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TROUBLE DIAGNOSIS — INDEX

Alphabetical & P No. Index for DTC

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

NCA70007

NCA70001S01

Items (CONSULT screen terms)	DTC		Reference page
	ECM*1	CONSULT GST*2	
A/T 1ST GR FNCTN	1103	P0731	AT-112
A/T 2ND GR FNCTN	1104	P0732	AT-118
A/T 3RD GR FNCTN	1105	P0733	AT-124
A/T 4TH GR FNCTN	1106	P0734	AT-130
A/T TCC S/V FNCTN	1107	P0744	AT-144
ENGINE SPEED SIG	1207	P0725	AT-108
ATF TEMP SEN/CIRC	1208	P0710	AT-97
PNP SW/CIRC	1101	P0705	AT-92
L/PRESS SOL/CIRC	1205	P0745	AT-152
O/R CLTCH SOL/CIRC	1203	P1760	AT-176
SFT SOL A/CIRC*3	1108	P0750	AT-158
SFT SOL B/CIRC*3	1201	P0755	AT-163
TP SEN/CIRC A/T*3	1206	P1705	AT-168
TCC SOLENOID/CIRC	1204	P0740	AT-139
VEH SPD SEN/CIR AT*4	1102	P0720	AT-103

*1: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.

*2: These numbers are prescribed by SAE J2012.

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

*4: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed 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 screen terms)	Reference page	GI
CONSULT GST*2	ECM*1			MA
P0705	1101	PNP SW/CIRC	AT-92	EM
P0710	1208	ATF TEMP SEN/CIRC	AT-97	LC
P0720	1102	VEH SPD SEN/CIR AT*4	AT-103	EC
P0725	1207	ENGINE SPEED SIG	AT-108	FE
P0731	1103	A/T 1ST GR FNCTN	AT-112	CL
P0732	1104	A/T 2ND GR FNCTN	AT-118	MT
P0733	1105	A/T 3RD GR FNCTN	AT-124	AT
P0734	1106	A/T 4TH GR FNCTN	AT-130	AX
P0740	1204	TCC SOLENOID/CIRC	AT-139	SU
P0744	1107	A/T TCC S/V FNCTN	AT-144	BR
P0745	1205	L/PRESS SOL/CIRC	AT-152	ST
P0750	1108	SFT SOL A/CIRC*3	AT-158	RS
P0755	1201	SFT SOL B/CIRC*3	AT-163	BT
P1705	1206	TP SEN/CIRC A/T*3	AT-168	HA
P1760	1203	O/R CLTCH SOL/CIRC	AT-176	SC

*1: In Diagnostic Test Mode II (Self-diagnostic results), these numbers are controlled by NISSAN.

*2: These numbers are prescribed by SAE J2012.

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

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

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PRECAUTIONS

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

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

NCAT0002

The Supplemental Restraint System "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

In addition to the supplemental air bag modules for a frontal collision, the supplemental side air bag used along with the seat belt helps to reduce the risk or severity of injury to the driver and front passenger in a side collision. The supplemental side air bag consists of air bag modules (located in the outer side of front seats), satellite sensor, diagnosis sensor unit (one of components of supplemental air bags for a frontal collision), wiring harness, warning lamp (one of components of supplemental 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.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses (except "SEAT BELT PRE-TENSIONER" connector) can be identified with yellow harness connector (and with yellow harness protector or yellow insulation tape before the harness connectors).

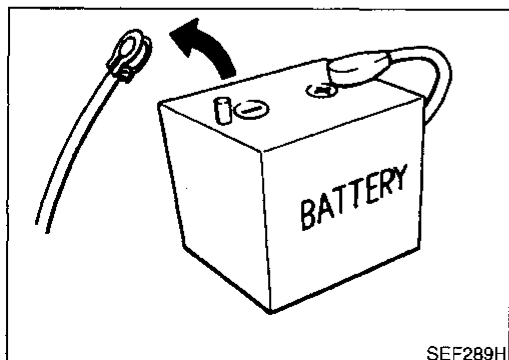
Precautions for On Board Diagnostic (OBD) System of A/T and Engine

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.



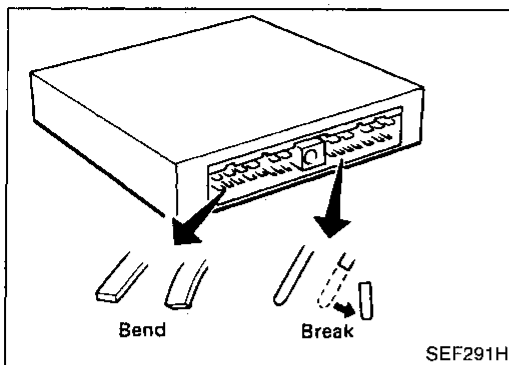
Precautions

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)



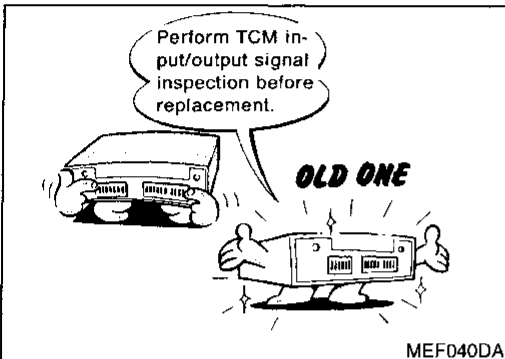
- When connecting or disconnecting pin connectors into or from TCM, take care not to damage pin terminals (bend or break).
Make sure that there are not any bends or breaks on TCM pin terminal, when connecting pin connectors.

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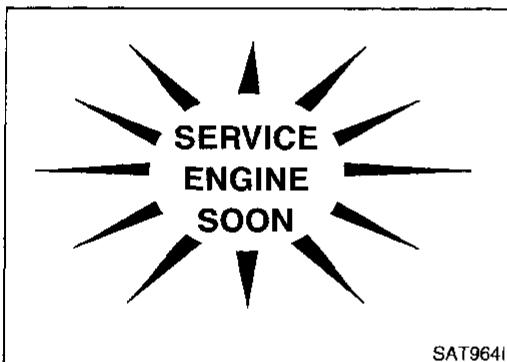
- Before replacing TCM, perform TCM input/output signal inspection and make sure whether TCM functions properly or not. (See page AT-85.)

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 "ATF COOLER SERVICE" (Refer to AT-7).
- After overhaul, refill the transaxle with new ATF.
- When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF cooling system.

Always follow the procedures under "Changing A/T Fluid" in the MA section when changing A/T fluid.

Service Notice or Precautions

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-48.)

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

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

Always follow the "WORK FLOW" (Refer to AT-56).

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:

PRECAUTIONS

Service Notice or Precautions (Cont'd)

- The fluid has an odor, is discolored, and there is no evidence of metal or clutch facing particles.
- The threads in one or more of the converter bolt holes are damaged.
- Transaxle failure did not display evidence of damaged or worn internal parts, steel particles or clutch plate lining material in unit and inside the fluid filter. GI
- 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. MA

ATF COOLER SERVICE

NCAT0004503

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
LC

OBD-II SELF-DIAGNOSIS

NCAT0004504

- A/T self-diagnosis is performed by the TCM in combination with the ECM. The results can be read through the blinking pattern of the O/D OFF indicator or the malfunction indicator lamp (MIL). Refer to the table on AT-39 for the indicator used to display each self-diagnostic result. EC
- The self-diagnostic results indicated by the MIL are automatically stored in both the ECM and TCM memories. FE
Always perform the procedure "HOW TO ERASE DTC" on AT-36 to complete the repair and avoid unnecessary blinking of the MIL. CL
- 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. MT
 - PNP switch
 - A/T 1st, 2nd, 3rd, or 4th gear function
 - A/T TCC S/V function (lock-up).

*: For details of OBD-II, refer to EC section ("ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION").

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

Wiring Diagrams and Trouble Diagnosis

NCAT0005

When you read wiring diagrams, refer to the followings:

- "HOW TO READ WIRING DIAGRAMS" in GI section BR
- "POWER SUPPLY ROUTING" for power distribution circuit in EL section ST

When you perform trouble diagnosis, refer to the followings:

- "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS" in GI section RS
- "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT" in GI section BT

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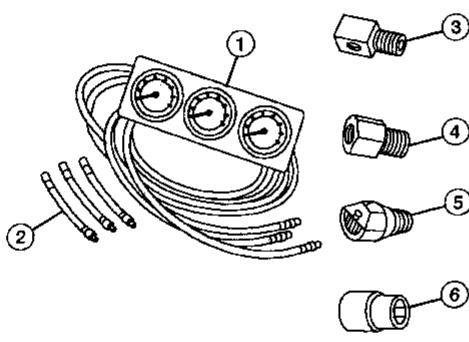
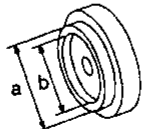
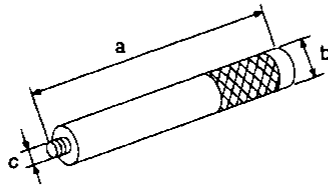
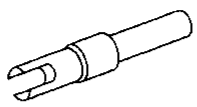
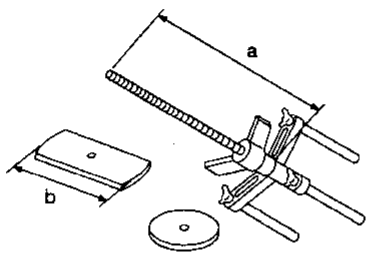
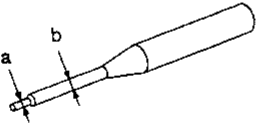
PREPARATION

Special Service Tools

Special Service Tools



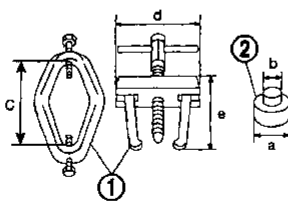
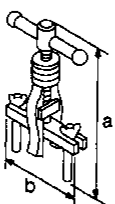
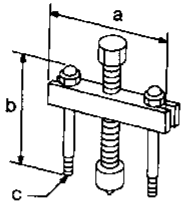
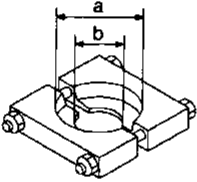
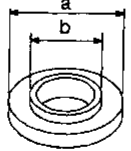
NCA70006

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		Measuring line pressure and governor pressure AAT896
KV31103000 (J38982) Drift		Installing differential oil seal (Use with ST35325000.) a: 59 mm (2.32 in) dia. b: 49 mm (1.93 in) dia. NT105
ST35325000 (—) Drift		Installing differential oil seal (Use with KV31103000.) a: 215 mm (8.46 in) b: 25 mm (0.98 in) dia. c: M12 x 1.5P NT417
KV38107700 (J39027) Preload adapter		<ul style="list-style-type: none"> ● Measuring turning torque of final drive assembly ● Measuring clearance between side gear and differential case with washer ● Selecting differential side bearing adjusting shim NT087
KV31103200 (J34285-A and J34285-87) Clutch spring compressor		Removing and installing clutch return spring a: 320 mm (12.60 in) b: 174 mm (6.85 in) NT423
ST23540000 (J25689-A) Pin punch		Removing and installing parking rod plate, manual plate and differential pinion mate shaft retaining pins a: 2.3 mm (0.091 in) dia. b: 4 mm (0.16 in) dia. NT442

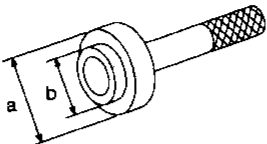
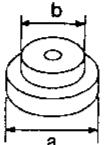
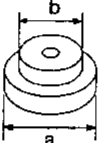
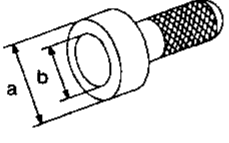
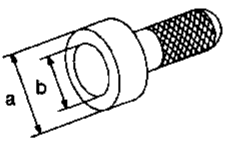
PREPARATION

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 a: 4 mm (0.16 in) dia.
NT410		GI MA EM
ST25710000 () Pin punch		Aligning groove of manual shaft and hole of transmission case a: 2 mm (0.08 in) dia.
NT410		LC EC
ST3306S001 (J22888-D) Differential side bearing puller set 1 ST33051001 (J22888-D) Puller 2 ST33061000 (J8107-2) Adapter		Removing differential side bearing inner race a: 39 mm (1.54 in) dia. b: 29.5 mm (1.161 in) dia. c: 130 mm (5.12 in) d: 135 mm (5.31 in) e: 120 mm (4.72 in)
NT745		FE CL MT
KV381054S0 (J34286) Puller		<ul style="list-style-type: none"> ● Removing idler gear bearing outer race ● Removing differential side oil seals ● Removing differential side bearing outer race ● Removing needle bearing from bearing retainer a: 250 mm (9.84 in) b: 160 mm (6.30 in)
NT414		AT AX SU
ST27180001 (J25726-A) Puller		<ul style="list-style-type: none"> ● Removing idler gear a: 100 mm (3.94 in) b: 110 mm (4.33 in) c: M8 x 1.25P
NT424		BR ST RS
ST30031000 (J22912-1) Puller		Removing reduction gear bearing inner race a: 90 mm (3.54 in) dia. b: 50 mm (1.97 in) dia.
NT411		BT HA SC
ST35272000 (J26092) Drift		<ul style="list-style-type: none"> ● Installing reduction gear bearing inner race ● Installing idler gear bearing inner race a: 72 mm (2.83 in) dia. b: 35.5 mm (1.398 in) dia.
NT426		EL IDX

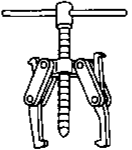
PREPARATION

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description
ST37830000 (—) Drift	 <p>Installing idler gear bearing outer race a: 62 mm (2.44 in) dia. b: 39 mm (1.54 in) dia.</p> <p style="text-align: center;">NT427</p>
ST35321000 (—) Drift	 <p>Installing output shaft bearing a: 49 mm (1.93 in) dia. b: 41 mm (1.61 in) dia.</p> <p style="text-align: center;">NT073</p>
ST30633000 (—) Drift	 <p>Installing differential side bearing outer race a: 67 mm (2.64 in) dia. b: 49 mm (1.93 in) dia.</p> <p style="text-align: center;">NT073</p>
ST35271000 (J26091) Drift	 <p>● Installing idler gear a: 72 mm (2.83 in) dia. b: 63 mm (2.48 in) dia.</p> <p style="text-align: center;">NT115</p>
ST33400001 (J26082) Drift	 <p>● Installing oil pump housing oil seal a: 60 mm (2.36 in) dia. b: 47 mm (1.85 in) dia.</p> <p style="text-align: center;">NT115</p>

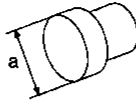
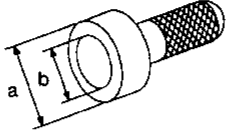
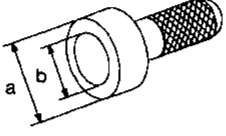
Commercial Service Tools

NCAT0007

Tool name	Description
Puller	 <p>● Removing idler gear bearing inner race ● Removing and installing band servo piston snap ring</p> <p style="text-align: center;">NT077</p>

PREPARATION

Commercial Service Tools (Cont'd)

Tool name	Description	
Drift	 <p>NT109</p>	<p>GI MA</p>
Drift	 <p>NT115</p>	<p>EM LC</p>
Drift	 <p>NT115</p>	<p>EC FE CL</p>

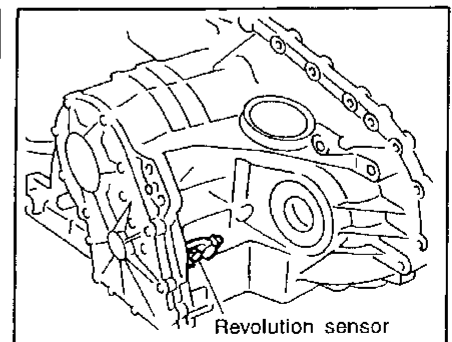
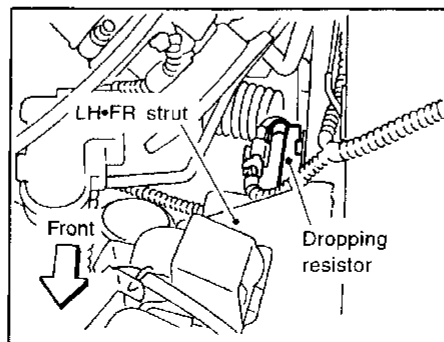
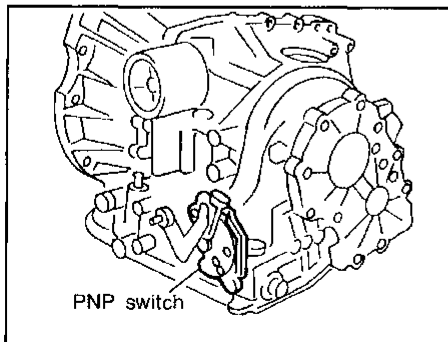
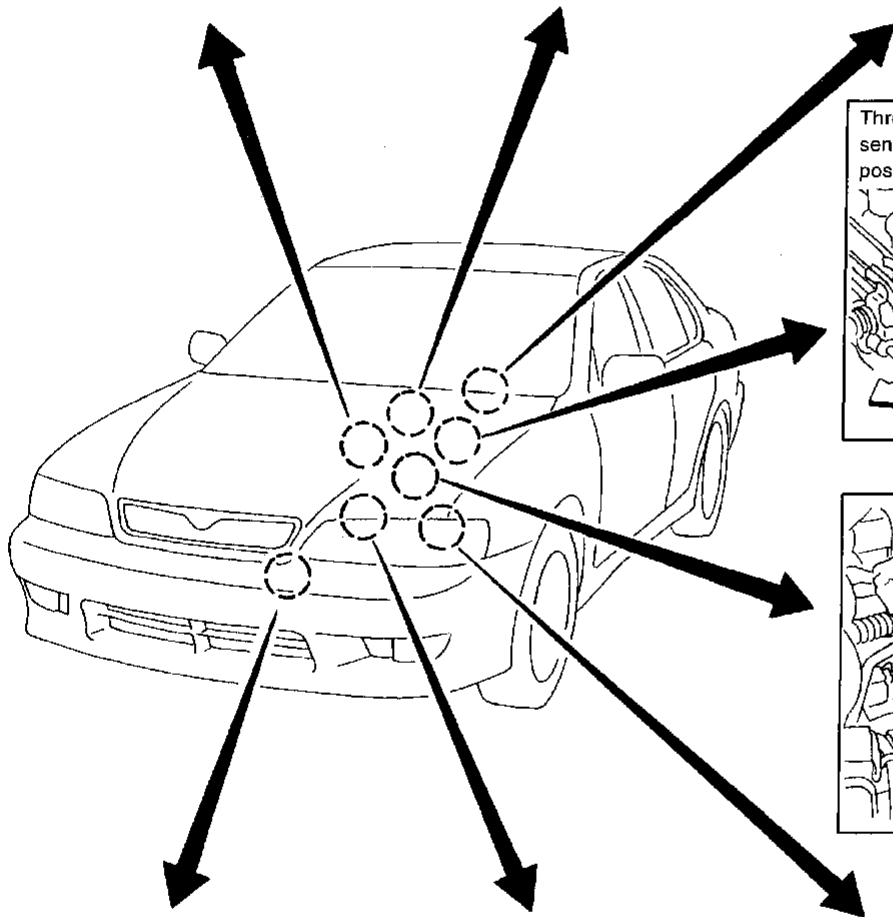
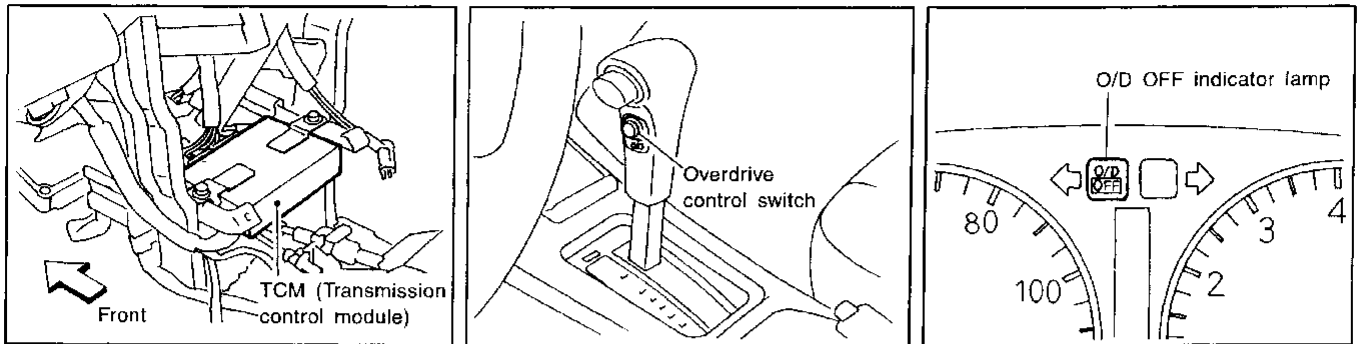
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- IDX

OVERALL SYSTEM

AT Electrical Parts Location

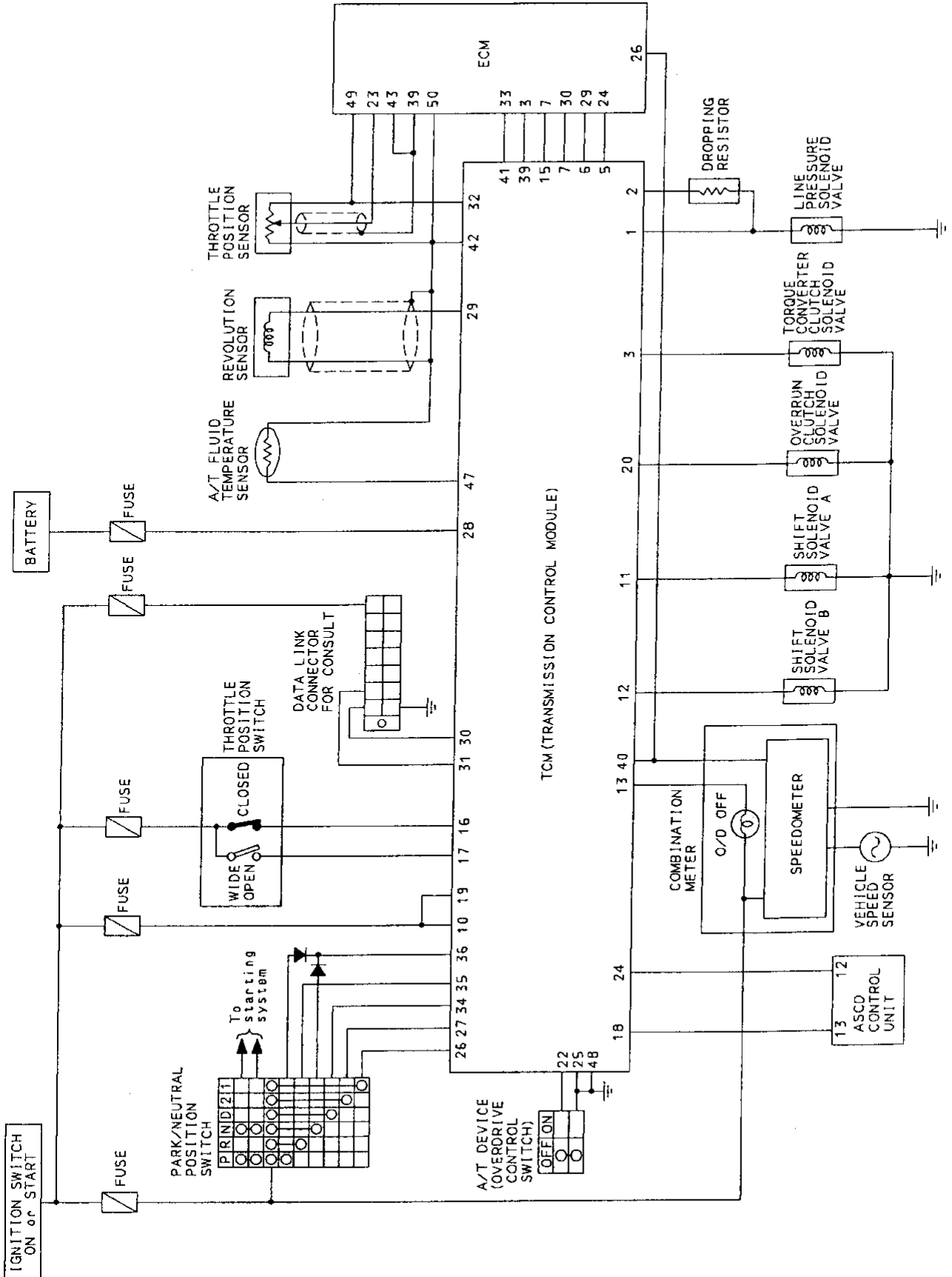
A/T Electrical Parts Location

NCA70009



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Circuit Diagram



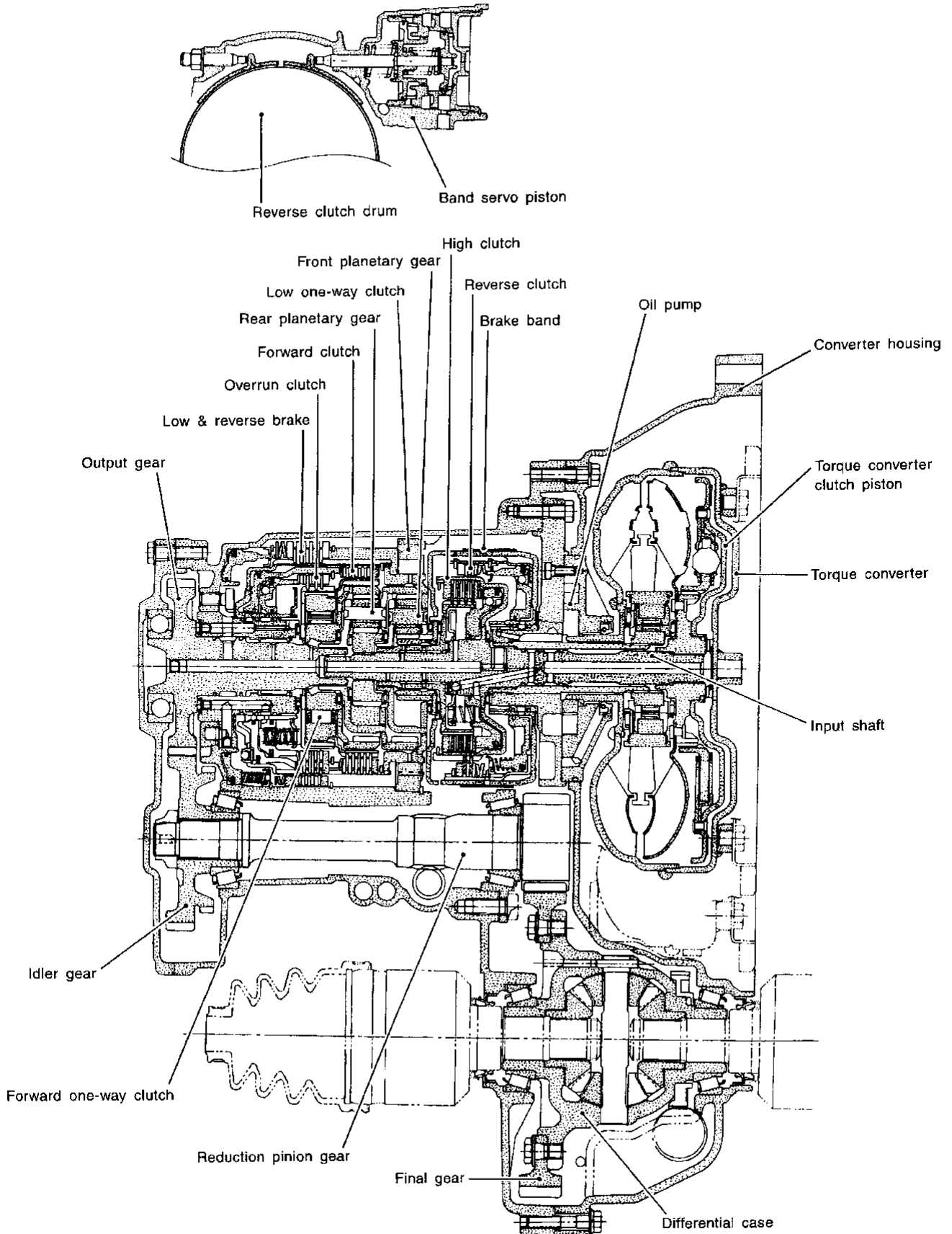
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OVERALL SYSTEM

Cross-sectional View — RE4F03A

Cross-sectional View — RE4F03A

NCAT0011



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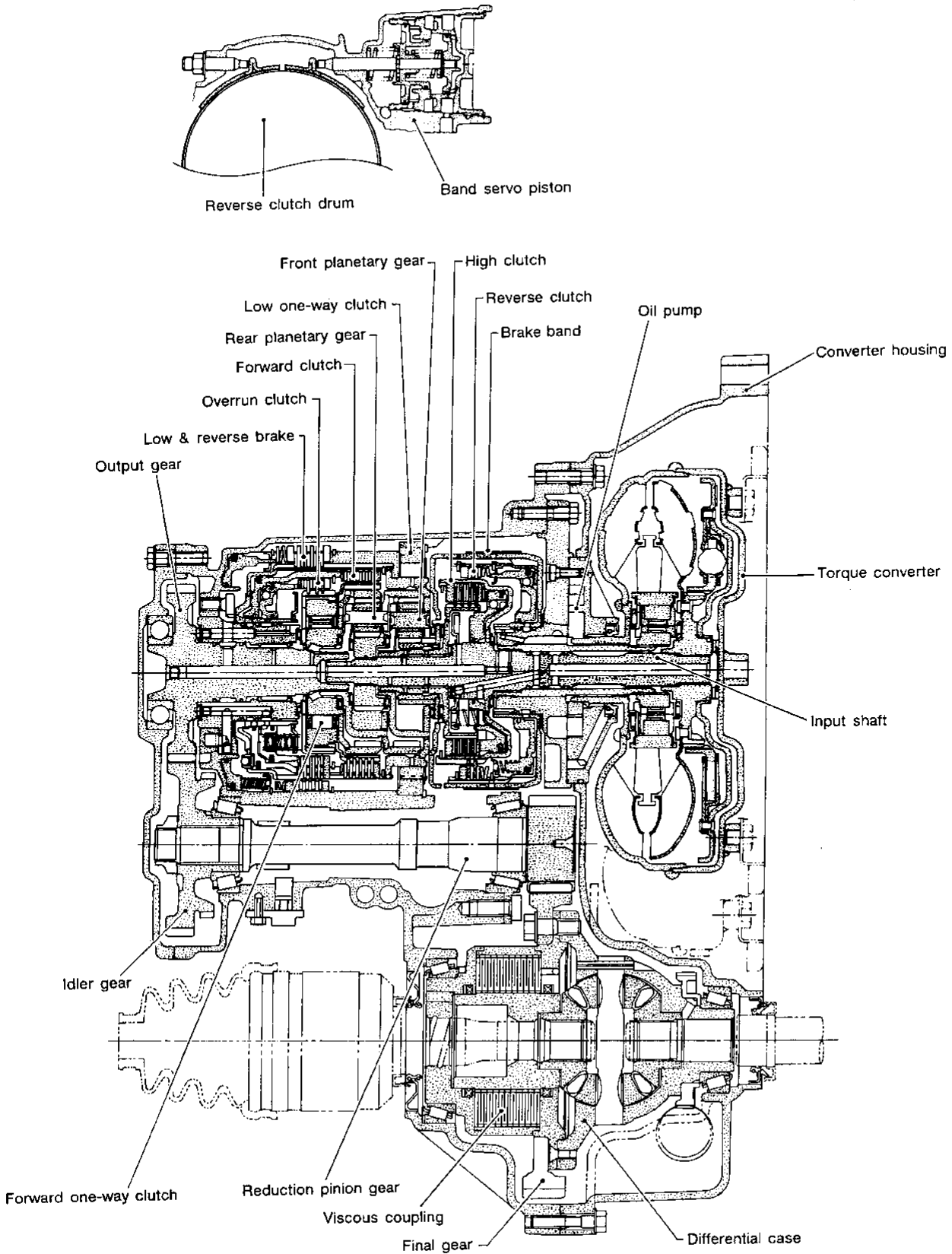
OVERALL SYSTEM

Cross-sectional View — RE4F03V

Cross-sectional View — RE4F03V

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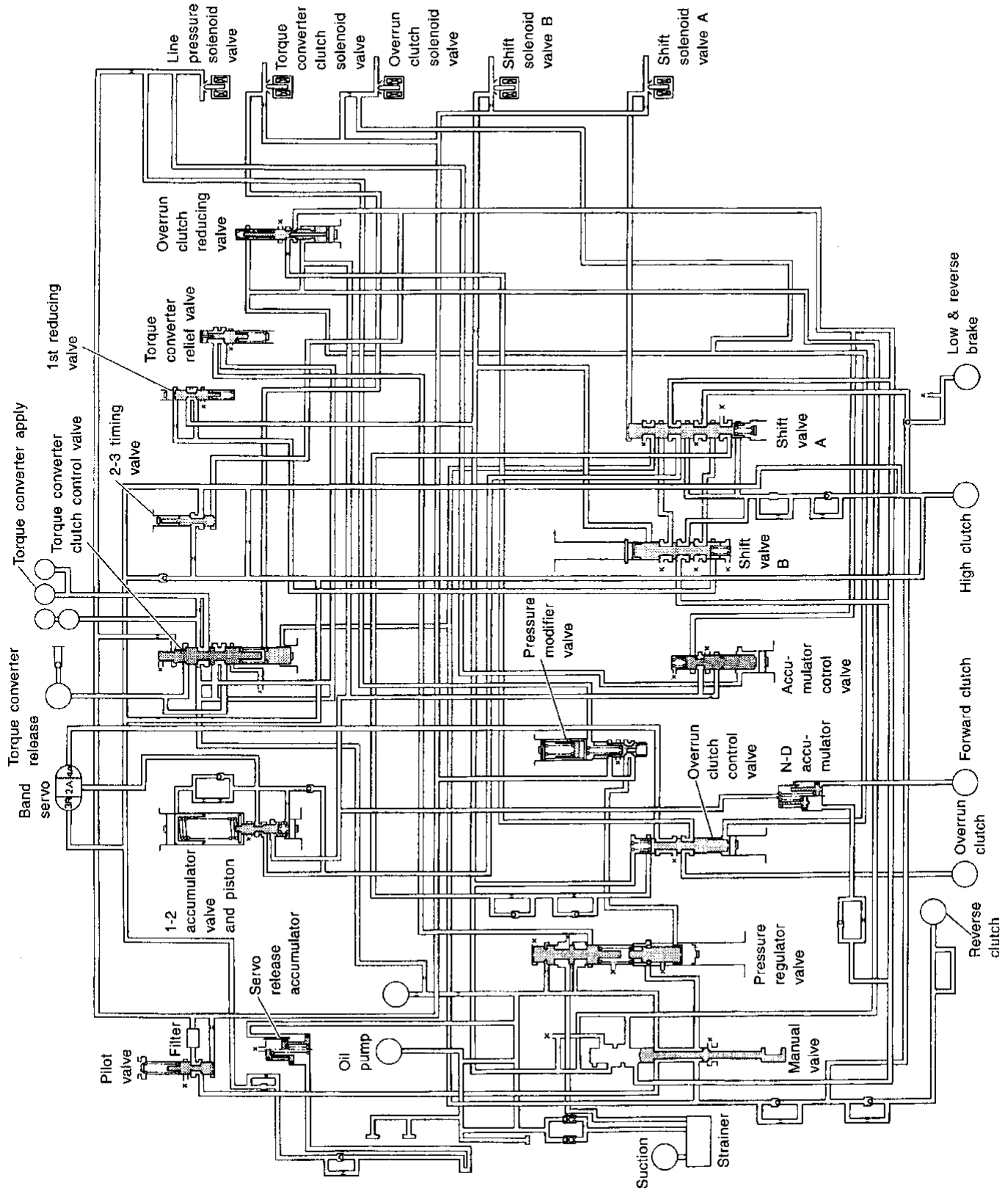
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OVERALL SYSTEM

Hydraulic Control Circuit

Hydraulic Control Circuit

NCAT0012



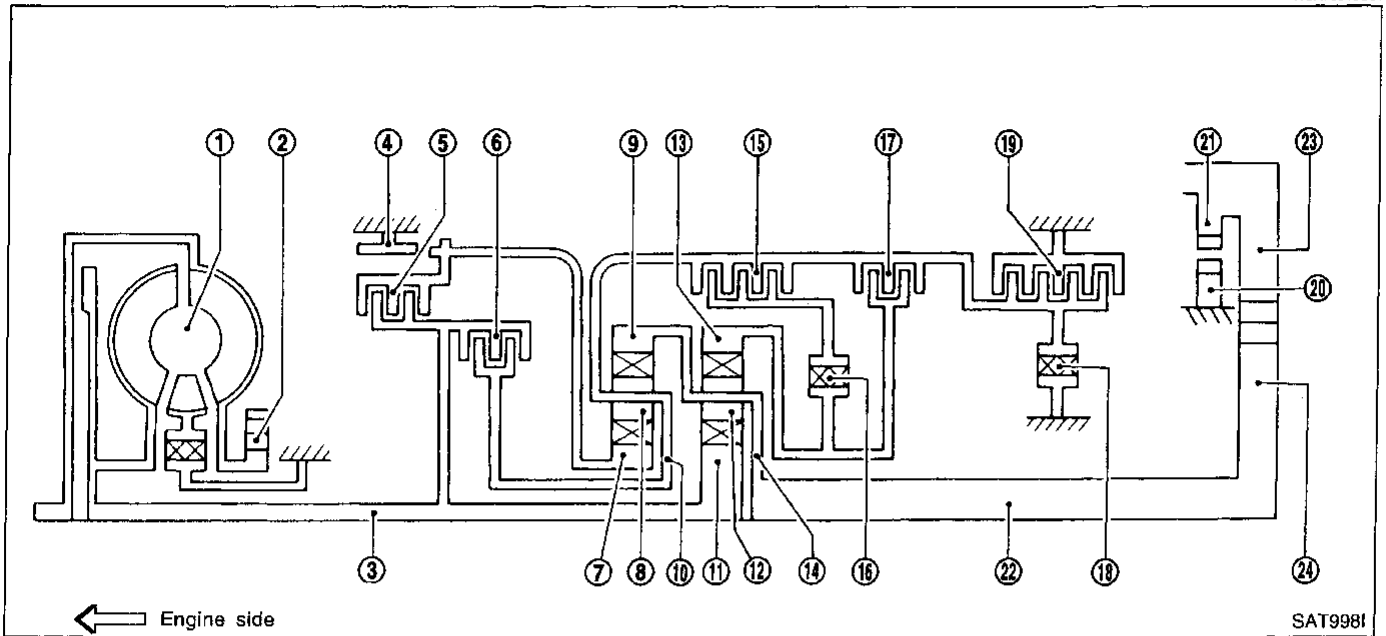
SAT369J

Shift Mechanism

CONSTRUCTION

NCAT0013

NCAT0013S01



SAT998I

- | | | |
|----------------------|-----------------------------|-------------------------|
| 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 5	High clutch 6	For-ward clutch 15	Over-run clutch 17	Band servo			Forward one-way clutch 16	Low one-way clutch 18	Low & reverse brake 19	Lock-up	Remarks
					2nd apply	3rd release	4th apply					
P												PARK POSITION
R	○									○		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

"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.

=NCAT0013S02

NCAT0013S0201

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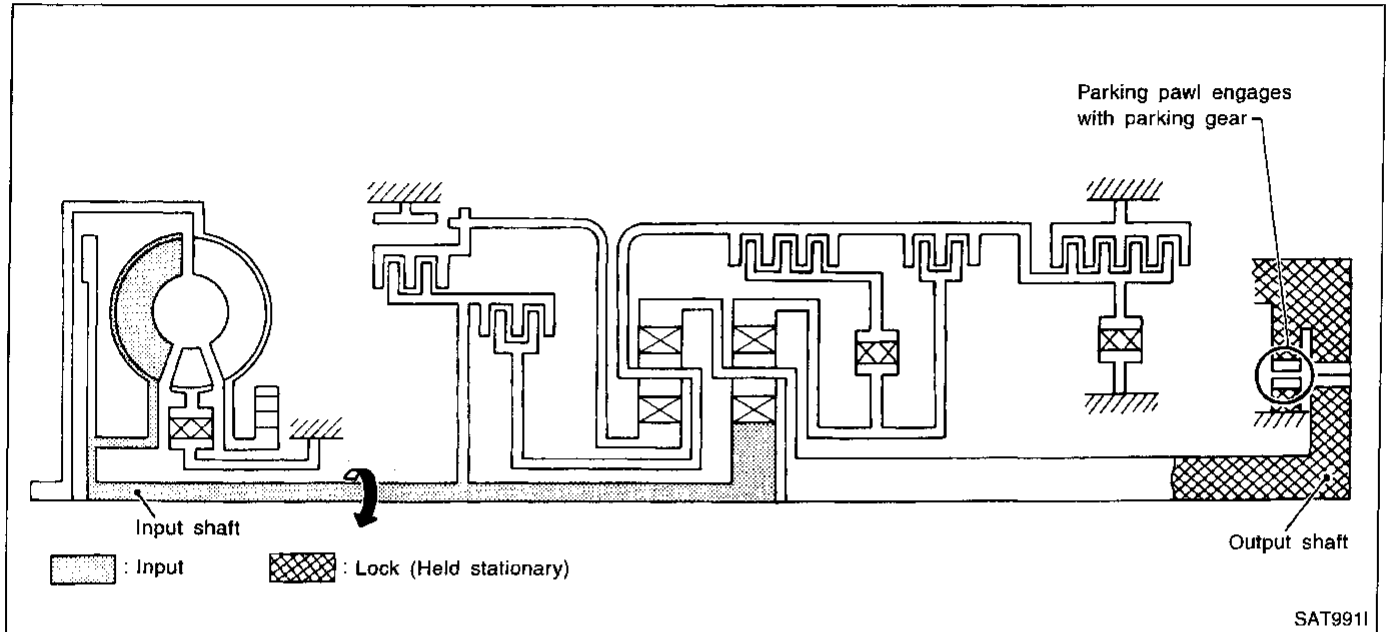
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OVERALL SYSTEM

Shift Mechanism (Cont'd)

=NCAT0013S0202

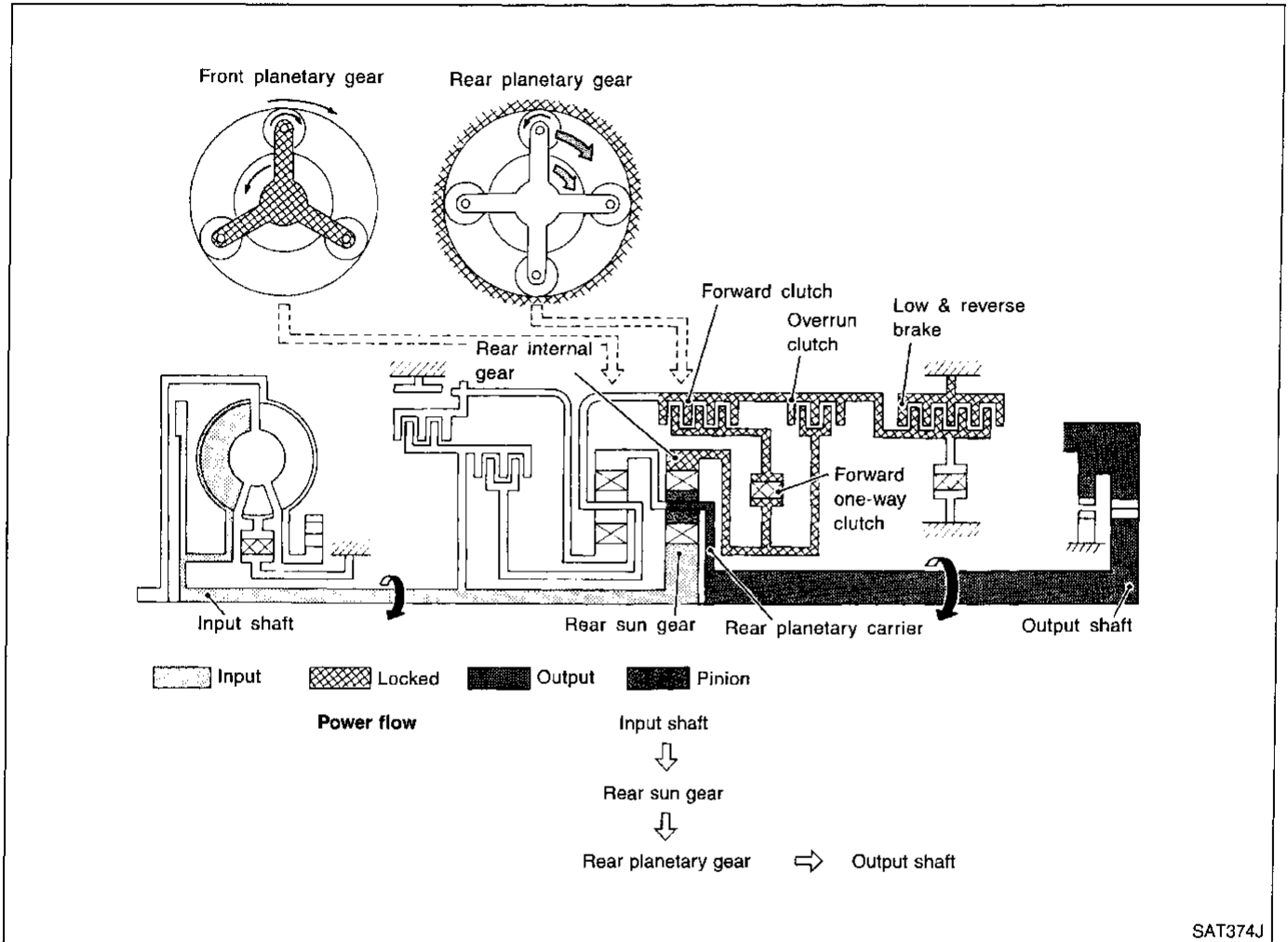
"1₁" Position

- Forward clutch
- Forward one-way clutch
- Overrun clutch
- Low and reverse brake

As overrun clutch engages, rear internal gear is locked by the operation of low and reverse brake.
This is different from that of D₁ and 2₁.

Engine brake

Overrun clutch always engages, therefore engine brake can be obtained when decelerating.



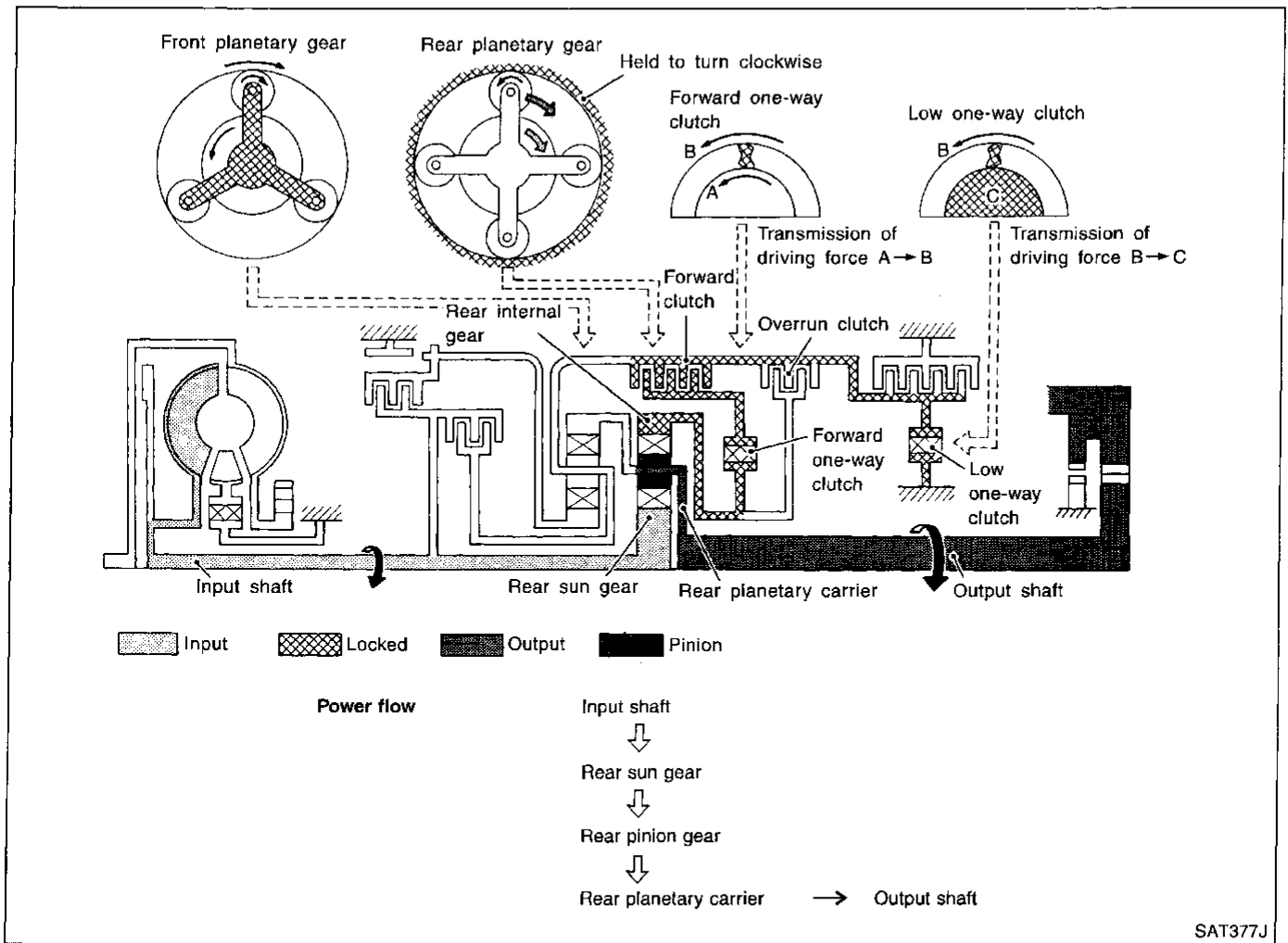
OVERALL SYSTEM

Shift Mechanism (Cont'd)

"D₁" and "2₁" Positions

-NCA70013S0203

<ul style="list-style-type: none"> • Forward one-way clutch • Forward clutch • Low one-way clutch 	Rear internal gear is locked to rotate counterclockwise because of the functioning of these three clutches.
Overrun clutch engagement conditions (Engine brake)	D ₁ : Overdrive control switch "OFF" and throttle opening is less than 3/16 2 ₁ : Always engaged At D ₁ and 2 ₁ positions, engine brake is not activated due to free turning of low one-way clutch.



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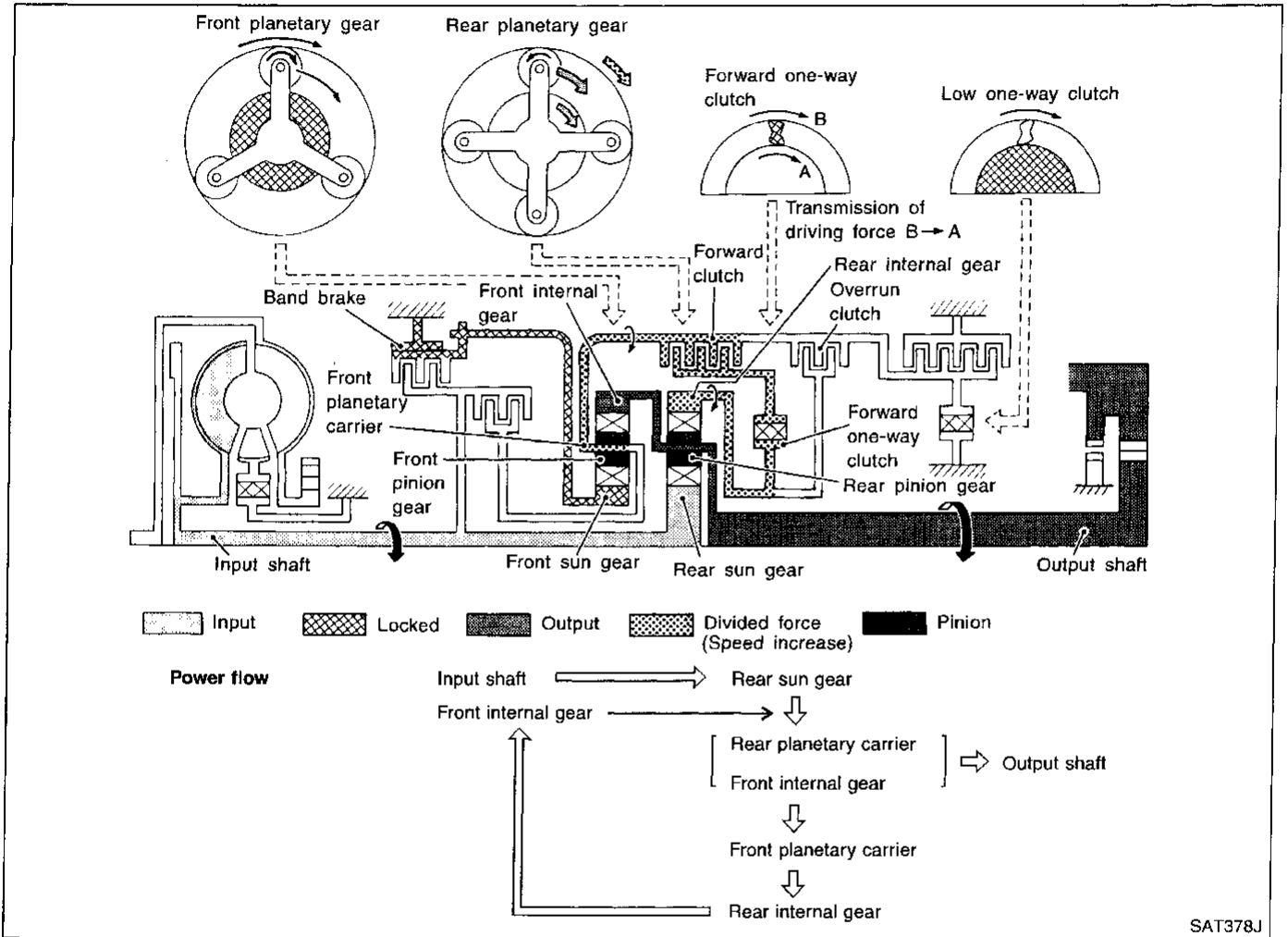
OVERALL SYSTEM

Shift Mechanism (Cont'd)

"D₂", "2₂" and "1₂" Positions

=NCAT0013S0204

<ul style="list-style-type: none"> ● Forward clutch ● Forward one-way clutch ● Brake band 	<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>Overrun clutch engagement conditions</p>	<p>D₂: Overdrive control switch "OFF" and throttle opening is less than 3/16 2₂ and 1₂: Always engaged</p>



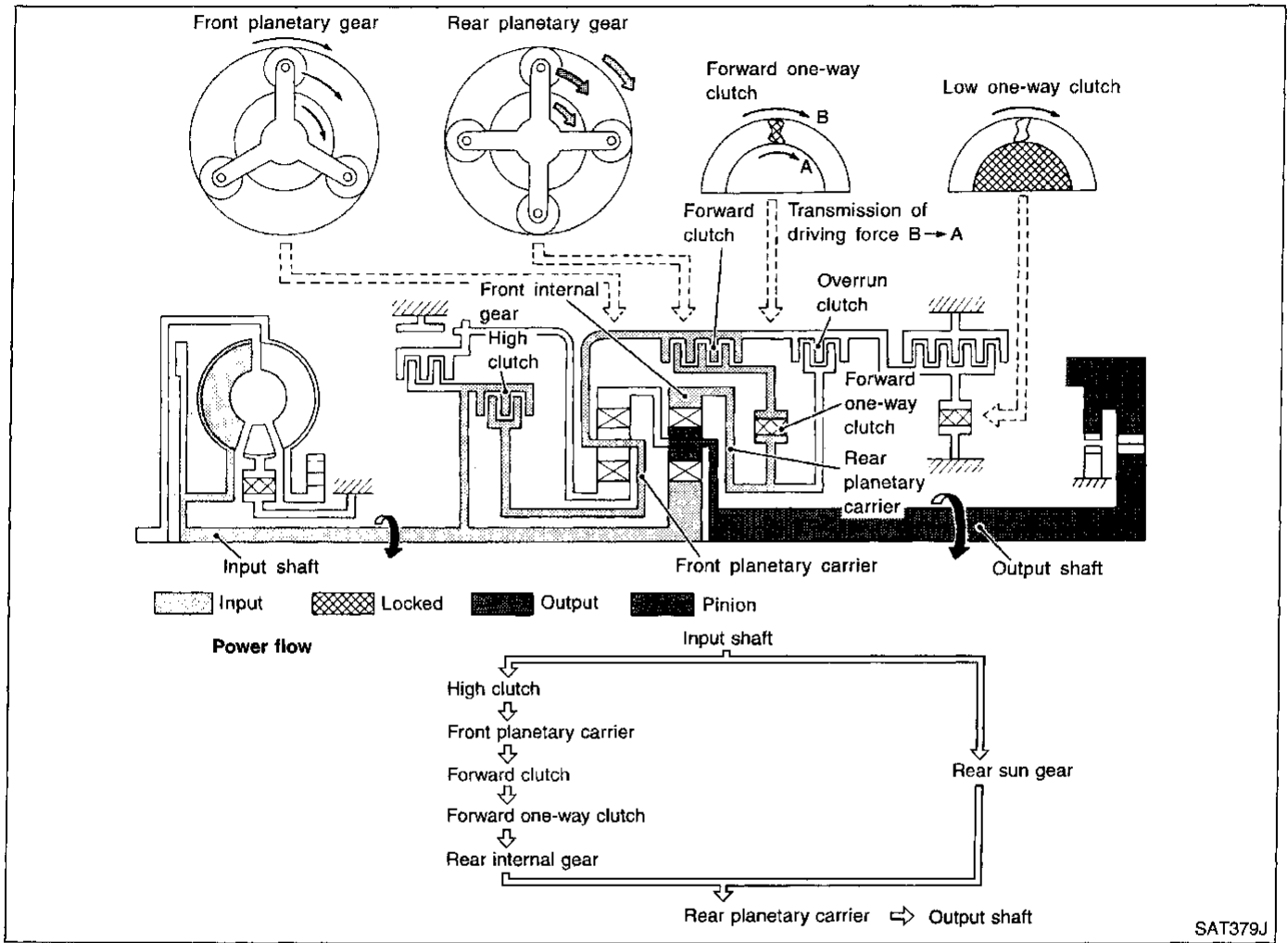
OVERALL SYSTEM

Shift Mechanism (Cont'd)

"D₃" Position

-NCAT0013S0205

<ul style="list-style-type: none"> • High clutch • Forward clutch • Forward one-way clutch 	<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</p>
<p>Overrun clutch engagement conditions</p>	<p>D₃: Overdrive control switch "OFF" and throttle opening is less than 3/16</p>	<p>EM</p>



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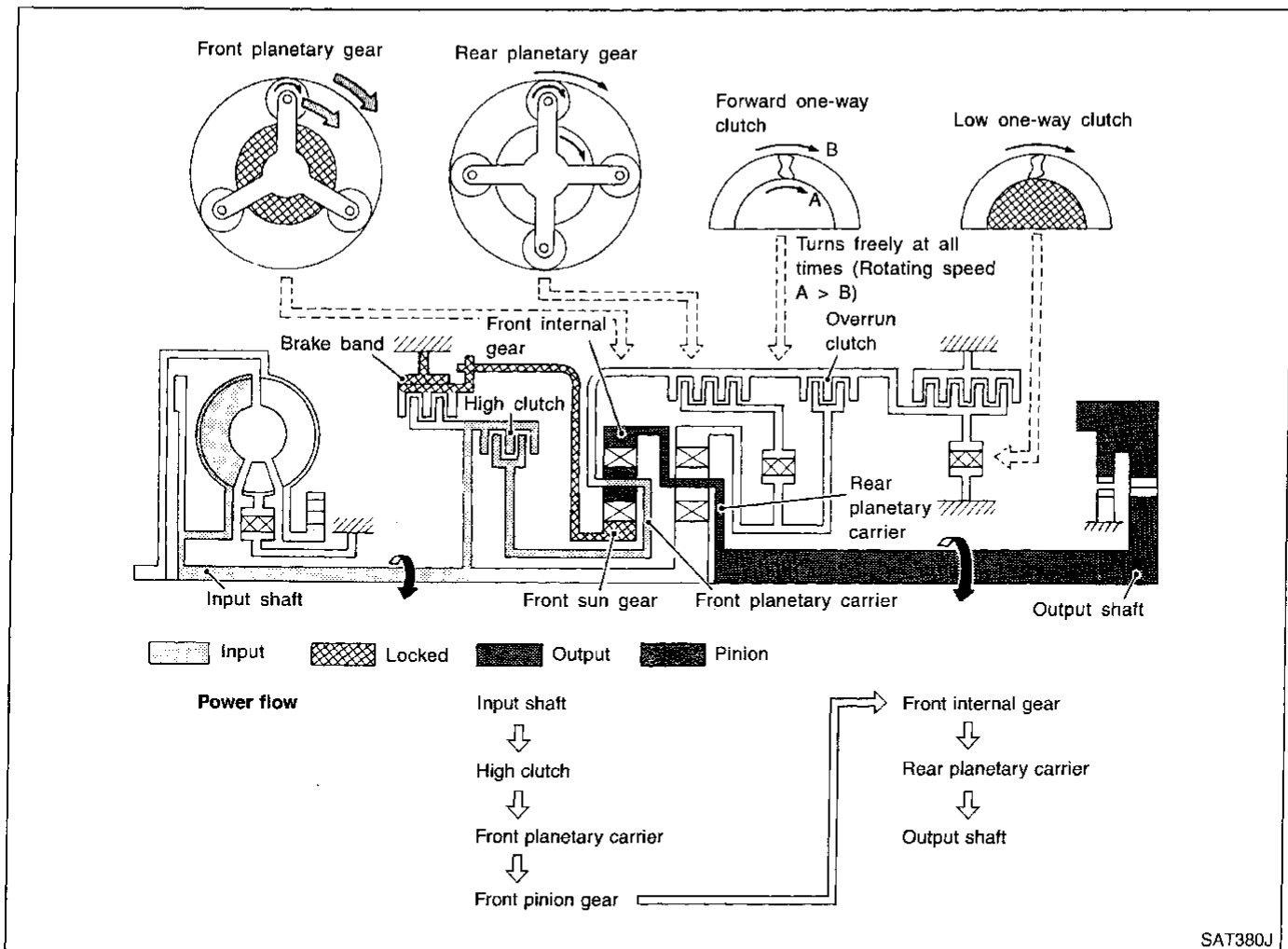
OVERALL SYSTEM

Shift Mechanism (Cont'd)

"D₄" (OD) Position

=NCAT0013S0206

<ul style="list-style-type: none"> • High clutch • Brake band • Forward clutch (Does not affect power transmission) 	<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 D₄ position, there is no one-way clutch in the power transmission line and engine brake can be obtained when decelerating.</p>



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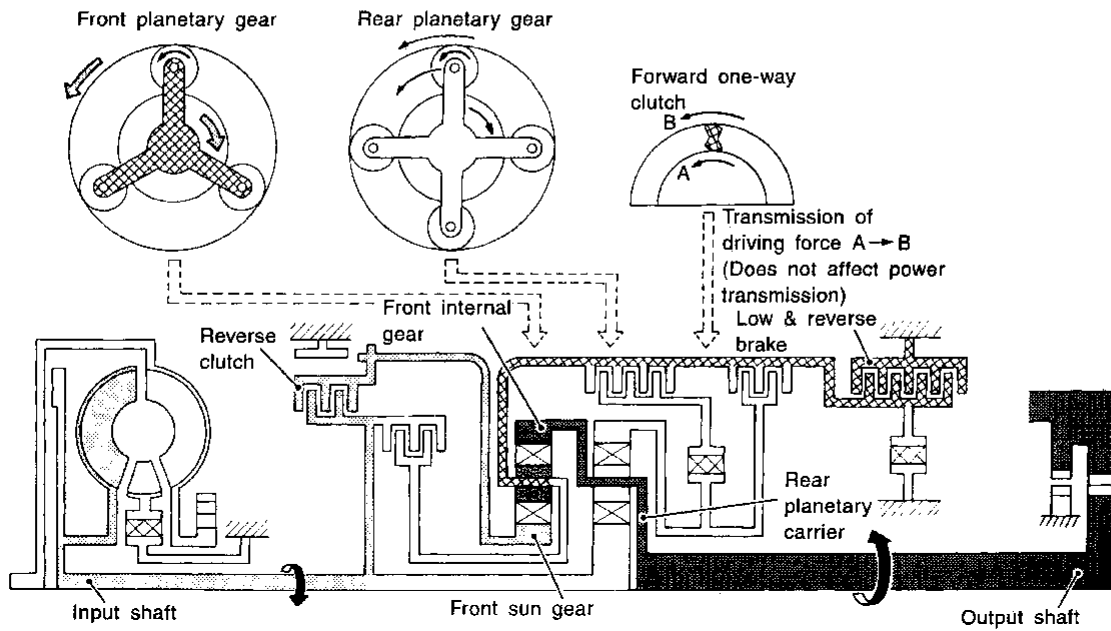
OVERALL SYSTEM

Shift Mechanism (Cont'd)

"R" Position

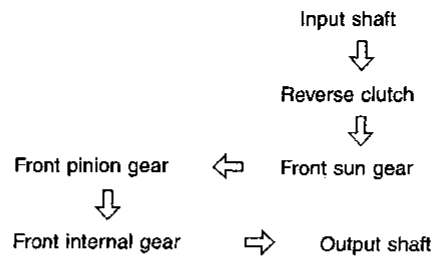
-NCAT0013S0207

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



Input
 Locked
 Output
 Pinion

Power flow



SAT381J

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OVERALL SYSTEM

Control System

Control System

=NCAT0014

OUTLINE

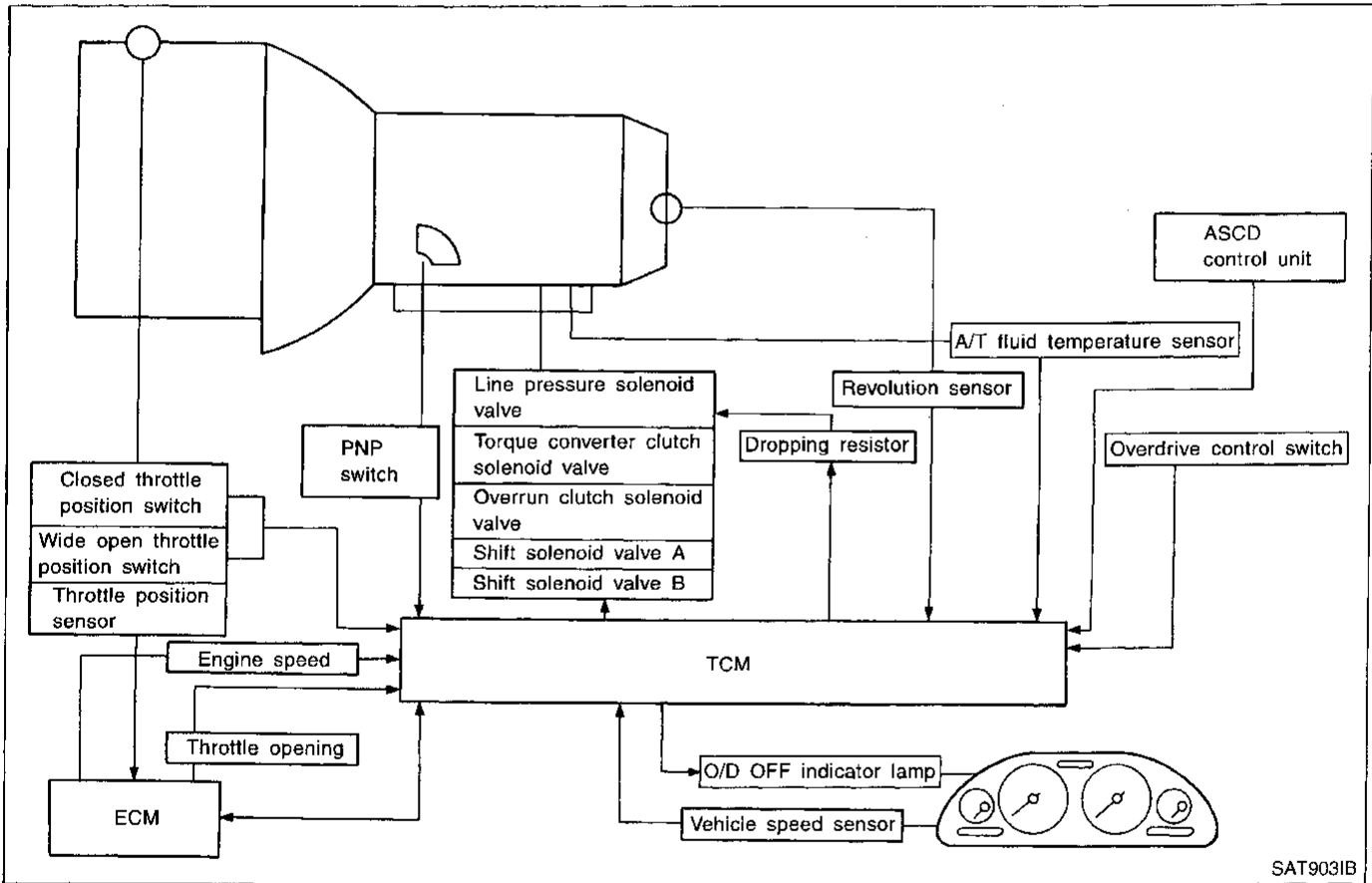
NCAT0014S01

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

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

CONTROL SYSTEM

NCAT0014S02



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 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.	MT
	Overdrive control switch	Sends a signal, which prohibits a shift to "D ₄ " (overdrive) position, to the TCM.	AT
	ASCD control unit	Sends the cruise signal and "D ₄ " (overdrive) cancellation signal from ASCD control unit to TCM.	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

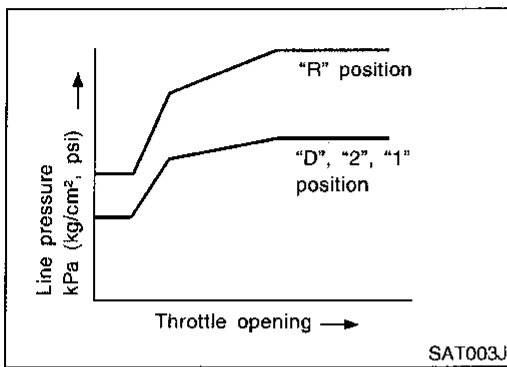
TCM has various line pressure control characteristics to match the driving conditions.

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

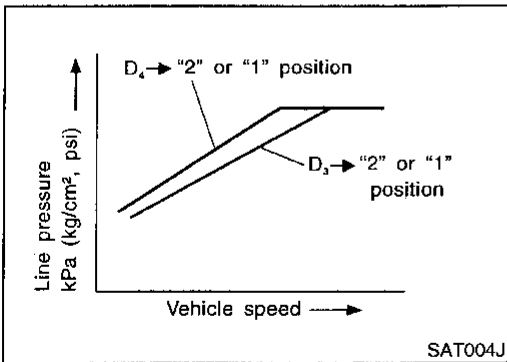
Control Mechanism (Cont'd)



Normal Control

NCAT0015S0101

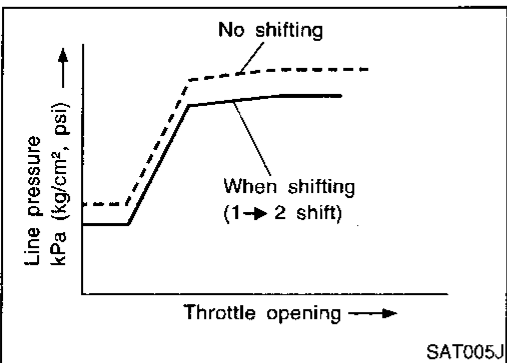
The line pressure to throttle opening characteristics is set for suitable clutch operation.



Back-up Control (Engine brake)

NCAT0015S0102

If the selector lever is shifted to "2" position while driving in D₄ (OD) or D₃, great driving force is applied to the clutch inside the transmission. Clutch operating pressure (line pressure) must be increased to deal with this driving force.



During Shift Change

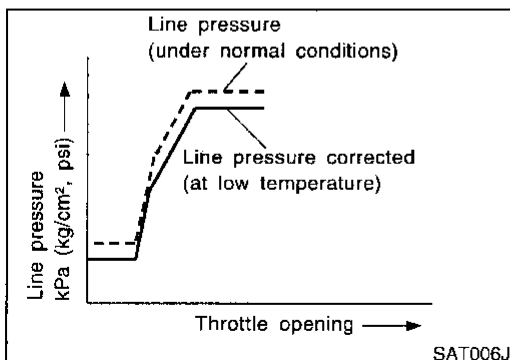
NCAT0015S0103

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

At Low Fluid Temperature

NCAT0015S0104

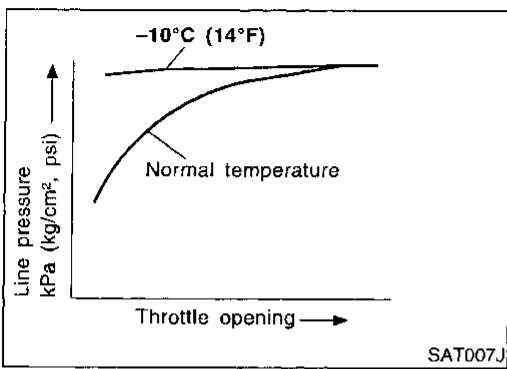
- Fluid viscosity and frictional characteristics of the clutch facing change with fluid temperature. Clutch engaging or band-contacting pressure is compensated for, according to fluid temperature, to stabilize shifting quality.



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

OVERALL SYSTEM

Control Mechanism (Cont'd)

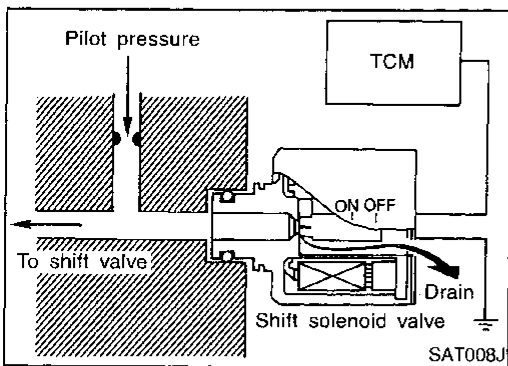


- Line pressure is increased to a maximum irrespective of the throttle opening when fluid temperature drops to -10°C (14°F). This pressure rise is adopted to prevent a delay in clutch and brake operation due to extreme drop of fluid viscosity at low temperature.

SHIFT CONTROL

The shift is regulated entirely by electronic control to accommodate vehicle speed and varying engine operations. This is accomplished by electrical signals transmitted by the revolution sensor and throttle position sensor. This results in improved acceleration performance and fuel economy.

NCAT0015S02



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

The shift solenoid valve performs simple ON-OFF operation. When set to "ON", the drain circuit closes and pilot pressure is applied to the shift valve.

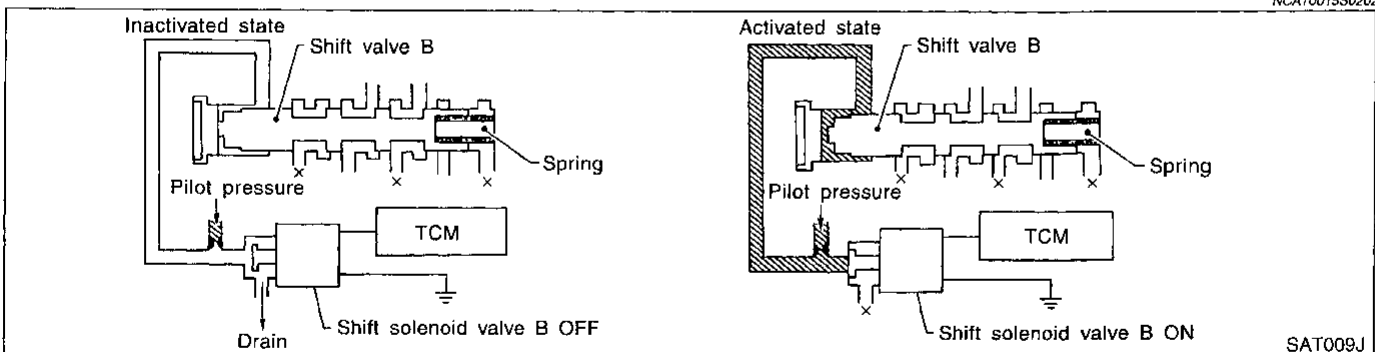
Relation Between Shift Solenoid Valves A and B and Gear Positions

NCAT0015S0203

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

Control of Shift Valves A and B

NCAT0015S0202



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

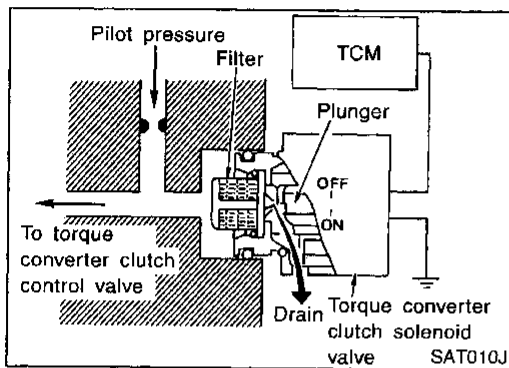
The torque converter clutch piston in the torque converter is locked to eliminate torque converter slip to increase power transmission efficiency. The solenoid valve is controlled by an ON-OFF duty signal sent from the TCM. The signal is converted to an oil pressure signal which controls the torque converter 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 ₄	D ₃
Vehicle speed sensor	More than set value	
Throttle position sensor	Less than set opening	
Closed throttle position switch	OFF	
A/T fluid temperature sensor	More than 40°C (104°F)	

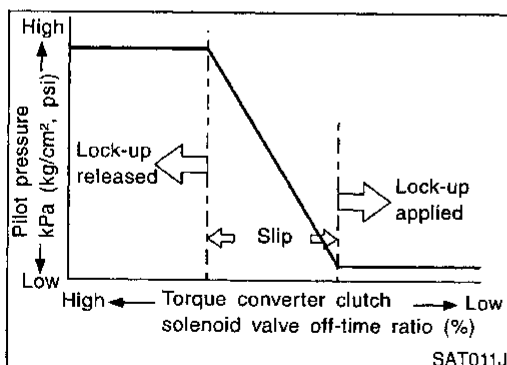


Torque Converter Clutch Solenoid Valve Control

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

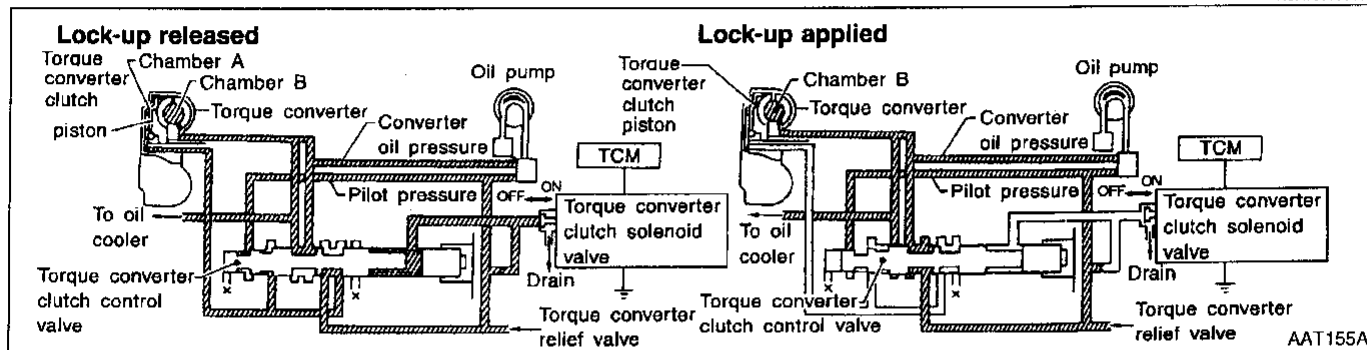
↓
Lock-up RELEASING

OVERALL SYSTEM

Control Mechanism (Cont'd)

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

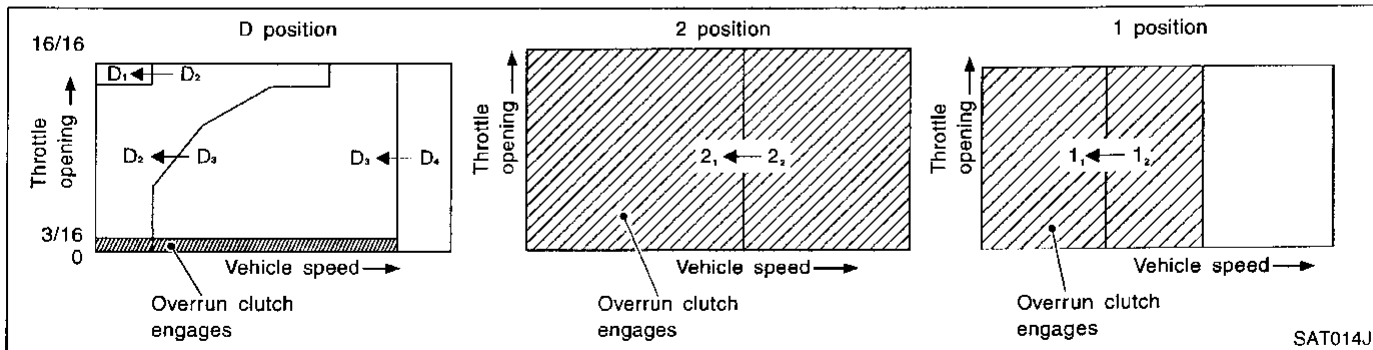
Forward one-way clutch is used to reduce shifting shocks in downshifting operations. This clutch transmits engine torque to the wheels. However, drive force from the wheels is not transmitted to the engine because the one-way clutch rotates idle. This means the engine brake is not effective.

The overrun clutch operates when the engine brake is needed.

Overrun Clutch Operating Conditions

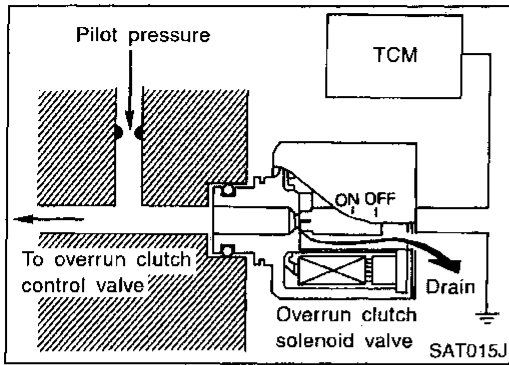
NCAT0015S0401

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



OVERALL SYSTEM

Control Mechanism (Cont'd)



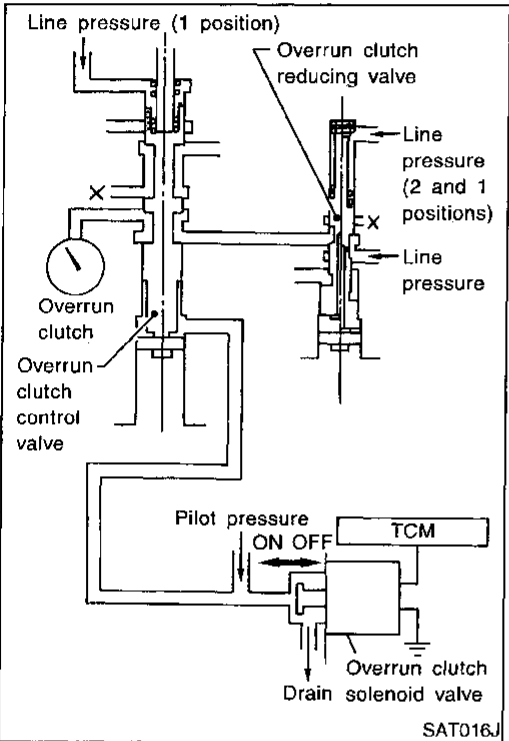
Overrun Clutch Solenoid Valve Control

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 backpressure 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 ₄ . (Interlocking occurs if the overrun clutch engages during D ₄ .)	EM
1st reducing valve	Reduces low & reverse brake pressure to dampen engine-brake shock when down-shifting from the "1" position 1 ₂ to 1 ₁ .	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.	FE
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

MT

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-49.

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

NCAT0019S01

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

TWO TRIP DETECTION LOGIC

NCAT0019S02

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

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

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

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

OBD-II Diagnostic Trouble Code (DTC)

NCAT0020

HOW TO READ DTC AND 1ST TRIP DTC

NCAT0020S01

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

1. (🔧 **No Tools**) The number of blinks of the malfunction indicator lamp in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 1101, 1102, 1103, 1104, etc. For details, refer to EC section [“Malfunction Indicator Lamp (MIL)”, “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION”].

These DTCs are controlled by NISSAN.

2. (🔌 **with CONSULT** or 🛠️ **GST**) CONSULT or GST (Generic Scan Tool) Examples: P0705, P0710, P0720, P0725, etc.

These DTCs are prescribed by SAE J2012.

(CONSULT also displays the malfunctioning component or system.)

● **1st trip DTC No. is the same as DTC No.**

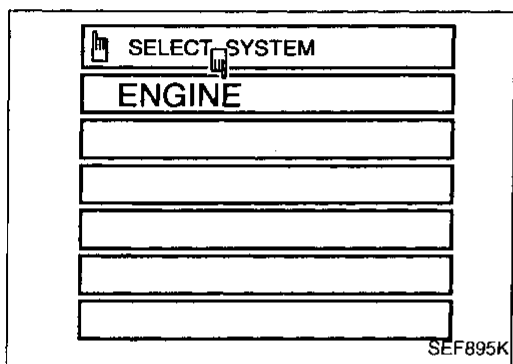
● **Output of the diagnostic trouble code indicates that the indicated circuit has a malfunction. However, in case of the Mode II and GST they do not indicate whether the malfunction is still occurring or occurred in the past and returned to normal.**

CONSULT can identify them as shown below. Therefore, using CONSULT (if available) is recommended.

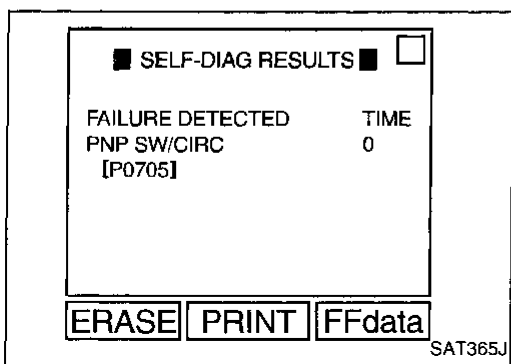
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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

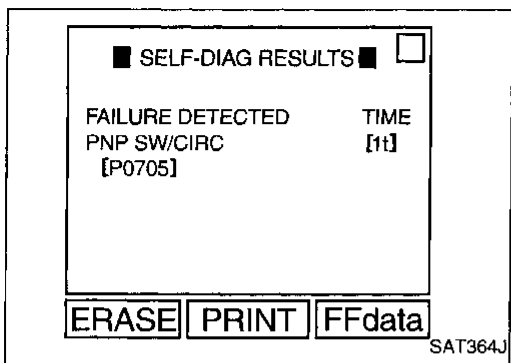
A sample of CONSULT display for DTC is shown at left. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode for "ENGINE" with CONSULT. Time data indicates how many times the vehicle was driven after the last detection of a DTC.



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



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



Freeze Frame Data and 1st Trip Freeze Frame Data

NCAT0020S0101

The ECM has a memory function, which stores the driving condition such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed and vehicle speed at the moment the ECM detects a malfunction.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data, and the data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen, not on the GST. For detail, refer to EC section ("CONSULT", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION").

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

The ECM has the following priorities to update the data.

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

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

HOW TO ERASE DTC

The diagnostic trouble code can be erased by CONSULT, GST or ECM DIAGNOSTIC TEST MODE ^{NCAT0020502} as described following.

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

The following emission-related diagnostic information is cleared from the ECM memory when erasing DTC related to OBD-II. For details, refer to EC section ("Emission-related Diagnostic Information", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION").

- 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)

- If a DTC is displayed for both ECM and TCM, it needs to be erased for both ECM and TCM. ^{NCAT0020503}
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
 2. Turn CONSULT "ON" and touch "A/T".
 3. Touch "SELF-DIAG RESULTS".
 4. Touch "ERASE". (The DTC in the TCM will be erased.) Then touch "BACK" twice.
 5. Touch "ENGINE".
 6. Touch "SELF-DIAG RESULTS".
 7. Touch "ERASE". (The DTC in the ECM will be erased.)

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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

How to erase DTC (With CONSULT)

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

SELECT SYSTEM
ENGINE
A/T

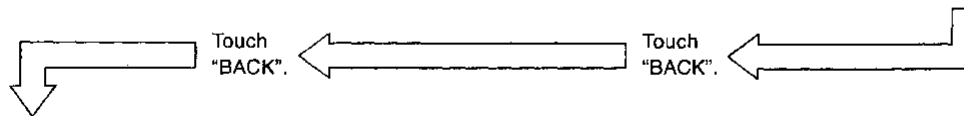
2. Turn CONSULT "ON", and touch "A/T".

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

3. Touch "SELF-DIAG RESULTS".

SELF-DIAG RESULTS
FAILURE DETECTED
SHIFT SOLENOID/V A
ERASE
PRINT
FFdata

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



SELECT SYSTEM
ENGINE
A/T

5. Touch "ENGINE".

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

6. Touch "SELF-DIAG RESULTS".

SELF-DIAG RESULTS
FAILURE DETECTED
SFT SOL A/CIRC
[P0750]
TIME
0
ERASE
PRINT
FFdata

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

SAT382J

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 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform "OBD-II SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-48. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with Generic Scan Tool (GST). For details, refer to EC section ["Generic Scan Tool (GST)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

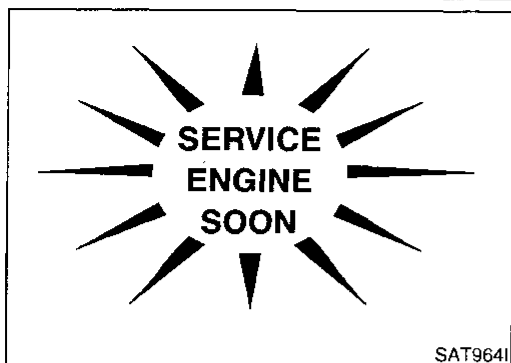
HOW TO ERASE DTC (NO TOOLS)

NCAT0020S05

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-48. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. Refer to EC section ["HOW TO SWITCH DIAGNOSTIC TEST MODES", "Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

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 section ("Warning Lamps/System Description", "WARNING LAMPS AND CHIME"). (Or see MIL & Data Link Connectors in EC section.)
2. When the engine is started, the malfunction indicator lamp should go off. If the lamp remains on, the on board diagnostic system has detected an emission-related (OBD-II) malfunction. For detail, refer to EC section ("ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION").

CONSULT

NCAT0022

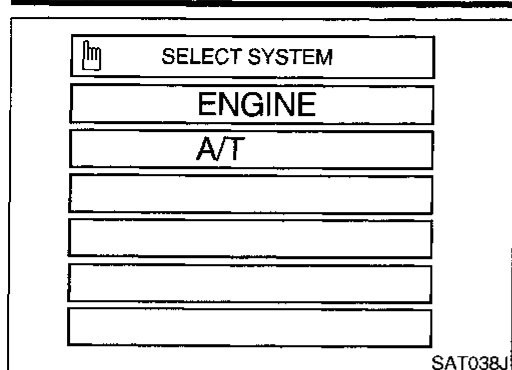
After performing "SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT)" (AT-39), place check marks for results on the "DIAGNOSTIC WORKSHEET", AT-54. Reference pages are provided following the items.

NOTICE:

- 1) The CONSULT 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 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 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 indicates the point where shifts are completed.
- 3) Shift solenoid valve "A" or "B" is displayed on CONSULT at the start of shifting. Gear position is displayed upon completion of shifting (which is computed by TCM).
- 4) Additional CONSULT information can be found in the Operation Manual supplied with the CONSULT unit.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

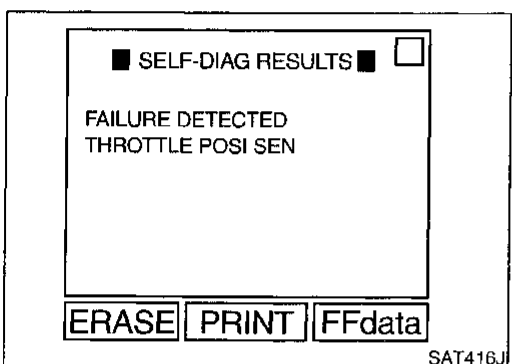
CONSULT (Cont'd)



① SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT)

NCAT0022S02

1. Turn on CONSULT 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-85. If result is NG, refer to EL section ("POWER SUPPLY ROUTING").



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



SELF-DIAGNOSTIC RESULT TEST MODE

NCAT0022S03

Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)	
"A/T"	"ENGINE"		Available by O/D OFF indicator lamp or "A/T" on CONSULT	Available by malfunction indicator lamp*2, "ENGINE" on CONSULT or GST	
PNP switch circuit		● TCM does not receive the correct voltage signal (based on the gear position) from the switch.	—	P0705	BR
—	PNP SW/CIRC				
Revolution sensor		● TCM does not receive the proper voltage signal from the sensor.	X	P0720	RS
VHCL SPEED SEN-A/T	VEH SPD SEN/CIR AT				
Vehicle speed sensor (Meter)		● TCM does not receive the proper voltage signal from the sensor.	X	—	BT
VHCL SPEED SEN-MTR	—				
A/T 1st gear function		● A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	—	P0731*1	HA
—	A/T 1ST GR FNCTN				
A/T 2nd gear function		● A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	—	P0732*1	EL
—	A/T 2ND GR FNCTN				
A/T 3rd gear function		● A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	—	P0733*1	IDX
—	A/T 3RD GR FNCTN				


ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
"A/T"	"ENGINE"		 Available by O/D OFF indicator lamp or "A/T" on CONSULT	 Available by malfunction indicator lamp*2, "ENGINE" on CON- SULT or GST
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 (Cont'd)

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

DATA MONITOR MODE (A/T)

NCAT0022504

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"> Vehicle speed computed from signal of revolution sensor is displayed. 	When racing engine in "N" or "P" position with vehicle stationary, CONSULT data may not indicate 0 km/h (0 mph).
Vehicle speed sensor 2 (Meter)	VHCL/S SE-MTR [km/h] or [mph]	X	—	<ul style="list-style-type: none"> Vehicle speed computed from signal of vehicle speed sensor is displayed. 	Vehicle speed display may not be accurate under approx. 10 km/h (6 mph). It may not indicate 0 km/h (0 mph) when vehicle is stationary.
Throttle position sensor	THRTL POS SEN [V]	X	—	<ul style="list-style-type: none"> Throttle position sensor signal voltage is displayed. 	
A/T fluid temperature sensor	FLUID TEMP SE [V]	X	—	<ul style="list-style-type: none"> A/T fluid temperature sensor signal voltage is displayed. Signal voltage lowers as fluid temperature rises. 	
Battery voltage	BATTERY VOLT [V]	X	—	<ul style="list-style-type: none"> Source voltage of TCM is displayed. 	
Engine speed	ENGINE SPEED [rpm]	X	X	<ul style="list-style-type: none"> Engine speed, computed from engine speed signal, is displayed. 	Engine speed display may not be accurate under approx. 800 rpm. It may not indicate 0 rpm even when engine is not running.
Overdrive control switch	OVERDRIVE SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF state computed from signal of overdrive control SW is displayed. 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
P/N position switch	P/N POSI SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF state computed from signal of P/N position SW is displayed. 	
R position switch	R POSITION SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF state computed from signal of R position SW is displayed. 	
D position switch	D POSITION SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF state computed from signal of D position SW is displayed. 	
2 position switch	2 POSITION SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF status, computed from signal of 2 position SW, is displayed. 	
1 position switch	1 POSITION SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF status, computed from signal of 1 position SW, is displayed. 	
ASCD cruise signal	ASCD-CRUISE [ON/OFF]	X	—	<ul style="list-style-type: none"> Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state 	<ul style="list-style-type: none"> This is displayed even when no ASCD is mounted.
ASCD OD cut signal	ASCD-OD CUT [ON/OFF]	X	—	<ul style="list-style-type: none"> Status of ASCD OD release signal is displayed. ON ... OD released OFF ... OD not released 	<ul style="list-style-type: none"> This is displayed even when no ASCD is mounted.
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF status, computed from signal of kickdown SW, is displayed. 	<ul style="list-style-type: none"> This is displayed even when no kickdown switch is equipped.
Closed throttle position switch	CLOSED THL/SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF status, computed from signal of closed throttle position SW, is displayed. 	
Wide open throttle position switch	W/O THRL/P-SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF status, computed from signal of wide open throttle position SW, is displayed. 	
Gear position	GEAR	—	X	<ul style="list-style-type: none"> Gear position data used for computation by TCM, is displayed. 	
Selector lever position	SLCT LVR POSI	—	X	<ul style="list-style-type: none"> Selector lever position data, used for computation by TCM, is displayed. 	<ul style="list-style-type: none"> A specific value used for control is displayed if fail-safe is activated due to error.
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	<ul style="list-style-type: none"> Vehicle speed data, used for computation by TCM, is displayed. 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
Throttle position	THROTTLE POSI [8]	—	X	<ul style="list-style-type: none"> Throttle position data, used for computation by TCM, is displayed. 	<ul style="list-style-type: none"> A specific value used for control is displayed if fail-safe is activated due to error.
Line pressure duty	LINE PRES DTY [%]	—	X	<ul style="list-style-type: none"> Control value of line pressure solenoid valve, computed by TCM from each input signal, is displayed. 	
Torque converter clutch solenoid valve duty	TCC S/V DUTY [%]	—	X	<ul style="list-style-type: none"> Control value of torque converter clutch solenoid valve, computed by TCM from each input signal, is displayed. 	
Shift solenoid valve A	SHIFT S/V A [ON/OFF]	—	X	<ul style="list-style-type: none"> Control value of shift solenoid valve A, computed by TCM from each input signal, is displayed. 	Control value of solenoid is displayed even if solenoid circuit is disconnected. The "OFF" signal is displayed if solenoid circuit is shorted.
Shift solenoid valve B	SHIFT S/V B [ON/OFF]	—	X	<ul style="list-style-type: none"> Control value of shift solenoid valve B, computed by TCM from each input signal, is displayed. 	
Overrun clutch solenoid valve	OVERRUN/C S/V [ON/OFF]	—	X	<ul style="list-style-type: none"> Control value of overrun clutch solenoid valve computed by TCM from each input signal is displayed. 	
Self-diagnosis display lamp (O/D OFF indicator lamp)	SELF-D DP LMP [ON/OFF]	—	X	<ul style="list-style-type: none"> Control status of O/D OFF indicator lamp is displayed. 	

X: Applicable

—: Not applicable

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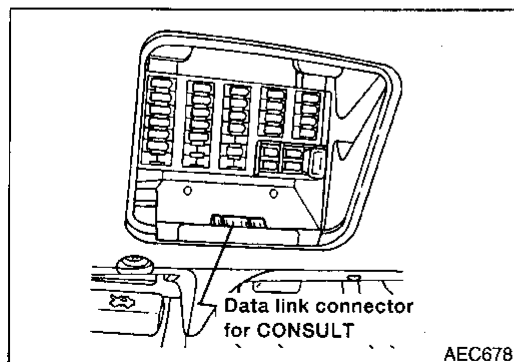
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DTC WORK SUPPORT MODE WITH CONSULT

CONSULT Setting Procedure

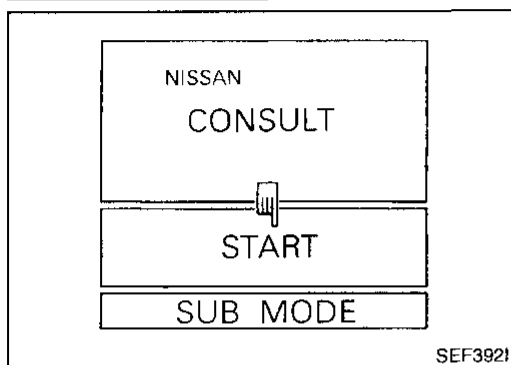
NCAT0022S05

NCAT0022S0501

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

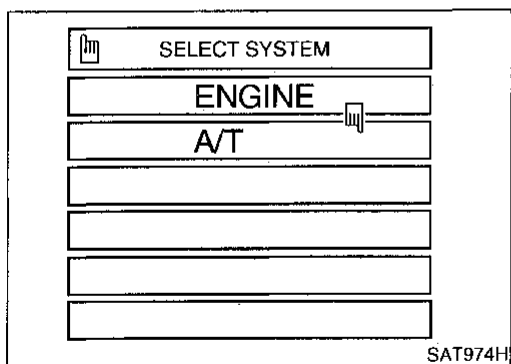
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)



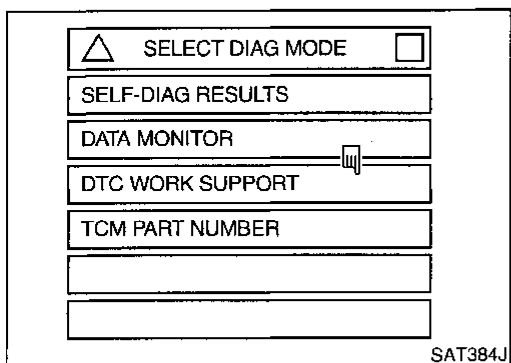
SEF392I

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



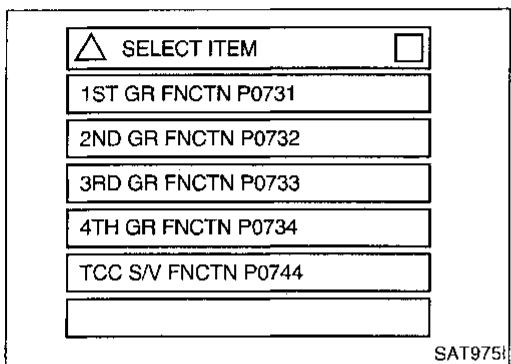
SAT974H

5. Touch "A/T".



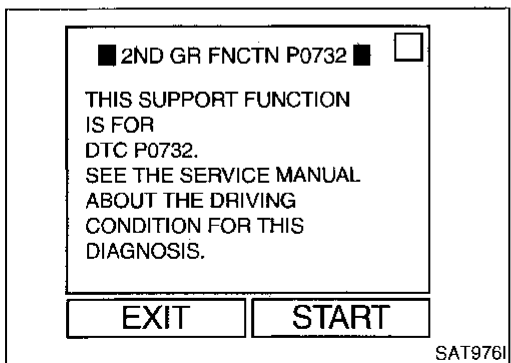
SAT384J

6. Touch "DTC WORK SUPPORT".



SAT975I

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

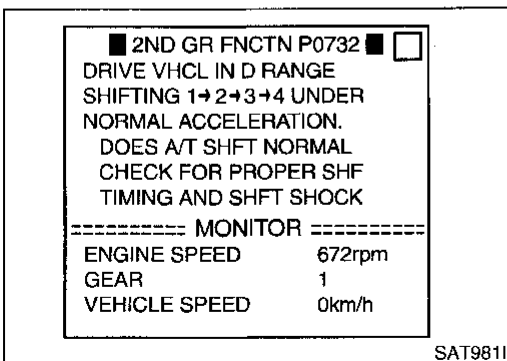
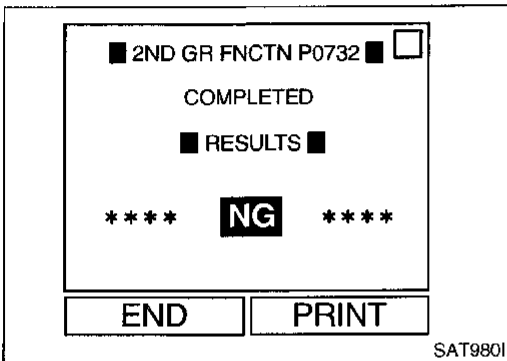
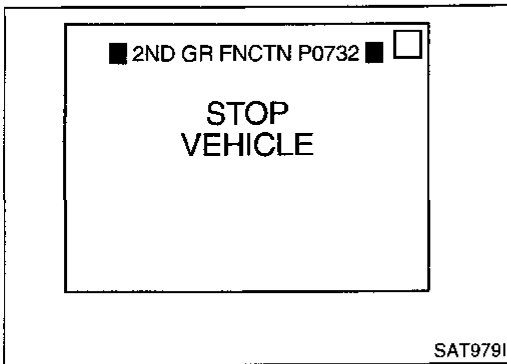
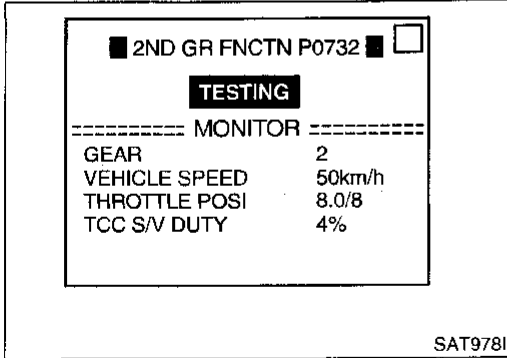
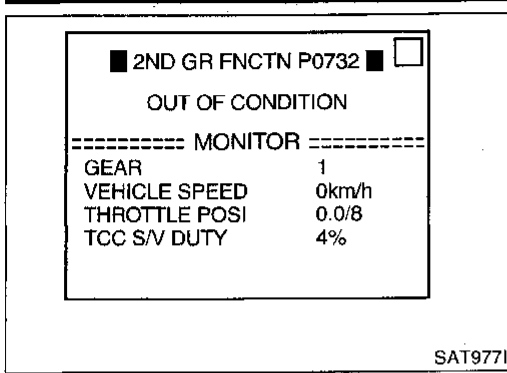


SAT976I

8. Touch "START".

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)



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

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

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

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

GI
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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

■ 2ND GR FNCTN P0732 ■

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

----- MONITOR -----
ENGINE SPEED 672rpm
GEAR 1
VEHICLE SPEED 0km/h

YES NO

SAT982I

12. Touch "YES" or "NO".

■ 2ND GR FNCTN P0732 ■

COMPLETED

■ RESULTS ■

**** OK ****

END PRINT

SAT983I

13. CONSULT procedure ended.

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

■ 2ND GR FNCTN P0732 ■

COMPLETED

■ RESULTS ■

**** **NG** ****

END PRINT

SAT980I

DTC WORK SUPPORT MODE

NCAT0022S06

DTC work support item	Description	Check items (Possible cause)
1ST GR FNCTN P0731	Following items for "A/T 1st gear function (P0731)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	<ul style="list-style-type: none"> ● Shift solenoid valve A ● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
2ND GR FNCTN P0732	Following items for "A/T 2nd gear function (P0732)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	<ul style="list-style-type: none"> ● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
3RD GR FNCTN P0733	Following items for "A/T 3rd gear function (P0733)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	<ul style="list-style-type: none"> ● Shift solenoid valve A ● Each clutch ● Hydraulic control circuit

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

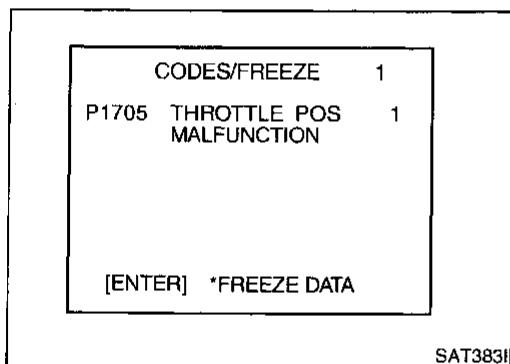
DTC work support item	Description	Check items (Possible cause)	
4TH GR FNCTN P0734	Following items for "A/T 4th gear function (P0734)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Shift solenoid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

EC

FE

CL

MT



DIAGNOSTIC PROCEDURE WITHOUT CONSULT

OBD-II Self-diagnostic Procedure (With GST)

NCAT0022S07

Refer to EC section ["Generic Scan Tool (GST)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

AT

AX

SU

BR

OBD-II Self-diagnostic Procedure (No Tools)

NCAT0022S0702

Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

ST

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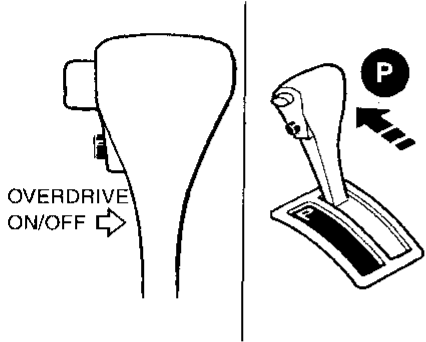
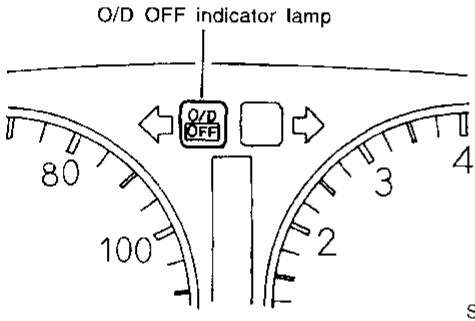
IDX

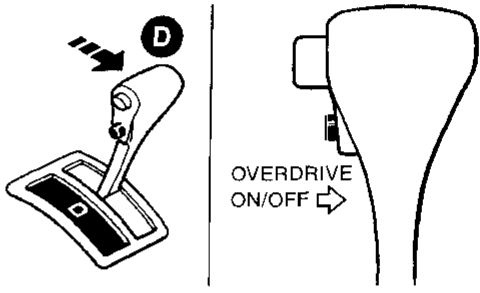
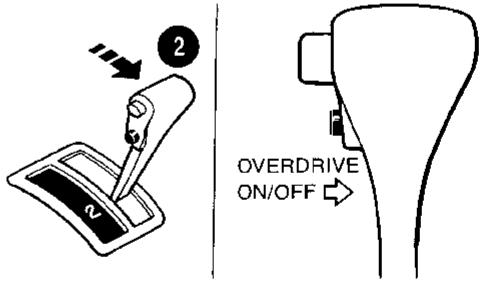
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

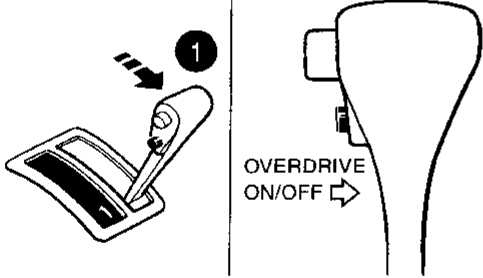
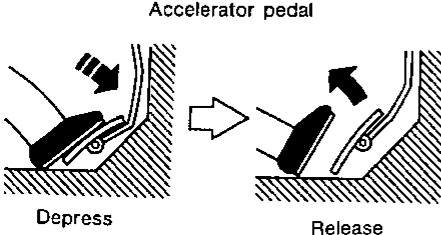
CONSULT (Cont'd)

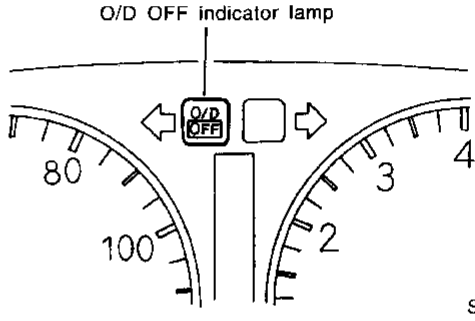
TCM Self-diagnostic Procedure (No Tools)

#NCAT0022S0703

1	CHECK O/D OFF INDICATOR LAMP
<ol style="list-style-type: none"> Move selector lever in "P" position. Start the engine. Warm engine to normal operating temperature. Turn ignition switch to "OFF" position. Wait 5 seconds. 	
	
