

# AUTOMATIC TRANSAXLE

## SECTION AT

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# TROUBLE DIAGNOSIS — INDEX

Alphabetical & P No. Index for DTC

## Alphabetical & P No. Index for DTC ALPHABETICAL INDEX FOR DTC

NCAT0001

NCAT0001S01

Items (CONSULT-II screen terms)	DTC	Reference page
	CONSULT-II GST*1	
A/T 1ST GR FNCTN	P0731	AT-128
A/T 2ND GR FNCTN	P0732	AT-135
A/T 3RD GR FNCTN	P0733	AT-141
A/T 4TH GR FNCTN	P0734	AT-147
A/T TCC S/V FNCTN	P0744	AT-163
ATF TEMP SEN/CIRC	P0710	AT-113
ENGINE SPEED SIG	P0725	AT-124
L/PRESS SOL/CIRC	P0745	AT-174
O/R CLTCH SOL/CIRC	P1760	AT-202
PNP SW/CIRC	P0705	AT-107
SFT SOL A/CIRC*2	P0750	AT-181
SFT SOL B/CIRC*2	P0755	AT-187
TCC SOLENOID/CIRC	P0740	AT-157
TP SEN/CIRC A/T*2	P1705	AT-193
VEH SPD SEN/CIR AT*3	P0720	AT-119

\*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

=NCAT0001S02

DTC	Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*1		
P0705	PNP SW/CIRC	AT-107
P0710	ATF TEMP SEN/CIRC	AT-113
P0720	VEH SPD SEN/CIR AT*3	AT-119
P0725	ENGINE SPEED SIG	AT-124
P0731	A/T 1ST GR FNCTN	AT-128
P0732	A/T 2ND GR FNCTN	AT-135
P0733	A/T 3RD GR FNCTN	AT-141
P0734	A/T 4TH GR FNCTN	AT-147
P0740	TCC SOLENOID/CIRC	AT-157
P0744	A/T TCC S/V FNCTN	AT-163
P0745	L/PRESS SOL/CIRC	AT-174
P0750	SFT SOL A/CIRC*2	AT-181
P0755	SFT SOL B/CIRC*2	AT-187
P1705	TP SEN/CIRC A/T*2	AT-193
P1760	O/R CLTCH SOL/CIRC	AT-202

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

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

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

## PRECAUTIONS

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

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

NCAT0220

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 G20 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 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 (except "SEAT BELT PRE-TENSIONER") covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.

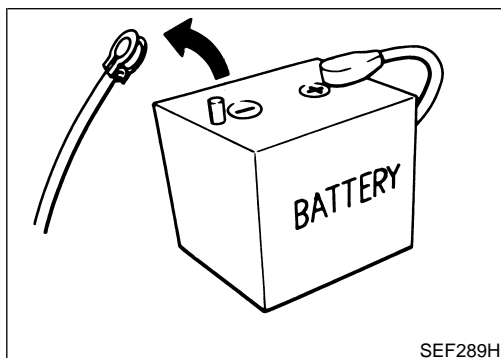
### Precautions for On Board Diagnostic (OBD) System of A/T and Engine

NCAT0198

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.



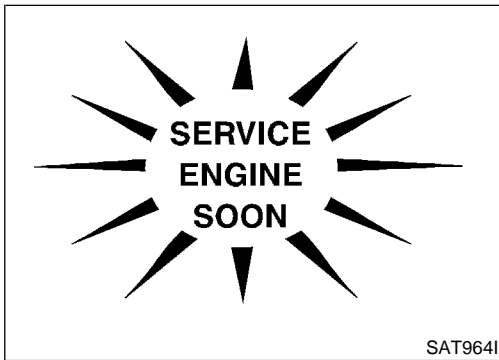
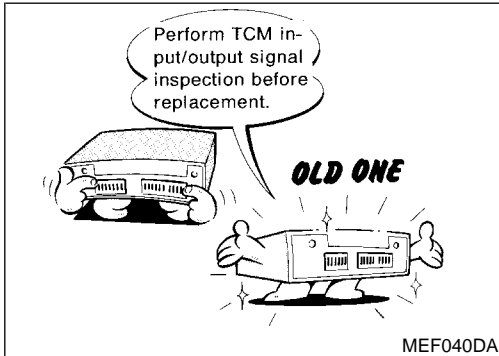
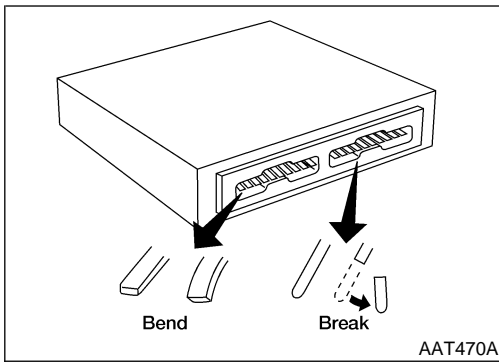
#### Precautions

NCAT0003

- 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.

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- Before replacing TCM, perform TCM input/output signal inspection and make sure whether TCM functions properly or not. (See page AT-99.)

EC

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

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- Before proceeding with disassembly, thoroughly clean the outside of the transaxle. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transaxle.
- Place disassembled parts in order for easier and proper assembly.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transaxle is disassembled.
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place disassembled valve body parts in order for easier and proper assembly. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed valves, sleeves, plugs, etc. will slide along bores in valve body under their own weight.
- Before assembly, apply a coat of recommended ATF to all

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# PRECAUTIONS

Precautions (Cont'd)

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

- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to AT-9, "ATF COOLER SERVICE".
- After overhaul, refill the transaxle with new ATF.
- When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF cooling system.  
Always follow the procedures under "Changing A/T Fluid" in the MA section when changing A/T fluid. Refer to MA-23, "Changing A/T Fluid".

## Service Notice or Precautions

NCAT0004

### FAIL-SAFE

NCAT0004S01

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-49.]

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

Always follow the "WORK FLOW" (Refer to AT-60).

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

NCAT0004S02

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

- External leaks in the hub weld area.
- Converter hub is scored or damaged.
- Converter pilot is broken, damaged or fits poorly into crankshaft.
- Steel particles are found after flushing the cooler and cooler lines.
- Pump is damaged or steel particles are found in the converter.
- Vehicle has TCC shudder and/or no TCC apply. Replace only after all hydraulic and electrical diagnoses have been made. (Converter clutch material may be glazed.)
- Converter is contaminated with engine coolant containing antifreeze.
- Internal failure of stator roller clutch.
- Heavy clutch debris due to overheating (blue converter).
- Steel particles or clutch lining material found in fluid filter or on magnet when no internal parts in unit are worn or damaged — indicates that lining material came from converter.

The torque converter should not be replaced if:

- The fluid has an odor, is discolored, and there is no evidence of metal or clutch facing particles.
- The threads in one or more of the converter bolt holes are damaged.



# PRECAUTIONS

Service Notice or Precautions (Cont'd)

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

GI

MA

## ATF COOLER SERVICE

NCAT0004S03

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.

EM

Refer to LC-14, "Radiator".

LC

## OBD-II SELF-DIAGNOSIS

NCAT0004S04

- 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-41 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-38 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).

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\*: For details of OBD-II, refer to EC-67, "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION".

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

AT

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## Wiring Diagrams and Trouble Diagnosis

NCAT0005

When you read wiring diagrams, refer to the following:

- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-9, "POWER SUPPLY ROUTING"

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When you perform trouble diagnosis, refer to the following:

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

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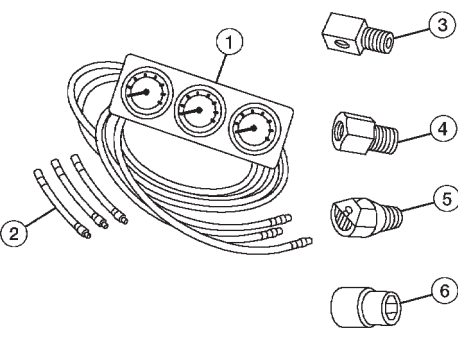
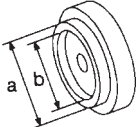
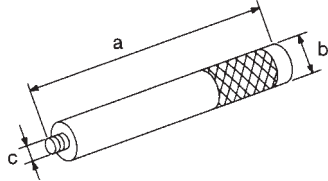
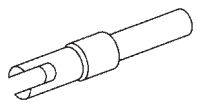
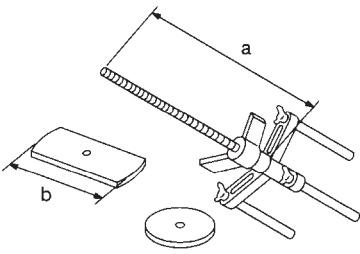
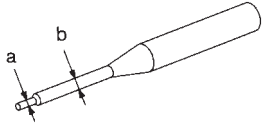
# PREPARATION

Special Service Tools

## Special Service Tools



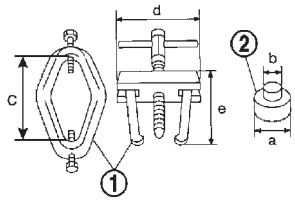
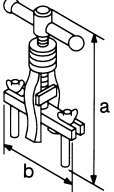
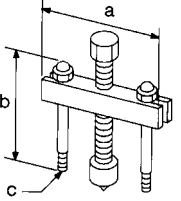
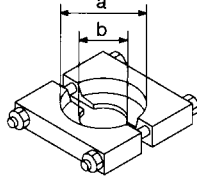
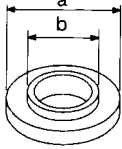
NCAT0006

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

Tool number (Kent-Moore No.) Tool name	Description	
(J34301-C) Oil pressure gauge set 1 (J34301-1) Oil pressure gauge 2 (J34301-2) Hoses 3 (J34298) Adapter 4 (J34282-2) Adapter 5 (790-301-1230-A) 60° Adapter 6 (J34301-15) Square socket	 <p>AAT896</p>	Measuring line pressure and governor pressure
KV31103000 (J38982) Drift	 <p>NT105</p>	Installing differential oil seal (Use with ST35325000.) <b>a: 59 mm (2.32 in) dia.</b> <b>b: 49 mm (1.93 in) dia.</b>
ST35325000 ( — ) Drift	 <p>NT417</p>	Installing differential oil seal (Use with KV31103000.) <b>a: 215 mm (8.46 in)</b> <b>b: 25 mm (0.98 in) dia.</b> <b>c: M12 x 1.5P</b>
KV38107700 (J39027) Preload adapter	 <p>NT087</p>	<ul style="list-style-type: none"> <li>● Measuring turning torque of final drive assembly</li> <li>● Measuring clearance between side gear and differential case with washer</li> <li>● Selecting differential side bearing adjusting shim</li> </ul>
KV31103200 (J34285-A and J34285-87) Clutch spring compressor	 <p>NT423</p>	Removing and installing clutch return spring <b>a: 320 mm (12.60 in)</b> <b>b: 174 mm (6.85 in)</b>
ST23540000 (J25689-A) Pin punch	 <p>NT442</p>	Removing and installing parking rod plate, manual plate and differential pinion mate shaft retaining pins <b>a: 2.3 mm (0.091 in) dia.</b> <b>b: 4 mm (0.16 in) dia.</b>

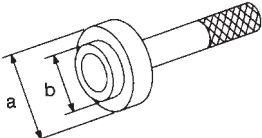
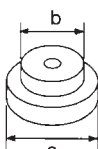
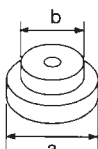
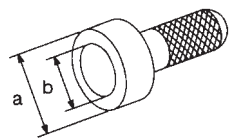
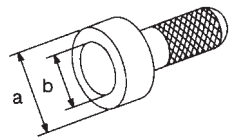
# PREPARATION

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description		
KV32101000 (J25689-A) Pin punch		Installing throttle lever and manual shaft retaining pins <b>a: 4 mm (0.16 in) dia.</b>	GI MA EM
ST25710000 ( — ) Pin punch		Aligning groove of manual shaft and hole of transmission case <b>a: 2 mm (0.08 in) dia.</b>	LC EC FE
ST3306S001 (J22888-D) Differential side bearing puller set 1 ST33051001 (J22888-D) Puller 2 ST33061000 (J8107-2) Adapter		Removing differential side bearing inner race <b>a: 39 mm (1.54 in) dia.</b> <b>b: 29.5 mm (1.161 in) dia.</b> <b>c: 130 mm (5.12 in)</b> <b>d: 135 mm (5.31 in)</b> <b>e: 120 mm (4.72 in)</b>	CL MT <b>AT</b>
KV381054S0 (J34286) Puller		<ul style="list-style-type: none"> <li>● Removing idler gear bearing outer race</li> <li>● Removing differential side oil seals</li> <li>● Removing differential side bearing outer race</li> <li>● Removing needle bearing from bearing retainer</li> </ul> <b>a: 250 mm (9.84 in)</b> <b>b: 160 mm (6.30 in)</b>	<b>AX</b> SU BR
ST27180001 (J25726-A) Puller		<ul style="list-style-type: none"> <li>● Removing idler gear</li> </ul> <b>a: 100 mm (3.94 in)</b> <b>b: 110 mm (4.33 in)</b> <b>c: M8 x 1.25P</b>	ST RS BT
ST30031000 (J22912-1) Puller		Removing reduction gear bearing inner race <b>a: 90 mm (3.54 in) dia.</b> <b>b: 50 mm (1.97 in) dia.</b>	HA SC
ST35272000 (J26092) Drift		<ul style="list-style-type: none"> <li>● Installing reduction gear bearing inner race</li> <li>● Installing idler gear bearing inner race</li> </ul> <b>a: 72 mm (2.83 in) dia.</b> <b>b: 35.5 mm (1.398 in) dia.</b>	EL IDX

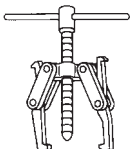
# PREPARATION

## Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST37830000 ( — ) Drift		Installing idler gear bearing outer race <b>a: 62 mm (2.44 in) dia.</b> <b>b: 39 mm (1.54 in) dia.</b>
	NT427	
ST35321000 ( — ) Drift		Installing output shaft bearing <b>a: 49 mm (1.93 in) dia.</b> <b>b: 41 mm (1.61 in) dia.</b>
	NT073	
ST30633000 ( — ) Drift		Installing differential side bearing outer race <b>a: 67 mm (2.64 in) dia.</b> <b>b: 49 mm (1.93 in) dia.</b>
	NT073	
ST35271000 (J26091) Drift		<ul style="list-style-type: none"> <li>● Installing idler gear</li> </ul> <b>a: 72 mm (2.83 in) dia.</b> <b>b: 63 mm (2.48 in) dia.</b>
	NT115	
ST33400001 (J26082) Drift		<ul style="list-style-type: none"> <li>● Installing oil pump housing oil seal</li> </ul> <b>a: 60 mm (2.36 in) dia.</b> <b>b: 47 mm (1.85 in) dia.</b>
	NT115	

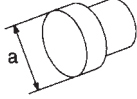
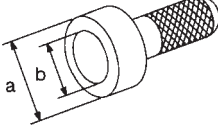
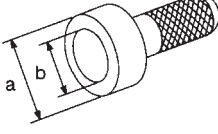
## Commercial Service Tools

NCAT0007

Tool name	Description	
Puller		<ul style="list-style-type: none"> <li>● Removing idler gear bearing inner race</li> <li>● Removing and installing band servo piston snap ring</li> </ul>
	NT077	

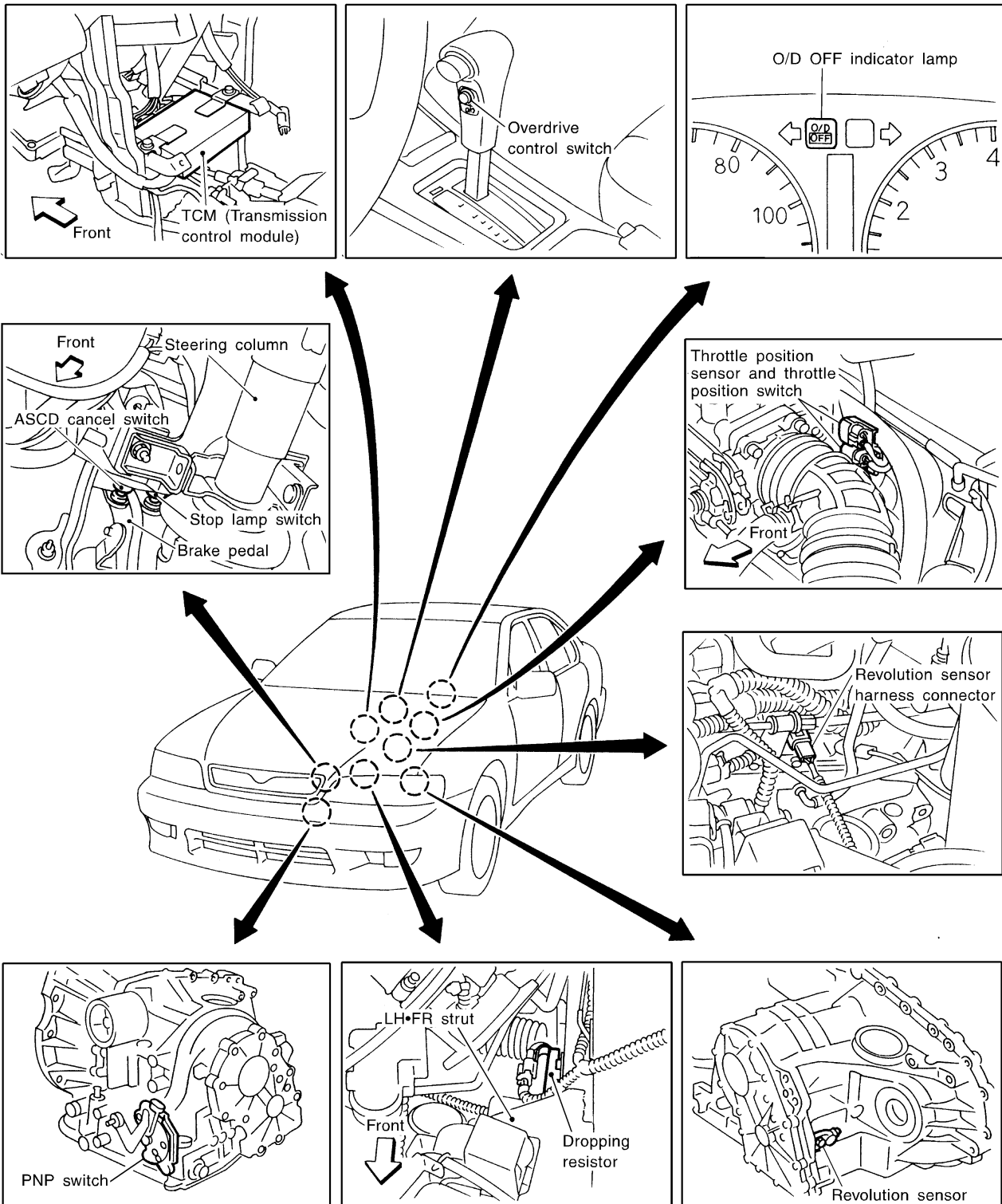
# PREPARATION

Commercial Service Tools (Cont'd)

Tool name	Description	
Drift	 <p>NT109</p>	<p>Removing idler gear bearing inner race  <b>a: 34 mm (1.34 in) dia.</b></p> <p>GI</p> <p>MA</p>
Drift	 <p>NT115</p>	<p>Installing differential left side bearing  <b>a: 86 mm (3.39 in) dia.</b>  <b>b: 80 mm (3.15 in) dia.</b></p> <p>EM</p> <p>LC</p>
Drift	 <p>NT115</p>	<p>Installing differential right side bearing  <b>a: 46 mm (1.81 in) dia.</b>  <b>b: 40 mm (1.57 in) dia.</b></p> <p>EC</p> <p>FE</p> <p>CL</p>
		<p>MT</p>
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		<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>

# OVERALL SYSTEM

## A/T Electrical Parts Location

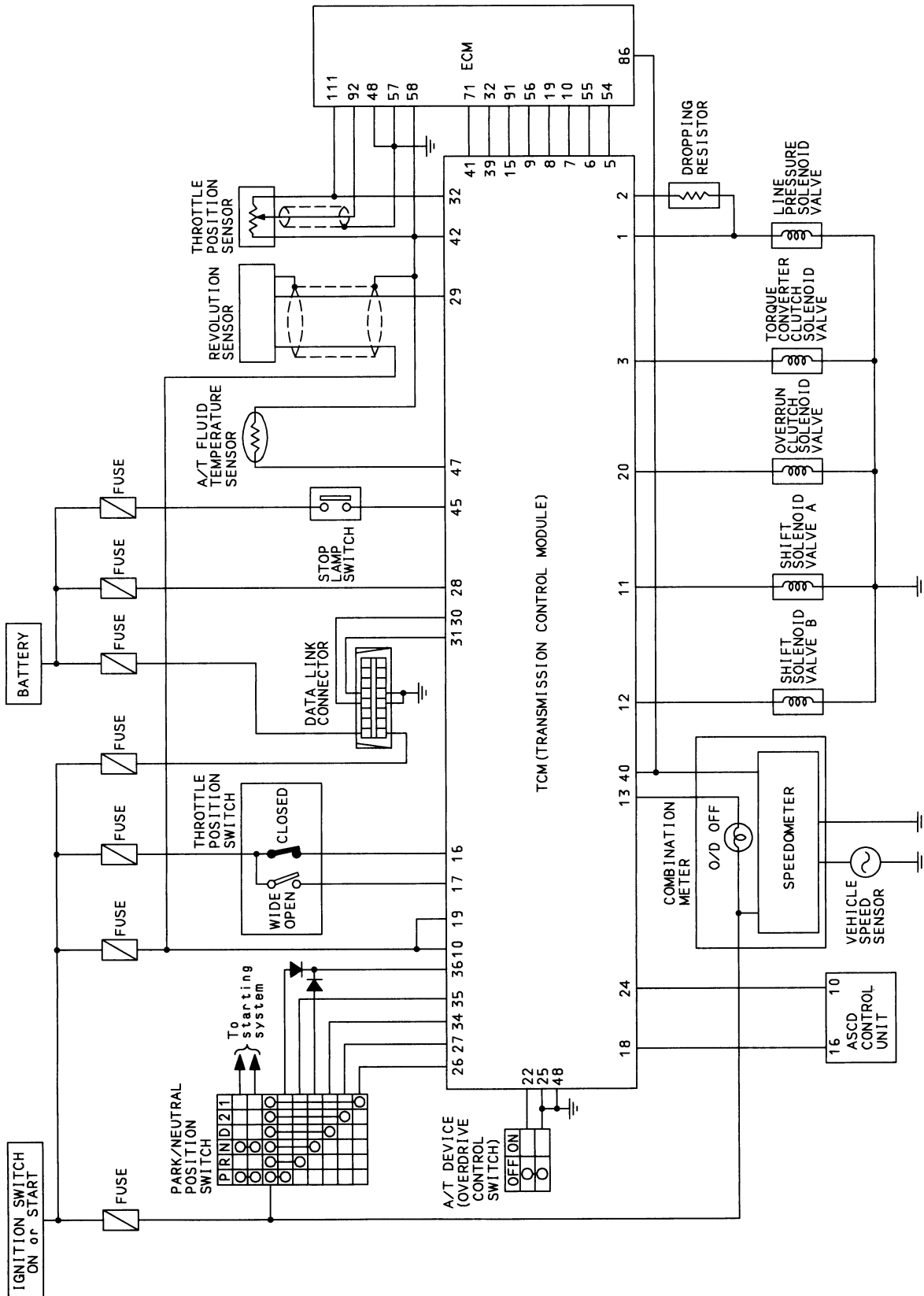


# OVERALL SYSTEM

Circuit Diagram

## Circuit Diagram

NCAT0009



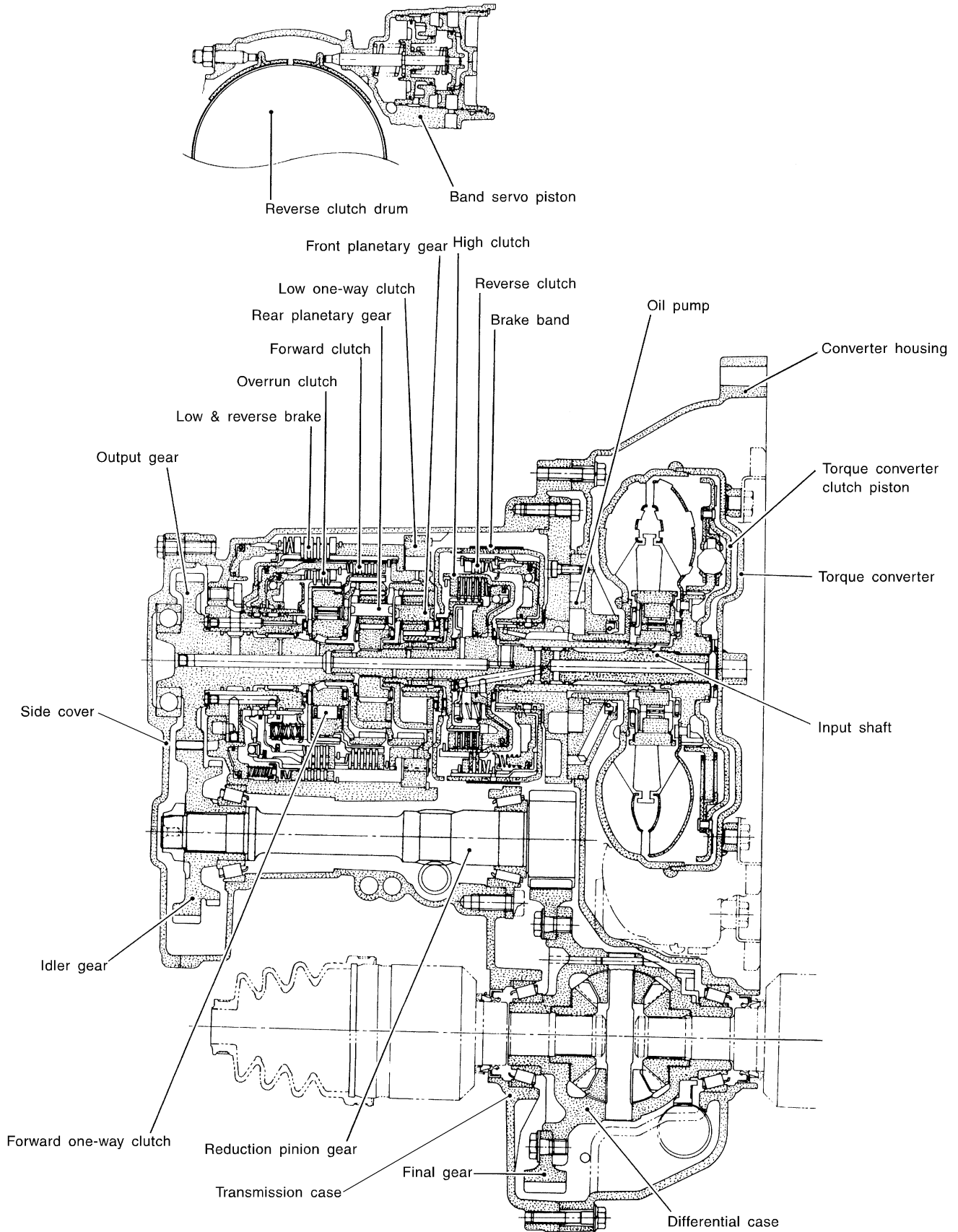
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# OVERALL SYSTEM

Cross-sectional View — RE4F03B

## Cross-sectional View — RE4F03B

NCAT0011



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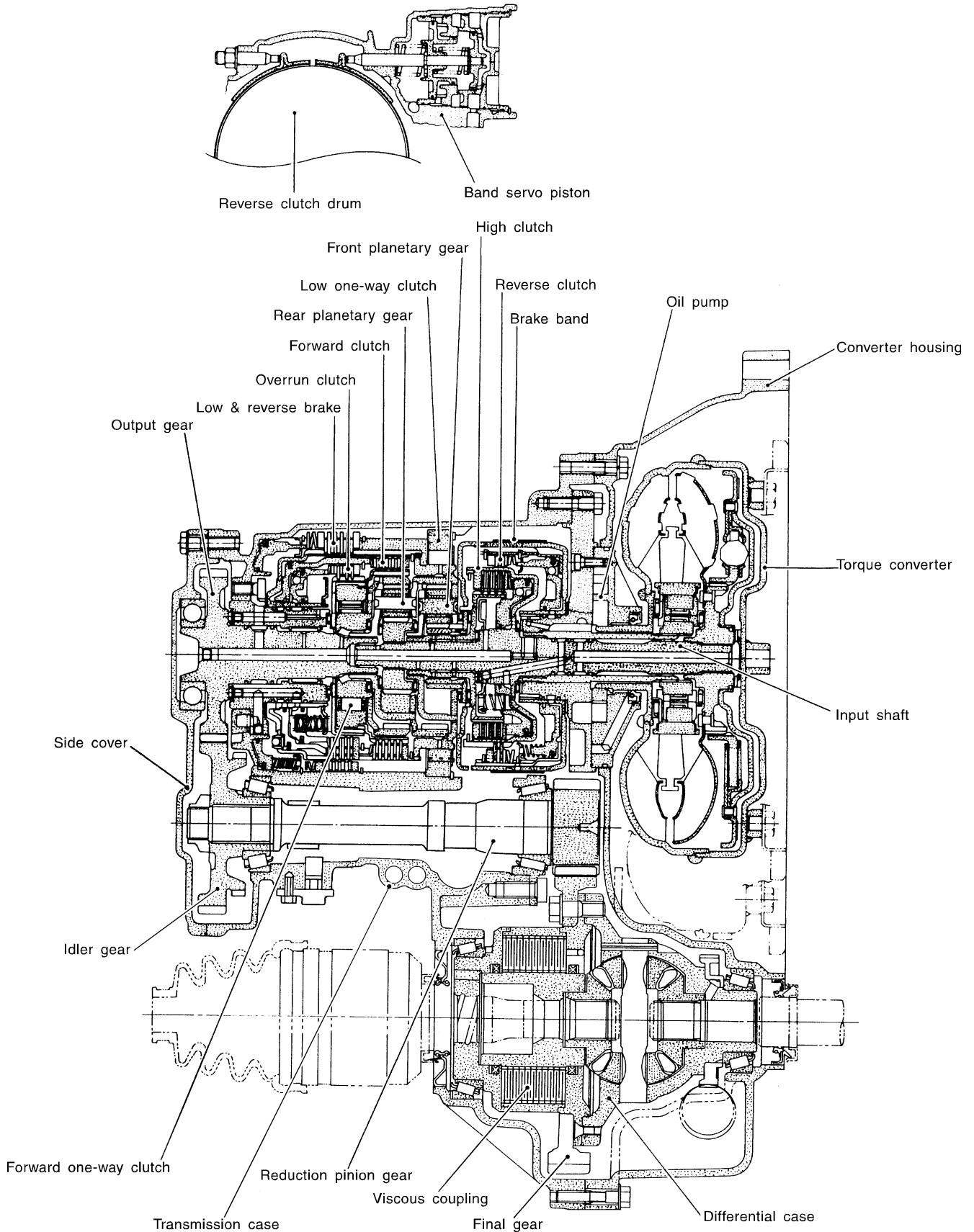


# OVERALL SYSTEM

Cross-sectional View — RE4F03W

## Cross-sectional View — RE4F03W

NCAT0217



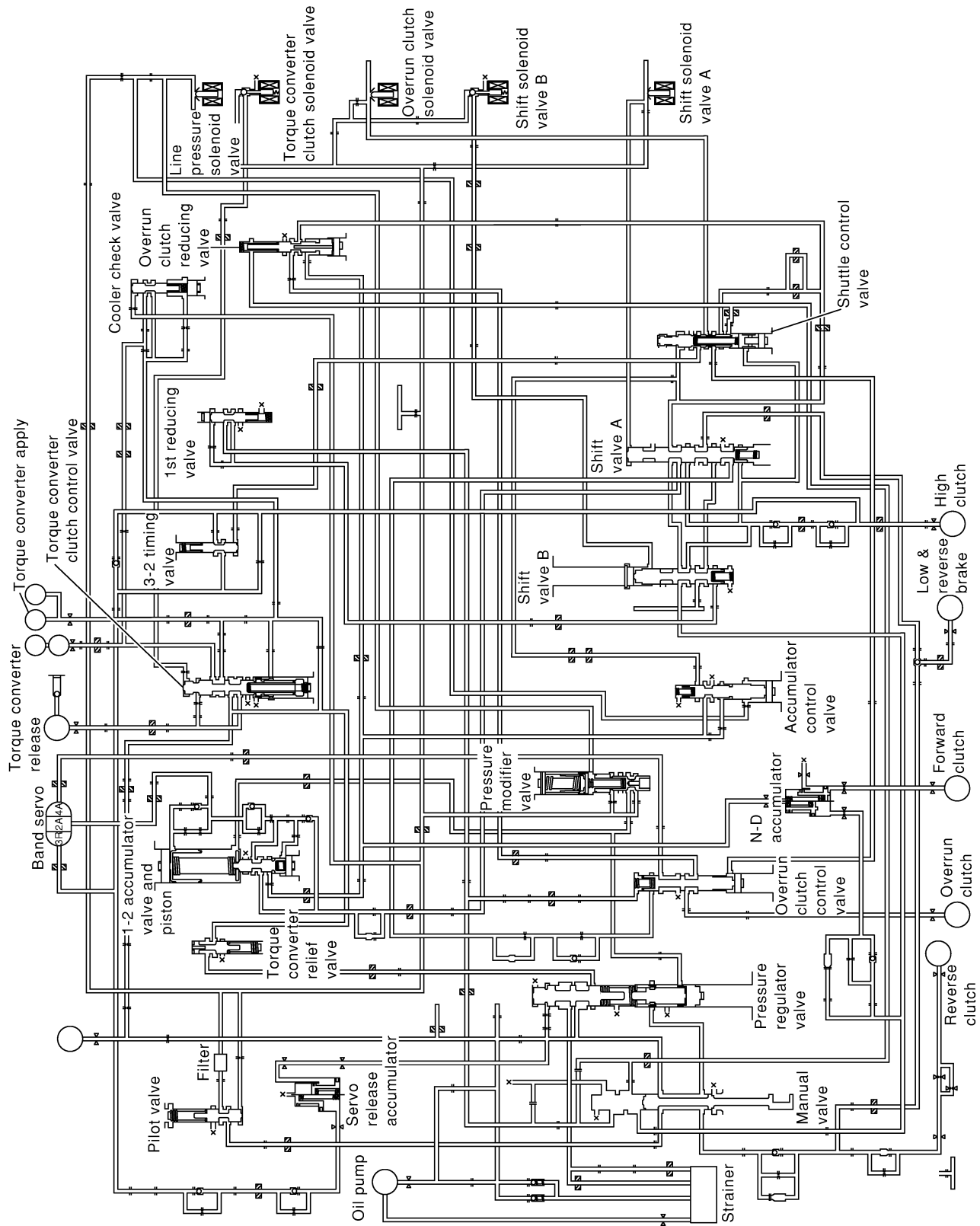
SAT843J

# OVERALL SYSTEM

Hydraulic Control Circuit

## Hydraulic Control Circuit

NCAT0012



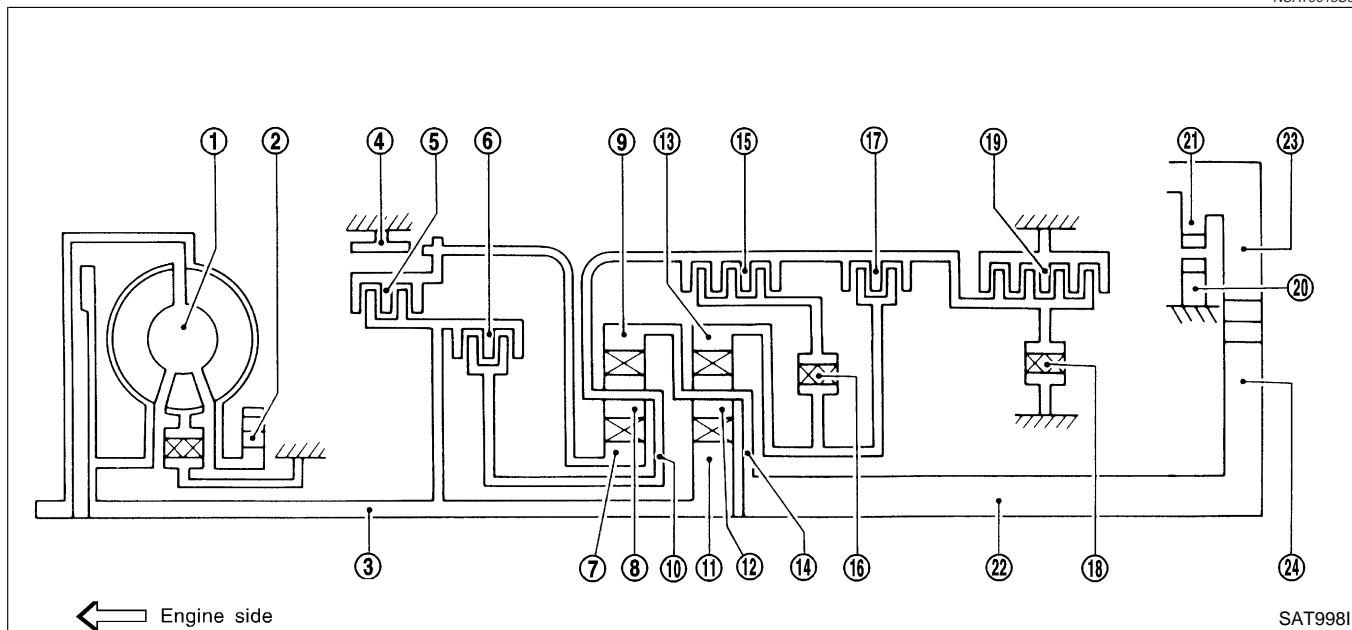
SAT844J

## Shift Mechanism

NCAT0013

NCAT0013S01

### CONSTRUCTION



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

### FUNCTION OF CLUTCH AND BRAKE

NCAT0013S03

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

# OVERALL SYSTEM

Shift Mechanism (Cont'd)

## CLUTCH AND BAND CHART

NCAT0013S04

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

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

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

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

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

\*5: Operates when overdrive control switch is "OFF".

○ : Operates.

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

B: Operates during "progressive" acceleration.

C: Operates but does not affect power transmission.

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

# OVERALL SYSTEM

Shift Mechanism (Cont'd)

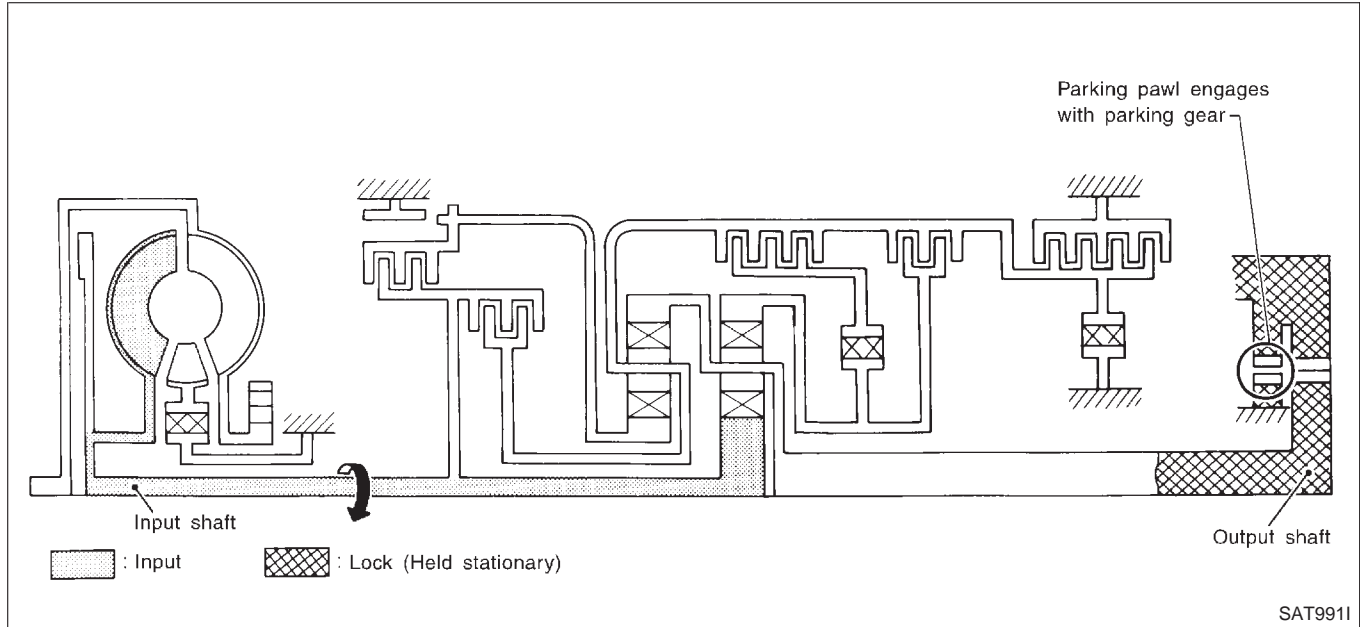
## POWER TRANSMISSION

=NCAT0013S02

NCAT0013S0201

### "N" and "P" Positions

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



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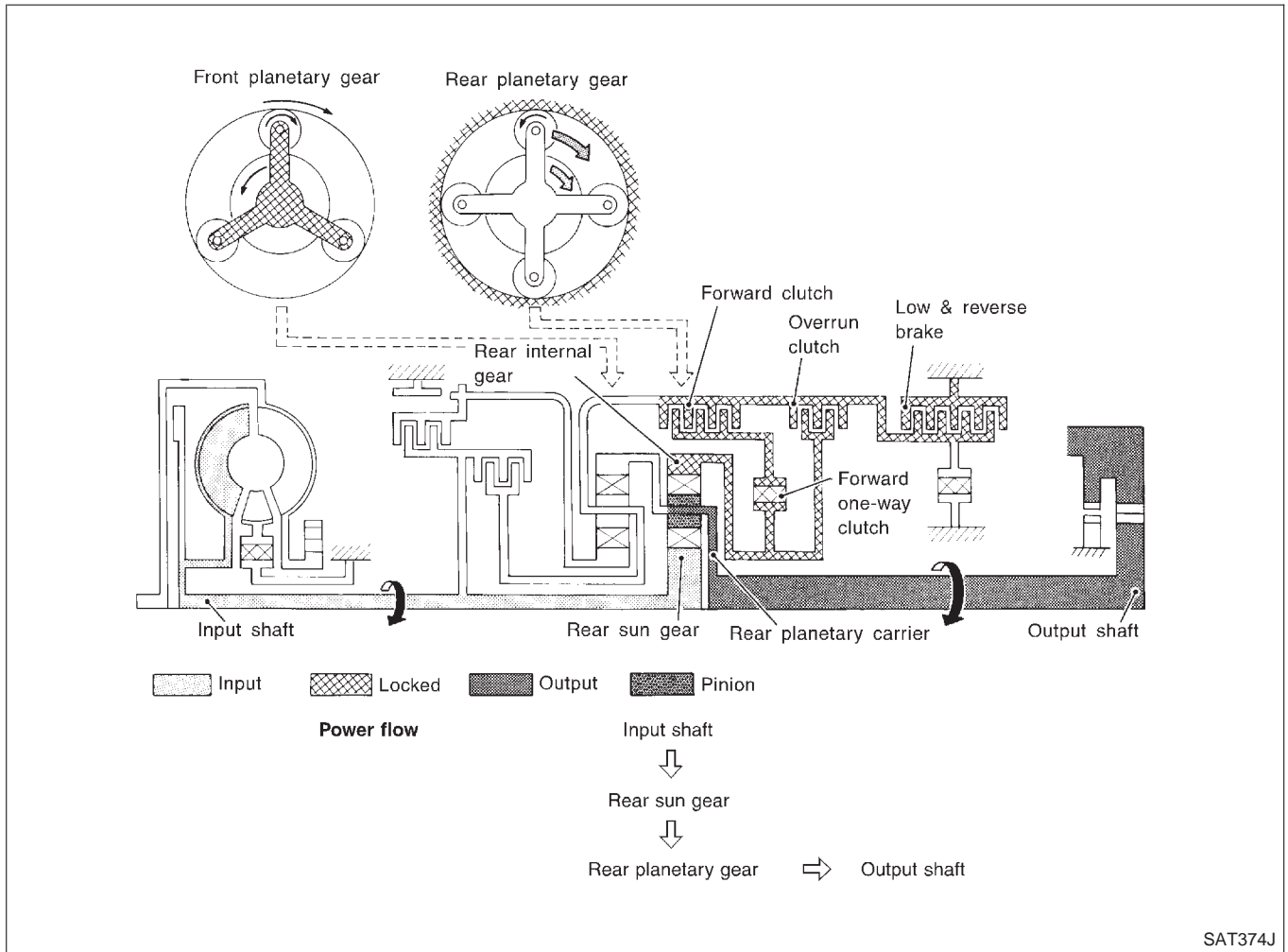
# OVERALL SYSTEM

Shift Mechanism (Cont'd)

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

=NCAT0013S0202

<ul style="list-style-type: none"> <li>● Forward clutch</li> <li>● Forward one-way clutch</li> <li>● Overrun clutch</li> <li>● Low and reverse brake</li> </ul>	<p>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>.</p>
<p>Engine brake</p>	<p>Overrun clutch always engages, therefore engine brake can be obtained when decelerating.</p>



SAT374J

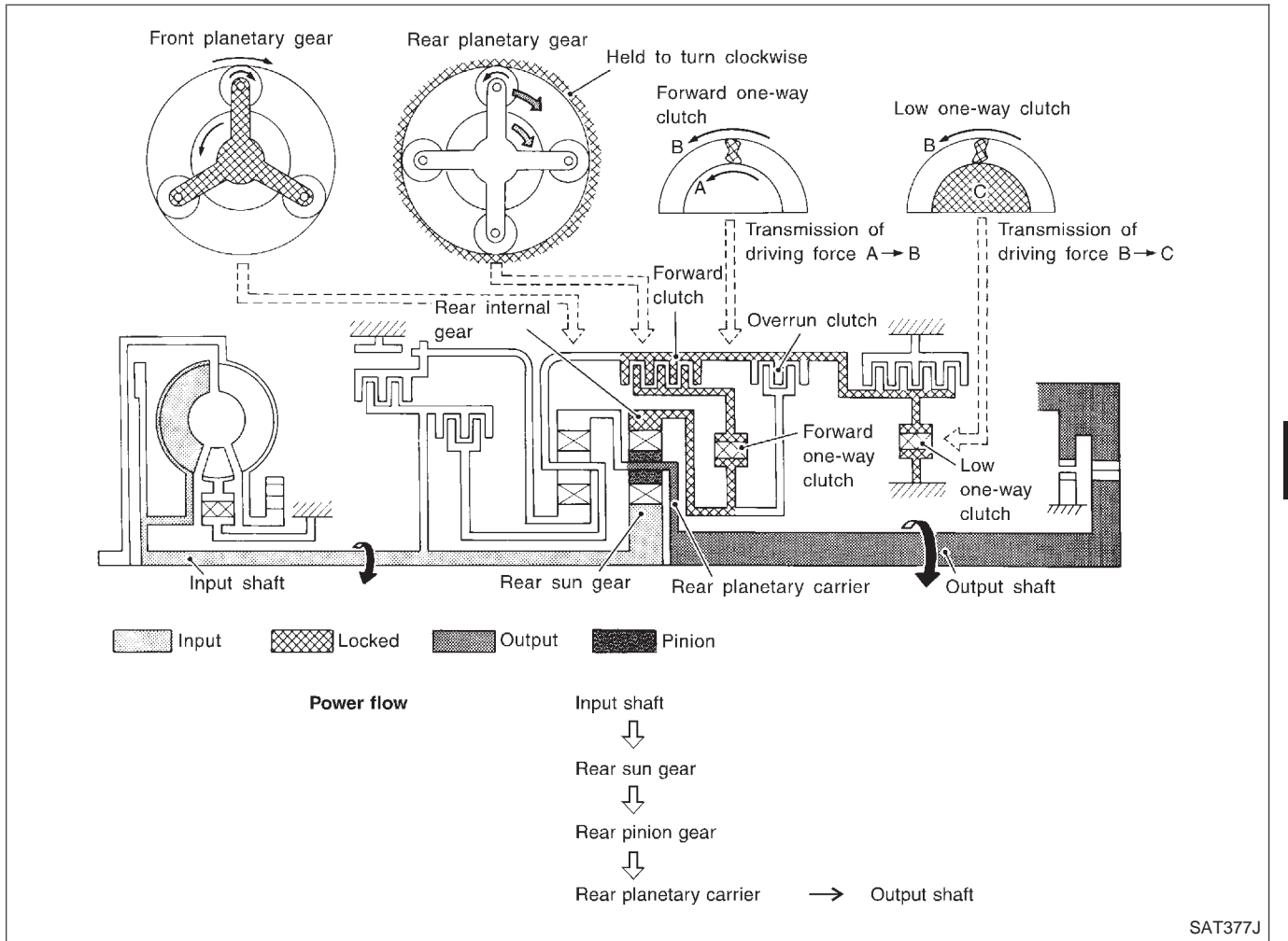
# OVERALL SYSTEM

Shift Mechanism (Cont'd)

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

=NCAT0013S0203

<ul style="list-style-type: none"> <li>● Forward one-way clutch</li> <li>● Forward clutch</li> <li>● Low one-way clutch</li> </ul>	Rear internal gear is locked to rotate counterclockwise because of the functioning of these three clutches.
<b>Overrun clutch engagement conditions (Engine brake)</b>	D <sub>1</sub> : Overdrive control switch "OFF" and throttle opening is less than 3/16 2 <sub>1</sub> : Always engaged 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.



SAT377J

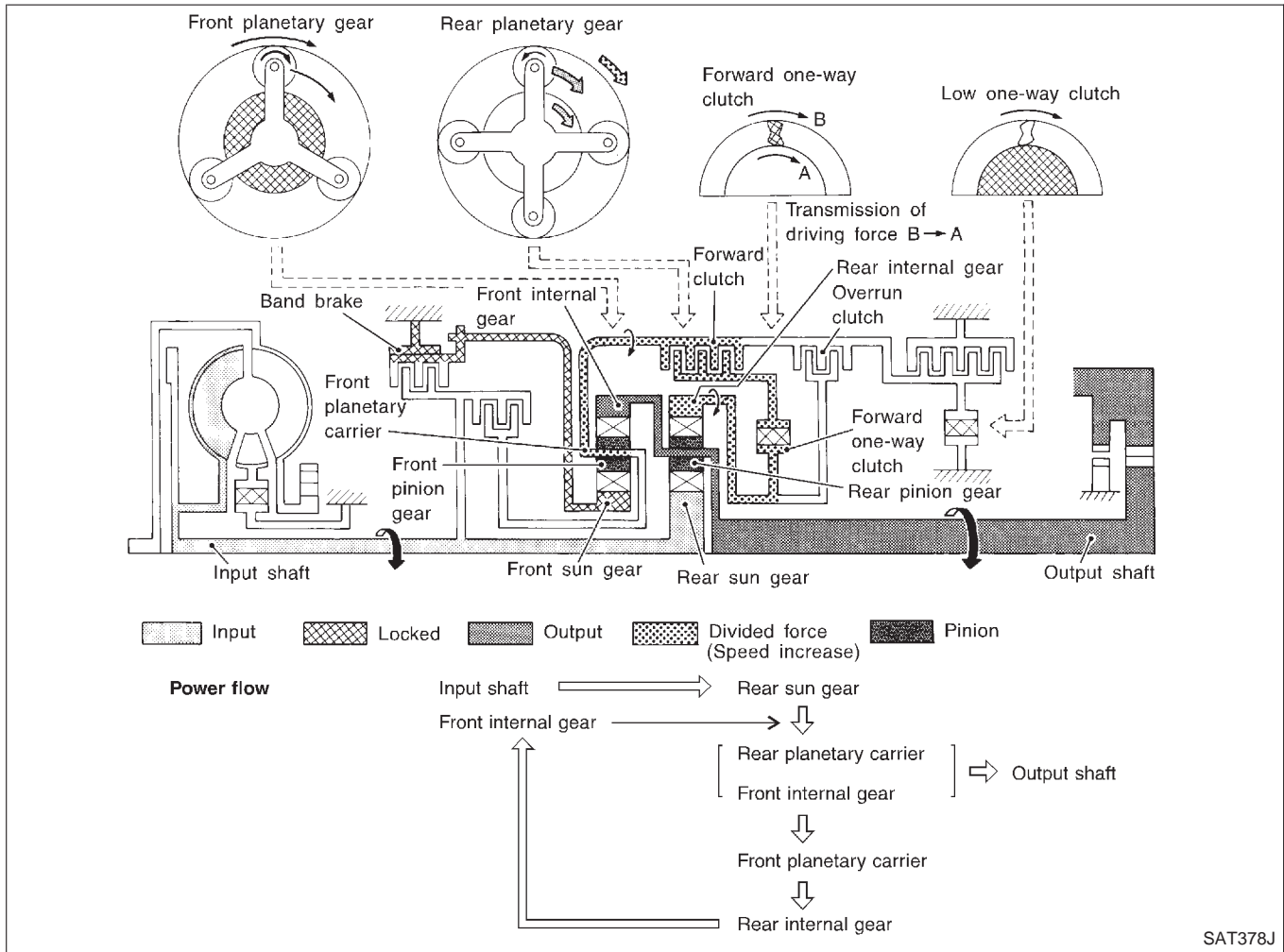
# OVERALL SYSTEM

Shift Mechanism (Cont'd)

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

=NCAT0013S0204

<ul style="list-style-type: none"> <li>● Forward clutch</li> <li>● Forward one-way clutch</li> <li>● Brake band</li> </ul>	<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.</p> <p>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 "OFF" and throttle opening is less than 3/16 2<sub>2</sub> and 1<sub>2</sub>: Always engaged</p>



SAT378J



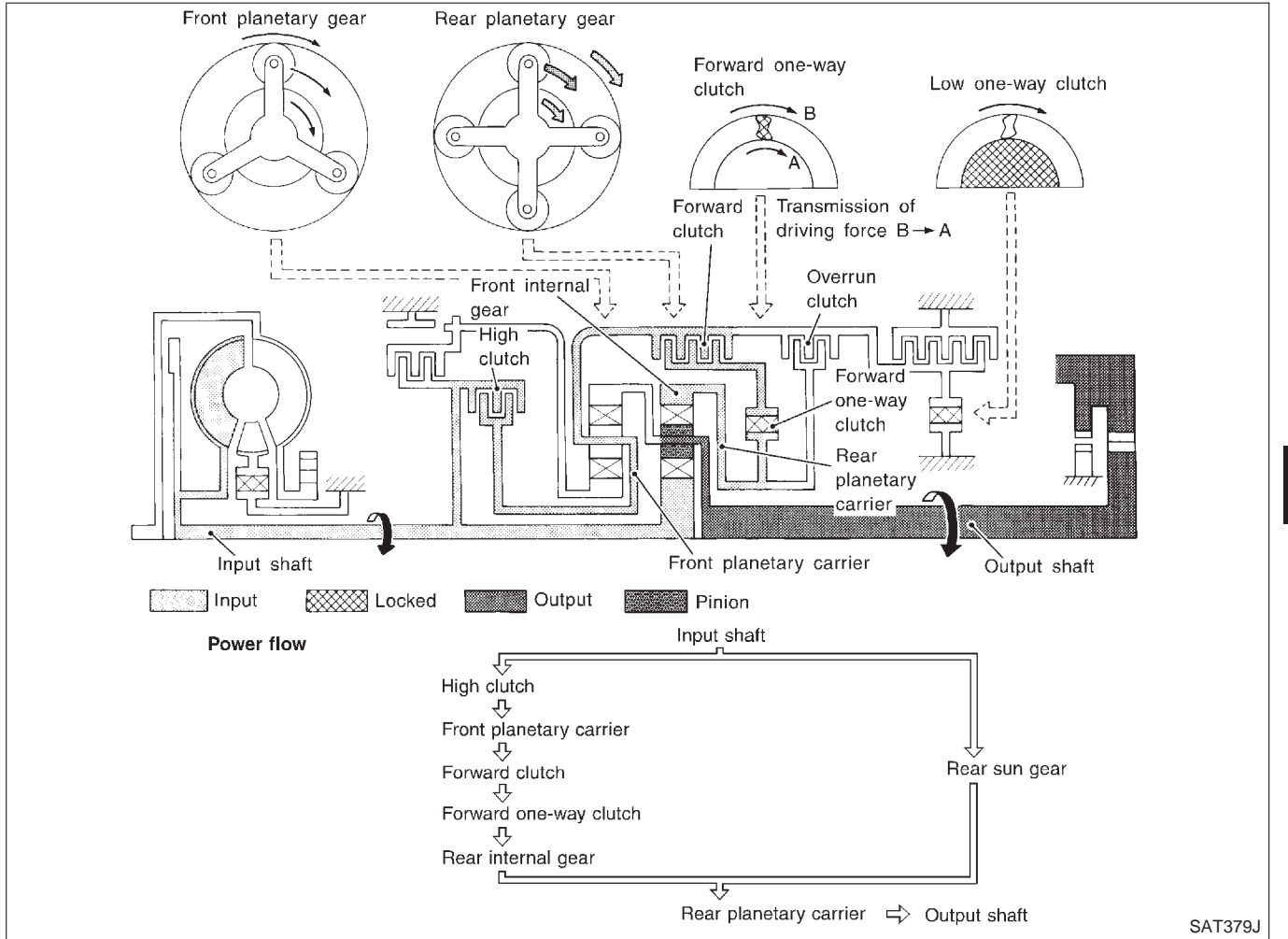
# OVERALL SYSTEM

Shift Mechanism (Cont'd)

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

=NCAT0013S0205

<ul style="list-style-type: none"> <li>● High clutch</li> <li>● Forward clutch</li> <li>● Forward one-way clutch</li> </ul>	<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>GI MA EM</p>
<p><b>Overrun clutch</b> engagement conditions</p>	<p>D<sub>3</sub>: Overdrive control switch "OFF" and throttle opening is less than 3/16</p>	<p>EM</p>



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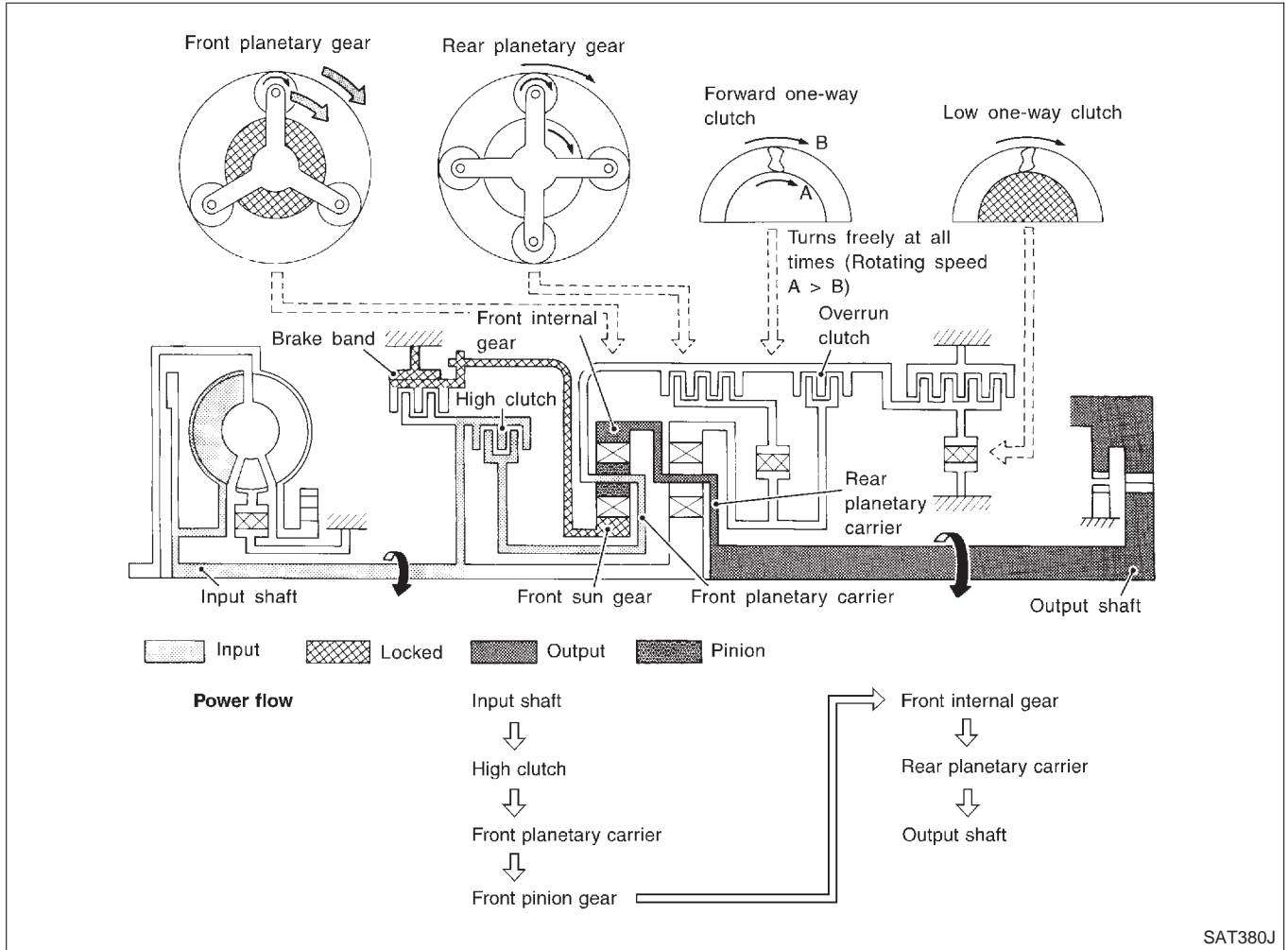
# OVERALL SYSTEM

Shift Mechanism (Cont'd)

=NCAT0013S0206

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

<ul style="list-style-type: none"> <li>● High clutch</li> <li>● Brake band</li> <li>● Forward clutch (Does not affect power transmission)</li> </ul>	<p>Input power is transmitted to front carrier through high clutch. This front carrier turns around the sun gear which is fixed by brake band and makes front internal gear (output) turn faster.</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>



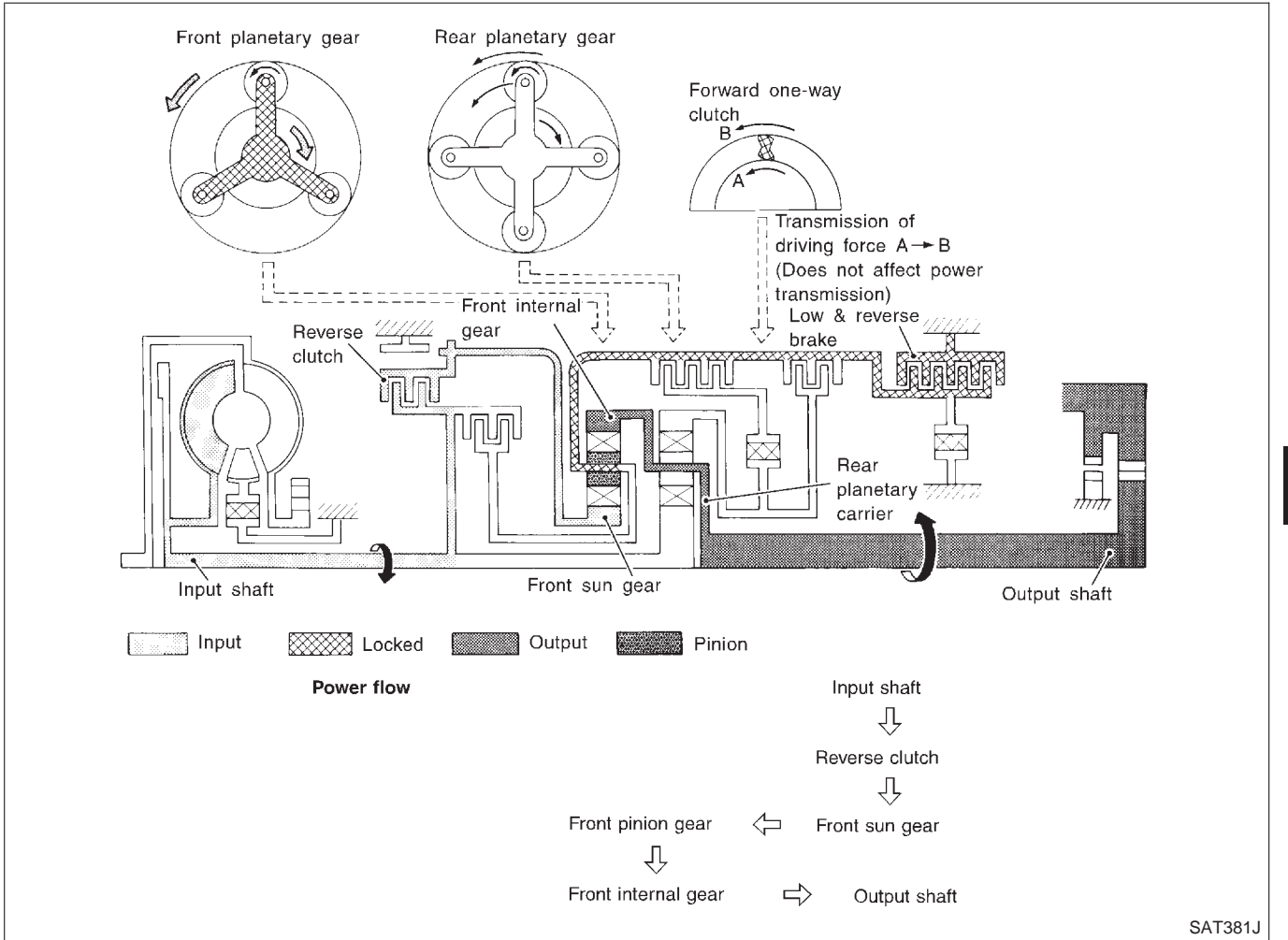
# OVERALL SYSTEM

Shift Mechanism (Cont'd)

## "R" Position

=NCAT0013S0207

<ul style="list-style-type: none"> <li>● Reverse clutch</li> <li>● Low and reverse brake</li> </ul>	<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>



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# OVERALL SYSTEM

Control System

## Control System

=NCAT0014

### OUTLINE

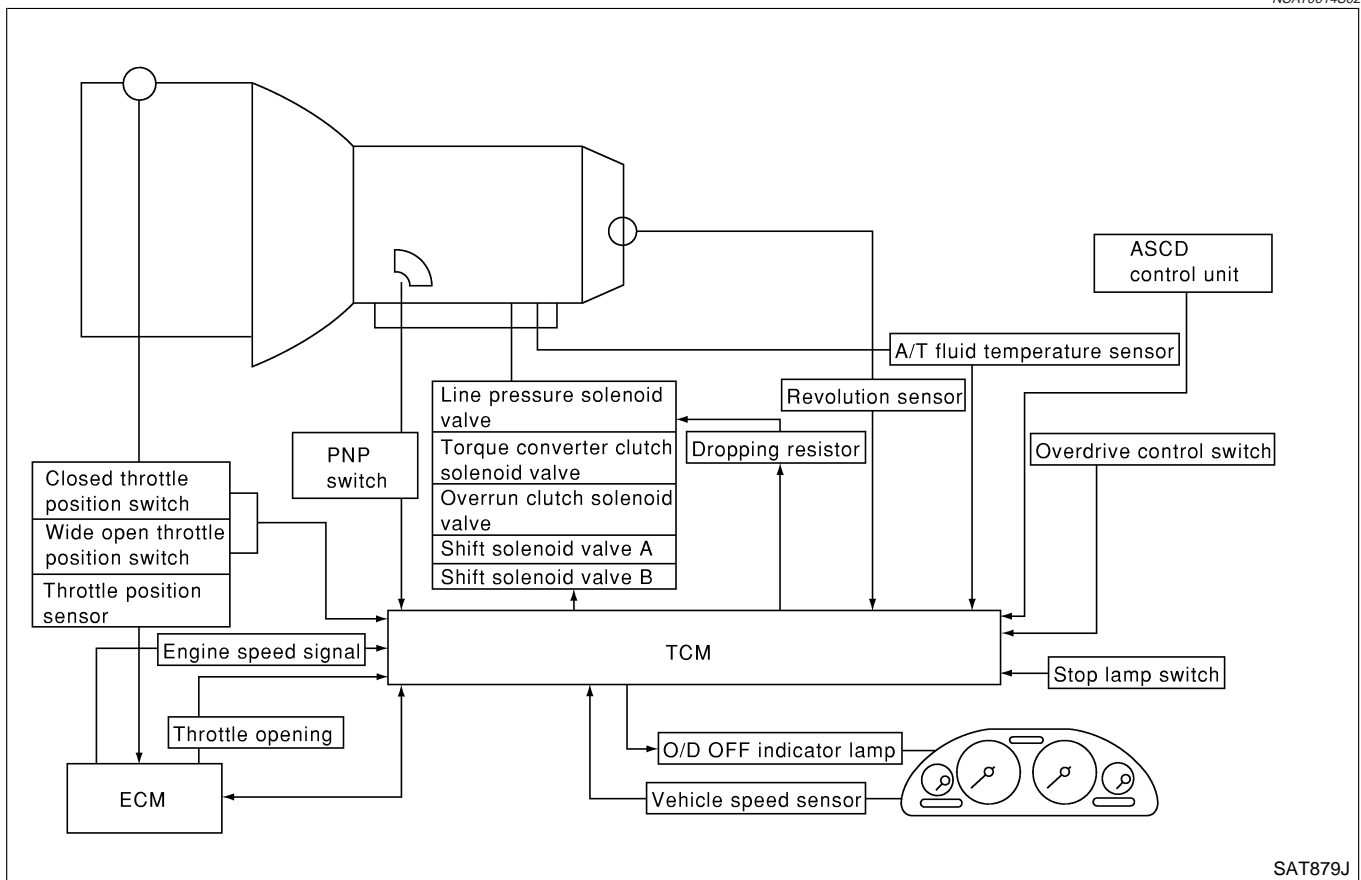
NCAT0014S01

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

SWITCHES & SENSORS		TCM		ACTUATORS
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	▶	Shift control Line pressure control Lock-up control Overrun clutch control Timing control Fail-safe control Self-diagnosis CONSULT-II communication line control Duet-EA control	▶	Shift solenoid valve A Shift solenoid valve B Overrun clutch solenoid valve Torque converter clutch solenoid valve Line pressure solenoid valve O/D OFF indicator lamp

### CONTROL SYSTEM

NCAT0014S02



SAT879J

# OVERALL SYSTEM

Control System (Cont'd)

## TCM FUNCTION

=NCAT0014S03

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

NCAT0014S04

	Sensors, switches and solenoid valves	Function	
Input	PNP switch	Detects select lever position and sends a signal to TCM.	GI
	Throttle position sensor	Detects throttle valve position and sends a signal to TCM.	MA
	Closed throttle position switch	Detects throttle valve's fully-closed position and sends a signal to TCM.	EM
	Wide open throttle position switch	Detects a throttle valve position of greater than 1/2 of full throttle and sends a signal to TCM.	LC
	Engine speed signal	From ECM.	EC
	A/T fluid temperature sensor	Detects transmission fluid temperature and sends a signal to TCM.	FE
	Revolution sensor	Detects output shaft rpm and sends a signal to TCM.	CL
	Vehicle speed sensor	Used as an auxiliary vehicle speed sensor. Sends a signal when revolution sensor (installed on transmission) malfunctions.	GL
	Overdrive control switch	Sends a signal, which prohibits a shift to "D <sub>4</sub> " (overdrive) position, to the TCM.	MT
	ASCD control unit	Sends the cruise signal and "D <sub>4</sub> " (overdrive) cancellation signal from ASCD control unit to TCM.	AT
	Stop lamp switch	Releases lock-up system when depressing pedal in lock-up condition.	AX
Output	Shift solenoid valve A/B	Selects shifting point suited to driving conditions in relation to a signal sent from TCM.	SU
	Line pressure solenoid valve	Regulates (or decreases) line pressure suited to driving conditions in relation to a signal sent from TCM.	BR
	Torque converter clutch solenoid valve	Regulates (or decreases) lock-up pressure suited to driving conditions in relation to a signal sent from TCM.	ST
	Overrun clutch solenoid valve	Controls an "engine brake" effect suited to driving conditions in relation to a signal sent from TCM.	RS
	O/D OFF indicator lamp	Shows TCM faults, when A/T control components malfunction.	BT

## Control Mechanism

NCAT0015

### LINE PRESSURE CONTROL

NCAT0015S01

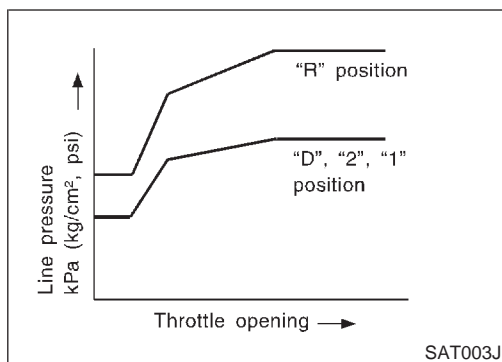
TCM has various line pressure control characteristics to match the driving conditions.

An ON-OFF duty signal is sent to the line pressure solenoid valve based on TCM characteristics.

Hydraulic pressure on the clutch and brake is electronically controlled through the line pressure solenoid valve to accommodate engine torque. This results in smooth shift operation.

# OVERALL SYSTEM

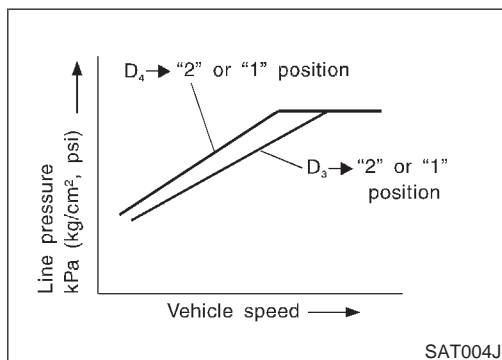
## Control Mechanism (Cont'd)



### Normal Control

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

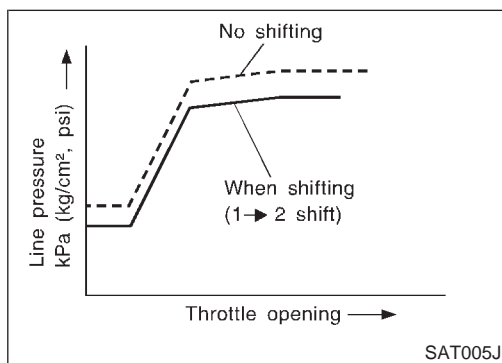
NCAT0015S0101



### 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.

NCAT0015S0102



### During Shift Change

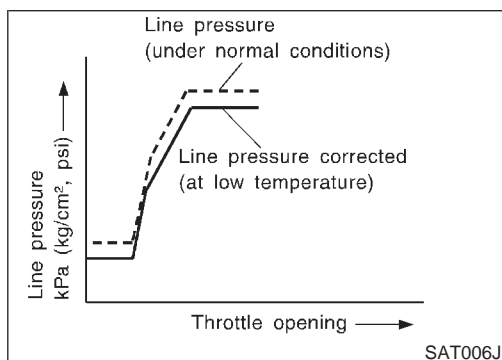
The line pressure is temporarily reduced corresponding to a change in engine torque when shifting gears (that is, when the shift solenoid valve is switched for clutch operation) to reduce shifting shock.

NCAT0015S0103

### 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.

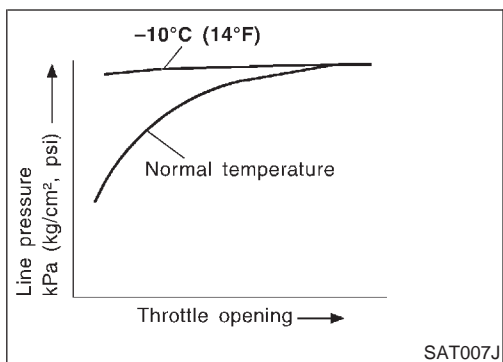
NCAT0015S0104



- 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.

# 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.

GI

MA

EM

LC

## 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.

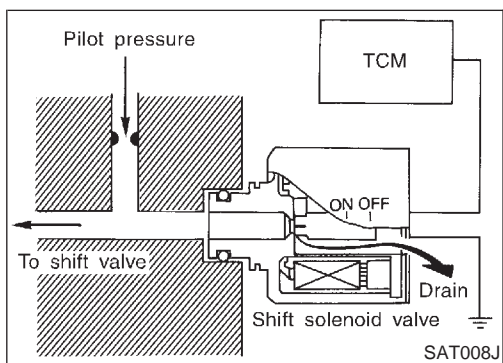
NCAT0015S02

EC

FE

CL

MT



## 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.

NCAT0015S0201

AT

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.

AX

SU

BR

## Relation Between Shift Solenoid Valves A and B and Gear Positions

NCAT0015S0203

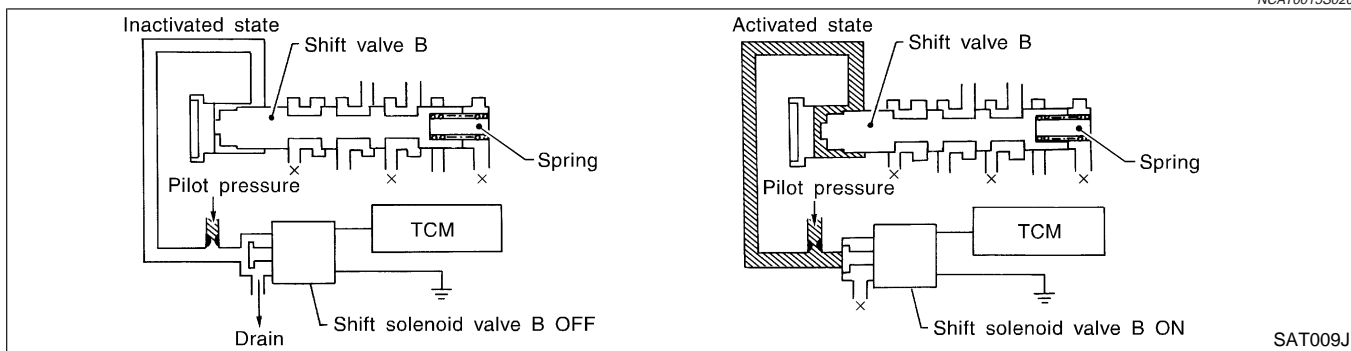
Shift solenoid valve	Gear position				
	D <sub>1</sub> , 2 <sub>1</sub> , 1 <sub>1</sub>	D <sub>2</sub> , 2 <sub>2</sub> , 1 <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub> (OD)	N-P
A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)	ON (Closed)
B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)

RS

BT

## Control of Shift Valves A and B

NCAT0015S0202



HA

SC

EL

IDX

# 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

NCAT0015S03

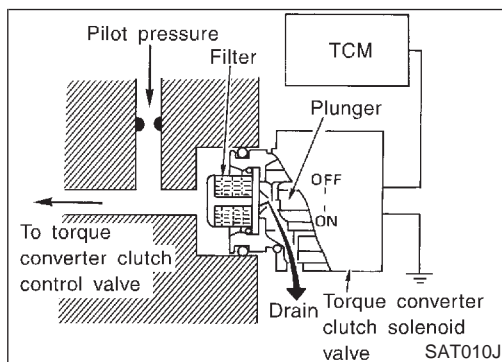
The torque converter clutch piston in the torque converter is locked to eliminate torque converter slip to increase power transmission efficiency. The solenoid valve is controlled by an ON-OFF duty signal sent from the TCM. The signal is converted to an oil pressure signal which controls the torque converter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

## Conditions for Lock-up Operation

NCAT0015S0301

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)	

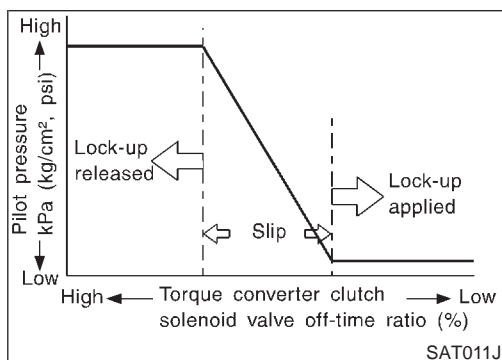


## Torque Converter Clutch Solenoid Valve Control

NCAT0015S0302

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

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



OFF-time INCREASING

↓  
Amount of drain DECREASING

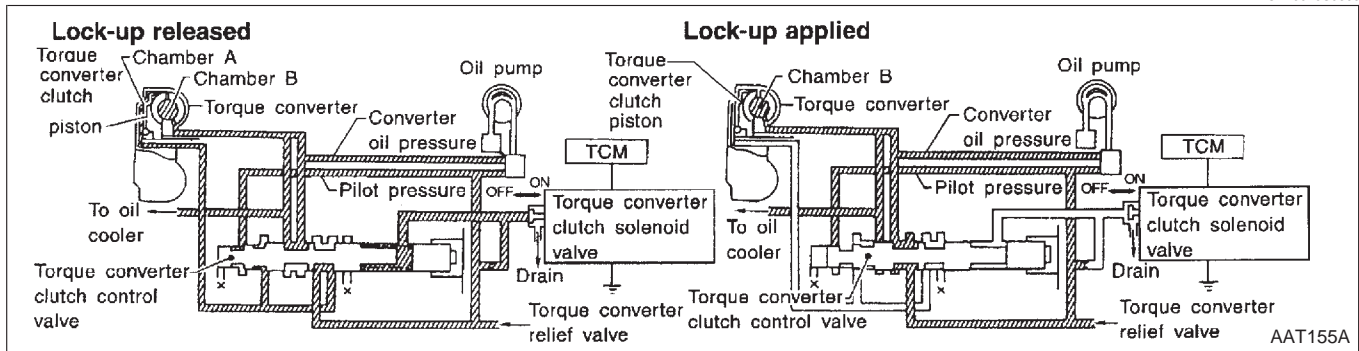
↓  
Pilot pressure HIGH

↓  
Lock-up RELEASING



## Torque Converter Clutch Control Valve Operation

NCAT0015S0303



### 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)

NCAT0015S04

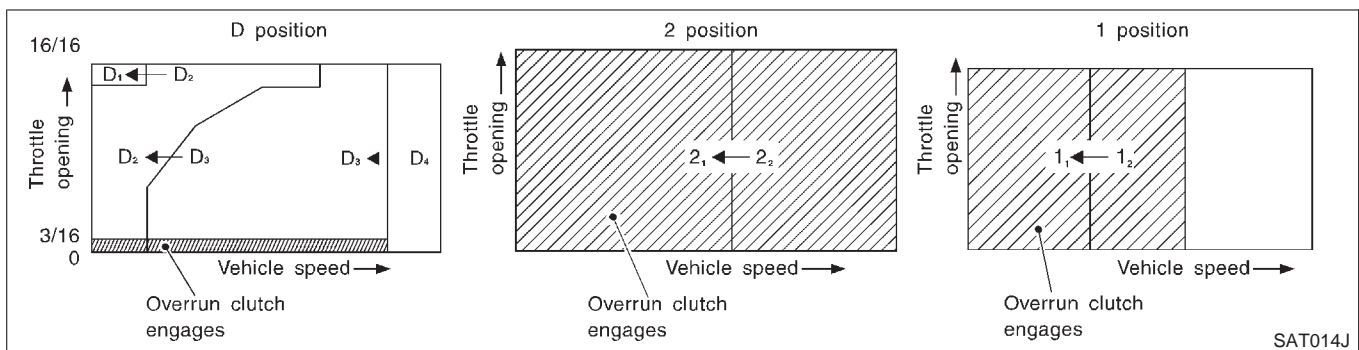
Forward one-way clutch is used to reduce shifting shocks in downshifting operations. This clutch transmits engine torque to the wheels. However, drive force from the wheels is not transmitted to the engine because the one-way clutch rotates idle. This means the engine brake is not effective.

The overrun clutch operates when the engine brake is needed.

### Overrun Clutch Operating Conditions

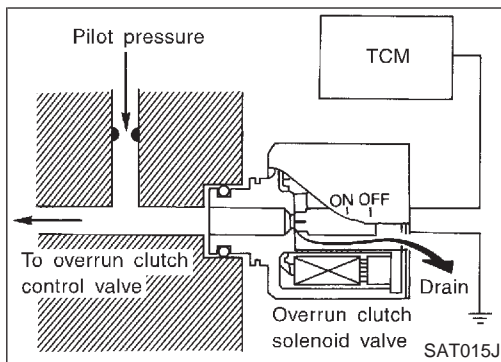
NCAT0015S0401

Selector lever position	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



# OVERALL SYSTEM

## Control Mechanism (Cont'd)



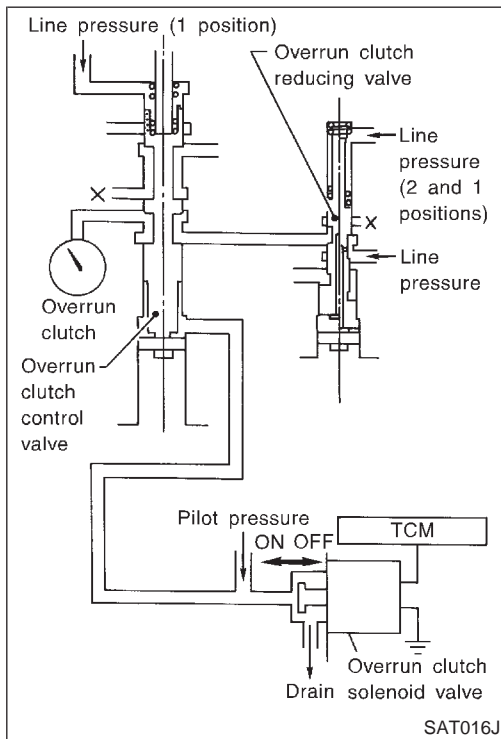
### Overrun Clutch Solenoid Valve Control

NCAT0015S0402

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

NCAT0015S0403

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

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

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

## Control Valve

NCAT0016

### FUNCTION OF CONTROL VALVES

NCAT0016S01

Valve name	Function
Pressure regulator valve, plug and sleeve	Regulates oil discharged from the oil pump to provide optimum line pressure for all driving conditions.
Pressure modifier valve and sleeve	Used as a signal supplementary valve to the pressure regulator valve. Regulates pressure-modifier pressure (signal pressure) which controls optimum line pressure for all driving conditions.
Pilot valve	Regulates line pressure to maintain a constant pilot pressure level which controls lock-up mechanism, overrun clutch, shift timing.
Accumulator control valve	Regulates accumulator back-pressure to pressure suited to driving conditions.
Manual valve	Directs line pressure to oil circuits corresponding to select positions. Hydraulic pressure drains when the shift lever is in Neutral.
Shift valve A	Simultaneously switches four oil circuits using output pressure of shift solenoid valve A to meet driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve B.

# OVERALL SYSTEM

Control Valve (Cont'd)

Valve name	Function	
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.	GI MA
Overrun clutch control valve	Switches hydraulic circuits to prevent engagement of the overrun clutch simultaneously with application of the brake band in D <sub>4</sub> . (Interlocking occurs if the overrun clutch engages during D <sub>4</sub> .)	EM
1st reducing valve	Reduces low & reverse brake pressure to dampen engine-brake shock when down-shifting from the "1" position 1 <sub>2</sub> to 1 <sub>1</sub> .	LC
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.	EC
Torque converter relief valve	Prevents an excessive rise in torque converter pressure.	
Torque converter clutch control valve, plug and sleeve	Activates or inactivates the lock-up function. Also provides smooth lock-up through transient application and release of the lock-up system.	FE
1-2 accumulator valve and piston	Dampens the shock encountered when 2nd gear band servo contracts, and provides smooth shifting.	CL
3-2 timing valve	Switches oil pressure with 3-2 timing valve according to throttle opening.	MT
Shuttle control valve	Reduces shock when down-shifting from 3rd to 2nd and regulates overrun clutch.	
Cooler check valve	Regulates oil pressure which causes lock-up when driving at low speeds.	AT

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Introduction

## Introduction

NCAT0017

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-41.

## OBD-II Function for A/T System

NCAT0018

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

NCAT0019

### 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.

NCAT0019S01

### 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

NCAT0019S02

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)

NCAT0020

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

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

NCAT0020S01

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

These DTCs are prescribed by SAE J2012.

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

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

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

# 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 "245".

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. NCAT0020S0101

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-88, "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.

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

# 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
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

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

### HOW TO ERASE DTC

The diagnostic trouble code can be erased by CONSULT-II, GST or ECM DIAGNOSTIC TEST MODE as described following. NCAT0020S02

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

The following emission-related diagnostic information is cleared from the ECM memory when erasing DTC related to OBD-II. For details, refer to EC-68, "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.** NCAT0020S03
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.
  2. Turn CONSULT-II "ON" and touch "A/T".
  3. Touch "SELF DIAGNOSIS".
  4. Touch "ERASE". (The DTC in the TCM will be erased.) Then touch "BACK" twice.
  5. Touch "ENGINE".
  6. Touch "SELF DIAGNOSIS".
  7. Touch "ERASE". (The DTC in the ECM will be erased.)

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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

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

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

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

DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

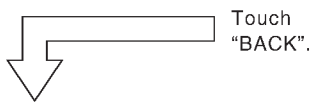
2. Turn CONSULT-II "ON", and touch "A/T".

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

3. Turn "SELF DIAGNOSIS".

SELF DIAG RESULTS	
DTC RESULTS	
T/C CLUTCH SCL/V	

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



DIAGNOSIS SYSTEM SELECTION
A/T
ENGINE

5. Touch "ENGINE".

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
DATA MONITOR (SPEC)
ACTIVE TEST
DTC & SRT CONFIRMATION

6. Touch "SELF DIAGNOSIS".

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

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

SAT286K

## HOW TO ERASE DTC (WITH GST)

NCAT0020S04

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.
2. Perform "OBD-II SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-49. (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-101, "Generic Scan Tool (GST)".

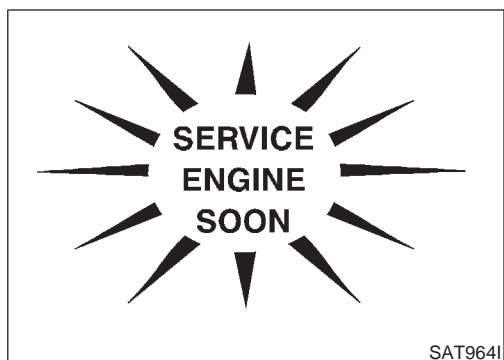
## HOW TO ERASE DTC (NO TOOLS)

NCAT0020S05

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 10 seconds and then turn it "ON" (engine stopped) again.
2. Perform "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-49. (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)

=NCAT0021

1. The malfunction indicator lamp will light up when the ignition switch is turned ON without the engine running. This is for checking the lamp.
  - If the malfunction indicator lamp does not light up, refer to EL-98, "Warning Lamps". (Or see MIL & CONSULT-II in EC section. Refer to EC-81, "Description", "Malfunction Indicator Lamp (MIL)" and EC-88, "CONSULT-II".)
2. When the engine is started, the malfunction indicator lamp should go off. If the lamp remains on, the on board diagnostic system has detected an emission-related (OBD-II) malfunction. For detail, refer to EC-67, "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION".

## CONSULT-II

NCAT0022

After performing "SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)" (AT-41), place check marks for results on the "DIAGNOSTIC WORKSHEET", AT-58. 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.



# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

SELECT SYSTEM
A/T
ENGINE

SAT014K

REAL-TIME DIAG
ENG SPEED SIG

SAT987J



## Ⓜ SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II) NCAT0022S02

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-99. If result is NG, refer to EL-9, "POWER SUPPLY ROUTING".
2. Touch "SELF DIAGNOSIS".  
Display shows malfunction experienced since the last erasing operation.  
CONSULT-II performs "real time diagnosis".  
Also, any malfunction detected while in this mode will be displayed at real time.

GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT

## SELF-DIAGNOSTIC RESULT TEST MODE

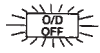

NCAT0022S03

Detected items (Screen terms for CONSULT-II, "SELF DIAGNOSIS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
"A/T"	"ENGINE"		 Available by O/D OFF indicator lamp or "A/T" on CONSULT-II	 Available by malfunction indicator lamp*2, "ENGINE" on CONSULT-II or GST
PNP switch circuit	PNP SW/CIRC	<ul style="list-style-type: none"> <li>TCM does not receive the correct voltage signal (based on the gear position) from the switch.</li> </ul>	—	P0705
Revolution sensor	VEH SPD SEN/CIR AT	<ul style="list-style-type: none"> <li>TCM does not receive the proper voltage signal from the sensor.</li> </ul>	X	P0720
Vehicle speed sensor (Meter)	—	<ul style="list-style-type: none"> <li>TCM does not receive the proper voltage signal from the sensor.</li> </ul>	X	—
A/T 1st gear function	A/T 1ST GR FNCTN	<ul style="list-style-type: none"> <li>A/T cannot be shifted to the 1st gear position even if electrical circuit is good.</li> </ul>	—	P0731*1
A/T 2nd gear function	A/T 2ND GR FNCTN	<ul style="list-style-type: none"> <li>A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.</li> </ul>	—	P0732*1
A/T 3rd gear function	A/T 3RD GR FNCTN	<ul style="list-style-type: none"> <li>A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.</li> </ul>	—	P0733*1

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
# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Detected items (Screen terms for CONSULT-II, "SELF DIAGNOSIS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
			 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
"A/T"	"ENGINE"			
A/T 4th gear function		● A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	—	P0734*1
—	A/T 4TH GR FNCTN			
A/T TCC S/V function (lock-up)		● A/T cannot perform lock-up even if electrical circuit is good.	—	P0744*1
—	A/T TCC S/V FNCTN			
Shift solenoid valve A		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0750
SHIFT SOLENOID/V A	SFT SOL A/CIRC			
Shift solenoid valve B		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0755
SHIFT SOLENOID/V B	SFT SOL B/CIRC			
Overrun clutch solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P1760
OVERRUN CLUTCH S/V	O/R CLUCH SOL/ CIRC			
T/C clutch solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0740
T/C CLUTCH SOL/V	TCC SOLENOID/ CIRC			
Line pressure solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0745
LINE PRESSURE S/V	L/PRESS SOL/ CIRC			
Throttle position sensor, Throttle position switch		● TCM receives an excessively low or high voltage from the sensor.	X	P1705
THROTTLE POSI SEN	TP SEN/CIRC A/T			
Engine speed signal		● TCM does not receive the proper voltage signal from the ECM.	X	P0725
ENGINE SPEED SIG				
A/T fluid temperature sensor		● TCM receives an excessively low or high voltage from the sensor.	X	P0710
BATT/FLUID TEMP SEN	ATF TEMP SEN/ CIRC			
TCM (RAM)		● TCM memory (RAM) is malfunctioning.	—	—
CONTROL UNIT (RAM)	—			
TCM (ROM)		● TCM memory (ROM) is malfunctioning.	—	—
CONTROL UNIT (ROM)	—			

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Detected items (Screen terms for CONSULT-II, "SELF DIAGNOSIS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
"A/T"	"ENGINE"			 Available by O/D OFF indicator lamp or "A/T" on CONSULT-II
TCM (EEP ROM)		<ul style="list-style-type: none"> <li>TCM memory (EEP ROM) is malfunctioning.</li> </ul>	—	—
CONT UNIT (EEP ROM)	—			
Initial start		<ul style="list-style-type: none"> <li>This is not a malfunction message (Whenever shutting off a power supply to the TCM, this message appears on the screen.)</li> </ul>	X	—
INITIAL START	—			
No failure (NO SELF DIAGNOSTIC FAILURE INDICATED FURTHER TESTING MAY BE REQUIRED**)		<ul style="list-style-type: none"> <li>No failure has been detected.</li> </ul>	X	X

X: Applicable

—: Not applicable

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

\*2: Refer to EC-81, "Malfunction Indicator Lamp (MIL)".

## DATA MONITOR MODE (A/T)

NCAT0022S04

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.

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
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>	
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>	
ASCD cruise signal	ASCD-CRUISE [ON/OFF]	X	—	<ul style="list-style-type: none"> <li>Status of ASCD cruise signal is displayed. ON ... Cruising state 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. ON ... OD released 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>
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>	
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>	
Gear position	GEAR	—	X	<ul style="list-style-type: none"> <li>Gear position data used for computation by TCM, is displayed.</li> </ul>	
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>
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>	

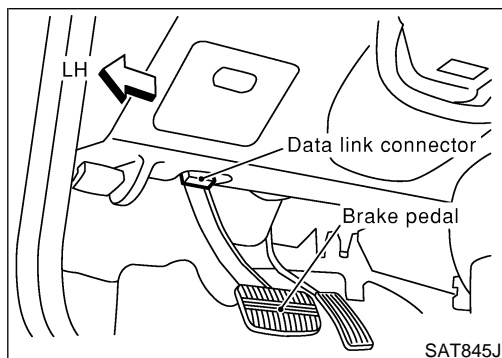
# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
Stop lamp switch	BRAKE SW [ON/OFF]	X	—	<ul style="list-style-type: none"> <li>ON/OFF status are displayed.</li> <li>ON: Brake pedal is depressed.</li> <li>OFF: Brake pedal is released.</li> </ul>	
Throttle position	THROTTLE POSI [8]	—	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>
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>	
Torque converter clutch solenoid valve duty	TCC S/V DUTY [%]	—	X	<ul style="list-style-type: none"> <li>Control value of torque converter clutch solenoid valve, computed by TCM from each input signal, is displayed.</li> </ul>	
Shift solenoid valve A	SHIFT S/V A [ON/OFF]	—	X	<ul style="list-style-type: none"> <li>Control value of shift solenoid valve A, computed by TCM from each input signal, is displayed.</li> </ul>	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	<ul style="list-style-type: none"> <li>Control value of shift solenoid valve B, computed by TCM from each input signal, is displayed.</li> </ul>	
Overrun clutch solenoid valve	OVERRUN/C S/V [ON/OFF]	—	X	<ul style="list-style-type: none"> <li>Control value of overrun clutch solenoid valve computed by TCM from each input signal is displayed.</li> </ul>	
Self-diagnosis display lamp (O/D OFF indicator lamp)	SELF-D DP LMP [ON/OFF]	—	X	<ul style="list-style-type: none"> <li>Control status of O/D OFF indicator lamp is displayed.</li> </ul>	

X: Applicable

—: Not applicable



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

NCAT0022S05

NCAT0022S0501

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

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RS

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HA

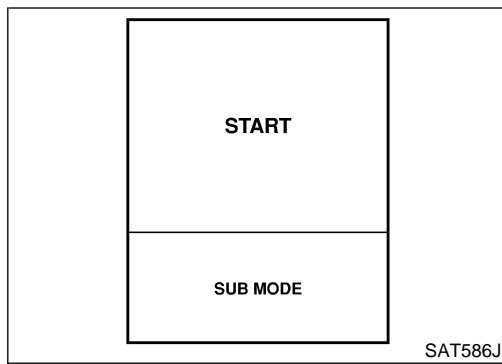
SC

EL

IDX

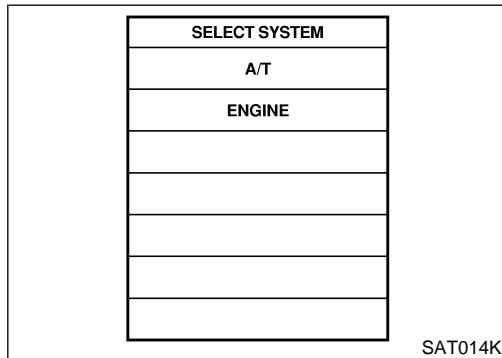
# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)



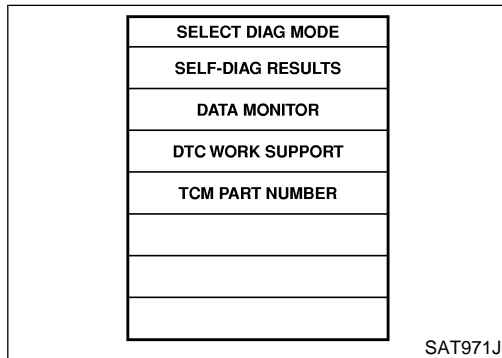
SAT586J

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



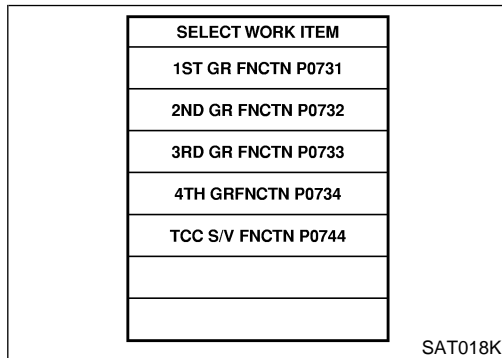
SAT014K

5. Touch "A/T".



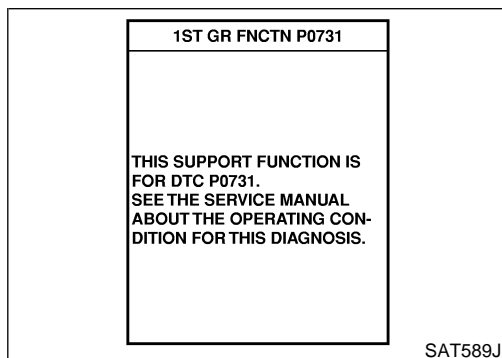
SAT971J

6. Touch "DTC WORK SUPPORT".



SAT018K

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



SAT589J

8. Touch "START".

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

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

SAT019K

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

SAT591J

1ST GR FNCTN P0731	
STOP VEHICLE	

SAT592J

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

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

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

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

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

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RS

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HA

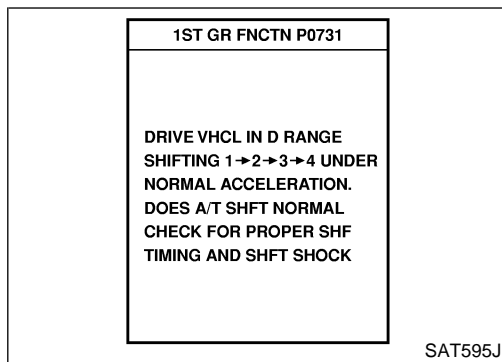
SC

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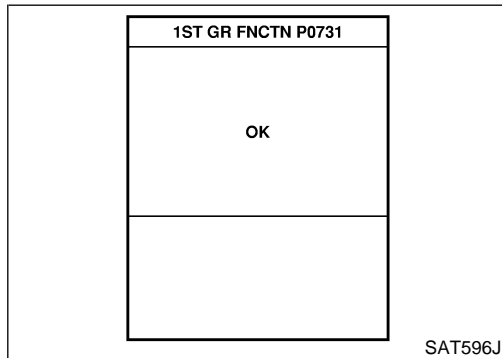
IDX

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

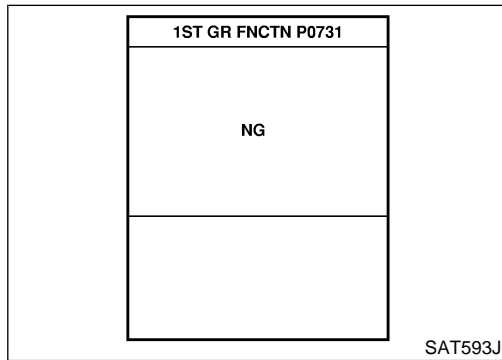
CONSULT-II (Cont'd)



12. Touch "YES" or "NO".



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



## DTC WORK SUPPORT MODE

NCAT0022S06

DTC work support item	Description	Check items (Possible cause)
1ST GR FNCTN P0731	<p>Following items for "A/T 1st gear function (P0731)" can be confirmed.</p> <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	<p>Following items for "A/T 2nd gear function (P0732)" can be confirmed.</p> <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	<p>Following items for "A/T 3rd gear function (P0733)" can be confirmed.</p> <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>



# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

DTC work support item	Description	Check items (Possible cause)
4TH GR FNCTN P0734	<p>Following items for "A/T 4th gear function (P0734)" can be confirmed.</p> <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	<p>Following items for "A/T TCC S/V function (lock-up) (P0744)" can be confirmed.</p> <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>

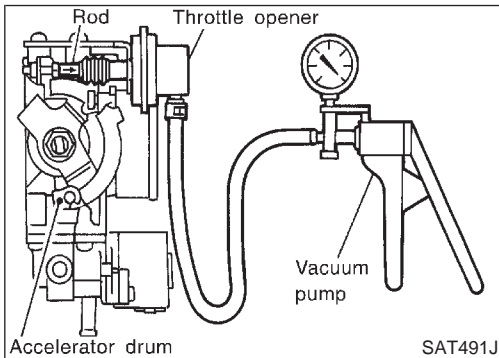
## DIAGNOSTIC PROCEDURE WITHOUT CONSULT-II

### OBD-II Self-diagnostic Procedure (With GST)

Refer to EC-101, section "Generic Scan Tool (GST)".

### OBD-II Self-diagnostic Procedure (No Tools)

Refer to EC-81, "Malfunction Indicator Lamp (MIL)".



### TCM Self-diagnostic Procedure (No Tools)

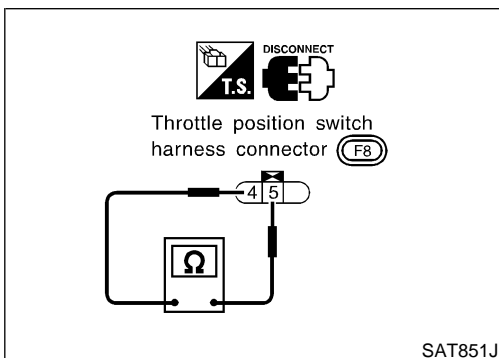
#### Preparation

- Turn ignition switch to "OFF" position.
- Connect the handy type vacuum pump to the throttle opener and apply vacuum  $-25.3$  kPa ( $-190$  mmHg,  $-7.48$  inHg).
- Disconnect the throttle position switch harness connector.
- Turn ignition switch to "ON" position.
- 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.)**

- Go to "TCM self-diagnostic procedure (No tools)".

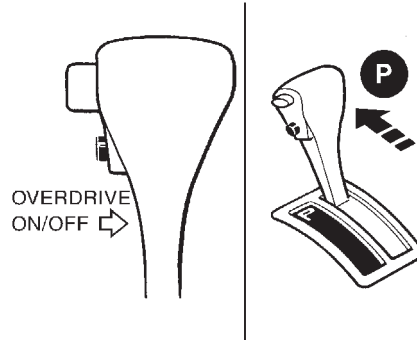


# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

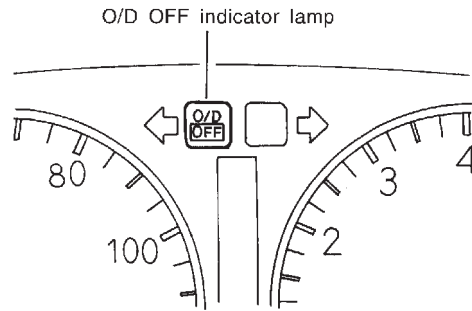
## 1 CHECK O/D OFF INDICATOR LAMP

1. Move selector lever in "P" position.  
Start the engine.  
Warm engine to normal operating temperature.
2. Turn ignition switch to "OFF" position.
3. Wait 5 seconds.



SAT967I

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



SAT490J

Yes or No

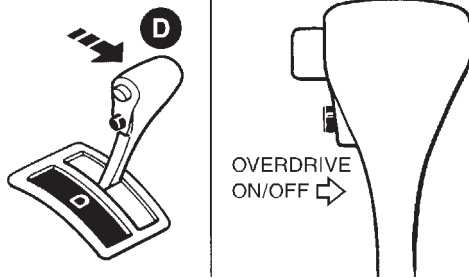
- |     |   |   |
|-----|---|---|
| Yes | ▶ | GO TO 2.  |
| No  | ▶ | Go to "1. O/D OFF Indicator Lamp Does Not Come On", AT-225. |

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

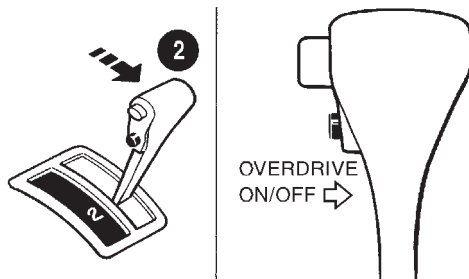
## 2 JUDGEMENT PROCEDURE STEP 1

1. Turn ignition switch to "OFF" position.
2. Turn ignition switch to "ACC" position.
3. Move selector lever from "P" to "D" position.
4. Turn ignition switch to "ON" position.  
(Do not start engine.)
5. Depress and hold overdrive control switch in "OFF" position (the O/D OFF indicator lamp will be "ON") until directed to release the switch.  
(If O/D OFF indicator lamp does not come on, go to step on AT-263.)
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 the 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.

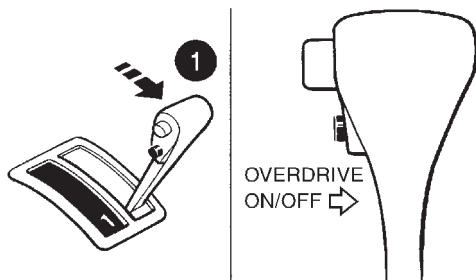
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# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

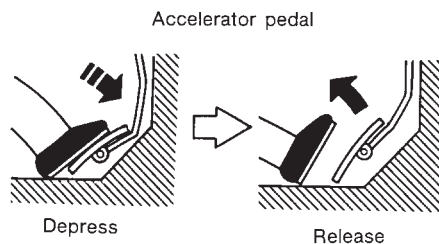
## 3 JUDGEMENT PROCEDURE STEP 2

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.



