressure solenoid valve from upper body.
  - d. Remove O-ring from solenoid.



- e. Remove 3-unit solenoid assembly from upper body.
  - f. Remove O-rings from solenoids.



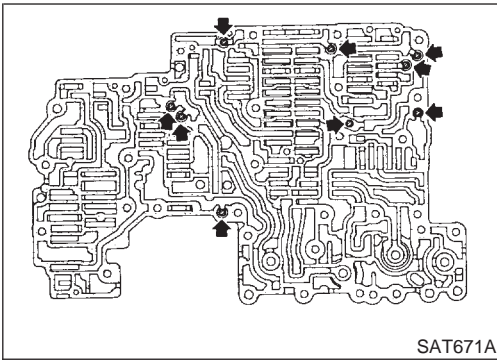
2. Disassemble upper and lower bodies.
  - a. Place upper body facedown, and remove bolts, reamer bolts and support plates.
  - b. Remove lower body, separator plate as a unit from upper body.
    - **Be careful not to drop pilot filter, orifice check valve, spring and steel balls.**



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

# REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)



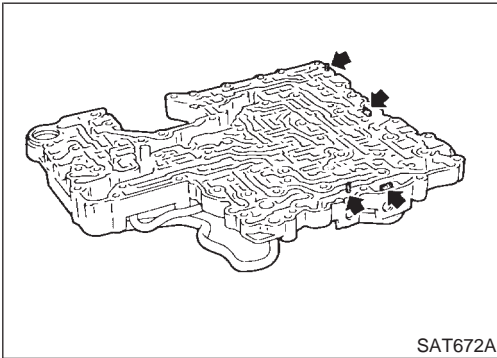
- e. Check to see that steel balls are properly positioned in upper body. Then remove them from upper body.

GI

MA

EM

LC



## INSPECTION Lower and Upper Bodies

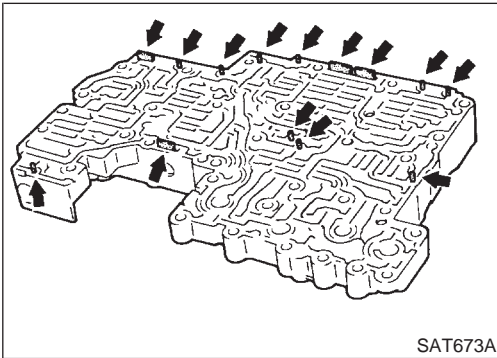
NBAT0118

NBAT0118S01

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

EC

FE



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

AT

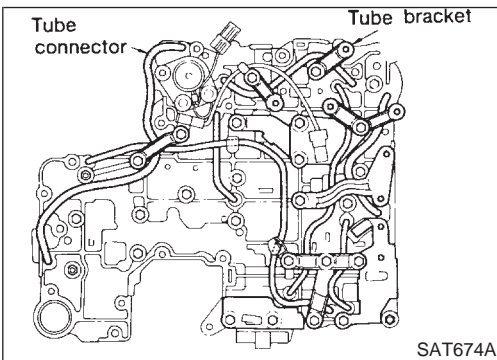
TF

PD

AX

SU

BR



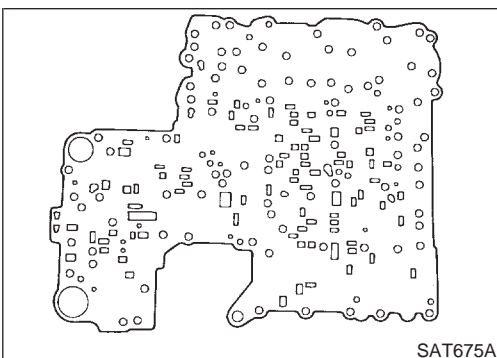
- Check to make sure that oil circuits are clean and free from damage.
- Check tube brackets and tube connectors for damage.

ST

RS

BT

HA



## Separator Plate

NBAT0118S02

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

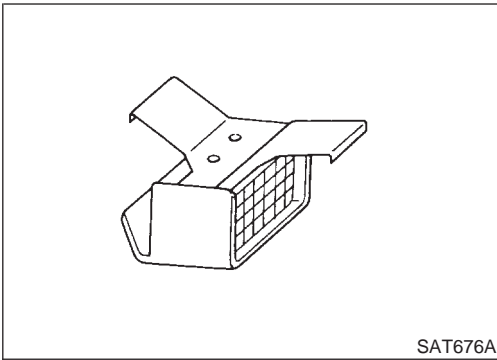
SC

EL

IDX

# REPAIR FOR COMPONENT PARTS

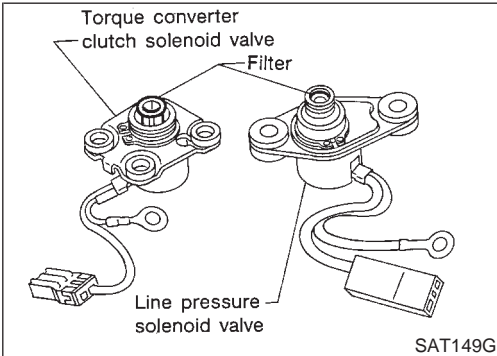
Control Valve Assembly (Cont'd)



## Pilot Filter

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

NBAT0118S03



## Torque Converter Clutch Solenoid Valve

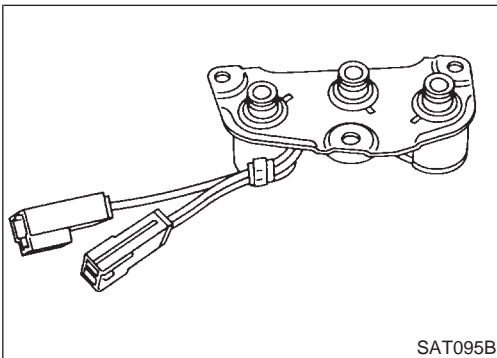
- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Component Inspection", AT-152.

NBAT0118S04

## Line Pressure Solenoid Valve

- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Component Inspection", AT-167.

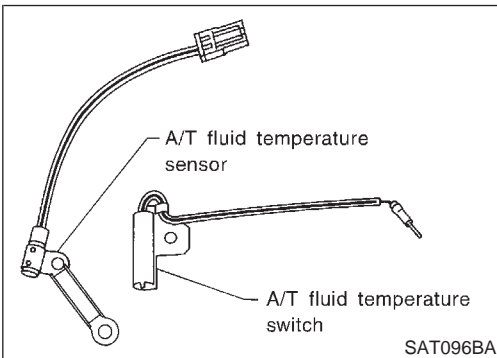
NBAT0118S05



## 3-Unit Solenoid Assembly (Overrun Clutch Solenoid Valve and Shift Solenoid Valves A and B)

- Measure resistance of each solenoid. Refer to "Component Inspection", AT-171, AT-175 and AT-189.

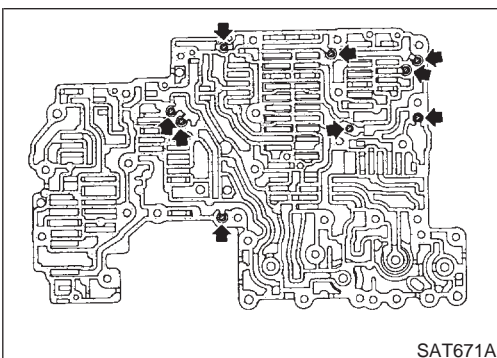
NBAT0118S06



## A/T Fluid Temperature Sensor and Switch

- Measure resistance. Refer to "Component Inspection", AT-110 and AT-264.

NBAT0118S07



## ASSEMBLY

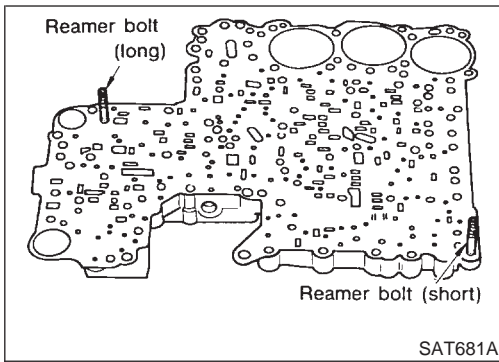
1. Install upper and lower bodies.
- a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

NBAT0119



# REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)



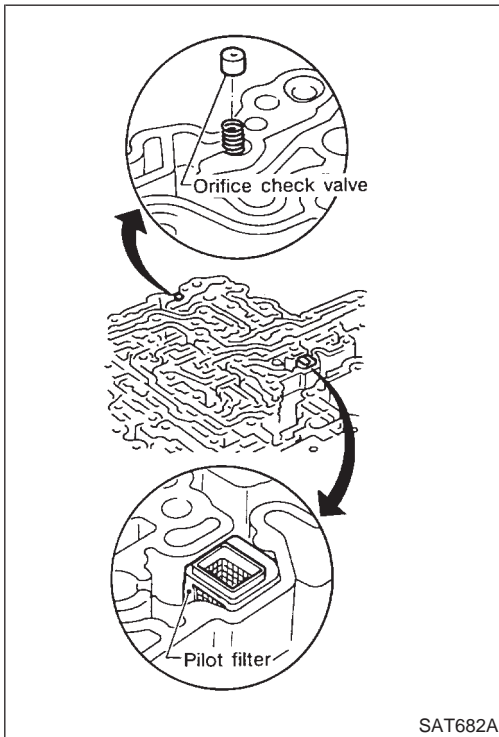
- b. Install reamer bolts from bottom of upper body.

GI

MA

EM

LC



- c. Place oil circuit of lower body face up. Install orifice check spring, orifice check valve and pilot filter.

EC

FE

AT

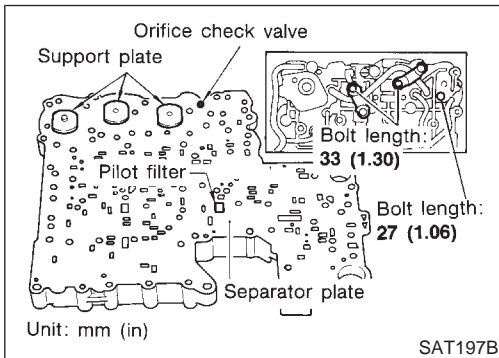
TF

PD

AX

SU

BR



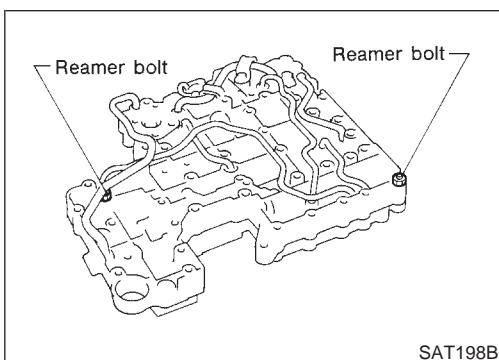
- d. Install lower separator plate on lower body.  
 e. Install and temporarily tighten support plates, A/T fluid temperature sensor and tube brackets.

ST

RS

BT

HA



- 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.

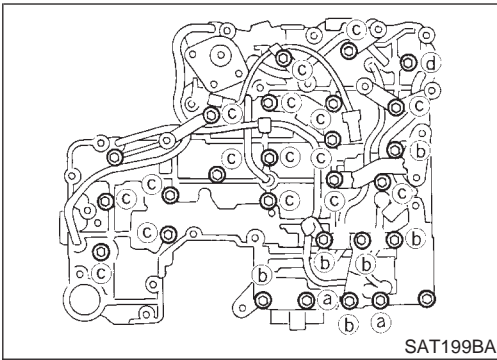
SC

EL

IDX

# REPAIR FOR COMPONENT PARTS

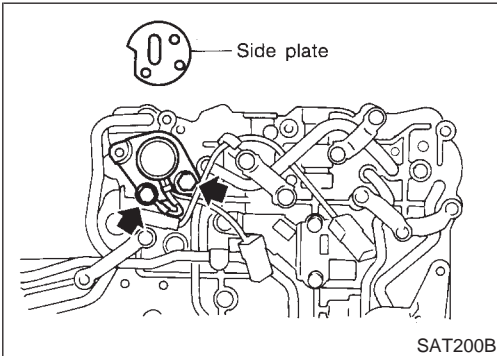
## Control Valve Assembly (Cont'd)



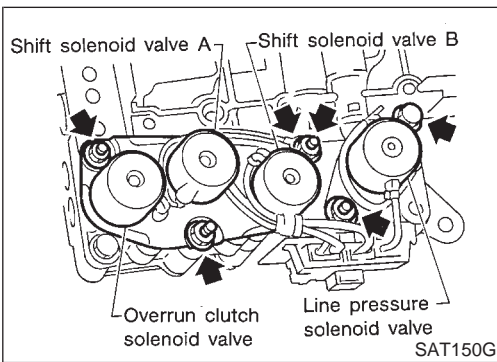
- g. Install and temporarily tighten bolts and tube brackets in their proper locations.

### 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.

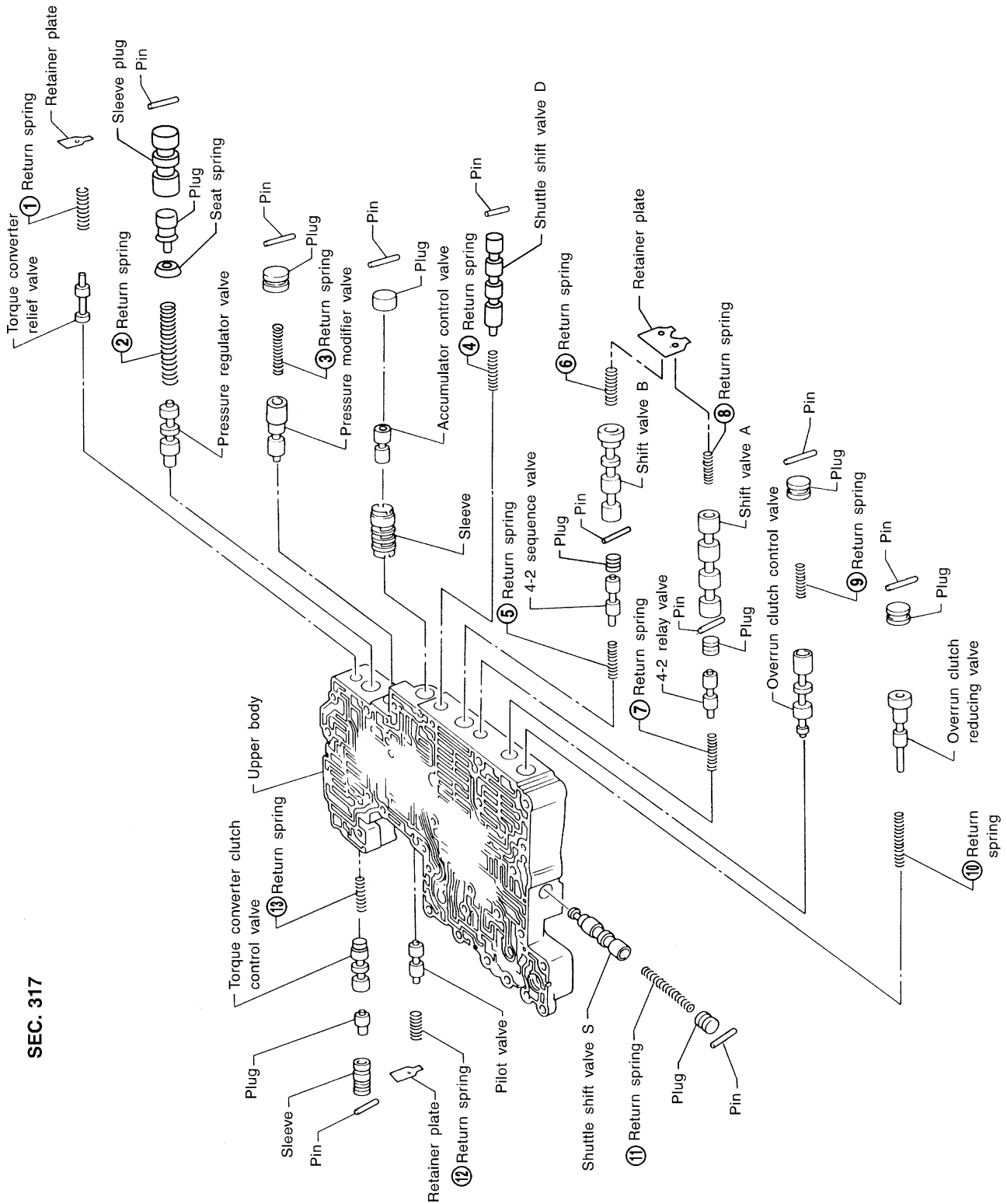


- b. Attach O-rings and install 3-unit solenoids assembly onto upper body.
- c. Attach O-ring and install line pressure solenoid valve onto upper body.
3. Tighten all bolts.

Control Valve Upper Body

COMPONENTS

NBAT0120



SEC. 317

GI  
MA  
EM  
LC  
EC  
FE  
**AT**  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

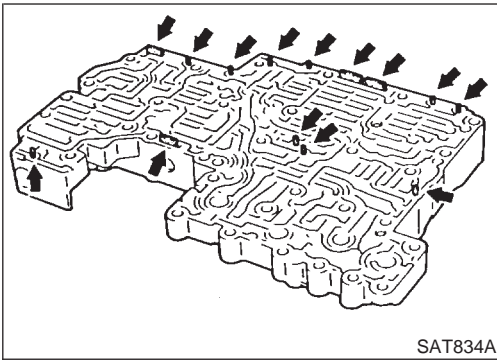
SAT142JA

Apply ATF to all components before their installation.  
Numbers preceding valve springs correspond with those shown in SDS on page AT-357.

# REPAIR FOR COMPONENT PARTS

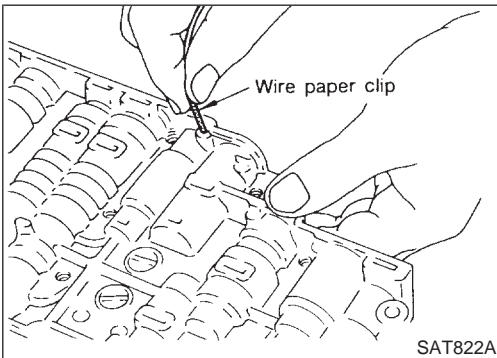
Control Valve Upper Body (Cont'd)

NBAT0121

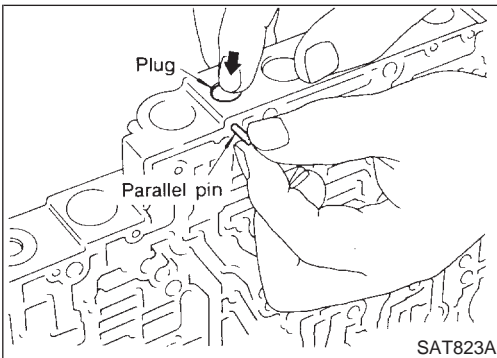


## DISASSEMBLY

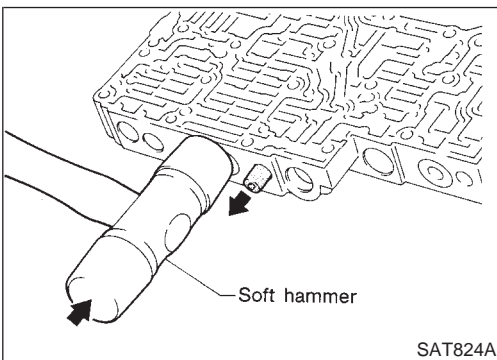
1. Remove valves at parallel pins.
  - Do not use a magnetic hand.



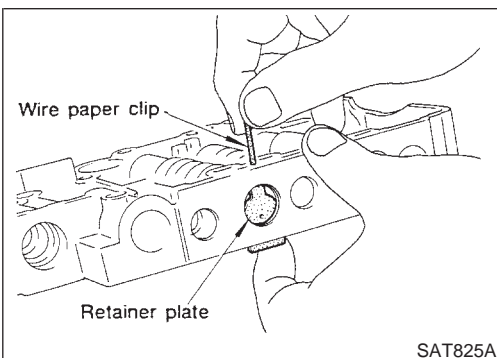
- a. Use a wire paper clip to push out parallel pins.



- b. Remove parallel pins while pressing their corresponding plugs and sleeves.
  - Remove plug slowly to prevent internal parts from jumping out.



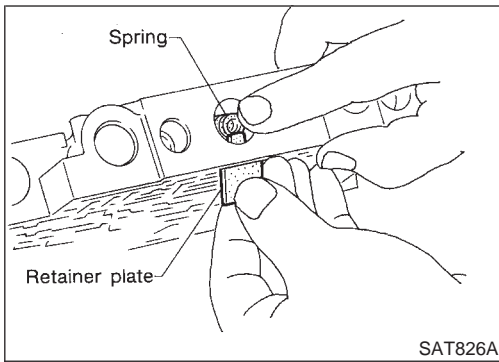
- c. Place mating surface of valve facedown, and remove internal parts.
  - If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer.
  - Be careful not to drop or damage valves and sleeves.



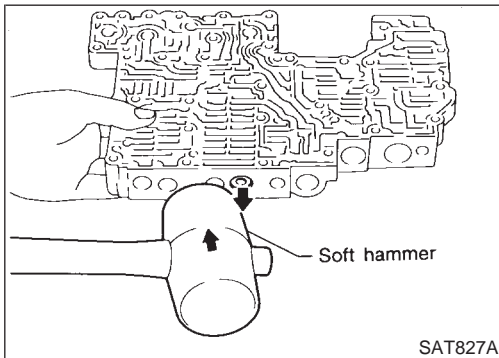
2. Remove valves at retainer plates.
  - a. Pry out retainer plate with wire paper clip.

# REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

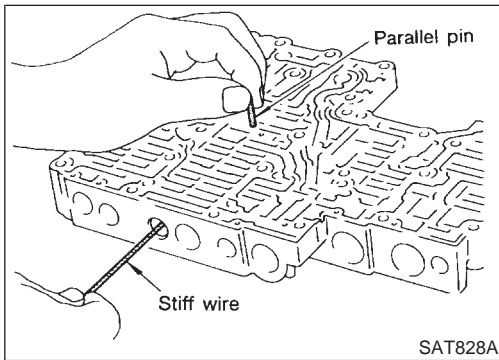


b. Remove retainer plates while holding spring.



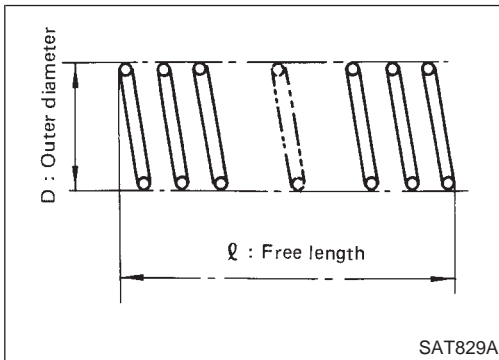
c. Place mating surface of valve facedown, and remove internal parts.

- 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

### Valve Springs

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

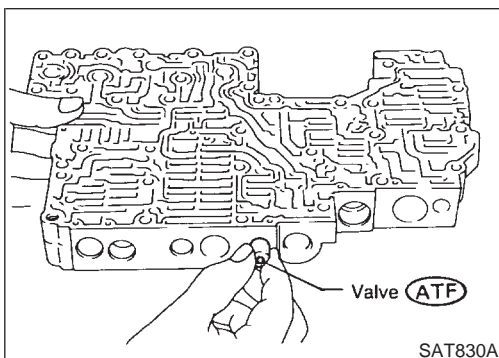
**Inspection standard:**

**Refer to SDS, AT-357.**

- Replace valve springs if deformed or fatigued.