SAT967I	
<ol style="list-style-type: none"> Turn ignition switch to "ON" position. (Do not start engine.) 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-195.

2	JUDGEMENT PROCEDURE STEP 1
<ol style="list-style-type: none"> Turn ignition switch to "OFF" position. Turn ignition switch to "ACC" position. Move selector lever from "P" to "D" position. Turn ignition switch to "ON" position. (Do not start engine.) 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-221.) Turn ignition switch to "OFF" position. 	
	
SAT968I	
<ol style="list-style-type: none"> Turn ignition switch to "ON" position. (Do not start engine.) Release the overdrive control switch (the O/D OFF indicator lamp will be "OFF"). Wait 2 seconds. Move the selector lever to "2" position. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be "ON"). 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.	

3	JUDGEMENT PROCEDURE STEP 2
<ol style="list-style-type: none"> 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	
<ol style="list-style-type: none"> 6. Depress accelerator pedal fully and release. 	
	
SAT981F	
<ol style="list-style-type: none"> 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
<p>Check O/D OFF indicator lamp. Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE, AT-49.</p>	
	
SAT490J	
▶ DIAGNOSIS END	

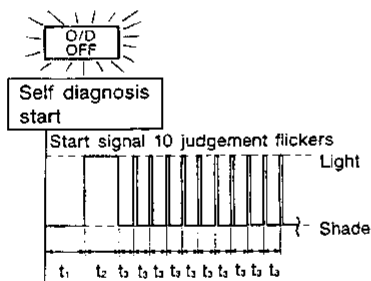
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Judgement of Self-diagnosis Code

NCAT0022S0704

O/D OFF indicator lamp:

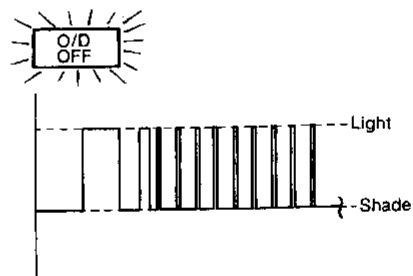
All judgement flickers are the same.



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-AT (REVOLUTION SENSOR) (DTC: 1102), AT-103.

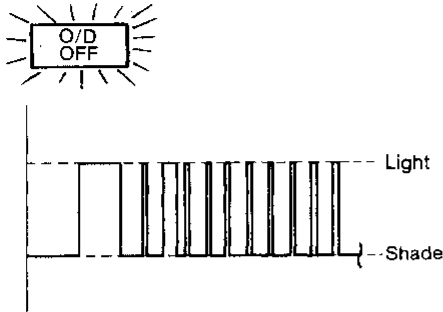
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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

O/D OFF indicator lamp:

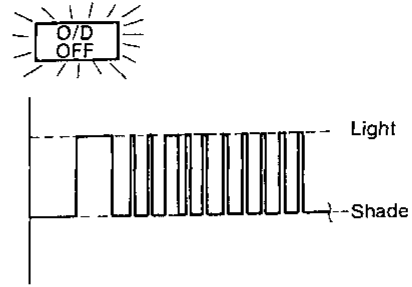
2nd judgement flicker is longer than others.



SAT439F

Vehicle speed sensor circuit is short-circuited or disconnected.
⇒ Go to **VEHICLE SPEED SENSOR-MTR, AT-187.**

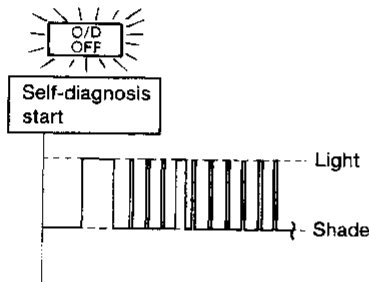
3rd judgement flicker is longer than others.



SAT441F

Throttle position sensor circuit is short-circuited or disconnected.
⇒ Go to **THROTTLE POSITION SENSOR (DTC: 1206), AT-168.**

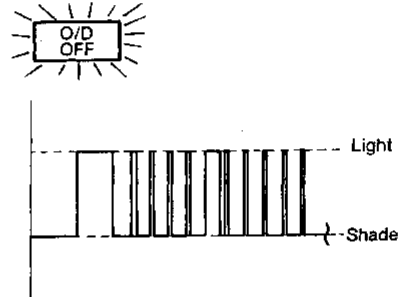
4th judgement flicker is longer than others.



SAT443F

Shift solenoid valve A circuit is short-circuited or disconnected.
⇒ Go to **SHIFT SOLENOID VALVE A (DTC: 1108), AT-158.**

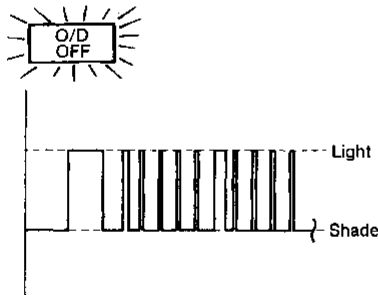
5th judgement flicker is longer than others.



SAT445F

Shift solenoid valve B circuit is short-circuited or disconnected.
⇒ Go to **SHIFT SOLENOID VALVE B (DTC: 1201), AT-163.**

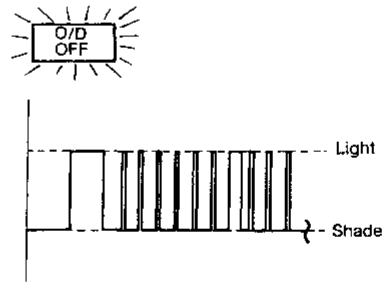
6th judgement flicker is longer than others.



SAT447F

Overrun clutch solenoid valve circuit is short-circuited or disconnected.
⇒ Go to **OVERRUN CLUTCH SOLENOID VALVE (DTC: 1203), AT-176.**

7th judgement flicker is longer than others.



SAT449F

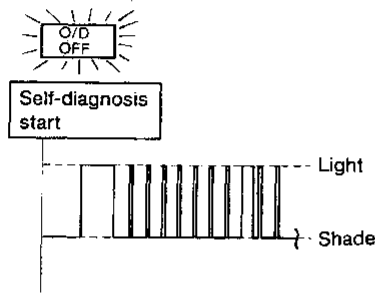
Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
⇒ Go to **TORQUE CONVERTER CLUTCH SOLENOID VALVE (DTC: 1204), AT-139.**

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT (Cont'd)

O/D OFF indicator lamp:

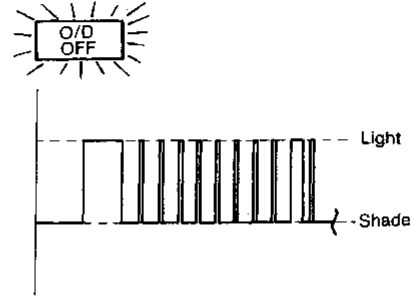
8th judgement flicker is longer than others.



SAT451F

A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged.
 ⇒ Go to **A/T FLUID TEMPERATURE SENSOR AND TCM POWER SOURCE, AT-97.**

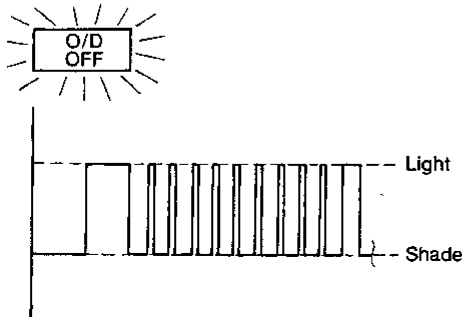
9th judgement flicker is longer than others.



SAT453F

Engine speed signal circuit is short-circuited or disconnected.
 ⇒ Go to **ENGINE SPEED SIGNAL (DTC: 1207), AT-108.**

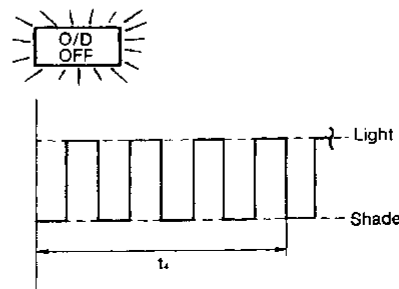
10th judgement flicker is longer than others.



SAT455F

Line pressure solenoid valve circuit is short-circuited or disconnected.
 ⇒ Go to **LINE PRESSURE SOLENOID VALVE (DTC: 1205), AT-152.**

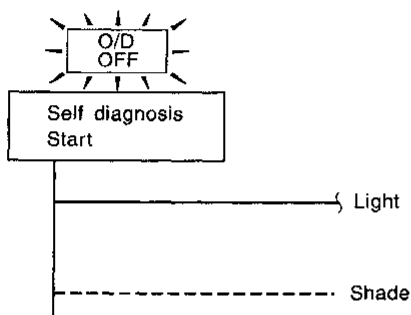
Flickers as shown below.



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.)

Lamp comes on.



SAT367J

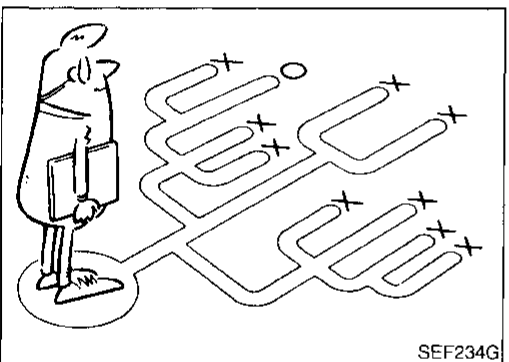
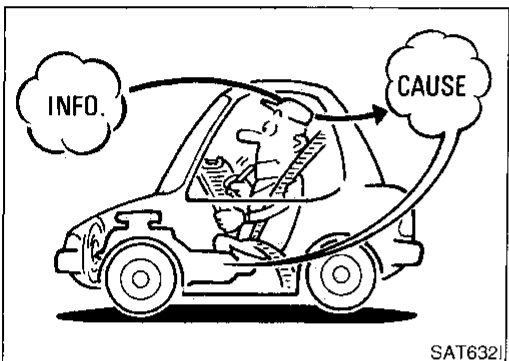
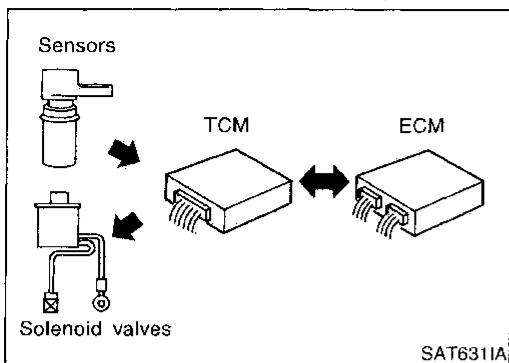
PNP switch, overdrive control switch or throttle position switch circuit is disconnected or TCM is damaged.
 ⇒ Go to **21. TCM Self-diagnosis Does Not Activate (PNP, OVERDRIVE CONTROL AND THROTTLE POSITION SWITCHES), AT-221.**

$t_1 = 2.5$ seconds $t_2 = 2.0$ seconds $t_3 = 1.0$ second $t_4 = 1.0$ 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 (or GST) or a circuit tester connected should be performed. Follow the "Work Flow". Refer to AT-56.

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-54) 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-6
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-58
3.	<input type="checkbox"/> Perform STALL TEST and LINE PRESSURE TEST. <input type="checkbox"/> Stall test — Mark possible damaged components/others. <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <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 </div> <div style="width: 45%;"> <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 </div> </div> <input type="checkbox"/> Line Pressure test — Suspected parts:	AT-58, 62
4.	<input type="checkbox"/> Perform all ROAD TEST and mark required procedures.	AT-63
4-1.	Check before engine is started. <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items. <input type="checkbox"/> PNP switch, AT-92. <input type="checkbox"/> A/T fluid temperature sensor, AT-97. <input type="checkbox"/> Vehicle speed sensor-A/T (Revolution sensor), AT-103. <input type="checkbox"/> Engine speed signal, AT-108. <input type="checkbox"/> Torque converter clutch solenoid valve, AT-139. <input type="checkbox"/> Line pressure solenoid valve, AT-152. <input type="checkbox"/> Shift solenoid valve A, AT-158. <input type="checkbox"/> Shift solenoid valve B, AT-163. <input type="checkbox"/> Throttle position sensor, AT-168. <input type="checkbox"/> Overrun clutch solenoid valve, AT-176. <input type="checkbox"/> PNP, overdrive control and throttle position switches, AT-221. <input type="checkbox"/> A/T fluid temperature sensor and TCM power source, AT-181. <input type="checkbox"/> Vehicle speed sensor-MTR, AT-187. <input type="checkbox"/> Battery <input type="checkbox"/> Others	AT-64
4-2.	Check at idle <input type="checkbox"/> 1. O/D OFF Indicator Lamp Does Not Come On, AT-195. <input type="checkbox"/> 2. Engine Cannot Be Started in "P" And "N" Position, AT-197. <input type="checkbox"/> 3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed, AT-198. <input type="checkbox"/> 4. In "N" Position, Vehicle Moves, AT-199. <input type="checkbox"/> 5. Large Shock. "N" → "R" Position, AT-200. <input type="checkbox"/> 6. Vehicle Does Not Creep Backward In "R" Position, AT-201. <input type="checkbox"/> 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position, AT-203.	AT-65

TROUBLE DIAGNOSIS — INTRODUCTION

Introduction (Cont'd)

4.	4-3.	<p>Cruise test</p> <hr/> <p>Part-1</p> <ul style="list-style-type: none"> <input type="checkbox"/> 8. Vehicle Cannot Be Started From D₁, AT-205. <input type="checkbox"/> 9. A/T Does Not Shift: D₁→ D₂ Or Does Not Kickdown: D₄→ D₂, AT-207. <input type="checkbox"/> 10. A/T Does Not Shift: D₂→D₃, AT-209. <input type="checkbox"/> 11. A/T Does Not Shift: D₃→D₄, AT-211. <input type="checkbox"/> 12. A/T Does Not Perform Lock-up, AT-213. <input type="checkbox"/> 13. A/T Does Not Hold Lock-up Condition, AT-214. <input type="checkbox"/> 14. Lock-up Is Not Released, AT-215. <input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Light Braking D₄→ D₃), AT-216. <hr/> <p>Part-2</p> <ul style="list-style-type: none"> <input type="checkbox"/> 16. Vehicle Does Not Start From D₁, AT-217. <input type="checkbox"/> 9. A/T Does Not Shift: D₁→ D₂ Or Does Not Kickdown: D₄→ D₂, AT-207. <input type="checkbox"/> 10. A/T Does Not Shift: D₂→D₃, AT-209. <input type="checkbox"/> 11. A/T Does Not Shift: D₃→D₄, AT-211. <hr/> <p>Part-3</p> <ul style="list-style-type: none"> <input type="checkbox"/> 17. A/T Does Not Shift: D₄→D₃ When Overdrive Control Switch "ON" → "OFF", AT-218 <input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Engine Brake In D₃), AT-216. <input type="checkbox"/> 18. A/T Does Not Shift: D₃→2₂, When Selector Lever "D" → "2" Position, AT-219. <input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Engine Brake In 2₂), AT-216. <input type="checkbox"/> 19. A/T Does Not Shift: 2₂→1₁, When Selector Lever "2" → "1" Position, AT-220. <input type="checkbox"/> 20. Vehicle Does Not Decelerate By Engine Brake, AT-221. <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items. <hr/> <ul style="list-style-type: none"> <input type="checkbox"/> PNP switch, AT-92. <input type="checkbox"/> A/T fluid temperature sensor, AT-97. <input type="checkbox"/> Vehicle speed sensor-A/T (Revolution sensor), AT-103. <input type="checkbox"/> Engine speed signal, AT-108. <input type="checkbox"/> Torque converter clutch solenoid valve, AT-139. <input type="checkbox"/> Line pressure solenoid valve, AT-152. <input type="checkbox"/> Shift solenoid valve A, AT-158. <input type="checkbox"/> Shift solenoid valve B, AT-163. <input type="checkbox"/> Throttle position sensor, AT-168. <input type="checkbox"/> Overrun clutch solenoid valve, AT-176. <input type="checkbox"/> PNP, overdrive control and throttle position switches, AT-221. <input type="checkbox"/> A/T fluid temperature sensor and TCM power source, AT-181. <input type="checkbox"/> Vehicle speed sensor-MTR, AT-187. <input type="checkbox"/> Battery <input type="checkbox"/> Others 	<p>AT-67 AT-70</p> <hr/> <p>AT-72</p> <hr/> <p>AT-73</p>	<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 style="background-color: black; color: white; text-align: center;">AT</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p>
5.		<input type="checkbox"/> For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.	AT-39	RS
6.		<input type="checkbox"/> Perform all ROAD TEST and re-mark required procedures.	AT-63	
7.		<input type="checkbox"/> Perform DTC CONFIRMATION PROCEDURE for following MIL indicating items and check out NG items. Refer to EC section ["Emission-related Diagnostic Information", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].	EC section	BT
		<ul style="list-style-type: none"> <input type="checkbox"/> DTC (P0731, 1103) A/T 1st gear function, AT-112. <input type="checkbox"/> DTC (P0732, 1104) A/T 2nd gear function, AT-118. <input type="checkbox"/> DTC (P0733, 1105) A/T 3rd gear function, AT-124. <input type="checkbox"/> DTC (P0734, 1106) A/T 4th gear function, AT-130. <input type="checkbox"/> DTC (P0744, 1107) A/T TCC S/V function (lock-up), AT-144. 		<p>HA</p> <p>SC</p>
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-85 AT-75	<p>EL</p> <p>IDX</p>
9.		<input type="checkbox"/> Erase DTC from TCM and ECM memories.	AT-36	

TROUBLE DIAGNOSIS — INTRODUCTION

Work Flow

Work Flow

HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

NCAT0024

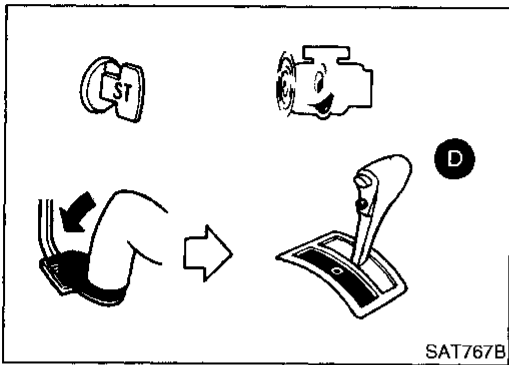
NCAT0024S01

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-53) and "DIAGNOSTIC WORKSHEET" (AT-54), to perform the best troubleshooting possible.

TROUBLE DIAGNOSIS — BASIC INSPECTION

A/T Fluid Check



SAT767B

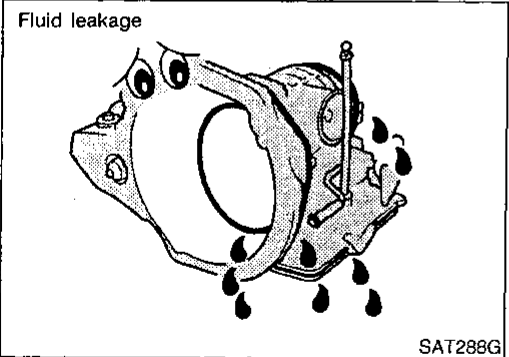
A/T Fluid Check

FLUID LEAKAGE CHECK

NCAT0025

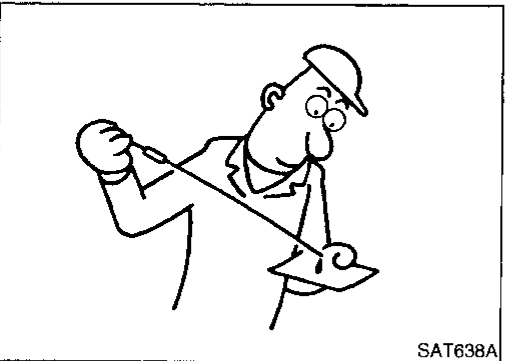
NCAT0025S01

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.



SAT288G

4. Check for fresh leakage.



SAT638A

FLUID CONDITION CHECK

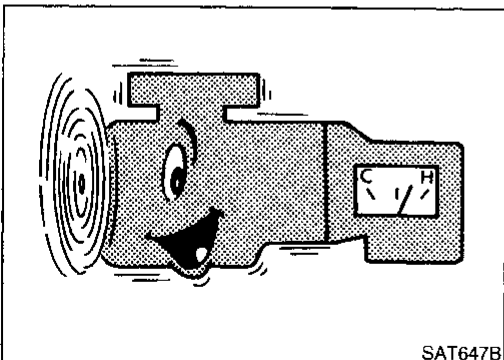
NCAT0025S02

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 section ("Checking A/T Fluid", "CHASSIS AND BODY MAINTENANCE").



SAT647B

Stall Test

STALL TEST PROCEDURE

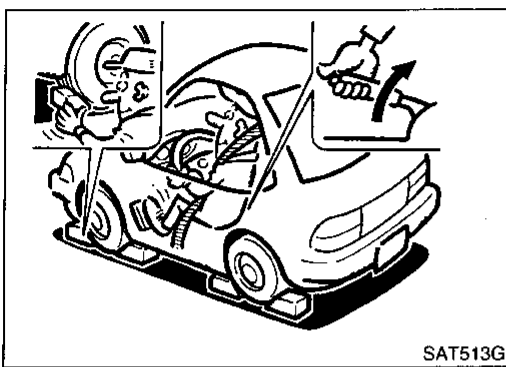
NCAT0026

NCAT0026S01

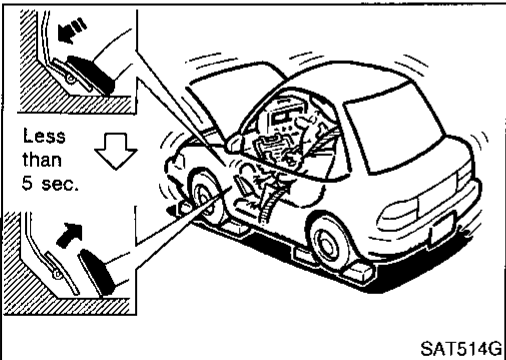
1. Check A/T and engine fluid levels. If necessary, add.
2. Drive vehicle for approx. 10 minutes or until engine oil and ATF reach operating temperature.

ATF operating temperature:

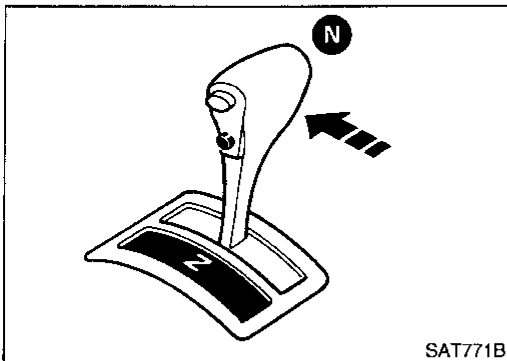
50 - 80°C (122 - 176°F)



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:

1,900 - 2,200 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

NCA70026S02

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-56.

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

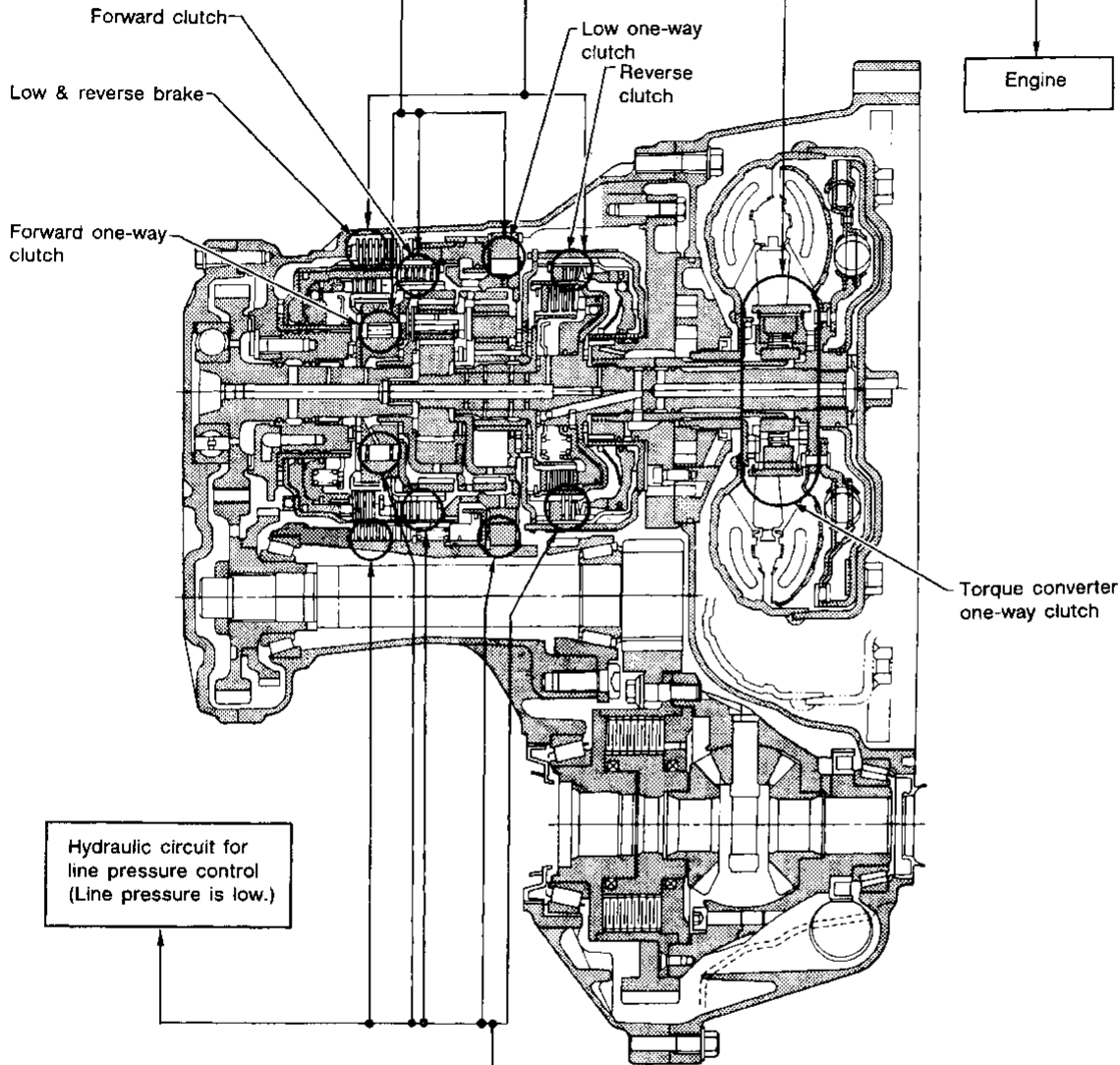
TROUBLE DIAGNOSIS — BASIC INSPECTION

Stall Test (Cont'd)

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

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

Damaged components



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

Engine

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.)

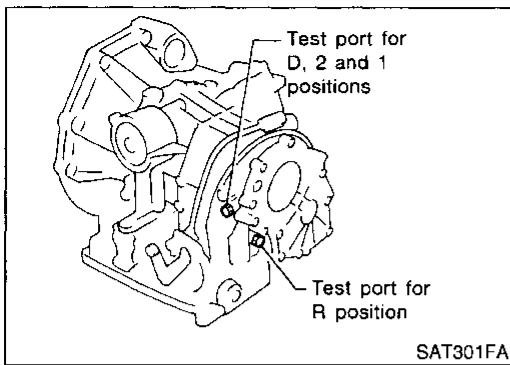
D	H	O
2	H	O
1	H	O
R	H	O
Selector lever position	Judgement	

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

SAT895H

TROUBLE DIAGNOSIS — BASIC INSPECTION

Line Pressure Test



Line Pressure Test

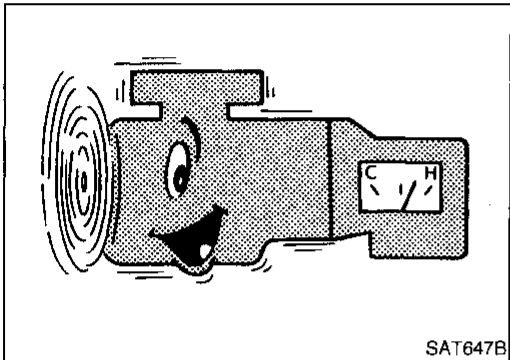
NCA10027

LINE PRESSURE TEST PORTS

NCA10027S01

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

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



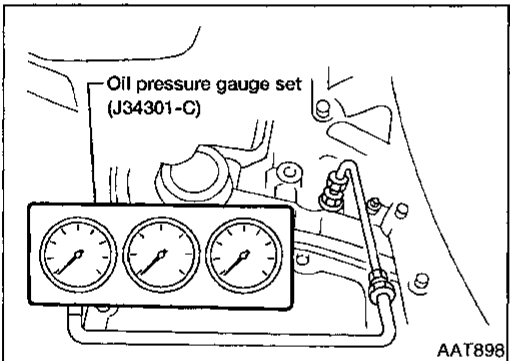
LINE PRESSURE TEST PROCEDURE

NCA10027S02

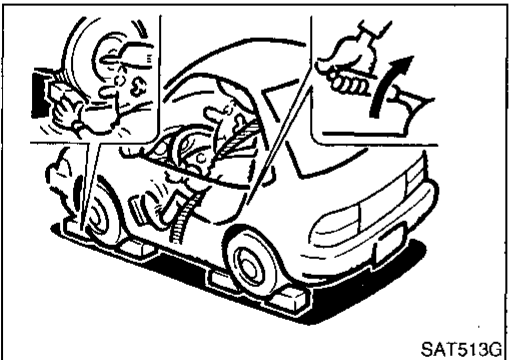
1. Check A/T fluid and engine oil levels. If necessary, add fluid or oil.
2. Drive vehicle for approx. 10 minutes or until engine oil and ATF reach operating temperature.

ATF operating temperature:

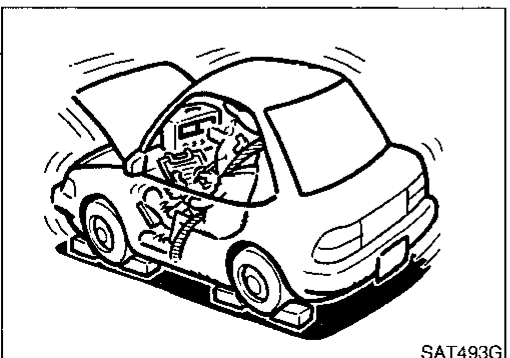
50 - 80°C (122 - 176°F)



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-343.

TROUBLE DIAGNOSIS — BASIC INSPECTION

Line Pressure Test (Cont'd)

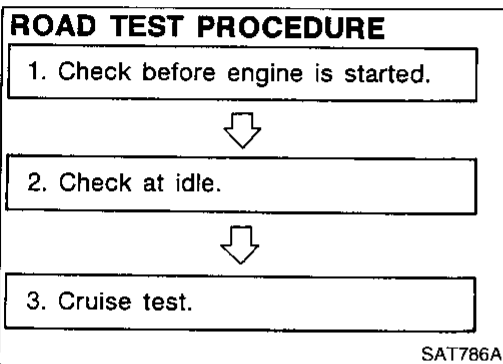
JUDGEMENT OF LINE PRESSURE TEST

NCAT0027S03

Judgement	Suspected parts		
At idle	Line pressure is low in all positions.	<ul style="list-style-type: none"> Oil pump wear Control piston damage Pressure regulator valve or plug sticking Spring for pressure regulator valve damaged Fluid pressure leakage between oil strainer and pressure regulator valve Clogged strainer 	GI MA EM
	Line pressure is low in particular position.	<ul style="list-style-type: none"> Fluid pressure leakage between manual valve and particular clutch For example, line pressure is: <ul style="list-style-type: none"> Low in "R" and "1" positions, but Normal in "D" and "2" positions. Therefore, fluid leakage exists at or around low and reverse brake circuit. Refer to "CLUTCH AND BAND CHART", AT-18. 	LC EC
	Line pressure is high.	<ul style="list-style-type: none"> Maladjustment of throttle position sensor A/T fluid temperature sensor damaged Line pressure solenoid valve sticking Short circuit of line pressure solenoid valve circuit Pressure modifier valve sticking Pressure regulator valve or plug sticking Open in dropping resistor circuit 	FE CL
At stall speed	Line pressure is low.	<ul style="list-style-type: none"> Maladjustment of throttle position sensor Line pressure solenoid valve sticking Short circuit of line pressure solenoid valve circuit Pressure regulator valve or plug sticking Pressure modifier valve sticking Pilot valve sticking 	MT AT

GI
MA
EM
LC
EC
FE
CL
MT
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AX
SU
BR



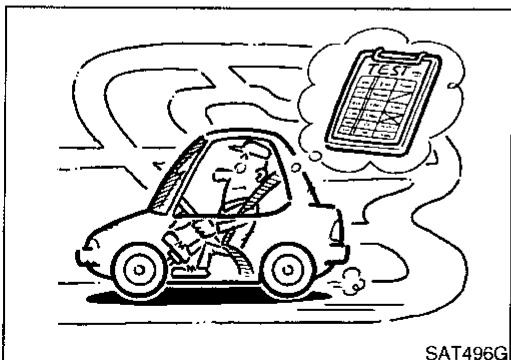
Road Test DESCRIPTION

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-34 - AT-49 and AT-195 - AT-221.

ST
RS
BT
HA
SC
EL
IDX

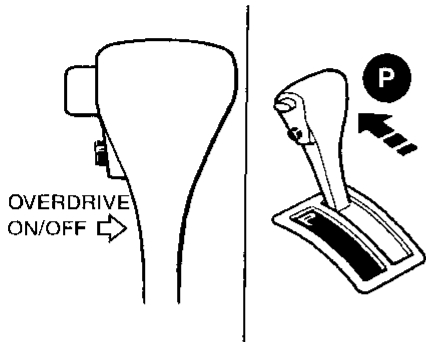
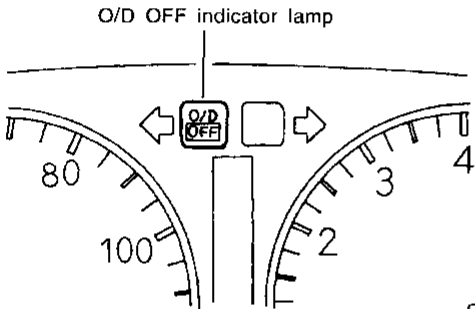


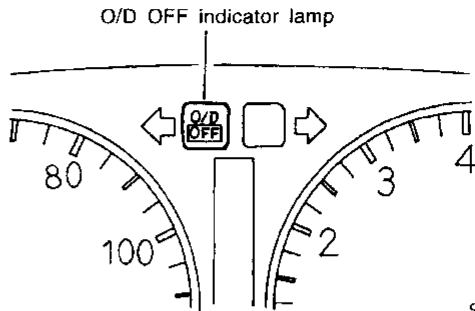
TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

1. CHECK BEFORE ENGINE IS STARTED

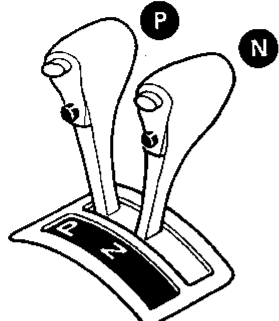
=NCAT0028S02

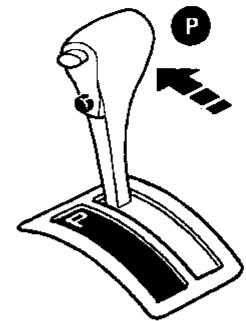
1 CHECK O/D OFF INDICATOR LAMP	
<p>1. Park vehicle on flat surface. 2. Move selector lever to "P" position.</p>	
	
SAT967I	
<p>3. Turn ignition switch to "OFF" position. Wait at least 5 seconds. 4. Turn ignition switch to "ON" position. (Do not start engine.) 5. Does O/D OFF indicator lamp come on for about 2 seconds?</p>	
	
SAT490J	
Yes or No	
Yes	▶ GO TO 2.
No	▶ Stop ROAD TEST. Go to "1. O/D OFF Indicator Lamp Does Not Come On", AT-195.

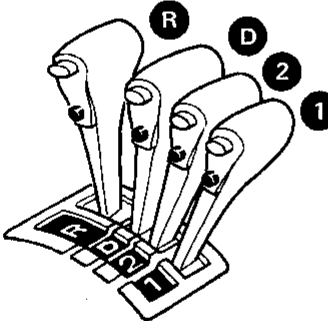
2 CHECK O/D OFF INDICATOR LAMP	
Does O/D OFF indicator lamp flicker for about 8 seconds?	
	
SAT490J	
Yes or No	
Yes	▶ Perform self-diagnosis and check NG items on the DIAGNOSTIC WORKSHEET, AT-54. Refer to TCM SELF-DIAGNOSIS PROCEDURE (NO TOOLS), AT-48.
No	▶ 1. Turn ignition switch to "OFF" position. 2. Perform self-diagnosis and note NG items. Refer to TCM SELF-DIAGNOSIS PROCEDURE (NO TOOLS), AT-48. 3. Go to "2. CHECK AT IDLE", AT-65.

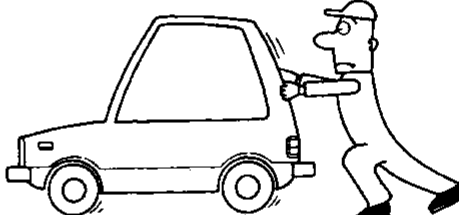
2. CHECK AT IDLE

-NCAT0028S03

1	CHECK ENGINE START	<ol style="list-style-type: none"> 1. Park vehicle on flat surface. 2. Move selector lever to "P" position.  <p style="text-align: right;">SAT769B</p> <ol style="list-style-type: none"> 3. Turn ignition switch to "OFF" position. 4. Turn ignition switch to "START" position. 5. Is engine started? <p style="text-align: center;">Yes or No</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Yes</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 2.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>Mark the box on the DIAGNOSTIC WORKSHEET. Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-197. Continue ROAD TEST.</td> </tr> </table>	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-197. Continue ROAD TEST.
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-197. Continue ROAD TEST.						

3	CHECK VEHICLE MOVE	<ol style="list-style-type: none"> 1. Move selector lever to "P" position.  <p style="text-align: right;">SAT768B</p> <ol style="list-style-type: none"> 2. Turn ignition switch to "OFF" position. 3. Release parking brake. <p style="text-align: center;">▶ GO TO 4.</p>
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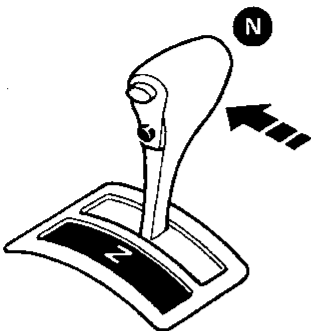
2	CHECK ENGINE START	<ol style="list-style-type: none"> 1. Turn ignition switch to "ACC" position. 2. Move selector lever to "D", "1", "2" or "R" position.  <p style="text-align: right;">SAT770B</p> <ol style="list-style-type: none"> 3. Turn ignition switch to "START" position. 4. Is engine started? <p style="text-align: center;">Yes or No</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Yes</td> <td style="width: 10%; text-align: center;">▶</td> <td>Mark the box on the DIAGNOSTIC WORKSHEET. Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-197. Continue ROAD TEST.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 3.</td> </tr> </table>	Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-197. Continue ROAD TEST.	No	▶	GO TO 3.
Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-197. Continue ROAD TEST.						
No	▶	GO TO 3.						

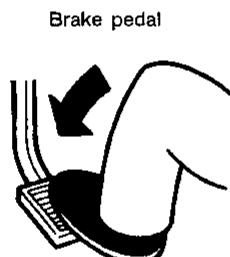
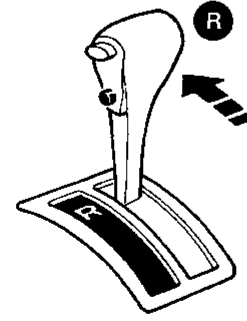
4	CHECK VEHICLE MOVE	<ol style="list-style-type: none"> 1. Push vehicle forward or backward. 2. Does vehicle move when it is pushed forward or backward?  <p style="text-align: right;">SAT796A</p> <ol style="list-style-type: none"> 3. Apply parking brake. <p style="text-align: center;">Yes or No</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Yes</td> <td style="width: 10%; text-align: center;">▶</td> <td>Mark the box on the DIAGNOSTIC WORKSHEET. Go to "3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed", AT-198. Continue ROAD TEST.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 5.</td> </tr> </table>	Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed", AT-198. Continue ROAD TEST.	No	▶	GO TO 5.
Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed", AT-198. Continue ROAD TEST.						
No	▶	GO TO 5.						

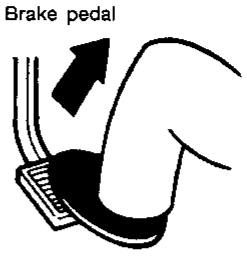
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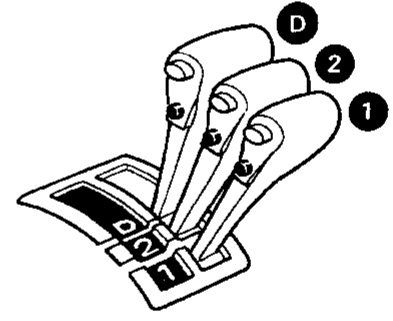
TROUBLE DIAGNOSIS — BASIC INSPECTION

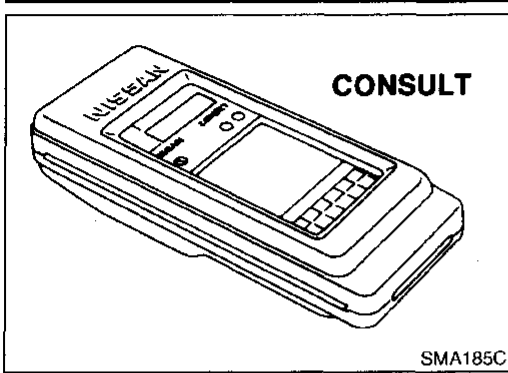
Road Test (Cont'd)

5	CHECK VEHICLE MOVE	<p>1. Start engine. 2. Move selector lever to "N" position.</p>  <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;">Yes or No</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; border-right: 1px solid black;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td style="border-right: 1px solid black;">Mark the box on the DIAGNOSTIC WORKSHEET. Go to "4. In "N" Position, Vehicle Moves", AT-199. Continue ROAD TEST.</td> </tr> <tr> <td style="border-right: 1px solid black;">No</td> <td style="text-align: center;">▶</td> <td>GO TO 6.</td> </tr> </table>		Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "4. In "N" Position, Vehicle Moves", AT-199. Continue ROAD TEST.	No	▶	GO TO 6.
Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "4. In "N" Position, Vehicle Moves", AT-199. Continue ROAD TEST.							
No	▶	GO TO 6.							

6	CHECK SHIFT SHOCK	<p>1. Apply foot brake.</p>  <p style="text-align: right;">SAT797A</p> <p>2. Move selector lever to "R" position.</p>  <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;">Yes or No</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; border-right: 1px solid black;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td style="border-right: 1px solid black;">Mark the box on the DIAGNOSTIC WORKSHEET. Go to "5. Large Shock "N" → "R" Position", AT-200. Continue ROAD TEST.</td> </tr> <tr> <td style="border-right: 1px solid black;">No</td> <td style="text-align: center;">▶</td> <td>GO TO 7.</td> </tr> </table>		Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "5. Large Shock "N" → "R" Position", AT-200. Continue ROAD TEST.	No	▶	GO TO 7.
Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "5. Large Shock "N" → "R" Position", AT-200. Continue ROAD TEST.							
No	▶	GO TO 7.							

7	CHECK VEHICLE MOVE	<p>1. Release foot brake for several seconds.</p>  <p style="text-align: center;">For several seconds</p> <p style="text-align: right;">SAT799A</p> <p>2. Does vehicle creep backward when foot brake is released?</p> <p style="text-align: center;">Yes or No</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; border-right: 1px solid black;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td style="border-right: 1px solid black;">GO TO 8.</td> </tr> <tr> <td style="border-right: 1px solid black;">No</td> <td style="text-align: center;">▶</td> <td>Mark the box on the DIAGNOSTIC WORKSHEET. Go to "6. Vehicle Does Not Creep Backward In "R" Position", AT-201. Continue ROAD TEST.</td> </tr> </table>		Yes	▶	GO TO 8.	No	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "6. Vehicle Does Not Creep Backward In "R" Position", AT-201. Continue ROAD TEST.
Yes	▶	GO TO 8.							
No	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "6. Vehicle Does Not Creep Backward In "R" Position", AT-201. Continue ROAD TEST.							

8	CHECK VEHICLE MOVE	<p>1. Move selector lever to "D", "2" and "1" positions and check if vehicle creeps forward.</p>  <p style="text-align: right;">SAT773B</p> <p>2. Does vehicle creep forward in all three positions?</p> <p style="text-align: center;">Yes or No</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; border-right: 1px solid black;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td style="border-right: 1px solid black;">Go to 3. CRUISE TEST, AT-67.</td> </tr> <tr> <td style="border-right: 1px solid black;">No</td> <td style="text-align: center;">▶</td> <td>Mark the box on the DIAGNOSTIC WORKSHEET. Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position", AT-203. Continue ROAD TEST.</td> </tr> </table>		Yes	▶	Go to 3. CRUISE TEST, AT-67.	No	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position", AT-203. Continue ROAD TEST.
Yes	▶	Go to 3. CRUISE TEST, AT-67.							
No	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position", AT-203. Continue ROAD TEST.							



3. CRUISE TEST

NCAT0028504

- Check all items listed in Parts 1 through 3.

Ⓜ With CONSULT

NCAT002850401

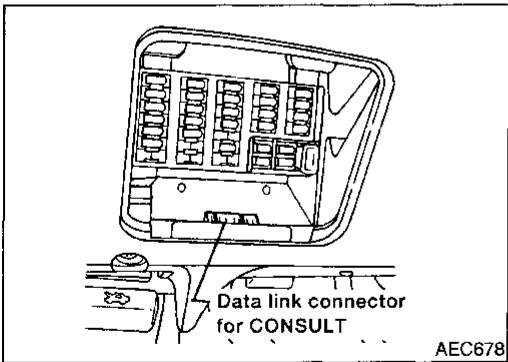
- Using CONSULT, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per Shift Schedule.

GI

MA

EM

LC



CONSULT Setting Procedure

NCAT002850402

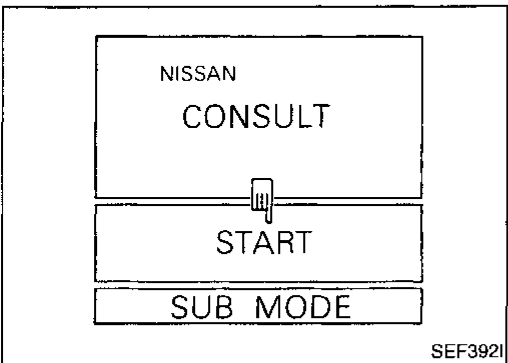
1. Turn ignition switch "OFF".
2. Connect CONSULT to Data link connector for CONSULT. Data link connector for CONSULT is located in left side dash panel.

EC

FE

CL

MT



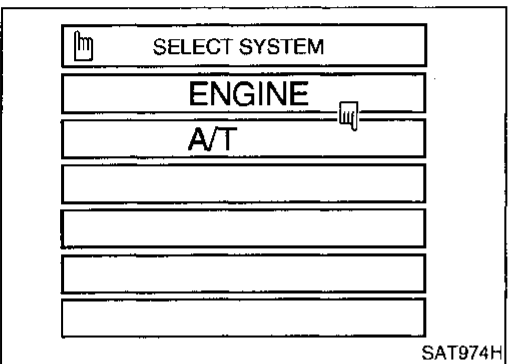
3. Turn ignition switch "ON".
4. Touch "START".

AT

AX

SU

BR



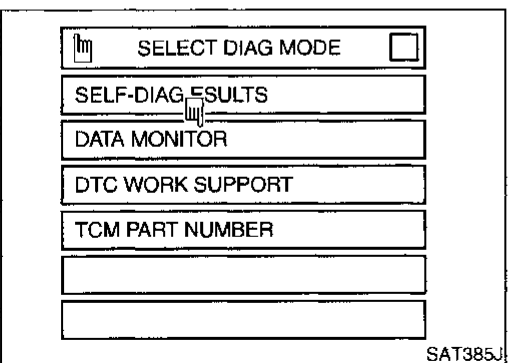
5. Touch "A/T".

ST

RS

BT

HA



6. Touch "DATA MONITOR".

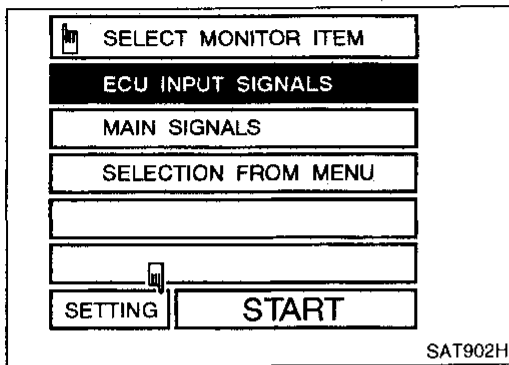
SC

EL

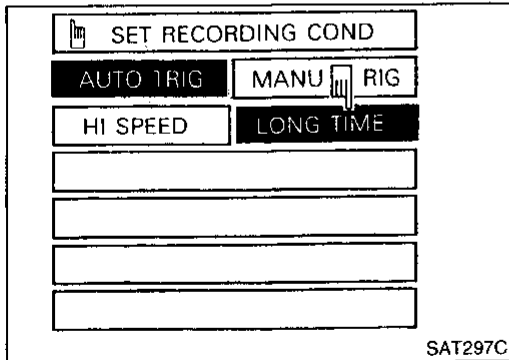
IDX

TROUBLE DIAGNOSIS — BASIC INSPECTION

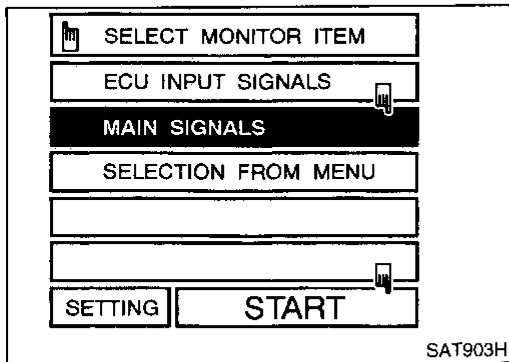
Road Test (Cont'd)



7. Touch "SETTING" to set recording condition.

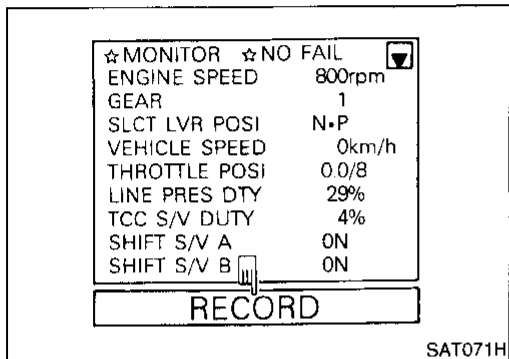


8. Touch "LONG TIME" and "ENTER" key.

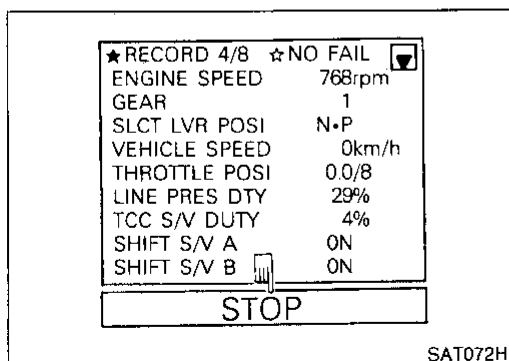


9. Go back to SELECT MONITOR ITEM and touch "MAIN SIGNALS".

10. Touch "START".



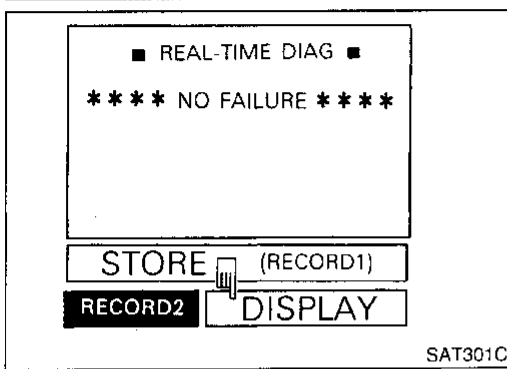
11. When performing cruise test, touch "RECORD".



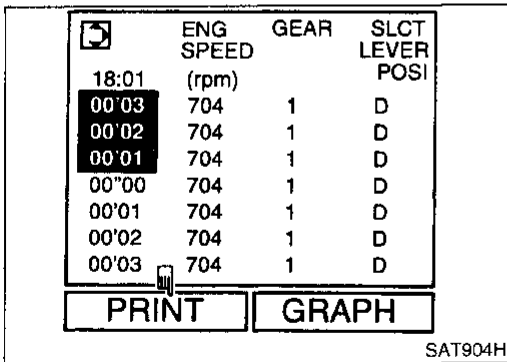
12. After finishing cruise test part 1, touch "STOP".

TROUBLE DIAGNOSIS — BASIC INSPECTION

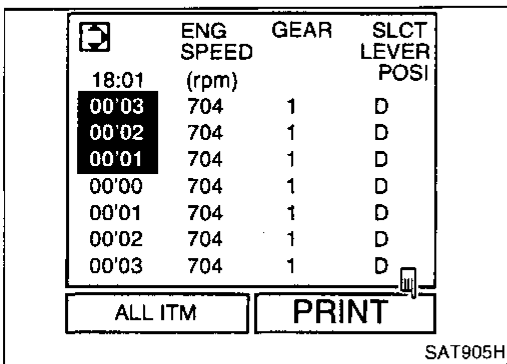
Road Test (Cont'd)



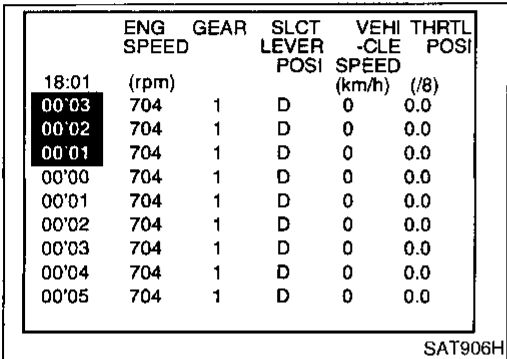
13. Touch "DISPLAY".



14. Touch "PRINT".

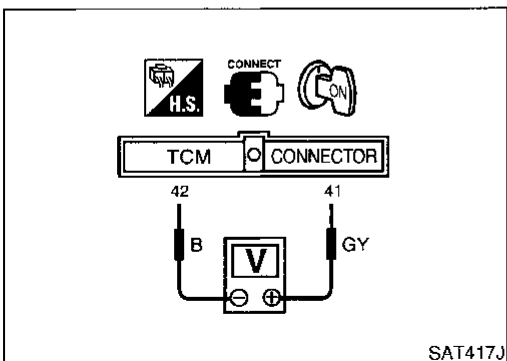


15. Touch "PRINT" again.



16. Check the monitor data printed out.

17. Continue cruise test part 2 and 3.



⊗ Without CONSULT

NCA70028S0403

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

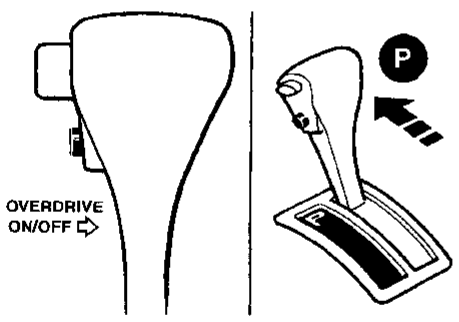
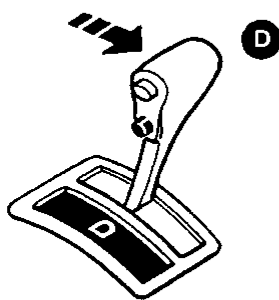
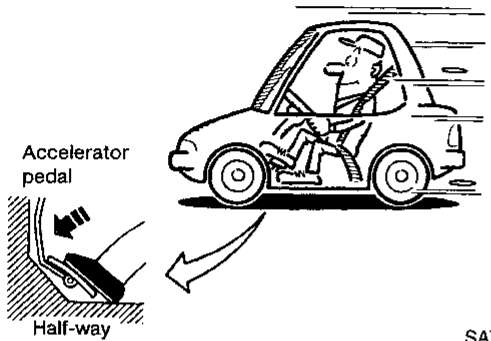
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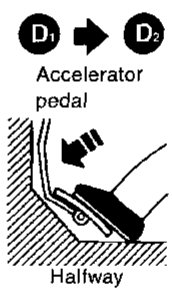
TROUBLE DIAGNOSIS — BASIC INSPECTION

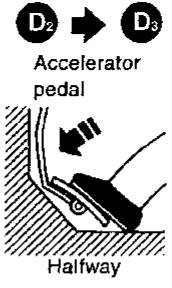
Road Test (Cont'd)

Cruise Test — Part 1

-NCAT0028S0404

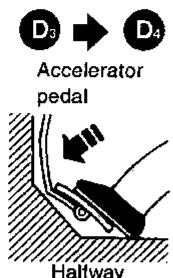
1	CHECK STARTING GEAR (D₁) POSITION
<p>1. Drive vehicle for approx. 10 minutes to warm engine oil and ATF up to operating temperature. ATF operating temperature: 50 - 80°C (122 - 176°F)</p> <p>2. Park vehicle on flat surface.</p> <p>3. Set overdrive control switch to "ON" position.</p> <p>4. Move selector lever to "P" position.</p>	
 <p style="text-align: right;">SAT001J</p>	
<p>5. Start engine.</p> <p>6. Move selector lever to "D" position.</p>	
 <p style="text-align: right;">SAT775B</p>	
<p>7. Accelerate vehicle by constantly depressing accelerator pedal halfway.</p>	
 <p style="text-align: right;">SAT495G</p>	
<p>8. Does vehicle start from D₁? <input type="checkbox"/> Read gear position.</p> <p style="text-align: center;">Yes or No</p>	
Yes	▶ GO TO 2.
No	▶ Go to "8. Vehicle Cannot Be Started From D ₁ ", AT-205. Continue ROAD TEST.

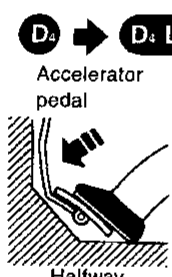
2	CHECK SHIFT UP (D₁ TO D₂)
<p>Does A/T shift from D₁ to D₂ at the specified speed? <input type="checkbox"/> Read gear position, throttle opening and vehicle speed.</p> <p style="text-align: center;">Specified speed when shifting from D₁ to D₂: Refer to Shift schedule, AT-343.</p>	
 <p style="text-align: right;">SAT954I</p>	
Yes or No	
Yes	▶ GO TO 3.
No	▶ Go to "9. A/T Does Not Shift: D ₁ → D ₂ Or Does Not Kickdown: D ₄ → D ₂ ", AT-207. Continue ROAD TEST.

3	CHECK SHIFT UP (D₂ TO D₃)
<p>Does A/T shift from D₂ to D₃ at the specified speed? <input type="checkbox"/> Read gear position, throttle position and vehicle speed.</p> <p style="text-align: center;">Specified speed when shifting from D₂ to D₃: Refer to Shift schedule, AT-343.</p>	
 <p style="text-align: right;">SAT955I</p>	
Yes or No	
Yes	▶ GO TO 4.
No	▶ Go to "10. A/T Does Not Shift: D ₂ → D ₃ ", AT-209. Continue ROAD TEST.

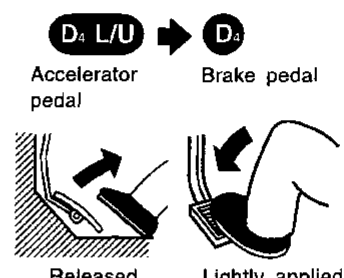
TROUBLE DIAGNOSIS — BASIC INSPECTION

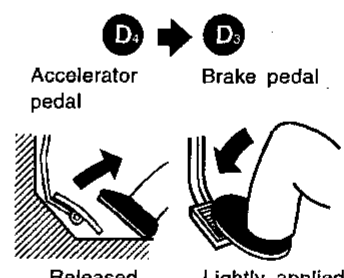
Road Test (Cont'd)

4	CHECK SHIFT UP (D₃ TO D₄)
Does A/T shift from D ₃ to D ₄ at the specified speed? Ⓢ Read gear position, throttle position and vehicle speed. Specified speed when shifting from D ₃ to D ₄ : Refer to Shift schedule, AT-343.	
	
SAT956I	
Yes or No	
Yes	▶ GO TO 5.
No	▶ Go to "11. A/T Does Not Shift: D ₃ → D ₄ ", AT-211. Continue ROAD TEST.

5	CHECK LOCK-UP (D₄ TO D₄ L/U)
Does A/T perform lock-up at the specified speed? Ⓢ Read vehicle speed, throttle position when lock-up duty becomes 94%. Specified speed when lock-up occurs: Refer to Shift schedule, AT-343.	
	
SAT957I	
Yes or No	
Yes	▶ GO TO 6.
No	▶ Go to "12. A/T Does Not Perform Lock-up", AT-213. Continue ROAD TEST.

6	CHECK HOLD LOCK-UP
Does A/T hold lock-up condition for more than 30 seconds? Yes or No	
Yes	▶ GO TO 7.
No	▶ Go to "13. A/T Does Not Hold Lock-up Condition", AT-214.

7	CHECK SHIFT DOWN (D₄ L/U TO D₄)
1. Release accelerator pedal. 2. Is lock-up released when accelerator pedal is released?	
	
SAT958I	
Yes or No	
Yes	▶ GO TO 8.
No	▶ Go to "14. Lock-up Is Not Released", AT-215. Continue ROAD TEST.

8	CHECK SHIFT DOWN (D₄ TO D₃)
1. Decelerate vehicle by applying foot brake lightly. 2. Does engine speed return to idle smoothly when A/T is shifted from D ₄ to D ₃ ? Ⓢ Read gear position and engine speed.	
	
SAT959I	
Yes or No	
Yes	▶ 1. Stop vehicle. 2. Go to "Cruise test — Part 2", AT-72.
No	▶ Go to "15. Engine Speed Does Not Return To Idle (Light Braking D ₄ → D ₃)", AT-216. Continue ROAD TEST.

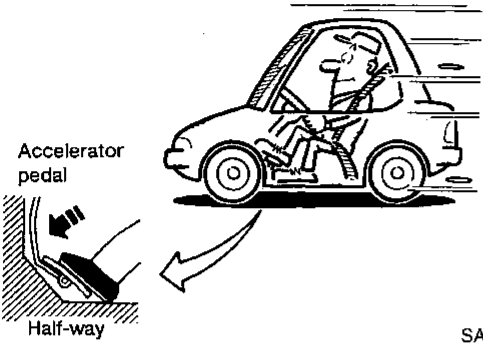
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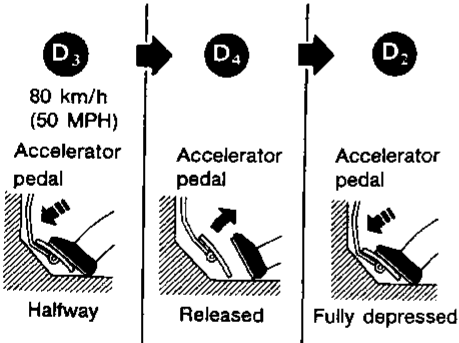
TROUBLE DIAGNOSIS — BASIC INSPECTION

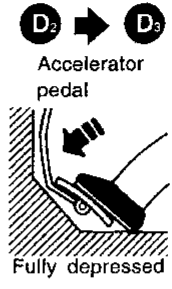
Road Test (Cont'd)

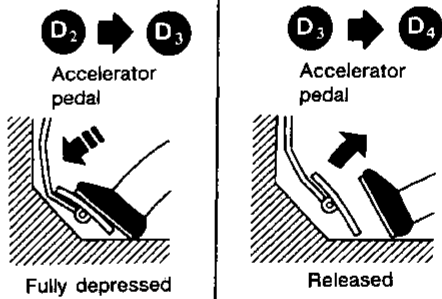
Cruise Test — Part 2

-NCAT0028S0405

1	CHECK STARTING GEAR (D₁) POSITION
<ol style="list-style-type: none"> 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 D₁? <p>Ⓜ Read gear position.</p>	
	
SAT495G	
Yes or No	
Yes	▶ GO TO 2.
No	▶ Go to "16. Vehicle Does Not Start From D ₁ ", AT-217. Continue ROAD TEST.

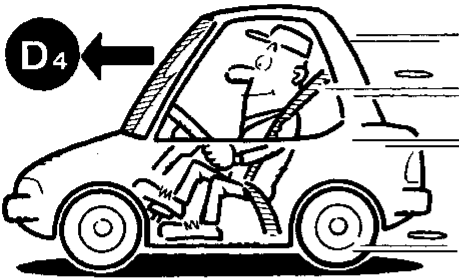
2	CHECK SHIFT UP AND SHIFT DOWN (D₃ TO D₄ TO D₂)
<ol style="list-style-type: none"> 1. Accelerate vehicle to 80 km/h (50 MPH) as shown in illustration. 2. Release accelerator pedal and then quickly depress it fully. 3. Does A/T shift from D₄ to D₂ as soon as accelerator pedal is depressed fully? <p>Ⓜ Read gear position and throttle position.</p>	
	
SAT404H	
Yes or No	
Yes	▶ GO TO 3.
No	▶ Go to "9. A/T Does Not Shift: D ₁ → D ₂ Or Does Not Kickdown: D ₄ → D ₂ ", AT-207. Continue ROAD TEST.

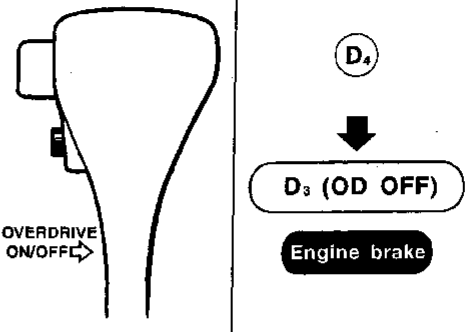
3	CHECK SHIFT UP (D₂ TO D₃)
<p>Does A/T shift from D₂ to D₃ at the specified speed?</p> <p>Ⓜ Read gear position, throttle position and vehicle speed.</p> <p style="text-align: center;">Specified speed when shifting from D₂ to D₃: Refer to Shift schedule, AT-343.</p>	
	
SAT960I	
Yes or No	
Yes	▶ GO TO 4.
No	▶ Go to "10. A/T Does Not Shift: D ₂ → D ₃ ", AT-209. Continue ROAD TEST.

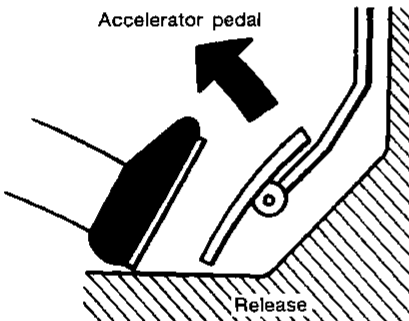
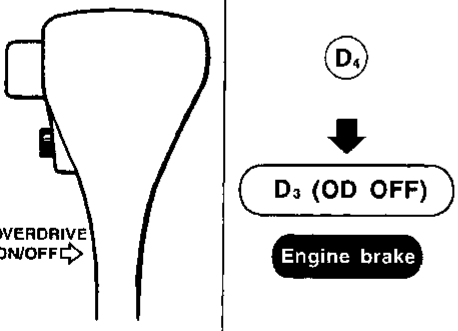
4	CHECK SHIFT UP (D₃ TO D₄) AND ENGINE BRAKE
<p>Release accelerator pedal after shifting from D₂ to D₃. Does A/T shift from D₃ to D₄ and does vehicle decelerate by engine brake?</p> <p>Ⓜ Read gear position, throttle position and vehicle speed.</p>	
	
SAT405H	
Yes or No	
Yes	▶ <ol style="list-style-type: none"> 1. Stop vehicle. 2. Go to "Cruise test — Part 3", AT-73.
No	▶ Go to "11. A/T Does Not Shift: D ₃ → D ₄ ", AT-211. Continue ROAD TEST.

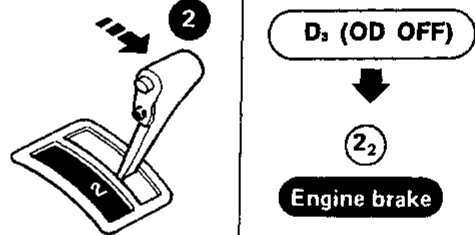
Cruise Test — Part 3

—NCAT002850406

1	VEHICLE SPEED D₄ POSITION		
<ol style="list-style-type: none"> 1. Confirm overdrive control switch is in "ON" position. 2. Confirm selector lever is in "D" position. 3. Accelerate vehicle using half-throttle to D₄. 			
			
SAT812A			
<table border="0" style="width: 100%;"> <tr> <td style="width: 10%; text-align: center;">▶</td> <td style="text-align: left;">GO TO 2.</td> </tr> </table>		▶	GO TO 2.
▶	GO TO 2.		

3	CHECK ENGINE BRAKE
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 ₄ → D ₃)", AT-216. Continue ROAD TEST.


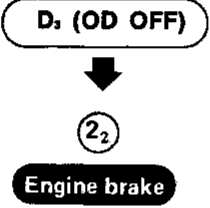
2	CHECK SHIFT DOWN (D₄ TO D₃)
1. Release accelerator pedal.	
	
SAT813A	
2. Set overdrive control switch to "OFF" position while driving in D ₄ .	
3. Does A/T shift from D ₄ to D ₃ (O/D OFF)?	
<input type="checkbox"/> Read gear position and vehicle speed.	
	
SAT999I	
Yes or No	
Yes	▶ GO TO 3.
No	▶ Go to "17. A/T Does Not Shift: D ₄ → D ₃ , When Overdrive Control Switch "ON" → "OFF", AT-218. Continue ROAD TEST.

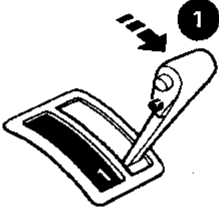
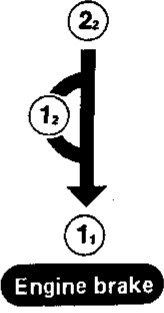
4	CHECK SHIFT DOWN (D₃ TO D₂)
1. Move selector lever from "D" to "2" position while driving in D ₃ (O/D OFF).	
2. Does A/T shift from D ₃ (O/D OFF) to 2 ₂ ?	
<input type="checkbox"/> Read gear position.	
	
SAT791GA	
Yes or No	
Yes	▶ GO TO 5.
No	▶ Go to "18. A/T Does Not Shift: D ₃ → D ₂ , When Selector Lever "D" → "2" Position", AT-219. Continue ROAD TEST.

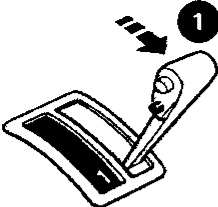
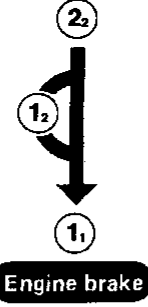
GI
MA
EM
LC
EC
FE
CL
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AT
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

5	CHECK ENGINE BRAKE	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 ₄ → D ₃)", AT-216. Continue ROAD TEST.	

7	CHECK ENGINE BRAKE	Does vehicle decelerate by engine brake?	
			SAT778B
Yes or No			
Yes	▶	1. Stop vehicle. 2. Perform self-diagnosis. Refer to TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS), AT-48.	
No	▶	Go to "20. Vehicle Does Not Decelerate By Engine Brake", AT-221. Continue ROAD TEST.	

6	CHECK SHIFT DOWN	1. Move selector lever from "2" to "1" position while driving in 2 ₂ . 2. Does A/T shift from 2 ₂ to 1 ₁ position? <input type="checkbox"/> Read gear position.	
			SAT778B
Yes or No			
Yes	▶	GO TO 7.	
No	▶	Go to "19. A/T Does Not Shift: 2 ₂ → 1 ₁ , When Selector lever "2" → "1" Position", AT-220. Continue ROAD TEST.	

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.

Symptom	Condition	Diagnostic Item	Reference Page	
Engine does not start in "N", "P" positions. AT-197	ON vehicle	1. Ignition switch and starter	EL and EM section	GI
		2. Control cable adjustment	AT-235	MA
		3. PNP switch adjustment	AT-235	EM
Engine starts in position other than "N" and "P" positions. AT-197	ON vehicle	1. Control cable adjustment	AT-235	LC
		2. PNP switch adjustment	AT-235	
Transmission noise in "P" and "N" positions.	ON vehicle	1. Fluid level	AT-58	EC
		2. Line pressure test	AT-62	
		3. Throttle position sensor (Adjustment)	EC section	FE
		4. Revolution sensor and vehicle speed sensor	AT-103, AT-187	CL
	OFF vehicle	5. Engine speed signal	AT-108	
		6. Oil pump	AT-262	MT
		7. Torque converter	AT-245	
Vehicle moves when changing into "P" position, or parking gear does not disengage when shifted out of "P" position. AT-198	ON vehicle	1. Control cable adjustment	AT-235	AT
	OFF vehicle	2. Parking components	AT-240	AX
Vehicle runs in "N" position. AT-199	ON vehicle	1. Control cable adjustment	AT-235	SU
	OFF vehicle	2. Forward clutch	AT-290	
		3. Reverse clutch	AT-281	BR
		4. Overrun clutch	AT-290	
Vehicle will not run in "R" position (but runs in "D", "2" and "1" positions). Clutch slips. Very poor acceleration. AT-201	ON vehicle	1. Control cable adjustment	AT-235	ST
		2. Line pressure test	AT-62	
		3. Line pressure solenoid valve	AT-152	RS
		4. Control valve assembly	AT-234	
	OFF vehicle	5. Reverse clutch	AT-281	BT
		6. High clutch	AT-285	
		7. Forward clutch	AT-290	HA
		8. Overrun clutch	AT-290	
		9. Low & reverse brake	AT-297	SC

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Vehicle braked when shifting into "R" position.	ON vehicle	1. Fluid level	AT-58
		2. Control cable adjustment	AT-235
		3. Line pressure test	AT-62
		4. Line pressure solenoid valve	AT-152
		5. Control valve assembly	AT-234
	OFF vehicle	6. High clutch	AT-285
		7. Brake band	AT-310
		8. Forward clutch	AT-290
		9. Overrun clutch	AT-290
Sharp shock in shifting from "N" to "D" position.	ON vehicle	1. Engine idling rpm	AT-62
		2. Throttle position sensor (Adjustment)	EC section
		3. Line pressure test	AT-62
		4. A/T fluid temperature sensor	AT-97
		5. Engine speed signal	AT-108
		6. Line pressure solenoid valve	AT-152
		7. Control valve assembly	AT-234
		8. Accumulator N-D	AT-234
	OFF vehicle	9. Forward clutch	AT-290
Vehicle will not run in "D" and "2" positions (but runs in "1" and "R" positions).	ON vehicle	1. Control cable adjustment	AT-235
	OFF vehicle	2. Low one-way clutch	AT-240
Vehicle will not run in "D", "1", "2" positions (but runs in "R" position). Clutch slips. Very poor acceleration. AT-203	ON vehicle	1. Fluid level	AT-58
		2. Line pressure test	AT-62
		3. Line pressure solenoid valve	AT-152
		4. Control valve assembly	AT-234
		5. Accumulator N-D	AT-234
	OFF vehicle	6. Reverse clutch	AT-281
		7. High clutch	AT-285
		8. Forward clutch	AT-290
		9. Forward one-way clutch	AT-301
		10. Low one-way clutch	AT-240

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page	
Clutches or brakes slip somewhat in starting.	ON vehicle	1. Fluid level	AT-58	GI
		2. Control cable adjustment	AT-235	
		3. Throttle position sensor (Adjustment)	EC section	MA
		4. Line pressure test	AT-62	
		5. Line pressure solenoid valve	AT-152	EM
		6. Control valve assembly	AT-234	
		7. Accumulator N-D	AT-234	LC
	OFF vehicle	8. Forward clutch	AT-290	
		9. Reverse clutch	AT-281	EC
		10. Low & reverse brake	AT-297	
		11. Oil pump	AT-262	FE
		12. Torque converter	AT-245	CL
Excessive creep.	ON vehicle	1. Engine idling rpm	AT-62	
No creep at all. AT-201, 203	ON vehicle	1. Fluid level	AT-58	MT
		2. Line pressure test	AT-62	
		3. Control valve assembly	AT-234	AT
	OFF vehicle	4. Forward clutch	AT-290	
		5. Oil pump	AT-262	AX
		6. Torque converter	AT-245	
Failure to change gear from "D ₁ " to "D ₂ ".	ON vehicle	1. PNP switch adjustment	AT-235	SU
		2. Control cable adjustment	AT-235	
		3. Shift solenoid valve A	AT-158	BR
		4. Control valve assembly	AT-234	
		5. Revolution sensor and vehicle speed sensor	AT-103, AT-187	ST
	OFF vehicle	6. Brake band	AT-240	RS
Failure to change gear from "D ₂ " to "D ₃ ".	ON vehicle	1. PNP switch adjustment	AT-235	
		2. Control cable adjustment	AT-235	BT
		3. Shift solenoid valve B	AT-163	
		4. Control valve assembly	AT-234	HA
		5. Revolution sensor and vehicle speed sensor	AT-103, AT-187	SC
	OFF vehicle	6. High clutch	AT-285	
		7. Brake band	AT-240	EL

IDX

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Failure to change gear from "D ₃ " to "D ₄ ".	ON vehicle	1. PNP switch adjustment	AT-235
		2. Control cable adjustment	AT-235
		3. Shift solenoid valve A	AT-158
		4. Revolution sensor and vehicle speed sensor	AT-103, AT-187
		5. A/T fluid temperature sensor	AT-97
	OFF vehicle	6. Brake band	AT-240
Too high a gear change point from "D ₁ " to "D ₂ ", from "D ₂ " to "D ₃ ", from "D ₃ " to "D ₄ ". AT-207, 209, 211	ON vehicle	1. Throttle position sensor (Adjustment)	EC section
		2. Revolution sensor and vehicle speed sensor	AT-103, AT-187
		3. Shift solenoid valve A	AT-158
		4. Shift solenoid valve B	AT-163
Gear change directly from "D ₁ " to "D ₃ " occurs.	ON vehicle	1. Fluid level	AT-58
	OFF vehicle	2. Accumulator servo release	AT-234
		3. Brake band	AT-240
Engine stops when shifting lever into "R", "D", "2" and "1".	ON vehicle	1. Engine idling rpm	AT-62
		2. Torque converter clutch solenoid valve	AT-245
		3. Control valve assembly	AT-234
	OFF vehicle	4. Torque converter	AT-245
Too sharp a shock in change from "D ₁ " to "D ₂ ".	ON vehicle	1. Throttle position sensor (Adjustment)	EC section
		2. Line pressure test	AT-62
		3. Accumulator servo release	AT-234
		4. Control valve assembly	AT-234
		5. A/T fluid temperature sensor	AT-97
	OFF vehicle	6. Brake band	AT-240
Too sharp a shock in change from "D ₂ " to "D ₃ ".	ON vehicle	1. Throttle position sensor (Adjustment)	EC section
		2. Line pressure test	AT-62
		3. Control valve assembly	AT-234
	OFF vehicle	4. High clutch	AT-285
		5. Brake band	AT-240
Too sharp a shock in change from "D ₃ " to "D ₄ ".	ON vehicle	1. Throttle position sensor (Adjustment)	EC section
		2. Line pressure test	AT-62
		3. Control valve assembly	AT-234
	OFF vehicle	4. Brake band	AT-240
		5. Overrun clutch	AT-290

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page	
Almost no shock or clutches slipping in change from "D ₁ " to "D ₂ ".	ON vehicle	1. Fluid level	AT-58	GI
		2. Throttle position sensor (Adjustment)	EC section	
		3. Line pressure test	AT-62	MA
		4. Accumulator servo release	AT-234	
		5. Control valve assembly	AT-234	EM
	OFF vehicle	6. Brake band	AT-240	
Almost no shock or slipping in change from "D ₂ " to "D ₃ ".	ON vehicle	1. Fluid level	AT-58	LC
		2. Throttle position sensor (Adjustment)	EC section	
		3. Line pressure test	AT-62	EC
		4. Control valve assembly	AT-234	
	OFF vehicle	5. High clutch	AT-285	FE
		6. Brake band	AT-240	
Almost no shock or slipping in change from "D ₃ " to "D ₄ ".	ON vehicle	1. Fluid level	AT-58	CL
		2. Throttle position sensor (Adjustment)	EC section	
		3. Line pressure test	AT-62	MT
		4. Control valve assembly	AT-234	AT
	OFF vehicle	5. High clutch	AT-285	
		6. Brake band	AT-240	AX
Vehicle braked by gear change from "D ₁ " to "D ₂ ".	ON vehicle	1. Fluid level	AT-58	
	OFF vehicle	2. Reverse clutch	AT-281	SU
		3. Low & reverse brake	AT-297	
		4. High clutch	AT-285	BR
		5. Low one-way clutch	AT-240	
Vehicle braked by gear change from "D ₂ " to "D ₃ ".	ON vehicle	1. Fluid level	AT-58	ST
	OFF vehicle	2. Brake band	AT-240	
Vehicle braked by gear change from "D ₃ " to "D ₄ ".	ON vehicle	1. Fluid level	AT-58	RS
	OFF vehicle	2. Overrun clutch	AT-290	
		3. Forward one-way clutch	AT-301	BT
		4. Reverse clutch	AT-281	HA

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Maximum speed not attained. Acceleration poor.	ON vehicle	1. Fluid level	AT-58
		2. PNP switch adjustment	AT-235
		3. Shift solenoid valve A	AT-158
		4. Shift solenoid valve B	AT-163
		5. Control valve assembly	AT-234
	OFF vehicle	6. Reverse clutch	AT-281
		7. High clutch	AT-285
		8. Brake band	AT-240
		9. Low & reverse brake	AT-297
		10. Oil pump	AT-262
		11. Torque converter	AT-245
Failure to change gear from "D ₄ " to "D ₃ ".	ON vehicle	1. Fluid level	AT-58
		2. Throttle position sensor (Adjustment)	EC section
		3. Overrun clutch solenoid valve	AT-176
		4. Shift solenoid valve A	AT-158
		5. Line pressure solenoid valve	AT-152
		6. Control valve assembly	AT-234
	OFF vehicle	7. Low & reverse brake	AT-297
		8. Overrun clutch	AT-290
Failure to change gear from "D ₃ " to "D ₂ " or from "D ₄ " to "D ₂ ".	ON vehicle	1. Fluid level	AT-58
		2. Throttle position sensor (Adjustment)	EC section
		3. Shift solenoid valve A	AT-158
		4. Shift solenoid valve B	AT-163
		5. Control valve assembly	AT-234
	OFF vehicle	6. High clutch	AT-285
		7. Brake band	AT-240
Failure to change gear from "D ₂ " to "D ₁ " or from "D ₃ " to "D ₁ ".	ON vehicle	1. Fluid level	AT-58
		2. Throttle position sensor (Adjustment)	EC section
		3. Shift solenoid valve A	AT-158
		4. Shift solenoid valve B	AT-163
		5. Control valve assembly	AT-234
	OFF vehicle	6. Low one-way clutch	AT-328
		7. High clutch	AT-285
		8. Brake band	AT-240
Gear change shock felt during deceleration by releasing accelerator pedal.	ON vehicle	1. Throttle position sensor (Adjustment)	EC section
		2. Line pressure test	AT-62
		3. Overrun clutch solenoid valve	AT-176
		4. Control valve assembly	AT-234

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page	
Too high a change point from "D ₄ " to "D ₃ ", from "D ₃ " to "D ₂ ", from "D ₂ " to "D ₁ ".	ON vehicle	1. Throttle position sensor (Adjustment)	EC section	GI
		2. Revolution sensor and vehicle speed sensor	AT-103, AT-187	MA
Kickdown does not operate when depressing pedal in "D ₄ " within kickdown vehicle speed.	ON vehicle	1. Throttle position sensor (Adjustment)	EC section	
		2. Revolution sensor and vehicle speed sensor	AT-103, AT-187	EM
		3. Shift solenoid valve A	AT-158	LC
		4. Shift solenoid valve B	AT-163	
Kickdown operates or engine overruns when depressing pedal in "D ₄ " beyond kickdown vehicle speed limit.	ON vehicle	1. Revolution sensor and vehicle speed sensor	AT-103, AT-187	EC
		2. Throttle position sensor (Adjustment)	EC section	FE
		3. Shift solenoid valve A	AT-158	
		4. Shift solenoid valve B	AT-163	CL
Races extremely fast or slips in changing from "D ₄ " to "D ₃ " when depressing pedal.	ON vehicle	1. Fluid level	AT-58	MT
		2. Throttle position sensor (Adjustment)	EC section	
		3. Line pressure test	AT-62	AT
		4. Line pressure solenoid valve	AT-152	
		5. Control valve assembly	AT-234	
	OFF vehicle	6. High clutch	AT-285	AX
		7. Forward clutch	AT-290	
Races extremely fast or slips in changing from "D ₄ " to "D ₂ " when depressing pedal.	ON vehicle	1. Fluid level	AT-58	SU
		2. Throttle position sensor (Adjustment)	EC section	
		3. Line pressure test	AT-62	BR
		4. Line pressure solenoid valve	AT-152	
		5. Shift solenoid valve A	AT-158	ST
		6. Control valve assembly	AT-234	
	OFF vehicle	7. Brake band	AT-240	RS
		8. Forward clutch	AT-290	
Races extremely fast or slips in changing from "D ₃ " to "D ₂ " when depressing pedal.	ON vehicle	1. Fluid level	AT-58	BT
		2. Throttle position sensor (Adjustment)	EC section	
		3. Line pressure test	AT-62	HA
		4. Line pressure solenoid valve	AT-152	
		5. Control valve assembly	AT-234	SC
		6. A/T fluid temperature sensor	AT-97	EL
	OFF vehicle	7. Brake band	AT-240	
		8. Forward clutch	AT-290	IDX
		9. High clutch	AT-285	

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Races extremely fast or slips in changing from "D ₄ " or "D ₃ " to "D ₁ " when depressing pedal.	ON vehicle	1. Fluid level	AT-58
		2. Throttle position sensor (Adjustment)	EC section
		3. Line pressure test	AT-62
		4. Line pressure solenoid valve	AT-152
		5. Control valve assembly	AT-234
	OFF vehicle	6. Forward clutch	AT-290
		7. Forward one-way clutch	AT-301
		8. Low one-way clutch	AT-240
Vehicle will not run in any position.	ON vehicle	1. Fluid level	AT-58
		2. Control cable adjustment	AT-235
		3. Line pressure test	AT-62
		4. Line pressure solenoid valve	AT-152
	OFF vehicle	5. Oil pump	AT-262
		6. High clutch	AT-285
		7. Brake band	AT-240
		8. Low & reverse brake	AT-297
		9. Torque converter	AT-245
		10. Parking components	AT-322
Transmission noise in "D", "2", "1" and "R" positions.	ON vehicle	1. Fluid level	AT-58
	OFF vehicle	2. Torque converter	AT-245
Failure to change from "D ₃ " to "2 ₂ " when changing lever into "2" position. AT-203	ON vehicle	1. PNP switch adjustment	AT-235
		2. Throttle position sensor (Adjustment)	EC section
		3. Overrun clutch solenoid valve	AT-176
		4. Shift solenoid valve B	AT-163
		5. Shift solenoid valve A	AT-158
		6. Control valve assembly	AT-234
		7. Control cable adjustment	AT-235
	OFF vehicle	8. Brake band	AT-240
		9. Overrun clutch	AT-290
Gear change from "2 ₂ " to "2 ₃ " in "2" position.	ON vehicle	1. PNP switch adjustment	AT-235

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page	
Engine brake does not operate in "1" position. AT-217	ON vehicle	1. PNP switch adjustment	AT-235	GI
		2. Control cable adjustment	AT-235	
		3. Throttle position sensor (Adjustment)	EC section	MA
		4. Revolution sensor and vehicle speed sensor	AT-103, AT-187	EM
		5. Shift solenoid valve A	AT-158	
		6. Control valve assembly	AT-234	LC
		7. Overrun clutch solenoid valve	AT-176	
	OFF vehicle	8. Overrun clutch	AT-290	EC
		9. Low & reverse brake	AT-297	
Gear change from "1 ₁ " to "1 ₂ " in "1" position.	ON vehicle	1. PNP switch adjustment	AT-235	FE
		2. Control cable adjustment	AT-235	
Does not change from "1 ₂ " to "1 ₁ " in "1" position.	ON vehicle	1. PNP switch adjustment	AT-235	CL
		2. Revolution sensor and vehicle speed sensor	AT-103, AT-187	MT
		3. Shift solenoid valve A	AT-158	
		4. Control valve assembly	AT-234	AT
		5. Overrun clutch solenoid valve	AT-176	
	OFF vehicle	6. Overrun clutch	AT-290	AX
		7. Low & reverse brake	AT-297	
Large shock changing from "1 ₂ " to "1 ₁ " in "1" position.	ON vehicle	1. Control valve assembly	AT-234	SU
	OFF vehicle	2. Low & reverse brake	AT-297	
Transmission overheats.	ON vehicle	1. Fluid level	AT-58	BR
		2. Engine idling rpm	AT-62	
		3. Throttle position sensor (Adjustment)	EC section	ST
		4. Line pressure test	AT-62	
		5. Line pressure solenoid valve	AT-152	RS
		6. Control valve assembly	AT-234	BT
	OFF vehicle	7. Oil pump	AT-262	
		8. Reverse clutch	AT-281	HA
		9. High clutch	AT-285	
		10. Brake band	AT-240	SC
		11. Forward clutch	AT-290	
		12. Overrun clutch	AT-290	EL
		13. Low & reverse brake	AT-297	
		14. Torque converter	AT-245	IDX

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	ON vehicle	1. Fluid level	AT-58
	OFF vehicle	2. Reverse clutch	AT-281
		3. High clutch	AT-285
		4. Brake band	AT-240
		5. Forward clutch	AT-290
		6. Overrun clutch	AT-290
		7. Low & reverse brake	AT-297
Offensive smell at fluid charging pipe.	ON vehicle	1. Fluid level	AT-58
	OFF vehicle	2. Torque converter	AT-245
		3. Oil pump	AT-262
		4. Reverse clutch	AT-281
		5. High clutch	AT-285
		6. Brake band	AT-240
		7. Forward clutch	AT-290
		8. Overrun clutch	AT-290
		9. Low & reverse brake	AT-297
Torque converter is not locked up.	ON vehicle	1. Throttle position sensor (Adjustment)	EC section
		2. Revolution sensor and vehicle speed sensor	AT-103, AT-187
		3. PNP switch adjustment	AT-235
		4. Engine speed signal	AT-108
		5. A/T fluid temperature sensor	AT-97
		6. Line pressure test	AT-62
		7. Torque converter clutch solenoid valve	AT-139
		8. Control valve assembly	AT-234
	OFF vehicle	9. Torque converter	AT-245
Torque converter clutch piston slip.	ON vehicle	1. Fluid level	AT-58
		2. Throttle position sensor (Adjustment)	EC section
		3. Line pressure test	AT-62
		4. Torque converter clutch solenoid valve	AT-139
		5. Line pressure solenoid valve	AT-152
		6. Control valve assembly	AT-234
	OFF vehicle	7. Torque converter	AT-245
Lock-up point is extremely high or low. AT-213	ON vehicle	1. Throttle position sensor (Adjustment)	EC section
		2. Revolution sensor and vehicle speed sensor	AT-103, AT-187
		3. Torque converter clutch solenoid valve	AT-139
		4. Control valve assembly	AT-234

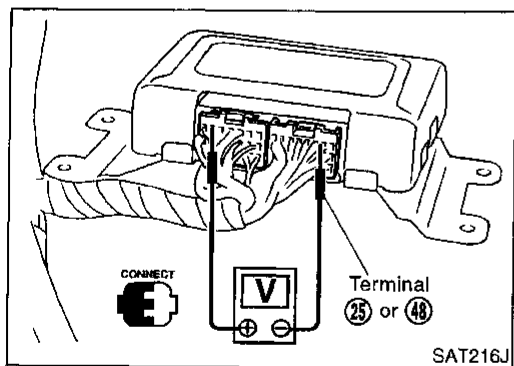
TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
A/T does not shift to "D ₄ " when driving with overdrive control switch "ON".	ON vehicle	1. Throttle position sensor (Adjustment)	EC section
		2. PNP switch adjustment	AT-235
		3. Revolution sensor and vehicle speed sensor	AT-103, AT-187
		4. Shift solenoid valve A	AT-158
		5. Overrun clutch solenoid valve	AT-176
		6. Control valve assembly	AT-234
		7. A/T fluid temperature sensor	AT-97
		8. Line pressure test	AT-62
	OFF vehicle	9. Brake band	AT-240
		10. Overrun clutch	AT-290
Engine is stopped at "R", "D", "2" and "1" positions.	ON vehicle	1. Fluid level	AT-58
		2. Torque converter clutch solenoid valve	AT-139
		3. Shift solenoid valve B	AT-163
		4. Shift solenoid valve A	AT-158
		5. Control valve assembly	AT-234

GI
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TCM Terminals and Reference Value PREPARATION

NCAT0030

NCAT0030S01

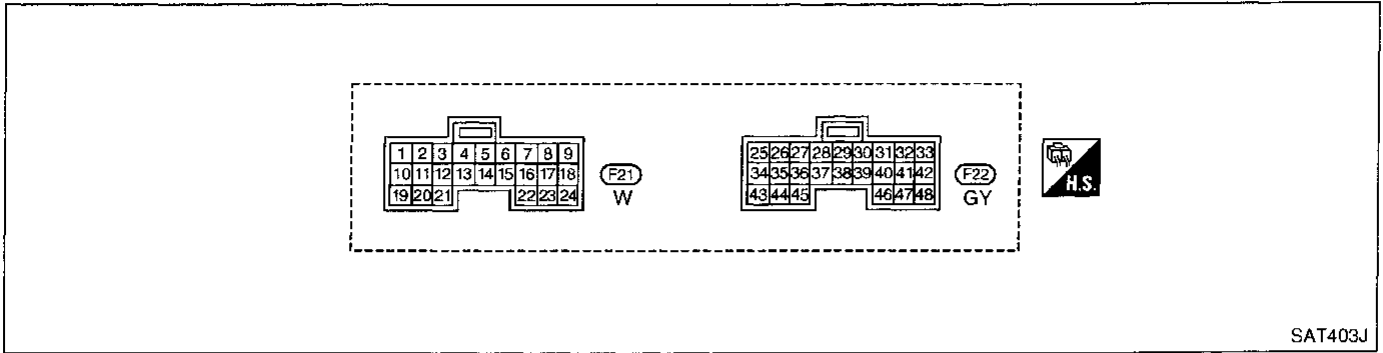
- Measure voltage between each terminal and terminal 25 or 48 by following "TCM INSPECTION TABLE".

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
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.	0.5V or less
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.	0.5V or less
3	GY/R	Torque converter clutch solenoid valve	When A/T performs lock-up.	8 - 15V
			When A/T does not perform lock-up.	1V or less
5 *1	Y/R	—	—	—
6 *1	Y/G	—	—	—
7 *1	Y/B	—	—	—
10	G/OR	Power source	When turning ignition switch to "ON".	Battery voltage
			When turning ignition switch to "OFF".	1V or less
11	LW	Shift solenoid valve A	When shift solenoid valve A operates. (When driving in "D ₁ " or "D ₄ ".)	Battery voltage
			When shift solenoid valve A does not operate. (When driving in "D ₂ " or "D ₃ ".)	1V or less
12	LY	Shift solenoid valve B	When shift solenoid valve B operates. (When driving in "D ₁ " or "D ₂ ".)	Battery voltage
			When shift solenoid valve B does not operate. (When driving in "D ₃ " or "D ₄ ".)	1V or less














TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

TCM Terminals and Reference Value (Cont'd)

Terminal No.	Wire color	Item	Condition		Judgement standard	
13	OR/B	O/D OFF indicator lamp		When setting overdrive control switch in "OFF" position.	1V or less	GI
				When setting overdrive control switch in "ON" position.	Battery voltage	MA
15 *1	PU	—		—	—	EM
16	Y	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine.	Battery voltage	LC
				When depressing accelerator pedal after warming up engine.	1V or less	EC
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	FE
				When releasing accelerator pedal after warming up engine.	1V or less	CL
18	OR	ASCD cruise switch		When ASCD cruise is being performed. ("CRUISE" light comes on.)	Battery voltage	MT
				When ASCD cruise is not being performed. ("CRUISE" light does not come on.)	1V or less	AT
19	G/OR	Power source		Same as No. 10		AX
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage	SU
				When overrun clutch solenoid valve does not operate.	1V or less	BR
22	G/R	Overdrive control switch		When setting overdrive control switch in "ON" position	Battery voltage	ST
				When setting overdrive control switch in "OFF" position	1V or less	RS
24	OR/B	ASCD OD cut signal		When "ACCEL" set switch on ASCD cruise is in "D ₄ " position.	5 - 8V	BT
				When "ACCEL" set switch on ASCD cruise is in "D ₃ " position.	1V or less	HA
25	B	Ground		—	—	SC
26	SB	PNP switch "1" position		When setting selector lever to "1" position.	Battery voltage	EL
				When setting selector lever to other positions.	1V or less	
27	L/OR	PNP switch "2" position		When setting selector lever to "2" position.	Battery voltage	IDX
				When setting selector lever to other positions.	1V or less	


TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

TCM Terminals and Reference Value (Cont'd)

Terminal No.	Wire color	Item	Condition		Judgement standard
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 (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
				When vehicle parks.	0V
30 *2	G/B	—		—	—
31 *2	GY/L	—		—	—
32	P/L	Throttle position sensor (Power source)		—	4.5 - 5.5V
34	LG	PNP switch "D" position		 	When setting selector lever to "D" position.
			When setting selector lever to other positions.		1V or less
35	G	PNP switch "R" position	 	When setting selector lever to "R" position.	Battery voltage
				When setting selector lever to other positions.	1V or less
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.	1V or less
39	L	Engine speed signal	 	When engine runs at idle speed.	0.5 - 1.5V
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

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

TCM Terminals and Reference Value (Cont'd)

Terminal No.	Wire color	Item	Condition	Judgement standard		
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: Approximately 0.5V Fully-open throttle: Approximately 4V	GI MA EM
				—	—	LC
42	B	Throttle position sensor (Ground)				EC
47	BR	A/T fluid temperature sensor	When ATF temperature is 20°C (68°F).	Approximately 1.5V	FE	
			When ATF temperature is 80°C (176°F).	Approximately 0.5V	CL	
48	B	Ground	—	—		

*1: This terminal is connected to the ECM.

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

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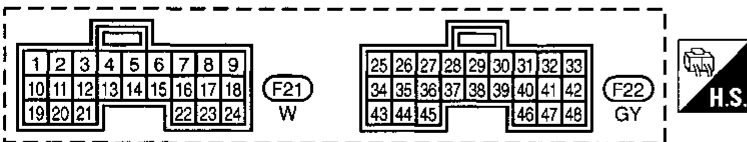
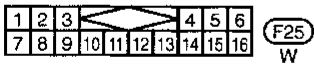
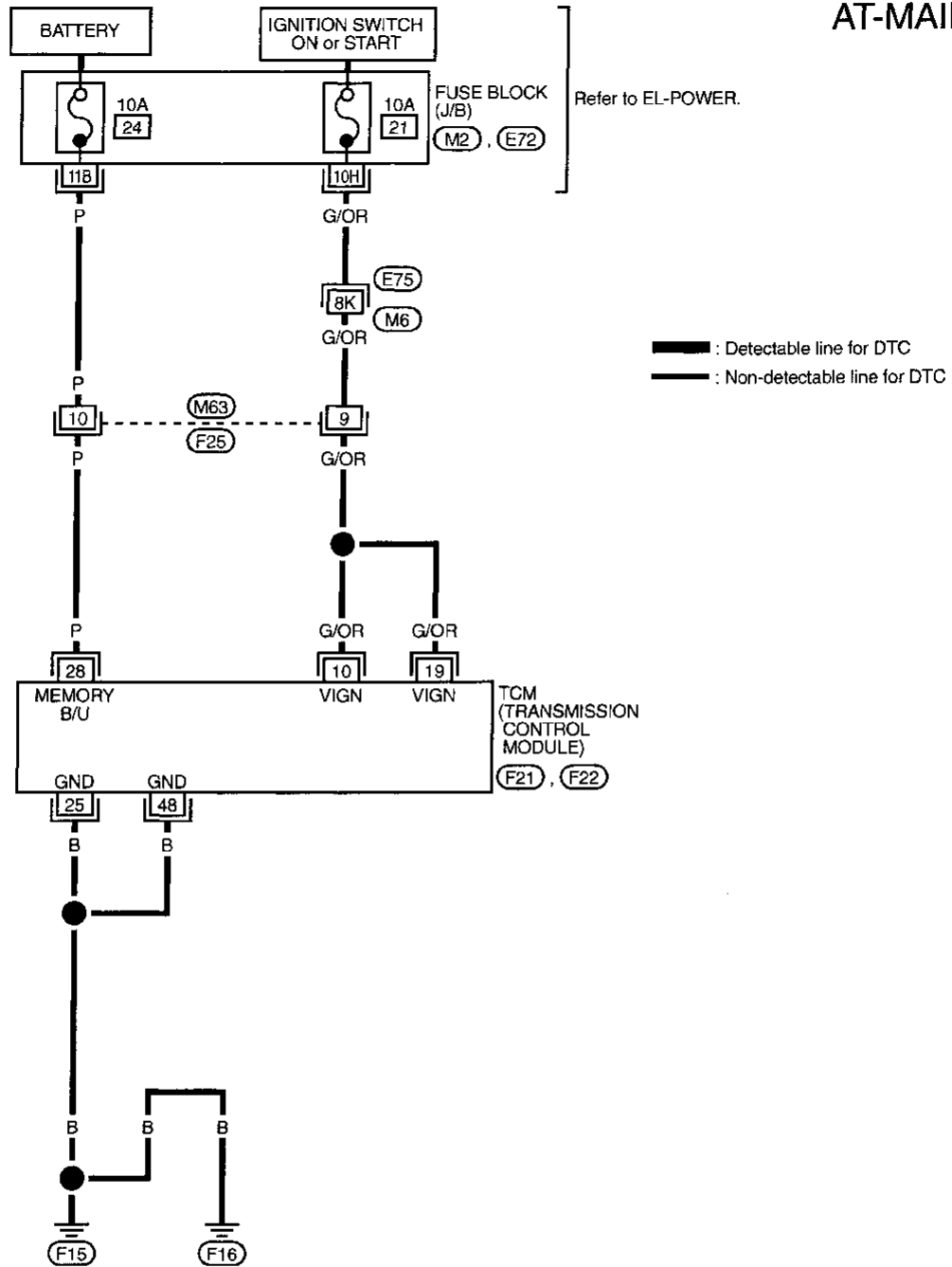
TROUBLE DIAGNOSIS FOR POWER SUPPLY

Wiring Diagram — AT — MAIN

Wiring Diagram — AT — MAIN

NCAT0031

AT-MAIN-01



Refer to last page (Foldout page).

M6, E75

M2

E72









TROUBLE DIAGNOSIS FOR POWER SUPPLY

Wiring Diagram — AT — MAIN (Cont'd)

TCM TERMINALS AND REFERENCE VALUE

NCAT0031S01

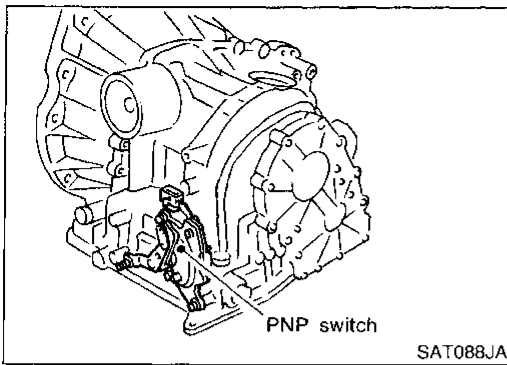
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard	
10	G/OR	Power source	 	When turning ignition switch to "ON".	Battery voltage
				When turning ignition switch to "OFF".	1V or less
19	G/OR	Power source	 or 	Same as No. 10	
25	B	Ground		—	
28	P	Power source (Memory back-up)	 or 	When turning ignition switch to "OFF".	Battery voltage
				When turning ignition switch to "ON".	Battery voltage
48	B	Ground	 	—	

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DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH

Description



Description

NCAT0032

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

TCM TERMINALS AND REFERENCE VALUE

NCAT0032S01

Remarks: Specification data are reference values.

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



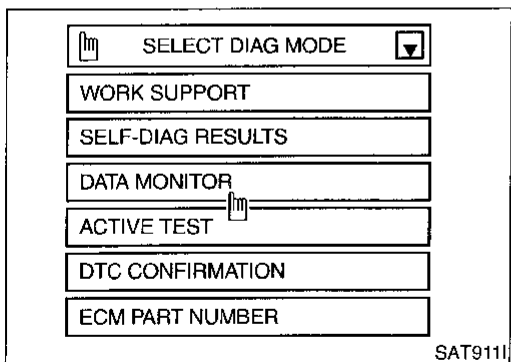
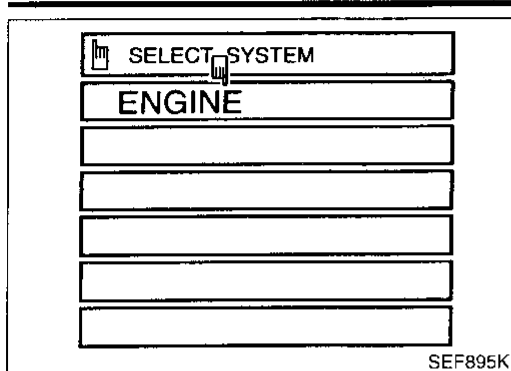
ON BOARD DIAGNOSIS LOGIC

NCAT0032S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
(P) : PNP SW/CIRC (P0705) (MIL Code No. 1101)	TCM does not receive the correct voltage signal from the switch based on the gear position.	<ul style="list-style-type: none"> • Harness or connectors (The PNP switch circuit is open or shorted.) • PNP switch

DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH

Description (Cont'd)



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

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode for "ENGINE" with CONSULT.
- 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

- 1) Start engine.
- 2) Drive vehicle under the following conditions:
Selector lever in "D" position, overdrive control switch in "ON" or "OFF" position, vehicle speed higher than 10 km/h (6 MPH), throttle position sensor more than 1.3V and driving for more than 5 seconds.
- 3) Select "MODE 7" with GST.