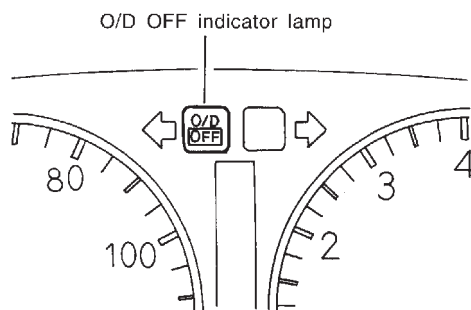
SAT981F

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

▶ GO TO 4.

## 4 CHECK SELF-DIAGNOSIS CODE

Check O/D OFF indicator lamp. Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE, AT-53.



SAT490J

▶ DIAGNOSIS END

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

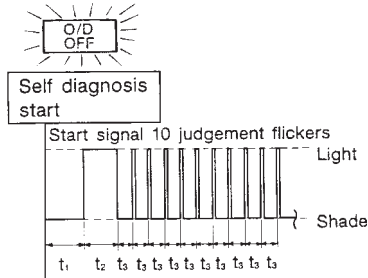
CONSULT-II (Cont'd)

## Judgement of Self-diagnosis Code

NCAT0022S0704

O/D OFF indicator lamp:

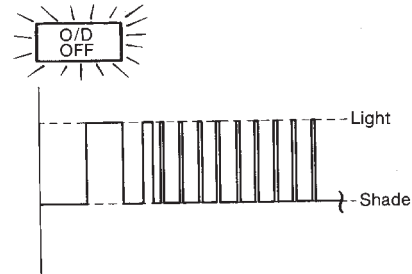
All judgement flickers are the same.



SAT436F

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

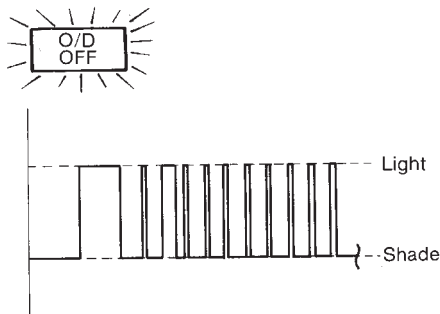
1st judgement flicker is longer than others.



SAT437F

Revolution sensor circuit is short-circuited or disconnected.  
⇒ Go to **VEHICLE SPEED SENSOR-A/T (REVOLUTION SENSOR), AT-119.**

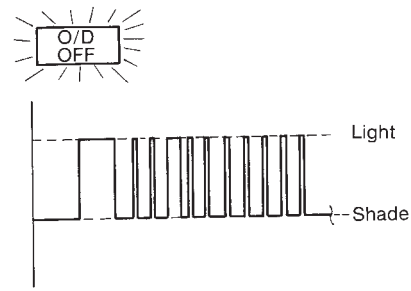
2nd judgement flicker is longer than others.



SAT439F

Vehicle speed sensor circuit is short-circuited or disconnected.  
⇒ Go to **VEHICLE SPEED SENSOR-MTR, AT-215.**

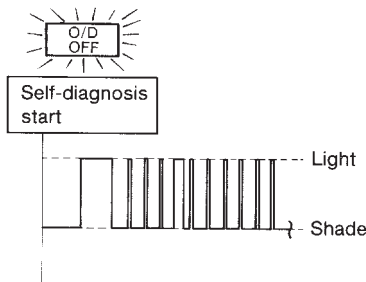
3rd judgement flicker is longer than others.



SAT441F

Throttle position sensor circuit is short-circuited or disconnected.  
⇒ Go to **THROTTLE POSITION SENSOR, AT-193.**

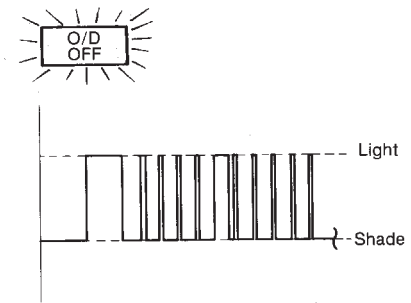
4th judgement flicker is longer than others.



SAT443F

Shift solenoid valve A circuit is short-circuited or disconnected.  
⇒ Go to **SHIFT SOLENOID VALVE A, AT-181.**

5th judgement flicker is longer than others.



SAT445F

Shift solenoid valve B circuit is short-circuited or disconnected.  
⇒ Go to **SHIFT SOLENOID VALVE B, AT-187.**

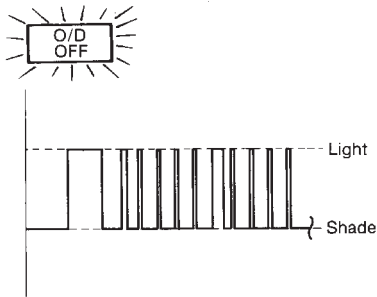
GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

O/D OFF indicator lamp:

6th judgement flicker is longer than others.

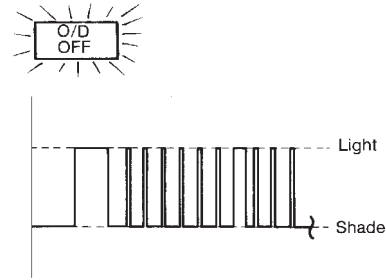


SAT447F

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

⇒ Go to **VERRUN CLUTCH SOLENOID VALVE, AT-202.**

7th judgement flicker is longer than others.

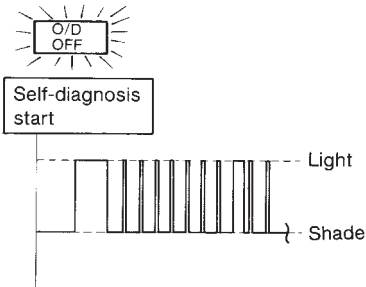


SAT449F

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

⇒ Go to **TORQUE CONVERTER CLUTCH SOLENOID VALVE, AT-157.**

8th judgement flicker is longer than others.

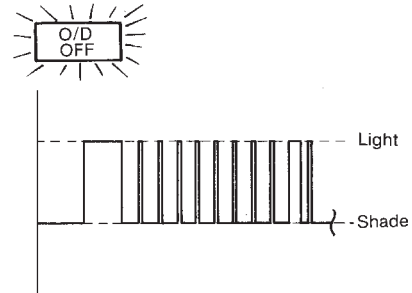


SAT451F

A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged.

⇒ Go to **A/T FLUID TEMPERATURE SENSOR AND TCM POWER SOURCE, AT-113.**

9th judgement flicker is longer than others.

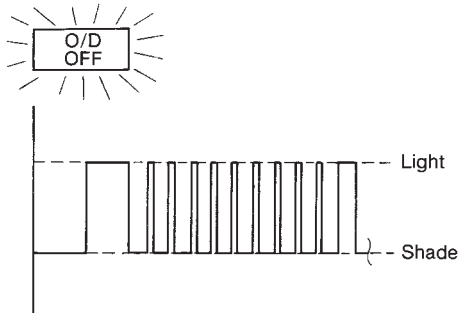


SAT453F

Engine speed signal circuit is short-circuited or disconnected.

⇒ Go to **ENGINE SPEED SIGNAL, AT-124.**

10th judgement flicker is longer than others.

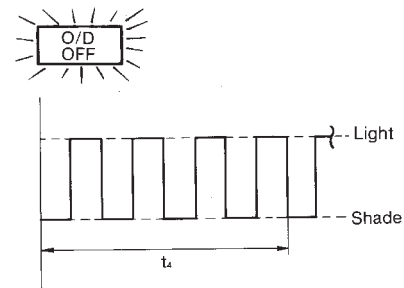


SAT455F

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

⇒ Go to **LINE PRESSURE SOLENOID VALVE, AT-174.**

Flickers as shown below.



SAT457F

Battery power is low.

Battery has been disconnected for a long time.

Battery is connected conversely.

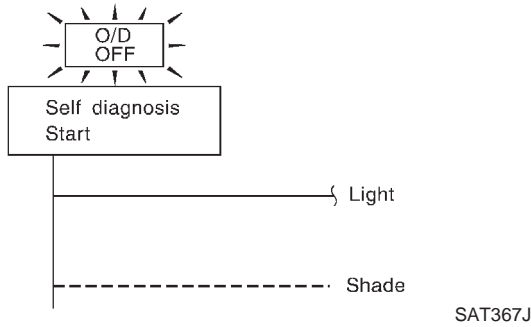
(When reconnecting TCM connectors. — This is not a problem.)

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

O/D OFF indicator lamp:

Lamp comes on.



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-263.**

t<sub>1</sub> = 2.5 seconds t<sub>2</sub> = 2.0 seconds t<sub>3</sub> = 1.0 second t<sub>4</sub> = 1.0 second

GI

MA

EM

LC

EC

FE

CL

MT

**AT**

AX

SU

BR

ST

RS

BT

HA

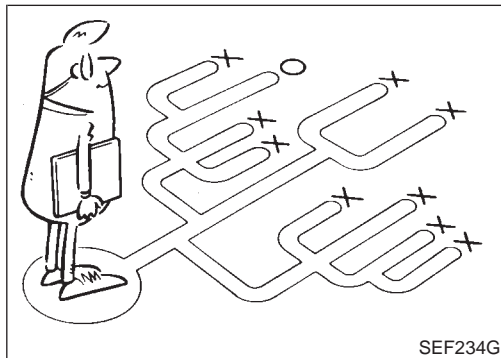
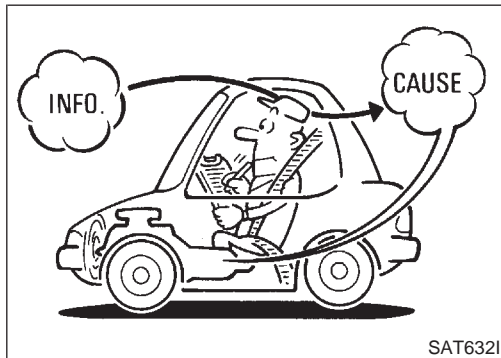
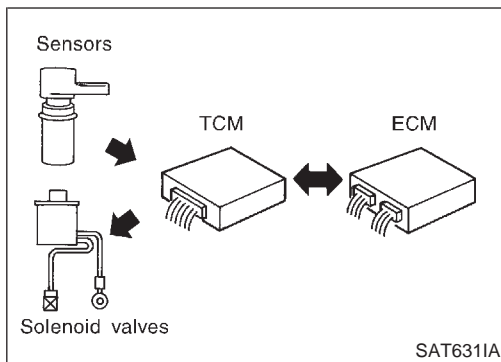
SC

EL

IDX

# TROUBLE DIAGNOSIS — INTRODUCTION

## Introduction



## Introduction

NCAT0023

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-60.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic Worksheet" like the example (AT-58) should be used.

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

**Also check related Service bulletins for information.**





# TROUBLE DIAGNOSIS — INTRODUCTION

Introduction (Cont'd)

## Diagnostic Worksheet

=NCAT0023S0102

1.	<input type="checkbox"/> Read the Fail-safe and listen to customer complaints.	AT-8		
2.	<input type="checkbox"/> CHECK A/T FLUID <input type="checkbox"/> Leakage (Follow specified procedure) <input type="checkbox"/> Fluid condition <input type="checkbox"/> Fluid level	AT-62		
3.	<input type="checkbox"/> Perform STALL TEST and LINE PRESSURE TEST. <input type="checkbox"/> Stall test — Mark possible damaged components/others. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <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"/> Line Pressure test — Suspected parts:	<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	AT-62, 66
<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			
4.	<input type="checkbox"/> Perform all ROAD TEST and mark required procedures.	AT-67		
4-1.	Check before engine is started. <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items. <input type="checkbox"/> PNP switch, AT-107. <input type="checkbox"/> A/T fluid temperature sensor, AT-113. <input type="checkbox"/> Vehicle speed sensor-A/T (Revolution sensor), AT-119. <input type="checkbox"/> Engine speed signal, AT-124. <input type="checkbox"/> Torque converter clutch solenoid valve, AT-157. <input type="checkbox"/> Line pressure solenoid valve, AT-174. <input type="checkbox"/> Shift solenoid valve A, AT-181. <input type="checkbox"/> Shift solenoid valve B, AT-187. <input type="checkbox"/> Throttle position sensor, AT-193. <input type="checkbox"/> Overrun clutch solenoid valve, AT-202. <input type="checkbox"/> PNP, overdrive control and throttle position switches, AT-263. <input type="checkbox"/> A/T fluid temperature sensor and TCM power source, AT-208. <input type="checkbox"/> Vehicle speed sensor-MTR, AT-215. <input type="checkbox"/> Control unit (RAM), control unit (ROM), AT-219. <input type="checkbox"/> Control unit (EEP ROM), AT-221. <input type="checkbox"/> Battery <input type="checkbox"/> Others	AT-68		
4-2.	Check at idle <input type="checkbox"/> 1. O/D OFF Indicator Lamp Does Not Come On, AT-225. <input type="checkbox"/> 2. Engine Cannot Be Started In "P" And "N" Position, AT-228. <input type="checkbox"/> 3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed, AT-229. <input type="checkbox"/> 4. In "N" Position, Vehicle Moves, AT-230. <input type="checkbox"/> 5. Large Shock. "N" → "R" Position, AT-232. <input type="checkbox"/> 6. Vehicle Does Not Creep Backward In "R" Position, AT-234. <input type="checkbox"/> 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position, AT-237.	AT-69		

# TROUBLE DIAGNOSIS — INTRODUCTION

Introduction (Cont'd)

4.	4-3.	<p>Cruise test</p> <hr/> <p>Part-1</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 8. Vehicle Cannot Be Started From D<sub>1</sub>, AT-240.</li> <li><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-243.</li> <li><input type="checkbox"/> 10. A/T Does Not Shift: D<sub>2</sub> → D<sub>3</sub>, AT-246.</li> <li><input type="checkbox"/> 11. A/T Does Not Shift: D<sub>3</sub> → D<sub>4</sub>, AT-249.</li> <li><input type="checkbox"/> 12. A/T Does Not Perform Lock-up, AT-252.</li> <li><input type="checkbox"/> 13. A/T Does Not Hold Lock-up Condition, AT-254.</li> <li><input type="checkbox"/> 14. Lock-up Is Not Released, AT-256.</li> <li><input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Light Braking D<sub>4</sub> → D<sub>3</sub>), AT-257.</li> </ul> <hr/> <p>Part-2</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 16. Vehicle Does Not Start From D<sub>1</sub>, AT-259.</li> <li><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-243.</li> <li><input type="checkbox"/> 10. A/T Does Not Shift: D<sub>2</sub> → D<sub>3</sub>, AT-246.</li> <li><input type="checkbox"/> 11. A/T Does Not Shift: D<sub>3</sub> → D<sub>4</sub>, AT-249.</li> </ul> <hr/> <p>Part-3</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 17. A/T Does Not Shift: D<sub>4</sub> → D<sub>3</sub> When Overdrive Control Switch "ON" → "OFF", AT-260</li> <li><input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Engine Brake In D<sub>3</sub>), AT-257.</li> <li><input type="checkbox"/> 18. A/T Does Not Shift: D<sub>3</sub> → 2<sub>2</sub>, When Selector Lever "D" → "2" Position, AT-261.</li> <li><input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Engine Brake In 2<sub>2</sub>), AT-257.</li> <li><input type="checkbox"/> 19. A/T Does Not Shift: 2<sub>2</sub> → 1<sub>1</sub>, When Selector Lever "2" → "1" Position, AT-262.</li> <li><input type="checkbox"/> 20. Vehicle Does Not Decelerate By Engine Brake, AT-263.</li> <li><input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items.</li> </ul> <hr/> <ul style="list-style-type: none"> <li><input type="checkbox"/> PNP switch, AT-107.</li> <li><input type="checkbox"/> A/T fluid temperature sensor, AT-113.</li> <li><input type="checkbox"/> Vehicle speed sensor-A/T (Revolution sensor), AT-119.</li> <li><input type="checkbox"/> Engine speed signal, AT-124.</li> <li><input type="checkbox"/> Torque converter clutch solenoid valve, AT-157.</li> <li><input type="checkbox"/> Line pressure solenoid valve, AT-174.</li> <li><input type="checkbox"/> Shift solenoid valve A, AT-181.</li> <li><input type="checkbox"/> Shift solenoid valve B, AT-187.</li> <li><input type="checkbox"/> Throttle position sensor, AT-193.</li> <li><input type="checkbox"/> Overrun clutch solenoid valve, AT-202.</li> <li><input type="checkbox"/> PNP, overdrive control and throttle position switches, AT-263.</li> <li><input type="checkbox"/> A/T fluid temperature sensor and TCM power source, AT-208.</li> <li><input type="checkbox"/> Vehicle speed sensor-MTR, AT-215.</li> <li><input type="checkbox"/> Control unit (RAM), control unit (ROM), AT-219.</li> <li><input type="checkbox"/> Control unit (EEP ROM), AT-221.</li> <li><input type="checkbox"/> Battery</li> <li><input type="checkbox"/> Others</li> </ul>	<p>AT-72 AT-76</p> <hr/> <p>AT-80</p> <hr/> <p>AT-82</p>	<p>GI</p> <hr/> <p>MA</p> <hr/> <p>EM</p> <hr/> <p>LC</p> <hr/> <p>EC</p> <hr/> <p>FE</p> <hr/> <p>CL</p> <hr/> <p>MT</p> <hr/> <p><b>AT</b></p> <hr/> <p>AX</p> <hr/> <p>SU</p> <hr/> <p>BR</p> <hr/> <p>ST</p> <hr/> <p>RS</p>
5.	<input type="checkbox"/> For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.		AT-41	
6.	<input type="checkbox"/> Perform all ROAD TEST and re-mark required procedures.		AT-67	BT
7.	<input type="checkbox"/> Perform DTC CONFIRMATION PROCEDURE for following MIL indicating items and check out NG items. Refer to EC-68, "Emission-related Diagnostic Information".		EC section	HA
	<ul style="list-style-type: none"> <li><input type="checkbox"/> DTC (P0731) A/T 1st gear function, AT-128.</li> <li><input type="checkbox"/> DTC (P0732) A/T 2nd gear function, AT-135.</li> <li><input type="checkbox"/> DTC (P0733) A/T 3rd gear function, AT-141.</li> <li><input type="checkbox"/> DTC (P0734) A/T 4th gear function, AT-147.</li> <li><input type="checkbox"/> DTC (P0744) A/T TCC S/V function (lock-up), AT-163.</li> </ul>			SC
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-99 AT-86	EL  IDX
9.	<input type="checkbox"/> Erase DTC from TCM and ECM memories.		AT-38	

# TROUBLE DIAGNOSIS — INTRODUCTION

*Work Flow*

---

## **Work Flow**

NCAT0024

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

NCAT0024S01

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

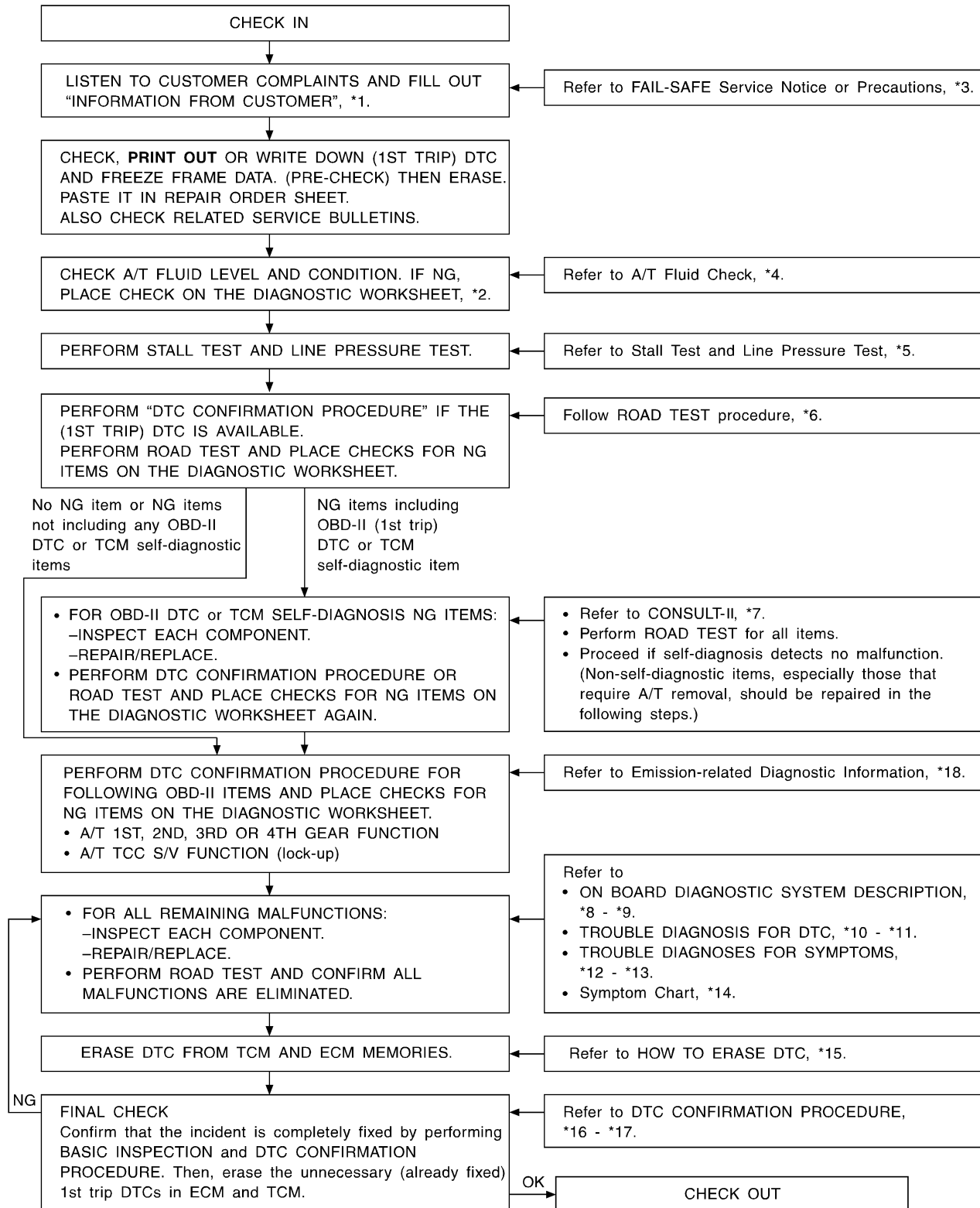
Make good use of the two sheets provided, "INFORMATION FROM CUSTOMER" (AT-57) and "DIAGNOSTIC WORKSHEET" (AT-58), to perform the best troubleshooting possible.

# TROUBLE DIAGNOSIS — INTRODUCTION

Work Flow (Cont'd)

NCAT0024S02

## WORK FLOW CHART



- \*1: AT-57
- \*2: AT-58
- \*3: AT-8
- \*4: AT-62
- \*5: AT-62, 66
- \*6: AT-67

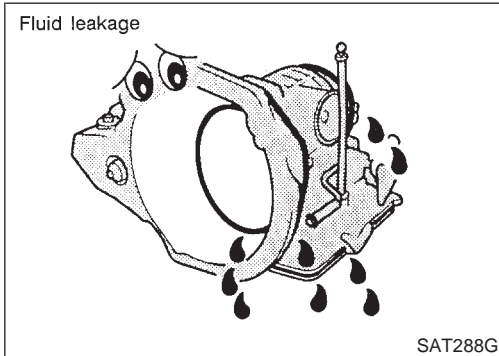
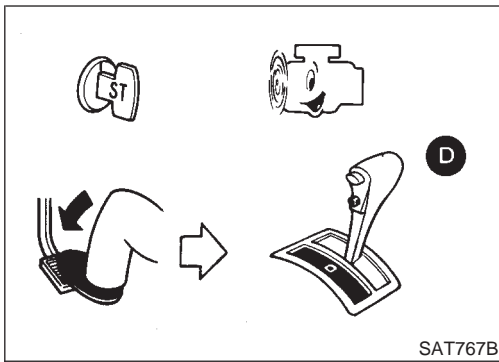
- \*7: AT-40
- \*8: AT-36
- \*9: AT-53
- \*10: AT-107
- \*11: AT-221
- \*12: AT-225

- \*13: AT-263
- \*14: AT-86
- \*15: AT-38
- \*16: AT-108
- \*17: AT-221
- \*18: EC-68

GI  
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CL  
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AT  
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SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# TROUBLE DIAGNOSIS — BASIC INSPECTION

## A/T Fluid Check



## A/T Fluid Check

NCAT0025

### FLUID LEAKAGE CHECK

NCAT0025S01

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

### FLUID CONDITION CHECK

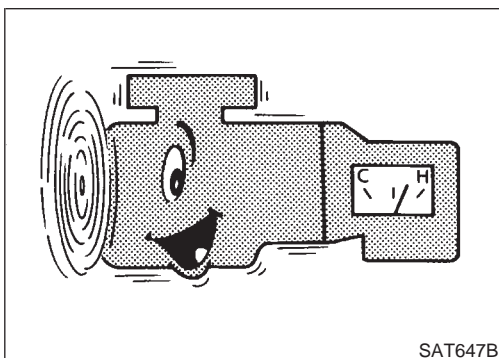
NCAT0025S02

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

### FLUID LEVEL CHECK

NCAT0025S03

Refer to MA-23, “Checking A/T Fluid”.



## Stall Test

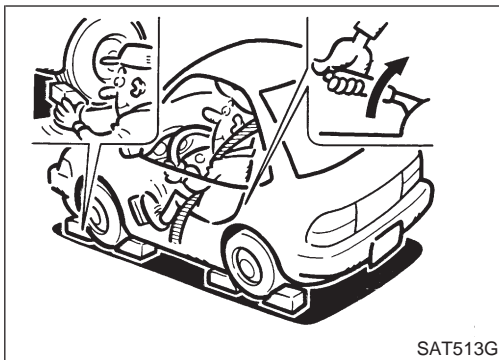
NCAT0026

### STALL TEST PROCEDURE

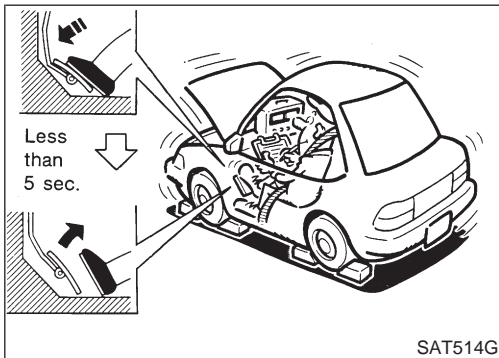
NCAT0026S01

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

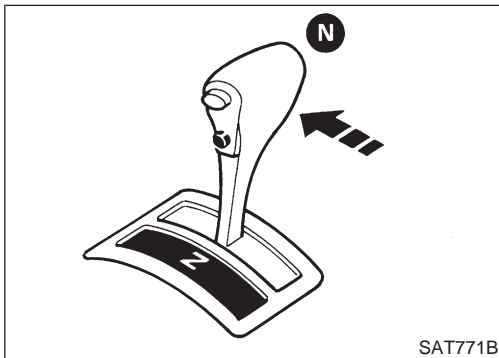
**ATF operating temperature:**  
50 - 80°C (122 - 176°F)



SAT513G



SAT514G



SAT771B

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

GI

MA

EM

LC

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.

EC

FE

CL

**Stall revolution:  
2,350 - 2,850 rpm**

MT

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.

AT

AX

SU

BR

## JUDGEMENT OF STALL TEST

NCAT0026S02

The test result and possible damaged components relating to each result are shown in the illustrations on next page.

In order to pinpoint the possible damaged components, follow the WORK FLOW shown in AT-60.

### NOTE:

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

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

ST

RS

BT

HA

SC

EL

#### 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

IDX

#### Stall revolution within specifications:

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

## TROUBLE DIAGNOSIS — BASIC INSPECTION

Stall Test (Cont'd)

---

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

**CAUTION:**

**Be careful since automatic fluid temperature increases abnormally.**

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

**Stall revolution less than specifications:**

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



# TROUBLE DIAGNOSIS — BASIC INSPECTION

Stall Test (Cont'd)

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

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

GI

MA

EM

LC

EC

FE

CL

MT

**AT**

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BR

ST

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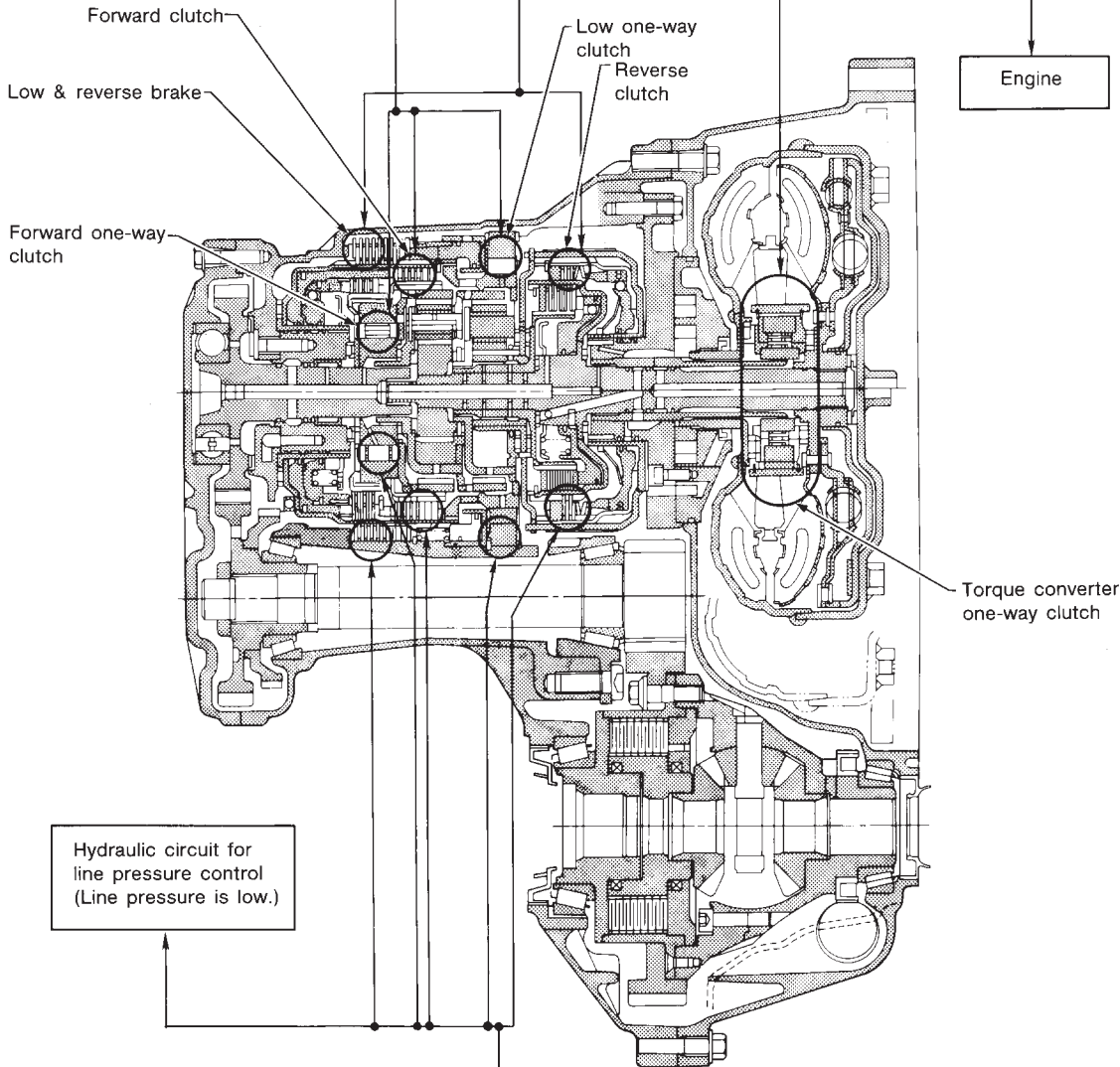
HA

SC

EL

IDX

Damaged components



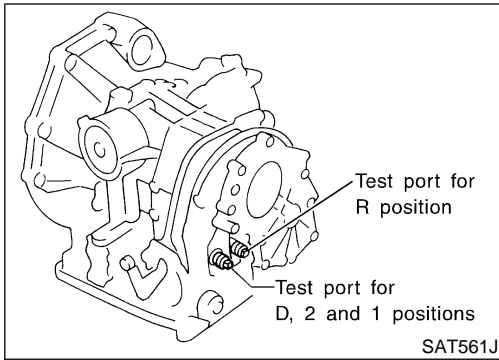
Hydraulic circuit for line pressure control (Line pressure is low.)

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

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

# TROUBLE DIAGNOSIS — BASIC INSPECTION

## Line Pressure Test



## Line Pressure Test

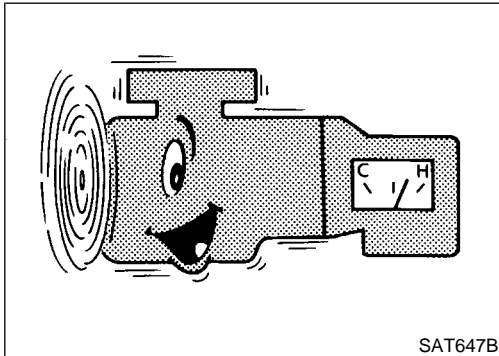
NCAT0027

### LINE PRESSURE TEST PORTS

NCAT0027S01

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

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

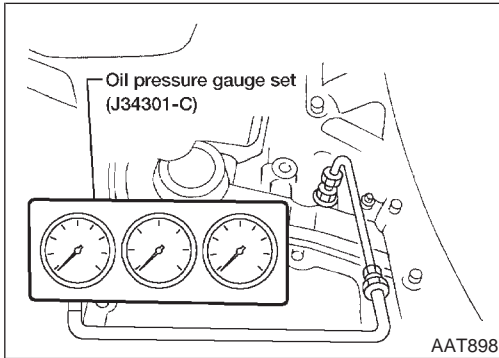


### LINE PRESSURE TEST PROCEDURE

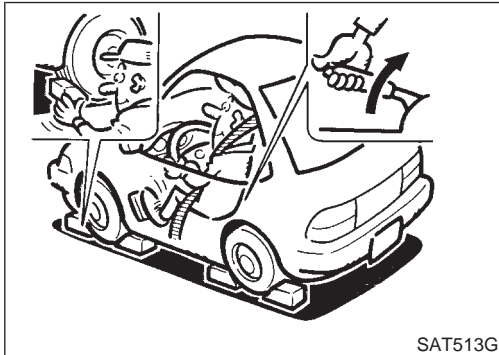
NCAT0027S02

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

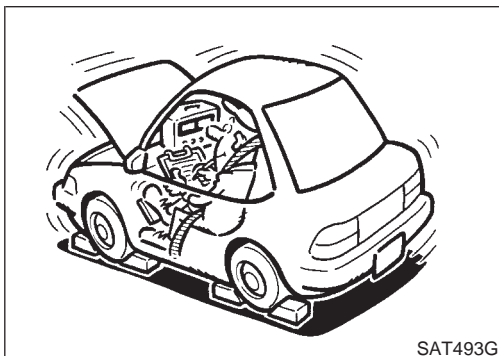
**ATF operating temperature:  
50 - 80°C (122 - 176°F)**



3. Install pressure gauge to corresponding line pressure port.



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



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

Line pressure: Refer to SDS, AT-389.

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Line Pressure Test (Cont'd)

## JUDGEMENT OF LINE PRESSURE TEST

NCAT0027S03

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>	GI MA EM
	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>                             Therefore, fluid leakage exists at or around low and reverse brake circuit. Refer to "CLUTCH AND BAND CHART", AT-20.                         </li> </ul>	LC EC
	Line pressure is high.	<ul style="list-style-type: none"> <li>Maladjustment of throttle position sensor</li> <li>A/T 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>	FE CL
At stall speed	Line pressure is low.	<ul style="list-style-type: none"> <li>Maladjustment 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>	MT <b>AT</b>

AX

SU

BR

### ROAD TEST PROCEDURE

1. Check before engine is started.

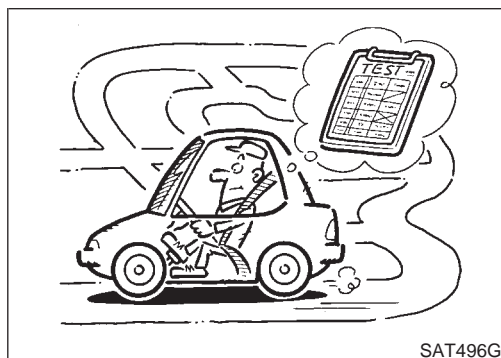


2. Check at idle.



3. Cruise test.

SAT786A



SAT496G

### Road Test

#### DESCRIPTION

NCAT0028

NCAT0028S01

- 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:
  - Check before engine is started
  - Check at idle
  - Cruise test
- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items until specified symptom is found. Troubleshoot items which check out No Good after road test. Refer to "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" and "TROUBLE DIAGNOSES FOR SYMPTOMS", AT-36 - AT-53 and AT-225 - AT-263.

ST

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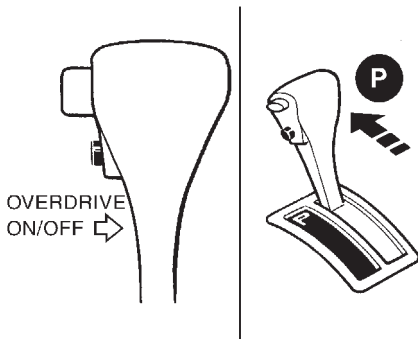
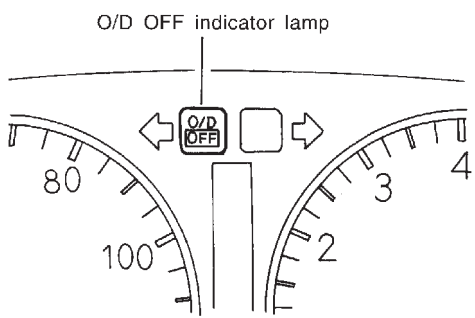
IDX

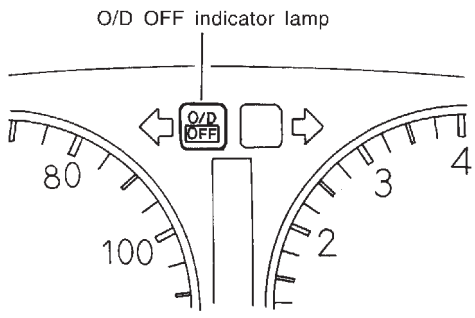
# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

## 1. CHECK BEFORE ENGINE IS STARTED

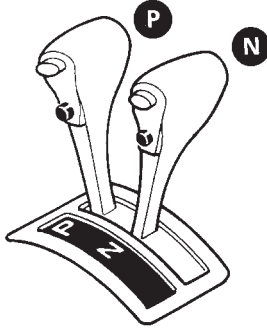
=NCAT0028S02

<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.</p>  <p style="text-align: right;">SAT9671</p>	
		<p>3. Turn ignition switch to "OFF" position. Wait at least 5 seconds. 4. Turn ignition switch to "ON" position. (Do not start engine.) 5. Does O/D OFF indicator lamp come on for about 2 seconds?</p>  <p style="text-align: right;">SAT490J</p>	
		<b>Yes or No</b>	
Yes	▶	GO TO 2.	
No	▶	Stop ROAD TEST. Go to "1. O/D OFF Indicator Lamp Does Not Come On", AT-225.	

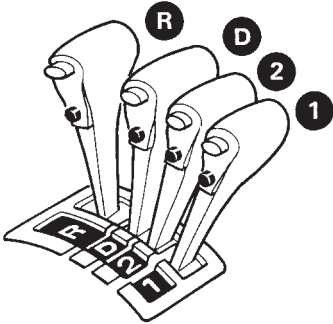
<b>2</b>	<b>CHECK O/D OFF INDICATOR LAMP</b>		
		<p>Does O/D OFF indicator lamp flicker for about 8 seconds?</p>  <p style="text-align: right;">SAT490J</p>	
		<b>Yes or No</b>	
Yes	▶	Perform self-diagnosis and check NG items on the DIAGNOSTIC WORKSHEET, AT-58. Refer to TCM SELF-DIAGNOSIS PROCEDURE (NO TOOLS), AT-49.	
No	▶	<p>1. Turn ignition switch to "OFF" position. 2. Perform self-diagnosis and note NG items. Refer to TCM SELF-DIAGNOSIS PROCEDURE (NO TOOLS), AT-49. 3. Go to "2. CHECK AT IDLE", AT-69.</p>	

## 2. CHECK AT IDLE

=NCAT0028S03

<b>1</b>	<b>CHECK ENGINE START</b>	
<p>1. Park vehicle on flat surface. 2. Move selector lever to "P" position.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch to "OFF" position. 4. Turn ignition switch to "START" position. 5. Is engine started?</p> <p style="text-align: center;"><b>Yes or No</b></p>		
Yes	▶	GO TO 2.
No	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-228. Continue ROAD TEST.

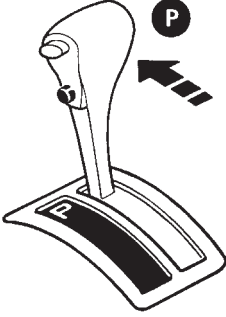
GI  
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**AT**

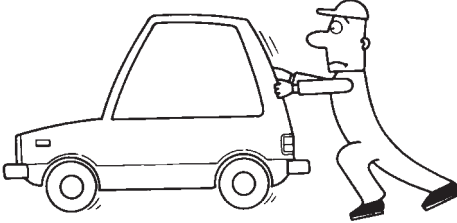
<b>2</b>	<b>CHECK ENGINE START</b>	
<p>1. Turn ignition switch to "ACC" position. 2. Move selector lever to "D", "1", "2" or "R" position.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch to "START" position. 4. Is engine started?</p> <p style="text-align: center;"><b>Yes or No</b></p>		
Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-228. Continue ROAD TEST.
No	▶	GO TO 3.

AX  
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# TROUBLE DIAGNOSIS — BASIC INSPECTION

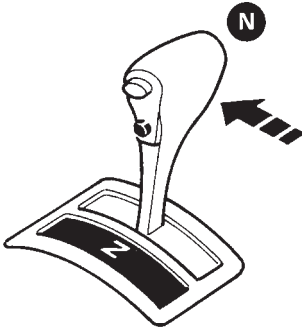
Road Test (Cont'd)

<b>3</b>	<b>CHECK VEHICLE MOVE</b>
<p>1. Move selector lever to "P" position.</p> <div style="text-align: center;">  </div>	
SAT768B	
<p>2. Turn ignition switch to "OFF" position. 3. Release parking brake.</p>	
▶	GO TO 4.

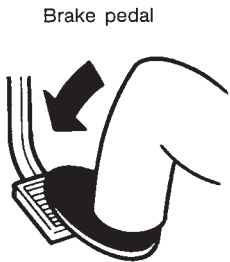
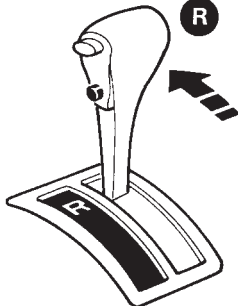
<b>4</b>	<b>CHECK VEHICLE MOVE</b>
<p>1. Push vehicle forward or backward. 2. Does vehicle move when it is pushed forward or backward?</p> <div style="text-align: center;">  </div>	
SAT796A	
<p>3. Apply parking brake.</p>	
<b>Yes or No</b>	
Yes	▶ Mark the box on the DIAGNOSTIC WORKSHEET. Go to "3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed", AT-229. Continue ROAD TEST.
No	▶ GO TO 5.

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

<b>5</b>	<b>CHECK VEHICLE MOVE</b>	
<p>1. Start engine. 2. Move selector lever to "N" position.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT771B</p> <p>3. Release parking brake. 4. Does vehicle move forward or backward?</p> <p style="text-align: center;"><b>Yes or No</b></p>		
Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "4. In "N" Position, Vehicle Moves", AT-230. Continue ROAD TEST.
No	▶	GO TO 6.


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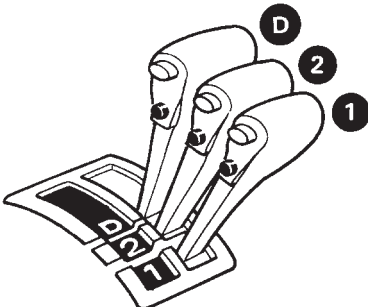
<b>6</b>	<b>CHECK SHIFT SHOCK</b>	
<p>1. Apply foot brake.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT797A</p> <p>2. Move selector lever to "R" position.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT772B</p> <p>3. Is there large shock when changing from "N" to "R" position?</p> <p style="text-align: center;"><b>Yes or No</b></p>		
Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "5. Large Shock "N" → "R" Position", AT-232. Continue ROAD TEST.
No	▶	GO TO 7.

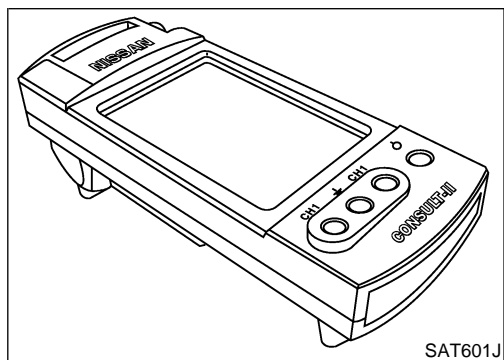
AT  
AX  
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BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

<b>7</b>	<b>CHECK VEHICLE MOVE</b>	
1. Release foot brake for several seconds.		
		
SAT799A		
2. Does vehicle creep backward when foot brake is released?		
<b>Yes or No</b>		
Yes	▶	GO TO 8.
No	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "6. Vehicle Does Not Creep Backward In "R" Position", AT-234. Continue ROAD TEST.

<b>8</b>	<b>CHECK VEHICLE MOVE</b>	
1. Move selector lever to "D", "2" and "1" positions and check if vehicle creeps forward.		
		
SAT773B		
2. Does vehicle creep forward in all three positions?		
<b>Yes or No</b>		
Yes	▶	Go to 3. CRUISE TEST, AT-72.
No	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position", AT-237. Continue ROAD TEST.



## 3. CRUISE TEST

- Check all items listed in Parts 1 through 3.

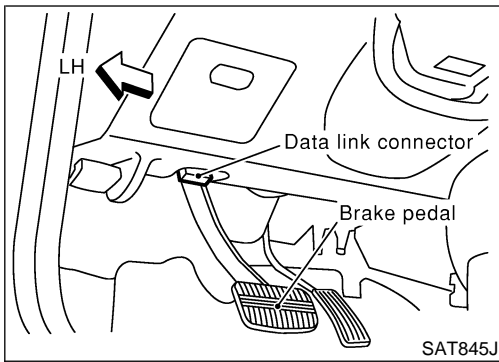
NCAT0028S04

### With CONSULT-II

NCAT0028S0401

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





## CONSULT-II Setting Procedure

NCAT0028S0402

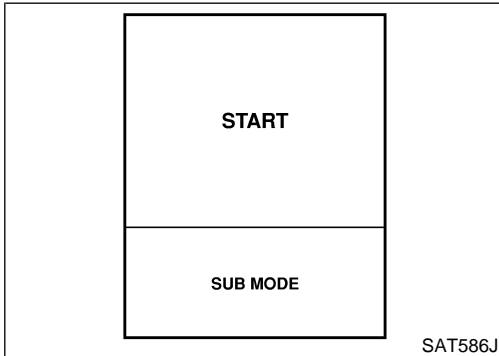
1. Turn ignition switch "OFF".
2. Connect CONSULT-II to Data link connector which is located in left side lower dash panel.

GI

MA

EM

LC



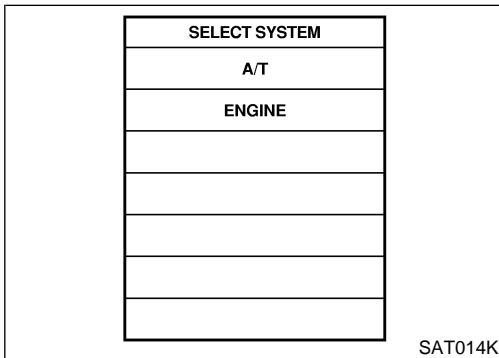
3. Turn ignition switch "ON".
4. Touch "START".

EC

FE

CL

MT



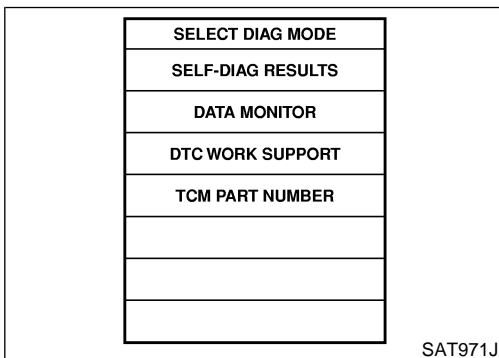
5. Touch "A/T".

**AT**

AX

SU

BR



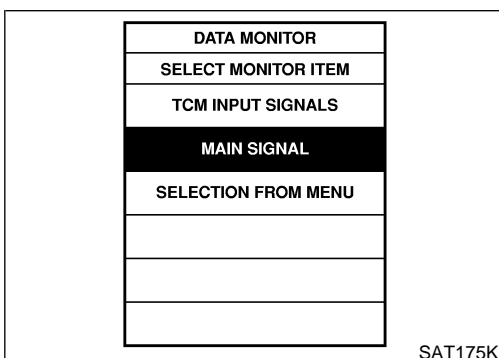
6. Touch "DATA MONITOR".

ST

RS

BT

HA



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

SC

EL

IDX

# 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".

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".

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".

REAL-TIME DIAG	
ENG SPEED SIG	

SAT987J

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

STORE	
SYSTEM	SAVE REC DATA

SAT974J



# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

## Cruise Test — Part 1

=NCAT0028S0404

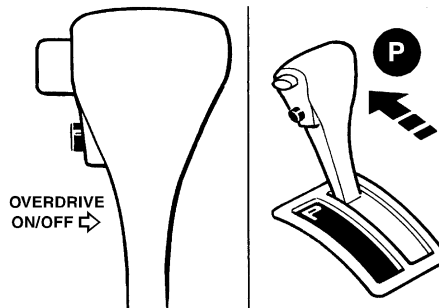
### 1 CHECK STARTING GEAR (D<sub>1</sub>) POSITION

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

**ATF operating temperature:**

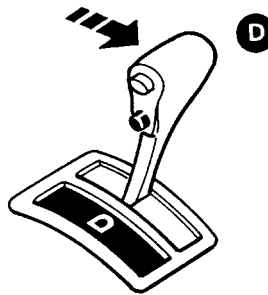
**50 - 80°C (122 - 176°F)**

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



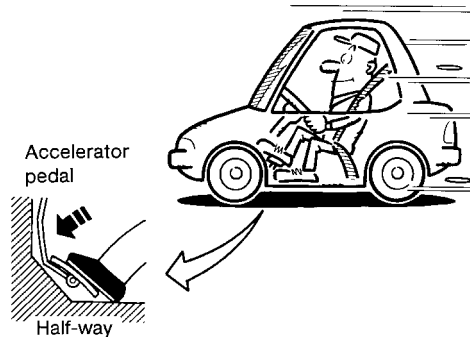
SAT001J

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



SAT775B

7. Accelerate vehicle by constantly depressing accelerator pedal halfway.



SAT495G

8. Does vehicle start from D<sub>1</sub>?

**Read gear position.**

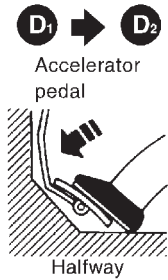
**Yes or No**

Yes  GO TO 2.

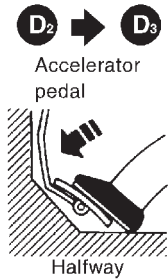
No  Go to "8. Vehicle Cannot Be Started From D<sub>1</sub>", AT-240. Continue ROAD TEST.

# 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-389.		
 <p style="text-align: center;">Accelerator pedal Halfway</p>		
<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-243. Continue ROAD TEST.

GI  
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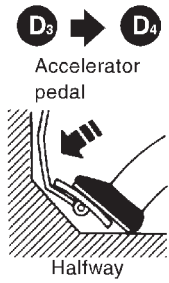
<b>3</b>	<b>CHECK SHIFT UP (D<sub>2</sub> TO D<sub>3</sub>)</b>	
Does A/T shift from D <sub>2</sub> to D <sub>3</sub> at the specified speed? <input type="checkbox"/> <b>Read gear position, throttle position and vehicle speed.</b> Specified speed when shifting from D <sub>2</sub> to D <sub>3</sub> : Refer to Shift schedule, AT-389.		
 <p style="text-align: center;">Accelerator pedal Halfway</p>		
<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-246. Continue ROAD TEST.

MT  
**AT**  
 AX  
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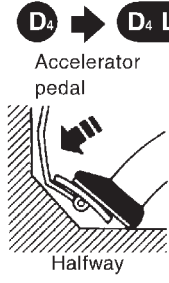
RS  
 BT  
 HA  
 SC  
 EL  
 IDX

# 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? (i) <b>Read gear position, throttle position and vehicle speed.</b> Specified speed when shifting from D <sub>3</sub> to D <sub>4</sub> : Refer to Shift schedule, AT-389.		
 <p style="text-align: center;">Accelerator pedal Halfway</p>		
<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-249. Continue ROAD TEST.

SAT956I

<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? (i) <b>Read vehicle speed, throttle position when lock-up duty becomes 94%.</b> Specified speed when lock-up occurs: Refer to Shift schedule, AT-389.		
 <p style="text-align: center;">Accelerator pedal Halfway</p>		
<b>Yes or No</b>		
Yes	▶	GO TO 6.
No	▶	Go to "12. A/T Does Not Perform Lock-up", AT-252. Continue ROAD TEST.

SAT957I

<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-254.

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

<b>7</b>	<b>CHECK SHIFT DOWN (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="margin-left: 100px;"> <span style="margin-right: 100px;"><b>D<sub>4</sub> L/U</b></span> <span><b>D<sub>4</sub></b></span>              Accelerator pedal      Brake pedal              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-256. Continue ROAD TEST.

GI  
 MA  
 EM  
 LC  
 EC  
 FE

<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="margin-left: 100px;"> <span style="margin-right: 100px;"><b>D<sub>4</sub></b></span> <span><b>D<sub>3</sub></b></span>              Accelerator pedal      Brake pedal              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-80.
No	▶	Go to "15. Engine Speed Does Not Return To Idle (Light Braking D <sub>4</sub> → D <sub>3</sub> )", AT-257. Continue ROAD TEST.

CL  
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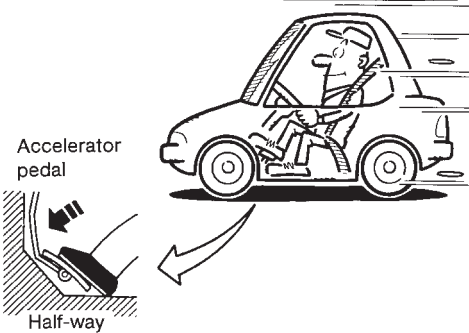
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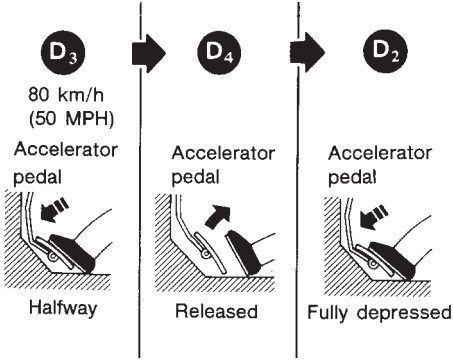
# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

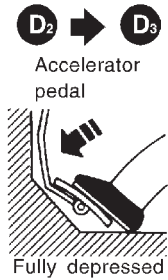
## Cruise Test — Part 2

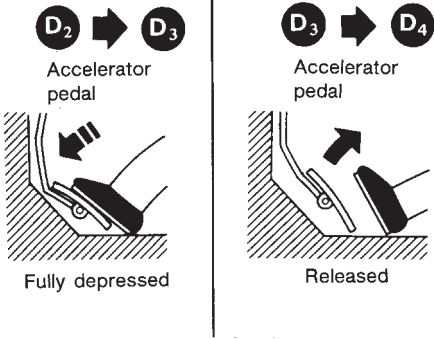
=NCAT0028S0405

<b>1</b>	<b>CHECK STARTING GEAR (D<sub>1</sub>) POSITION</b>
<p>1. Confirm overdrive control switch is in "ON" position.                  2. Confirm selector lever is in "D" position.                  3. Accelerate vehicle by half throttle again.                  4. Does vehicle start from D<sub>1</sub>?</p> <p> <b>Read gear position.</b></p> <div style="text-align: center;">  <p>Accelerator pedal Half-way</p> </div> <p style="text-align: right;">SAT495G</p>	
<b>Yes or No</b>	
Yes	▶ GO TO 2.
No	▶ Go to "16. Vehicle Does Not Start From D <sub>1</sub> ", AT-259. Continue ROAD TEST.

<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>
<p>1. Accelerate vehicle to 80 km/h (50 MPH) as shown in illustration.                  2. Release accelerator pedal and then quickly depress it fully.                  3. Does A/T shift from D<sub>4</sub> to D<sub>2</sub> as soon as accelerator pedal is depressed fully?</p> <p> <b>Read gear position and throttle position.</b></p> <div style="text-align: center;">  <p style="text-align: center;">D<sub>3</sub>      D<sub>4</sub>      D<sub>2</sub></p> <p style="text-align: center;">80 km/h (50 MPH) Accelerator pedal Halfway      Released      Fully depressed</p> </div> <p style="text-align: right;">SAT404H</p>	
<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-243. Continue ROAD TEST.



<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-389.		
		
<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-246. Continue ROAD TEST.

<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-82.
No	▶	Go to "11. A/T Does Not Shift: D <sub>3</sub> → D <sub>4</sub> ", AT-249. Continue ROAD TEST.

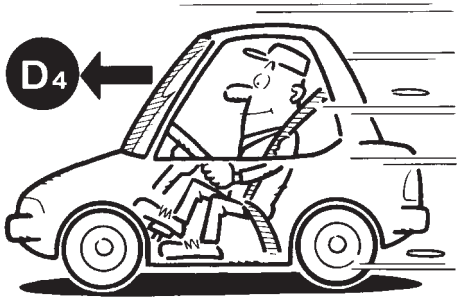
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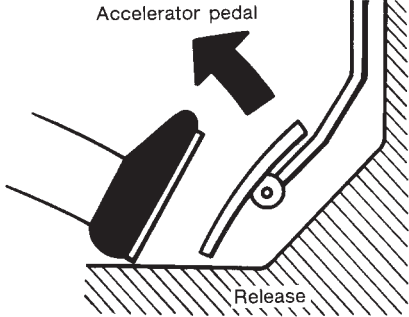
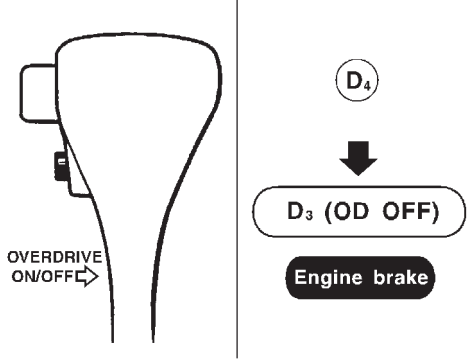
# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

## Cruise Test — Part 3

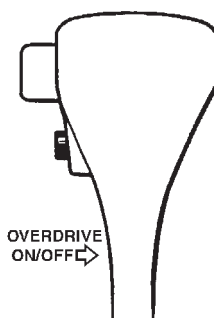
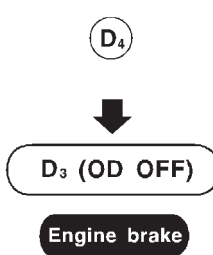
=NCAT0028S0406

<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> <div style="text-align: right; margin-top: 10px;">SAT812A</div>
▶ GO TO 2.		


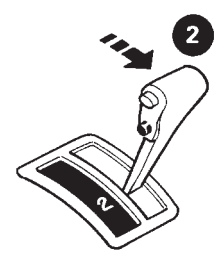
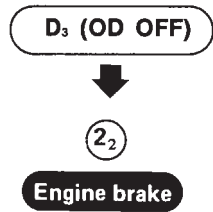
<b>2</b>	<b>CHECK SHIFT DOWN (D<sub>4</sub> TO D<sub>3</sub>)</b>	<ol style="list-style-type: none"> <li>1. Release accelerator pedal.</li> </ol> <div style="text-align: center; margin: 20px 0;">  </div> <div style="text-align: right; margin-top: 10px;">SAT813A</div> <ol style="list-style-type: none"> <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> <div style="text-align: center; margin-top: 10px;">Yes or No</div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 20%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">Yes</td> <td style="width: 5%; text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 3.</td> </tr> <tr> <td style="padding: 5px;">No</td> <td style="text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">Go to "17. A/T Does Not Shift: D<sub>4</sub> → D<sub>3</sub>, When Overdrive Control Switch "ON" → "OFF", AT-260. Continue ROAD TEST.</td> </tr> </table> </div> <div style="width: 75%;"></div> </div>	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-260. Continue ROAD TEST.
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-260. Continue ROAD TEST.						

# TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

<b>3</b>	<b>CHECK ENGINE BRAKE</b>		
Does vehicle decelerate by engine brake?			
			
SAT999I			
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-257. Continue ROAD TEST.	

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CL


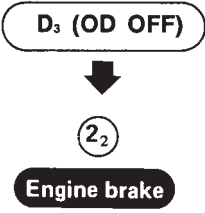
<b>4</b>	<b>CHECK SHIFT DOWN (D<sub>3</sub> TO D<sub>2</sub>)</b>		
1. Move selector lever from "D" to "2" position while driving in D <sub>3</sub> (O/D OFF). 2. Does A/T shift from D <sub>3</sub> (O/D OFF) to 2 <sub>2</sub> ?  <b>Read gear position.</b>			
			
SAT791GA			
Yes or No			
Yes	▶	GO TO 5.	
No	▶	Go to "18. A/T Does Not Shift: D <sub>3</sub> → D <sub>2</sub> , When Selector Lever "D" → "2" Position", AT-261. Continue ROAD TEST.	

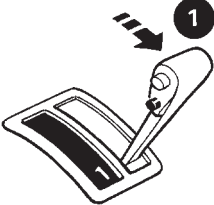
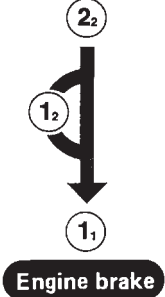
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# TROUBLE DIAGNOSIS — BASIC INSPECTION

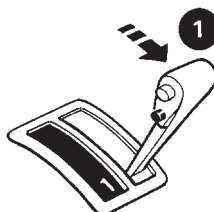
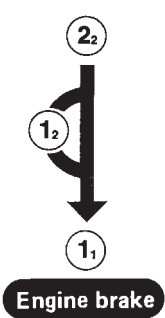
Road Test (Cont'd)

5	<b>CHECK ENGINE BRAKE</b>		
Does vehicle decelerate by engine brake?			
			SAT791GA
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-257. Continue ROAD TEST.	

6	<b>CHECK SHIFT DOWN</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? ⓘ Read gear 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-262. Continue ROAD TEST.	

# 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: right; margin-top: 10px;">SAT778B</p>		
<b>Yes or No</b>		
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-49.</li> </ol>
No	▶	Go to “20. Vehicle Does Not Decelerate By Engine Brake”, AT-263. Continue ROAD TEST.

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 EL  
 IDX

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart

## Symptom Chart

NCAT0029

Numbers are arranged in order of inspection.

Perform inspections starting with number one and work up.

Item	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	Engine cannot start in "P" and "N" positions. AT-228	ON vehicle	1. Ignition switch and starter	EL-9, "POWER SUPPLY ROUTING" and SC-10, "STARTING SYSTEM"
			2. Control cable adjustment	AT-281
			3. PNP switch adjustment	AT-281
	Engine starts in position other than "N" and "P" positions. AT-228	ON vehicle	1. Control cable adjustment	AT-281
			2. PNP switch adjustment	AT-281
	Transaxle noise in "P" and "N" positions.	ON vehicle	1. Fluid level	AT-62
			2. Line pressure test	AT-66
			3. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"
			4. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-119, AT-215
			5. Engine speed signal	AT-124
		OFF vehicle	6. Oil pump	AT-308
			7. Torque converter	AT-291
	Vehicle moves when changing into "P" position, or parking gear does not disengage when shifted out of "P" position. AT-229	ON vehicle	1. Control cable adjustment	AT-281
		OFF vehicle	2. Parking components	AT-286
Vehicle runs in "N" position. AT-230	ON vehicle	1. Control cable adjustment	AT-281	
	OFF vehicle	2. Forward clutch	AT-336	
		3. Reverse clutch	AT-327	
		4. Overrun clutch	AT-336	
Slip/Will Not Engage	ON vehicle	1. Control cable adjustment	AT-281	
		2. Line pressure test	AT-66	
		3. Line pressure solenoid valve	AT-174	
		4. Control valve assembly	AT-280	
	OFF vehicle	5. Reverse clutch	AT-327	
		6. High clutch	AT-331	
		7. Forward clutch	AT-336	
		8. Overrun clutch	AT-336	
		9. Low & reverse brake	AT-343	

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*Symptom Chart (Cont'd)*

Item	Symptom	Condition	Diagnostic Item	Reference Page	
NOT USED	Vehicle braked when shifting into "R" position.	ON vehicle	1. Fluid level	AT-62	GI
			2. Control cable adjustment	AT-281	
			3. Line pressure test	AT-66	MA
			4. Line pressure solenoid valve	AT-174	
			5. Control valve assembly	AT-280	EM
		OFF vehicle	6. High clutch	AT-331	
			7. Brake band	AT-356	LC
			8. Forward clutch	AT-336	
			9. Overrun clutch	AT-336	EC
Shift Shock	Sharp shock in shifting from "N" to "D" position.	ON vehicle	1. Engine idling rpm	AT-66	FE
			2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	CL
			3. Line pressure test	AT-66	MT
			4. A/T fluid temperature sensor	AT-113	
			5. Engine speed signal	AT-124	<b>AT</b>
			6. Line pressure solenoid valve	AT-174	
			7. Control valve assembly	AT-280	AX
			8. Accumulator N-D	AT-280	
		OFF vehicle	9. Forward clutch	AT-336	SU
Slips/Will Not Engage	Vehicle will not run in "D" and "2" positions (but runs in "1" and "R" positions).	ON vehicle	1. Control cable adjustment	AT-281	BR
		OFF vehicle	2. Low one-way clutch	AT-286	
	ON vehicle	Vehicle will not run in "D", "1", "2" positions (but runs in "R" position). Clutch slips. Very poor acceleration. AT-237	1. Fluid level	AT-62	ST
			2. Line pressure test	AT-66	
			3. Line pressure solenoid valve	AT-174	RS
			4. Control valve assembly	AT-280	
			5. Accumulator N-D	AT-280	BT
	OFF vehicle	6. Reverse clutch	AT-327		
		7. High clutch	AT-331	HA	
		8. Forward clutch	AT-336		
9. Forward one-way clutch		AT-347	SC		
10. Low one-way clutch		AT-286			

EL

IDX

## TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*Symptom Chart (Cont'd)*

Item	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Clutches or brakes slip somewhat in starting.	ON vehicle	1. Fluid level	AT-62
			2. Control cable adjustment	AT-281
			3. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"
			4. Line pressure test	AT-66
			5. Line pressure solenoid valve	AT-174
			6. Control valve assembly	AT-280
			7. Accumulator N-D	AT-280
		OFF vehicle	8. Forward clutch	AT-336
			9. Reverse clutch	AT-327
			10. Low & reverse brake	AT-343
			11. Oil pump	AT-308
			12. Torque converter	AT-291
NOT USED	Excessive creep.	ON vehicle	1. Engine idling rpm	EC-53, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment"
Slips/Will Not Engage	No creep at all. AT-234, 237	ON vehicle	1. Fluid level	AT-62
			2. Line pressure test	AT-66
			3. Control valve assembly	AT-280
		OFF vehicle	4. Forward clutch	AT-336
			5. Oil pump	AT-308
			6. Torque converter	AT-291



# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*Symptom Chart (Cont'd)*

Item	Symptom	Condition	Diagnostic Item	Reference Page	
No Up Shift	Failure to change gear from "D <sub>1</sub> " to "D <sub>2</sub> ".	ON vehicle	1. PNP switch adjustment	AT-281	GI
			2. Control cable adjustment	AT-281	
			3. Shift solenoid valve A	AT-181	MA
			4. Control valve assembly	AT-280	
			5. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-119, AT-215	EM
		OFF vehicle	6. Brake band	AT-286	LC
	Failure to change gear from "D <sub>2</sub> " to "D <sub>3</sub> ".	ON vehicle	1. PNP switch adjustment	AT-281	EC
			2. Control cable adjustment	AT-281	
			3. Shift solenoid valve B	AT-187	FE
			4. Control valve assembly	AT-280	
		OFF vehicle	5. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-119, AT-215	CL
			6. High clutch	AT-331	MT
			7. Brake band	AT-286	
	Failure to change gear from "D <sub>3</sub> " to "D <sub>4</sub> ".	ON vehicle	1. PNP switch adjustment	AT-281	<b>AT</b>
			2. Control cable adjustment	AT-281	
3. Shift solenoid valve A			AT-181	AX	
4. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR			AT-119, AT-215	SU	
5. A/T fluid temperature sensor			AT-113	BR	
OFF vehicle		6. Brake band	AT-286		
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-243, 246, 249	ON vehicle	1. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	ST
			2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-119, AT-215	RS
			3. Shift solenoid valve A	AT-181	BT
			4. Shift solenoid valve B	AT-187	HA
	Gear change directly from "D <sub>1</sub> " to "D <sub>3</sub> " occurs.	ON vehicle	1. Fluid level	AT-62	SC
			2. Accumulator servo release	AT-280	
		OFF vehicle	3. Brake band	AT-286	EL

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

## Symptom Chart (Cont'd)

Item	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	Engine stops when shifting lever into "R", "D", "2" and "1".	ON vehicle	1. Engine idling rpm	EC-53, "Idle Speed/Idle Ignition Timing/Idle Mixture Ratio Adjustment"
			2. Torque converter clutch solenoid valve	AT-291
			3. Control valve assembly	AT-280
		OFF vehicle	4. Torque converter	AT-291
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-177, "DTC P0120 THROTTLE POSITION SENSOR"
			2. Line pressure test	AT-66
			3. Accumulator servo release	AT-280
			4. Control valve assembly	AT-280
			5. A/T fluid temperature sensor	AT-113
		OFF vehicle	6. Brake band	AT-286
	Too sharp a shock in change from "D <sub>2</sub> " to "D <sub>3</sub> ".	ON vehicle	1. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"
			2. Line pressure test	AT-66
			3. Control valve assembly	AT-280
		OFF vehicle	4. High clutch	AT-331
			5. Brake band	AT-286
	Too sharp a shock in change from "D <sub>3</sub> " to "D <sub>4</sub> ".	ON vehicle	1. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"
2. Line pressure test			AT-66	
3. Control valve assembly			AT-280	
OFF vehicle		4. Brake band	AT-286	
		5. Overrun clutch	AT-336	

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*Symptom Chart (Cont'd)*

Item	Symptom	Condition	Diagnostic Item	Reference Page		
Slips/Will Not Engage	Almost no shock or clutches slipping in change from "D <sub>1</sub> " to "D <sub>2</sub> ".	ON vehicle	1. Fluid level	AT-62	GI	
			2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	MA	
			3. Line pressure test	AT-66	EM	
			4. Accumulator servo release	AT-280	LC	
			5. Control valve assembly	AT-280		
		OFF vehicle	6. Brake band	AT-286	EC	
		Almost no shock or slipping in change from "D <sub>2</sub> " to "D <sub>3</sub> ".	ON vehicle	1. Fluid level	AT-62	
				2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	FE
				3. Line pressure test	AT-66	CL
				4. Control valve assembly	AT-280	MT
	OFF vehicle		5. High clutch	AT-331	<b>AT</b>	
			6. Brake band	AT-286		
	Almost no shock or slipping in change from "D <sub>3</sub> " to "D <sub>4</sub> ".	ON vehicle	1. Fluid level	AT-62	AX	
			2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	SU	
			3. Line pressure test	AT-66	BR	
			4. Control valve assembly	AT-280		
		OFF vehicle	5. High clutch	AT-331	ST	
			6. Brake band	AT-286		
Vehicle braked by gear change from "D <sub>1</sub> " to "D <sub>2</sub> ".			ON vehicle	1. Fluid level	AT-62	RS
			OFF vehicle	2. Reverse clutch	AT-327	BT
	3. Low & reverse brake	AT-343				
	4. High clutch	AT-331		HA		
	5. Low one-way clutch	AT-286				
Vehicle braked by gear change from "D <sub>2</sub> " to "D <sub>3</sub> ".	ON vehicle	1. Fluid level	AT-62	SC		
	OFF vehicle	2. Brake band	AT-286			

EL  
IDX

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

## Symptom Chart (Cont'd)

Item	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	Vehicle braked by gear change from "D <sub>3</sub> " to "D <sub>4</sub> ".	ON vehicle	1. Fluid level	AT-62
		OFF vehicle	2. Overrun clutch	AT-336
			3. Forward one-way clutch	AT-347
			4. Reverse clutch	AT-327
	Maximum speed not attained. Acceleration poor.	ON vehicle	1. Fluid level	AT-62
			2. PNP switch adjustment	AT-281
			3. Shift solenoid valve A	AT-181
			4. Shift solenoid valve B	AT-187
			5. Control valve assembly	AT-280
		OFF vehicle	6. Reverse clutch	AT-327
			7. High clutch	AT-331
No Down Shift	Failure to change gear from "D <sub>4</sub> " to "D <sub>3</sub> ".	ON vehicle	1. Fluid level	AT-62
			2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"
			3. Overrun clutch solenoid valve	AT-202
			4. Shift solenoid valve A	AT-181
			5. Line pressure solenoid valve	AT-174
			6. Control valve assembly	AT-280
	OFF vehicle	7. Low & reverse brake	AT-343	
		8. Overrun clutch	AT-336	
	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-62
			2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"
3. Shift solenoid valve A			AT-181	
4. Shift solenoid valve B			AT-187	
5. Control valve assembly			AT-280	
OFF vehicle		6. High clutch	AT-331	
		7. Brake band	AT-286	

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*Symptom Chart (Cont'd)*

Item	Symptom	Condition	Diagnostic Item	Reference Page	
No Down Shift	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-62	GI
			2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	MA
			3. Shift solenoid valve A	AT-181	EM
			4. Shift solenoid valve B	AT-187	LC
			5. Control valve assembly	AT-280	
		OFF vehicle	6. Low one-way clutch	AT-374	EC
			7. High clutch	AT-331	
			8. Brake band	AT-286	FE
Shift Shock	Gear change shock felt during deceleration by releasing accelerator pedal.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	CL
			2. Line pressure test	AT-66	MT
			3. Overrun clutch solenoid valve	AT-202	<b>AT</b>
			4. Control valve assembly	AT-280	
Improper Shift Timing	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	1. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	AX
			2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-119, AT-215	SU
	Kickdown does not operate when depressing pedal in "D <sub>4</sub> " within kickdown vehicle speed.	ON vehicle	1. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	BR
			2. Revolution sensor and vehicle speed sensor	AT-119, AT-215	ST
			3. Shift solenoid valve A	AT-181	RS
			4. Shift solenoid valve B	AT-187	BT
	Kickdown operates or engine overruns when depressing pedal in "D <sub>4</sub> " beyond kickdown vehicle speed limit.	ON vehicle	1. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-119, AT-215	HA
			2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	SC
			3. Shift solenoid valve A	AT-181	EL
			4. Shift solenoid valve B	AT-187	IDX

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

## Symptom Chart (Cont'd)

Item	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	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-62
			2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"
			3. Line pressure test	AT-66
			4. Line pressure solenoid valve	AT-174
			5. Control valve assembly	AT-280
		OFF vehicle	6. High clutch	AT-331
			7. Forward clutch	AT-336
	Races extremely fast or slips in changing from "D <sub>4</sub> " to "D <sub>2</sub> " when depressing pedal.	ON vehicle	1. Fluid level	AT-62
			2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"
			3. Line pressure test	AT-66
			4. Line pressure solenoid valve	AT-174
			5. Shift solenoid valve A	AT-181
			6. Control valve assembly	AT-280
		OFF vehicle	7. Brake band	AT-286
			8. Forward clutch	AT-336
	Races extremely fast or slips in changing from "D <sub>3</sub> " to "D <sub>2</sub> " when depressing pedal.	ON vehicle	1. Fluid level	AT-62
			2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"
			3. Line pressure test	AT-66
4. Line pressure solenoid valve			AT-174	
5. Control valve assembly			AT-280	
6. A/T fluid temperature sensor			AT-113	
OFF vehicle		7. Brake band	AT-286	
		8. Forward clutch	AT-336	
		9. High clutch	AT-331	

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*Symptom Chart (Cont'd)*

Item	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-62	GI
			2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	MA
			3. Line pressure test	AT-66	EM
			4. Line pressure solenoid valve	AT-174	LC
			5. Control valve assembly	AT-280	
	OFF vehicle	6. Forward clutch	AT-336	EC	
		7. Forward one-way clutch	AT-347		
		8. Low one-way clutch	AT-286	FE	
	Vehicle will not run in any position.	ON vehicle	1. Fluid level	AT-62	
			2. Control cable adjustment	AT-281	CL
3. Line pressure test			AT-66		
4. Line pressure solenoid valve			AT-174	MT	
OFF vehicle		5. Oil pump	AT-308		
		6. High clutch	AT-331	<b>AT</b>	
		7. Brake band	AT-286		
		8. Low & reverse brake	AT-343	AX	
		9. Torque converter	AT-291	SU	
		10. Parking components	AT-368		
NOT USED	Transmission noise in "D", "2", "1" and "R" positions.	ON vehicle	1. Fluid level	AT-62	
		OFF vehicle	2. Torque converter	AT-291	BR
No Down Shift	Failure to change from "D <sub>3</sub> " to "2 <sub>2</sub> " when changing lever into "2" position. AT-237	ON vehicle	1. PNP switch adjustment	AT-281	ST
			2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	RS
			3. Overrun clutch solenoid valve	AT-202	BT
			4. Shift solenoid valve B	AT-187	
			5. Shift solenoid valve A	AT-181	HA
			6. Control valve assembly	AT-280	
			7. Control cable adjustment	AT-281	SC
		OFF vehicle	8. Brake band	AT-286	EL
			9. Overrun clutch	AT-336	
Improper Shift Timing	Gear change from "2 <sub>2</sub> " to "2 <sub>3</sub> " in "2" position.	ON vehicle	1. PNP switch adjustment	AT-281	IDX

## TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

### Symptom Chart (Cont'd)

Item	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	Engine brake does not operate in "1" position. AT-259	ON vehicle	1. PNP switch adjustment	AT-281
			2. Control cable adjustment	AT-281
			3. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"
			4. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-119, AT-215
			5. Shift solenoid valve A	AT-181
			6. Control valve assembly	AT-280
			7. Overrun clutch solenoid valve	AT-202
		OFF vehicle	8. Overrun clutch	AT-336
			9. Low & reverse brake	AT-343
Improper Shift Timing	Gear change from "1 <sub>1</sub> " to "1 <sub>2</sub> " in "1" position.	ON vehicle	1. PNP switch adjustment	AT-281
			2. Control cable adjustment	AT-281
No Down Shift	Does not change from "1 <sub>2</sub> " to "1 <sub>1</sub> " in "1" position.	ON vehicle	1. PNP switch adjustment	AT-281
			2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-119, AT-215
			3. Shift solenoid valve A	AT-181
			4. Control valve assembly	AT-280
			5. Overrun clutch solenoid valve	AT-202
		OFF vehicle	6. Overrun clutch	AT-336
			7. Low & reverse brake	AT-343
Shift Shock	Large shock changing from "1 <sub>2</sub> " to "1 <sub>1</sub> " in "1" position.	ON vehicle	1. Control valve assembly	AT-280
		OFF vehicle	2. Low & reverse brake	AT-343



# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

*Symptom Chart (Cont'd)*

Item	Symptom	Condition	Diagnostic Item	Reference Page	
NOT USED	Transmission overheats.	ON vehicle	1. Fluid level	AT-62	GI
			2. Engine idling rpm	EC-53, "Idle speed/ignition timing/idle mixture ratio adjustment"	MA
			3. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	EM
			4. Line pressure test	AT-66	LC
			5. Line pressure solenoid valve	AT-174	EC
			6. Control valve assembly	AT-280	FE
		OFF vehicle	7. Oil pump	AT-308	CL
			8. Reverse clutch	AT-327	CL
			9. High clutch	AT-331	MT
			10. Brake band	AT-286	MT
			11. Forward clutch	AT-336	AT
			12. Overrun clutch	AT-336	AT
			13. Low & reverse brake	AT-343	AX
			14. Torque converter	AT-291	AX
ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	ON vehicle	1. Fluid level	AT-62	SU	
	OFF vehicle	2. Reverse clutch	AT-327	BR	
		3. High clutch	AT-331	BR	
		4. Brake band	AT-286	ST	
		5. Forward clutch	AT-336	ST	
		6. Overrun clutch	AT-336	RS	
		7. Low & reverse brake	AT-343	RS	
NOT USED	Offensive smell at fluid charging pipe.	ON vehicle	1. Fluid level	AT-62	BT
		OFF vehicle	2. Torque converter	AT-291	BT
			3. Oil pump	AT-308	HA
			4. Reverse clutch	AT-327	HA
			5. High clutch	AT-331	SC
			6. Brake band	AT-286	SC
			7. Forward clutch	AT-336	EL
			8. Overrun clutch	AT-336	EL
			9. Low & reverse brake	AT-343	EL

IDX

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

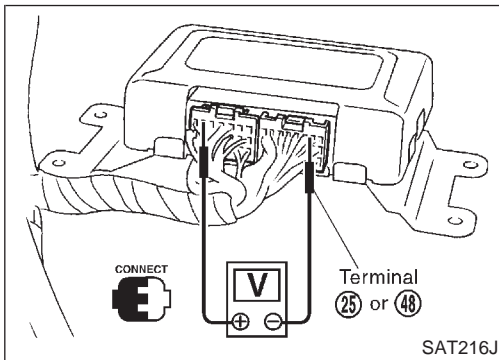
## Symptom Chart (Cont'd)

Item	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-177, "DTC P0120 THROTTLE POSITION SENSOR"
			2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-119, AT-215
			3. PNP switch adjustment	AT-281
			4. Engine speed signal	AT-124
			5. A/T fluid temperature sensor	AT-113
			6. Line pressure test	AT-66
			7. Torque converter clutch solenoid valve	AT-157
			8. Control valve assembly	AT-280
		OFF vehicle	9. Torque converter	AT-291
	Torque converter clutch piston slip.	ON vehicle	1. Fluid level	AT-62
			2. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"
			3. Line pressure test	AT-66
			4. Torque converter clutch solenoid valve	AT-157
			5. Line pressure solenoid valve	AT-174
			6. Control valve assembly	AT-280
OFF vehicle		7. Torque converter	AT-291	
Lock-up point is extremely high or low. AT-252	ON vehicle	1. Throttle position sensor (Adjustment)	EC-177, "DTC P0120 THROTTLE POSITION SENSOR"	
		2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-119, AT-215	
		3. Torque converter clutch solenoid valve	AT-157	
		4. Control valve assembly	AT-280	

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Item	Symptom	Condition	Diagnostic Item	Reference Page
No Up Shift	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-177, "DTC P0120 THROTTLE POSITION SENSOR"
			2. PNP switch adjustment	AT-281
			3. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR	AT-119, AT-215
			4. Shift solenoid valve A	AT-181
			5. Overrun clutch solenoid valve	AT-202
			6. Control valve assembly	AT-280
			7. A/T fluid temperature sensor	AT-113
			8. Line pressure test	AT-66
		OFF vehicle	9. Brake band	AT-286
			10. Overrun clutch	AT-336
NOT USED	Engine is stopped at "R", "D", "2" and "1" positions.	ON vehicle	1. Fluid level	AT-62
			2. Torque converter clutch solenoid valve	AT-157
			3. Shift solenoid valve B	AT-187
			4. Shift solenoid valve A	AT-181
			5. Control valve assembly	AT-280



## TCM Terminals and Reference Value PREPARATION

NCAT0030

NCAT0030S01

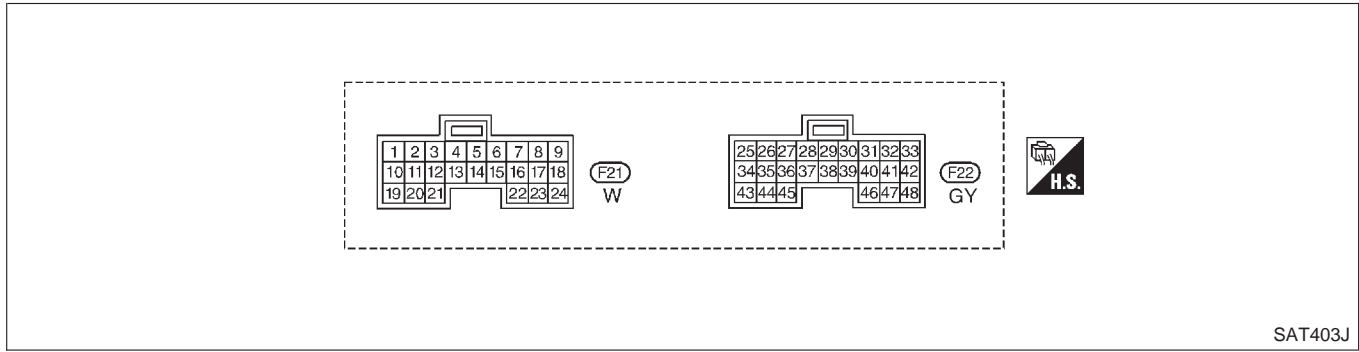
- Measure voltage between each terminal and terminal 25 or 48 by following "TCM INSPECTION TABLE".

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

TCM Terminals and Reference Value (Cont'd)

## TCM HARNESS CONNECTOR TERMINAL LAYOUT







NCAT0030S02



## TCM INSPECTION TABLE








(Data are reference values.)

NCAT0030S03

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

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION









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

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)	
13	G/W	O/D OFF indicator lamp	When setting overdrive control switch in "OFF" position.	0V	
			When setting overdrive control switch in "ON" position.	Battery voltage	
15 *2	PU	—	—	—	
16	Y	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine. Refer to "TCM SELF-DIAGNOSTIC PROCEDURE (No tools)", AT-49.	Battery voltage
				When depressing accelerator pedal after warming up engine. Refer to "TCM SELF-DIAGNOSTIC PROCEDURE (No tools)", AT-49.	0V
17	LG	Wide open throttle position switch (in throttle position switch)		When depressing accelerator pedal more than half-way after warming up engine.	Battery voltage
				When releasing accelerator pedal after warming up engine.	0V
18	OR	ASCD cruise switch		When ASCD cruise is being performed. ("CRUISE" light comes on.)	Battery voltage
				When ASCD cruise is not being performed. ("CRUISE" light does not come on.)	0V
19	R	Power source		Same as No. 10	
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	0V
22	OR/B	Overdrive control switch		When setting overdrive control switch in "ON" position	Battery voltage
				When setting overdrive control switch in "OFF" position	0V
24	W/B	ASCD OD cut signal		When "ACCEL" set switch on ASCD cruise is in "D <sub>4</sub> " position.	5 - 8V
				When "ACCEL" set switch on ASCD cruise is in "D <sub>3</sub> " position.	0V

GI  
MA  
EM  
LG  
EC  
FE  
CL  
MT  
AT  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX



# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

TCM Terminals and Reference Value (Cont'd)

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)	
25	B	Ground	—	—	
26	SB	PNP switch "1" position		When setting selector lever to "1" position.	Battery voltage
				When setting selector lever to other positions.	0V
27	L/OR	PNP switch "2" position		When setting selector lever to "2" position.	Battery voltage
				When setting selector lever to other positions.	0V
28	P	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		When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function.*1 <b>CAUTION:</b> <b>Connect the diagnosis data link cable to the vehicle diagnosis connector.</b> *1: A circuit tester cannot be used to test this item.	150Hz
				When vehicle parks.	Under 1.3V or over 4.5V
30 *3	G/B	—	—	—	
31 *3	GY/L	—	—	—	
32	P/L	Throttle position sensor (Power source)		Ignition switch "ON"	4.5 - 5.5V
				Ignition switch "OFF".	0V
34	LG	PNP switch "D" position		When setting selector lever to "D" position.	Battery voltage
				When setting selector lever to other positions.	0V
35	G	PNP switch "R" position		When setting selector lever to "R" position.	Battery voltage
				When setting selector lever to other positions.	0V
36	GY/R	PNP switch "N" or "P" position		When setting selector lever to "N" or "P" position.	Battery voltage
				When setting selector lever to other positions.	0V
39	L	Engine speed signal		Refer to EC-134, "ECM Inspection Table".	—

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)	
40	Y/G	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	GI MA EM
41	GY	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.5V Fully-open throttle: 4V	LC EC
42	B	Throttle position sensor (Ground)		—	—	FE
45	R/G	Stop lamp switch		When depressing brake pedal.	Battery voltage	CL
47	BR	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.5V	MT
				When ATF temperature is 80°C (176°F).	0.5V	AT
48	B	Ground	—	—		

\*2: This terminal is connected to the ECM.

\*3: These terminals are connected to the Data link connector.

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

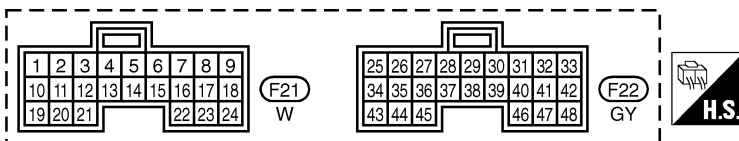
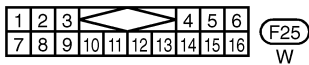
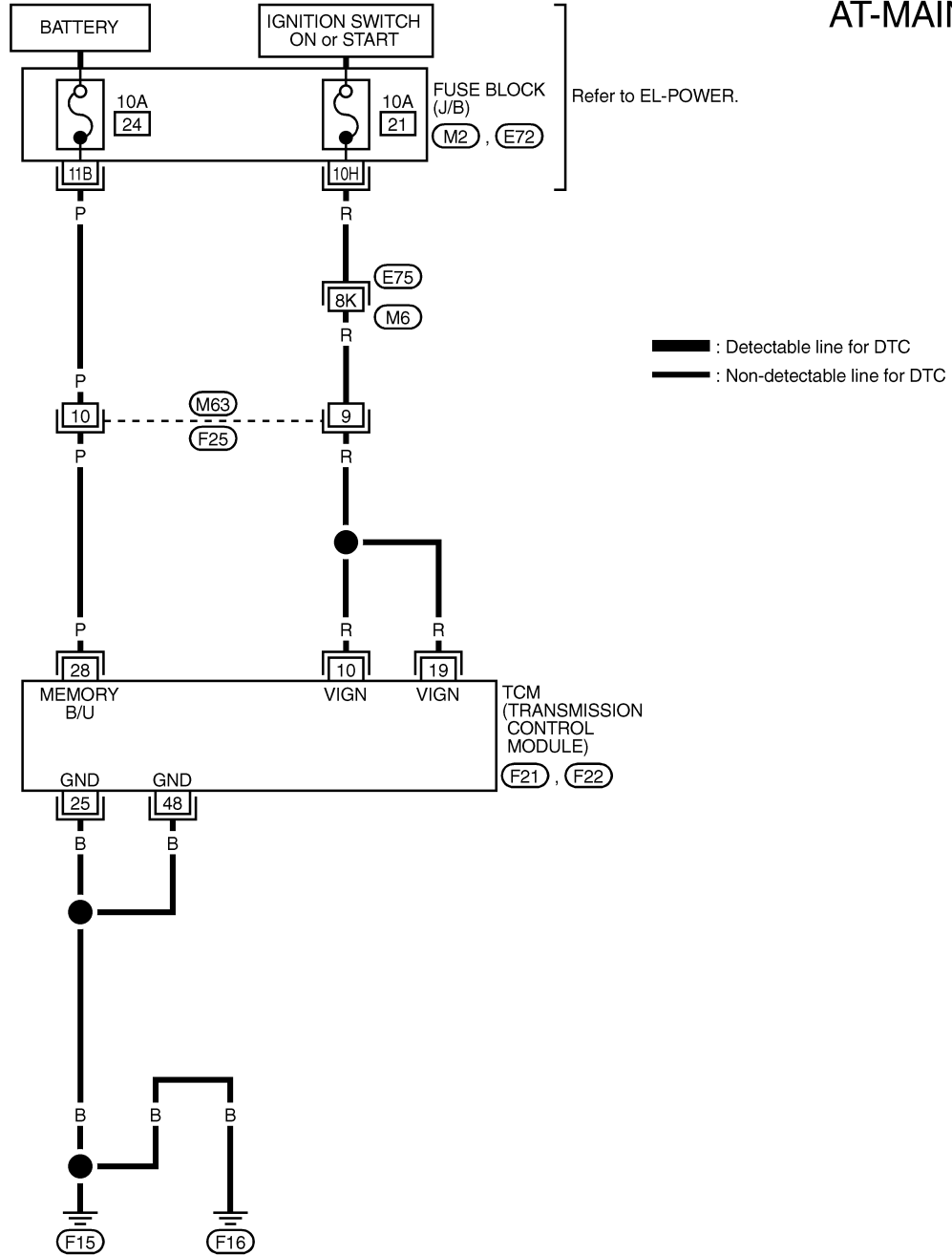
# TROUBLE DIAGNOSIS FOR POWER SUPPLY

Wiring Diagram — AT — MAIN

## Wiring Diagram — AT — MAIN

NCAT0031

AT-MAIN-01



REFER TO THE FOLLOWING.

- (E75)** -SUPER MULTIPLE JUNCTION (SMJ)
- (M2), (E72)** -FUSE BLOCK-JUNCTION BOX (J/B)

TAT222











# TROUBLE DIAGNOSIS FOR POWER SUPPLY

Wiring Diagram — AT — MAIN (Cont'd)

## TCM TERMINALS AND REFERENCE VALUE

NCAT0031S01

Remarks: Specification data are reference values.

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

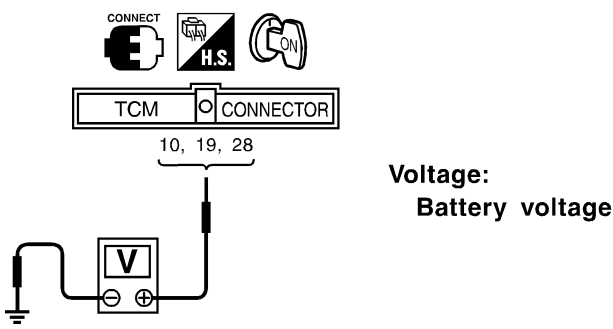
GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT

**AT**

AX  
SU  
BR

## Diagnostic Procedure

NCAT0228

<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>	
	
<p>OK or NG</p>	
OK	▶ GO TO 2.
NG	▶ GO TO 3.

ST  
RS  
BT  
HA  
SC  
EL  
IDX

SAT611J

# TROUBLE DIAGNOSIS FOR POWER SUPPLY

Diagnostic Procedure (Cont'd)

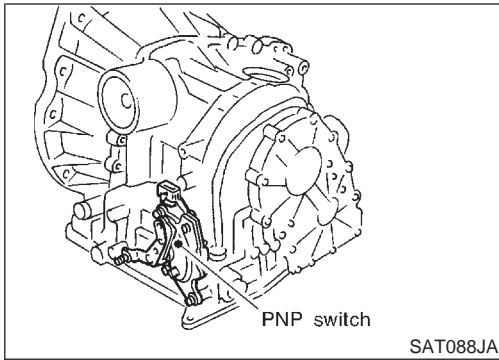
2	<b>CHECK TCM POWER SOURCE STEP 2</b>		
<p>1. Turn ignition switch to OFF position. 2. Check voltage between TCM terminal 28 and ground.</p> <div style="text-align: center;"> </div>			
SAT612JD			
OK	▶	GO TO 4.	
NG	▶	GO TO 3.	

3	<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>● Fuse</li> <li>● Ignition switch</li> </ul> <p>Refer to EL-9, "POWER SUPPLY ROUTING".</p>			
OK or NG			
OK	▶	GO TO 4.	
NG	▶	Repair or replace damaged parts.	

4	<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>			
OK or NG			
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 (PNP) SWITCH

Description



## Description

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

NCAT0032

GI

MA

EM

LC

## TCM TERMINALS AND REFERENCE VALUE

NCAT0032S01

Remarks: Specification data are reference values.

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



EC

FE

CL

MT

AT

AX

SU

BR

ST

RS

## ON BOARD DIAGNOSIS LOGIC

NCAT0032S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (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>

BT

HA

SC

EL

IDX

# DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH

Description (Cont'd)

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
DATA MONITOR (SPEC)
ACTIVE TEST
DTC & SRT CONFIRMATION

SEF949Y

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0032S03

### 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 (PNP) SWITCH

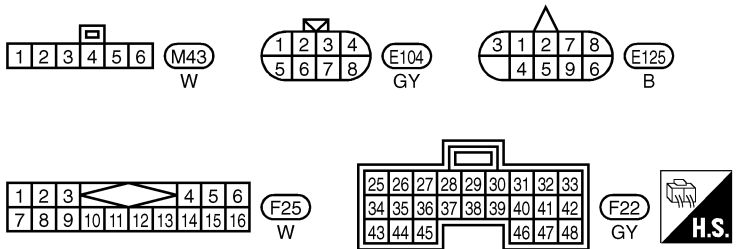
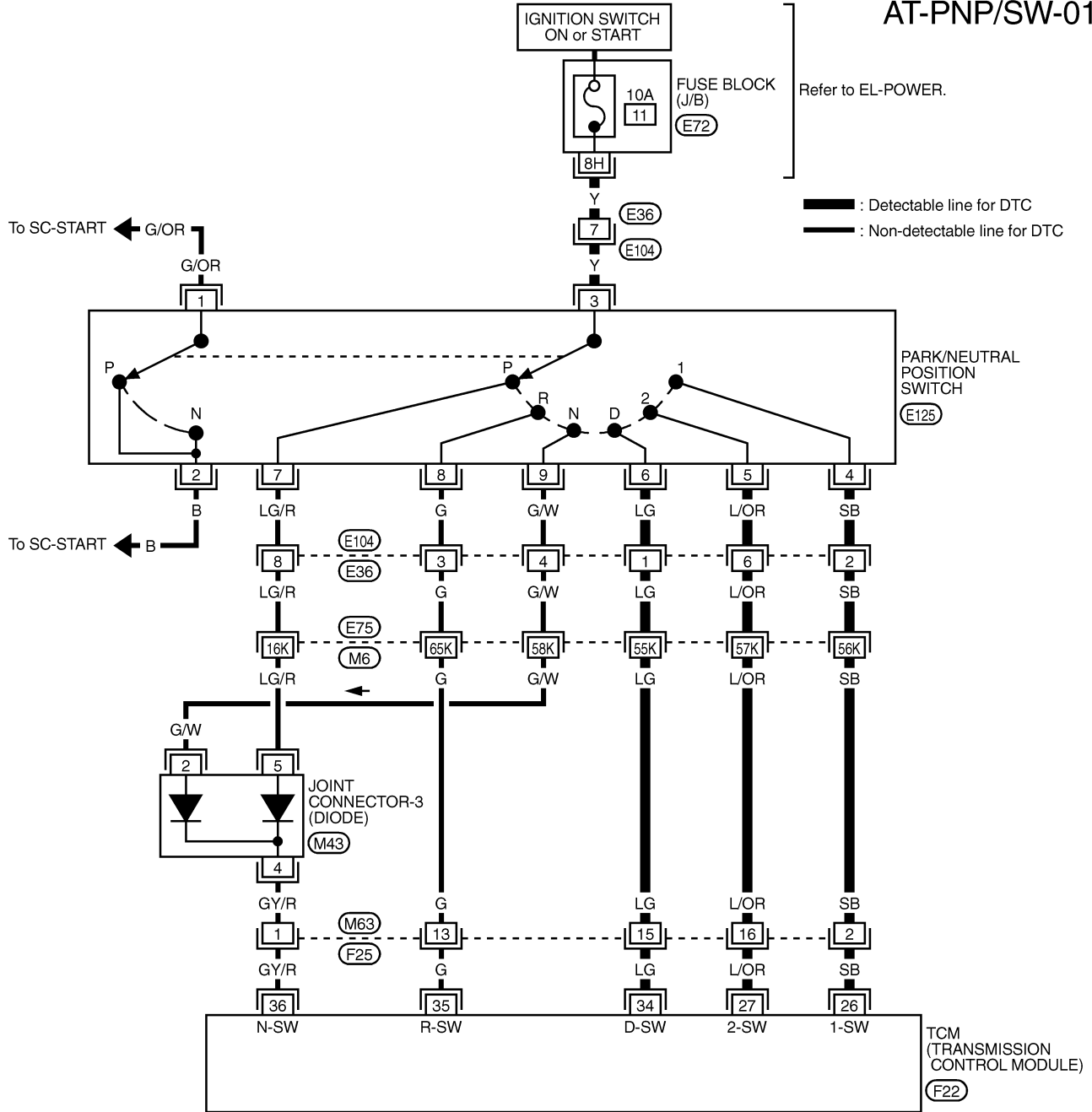
Wiring Diagram — AT — PNP/SW

## Wiring Diagram — AT — PNP/SW

NCAT0199

AT-PNP/SW-01

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



REFER TO THE FOLLOWING.  
 (E75) -SUPER MULTIPLE JUNCTION (SMJ)  
 (E72) -FUSE BLOCK-JUNCTION BOX (J/B)


TAT223

# DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH

Diagnostic Procedure

## Diagnostic Procedure

NCAT0033

<b>1</b>	<b>CHECK PNP SWITCH CIRCUIT (With CONSULT-II)</b>																	
<p> <b>With CONSULT-II</b></p> <p>1. Turn ignition switch to "ON" position. (Do not start engine.)</p> <p>2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</p>																		
<table border="1"> <thead> <tr> <th colspan="2">SELECT SYSTEM</th> </tr> </thead> <tbody> <tr> <td colspan="2" style="text-align: center;">A/T</td> </tr> <tr> <td colspan="2" style="text-align: center;">ENGINE</td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <td colspan="2"> </td> </tr> </tbody> </table>			SELECT SYSTEM		A/T		ENGINE											
SELECT SYSTEM																		
A/T																		
ENGINE																		
<p>3. Read out "P/N", "R", "D", "2" and "1" position switches moving selector lever to each position. Check the signal of the selector lever position is indicated properly.</p>																		
<table border="1"> <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																	
<b>OK or NG</b>																		
<b>OK</b>	▶	GO TO 3.																
<b>NG</b>	▶	<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● PNP switch Refer to "Component Inspection", AT-112.</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>● Ignition switch and fuse Refer to EL-9, "POWER SUPPLY ROUTING".</li> <li>● Diode (P, N positions)</li> </ul>																

SAT014K

SAT701J

# DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH

Diagnostic Procedure (Cont'd)

## 2 CHECK PNP SWITCH CIRCUIT (Without CONSULT-II)

**⊗ Without CONSULT-II**

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

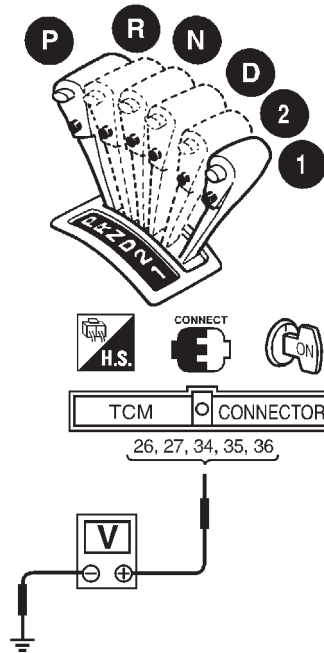
**Voltage:**

**B: Battery voltage**

**0: 0V**

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

MTBL0136



SAT425J

OK or NG

OK ► GO TO 3.

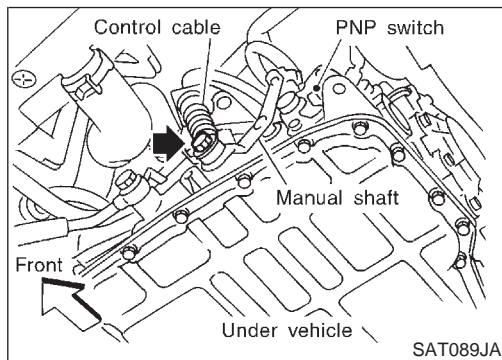
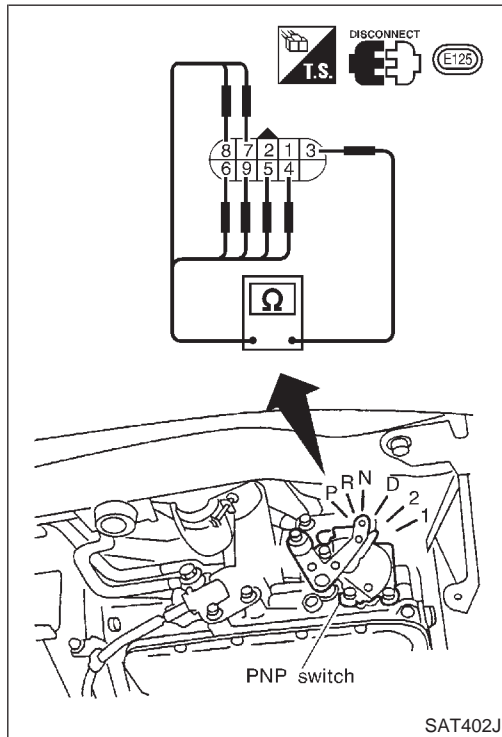
- NG ► **Check the following items:**
- PNP switch  
Refer to "Component Inspection", AT-112.
  - Harness for short or open between ignition switch and PNP switch (Main harness)
  - Harness for short or open between PNP switch and TCM (Main harness)
  - Ignition switch and fuse  
Refer to EL-9, "POWER SUPPLY ROUTING".
  - Diode (P, N positions)

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

# DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH

Diagnostic Procedure (Cont'd)

<b>3</b>	<b>CHECK DTC</b>
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-108.	
<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>



## Component Inspection

### PARK/NEUTRAL POSITION SWITCH

NCAT0034

NCAT0034S01

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

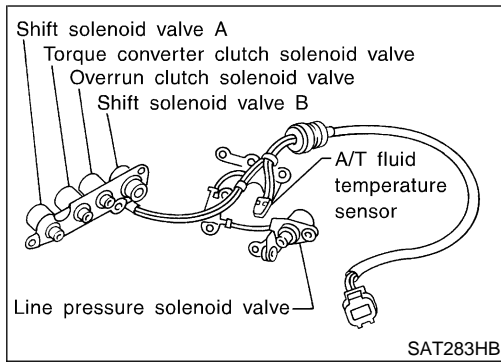
Lever position	Terminal No.	
P	3 — 7	1 — 2
R	3 — 8	
N	3 — 9	1 — 2
D	3 — 6	
2	3 — 5	
1	3 — 4	

2. If NG, check again with control cable disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust control cable. Refer to AT-281.
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-281.
6. If NG on step 4, replace PNP switch.



# DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

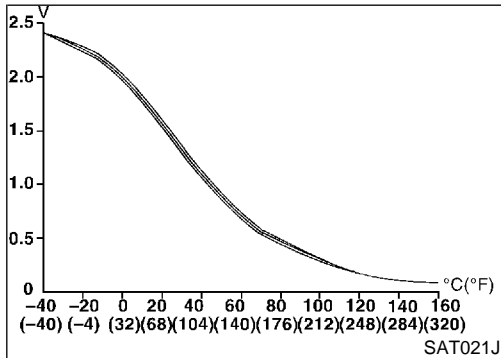
Description



## Description

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

NCAT0035



## CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NCAT0035S01

Remarks: Specification data are reference values.

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

## TCM TERMINALS AND REFERENCE VALUE

NCAT0035S02

Remarks: Specification data are reference values.