### Control Valves

- Check sliding surfaces of valves, sleeves and plugs.



## ASSEMBLY

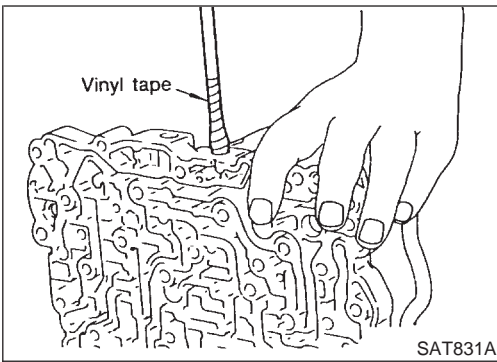
1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.

- Be careful not to scratch or damage valve body.

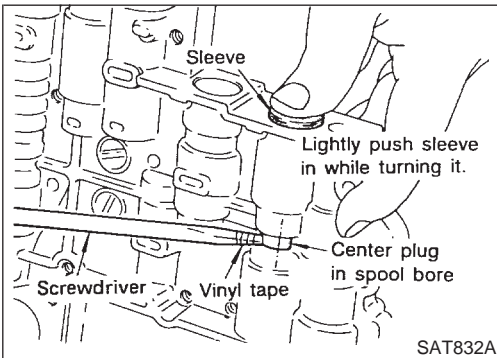
GI  
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# REPAIR FOR COMPONENT PARTS

## Control Valve Upper Body (Cont'd)

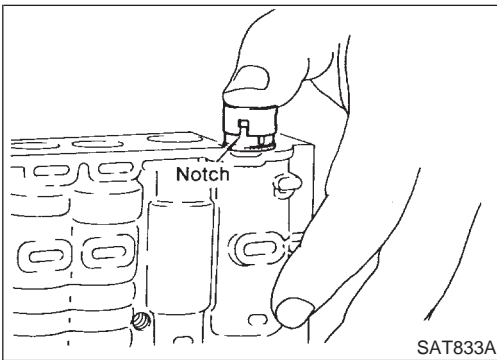


- Wrap a small screwdriver with vinyl tape and use it to insert the valves into proper position.



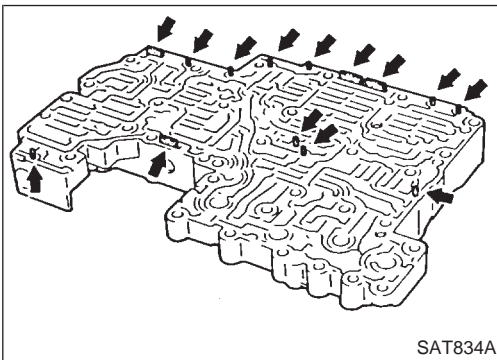
### Pressure regulator valve

- 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.

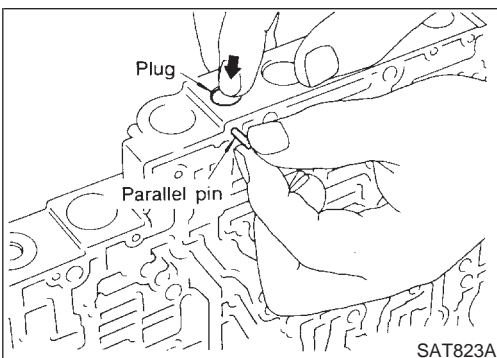


### Accumulator control plug

- Align protrusion of accumulator control sleeve with notch in plug.
- Align parallel pin groove in plug with parallel pin, and install accumulator control valve.



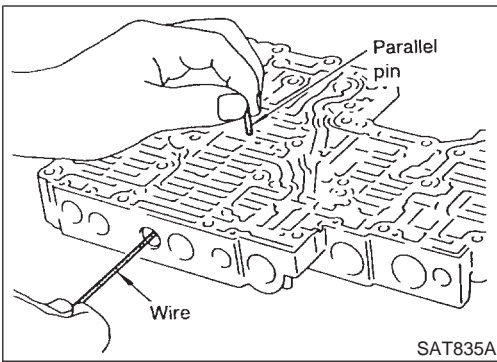
2. Install parallel pins and retainer plates.



- While pushing plug, install parallel pin.

# REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)



## 4-2 sequence valve and relay valve

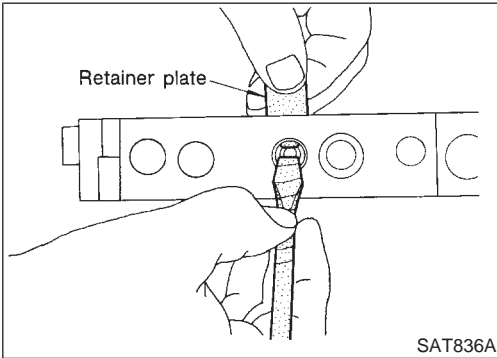
- Push 4-2 sequence valve and relay valve with wire wrapped in vinyl tape to prevent scratching valve body. Install parallel pins.

GI

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- Insert retainer plate while pushing spring.

EC

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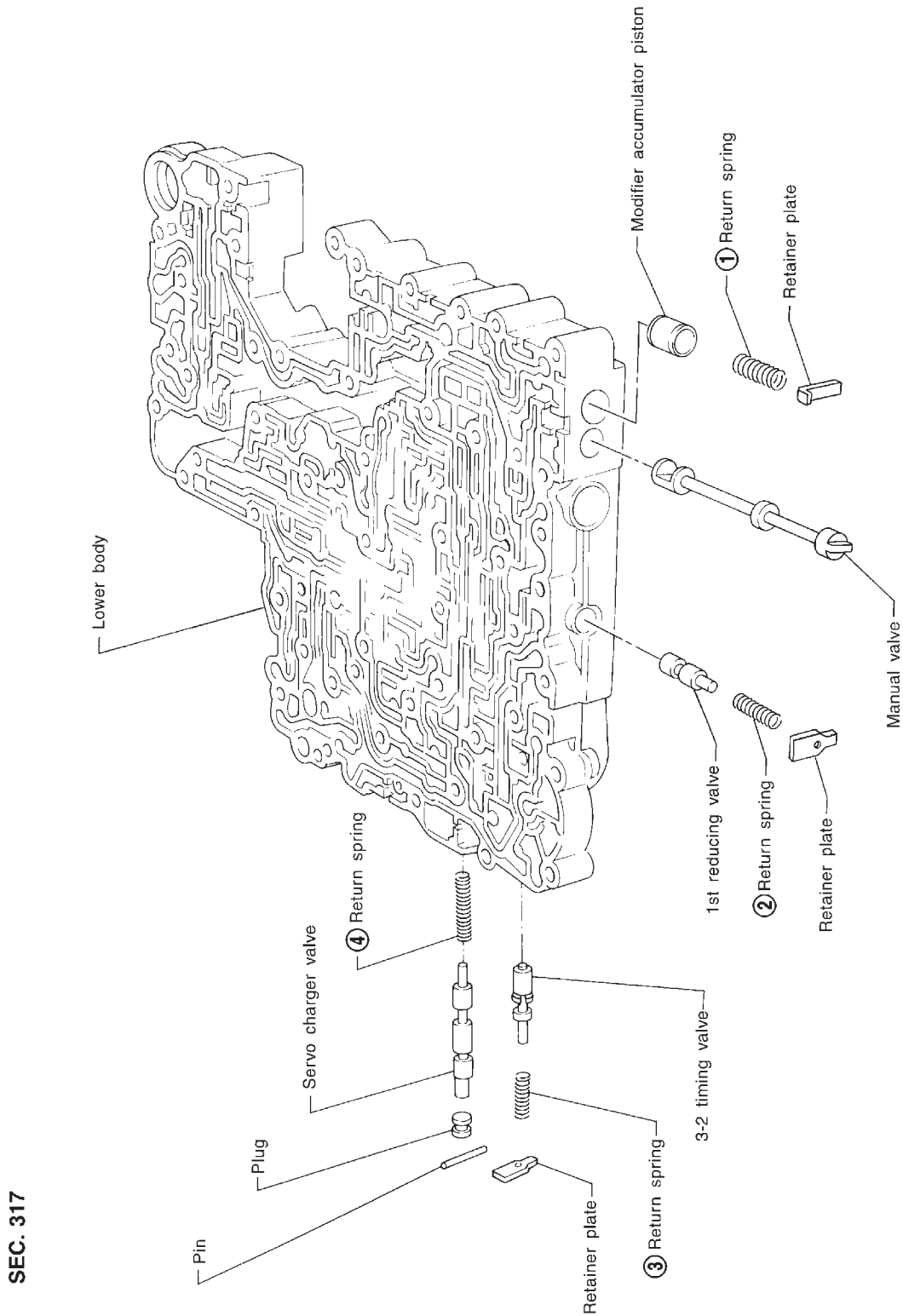
# REPAIR FOR COMPONENT PARTS

Control Valve Lower Body

## Control Valve Lower Body

### COMPONENTS

NBAT0124



SEC. 317

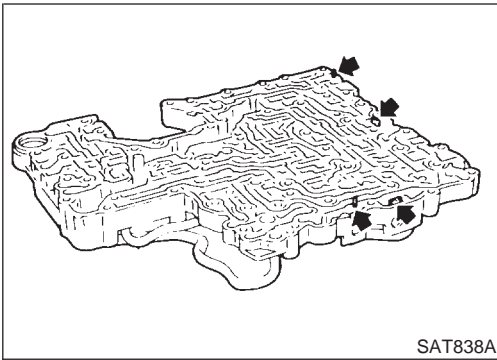
SAT9661

Apply ATF to all components before their installation.  
Numbers preceding valve springs correspond with those shown in SDS on page AT-357.



# REPAIR FOR COMPONENT PARTS

Control Valve Lower Body (Cont'd)



## DISASSEMBLY

NBAT0125

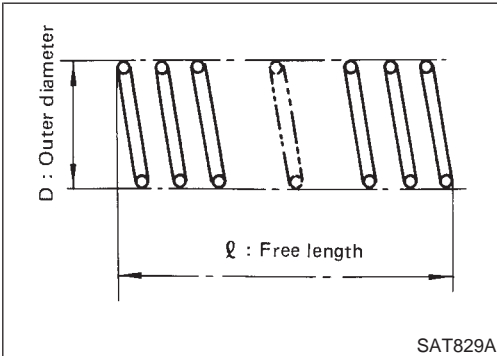
1. Remove valves at parallel pins.
2. Remove valves at retainer plates.  
For removal procedures, refer to "DISASSEMBLY" of Control Valve Upper Body.

GI

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## INSPECTION

NBAT0126

### Valve Springs

NBAT0126S01

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

**Inspection standard:**

**Refer to SDS, AT-357.**

- Replace valve springs if deformed or fatigued.

EC

FE

AT

### Control Valves

NBAT0126S02

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

TF

## ASSEMBLY

NBAT0127

- Install control valves.  
For installation procedures, refer to "ASSEMBLY" of Control Valve Upper Body, AT-309.

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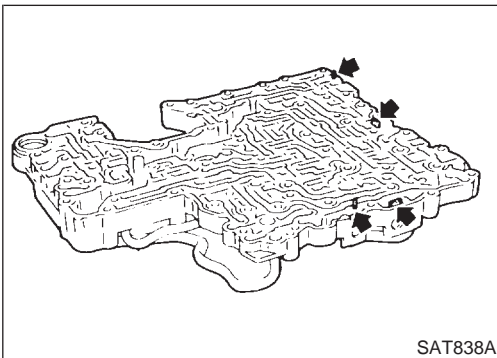
BT

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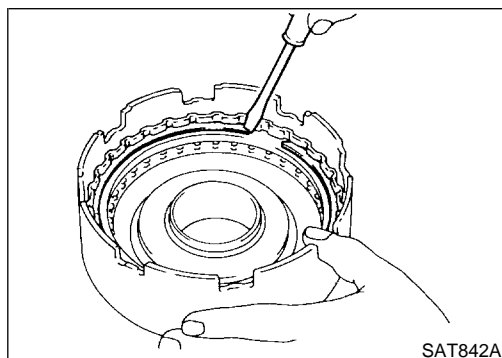
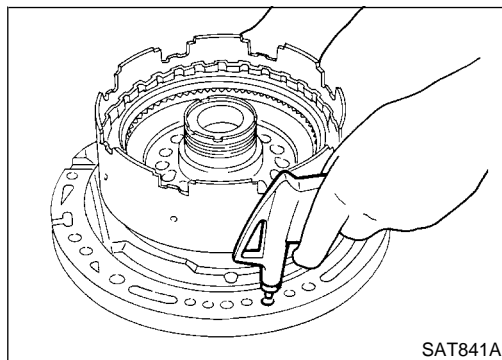
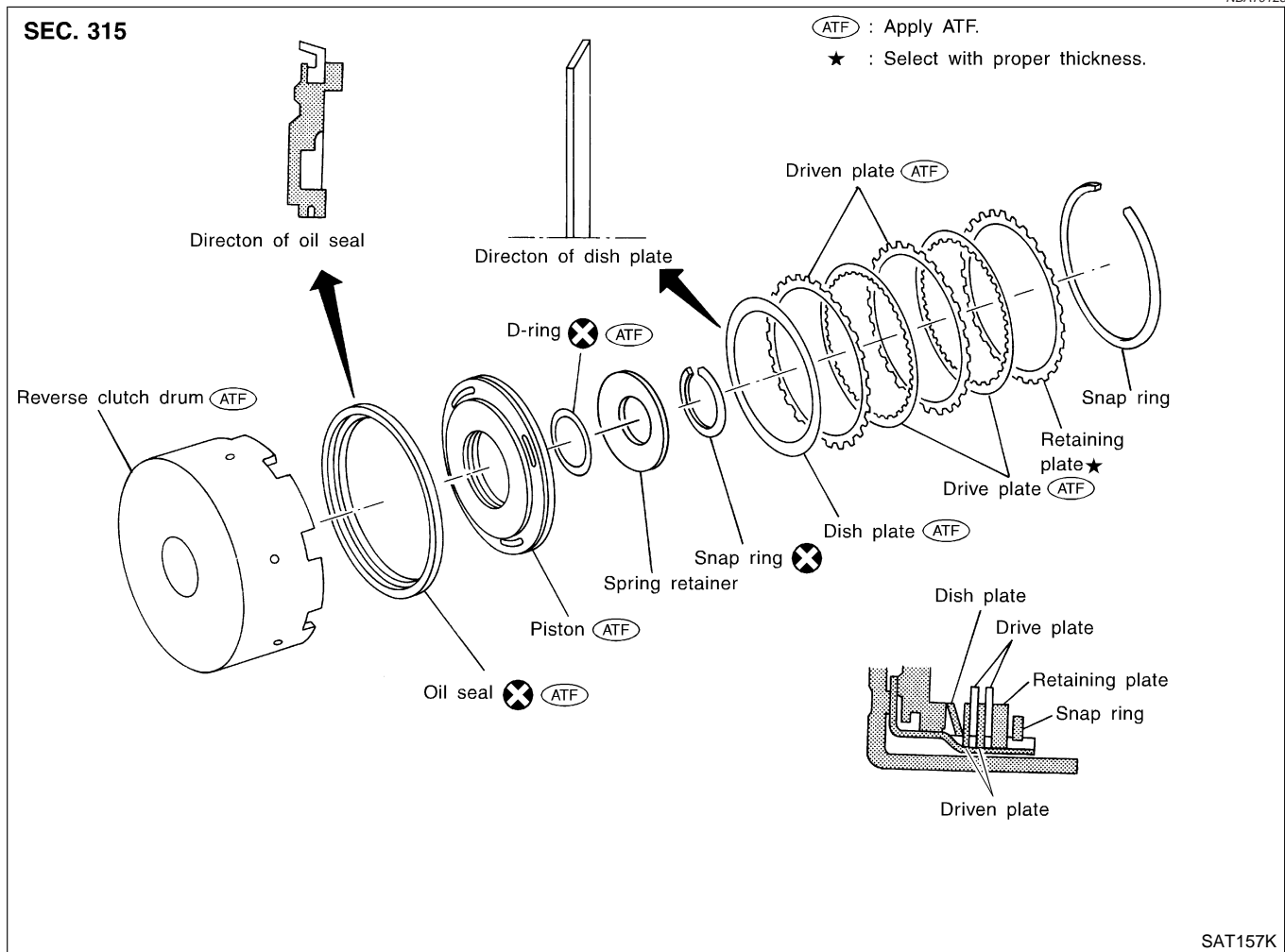


# REPAIR FOR COMPONENT PARTS

Reverse Clutch

## Reverse Clutch COMPONENTS

NBAT0128



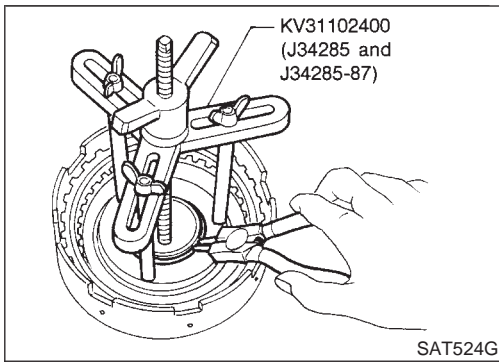
### DISASSEMBLY

NBAT0129

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.

# REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)



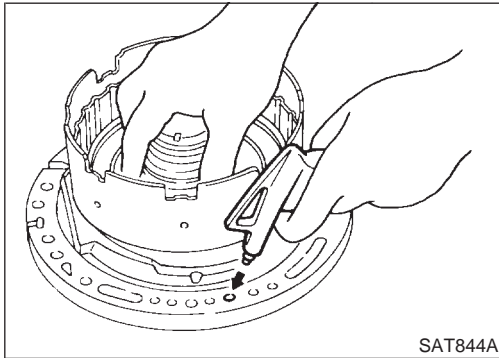
3. Remove snap ring from clutch drum while compressing clutch springs.
  - **Do not expand snap ring excessively.**
4. Remove spring retainer.

GI

MA

EM

LC



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.

EC

FE

AT

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## INSPECTION

### Reverse Clutch Snap Ring and Spring Retainer

- Check for deformation, fatigue or damage.

NBAT0130

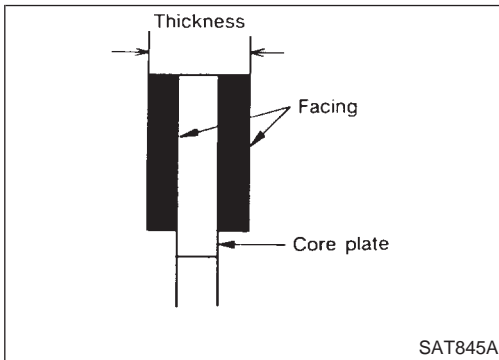
NBAT0130S01

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### 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.

NBAT0130S03

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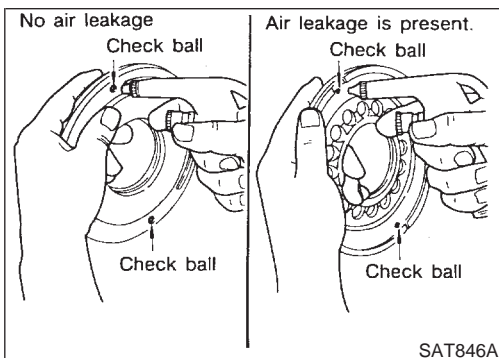
BT

### Reverse Clutch Dish Plate

- Check for deformation or damage.

NBAT0130S04

HA



### 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.

NBAT0130S05

SC

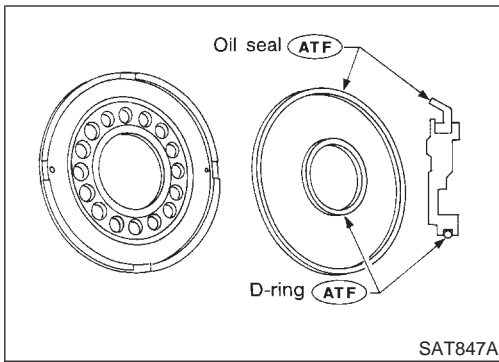
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# REPAIR FOR COMPONENT PARTS

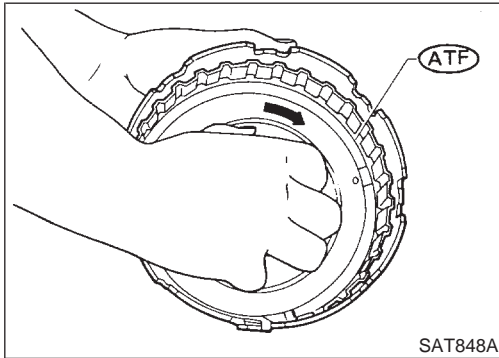
## Reverse Clutch (Cont'd)

NBAT0131

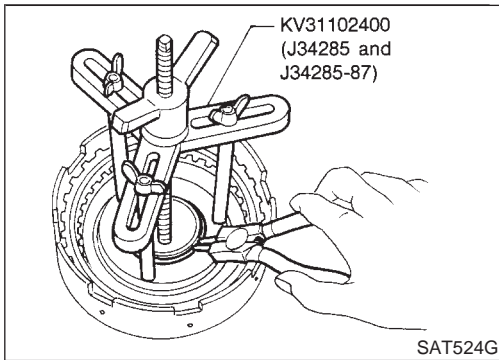


### ASSEMBLY

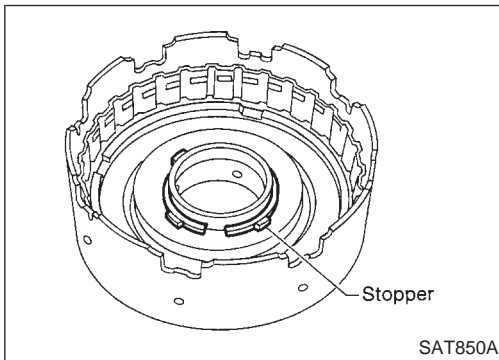
1. Install D-ring and oil seal on piston.
  - **Apply ATF to both parts.**



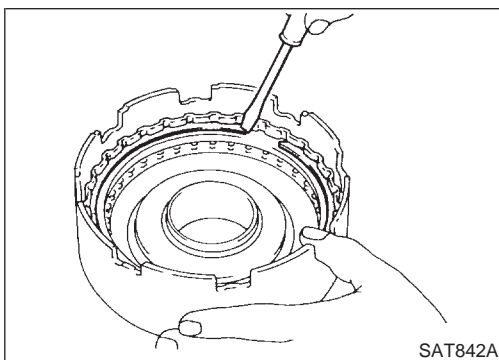
2. Install piston assembly by turning it slowly and evenly.
  - **Apply ATF to inner surface of drum.**
3. Install spring retainer.



