SECTION AT

CONTENTS

TROUBLE DIAGNOSIS — INDEX 2
Alphabetical & P No. Index for DTC 2
PRECAUTIONS 4
Precautions for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" 4
Precautions for On Board Diagnostic (OBD) System of A/T and Engine 4
Precautions 4
Service Notice or Precautions 6
Wiring Diagrams and Trouble Diagnosis 7
PREPARATION 8
Special Service Tools 8
Commercial Service Tools 10
OVERALL SYSTEM 12
A/T Electrical Parts Location 12
Circuit Diagram 13
Cross-sectional View — RE4F03A 14
Cross-sectional View — RE4F03V 15
Hydraulic Control Circuit 16
Shift Mechanism 17
Control System 26
Control Mechanism 27
Control Valve 32
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION 34
Introduction 34
OBD-II Function for A/T System 34
One or Two Trip Detection Logic of OBD-II 34
OBD-II Diagnostic Trouble Code (DTC) 34
Malfunction Indicator Lamp (MIL) 38
CONSULT 38
TROUBLE DIAGNOSIS — INTRODUCTION 52
Introduction 52
Work Flow 56
TROUBLE DIAGNOSIS — BASIC INSPECTION 58
A/T Fluid Check 58
Stall Test 58
Line Pressure Test 62
Road Test 63
TROUBLE DIAGNOSIS — GENERAL DESCRIPTION 75
Symptom Chart 75
TCM Terminals and Reference Value 85
TROUBLE DIAGNOSIS FOR POWER SUPPLY 90
Wiring Diagram — AT — MAIN 90
DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH 92
Description 92
Wiring Diagram — AT — PNP/SW 94
Diagnostic Procedure 95
Component Inspection 96
DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT 97
Description 97
Wiring Diagram — AT — FTS 99
Diagnostic Procedure 100
Component Inspection 102
DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR) 103
Description 103
Wiring Diagram — AT — VSSA/T 105
Diagnostic Procedure 106
Component Inspection 107
DTC P0725 ENGINE SPEED SIGNAL 108
Description 108
Wiring Diagram — AT — ENGSS 110
Diagnostic Procedure 111
DTC P0731 A/T 1ST GEAR FUNCTION 112
Description 112
Wiring Diagram — AT — 1ST 115
Diagnostic Procedure 116
Component Inspection 117
DTC P0732 A/T 2ND GEAR FUNCTION 118
Description 118
Wiring Diagram — AT — 2ND 121
Diagnostic Procedure 122
Component Inspection 123

CONTENTS (Cont'd)

DTC P0733 A/T 3RD GEAR FUNCTION 124
Description 124
Wiring Diagram — AT — 3RD 127
Diagnostic Procedure 128
Component Inspection 129
DTC P0734 A/T 4TH GEAR FUNCTION 130
Description 130
Wiring Diagram — AT — 4TH 134
Diagnostic Procedure 135
Component Inspection 138
DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE 139
Description 139
Wiring Diagram — AT — TCV 141
Diagnostic Procedure 142
Component Inspection 143
DTC P0744 A/T TCC S/V FUNCTION (LOCK-UP) 144
Description 144
Wiring Diagram — AT — TCCSIG 147
Diagnostic Procedure 148
Component Inspection 151
DTC P0745 LINE PRESSURE SOLENOID VALVE 152
Description 152
Wiring Diagram — AT — LPSV 154
Diagnostic Procedure 155
Component Inspection 157
DTC P0750 SHIFT SOLENOID VALVE A 158
Description 158
Wiring Diagram — AT — SSV/A 160
Diagnostic Procedure 161
Component Inspection 162
DTC P0755 SHIFT SOLENOID VALVE B 163
Description 163
Wiring Diagram — AT — SSV/B 165
Diagnostic Procedure 166
Component Inspection 167
DTC P1705 THROTTLE POSITION SENSOR 168
Description 168
Wiring Diagram — AT — TPS 171
Diagnostic Procedure 172
Component Inspection 175
DTC P1760 OVERRUN CLUTCH SOLENOID VALVE 176
Description 176
Wiring Diagram — AT — OVRCSV 178
Diagnostic Procedure 179
Component Inspection 180
DTC BATT/FLUID TEMP SEN A/T FLUID TEMPERATURE SENSOR CIRCUIT AND TCM POWER SOURCE 181
Description 181
Wiring Diagram — AT — BA/FTS 183
Diagnostic Procedure 184
Component Inspection 186
DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR 187
Description 187
Wiring Diagram — AT — VSSMTR 189
Diagnostic Procedure 190
DTC CONTROL UNIT (RAM), CONTROL UNIT (ROM) 191
Description 191
Diagnostic Procedure 191
TROUBLE DIAGNOSES FOR SYMPTOMS 193
Wiring Diagram — AT — NONDTC 193
1. O/D OFF Indicator Lamp Does Not Come On 195
2. Engine Cannot Be Started In "P" and "N" Position 197
3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed 198
4. In "N" Position, Vehicle Moves 199
5. Large Shock. "N" → "R" Position 200
6. Vehicle Does Not Creep Backward In "R" Position 201
7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position 203
8. Vehicle Cannot Be Started From D_1 205
9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$ 207
10. A/T Does Not Shift: $D_2 \rightarrow D_3$ 209
11. A/T Does Not Shift: $D_3 \rightarrow D_4$ 211
12. A/T Does Not Perform Lock-up 213
13. A/T Does Not Hold Lock-up Condition 214
14. Lock-up Is Not Released 215
15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$) 216
16. Vehicle Does Not Start From D_1 217
17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch "ON" → "OFF" 218
18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever "D" → "2" Position 219
19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever "2" → "1" Position 220
20. Vehicle Does Not Decelerate By Engine Brake 221
21. TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Throttle Position Switches Circuit Checks) 221
A/T SHIFT LOCK SYSTEM 227
Description 227
Shift Lock System Electrical Parts Location 227
Wiring Diagram — SHIFT — 228
Diagnostic Procedure 229
Component Check 230

CONTENTS (Cont'd)

KEY INTERLOCK CABLE 232
Components 232
Removal 232
Installation 233
ON-VEHICLE SERVICE 234
Control Valve Assembly and Accumulators 234
Control Cable Adjustment 235
Park/Neutral Position (PNP) Switch Adjustment 235
Differential Side Oil Seal Replacement 236
Revolution Sensor Replacement 236
REMOVAL AND INSTALLATION 237
Removal 237
Installation 238
OVERHAUL 240
Components 240
Oil Channel 243
Locations of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings 244
DISASSEMBLY 245
REPAIR FOR COMPONENT PARTS 259
Manual Shaft 259
Oil Pump 262
Control Valve Assembly 266
Control Valve Upper Body 275
Control Valve Lower Body 279
Reverse Clutch 281
High Clutch 285
Forward Clutch and Overrun Clutch 290
Low & Reverse Brake 297
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub 301
Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer 305
Band Servo Piston Assembly 310
Final Drive 315
ASSEMBLY 322
Assembly (1) 322
Adjustment (1) 323
Assembly (2) 328
Adjustment (2) 332
Assembly (3) 336
Assembly (4) 338
SERVICE DATA AND SPECIFICATIONS (SDS) 343
General Specifications 343
Shift Schedule 343
Stall Revolution 343
Line Pressure 343
Control Valves 344
Clutch and Brakes 344
Clutch and Brake Return Springs 346
Oil Pump 346
Input Shaft 347
Planetary Carrier 347
Final Drive 347
Reduction Pinion Gear 350
Output Shaft 352
Bearing Retainer 352
Total End Play 353
Reverse Clutch End Play 353
Accumulator 353
Band Servo 353
Removal and Installation 353

Alphabetical & P No. Index for DTC

NCAT0001

ALPHABETICAL INDEX FOR DTC

NCAT0001S01

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.

P NO. INDEX FOR DTC

=NCAT0001S02

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

*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.

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).**

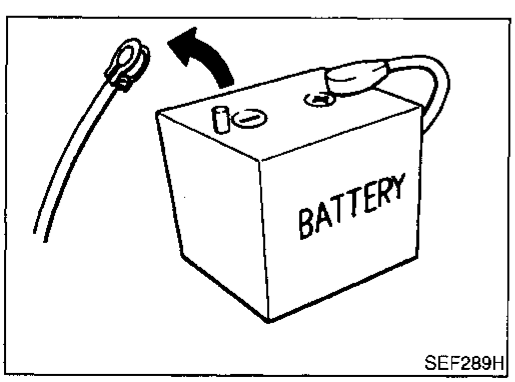
Precautions for On Board Diagnostic (OBD) System of A/T and Engine

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.**

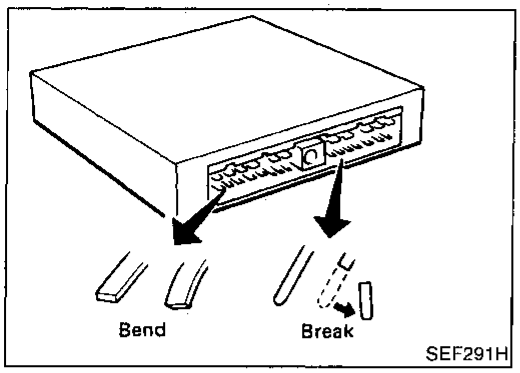


SEF289H

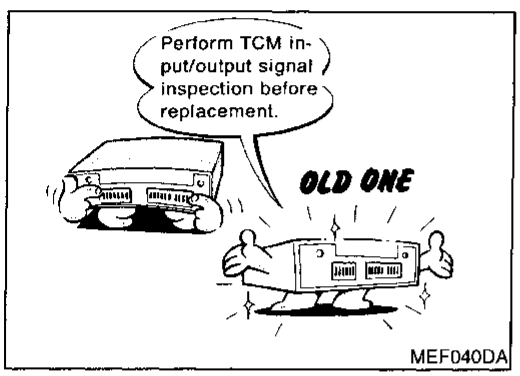
Precautions

NCAT0003

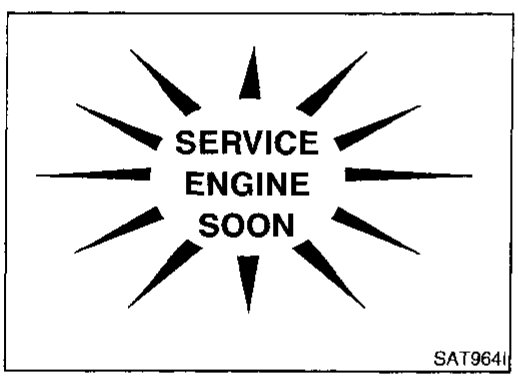
- **Before connecting or disconnecting the TCM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the TCM. Because battery voltage is applied to TCM even if ignition switch is turned off.**



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



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



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

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

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

- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to "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:

- The fluid has an odor, is discolored, and there is no evidence of metal or clutch facing particles.
- The threads in one or more of the converter bolt holes are damaged.
- Transaxle failure did not display evidence of damaged or worn internal parts, steel particles or clutch plate lining material in unit and inside the fluid filter.
- Vehicle has been exposed to high mileage (only). The exception may be where the torque converter clutch dampener plate lining has seen excess wear by vehicles operated in heavy and/or constant traffic, such as taxi, delivery or police use.

ATF COOLER SERVICE

NCAT0004S03

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

OBD-II SELF-DIAGNOSIS

NCAT0004S04

- A/T self-diagnosis is performed by the TCM in combination with the ECM. The results can be read through the blinking pattern of the O/D OFF indicator or the malfunction indicator lamp (MIL). Refer to the table on AT-39 for the indicator used to display each self-diagnostic result.
- The self-diagnostic results indicated by the MIL are automatically stored in both the ECM and TCM memories.
  Always perform the procedure "HOW TO ERASE DTC" on AT-36 to complete the repair and avoid unnecessary blinking of the MIL.
- The following self-diagnostic items can be detected using ECM self-diagnostic results mode* only when the O/D OFF indicator lamp does not indicate any malfunctions.

– PNP switch
– A/T 1st, 2nd, 3rd, or 4th gear function
– A/T TCC S/V function (lock-up).

*: 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.**
  For description and how to disconnect, refer to EL section, "Description", "HARNESS CONNECTOR".

Wiring Diagrams and Trouble Diagnosis

NCAT0005

When you read wiring diagrams, refer to the followings:

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

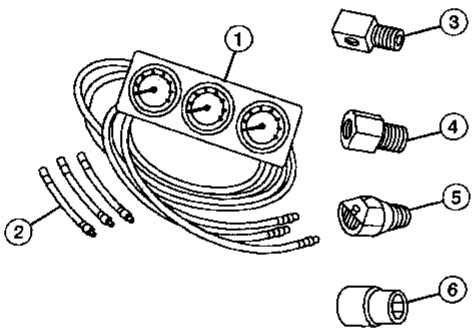
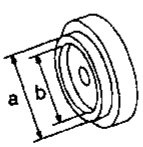
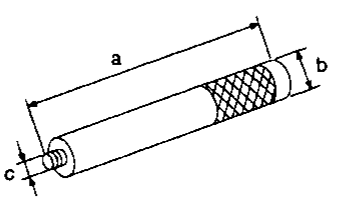
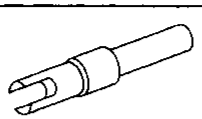
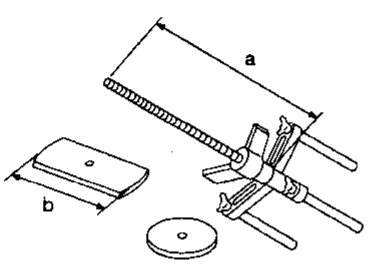
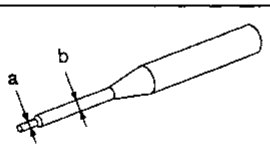
When you perform trouble diagnosis, refer to the followings:

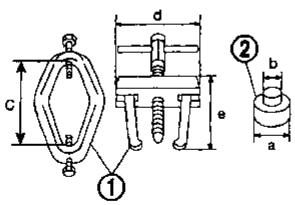
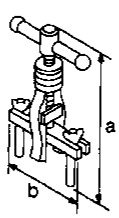
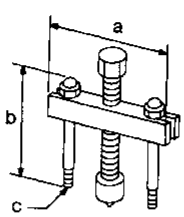
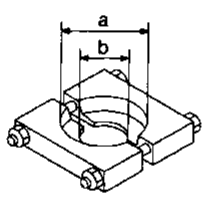
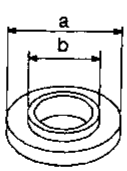
- "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS" in GI section
- "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT" in GI section

Special Service Tools

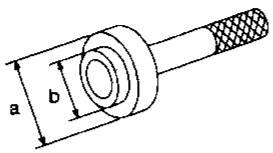
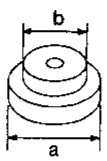
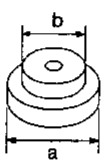
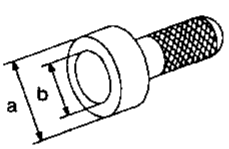
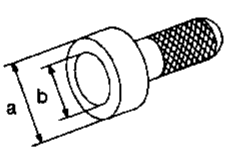
NCAT0006

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

Tool number (Kent-Moore No.) Tool name	Description	
(J34301-C) Oil pressure gauge set 1 (J34301-1) Oil pressure gauge 2 (J34301-2) Hoses 3 (J34298) Adapter 4 (J34282-2) Adapter 5 (790-301-1230-A) 60° Adapter 6 (J34301-15) Square socket	 AAT896	Measuring line pressure and governor pressure
KV31103000 (J38982) Drift	 NT105	Installing differential oil seal (Use with ST35325000.) **a: 59 mm (2.32 in) dia.** **b: 49 mm (1.93 in) dia.**
ST35325000 (—) Drift	 NT417	Installing differential oil seal (Use with KV31103000.) **a: 215 mm (8.46 in)** **b: 25 mm (0.98 in) dia.** **c: M12 x 1.5P**
KV38107700 (J39027) Preload adapter	 NT087	• Measuring turning torque of final drive assembly • Measuring clearance between side gear and differential case with washer • Selecting differential side bearing adjusting shim
KV31103200 (J34285-A and J34285-87) Clutch spring compressor	 NT423	Removing and installing clutch return spring **a: 320 mm (12.60 in)** **b: 174 mm (6.85 in)**
ST23540000 (J25689-A) Pin punch	 NT442	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.**

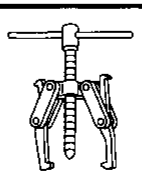
Tool number (Kent-Moore No.) Tool name	Description	
KV32101000 (J25689-A) Pin punch	 NT410	Installing throttle lever and manual shaft retaining pins **a: 4 mm (0.16 in) dia.**
ST25710000 (—) Pin punch	 NT410	Aligning groove of manual shaft and hole of transmission case **a: 2 mm (0.08 in) dia.**
ST3306S001 (J22888-D) Differential side bearing puller set 1 ST33051001 (J22888-D) Puller 2 ST33061000 (J8107-2) Adapter	 NT745	Removing differential side bearing inner race **a: 39 mm (1.54 in) dia.** **b: 29.5 mm (1.161 in) dia.** **c: 130 mm (5.12 in)** **d: 135 mm (5.31 in)** **e: 120 mm (4.72 in)**
KV381054S0 (J34286) Puller	 NT414	• Removing idler gear bearing outer race • Removing differential side oil seals • Removing differential side bearing outer race • Removing needle bearing from bearing retainer **a: 250 mm (9.84 in)** **b: 160 mm (6.30 in)**
ST27180001 (J25726-A) Puller	 NT424	• Removing idler gear **a: 100 mm (3.94 in)** **b: 110 mm (4.33 in)** **c: M8 x 1.25P**
ST30031000 (J22912-1) Puller	 NT411	Removing reduction gear bearing inner race **a: 90 mm (3.54 in) dia.** **b: 50 mm (1.97 in) dia.**
ST35272000 (J26092) Drift	 NT426	• Installing reduction gear bearing inner race • Installing idler gear bearing inner race **a: 72 mm (2.83 in) dia.** **b: 35.5 mm (1.398 in) dia.**

Special Service Tools (Cont'd)

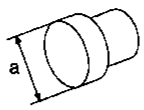
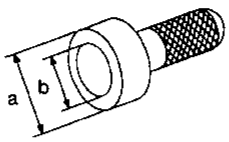
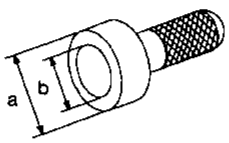
Tool number (Kent-Moore No.) Tool name	Description	
ST37830000 (—) Drift	 NT427	Installing idler gear bearing outer race **a: 62 mm (2.44 in) dia.** **b: 39 mm (1.54 in) dia.**
ST35321000 (—) Drift	 NT073	Installing output shaft bearing **a: 49 mm (1.93 in) dia.** **b: 41 mm (1.61 in) dia.**
ST30633000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

Commercial Service Tools

NCAT0007

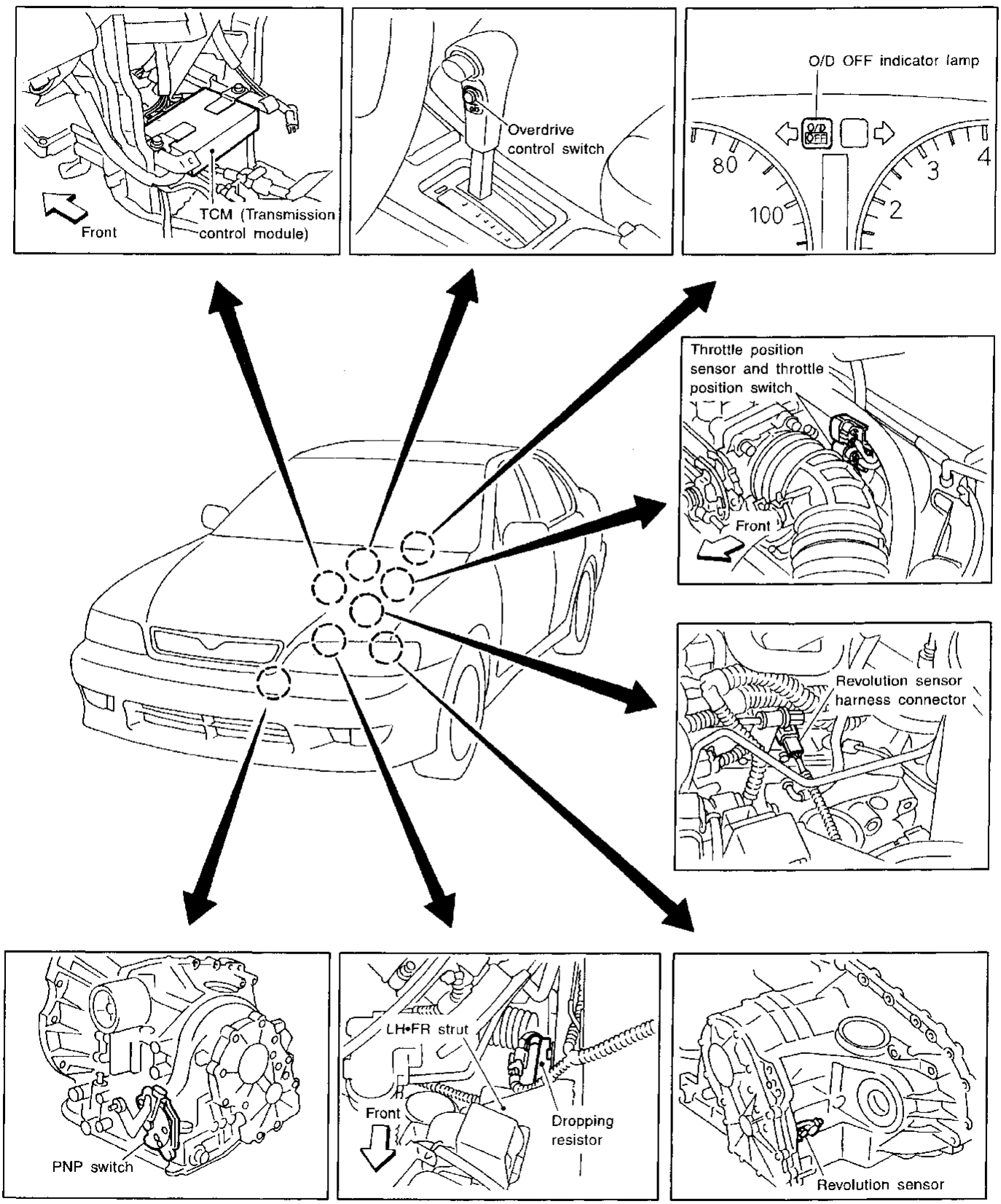
Tool name	Description	
Puller	 NT077	• Removing idler gear bearing inner race • Removing and installing band servo piston snap ring

Commercial Service Tools (Cont'd)

Tool name	Description	
Drift	 NT109	Removing idler gear bearing inner race **a: 34 mm (1.34 in) dia.**
Drift	 NT115	Installing differential left side bearing **a: 86 mm (3.39 in) dia.** **b: 80 mm (3.15 in) dia.**
Drift	 NT115	Installing differential right side bearing **a: 46 mm (1.81 in) dia.** **b: 40 mm (1.57 in) dia.**

A/T Electrical Parts Location

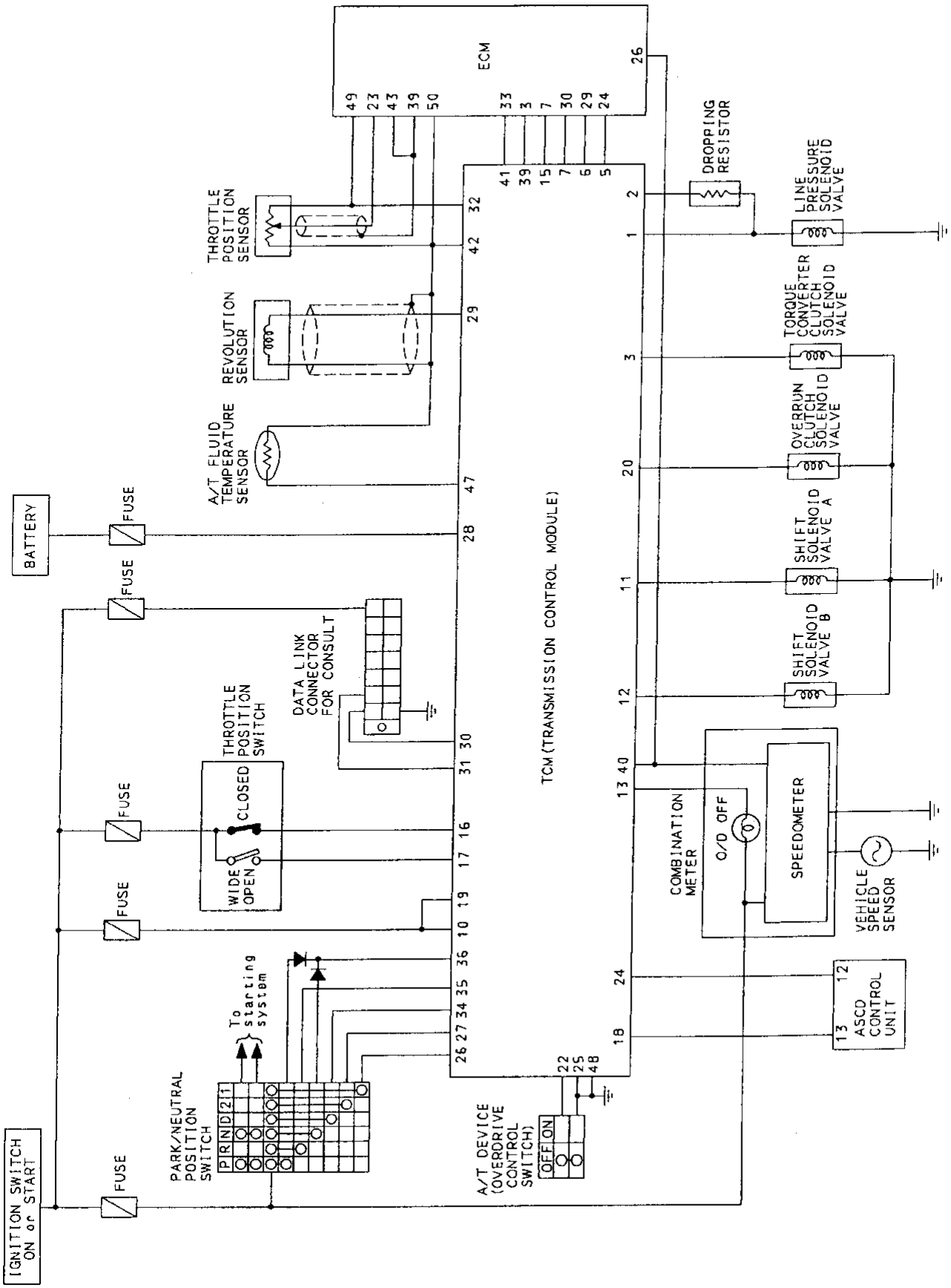
NCAT0008



SAT368J

Circuit Diagram

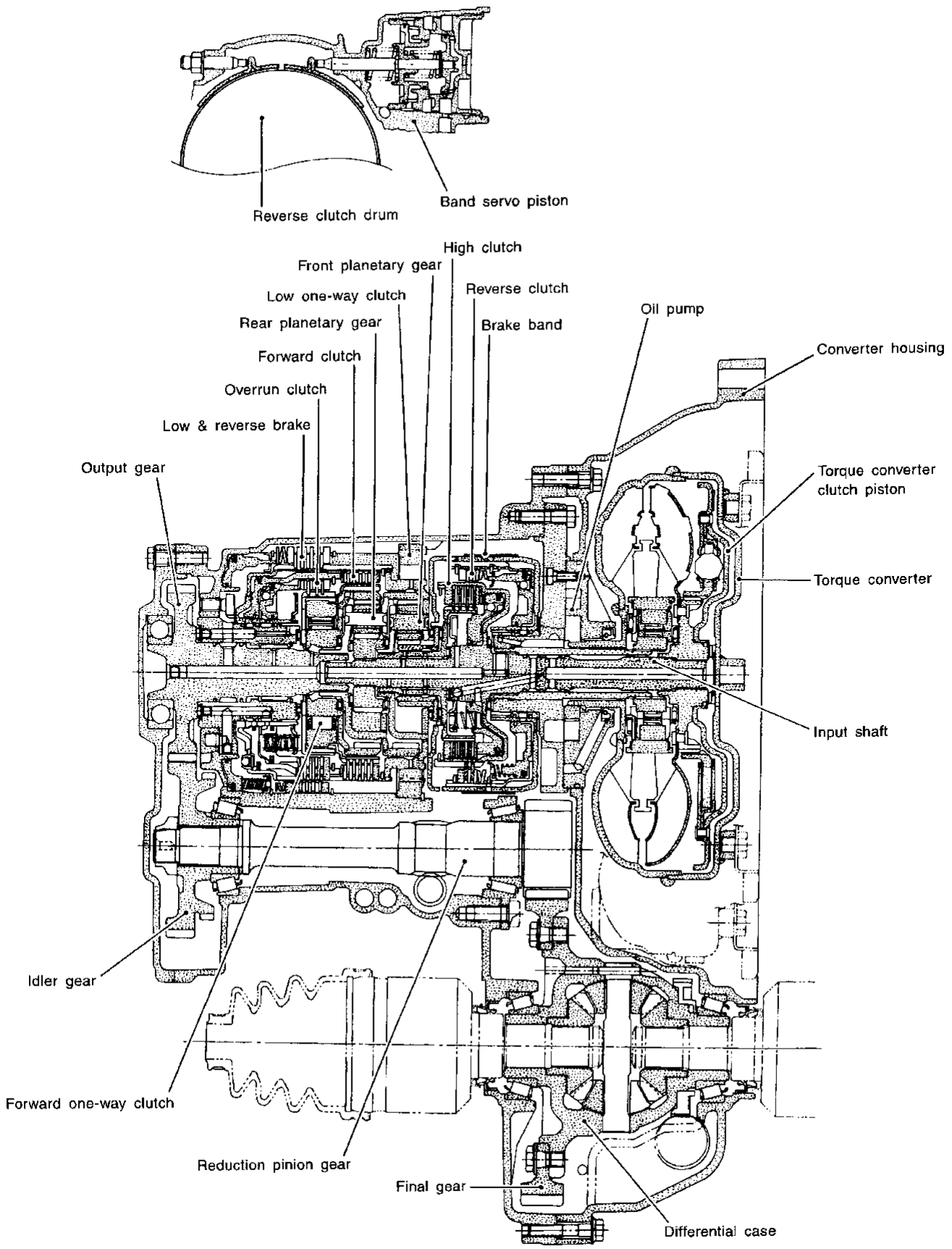
NCAT0009



TAT172

Cross-sectional View — RE4F03A

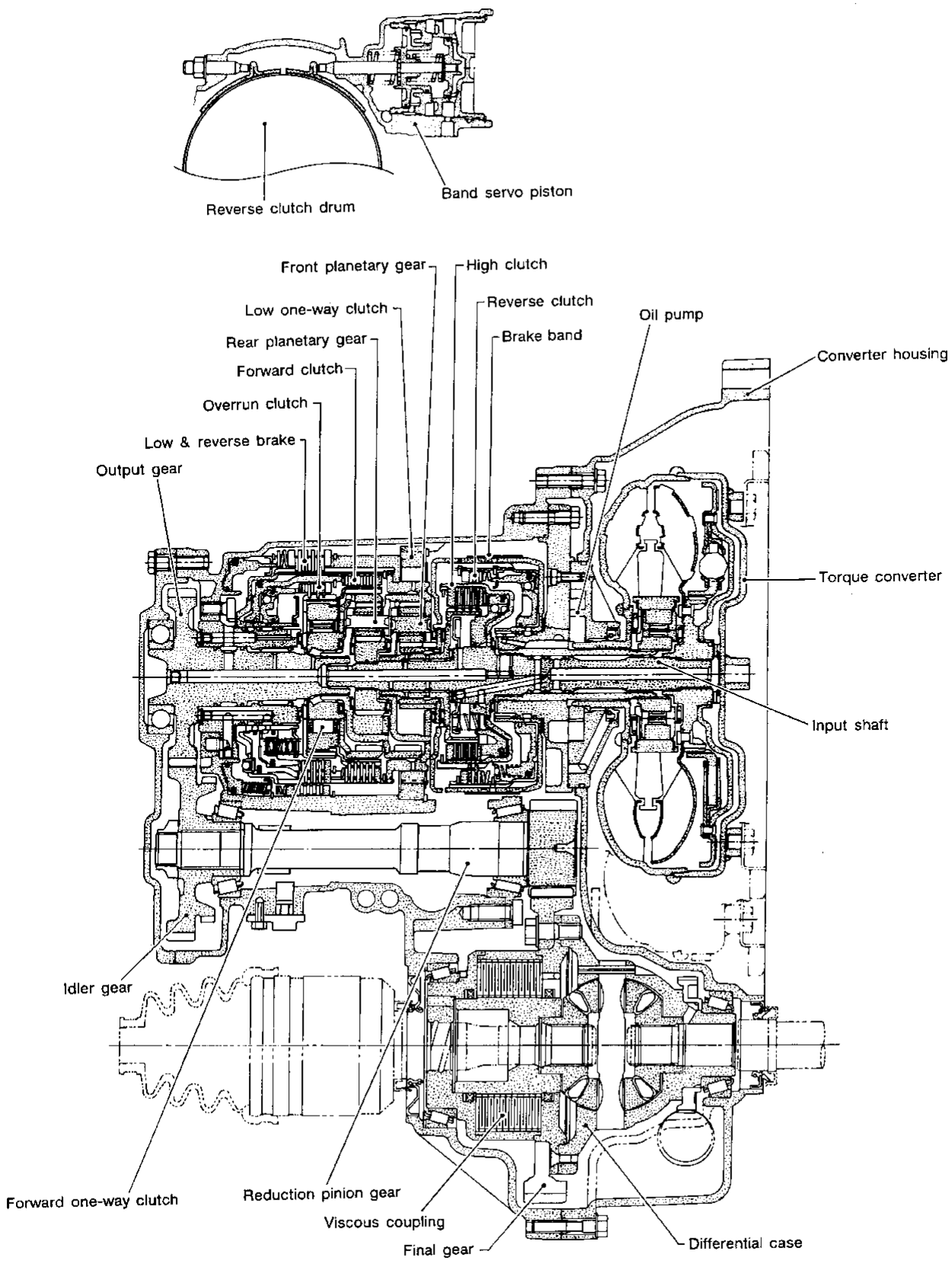
NCAT0011



SAT589HB

Cross-sectional View — RE4F03V

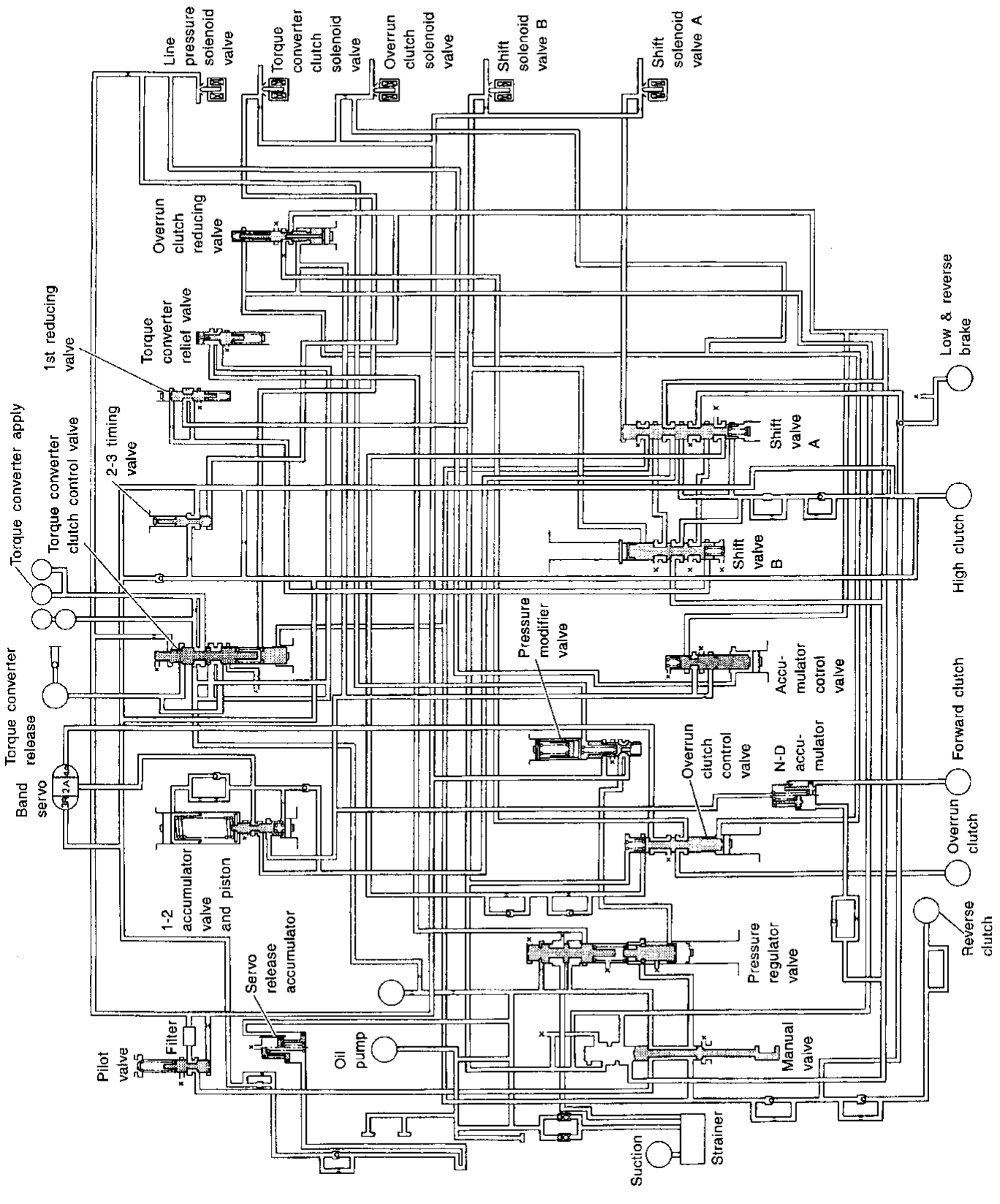
NCAT0217



SAT324GA

Hydraulic Control Circuit

NCAT0012



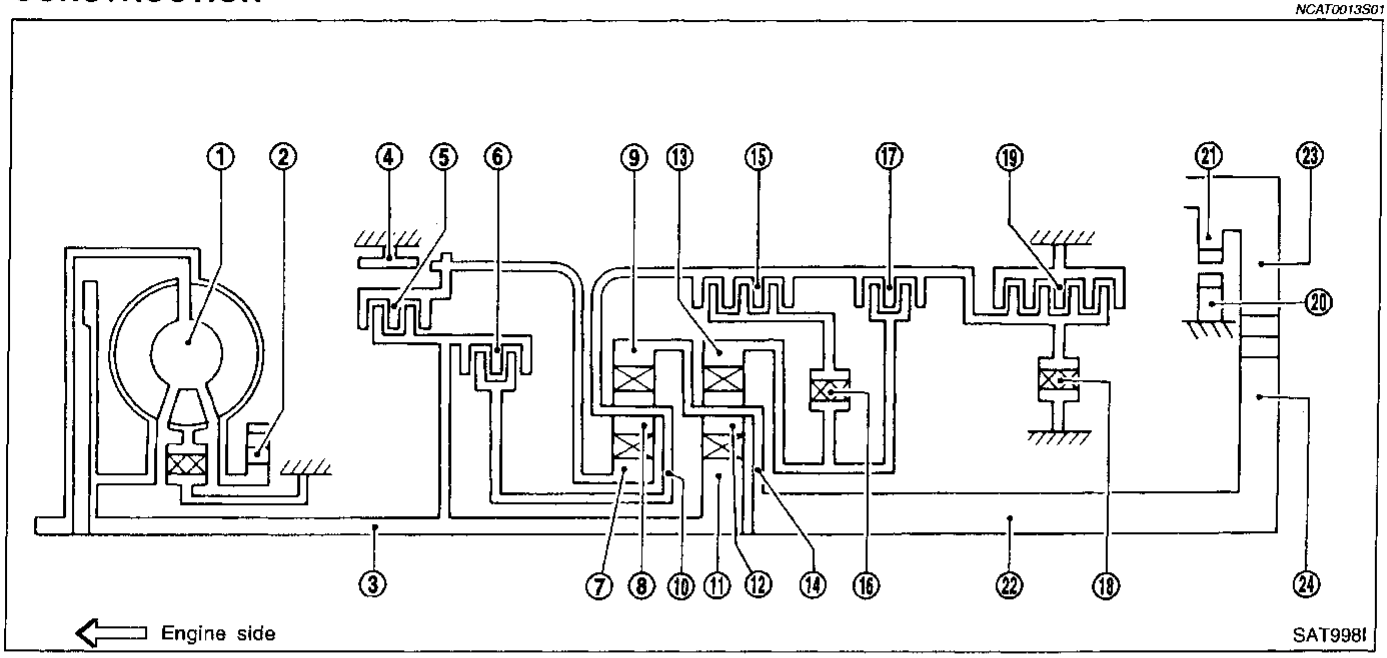
SAT369J

Shift Mechanism

NCAT0013

CONSTRUCTION

NCAT0013S01



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

FUNCTION OF CLUTCH AND BRAKE

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**.

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.

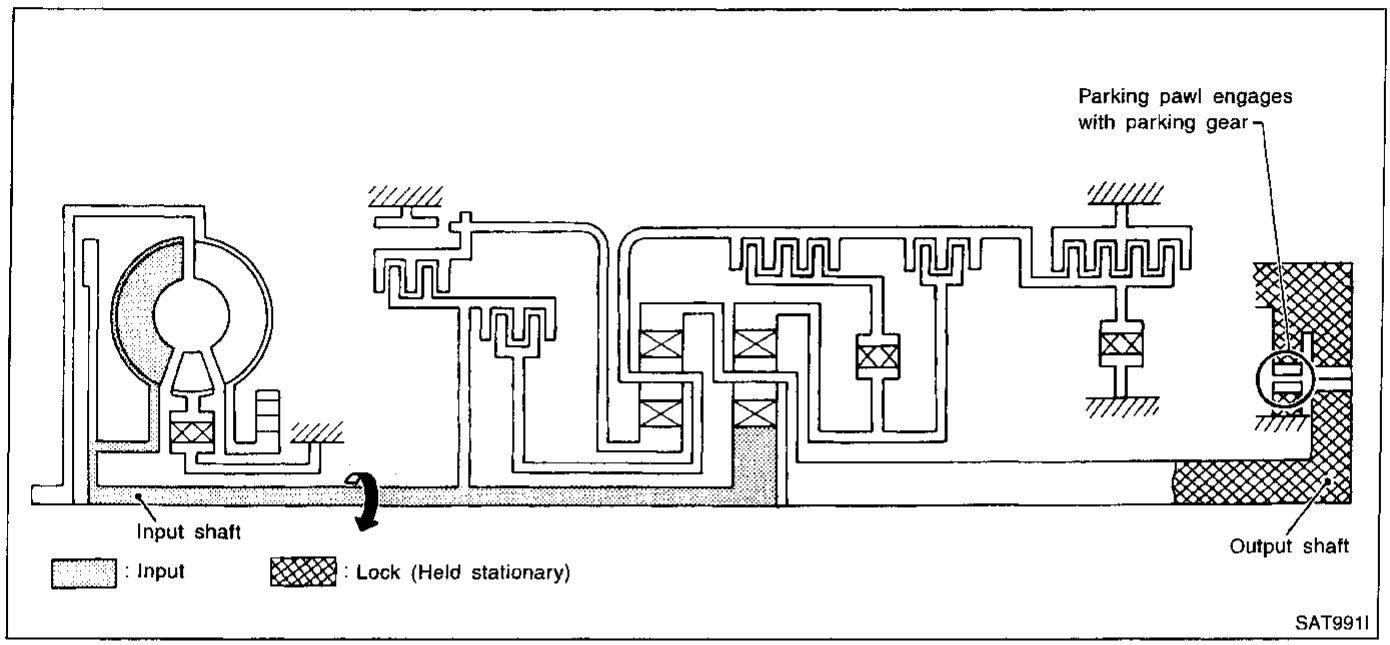
POWER TRANSMISSION

"N" and "P" Positions

=NCAT0013S02

NCAT0013S0201

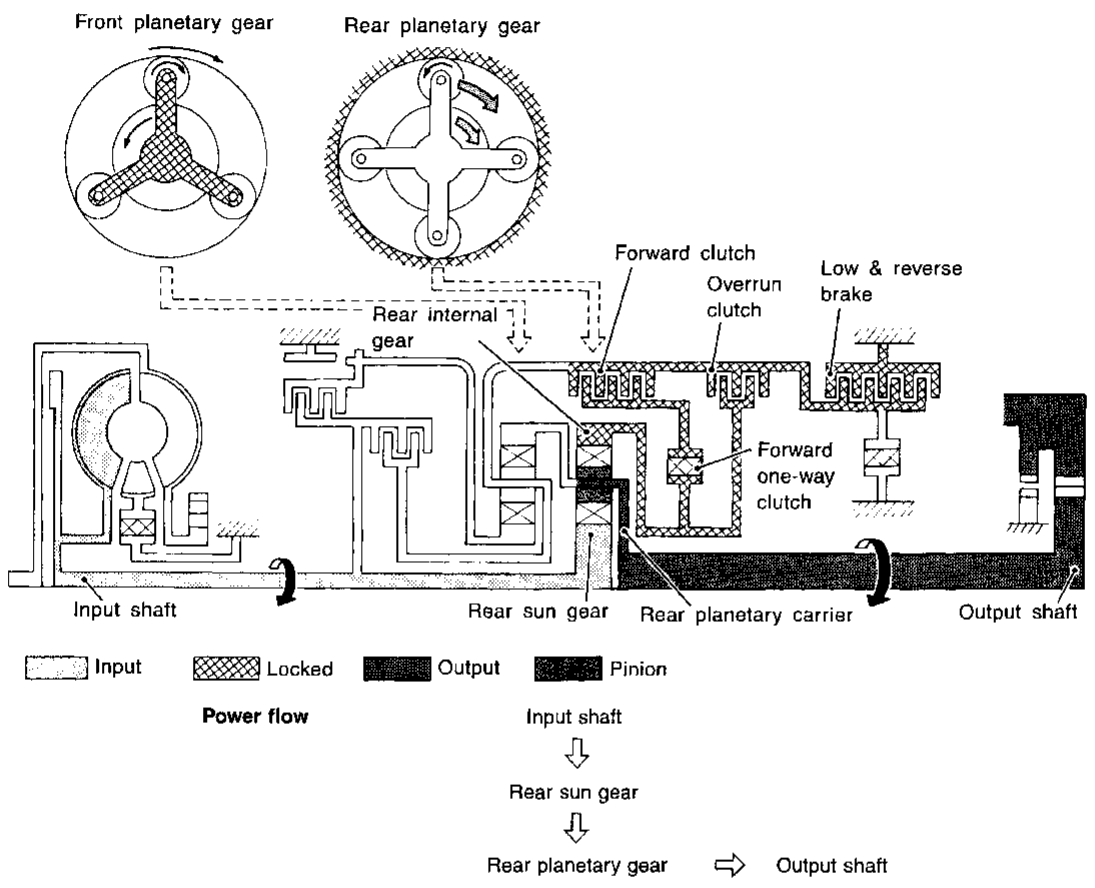
- "N" position
  Power from the input shaft is not transmitted to the output shaft because the clutches do not operate.
- "P" position
  Similar to the "N" position, the clutches do not operate. The parking pawl engages with the parking gear to mechanically hold the output shaft so that the power train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



"1_1" Position

=NCAT0013S0202

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

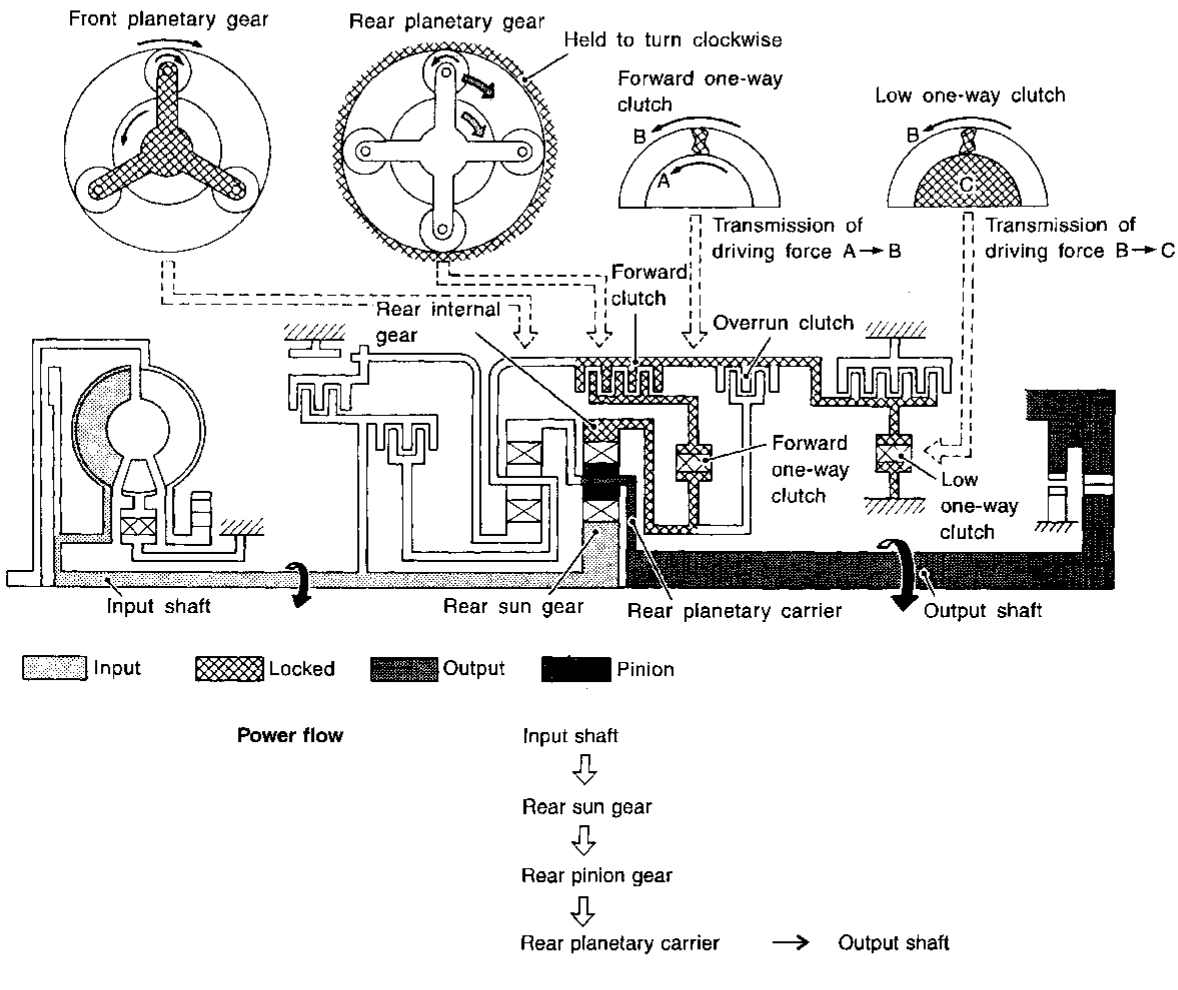


SAT374J

"D_1" and "2_1" Positions

=NCAT0013S0203

• **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.



Power flow

Input shaft
⇩
Rear sun gear
⇩
Rear pinion gear
⇩
Rear planetary carrier → Output shaft

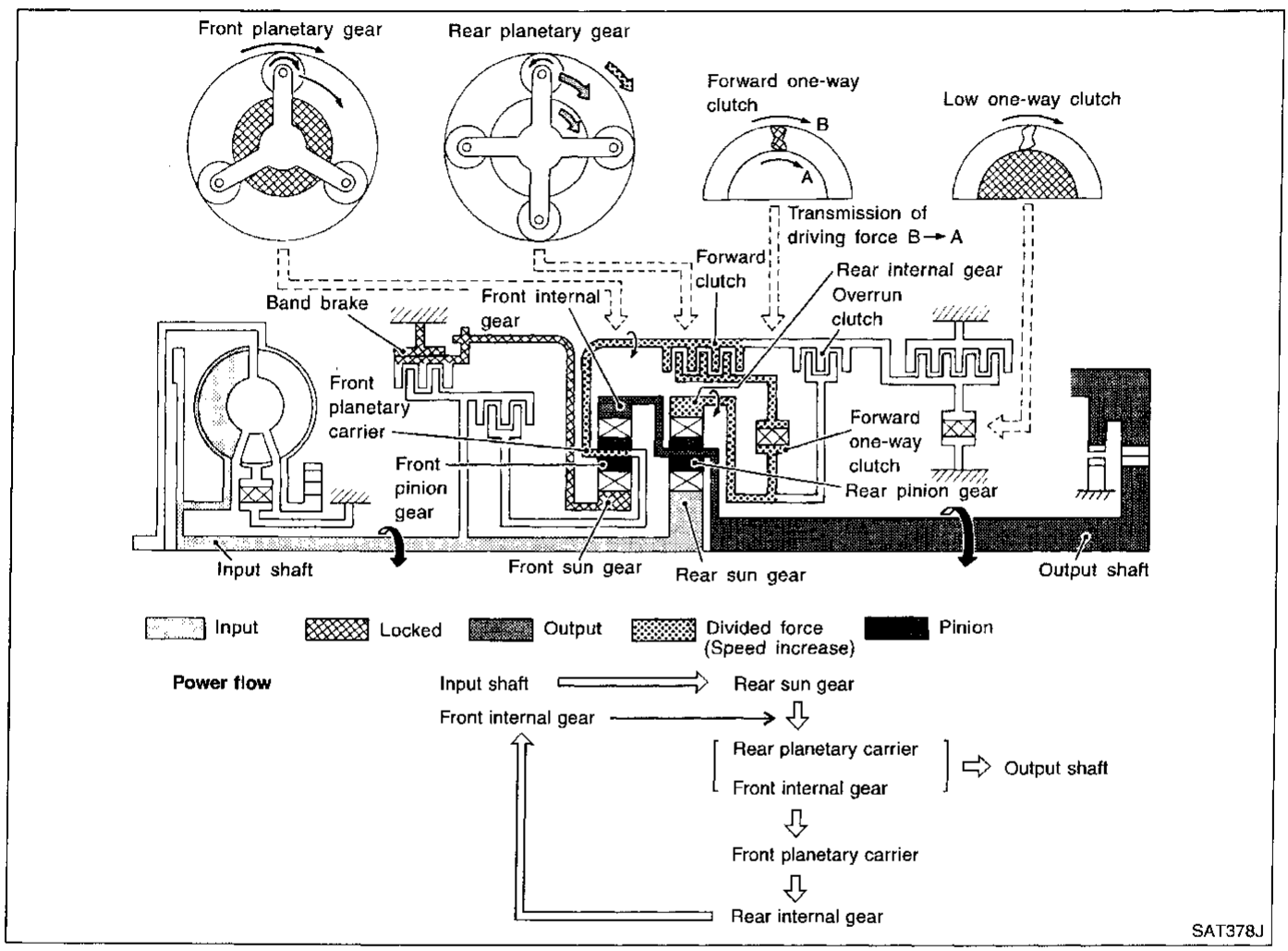
SAT377J

Shift Mechanism (Cont'd)

"D_2", "2_2" and "1_2" Positions

=NCAT0013S0204

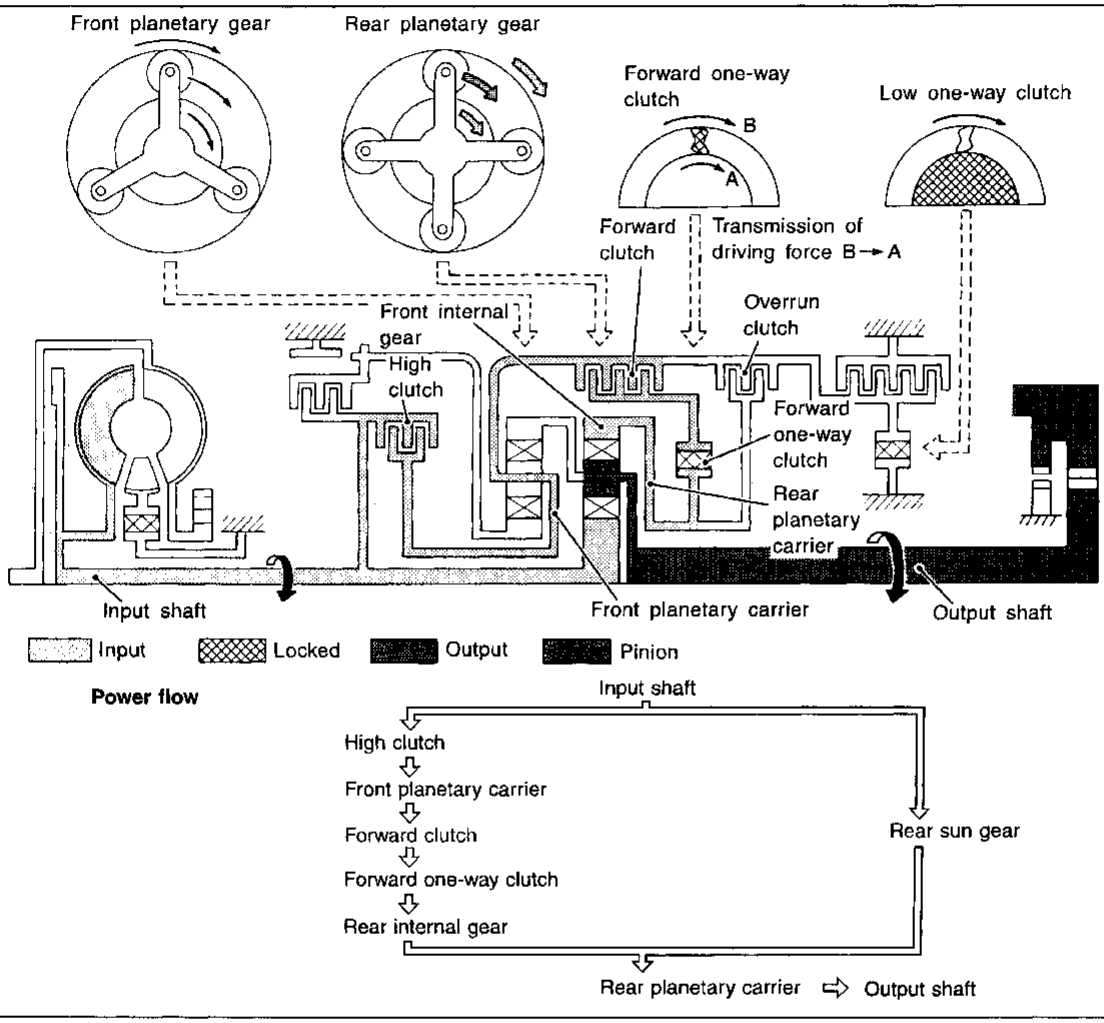
• **Forward clutch** • **Forward one-way clutch** • **Brake band**	Rear sun gear drives rear planetary carrier and combined front internal gear. Front internal gear now rotates around front sun gear accompanying front planetary carrier. As front planetary carrier transfers the power to rear internal gear through forward clutch and forward one-way clutch, this rotation of rear internal gear increases the speed of rear planetary carrier compared with that of the 1st speed.
Overrun clutch engagement conditions	D_2: Overdrive control switch "OFF" and throttle opening is less than 3/16 2_2 and 1_2: Always engaged



"D_3" Position

=NCAT0013S0205

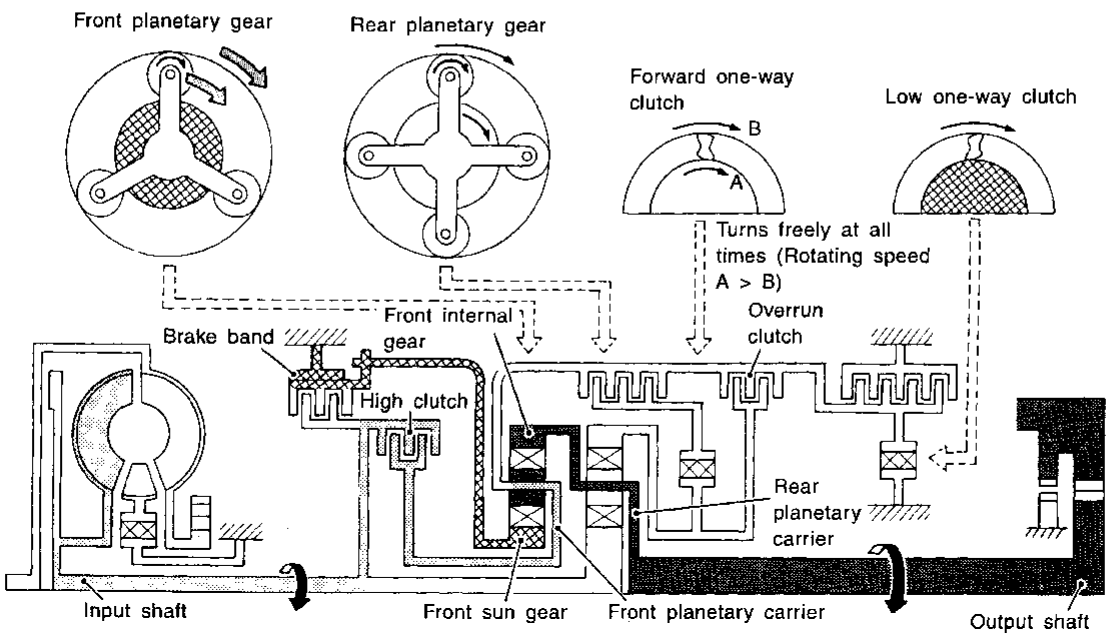
• **High clutch** • **Forward clutch** • **Forward one-way clutch**	Input power is transmitted to front planetary carrier through high clutch. And front planetary carrier is connected to rear internal gear by operation of forward clutch and forward one-way clutch. This rear internal gear rotation and another input (the rear sun gear) accompany rear planetary carrier to turn at the same speed.
Overrun clutch engagement conditions	D_3: Overdrive control switch "OFF" and throttle opening is less than 3/16



"D_4" (OD) Position

=NCAT0013S0206

• **High clutch** • **Brake band** • **Forward clutch** (Does not affect power transmission)	Input power is transmitted to front carrier through high clutch. This front carrier turns around the sun gear which is fixed by brake band and makes front internal gear (output) turn faster.
Engine brake	At D_4 position, there is no one-way clutch in the power transmission line and engine brake can be obtained when decelerating.



Power flow

Input shaft
⇩
High clutch
⇩
Front planetary carrier
⇩
Front pinion gear

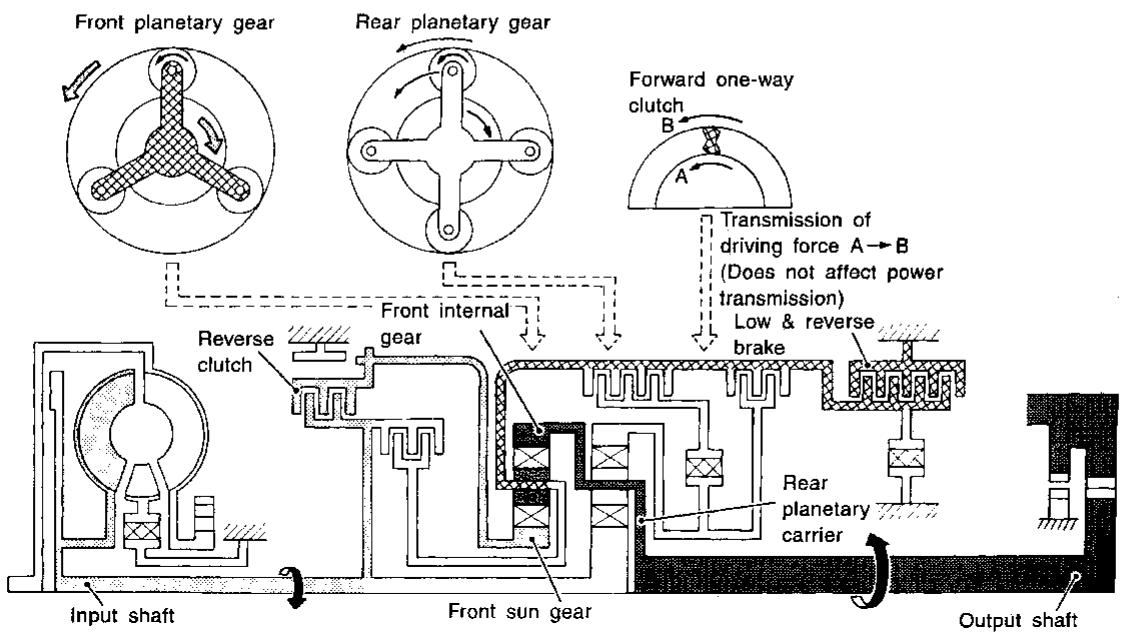
Front internal gear
⇩
Rear planetary carrier
⇩
Output shaft

SAT380J

"R" Position

=NCAT0013S0207

• **Reverse clutch** • **Low and reverse brake**	Front planetary carrier is stationary because of the operation of low and reverse brake. Input power is transmitted to front sun gear through reverse clutch, which drives front internal gear in the opposite direction.
Engine brake	As there is no one-way clutch in the power transmission line, engine brake can be obtained when decelerating.



Power flow

Input shaft
⇩
Reverse clutch
⇩
Front pinion gear ⇦ Front sun gear
⇩
Front internal gear ⇨ Output shaft

SAT381J

Control System

=NCAT0014

OUTLINE

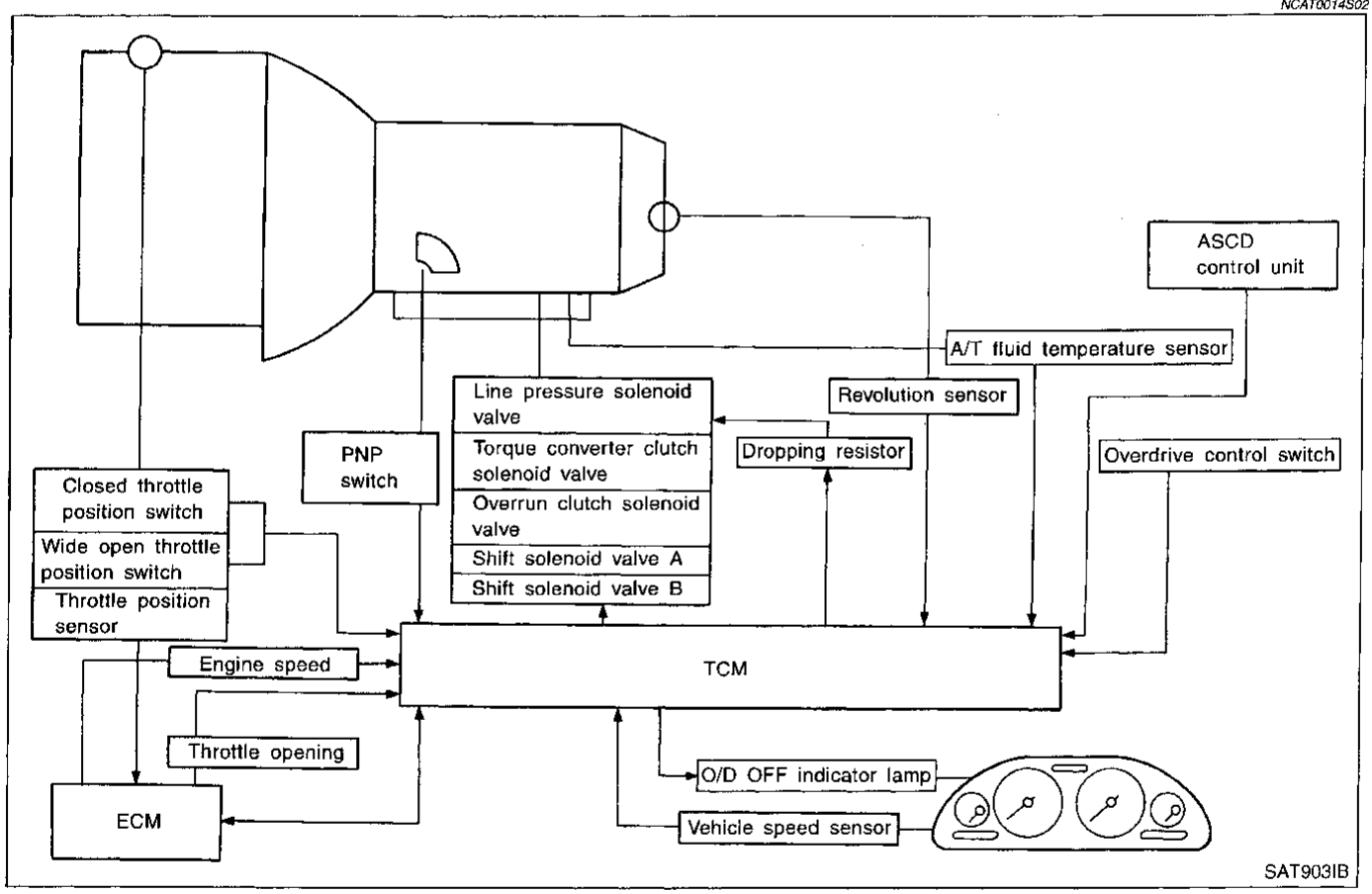
NCAT0014S01

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



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.
	Throttle position sensor	Detects throttle valve position and sends a signal to TCM.
	Closed throttle position switch	Detects throttle valve's fully-closed position and sends a signal to TCM.
	Wide open throttle position switch	Detects a throttle valve position of greater than 1/2 of full throttle and sends a signal to TCM.
	Engine speed signal	From ECM.
	A/T fluid temperature sensor	Detects transmission fluid temperature and sends a signal to TCM.
	Revolution sensor	Detects output shaft rpm and sends a signal to TCM.
	Vehicle speed sensor	Used as an auxiliary vehicle speed sensor. Sends a signal when revolution sensor (installed on transmission) malfunctions.
	Overdrive control switch	Sends a signal, which prohibits a shift to "D_4" (overdrive) position, to the TCM.
	ASCD control unit	Sends the cruise signal and "D_4" (overdrive) cancellation signal from ASCD control unit to TCM.
Output	Shift solenoid valve A/B	Selects shifting point suited to driving conditions in relation to a signal sent from TCM.
	Line pressure solenoid valve	Regulates (or decreases) line pressure suited to driving conditions in relation to a signal sent from TCM.
	Torque converter clutch solenoid valve	Regulates (or decreases) lock-up pressure suited to driving conditions in relation to a signal sent from TCM.
	Overrun clutch solenoid valve	Controls an "engine brake" effect suited to driving conditions in relation to a signal sent from TCM.
	O/D OFF indicator lamp	Shows TCM faults, when A/T control components malfunction.

Control Mechanism

NCAT0015

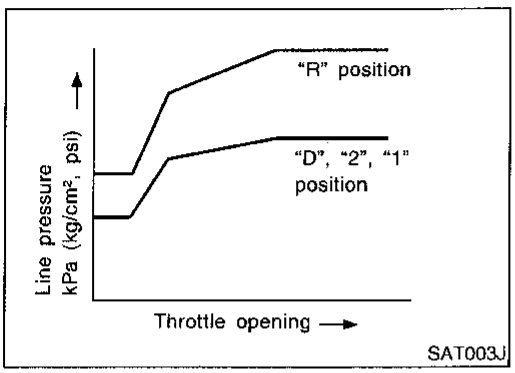
LINE PRESSURE CONTROL

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.

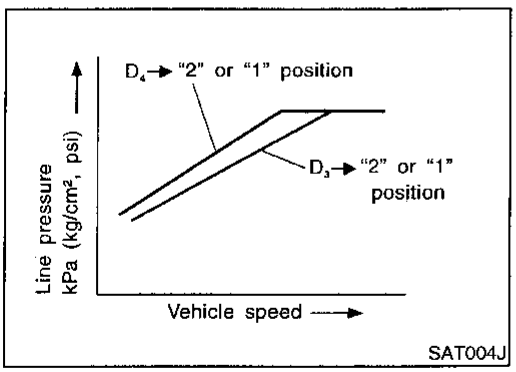
Hydraulic pressure on the clutch and brake is electronically controlled through the line pressure solenoid valve to accommodate engine torque. This results in smooth shift operation.



Normal Control

NCAT0015S0101

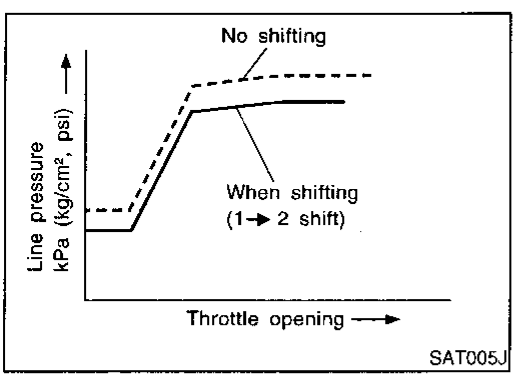
The line pressure to throttle opening characteristics is set for suitable clutch operation.



Back-up Control (Engine brake)

NCAT0015S0102

If the selector lever is shifted to "2" position while driving in D_4 (OD) or D_3, great driving force is applied to the clutch inside the transmission. Clutch operating pressure (line pressure) must be increased to deal with this driving force.



During Shift Change

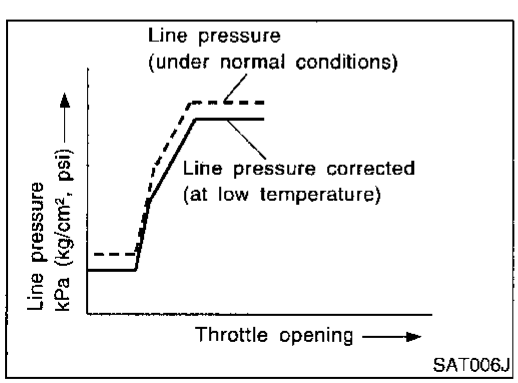
NCAT0015S0103

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.