No Tools

- 1) Start engine.
- 2) Drive vehicle under the following conditions:
Selector lever in "D" position, overdrive control switch in "ON" or "OFF" position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 5 seconds.
- 3) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

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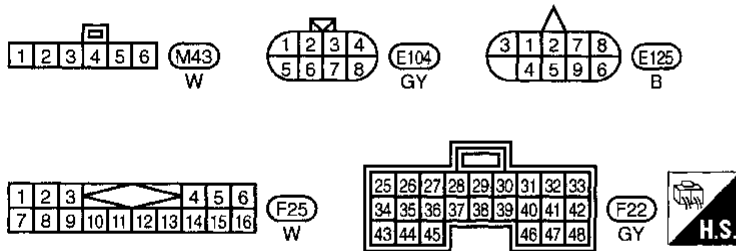
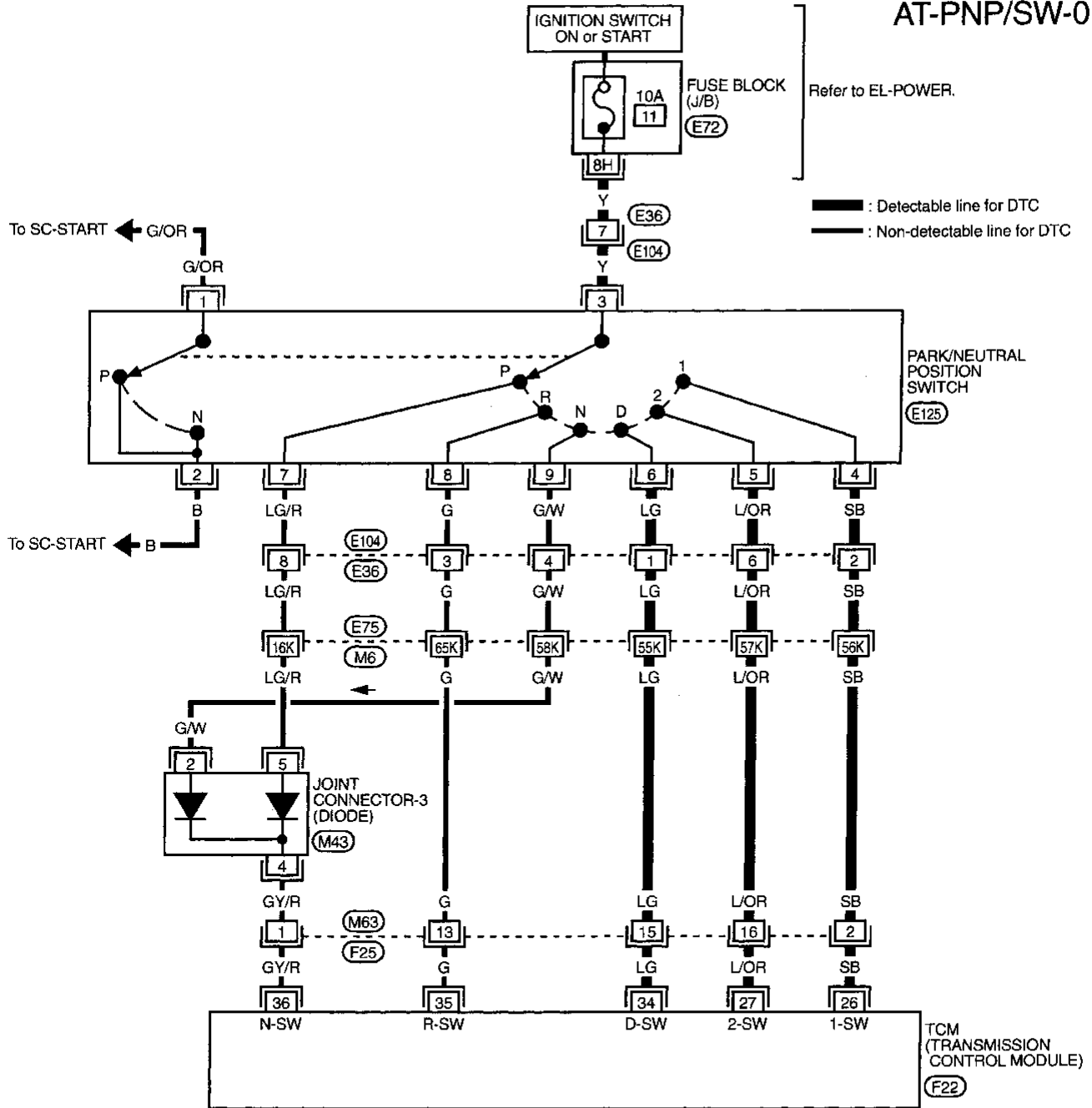
DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH

Wiring Diagram — AT — PNP/SW

Wiring Diagram — AT — PNP/SW

NCAT0199

AT-PNP/SW-01



Refer to last page (Foldout page).

(M6) (E75) (E72)

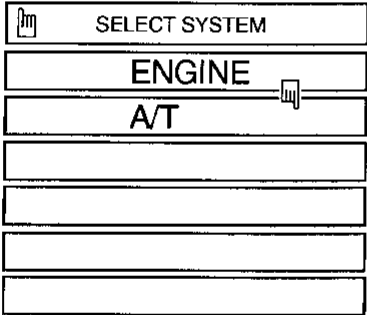
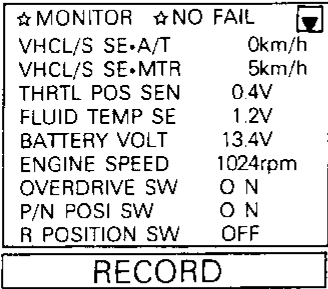
TAT174

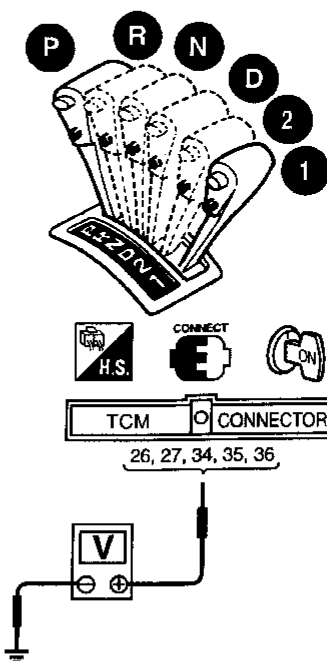
DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH

Diagnostic Procedure

NCA70033

Diagnostic Procedure

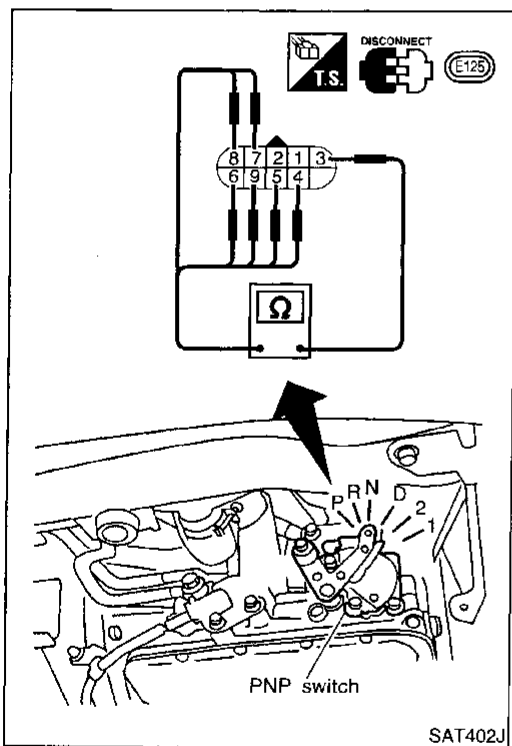
1	CHECK PNP SWITCH CIRCUIT (With CONSULT)
<p>With CONSULT</p> <ol style="list-style-type: none"> Turn ignition switch to "ON" position. (Do not start engine.) Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT. 	
	
SAT974H	
<ol style="list-style-type: none"> Read out "P/N", "R", "D", "2" and "1" position switches moving selector lever to each position. Check the signal of the selector lever position is indicated properly. 	
	
SAT076H	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Check the following items: <ul style="list-style-type: none"> PNP switch Refer to "Component Inspection", AT-96. Harness for short or open between ignition switch and PNP switch (Main harness) Harness for short or open between PNP switch and TCM (Main harness) Ignition switch and fuse Refer to EL section ("POWER SUPPLY ROUTING"). Diode (P, N positions)

2	CHECK PNP SWITCH CIRCUIT (Without CONSULT)																																									
<p>Without CONSULT</p> <ol style="list-style-type: none"> 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. 																																										
<p>Voltage: B: Battery voltage 0: 0V</p>																																										
<table border="1"> <thead> <tr> <th rowspan="2">Lever position</th> <th colspan="5">Terminal No.</th> </tr> <tr> <th>36</th> <th>35</th> <th>34</th> <th>27</th> <th>26</th> </tr> </thead> <tbody> <tr> <td>P, N</td> <td>B</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>R</td> <td>0</td> <td>B</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>D</td> <td>0</td> <td>0</td> <td>B</td> <td>0</td> <td>0</td> </tr> <tr> <td>2</td> <td>0</td> <td>0</td> <td>0</td> <td>B</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>B</td> </tr> </tbody> </table>		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
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: <ul style="list-style-type: none"> PNP switch Refer to "Component Inspection", AT-96. Harness for short or open between ignition switch and PNP switch (Main harness) Harness for short or open between PNP switch and TCM (Main harness) Ignition switch and fuse Refer to EL section ("POWER SUPPLY ROUTING"). Diode (P, N positions) 																																									

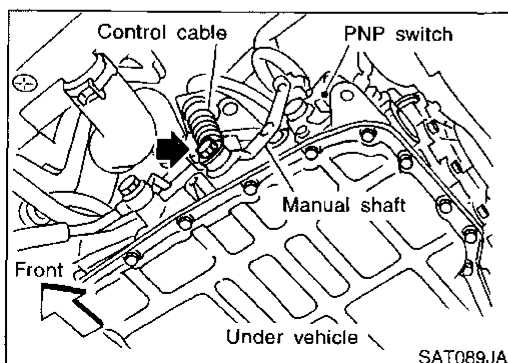
DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH

Diagnostic Procedure (Cont'd)

3	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-93.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ <ol style="list-style-type: none"> 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.



SAT402J



SAT089JA

Component Inspection

PARK/NEUTRAL POSITION SWITCH

NCA70034

NCA70034S01

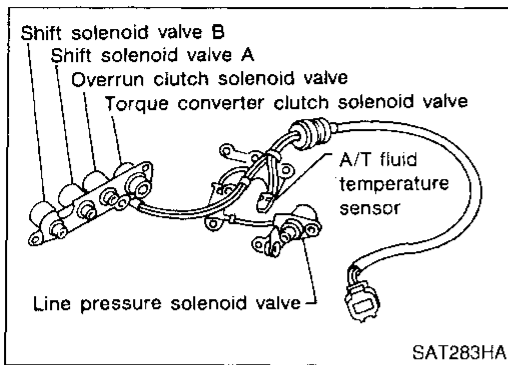
1. Check continuity between terminals 1 and 3 and between terminals 2 and 4, 5, 6, 7, 8, 9 while moving manual shaft through each position.

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-235.
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-235.
6. If NG on step 4, replace PNP switch.

DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

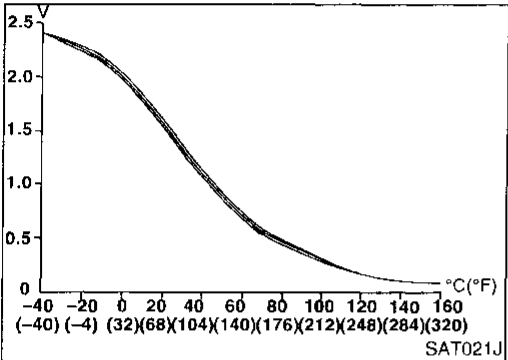
Description



Description

NCAT0035

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



CONSULT REFERENCE VALUE IN DATA MONITOR MODE

NCAT0035S01

Remarks: Specification data are reference values.

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

TCM TERMINALS AND REFERENCE VALUE

NCAT0035S02

Remarks: Specification data are reference values.

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

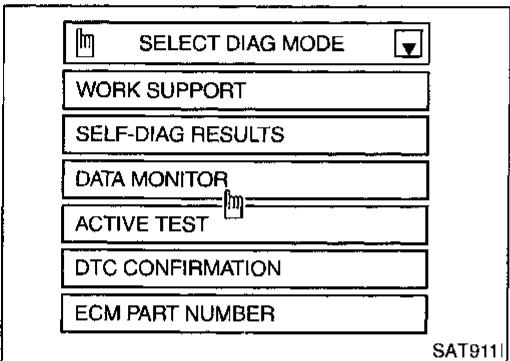
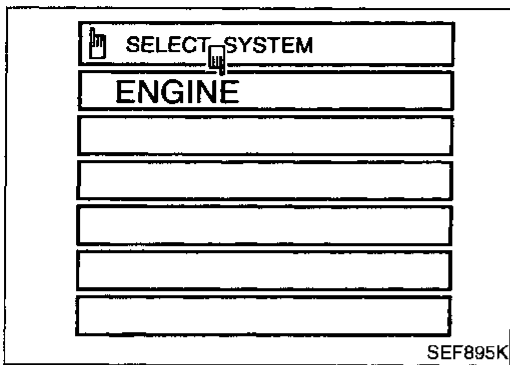
ON BOARD DIAGNOSIS LOGIC

NCAT0035S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
P ₀₇₁₀ : ATF TEMP SEN/CIRC P ₀₇₁₀ : P0710 NO TOOL : MIL Code No. 1208	TCM receives an excessively low or high voltage from the sensor.	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) A/T fluid temperature sensor

DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Description (Cont'd)



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.

④ With CONSULT

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

④ With GST

- 1) Start engine.
- 2) Drive vehicle under the following conditions:
Selector lever in "D" (OD "ON"), vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes (Total).
- 3) Select "MODE 7" with GST.

④ No Tools

- 1) Start engine.
- 2) Drive vehicle under the following conditions:
Selector lever in "D" (OD "ON"), vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes (Total).
- 3) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Wiring Diagram — AT — FTS

Wiring Diagram — AT — FTS

NCAT0200

AT-FTS-01 GI

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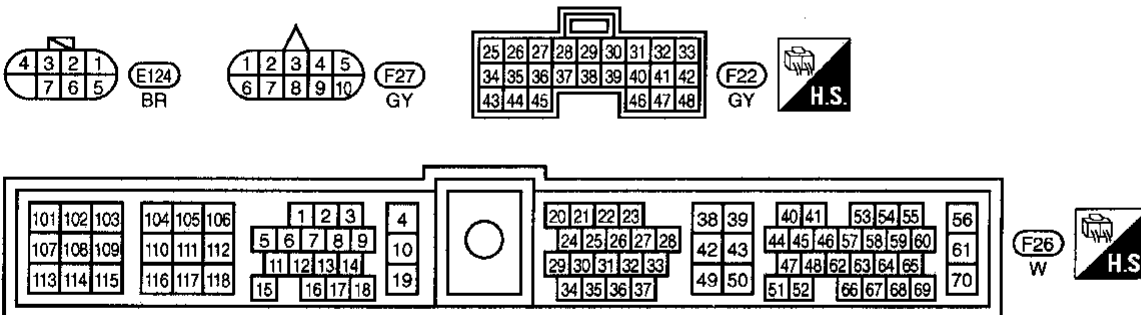
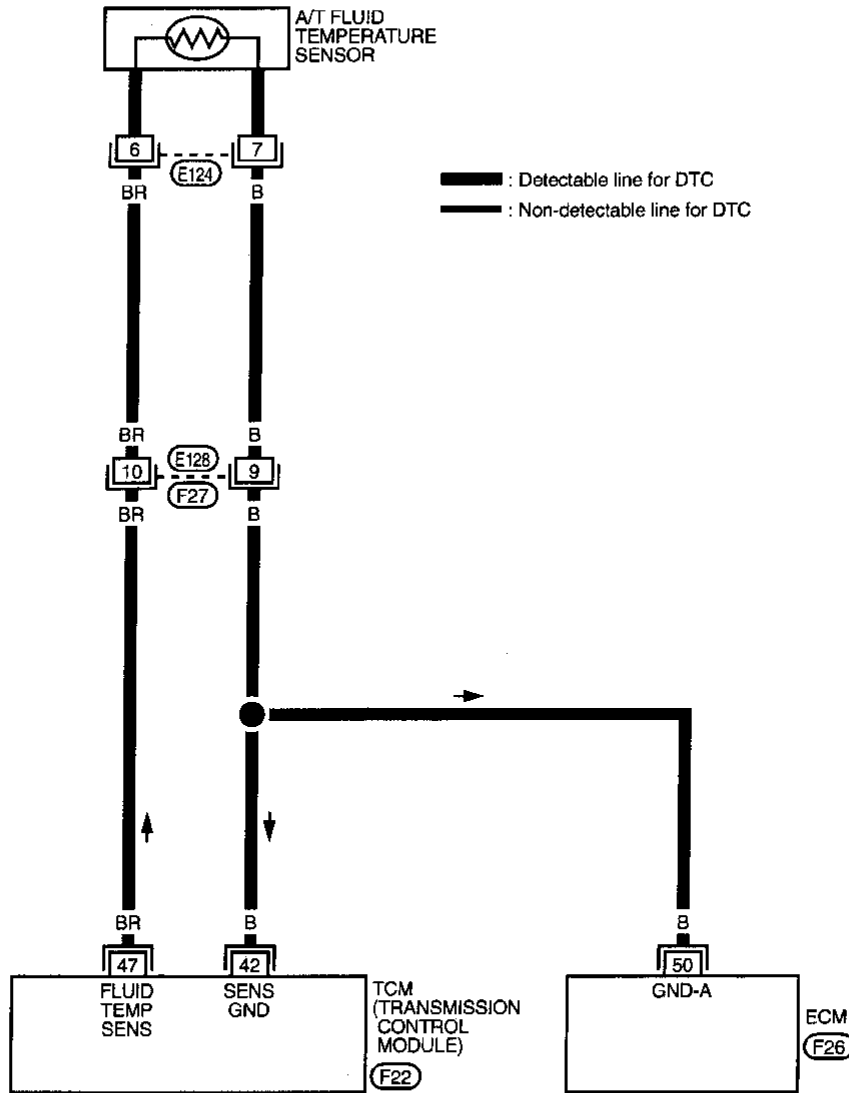
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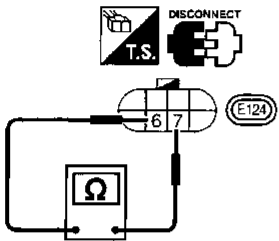
TAT175

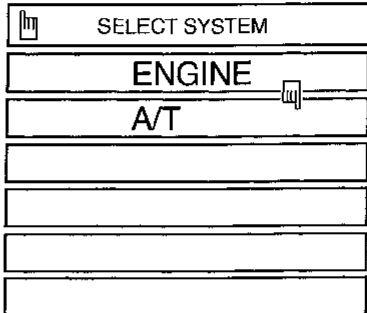
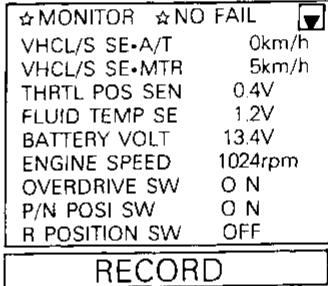
DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Diagnostic Procedure

Diagnostic Procedure

NCAT0036

1	CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY
<ol style="list-style-type: none"> Turn ignition switch to "OFF" position. Disconnect terminal cord assembly connector in engine compartment. Check resistance between terminals 6 and 7 when A/T is cold. <p>Resistance: Cold [20°C (68°F)] Approximately 2.5 kΩ</p> 	
SAT419J	
4. Reinstall any part removed.	
OK or NG	
OK (With CONSULT) ▶	GO TO 2.
OK (Without CONSULT) ▶	GO TO 3.
NG ▶	<ol style="list-style-type: none"> Remove oil pan. Check the following items: <ul style="list-style-type: none"> A/T fluid temperature sensor Refer to "Component Inspection", AT-102. Harness of terminal cord assembly for short or open

2	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (With CONSULT)
<p>With CONSULT</p> <ol style="list-style-type: none"> Start engine. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT. 	
	
SAT974H	
3. Read out the value of "FLUID TEMP SE".	
<p>Voltage: Cold [20°C (68°F)] → Hot [80°C (176°F)]: Approximately 1.5V → 0.5V</p>	
	
SAT076H	
OK or NG	
OK ▶	GO TO 4.
NG ▶	<p>Check the following item:</p> <ul style="list-style-type: none"> Harness for short to ground or short to power or open between TCM, ECM and terminal cord assembly (Main harness) Ground circuit for ECM Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY").

DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Diagnostic Procedure (Cont'd)

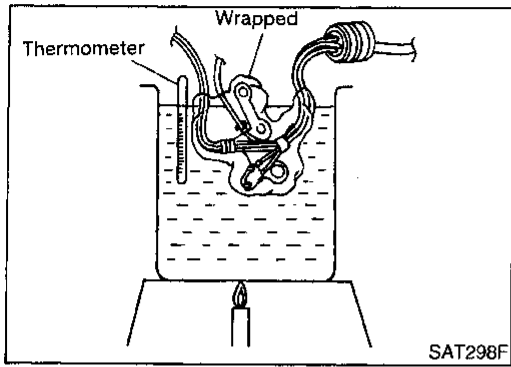
3	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (Without CONSULT)
<p>⊗ Without CONSULT</p> <p>1. Start engine.</p> <p>2. Check voltage between TCM terminal 47 and ground while warming up A/T.</p> <p>Voltage: Cold [20°C (68°F)] → Hot [80°C (176°F)]: Approximately 1.5V → 0.5V</p> <p style="text-align: right;">SAT420J</p> <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>Continuity should exist.</p> <p style="text-align: right;">SAT421J</p> <p>If OK, check harness for short to ground and short to power.</p>	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Check the following item: <ul style="list-style-type: none"> ● Harness for short to ground or short to power or open between TCM, ECM and terminal cord assembly (Main harness) ● Ground circuit for ECM Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY").

4	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-98.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ <ul style="list-style-type: none"> 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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DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Component Inspection



Component Inspection A/T FLUID TEMPERATURE SENSOR

NCAT0037

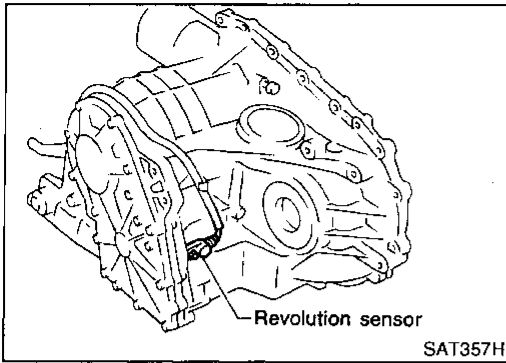
NCAT0037/S01

- For removal, refer to AT-234.
- Check resistance between two terminals while changing temperature as shown at left.

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

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
29	W	Revolution sensor (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
				When vehicle parks.	0V
42	B	Throttle position sensor (Ground)		—	—

EC

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AX

ON BOARD DIAGNOSIS LOGIC

NCAT0038S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
(H) : VEH SPD SEN/CIR AT (SET) : P0720 (MIL) : MIL Code No. 1102	TCM does not receive the proper voltage signal from the sensor.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Revolution sensor

SU

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HA

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EL

IDX

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

Description (Cont'd)

SELECT SYSTEM

ENGINE

A/T

SAT974H

SELECT DIAG MODE

SELF-DIAG RESULTS

DATA MONITOR

DTC WORK SUPPORT

TCM PART NUMBER

SAT385J

SELECT SYSTEM

ENGINE

SEF895K

SELECT DIAG MODE

WORK SUPPORT

SELF-DIAG RESULTS

DATA MONITOR

ACTIVE TEST

DTC CONFIRMATION

ECM PART NUMBER

SAT911I

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.

④ With CONSULT

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "A/T" with CONSULT.
- 2) Drive vehicle and check for an increase of "VHCL/S SE-A/T" value in response to "VHCL/S SE-MTR" value increase. If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-190. If the check result is OK, go to following step.
- 3) Select "DATA MONITOR" mode for "ENGINE" with CONSULT.
- 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-106.
 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.

⑤ With GST

- 1) Start engine.
- 2) Drive vehicle under the following conditions:
 Selector lever in "D" (OD "ON"), vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.
- 3) Select "MODE 7" with GST.

⑥ No Tools

- 1) Start engine.
- 2) Drive vehicle under the following conditions:
 Selector lever in "D" (OD "ON"), vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.
- 3) Perform self-diagnosis for ECM.
 Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

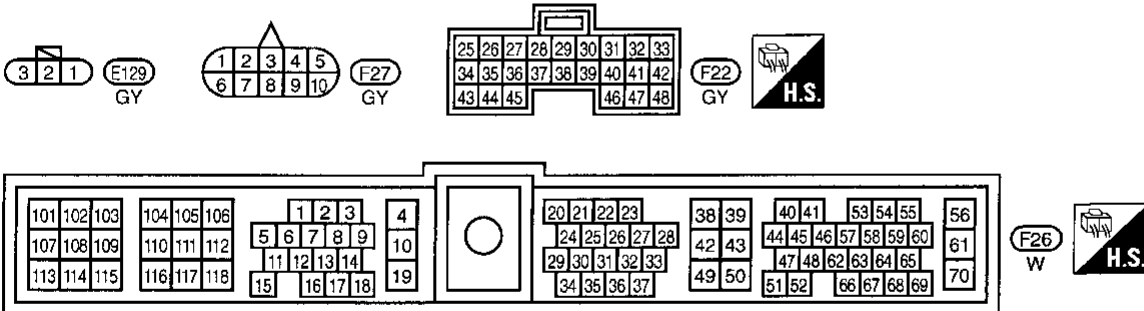
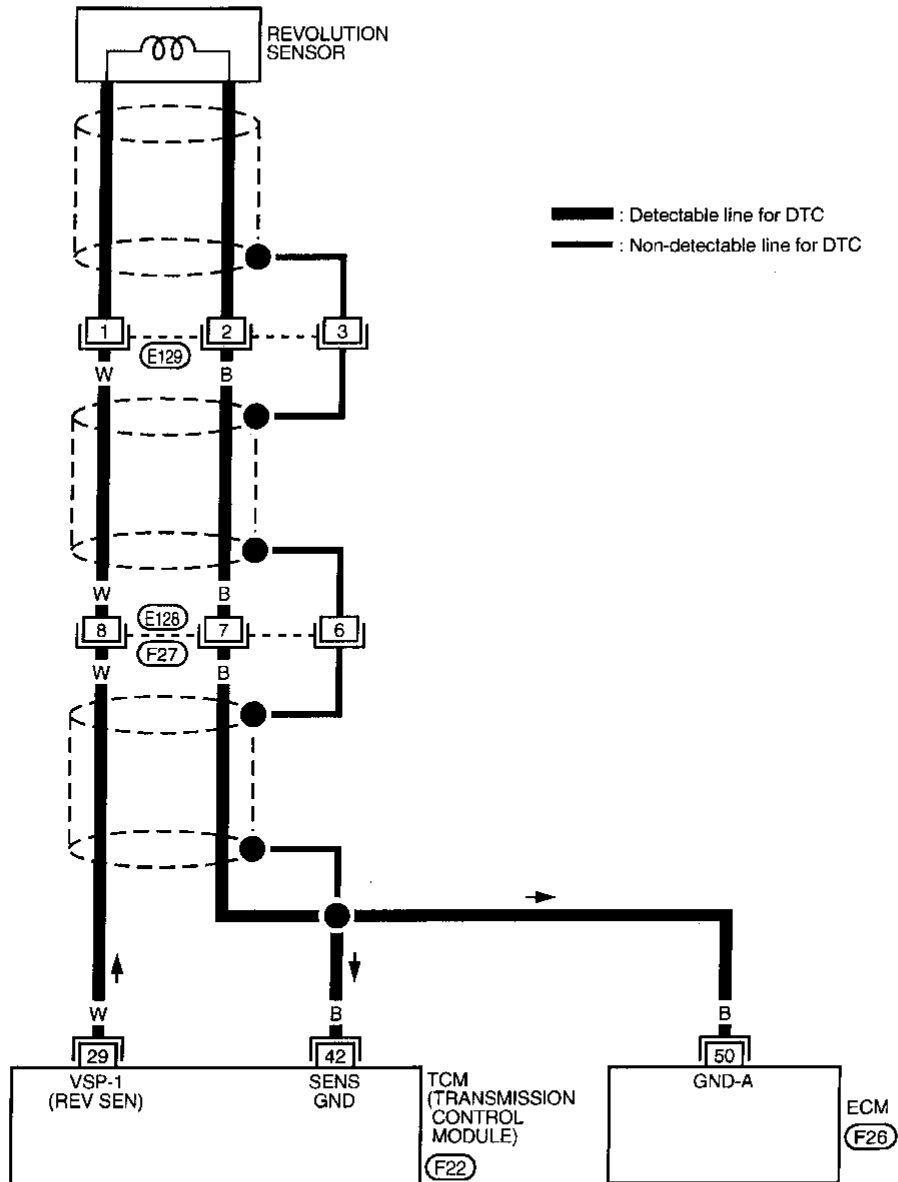
DTC P0720 VEHICLE SPEED SENSOR-A/T (REVOLUTION SENSOR)

Wiring Diagram — AT — VSSA/T

Wiring Diagram — AT — VSSA/T

NCAT0201

AT-VSSAT-01 GI



TAT176

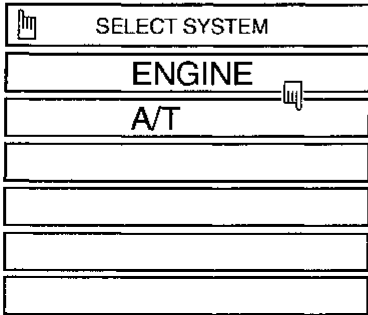
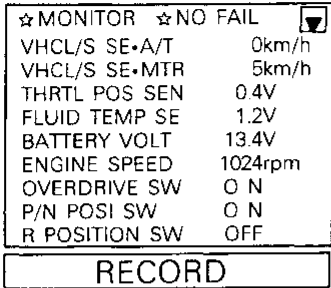
DTC P0720 VEHICLE SPEED SENSOR-A/T (REVOLUTION SENSOR)

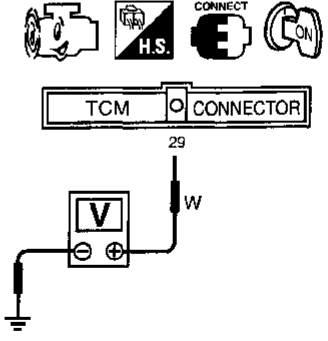
Diagnostic Procedure

Diagnostic Procedure

NCA10039

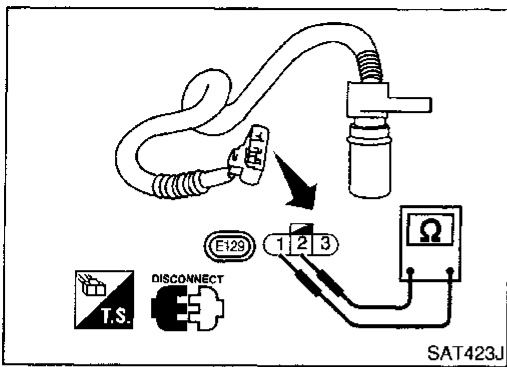
1	CHECK REVOLUTION SENSOR
Refer to "Component Inspection" AT-107.	
OK or NG	
OK (With CONSULT) ▶	GO TO 2.
OK (Without CONSULT) ▶	GO TO 3.
NG ▶	Repair or replace revolution sensor.

2	CHECK INPUT SIGNAL (With CONSULT)
<p>Ⓜ With CONSULT</p> <p>1. Start engine.</p> <p>2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT.</p>	
	
SAT974H	
<p>3. Read out the value of "VHCL/S SE-A/T" while driving. Check the value changes according to driving speed.</p>	
	
SAT076H	
OK or NG	
OK ▶	GO TO 4.
NG ▶	<p>Check the following items:</p> <ul style="list-style-type: none"> • Harness for short or open between TCM, ECM and revolution sensor (Main harness) • Ground circuit for ECM <p>Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY").</p>

3	CHECK INPUT SIGNAL (Without CONSULT)
<p>ⓧ Without CONSULT</p> <p>1. Start engine.</p> <p>2. Check voltage between TCM terminal 29 and ground while driving. (Measure with AC range.)</p> <p>Voltage:</p> <p>At 0 km/h (0 MPH): 0V</p> <p>At 30 km/h (19 MPH): 1V or more</p> <p>(Voltage rises gradually in response to vehicle speed.)</p>	
	
SAT422J	
OK or NG	
OK ▶	GO TO 4.
NG ▶	<p>Check the following items:</p> <ul style="list-style-type: none"> • Harness for short or open between TCM, ECM and revolution sensor (Main harness) • Ground circuit for ECM <p>Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY").</p>
4	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-104.	
OK or NG	
OK ▶	INSPECTION END
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>

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

Component Inspection



Component Inspection REVOLUTION SENSOR

NCAT0040

NCAT0040S01

- For removal, refer to AT-236.
- Check resistance between terminals 1 and 2.

Terminal No.		Resistance
1	2	500 - 650Ω

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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

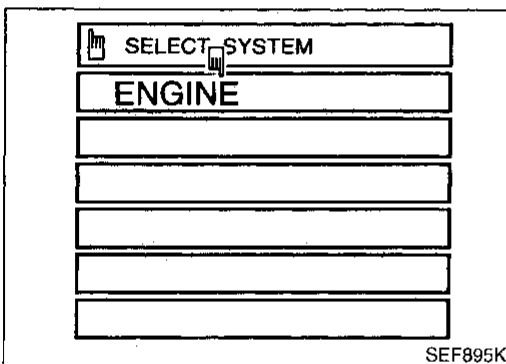
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard
39	L	Engine speed signal	 When engine runs at idle speed.	0.5 - 1.5V

ON BOARD DIAGNOSIS LOGIC

NCAT0041S02

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
(P) : ENGINE SPEED SIG (G) : P0725 (M) : MIL Code No. 1207	TCM does not receive the proper voltage signal from ECM.	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.)



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.

(P) With CONSULT

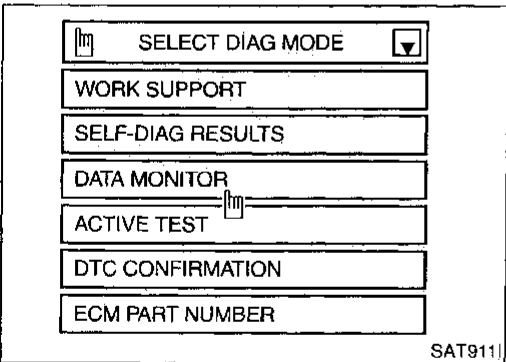
- Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT.
- Start engine and maintain the following conditions for at least 10 consecutive seconds.
VHCL SPEED SE: 10 km/h (6 MPH) or more
THRTL POS SEN: More than 1.2V
Selector lever: D position (OD "ON")

(G) With GST

- Start engine.
- Drive vehicle under the following conditions:
 Selector lever in "D" (OD "ON"), vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 10 consecutive seconds.
- Select "MODE 7" with GST.

(M) No Tools

- Start engine.
- Drive vehicle under the following conditions:
 Selector lever in "D" (OD "ON"), vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 10 consecutive seconds.



DTC P0725 ENGINE SPEED SIGNAL

Description (Cont'd)

- 3) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

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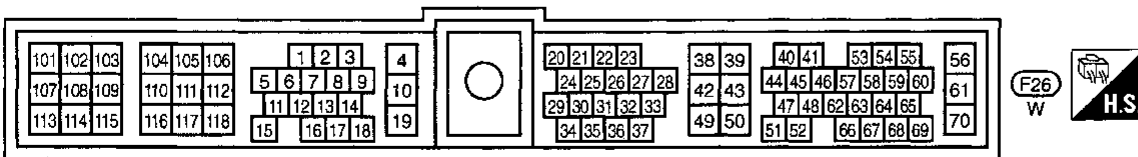
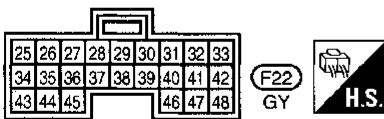
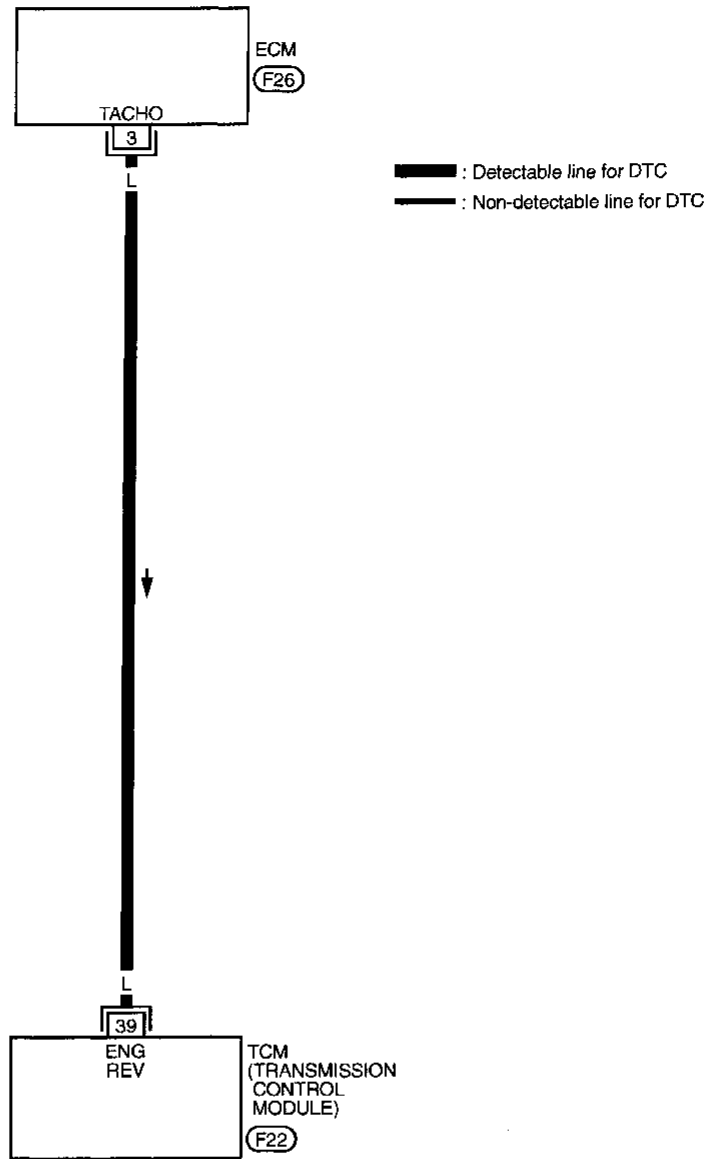
DTC P0725 ENGINE SPEED SIGNAL

Wiring Diagram — AT — ENGSS

Wiring Diagram — AT — ENGSS

NCAT0202

AT-ENGSS-01



TAT177

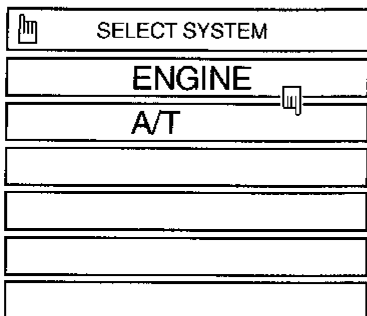
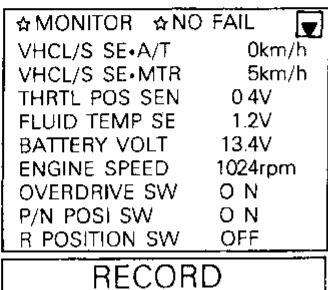
DTC P0725 ENGINE SPEED SIGNAL

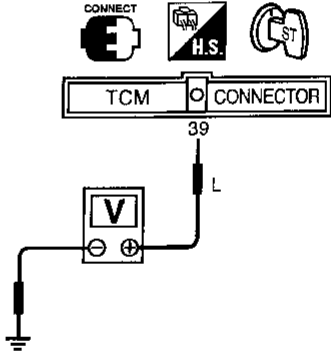
Diagnostic Procedure

Diagnostic Procedure

NCAT0042

1	CHECK DTC WITH ECM
Perform diagnostic test mode II (self-diagnostic results) for engine control. Check ignition signal circuit condition.	
OK or NG	
OK (With CONSULT) ▶	GO TO 2.
OK (Without CONSULT) ▶	GO TO 3.
NG ▶	Check ignition signal circuit for engine control. Refer to EC section ["Ignition Signal (DTC: 0201)", TROUBLE DIAGNOSIS FOR DTC P1320"].

2	CHECK INPUT SIGNAL (With CONSULT)
<p>With CONSULT</p> <p>1. Start engine.</p> <p>2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT.</p>	
 <p style="text-align: right;">SAT974H</p>	
<p>3. Read out the value of "ENGINE SPEED". Check engine speed changes according to throttle position.</p>	
 <p style="text-align: right;">SAT076H</p>	
OK or NG	
OK ▶	GO TO 4.
NG ▶	<p>Check the following items:</p> <ul style="list-style-type: none"> • Harness for short or open between TCM and ECM • Resistor and ignition coil <p>Refer to EC section ["Ignition Signal (DTC: 0201)", "TROUBLE DIAGNOSIS FOR DTC P1320"].</p>

3	CHECK INPUT SIGNAL (Without CONSULT)
<p>Without CONSULT</p> <p>1. Start engine.</p> <p>2. Check voltage between TCM terminal 39 and ground.</p> <p style="text-align: center;">Voltage (Idle speed): 0.5 - 1.5V</p>	
 <p style="text-align: right;">SAT424J</p>	
OK or NG	
OK ▶	GO TO 4.
NG ▶	<p>Check the following items:</p> <ul style="list-style-type: none"> • Harness for short or open between TCM and ECM • Resistor and ignition coil <p>Refer to EC section ["Ignition Signal (DTC: 0201)", "TROUBLE DIAGNOSIS FOR DTC P1320"].</p>

4	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-108.	
OK or NG	
OK ▶	INSPECTION END
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>

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DTC P0731 A/T 1ST GEAR FUNCTION

Description

Description

NCA10043

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

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

TCM TERMINALS AND REFERENCE VALUE

NCA10043S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard
11	LW	Shift solenoid valve A	When shift solenoid valve A operates. (When driving in "D ₁ " or "D ₄ ".)	Battery voltage
			When shift solenoid valve A does not operate. (When driving in "D ₂ " or "D ₃ ".)	1V or less
12	LY	Shift solenoid valve B	When shift solenoid valve B operates. (When driving in "D ₁ " or "D ₂ ".)	Battery voltage
			When shift solenoid valve B does not operate. (When driving in "D ₃ " or "D ₄ ".)	1V or less



ON BOARD DIAGNOSTIC LOGIC

NCA10043S02

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	A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	<ul style="list-style-type: none"> ● Shift solenoid valve A ● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
: P0731		
: MIL Code No. 1103		

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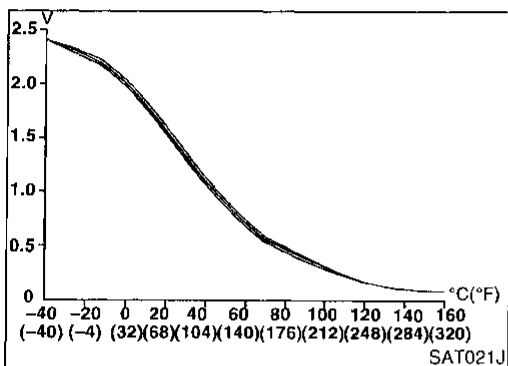
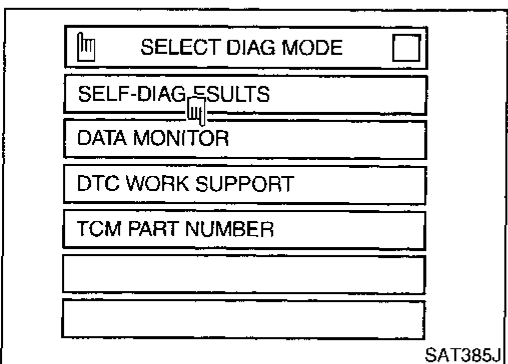
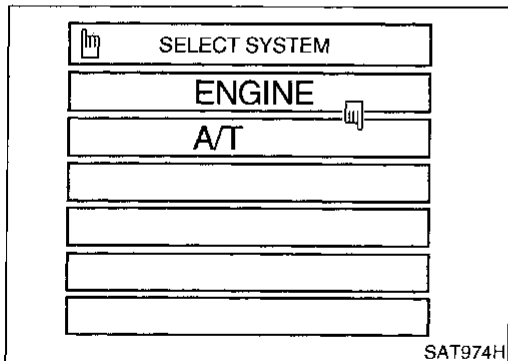
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DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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

- 1) Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT.
- 2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
FLUID TEMP SEN: 0.4 - 1.5V
If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
- 3) Select "1ST GR FNCTN P0731" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT 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 1/8 (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 7/8 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 screen, go to "DIAGNOSTIC PROCEDURE", AT-116.
If "STOP VEHICLE" appears on CONSULT screen, go to the following step.
- Check that "GEAR" shows "1" when depressing accelerator pedal to WOT.
- If "TESTING" does not appear on CONSULT for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case

DTC P0731 A/T 1ST GEAR FUNCTION

Description (Cont'd)

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

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

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

- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
Refer to "DIAGNOSTIC PROCEDURE", AT-116.
Refer to shift schedule, AT-343.

With GST

- 1) Start engine and warm up ATF.
- 2) 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 1/8
Selector lever: D position (OD "ON")
Refer to shift schedule, AT-343.
- 3) Depress accelerator pedal to WOT (more than 7/8 of "THROTTLE POSI") quickly from a speed of 20 to 25 km/h (12 to 16 MPH). (It will take approximately 3 seconds.)
- 4) Select "MODE 7" with GST.

No Tools

- 1) Start engine and warm up ATF.
- 2) 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 1/8
Selector lever: D position (OD "ON")
Refer to shift schedule, AT-343.
- 3) Depress accelerator pedal to WOT (more than 7/8 of "THROTTLE POSI") quickly from a speed of 20 to 25 km/h (12 to 16 MPH). (It will take approximately 3 seconds.)
- 4) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

DTC P0731 A/T 1ST GEAR FUNCTION

Wiring Diagram — AT — 1ST

Wiring Diagram — AT — 1ST

NCAT0203

AT-1STSIG-01 GI

MA

EM

LC

EC

FE

CL

MT

AT

AX

SU

BR

ST

RS

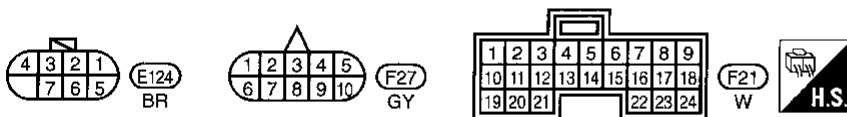
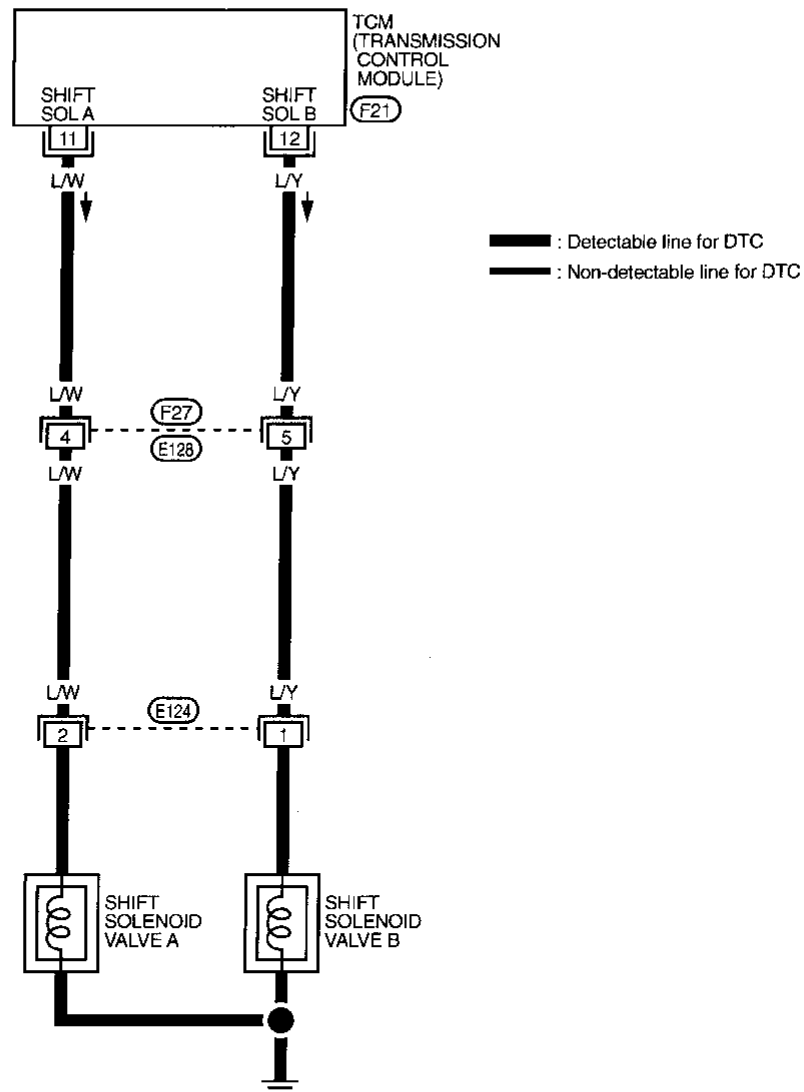
BT

HA

SC

EL

IDX



TAT178

DTC P0731 A/T 1ST GEAR FUNCTION

Diagnostic Procedure

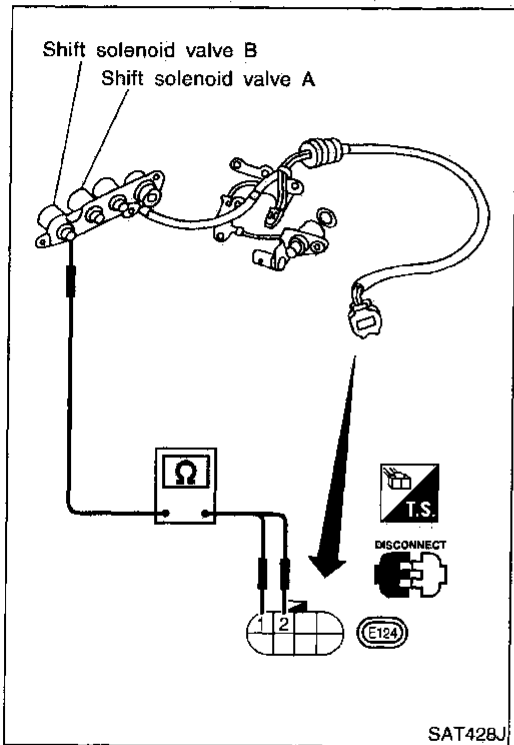
Diagnostic Procedure

NCAT0044

1	CHECK SHIFT SOLENOID VALVE
<p>1. Remove control valve assembly. Refer to AT-234. 2. Check shift solenoid valve operation.</p> <ul style="list-style-type: none"> ● Shift solenoid valve A ● Shift solenoid valve B <p>Refer to "Component Inspection", AT-117.</p>	
SAT426J	
OK or NG	
OK	▶ GO TO 2.
NG	▶ Repair or replace shift solenoid valve assembly.

2	CHECK CONTROL VALVE
<p>1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-266. 2. Check to ensure that:</p> <ul style="list-style-type: none"> ● Valve, sleeve and plug slide along valve bore under their own weight. ● Valve, sleeve and plug are free from burrs, dents and scratches. ● Control valve springs are free from damage, deformation and fatigue. ● Hydraulic line is free from obstacles. 	
SAT367H	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair control valve assembly.

3	CHECK DTC
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-113.</p>	
OK or NG	
OK	▶ INSPECTION END
NG	▶ Check control valve again. Repair or replace control valve assembly.



Component Inspection SHIFT SOLENOID VALVE A AND B

NCAT0045

NCAT0045S01

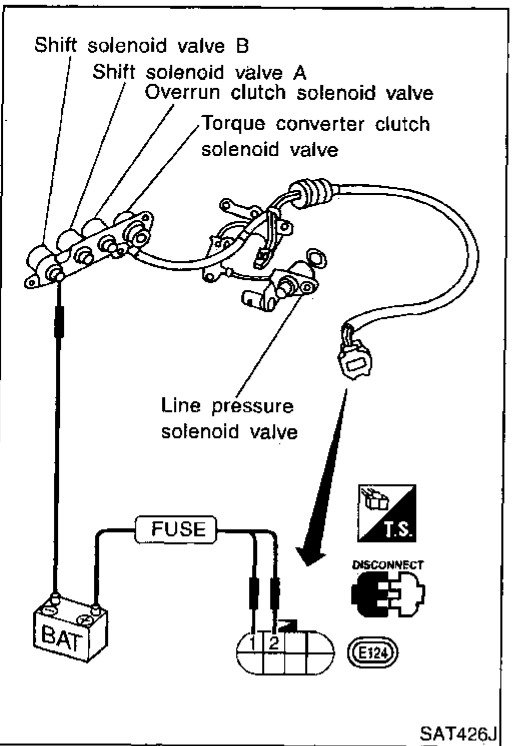
- For removal, refer to AT-234.

Resistance Check

NCAT0045S0101

- Check resistance between two terminals.

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



Operation Check

NCAT0045S0102

- 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 P0732 A/T 2ND GEAR FUNCTION

Description

Description

NCAT0046


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

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

TCM TERMINALS AND REFERENCE VALUE

NCAT0046S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard	
12	LY	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D ₁ " or "D ₂ ".)	Battery voltage
			When shift solenoid valve B does not operate. (When driving in "D ₃ " or "D ₄ ".)	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

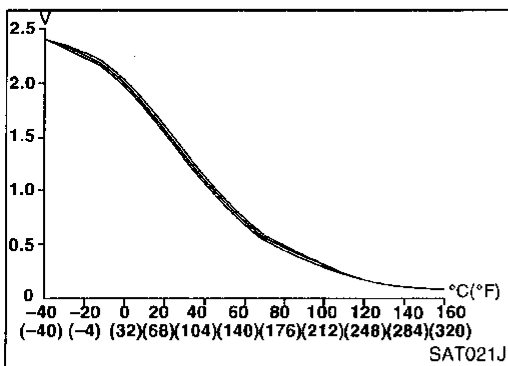
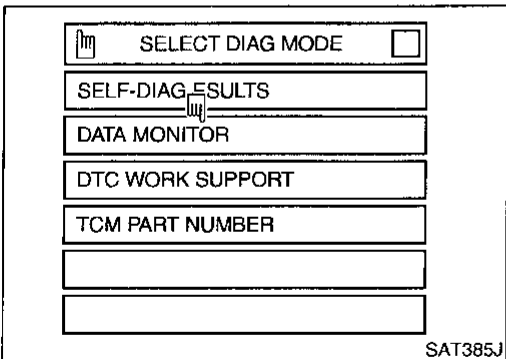
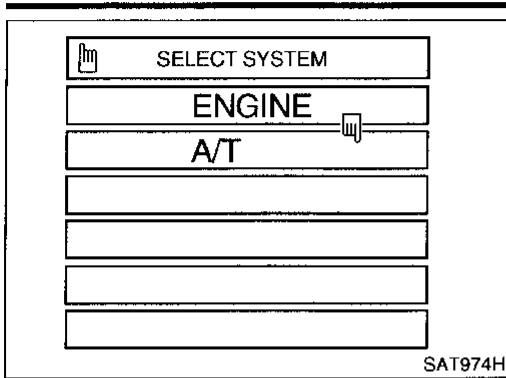
C: Gear ratio determined as gear position which TCM supposes
 If the actual gear position is higher than the position (2nd) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.

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 (P0732) : P0732 (MIL) : MIL Code No. 1104	A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	<ul style="list-style-type: none"> ● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit



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.

① With CONSULT

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

2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.

FLUID TEMP SEN: 0.4 - 1.5V

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

3) Select "2ND GR FNCTN P0732" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT 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 1/8 (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 7/8 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 screen, go to "DIAGNOSTIC PROCEDURE", AT-122.

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

- Check that "GEAR" shows "2" when depressing accelerator pedal to WOT.

- If "TESTING" does not appear on CONSULT for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0732 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".

6) Stop vehicle.

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

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

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

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-122.
Refer to shift schedule, AT-343.

With GST

- 1) Start engine and warm up ATF.
- 2) 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 1/8
Selector lever: D position (OD "ON")
Refer to shift schedule, AT-343.
- 3) Depress accelerator pedal to WOT (more than 7/8 of "THROTTLE POSI") quickly from a speed of 53 to 68 km/h (33 to 42 MPH). (It will take approximately 3 seconds.)
- 4) Select "MODE 7" with GST.

No Tools

- 1) Start engine and warm up ATF.
- 2) 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 1/8
Selector lever: D position (OD "ON")
Refer to shift schedule, AT-343.
- 3) Depress accelerator pedal to WOT (more than 7/8 of "THROTTLE POSI") quickly from a speed of 53 to 68 km/h (33 to 42 MPH). (It will take approximately 3 seconds.)
- 4) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

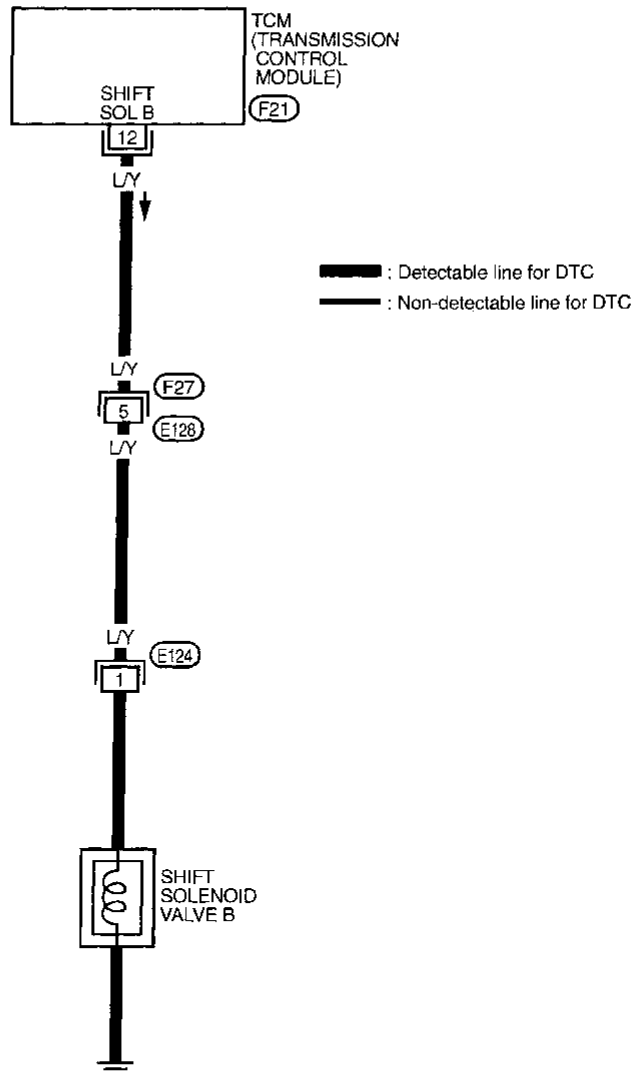
DTC P0732 A/T 2ND GEAR FUNCTION

Wiring Diagram — AT — 2ND

Wiring Diagram — AT — 2ND

NCA0204

AT-2NDSIG-01 GI



MA

EM

LC

EC

FE

CL

MT

AT

AX

SU

BR

ST

RS

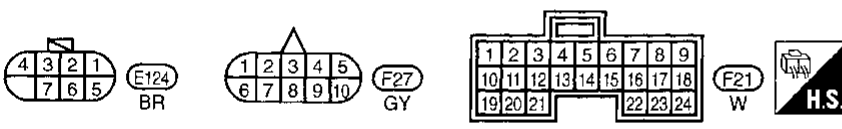
BT

HA

SC

EL

IDX



TAT179

DTC P0732 A/T 2ND GEAR FUNCTION

Diagnostic Procedure

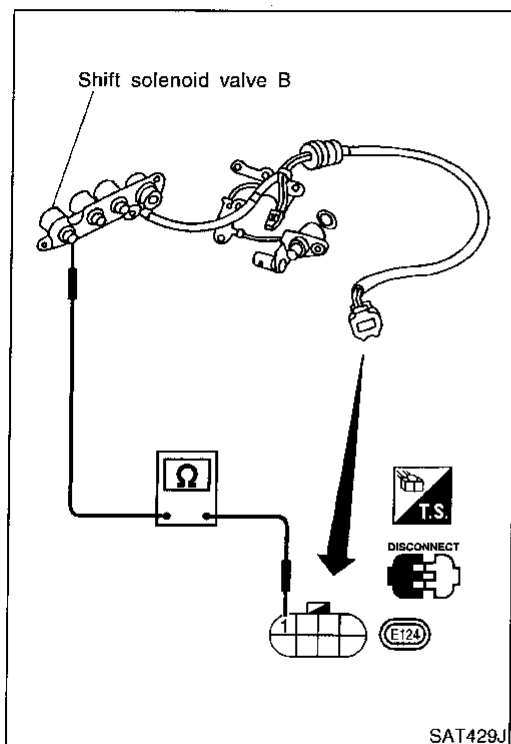
Diagnostic Procedure

NCAT0047

1 CHECK SHIFT SOLENOID VALVE	
1. Remove control valve assembly. Refer to AT-234. 2. Check shift solenoid valve operation. ● Shift solenoid valve B Refer to "Component Inspection", AT-123.	
SAT427J	
OK or NG	
OK	▶ GO TO 2.
NG	▶ Repair or replace shift solenoid valve assembly.

2 CHECK CONTROL VALVE	
1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-266. 2. Check to ensure that: <ul style="list-style-type: none"> ● Valve, sleeve and plug slide along valve bore under their own weight. ● Valve, sleeve and plug are free from burrs, dents and scratches. ● Control valve springs are free from damage, deformation and fatigue. ● Hydraulic line is free from obstacles. 	
SAT367H	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair control valve assembly.

3 CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-119.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ Check control valve again. Repair or replace control valve assembly.



Component Inspection SHIFT SOLENOID VALVE B

NCAT0048

NCAT0048S01

GI

- For removal, refer to AT-234.

Resistance Check

NCAT0048S0101

MA

- Check resistance between two terminals.

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

EM

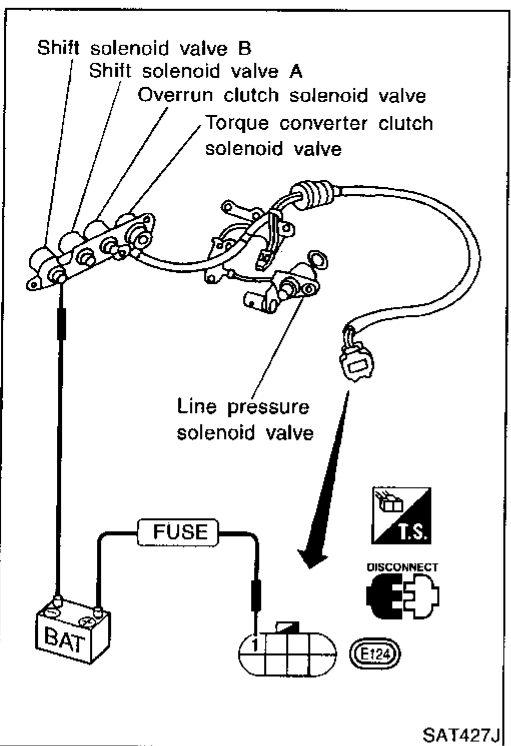
LC

EC

FE

CL

MT



Operation Check

NCAT0048S0102

AT

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

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

DTC P0733 A/T 3RD GEAR FUNCTION

Description

Description

NCAT0049


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

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

TCM TERMINALS AND REFERENCE VALUE

NCAT0049S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard	
11	LW	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in "D ₁ " or "D ₄ ".)	Battery voltage
			When shift solenoid valve A does not operate. (When driving in "D ₂ " or "D ₃ ".)	1V or less	

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.

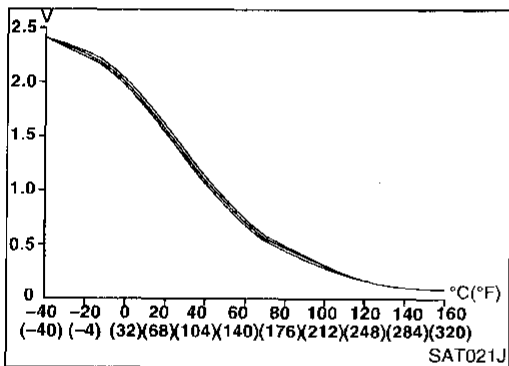
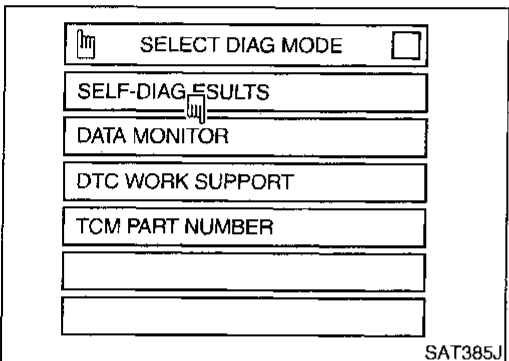
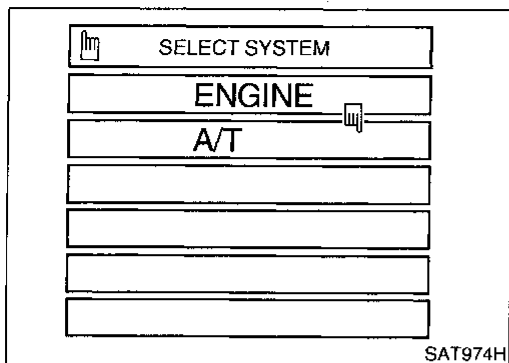
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve A stuck closed	1	1	4*	4

*: P0733 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"> P : A/T 3RD GR FNCTN </div> <div style="display: flex; align-items: center;"> P0733 </div> <div style="display: flex; align-items: center;"> MIL : MIL Code No. 1105 </div> </div>	A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	<ul style="list-style-type: none"> • Shift solenoid valve A • Each clutch • Hydraulic control circuit

DTC P0733 A/T 3RD GEAR FUNCTION

Description (Cont'd)



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.

Ⓟ With CONSULT

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

FLUID TEMP SEN: 0.4 - 1.5V

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

- Select "3RD GR FNCTN P0733" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT and touch "START".
- 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 1/8 (at all times during step 4)
Selector lever: D position (OD "ON")

- Check that "GEAR" shows "4" after releasing pedal.
- Depress accelerator pedal steadily with 3.5/8 - 4.5/8 of "THROTTLE POSI" from a speed of 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 screen, go to "DIAGNOSTIC PROCEDURE", AT-128.

If "STOP VEHICLE" appears on CONSULT 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 for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0733 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".

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

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

- Make sure that "OK" is displayed. (If "NG" is displayed, refer

DTC P0733 A/T 3RD GEAR FUNCTION

Description (Cont'd)

to "DIAGNOSTIC PROCEDURE".)
Refer to "DIAGNOSTIC PROCEDURE", AT-128.
Refer to shift schedule, AT-343.

With GST

- 1) Start engine and warm up ATF.
- 2) 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 1/8

Selector lever: D position (OD "ON")

Refer to shift schedule, AT-343.

- 3) Depress accelerator pedal with 3.5/8 - 4.5/8 of "THROTTLE POSI" from a speed of 80 to 95 km/h (50 to 59 MPH). (It will take approximately 3 seconds.)
- 4) Select "MODE 7" with GST.

No Tools

- 1) Start engine and warm up ATF.
- 2) 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 1/8

Selector lever: D position (OD "ON")

Refer to shift schedule, AT-343.

- 3) Depress accelerator pedal with 3.5/8 - 4.5/8 of "THROTTLE POSI" from a speed of 80 to 95 km/h (50 to 59 MPH). (It will take approximately 3 seconds.)
- 4) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

DTC P0733 A/T 3RD GEAR FUNCTION

Wiring Diagram — AT — 3RD

Wiring Diagram — AT — 3RD

NCA70205

AT-3RDSIG-01

GI

MA

EM

LC

EC

FE

CL

MT

AT

AX

SU

BR

ST

RS

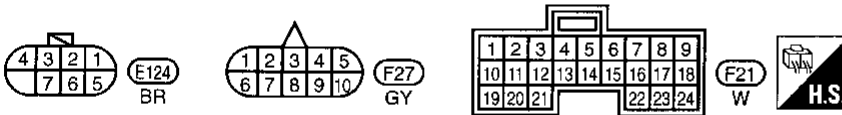
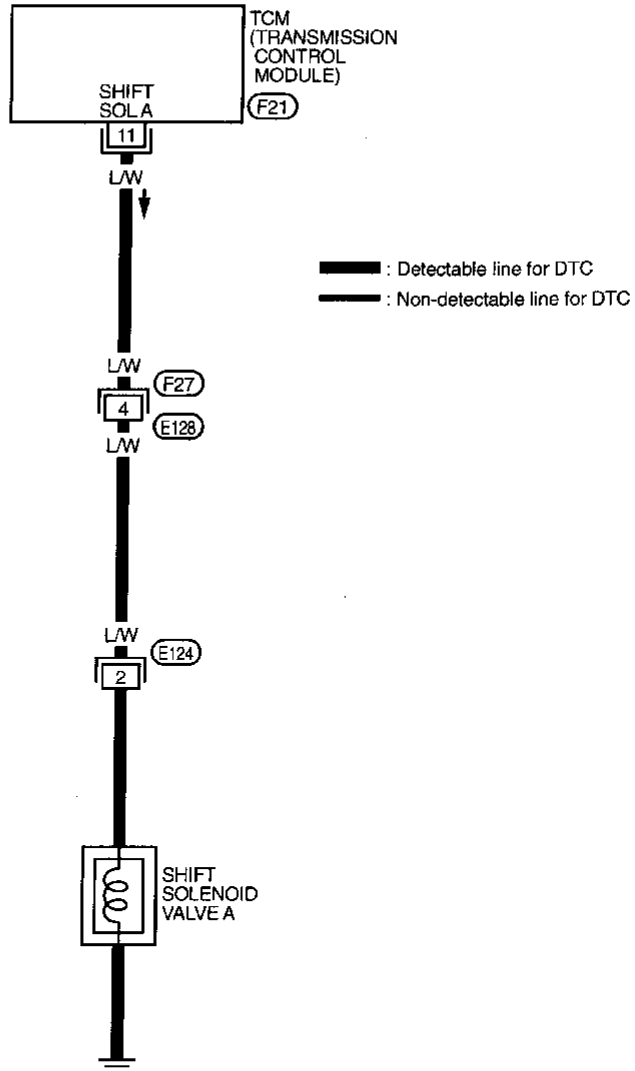
BT

HA

SC

EL

IDX



TAT180

DTC P0733 A/T 3RD GEAR FUNCTION

Diagnostic Procedure

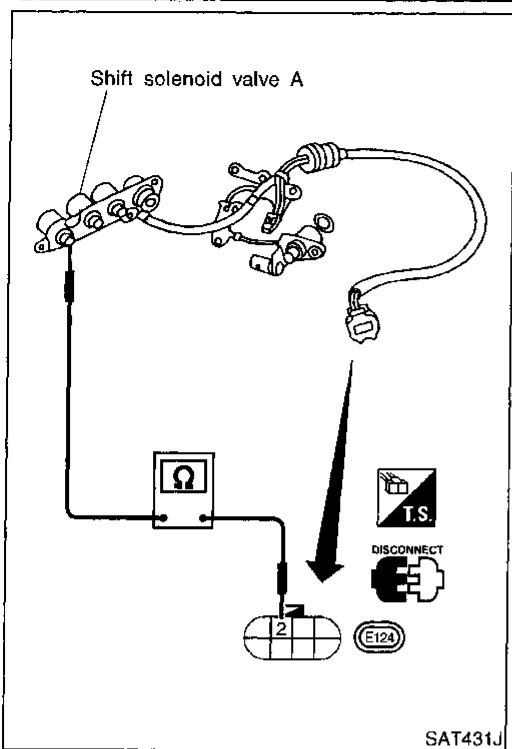
Diagnostic Procedure

NCAT005D

1	CHECK SHIFT SOLENOID VALVE
<p>1. Remove control valve assembly. Refer to AT-234. 2. Check shift solenoid valve operation.</p> <ul style="list-style-type: none"> Shift solenoid valve A Refer to "Component Inspection" below. 	
SAT430J	
OK or NG	
OK	▶ GO TO 2.
NG	▶ Repair or replace shift solenoid valve assembly.

2	CHECK CONTROL VALVE
<p>1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-266. 2. Check to ensure that:</p> <ul style="list-style-type: none"> Valve, sleeve and plug slide along valve bore under their own weight. Valve, sleeve and plug are free from burrs, dents and scratches. Control valve springs are free from damage, deformation and fatigue. Hydraulic line is free from obstacles. 	
SAT367H	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair control valve assembly.

3	CHECK DTC
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-125.</p>	
OK or NG	
OK	▶ INSPECTION END
NG	▶ Check control valve again. Repair or replace control valve assembly.



Component Inspection SHIFT SOLENOID VALVE A

NCAT0051

NCAT0051S01

GI

- For removal, refer to AT-234.

Resistance Check

NCAT0051S0101

MA

- Check resistance between two terminals.

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

EM

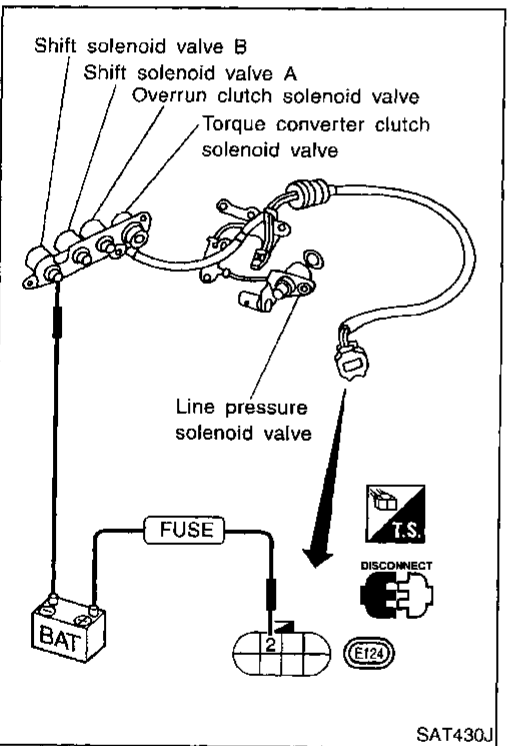
LC

EC

FE

CL

MT



Operation Check

NCAT0051S0102

AT

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

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

DTC P0734 A/T 4TH GEAR FUNCTION

Description

Description

NCAT0052

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

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

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

NCAT0052S01

Remarks: Specification data are reference values.

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

TCM TERMINALS AND REFERENCE VALUE

NCAT0052S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard
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.	0.5V or less
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.	0.5V or less



DTC P0734 A/T 4TH GEAR FUNCTION

Description (Cont'd)

Terminal No.	Wire color	Item	Condition	Judgement standard
3	GY/R	Torque converter clutch solenoid valve	When A/T performs lock-up.	8 - 15V
			When A/T does not perform lock-up.	1V or less
11	LW	Shift solenoid valve A	When shift solenoid valve A operates. (When driving in "D ₁ " or "D ₄ ".)	Battery voltage
			When shift solenoid valve A does not operate. (When driving in "D ₂ " or "D ₃ ".)	1V or less
12	LY	Shift solenoid valve B	When shift solenoid valve B operates. (When driving in "D ₁ " or "D ₂ ".)	Battery voltage
			When shift solenoid valve B does not operate. (When driving in "D ₃ " or "D ₄ ".)	1V or less
20	L/B	Overrun clutch solenoid valve	When overrun clutch solenoid valve operates.	Battery voltage
			When overrun clutch solenoid valve does not operate.	1V or less



ON BOARD DIAGNOSTIC LOGIC

NCAT0052S03

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

Torque converter slip ratio = A x C/B

A: Output shaft revolution signal from revolution sensor

B: Engine speed signal from ECM

C: Gear ratio determined as gear position which TCM supposes

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

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

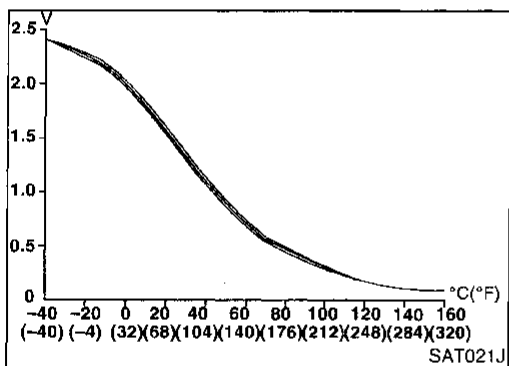
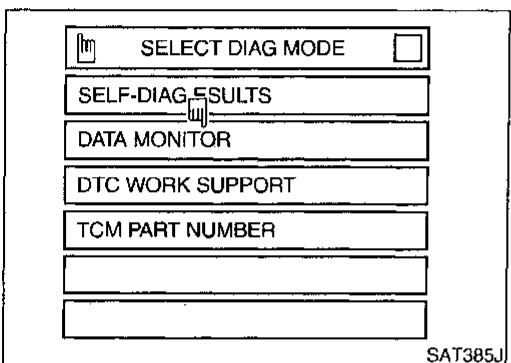
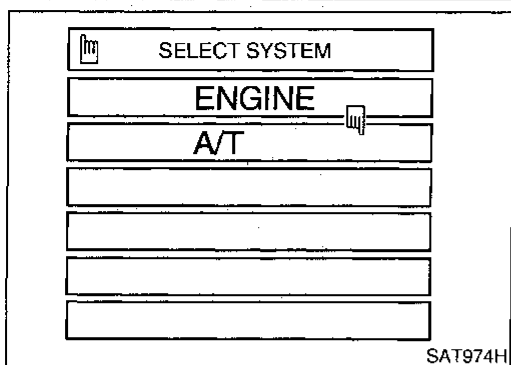
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve B stuck closed	1	2	2	1*

*: P0734 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
<div style="border: 1px solid black; border-radius: 50%; padding: 2px; display: inline-block;">H</div> : 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"> ● Shift solenoid valve A ● Shift solenoid valve B ● Overrun clutch solenoid valve ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit ● Torque converter clutch solenoid valve
<div style="border: 1px solid black; border-radius: 50%; padding: 2px; display: inline-block;">P0734</div> : P0734		
<div style="border: 1px solid black; border-radius: 50%; padding: 2px; display: inline-block;">MIL</div> : MIL Code No. 1106		

DTC P0734 A/T 4TH GEAR FUNCTION

Description (Cont'd)



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.

① With CONSULT

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

FLUID TEMP SEN: 0.4 - 1.5V

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

- 3) Select "4TH GR FNCTN P0734" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT 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 1/8 - 2/8 of "THROTTLE POSI" from a speed of 50 to 60 km/h (31 to 37 MPH) until "TESTING" has turned to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
If the check result NG appears on CONSULT screen, go to "DIAGNOSTIC PROCEDURE", AT-135.
If "STOP VEHICLE" appears on CONSULT screen, go to following step.
 - Check that "GEAR" shows "4" when depressing accelerator pedal with 1/8 - 2/8 of "THROTTLE POSI".
 - If "TESTING" does not appear on CONSULT for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0734 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".
 - 6) Stop vehicle.
 - 7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

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	GI
Malfunction for P0734 exists.	1 → 2 → 2 → 1	MA

- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
 Refer to "DIAGNOSTIC PROCEDURE", AT-135.
 Refer to shift schedule, AT-343.

EM

 **With GST**

LC

- 1) Start engine and warm up ATF.
- 2) Accelerate vehicle to 50 to 60 km/h (31 to 37 MPH) under the following condition and release the accelerator pedal completely.

EC

THROTTLE POSI: Less than 5.5/8

Selector lever: D position (OD "ON")

Refer to shift schedule, AT-343.

FE

- 3) Depress accelerator pedal with 1/8 - 2/8 of "THROTTLE POSI" from a speed of 50 to 60 km/h (31 to 37 MPH). (It will take approximately 3 seconds.)

CL

- 4) Select "MODE 7" with GST.

MT

 **No Tools**

- 1) Start engine and warm up ATF.
- 2) Accelerate vehicle to 50 to 60 km/h (31 to 37 MPH) under the following condition and release the accelerator pedal completely.

AT

THROTTLE POSI: Less than 5.5/8

Selector lever: D position (OD "ON")

Refer to shift schedule, AT-343.

AX

- 3) Depress accelerator pedal with 1/8 - 2/8 of "THROTTLE POSI" from a speed of 50 to 60 km/h (31 to 37 MPH). (It will take approximately 3 seconds.)

SU

- 4) Perform self-diagnosis for ECM.

BR

Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

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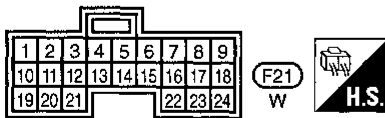
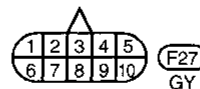
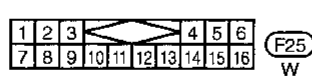
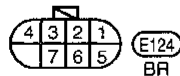
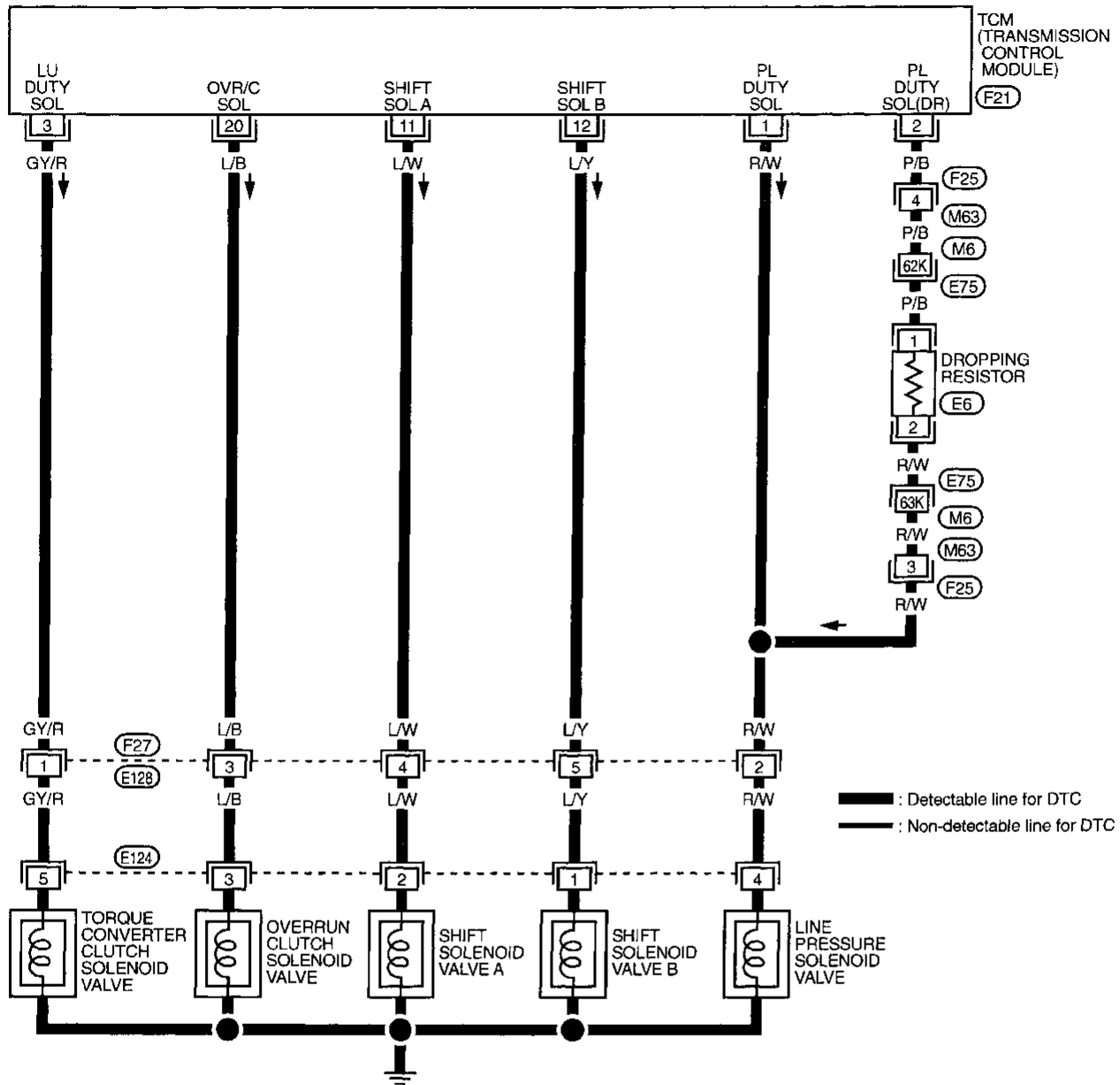
DTC P0734 A/T 4TH GEAR FUNCTION

Wiring Diagram — AT — 4TH

Wiring Diagram — AT — 4TH

NCAT0206

AT-4THSIG-01



Refer to last page (Foldout page).

(M6) (E75)

Diagnostic Procedure

1	CHECK SHIFT UP (D₃ TO D₄)
During "Cruise test - Part 1" (AT-70), does A/T shift from D ₃ to D ₄ at the specified speed?	
SAT988H	
Yes or No	
Yes	▶ GO TO 11. And check for proper lock-up.
No	▶ GO TO 2.

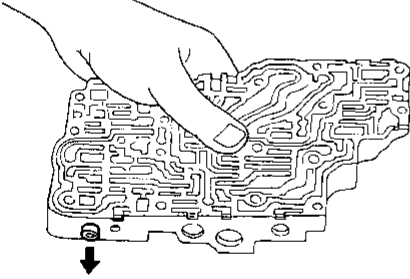
2	CHECK LINE PRESSURE
Perform line pressure test. Refer to AT-62.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ GO TO 7.

3	CHECK SOLENOID VALVES
<ol style="list-style-type: none"> Remove control valve assembly. Refer to AT-234. Refer to "Component Inspection", AT-138. 	
SAT404J	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Replace solenoid valve assembly.

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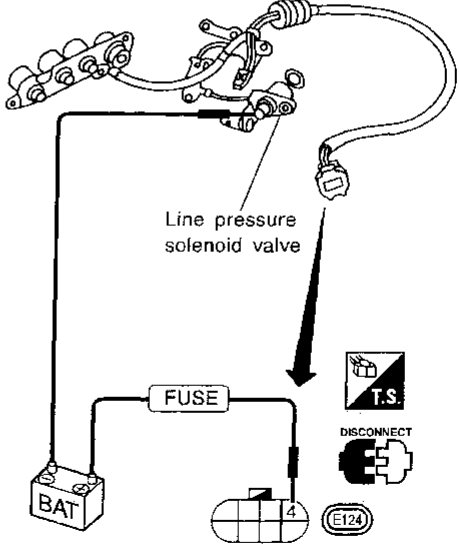
DTC P0734 A/T 4TH GEAR FUNCTION

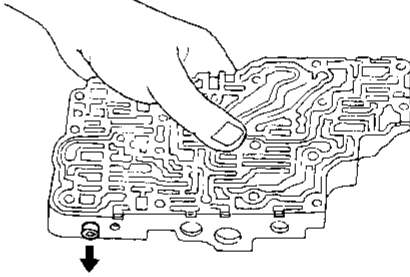
Diagnostic Procedure (Cont'd)

4	CHECK CONTROL VALVE
<ol style="list-style-type: none"> Disassemble control valve assembly. Refer to AT-266. Check to ensure that: <ul style="list-style-type: none"> Valve, sleeve and plug slide along valve bore under their own weight. Valve, sleeve and plug are free from burrs, dents and scratches. Control valve springs are free from damage, deformation and fatigue. Hydraulic line is free from obstacles. 	
	
SAT367H	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair control valve.

5	CHECK SHIFT UP (D₃ TO D₄)
Does A/T shift from D ₃ to D ₄ at the specified speed?	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Check control valve again. Repair or replace control valve assembly.

6	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-132.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ GO TO 11. And check for proper lock-up.

7	CHECK LINE PRESSURE SOLENOID VALVE
<ol style="list-style-type: none"> Remove control valve assembly. Refer to AT-234. Refer to "Component Inspection", AT-138. 	
	
SAT432J	
OK or NG	
OK	▶ GO TO 8.
NG	▶ Replace solenoid valve assembly.

8	CHECK CONTROL VALVE
<ol style="list-style-type: none"> Disassemble control valve assembly. Refer to AT-266. Check line pressure circuit valves for sticking. <ul style="list-style-type: none"> Pressure regulator valve Pilot valve Pressure modifier valve 	
	
SAT367H	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Repair control valve.

DTC P0734 A/T 4TH GEAR FUNCTION

Diagnostic Procedure (Cont'd)

9	CHECK SHIFT UP (D₃ TO D₄)
Does A/T shift from D ₃ to D ₄ at the specified speed?	
Yes or No	
Yes	▶ GO TO 10.
No	▶ Check control valve again. Repair or replace control valve assembly.

10	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-132.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ GO TO 11. And check for proper lock-up.

11	CHECK LOCK-UP CONDITION
During "Cruise test – Part 1" (AT-70), does A/T perform lock-up at the specified speed?	
Yes or No	
Yes	▶ Perform "Cruise test – Part 1" again and return to the start point of this flow chart.
No	▶ GO TO 12.

12	CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE
<ol style="list-style-type: none"> Remove control valve assembly. Refer to AT-234. Refer to "Component Inspection", AT-138. 	
OK or NG	
OK	▶ GO TO 13.
NG	▶ Replace solenoid valve assembly.

13	CHECK CONTROL VALVE
<ol style="list-style-type: none"> Disassemble control valve assembly. Refer to AT-266. Check control valves for sticking. <ul style="list-style-type: none"> Torque converter clutch control valve Torque converter clutch relief valve 	
OK or NG	
OK	▶ GO TO 14.
NG	▶ Repair control valve

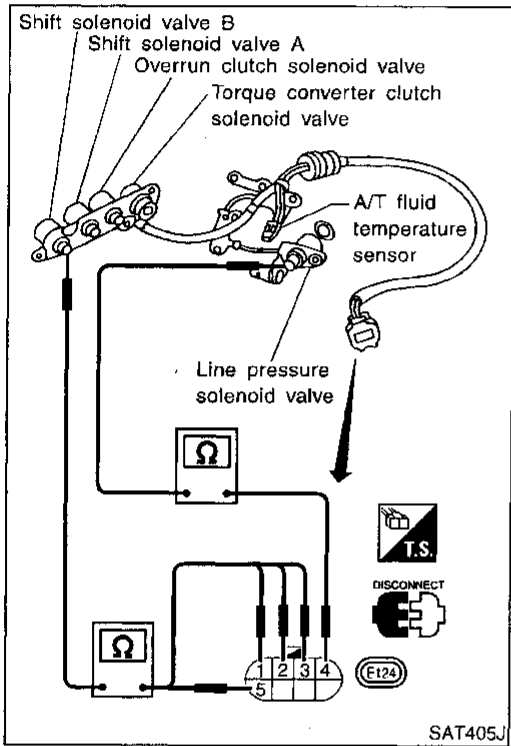
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DTC P0734 A/T 4TH GEAR FUNCTION

Diagnostic Procedure (Cont'd)

14	CHECK LOCK-UP
Does A/T perform lock-up at the specified speed?	
Yes or No	
Yes	▶ GO TO 15.
No	▶ Check control valve again. Repair or replace control valve assembly.

15	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-132.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ Perform "Cruise test — Part 1" again and return to the start point of this flow chart.



Component Inspection

SOLENOID VALVES

NCAT0054

NCAT0054S01

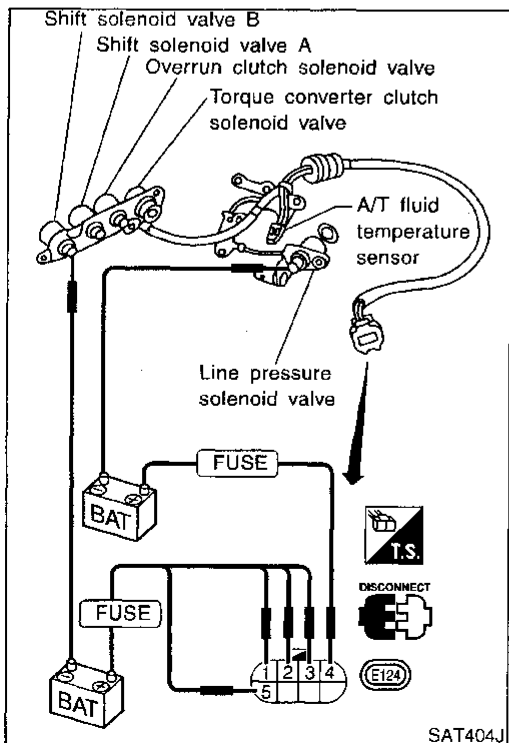
- For removal, refer to AT-234.

Resistance Check

NCAT0054S0101

- Check resistance between two terminals.

Solenoid valve	Terminal No.	Resistance (Approx.)
Shift solenoid valve A	2	20 - 40Ω
Shift solenoid valve B	1	
Overrun clutch solenoid valve	3	2.5 - 5Ω
Line pressure solenoid valve	4	
Torque converter clutch solenoid valve	5	10 - 20Ω



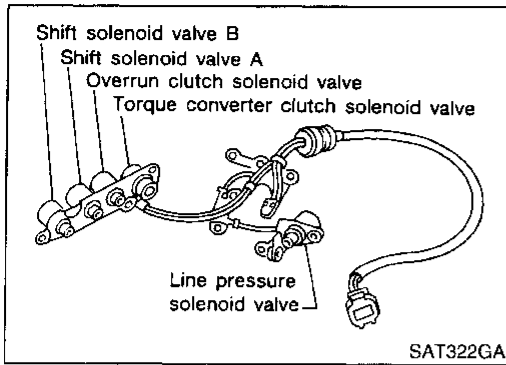
Operation Check

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

NCA70055

The torque converter clutch solenoid valve is activated, with the gear in "D₄", by the TCM in response to signals sent from the vehicle speed and throttle position sensors. Lock-up piston operation will then be controlled.

Lock-up operation, however, is prohibited when A/T fluid temperature is too low.

When the accelerator pedal is depressed (less than 2/8) in lock-up condition, the engine speed should not change abruptly. If there is a big jump in engine speed, there is no lock-up.

CONSULT REFERENCE VALUE IN DATA MONITOR MODE

NCA70055S01


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

NCA70055S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard
3	GY/R	Torque converter clutch solenoid valve	 When A/T performs lock-up.	8 - 15V
			When A/T does not perform lock-up.	1V or less

ON BOARD DIAGNOSIS LOGIC

NCA70055S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
P ₁ : TCC SOLENOID/CIRC GST : P0740 MS : MIL Code No. 1204	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> • Harness or connectors (The solenoid circuit is open or shorted.) • T/C clutch solenoid valve

DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Description (Cont'd)

SELECT SYSTEM

ENGINE

SEF895K

SELECT DIAG MODE

WORK SUPPORT

SELF-DIAG RESULTS

DATA MONITOR

ACTIVE TEST

DTC CONFIRMATION

ECM PART NUMBER

SAT911I

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.

④ With CONSULT

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode for "ENGINE" with CONSULT and wait at least 1 second.

Ⓞ With GST

- 1) Turn ignition switch "ON".
- 2) Select "MODE 7" with GST.

Ⓞ No Tools

- 1) Turn ignition switch "ON".
- 2) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

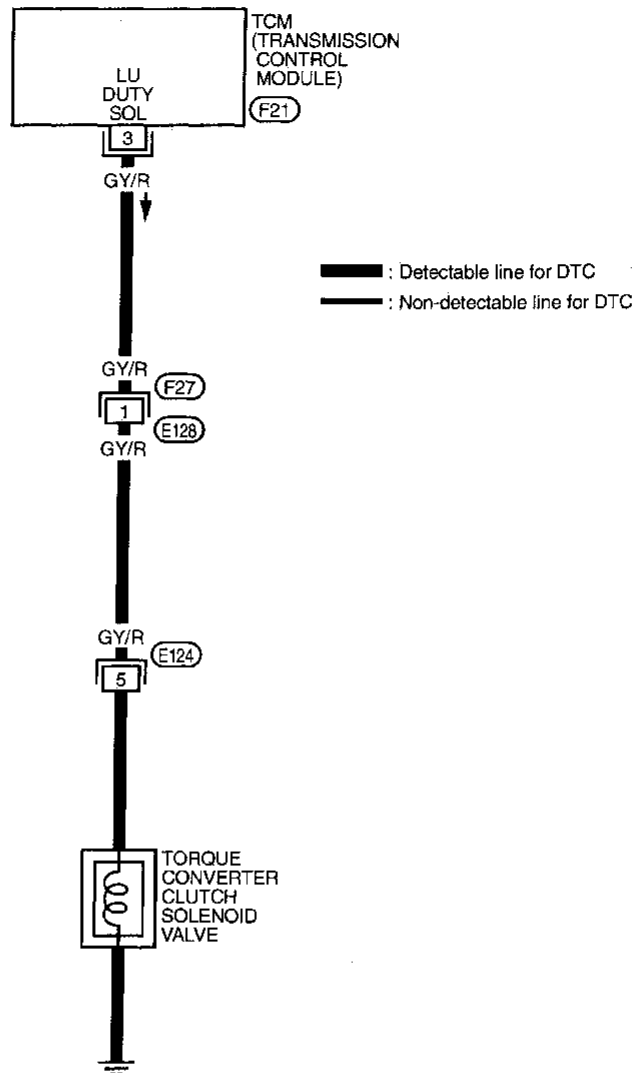
DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Wiring Diagram — AT — TCV

Wiring Diagram — AT — TCV

NCAT0207

AT-TCV-01 GI



MA

EM

LC

EC

FE

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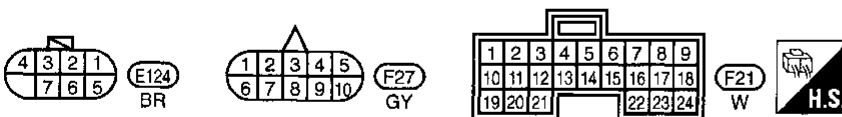
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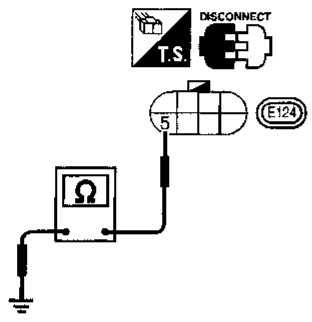
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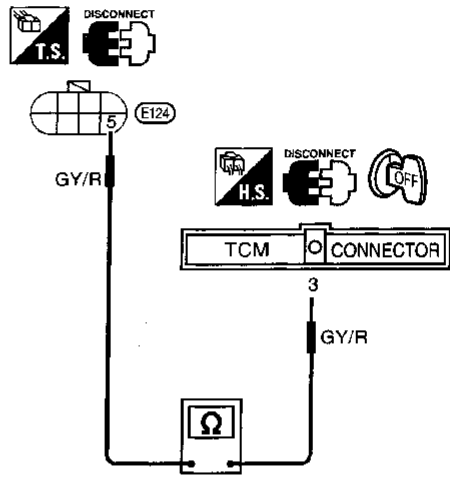
DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Diagnostic Procedure

Diagnostic Procedure

NCAT0056

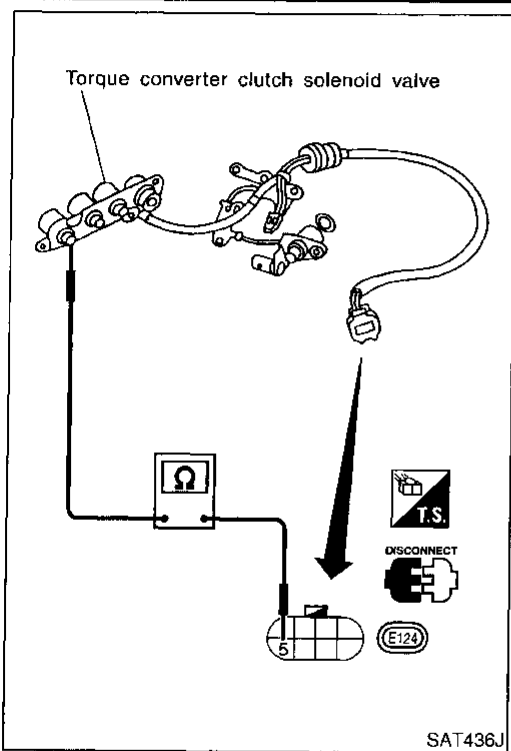
1 CHECK GROUND CIRCUIT	
1. Turn ignition switch to "OFF" position. 2. Disconnect terminal cord assembly connector in engine compartment. 3. Check resistance between terminal 5 and ground. Resistance: 10 - 20Ω	
	
SAT434J	
OK or NG	
OK	▶ GO TO 2.
NG	▶ <ol style="list-style-type: none"> 1. Remove oil pan. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> • Torque converter clutch solenoid valve Refer to "Component Inspection", AT-143. <ul style="list-style-type: none"> • Harness of terminal cord assembly for short or open

2 CHECK POWER SOURCE CIRCUIT	
1. Turn ignition switch to "OFF" position. 2. Disconnect TCM harness connector. 3. Check continuity between terminal 5 and TCM harness connector terminal 3. Continuity should exist.	
	
SAT435J	
If OK, check harness for short to ground and short to power. 4. Reinstall any part removed.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

3 CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-140.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ <ol style="list-style-type: none"> 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Component Inspection



Component Inspection

TORQUE CONVERTER CLUTCH SOLENOID VALVE

NCAT0057

NCAT0057S01

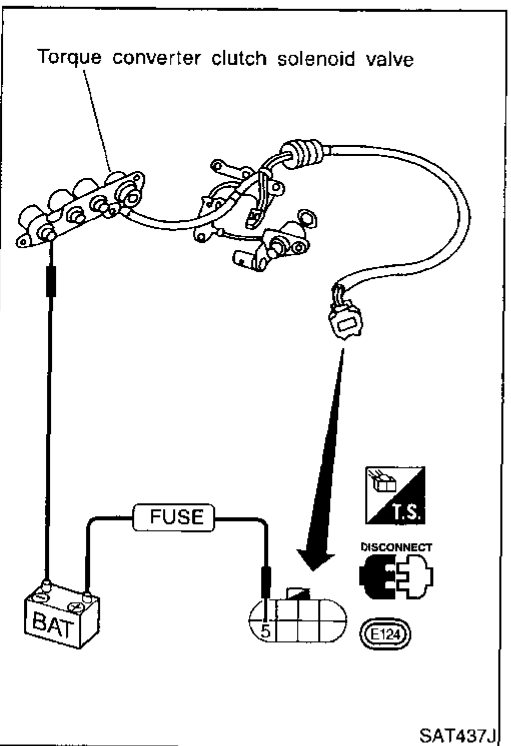
- For removal, refer to AT-234.

Resistance Check

NCAT0057S0101

- Check resistance between two terminals.

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



Operation Check

NCAT0057S0102

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

GI

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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.
- 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.

NCAT0058

CONSULT 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	
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.	0.5V or less
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.	0.5V or less
3	GY/R	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	1V or less
11	L/W	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in "D ₁ " or "D ₄ ".)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in "D ₂ " or "D ₃ ".)	1V or less
12	L/Y	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D ₁ " or "D ₂ ".)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in "D ₃ " or "D ₄ ".)	1V or less
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	1V or less

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

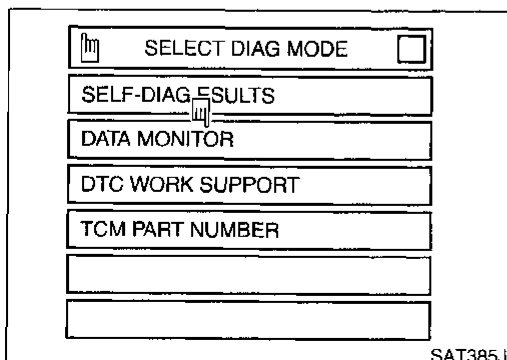
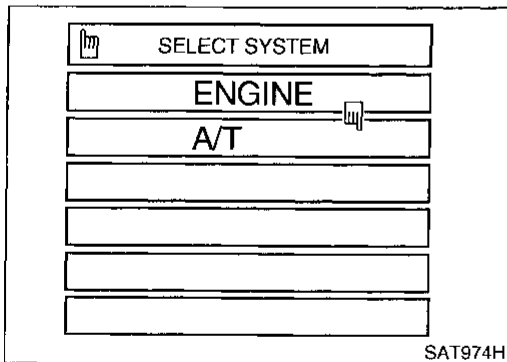
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is much lower than the position (4th) supposed by TCM, the slip ratio will be much less than normal. In case the ratio does not reach the specified value, TCM judges this diagnosis malfunction.

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"> • Torque converter clutch solenoid valve • Each clutch • Hydraulic control circuit
: P0744		
: MIL Code No. 1107		



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

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

2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.

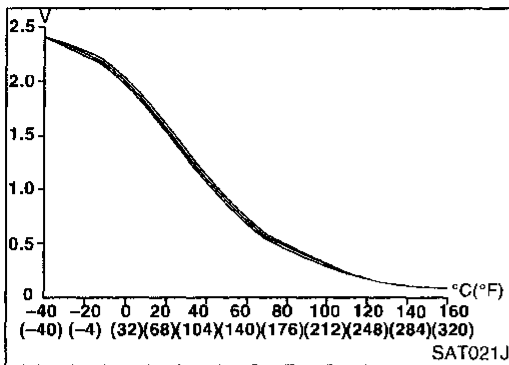
FLUID TEMP SEN: 0.4 - 1.5V

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

3) Select "TCC S/V FNCTN P0744" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT 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: 1/8 - 2/8 (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-343.
 - If "TESTING" does not appear on CONSULT for a long time, select "SELF-DIAG RESULTS". In case a 1st trip DTC other than P0744 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".
- 5) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
Refer to "DIAGNOSTIC PROCEDURE", AT-148.
Refer to shift schedule, AT-343.

Ⓢ With GST

- 1) Start engine and warm up ATF.
- 2) Start vehicle with selector lever in "D" (OD "ON"), throttle opening halfway and D₄ lock-up position for approximately 30 seconds. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-343.
- 3) Select "MODE 7" with GST.

Ⓢ No Tools

- 1) Start engine and warm up ATF.
- 2) Start vehicle with selector lever in "D" (OD "ON"), throttle opening halfway and D₄ lock-up position for approximately 30 seconds. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-343.
- 3) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

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

Wiring Diagram — AT — TCCSIG

Wiring Diagram — AT — TCCSIG

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AT-TCCSIG-01

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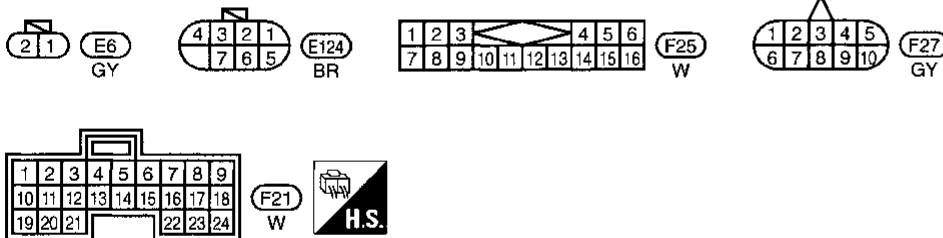
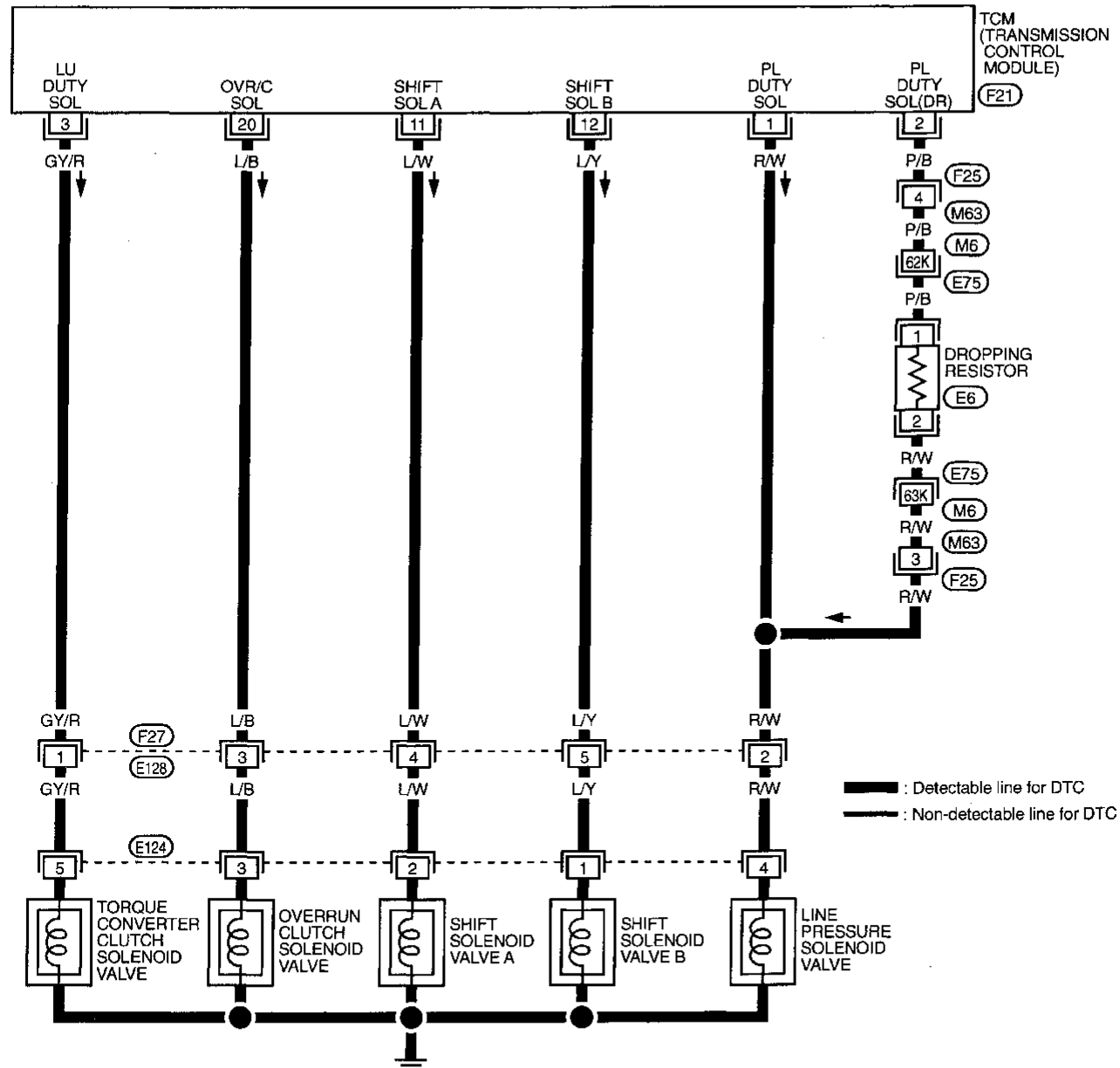
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Refer to last page (Foldout page).

M6, E75

TAT183

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

Diagnostic Procedure

NCAT0059

Diagnostic Procedure

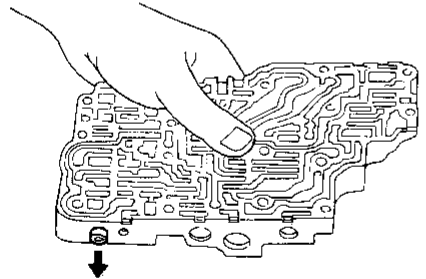
1	CHECK SHIFT UP (D₃ TO D₄)
During "Cruise test – Part 1" (AT-70), does A/T shift from D ₃ to D ₄ at the specified speed?	
<p style="text-align: center;">D₃ → D₄ Accelerator pedal Halfway</p>	
SAT988H	
Yes or No	
Yes	▶ GO TO 11. And check for proper lock-up.
No	▶ GO TO 2.

2	CHECK LINE PRESSURE
Perform line pressure test. Refer to AT-62.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ GO TO 7.