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

## ON BOARD DIAGNOSIS LOGIC

NCAT0035S03

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

# 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
DATA MONITOR (SPEC)
ACTIVE TEST
DTC & SRT CONFIRMATION

SEF949Y

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0035S04

### 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 AT FLUID TEMPERATURE SENSOR CIRCUIT

Wiring Diagram — AT — FTS

## Wiring Diagram — AT — FTS

NCAT0200

AT-FTS-01 GI

MA

EM

LC

EC

FE

CL

MT

**AT**

AX

SU

BR

ST

RS

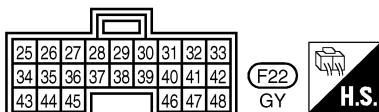
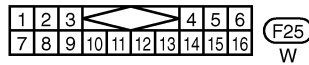
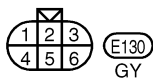
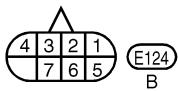
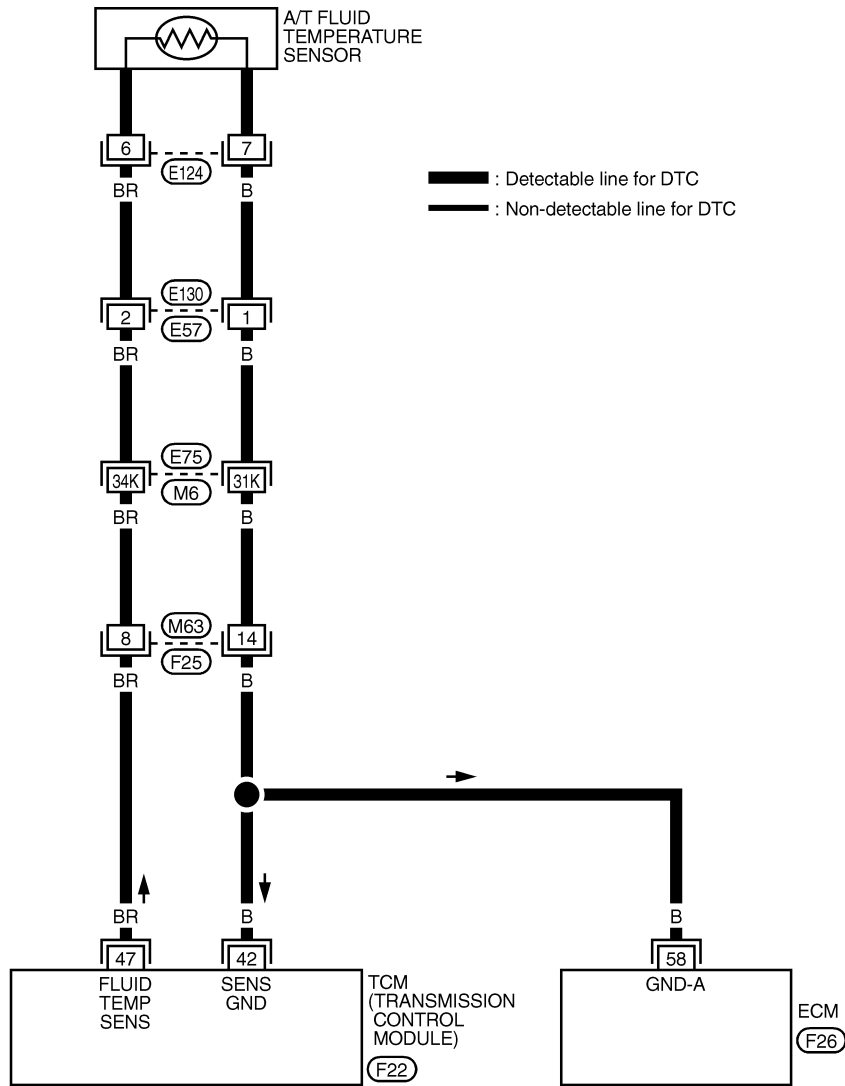
BT

HA

SC

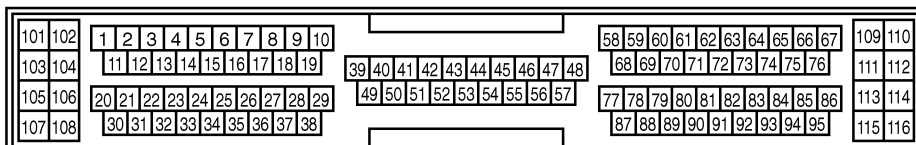
EL

IDX



REFER TO THE FOLLOWING.

(E75) -SUPER MULTIPLE JUNCTION (SMJ)



TAT224


# DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Diagnostic Procedure

## Diagnostic Procedure

NCAT0036

<b>1</b>	<b>INSPECTION START</b>	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

<b>2</b>	<b>CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (With CONSULT-II)</b>																			
<p> <b>With CONSULT-II</b></p> <p>1. Start engine.</p> <p>2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</p>																				
<table border="1" style="margin: auto;"> <tr><th colspan="2">SELECT SYSTEM</th></tr> <tr><td style="text-align: center;">A/T</td><td></td></tr> <tr><th colspan="2">ENGINE</th></tr> <tr><td> </td><td></td></tr> <tr><td> </td><td></td></tr> <tr><td> </td><td></td></tr> <tr><td> </td><td></td></tr> <tr><td> </td><td></td></tr> <tr><td> </td><td></td></tr> </table>			SELECT SYSTEM		A/T		ENGINE													
SELECT SYSTEM																				
A/T																				
ENGINE																				
<p>3. Read out the value of "FLUID TEMP SE".</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>																				
<table border="1" style="margin: auto;"> <tr><th colspan="2">DATA MONITOR</th></tr> <tr><th colspan="2">MONITORING</th></tr> <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> </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 5.																		

SAT014K

SAT614J

# DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Diagnostic Procedure (Cont'd)

<b>3</b>	<b>CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (Without CONSULT-II)</b>	
<p>⊗ Without CONSULT-II</p> <p>1. Start engine.</p> <p>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> <div style="text-align: center;"> <p>Diagram showing a voltmeter connected to terminal 47 of the TCM connector and ground. The ignition is ON, and the engine is running (H.S.).</p> </div> <p>3. Turn ignition switch to "OFF" position.</p> <p>4. Disconnect TCM harness connector.</p> <p>5. Check continuity between terminal 42 and ground.</p> <p><b>Continuity should exist.</b></p> <div style="text-align: center;"> <p>Diagram showing a continuity tester connected to terminal 42 of the TCM connector and ground. The ignition is OFF, and the TCM connector is disconnected.</p> </div> <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>		
OK	▶	GO TO 4.
NG	▶	GO TO 5.

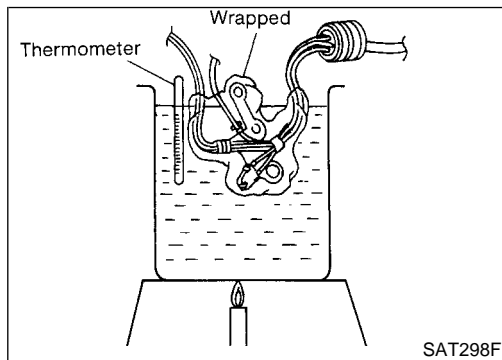
<b>4</b>	<b>CHECK DTC</b>	
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-114.</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	<b>INSPECTION END</b>
NG	▶	<p>1. Perform TCM input/output signal inspection.</p> <p>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</p>

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

# DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Diagnostic Procedure (Cont'd)

5	CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY
<p>1. Turn ignition switch to "OFF" position.                      2. Disconnect terminal cord assembly connector in engine compartment.                      3. Check resistance between terminals 6 and 7 when A/T is cold.</p> <p><b>Resistance:</b>  <b>Cold [20°C (68°F)]</b>  <b>Approximately 2.5 kΩ</b></p> <div style="text-align: center;"> </div> <p style="text-align: right;">SAT880J</p> <p>4. Reinstall any part removed.</p> <p style="text-align: center;"><b>OK or NG</b></p>	
OK (With CONSULT-II) ▶	GO TO 2.
OK (Without CONSULT-II) ▶	GO TO 3.
NG ▶	<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-118.</li> <li>● Harness of terminal cord assembly for short or open</li> </ul>



## Component Inspection A/T FLUID TEMPERATURE SENSOR

NCAT0037

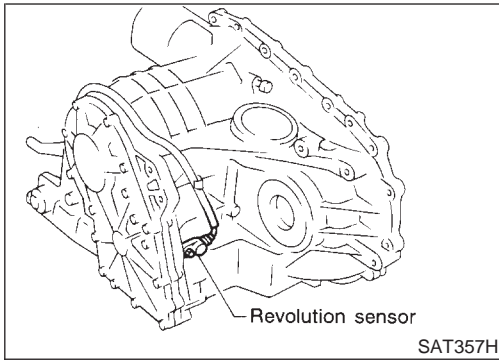
NCAT0037S01

- For removal, refer to AT-280.
- Check resistance between two terminals while changing temperature as shown at left.

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

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

Description



## Description

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

NCAT0038

GI

MA

EM

LC

## TCM TERMINALS AND REFERENCE VALUE

NCAT0038S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
29	W	Revolution sensor		When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function.*1 <b>CAUTION:</b> Connect the diagnosis data link cable to the vehicle diagnosis connector. *1: A circuit tester cannot be used to test this item.	150 Hz
				When vehicle parks.	Under 1.3V or over 4.5V
42	B	Throttle position sensor (Ground)		—	—

EC

FE

CL

MT

AT

AX

SU

BR

## ON BOARD DIAGNOSIS LOGIC

NCAT0038S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: VEH SPD SEN/CIR AT	TCM does not receive the proper voltage signal from the sensor.	<ul style="list-style-type: none"> <li>• Harness or connectors (The sensor circuit is open or shorted.)</li> <li>• Revolution sensor</li> </ul>
: P0720		

ST

RS

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
DATA MONITOR (SPEC)
ACTIVE TEST
DTC & SRT CONFIRMATION

SEF949Y

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0038S03

### 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-218.  
If the check result is OK, go to following step.
- 3) Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
- 4) Start engine and maintain the following conditions for at least 5 consecutive seconds.  
**VHCL SPEED SE: 30 km/h (19 MPH) or more**  
**THRTL POS SEN: More than 1.2V**  
**Selector lever: D position (OD "ON")**  
**Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**  
If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-122.  
If the check result is OK, go to following step.
- 5) Maintain the following conditions for at least 5 consecutive seconds.  
**CMPS-RPM (REF): 3,500 rpm or more**  
**THRTL POS SEN: More than 1.2V**  
**Selector lever: D position (OD "ON")**  
**Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**

### With GST

Follow the procedure "With CONSULT-II".



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

Wiring Diagram — AT — VSSA/T

## Wiring Diagram — AT — VSSA/T

NCAT0201

AT-VSSAT-01

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**AT**

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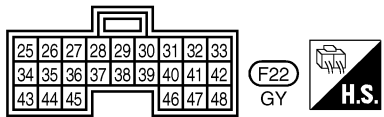
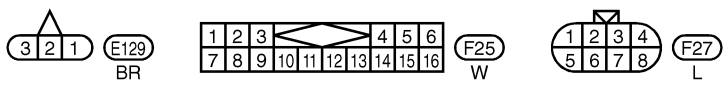
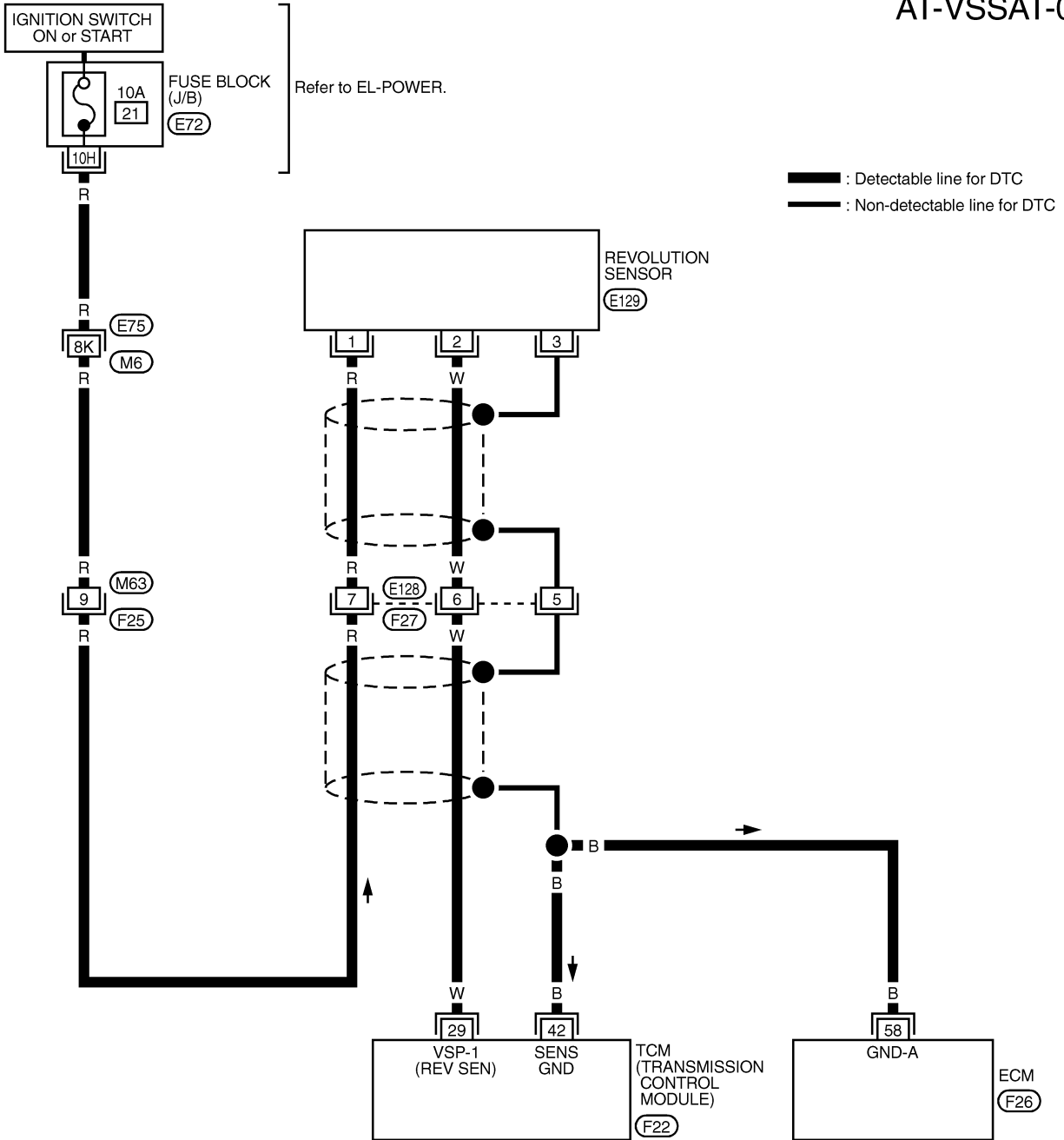
BT

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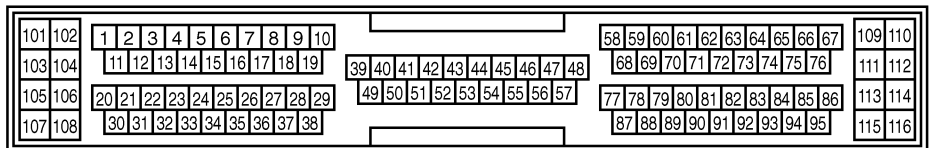
IDX



REFER TO THE FOLLOWING.

(E75) -SUPER MULTIPLE JUNCTION (SMJ)

(E72) -FUSE BLOCK-JUNCTION BOX (J/B)




TAT225

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

Diagnostic Procedure


## Diagnostic Procedure

NCAT0039

<b>1</b>	<b>CHECK INPUT SIGNAL (With CONSULT-II)</b>														
<p> <b>With CONSULT-II</b></p> <p>1. Start engine.</p> <p>2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</p>															
<table border="1" style="margin: auto;"> <tr><th style="text-align: center;">SELECT SYSTEM</th></tr> <tr><td style="text-align: center;">A/T</td></tr> <tr><td style="text-align: center;">ENGINE</td></tr> <tr><td style="text-align: center;"> </td></tr> <tr><td style="text-align: center;"> </td></tr> <tr><td style="text-align: center;"> </td></tr> <tr><td style="text-align: center;"> </td></tr> <tr><td style="text-align: center;"> </td></tr> </table>		SELECT SYSTEM	A/T	ENGINE											
SELECT SYSTEM															
A/T															
ENGINE															
<p>3. Read out the value of "VHCL/S SE-A/T" while driving. Check the value changes according to driving speed.</p>															
<table border="1" style="margin: auto;"> <tr><th colspan="2" style="text-align: center;">DATA MONITOR</th></tr> <tr><th style="text-align: center;">MONITORING</th><th style="text-align: center;"> </th></tr> <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> </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														
<b>OK or NG</b>															
OK	▶ GO TO 4.														
NG	▶ GO TO 3.														

SAT014K

SAT614J

<b>2</b>	<b>CHECK REVOLUTION SENSOR (With CONSULT-II)</b>						
<p> <b>With CONSULT-II</b></p> <p>Start engine.</p>							
<table border="1" style="margin: auto;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Judgement standard (Approx.)</th> </tr> </thead> <tbody> <tr> <td>When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function. *1 <b>CAUTION:</b> Connect the diagnosis data link cable to the vehicle diagnosis connector. *1: A circuit tester cannot be used to test this item.</td> <td style="text-align: center;">150 Hz</td> </tr> <tr> <td>When vehicle parks.</td> <td style="text-align: center;">Under 1.3V or over 4.5V</td> </tr> </tbody> </table>		Condition	Judgement standard (Approx.)	When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function. *1 <b>CAUTION:</b> Connect the diagnosis data link cable to the vehicle diagnosis connector. *1: A circuit tester cannot be used to test this item.	150 Hz	When vehicle parks.	Under 1.3V or over 4.5V
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When vehicle parks.	Under 1.3V or over 4.5V						
<p>Harness for short open between TCM, ECM and revolution sensor (Main harness)</p>							
<b>OK or NG</b>							
OK	▶ GO TO 3.						
NG	▶ Repair or replace damaged parts.						

MTBL0578

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

Diagnostic Procedure (Cont'd)

<b>3</b>	<b>CHECK DTC</b>
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-120.	
<b>OK or NG</b>	
OK	▶ <b>INSPECTION END</b>
NG	▶ GO TO 4.

GI

MA

EM

<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.

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# DTC P0725 ENGINE SPEED SIGNAL

Description

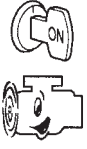
## Description

The engine speed signal is sent from the ECM to the TCM. NCAT0041

## TCM TERMINALS AND REFERENCE VALUE



NCAT0041S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)
39	L	Engine speed signal	 <p>Refer to EC-134, "ECM INSPECTION TABLE".</p>	—

## ON BOARD DIAGNOSIS LOGIC

NCAT0041S02

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

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
DATA MONITOR (SPEC)
ACTIVE TEST
DTC & SRT CONFIRMATION

SEF949Y

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0041S03

### 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".

# DTC P0725 ENGINE SPEED SIGNAL

Wiring Diagram — AT — ENGSS

## Wiring Diagram — AT — ENGSS

NCAT0202

AT-ENGSS-01

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**AT**

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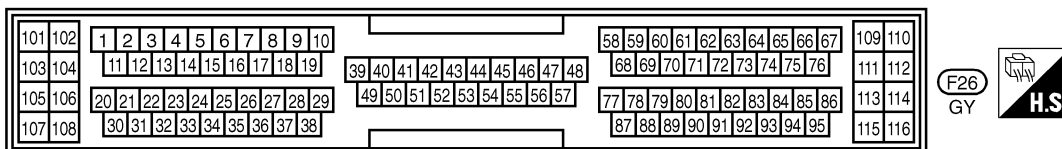
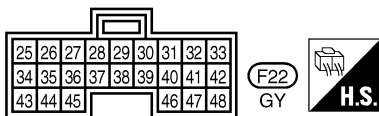
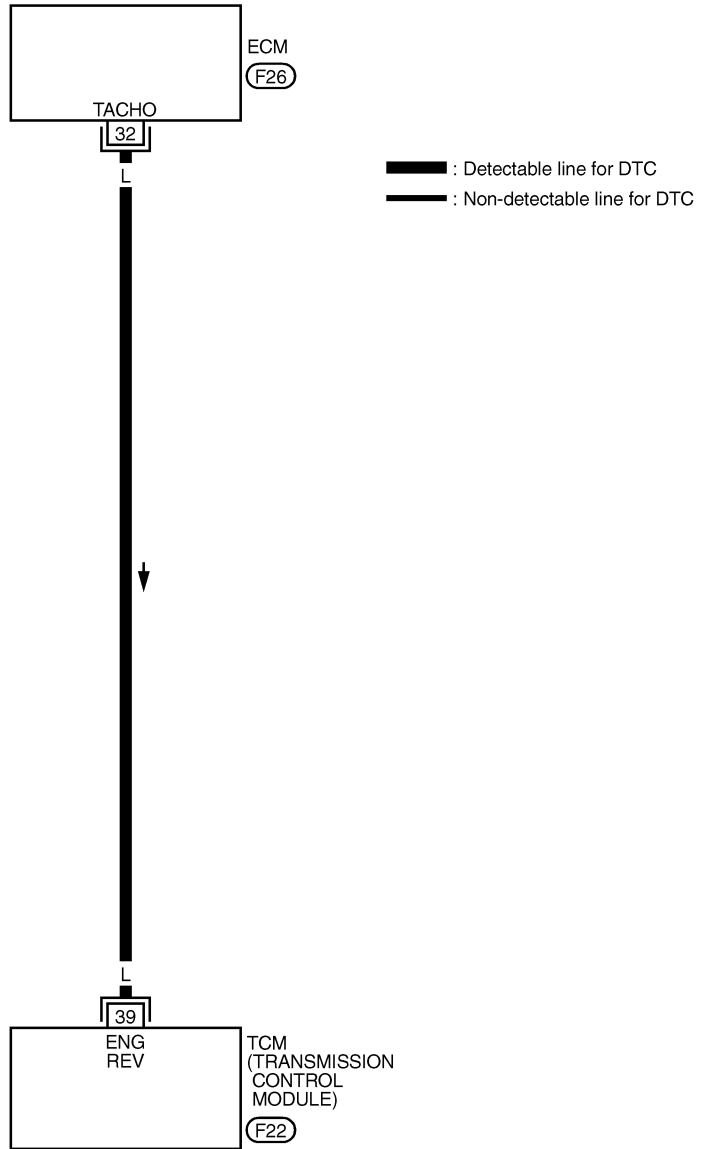
BT

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IDX



TAT226

# DTC P0725 ENGINE SPEED SIGNAL

Diagnostic Procedure

## Diagnostic Procedure

NCAT0042

<b>1</b>	<b>CHECK DTC WITH ECM</b>	
Perform diagnostic test mode II (self- diagnostic results) for engine control. Check ignition signal circuit condition.		
<b>OK or NG</b>		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Check ignition signal circuit for engine control. Refer to EC-566, "DTC P1320 IGNITION SIGNAL".

<b>2</b>	<b>CHECK INPUT SIGNAL (With CONSULT-II)</b>															
<p> <b>With CONSULT-II</b></p> <p>1. Start engine.</p> <p>2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th style="text-align: center;">SELECT SYSTEM</th></tr> <tr><td style="text-align: center;">A/T</td></tr> <tr><td style="text-align: center;">ENGINE</td></tr> <tr><td style="text-align: center;"> </td></tr> <tr><td style="text-align: center;"> </td></tr> <tr><td style="text-align: center;"> </td></tr> <tr><td style="text-align: center;"> </td></tr> <tr><td style="text-align: center;"> </td></tr> </table>			SELECT SYSTEM	A/T	ENGINE											
SELECT SYSTEM																
A/T																
ENGINE																
<p>3. Read out the value of "ENGINE SPEED". Check engine speed changes according to throttle position.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">DATA MONITOR</th></tr> <tr><th style="text-align: center;">MONITORING</th><th style="text-align: center;"> </th></tr> <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> </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																
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PN POSI SW	OFF															
R POSITION SW	OFF															
SAT014K																
<b>OK or NG</b>																
OK	▶	GO TO 4.														
NG	▶	<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 and ignition coil</li> </ul> <p>Refer to EC-566, "DTC P1320 IGNITION SIGNAL".</p>														
SAT645J																

# DTC P0725 ENGINE SPEED SIGNAL

Diagnostic Procedure (Cont'd)

<b>3</b>	<b>CHECK INPUT SIGNAL (Without CONSULT-II)</b>	
<p>⊗ Without CONSULT-II</p> <p>1. Start engine.</p> <p>2. Check voltage between TCM terminal 39 and ground.</p> <p style="color: blue;"><b>Voltage (Idle speed):</b> Refer to EC-610, "Idle Speed and Ignition Timing".</p> <div style="text-align: center;"> <p>The diagram shows a voltmeter (V) with its positive lead connected to terminal 39 of the TCM connector and its negative lead connected to ground. Above the TCM connector are three icons: a battery labeled 'CONNECT', a hand holding a wire labeled 'H.S.', and a spark plug labeled 'ST'.</p> </div> <p style="text-align: right;">SAT424J</p> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 4.
NG	▶	<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 and ignition coil</li> </ul> <p>Refer to EC-566, "DTC P1320 IGNITION SIGNAL".</p>

<b>4</b>	<b>CHECK DTC</b>	
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-124.</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.</p> <p>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</p>

GI  
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# DTC P0731 A/T 1ST GEAR FUNCTION

Description

## Description

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NCAT0043
- 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

NCAT0043S01

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
12	L/Y	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 DIAGNOSTIC LOGIC

NCAT0043S02

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

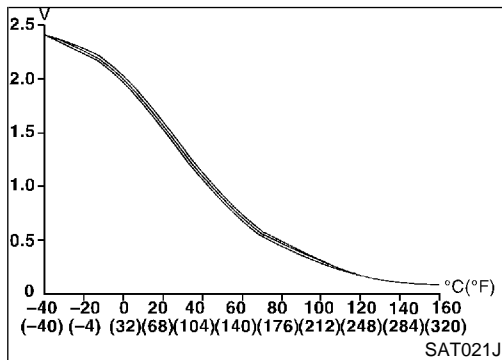
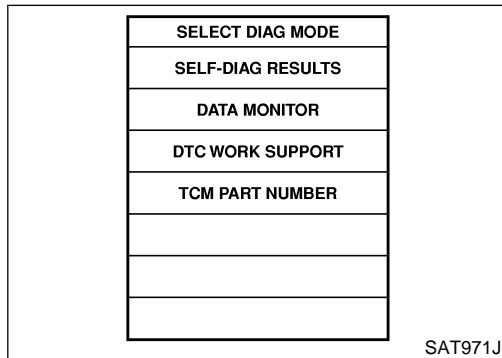
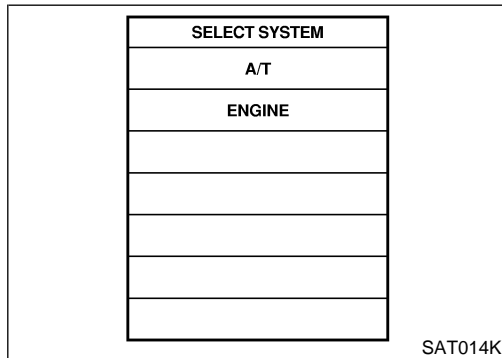
\*: P0731 is detected.



# DTC P0731 A/T 1ST GEAR FUNCTION

Description (Cont'd)

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 1ST GR FNCTN : P0731	A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	<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>



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0043S03

### CAUTION:

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

### NOTE:

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

### TESTING CONDITION:

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

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

### With CONSULT-II

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

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

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

- 3) Select "1ST GR FNCTN P0731" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
- 4) Accelerate vehicle to 20 to 25 km/h (12 to 16 MPH) under the following condition and release the accelerator pedal completely.

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

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

- Check that "GEAR" shows "2" after releasing pedal.
- 5) Depress accelerator pedal to WOT (more than 7.0/8 of "THROTTLE POSI") quickly from a speed of 20 to 25 km/h (12 to 16 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)  
If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-132.  
If "STOP VEHICLE" appears on CONSULT-II screen, go to the following step.
- Check that "GEAR" shows "1" when depressing accelerator pedal to WOT.
- If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAGNOSIS" for "ENGINE". In case a

## DTC P0731 A/T 1ST GEAR FUNCTION

Description (Cont'd)

1st trip DTC other than P0731 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".

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

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

- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)  
Refer to "DIAGNOSTIC PROCEDURE", AT-132.  
Refer to shift schedule, AT-389.



### **With GST**

Follow the procedure "With CONSULT-II".



# DTC P0731 A/T 1ST GEAR FUNCTION

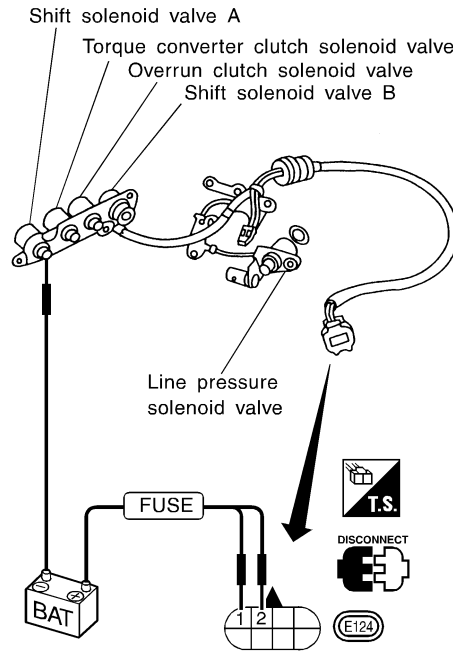
Diagnostic Procedure

## Diagnostic Procedure

NCAT0044

### 1 CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-280.
  2. Check shift solenoid valve operation.
    - Shift solenoid valve A
    - Shift solenoid valve B
- Refer to "Component Inspection", AT-133.



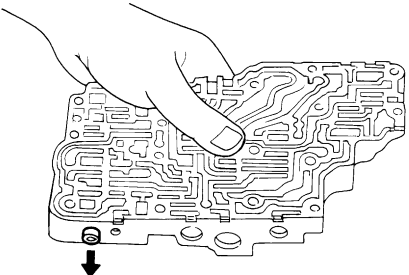
SAT881JA

OK or NG

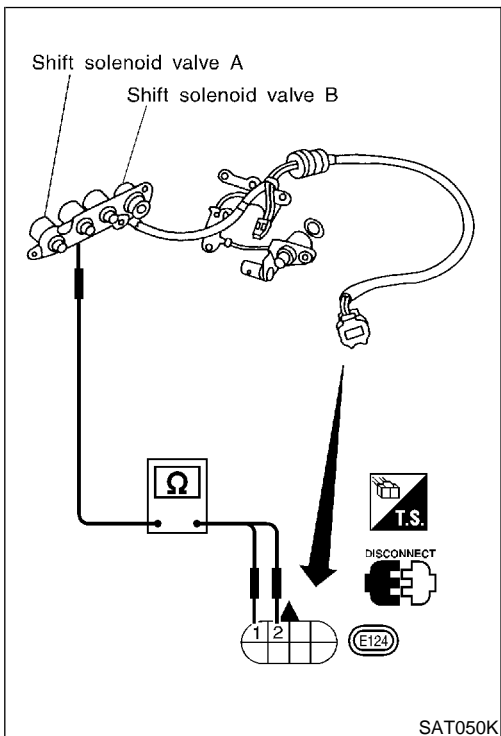
OK	▶	GO TO 2.
NG	▶	Repair or replace shift solenoid valve assembly.

# DTC P0731 A/T 1ST GEAR FUNCTION

Diagnostic Procedure (Cont'd)

<b>2</b>	<b>CHECK CONTROL VALVE</b>	<p>1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-312.</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>	GI MA EM LC EC FE CL MT
			SAT367H
		<b>OK or NG</b>	
OK	▶	GO TO 3.	
NG	▶	Repair control valve assembly.	

<b>3</b>	<b>CHECK DTC</b>	<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-129.</p>	
		<b>OK or NG</b>	
OK	▶	<b>INSPECTION END</b>	
NG	▶	Check control valve again. Repair or replace control valve assembly.	



## Component Inspection SHIFT SOLENOID VALVE A AND B

NCAT0045

NCAT0045S01

- For removal, refer to AT-280.

### Resistance Check

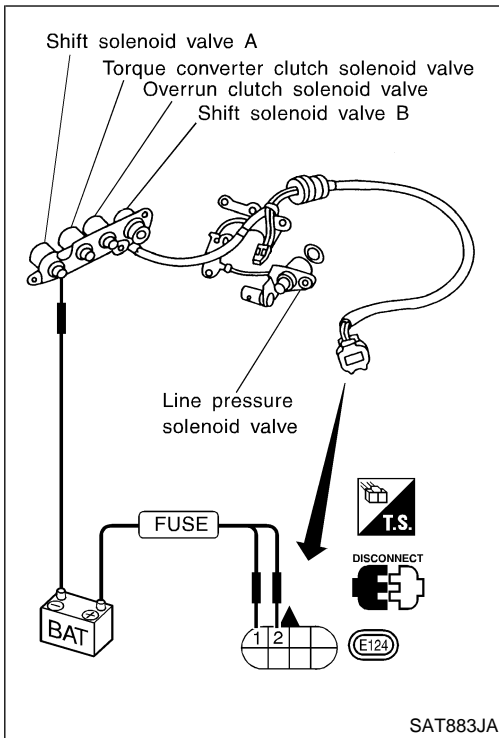
NCAT0045S0101

- Check resistance between two terminals.

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

# DTC P0731 A/T 1ST GEAR FUNCTION

Component Inspection (Cont'd)



## Operation Check

NCA70045S0102

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

# DTC P0732 A/T 2ND GEAR FUNCTION

Description

## Description


- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NCAT0046
- 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 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. MA

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

NCAT0046S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)	
12	L/Y	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D <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> ".)	1V or less

## ON BOARD DIAGNOSTIC LOGIC

NCAT0046S02

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:

Torque converter slip ratio = A x C/B

A: Output shaft revolution signal from revolution sensor

B: Engine speed signal from ECM

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

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

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

\*: P0732 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
P : A/T 2ND GR FNCTN EST : P0732	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>

# DTC P0732 A/T 2ND GEAR FUNCTION

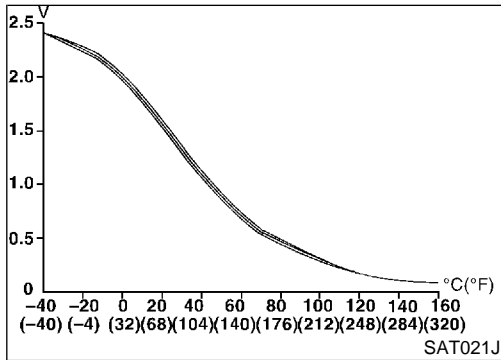
Description (Cont'd)

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

NCAT0046S03

### CAUTION:

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

### NOTE:

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

### TESTING CONDITION:

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

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

### 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 "2ND GR FNCTN P0732" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
- 4) Accelerate vehicle to 53 to 68 km/h (33 to 42 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 53 to 68 km/h (33 to 42 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-139.

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

- Check that "GEAR" shows "2" when depressing accelerator pedal to WOT.
  - If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAGNOSIS" for "ENGINE". In case a 1st trip DTC other than P0732 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".
- 6) Stop vehicle.
  - 7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

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



# DTC P0732 A/T 2ND GEAR FUNCTION

Description (Cont'd)

- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)  
Refer to "DIAGNOSTIC PROCEDURE", AT-139.  
Refer to shift schedule, AT-389.

GI

 **With GST**

Follow the procedure "With CONSULT-II".

MA

EM

LC

EC

FE

CL

MT

**AT**

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

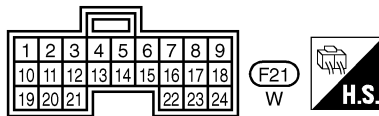
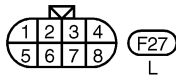
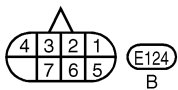
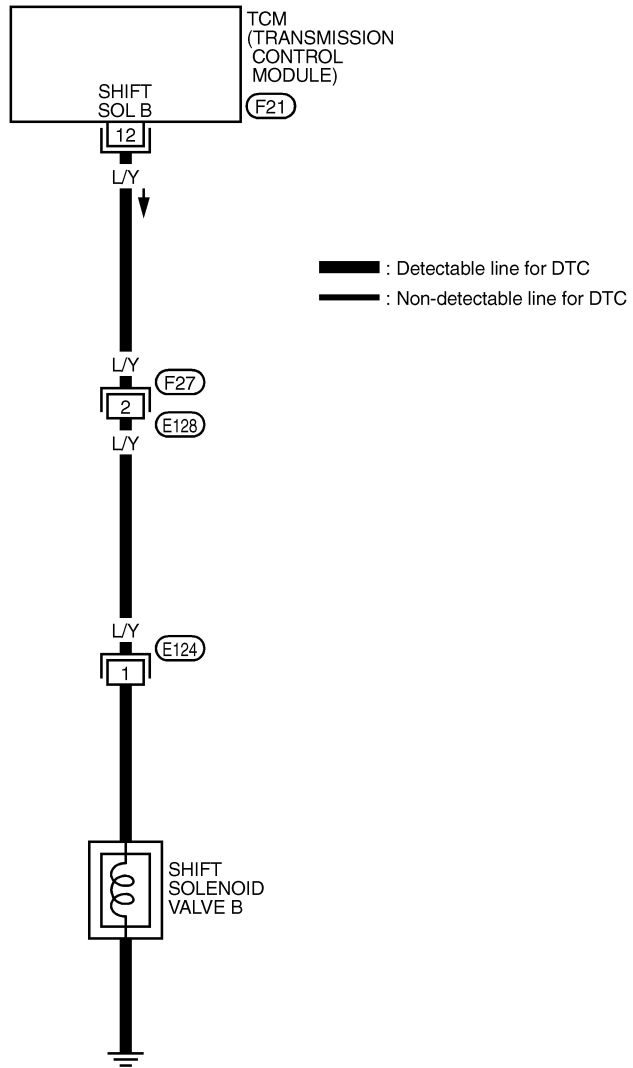
# DTC P0732 A/T 2ND GEAR FUNCTION

Wiring Diagram — AT — 2ND

## Wiring Diagram — AT — 2ND

NCAT0204

AT-2NDSIG-01



## Diagnostic Procedure

NCAT0047

<b>1</b>	<b>CHECK SHIFT SOLENOID VALVE</b>	<p>1. Remove control valve assembly. Refer to AT-280.                  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-140.</p> <div style="text-align: center;"> <p>Shift solenoid valve A                      Torque converter clutch solenoid valve                      Overrun clutch solenoid valve                      Shift solenoid valve B</p> <p>Line pressure solenoid valve</p> <p>BAT</p> <p>FUSE</p> <p>DISCONNECT</p> <p>T.S.</p> <p>(E124)</p> </div> <p style="text-align: center;"><b>OK or NG</b></p>	GI MA EM LC EC FE CL MT <b>AT</b> AX SU BR
OK	▶	GO TO 2.	
NG	▶	Repair or replace shift solenoid valve assembly.	

SAT884JA

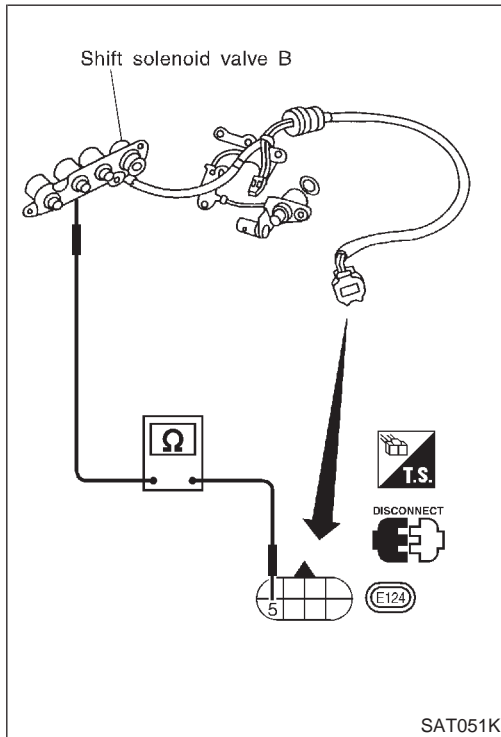
<b>2</b>	<b>CHECK CONTROL VALVE</b>	<p>1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-312.                  2. Check to ensure that:</p> <ul style="list-style-type: none"> <li>● Valve, sleeve and plug slide along valve bore under their own weight.</li> <li>● Valve, sleeve 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;"> </div> <p style="text-align: center;"><b>OK or NG</b></p>	ST RS BT HA SC EL IDX
OK	▶	GO TO 3.	
NG	▶	Repair control valve assembly.	

SAT367H

# DTC P0732 A/T 2ND GEAR FUNCTION

Diagnostic Procedure (Cont'd)

<b>3</b>	<b>CHECK DTC</b>	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-136.		
OK or NG		
OK	▶	<b>INSPECTION END</b>
NG	▶	Check control valve again. Repair or replace control valve assembly.



## Component Inspection SHIFT SOLENOID VALVE B

NCAT0048

NCAT0048S01

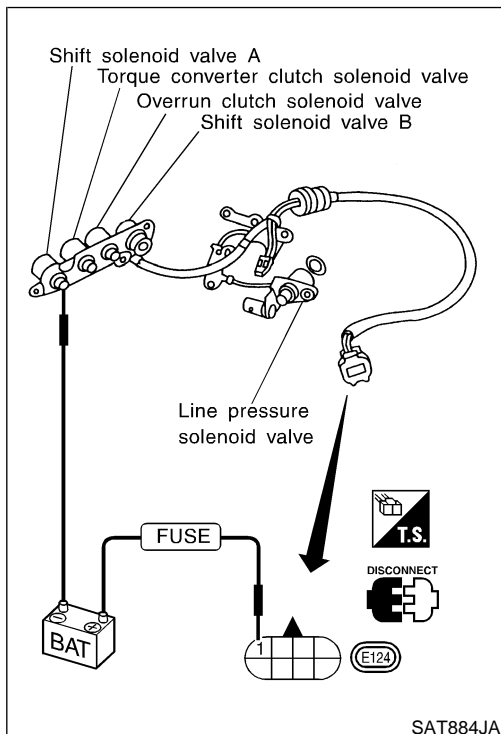
- For removal, refer to AT-280.

## Resistance Check

NCAT0048S0101

- Check resistance between two terminals.

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



## Operation Check

NCAT0048S0102

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

# DTC P0733 A/T 3RD GEAR FUNCTION

Description

## Description


- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NCAT0049
- 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

NCAT0049S01

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 DIAGNOSTIC LOGIC

NCAT0049S02

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:

Torque converter slip ratio = A x C/B

A: Output shaft revolution signal from revolution sensor



B: Engine speed signal from ECM

C: Gear ratio determined as gear position which TCM supposes  
If the actual gear position is higher than the position (3rd) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.

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

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

\*: P0733 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
 : A/T 3RD GR FNCTN	A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	<ul style="list-style-type: none"> <li>• Shift solenoid valve A</li> <li>• Each clutch</li> <li>• Hydraulic control circuit</li> </ul>
 : P0733		

# DTC P0733 A/T 3RD GEAR FUNCTION

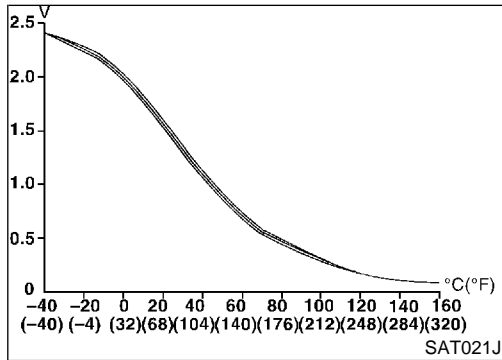
Description (Cont'd)

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

NCAT0049S03

### CAUTION:

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

### NOTE:

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

### TESTING CONDITION:

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

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

### 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 "3RD GR FNCTN P0733" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
- 4) Accelerate vehicle to 80 to 95 km/h (50 to 59 MPH) under the following condition and release the accelerator pedal completely.

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

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

- Check that "GEAR" shows "4" after releasing pedal.
- 5) Depress accelerator pedal steadily with 3.5/8 - 4.5/8 of "THROTTLE POSI" from a speed of 80 to 95 km/h (50 to 59 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)

If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-145.

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

- Check that "GEAR" shows "3" when depressing accelerator pedal with 3.5/8 - 4.5/8 of "THROTTLE POSI".
  - If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAGNOSIS" for "ENGINE". In case a 1st trip DTC other than P0733 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".
- 6) Stop vehicle.
  - 7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

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

# DTC P0733 A/T 3RD GEAR FUNCTION

Description (Cont'd)

- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)  
Refer to "DIAGNOSTIC PROCEDURE", AT-145.  
Refer to shift schedule, AT-389.

GI

 **With GST**

Follow the procedure "With CONSULT-II".

MA

EM

LC

EC

FE

CL

MT

**AT**

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

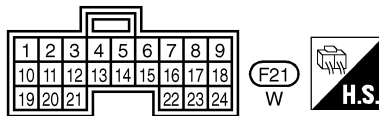
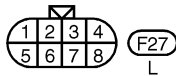
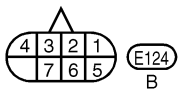
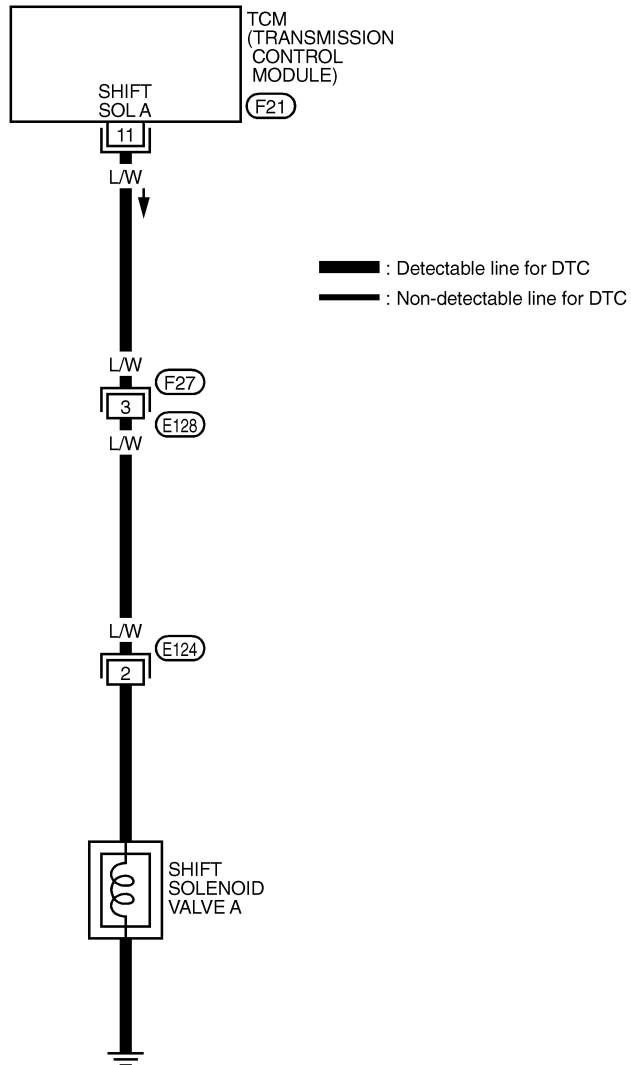
# DTC P0733 A/T 3RD GEAR FUNCTION

Wiring Diagram — AT — 3RD

## Wiring Diagram — AT — 3RD

NCAT0205

AT-3RDSIG-01



TAT229



## Diagnostic Procedure

NCAT0050

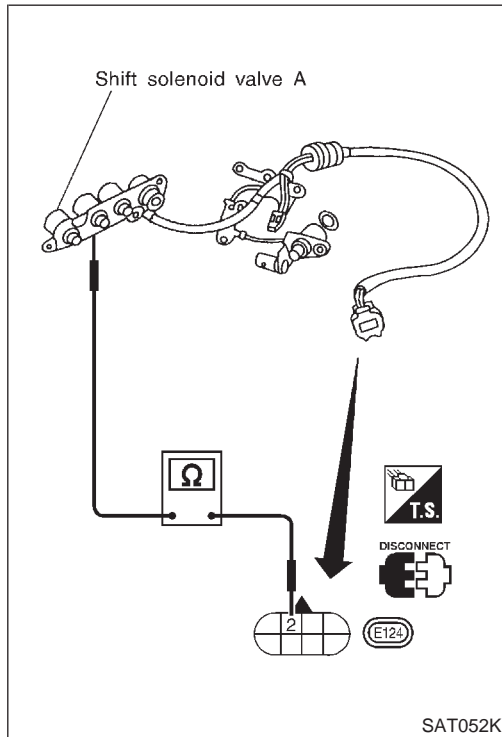
<b>1</b>	<b>CHECK SHIFT SOLENOID VALVE</b>	<p>1. Remove control valve assembly. Refer to AT-280.</p> <p>2. Check shift solenoid valve operation.</p> <ul style="list-style-type: none"> <li>Shift solenoid valve A Refer to "Component Inspection" below.</li> </ul>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p><b>AT</b></p> <p>AX</p> <p>SU</p> <p>BR</p>
		<p style="text-align: center;"><b>OK or NG</b></p>	<p>SAT886JA</p>
OK	▶	GO TO 2.	
NG	▶	Repair or replace shift solenoid valve assembly.	

<b>2</b>	<b>CHECK CONTROL VALVE</b>	<p>1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-312.</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>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
		<p style="text-align: center;"><b>OK or NG</b></p>	<p>SAT367H</p>
OK	▶	GO TO 3.	
NG	▶	Repair control valve assembly.	

# DTC P0733 A/T 3RD GEAR FUNCTION

Diagnostic Procedure (Cont'd)

<b>3</b>	<b>CHECK DTC</b>
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-142.	
<b>OK or NG</b>	
OK	▶ <b>INSPECTION END</b>
NG	▶ Check control valve again. Repair or replace control valve assembly.



## Component Inspection SHIFT SOLENOID VALVE A

NCAT0051

NCAT0051S01

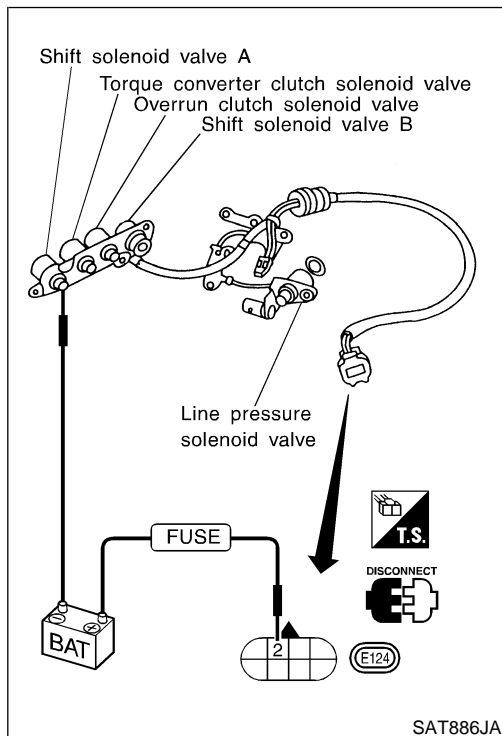
- For removal, refer to AT-280.

## Resistance Check

NCAT0051S0101

- Check resistance between two terminals.

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



## Operation Check

NCAT0051S0102

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

# DTC P0734 A/T 4TH GEAR FUNCTION

Description

## Description

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NCAT0052
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into fourth gear position or the torque converter clutch does not lock up as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.

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

## CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NCAT0052S01

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%

## TCM TERMINALS AND REFERENCE VALUE

NCAT0052S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)
1	R/W	Line pressure solenoid valve	When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
			When depressing accelerator pedal fully after warming up engine.	0V
2	P/B	Line pressure solenoid valve (with dropping resistor)	When releasing accelerator pedal after warming up engine.	5 - 14V
			When depressing accelerator pedal fully after warming up engine.	0V
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/Y	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 A/T 4TH GEAR FUNCTION

Description (Cont'd)

## ON BOARD DIAGNOSTIC LOGIC

NCAT005ZS03

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:

Torque converter slip ratio =  $A \times C/B$

A: Output shaft revolution signal from revolution sensor



B: Engine speed signal from ECM

C: Gear ratio determined as gear position which TCM supposes  
 If the actual gear position is much lower than the position (4th) supposed by TCM, the slip ratio will be much less than normal. In case the ratio does not reach the specified value, TCM judges this diagnosis malfunction.

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

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

\*: P0734 is detected.

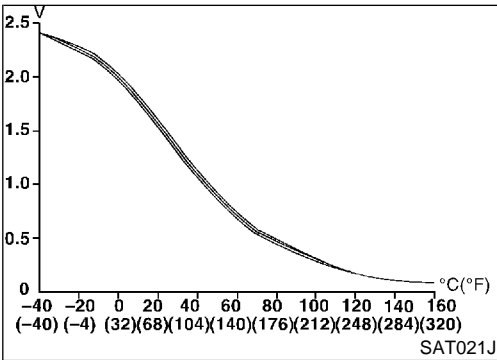
Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
 : A/T 4TH GR FNCTN	A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	<ul style="list-style-type: none"> <li>● Shift solenoid valve A</li> <li>● Shift solenoid valve B</li> <li>● Line pressure solenoid valve</li> <li>● Each clutch</li> <li>● Hydraulic control circuit</li> </ul>
 : P0734		

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

NCAT0052S04

### CAUTION:

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

### NOTE:

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

### TESTING CONDITION:

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

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

### 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 "4TH GR FNCTN P0734" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
- 4) Accelerate vehicle to 50 to 60 km/h (31 to 37 MPH) under the following condition and release the accelerator pedal completely.

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

**Selector lever: D position (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 50 to 60 km/h (31 to 37 MPH) until "TESTING" has turned to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)  
If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-152.  
If "STOP VEHICLE" appears on CONSULT-II screen, go to following step.
  - Check that "GEAR" shows "4" when depressing accelerator pedal with 1.0/8 - 2.0/8 of "THROTTLE POSI".
  - If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAGNOSIS" for "ENGINE". In case a 1st trip DTC other than P0734 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".
  - 6) Stop vehicle.
  - 7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

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

## DTC P0734 A/T 4TH GEAR FUNCTION

Description (Cont'd)

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

- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)  
Refer to "DIAGNOSTIC PROCEDURE", AT-152.  
Refer to shift schedule, AT-389.



### **With GST**

Follow the procedure "With CONSULT-II".

# DTC P0734 A/T 4TH GEAR FUNCTION

Wiring Diagram — AT — 4TH

## Wiring Diagram — AT — 4TH

NCAT0206

AT-4THSIG-01

GI

MA

EM

LC

EC

FE

CL

MT

**AT**

AX

SU

BR

ST

RS

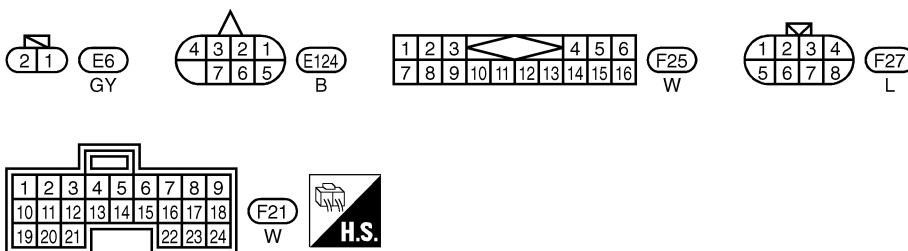
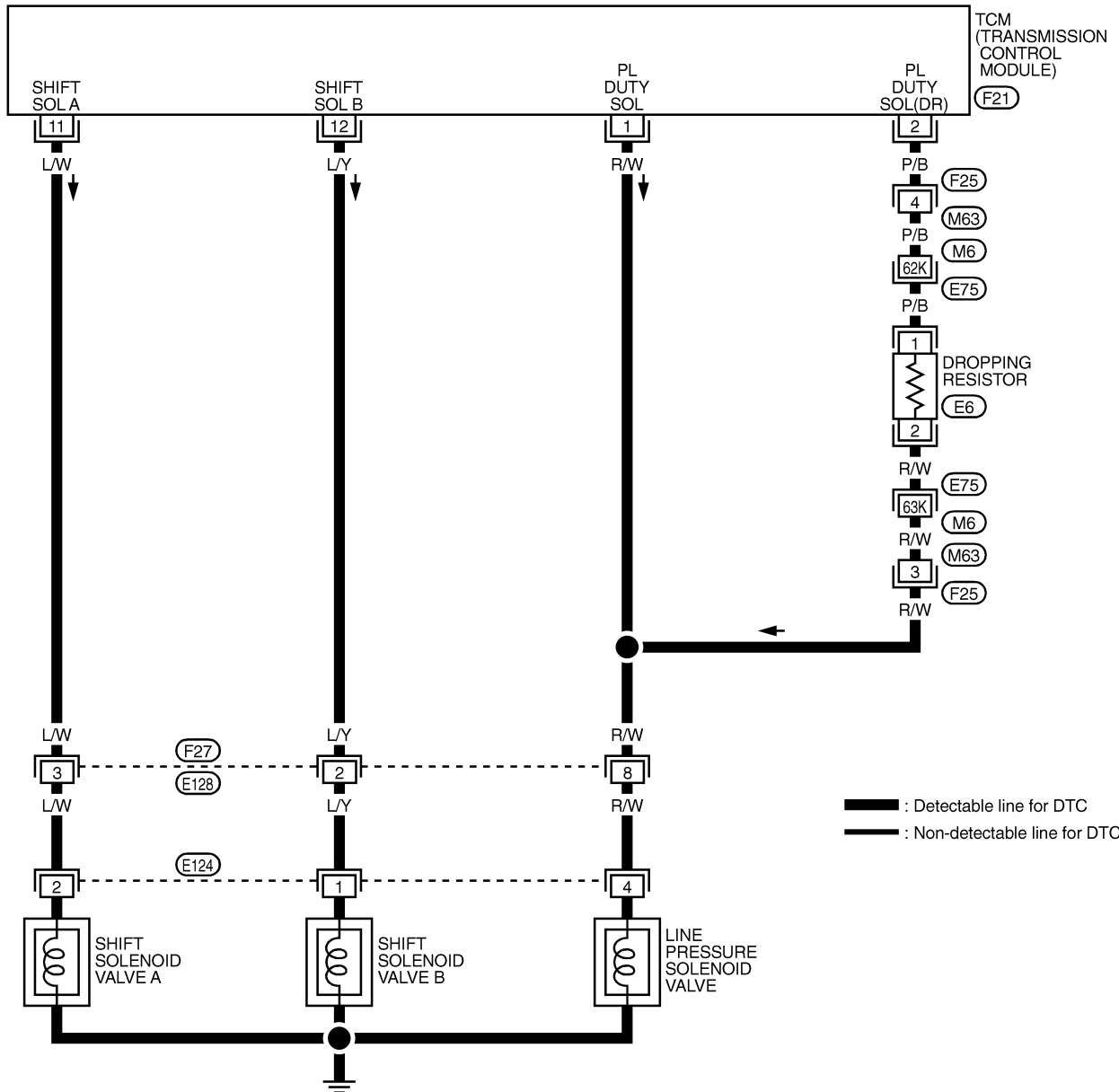
BT

HA

SC

EL

IDX



REFER TO THE FOLLOWING.

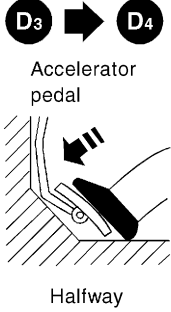
(E75) -SUPER MULTIPLE JUNCTION (SMJ)

# DTC P0734 A/T 4TH GEAR FUNCTION

Diagnostic Procedure

## Diagnostic Procedure

NCAT0053

<b>1</b>	<b>CHECK SHIFT UP (D<sub>3</sub> TO D<sub>4</sub>)</b>		
During "Cruise test – Part 1" (AT-76), 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	▶	GO TO 9.	
No	▶	GO TO 2.	

SAT988H

<b>2</b>	<b>CHECK LINE PRESSURE</b>													
Perform line pressure test. Refer to AT-66.														
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Engine speed rpm</th> <th colspan="2">Line pressure kPa (kg/cm<sup>2</sup>, psi)</th> </tr> <tr> <th>D, 2 and 1 positions</th> <th>R position</th> </tr> </thead> <tbody> <tr> <td>Idle</td> <td>500 (5.1, 73)</td> <td>778 (7.9, 113)</td> </tr> <tr> <td>Stall</td> <td>1,170 (11.9, 169)</td> <td>1,820 (18.5, 263)</td> </tr> </tbody> </table>				Engine speed rpm	Line pressure kPa (kg/cm <sup>2</sup> , psi)		D, 2 and 1 positions	R position	Idle	500 (5.1, 73)	778 (7.9, 113)	Stall	1,170 (11.9, 169)	1,820 (18.5, 263)
Engine speed rpm	Line pressure kPa (kg/cm <sup>2</sup> , psi)													
	D, 2 and 1 positions	R position												
Idle	500 (5.1, 73)	778 (7.9, 113)												
Stall	1,170 (11.9, 169)	1,820 (18.5, 263)												
<b>OK or NG</b>														
OK	▶	GO TO 3.												
NG	▶	GO TO 6.												

MTBL0388



# DTC P0734 A/T 4TH GEAR FUNCTION

Diagnostic Procedure (Cont'd)

<b>3</b>	<b>CHECK SOLENOID VALVES</b>	<p>1. Remove control valve assembly. Refer to AT-280.</p> <p>2. Refer to "Component Inspection", AT-156.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SAT847JA</p>	GI MA EM LC EC FE CL MT <b>AT</b> AX SU
		<b>OK or NG</b>	
OK	▶	GO TO 4.	
NG	▶	Replace solenoid valve assembly.	

<b>4</b>	<b>CHECK CONTROL VALVE</b>	<p>1. Disassemble control valve assembly. Refer to AT-312.</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;"> </div> <p style="text-align: right;">SAT367H</p>	BR ST RS BT HA SC EL IDX
		<b>OK or NG</b>	
OK	▶	GO TO 5.	
NG	▶	Repair control valve.	

# DTC P0734 A/T 4TH GEAR FUNCTION

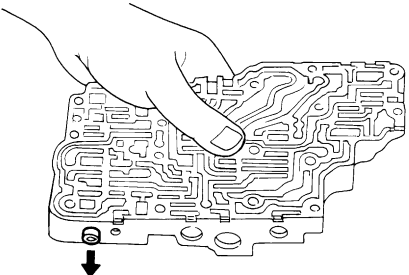
Diagnostic Procedure (Cont'd)

<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>OK or NG</b>	
OK	▶ GO TO 9.
NG	▶ Check control valve again. Repair or replace control valve assembly.

<b>6</b>	<b>CHECK LINE PRESSURE SOLENOID VALVE</b>
<ol style="list-style-type: none"> <li>Remove control valve assembly. Refer to AT-280.</li> <li>Refer to "Component Inspection", AT-156.</li> </ol>	
<p>The diagram illustrates the electrical circuit for the line pressure solenoid valve. A battery (BAT) is connected to a fuse, which is then connected to terminal 4 of a connector. The other end of the wire is connected to the line pressure solenoid valve. Symbols include T.S. (Torque Spec), DISCONNECT, and E124.</p>	
SAT888J	
<b>OK or NG</b>	
OK	▶ GO TO 7.
NG	▶ Replace solenoid valve assembly.

# DTC P0734 A/T 4TH GEAR FUNCTION

Diagnostic Procedure (Cont'd)

<b>7</b>	<b>CHECK CONTROL VALVE</b>		
		<p>1. Disassemble control valve assembly. Refer to AT-312.</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>	GI  MA  EM  LC  EC  FE  CL  MT
			
		SAT367H	
		<b>OK or NG</b>	
	OK	▶	GO TO 8.
	NG	▶	Repair control valve.

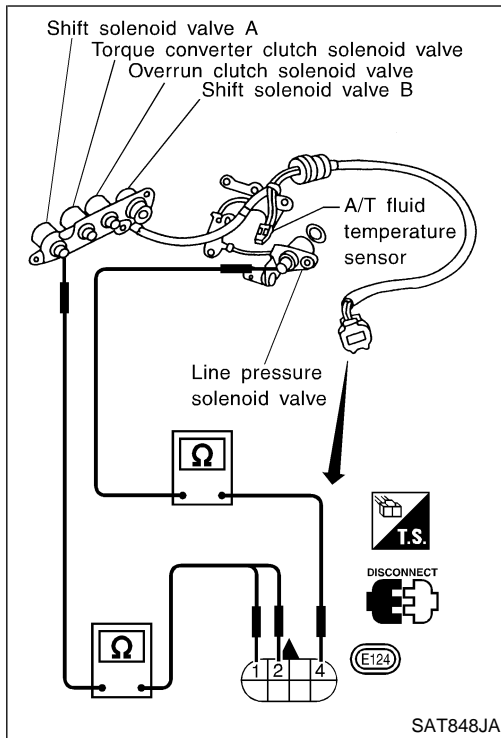
<b>8</b>	<b>CHECK SHIFT UP (D<sub>3</sub> TO D<sub>4</sub>)</b>		
		Does A/T shift from D <sub>3</sub> to D <sub>4</sub> at the specified speed?	<b>AT</b>
		<b>Yes or No</b>	AX
	Yes	▶	GO TO 9.
	No	▶	Check control valve again. Repair or replace control valve assembly.

<b>9</b>	<b>CHECK DTC</b>		
		Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-149.	BR
		<b>OK or NG</b>	ST
	OK	▶	<b>INSPECTION END</b>
	NG	▶	Perform "Cruise test — Part 1" again and return to the start point of this test group.

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

# DTC P0734 A/T 4TH GEAR FUNCTION

## Component Inspection



## Component Inspection

=NCAT0054

### SOLENOID VALVES

NCAT0054S01

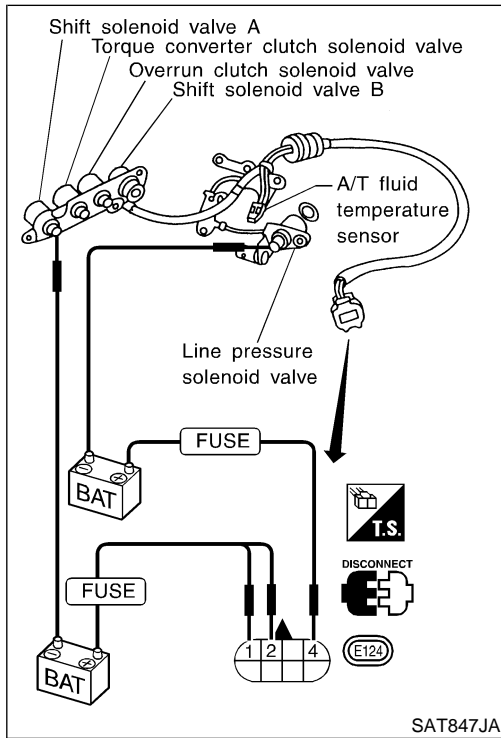
- For removal, refer to AT-280.

### Resistance Check

NCAT0054S0101

- Check resistance between two terminals.

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



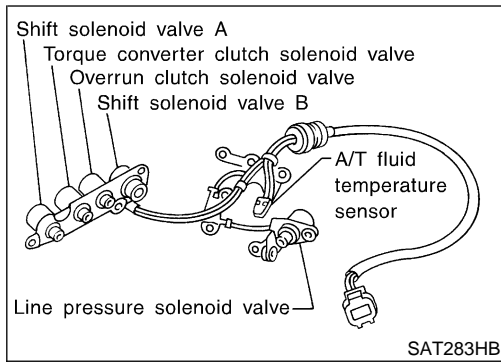
## Operation Check

NCAT0054S0102

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

# DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Description



## Description

NCAT0055

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

NCAT0055S01


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

NCAT0055S02

Remarks: Specification data are reference values.

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

## ON BOARD DIAGNOSIS LOGIC

NCAT0055S03

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

# 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
DATA MONITOR (SPEC)
ACTIVE TEST
DTC & SRT CONFIRMATION

SEF949Y

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0055S04

### 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".

# DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

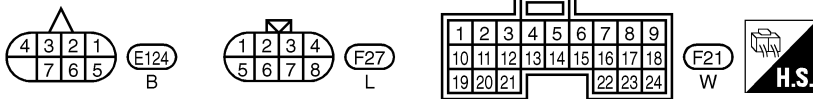
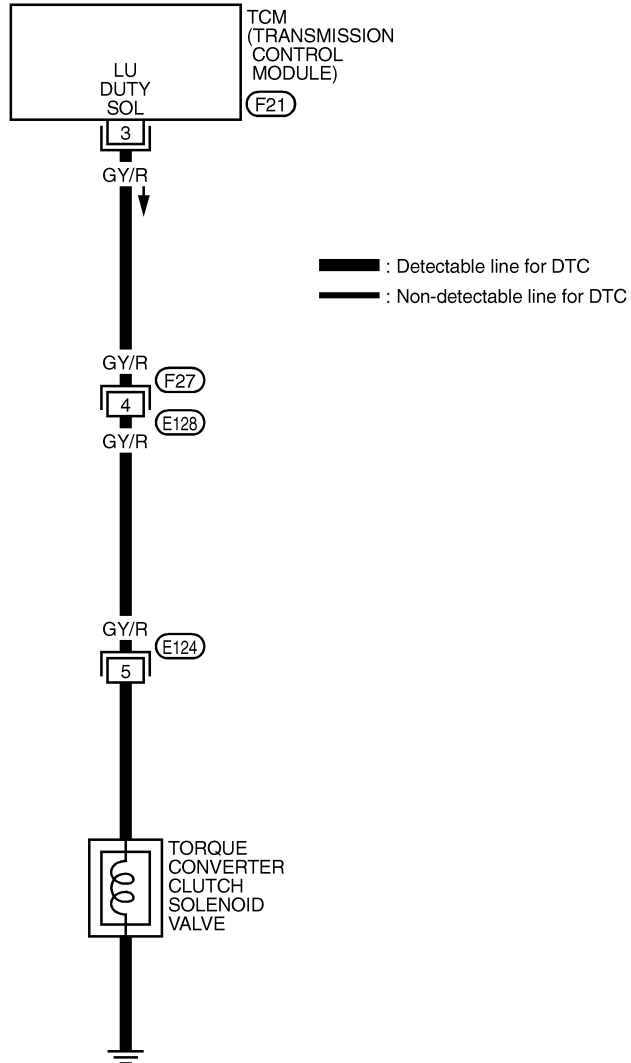
Wiring Diagram — AT — TCV

## Wiring Diagram — AT — TCV

NCAT0207

AT-TCV-01

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



# DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Diagnostic Procedure

## Diagnostic Procedure

NCAT0056

1	CHECK VALVE RESISTANCE
	<p>1. Turn ignition switch to "OFF" position. 2. Disconnect terminal cord assembly connector in engine compartment. 3. Check resistance between terminal 5 and ground.</p> <p><b>Resistance:</b> <b>10 - 20Ω</b></p> <div><p>The diagram illustrates the resistance measurement setup. A multimeter with an ohm symbol (Ω) is connected to terminal 5 of a terminal cord assembly connector. The connector is shown with a 'DISCONNECT' symbol and a ground symbol. The terminal cord assembly is labeled 'E124'. A ground symbol is shown below the multimeter.</p></div> <p style="text-align: center;"><b>OK or NG</b></p>
OK	▶ GO TO 2.
NG	▶ <ul style="list-style-type: none"><li>1. Remove oil pan. Refer to AT-280.</li><li>2. Check the following items:<ul style="list-style-type: none"><li>● Torque converter clutch solenoid valve Refer to "Component Inspection", AT-162.</li><li>● Harness of terminal cord assembly for short or open</li></ul></li></ul>

SAT889J



# DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Diagnostic Procedure (Cont'd)

<b>2</b>	<b>CHECK POWER SOURCE CIRCUIT</b>	
<p>1. Turn ignition switch to "OFF" position.                  2. Disconnect TCM harness connector.                  3. Check continuity between terminal 5 and TCM harness connector terminal 3.  <b>Continuity should exist.</b></p>		
<p>If OK, check harness for short to ground and short to power.</p>		
<p>4. Reinstall any part removed.</p>		
<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.

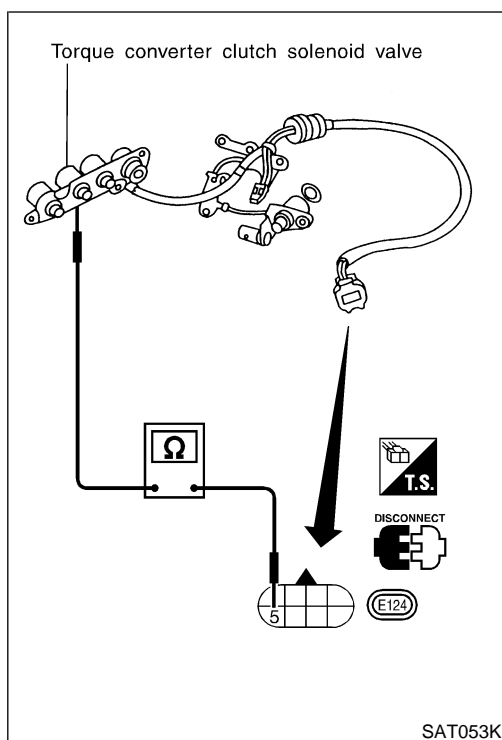
SAT890J

<b>3</b>	<b>CHECK DTC</b>	
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-158.</p>		
<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>

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

# DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

## Component Inspection



## Component Inspection

### TORQUE CONVERTER CLUTCH SOLENOID VALVE

NCAT0057

NCAT0057S01

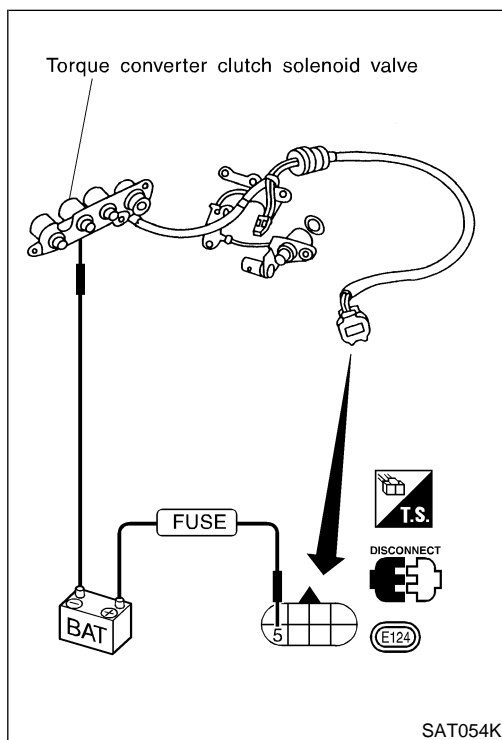
- For removal, refer to AT-280.

### Resistance Check

NCAT0057S0101

- Check resistance between two terminals.

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



## Operation Check

NCAT0057S0102

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

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

Description

## Description

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NCAT0058
- 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

NCAT0058S01




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

NCAT0058S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)	
1	R/W	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine. <span style="float: right;">AX</span>	1.5 - 2.5V
				When depressing accelerator pedal fully after warming up engine. <span style="float: right;">SU</span>	0V
2	P/B	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine. <span style="float: right;">BR</span>	5 - 14V
				When depressing accelerator pedal fully after warming up engine. <span style="float: right;">ST</span>	0V
3	GY/R	Torque converter clutch solenoid valve		When A/T performs lock-up. <span style="float: right;">RS</span>	8 - 15V
				When A/T does not perform lock-up. <span style="float: right;">BT</span>	0V

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

Description (Cont'd)

## ON BOARD DIAGNOSTIC LOGIC

=NCAT0058S03

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:

Torque converter slip ratio =  $A \times C/B$

A: Output shaft revolution signal from revolution sensor



B: Engine speed signal from ECM

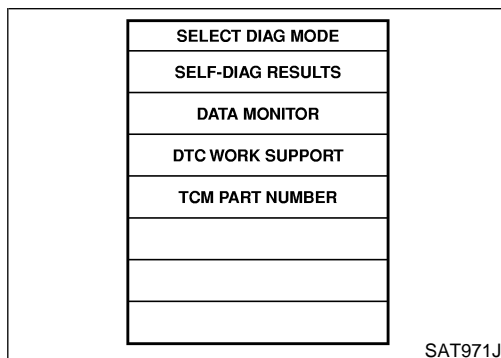
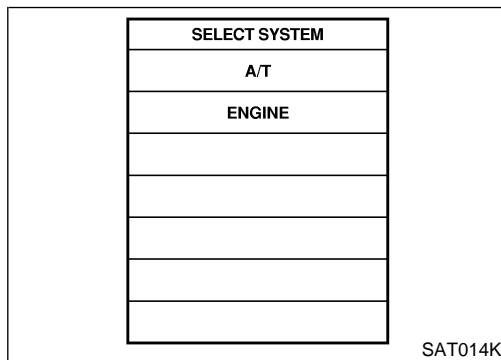
C: Gear ratio determined as gear position which TCM supposes  
If the actual gear position is much lower than the position (4th) supposed by TCM, the slip ratio will be much less than normal. In case the ratio does not reach the specified value, TCM judges this diagnosis malfunction.

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

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

\*: P0744 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
 : A/T TCC S/V FNCTN	A/T cannot perform lock-up even if electrical circuit is good.	<ul style="list-style-type: none"> <li>● Torque converter clutch solenoid valve</li> <li>● Line pressure solenoid valve</li> <li>● Each clutch</li> <li>● Hydraulic control circuit</li> </ul>
 : P0744		



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0058S04

### 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.

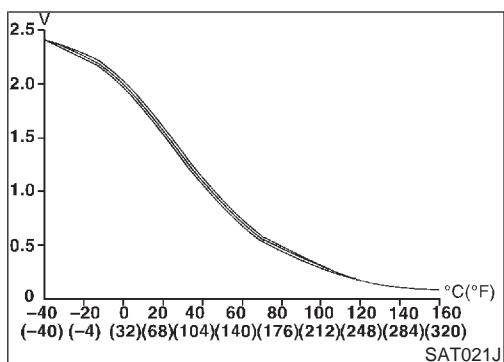
After the repair, perform the following procedure to confirm the malfunction is eliminated.

### 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".

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

Description (Cont'd)



- 4) Accelerate vehicle to more than 80 km/h (50 MPH) and maintain the following condition continuously until "TESTING" has turned to "COMPLETE". (It will take approximately 30 seconds after "TESTING" shows.)

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

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

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

**VHCL/S SE-A/T: Constant speed of more than 80 km/h (50 MPH)**

- Check that "GEAR" shows "4".
  - For shift schedule, refer to SDS, AT-389.
  - If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAGNOSIS". In case a 1st trip DTC other than P0744 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".
- 5) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)  
Refer to "DIAGNOSTIC PROCEDURE", AT-167.  
Refer to shift schedule, AT-389.

 **With GST**

Follow the procedure "With CONSULT-II".

GI

MA

EM

LC

EC

FE

CL

MT

**AT**

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

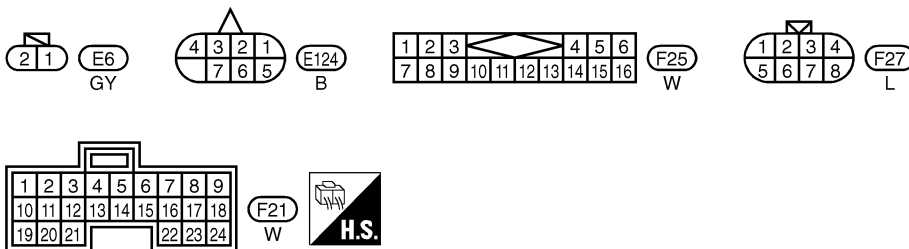
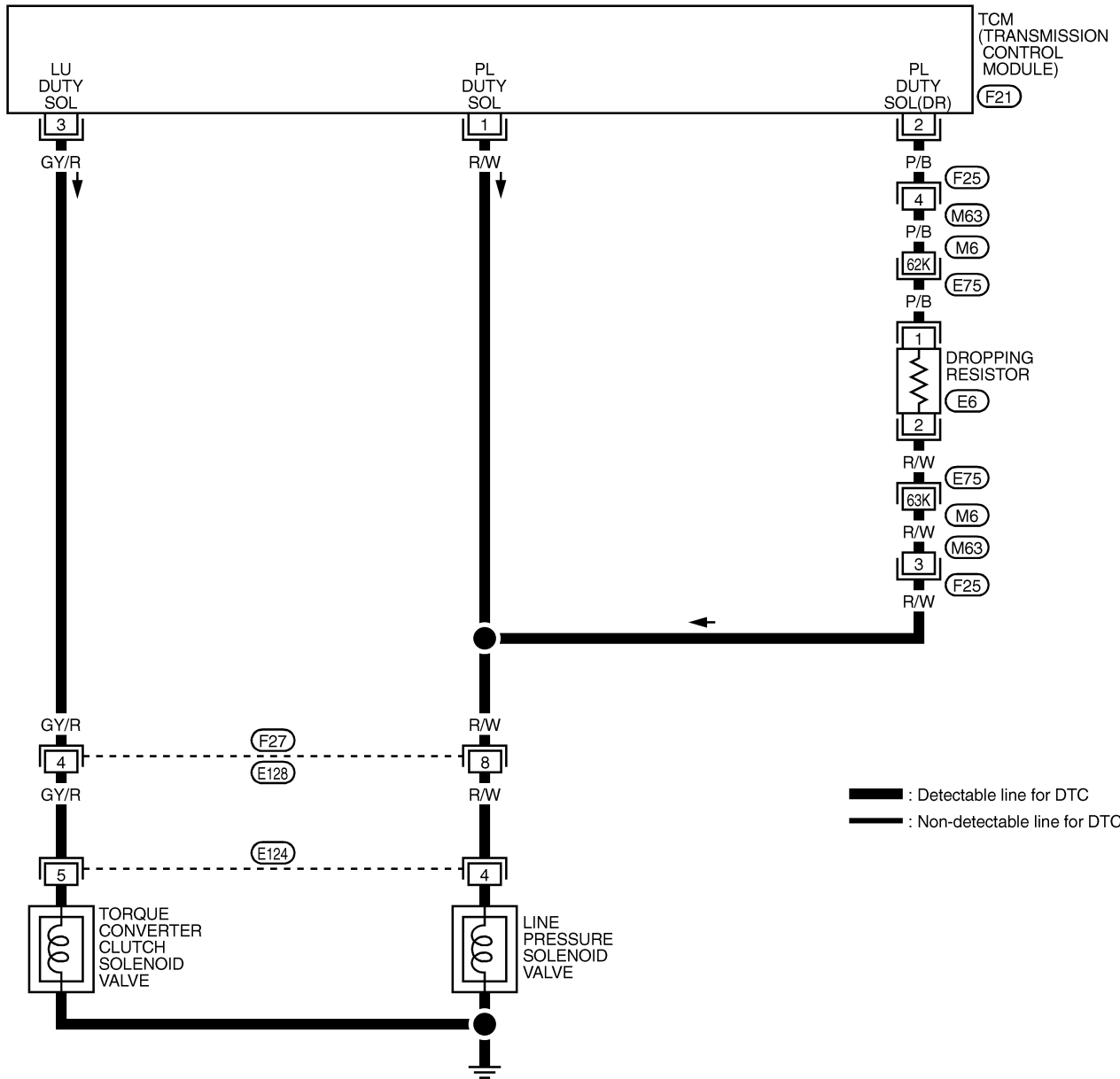
# DTC P0744 A/T TCC S/V FUNCTION (LOCK-UP)

Wiring Diagram — AT — TCCSIG

## Wiring Diagram — AT — TCCSIG

NCAT0208

AT-TCCSIG-01



REFER TO THE FOLLOWING.

(E75) -SUPER MULTIPLE JUNCTION (SMJ)

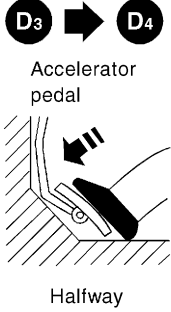
TAT232

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

Diagnostic Procedure

## Diagnostic Procedure

NCAT0059

<b>1</b>	<b>CHECK SHIFT UP (D<sub>3</sub> TO D<sub>4</sub>)</b>	
During "Cruise test – Part 1" (AT-76), 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 10.
No	▶	GO TO 2.

GI

MA

EM

LC

EC

FE

CL

SAT988H

<b>2</b>	<b>CHECK LINE PRESSURE</b>												
Perform line pressure test. Refer to AT-66.													
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Engine speed rpm</th> <th colspan="2">Line pressure kPa (kg/cm<sup>2</sup>, psi)</th> </tr> <tr> <th>D, 2 and 1 positions</th> <th>R position</th> </tr> </thead> <tbody> <tr> <td>Idle</td> <td>500 (5.1, 73)</td> <td>778 (7.9, 113)</td> </tr> <tr> <td>Stall</td> <td>1,170 (11.9, 169)</td> <td>1,820 (18.5, 263)</td> </tr> </tbody> </table>			Engine speed rpm	Line pressure kPa (kg/cm <sup>2</sup> , psi)		D, 2 and 1 positions	R position	Idle	500 (5.1, 73)	778 (7.9, 113)	Stall	1,170 (11.9, 169)	1,820 (18.5, 263)
Engine speed rpm	Line pressure kPa (kg/cm <sup>2</sup> , psi)												
	D, 2 and 1 positions	R position											
Idle	500 (5.1, 73)	778 (7.9, 113)											
Stall	1,170 (11.9, 169)	1,820 (18.5, 263)											
<b>OK or NG</b>													
OK	▶	GO TO 3.											
NG	▶	GO TO 6.											

MT

AT

AX

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BR

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RS

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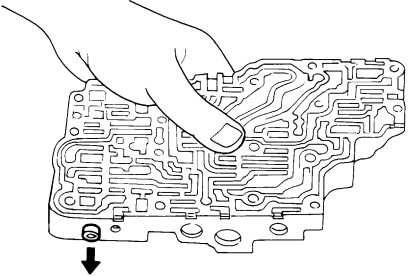
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IDX

MTBL0388

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

Diagnostic Procedure (Cont'd)

<b>3</b>	<b>CHECK CONTROL VALVE</b>	
<p>1. Disassemble control valve assembly. Refer to AT-312.</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>		
		
SAT367H		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	Repair control valve.

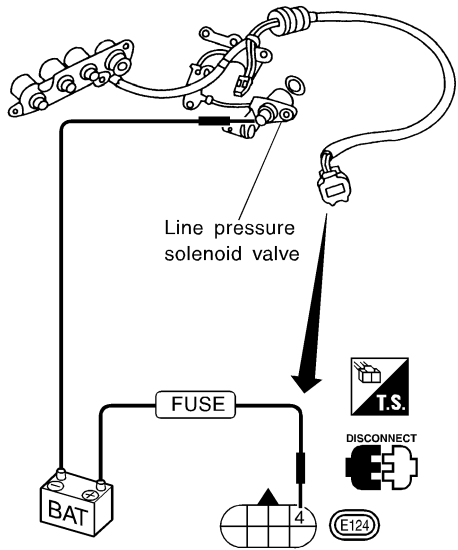
<b>4</b>	<b>CHECK SHIFT UP (D<sub>3</sub> TO D<sub>4</sub>)</b>	
Does A/T shift from D <sub>3</sub> to D <sub>4</sub> at the specified speed?		
<b>Yes or No</b>		
Yes	▶	GO TO 5.
No	▶	Check control valve again. Repair or replace control valve assembly.

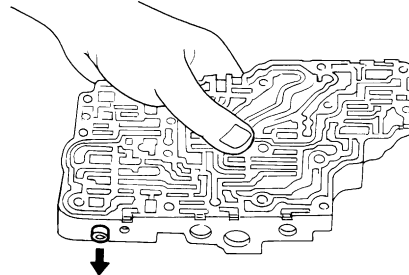
<b>5</b>	<b>CHECK DTC</b>	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-164.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	GO TO 10. CHECK LOCK-UP CONDITION.



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

Diagnostic Procedure (Cont'd)

<b>6</b>	<b>CHECK LINE PRESSURE SOLENOID VALVE</b>	<p>1. Remove control valve assembly. Refer to AT-280.</p> <p>2. Check line pressure solenoid valve operation. Refer to AT-173.</p> <div style="text-align: center;">  <p style="text-align: center;">OK or NG</p> </div> <p style="text-align: right;">SAT893J</p>	GI MA EM LC EC FE CL MT <b>AT</b> AX SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 7.	
NG	▶	Replace solenoid valve assembly.	

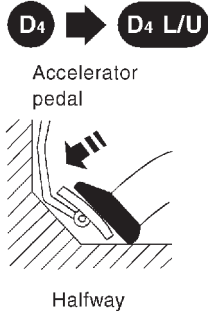
<b>7</b>	<b>CHECK CONTROL VALVE</b>	<p>1. Disassemble control valve assembly. Refer to AT-312.</p> <p>2. Check line pressure circuit valves for sticking.</p> <ul style="list-style-type: none"> <li>● Pressure regulator valve</li> <li>● Pilot valve</li> <li>● Pressure modifier valve</li> </ul> <div style="text-align: center;">  <p style="text-align: center;">OK or NG</p> </div> <p style="text-align: right;">SAT367H</p>	GI MA EM LC EC FE CL MT <b>AT</b> AX SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 8.	
NG	▶	Repair control valve.	

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

Diagnostic Procedure (Cont'd)

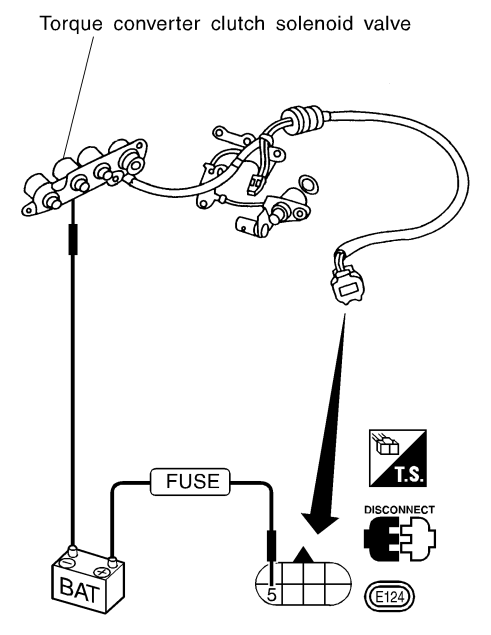
<b>8</b>	<b>CHECK SHIFT UP (D<sub>3</sub> TO D<sub>4</sub>)</b>	
Does A/T shift from D <sub>3</sub> to D <sub>4</sub> at the specified speed?		
<b>Yes or No</b>		
Yes	▶	GO TO 9.
No	▶	Check control valve again. Repair or replace control valve assembly.

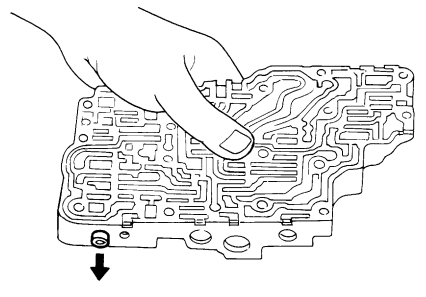
<b>9</b>	<b>CHECK DTC</b>	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-164.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	GO TO 10. And check for proper lock-up.

<b>10</b>	<b>CHECK LOCK-UP CONDITION</b>	
During "Cruise test – Part 1" (AT-76), does A/T perform lock-up at the specified speed?		
 <p style="text-align: center;">Accelerator pedal</p> <p style="text-align: center;">Halfway</p>		
SAT989H		
<b>Yes or No</b>		
Yes	▶	Perform "Cruise test – Part 1" again and return to the start point of this test group.
No	▶	GO TO 11.

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

Diagnostic Procedure (Cont'd)

<b>11</b>	<b>CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE</b>	<p>1. Remove control valve assembly. Refer to AT-280.</p> <p>2. Check torque converter clutch solenoid valve operation. Refer to AT-173.</p> <div style="text-align: center; margin-top: 20px;">  <p style="margin-left: 100px;">Torque converter clutch solenoid valve</p> </div> <p style="text-align: right; margin-top: 10px;">SAT055K</p>	GI MA EM LC EC FE CL MT <b>AT</b> AX SU
<b>OK or NG</b>			
OK	▶	GO TO 12.	
NG	▶	Replace solenoid valve assembly.	

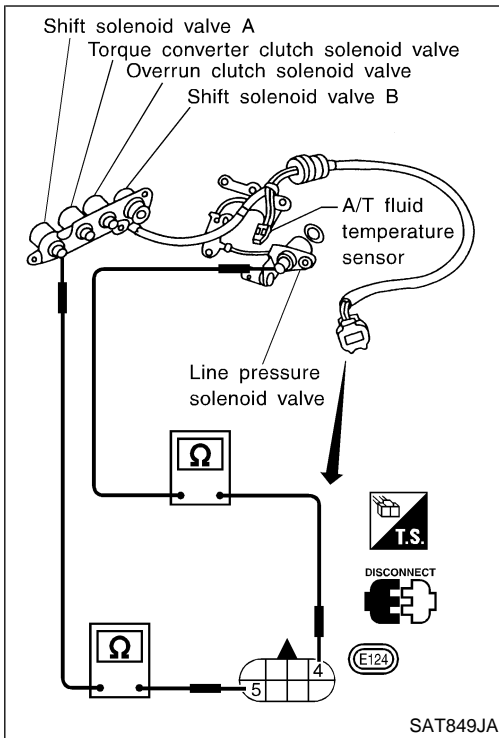
<b>12</b>	<b>CHECK CONTROL VALVE</b>	<p>1. Disassemble control valve assembly. Refer to AT-312.</p> <p>2. Check control valves for sticking.</p> <ul style="list-style-type: none"> <li>● Torque converter clutch control valve</li> <li>● Torque converter clutch relief valve</li> </ul> <div style="text-align: center; margin-top: 20px;">  </div> <p style="text-align: right; margin-top: 10px;">SAT367H</p>	BR ST RS BT HA SC EL IDX
<b>OK or NG</b>			
OK	▶	GO TO 13.	
NG	▶	Repair control valve.	

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

Diagnostic Procedure (Cont'd)

<b>13</b>	<b>CHECK LOCK-UP CONDITION</b>
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.

<b>14</b>	<b>CHECK DTC</b>
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-164.	
<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 test group.



## Component Inspection

=NCAT0060

### SOLENOID VALVES

NCAT0060S01

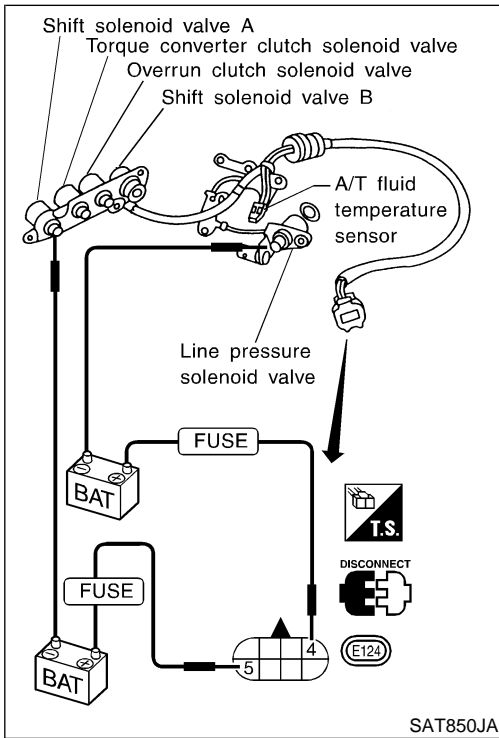
- For removal, refer to AT-280.

### Resistance Check

NCAT0060S0101

- Check resistance between two terminals.

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



### Operation Check

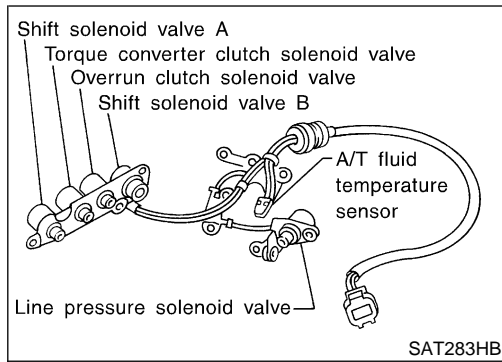
NCAT0060S0102

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

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

# DTC P0745 LINE PRESSURE SOLENOID VALVE

## Description



## Description

NCAT0061

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

NCAT0061S01

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

NCAT0061S02

Remarks: Specification data are reference values.

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

## ON BOARD DIAGNOSIS LOGIC

NCAT0061S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: L/PRESS SOL/CIRC : P0745	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	<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>

# 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
DATA MONITOR (SPEC)
ACTIVE TEST
DTC & SRT CONFIRMATION

SEF949Y

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0061S04

### 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  
CL  
MT  
AT  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

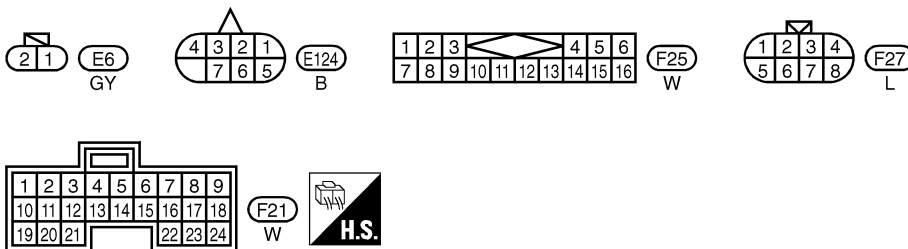
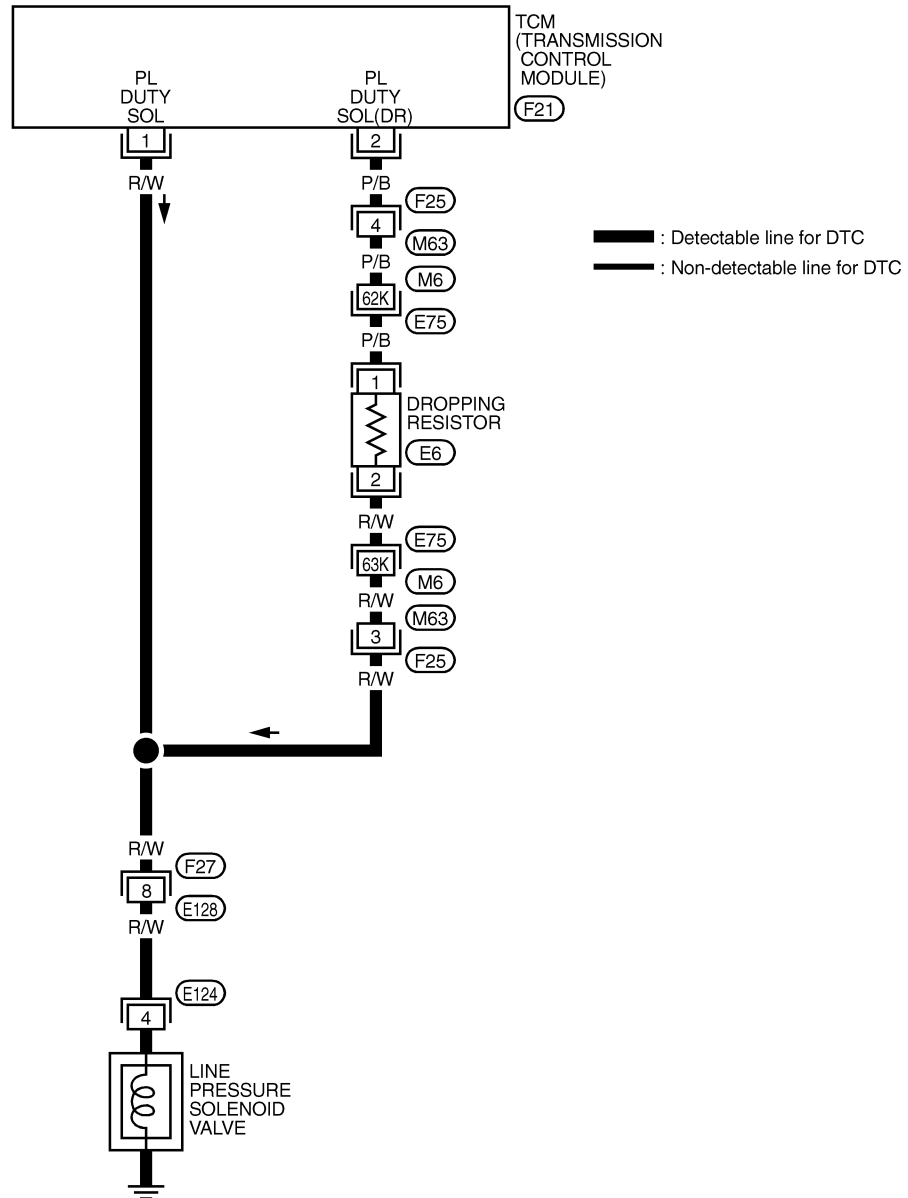
# DTC P0745 LINE PRESSURE SOLENOID VALVE

Wiring Diagram — AT — LPSV

## Wiring Diagram — AT — LPSV

NCAT0209

AT-LPSV-01



REFER TO THE FOLLOWING.

(E75) -SUPER MULTIPLE JUNCTION (SMJ)

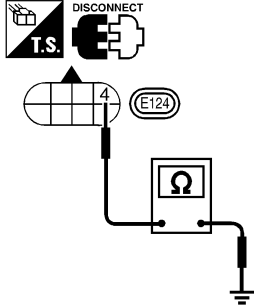


# DTC P0745 LINE PRESSURE SOLENOID VALVE

Diagnostic Procedure

## Diagnostic Procedure

NCAT0062

<b>1</b>	<b>CHECK VALVE RESISTANCE</b>	
	<p>1. Turn ignition switch to "OFF" position.                  2. Disconnect terminal cord assembly connector in engine compartment.                  3. Check resistance between terminal 4 and ground.</p> <p><b>Resistance:</b>  <b>2.5 - 5Ω</b></p> <div style="text-align: center;">  <p>The diagram illustrates the resistance measurement setup. A terminal cord assembly connector is shown with terminal 4 connected to a multimeter. The multimeter is grounded. A 'DISCONNECT' symbol and 'T.S.' are shown above the connector. A circled 'E124' is also present.</p> </div> <p style="text-align: right;">SAT895J</p>	
	<b>OK or NG</b>	
OK	▶	GO TO 2.
NG	▶	<p>1. Remove control valve assembly. Refer to AT-280.                  2. Check the following items:</p> <ul style="list-style-type: none"> <li>● Line pressure solenoid valve                      Refer to "Component Inspection", AT-180.</li> <li>● Harness of terminal cord assembly for short or open</li> </ul>

GI

MA

EM

LC

EC

FE

CL

MT

**AT**

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

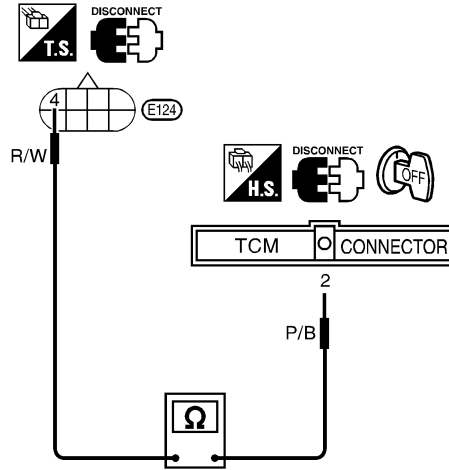
# DTC P0745 LINE PRESSURE SOLENOID VALVE

Diagnostic Procedure (Cont'd)

## 2 CHECK POWER SOURCE CIRCUIT

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

**Resistance:**  
**10 - 15Ω**



SAT896J

OK or NG

OK



GO TO 3.

NG



**Check the following items:**

- Dropping resistor  
Refer to "Component Inspection", AT-180.
- Harness for short or open between TCM terminal 2 and terminal cord assembly (Main harness)

# DTC P0745 LINE PRESSURE SOLENOID VALVE

Diagnostic Procedure (Cont'd)

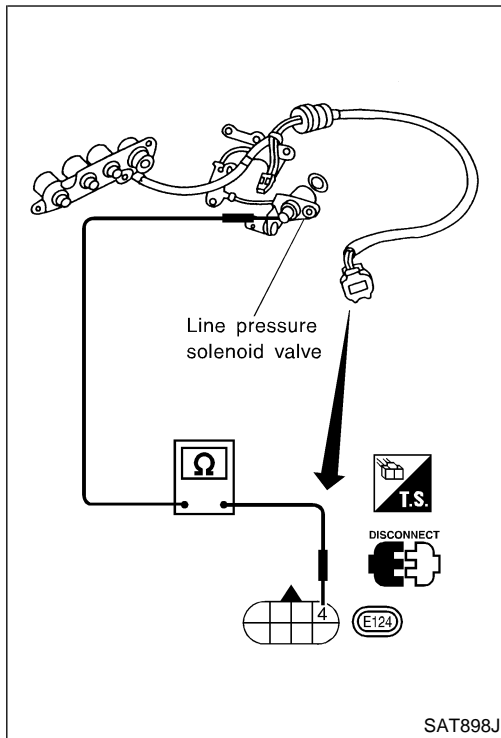
<b>3</b>	<b>CHECK POWER SOURCE CIRCUIT</b>	
<p>1. Turn ignition switch to "OFF" position.                  2. Check resistance between terminal 4 and TCM harness connector terminal 1.</p> <p><b>Resistance:</b>  <b>Approx. 0Ω</b></p>		
<p>If OK, check harness for short to ground and short to power.</p> <p>3. Reinstall any part removed.</p> <p style="text-align: right;">SAT897J</p>		
<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>	
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-175.</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.</p> <p>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</p>

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

# DTC P0745 LINE PRESSURE SOLENOID VALVE

## Component Inspection



## Component Inspection LINE PRESSURE SOLENOID VALVE

=NCAT0063

NCAT0063S01

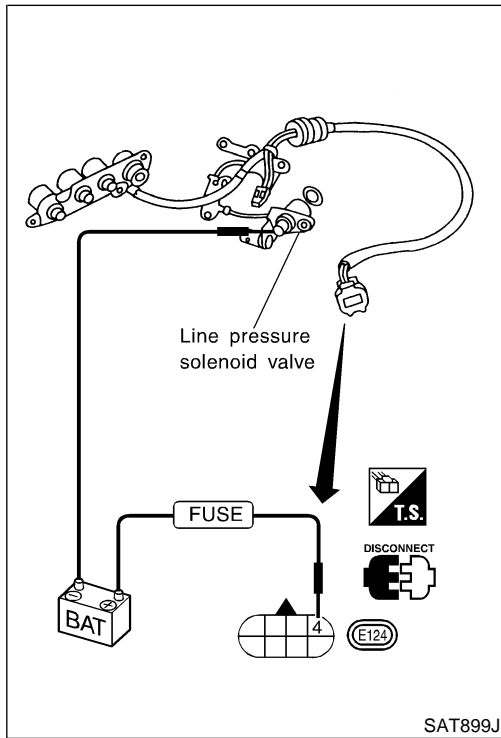
- For removal, refer to AT-280.

### Resistance Check

NCAT0063S0101

- Check resistance between two terminals.

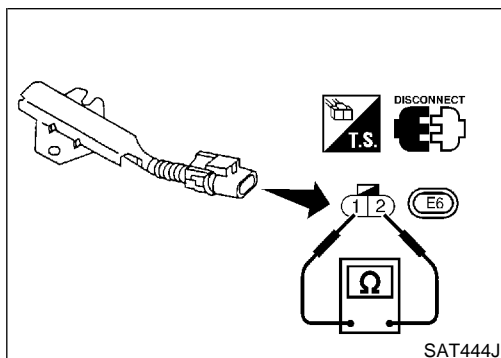
Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	4	Ground	2.5 - 5Ω



### Operation Check

NCAT0063S0102

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



### DROPPING RESISTOR

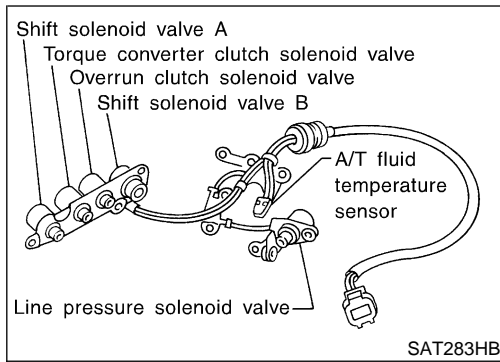
NCAT0063S02

- Check resistance between two terminals.