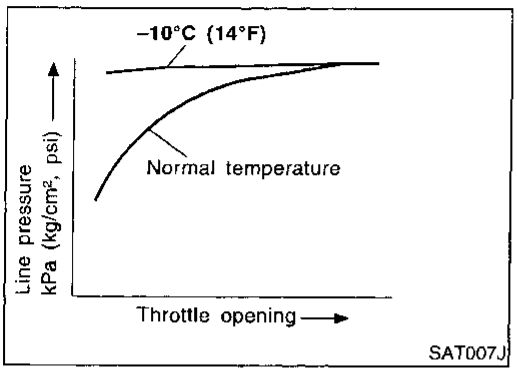
At Low Fluid Temperature

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.

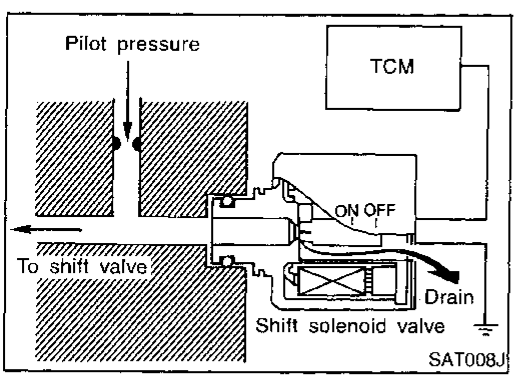


- Line pressure is increased to a maximum irrespective of the throttle opening when fluid temperature drops to −10°C (14°F). This pressure rise is adopted to prevent a delay in clutch and brake operation due to extreme drop of fluid viscosity at low temperature.

SHIFT CONTROL

NCAT0015S02

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



Control of Shift Solenoid Valves A and B

NCAT0015S0201

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

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

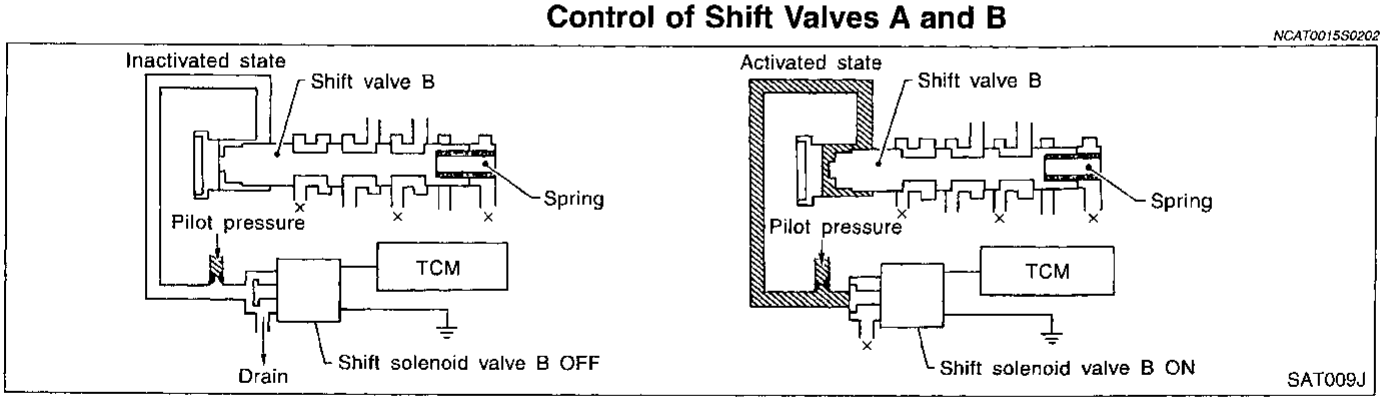
Relation Between Shift Solenoid Valves A and B and Gear Positions

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



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

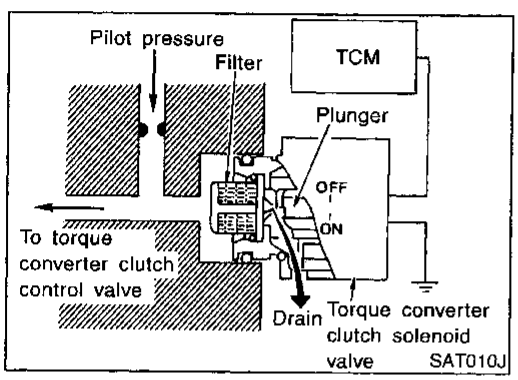
The torque converter clutch piston in the torque converter is locked to eliminate torque converter slip to increase power transmission efficiency. The solenoid valve is controlled by an ON-OFF duty signal sent from the TCM. The signal is converted to an oil pressure signal which controls the torque converter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

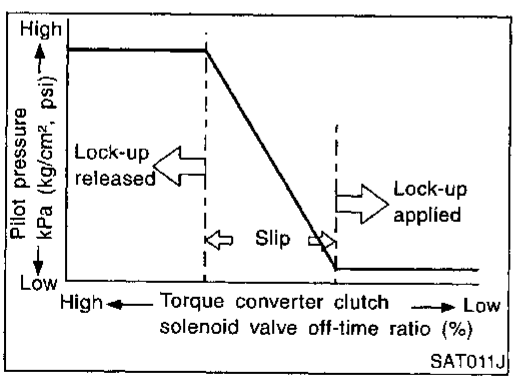
Overdrive control switch	ON	OFF
Selector lever	"D" position	
Gear position	D_4	D_3
Vehicle speed sensor	More than set value	
Throttle position sensor	Less than set opening	
Closed throttle position switch	OFF	
A/T fluid temperature sensor	More than 40°C (104°F)	



Torque Converter Clutch Solenoid Valve Control

NCAT0015S0302

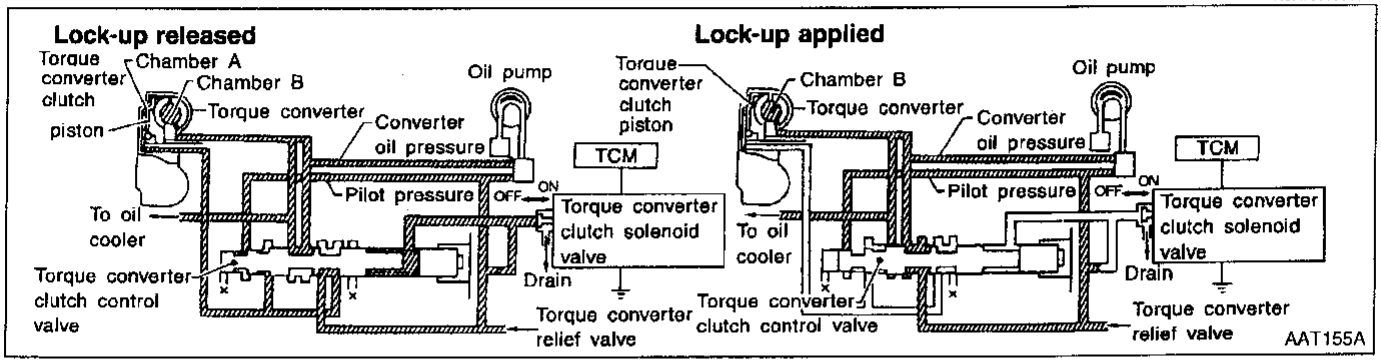
The torque converter clutch solenoid valve is controlled by the TCM. The plunger closes the drain circuit during the "OFF" period, and opens the circuit during the "ON" period. If the percentage of OFF-time increases in one cycle, the pilot pressure drain time is reduced and pilot pressure remains high.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

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

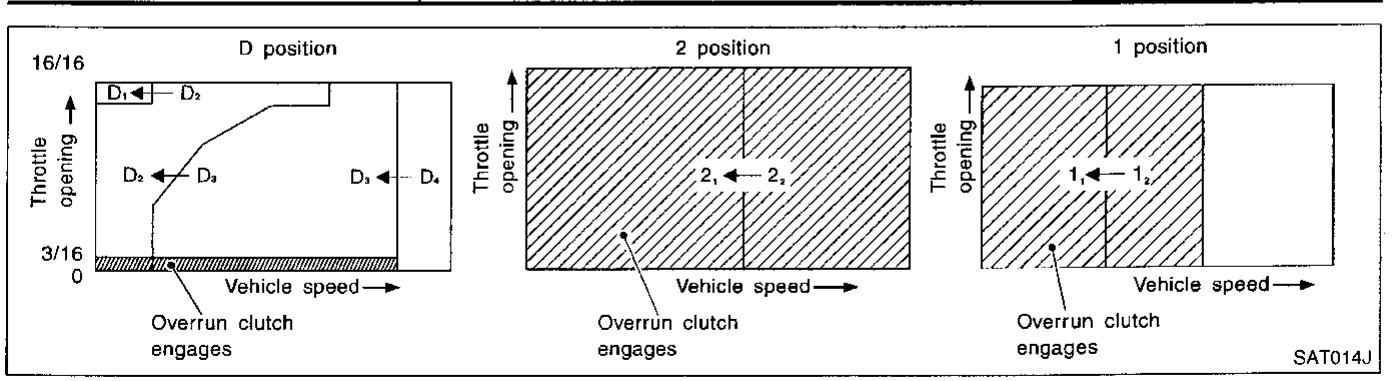
Forward one-way clutch is used to reduce shifting shocks in down-shifting operations. This clutch transmits engine torque to the wheels. However, drive force from the wheels is not transmitted to the engine because the one-way clutch rotates idle. This means the engine brake is not effective.

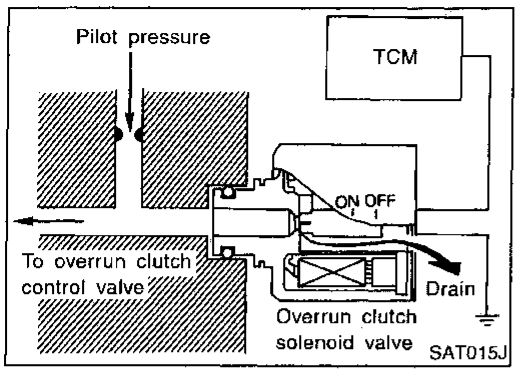
The overrun clutch operates when the engine brake is needed.

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

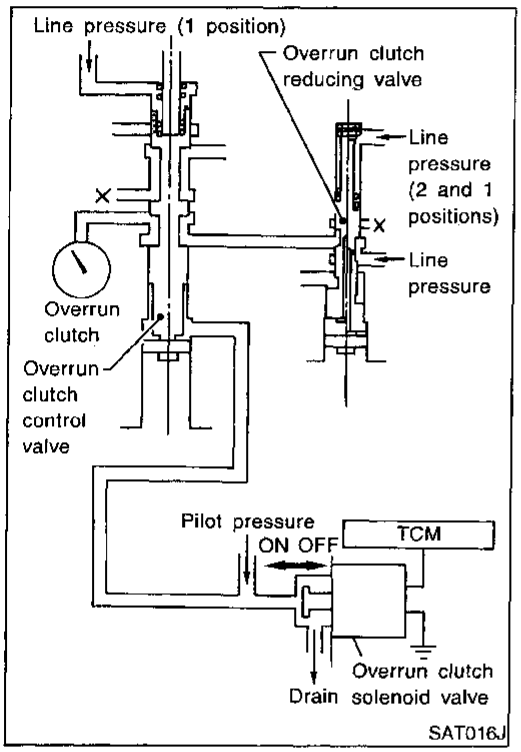




Overrun Clutch Solenoid Valve Control

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.

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.
Overrun clutch control valve	Switches hydraulic circuits to prevent engagement of the overrun clutch simultaneously with application of the brake band in D_4. (Interlocking occurs if the overrun clutch engages during D_4.)
1st reducing valve	Reduces low & reverse brake pressure to dampen engine-brake shock when down-shifting from the "1" position 1_2 to 1_1.
Overrun clutch reducing valve	Reduces oil pressure directed to the overrun clutch and prevents engine-brake shock. In "1" and "2" positions, line pressure acts on the overrun clutch reducing valve to increase the pressure-regulating point, with resultant engine brake capability.
Torque converter relief valve	Prevents an excessive rise in torque converter pressure.
Torque converter clutch control valve, plug and sleeve	Activates or inactivates the lock-up function. Also provides smooth lock-up through transient application and release of the lock-up system.
1-2 accumulator valve and piston	Dampens the shock encountered when 2nd gear band servo contracts, and provides smooth shifting.

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

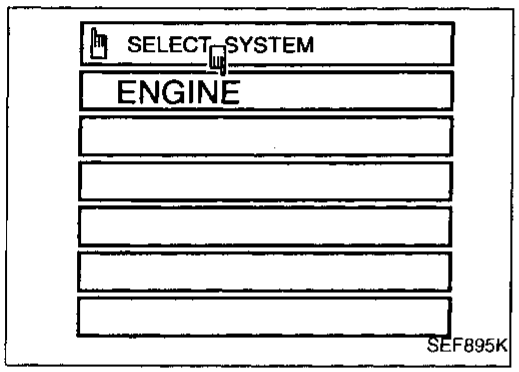
NCAT0020S01

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

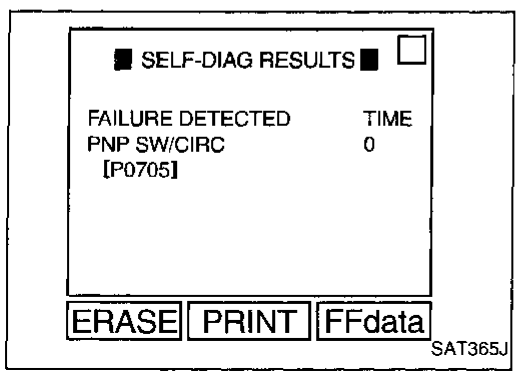
1. (NO TOOLS) **No Tools)** The number of blinks of the malfunction indicator lamp in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 1101, 1102, 1103, 1104, etc. For details, refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].
   These DTCs are controlled by NISSAN.
2. (CONSULT) **with CONSULT or** (GST) **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.

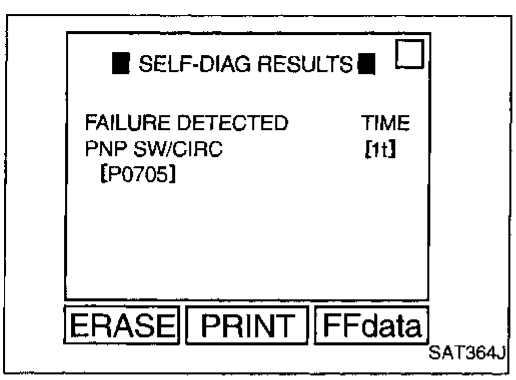
A sample of CONSULT display for DTC is shown at left. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode for "ENGINE" with CONSULT. Time data indicates how many times the vehicle was driven after the last detection of a DTC.



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

The ECM has the following priorities to update the data.

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

NCAT0020S02

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

- **If the battery terminal is disconnected, the diagnostic trouble code will be lost within 24 hours.**
- **When you erase the DTC, using CONSULT 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)

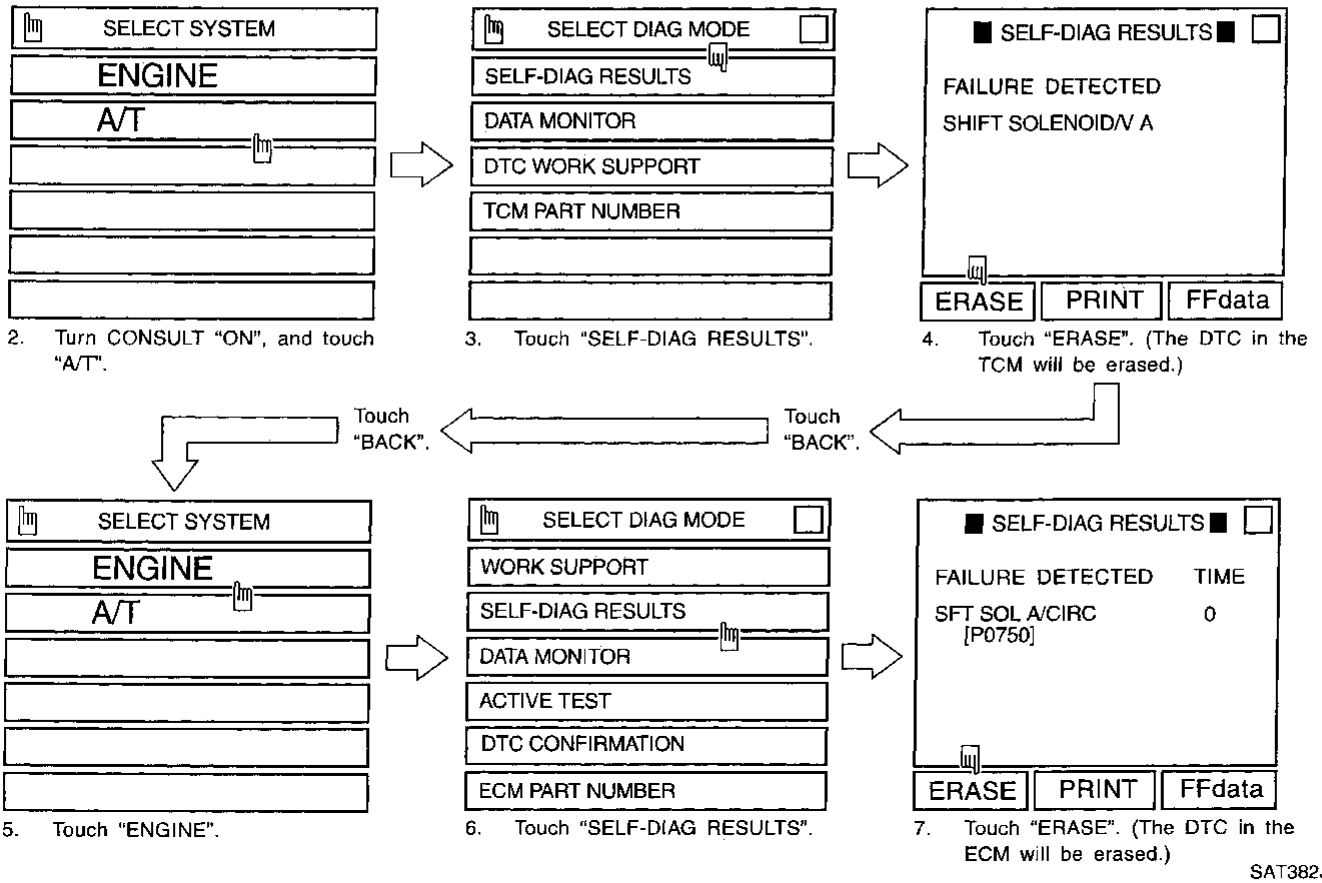
NCAT0020S03

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

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

How to erase DTC (With 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.



2. Turn CONSULT "ON", and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". (The DTC in the TCM will be erased.)
5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)

SAT382J

HOW TO ERASE DTC (WITH GST)

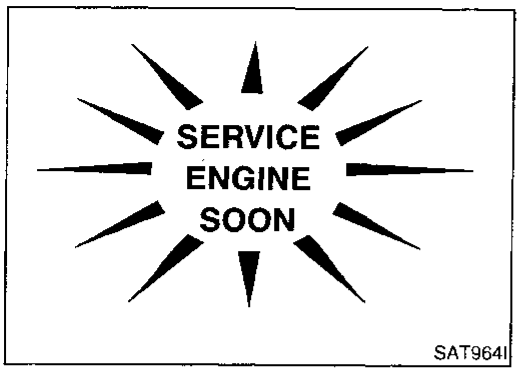
NCAT0020S04

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"].



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

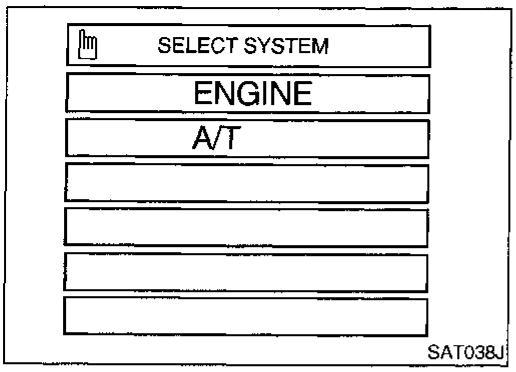
After performing "SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT)" (AT-39), place check marks for results on the "DIAGNOSTIC WORKSHEET", AT-54. Reference pages are provided following the items.

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.

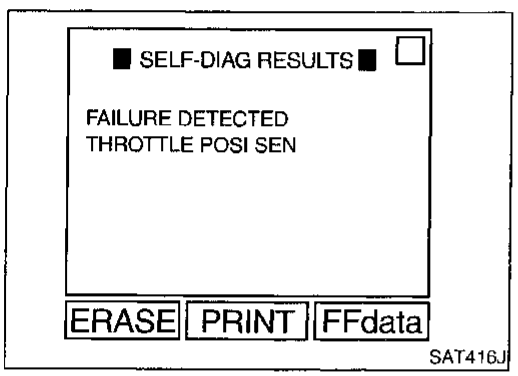
3) Shift solenoid valve "A" or "B" is displayed on CONSULT at the start of shifting. Gear position is displayed upon completion of shifting (which is computed by TCM).
4) Additional CONSULT information can be found in the Operation Manual supplied with the CONSULT unit.



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
—	PNP SW/CIRC			
Revolution sensor		• TCM does not receive the proper voltage signal from the sensor.	X	P0720
VHCL SPEED SEN·A/T	VEH SPD SEN/CIR AT			
Vehicle speed sensor (Meter)		• TCM does not receive the proper voltage signal from the sensor.	X	—
VHCL SPEED SEN·MTR	—			
A/T 1st gear function		• A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	—	P0731*1
—	A/T 1ST GR FNCTN			
A/T 2nd gear function		• A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	—	P0732*1
—	A/T 2ND GR FNCTN			
A/T 3rd gear function		• A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	—	P0733*1
—	A/T 3RD GR FNCTN			

CONSULT (Cont'd)

Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
			O/D OFF Available by O/D OFF indicator lamp or "A/T" on CONSULT	SERVICE ENGINE SOON Available by malfunction indicator lamp*2, "ENGINE" on CONSULT or GST
"A/T"	"ENGINE"			
A/T 4th gear function		• A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	—	P0734*1
—	A/T 4TH GR FNCTN			
A/T TCC S/V function (lock-up)		• A/T cannot perform lock-up even if electrical circuit is good.	—	P0744*1
—	A/T TCC S/V FNCTN			
Shift solenoid valve A		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0750
SHIFT SOLENOID/V A	SFT SOL A/CIRC			
Shift solenoid valve B		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0755
SHIFT SOLENOID/V B	SFT SOL B/CIRC			
Overrun clutch solenoid valve		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P1760
OVERRUN CLUTCH S/V	O/R CLUCH SOL/ CIRC			
T/C clutch solenoid valve		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0740
T/C CLUTCH SOL/V	TCC SOLENOID/ CIRC			
Line pressure solenoid valve		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0745
LINE PRESSURE S/V	L/PRESS SOL/ CIRC			
Throttle position sensor, Throttle position switch		• TCM receives an excessively low or high voltage from the sensor.	X	P1705
THROTTLE POSI SEN	TP SEN/CIRC A/T			
Engine speed signal		• TCM does not receive the proper voltage signal from the ECM.	X	P0725
ENGINE SPEED SIG				
A/T fluid temperature sensor		• TCM receives an excessively low or high voltage from the sensor.	X	P0710
BATT/FLUID TEMP SEN	ATF TEMP SEN/ CIRC			
TCM (RAM)		• TCM memory (RAM) is malfunctioning.	—	—
CONTROL UNIT (RAM)	—			
TCM (ROM)		• TCM memory (ROM) is malfunctioning.	—	—
CONTROL UNIT (ROM)	—			

CONSULT (Cont'd)

Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
			O/D OFF	SERVICE ENGINE SOON
"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
Initial start		• This is not a malfunction message (Whenever shutting off a power supply to the TCM, this message appears on the screen.)	X	—
INITIAL START	—			
No failure (NO SELF DIAGNOSTIC FAILURE INDICATED FURTHER TESTING MAY BE REQUIRED**)		• No failure has been detected.	X	X

X: Applicable
—: Not applicable
*1: These malfunctions cannot be displayed by MIL (SERVICE ENGINE SOON) if another malfunction is assigned to MIL.
*2: Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

DATA MONITOR MODE (A/T)

NCAT0022S04

Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
Vehicle speed sensor 1 (A/T) (Revolution sensor)	VHCL/S SE·A/T [km/h] or [mph]	X	—	• 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	—	• Vehicle speed computed from signal of vehicle speed sensor is displayed.	Vehicle speed display may not be accurate under approx. 10 km/h (6 mph). It may not indicate 0 km/h (0 mph) when vehicle is stationary.
Throttle position sensor	THRTL POS SEN [V]	X	—	• Throttle position sensor signal voltage is displayed.	
A/T fluid temperature sensor	FLUID TEMP SE [V]	X	—	• A/T fluid temperature sensor signal voltage is displayed. • Signal voltage lowers as fluid temperature rises.	
Battery voltage	BATTERY VOLT [V]	X	—	• Source voltage of TCM is displayed.	
Engine speed	ENGINE SPEED [rpm]	X	X	• Engine speed, computed from engine speed signal, is displayed.	Engine speed display may not be accurate under approx. 800 rpm. It may not indicate 0 rpm even when engine is not running.
Overdrive control switch	OVERDRIVE SW [ON/OFF]	X	—	• ON/OFF state computed from signal of overdrive control SW is displayed.	

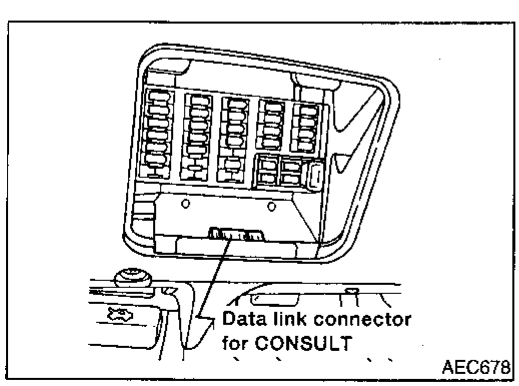
CONSULT (Cont'd)

Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
P/N position switch	P/N POSI SW [ON/OFF]	X	—	• ON/OFF state computed from signal of P/N position SW is displayed.	
R position switch	R POSITION SW [ON/OFF]	X	—	• ON/OFF state computed from signal of R position SW is displayed.	
D position switch	D POSITION SW [ON/OFF]	X	—	• ON/OFF state computed from signal of D position SW is displayed.	
2 position switch	2 POSITION SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of 2 position SW, is displayed.	
1 position switch	1 POSITION SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of 1 position SW, is displayed.	
ASCD cruise signal	ASCD·CRUISE [ON/OFF]	X	—	• Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state	• This is displayed even when no ASCD is mounted.
ASCD OD cut signal	ASCD·OD CUT [ON/OFF]	X	—	• Status of ASCD OD release signal is displayed. ON ... OD released OFF ... OD not released	• This is displayed even when no ASCD is mounted.
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of kickdown SW, is displayed.	• This is displayed even when no kickdown switch is equipped.
Closed throttle position switch	CLOSED THL/SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of closed throttle position SW, is displayed.	
Wide open throttle position switch	W/O THRL/P-SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of wide open throttle position SW, is displayed.	
Gear position	GEAR	—	X	• Gear position data used for computation by TCM, is displayed.	
Selector lever position	SLCT LVR POSI	—	X	• Selector lever position data, used for computation by TCM, is displayed.	• A specific value used for control is displayed if fail-safe is activated due to error.
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	• Vehicle speed data, used for computation by TCM, is displayed.	

CONSULT (Cont'd)

Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
Throttle position	THROTTLE POSI [/8]	—	X	• Throttle position data, used for computation by TCM, is displayed.	• A specific value used for control is displayed if fail-safe is activated due to error.
Line pressure duty	LINE PRES DTY [%]	—	X	• Control value of line pressure solenoid valve, computed by TCM from each input signal, is displayed.	
Torque converter clutch solenoid valve duty	TCC S/V DUTY [%]	—	X	• Control value of torque converter clutch solenoid valve, computed by TCM from each input signal, is displayed.	
Shift solenoid valve A	SHIFT S/V A [ON/OFF]	—	X	• Control value of shift solenoid valve A, computed by TCM from each input signal, is displayed.	Control value of solenoid is displayed even if solenoid circuit is disconnected. The "OFF" signal is displayed if solenoid circuit is shorted.
Shift solenoid valve B	SHIFT S/V B [ON/OFF]	—	X	• Control value of shift solenoid valve B, computed by TCM from each input signal, is displayed.	
Overrun clutch solenoid valve	OVERRUN/C S/V [ON/OFF]	—	X	• Control value of overrun clutch solenoid valve computed by TCM from each input signal is displayed.	
Self-diagnosis display lamp (O/D OFF indicator lamp)	SELF-D DP LMP [ON/OFF]	—	X	• Control status of O/D OFF indicator lamp is displayed.	

X: Applicable
—: Not applicable



DTC WORK SUPPORT MODE WITH CONSULT

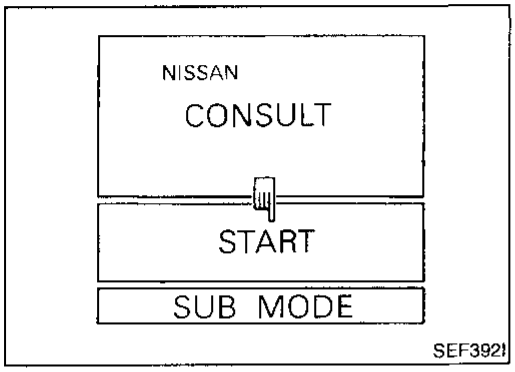
NCAT0022S05

CONSULT Setting Procedure

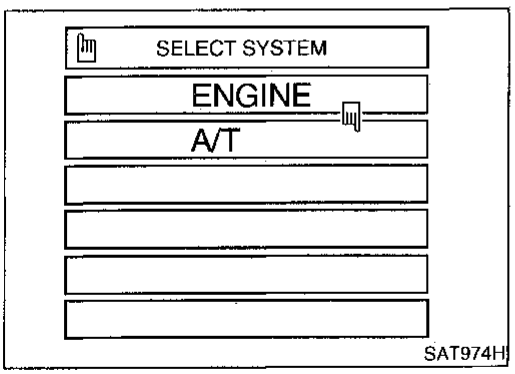
NCAT0022S0501

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.

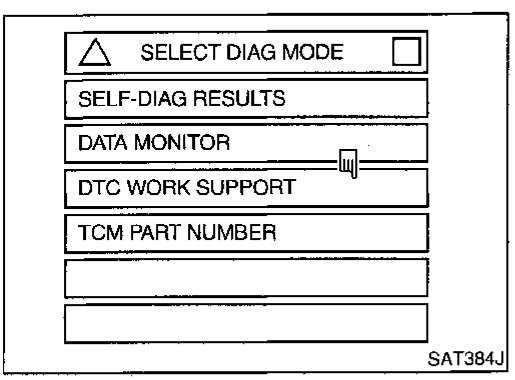
CONSULT (Cont'd)



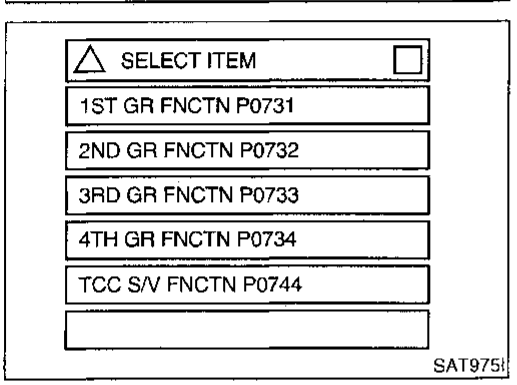
3. Turn ignition switch "ON".
4. Touch "START".



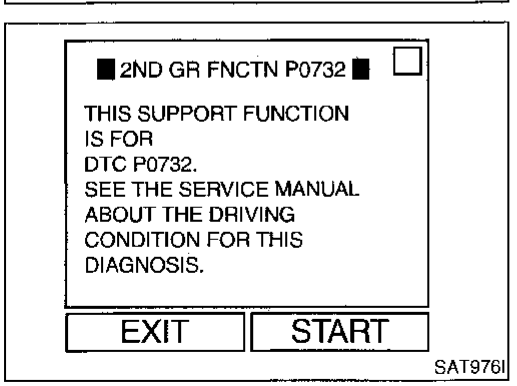
5. Touch "A/T".



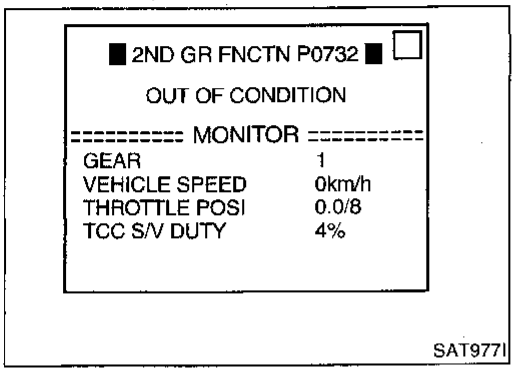
6. Touch "DTC WORK SUPPORT".



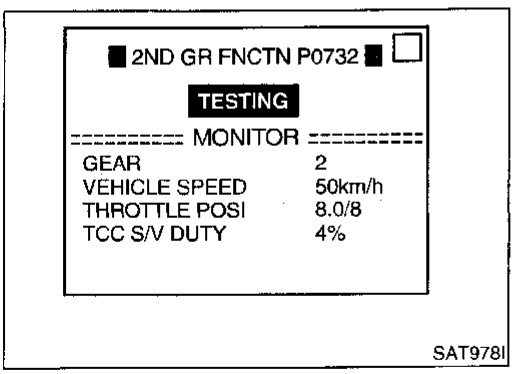
7. Touch select item menu (1ST, 2ND, etc.).



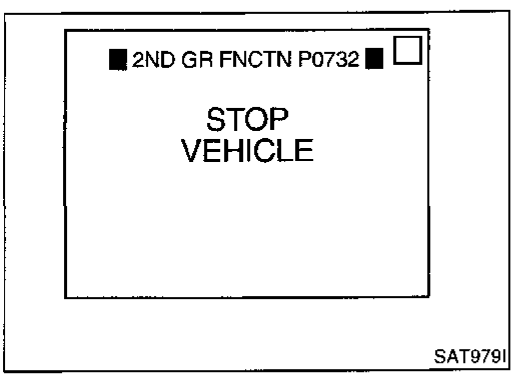
8. Touch "START".



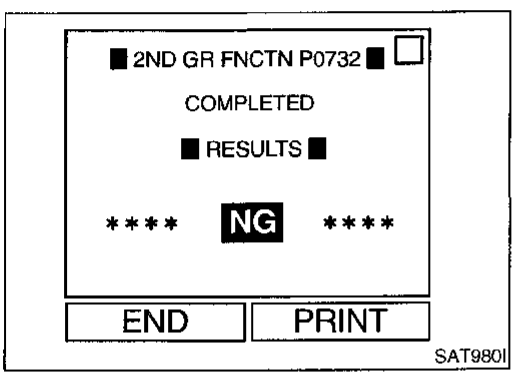
9. Perform driving test according to "DTC CONFIRMATION PROCEDURE" in "TROUBLE DIAGNOSIS FOR DTC".

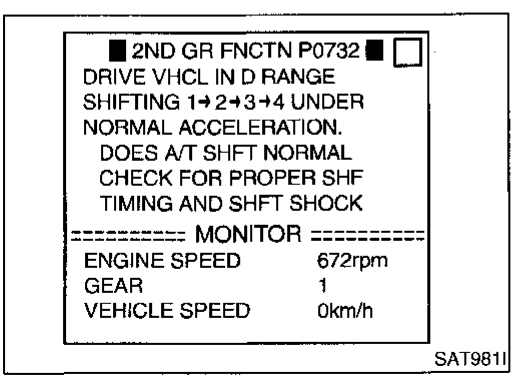


- **When testing conditions are satisfied, CONSULT screen changes from "OUT OF CONDITION" to "TESTING".**



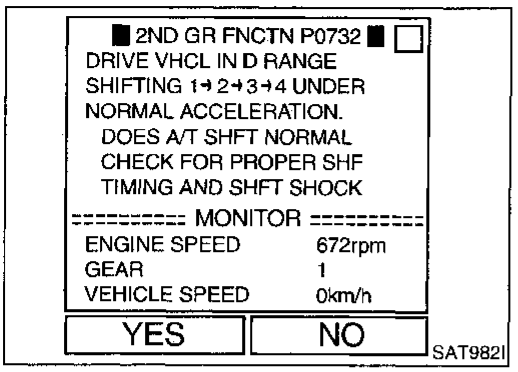
10. Stop vehicle. If "NG" appears on the screen, malfunction may exist. Go to "DIAGNOSTIC PROCEDURE".



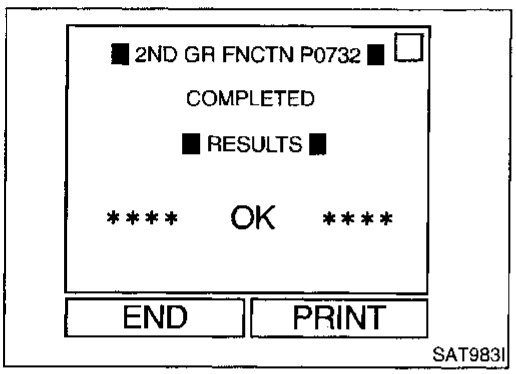


11. Perform test drive to check gear shift feeling in accordance with instructions displayed.

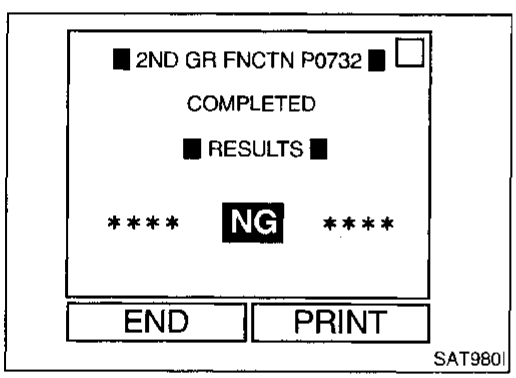
CONSULT (Cont'd)



12. Touch "YES" or "NO".



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



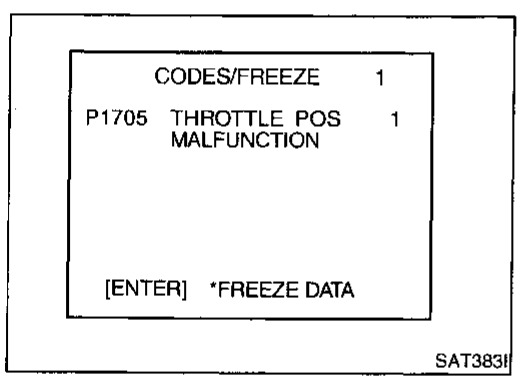
DTC WORK SUPPORT MODE

NCAT0022S06

DTC work support item	Description	Check items (Possible cause)
1ST GR FNCTN P0731	Following items for "A/T 1st gear function (P0731)" can be confirmed. • Self-diagnosis status (whether the diagnosis is being conducted or not) • Self-diagnosis result (OK or NG)	• Shift solenoid valve A • Shift solenoid valve B • Each clutch • Hydraulic control circuit
2ND GR FNCTN P0732	Following items for "A/T 2nd gear function (P0732)" can be confirmed. • Self-diagnosis status (whether the diagnosis is being conducted or not) • Self-diagnosis result (OK or NG)	• Shift solenoid valve B • Each clutch • Hydraulic control circuit
3RD GR FNCTN P0733	Following items for "A/T 3rd gear function (P0733)" can be confirmed. • Self-diagnosis status (whether the diagnosis is being conducted or not) • Self-diagnosis result (OK or NG)	• Shift solenoid valve A • Each clutch • Hydraulic control circuit

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
TCC S/V FNCTN P0744	Following items for "A/T TCC S/V function (lock-up) (P0744)" can be confirmed. • Self-diagnosis status (whether the diagnosis is being conducted or not) • Self-diagnosis result (OK or NG)	• Torque converter clutch solenoid valve • Each clutch • Hydraulic control circuit



DIAGNOSTIC PROCEDURE WITHOUT CONSULT

NCAT0022S07

OBD-II Self-diagnostic Procedure (With GST)

NCAT0022S0701

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

OBD-II Self-diagnostic Procedure (No Tools)

NCAT0022S0702

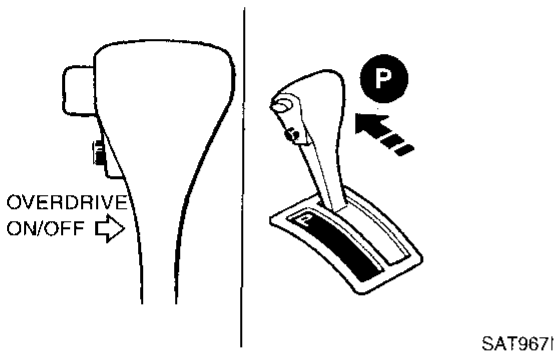
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

TCM Self-diagnostic Procedure (No Tools)

=NCAT0022S0703

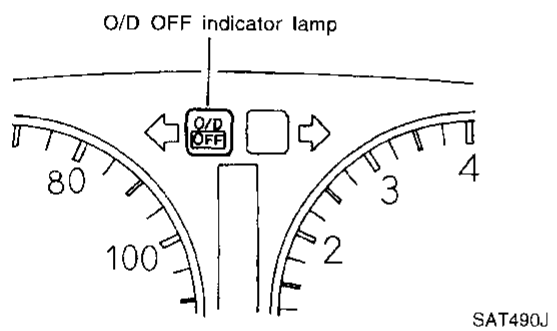
1 CHECK O/D OFF INDICATOR LAMP

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



SAT967I

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



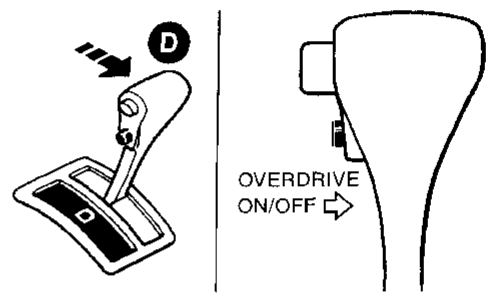
SAT490J

Yes or No

Yes	▶	GO TO 2.
No	▶	Go to "1. O/D OFF Indicator Lamp Does Not Come On", AT-195.

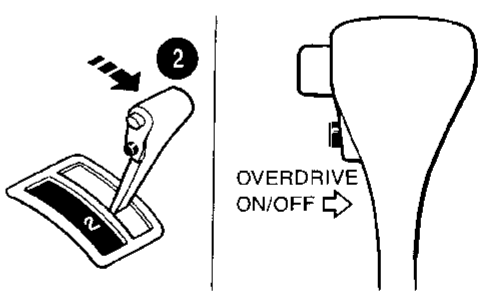
2 JUDGEMENT PROCEDURE STEP 1

1. Turn ignition switch to "OFF" position.
2. Turn ignition switch to "ACC" position.
3. Move selector lever from "P" to "D" position.
4. Turn ignition switch to "ON" position.
   (Do not start engine.)
5. Depress and hold overdrive control switch in "OFF" position (the O/D OFF indicator lamp will be "ON") until directed to release the switch.
   (If O/D OFF indicator lamp does not come on, go to step on AT-221.)
6. Turn ignition switch to "OFF" position.



SAT968I

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

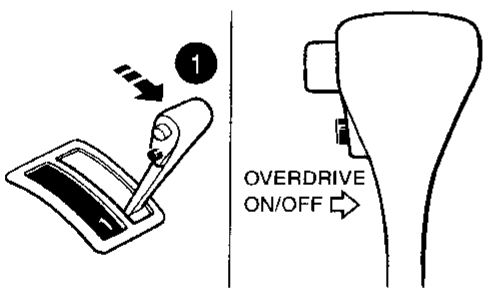


SAT969I

▶	GO TO 3.

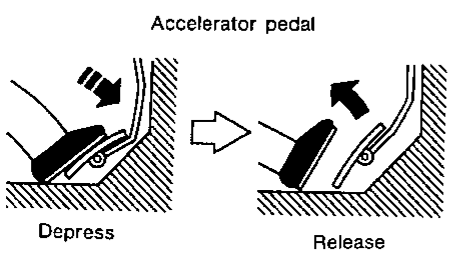
3	JUDGEMENT PROCEDURE STEP 2

1. Move selector lever to "1" position.
2. Release the overdrive control switch.
3. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be "ON").
4. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be "OFF").
5. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be "ON") until directed to release the switch.



SAT970I

6. Depress accelerator pedal fully and release.



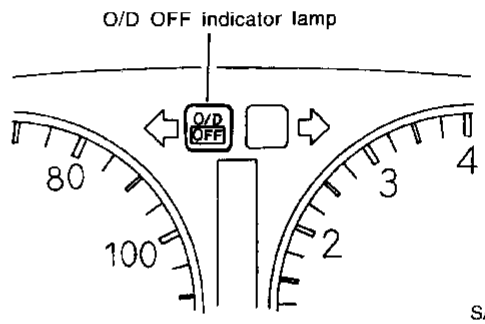
SAT981F

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

▶ GO TO 4.

4	CHECK SELF-DIAGNOSIS CODE

Check O/D OFF indicator lamp. Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE, AT-49.



SAT490J

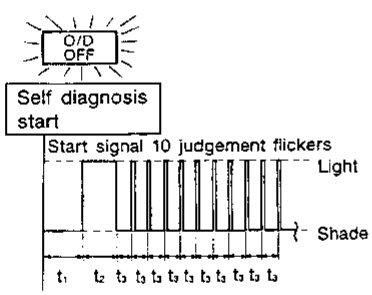
▶ DIAGNOSIS END

Judgement of Self-diagnosis Code

NCAT0022S0704

O/D OFF indicator lamp:

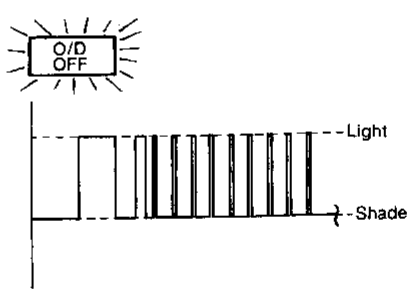
All judgement flickers are the same.



SAT436F

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

1st judgement flicker is longer than others.

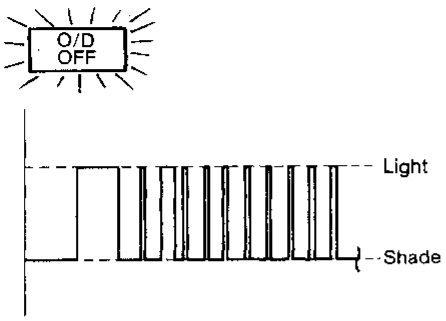


SAT437F

Revolution sensor circuit is short-circuited or disconnected.
⇒ Go to VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR) (DTC: 1102), AT-103.

O/D OFF indicator lamp:

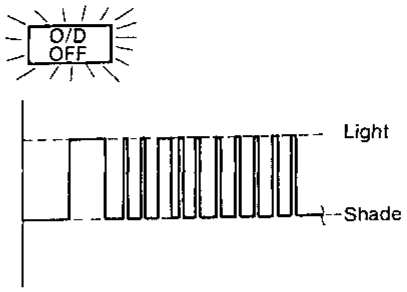
2nd judgement flicker is longer than others.



SAT439F

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

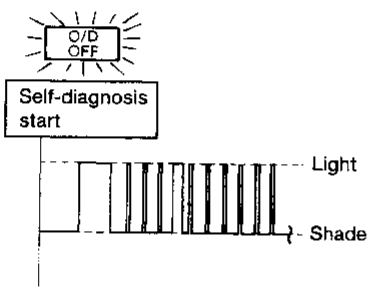
3rd judgement flicker is longer than others.



SAT441F

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

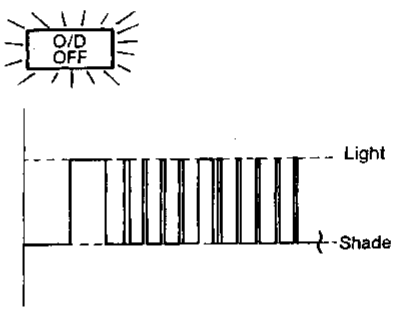
4th judgement flicker is longer than others.



SAT443F

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

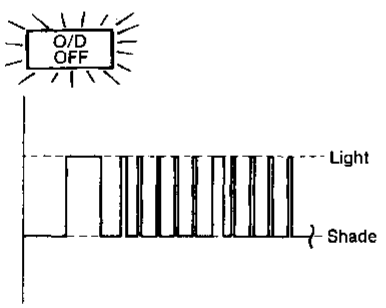
5th judgement flicker is longer than others.



SAT445F

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

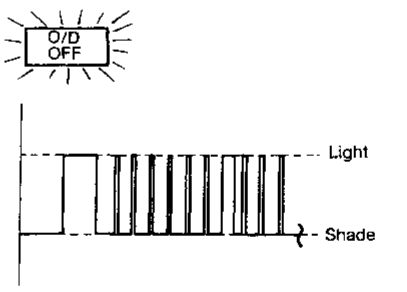
6th judgement flicker is longer than others.



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.

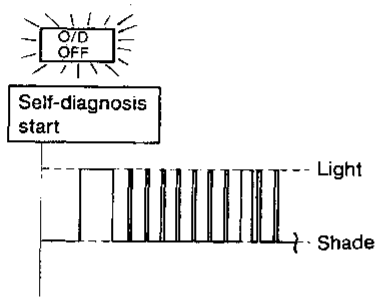


SAT449F

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

O/D OFF indicator lamp:

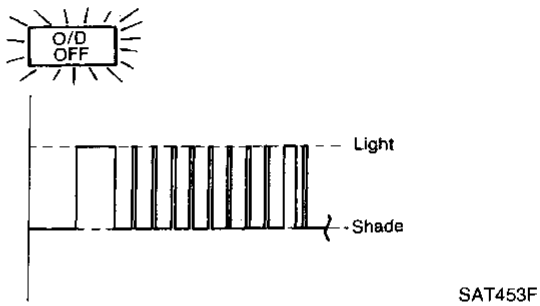
8th judgement flicker is longer than others.



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.**

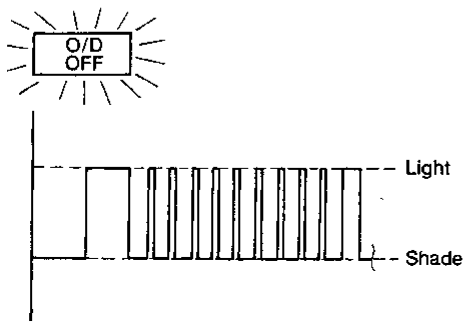
9th judgement flicker is longer than others.



SAT453F

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

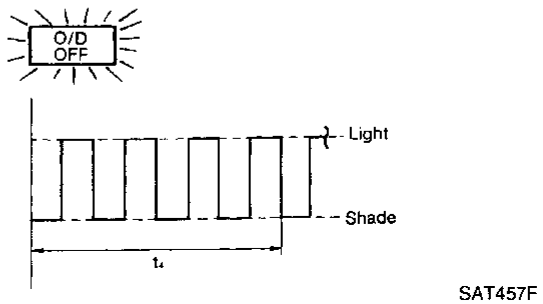
10th judgement flicker is longer than others.



SAT455F

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

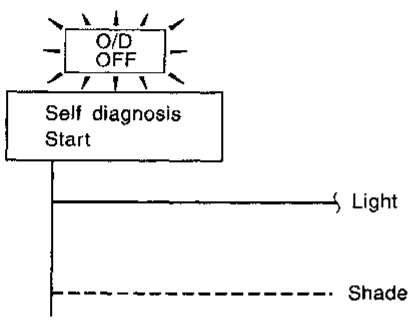
Flickers as shown below.



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.)

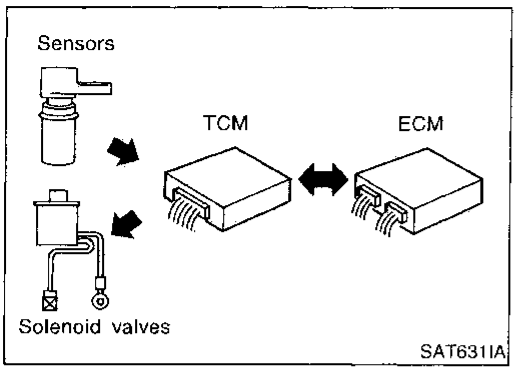
Lamp comes on.

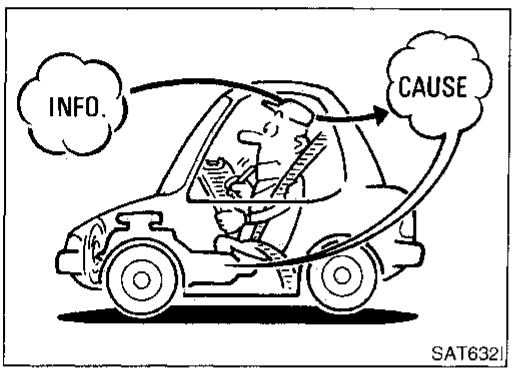


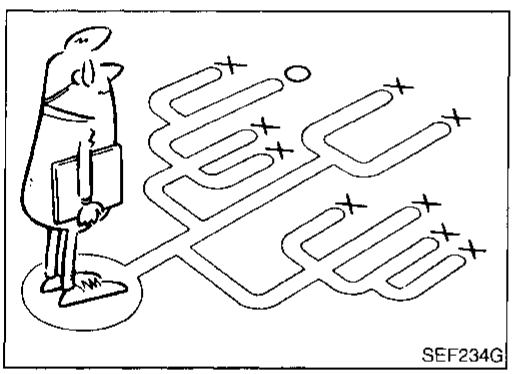
SAT367J

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







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.

DIAGNOSTIC WORKSHEET

=NCAT0023S01

Information from Customer

NCAT0023S0101

KEY POINTS

WHAT ..... Vehicle & A/T model

WHEN..... Date, Frequencies

WHERE..... Road conditions

HOW..... Operating conditions, Symptoms

Customer name MR/MS	Model & Year	VIN
Trans. model	Engine	Mileage
Incident Date	Manuf. Date	In Service Date
Frequency	☐ Continuous ☐ Intermittent (times a day)	
Symptoms	☐ Vehicle does not move. (☐ Any position ☐ Particular position)	
	☐ No up-shift (☐ 1st → 2nd ☐ 2nd → 3rd ☐ 3rd → O/D)	
	☐ No down-shift (☐ O/D → 3rd ☐ 3rd → 2nd ☐ 2nd → 1st)	
	☐ Lockup malfunction	
	☐ Shift point too high or too low.	
	☐ Shift shock or slip (☐ N → D ☐ Lockup ☐ Any drive position)	
	☐ Noise or vibration	
	☐ No kickdown	
	☐ No pattern select	
	☐ Others ( )	
O/D OFF indicator lamp	Blinks for about 8 seconds.	
	☐ Continuously lit	☐ Not lit
Malfunction indicator lamp (MIL)	☐ Continuously lit	☐ Not lit

Diagnostic Worksheet

=NCAT0023S0102

1.	☐ Read the Fail-safe and listen to customer complaints.		AT-6
2.	☐ CHECK A/T FLUID		AT-58
	☐ Leakage (Follow specified procedure) ☐ Fluid condition ☐ Fluid level		
3.	☐ Perform STALL TEST and LINE PRESSURE TEST.		AT-58, 62
	☐ Stall test — Mark possible damaged components/others.		
	☐ Torque converter one-way clutch ☐ Reverse clutch ☐ Forward clutch ☐ Overrun clutch ☐ Forward one-way clutch	☐ Low & reverse brake ☐ Low one-way clutch ☐ Engine ☐ Line pressure is low ☐ Clutches and brakes except high clutch and brake band are OK	
	☐ Line Pressure test — Suspected parts:		
4.	☐ Perform all ROAD TEST and mark required procedures.		AT-63
	4-1. Check before engine is started.		AT-64
	☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.		
	☐ PNP switch, AT-92. ☐ A/T fluid temperature sensor, AT-97. ☐ Vehicle speed sensor·A/T (Revolution sensor), AT-103. ☐ Engine speed signal, AT-108. ☐ Torque converter clutch solenoid valve, AT-139. ☐ Line pressure solenoid valve, AT-152. ☐ Shift solenoid valve A, AT-158. ☐ Shift solenoid valve B, AT-163. ☐ Throttle position sensor, AT-168. ☐ Overrun clutch solenoid valve, AT-176. ☐ PNP, overdrive control and throttle position switches, AT-221. ☐ A/T fluid temperature sensor and TCM power source, AT-181. ☐ Vehicle speed sensor·MTR, AT-187. ☐ Battery ☐ Others		
	4-2. Check at idle		AT-65
	☐ 1. O/D OFF Indicator Lamp Does Not Come On, AT-195. ☐ 2. Engine Cannot Be Started In "P" And "N" Position, AT-197. ☐ 3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed, AT-198. ☐ 4. In "N" Position, Vehicle Moves, AT-199. ☐ 5. Large Shock. "N" → "R" Position, AT-200. ☐ 6. Vehicle Does Not Creep Backward In "R" Position, AT-201. ☐ 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position, AT-203.		

4.	4-3.	Cruise test	AT-67 AT-70
		Part-1	
		☐ 8. Vehicle Cannot Be Started From D_1, AT-205. ☐ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-207. ☐ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-209. ☐ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-211. ☐ 12. A/T Does Not Perform Lock-up, AT-213. ☐ 13. A/T Does Not Hold Lock-up Condition, AT-214. ☐ 14. Lock-up Is Not Released, AT-215. ☐ 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$), AT-216.	
		Part-2	AT-72
		☐ 16. Vehicle Does Not Start From D_1, AT-217. ☐ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-207. ☐ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-209. ☐ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-211.	
		Part-3	AT-73
		☐ 17. A/T Does Not Shift: $D_4 \rightarrow D_3$ When Overdrive Control Switch "ON" → "OFF", AT-218 ☐ 15. Engine Speed Does Not Return To Idle (Engine Brake In D_3), AT-216. ☐ 18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever "D" → "2" Position, AT-219. ☐ 15. Engine Speed Does Not Return To Idle (Engine Brake In 2_2), AT-216. ☐ 19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever "2" → "1" Position, AT-220. ☐ 20. Vehicle Does Not Decelerate By Engine Brake, AT-221. ☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.	
		☐ PNP switch, AT-92. ☐ A/T fluid temperature sensor, AT-97. ☐ Vehicle speed sensor·A/T (Revolution sensor), AT-103. ☐ Engine speed signal, AT-108. ☐ Torque converter clutch solenoid valve, AT-139. ☐ Line pressure solenoid valve, AT-152. ☐ Shift solenoid valve A, AT-158. ☐ Shift solenoid valve B, AT-163. ☐ Throttle position sensor, AT-168. ☐ Overrun clutch solenoid valve, AT-176. ☐ PNP, overdrive control and throttle position switches, AT-221. ☐ A/T fluid temperature sensor and TCM power source, AT-181. ☐ Vehicle speed sensor·MTR, AT-187. ☐ Battery ☐ Others	
5.	☐ For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.		AT-39
6.	☐ Perform all ROAD TEST and re-mark required procedures.		AT-63
7.	☐ 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
	☐ DTC (P0731, 1103) A/T 1st gear function, AT-112. ☐ DTC (P0732, 1104) A/T 2nd gear function, AT-118. ☐ DTC (P0733, 1105) A/T 3rd gear function, AT-124. ☐ DTC (P0734, 1106) A/T 4th gear function, AT-130. ☐ DTC (P0744, 1107) A/T TCC S/V function (lock-up), AT-144.		
8.	☐ Perform the Diagnostic Procedures for all remaining items marked NG. Repair or replace the damaged parts. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the component inspection orders.)		AT-85 AT-75
9.	☐ Erase DTC from TCM and ECM memories.		AT-36

Work Flow

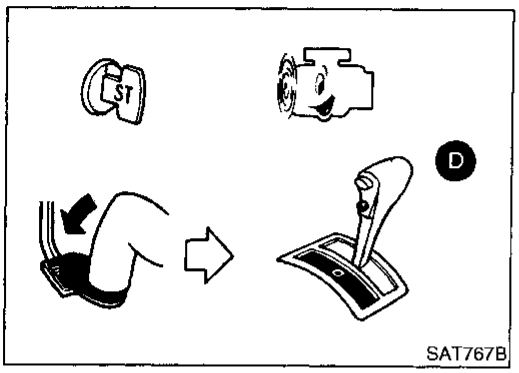
NCAT0024

HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

NCAT0024S01

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

Make good use of the two sheets provided, "INFORMATION FROM CUSTOMER" (AT-53) and "DIAGNOSTIC WORKSHEET" (AT-54), to perform the best troubleshooting possible.



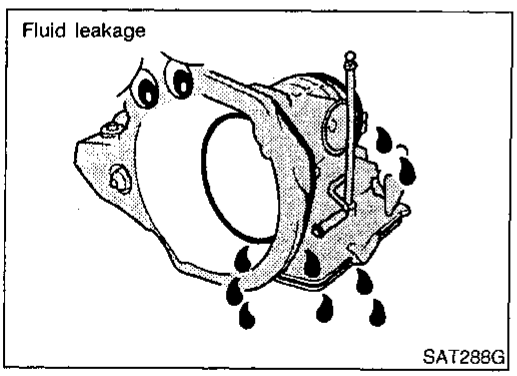
A/T Fluid Check

NCAT0025

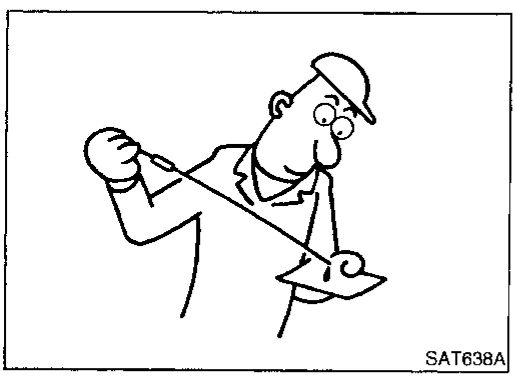
FLUID LEAKAGE CHECK

NCAT0025S01

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



4. Check for fresh leakage.



FLUID CONDITION CHECK

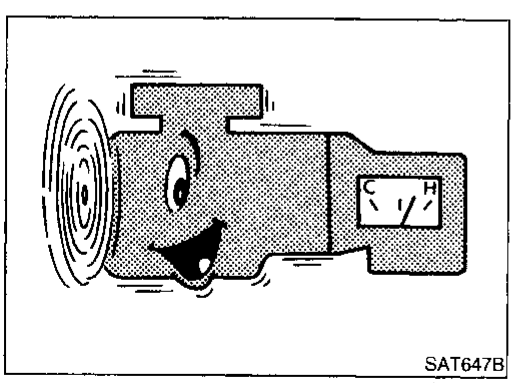
NCAT0025S02

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

FLUID LEVEL CHECK

NCAT0026S03

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



Stall Test

NCAT0026

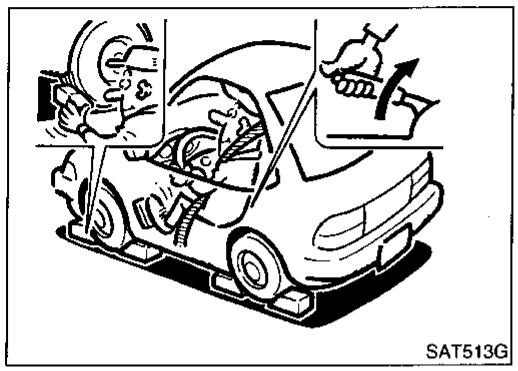
STALL TEST PROCEDURE

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.

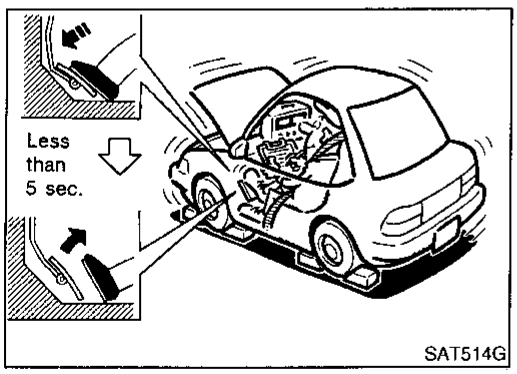
   ATF operating temperature:

   50 - 80°C (122 - 176°F)



SAT513G

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.**

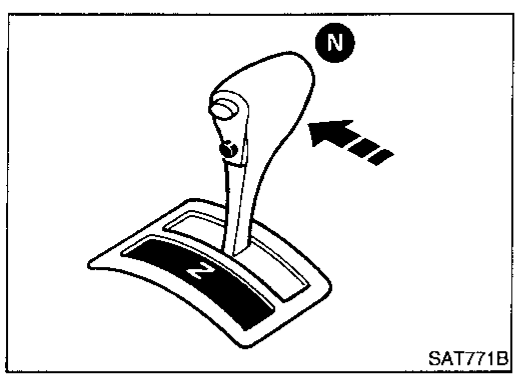


SAT514G

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

   Stall revolution:

   1,900 - 2,200 rpm



SAT771B

8. Move selector lever to "N" position.
9. Cool off ATF.
   - **Run engine at idle for at least one minute.**
10. Repeat steps 5 through 9 with selector lever in "2", "1" and "R" positions.

JUDGEMENT OF STALL TEST

NCAT0026S02

The test result and possible damaged components relating to each result are shown in the illustrations on next page.
In order to pinpoint the possible damaged components, follow the WORK FLOW shown in AT-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

Stall revolution is too high in R position:

- Engine brake does not function in "1" position. ..... Low & reverse brake slippage
- Engine brake functions in "1" position. ..... Reverse clutch slippage

Stall revolution within specifications:

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

Stall Test (Cont'd)

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

CAUTION:
Be careful since automatic fluid temperature increases abnormally.

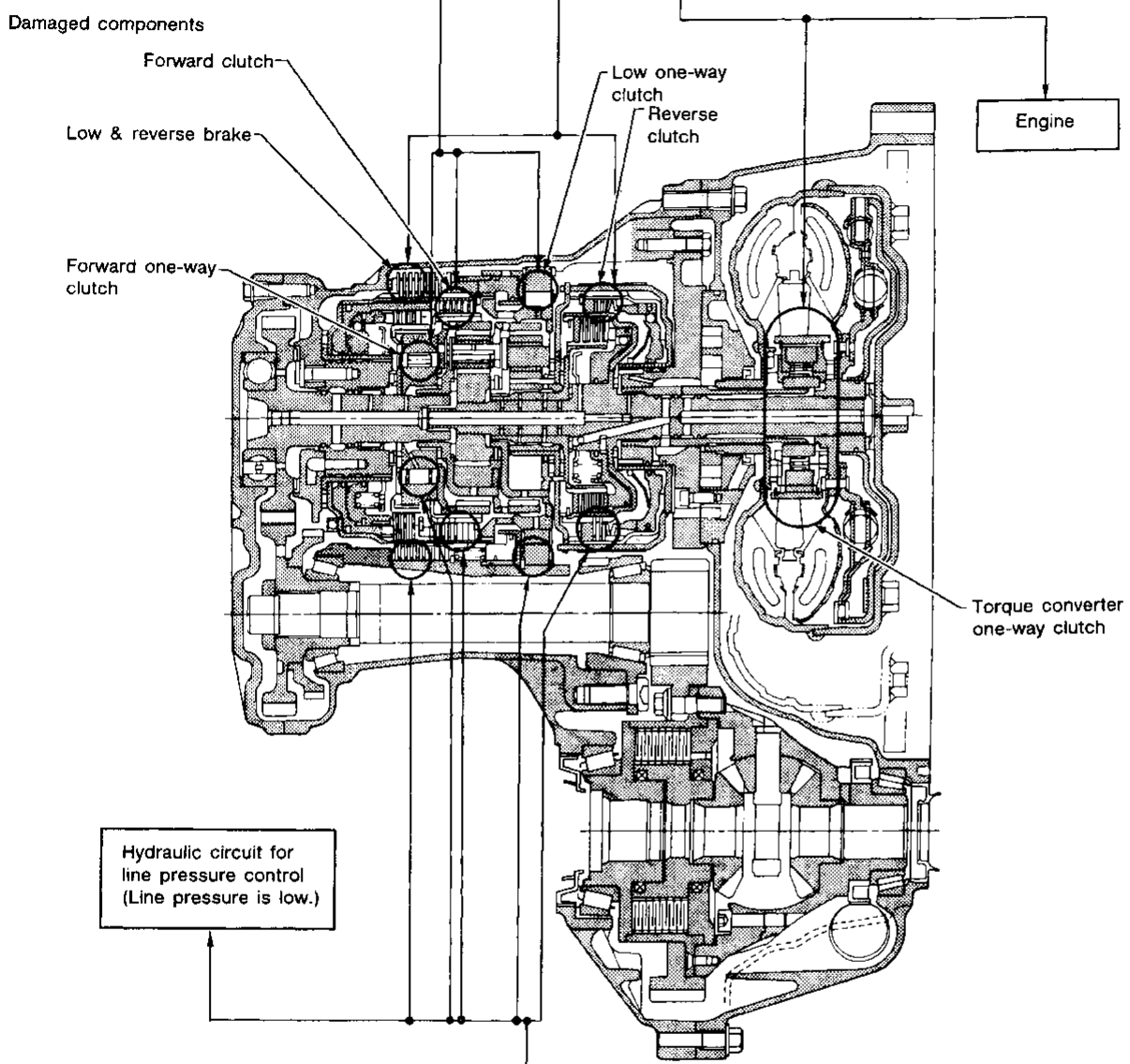
- Slippage occurs in 3rd and 4th gears in "D" position. ..... High clutch slippage
- Slippage occurs in 2nd and 4th gear in "D" position. ..... Brake band slippage
- Engine brake does not function in 2nd and 3rd gears in "D" position, 2nd gear in "2" position, and 1st gear in "1" position with overdrive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

Stall revolution less than specifications:

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

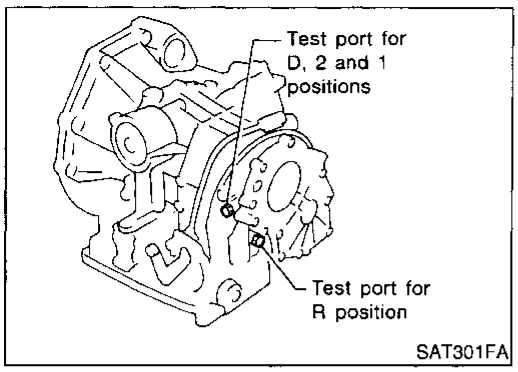
Selector lever position	Judgement		
D	H	O	L
2	H	O	L
1	H	O	L
R	O	H	L

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



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

SAT895H



Line Pressure Test

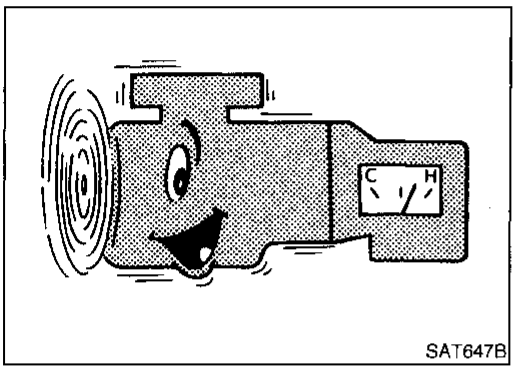
NCAT0027

LINE PRESSURE TEST PORTS

NCAT0027S01

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

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

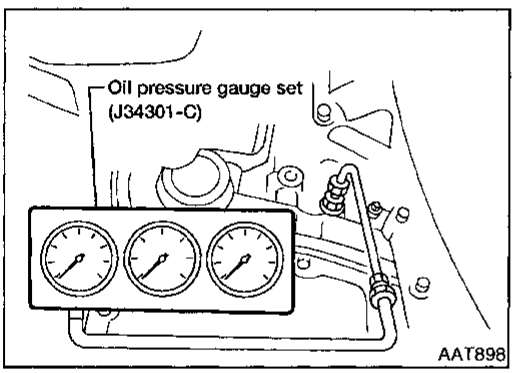


LINE PRESSURE TEST PROCEDURE

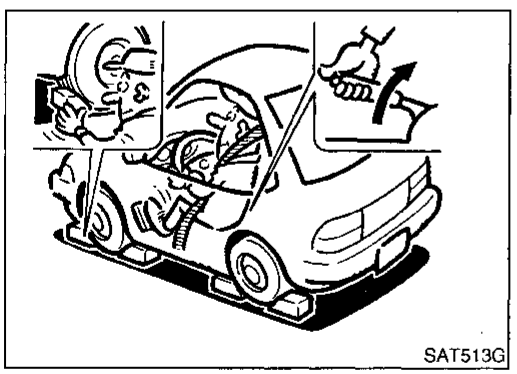
NCAT0027S02

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

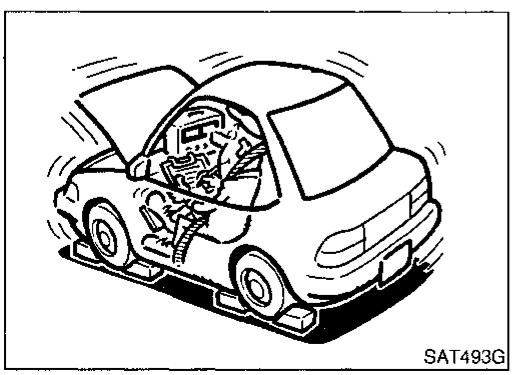
   ATF operating temperature:
   50 - 80°C (122 - 176°F)



3. Install pressure gauge to corresponding line pressure port.



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



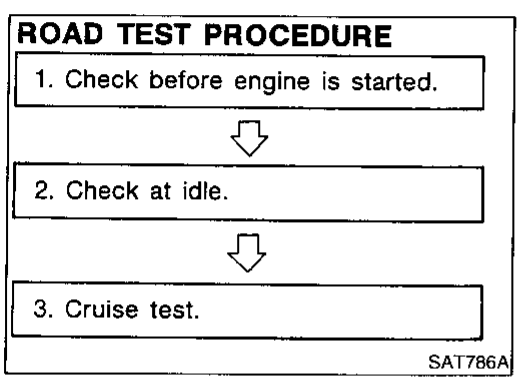
5. Start engine and measure line pressure at idle and stall speed.
- **When measuring line pressure at stall speed, follow the stall test procedure.**

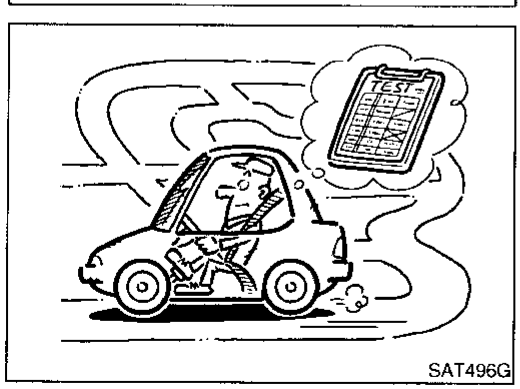
Line pressure: Refer to SDS, AT-343.