3	CHECK SOLENOID VALVES
1. Remove control valve assembly. Refer to AT-234. 2. Check solenoid valve assembly operation. Refer to AT-151.	
SAT404J	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Replace solenoid valve assembly.

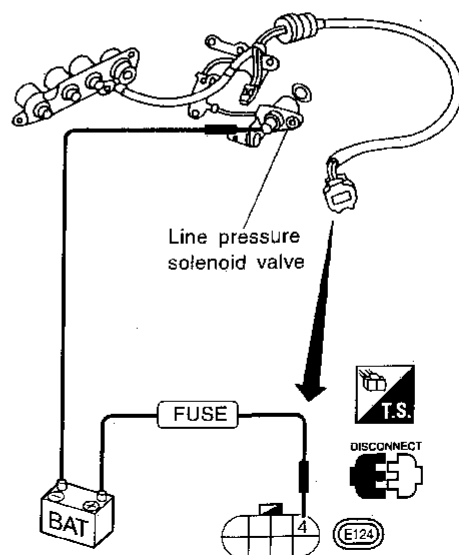
DTC P0744 A/T TCC S/V FUNCTION (LOCK-UP)

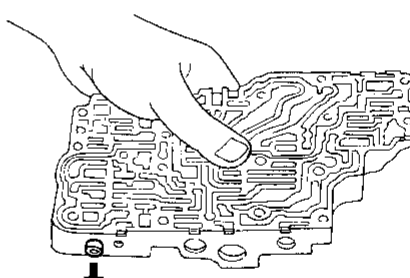
Diagnostic Procedure (Cont'd)

4	CHECK CONTROL VALVE
<p>1. Disassemble control valve assembly. Refer to AT-266.</p> <p>2. Check to ensure that:</p> <ul style="list-style-type: none"> ● Valve, sleeve and plug slide along valve bore under their own weight. ● Valve, sleeve and plug are free from burrs, dents and scratches. ● Control valve springs are free from damage, deformation and fatigue. ● Hydraulic line is free from obstacles. 	
	
SAT367H	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair control valve.

5	CHECK SHIFT UP (D₃ TO D₄)
Does A/T shift from D ₃ to D ₄ at the specified speed?	
Yes or No	
Yes	▶ GO TO 6.
No	▶ Check control valve again. Repair or replace control valve assembly.

6	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-145.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ GO TO 11. And check for proper lock-up.

7	CHECK LINE PRESSURE SOLENOID VALVE
<p>1. Remove control valve assembly. Refer to AT-234.</p> <p>2. Check line pressure solenoid valve operation. Refer to AT-151.</p>	
	
SAT438J	
OK or NG	
OK	▶ GO TO 8.
NG	▶ Replace solenoid valve assembly.

8	CHECK CONTROL VALVE
<p>1. Disassemble control valve assembly. Refer to AT-266.</p> <p>2. Check line pressure circuit valves for sticking.</p> <ul style="list-style-type: none"> ● Pressure regulator valve ● Pilot valve ● Pressure modifier valve 	
	
SAT367H	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Repair control valve.

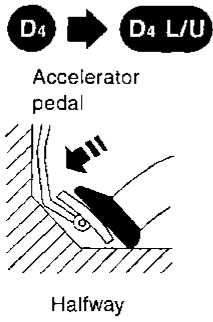
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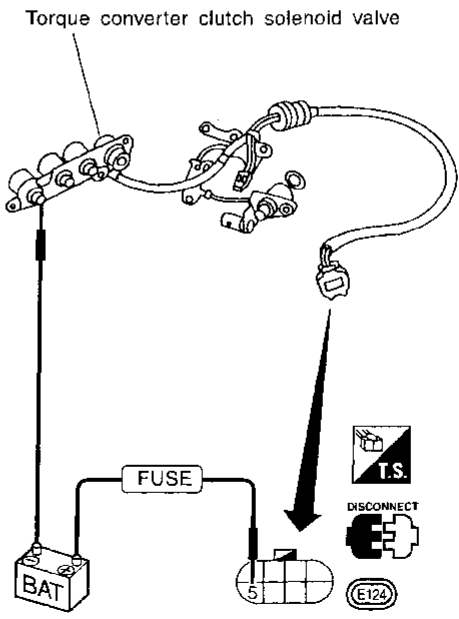
DTC P0744 A/T TCC S/V FUNCTION (LOCK-UP)

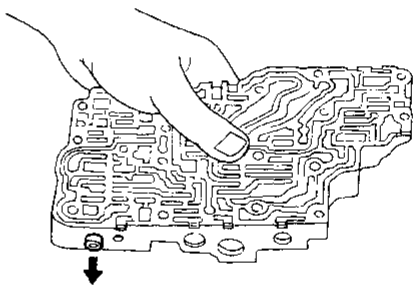
Diagnostic Procedure (Cont'd)

9	CHECK SHIFT UP (D₃ TO D₄)
Does A/T shift from D ₃ to D ₄ at the specified speed?	
Yes or No	
Yes	▶ GO TO 10.
No	▶ Check control valve again. Repair or replace control valve assembly.

10	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-145.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ GO TO 11. And check for proper lock-up.

11	CHECK LOCK-UP CONDITION
During "Cruise test – Part 1" (AT-70), does A/T perform lock-up at the specified speed?	
	
SAT989H	
Yes or No	
Yes	▶ Perform "Cruise test – Part 1" again and return to the start point of this flow chart.
No	▶ GO TO 12.

12	CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE
<ol style="list-style-type: none"> Remove control valve assembly. Refer to AT-234. Check torque converter clutch solenoid valve operation. Refer to AT-151. 	
	
SAT439J	
OK or NG	
OK	▶ GO TO 13.
NG	▶ Replace solenoid valve assembly.

13	CHECK CONTROL VALVE
<ol style="list-style-type: none"> Disassemble control valve assembly. Refer to AT-266. Check control valves for sticking. <ul style="list-style-type: none"> • Torque converter clutch control valve • Torque converter clutch relief valve 	
	
SAT367H	
OK or NG	
OK	▶ GO TO 14.
NG	▶ Repair control valve.

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

Diagnostic Procedure (Cont'd)

14	CHECK LOCK-UP CONDITION
Does A/T perform lock-up at the specified speed?	
Yes or No	
Yes	▶ GO TO 15.
No	▶ Check control valve again. Repair or replace control valve assembly.

15	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-145.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ Perform "Cruise test — Part 1" again and return to the start point of this flow chart.

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Component Inspection SOLENOID VALVES

NCAT0060

NCAT0060S01

- For removal, refer to AT-234.

Resistance Check

NCAT0060S0101

- Check resistance between two terminals.

Solenoid valve	Terminal No.	Resistance (Approx.)
Shift solenoid valve A	2	20 - 40Ω
Shift solenoid valve B	1	
Overrun clutch solenoid valve	3	2.5 - 5Ω
Line pressure solenoid valve	4	
Torque converter clutch solenoid valve	5	10 - 20Ω

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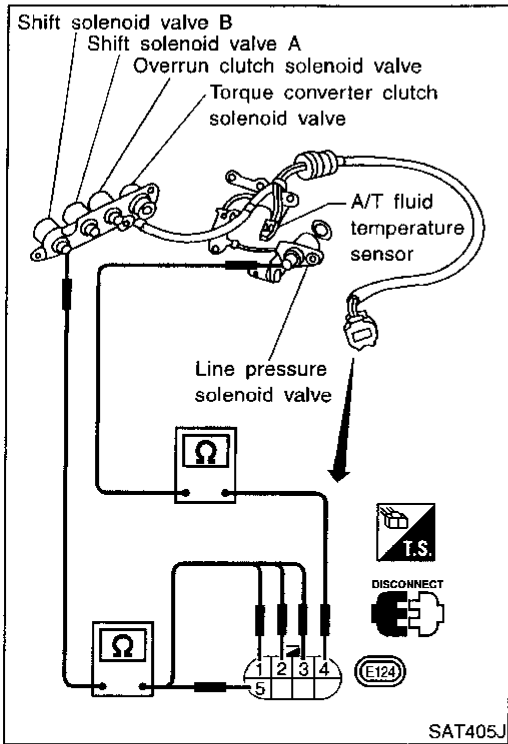
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Operation Check

NCAT0060S0102

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

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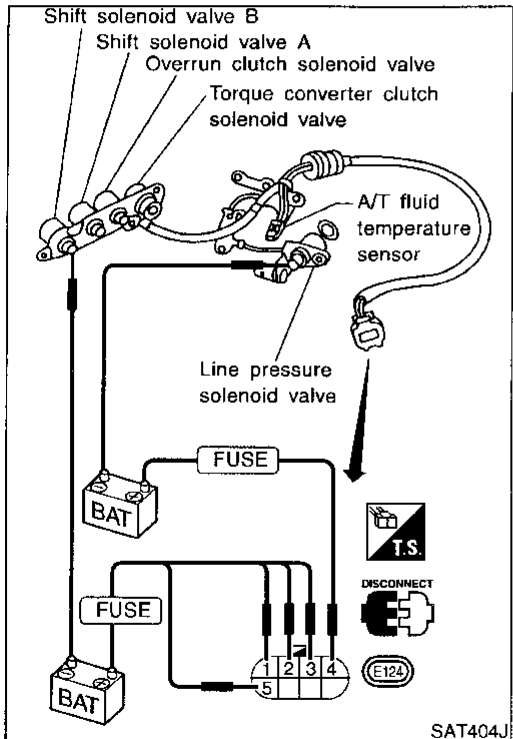
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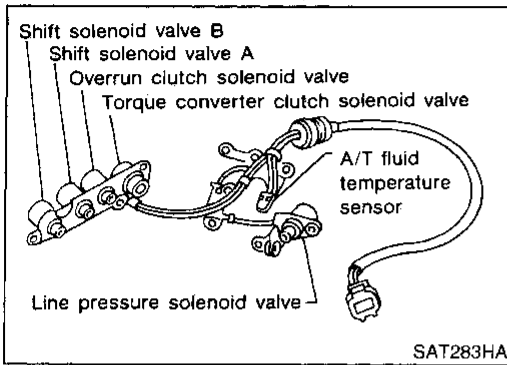
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SAT404J

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 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	
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.	0.5V or less
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.	0.5V or less

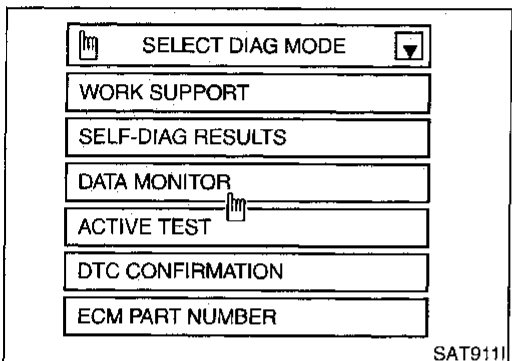
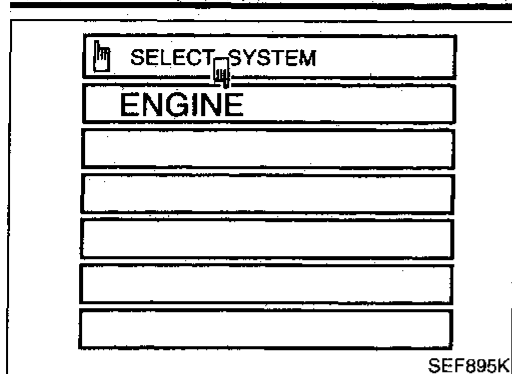
ON BOARD DIAGNOSIS LOGIC

NCAT0061S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: L/PRESS SOL/CIRC : P0745 : MIL Code No. 1205	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> • Harness or connectors (The solenoid circuit is open or shorted.) • Line pressure solenoid valve

DTC P0745 LINE PRESSURE SOLENOID VALVE

Description (Cont'd)



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

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT.
- 2) Depress accelerator pedal completely and wait at least 1 second.

Ⓒ With GST

- 1) Turn ignition switch "ON".
- 2) Depress accelerator pedal completely and wait at least 1 second.
- 3) Select "MODE 7" with GST.

Ⓓ No Tools

- 1) Turn ignition switch "ON".
- 2) Depress accelerator pedal completely and wait at least 1 second.
- 3) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

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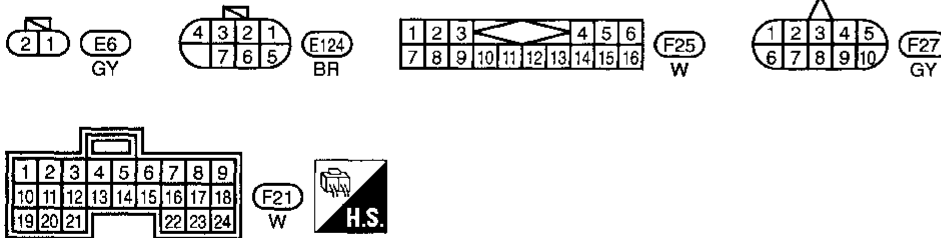
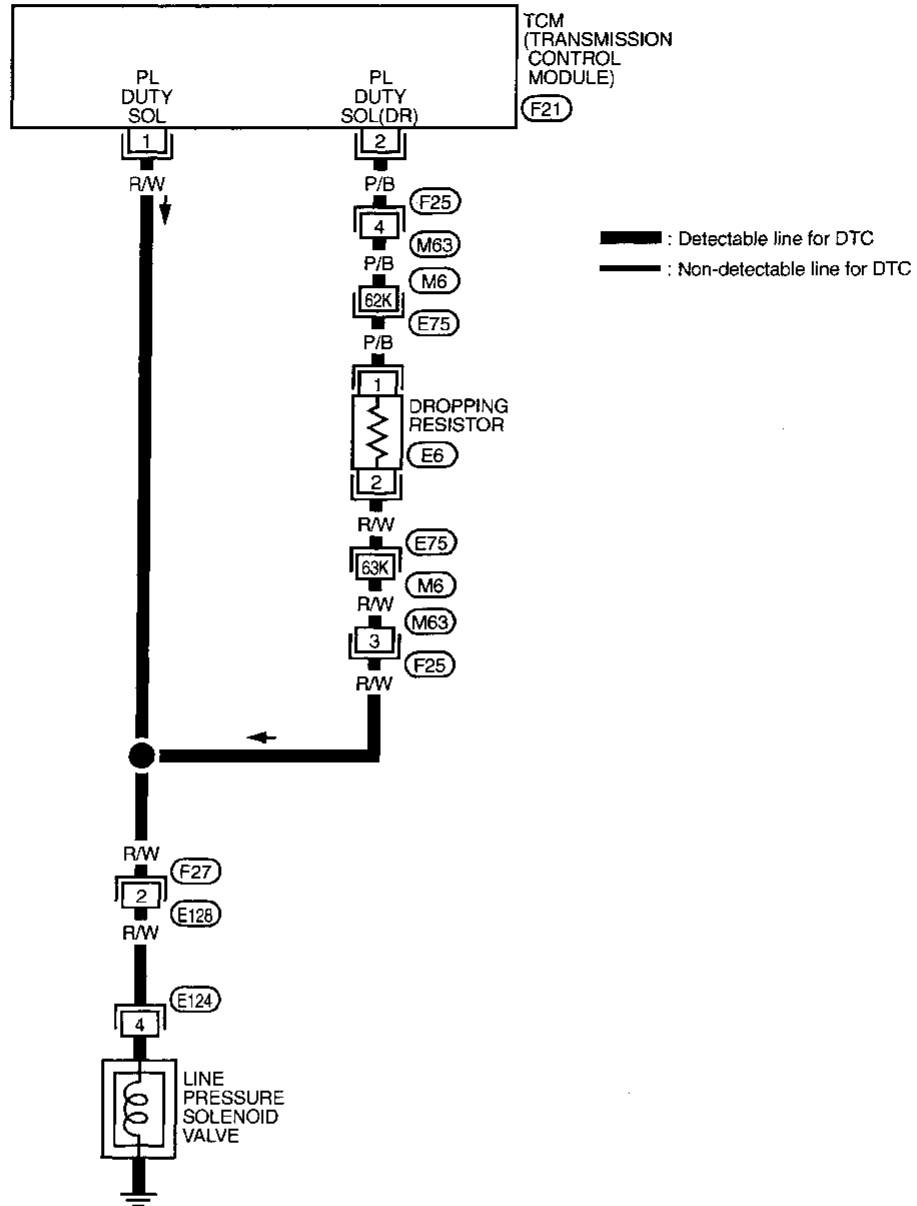
DTC P0745 LINE PRESSURE SOLENOID VALVE

Wiring Diagram — AT — LPSV

Wiring Diagram — AT — LPSV

NCA10209

AT-LPSV-01



Refer to last page (Foldout page).

(M6) (E75)

DTC P0745 LINE PRESSURE SOLENOID VALVE

Diagnostic Procedure

Diagnostic Procedure

NCAT0062

1	CHECK GROUND CIRCUIT
<ol style="list-style-type: none"> Turn ignition switch to "OFF" position. Disconnect terminal cord assembly connector in engine compartment. Check resistance between terminal 4 and ground. <p>Resistance: 2.5 - 5Ω</p> <p style="text-align: right;">SAT440J</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 2.
NG	▶ <ol style="list-style-type: none"> Remove control valve assembly. Refer to AT-234. Check the following items: <ul style="list-style-type: none"> Line pressure solenoid valve Refer to "Component Inspection", AT-157. Harness of terminal cord assembly for short or open

2	CHECK POWER SOURCE CIRCUIT
<ol style="list-style-type: none"> Turn ignition switch to "OFF" position. Disconnect TCM harness connector. Check resistance between terminal 4 and TCM harness connector terminal 2. <p>Resistance: 11.2 - 12.8Ω</p> <p style="text-align: right;">SAT441J</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ <p>Check the following items:</p> <ul style="list-style-type: none"> Dropping resistor Refer to "Component Inspection", AT-157. Harness for short or open between TCM terminal 2 and terminal cord assembly (Main harness)

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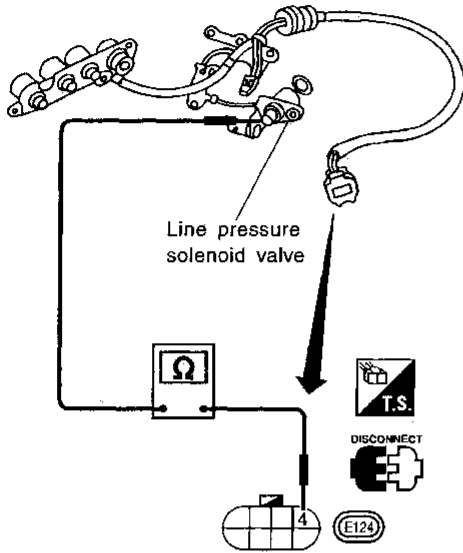
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DTC P0745 LINE PRESSURE SOLENOID VALVE

Diagnostic Procedure (Cont'd)

3 CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Check continuity between terminal 1 and TCM harness connector terminal 1 and 2.
Continuity should exist.



SAT442J

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

3. Reinstall any part removed.

OK or NG

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

4 CHECK DTC

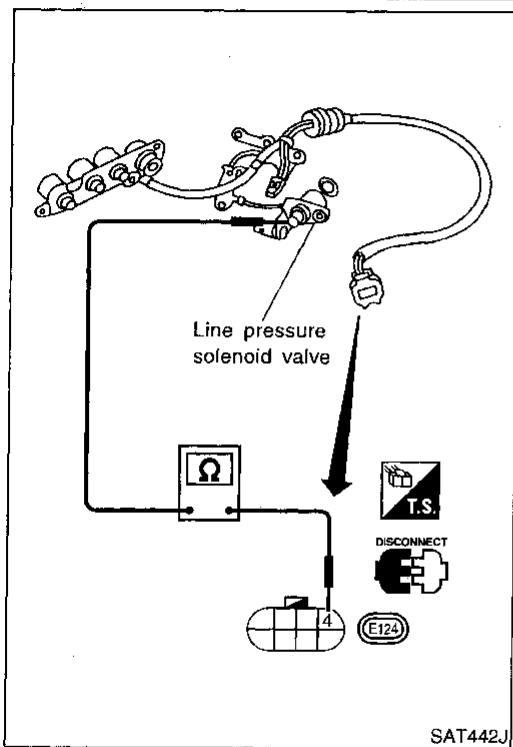
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-153.

OK or NG

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

DTC P0745 LINE PRESSURE SOLENOID VALVE

Component Inspection



Component Inspection

LINE PRESSURE SOLENOID VALVE

- For removal, refer to AT-234.

Resistance Check

- Check resistance between two terminals.

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

NCAT0063

NCAT0063S01

NCAT0063S0101

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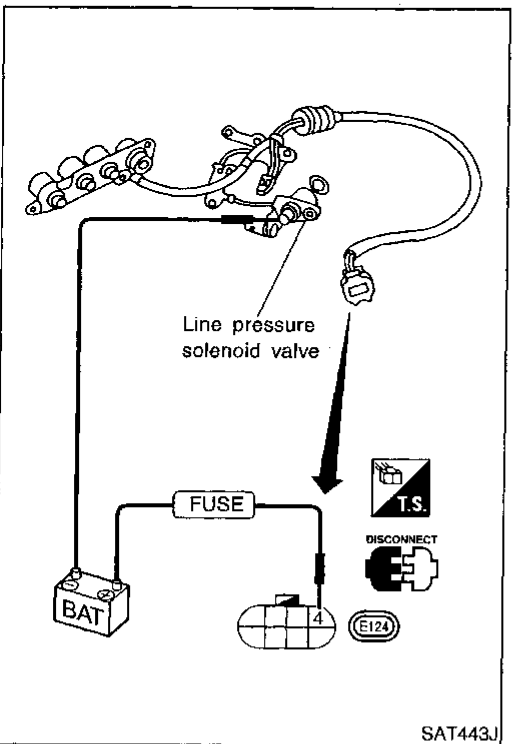
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Operation Check

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

NCAT0063S0102

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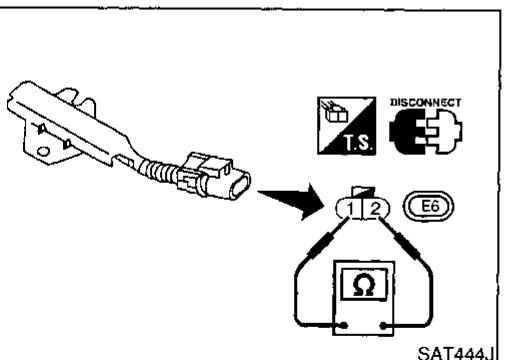
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DROPPING RESISTOR

- Check resistance between two terminals.

Resistance:

11.2 - 12.8Ω

NCAT0063S02

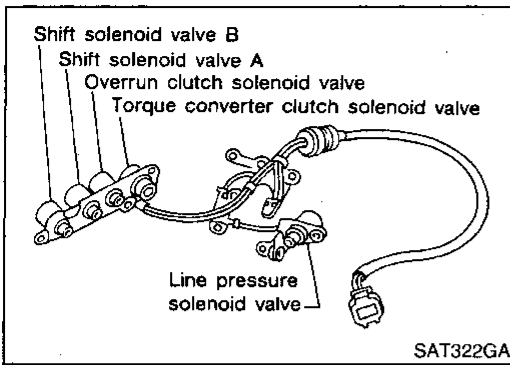
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DTC P0750 SHIFT SOLENOID VALVE A

Description



Description


Shift solenoid valves A and B are turned "ON" or "OFF" by the TCM ^{NCA70064} in response to signals sent from the PNP switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position.

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

TCM TERMINALS AND REFERENCE VALUE

NCA70064S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard	
11	LW	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in "D ₁ " or "D ₄ ".)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in "D ₂ " or "D ₃ ".)	1V or less

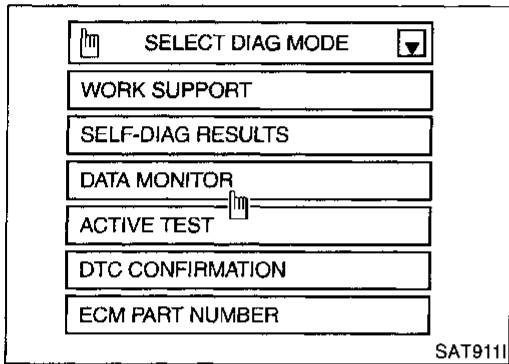
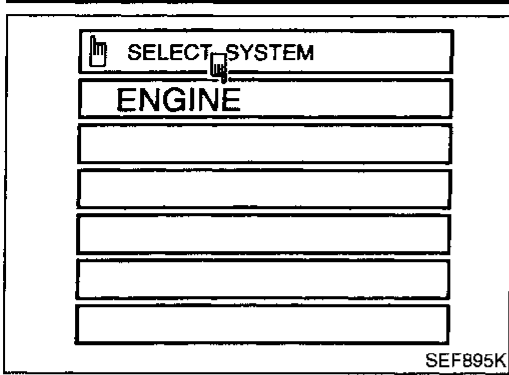
ON BOARD DIAGNOSIS LOGIC

NCA70064S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
P : SFT SOL A/CIRC P0750 MIL Code No. 1108	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> • Harness or connectors (The solenoid circuit is open or shorted.) • Shift solenoid valve A

DTC P0750 SHIFT SOLENOID VALVE A

Description (Cont'd)



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.

④ With CONSULT

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

⊕ With GST

- 1) Start engine.
- 2) Drive vehicle in D₁ → D₂ position.
- 3) Select "MODE 7" with GST.

⊖ No Tools

- 1) Start engine.
- 2) Drive vehicle in D₁ → D₂ position.
- 3) Perform self-diagnosis for ECM.

Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

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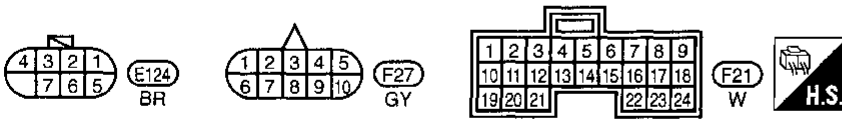
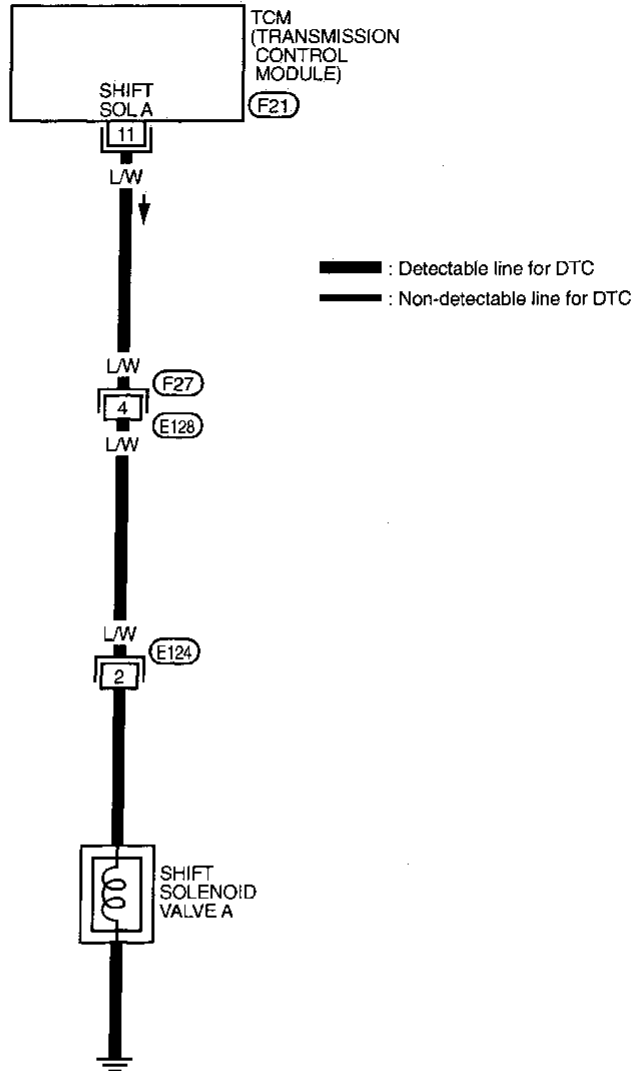
DTC P0750 SHIFT SOLENOID VALVE A

Wiring Diagram — AT — SSV/A

Wiring Diagram — AT — SSV/A

NCAT0210

AT-SSV/A-01



TAT185

Diagnostic Procedure

1	CHECK GROUND CIRCUIT
<ol style="list-style-type: none"> Turn ignition switch to "OFF" position. Disconnect terminal cord assembly connector in engine compartment. Check resistance between terminal 2 and ground. Resistance: 20 - 40Ω 	
SAT445J	
OK or NG	
OK	▶ GO TO 2.
NG	▶ <ol style="list-style-type: none"> Remove control valve assembly. Refer to AT-234. Check the following items: <ul style="list-style-type: none"> Shift solenoid valve A Refer to "Component Inspection", AT-162. Harness of terminal cord assembly for short or open

2	CHECK POWER SOURCE CIRCUIT
<ol style="list-style-type: none"> Turn ignition switch to "OFF" position. Disconnect TCM harness connector. Check continuity between terminal 2 and TCM harness connector terminal 11. Continuity should exist. 	
SAT446J	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-159.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ <ol style="list-style-type: none"> Perform TCM input/output signal inspection. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

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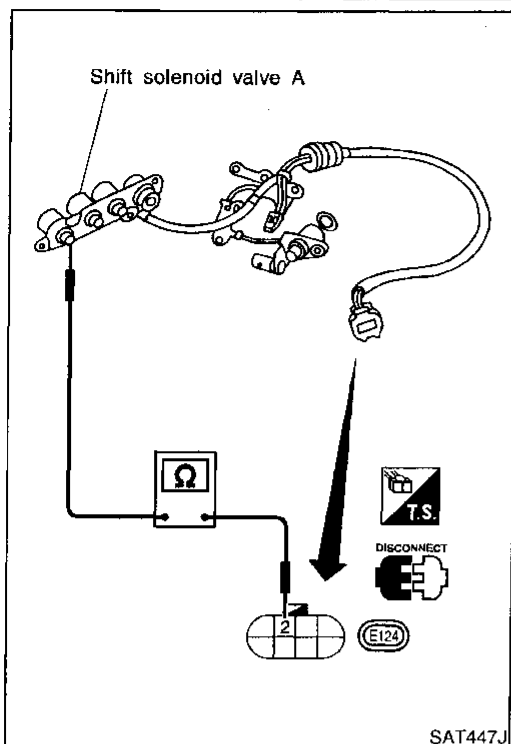
SC

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IDX

DTC P0750 SHIFT SOLENOID VALVE A

Component Inspection



Component Inspection SHIFT SOLENOID VALVE A

NCAT0066

NCAT0066S01

- For removal, refer to AT-234.

Resistance Check

NCAT0066S0101

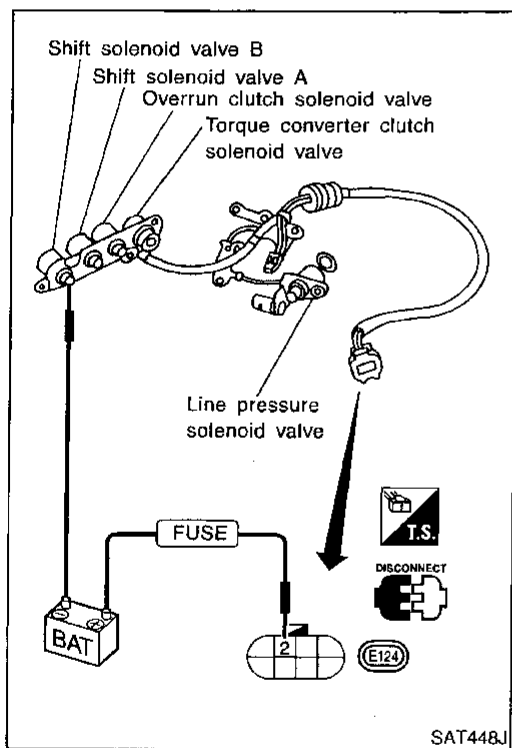
- Check resistance between two terminals.

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

Operation Check

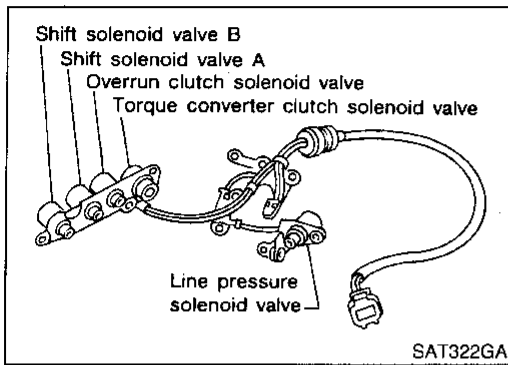
NCAT0066S0102

- 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 ₁ " or "D ₂ ".)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in "D ₃ " or "D ₄ ".)

CL

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AX

ON BOARD DIAGNOSIS LOGIC

NCAT0067S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
(P) : SFT SOL B/CIRC (P0755) (MIL) : MIL Code No. 1201	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> Harness or connectors (The solenoid circuit is open or shorted.) Shift solenoid valve B

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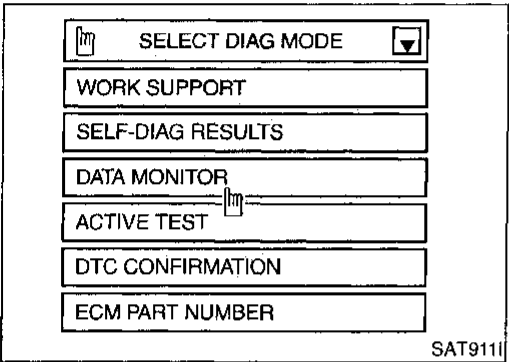
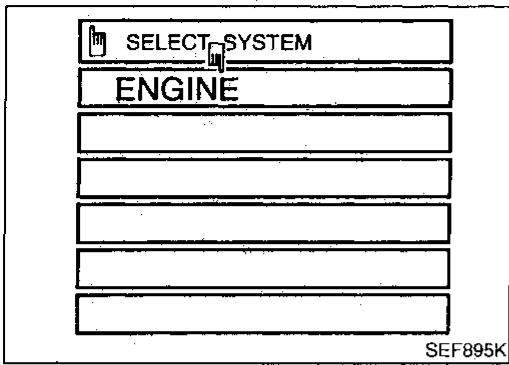
SC

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DTC P0755 SHIFT SOLENOID VALVE B

Description (Cont'd)



DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCA70067S03

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

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

With GST

- 1) Start engine.
- 2) Drive vehicle in D₁ → D₂ → D₃ position.
- 3) Select "MODE 7" with GST.

No Tools

- 1) Start engine.
- 2) Drive vehicle in D₁ → D₂ → D₃ position.
- 3) Perform self-diagnosis for ECM.

Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

DTC P0755 SHIFT SOLENOID VALVE B

Wiring Diagram — AT — SSV/B

Wiring Diagram — AT — SSV/B

NCAT0211

AT-SSV/B-01

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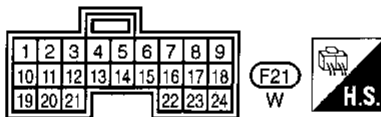
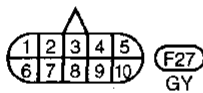
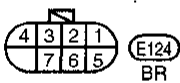
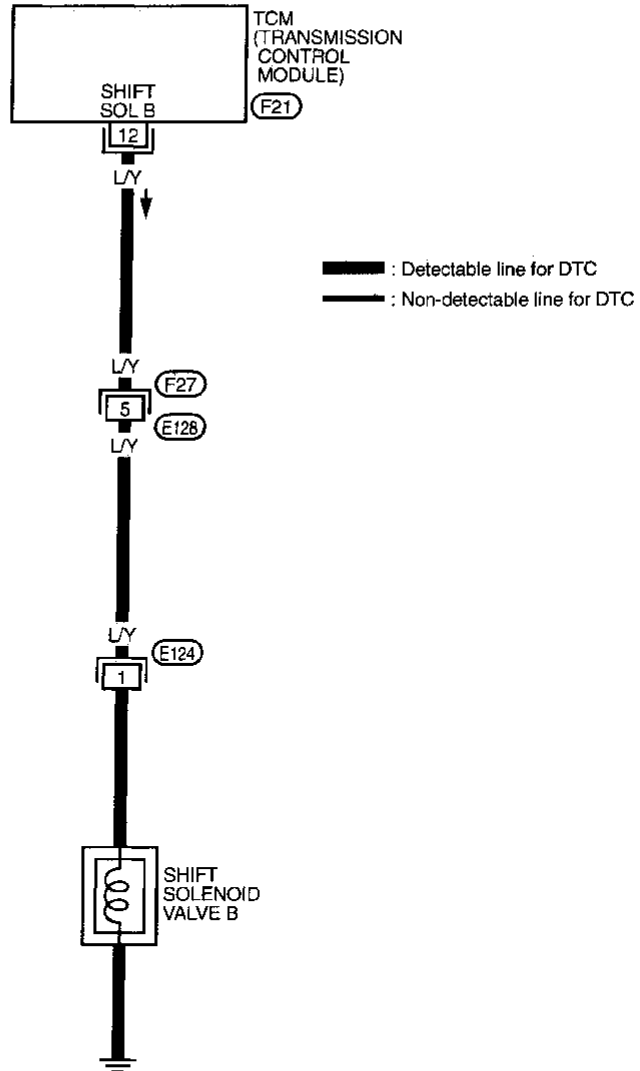
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TAT186

DTC P0755 SHIFT SOLENOID VALVE B

Diagnostic Procedure

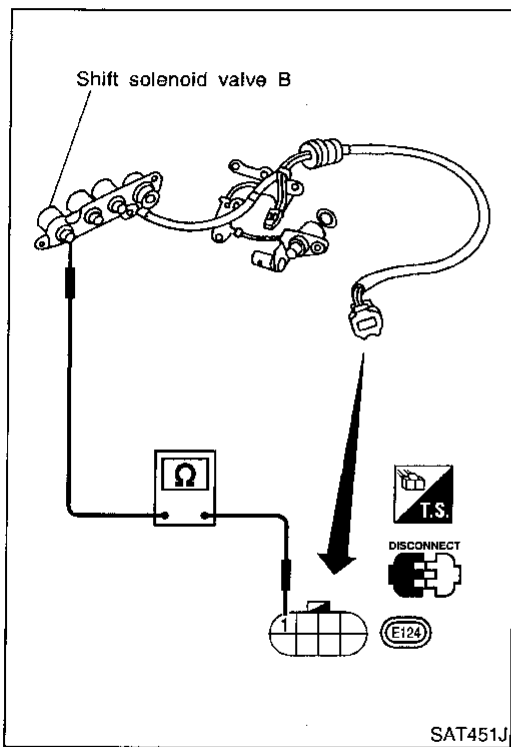
Diagnostic Procedure

NCAT0068

1 CHECK GROUND CIRCUIT	
1. Turn ignition switch to "OFF" position. 2. Disconnect terminal cord assembly connector in engine compartment. 3. Check resistance between terminal 1 and ground. Resistance: 20 - 40Ω	
SAT449J	
OK or NG	
OK	▶ GO TO 2.
NG	▶ <ol style="list-style-type: none"> Remove control valve assembly. Refer to AT-234. Check the following items: <ul style="list-style-type: none"> Shift solenoid valve B Refer to "Component Inspection", AT-167. Harness of terminal cord assembly for short or open

2 CHECK POWER SOURCE CIRCUIT	
1. Turn ignition switch to "OFF" position. 2. Disconnect TCM harness connector. 3. Check continuity between terminal 12 and TCM harness connector terminal 1. Continuity should exist.	
SAT450J	
If OK, check harness for short to ground and short to power. 4. Reinstall any part removed.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

3 CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-164.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ <ol style="list-style-type: none"> Perform TCM input/output signal inspection. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.



Component Inspection SHIFT SOLENOID VALVE B

NCAT0069

NCAT0069S01

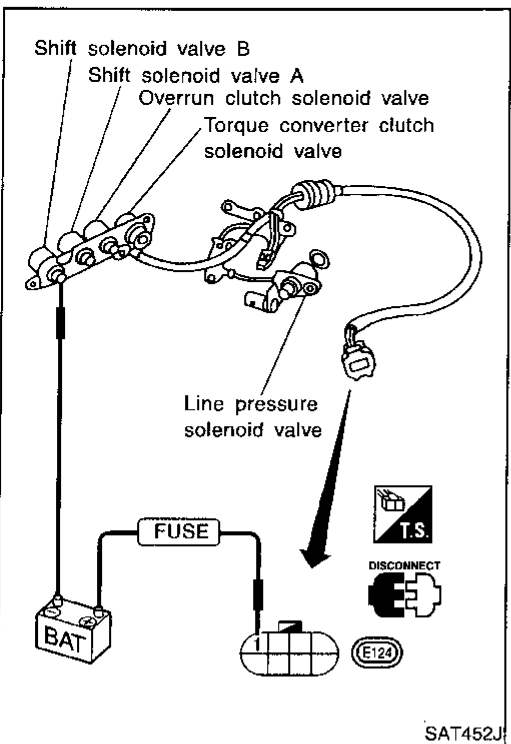
- For removal, refer to AT-234.

Resistance Check

NCAT0069S0101

- Check resistance between two terminals.

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



Operation Check

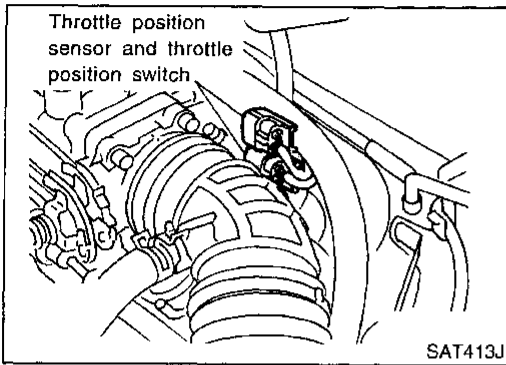
NCAT0069S0102

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

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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 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
16	Y	Closed throttle position switch (in throttle position switch)	When releasing accelerator pedal after warming up engine.	Battery voltage
			When depressing accelerator pedal after warming up engine.	1V or less
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.	1V or less
32	P/L	Throttle position sensor (Power source)	—	4.5 - 5.5V
41	GY	Throttle position sensor	When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: Approximately 0.5V Fully-open throttle: Approximately 4V
42	B	Ground (Throttle position sensor)	—	—

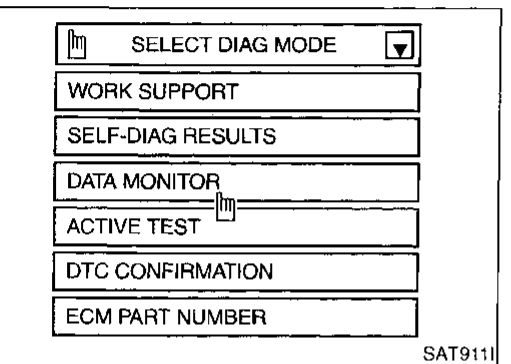
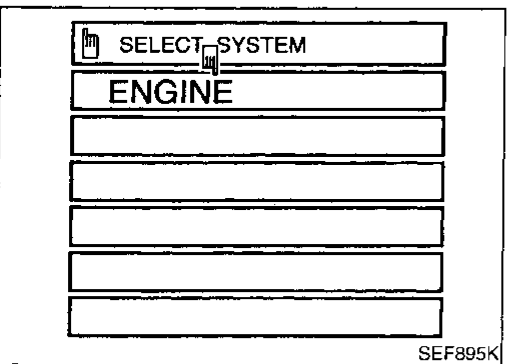
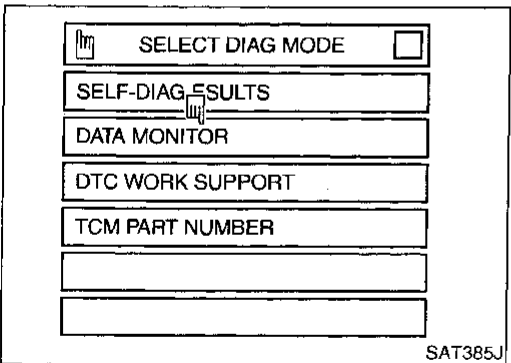
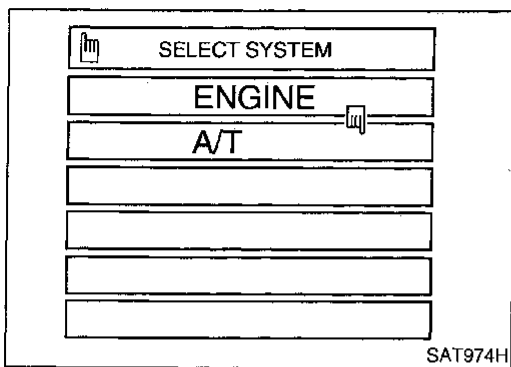
ON BOARD DIAGNOSIS LOGIC

NCAT0070S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
(P) : TP SEN/CIRC A/T (P1705) : P1705 (MIL Code No. 1206) : MIL Code No. 1206	TCM receives an excessively low or high voltage from the sensor.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Throttle position sensor ● Throttle position switch

DTC P1705 THROTTLE POSITION SENSOR

Description (Cont'd)



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

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "A/T" with CONSULT.
- 2) Check the following.

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

If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-172.

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

- 3) Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT.
- 4) Start engine and maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.

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

THRTL POS SEN: Approximately 3V or less

Selector lever: D position (OD "ON")

If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-172.

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

- 5) Maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.

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

Accelerator pedal: Wide open throttle

Selector lever: D position (OD "ON")

Ⓟ With GST

- 1) Start engine.
- 2) Drive vehicle under the following conditions:
Selector lever in "D" (OD "ON"), vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 3 seconds.
- 3) Select "MODE 7" with GST.

Ⓢ No Tools

- 1) Start engine.
- 2) Drive vehicle under the following conditions:
Selector lever in "D" (OD "ON"), vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 3 seconds.
- 3) Perform self-diagnosis for ECM.

DTC P1705 THROTTLE POSITION SENSOR

Description (Cont'd)

Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

DTC P1705 THROTTLE POSITION SENSOR

Wiring Diagram — AT — TPS

Wiring Diagram — AT — TPS

NCAT0212

AT-TPS-01

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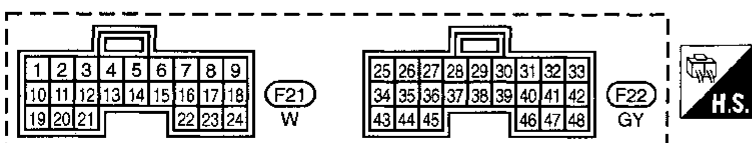
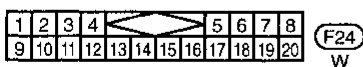
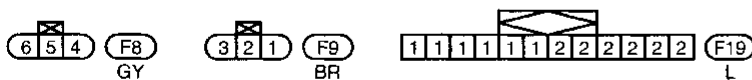
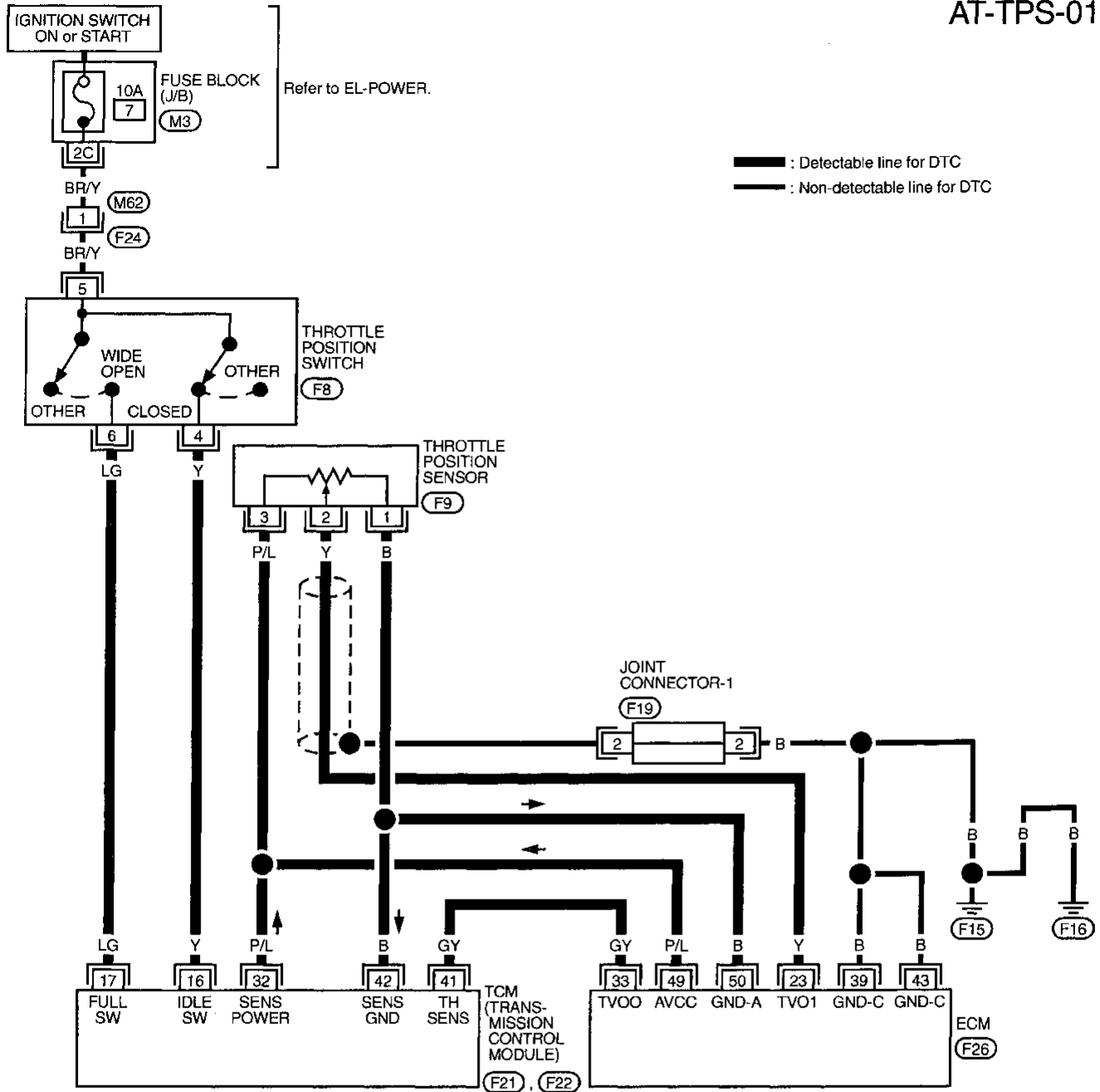
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Refer to last page (Foldout page).

(M3)

(F26)

TAT187


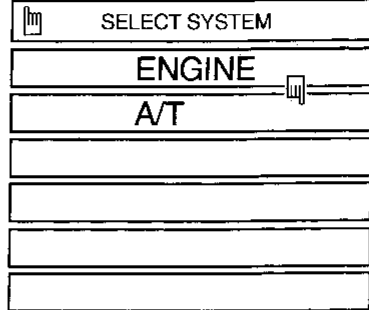
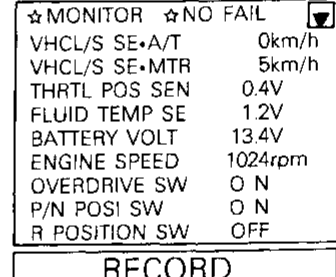
DTC P1705 THROTTLE POSITION SENSOR

Diagnostic Procedure

Diagnostic Procedure

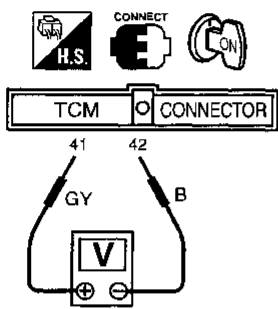
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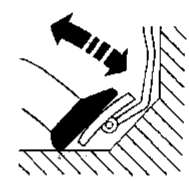
1	CHECK DTC WITH ECM
Perform diagnostic test mode II (self- diagnostic results) for engine control. Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].	
OK or NG	
OK (With CONSULT) ▶	GO TO 2.
OK (Without CONSULT) ▶	GO TO 3.
NG ▶	Check throttle position sensor circuit for engine control. Refer to EC section ["Throttle Position Sensor (DTC: 0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].

2	CHECK INPUT SIGNAL (WITH CONSULT)
<p> With CONSULT</p> <ol style="list-style-type: none"> Turn ignition switch to "ON" position. (Do not start engine.) Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT. 	
	
SAT974H	
<ol style="list-style-type: none"> Read out the value of "THRTL POS SEN". <p>Voltage: Fully-closed throttle: Approximately 0.5V Fully-open throttle: Approximately 4V</p>	
	
SAT076H	
OK or NG	
OK ▶	GO TO 4.
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)

3	CHECK INPUT SIGNAL (WITHOUT CONSULT)						
<p>⊗ Without CONSULT</p> <ol style="list-style-type: none"> Turn ignition switch to "ON" position. (Do not start engine.) Check voltage between TCM terminals 41 and 42 while accelerator pedal is depressed slowly. <p>Voltage:</p> <p>Fully-closed throttle valve: Approximately 0.5V</p> <p>Fully-open throttle valve: Approximately 4V</p> <p>(Voltage rises gradually in response to throttle position)</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT453J</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Check harness for short or open between ECM and TCM regarding throttle position sensor circuit. (Main harness)</td> </tr> </table>		OK	▶	GO TO 5.	NG	▶	Check harness for short or open between ECM and TCM regarding throttle position sensor circuit. (Main harness)
OK	▶	GO TO 5.					
NG	▶	Check harness for short or open between ECM and TCM regarding throttle position sensor circuit. (Main harness)					

4	CHECK THROTTLE POSITION SWITCH CIRCUIT (WITH CONSULT)																																																		
<p>Ⓜ With CONSULT</p> <ol style="list-style-type: none"> Turn ignition switch to "ON" position. (Do not start engine.) Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT. 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. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Accelerator pedal condition</th> <th colspan="2">Data monitor</th> </tr> <tr> <th>CLOSED THL/SW</th> <th>W/O THRL/P-SW</th> </tr> </thead> <tbody> <tr> <td>Released</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>Fully depressed</td> <td style="text-align: center;">OFF</td> <td style="text-align: center;">ON</td> </tr> </tbody> </table> <p style="text-align: right; margin-top: 5px;">MTBL0011</p> <div style="text-align: center; margin-top: 20px;">  </div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 20px;"> <tr> <td style="width: 50%; text-align: center;">☆ MONITOR</td> <td style="width: 50%; text-align: center;">☆ NO FAIL</td> <td style="width: 20px; text-align: center;">⏪</td> </tr> <tr> <td>D POSITION SW</td> <td style="text-align: center;">OFF</td> <td></td> </tr> <tr> <td>2 POSITION SW</td> <td style="text-align: center;">OFF</td> <td></td> </tr> <tr> <td>1 POSITION SW</td> <td style="text-align: center;">OFF</td> <td></td> </tr> <tr> <td>ASCD • CRUISE</td> <td style="text-align: center;">OFF</td> <td></td> </tr> <tr> <td>ASCD • OD CUT</td> <td style="text-align: center;">OFF</td> <td></td> </tr> <tr> <td>KICKDOWN SW</td> <td style="text-align: center;">OFF</td> <td></td> </tr> <tr> <td>POWERSHIFT SW</td> <td style="text-align: center;">OFF</td> <td></td> </tr> <tr> <td>CLOSED THL/SW</td> <td style="text-align: center;">ON</td> <td></td> </tr> <tr> <td>W/O THRL/P-SW</td> <td style="text-align: center;">OFF</td> <td></td> </tr> <tr> <td colspan="3" style="text-align: center; padding: 5px;">RECORD</td> </tr> </table> <p style="text-align: right; margin-top: 5px;">SAT963H</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 6.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td> <p>Check the following items:</p> <ul style="list-style-type: none"> Throttle position switch — Refer to "Components Inspection", AT-175. 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) </td> </tr> </table>		Accelerator pedal condition	Data monitor		CLOSED THL/SW	W/O THRL/P-SW	Released	ON	OFF	Fully depressed	OFF	ON	☆ MONITOR	☆ NO FAIL	⏪	D POSITION SW	OFF		2 POSITION SW	OFF		1 POSITION SW	OFF		ASCD • CRUISE	OFF		ASCD • OD CUT	OFF		KICKDOWN SW	OFF		POWERSHIFT SW	OFF		CLOSED THL/SW	ON		W/O THRL/P-SW	OFF		RECORD			OK	▶	GO TO 6.	NG	▶	<p>Check the following items:</p> <ul style="list-style-type: none"> Throttle position switch — Refer to "Components Inspection", AT-175. 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)
Accelerator pedal condition	Data monitor																																																		
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OK	▶	GO TO 6.																																																	
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DTC P1705 THROTTLE POSITION SENSOR

Diagnostic Procedure (Cont'd)

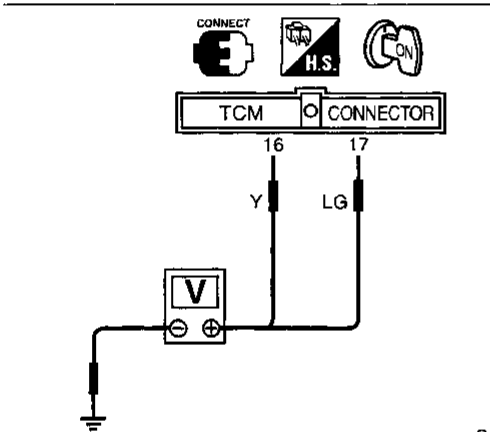
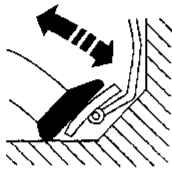
5 CHECK THROTTLE POSITION SWITCH CIRCUIT (WITHOUT CONSULT)

⊗ Without CONSULT

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

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

MTBL0137



SAT454J

OK or NG

OK	▶	GO TO 6.
NG	▶	Check the following items: <ul style="list-style-type: none"> • Throttle position switch — Refer to "Components Inspection", AT-175. • 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

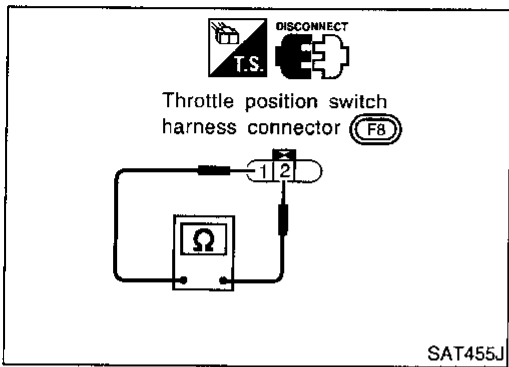
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-169.

OK or NG

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

DTC P1705 THROTTLE POSITION SENSOR

Component Inspection



Component Inspection

THROTTLE POSITION SWITCH

=NCAT0072

Closed Throttle Position Switch (Idle position)

NCAT0072S01

NCAT0072S0101

- Check continuity between terminals 1 and 2.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

- To adjust closed throttle position switch, refer to EC section (“Basic Inspection”, “TROUBLE DIAGNOSIS — Basic Inspection”).

GI

MA

EM

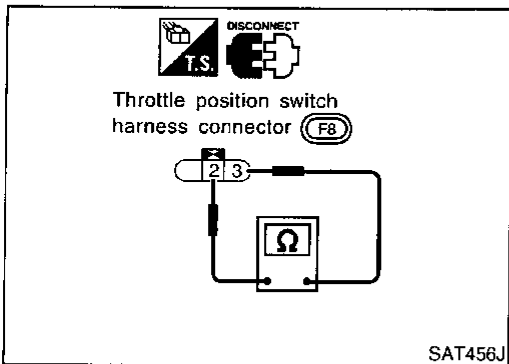
LC

EC

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MT



Wide Open Throttle Position Switch

NCAT0072S0102

- Check continuity between terminals 2 and 3.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

AT

AX

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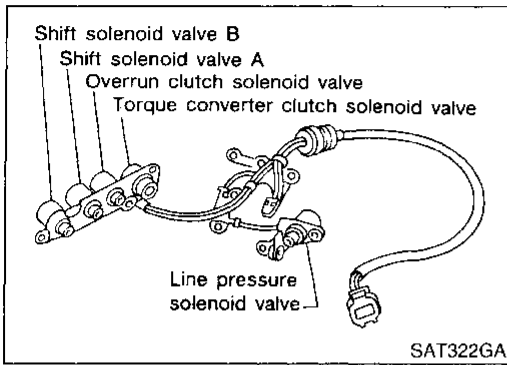
SC

EL

IDX

DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Description



Description


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

NCA10073

TCM TERMINALS AND REFERENCE VALUE




NCAT0073S01

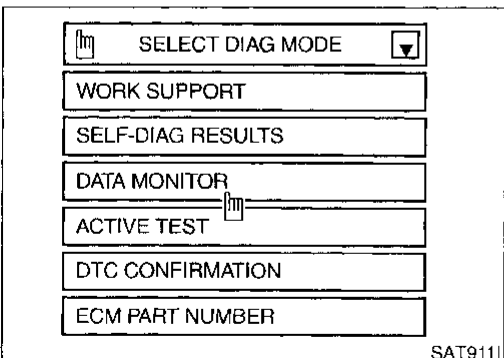
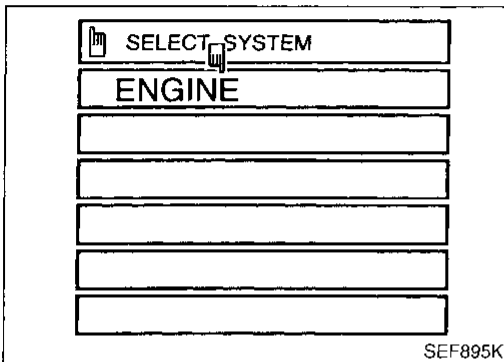
Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard
20	L/B	Overrun clutch solenoid valve	 When overrun clutch solenoid valve operates.	Battery voltage
			When overrun clutch solenoid valve does not operate.	1V or less

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"> • Harness or connectors (The solenoid circuit is open or shorted.) • Overrun clutch solenoid valve
 : P1760		
 : MIL Code No. 1203		



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

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

- 1) Start engine. GI
- 2) Drive vehicle under the following conditions:
Selector lever in "D", overdrive control switch in "ON" or "OFF"
position and vehicle speed higher than 10 km/h (6 MPH). MA
- 3) Select "MODE 7" with GST.

 **No Tools**

- 1) Start engine. EM
- 2) Drive vehicle under the following conditions:
Selector lever in "D", overdrive control switch in "ON" or "OFF"
position and vehicle speed higher than 10 km/h (6 MPH). LC
- 3) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON
BOARD DIAGNOSTIC SYSTEM DESCRIPTION"]. EC

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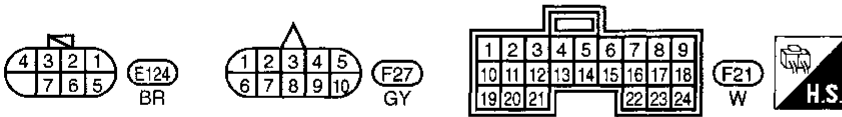
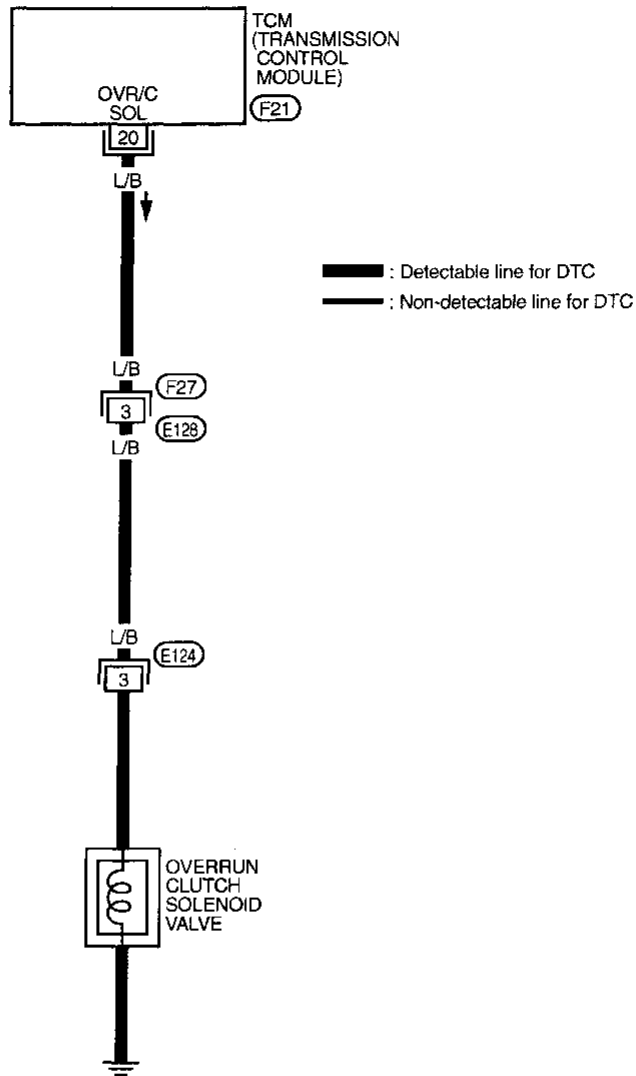
DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Wiring Diagram — AT — OVRCSV

Wiring Diagram — AT — OVRCSV

NCAT0213

AT-OVRCSV-01



TAT188

DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Diagnostic Procedure

Diagnostic Procedure

NCAT0074

1 CHECK GROUND CIRCUIT	
1. Turn ignition switch to "OFF" position. 2. Disconnect terminal cord assembly connector in engine compartment. 3. Check resistance between terminal 3 and ground. Resistance: 20 - 40Ω	
SAT457J	
OK or NG	
OK	▶ GO TO 2.
NG	▶ <ol style="list-style-type: none"> Remove control valve assembly. Refer to AT-234. Check the following items: <ul style="list-style-type: none"> ● Overrun clutch solenoid valve Refer to "Component Inspection", AT-180. ● Harness of terminal cord assembly for short or open

2 CHECK POWER SOURCE CIRCUIT	
1. Turn ignition switch to "OFF" position. 2. Disconnect TCM harness connector. 3. Check continuity between terminal 3 and TCM harness connector terminal 20. Continuity should exist.	
SAT458J	
If OK, check harness for short to ground and short to power. 4. Reinstall any part removed.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

3 CHECK DTC	
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-176.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ <ol style="list-style-type: none"> Perform TCM input/output signal inspection. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

GI

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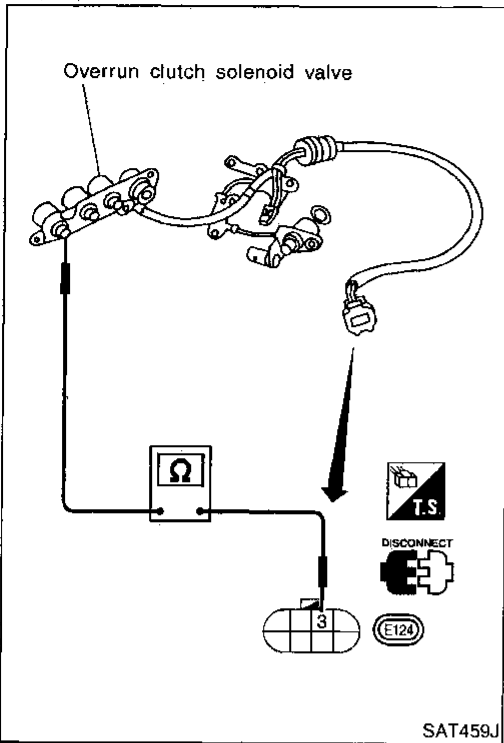
SC

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DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Component Inspection



Component Inspection OVERRUN CLUTCH SOLENOID VALVE

NCAT0075

NCAT0075S01

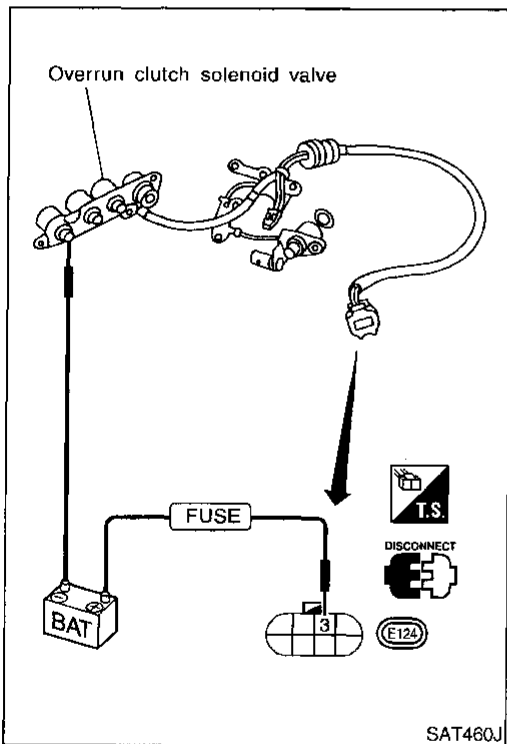
- For removal, refer to AT-234.

Resistance Check

NCAT0075S0101

- Check resistance between two terminals.

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



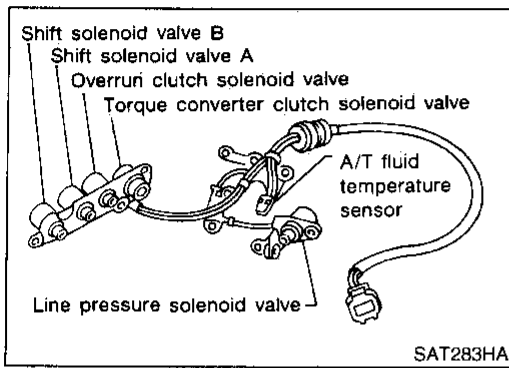
Operation Check

NCAT0075S0102

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

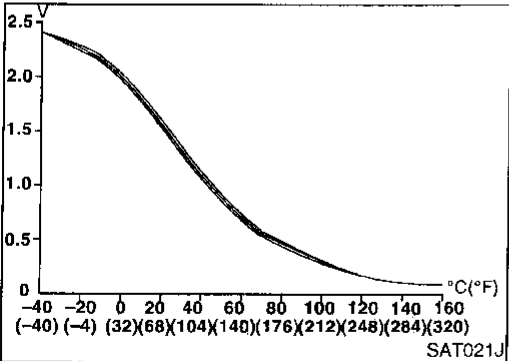
DTC BATT/FLUID TEMP SEN A/T FLUID TEMPERATURE SENSOR CIRCUIT AND TCM POWER SOURCE

Description



Description

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



CONSULT REFERENCE VALUE IN DATA MONITOR MODE

NCAT0076S01

Remarks: Specification data are reference values.

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

TCM TERMINALS AND REFERENCE VALUE

NCAT0076S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard	
10	G/OR	Power source		When turning ignition switch to "ON".	Battery voltage
				When turning ignition switch to "OFF".	1V or less
19	G/OR	Power source	Same as No. 10		
28	P	Power source (Memory back-up)		When turning ignition switch to "OFF".	Battery voltage
			or 	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).	Approximately 1.5V
				When ATF temperature is 80°C (176°F).	Approximately 0.5V

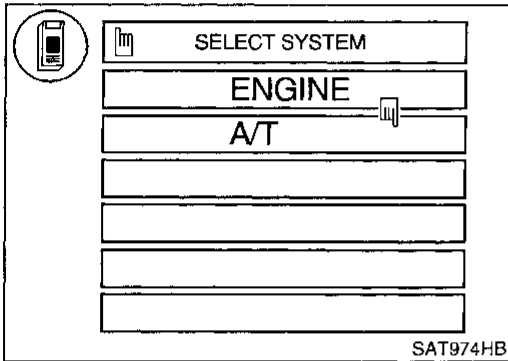
DTC BATT/FLUID TEMP SEN A/T FLUID TEMPERATURE SENSOR CIRCUIT AND TCM POWER SOURCE

Description (Cont'd)

ON BOARD DIAGNOSIS LOGIC

NCAT0076S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
Ⓜ : BATT/FLUID TEMP SEN	TCM receives an excessively low or high voltage from the sensor.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • A/T fluid temperature sensor
ⓧ : 8th judgement flicker		



DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0076S04

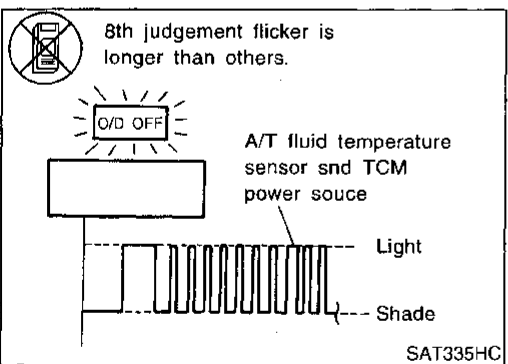
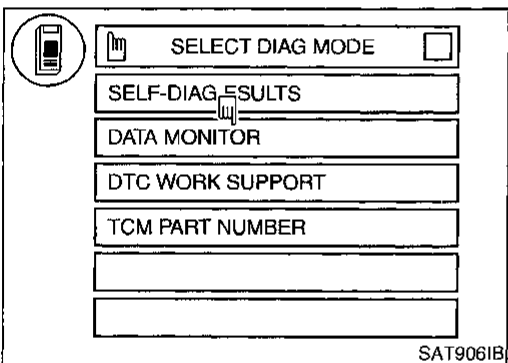
After the repair, perform the following procedure to confirm the malfunction is eliminated.

Ⓜ With CONSULT

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

ⓧ Without CONSULT

- 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-48.



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

Wiring Diagram — AT — BA/FTS

Wiring Diagram — AT — BA/FTS

NCAT0214

AT-BA/FTS-01

GI

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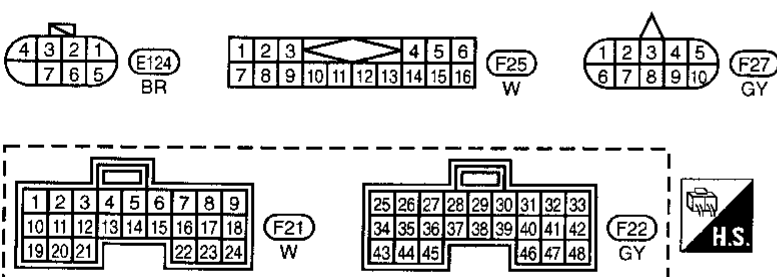
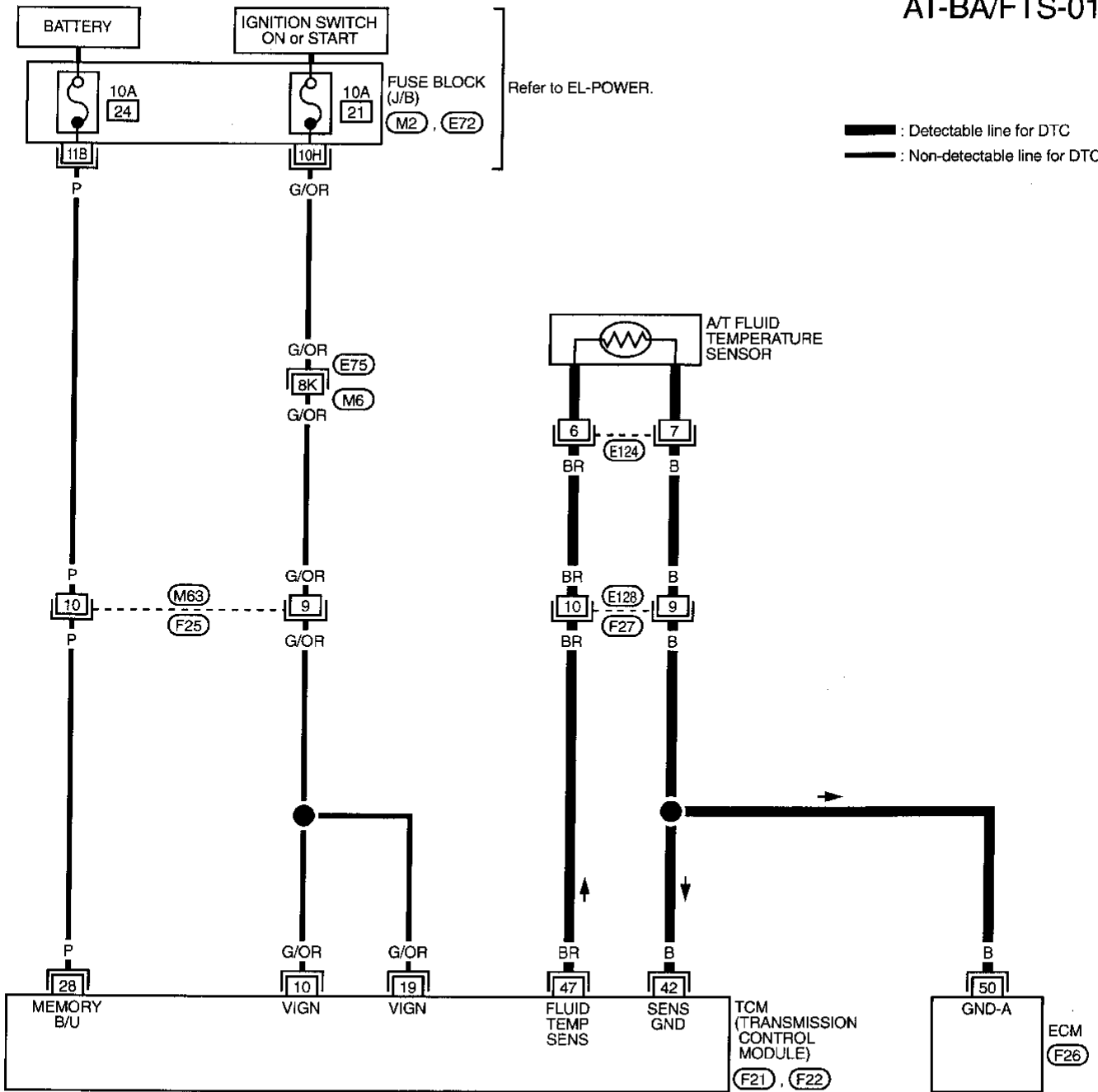
BT

HA

SC

EL

IDX



Refer to last page (Foldout page).
 M6, E75
 M2
 E72
 F26



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

Diagnostic Procedure

Diagnostic Procedure

NCAT0077

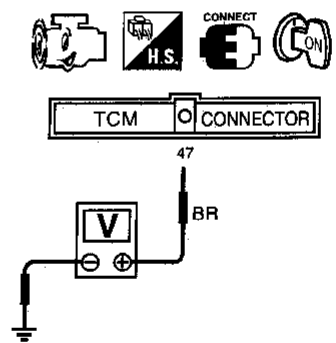
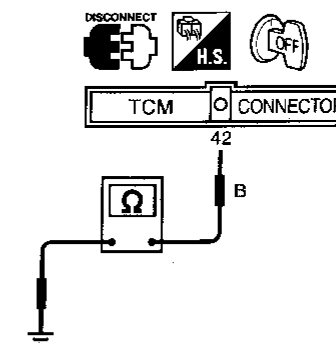
1	CHECK TCM POWER SOURCE
<ol style="list-style-type: none"> 1. Turn ignition switch to "ON" position. (Do not start engine.) 2. Check voltage between TCM terminals 10, 19, 28 and ground. Voltage: Battery voltage 3. Turn ignition switch to "OFF" position. 4. Check voltage between TCM terminal 28 and ground. Voltage: Battery voltage 	
SAT461J	
OK or NG	
OK	▶ GO TO 2.
NG	<p>Check the following items:</p> <ul style="list-style-type: none"> • Harness for short or open between ignition switch and TCM (Main harness) • Ignition switch and fuse Refer to EL section ("POWER SUPPLY ROUTING").

2	CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY
<ol style="list-style-type: none"> 1. Turn ignition switch to "OFF" position. 2. Disconnect terminal cord assembly connector in engine compartment. 3. Check resistance between terminals 6 and 7 when A/T is cold. Resistance: Cold [20°C (68°F)] Approximately 2.5 kΩ 	
SAT462J	
OK or NG	
OK (With CONSULT)	▶ GO TO 3.
OK (Without CONSULT)	▶ GO TO 4.
NG	<ol style="list-style-type: none"> 1. Remove oil pan. 2. Check the following items: <ul style="list-style-type: none"> • A/T fluid temperature sensor Refer to "Component Inspection", AT-186. • Harness of terminal cord assembly for short or open

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

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT)																																				
<p>Ⓟ With CONSULT</p> <ol style="list-style-type: none"> Start engine. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT. Read out the value of "FLUID TEMP SE". <p>Voltage: Cold [20°C (68°F)] → Hot [80°C (176°F)]: Approximately 1.5V → 0.5V</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <tr> <td>☆ MONITOR</td> <td>☆ NO FAIL</td> <td style="text-align: right;">▼</td> </tr> <tr> <td>VHCL/S SE-A/T</td> <td>0km/h</td> <td></td> </tr> <tr> <td>VHCL/S SE-MTR</td> <td>5km/h</td> <td></td> </tr> <tr> <td>THRTL POS SEN</td> <td>0.4V</td> <td></td> </tr> <tr> <td>FLUID TEMP SE</td> <td>1.2V</td> <td></td> </tr> <tr> <td>BATTERY VOLT</td> <td>13.4V</td> <td></td> </tr> <tr> <td>ENGINE SPEED</td> <td>1024rpm</td> <td></td> </tr> <tr> <td>OVERDRIVE SW</td> <td>O N</td> <td></td> </tr> <tr> <td>P/N POSI SW</td> <td>O N</td> <td></td> </tr> <tr> <td>R POSITION SW</td> <td>OFF</td> <td></td> </tr> </table> <p style="text-align: center; border: 1px solid black; padding: 5px; margin: 10px 0;">RECORD</p> <p style="text-align: right; margin-right: 20px;">SAT076H</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 15%; text-align: center;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td style="text-align: center;">NG</td> <td style="text-align: center;">▶</td> <td> <p>Check the following item:</p> <ul style="list-style-type: none"> Harness for short or open between TCM, ECM and terminal cord assembly (Main harness) Ground circuit for ECM Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY"). </td> </tr> </table>		☆ MONITOR	☆ NO FAIL	▼	VHCL/S SE-A/T	0km/h		VHCL/S SE-MTR	5km/h		THRTL POS SEN	0.4V		FLUID TEMP SE	1.2V		BATTERY VOLT	13.4V		ENGINE SPEED	1024rpm		OVERDRIVE SW	O N		P/N POSI SW	O N		R POSITION SW	OFF		OK	▶	GO TO 5.	NG	▶	<p>Check the following item:</p> <ul style="list-style-type: none"> Harness for short or open between TCM, ECM and terminal cord assembly (Main harness) Ground circuit for ECM Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY").
☆ MONITOR	☆ NO FAIL	▼																																			
VHCL/S SE-A/T	0km/h																																				
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BATTERY VOLT	13.4V																																				
ENGINE SPEED	1024rpm																																				
OVERDRIVE SW	O N																																				
P/N POSI SW	O N																																				
R POSITION SW	OFF																																				
OK	▶	GO TO 5.																																			
NG	▶	<p>Check the following item:</p> <ul style="list-style-type: none"> Harness for short or open between TCM, ECM and terminal cord assembly (Main harness) Ground circuit for ECM Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY"). 																																			

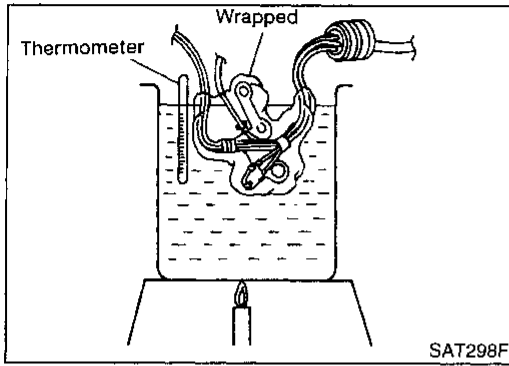
4	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT)						
<p>ⓧ Without CONSULT</p> <ol style="list-style-type: none"> Start engine. Check voltage between TCM terminal 47 and ground while warming up A/T. <p>Voltage: Cold [20°C (68°F)] → Hot [80°C (176°F)]: Approximately 1.5V → 0.5V</p>  <p style="text-align: right; margin-right: 20px;">SAT463J</p> <ol style="list-style-type: none"> Turn ignition switch to "OFF" position. Disconnect TCM harness connector. Check resistance between terminal 42 and ground. <p>Continuity should exist.</p>  <p style="text-align: right; margin-right: 20px;">SAT464J</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 15%; text-align: center;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td style="text-align: center;">NG</td> <td style="text-align: center;">▶</td> <td> <p>Check the following item:</p> <ul style="list-style-type: none"> Harness for short or open between TCM, ECM and terminal cord assembly (Main harness) Ground circuit for ECM Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY"). </td> </tr> </table>		OK	▶	GO TO 5.	NG	▶	<p>Check the following item:</p> <ul style="list-style-type: none"> Harness for short or open between TCM, ECM and terminal cord assembly (Main harness) Ground circuit for ECM Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY").
OK	▶	GO TO 5.					
NG	▶	<p>Check the following item:</p> <ul style="list-style-type: none"> Harness for short or open between TCM, ECM and terminal cord assembly (Main harness) Ground circuit for ECM Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY"). 					

5	CHECK DTC						
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-182.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 15%; text-align: center;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>INSPECTION END</td> </tr> <tr> <td style="text-align: center;">NG</td> <td style="text-align: center;">▶</td> <td> <ol style="list-style-type: none"> Perform TCM input/output signal inspection. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. </td> </tr> </table>		OK	▶	INSPECTION END	NG	▶	<ol style="list-style-type: none"> Perform TCM input/output signal inspection. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.
OK	▶	INSPECTION END					
NG	▶	<ol style="list-style-type: none"> Perform TCM input/output signal inspection. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. 					

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

Component Inspection



Component Inspection A/T FLUID TEMPERATURE SENSOR

NCAT0078

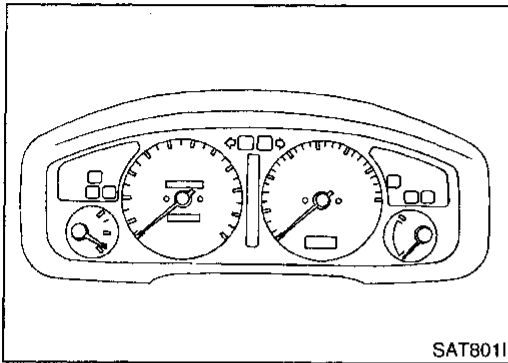
NCAT0078S01

- For removal, refer to AT-234.
- Check resistance between two terminals while changing temperature as shown at left.

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

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

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EM

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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	 When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1V and more than 4.5V

EC



FE

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"> • Harness or connectors (The sensor circuit is open or shorted.) • Vehicle speed sensor

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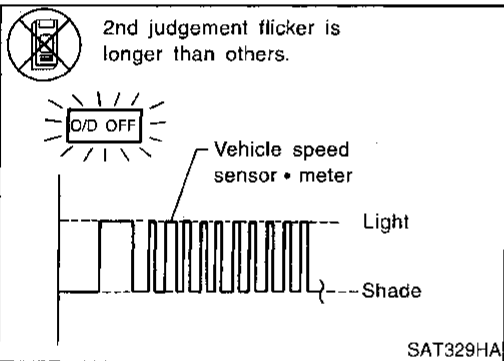
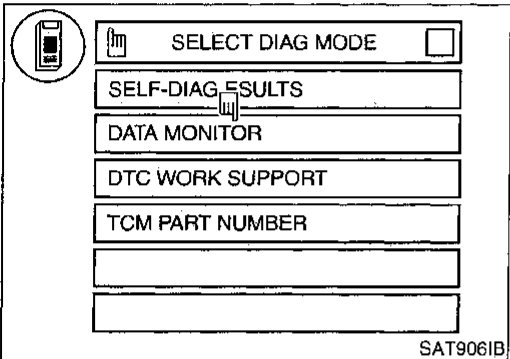
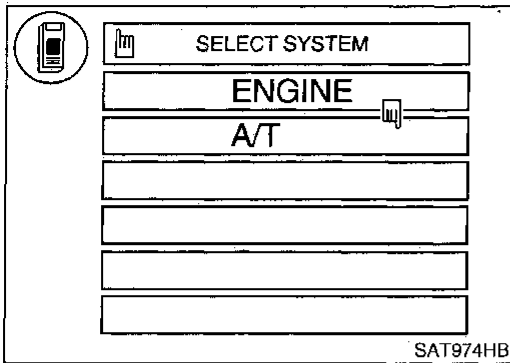
SC

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.

④ With CONSULT

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

⊗ Without CONSULT

- 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-48.

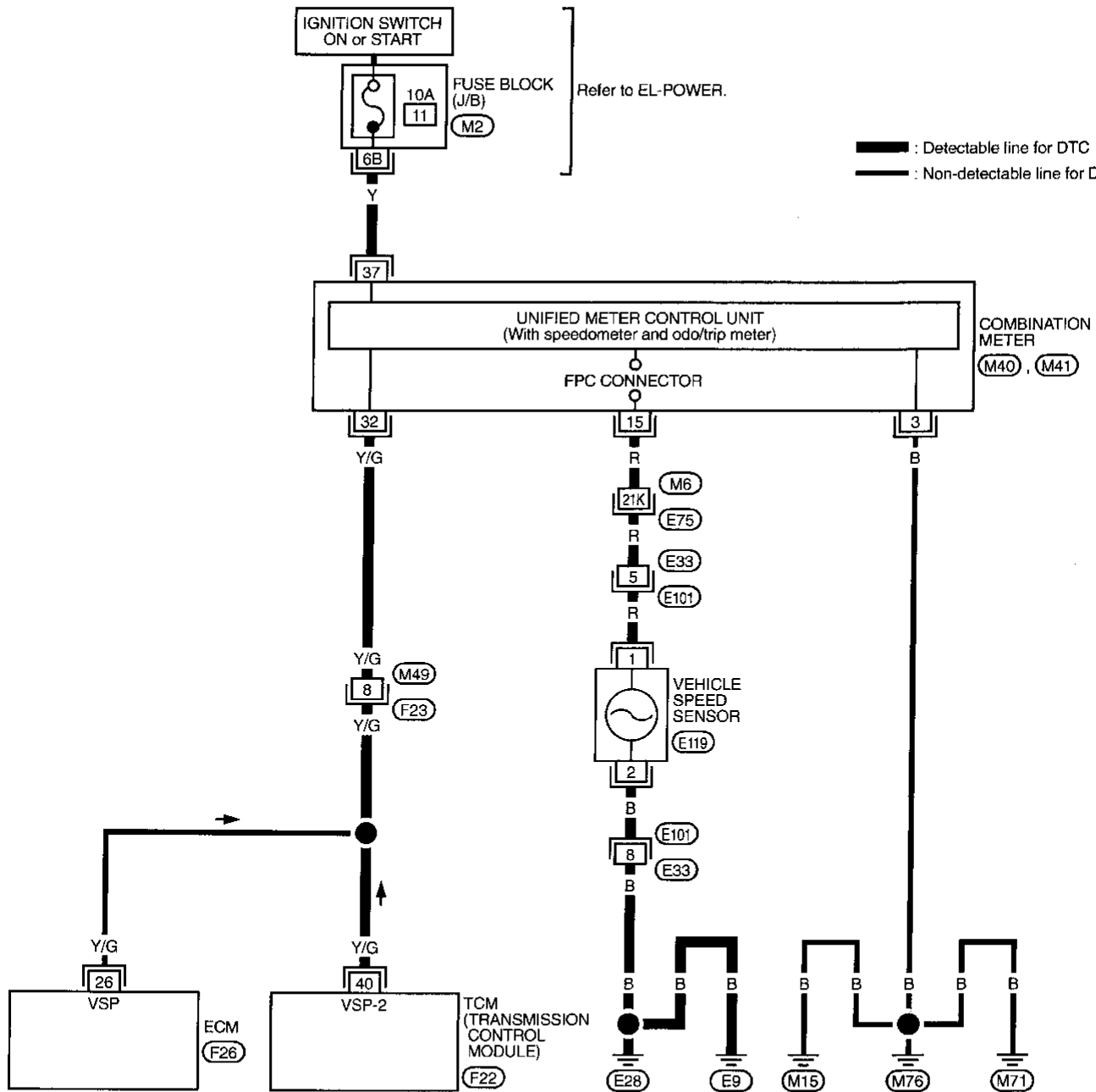
DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR

Wiring Diagram — AT — VSSMTR

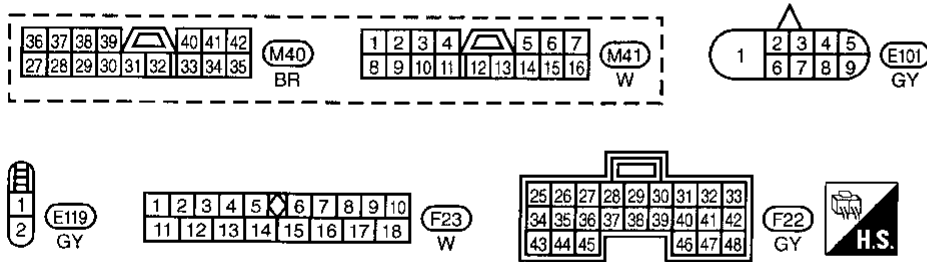
Wiring Diagram — AT — VSSMTR

NCAT0215

AT-VSSMTR-01



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



Refer to last page (Foldout page).

M6, E75
 M2
 F26

GI
 MA
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 LC
 EC
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 SU
 BR
 ST
 RS
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 HA
 SC
 EL
 IDX

TAT190

DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR

Diagnostic Procedure

Diagnostic Procedure

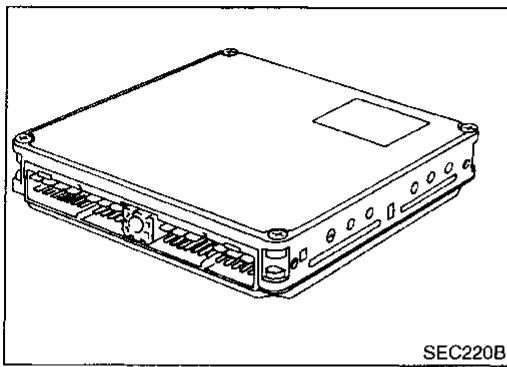
NCAT0080

1	CHECK INPUT SIGNAL																														
<p>With CONSULT</p> <ol style="list-style-type: none"> Start engine. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT. Read out the value of "VHCL/S SE·MTR" while driving. Check the value changes according to driving speed. <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td>☆ MONITOR</td> <td>☆ NO FAIL</td> <td style="text-align: right;">▼</td> </tr> <tr> <td>VHCL/S SE·A/T</td> <td>0km/h</td> <td></td> </tr> <tr> <td>VHCL/S SE·MTR</td> <td>5km/h</td> <td></td> </tr> <tr> <td>THRTL POS SEN</td> <td>0.4V</td> <td></td> </tr> <tr> <td>FLUID TEMP SE</td> <td>1.2V</td> <td></td> </tr> <tr> <td>BATTERY VOLT</td> <td>13.4V</td> <td></td> </tr> <tr> <td>ENGINE SPEED</td> <td>1024rpm</td> <td></td> </tr> <tr> <td>OVERDRIVE SW</td> <td>O N</td> <td></td> </tr> <tr> <td>P/N POSI SW</td> <td>O N</td> <td></td> </tr> <tr> <td>R POSITION SW</td> <td>OFF</td> <td></td> </tr> </table> <div style="border: 1px solid black; padding: 2px; text-align: center; margin-top: 5px;">RECORD</div> </div> <p style="text-align: right; margin-top: 10px;">SAT076H</p>		☆ MONITOR	☆ NO FAIL	▼	VHCL/S SE·A/T	0km/h		VHCL/S SE·MTR	5km/h		THRTL POS SEN	0.4V		FLUID TEMP SE	1.2V		BATTERY VOLT	13.4V		ENGINE SPEED	1024rpm		OVERDRIVE SW	O N		P/N POSI SW	O N		R POSITION SW	OFF	
☆ MONITOR	☆ NO FAIL	▼																													
VHCL/S SE·A/T	0km/h																														
VHCL/S SE·MTR	5km/h																														
THRTL POS SEN	0.4V																														
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ENGINE SPEED	1024rpm																														
OVERDRIVE SW	O N																														
P/N POSI SW	O N																														
R POSITION SW	OFF																														
<p>Without CONSULT</p> <ol style="list-style-type: none"> Start engine. 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. <p>Voltage: Voltage varies between less than 1V and more than 4.5V.</p> <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: right; margin-top: 10px;">SAT465J</p>																															
OK or NG																															
OK	▶ GO TO 2.																														
NG	<p>Check the following items:</p> <ul style="list-style-type: none"> ● Vehicle speed sensor and ground circuit for vehicle speed sensor Refer to EL section ("METERS AND GAUGES"). ● Harness for short or open between TCM and vehicle speed sensor (Main harness) 																														

2	CHECK DTC
<p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-188.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ INSPECTION END
NG	<ol style="list-style-type: none"> Perform TCM input/output signal inspection. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

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

Description



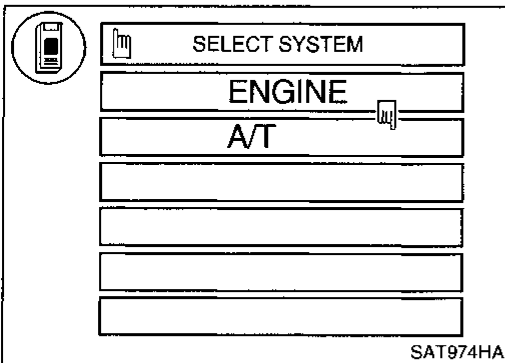
Description

The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the A/T. NCAT0218

ON BOARD DIAGNOSIS LOGIC

NCAT0218S01

Diagnostic Trouble Code No.	Malfunction is detected when	Check Item (Possible Cause)
P0 : CONTROL UNIT (RAM) CONTROL UNIT (ROM)	TCM memory (RAM) or (ROM) is malfunctioning.	• TCM



SAT974HA

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

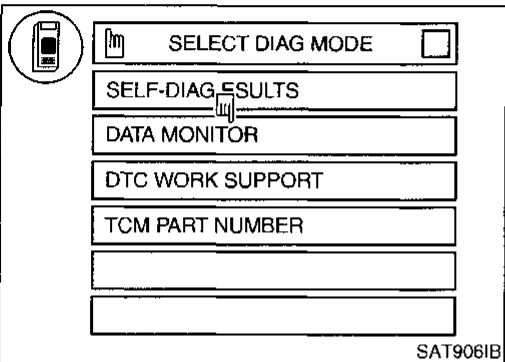
NCAT0218S02

NOTE:

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

With CONSULT

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode for A/T with CONSULT.
- 2) Start engine.
- 3) Run engine for at least 2 seconds at idle speed.



SAT906IB

Diagnostic Procedure

NCAT0219

1	INSPECTION START (WITH CONSULT)
With CONSULT 1. Turn ignition switch "ON" and select "SELF DIAG RESULTS" mode for A/T with CONSULT. 2. Touch "ERASE".	
▶	GO TO 2.

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

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

Diagnostic Procedure (Cont'd)

3	CHECK DTC AGAIN
Is the "CONTROL UNIT (RAM) or CONTROL UNIT (ROM)" displayed again?	
Yes or No	
Yes	▶ Replace TCM.
No	▶ INSPECTION END

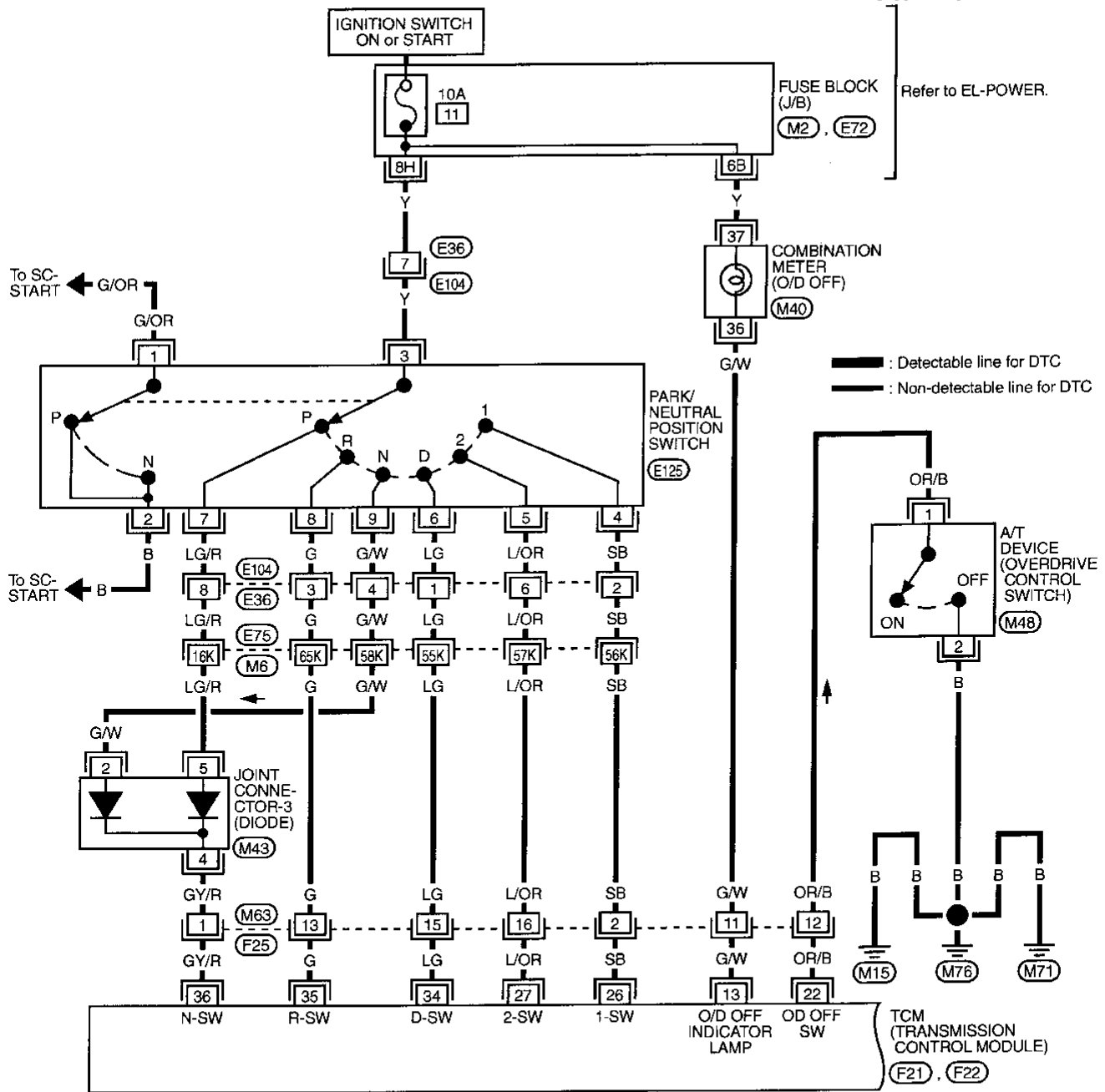
TROUBLE DIAGNOSES FOR SYMPTOMS

Wiring Diagram — AT — NONDTC

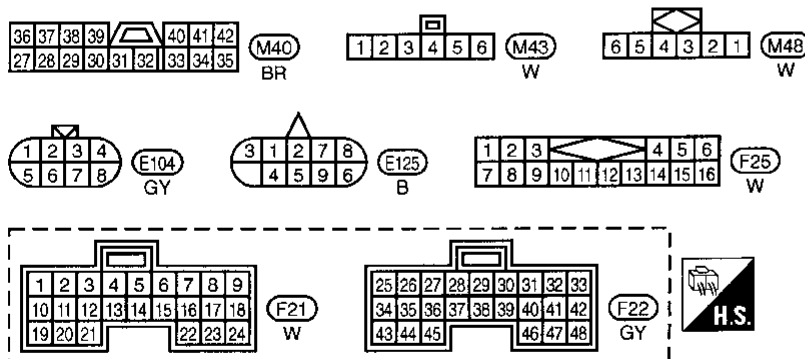
Wiring Diagram — AT — NONDTC

NCAT0216

AT-NONDTC-01



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



Refer to last page (Foldout page).

M6, E75

M2

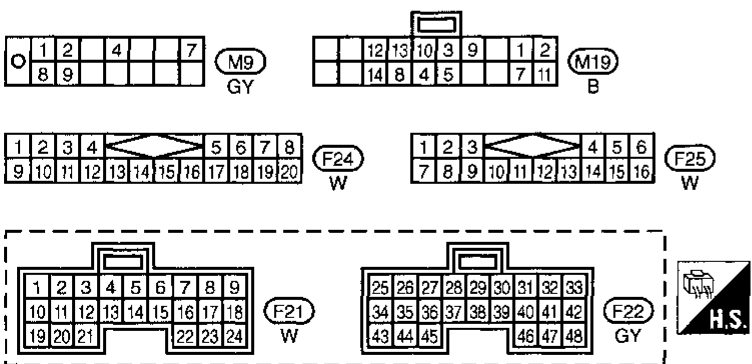
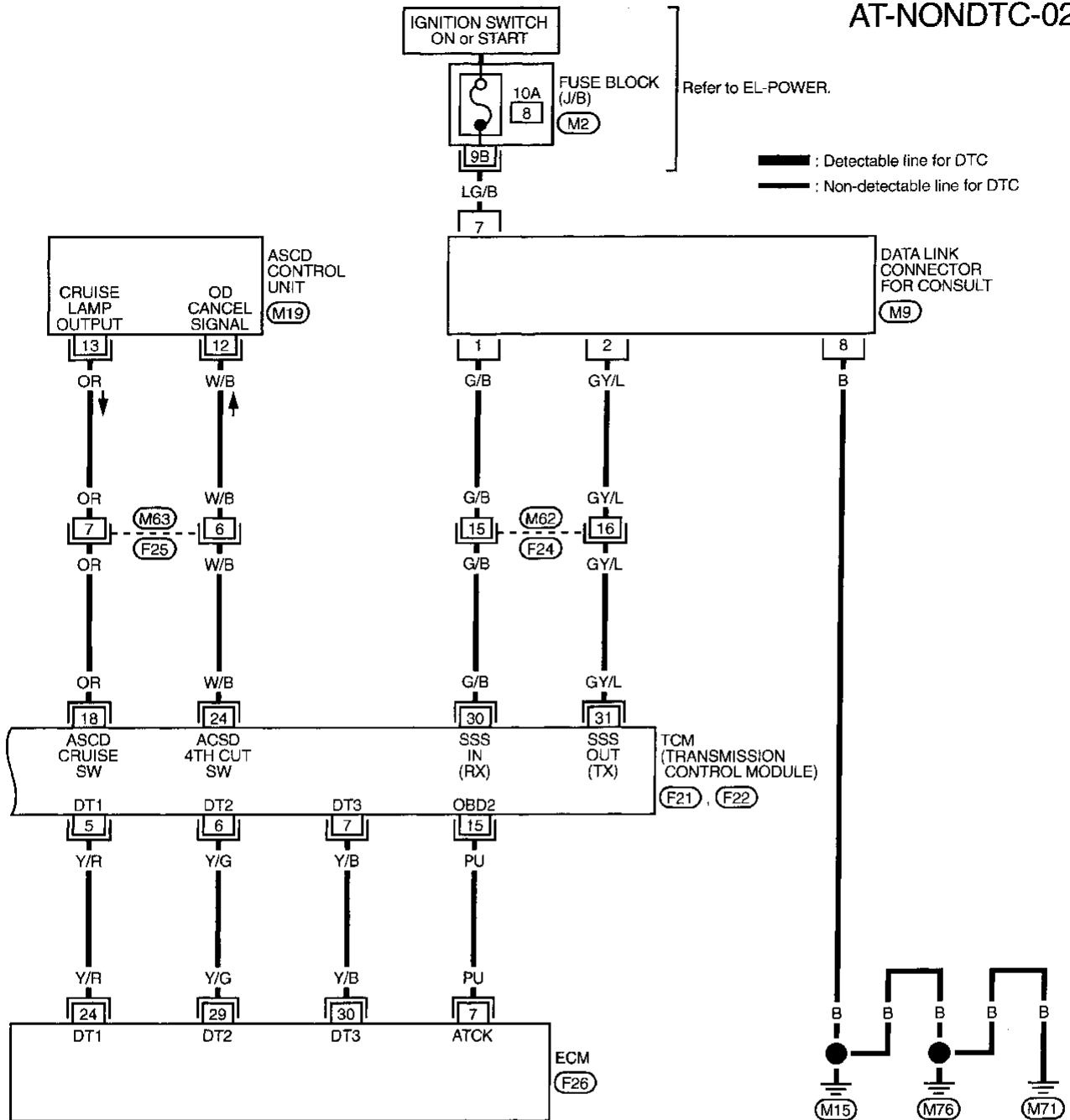
E72

TAT191

TROUBLE DIAGNOSES FOR SYMPTOMS

Wiring Diagram — AT — NONDTC (Cont'd)

AT-NONDTC-02



Refer to last page (Foldout page).



TROUBLE DIAGNOSES FOR SYMPTOMS

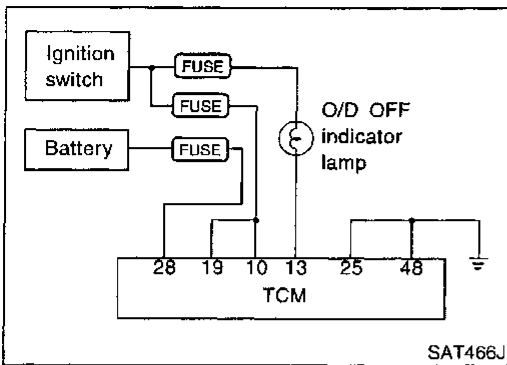
1. O/D OFF Indicator Lamp Does Not Come On

-NCAT0081

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

SYMPTOM:

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



SAT466J

1 CHECK TCM POWER SOURCE	
<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. Voltage: Battery voltage</p>	
<p>3. Turn ignition switch to "OFF" position.</p> <p>4. Check voltage between TCM terminal 28 and ground. Voltage: Battery voltage</p>	
OK or NG	
OK	▶ GO TO 2.
NG	▶ Check the following items: <ul style="list-style-type: none"> • Harness for short or open between ignition switch and TCM (Main harness) Refer to "Wiring Diagram — AT — MAIN", AT-90. • Ignition switch and fuse Refer to EL section ("POWER SUPPLY ROUTING").

SAT467J

2 CHECK TCM GROUND CIRCUIT	
<p>1. Turn ignition switch to "OFF" position.</p> <p>2. Disconnect TCM harness connector.</p> <p>3. Check continuity between TCM terminals 25, 48 and ground.</p>	
<p>Continuity should exist. If OK, check harness for short to ground and short to power.</p>	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors. Refer to "Wiring Diagram — AT — MAIN", AT-90.