4. Install snap ring while compressing clutch springs.



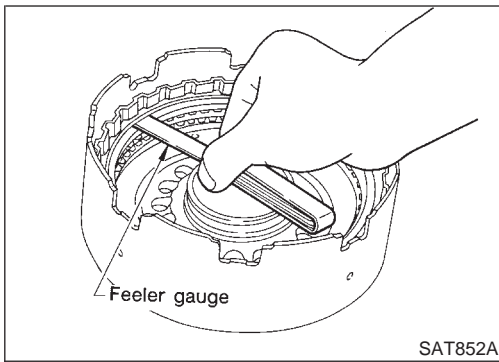
- **Do not align snap ring gap with spring retainer stopper.**



5. Install drive plates, driven plates, retaining plate and dish plate.
6. Install snap ring.

# REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)



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

**Specified clearance:**

**Standard**

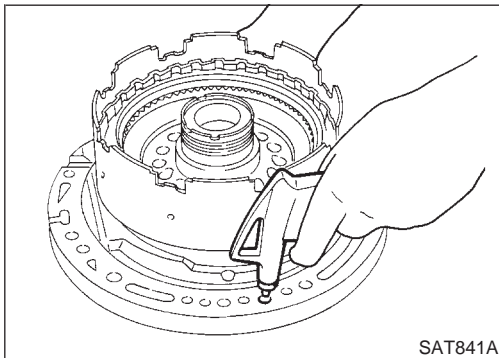
**0.5 - 0.8 mm (0.020 - 0.031 in)**

**Allowable limit**

**1.2 mm (0.047 in)**

**Retaining plate:**

**Refer to SDS, AT-358.**



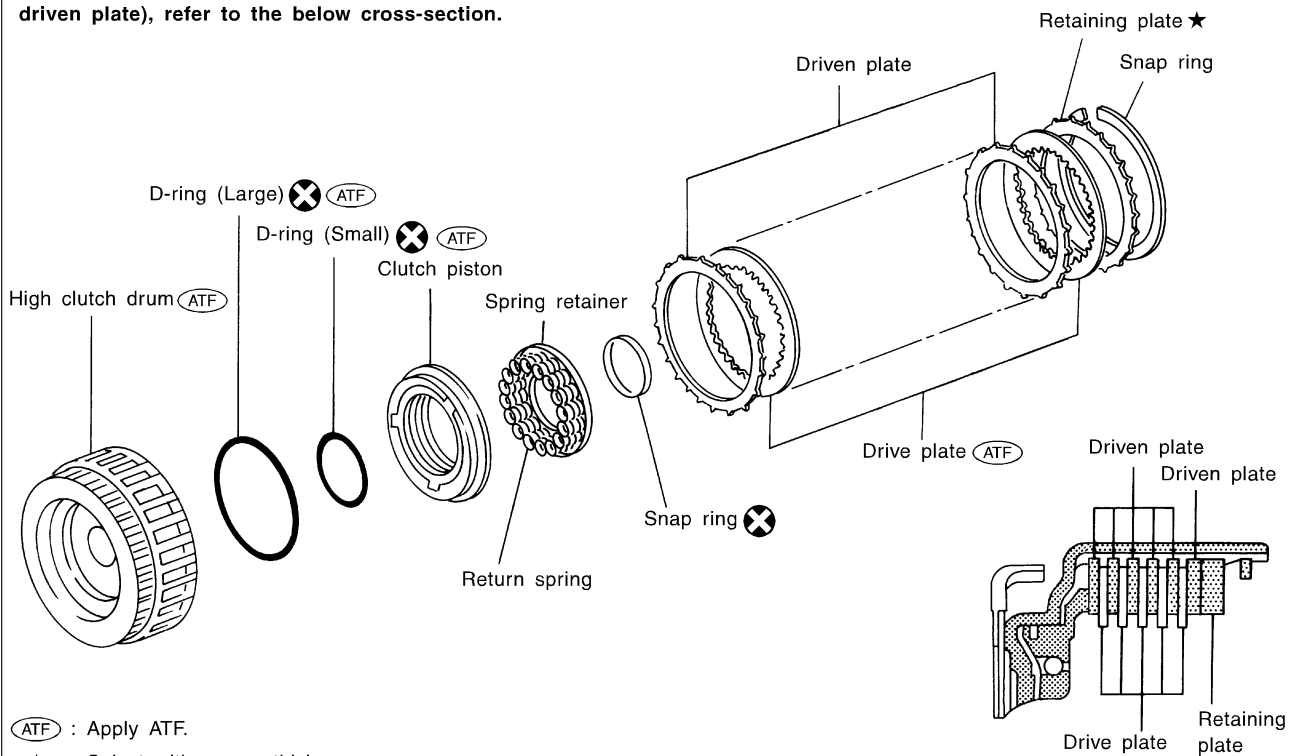
8. Check operation of reverse clutch. Refer to "DISASSEMBLY" of Reverse Clutch, AT-314.

## High Clutch COMPONENTS

NBAT0132

### SEC. 315

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



(ATF) : Apply ATF.

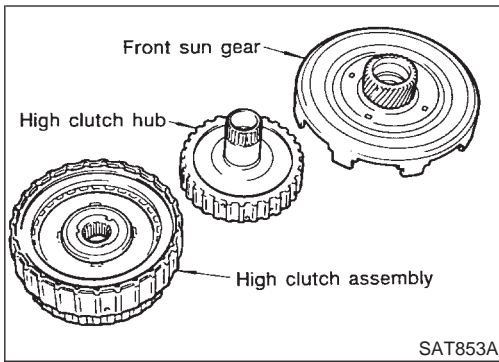
★ : Select with proper thickness.

SAT158K

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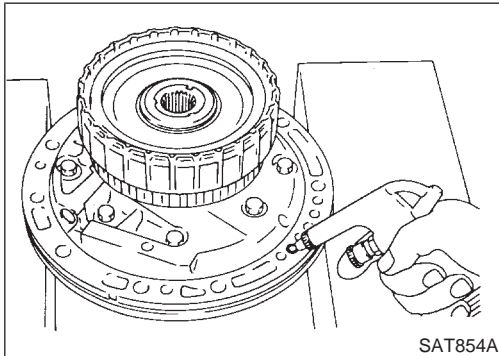
# REPAIR FOR COMPONENT PARTS

## High Clutch (Cont'd)

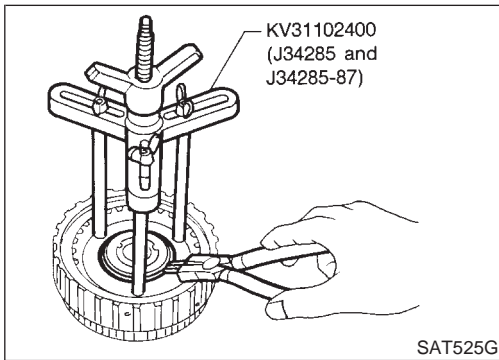


### DISASSEMBLY AND ASSEMBLY

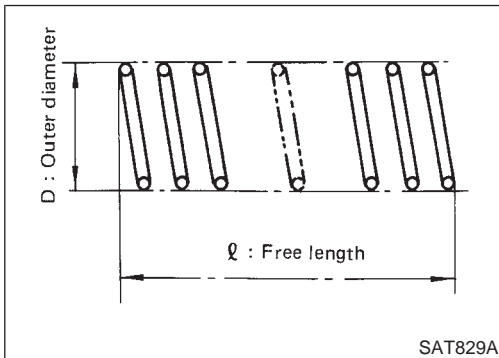
Service procedures for high clutch are essentially the same as those for reverse clutch, with the following exception: NBAT0133



- Check of high clutch operation

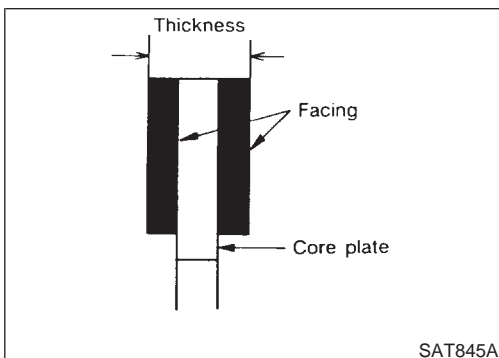


- Removal and installation of return spring



- Inspection of high clutch return springs

**Inspection standard:**  
**Refer to SDS, AT-357.**

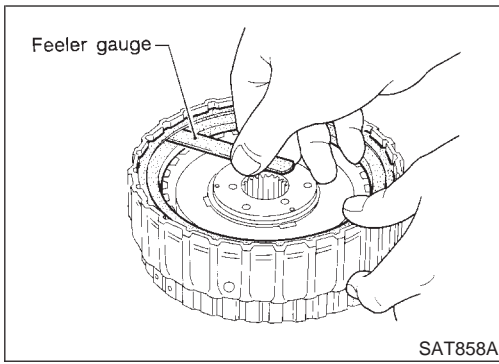


- Inspection of high clutch drive plate

**Thickness of drive plate:**  
**Standard**  
**1.52 - 1.67 mm (0.0598 - 0.0657 in)**  
**Wear limit**  
**1.40 mm (0.0551 in)**

# REPAIR FOR COMPONENT PARTS

High Clutch (Cont'd)



- Measurement of clearance between retaining plate and snap ring

**Specified clearance:**

**Standard**

**1.8 - 2.2 mm (0.071 - 0.087 in)**

**Allowable limit**

**3.2 mm (0.126 in)**

**Retaining plate:**

**Refer to SDS, AT-358.**

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# REPAIR FOR COMPONENT PARTS

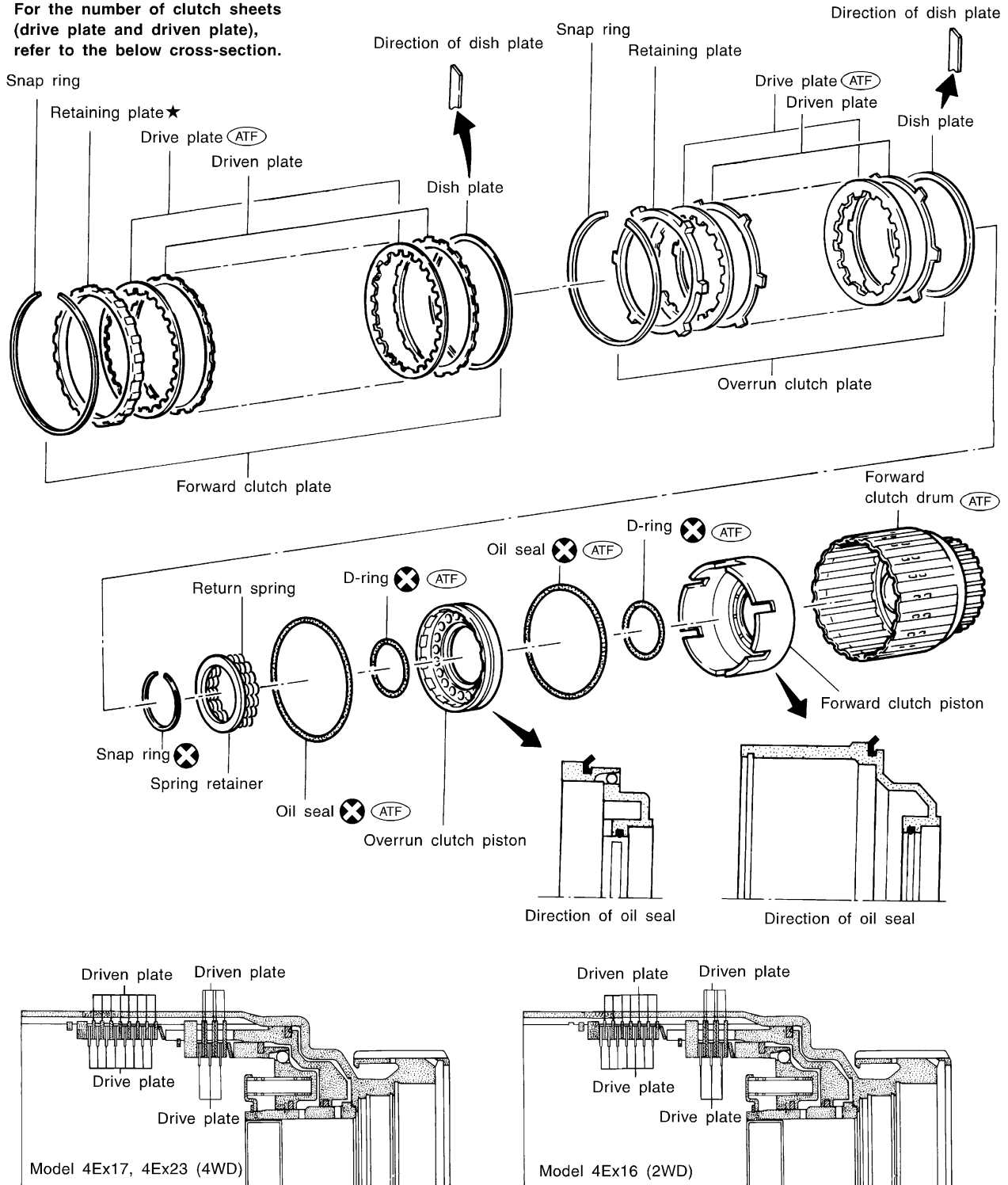
Forward and Overrun Clutches

## Forward and Overrun Clutches COMPONENTS

NBAT0134

### SEC. 315

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



(ATF) : Apply ATF.

★ : Select with proper thickness.

SAT159K



# REPAIR FOR COMPONENT PARTS

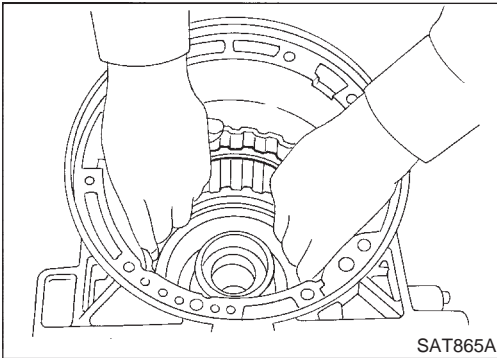
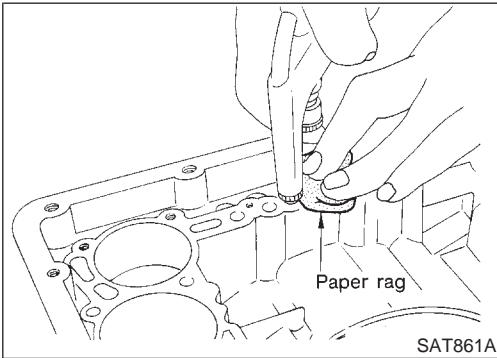
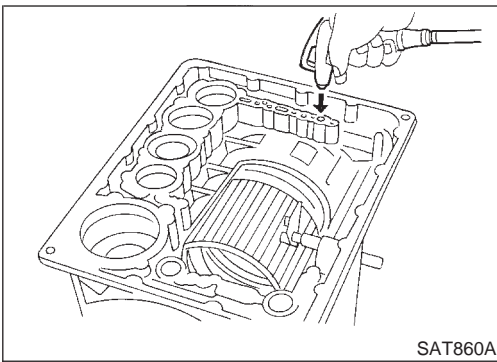
Forward and Overrun Clutches (Cont'd)

NBAT0135

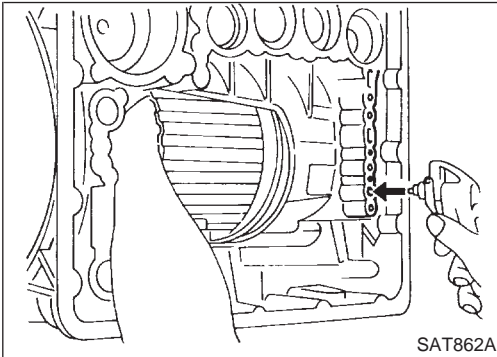
## DISASSEMBLY AND ASSEMBLY

Forward and overrun clutches are serviced essentially the same way as reverse clutch is serviced. However, note the following exceptions.

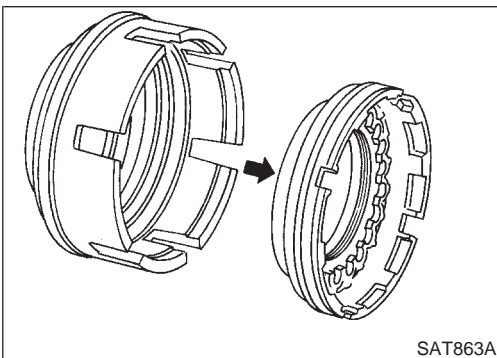
- Check of forward clutch operation
- Check of overrun clutch operation



- Removal of forward clutch drum  
Remove forward clutch drum from transmission case by holding snap ring.



- Removal of forward clutch and overrun clutch pistons  
a) While holding overrun clutch piston, gradually apply compressed air to oil hole.

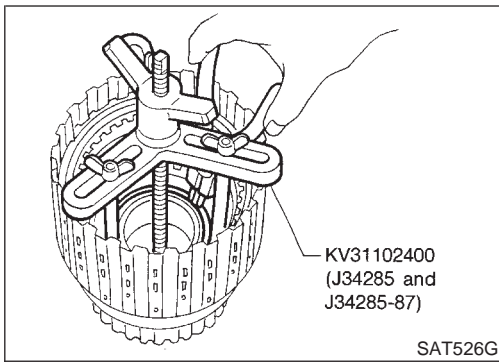


- b) Remove overrun clutch from forward clutch.

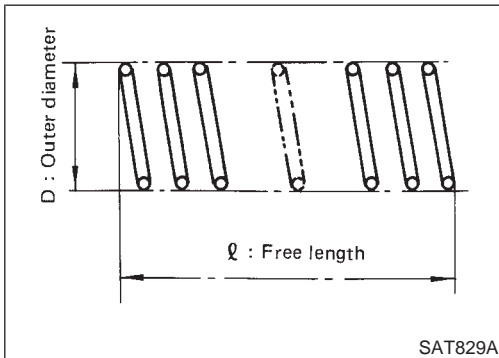
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# REPAIR FOR COMPONENT PARTS

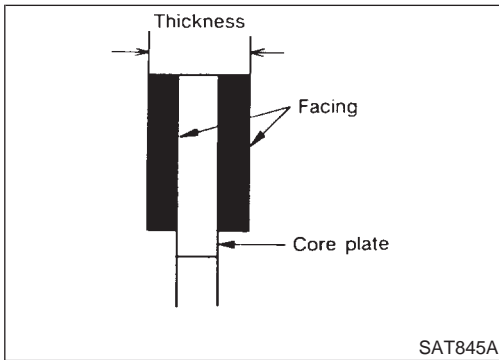
## Forward and Overrun Clutches (Cont'd)



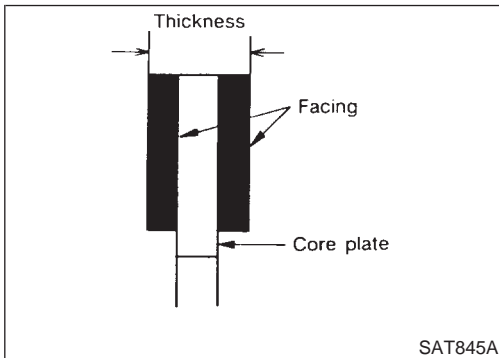
- Removal and installation of return springs



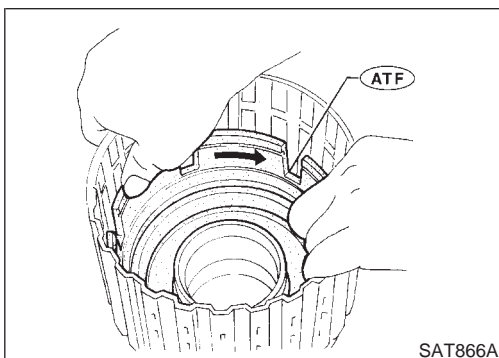
- Inspection of forward clutch and overrun clutch return springs  
**Inspection standard:**  
**Refer to SDS, AT-357.**



- 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)**



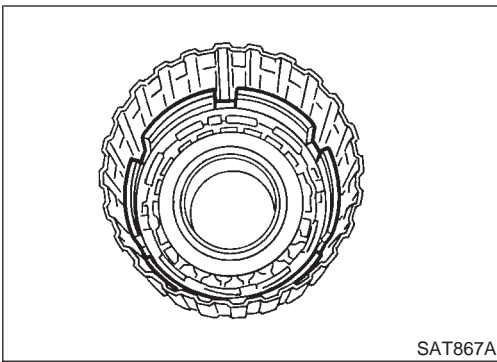
- Inspection of overrun clutch drive plates  
**Thickness of drive plate:**  
**Standard**  
**1.90 - 2.05 mm (0.0748 - 0.0807 in)**  
**Wear limit**  
**1.80 mm (0.0709 in)**



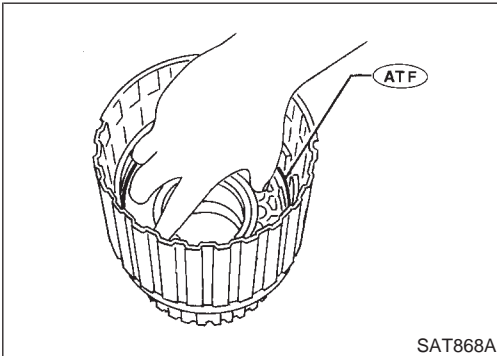
- Installation of forward clutch piston and overrun clutch piston  
a) Install forward clutch piston by turning it slowly and evenly.  
● **Apply ATF to inner surface of clutch drum.**

# REPAIR FOR COMPONENT PARTS

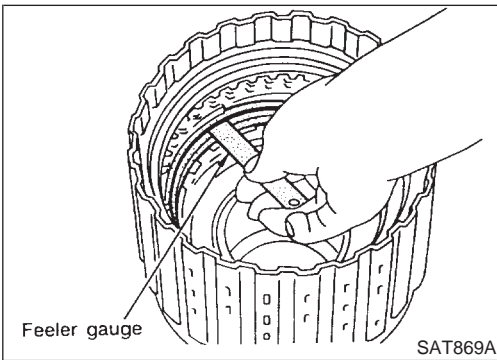
Forward and Overrun Clutches (Cont'd)



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



- b) 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**

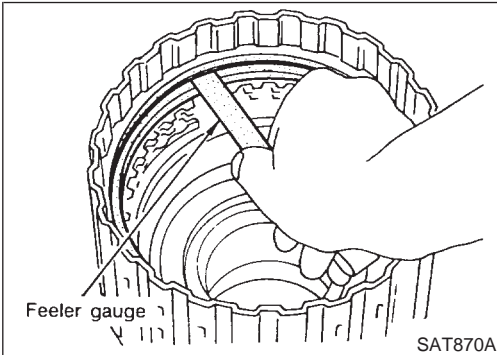
**1.0 - 1.4 mm (0.039 - 0.055 in)**

**Allowable limit**

**2.0 mm (0.079 in)**

**Retaining plate:**

**Refer to SDS, AT-359.**



- 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**

**Model 4EX16 (2WD)**

**2.15 mm (0.0846 in)**

**Model 4EX17, 4EX23 (4WD)**

**2.35 mm (0.0925 in)**

**Retaining plate:**

**Refer to SDS, AT-359.**

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# REPAIR FOR COMPONENT PARTS

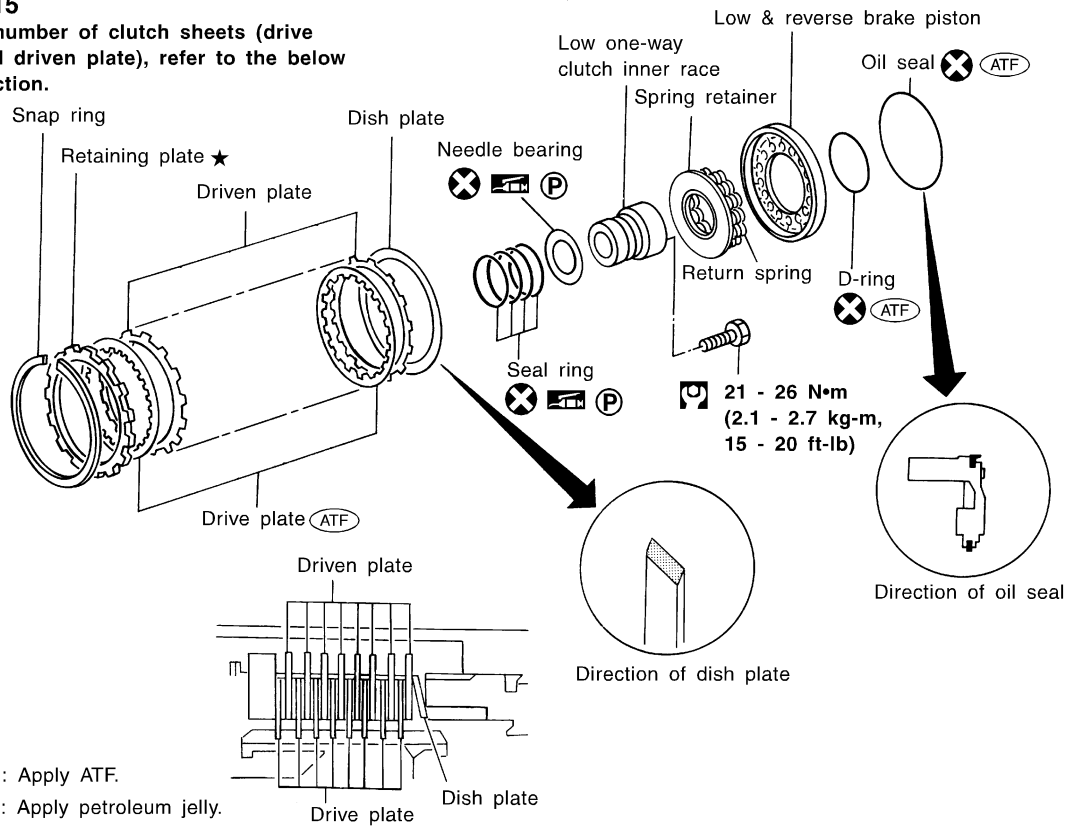
Low & Reverse Brake

## Low & Reverse Brake COMPONENTS

NBAT0136

### SEC. 315

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

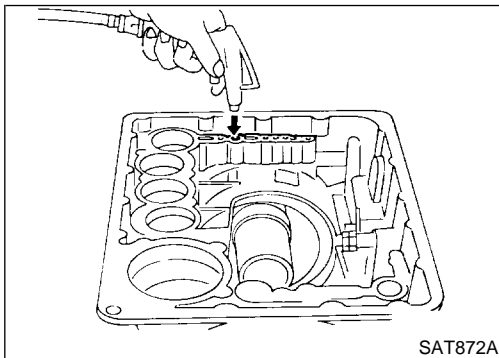


(ATF) : Apply ATF.