JUDGEMENT OF LINE PRESSURE TEST

NCAT0027S03

Judgement		Suspected parts
At idle	Line pressure is low in all positions.	• Oil pump wear • Control piston damage • Pressure regulator valve or plug sticking • Spring for pressure regulator valve damaged • Fluid pressure leakage between oil strainer and pressure regulator valve • Clogged strainer
	Line pressure is low in particular position.	• Fluid pressure leakage between manual valve and particular clutch • For example, line pressure is: – Low in "R" and "1" positions, but – Normal in "D" and "2" positions. Therefore, fluid leakage exists at or around low and reverse brake circuit. Refer to "CLUTCH AND BAND CHART", AT-18.
	Line pressure is high.	• 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
At stall speed	Line pressure is low.	• Maladjustment of throttle position sensor • Line pressure solenoid valve sticking • Short circuit of line pressure solenoid valve circuit • Pressure regulator valve or plug sticking • Pressure modifier valve sticking • Pilot valve sticking





Road Test

NCAT0028

DESCRIPTION

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:

1. Check before engine is started
2. Check at idle
3. Cruise test

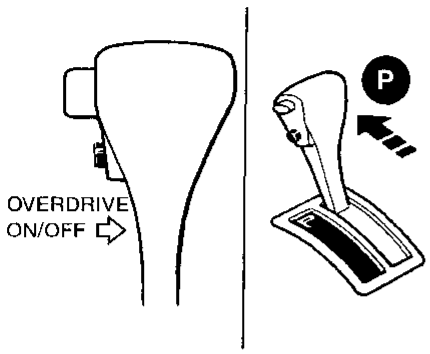
- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items until specified symptom is found. Troubleshoot items which check out No Good after road test. Refer to "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" and "TROUBLE DIAGNOSES FOR SYMPTOMS", AT-34 - AT-49 and AT-195 - AT-221.

1. CHECK BEFORE ENGINE IS STARTED

=NCAT0028S02

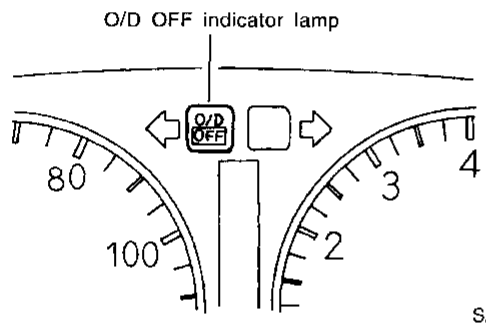
1	CHECK O/D OFF INDICATOR LAMP

1. Park vehicle on flat surface.
2. Move selector lever to "P" position.



SAT967I

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?



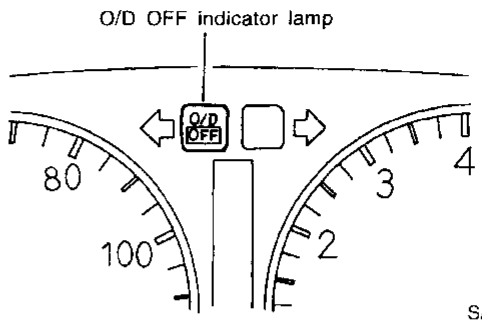
SAT490J

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

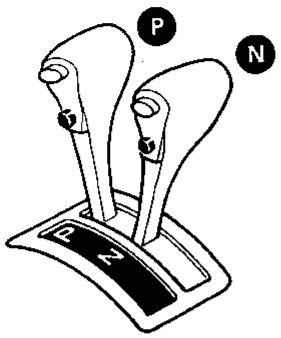
Yes	▶	Perform self-diagnosis and check NG items on the DIAGNOSTIC WORKSHEET, AT-54. Refer to TCM SELF-DIAGNOSIS PROCEDURE (NO TOOLS), AT-48.
No	▶	1. Turn ignition switch to "OFF" position. 2. Perform self-diagnosis and note NG items. Refer to TCM SELF-DIAGNOSIS PROCEDURE (NO TOOLS), AT-48. 3. Go to "2. CHECK AT IDLE", AT-65.

2. CHECK AT IDLE

=NCAT0026S03

1	CHECK ENGINE START

1. Park vehicle on flat surface.
2. Move selector lever to "P" position.



SAT769B

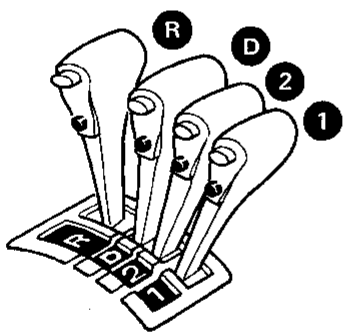
3. Turn ignition switch to "OFF" position.
4. Turn ignition switch to "START" position.
5. Is engine started?

Yes or No

Yes ▶	GO TO 2.
No ▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-197. Continue ROAD TEST.

2	CHECK ENGINE START

1. Turn ignition switch to "ACC" position.
2. Move selector lever to "D", "1", "2" or "R" position.



SAT770B

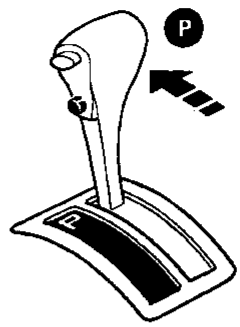
3. Turn ignition switch to "START" position.
4. Is engine started?

Yes or No

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.

3	CHECK VEHICLE MOVE

1. Move selector lever to "P" position.



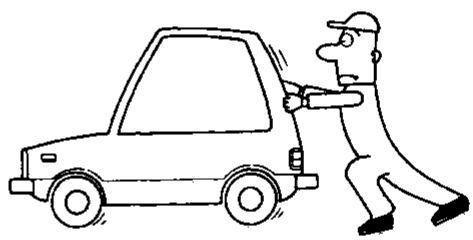
SAT768B

2. Turn ignition switch to "OFF" position.
3. Release parking brake.

▶	GO TO 4.

4	CHECK VEHICLE MOVE

1. Push vehicle forward or backward.
2. Does vehicle move when it is pushed forward or backward?



SAT796A

3. Apply parking brake.

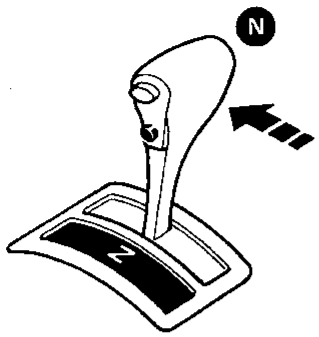
Yes or No

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.

Road Test (Cont'd)

5	CHECK VEHICLE MOVE

1. Start engine.
2. Move selector lever to "N" position.



SAT771B

3. Release parking brake.
4. Does vehicle move forward or backward?

Yes or No

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.

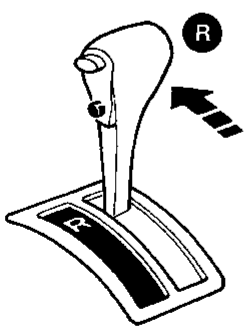
6	CHECK SHIFT SHOCK

1. Apply foot brake.

Brake pedal

SAT797A

2. Move selector lever to "R" position.



SAT772B

3. Is there large shock when changing from "N" to "R" position?

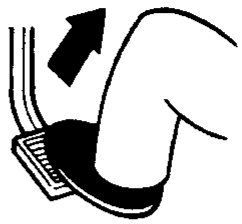
Yes or No

Yes	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "5. Large Shock "N" → "R" Position", AT-200. Continue ROAD TEST.
No	▶	GO TO 7.

7	CHECK VEHICLE MOVE

1. Release foot brake for several seconds.

Brake pedal



For several seconds

SAT799A

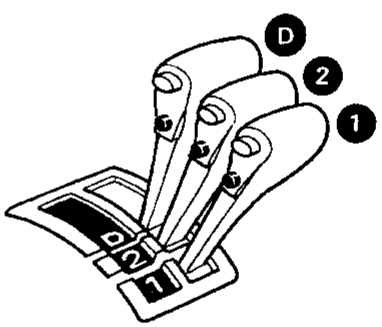
2. Does vehicle creep backward when foot brake is released?

Yes or No

Yes	▶	GO TO 8.
No	▶	Mark the box on the DIAGNOSTIC WORKSHEET. Go to "6. Vehicle Does Not Creep Backward In "R" Position", AT-201. Continue ROAD TEST.

8	CHECK VEHICLE MOVE

1. Move selector lever to "D", "2" and "1" positions and check if vehicle creeps forward.

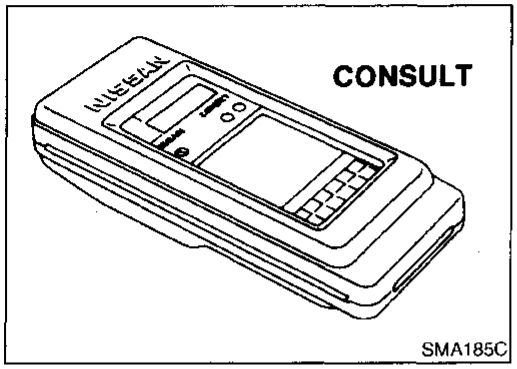


SAT773B

2. Does vehicle creep forward in all three positions?

Yes or No

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.



SMA185C

3. CRUISE TEST

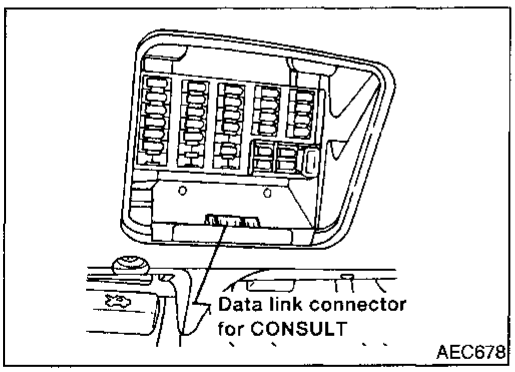
NCAT0028S04

- Check all items listed in Parts 1 through 3.

With CONSULT

NCAT0028S0401

- 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.

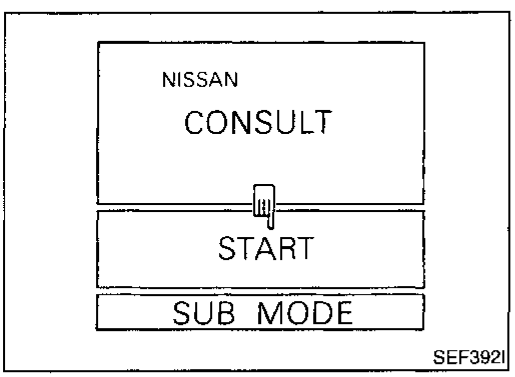


AEC678

CONSULT Setting Procedure

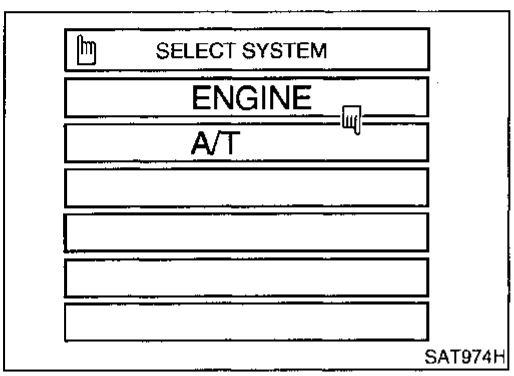
NCAT0028S0402

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.



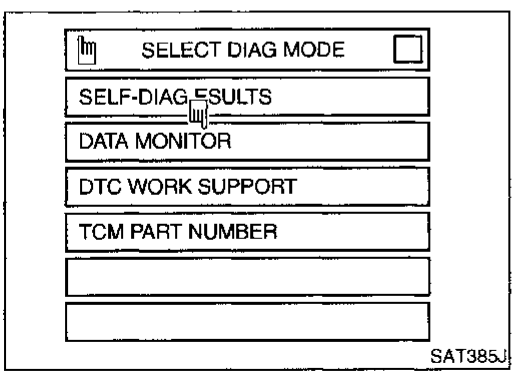
SEF392I

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



SAT974H

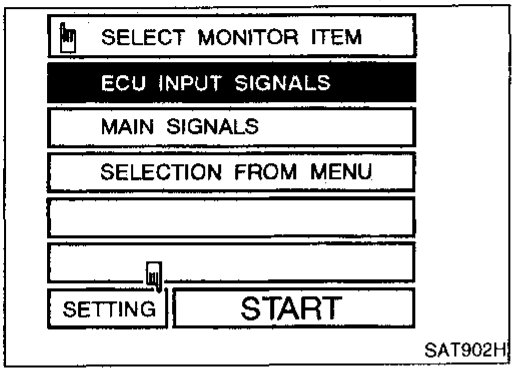
5. Touch "A/T".



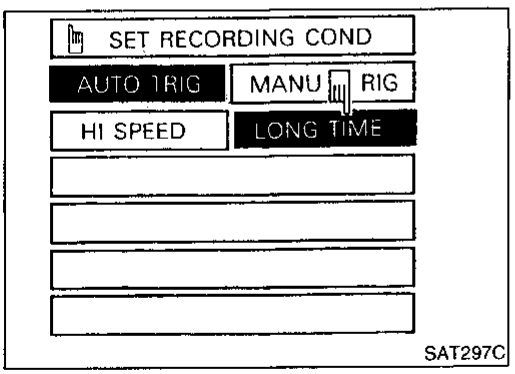
SAT385J

6. Touch "DATA MONITOR".

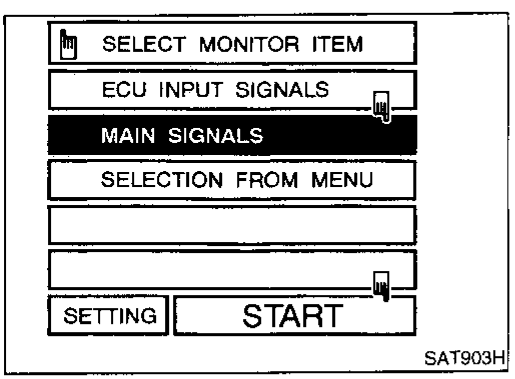
Road Test (Cont'd)



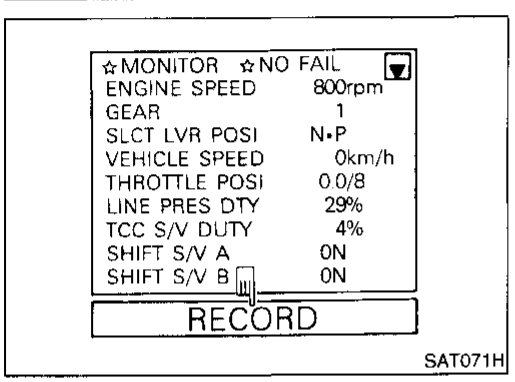
7. Touch "SETTING" to set recording condition.



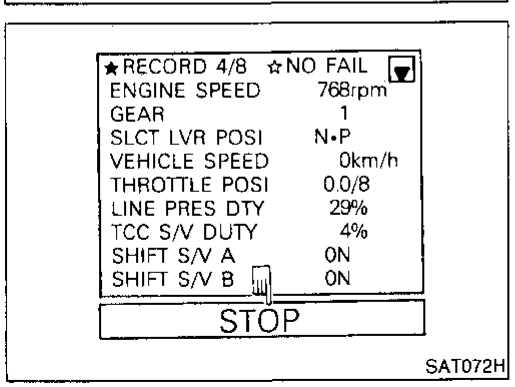
8. Touch "LONG TIME" and "ENTER" key.



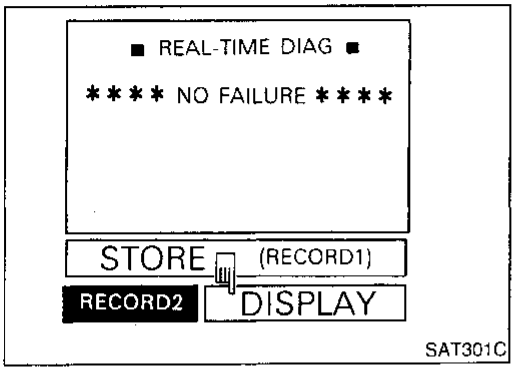
9. Go back to SELECT MONITOR ITEM and touch "MAIN SIGNALS".
10. Touch "START".



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

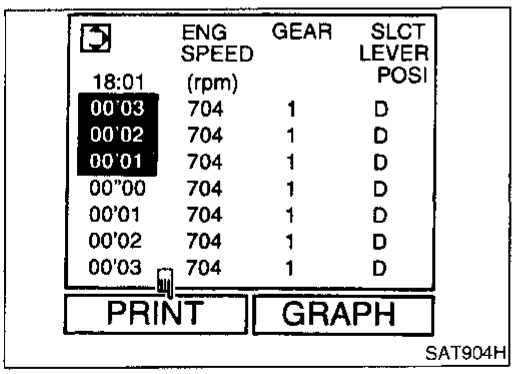


12. After finishing cruise test part 1, touch "STOP".



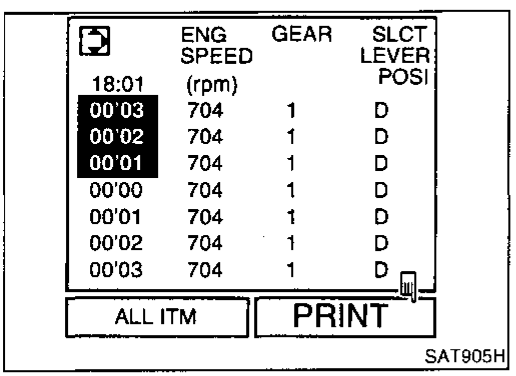
SAT301C

13. Touch "DISPLAY".



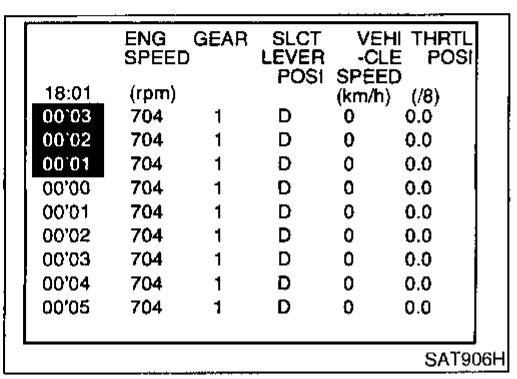
SAT904H

14. Touch "PRINT".



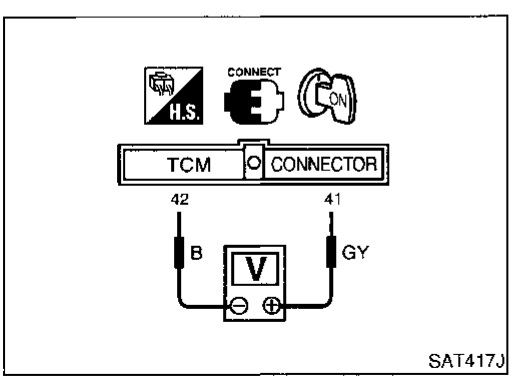
SAT905H

15. Touch "PRINT" again.



SAT906H

16. Check the monitor data printed out.
17. Continue cruise test part 2 and 3.



SAT417J

⊗ Without CONSULT

NCAT0028S0403

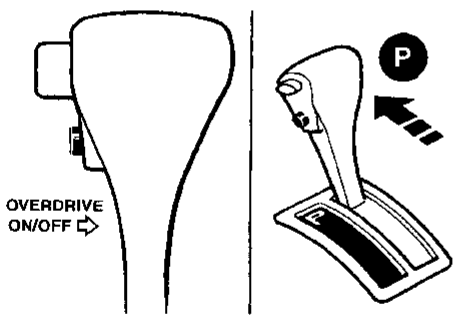
- Throttle position sensor can be checked by voltage across terminals 41 and 42 of TCM.

Cruise Test — Part 1

=NCAT0028S0404

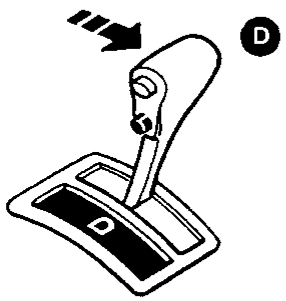
1 CHECK STARTING GEAR (D_1) POSITION

1. Drive vehicle for approx. 10 minutes to warm engine oil and ATF up to operating temperature.
   ATF operating temperature:
   50 - 80°C (122 - 176°F)
2. Park vehicle on flat surface.
3. Set overdrive control switch to "ON" position.
4. Move selector lever to "P" position.



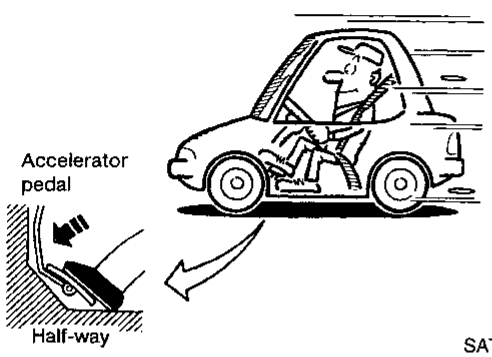
SAT001J

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



SAT775B

7. Accelerate vehicle by constantly depressing accelerator pedal halfway.



SAT495G

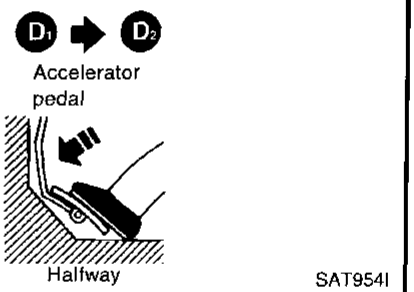
8. Does vehicle start from D_1?
   Read gear position.

Yes or No

Yes	▶	GO TO 2.
No	▶	Go to "8. Vehicle Cannot Be Started From D_1", AT-205. Continue ROAD TEST.

2 CHECK SHIFT UP (D_1 TO D_2)

Does A/T shift from D_1 to D_2 at the specified speed?
Read gear position, throttle opening and vehicle speed.
Specified speed when shifting from D_1 to D_2:
Refer to Shift schedule, AT-343.



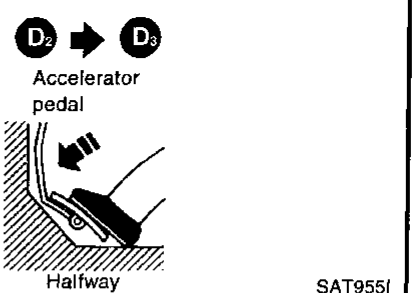
SAT954I

Yes or No

Yes	▶	GO TO 3.
No	▶	Go to "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-207. Continue ROAD TEST.

3 CHECK SHIFT UP (D_2 TO D_3)

Does A/T shift from D_2 to D_3 at the specified speed?
Read gear position, throttle position and vehicle speed.
Specified speed when shifting from D_2 to D_3:
Refer to Shift schedule, AT-343.



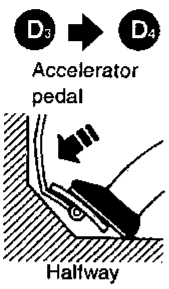
SAT955I

Yes or No

Yes	▶	GO TO 4.
No	▶	Go to "10. A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-209. Continue ROAD TEST.

4	CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?
Ⓐ Read gear position, throttle position and vehicle speed.
Specified speed when shifting from D_3 to D_4:
Refer to Shift schedule, AT-343.



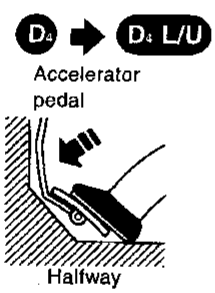
SAT956I

Yes or No

Yes	▶	GO TO 5.
No	▶	Go to "11. A/T Does Not Shift: $D_3 \rightarrow D_4$", AT-211. Continue ROAD TEST.

5	CHECK LOCK-UP (D_4 TO D_4 L/U)

Does A/T perform lock-up at the specified speed?
Ⓐ Read vehicle speed, throttle position when lock-up duty becomes 94%.
Specified speed when lock-up occurs:
Refer to 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

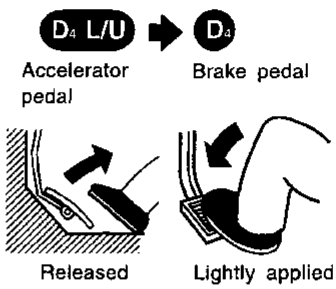
Does A/T hold lock-up condition for more than 30 seconds?

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 (D_4 L/U TO D_4)

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



SAT958I

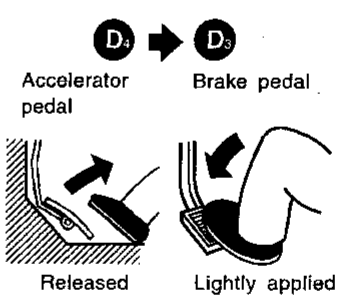
Yes or No

Yes	▶	GO TO 8.
No	▶	Go to "14. Lock-up Is Not Released", AT-215. Continue ROAD TEST.

8	CHECK SHIFT DOWN (D_4 TO D_3)

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

Ⓐ Read gear position and engine speed.



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 $D_4 \rightarrow D_3$)", AT-216. Continue ROAD TEST.

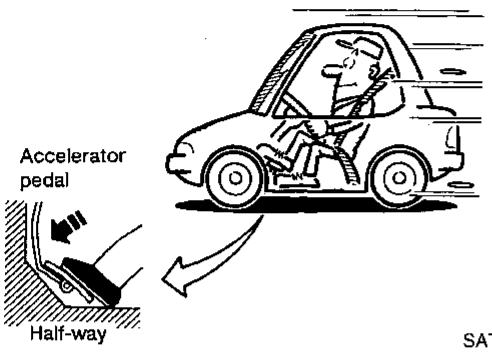
Cruise Test — Part 2

=NCAT0028S0405

1 CHECK STARTING GEAR (D_1) POSITION

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

Read gear position.



SAT495G

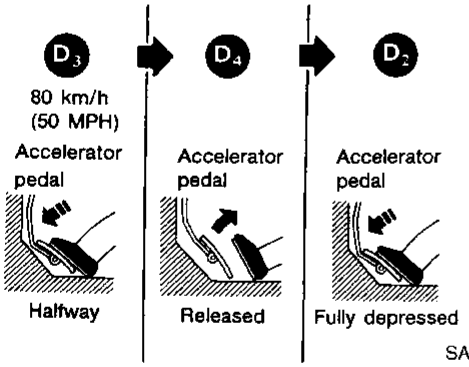
Yes or No

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 (D_3 TO D_4 TO D_2)

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

Read gear position and throttle position.



SAT404H

Yes or No

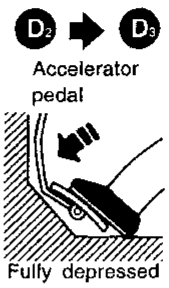
Yes	▶	GO TO 3.
No	▶	Go to "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-207. Continue ROAD TEST.

3 CHECK SHIFT UP (D_2 TO D_3)

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

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_2 to D_3:
Refer to Shift schedule, AT-343.



SAT960I

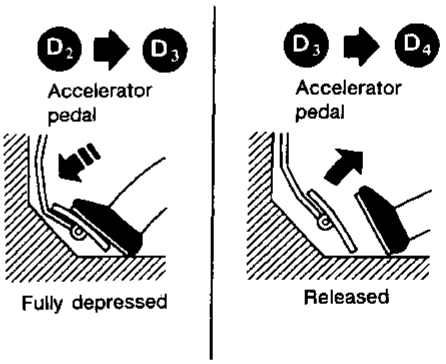
Yes or No

Yes	▶	GO TO 4.
No	▶	Go to "10. A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-209. Continue ROAD TEST.

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

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

Read gear position, throttle position and vehicle speed.



SAT405H

Yes or No

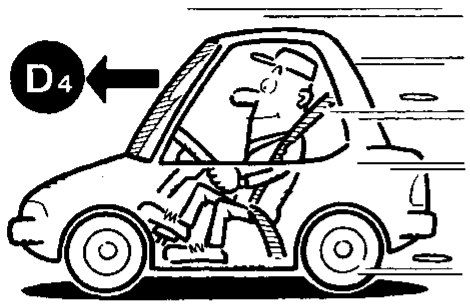
Yes	▶	1. Stop vehicle. 2. Go to "Cruise test — Part 3", AT-73.
No	▶	Go to "11. A/T Does Not Shift: $D_3 \rightarrow D_4$", AT-211. Continue ROAD TEST.

Cruise Test — Part 3

=NCAT0026S0406

1 VEHICLE SPEED D_4 POSITION

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

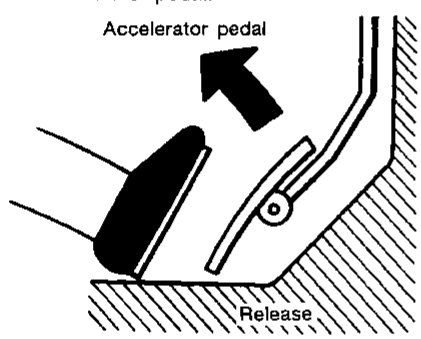


SAT812A

▶ GO TO 2.

2 CHECK SHIFT DOWN (D_4 TO D_3)

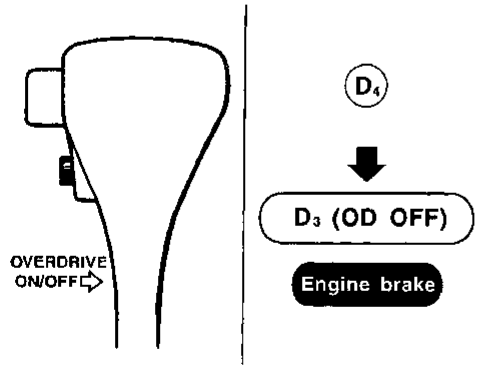
1. Release accelerator pedal.



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)?

Read gear position and vehicle speed.



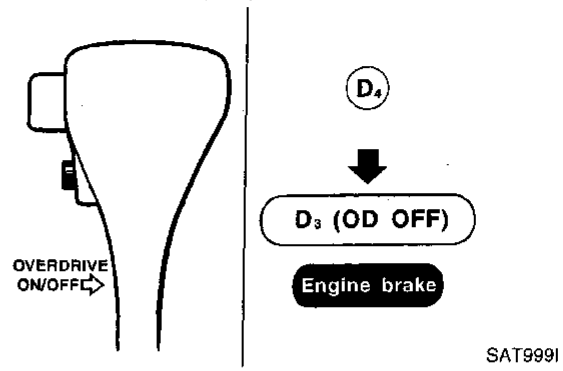
SAT999I

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.

3 CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?



SAT999I

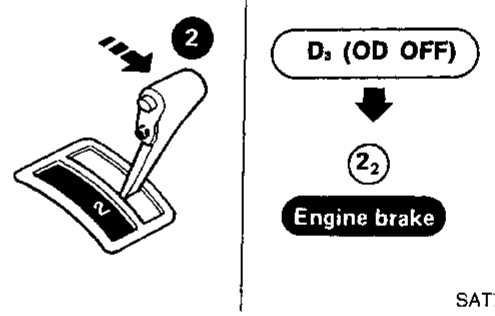
Yes or No

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.

4 CHECK SHIFT DOWN (D_3 TO D_2)

1. Move selector lever from "D" to "2" position while driving in D_3 (O/D OFF).
2. Does A/T shift from D_3 (O/D OFF) to 2_2?

Read gear position.



SAT791GA

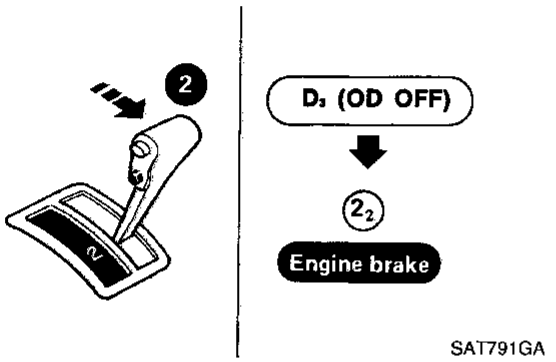
Yes or No

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.

Road Test (Cont'd)

5	CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?



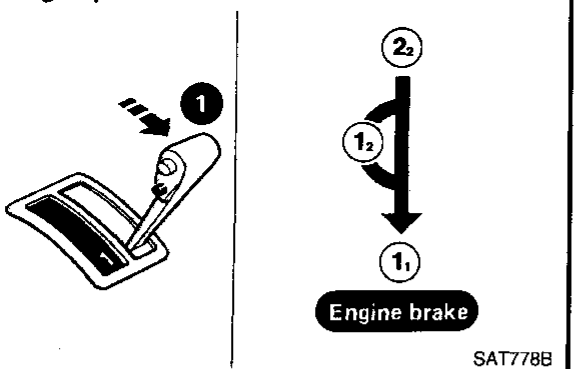
Yes or No

Yes	▶	GO TO 6.
No	▶	Go to "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-216. 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?

Read gear position.

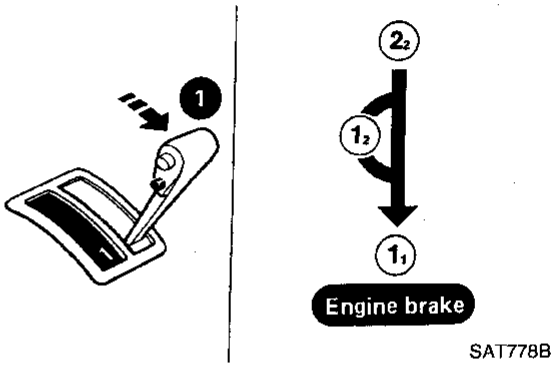


Yes or No

Yes	▶	GO TO 7.
No	▶	Go to "19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector lever "2" → "1" Position", AT-220. Continue ROAD TEST.

7	CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?



Yes or No

Yes	▶	1. Stop vehicle. 2. Perform self-diagnosis. Refer to TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS), AT-48.
No	▶	Go to "20. Vehicle Does Not Decelerate By Engine Brake", AT-221. Continue ROAD TEST.

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
		2. Control cable adjustment	AT-235
		3. PNP switch adjustment	AT-235
Engine starts in position other than "N" and "P" positions. AT-197	ON vehicle	1. Control cable adjustment	AT-235
		2. PNP switch adjustment	AT-235
Transmission noise in "P" and "N" positions.	ON vehicle	1. Fluid level	AT-58
		2. Line pressure test	AT-62
		3. Throttle position sensor (Adjustment)	EC section
		4. Revolution sensor and vehicle speed sensor	AT-103, AT-187
		5. Engine speed signal	AT-108
	OFF vehicle	6. Oil pump	AT-262
		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
	OFF vehicle	2. Parking components	AT-240
Vehicle runs in "N" position. AT-199	ON vehicle	1. Control cable adjustment	AT-235
	OFF vehicle	2. Forward clutch	AT-290
		3. Reverse clutch	AT-281
		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
		2. Line pressure test	AT-62
		3. Line pressure solenoid valve	AT-152
		4. Control valve assembly	AT-234
	OFF vehicle	5. Reverse clutch	AT-281
		6. High clutch	AT-285
		7. Forward clutch	AT-290
		8. Overrun clutch	AT-290
		9. Low & reverse brake	AT-297

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

Symptom Chart (Cont'd)

Symptom	Condition	Diagnostic Item	Reference Page
Clutches or brakes slip somewhat in starting.	ON vehicle	1. Fluid level	AT-58
		2. Control cable adjustment	AT-235
		3. Throttle position sensor (Adjustment)	EC section
		4. Line pressure test	AT-62
		5. Line pressure solenoid valve	AT-152
		6. Control valve assembly	AT-234
		7. Accumulator N-D	AT-234
	OFF vehicle	8. Forward clutch	AT-290
		9. Reverse clutch	AT-281
		10. Low & reverse brake	AT-297
		11. Oil pump	AT-262
		12. Torque converter	AT-245
Excessive creep.	ON vehicle	1. Engine idling rpm	AT-62
No creep at all. AT-201, 203	ON vehicle	1. Fluid level	AT-58
		2. Line pressure test	AT-62
		3. Control valve assembly	AT-234
	OFF vehicle	4. Forward clutch	AT-290
		5. Oil pump	AT-262
		6. Torque converter	AT-245
Failure to change gear from "D_1" to "D_2".	ON vehicle	1. PNP switch adjustment	AT-235
		2. Control cable adjustment	AT-235
		3. Shift solenoid valve A	AT-158
		4. Control valve assembly	AT-234
		5. Revolution sensor and vehicle speed sensor	AT-103, AT-187
	OFF vehicle	6. Brake band	AT-240
Failure to change gear from "D_2" to "D_3".	ON vehicle	1. PNP switch adjustment	AT-235
		2. Control cable adjustment	AT-235
		3. Shift solenoid valve B	AT-163
		4. Control valve assembly	AT-234
		5. Revolution sensor and vehicle speed sensor	AT-103, AT-187
	OFF vehicle	6. High clutch	AT-285
		7. Brake band	AT-240

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
		2. Accumulator servo release	AT-234
	OFF vehicle	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

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
		2. Throttle position sensor (Adjustment)	EC section
		3. Line pressure test	AT-62
		4. Accumulator servo release	AT-234
		5. Control valve assembly	AT-234
	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
		2. Throttle position sensor (Adjustment)	EC section
		3. Line pressure test	AT-62
		4. Control valve assembly	AT-234
	OFF vehicle	5. High clutch	AT-285
		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
		2. Throttle position sensor (Adjustment)	EC section
		3. Line pressure test	AT-62
		4. Control valve assembly	AT-234
	OFF vehicle	5. High clutch	AT-285
		6. Brake band	AT-240
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
		3. Low & reverse brake	AT-297
		4. High clutch	AT-285
		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
	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
	OFF vehicle	2. Overrun clutch	AT-290
		3. Forward one-way clutch	AT-301
		4. Reverse clutch	AT-281

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

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
		2. Revolution sensor and vehicle speed sensor	AT-103, AT-187
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
		3. Shift solenoid valve A	AT-158
		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
		2. Throttle position sensor (Adjustment)	EC section
		3. Shift solenoid valve A	AT-158
		4. Shift solenoid valve B	AT-163
Races extremely fast or slips in changing from "D_4" to "D_3" 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. High clutch	AT-285
		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
		2. Throttle position sensor (Adjustment)	EC section
		3. Line pressure test	AT-62
		4. Line pressure solenoid valve	AT-152
		5. Shift solenoid valve A	AT-158
		6. Control valve assembly	AT-234
	OFF vehicle	7. Brake band	AT-240
		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
		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
		6. A/T fluid temperature sensor	AT-97
	OFF vehicle	7. Brake band	AT-240
		8. Forward clutch	AT-290
		9. High clutch	AT-285

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

Symptom Chart (Cont'd)

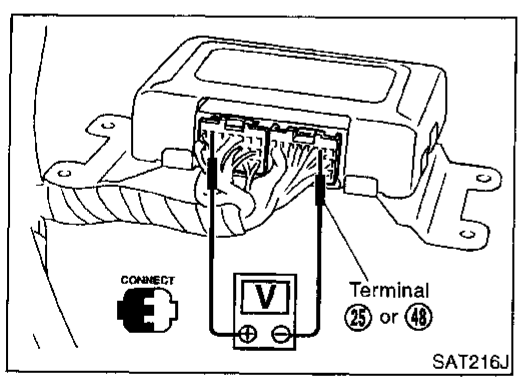
Symptom	Condition	Diagnostic Item	Reference Page
Engine brake does not operate in "1" position. AT-217	ON vehicle	1. PNP switch adjustment	AT-235
		2. Control cable adjustment	AT-235
		3. Throttle position sensor (Adjustment)	EC section
		4. Revolution sensor and vehicle speed sensor	AT-103, AT-187
		5. Shift solenoid valve A	AT-158
		6. Control valve assembly	AT-234
		7. Overrun clutch solenoid valve	AT-176
	OFF vehicle	8. Overrun clutch	AT-290
		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
		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
		2. Revolution sensor and vehicle speed sensor	AT-103, AT-187
		3. Shift solenoid valve A	AT-158
		4. Control valve assembly	AT-234
		5. Overrun clutch solenoid valve	AT-176
	OFF vehicle	6. Overrun clutch	AT-290
		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
	OFF vehicle	2. Low & reverse brake	AT-297
Transmission overheats.	ON vehicle	1. Fluid level	AT-58
		2. Engine idling rpm	AT-62
		3. Throttle position sensor (Adjustment)	EC section
		4. Line pressure test	AT-62
		5. Line pressure solenoid valve	AT-152
		6. Control valve assembly	AT-234
	OFF vehicle	7. Oil pump	AT-262
		8. Reverse clutch	AT-281
		9. High clutch	AT-285
		10. Brake band	AT-240
		11. Forward clutch	AT-290
		12. Overrun clutch	AT-290
		13. Low & reverse brake	AT-297
		14. Torque converter	AT-245

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

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



TCM Terminals and Reference Value

NCAT0030

PREPARATION

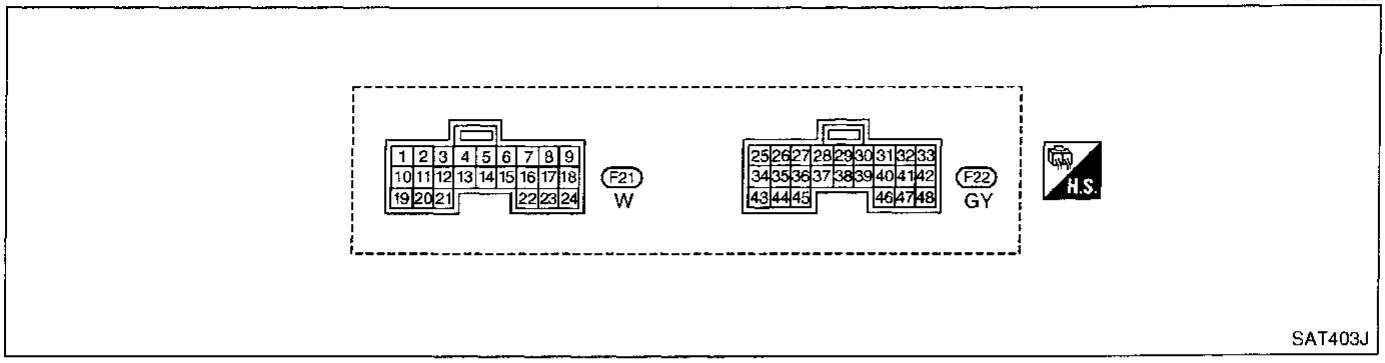
NCAT0030S01

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

TCM Terminals and Reference Value (Cont'd)

TCM HARNESS CONNECTOR TERMINAL LAYOUT

NCAT0030S02

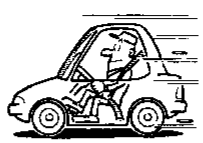
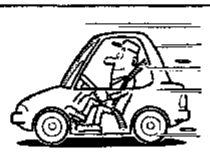


TCM INSPECTION TABLE

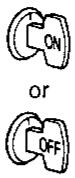
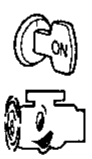
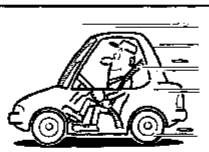
(Data are reference values.)

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	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

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
				When setting overdrive control switch in "ON" position.	Battery voltage
15 *1	PU	—		—	—
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
18	OR	ASCD cruise switch		When ASCD cruise is being performed. ("CRUISE" light comes on.)	Battery voltage
				When ASCD cruise is not being performed. ("CRUISE" light does not comes on.)	1V or less
19	G/OR	Power source		Same as No. 10	
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	1V or less
22	G/R	Overdrive control switch		When setting overdrive control switch in "ON" position	Battery voltage
				When setting overdrive control switch in "OFF" position	1V or less
24	OR/B	ASCD OD cut signal		When "ACCEL" set switch on ASCD cruise is in "D_4" position.	5 - 8V
				When "ACCEL" set switch on ASCD cruise is in "D_3" position.	1V or less
25	B	Ground		—	—
26	SB	PNP switch "1" position		When setting selector lever to "1" position.	Battery voltage
				When setting selector lever to other positions.	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

TCM Terminals and Reference Value (Cont'd)

Terminal No.	Wire color	Item	Condition		Judgement standard
28	P	Power source (Memory back-up)		When turning ignition switch to "OFF".	Battery voltage
				When turning ignition switch to "ON".	Battery voltage
29	W	Revolution sensor (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.	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
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

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
42	B	Throttle position sensor (Ground)		—	—
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
48	B	Ground		—	—

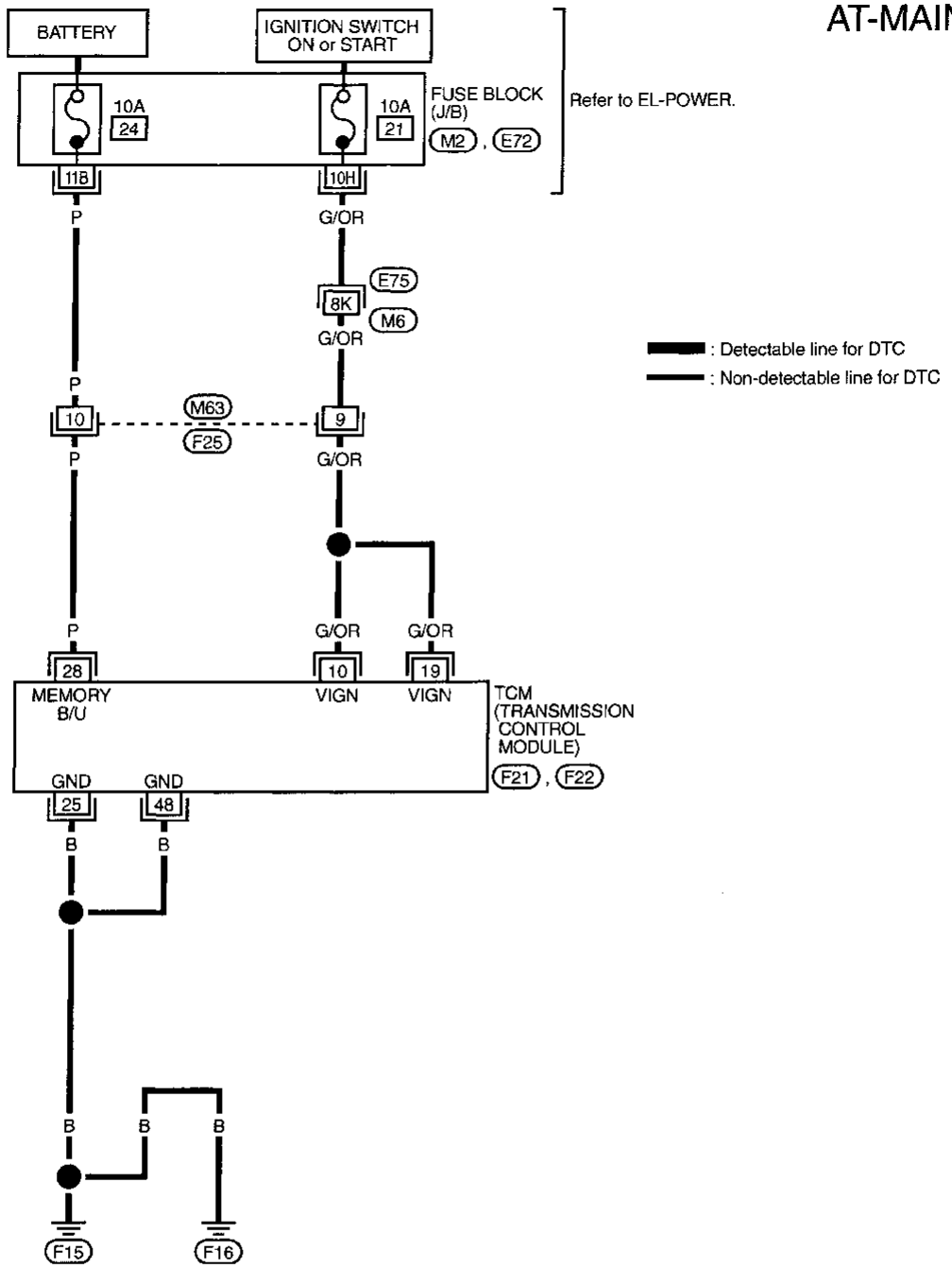
*1: This terminal is connected to the ECM.

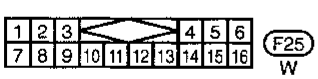
*2: These terminals are connected to the Data link connector for CONSULT.

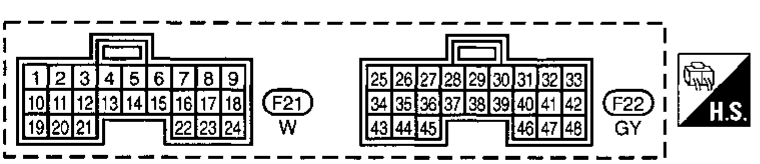
Wiring Diagram — AT — MAIN

NCAT0031

AT-MAIN-01







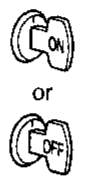
Refer to last page (Foldout page).
M6 , E75
M2
E72

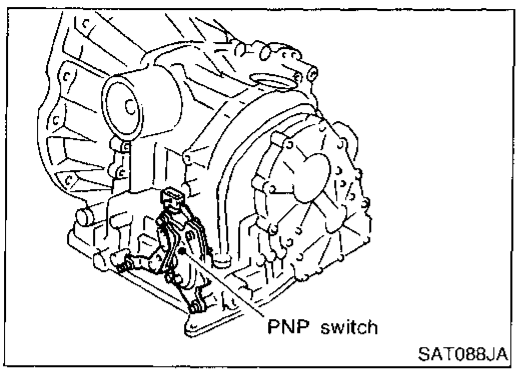
TAT173

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		Same as No. 10	
25	B	Ground		—	—
28	P	Power source (Memory back-up)		When turning ignition switch to "OFF".	Battery voltage
				When turning ignition switch to "ON".	Battery voltage
48	B	Ground		—	—



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

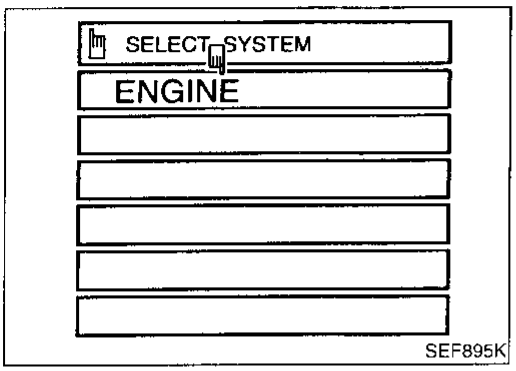
Remarks: Specification data are reference values.

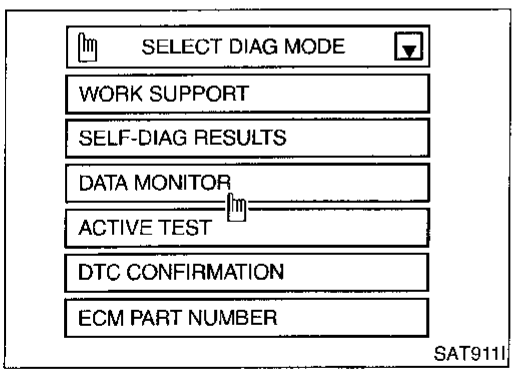
Terminal No.	Wire color	Item	Condition		Judgement standard
26	SB	PNP switch "1" position		When setting selector lever to "1" position.	Battery voltage
				When setting selector lever to other positions.	1V or less
27	L/OR	PNP switch "2" position		When setting selector lever to "2" position.	Battery voltage
				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)
: PNP SW/CIRC	TCM does not receive the correct voltage signal from the switch based on the gear position.	• Harness or connectors (The PNP switch circuit is open or shorted.) • PNP switch
: P0705		
: MIL Code No. 1101		





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

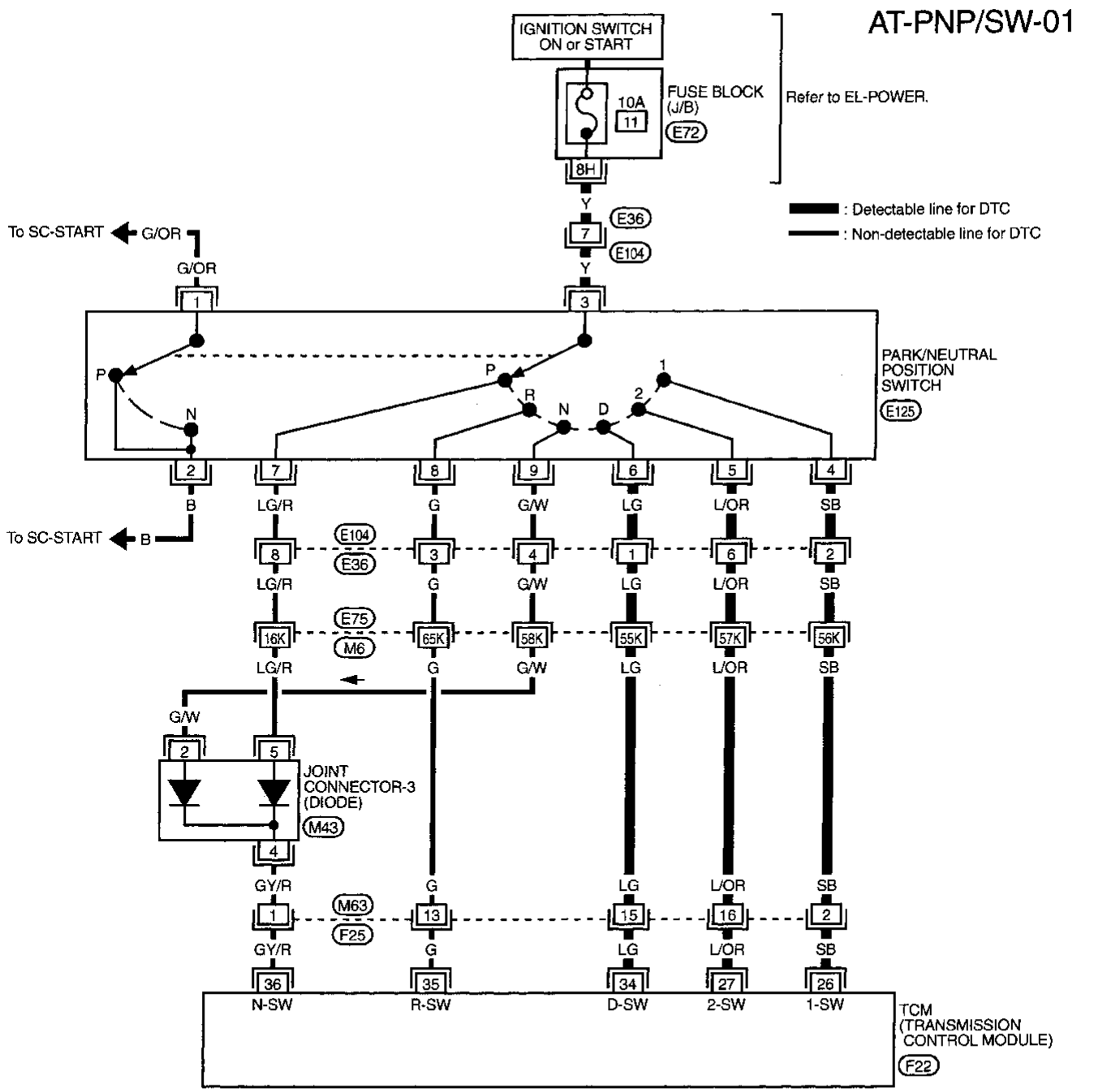
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D" position, overdrive control switch in "ON" or "OFF" position, vehicle speed higher than 10 km/h (6 MPH), throttle position sensor more than 1.3V and driving for more than 5 seconds.
3) Select "MODE 7" with GST.

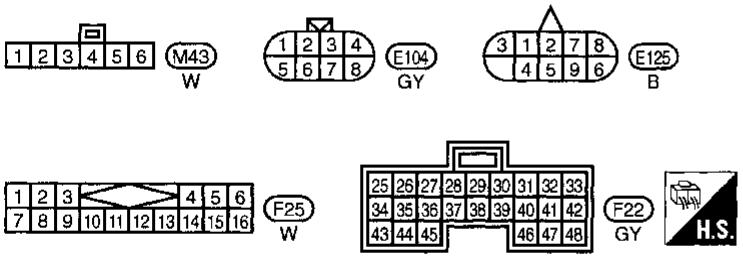
No Tools

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"].

Wiring Diagram — AT — PNP/SW

NCAT0199





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

TAT174

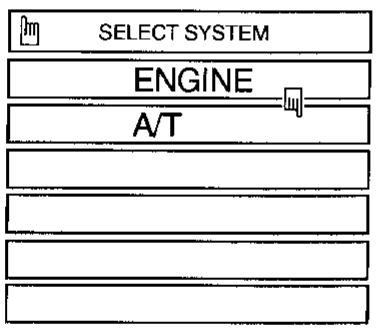
Diagnostic Procedure

NCAT0033

1 CHECK PNP SWITCH CIRCUIT (With CONSULT)

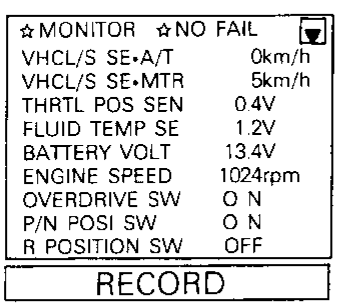
With CONSULT

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.



SAT974H

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



SAT076H

OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following items:** • 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)

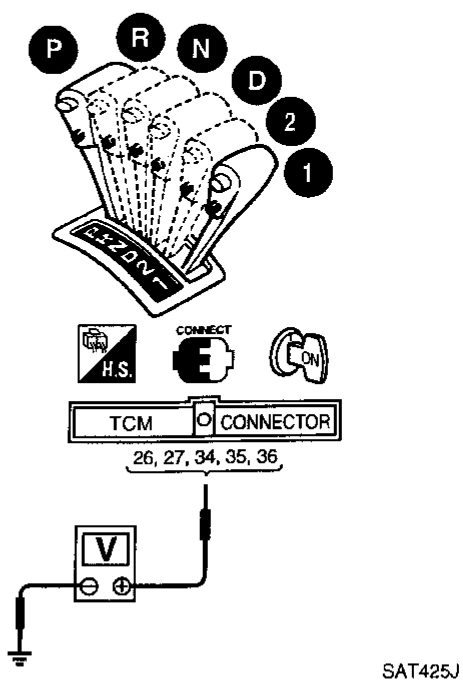
Without CONSULT

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

Voltage:
B: Battery voltage
0: 0V

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

MTBL0136

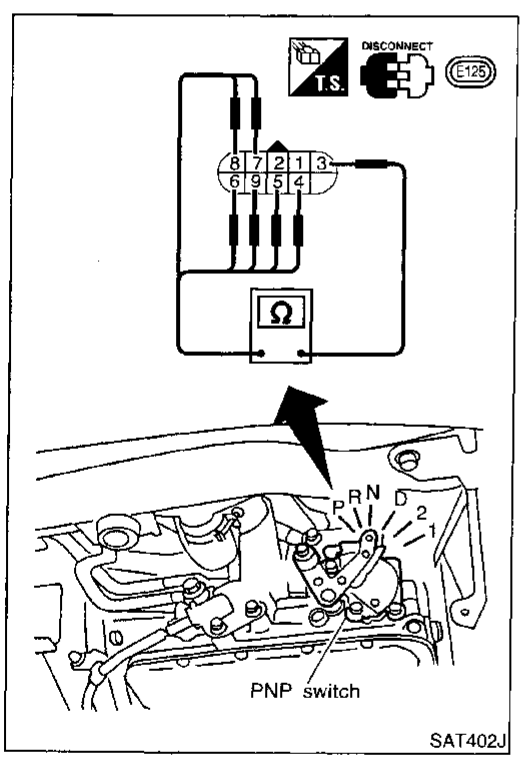


SAT425J

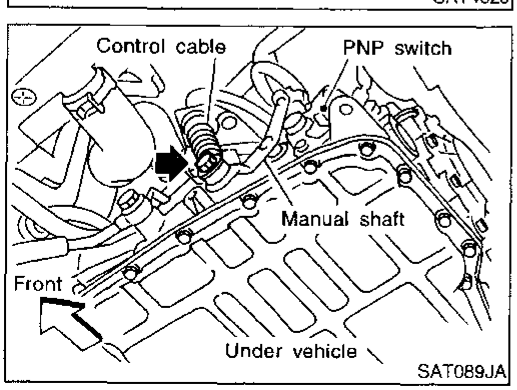
OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following items:** • PNP switch Refer to "Component Inspection", AT-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)

3	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-93.	
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.



SAT402J



SAT089JA

Component Inspection

NCAT0034

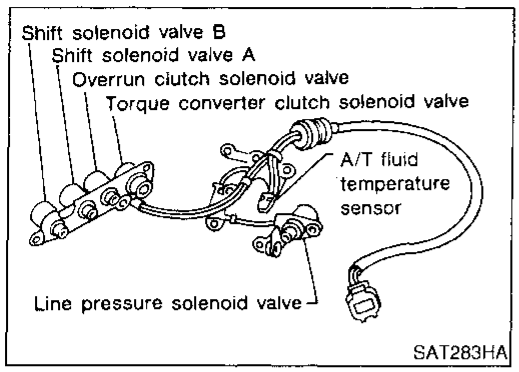
PARK/NEUTRAL POSITION SWITCH

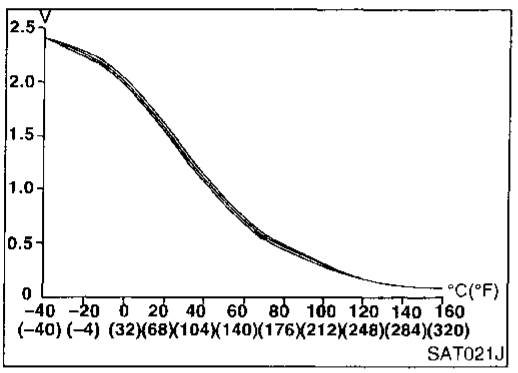
NCAT0034S01

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

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

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





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)] ↓ Hot [80°C (176°F)]	Approximately 1.5V ↓ Approximately 0.5V

TCM TERMINALS AND REFERENCE VALUE

NCAT0035S02

Remarks: Specification data are reference values.

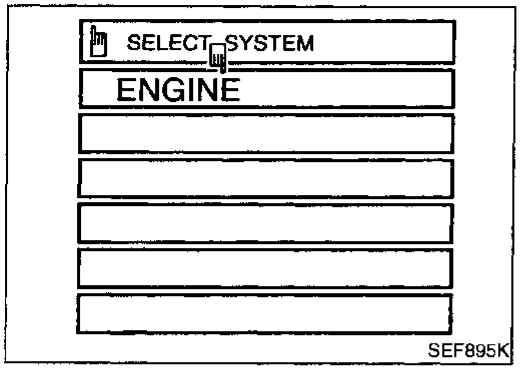
Terminal No.	Wire color	Item	Condition		Judgement standard
42	B	Throttle position sensor (Ground)		—	—
47	BR	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	Approximately 1.5V
				When ATF temperature is 80°C (176°F).	Approximately 0.5V

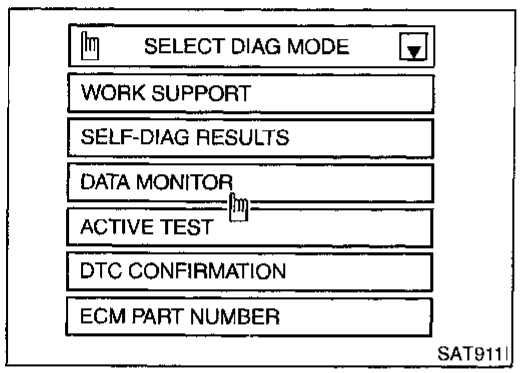
ON BOARD DIAGNOSIS LOGIC

NCAT0035S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
(P) : ATF TEMP SEN/CIRC	TCM receives an excessively low or high voltage from the sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • A/T fluid temperature sensor
(GST) : P0710		
(NO TOOLS) : MIL Code No. 1208		

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.

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")

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.

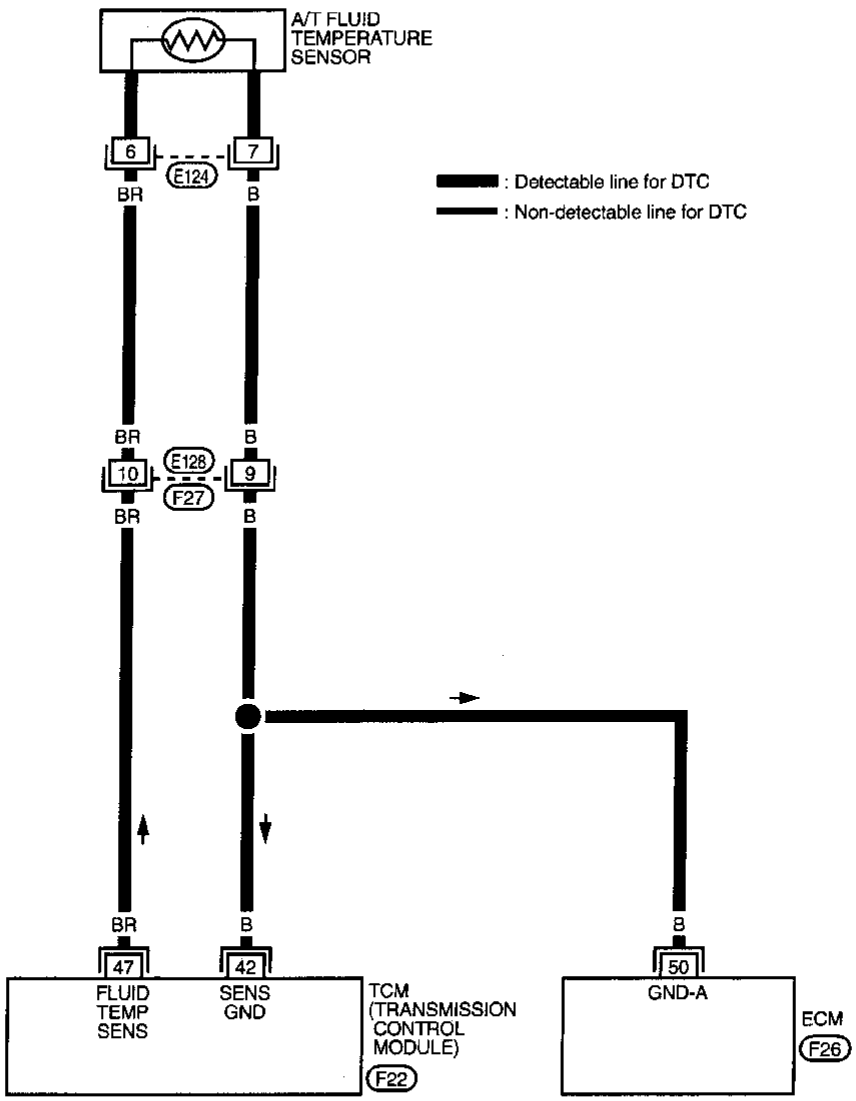
No Tools

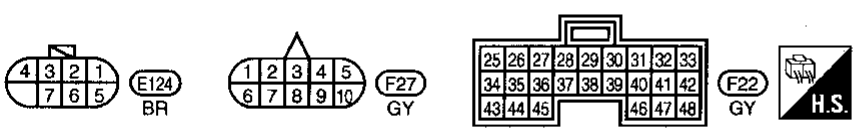
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D" (OD "ON"), vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes (Total).
3) Perform self-diagnosis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

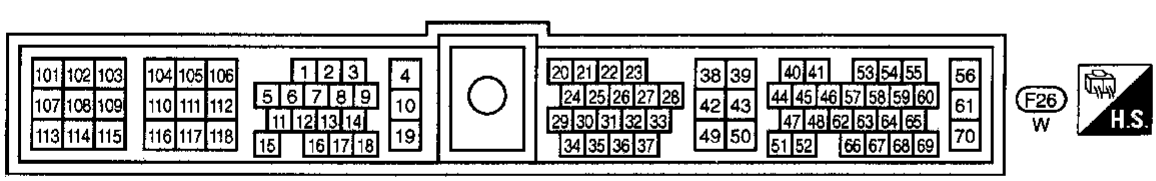
Wiring Diagram — AT — FTS

NCAT0200

AT-FTS-01







TAT175

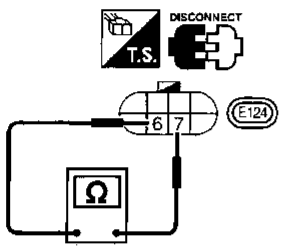
Diagnostic Procedure

NCAT0036

1 CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY

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

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



SAT419J

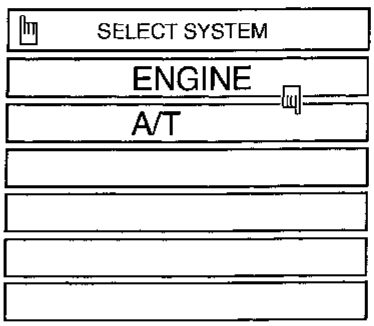
4. Reinstall any part removed.

OK or NG

OK (With CONSULT)	▶	GO TO 2.
OK (Without CONSULT)	▶	GO TO 3.
NG	▶	1. Remove oil pan. 2. Check the following items: • 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)

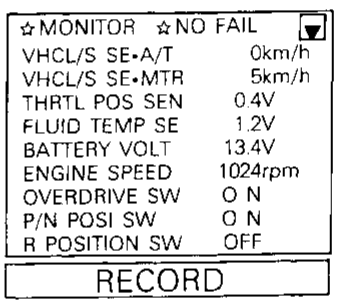
With CONSULT
1. Start engine.
2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT.



SAT974H

3. Read out the value of "FLUID TEMP SE".

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



SAT076H

OK or NG

OK	▶	GO TO 4.
NG	▶	**Check the following item:** • 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").

3	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (Without CONSULT)

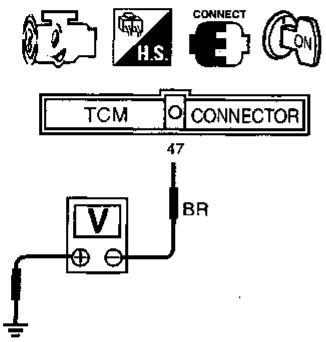
Without CONSULT

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

   Voltage:

   Cold [20°C (68°F)] → Hot [80°C (176°F)]:

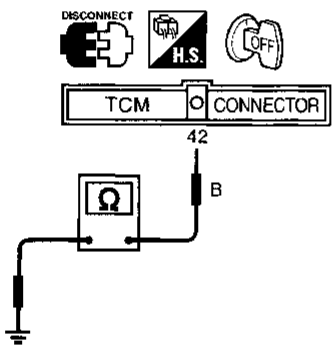
   Approximately 1.5V → 0.5V



SAT420J

3. Turn ignition switch to "OFF" position.
4. Disconnect TCM harness connector.
5. Check continuity between terminal 42 and ground.

   Continuity should exist.



SAT421J

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

OK or NG

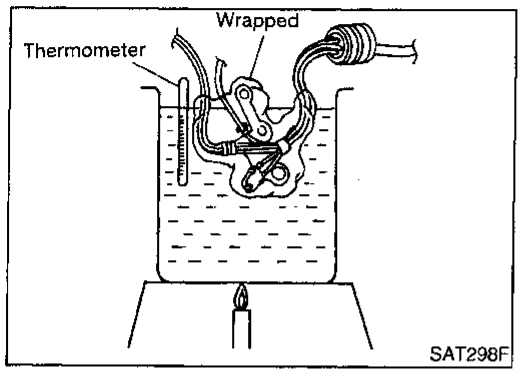
OK	▶	GO TO 4.
NG	▶	**Check the following item:** • Harness for short to ground or short to power or open between TCM, ECM and terminal cord assembly (Main harness) • Ground circuit for ECM Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY").

4	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-98.

OK or NG

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



Component Inspection

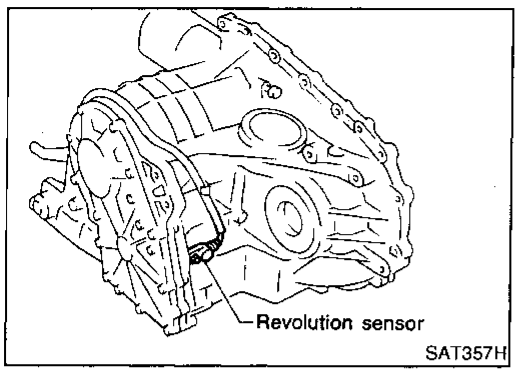
NCAT0037

A/T FLUID TEMPERATURE SENSOR

NCAT0037S01

- 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 kΩ
80 (176)	Approximately 0.3 kΩ



Description

NCAT0038

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.

TCM TERMINALS AND REFERENCE VALUE

NCAT0038S01

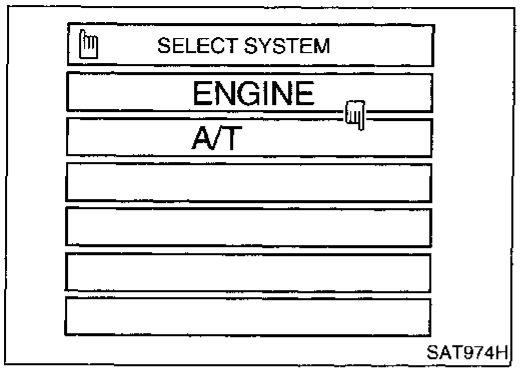
Remarks: Specification data are reference values.