SAT468J

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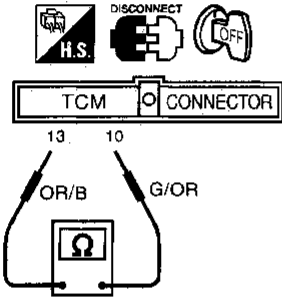
SC

EL

IDX

TROUBLE DIAGNOSES FOR SYMPTOMS

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

3	CHECK LAMP CIRCUIT
<p>1. Turn ignition switch to "OFF" position.</p> <p>2. Check resistance between TCM terminals 13 and 10. Resistance: 50 - 100Ω</p>	
	
SAT469J	
3. Reinstall any part removed.	
OK or NG	
OK	▶ GO TO 4.
NG	<p>▶ Check the following items:</p> <ul style="list-style-type: none"> ● O/D OFF indicator lamp Refer to EL section. ● Harness and fuse for short or open between ignition switch and O/D OFF indicator lamp (Main harness) Refer to EL section ("POWER SUPPLY ROUTING"). ● Harness for short or open between O/D OFF indicator lamp and TCM

4	CHECK SYMPTOM
Check again.	
OK or NG	
OK	▶ INSPECTION END
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>

TROUBLE DIAGNOSES FOR SYMPTOMS



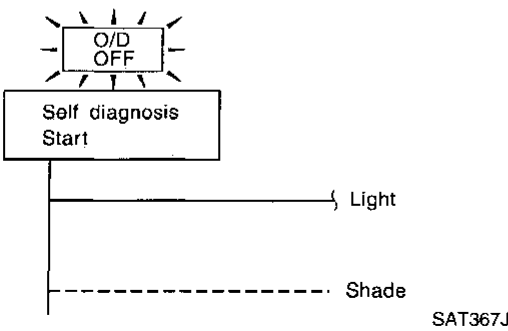
2. Engine Cannot Be Started In "P" and "N" Position

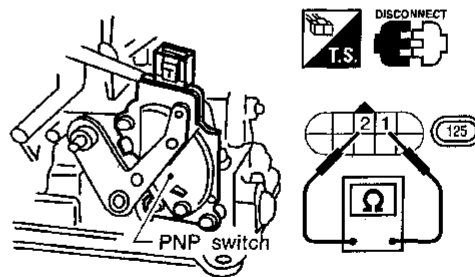
2. Engine Cannot Be Started In "P" and "N" Position

=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.

1	CHECK PNP SWITCH CIRCUIT
<p> With CONSULT Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?</p>	
<p> Without CONSULT Does self-diagnosis show damage to PNP switch circuit?</p>	
	
Yes or No	
Yes	▶ Check PNP switch circuit. Refer to "DTC P0705", AT-92.
No	▶ GO TO 2.

2	CHECK PNP SWITCH INSPECTION
<p>Check for short or open of PNP switch harness connector terminals 1 and 2. Refer to "Component Inspection", AT-96.</p>	
	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair or replace PNP switch.

3	CHECK STARTING SYSTEM
<p>Check starting system. Refer to EL section ("System Description", "STARTING SYSTEM").</p>	
OK or NG	
OK	▶ INSPECTION END
NG	▶ Repair or replace damaged parts.

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TROUBLE DIAGNOSES FOR SYMPTOMS

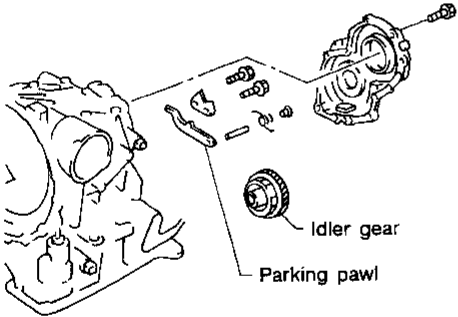
3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed

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.

1	CHECK PARKING COMPONENTS
<p>Check parking components. Refer to "Parking Pawl Components", AT-240, 245.</p>	
	
OK or NG	
OK	▶ INSPECTION END
NG	▶ Repair or replace damaged parts.

TROUBLE DIAGNOSES FOR SYMPTOMS

4. In "N" Position, Vehicle Moves

=NCAT0084

4. In "N" Position, Vehicle Moves

SYMPTOM:

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

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LC

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BR

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RS



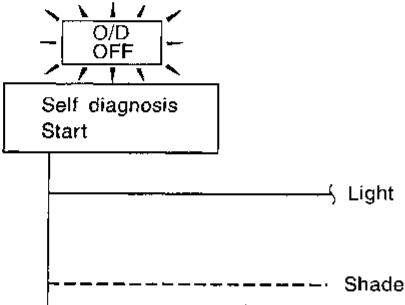
BT

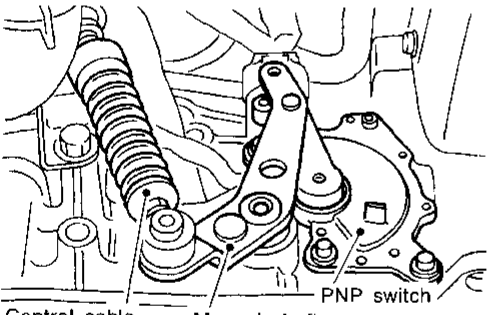
HA

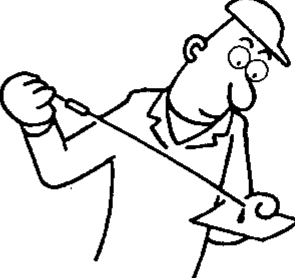
SC

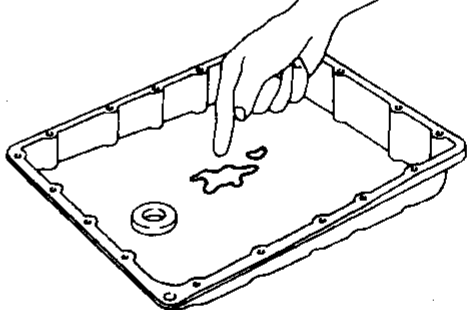
EL

IDX

1	CHECK PNP SWITCH CIRCUIT
<p> With CONSULT Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?</p>	
<p> Without CONSULT Does self-diagnosis show damage to inhibitor switch circuit?</p>	
	
SAT367J	
Yes or No	
Yes	▶ Check PNP switch circuit. Refer to "DTC P0705", AT-92.
No	▶ GO TO 2.

2	CHECK CONTROL CABLE
Check control cable. Refer to AT-235.	
	
SAT023JB	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Adjust control cable. Refer to AT-235.

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

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

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

TROUBLE DIAGNOSES FOR SYMPTOMS

5. Large Shock. "N" → "R" Position

-NCAT0085

5. Large Shock. "N" → "R" Position

SYMPTOM:

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

1	CHECK SELF-DIAGNOSTIC RESULTS
Does self-diagnosis show damage to A/T fluid temperature sensor, line pressure solenoid valve or throttle position sensor circuit?	
<p style="text-align: right;">SAT345HA</p>	
Yes or No	
Yes	▶ Check damaged circuit. Refer to "DTC P0710, P0745 or P1705", AT-97, 152 or 168.
No	▶ GO TO 2.

2	CHECK THROTTLE POSITION SENSOR
Check throttle position sensor. Refer to EC section ["Throttle Position Sensor (DTC: 0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].	
<p style="text-align: right;">SAT413J</p>	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair or replace throttle position sensor.

3	CHECK LINE PRESSURE
Check line pressure at idle with selector lever in "D" position. Refer to "Line Pressure Test", AT-62.	
<p style="text-align: right;">SAT494G</p>	
OK or NG	
OK	▶ GO TO 4.
NG	▶ <ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> • Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) • Line pressure solenoid valve

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

TROUBLE DIAGNOSES FOR SYMPTOMS


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

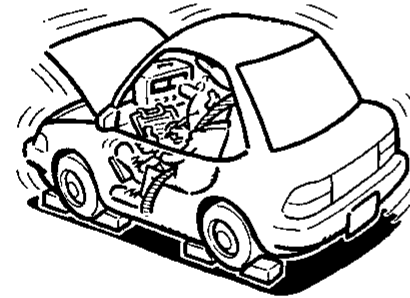
6. Vehicle Does Not Creep Backward In "R" Position

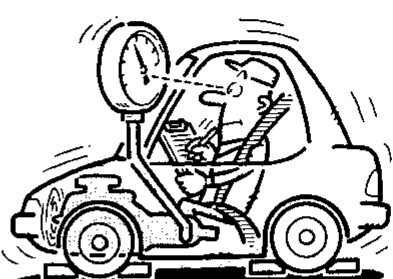
-NCAT0086

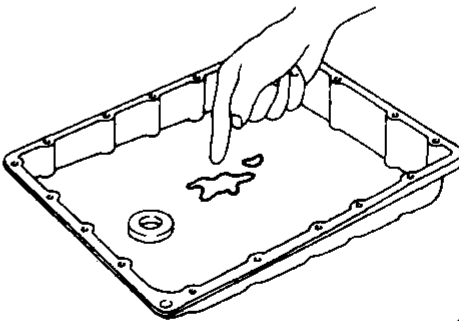
SYMPTOM:

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

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

2	CHECK STALL TEST
Check stall revolution with selector lever in "1" and "R" positions.	
	
SAT493G	
OK or NG	
OK	▶ GO TO 3.
OK in "1" position, NG in "R" position	▶ <ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-234. 2. Check the following items: <ul style="list-style-type: none"> ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> ● Oil pump assembly ● Torque converter ● Reverse clutch assembly ● High clutch assembly
NG in both "1" and "R" positions	▶ GO TO 6.

3	CHECK LINE PRESSURE
Check line pressure at idle with selector lever in "R" position. Refer to "Line Pressure Test", AT-62.	
	
SAT494G	
OK or NG	
OK	▶ GO TO 4.
NG	▶ <ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-234. 2. Check the following items: <ul style="list-style-type: none"> ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following item: <ul style="list-style-type: none"> ● Oil pump assembly

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

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TROUBLE DIAGNOSES FOR SYMPTOMS

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

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

6		DETECT MALFUNCTIONING ITEM
1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-234. 2. Check the following items: <ul style="list-style-type: none"> ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> ● Oil pump assembly ● Torque converter ● Reverse clutch assembly ● High clutch assembly ● Low & reverse brake assembly ● Low one-way clutch 		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

TROUBLE DIAGNOSES FOR SYMPTOMS


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

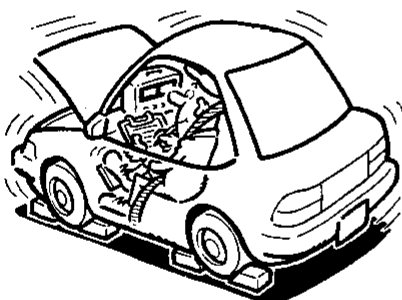
7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position

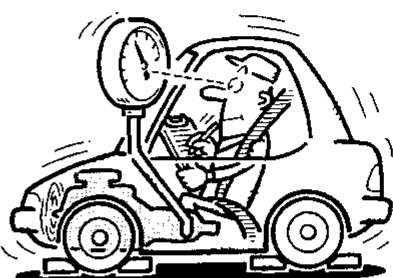
-NCAT0097

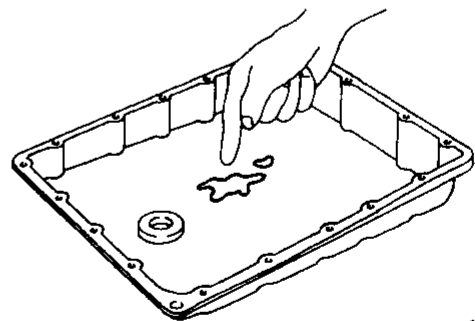
SYMPTOM:

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

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

2	CHECK STALL TEST
Check stall revolution with selector lever in "D" position. Refer to "Stall Test", AT-58.	
	
SAT493G	
OK or NG	
OK	▶ GO TO 3.
NG	▶ GO TO 6.

3	CHECK LINE PRESSURE
Check line pressure at idle with selector lever in "D" position. Refer to "Line Pressure Test", AT-62.	
	
SAT494G	
OK or NG	
OK	▶ GO TO 4.
NG	▶ <ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> • Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) • Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following item: <ul style="list-style-type: none"> • Oil pump assembly

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

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

6	DETECT MALFUNCTIONING ITEM
<ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> ● Oil pump assembly ● Forward clutch assembly ● Forward one-way clutch ● Low one-way clutch ● Low & reverse brake assembly ● Torque converter 	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair or replace damaged parts.

TROUBLE DIAGNOSES FOR SYMPTOMS

8. Vehicle Cannot Be Started From D₁

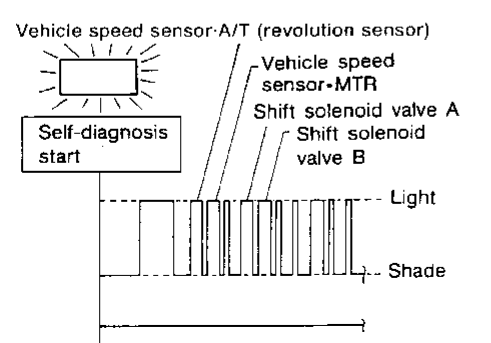
8. Vehicle Cannot Be Started From D₁

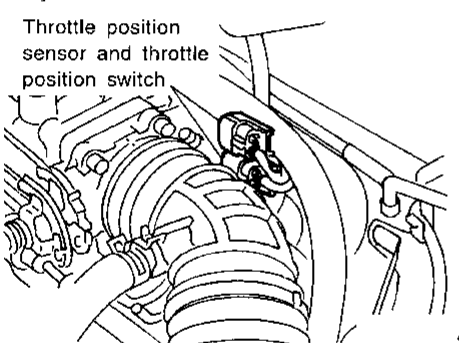
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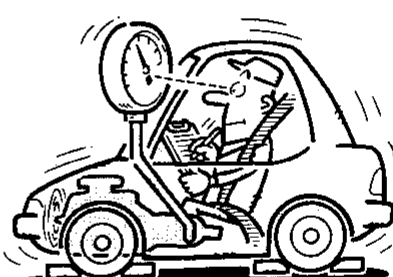
SYMPTOM:

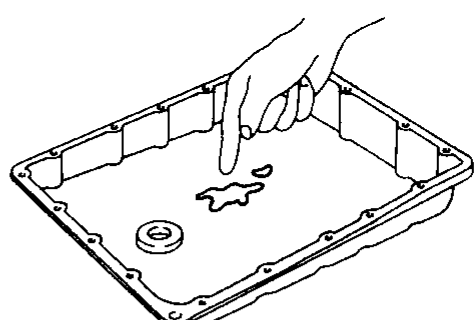
Vehicle cannot be started from D₁ on Cruise test — Part 1.

1	CHECK SYMPTOM
Is 6. Vehicle Does Not Creep Backward In "R" Position OK?	
Yes or NO	
Yes	▶ GO TO 2.
No	▶ Go to 6. Vehicle Does Not Creep Backward In "R" Position, AT-201.

2	CHECK SELF-DIAGNOSTIC RESULTS
Does self-diagnosis show damage to vehicle speed sensor-A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor-MTR after cruise test?	
 <p style="text-align: right;">SAT934FB</p>	
Yes or No	
Yes	▶ Check damaged circuit. Refer to "DTC P0720, P0750, P0755 or VHCL SPEED SEN-MTR", AT-103, 158, 163 or 187.
No	▶ GO TO 3.

3	CHECK THROTTLE POSITION SENSOR
Check throttle position sensor. Refer to EC section ["Throttle Position Sensor (DTC: 0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].	
 <p style="text-align: right;">SAT413J</p>	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace throttle position sensor.

4	CHECK LINE PRESSURE
Check line pressure at stall point with selector lever in "D" position. Refer to "Line Pressure Test", AT-75.	
 <p style="text-align: right;">SAT494G</p>	
OK or NG	
OK	▶ GO TO 5.
NG	▶ GO TO 8.

5	CHECK A/T FLUID CONDITION
<ol style="list-style-type: none"> 1. Remove oil pan. 2. Check A/T fluid condition. 	
 <p style="text-align: right;">SAT171B</p>	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 8.

6	DETECT MALFUNCTIONING ITEM
<ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> ● Shift valve A ● Shift valve B ● Shift solenoid valve A ● Shift solenoid valve B ● Pilot valve ● Pilot filter 	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Repair or replace damaged parts.

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TROUBLE DIAGNOSES FOR SYMPTOMS

8. Vehicle Cannot Be Started From D₁ (Cont'd)

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

8	DETECT MALFUNCTIONING ITEM
<ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> ● Shift valve A ● Shift valve B ● Shift solenoid valve A ● Shift solenoid valve B ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> ● Forward clutch assembly ● Forward one-way clutch ● Low one-way clutch ● High clutch assembly ● Torque converter ● Oil pump assembly 	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Repair or replace damaged parts.

TROUBLE DIAGNOSES FOR SYMPTOMS

9. A/T Does Not Shift: D₁ → D₂ Or Does Not Kickdown: D₄ → D₂

9. A/T Does Not Shift: D₁ → D₂ Or Does Not Kickdown: D₄ → D₂

≈NCAT0089

SYMPTOM:

A/T does not shift from D₁ to D₂ at the specified speed.

A/T does not shift from D₄ to D₂ when depressing accelerator pedal fully at the specified speed.

1	CHECK SYMPTOM
Are 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From D ₁ , OK?	
Yes or No	
Yes	▶ GO TO 2.
No	▶ Go to 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From D ₁ , AT-203, 205.

2	CHECK PNP SWITCH CIRCUIT
<p>Ⓟ With CONSULT Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?</p>	
<p>ⓧ Without CONSULT Does self-diagnosis show damage to PNP switch circuit?</p>	
Yes or No	
Yes	▶ Check PNP switch circuit. Refer to "DTC P0705", AT-92.
No	▶ GO TO 3.

3	CHECK VEHICLE SPEED SENSOR-A/T AND CHECK VEHICLE SPEED SENSOR-MTR CIRCUIT
Check vehicle speed sensor-A/T (revolution sensor) and vehicle speed sensor-MTR circuit. Refer to "DTC P0720 and VHCL SPEED SEN-MTR", AT-103, AT-187.	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace vehicle speed sensor-A/T (revolution sensor) and vehicle speed sensor-MTR circuits.

4	CHECK THROTTLE POSITION SENSOR
Check throttle position sensor. Refer to EC section ["Throttle Position Sensor (DTC: 0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair or replace throttle position sensor.

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

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)

6	DETECT MALFUNCTIONING ITEM	
1. Remove control valve. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> ● Shift valve A ● Shift solenoid valve A ● Pilot valve ● Pilot filter 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

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

8	DETECT MALFUNCTIONING ITEM	
1. Remove control valve. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> ● Shift valve A ● Shift solenoid valve A ● Pilot valve ● Pilot filter 		
3. Disassemble A/T.		
4. Check the following items:		
<ul style="list-style-type: none"> ● Servo piston assembly ● Brake band ● Oil pump assembly 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

TROUBLE DIAGNOSES FOR SYMPTOMS

10. A/T Does Not Shift: D₂ → D₃

10. A/T Does Not Shift: D₂ → D₃



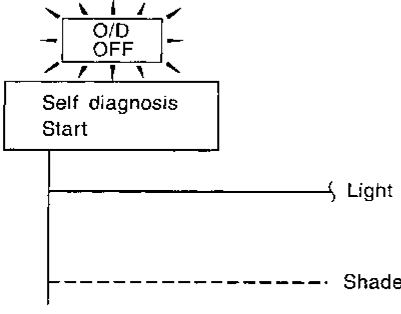
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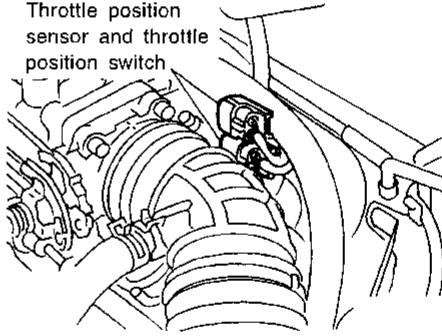
SYMPTOM:

A/T does not shift from D₂ to D₃ at the specified speed.

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1	CHECK SYMPTOM
Are 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From D, OK?	
Yes or No	
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, AT-203, 205.

2	CHECK PNP SWITCH CIRCUIT
<p> With CONSULT Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?</p>	
<p> Without CONSULT Does self-diagnosis show damage to PNP switch circuit?</p>	
	
SAT367J	
Yes or No	
Yes	▶ Check PNP switch circuit. Refer to "DTC P0705", AT-92.
No	▶ GO TO 3.

3	CHECK THROTTLE POSITION SENSOR
Check throttle position sensor. Refer to EC section ["Throttle Position Sensor (DTC: 0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].	
	
SAT413J	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace throttle position sensor.

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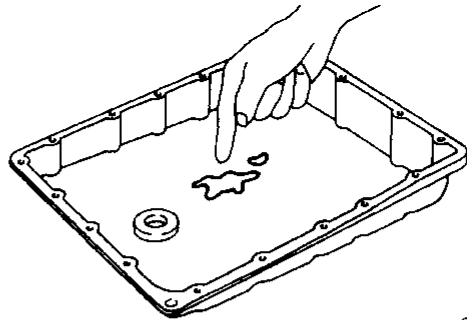
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4	CHECK A/T FLUID CONDITION
<ol style="list-style-type: none"> Remove oil pan. Check A/T fluid condition. 	
	
SAT171B	
OK or NG	
OK	▶ GO TO 5.
NG	▶ GO TO 7.

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5	DETECT MALFUNCTIONING ITEM
<ol style="list-style-type: none"> Remove control valve assembly. Refer to AT-234. Check the following items: <ul style="list-style-type: none"> Shift valve B Shift solenoid valve B Pilot valve Pilot filter 	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Repair or replace damaged parts.

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TROUBLE DIAGNOSES FOR SYMPTOMS

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

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

7		DETECT MALFUNCTIONING ITEM
1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> ● Shift valve B ● Shift solenoid valve B ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> ● Servo piston assembly ● High clutch assembly ● Oil pump assembly 		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

TROUBLE DIAGNOSES FOR SYMPTOMS

11. A/T Does Not Shift: D₃ → D₄

—NCA70091

11. A/T Does Not Shift: D₃ → D₄

SYMPTOM:

- A/T does not shift from D₃ to D₄ at the specified speed.
- A/T must be warm before D₃ to D₄ shift will occur.

1	CHECK SYMPTOM	
Are 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From D ₁ , OK?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Go to 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From D ₁ , AT-203, 205.

2	CHECK SELF-DIAGNOSTIC RESULTS	
<p>Ⓟ With CONSULT Does self-diagnosis, after cruise test, show damage to any of the following circuits?</p> <ul style="list-style-type: none"> • PNP switch • Overdrive control switch • A/T fluid temperature sensor • Vehicle speed sensor-A/T (revolution sensor) • Shift solenoid valve A or B • Vehicle speed sensor-MTR 		
<p style="text-align: right;">SAT363HC</p>		
Yes or No		
Yes	▶	Check damaged circuit. Refer to "DTC P0705, P0710, P0720, P0750, P0755 or VHCL SPEED SEN-MTR", AT-92, 97, 103, 158, 163 or 187.
No	▶	GO TO 3.

3	CHECK THROTTLE POSITION SENSOR	
Check throttle position sensor. Refer to EC section ["Throttle Position Sensor (DTC: 0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].		
<p style="text-align: right;">SAT413J</p>		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace throttle position sensor.

4	CHECK A/T FLUID CONDITION	
<ol style="list-style-type: none"> 1. Remove oil pan. 2. Check A/T fluid condition. 		
<p style="text-align: right;">SAT171B</p>		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 7.

5	DETECT MALFUNCTIONING ITEM	
<ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> • Shift valve B • Overrun clutch control valve • Shift solenoid valve B • Pilot valve • Pilot filter 		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

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TROUBLE DIAGNOSES FOR SYMPTOMS

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

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

7	DETECT MALFUNCTIONING ITEM	
<ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> ● Shift valve B ● Overrun clutch control valve ● Shift solenoid valve B ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> ● Servo piston assembly ● Brake band ● Torque converter ● Oil pump assembly 		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

TROUBLE DIAGNOSES FOR SYMPTOMS

12. A/T Does Not Perform Lock-up

12. A/T Does Not Perform Lock-up

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SYMPTOM:

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

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1 CHECK SELF-DIAGNOSTIC RESULTS	
Does self-diagnosis show damage to torque converter clutch solenoid valve circuit after cruise test?	
SAT346H	
Yes or No	
Yes	▶ Check torque converter clutch solenoid valve circuit. Refer to "DTC P0740", AT-139.
No	▶ GO TO 2.

3 DETECT MALFUNCTIONING ITEM	
1. Remove control valve. Refer to AT-234.	
2. Check following items:	
<ul style="list-style-type: none"> • Torque converter clutch control valve • Torque converter relief valve • Torque converter clutch solenoid valve • Pilot valve • Pilot filter 	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace damaged parts.

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

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2 CHECK THROTTLE POSITION SENSOR	
Check throttle position sensor. Refer to EC section ["Throttle Position Sensor (DTC: 0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].	
SAT413J	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair or replace throttle position sensor.

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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

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SYMPTOM:

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

1	CHECK DIAGNOSTIC RESULTS
Does self-diagnosis show damage to engine speed signal circuit after cruise test?	
SAT347H	
Yes or No	
Yes	▶ Check engine speed signal circuit. Refer to "DTC P0725", AT-108.
No	▶ GO TO 2.

2	CHECK A/T FLUID CONDITION
1. Remove oil pan. 2. Check A/T fluid condition.	
SAT171B	
OK or NG	
OK	▶ GO TO 3.
NG	▶ GO TO 5.

3	DETECT MALFUNCTIONING ITEM
1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> ● Torque converter clutch control valve ● Pilot valve ● Pilot filter 	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace damaged parts.

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

5	DETECT MALFUNCTIONING ITEM
1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> ● Torque converter clutch control valve ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check torque converter and oil pump assembly.	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace damaged parts.

TROUBLE DIAGNOSES FOR SYMPTOMS



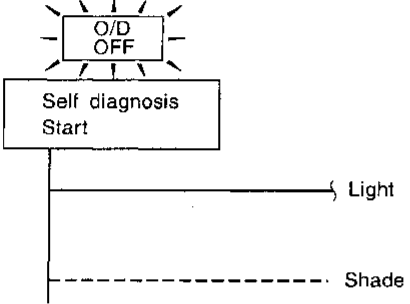
14. Lock-up Is Not Released

14. Lock-up Is Not Released

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SYMPTOM:

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

1	CHECK THROTTLE POSITION SWITCH CIRCUIT
<p> With CONSULT Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to closed throttle position switch circuit?</p>	
<p> Without CONSULT Does self-diagnosis show damage to closed throttle position switch circuit?</p>	
 <p style="text-align: right;">SAT367J</p>	
Yes or No	
Yes	▶ Check closed throttle position switch circuit. Refer to "DTC P0705", AT-92.
No	▶ GO TO 2.

2	CHECK SYMPTOM
Check again.	
OK or NG	
OK	▶ INSPECTION END
NG	▶ <ol style="list-style-type: none"> 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

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

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

SYMPTOM:

- Engine speed does not smoothly return to idle when A/T shifts from D_4 to D_3 .
- Vehicle does not decelerate by engine brake when turning overdrive control switch OFF.
- Vehicle does not decelerate by engine brake when shifting A/T from "D" to "2" position.

1	CHECK SELF-DIAGNOSTIC RESULTS
Does self-diagnosis show damage to overrun clutch solenoid valve circuit after cruise test?	
<p>The diagram shows a pulse train representing a self-diagnosis test. A box labeled 'Self-diagnosis start' is connected to the beginning of the pulse train. A label 'Overrun clutch solenoid valve' points to the pulse train. A 'Light' is shown as a horizontal line above the pulses, and a 'Shade' is shown as a horizontal line below the pulses.</p>	
SAT348H	
Yes or NO	
Yes	▶ Check overrun clutch solenoid valve circuit. Refer to "DTC P1760", AT-176.
No	▶ GO TO 2.

3	CHECK A/T FLUID CONDITION
<ol style="list-style-type: none"> 1. Remove oil pan. 2. Check A/T fluid condition. 	
<p>A hand is shown pointing to a puddle of fluid on the bottom of an oil pan.</p>	
SAT171B	
OK or NG	
OK	▶ GO TO 4.
NG	▶ GO TO 6.

2	CHECK THROTTLE POSITION SENSOR
Check throttle position sensor. Refer to EC section ["Throttle Position Sensor (DTC: 0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].	
<p>The diagram shows the throttle position sensor and throttle position switch installed on the throttle body.</p>	
SAT413J	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair or replace throttle position sensor.

4	DETECT MALFUNCTIONING ITEM
<ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> • Overrun clutch control valve • Overrun clutch reducing valve • Overrun clutch solenoid valve 	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair or replace damaged parts.

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

TROUBLE DIAGNOSES FOR SYMPTOMS

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

6	DETECT MALFUNCTIONING ITEM	
	1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: <ul style="list-style-type: none"> ● Overrun clutch control valve ● Overrun clutch reducing valve ● Overrun clutch solenoid valve 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> ● Overrun clutch assembly ● Oil pump assembly 	
	OK or NG	
OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

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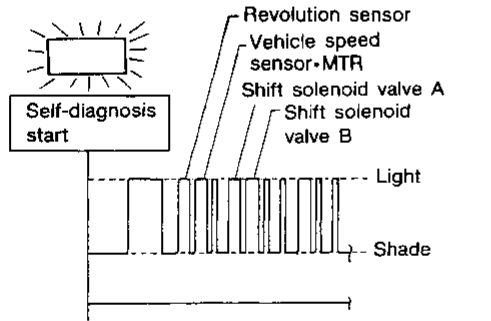
16. Vehicle Does Not Start From D_1

SYMPTOM:

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

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1	CHECK SELF-DIAGNOSTIC RESULTS	
	Does self-diagnosis show damage to vehicle speed sensor-A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor-MTR after cruise test?	
		
	SAT934FA	
	Yes or No	
Yes	▶	Check damaged circuit. Refer to "DTC P0720, P0750, P0755 or VHCL SPEED SEN-MTR", AT-103, 158, 163 or 187.
No	▶	GO TO 2.

2	CHECK SYMPTOM	
	Check again.	
	OK or NG	
OK	▶	Go to 8. Vehicle Cannot Be Started From D_1 , AT-205.
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



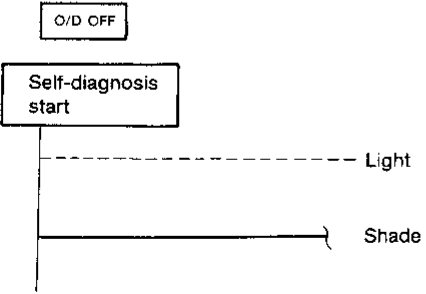
17. A/T Does Not Shift: D₄ → D₃, When Overdrive Control Switch "ON" → "OFF"

17. A/T Does Not Shift: D₄ → D₃, When Overdrive Control Switch "ON" → "OFF"

=NCAT0097

SYMPTOM:

A/T does not shift from D₄ to D₃ when changing overdrive control switch to "OFF" position.

1	CHECK OVERDRIVE CONTROL SWITCH CIRCUIT
<p> With CONSULT Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to overdrive control switch circuit?</p>	
<p> Without CONSULT Does self-diagnosis show damage to overdrive control switch circuit?</p> <div style="text-align: center;">  <p style="text-align: right;">SAT344H</p> </div>	
Yes or No	
Yes	▶ Check overdrive control switch circuit. Refer to AT-222.
No	▶ Go to 10. A/T Does Not Shift: D ₂ → D ₃ , AT-209.

TROUBLE DIAGNOSES FOR SYMPTOMS

18. A/T Does Not Shift: D₃ → 2₂, When Selector Lever "D" → "2" Position

18. A/T Does Not Shift: D₃ → 2₂, When Selector Lever "D" → "2" Position

~NCAT0098

SYMPTOM:

A/T does not shift from D₃ to 2₂ when changing selector lever from "D" to "2" position.

1	CHECK INHIBITOR SWITCH CIRCUIT
<p><input type="checkbox"/> With CONSULT Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?</p>	
<p><input checked="" type="checkbox"/> Without CONSULT Does self-diagnosis show damage to PNP switch circuit?</p>	
<p style="text-align: right;">SAT367J</p>	
Yes or No	
Yes	▶ Check PNP switch circuit. Refer to "DTC P0705", AT-92.
No	▶ Go to 9. A/T Does Not Shift: D ₁ → D ₂ Or Does Not Kickdown: D ₄ → D ₂ , AT-207.

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TROUBLE DIAGNOSES FOR SYMPTOMS

19. A/T Does Not Shift: 2₂ → 1₁, When Selector Lever "2" → "1" Position

19. A/T Does Not Shift: 2₂ → 1₁, When Selector Lever "2" → "1" Position

=NCA10099

SYMPTOM:

A/T does not shift from 2₂ to 1₁ when changing selector lever from "2" to "1" position.

1	CHECK PNP SWITCH CIRCUIT
<p> With CONSULT Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?</p>	
<p> Without CONSULT Does self-diagnosis show damage to PNP switch circuit?</p>	
SAT367J	
Yes or No	
Yes	▶ Check PNP switch circuit. Refer to "DTC P0705", AT-92.
No	▶ GO TO 2.

2	CHECK SYMPTOM
Check again.	
SAT778B	
OK or NG	
OK	▶ INSPECTION END
NG	▶ <ol style="list-style-type: none"> 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

TROUBLE DIAGNOSES FOR SYMPTOMS

20. Vehicle Does Not Decelerate By Engine Brake

20. Vehicle Does Not Decelerate By Engine Brake

~NCAT0100 GI

SYMPTOM:

Vehicle does not decelerate by engine brake when shifting from 2₂ (1₂) to 1₁.

MA

1 CHECK SYMPTOM	
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 ₄ → D ₃), AT-216.
No	▶ Go to 6. Vehicle Does Not Creep Backward In "R" Position, AT-201.

EM

LC

EC

FE

CL

MT

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.

AX

DESCRIPTION

NCAT0101S01

- 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.

SU

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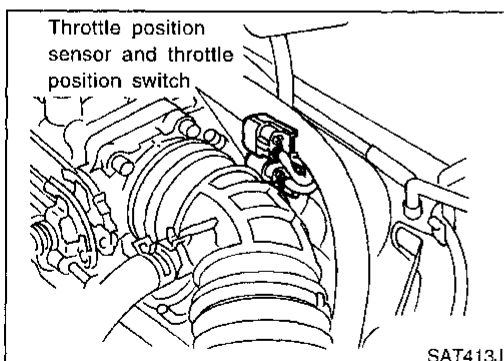
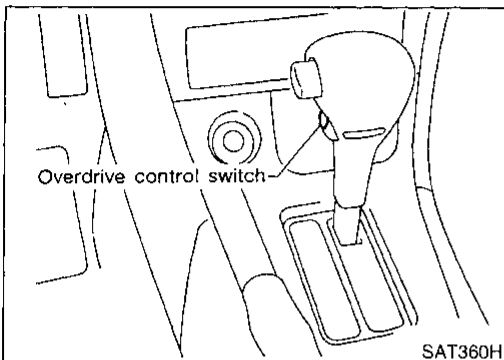
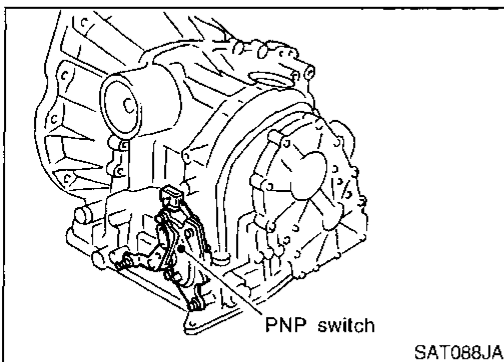
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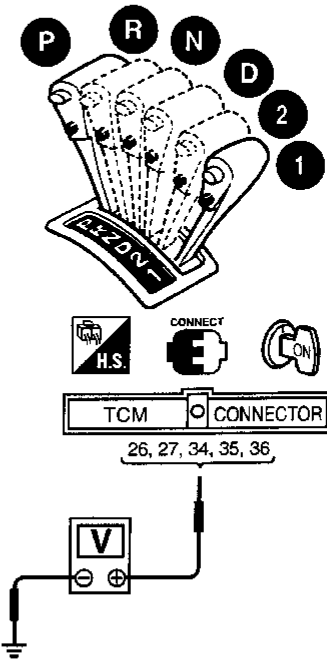
TROUBLE DIAGNOSES FOR SYMPTOMS

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

DIAGNOSTIC PROCEDURE

NCAT0101502

1	CHECK PNP SWITCH CIRCUIT (With CONSULT)																														
<p>Ⓜ With CONSULT</p> <ol style="list-style-type: none"> 1. Turn ignition switch to "ON" position. (Do not start engine.) 2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT. 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. 																															
<table border="1" style="border-collapse: collapse; width: 80%; margin: auto;"> <tr> <td>☆ MONITOR</td> <td>☆ NO FAIL</td> <td style="text-align: right;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>VHCL/S SE-A/T</td> <td>0km/h</td> <td></td> </tr> <tr> <td>VHCL/S SE-MTR</td> <td>5km/h</td> <td></td> </tr> <tr> <td>THRTL POS SEN</td> <td>0.4V</td> <td></td> </tr> <tr> <td>FLUID TEMP SE</td> <td>1.2V</td> <td></td> </tr> <tr> <td>BATTERY VOLT</td> <td>13.4V</td> <td></td> </tr> <tr> <td>ENGINE SPEED</td> <td>1024rpm</td> <td></td> </tr> <tr> <td>OVERDRIVE SW</td> <td>O N</td> <td></td> </tr> <tr> <td>P/N POSI SW</td> <td>O N</td> <td></td> </tr> <tr> <td>R POSITION SW</td> <td>OFF</td> <td></td> </tr> </table>		☆ MONITOR	☆ NO FAIL	<input checked="" type="checkbox"/>	VHCL/S SE-A/T	0km/h		VHCL/S SE-MTR	5km/h		THRTL POS SEN	0.4V		FLUID TEMP SE	1.2V		BATTERY VOLT	13.4V		ENGINE SPEED	1024rpm		OVERDRIVE SW	O N		P/N POSI SW	O N		R POSITION SW	OFF	
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SAT076H																															
OK or NG																															
OK	▶ GO TO 3.																														
NG	<p>Check the following items:</p> <ul style="list-style-type: none"> ● PNP switch (Refer to "Component Inspection", AT-225.) ● Harness for short or open between ignition switch and PNP switch (Main harness) ● Harness for short or open between PNP switch and TCM (Main harness) ● Diode (P, N positions) 																														

2	CHECK PNP SWITCH CIRCUIT (Without CONSULT)																																									
<p>ⓧ Without CONSULT</p> <ol style="list-style-type: none"> 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. 																																										
<p>Voltage: B: Battery voltage 0: 0V</p>																																										
<table border="1" style="border-collapse: collapse; width: 80%; margin: auto;"> <thead> <tr> <th rowspan="2">Lever position</th> <th colspan="5">Terminals</th> </tr> <tr> <th>36</th> <th>35</th> <th>34</th> <th>27</th> <th>26</th> </tr> </thead> <tbody> <tr> <td>P, N</td> <td>B</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>R</td> <td>0</td> <td>B</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>D</td> <td>0</td> <td>0</td> <td>B</td> <td>0</td> <td>0</td> </tr> <tr> <td>2</td> <td>0</td> <td>0</td> <td>0</td> <td>B</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>B</td> </tr> </tbody> </table>		Lever position	Terminals					36	35	34	27	26	P, N	B	0	0	0	0	R	0	B	0	0	0	D	0	0	B	0	0	2	0	0	0	B	0	1	0	0	0	0	B
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SAT470J																																										
OK or NG																																										
OK	▶ GO TO 4.																																									
NG	<p>Check the following items:</p> <ul style="list-style-type: none"> ● PNP switch (Refer to "Component Inspection", AT-225.) ● Harness for short or open between ignition switch and PNP switch (Main harness) ● Harness for short or open between PNP switch and TCM (Main harness) ● Diode (P, N positions) 																																									

TROUBLE DIAGNOSES FOR SYMPTOMS

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

3	CHECK OVERDRIVE CONTROL SWITCH CIRCUIT (With CONSULT)																														
<p>With CONSULT</p> <ol style="list-style-type: none"> Turn ignition switch to "ON" position. (Do not start engine.) Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT. Read out "OVERDRIVE SWITCH". Check the signal of the overdrive control switch is indicated properly. (Overdrive control switch "ON" displayed on CONSULT means overdrive "OFF".) 																															
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OK or NG																															
OK	▶ GO TO 5.																														
NG	▶ Check the following items: <ul style="list-style-type: none"> ● Overdrive control switch (Refer to "Component Inspection", AT-225.) ● Harness for short or open between TCM and overdrive control switch (Main harness) ● Harness of ground circuit for overdrive control switch (Main harness) for short or open 																														

4	CHECK OVERDRIVE CONTROL SWITCH CIRCUIT (Without CONSULT)
<p>Without CONSULT</p> <ol style="list-style-type: none"> Turn ignition switch to "ON" position. (Do not start engine.) Check voltage between TCM terminal 22 and ground when overdrive control switch is "ON" and "OFF". Voltage: Switch position "ON": Battery voltage Switch position "OFF": 1V or less 	
SAT471J	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Check the following items: <ul style="list-style-type: none"> ● Overdrive control switch (Refer to "Component Inspection", AT-225.) ● Harness for short or open between TCM and overdrive control switch (Main harness) ● Harness of ground circuit for overdrive control switch (Main harness) for short or open

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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)

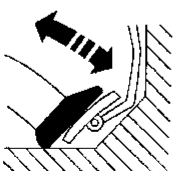
5 CHECK THROTTLE POSITION SWITCH CIRCUIT (With CONSULT)

With CONSULT

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

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

MTBL0011



☆ MONITOR	☆ NO FAIL	☐
D POSITION SW	OFF	
2 POSITION SW	OFF	
1 POSITION SW	OFF	
ASCD • CRUISE	OFF	
ASCD • OD CUT	OFF	
KICKDOWN SW	OFF	
POWERSHIFT SW	OFF	
CLOSED THL/SW	ON	
W/O THRL/P-SW	OFF	

RECORD

SAT963H

OK or NG

OK	▶	GO TO 7.
NG	▶	<p>Check the following items:</p> <ul style="list-style-type: none"> ● Throttle position switch — Refer to "Component Inspection", AT-225. ● 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)

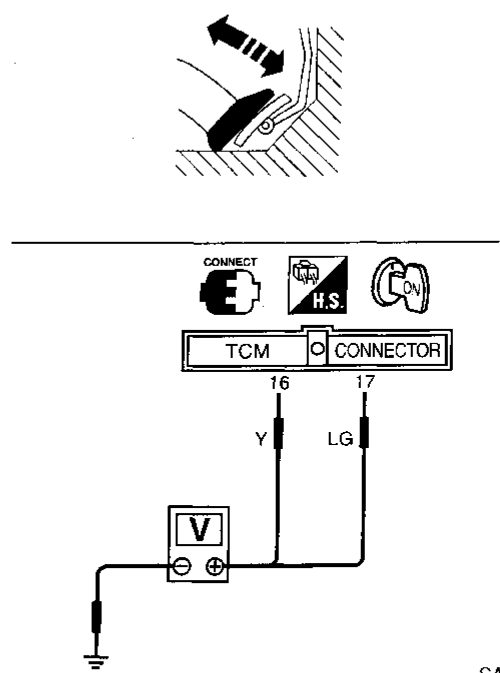
6 CHECK THROTTLE POSITION SWITCH CIRCUIT (Without CONSULT)

Without CONSULT

- Turn ignition switch to "ON" position. (Do not start engine.)
- 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 7.
NG	▶	<p>Check the following items:</p> <ul style="list-style-type: none"> ● Throttle position switch — Refer to "Component Inspection", AT-225. ● 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)

7 CHECK DTC

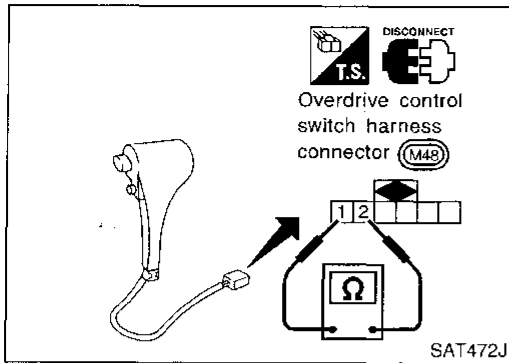
Perform "DIAGNOSTIC PROCEDURE", AT-222

OK or NG

OK	▶	INSPECTION END
NG	▶	<ul style="list-style-type: none"> ● Perform TCM input/output signal inspection. ● If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

TROUBLE DIAGNOSES FOR SYMPTOMS

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



COMPONENT INSPECTION

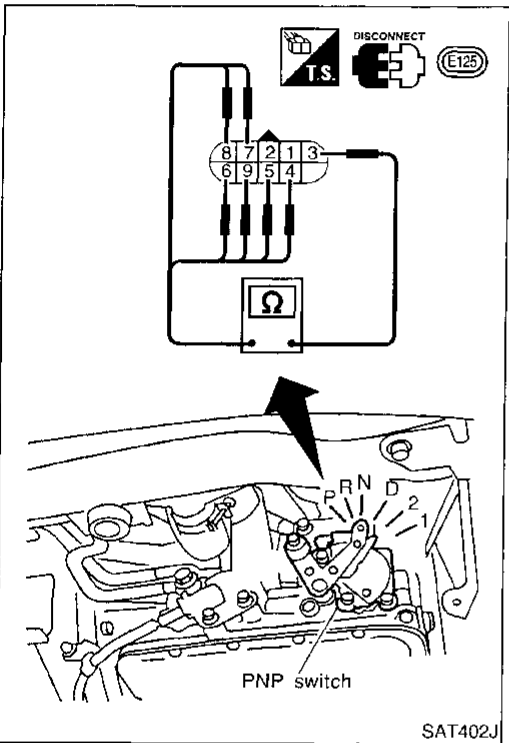
NCAT0101S03

Overdrive Control Switch

NCAT0101S0301

- Check continuity between two terminals.

Switch position	Continuity
ON	No
OFF	Yes

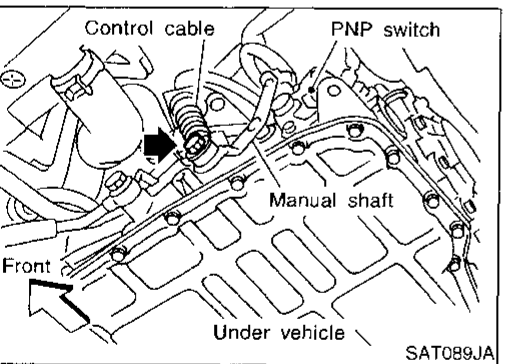


PNP Switch

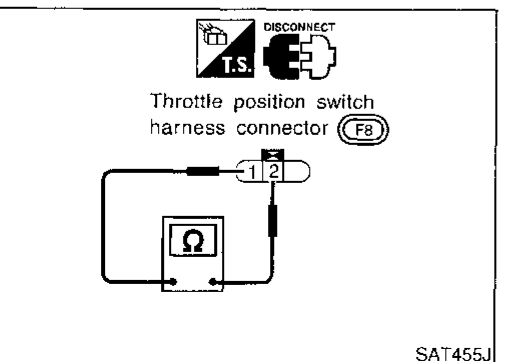
NCAT0101S0302

- 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-235.
- 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-235.
- If NG on step 4, replace PNP switch.



Throttle Position Switch

NCAT0101S0303

Closed throttle position switch (idle position)

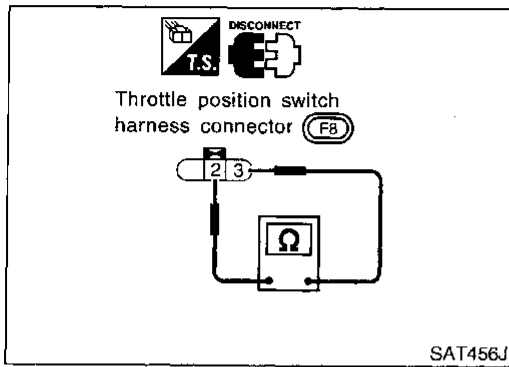
- Check continuity between terminals 1 and 2.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

- To adjust closed throttle position switch, refer to EC section ("Basic Inspection", "TROUBLE DIAGNOSIS — Basic Inspection").

TROUBLE DIAGNOSES FOR SYMPTOMS

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



Wide open throttle position switch

- Check continuity between terminals 2 and 3.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

A/T SHIFT LOCK SYSTEM

Description

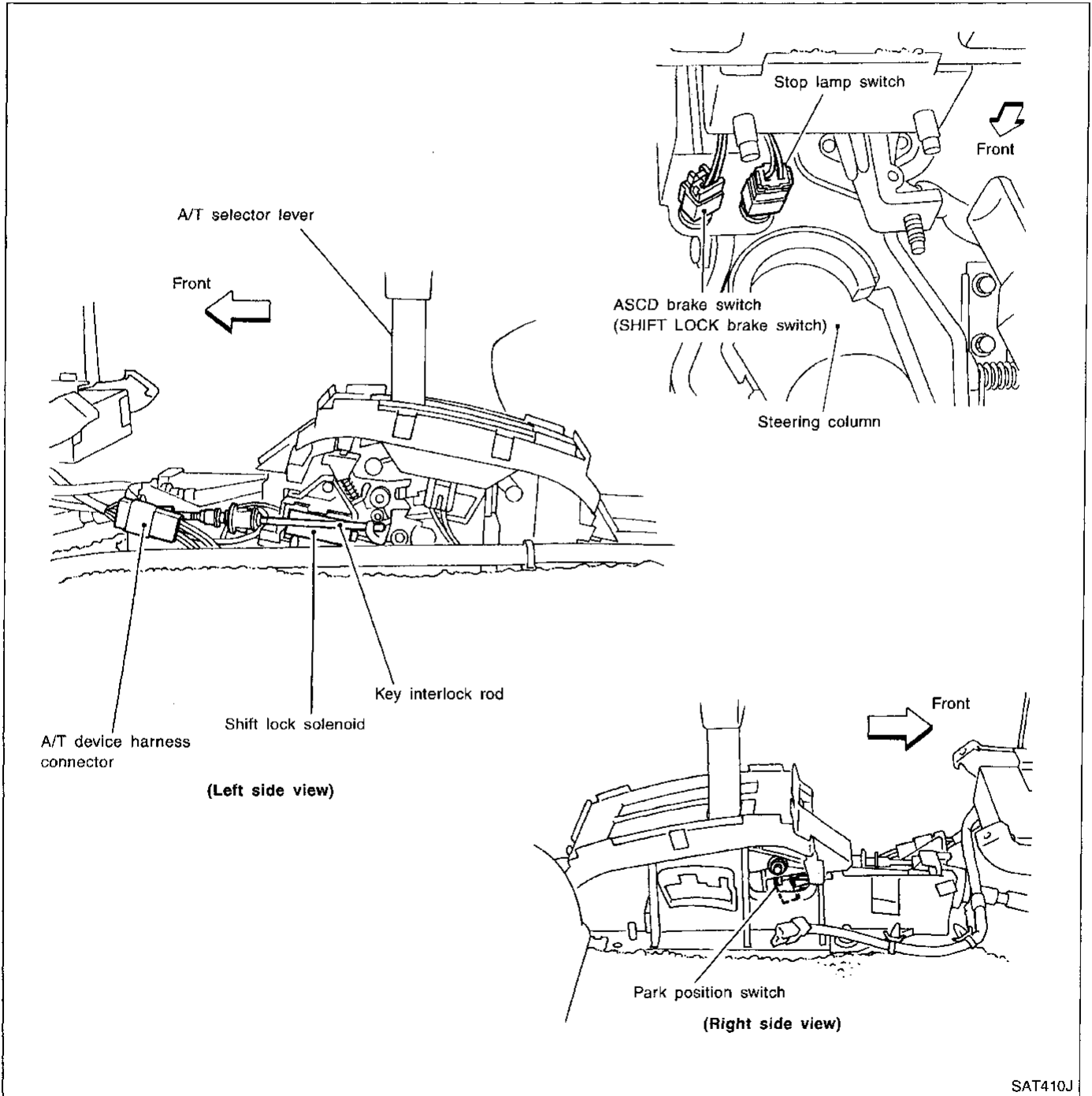
Description

NCA70102

- 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

NCA70103



GI

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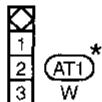
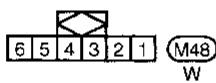
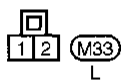
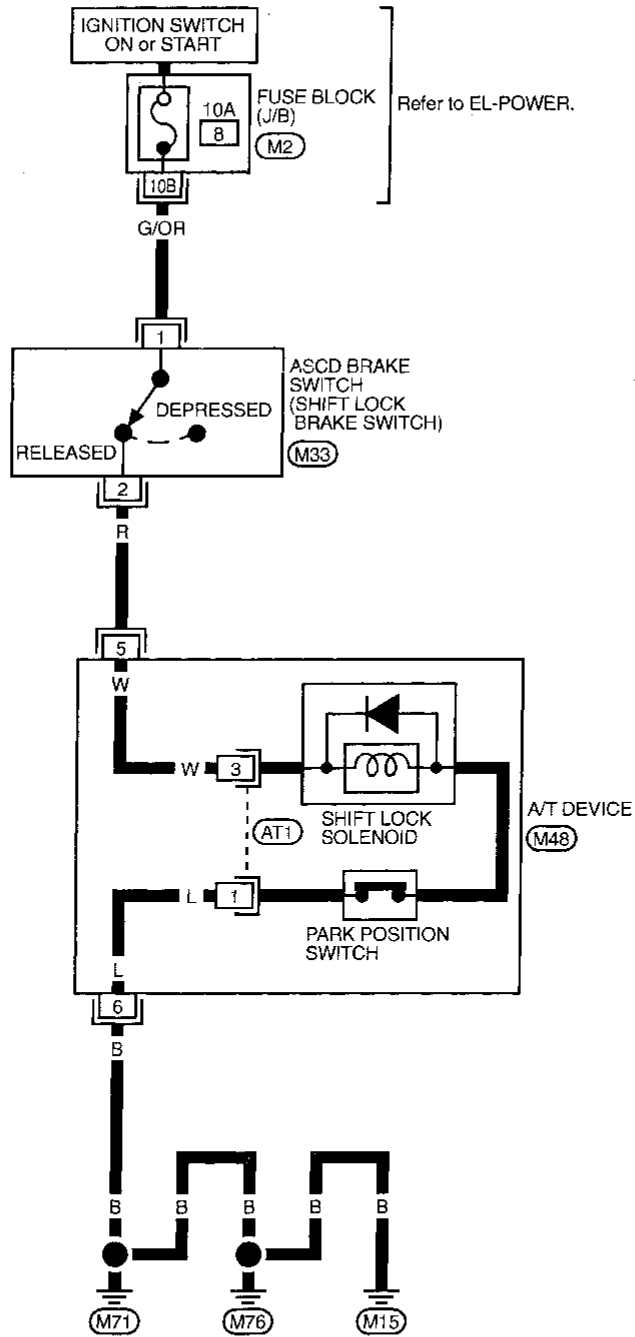
AT SHIFT LOCK SYSTEM

Wiring Diagram — SHIFT —

Wiring Diagram — SHIFT —

NCAT0104

AT-SHIFT-01



Refer to last page (Foldout page).



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

TAT193

NCAT0105

Diagnostic Procedure

SYMPTOM 1:

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

SYMPTOM 2:

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

1	CHECK KEY INTERLOCK CABLE
Check key interlock cable for damage.	
OK or NG	
OK	▶ GO TO 2.
NG	▶ Repair key interlock cable. Refer to AT-232.

2	CHECK SELECTOR LEVER POSITION
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-235.

3	CHECK POWER SOURCE
<ol style="list-style-type: none"> 1. Turn ignition switch to "ON" position. (Do not start engine.) 2. Check voltage between ASCD brake switch (SHIFT LOCK brake switch) harness terminal 1 and ground. 	
Voltage: Battery voltage	
<p>ASCD brake switch (SHIFT LOCK brake switch) harness terminal (M33)</p>	
SAT473J	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Check the following items:

1. Harness for short or open between battery and ASCD brake switch (SHIFT LOCK brake switch) harness terminal 1
2. Fuse
3. Ignition switch (Refer to EL section.)

4	CHECK INPUT SIGNAL (A/T DEVICE)
Turn ignition switch to "ON" position. (Do not start engine.)	
<ul style="list-style-type: none"> • Check voltage between A/T device harness terminal 5 and ground. 	
Voltage:	
Brake pedal depressed:	
0V	
Brake pedal released:	
Battery voltage	
<p>A/T device harness terminal (M48)</p>	
SAT474J	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Check the following items:

1. Harness for short or open between A/T device harness connector 5 and ASCD brake switch (SHIFT LOCK brake switch) harness connector 2
2. A/T shift lock switch (ASCD brake switch) (Refer to "Component Check", AT-230.)

A/T SHIFT LOCK SYSTEM

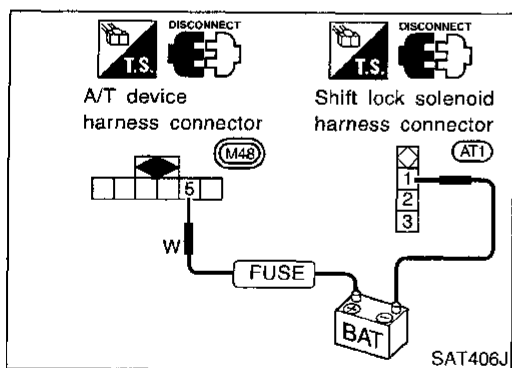
Diagnostic Procedure (Cont'd)

5	CHECK GROUND CIRCUIT
<ol style="list-style-type: none"> Turn ignition switch to "OFF" position. Disconnect A/T device harness connector. Check continuity between A/T device harness terminal 6 and ground. <p>Continuity should exist. If OK, check harness for short to ground and short to power.</p>	
<p style="text-align: center;">SAT475J</p>	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK PARK POSITION SWITCH
Refer to "Component Check", AT-230.	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Replace park position switch.

7	CHECK SHIFT LOCK SOLENOID
Refer to "Component Check", AT-230.	
OK or NG	
OK	▶ GO TO 8.
NG	▶ Replace shift lock solenoid.

8	
<ol style="list-style-type: none"> Reconnect shift lock harness connector. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.) Recheck shift lock operation. 	
OK or NG	
OK	▶ INSPECTION END
NG	▶ <ol style="list-style-type: none"> Perform A/T device input/output signal inspection test. If NG, recheck harness connector connection.

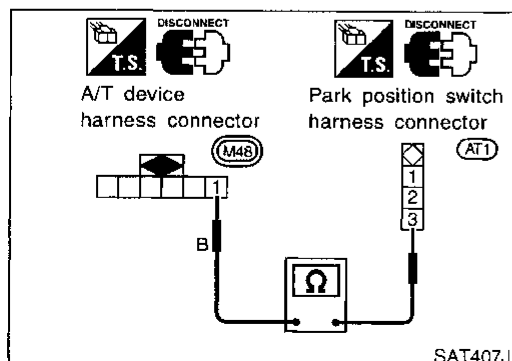


Component Check SHIFT LOCK SOLENOID

NCAT0106

NCAT0106S01

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



PARK POSITION SWITCH

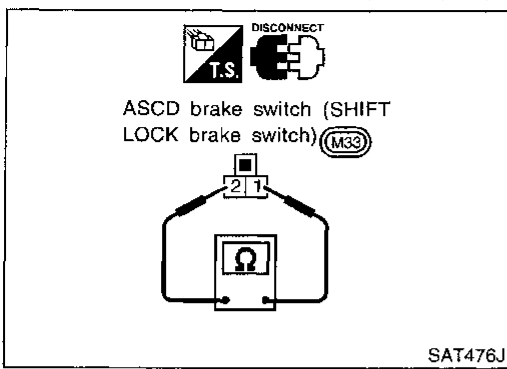
NCAT0106S02

- Check continuity between A/T device harness terminal 6 and shift lock solenoid & park position switch harness terminal 3.

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

A/T SHIFT LOCK SYSTEM

Component Check (Cont'd)



ASC D BRAKE SWITCH (SHIFT LOCK BRAKE SWITCH)

NCAT0108S03

- Check continuity between terminals 1 and 2.

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

Check ASC D brake switch (SHIFT LOCK brake switch) after adjusting brake pedal — refer to BR section (“Adjustment”, “BRAKE PEDAL AND BRACKET”).

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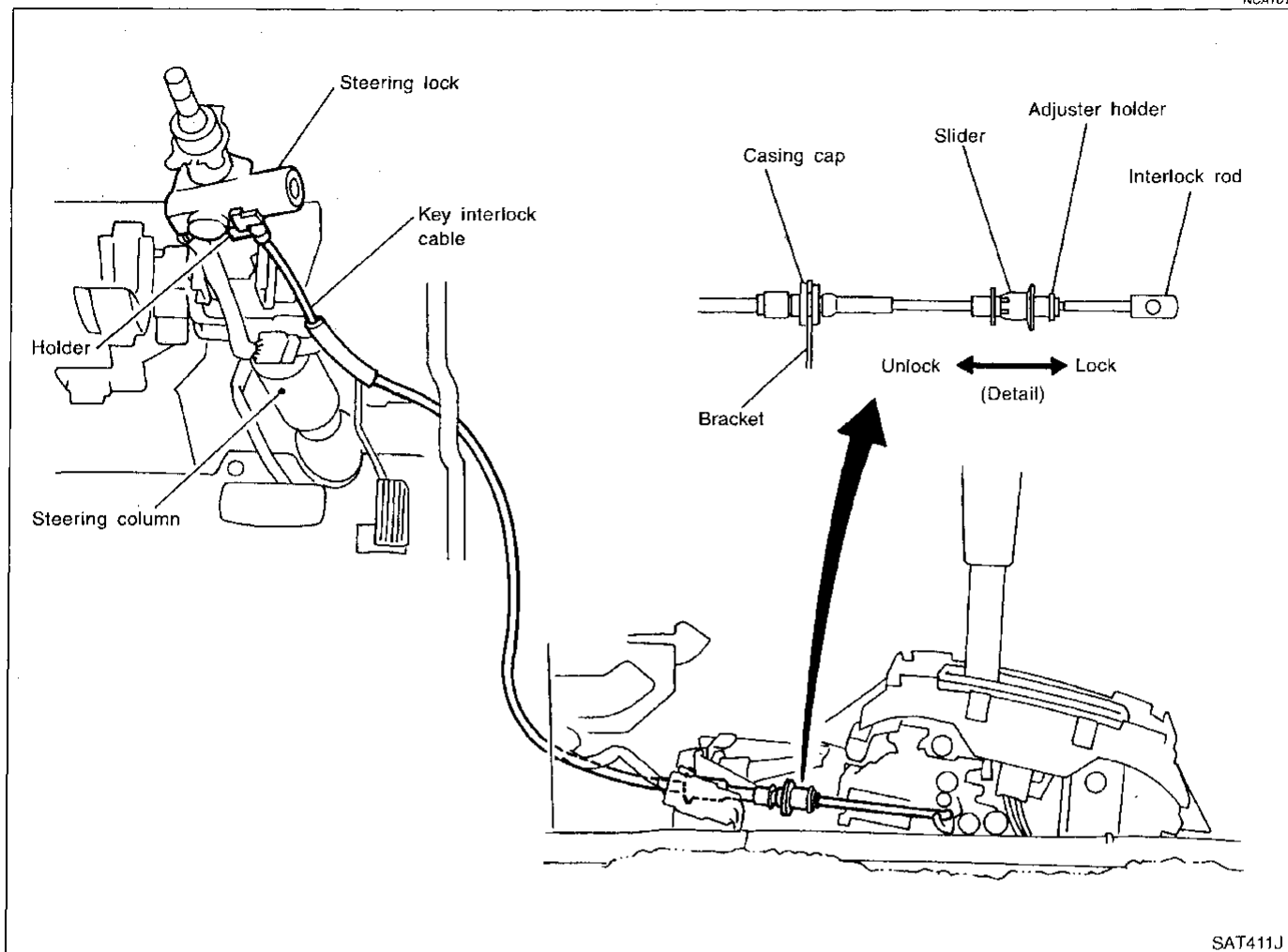
IDX

KEY INTERLOCK CABLE

Components

Components

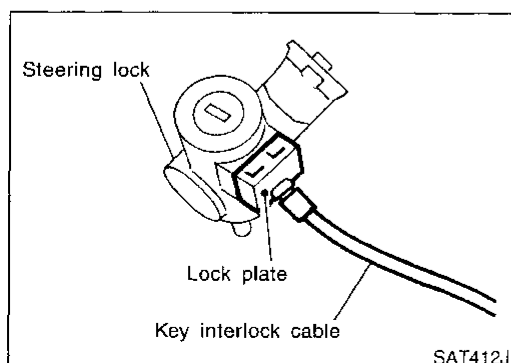
NCAT0107



SAT411J

CAUTION:

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



SAT412J

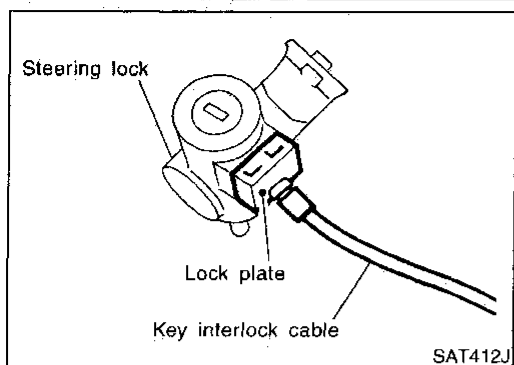
Removal

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

NCAT0108

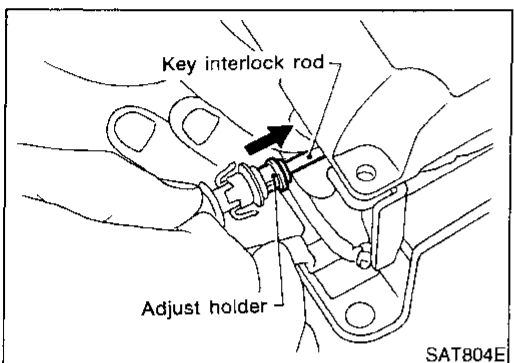
KEY INTERLOCK CABLE

Installation

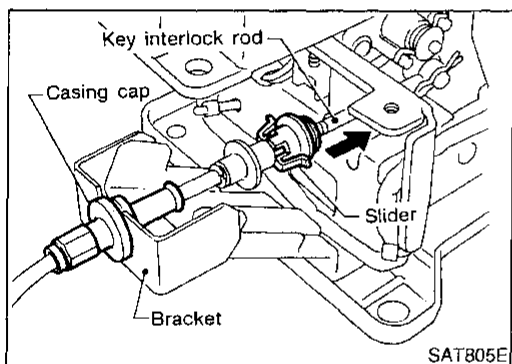


Installation

1. Set key interlock cable to steering lock assembly and install lock plate. NCAT0109
2. Clamp cable to steering column and fix to control cable with band.
3. Set control lever to P position.



4. Insert interlock rod into adjuster holder.



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

GI

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ON-VEHICLE SERVICE

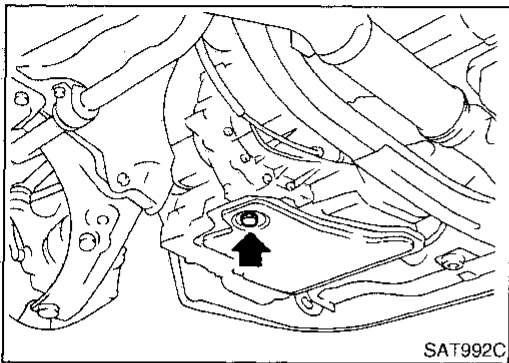
Control Valve Assembly and Accumulators

Control Valve Assembly and Accumulators

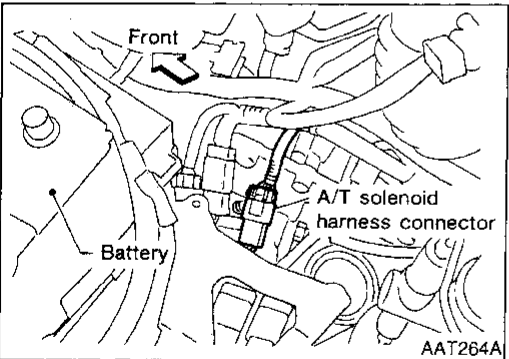
NCAT0110

REMOVAL

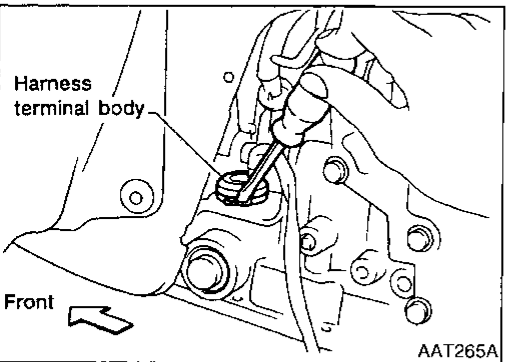
NCAT0110S01



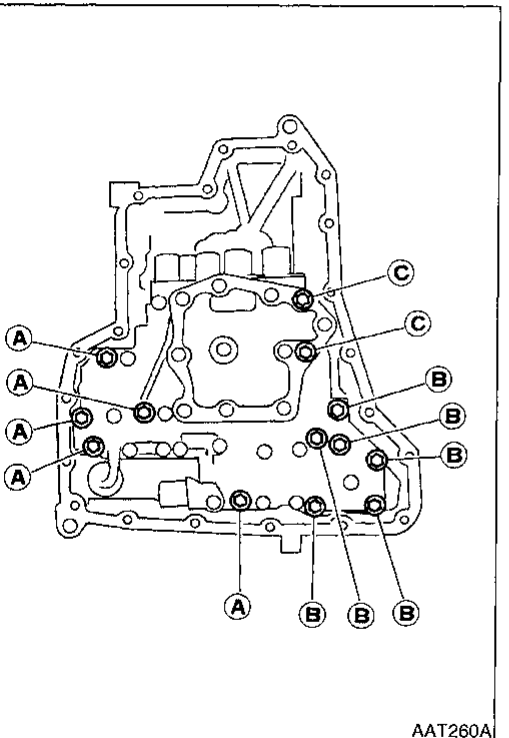
1. Drain ATF from transaxle.
2. Remove oil pan and gasket.



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:

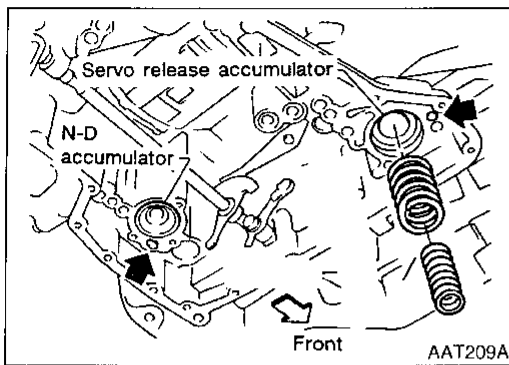
Bolt symbol	A	B	C
Bolt length "ℓ"  ℓ	40.0 mm (1.575 in)	33.0 mm (1.299 in)	43.5 mm (1.713 in)
Number of bolts	5	6	2

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

7. Disassemble and inspect control valve assembly if necessary. Refer to AT-245.

ON-VEHICLE SERVICE

Control Valve Assembly and Accumulators (Cont'd)



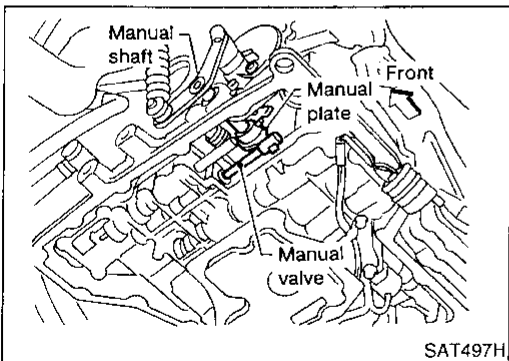
8. Remove servo release and N-D accumulators by applying compressed air if necessary.
 - Hold each piston with a rag.

GI

MA

EM

LC



INSTALLATION

NCAT0110S02

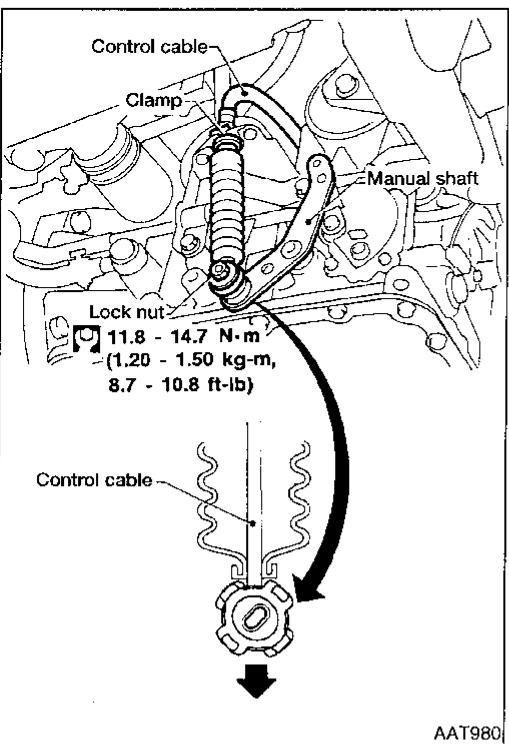
- Tighten fixing bolts to specification.
 - ☛ : 7 - 9 N·m (0.7 - 0.9 kg·m, 61 - 78 in·lb)
- Set manual shaft in Neutral position, then align manual plate with groove in manual valve.
- After installing control valve assembly to transmission case, make sure that selector lever can be moved to all positions.

EC

FE

CL

MT



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.

AT

AX

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.

SU

BR

Specified force: 6.9 N (0.7 kg, 1.5 lb)

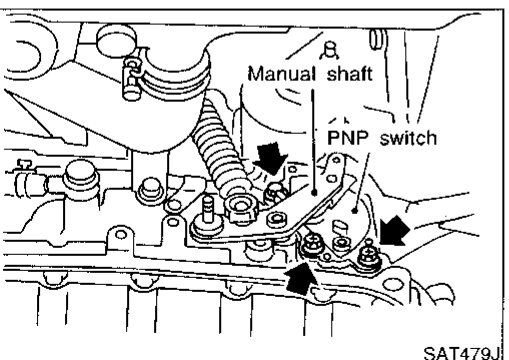
4. Return control cable in the opposite direction of the arrow for 1.0 mm (0.039 in).
5. Tighten control cable lock nut.
6. Move selector lever from "P" to "1" position again. Make sure that selector lever moves smoothly.
7. Apply grease to contacting areas of selector lever and control cable. Install any part removed.

ST

RS

BT

HA



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.

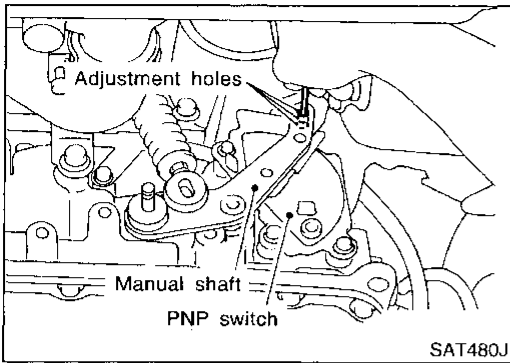
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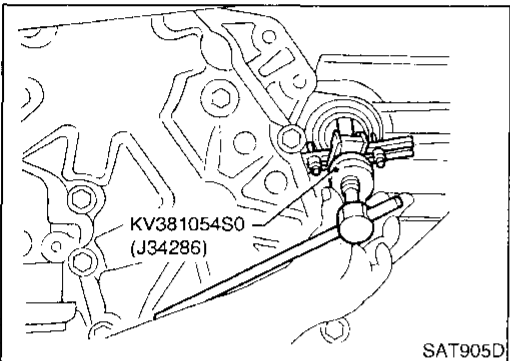
IDX

ON-VEHICLE SERVICE

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

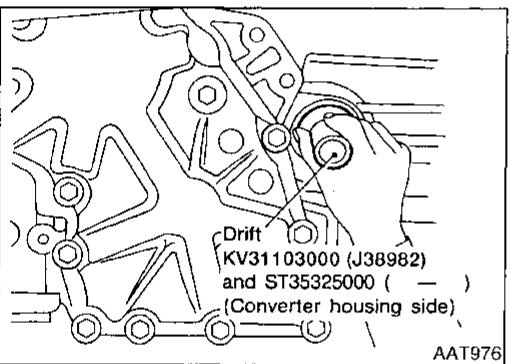


4. Use a 4 mm (0.157 in) pin for this adjustment.
 - a. Insert the pin straight into the manual shaft adjustment hole.
 - b. Rotate PNP switch until the pin can also be inserted straight into hole in PNP switch.
5. Tighten PNP switch fixing bolts.
6. Remove pin from adjustment hole after adjusting PNP switch.
7. Reinstall any part removed.
8. Adjust control cable. Refer to "Control Cable Adjustment".
9. Check continuity of PNP switch. Refer to AT-96.

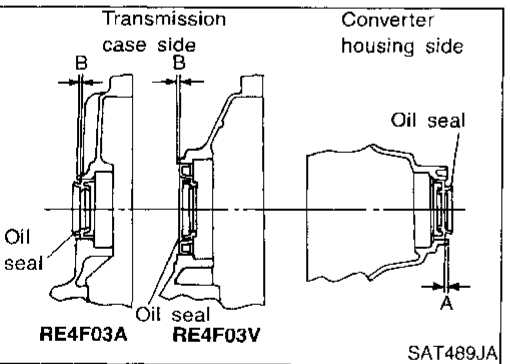


Differential Side Oil Seal Replacement

1. Remove drive shaft assemblies. Refer to FA section ("Drive Shaft", "FRONT AXLE"). NCAT0113
2. Remove oil seals.



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

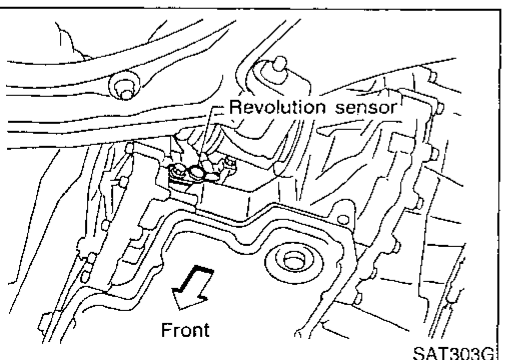


- Install oil seals so that dimensions "A" and "B" are within specifications.

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.

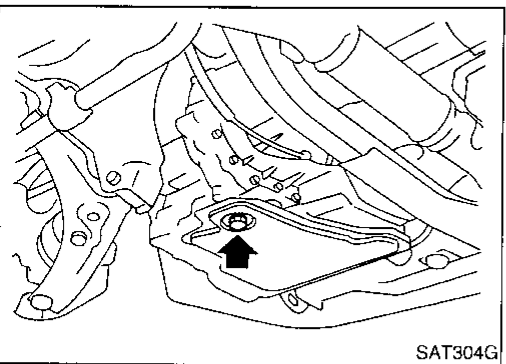
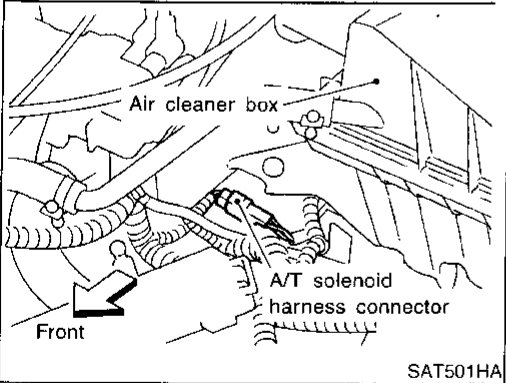
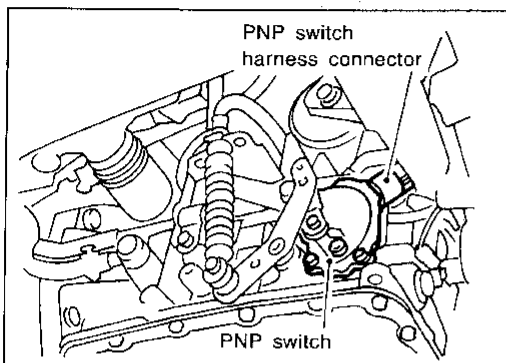


Revolution Sensor Replacement

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.

NCAT0116



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 FA section ("Drive Shaft", "FRONT AXLE").
9. Remove the intake manifold support bracket. Refer to EM section ("SR or GA", "OUTER COMPONENT PARTS").
10. Remove starter motor from transaxle.

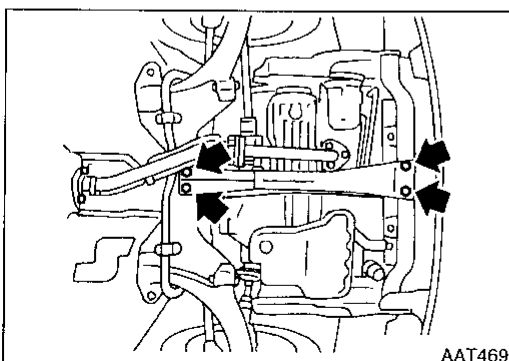
Tighten bolts to specified torque.

: 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.

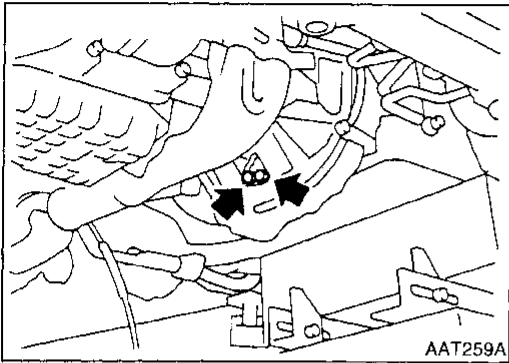
- Tighten center member fixing bolts to specified torque, Refer to EM section ("ENGINE REMOVAL").



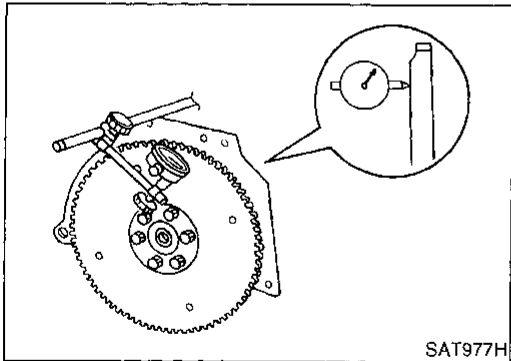
GI
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REMOVAL AND INSTALLATION

Removal (Cont'd)



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 section ("ENGINE REMOVAL").
17. Support engine with a jack.
18. Remove rear transaxle mount. Refer to EM section ("ENGINE REMOVAL").
19. Remove lower bolts fixing transaxle to engine.
20. Lower transaxle with an A/T jack.



Installation

NCA10116

1. Check drive plate runout.

CAUTION:

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

Maximum allowable runout:

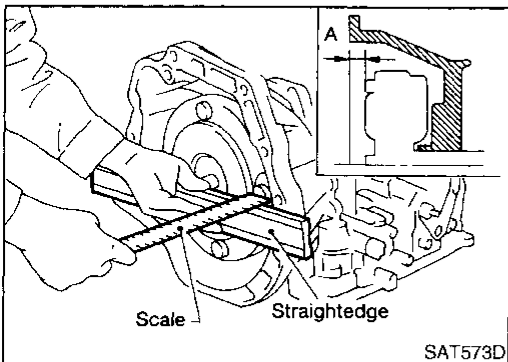
Refer to EM section ("Inspection", "CYLINDER BLOCK").

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

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

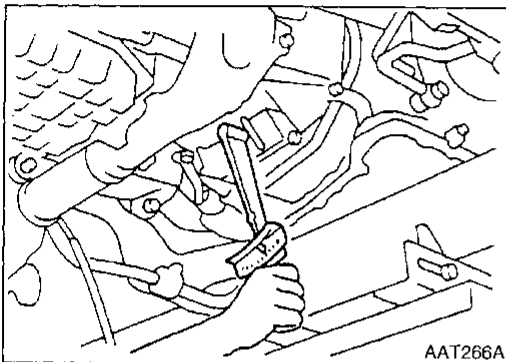
Distance "A":

15.9 mm (0.626 in) or more

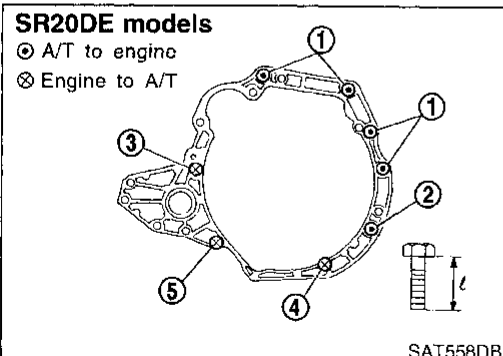


3. Install torque converter to drive plate.

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



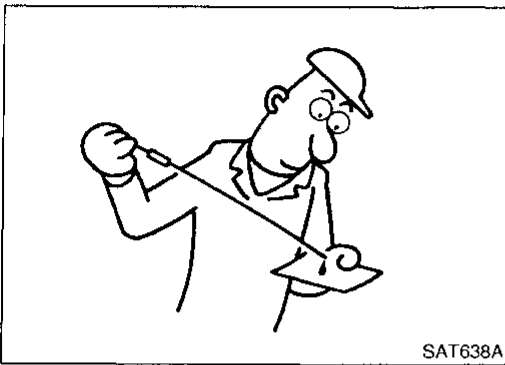
4. Tighten belts fixing transaxle.



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)	45 (1.77)

REMOVAL AND INSTALLATION

Installation (Cont'd)



5. Reinstall any part removed.
6. Adjust control cable. Refer to AT-235.
7. Check continuity of PNP switch. Refer to AT-96.
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-63.

GI

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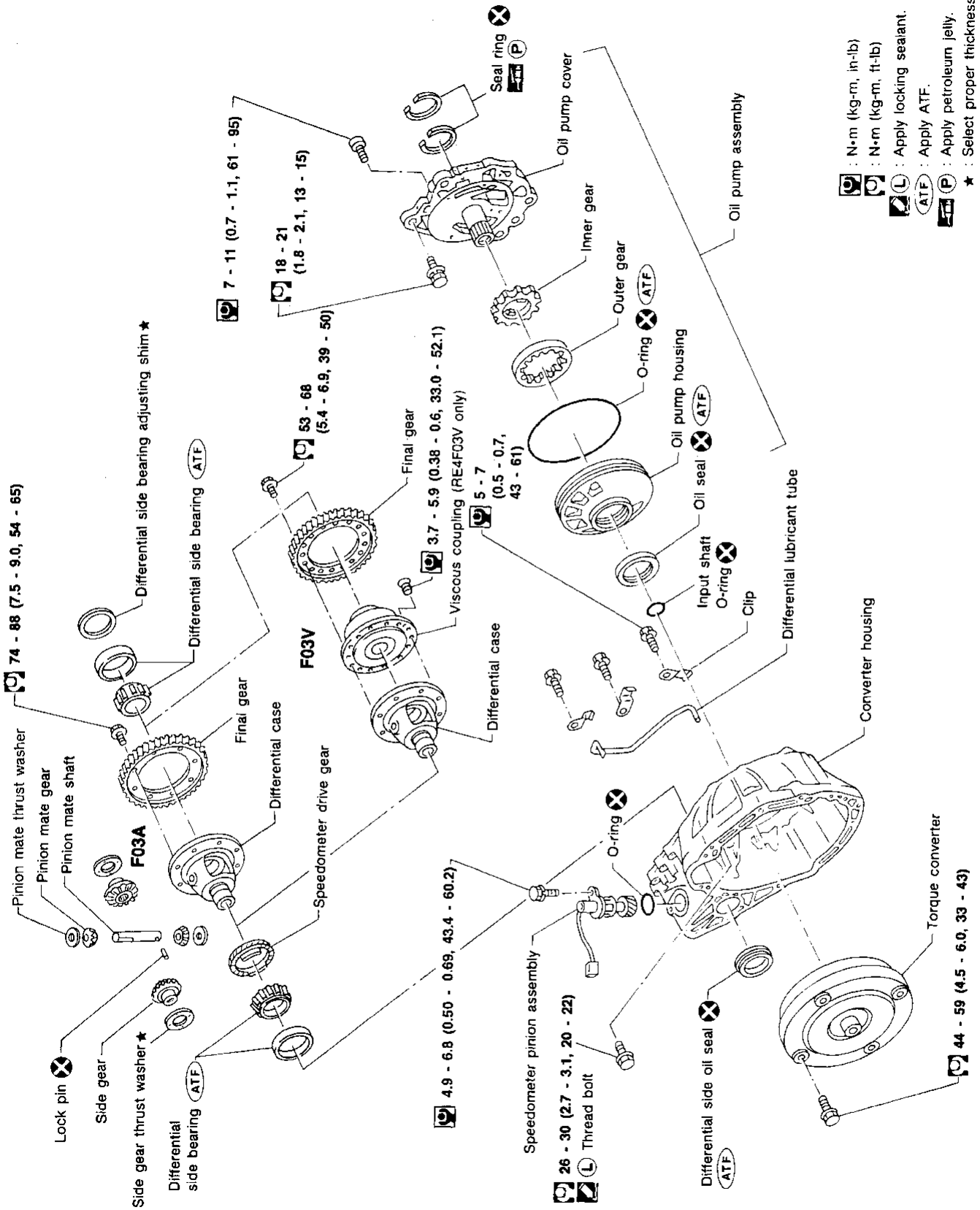
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OVERHAUL

Components

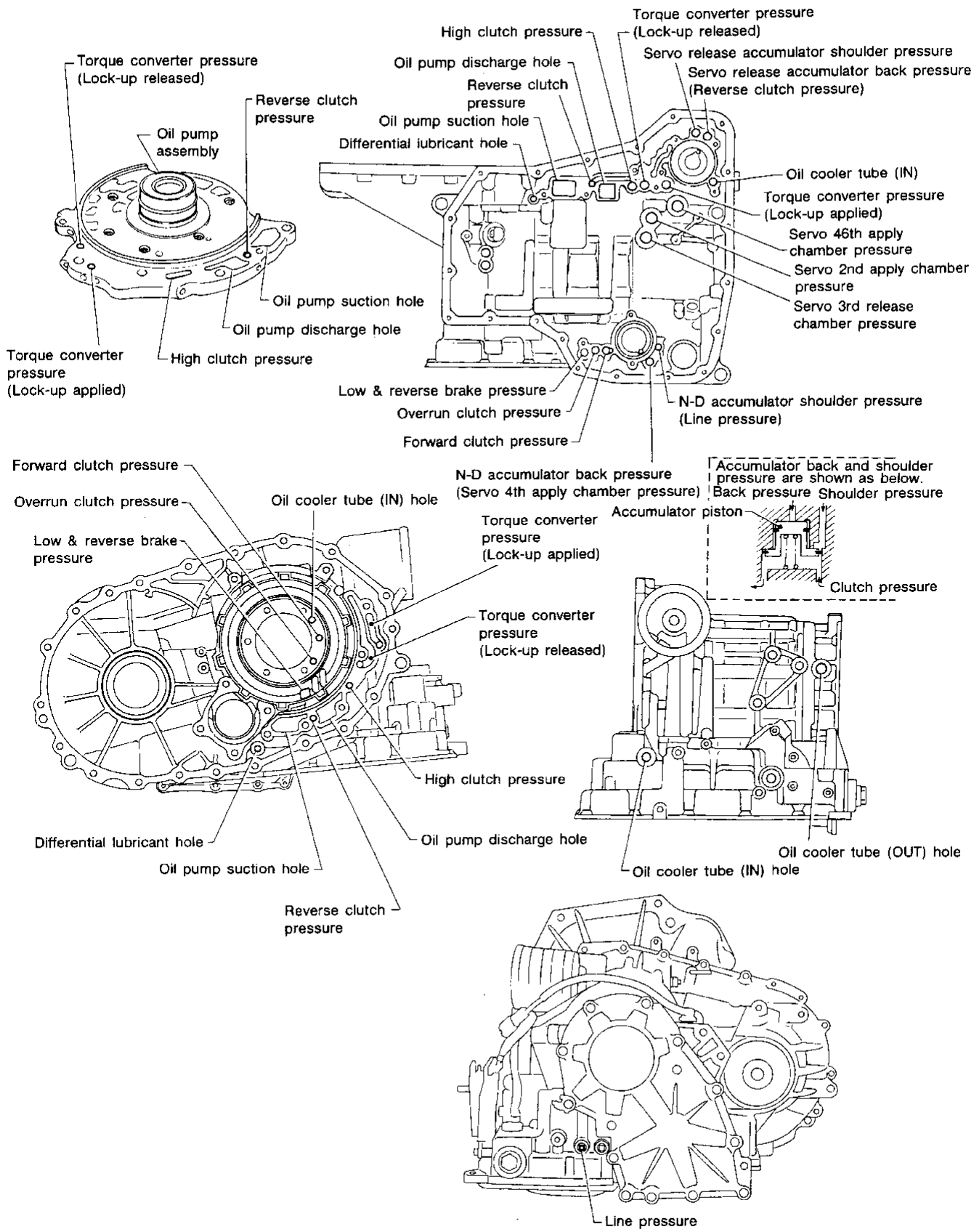
NCAT0119

SEC. 311-313-327-381



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

Oil Channel



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

OVERHAUL

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

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

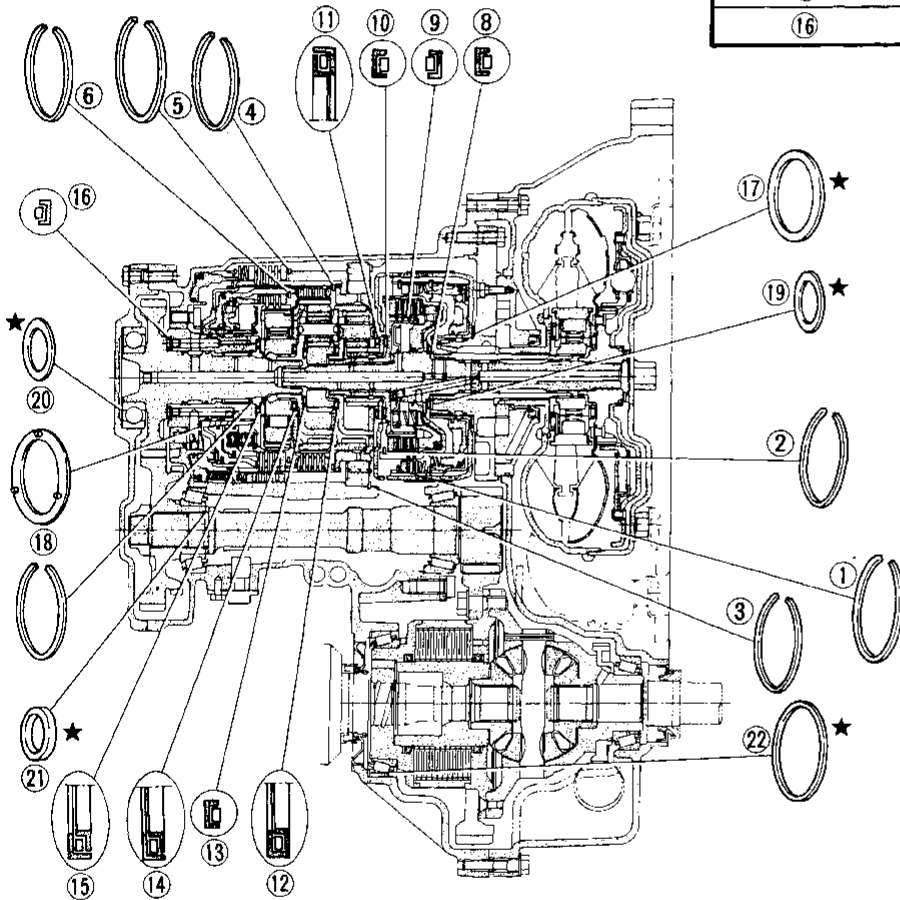
NCAT0117

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)	42.0 (1.654)
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.

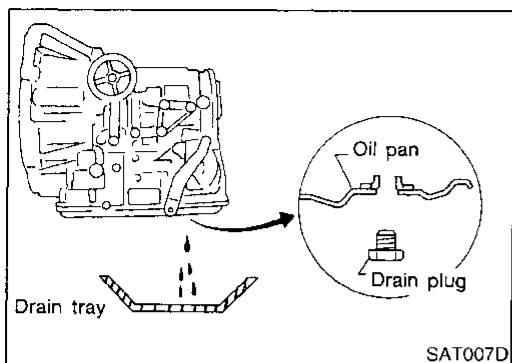
Outer & inner diameter of bearing race and adjusting shims

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	105.0 (4.13)	96.0 (3.78)

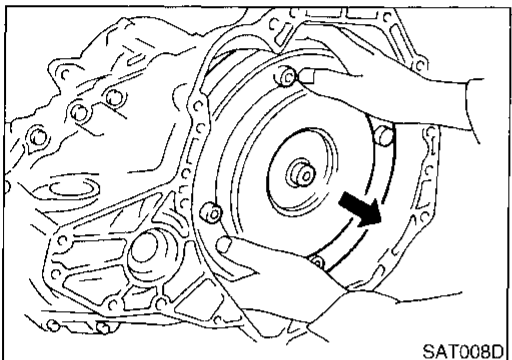
Outer diameter of snap rings

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	159.0 (6.26)
⑥	126.0 (4.96)
⑦	40.5 (1.594)

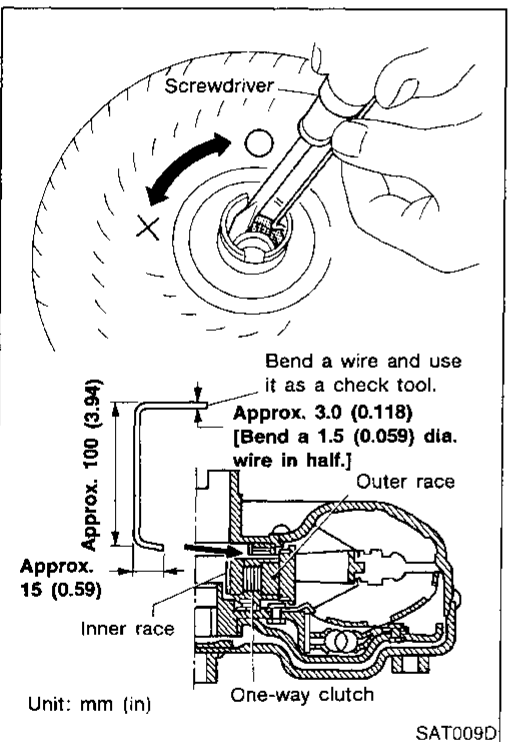
DISASSEMBLY



1. Drain ATF through drain plug.

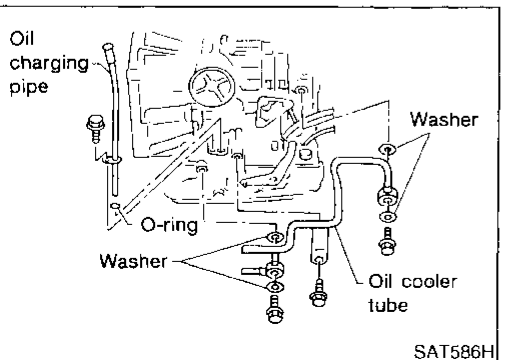


2. Remove torque converter.



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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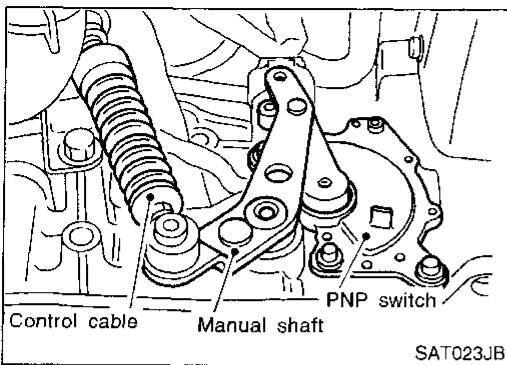
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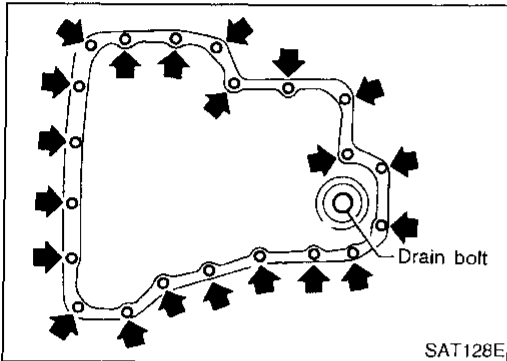
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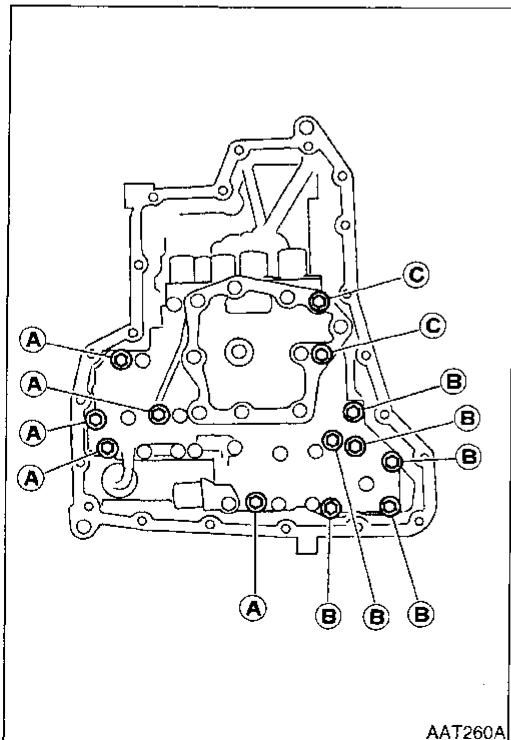
DISASSEMBLY



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

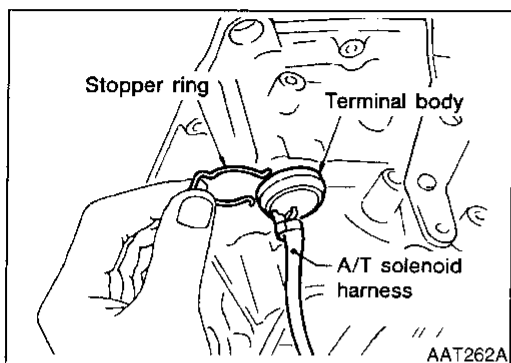


7. Remove oil pan and oil pan gasket.
 - **Do not reuse oil pan bolts.**
8. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that 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 section ("Radiator", "ENGINE COOLING SYSTEM").**
9. Remove control valve assembly according to the following procedures.



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

DISASSEMBLY



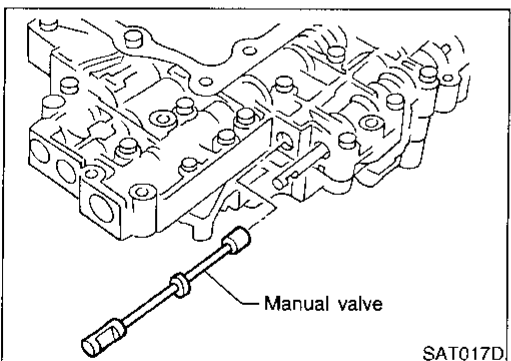
- b. Remove stopper ring from terminal body.
- c. Push terminal body into transmission case and draw out solenoid harness.

GI

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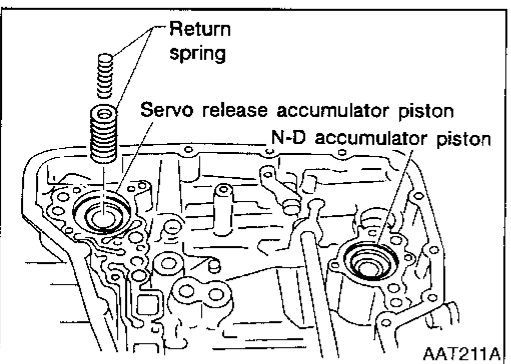
- 10. Remove manual valve from control valve assembly as a precaution.

EC

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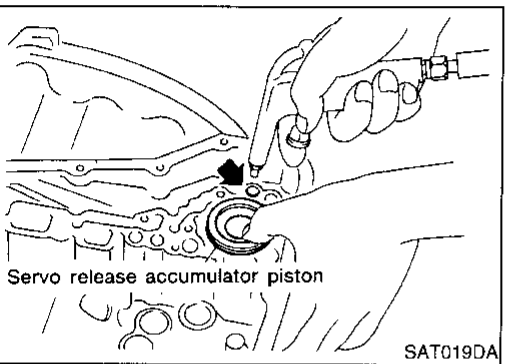
- 11. Remove return spring from servo release accumulator piston.

AT

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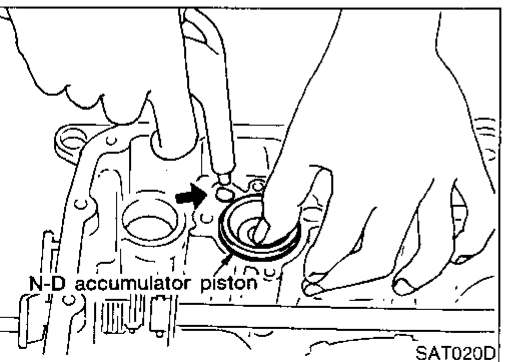
- 12. Remove servo release accumulator piston with compressed air.
- 13. Remove O-rings from servo release accumulator piston.

ST

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HA



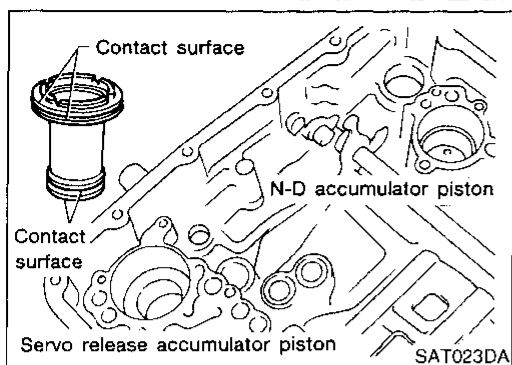
- 14. Remove N-D accumulator piston and return spring with compressed air.
- 15. Remove O-rings from N-D accumulator piston.

SC

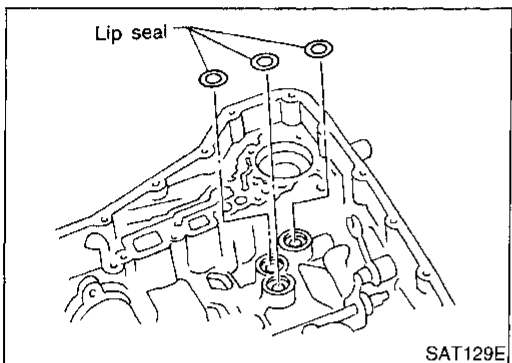
EL

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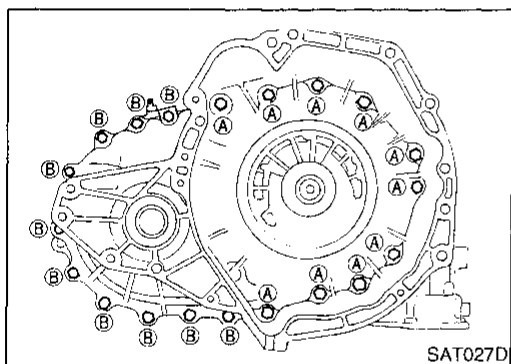
DISASSEMBLY



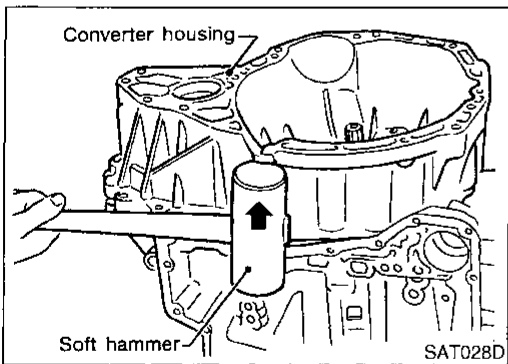
16. Check accumulator pistons and contact surface of transmission case for damage.
17. Check accumulator return springs for damage and free length.
Return springs:
Refer to SDS, AT-353.



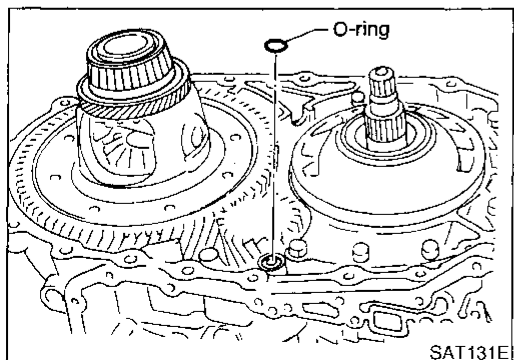
18. Remove lip seals from band servo oil port.



19. Remove converter housing according to the following procedures.
 - a. Remove converter housing mounting bolts A and B.

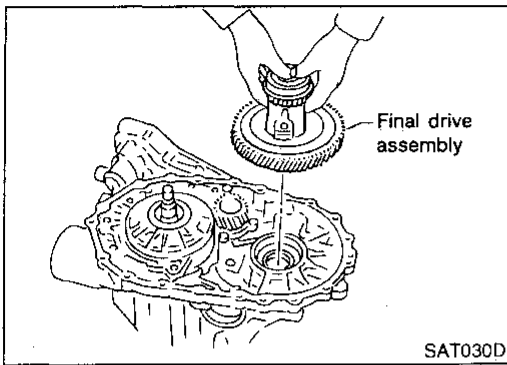


- b. Remove converter housing.

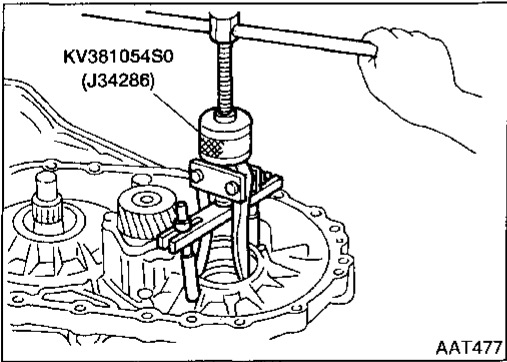


- c. Remove O-ring from differential oil port.