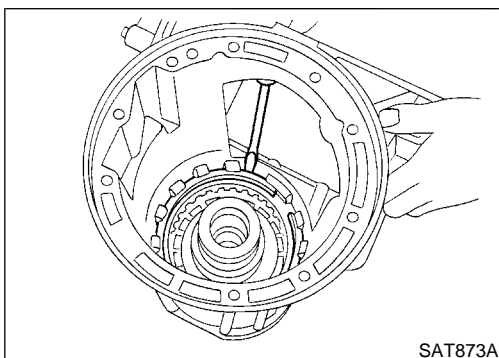
(P) : Apply petroleum jelly.

★ : Select with proper thickness.

SAT160K



SAT872A



SAT873A

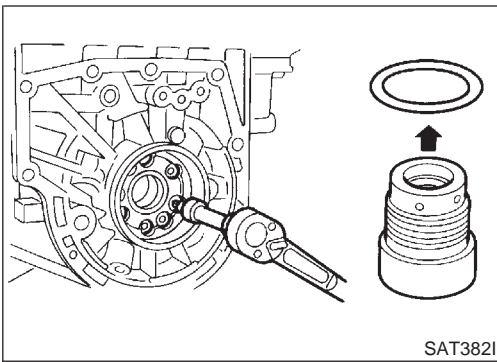
### DISASSEMBLY

NBAT0137

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.

# REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)



SAT382I

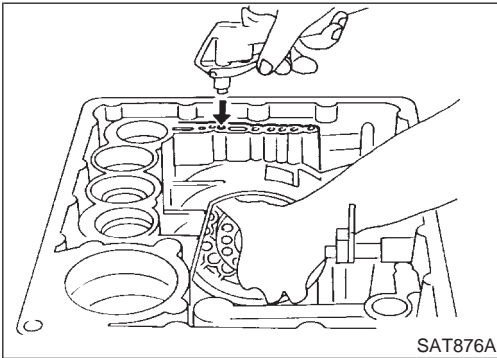
3. Remove low one-way clutch inner race, spring retainer and return spring from transmission case.
4. Remove seal rings from low one-way clutch inner race.
5. Remove needle bearing from low one-way clutch inner race.

GI

MA

EM

LC



SAT876A

6. Remove low and reverse brake piston using compressed air.
7. Remove oil seal and D-ring from piston.

EC

FE

AT

TF

## INSPECTION

### Low and Reverse Brake Snap Ring and Spring Retainer

NBAT0138

NBAT0138S01

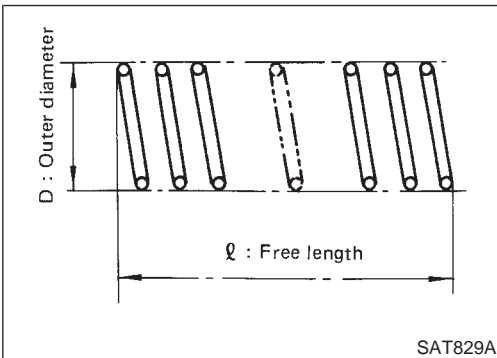
- Check for deformation, or damage.

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SAT829A

### Low and Reverse Brake Return Springs

NBAT0138S02

- Check for deformation or damage. Also measure free length and outside diameter.

**Inspection standard:**

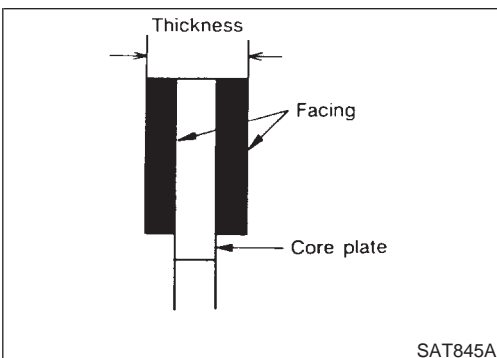
**Refer to SDS, AT-357.**

ST

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SAT845A

### Low and Reverse Brake Drive Plates

NBAT0138S03

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

**Thickness of drive plate:**

**Standard value**

**Model 4EX16 (2WD)**

**1.90 - 2.05 mm (0.075 - 0.081 in)**

**Model 4EX17, 4EX23 (4WD)**

**1.52 - 1.67 mm (0.0598 - 0.0657 in)**

**Wear limit**

SC

EL

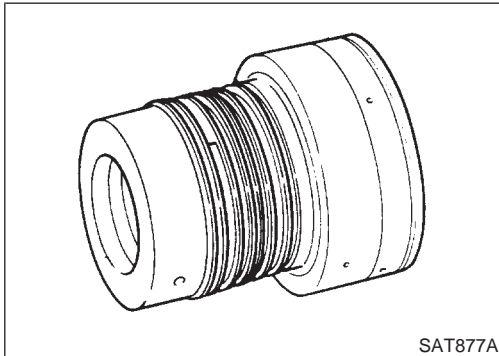
IDX

# REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)

**1.40 mm (0.0551 in)**

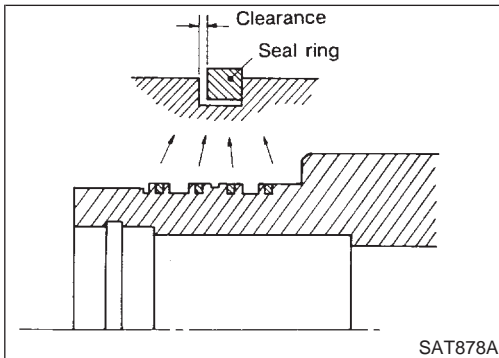
- If not within wear limit, replace.



## Low One-way Clutch Inner Race

NBAT0138S04

- Check frictional surface of inner race for wear or damage.



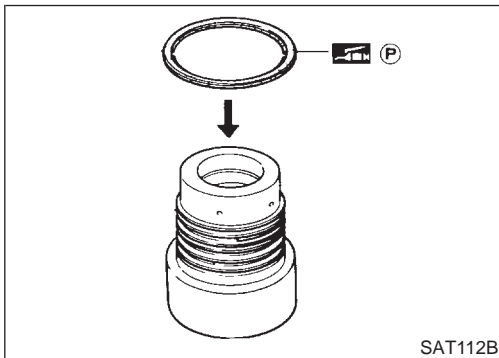
- Install a new seal rings onto low one-way clutch inner race.
- **Be careful not to expand seal ring gap excessively.**
- Measure seal ring-to-groove clearance.

### Inspection standard:

**Standard value: 0.10 - 0.25 mm (0.0039 - 0.0098 in)**

**Allowable limit: 0.25 mm (0.0098 in)**

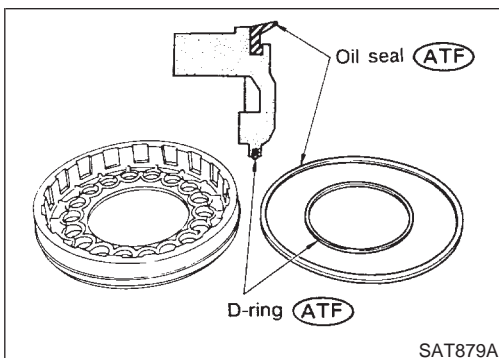
- If not within allowable limit, replace low one-way clutch inner race.



## ASSEMBLY

NBAT0139

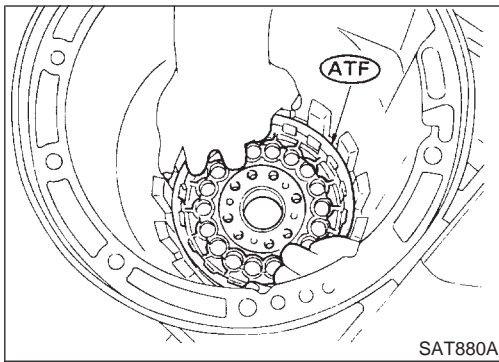
1. Install needle bearing onto one-way clutch inner race.
  - Pay attention to its direction — **Black surface goes to rear side.**
  - Apply petroleum jelly to needle bearing.



2. Install oil seal and D-ring onto piston.
  - **Apply ATF to oil seal and D-ring.**

# REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)



SAT880A

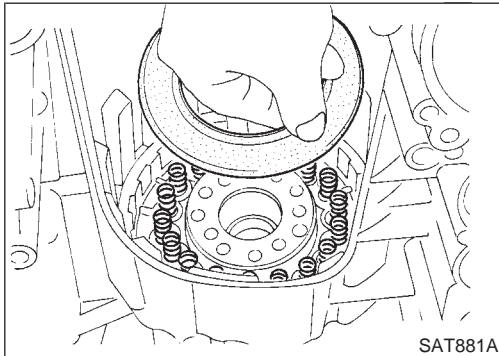
3. Install piston by rotating it slowly and evenly.
  - **Apply ATF to inner surface of transmission case.**

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SAT881A

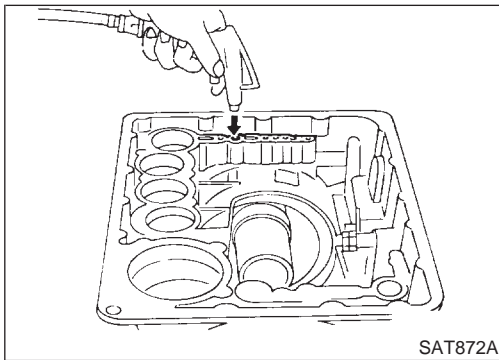
4. Install return springs, spring retainer and low one-way clutch inner race onto transmission case.
5. Install dish plate, low and reverse brake drive plates, driven plates and retaining plate.
6. Install snap ring on transmission case.

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**AT**

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SAT872A

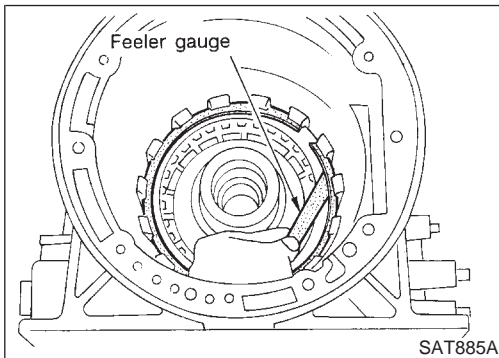
7. Check operation of low and reverse brake clutch piston. Refer to "DISASSEMBLY", AT-324.

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SAT885A

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

ST

**Specified clearance:**

**Standard**

**0.8 - 1.1 mm (0.031 - 0.043 in)**

**Allowable limit**

**2.7 mm (0.106 in)**

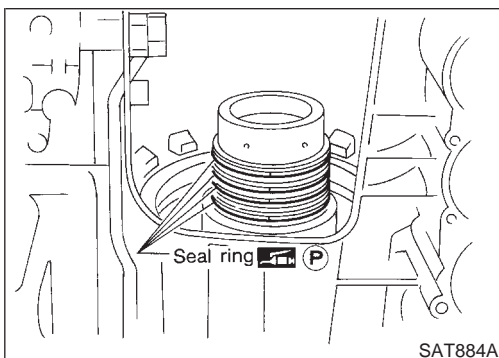
**Retaining plate:**

**Refer to SDS, AT-360.**

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SAT884A

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.**

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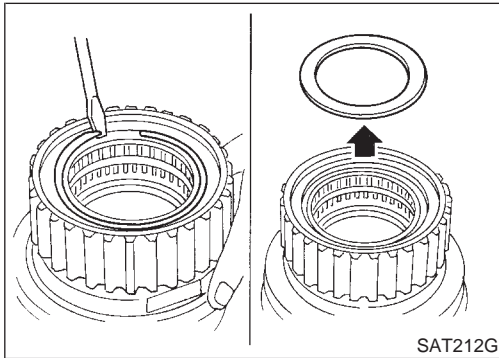
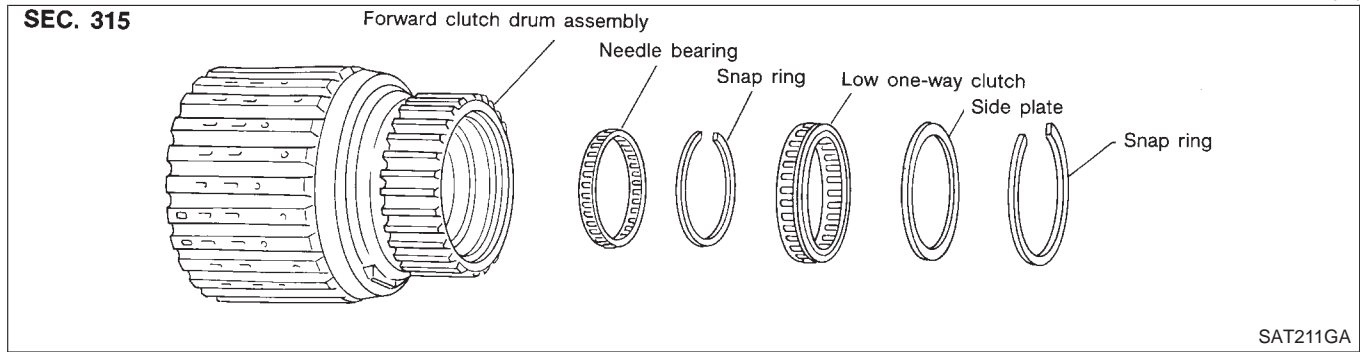
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# REPAIR FOR COMPONENT PARTS

Forward Clutch Drum Assembly

## Forward Clutch Drum Assembly COMPONENTS

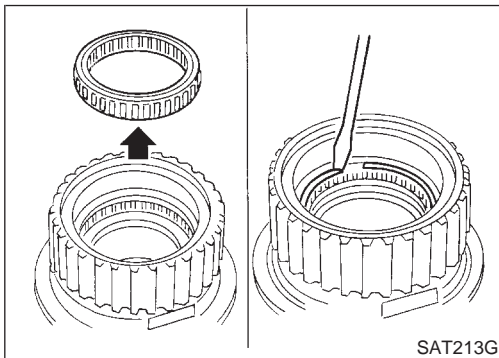
NBAT0140



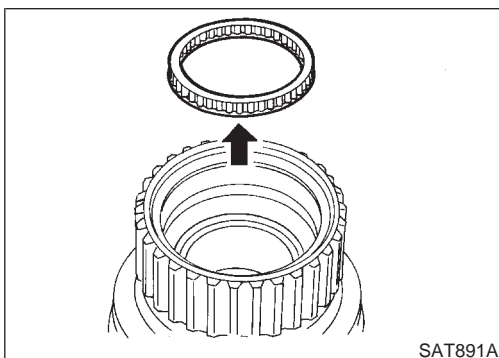
### DISASSEMBLY

NBAT0141

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.

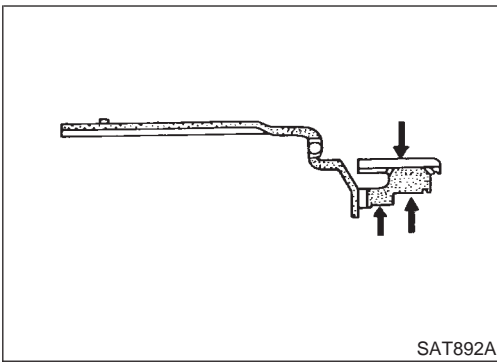


5. Remove needle bearing from forward clutch drum.



# REPAIR FOR COMPONENT PARTS

Forward Clutch Drum Assembly (Cont'd)



## INSPECTION

### Forward Clutch Drum

NBAT0142

NBAT0142S01

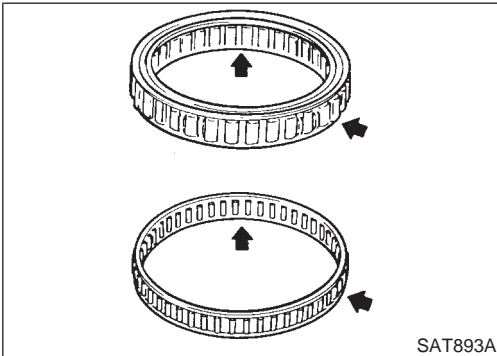
- Check spline portion for wear or damage.
- Check frictional surfaces of low one-way clutch and needle bearing for wear or damage.

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### Needle Bearing and Low One-way Clutch

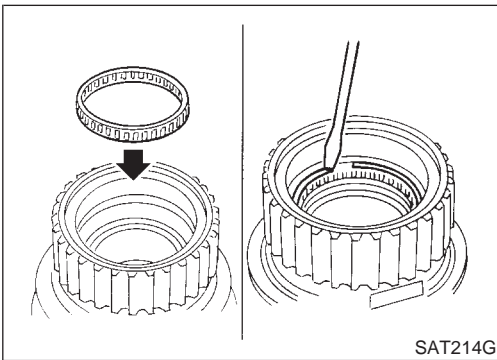
NBAT0142S02

- Check frictional surface for wear or damage.

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## ASSEMBLY

NBAT0143

1. Install needle bearing in forward clutch drum.
2. Install snap ring onto forward clutch drum.

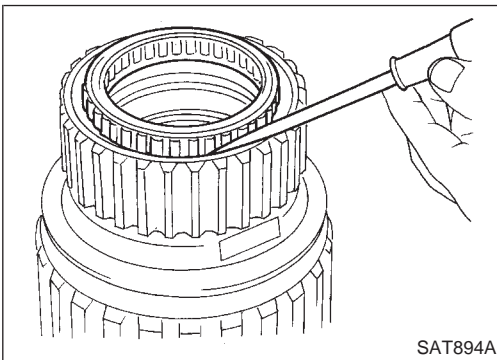
TF

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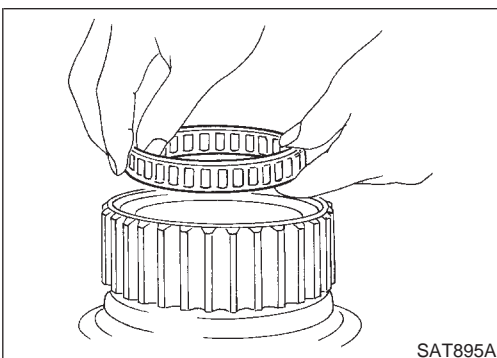
3. Install low one-way clutch onto forward clutch drum by pushing the roller in evenly.

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- Install low one-way clutch with flange facing rearward.

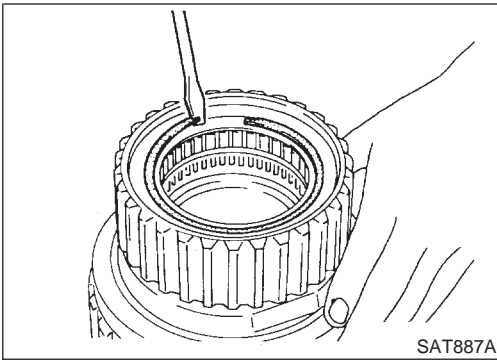
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# REPAIR FOR COMPONENT PARTS

## Forward Clutch Drum Assembly (Cont'd)

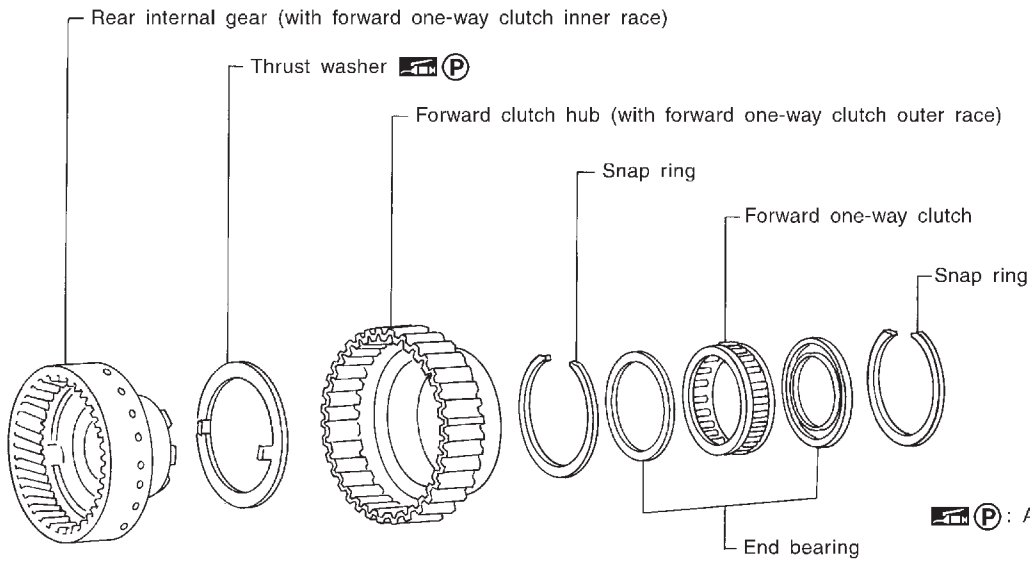


4. Install side plate onto forward clutch drum.
5. Install snap ring onto forward clutch drum.

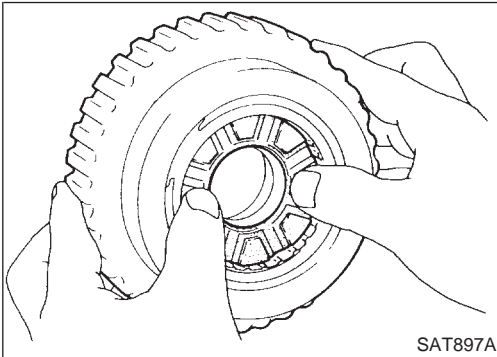
## Rear Internal Gear and Forward Clutch Hub COMPONENTS

NBAT0144

### SEC. 315



SAT896AA

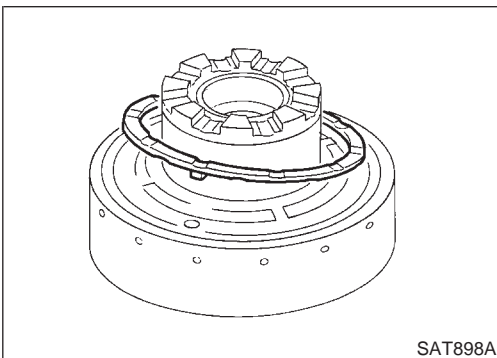


SAT897A

## DISASSEMBLY

NBAT0145

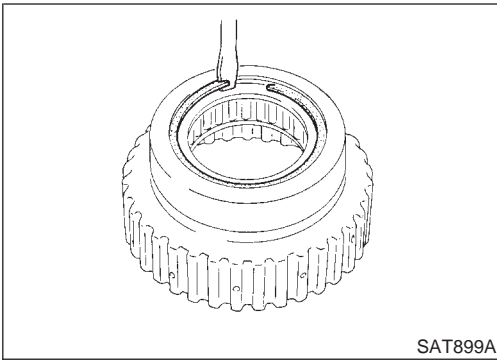
1. Remove rear internal gear by pushing forward clutch hub forward.
2. Remove thrust washer from rear internal gear.