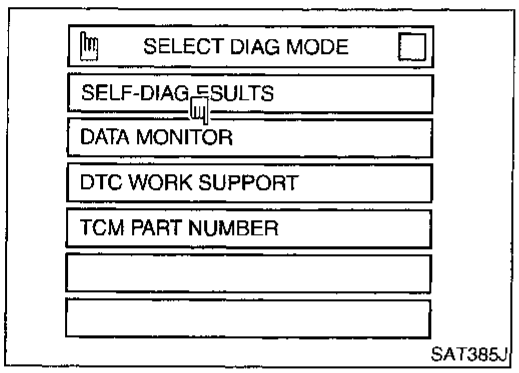
Terminal No.	Wire color	Item	Condition		Judgement standard
29	W	Revolution sensor (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
				When vehicle parks.	0V
42	B	Throttle position sensor (Ground)		—	—

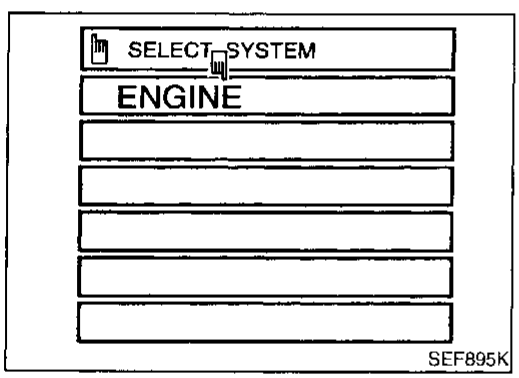
ON BOARD DIAGNOSIS LOGIC

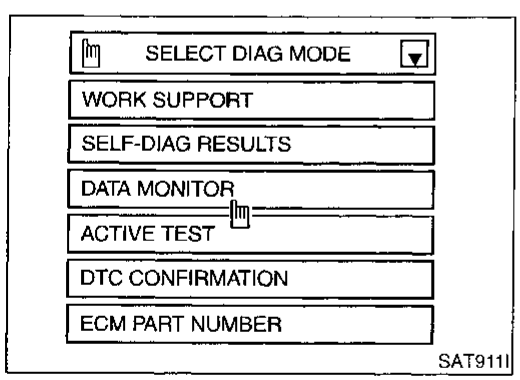
NCAT0038S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: VEH SPD SEN/CIR AT	TCM does not receive the proper voltage signal from the sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Revolution sensor
: P0720		
: MIL Code No. 1102		









DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0036S03

CAUTION:

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

NOTE:

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

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

With CONSULT

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.

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.

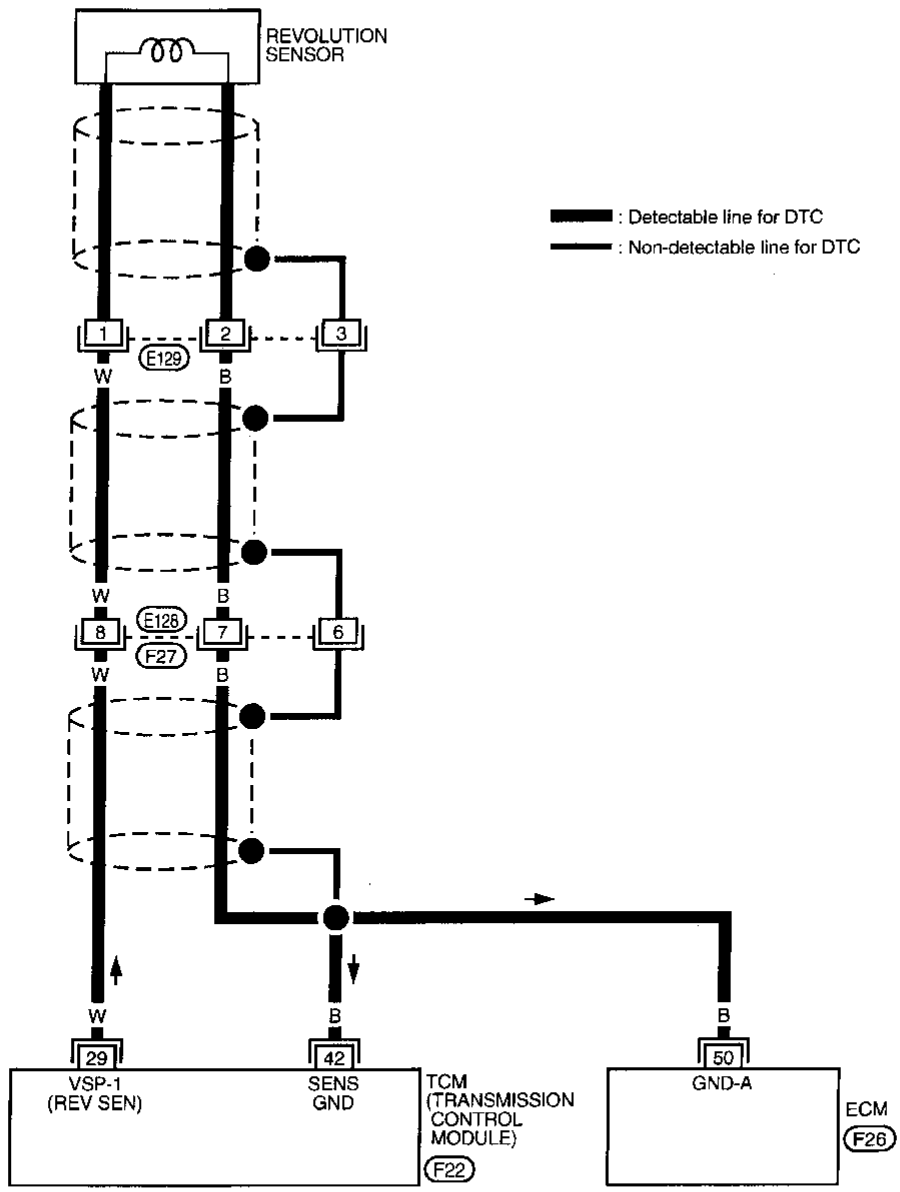
No Tools

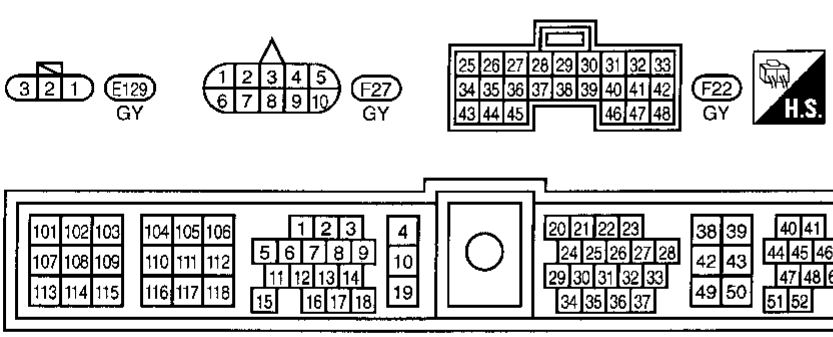
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D" (OD "ON"), vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.
3) Perform self-diagnosis for ECM.
   Refer to EC section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

Wiring Diagram — AT — VSSA/T

NCAT0201

AT-VSSAT-01





TAT176

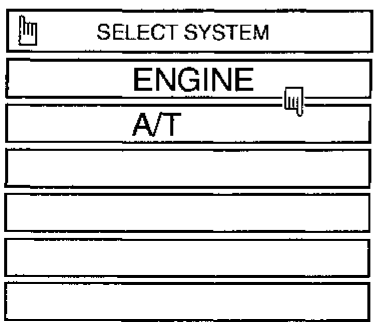
Diagnostic Procedure

NCAT0039

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.

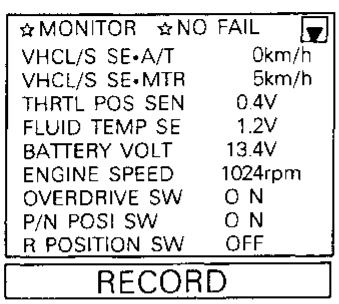
2	CHECK INPUT SIGNAL (With CONSULT)

With CONSULT
1. Start engine.
2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT.



SAT974H

3. Read out the value of "VHCL/S SE-A/T" while driving. Check the value changes according to driving speed.



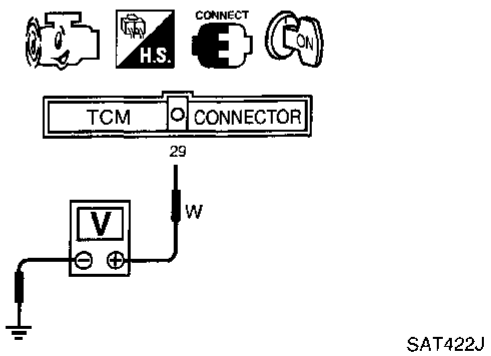
SAT076H

OK or NG

OK ▶	GO TO 4.
NG ▶	**Check the following items:** • Harness for short or open between TCM, ECM and revolution sensor (Main harness) • Ground circuit for ECM Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY").

3	CHECK INPUT SIGNAL (Without CONSULT)

Without CONSULT
1. Start engine.
2. Check voltage between TCM terminal 29 and ground while driving.
   (Measure with AC range.)
   Voltage:
   At 0 km/h (0 MPH):
   0V
   At 30 km/h (19 MPH):
   1V or more
   (Voltage rises gradually in response to vehicle speed.)

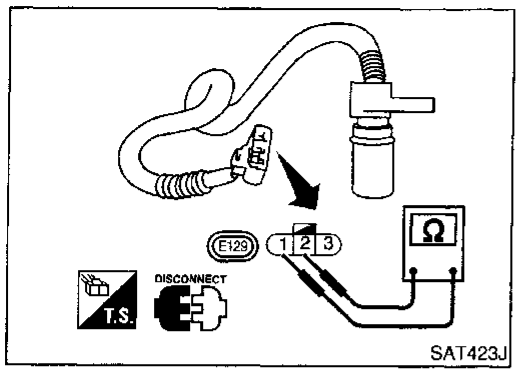


SAT422J

OK or NG

OK ▶	GO TO 4.
NG ▶	**Check the following items:** • Harness for short or open between TCM, ECM and revolution sensor (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-104.	
OK or NG	
OK ▶	**INSPECTION END**
NG ▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.



Component Inspection

NCAT0040

REVOLUTION SENSOR

NCAT0040S01

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

Terminal No.		Resistance
1	2	500 - 650Ω

Description

NCAT0041

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

TCM TERMINALS AND REFERENCE VALUE

NCAT0041S01

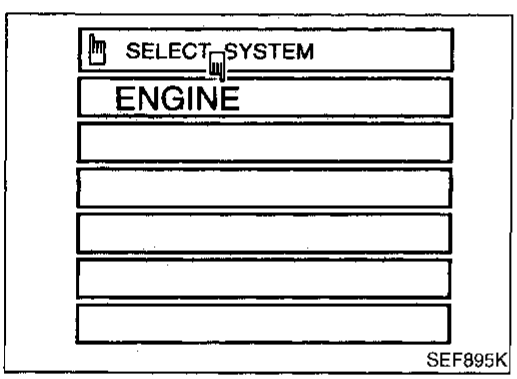
Remarks: Specification data are reference values.

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

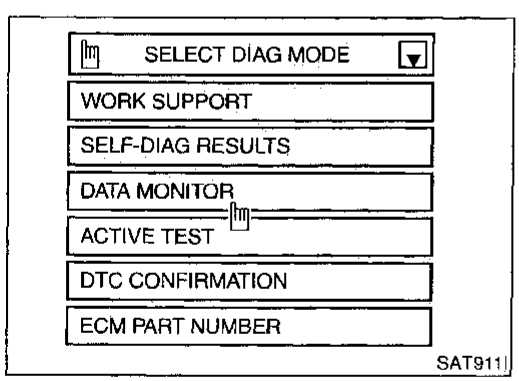
ON BOARD DIAGNOSIS LOGIC

NCAT0041S02

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: ENGINE SPEED SIG : P0725 : MIL Code No. 1207	TCM does not receive the proper voltage signal from ECM.	• Harness or connectors (The sensor circuit is open or shorted.)



SEF895K



SAT911I

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0041S03

CAUTION:
Always drive vehicle at a safe speed.

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

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

With CONSULT

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 consecutive seconds.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (OD "ON")

With GST

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 throttle position and driving for more than 10 consecutive seconds.
3) Select "MODE 7" with GST.

No Tools

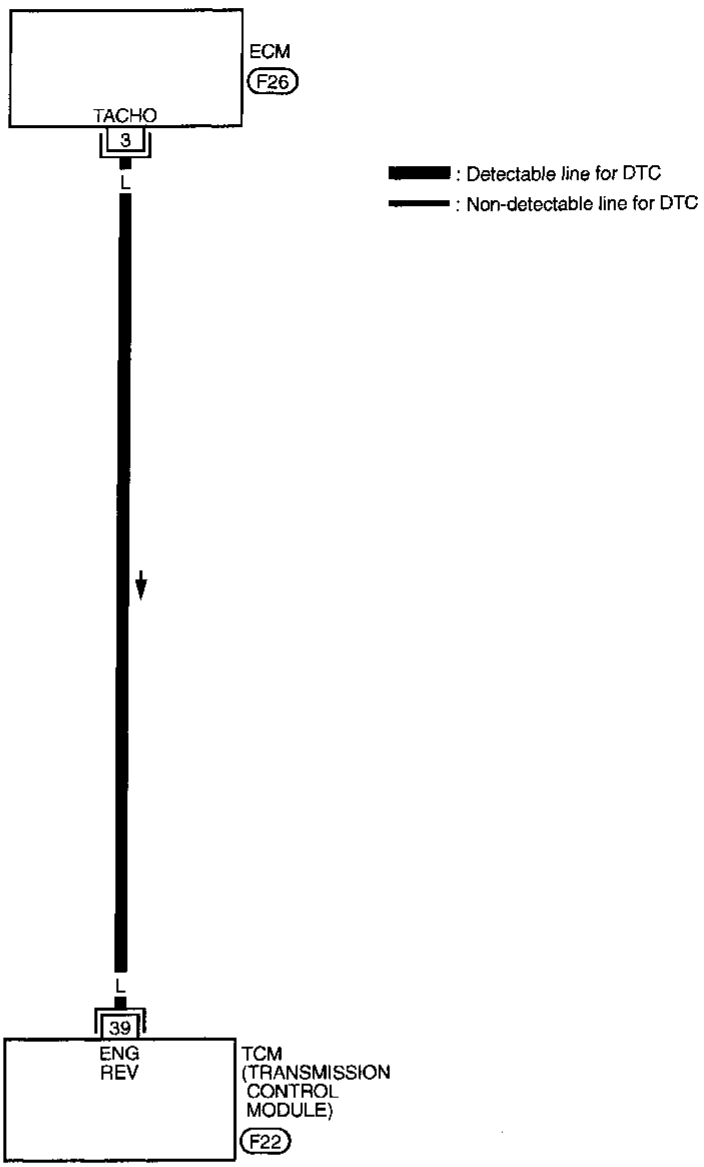
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D" (OD "ON"), vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 10 consecutive seconds.

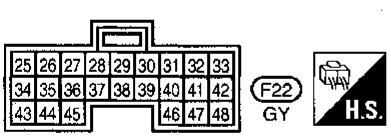
3) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

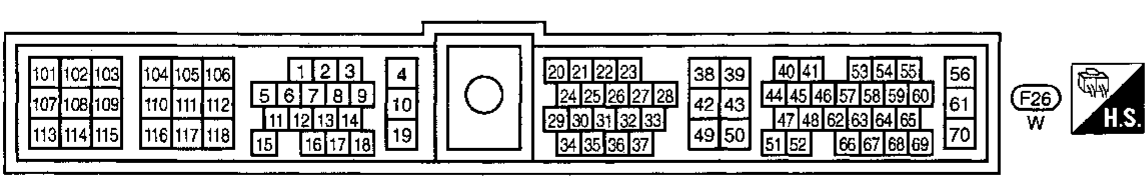
Wiring Diagram — AT — ENGSS

NCAT0202

AT-ENGSS-01







TAT177

Diagnostic Procedure

NCAT0042

1	CHECK DTC WITH ECM

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

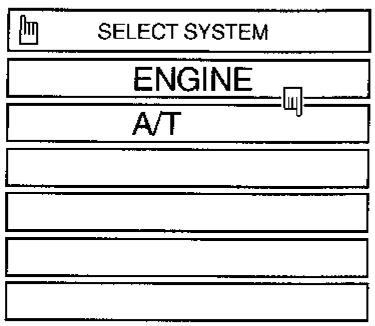
OK or NG

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)

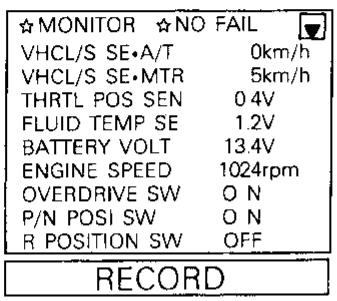
With CONSULT

1. Start engine.
2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT.



SAT974H

3. Read out the value of "ENGINE SPEED". Check engine speed changes according to throttle position.



SAT076H

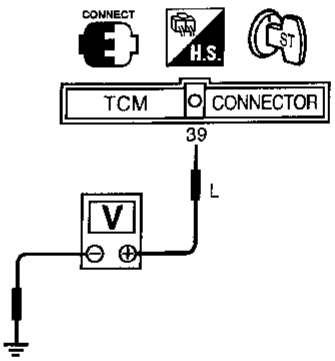
OK or NG

OK	▶	GO TO 4.
NG	▶	**Check the following items:** • Harness for short or open between TCM and ECM • Resistor and ignition coil Refer to EC section ["Ignition Signal (DTC: 0201)", "TROUBLE DIAGNOSIS FOR DTC P1320"].

3	CHECK INPUT SIGNAL (Without CONSULT)

Without CONSULT

1. Start engine.
2. Check voltage between TCM terminal 39 and ground.
   Voltage (Idle speed):
   0.5 - 1.5V



SAT424J

OK or NG

OK	▶	GO TO 4.
NG	▶	**Check the following items:** • Harness for short or open between TCM and ECM • Resistor and ignition coil Refer to EC section ["Ignition Signal (DTC: 0201)", "TROUBLE DIAGNOSIS FOR DTC P1320"].

4	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-108.

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.

Description

NCAT0043

- 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

NCAT0043S01

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard
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

ON BOARD DIAGNOSTIC LOGIC

NCAT0043S02

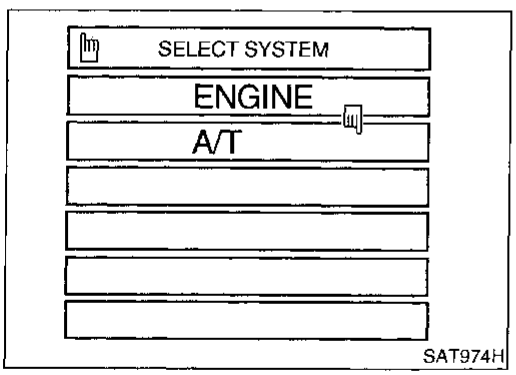
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (1st) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when either shift solenoid valve A is stuck open or shift solenoid valve B is stuck open.

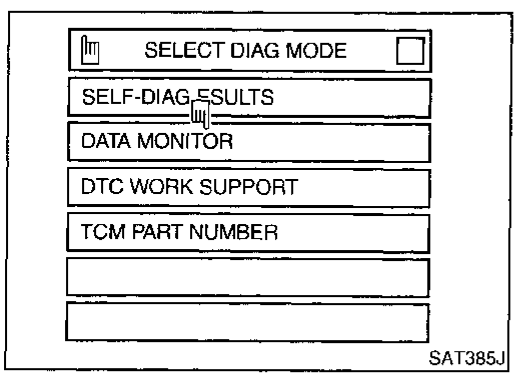
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve A stuck open	2*	2	3	3
In case of gear position with shift solenoid valve B stuck open	4*	3	3	4

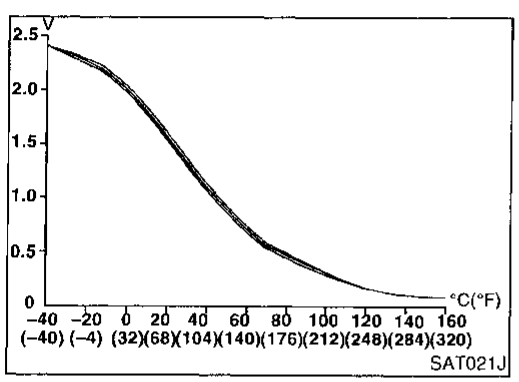
*: P0731 is detected.

Description (Cont'd)

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 1ST GR FNCTN : P0731 : MIL Code No. 1103	A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	• Shift solenoid valve A • Shift solenoid valve B • Each clutch • Hydraulic control circuit







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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**

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) ake 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.

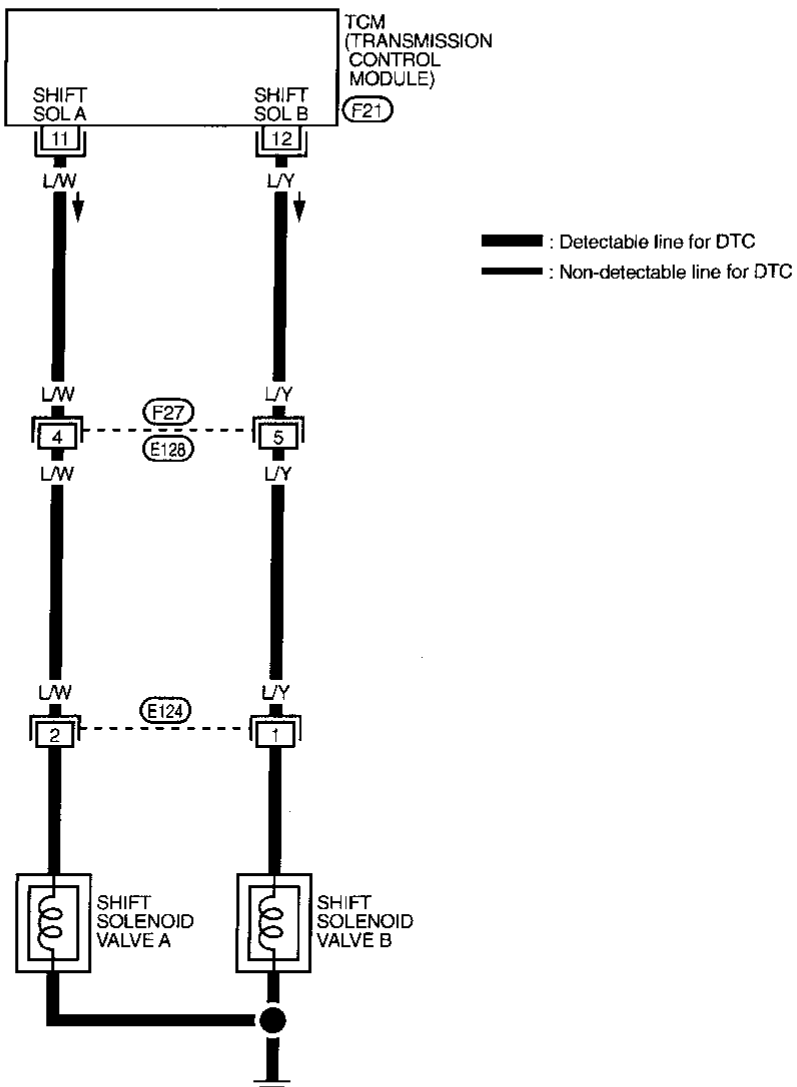
No Tools

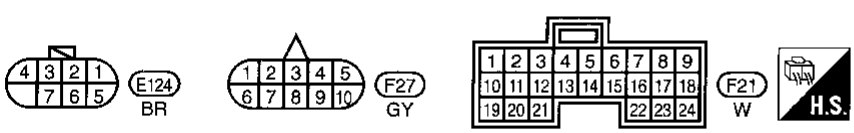
1) Start engine and warm up ATF.
2) Accelerate vehicle to 20 to 25 km/h (12 to 16 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1/8
   Selector lever: D position (OD "ON")
   Refer to shift schedule, AT-343.
3) Depress accelerator pedal to 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"].

Wiring Diagram — AT — 1ST

NCAT0203

AT-1STSIG-01





TAT178

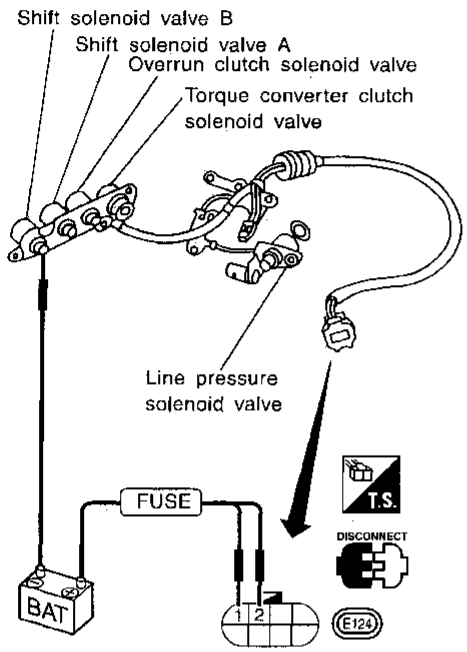
Diagnostic Procedure

NCAT0044

1 CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-234.
2. Check shift solenoid valve operation.
- Shift solenoid valve A
- Shift solenoid valve B

Refer to "Component Inspection", AT-117.



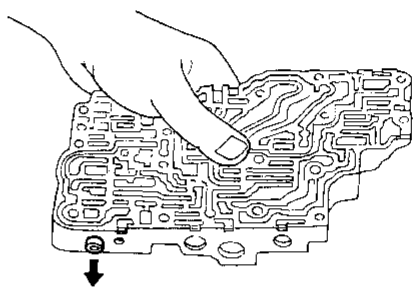
SAT426J

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:
- 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

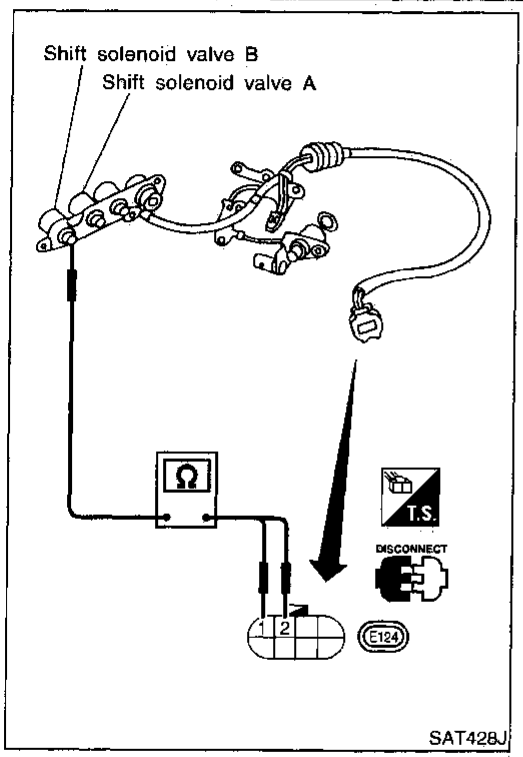
OK	▶	GO TO 3.
NG	▶	Repair control valve assembly.

3 CHECK DTC

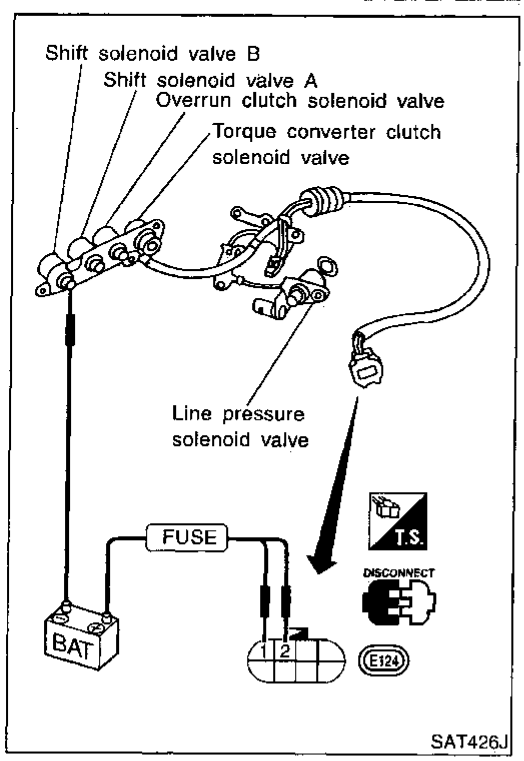
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-113.

OK or NG

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



SAT428J



SAT426J

Component Inspection

NCAT0045

SHIFT SOLENOID VALVE A AND B

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.

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	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

ON BOARD DIAGNOSTIC LOGIC

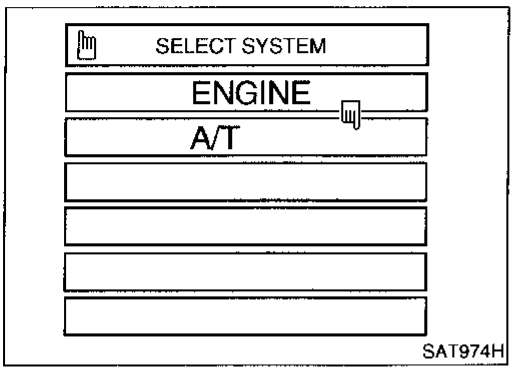
NCAT0046S02

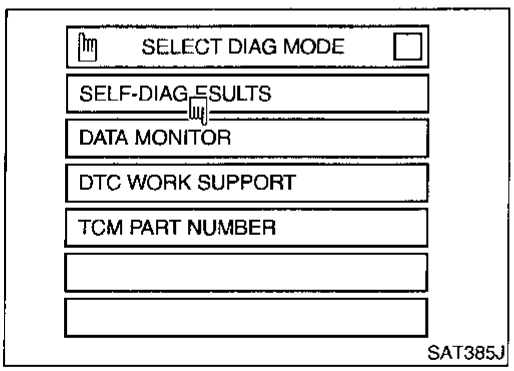
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
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.

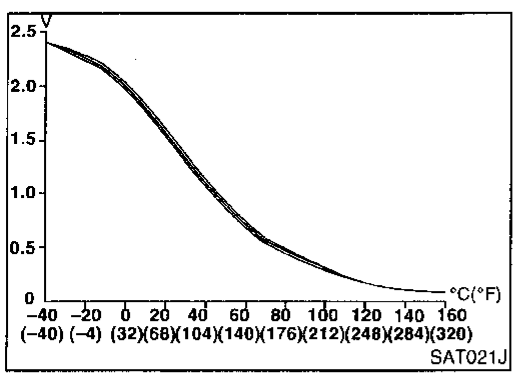
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve B stuck open	4	3*	3	4

*: P0732 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
(OBD) : A/T 2ND GR FNCTN	A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	• Shift solenoid valve B • Each clutch • Hydraulic control circuit
(OBD) : P0732		
(OBD) : MIL Code No. 1104		







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.

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

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.

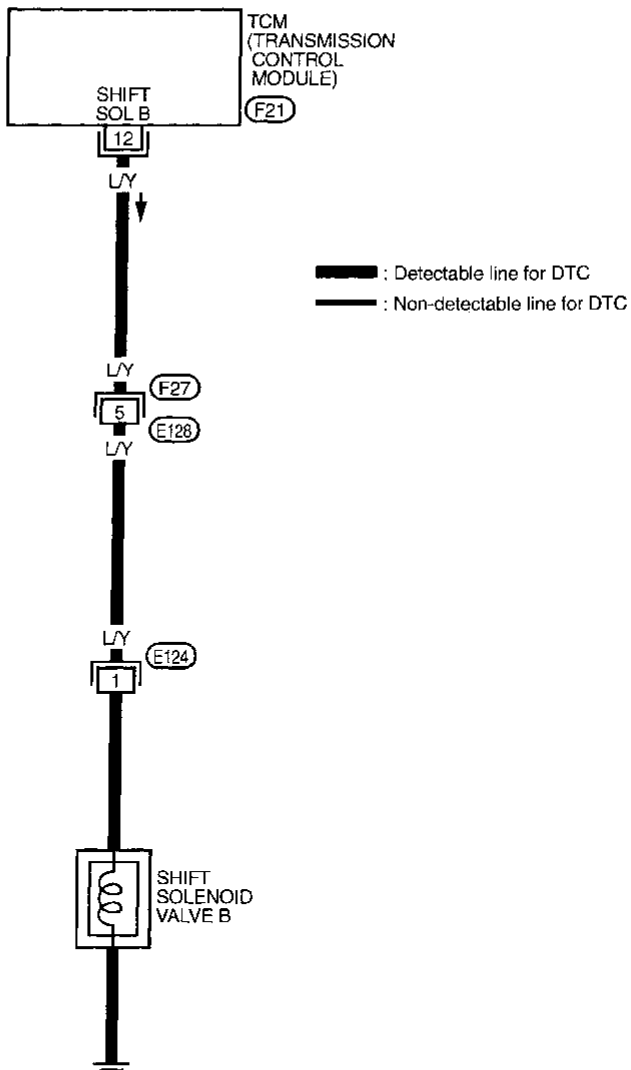
No Tools

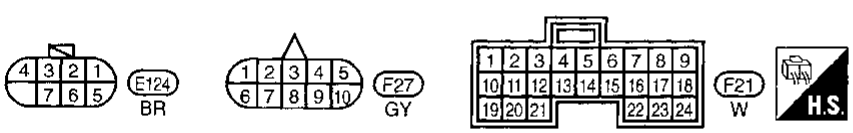
1) Start engine and warm up ATF.
2) Accelerate vehicle to 53 to 68 km/h (33 to 42 MPH) under the following condition and release the accelerator pedal completely.
THROTTLE POSI: Less than 1/8
Selector lever: D position (OD "ON")
Refer to shift schedule, AT-343.
3) Depress accelerator pedal to WOT (more 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"].

Wiring Diagram — AT — 2ND

NCAT0204

AT-2NDSIG-01





TAT179

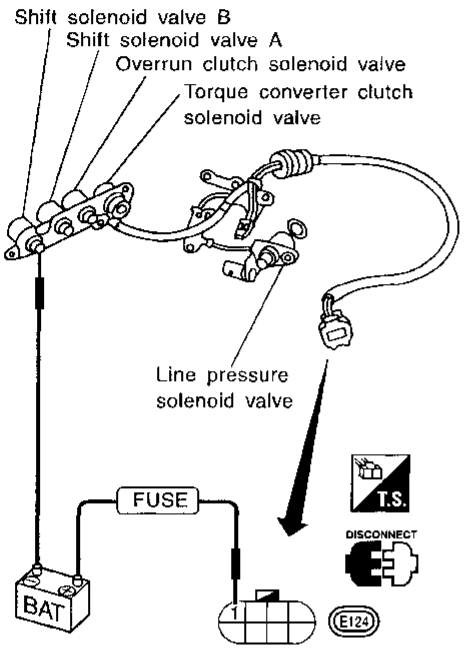
Diagnostic Procedure

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.



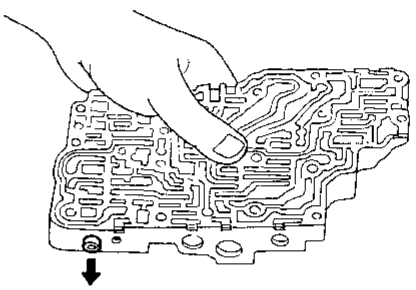
SAT427J

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:
- 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

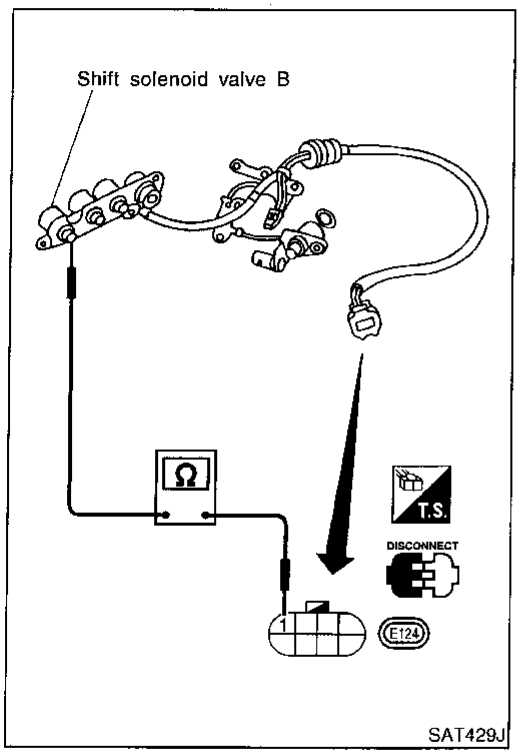
OK	▶	GO TO 3.
NG	▶	Repair control valve assembly.

3 CHECK DTC

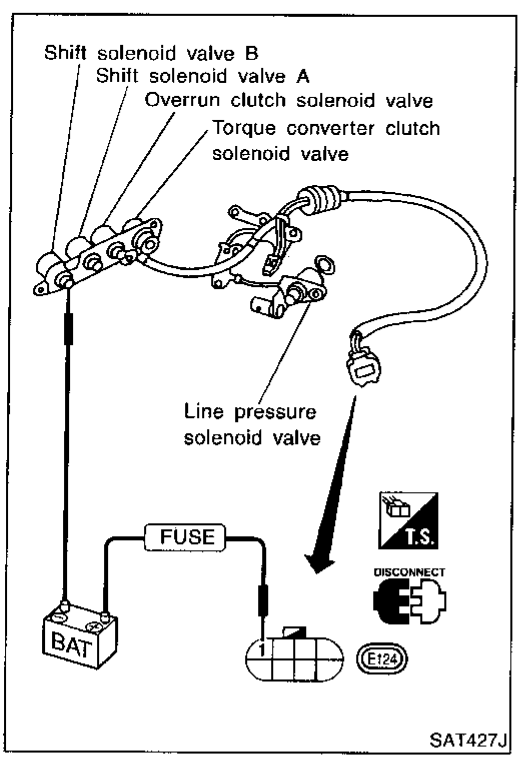
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-119.

OK or NG

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



SAT429J



SAT427J

Component Inspection

NCAT0048

SHIFT SOLENOID VALVE B

NCAT0048S01

- For removal, refer to AT-234.

Resistance Check

NCAT0048S0101

- Check resistance between two terminals.

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

Operation Check

NCAT0048S0102

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

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	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

ON BOARD DIAGNOSTIC LOGIC

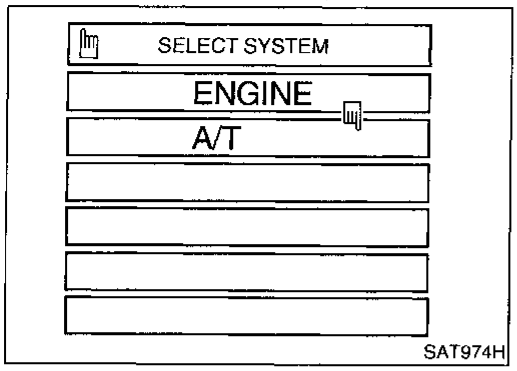
NCAT0049S02

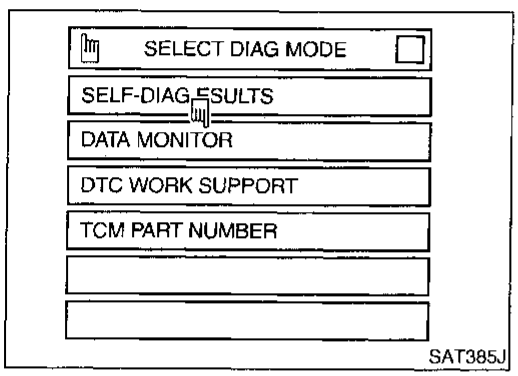
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (3rd) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve A is stuck closed.

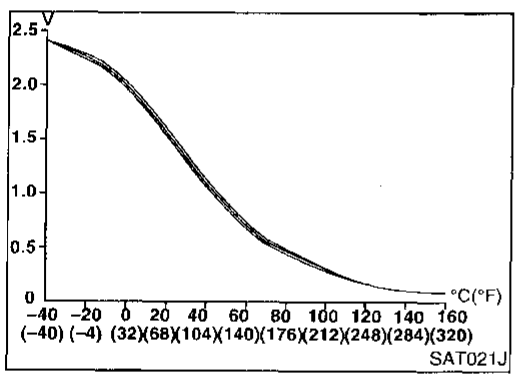
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve A stuck closed	1	1	4*	4

*: P0733 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 3RD GR FNCTN	A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	• Shift solenoid valve A • Each clutch • Hydraulic control circuit
: P0733		
: MIL Code No. 1105		







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

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 "3RD GR FNCTN P0733" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT and touch "START".
4) Accelerate vehicle to 80 to 95 km/h (50 to 59 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1/8 (at all times during step 4)
   Selector lever: D position (OD "ON")
   - **Check that "GEAR" shows "4" after releasing pedal.**
5) Depress accelerator pedal steadily with 3.5/8 - 4.5/8 of "THROTTLE POSI" from a speed of 80 to 95 km/h (50 to 59 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT 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".**
6) Stop vehicle.
7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

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

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

to "DIAGNOSTIC PROCEDURE".)
Refer to "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.

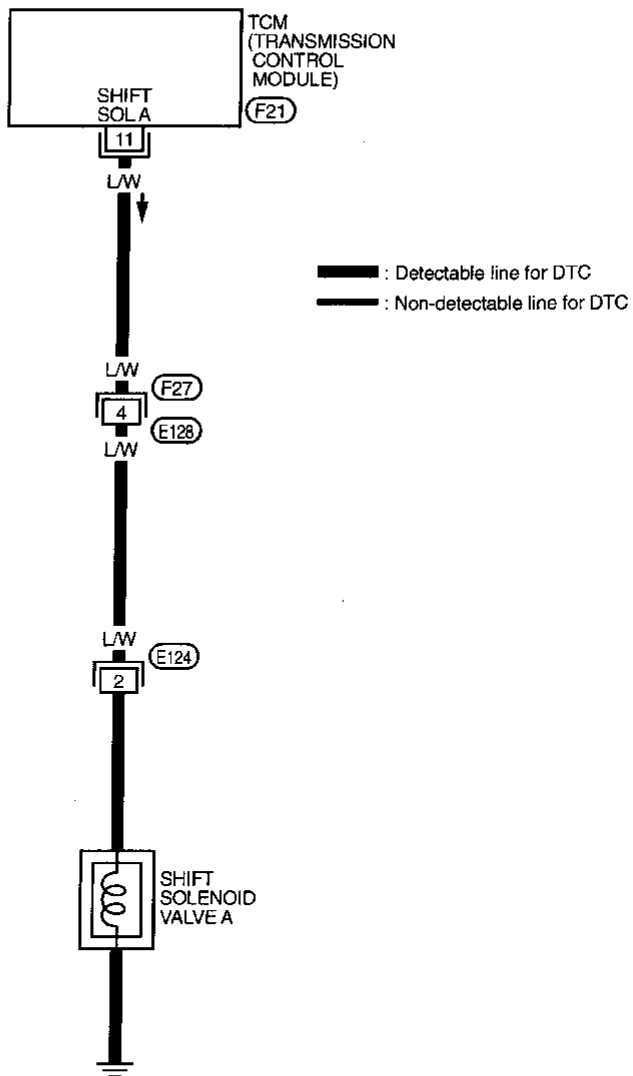
No Tools

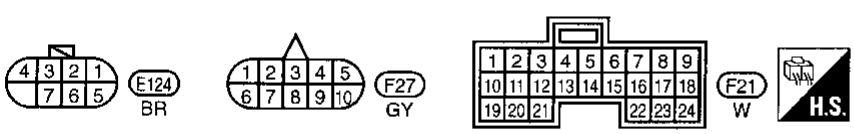
1) Start engine and warm up ATF.
2) Accelerate vehicle to 80 to 95 km/h (50 to 59 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1/8
   Selector lever: D position (OD "ON")
   Refer to shift schedule, AT-343.
3) Depress accelerator pedal with 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"].

Wiring Diagram — AT — 3RD

NCAT0205

AT-3RDSIG-01





TAT180

Diagnostic Procedure

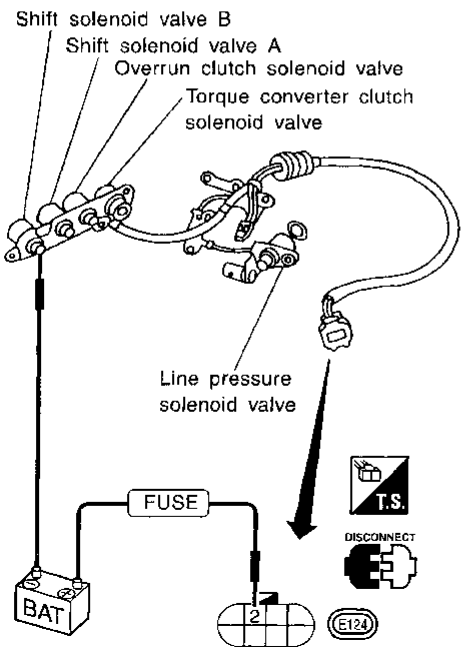
NCAT0050

1 CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-234.
2. Check shift solenoid valve operation.

- Shift solenoid valve A

Refer to "Component Inspection" below.



SAT430J

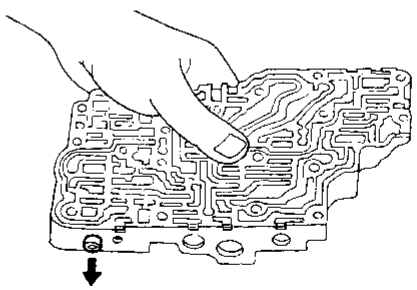
OK or NG

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

2 CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-266.
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



SAT367H

OK or NG

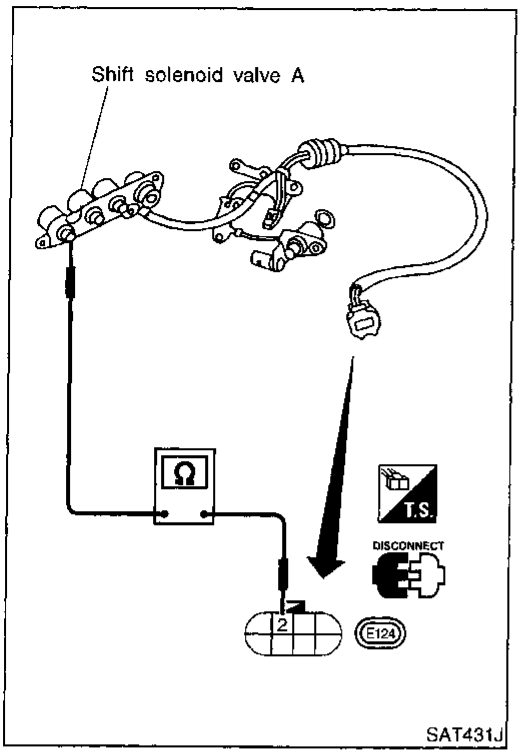
OK	▶	GO TO 3.
NG	▶	Repair control valve assembly.

3 CHECK DTC

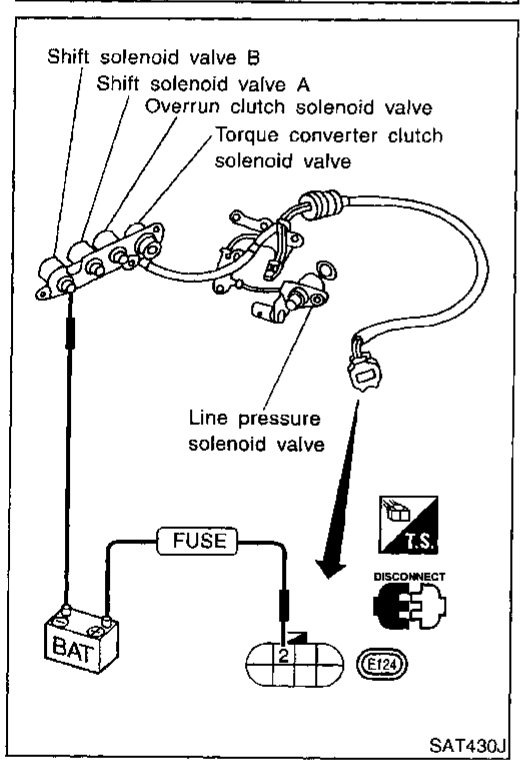
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-125.

OK or NG

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



SAT431J



SAT430J

Component Inspection

NCAT0051

SHIFT SOLENOID VALVE A

NCAT0051S01

- For removal, refer to AT-234.

Resistance Check

NCAT0051S0101

- Check resistance between two terminals.

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

Operation Check

NCAT0051S0102

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

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" ↓ Lock-up "ON"	Approximately 4% ↓ Approximately 94%
Line pressure solenoid valve duty	Small throttle opening (Low line pressure) ↓ Large throttle opening (High line pressure)	Approximately 24% ↓ Approximately 95%

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

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	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

ON BOARD DIAGNOSTIC LOGIC

NCAT0052S03

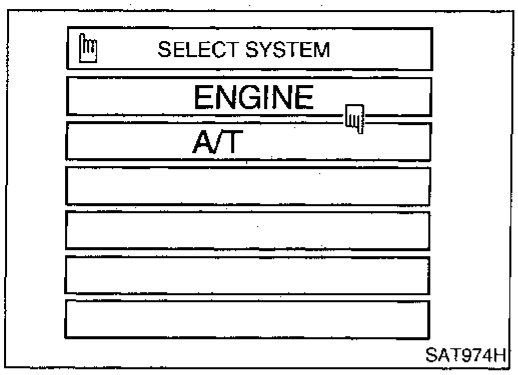
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
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.

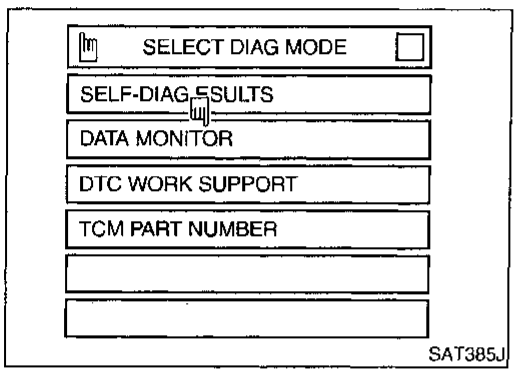
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve B stuck closed	1	2	2	1*

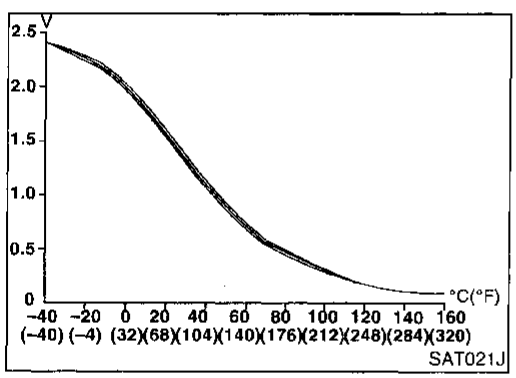
*: P0734 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
(H) : A/T 4TH GR FNCTN	A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	• 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
(GST) : P0734		
(NO TOOLS) : MIL Code No. 1106		

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.

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.)

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

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

With GST

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.
THROTTLE POSI: Less than 5.5/8
Selector lever: D position (OD "ON")
Refer to shift schedule, AT-343.
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.)
4) Select "MODE 7" with GST.

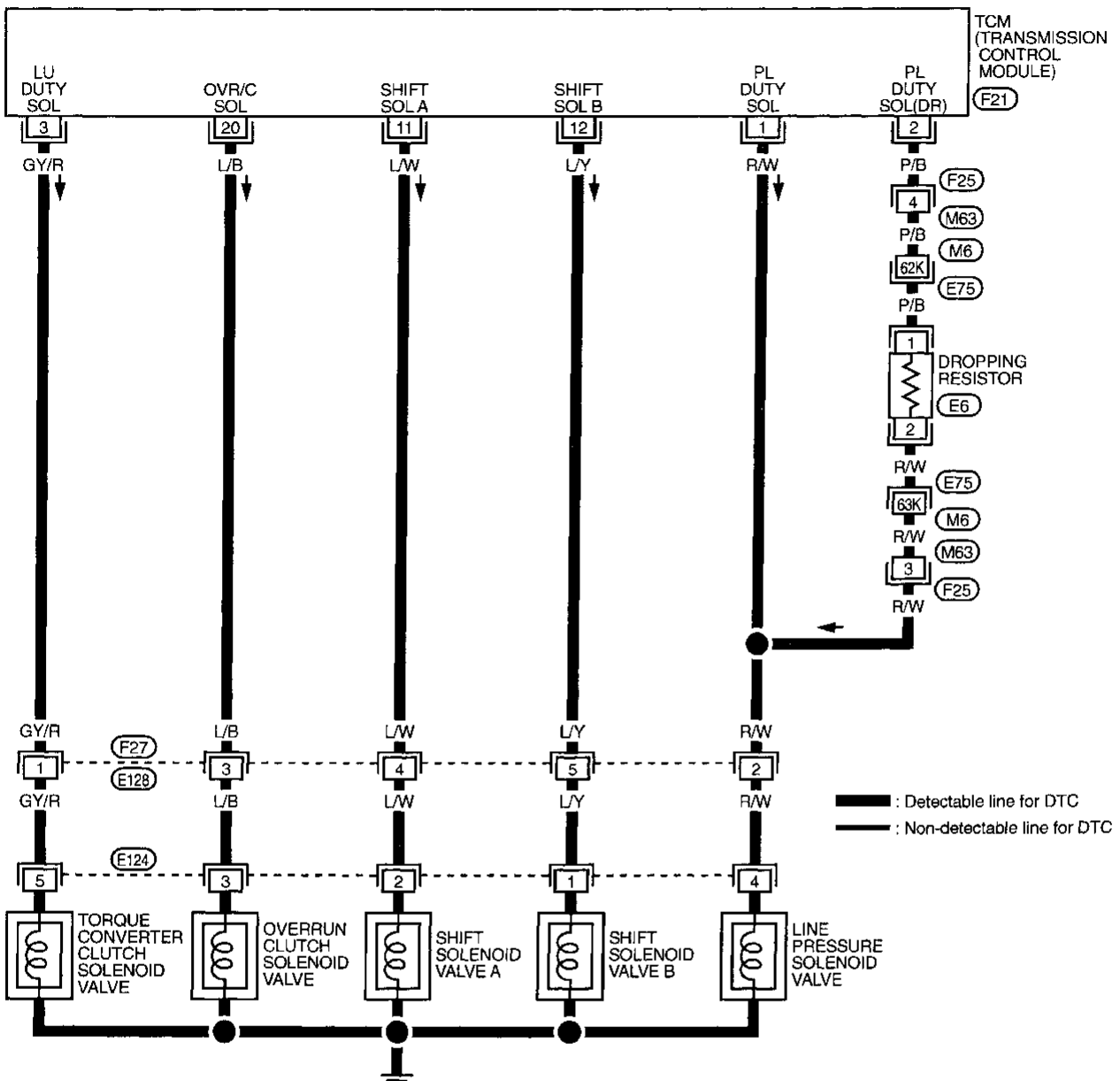
No Tools

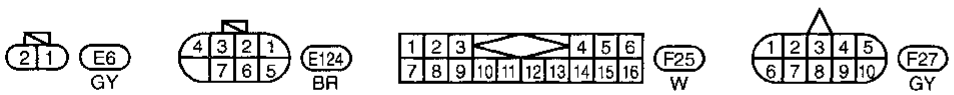
1) Start engine and warm up ATF.
2) Accelerate vehicle to 50 to 60 km/h (31 to 37 MPH) under the following condition and release the accelerator pedal completely.
THROTTLE POSI: Less than 5.5/8
Selector lever: D position (OD "ON")
Refer to shift schedule, AT-343.
3) Depress accelerator pedal with 1/8 - 2/8 of "THROTTLE POSI" from a speed of 50 to 60 km/h (31 to 37 MPH). (It will take approximately 3 seconds.)
4) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

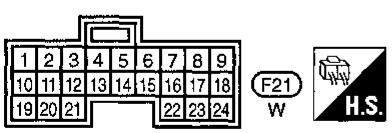
Wiring Diagram — AT — 4TH

NCAT0206

AT-4THSIG-01







Refer to last page (Foldout page).
M6 , E75

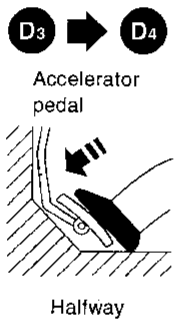
TAT181

Diagnostic Procedure

NCAT0053

1	CHECK SHIFT UP (D_3 TO D_4)

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

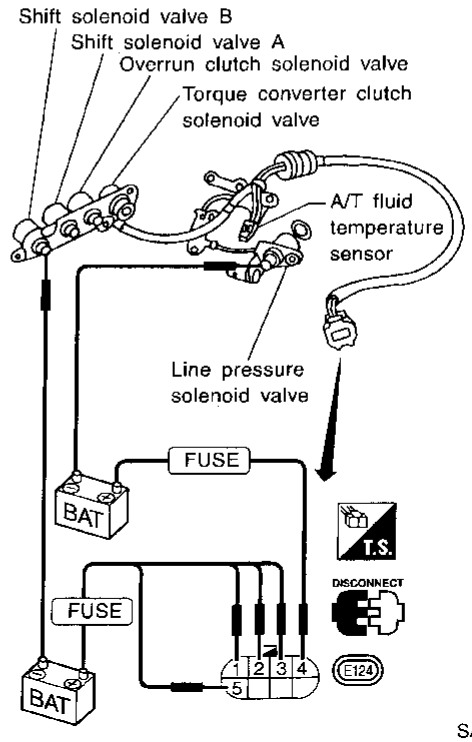
Perform line pressure test.
Refer to AT-62.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 7.

3	CHECK SOLENOID VALVES

1. Remove control valve assembly.
   Refer to AT-234.
2. Refer to "Component Inspection", AT-138.



SAT404J

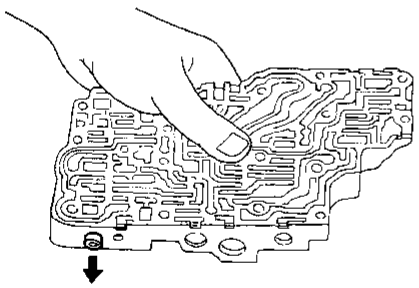
OK or NG

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

4	CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-266.
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



SAT367H

OK or NG

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

5	CHECK SHIFT UP (D_3 TO D_4)

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

OK or NG

OK	▶	GO TO 6.
NG	▶	Check control valve again. Repair or replace control valve assembly.

6	CHECK DTC

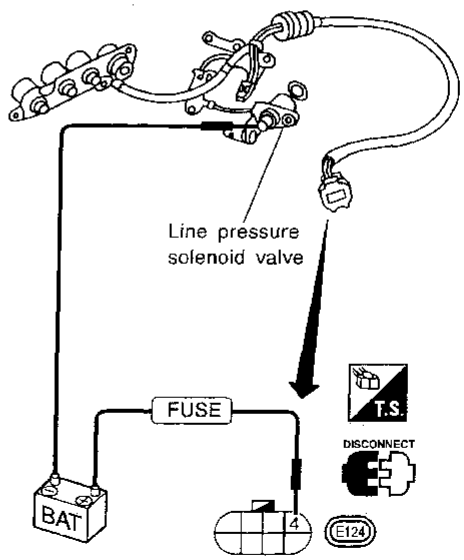
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-132.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 11. And check for proper lock-up.

7	CHECK LINE PRESSURE SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-234.
2. Refer to "Component Inspection", AT-138.



SAT432J

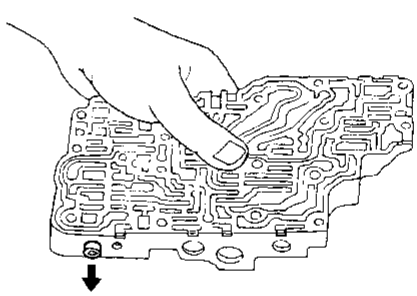
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace solenoid valve assembly.

8	CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-266.
2. Check line pressure circuit valves for sticking.

- Pressure regulator valve
- Pilot valve
- Pressure modifier valve



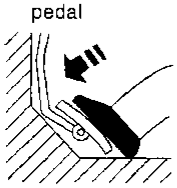
SAT367H

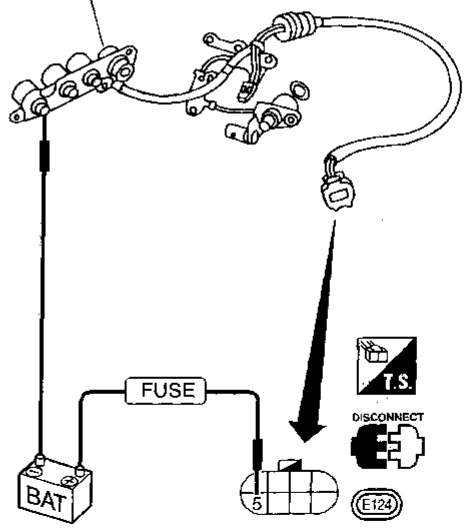
OK or NG

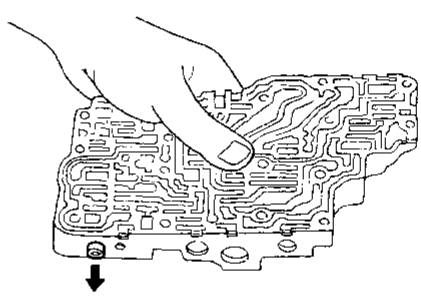
OK	▶	GO TO 9.
NG	▶	Repair control valve.

9	CHECK SHIFT UP (D_3 TO D_4)	
Does A/T shift from D_3 to D_4 at the specified speed?		
Yes or No		
Yes	▶	GO TO 10.
No	▶	Check control valve again. Repair or replace control valve assembly.

10	CHECK DTC	
Perform 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?		
D4 ➡ D4 L/U		
Accelerator pedal		
		
Halfway		
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.

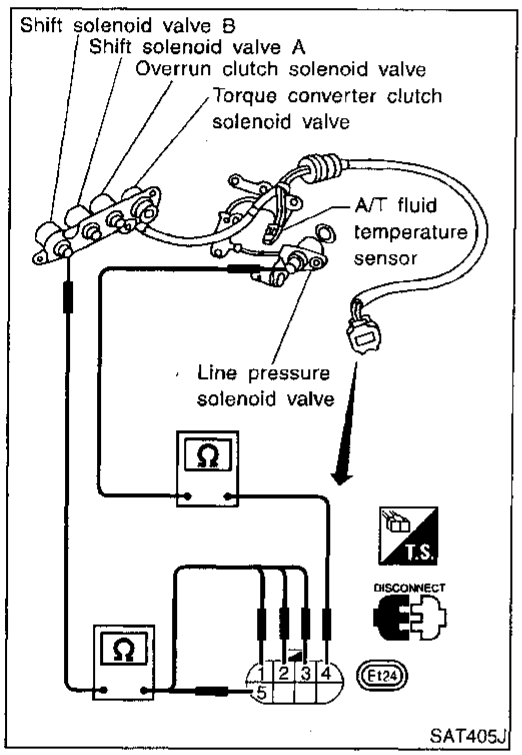
12	CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE	
1. Remove control valve assembly. Refer to AT-234. 2. Refer to "Component Inspection", AT-138.		
Torque converter clutch solenoid valve		
		
SAT433J		
OK or NG		
OK	▶	GO TO 13.
NG	▶	Replace solenoid valve assembly.

13	CHECK CONTROL VALVE	
1. Disassemble control valve assembly. Refer to AT-266. 2. Check control valves for sticking. • Torque converter clutch control valve • Torque converter clutch relief valve		
		
SAT367H		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Repair control valve

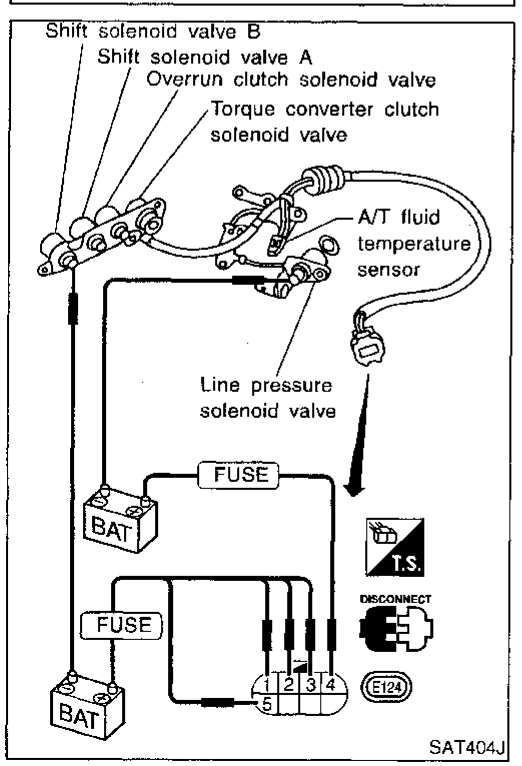
Diagnostic Procedure (Cont'd)

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.



SAT405J



SAT404J

Component Inspection

NCAT0054

SOLENOID VALVES

NCAT0054S01

- For removal, refer to AT-234.

Resistance Check

NCAT0054S0101

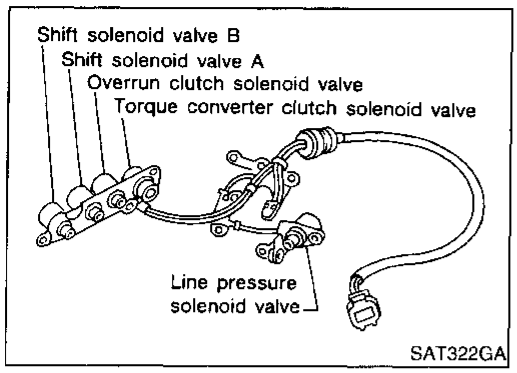
- Check resistance between two terminals.

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



Description

NCAT0055

The torque converter clutch solenoid valve is activated, with the gear in "D_4", 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

NCAT0055S01

Remarks: Specification data are reference values.

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

TCM TERMINALS AND REFERENCE VALUE

NCAT0055S02

Remarks: Specification data are reference values.

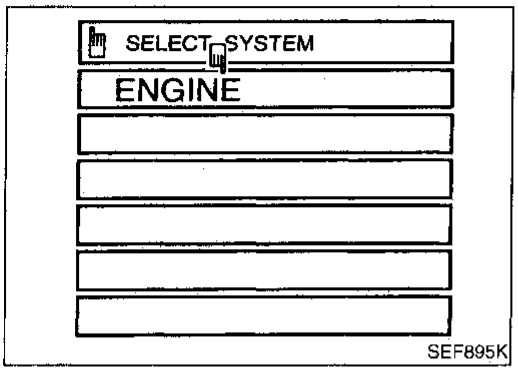
Terminal No.	Wire color	Item	Condition		Judgement standard
3	GY/R	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	1V or less

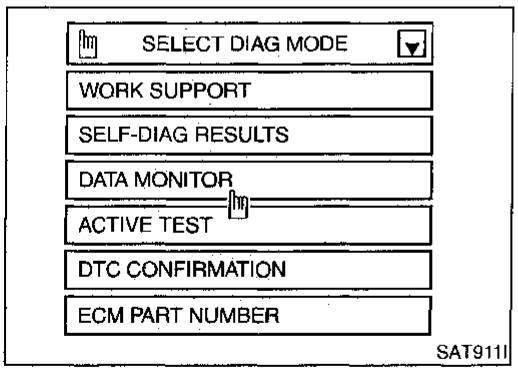
ON BOARD DIAGNOSIS LOGIC

NCAT0055S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
(H) : TCC SOLENOID/CIRC (GST) : P0740 (NO TOOLS) : MIL Code No. 1204	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • T/C clutch solenoid valve

Description (Cont'd)





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0055S04

NOTE:

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

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

With CONSULT

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.

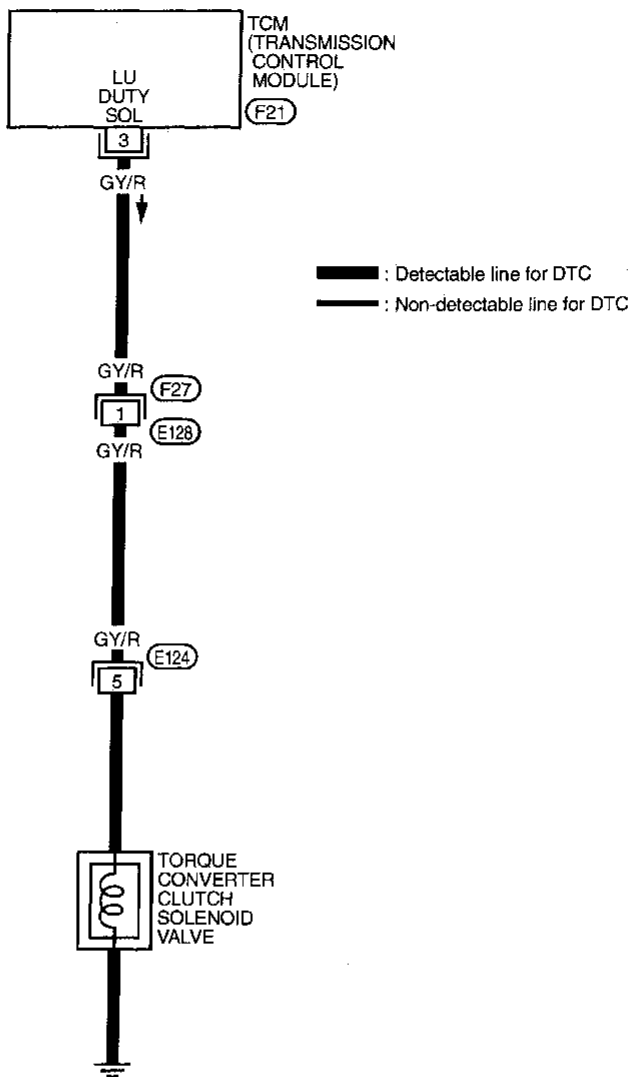
No Tools

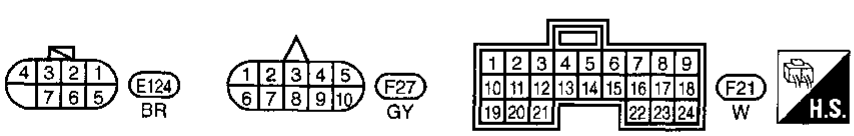
1) Turn ignition switch "ON".
2) Perform self-diagnosis for ECM.
   Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

Wiring Diagram — AT — TCV

NCAT0207

AT-TCV-01





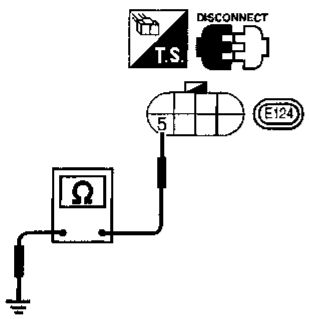
TAT182

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



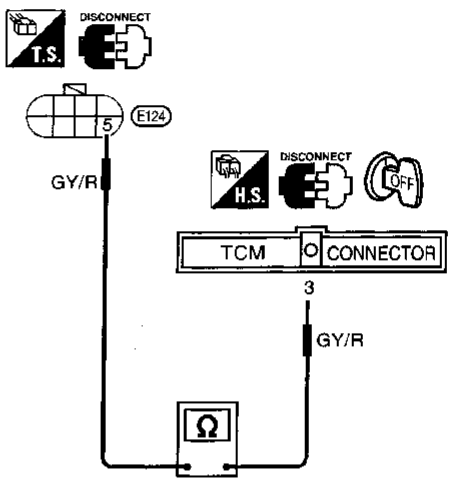
SAT434J

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Remove oil pan. Refer to AT-234. 2. Check the following items: • Torque converter clutch solenoid valve Refer to "Component Inspection", AT-143. • 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

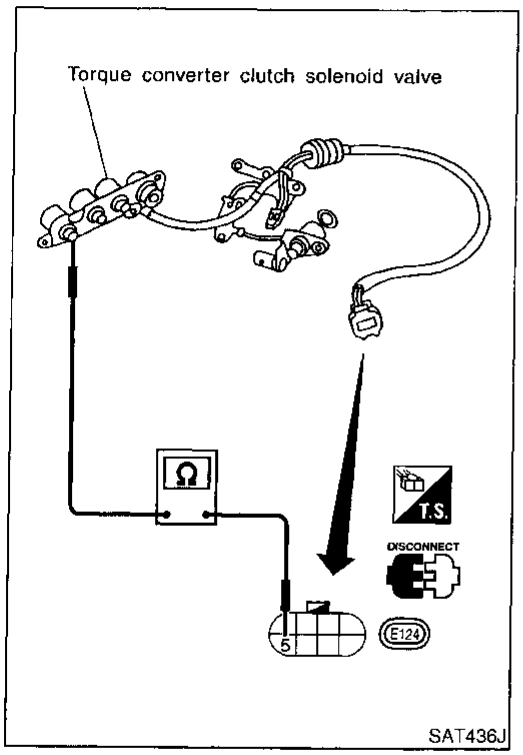
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3 CHECK DTC

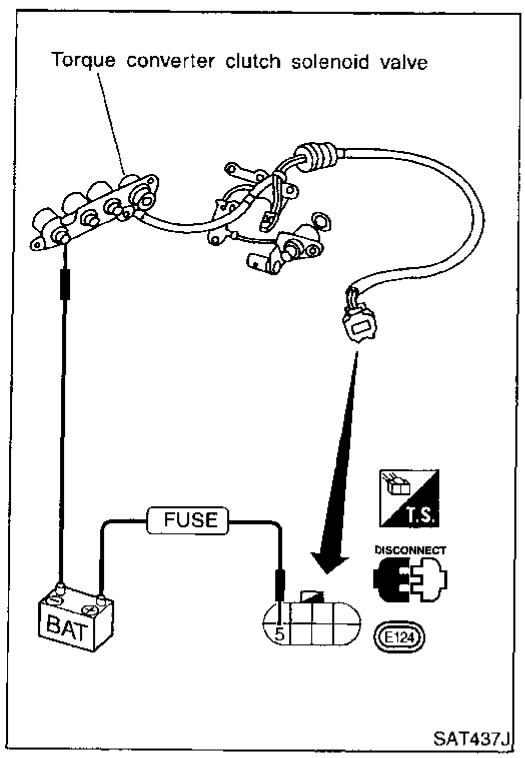
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-140.