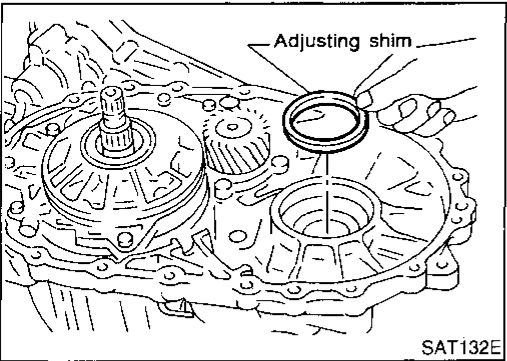
DISASSEMBLY



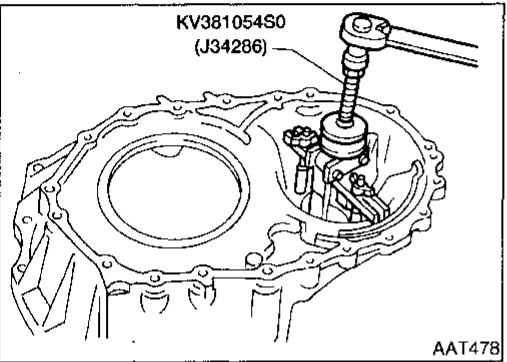
20. Remove final drive assembly from transmission case.



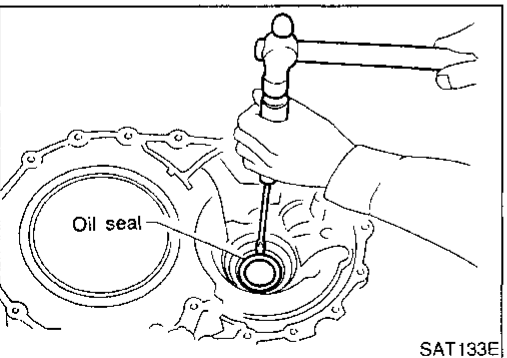
21. Remove differential side bearing outer race from transmission case.



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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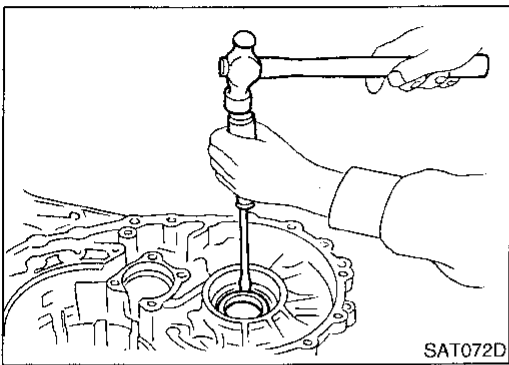
HA

SC

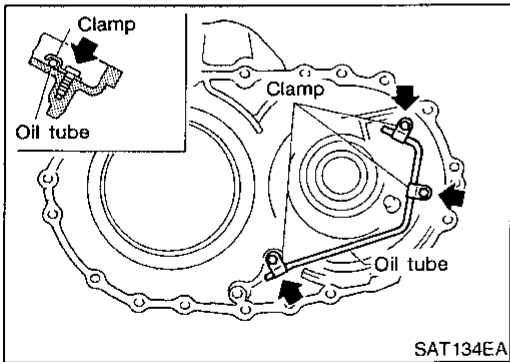
EL

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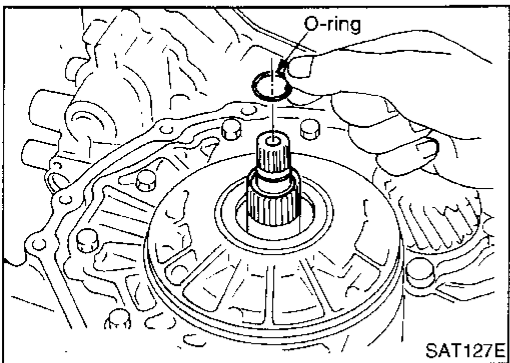
DISASSEMBLY



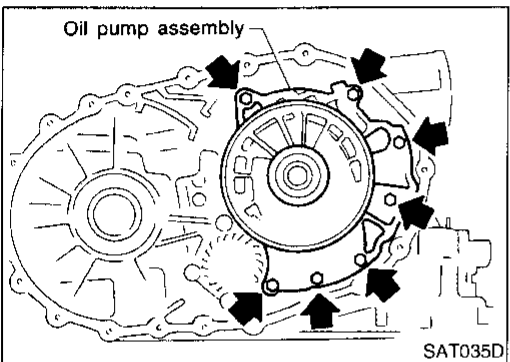
25. Remove side oil seal from transmission case using a screwdriver.



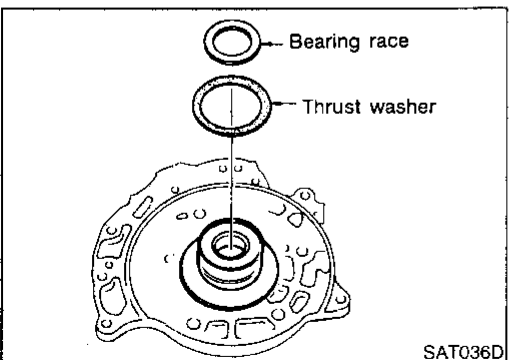
26. Remove oil tube from converter housing.



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

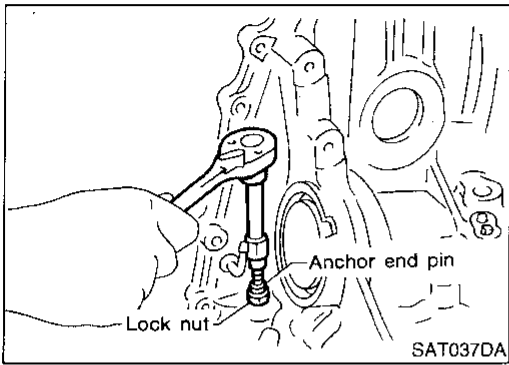


b. Remove oil pump assembly from transmission case.



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

DISASSEMBLY



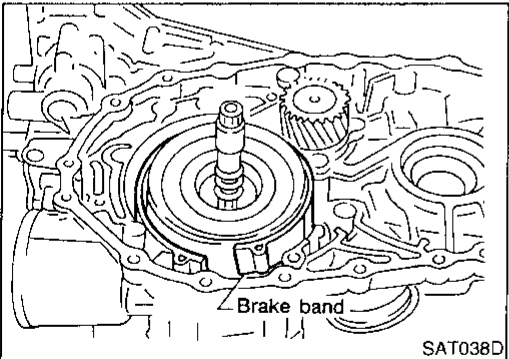
28. Remove brake band according to the following procedures.
- Loosen lock nut, then back off anchor end pin.
 - Do not reuse anchor end pin.**

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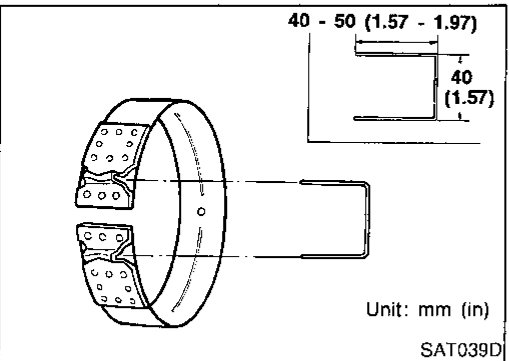


- Remove brake band from transmission case.

EC

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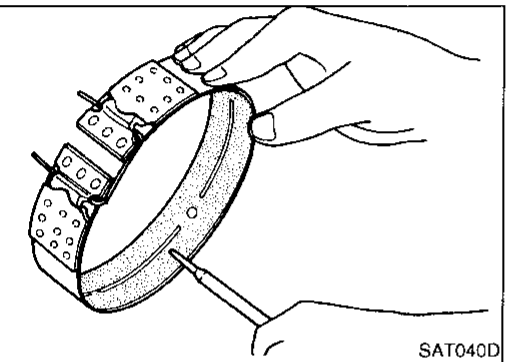


- To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at left. Leave the clip in position after removing the brake band.**

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

SU

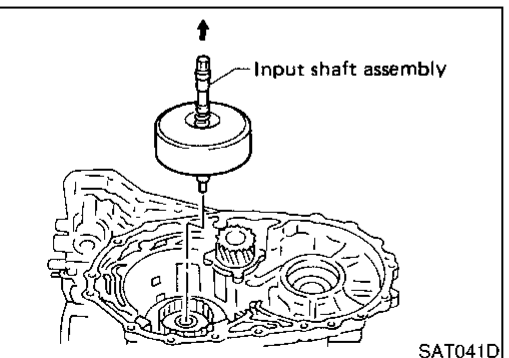
BR

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

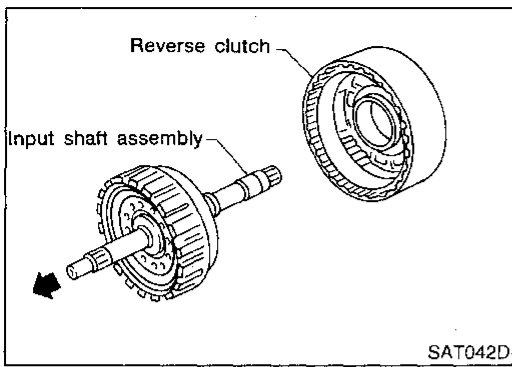
- Remove input shaft assembly (high clutch) with reverse clutch.

SC

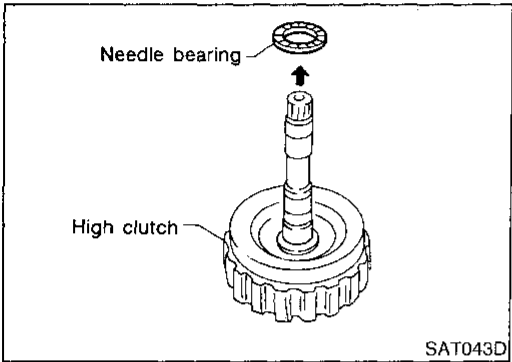
EL

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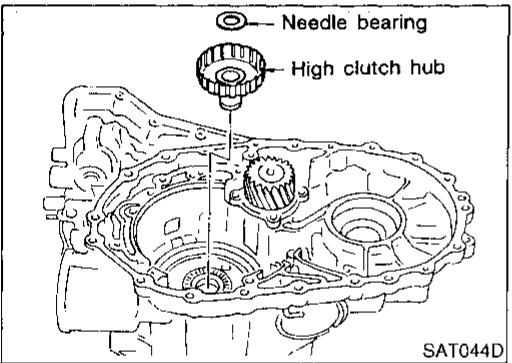
DISASSEMBLY



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

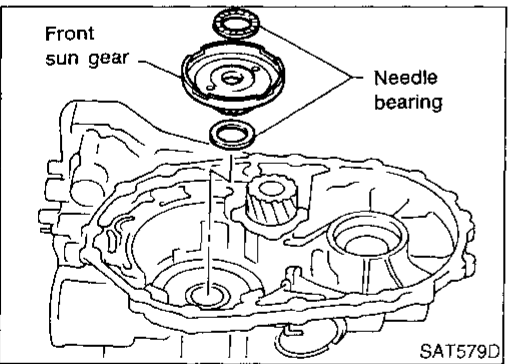


- c. Remove needle bearing from high clutch drum.
- d. Check input shaft assembly and needle bearing for damage or wear.



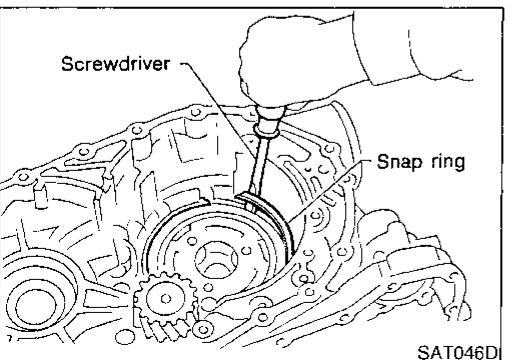
30. Remove high clutch hub and needle bearing from transmission case.

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



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

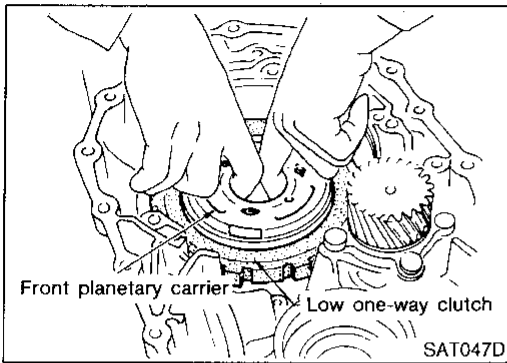
33. Check front sun gear and needle bearings for damage or wear.



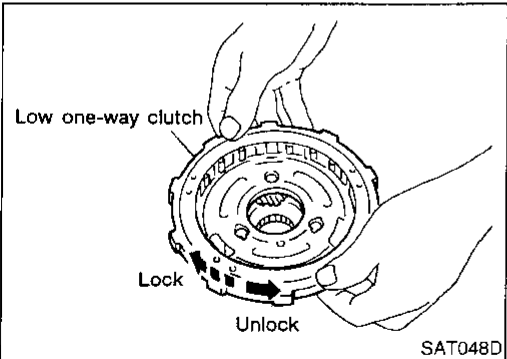
34. Remove front planetary carrier assembly and low one-way clutch according to the following procedures.

- a. Remove snap ring using a screwdriver.

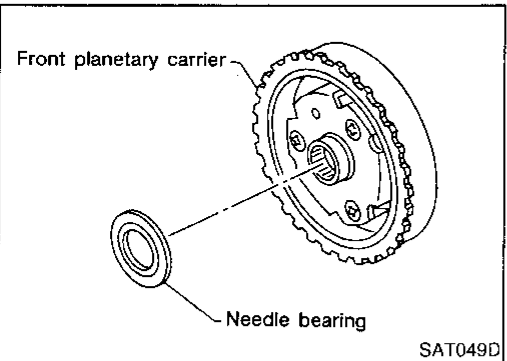
DISASSEMBLY



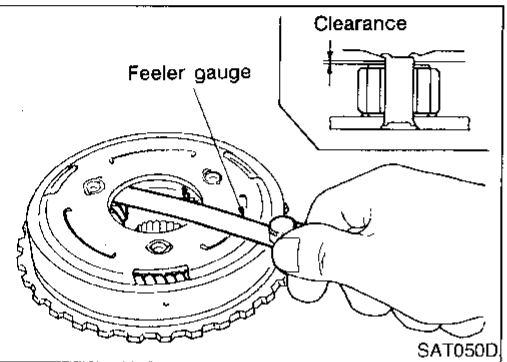
b. Remove front planetary carrier with low one-way clutch.



- 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.

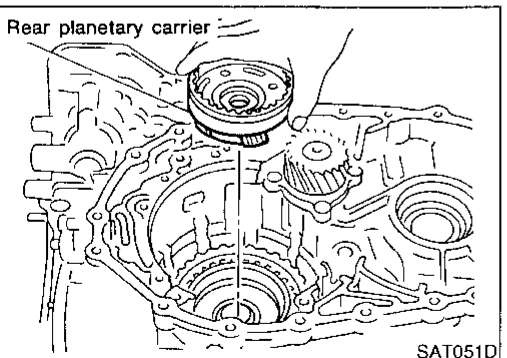
Standard clearance:

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.

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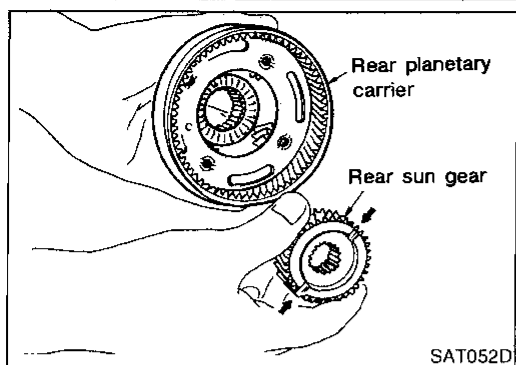
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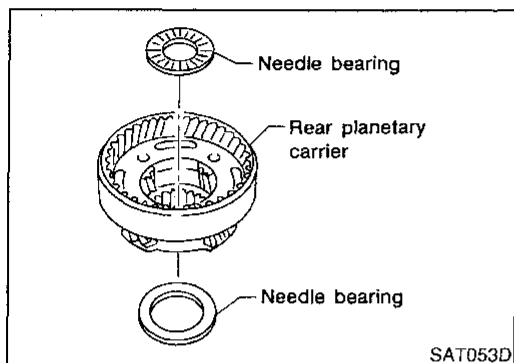
EL

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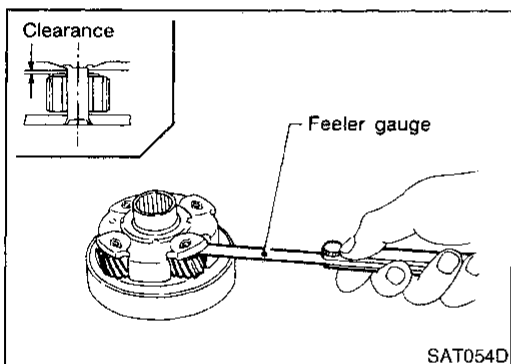
DISASSEMBLY



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.

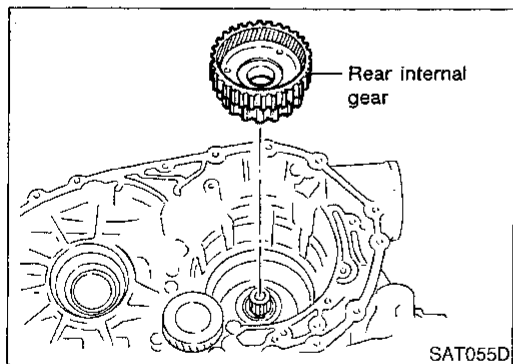
Standard clearance:

0.15 - 0.70 mm (0.0059 - 0.0276 in)

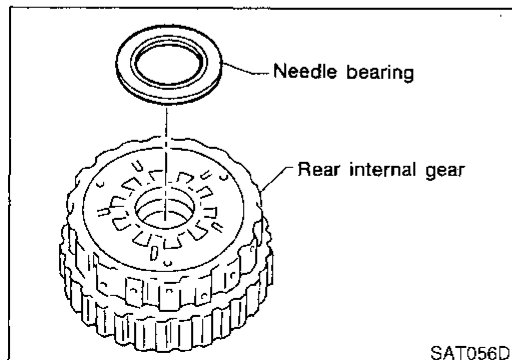
Allowable limit:

0.80 mm (0.0315 in)

Replace rear planetary carrier if the clearance exceeds allowable limit.



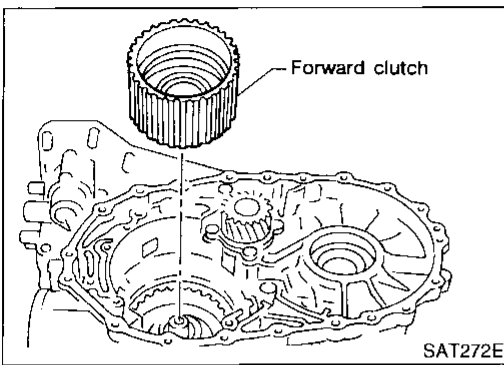
36. Remove rear internal gear from transmission case.



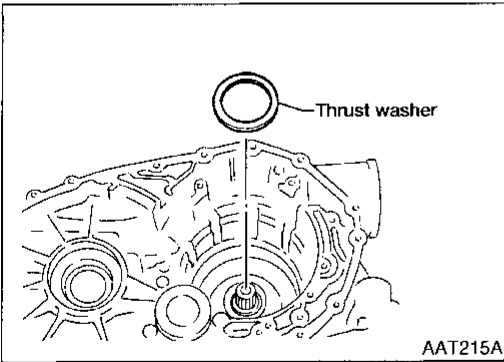
37. Remove needle bearing from rear internal gear.

- Check needle bearing for damage or wear.

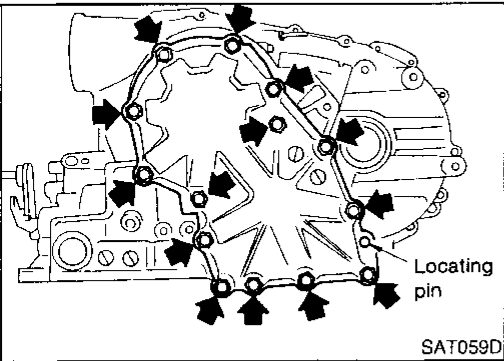
DISASSEMBLY



38. Remove forward clutch assembly from transmission case.

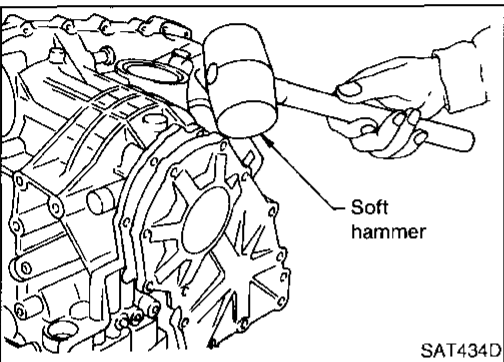


39. Remove thrust washer from transmission case.

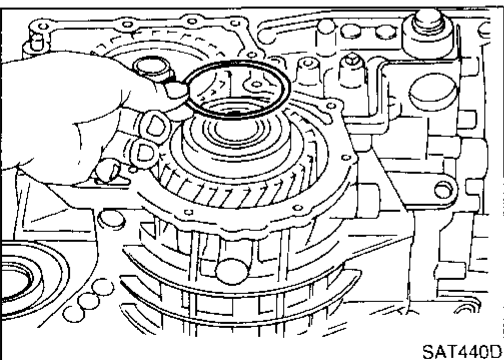


40. Remove output shaft assembly according to the following procedures.

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.

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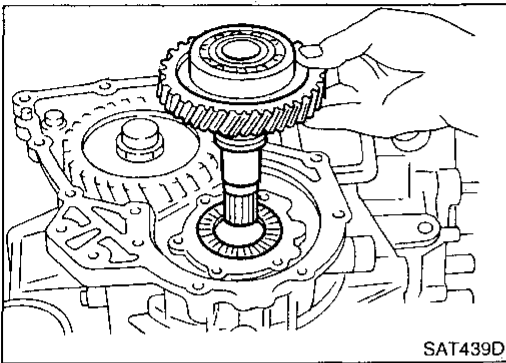
HA

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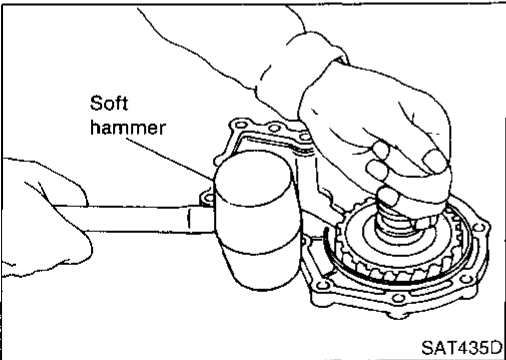
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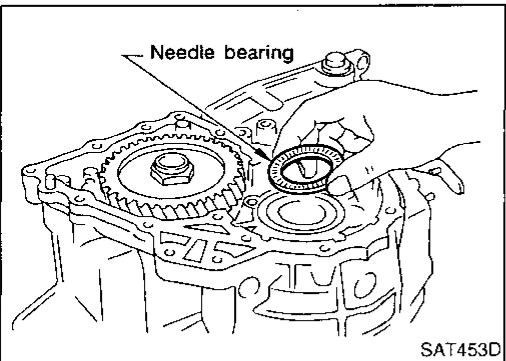
DISASSEMBLY



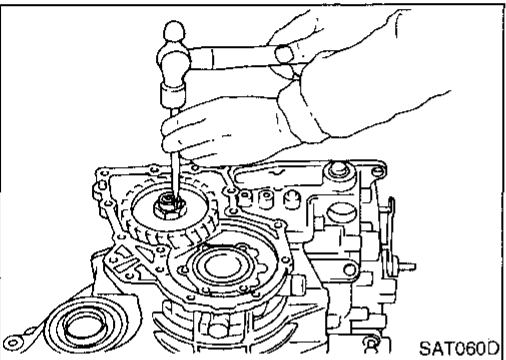
d. Remove output shaft assembly.



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

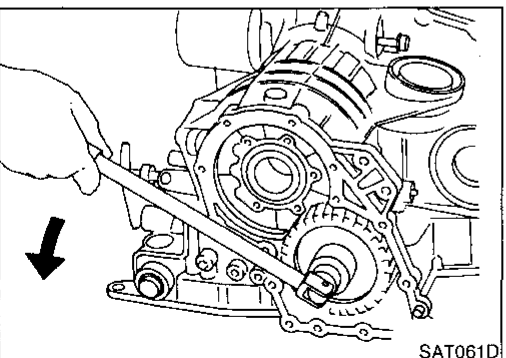


e. Remove needle bearing.



41. Disassemble reduction pinion gear according to the following procedures.

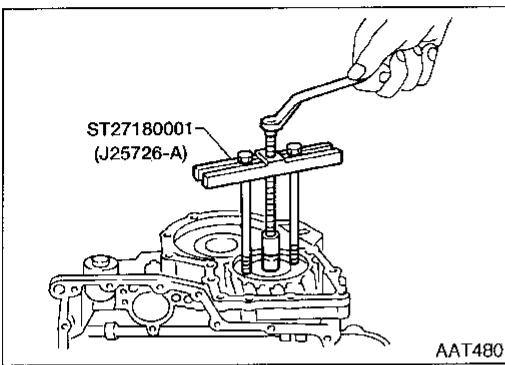
- a. Set manual shaft to position "P" to fix idler gear.
- b. Unlock idler gear lock nut using a pin punch.



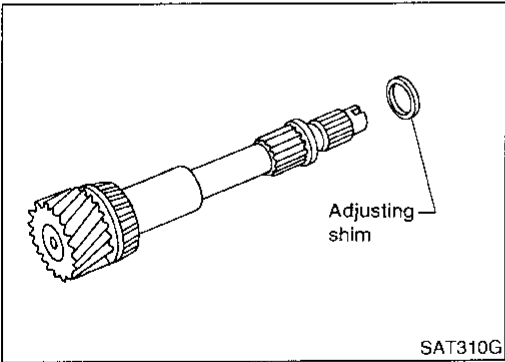
c. Remove idler gear lock nut.

- Do not reuse idler gear lock nut.

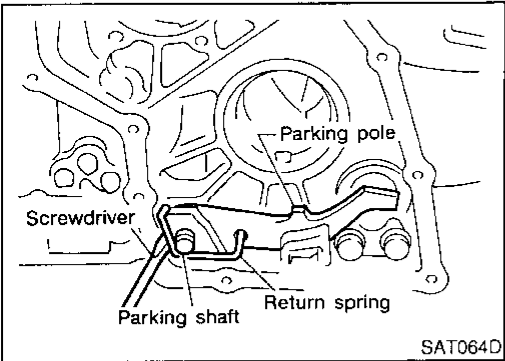
DISASSEMBLY



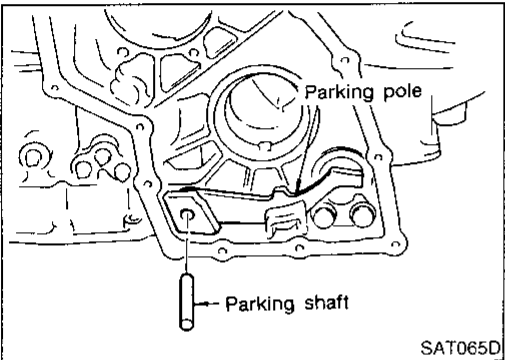
d. Remove idler gear with puller.



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

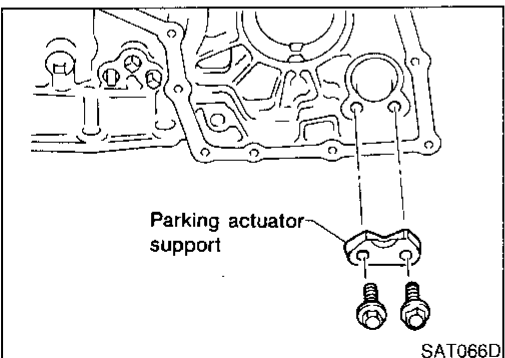


42. Remove return spring from parking shaft using a screwdriver.



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.

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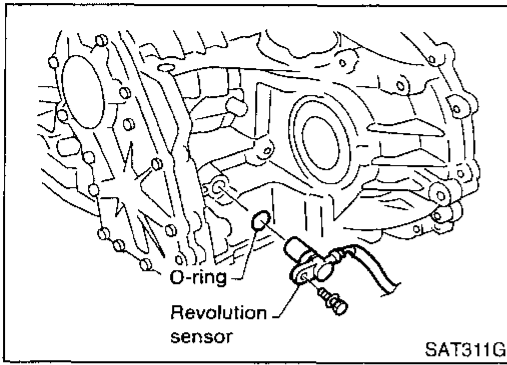
SC

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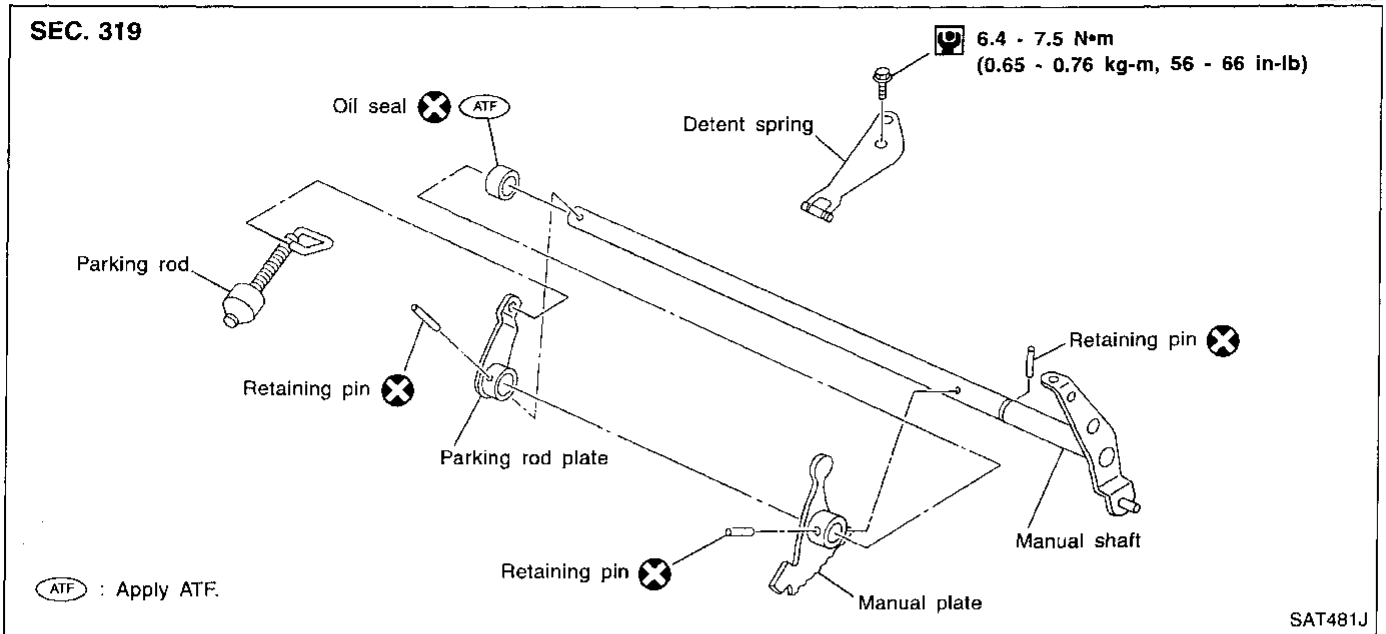
DISASSEMBLY

46. Remove revolution sensor from transmission case.



Manual Shaft COMPONENTS

NCAT0121



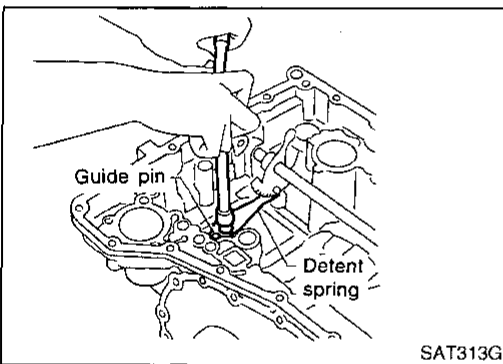
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REMOVAL

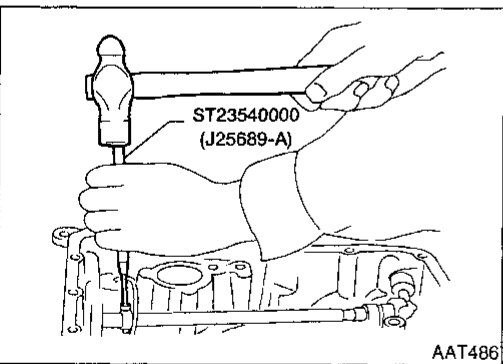
NCAT0122

1. Remove detent spring from transmission case.

AT

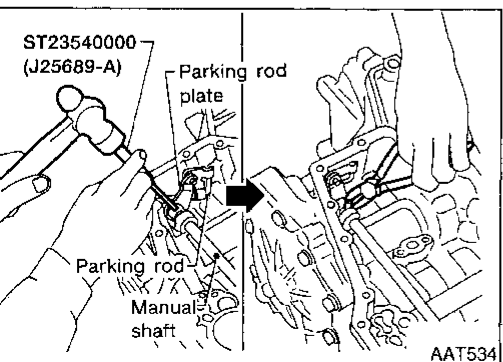


AX
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2. Drive out manual plate retaining pin.

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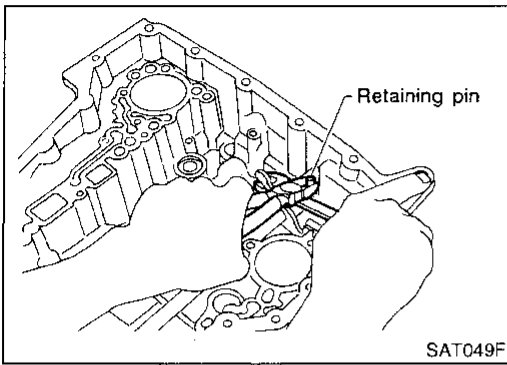


3. Drive and pull out parking rod plate retaining pin.
4. Remove parking rod plate from manual shaft.
5. Draw out parking rod from transmission case.

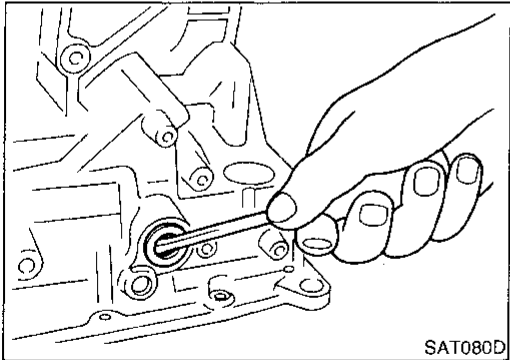
SC
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IDX

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.

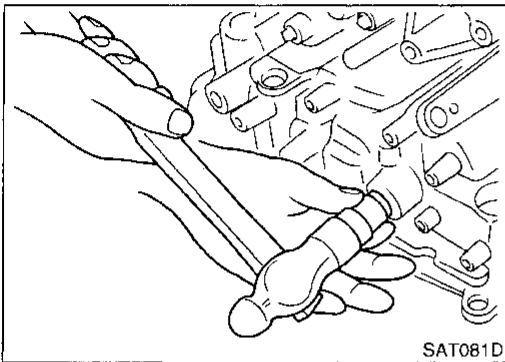


8. Remove manual shaft oil seal.

INSPECTION

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

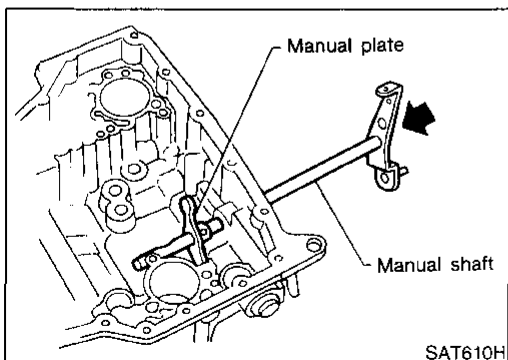
NCAT0123



INSTALLATION

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

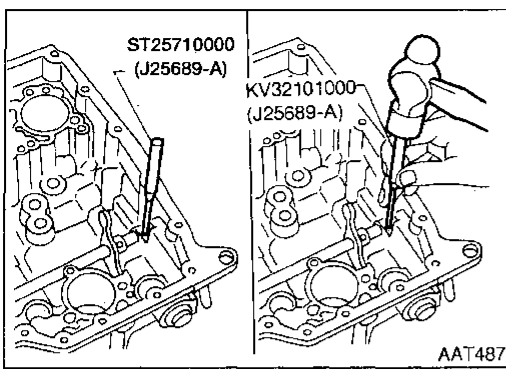
NCAT0124



2. Install manual shaft and manual plate.

REPAIR FOR COMPONENT PARTS

Manual Shaft (Cont'd)



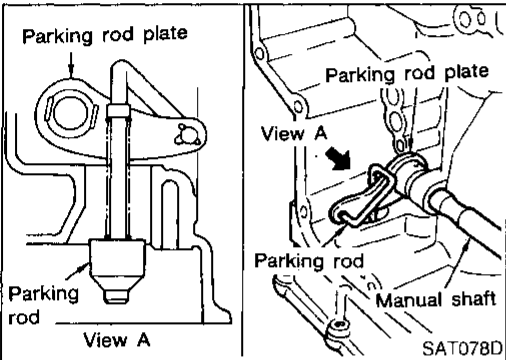
3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin.

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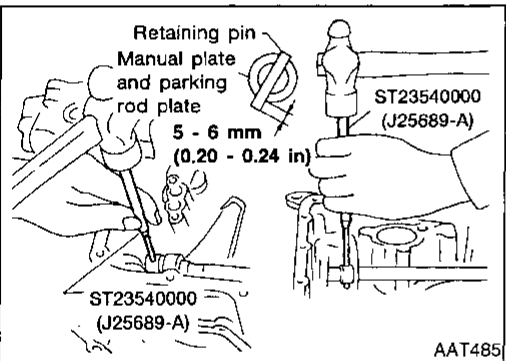
5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft.

EC

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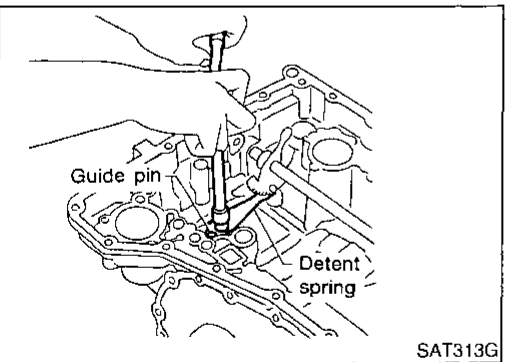
7. Drive in manual plate retaining pin and parking rod plate retaining pin.

AT

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8. Install detent spring.

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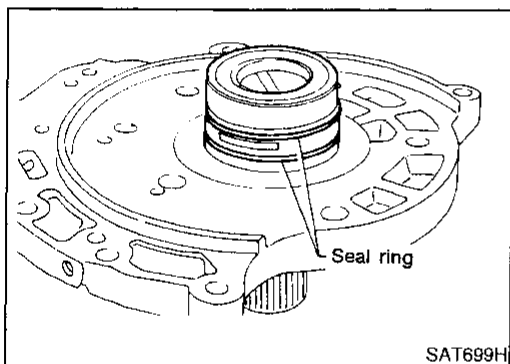
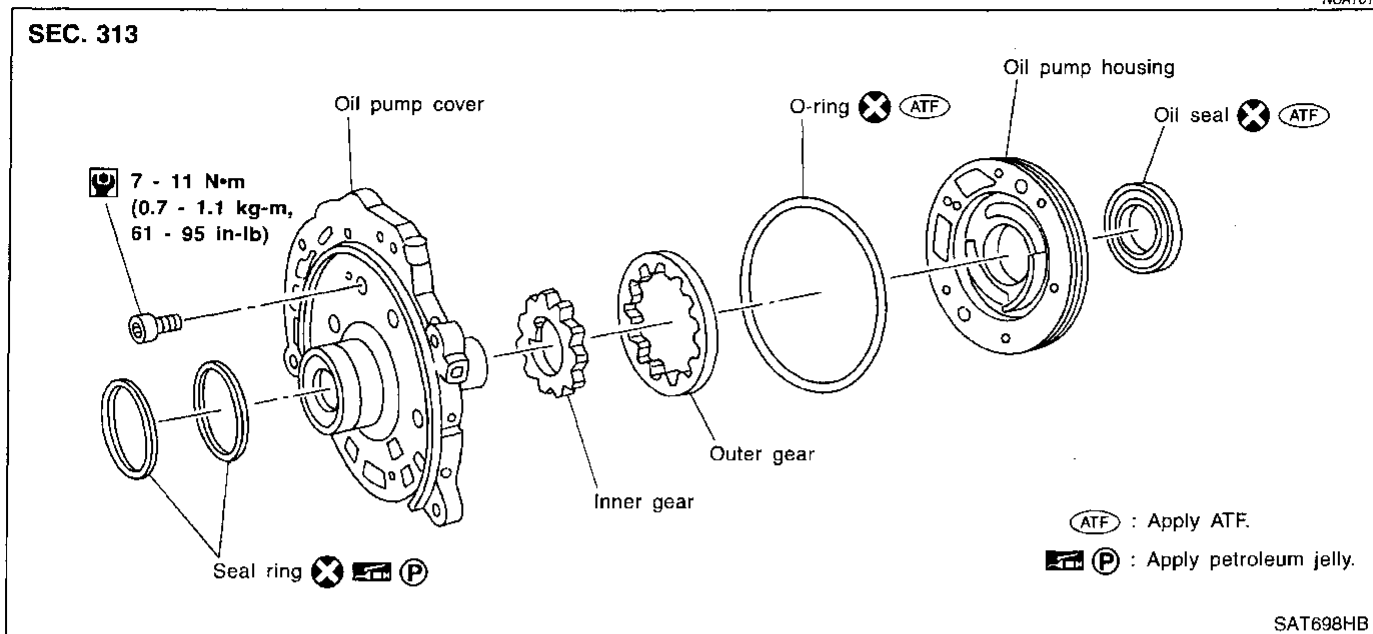
IDX

REPAIR FOR COMPONENT PARTS

Oil Pump

Oil Pump COMPONENTS

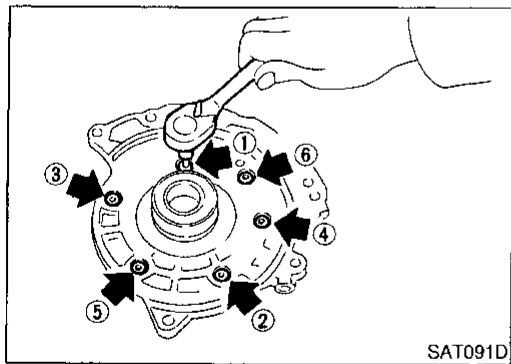
NCA70125



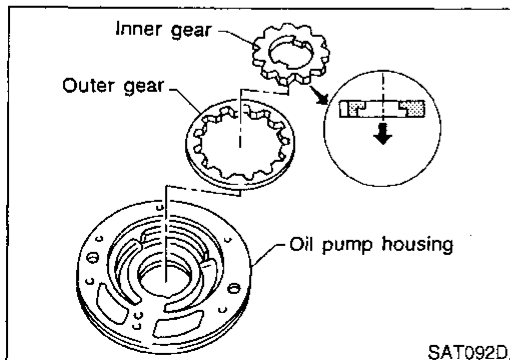
DISASSEMBLY

NCA70126

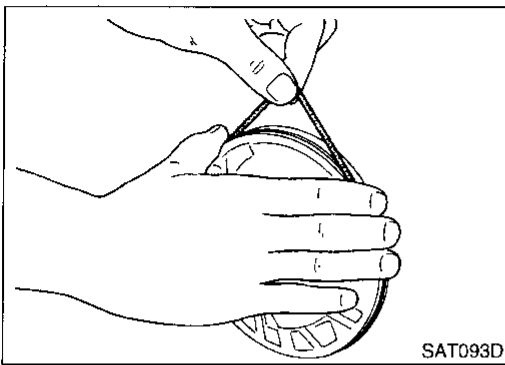
1. Remove seal rings.



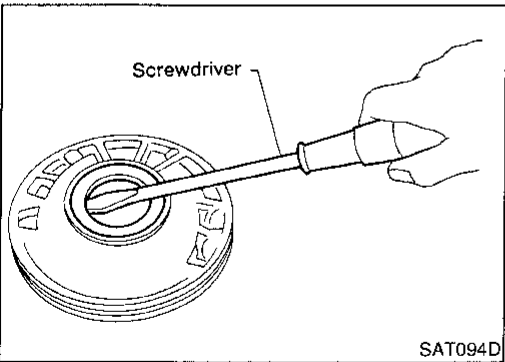
2. Loosen bolts in numerical order and remove oil pump cover.



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



4. Remove O-ring from oil pump housing.



5. Remove oil pump housing oil seal.

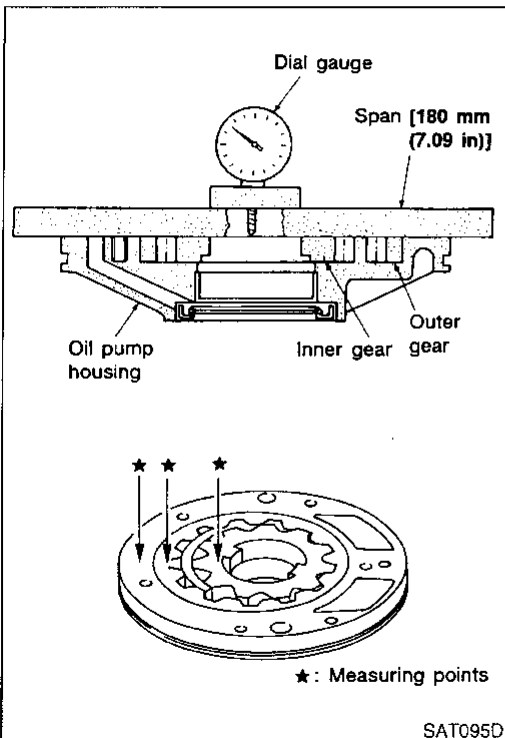
INSPECTION

Oil Pump Housing, Oil Pump Cover, Inner Gear and Outer Gear

NCAT0127

- Check for wear or damage.

NCAT0127S01



Side Clearances

NCAT0127S02

- Measure side clearance of inner and outer gears in at least four places around each outside edge. Maximum measured values should be within specified range.

Standard clearance:

0.02 - 0.04 mm (0.0008 - 0.0016 in)

- If clearance is less than standard, select inner and outer gear as a set so that clearance is within specifications.

Inner and outer gear:

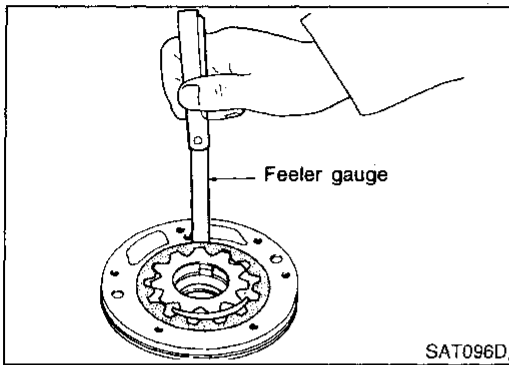
Refer to SDS, AT-346.

- If clearance is more than standard, replace whole oil pump assembly except oil pump cover.

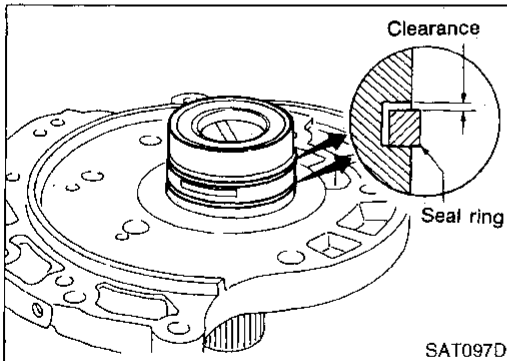
GI
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IDX

REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)



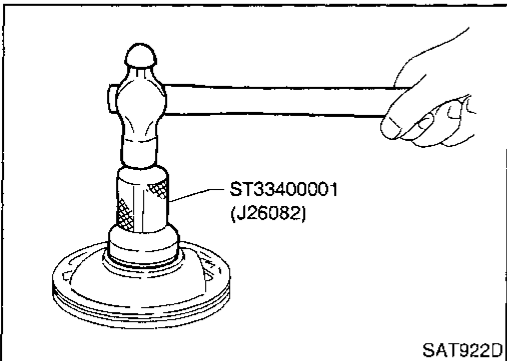
- Measure clearance between outer gear and oil pump housing.
Standard clearance:
0.08 - 0.15 mm (0.0031 - 0.0059 in)
Allowable limit:
0.15 mm (0.0059 in)
- If not within allowable limit, replace whole oil pump assembly except oil pump cover.



Side Ring Clearance

NCAT0127S03

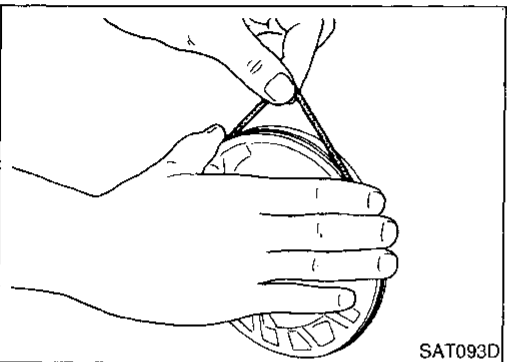
- Install new seal rings onto oil pump cover.
- Measure clearance between seal ring and ring groove.
Standard clearance:
0.1 - 0.25 mm (0.0039 - 0.0098 in)
Allowable limit:
0.25 mm (0.0098 in)
- If not within allowable limit, replace oil pump cover assembly.



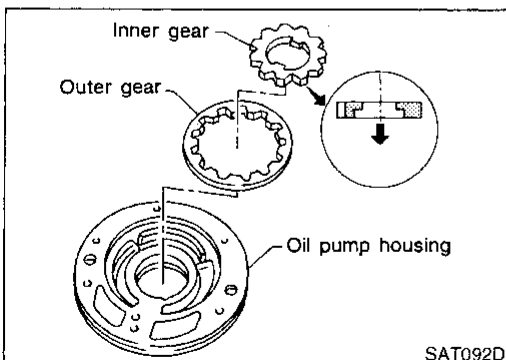
ASSEMBLY

NCAT0128

1. Install oil seal on oil pump housing.



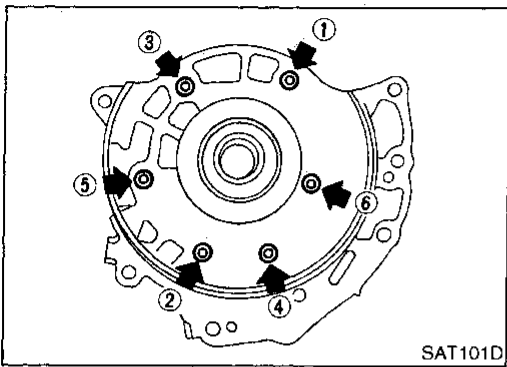
2. Install O-ring on oil pump housing.
 - Apply ATF to O-ring.



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)



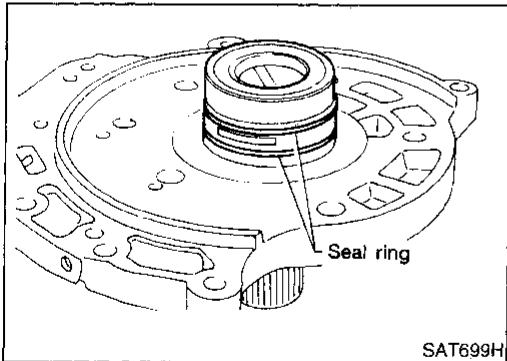
4. Install oil pump cover on oil pump housing.
 - a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly on oil pump housing assembly, then remove masking tape.
 - b. Tighten bolts in numerical order.

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

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AT

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ST

RS

BT

HA

SC

EL

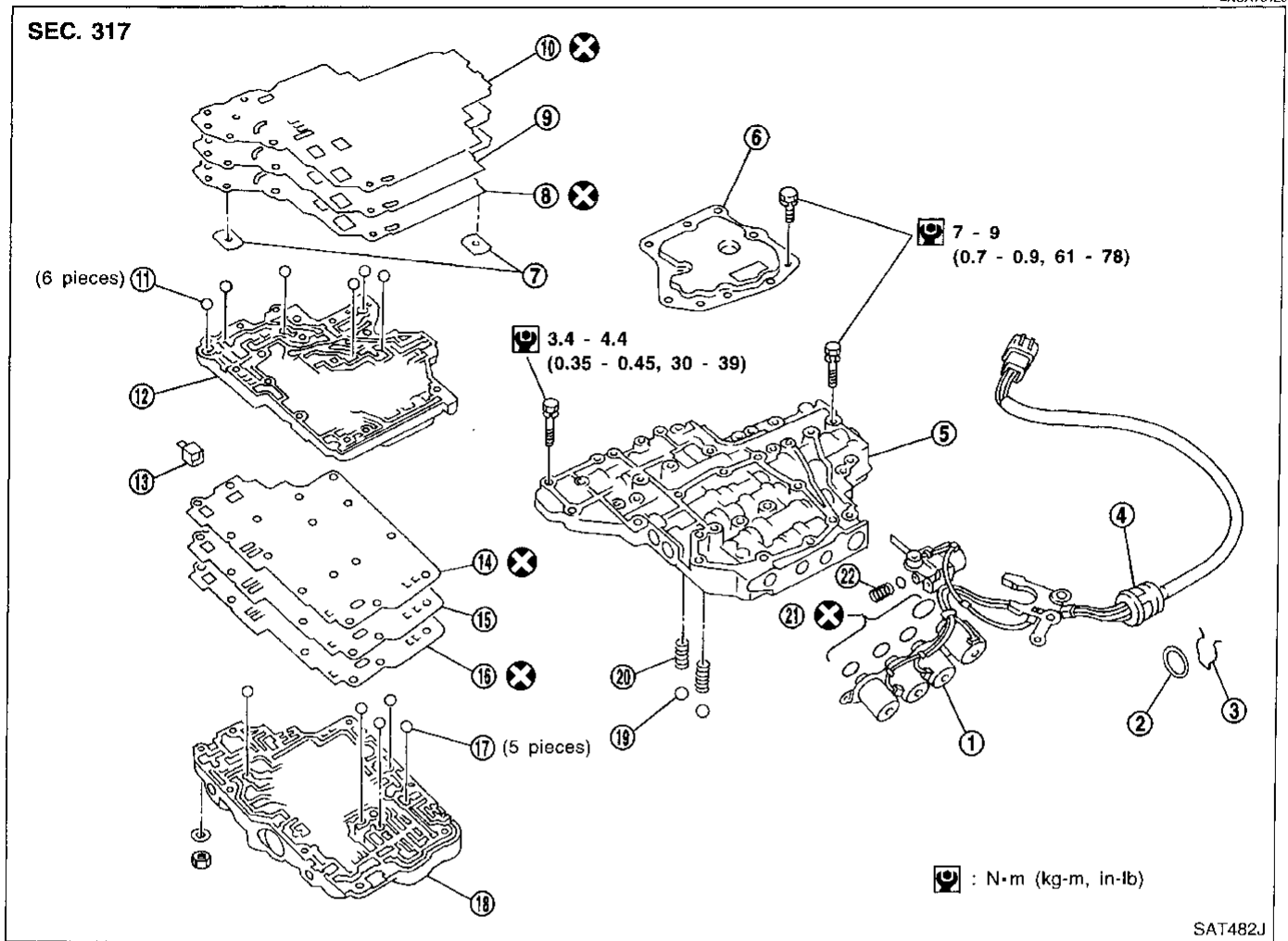
IDX

REPAIR FOR COMPONENT PARTS

Control Valve Assembly

Control Valve Assembly COMPONENTS

=NCAT0129



1. Solenoid valve assembly
2. O-ring
3. Clip
4. Terminal body
5. Control valve lower body
6. Oil strainer
7. Support plate
8. Lower inter separating gasket

9. Separating plate
10. Lower separating gasket
11. Steel ball
12. Control valve inter body
13. Pilot filter
14. Upper inter separating gasket
15. Separating plate
16. Upper separating gasket

17. Steel ball
18. Control valve upper body
19. Check ball
20. Oil cooler relief valve spring
21. O-ring
22. Line pressure solenoid valve spring

REPAIR FOR COMPONENT PARTS


Control Valve Assembly (Cont'd)

DISASSEMBLY

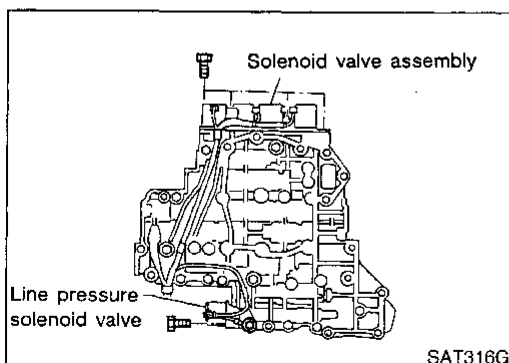
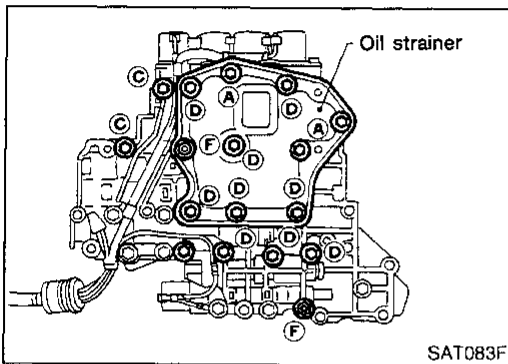
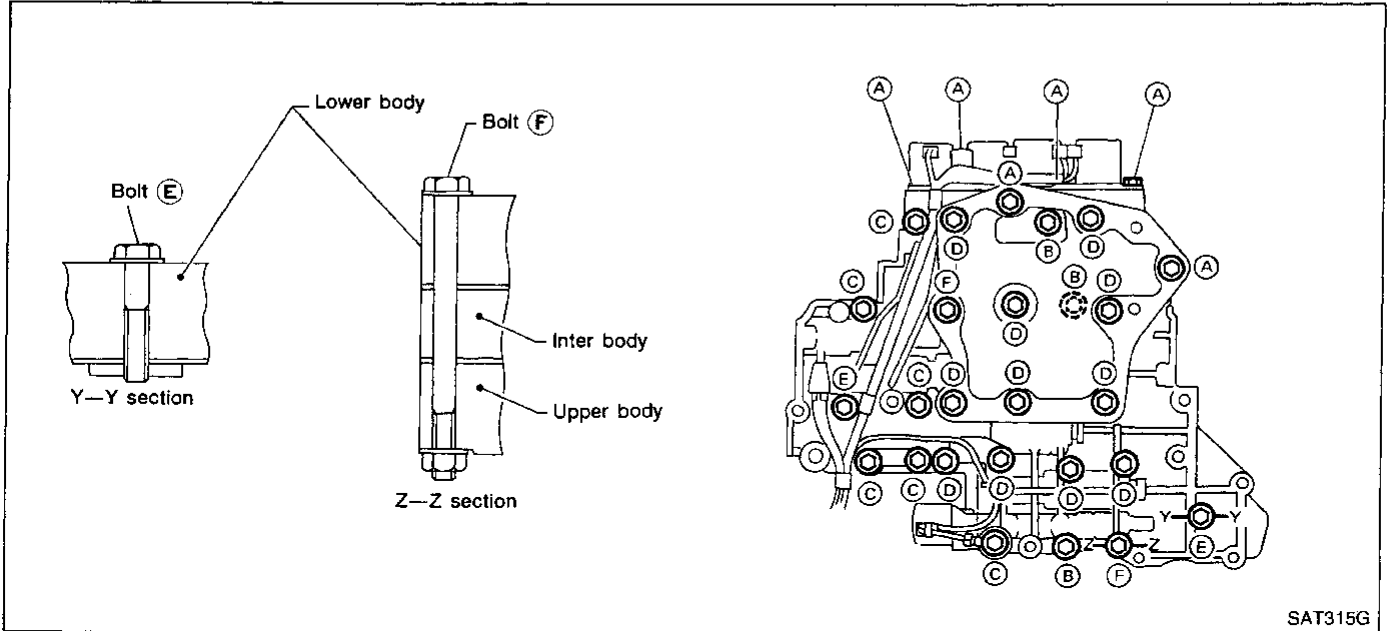
=NGAT0130

- Disassemble upper, inter and lower bodies.

Bolt length, number and location:

Bolt symbol	A	B	C	D	E	F
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)
Number of bolts	6	3	6	11	2	2

F: Reamer bolt with nut



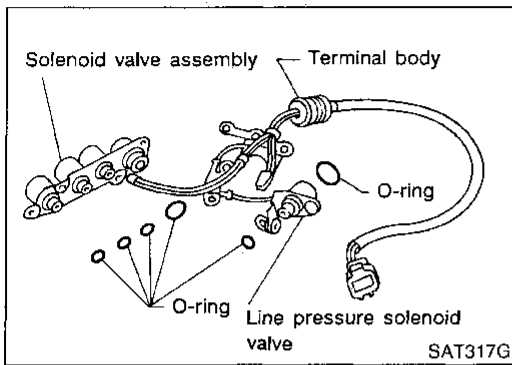
- Remove bolts A, D and F, and remove oil strainer from control valve assembly.

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

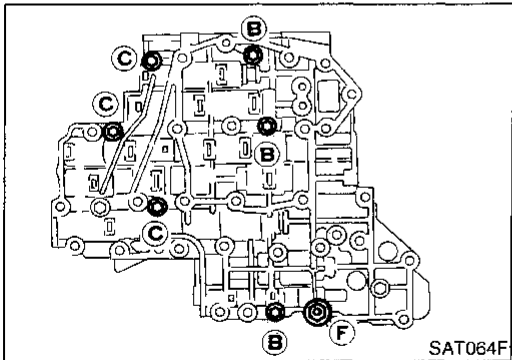
- Be careful not to lose the line pressure solenoid valve spring.

REPAIR FOR COMPONENT PARTS

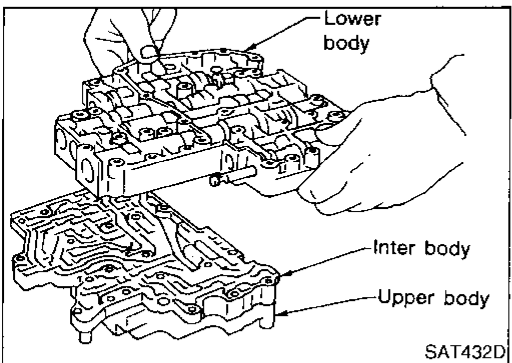
Control Valve Assembly (Cont'd)



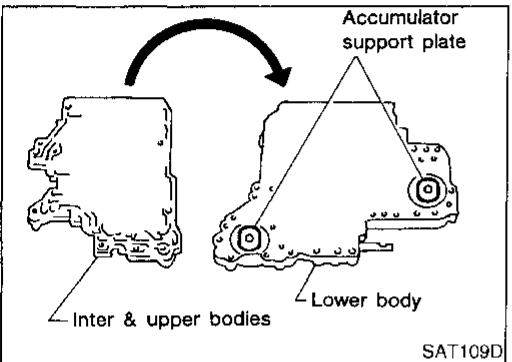
3. Remove O-rings from solenoid valves and terminal body.



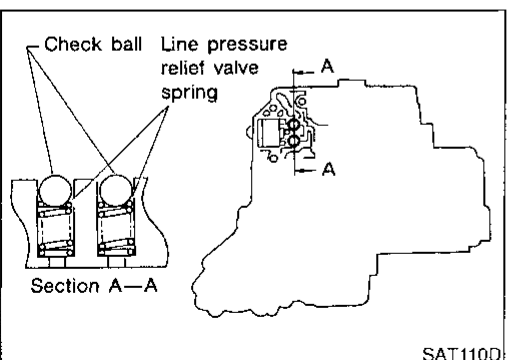
4. Place upper body facedown, and remove bolts B, C and F.



5. Remove lower body from inter body.



6. Turn over lower body, and accumulator support plates.



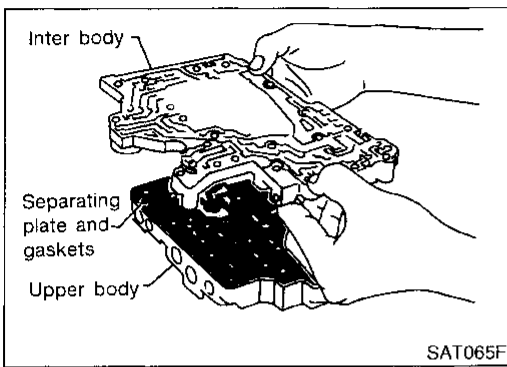
7. Remove bolts E, separating plate and separating gaskets from lower body.

8. Remove steel balls and relief valve springs from lower body.

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

REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)



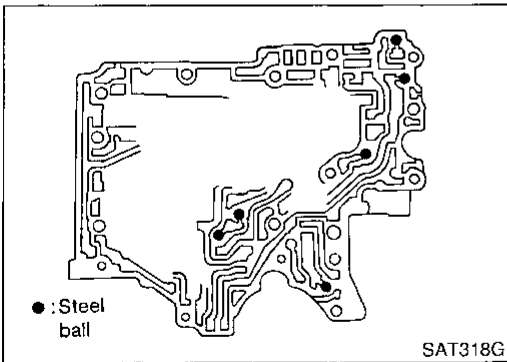
9. Remove inter body from upper body.
10. Remove pilot filter, separating plate and gaskets from upper body.

GI

MA

EM

LC



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

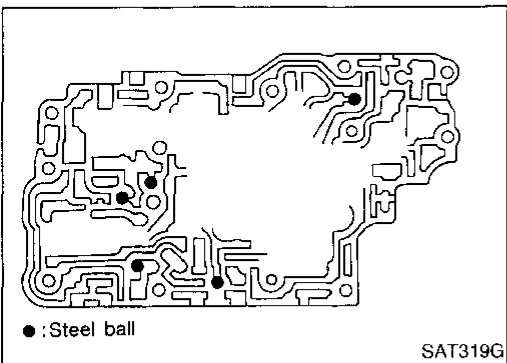
- Be careful not to lose steel balls.

EC

FE

CL

MT



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

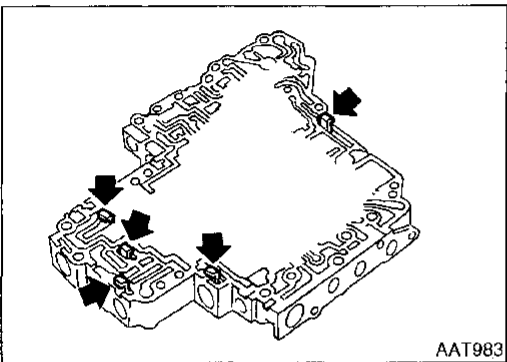
- Be careful not to lose steel balls.

AT

AX

SU

BR



INSPECTION Lower and Upper Bodies

NCAT0131

ST

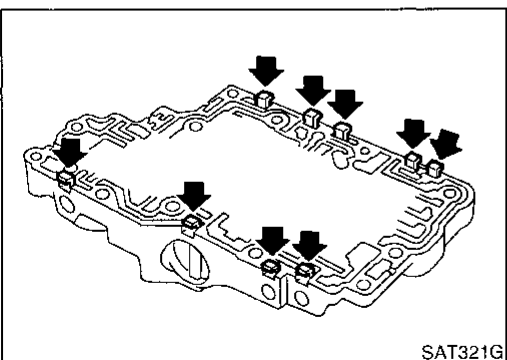
NCAT0131S01

- 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.

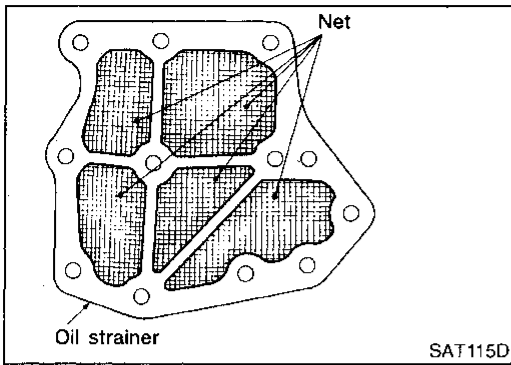
SC

EL

IDX

REPAIR FOR COMPONENT PARTS

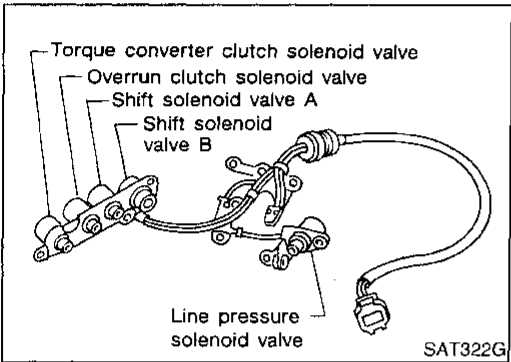
Control Valve Assembly (Cont'd)



Oil Strainer

NCAT0131S02

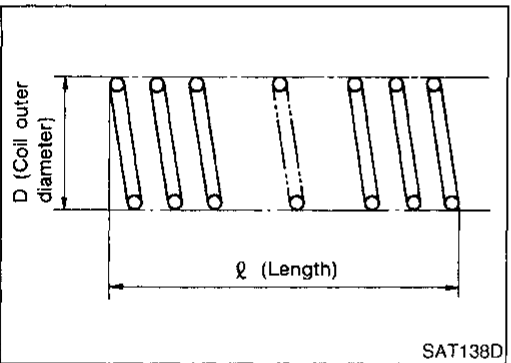
- Check wire netting of oil strainer for damage.



Shift Solenoid Valves A and B, Line Pressure Solenoid Valve, Torque Converter Clutch Solenoid Valve and Overrun Clutch Solenoid Valve

NCAT0131S03

- Measure resistance. Refer to AT-138.



Oil Cooler Relief Valve Spring

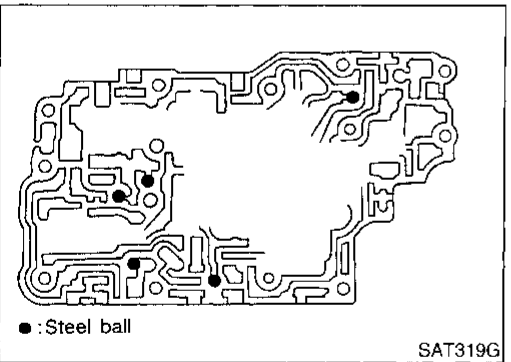
NCAT0131S04

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

Inspection standard:

Unit: mm (in)

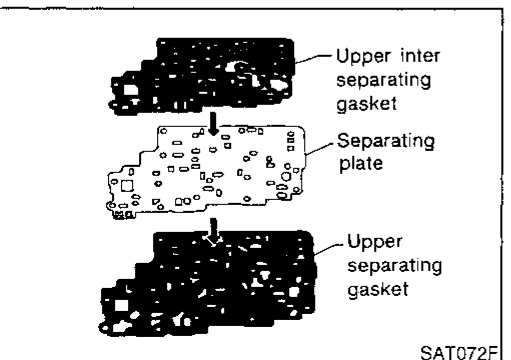
Part No.	l	D
31872 31X00	17.0 (0.669)	8.0 (0.315)



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.

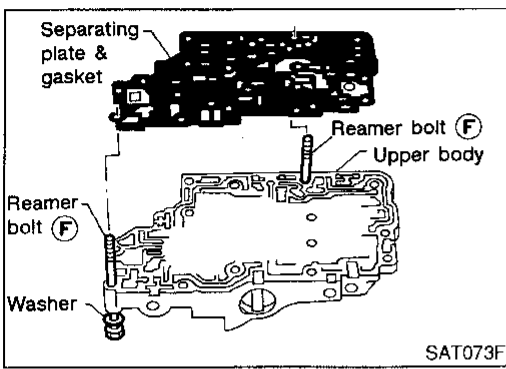


- b. Install upper separating gasket, upper inter separating gasket and upper separating plate in order shown in illustration.

- Always use new gaskets.

REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)



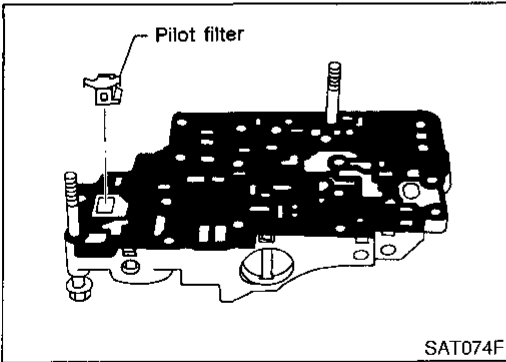
- c. Install reamer bolts F from bottom of upper body. Using reamer bolts as guides, install separating plate and gaskets as a seat.

GI

MA

EM

LC



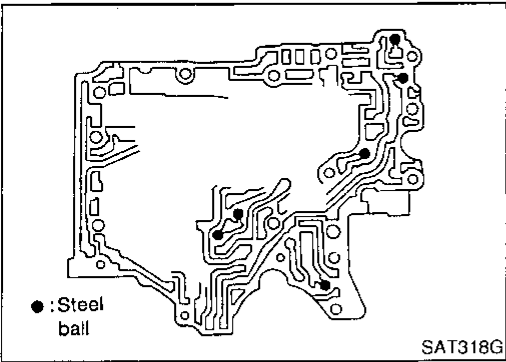
- d. Install pilot filter.

EC

FE

CL

MT



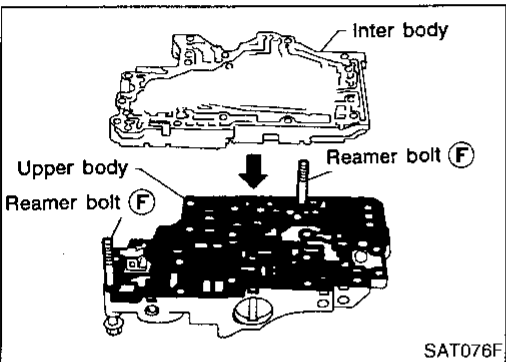
- e. Place inter body as shown in the illustration. Install steel balls in their proper positions.

AT

AX

SU

BR



- f. Install inter body on upper body using reamer bolts F as guides.

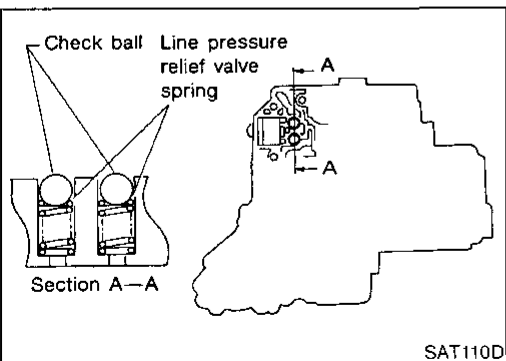
ST

- Be careful not to dislocate or drop steel balls.

RS

BT

HA



- g. Install steel balls and relief valve springs in their proper positions in lower body.

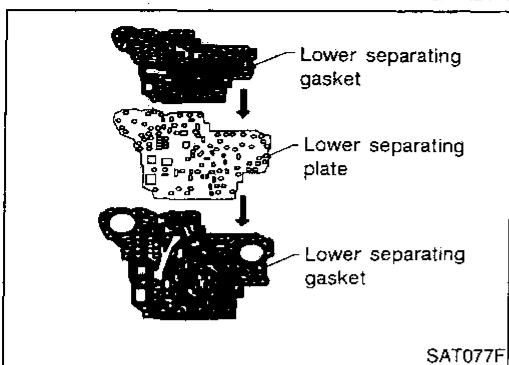
SC

EL

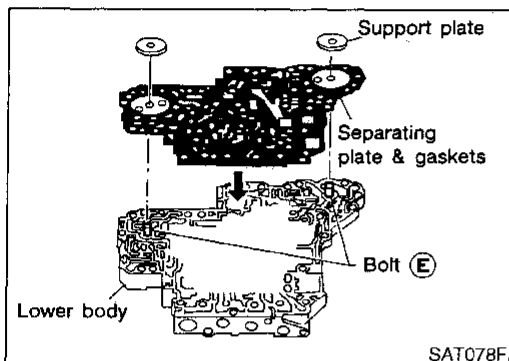
IDX

REPAIR FOR COMPONENT PARTS

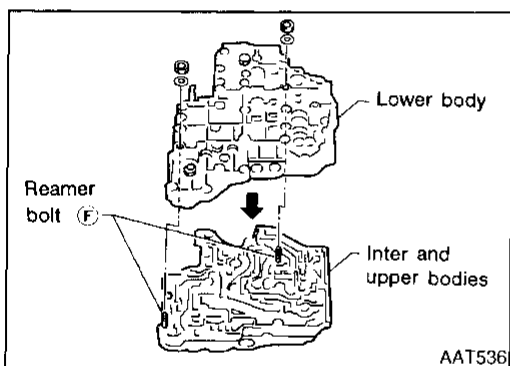
Control Valve Assembly (Cont'd)



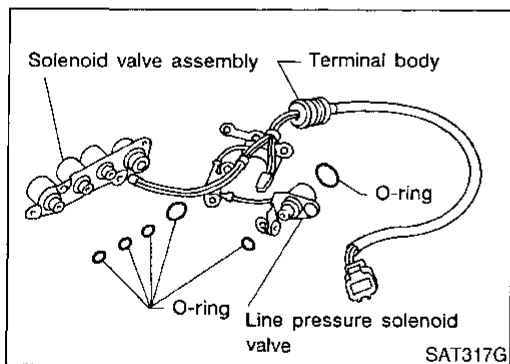
h. Install lower separating gasket, inner separating gasket and lower separating plate in order shown in the illustration.



- 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.**

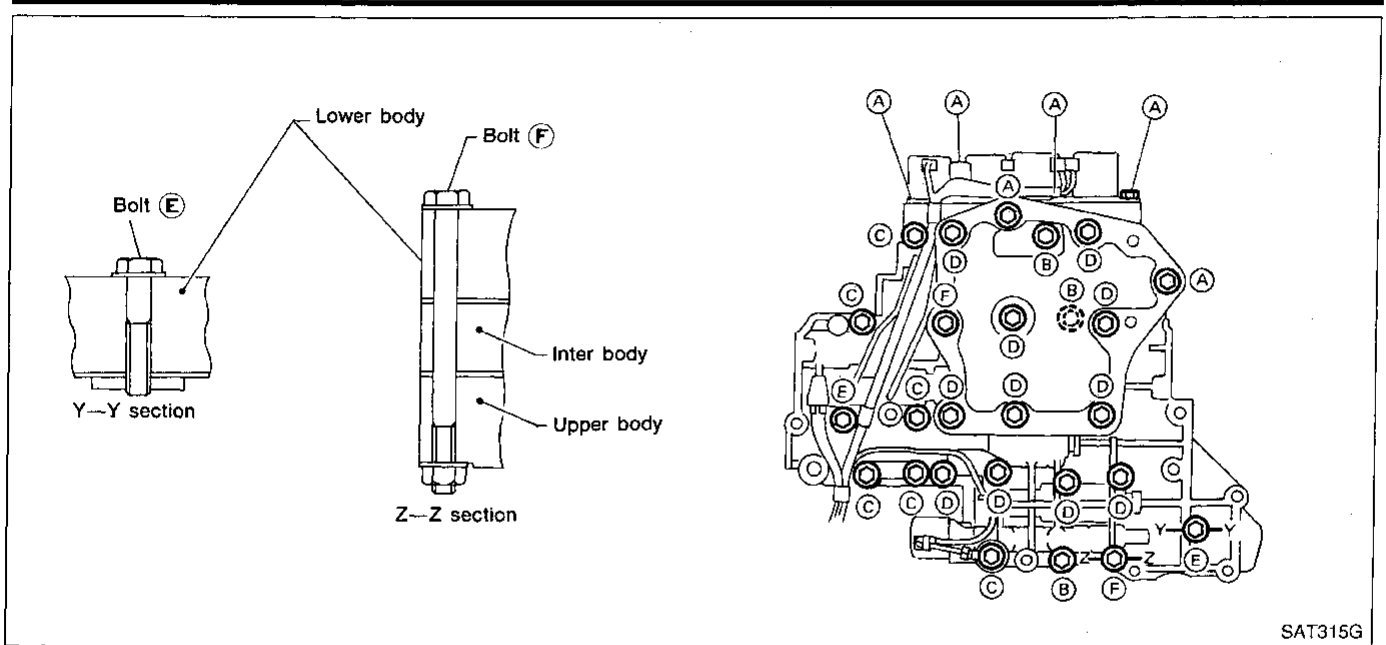
3. Install and tighten bolts.

Bolt length, number and location:

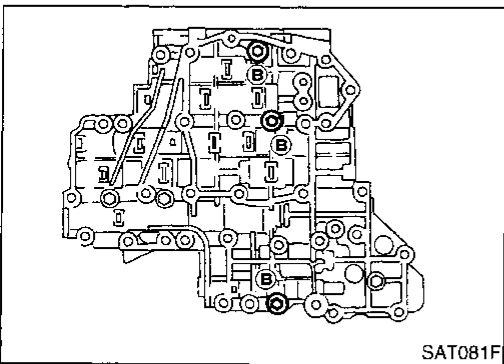
Bolt symbol	A	B	C	D	E	F
Bolt length "ℓ" 	13.5 mm (0.531 in)	58.0 mm (2.283 in)	44.0 mm (1.732 in)	66.0 mm (2.598 in)	33.0 mm (1.299 in)	78.0 mm (3.071 in)
Number of bolts	6	3	6	11	2	2

REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)



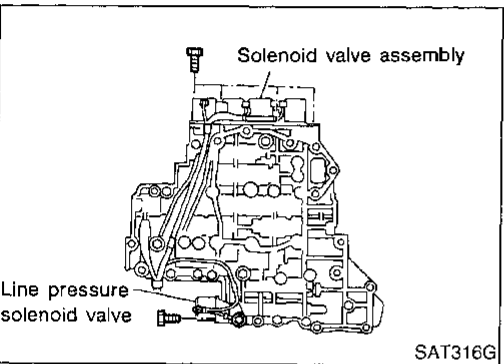
GI
MA
EM
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EC
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CL



- a. Install and tighten bolts B to specified torque.
 ☐ : 7 - 9 N·m (0.7 - 0.9 kg·m, 61 - 78 in·lb)

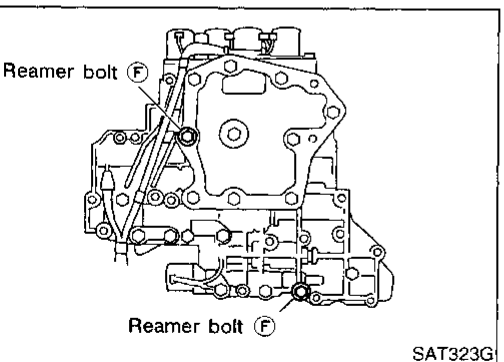
MT
AT

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- b. Install solenoid valve assembly and line pressure solenoid valve to lower body.

ST
RS
BT
HA

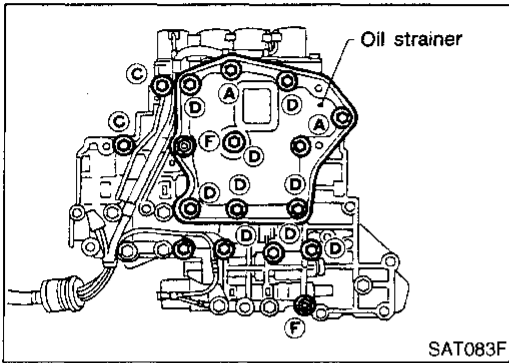


- c. Remove reamer bolts F and set oil strainer on control valve assembly.
 d. Reinstall reamer bolts F from lower body side.

SC
EL
IDX

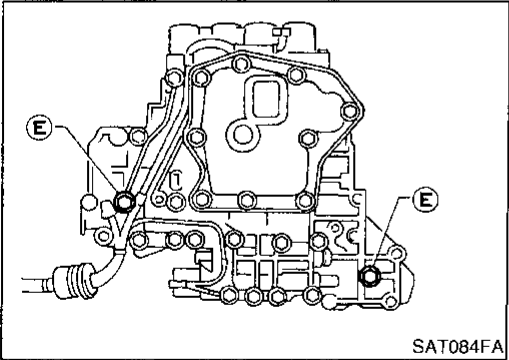
REPAIR FOR COMPONENT PARTS

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)

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body

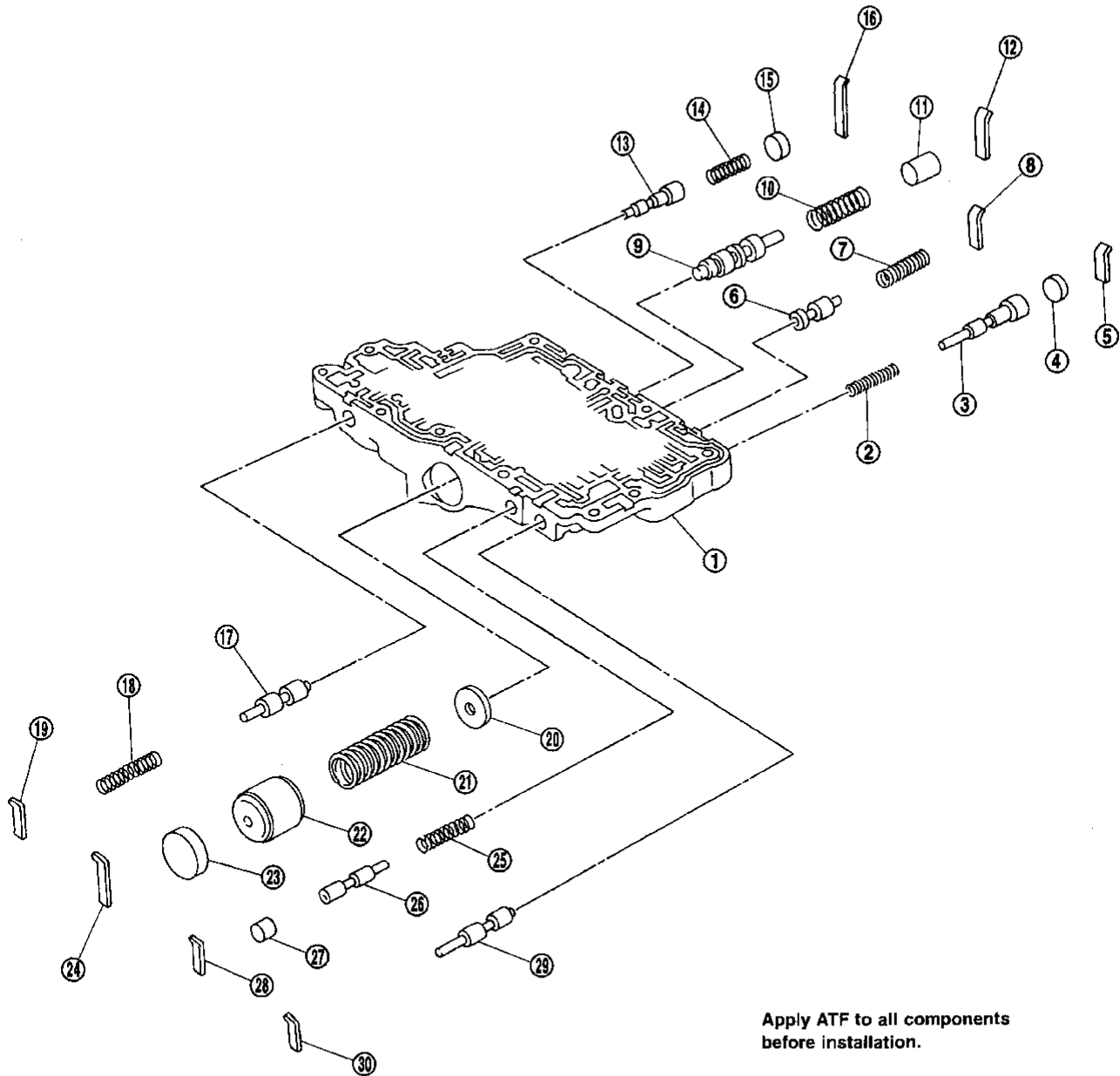
Control Valve Upper Body

COMPONENTS

Numbers preceding valve springs correspond with those shown in SDS table on page AT-344.

=NCAT0133

SEC. 317



Apply ATF to all components before installation.

- | | | |
|--|------------------------------------|----------------------------|
| 1. Control valve upper body | 11. Plug | 21. Return spring |
| 2. Return spring | 12. Retainer plate | 22. 1-2 accumulator piston |
| 3. Overrun clutch reducing valve | 13. 1-2 accumulator valve | 23. Plug |
| 4. Plug | 14. Return spring | 24. Retainer plate |
| 5. Retainer plate | 15. Plug | 25. Return spring |
| 6. Torque converter relief valve | 16. Retainer plate | 26. 1st reducing valve |
| 7. Return spring | 17. Pilot valve | 27. Plug |
| 8. Retainer plate | 18. Return spring | 28. Retainer plate |
| 9. Torque converter clutch control valve | 19. Retainer plate | 29. 2-3 timing valve |
| 10. Return spring | 20. 1-2 accumulator retainer plate | 30. Retainer plate |

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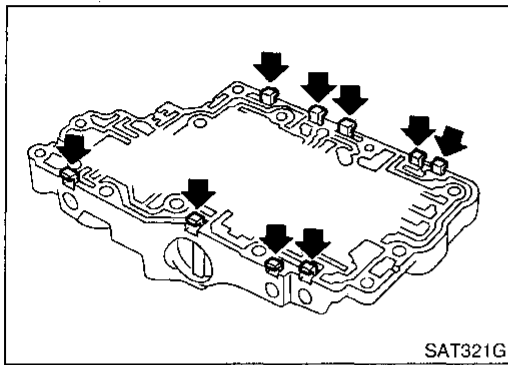
SAT483J

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REPAIR FOR COMPONENT PARTS

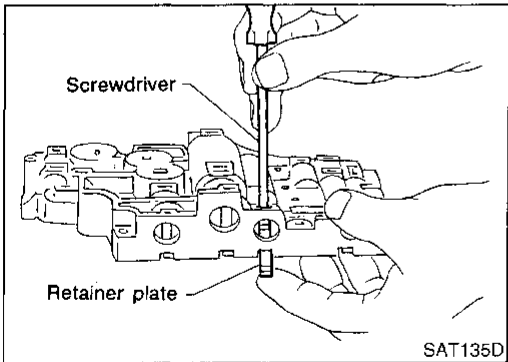
Control Valve Upper Body (Cont'd)

NCAT0134

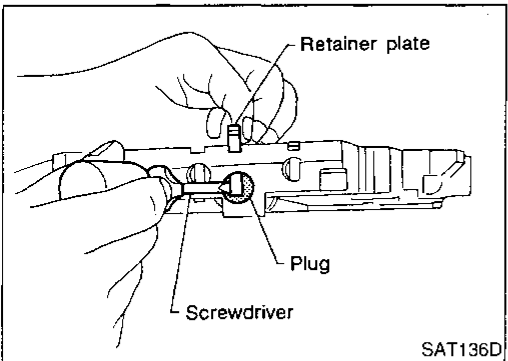


DISASSEMBLY

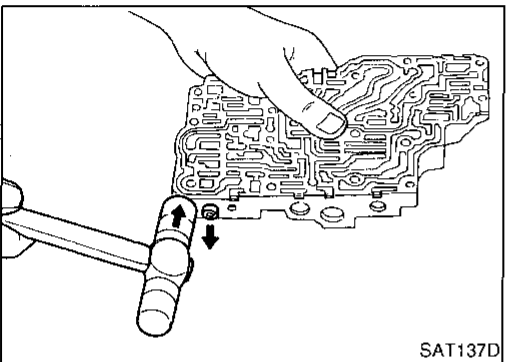
1. Remove valves at retainer plates.
 - Do not use a magnetic "hand".



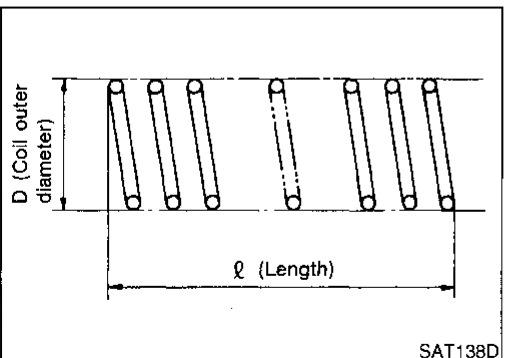
- a. Use a screwdriver to remove retainer plates.



- 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

NCAT0135

Valve Spring

NCAT0135S01

- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.

Inspection standard:

Refer to SDS, AT-344.

- Replace valve springs if deformed or fatigued.

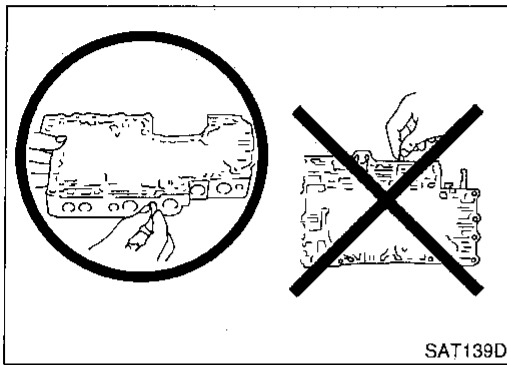
Control Valves

NCAT0135S02

- Check sliding surfaces of valves, sleeves and plugs.

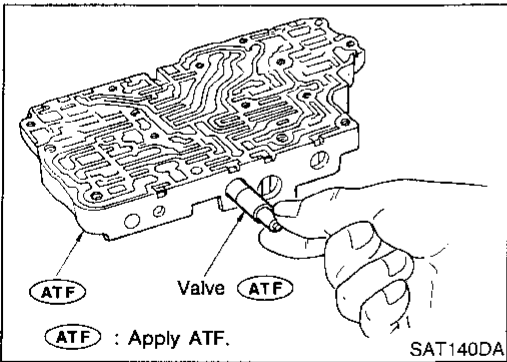
REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

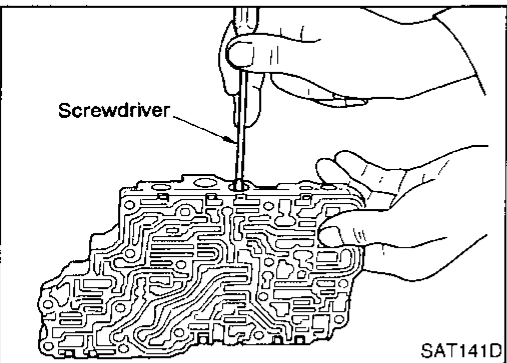


ASSEMBLY

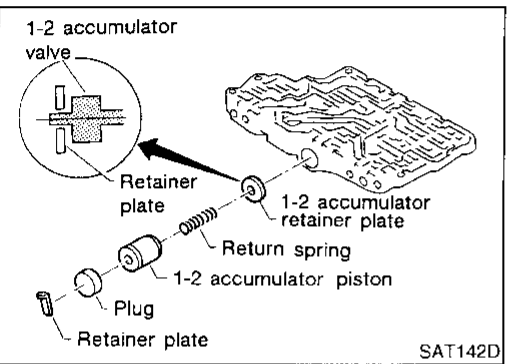
- Lay control valve body down when installing valves. Do not stand the control valve body upright. NCAT0136



1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.
- Be careful not to scratch or damage valve body.

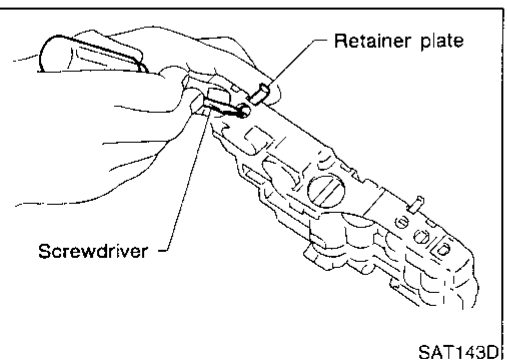


- Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.



1-2 Accumulator Valve

- Install 1-2 accumulator valve. Align 1-2 accumulator retainer plate from opposite side of control valve body. NCAT0136S01
- Install return spring, 1-2 accumulator piston and plug.



1. Install retainer plates.
- Install retainer plate while pushing plug or return spring.

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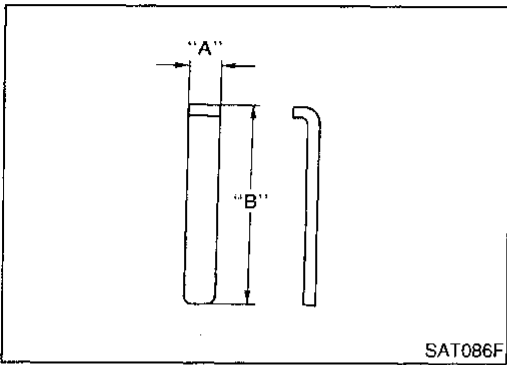
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REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)



Retainer Plate (for control valve upper body)

NCAT0196S02
Unit: mm (in)

Name of control valve	No.	Length A	Length B
Pilot valve	19	6.0 (0.236)	21.5 (0.846)
1-2 accumulator valve	16		38.5 (1.516)
1-2 accumulator piston	24		21.5 (0.846)
1st reducing valve	28		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	12		21.5 (0.846)
2-3 timing valve	30		21.5 (0.846)

- Install proper retainer plates.

REPAIR FOR COMPONENT PARTS

Control Valve Lower Body

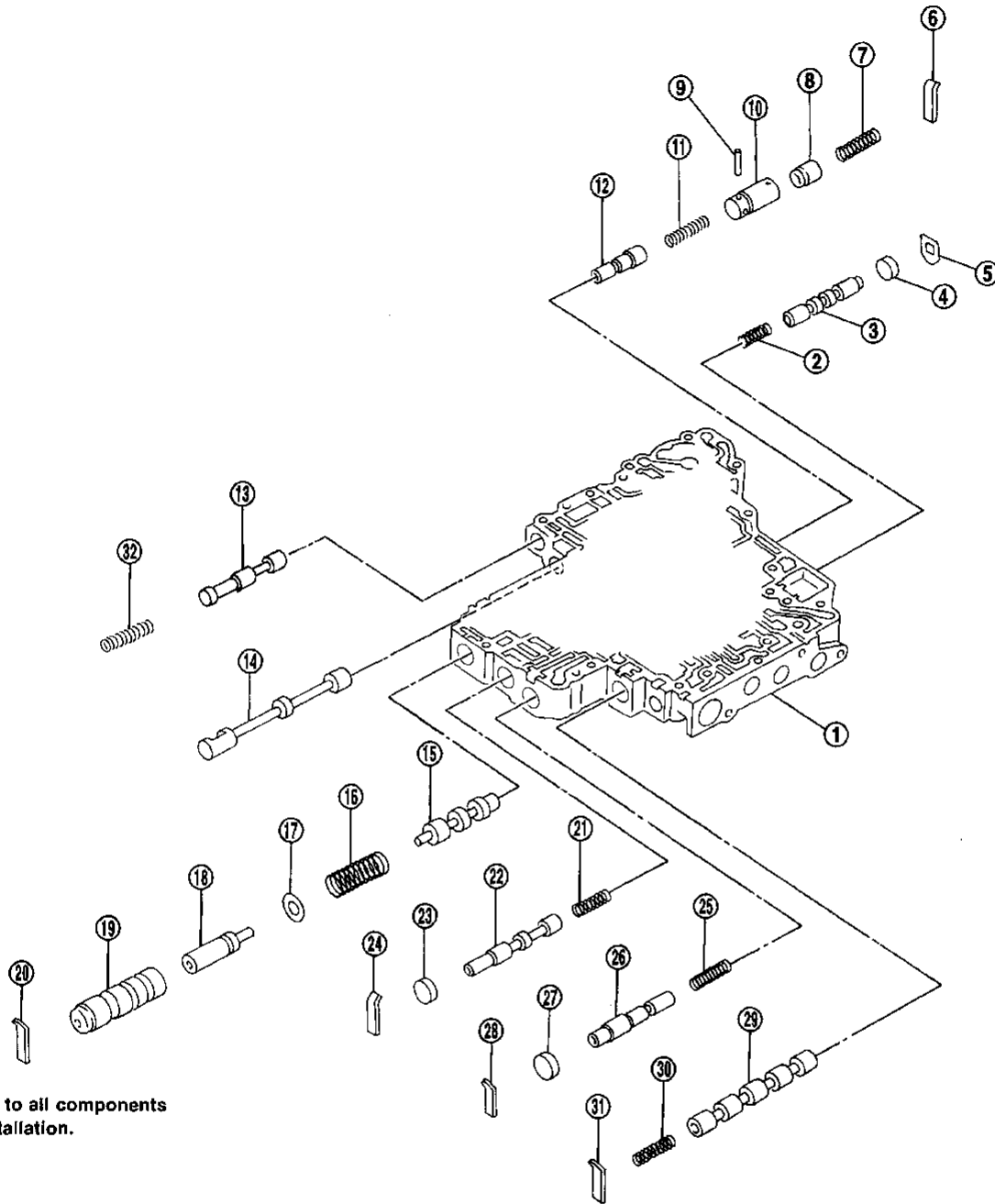
Control Valve Lower Body

COMPONENTS

Numbers preceding valve springs correspond with those shown in SDS table on page AT-344.

=NCAT0137

SEC. 317



Apply ATF to all components before installation.

- | | | |
|-----------------------------|----------------------------------|-------------------------------|
| 1. Control valve lower body | 12. Pressure modifier valve | 23. Plug |
| 2. Return spring | 13. Plug | 24. Retainer plate |
| 3. Shift valve B | 14. Manual valve | 25. Return spring |
| 4. Plug | 15. Pressure regulator valve | 26. Accumulator control valve |
| 5. Retainer plate | 16. Return spring | 27. Plug |
| 6. Retainer plate | 17. Spring seat | 28. Retainer plate |
| 7. Return spring | 18. Plug | 29. Shift valve A |
| 8. Piston | 19. Sleeve | 30. Return spring |
| 9. Parallel pin | 20. Retainer plate | 31. Retainer plate |
| 10. Sleeve | 21. Return spring | 32. Return spring |
| 11. Return spring | 22. Overrun clutch control valve | |

AT-279

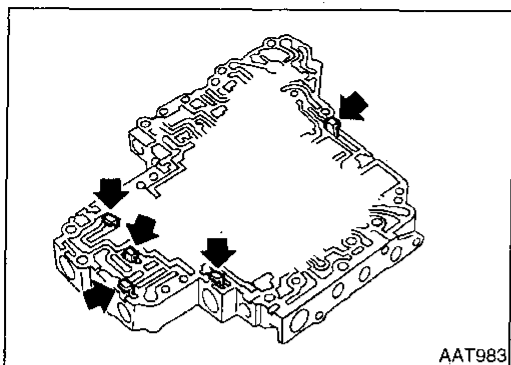
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REPAIR FOR COMPONENT PARTS

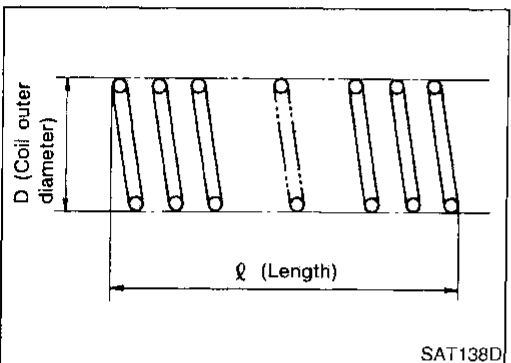
Control Valve Lower Body (Cont'd)



DISASSEMBLY

Remove valves at retainer plate.
For removal procedures, refer to AT-267.

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-344.

- Replace valve springs if deformed or fatigued.

Control Valves

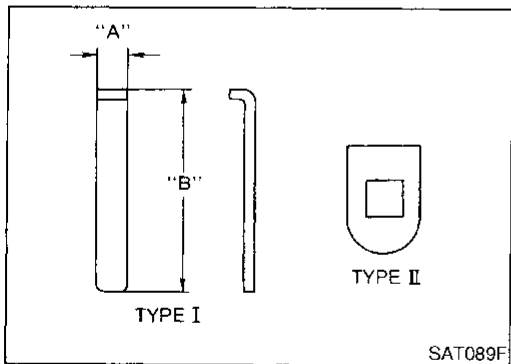
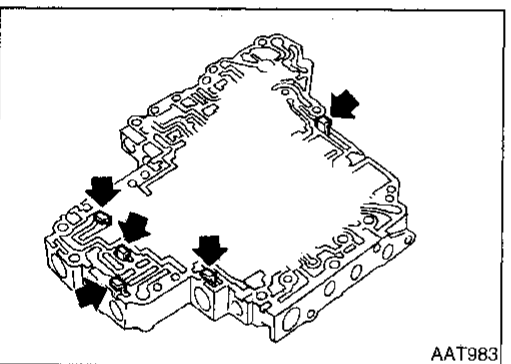
- Check sliding surfaces of control valves, sleeves and plugs for damage.

NCAT0139S01
NCAT0139S02

NCAT0140

ASSEMBLY

- Install control valves.
For installation procedures, refer to AT-344.



Retainer Plate (for control valve lower body)

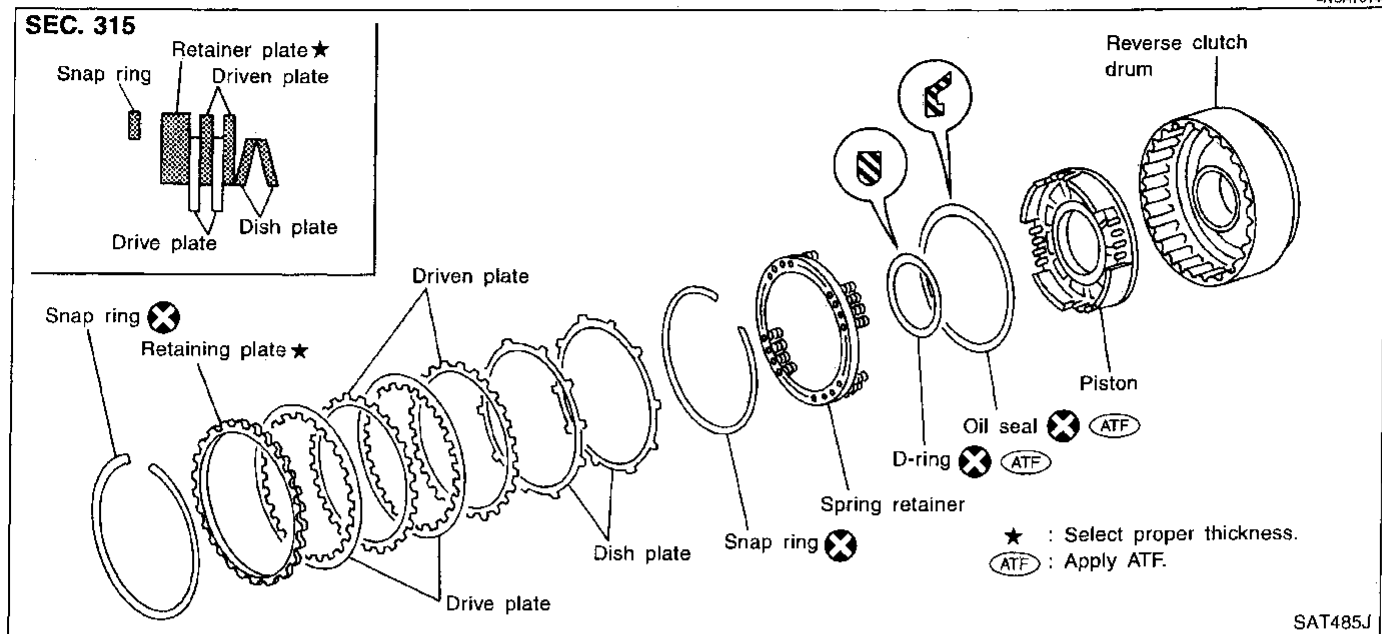
NCAT0140S01
Unit: mm (in)

Name of control valve and plug	No.	Length A	Length B	Type
Pressure regulator valve	20	6.0 (0.236)	28.0 (1.102)	I
Accumulator control valve	28			
Shift valve A	31			
Overrun clutch control valve	24			
Pressure modifier valve	6			
Shift valve B	5	—	—	II

- Install proper retainer plates.

Reverse Clutch COMPONENTS

-NCAT0141



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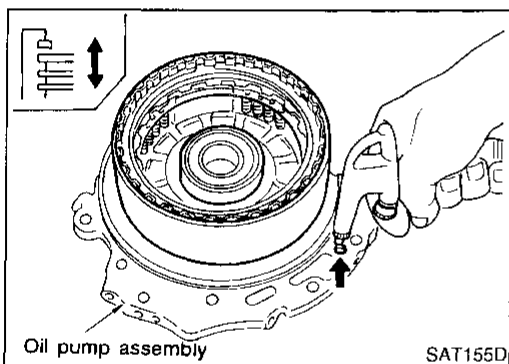
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DISASSEMBLY

NCAT0142

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.