**Resistance:**  
**10 - 15Ω**

# 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.

NCAT0064

GI

MA

EM

LC

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)


EC

FE

## TCM TERMINALS AND REFERENCE VALUE

NCAT0064S01

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

CL

MT

AT

AX

## ON BOARD DIAGNOSIS LOGIC

NCAT0064S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
(SFT SOL A/CIRC) (P0750)	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	<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>

SU

BR

ST

RS

BT

HA

SC

EL

IDX

# DTC P0750 SHIFT SOLENOID VALVE A

Description (Cont'd)

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
DATA MONITOR (SPEC)
ACTIVE TEST
DTC & SRT CONFIRMATION

SEF949Y

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0064S03

### 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

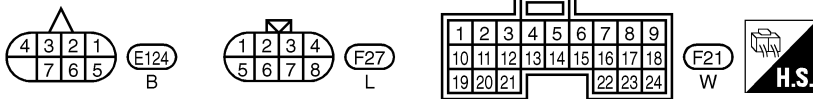
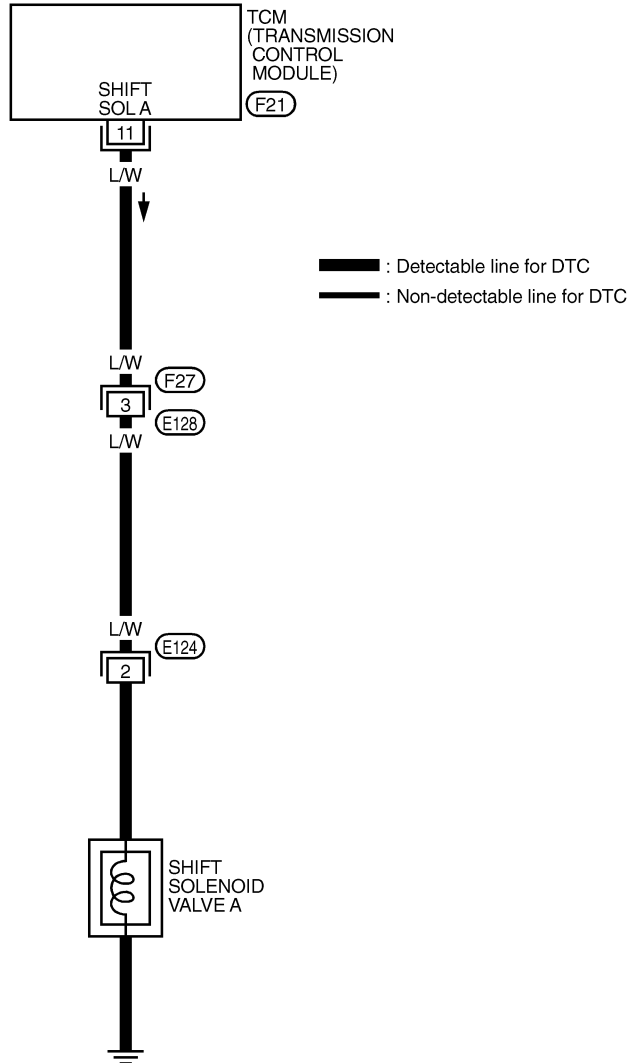
Wiring Diagram — AT — SSV/A

## Wiring Diagram — AT — SSV/A

NCAT0210

AT-SSV/A-01

- GI
- MA
- EM
- LC
- EC
- FE
- CL
- MT
- AT**
- AX
- SU
- BR
- ST
- RS
- BT
- HA
- SC
- EL
- IDX

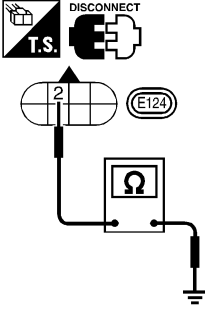


# DTC P0750 SHIFT SOLENOID VALVE A

Diagnostic Procedure

## Diagnostic Procedure

NCAT0065

1	CHECK VALVE RESISTANCE
	<p>1. Turn ignition switch to "OFF" position. 2. Disconnect terminal cord assembly connector in engine compartment. 3. Check resistance between terminal 2 and ground.</p> <p><b>Resistance:</b> <b>20 - 40Ω</b></p> <div></div> <p style="text-align: right;">SAT900J</p>
OK	▶ GO TO 2.
NG	▶ <ol style="list-style-type: none"><li>1. Remove control valve assembly. Refer to AT-280.</li><li>2. Check the following items:<ul style="list-style-type: none"><li>● Shift solenoid valve A Refer to "Component Inspection", AT-186.</li><li>● Harness of terminal cord assembly for short or open</li></ul></li></ol>



# DTC P0750 SHIFT SOLENOID VALVE A

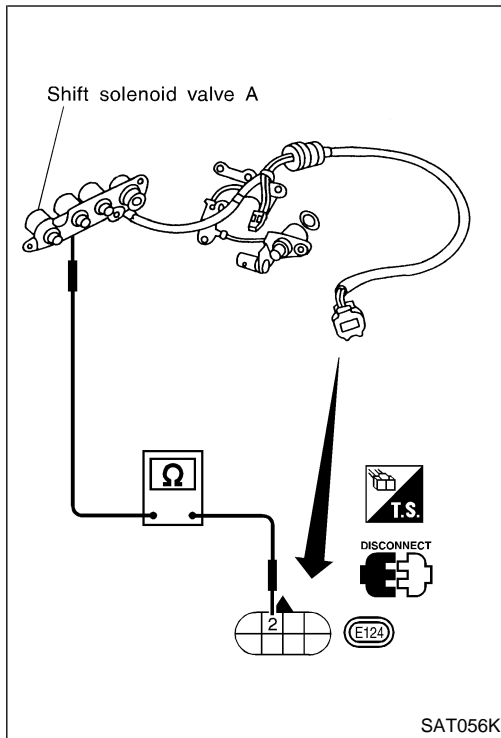
Diagnostic Procedure (Cont'd)

<b>2</b>	<b>CHECK POWER SOURCE CIRCUIT</b>	<p>1. Turn ignition switch to "OFF" position.                  2. Disconnect TCM harness connector.                  3. Check continuity between terminal 2 and TCM harness connector terminal 11.  <b>Continuity should exist.</b></p>	GI MA EM LC EC FE CL MT
			AT
		<p>If OK, check harness for short to ground and short to power.                  4. Reinstall any part removed.</p>	SAT901J AX
		<b>OK or NG</b>	SU
OK	▶	GO TO 3.	BR
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	ST

<b>3</b>	<b>CHECK DTC</b>	<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-182.</p>	RS
		<b>OK or NG</b>	BT
OK	▶	<b>INSPECTION END</b>	HA
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>	SC EL IDX

# DTC P0750 SHIFT SOLENOID VALVE A

## Component Inspection



## Component Inspection SHIFT SOLENOID VALVE A

NCAT0066

NCAT0066S01

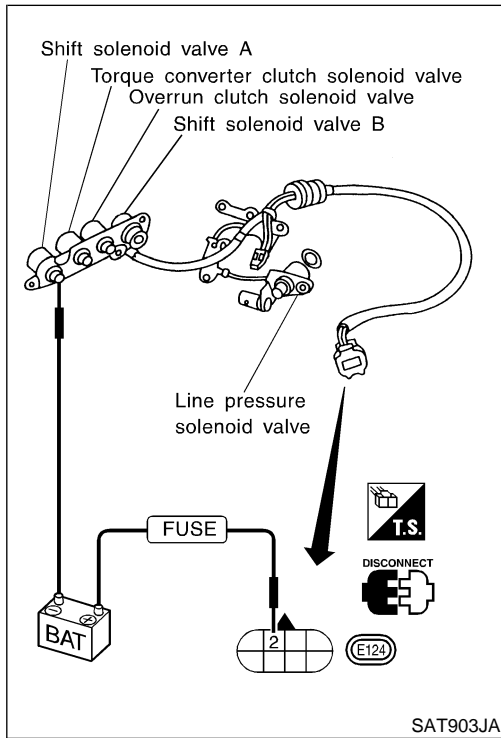
- For removal, refer to AT-280.

## Resistance Check

NCAT0066S0101

- Check resistance between two terminals.

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



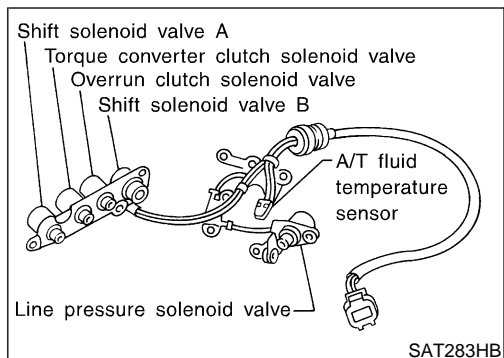
## Operation Check

NCAT0066S0102

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

NCAT0067

GI

MA

EM

LC

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)


EC

FE

## TCM TERMINALS AND REFERENCE VALUE

NCAT0067S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard
12	L/Y	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> ".)	1V or less

CL

MT

AT

AX

## ON BOARD DIAGNOSIS LOGIC

NCAT0067S02

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

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# DTC P0755 SHIFT SOLENOID VALVE B

Description (Cont'd)

SELECT SYSTEM
A/T
ENGINE

SAT014K

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
DATA MONITOR (SPEC)
ACTIVE TEST
DTC & SRT CONFIRMATION

SEF949Y

## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0067S03

### CAUTION:

Always drive vehicle at a safe speed.

### NOTE:

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

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

### With CONSULT-II

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

### With GST

Follow the procedure "With CONSULT-II".

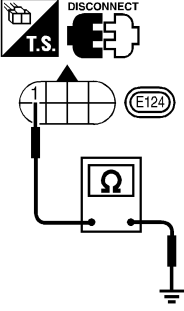


# DTC P0755 SHIFT SOLENOID VALVE B

Diagnostic Procedure

## Diagnostic Procedure

NCAT0068

1	CHECK VALVE RESISTANCE
	<p>1. Turn ignition switch to "OFF" position. 2. Disconnect terminal cord assembly connector in engine compartment. 3. Check resistance between terminal 1 and ground.</p> <p><b>Resistance:</b> <b>20 - 40Ω</b></p> <div style="text-align: center;"></div> <p style="text-align: center;"><b>OK or NG</b></p>
OK	▶ GO TO 2.
NG	▶ 1. Remove control valve assembly. Refer to AT-280. 2. Check the following items: <ul style="list-style-type: none"><li>● Shift solenoid valve B Refer to "Component Inspection", AT-192.</li><li>● Harness of terminal cord assembly for short or open</li></ul>

SAT904J

# DTC P0755 SHIFT SOLENOID VALVE B

Diagnostic Procedure (Cont'd)

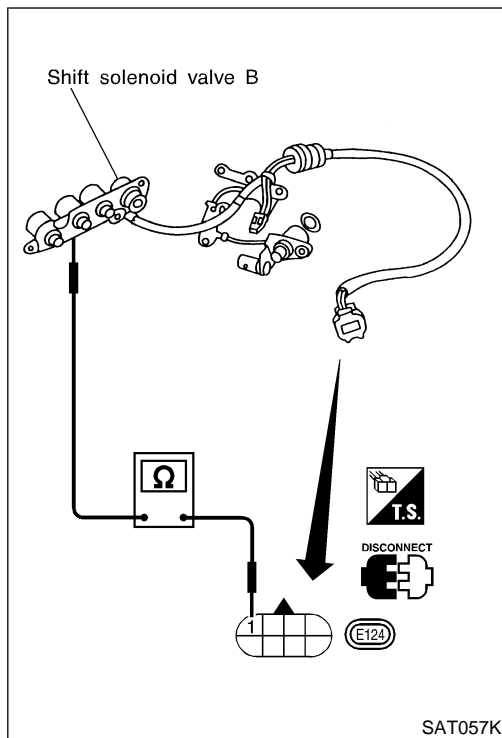
<b>2</b>	<b>CHECK POWER SOURCE CIRCUIT</b>	
<p>1. Turn ignition switch to "OFF" position.                  2. Disconnect TCM harness connector.                  3. Check continuity between terminal 12 and TCM harness connector terminal 1.  <b>Continuity should exist.</b></p>		
<p>If OK, check harness for short to ground and short to power.                  4. Reinstall any part removed.</p>		
SAT905J		
<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 DTC</b>	
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-188.</p>		
<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>

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# DTC P0755 SHIFT SOLENOID VALVE B

## Component Inspection



## Component Inspection SHIFT SOLENOID VALVE B

NCAT0069

NCAT0069S01

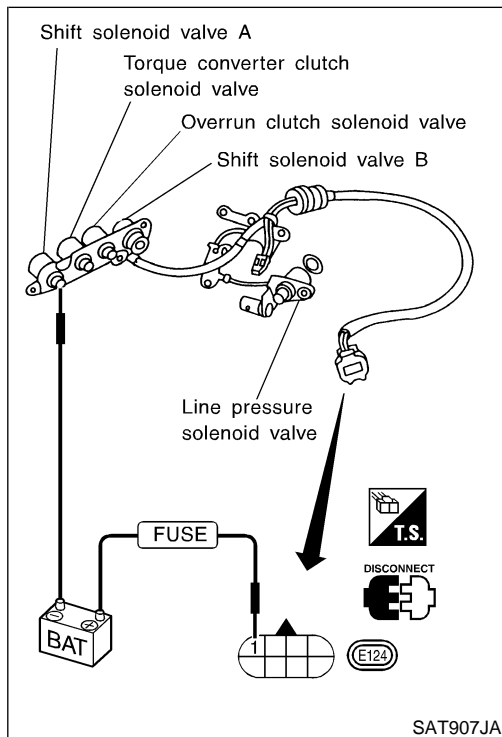
- For removal, refer to AT-280.

### Resistance Check

NCAT0069S0101

- Check resistance between two terminals.

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



## Operation Check

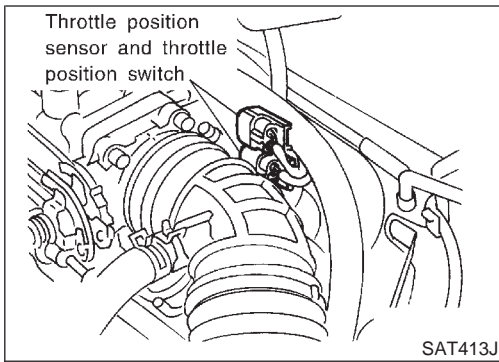
NCAT0069S0102

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



# DTC P1705 THROTTLE POSITION SENSOR

Description



## Description

NCAT0070

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

## CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NCAT0070S01

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

NCAT0070S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)
16	Y	Closed throttle position switch (in throttle position switch)	When releasing accelerator pedal after warming up engine. Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-49.	Battery voltage
			When depressing accelerator pedal after warming up engine. Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-49.	0V
17	LG	Wide open throttle position switch (in throttle position switch)	When depressing accelerator pedal more than half-way after warming up engine.	Battery voltage
			When releasing accelerator pedal after warming up engine.	0V
32	P/L	Throttle position sensor (Power source)	Ignition switch "ON".	4.5 - 5.5V
			Ignition switch "OFF".	0V
41	GY	Throttle position sensor	When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.5V Fully-open throttle: 4V
42	B	Ground (Throttle position sensor)	—	—



# DTC P1705 THROTTLE POSITION SENSOR

Description (Cont'd)

## ON BOARD DIAGNOSIS LOGIC

NCAT0070S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (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 sensor circuit is open or shorted.)</li> <li>• Throttle position sensor</li> <li>• Throttle position switch</li> </ul>

SELECT SYSTEM
A/T
ENGINE

SAT014K

### DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0070S04

#### 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) Apply vacuum to the throttle opener, then check the following. Refer to steps from 1 to 5 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-49.
- 2) Turn ignition switch "ON" and select "TCM INPUT SIGNALS" in DATA MONITOR" mode for "A/T" with CONSULT-II.
- 3) Check the following.

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

If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-197.

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

- 4) Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
- 5) 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-197.

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

- 6) 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
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
DATA MONITOR (SPEC)
ACTIVE TEST
DTC & SRT CONFIRMATION

SEF949Y

# DTC P1705 THROTTLE POSITION SENSOR

Description (Cont'd)



**With GST**

Follow the procedure "With CONSULT-II".

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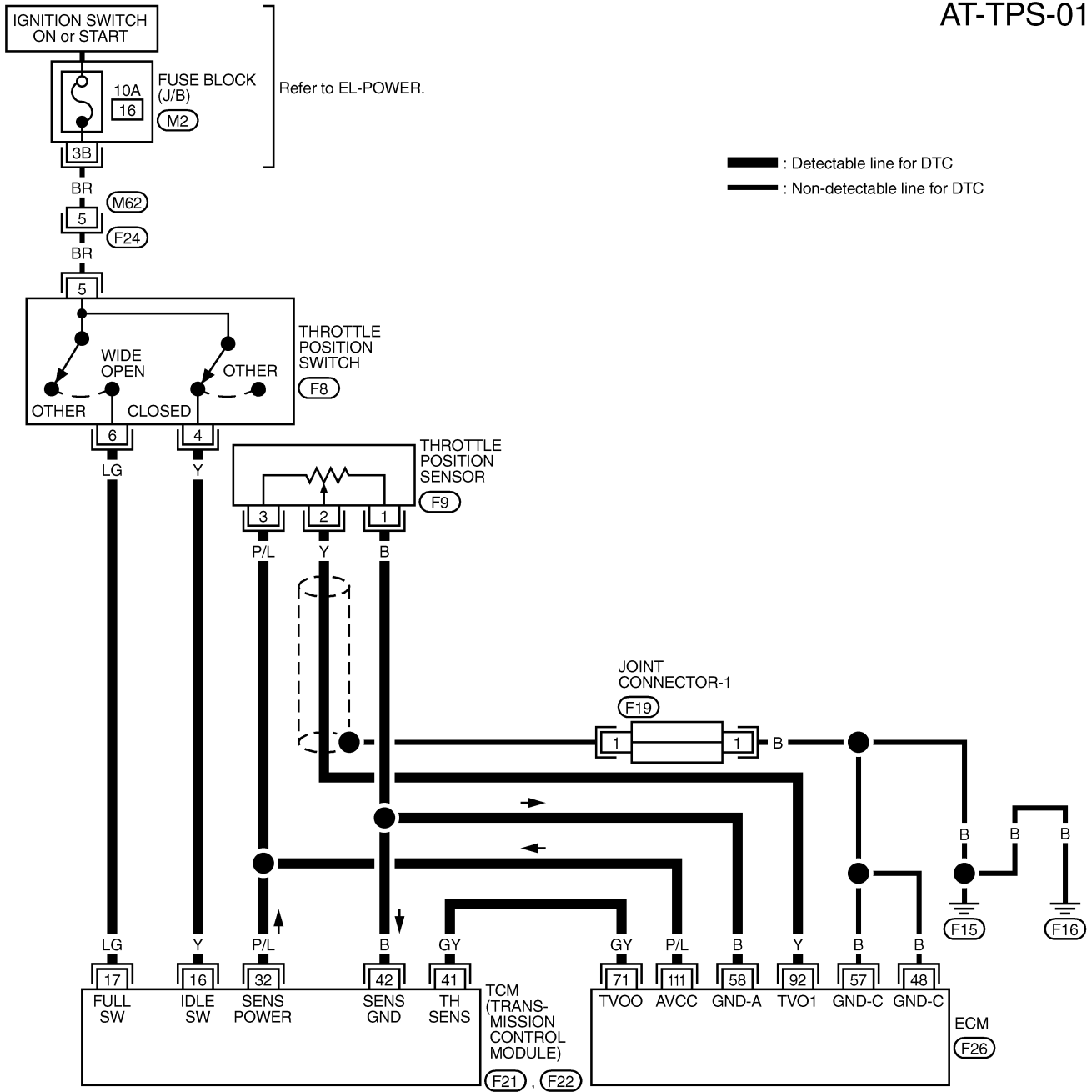
# DTC P1705 THROTTLE POSITION SENSOR

Wiring Diagram — AT — TPS

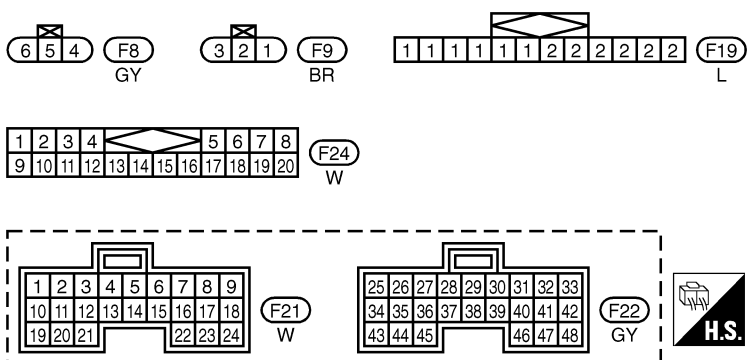
## Wiring Diagram — AT — TPS

NCAT0212

AT-TPS-01



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



REFER TO THE FOLLOWING.  
 (M2) -FUSE BLOCK-JUNCTION BOX (J/B)  
 (F26) -ELECTRICAL UNITS

# DTC P1705 THROTTLE POSITION SENSOR


Diagnostic Procedure

## Diagnostic Procedure

NCAT0071

<b>1</b>	<b>CHECK DTC WITH ECM</b>	
Perform diagnostic test mode II (self-diagnostic results) for engine control. Refer to EC-81, "Malfunction Indicator Lamp (MIL)".		
<b>OK or NG</b>		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Check throttle position sensor circuit for engine control. Refer to EC-177, "DTC P0120 THROTTLE POSITION SENSOR".

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<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>Apply vacuum to the throttle opener then check the following. Refer from step 1 to 5 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-49.</li> <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> </ol>																		
<table border="1" style="margin: auto;"> <tr><th colspan="2">SELECT SYSTEM</th></tr> <tr><td style="text-align: center;">A/T</td><td></td></tr> <tr><th colspan="2">ENGINE</th></tr> <tr><td> </td><td></td></tr> <tr><td> </td><td></td></tr> <tr><td> </td><td></td></tr> <tr><td> </td><td></td></tr> <tr><td> </td><td></td></tr> </table>			SELECT SYSTEM		A/T		ENGINE											
SELECT SYSTEM																		
A/T																		
ENGINE																		
<p>4. Read out the value of "THRTL POS SEN".</p> <p><b>Voltage:</b>  <b>Fully-closed throttle:</b>              <b>Approximately 0.5V</b>  <b>Fully-open throttle:</b>              <b>Approximately 4V</b></p>																		
<table border="1" style="margin: auto;"> <tr><th colspan="2">DATA MONITOR</th></tr> <tr><th colspan="2">MONITORING</th></tr> <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> </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																		
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VHCL/S SE-MTR	XXX km/h																	
THRTL POS SEN	XXX V																	
FLUID TEMP SE	XXX V																	
BATTERY VOLT	XXX V																	
<b>OK or NG</b>																		
OK	▶	GO TO 4.																
NG	▶	Check harness for short or open between ECM and TCM regarding throttle position sensor circuit. (Main harness)																

SAT014K

SAT614J

# DTC P1705 THROTTLE POSITION SENSOR

Diagnostic Procedure (Cont'd)

## 3 CHECK INPUT SIGNAL (WITHOUT CONSULT-II)

### ⊗ Without CONSULT-II

1. Apply vacuum to the throttle opener then check the following. Refer to steps 1 to 5 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-49.
2. Turn ignition switch to "ON" position.  
(Do not start engine.)
3. Check voltage between TCM terminals 41 and 42 while accelerator pedal is depressed slowly.

#### Voltage:

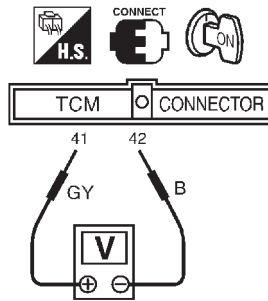
**Fully-closed throttle valve:**

**Approximately 0.5V**

**Fully-open throttle valve:**

**Approximately 4V**

(Voltage rises gradually in response to throttle position)



SAT453J

OK or NG

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

# DTC P1705 THROTTLE POSITION SENSOR

Diagnostic Procedure (Cont'd)

4	CHECK THROTTLE POSITION SWITCH CIRCUIT (WITH CONSULT-II)															
<p><b>Ⓟ With CONSULT-II</b></p> <ol style="list-style-type: none"> <li>Apply vacuum to the throttle opener, then check the following. Refer to steps 1 to 5 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-49.</li> <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 "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;"> <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>ON</td> <td>OFF</td> </tr> <tr> <td>Fully depressed</td> <td>OFF</td> <td>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														
MTBL0011																
<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>POWERSHIFT SW</td> <td>OFF</td> </tr> <tr> <td>CLOSED THL/SW</td> <td>OFF</td> </tr> <tr> <td>W/O THRL/P-SW</td> <td>OFF</td> </tr> <tr> <td>HOLD SW</td> <td>OFF</td> </tr> <tr> <td>BRAKE SW</td> <td>ON</td> </tr> </tbody> </table>			DATA MONITOR		MONITORING		POWERSHIFT SW	OFF	CLOSED THL/SW	OFF	W/O THRL/P-SW	OFF	HOLD SW	OFF	BRAKE SW	ON
DATA MONITOR																
MONITORING																
POWERSHIFT SW	OFF															
CLOSED THL/SW	OFF															
W/O THRL/P-SW	OFF															
HOLD SW	OFF															
BRAKE SW	ON															
SAT702J																
<b>OK or NG</b>																
OK	▶	GO TO 6.														
NG	▶	<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>Throttle position switch — Refer to "Components Inspection", AT-201.</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>														

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# DTC P1705 THROTTLE POSITION SENSOR

Diagnostic Procedure (Cont'd)

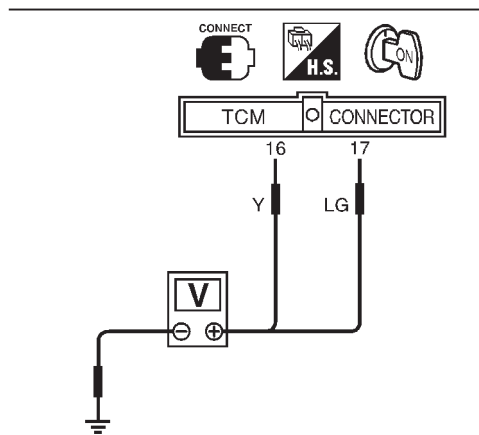
## 5 CHECK THROTTLE POSITION SWITCH CIRCUIT (WITHOUT CONSULT-II)

### ⊗ Without CONSULT-II

1. Apply vacuum to the throttle opener, then check the following. Refer to steps 1 to 5 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-49.
2. Turn ignition switch to "ON" position.  
(Do not start engine.)
3. Check voltage between TCM terminals 16, 17 and ground while depressing, and releasing accelerator pedal slowly.  
(After warming up engine)

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

MTBL0137



SAT454J

OK or NG

OK ► GO TO 6.

NG ► **Check the following items:**

- Throttle position switch — Refer to "Components Inspection", AT-201.
- Harness for short or open between ignition switch and throttle position switch (Main harness)
- Harness for short or open between throttle position switch and TCM (Main harness)

## 6 CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-194.

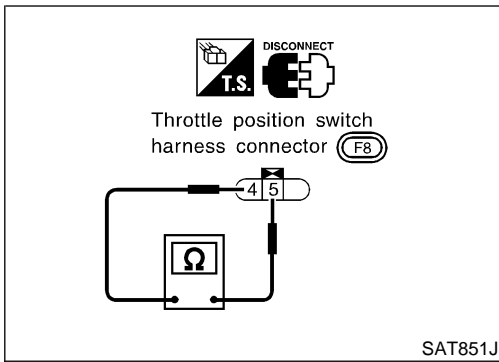
OK or NG

OK ► **INSPECTION END**

NG ►

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





## Component Inspection

### THROTTLE POSITION SWITCH

=NCAT0072

NCAT0072S01

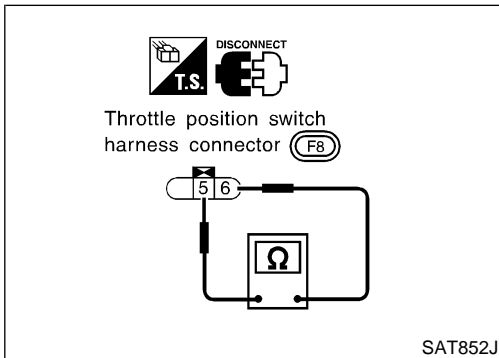
NCAT0072S0101

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

- Check continuity between terminals 4 and 5.  
[Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-49.]

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

- To adjust closed throttle position switch, refer to EC-432, "DTC P0510 CLOSED THROTTLE POSITION SWITCH".



#### Wide Open Throttle Position Switch

NCAT0072S0102

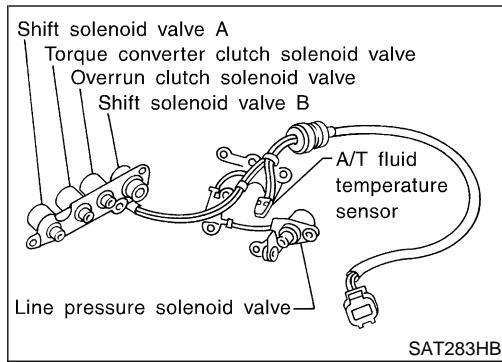
- Check continuity between terminals 5 and 6.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

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IDX

# DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

## Description




## Description

The overrun clutch solenoid valve is activated by the TCM <sup>NCAT0073</sup> 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.

## TCM TERMINALS AND REFERENCE VALUE



Remarks: Specification data are reference values.

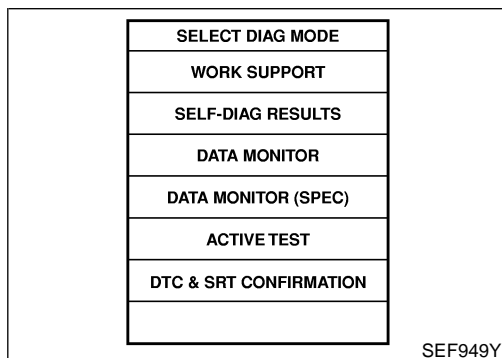
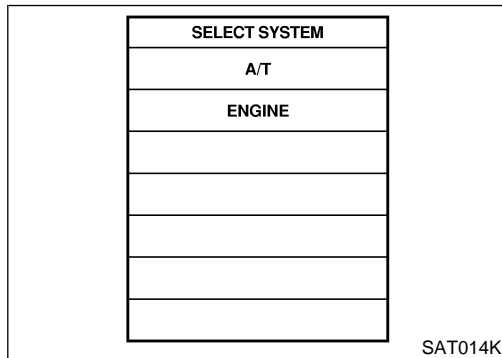
NCAT0073S01

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

## ON BOARD DIAGNOSIS LOGIC

NCAT0073S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
 : O/R CLTCH SOL/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	<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		



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0073S03

### CAUTION:

Always drive vehicle at a safe speed.

### NOTE:

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

### TESTING CONDITION:

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

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

### With CONSULT-II

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

# DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Description (Cont'd)



**With GST**

Follow the procedure "With CONSULT-II".

GI

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EM

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EC

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**AT**

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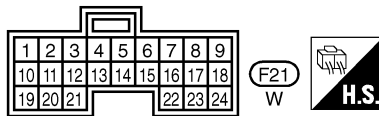
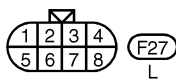
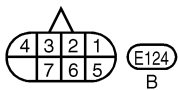
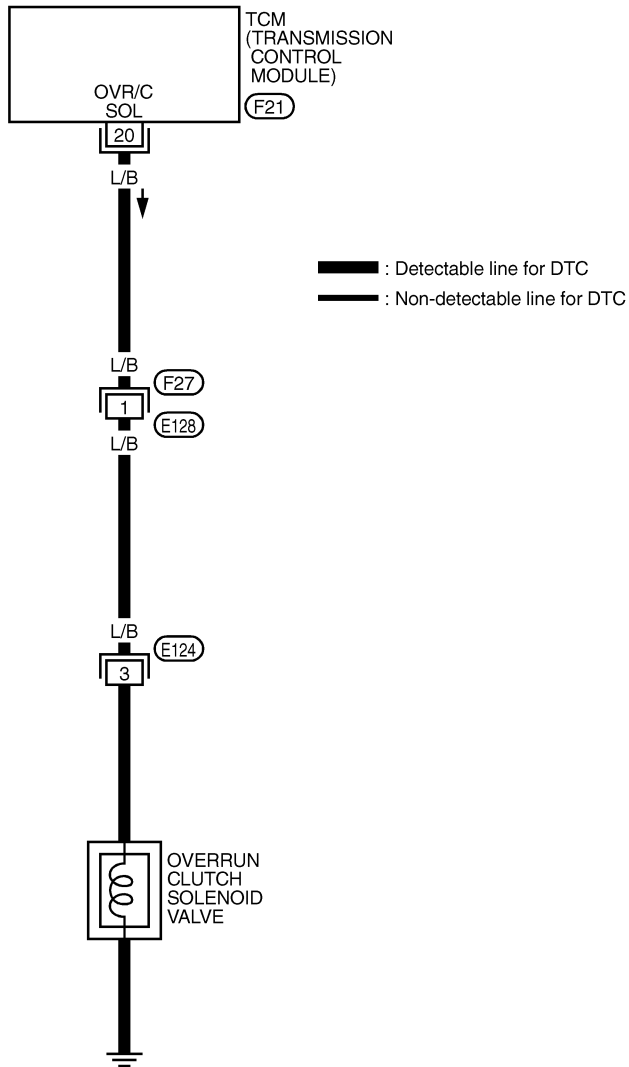
# DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Wiring Diagram — AT — OVRCSV

## Wiring Diagram — AT — OVRCSV

NCAT0213

AT-OVRCSV-01



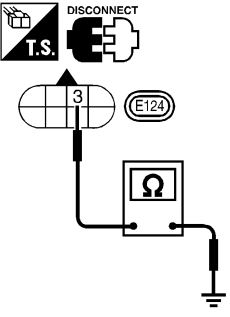
TAT237

# DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Diagnostic Procedure

## Diagnostic Procedure

NCAT0074

<b>1</b>	<b>CHECK VALVE RESISTANCE</b>	
	<p>1. Turn ignition switch to "OFF" position.                  2. Disconnect terminal cord assembly connector in engine compartment.                  3. Check resistance between terminal 3 and ground.</p> <p><b>Resistance:</b>  <b>20 - 40Ω</b></p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT908J</p>	
	<b>OK or NG</b>	
OK	▶	GO TO 2.
NG	▶	<p>1. Remove control valve assembly. Refer to AT-280.                  2. Check the following items:</p> <ul style="list-style-type: none"> <li>● Overrun clutch solenoid valve                      Refer to "Component Inspection", AT-207.</li> <li>● Harness of terminal cord assembly for short or open</li> </ul>

GI

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# DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Diagnostic Procedure (Cont'd)

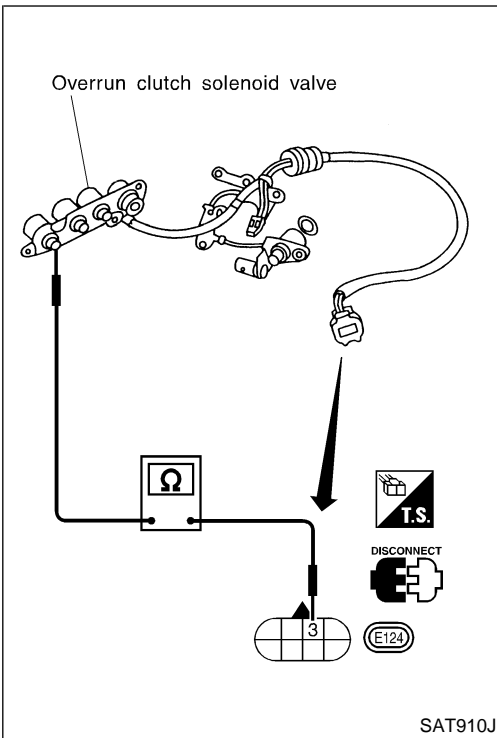
<b>2</b>	<b>CHECK POWER SOURCE CIRCUIT</b>	
<p>1. Turn ignition switch to "OFF" position.                  2. Disconnect TCM harness connector.                  3. Check continuity between terminal 3 and TCM harness connector terminal 20.  <b>Continuity should exist.</b></p>		
<p>If OK, check harness for short to ground and short to power.</p>		
<p>4. Reinstall any part removed.</p>		
<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.

SAT909J

<b>3</b>	<b>CHECK DTC</b>	
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-202.</p>		
<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>

# DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Component Inspection



## Component Inspection OVERRUN CLUTCH SOLENOID VALVE

NCAT0075

NCAT0075S01

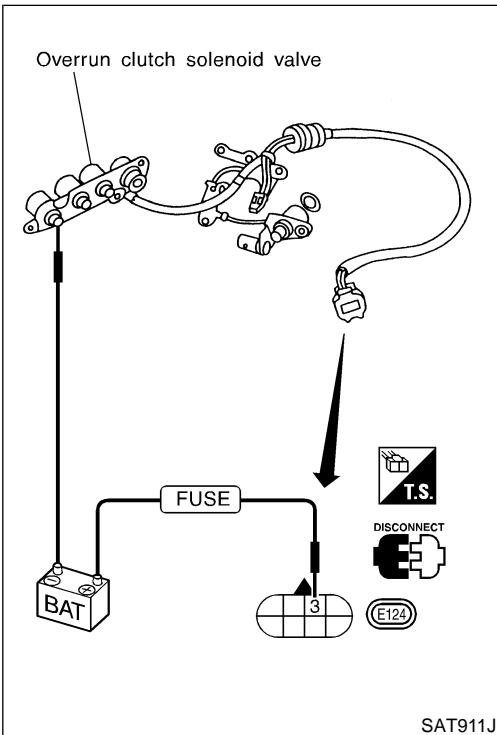
- For removal, refer to AT-280.

### Resistance Check

NCAT0075S0101

- Check resistance between two terminals.

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



### Operation Check

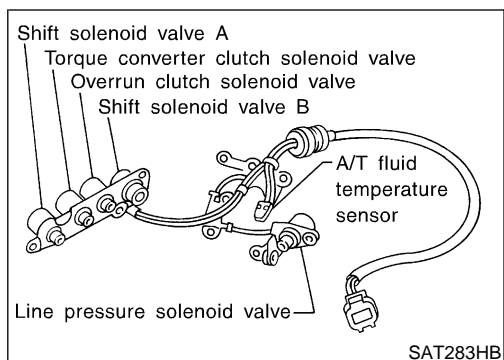
NCAT0075S0102

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

GI  
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IDX

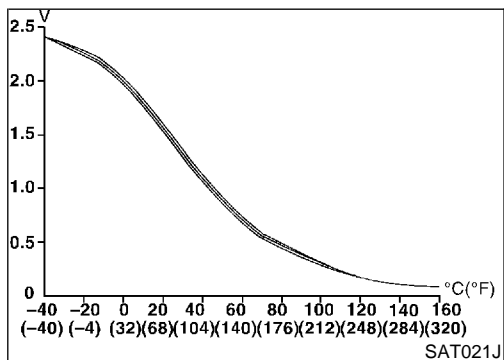
# DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)

## Description



## Description

The A/T fluid temperature sensor detects the A/T fluid temperature and sends a signal to the TCM. NCAT0076



## CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values. NCAT0076S01

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

## TCM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values. NCAT0076S02

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



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

Description (Cont'd)

## ON BOARD DIAGNOSIS LOGIC

NCAT0076S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
<input type="checkbox"/> : BATT/FLUID TEMP SEN <input checked="" type="checkbox"/> : 8th judgement flicker	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

### DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0076S04

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

#### With CONSULT-II

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

EC

FE

CL

MT

#### Without CONSULT-II

- 1) Start engine.
- 2) Drive vehicle under the following conditions:  
Selector lever in "D", vehicle speed higher than 20 km/h (12 MPH).
- 3) Perform self-diagnosis.  
Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-49.

AT

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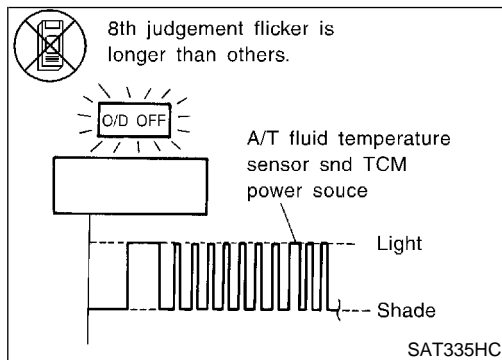
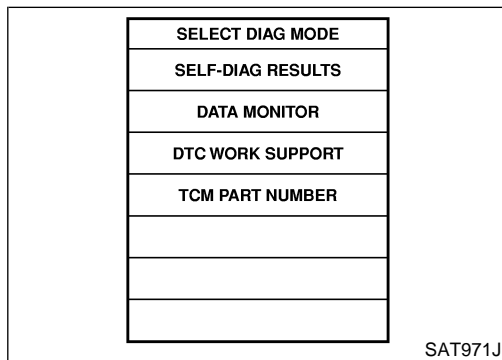
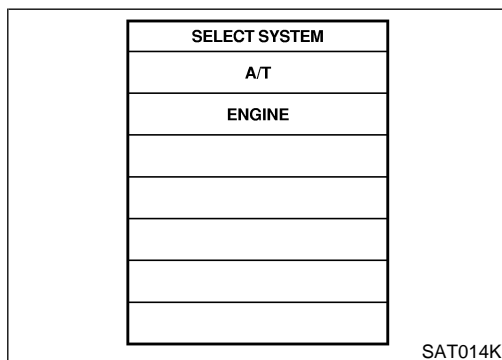
BT

HA

SC

EL

IDX



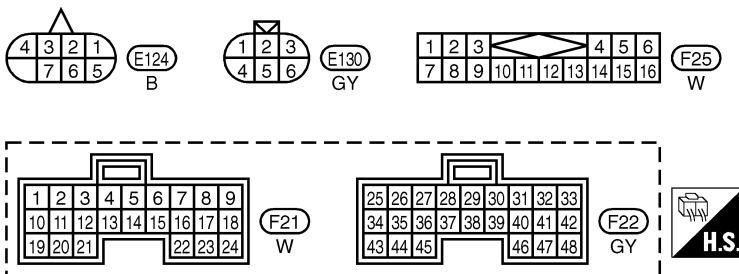
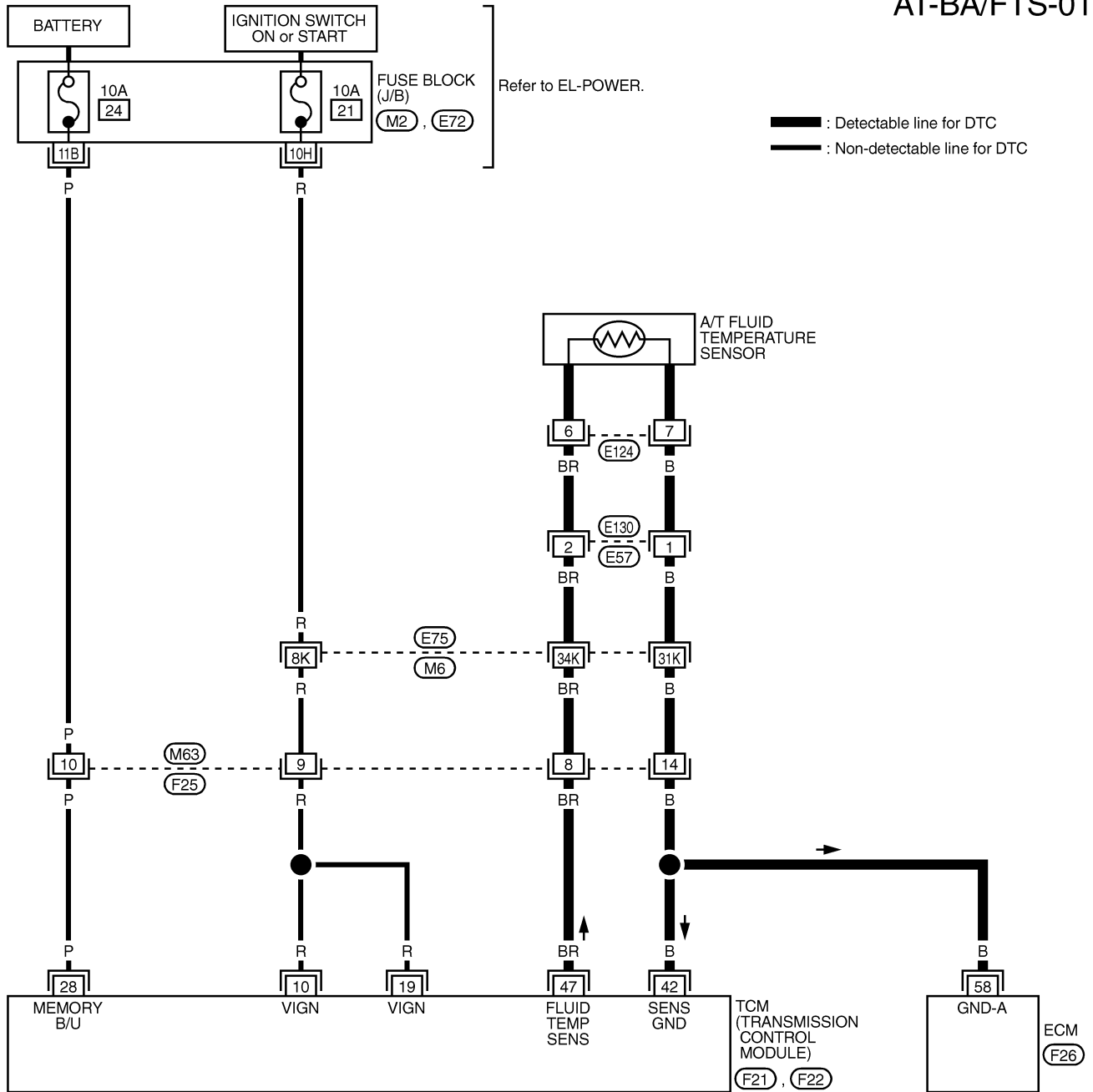
# DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)

Wiring Diagram — AT — BA/FTS

## Wiring Diagram — AT — BA/FTS

NCAT0214

AT-BA/FTS-01



TAT238

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

Diagnostic Procedure

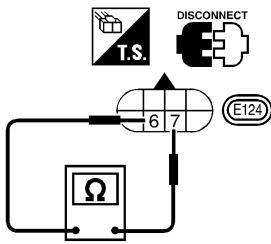
## Diagnostic Procedure

NCAT0077


<b>1</b>	<b>CHECK TCM POWER SOURCE</b>		GI
	<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. <b>Voltage:</b> <b>Battery voltage</b></p> <p>3. Turn ignition switch to "OFF" position.</p> <p>4. Check voltage between TCM terminal 28 and ground. <b>Voltage:</b> <b>Battery voltage</b></p> <div style="text-align: center;"> <p>SAT461J</p> </div> <p style="text-align: center;"><b>OK or NG</b></p>		MA EM LC EC FE CL MT
OK	▶	GO TO 2.	<b>AT</b>
NG	▶	<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● Harness for short or open between ignition switch and TCM (Main harness)</li> <li>● Ignition switch and fuse Refer to EL-9, "POWER SUPPLY ROUTING".</li> </ul>	AX SU BR 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>2</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 in engine compartment.                  3. Check resistance between terminals 6 and 7 when A/T is cold.</p> <p><b>Resistance:</b>  <b>Cold [20°C (68°F)]</b>  <b>Approximately 2.5 kΩ</b></p> <div style="text-align: center;">  </div> <p>4. Reinstall any part removed.</p> <p style="text-align: center;"><b>OK or NG</b></p>	
OK (With CONSULT-II) ▶	GO TO 3.
OK (Without CONSULT-II) ▶	GO TO 4.
NG ▶	<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-214.</li> <li>● Harness of terminal cord assembly for short or open</li> </ul>

SAT912J

<b>3</b>	<b>CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II)</b>														
<p> <b>With CONSULT-II</b></p> <p>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".</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> <div style="text-align: center;"> <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>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> </div> <p style="text-align: center;"><b>OK or NG</b></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 5.														
NG ▶	<p><b>Check the following item:</b></p> <ul style="list-style-type: none"> <li>● Harness for short or open between TCM, ECM and terminal cord assembly (Main harness)</li> <li>● Ground circuit for ECM Refer to EC-147, "TROUBLE DIAGNOSIS FOR POWER SUPPLY".</li> </ul>														

SAT614J

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

Diagnostic Procedure (Cont'd)

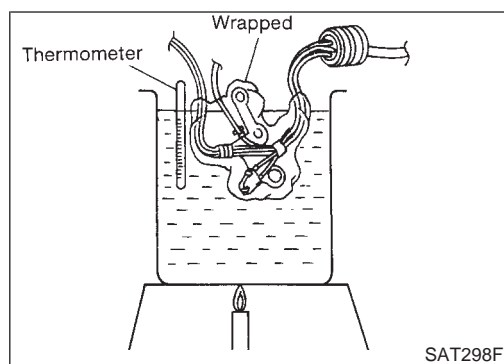
<b>4</b>	<b>CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)</b>	
<p>⊗ Without CONSULT-II</p> <p>1. Start engine.</p> <p>2. Check voltage between TCM terminal 47 and ground while warming up A/T.</p> <p><b>Voltage:</b>  <b>Cold [20°C (68°F)] → Hot [80°C (176°F)]:</b>  <b>Approximately 1.5V → 0.5V</b></p> <div style="text-align: center;"> </div> <p>3. Turn ignition switch to "OFF" position.</p> <p>4. Disconnect TCM harness connector.</p> <p>5. Check resistance between terminal 42 and ground.</p> <p><b>Continuity should exist.</b></p> <div style="text-align: center;"> </div> <p style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 5.
NG	▶	<p><b>Check the following item:</b></p> <ul style="list-style-type: none"> <li>● Harness for short or open between TCM, ECM and terminal cord assembly (Main harness)</li> <li>● Ground circuit for ECM</li> </ul> <p>Refer to EC-147, "TROUBLE DIAGNOSIS FOR POWER SUPPLY".</p>

<b>5</b>	<b>CHECK DTC</b>	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-209.		
<b>OK or NG</b>		
OK	▶	<b>INSPECTION END</b>
NG	▶	<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>

GI  
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EL  
IDX

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

## Component Inspection



## Component Inspection A/T FLUID TEMPERATURE SENSOR

NCAT0078

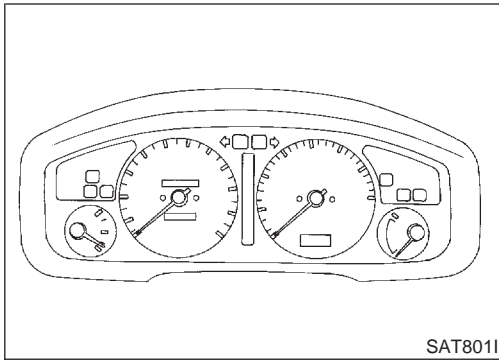
NCAT0078S01

- For removal, refer to AT-280.
- Check resistance between two terminals while changing temperature as shown at left.

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

# DTC VHCL SPEED SEN-MTR 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.

NCAT0079

GI

MA

EM

LC

## TCM TERMINALS AND REFERENCE VALUE

NCAT0079S01

Remarks: Specification data are reference values.

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

EC

FE

CL

MT

## ON BOARD DIAGNOSIS LOGIC

NCAT0079S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
<p> : VHCL SPEED SEN-MTR</p> <p> : 2nd judgement flicker</p>	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>

AT

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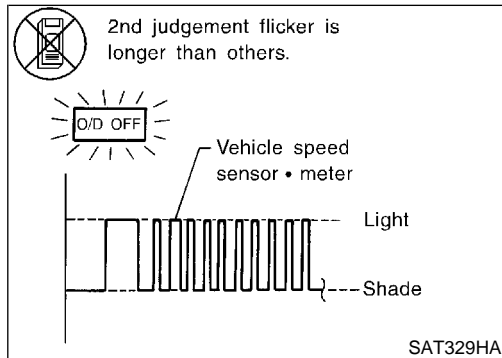
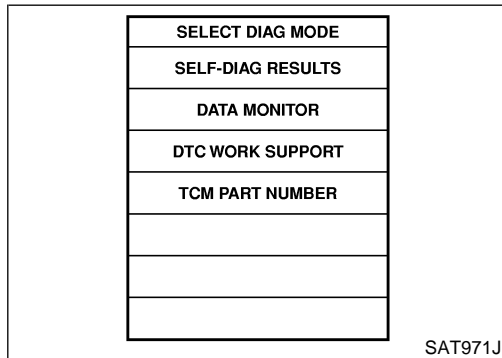
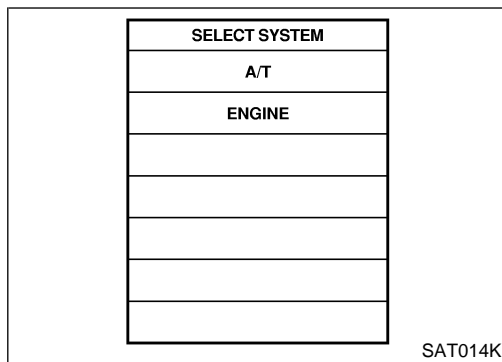
SC

EL

IDX

# DTC VHCL SPEED SEN-MTR VEHICLE SPEED SENSOR-MTR

Description (Cont'd)



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0079S03

### CAUTION:

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

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

### ☑ With CONSULT-II

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

### ☒ Without CONSULT-II

- 1) Start engine.
- 2) Drive vehicle under the following conditions:  
Selector lever in “D” and vehicle speed higher than 25 km/h (16 MPH).
- 3) Perform self-diagnosis.  
Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-49.



# DTC VHCL SPEED SEN-MTR VEHICLE SPEED SENSOR-MTR

Wiring Diagram — AT — VSSMTR

## Wiring Diagram — AT — VSSMTR

NCAT0215

AT-VSSMTR-01

GI

MA

EM

LC

EC

FE

CL

MT

**AT**

AX

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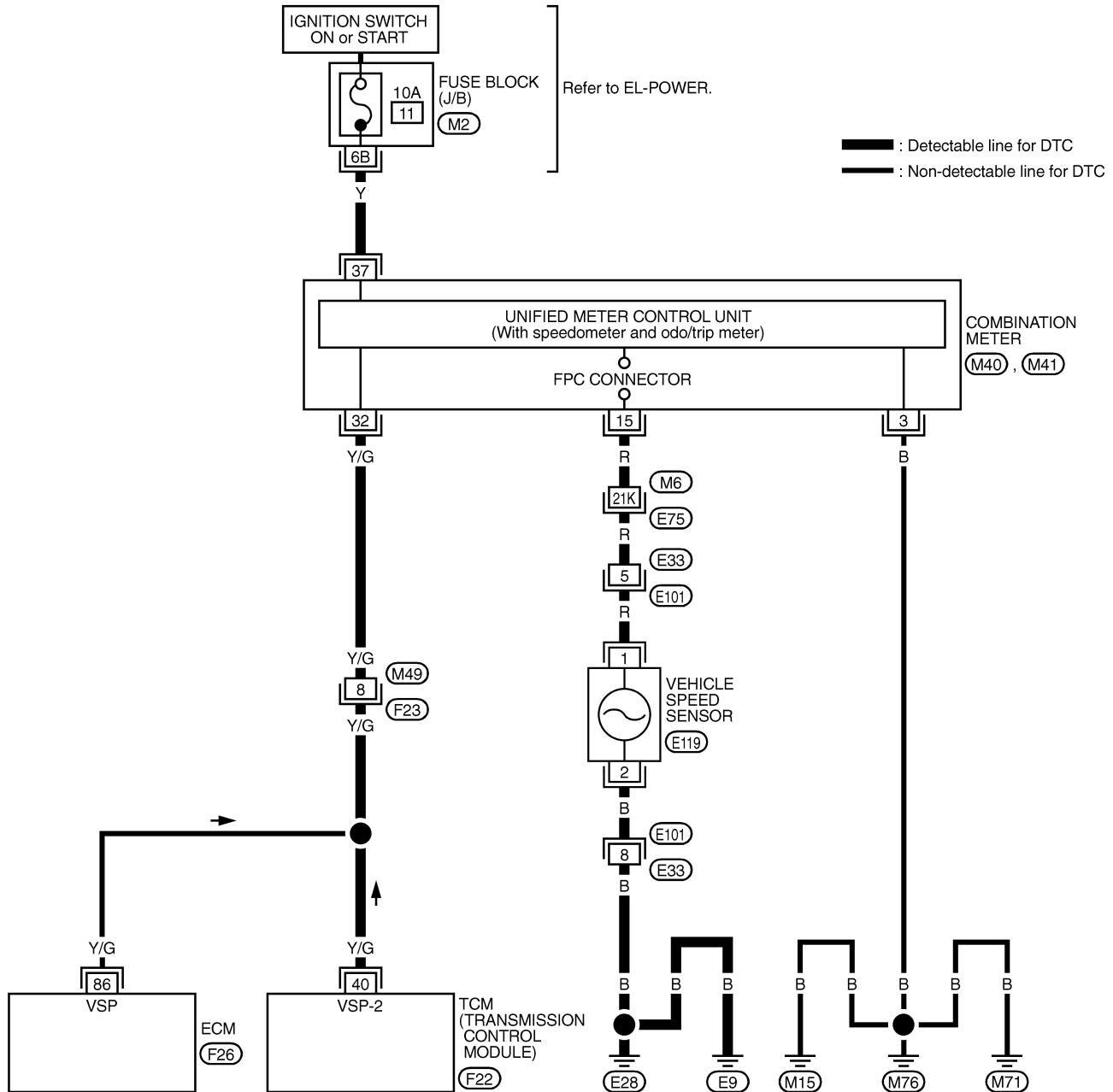
BT

HA

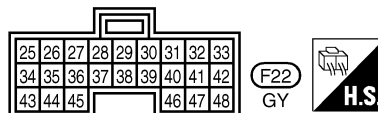
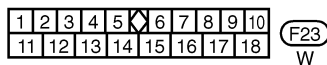
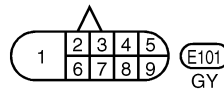
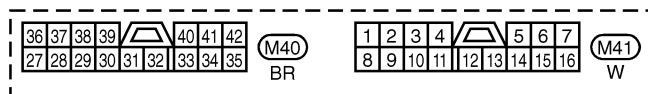
SC

EL

IDX



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



REFER TO THE FOLLOWING.

- (E75) - SUPER MULTIPLE JUNCTION (SMJ)
- (M2) - FUSE BLOCK-JUNCTION BOX (J/B)
- (F26) - ELECTRICAL UNITS



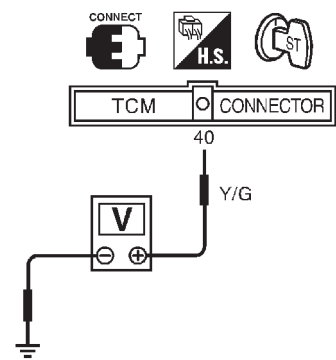
TAT239

# DTC VHCL SPEED SEN-MTR VEHICLE SPEED SENSOR-MTR

Diagnostic Procedure

## Diagnostic Procedure

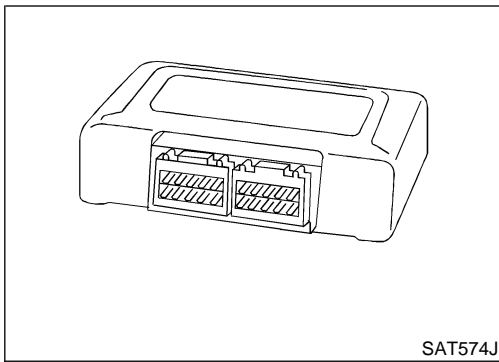
NCAT0080

<b>1</b>	<b>CHECK INPUT SIGNAL</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-MTR" while driving. Check the value changes according to driving speed.</li> </ol>															
<table border="1"> <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														
SAT614J															
<p> <b>Without CONSULT-II</b></p> <ol style="list-style-type: none"> <li>Start engine.</li> <li>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. <b>Voltage:</b> <b>Voltage varies between less than 1V and more than 4.5V.</b></li> </ol>															
															
OK or NG															
OK	▶ GO TO 2.														
NG	▶ <b>Check the following items:</b> <ul style="list-style-type: none"> <li>Vehicle speed sensor and ground circuit for vehicle speed sensor Refer to EL-83, "METERS AND GAUGES".</li> <li>Harness for short or open between TCM and vehicle speed sensor (Main harness)</li> </ul>														

<b>2</b>	<b>CHECK DTC</b>
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-216.	
OK or NG	
OK	▶ <b>INSPECTION END</b>
NG	▶ <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>

# 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. NCAT0218

GI

MA

EM

LC

## ON BOARD DIAGNOSIS LOGIC

NCAT0218S01

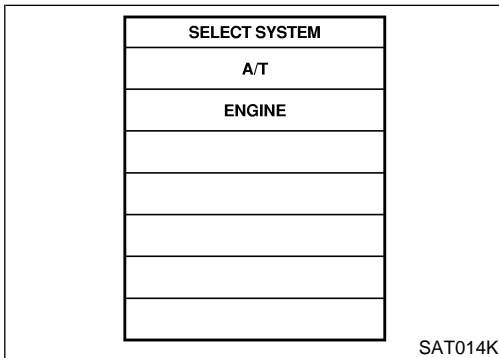
Diagnostic Trouble Code No.	Malfunction is detected when ....	Check Item (Possible Cause)
Ⓛ : CONTROL UNIT (RAM), CONTROL UNIT (ROM)	TCM memory (RAM) or (ROM) is malfunctioning.	• TCM

EC

FE

CL

MT



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0218S02

AT

### 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.

AX

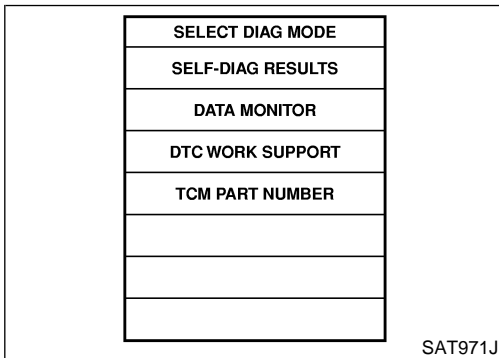
SU

### Ⓛ 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

## Diagnostic Procedure

NCAT0219

1	<b>INSPECTION START (WITH CONSULT-II)</b>
Ⓛ With CONSULT-II 1. Turn ignition switch "ON" and select "SELF DIAGNOSIS" mode for A/T with CONSULT-II. 2. Touch "ERASE".	
▶	GO TO 2.

EL

IDX

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

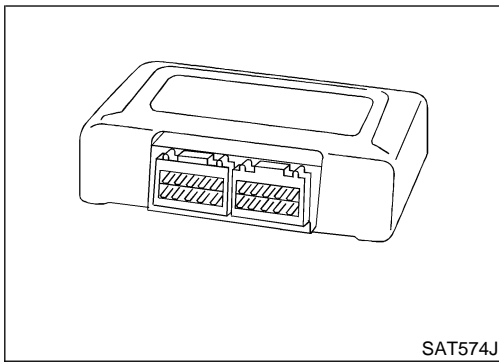
Diagnostic Procedure (Cont'd)

<b>2</b>	<b>CHECK DTC</b>
PERFORM DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE. See above.	
	▶ GO TO 3.

<b>3</b>	<b>CHECK DTC AGAIN</b>
Is the "CONTROL UNIT (RAM) or CONTROL UNIT (ROM)" displayed again? <b>Yes or No</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. NCAT0221

GI

MA

EM

LC

## ON BOARD DIAGNOSIS LOGIC

NCAT0221S01

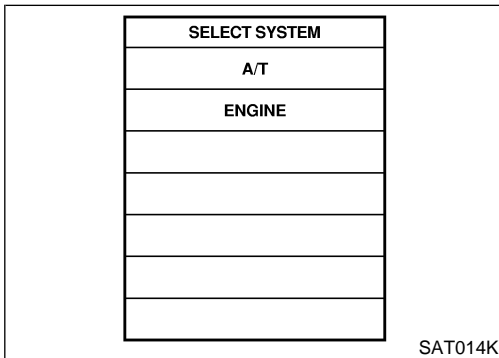
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: CONT UNIT (EEP ROM)	TCM memory (EEP ROM) is malfunctioning.	<ul style="list-style-type: none"> <li>• TCM</li> </ul>

EC

FE

CL

MT



## DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0221S02

### 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.

AT

AX

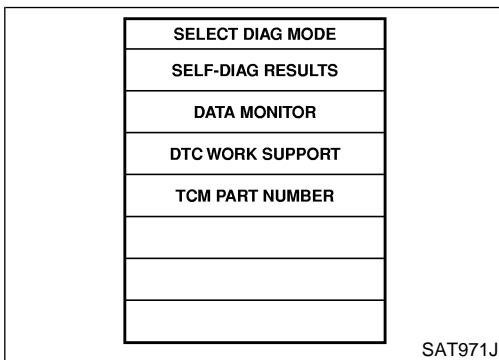
SU

### 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

NCAT0222

<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 DIAGNOSIS" 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 "CONT UNIT (EEP ROM)" displayed again?</b></p>	
Yes	▶ Replace TCM.
No	▶ <b>INSPECTION END</b>

# TROUBLE DIAGNOSES FOR SYMPTOMS

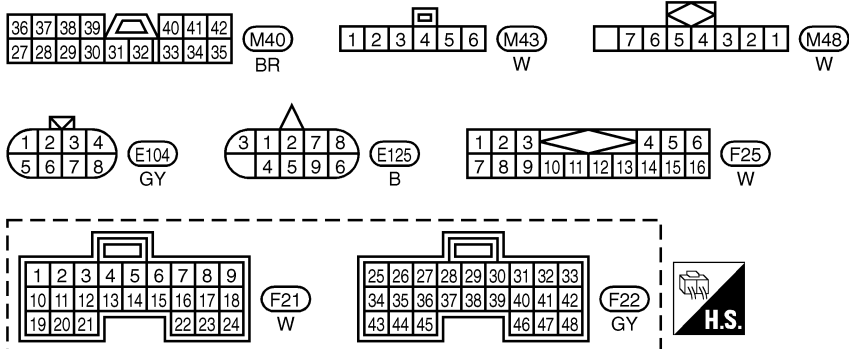
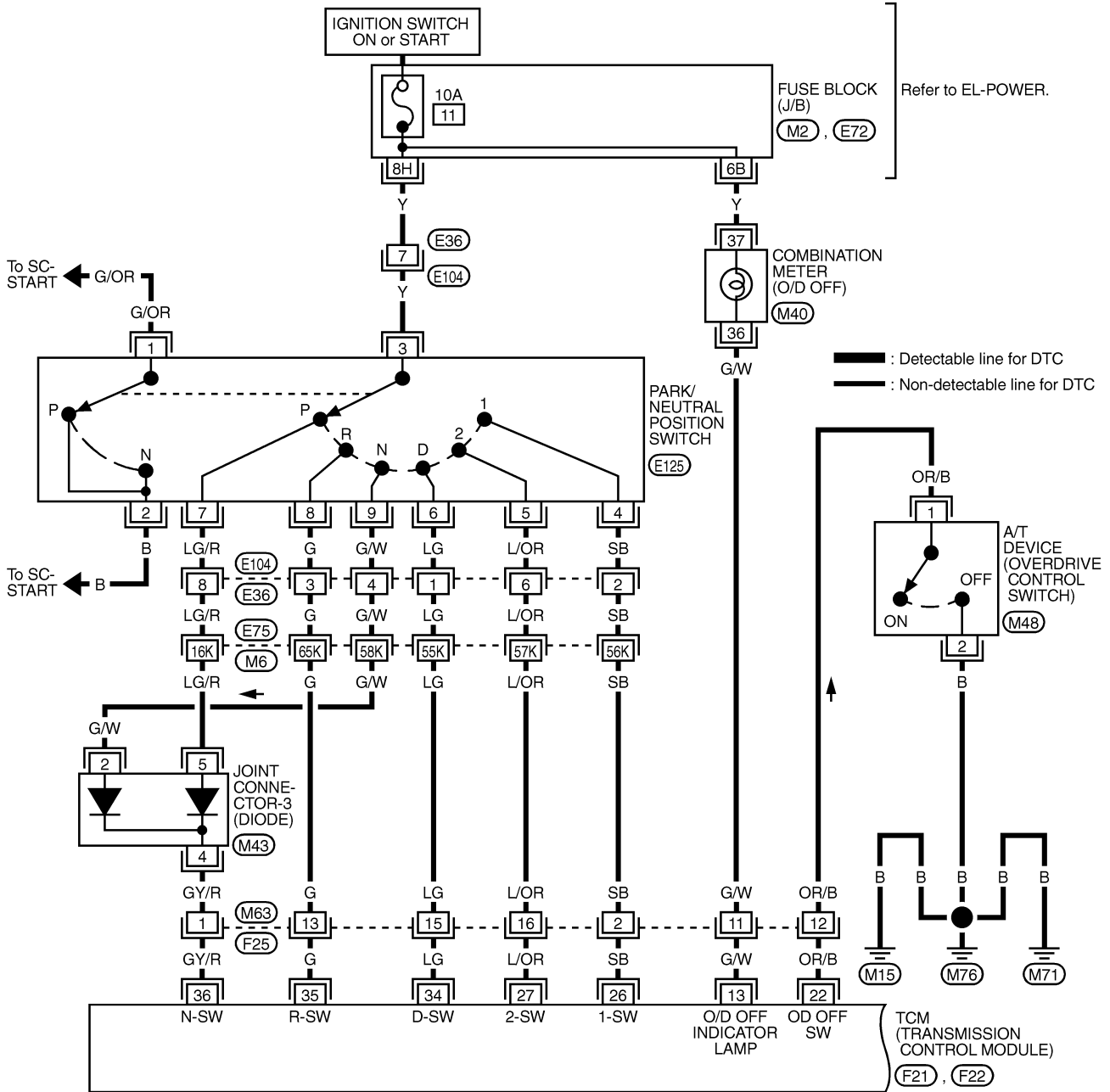
Wiring Diagram — AT — NONDTC

## Wiring Diagram — AT — NONDTC

NCAT0216

AT-NONDTC-01

GI  
MA  
EM  
LC  
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**AT**  
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IDX

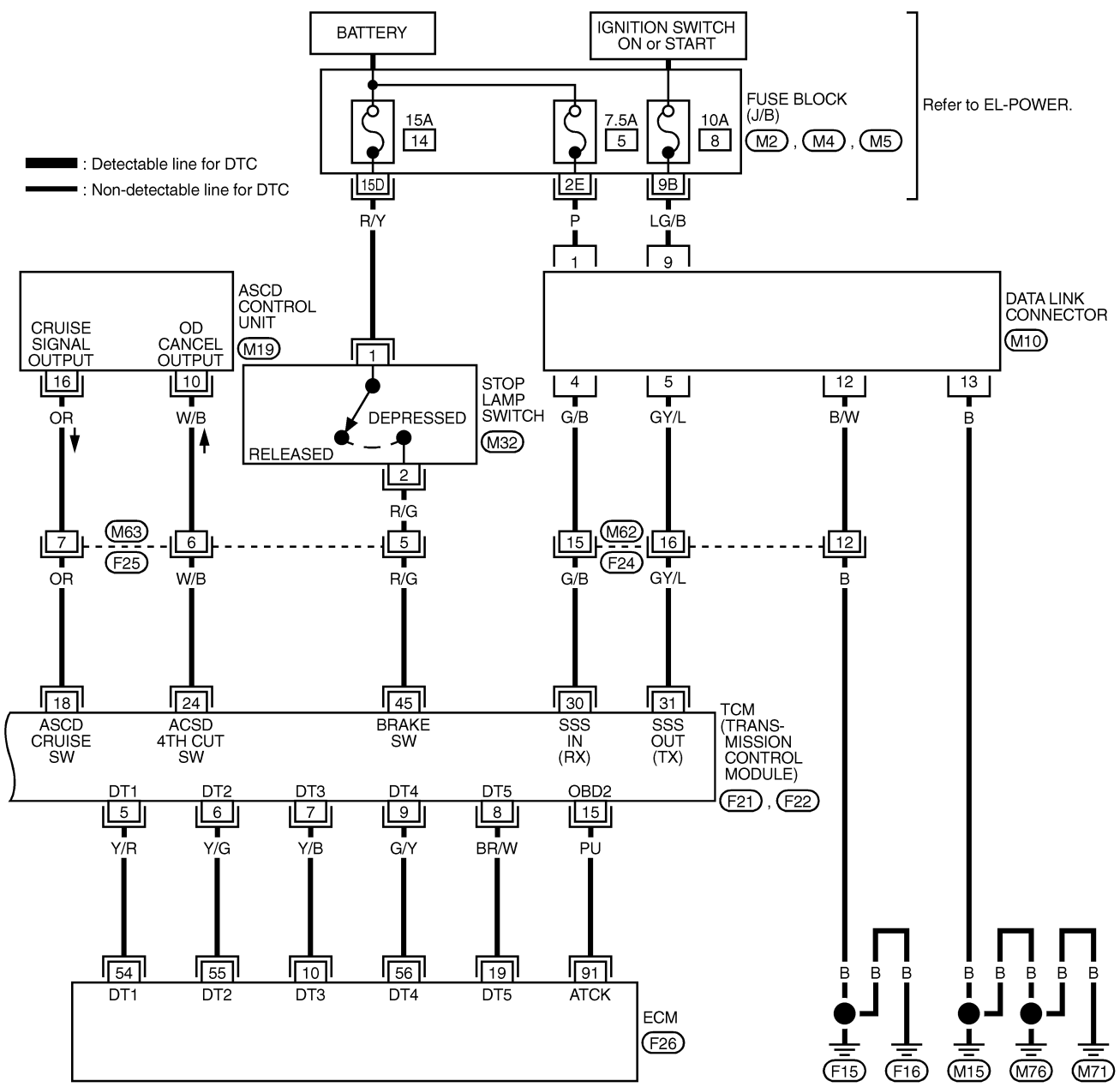


REFER TO THE FOLLOWING.  
 (E75) -SUPER MULTIPLE  
 JUNCTION (SMJ)  
 (M2, E72) -FUSE BLOCK-  
 JUNCTION BOX (J/B)

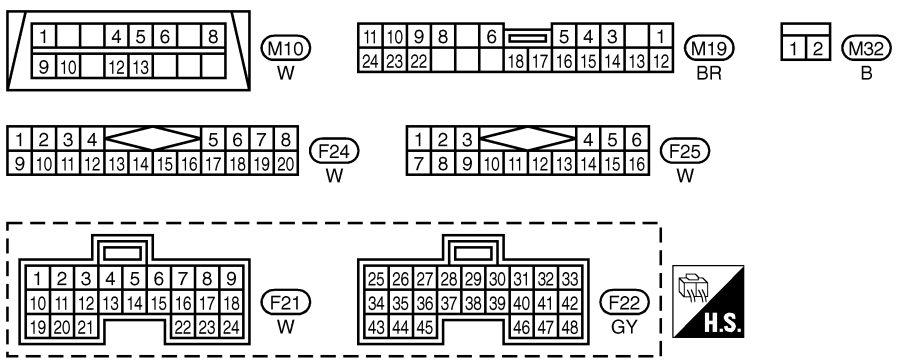
# TROUBLE DIAGNOSES FOR SYMPTOMS

Wiring Diagram — AT — NONDTC (Cont'd)

AT-NONDTC-02



Refer to EL-POWER.



REFER TO THE FOLLOWING.  
 (M2), (M4), (M5) - FUSE BLOCK-JUNCTION BOX (J/B)  
 (F26) - ELECTRICAL UNITS

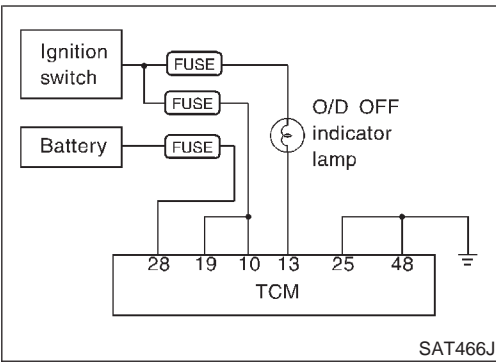


TAT241



# TROUBLE DIAGNOSES FOR SYMPTOMS

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



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

=NCAT0081

### SYMPTOM:

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

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MA

EM

LC

EC

FE

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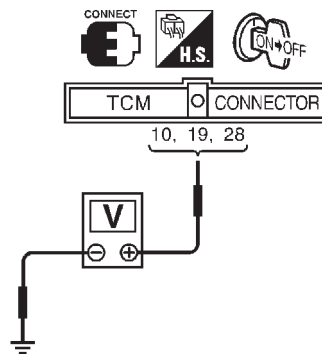
EL

IDX

### 1 CHECK TCM POWER SOURCE

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

**Voltage: Battery voltage**



SAT467J

- Turn ignition switch to "OFF" position.
- Check voltage between TCM terminal 28 and ground.

**Voltage: Battery voltage**

OK or NG

OK ► GO TO 2.

NG ► **Check the following items:**

- Harness for short or open between ignition switch and TCM (Main harness) Refer to "Wiring Diagram — AT — MAIN", AT-104.
- Ignition switch and fuse Refer to EL-9, "POWER SUPPLY ROUTING".

# TROUBLE DIAGNOSES FOR SYMPTOMS

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

2	CHECK TCM GROUND CIRCUIT
<p>1. Turn ignition switch to "OFF" position.                      2. Disconnect TCM harness connector.                      3. Check continuity between TCM terminals 25, 48 and ground.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SAT468J</p> <p><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 3.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors. Refer to "Wiring Diagram — AT — MAIN", AT-104.

3	CHECK LAMP CIRCUIT
<p>1. Turn ignition switch to "OFF" position.                      2. Check resistance between TCM terminals 13 and 10.  <b>Resistance: 50 - 100Ω</b></p> <div style="text-align: center;"> </div> <p style="text-align: right;">SAT469JA</p> <p>3. Reinstall any part removed.</p> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶ GO TO 4.
NG	▶ <b>Check the following items:</b> <ul style="list-style-type: none"> <li>● O/D OFF indicator lamp. Refer to EL-83, "METERS AND GAUGES".</li> <li>● Harness and fuse for short or open between ignition switch and O/D OFF indicator lamp (Main harness) Refer to EL-9, "POWER SUPPLY ROUTING".</li> <li>● Harness for short or open between O/D OFF indicator lamp and TCM.</li> </ul>

# TROUBLE DIAGNOSES FOR SYMPTOMS

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

<b>4</b>	<b>CHECK SYMPTOM</b>	
Check again.		
OK or NG		
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



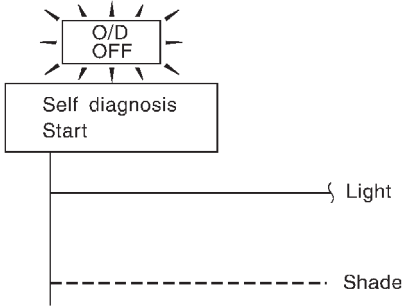
2. Engine Cannot Be Started In "P" and "N" Position

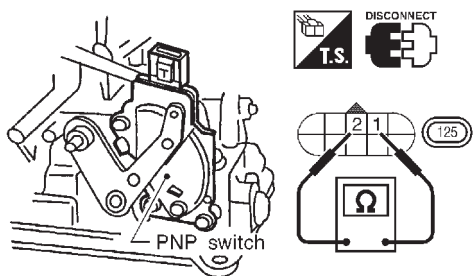
## 2. Engine Cannot Be Started In "P" and "N" Position

=NCAT0082

### SYMPTOM:

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

<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-107.
No	▶	GO TO 2.

<b>2</b>	<b>CHECK PNP SWITCH INSPECTION</b>	
<p>Check for short or open of PNP switch harness connector terminals 1 and 2. Refer to "Component Inspection", AT-112.</p>		
		
SAT408J		
<b>OK or NG</b>		
OK	▶	GO TO 3.
NG	▶	Repair or replace PNP switch.

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

# TROUBLE DIAGNOSES FOR SYMPTOMS

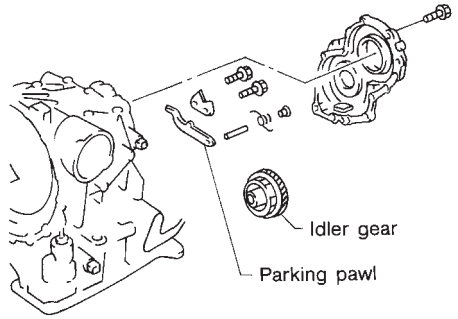
3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed

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

=NCAT0083

### SYMPTOM:

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

<b>1</b>	<b>CHECK PARKING COMPONENTS</b>	<p>Check parking components. Refer to "Parking Pawl Components", AT-286, 291.</p> <div style="text-align: center;">  </div> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶	<b>INSPECTION END</b>	
NG	▶	Repair or replace damaged parts.	

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# TROUBLE DIAGNOSES FOR SYMPTOMS



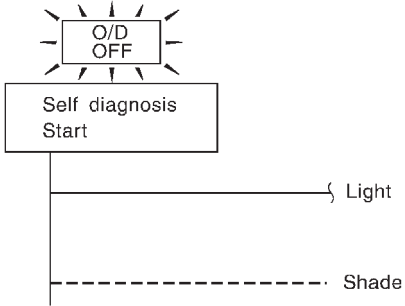
4. In "N" Position, Vehicle Moves

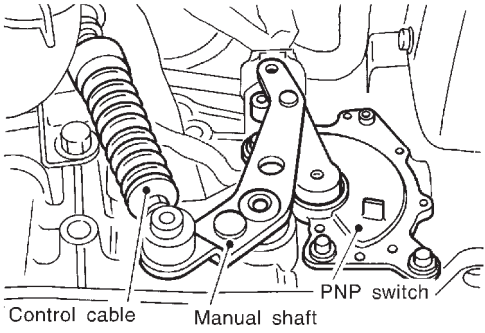
## 4. In "N" Position, Vehicle Moves

=NCAT0084

### SYMPTOM:


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

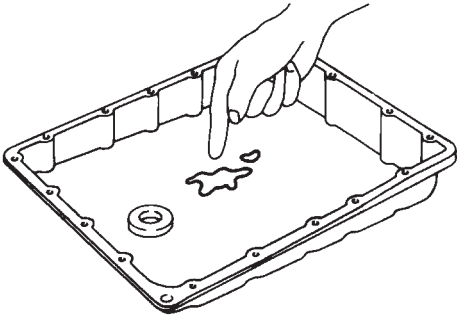
<b>1</b>	<b>CHECK PNP SWITCH CIRCUIT</b>
<p> <b>With CONSULT-II</b> Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?</p>	
<p> <b>Without CONSULT-II</b> Does self-diagnosis show damage to inhibitor switch circuit?</p>	
	
SAT367J	
<b>Yes or No</b>	
Yes	▶ Check PNP switch circuit. Refer to "DTC P0705", AT-107.
No	▶ GO TO 2.

<b>2</b>	<b>CHECK CONTROL CABLE</b>
Check control cable. Refer to AT-281.	
	
SAT023JB	
<b>OK or NG</b>	
OK	▶ GO TO 3.
NG	▶ Adjust control cable. Refer to AT-281.

# 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>	
1. Remove oil pan. 2. Check A/T fluid condition.		
		
SAT171B		
<b>OK or NG</b>		
OK	▶	GO TO 5.
NG	▶	1. Disassemble A/T. 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>

<b>5</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

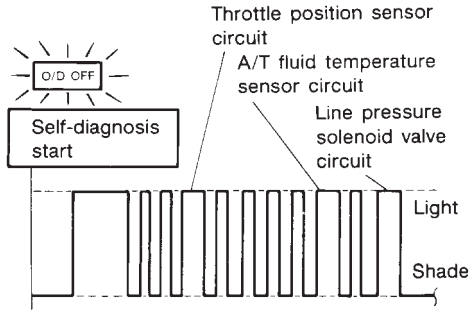
5. Large Shock. "N" → "R" Position

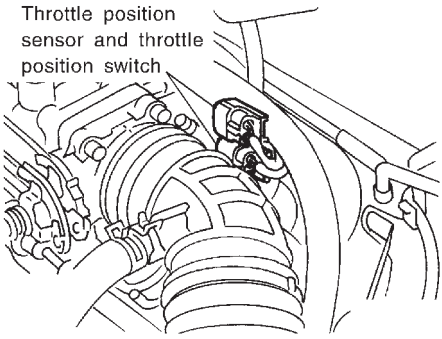
## 5. Large Shock. "N" → "R" Position

=NCAT0085

### SYMPTOM:

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

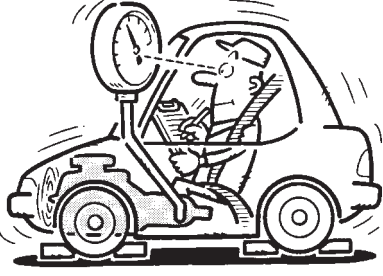
<b>1</b>	<b>CHECK SELF-DIAGNOSTIC RESULTS</b>	
Does self-diagnosis show damage to A/T fluid temperature sensor, line pressure solenoid valve or throttle position sensor circuit?		
		
SAT345HA		
<b>Yes or No</b>		
Yes	▶	Check damaged circuit. Refer to "DTC P0710, P0745 or P1705", AT-113, 174 or 193.
No	▶	GO TO 2.

<b>2</b>	<b>CHECK THROTTLE POSITION SENSOR</b>	
Check throttle position sensor. Refer to EC-177, "DTC P0120 THROTTLE POSITION SENSOR".		
		
SAT413J		
<b>OK or NG</b>		
OK	▶	GO TO 3.
NG	▶	Repair or replace throttle position sensor.



# TROUBLE DIAGNOSES FOR SYMPTOMS

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

<b>3</b>	<b>CHECK LINE PRESSURE</b>	
<p>Check line pressure at idle with selector lever in "D" position. Refer to "Line Pressure Test", AT-66.</p>		
		
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-280.</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>	
<p>Check again.</p>		
<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>

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# TROUBLE DIAGNOSES FOR SYMPTOMS


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

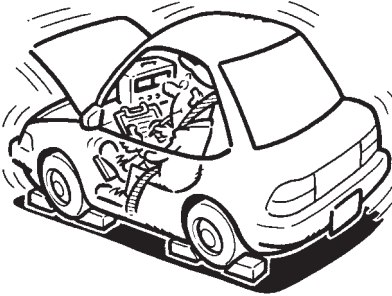
### 6. Vehicle Does Not Creep Backward In "R" Position

=NCAT0086

#### SYMPTOM:

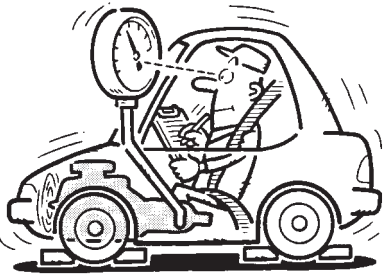
Vehicle does not creep backward when selecting "R" position.

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

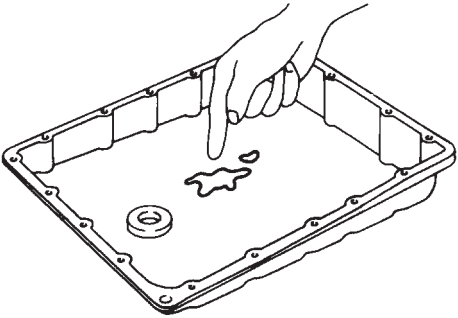
<b>2</b>	<b>CHECK STALL TEST</b>		
Check stall revolution with selector lever in "1" and "R" positions.			
			
SAT493G			
<b>OK or NG</b>			
OK	▶	GO TO 3.	
OK in "1" position, NG in "R" position	▶	<ol style="list-style-type: none"> <li>1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-280.</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.	

# 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-66.</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-280.</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 item: <ul style="list-style-type: none"> <li>● Oil pump assembly</li> </ul> </li> </ol>

GI  
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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> <p style="text-align: center;"><b>OK or NG</b></p>
OK	▶	GO TO 5.
NG	▶	GO TO 6.

**AT**  
AX  
SU  
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RS  
BT

<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>

HA  
SC  
EL  
IDX

## TROUBLE DIAGNOSES FOR SYMPTOMS

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

6	DETECT MALFUNCTIONING ITEM
	<p>1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-280.</p> <p>2. Check the following items:</p> <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> <p>3. Disassemble A/T.</p> <p>4. Check the following items:</p> <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> <p style="text-align: right;"><b>OK or NG</b></p>
OK	▶ GO TO 5.
NG	▶ Repair or replace damaged parts.

# TROUBLE DIAGNOSES FOR SYMPTOMS


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

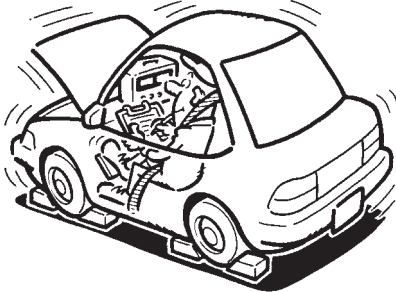
## 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position

=NCAT0087

### SYMPTOM:

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

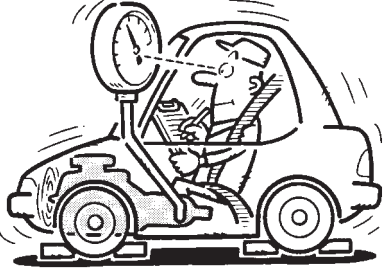
<b>1</b>	<b>CHECK A/T FLUID LEVEL</b>	Check A/T fluid level again.	
		SAT638A	
OK or NG			
OK	▶	GO TO 2.	
NG	▶	Refill ATF.	

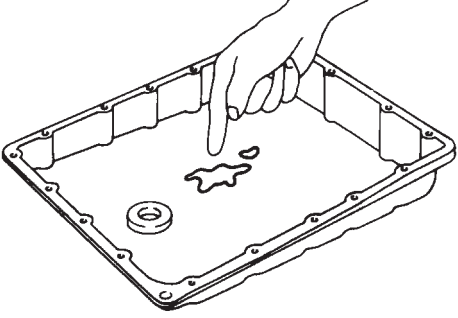
<b>2</b>	<b>CHECK STALL TEST</b>	Check stall revolution with selector lever in "D" position. Refer to "Stall Test", AT-62.	
		SAT493G	
OK or NG			
OK	▶	GO TO 3.	
NG	▶	GO TO 6.	

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## 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 "D" position. Refer to "Line Pressure Test ", AT-66.</p>		
		
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-280.</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 item: <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>		
		
SAT171B		
<b>OK or NG</b>		
OK	▶	GO TO 5.
NG	▶	GO TO 6.

<b>5</b>	<b>CHECK SYMPTOM</b>	
<p>Check again.</p>		
<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

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

<b>6</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
	<p>1. Remove control valve assembly. Refer to AT-280.</p> <p>2. Check the following items:</p> <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> <p>3. Disassemble A/T.</p> <p>4. Check the following items:</p> <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> <p style="text-align: center;"><b>OK or NG</b></p>	
OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

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# TROUBLE DIAGNOSES FOR SYMPTOMS

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

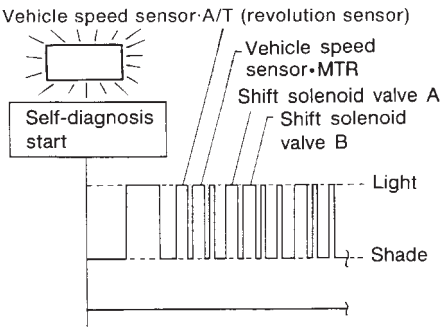
## 8. Vehicle Cannot Be Started From D<sub>1</sub>

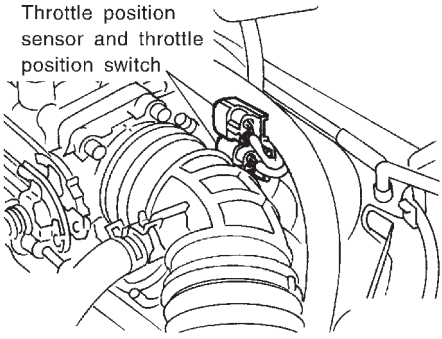
=NCAT0088

### 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-234.

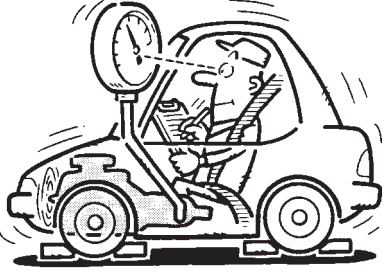
<b>2</b>	<b>CHECK SELF-DIAGNOSTIC RESULTS</b>	
Does self-diagnosis show damage to vehicle speed sensor-A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor-MTR after cruise test?		
		
SAT934FB		
<b>Yes or No</b>		
Yes	▶	Check damaged circuit. Refer to "DTC P0720, P0750, P0755 or VHCL SPEED SEN-MTR", AT-119, 181, 187 or 215.
No	▶	GO TO 3.

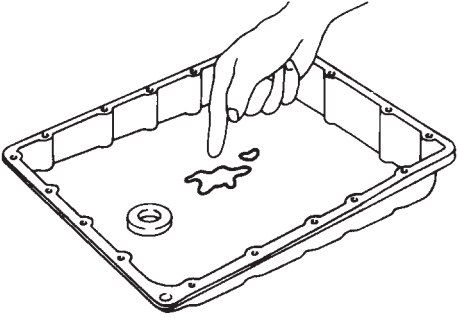
<b>3</b>	<b>CHECK THROTTLE POSITION SENSOR</b>	
Check throttle position sensor. Refer to EC-177, "DTC P0120 THROTTLE POSITION SENSOR".		
		
SAT413J		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	Repair or replace throttle position sensor.



# 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-86.</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>		GI MA EM LC EC FE
	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> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT171B</p> <p style="text-align: center;"><b>OK or NG</b></p>		CL MT <b>AT</b> AX SU BR ST
	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-280. 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> <p style="text-align: right;">SAT171B</p> <p style="text-align: center;"><b>OK or NG</b></p>		RS BT HA SC EL IDX
	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.

<b>8</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
1. Remove control valve assembly. Refer to AT-280. 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.

# 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: $D_4 \rightarrow D_2$

=NCAT0089

### 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.

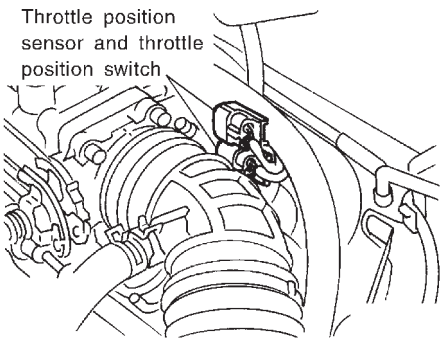
<b>1</b>	<b>CHECK SYMPTOM</b>	
Are 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From $D_1$ OK?		
<b>Yes or No</b>		
Yes	▶	GO TO 2.
No	▶	Go to 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From $D_1$ , AT-237, 240.

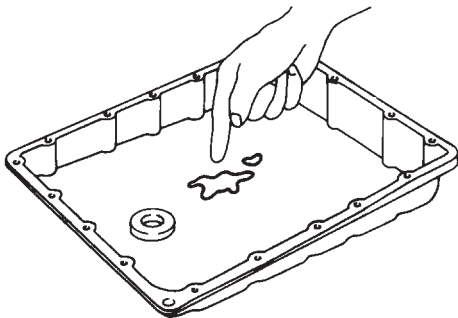
<b>2</b>	<b>CHECK PNP SWITCH CIRCUIT</b>	
<input type="checkbox"/> <b>With CONSULT-II</b> Does "TCM INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?		
<input checked="" type="checkbox"/> <b>Without CONSULT-II</b> Does self-diagnosis show damage to PNP switch circuit?		
SAT367J		
<b>Yes or No</b>		
Yes	▶	Check PNP switch circuit. Refer to "DTC P0705", AT-107.
No	▶	GO TO 3.

<b>3</b>	<b>CHECK VEHICLE SPEED SENSOR-A/T AND CHECK 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 VHCL SPEED SEN-MTR", AT-119, AT-215.		
<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:  $D_1 \rightarrow D_2$  Or Does Not Kickdown:  $D_4 \rightarrow D_2$  (Cont'd)

<b>4</b>	<b>CHECK THROTTLE POSITION SENSOR</b>		
<p>Check throttle position sensor. Refer to EC-177, "DTC P0120 THROTTLE POSITION SENSOR".</p> <div style="text-align: center;">  <p>Throttle position sensor and throttle position switch</p> </div> <p style="text-align: right;">SAT413J</p>			
<b>OK or NG</b>			
OK	▶	GO TO 5.	
NG	▶	Repair or replace throttle position sensor.	

<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>			
<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. Refer to AT-280. 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: right;">SAT171B</p>			
<b>OK or NG</b>			
OK	▶	GO TO 7.	
NG	▶	Repair or replace damaged parts.	

# 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>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.

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<b>8</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
1. Remove control valve. Refer to AT-280. 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.

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# TROUBLE DIAGNOSES FOR SYMPTOMS

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

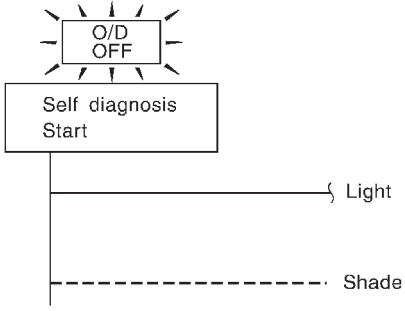
## 10. A/T Does Not Shift: $D_2 \rightarrow D_3$

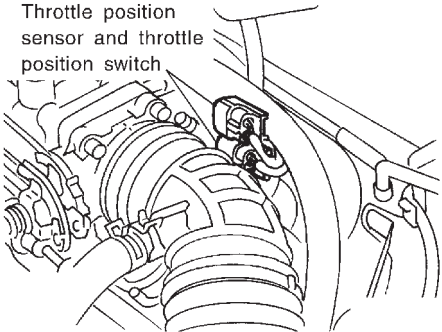
=NCAT0090

### SYMPTOM:

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

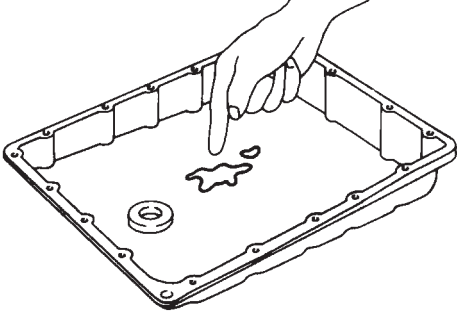
<b>1</b>	<b>CHECK SYMPTOM</b>	
Are 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From $D_1$ OK?		
<b>Yes or No</b>		
Yes	▶	GO TO 2.
No	▶	Go to 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From $D_1$ , AT-237, 240.

<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-107.
No	▶	GO TO 3.

<b>3</b>	<b>CHECK THROTTLE POSITION SENSOR</b>	
Check throttle position sensor. Refer to EC-177, "DTC P0120 THROTTLE POSITION SENSOR".		
		
SAT413J		
<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> <div style="text-align: center;">  <p>SAT171B</p> </div> <p style="text-align: center;"><b>OK or NG</b></p>		
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-280. 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 style="text-align: center;"><b>OK or NG</b></p>		
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

<b>6</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>

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## TROUBLE DIAGNOSES FOR SYMPTOMS

10. A/T Does Not Shift:  $D_2 \rightarrow D_3$  (Cont'd)

7	DETECT MALFUNCTIONING ITEM
	<p>1. Remove control valve assembly. Refer to AT-280.</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: right;"><b>OK or NG</b></p>
OK	▶ GO TO 6.
NG	▶ Repair or replace damaged parts.



# TROUBLE DIAGNOSES FOR SYMPTOMS

11. A/T Does Not Shift: D<sub>3</sub> → D<sub>4</sub>


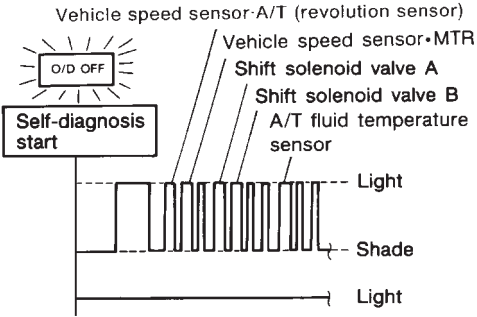
## 11. A/T Does Not Shift: D<sub>3</sub> → D<sub>4</sub>

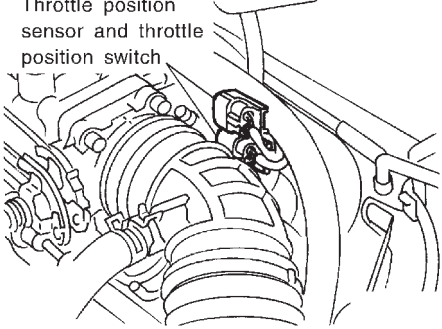
=NCAT0091

### SYMPTOM:

- A/T does not shift from D<sub>3</sub> to D<sub>4</sub> at the specified speed.
- A/T must be warm before D<sub>3</sub> to D<sub>4</sub> shift will occur.

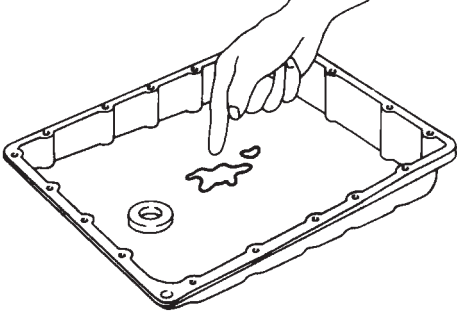
<b>1</b>	<b>CHECK SYMPTOM</b>
Are 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From D <sub>1</sub> OK?	
<b>Yes or No</b>	
Yes	▶ GO TO 2.
No	▶ Go to 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From D <sub>1</sub> , AT-237, 240.

<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>● PNP switch</li> <li>● Overdrive control switch</li> <li>● A/T fluid temperature sensor</li> <li>● Vehicle speed sensor-A/T (revolution sensor)</li> <li>● Shift solenoid valve A or B</li> <li>● Vehicle speed sensor-MTR</li> </ul>	
	
SAT363HC	
<b>Yes or No</b>	
Yes	▶ Check damaged circuit. Refer to "DTC P0705, P0710, P0720, P0750, P0755 or VHCL SPEED SEN-MTR", AT-107, 113, 119, 181, 187 or 215.
No	▶ GO TO 3.

<b>3</b>	<b>CHECK THROTTLE POSITION SENSOR</b>
Check throttle position sensor. Refer to EC-177, "DTC P0120 THROTTLE POSITION SENSOR".	
	
SAT413J	
<b>OK or NG</b>	
OK	▶ GO TO 4.
NG	▶ Repair or replace throttle position sensor.

## TROUBLE DIAGNOSES FOR SYMPTOMS

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

<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>		
<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-280. 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>		
<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

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

7	DETECT MALFUNCTIONING ITEM	
	1. Remove control valve assembly. Refer to AT-280. 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.

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# TROUBLE DIAGNOSES FOR SYMPTOMS

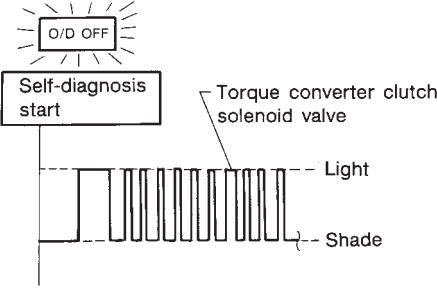
12. A/T Does Not Perform Lock-up

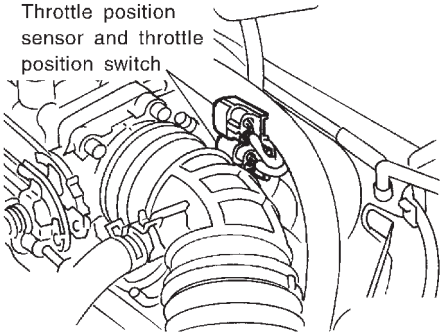
## 12. A/T Does Not Perform Lock-up

=NCAT0092

**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?	
	
SAT346H	
<b>Yes or No</b>	
Yes	▶ Check torque converter clutch solenoid valve circuit. Refer to "DTC P0740", AT-157.
No	▶ GO TO 2.

<b>2</b>	<b>CHECK THROTTLE POSITION SENSOR</b>
Check throttle position sensor. Refer to EC-177, "DTC P0120 THROTTLE POSITION SENSOR".	
	
SAT413J	
<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-280. 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.

# 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	▶	<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

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

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

=NCAT0093

**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?		
<p>The diagram illustrates the self-diagnosis process. At the top, a box labeled 'O/D OFF' has radiating lines above it. Below it, a box labeled 'Self-diagnosis start' has a vertical line extending downwards. To the right, a box labeled 'Engine speed signal' has an arrow pointing to a series of vertical bars of varying heights, representing a pulse signal. Below the signal, a horizontal line is labeled 'Light' and 'Shade'.</p>		
SAT347H		
<b>Yes or No</b>		
Yes	▶	Check engine speed signal circuit. Refer to "DTC P0725", AT-124.
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>		
<p>The diagram shows a hand pointing to a puddle of fluid in an oil pan. The oil pan is a rectangular metal tray with a central circular drain plug. A hand is shown from the top left, with the index finger pointing to a dark, irregular puddle of fluid on the surface of the pan.</p>		
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-280.</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.

# TROUBLE DIAGNOSES FOR SYMPTOMS

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

<b>4</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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<b>5</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
1. Remove control valve assembly. Refer to AT-280. 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.		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

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# TROUBLE DIAGNOSES FOR SYMPTOMS



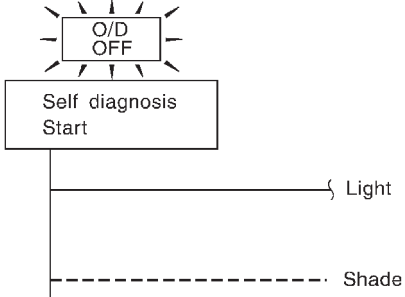
14. Lock-up Is Not Released

## 14. Lock-up Is Not Released

=NCAT0094

**SYMPTOM:**

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

<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 P0705", AT-107.
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>)

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

=NCAT0095

### SYMPTOM:

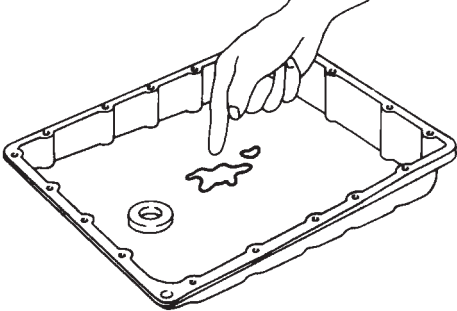
- Engine speed does not smoothly return to idle when A/T shifts from D<sub>4</sub> to D<sub>3</sub>.
- Vehicle does not decelerate by engine brake when turning overdrive control switch OFF.
- Vehicle does not decelerate by engine brake when shifting A/T from “D” to “2” position.

<b>1</b>	<b>CHECK SELF-DIAGNOSTIC RESULTS</b>		
		Does self-diagnosis show damage to overrun clutch solenoid valve circuit after cruise test?	
		SAT348H	
<b>Yes or NO</b>			
Yes	▶	Check overrun clutch solenoid valve circuit. Refer to “DTC P1760”, AT-202.	
No	▶	GO TO 2.	

<b>2</b>	<b>CHECK THROTTLE POSITION SENSOR</b>		
		Check throttle position sensor. Refer to EC-177, “DTC P0120 THROTTLE POSITION SENSOR”.	
		SAT413J	
<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>		
		
SAT171B		
<b>OK or NG</b>		
OK	▶	GO TO 4.
NG	▶	GO TO 6.

<b>4</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p>1. Remove control valve assembly. Refer to AT-280. 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>		
<b>OK or NG</b>		
OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

<b>5</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>

<b>6</b>	<b>DETECT MALFUNCTIONING ITEM</b>	
<p>1. Remove control valve assembly. Refer to AT-280. 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>		
<b>OK or NG</b>		
OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

# TROUBLE DIAGNOSES FOR SYMPTOMS

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

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

NCAT0096

### SYMPTOM:

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

<b>1</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?		
SAT934FA		
<b>Yes or No</b>		
Yes	▶	Check damaged circuit. Refer to "DTC P0720, P0750, P0755 or VHCL SPEED SEN-MTR", AT-119, 181, 187 or 215.
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-240.
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

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

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

=NCAT0097

### SYMPTOM:

A/T does not shift from  $D_4$  to  $D_3$  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> <div style="text-align: center; margin: 20px 0;"> <pre> graph TD     A[O/D OFF] --- B[Self-diagnosis start]     B -.-&gt; C[Light]     B --- D[Shade]                     </pre> </div>	
SAT344H	
<b>Yes or No</b>	
Yes	▶ Check overdrive control switch circuit. Refer to AT-264.
No	▶ Go to 10. A/T Does Not Shift: $D_2 \rightarrow D_3$ , AT-246.

# 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

=NCAT0098

### 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;"> </div> <p style="text-align: right;">SAT367J</p>	
<b>Yes or No</b>	
Yes	▶ Check PNP switch circuit. Refer to "DTC P0705", AT-107.
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-243.

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# TROUBLE DIAGNOSES FOR SYMPTOMS



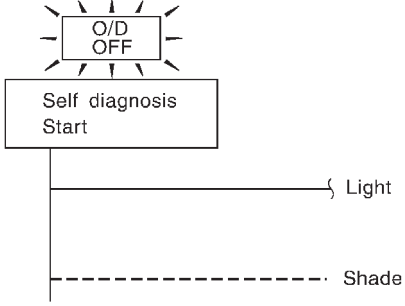
19. A/T Does Not Shift: 2<sub>2</sub> → 1<sub>1</sub>, When Selector Lever "2" → "1" Position

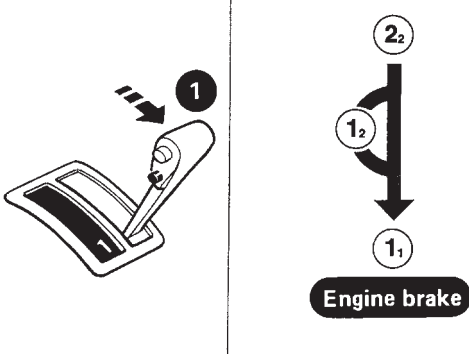
## 19. A/T Does Not Shift: 2<sub>2</sub> → 1<sub>1</sub>, When Selector Lever "2" → "1" Position

=NCAT0099

### 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-107.
No	▶	GO TO 2.

<b>2</b>	<b>CHECK SYMPTOM</b>	
Check again.		
		
OK or NG		
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>

SAT778B

# TROUBLE DIAGNOSES FOR SYMPTOMS

20. Vehicle Does Not Decelerate By Engine Brake

## 20. Vehicle Does Not Decelerate By Engine Brake

=NCAT0100

### SYMPTOM:

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

<b>1</b>	<b>CHECK SYMPTOM</b>	
Is 6. Vehicle Does Not Creep Backward In "R" Position OK?		
Yes or No		
Yes	▶	Go to 15. Engine Speed Does Not Return To Idle (Light Braking D <sub>4</sub> → D <sub>3</sub> ), AT-257.
No	▶	Go to 6. Vehicle Does Not Creep Backward In "R" Position, AT-234.