OK or NG

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



SAT436J



SAT437J

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.

Description

NCAT0058

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

CONSULT 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" ↓ Lock-up "ON"	Approximately 4% ↓ 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

ON BOARD DIAGNOSTIC LOGIC

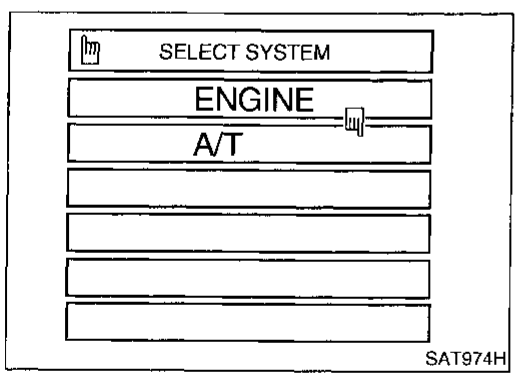
NCAT0058S03

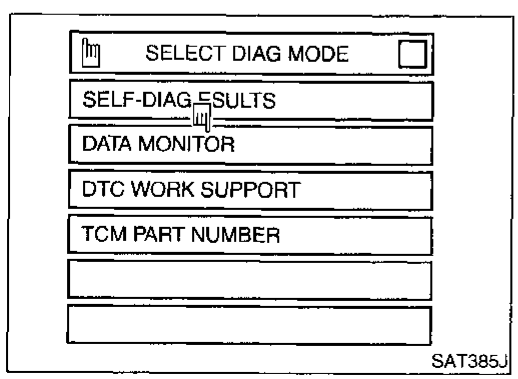
This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is much lower than the position (4th) supposed by TCM, the slip ratio will be much less than normal. In case the ratio does not reach the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve B is stuck closed.

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

*: P0744 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
(F) : A/T TCC S/V FNCTN (CONSULT) : P0744 (NO TOOLS) : MIL Code No. 1107	A/T cannot perform lock-up even if electrical circuit is good.	• Torque converter clutch solenoid valve • Each clutch • Hydraulic control circuit





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0058S04

CAUTION:
Always drive vehicle at a safe speed.

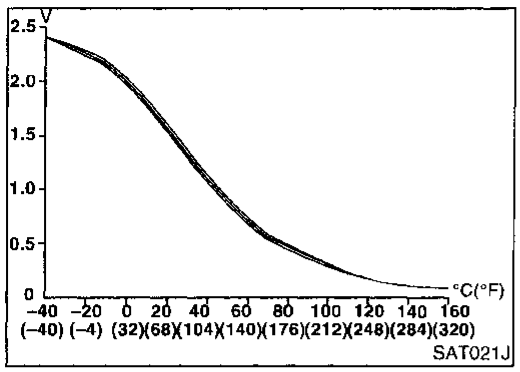
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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

(CONSULT) 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".

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 D_4 lock-up position for approximately 30 seconds. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance with shift schedule.
Refer to shift schedule, AT-343.
3) Select "MODE 7" with GST.

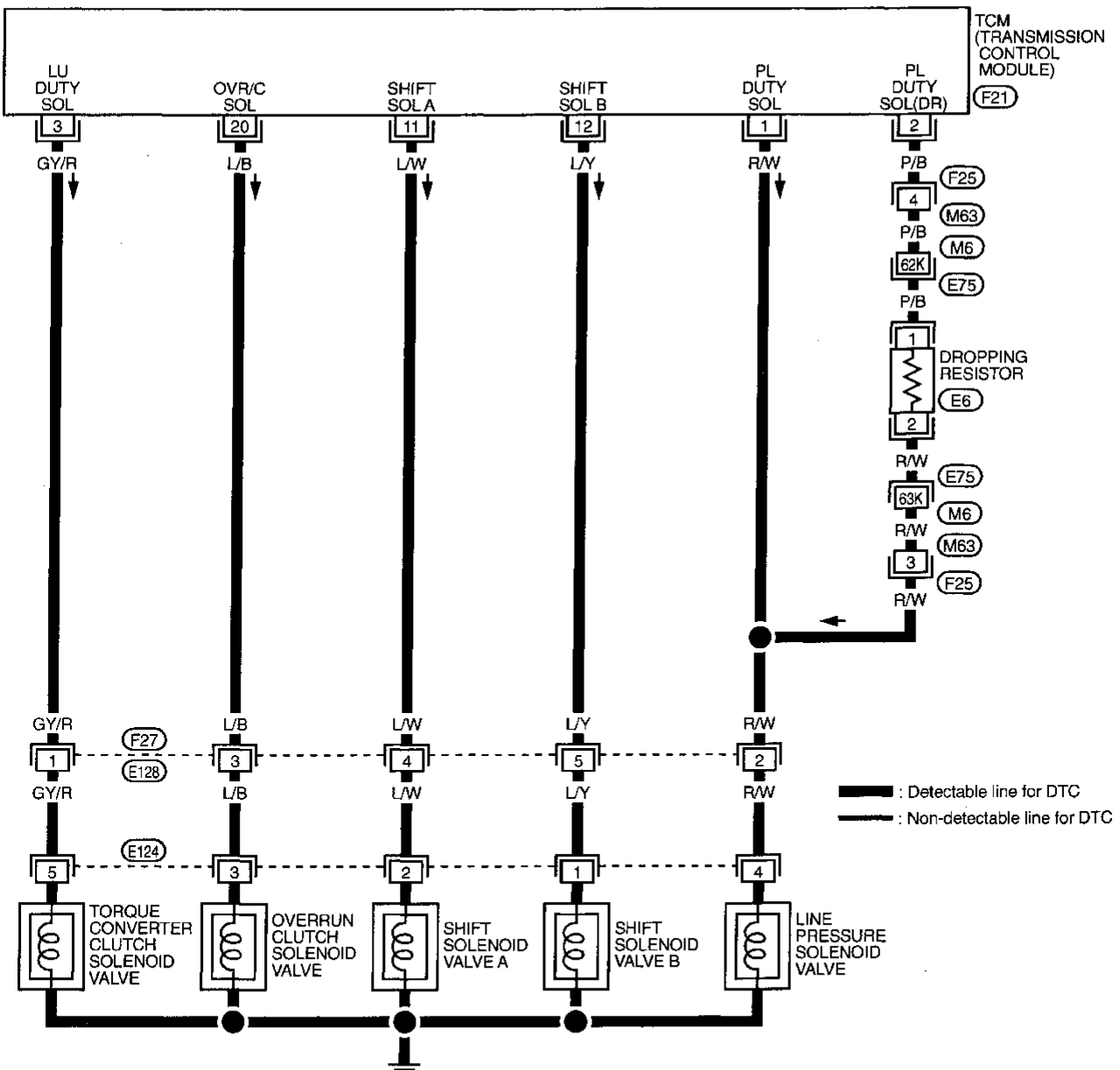
No Tools

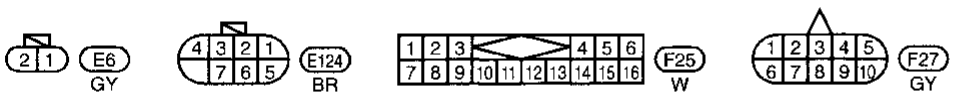
1) Start engine and warm up ATF.
2) Start vehicle with selector lever in "D" (OD "ON"), throttle opening halfway and D_4 lock-up position for approximately 30 seconds. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance 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"].

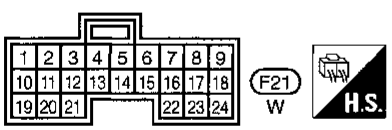
Wiring Diagram — AT — TCCSIG

NCAT0208

AT-TCCSIG-01







Refer to last page (Foldout page).
M6, E75

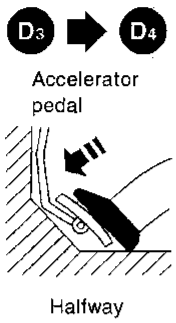
TAT183

Diagnostic Procedure

NCAT0059

1	CHECK SHIFT UP (D_3 TO D_4)

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

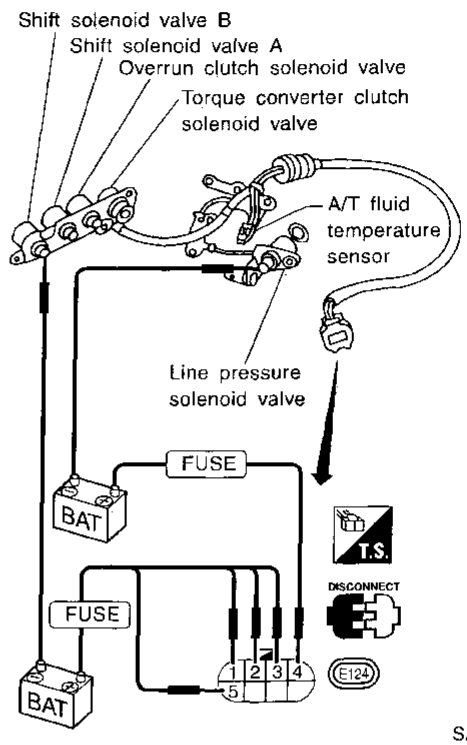
Perform line pressure test.
Refer to AT-62.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 7.

3	CHECK SOLENOID VALVES

1. Remove control valve assembly.
   Refer to AT-234.
2. Check solenoid valve assembly operation.
   Refer to AT-151.



SAT404J

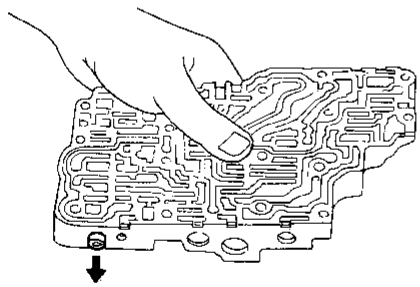
OK or NG

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

4	CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-266.
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



SAT367H

OK or NG

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

5	CHECK SHIFT UP (D_3 TO D_4)

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

Yes or No

Yes	▶	GO TO 6.
No	▶	Check control valve again. Repair or replace control valve assembly.

6	CHECK DTC

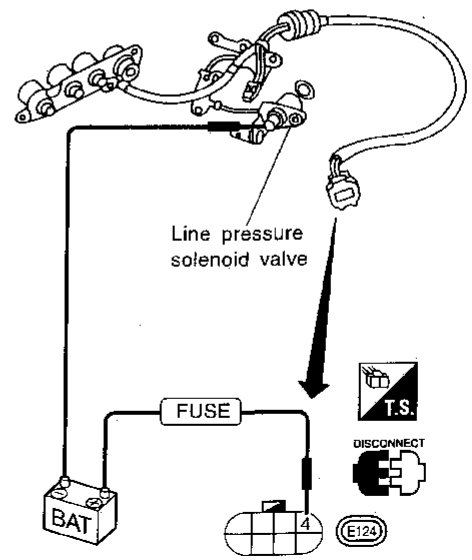
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-145.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 11. And check for proper lock-up.

7	CHECK LINE PRESSURE SOLENOID VALVE

1. Remove control valve assembly.
   Refer to AT-234.
2. Check line pressure solenoid valve operation.
   Refer to AT-151.



SAT438J

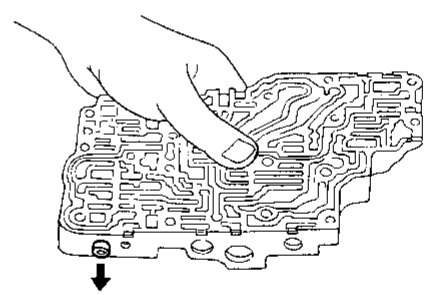
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace solenoid valve assembly.

8	CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-266.
2. Check line pressure circuit valves for sticking.

- Pressure regulator valve
- Pilot valve
- Pressure modifier valve



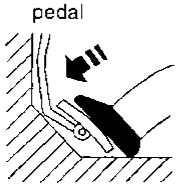
SAT367H

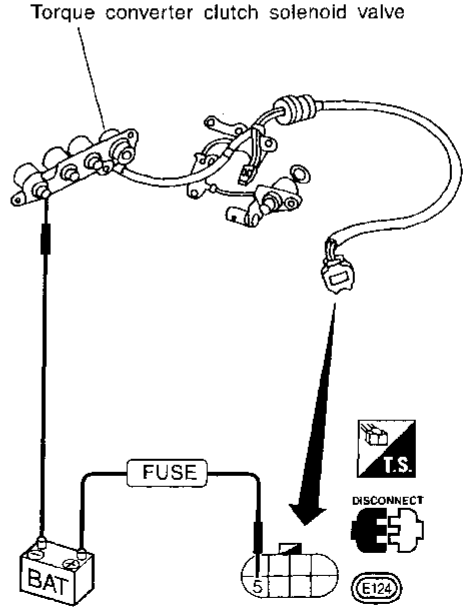
OK or NG

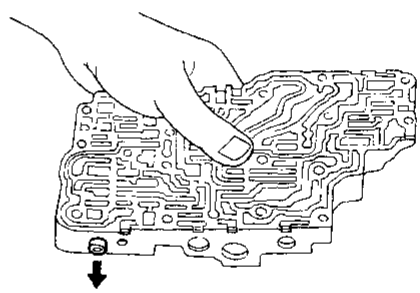
OK	▶	GO TO 9.
NG	▶	Repair control valve.

9	CHECK SHIFT UP (D_3 TO D_4)	
Does A/T shift from D_3 to D_4 at the specified speed?		
Yes or No		
Yes	▶	GO TO 10.
No	▶	Check control valve again. Repair or replace control valve assembly.

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

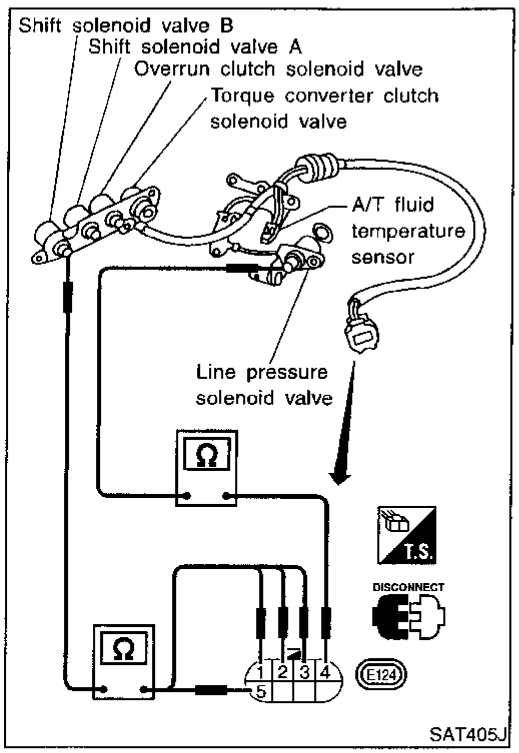
11	CHECK LOCK-UP CONDITION	
During "Cruise test – Part 1" (AT-70), does A/T perform lock-up at the specified speed?		
D4 ➡ D4 L/U		
Accelerator pedal		
		
Halfway		
SAT989H		
Yes or No		
Yes	▶	Perform "Cruise test – Part 1" again and return to the start point of this flow chart.
No	▶	GO TO 12.

12	CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE	
1. Remove control valve assembly. Refer to AT-234.		
2. Check torque converter clutch solenoid valve operation. Refer to AT-151.		
Torque converter clutch solenoid valve		
		
SAT439J		
OK or NG		
OK	▶	GO TO 13.
NG	▶	Replace solenoid valve assembly.

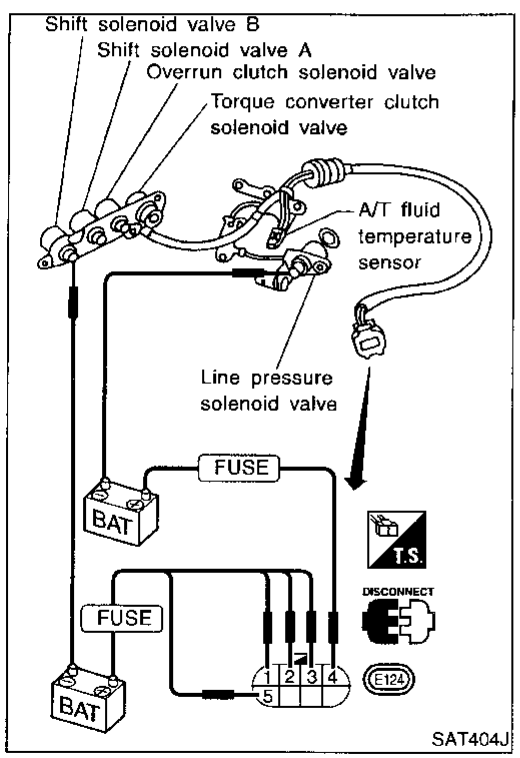
13	CHECK CONTROL VALVE	
1. Disassemble control valve assembly. Refer to AT-266.		
2. Check control valves for sticking.		
• Torque converter clutch control valve		
• Torque converter clutch relief valve		
		
SAT367H		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Repair control valve.

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.



SAT405J



SAT404J

Component Inspection

SOLENOID VALVES

NCAT0060

NCAT0060S01

- For removal, refer to AT-234.

Resistance Check

NCAT0060S0101

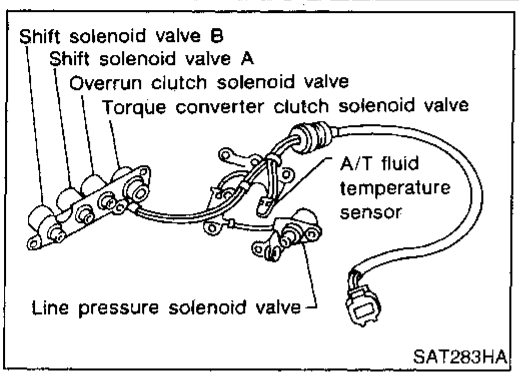
- Check resistance between two terminals.

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

Operation Check

NCAT0060S0102

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



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) ↓ Large throttle opening (High line pressure)	Approximately 24% ↓ 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

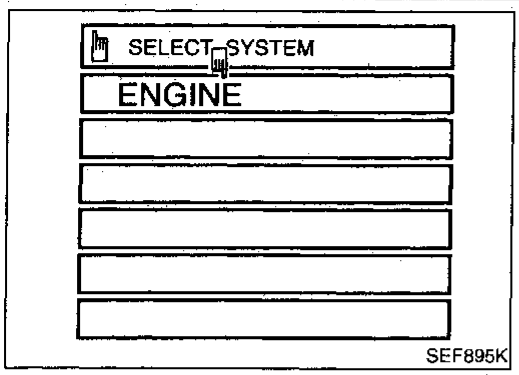
Remarks: Specification data are reference values.

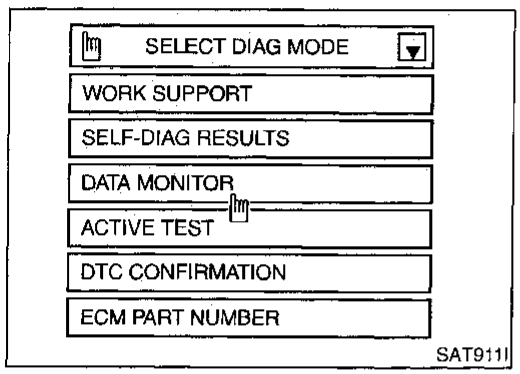
Terminal No.	Wire color	Item	Condition		Judgement standard
1	R/W	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
				When depressing accelerator pedal fully after warming up engine.	0.5V or less
2	P/B	Line pressure solenoid valve (with dropping resistor)		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	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • Line pressure solenoid valve
: P0745		
: MIL Code No. 1205		





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.

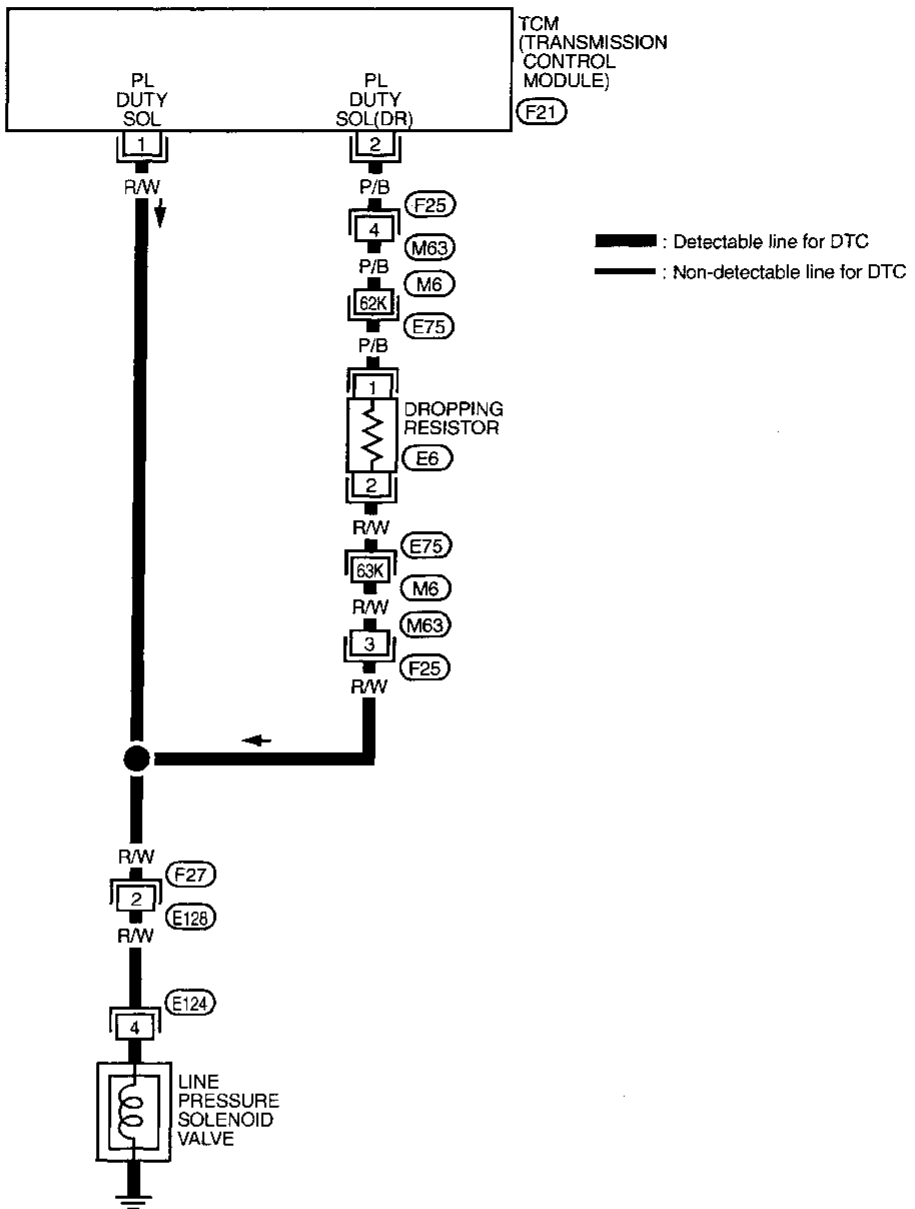
No Tools

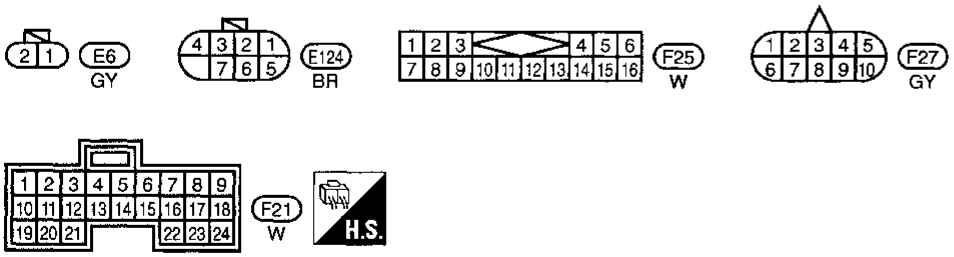
1) Turn ignition switch "ON".
2) Depress accelerator pedal completely and wait at least 1 second.
3) Perform self-diagnosis for ECM.
   Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

Wiring Diagram — AT — LPSV

NCAT0209

AT-LPSV-01





Refer to last page (Foldout page).
M6 , E75

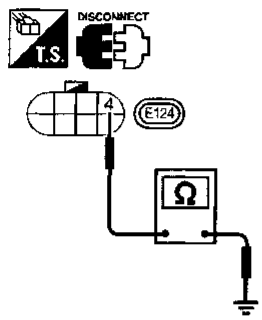
TAT184

Diagnostic Procedure

NCAT0062

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 4 and ground.
   Resistance:
   2.5 - 5Ω



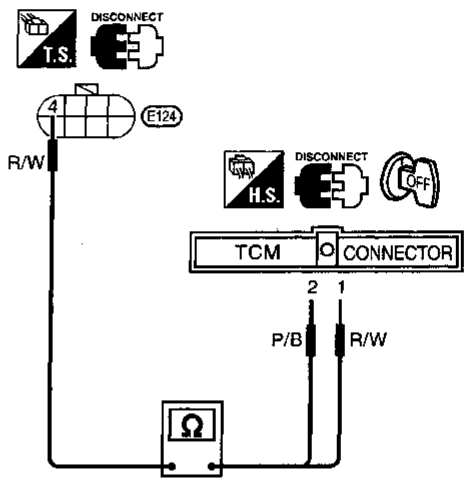
SAT440J

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: • Line pressure solenoid valve Refer to "Component Inspection", AT-157. • Harness of terminal cord assembly for short or open

2	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 4 and TCM harness connector terminal 2.
   Resistance:
   11.2 - 12.8Ω



SAT441J

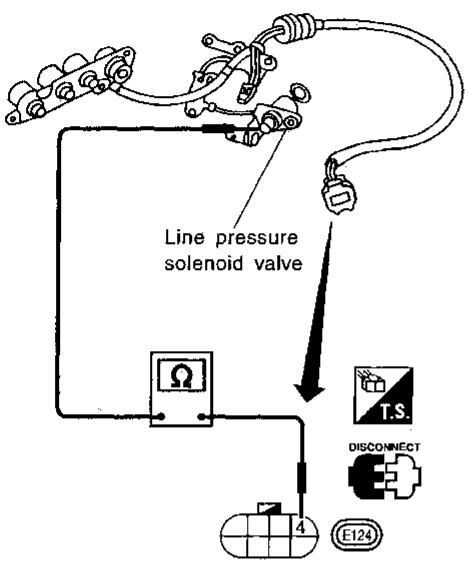
OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following items:** • Dropping resistor Refer to "Component Inspection", AT-157. • Harness for short or open between TCM terminal 2 and terminal cord assembly (Main harness)

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

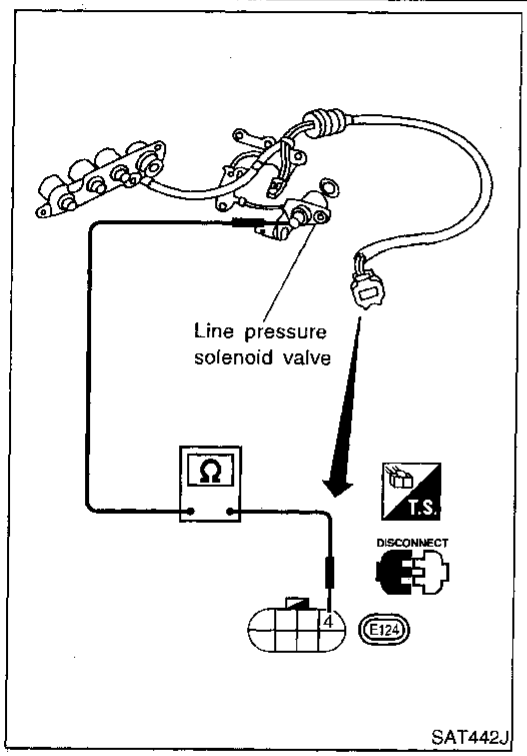
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK DTC

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

OK or NG

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



SAT442J

Component Inspection

NCAT0063

LINE PRESSURE SOLENOID VALVE

NCAT0063S01

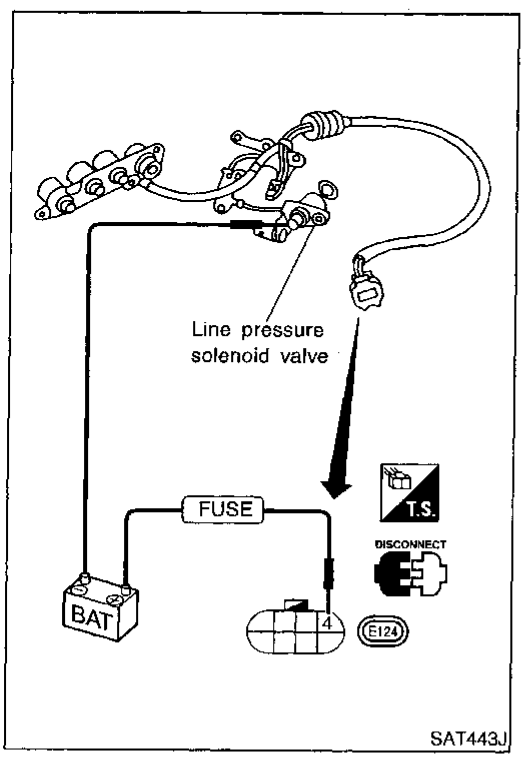
- For removal, refer to AT-234.

Resistance Check

NCAT0063S0101

- Check resistance between two terminals.

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

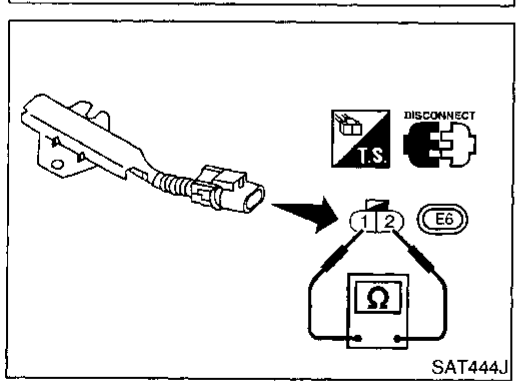


SAT443J

Operation Check

NCAT0063S0102

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



SAT444J

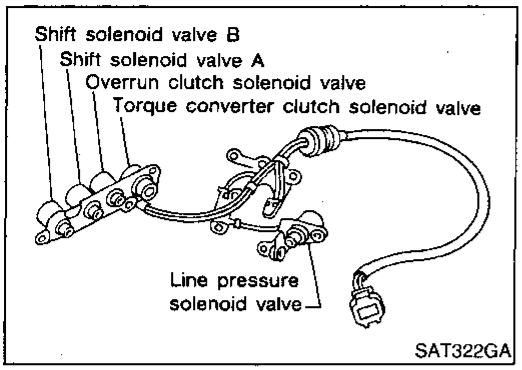
DROPPING RESISTOR

NCAT0063S02

- Check resistance between two terminals.

Resistance:

11.2 - 12.8Ω



Description

NCAT0064

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

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

TCM TERMINALS AND REFERENCE VALUE

NCAT0064S01

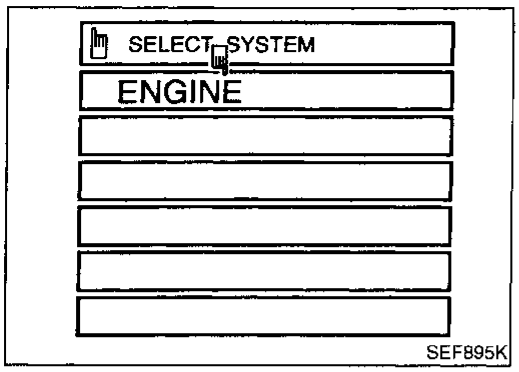
Remarks: Specification data are reference values.

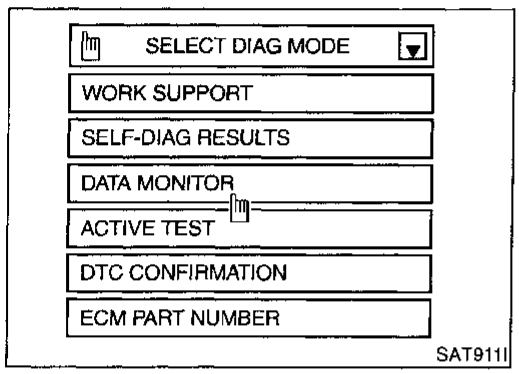
Terminal No.	Wire color	Item	Condition		Judgement standard
11	L/W	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in "D_1" or "D_4".)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in "D_2" or "D_3".)	1V or less

ON BOARD DIAGNOSIS LOGIC

NCAT0064S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: SFT SOL A/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • Shift solenoid valve A
: P0750		
: MIL Code No. 1108		





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0064S03

CAUTION:
Always drive vehicle at a safe speed.

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

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

With CONSULT

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 D_1 → D_2 position.
3) Select "MODE 7" with GST.

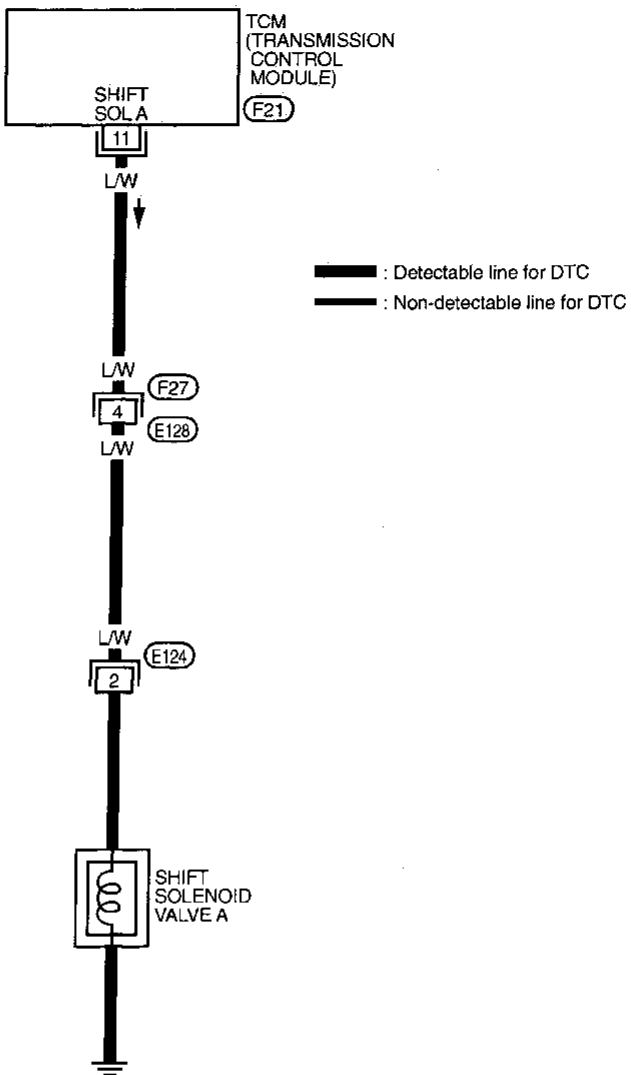
No Tools

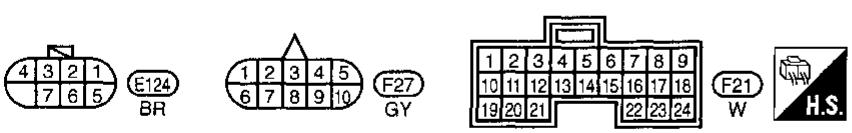
1) Start engine.
2) Drive vehicle in D_1 → D_2 position.
3) Perform self-diagnosis for ECM.
   Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

Wiring Diagram — AT — SSV/A

NCAT0210

AT-SSV/A-01





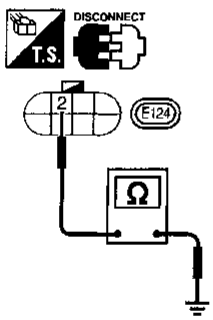
TAT185

Diagnostic Procedure

NCAT0065

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 2 and ground.
   Resistance:
   20 - 40Ω



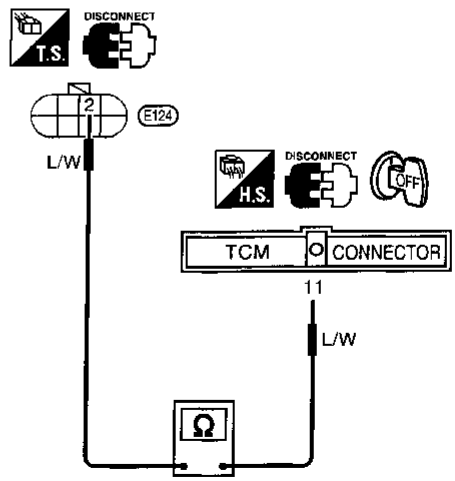
SAT445J

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: • Shift solenoid valve A Refer to "Component Inspection", AT-162. • Harness of terminal cord assembly for short or open

2	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal 2 and TCM harness connector terminal 11.
   Continuity should exist.



SAT446J

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

4. Reinstall any part removed.

OK or NG

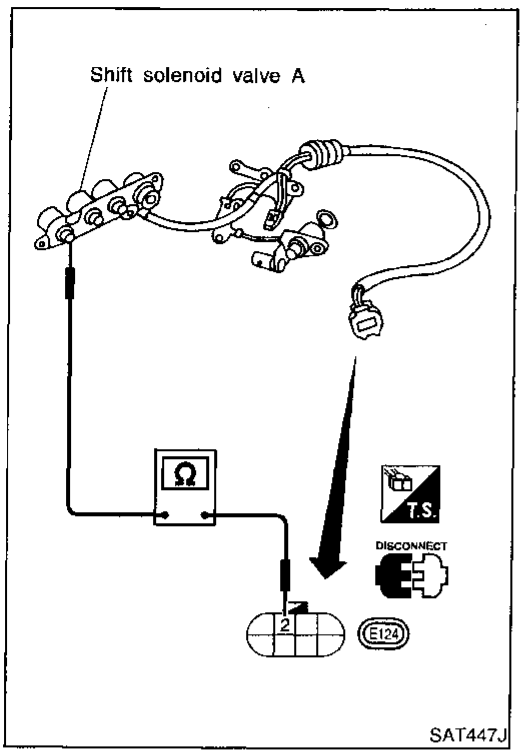
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

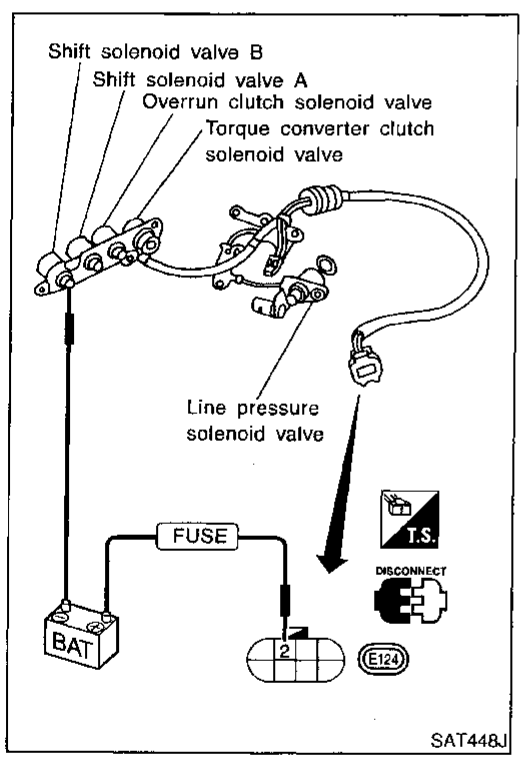
3	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-159.

OK or NG

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





Component Inspection

NCAT0066

SHIFT SOLENOID VALVE A

NCAT0066S01

- For removal, refer to AT-234.

Resistance Check

NCAT0066S0101

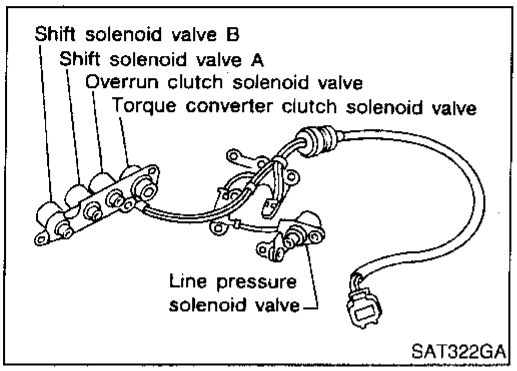
- Check resistance between two terminals.

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.



Description

NCAT0067

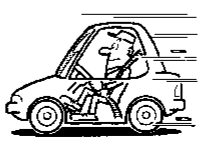
Shift solenoid valves A and B are turned "ON" or "OFF" by the TCM in response to signals sent from the PNP switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position.

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

TCM TERMINALS AND REFERENCE VALUE

NCAT0067S01

Remarks: Specification data are reference values.

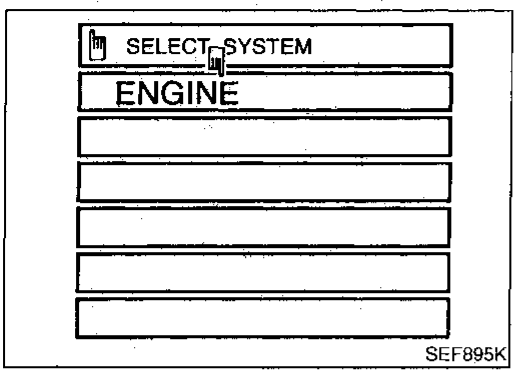
Terminal No.	Wire color	Item	Condition		Judgement standard
12	L/Y	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D_1" or "D_2".)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in "D_3" or "D_4".)	1V or less

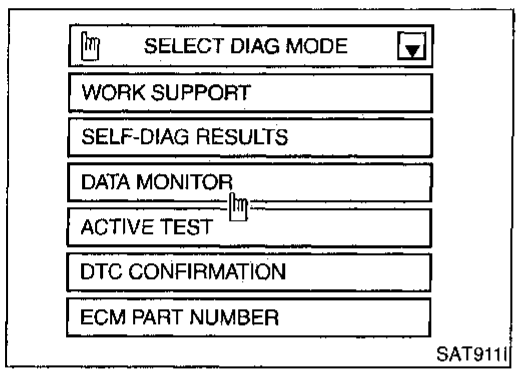
ON BOARD DIAGNOSIS LOGIC

NCAT0067S02

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: SFT SOL B/CIRC : P0755 : MIL Code No. 1201	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • Shift solenoid valve B

Description (Cont'd)





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0067S03

CAUTION:
Always drive vehicle at a safe speed.

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

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

With CONSULT

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 D_1 → D_2 → D_3 position.
3) Select "MODE 7" with GST.

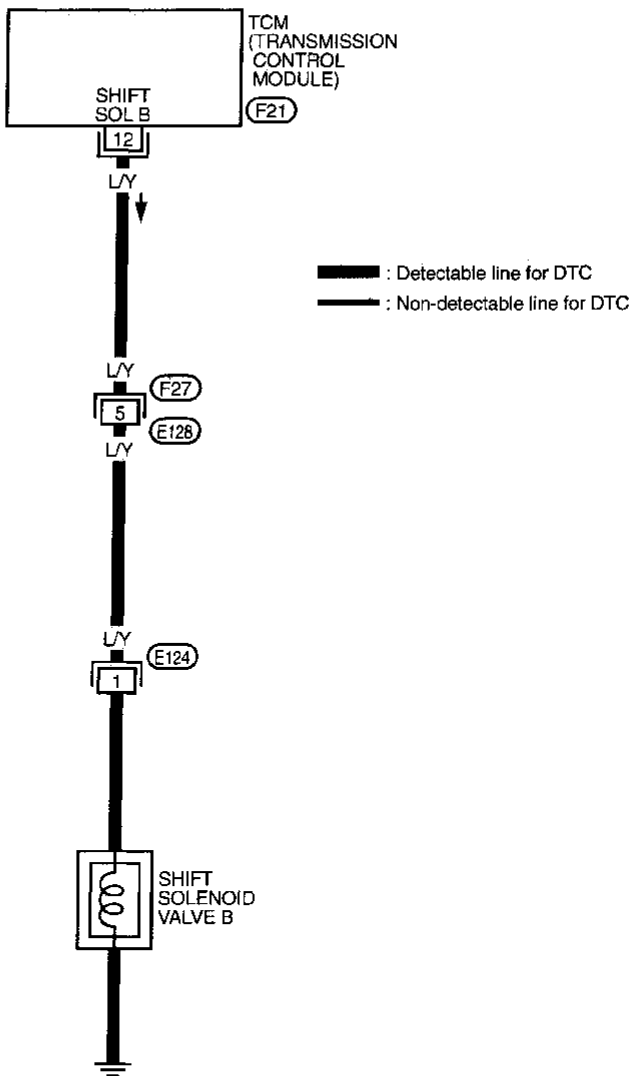
No Tools

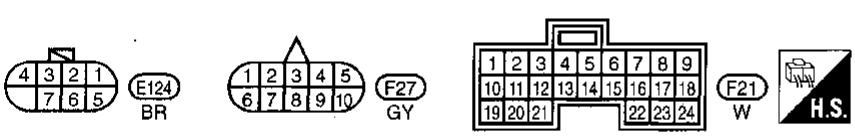
1) Start engine.
2) Drive vehicle in D_1 → D_2 → D_3 position.
3) Perform self-diagnosis for ECM.
   Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

Wiring Diagram — AT — SSV/B

NCAT0211

AT-SSV/B-01





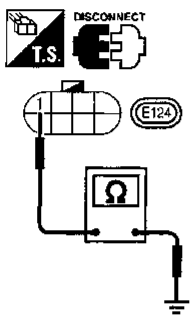
TAT186

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



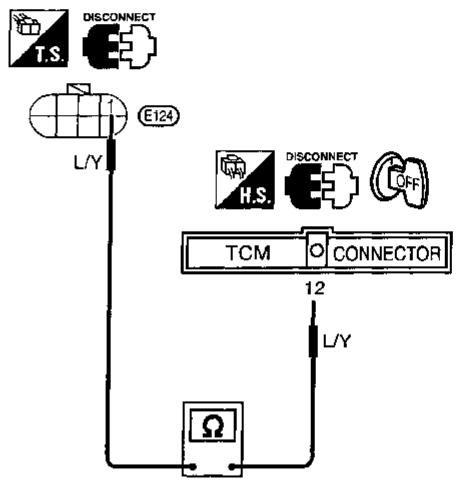
SAT449J

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: • 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

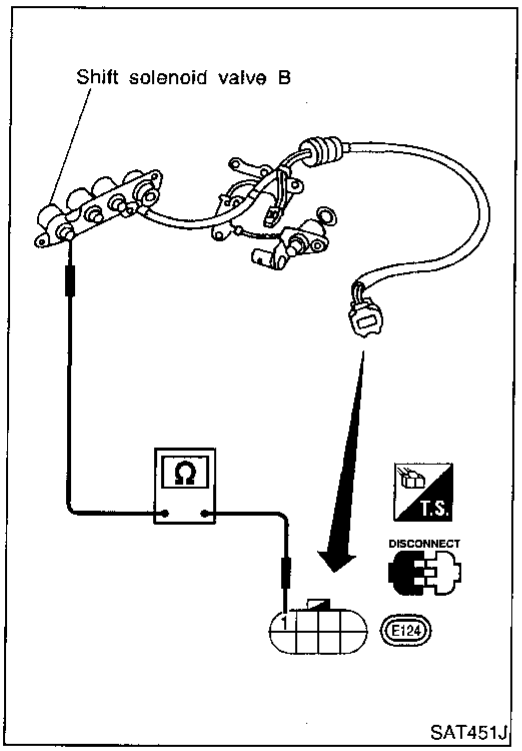
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3 CHECK DTC

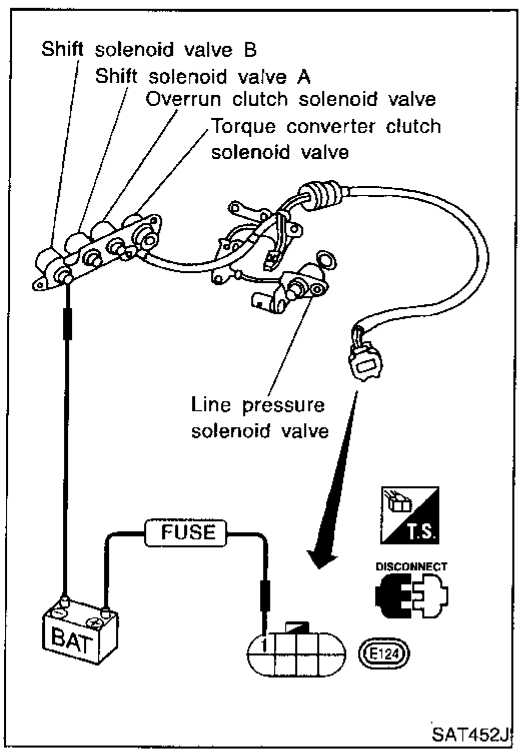
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-164.

OK or NG

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



SAT451J



SAT452J

Component Inspection

NCAT0069

SHIFT SOLENOID VALVE B

NCAT0069S01

- For removal, refer to AT-234.

Resistance Check

NCAT0069S0101

- Check resistance between two terminals.

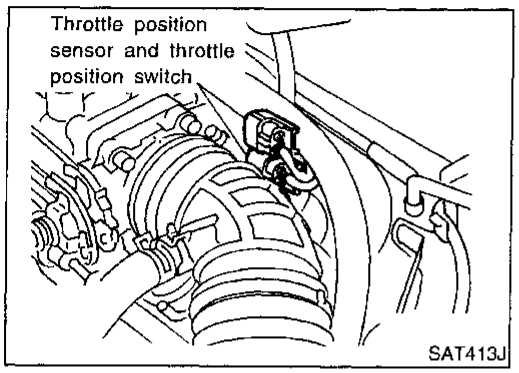
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	1	Ground	20 - 40Ω

Operation Check

NCAT0069S0102

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

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

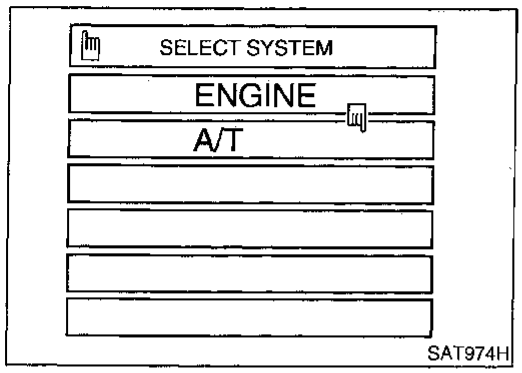
Remarks: Specification data are reference values.

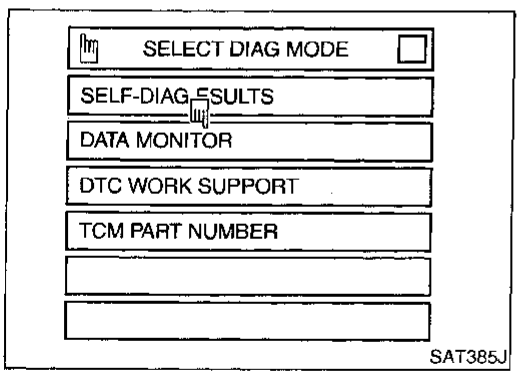
Terminal No.	Wire color	Item	Condition		Judgement standard
16	Y	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine.	Battery voltage
				When depressing accelerator pedal after warming up engine.	1V or less
17	LG	Wide open throttle position 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)		—	—

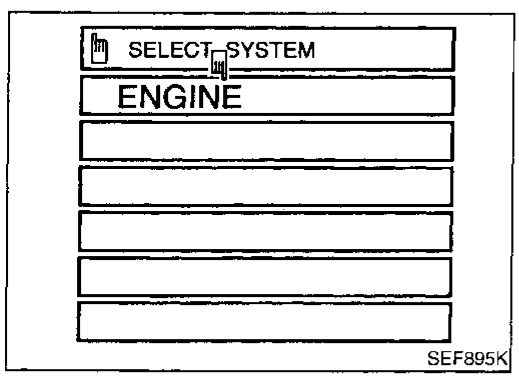
ON BOARD DIAGNOSIS LOGIC

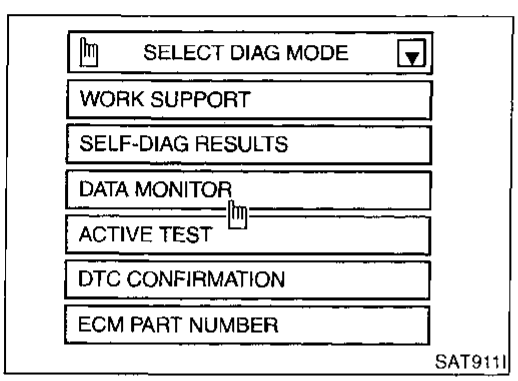
NCAT0070S03

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: TP SEN/CIRC A/T	TCM receives an excessively low or high voltage from the sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Throttle position sensor • Throttle position switch
: P1705		
: MIL Code No. 1206		









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.

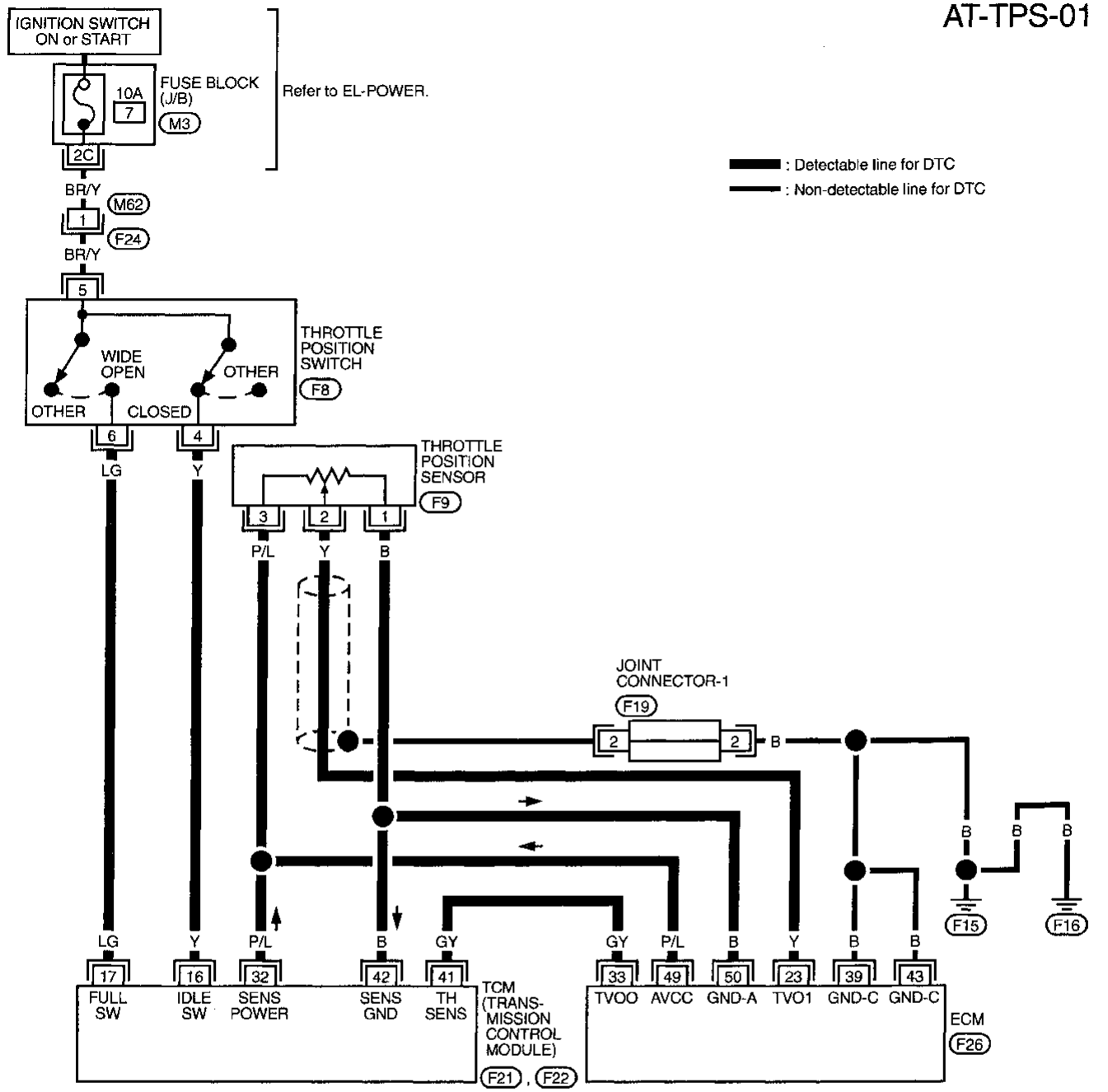
Description (Cont'd)

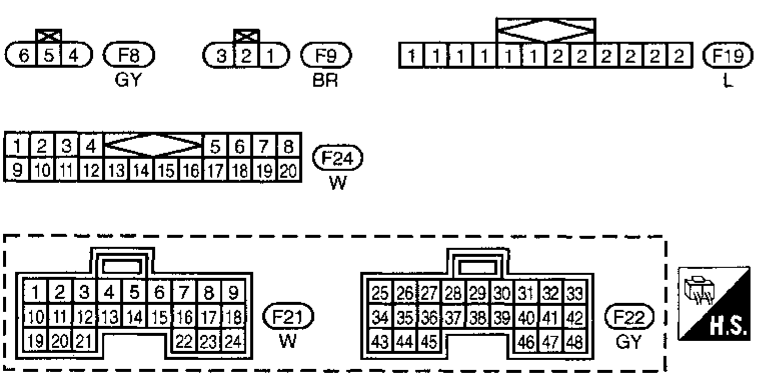
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

Wiring Diagram — AT — TPS

NCAT0212

AT-TPS-01





Refer to last page (Foldout page).
M3
F26

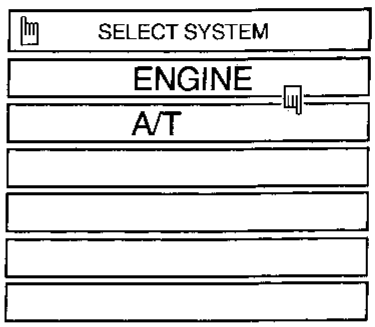
TAT187

Diagnostic Procedure

NCAT0071

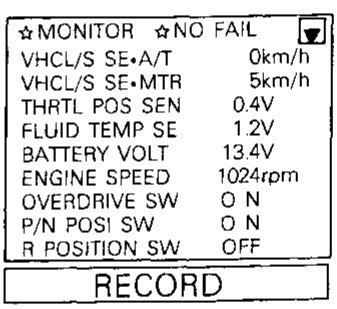
1	CHECK DTC WITH ECM
Perform diagnostic test mode II (self- diagnostic results) for engine control. Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].	
OK or NG	
OK (With CONSULT) ▶	GO TO 2.
OK (Without CONSULT) ▶	GO TO 3.
NG ▶	Check throttle position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



SAT974H

3. Read out the value of "THRTL POS SEN".
   Voltage:
   Fully-closed throttle:
   Approximately 0.5V
   Fully-open throttle:
   Approximately 4V



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)

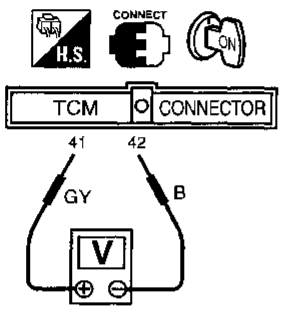
3	CHECK INPUT SIGNAL (WITHOUT CONSULT)

Without CONSULT

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between TCM terminals 41 and 42 while accelerator pedal is depressed slowly.

Voltage:

Fully-closed throttle valve:
Approximately 0.5V
Fully-open throttle valve:
Approximately 4V
(Voltage rises gradually in response to throttle position)



SAT453J

OK or NG

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

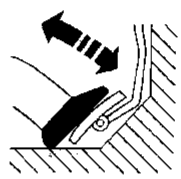
4	CHECK THROTTLE POSITION SWITCH CIRCUIT (WITH CONSULT)

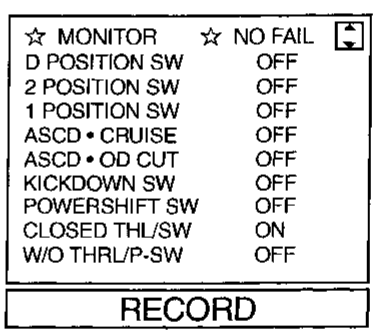
With CONSULT

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 "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





SAT963H

OK or NG

OK	▶	GO TO 6.
NG	▶	**Check the following items:** • 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)

Diagnostic Procedure (Cont'd)

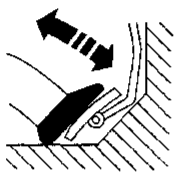
5	CHECK THROTTLE POSITION SWITCH CIRCUIT (WITHOUT CONSULT)

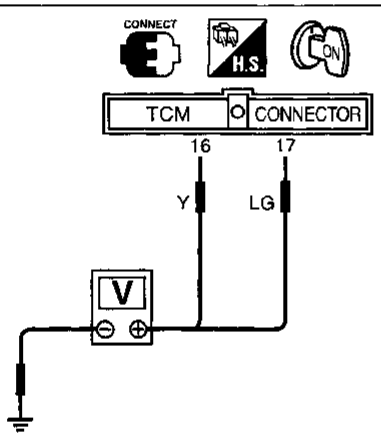
Without CONSULT

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

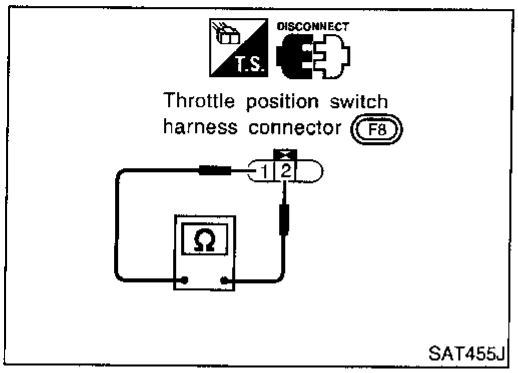
OK	▶	GO TO 6.
NG	▶	**Check the following items:** • Throttle position switch — Refer to "Components Inspection", AT-175. • Harness for short or open between ignition switch and throttle position switch (Main harness) • Harness for short or open between throttle position switch and TCM (Main harness)

6	CHECK DTC

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

OK or NG

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



Component Inspection

=NCAT0072

THROTTLE POSITION SWITCH

NCAT0072S01

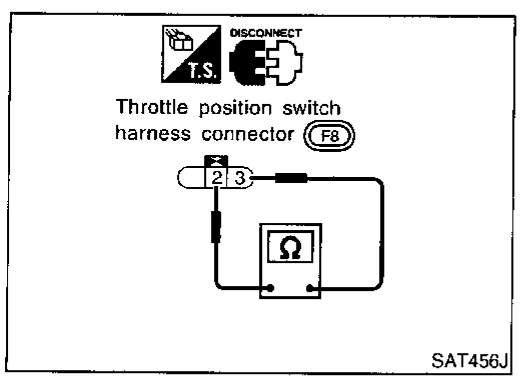
Closed Throttle Position Switch (Idle position)

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").



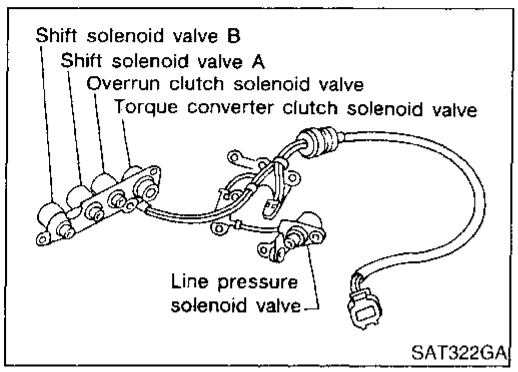
Wide Open Throttle Position Switch

NCAT0072S0102

- Check continuity between terminals 2 and 3.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

DTC P1760 OVERRUN CLUTCH SOLENOID VALVE



Description

NCA10073

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.

TCM TERMINALS AND REFERENCE VALUE

NCAT0073S01

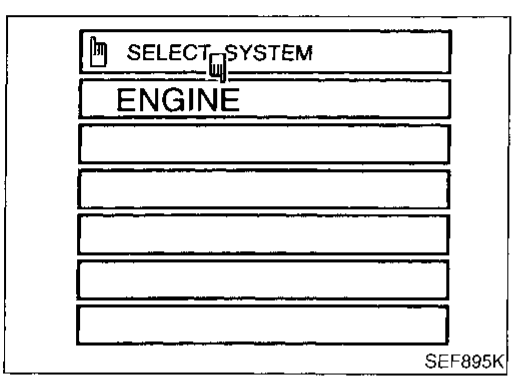
Remarks: Specification data are reference values.

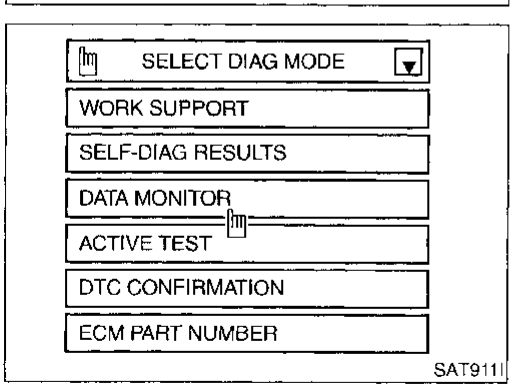
Terminal No.	Wire color	Item	Condition		Judgement standard
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	1V or less

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.	• 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").

With GST

1) Start engine.
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).
3) Select "MODE 7" with GST.

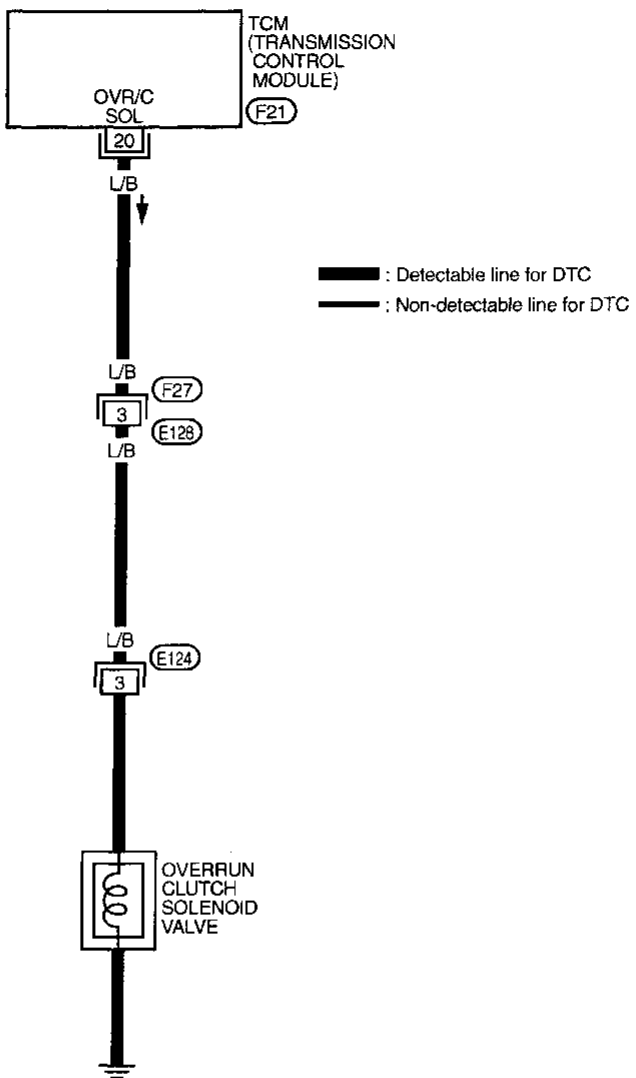
No Tools

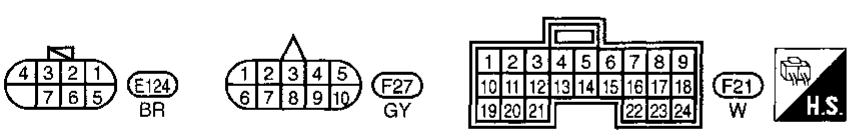
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D", overdrive control switch in "ON" or "OFF" position and vehicle speed higher than 10 km/h (6 MPH).
3) Perform self-diagnosis for ECM.
   Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC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

Wiring Diagram — AT — OVRCSV

NCAT0213

AT-OVRCSV-01





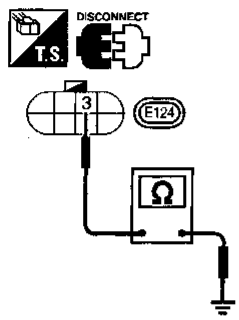
TAT188

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



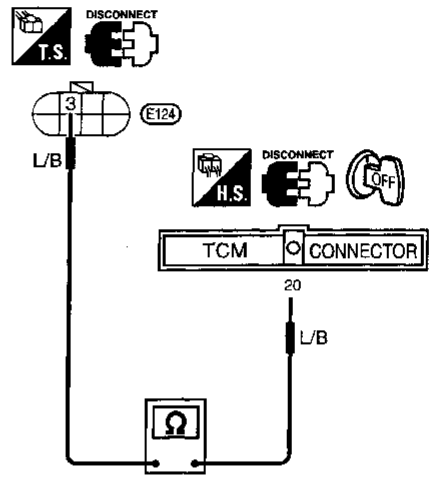
SAT457J

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: • 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

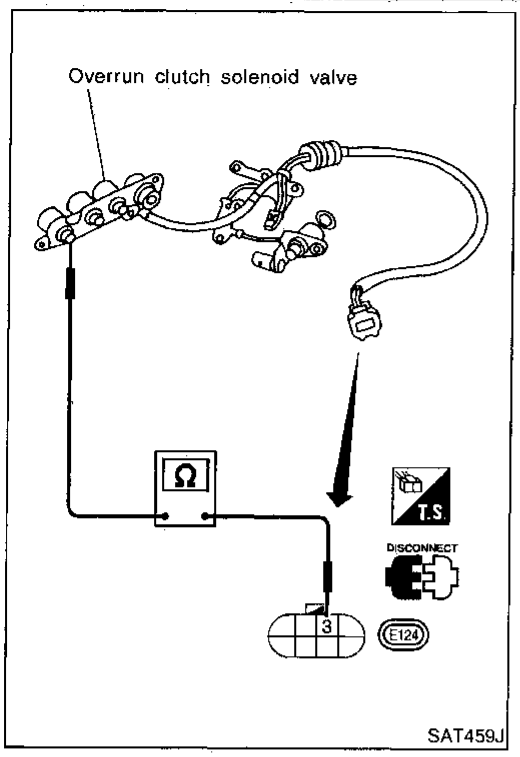
OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3 CHECK DTC

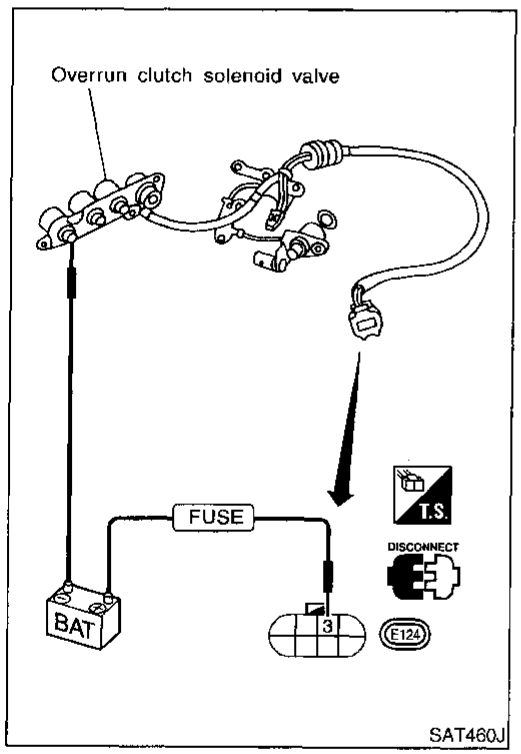
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-176.

OK or NG

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



SAT459J



SAT460J

Component Inspection

NCAT0075

OVERRUN CLUTCH SOLENOID VALVE

NCAT0075S01

- For removal, refer to AT-234.

Resistance Check

NCAT0075S0101

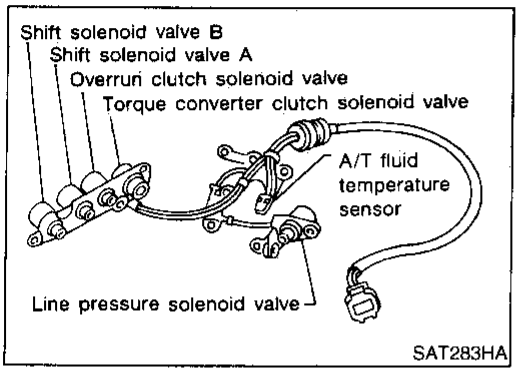
- Check resistance between two terminals.

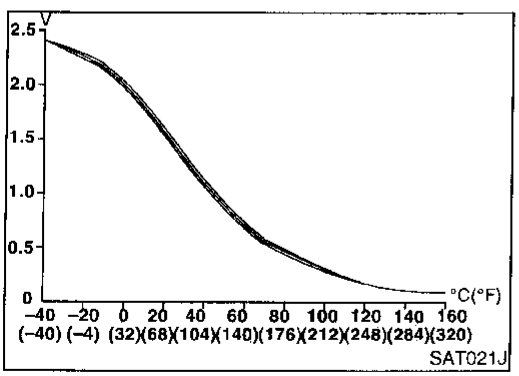
Solenoid valve	Terminal No.		Resistance (Approx.)
Overrun clutch solenoid valve	3	Ground	20 - 40Ω

Operation Check

NCAT0075S0102

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





Description

NCAT0076

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

NCAT0076S01

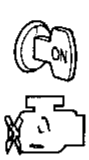
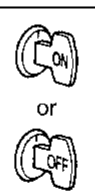
Remarks: Specification data are reference values.