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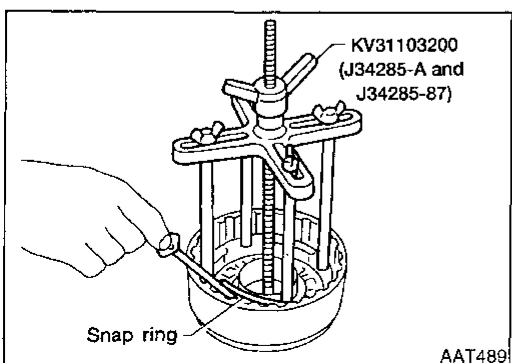
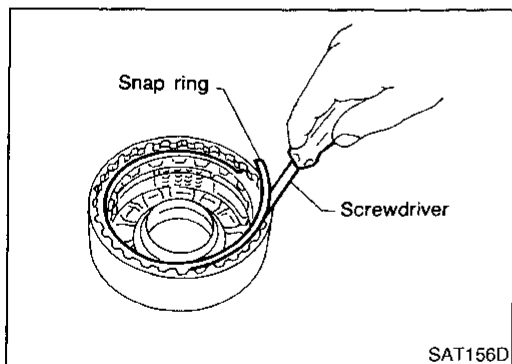
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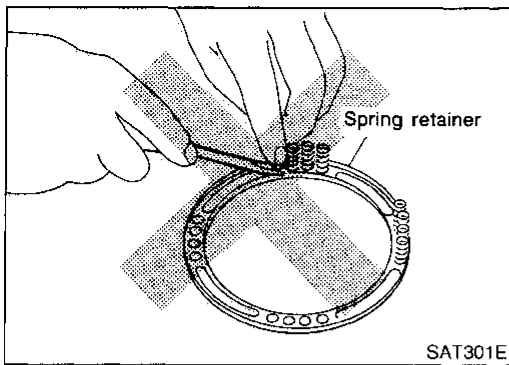
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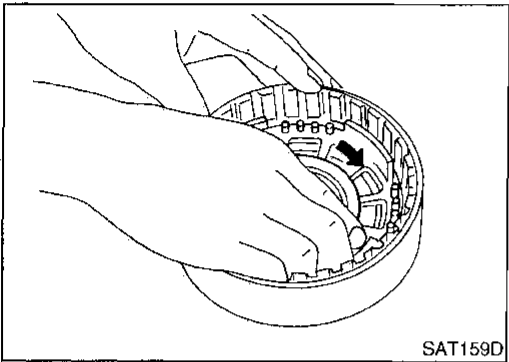
4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.
 - Set Tool directly above springs.
 - Do not expand snap ring excessively.
5. Remove spring retainer and return springs.

REPAIR FOR COMPONENT PARTS

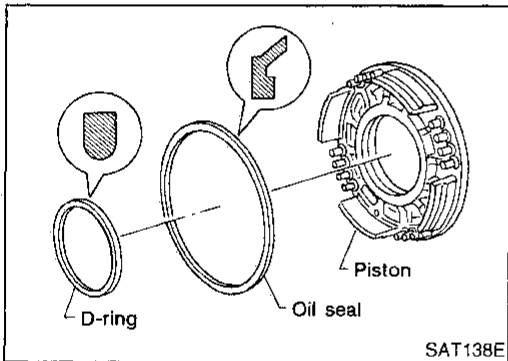
Reverse Clutch (Cont'd)



- 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

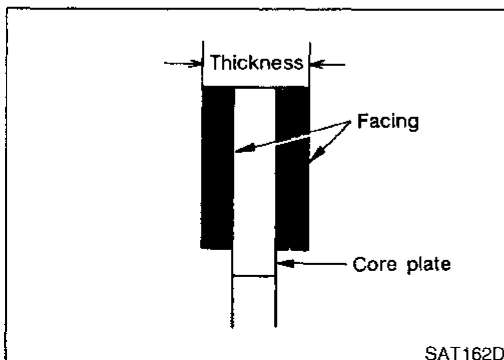
NCAT0143S01

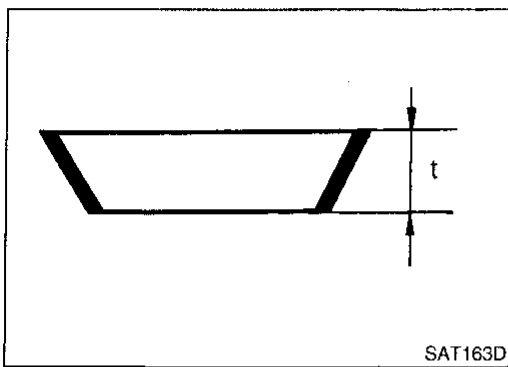
- Check for deformation, fatigue or damage.
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**

Reverse Clutch Drive Plates

NCAT0143S02

- Check facing for burns, cracks or damage.
- Measure thickness of facing.
Thickness of drive plate:
Standard value: 2.0 mm (0.079 in)
Wear limit: 1.8 mm (0.071 in)
- If not within wear limit, replace.





Reverse Clutch Dish Plates

NCAT0143S03

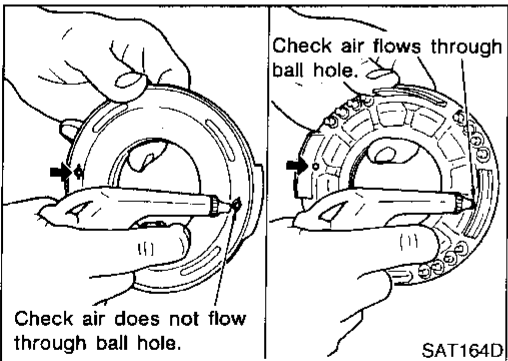
- Check for deformation or damage.
- Measure thickness of dish plate.
Thickness of dish plate "t": 2.8 mm (0.110 in)
- If deformed or fatigued, replace.

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Reverse Clutch Piston

NCAT0143S04

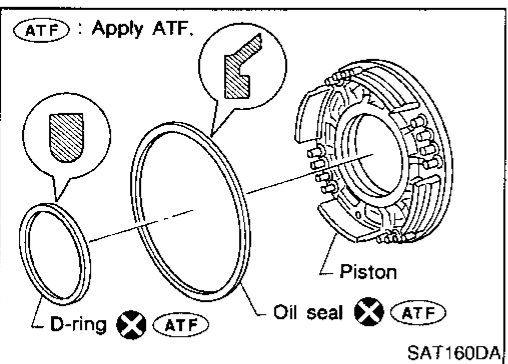
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure that there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure air leaks past ball.

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ASSEMBLY

NCAT0144

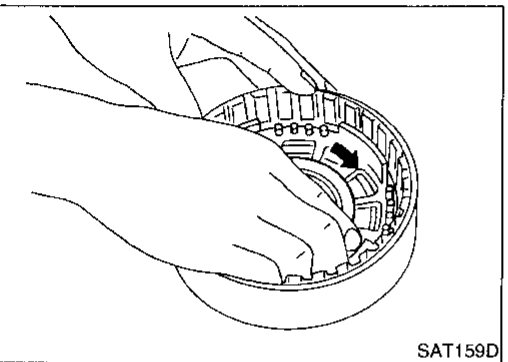
1. Install D-ring and oil seal on piston.
 - Take care with the direction of the oil seal.
 - Apply ATF to both parts.

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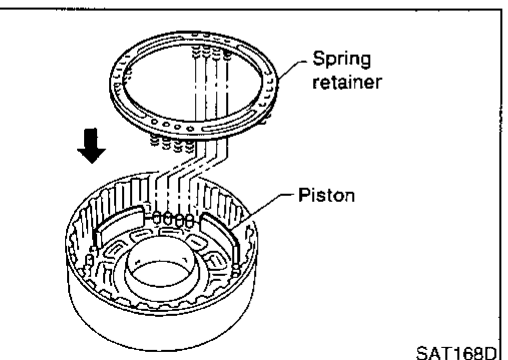
2. Install piston assembly by turning it slowly.
 - Apply ATF to inner surface of drum.

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3. Install return springs and spring retainer on piston.

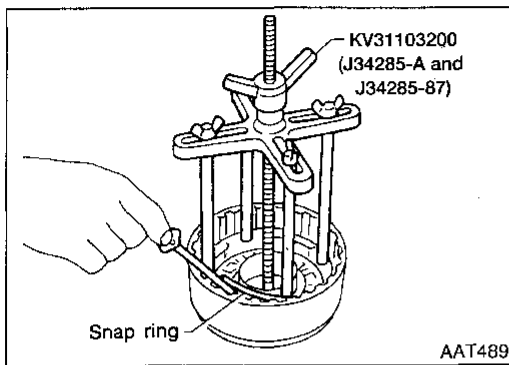
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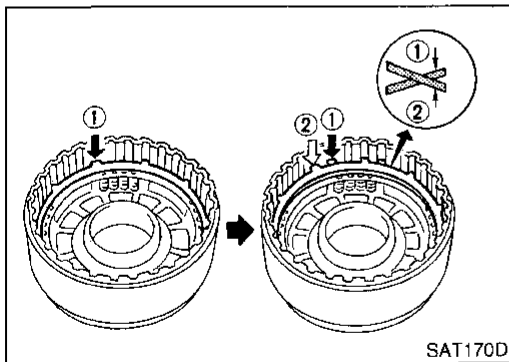
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REPAIR FOR COMPONENT PARTS

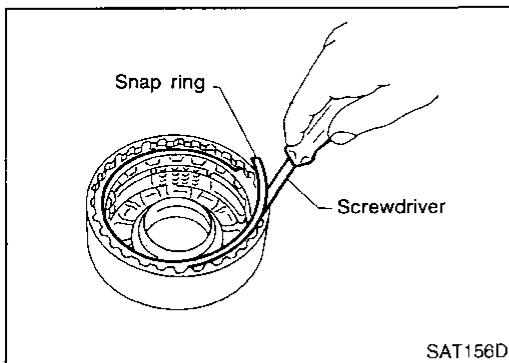
Reverse Clutch (Cont'd)



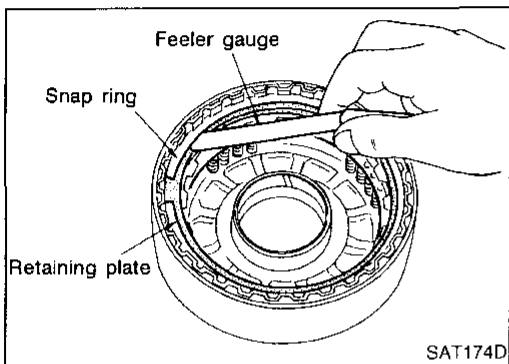
4. Set Tool on spring retainer and install snap ring while compressing return springs.
 - **Set Tool directly above return springs.**



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.



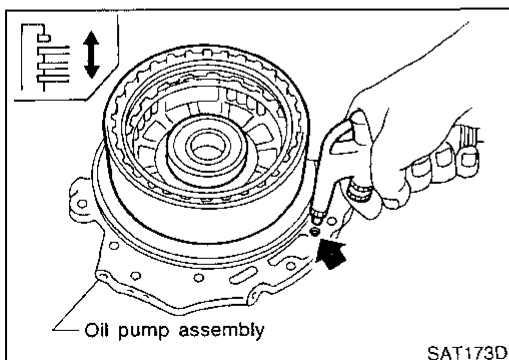
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

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-344.



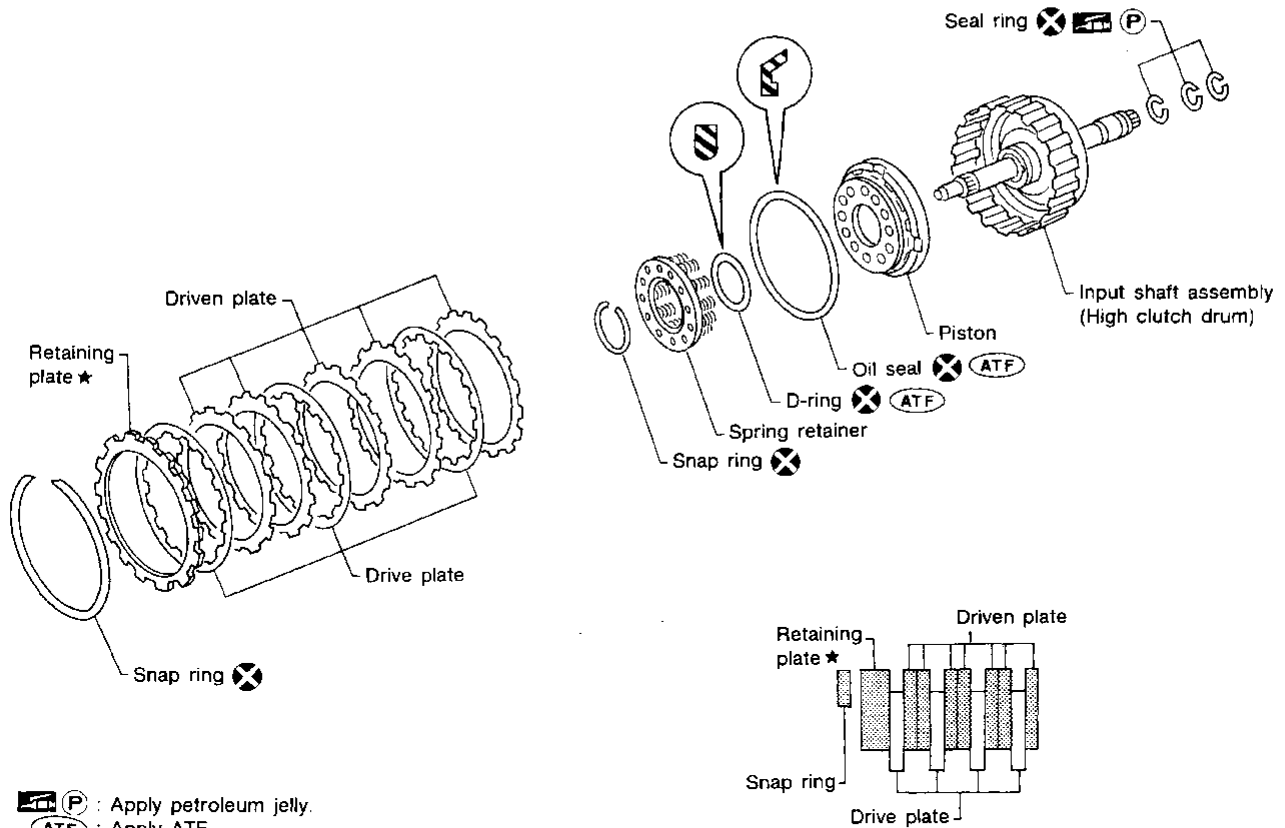
8. Check operation of reverse clutch. Refer to AT-281.

High Clutch COMPONENTS

=NCAT0145

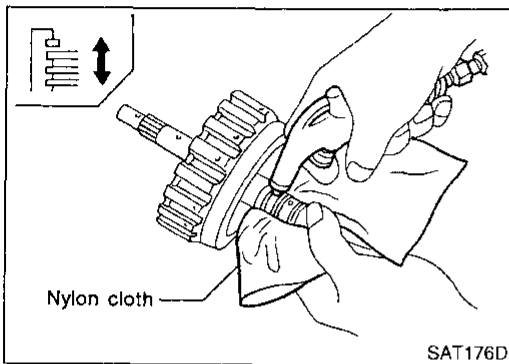
SEC. 315

For the number of clutch sheets (drive plates and driven plates), refer to the below cross-section.

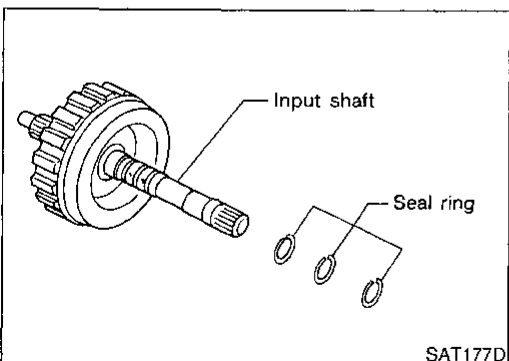


- (P) : Apply petroleum jelly.
- (ATF) : Apply ATF.
- ★ : Select proper thickness.

AAT212A



SAT176D



SAT177D

DISASSEMBLY

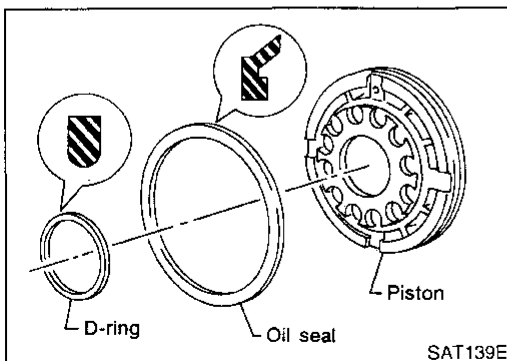
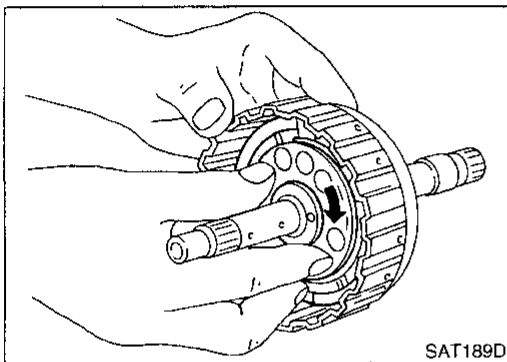
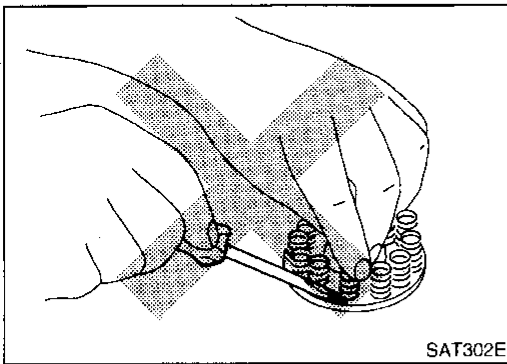
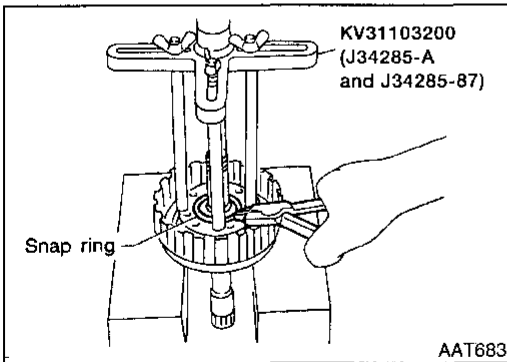
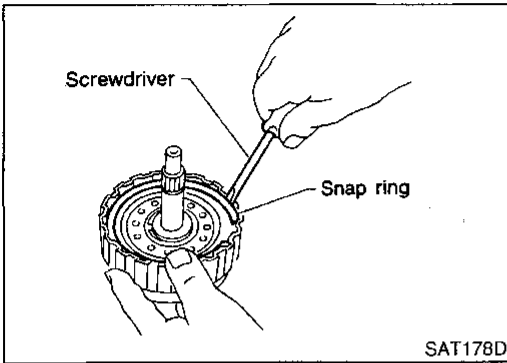
NCAT0146

1. Check operation of high clutch.
 - a. Apply compressed air to oil hole of input shaft.
 - **Stop up a hole on opposite side of input shaft.**
 - b. Check to see that retaining plate moves to snap ring.
 - c. If retaining plate does not contact snap ring:
 - D-ring might be damaged.
 - Oil seal might be damaged.
 - Fluid might be leaking past piston check ball.
2. Remove seal rings from input shaft.

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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

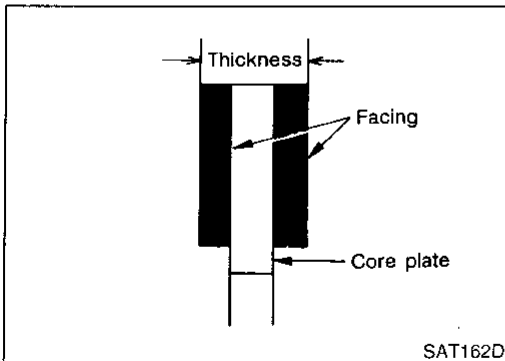
- Check for deformation, fatigue or damage. NCAT0147S01
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**

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High Clutch Drive Plates NCAT0147S02

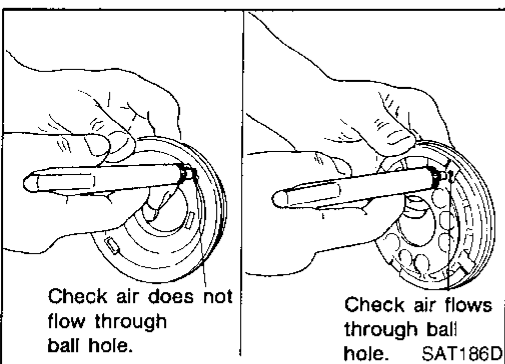
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
- **Thickness of drive plate:**
Standard value: 1.6 mm (0.063 in)
Wear limit: 1.4 mm (0.055 in)
- If not within wear limit, replace.

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High Clutch Piston NCAT0147S03

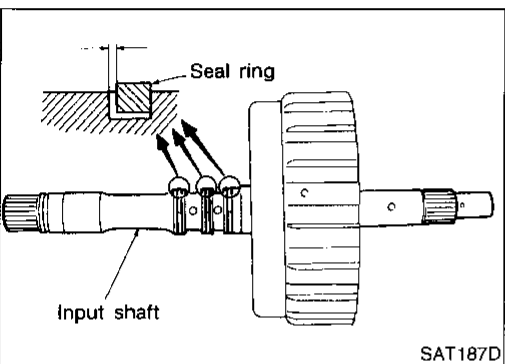
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure air leaks past ball.

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Seal Ring Clearance NCAT0147S04

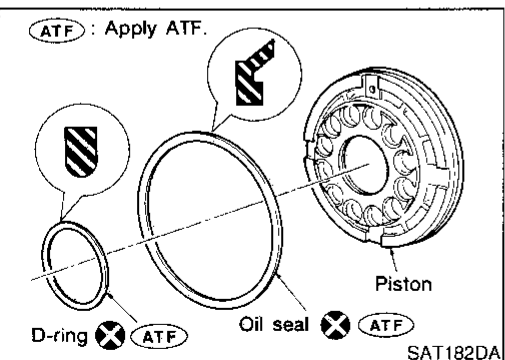
- Install new seal rings onto input shaft.
- Measure clearance between seal ring and ring groove.
- **Standard clearance:**
0.08 - 0.23 mm (0.0031 - 0.0091 in)
- **Allowable limit:**
0.23 mm (0.0091 in)
- If not within wear limit, replace input shaft assembly.

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ASSEMBLY

1. Install D-ring and oil seal on piston.
- **Take care with the direction of the oil seal.**
- **Apply ATF to both parts.**

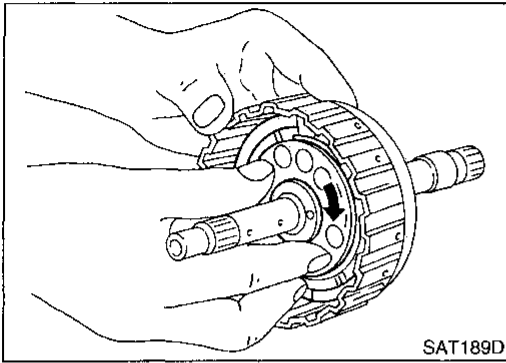
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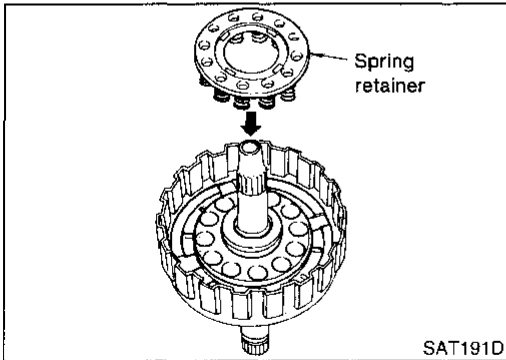
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REPAIR FOR COMPONENT PARTS

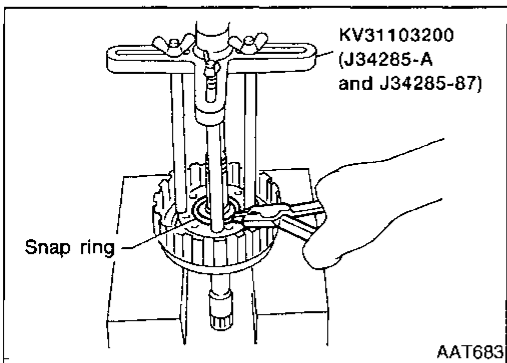
High Clutch (Cont'd)



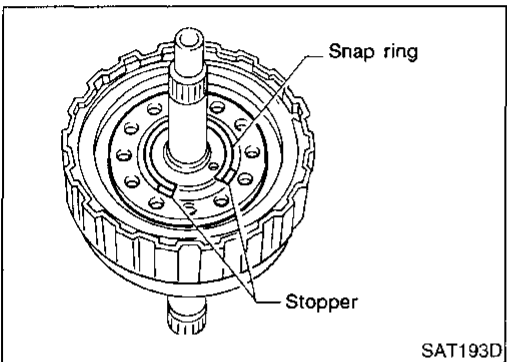
2. Install piston assembly by turning it slowly.
 - **Apply ATF to inner surface of drum.**



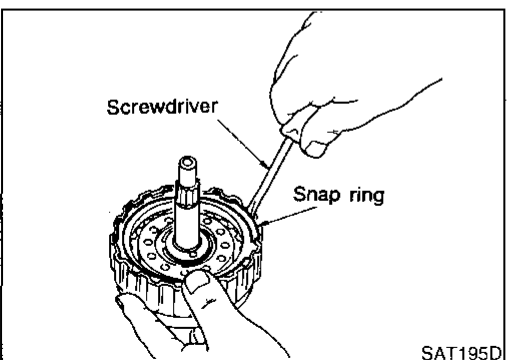
3. Install return springs and spring retainer on piston.



4. Set Tool on spring retainer and install snap ring while compressing return springs.
 - **Set Tool directly above return springs.**



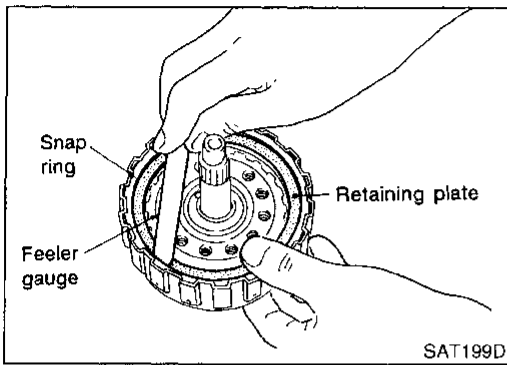
- **Do not align snap ring gap with spring retainer stopper.**



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)



- 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: 2.6 mm (0.102 in)

Retaining plate:

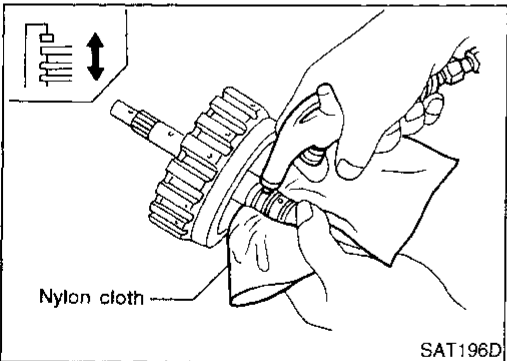
Refer to SDS, AT-344.

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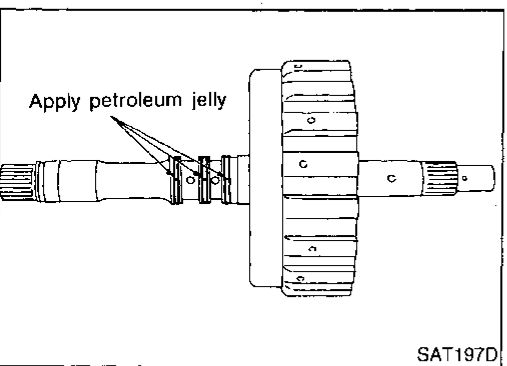
- Check operation of high clutch.
Refer to "DISASSEMBLY", "High Clutch", AT-285.

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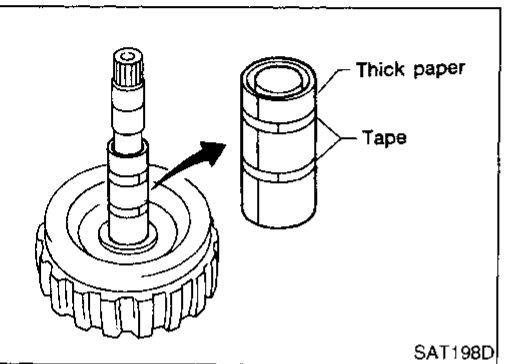
- Install seal rings to input shaft.
 - Apply petroleum jelly to seal rings.

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- Roll paper around seal rings to prevent seal rings from spreading.

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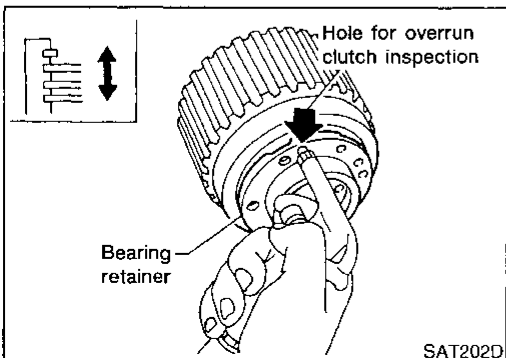
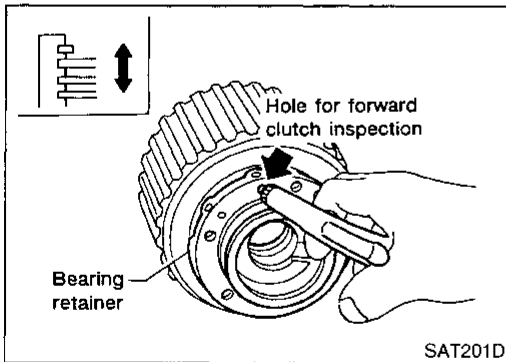
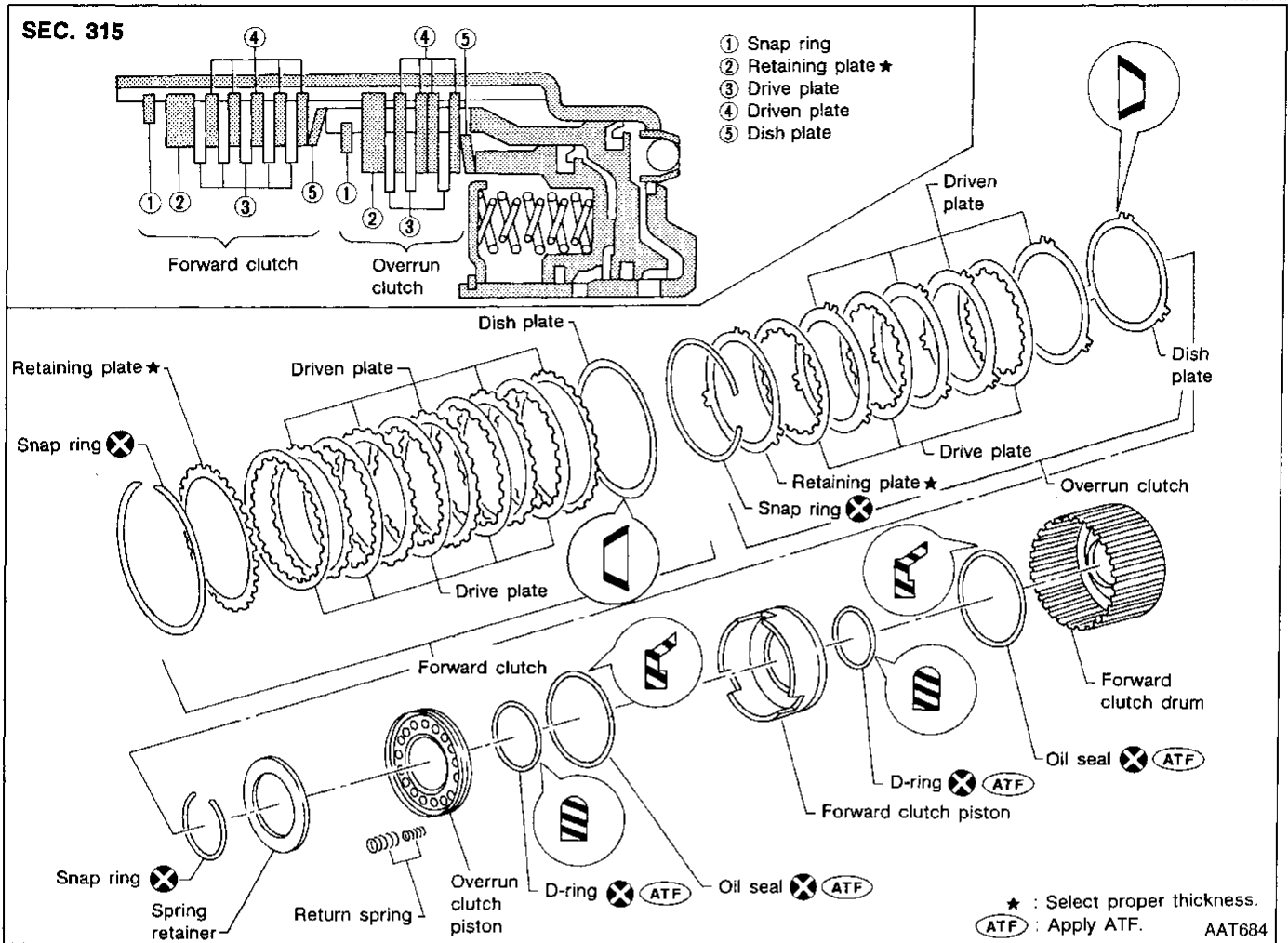
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REPAIR FOR COMPONENT PARTS

Forward Clutch and Overrun Clutch

Forward Clutch and Overrun Clutch COMPONENTS

NCAT0149



DISASSEMBLY

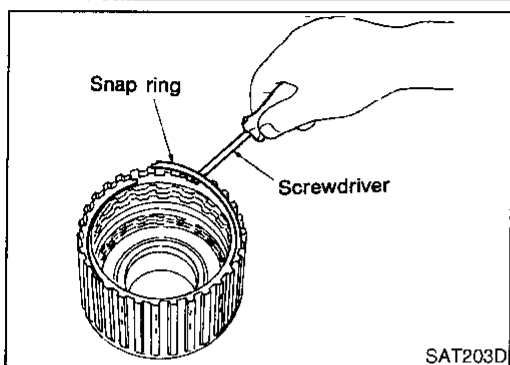
NCAT0150

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)



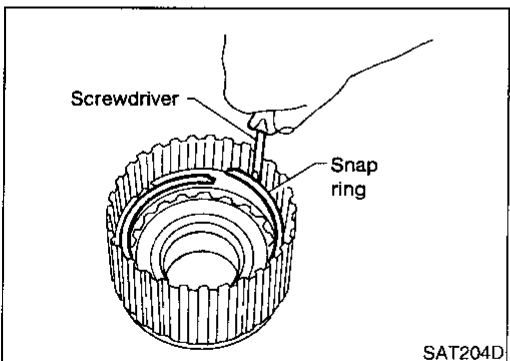
2. Remove snap ring for forward clutch.
3. Remove drive plates, driven plates, retaining plate and dish plate for forward clutch.

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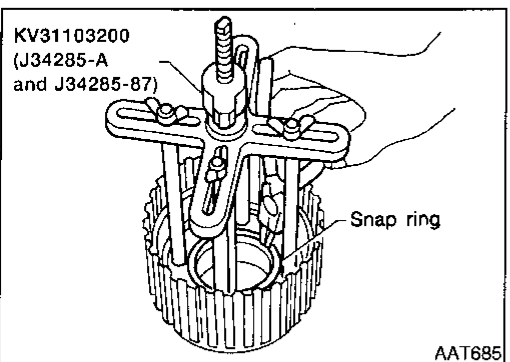
4. Remove snap ring for overrun clutch.
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.

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6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.

- **Set Tool directly above return springs.**
- **Do not expand snap ring excessively.**

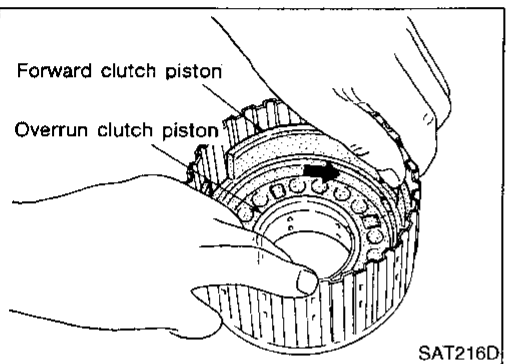
7. Remove spring retainer and return springs.

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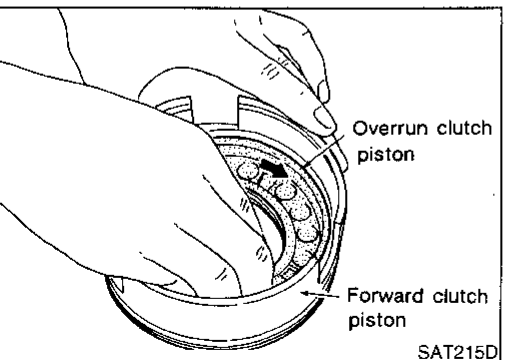
8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.

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9. Remove overrun clutch piston from forward clutch piston by turning it.

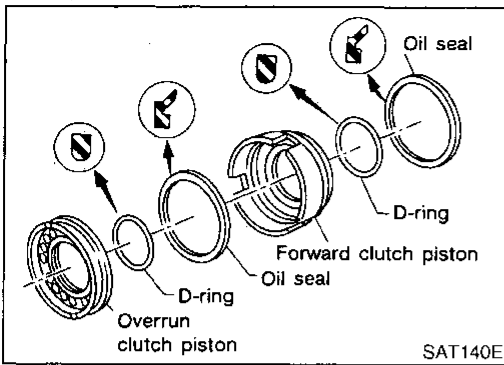
SC

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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.

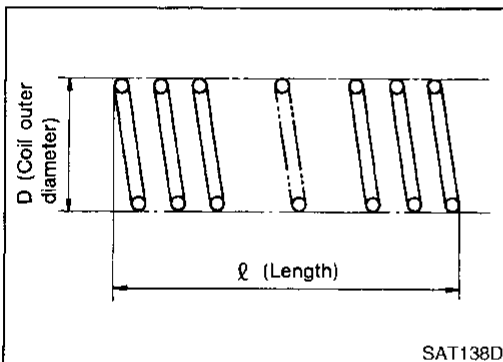
INSPECTION

Snap Rings and Spring Retainer

- Check for deformation, fatigue or damage.

NCAT0151

NCAT0151S01



Forward Clutch and Overrun Clutch Return Springs

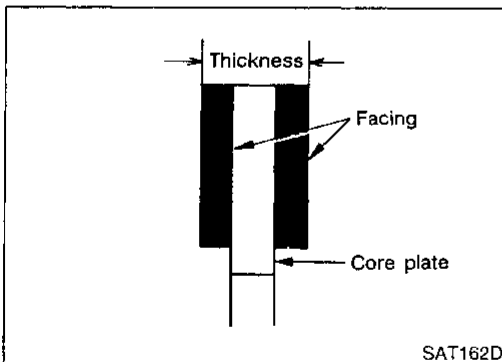
- Check for deformation or damage.
- Measure free length and outer diameter.

Inspection standard:

Refer to SDS, AT-346.

- Replace if deformed or fatigued.

NCAT0151S02



Forward Clutch and Overrun Clutch Drive Plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

Forward clutch

Standard value: 1.8 mm (0.071 in)

Wear limit: 1.6 mm (0.063 in)

Overrun clutch

Standard value: 1.6 mm (0.063 in)

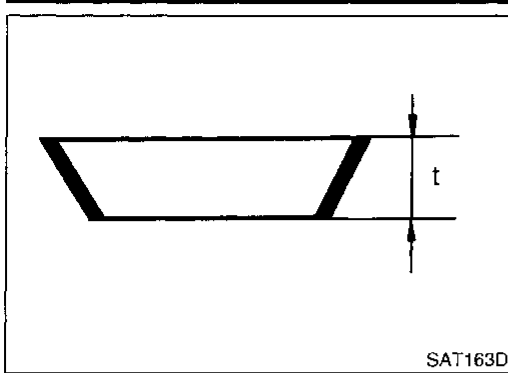
Wear limit: 1.4 mm (0.055 in)

- If not within wear limit, replace.

NCAT0151S03

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)

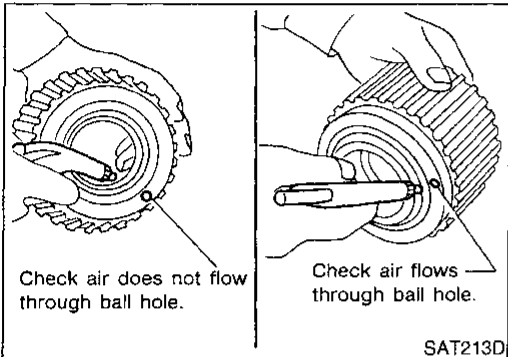
- If deformed or fatigued, replace.

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Forward Clutch Drum

NCAT0151S05

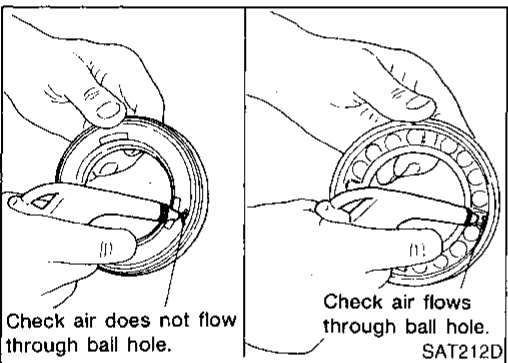
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole from outside of forward clutch drum. Make sure air leaks past ball.
- Apply compressed air to oil hole from inside of forward clutch drum. Make sure there is no air leakage.

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Overrun Clutch Piston

NCAT0151S06

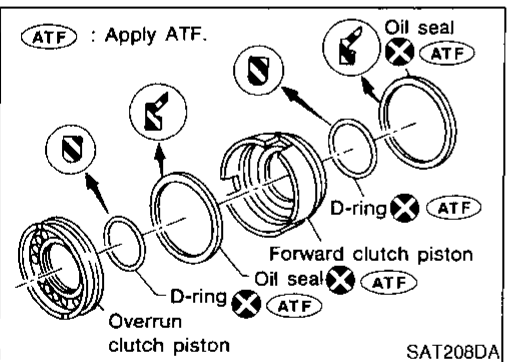
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side. Make sure air leaks past ball.

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ASSEMBLY

NCAT0152

1. Install D-rings and oil seals on forward clutch piston and overrun clutch piston.

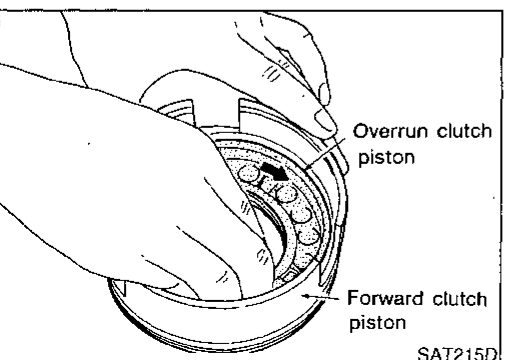
- Take care with direction of oil seal.
- Apply ATF to both parts.

ST

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2. Install overrun clutch piston assembly on forward clutch piston while turning it slowly.

- Apply ATF to inner surface of forward clutch piston.

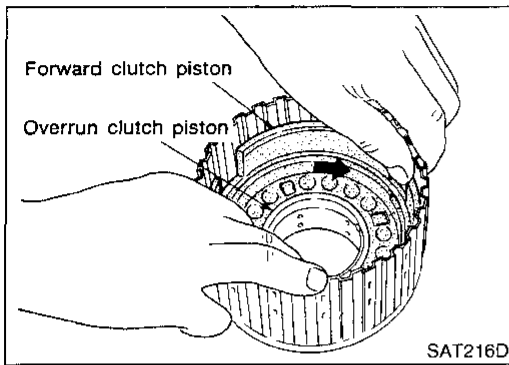
SC

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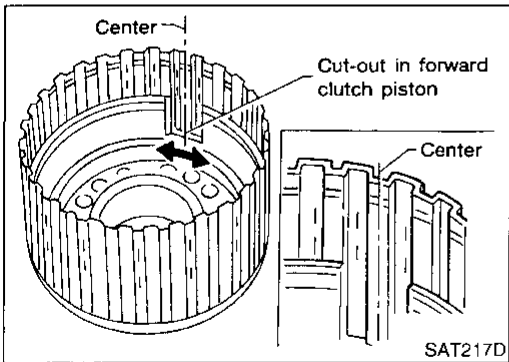
IDX

REPAIR FOR COMPONENT PARTS

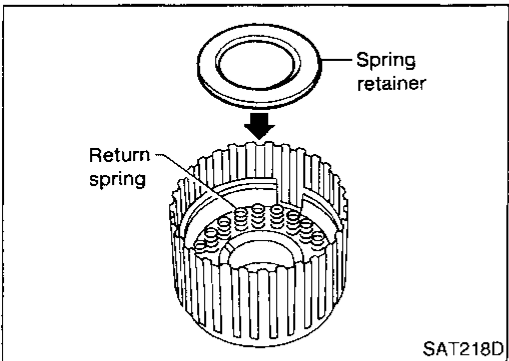
Forward Clutch and Overrun Clutch (Cont'd)



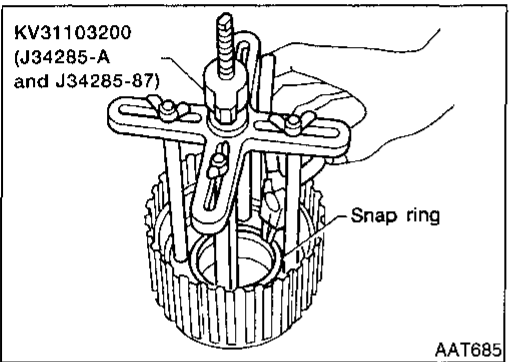
3. Install forward clutch piston assembly on forward clutch drum while turning it slowly.
 - **Apply ATF to inner surface of drum.**



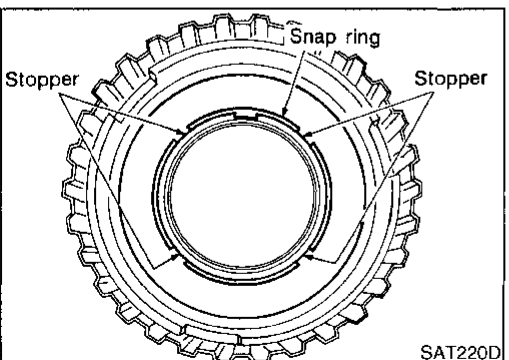
4. Align notch in forward clutch piston with groove in forward clutch drum.



5. Install return spring on piston.
6. Install spring retainer on return springs.



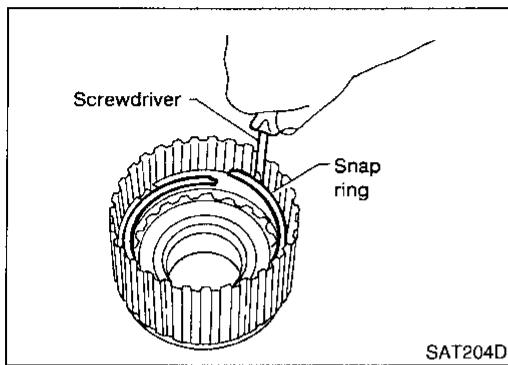
7. Set Tool on spring retainer and install snap ring while compressing return springs.
 - **Set Tool directly above return springs.**



- **Do not align snap ring gap with spring retainer stopper.**

REPAIR FOR COMPONENT PARTS

Forward Clutch and Overrun Clutch (Cont'd)



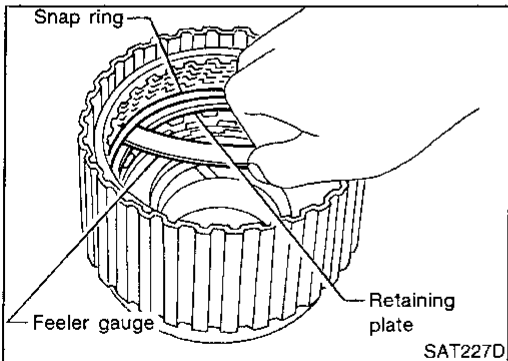
8. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
9. Install snap ring for overrun clutch.

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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:

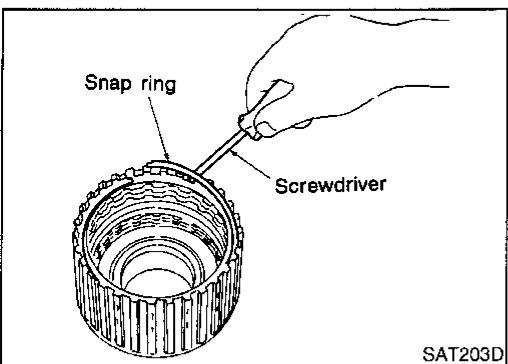
Refer to SDS, AT-345.

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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.

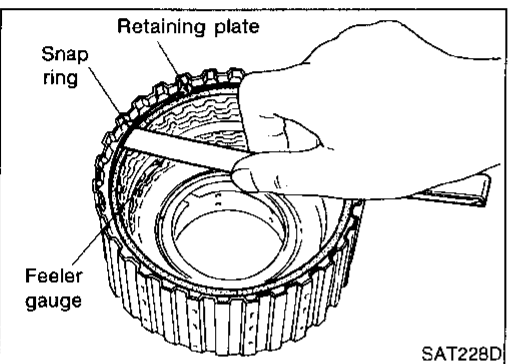
12. Install snap ring for forward clutch.

AT

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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:

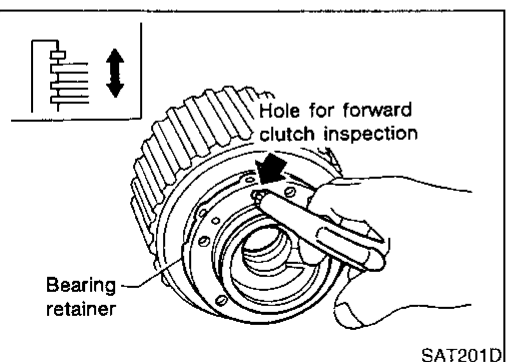
Refer to SDS, AT-345.

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14. Check operation of forward clutch.
Refer to AT-290.

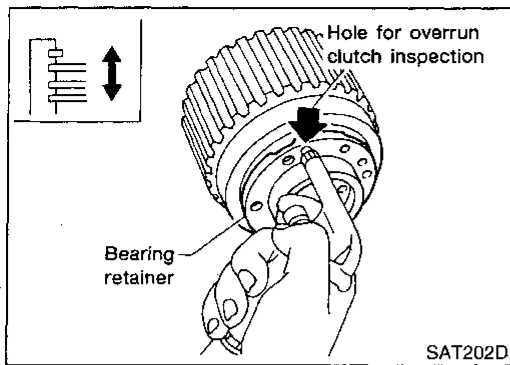
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REPAIR FOR COMPONENT PARTS

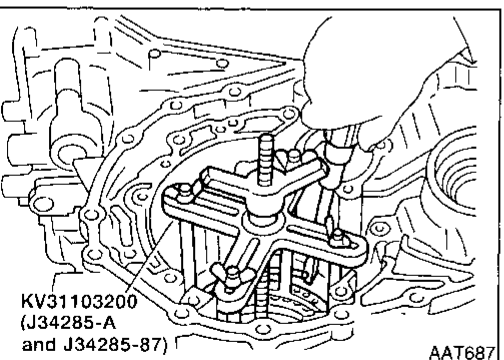
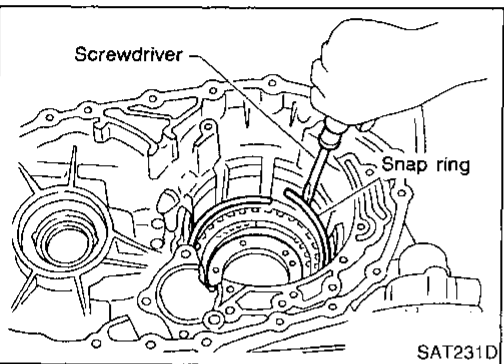
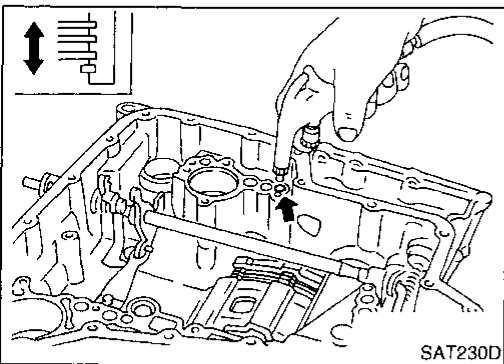
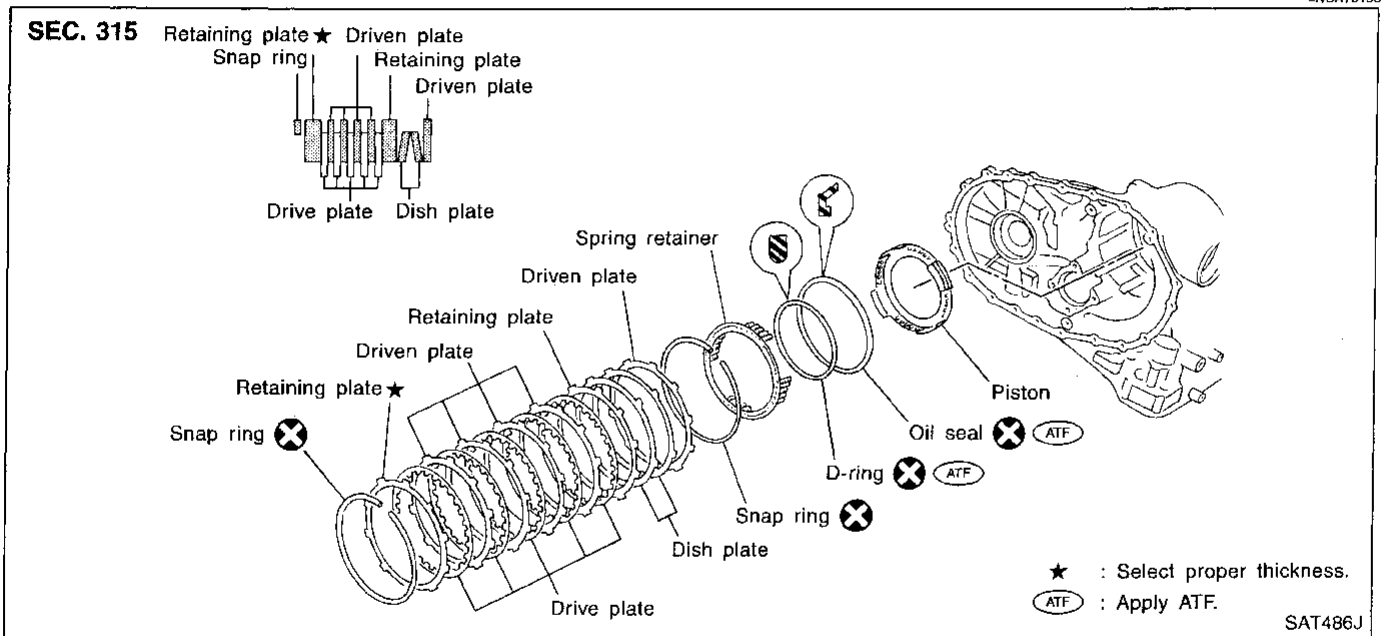
Forward Clutch and Overrun Clutch (Cont'd)



15. Check operation of overrun clutch.
Refer to "DISASSEMBLY" in "Forward Clutch and Overrun Clutch", AT-290.

Low & Reverse Brake COMPONENTS

-NCAT0153



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.
2. Stand transmission case.
3. Remove snap ring.
4. Remove drive plates, driven plates, retaining plate from transmission case.
5. Set Tool on spring retainer and remove snap ring while compressing return springs.
 - Set Tool directly above return springs.
 - Do not expand snap ring excessively.
6. Remove spring retainer and return springs.

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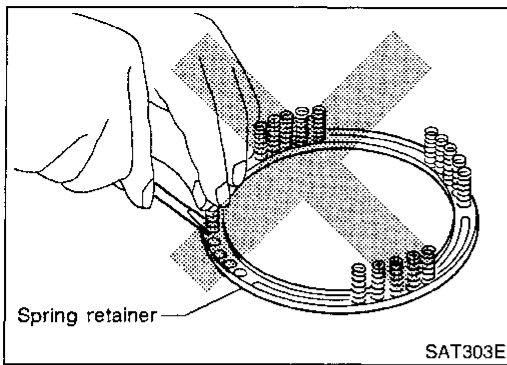
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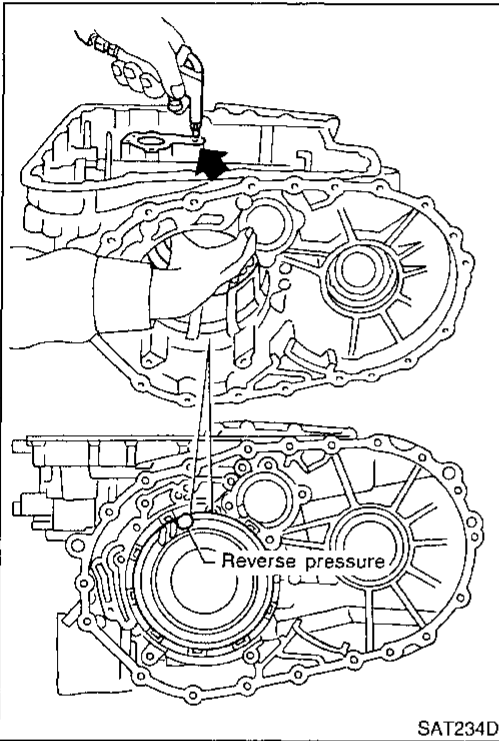
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REPAIR FOR COMPONENT PARTS

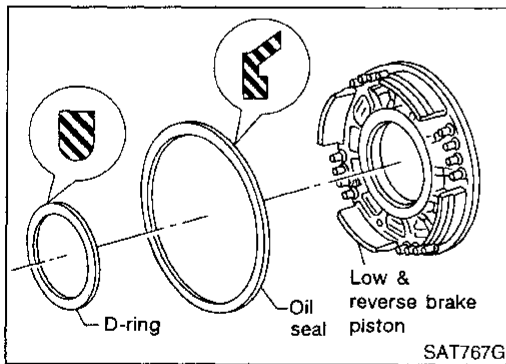
Low & Reverse Brake (Cont'd)



- 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

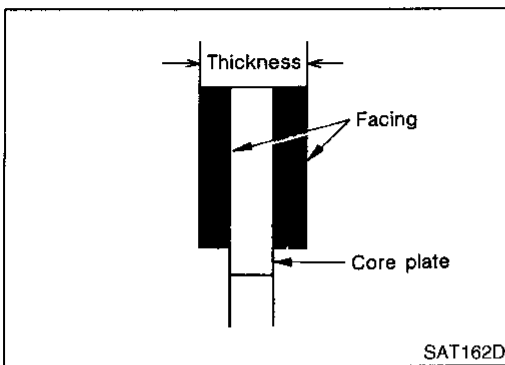
NCAT0155

NCAT0155S01

- Check for deformation, fatigue or damage.
- Replace if necessary.
- When replacing spring retainer and return springs, replace them as a set.

REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)



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.

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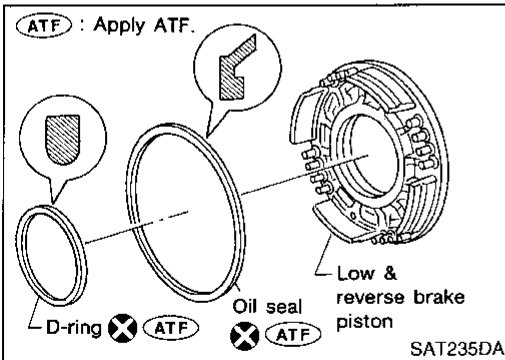
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ASSEMBLY

NCAT0156

1. Install D-ring and oil seal on piston.
 - Take care with the direction of the oil seal.
 - Apply ATF to both parts.

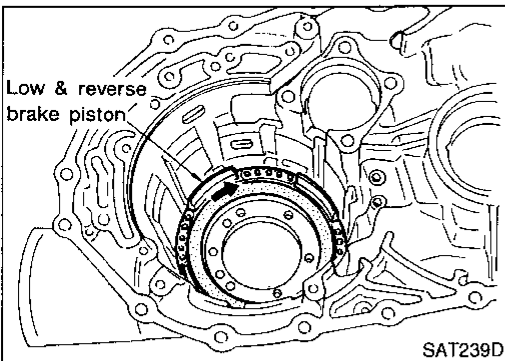


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2. Stand transmission case.
3. Install piston assembly on transmission case while turning it slowly.
 - Apply ATF to inner surface of transmission case.

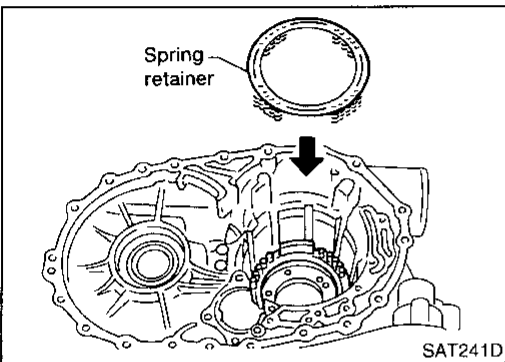
AT

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4. Install return springs and spring retainer on piston.



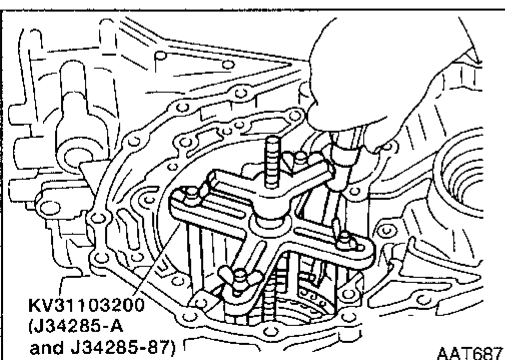
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5. Install snap ring while compressing return springs.
 - Set Tool directly above return springs.



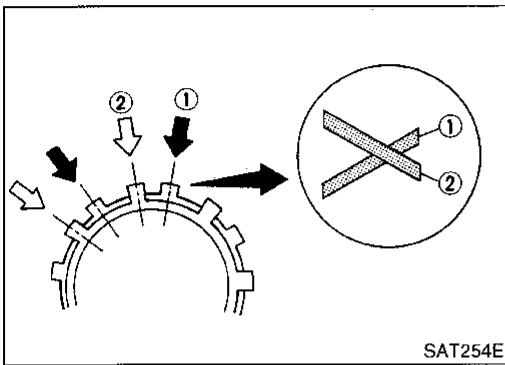
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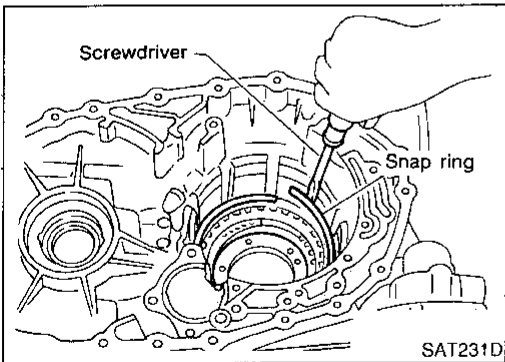
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REPAIR FOR COMPONENT PARTS

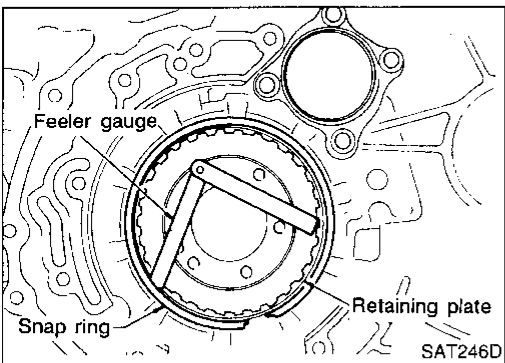
Low & Reverse Brake (Cont'd)



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:

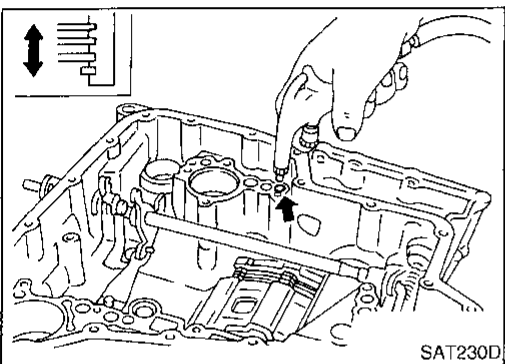
Standard: 1.4 - 1.8 mm (0.055 - 0.071 in)

Allowable limit:

2.8 mm (0.110 in)

Retaining plate:

Refer to SDS, AT-346.



9. Check operation of low & reverse brake.
Refer to "DISASSEMBLY", "Low & Reverse Brake", AT-297.

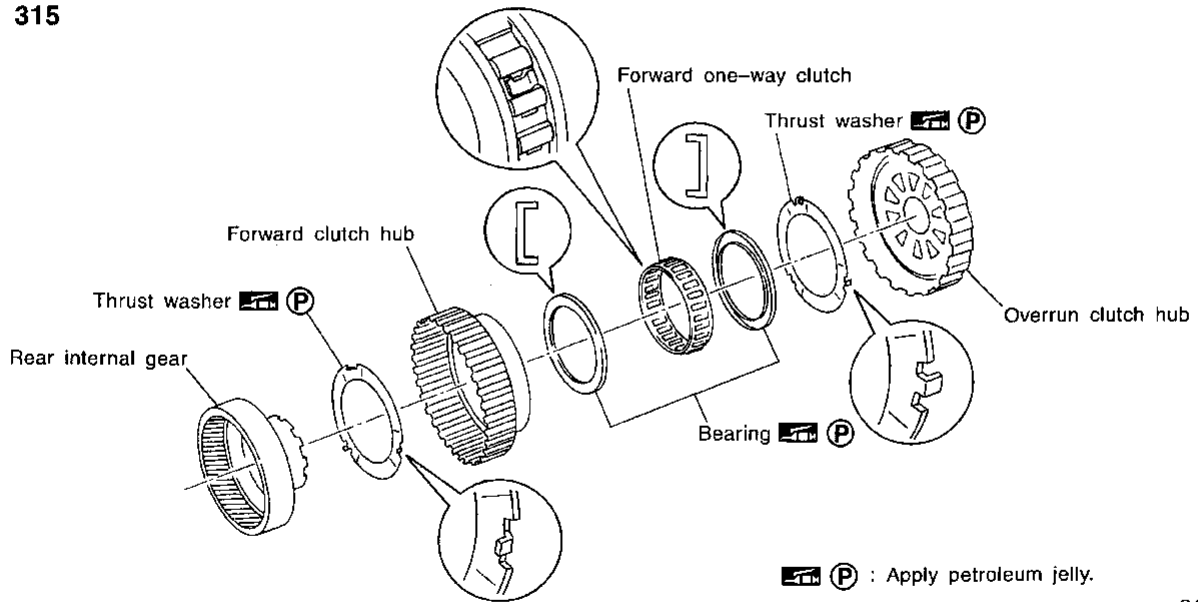
REPAIR FOR COMPONENT PARTS

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub COMPONENTS

NCAT0157

SEC. 315

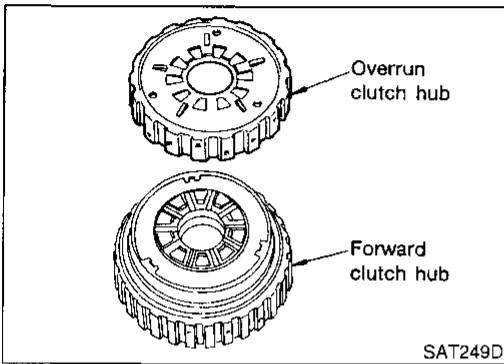


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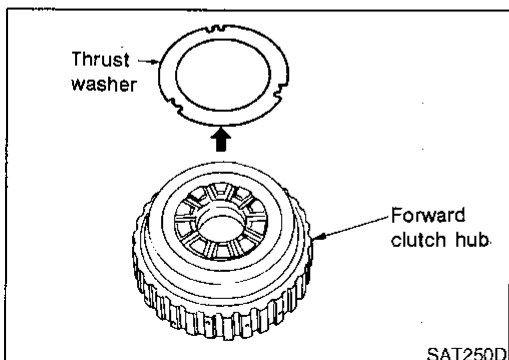
SAT249D

DISASSEMBLY

NCAT0158

1. Remove snap ring from overrun clutch hub.
2. Remove overrun clutch hub from forward clutch hub.

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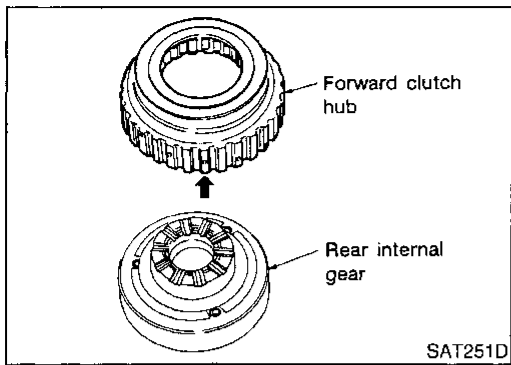
SAT250D

3. Remove thrust washer from forward clutch hub.

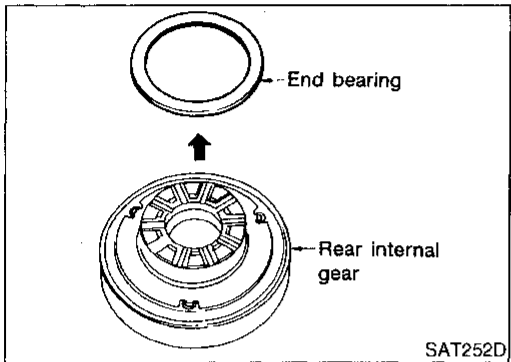
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REPAIR FOR COMPONENT PARTS

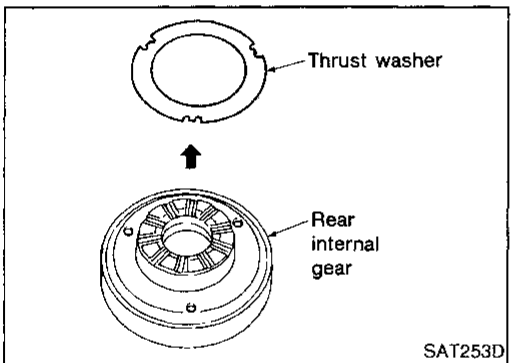
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



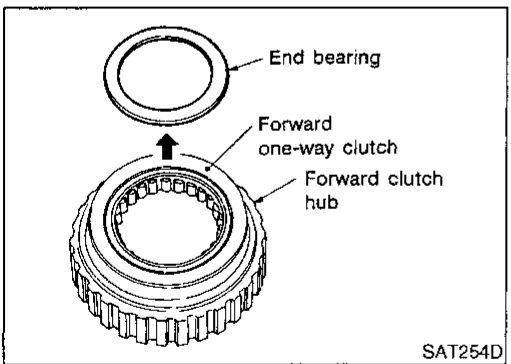
4. Remove forward clutch hub from rear internal gear.



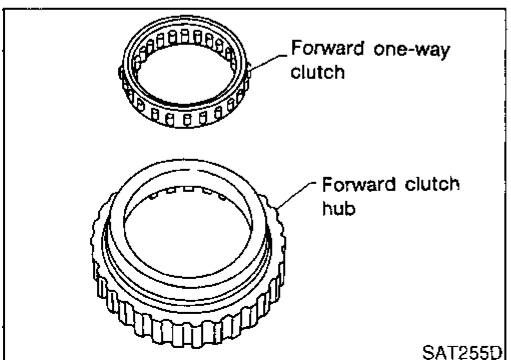
5. Remove end bearing from rear internal gear.



6. Remove thrust washer from rear internal gear.



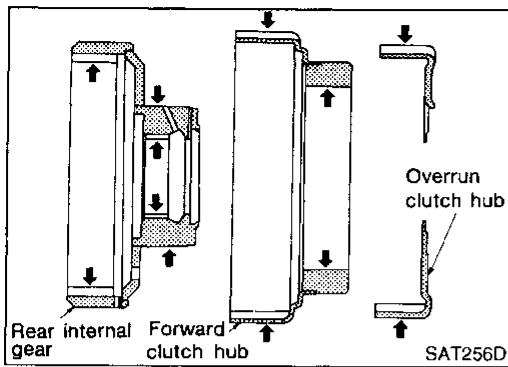
7. Remove end bearing from forward one-way clutch.



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)



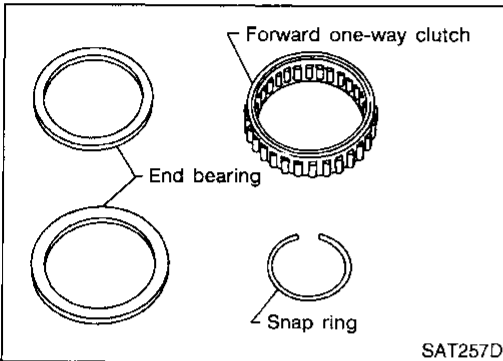
INSPECTION

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

NCAT0159

NCAT0159S01

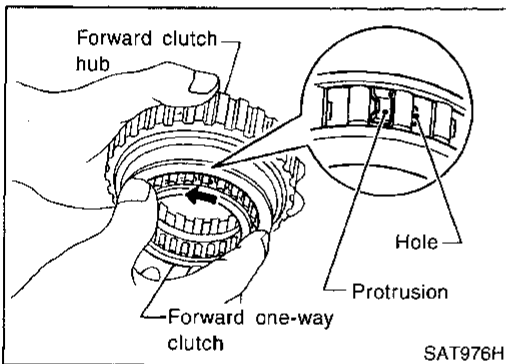
- Check rubbing surfaces for wear or damage.



Snap Ring, End Bearings and Forward One-way Clutch

NCAT0159S02

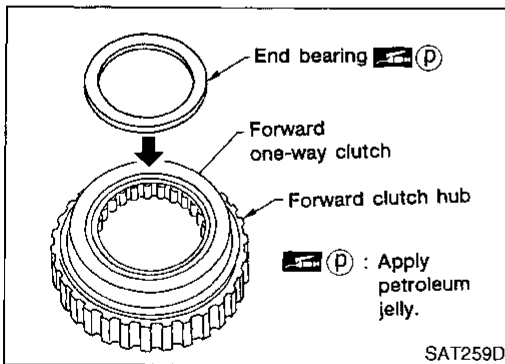
- Check snap ring and end bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.



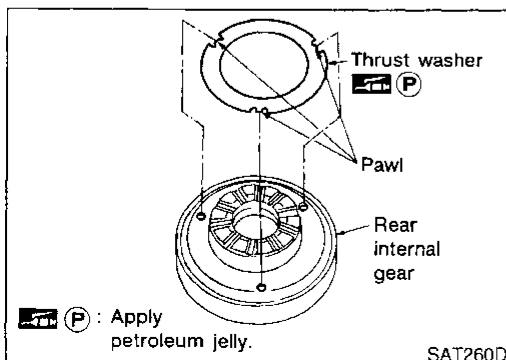
ASSEMBLY

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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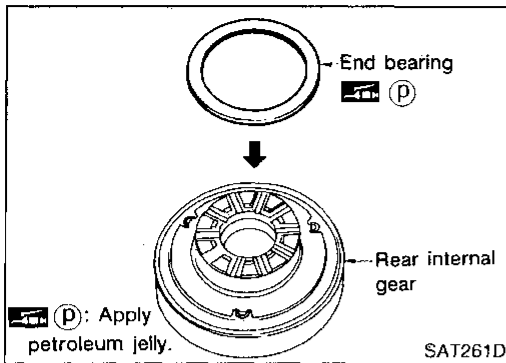
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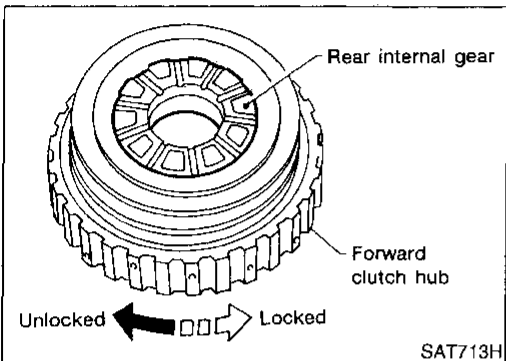
REPAIR FOR COMPONENT PARTS

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



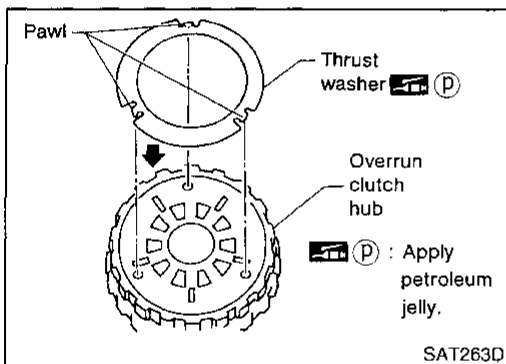
4. Install end bearing on rear internal gear.

- Apply petroleum jelly to end bearing.



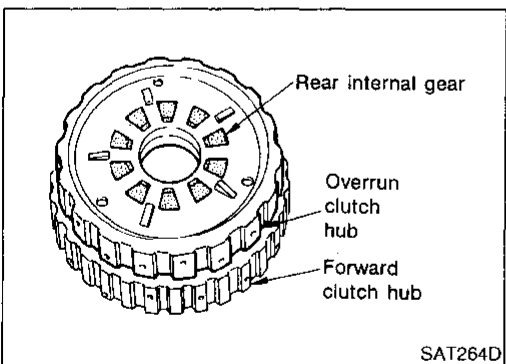
5. Install forward clutch hub on rear internal gear.

- 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.



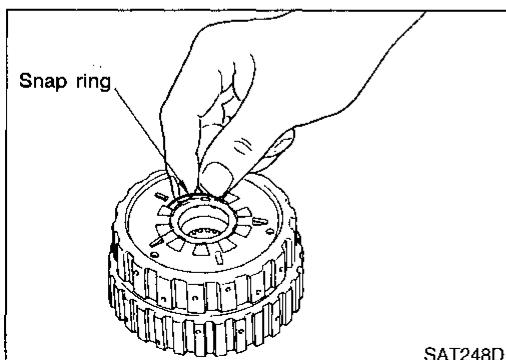
6. Install thrust washer and overrun clutch hub.

- 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

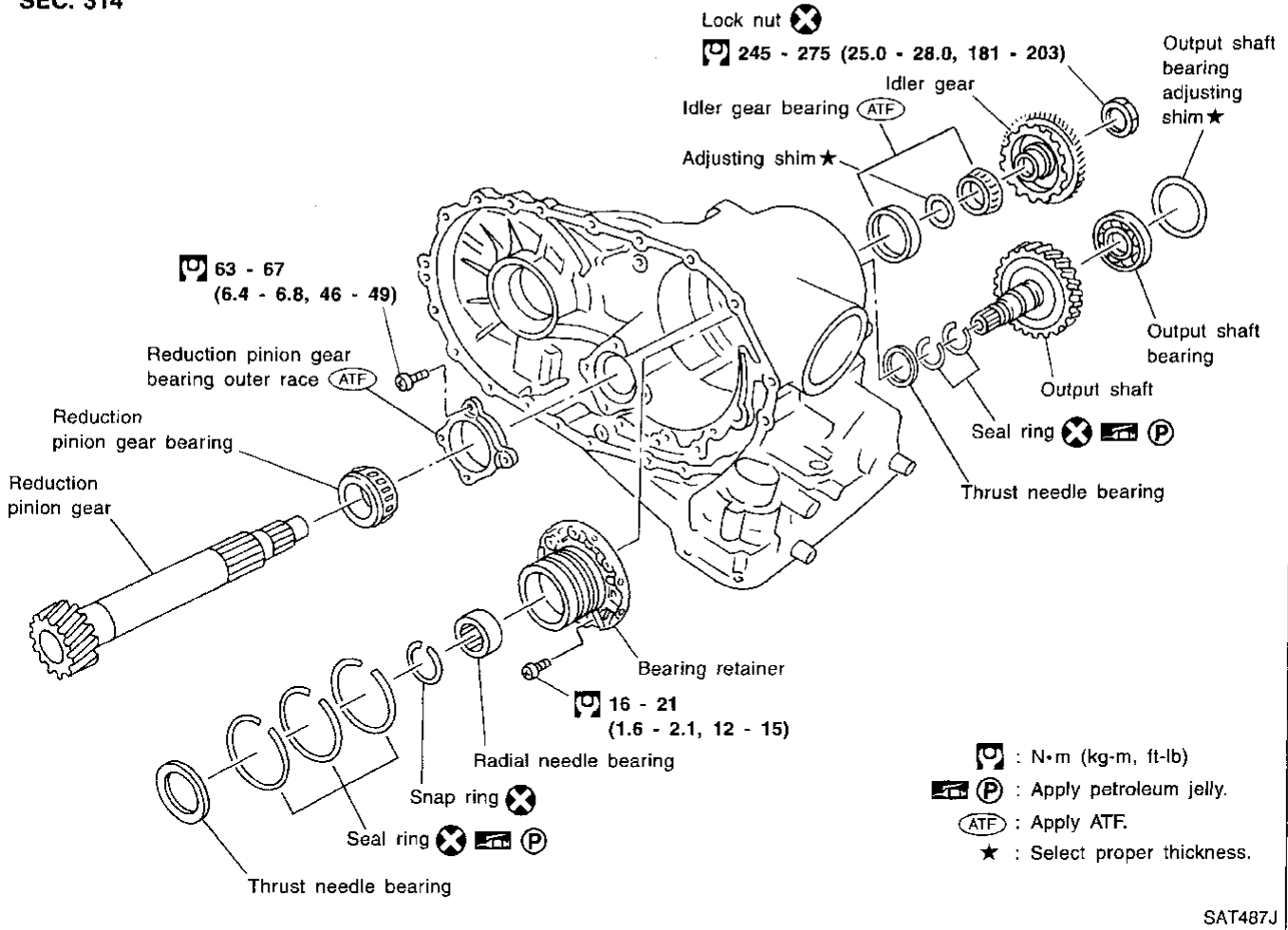
Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer COMPONENTS

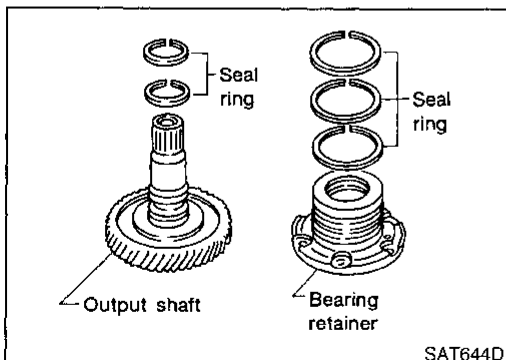
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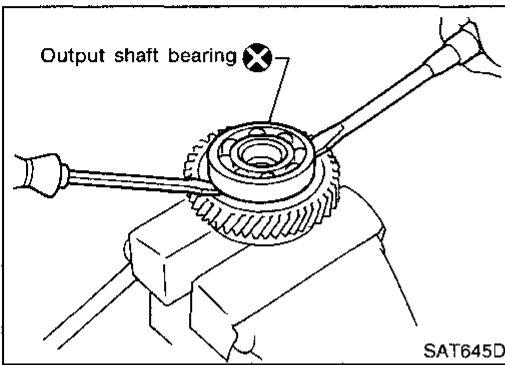
DISASSEMBLY

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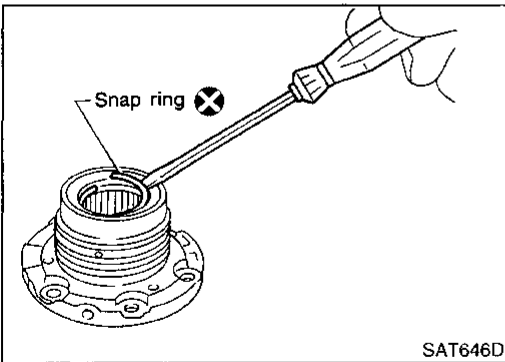
1. Remove seal rings from output shaft and bearing retainer.

REPAIR FOR COMPONENT PARTS

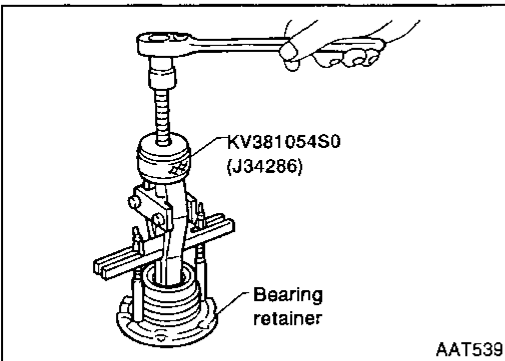
Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)



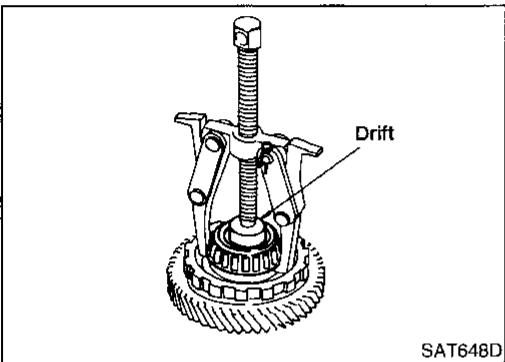
2. Remove output shaft bearing with screwdrivers.
 - Always replace bearing with a new one when removed.
 - Do not damage output shaft.



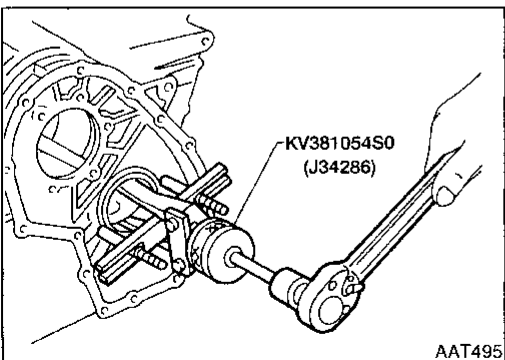
3. Remove snap ring from bearing retainer.



4. Remove needle bearing from bearing retainer.



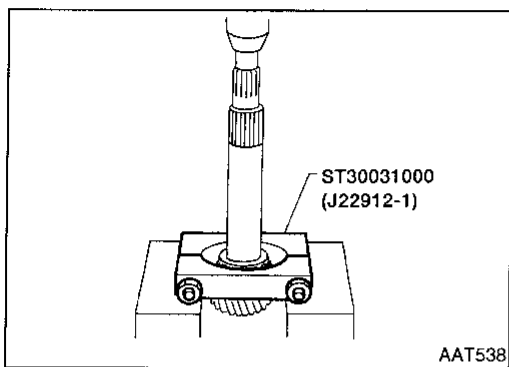
5. Remove idler gear bearing inner race from idler gear.



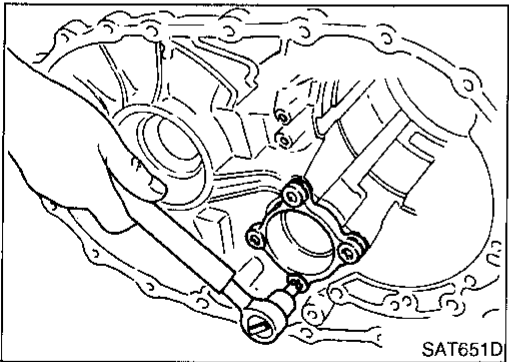
6. Remove idler gear bearing outer race from transmission case.

REPAIR FOR COMPONENT PARTS

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)



- Press out reduction pinion gear bearing from reduction pinion gear.



- Remove reduction pinion gear bearing outer race from transmission case.

INSPECTION

Output Shaft, Idler Gear and Reduction Pinion Gear

NCAT0163
NCAT0163S01

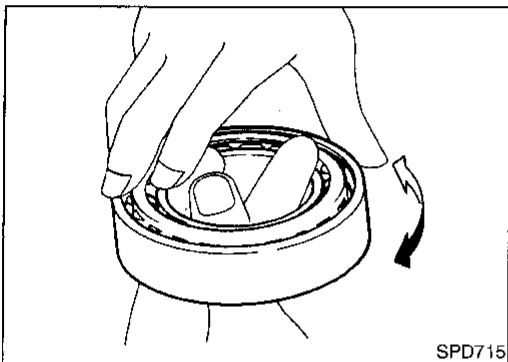
AT

- Check shafts for cracks, wear or bending.
- Check gears for wear, chips and cracks.

AX

SU

BR



Bearing

NCAT0163S02

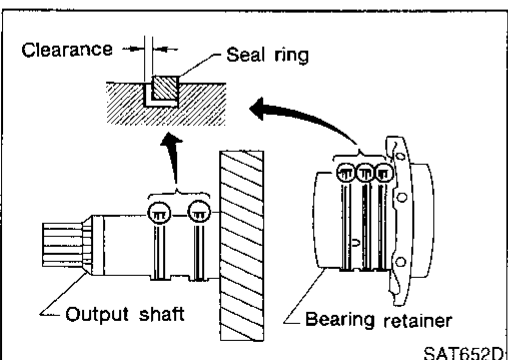
ST

- 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.

RS

BT

HA



Seal Ring Clearance

NCAT0163S03

SC

- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.

EL

Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Allowable limit:

0.25 mm (0.0098 in)

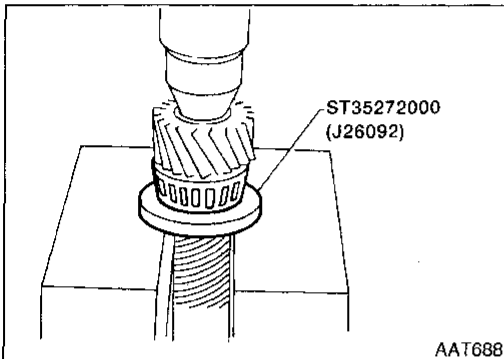
IDX

- If not within allowable limit, replace output shaft.
- Install new seal rings to bearing retainer.

REPAIR FOR COMPONENT PARTS

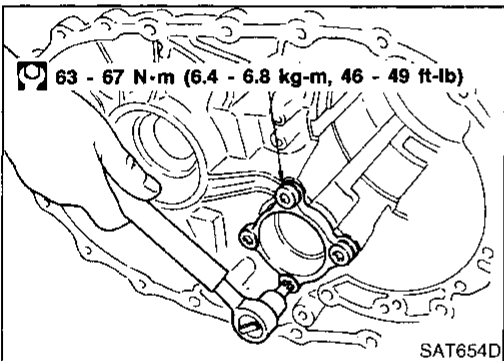
Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)

- 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.

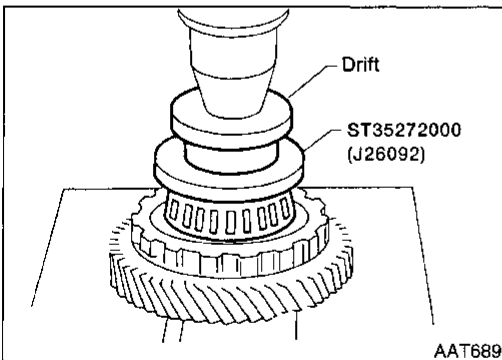


ASSEMBLY

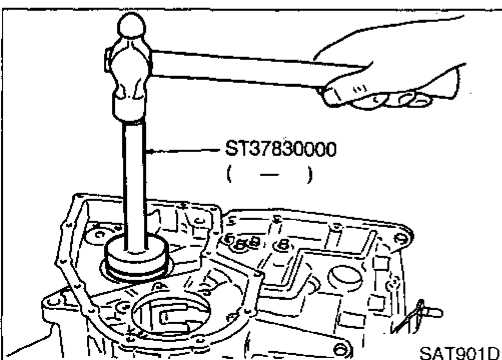
1. Press reduction pinion gear bearing on reduction pinion gear. NCAT0164



2. Install reduction pinion gear bearing outer race on transmission case.



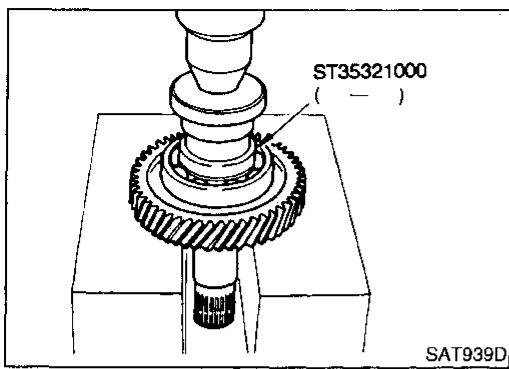
3. Press idler gear bearing inner race on idler gear.



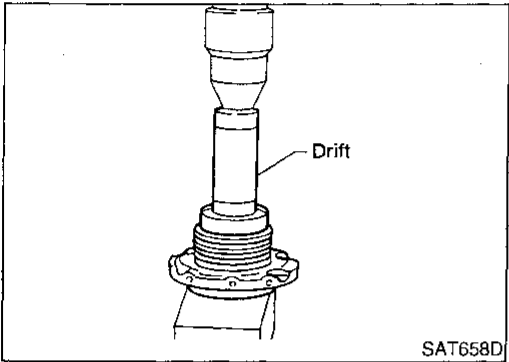
4. Install idler gear bearing outer race on transmission case.

REPAIR FOR COMPONENT PARTS

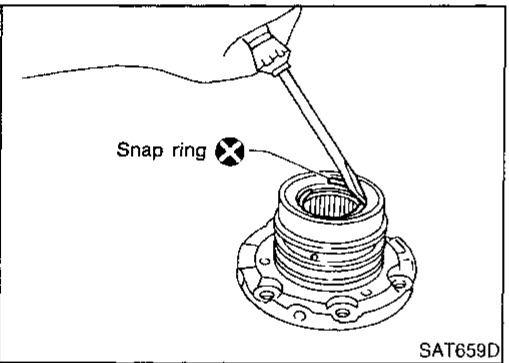
Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)



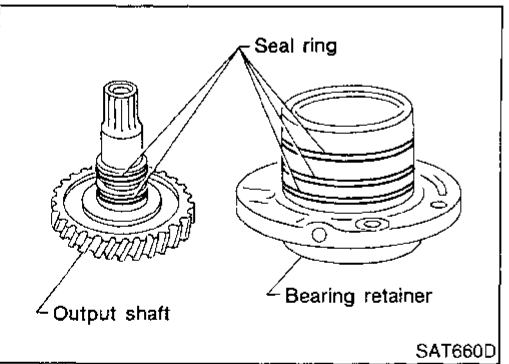
5. Press output shaft bearing on output shaft.



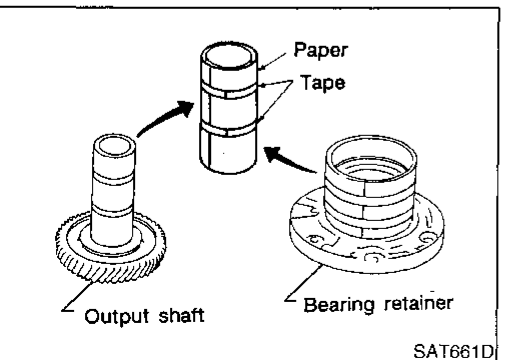
6. Press needle bearing on bearing retainer.



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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AT

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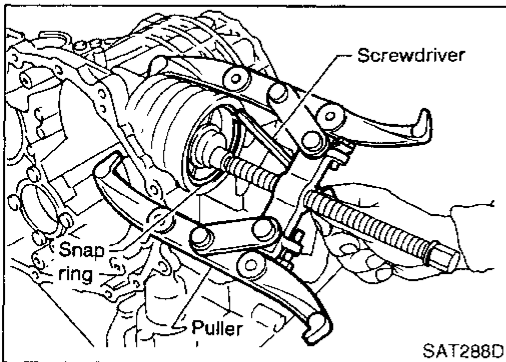
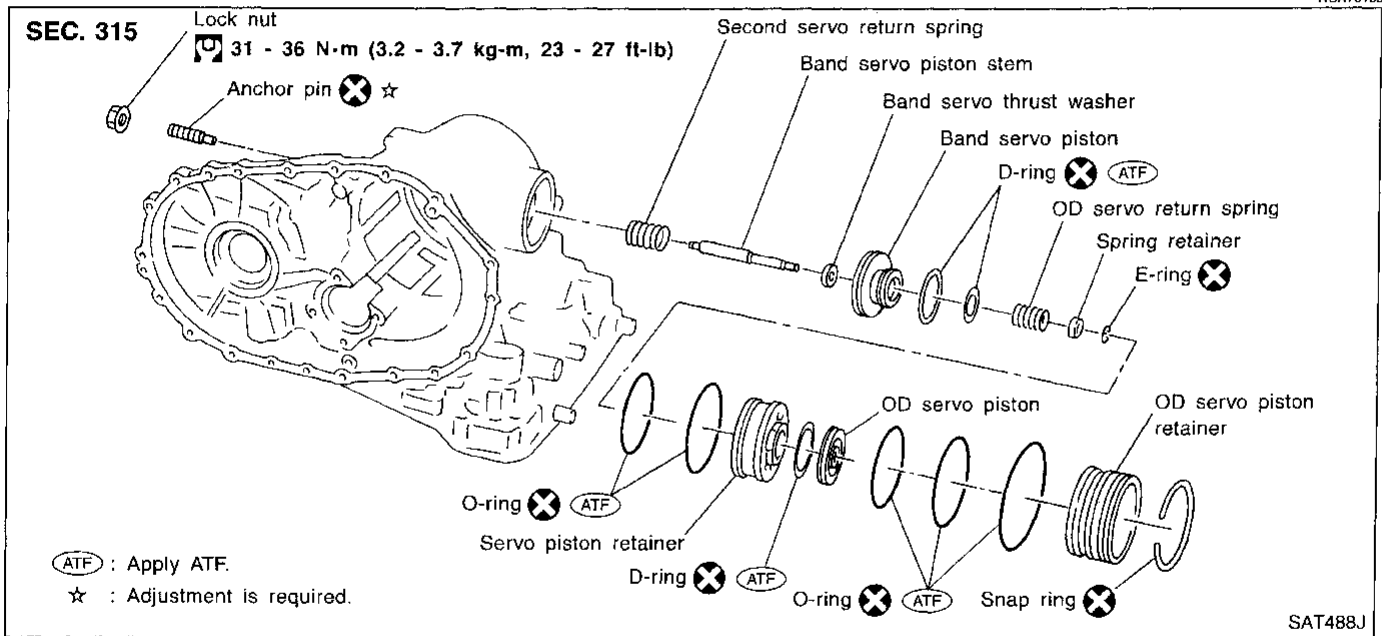
IDX

REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly

Band Servo Piston Assembly COMPONENTS

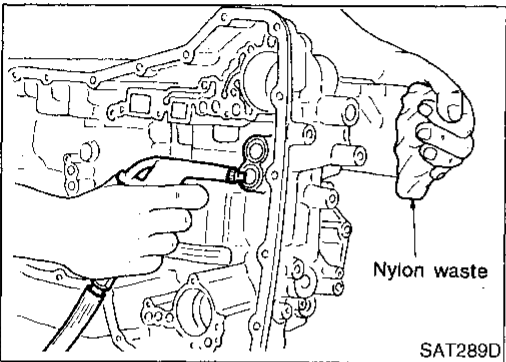
NCAT0165



DISASSEMBLY

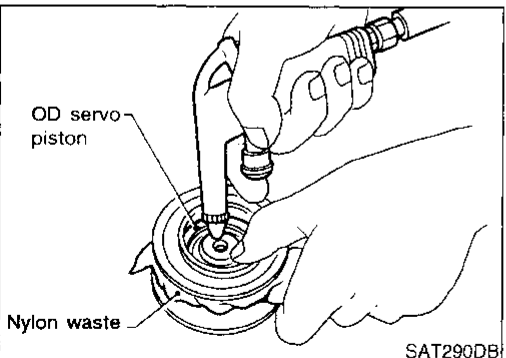
NCAT0166

1. Remove band servo piston snap ring.



2. Apply compressed air to oil hole in transmission case to remove OD servo piston retainer and band servo piston assembly.

- Hold band servo piston assembly with a rag or nylon waste.

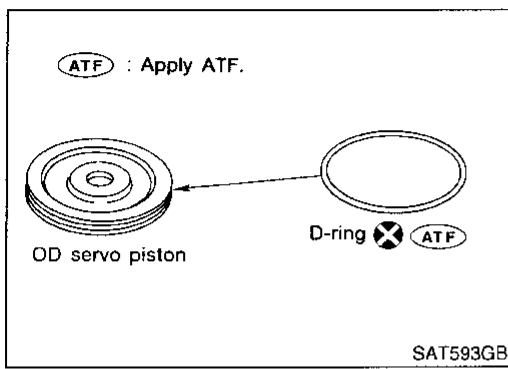


3. Apply compressed air to oil hole in OD servo piston retainer to remove OD servo piston from retainer.

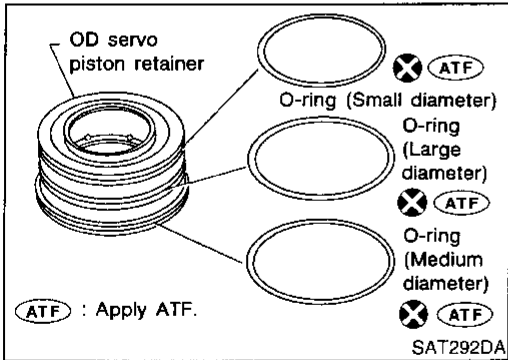
- Hold OD servo piston while applying compressed air.

REPAIR FOR COMPONENT PARTS

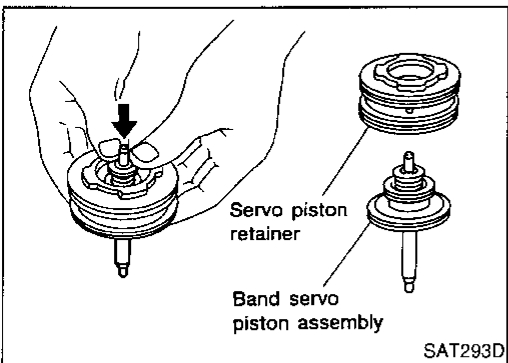
Band Servo Piston Assembly (Cont'd)



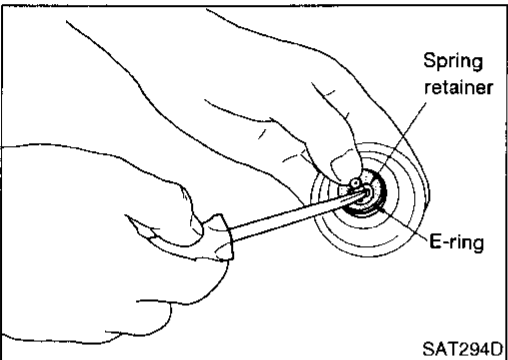
4. Remove D-ring from OD servo piston.



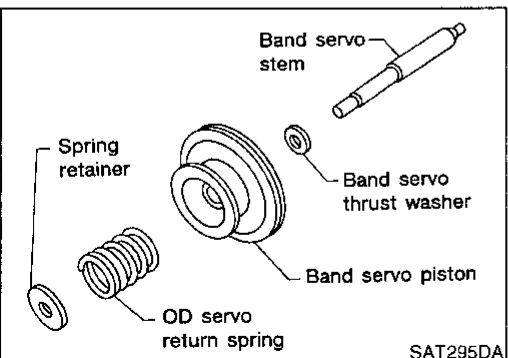
5. Remove O-rings from OD servo piston retainer.



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

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EM

LC

EC

FE

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MT

AT

AX

SU

BR

ST

RS

BT

HA

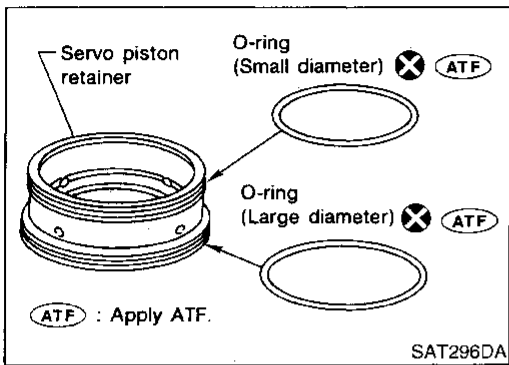
SC

EL

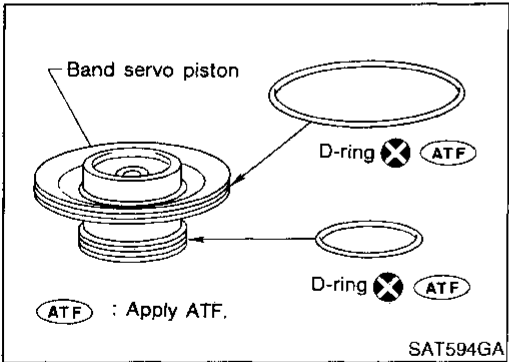
IDX

REPAIR FOR COMPONENT PARTS

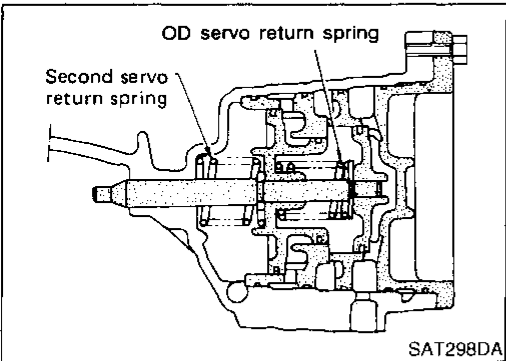
Band Servo Piston Assembly (Cont'd)



9. Remove O-rings from servo piston retainer.



10. Remove D-rings from band servo piston.



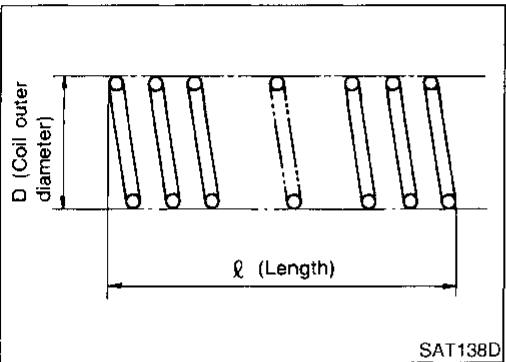
INSPECTION

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:

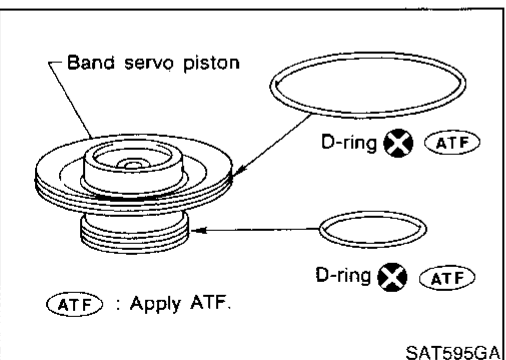
Refer to SDS, AT-353.

NCAT0167S02

ASSEMBLY

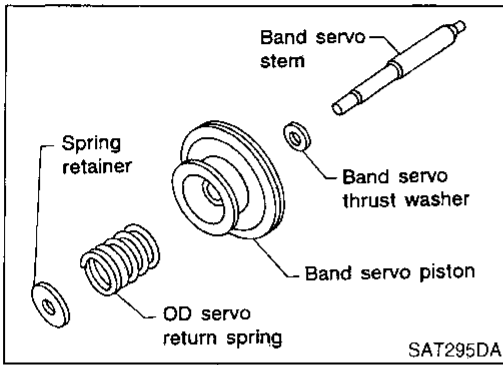
1. Install D-rings to servo piston retainer.
- **Apply ATF to O-rings.**
 - **Pay attention to position of each O-ring.**

NCAT0168



REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)



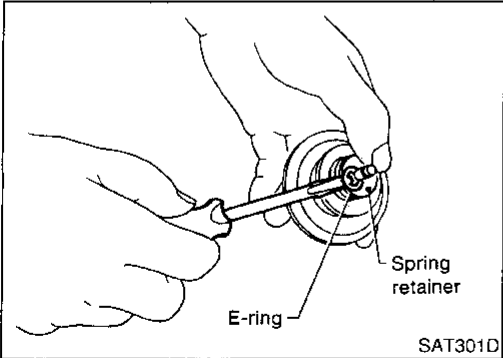
2. Install band servo piston stem, band servo thrust washer, OD servo return spring and spring retainer to band servo piston.

GI

MA

EM

LC



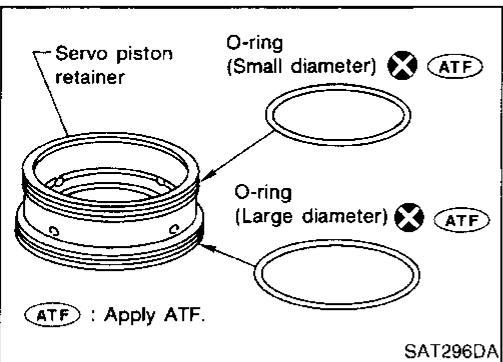
3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.

EC

FE

CL

MT



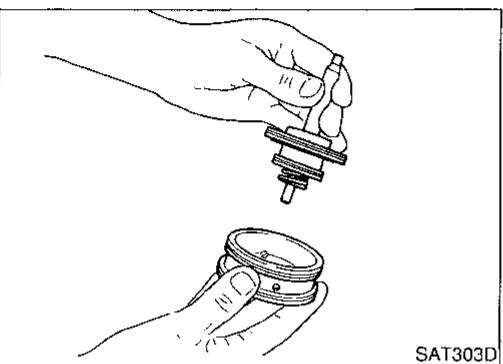
4. Install O-rings to servo piston retainer.
 - Apply ATF to O-rings.
 - Pay attention to the positions of the O-rings.

AT

AX

SU

BR



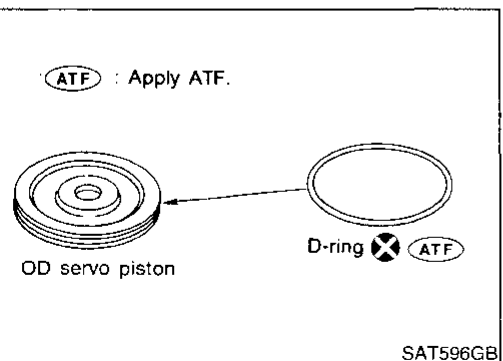
5. Install band servo piston assembly to servo piston retainer by pushing it inward.