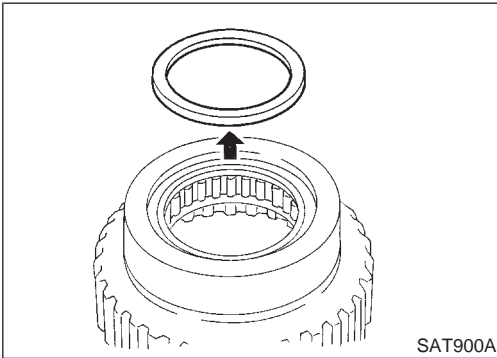
SAT898A

# REPAIR FOR COMPONENT PARTS

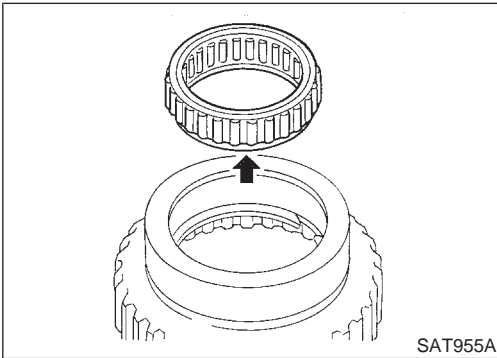
Rear Internal Gear and Forward Clutch Hub (Cont'd)



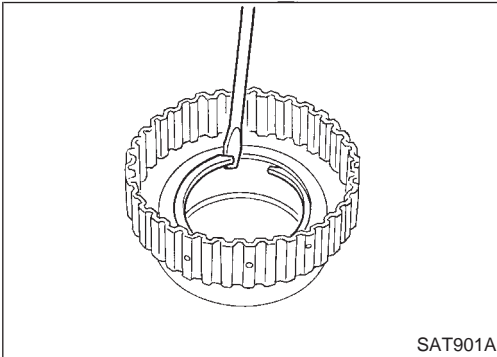
3. Remove snap ring from forward clutch hub.



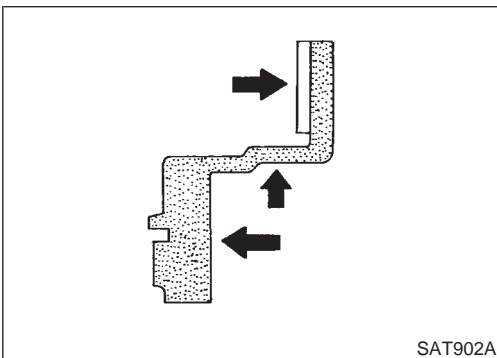
4. Remove end bearing.



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

### 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.

NBAT0146

NBAT0146S01

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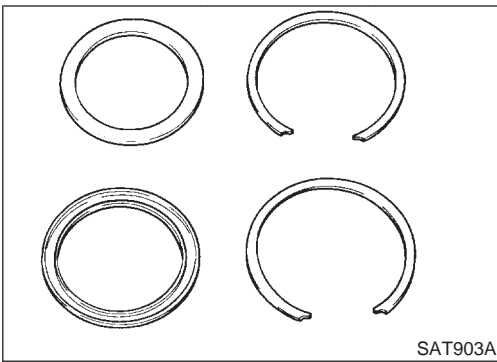
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# REPAIR FOR COMPONENT PARTS

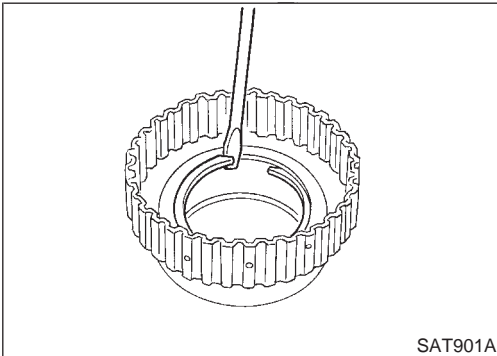
Rear Internal Gear and Forward Clutch Hub (Cont'd)



## Snap Ring and End Bearing

- Check for deformation or damage.

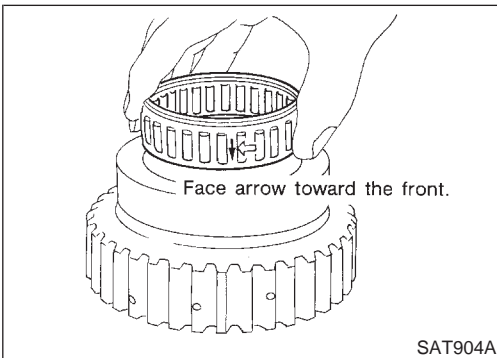
NBAT0146S02



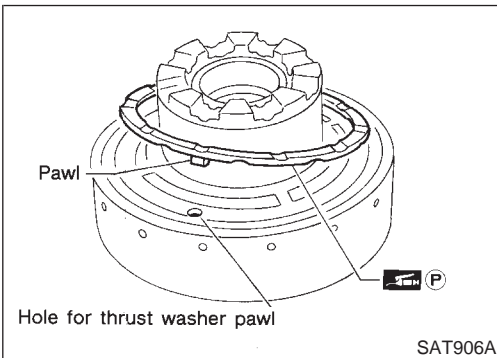
## ASSEMBLY

1. Install snap ring onto forward clutch hub.
2. Install end bearing.

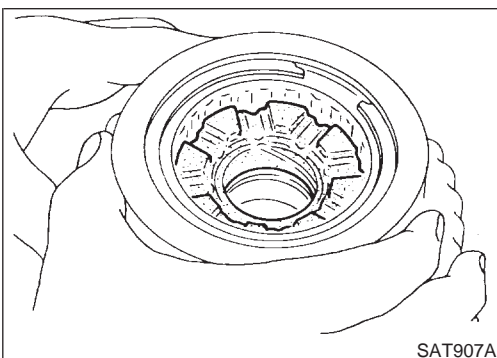
NBAT0147



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.



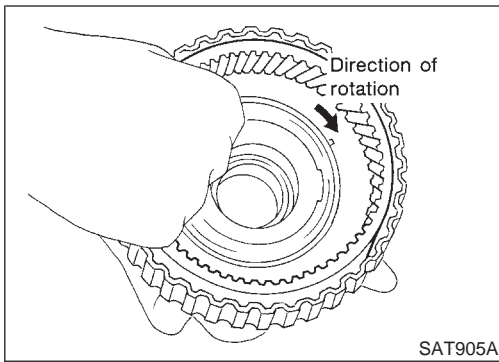
6. Install thrust washer onto rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Securely insert pawls of thrust washer into holes in rear internal gear.**



7. Position forward clutch hub in rear internal gear.

# REPAIR FOR COMPONENT PARTS

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



- After installing, check to assure that forward clutch hub rotates clockwise.

GI

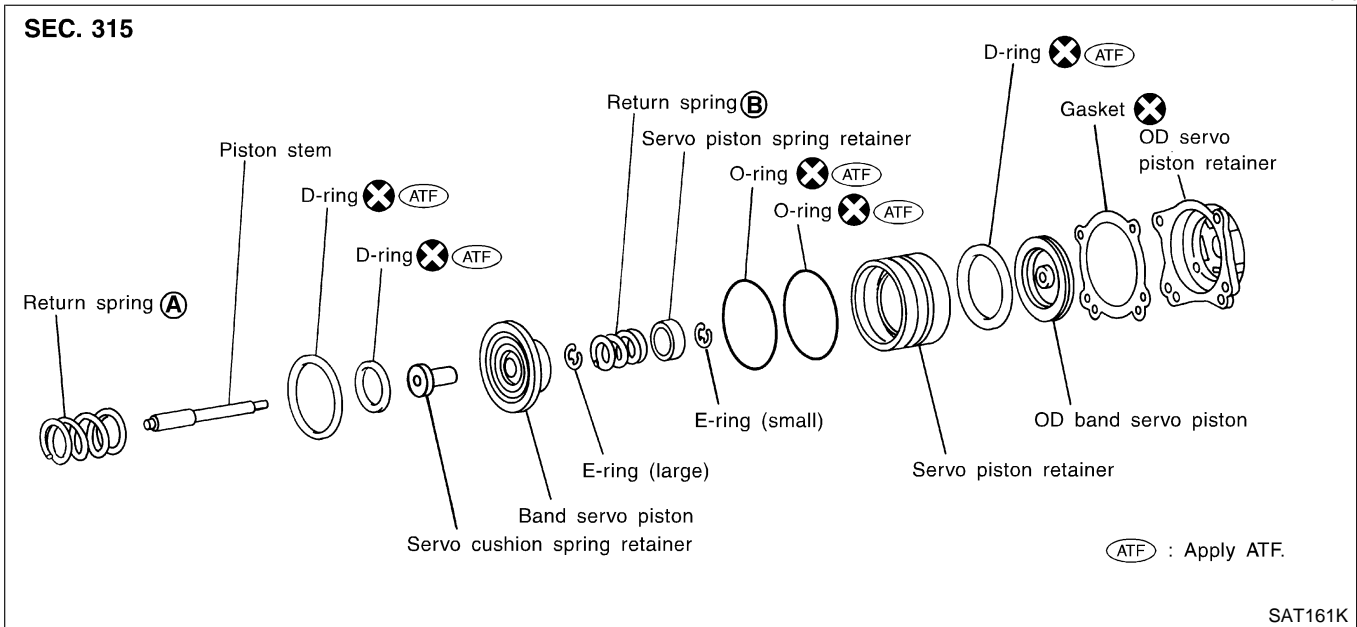
MA

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## Band Servo Piston Assembly COMPONENTS

NBAT0148



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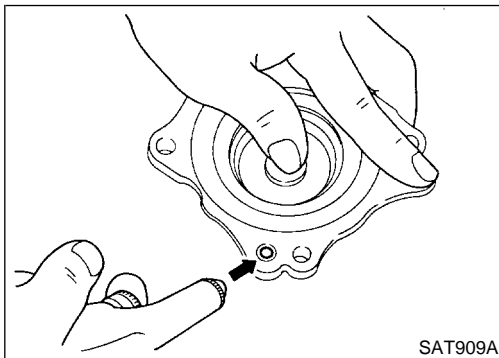
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## DISASSEMBLY

NBAT0149

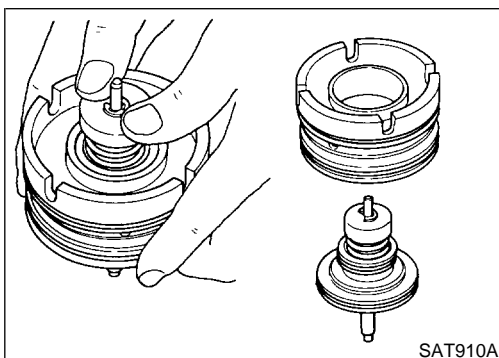
- Block one oil hole in OD servo piston retainer and the center hole in OD band servo piston.
- Apply compressed air to the other oil hole in piston retainer to remove OD band servo piston from retainer.
- Remove D-ring from OD band servo piston.

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

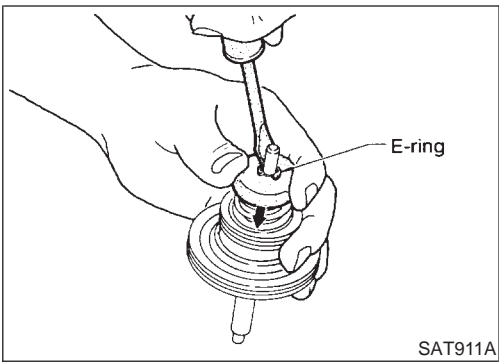
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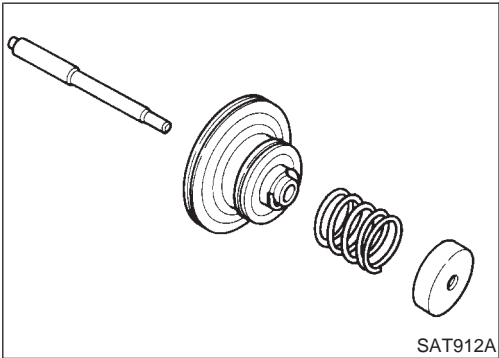
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# REPAIR FOR COMPONENT PARTS

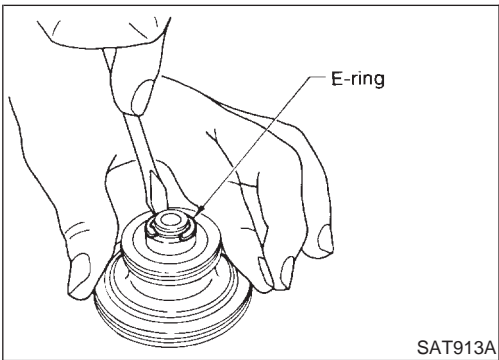
## Band Servo Piston Assembly (Cont'd)



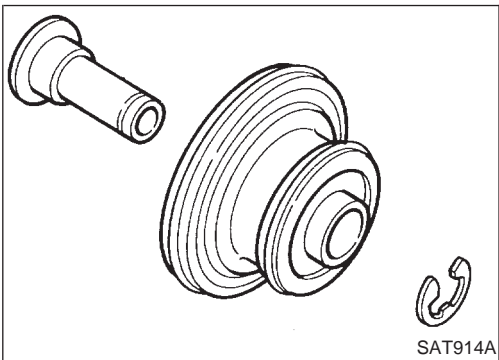
5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.



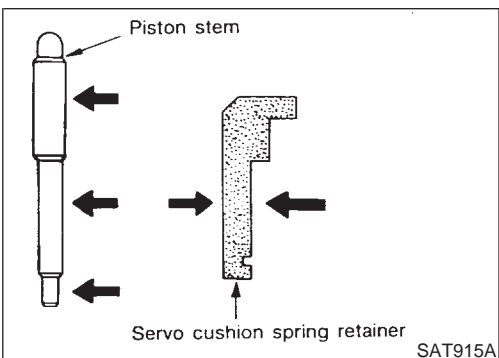
6. Remove servo piston spring retainer, return spring C and piston stem from band servo piston.



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

#### Pistons, Retainers and Piston Stem

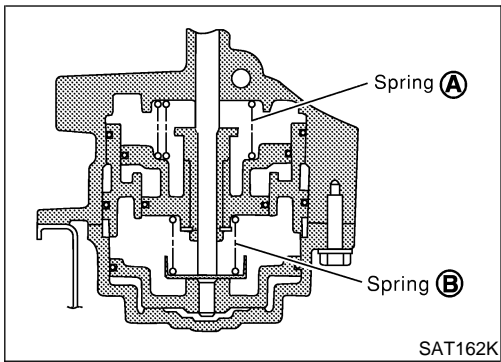
- Check frictional surfaces for abnormal wear or damage.

NBAT0150

NBAT0150S01

# REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)

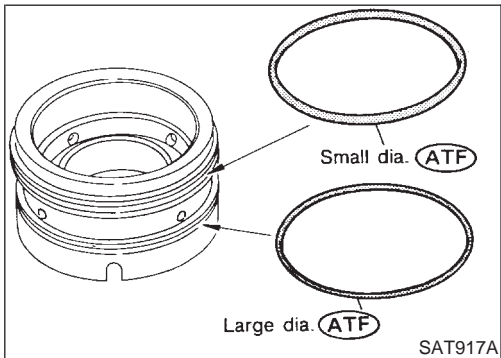


## Return Springs

- Check for deformation or damage. Measure free length and outer diameter. NBAT0150S02

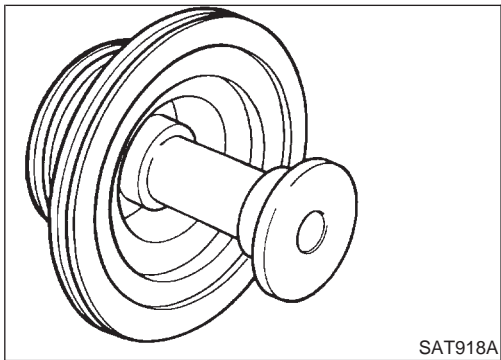
**Inspection standard:**

**Refer to SDS, AT-357.**

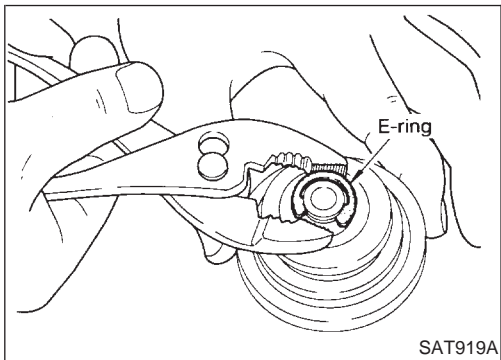


## ASSEMBLY

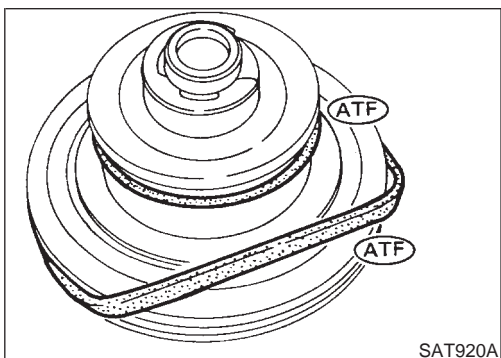
1. Install O-rings onto servo piston retainer. NBAT0151
  - **Apply ATF to O-rings.**
  - **Pay attention to position of each O-ring.**



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.**

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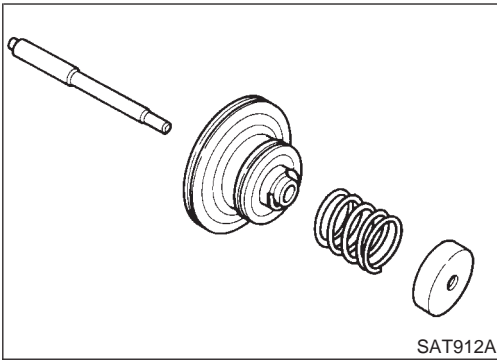
SC

EL

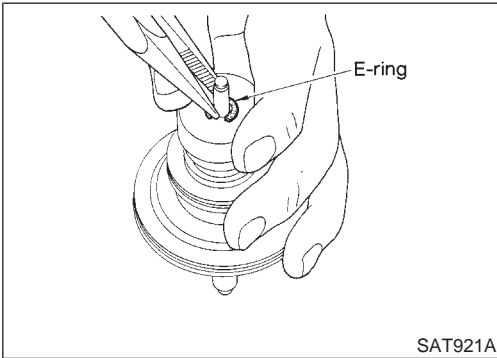
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# REPAIR FOR COMPONENT PARTS

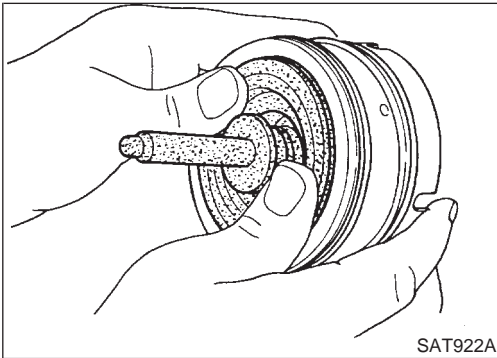
## Band Servo Piston Assembly (Cont'd)



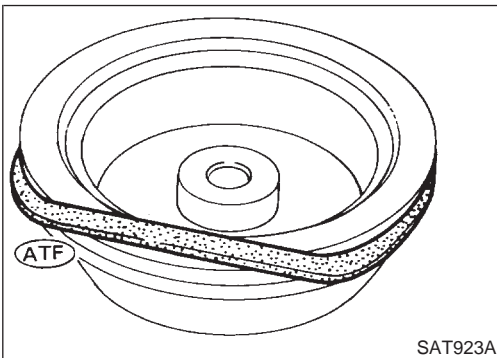
5. Install servo piston spring retainer, return spring C and piston stem onto band servo piston.