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

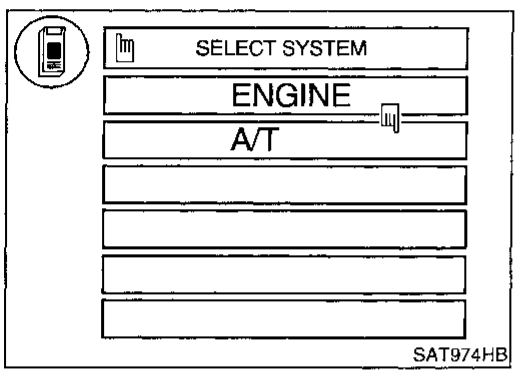
DTC BATT/FLUID TEMP SEN A/T FLUID TEMPERATURE SENSOR CIRCUIT AND TCM POWER SOURCE

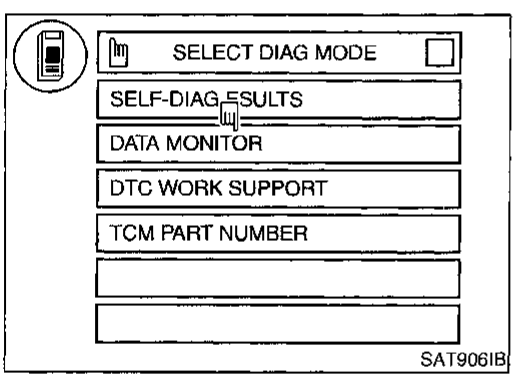
Description (Cont'd)

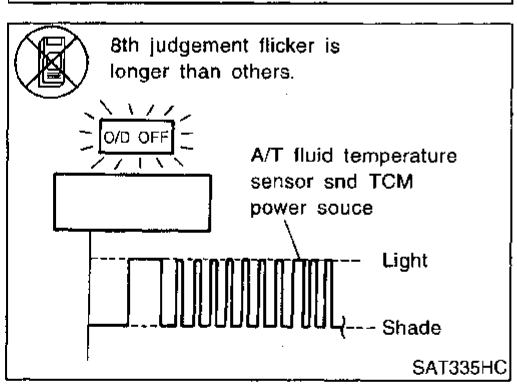
ON BOARD DIAGNOSIS LOGIC

NCAT0076S03

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







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

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).

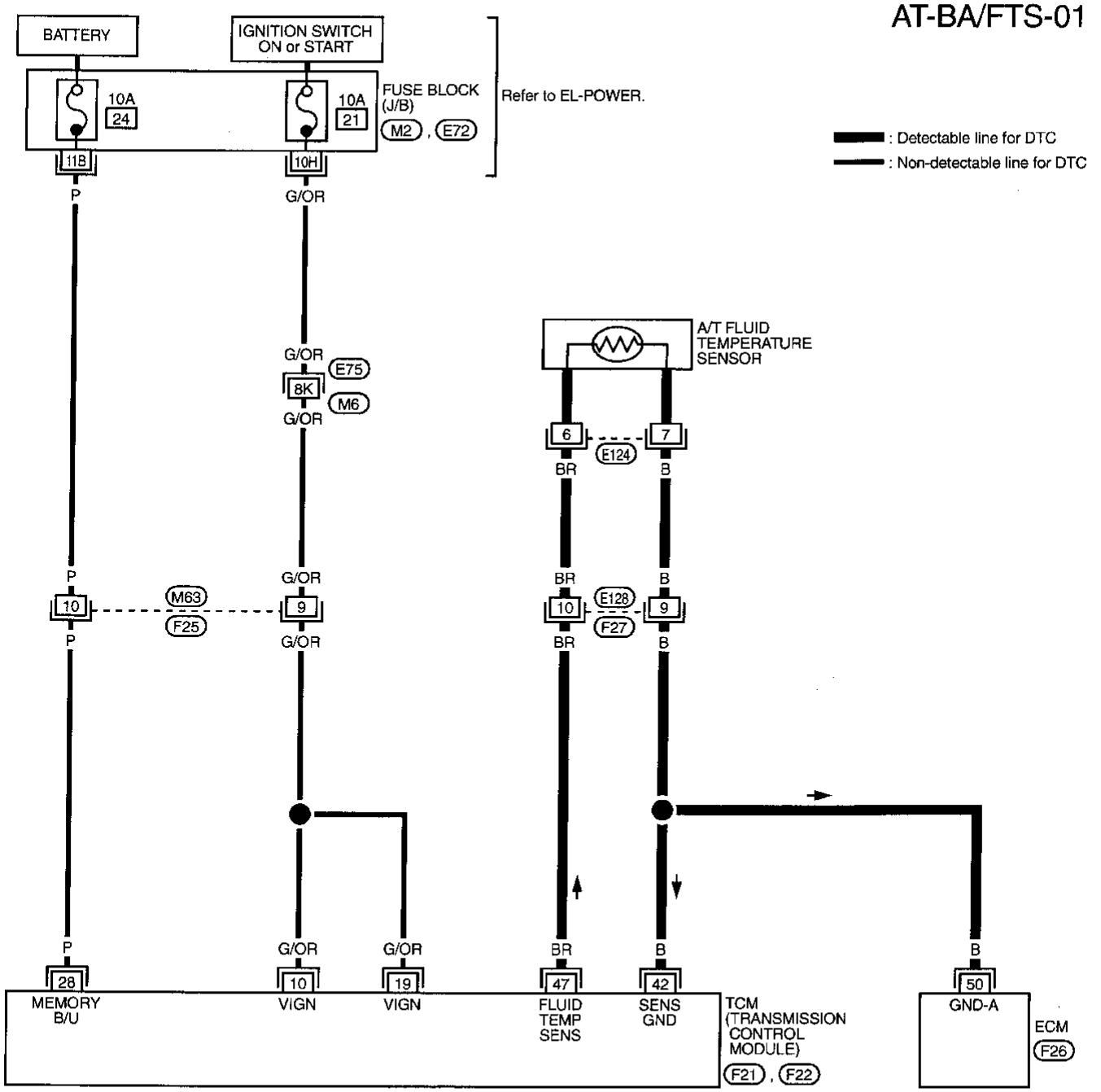
Without CONSULT

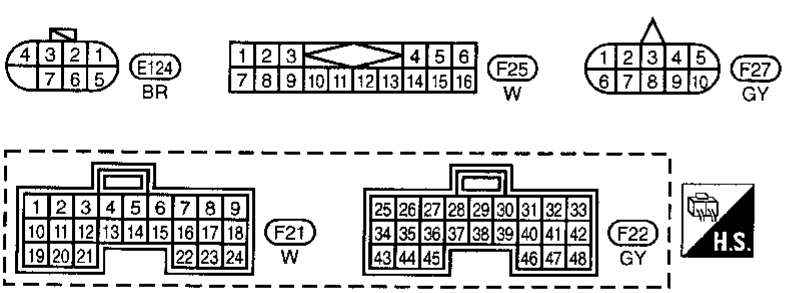
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D", vehicle speed higher than 20 km/h (12 MPH).
3) Perform self-diagnosis.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-48.

Wiring Diagram — AT — BA/FTS

NCAT0214

AT-BA/FTS-01





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

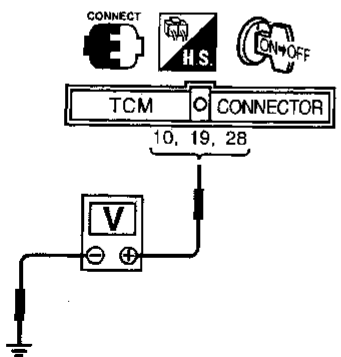
TAT189

Diagnostic Procedure

NCAT0077

1 CHECK TCM POWER SOURCE

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between TCM terminals 10, 19, 28 and ground.
   Voltage:
   Battery voltage
3. Turn ignition switch to "OFF" position.
4. Check voltage between TCM terminal 28 and ground.
   Voltage:
   Battery voltage



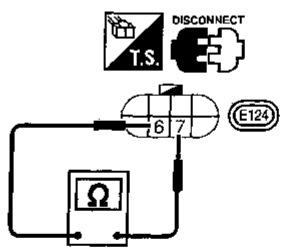
SAT461J

OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following items:** • 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

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

4. Reinstall any part removed.

OK or NG

OK (With CONSULT)	▶	GO TO 3.
OK (Without CONSULT)	▶	GO TO 4.
NG	▶	1. Remove oil pan. 2. Check the following items: • A/T fluid temperature sensor Refer to "Component Inspection", AT-186. • Harness of terminal cord assembly for short or open

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

With CONSULT

1. Start engine.
2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT.
3. Read out the value of "FLUID TEMP SE".

Voltage:

Cold [20°C (68°F)] → Hot [80°C (176°F)]:

Approximately 1.5V → 0.5V

☆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

RECORD

SAT076H

OK or NG

OK	▶	GO TO 5.
NG	▶	**Check the following item:** • 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)

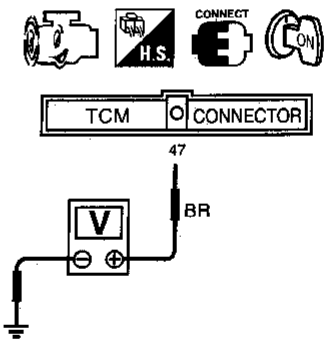
Without CONSULT

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

Voltage:

Cold [20°C (68°F)] → Hot [80°C (176°F)]:

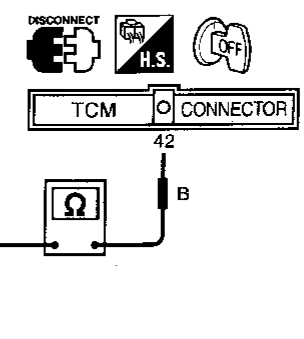
Approximately 1.5V → 0.5V



SAT463J

3. Turn ignition switch to "OFF" position.
4. Disconnect TCM harness connector.
5. Check resistance between terminal 42 and ground.

Continuity should exist.



SAT464J

OK or NG

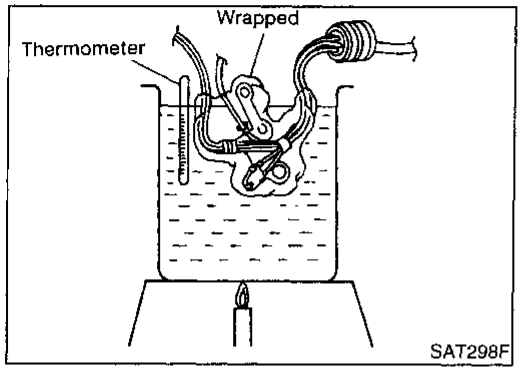
OK	▶	GO TO 5.
NG	▶	**Check the following item:** • Harness for short or open between TCM, ECM and terminal cord assembly (Main harness) • Ground circuit for ECM Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY").

5	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-182.

OK or NG

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



Component Inspection

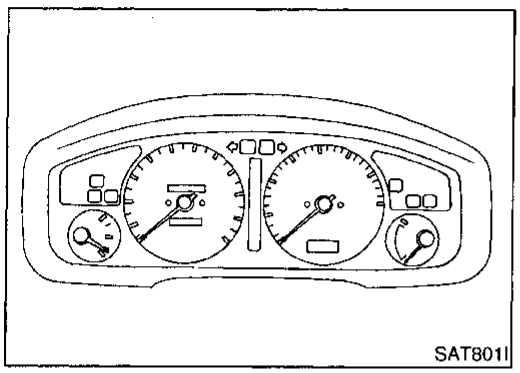
NCAT0078

A/T FLUID TEMPERATURE SENSOR

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 kΩ
80 (176)	Approximately 0.3 kΩ


SAT801I

Description

NCAT0079

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.

TCM TERMINALS AND REFERENCE VALUE

NCAT0079S01

Remarks: Specification data are reference values.

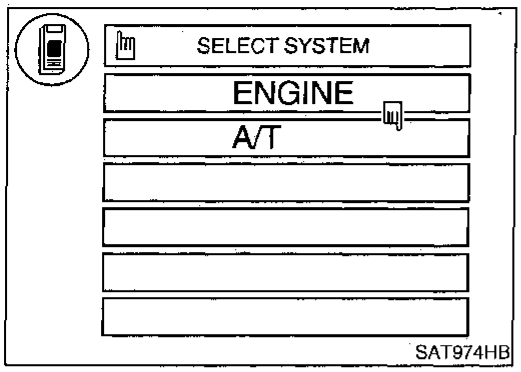
Terminal No.	Wire color	Item	Condition		Judgement standard
40	Y/G	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1V and more than 4.5V

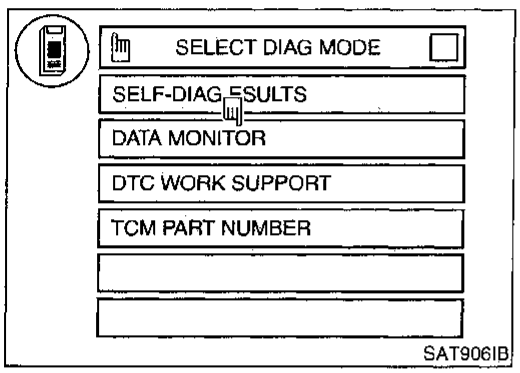
ON BOARD DIAGNOSIS LOGIC

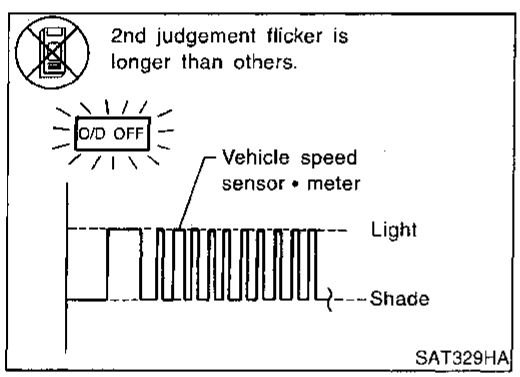
NCAT0079S02

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

Description (Cont'd)







DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NCAT0079S03

CAUTION:

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

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

With CONSULT

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).

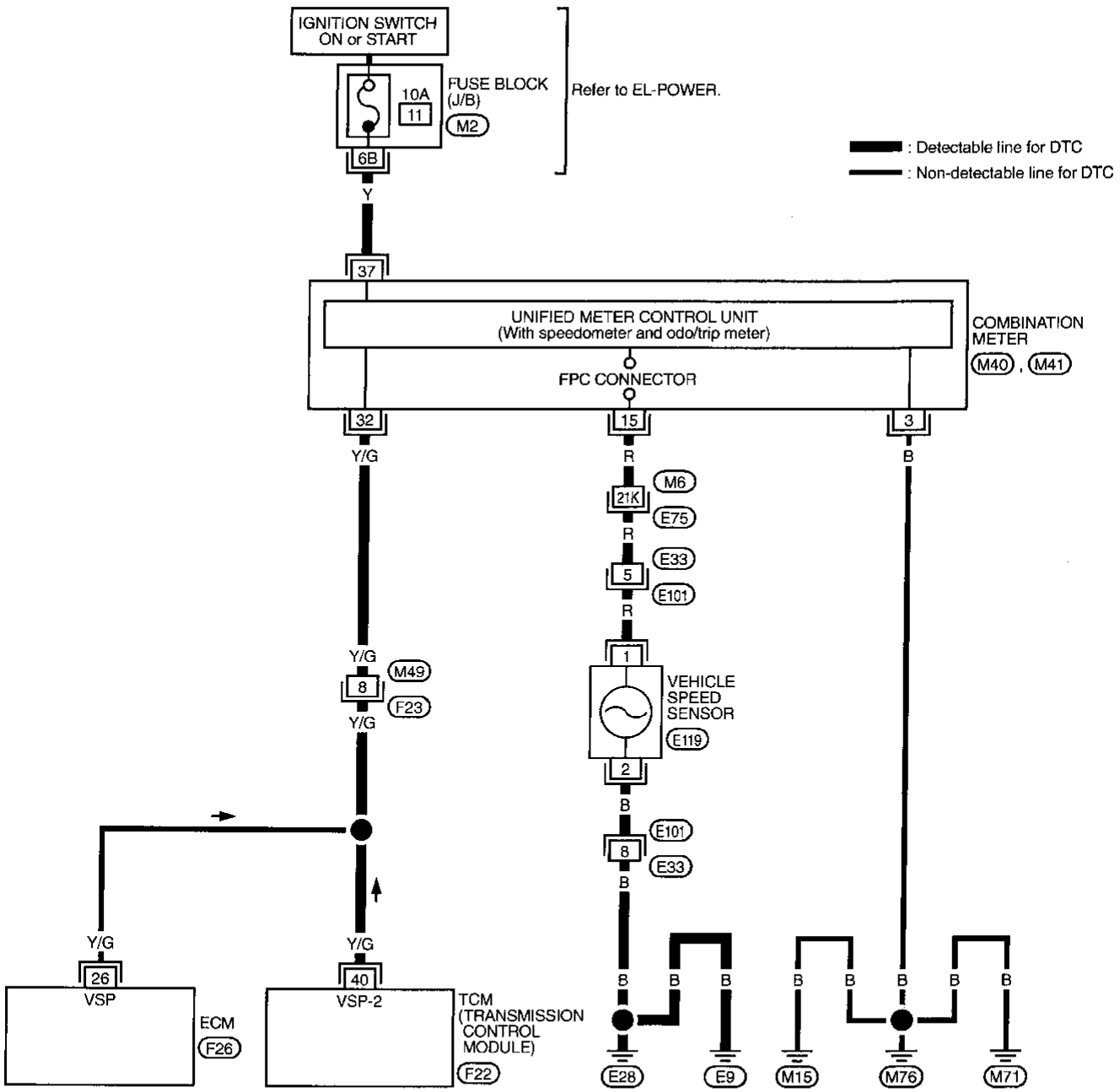
Without CONSULT

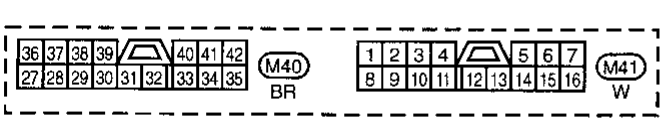
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D" and vehicle speed higher than 25 km/h (16 MPH).
3) Perform self-diagnosis.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-48.

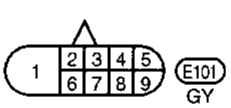
Wiring Diagram — AT — VSSMTR

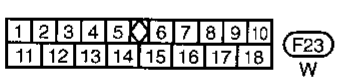
NCAT0215

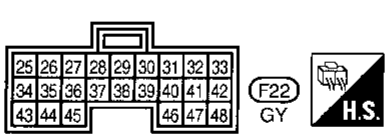
AT-VSSMTR-01











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

TAT190

Diagnostic Procedure

NCAT0080

1	CHECK INPUT SIGNAL

With CONSULT

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

☆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

RECORD

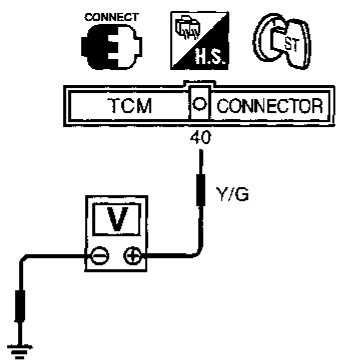
SAT076H

Without CONSULT

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

Voltage:

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



SAT465J

OK or NG

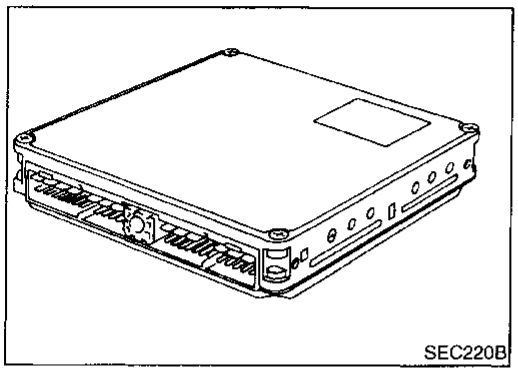
OK	▶	GO TO 2.
NG	▶	**Check the following items:** • Vehicle speed sensor and ground circuit for vehicle speed sensor Refer to EL section ("METERS AND GAUGES"). • Harness for short or open between TCM and vehicle speed sensor (Main harness)

2	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-188.

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.


SEC220B

Description

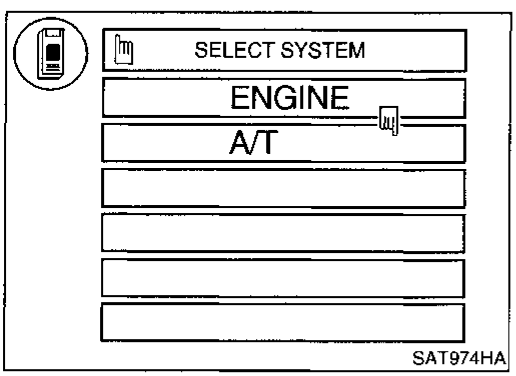
NCAT0218

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

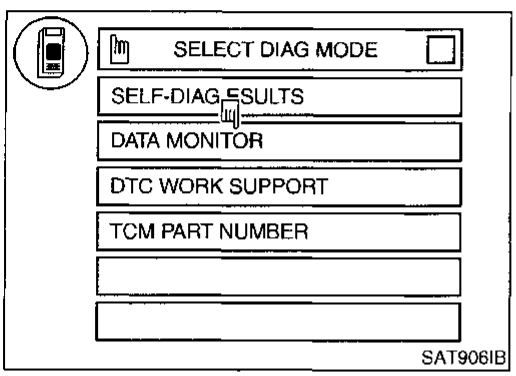
ON BOARD DIAGNOSIS LOGIC

NCAT0218S01

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



SAT974HA



SAT906IB

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.

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.

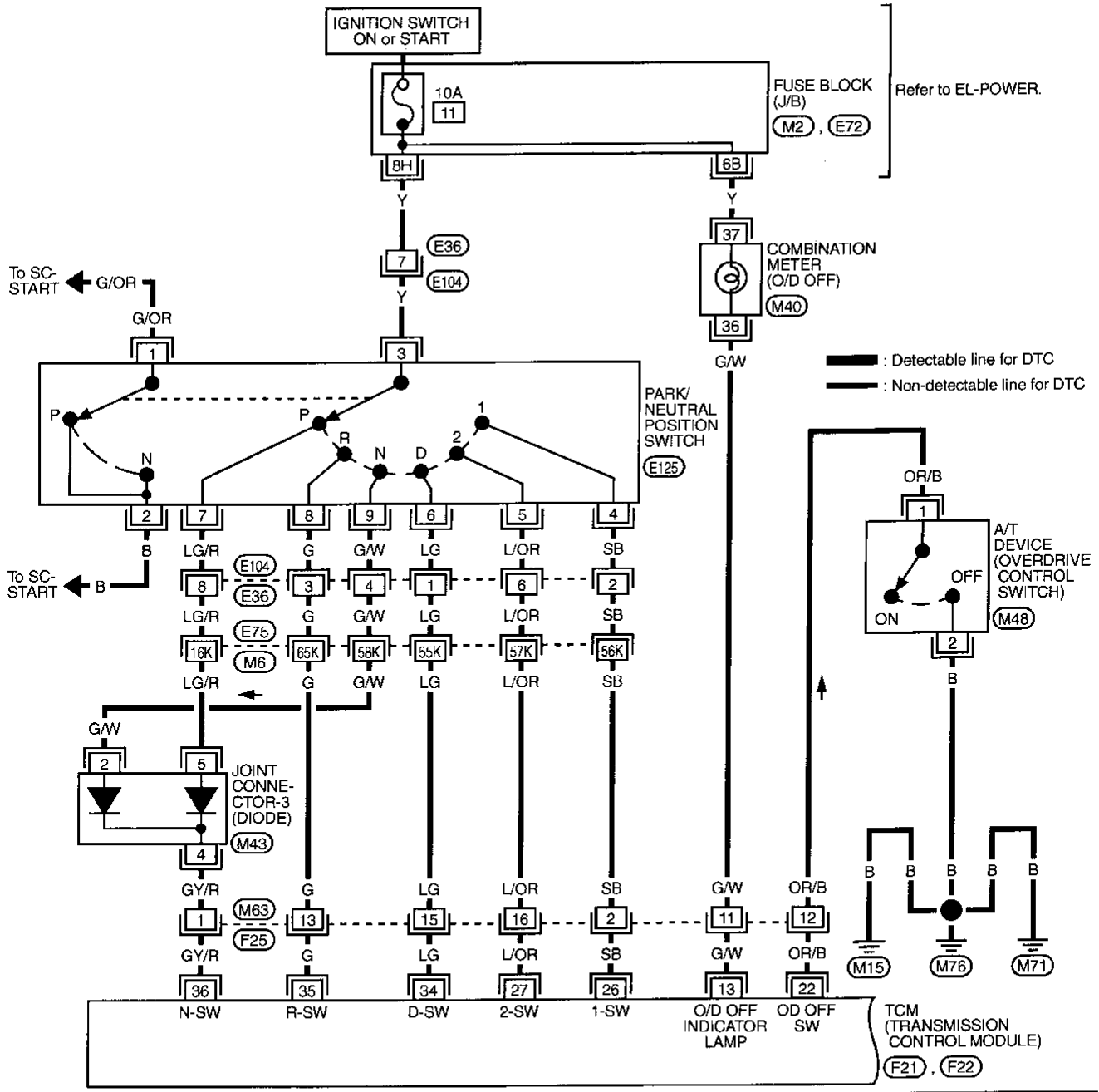
Diagnostic Procedure (Cont'd)

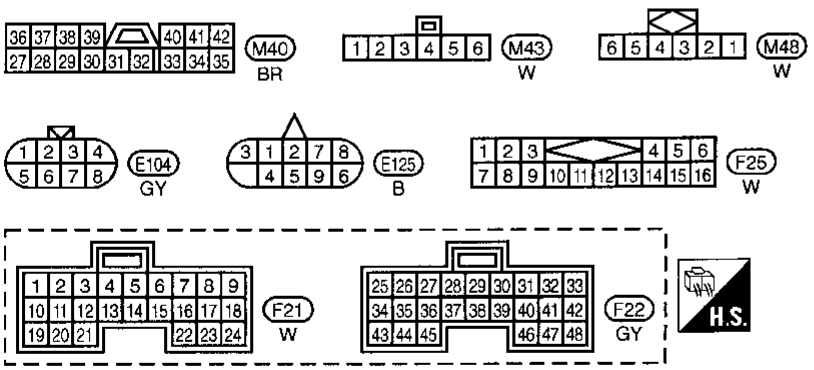
3	CHECK DTC AGAIN	
Is the "CONTROL UNIT (RAM) or CONTROL UNIT (ROM)" displayed again?		
	Yes or No	
Yes	▶	Replace TCM.
No	▶	**INSPECTION END**

Wiring Diagram — AT — NONDTC

NCAT0216

AT-NONDTC-01





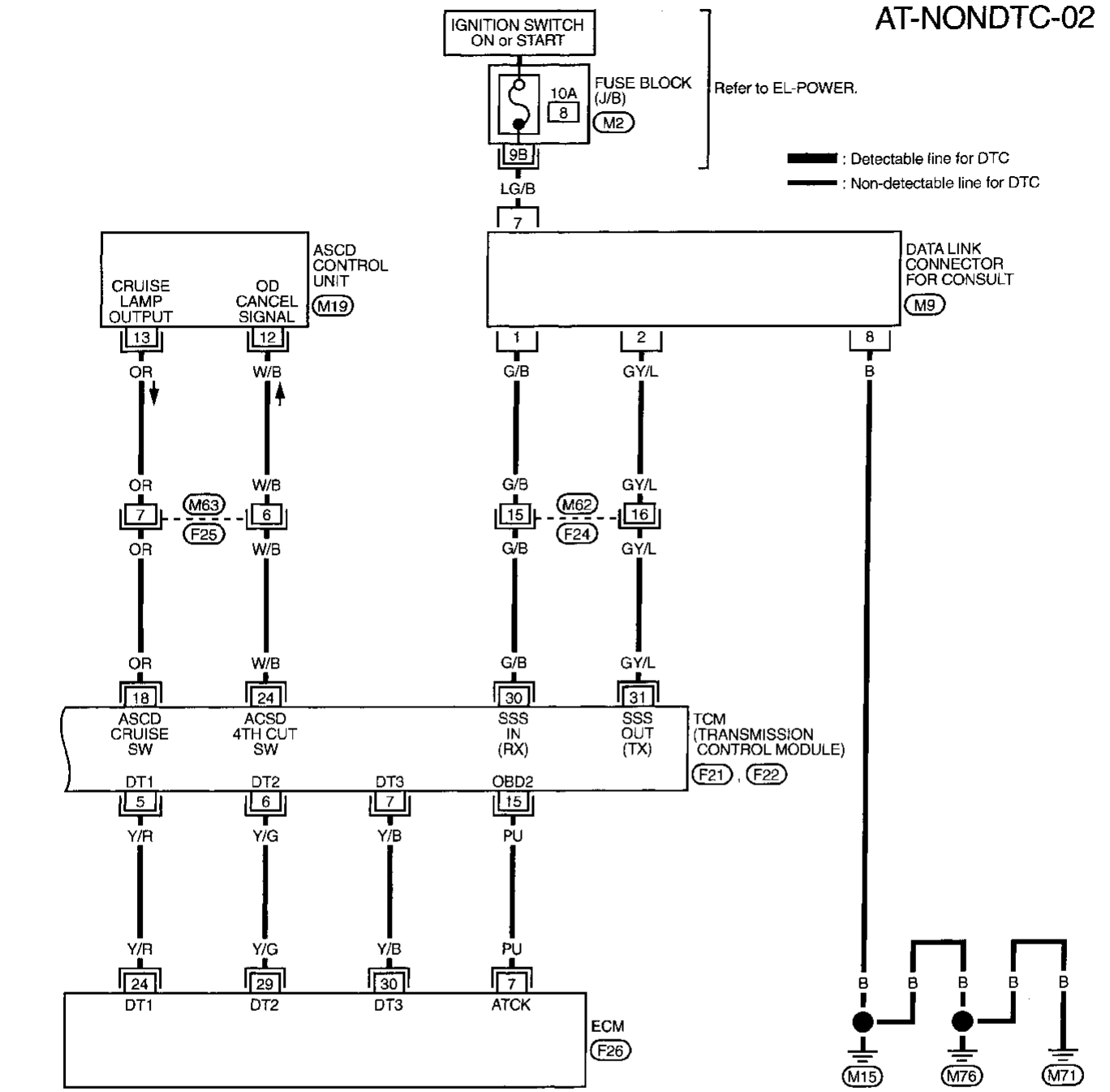
Refer to last page (Foldout page).

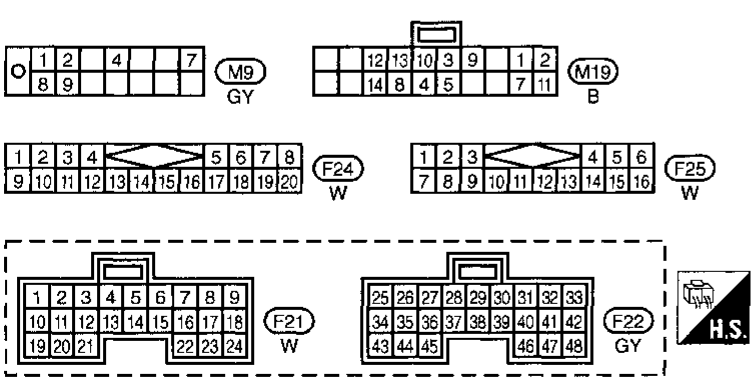
M6 , E75

M2

E72

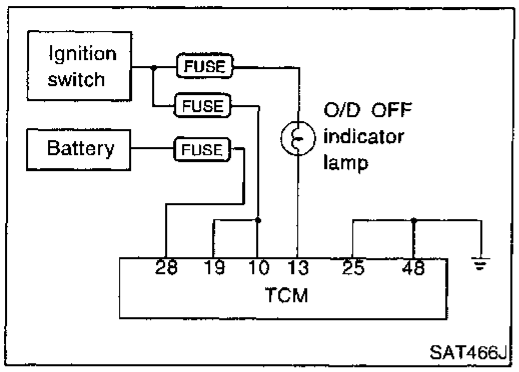
TAT191





Refer to last page (Foldout page).
M2
F26

TAT192



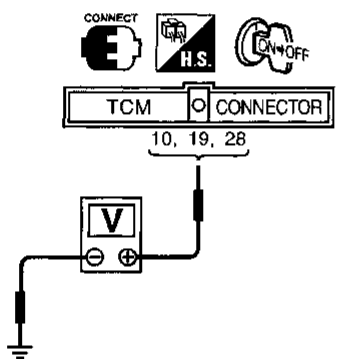
1. O/D OFF Indicator Lamp Does Not Come On

=NCAT0081

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

1	CHECK TCM POWER SOURCE

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



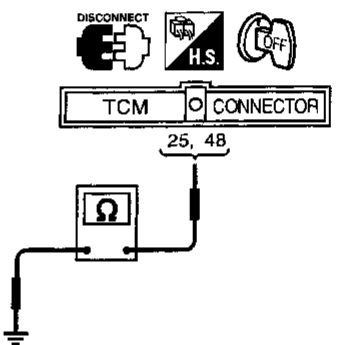
3. Turn ignition switch to "OFF" position.
4. Check voltage between TCM terminal 28 and ground.
   Voltage: Battery voltage

OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following items:** • Harness for short or open between ignition switch and TCM (Main harness) Refer to "Wiring Diagram — AT — MAIN", AT-90. • Ignition switch and fuse Refer to EL section ("POWER SUPPLY ROUTING").

2	CHECK TCM GROUND CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Disconnect TCM harness connector.
3. Check continuity between TCM terminals 25, 48 and ground.



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

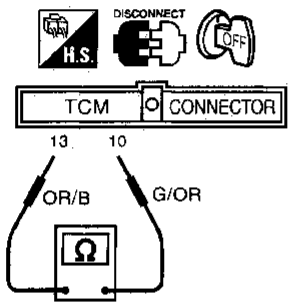
OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors. Refer to "Wiring Diagram — AT — MAIN", AT-90.

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

3	CHECK LAMP CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Check resistance between TCM terminals 13 and 10.
   Resistance: 50 - 100Ω



SAT469J

3. Reinstall any part removed.

OK or NG

OK	▶	GO TO 4.
NG	▶	**Check the following items:** • 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	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

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

=NCAT0082

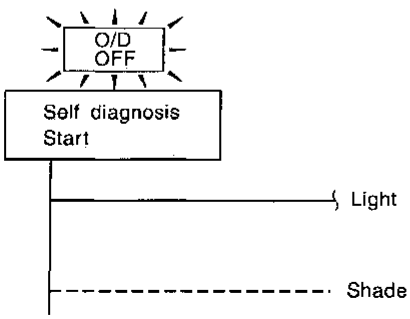
SYMPTOM:

- **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

With CONSULT
Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?

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



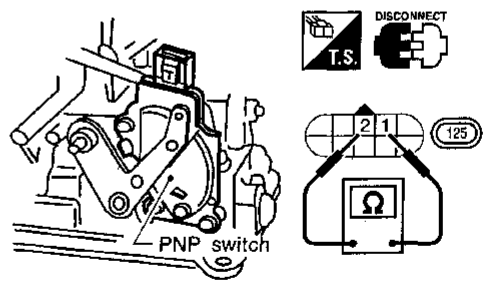
SAT367J

Yes or No

Yes	▶	Check PNP switch circuit. Refer to "DTC P0705", AT-92.
No	▶	GO TO 2.

2	CHECK PNP SWITCH INSPECTION

Check for short or open of PNP switch harness connector terminals 1 and 2.
Refer to "Component Inspection", AT-96.



SAT408J

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace PNP switch.

3	CHECK STARTING SYSTEM

Check starting system. Refer to EL section ("System Description", "STARTING SYSTEM").

OK or NG

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

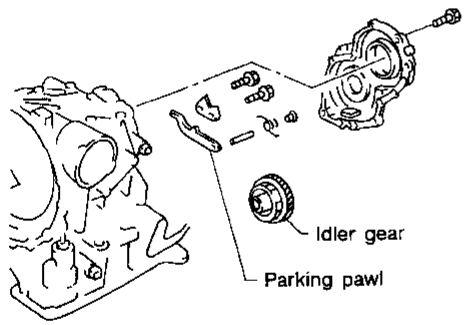
3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed

=NCAT0083

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

1	CHECK PARKING COMPONENTS

Check parking components. Refer to "Parking Pawl Components", AT-240, 245.



SAT282F

OK or NG

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

4. In "N" Position, Vehicle Moves

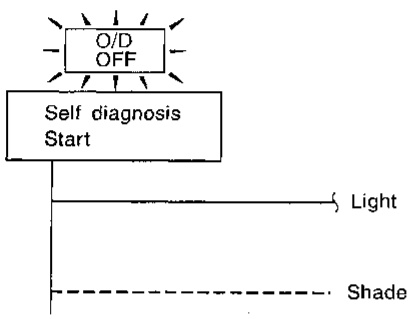
=NCAT0084

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

1	CHECK PNP SWITCH CIRCUIT

With CONSULT
Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?

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



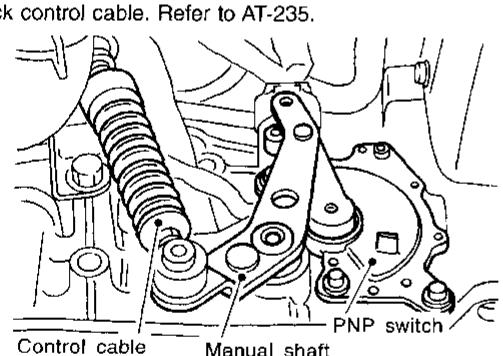
SAT367J

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.

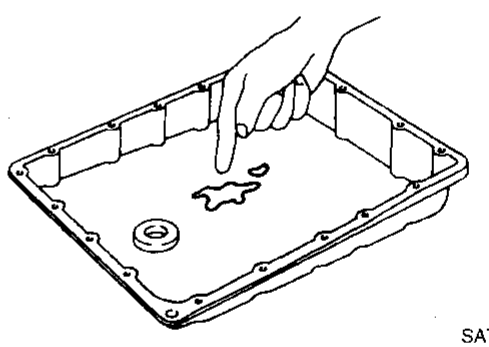
SAT638A

OK or NG

OK	▶	GO TO 4.
NG	▶	Refill ATF.

4	CHECK A/T FLUID CONDITION

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



SAT171B

OK or NG

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

5	CHECK SYMPTOM

Check again.

OK or NG

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

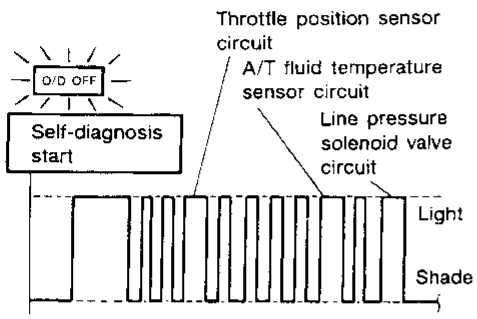
5. Large Shock. "N" → "R" Position

=NCAT0085

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?



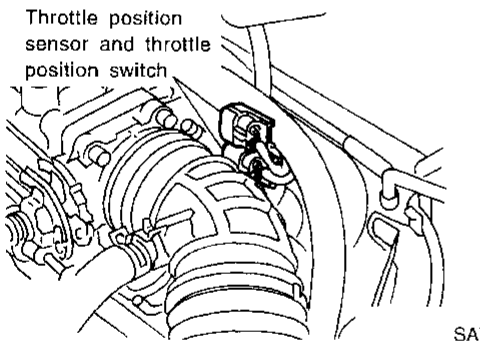
SAT345HA

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"].



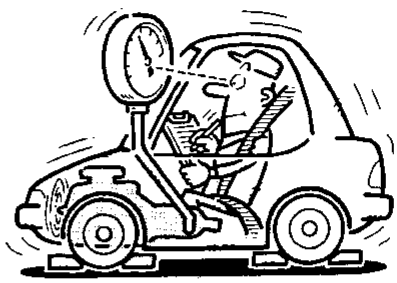
SAT413J

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.



SAT494G

OK or NG

OK	▶	GO TO 4.
NG	▶	1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: • Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) • Line pressure solenoid valve

4	CHECK SYMPTOM

Check again.

OK or NG

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

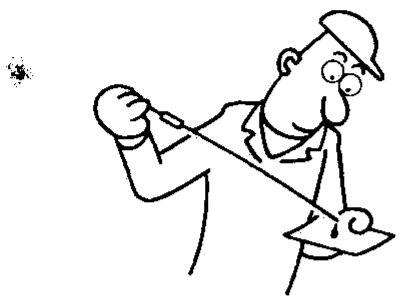
6. Vehicle Does Not Creep Backward In "R" Position

=NCAT0086

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

1	CHECK A/T FLUID LEVEL

Check A/T fluid level again.



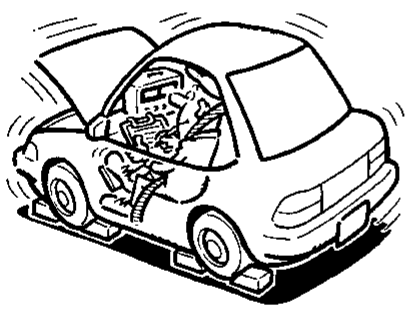
SAT638A

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.



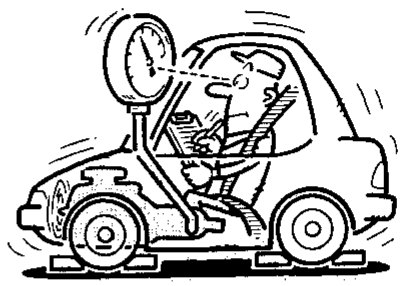
SAT493G

OK or NG

OK	▶	GO TO 3.
OK in "1" position, NG in "R" position	▶	1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-234. 2. Check the following items: • Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) • Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: • Oil pump assembly • Torque converter • Reverse clutch assembly • High clutch assembly
NG in both "1" and "R" positions	▶	GO TO 6.

3	CHECK LINE PRESSURE

Check line pressure at idle with selector lever in "R" position. Refer to "Line Pressure Test", AT-62.



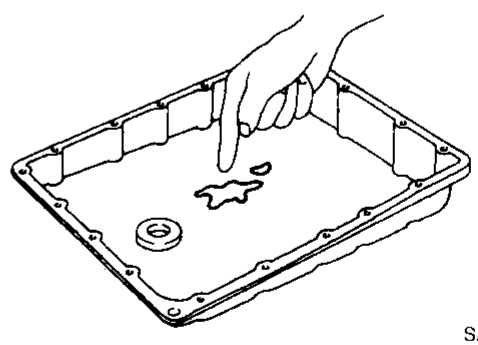
SAT494G

OK or NG

OK	▶	GO TO 4.
NG	▶	1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-234. 2. Check the following items: • Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) • Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following item: • Oil pump assembly

4	CHECK A/T FLUID CONDITION

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



SAT171B

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 6.

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: • Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) • Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: • Oil pump assembly • Torque converter • Reverse clutch assembly • High clutch assembly • Low & reverse brake assembly • Low one-way clutch **OK or NG**	
OK ▶	GO TO 5.
NG ▶	Repair or replace damaged parts.

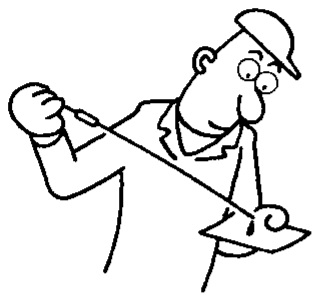
7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position

=NCAT0087

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

1	CHECK A/T FLUID LEVEL

Check A/T fluid level again.



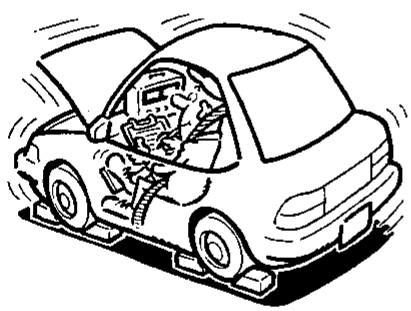
SAT638A

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.



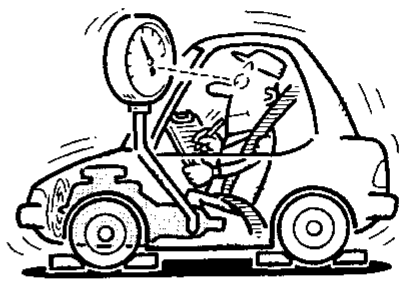
SAT493G

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.



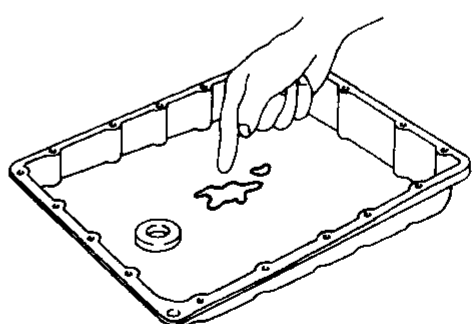
SAT494G

OK or NG

OK	▶	GO TO 4.
NG	▶	1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: • Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) • Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following item: • Oil pump assembly

4	CHECK A/T FLUID CONDITION

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



SAT171B

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 6.

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

6	DETECT MALFUNCTIONING ITEM
1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: • Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) • Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: • Oil pump assembly • Forward clutch assembly • Forward one-way clutch • Low one-way clutch • Low & reverse brake assembly • Torque converter **OK or NG**	
OK ▶	GO TO 5.
NG ▶	Repair or replace damaged parts.

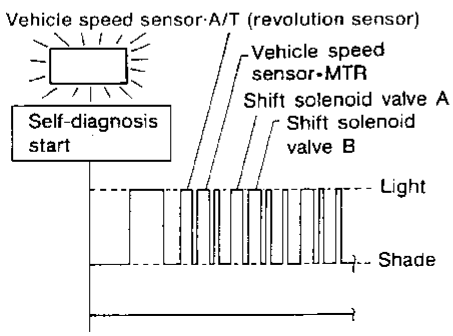
8. Vehicle Cannot Be Started From D_1

=NCAT0088

SYMPTOM:
Vehicle cannot be started from D_1 on Cruise test — Part 1.

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

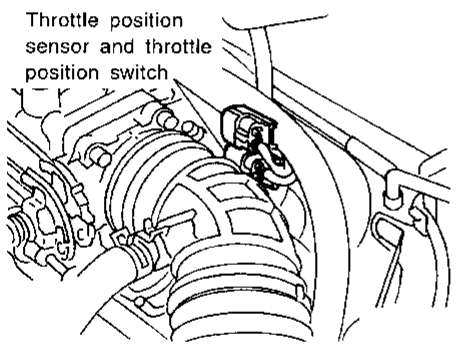
2	CHECK SELF-DIAGNOSTIC RESULTS
Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test?	



SAT934FB

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.

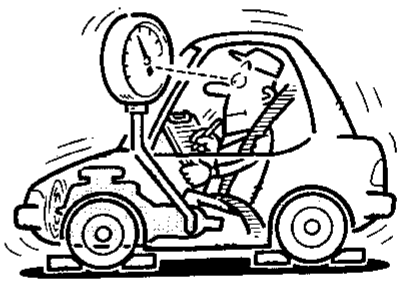
3	CHECK THROTTLE POSITION SENSOR
Check throttle position sensor. Refer to EC section ["Throttle Position Sensor (DTC: 0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].	



SAT413J

OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace throttle position sensor.

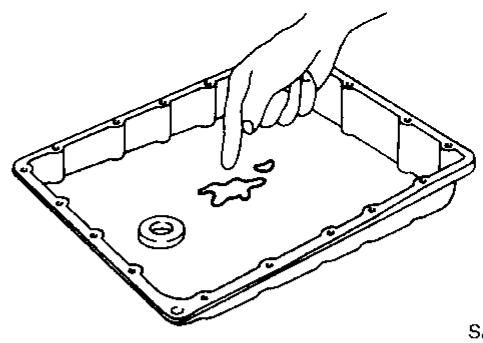
4	CHECK LINE PRESSURE
Check line pressure at stall point with selector lever in "D" position. Refer to "Line Pressure Test", AT-75.	



SAT494G

OK or NG	
OK ▶	GO TO 5.
NG ▶	GO TO 8.

5	CHECK A/T FLUID CONDITION
1. Remove oil pan. 2. Check A/T fluid condition.	



SAT171B

OK or NG	
OK ▶	GO TO 6.
NG ▶	GO TO 8.

6	DETECT MALFUNCTIONING ITEM
1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: • Shift valve A • Shift valve B • Shift solenoid valve A • Shift solenoid valve B • Pilot valve • Pilot filter	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Repair or replace damaged parts.

8. Vehicle Cannot Be Started From D_1 (Cont'd)

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

8	DETECT MALFUNCTIONING ITEM
1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: • Shift valve A • Shift valve B • Shift solenoid valve A • Shift solenoid valve B • Pilot valve • Pilot filter 3. Disassemble A/T. 4. Check the following items: • Forward clutch assembly • Forward one-way clutch • Low one-way clutch • High clutch assembly • Torque converter • Oil pump assembly	
OK/NG	
OK ▶	GO TO 7.
NG ▶	Repair or replace damaged parts.

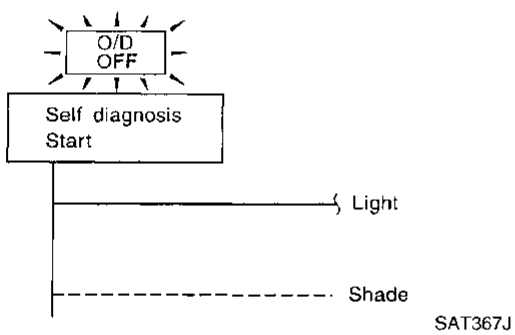
9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$

=NCAT0089

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

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
With CONSULT Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?	
Without CONSULT Does self-diagnosis show damage to PNP switch circuit?	

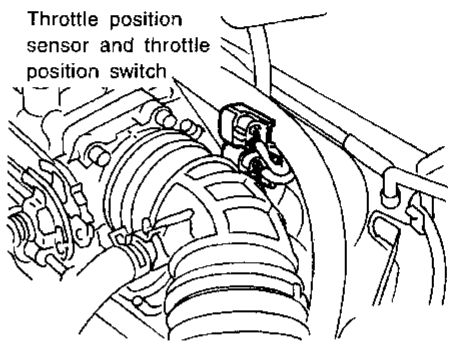


SAT367J

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.

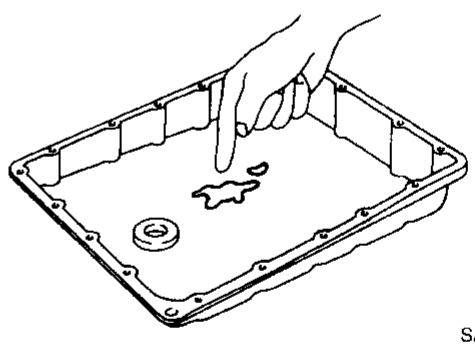
4	CHECK THROTTLE POSITION SENSOR
Check throttle position sensor. Refer to EC section ["Throttle Position Sensor (DTC: 0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].	



SAT413J

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

5	CHECK A/T FLUID CONIDITION
1. Remove oil pan. 2. Check A/T fluid condition.	


SAT171B

OK or NG	
OK ▶	GO TO 6.
NG ▶	GO TO 8.

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: • 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: • Shift valve A • Shift solenoid valve A • Pilot valve • Pilot filter 3. Disassemble A/T. 4. Check the following items: • Servo piston assembly • Brake band • Oil pump assembly	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Repair or replace damaged parts.

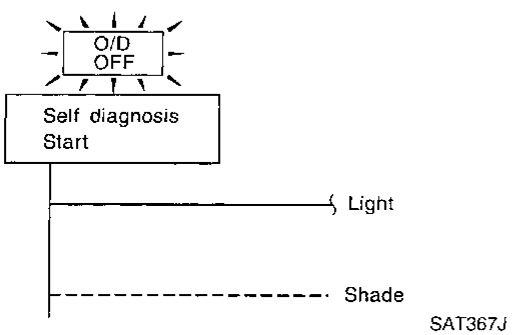
10. A/T Does Not Shift: $D_2 \rightarrow D_3$

=NCAT0090

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

1	CHECK SYMPTOM
Are 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From D_1 OK?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	Go to 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From D_1, AT-203, 205.

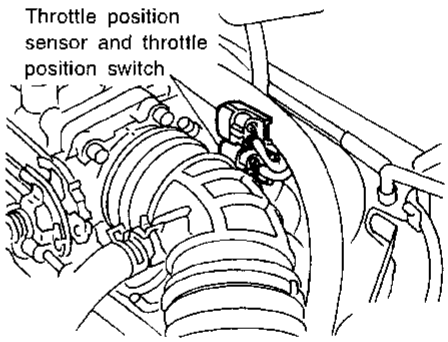
2	CHECK PNP SWITCH CIRCUIT
With CONSULT Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?	
Without CONSULT Does self-diagnosis show damage to PNP switch circuit?	



SAT367J

Yes or No	
Yes ▶	Check PNP switch circuit. Refer to "DTC P0705", AT-92.
No ▶	GO TO 3.

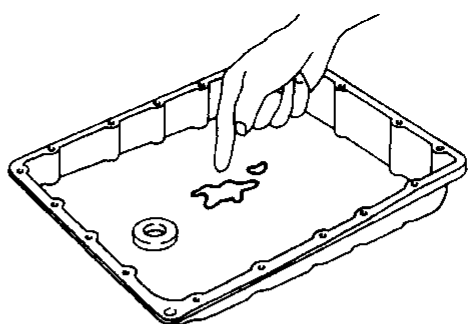
3	CHECK THROTTLE POSITION SENSOR
Check throttle position sensor. Refer to EC section ["Throttle Position Sensor (DTC: 0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].	



SAT413J

OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace throttle position sensor.

4	CHECK A/T FLUID CONDITION
1. Remove oil pan. 2. Check A/T fluid condition.	


SAT171B

OK or NG	
OK ▶	GO TO 5.
NG ▶	GO TO 7.

5	DETECT MALFUNCTIONING ITEM
1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: • Shift valve B • Shift solenoid valve B • Pilot valve • Pilot filter	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Repair or replace damaged parts.

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: • Shift valve B • Shift solenoid valve B • Pilot valve • Pilot filter 3. Disassemble A/T. 4. Check the following items: • Servo piston assembly • High clutch assembly • Oil pump assembly **OK or NG**	
OK ▶	GO TO 6.
NG ▶	Repair or replace damaged parts.

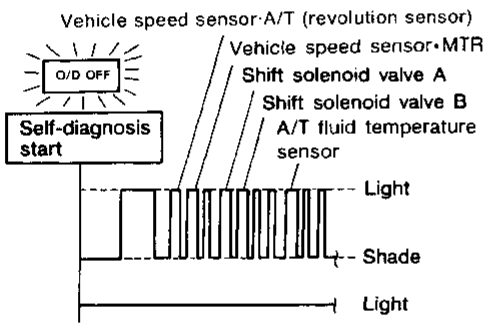
11. A/T Does Not Shift: $D_3 \rightarrow D_4$

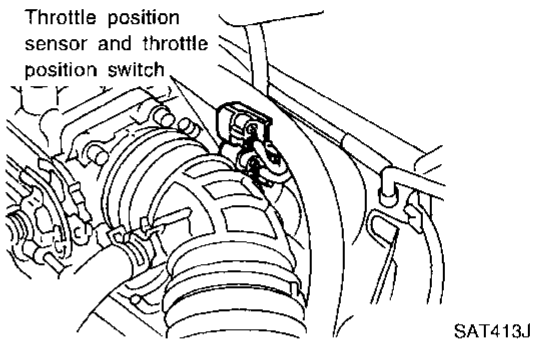
=NCAT0091

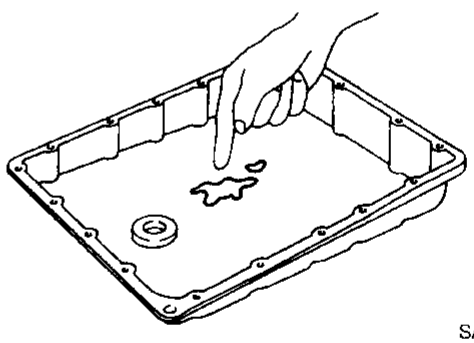
SYMPTOM:

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

1	CHECK SYMPTOM
Are 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position and 8. Vehicle Cannot Be Started From D_1 OK?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	Go to 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
With CONSULT Does self-diagnosis, after cruise test, show damage to any of the following circuits? • PNP switch • Overdrive control switch • A/T fluid temperature sensor • Vehicle speed sensor·A/T (revolution sensor) • Shift solenoid valve A or B • Vehicle speed sensor·MTR  SAT363HC	
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"].  SAT413J	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace throttle position sensor.

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

5	DETECT MALFUNCTIONING ITEM
1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: • Shift valve B • Overrun clutch control valve • Shift solenoid valve B • Pilot valve • Pilot filter	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Repair or replace damaged parts.

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 ▶	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: • Shift valve B • Overrun clutch control valve • Shift solenoid valve B • Pilot valve • Pilot filter 3. Disassemble A/T. 4. Check the following items: • Servo piston assembly • Brake band • Torque converter • Oil pump assembly **OK or NG**	
OK ▶	GO TO 6.
NG ▶	Repair or replace damaged parts.

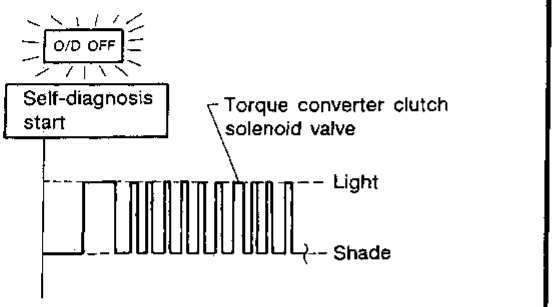
12. A/T Does Not Perform Lock-up

=NCAT0092

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

1	CHECK SELF-DIAGNOSTIC RESULTS

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



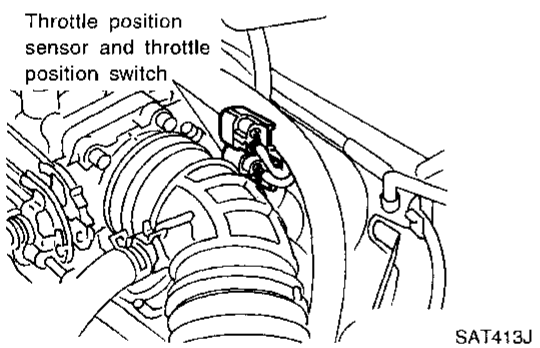
SAT346H

Yes or No

Yes	▶	Check torque converter clutch solenoid valve circuit. Refer to "DTC P0740", AT-139.
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"].



SAT413J

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace throttle position sensor.

3	DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-234.
2. Check following items:
- Torque converter clutch control valve
- Torque converter relief valve
- Torque converter clutch solenoid valve
- Pilot valve
- Pilot filter

OK or NG

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

4	CHECK SYMPTOM

Check again.

OK or NG

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

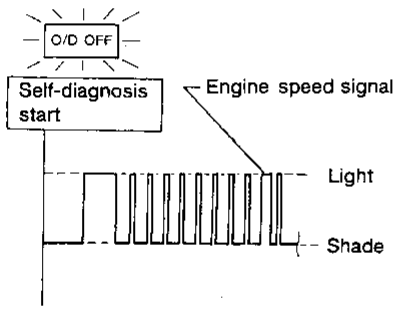
13. A/T Does Not Hold Lock-up Condition

=NCAT0093

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?



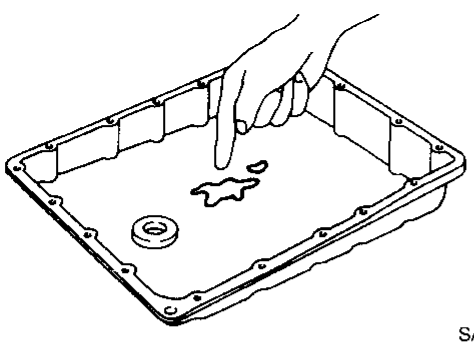
SAT347H

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

OK or NG

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

4	CHECK SYMPTOM

Check again.

OK or NG

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

5	DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-234.
2. Check the following items:
- Torque converter clutch control valve
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check torque converter and oil pump assembly.

OK or NG

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

14. Lock-up Is Not Released

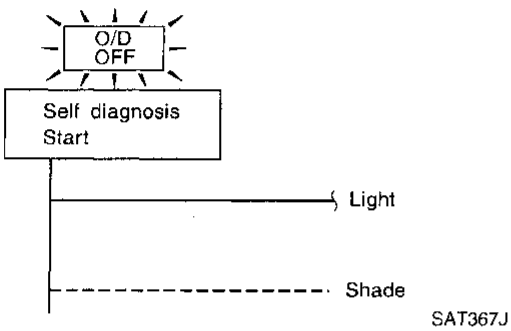
=NCAT0094

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

1	CHECK THROTTLE POSITION SWITCH CIRCUIT

With CONSULT
Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to closed throttle position switch circuit?

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



SAT367J

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

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

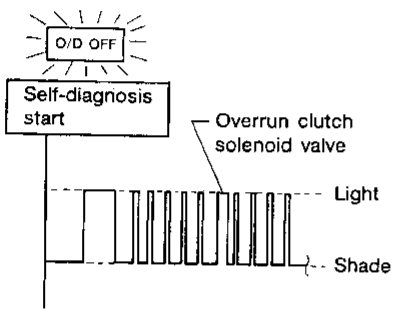
=NCAT0095

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?



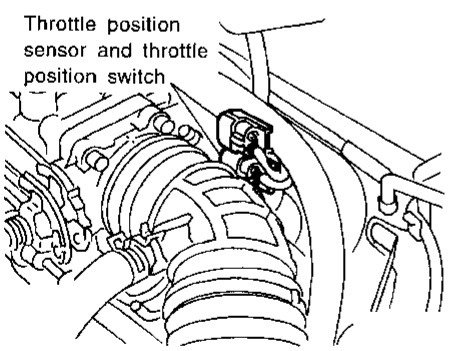
SAT348H

Yes or NO

Yes	▶	Check overrun clutch solenoid valve circuit. Refer to "DTC P1760", AT-176.
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"].



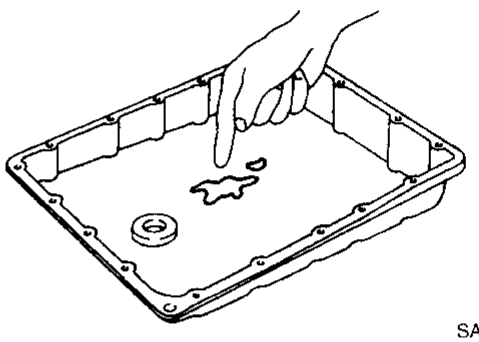
SAT413J

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace throttle position sensor.

3 CHECK A/T FLUID CONDITION

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



SAT171B

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 6.

4 DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-234.
2. Check the following items:
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

OK or NG

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

5 CHECK SYMPTOM

Check again.

OK or NG

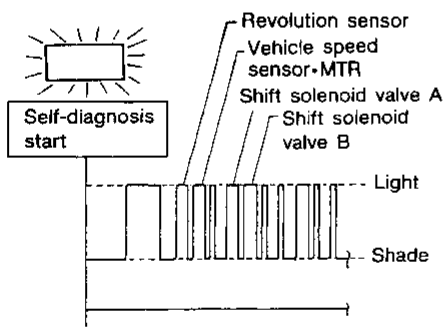
OK	▶	**INSPECTION END**
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

6	DETECT MALFUNCTIONING ITEM
1. Remove control valve assembly. Refer to AT-234. 2. Check the following items: • Overrun clutch control valve • Overrun clutch reducing valve • Overrun clutch solenoid valve 3. Disassemble A/T. 4. Check the following items: • Overrun clutch assembly • Oil pump assembly	
OK or NG	
OK ▶	GO TO 5.
NG ▶	Repair or replace damaged parts.

16. Vehicle Does Not Start From D_1

NCAT0096

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

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

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

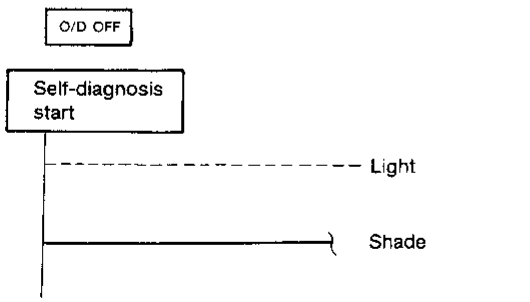
=NCAT0097

SYMPTOM:
A/T does not shift from D_4 to D_3 when changing overdrive control switch to "OFF" position.

1	CHECK OVERDRIVE CONTROL SWITCH CIRCUIT

With CONSULT
Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to overdrive control switch circuit?

Without CONSULT
Does self-diagnosis show damage to overdrive control switch circuit?



SAT344H

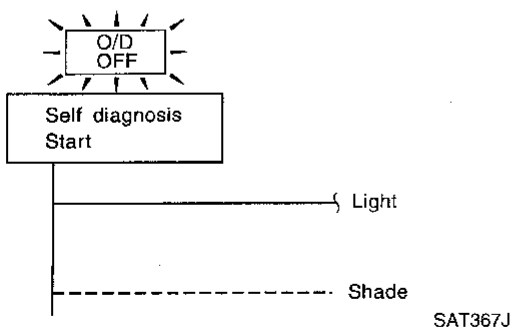
Yes or No

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.

18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever "D" → "2" Position

=NCAT0098

SYMPTOM:
A/T does not shift from D_3 to 2_2 when changing selector lever from "D" to "2" position.

1	CHECK INHIBITOR SWITCH CIRCUIT
With CONSULT Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?	
Without CONSULT Does self-diagnosis show damage to PNP switch circuit?  SAT367J	
Yes or No	
Yes ▶	Check PNP switch circuit. Refer to "DTC P0705", AT-92.
No ▶	Go to 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-207.

19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever "2" → "1" Position

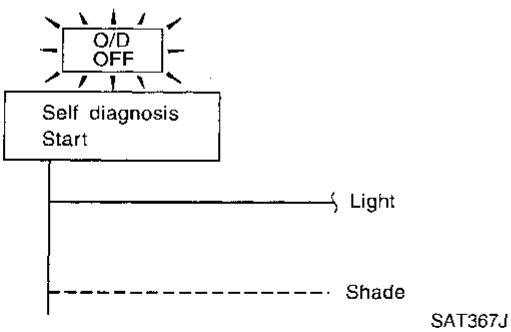
=NCAT0099

SYMPTOM:
A/T does not shift from 2_2 to 1_1 when changing selector lever from "2" to "1" position.

1	CHECK PNP SWITCH CIRCUIT

With CONSULT
Does "ECU INPUT SIGNALS" in "DATA MONITOR" show damage to PNP switch circuit?

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



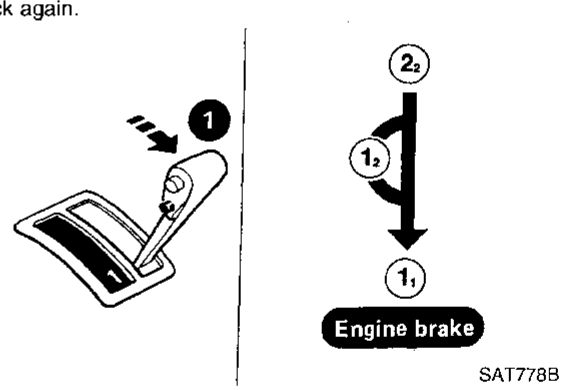
SAT367J

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

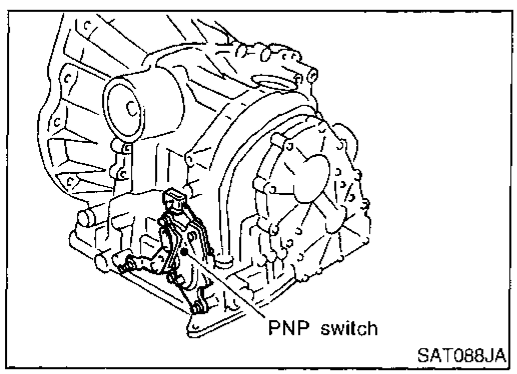
20. Vehicle Does Not Decelerate By Engine Brake

=NCAT0100

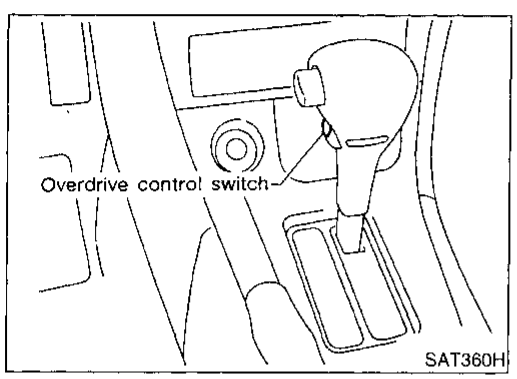
SYMPTOM:

Vehicle does not decelerate by engine brake when shifting from 2_2 (1_2) to 1_1.

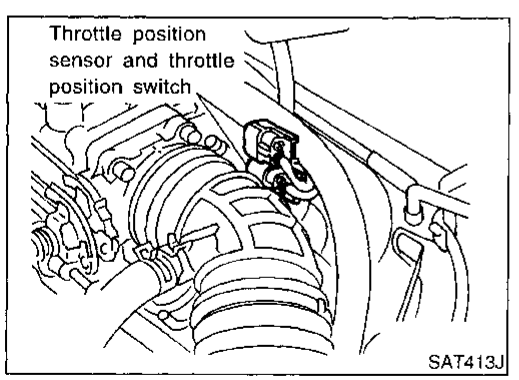
1	CHECK SYMPTOM	
Is 6. Vehicle Does Not Creep Backward In "R" Position OK?		
Yes or No		
Yes	▶	Go to 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$), AT-216.
No	▶	Go to 6. Vehicle Does Not Creep Backward In "R" Position, AT-201.



SAT088JA



SAT360H



SAT413J

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

NCAT0101

SYMPTOM:

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

DESCRIPTION

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.

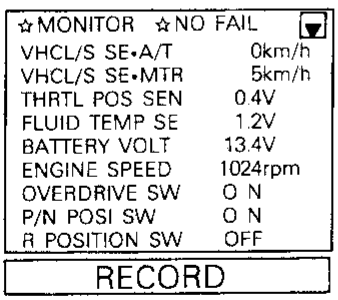
DIAGNOSTIC PROCEDURE

NCAT0101S02

1 CHECK PNP SWITCH CIRCUIT (With CONSULT)

With CONSULT

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.



SAT076H

OK or NG

OK	▶	GO TO 3.
NG	▶	**Check the following items:** • 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)

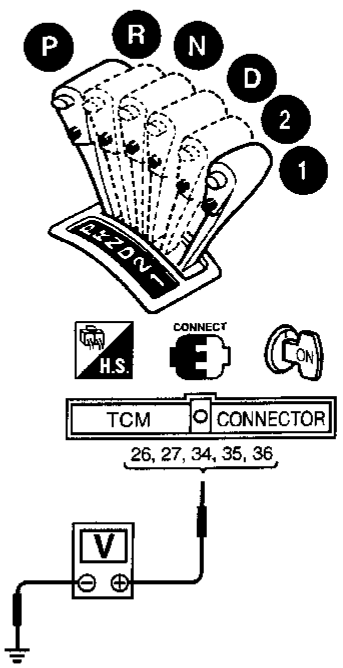
Without CONSULT

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

Voltage:
B: Battery voltage
0: 0V

Lever position	Terminals				
	36	35	34	27	26
P, N	B	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

MTBL0138



SAT470J

OK or NG

OK	▶	GO TO 4.
NG	▶	**Check the following items:** • 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)

3	CHECK OVERDRIVE CONTROL SWITCH CIRCUIT (With CONSULT)

With CONSULT

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

☆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

RECORD

SAT076H

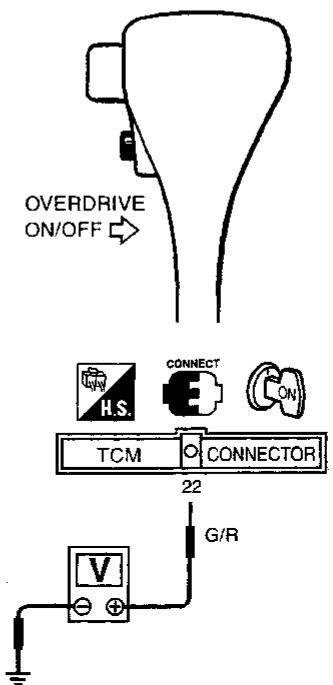
OK or NG

OK	▶	GO TO 5.
NG	▶	**Check the following items:** • 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)

Without CONSULT

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between TCM terminal 22 and ground when overdrive control switch is "ON" and "OFF".
   Voltage:
   Switch position "ON":
   Battery voltage
   Switch position "OFF":
   1V or less



SAT471J

OK or NG

OK	▶	GO TO 6.
NG	▶	**Check the following items:** • 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

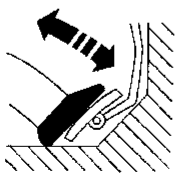
5 CHECK THROTTLE POSITION SWITCH CIRCUIT (With CONSULT)

With CONSULT

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 "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	▶	**Check the following items:** • 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)

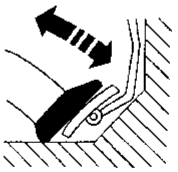
6 CHECK THROTTLE POSITION SWITCH CIRCUIT (Without CONSULT)

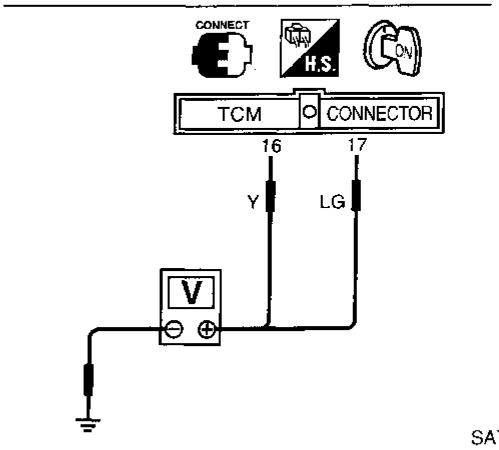
Without CONSULT

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

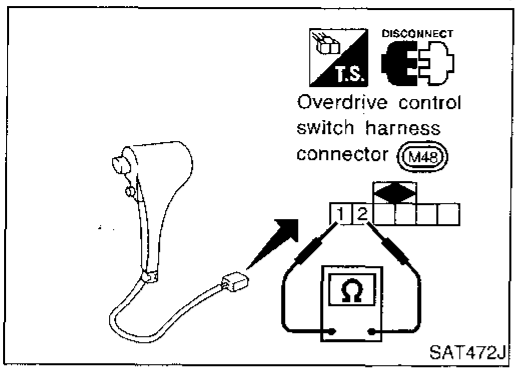
OK	▶	GO TO 7.
NG	▶	**Check the following items:** • Throttle position switch — Refer to "Component Inspection", AT-225. • Harness for short or open between ignition switch and throttle position switch (Main harness) • Harness for short or open between throttle position switch and TCM (Main harness)

7 CHECK DTC

Perform "DIAGNOSTIC PROCEDURE", AT-222

OK or NG

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



COMPONENT INSPECTION

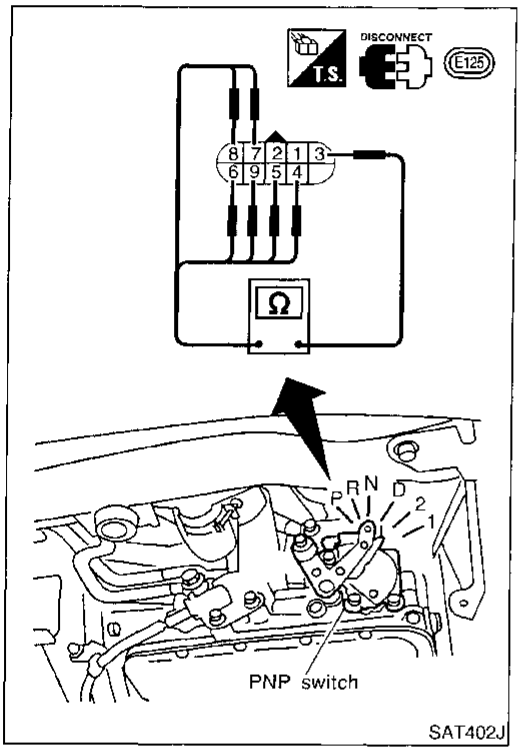
NCAT0101S03

Overdrive Control Switch

NCAT0101S0301

- Check continuity between two terminals.