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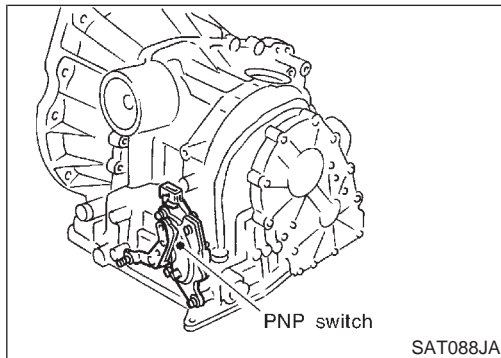
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## 21. TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Throttle Position Switches Circuit Checks)

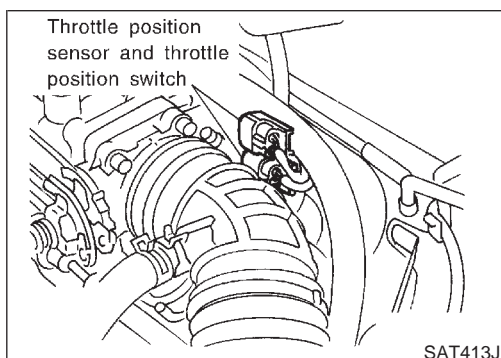
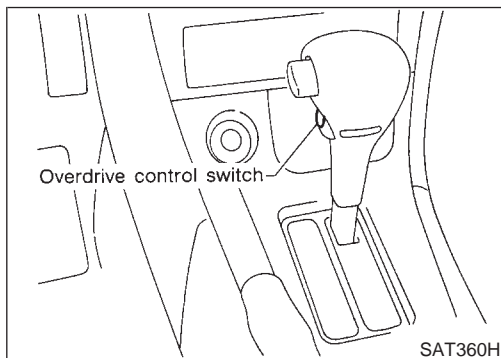
NCAT0101

### SYMPTOM:

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

### DESCRIPTION

- PNP switch  
The PNP switch assembly includes a transmission range switch. The transmission range switch detects the selector lever position and sends a signal to the TCM.
- Overdrive control switch  
Detects the overdrive control switch position (ON or OFF) and sends a signal to the TCM.
- Throttle position switch  
Consists of a wide open throttle position switch and a closed throttle position switch.  
The wide open throttle position switch sends a signal to the TCM when the throttle valve is open at least 1/2 of the full throttle position. The closed throttle position switch sends a signal to the TCM when the throttle valve is fully closed.



# TROUBLE DIAGNOSES FOR SYMPTOMS

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

## DIAGNOSTIC PROCEDURE

NCAT0101S02

<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>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/N", "R", "D", "2" and "1" position switches moving selector lever to each position. Check that the signal of the selector lever position is indicated properly.</li> </ol>															
	<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="text-align: left;">MONITORING</th> <th style="text-align: left;"></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																
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1 POSITION SW	OFF															
	SAT701J															
	<b>OK or NG</b>															
OK	▶	GO TO 3.														
NG	▶	<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● PNP switch (Refer to "Component Inspection", AT-270.)</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 positions)</li> </ul>														



# TROUBLE DIAGNOSES FOR SYMPTOMS

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

## 2 CHECK PNP SWITCH CIRCUIT (Without CONSULT-II)

⊗ Without CONSULT-II

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

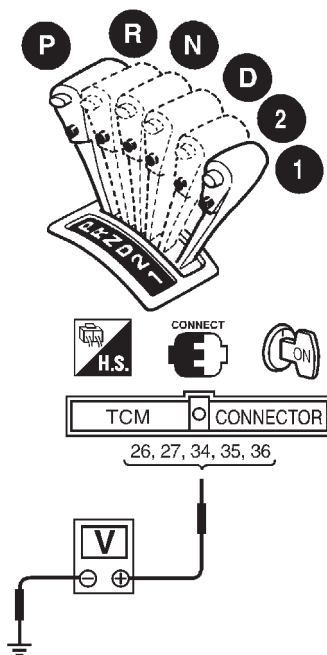
**Voltage:**

**B: Battery voltage**

**0: 0V**

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>

MTBL0138



SAT470J

**OK or NG**

OK	▶	GO TO 4.
NG	▶	<b>Check the following items:</b> <ul style="list-style-type: none"> <li>● PNP switch (Refer to "Component Inspection", AT-270.)</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 positions)</li> </ul>

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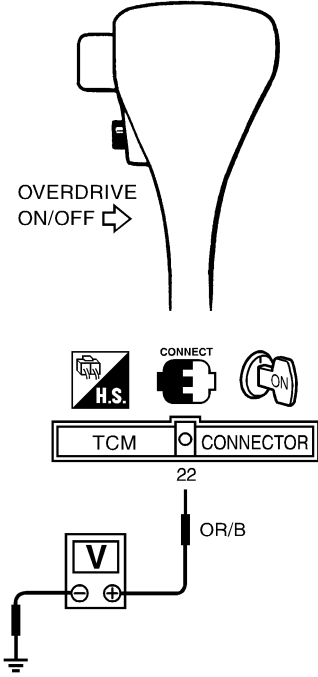
# TROUBLE DIAGNOSES FOR SYMPTOMS

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

<b>3</b>	<b>CHECK OVERDRIVE CONTROL 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 "AT" with CONSULT-II.</li> <li>3. Read out "OVERDRIVE SWITCH". Check the signal of the overdrive control switch is indicated properly. (Overdrive control switch "ON" displayed on CONSULT-II means overdrive "OFF".)</li> </ol>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="text-align: center;">MONITORING</th> <th style="text-align: center;">MONITORING</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ENGINE SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">TURBINE REV</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">OVERDRIVE SW</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">PN POSI SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td style="text-align: center;">R POSITION SW</td> <td style="text-align: center;">OFF</td> </tr> </tbody> </table>			DATA MONITOR		MONITORING	MONITORING	ENGINE SPEED	XXX rpm	TURBINE REV	XXX rpm	OVERDRIVE SW	ON	PN POSI SW	OFF	R POSITION SW	OFF
DATA MONITOR																
MONITORING	MONITORING															
ENGINE SPEED	XXX rpm															
TURBINE REV	XXX rpm															
OVERDRIVE SW	ON															
PN POSI SW	OFF															
R POSITION SW	OFF															
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<b>OK or NG</b>																
OK	▶	GO TO 5.														
NG	▶	<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● Overdrive control switch (Refer to "Component Inspection", AT-270.)</li> <li>● Harness for short or open between TCM and overdrive control switch (Main harness)</li> <li>● Harness of ground circuit for overdrive control switch (Main harness) for short or open</li> </ul>														

# TROUBLE DIAGNOSES FOR SYMPTOMS

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

4	CHECK OVERDRIVE CONTROL SWITCH CIRCUIT (Without CONSULT-II)
	<p>⊗ Without CONSULT-II</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><b>Voltage:</b>  <b>Switch position "ON":</b>          Battery voltage  <b>Switch position "OFF":</b>          1V or less</p>  <p style="text-align: right;">SAT471JA</p> <p style="text-align: center;"><b>OK or NG</b></p>
OK	▶ GO TO 6.
NG	<p>▶ <b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>Overdrive control switch (Refer to "Component Inspection", AT-270.)</li> <li>Harness for short or open between TCM and overdrive control switch (Main harness)</li> <li>Harness of ground circuit for overdrive control switch (Main harness) for short or open</li> </ul>

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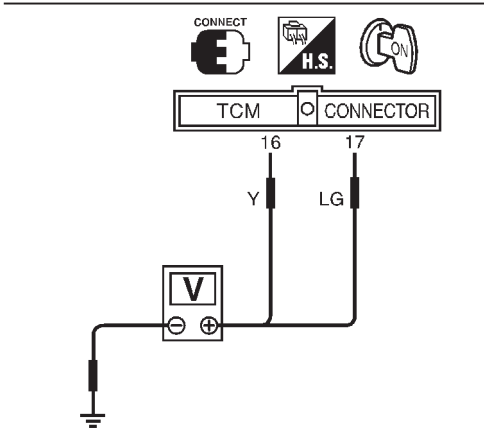
# TROUBLE DIAGNOSES FOR SYMPTOMS

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

5	CHECK THROTTLE POSITION SWITCH CIRCUIT (With CONSULT-II)															
<p> <b>With CONSULT-II</b></p> <ol style="list-style-type: none"> <li>1. Apply vacuum to the throttle opener, then check the following. Refer from step 1 to 5 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-49.</li> <li>2. Turn ignition switch to "ON" position. (Do not start engine.)</li> <li>3. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.</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" style="padding: 5px;">Accelerator pedal condition</th> <th colspan="2" style="padding: 5px;">Data monitor</th> </tr> <tr> <th style="padding: 5px;">CLOSED THL/SW</th> <th style="padding: 5px;">W/O THRL/P-SW</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Released</td> <td style="padding: 5px; text-align: center;">ON</td> <td style="padding: 5px; text-align: center;">OFF</td> </tr> <tr> <td style="padding: 5px;">Fully depressed</td> <td style="padding: 5px; text-align: center;">OFF</td> <td style="padding: 5px; 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														
MTBL0011																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="padding: 5px;">DATA MONITOR</th> </tr> <tr> <th style="padding: 5px;">MONITORING</th> <th style="padding: 5px;"></th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">POWERSHIFT SW</td> <td style="padding: 5px; text-align: center;">OFF</td> </tr> <tr> <td style="padding: 5px;">CLOSED THL/SW</td> <td style="padding: 5px; text-align: center;">OFF</td> </tr> <tr> <td style="padding: 5px;">W/O THRL/P-SW</td> <td style="padding: 5px; text-align: center;">OFF</td> </tr> <tr> <td style="padding: 5px;">HOLD SW</td> <td style="padding: 5px; text-align: center;">OFF</td> </tr> <tr> <td style="padding: 5px;">BRAKE SW</td> <td style="padding: 5px; text-align: center;">ON</td> </tr> </tbody> </table>			DATA MONITOR		MONITORING		POWERSHIFT SW	OFF	CLOSED THL/SW	OFF	W/O THRL/P-SW	OFF	HOLD SW	OFF	BRAKE SW	ON
DATA MONITOR																
MONITORING																
POWERSHIFT SW	OFF															
CLOSED THL/SW	OFF															
W/O THRL/P-SW	OFF															
HOLD SW	OFF															
BRAKE SW	ON															
SAT702J																
<b>OK or NG</b>																
OK	▶	GO TO 7.														
NG	▶	<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● Throttle position switch — Refer to "Component Inspection", AT-270.</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>														

# TROUBLE DIAGNOSES FOR SYMPTOMS

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

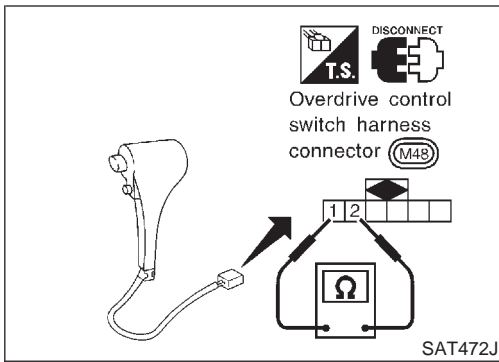
<b>6</b>	<b>CHECK THROTTLE POSITION SWITCH CIRCUIT (Without CONSULT-II)</b>												
<p>⊗ <b>Without CONSULT-II</b></p> <ol style="list-style-type: none"> <li>1. Apply vacuum to the throttle opener, then check the following. Refer from step 1 to 5 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-49.</li> <li>2. Turn ignition switch to "ON" position. (Do not start engine.)</li> <li>3. Check voltage between TCM terminals 16, 17 and ground while depressing, and releasing accelerator pedal slowly. (After warming up engine)</li> </ol>													
<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>1V or less</td> </tr> <tr> <td>Fully depressed</td> <td>1V or less</td> <td>Battery voltage</td> </tr> </tbody> </table>			Accelerator pedal condition	Voltage		Terminal No. 16	Terminal No. 17	Released	Battery voltage	1V or less	Fully depressed	1V or less	Battery voltage
Accelerator pedal condition	Voltage												
	Terminal No. 16	Terminal No. 17											
Released	Battery voltage	1V or less											
Fully depressed	1V or less	Battery voltage											
MTBL0137													
													
													
OK or NG													
OK	▶	GO TO 7.											
NG	▶	<p><b>Check the following items:</b></p> <ul style="list-style-type: none"> <li>● Throttle position switch — Refer to "Component Inspection", AT-270.</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>											

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<b>7</b>	<b>CHECK DTC</b>	
Perform "DIAGNOSTIC PROCEDURE", AT-264.		
OK or NG		
OK	▶	<b>INSPECTION END</b>
NG	▶	<ul 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> </ul>

# TROUBLE DIAGNOSES FOR SYMPTOMS

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



### COMPONENT INSPECTION

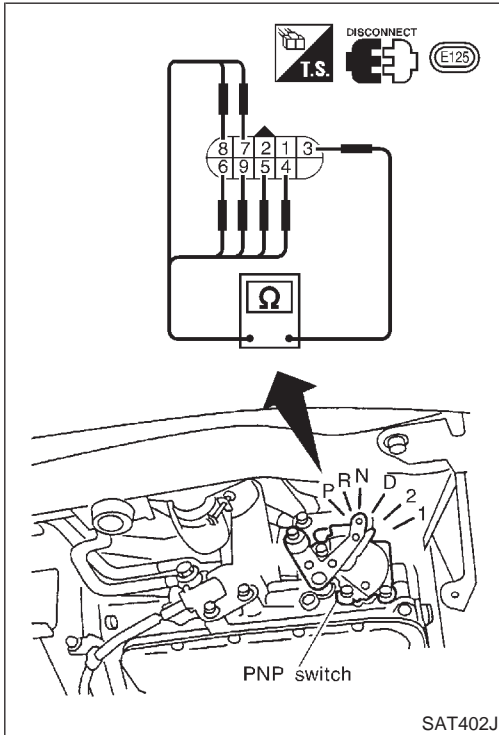
#### Overdrive Control Switch

NCAT0101S03

NCAT0101S0301

- Check continuity between two terminals.

Switch position	Continuity
ON	No
OFF	Yes

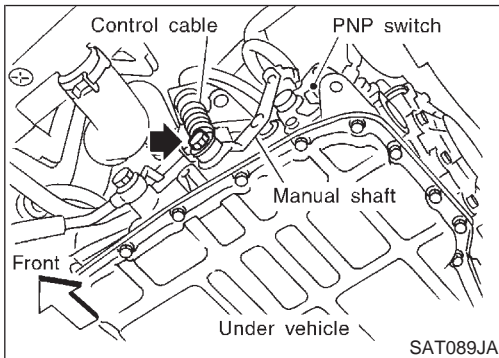


#### PNP Switch

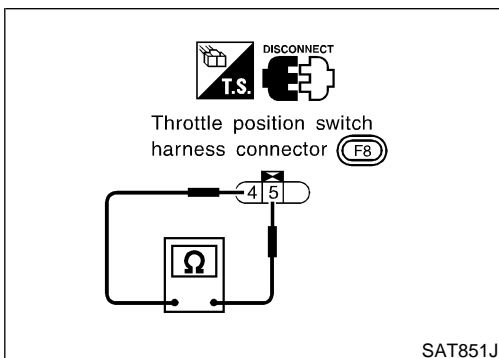
NCAT0101S0302

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

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



- If NG, check again with manual control cable disconnected from manual shaft of A/T assembly. Refer to step 1.
- If OK on step 2, adjust manual control cable. Refer to AT-281.
- 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-281.
- If NG on step 4, replace PNP switch.



#### Throttle Position Switch

NCAT0101S0303

##### Closed throttle position switch (idle position)

- Check continuity between terminals 4 and 5. Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-49.

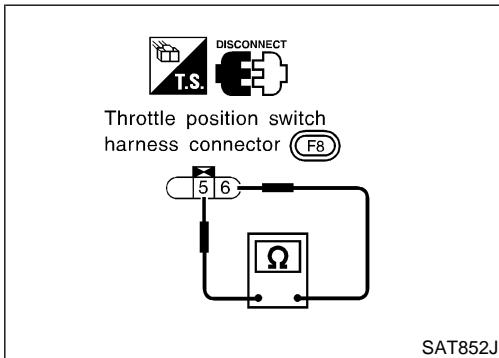
Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

- To adjust closed throttle position switch, refer to EC-432, "DTC

# TROUBLE DIAGNOSES FOR SYMPTOMS

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

P0510 CLOSED THROTTLE POSITION SWITCH".



## Wide open throttle position switch

- Check continuity between terminals 5 and 6.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

GI

MA

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# A/T SHIFT LOCK SYSTEM

Description

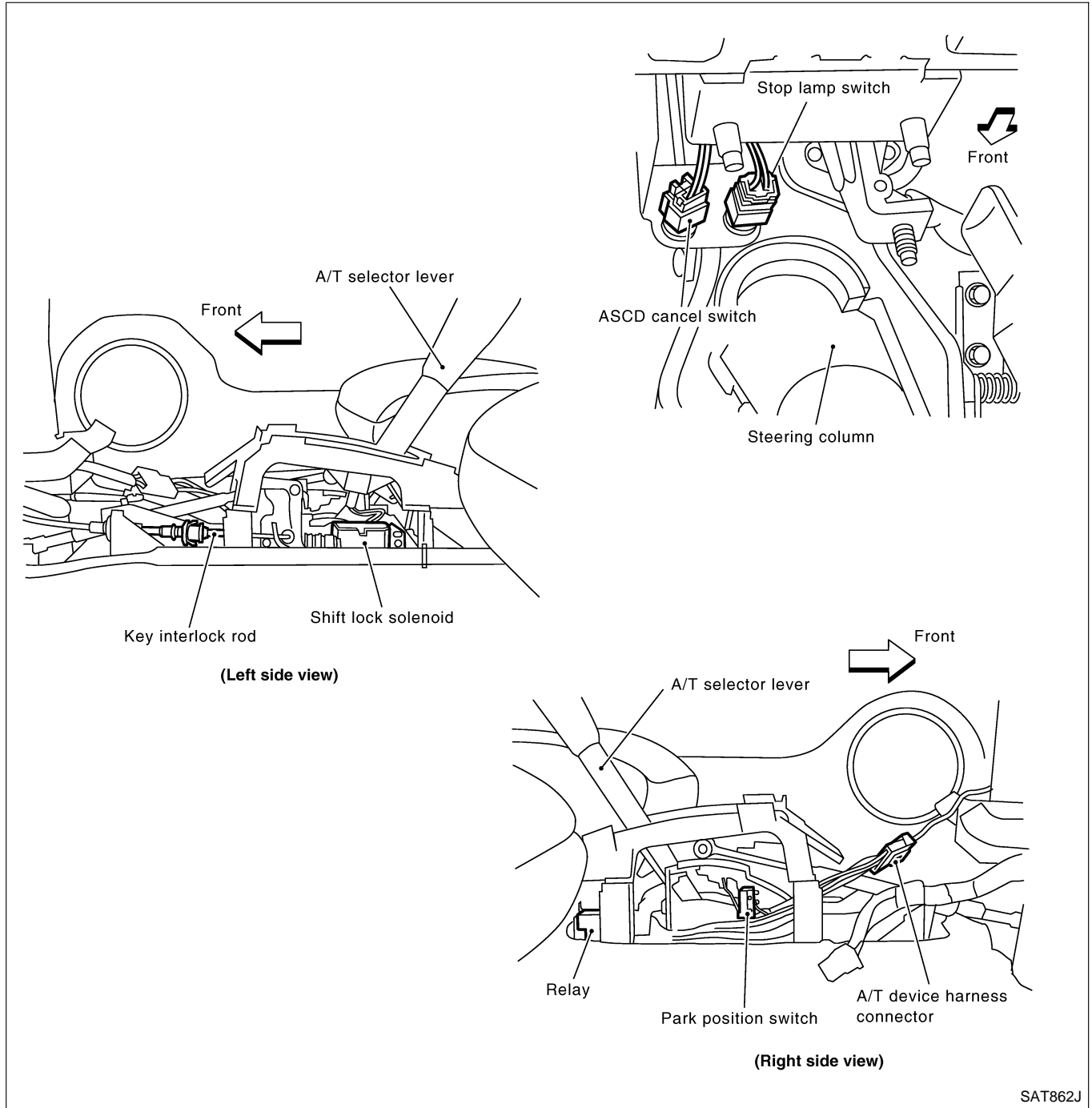
## Description

NCAT0102

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

## Shift Lock System Electrical Parts Location

NCAT0103



SAT862J



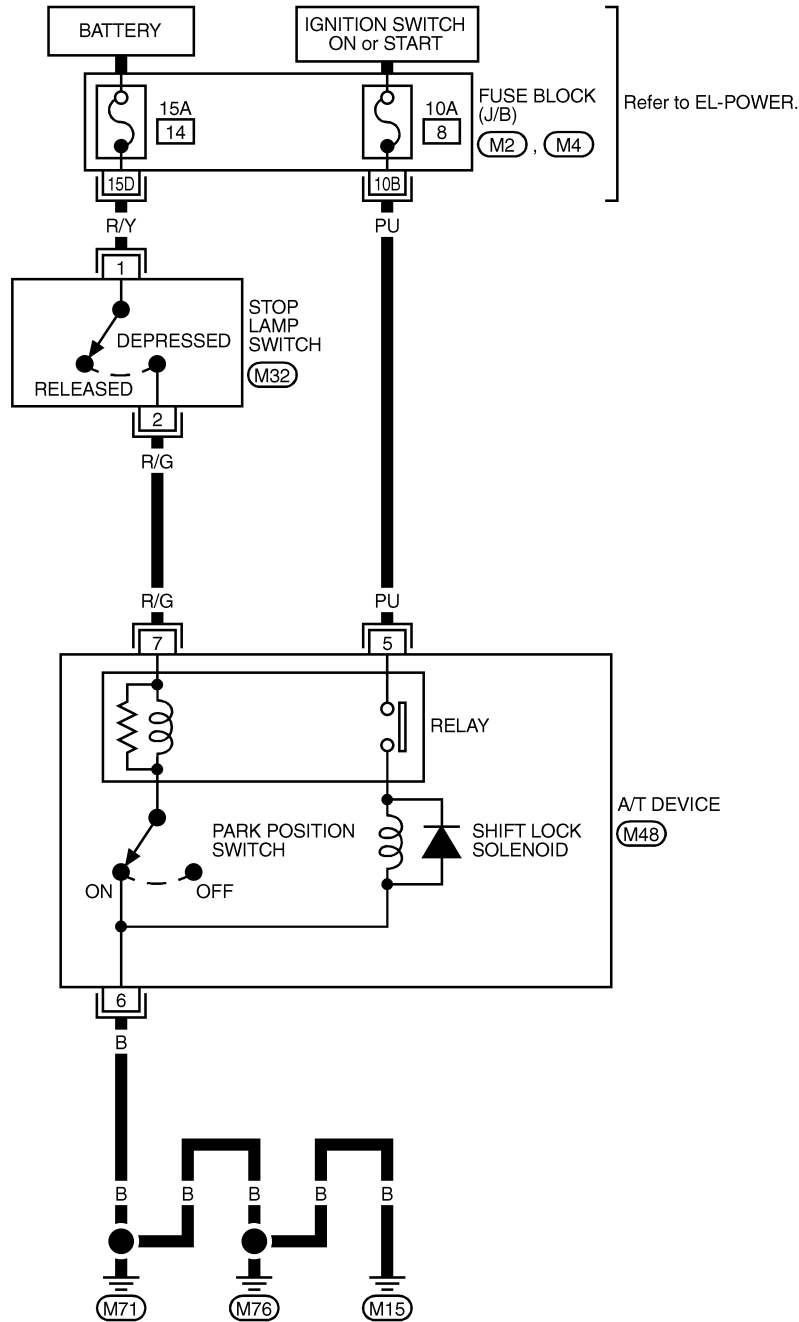
# A/T SHIFT LOCK SYSTEM

Wiring Diagram — SHIFT —

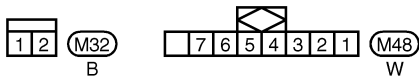
## Wiring Diagram — SHIFT —

NCAT0104

AT-SHIFT-01



- GI
- MA
- EM
- LC
- EC
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- AT**
- AX
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- HA
- SC
- EL
- IDX



REFER TO THE FOLLOWING.  
 (M2), (M4) - FUSE BLOCK-  
 JUNCTION BOX (J/B)

TAT242

# A/T SHIFT LOCK SYSTEM

Diagnostic Procedure

## Diagnostic Procedure

NCAT0105

### SYMPTOM 1:

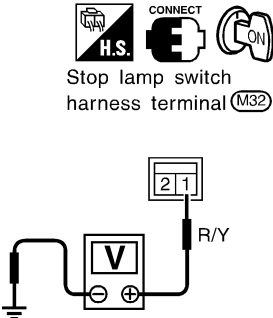
- Selector lever cannot be moved from “P” position with key in ON position and brake pedal applied.
- Selector lever can be moved from “P” position with key in ON position and brake pedal released.
- Selector lever can be moved from “P” position when key is removed from key cylinder.

### 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.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair key interlock cable. Refer to AT-278.

<b>2</b>	<b>CHECK SELECTOR LEVER POSITION</b>	
Check selector lever position for damage.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Check selector lever. Refer to “ON-VEHICLE SERVICE — PNP Switch and Control Cable Adjustment”, AT-281.

<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 stop lamp switch harness terminal 1 and ground.</p> <p style="color: blue;"><b>Voltage: Battery voltage</b></p>		
 <p style="text-align: center;">Stop lamp switch harness terminal (M32)</p>		
OK or NG		
OK	▶	GO TO 4.
NG	▶	<p><b>Check the following items:</b></p> <ol style="list-style-type: none"> <li>1. Harness for short or open between battery and stop lamp switch harness terminal 1</li> <li>2. Fuse</li> <li>3. Ignition switch (Refer to EL-9, “POWER SUPPLY ROUTING”).</li> </ol>

SAT855J

# A/T SHIFT LOCK SYSTEM

Diagnostic Procedure (Cont'd)

<b>4</b>	<b>CHECK INPUT SIGNAL (A/T DEVICE)</b>	<p>Turn ignition switch to "ON" position. (Do not start engine.)</p> <ul style="list-style-type: none"> <li>Check voltage between A/T device harness terminal 7 and ground.</li> </ul> <p><b>Voltage:</b>  <b>Brake pedal depressed:</b>  <b>Battery voltage</b>  <b>Brake pedal released:</b>  <b>0V</b></p> <div style="text-align: center;"> <p>OK or NG</p> </div> <p style="text-align: right;">SAT856J</p>	
OK	▶	GO TO 5.	
NG	▶	<p><b>Check the following items:</b></p> <ol style="list-style-type: none"> <li>Harness for short and open between battery and stop lamp switch harness connector 1.</li> <li>Harness for short or open between stop lamp switch harness connector 2 and A/T device harness connector 7.</li> <li>Fuse</li> <li>Stop lamp switch (Refer to "Component Check", AT-277.)</li> </ol>	<b>AT</b>

<b>5</b>	<b>CHECK GROUND CIRCUIT</b>	<ol style="list-style-type: none"> <li>Turn ignition switch to "OFF" position.</li> <li>Disconnect A/T device harness connector.</li> <li>Check continuity between A/T device harness terminal 6 and ground.</li> </ol> <p><b>Continuity should exist.</b></p> <p>If OK, check harness for short to ground and short to power.</p> <div style="text-align: center;"> <p>OK or NG</p> </div> <p style="text-align: right;">SAT857J</p>	
OK	▶	GO TO 6.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

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# A/T SHIFT LOCK SYSTEM

Diagnostic Procedure (Cont'd)

6	CHECK RELAY CIRCUIT													
1. Turn ignition switch to ON. ● Check voltage between terminal 7 - 6 and 5 - 6.														
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Condition</th> <th style="width: 15%;">Ignition switch</th> <th style="width: 20%;">Terminal No.</th> <th style="width: 25%;">Voltage</th> </tr> </thead> <tbody> <tr> <td rowspan="2">When selector lever is set in "P" position and depressed brake pedal.</td> <td rowspan="2">ON</td> <td>7 - 6</td> <td>Battery voltage</td> </tr> <tr> <td>5 - 6</td> <td>Battery voltage</td> </tr> </tbody> </table>					Condition	Ignition switch	Terminal No.	Voltage	When selector lever is set in "P" position and depressed brake pedal.	ON	7 - 6	Battery voltage	5 - 6	Battery voltage
Condition	Ignition switch	Terminal No.	Voltage											
When selector lever is set in "P" position and depressed brake pedal.	ON	7 - 6	Battery voltage											
		5 - 6	Battery voltage											
SAT858J														
<b>OK or NG</b>														
OK	▶	GO TO 7.												
NG	▶	Replace A/T device.												

7	CHECK PARK POSITION SWITCH			
Refer to "A/T device Check", AT-277.				
<b>OK or NG</b>				
OK	▶	GO TO 8.		
NG	▶	Replace A/T device.		

8	CHECK SHIFT LOCK SOLENOID			
Refer to "A/T device Check", AT-277.				
<b>OK or NG</b>				
OK	▶	GO TO 9.		
NG	▶	Replace A/T device.		

9	SHIFT LOCK OPERATION			
1. Reconnect shift lock harness connector. 2. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.) 3. Recheck shift lock operation.				
<b>OK or NG</b>				
OK	▶	INSPECTION END		
NG	▶	1. Perform A/T device input/output signal inspection test. 2. If NG, recheck harness connector connection.		

## A/T DEVICE CHECK

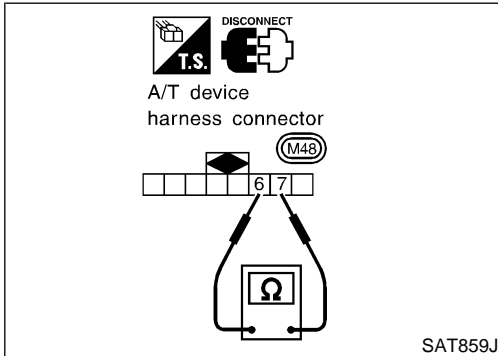
=NCAT0105S01

### 1. Shift Lock Solenoid

NCAT0105S0101

- Check operation sound.  
When ignition switch is turned to "ON" position and selector lever is set in "P" position.

Brake pedal	Operation sound
Depressed	Yes
Released	No

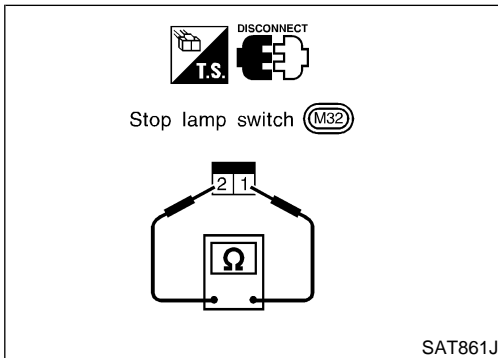


### 2. Park Position Switch

NCAT0105S0102

- Check resistance between A/T device harness terminal 6 and 7.

Condition	Resistance
When selector lever is set in "P" position and selector lever button is released	111Ω
Except above	0Ω



## STOP LAMP SWITCH

NCAT0105S02

- Check continuity between terminals 1 and 2.

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

Check stop lamp switch after adjusting brake pedal — refer to BR-12, "BRAKE PEDAL AND BRACKET".

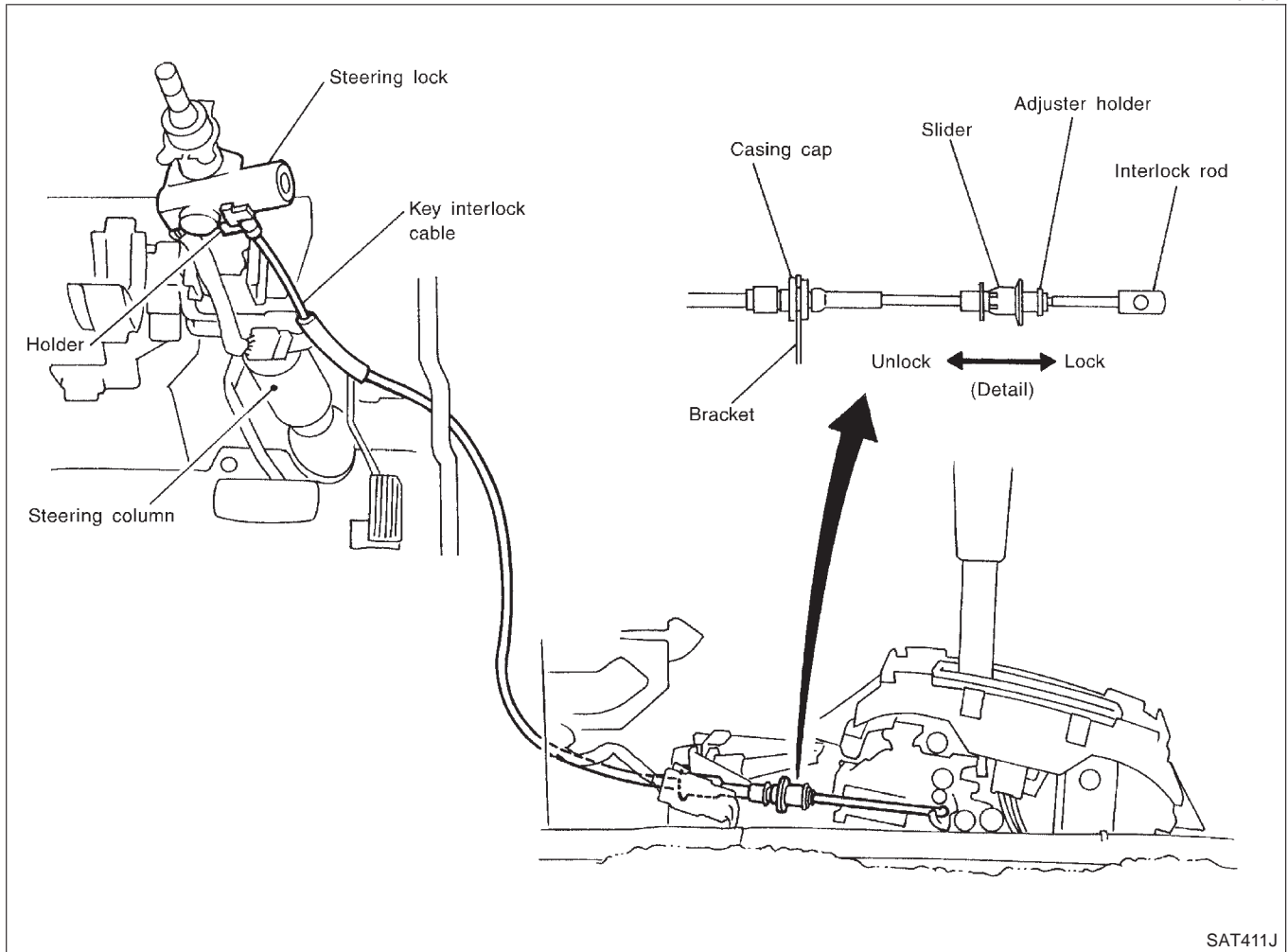
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# KEY INTERLOCK CABLE

Components

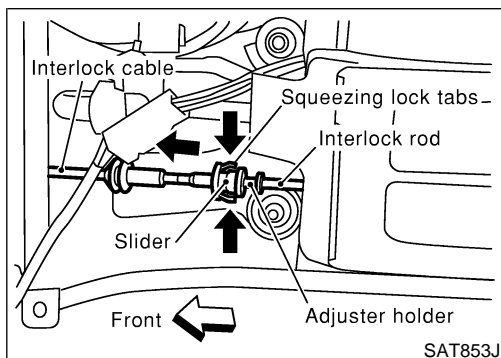
## Components

NCAT0107



### CAUTION:

- Install key interlock cable in such a way that it will not be damaged by sharp bends, twists or interference with adjacent parts.
- After installing key interlock cable to control device, make sure that casing cap and bracket are firmly secured in their positions.



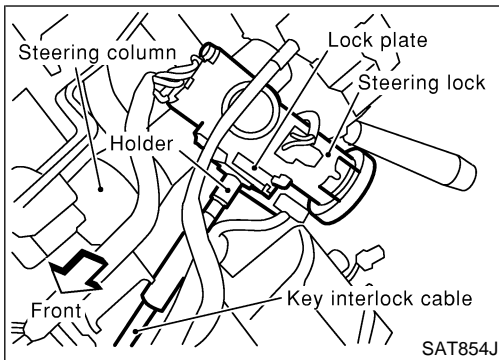
### Removal

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

NCAT0108

# KEY INTERLOCK CABLE

Removal (Cont'd)



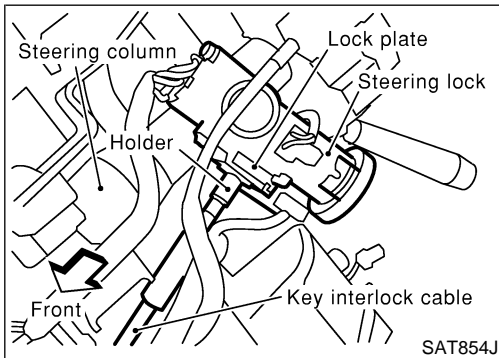
2. Remove lock plate from steering lock assembly and remove key interlock cable.

GI

MA

EM

LC



## Installation

NCAT0109

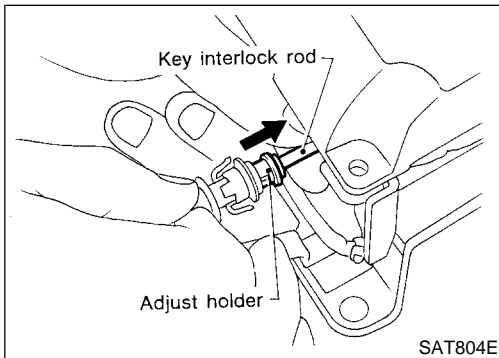
1. Turn ignition key to lock position.
2. Set A/T selector lever to P position.
3. Set key interlock cable to steering lock assembly and install lock plate.
4. Clamp cable to steering column and fix to control cable with band.

EC

FE

CL

MT



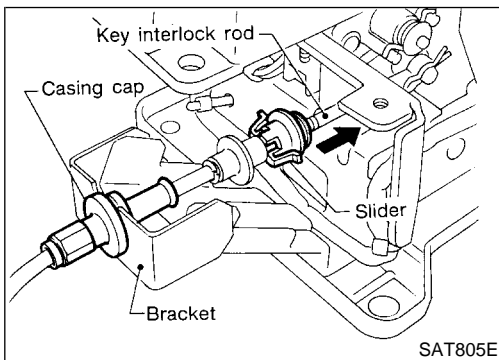
5. Insert interlock rod into adjuster holder.

AT

AX

SU

BR



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

ST

RS

BT

HA

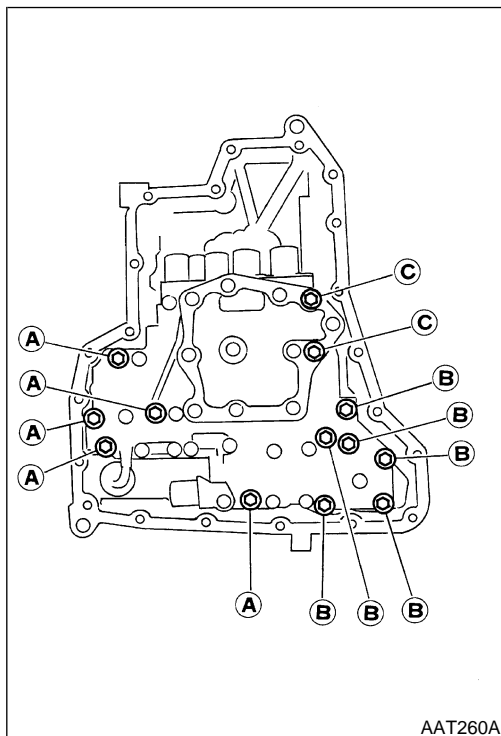
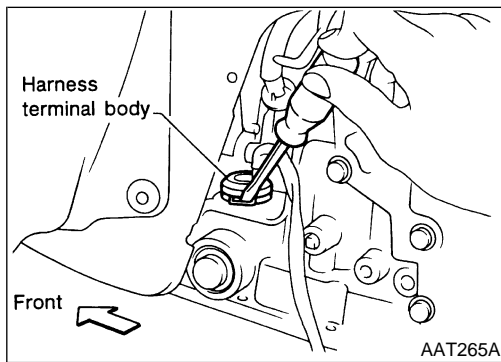
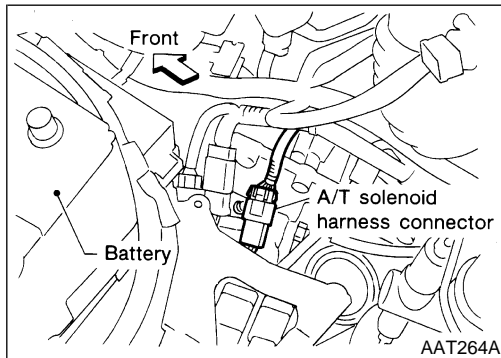
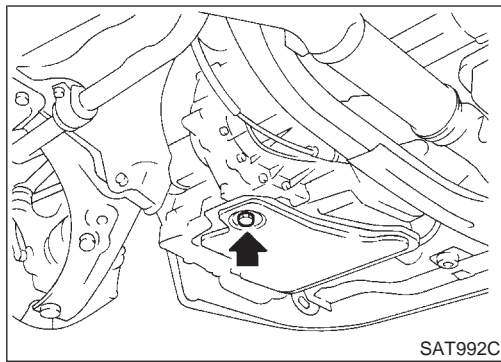
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# ON-VEHICLE SERVICE

## Control Valve Assembly and Accumulators




## Control Valve Assembly and Accumulators

NCAT0110

### REMOVAL

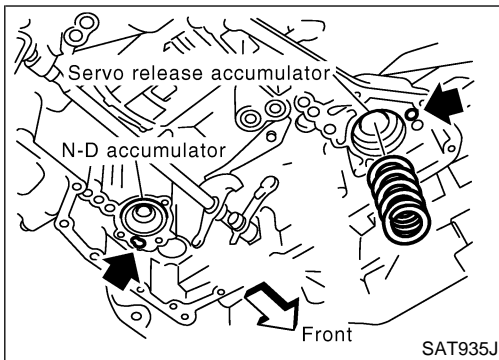
NCAT0110S01

1. Drain ATF from transaxle.
  2. Remove oil pan and gasket.
  3. Disconnect A/T solenoid harness connector.
  4. Remove stopper ring from A/T solenoid harness terminal body.
  5. Remove A/T solenoid harness by pushing terminal body into transmission case.
  6. Remove control valve assembly by removing fixing bolts.
- Bolt length, number and location:**
- | Bolt symbol  | A                     | B                     | C                     |
|--|-----------------------|-----------------------|-----------------------|
| Bolt length "ℓ"<br> ℓ | 40.0 mm<br>(1.575 in) | 33.0 mm<br>(1.299 in) | 43.5 mm<br>(1.713 in) |
| Number of bolts  | 5                     | 6                     | 2                     |
- **Be careful not to drop manual valve and servo release accumulator return springs.**
7. Disassemble and inspect control valve assembly if necessary. Refer to AT-291.



# ON-VEHICLE SERVICE

Control Valve Assembly and Accumulators (Cont'd)



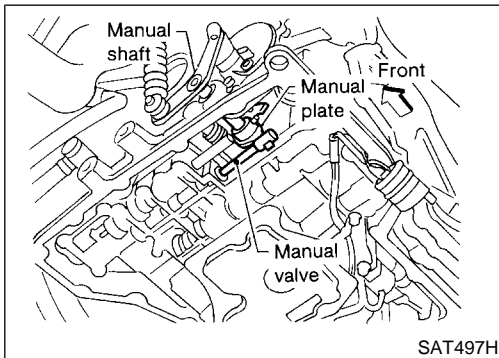
8. Remove servo release and N-D accumulators by applying compressed air if necessary.
- **Hold each piston with a rag.**

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## INSTALLATION

NCAT0110S02

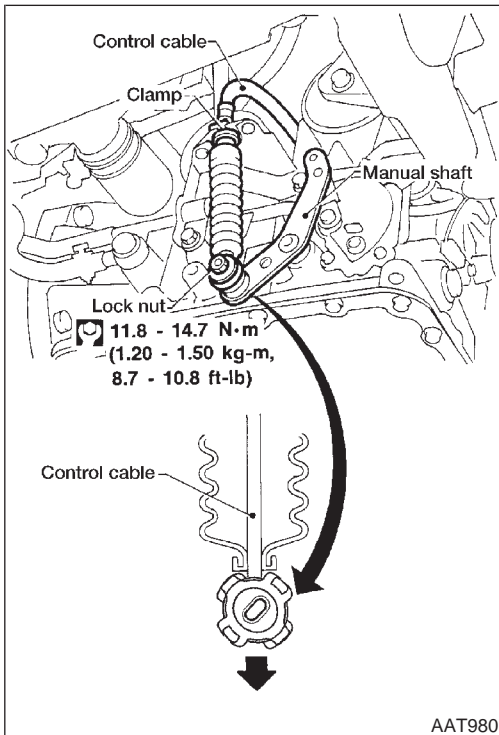
- **Tighten fixing bolts to specification.**  
🔧 : **7 - 9 N·m (0.7 - 0.9 kg·m, 61 - 78 in·lb)**
- **Set manual shaft in Neutral position, then align manual plate with groove in manual valve.**
- **After installing control valve assembly to transmission case, make sure that selector lever can be moved to all positions.**

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## Control Cable Adjustment

NCAT0111

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

1. Place selector lever in "P" position.
2. Loosen control cable lock nut and place manual shaft in "P" position.
3. Pull control cable, by specified force, in the direction of the arrow shown in the illustration.  
**Specified force: 6.9 N (0.7 kg, 1.5 lb)**
4. Return control cable in the opposite direction of the arrow for 1.0 mm (0.039 in).
5. Tighten control cable lock nut.
6. Move selector lever from "P" to "1" position again. Make sure that selector lever moves smoothly.
7. Apply grease to contacting areas of selector lever and control cable. Install any part removed.

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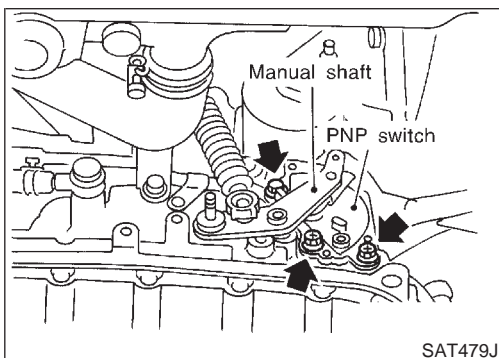
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## Park/Neutral Position (PNP) Switch Adjustment

NCAT0112

1. Remove control cable end from manual shaft.
2. Set manual shaft in "N" position.
3. Loosen PNP switch fixing bolts.

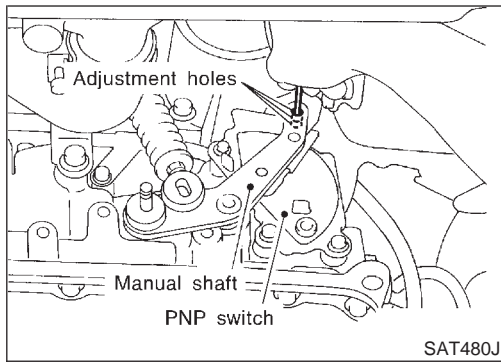
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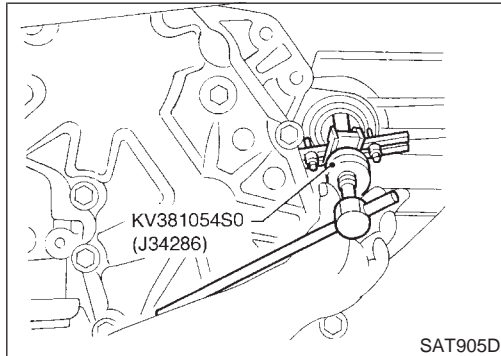
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# ON-VEHICLE SERVICE

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

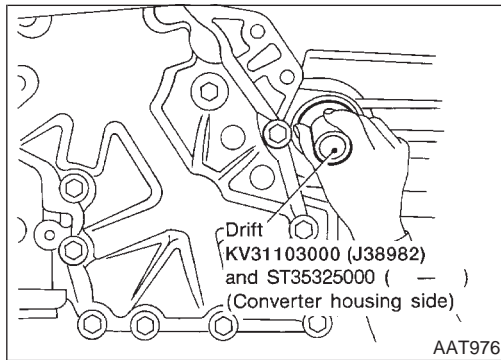


4. Use a 4 mm (0.157 in) pin for this adjustment.
  - a. Insert the pin straight into the manual shaft adjustment hole.
  - b. Rotate PNP switch until the pin can also be inserted straight into hole in PNP switch.
5. Tighten PNP switch fixing bolts.
6. Remove pin from adjustment hole after adjusting PNP switch.
7. Reinstall any part removed.
8. Adjust control cable. Refer to "Control Cable Adjustment".
9. Check continuity of PNP switch. Refer to AT-112.

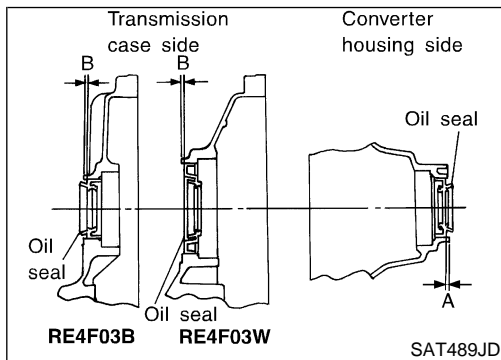


## Differential Side Oil Seal Replacement

1. Remove drive shaft assemblies. Refer to AX-10, "Drive Shaft". NCAT0113
2. Remove oil seals.



3. Install oil seals.
  - **Apply ATF to oil seal surface before installing.**

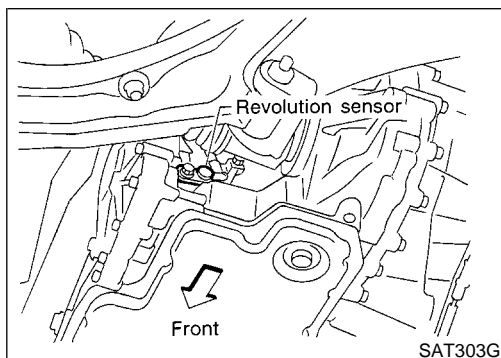


- **Install oil seals so that dimensions "A" and "B" are within specifications.**

Unit: mm (in)

A	B
5.5 - 6.5 (0.217 - 0.256)	-0.5 to 0.5 (-0.020 to 0.020)

4. Reinstall any part removed.

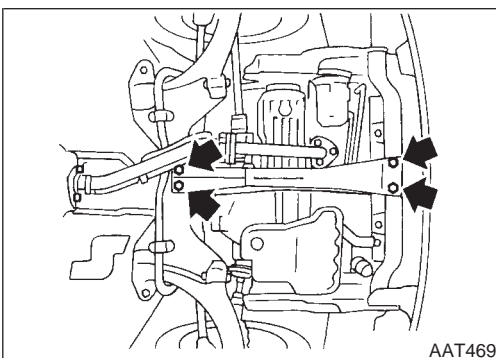
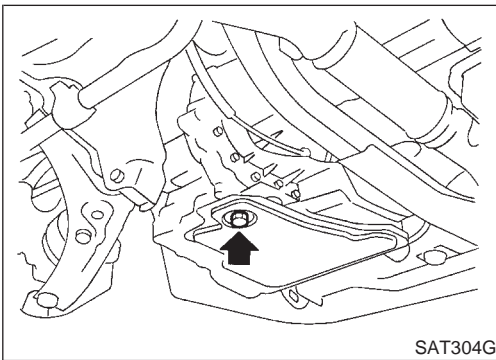
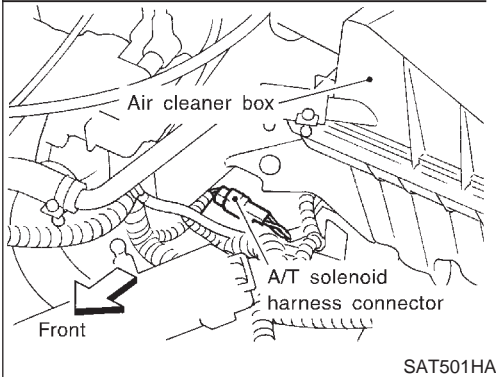
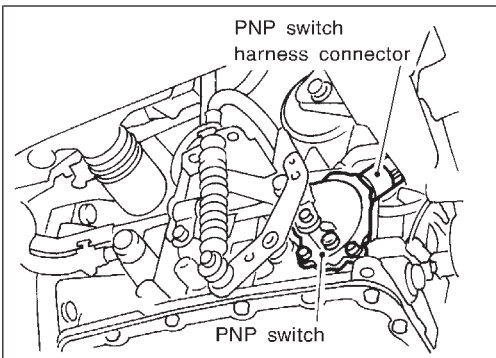


## Revolution Sensor Replacement

1. Disconnect revolution sensor harness connector. NCAT0114
2. Remove harness bracket from A/T.
3. Remove revolution sensor from A/T.
4. Reinstall any part removed.

**Always use new sealing parts.**

NCAT0115



## Removal

### CAUTION:

Before separating transaxle from engine, remove the crankshaft position sensor (OBD) from transaxle. Be careful not to damage sensor.

1. Remove battery and bracket.
2. Remove air duct between throttle body and air cleaner.
3. Disconnect A/T solenoid harness connector, PNP switch harness connector and revolution sensor harness connector.
4. Remove crankshaft position sensor (OBD) from transaxle.

5. Drain ATF from transaxle.
6. Disconnect control cable from transaxle.
7. Disconnect oil cooler hoses.
8. Remove drive shafts. Refer to AX-10, "Drive Shaft".
9. Remove the intake manifold support bracket. Refer to EM-10, "OUTER COMPONENT PARTS".
10. Remove starter motor from transaxle.

**Tighten bolts to specified torque.**

**Ⓒ : 41 - 52 N·m (4.2 - 5.3 kg-m, 30 - 38 ft-lb)**

11. Remove upper bolts fixing transaxle to engine.
12. Support transaxle with a jack.

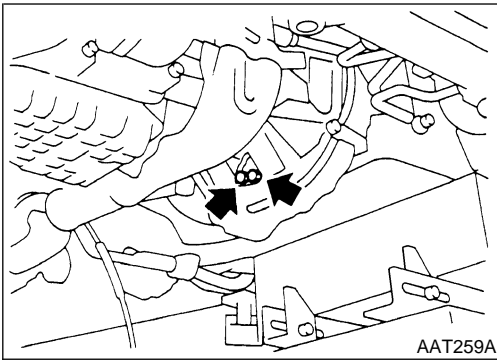
13. Remove center member.

- Tighten center member fixing bolts to specified torque, Refer to EM-55, "REMOVAL AND INSTALLATION".

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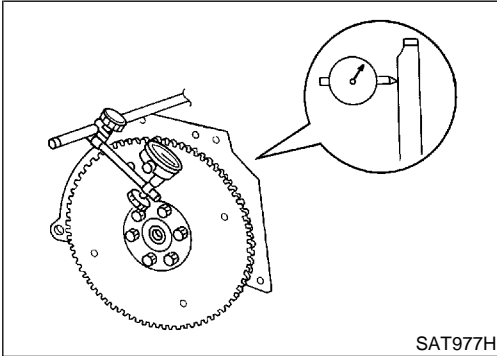
# REMOVAL AND INSTALLATION

Removal (Cont'd)



AAT259A

14. Remove rear plate cover.
15. Remove torque converter bolts.  
Rotate crankshaft to gain access to securing bolts.
16. Remove rear transaxle to engine bracket. Refer to EM-55, "REMOVAL AND INSTALLATION".
17. Support engine with a jack.
18. Remove rear transaxle mount. Refer to EM-55, "REMOVAL AND INSTALLATION".
19. Remove lower bolts fixing transaxle to engine.
20. Lower transaxle while supporting it with a jack.



SAT977H

## Installation

NCAT0116

1. Check drive plate runout.

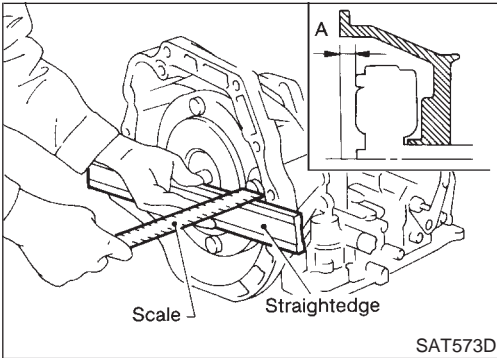
### CAUTION:

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

#### Maximum allowable runout:

Refer to EM-67, "FLYWHEEL/DRIVE PLATE RUNOUT".

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

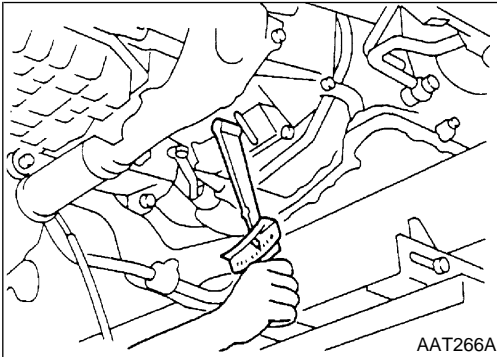


SAT573D

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

#### Distance "A":

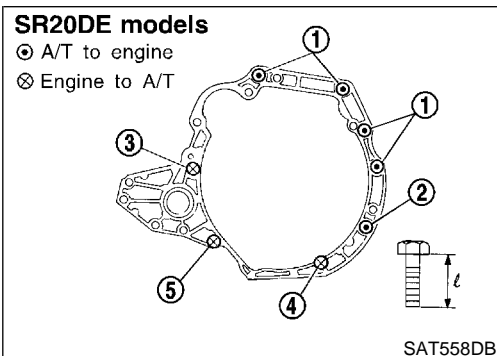
15.9 mm (0.626 in) or more



AAT266A

3. Install torque converter to drive plate.

- With converter installed, rotate crankshaft several turns to check that transaxle rotates freely without binding.



SAT558DB

4. Tighten belts fixing transaxle.

Bolt No.	Tightening torque N-m (kg-m, ft-lb)	Bolt length "l" mm (in)
1	70 - 79 (7.1 - 8.1, 51 - 59)	55 (2.17)
2	70 - 79 (7.1 - 8.1, 51 - 59)	50 (1.97)
3	70 - 79 (7.1 - 8.1, 51 - 59)	65 (2.56)
4	16 - 21 (1.6 - 2.1, 12 - 15)	35 (1.38)
5	16 - 21 (1.6 - 2.1, 12 - 15)	47 (1.85)

# REMOVAL AND INSTALLATION

Installation (Cont'd)



5. Reinstall any part removed.
6. Adjust control cable. Refer to AT-281.
7. Check continuity of PNP switch. Refer to AT-112.
8. Refill transaxle with ATF and check fluid level.
9. Move selector lever through all positions to be sure that transaxle operates correctly. With parking brake applied, idle engine. Move selector lever through "N" to "D", to "2", to "1" and "R" positions. A slight shock should be felt through the hand gripping the selector each time the transaxle is shifted.
10. Perform road test. Refer to AT-67.

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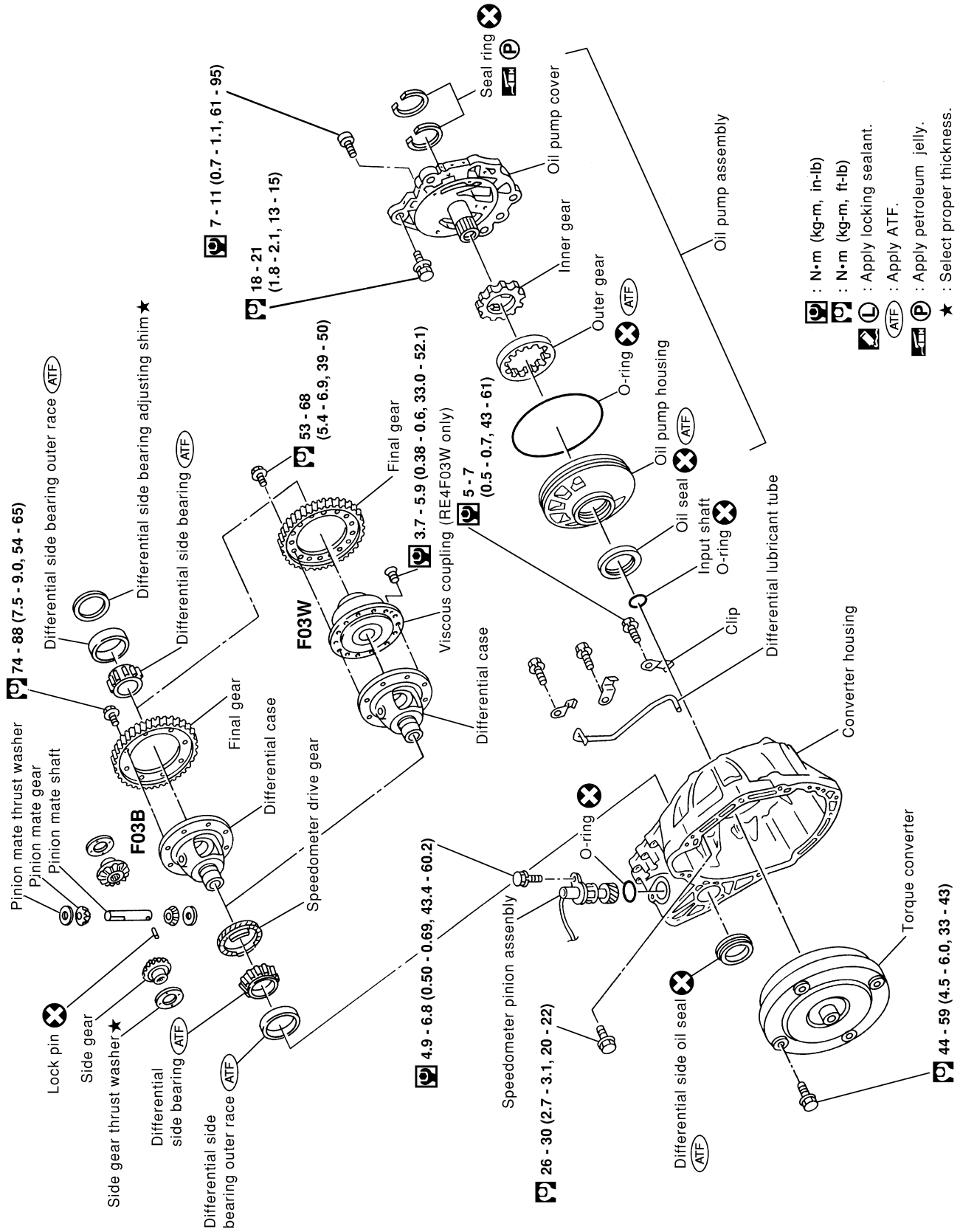
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# OVERHAUL

## Components

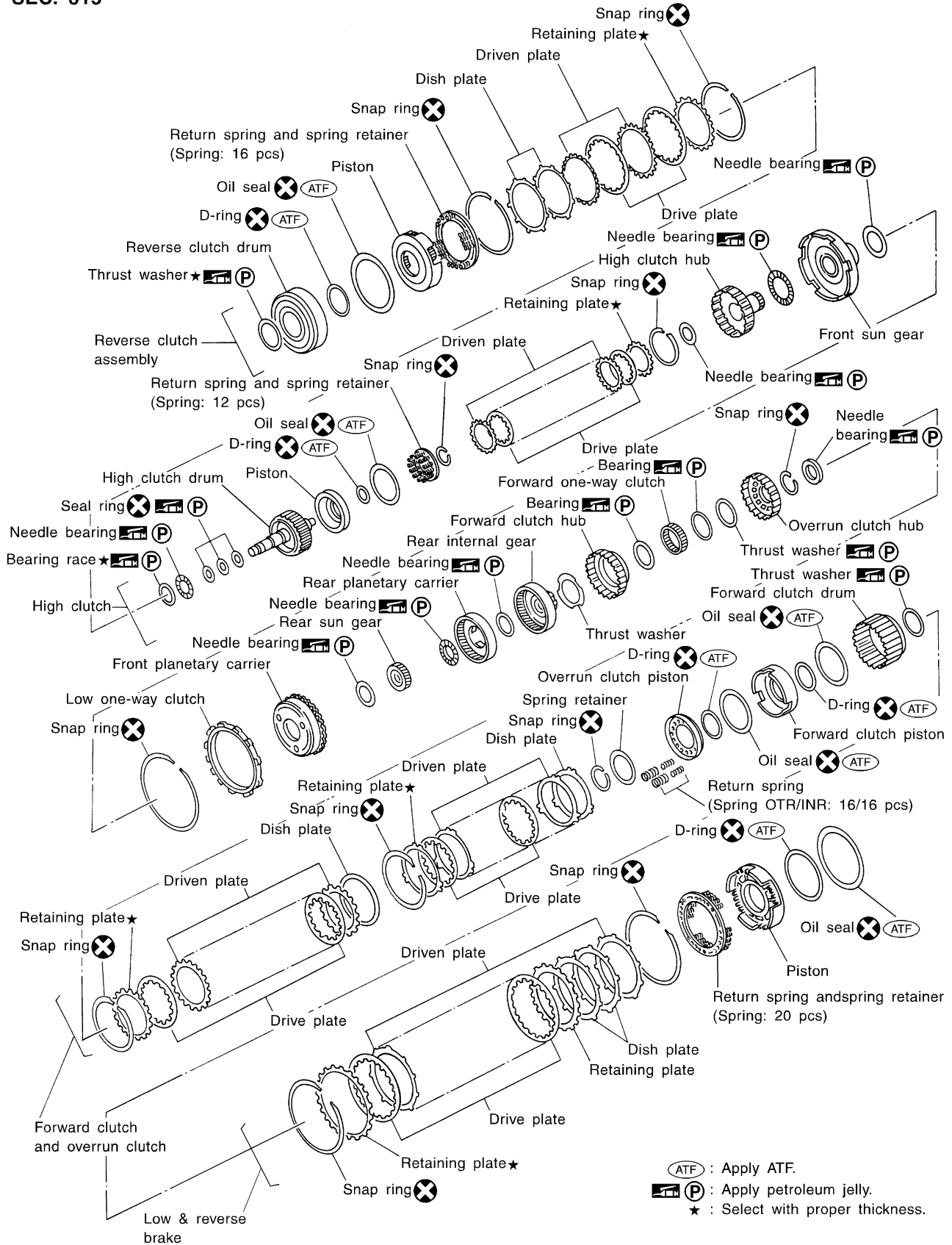


- : N•m (kg-m, in-lb)
- : N•m (kg-m, ft-lb)
- : Apply locking sealant.
- : Apply ATF.
- : Apply petroleum jelly.
- : Select proper thickness.

# OVERHAUL

Components (Cont'd)

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SAT936J









# OVERHAUL

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

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

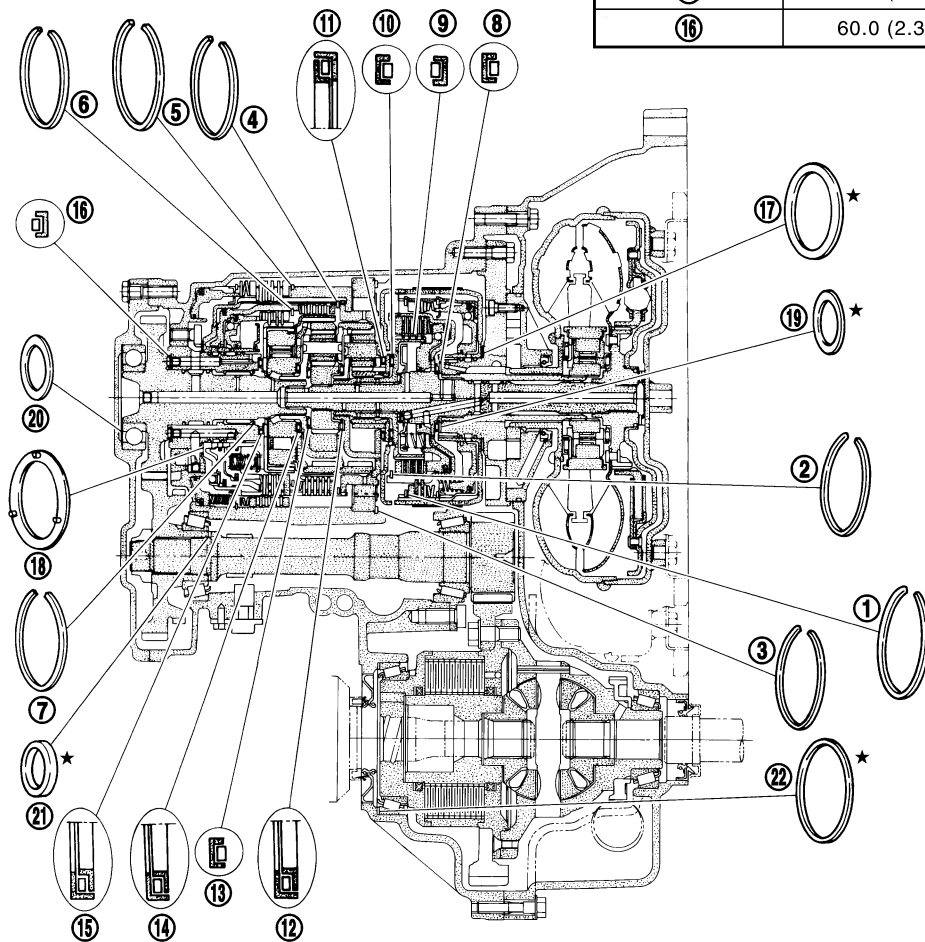
NCAT0117

Outer diameter and color of thrust washers

Item number	Outer diameter mm (in)	Color
⑰	72.0 (2.835)	Black
⑱	78.5 (3.091)	

Outer & inner diameter of needle bearings

Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑧	47.0 (1.850)	32.0 (1.260)
⑨	35.0 (1.378)	20.1 (0.791)
⑩	60.0 (2.362)	42.1 (1.657)
⑪	60.0 (2.362)	45.0 (1.772)
⑫	47.0 (1.850)	30.0 (1.181)
⑬	42.6 (1.677)	26.0 (1.024)
⑭	48.0 (1.890)	33.5 (1.319)
⑮	55.0 (2.165)	40.5 (1.594)
⑯	60.0 (2.362)	40.1 (1.579)



★ : Select proper thickness.

Outer & inner diameter of bearing race and adjusting shims

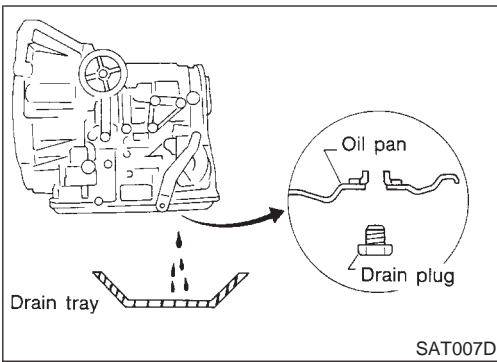
Item number		Outer diameter mm (in)	Inner diameter mm (in)
⑲		48.0 (1.890)	33.0 (1.299)
⑳		72.0 (2.835)	61.0 (2.402)
㉑		34.5 (1.358)	26.1 (1.028)
㉒	Viscous type	105.0 (4.13)	96.0 (3.78)
	Conventional type	68.0 (2.677)	60.0 (2.362)

Outer diameter of snap rings

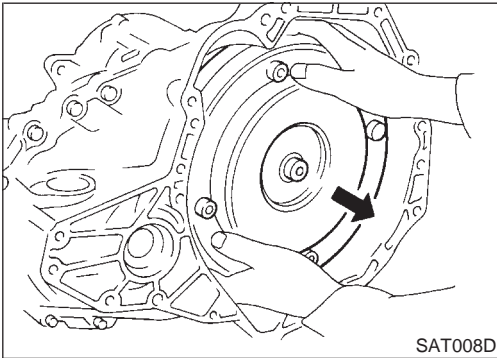
Item number	Outer diameter mm (in)
①	142.0 (5.59)
②	113.0 (4.45)
③	162.4 (6.39)
④	135.4 (5.33)
⑤	162.3 (6.39)
⑥	126.0 (4.96)
⑦	40.5 (1.594)

SAT325GC

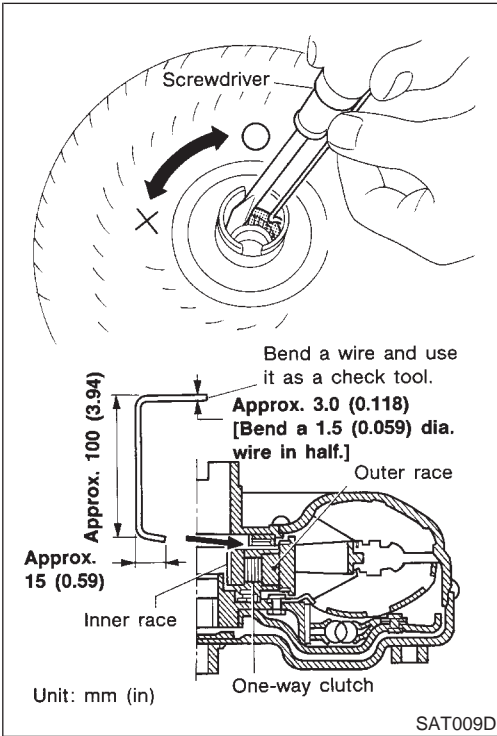
# DISASSEMBLY



1. Drain ATF through drain plug.

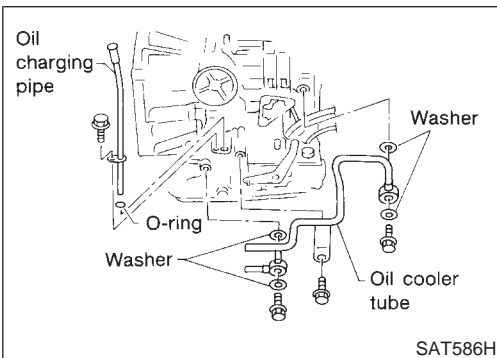


2. Remove torque converter.



3. Check torque converter one-way clutch using check tool as shown at left.

- a. Insert check tool into the groove of bearing support built into one-way clutch outer race.
- b. While fixing bearing support with check tool, rotate one-way clutch spline using flat-bladed screwdriver.
- c. Check inner race rotates clockwise only. If not, replace torque converter assembly.



4. Remove oil charging pipe and oil cooler tube.

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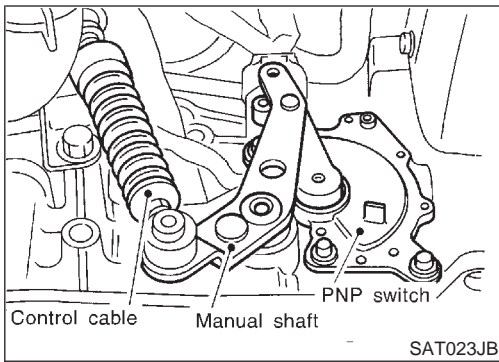
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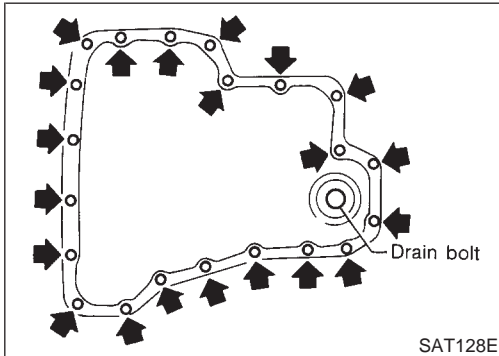
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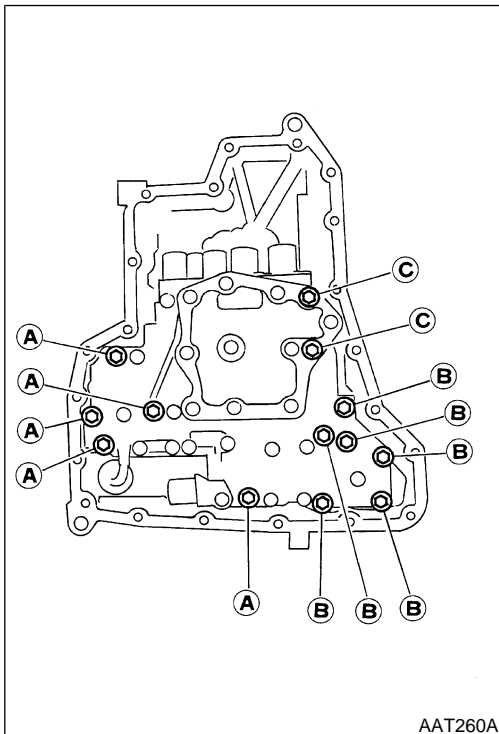
## DISASSEMBLY



5. Set manual shaft to "P" position.
6. Remove PNP switch.

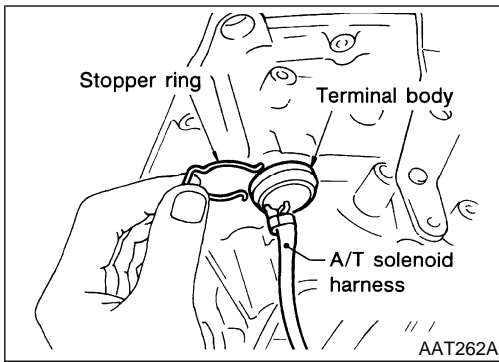


7. Remove oil pan and oil pan gasket.
  - **Do not reuse oil pan bolts.**
8. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves, servo, and clutches to stick and may inhibit pump pressure.
  - **If frictional material is detected, replace radiator after repair of A/T. Refer to LC-14, section "Radiator".**
9. Remove control valve assembly according to the following procedures.



- a. Remove control valve assembly mounting bolts A, B and C.

# DISASSEMBLY



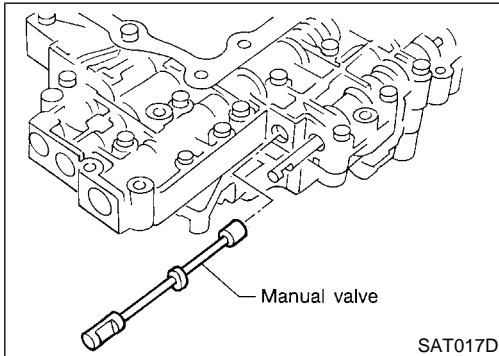
- b. Remove stopper ring from terminal body.
- c. Push terminal body into transmission case and draw out solenoid harness.

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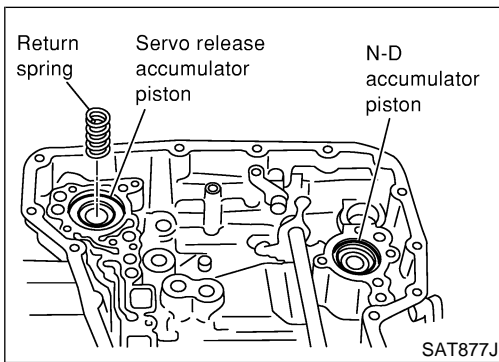
10. Remove manual valve from control valve assembly as a precaution.

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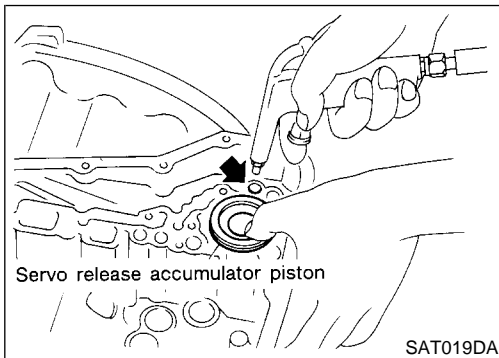
11. Remove return spring from servo release accumulator piston.

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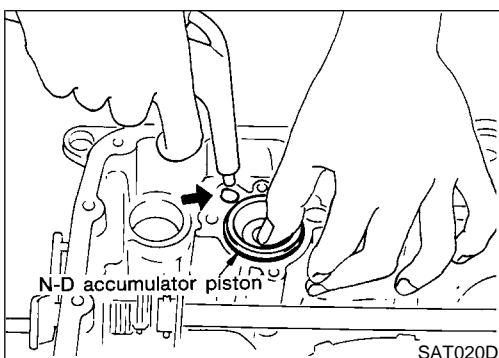
12. Remove servo release accumulator piston with compressed air.
13. Remove O-rings from servo release accumulator piston.

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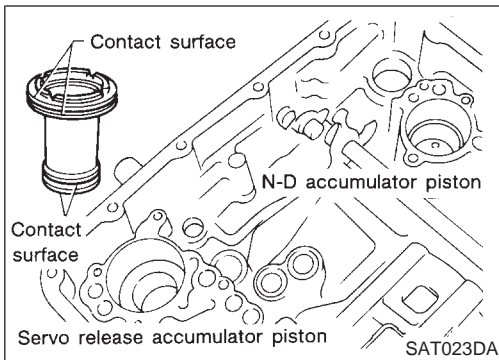
14. Remove N-D accumulator piston and return spring with compressed air.
15. Remove O-rings from N-D accumulator piston.

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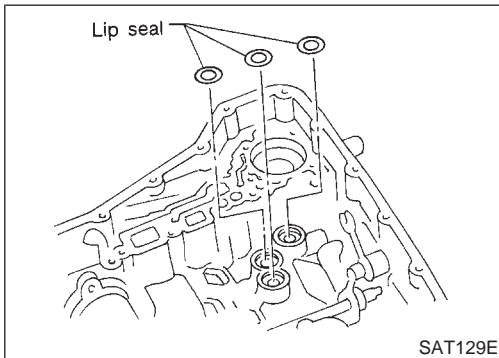
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## DISASSEMBLY

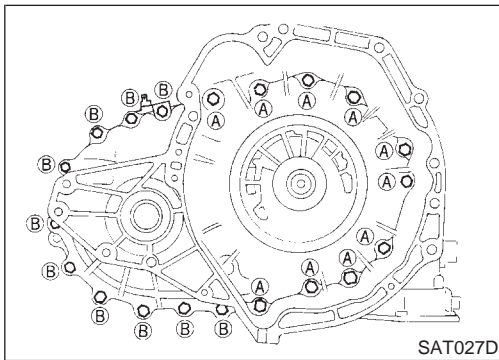


16. Check accumulator pistons and contact surface of transmission case for damage.
17. Check accumulator return springs for damage and free length.

**Return springs:**  
**Refer to SDS, AT-399.**

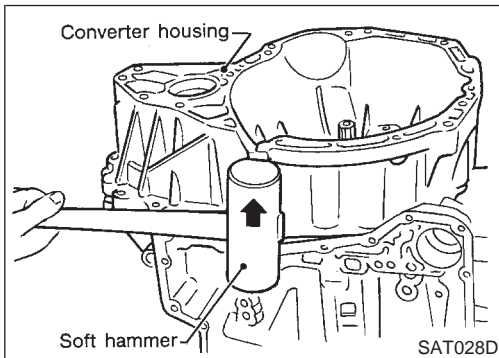


18. Remove lip seals from band servo oil port.

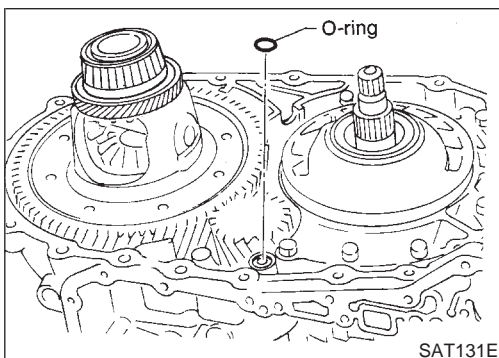


19. Remove converter housing according to the following procedures.

- a. Remove converter housing mounting bolts A and B.

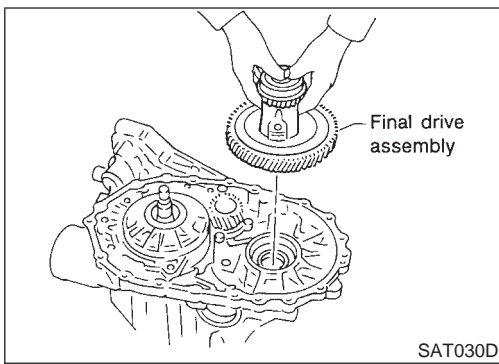


- b. Remove converter housing.

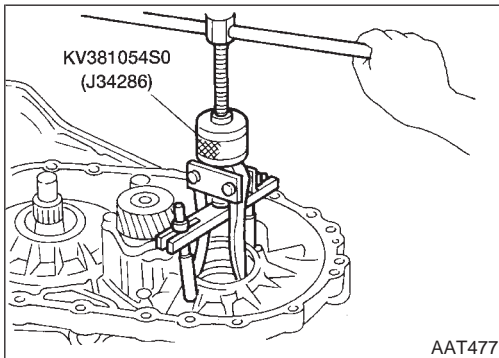


- c. Remove O-ring from differential oil port.

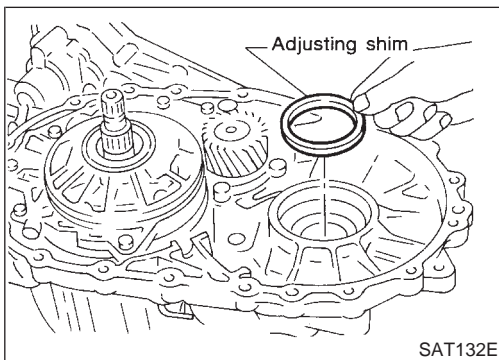
# DISASSEMBLY



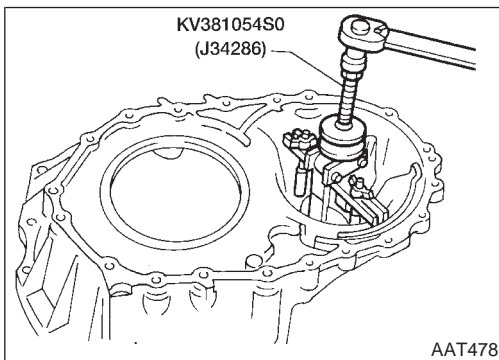
20. Remove final drive assembly from transmission case.



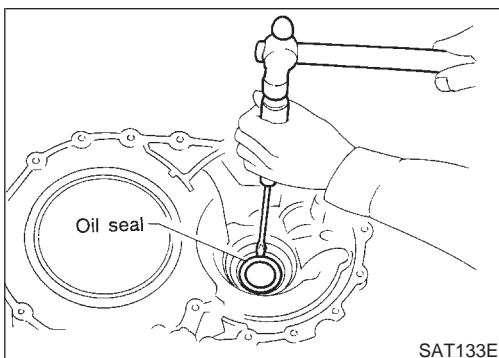
21. Remove differential side bearing outer race from transmission case.



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



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

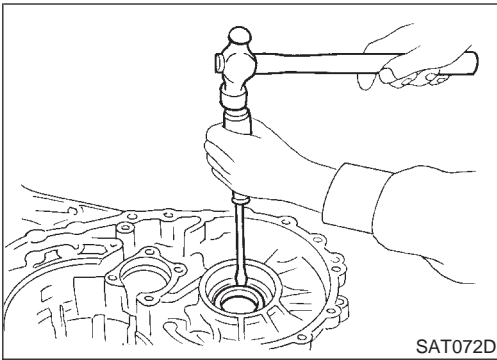


24. Remove oil seal from converter housing using a screwdriver.  
● **Be careful not to damage case.**

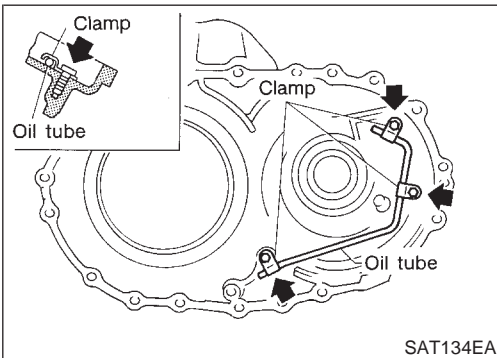
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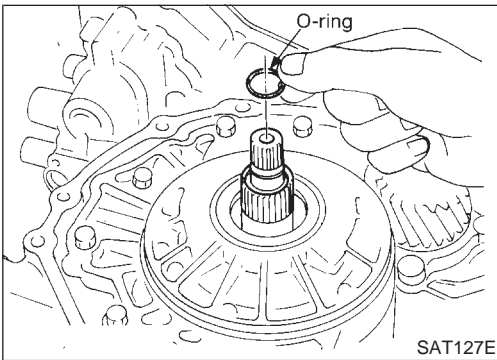
# DISASSEMBLY



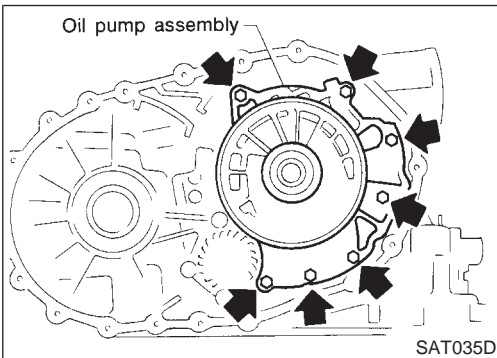
25. Remove side oil seal from transmission case using a screwdriver.



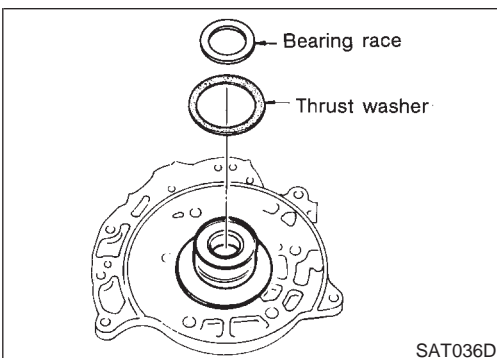
26. Remove oil tube from converter housing.



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



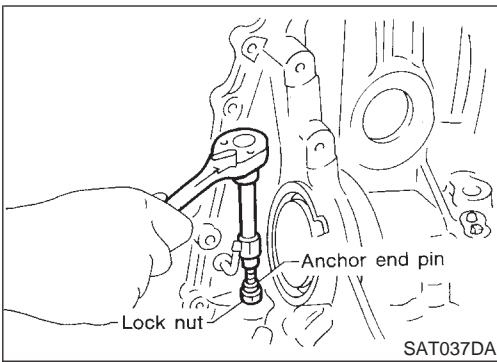
- b. Remove oil pump assembly from transmission case.



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



# DISASSEMBLY



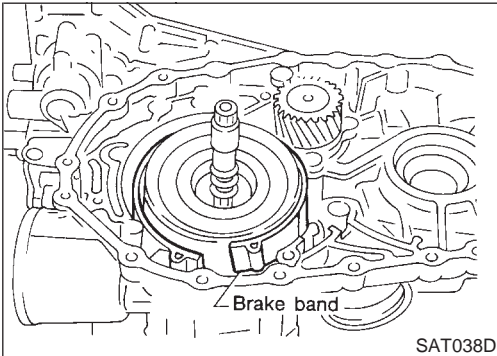
28. Remove brake band according to the following procedures.
- a. Loosen lock nut, then back off anchor end pin.
    - **Do not reuse anchor end pin.**

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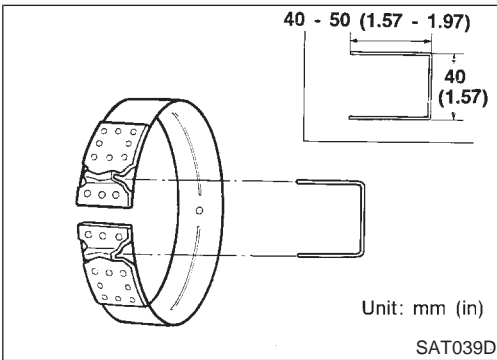


- b. Remove brake band from transmission case.

EC

FE

CL



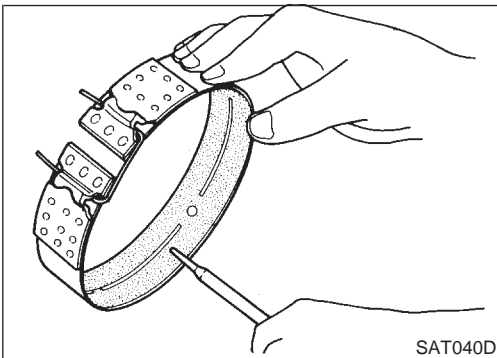
- **To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at left. Leave the clip in position after removing the brake band.**

AT

AX

SU

BR



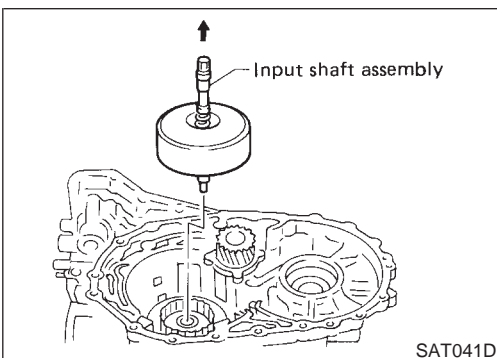
- c. Check brake band facing for damage, cracks, wear or burns.

ST

RS

BT

HA



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

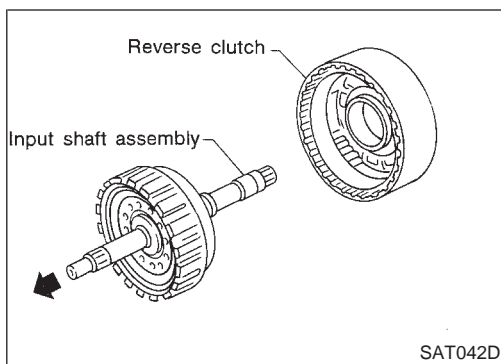
SC

- a. Remove input shaft assembly (high clutch) with reverse clutch.

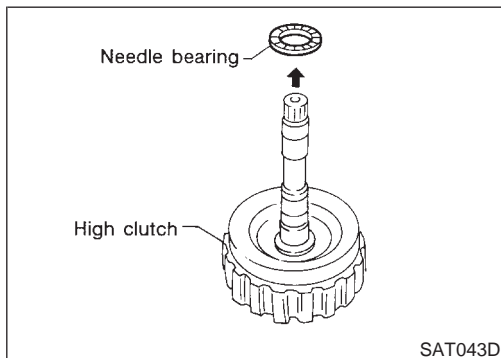
EL

IDX

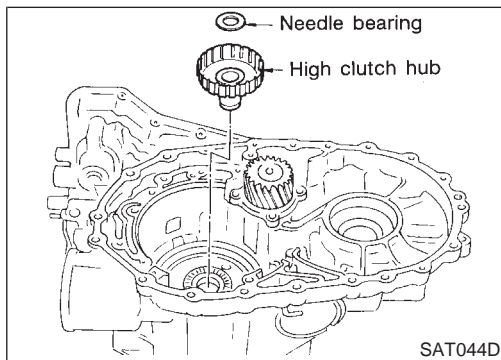
## DISASSEMBLY



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

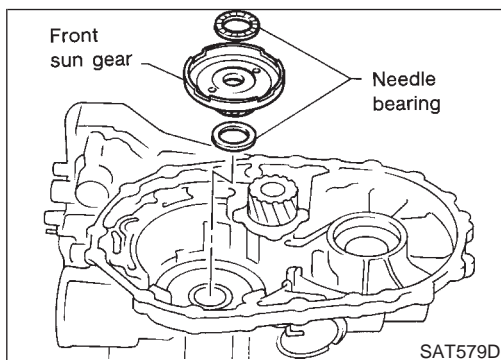


- c. Remove needle bearing from high clutch drum.  
d. Check input shaft assembly and needle bearing for damage or wear.



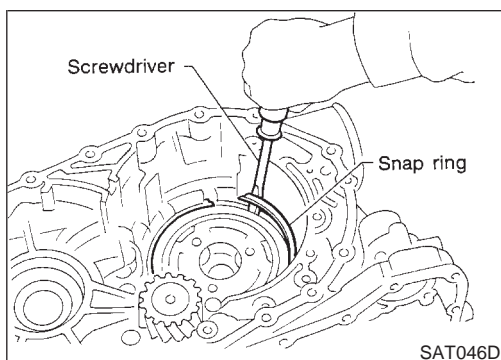
30. Remove high clutch hub and needle bearing from transmission case.

31. Check high clutch hub and needle bearing for damage or wear.



32. Remove front sun gear and needle bearings from transmission case.

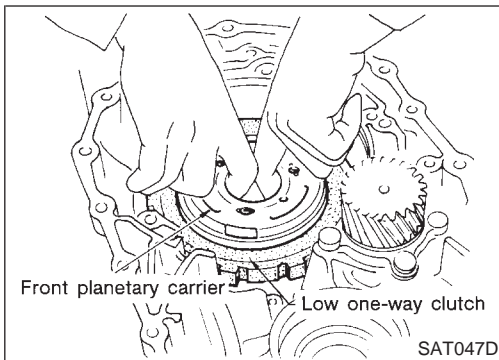
33. Check front sun gear and needle bearings for damage or wear.



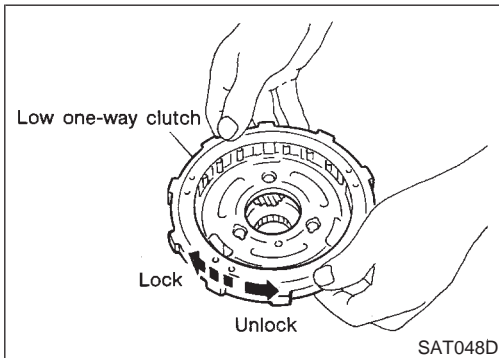
34. Remove front planetary carrier assembly and low one-way clutch according to the following procedures.

- a. Remove snap ring using a screwdriver.

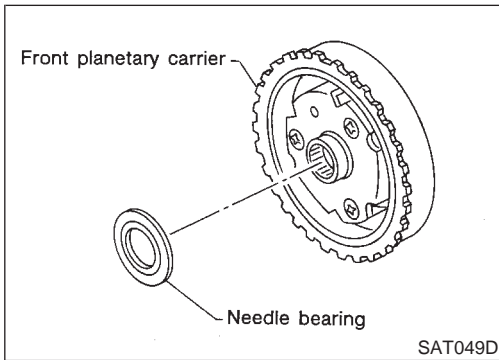
# DISASSEMBLY



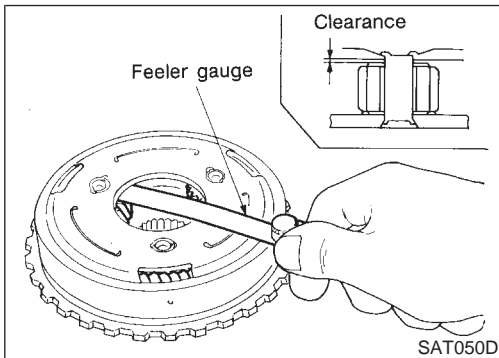
b. Remove front planetary carrier with low one-way clutch.



- c. Check that low one-way clutch rotates in the direction of the arrow and locks in the opposite direction.
- d. Remove low one-way clutch from front planetary carrier by rotating it in the direction of unlock.



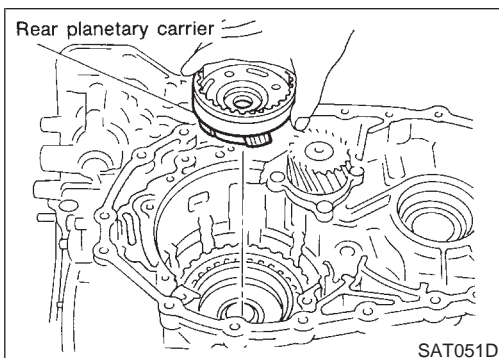
e. Remove needle bearing from front planetary carrier.



- f. Check front planetary carrier, low one-way clutch and needle bearing for damage or wear.
- g. Check clearance between pinion washer and planetary carrier using feeler gauge.

**Standard clearance:**  
**0.15 - 0.70 mm (0.0059 - 0.0276 in)**  
**Allowable limit:**  
**0.80 mm (0.0315 in)**

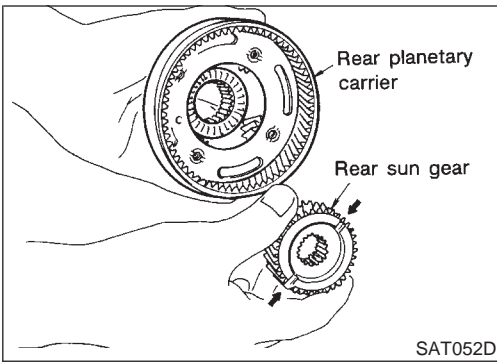
Replace front planetary carrier if the clearance exceeds allowable limit.



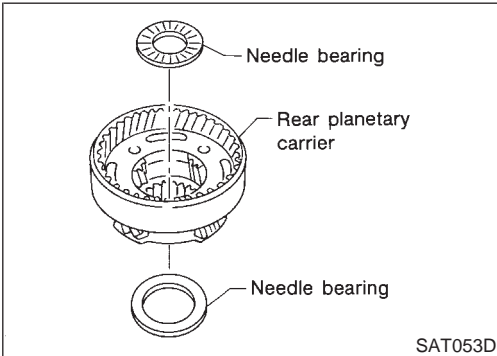
- 35. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.
  - a. Remove rear planetary carrier assembly from transmission case.

GI  
 MA  
 EM  
 LC  
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**AT**  
 AX  
 SU  
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 ST  
 RS  
 BT  
 HA  
 SC  
 EL  
 IDX

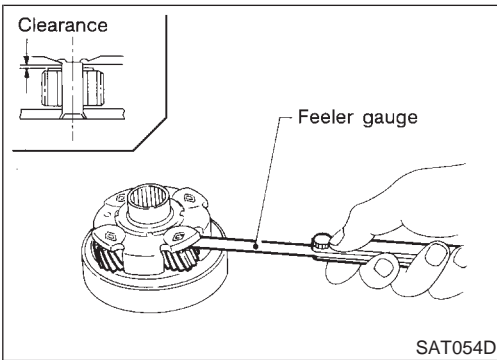
# DISASSEMBLY



b. Remove rear sun gear from rear planetary carrier.



c. Remove needle bearings from rear planetary carrier assembly.



d. Check rear planetary carrier, rear sun gear and needle bearings for damage or wear.

e. Check clearance between pinion washer and rear planetary carrier using feeler gauge.

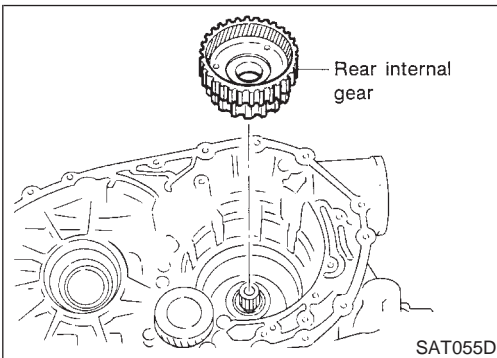
**Standard clearance:**

**0.15 - 0.70 mm (0.0059 - 0.0276 in)**

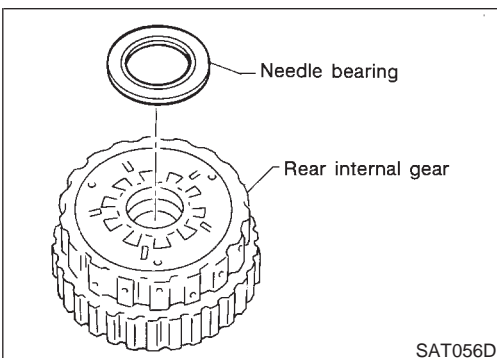
**Allowable limit:**

**0.80 mm (0.0315 in)**

Replace rear planetary carrier if the clearance exceeds allowable limit.



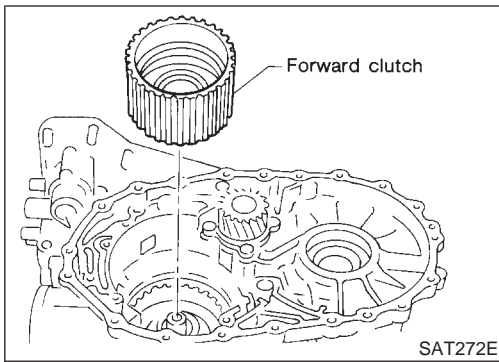
36. Remove rear internal gear from transmission case.



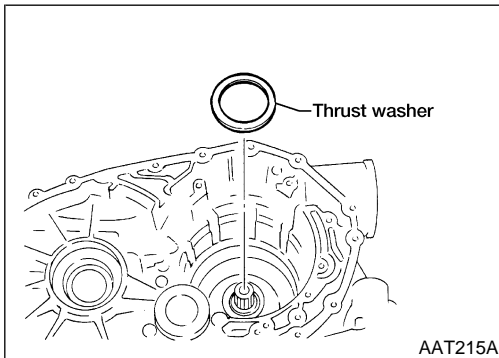
37. Remove needle bearing from rear internal gear.

- Check needle bearing for damage or wear.

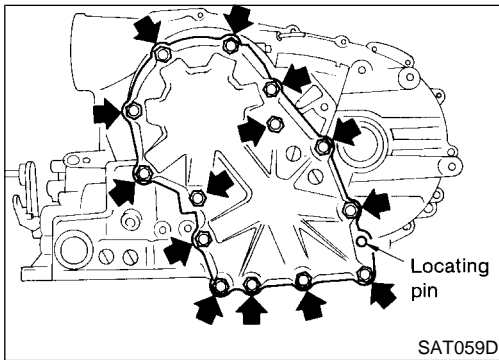
# DISASSEMBLY



38. Remove forward clutch assembly from transmission case.

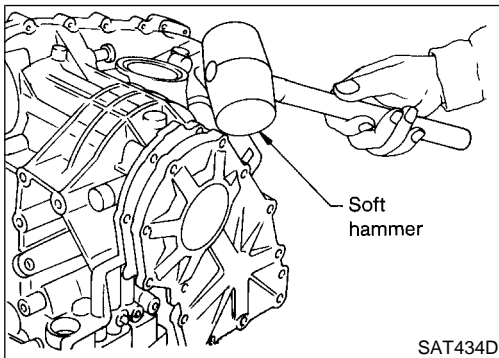


39. Remove thrust washer from transmission case.



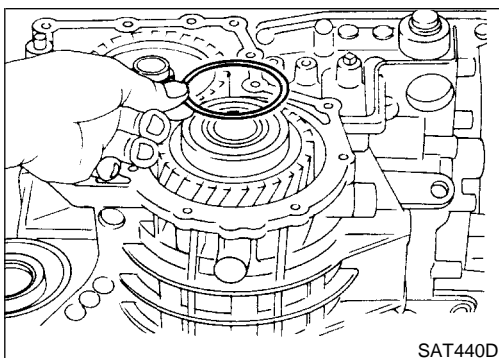
40. Remove output shaft assembly according to the following procedures.

a. Remove side cover bolts.



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

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



c. Remove adjusting shim.

GI

MA

EM

LC

EC

FE

CL

MT

**AT**

AX

SU

BR

ST

RS

BT

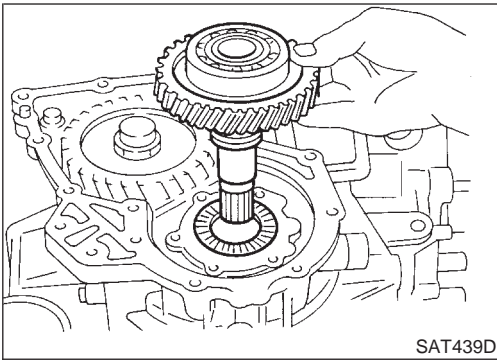
HA

SC

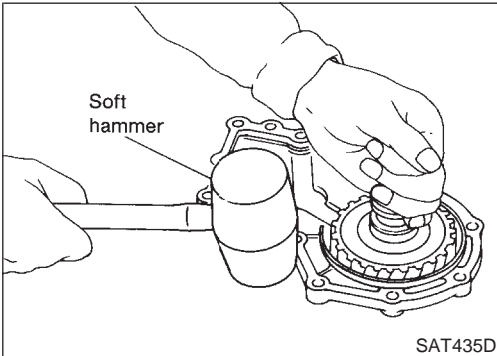
EL

IDX

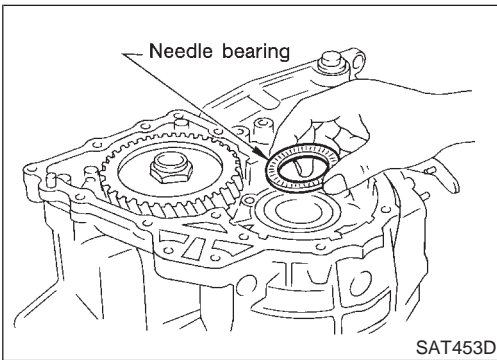
# DISASSEMBLY



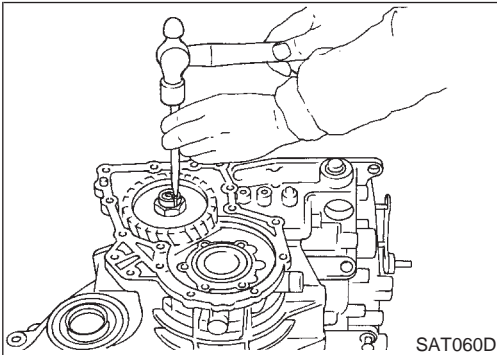
d. Remove output shaft assembly.



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

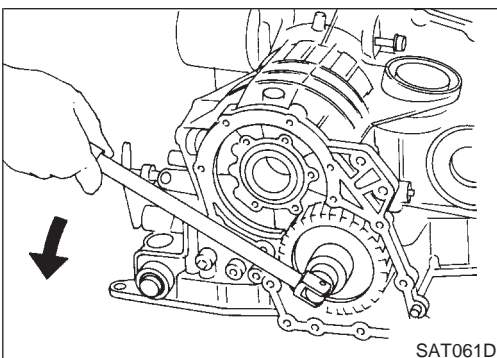


e. Remove needle bearing.