ST

RS

BT

HA



6. Install D-ring to OD servo piston.
 - Apply ATF to D-ring.

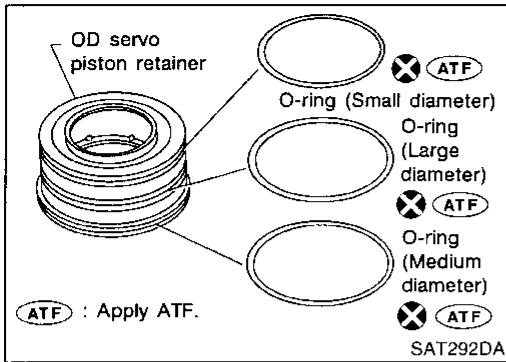
SC

EL

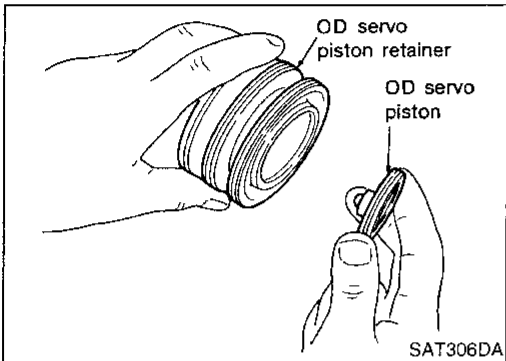
IDX

REPAIR FOR COMPONENT PARTS

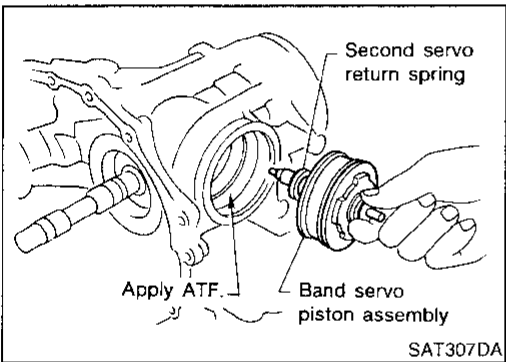
Band Servo Piston Assembly (Cont'd)



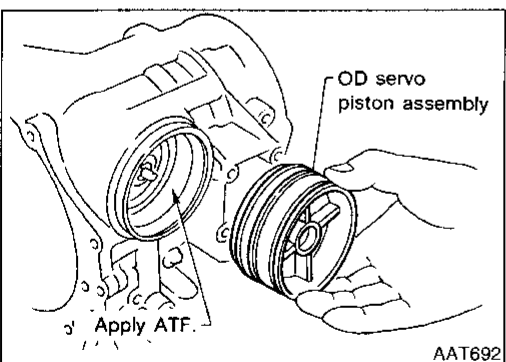
7. Install O-rings to OD servo piston retainer.
 - Apply ATF to O-rings.
 - Pay attention to the positions of the O-rings.



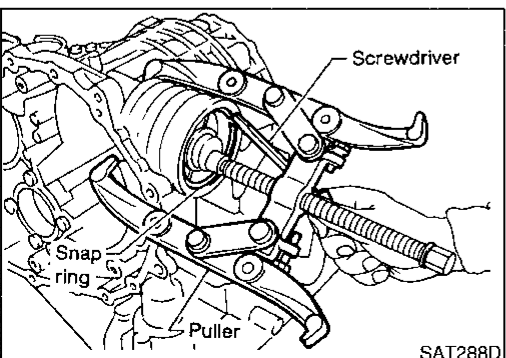
8. Install OD servo piston to OD servo piston retainer.



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.



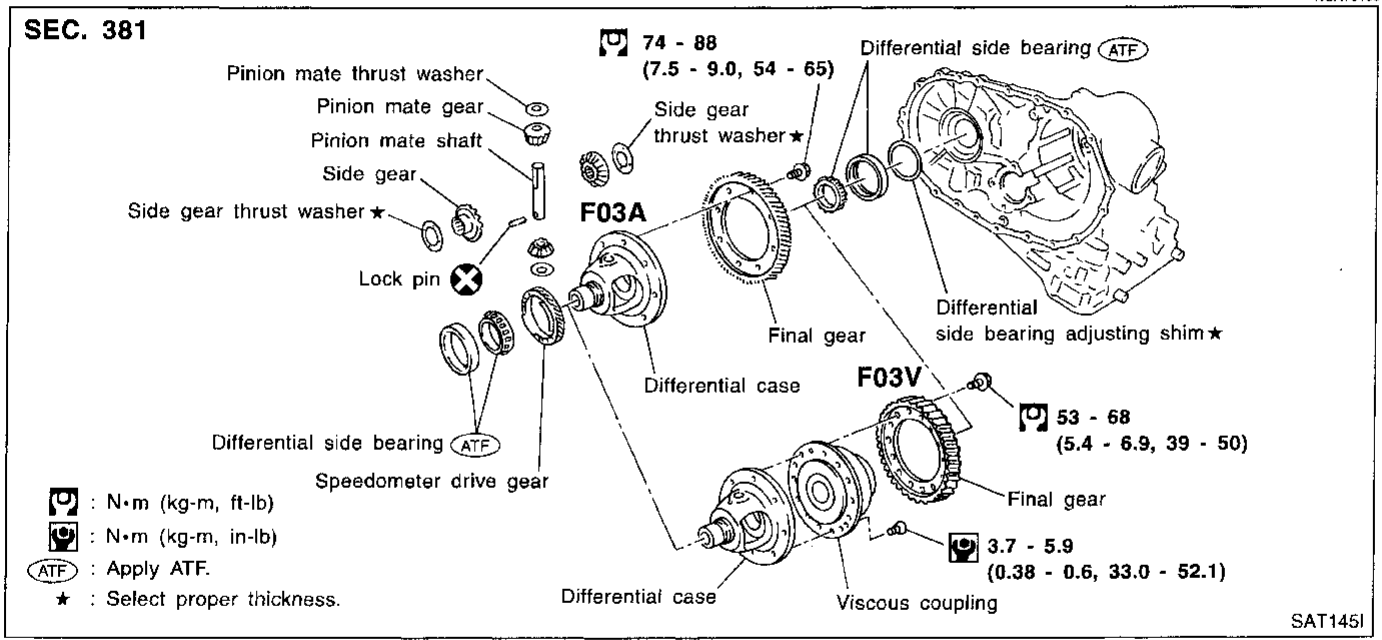
10. Install OD servo piston assembly to transmission case.
 - Apply ATF to O-ring of band servo piston and transmission case.



11. Install band servo piston snap ring to transmission case.

Final Drive COMPONENTS

NCAT0169



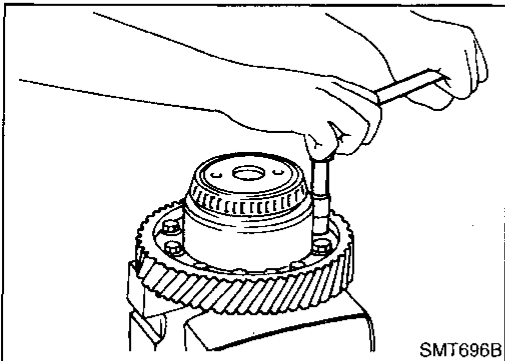
GI
MA
EM
LC
EC
FE
CL
MT

DISASSEMBLY

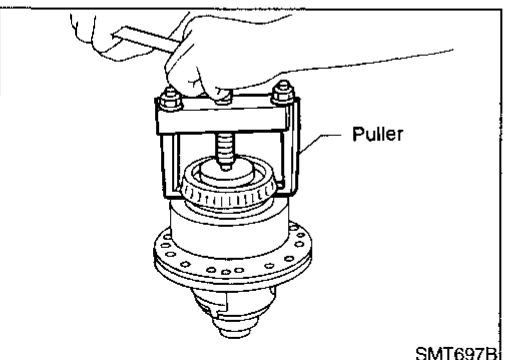
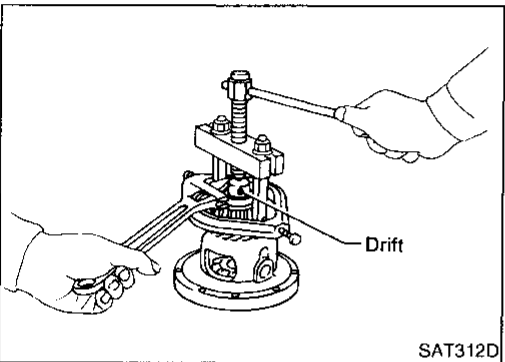
NCAT0170

1. Remove final gear.

AT



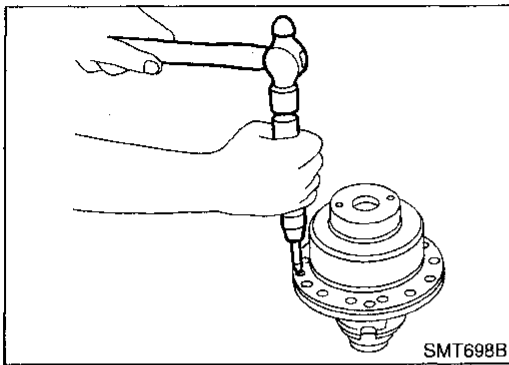
2. Press out differential side bearings.



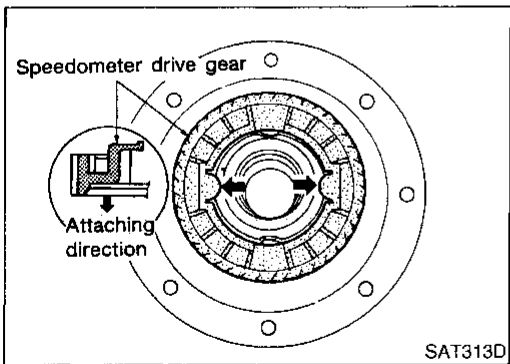
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

REPAIR FOR COMPONENT PARTS

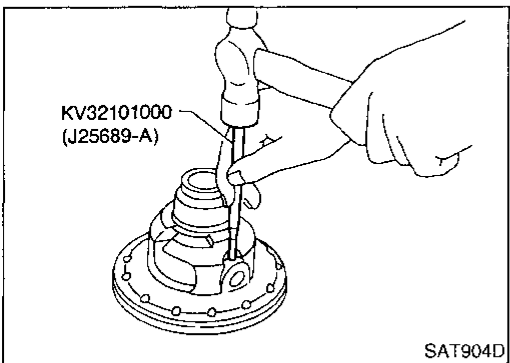
Final Drive (Cont'd)



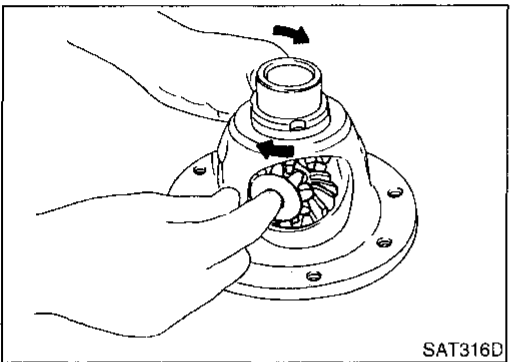
3. Remove viscous coupling — RE4F03V.



4. Remove speedometer drive gear.

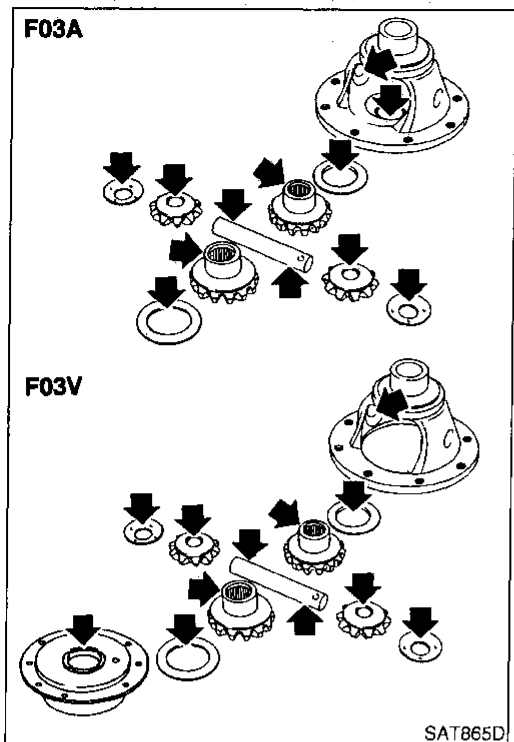


5. Drive out pinion mate shaft lock pin.



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

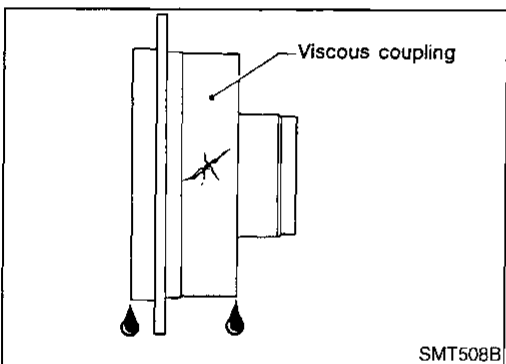
LC

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MT



Viscous Coupling — RE4F03V

NCAT0171S02

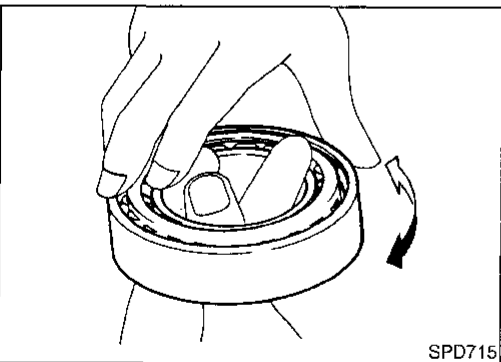
- Check case for cracks.
- Check silicone oil for leakage.

AT

AX

SU

BR



Bearings

NCAT0171S03

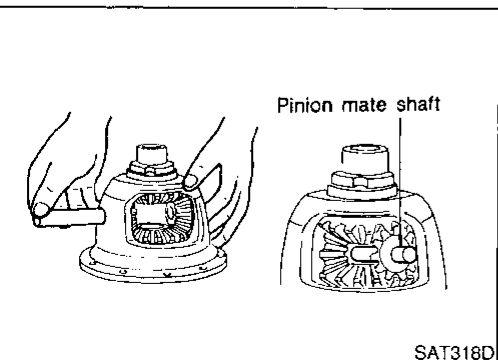
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- When replacing taper roller bearing, replace outer and inner race as a set.

ST

RS

BT

HA



ASSEMBLY

— RE4F03A —

NCAT0172

NCAT0172S01

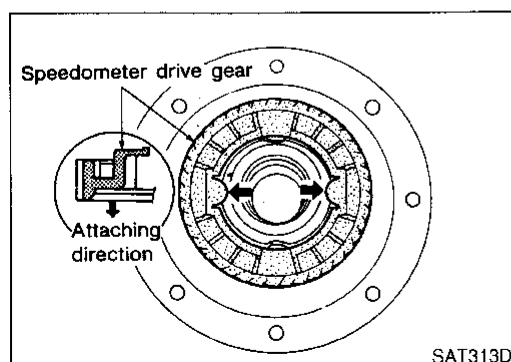
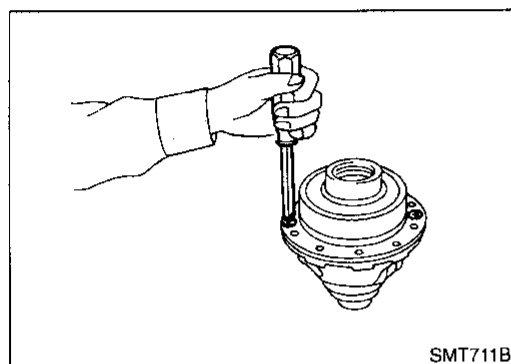
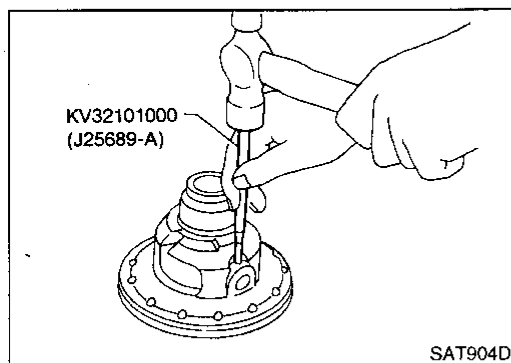
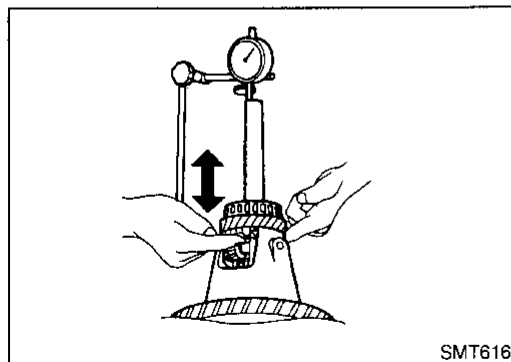
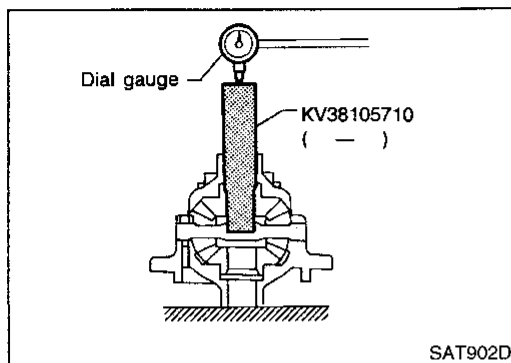
1. Install side gear and thrust washers in differential case.
 2. Install pinion mate gears and thrust washers in differential case while rotating them.
- When inserting, be careful not to damage pinion mate gear washers.
 - Apply ATF to any parts.

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-347.

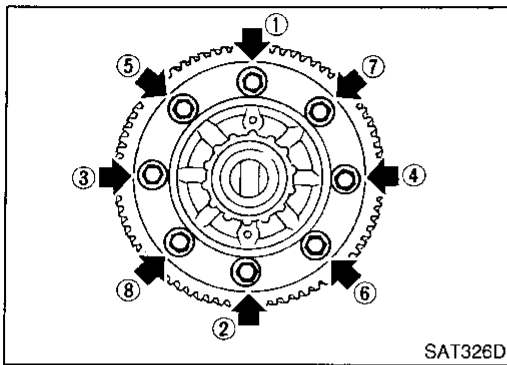
4. Install lock pin.

- **Make sure that lock pin is flush with case.**

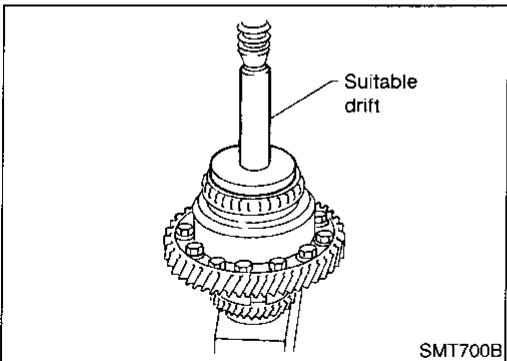
5. Install side gear (viscous coupling side) on differential case and then install viscous coupling — RE4F03V.

6. Install speedometer drive gear on differential case.

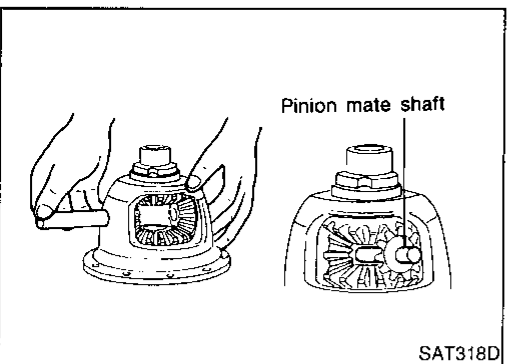
- **Align the projection of speedometer drive gear with the groove of differential case.**



7. Install final gear and tighten fixing bolts in numerical order.



8. Press on differential side bearings.



— RE4F03V —

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.

GI
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BR

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RS

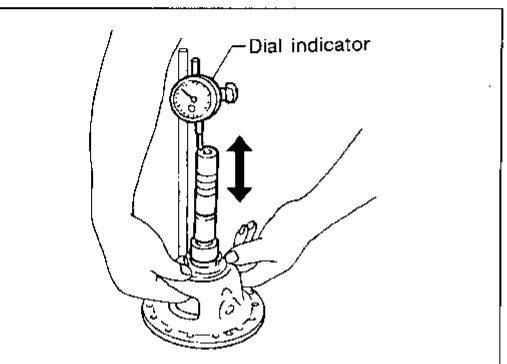
BT

HA

SC

EL

IDX



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.

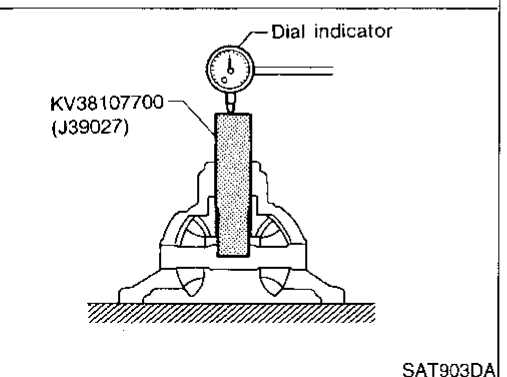
Clearance between side gear and differential case with washers:

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.

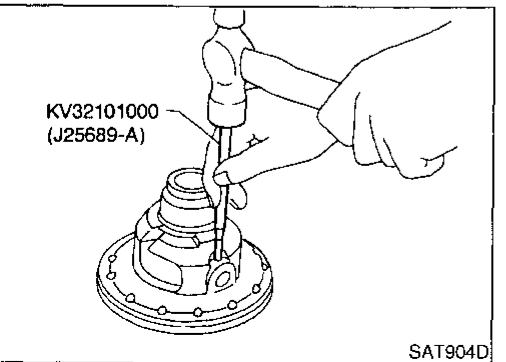
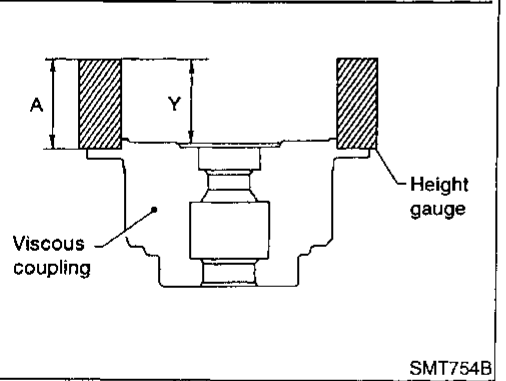
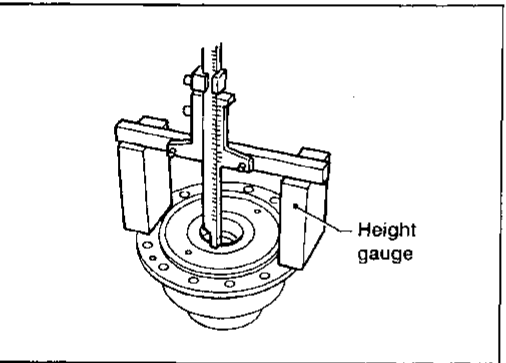
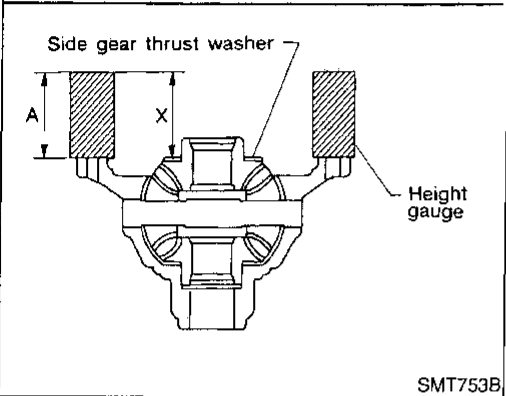
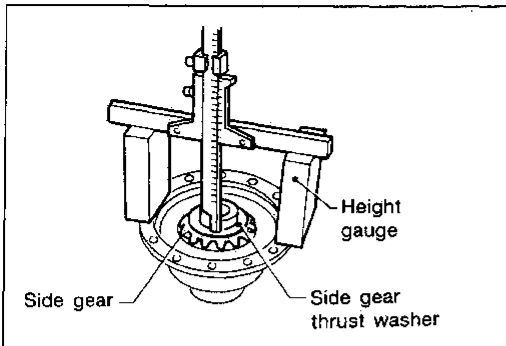
Side gear thrust washers for differential case side:

Refer to SDS, AT-347.



REPAIR FOR COMPONENT PARTS

Final Drive (Cont'd)



Viscous Coupling Side

NCAT0172S0202

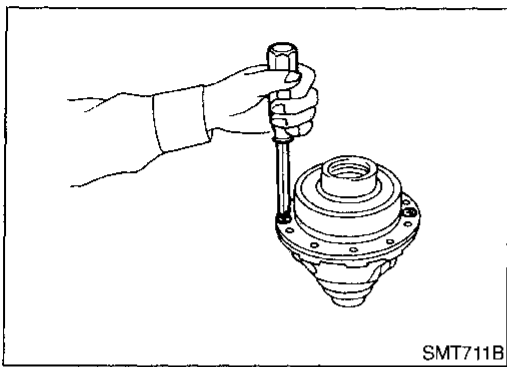
- 1) Place side gear and thrust washer on pinion mate gears installed on differential case.
- 2) Measure dimension X.
 - Measure dimension X in at least two places.

- 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-347.

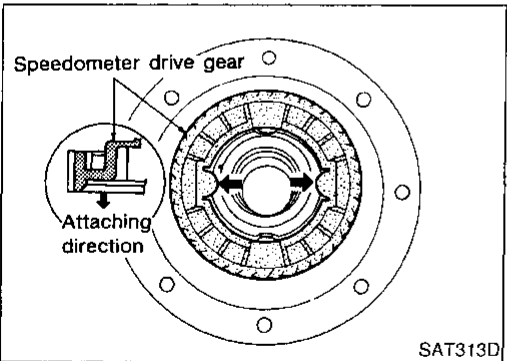
4. Install lock pin.
 - Make sure that lock pin is flush with case.

REPAIR FOR COMPONENT PARTS

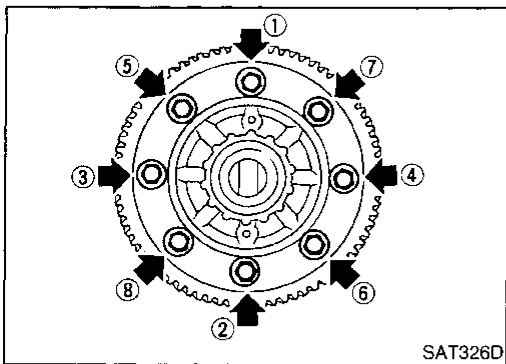
Final Drive (Cont'd)



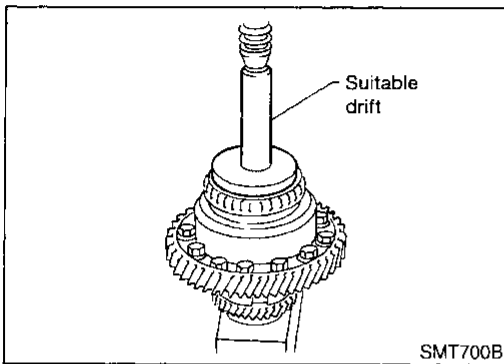
5. Install side gear (viscous coupling side) on differential case and then install viscous coupling — RE4F03V.



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.



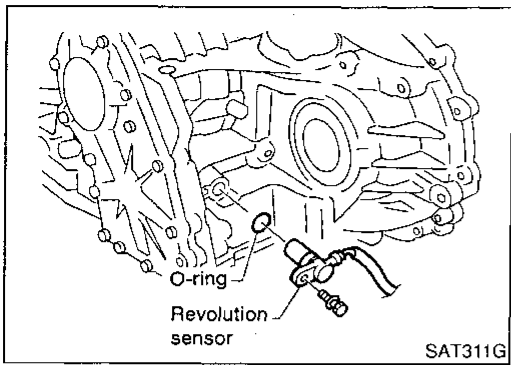
8. Press on differential side bearings.

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ASSEMBLY

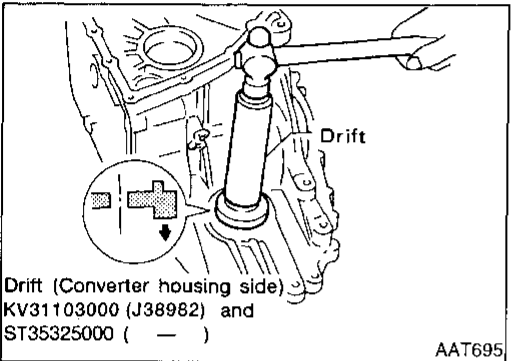
Assembly (1)

NCAT0173

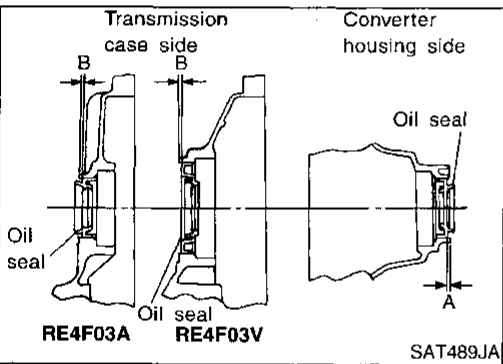


Assembly (1)

1. Install revolution sensor onto transmission case.
Always use new sealing parts.

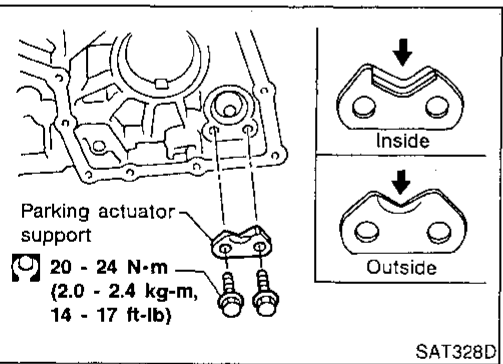


2. Install differential side oil seals on transmission case and converter housing, so that "A" and "B" are within specifications.

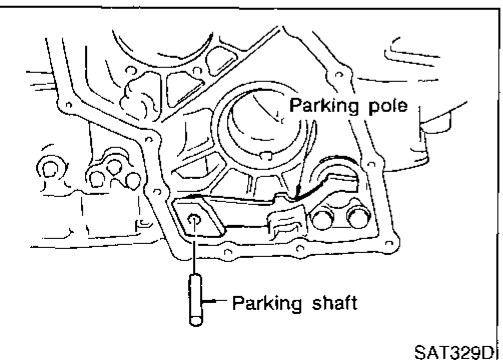


Unit: mm (in)

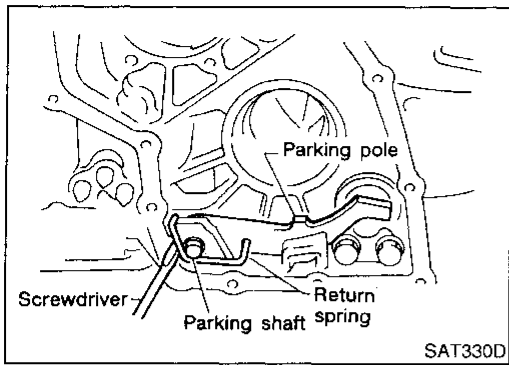
A	B
5.5 - 6.5 (0.217 - 0.256)	-0.5 to 0.5 (-0.020 to 0.020)



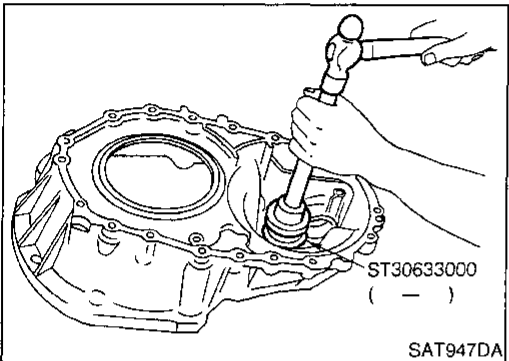
3. Install parking actuator support to transmission case.
● **Pay attention to direction of parking actuator support.**



4. Install parking pawl on transmission case and fix it with parking shaft.



5. Install return spring.



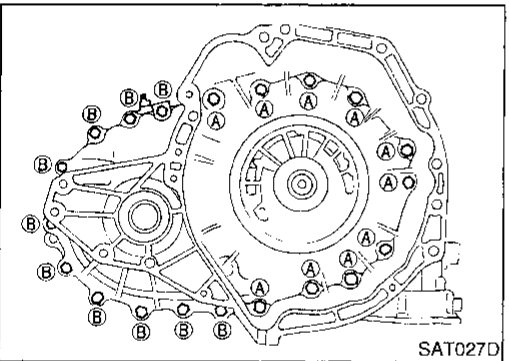
Adjustment (1)

DIFFERENTIAL SIDE BEARING PRELOAD

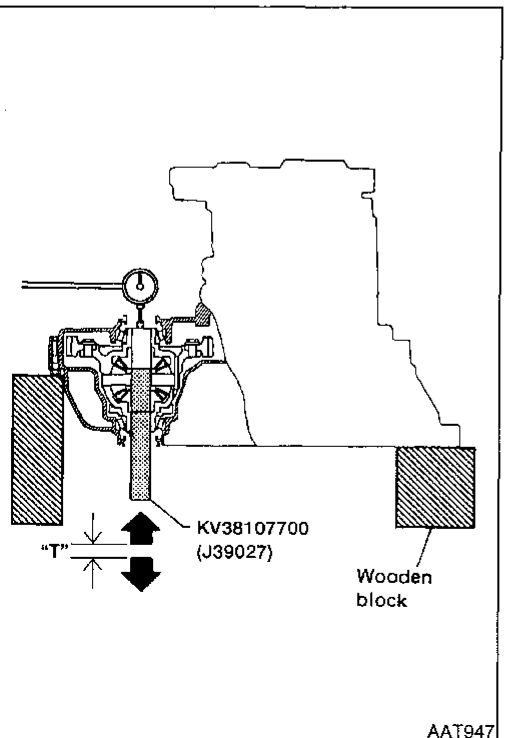
NCAT0174

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.

Differential side bearing preload "T":

0.04 - 0.09 mm (0.0016 - 0.0035 in)

8. Select proper thickness of differential side bearing adjusting shim(s) using SDS table as a guide.

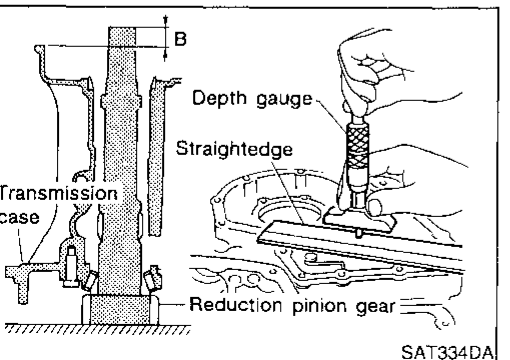
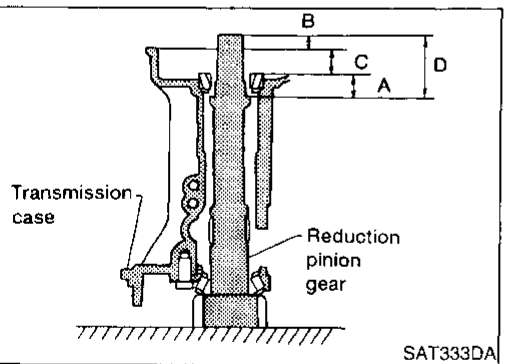
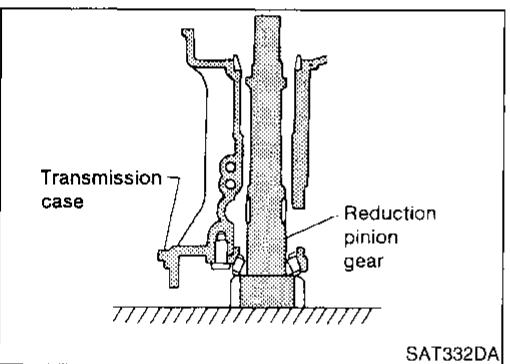
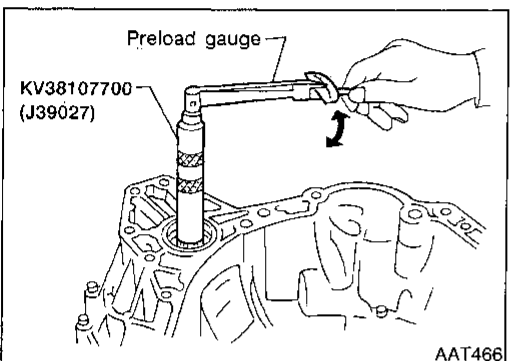
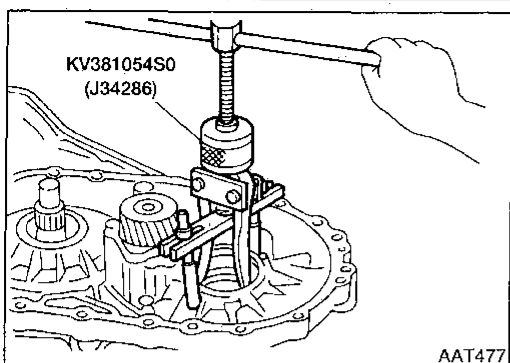
Differential side bearing adjusting shim:

Refer to SDS, AT-348.

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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

1. Remove transmission case and final drive assembly from converter housing.
2. Select proper thickness of reduction pinion gear bearing adjusting shim using the following procedures.
 - a. Place reduction pinion gear on transmission case as shown.

- b. Place idler gear bearing on transmission case.
- c. Measure dimensions "B" "C" and "D" and calculate dimension "A".

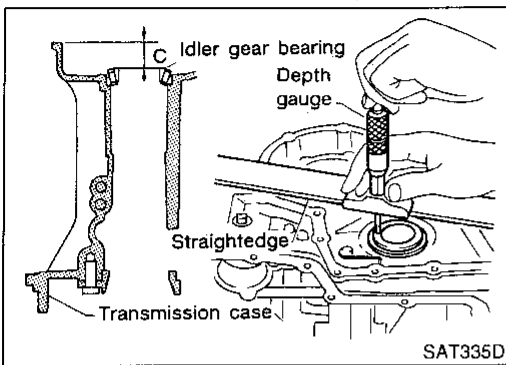
$$A = D - (B + C)$$

"A": Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction pinion gear.

- Measure dimension "B" between the end of reduction pinion gear and the surface of transmission case.
- Measure dimension "B" in at least two places.

ASSEMBLY

Adjustment (1) (Cont'd)



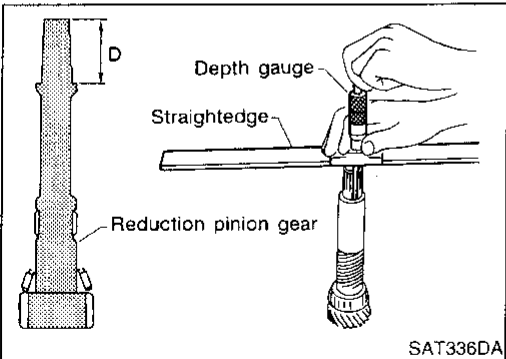
- Measure dimension "C" between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension "C" in at least two places.**

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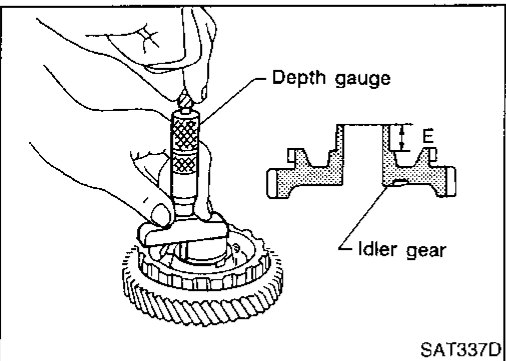
- Measure dimension "D" between the end of reduction pinion gear and the adjusting shim mating surface of reduction pinion gear.
- **Measure dimension "D" in at least two places.**
- Calculate dimension "A".
 $A = D - (B + C)$

EC

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- 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.**

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- e. Calculate "T" and select proper thickness of reduction pinion gear bearing adjusting shim using SDS table as a guide.

$$T = A - E$$

Reduction pinion gear bearing adjusting shim:

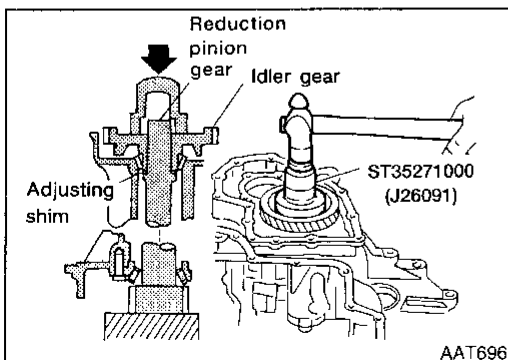
Refer to SDS, AT-351.

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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.**

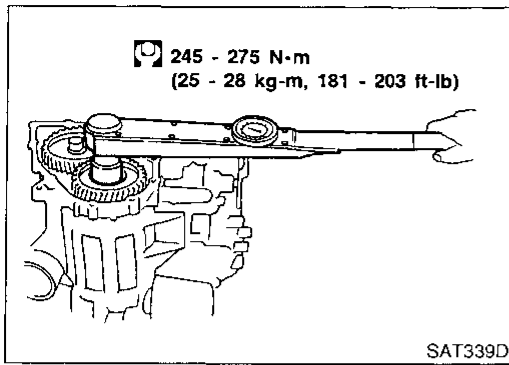
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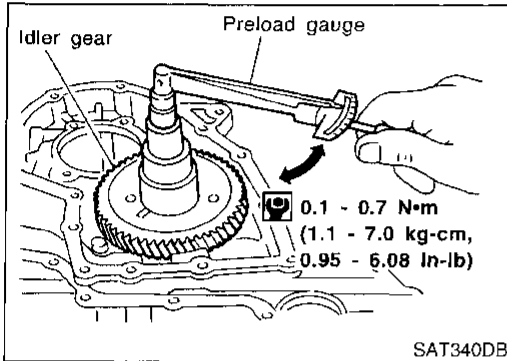
IDX

ASSEMBLY

Adjustment (1) (Cont'd)

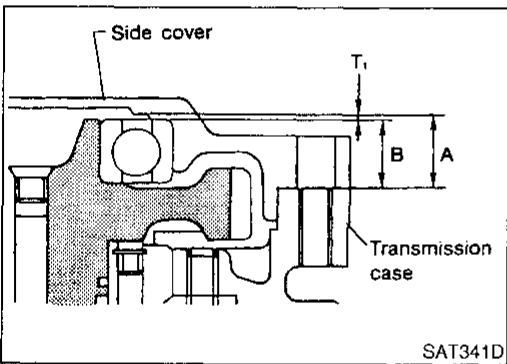


6. Tighten idler gear lock nut to the specified torque.
 - Lock idler gear with parking pawl when tightening lock nut.



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.

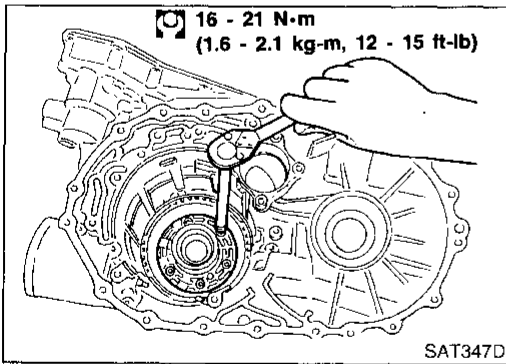
Turning torque of reduction pinion gear:
0.1 - 0.7 N·m (1.1 - 7.0 kg-cm, 0.95 - 6.08 in-lb)



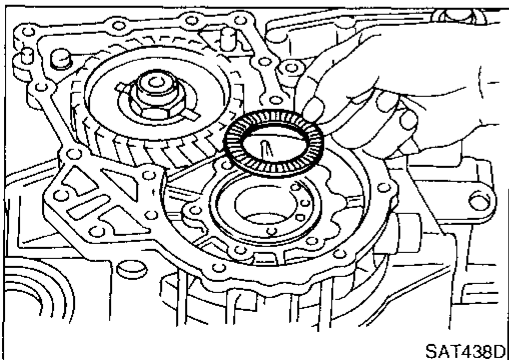
OUTPUT SHAFT END PLAY

NCAT0174S03

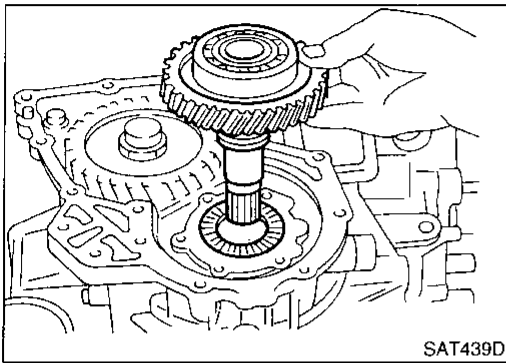
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



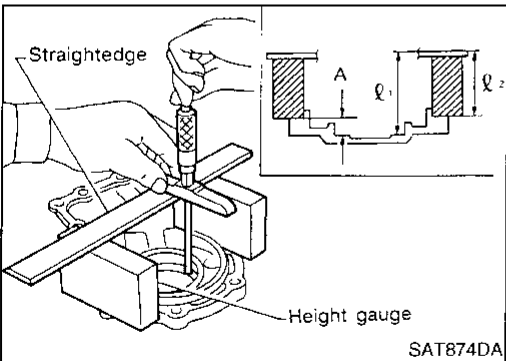
1. Install bearing retainer for output shaft.



2. Install output shaft thrust needle bearing on bearing retainer.



3. Install output shaft on transmission case.

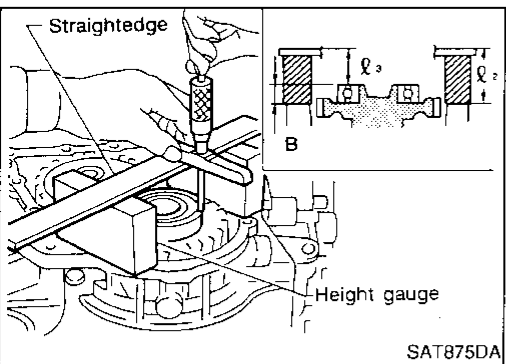


4. Measure dimensions " l_1 " and " l_2 " at side cover and then calculate dimension "A".

- 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



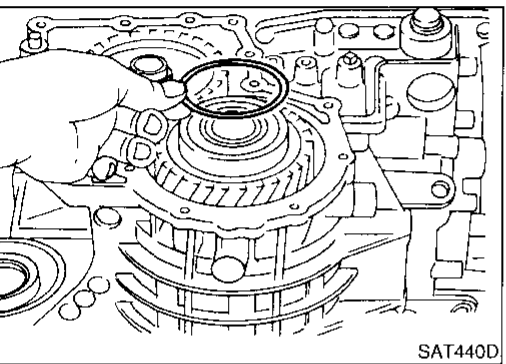
5. Measure dimensions " l_2 " and " l_3 " and then calculate dimension "B".

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.

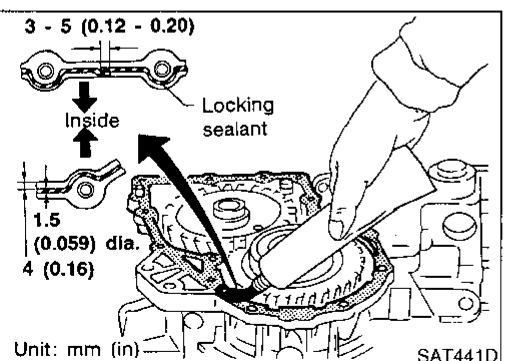
Output shaft end play (A - B):

0 - 0.5 mm (0 - 0.020 in)

Output shaft end play adjusting shim:

Refer to SDS, AT-352.

7. Install adjusting shim on output shaft bearing.

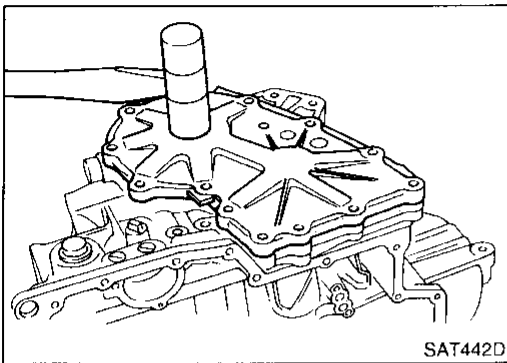


8. Apply locking sealant to transmission case as shown in illustration.

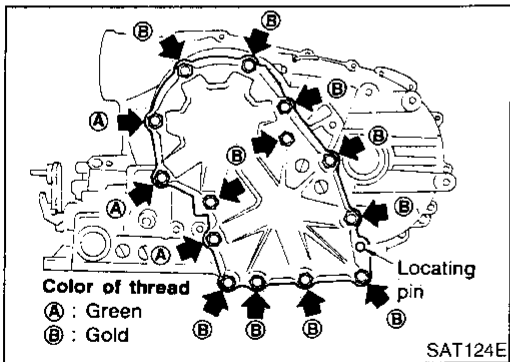
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ASSEMBLY

Adjustment (1) (Cont'd)



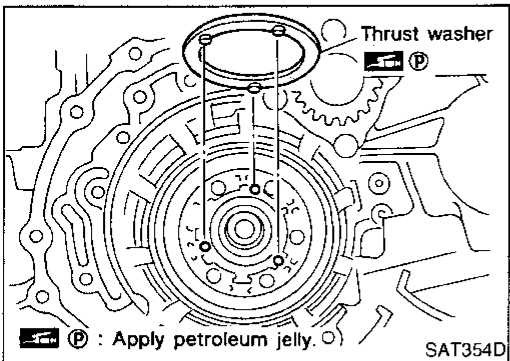
9. Install side cover on transmission case.
 - Apply locking sealant to the mating surface of transmission case.



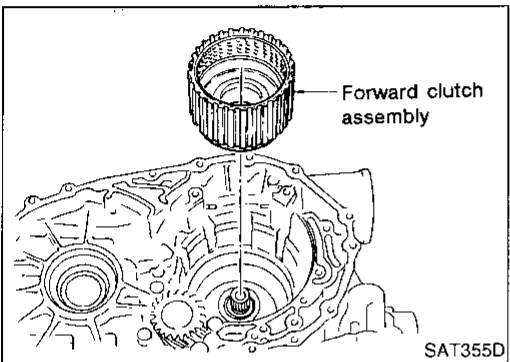
10. Tighten side cover fixing bolts to specified torque.
 - Do not mix bolts A and B.
 - Always replace bolts A as they are self-sealing bolts.

Assembly (2)

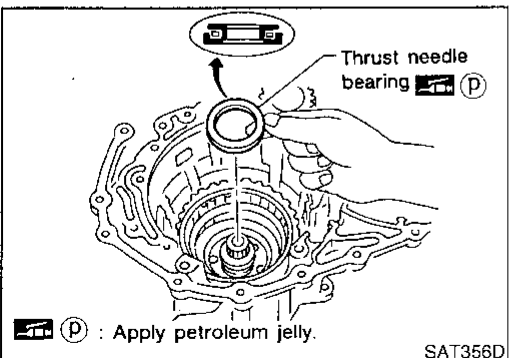
NCAT0175



1. Remove paper rolled around bearing retainer.
2. Install thrust washer on bearing retainer.
 - Apply petroleum jelly to thrust washer.



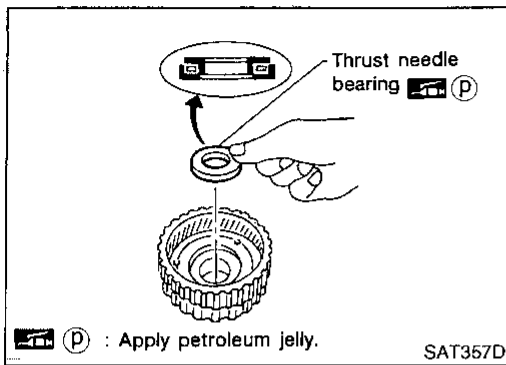
3. Install forward clutch assembly.
 - Align teeth of low & reverse brake drive plates before installing.
 - Make sure that bearing retainer seal rings are not spread.



4. Install thrust needle bearing on bearing retainer.
 - Apply petroleum jelly to thrust bearing.
 - Pay attention to direction of thrust needle bearing.

ASSEMBLY

Assembly (2) (Cont'd)



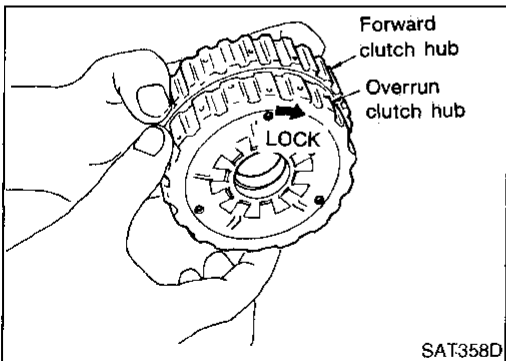
5. Install thrust needle bearing on rear internal gear.
 - Apply petroleum jelly to thrust needle bearing.
 - Pay attention to direction of thrust needle bearing.

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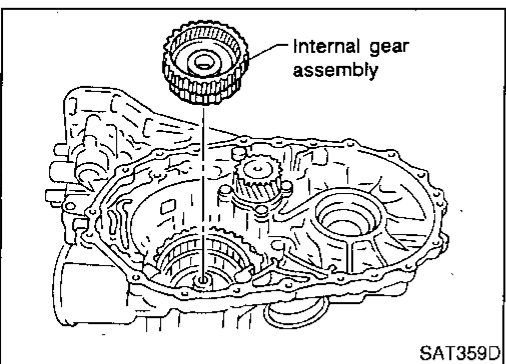
6. Hold forward clutch hub and turn overrun clutch hub. Check overrun clutch hub for directions of lock and unlock.
 - If not as shown in illustration, check installed direction of forward one-way clutch.

EC

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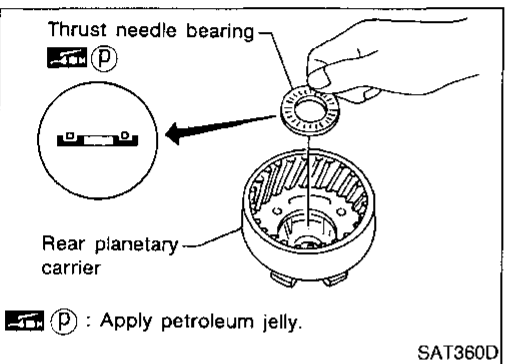
7. Install rear internal gear assembly.
 - Align teeth of forward clutch and overrun clutch drive plate.

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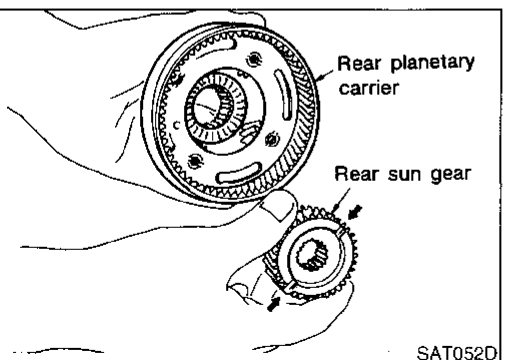
8. Install needle bearing on rear planetary carrier.
 - Apply petroleum jelly to needle bearing.
 - Pay attention to direction of needle bearing.

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9. Install rear sun gear on rear planetary carrier.
 - Pay attention to direction of rear sun gear.

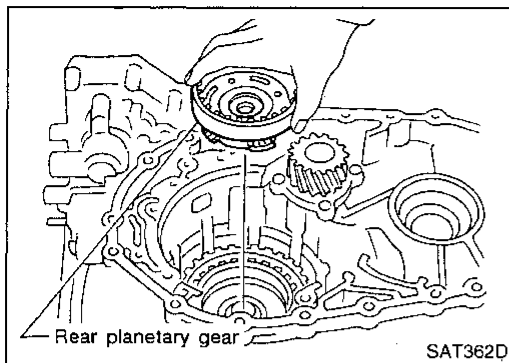
SC

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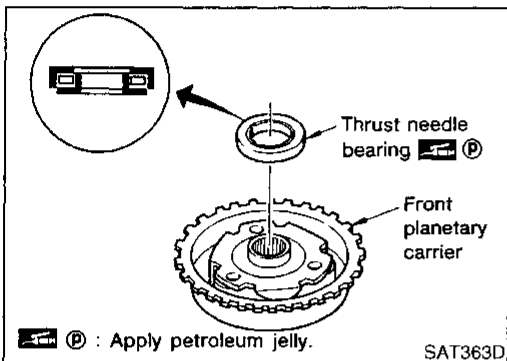
IDX

ASSEMBLY

Assembly (2) (Cont'd)

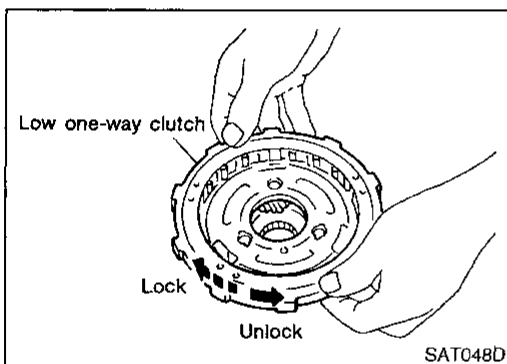


10. Install rear planetary carrier on transmission case.



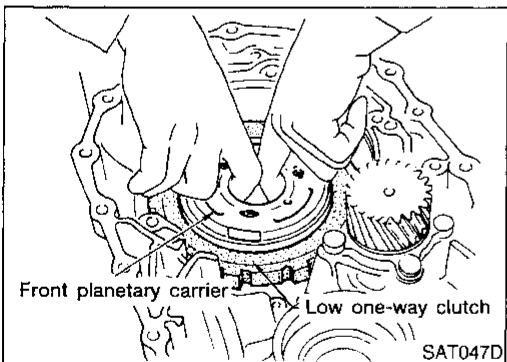
11. Install thrust needle bearing on front planetary carrier.

- Apply petroleum jelly to thrust needle bearing.
- Pay attention to direction of thrust needle bearing.

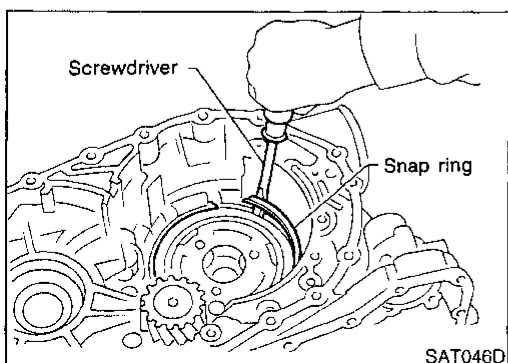


12. Install low one-way clutch to front planetary carrier by turning it in the direction of the arrow as shown.

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.

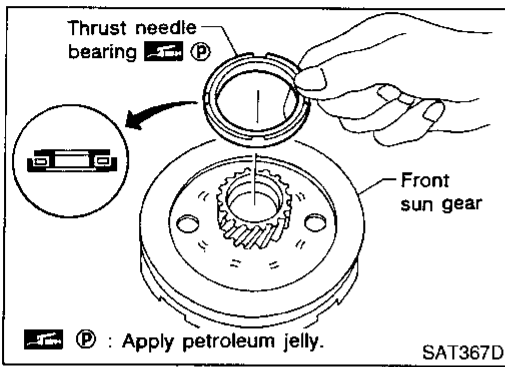


15. Install snap ring with screwdriver.

- Forward clutch and bearings must be correctly installed for snap ring to fit groove of transmission case.

ASSEMBLY

Assembly (2) (Cont'd)



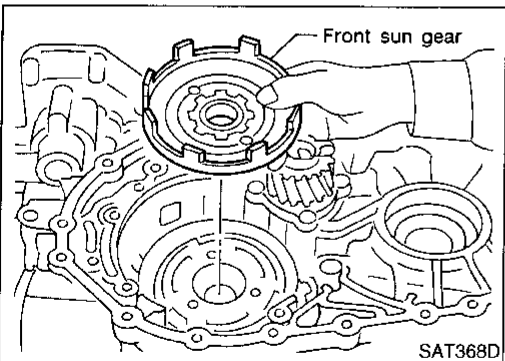
16. Install needle bearing on front sun gear.
- Apply petroleum jelly to needle bearing.
 - Pay attention to direction of needle bearing.

GI

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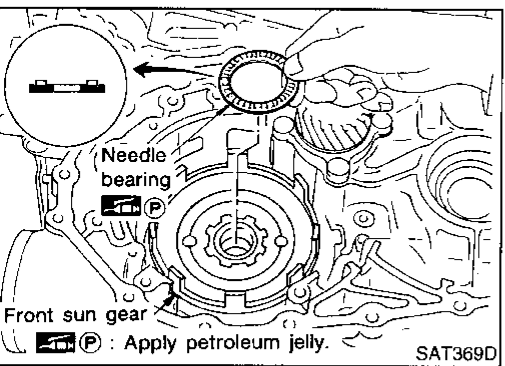
17. Install front sun gear on front planetary carrier.

EC

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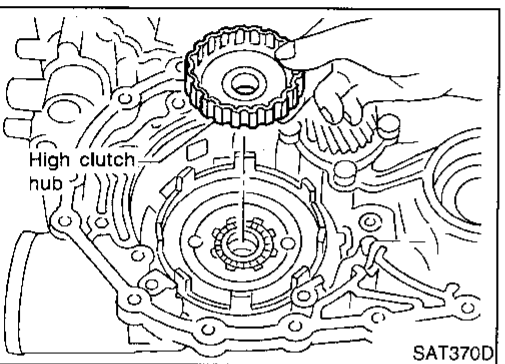
18. Install needle bearing on front sun gear.
- Apply petroleum jelly to needle bearing.
 - Pay attention to direction of needle bearing.

AT

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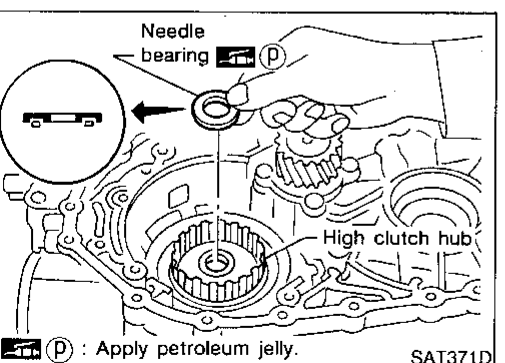
19. Install high clutch hub on front sun gear.

ST

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20. Install needle bearing on high clutch hub.
- Apply petroleum jelly to needle bearing.
 - Pay attention to direction of needle bearing.

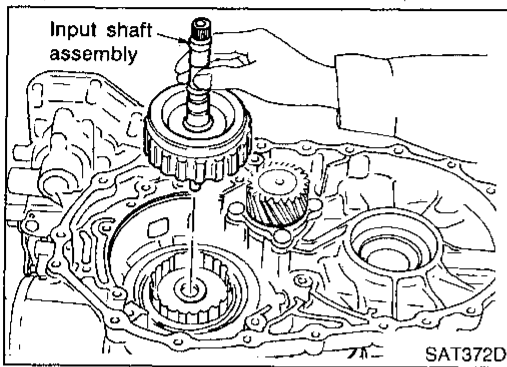
SC

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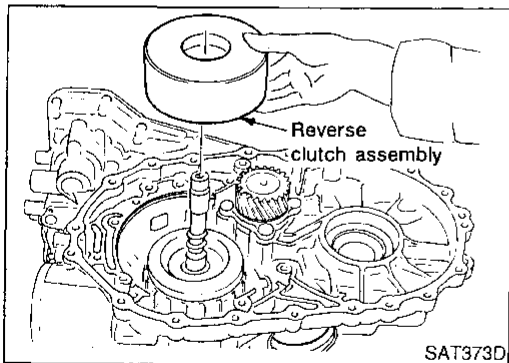
IDX

ASSEMBLY

Assembly (2) (Cont'd)



21. Remove paper rolled around input shaft.
22. Install input shaft assembly.
 - Align teeth of high clutch drive plates before installing.

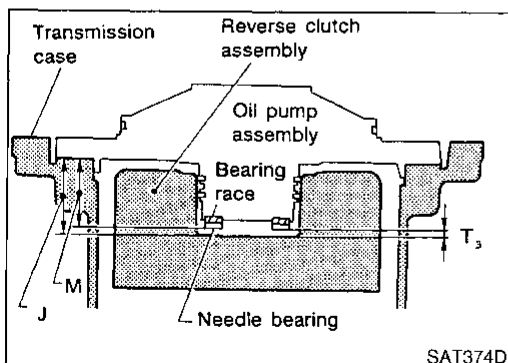


23. Install reverse clutch assembly.
 - Align teeth of reverse clutch drive plates before installing.

Adjustment (2)

When any parts listed below are replaced, adjust total end play and reverse clutch end play. NCAT0176

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	—	●

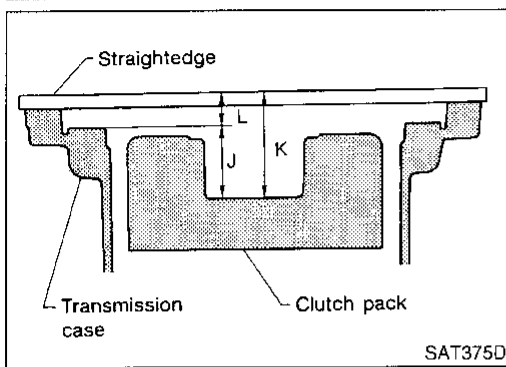


TOTAL END PLAY

- Measure clearance between reverse clutch drum and needle bearing for oil pump cover. NCAT0176S01
- Select proper thickness of bearing race so that end play is within specifications.

ASSEMBLY

Adjustment (2) (Cont'd)



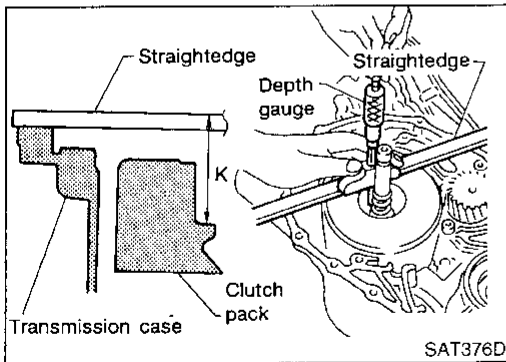
1. Measure dimensions "K" and "L" and then calculate dimension "J".

GI

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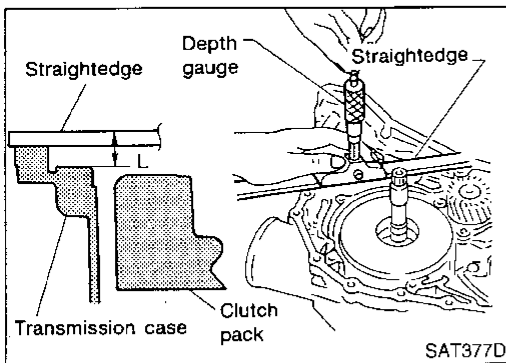
- a. Measure dimension "K".

EC

FE

CL

MT



- 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

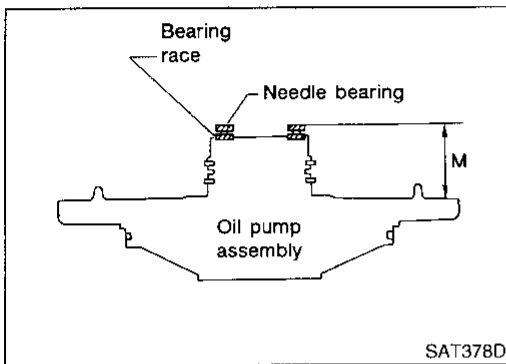
$$J = K - L$$

AT

AX

SU

BR



2. Measure dimension "M".

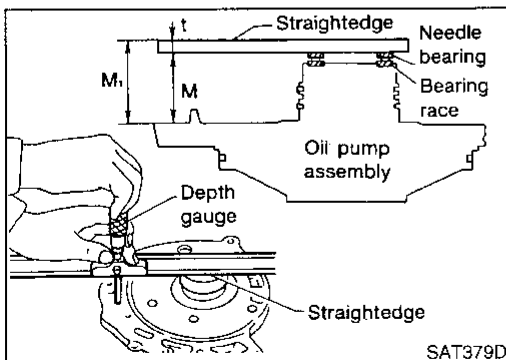
- a. Place bearing race and needle bearing on oil pump assembly.

ST

RS

BT

HA



- b. Measure dimension "M".

"M": Distance between transmission case fitting surface and needle bearing on oil pump cover

"M₁": Indication of gauge

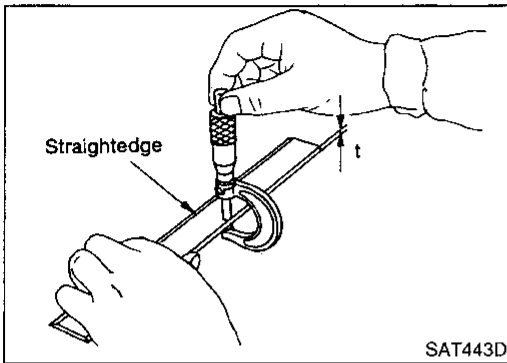
SC

EL

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ASSEMBLY

Adjustment (2) (Cont'd)



- c. Measure thickness of straightedge "t".

$$M = M_1 - t$$

3. Adjust total end play "T₃".

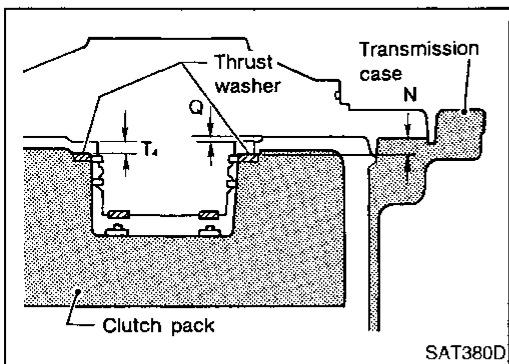
$$T_3 = J - M$$

Total end play "T₃":

0.25 - 0.55 mm (0.0098 - 0.0217 in)

- Select proper thickness of bearing race so that total end play is within specifications.

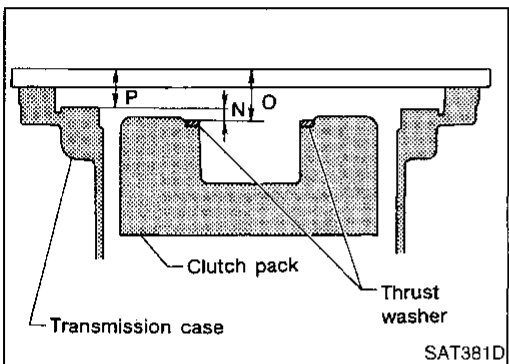
Bearing races: Refer to SDS, AT-353.



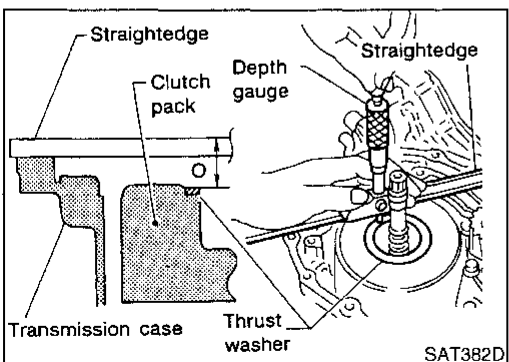
REVERSE CLUTCH END PLAY

NCA70176502

- Measure clearance between oil pump cover and thrust washer for reverse clutch drum.
- Select proper thickness of thrust washer so that end play is within specifications.



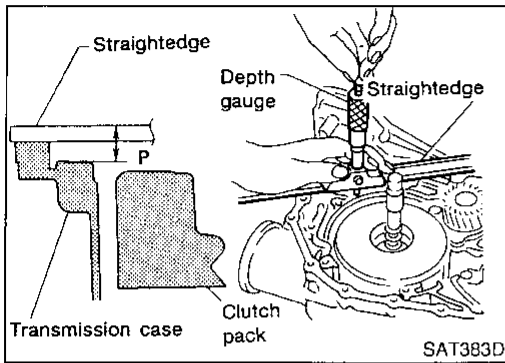
1. Measure dimensions "O" and "P" and then calculate dimension "N".



- a. Place thrust washer on reverse clutch drum.
b. Measure dimension "O".

ASSEMBLY

Adjustment (2) (Cont'd)



- 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

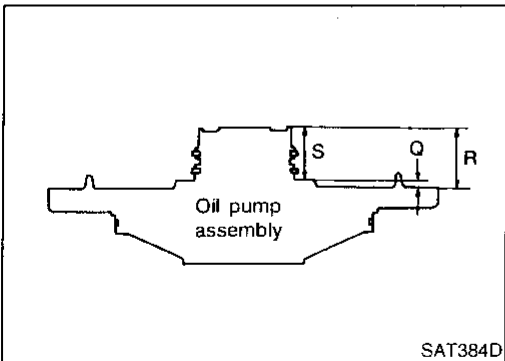
$$N = O - P$$

GI

MA

EM

LC



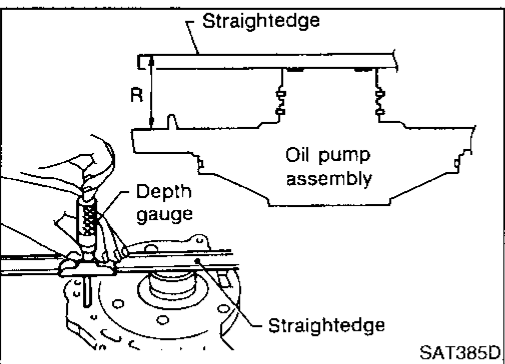
2. Measure dimensions "R" and "S" and then calculate dimension "Q".

EC

FE

CL

MT



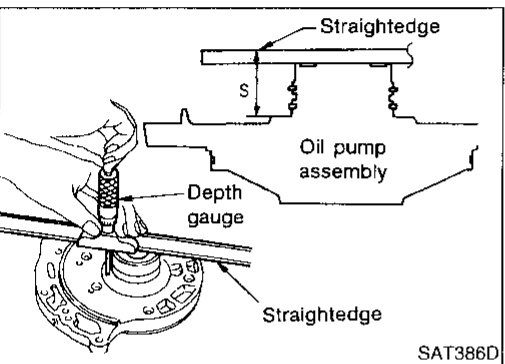
- a. Measure dimension "R".

AT

AX

SU

BR



- b. Measure dimension "S".
- c. Calculate dimension "Q".
"Q": Distance between transmission case fitting surface and thrust washer mating surface

$$Q = R - S$$

ST

RS

BT

HA

3. Adjust reverse clutch end play "T₄".

$$T_4 = N - Q$$

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.

SC

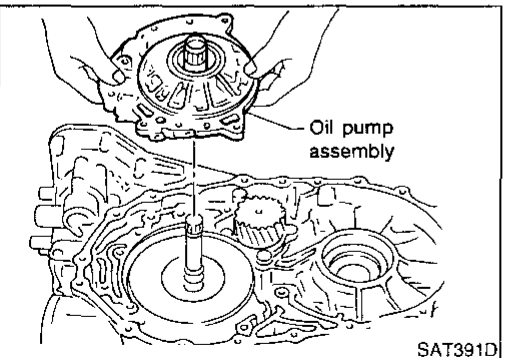
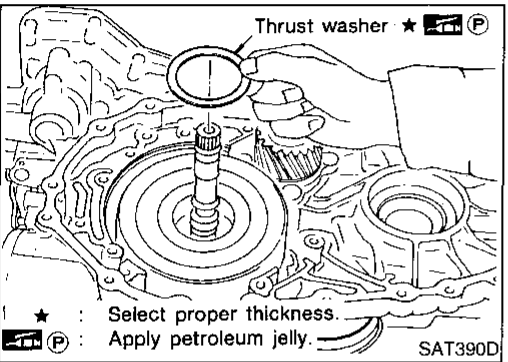
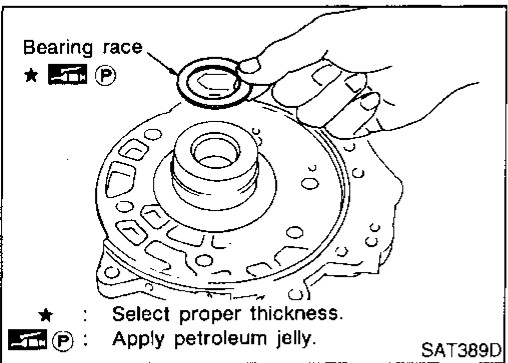
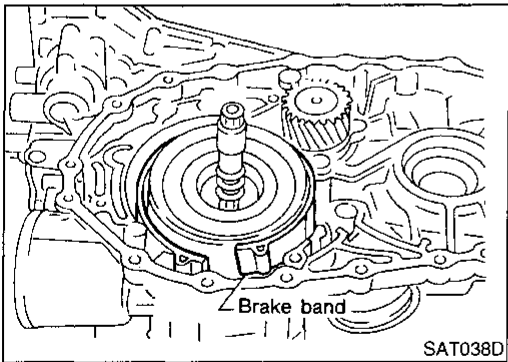
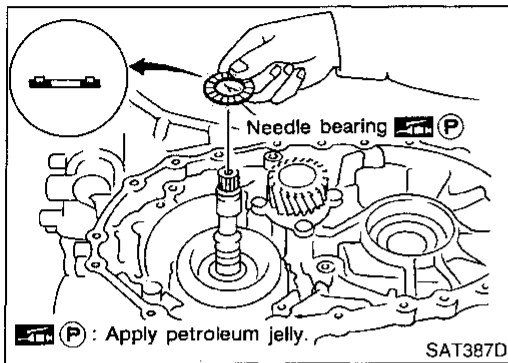
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Thrust washer: Refer to SDS, AT-353.

ASSEMBLY

Assembly (3)



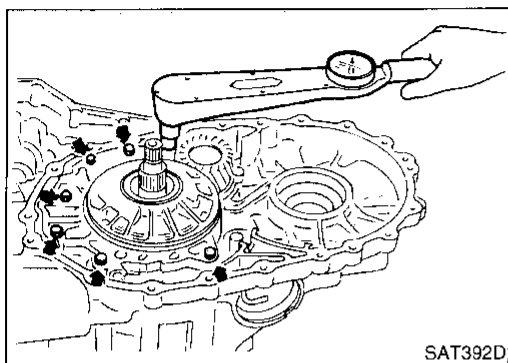
Assembly (3)

NCAT0177

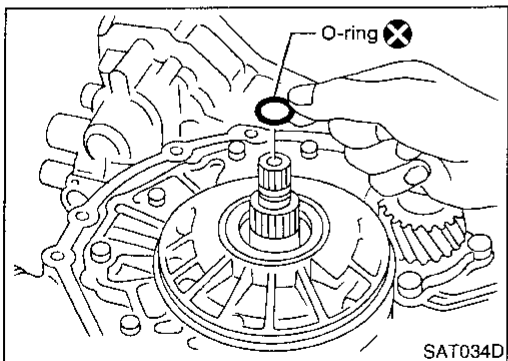
1. Remove reverse clutch assembly and install needle bearing on high clutch assembly.
 - Pay attention to direction of needle bearing.
2. Install reverse clutch assembly.
3. Install anchor end pin and lock nut on transmission case.
4. Place brake band on outside of reverse clutch drum. Tighten anchor end pin just enough so that brake band is evenly fitted on reverse clutch drum.
5. Place bearing race selected in total end play adjustment step on oil pump cover.
 - Apply petroleum jelly to bearing race.
6. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.
 - Apply petroleum jelly to thrust washer.
7. Install oil pump assembly on transmission case.

ASSEMBLY

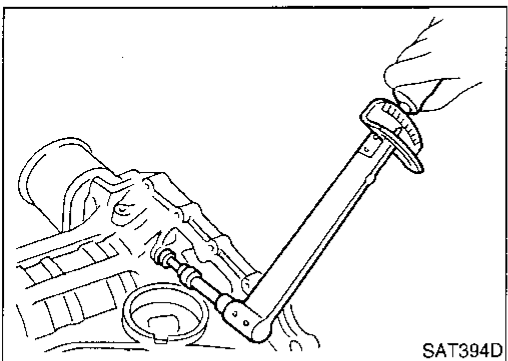
Assembly (3) (Cont'd)



8. Tighten oil pump fixing bolts to specified torque.



9. Install O-ring to input shaft.
● Apply ATF to O-ring.

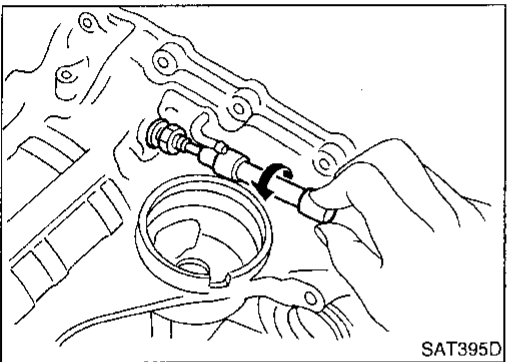


10. Adjust brake band.

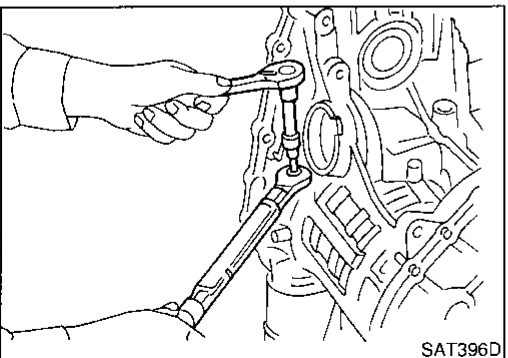
a. Tighten anchor end pin to specified torque.

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.



c. While holding anchor end pin, tighten lock nut.

GI

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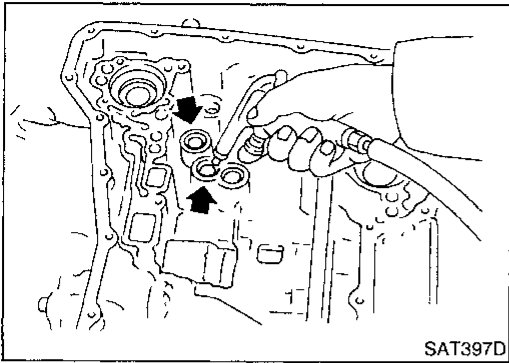
SC

EL

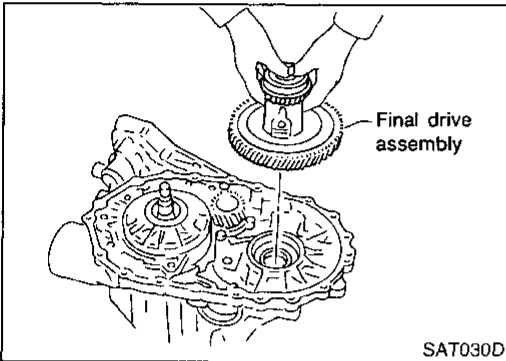
IDX

ASSEMBLY

Assembly (3) (Cont'd)



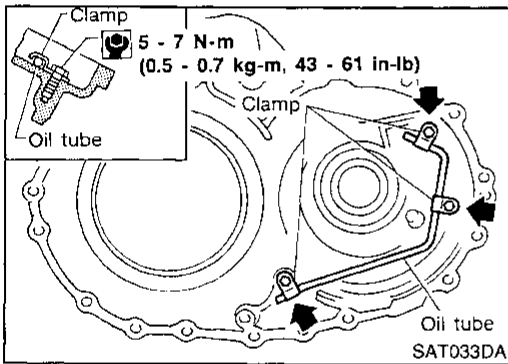
11. Apply compressed air to oil holes of transmission case and check operation of brake band.



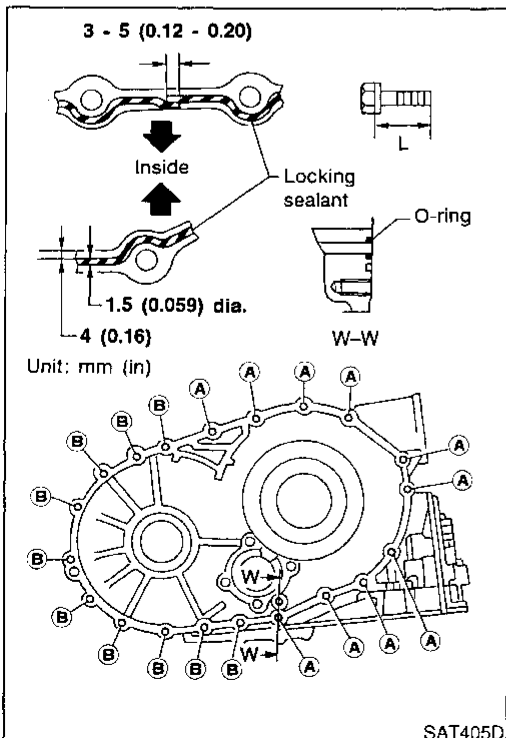
Assembly (4)

NCAT0178

1. Install final drive assembly on transmission case.



2. Install oil tube on converter housing.

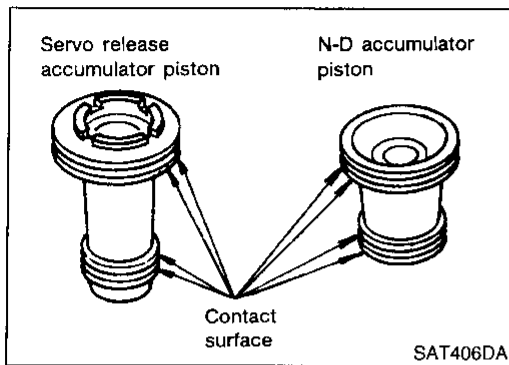


3. Install O-ring on differential oil port of transmission case.
 4. Install converter housing on transmission case.
- Apply locking sealant to mating surface of converter housing.

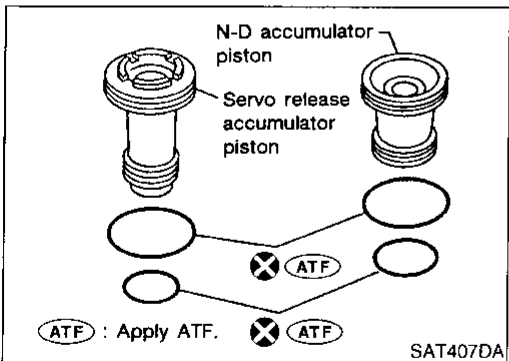
Bolt	Length mm (in)
A	32.8 (1.291)
B	40 (1.57)

ASSEMBLY

Assembly (4) (Cont'd)

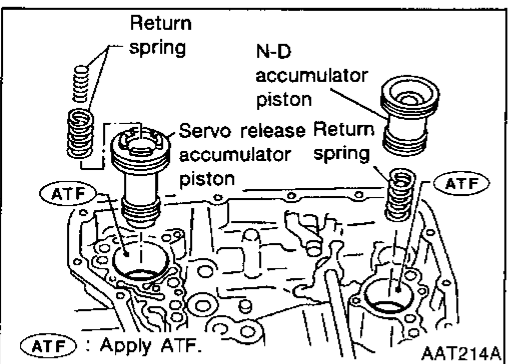


5. Install accumulator piston.
 - a. Check contact surface of accumulator piston for damage.



- b. Install O-rings on accumulator piston.
 - Apply ATF to O-rings.

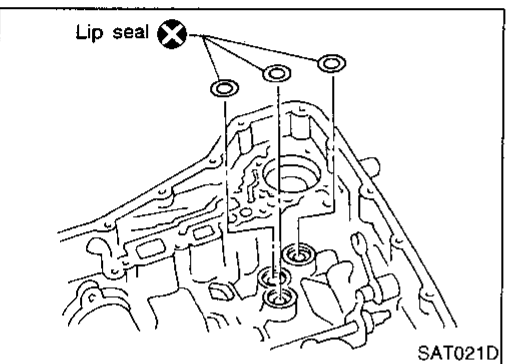
Accumulator piston O-rings:
Refer to SDS, AT-353.



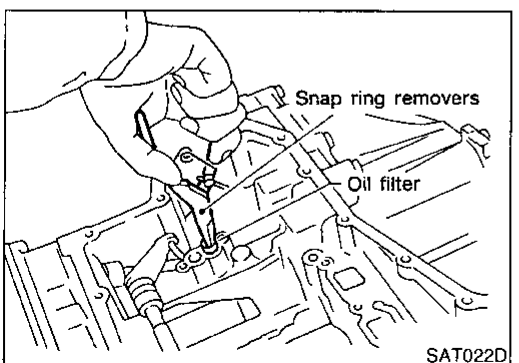
- c. Install accumulator pistons and return springs on transmission case.

- **Apply ATF to inner surface of transmission case.**

Return springs:
Refer to SDS, AT-353.



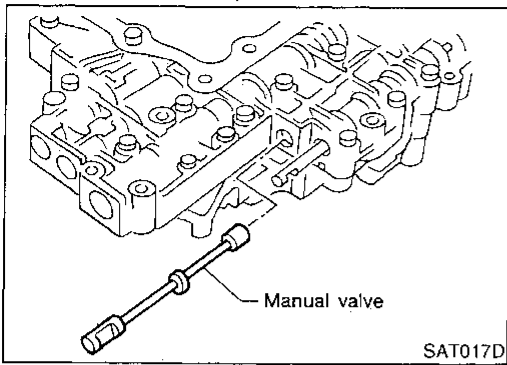
6. Install lip seals for band servo oil holes on transmission case.
 - **Apply petroleum jelly to lip seals.**



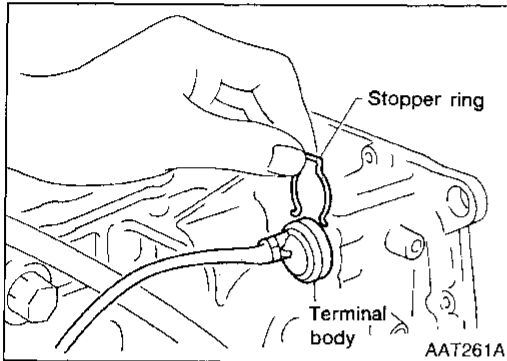
GI
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ASSEMBLY

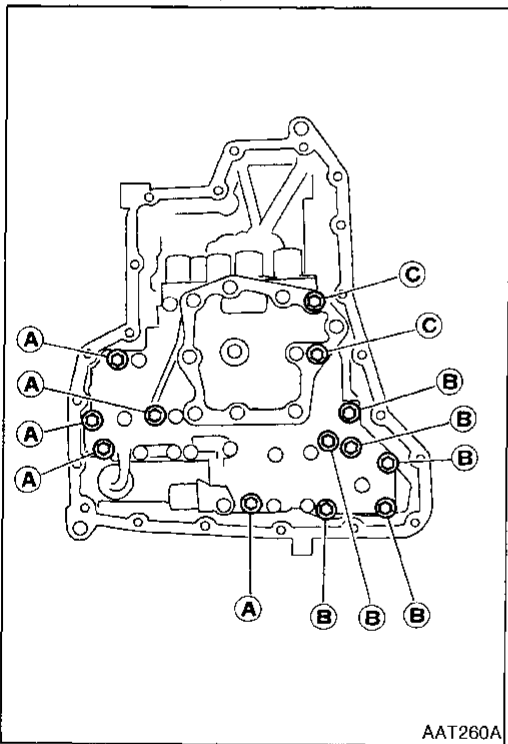
Assembly (4) (Cont'd)




7. Install control valve assembly.
 - a. Insert manual valve into control valve assembly.
 - Apply ATF to manual valve.




- b. Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.
- c. Install stopper ring to terminal body.

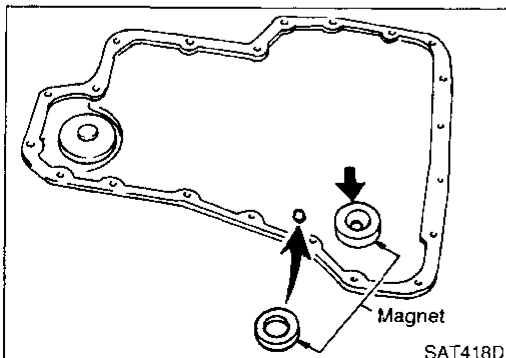


- d. Tighten bolts A, B and C.

 : 7 - 9 N·m (0.7 - 0.9 kg·m, 61 - 78 in·lb)

Bolt length, number and location

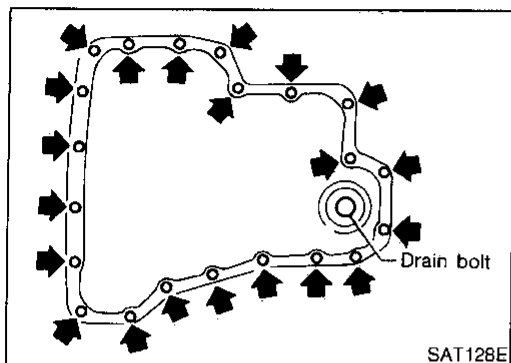
Bolt symbol	A	B	C
Bolt length "ℓ"  ℓ	40.0 mm (1.575 in)	33.0 mm (1.299 in)	43.5 mm (1.713 in)
Number of bolts	5	6	2



8. Install oil pan.
 - a. Attach magnet to oil pan.

ASSEMBLY

Assembly (4) (Cont'd)



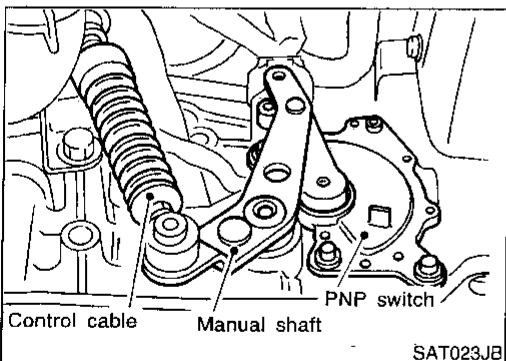
- b. Install new oil pan gasket on transmission case.
- c. Install oil pan on transmission case.
 - **Always replace oil pan bolts as they are self-sealing bolts.**
 - **Tighten the four bolts in a criss-cross pattern to prevent dislocation of gasket.**
- d. Tighten drain plug to specified torque.

GI

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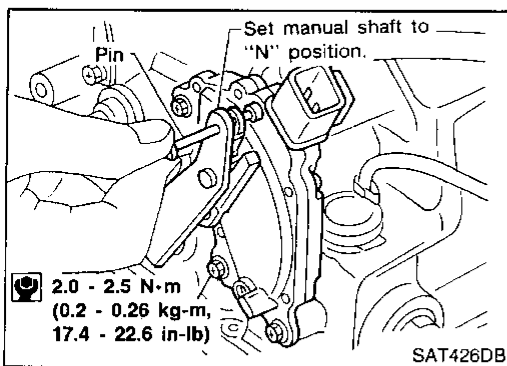
9. Install PNP switch.
 - a. Set manual shaft in "P" position.
 - b. Temporarily install PNP switch on manual shaft.
 - c. Move selector lever to "N" position.

EC

FE

CL

MT



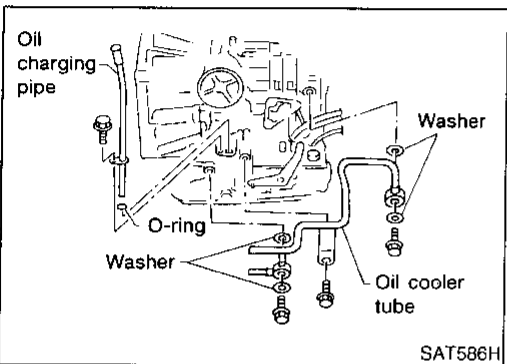
- d. Use a 4 mm (0.157 in) pin for this adjustment.
 - 1) Insert the pin straight into the manual shaft adjustment hole.
 - 2) Rotate PNP switch until the pin can also be inserted straight into hole in PNP switch.
- e. Tighten PNP switch fixing bolts.
- f. Remove pin from adjustment hole after adjusting PNP switch.

AT

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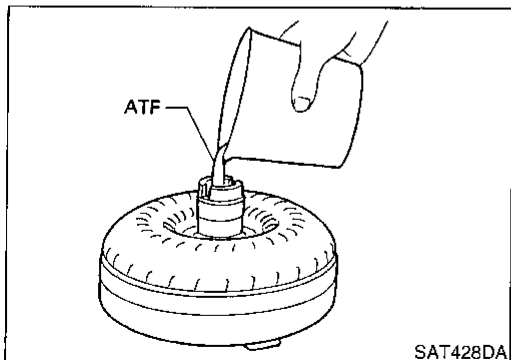
10. Install oil charging pipe and oil cooler tube to transmission case.

ST

RS

BT

HA



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.**

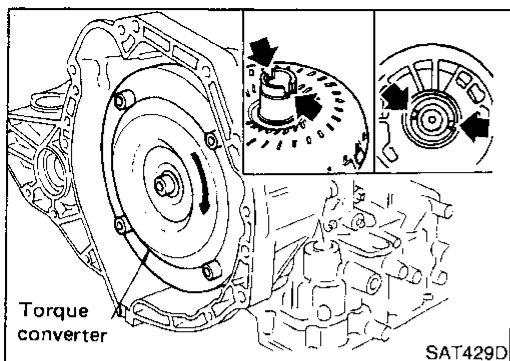
SC

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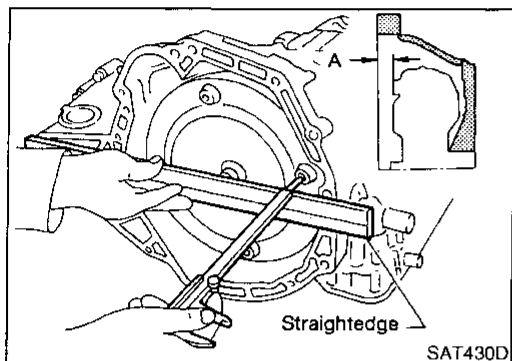
IDX

ASSEMBLY

Assembly (4) (Cont'd)



- 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		RE4F03A	RE4F03V
Automatic transaxle assembly	Model code number	36X17	36X18
Transaxle gear ratio	1st	2.861	
	2nd	1.562	
	3rd	1.000	
	4th	0.697	
	Reverse	2.310	
	Final drive	3.827	
Recommended fluid		Nissan Matic "D" (Continental U.S. and Alaska) or Genuine Nissan Automatic Transmission Fluid (Canada)*1	
Fluid capacity		7.0ℓ (7-3/8 US qt, 6-1/8 Imp qt)	

*1: Refer to MA section ("Fluids and Lubricants", "RECOMMENDED FLUIDS AND LUBRICANTS").

Shift Schedule

VEHICLE SPEED WHEN SHIFTING GEARS

NCAT0180

NCAT0180S01

Throttle position	Shift pattern	Vehicle speed km/h (MPH)						
		D ₁ → D ₂	D ₂ → D ₃	D ₃ → D ₄	D ₄ → D ₃	D ₃ → D ₂	D ₂ → D ₁	1 ₂ → 1 ₁
Full throttle	Comfort	51 - 59 (32 - 37)	97 - 105 (60 - 65)	153 - 161 (95 - 100)	149 - 157 (93 - 98)	87 - 95 (54 - 59)	45 - 53 (28 - 33)	51 - 59 (32 - 37)
Half throttle	Comfort	29 - 37 (18 - 23)	56 - 64 (35 - 40)	125 - 133 (78 - 83)	76 - 84 (47 - 52)	42 - 50 (26 - 31)	5 - 13 (3 - 8)	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 ₄)	Comfort	108 - 116 (67 - 72)	59 - 67 (37 - 42)
	OFF (D ₃)	Comfort	86 - 94 (53 - 58)	83 - 91 (52 - 57)

Stall Revolution

NCAT0181

Engine	Stall revolution rpm
(SR20DE)	1,900 - 2,200

Line Pressure

NCAT0182

Engine speed rpm	Line pressure kPa (kg/cm ² , psi)			
	R position	D position	2 position	1 position
Idle	853 (8.7, 124)	500 (5.1, 73)	500 (5.1, 73)	500 (5.1, 73)
Stall	1,785 (18.2, 259)	1,147 (11.7, 166)	1,147 (11.7, 166)	1,147 (11.7, 166)

SERVICE DATA AND SPECIFICATIONS (SDS)

Control Valves

Control Valves

NCAT0183

CONTROL VALVE AND PLUG RETURN SPRINGS

NCAT0183S01
Unit: mm (in)

Parts		Part No.	Free length	Outer diameter	
Upper body	18	Pilot valve spring	31742-80X14	36.0 (1.417)	8.1 (0.319)
	14	1-2 accumulator valve spring	31742-80X10	20.5 (0.807)	7.0 (0.276)
	21	1-2 accumulator piston spring	31742-33X03	48.8 (1.921)	19.8 (0.780)
	25	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	31742-33X00	31.0 (1.220)	8.9 (0.350)
	10	Torque converter clutch control valve	31742-80X17	39.5 (1.555)	11.0 (0.433)
	—	Oil cooler relief valve spring	31872-31X00	17.0 (0.669)	8.0 (0.315)
Lower body	32	Plug spring	31742-80X11	17.0 (0.669)	10.7 (0.421)
	16	Pressure regulator valve spring	31742-80X13	45.0 (1.772)	15.0 (0.591)
	21	Overrun clutch control valve spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	25	Accumulator control valve spring	31742-80X02	22.0 (0.866)	6.5 (0.256)
	30	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)
	7	Pressure modifier valve spring	31742-41X15	30.5 (1.201)	9.8 (0.386)
	11		31742-80X16	32.0 (1.260)	6.9 (0.272)

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

HIGH CLUTCH

NCAT0184S02

Number of drive plates		4
Number of driven plates		6 + 1
Drive plate thickness mm (in)	Standard	1.6 (0.063)
	Allowable limit	1.4 (0.055)
Clearance mm (in)	Standard	1.4 - 1.8 (0.055 - 0.071)
	Allowable limit	2.6 (0.102)

SERVICE DATA AND SPECIFICATIONS (SDS)

Clutch and Brakes (Cont'd)

	Thickness mm (in)	Part number
Thickness of retaining plates	3.6 (0.142)	31537-32X12
	3.8 (0.150)	31537-32X00
	4.0 (0.157)	31537-32X01
	4.2 (0.165)	31537-32X02
	4.4 (0.173)	31537-32X03
	4.6 (0.181)	31537-32X04
	4.8 (0.189)	31537-32X05
	5.0 (0.197)	31537-32X06

GI
MA
EM

FORWARD CLUTCH

NCAT0184503

Number of drive plates	5	
Number of driven plates	5	
Drive plate thickness mm (in)	Standard	1.8 (0.071)
	Allowable limit	1.6 (0.063)
Clearance mm (in)	Standard	0.45 - 0.85 (0.0177 - 0.0335)
	Allowable limit	1.85 (0.0728)

LC
EC
FE
CL

	Thickness mm (in)	Part number
Thickness of retaining plate	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

MT
AT

OVERRUN CLUTCH

NCAT0184504

Number of drive plates	3	
Number of driven plates	4	
Drive plate thickness mm (in)	Standard	1.6 (0.063)
	Allowable limit	1.4 (0.055)
Clearance mm (in)	Standard	1.0 - 1.4 (0.039 - 0.055)
	Allowable limit	2.0 (0.079)

AX
SU
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ST

	Thickness mm (in)	Part number
Thickness of retaining plate	3.6 (0.142)	31567-32X79
	3.8 (0.150)	31567-32X80
	4.0 (0.157)	31567-31X81
	4.2 (0.165)	31567-31X82
	4.4 (0.173)	31567-31X83

RS
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SERVICE DATA AND SPECIFICATIONS (SDS)

Clutch and Brakes (Cont'd)

LOW & REVERSE BRAKE

NCAT0184S05

Number of drive plates		5
Number of driven plates		5
Drive plate thickness mm (in)	Standard	2.0 (0.079)
	Allowable limit	1.8 (0.071)
Clearance mm (in)	Standard	1.4 - 1.8 (0.055 - 0.071)
	Allowable limit	2.8 (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

BRAKE BAND

NCAT0184S06

Anchor end pin tightening torque	3.9 - 5.9 N-m (0.4 - 0.6 kg-m, 35 - 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) (16 pcs)	26.6 (1.047)	10.6 (0.417)	31505-31X02
	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

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

Input Shaft

NCAT0187
Unit: mm (in)

Input shaft seal ring clearance	Standard	0.08 - 0.23 (0.0031 - 0.0091)	GI
	Allowable limit	0.23 (0.0091)	

Planetary Carrier

NCAT0188
Unit: mm (in)

Clearance between planetary carrier and pinion washer	Standard	0.15 - 0.70 (0.0059 - 0.0276)	MA EM
	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)	EC FE
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DIFFERENTIAL SIDE GEAR THRUST WASHERS (FOR RE4F03A)

NCAT0189S02

Thickness mm (in)	Part number	
0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111	CL MT AT
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	

DIFFERENTIAL SIDE GEAR THRUST WASHER (FOR RE4F03V)

NCAT0189S07

Location	Differential case side	
Thickness mm (in)	Part number	
0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111	AX SU BR
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	ST RS BT HA SC
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	

BEARING PRELOAD

NCAT0189S03

Differential side bearing preload "T"	0.04 - 0.09 mm (0.0016 - 0.0035 in)	EL
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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)	IDX
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SERVICE DATA AND SPECIFICATIONS (SDS)

Final Drive (Cont'd)

DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS (FOR RE4F03A)

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

DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS (FOR RE4F03V)

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

SERVICE DATA AND SPECIFICATIONS (SDS)

Final Drive (Cont'd)

TABLE FOR SELECTING DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS (FOR RE4F03A)

NCATO189S06
Unit: mm (in)

Dial indicator deflection	Suitable shim(s)
0.31 - 0.35 (0.0122 - 0.0138)	0.40 (0.0157)
0.35 - 0.39 (0.0138 - 0.0154)	0.44 (0.0173)
0.39 - 0.43 (0.0154 - 0.0169)	0.48 (0.0189)
0.43 - 0.47 (0.0169 - 0.0185)	0.52 (0.0205)
0.47 - 0.51 (0.0185 - 0.0201)	0.56 (0.0220)
0.51 - 0.55 (0.0201 - 0.0217)	0.60 (0.0236)
0.55 - 0.59 (0.0217 - 0.0232)	0.64 (0.0252)
0.59 - 0.63 (0.0232 - 0.0248)	0.68 (0.0268)
0.63 - 0.67 (0.0248 - 0.0264)	0.72 (0.0283)
0.67 - 0.71 (0.0264 - 0.0280)	0.76 (0.0299)
0.71 - 0.75 (0.0280 - 0.0295)	0.80 (0.0315)
0.75 - 0.79 (0.0295 - 0.0311)	0.84 (0.0331)
0.79 - 0.83 (0.0311 - 0.0327)	0.88 (0.0346)
0.83 - 0.87 (0.0327 - 0.0343)	0.92 (0.0362)
0.87 - 0.91 (0.0343 - 0.0358)	0.48 (0.0189) + 0.48 (0.0189)
0.91 - 0.95 (0.0358 - 0.0374)	0.48 (0.0189) + 0.52 (0.0205)
0.95 - 0.99 (0.0374 - 0.0390)	0.52 (0.0205) + 0.52 (0.0205)
0.99 - 1.03 (0.0390 - 0.0406)	0.52 (0.0205) + 0.56 (0.0220)
1.03 - 1.07 (0.0406 - 0.0421)	0.56 (0.0220) + 0.56 (0.0220)
1.07 - 1.11 (0.0421 - 0.0437)	0.56 (0.0220) + 0.60 (0.0236)
1.11 - 1.15 (0.0437 - 0.0453)	0.60 (0.0236) + 0.60 (0.0236)
1.15 - 1.19 (0.0453 - 0.0469)	0.60 (0.0236) + 0.64 (0.0252)
1.19 - 1.23 (0.0469 - 0.0484)	0.64 (0.0252) + 0.64 (0.0252)
1.23 - 1.27 (0.0484 - 0.0500)	0.64 (0.0252) + 0.68 (0.0268)
1.27 - 1.31 (0.0500 - 0.0516)	0.68 (0.0268) + 0.68 (0.0268)
1.31 - 1.35 (0.0516 - 0.0531)	0.68 (0.0268) + 0.72 (0.0283)
1.35 - 1.39 (0.0531 - 0.0547)	1.44 (0.0567)
1.39 - 1.43 (0.0547 - 0.0563)	0.72 (0.0283) + 0.76 (0.0299)
1.43 - 1.47 (0.0563 - 0.0579)	0.76 (0.0299) + 0.76 (0.0299)
1.47 - 1.51 (0.0579 - 0.0594)	0.76 (0.0299) + 0.80 (0.0315)
1.51 - 1.55 (0.0594 - 0.0610)	0.80 (0.0315) + 0.80 (0.0315)
1.55 - 1.59 (0.0610 - 0.0626)	0.80 (0.0315) + 0.84 (0.0331)
1.59 - 1.63 (0.0626 - 0.0642)	0.84 (0.0331) + 0.84 (0.0331)
1.63 - 1.67 (0.0642 - 0.0657)	0.84 (0.0331) + 0.88 (0.0346)
1.67 - 1.71 (0.0657 - 0.0673)	0.88 (0.0346) + 0.88 (0.0346)
1.71 - 1.75 (0.0673 - 0.0689)	0.88 (0.0346) + 0.92 (0.0362)
1.75 - 1.79 (0.0689 - 0.0705)	0.92 (0.0362) + 0.92 (0.0362)
1.79 - 1.83 (0.0705 - 0.0720)	0.92 (0.0362) + 0.96 (0.0378)
1.83 - 1.87 (0.0720 - 0.0736)	0.96 (0.0378) + 0.96 (0.0378)
1.87 - 1.91 (0.0736 - 0.0752)	0.52 (0.0205) + 1.44 (0.0567)
1.91 - 1.95 (0.0752 - 0.0768)	0.56 (0.0220) + 1.44 (0.0567)

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 RE4F03V)

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

BEARING PRELOAD

NCAT0190

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 - 0.7 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	EC
2.08 (0.0819)	31439-31X64	
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
		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

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 ₃ "	0.25 - 0.55 mm (0.0098 - 0.0217 in)
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GI

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

MA

EM

LC

EC

Reverse Clutch End Play

NCAT0194

Reverse clutch end play "T ₄ "	0.65 - 1.00 mm (0.0256 - 0.0394 in)
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FE

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

CL

MT

AT

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

AX

SU

BR

RETURN SPRING

NCAT0195S02
Unit: mm (in)

Accumulator		Free length	Outer diameter	Part number
Servo release accumulator spring	Outer	52.5 (2.067)	21.1 (0.831)	31605-33X02
	Inner	52.0 (2.047)	13.1 (0.516)	31605-33X03
N-D accumulator spring		45.0 (1.772)	27.6 (1.087)	31605-33X01

ST

RS

BT

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)	31605-31X00
OD servo return spring	31.0 (1.220)	21.7 (0.854)	31605-31X01

HA

SC

EL

Removal and Installation

NCAT0197
Unit: mm (in)

Distance between end of converter housing and torque converter	15.9 (0.626) or more
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IDX