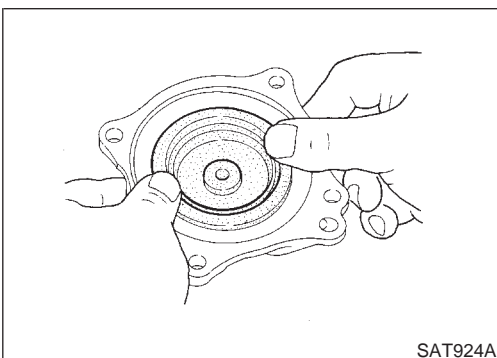
6. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



7. Install band servo piston assembly onto servo piston retainer by pushing it inward.



8. Install D-ring on OD band servo piston.
  - **Apply ATF to D-ring.**

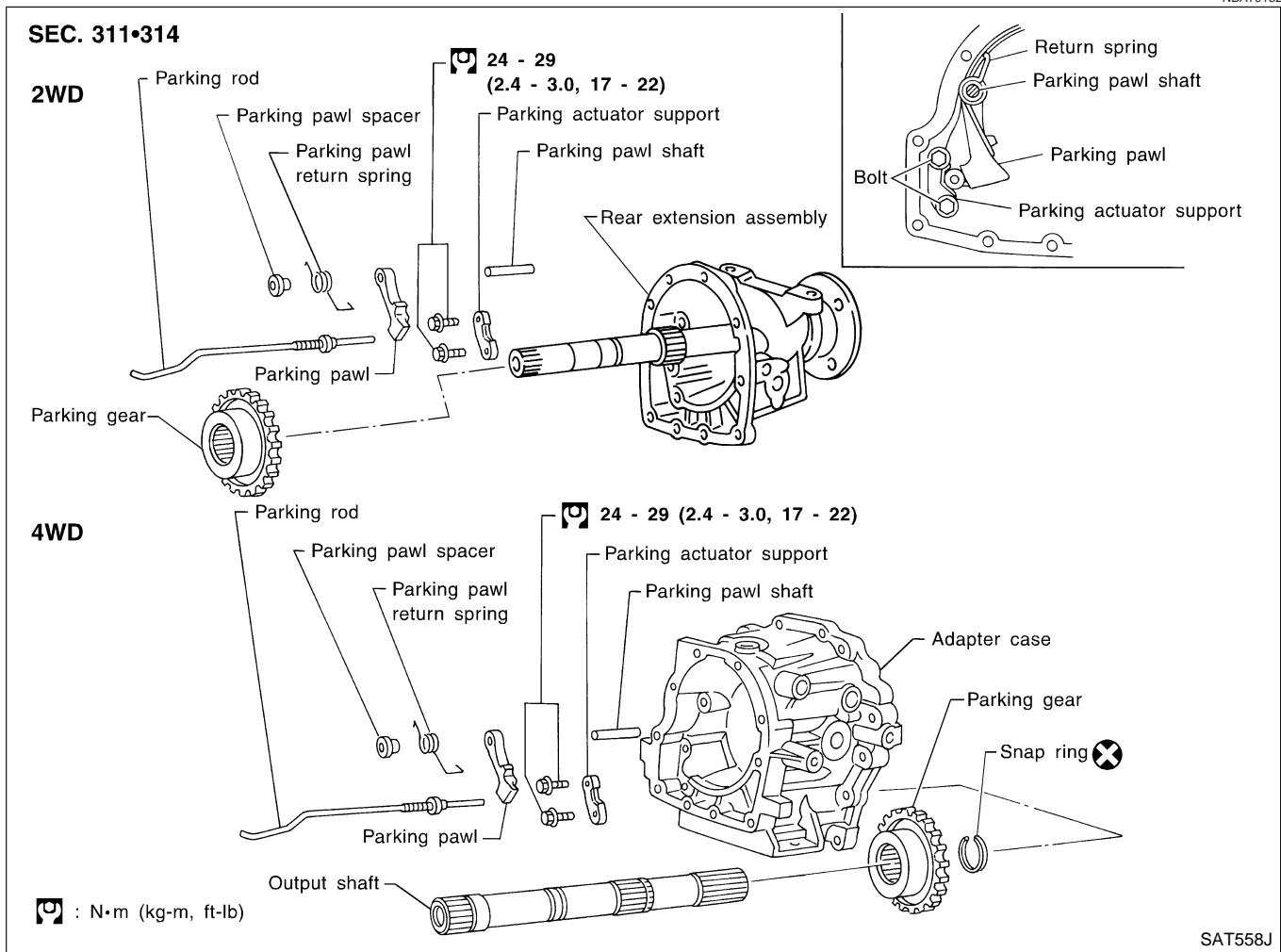


9. Install OD band servo piston onto servo piston retainer by pushing it inward.

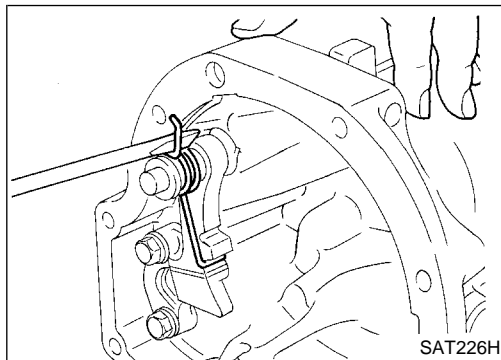


Parking Pawl Components  
COMPONENTS

NBAT0152



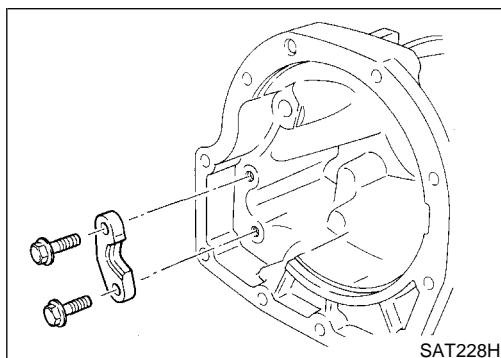
GI  
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**DISASSEMBLY**

NBAT0153

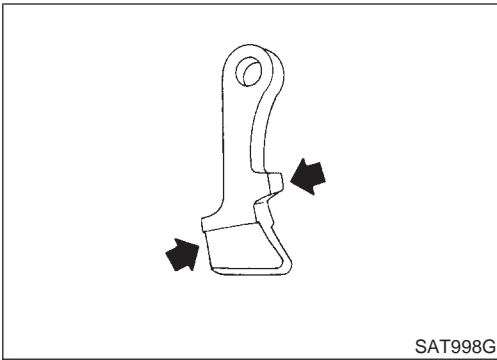
1. Slide return spring to the front of adapter case flange.
2. Remove return spring, parking pawl spacer and parking pawl from adapter case.
3. Remove parking pawl shaft from adapter case.



4. Remove parking actuator support from adapter case.

# REPAIR FOR COMPONENT PARTS

## Parking Pawl Components (Cont'd)



### INSPECTION

#### Parking Pawl and Parking Actuator Support

NBAT0209

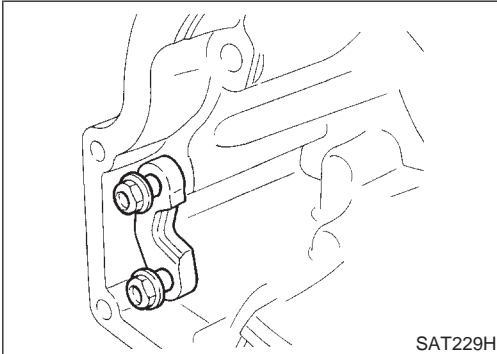
NBAT0209S01

- Check contact surface of parking rod for wear.

#### Rear Extension Assembly (2WD model only)

NBAT0209S02

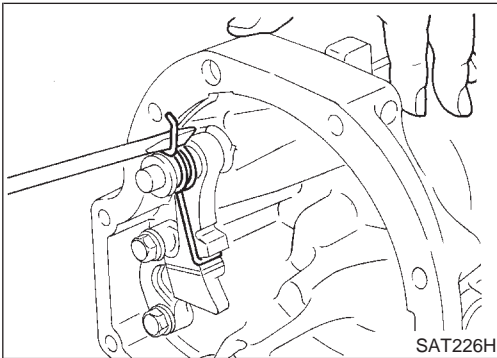
- Check for free play between companion flange and output shaft.
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- Check contact surface of output shaft for wear.



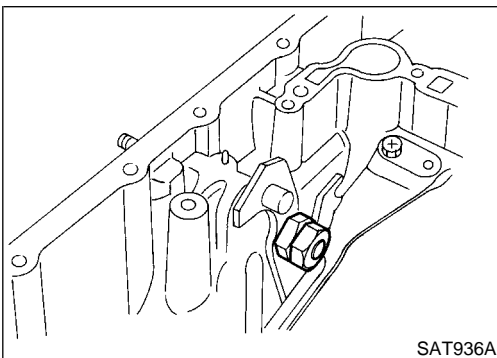
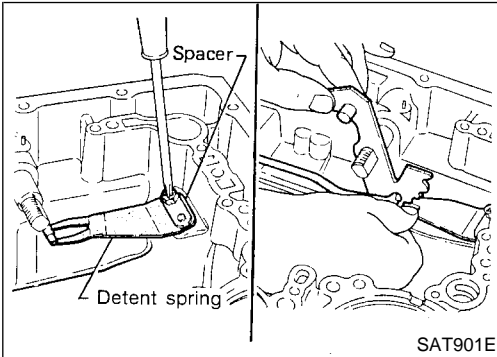
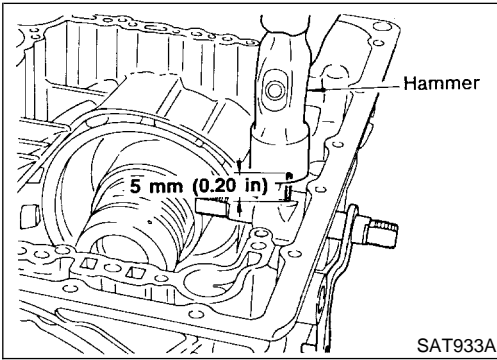
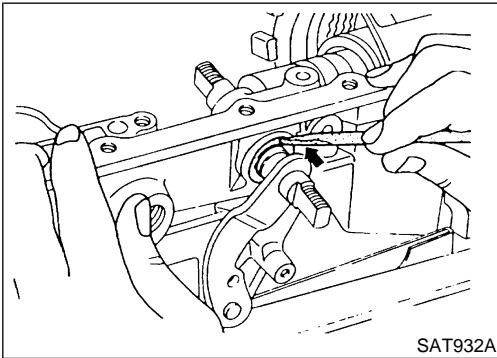
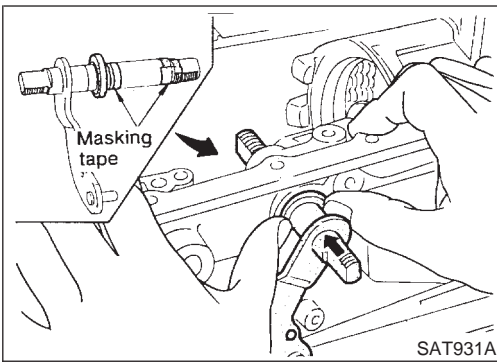
### ASSEMBLY

NBAT0154

1. Install parking actuator support onto adapter case.
2. Insert parking pawl shaft into adapter case.
3. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.



4. Bend return spring upward and install it onto adapter case.



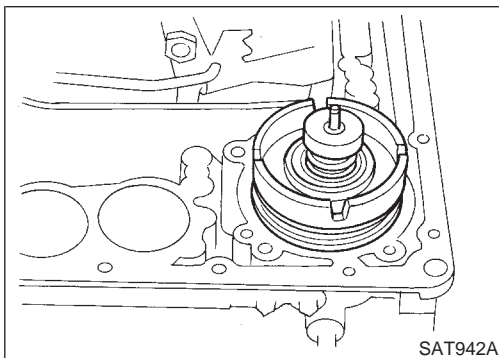
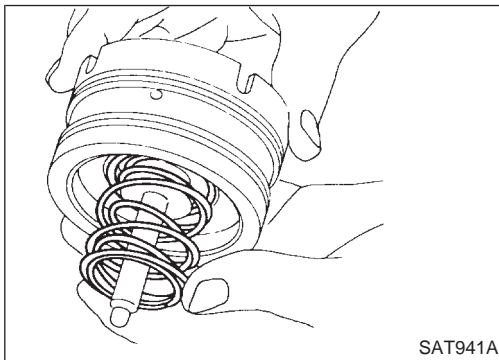
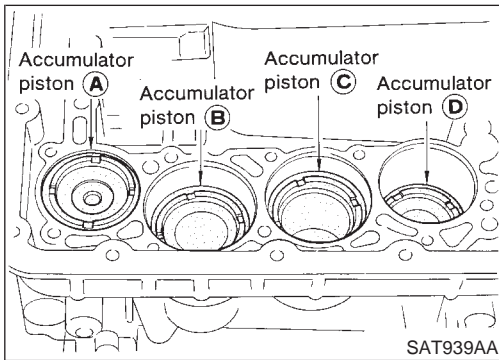
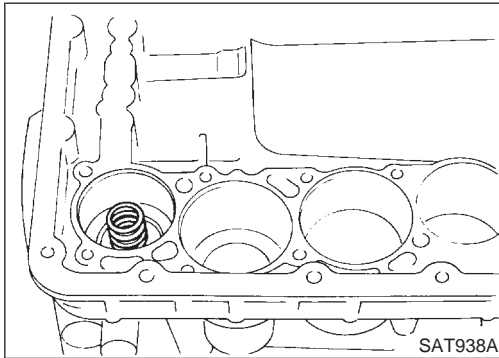
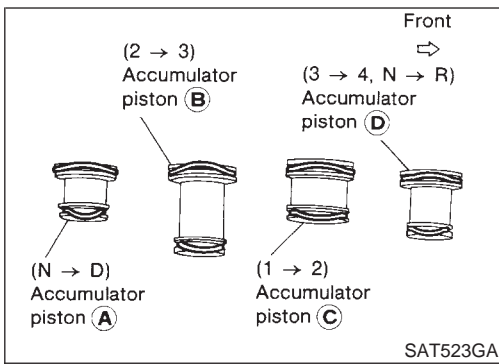
## Assembly (1)

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 retaining pin hole, then retaining 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.

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# ASSEMBLY

## Assembly (1) (Cont'd)



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 SDS, AT-357.**

- 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.

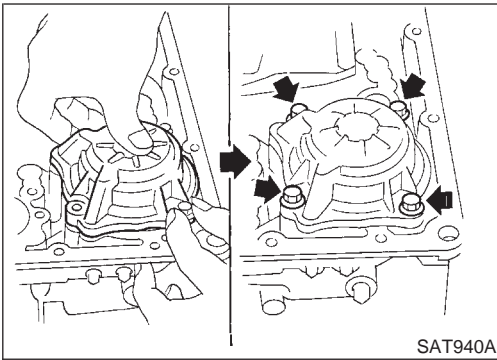
- b. Install band servo piston onto transmission case.

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

- c. Install gasket for band servo onto transmission case.

# ASSEMBLY

Assembly (1) (Cont'd)



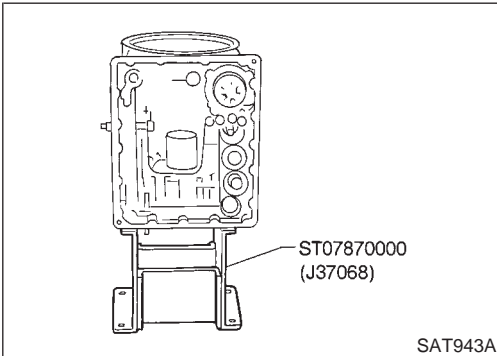
- d. Install band servo retainer onto transmission case.

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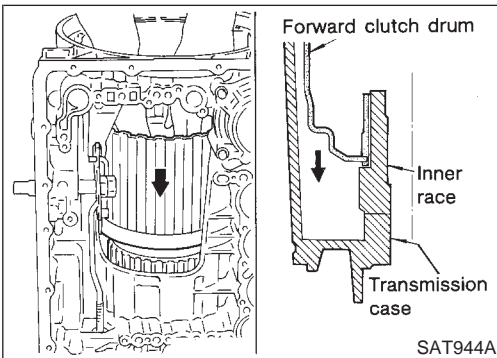
4. Install rear side clutch and gear components.  
a. Place transmission case in vertical position.

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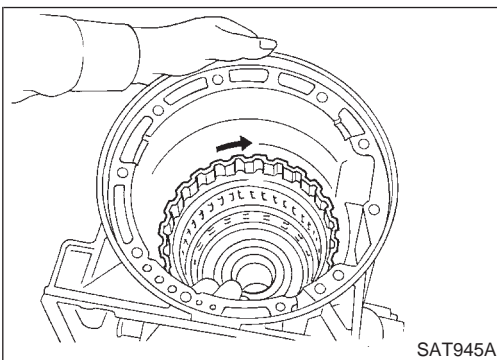
- b. Slightly lift forward clutch drum assembly. Then slowly rotate it clockwise until its hub passes fully over clutch inner race inside transmission case.

PD

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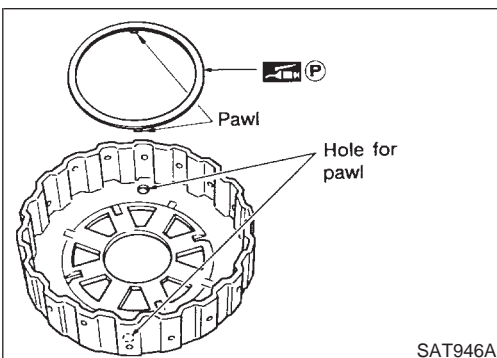
- c. Check to be sure that rotation direction of forward clutch assembly is correct.

ST

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- 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.

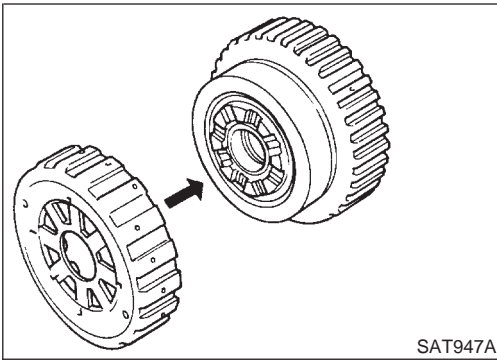
SC

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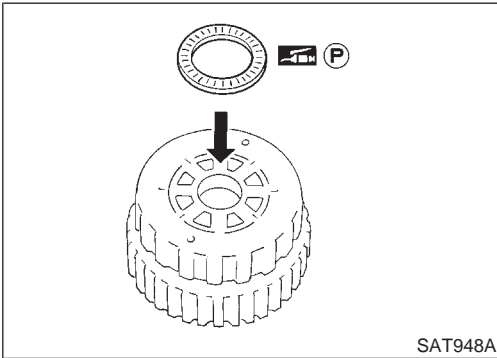
IDX

# ASSEMBLY

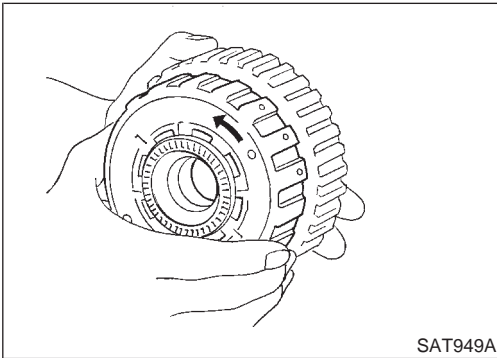
## Assembly (1) (Cont'd)



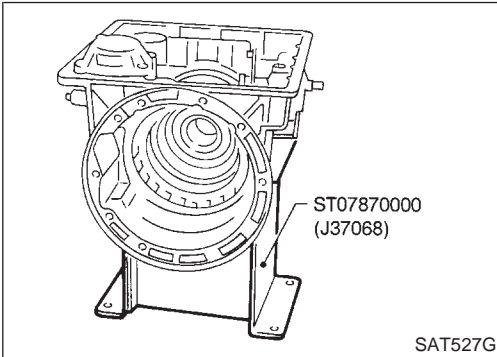
e. Install overrun clutch hub onto rear internal gear assembly.



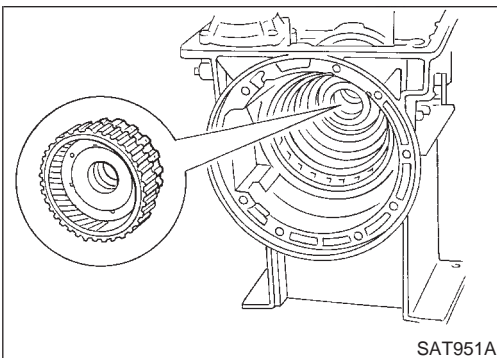
f. Install needle bearing onto rear of overrun clutch hub.  
● **Apply petroleum jelly to needle bearing.**



g. Check that overrun clutch hub rotates as shown while holding forward clutch hub.



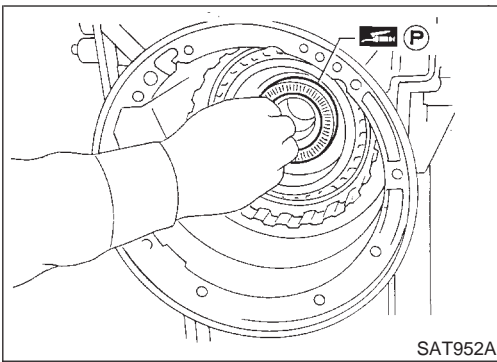
h. Place transmission case into horizontal position.



i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.

# ASSEMBLY

Assembly (1) (Cont'd)



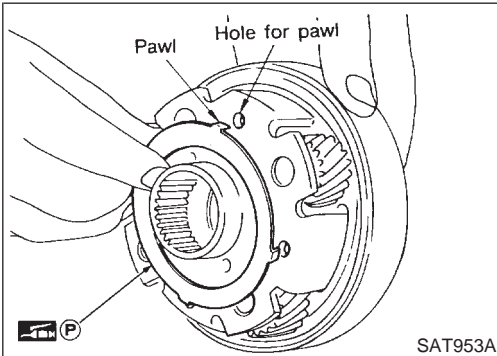
- j. Install needle bearing onto rear internal gear.
- **Apply petroleum jelly to needle bearing.**

GI

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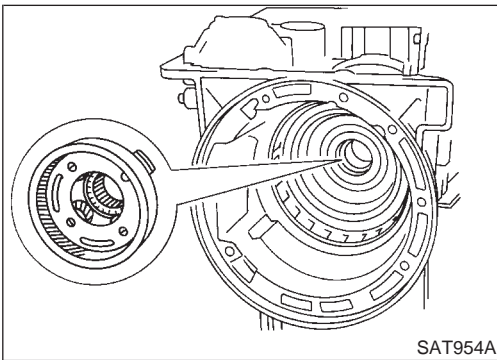


- k. Install bearing race onto rear of front internal gear.
- **Apply petroleum jelly to bearing race.**
  - **Securely engage pawls of bearing race with holes in front internal gear.**

EC

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- l. Install front internal gear on transmission case.