41. Disassemble reduction pinion gear according to the following procedures.

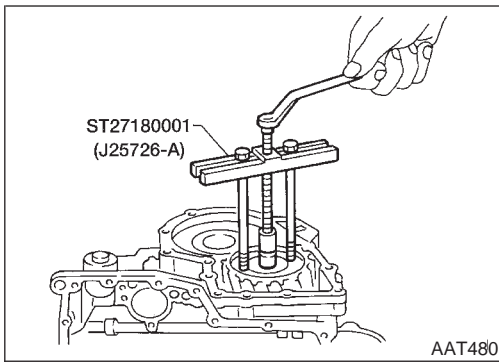
- a. Set manual shaft to position "P" to fix idler gear.
- b. Unlock idler gear lock nut using a pin punch.



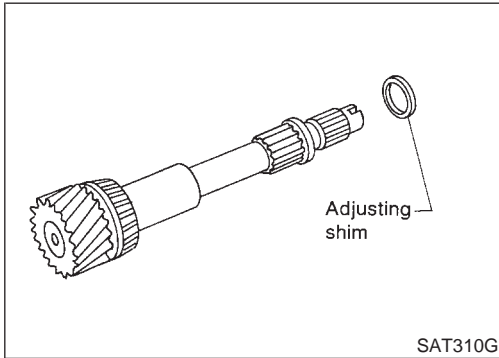
c. Remove idler gear lock nut.

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

# DISASSEMBLY

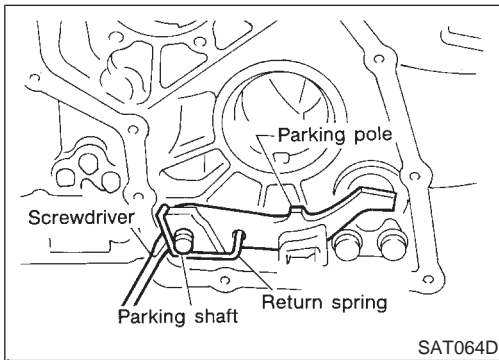


d. Remove idler gear with puller.

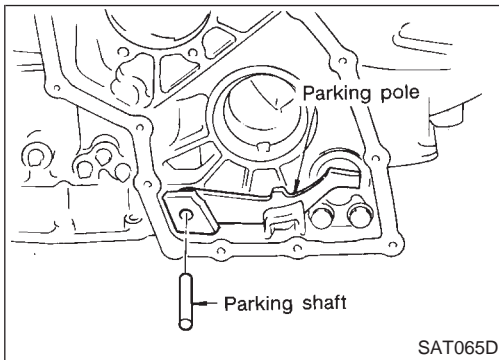


e. Remove reduction pinion gear.

f. Remove adjusting shim from reduction pinion gear.

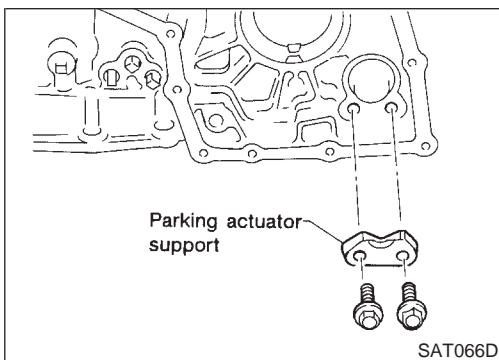


42. Remove return spring from parking shaft using a screwdriver.



43. Draw out parking shaft and remove parking pole from transmission case.

44. Check parking pole and shaft for damage or wear.



45. Remove parking actuator support from transmission case.

- Check parking actuator support for damage or wear.

GI

MA

EM

LC

EC

FE

CL

MT

AT

AX

SU

BR

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RS

BT

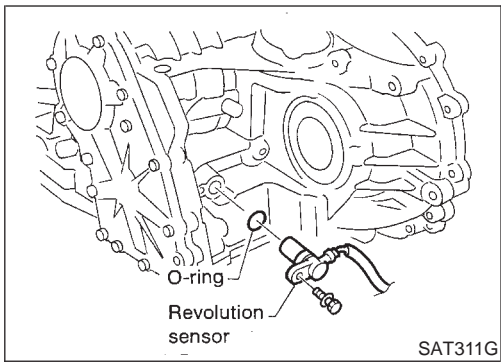
HA

SC

EL

IDX

## DISASSEMBLY

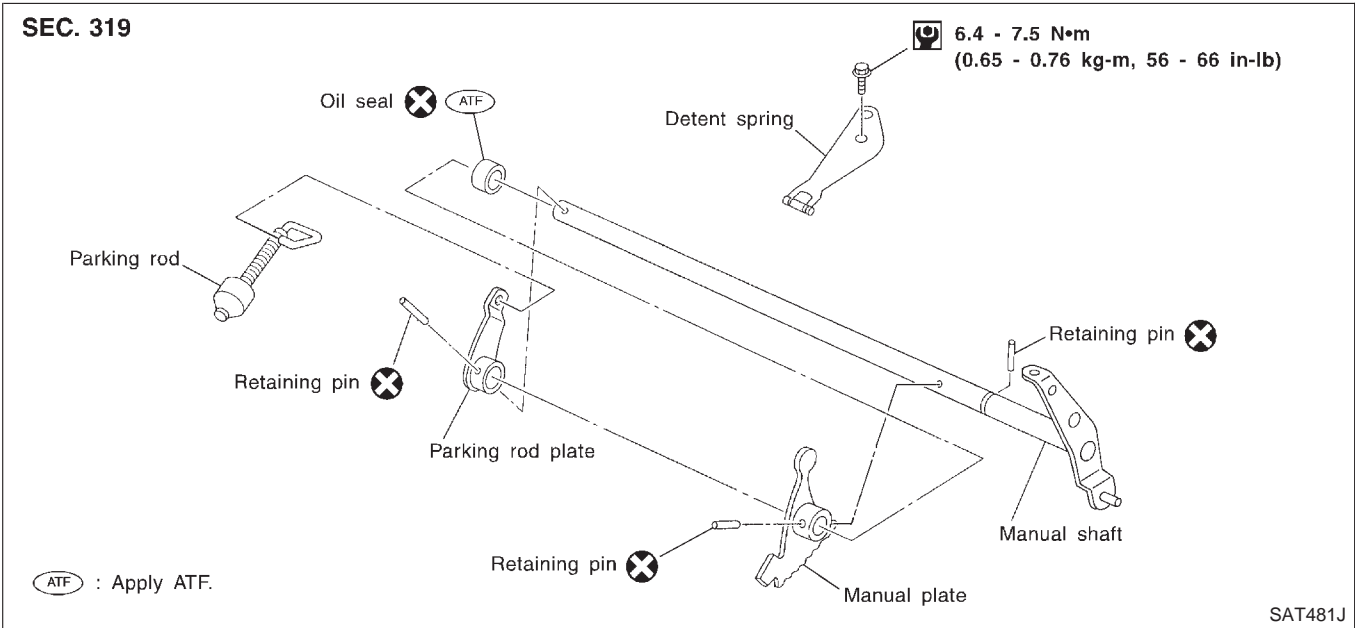


46. Remove revolution sensor from transmission case.

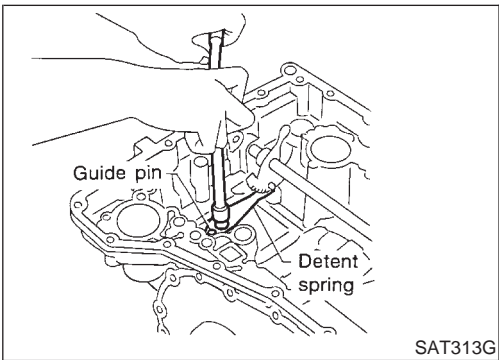


Manual Shaft  
COMPONENTS

NCA70121



GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT

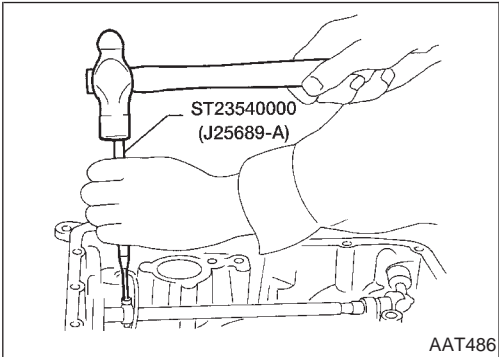


**REMOVAL**

NCA70122

1. Remove detent spring from transmission case.

AT



2. Drive out manual plate retaining pin.

AX

SU

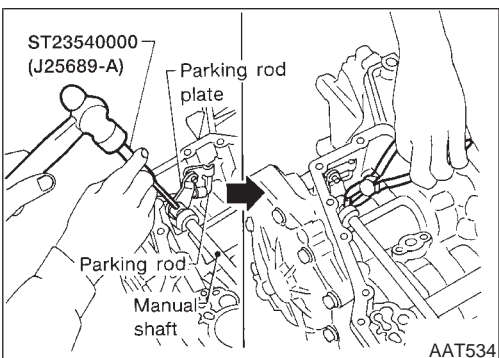
BR

ST

RS

BT

HA



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

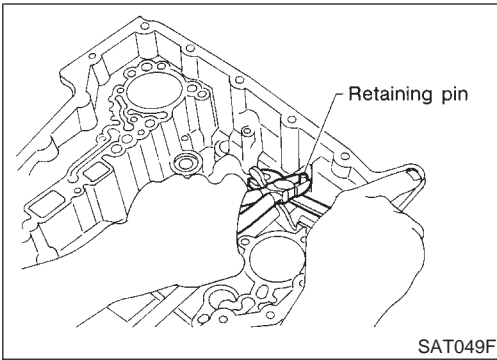
SC

EL

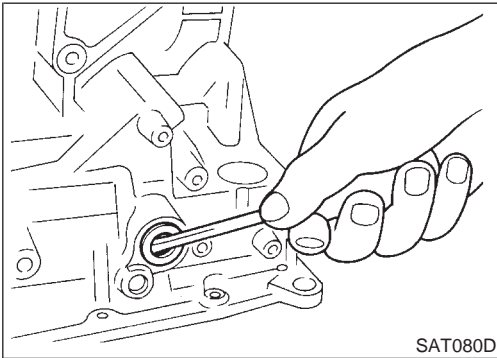
IDX

# REPAIR FOR COMPONENT PARTS

## Manual Shaft (Cont'd)



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

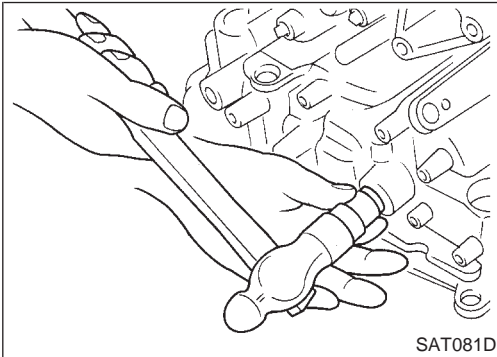


8. Remove manual shaft oil seal.

### INSPECTION

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

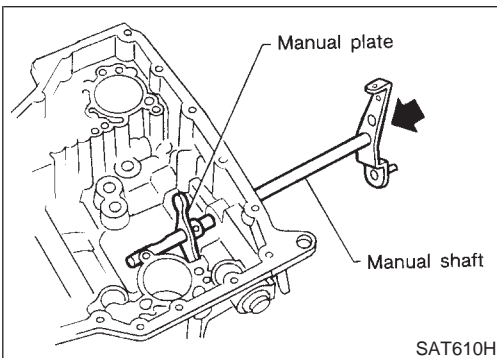
NCAT0123



### INSTALLATION

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

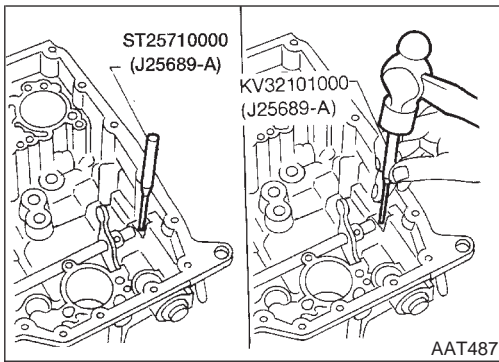
NCAT0124



2. Install manual shaft and manual plate.

# REPAIR FOR COMPONENT PARTS

Manual Shaft (Cont'd)



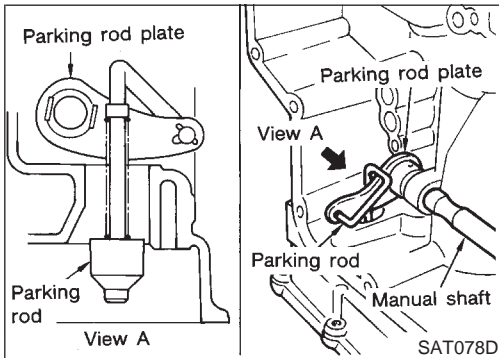
3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin.

GI

MA

EM

LC



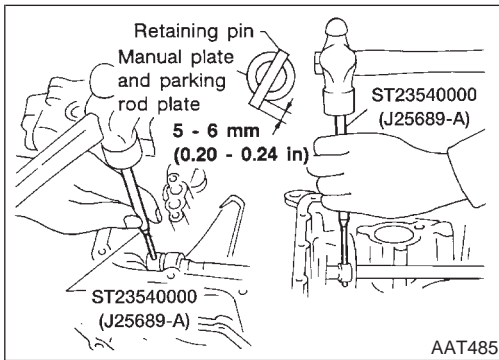
5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft.

EC

FE

CL

MT



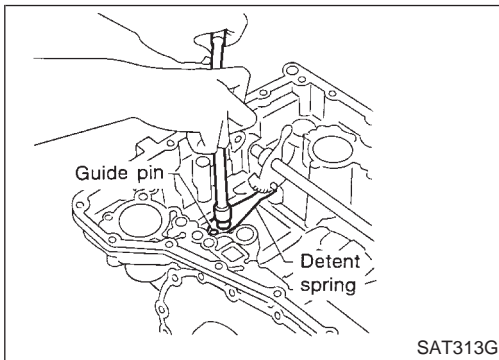
7. Drive in manual plate retaining pin and parking rod plate retaining pin.

AT

AX

SU

BR



8. Install detent spring.

ST

RS

BT

HA

SC

EL

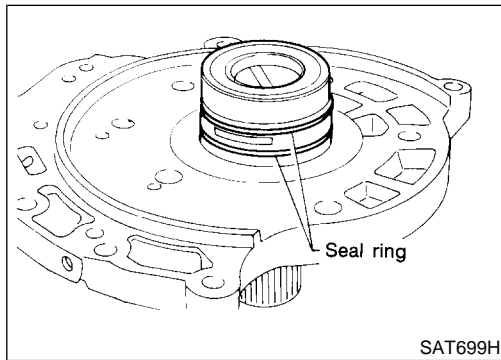
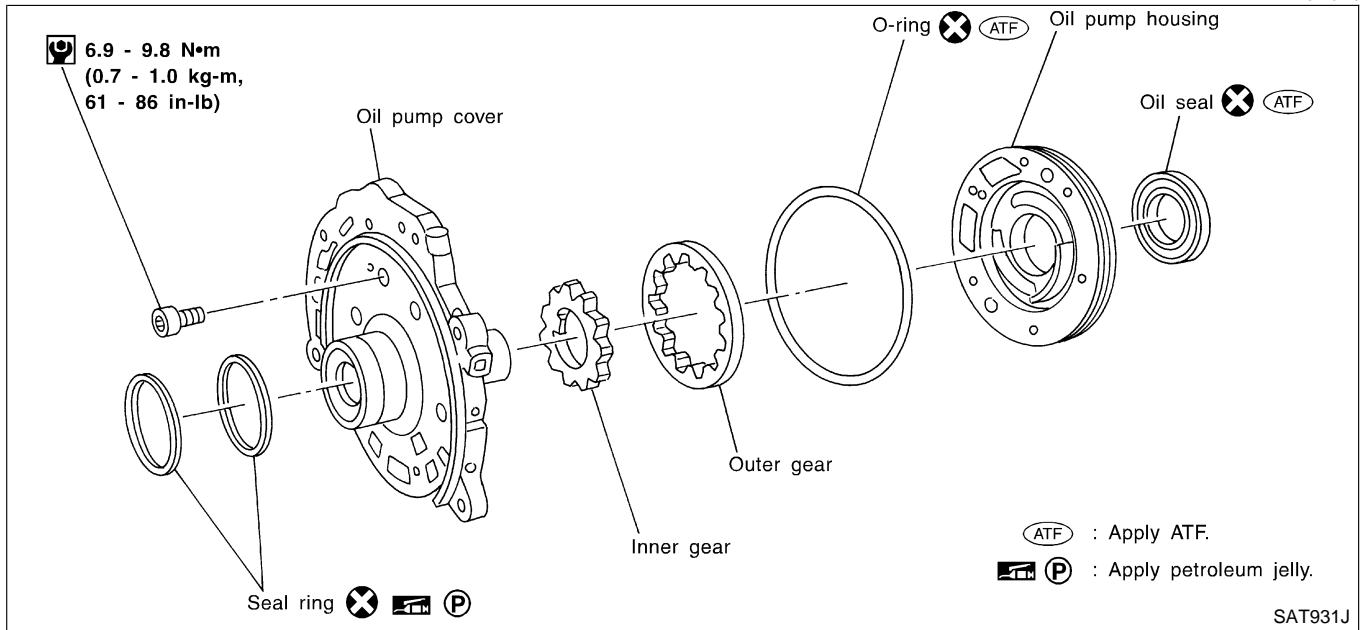
IDX

# REPAIR FOR COMPONENT PARTS

Oil Pump

## Oil Pump COMPONENTS

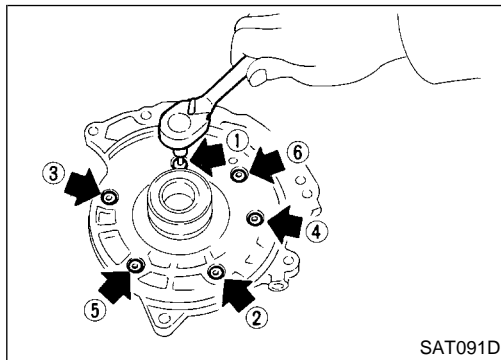
NCAT0125



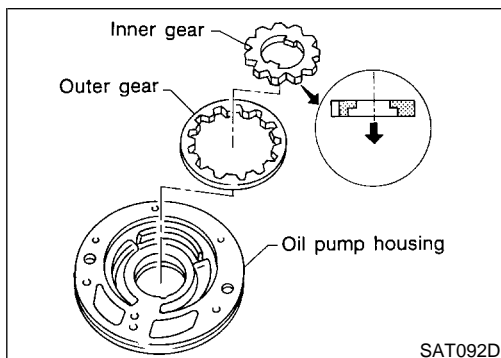
### DISASSEMBLY

NCAT0126

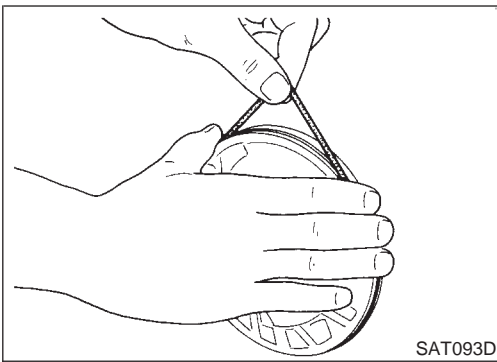
1. Remove seal rings.



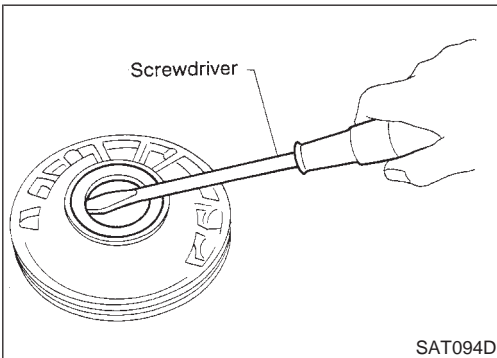
2. Loosen bolts in numerical order and remove oil pump cover.



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



4. Remove O-ring from oil pump housing.



5. Remove oil pump housing oil seal.

GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT

## INSPECTION

### Oil Pump Housing, Oil Pump Cover, Inner Gear and Outer Gear

NCAT0127

AT

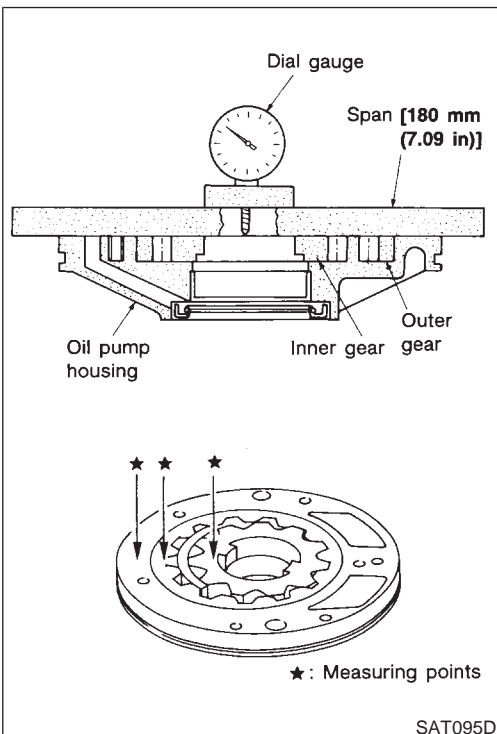
- Check for wear or damage.

NCAT0127S01

AX

SU

BR



## Side Clearances

NCAT0127S02

ST

- Measure side clearance of inner and outer gears in at least four places around each outside edge. Maximum measured values should be within specified range.

### Standard clearance:

**0.02 - 0.04 mm (0.0008 - 0.0016 in)**

RS

- If clearance is less than standard, select inner and outer gear as a set so that clearance is within specifications.

### Inner and outer gear:

**Refer to SDS, AT-392.**

BT

HA

- If clearance is more than standard, replace whole oil pump assembly except oil pump cover.

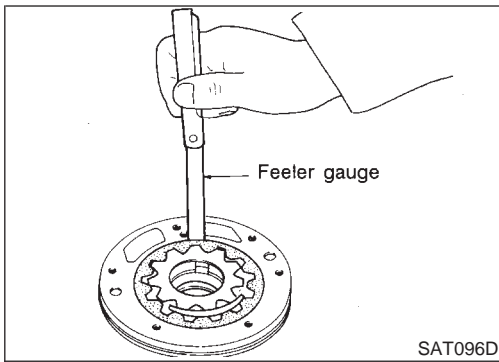
SC

EL

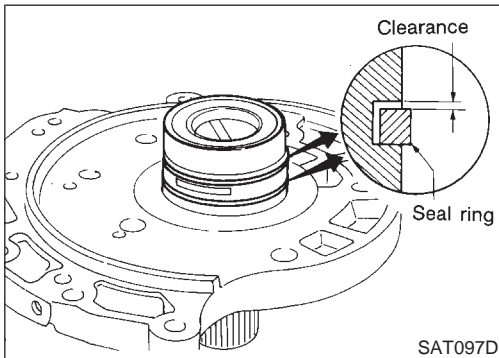
IDX

# REPAIR FOR COMPONENT PARTS

## Oil Pump (Cont'd)



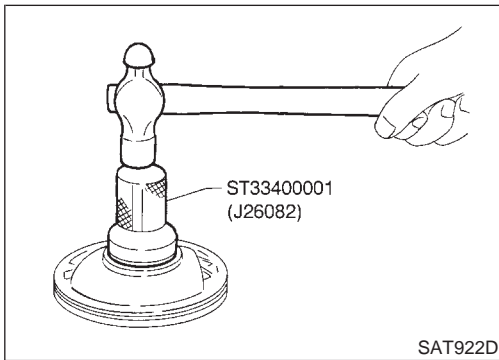
- Measure clearance between outer gear and oil pump housing.  
**Standard clearance:**  
**0.08 - 0.15 mm (0.0031 - 0.0059 in)**  
**Allowable limit:**  
**0.15 mm (0.0059 in)**
- If not within allowable limit, replace whole oil pump assembly except oil pump cover.



### Side Ring Clearance

NCAT0127S03

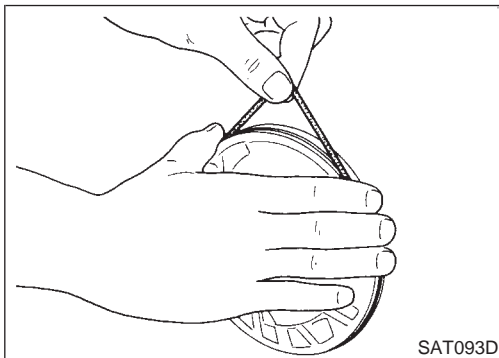
- Install new seal rings onto oil pump cover.
- Measure clearance between seal ring and ring groove.  
**Standard clearance:**  
**0.1 - 0.25 mm (0.0039 - 0.0098 in)**  
**Allowable limit:**  
**0.25 mm (0.0098 in)**
- If not within allowable limit, replace oil pump cover assembly.



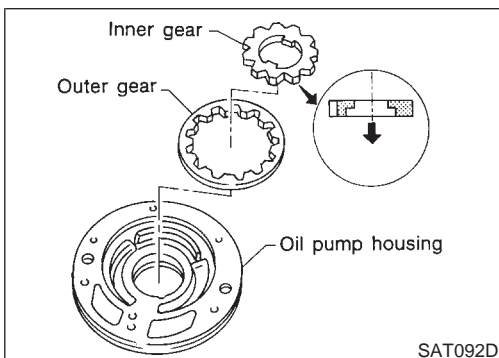
### ASSEMBLY

NCAT0128

1. Install oil seal on oil pump housing.



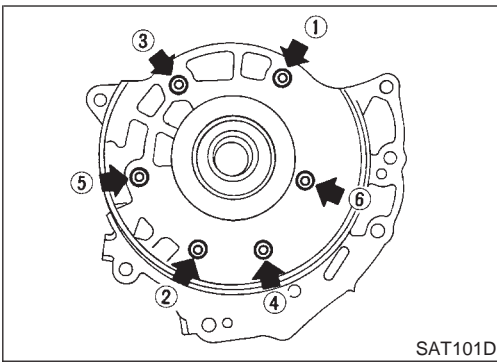
2. Install O-ring on oil pump housing.
  - **Apply ATF to O-ring.**



3. Install inner and outer gears on oil pump housing.
  - **Take care with the direction of the inner gear.**

# REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)



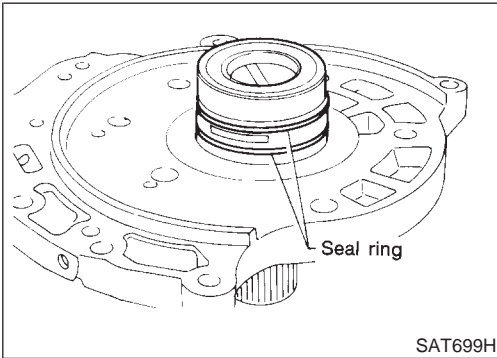
4. Install oil pump cover on oil pump housing.
  - a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly on oil pump housing assembly, then remove masking tape.
  - b. Tighten bolts in numerical order.

GI

MA

EM

LC



5. Install new seal rings carefully after packing ring groove with petroleum jelly.
  - **Do not spread gap of seal ring excessively while installing. It may deform the ring.**

EC

FE

CL

MT

**AT**

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX





# REPAIR FOR COMPONENT PARTS


Control Valve Assembly (Cont'd)

## DISASSEMBLY

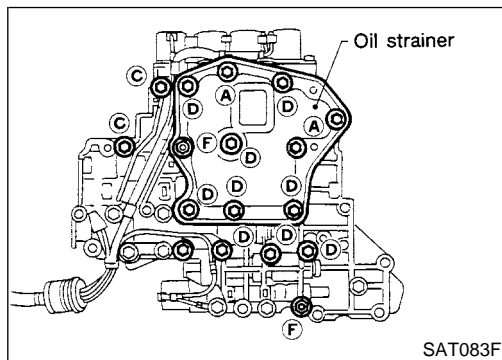
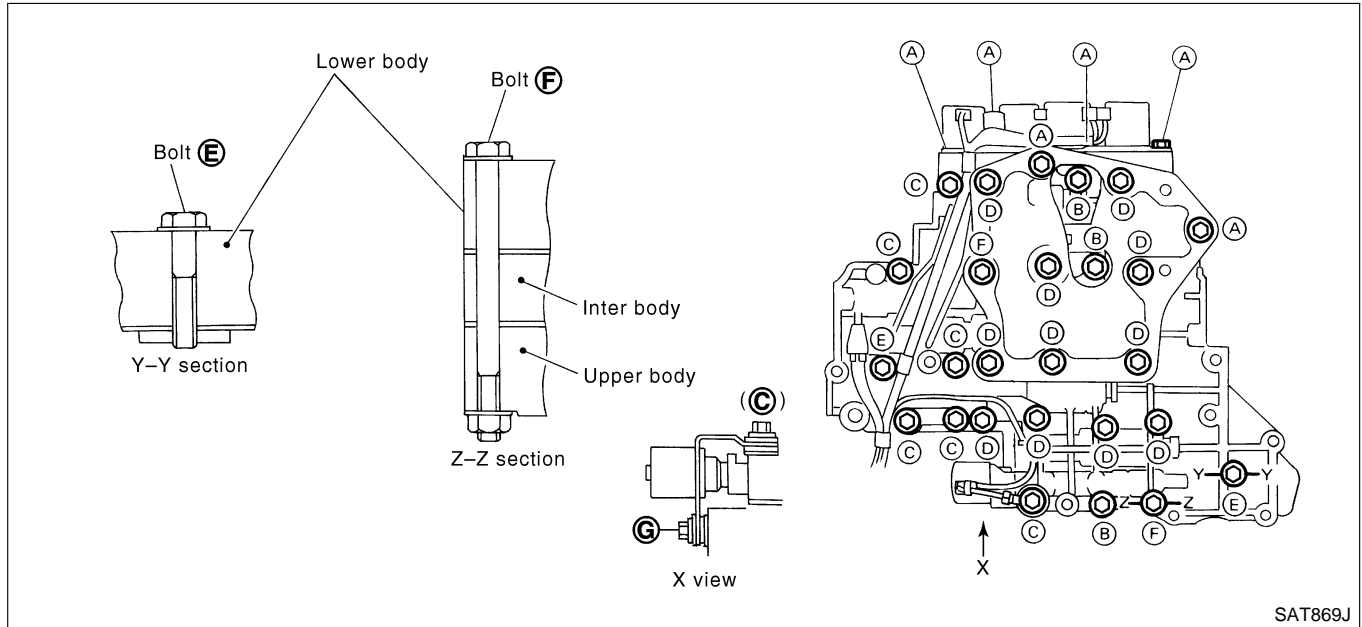
=NCAT0130

- Disassemble upper, inter and lower bodies.

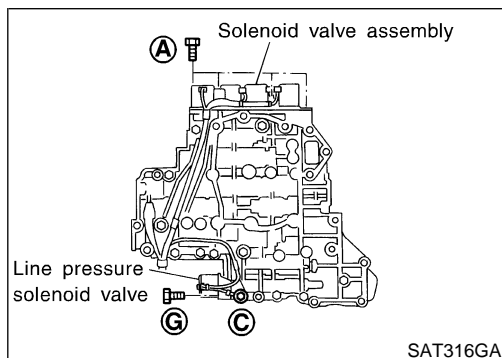
### Bolt length, number and location:

Bolt symbol	A	B	C	D	E	F	G
Bolt length "ℓ" 	13.5 mm (0.531 in)	58.0 mm (2.283 in)	40.0 mm (1.575 in)	66.0 mm (2.598 in)	33.0 mm (1.299 in)	78.0 mm (3.071 in)	18.0 mm (0.709 in)
Number of bolts	6	3	6	11	2	2	1

F: Reamer bolt with nut



- Remove bolts A, D and F, and remove oil strainer from control valve assembly.

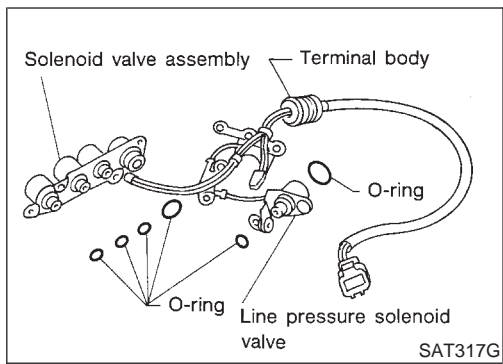


- Remove solenoid valve assembly and line pressure solenoid valve from control valve assembly.
  - Be careful not to lose the line pressure solenoid valve spring.

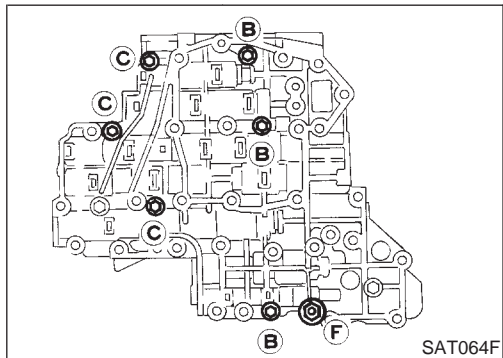
GI  
MA  
EM  
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AT  
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SU  
BR  
ST  
RS  
BT  
HA  
SC  
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IDX

# REPAIR FOR COMPONENT PARTS

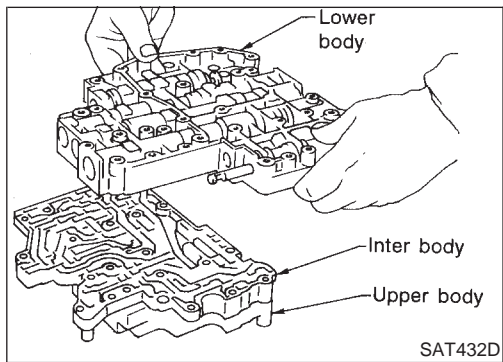
## Control Valve Assembly (Cont'd)



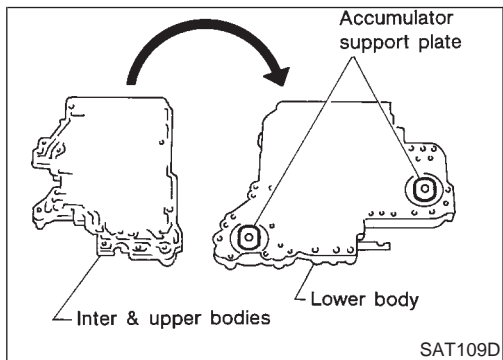
3. Remove O-rings from solenoid valves and terminal body.



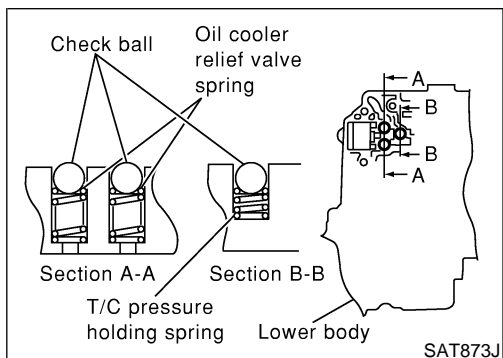
4. Place upper body facedown, and remove bolts B, C and F.



5. Remove lower body from inter body.



6. Turn over lower body, and accumulator support plates.



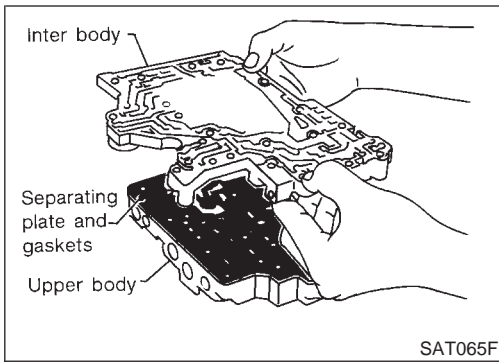
7. Remove bolts E, separating plate and separating gaskets from lower body.

8. Remove check balls, oil cooler relief valve springs and T/C pressure holding spring from lower body.

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

# REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)



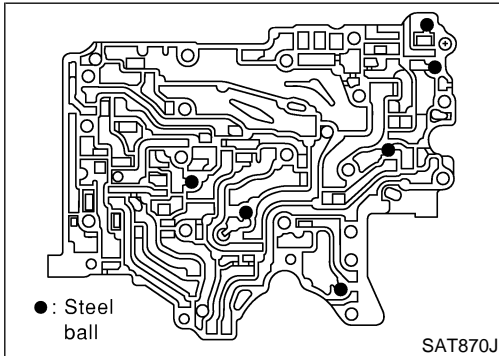
9. Remove inter body from upper body.
10. Remove pilot filter, separating plate and gaskets from upper body.

GI

MA

EM

LC



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

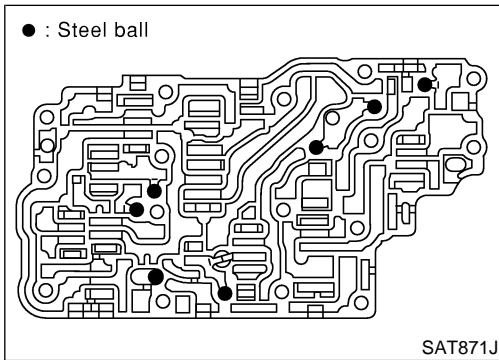
- **Be careful not to lose steel balls.**

EC

FE

CL

MT



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

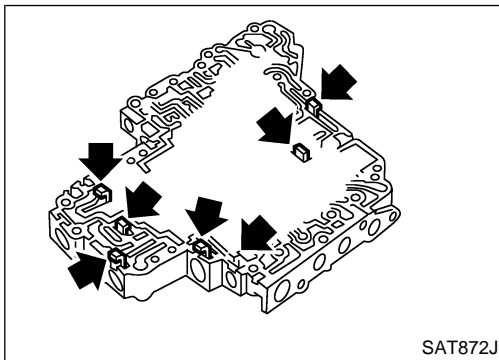
- **Be careful not to lose steel balls.**

AT

AX

SU

BR



## INSPECTION Lower and Upper Bodies

NCAT0131

ST

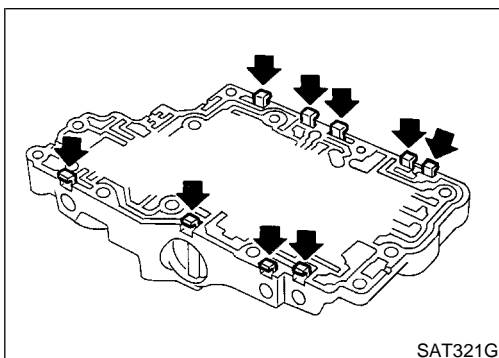
NCAT0131S01

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

RS

BT

HA



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

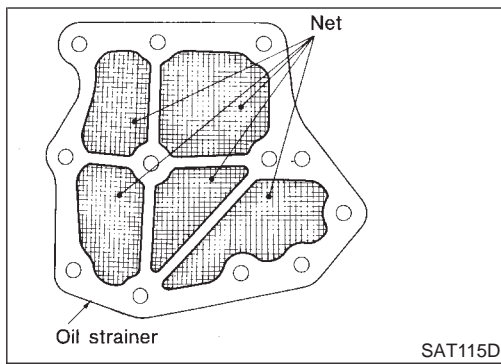
SC

EL

IDX

# REPAIR FOR COMPONENT PARTS

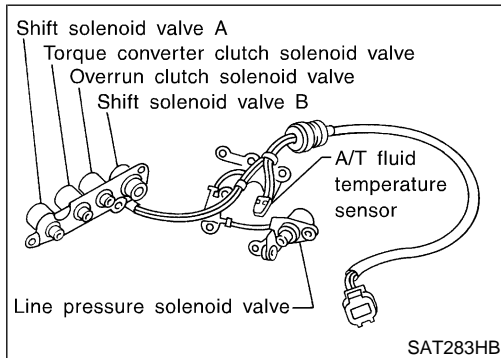
Control Valve Assembly (Cont'd)



## Oil Strainer

NCAT0131S02

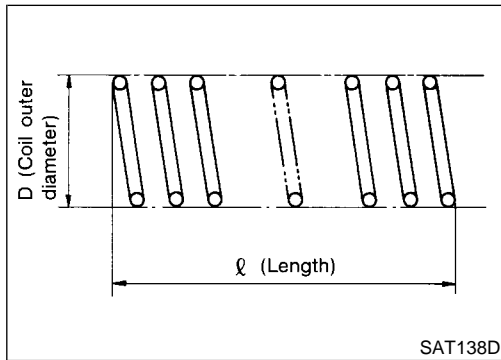
- Check wire netting of oil strainer for damage.



## Shift Solenoid Valves A and B, Line Pressure Solenoid valve, Torque Converter Clutch Solenoid Valve and Overrun Clutch Solenoid Valve

NCAT0131S03

- Refer to "Resistance Check", AT-156, 162 and 207.



## Oil Cooler Relief Valve Spring

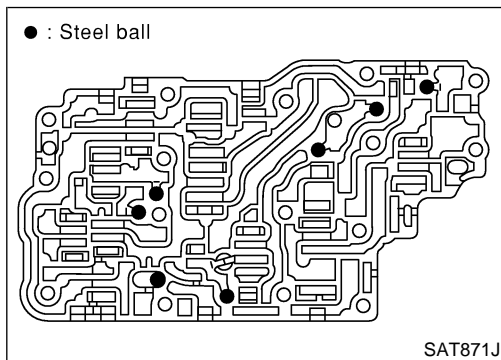
NCAT0131S04

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

### Inspection standard:

Unit: mm (in)

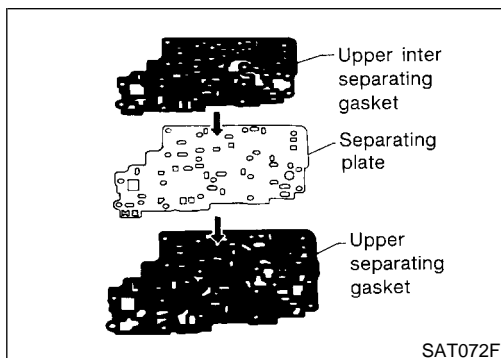
Part No.	$\ell$	D
31872 31X00	17.0 (0.669)	8.0 (0.315)



## ASSEMBLY

NCAT0132

1. Install upper, inter and lower body.
  - a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

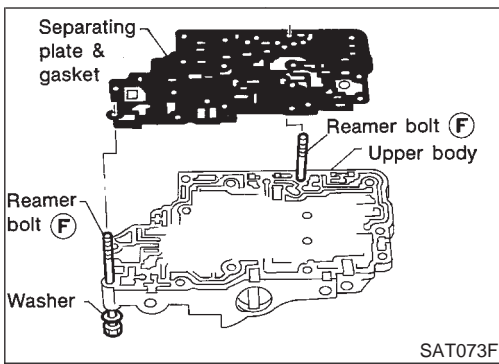


- b. Install upper separating gasket, upper inter separating gasket and upper separating plate in order shown in illustration.

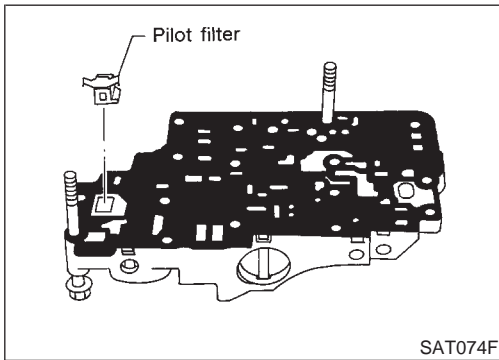
- **Always use new gaskets.**

# REPAIR FOR COMPONENT PARTS

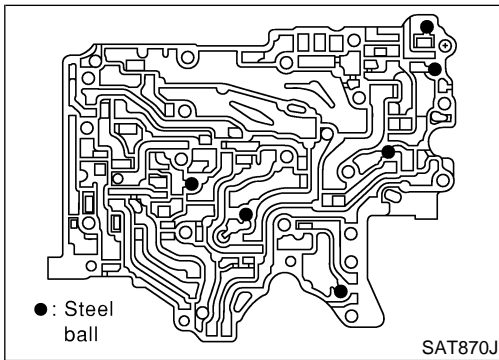
Control Valve Assembly (Cont'd)



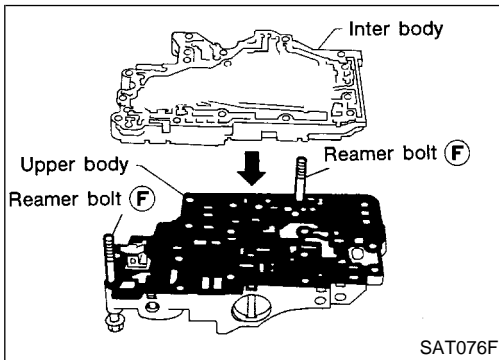
- c. Install reamer bolts **F** from bottom of upper body. Using reamer bolts as guides, install separating plate and gaskets as a seat.



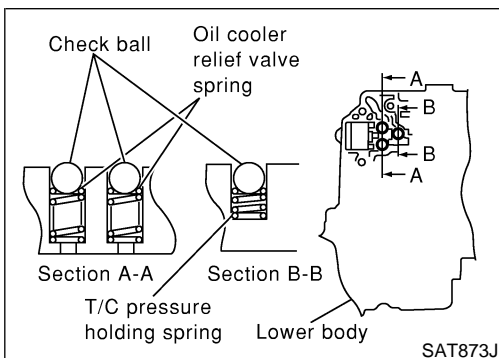
- d. Install pilot filter.



- e. Place inter body as shown in the illustration. Install steel balls in their proper positions.



- f. Install inter body on upper body using reamer bolts **F** as guides.  
 ● **Be careful not to dislocate or drop steel balls.**



- g. Install check balls, oil cooler relief valve springs and T/C pressure holding spring in their proper positions in lower body.

GI

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**AT**

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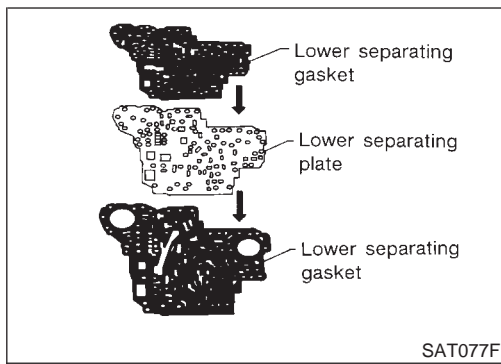
SC

EL

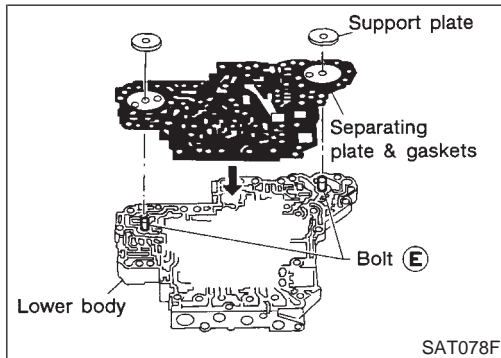
IDX

# REPAIR FOR COMPONENT PARTS

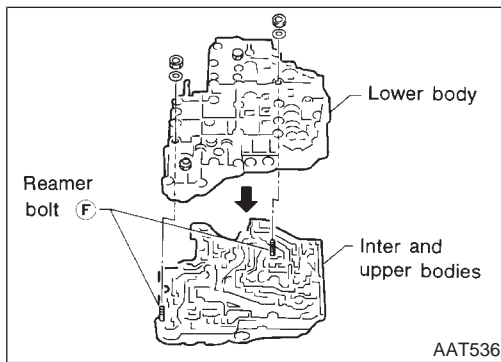
## Control Valve Assembly (Cont'd)



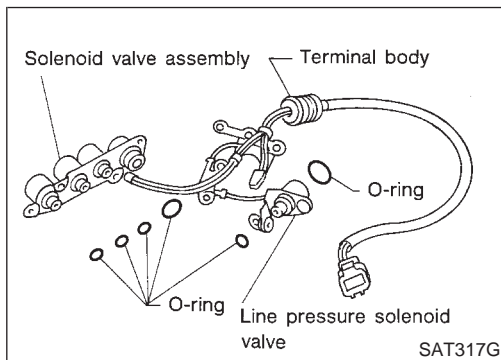
- h. Install lower separating gasket, inner separating gasket and lower separating plate in order shown in the illustration.



- i. Install bolts **E** from bottom of lower body. Using bolt **E** as guides, install separating plate and gaskets as a set.  
j. Install support plates on lower body.




- k. Install lower body on inter body using reamer bolts **F** as guides and tighten reamer bolts **F** slightly.



2. Install O-rings to solenoid valves and terminal body.  
● **Apply ATF to O-rings.**

3. Install and tighten bolts.

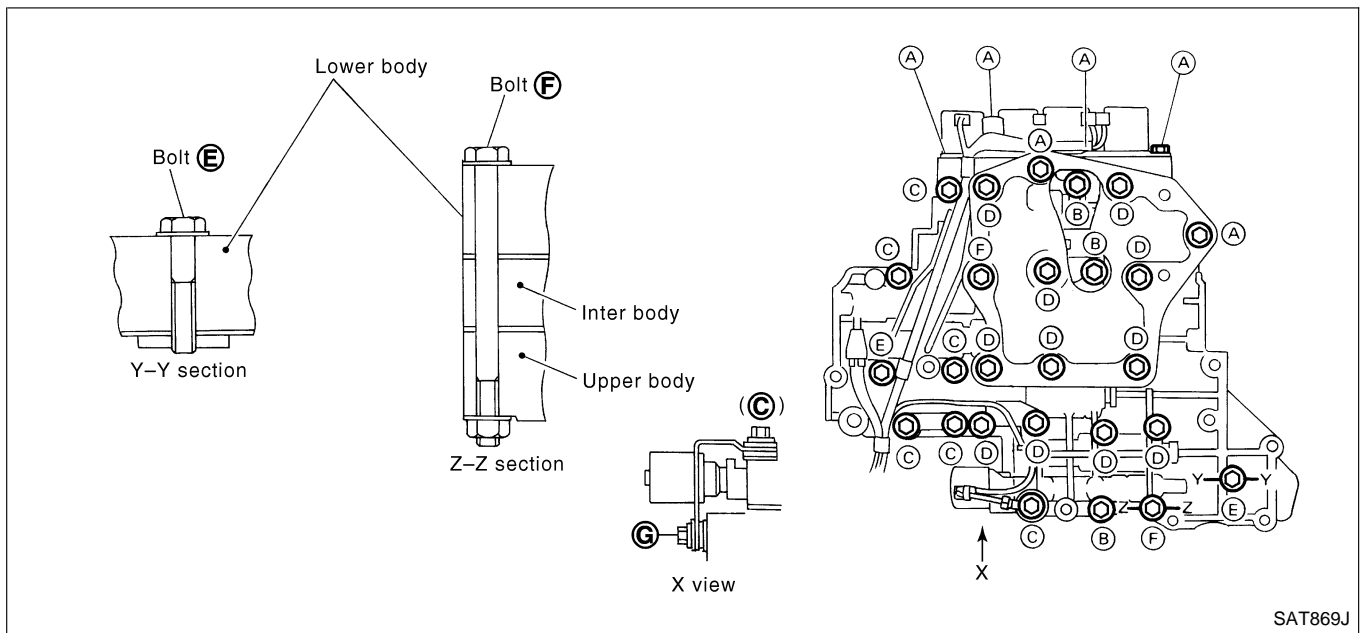
### Bolt length, number and location:

Bolt symbol	A	B	C	D	E	F	G
Bolt length "ℓ" 	13.5 mm (0.531 in)	58.0 mm (2.283 in)	44.0 mm (1.732 in)	66.0 mm (2.598 in)	33.0 mm (1.299 in)	78.0 mm (3.071 in)	18.0 mm (0.709 in)
Number of bolts	6	3	6	11	2	2	1

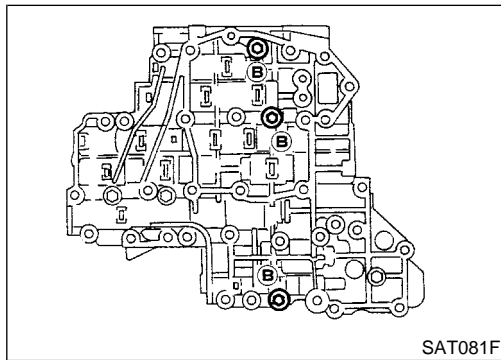
F: Reamer bolt with nut

# REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)



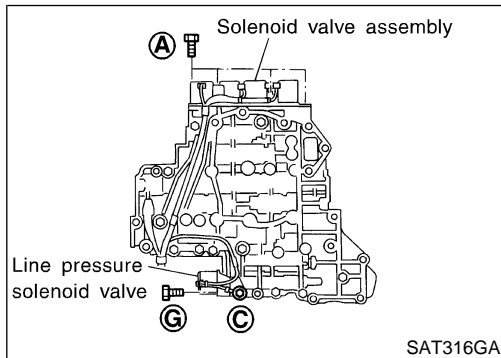
SAT869J



SAT081F

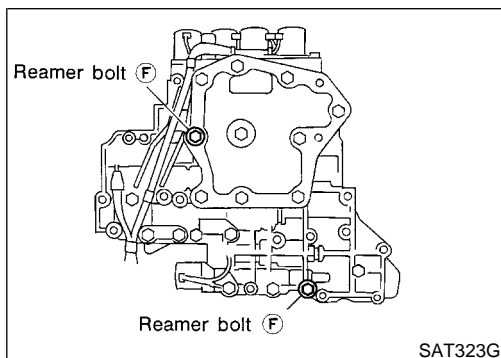
- a. Install and tighten bolts **B** to specified torque.

 : 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



SAT316GA

- b. Install solenoid valve assembly and line pressure solenoid valve to lower body.



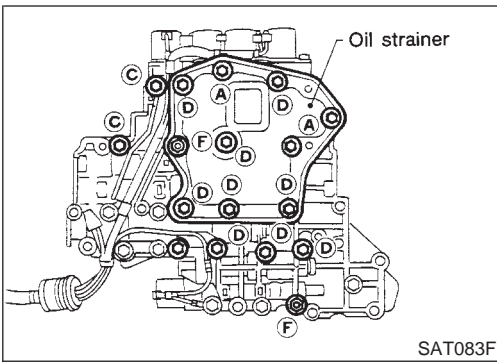
SAT323G

- c. Remove reamer bolts **F** and set oil strainer on control valve assembly.  
 d. Reinstall reamer bolts **F** from lower body side.

GI  
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 IDX

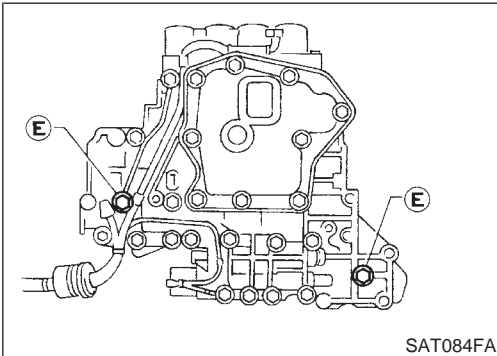
## REPAIR FOR COMPONENT PARTS

### Control Valve Assembly (Cont'd)



e. Tighten bolts **A**, **C**, **D** and **F** to specified torque.

 : 7 - 9 N·m (0.7 - 0.9 kg·m, 61 - 78 in·lb)



f. Tighten bolts **E** to specified torque.

 : 3.4 - 4.4 N·m (0.35 - 0.45 kg·m, 30.4 - 39.1 in·lb)



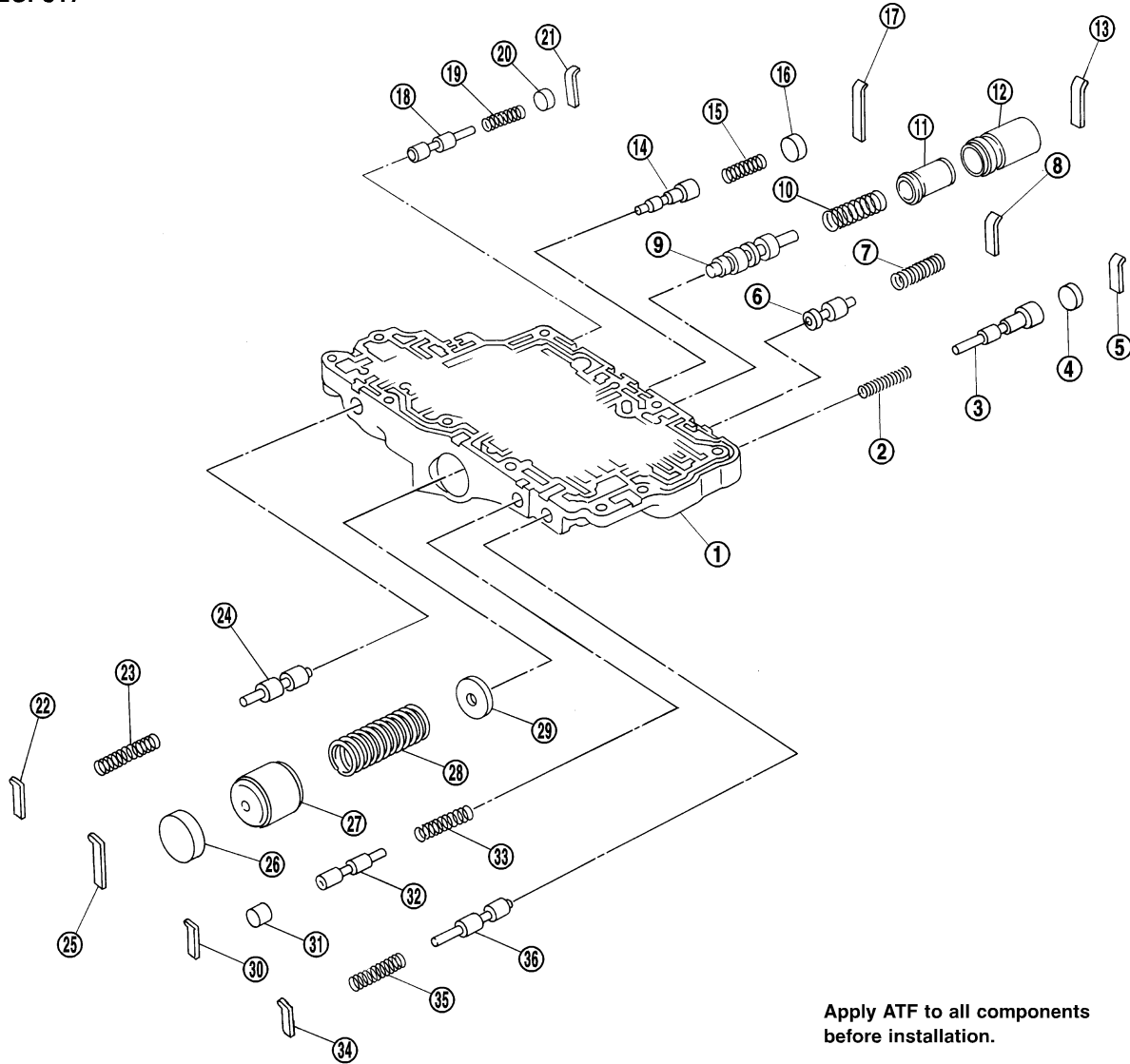
## Control Valve Upper Body

### COMPONENTS

Numbers preceding valve springs correspond with those shown in SDS table on page AT-390.

=NCAT0133

#### SEC. 317



Apply ATF to all components before installation.

- |  |                           |                                    |
|--|---------------------------|------------------------------------|
| 1. Control valve upper body              | 13. Retainer plate        | 25. Retainer plate                 |
| 2. Return spring                         | 14. 1-2 accumulator valve | 26. Plug                           |
| 3. Overrun clutch reducing valve         | 15. Return spring         | 27. 1-2 accumulator piston         |
| 4. Plug                                  | 16. Plug                  | 28. Return spring                  |
| 5. Retainer plate                        | 17. Retainer plate        | 29. 1-2 accumulator retainer plate |
| 6. Torque converter relief valve         | 18. Cooler check valve    | 30. Retainer plate                 |
| 7. Return spring                         | 19. Return spring         | 31. Plug                           |
| 8. Retainer plate                        | 20. Plug                  | 32. 1st reducing valve             |
| 9. Torque converter clutch control valve | 21. Retainer plate        | 33. Return spring                  |
| 10. Return spring                        | 22. Retainer plate        | 34. Retainer plate                 |
| 11. Plug                                 | 23. Return spring         | 35. Return spring                  |
| 12. Sleeve                               | 24. Pilot valve           | 36. 3-2 timing valve               |

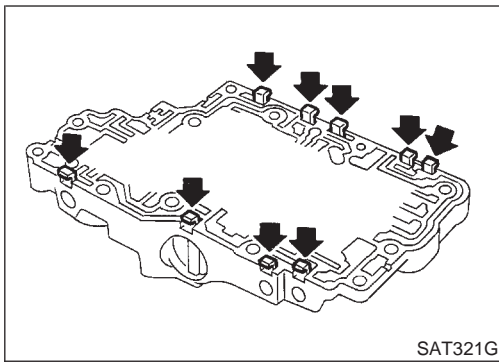
SAT863J

GI  
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# REPAIR FOR COMPONENT PARTS

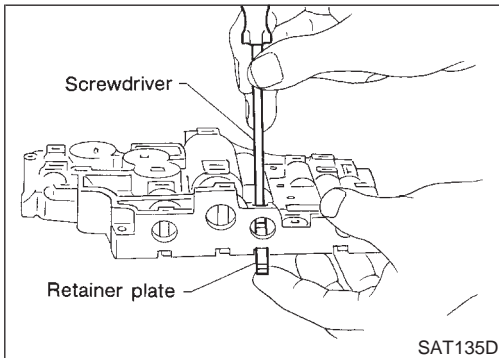
Control Valve Upper Body (Cont'd)

NCAT0134

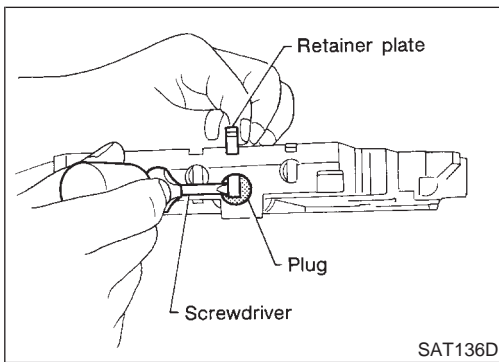


## DISASSEMBLY

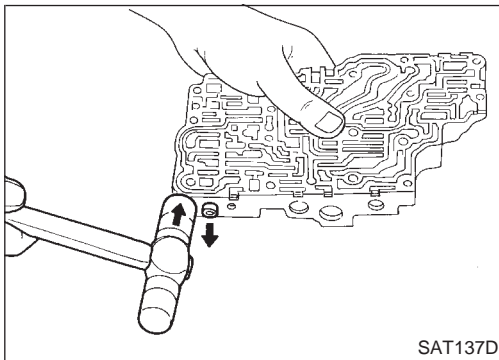
1. Remove valves at retainer plates.
  - Do not use a magnetic "hand".



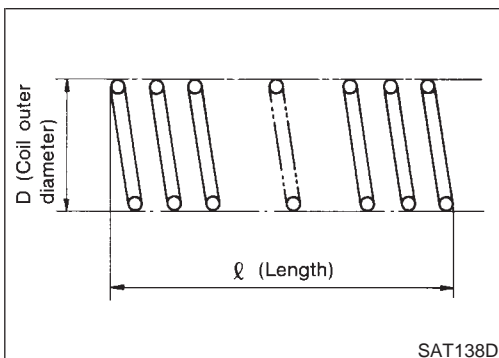
- a. Use a screwdriver to remove retainer plates.



- b. Remove retainer plates while holding spring, plugs or sleeves.
  - Remove plugs slowly to prevent internal parts from jumping out.



- c. Place mating surface of valve body face down, and remove internal parts.
  - If a valve is hard to remove, place valve body face down and lightly tap it with a soft hammer.
  - Be careful not to drop or damage valves and sleeves.



## INSPECTION

### Valve Spring

NCAT0135

NCAT0135S01

- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.

**Inspection standard:**

**Refer to SDS, AT-390.**

- Replace valve springs if deformed or fatigued.

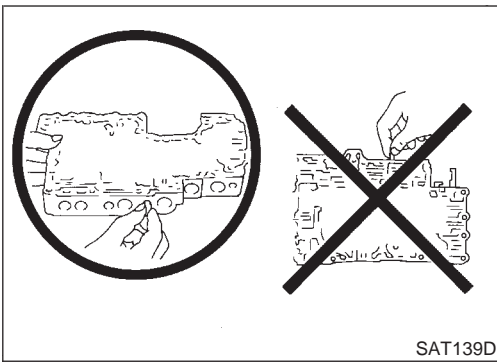
### Control Valves

NCAT0135S02

- Check sliding surfaces of valves, sleeves and plugs.

# REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)



## ASSEMBLY

NCA70136

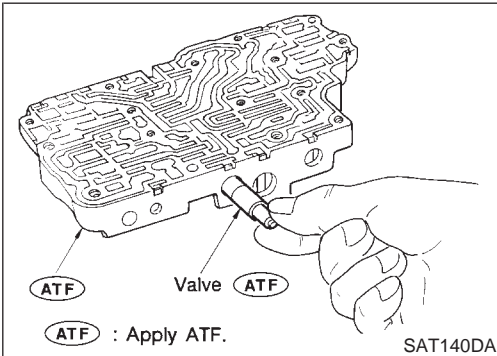
- Lay control valve body down when installing valves. Do not stand the control valve body upright.

GI

MA

EM

LC



1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.

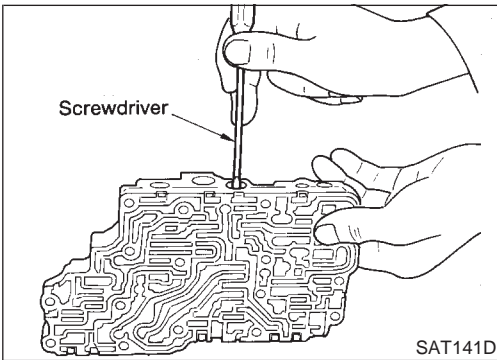
- Be careful not to scratch or damage valve body.

EC

FE

CL

MT



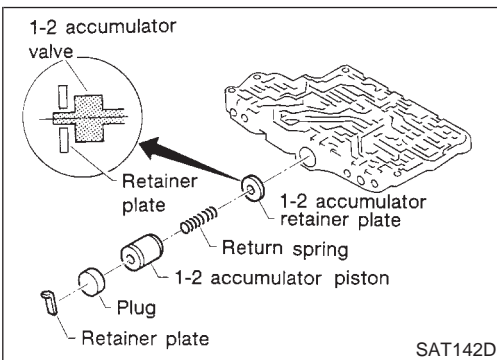
- Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.

AT

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## 1-2 Accumulator Valve

NCA70136S01

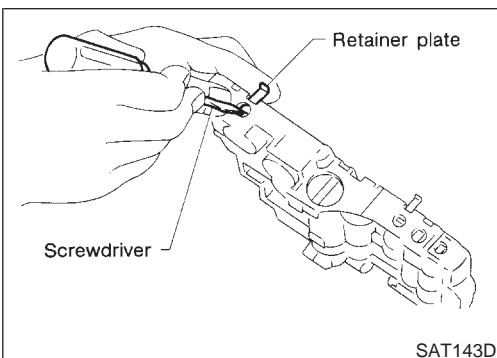
- Install 1-2 accumulator valve. Align 1-2 accumulator retainer plate from opposite side of control valve body.
- Install return spring, 1-2 accumulator piston and plug.

ST

RS

BT

HA



1. Install retainer plates.
- Install retainer plate while pushing plug or return spring.

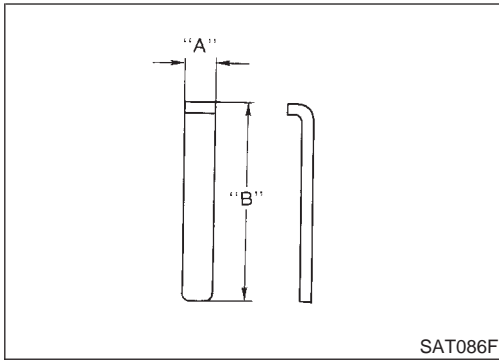
SC

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IDX

# REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)



## Retainer Plate (for control valve upper body)

NCAT0136S02

Refer to AT-321.

Unit: mm (in)

Name of valve and piston	No.	Length A	Length B
Pilot valve	22	6.0 (0.236)	21.5 (0.846)
1-2 accumulator valve	17		38.5 (1.516)
1-2 accumulator piston	25		21.5 (0.846)
1st reducing valve	30		24.0 (0.945)
Overrun clutch reducing valve	5		21.5 (0.846)
Torque converter relief valve	8		28.0 (1.102)
Torque converter clutch control valve	13		21.5 (0.846)
3-2 timing valve	34		24.0 (0.945)
Cooler check valve	21		

- Install proper retainer plates.

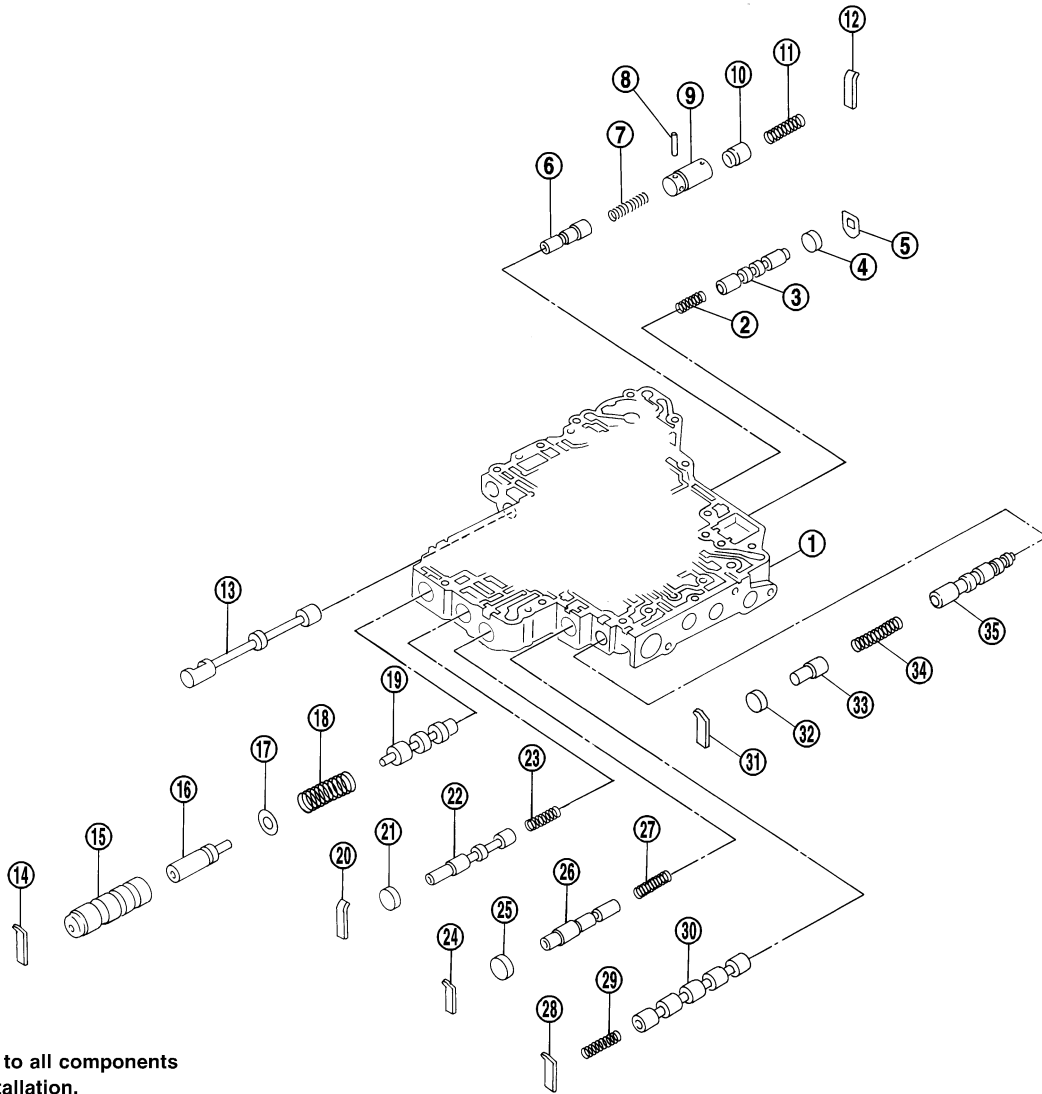
## Control Valve Lower Body

### COMPONENTS

Numbers preceding valve springs correspond with those shown in SDS table on page AT-390.

=NCAT0137

#### SEC. 317



Apply ATF to all components before installation.

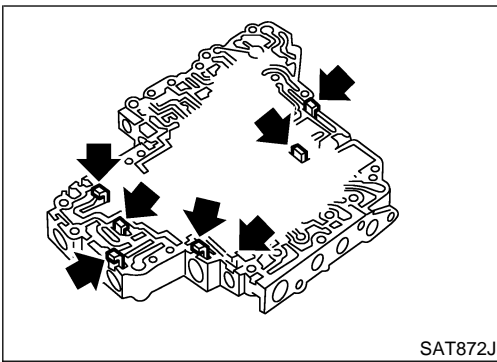
- |                             |                                  |                               |
|-----------------------------|----------------------------------|-------------------------------|
| 1. Control valve lower body | 13. Manual valve                 | 25. Plug                      |
| 2. Return spring            | 14. Retainer plate               | 26. Accumulator control valve |
| 3. Shift valve B            | 15. Sleeve                       | 27. Return spring             |
| 4. Plug                     | 16. Plug                         | 28. Retainer plate            |
| 5. Retainer plate           | 17. Spring seat                  | 29. Return spring             |
| 6. Pressure modifier valve  | 18. Return spring                | 30. Shift valve A             |
| 7. Return spring            | 19. Pressure regulator valve     | 31. Retainer plate            |
| 8. Parallel pin             | 20. Retainer plate               | 32. Plug                      |
| 9. Sleeve                   | 21. Plug                         | 33. Plug                      |
| 10. Piston                  | 22. Overrun clutch control valve | 34. Return spring             |
| 11. Return spring           | 23. Return spring                | 35. Shuttle control valve     |
| 12. Retainer plate          | 24. Retainer plate               |                               |

SAT864J

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# REPAIR FOR COMPONENT PARTS

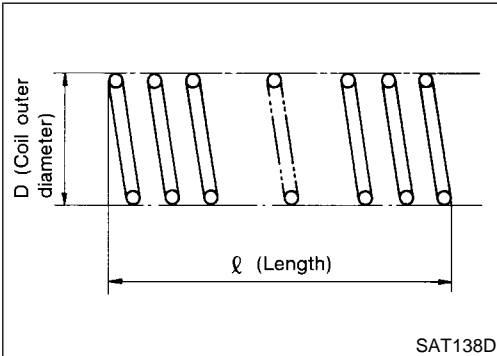
Control Valve Lower Body (Cont'd)



## DISASSEMBLY

Remove valves at retainer plate.  
For removal procedures, refer to AT-313.

NCAT0138



## INSPECTION

### Valve Springs

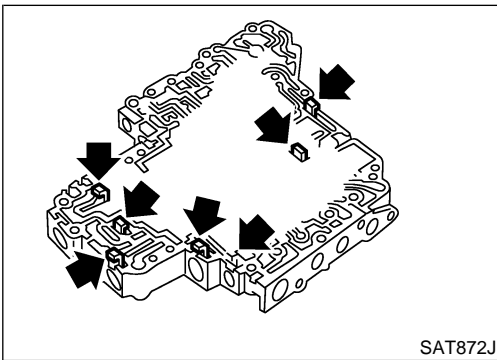
- Check each valve spring for damage or deformation. Also measure free length and outer diameter.

**Inspection standard:**  
**Refer to SDS, AT-390.**

- Replace valve springs if deformed or fatigued.

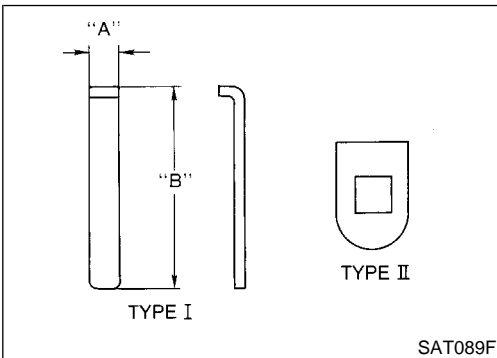
### Control Valves

- Check sliding surfaces of control valves, sleeves and plugs for damage.



## ASSEMBLY

- Install control valves.  
For installation procedures, refer to AT-390.



## Retainer Plate (for control valve lower body)

Refer to AT-325.

NCAT0140S01

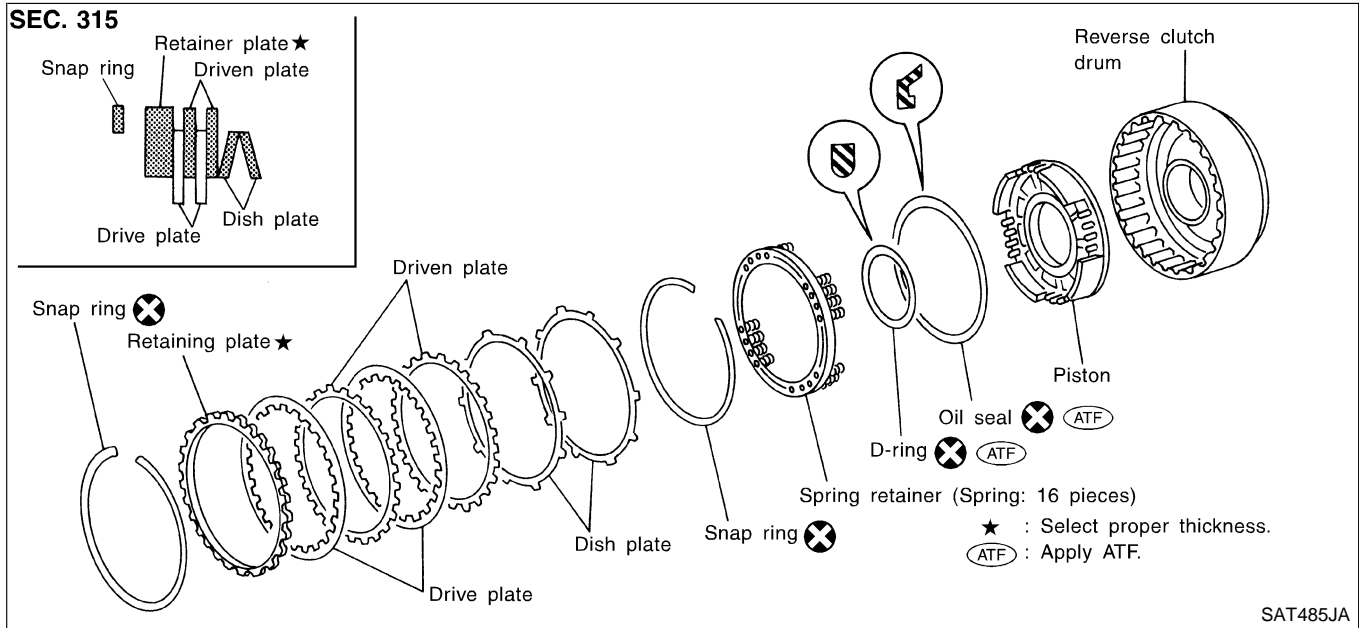
Unit: mm (in)

Name of control valve	No.	Length A	Length B	Type
Pressure regulator valve	14	6.0 (0.236)	28.0 (1.102)	I
Accumulator control valve	24			
Shift valve A	28			
Overrun clutch control valve	20			
Pressure modifier valve	12			
Shuttle control valve	31			
Shift valve B	5	—	—	II

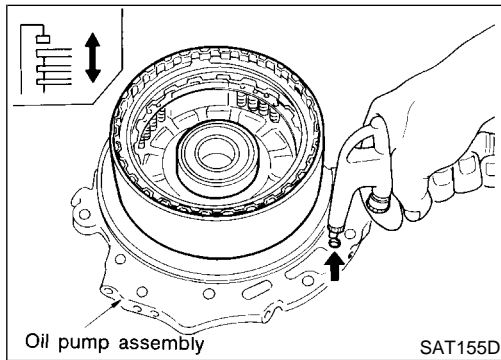
- Install proper retainer plates.

## Reverse Clutch COMPONENTS

=NCAT0141



GI  
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EM  
LC  
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CL  
MT



NCAT0142

### DISASSEMBLY

1. Check operation of reverse clutch.
  - a. Install seal ring onto drum support of oil pump cover and install reverse clutch assembly. Apply compressed air to oil hole.
  - b. Check to see that retaining plate moves to snap ring.
  - c. If retaining plate does not contact snap ring:
    - D-ring might be damaged.
    - Oil seal might be damaged.
    - Fluid might be leaking past piston check ball.
2. Remove snap ring.
3. Remove drive plates, driven plates, retaining plate, and dish plates.

AT

AX

SU

BR

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RS

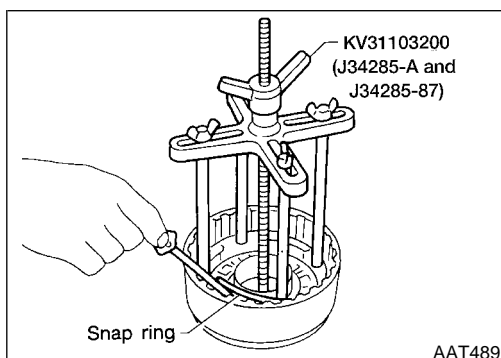
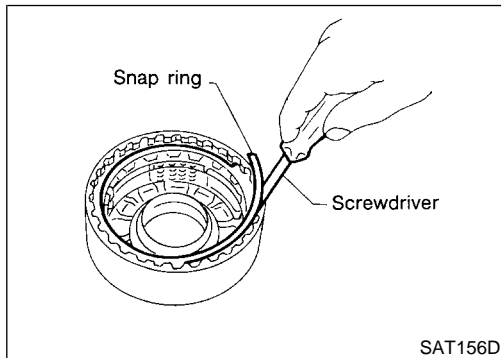
BT

HA

SC

EL

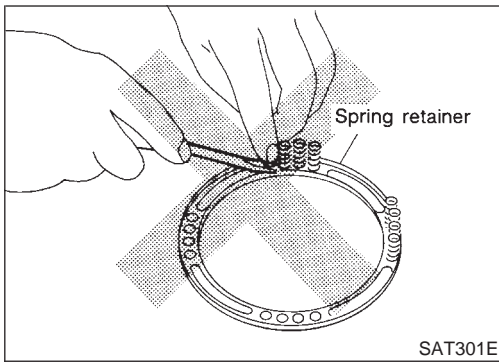
IDX



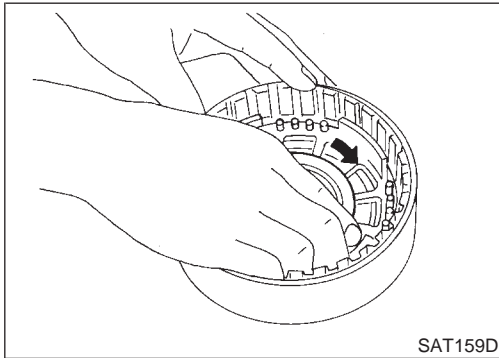
4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.
  - **Set Tool directly above springs.**
  - **Do not expand snap ring excessively.**
5. Remove spring retainer and return springs.

# REPAIR FOR COMPONENT PARTS

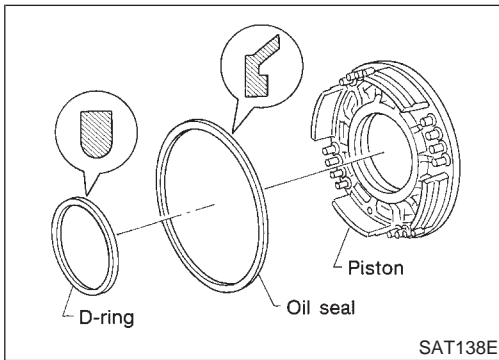
## Reverse Clutch (Cont'd)



- Do not remove return springs from spring retainer.



6. Remove piston from reverse clutch drum by turning it.

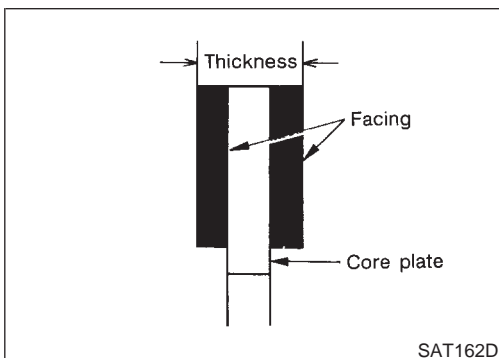


7. Remove D-ring and oil seal from piston.

## INSPECTION

### Reverse Clutch Snap Ring, Spring Retainer and Return Springs NCAT0143

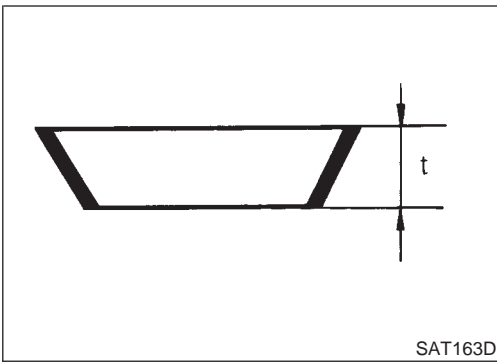
- Check for deformation, fatigue or damage. NCAT0143S01
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**



### Reverse Clutch Drive Plates NCAT0143S02

- Check facing for burns, cracks or damage. NCAT0143S02
- Measure thickness of facing.
  - Thickness of drive plate:**
  - Standard value: 2.0 mm (0.079 in)**
  - Wear limit: 1.8 mm (0.071 in)**
- If not within wear limit, replace.





## Reverse Clutch Dish Plates

NCAT0143S03

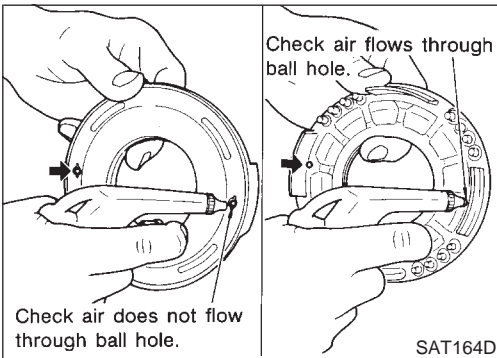
- Check for deformation or damage.
- Measure thickness of dish plate.  
**Thickness of dish plate "t": 2.8 mm (0.110 in)**
- If deformed or fatigued, replace.

GI

MA

EM

LC



## Reverse Clutch Piston

NCAT0143S04

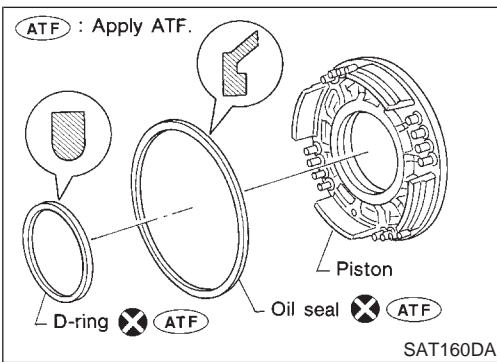
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure that there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure air leaks past ball.

EC

FE

CL

MT



## ASSEMBLY

NCAT0144

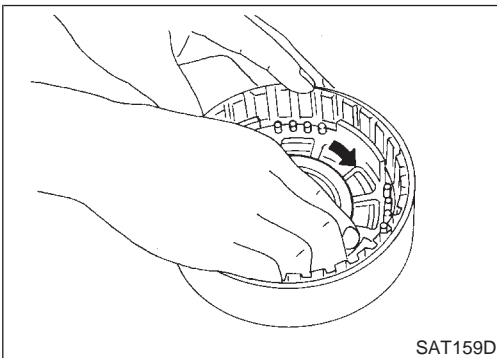
1. Install D-ring and oil seal on piston.
  - Take care with the direction of the oil seal.
  - Apply ATF to both parts.

AT

AX

SU

BR



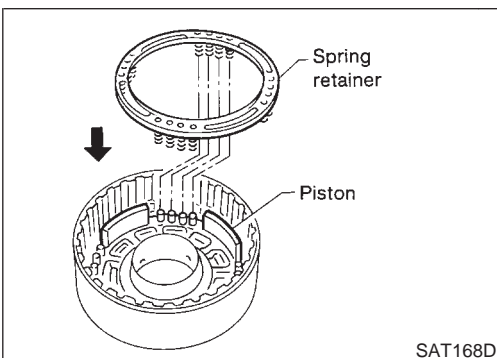
2. Install piston assembly by turning it slowly.
  - Apply ATF to inner surface of drum.

ST

RS

BT

HA



3. Install return springs and spring retainer on piston.

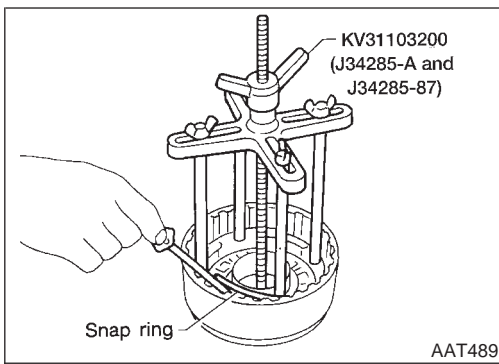
SC

EL

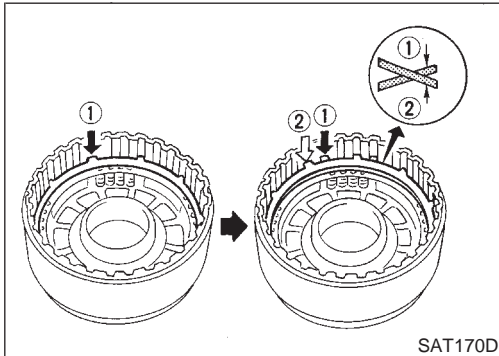
IDX

# REPAIR FOR COMPONENT PARTS

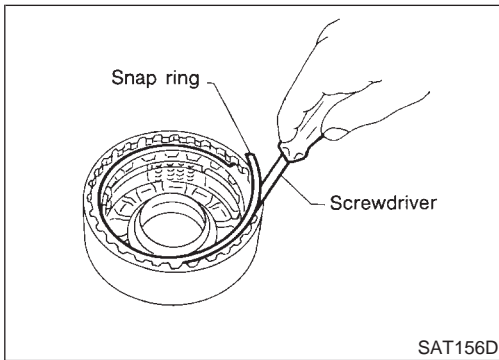
## Reverse Clutch (Cont'd)



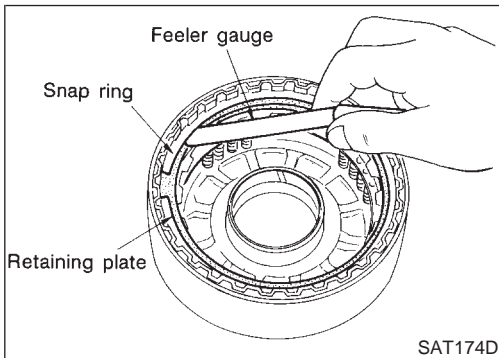
4. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly above return springs.**



5. Install drive plates, driven plates, retaining plate and dish plates.
- **Do not align the projections of any two dish plates.**
  - **Take care with the order and direction of plates.**



6. Install snap ring.



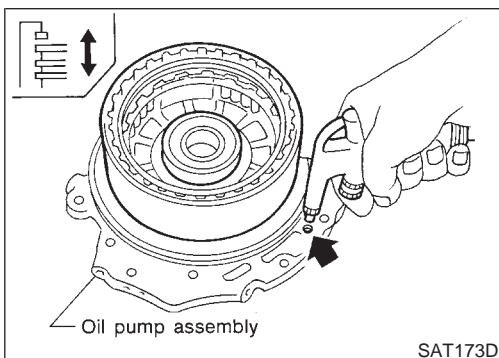
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

### **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-390.**



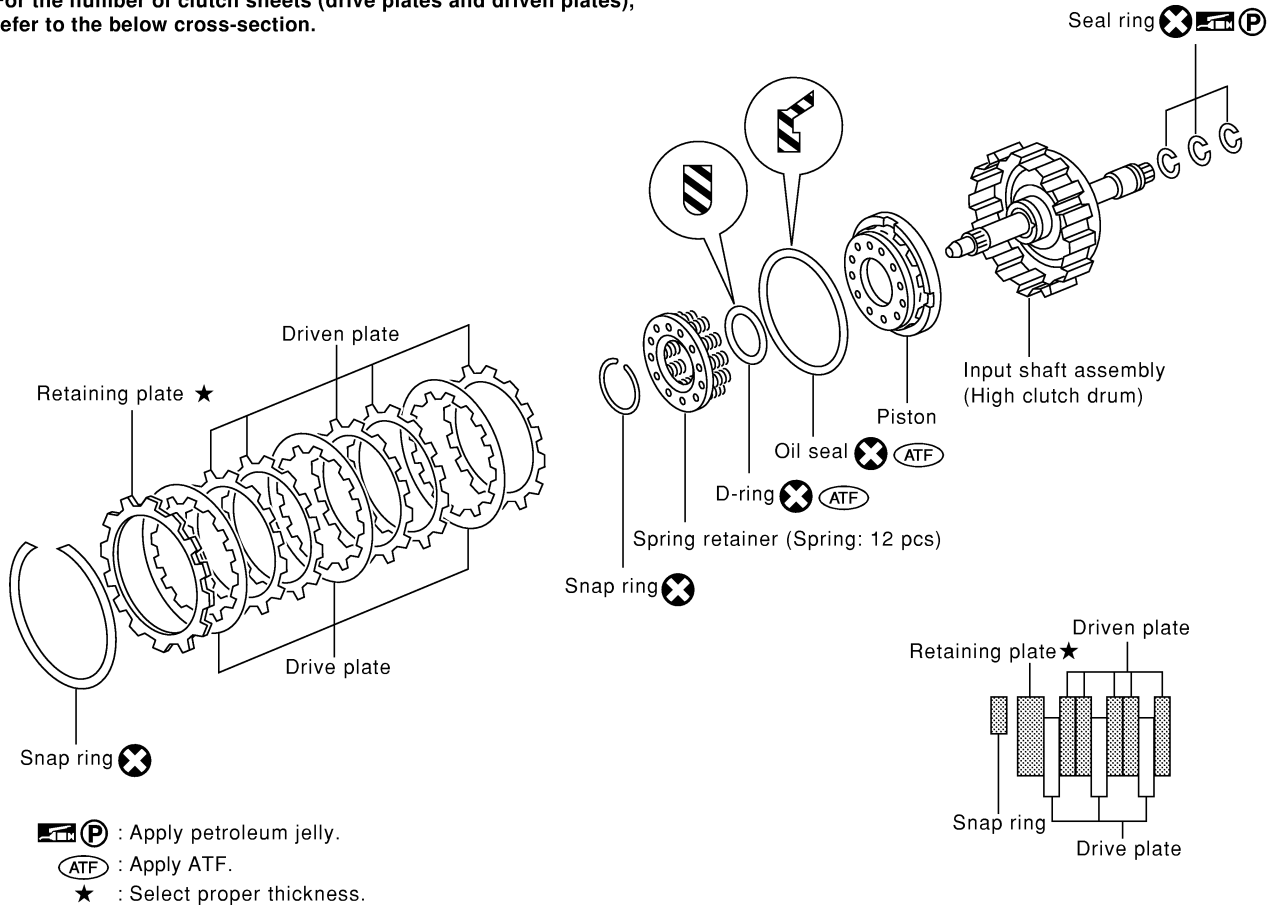
8. Check operation of reverse clutch. Refer to "Reverse Clutch", AT-327.

## High Clutch COMPONENTS

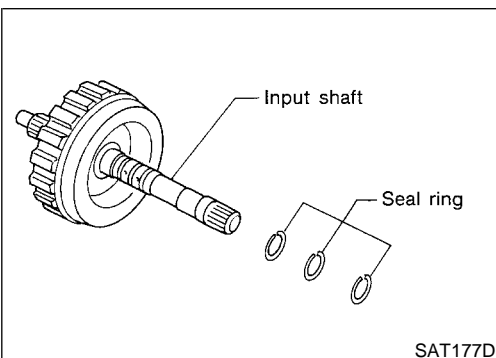
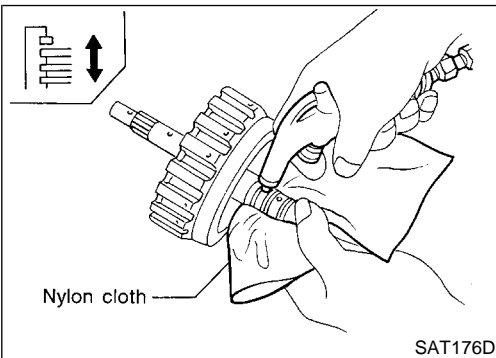
=NCAT0145

### SEC. 315

For the number of clutch sheets (drive plates and driven plates), refer to the below cross-section.



SAT874J



### DISASSEMBLY

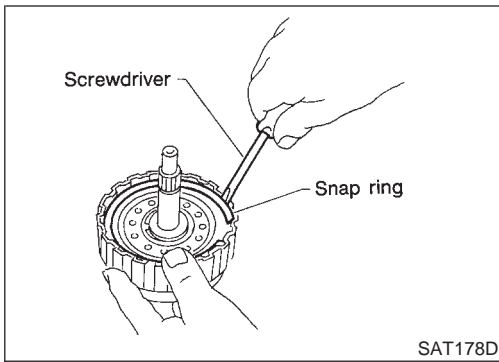
NCAT0146

- Check operation of high clutch.
  - Apply compressed air to oil hole of input shaft.
    - **Stop up a hole on opposite side of input shaft.**
  - Check to see that retaining plate moves to snap ring.
  - 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.
- Remove seal rings from input shaft.

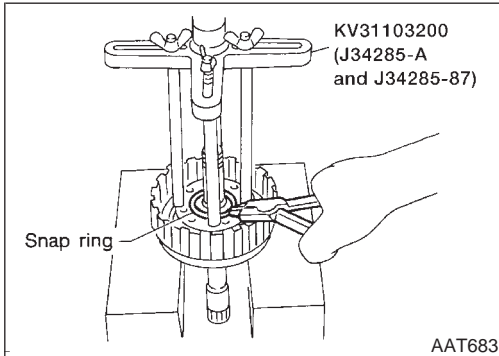
GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
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EL  
IDX

# REPAIR FOR COMPONENT PARTS

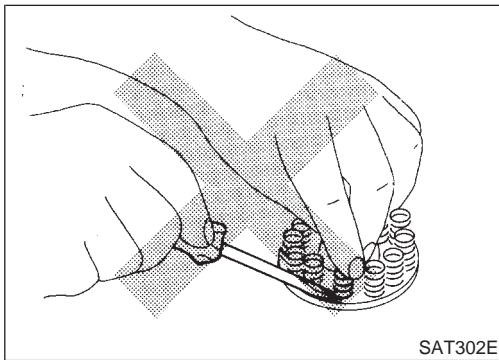
## High Clutch (Cont'd)



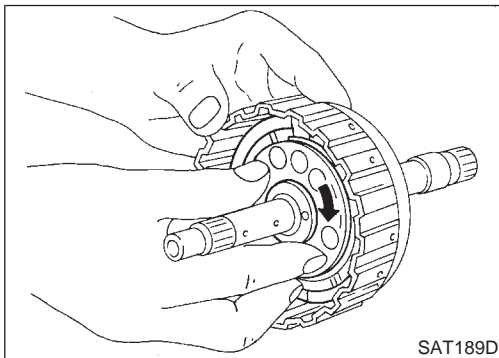
3. Remove snap ring.
4. Remove drive plates, driven plates and retaining plate.



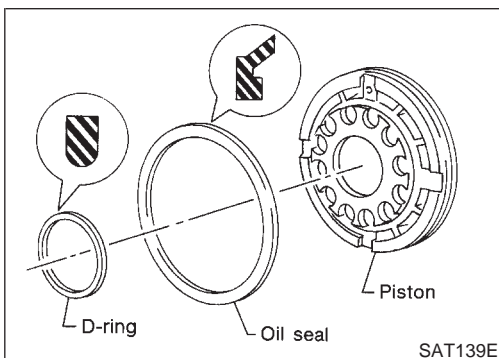
5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.
  - **Set Tool directly above springs.**
  - **Do not expand snap ring excessively.**
6. Remove spring retainer and return springs.



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



7. Remove piston from high clutch drum by turning it.



8. Remove D-ring and oil seal from piston.

## INSPECTION

### Reverse Clutch Snap Ring, Spring Retainer and Return Springs

NCAT0147

NCAT0147S01

- Check for deformation, fatigue or damage.
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**

GI

MA

EM

LC

NCAT0147S02

### High Clutch Drive Plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

**Thickness of drive plate:**

**Standard value: 2.0 mm (0.079 in)**

**Wear limit: 1.8 mm (0.071 in)**

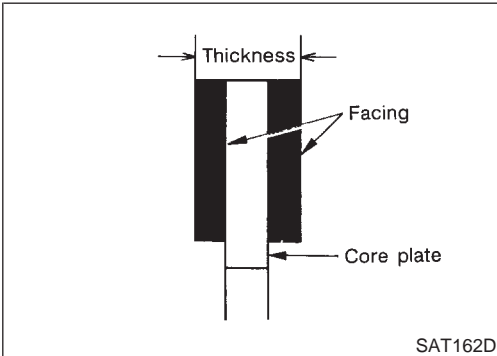
- If not within wear limit, replace.

EC

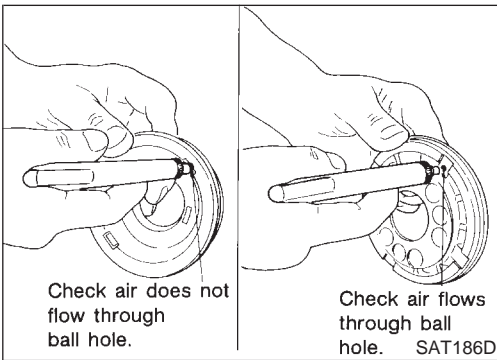
FE

CL

MT



SAT162D



### High Clutch Piston

NCAT0147S03

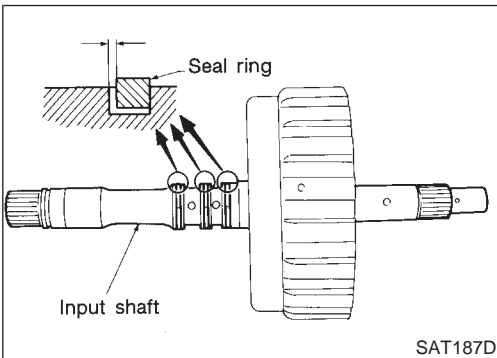
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure air leaks past ball.

AT

AX

SU

BR



### Seal Ring Clearance

NCAT0147S04

- Install new seal rings onto input shaft.
- Measure clearance between seal ring and ring groove.

**Standard clearance:**

**0.08 - 0.23 mm (0.0031 - 0.0091 in)**

**Allowable limit:**

**0.23 mm (0.0091 in)**

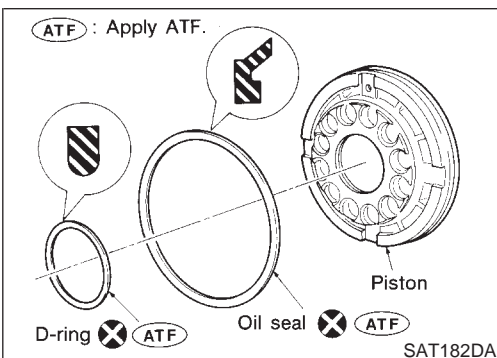
- If not within wear limit, replace input shaft assembly.

ST

RS

BT

HA



## ASSEMBLY

NCAT0148

1. Install D-ring and oil seal on piston.
  - Take care with the direction of the oil seal.
  - Apply ATF to both parts.

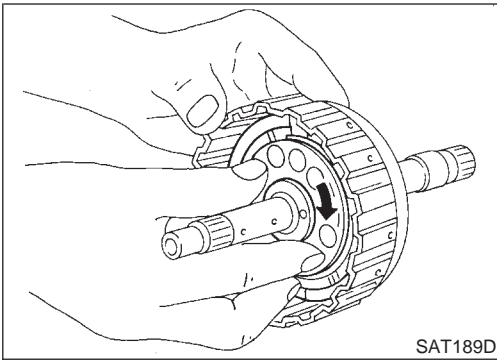
SC

EL

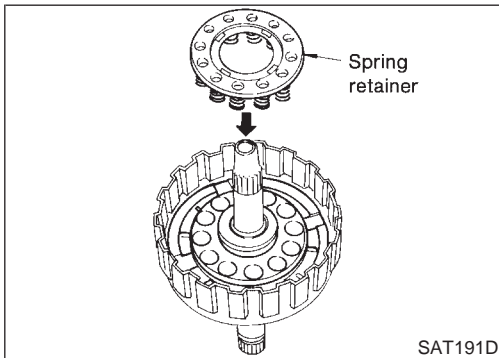
IDX

## REPAIR FOR COMPONENT PARTS

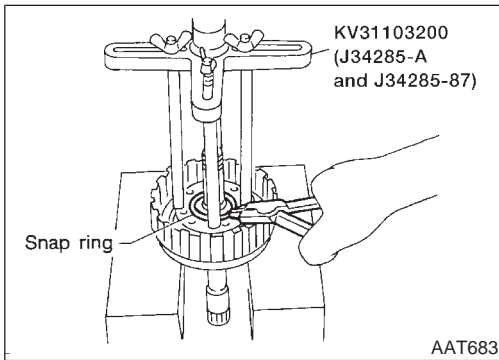
### High Clutch (Cont'd)



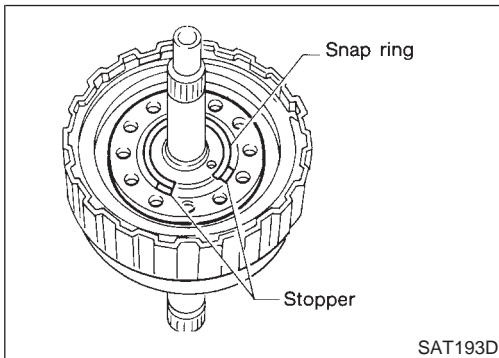
2. Install piston assembly by turning it slowly.
  - Apply ATF to inner surface of drum.



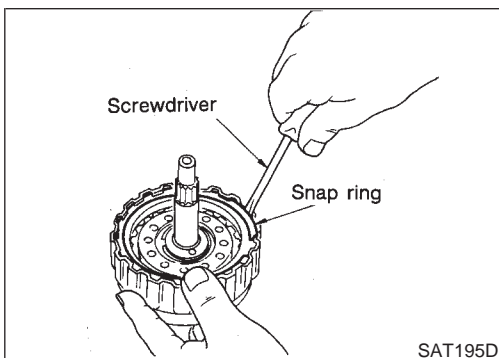
3. Install return springs and spring retainer on piston.



4. Set Tool on spring retainer and install snap ring while compressing return springs.
  - Set Tool directly above return springs.



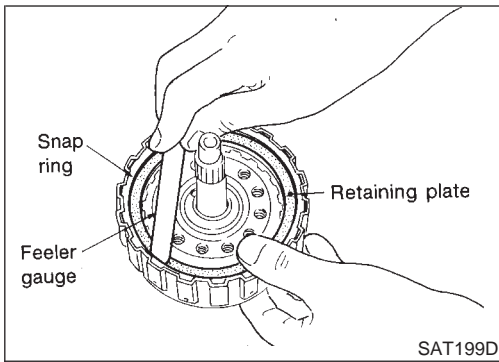
- Do not align snap ring gap with spring retainer stopper.



5. Install drive plates, driven plates and retaining plate.  
**Take care with the order and direction of plates.**
6. Install snap ring.

# REPAIR FOR COMPONENT PARTS

High Clutch (Cont'd)



7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

**Specified clearance:**

**Standard: 1.4 - 1.8 mm (0.055 - 0.071 in)**

**Allowable limit: 2.4 mm (0.094 in)**

**Retaining plate:**

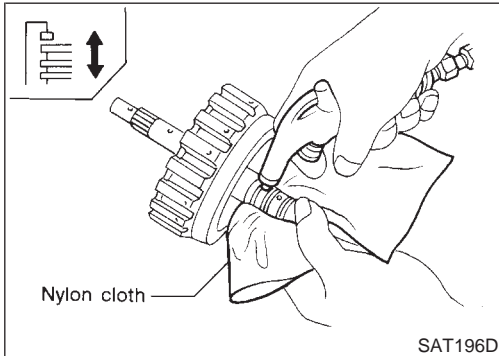
**Refer to SDS, AT-390.**

GI

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EM

LC



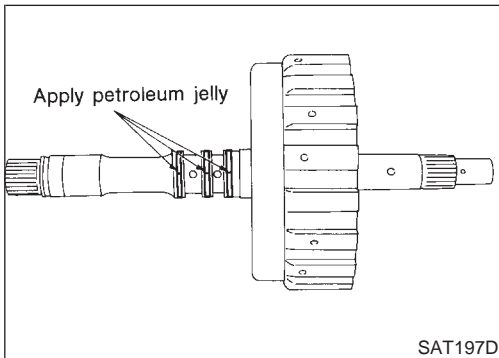
8. Check operation of high clutch. Refer to "High Clutch", AT-331.