Switch position	Continuity
ON	No
OFF	Yes

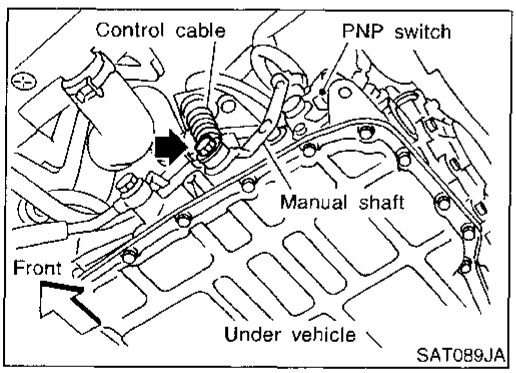


PNP Switch

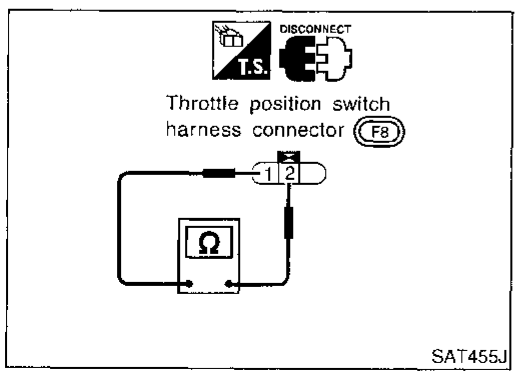
NCAT0101S0302

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 manual control cable disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control cable. Refer to AT-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.



Throttle Position Switch

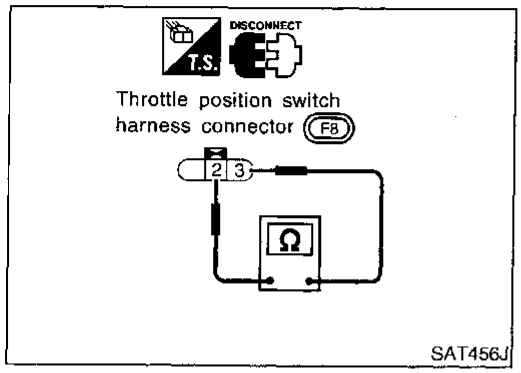
NCAT0101S0303

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").



Wide open throttle position switch

- Check continuity between terminals 2 and 3.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

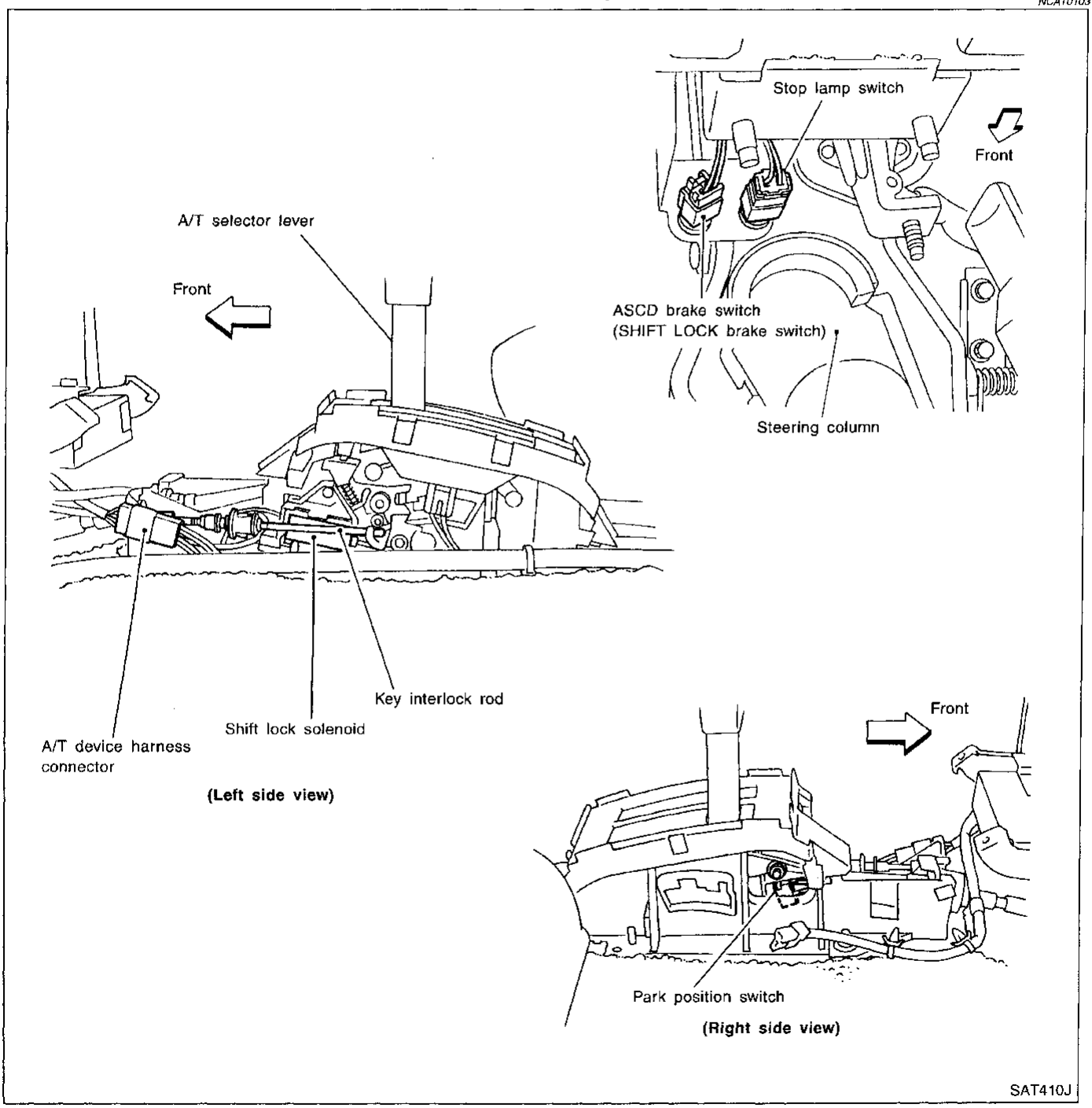
Description

NCAT0102

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

Shift Lock System Electrical Parts Location

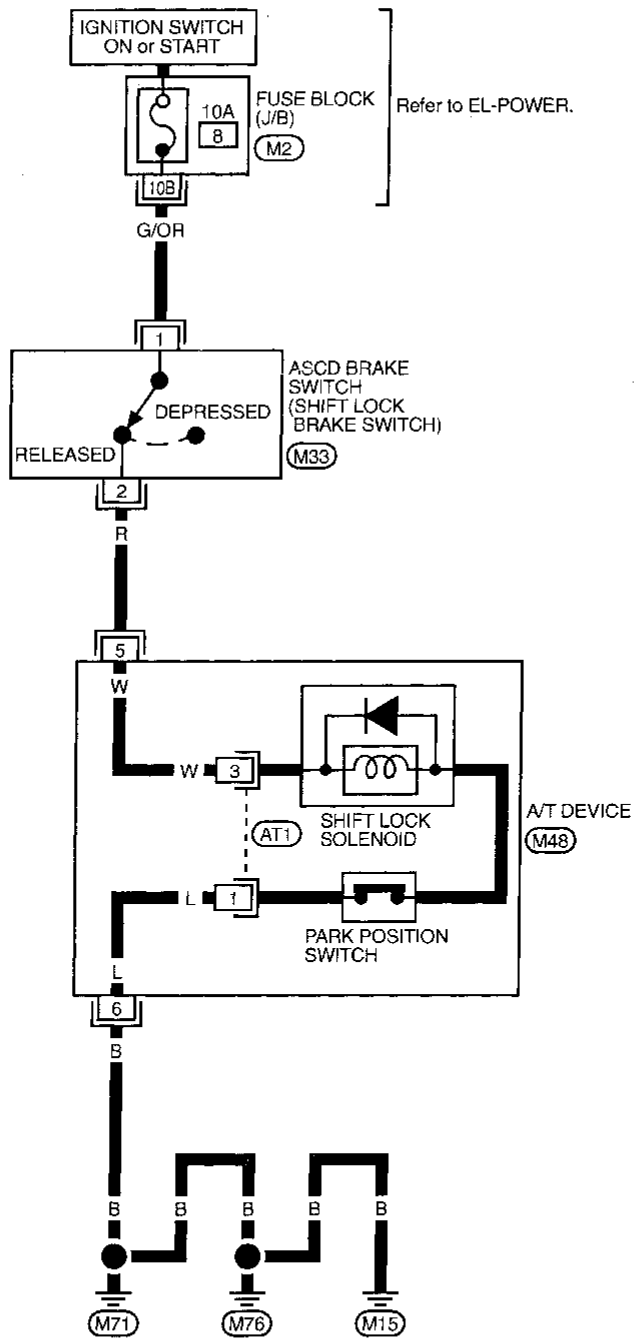
NCAT0103

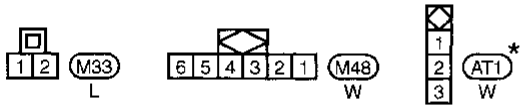


Wiring Diagram — SHIFT —

NCAT0104

AT-SHIFT-01





Refer to last page (Foldout page).
M2

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

TAT193

Diagnostic Procedure

NCAT0105

SYMPTOM 1:

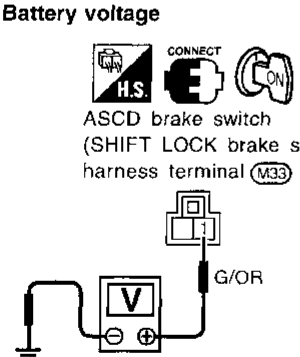
- **Selector lever cannot be moved from "P" position with key in ON position and brake pedal applied.**
- **Selector lever can be moved from "P" position with key in ON position and brake pedal released.**
- **Selector lever can be moved from "P" position when key is removed from key cylinder.**

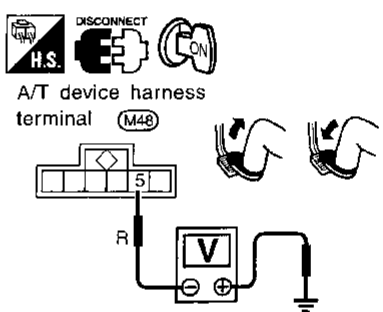
SYMPTOM 2:

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

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.

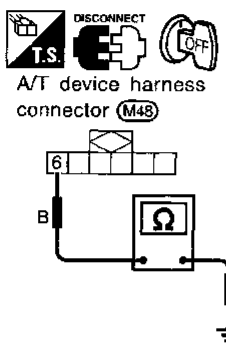
3	CHECK POWER SOURCE
1. Turn ignition switch to "ON" position. (Do not start engine.) 2. Check voltage between ASCD brake switch (SHIFT LOCK brake switch) harness terminal 1 and ground. **Voltage: Battery voltage**  SAT473J **OK or NG**	
OK ▶	GO TO 4.
NG ▶	**Check the following items:** 1. Harness for 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.) • Check voltage between A/T device harness terminal 5 and ground. **Voltage:** **Brake pedal depressed:** **0V** **Brake pedal released:** **Battery voltage**  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.)

Diagnostic Procedure (Cont'd)

5	CHECK GROUND CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Disconnect A/T device harness connector.
3. Check continuity between A/T device harness terminal 6 and ground.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.



SAT475J

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

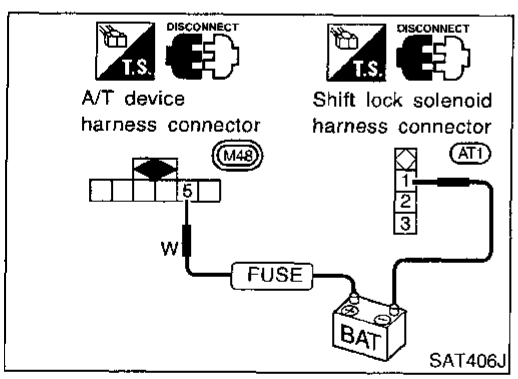
OK	▶	GO TO 8.
NG	▶	Replace shift lock solenoid.

8	

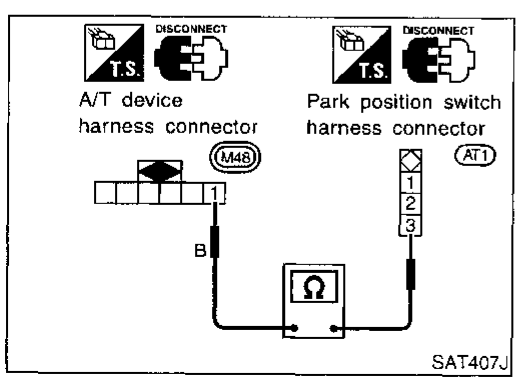
1. Reconnect shift lock harness connector.
2. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.)
3. Recheck shift lock operation.

OK or NG

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



SAT406J



SAT407J

Component Check

SHIFT LOCK SOLENOID

NCAT0106

NCAT0106S01

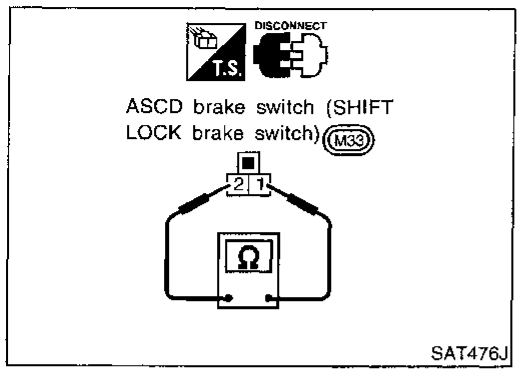
- Check operation by applying battery voltage to A/T device harness terminal 5 and shift lock solenoid & park position switch harness terminal 1.

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



ASCD BRAKE SWITCH (SHIFT LOCK BRAKE SWITCH)

NCAT0106S03

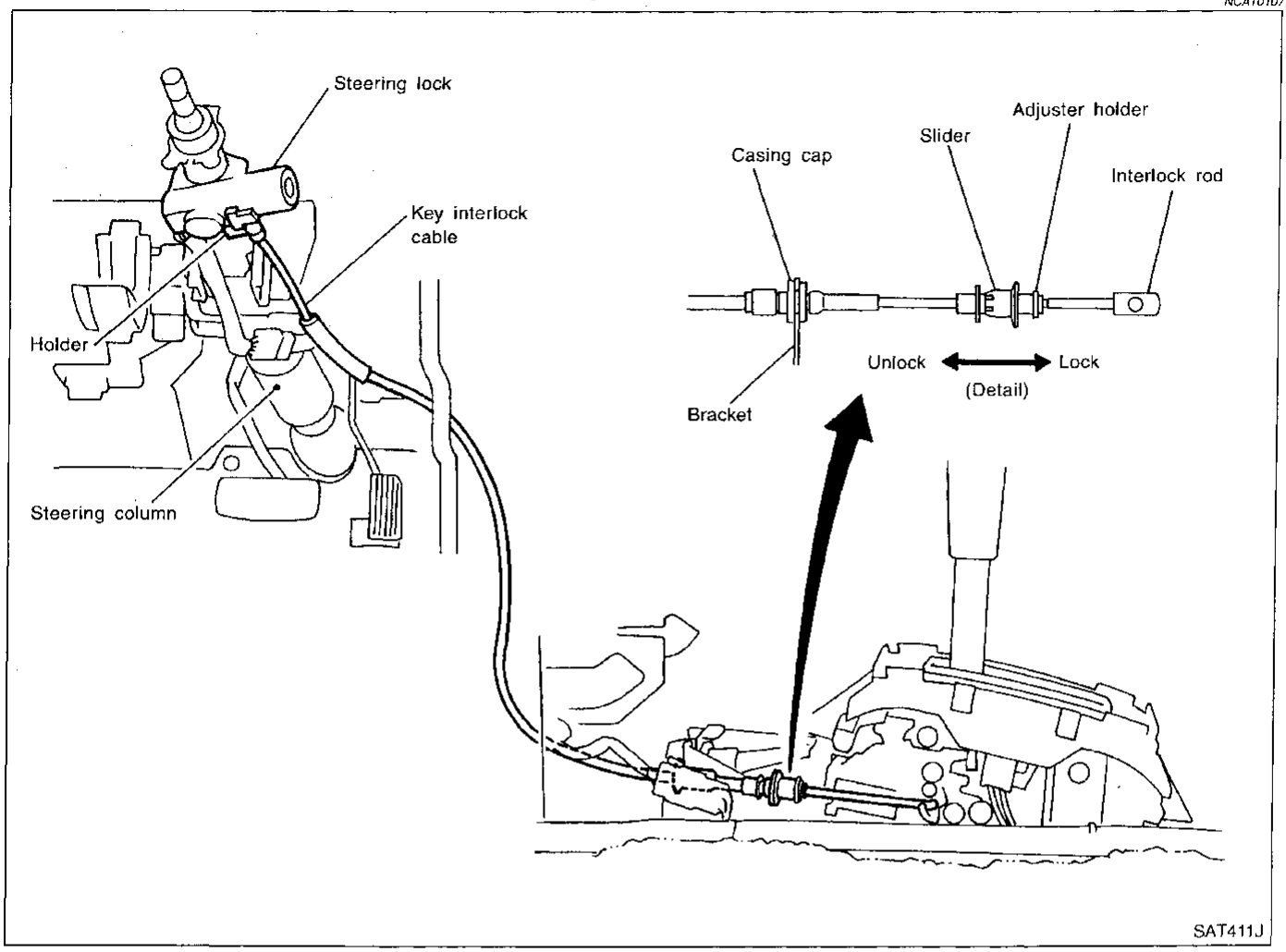
- Check continuity between terminals 1 and 2.

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

Check ASCD brake switch (SHIFT LOCK brake switch) after adjusting brake pedal — refer to BR section ("Adjustment", "BRAKE PEDAL AND BRACKET").

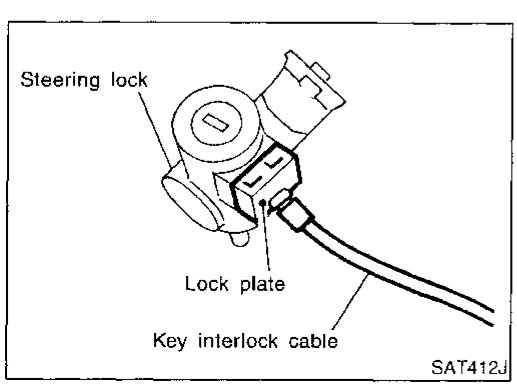
Components

NCAT0107



CAUTION:

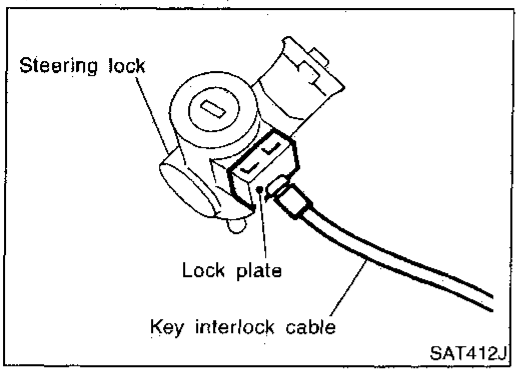
- **Install key interlock cable in such a way that it will not be damaged by sharp bends, twists or interference with adjacent parts.**
- **After installing key interlock cable to control device, make sure that casing cap and bracket are firmly secured in their positions. If casing cap can be removed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



Removal

NCAT0108

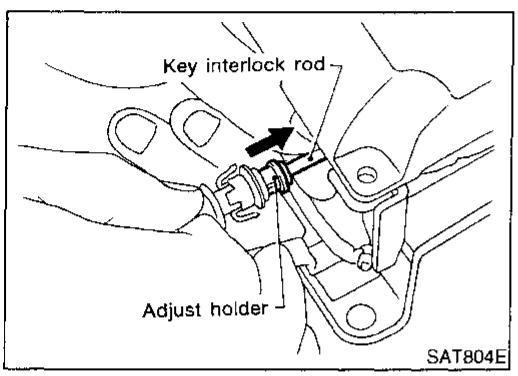
Unlock slider by squeezing lock tabs on slider from adjuster holder and remove interlock rod from cable.



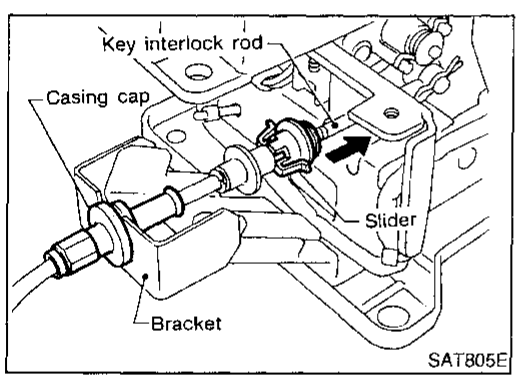
Installation

NCAT0109

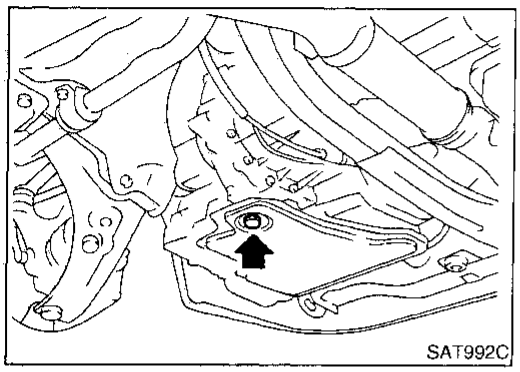
1. Set key interlock cable to steering lock assembly and install lock plate.
2. Clamp cable to steering column and fix to control cable with band.
3. Set control lever to P position.



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.


SAT992C

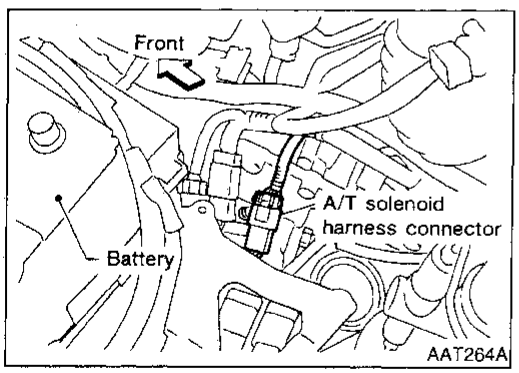
Control Valve Assembly and Accumulators

NCAT0110

REMOVAL

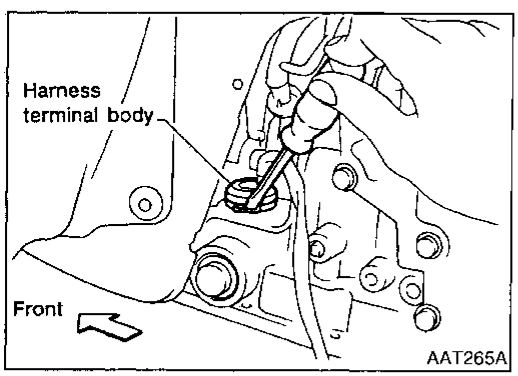
NCAT0110S01

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



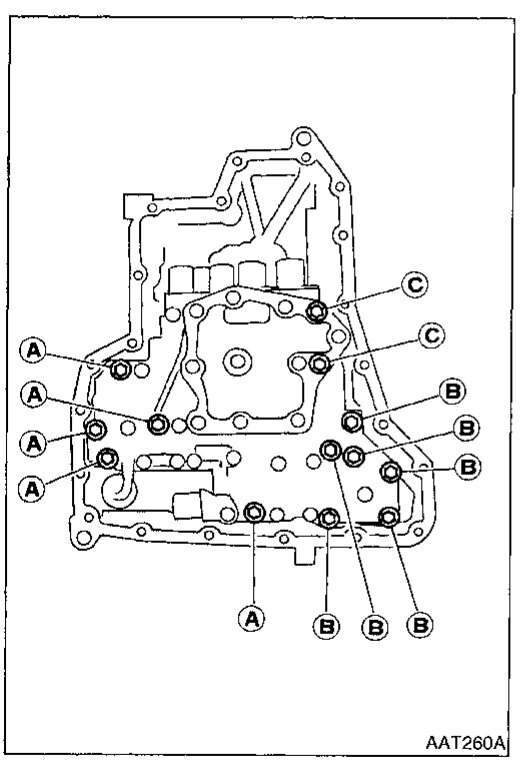
AAT264A

3. Disconnect A/T solenoid harness connector.



AAT265A

4. Remove stopper ring from A/T solenoid harness terminal body.
5. Remove A/T solenoid harness by pushing terminal body into transmission case.



AAT260A

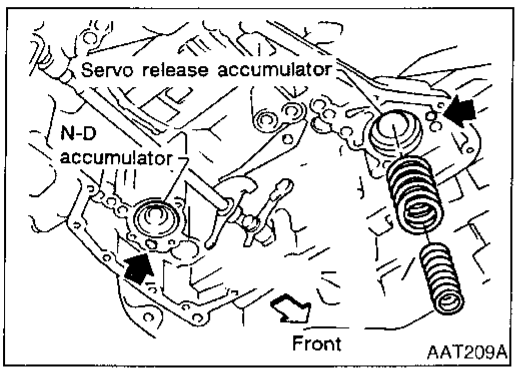
6. Remove control valve assembly by removing fixing bolts.

Bolt length, number and location:

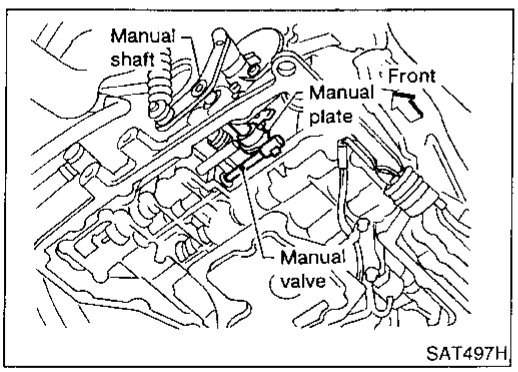
Bolt symbol	A	B	C
Bolt length "ℓ" ℓ	40.0 mm (1.575 in)	33.0 mm (1.299 in)	43.5 mm (1.713 in)
Number of bolts	5	6	2

- **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.



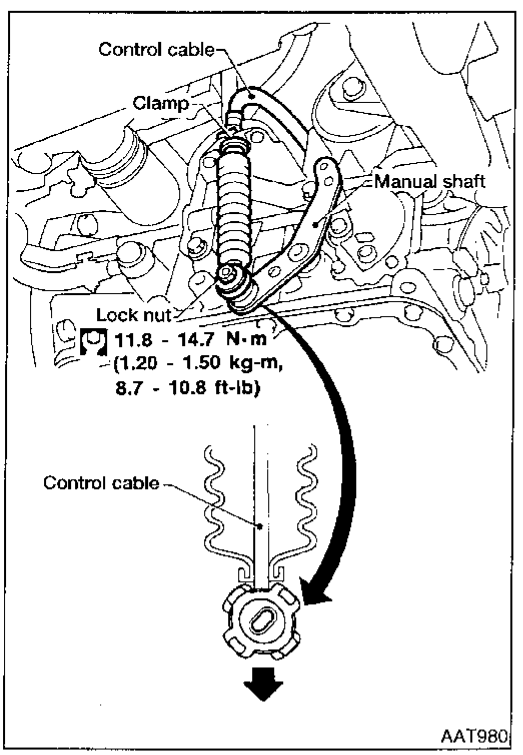
8. Remove servo release and N-D accumulators by applying compressed air if necessary.
- **Hold each piston with a rag.**



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.**

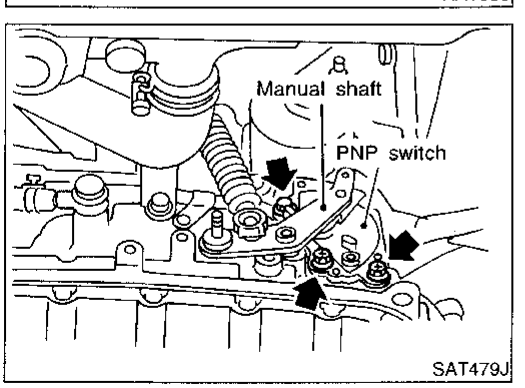


Control Cable Adjustment

NCAT0111

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

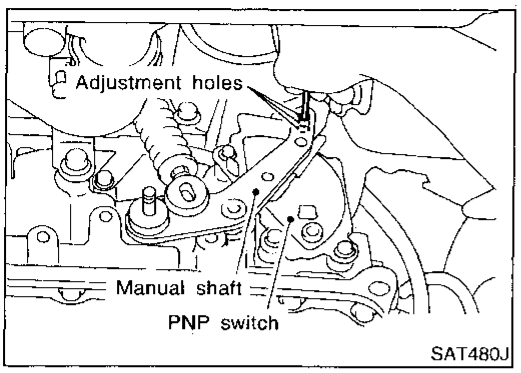
1. Place selector lever in "P" position.
2. Loosen control cable lock nut and place manual shaft in "P" position.
3. Pull control cable, by specified force, in the direction of the arrow shown in the illustration.
   Specified force: 6.9 N (0.7 kg, 1.5 lb)
4. Return control cable in the opposite direction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



Park/Neutral Position (PNP) Switch Adjustment

NCAT0112

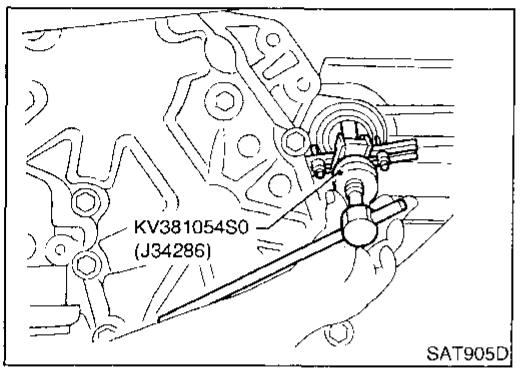
1. Remove control cable end from manual shaft.
2. Set manual shaft in "N" position.
3. Loosen PNP switch fixing bolts.



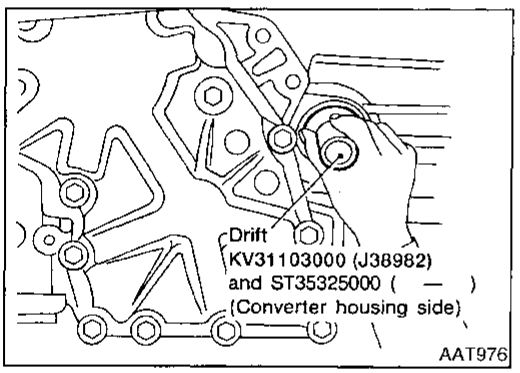
4. Use a 4 mm (0.157 in) pin for this adjustment.
a. Insert the pin straight into the manual shaft adjustment hole.
b. Rotate PNP switch until the pin can also be inserted straight into hole in PNP switch.
5. Tighten PNP switch fixing bolts.
6. Remove pin from adjustment hole after adjusting PNP switch.
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

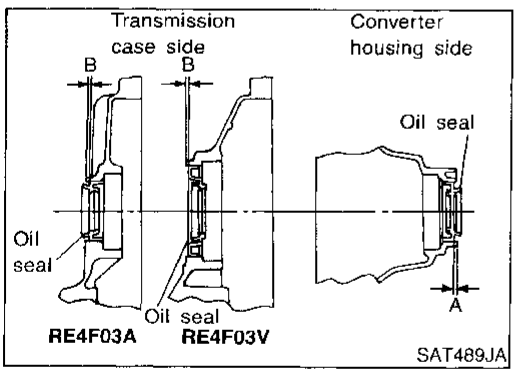
NCAT0113



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



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

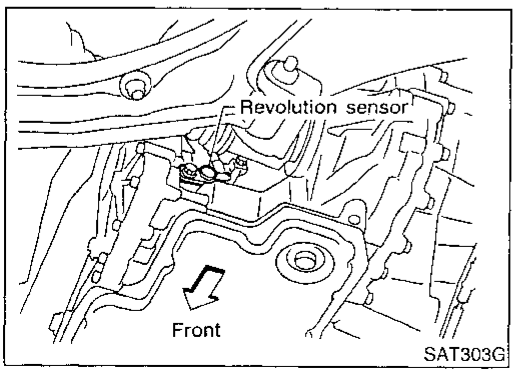


- **Install oil seals so that dimensions "A" and "B" are within specifications.**

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.

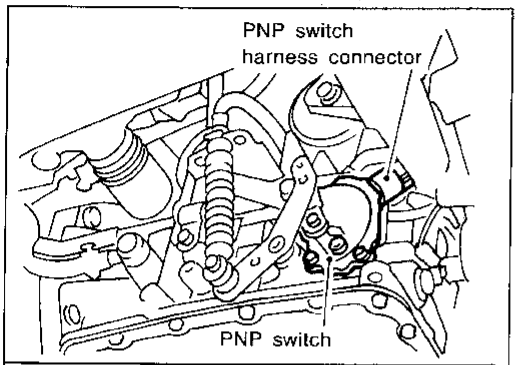


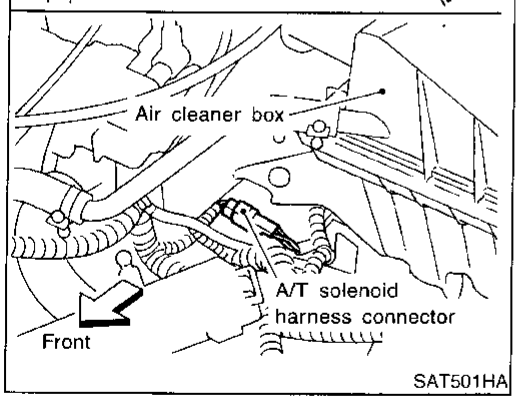
Revolution Sensor Replacement

NCAT0114

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

Always use new sealing parts.





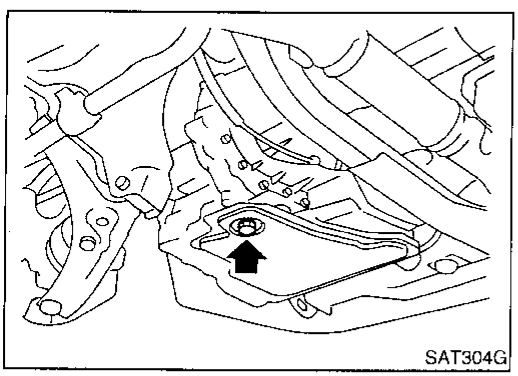
Removal

NCAT0115

CAUTION:

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

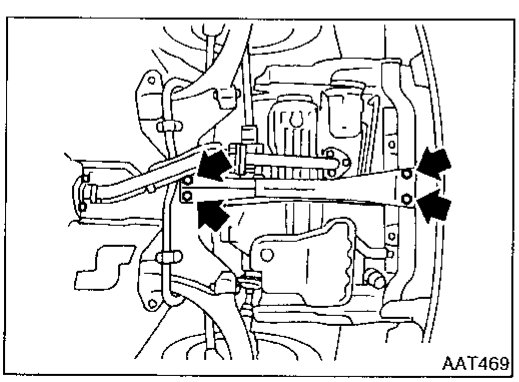
1. Remove battery and bracket.
2. Remove air duct between throttle body and air cleaner.
3. Disconnect A/T solenoid harness connector, PNP switch harness connector and revolution sensor harness connector.
4. Remove crankshaft position sensor (OBD) from transaxle.



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.

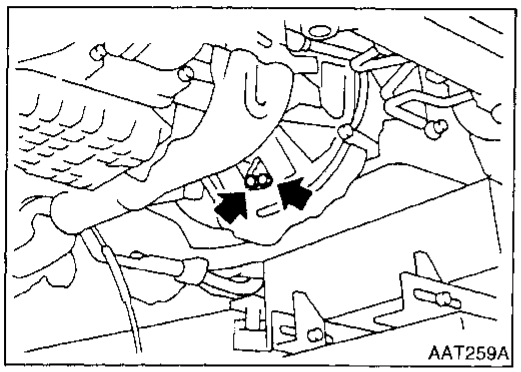
    : 41 - 52 N·m (4.2 - 5.3 kg-m, 30 - 38 ft-lb)
11. Remove upper bolts fixing transaxle to engine.
12. Support transaxle with a jack.



13. Remove center member.

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

Removal (Cont'd)


AAT259A

14. Remove rear plate cover.
15. Remove torque converter bolts.
    Rotate crankshaft to gain access to securing bolts.
16. Remove rear transaxle to engine bracket. Refer to EM 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.

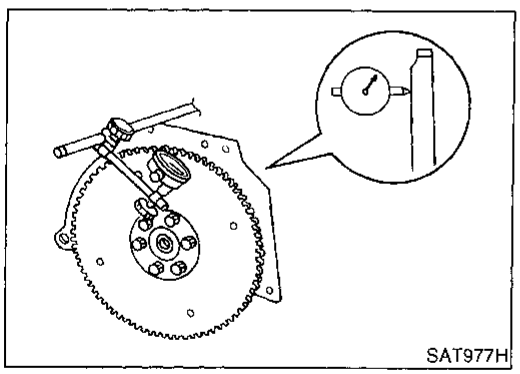
Installation

NCAT0116

1. Check drive plate runout.

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

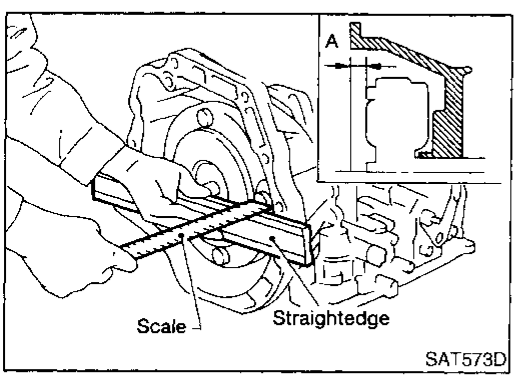
Maximum allowable runout:
Refer to EM section ("Inspection", "CYLINDER BLOCK").


SAT977H

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

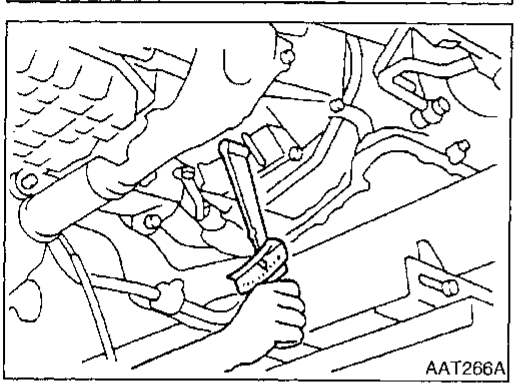
2. When connecting torque converter to transaxle, measure distance "A" to be certain that they are correctly assembled.

Distance "A":
15.9 mm (0.626 in) or more

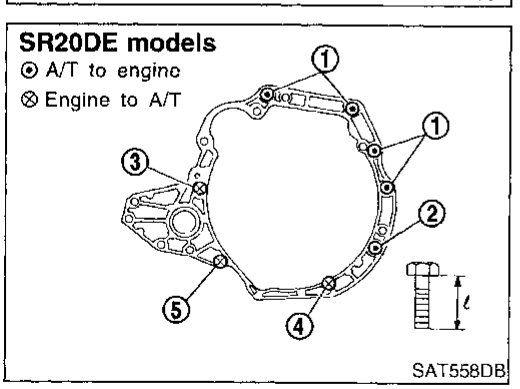


SAT573D

3. Install torque converter to drive plate.
- **With converter installed, rotate crankshaft several turns to check that transaxle rotates freely without binding.**

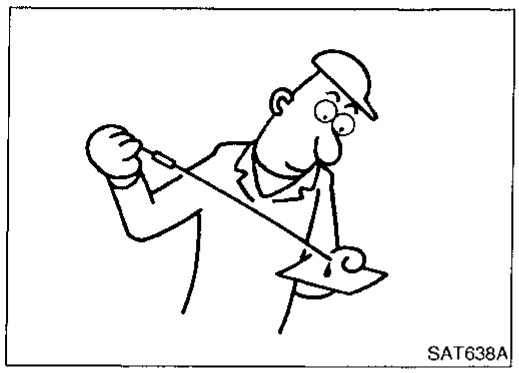

AAT266A

4. Tighten belts fixing transaxle.



SAT558DB

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)

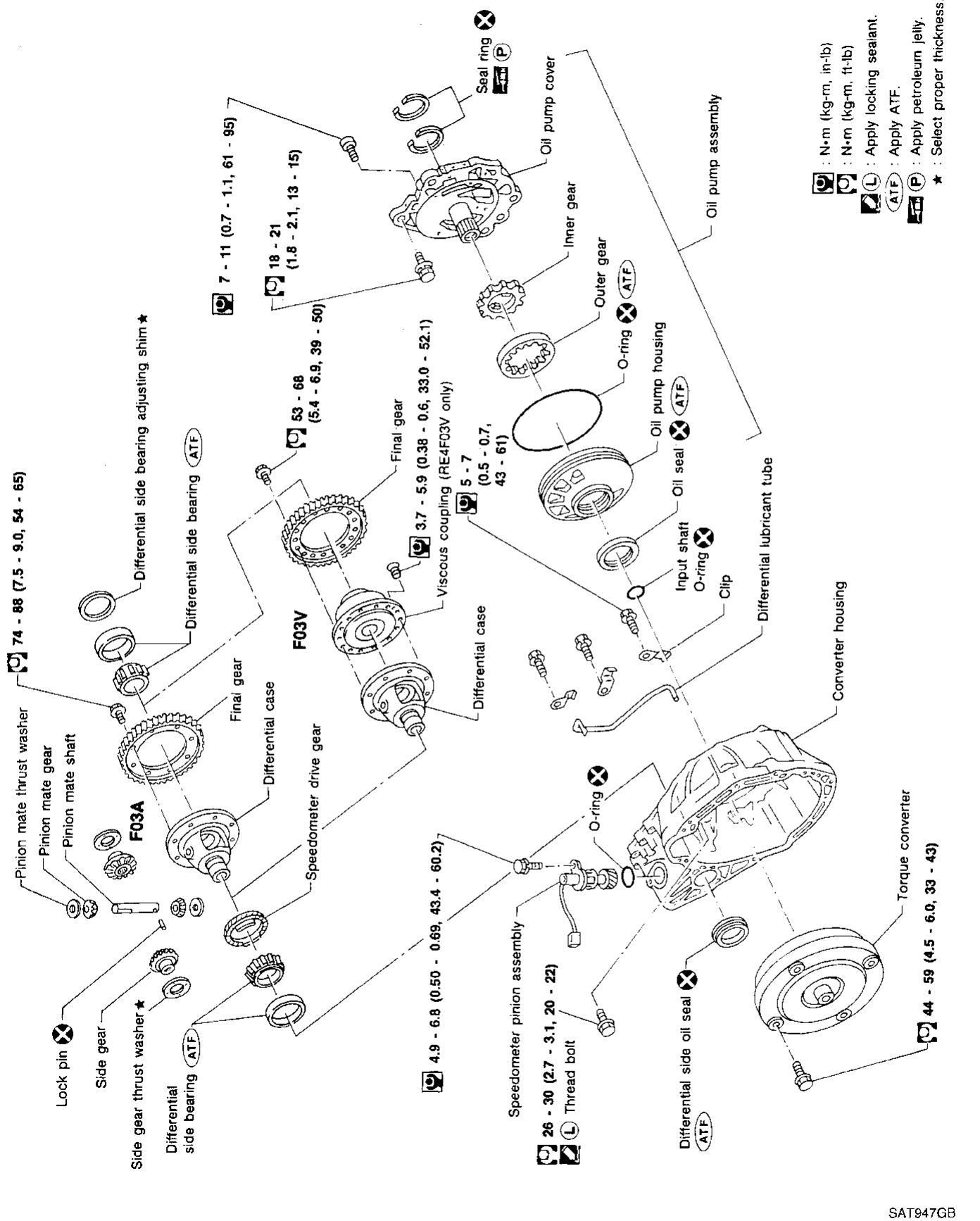

SAT638A

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.

Components

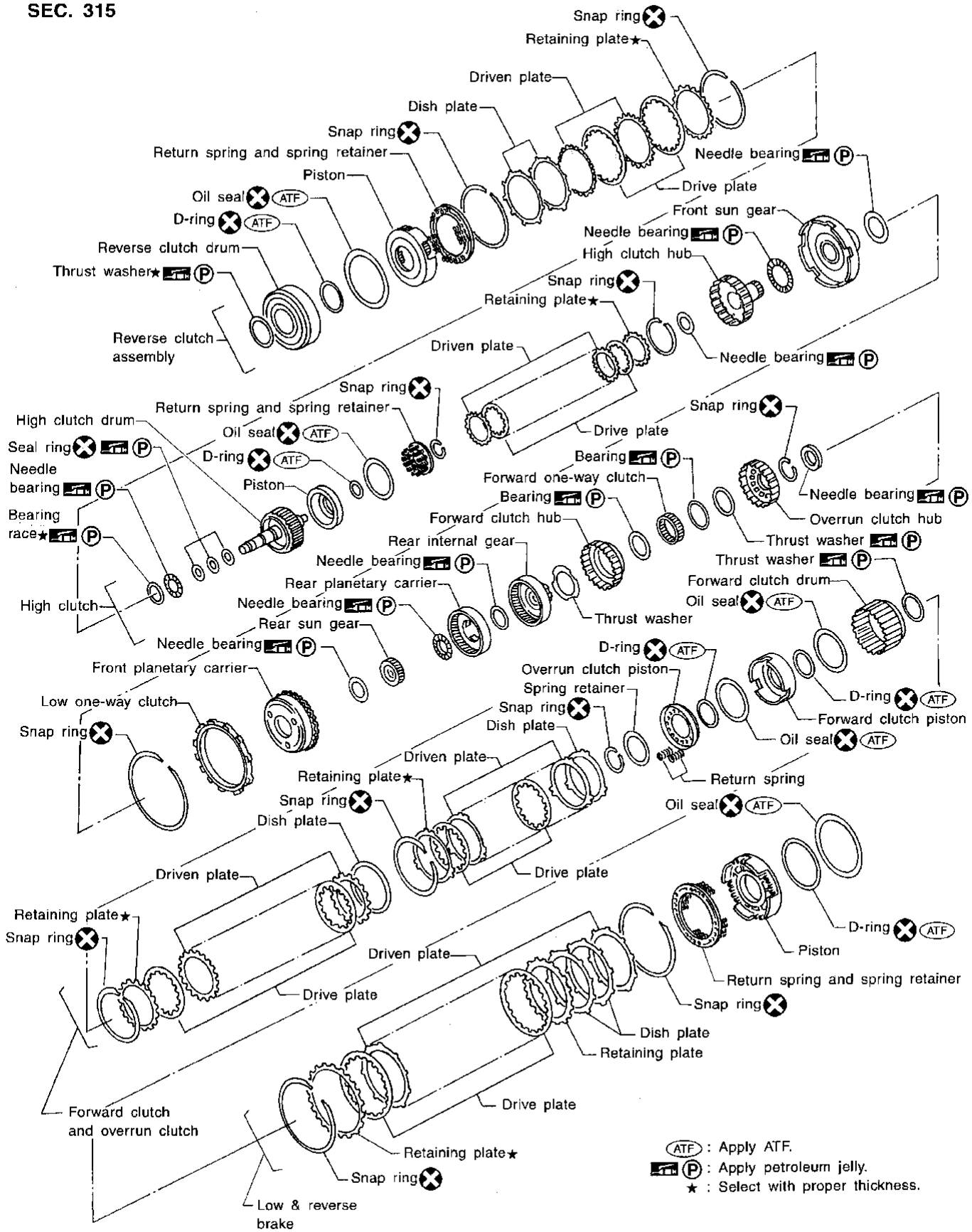
NCAT0119

SEC. 311•313•327•381



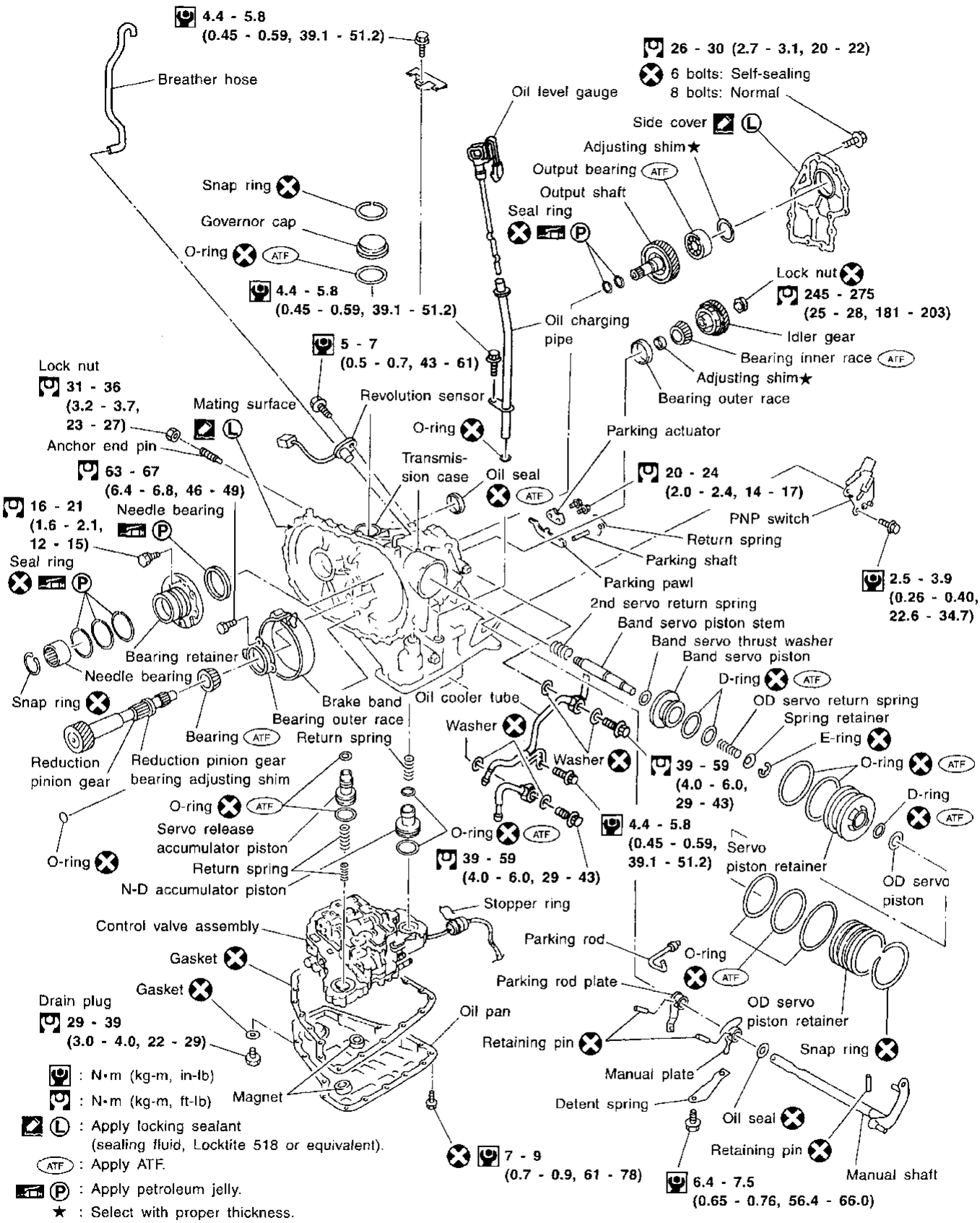
SAT947GB

SEC. 315



SAT148I

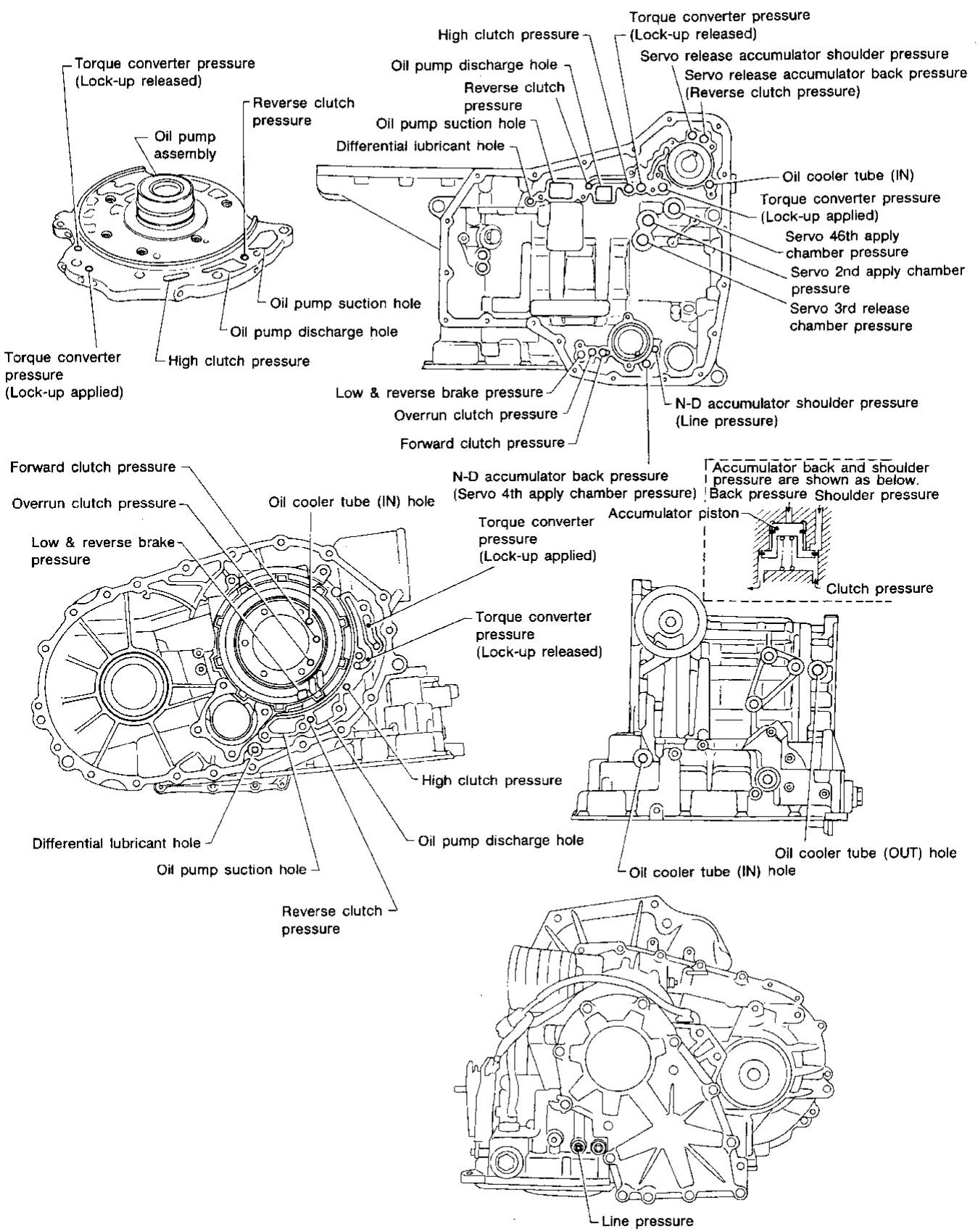
SEC. 310•315•317•319



SAT373J

Oil Channel

NCAT0118



SAT894G

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

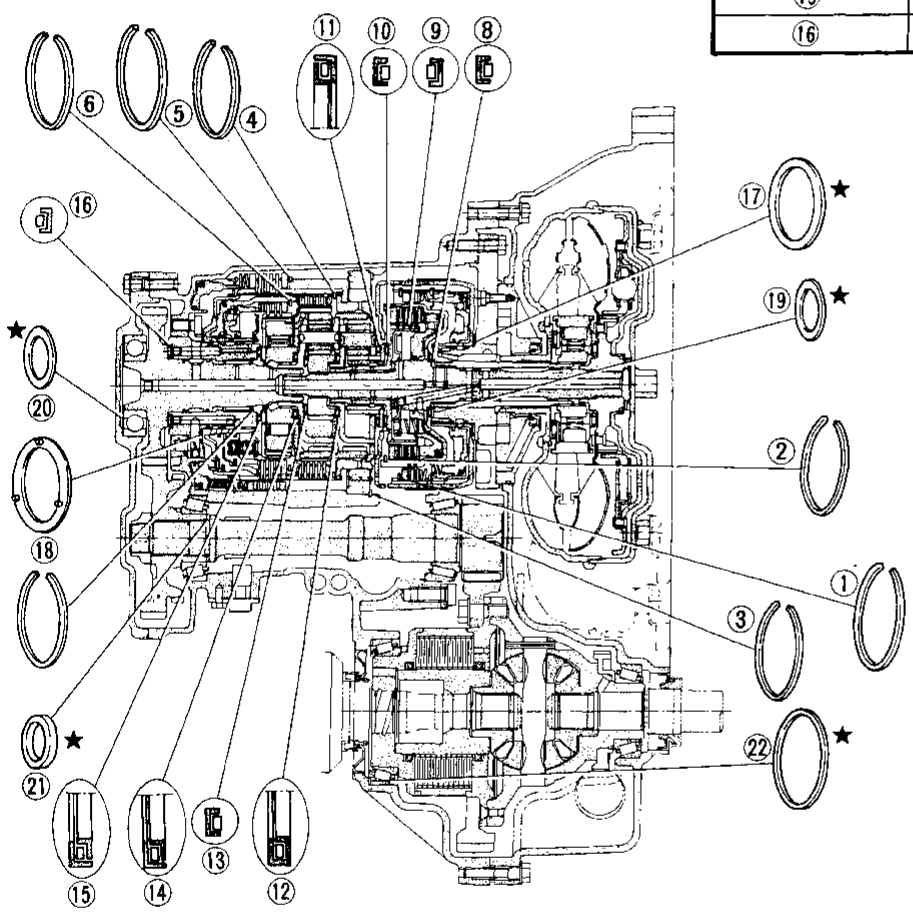
NCAT0117

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

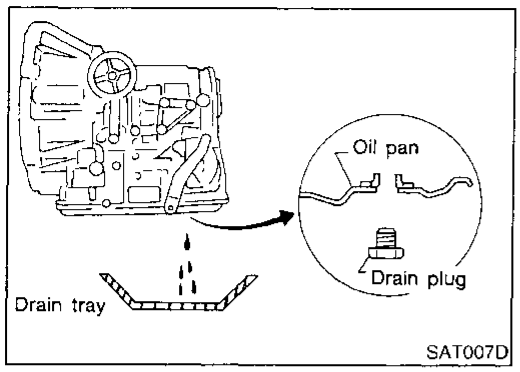
Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑲	48.0 (1.890)	33.0 (1.299)
⑳	72.0 (2.835)	61.0 (2.402)
㉑	34.5 (1.358)	26.1 (1.028)
㉒	105.0 (4.13)	96.0 (3.78)

Outer diameter of snap rings

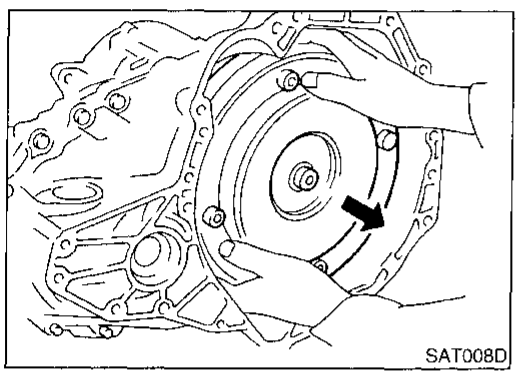
Item number	Outer diameter mm (in)
①	142.0 (5.59)
②	113.0 (4.45)
③	162.4 (6.39)
④	135.4 (5.33)
⑤	159.0 (6.26)
⑥	126.0 (4.96)
⑦	40.5 (1.594)

SAT325GA

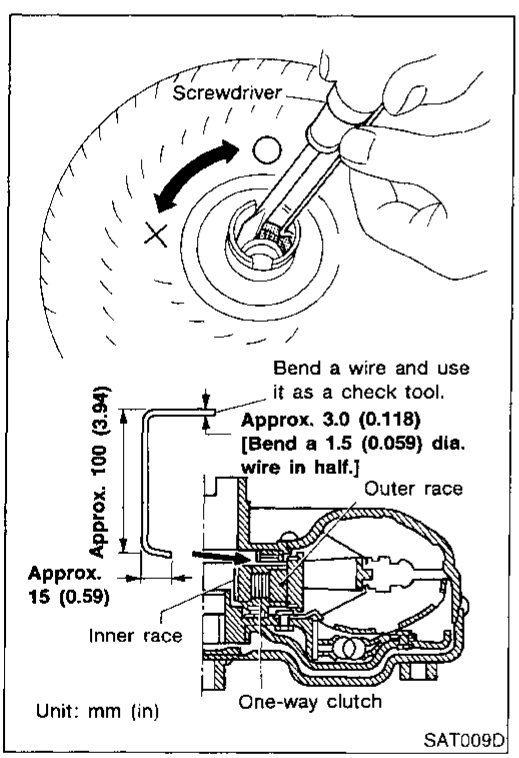
DISASSEMBLY



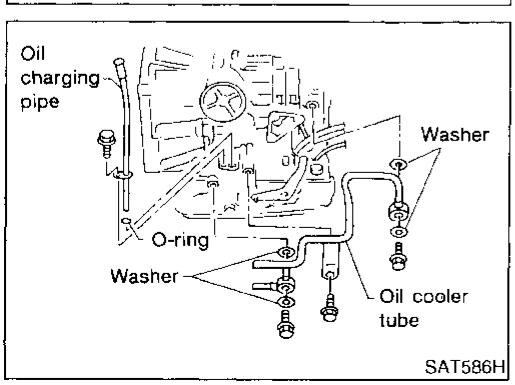
1. Drain ATF through drain plug.



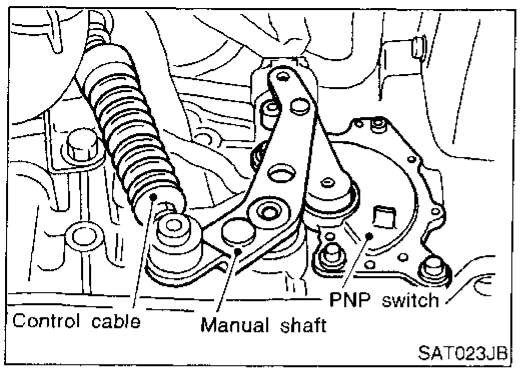
2. Remove torque converter.



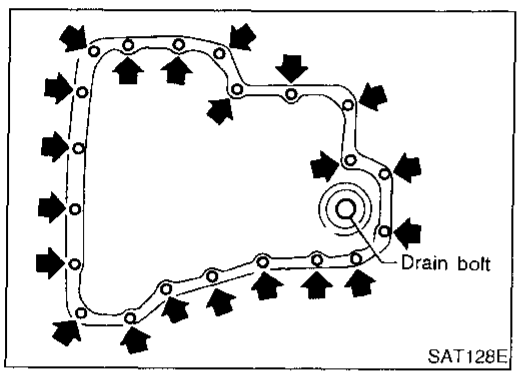
3. Check torque converter one-way clutch using check tool as shown at left.
   a. Insert check tool into the groove of bearing support built into one-way clutch outer race.
   b. While fixing bearing support with check tool, rotate one-way clutch spline using flat-bladed screwdriver.
   c. Check inner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



4. Remove oil charging pipe and oil cooler tube.



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



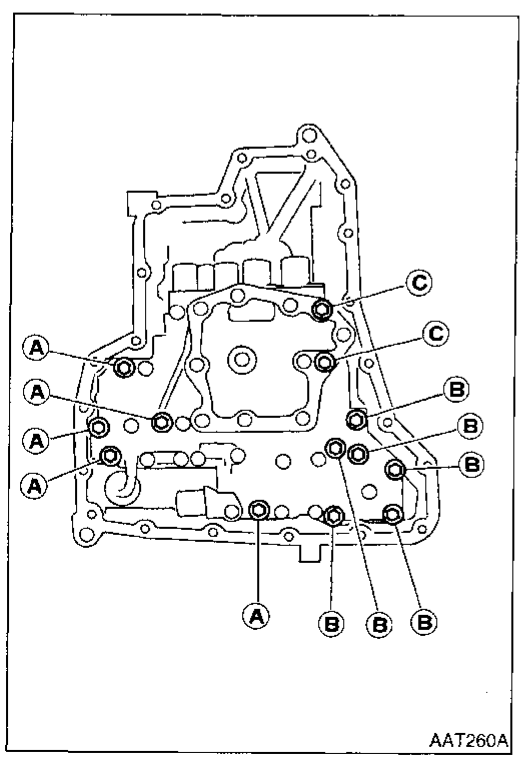
7. Remove oil pan and oil pan gasket.

- **Do not reuse oil pan bolts.**

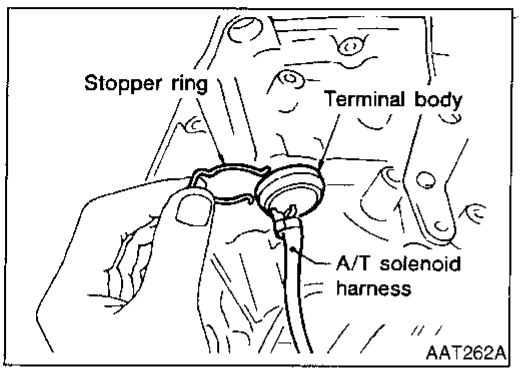
8. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves,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

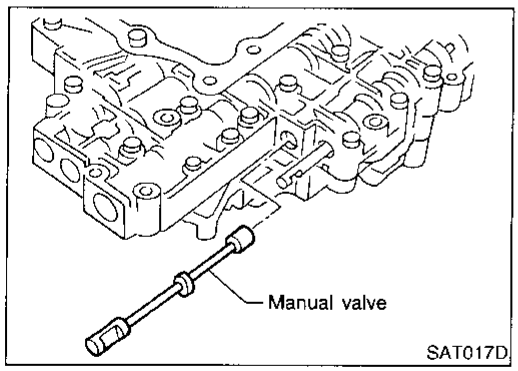
9. Remove control valve assembly according to the following procedures.



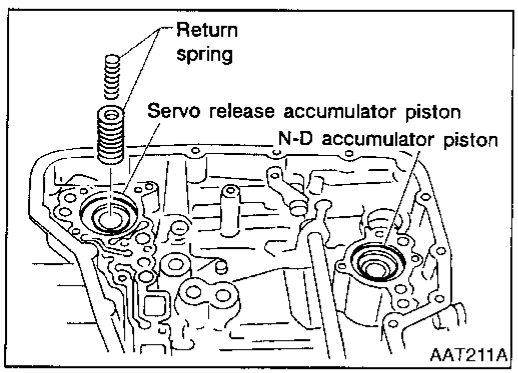
a. Remove control valve assembly mounting bolts A, B and C.



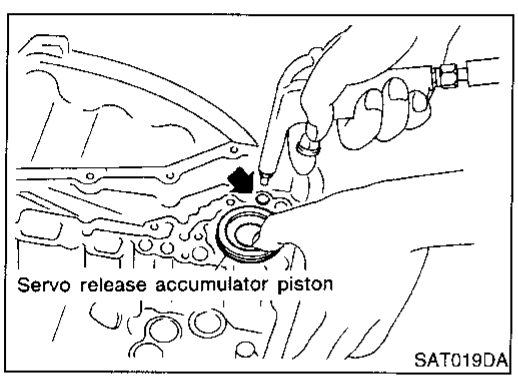
b. Remove stopper ring from terminal body.
c. Push terminal body into transmission case and draw out solenoid harness.



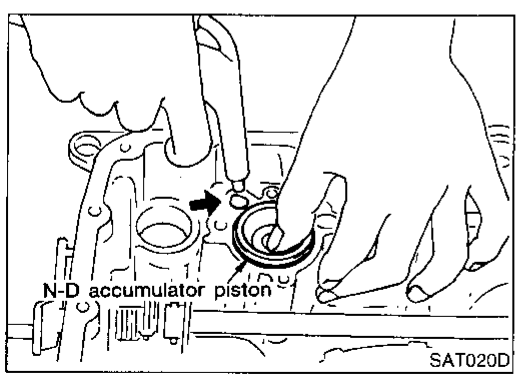
10. Remove manual valve from control valve assembly as a precaution.



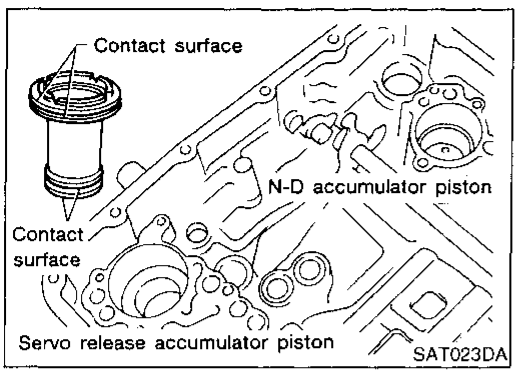
11. Remove return spring from servo release accumulator piston.



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



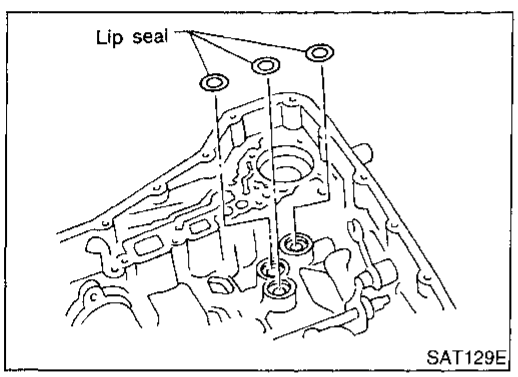
14. Remove N-D accumulator piston and return spring with compressed air.
15. Remove O-rings from N-D accumulator piston.



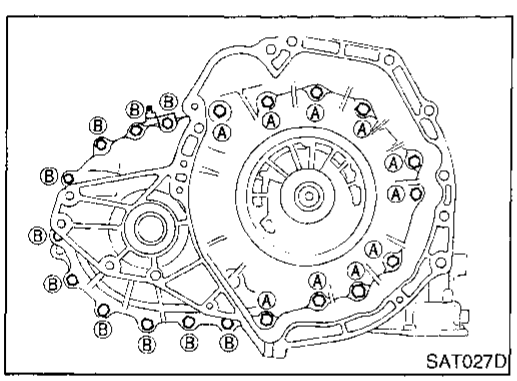
16. Check accumulator pistons and contact surface of transmission case for damage.
17. Check accumulator return springs for damage and free length.

Return springs:

Refer to SDS, AT-353.

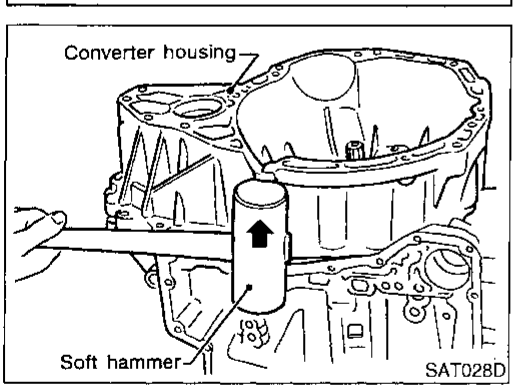


18. Remove lip seals from band servo oil port.

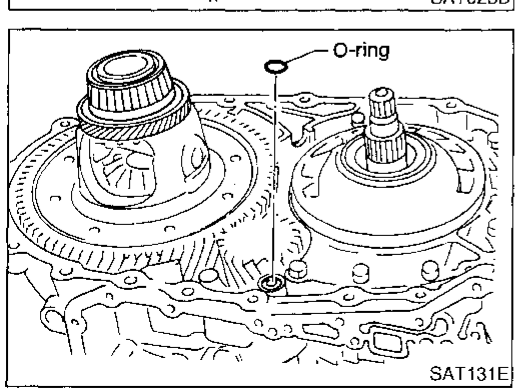


19. Remove converter housing according to the following procedures.

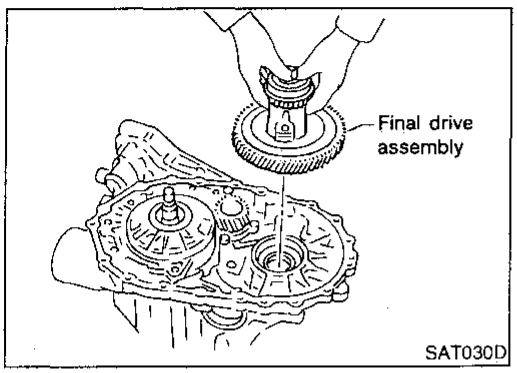
a. Remove converter housing mounting bolts A and B.