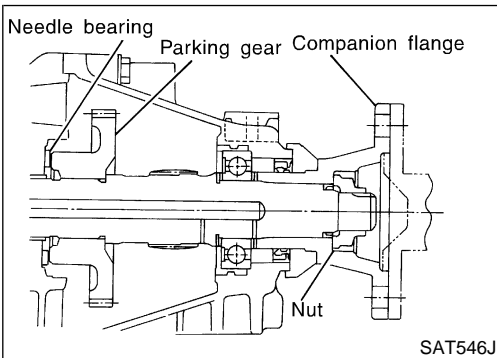
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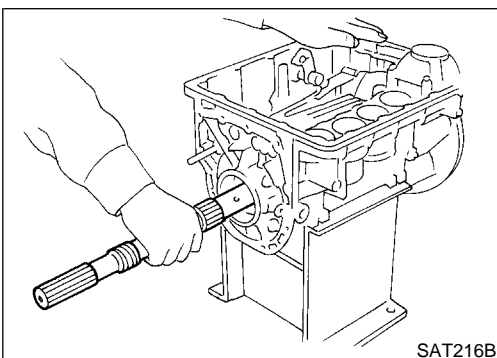
5. Install rear extension assembly on transmission case (2WD model only).
- Install revolution sensor on rear extension.
  - Install rear extension gasket on transmission case.
  - Install parking rod on transmission case.
  - Install parking gear and needle bearing.
- **Insert rear extension assembly into place while holding parking gear and needle bearing by hand.**

ST

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6. Install output shaft and parking gear (4WD model only).
- Insert output shaft from rear of transmission case while slightly lifting front internal gear.
- **Do not force output shaft against front of transmission case.**

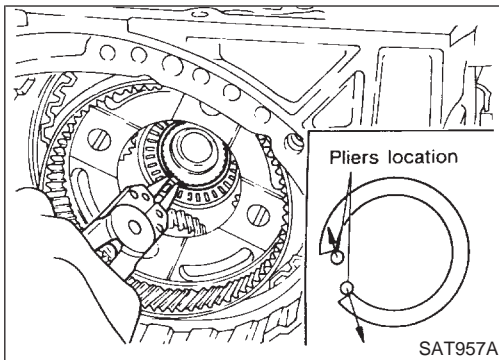
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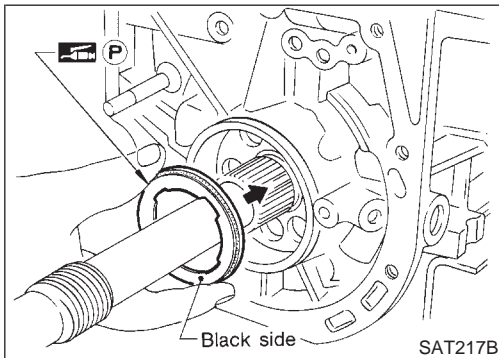
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# ASSEMBLY

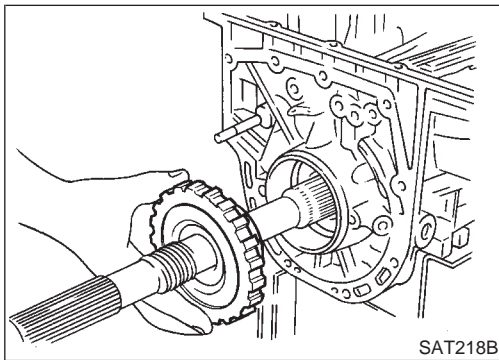
## Assembly (1) (Cont'd)



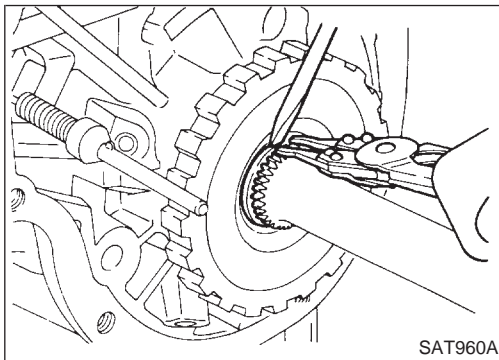
- b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.
- **Check to be sure output shaft cannot be removed in rear direction.**



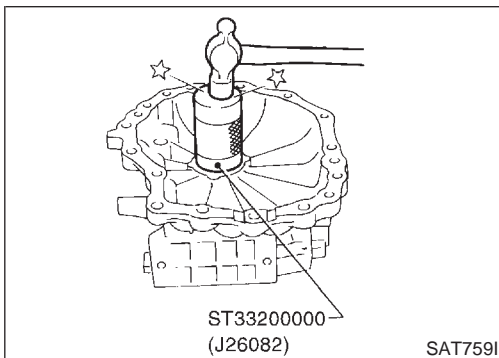
- c. Install needle bearing on transmission case.
- **Pay attention to its direction — Black side goes to rear.**
- **Apply petroleum jelly to needle bearing.**



- 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.**

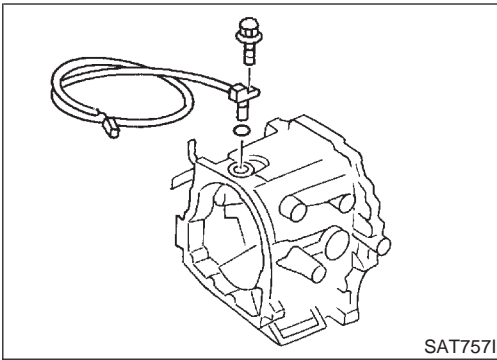


- 7. Install adapter case (4WD model only).
- a. Install oil seal on adapter case.
- **Apply ATF to oil seal.**



# ASSEMBLY

Assembly (1) (Cont'd)



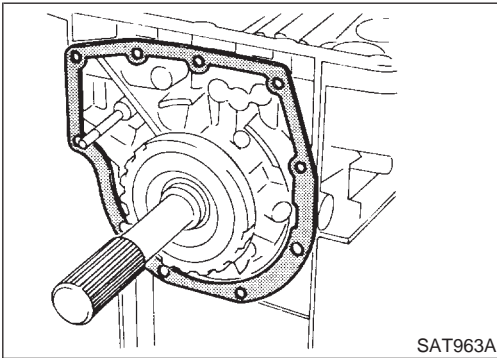
- b. Install O-ring on revolution sensor.
  - **Apply ATF to O-ring.**
- c. Install revolution sensor on adapter case.

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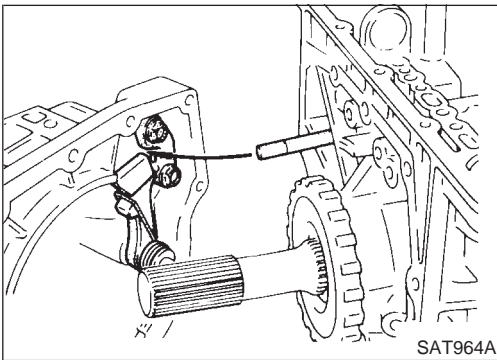
- d. Install adapter case gasket on transmission case.

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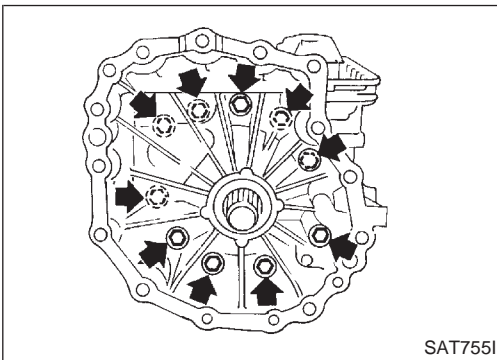
- e. Install parking rod on transmission case.

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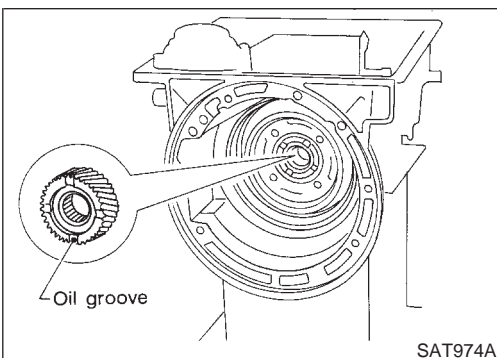
- f. Install adapter case on transmission case.

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- 8. Install front side clutch and gear components.
  - a. Install rear sun gear on transmission case.
    - **Pay attention to its direction.**

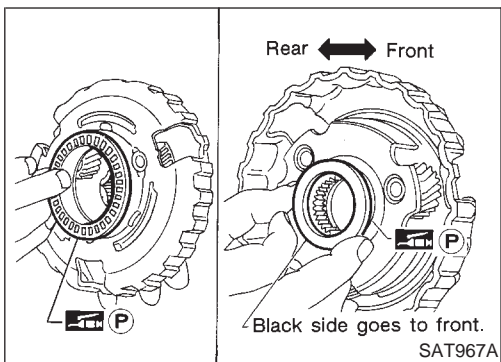
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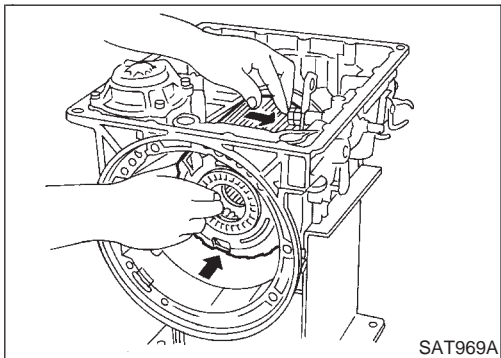
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# ASSEMBLY

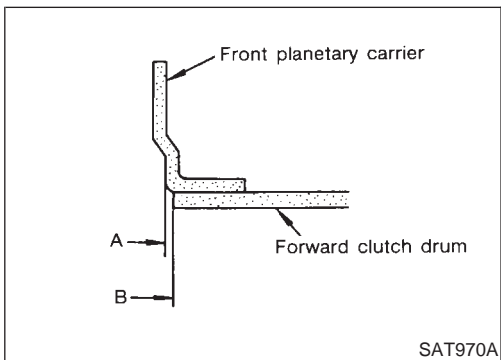
## Assembly (1) (Cont'd)



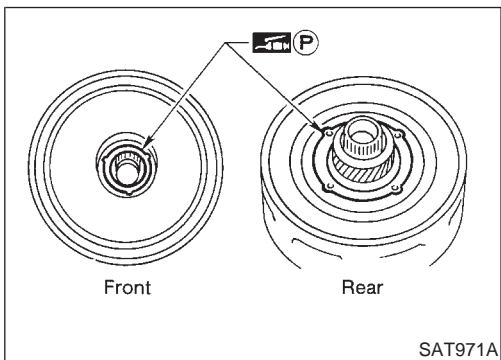
- b. Make sure needle bearing is on front of front planetary carrier.
  - **Apply petroleum jelly to needle bearing.**
- c. Make sure needle bearing is on rear of front planetary carrier.
  - **Apply petroleum jelly to bearing.**
  - **Pay attention to its direction — Black side goes to front.**



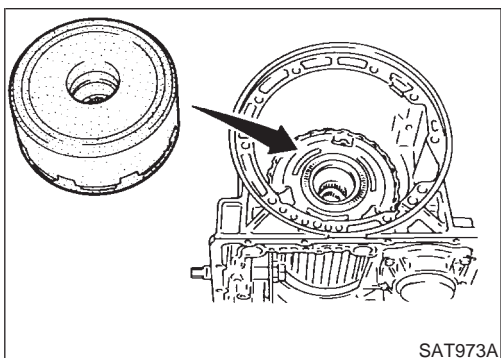
- d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.



- **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.**

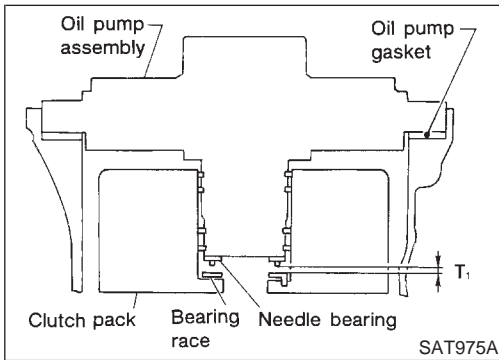


- f. Install clutch pack into transmission case.

## Adjustment

When any parts listed in the following table are replaced, total end play or reverse clutch end play must be adjusted. =NBAT0156

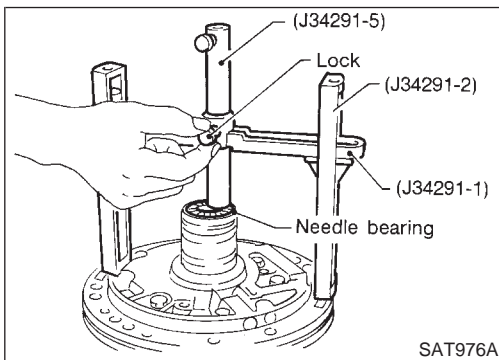
Part name	Total end play	Reverse clutch end play
Transmission case	•	•
Low one-way clutch inner race	•	•
Overrun clutch hub	•	•
Rear internal gear	•	•
Rear planetary carrier	•	•
Rear sun gear	•	•
Front planetary carrier	•	•
Front sun gear	•	•
High clutch hub	•	•
High clutch drum	•	•
Oil pump cover	•	•
Reverse clutch drum	—	•



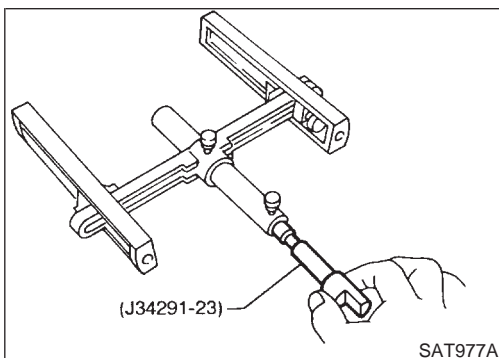
1. Adjust total end play.

**Total end play "T<sub>1</sub>":**

**0.25 - 0.55 mm (0.0098 - 0.0217 in)**



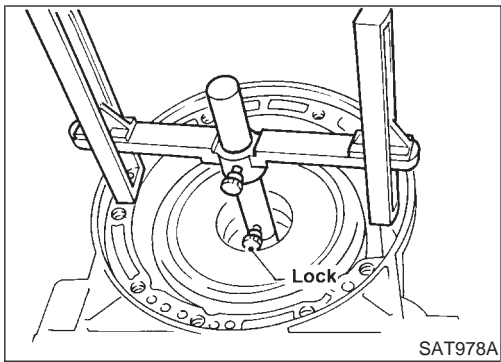
- a. With needle bearing installed, place J34291-1 (bridge), J34291-2 (legs) and the J34291-5 (gauging cylinder) onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly. The gauging cylinder should rest on top of the needle bearing. Lock gauging cylinder in place with set screw.



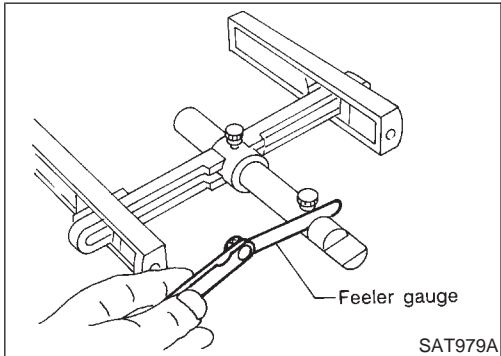
- b. Install J34291-23 (gauging plunger) into gauging cylinder.

# ASSEMBLY

## Adjustment (Cont'd)



- 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.

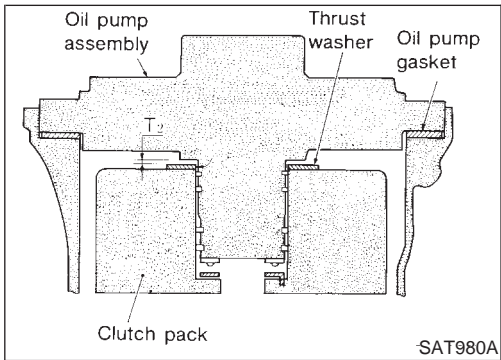
**Total end play "T<sub>1</sub>":**

**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:**

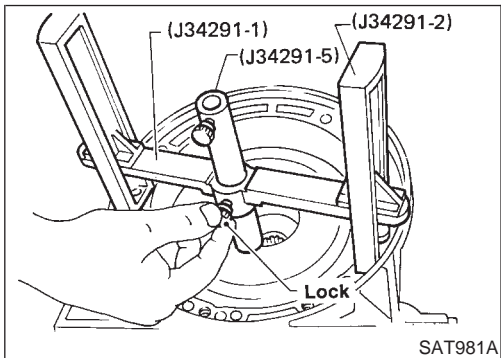
**Refer to SDS, AT-360.**



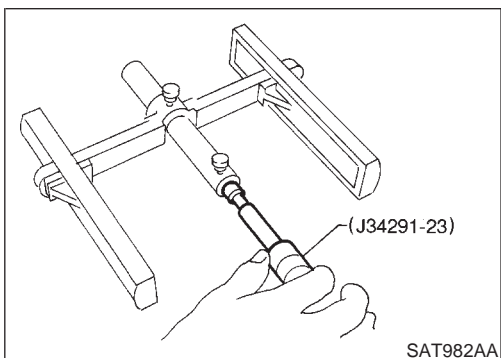
2. Adjust reverse clutch drum end play.

**Reverse clutch drum end play "T<sub>2</sub>":**

**0.55 - 0.90 mm (0.0217 - 0.0354 in)**



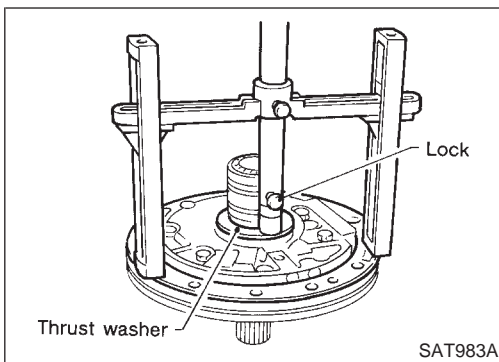
- a. Place J34291-1 (bridge), J34291-2 (legs) and J34291-5 (gauging cylinder) on machined surface of transmission case (no gasket). Allow gauging cylinder to rest on front thrust surface of reverse clutch drum. Lock cylinder in place with set screw.



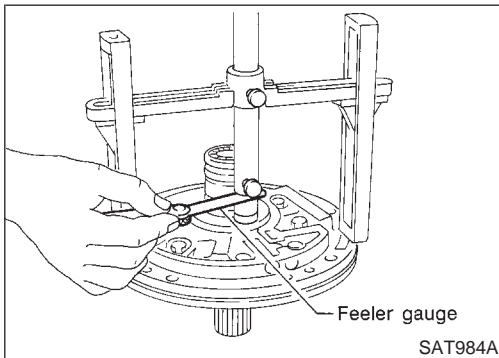
- b. Install J34291-23 (gauging plunger) into gauging cylinder.

# ASSEMBLY

Adjustment (Cont'd)



- 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.

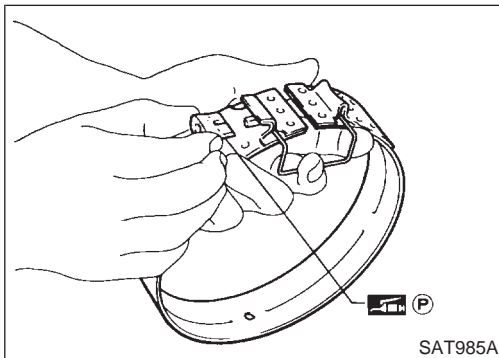


- d. Use feeler gauge to measure gap between gauging plunger and gauging cylinder. This measurement should give you exact reverse clutch drum end play.

**Reverse clutch drum end play "T<sub>2</sub>":  
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 SDS, AT-361.**

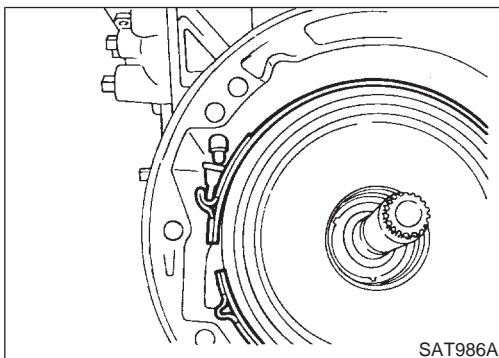


## Assembly (2)

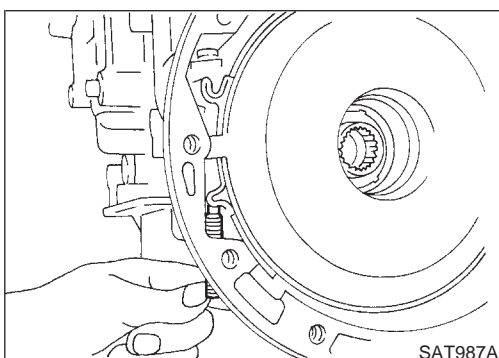
1. Install brake band and band strut.

- 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.

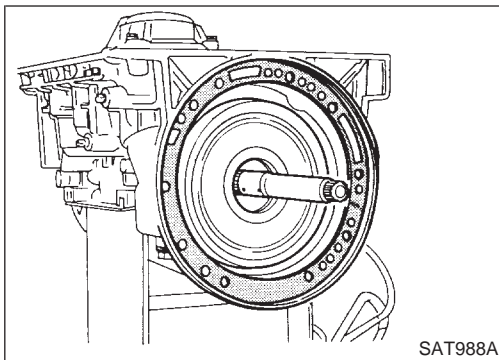


- c. Install anchor end bolt on transmission case. Then, tighten anchor end bolt just enough so that reverse clutch drum (clutch pack) will not tilt forward.

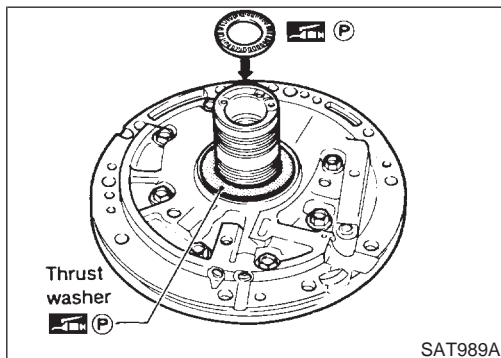
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## ASSEMBLY

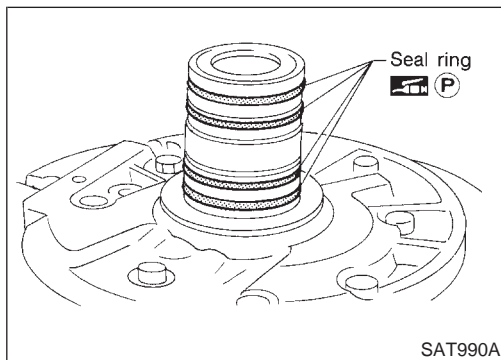
### Assembly (2) (Cont'd)



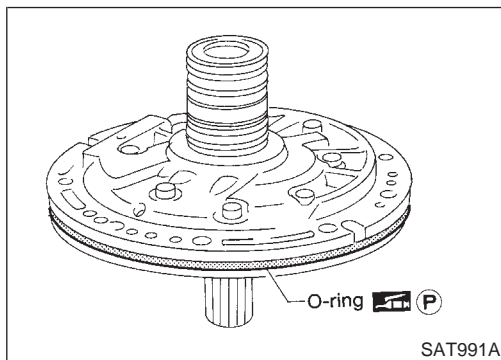
2. Install input shaft on transmission case.
  - **Pay attention to its direction — O-ring groove side is front.**
3. Install gasket on transmission case.



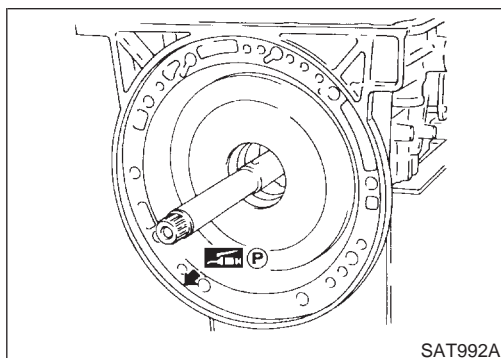
4. Install oil pump assembly.
  - a. Install needle bearing on oil pump assembly.
    - **Apply petroleum jelly to the needle bearing.**
  - b. Install selected thrust washer on oil pump assembly.
    - **Apply petroleum jelly to thrust washer.**



- c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit.



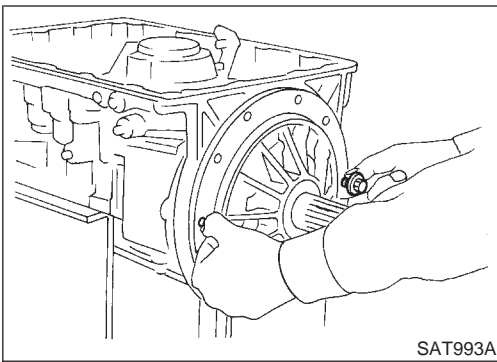
- d. Install O-ring on oil pump assembly.
  - **Apply petroleum jelly to O-ring.**



- e. Apply petroleum jelly to mating surface of transmission case and oil pump assembly.