EC

FE

CL

MT



9. Install seal rings to input shaft.

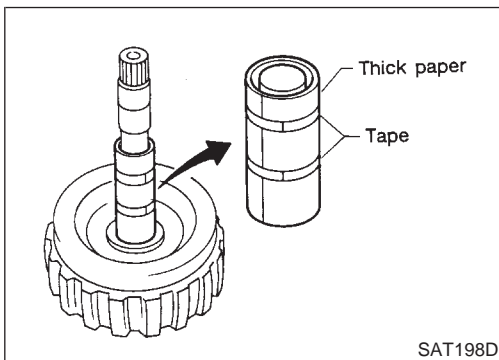
- **Apply petroleum jelly to seal rings.**

**AT**

AX

SU

BR



- **Roll paper around seal rings to prevent seal rings from spreading.**

ST

RS

BT

HA

SC

EL

IDX

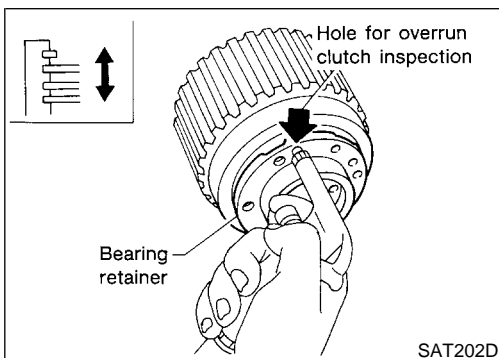
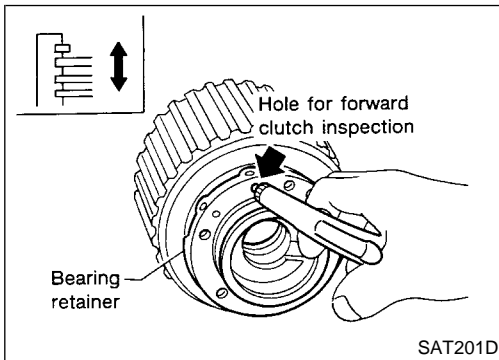
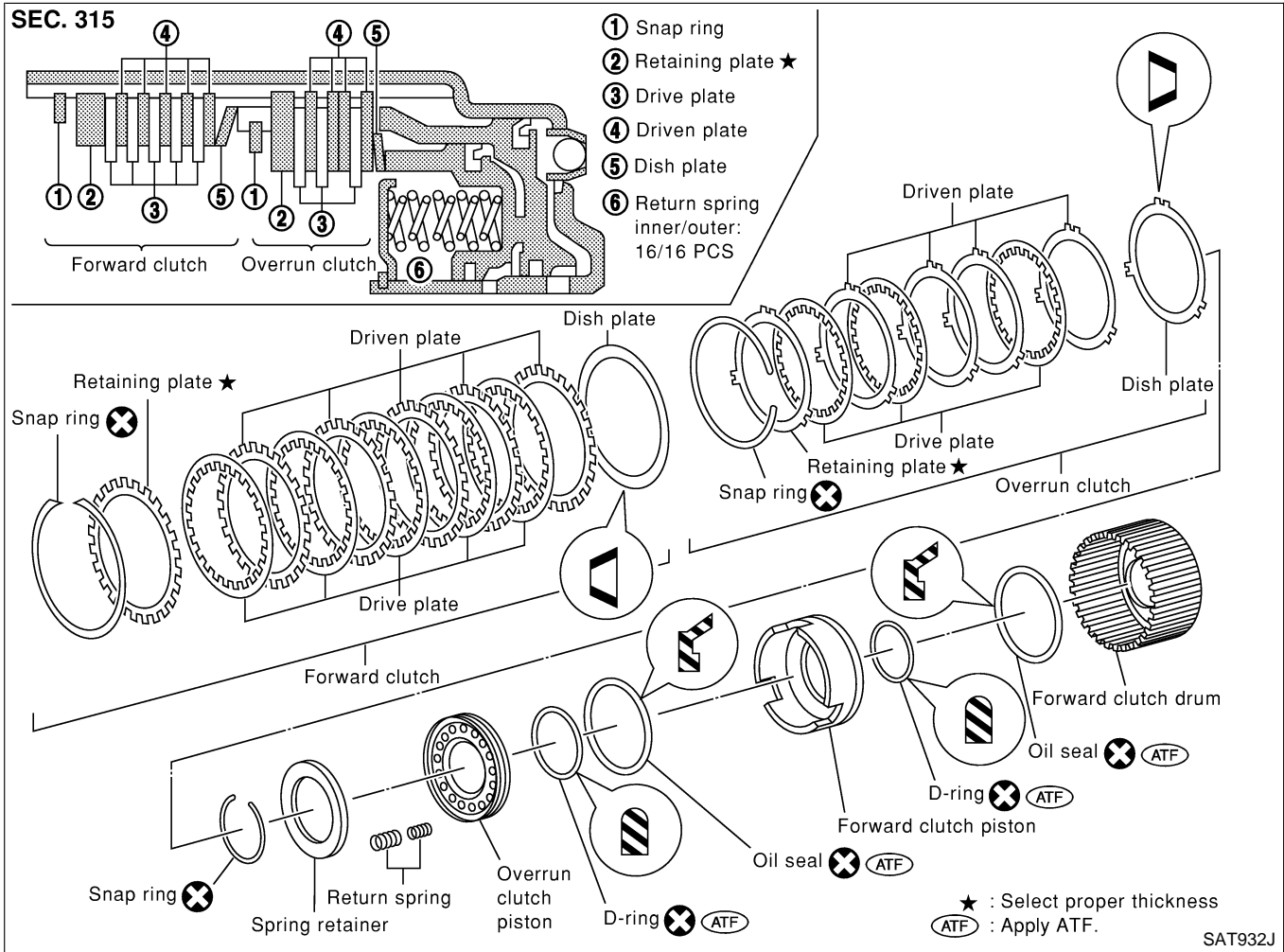


# REPAIR FOR COMPONENT PARTS

Forward Clutch and Overrun Clutch

## Forward Clutch and Overrun Clutch COMPONENTS

NCAT0149



### DISASSEMBLY

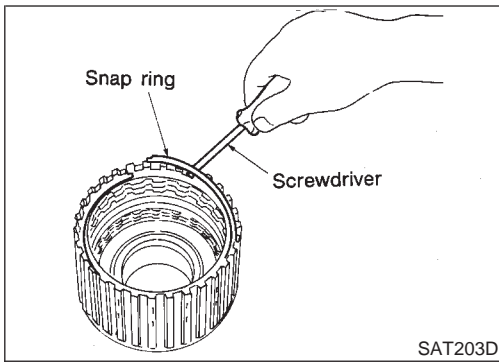
NCAT0150

1. Check operation of forward clutch and overrun clutch.
  - a. Install bearing retainer on forward clutch drum.
  - b. Apply compressed air to oil hole of forward clutch drum.
  - c. Check to see that retaining plate moves to snap ring.
- d. If retaining plate does not contact snap ring:
  - D-ring might be damaged.
  - Oil seal might be damaged.
  - Fluid might be leaking past piston check ball.



# REPAIR FOR COMPONENT PARTS

Forward Clutch and Overrun Clutch (Cont'd)



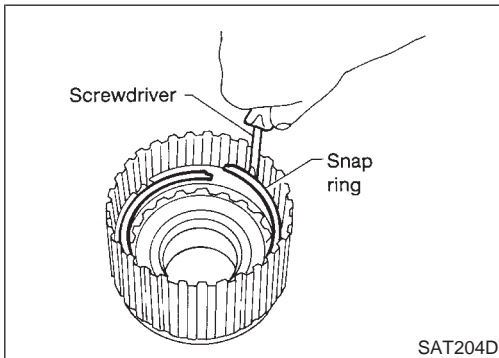
2. Remove snap ring for forward clutch.
3. Remove drive plates, driven plates, retaining plate and dish plate for forward clutch.

GI

MA

EM

LC



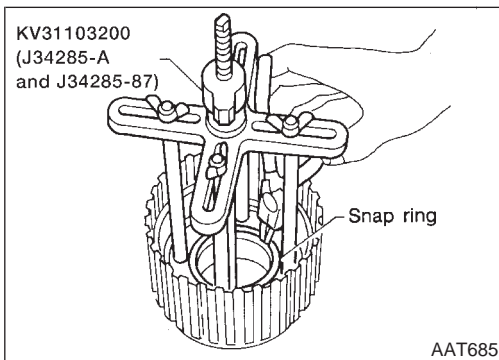
4. Remove snap ring for overrun clutch.
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.

EC

FE

CL

MT



6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.

AT

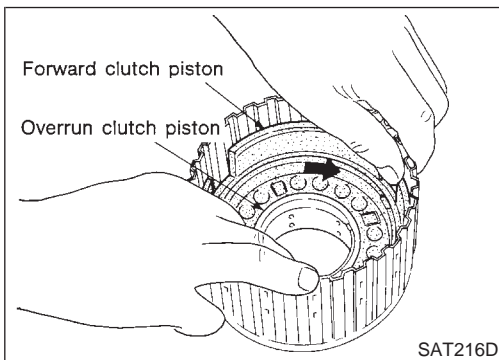
- **Set Tool directly above return springs.**
- **Do not expand snap ring excessively.**

AX

7. Remove spring retainer and return springs.

SU

BR



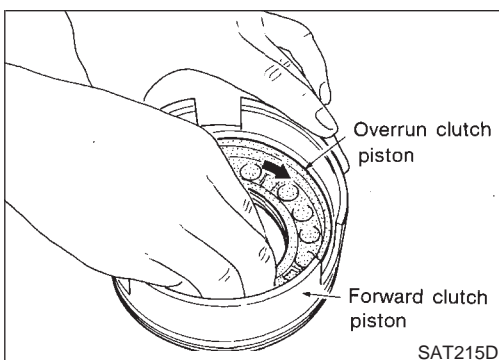
8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.

ST

RS

BT

HA



9. Remove overrun clutch piston from forward clutch piston by turning it.

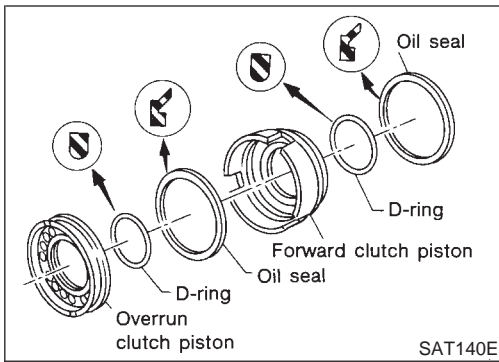
SC

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# REPAIR FOR COMPONENT PARTS

## Forward Clutch and Overrun Clutch (Cont'd)



- Remove D-rings and oil seals from forward clutch piston and overrun clutch piston.

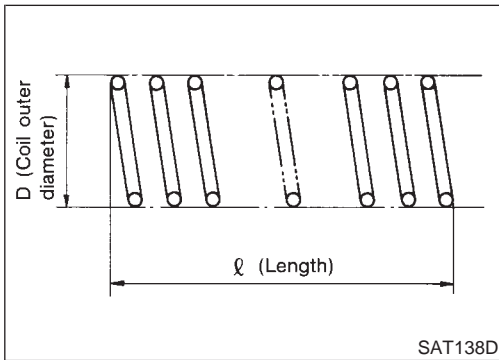
### INSPECTION

#### Snap Rings and Spring Retainer

- Check for deformation, fatigue or damage.

NCAT0151

NCAT0151S01



#### Forward Clutch and Overrun Clutch Return Springs

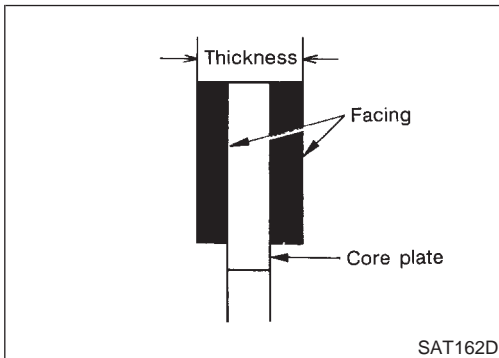
NCAT0151S02

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

#### Inspection standard:

Refer to SDS, AT-392.

- Replace if deformed or fatigued.



#### Forward Clutch and Overrun Clutch Drive Plates

NCAT0151S03

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

#### Thickness of drive plate:

##### Forward clutch

Standard value: 1.8 mm (0.071 in)

Wear limit: 1.6 mm (0.063 in)

##### Overrun clutch

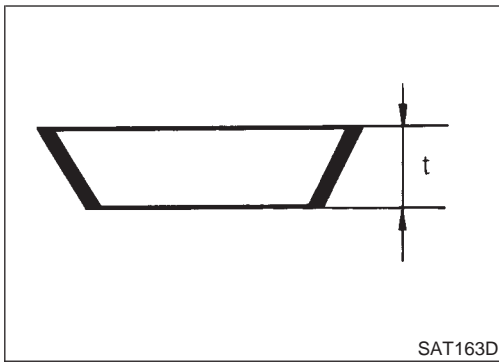
Standard value: 1.6 mm (0.063 in)

Wear limit: 1.4 mm (0.055 in)

- If not within wear limit, replace.

# REPAIR FOR COMPONENT PARTS

Forward Clutch and Overrun Clutch (Cont'd)



## Forward Clutch and Overrun Clutch Dish Plates

NCAT0151S04

- Check for deformation or damage.
- Measure thickness of dish plate.

**Thickness of dish plate "t":**

**Forward clutch: 2.5 mm (0.098 in)**

**Overrun clutch: 2.15 mm (0.0846 in)**

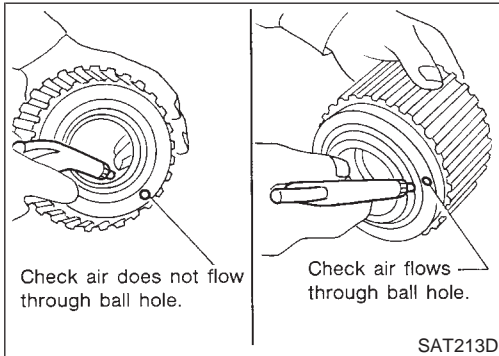
- If deformed or fatigued, replace.

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## Forward Clutch Drum

NCAT0151S05

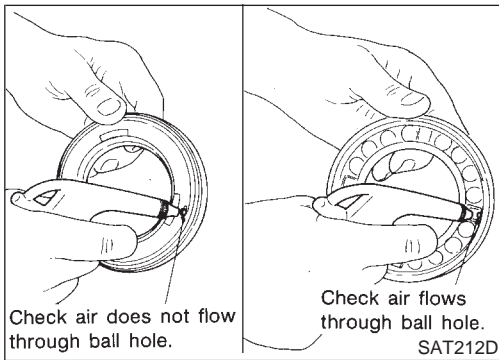
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole from outside of forward clutch drum. Make sure air leaks past ball.
- Apply compressed air to oil hole from inside of forward clutch drum. Make sure there is no air leakage.

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## Overrun Clutch Piston

NCAT0151S06

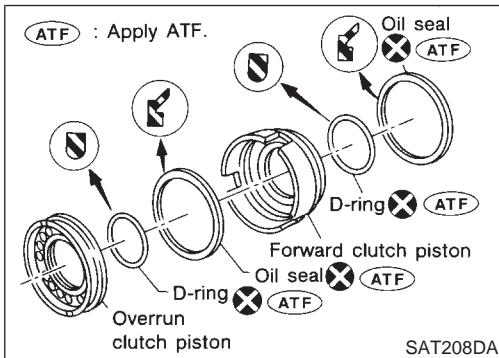
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side. Make sure air leaks past ball.

AT

AX

SU

BR



## ASSEMBLY

NCAT0152

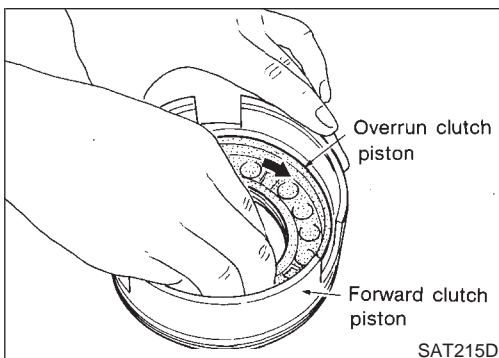
1. Install D-rings and oil seals on forward clutch piston and overrun clutch piston.
  - Take care with direction of oil seal.
  - Apply ATF to both parts.

ST

RS

BT

HA



2. Install overrun clutch piston assembly on forward clutch piston while turning it slowly.
  - Apply ATF to inner surface of forward clutch piston.

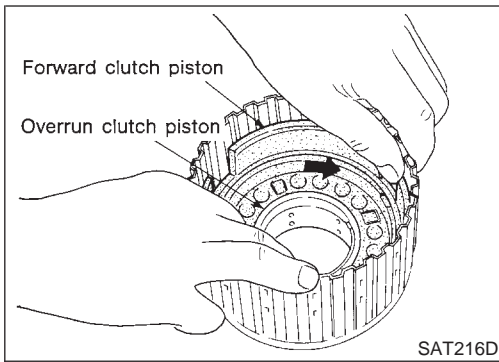
SC

EL

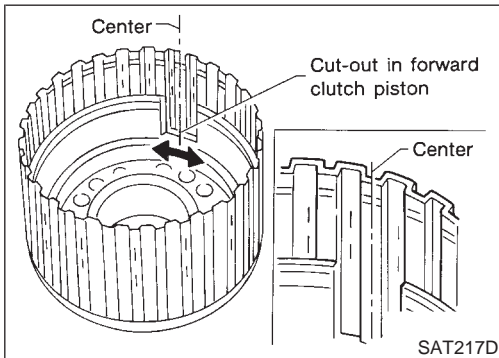
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# REPAIR FOR COMPONENT PARTS

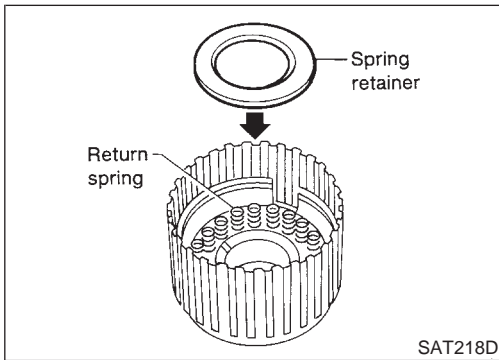
## Forward Clutch and Overrun Clutch (Cont'd)



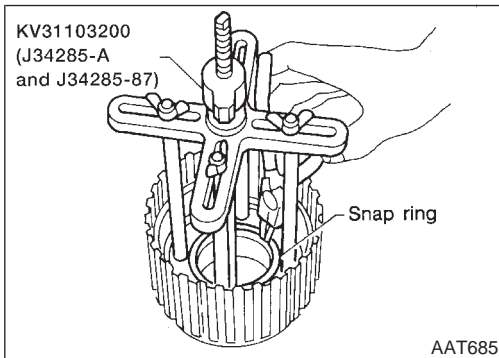
3. Install forward clutch piston assembly on forward clutch drum while turning it slowly.
  - **Apply ATF to inner surface of drum.**



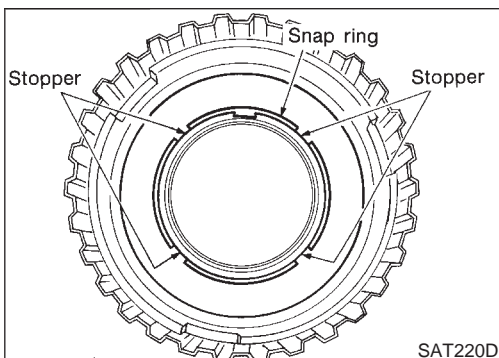
4. Align notch in forward clutch piston with groove in forward clutch drum.



5. Install return spring on piston.
6. Install spring retainer on return springs.



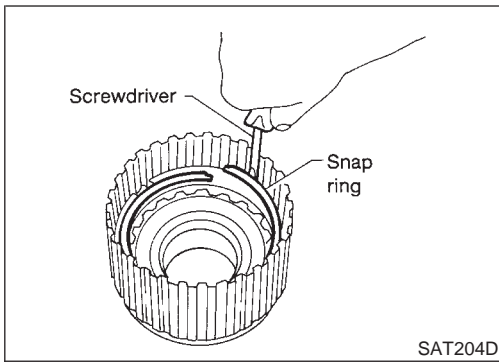
7. Set Tool on spring retainer and install snap ring while compressing return springs.
  - **Set Tool directly above return springs.**



- **Do not align snap ring gap with spring retainer stopper.**

# REPAIR FOR COMPONENT PARTS

Forward Clutch and Overrun Clutch (Cont'd)



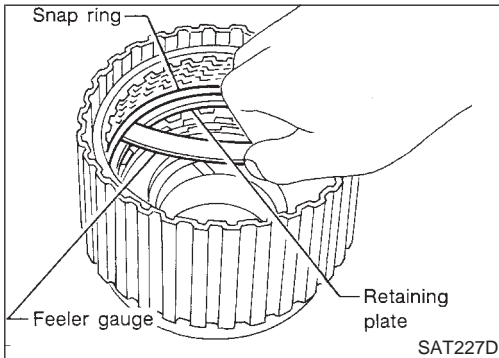
8. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
9. Install snap ring for overrun clutch.

GI

MA

EM

LC



10. Measure clearance between overrun clutch retaining plate and snap ring.  
If not within allowable limit, select proper retaining plate.

**Specified clearance:**

**Standard: 1.0 - 1.4 mm (0.039 - 0.055 in)**

**Allowable limit: 2.0 mm (0.079 in)**

**Overrun clutch retaining plate:**

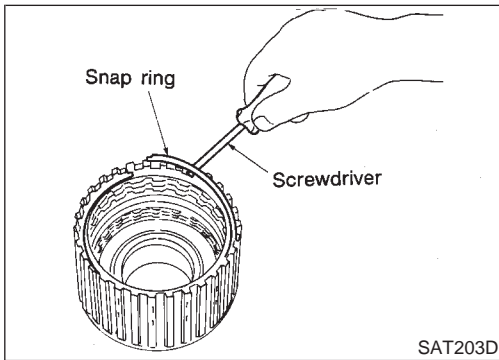
**Refer to SDS, AT-391.**

EC

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11. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.

**Take care with the order and direction of plates.**

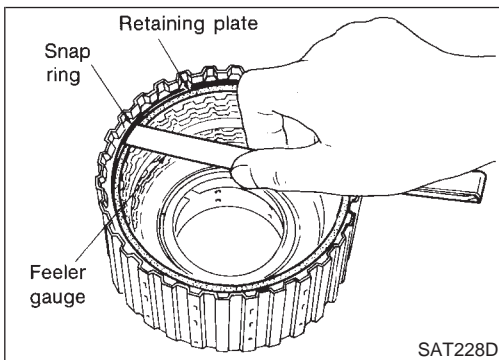
12. Install snap ring for forward clutch.

AT

AX

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BR



13. Measure clearance between forward clutch retaining plate and snap ring.

If not within allowable limit, select proper retaining plate.

**Specified clearance:**

**Standard: 0.45 - 0.85 mm (0.0177 - 0.0335 in)**

**Allowable limit: 1.85 mm (0.0728 in)**

**Forward clutch retaining plate:**

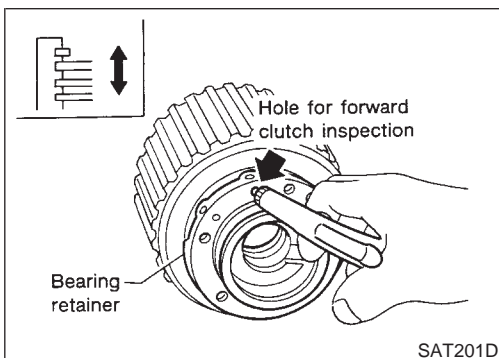
**Refer to SDS, AT-391.**

ST

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14. Check operation of forward clutch.

Refer to "Forward Clutch and Overrun Clutch", AT-336.

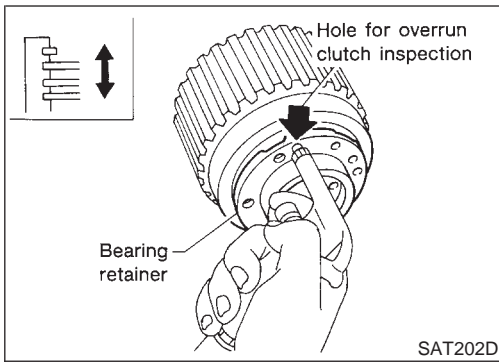
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## REPAIR FOR COMPONENT PARTS

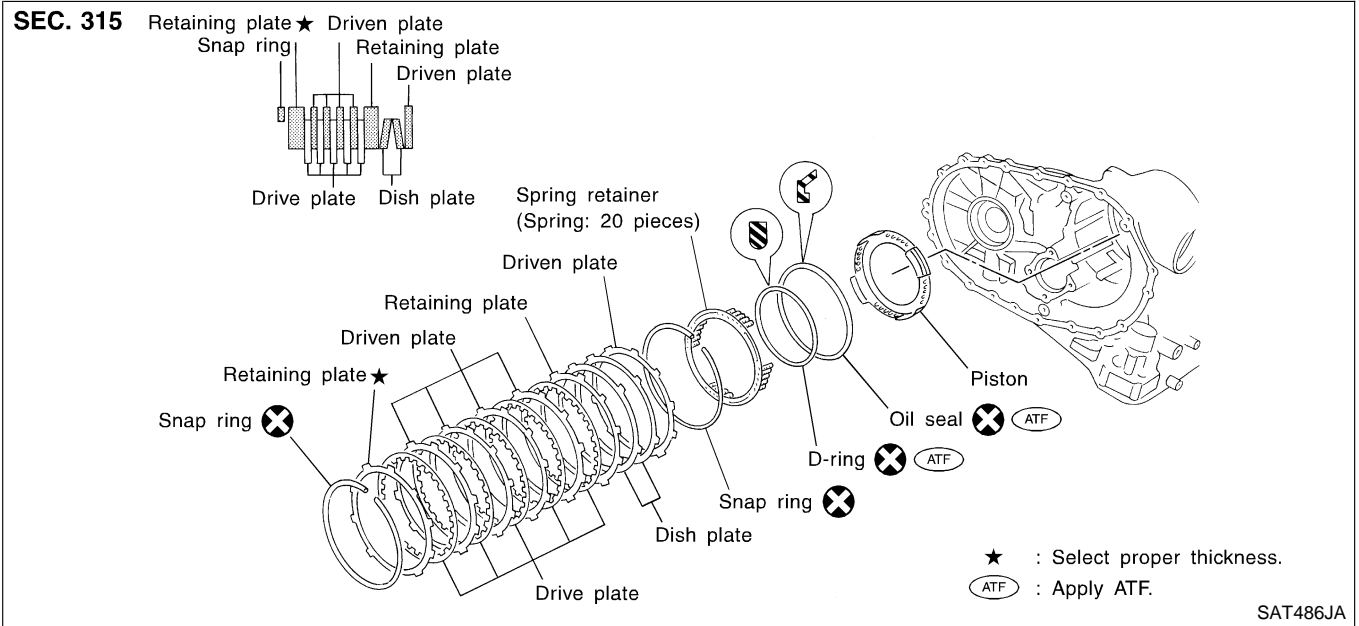
### Forward Clutch and Overrun Clutch (Cont'd)



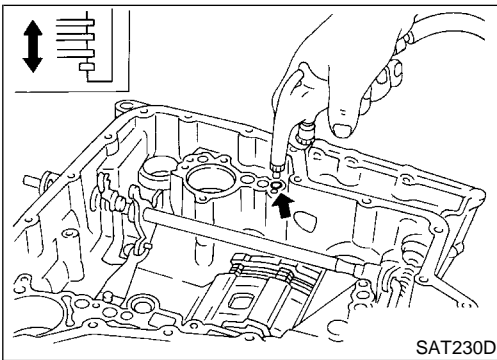
15. Check operation of overrun clutch.  
Refer to "Forward Clutch and Overrun Clutch", AT-336.

## Low & Reverse Brake COMPONENTS

=NCAT0153



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### DISASSEMBLY

NCAT0154

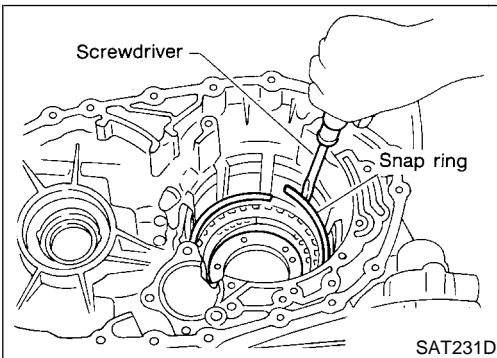
1. Check operation of low & reverse brake.
  - a. Apply compressed air to oil hole of transmission case.
  - b. Check to see that retaining plate moves to snap ring.
  - c. If retaining plate does not contact snap ring:
    - D-ring might be damaged.
    - Oil seal might be damaged.
    - Fluid might be leaking past piston check ball.

AT

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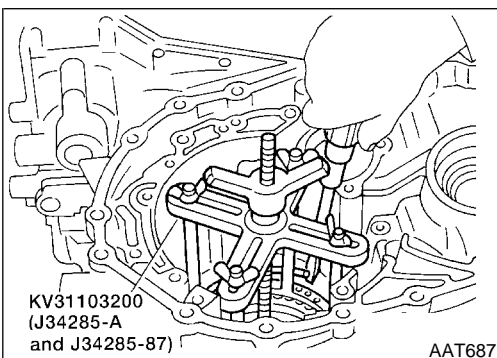
2. Stand transmission case.
3. Remove snap ring.
4. Remove drive plates, driven plates, retaining plate from transmission case.

ST

RS

BT

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5. Set Tool on spring retainer and remove snap ring while compressing return springs.
  - **Set Tool directly above return springs.**
  - **Do not expand snap ring excessively.**
6. Remove spring retainer and return springs.

SC

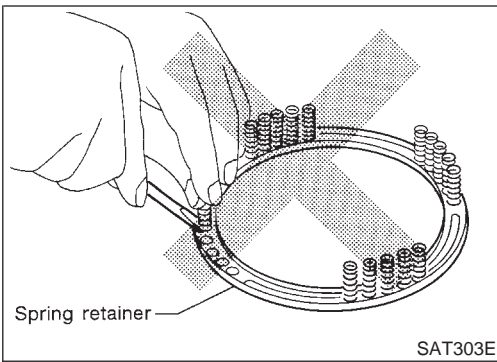
EL

IDX

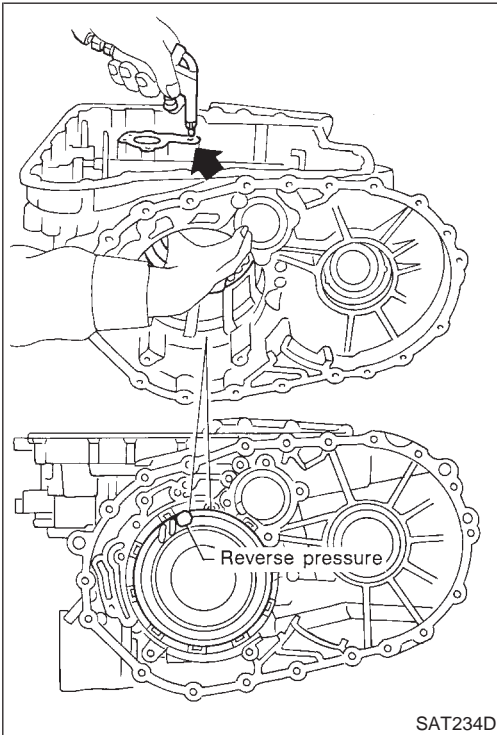


# REPAIR FOR COMPONENT PARTS

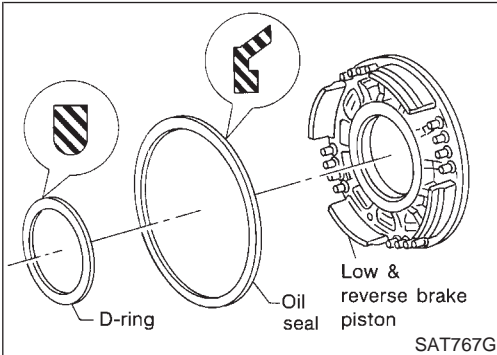
## Low & Reverse Brake (Cont'd)



- Do not remove return springs from spring retainer.



7. Apply compressed air to oil hole of transmission case while holding piston.
8. Remove piston from transmission case by turning it.



9. Remove D-ring and oil seal from piston.

## INSPECTION

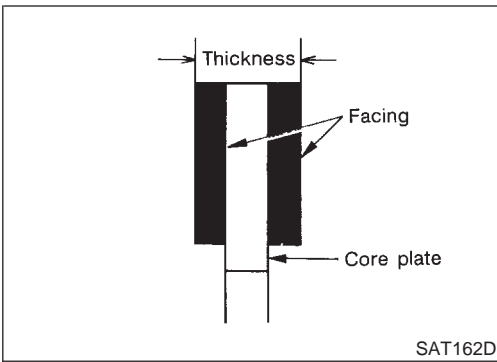
### Low & Reverse Clutch Snap Ring, Spring Retainer and Return Springs

NCAT0155

NCAT0155S01

- Check for deformation, fatigue or damage.
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**





## Low & Reverse Brake Drive Plates

NCAT0155S02

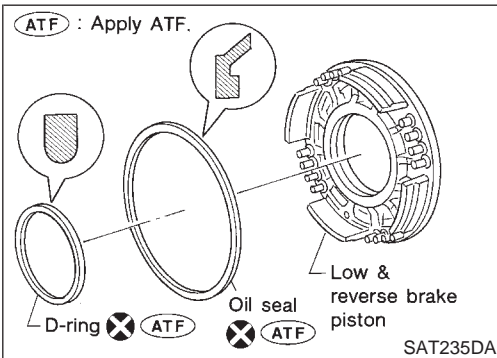
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  - Thickness of drive plate:**
  - Standard value: 2.0 mm (0.079 in)**
  - Wear limit: 1.8 mm (0.071 in)**
- If not within wear limit, replace.

GI

MA

EM

LC



## ASSEMBLY

NCAT0156

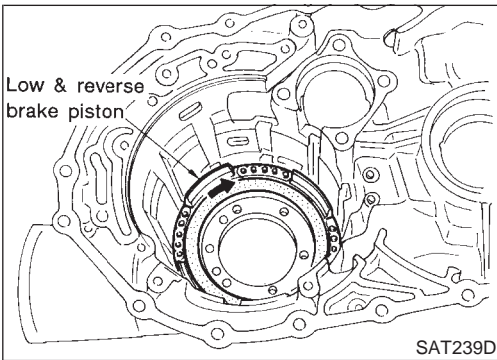
1. Install D-ring and oil seal on piston.
  - Take care with the direction of the oil seal.
  - Apply ATF to both parts.

EC

FE

CL

MT



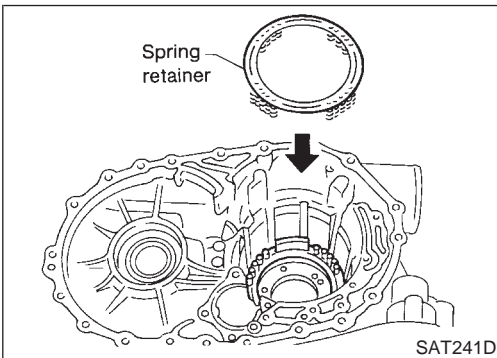
2. Stand transmission case.
3. Install piston assembly on transmission case while turning it slowly.
  - Apply ATF to inner surface of transmission case.

AT

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BR



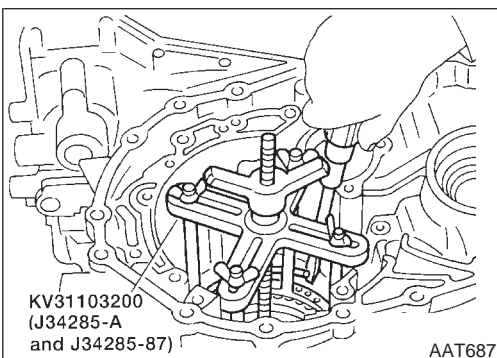
4. Install return springs and spring retainer on piston.

ST

RS

BT

HA



5. Install snap ring while compressing return springs.
  - Set Tool directly above return springs.

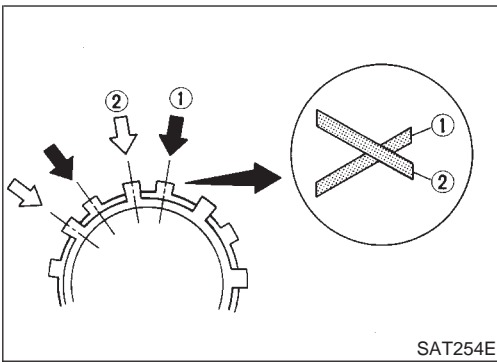
SC

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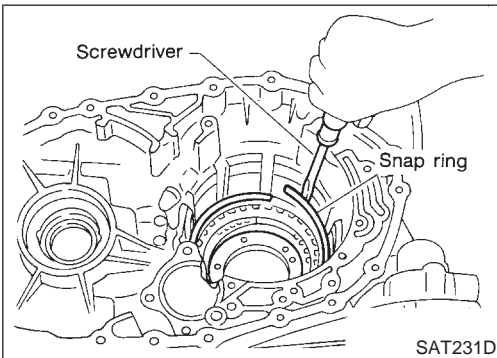
IDX

## REPAIR FOR COMPONENT PARTS

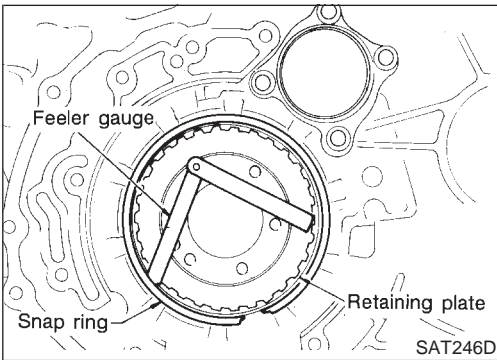
### Low & Reverse Brake (Cont'd)



6. Install drive plates, driven plates, retaining plates and dished plates.
  - Do not align the projections on the two dished plates.
  - Make sure to put the plates in the correct order and direction.



7. Install snap ring.



8. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate (front side).

**Specified clearance:**

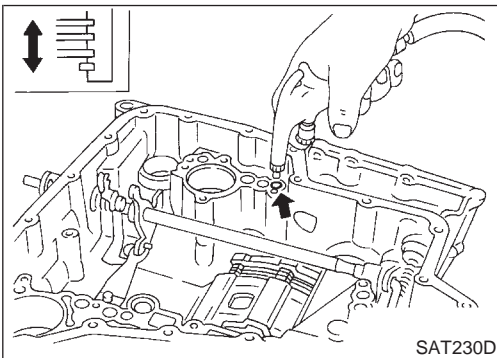
**Standard: 1.4 - 1.8 mm (0.055 - 0.071 in)**

**Allowable limit:**

**2.8 mm (0.110 in)**

**Retaining plate:**

**Refer to SDS, AT-392.**



9. Check operation of low & reverse brake. Refer to "DISASSEMBLY", AT-343.

# REPAIR FOR COMPONENT PARTS

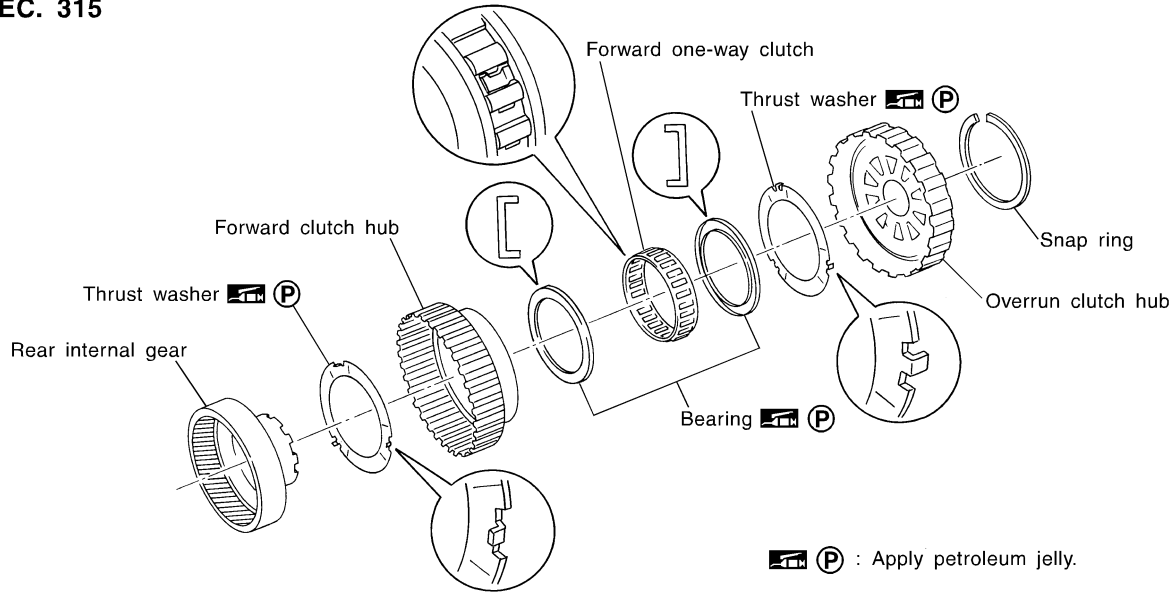
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

## Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub COMPONENTS

NCAT0157

GI  
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### SEC. 315



SAT875J

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### DISASSEMBLY

NCAT0158

1. Remove snap ring from overrun clutch hub.
2. Remove overrun clutch hub from forward clutch hub.

ST

RS

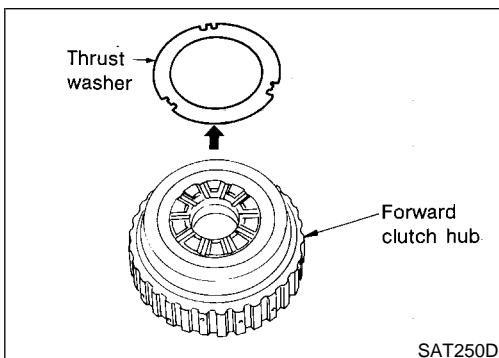
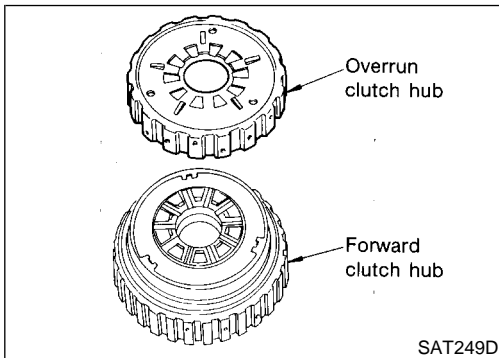
BT

HA

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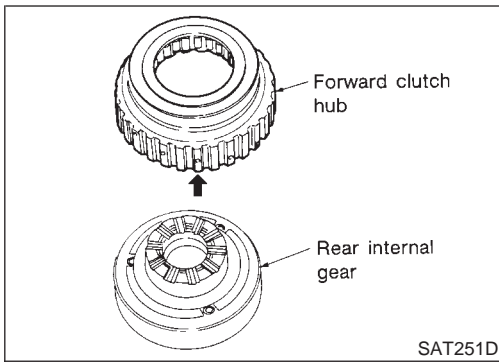
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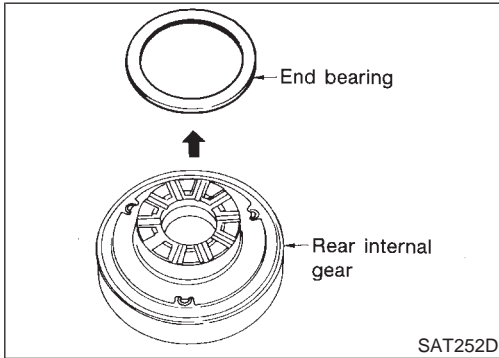
3. Remove thrust washer from forward clutch hub.

# REPAIR FOR COMPONENT PARTS

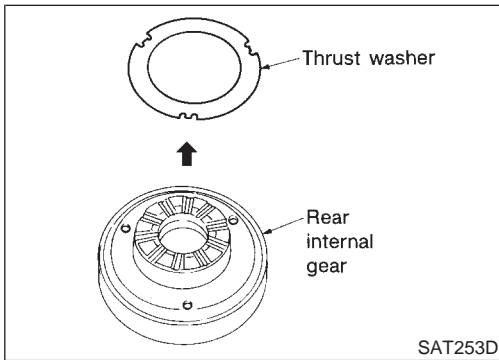
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



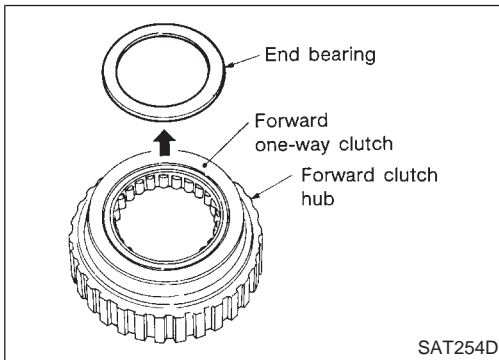
4. Remove forward clutch hub from rear internal gear.



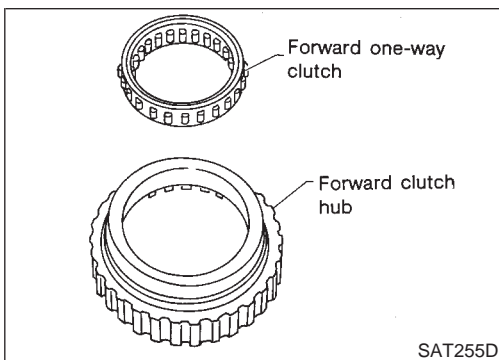
5. Remove end bearing from rear internal gear.



6. Remove thrust washer from rear internal gear.



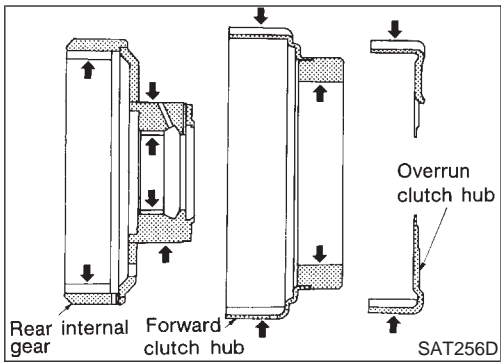
7. Remove end bearing from forward one-way clutch.



8. Remove one-way clutch from forward clutch hub.

# REPAIR FOR COMPONENT PARTS

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



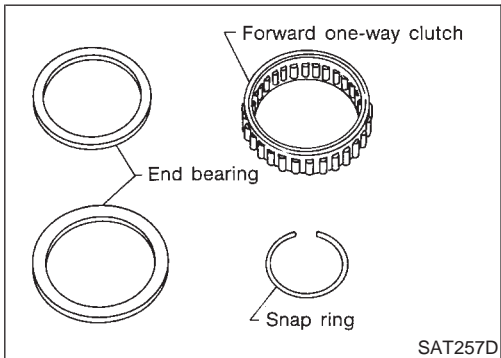
## INSPECTION

### Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

NCAT0159

NCAT0159S01

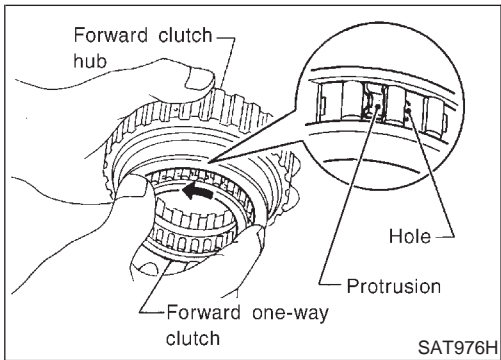
- Check rubbing surfaces for wear or damage.



### Snap Ring, End Bearings and Forward One-way Clutch

NCAT0159S02

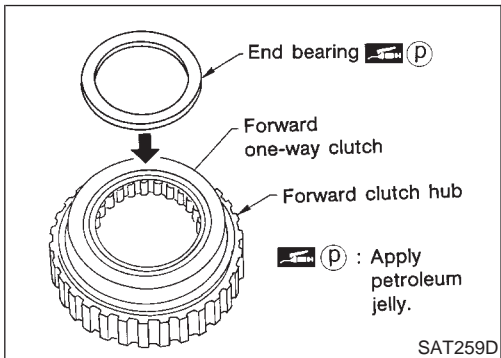
- Check snap ring and end bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.



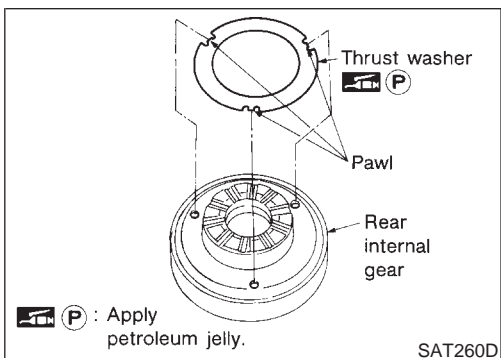
## ASSEMBLY

NCAT0160

1. Install forward one-way clutch on forward clutch.
  - Take care with the direction of forward one-way clutch.



2. Install end bearing on forward one-way clutch.
  - Apply petroleum jelly to end bearing.

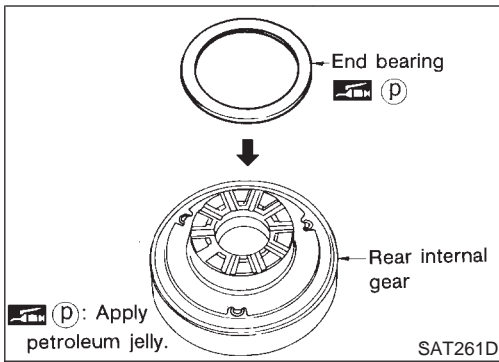


3. Install thrust washer on rear internal gear.
  - Apply petroleum jelly to thrust washer.
  - Align pawls of thrust washer with holes of rear internal gear.

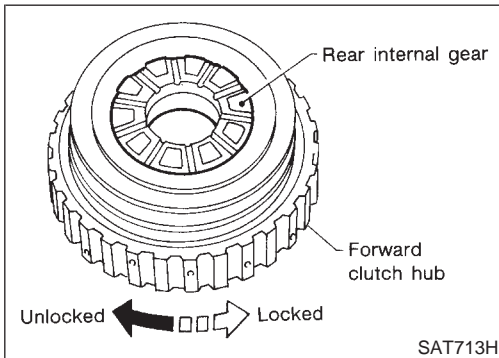
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# REPAIR FOR COMPONENT PARTS

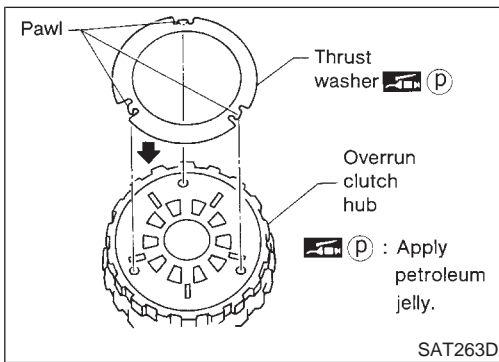
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



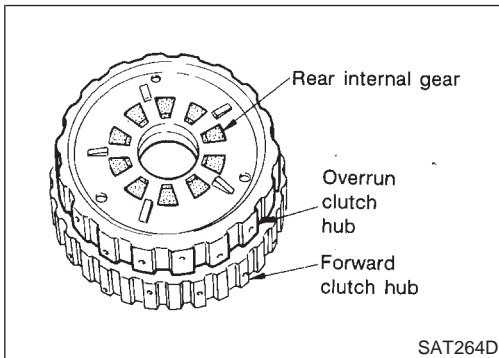
4. Install end bearing on rear internal gear.
  - Apply petroleum jelly to end bearing.



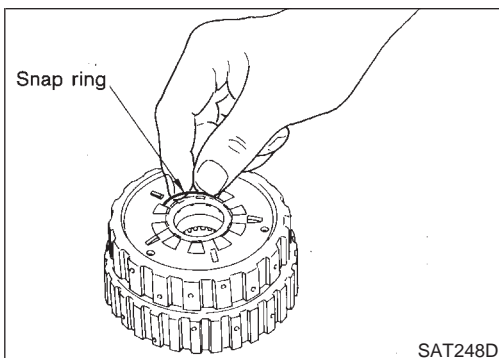
5. Install forward clutch hub on rear internal gear.
  - Check operation of forward one-way clutch. Hold rear internal gear and turn forward clutch hub. Check forward clutch hub for correct locking and unlocking directions.
  - If not as shown in illustration, check installation direction of forward one-way clutch.



6. Install thrust washer and overrun clutch hub.
  - Apply petroleum jelly to thrust washer.
  - Align pawls of thrust washer with holes of overrun clutch hub.



7. Install overrun clutch hub on rear internal gear.
  - Align projections of rear internal gear with holes of overrun clutch hub.



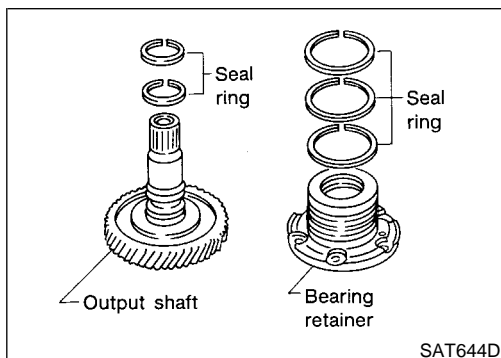
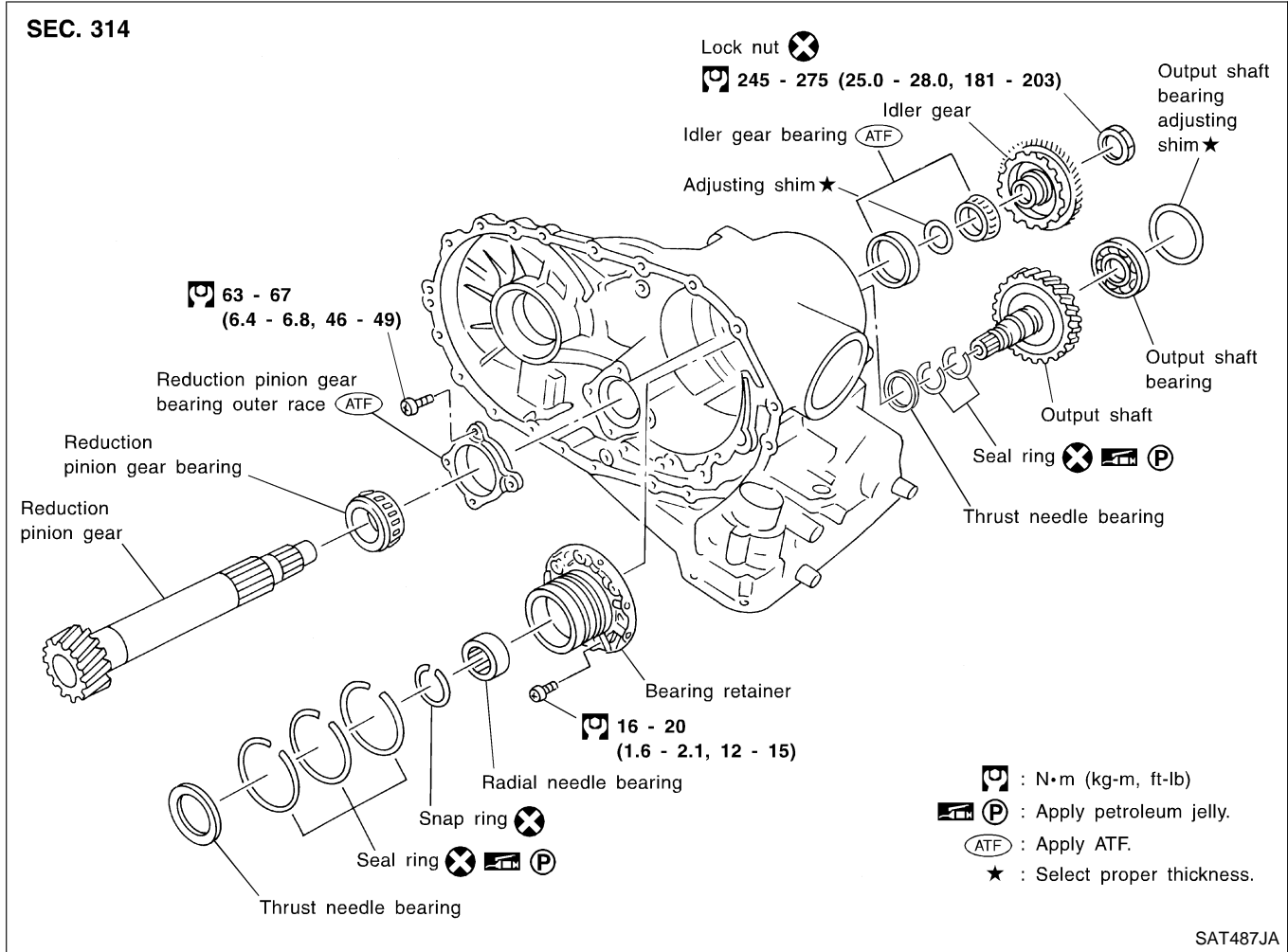
8. Install snap ring to groove of rear internal gear.

# REPAIR FOR COMPONENT PARTS

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer

## Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer COMPONENTS

NCAT0161



### DISASSEMBLY

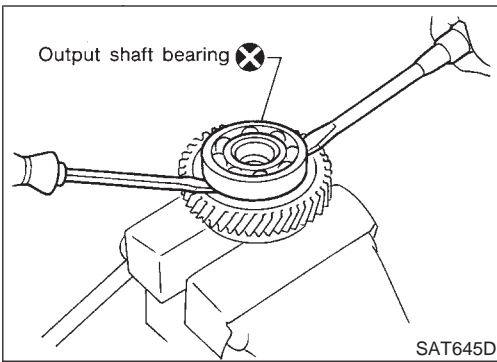
1. Remove seal rings from output shaft and bearing retainer.

NCAT0162

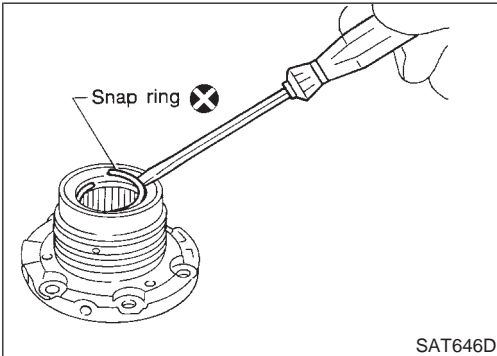
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## REPAIR FOR COMPONENT PARTS

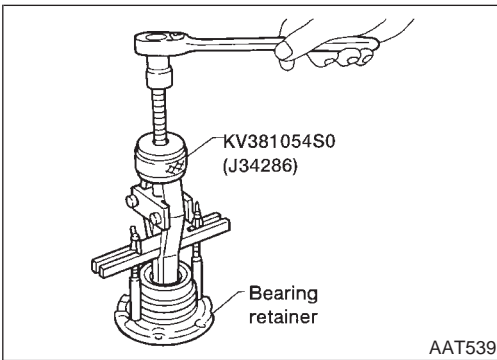
Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)



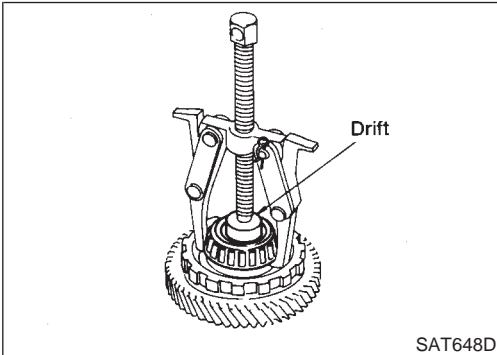
2. Remove output shaft bearing with screwdrivers.
  - Always replace bearing with a new one when removed.
  - Do not damage output shaft.



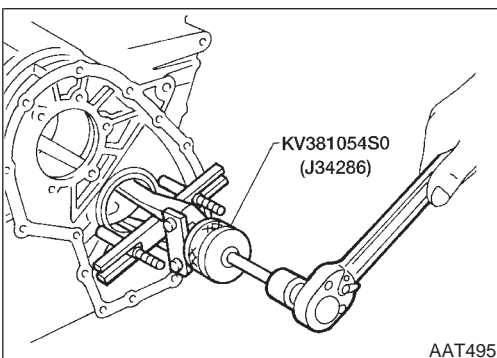
3. Remove snap ring from bearing retainer.



4. Remove needle bearing from bearing retainer.



5. Remove idler gear bearing inner race from idler gear.

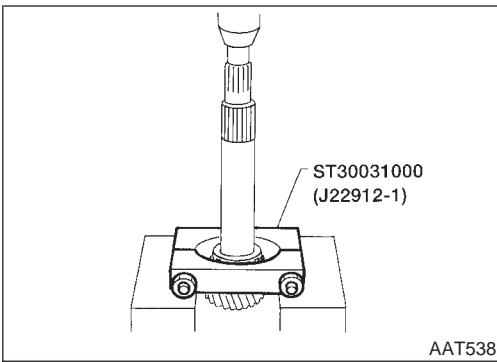


6. Remove idler gear bearing outer race from transmission case.

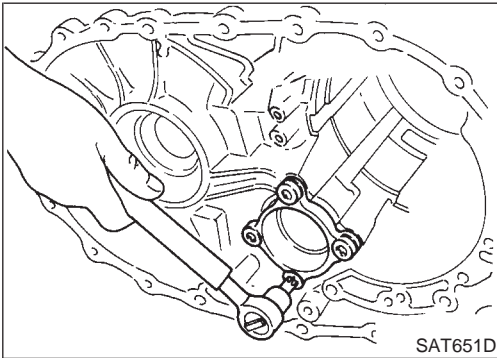


# REPAIR FOR COMPONENT PARTS

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)



7. Press out reduction pinion gear bearing from reduction pinion gear.



8. Remove reduction pinion gear bearing outer race from transmission case.

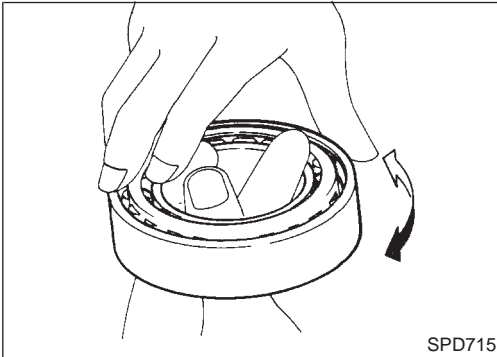
## INSPECTION

### Output Shaft, Idler Gear and Reduction Pinion Gear

NCAT0163

NCAT0163S01

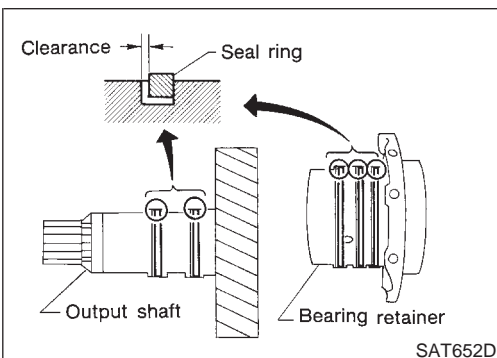
- Check shafts for cracks, wear or bending.
- Check gears for wear, chips and cracks.



## Bearing

NCAT0163S02

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**



## Seal Ring Clearance

NCAT0163S03

- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.

### Standard clearance:

**0.10 - 0.25 mm (0.0039 - 0.0098 in)**

### Allowable limit:

**0.25 mm (0.0098 in)**

- If not within allowable limit, replace output shaft.
- Install new seal rings to bearing retainer.

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# REPAIR FOR COMPONENT PARTS

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)

- Measure clearance between seal ring and ring groove of bearing retainer.

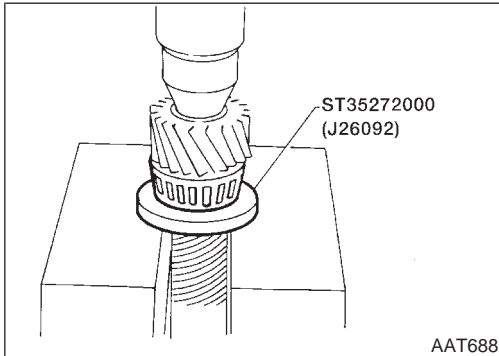
**Standard clearance:**

**0.10 - 0.25 mm (0.0039 - 0.0098 in)**

**Allowable limit:**

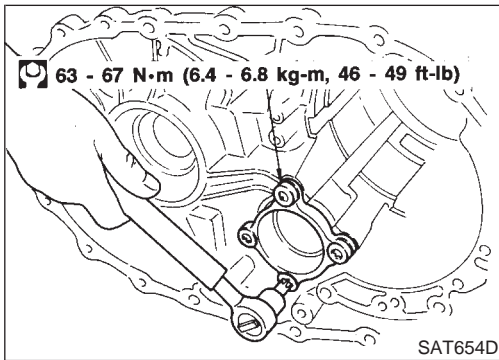
**0.25 mm (0.0098 in)**

- If not within allowable limit, replace bearing retainer.

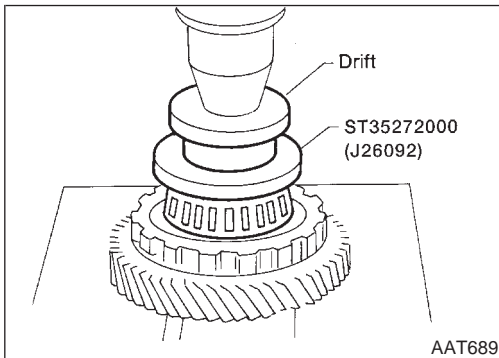


## ASSEMBLY

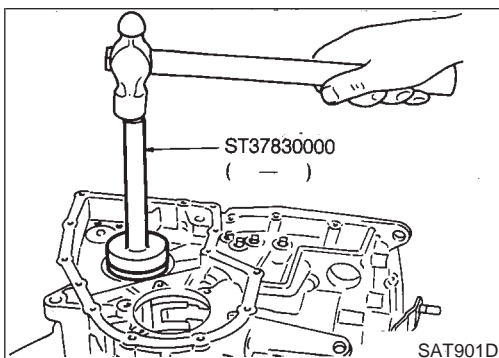
1. Press reduction pinion gear bearing on reduction pinion gear. NCAT0164



2. Install reduction pinion gear bearing outer race on transmission case.



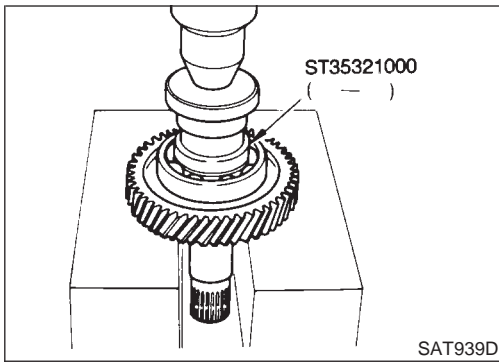
3. Press idler gear bearing inner race on idler gear.



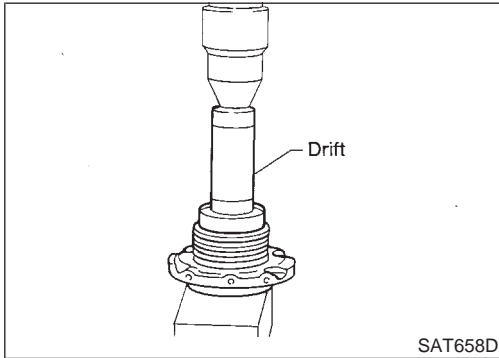
4. Install idler gear bearing outer race on transmission case.

# REPAIR FOR COMPONENT PARTS

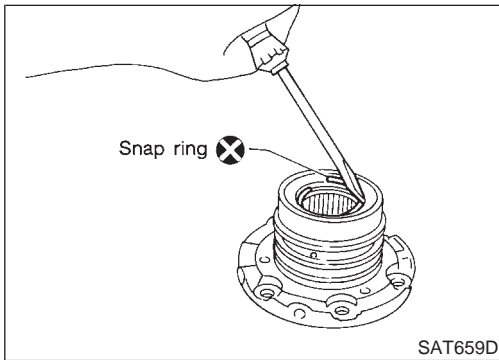
Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)



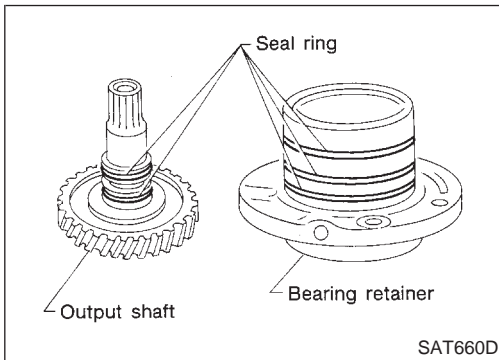
5. Press output shaft bearing on output shaft.



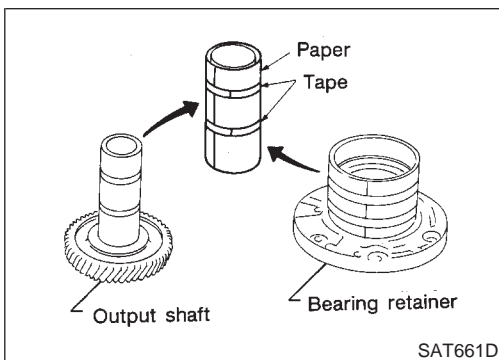
6. Press needle bearing on bearing retainer.



7. Install snap ring to bearing retainer.



8. After packing ring grooves with petroleum jelly, carefully install new seal rings on output shaft and bearing retainer.



- Roll paper around seal rings to prevent seal rings from spreading.

GI

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ST

RS

BT

HA

SC

EL

IDX

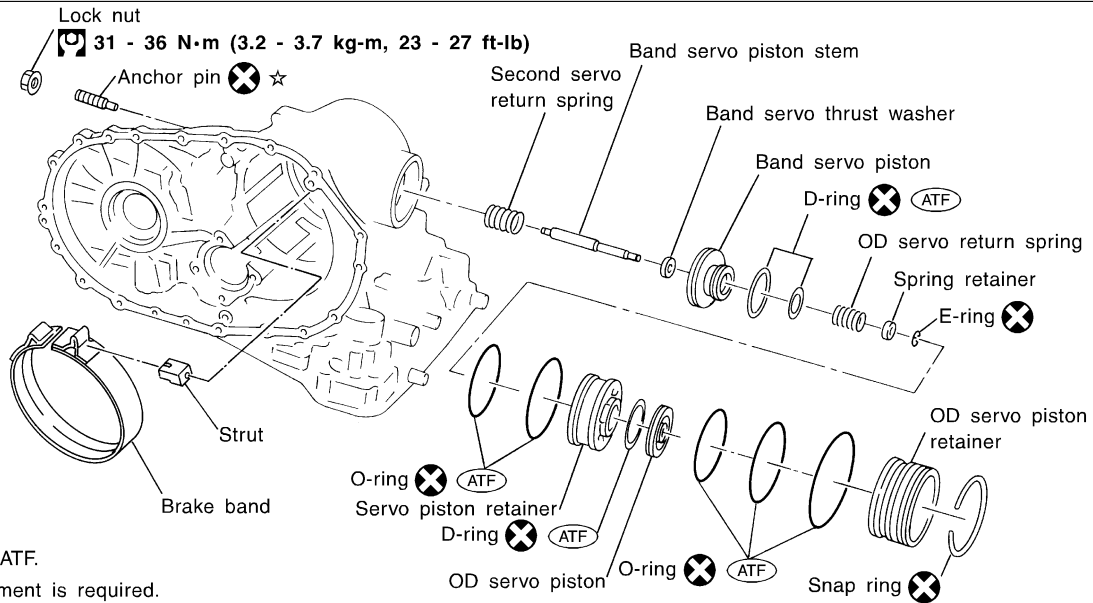
# REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly

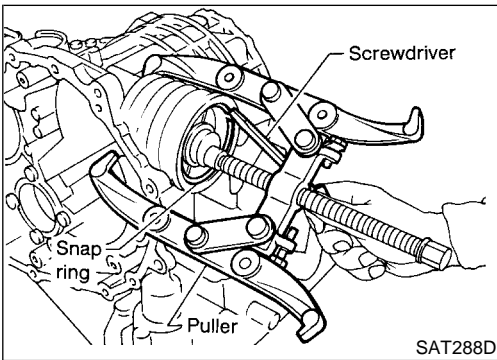
## Band Servo Piston Assembly COMPONENTS

NCAT0165

### SEC. 315



SAT098K

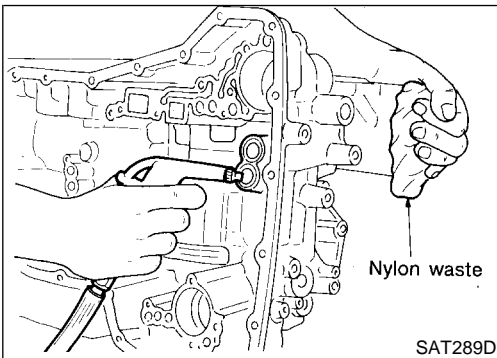


SAT288D

### DISASSEMBLY

NCAT0166

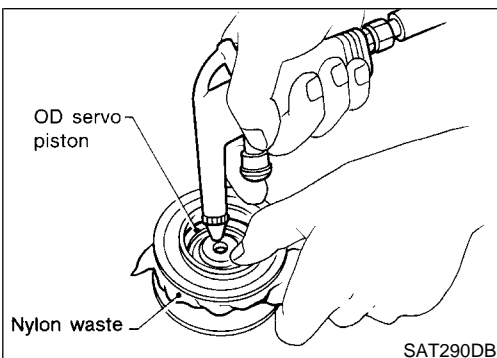
1. Remove band servo piston snap ring.



SAT289D

2. Apply compressed air to oil hole in transmission case to remove OD servo piston retainer and band servo piston assembly.

- Hold band servo piston assembly with a rag or nylon waste.



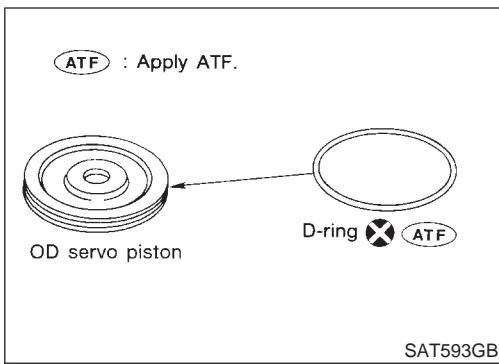
SAT290DB

3. Apply compressed air to oil hole in OD servo piston retainer to remove OD servo piston from retainer.

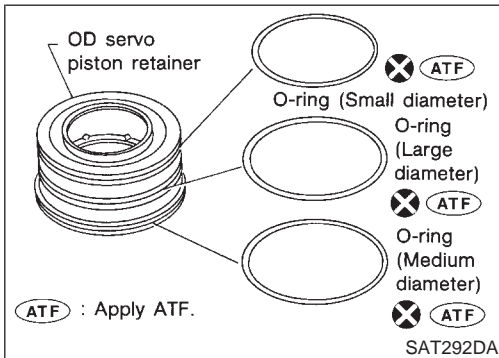
- Hold OD servo piston while applying compressed air.

# REPAIR FOR COMPONENT PARTS

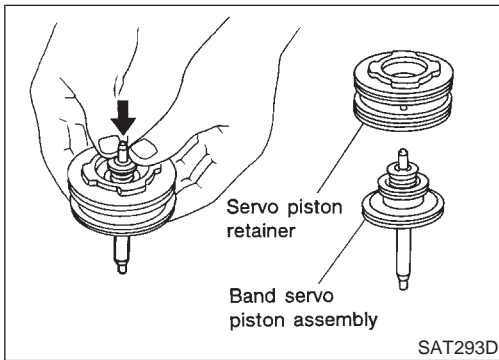
Band Servo Piston Assembly (Cont'd)



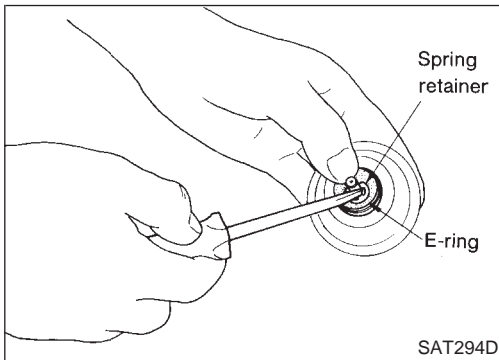
4. Remove D-ring from OD servo piston.



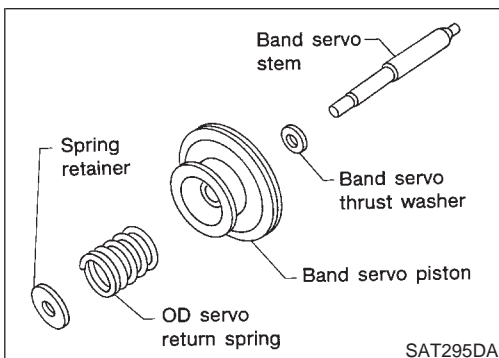
5. Remove O-rings from OD servo piston retainer.



6. Remove band servo piston assembly from servo piston retainer by pushing it forward.



7. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.



8. Remove OD servo return spring, band servo thrust washer and band servo piston stem from band servo piston.

GI

MA

EM

LC

EC

FE

CL

MT

AT

AX

SU

BR

ST

RS

BT

HA

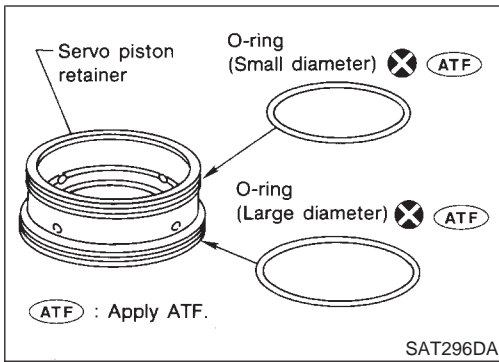
SC

EL

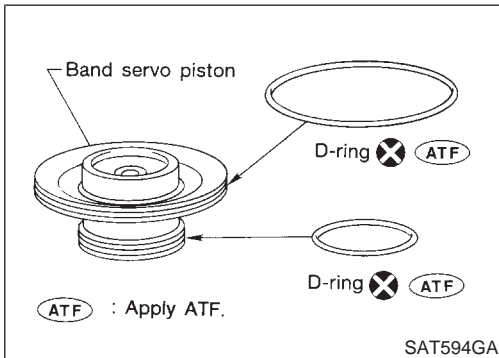
IDX

# REPAIR FOR COMPONENT PARTS

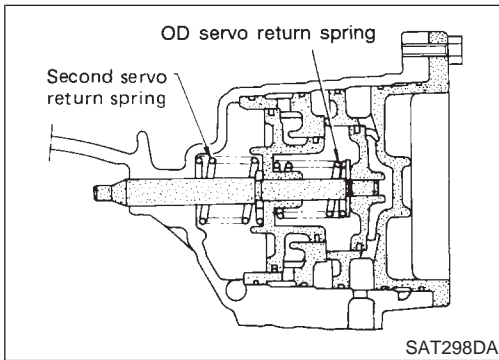
## Band Servo Piston Assembly (Cont'd)



9. Remove O-rings from servo piston retainer.



10. Remove D-rings from band servo piston.



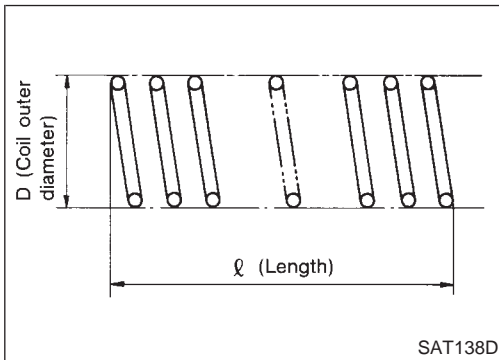
## INSPECTION

### Pistons, Retainers and Piston Stem

- Check frictional surfaces for abnormal wear or damage.

NCAT0167

NCAT0167S01

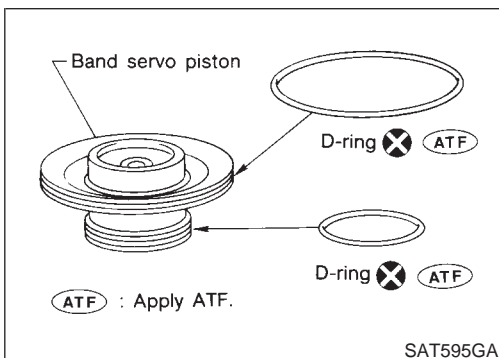


## Return Springs

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

**Band servo inspection standard:**  
Refer to SDS, AT-399.

NCAT0167S02



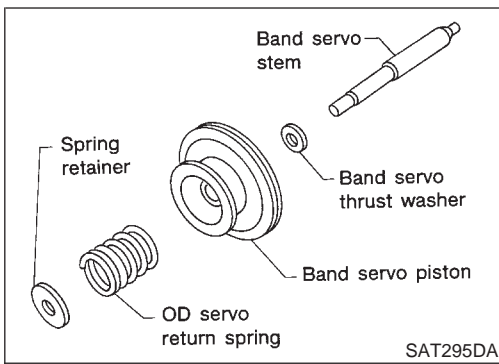
## ASSEMBLY

1. Install D-rings to servo piston retainer.
- Apply ATF to O-rings.
  - Pay attention to position of each O-ring.

NCAT0168

# REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)



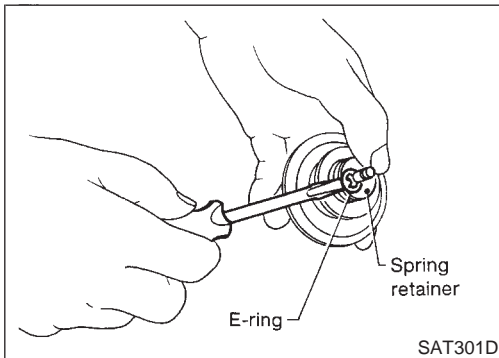
2. Install band servo piston stem, band servo thrust washer, OD servo return spring and spring retainer to band servo piston.

GI

MA

EM

LC



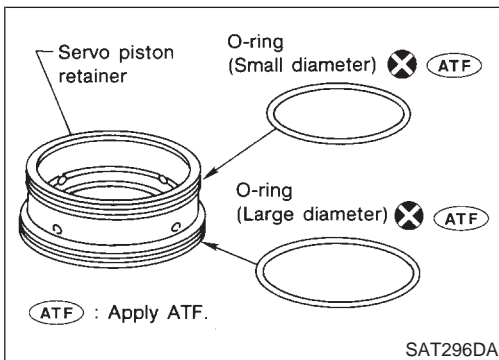
3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.

EC

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CL

MT



4. Install O-rings to servo piston retainer.

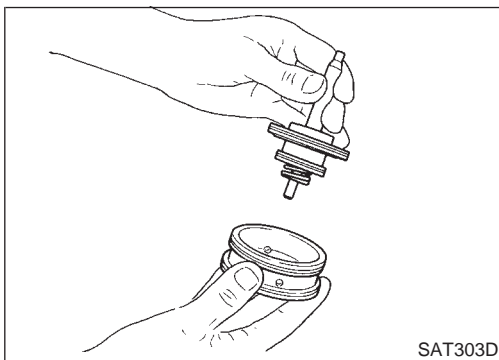
- **Apply ATF to O-rings.**
- **Pay attention to the positions of the O-rings.**

AT

AX

SU

BR



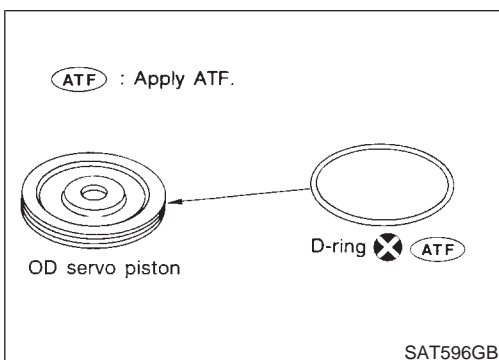
5. Install band servo piston assembly to servo piston retainer by pushing it inward.

ST

RS

BT

HA



6. Install D-ring to OD servo piston.

- **Apply ATF to D-ring.**

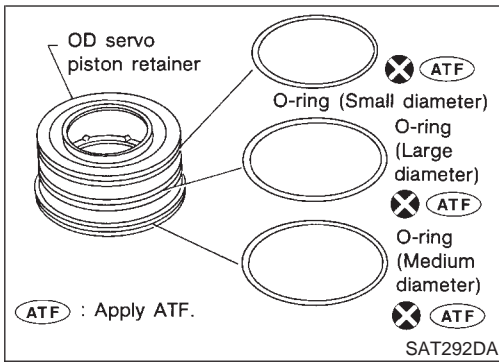
SC

EL

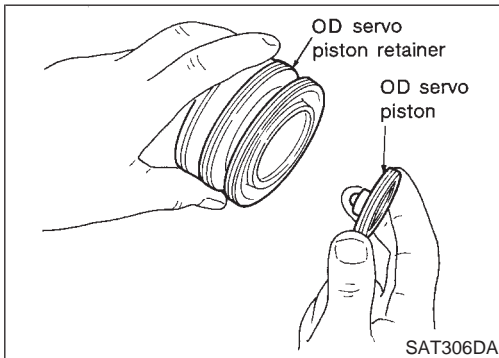
IDX

# REPAIR FOR COMPONENT PARTS

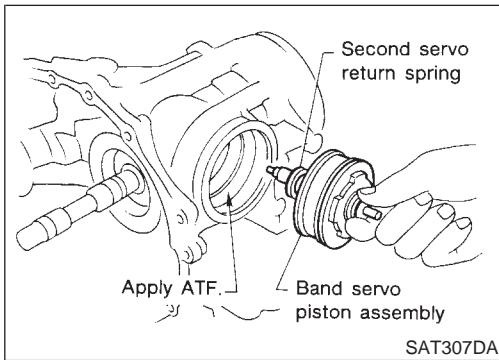
## Band Servo Piston Assembly (Cont'd)



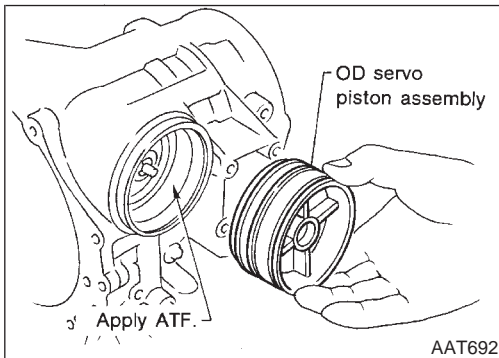
7. Install O-rings to OD servo piston retainer.
  - Apply ATF to O-rings.
  - Pay attention to the positions of the O-rings.



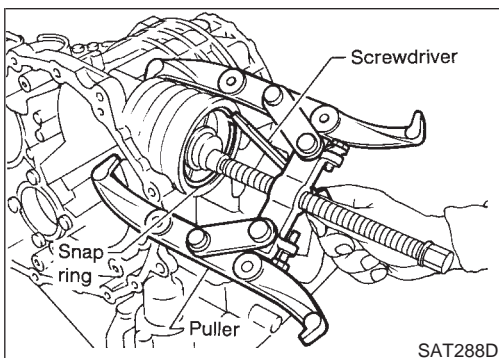
8. Install OD servo piston to OD servo piston retainer.



9. Install band servo piston assembly and 2nd servo return spring to transmission case.
  - Apply ATF to O-ring of band servo piston and transmission case.



10. Install OD servo piston assembly to transmission case.
  - Apply ATF to O-ring of band servo piston and transmission case.



11. Install band servo piston snap ring to transmission case.

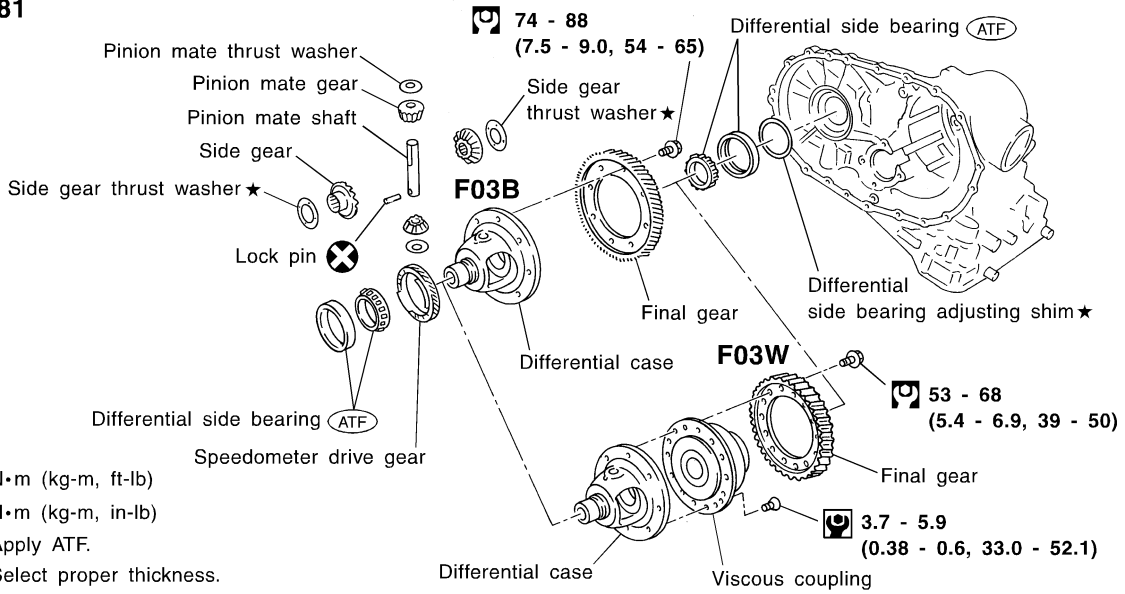


## Final Drive COMPONENTS

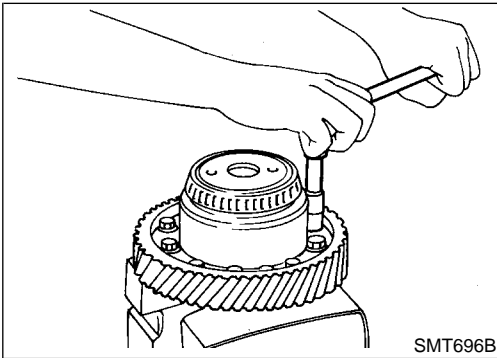
NCAT0169

GI  
MA  
EM  
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EC  
FE  
CL  
MT

### SEC. 381



SAT1451C



### DISASSEMBLY

1. Remove final gear.

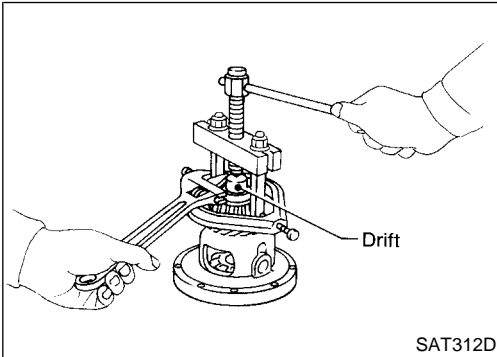
NCAT0170

AT

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BR



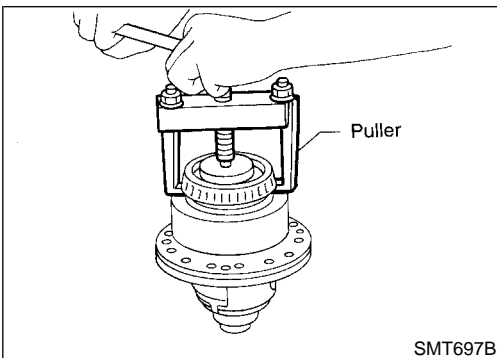
2. Press out differential side bearings.

ST

RS

BT

HA



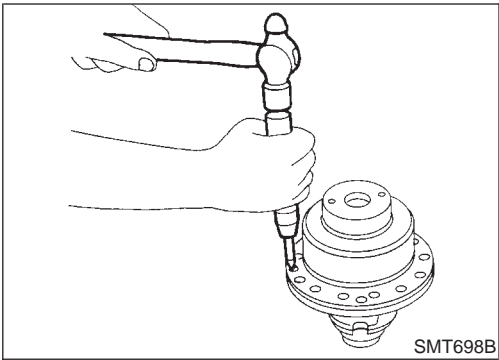
SC

EL

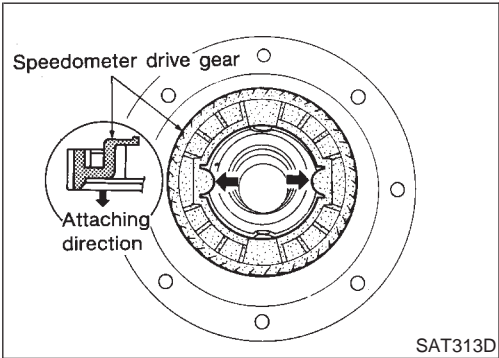
IDX

# REPAIR FOR COMPONENT PARTS

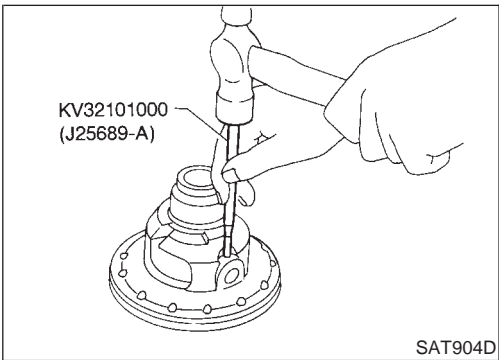
Final Drive (Cont'd)



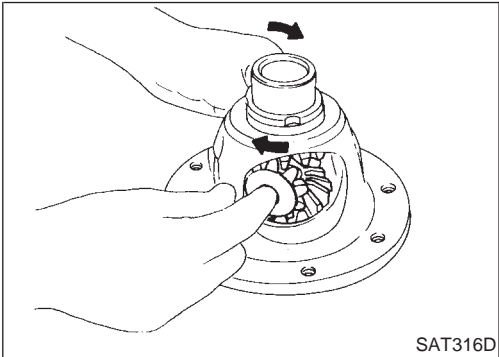
3. Remove viscous coupling — RE4F03W.



4. Remove speedometer drive gear.

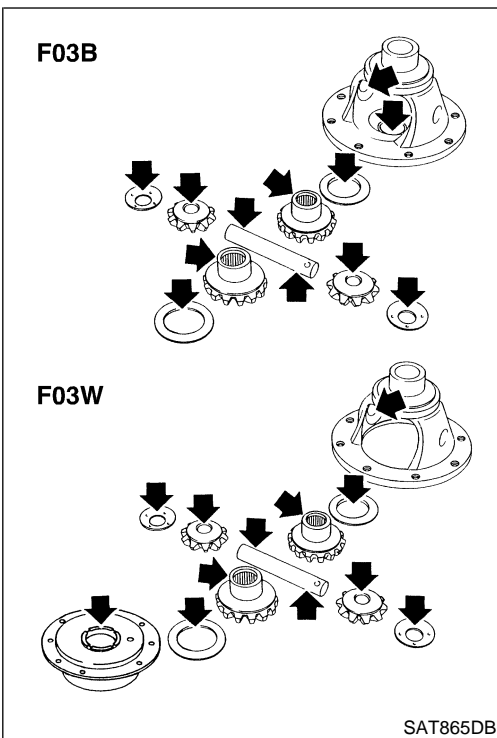


5. Drive out pinion mate shaft lock pin.



6. Draw out pinion mate shaft from differential case.

7. Remove pinion mate gears and side gears.



## INSPECTION

### Gear, Washer, Shaft and Case

NCAT0171

NCAT0171S01

- Check mating surfaces of differential case, side gears, pinion mate gears and viscous coupling.
- Check washers for wear.

GI

MA

EM

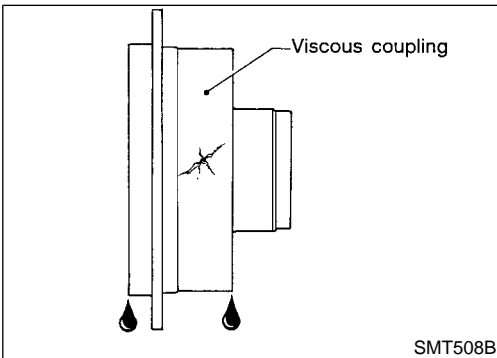
LC

EC

FE

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MT



### Viscous Coupling — RE4F03W

NCAT0171S02

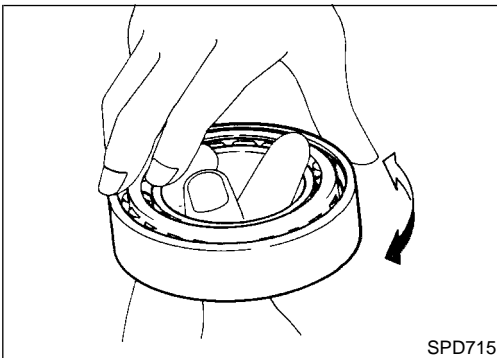
- Check case for cracks.
- Check silicone oil for leakage.

AT

AX

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BR



### Bearings

NCAT0171S03

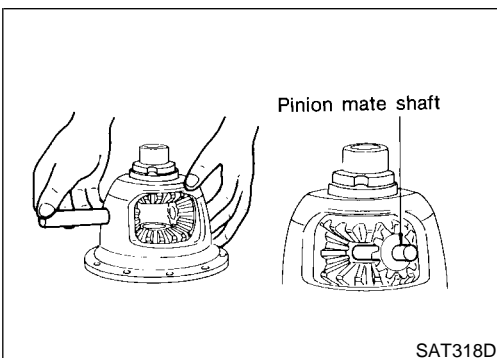
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**

ST

RS

BT

HA



## ASSEMBLY

### — RE4F03B —

NCAT0172

NCAT0172S01

1. Install side gear and thrust washers in differential case.
  2. Install pinion mate gears and thrust washers in differential case while rotating them.
- **When inserting, be careful not to damage pinion mate gear washers.**
  - **Apply ATF to any parts.**

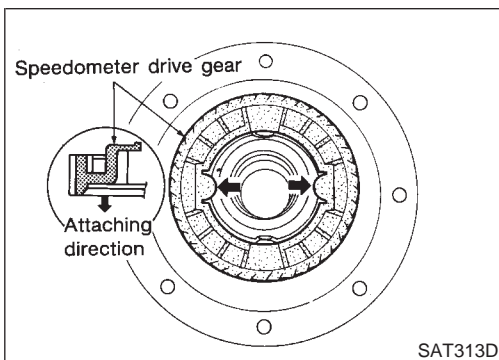
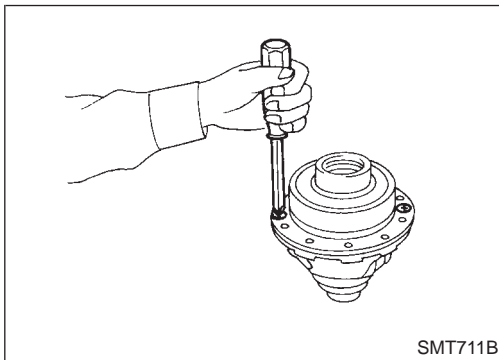
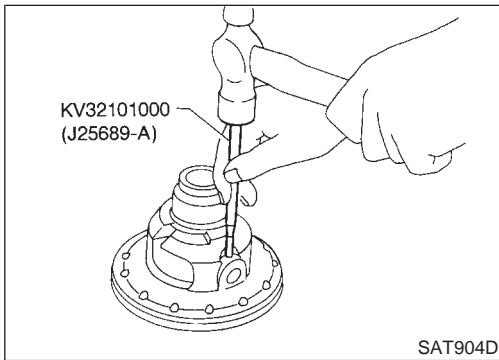
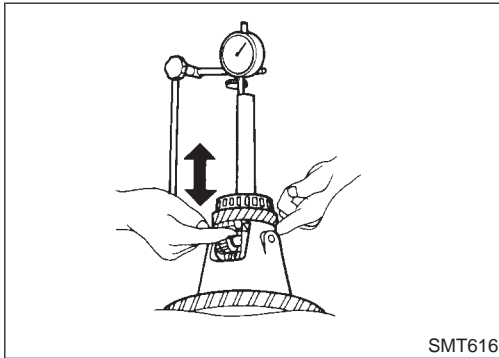
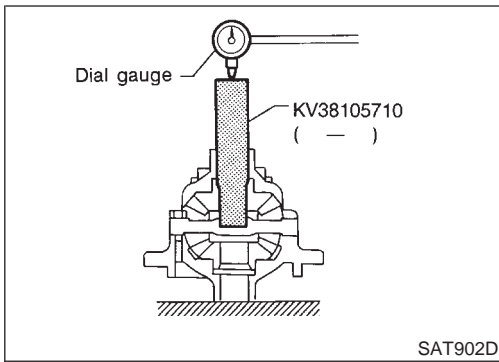
SC

EL

IDX

# REPAIR FOR COMPONENT PARTS

Final Drive (Cont'd)



3. Measure clearance between side gear and differential case with washers using the following procedure.
  - a. Set Tool and dial indicator on side gear.
  - b. Move side gear up and down to measure dial indicator deflection. Always measure indicator deflection on both side gears.

**Clearance between side gear and differential case with washers:**

**0.1 - 0.2 mm (0.004 - 0.008 in)**

- c. If not within specification adjust clearance by changing thickness of side gear thrust washers.

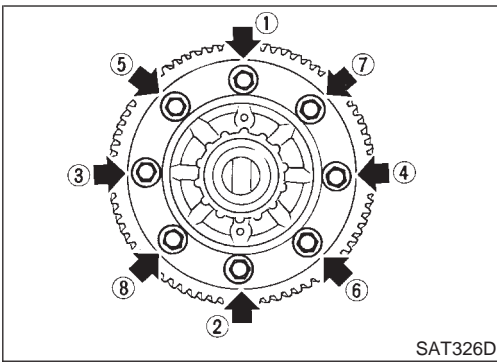
**Side gear thrust washer:**

**Refer to SDS, AT-393.**

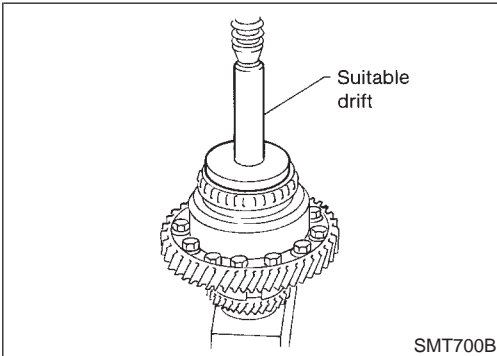
4. Install lock pin.
  - **Make sure that lock pin is flush with case.**

5. Install side gear (viscous coupling side) on differential case and then install viscous coupling — RE4F03W.

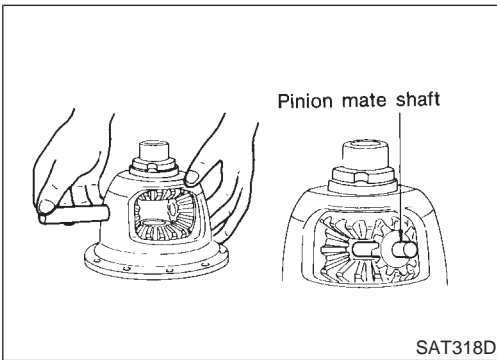
6. Install speedometer drive gear on differential case.
  - **Align the projection of speedometer drive gear with the groove of differential case.**



7. Install final gear and tighten fixing bolts in numerical order.



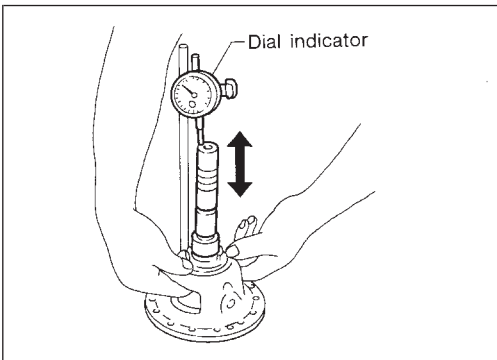
8. Press on differential side bearings.



— RE4F03W —

NCAT0172S02

1. Install side gear and thrust washers in differential case.
  2. Install pinion mate gears and thrust washers in differential case while rotating them.
- **When inserting, be careful not to damage pinion mate gear washers.**
  - **Apply ATF to any parts.**



3. Measure clearance between side gear and differential case & viscous coupling with washers using the following procedure:

**Differential Case Side**

NCAT0172S0201

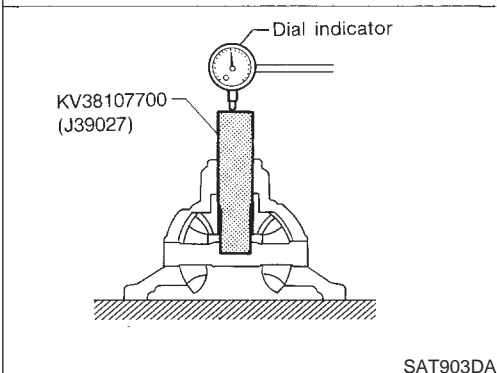
- 1) Set Tool and dial indicator on side gear.
- 2) Move side gear up and down to measure dial indicator deflection.

**Clearance between side gear and differential case with washers:**

**0.1 - 0.2 mm (0.004 - 0.008 in)**

- 3) If not within specification adjust clearance by changing thickness of side gear thrust washer.

**Side gear thrust washers for differential case side:**  
**Refer to SDS, AT-393.**

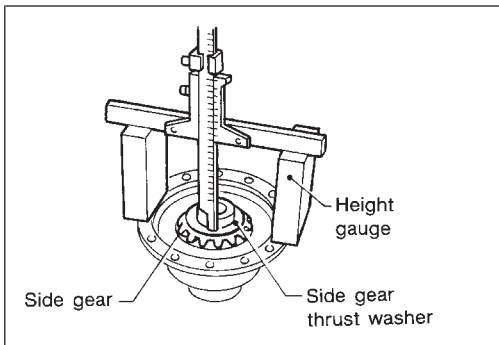


GI  
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**AT**  
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 SC  
 EL  
 IDX

# REPAIR FOR COMPONENT PARTS

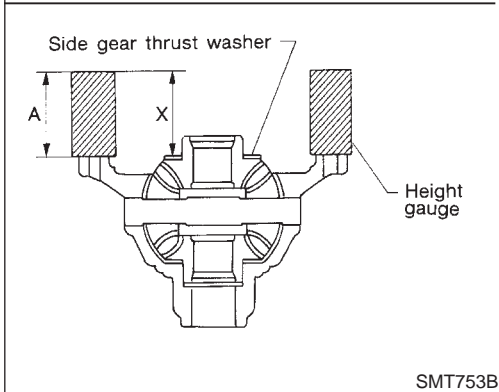
Final Drive (Cont'd)

NCAT0172S0202

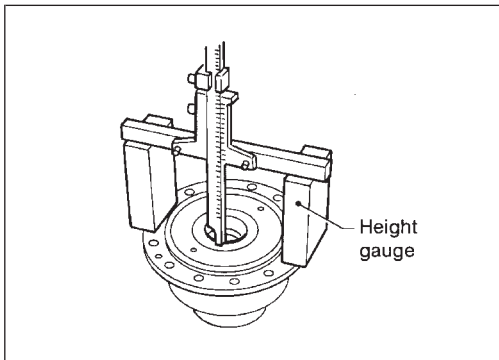


## Viscous Coupling Side

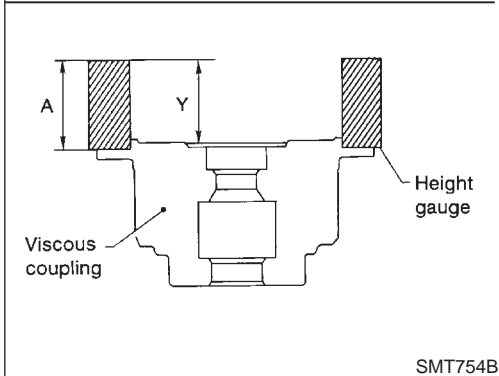
- 1) Place side gear and thrust washer on pinion mate gears installed on differential case.
- 2) Measure dimension X.
  - **Measure dimension X in at least two places.**



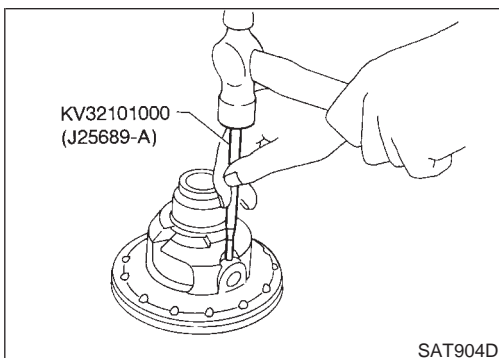
SMT753B



- 3) Measure dimension Y.
  - **Measure dimension Y in at least two places.**
    - Clearance between side gear and viscous coupling =  $X + Y - 2A$ : 0.1 - 0.2 mm (0.004 - 0.008 in)**
    - A: Height of gauge**
- 4) If not within specification, adjust clearance by changing thickness of side gear thrust washer.
  - Side gear thrust washers for viscous coupling side: Refer to SDS, AT-393.**



SMT754B

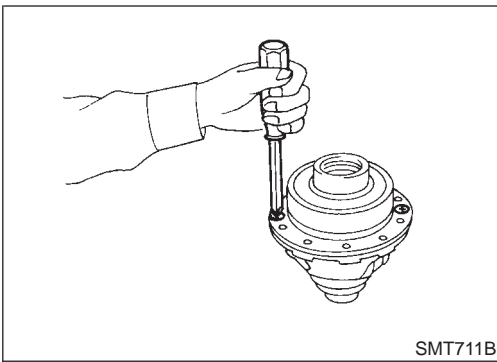


SAT904D

4. Install lock pin.
  - **Make sure that lock pin is flush with case.**

# REPAIR FOR COMPONENT PARTS

Final Drive (Cont'd)



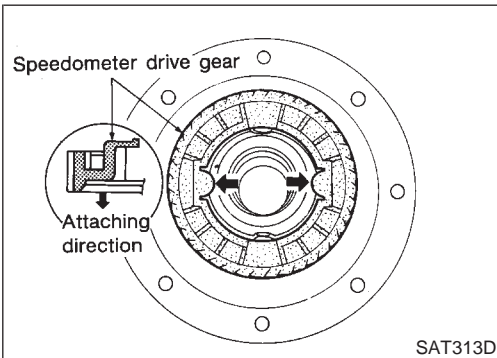
5. Install side gear (viscous coupling side) on differential case and then install viscous coupling — RE4F03W.