# ASSEMBLY

Assembly (2) (Cont'd)



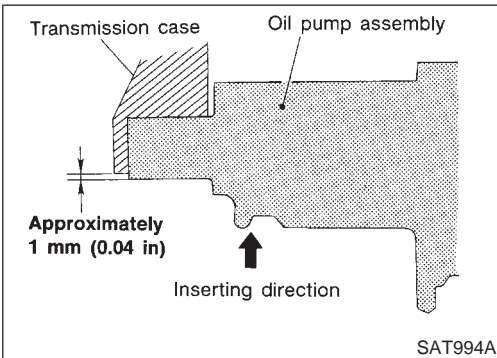
- f. Install oil pump assembly.
  - Install two converter housing securing bolts in bolt holes in oil pump assembly as guides.

GI

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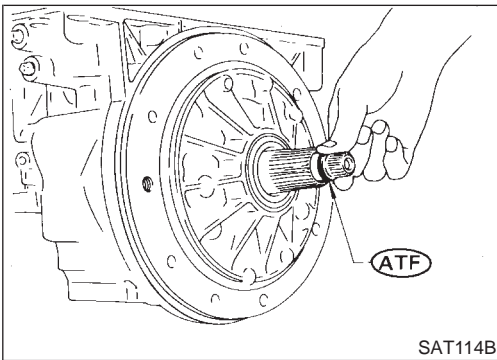


- Insert oil pump assembly to the specified position in transmission, as shown at left.

EC

FE

AT



- 5. Install O-ring on input shaft.
  - Apply ATF to O-rings.

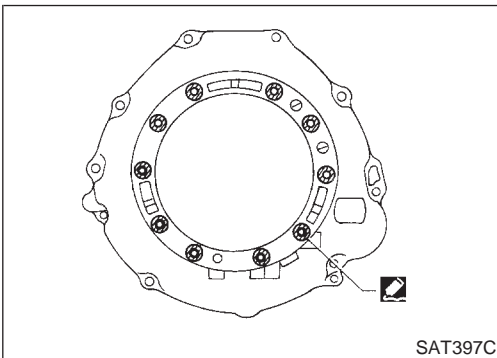
TF

PD

AX

SU

BR



- 6. Install converter housing.
  - a. Apply recommended sealant (Genuine anaerobic liquid gasket, Three Bond TB1215, Loctite Part No. 51813 or equivalent) to outer periphery of bolt holes in converter housing.

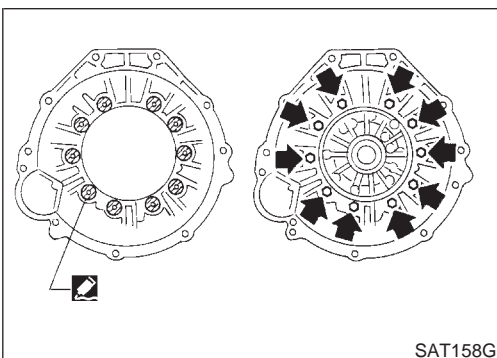
ST

RS

- Do not apply too much sealant.

BT

HA



- b. Apply recommended sealant (Genuine anaerobic liquid gasket, Three Bond TB1215, Loctite Part No. 51813 or equivalent) to seating surfaces of bolts that secure front of converter housing.

SC

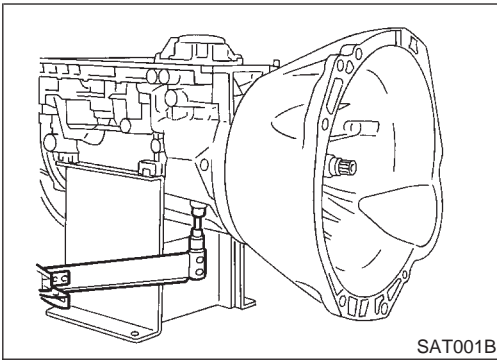
EL


- c. Install converter housing on transmission case.

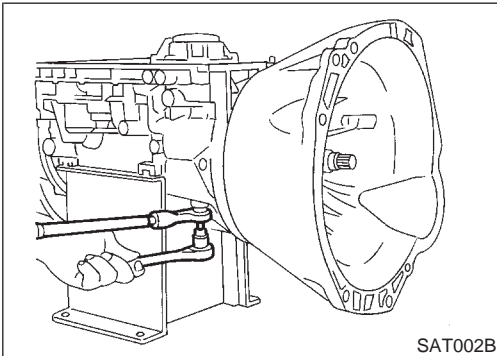
IDX


# ASSEMBLY

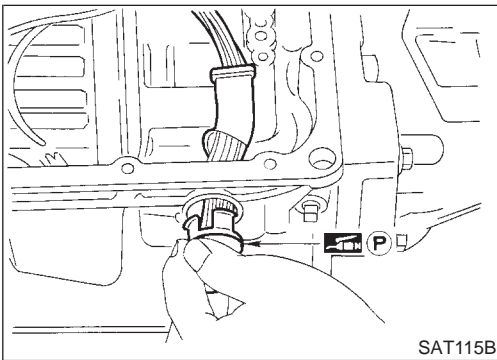
## Assembly (2) (Cont'd)



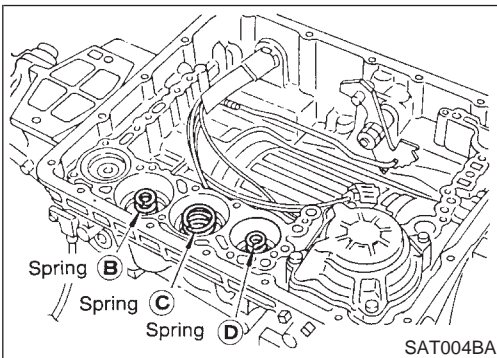
7. Install turbine revolution sensor.
8. Adjust brake band.
  - a. Tighten anchor end bolt to specified torque.  
**Anchor end bolt:**  
 : 4 - 6 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)
  - b. Back off anchor end bolt two and a half turns.



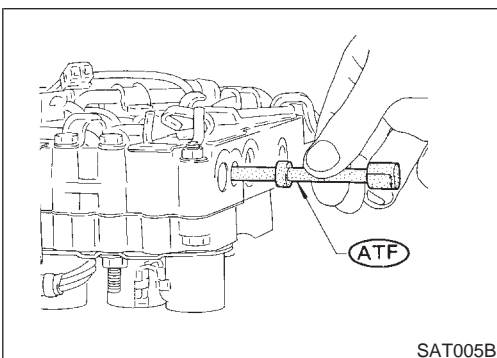
- c. While holding anchor end bolt, tighten lock nut.  
**Anchor end bolt nut:**  
 : 41 - 50 N·m (4.1 - 5.2 kg-m, 30 - 37 ft-lb)



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 SDS, AT-357.**

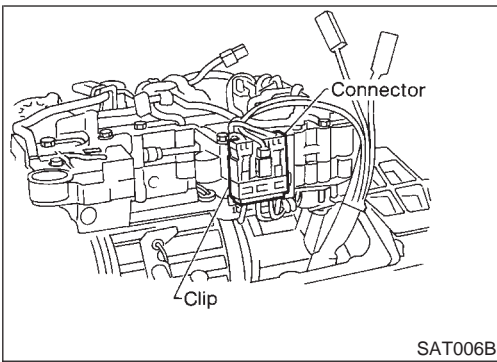


- b. Install manual valve on control valve.
      - **Apply ATF to manual valve.**



# ASSEMBLY

Assembly (2) (Cont'd)



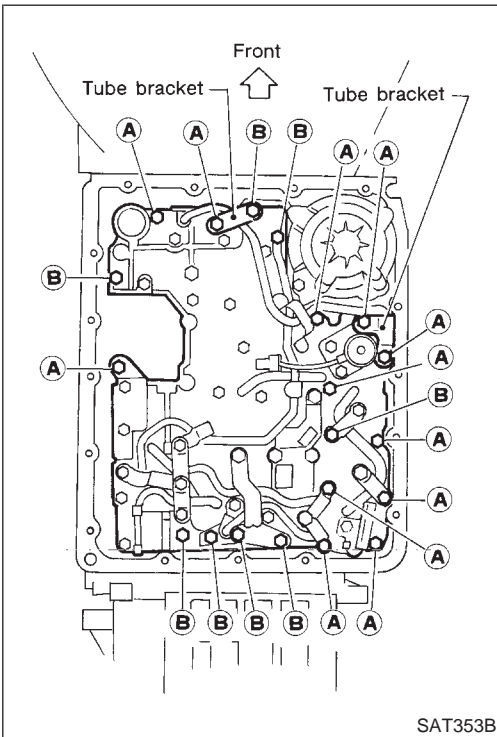
- c. Place control valve assembly on transmission case. Connect solenoid connector for upper body.
- d. Install connector clip.

GI

MA


EM

LC



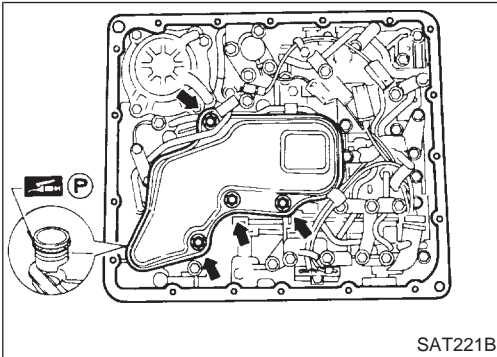
- e. Install control valve assembly on transmission case.
- f. Install connector tube brackets and tighten bolts A and B.
- **Check that terminal assembly does not catch.**

EC

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

FE

**AT**



- g. Install O-ring on oil strainer.
- **Apply petroleum jelly to O-ring.**
- h. Install oil strainer on control valve.

TF

PD

AX

SU

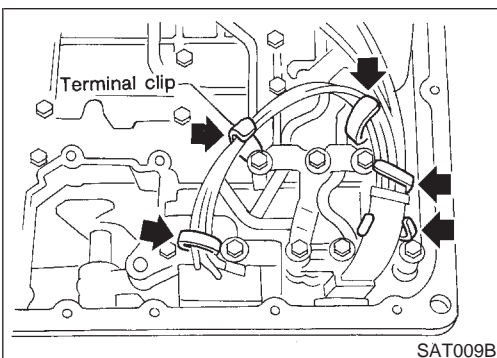
BR

ST

RS

BT

HA



- i. Securely fasten terminal harness with clips.

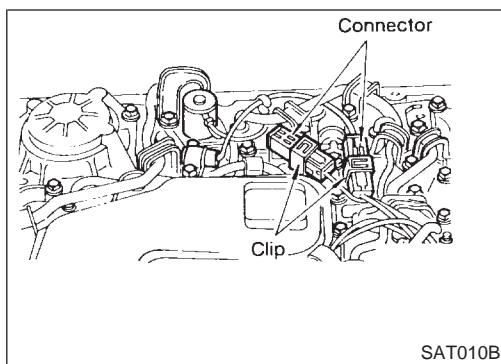
SC

EL

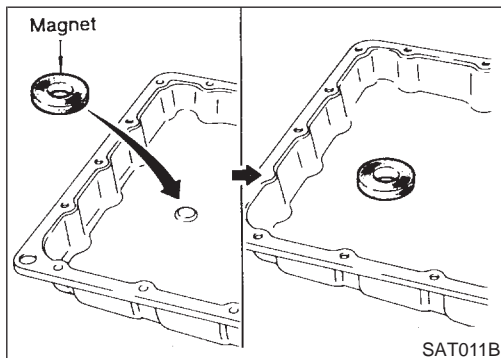
IDX

# ASSEMBLY

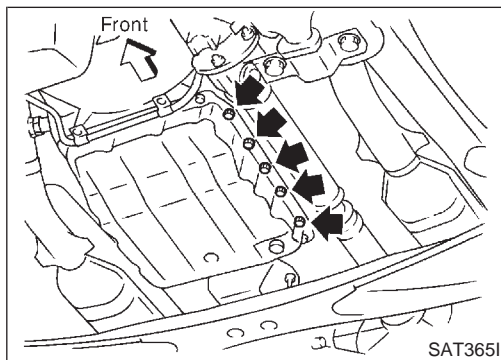
## Assembly (2) (Cont'd)



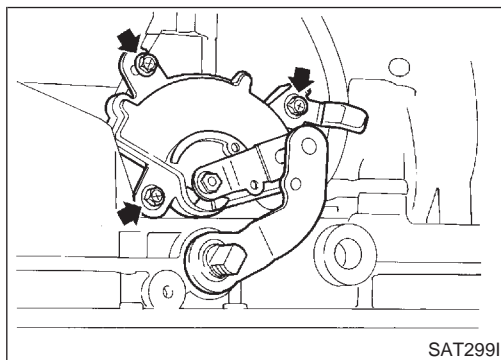
- j. Install torque converter clutch solenoid valve and A/T fluid temperature sensor connectors.



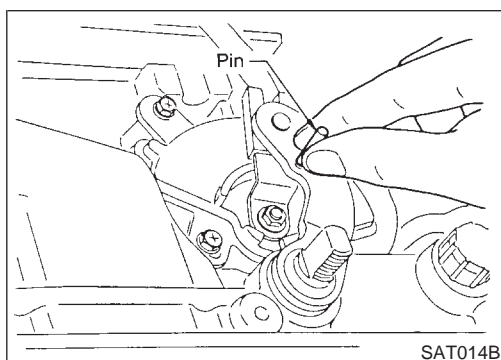
11. Install oil pan.  
a. Attach a magnet to oil pan.



- 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.



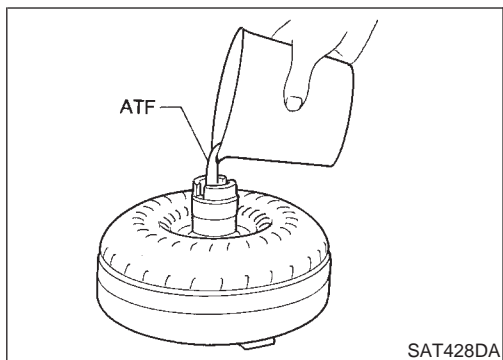
12. Install PNP switch.  
a. Check that manual shaft is in "1" position.  
b. Temporarily install PNP switch on manual shaft.  
c. Move manual shaft to "N".



- d. Tighten bolts while inserting 4.0 mm (0.157 in) dia. pin vertically into locating holes in PNP switch and manual shaft.

# ASSEMBLY

Assembly (2) (Cont'd)



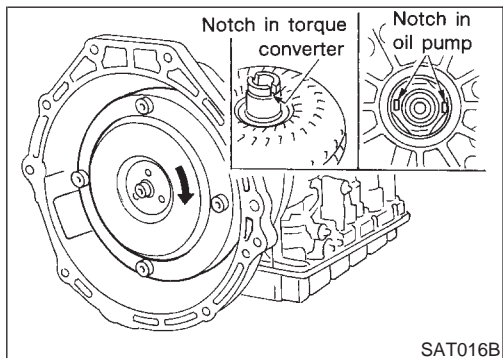
13. Install torque converter.
- a. Pour ATF into torque converter.
- Approximately 2 liters (2-1/8 US qt, 1-3/4 Imp qt) of fluid are required for a new torque converter.
  - When reusing old torque converter, add the same amount of fluid as was drained.

GI

MA

EM

LC

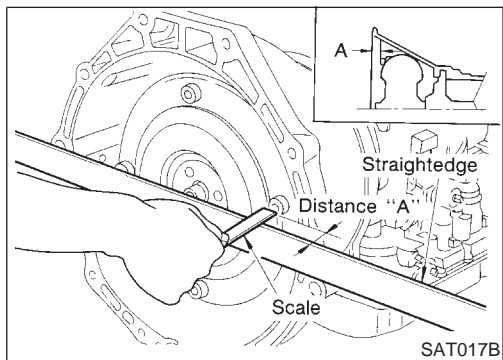


- b. Install torque converter while aligning notches and oil pump.

EC

FE

AT



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

**Distance "A":**  
**25.0 mm (0.984 in) or more**

TF

PD

AX

SU

BR

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IDX

# SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

## General Specifications

NBAT0160

Applied model		VQ35DE engine	
		2WD	4WD
Automatic transmission model		RE4R01A	
Transmission model code number		4EX16	4EX17
Stall torque ratio		2.0 : 1	
Transmission gear ratio	1st	2.785	
	2nd	1.545	
	Top	1.000	
	OD	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		8.5ℓ (9 US qt, 7-1/2 Imp qt)	

\*1: Refer to MA-11, "Fluids and Lubricants".

## Shift Schedule

NBAT0178

### VEHICLE SPEED WHEN SHIFTING GEARS THROTTLE POSITION

NBAT0178S01

Throttle position	Vehicle speed km/h (MPH)						
	D <sub>1</sub> → D <sub>2</sub>	D <sub>2</sub> → D <sub>3</sub>	D <sub>3</sub> → D <sub>4</sub>	D <sub>4</sub> → D <sub>3</sub>	D <sub>3</sub> → D <sub>2</sub>	D <sub>2</sub> → D <sub>1</sub>	1 <sub>2</sub> → 1 <sub>1</sub>
Full throttle	55 - 59 (34 - 37)	105 - 113 (65 - 70)	174 - 184 (108 - 114)	170 - 180 (106 - 112)	102 - 110 (63 - 68)	43 - 47 (27 - 29)	43 - 47 (27 - 29)
Half throttle	37 - 41 (23 - 25)	71 - 79 (44 - 49)	129 - 139 (80 - 86)	81 - 91 (50 - 57)	33 - 41 (21 - 25)	12 - 16 (7 - 10)	43 - 47 (27 - 29)

### VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

NBAT0178S02

Throttle position	Overdrive control switch [Shift position]	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Full throttle	ON [D <sub>4</sub> ]	174 - 184 (108 - 114)	170 - 180 (106 - 112)
	OFF [D <sub>3</sub> ]	104 - 114 (65 - 71)	101 - 111 (63 - 69)
Half throttle	ON [D <sub>4</sub> ]	151 - 161 (94 - 100)	106 - 116 (66 - 72)
	OFF [D <sub>3</sub> ]	85 - 95 (53 - 59)	82 - 92 (51 - 57)

## Stall Revolution

NBAT0163

Stall revolution rpm	2,440 - 2,640
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## Line Pressure

NBAT0164

Engine speed rpm	Line pressure kPa (kg/cm <sup>2</sup> , 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)

# SERVICE DATA AND SPECIFICATIONS (SDS)

Return Springs

## Return Springs

Unit: mm (in) <sup>NBATO165</sup>

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	31742-41X14	38.9 (1.531)	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	Torque converter clutch 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	31756-60X00	20.5 (0.807)	7.0 (0.276)
		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		—		31505-41X07	—	—
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)
Band servo	Spring A			31605-4AX03	45.6 (1.795)	34.3 (1.350)
	Spring B			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			31605-41X14	47.6 (1.874)	26.5 (1.043)
	Accumulator C			31605-41X09	45.0 (1.772)	29.3 (1.154)
	Accumulator D			31605-41X06	58.4 (2.299)	17.3 (0.681)

# SERVICE DATA AND SPECIFICATIONS (SDS)

Accumulator O-ring

## Accumulator O-ring

NBAT0166

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

NBAT0167

### REVERSE CLUTCH

NBAT0167S01

Code number	4EX16	4EX17
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 number*
	4.6 (0.181)	31537-42X20
	4.8 (0.189)	31537-42X21
	5.0 (0.197)	31537-42X22
	5.2 (0.205)	31537-42X23
	5.4 (0.213)	31537-42X24

### HIGH CLUTCH

NBAT0167S02

Code number	4EX16	4EX17
Number of drive plates	5	
Number of driven plates	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)
Thickness of retaining plate	Thickness mm (in)	Part number*
	4.0 (0.157)	31537-41X63
	4.2 (0.165)	31537-41X64
	4.4 (0.173)	31537-41X65
	4.6 (0.181)	31537-41X66
	4.8 (0.189)	31537-41X67
5.0 (0.197)	31537-41X68	

# SERVICE DATA AND SPECIFICATIONS (SDS)

Clutches and Brakes (Cont'd)

## FORWARD CLUTCH

NBAT0167S03

Code number		4EX16	4EX17	
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	0.35 - 0.75 (0.0138 - 0.0295)		
	Allowable limit	2.15 (0.0846)	2.35 (0.0925)	
Thickness of retaining plate	Thickness mm (in)		Part number*	
	4.6 (0.181)		31537-42X13	
	4.8 (0.189)		31537-42X14	
	5.0 (0.197)		31537-42X15	
	5.2 (0.205)		31537-4AX00	
	5.4 (0.213)		31537-4AX01	
	5.6 (0.220)		31537-4AX02	
		Thickness mm (in)	Part number*	
		4.2 (0.165)	31537-42X11	
		4.4 (0.173)	31537-42X12	
		4.6 (0.181)	31537-42X13	
		4.8 (0.189)	31537-42X14	
		5.0 (0.197)	31537-42X15	
		5.2 (0.205)	31537-4AX00	
		5.4 (0.213)	31537-4AX01	

GI  
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## OVERRUN CLUTCH

NBAT0167S04

Code number		4EX16	4EX17		
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	2.0 (0.079)			
Thickness of retaining plate	Thickness mm (in)		Part number*		
	4.2 (0.165)		31537-41X80		
	4.4 (0.173)		31537-41X81		
	4.6 (0.181)		31537-41X82		
	4.8 (0.189)		31537-41X83		
		5.0 (0.197)		31537-41X84	

TF  
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# SERVICE DATA AND SPECIFICATIONS (SDS)

*Clutches and Brakes (Cont'd)*

## LOW & REVERSE BRAKE

NBAT0167S05

Code number		4EX16	4EX17
Number of drive plates		8	
Number of driven plates		8	
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)	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	2.7 (0.106)	
Thickness of retaining plate		Thickness mm (in)	Part number*
		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

## BRAKE BAND

NBAT0167S06

Anchor end bolt nut tightening torque	40 - 51 N-m (4.1 - 5.2 kg-m, 30 - 38 ft-lb)
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

NBAT0168  
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

NBAT0169

Total end play "T <sub>1</sub> "	0.25 - 0.55 mm (0.0098 - 0.0217 in)	
Thickness of oil pump cover bearing race	Thickness mm (in)	Part number*
	0.8 (0.031)	31435-41X01
	1.0 (0.039)	31435-41X02
	1.2 (0.047)	31435-41X03
	1.4 (0.055)	31435-41X04
	1.6 (0.063)	31435-41X05
	1.8 (0.071)	31435-41X06
	2.0 (0.079)	31435-41X07



# SERVICE DATA AND SPECIFICATIONS (SDS)

Reverse Clutch Drum End Play

## Reverse Clutch Drum End Play

NBAT0170

Reverse clutch drum end play "T <sub>2</sub> "	0.55 - 0.90 mm (0.0217 - 0.0354 in)	
Thickness of oil pump thrust washer	Thickness mm (in)	Part number*
	0.9 (0.035)	31528-21X01
	1.1 (0.043)	31528-21X02
	1.3 (0.051)	31528-21X03
	1.5 (0.059)	31528-21X04
	1.7 (0.067)	31528-21X05
	1.9 (0.075)	31528-21X06

## Removal and Installation

NBAT0171

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 converter housing and torque converter		25.0 mm (0.984 in) or more

\*: Always check with the Parts Department for the latest parts information.

## Shift Solenoid Valves

NBAT0217

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

NBAT0218

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

NBAT0219

Remarks: Specification data are reference values.

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

## Turbine Revolution Sensor

NBAT0232

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

# SERVICE DATA AND SPECIFICATIONS (SDS)

Revolution Sensor

## Revolution Sensor

NBAT0220

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

## Dropping Resistor

NBAT0221

Resistance	11.2 - 12.8Ω
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