GI

MA

EM

LC



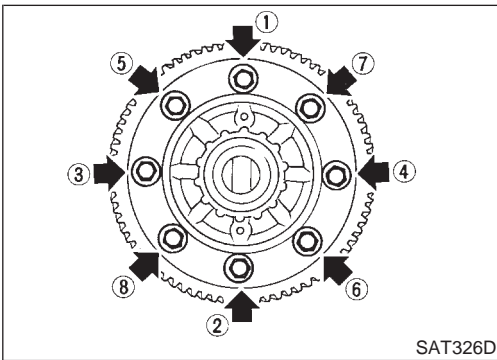
6. Install speedometer drive gear on differential case.
  - **Align the projection of speedometer drive gear with the groove of differential case.**

EC

FE

CL

MT



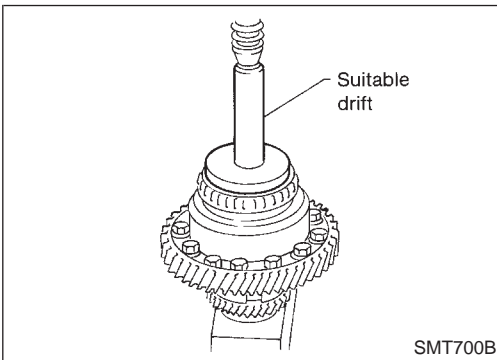
7. Install final gear and tighten fixing bolts in numerical order.

AT

AX

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BR



8. Press on differential side bearings.

ST

RS

BT

HA

SC

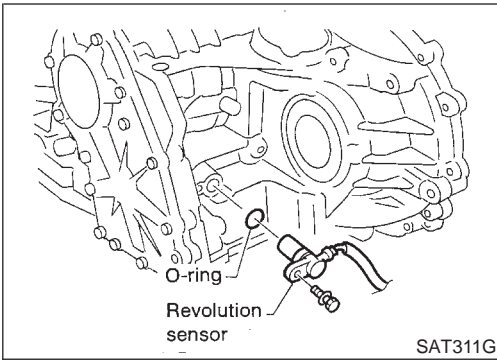
EL

IDX

# ASSEMBLY

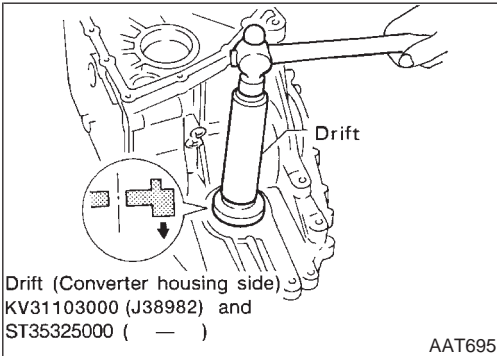
## Assembly (1)

NCAT0173

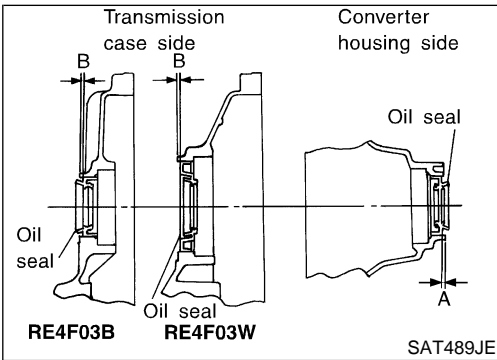


### Assembly (1)

1. Install revolution sensor onto transmission case.  
**Always use new sealing parts.**

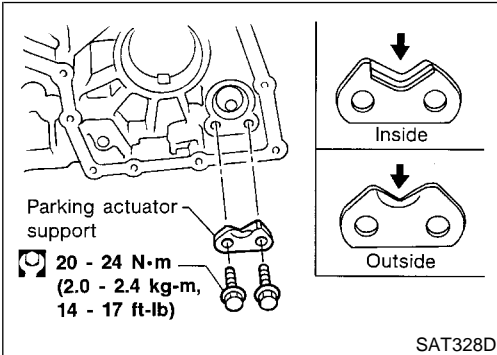


2. Install differential side oil seals on transmission case and converter housing, so that "A" and "B" are within specifications.



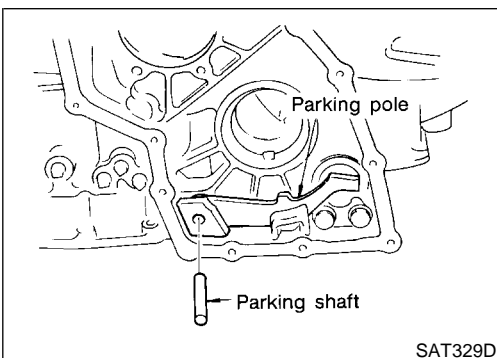
Unit: mm (in)

A	B
5.5 - 6.5 (0.217 - 0.256)	-0.5 to 0.5 (-0.020 to 0.020)



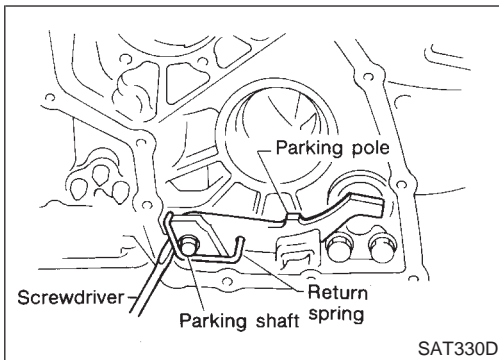
3. Install parking actuator support to transmission case.

- **Pay attention to direction of parking actuator support.**

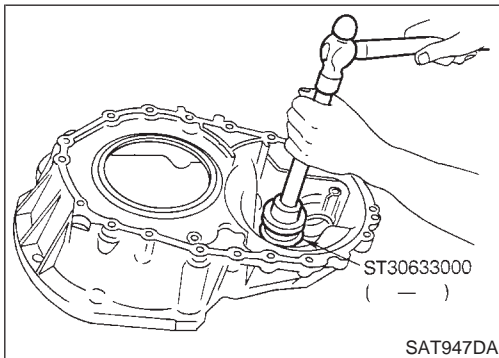


4. Install parking pawl on transmission case and fix it with parking shaft.





5. Install return spring.



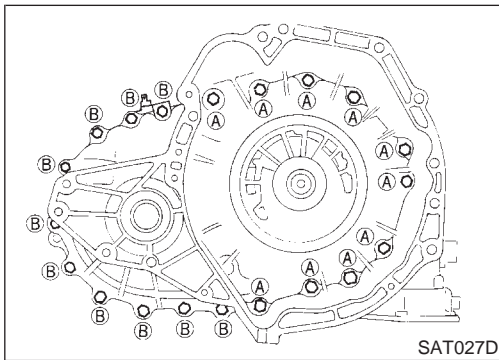
## Adjustment (1)

### DIFFERENTIAL SIDE BEARING PRELOAD

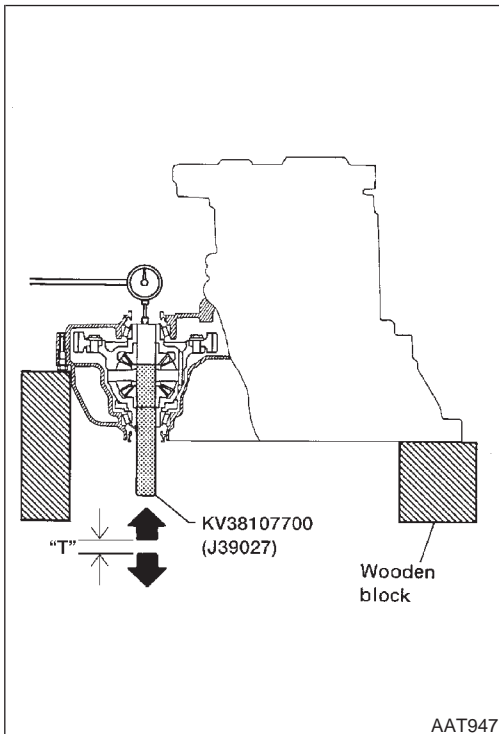
NCAT0174

NCAT0174S01

1. Install differential side bearing outer race without adjusting shim on transmission case.
2. Install differential side bearing outer race on converter housing.



3. Place final drive assembly on transmission case.
4. Install transmission case on converter housing. Tighten transmission case fixing bolts **A** and **B** to the specified torque.



5. Attach dial indicator on differential case at transmission case side.
6. Insert Tool into differential side gear from converter housing.
7. Move Tool up and down and measure dial indicator deflection.
8. Select proper thickness of differential side bearing adjusting shim(s) using SDS table as a guide.

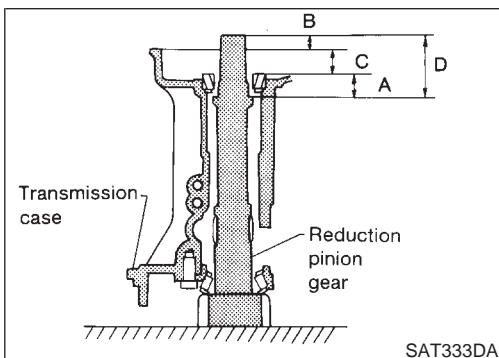
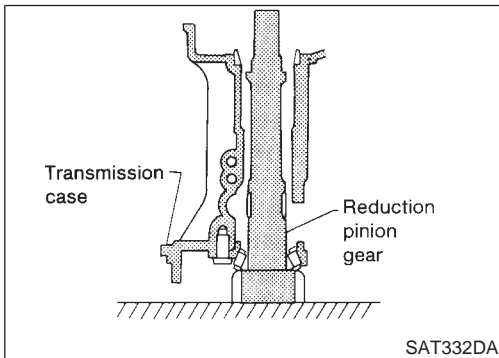
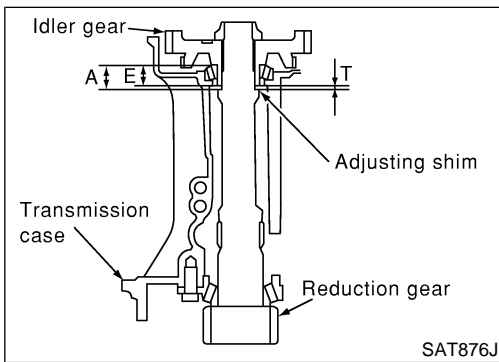
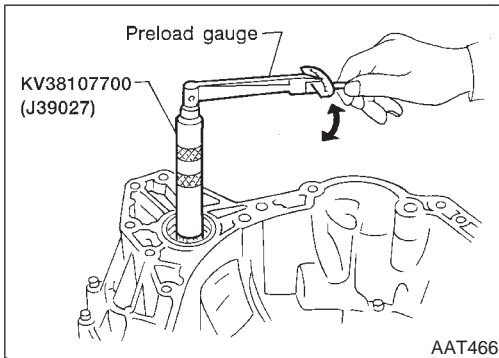
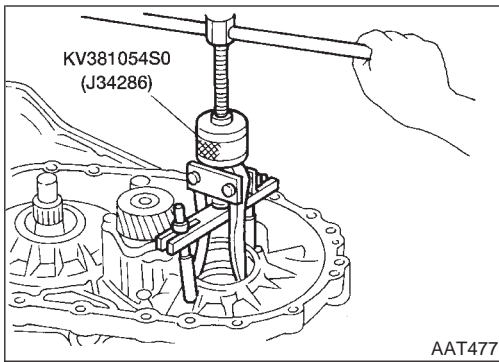
**Differential side bearing preload "T":  
0.04 - 0.09 mm (0.0016 - 0.0035 in)**

**Differential side bearing adjusting shim:  
Refer to SDS, AT-394.**

GI  
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AT  
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SC  
EL  
IDX

# ASSEMBLY

## Adjustment (1) (Cont'd)



9. Remove converter housing from transmission case.
10. Remove final drive assembly from transmission case.
11. Remove differential side bearing outer race from transmission case.
12. Reinstall differential side bearing outer race and shim(s) selected from SDS table on transmission case.
13. Reinstall converter housing on transmission case and tighten transmission case fixing bolts to the specified torque.

14. Insert Tool into differential case and measure turning torque of final drive assembly.

- Turn final drive assembly in both directions several times to seat bearing rollers correctly.

**Turning torque of final drive assembly (New bearing):**  
0.49 - 1.08 N-m (5.0 - 11.0 kg-cm, 4.3 - 9.5 in-lb)

- When old bearing is used again, turning torque will be slightly less than the above.
- Make sure torque is close to the specified range.

## REDUCTION PINION GEAR BEARING PRELOAD

NCAT0174S02

- Be sure to remove final drive assembly before doing this procedure.
- Using caliper and straightedge, calculate a dimension "T" (adjuster shim thickness) in the left figure by the following formula. And adjust the inspection standard for pre-load (rotating slide torque) as shown below.

$$T = A - E$$

**Inspection standard for preload:**

0.1 - 0.69 N-m (1.1 - 7.0 kg-cm, 0.95 - 6.08 in-lb)

1. Remove transmission case and final drive assembly from converter housing.
2. Select proper thickness of reduction pinion gear bearing adjusting shim using the following procedures.
  - a. Place reduction pinion gear on transmission case as shown.

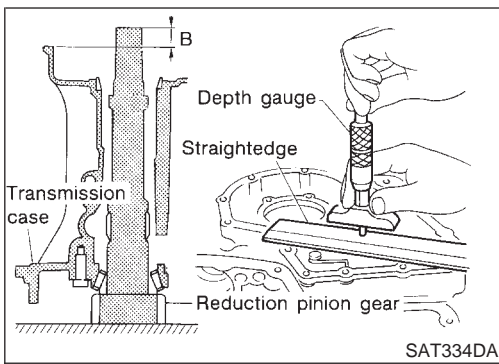
- b. Place idler gear bearing on transmission case.
  - c. Measure dimensions "B", "C" and "D" and calculate dimension "A".

$$A = D - (B + C)$$

**"A": Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction pinion gear.**

# ASSEMBLY

Adjustment (1) (Cont'd)



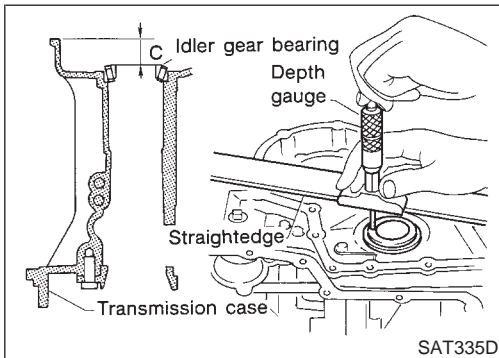
- Measure dimension “B” between the end of reduction pinion gear and the surface of transmission case.
- **Measure dimension “B” in at least two places.**

GI

MA

EM

LC



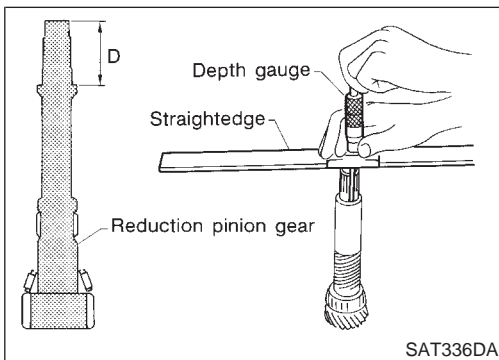
- Measure dimension “C” between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension “C” in at least two places.**

EC

FE

CL

MT



- Measure dimension “D” between the end of reduction pinion gear and the adjusting shim mating surface of reduction pinion gear.
- **Measure dimension “D” in at least two places.**
- Calculate dimension “A”.

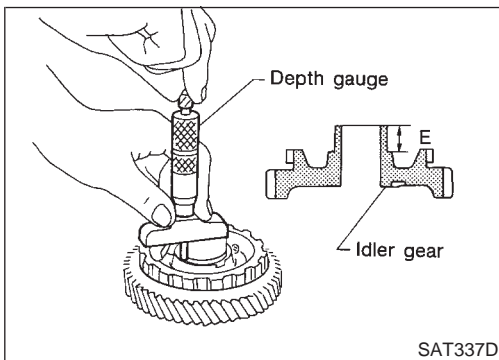
AT

AX

$$A = D - (B + C)$$

SU

BR



- d. Measure dimension “E” between the end of idler gear and the idler gear bearing inner race mating surface of idler gear.
- **Measure dimension “E” in at least two places.**

ST

RS

BT

HA

- e. Calculate “T” and select proper thickness of reduction pinion gear bearing adjusting shim using SDS table as a guide.

SC

$$T = A - E - 0.05 \text{ mm (0.0020 in)*}$$

EL

**Reduction pinion gear bearing adjusting shim:**

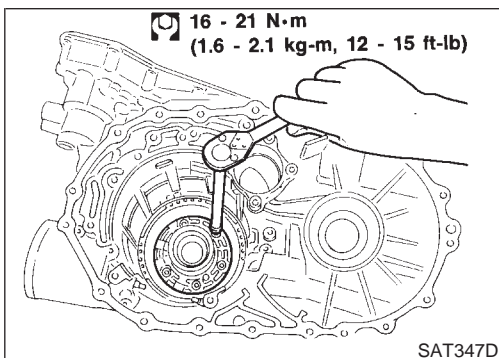
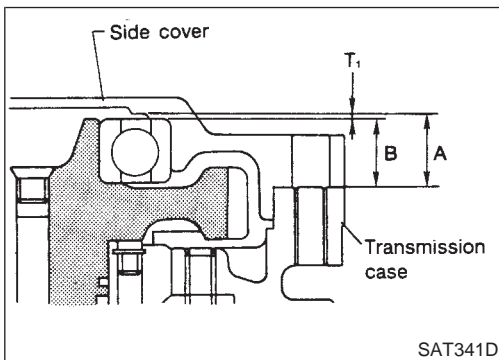
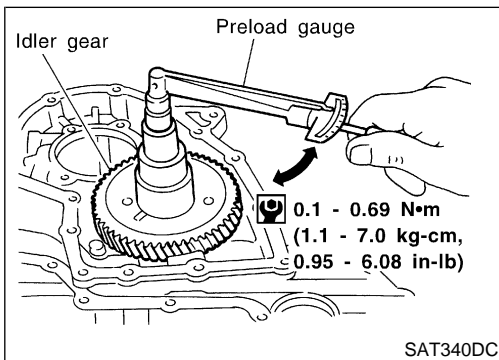
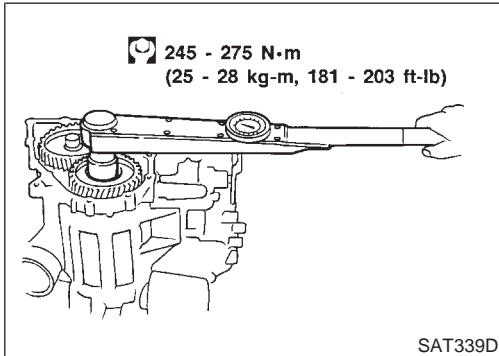
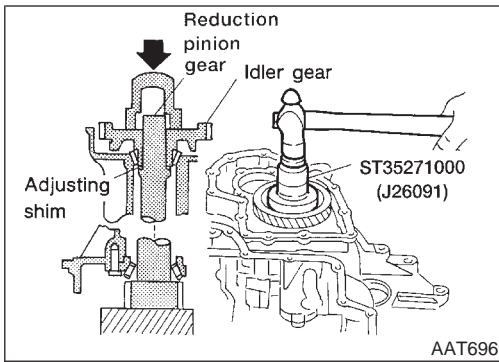
**Refer to SDS, AT-397.**

\*: Bearing preload

IDX

# ASSEMBLY

## Adjustment (1) (Cont'd)



3. Install reduction pinion gear and reduction pinion gear bearing adjusting shim selected in step 2-e on transmission case.
4. Press idler gear bearing inner race on idler gear.
5. Press idler gear on reduction pinion gear.
  - Press idler gear so that idler gear can be locked by parking pawl.

6. Tighten idler gear lock nut to the specified torque.
  - Lock idler gear with parking pawl when tightening lock nut.

7. Measure turning torque of reduction pinion gear.
  - When measuring turning torque, turn reduction pinion gear in both directions several times to seat bearing rollers correctly.

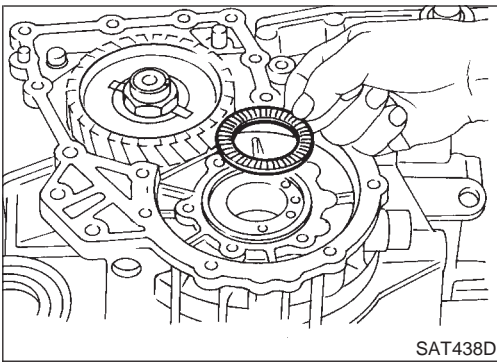
**Turning torque of reduction pinion gear:**  
0.1 - 0.69 N·m (1.1 - 7.0 kg-cm, 0.95 - 6.08 in-lb)

## OUTPUT SHAFT END PLAY

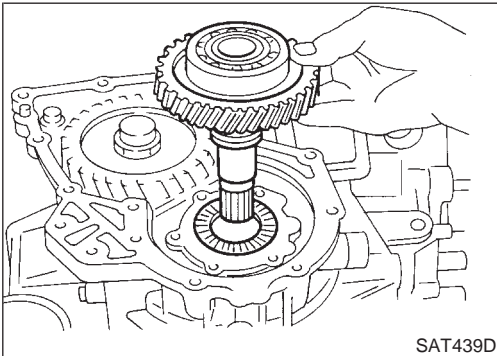
NCAT0174S03

- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.

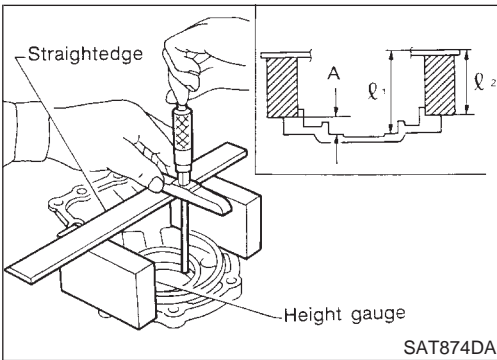
1. Install bearing retainer for output shaft.



2. Install output shaft thrust needle bearing on bearing retainer.



3. Install output shaft on transmission case.

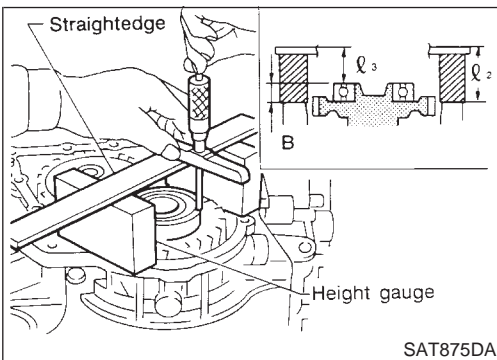


4. Measure dimensions " $l_1$ " and " $l_2$ " at side cover and then calculate dimension "A".

- Measure dimension " $l_1$ " and " $l_2$ " in at least two places  
**"A": Distance between transmission case fitting surface and adjusting shim mating surface**

$$A = l_1 - l_2$$

$l_2$ : Height of gauge



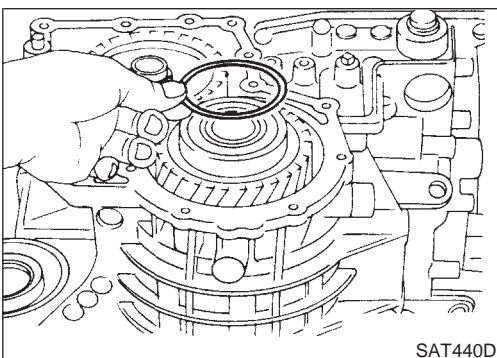
5. Measure dimensions " $l_2$ " and " $l_3$ " and then calculate dimension "B".

Measure " $l_2$ " and " $l_3$ " in at least two places.

**"B": Distance between the end of output shaft bearing outer race and the side cover fitting surface of transmission case**

$$B = l_2 - l_3$$

$l_2$ : Height of gauge



6. Select proper thickness of adjusting shim so that output shaft end play (clearance between side cover and output shaft bearing) is within specifications.

**Output shaft end play (A - B):**

**0 - 0.5 mm (0 - 0.020 in)**

**Output shaft end play adjusting shim:**

**Refer to SDS, AT-398.**

7. Install adjusting shim on output shaft bearing.

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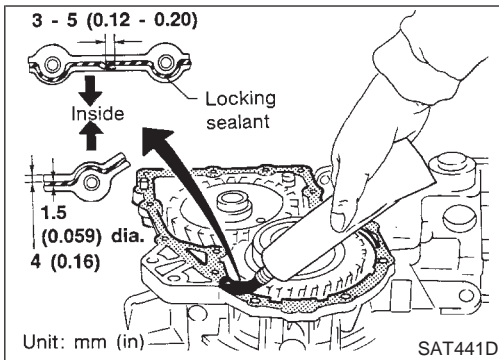
SC

EL

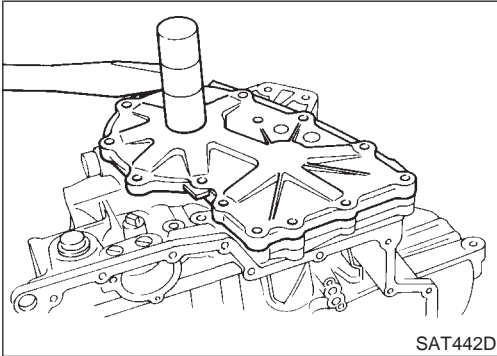
IDX

# ASSEMBLY

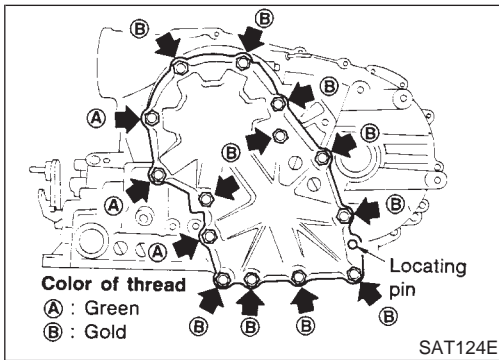
## Adjustment (1) (Cont'd)



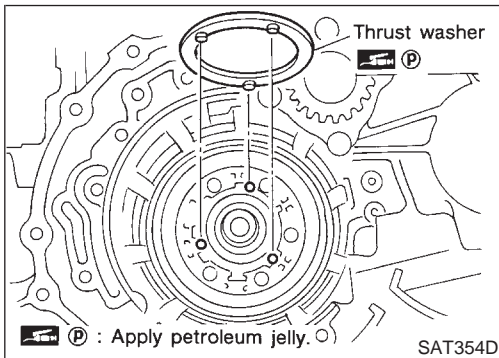
8. Apply locking sealant to transmission case as shown in illustration.



9. Install side cover on transmission case.
  - Apply locking sealant to the mating surface of transmission case.



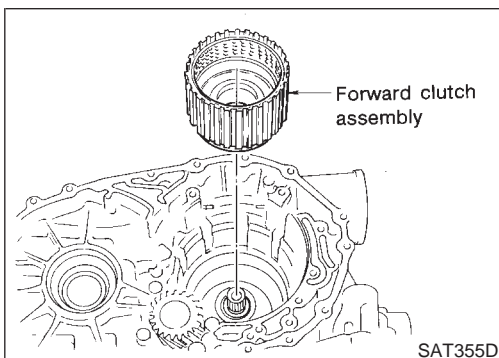
10. Tighten side cover fixing bolts to specified torque.
  - Do not mix bolts A and B.
  - Always replace bolts A as they are self-sealing bolts.



## Assembly (2)

NCAT0175

1. Remove paper rolled around bearing retainer.
2. Install thrust washer on bearing retainer.
  - Apply petroleum jelly to thrust washer.

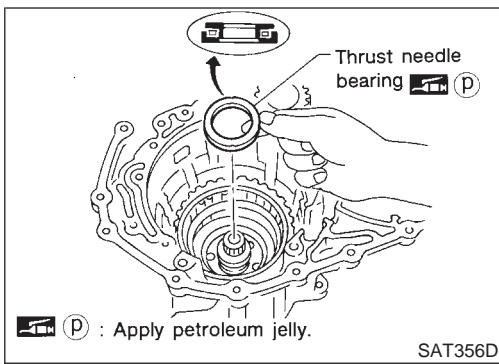


3. Install forward clutch assembly.
  - Align teeth of low & reverse brake drive plates before installing.
  - Make sure that bearing retainer seal rings are not spread.



# ASSEMBLY

Assembly (2) (Cont'd)



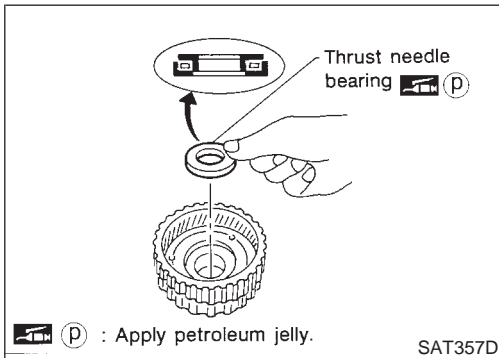
4. Install thrust needle bearing on bearing retainer.
  - Apply petroleum jelly to thrust bearing.
  - Pay attention to direction of thrust needle bearing.

GI

MA

EM

LC



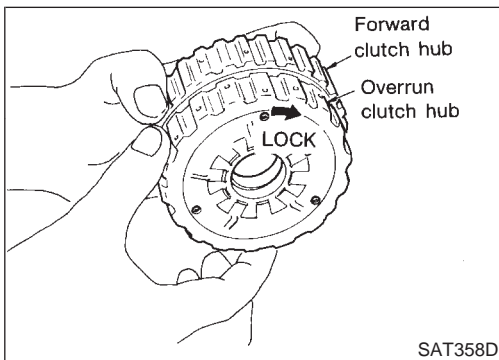
5. Install thrust needle bearing on rear internal gear.
  - Apply petroleum jelly to thrust needle bearing.
  - Pay attention to direction of thrust needle bearing.

EC

FE

CL

MT



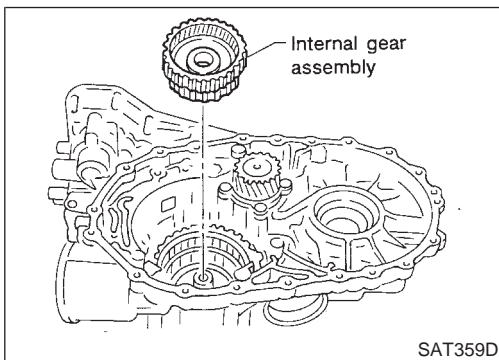
6. Hold forward clutch hub and turn overrun clutch hub. Check overrun clutch hub for directions of lock and unlock.
  - If not as shown in illustration, check installed direction of forward one-way clutch.

AT

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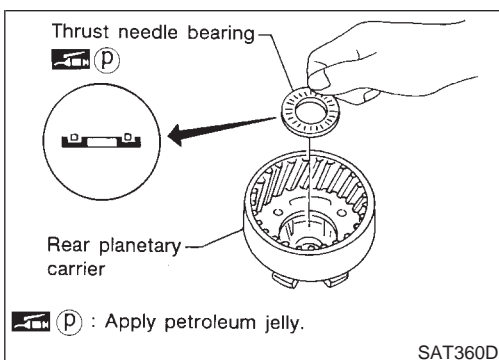
7. Install rear internal gear assembly.
  - Align teeth of forward clutch and overrun clutch drive plate.

ST

RS

BT

HA



8. Install needle bearing on rear planetary carrier.
  - Apply petroleum jelly to needle bearing.
  - Pay attention to direction of needle bearing.

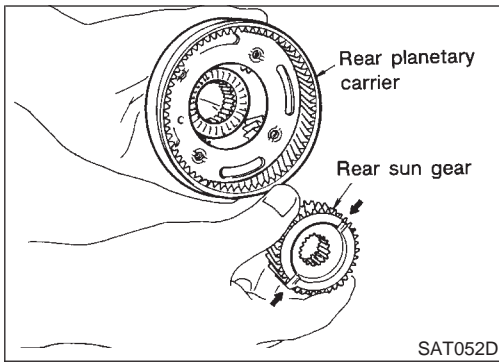
SC

EL

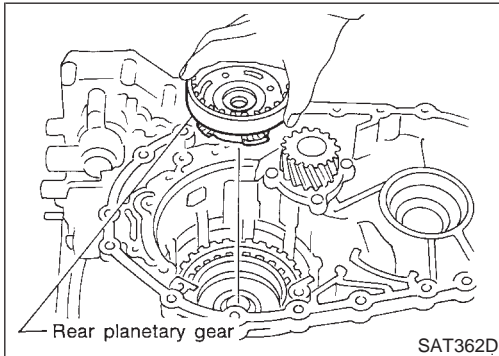
IDX

# ASSEMBLY

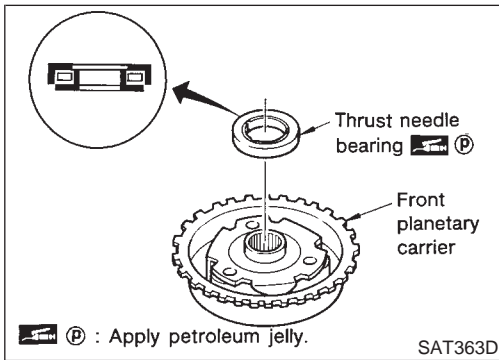
## Assembly (2) (Cont'd)



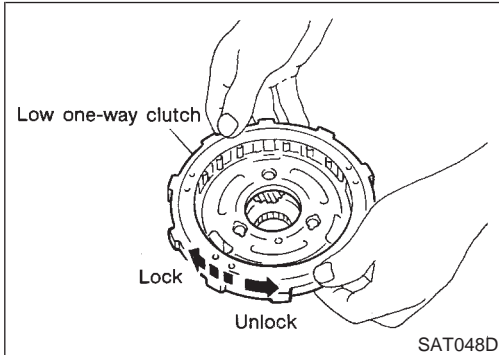
9. Install rear sun gear on rear planetary carrier.
  - Pay attention to direction of rear sun gear.



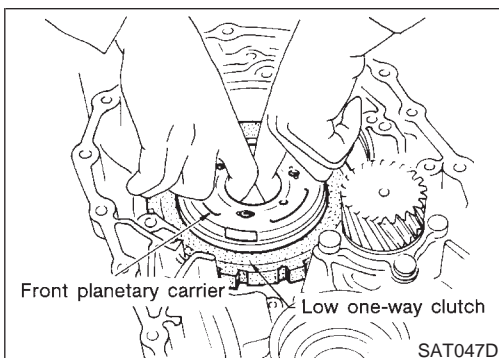
10. Install rear planetary carrier on transmission case.



11. Install thrust needle bearing on front planetary carrier.
  - Apply petroleum jelly to thrust needle bearing.
  - Pay attention to direction of thrust needle bearing.

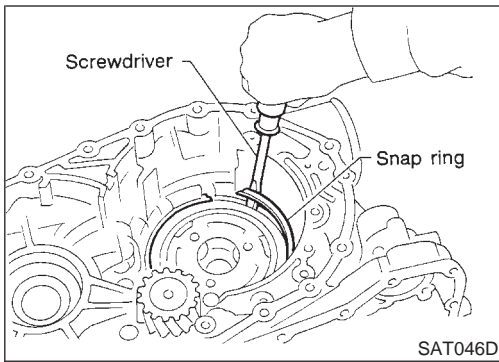


12. Install low one-way clutch to front planetary carrier by turning it in the direction of the arrow as shown.
13. While holding front planetary carrier, turn low one-way clutch. Check low one-way clutch for correct directions of lock and unlock.



14. Install front planetary carrier assembly on transmission case.





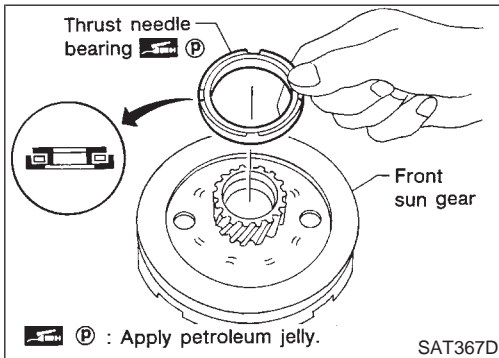
15. Install snap ring with screwdriver.
- **Forward clutch and bearings must be correctly installed for snap ring to fit groove of transmission case.**

GI

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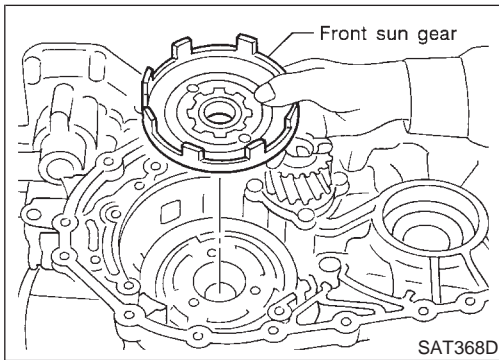
16. Install needle bearing on front sun gear.
- **Apply petroleum jelly to needle bearing.**
  - **Pay attention to direction of needle bearing.**

EC

FE

CL

MT



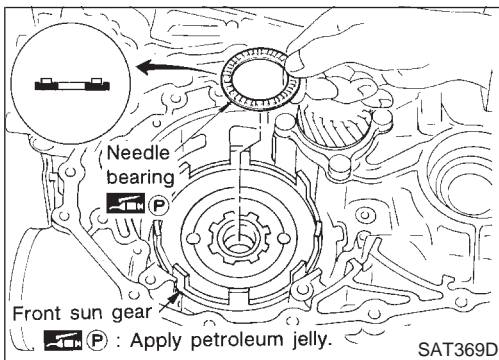
17. Install front sun gear on front planetary carrier.

**AT**

AX

SU

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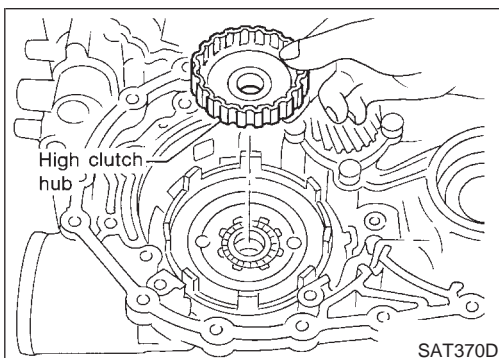
18. Install needle bearing on front sun gear.
- **Apply petroleum jelly to needle bearing.**
  - **Pay attention to direction of needle bearing.**

ST

RS

BT

HA



19. Install high clutch hub on front sun gear.

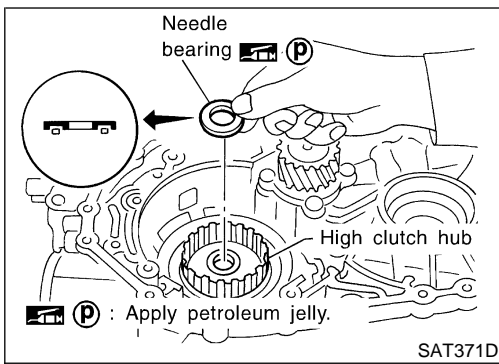
SC

EL

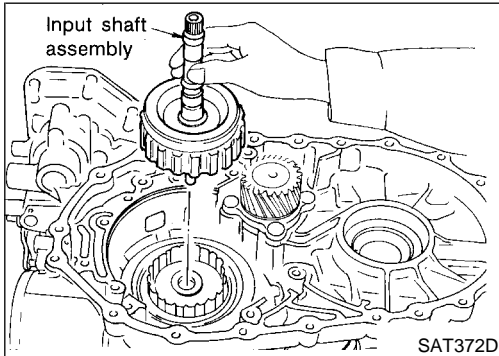
IDX

# ASSEMBLY

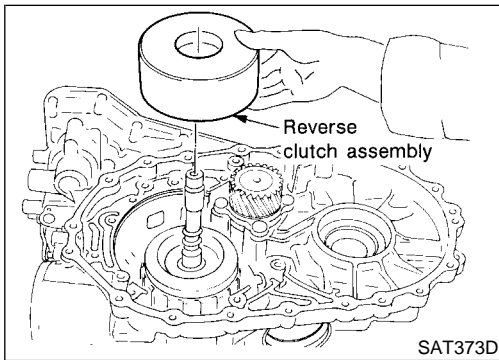
## Assembly (2) (Cont'd)



20. Install needle bearing on high clutch hub.
- Apply petroleum jelly to needle bearing.
  - Pay attention to direction of needle bearing.



21. Remove paper rolled around input shaft.  
22. Install input shaft assembly.
- Align teeth of high clutch drive plates before installing.



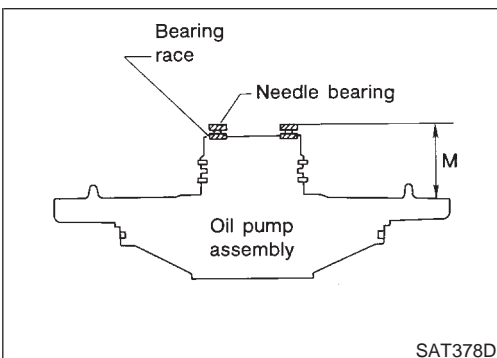
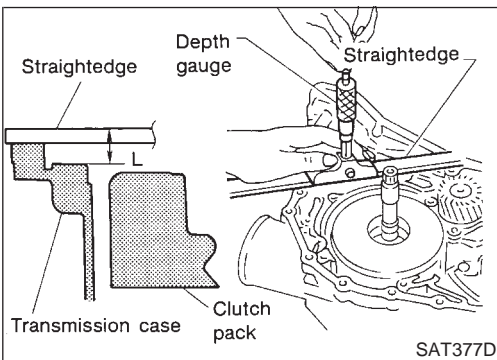
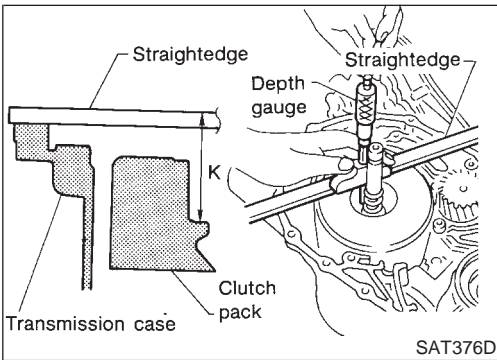
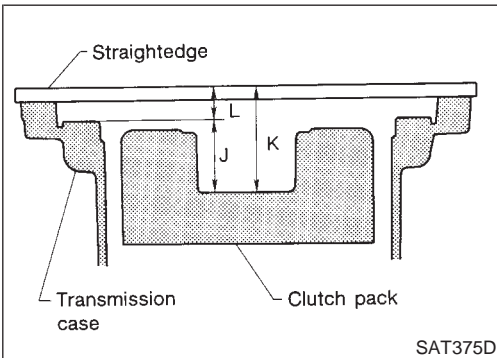
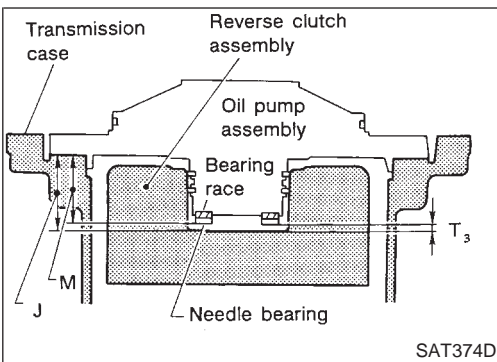
23. Install reverse clutch assembly.
- Align teeth of reverse clutch drive plates before installing.

## Adjustment (2)

NCAT0176

When any parts listed below are replaced, adjust total end play and reverse clutch end play.

Part name	Total end play	Reverse clutch end play
Transmission case	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●	●
Reverse clutch drum	—	●



## TOTAL END PLAY

NCAT0176S01

- Measure clearance between reverse clutch drum and needle bearing for oil pump cover.
- Select proper thickness of bearing race so that end play is within specifications.

1. Measure dimensions "K" and "L" and then calculate dimension "J".

- a. Measure dimension "K".

- b. Measure dimension "L".
- c. Calculate dimension "J".

**"J": Distance between oil pump fitting surface of transmission case and needle bearing mating surface of high clutch drum**

$$J = K - L$$

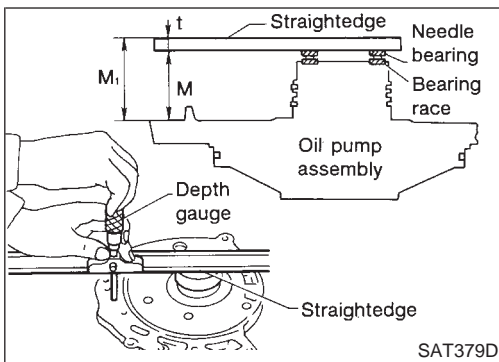
2. Measure dimension "M".

- a. Place bearing race and needle bearing on oil pump assembly.

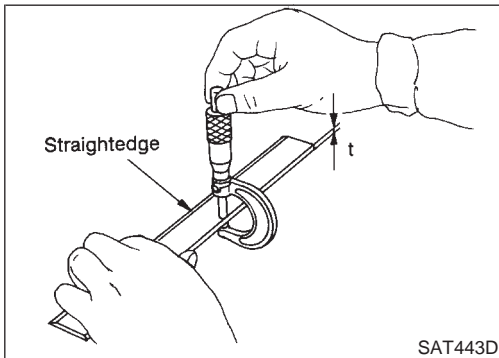
GI  
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CL  
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AT  
AX  
SU  
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ST  
RS  
BT  
HA  
SC  
EL  
IDX

# ASSEMBLY

## Adjustment (2) (Cont'd)



- b. Measure dimension "M".  
**"M": Distance between transmission case fitting surface and needle bearing on oil pump cover**  
**"M<sub>1</sub>": Indication of gauge**



- c. Measure thickness of straightedge "t".  
 **$M = M_1 - t$**

3. Adjust total end play "T<sub>3</sub>".

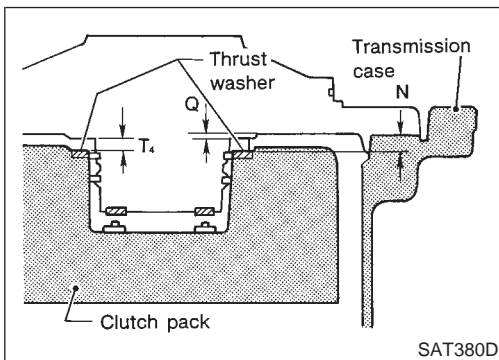
$$T_3 = J - M$$

**Total end play "T<sub>3</sub>":**

**0.25 - 0.55 mm (0.0098 - 0.0217 in)**

- Select proper thickness of bearing race so that total end play is within specifications.

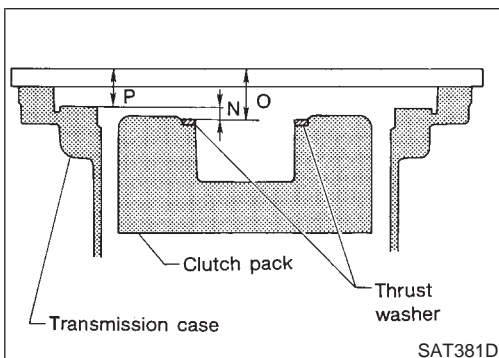
**Bearing races: Refer to SDS, AT-399.**



## REVERSE CLUTCH END PLAY

NCAT0176S02

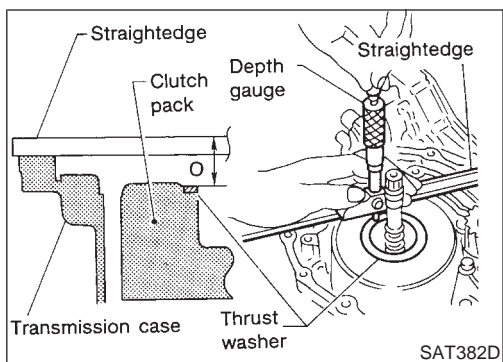
- Measure clearance between oil pump cover and thrust washer for reverse clutch drum.
- Select proper thickness of thrust washer so that end play is within specifications.



1. Measure dimensions "O" and "P" and then calculate dimension "N".

# ASSEMBLY

Adjustment (2) (Cont'd)



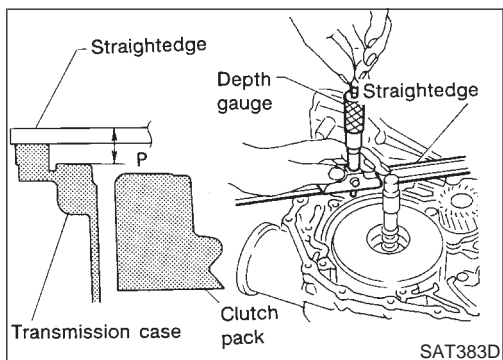
- a. Place thrust washer on reverse clutch drum.
- b. Measure dimension "O".

GI

MA

EM

LC



- c. Measure dimension "P".
- d. Calculate dimension "N".  
**"N": Distance between oil pump fitting surface of transmission case and thrust washer on reverse clutch drum**  

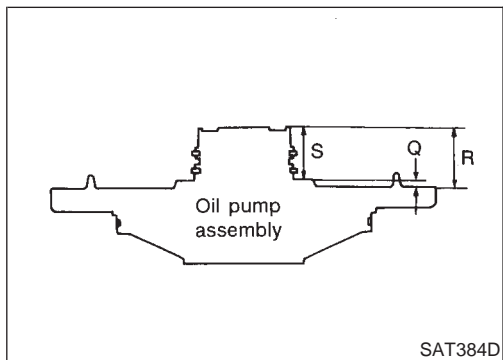
$$N = O - P$$

EC

FE

CL

MT



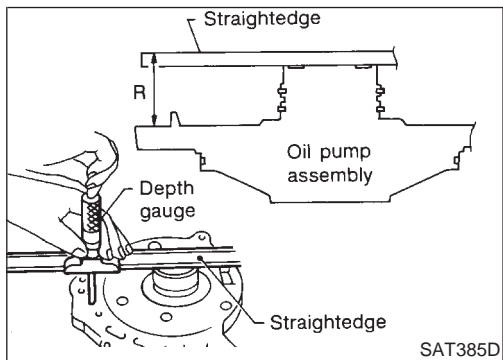
2. Measure dimensions "R" and "S" and then calculate dimension "Q".

AT

AX

SU

BR



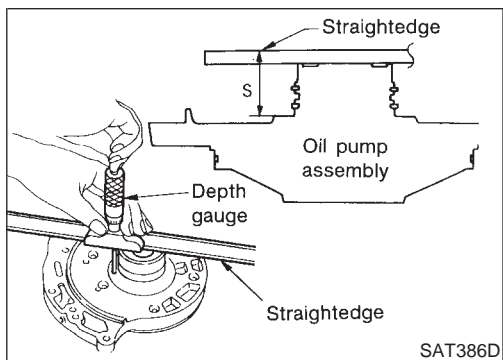
- a. Measure dimension "R".

ST

RS

BT

HA



- b. Measure dimension "S".
- c. Calculate dimension "Q".  
**"Q": Distance between transmission case fitting surface and thrust washer mating surface**  

$$Q = R - S$$

SC

EL

IDX

# ASSEMBLY

Adjustment (2) (Cont'd)

- Adjust reverse clutch end play "T<sub>4</sub>".

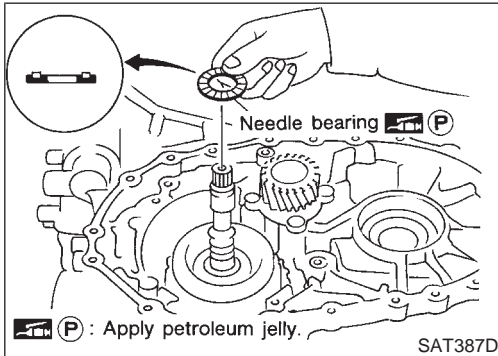
$$T_4 = N - Q$$

Reverse clutch end play:

0.65 - 1.00 mm (0.0256 - 0.0394 in)

- Select proper thickness of thrust washer so that reverse clutch end play is within specifications.

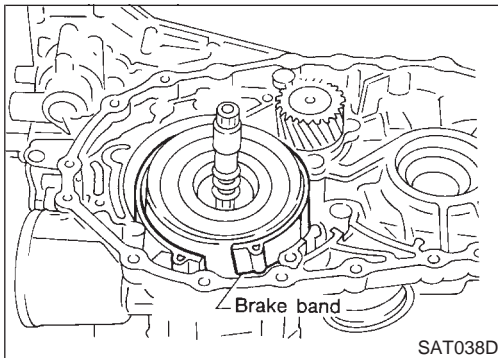
**Thrust washer: Refer to SDS, AT-399.**



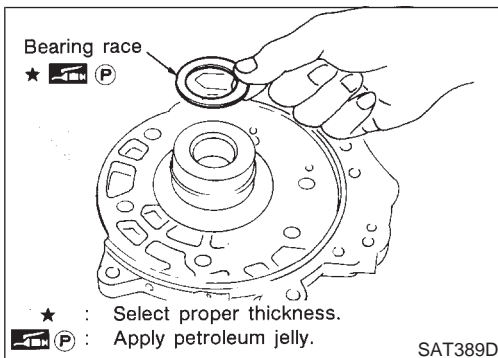
## Assembly (3)

NCAT0177

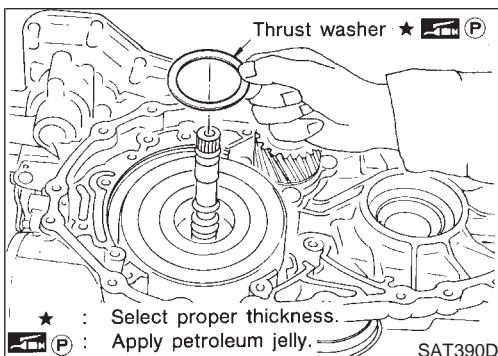
- Remove reverse clutch assembly and install needle bearing on high clutch assembly.
- Pay attention to direction of needle bearing.**
- Install reverse clutch assembly.



- Install anchor end pin and lock nut on transmission case.
- Place brake band on outside of reverse clutch drum. Tighten anchor end pin just enough so that brake band is evenly fitted on reverse clutch drum.



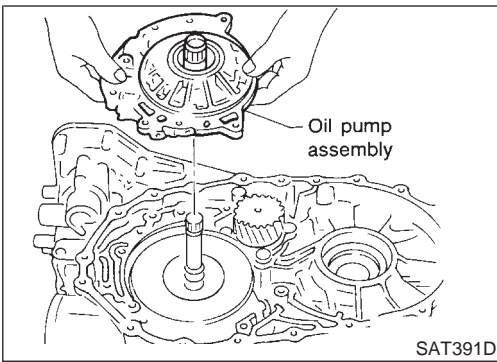
- Place bearing race selected in total end play adjustment step on oil pump cover.
- Apply petroleum jelly to bearing race.**



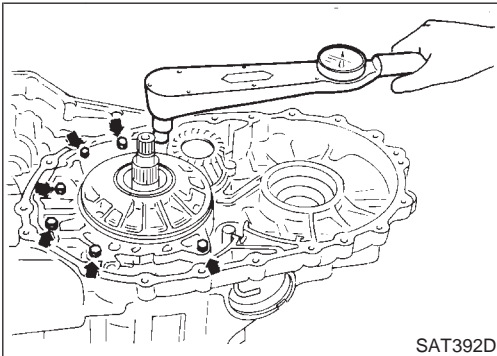
- Place thrust washer selected in reverse clutch end play step on reverse clutch drum.
- Apply petroleum jelly to thrust washer.**

# ASSEMBLY

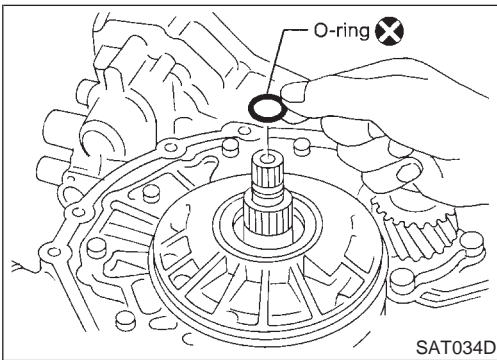
Assembly (3) (Cont'd)



7. Install oil pump assembly on transmission case.

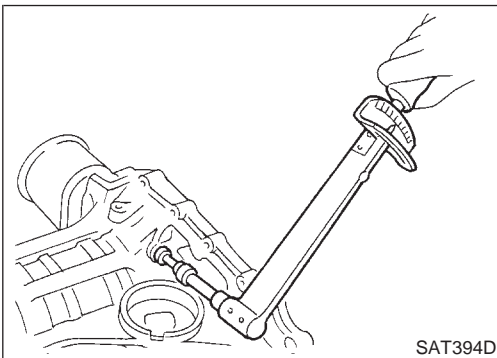


8. Tighten oil pump fixing bolts to specified torque.



9. Install O-ring to input shaft.

- Apply ATF to O-ring.

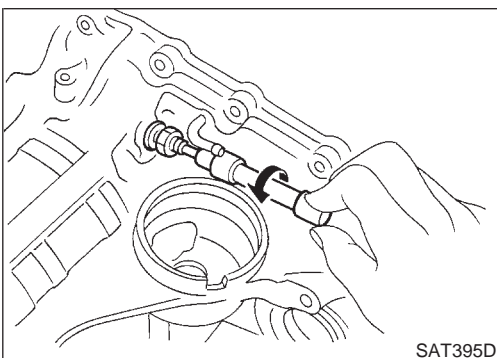


10. Adjust brake band.

a. Tighten anchor end pin to specified torque.

**Anchor end pin:**

**🔩 : 3.9 - 5.9 N·m (0.4 - 0.6 kg·m, 35 - 52 in·lb)**



b. Back off anchor end pin two and a half turns.

GI

MA

EM

LC

EC

FE

CL

MT

**AT**

AX

SU

BR

ST

RS

BT

HA

SC

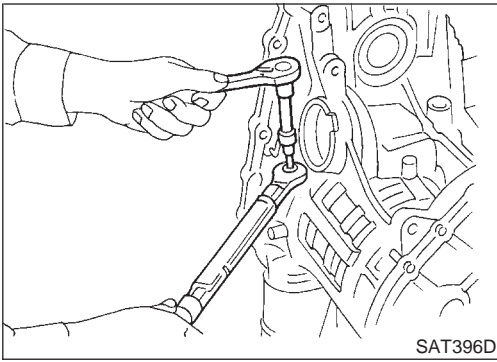
EL

IDX

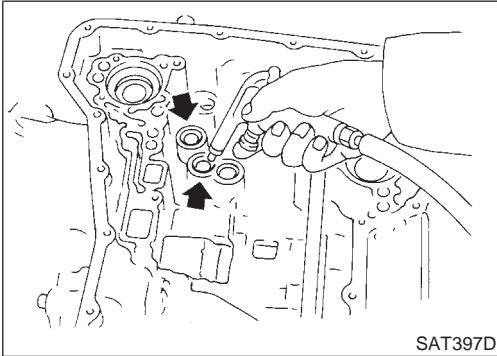


# ASSEMBLY

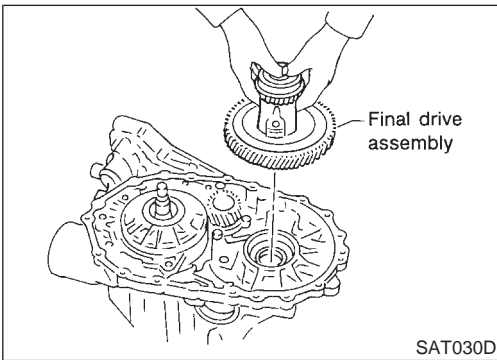
## Assembly (3) (Cont'd)



- c. While holding anchor end pin, tighten lock nut.



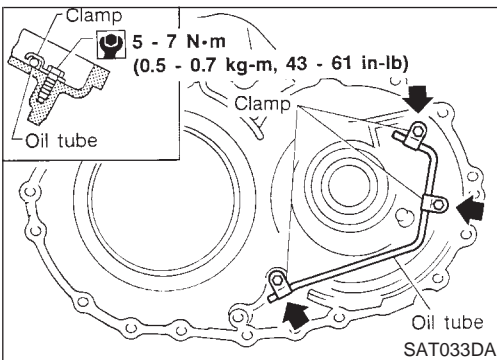
11. Apply compressed air to oil holes of transmission case and check operation of brake band.



## Assembly (4)

NCAT0178

1. Install final drive assembly on transmission case.

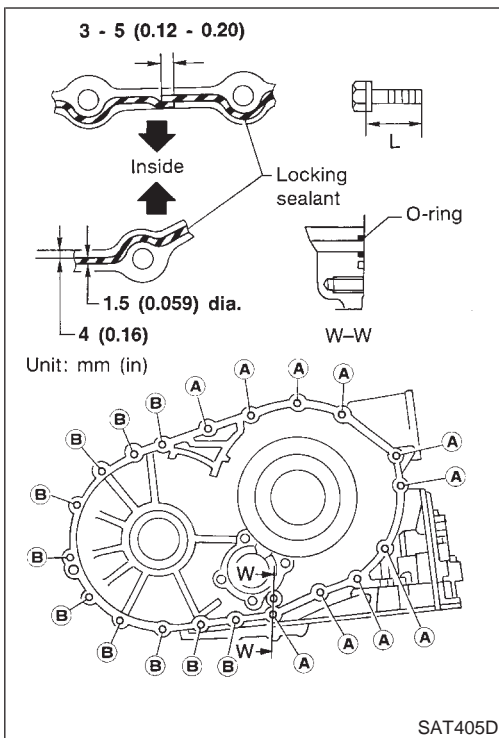


2. Install oil tube on converter housing.



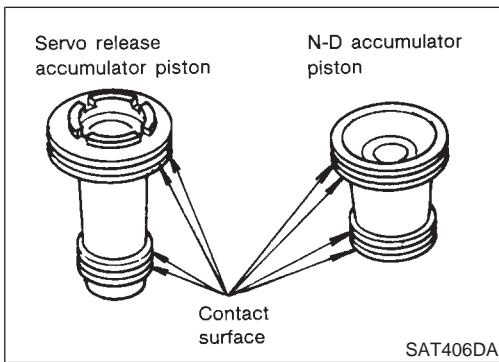
# ASSEMBLY

Assembly (4) (Cont'd)

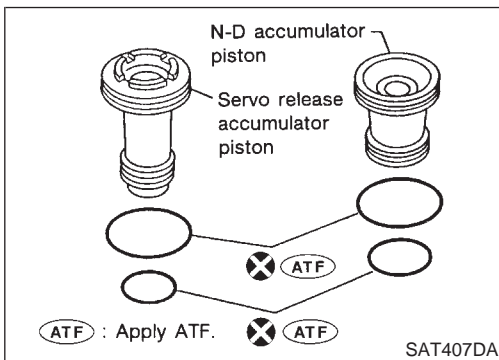


3. Install O-ring on differential oil port of transmission case.
4. Install converter housing on transmission case.
- **Apply locking sealant to mating surface of converter housing.**

Bolt	Length mm (in)
A	32.8 (1.291)
B	40 (1.57)

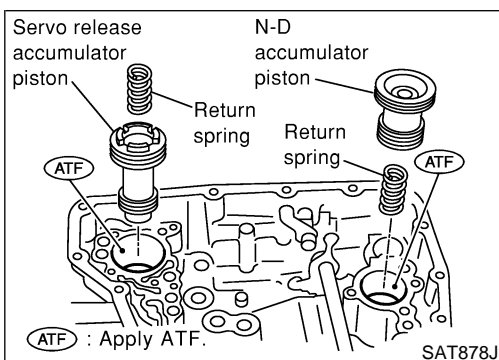


5. Install accumulator piston.
  - a. Check contact surface of accumulator piston for damage.



- b. Install O-rings on accumulator piston.

- Apply ATF to O-rings.
- Accumulator piston O-rings:**  
**Refer to SDS, AT-399.**

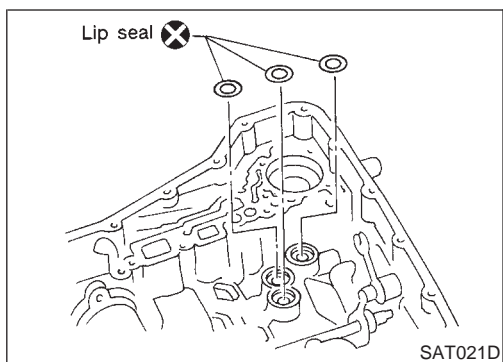


- c. Install accumulator pistons and return springs on transmission case.

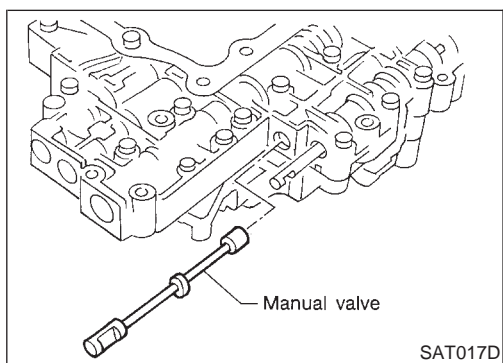
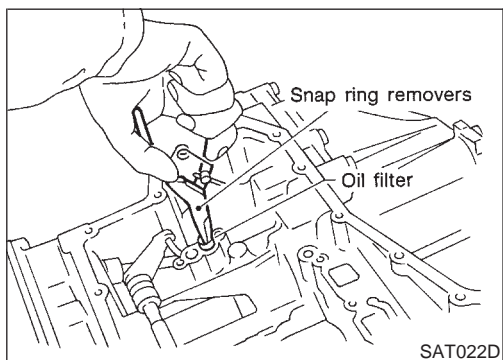
- **Apply ATF to inner surface of transmission case.**
- Return springs:**  
**Refer to SDS, AT-399.**

# ASSEMBLY

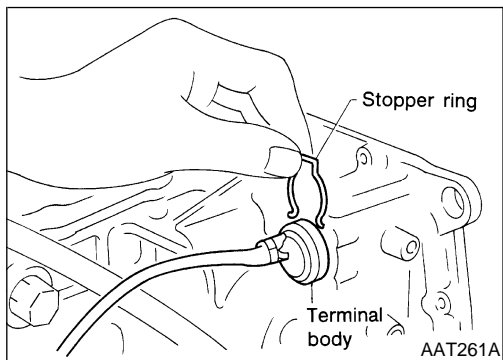
## Assembly (4) (Cont'd)



6. Install lip seals for band servo oil holes on transmission case.
  - Apply petroleum jelly to lip seals.



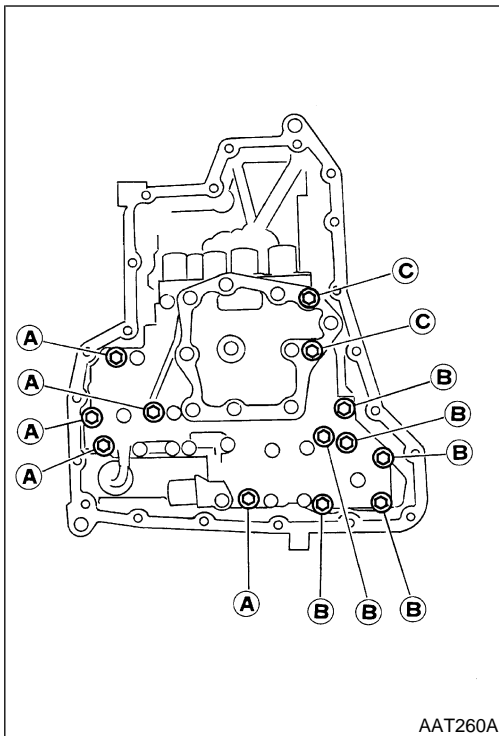
7. Install control valve assembly.
  - a. Insert manual valve into control valve assembly.
    - Apply ATF to manual valve.



- b. Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.
    - c. Install stopper ring to terminal body.

# ASSEMBLY

Assembly (4) (Cont'd)

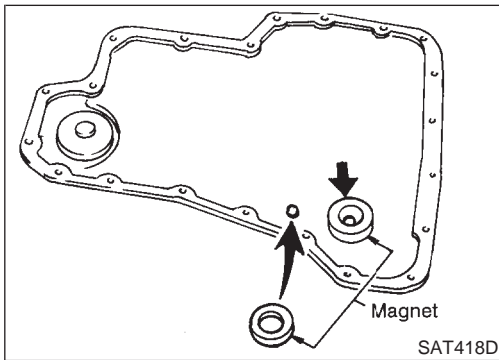


d. Tighten bolts A, B and C.

: 7 - 9 N·m (0.7 - 0.9 kg·m, 61 - 78 in·lb)

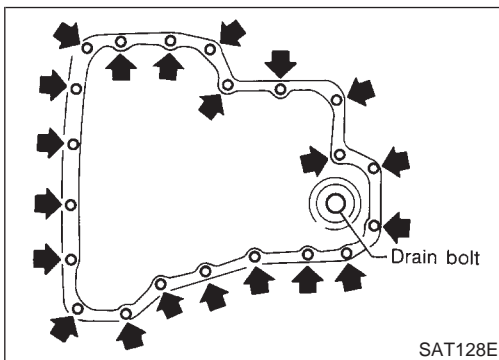
### Bolt length, number and location

Bolt symbol	A	B	C
Bolt length "ℓ" 	40.0 mm (1.575 in)	33.0 mm (1.299 in)	43.5 mm (1.713 in)
Number of bolts	5	6	2



8. Install oil pan.

a. Attach magnet to oil pan.

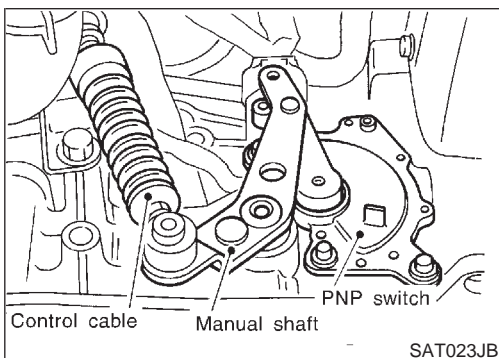


b. Install new oil pan gasket on transmission case.

c. Install oil pan on transmission case.

- Always replace oil pan bolts as they are self-sealing bolts.
- Tighten the four bolts in a criss-cross pattern to prevent dislocation of gasket.

d. Tighten drain plug to specified torque.



9. Install PNP switch.

a. Set manual shaft in "P" position.

b. Temporarily install PNP switch on manual shaft.

c. Move selector lever to "N" position.

GI

MA

EM

LC

EC

FE

CL

MT

AT

AX

SU

BR

ST

RS

BT

HA

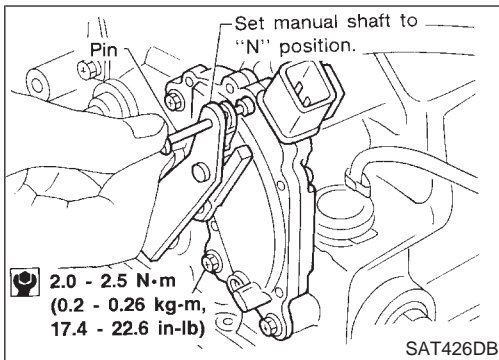
SC

EL

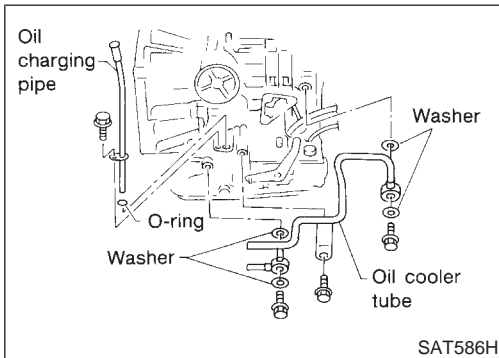
IDX

# ASSEMBLY

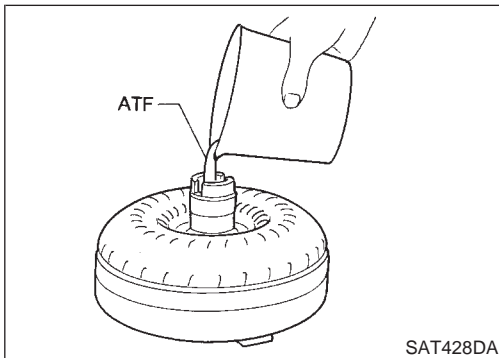
## Assembly (4) (Cont'd)



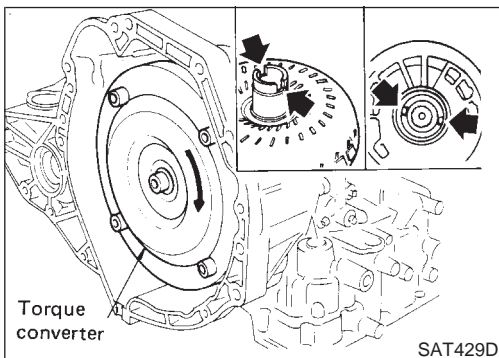
- d. Use a 4 mm (0.157 in) pin for this adjustment.
  - 1) Insert the pin straight into the manual shaft adjustment hole.
  - 2) Rotate PNP switch until the pin can also be inserted straight into hole in PNP switch.
- e. Tighten PNP switch fixing bolts.
- f. Remove pin from adjustment hole after adjusting PNP switch.



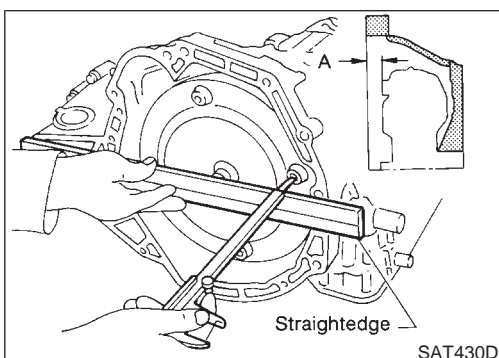
10. Install oil charging pipe and oil cooler tube to transmission case.



11. Install torque converter.
  - a. Pour ATF into torque converter.
    - **Approximately 1 liter (1-1/8 US qt, 7/8 Imp qt) of fluid is required for a new torque converter.**
    - **When reusing old torque converter, add the same amount of fluid as was drained.**



- b. Install torque converter while aligning notches of torque converter with notches of oil pump.



- c. Measure distance "A" to check that torque converter is in proper position.

**Distance "A":**

**15.9 mm (0.626 in) or more**

# SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

## General Specifications

NCAT0179

Engine		SR20DE	
Automatic transaxle model		RE4F03B	RE4F03W
Automatic transaxle assembly	Model code number	3AX11	3AX17
Transaxle gear ratio	1st	2.861	
	2nd	1.562	
	3rd	1.000	
	4th	0.697	
	Reverse	2.310	
	Final drive	4.072	
Recommended fluid		Nissan Matic "D" (Continental U.S. and Alaska) or Genuine Nissan Automatic Transmission Fluid (Canada)*1	
Fluid capacity		7.0ℓ (7-3/8 US qt, 6-1/8 Imp qt)	

\*1: Refer to MA-11, "Fluids and Lubricants".

## Shift Schedule

### VEHICLE SPEED WHEN SHIFTING GEARS

NCAT0180

NCAT0180S01

Throttle position	Shift pattern	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	Comfort	51 - 59 (32 - 37)	97 - 105 (60 - 65)	153 - 161 (95 - 100)	149 - 157 (93 - 98)	87 - 95 (54 - 59)	41 - 49 (25 - 30)	51 - 59 (32 - 37)
Half throttle	Comfort	33 - 41 (21 - 25)	58 - 66 (36 - 41)	121 - 129 (75 - 80)	72 - 80 (45 - 50)	34 - 42 (21 - 26)	9 - 17 (6 - 11)	51 - 59 (32 - 37)

### VEHICLE SPEED WHEN PERFORMING LOCK-UP

NCAT0180S02

Throttle opening	OD switch	Shift pattern	Vehicle speed km/h (MPH)	
			Lock-up ON	Lock-up OFF
2/8	ON (D <sub>4</sub> )	Comfort	105 - 113 (65 - 70)	74 - 82 (46 - 51)
	OFF (D <sub>3</sub> )	Comfort	86 - 94 (53 - 58)	83 - 91 (52 - 57)

## Stall Revolution

NCAT0181

Engine model	Stall revolution rpm
SR20DE	2,350 - 2,850

## Line Pressure

NCAT0182

Engine speed rpm	Line pressure kPa (kg/cm <sup>2</sup> , psi)			
	R position	D position	2 position	1 position
Idle	778 (7.9, 113)	500 (5.1, 73)	500 (5.1, 73)	500 (5.1, 73)
Stall	1,820 (18.5, 263)	1,170 (11.9, 169)	1,170 (11.9, 169)	1,170 (11.9, 169)

# SERVICE DATA AND SPECIFICATIONS (SDS)

Control Valves

## Control Valves

NCAT0183

### CONTROL VALVE AND PLUG RETURN SPRINGS

NCAT0183S01

Unit: mm (in)

	No.	Parts	Part No.*	Free length	Outer diameter
Upper body Refer to "Control Valve Upper Body", AT-321.	35	3-2 timing valve spring	31736-01X00	23.0 (0.906)	6.65 (0.2618)
	19	Cooler check valve spring	31742-3AX05	28.04 (1.1039)	7.15 (0.2815)
	23	Pilot valve spring	31742-3AX03	38.98 (1.5346)	8.9 (0.350)
	15	1-2 accumulator valve spring	31742-3AX00	20.5 (0.807)	6.95 (0.2736)
	28	1-2 accumulator piston spring	31742-3AX09	55.66 (2.1913)	19.5 (0.7677)
	33	1st reducing valve spring	31742-80X05	27.0 (1.063)	7.0 (0.276)
	2	Overrun clutch reducing valve spring	31742-80X06	37.5 (1.476)	7.0 (0.276)
	7	Torque converter relief valve spring	31742-3AX04	33.3 (1.3110)	9.0 (0.354)
	10	Torque converter clutch control valve spring	31742-3AX02	53.01 (2.0870)	6.5 (0.256)
Lower body Refer to "Control Valve Lower Body", AT-325.	34	Shuttle valve spring	31762-41X04	51.0 (2.0079)	5.65 (0.2224)
	18	Pressure regulator valve spring	31742-80X13	45.0 (1.772)	15.0 (0.591)
	23	Overrun clutch control valve spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	27	Accumulator control valve spring	31742-80X02	22.0 (0.866)	6.5 (0.256)
	29	Shift valve A spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	2	Shift valve B spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	11	Pressure modifier valve spring	31742-41X15	30.5 (1.201)	9.8 (0.386)
	7		31742-80X16	32.0 (1.260)	6.9 (0.272)
	—	Oil cooler relief valve spring	31872-31X00	17.02 (0.6701)	8.0 (0.315)
	—	T/C pressure spring	31742-3AX07	9.0 (0.354)	7.3 (0.287)

\*: Always check with the Parts Department for the latest parts information.

## Clutch and Brakes

NCAT0184

### REVERSE CLUTCH

NCAT0184S01

Number of drive plates		2
Number of driven plates		2
Drive plate thickness mm (in)	Standard	2.0 (0.079)
	Allowable limit	1.8 (0.071)
Clearance mm (in)	Standard	0.5 - 0.8 (0.020 - 0.031)
	Allowable limit	1.2 (0.047)
Thickness of retaining plates	Thickness mm (in)	Part number*
	4.4 (0.173)	31537-31X00
	4.6 (0.181)	31537-31X01
	4.8 (0.189)	31537-31X02
	5.0 (0.197)	31537-31X03
	5.2 (0.205)	31537-31X04

\*: Always check with the Parts Department for the latest parts information.

### HIGH CLUTCH

NCAT0184S02

Number of drive plates	3
Number of driven plates	5

**AT-390**

# SERVICE DATA AND SPECIFICATIONS (SDS)

Clutch and Brakes (Cont'd)

Drive plate thickness mm (in)	Standard	2.0 (0.079)		GI
	Allowable limit	1.8 (0.071)		
Clearance mm (in)	Standard	1.4 - 1.8 (0.055 - 0.071)		MA
	Allowable limit	2.4 (0.094)		
Thickness of retaining plates	Thickness mm (in)		Part number*	EM
	4.8 (0.189)		31537-32X05	
	5.0 (0.197)		31537-32X06	
	5.2 (0.205)		31537-32X07	
	5.4 (0.213)		31537-32X08	
	5.6 (0.220)		31537-32X09	
	6.0 (0.236)		31537-32X11	

\*: Always check with the Parts Department for the latest parts information.

## FORWARD CLUTCH

NCAT0184S03

Number of drive plates		5		FE
Number of driven plates		5		
Drive plate thickness mm (in)	Standard	1.8 (0.071)		CL
	Allowable limit	1.6 (0.063)		
Clearance mm (in)	Standard	0.45 - 0.85 (0.0177 - 0.0335)		MT
	Allowable limit	1.85 (0.0728)		
Thickness of retaining plate	Thickness mm (in)		Part number*	AT
	3.6 (0.142)		31537-31X60	
	3.8 (0.150)		31537-31X61	
	4.0 (0.157)		31537-31X62	
	4.2 (0.165)		31537-31X63	
	4.4 (0.173)		31537-31X64	
	4.6 (0.181)		31537-31X65	

\*: Always check with the Parts Department for the latest parts information.

## OVERRUN CLUTCH

NCAT0184S04

Number of drive plates		3		ST
Number of driven plates		4		
Drive plate thickness mm (in)	Standard	1.6 (0.063)		RS
	Allowable limit	1.4 (0.055)		
Clearance mm (in)	Standard	1.0 - 1.4 (0.039 - 0.055)		BT
	Allowable limit	2.0 (0.079)		
Thickness of retaining plate	Thickness mm (in)		Part number*	HA
	3.6 (0.142)		31567-31X79	
	3.8 (0.150)		31567-31X80	
	4.0 (0.157)		31567-31X81	
	4.2 (0.165)		31567-31X82	
	4.4 (0.173)		31567-31X83	

\*: Always check with the Parts Department for the latest parts information.

# SERVICE DATA AND SPECIFICATIONS (SDS)

Clutch and Brakes (Cont'd)

## LOW & REVERSE BRAKE

NCAT0184S05

Number of drive plates		5
Number of driven plates		4 + 1
Drive plate thickness mm (in)	Standard	2.0 (0.079)
	Allowable limit	1.8 (0.071)
Clearance mm (in)	Standard	1.4 - 1.8 (0.055 - 0.071)
	Allowable limit	2.8 (0.110)
Thickness of retaining plate	Thickness mm (in)	Part number*
	3.6 (0.142)	31667-31X16
	3.8 (0.150)	31667-31X17
	4.0 (0.157)	31667-31X18
	4.2 (0.165)	31667-31X19
	4.4 (0.173)	31667-31X20
	4.6 (0.181)	31667-31X21

\*: Always check with the Parts Department for the latest parts information.

## BRAKE BAND

NCAT0184S06

Anchor end pin tightening torque	3.5 - 5.8 N-m (0.35 - 0.6 kg-m, 31 - 52 in-lb)
Number of returning revolutions for anchor end pin	2.5±0.125
Lock nut tightening torque	31 - 36 N-m (3.2 - 3.7 kg-m, 23 - 27 ft-lb)

## Clutch and Brake Return Springs

NCAT0185  
Unit: mm (in)

Parts		Free length	Outer diameter	Part number*
Forward clutch (Overrun clutch)	Outer (16 pcs)	26.6 (1.047)	10.6 (0.417)	31505-31X02
	Inner (16 pcs)	26.3 (1.035)	7.7 (0.303)	31505-31X03
Reverse clutch (16 pcs)		18.6 (0.732)	8.0 (0.315)	31505-31X00
High clutch (12 pcs)		19.7 (0.776)	11.1 (0.437)	31505-31X01
Low reverse brake (20 pcs)		25.1 (0.988)	7.6 (0.299)	31505-31X04

\*: Always check with the Parts Department for the latest parts information.

## Oil Pump

NCAT0186

Oil pump side clearance mm (in)	0.02 - 0.04 (0.0008 - 0.0016)	
Thickness of inner gears and outer gears	Inner gear	
	Thickness mm (in)	Part number*
	9.99 - 10.00 (0.3933 - 0.3937)	31346-31X00
	9.98 - 9.99 (0.3929 - 0.3933)	31346-31X01
	9.97 - 9.98 (0.3925 - 0.3929)	31346-31X02
	Outer gear	
	Thickness mm (in)	Part number*
	9.99 - 10.00 (0.3933 - 0.3937)	31347-31X00
	9.98 - 9.99 (0.3929 - 0.3933)	31347-31X01
	9.97 - 9.98 (0.3925 - 0.3929)	31347-31X02
Clearance between oil pump housing and outer gear mm (in)	Standard	0.08 - 0.15 (0.0031 - 0.0059)
	Allowable limit	0.15 (0.0059)
Oil pump cover seal ring clearance mm (in)	Standard	0.1 - 0.25 (0.0039 - 0.0098)
	Allowable limit	0.25 (0.0098)



# SERVICE DATA AND SPECIFICATIONS (SDS)

Input Shaft

\*: Always check with the Parts Department for the latest parts information.

## Input Shaft

NCAT0187  
Unit: mm (in)

Input shaft seal ring clearance	Standard	0.08 - 0.23 (0.0031 - 0.0091)
	Allowable limit	0.23 (0.0091)

## Planetary Carrier

NCAT0188  
Unit: mm (in)

Clearance between planetary carrier and pin-ion washer	Standard	0.15 - 0.70 (0.0059 - 0.0276)
	Allowable limit	0.80 (0.0315)

## Final Drive

### DIFFERENTIAL SIDE GEAR CLEARANCE

NCAT0189

NCAT0189S01

Clearance between side gear and differential case with washer	0.1 - 0.2 mm (0.004 - 0.008 in)
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### DIFFERENTIAL SIDE GEAR THRUST WASHERS (FOR RE4F03B)

NCAT0189S02

Thickness mm (in)	Part number*
0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115

\*: Always check with the Parts Department for the latest parts information.

### DIFFERENTIAL SIDE GEAR THRUST WASHER (FOR RE4F03W)

NCAT0189S07

Location	Differential case side
Thickness mm (in)	Part number*
0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115
Location	Viscous coupling side
Thickness mm (in)	Part number*
0.70 - 0.75 (0.0276 - 0.0295)	38424-D2110
0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115
1.00 - 1.05 (0.0394 - 0.0413)	38424-D2116
1.05 - 1.10 (0.0413 - 0.0433)	38424-D2117
1.10 - 1.15 (0.0433 - 0.0453)	38424-D2118
1.15 - 1.20 (0.0453 - 0.0472)	38424-D2119
1.20 - 1.25 (0.0472 - 0.0492)	38424-D2120
1.25 - 1.30 (0.0492 - 0.0512)	38424-D2121
1.30 - 1.35 (0.0512 - 0.0531)	38424-D2122

\*: Always check with the Parts Department for the latest parts information.

### BEARING PRELOAD

NCAT0189S03

Differential side bearing preload "T"	0.04 - 0.09 mm (0.0016 - 0.0035 in)
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# SERVICE DATA AND SPECIFICATIONS (SDS)

Final Drive (Cont'd)

## TURNING TORQUE

NCAT0189S04

Turning torque of final drive assembly	0.49 - 1.08 N·m (5.0 - 11.0 kg·cm, 4.3 - 9.5 in·lb)
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## DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS (FOR RE4F03B)

NCAT0189S05

Thickness mm (in)	Part number*
0.40 (0.0157)	31499-21X07
0.44 (0.0173)	31499-21X08
0.48 (0.0189)	31499-21X09
0.52 (0.0205)	31499-21X10
0.56 (0.0220)	31499-21X11
0.60 (0.0236)	31499-21X12
0.64 (0.0252)	31499-21X13
0.68 (0.0268)	31499-21X14
0.72 (0.0283)	31499-21X15
0.76 (0.0299)	31499-21X16
0.80 (0.0315)	31499-21X17
0.84 (0.0331)	31499-21X18
0.88 (0.0346)	31499-21X19
0.92 (0.0362)	31499-21X20
1.44 (0.0567)	31499-21X21

\*: Always check with the Parts Department for the latest parts information.

## DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS (FOR RE4F03W)

NCAT0189S08

Thickness mm (in)	Part number*
0.28 (0.0110)	31439-31X00
0.32 (0.0126)	31439-31X01
0.36 (0.0142)	31439-31X02
0.40 (0.0157)	31439-31X03
0.44 (0.0173)	31439-31X04
0.48 (0.0189)	31439-31X05
0.52 (0.0205)	31439-31X06
0.56 (0.0220)	31439-31X07
0.60 (0.0236)	31439-31X08
0.64 (0.0252)	31439-31X09
0.68 (0.0268)	31439-31X10
0.72 (0.0283)	31439-31X11
0.76 (0.0299)	31439-31X12
0.80 (0.0315)	31439-31X13
0.84 (0.0331)	31439-31X14
0.88 (0.0346)	31439-31X15
0.92 (0.0362)	31439-31X16
0.96 (0.0378)	31439-31X17
1.44 (0.0567)	31439-31X18

\*: Always check with the Parts Department for the latest parts information.

# SERVICE DATA AND SPECIFICATIONS (SDS)

Final Drive (Cont'd)

## TABLE FOR SELECTING DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS (FOR RE4F03B)

NCAT0189S06  
Unit: mm (in)

Dial indicator deflection	Suitable shim(s)	
0.31 - 0.35 (0.0122 - 0.0138)	0.40 (0.0157)	GI
0.35 - 0.39 (0.0138 - 0.0154)	0.44 (0.0173)	MA
0.39 - 0.43 (0.0154 - 0.0169)	0.48 (0.0189)	
0.43 - 0.47 (0.0169 - 0.0185)	0.52 (0.0205)	EM
0.47 - 0.51 (0.0185 - 0.0201)	0.56 (0.0220)	
0.51 - 0.55 (0.0201 - 0.0217)	0.60 (0.0236)	
0.55 - 0.59 (0.0217 - 0.0232)	0.64 (0.0252)	LC
0.59 - 0.63 (0.0232 - 0.0248)	0.68 (0.0268)	
0.63 - 0.67 (0.0248 - 0.0264)	0.72 (0.0283)	
0.67 - 0.71 (0.0264 - 0.0280)	0.76 (0.0299)	
0.71 - 0.75 (0.0280 - 0.0295)	0.80 (0.0315)	EC
0.75 - 0.79 (0.0295 - 0.0311)	0.84 (0.0331)	
0.79 - 0.83 (0.0311 - 0.0327)	0.88 (0.0346)	
0.83 - 0.87 (0.0327 - 0.0343)	0.92 (0.0362)	
0.87 - 0.91 (0.0343 - 0.0358)	0.48 (0.0189) + 0.48 (0.0189)	FE
0.91 - 0.95 (0.0358 - 0.0374)	0.48 (0.0189) + 0.52 (0.0205)	
0.95 - 0.99 (0.0374 - 0.0390)	0.52 (0.0205) + 0.52 (0.0205)	
0.99 - 1.03 (0.0390 - 0.0406)	0.52 (0.0205) + 0.56 (0.0220)	CL
1.03 - 1.07 (0.0406 - 0.0421)	0.56 (0.0220) + 0.56 (0.0220)	
1.07 - 1.11 (0.0421 - 0.0437)	0.56 (0.0220) + 0.60 (0.0236)	
1.11 - 1.15 (0.0437 - 0.0453)	0.60 (0.0236) + 0.60 (0.0236)	
1.15 - 1.19 (0.0453 - 0.0469)	0.60 (0.0236) + 0.64 (0.0252)	MT
1.19 - 1.23 (0.0469 - 0.0484)	0.64 (0.0252) + 0.64 (0.0252)	
1.23 - 1.27 (0.0484 - 0.0500)	0.64 (0.0252) + 0.68 (0.0268)	
1.27 - 1.31 (0.0500 - 0.0516)	0.68 (0.0268) + 0.68 (0.0268)	
1.31 - 1.35 (0.0516 - 0.0531)	0.68 (0.0268) + 0.72 (0.0283)	AT
1.35 - 1.39 (0.0531 - 0.0547)	1.44 (0.0567)	
1.39 - 1.43 (0.0547 - 0.0563)	0.72 (0.0283) + 0.76 (0.0299)	
1.43 - 1.47 (0.0563 - 0.0579)	0.76 (0.0299) + 0.76 (0.0299)	AX
1.47 - 1.51 (0.0579 - 0.0594)	0.76 (0.0299) + 0.80 (0.0315)	
1.51 - 1.55 (0.0594 - 0.0610)	0.80 (0.0315) + 0.80 (0.0315)	
1.55 - 1.59 (0.0610 - 0.0626)	0.80 (0.0315) + 0.84 (0.0331)	SU
1.59 - 1.63 (0.0626 - 0.0642)	0.84 (0.0331) + 0.84 (0.0331)	
1.63 - 1.67 (0.0642 - 0.0657)	0.84 (0.0331) + 0.88 (0.0346)	
1.67 - 1.71 (0.0657 - 0.0673)	0.88 (0.0346) + 0.88 (0.0346)	
1.71 - 1.75 (0.0673 - 0.0689)	0.88 (0.0346) + 0.92 (0.0362)	BR
1.75 - 1.79 (0.0689 - 0.0705)	0.92 (0.0362) + 0.92 (0.0362)	
1.79 - 1.83 (0.0705 - 0.0720)	0.92 (0.0362) + 0.96 (0.0378)	
1.83 - 1.87 (0.0720 - 0.0736)	0.96 (0.0378) + 0.96 (0.0378)	
1.87 - 1.91 (0.0736 - 0.0752)	0.52 (0.0205) + 1.44 (0.0567)	ST
1.91 - 1.95 (0.0752 - 0.0768)	0.56 (0.0220) + 1.44 (0.0567)	

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

# SERVICE DATA AND SPECIFICATIONS (SDS)

Final Drive (Cont'd)

## TABLE FOR SELECTING DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS (FOR RE4F03W)

NCAT0189S09  
Unit: mm (in)

Dial indicator deflection	Suitable shim(s)
0.19 - 0.23 (0.0075 - 0.0091)	0.28 (0.0110)
0.23 - 0.27 (0.0091 - 0.0106)	0.32 (0.0126)
0.27 - 0.31 (0.0106 - 0.0122)	0.36 (0.0142)
0.31 - 0.35 (0.0122 - 0.0138)	0.40 (0.0157)
0.35 - 0.39 (0.0138 - 0.0154)	0.44 (0.0173)
0.39 - 0.43 (0.0154 - 0.0169)	0.48 (0.0189)
0.43 - 0.47 (0.0169 - 0.0185)	0.52 (0.0205)
0.47 - 0.51 (0.0185 - 0.0201)	0.56 (0.0220)
0.51 - 0.55 (0.0201 - 0.0217)	0.60 (0.0236)
0.55 - 0.59 (0.0217 - 0.0232)	0.64 (0.0252)
0.59 - 0.63 (0.0232 - 0.0248)	0.68 (0.0268)
0.63 - 0.67 (0.0248 - 0.0264)	0.72 (0.0283)
0.67 - 0.71 (0.0264 - 0.0280)	0.76 (0.0299)
0.71 - 0.75 (0.0280 - 0.0295)	0.80 (0.0315)
0.75 - 0.79 (0.0295 - 0.0311)	0.84 (0.0331)
0.79 - 0.83 (0.0311 - 0.0327)	0.88 (0.0346)
0.83 - 0.87 (0.0327 - 0.0343)	0.92 (0.0362)
0.87 - 0.91 (0.0343 - 0.0358)	0.48 (0.0189) + 0.48 (0.0189)
0.91 - 0.95 (0.0358 - 0.0374)	0.48 (0.0189) + 0.52 (0.0205)
0.95 - 0.99 (0.0374 - 0.0390)	0.52 (0.0205) + 0.52 (0.0205)
0.99 - 1.03 (0.0390 - 0.0406)	0.52 (0.0205) + 0.56 (0.0220)
1.03 - 1.07 (0.0406 - 0.0421)	0.56 (0.0220) + 0.56 (0.0220)
1.07 - 1.11 (0.0421 - 0.0437)	0.56 (0.0220) + 0.60 (0.0236)
1.11 - 1.15 (0.0437 - 0.0453)	0.60 (0.0236) + 0.60 (0.0236)
1.15 - 1.19 (0.0453 - 0.0469)	0.60 (0.0236) + 0.64 (0.0252)
1.19 - 1.23 (0.0469 - 0.0484)	0.64 (0.0252) + 0.64 (0.0252)
1.23 - 1.27 (0.0484 - 0.0500)	0.64 (0.0252) + 0.68 (0.0268)
1.27 - 1.31 (0.0500 - 0.0516)	0.68 (0.0268) + 0.68 (0.0268)
1.31 - 1.35 (0.0516 - 0.0531)	0.68 (0.0268) + 0.72 (0.0283)
1.35 - 1.39 (0.0531 - 0.0547)	1.44 (0.0567)
1.39 - 1.43 (0.0547 - 0.0563)	0.72 (0.0283) + 0.76 (0.0299)
1.43 - 1.47 (0.0563 - 0.0579)	0.76 (0.0299) + 0.76 (0.0299)
1.47 - 1.51 (0.0579 - 0.0594)	0.76 (0.0299) + 0.80 (0.0315)
1.51 - 1.55 (0.0594 - 0.0610)	0.80 (0.0315) + 0.80 (0.0315)
1.55 - 1.59 (0.0610 - 0.0626)	0.80 (0.0315) + 0.84 (0.0331)
1.59 - 1.63 (0.0626 - 0.0642)	0.84 (0.0331) + 0.84 (0.0331)
1.63 - 1.67 (0.0642 - 0.0657)	0.84 (0.0331) + 0.88 (0.0346)
1.67 - 1.71 (0.0657 - 0.0673)	0.88 (0.0346) + 0.88 (0.0346)
1.71 - 1.75 (0.0673 - 0.0689)	0.88 (0.0346) + 0.92 (0.0362)
1.75 - 1.79 (0.0689 - 0.0705)	0.92 (0.0362) + 0.92 (0.0362)
1.79 - 1.83 (0.0705 - 0.0720)	0.92 (0.0362) + 0.96 (0.0378)
1.83 - 1.87 (0.0720 - 0.0736)	0.96 (0.0378) + 0.96 (0.0378)
1.87 - 1.91 (0.0736 - 0.0752)	0.52 (0.0205) + 1.44 (0.0567)
1.91 - 1.95 (0.0752 - 0.0768)	0.56 (0.0220) + 1.44 (0.0567)

### Reduction Pinion Gear

NCAT0190

#### BEARING PRELOAD

NCAT0190S01

Reduction pinion gear bearing preload	0.05 mm (0.0020 in)
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#### TURNING TORQUE

NCAT0190S02

Turning torque of reduction pinion gear	0.1 - 0.69 N-m (1.1 - 7.0 kg-cm, 0.95 - 6.08 in-lb)
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# SERVICE DATA AND SPECIFICATIONS (SDS)

Reduction Pinion Gear (Cont'd)

## REDUCTION PINION GEAR BEARING ADJUSTING SHIMS

NCAT0190S03

Thickness mm (in)	Part number*	
1.74 (0.0685)	31438-31X16	GI
1.78 (0.0701)	31438-31X17	
1.82 (0.0717)	31438-31X18	MA
1.86 (0.0732)	31438-31X19	
1.90 (0.0748)	31438-31X20	
1.92 (0.0756)	31439-31X60	EM
1.94 (0.0764)	31438-31X21	
1.96 (0.0772)	31439-31X61	
1.98 (0.0780)	31438-31X22	
2.00 (0.0787)	31439-31X62	LC
2.02 (0.0795)	31438-31X23	
2.04 (0.0803)	31439-31X63	
2.06 (0.0811)	31438-31X24	
2.08 (0.0819)	31439-31X64	EC
2.10 (0.0827)	31438-31X60	
2.12 (0.0835)	31439-31X65	
2.14 (0.0843)	31438-31X61	FE
2.16 (0.0850)	31439-31X66	
2.18 (0.0858)	31438-31X62	
2.20 (0.0866)	31439-31X67	
2.22 (0.0874)	31438-31X63	CL
2.24 (0.0882)	31439-31X68	
2.26 (0.0890)	31438-31X64	
2.28 (0.0898)	31439-31X69	
2.30 (0.0906)	31438-31X65	MT
2.34 (0.0921)	31438-31X66	
2.38 (0.0937)	31438-31X67	
2.42 (0.0953)	31438-31X68	AT
2.46 (0.0969)	31438-31X69	
2.50 (0.0984)	31438-31X70	
2.54 (0.1000)	31438-31X71	AX
2.58 (0.1016)	31438-31X72	
2.62 (0.1031)	31438-31X73	
2.66 (0.1047)	31438-31X74	SU

\*: Always check with the Parts Department for the latest parts information.

BR

ST

RS

BT

HA

SC

EL

IDX

# SERVICE DATA AND SPECIFICATIONS (SDS)

Reduction Pinion Gear (Cont'd)

## TABLE FOR SELECTING REDUCTION PINION GEAR BEARING ADJUSTING SHIM

NCAT0190S04  
Unit: mm (in)

Dimension "T"	Suitable shim(s)
1.77 - 1.81 (0.0697 - 0.0713)	1.74 (0.0685)
1.81 - 1.85 (0.0713 - 0.0728)	1.78 (0.0701)
1.85 - 1.89 (0.0728 - 0.0744)	1.82 (0.0717)
1.89 - 1.93 (0.0744 - 0.0760)	1.86 (0.0732)
1.93 - 1.96 (0.0760 - 0.0772)	1.90 (0.0748)
1.96 - 1.98 (0.0772 - 0.0780)	1.92 (0.0756)
1.98 - 2.00 (0.0780 - 0.0787)	1.94 (0.0764)
2.00 - 2.02 (0.0787 - 0.0795)	1.96 (0.0772)
2.02 - 2.04 (0.0795 - 0.0803)	1.98 (0.0780)
2.04 - 2.06 (0.0803 - 0.0811)	2.00 (0.0787)
2.06 - 2.08 (0.0811 - 0.0819)	2.02 (0.0795)
2.08 - 2.10 (0.0819 - 0.0827)	2.04 (0.0803)
2.10 - 2.12 (0.0827 - 0.0835)	2.06 (0.0811)
2.12 - 2.14 (0.0835 - 0.0843)	2.08 (0.0819)
2.14 - 2.16 (0.0843 - 0.0850)	2.10 (0.0827)
2.16 - 2.18 (0.0850 - 0.0858)	2.12 (0.0835)
2.18 - 2.20 (0.0858 - 0.0866)	2.14 (0.0843)
2.20 - 2.22 (0.0866 - 0.0874)	2.16 (0.0850)
2.22 - 2.24 (0.0874 - 0.0888)	2.18 (0.0858)
2.24 - 2.26 (0.0882 - 0.0890)	2.20 (0.0866)
2.26 - 2.28 (0.0890 - 0.0898)	2.22 (0.0874)
2.28 - 2.30 (0.0898 - 0.0906)	2.24 (0.0882)
2.30 - 2.32 (0.0906 - 0.0913)	2.26 (0.0890)
2.32 - 2.34 (0.0913 - 0.0921)	2.28 (0.0898)
2.34 - 2.37 (0.0921 - 0.0933)	2.30 (0.0906)
2.37 - 2.41 (0.0933 - 0.0949)	2.34 (0.0921)
2.41 - 2.45 (0.0949 - 0.0965)	2.38 (0.0937)
2.45 - 2.49 (0.0965 - 0.0980)	2.42 (0.0953)
2.49 - 2.53 (0.0980 - 0.0996)	2.46 (0.0969)
2.53 - 2.57 (0.0996 - 0.1012)	2.50 (0.0984)
2.57 - 2.61 (0.1012 - 0.1028)	2.54 (0.1000)
2.61 - 2.65 (0.1028 - 0.1043)	2.58 (0.1016)
2.65 - 2.69 (0.1043 - 0.1059)	2.62 (0.1031)
2.69 - 2.73 (0.1059 - 0.1075)	2.66 (0.1047)

### Output Shaft

NCAT0191

#### SEAL RING CLEARANCE

NCAT0191S01  
Unit: mm (in)

Output shaft seal ring clearance	Standard	0.10 - 0.25 (0.0039 - 0.0098)
	Allowable limit	0.25 (0.0098)

#### END PLAY

NCAT0191S02

Output shaft end play	0 - 0.5 mm (0 - 0.020 in)
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#### OUTPUT SHAFT END PLAY ADJUSTING SHIMS

NCAT0191S03

Thickness mm (in)	Part number*
0.56 (0.0220)	31438-31X46
0.96 (0.0378)	31438-31X47
1.36 (0.0535)	31438-31X48

\*: Always check with the Parts Department for the latest parts information.

### Bearing Retainer

NCAT0192

#### SEAL RING CLEARANCE

NCAT0192S01  
Unit: mm (in)

Bearing retainer seal ring clearance	Standard	0.10 - 0.25 (0.0039 - 0.0098)
	Allowable limit	0.25 (0.0098)

# SERVICE DATA AND SPECIFICATIONS (SDS)

Total End Play

## Total End Play

NCAT0193

Total end play "T <sub>3</sub> "	0.25 - 0.55 mm (0.0098 - 0.0217 in)
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## BEARING RACE FOR ADJUSTING TOTAL END PLAY

NCAT0193S01

Thickness mm (in)	Part number*
0.6 (0.024)	31435-31X01
0.8 (0.031)	31435-31X02
1.0 (0.039)	31435-31X03
1.2 (0.047)	31435-31X04
1.4 (0.055)	31435-31X05
1.6 (0.063)	31435-31X06
1.8 (0.071)	31435-31X07
2.0 (0.079)	31435-31X08

\*: Always check with the Parts Department for the latest parts information.

## Reverse Clutch End Play

NCAT0194

Reverse clutch end play "T <sub>4</sub> "	0.65 - 1.00 mm (0.0256 - 0.0394 in)
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## THRUST WASHERS FOR ADJUSTING REVERSE CLUTCH END PLAY

NCAT0194S01

Thickness mm (in)	Part number*
0.65 (0.0256)	31508-31X10
0.80 (0.0315)	31508-31X11
0.95 (0.0374)	31508-31X12
1.10 (0.0433)	31508-31X13
1.25 (0.0492)	31508-31X14
1.40 (0.0551)	31508-31X15

\*: Always check with the Parts Department for the latest parts information.

## Accumulator

NCAT0195

### O-RING

NCAT0195S01  
Unit: mm (in)

Accumulator	Diameter (Small)	Part number*	Diameter (Large)	Part number*
Servo release accumulator	26.9 (1.059)	31526-41X03	44.2 (1.740)	31526-41X02
N-D accumulator	34.6 (1.362)	31526-31X08	39.4 (1.551)	31672-21X00

\*: Always check with the Parts Department for the latest parts information.

### RETURN SPRING

NCAT0195S02  
Unit: mm (in)

Accumulator	Free length	Outer diameter	Part number*
Servo release accumulator spring	52.5 (2.067)	20.1 (0.791)	31605-80X00
N-D accumulator spring	45.0 (1.772)	27.6 (1.087)	31605-33X01

\*: Always check with the Parts Department for the latest parts information.

## Band Servo

NCAT0196

### RETURN SPRING

NCAT0196S01  
Unit: mm (in)

Return spring	Free length	Outer diameter	Part number*
2nd servo return spring	32.5 (1.280)	25.9 (1.020)	31605-31X20
OD servo return spring	38.52 (1.5165)	22.0 (0.866)	31605-31X21

\*: Always check with the Parts Department for the latest parts information.

# SERVICE DATA AND SPECIFICATIONS (SDS)

Removal and Installation

## Removal and Installation

NCAT0197  
Unit: mm (in)

Distance between end of converter housing and torque converter

15.9 (0.626) or more

## Shift Solenoid Valves

NCAT0223

Gear	Solenoid A	Solenoid B
1st	ON	ON
2nd	OFF	ON
3rd	OFF	OFF
4th	ON	OFF

## Solenoid Valves

NCAT0224

Solenoid valve	Resistance (Approx.)	Terminal number
Shift solenoid A	20 - 30Ω	2
Shift solenoid B	5 - 20Ω	1
Ovr. clutch sol.	20 - 30Ω	3
Line pres. sol.	2.5 - 5Ω	4
T/conv. clutch sol.	5 - 20Ω	5

## A/T Fluid Temperature Sensor

NCAT0225

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

## Revolution Sensor

NCAT0226

150 Hz/20 km/h (12 MPH)

## Dropping Resistor

NCAT0227

Resistance	10 - 15Ω
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