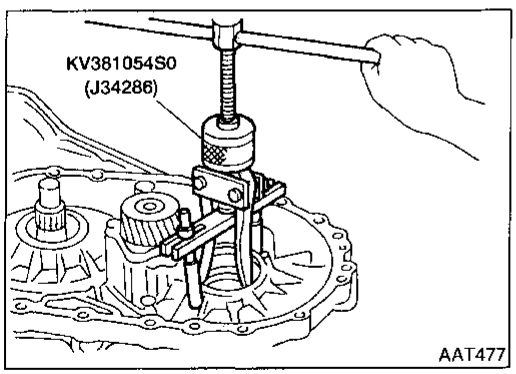
b. Remove converter housing.



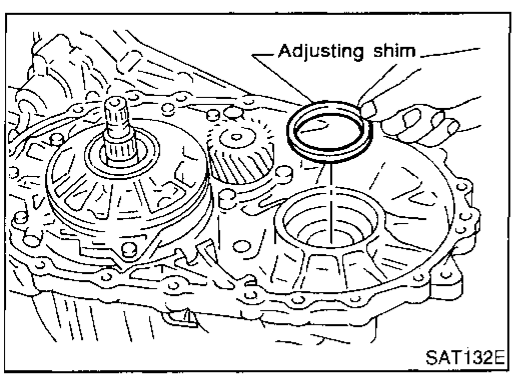
c. Remove O-ring from differential oil port.



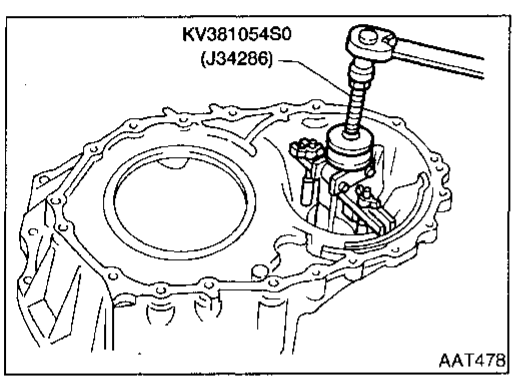
20. Remove final drive assembly from transmission case.



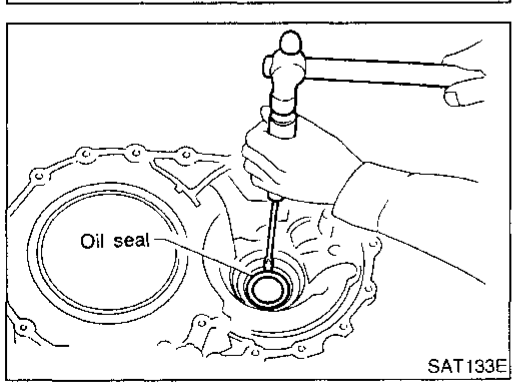
21. Remove differential side bearing outer race from transmission case.



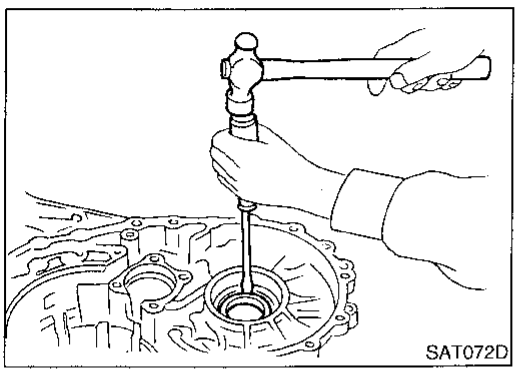
22. Remove differential side bearing adjusting shim from transmission case.



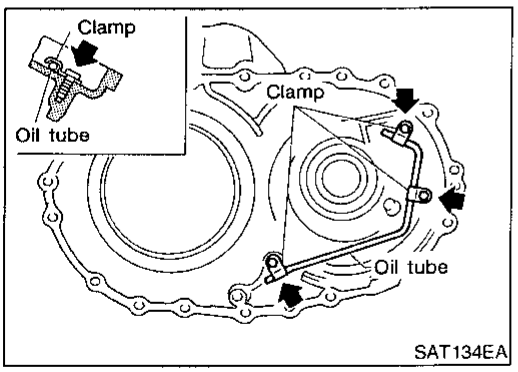
23. Remove differential side bearing outer race from converter housing.



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

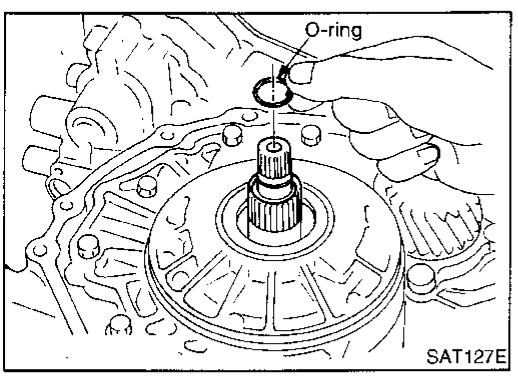

SAT072D

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



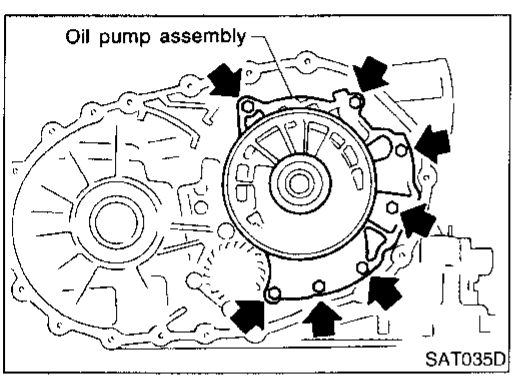
SAT134EA

26. Remove oil tube from converter housing.



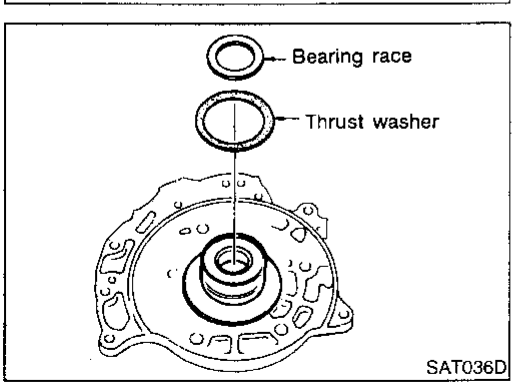
SAT127E

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



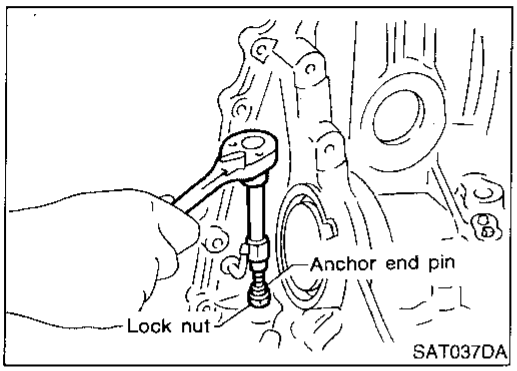
SAT035D

b. Remove oil pump assembly from transmission case.

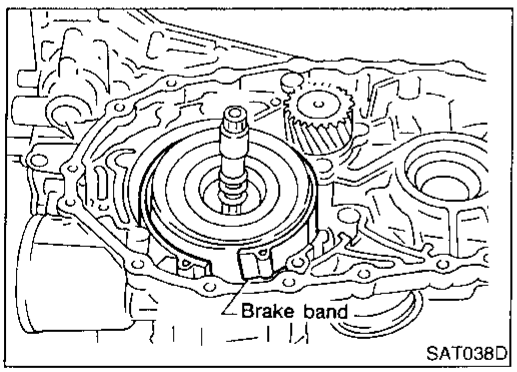


SAT036D

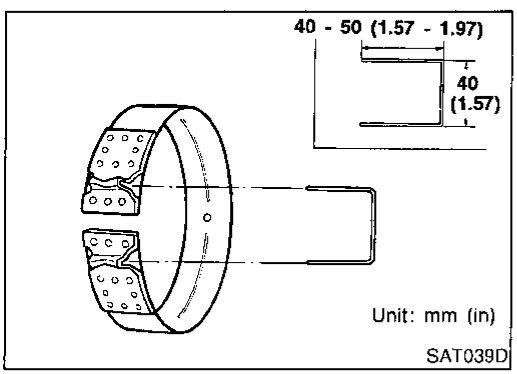
c. Remove thrust washer and bearing race from oil pump assembly.



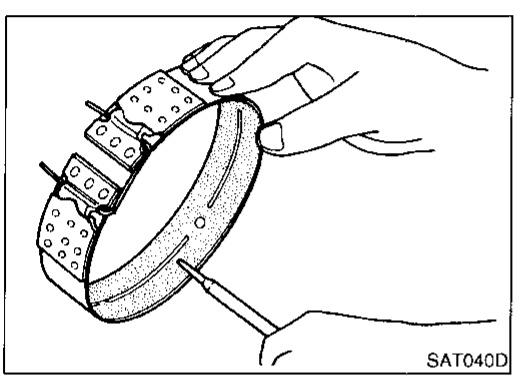
28. Remove brake band according to the following procedures.
a. Loosen lock nut, then back off anchor end pin.
- **Do not reuse anchor end pin.**



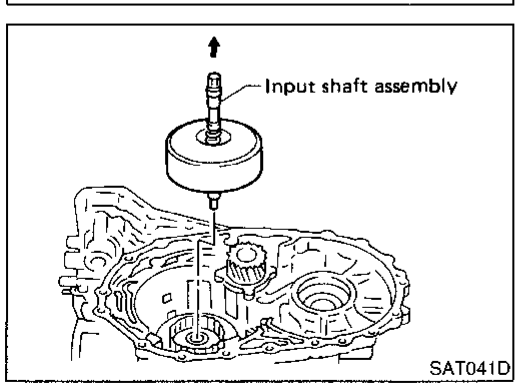
b. Remove brake band from transmission case.



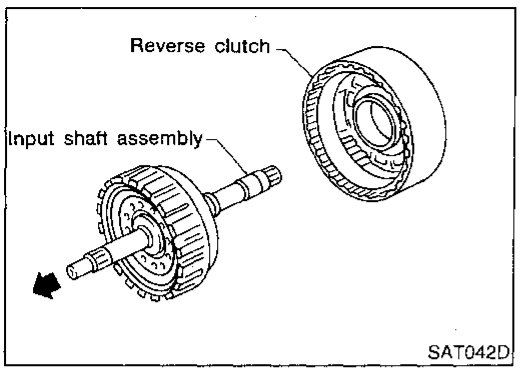
- **To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at left.**
Leave the clip in position after removing the brake band.



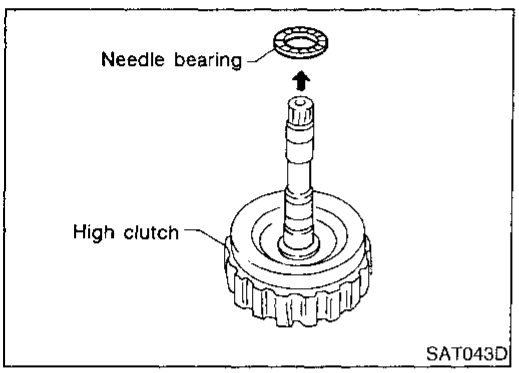
c. Check brake band facing for damage, cracks, wear or burns.



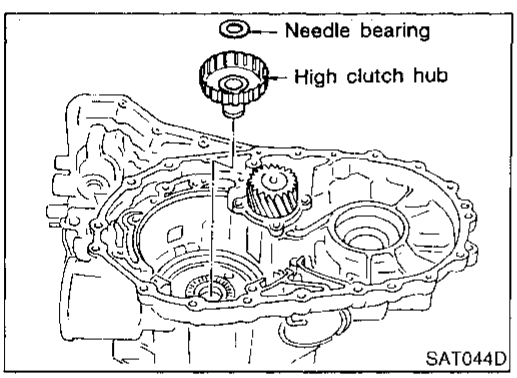
29. Remove input shaft assembly (high clutch) and reverse clutch according to the following procedures.
a. Remove input shaft assembly (high clutch) with reverse clutch.



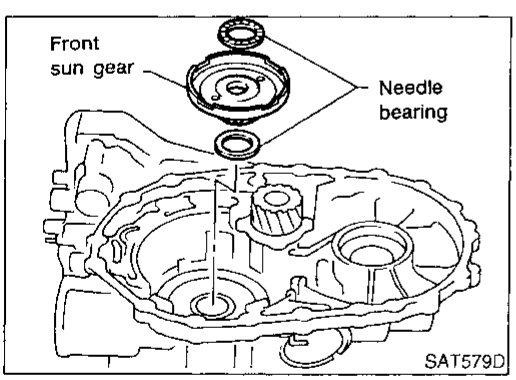
b. Remove input shaft assembly (high clutch) from reverse clutch.



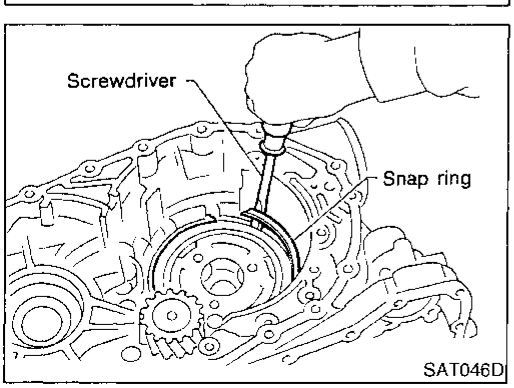
c. Remove needle bearing from high clutch drum.
d. Check input shaft assembly and needle bearing for damage or wear.



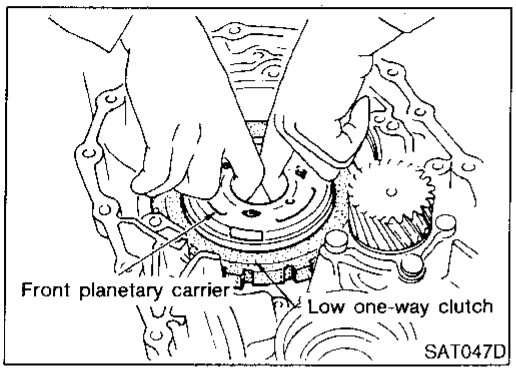
30. Remove high clutch hub and needle bearing from transmission case.
31. Check high clutch hub and needle bearing for damage or wear.



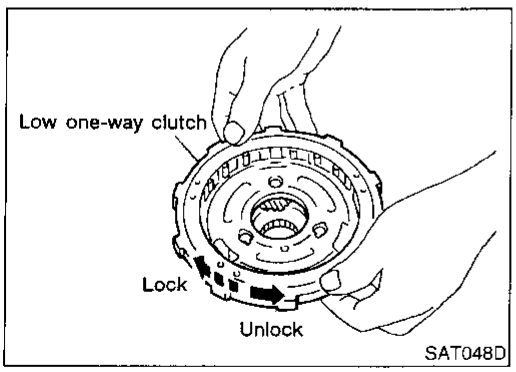
32. Remove front sun gear and needle bearings from transmission case.
33. Check front sun gear and needle bearings for damage or wear.



34. Remove front planetary carrier assembly and low one-way clutch according to the following procedures.
a. Remove snap ring using a screwdriver.

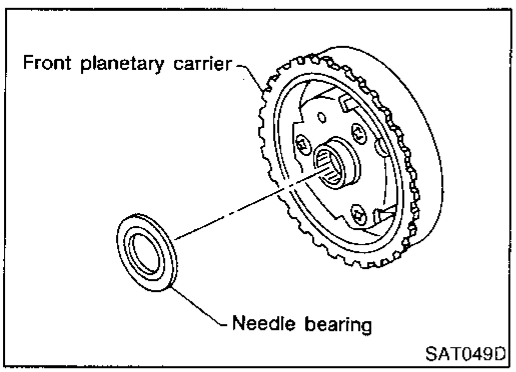


b. Remove front planetary carrier with low one-way clutch.

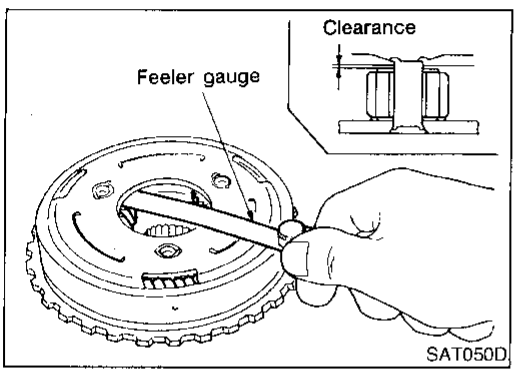


c. Check that low one-way clutch rotates in the direction of the arrow and locks in the opposite direction.

d. Remove low one-way clutch from front planetary carrier by rotating it in the direction of unlock.



e. Remove needle bearing from front planetary carrier.



f. Check front planetary carrier, low one-way clutch and needle bearing for damage or wear.

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

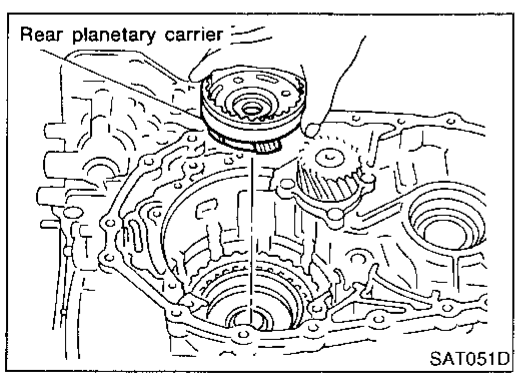
Standard clearance:

0.15 - 0.70 mm (0.0059 - 0.0276 in)

Allowable limit:

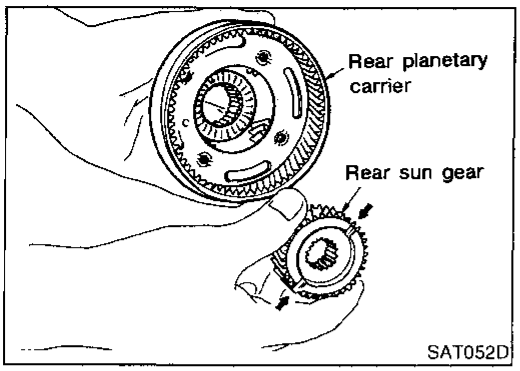
0.80 mm (0.0315 in)

Replace front planetary carrier if the clearance exceeds allowable limit.

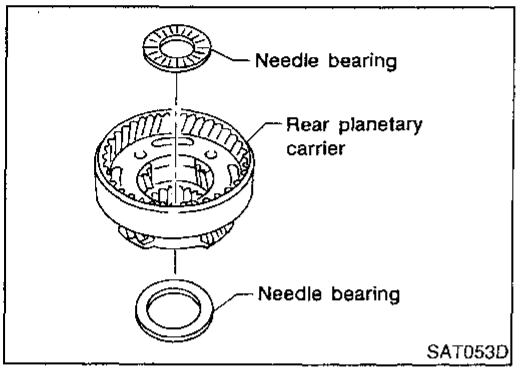


35. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.

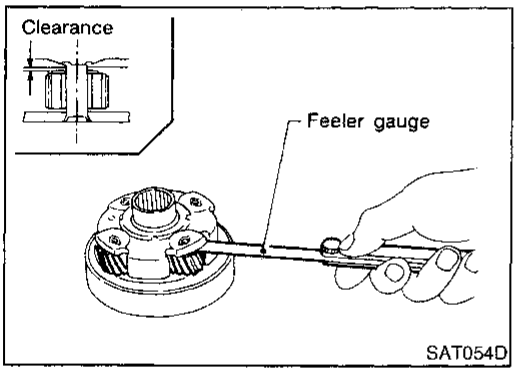
a. Remove rear planetary carrier assembly from transmission case.



b. Remove rear sun gear from rear planetary carrier.



c. Remove needle bearings from rear planetary carrier assembly.



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

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

Standard clearance:

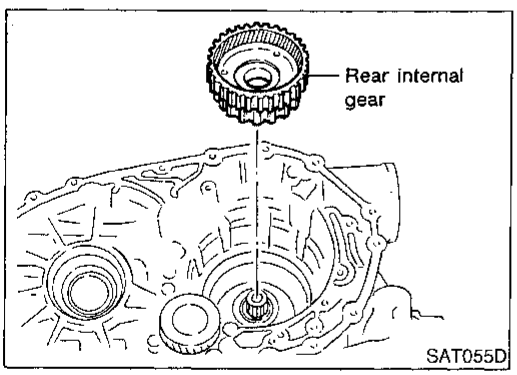
0.15 - 0.70 mm (0.0059 - 0.0276 in)

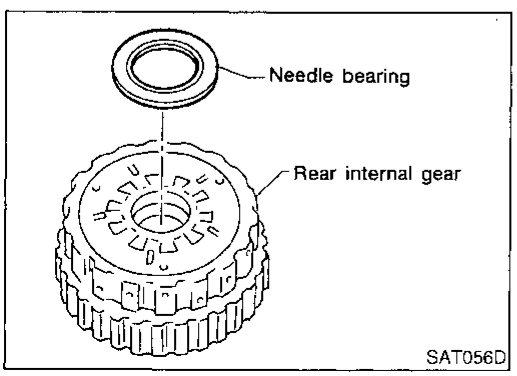
Allowable limit:

0.80 mm (0.0315 in)

Replace rear planetary carrier if the clearance exceeds allowable limit.

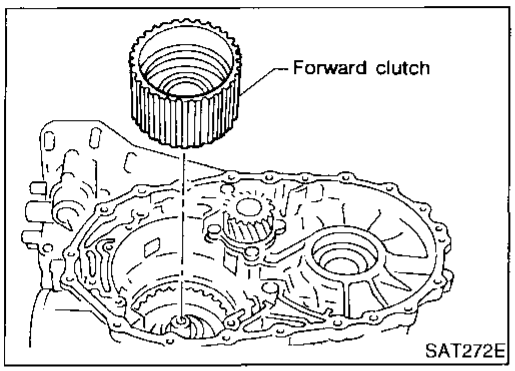
36. Remove rear internal gear from transmission case.



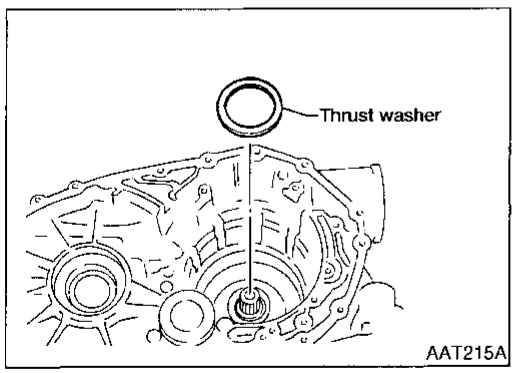


37. Remove needle bearing from rear internal gear.

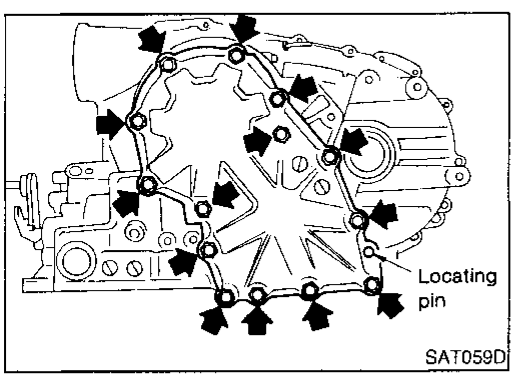
- Check needle bearing for damage or wear.



38. Remove forward clutch assembly from transmission case.

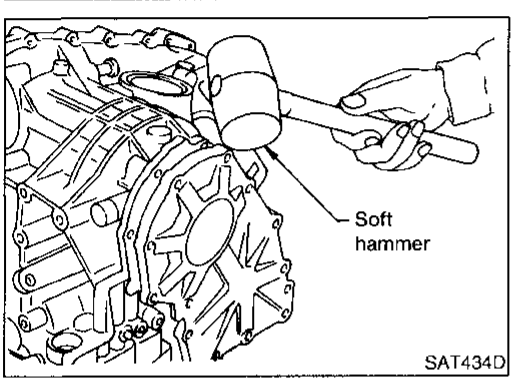


39. Remove thrust washer from transmission case.



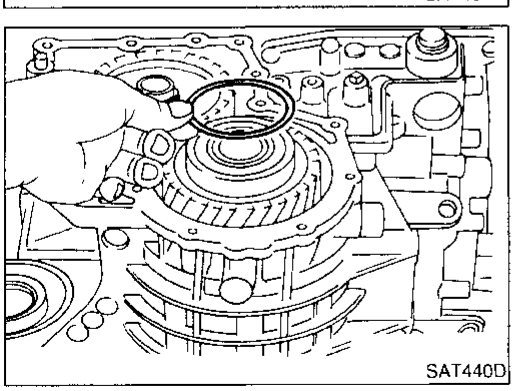
40. Remove output shaft assembly according to the following procedures.

a. Remove side cover bolts.

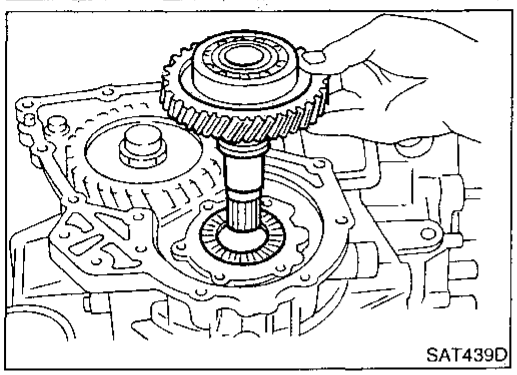


b. Remove side cover by lightly tapping it with a soft hammer.

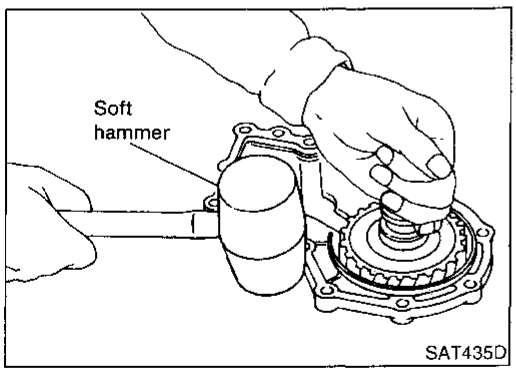
- **Be careful not to drop output shaft assembly. It might come out when removing side cover.**



c. Remove adjusting shim.

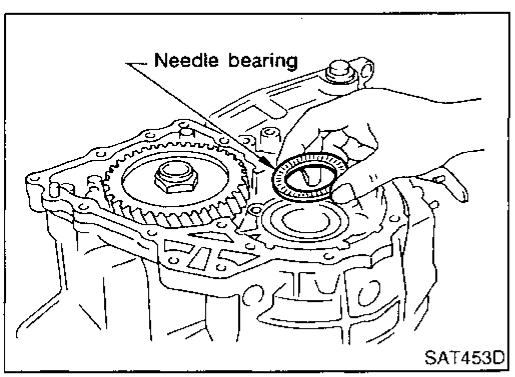

SAT439D

d. Remove output shaft assembly.



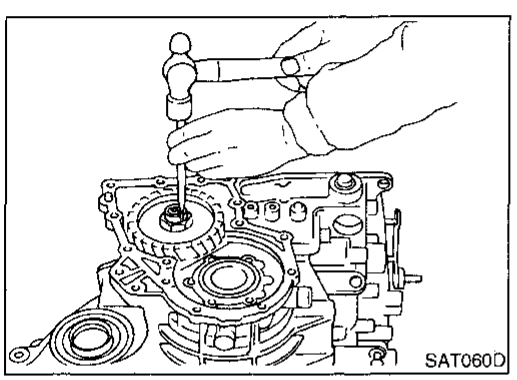
SAT435D

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

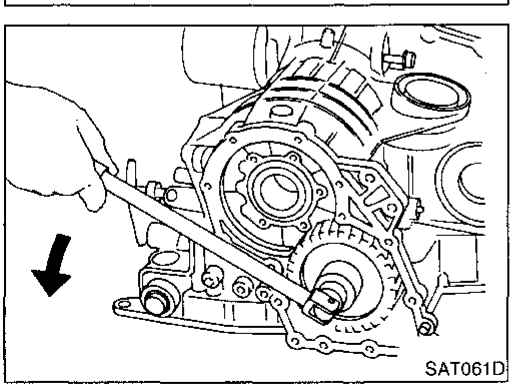


SAT453D

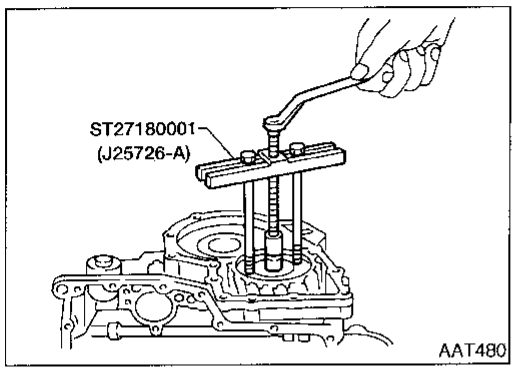
e. Remove needle bearing.


SAT060D

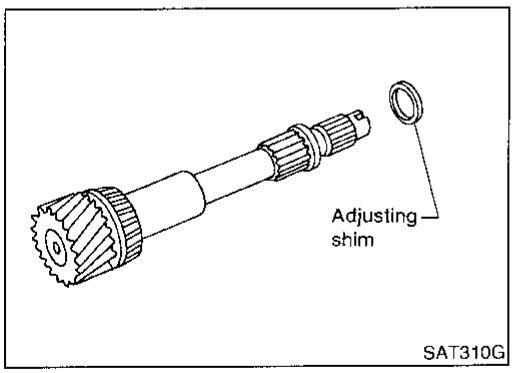
41. Disassemble reduction pinion gear according to the following procedures.
a. Set manual shaft to position "P" to fix idler gear.
b. Unlock idler gear lock nut using a pin punch.


SAT061D

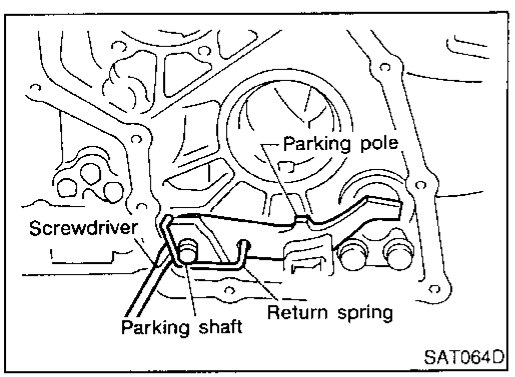
c. Remove idler gear lock nut.
- **Do not reuse idler gear lock nut.**



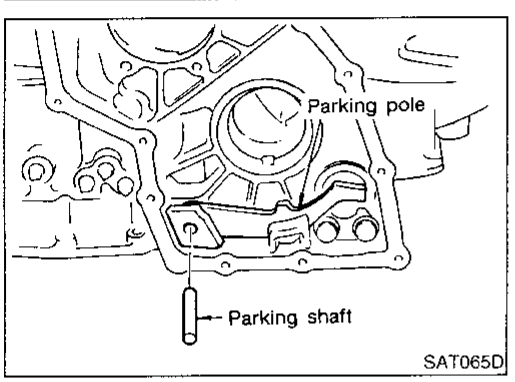
d. Remove idler gear with puller.



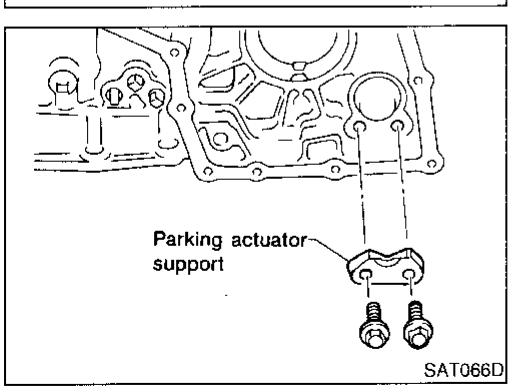
e. Remove reduction pinion gear.
f. Remove adjusting shim from reduction pinion gear.



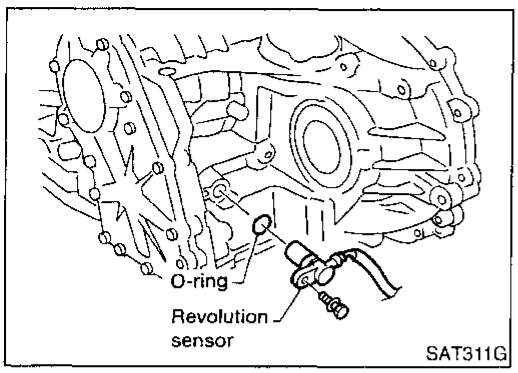
42. Remove return spring from parking shaft using a screwdriver.



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.

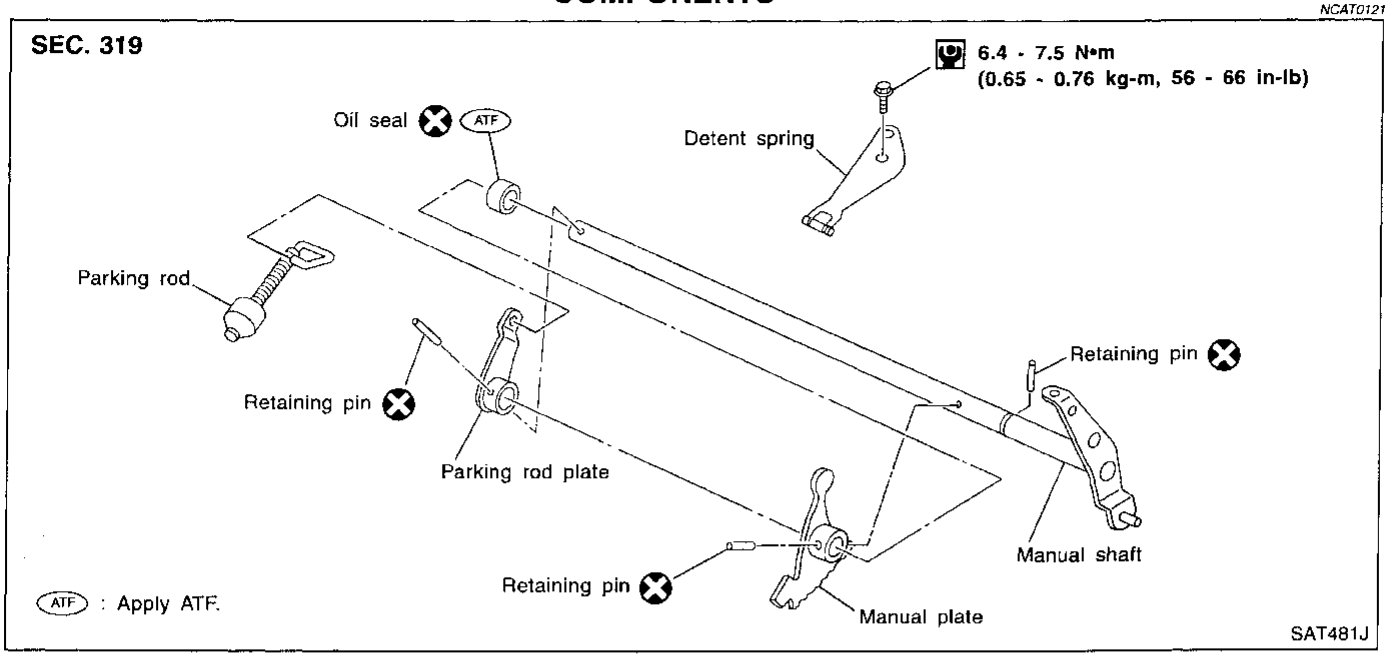


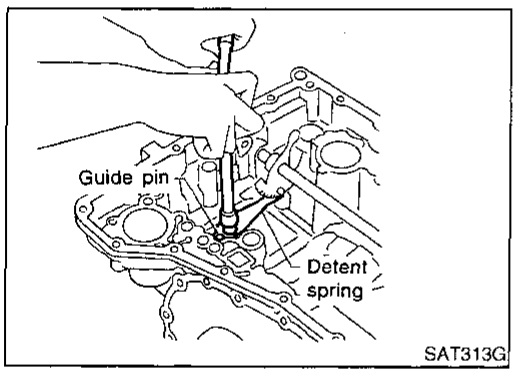
46. Remove revolution sensor from transmission case.

Manual Shaft

COMPONENTS

NCAT0121

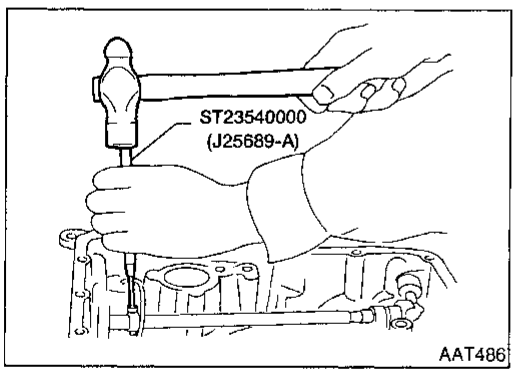




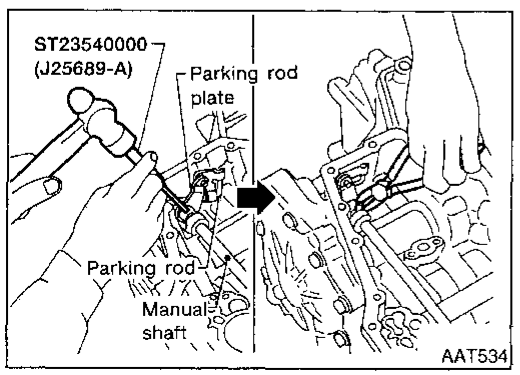
REMOVAL

NCAT0122

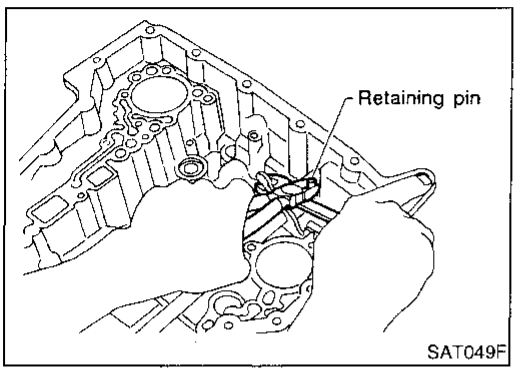
1. Remove detent spring from transmission case.



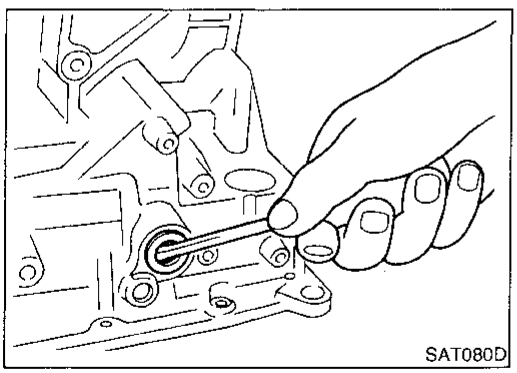
2. Drive out manual plate retaining pin.



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



6. Pull out manual shaft retaining pin.
7. Remove manual shaft and manual plate from transmission case.



8. Remove manual shaft oil seal.

INSPECTION

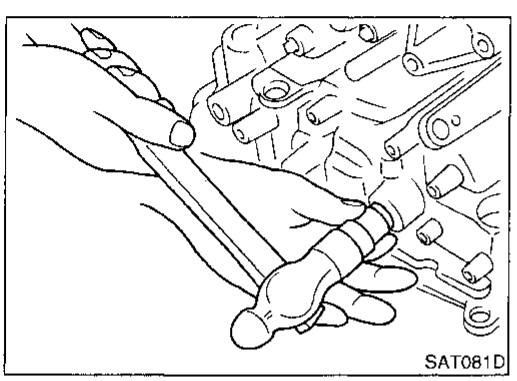
NCAT0123

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

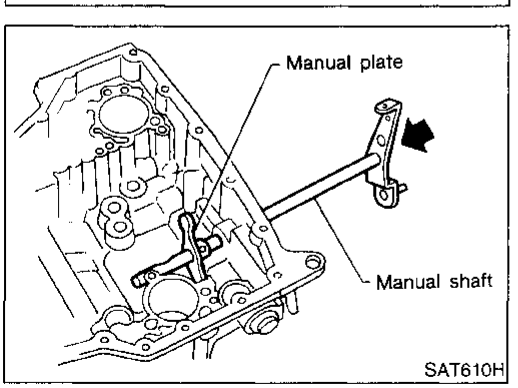
INSTALLATION

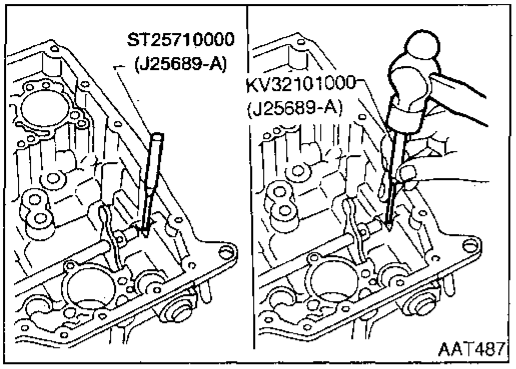
NCAT0124

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

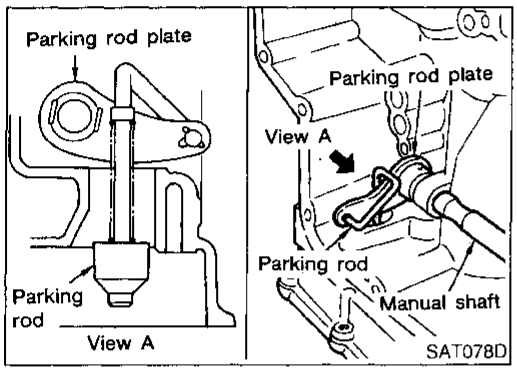


2. Install manual shaft and manual plate.

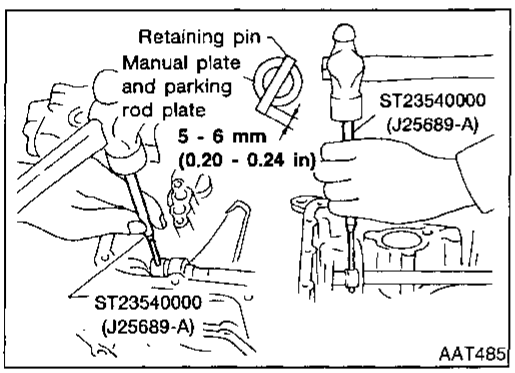




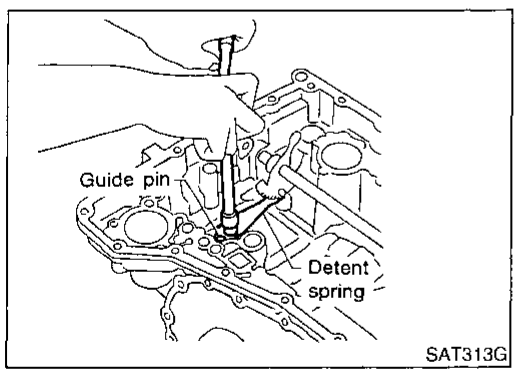
3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin.



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



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

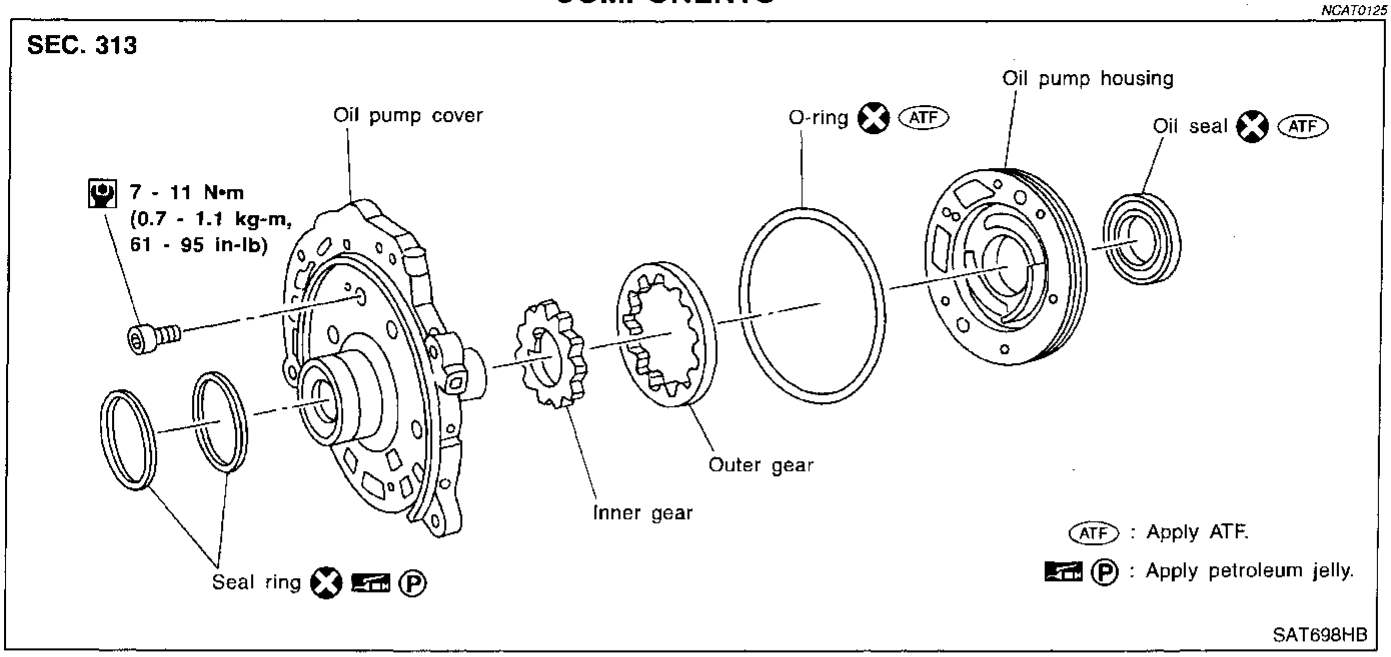


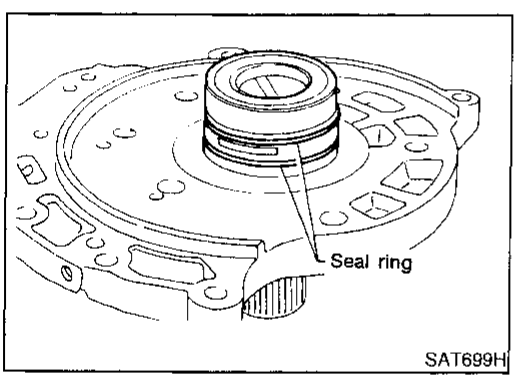
8. Install detent spring.

Oil Pump

COMPONENTS

NCAT0125

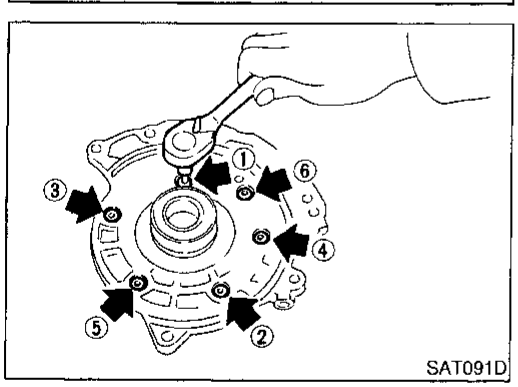




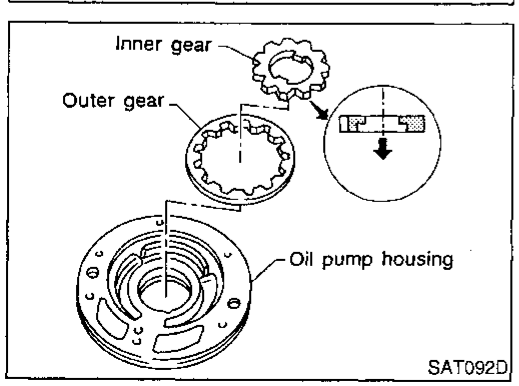
DISASSEMBLY

NCAT0126

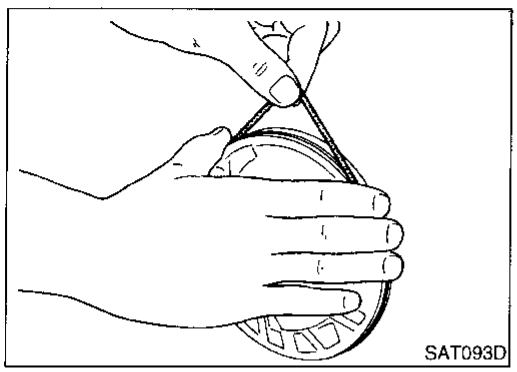
1. Remove seal rings.



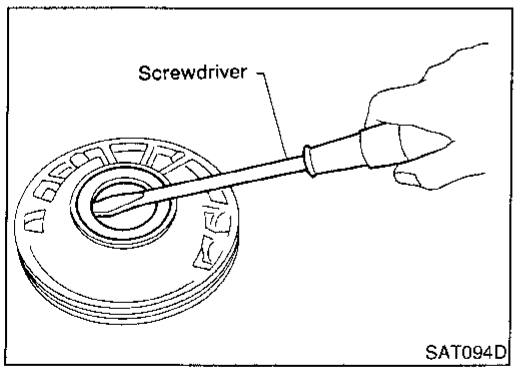
2. Loosen bolts in numerical order and remove oil pump cover.



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


SAT093D

4. Remove O-ring from oil pump housing.



SAT094D

5. Remove oil pump housing oil seal.

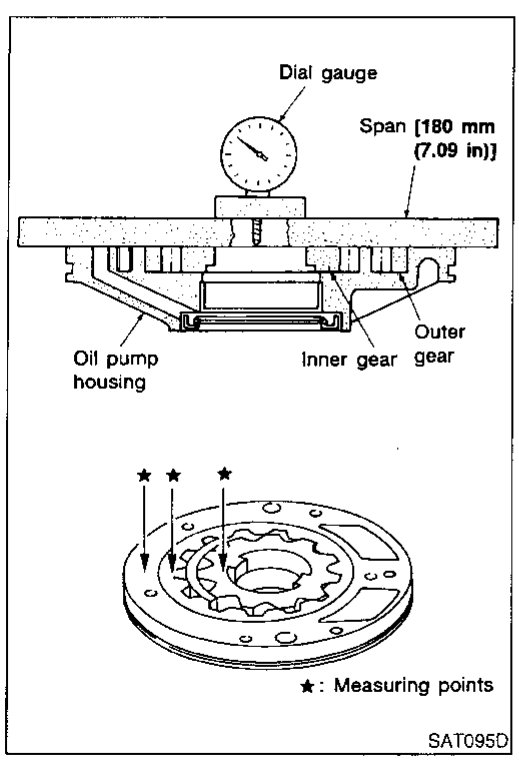
INSPECTION

NCAT0127

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

NCAT0127S01

- Check for wear or damage.



SAT095D

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:

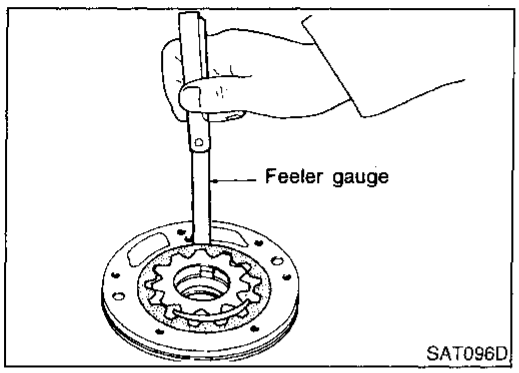
  0.02 - 0.04 mm (0.0008 - 0.0016 in)

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

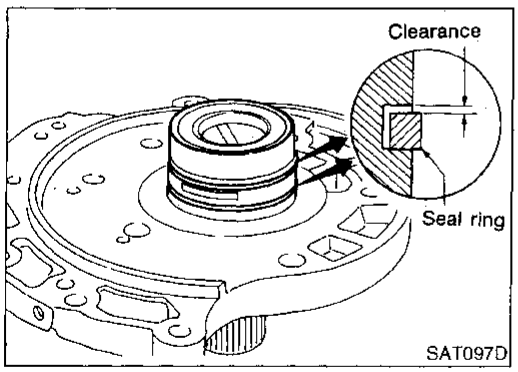
  Inner and outer gear:

  Refer to SDS, AT-346.

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



- 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

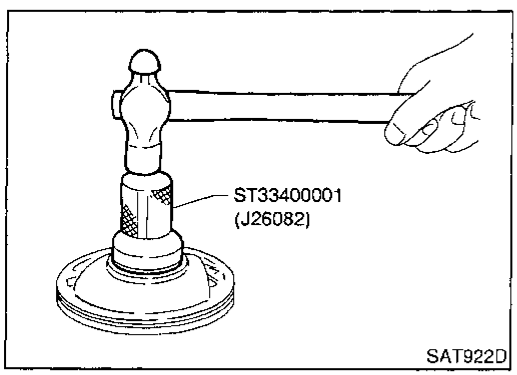
NCAT0127S03

- 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.

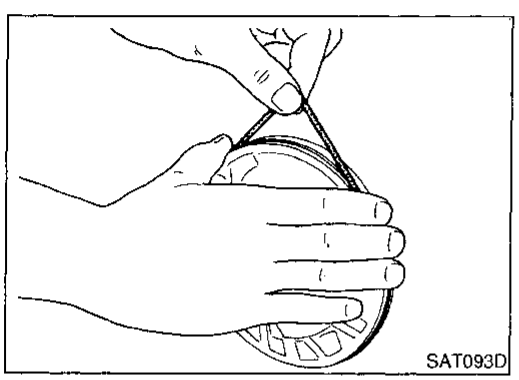
ASSEMBLY

NCAT0128

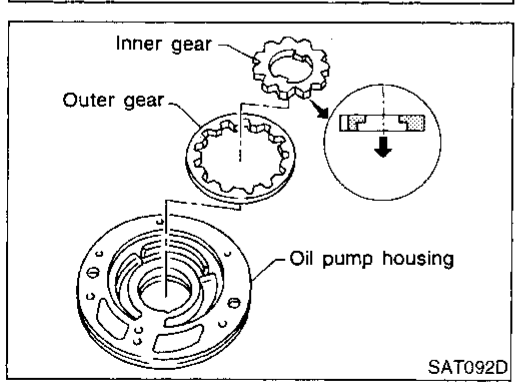
1. Install oil seal on oil pump housing.

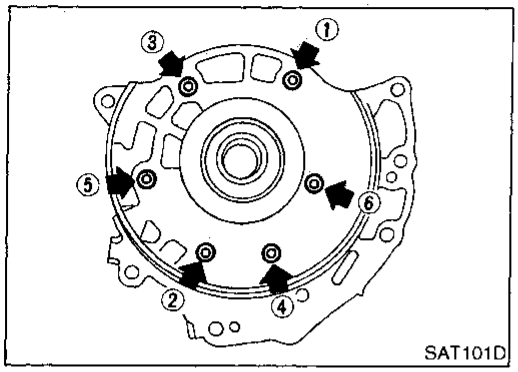


2. Install O-ring on oil pump housing.
- **Apply ATF to O-ring.**

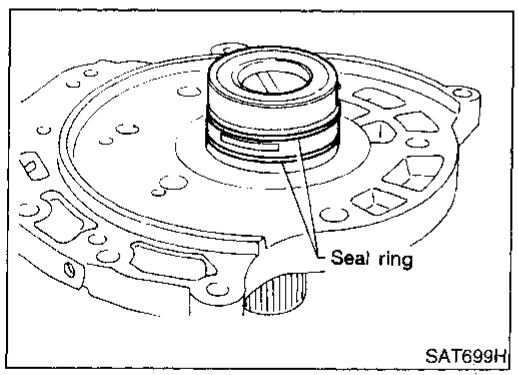


3. Install inner and outer gears on oil pump housing.
- **Take care with the direction of the inner gear.**





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



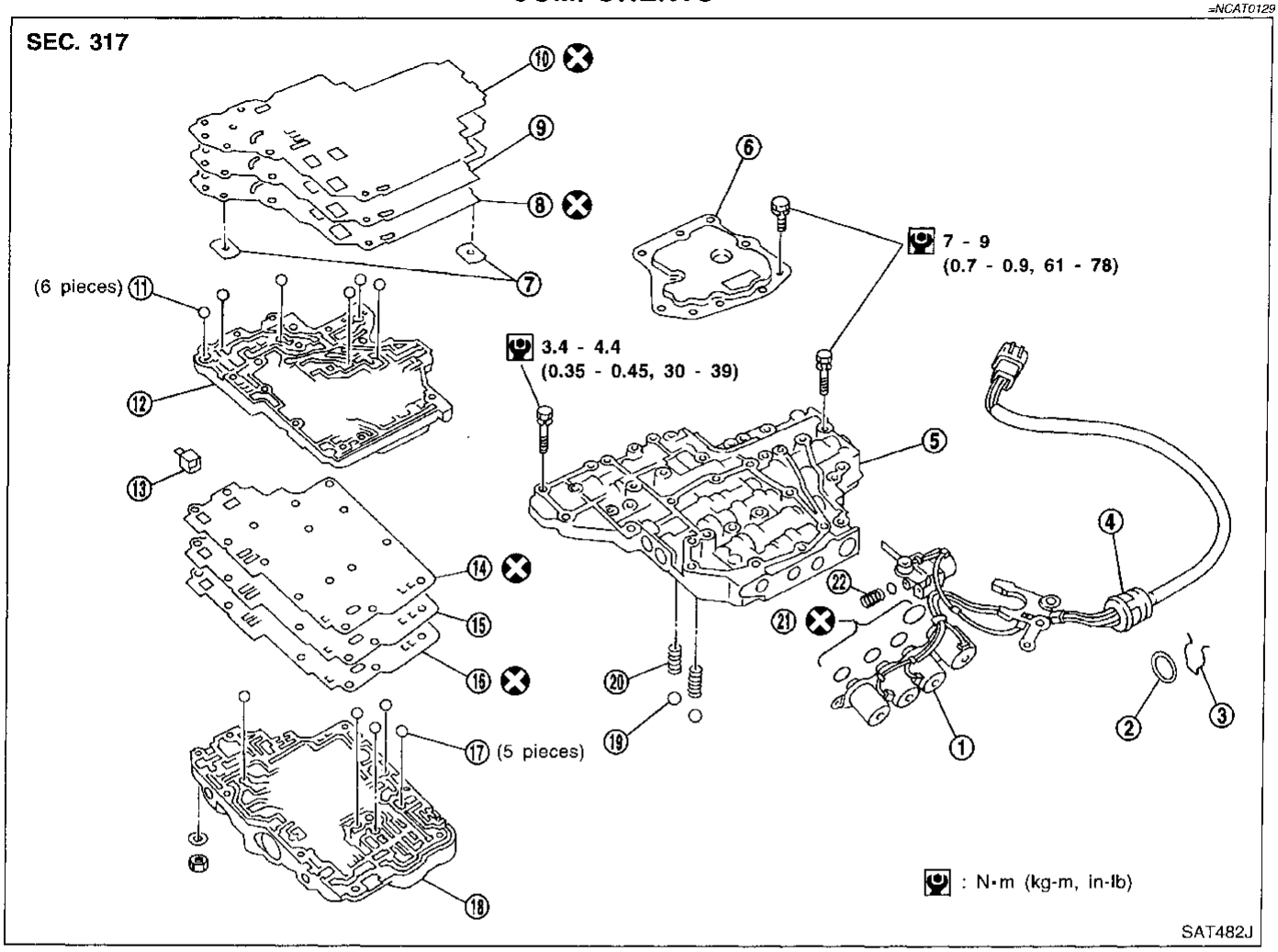
5. Install new seal rings carefully after packing ring groove with petroleum jelly.

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

Control Valve Assembly

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

DISASSEMBLY

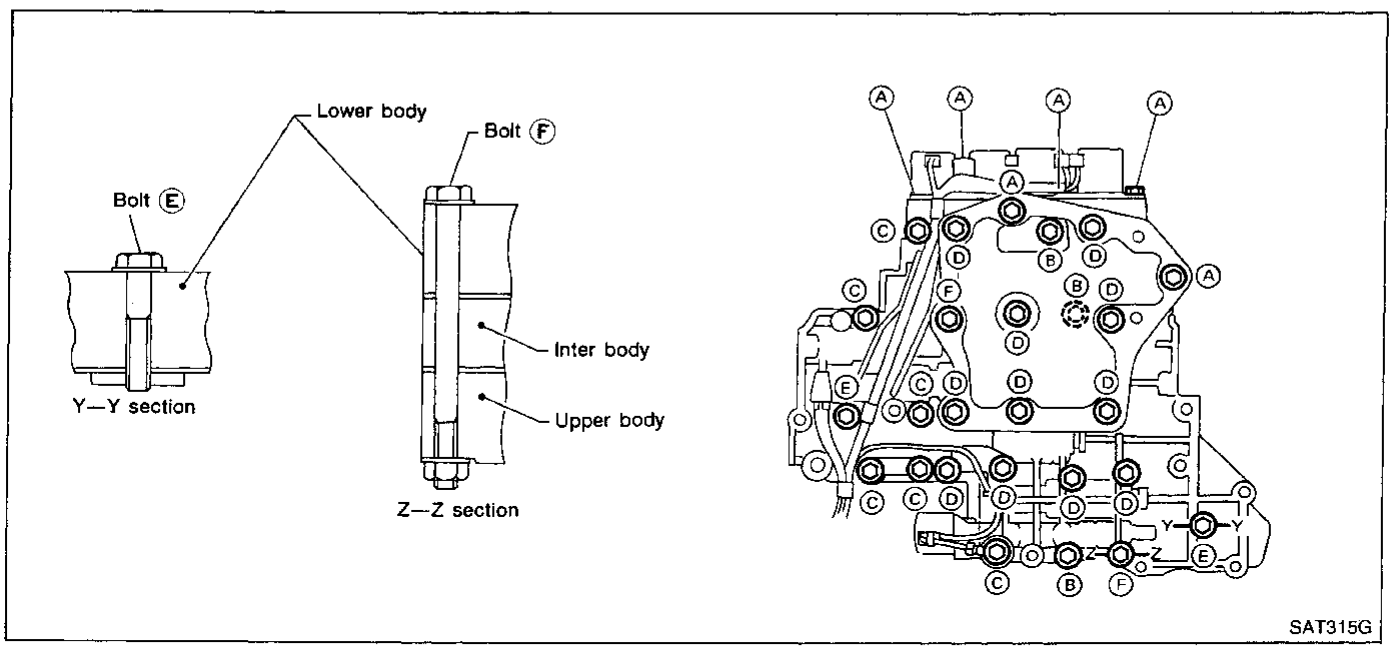
=NCAT0130

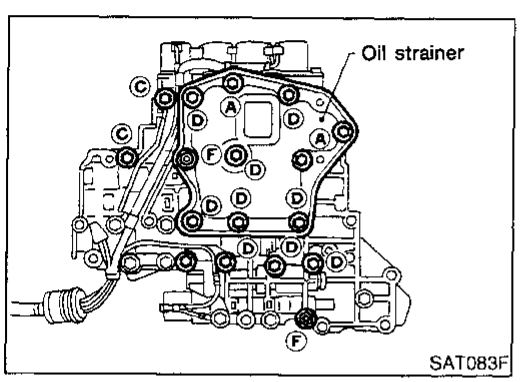
- Disassemble upper, inter and lower bodies.

Bolt length, number and location:

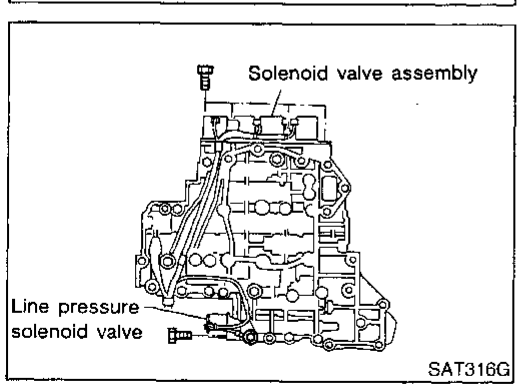
Bolt symbol	A	B	C	D	E	F
Bolt length "ℓ" ℓ	13.5 mm (0.531 in)	58.0 mm (2.283 in)	40.0 mm (1.575 in)	66.0 mm (2.598 in)	33.0 mm (1.299 in)	78.0 mm (3.071 in)
Number of bolts	6	3	6	11	2	2

F: Reamer bolt with nut



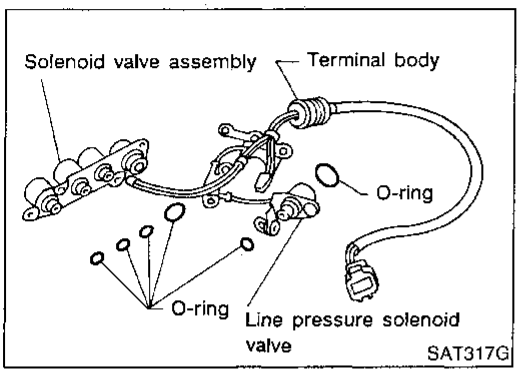


1. Remove bolts A, D and F, and remove oil strainer from control valve assembly.

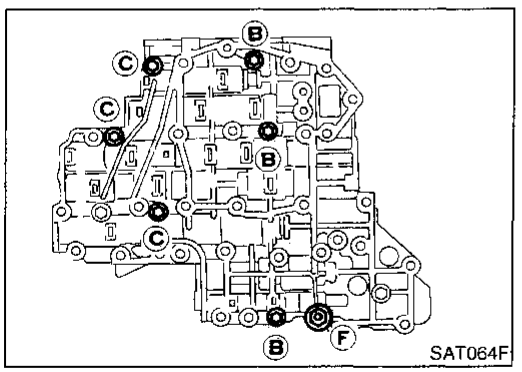


2. Remove solenoid valve assembly and line pressure solenoid valve from control valve assembly.

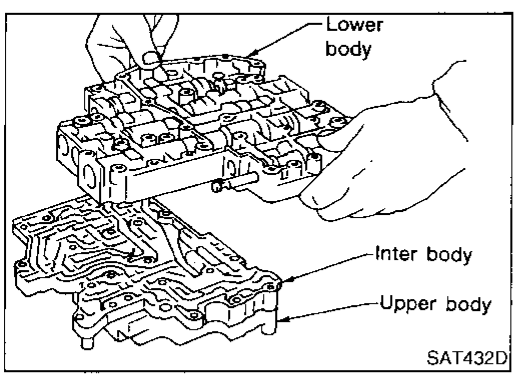
- **Be careful not to lose the line pressure solenoid valve spring.**



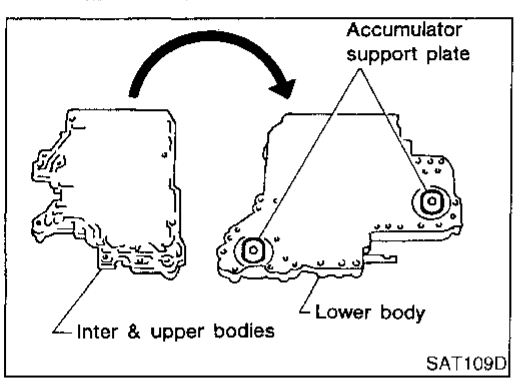
3. Remove O-rings from solenoid valves and terminal body.



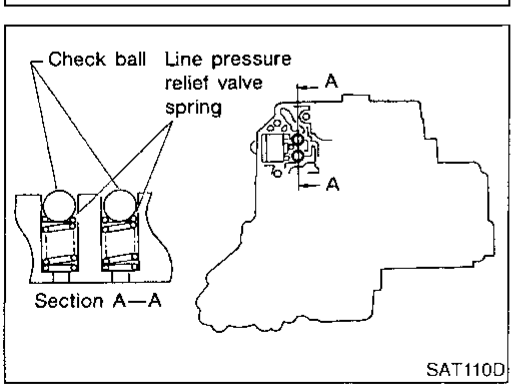
4. Place upper body facedown, and remove bolts B, C and F.



5. Remove lower body from inter body.

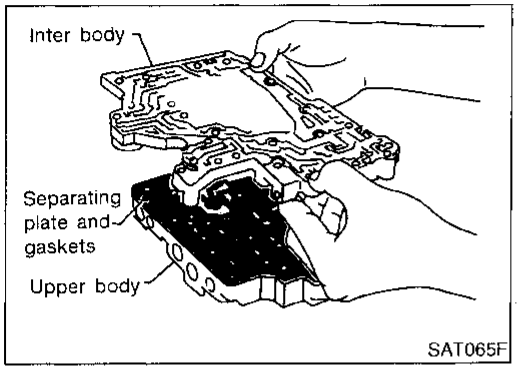


6. Turn over lower body, and accumulator support plates.



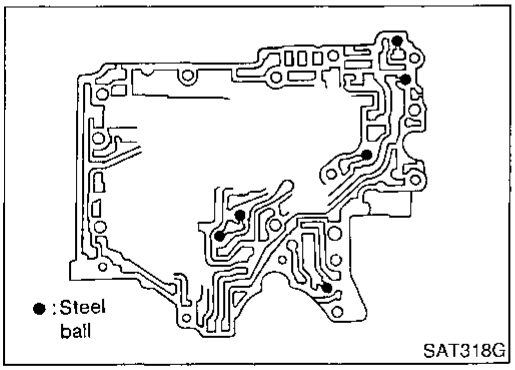
7. Remove bolts E, separating plate and separating gaskets from lower body.
8. Remove steel balls and relief valve springs from lower body.

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



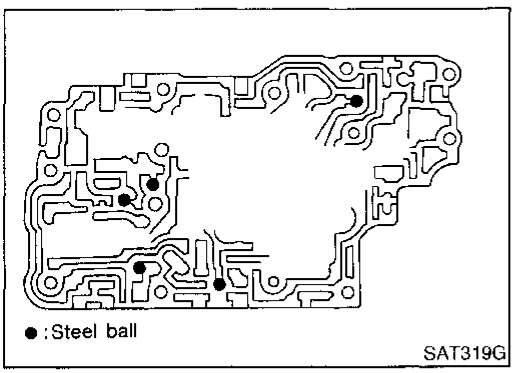
SAT065F

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



SAT318G

11. Check to see that steel balls are properly positioned in inter body and then remove them.
- **Be careful not to lose steel balls.**



SAT319G

12. Check to see that steel balls are properly positioned in upper body and then remove them.
- **Be careful not to lose steel balls.**

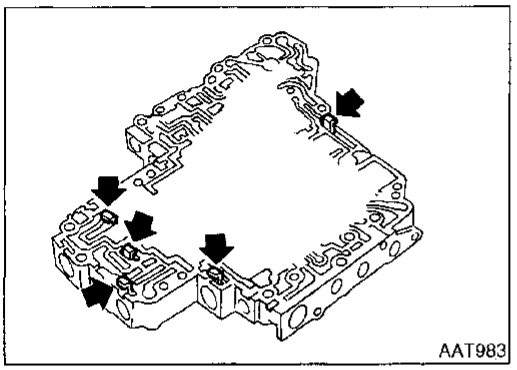
INSPECTION

NCAT0131

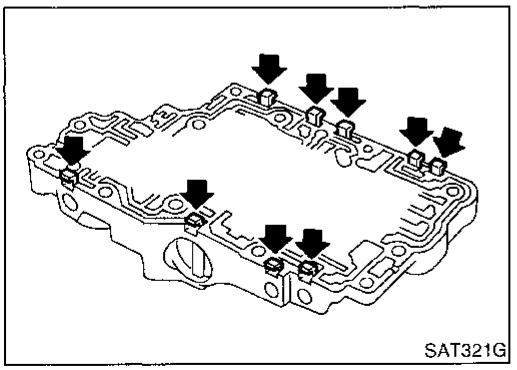
Lower and Upper Bodies

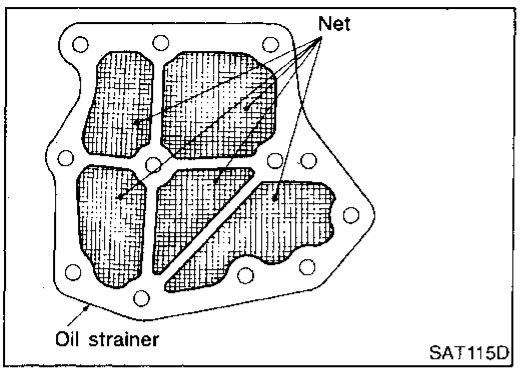
NCAT0131S01

- Check to see that retainer plates are properly positioned in lower body.


AAT983

- Check to see that retainer plates are properly positioned in upper body.

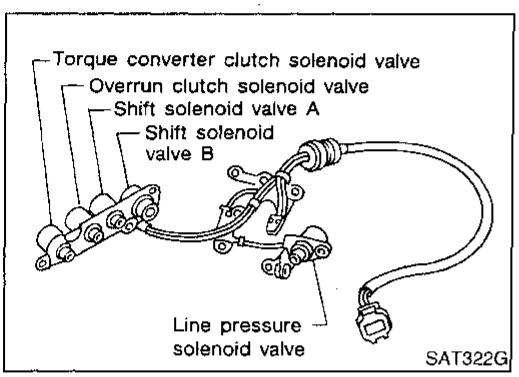

SAT321G



Oil Strainer

NCAT0131S02

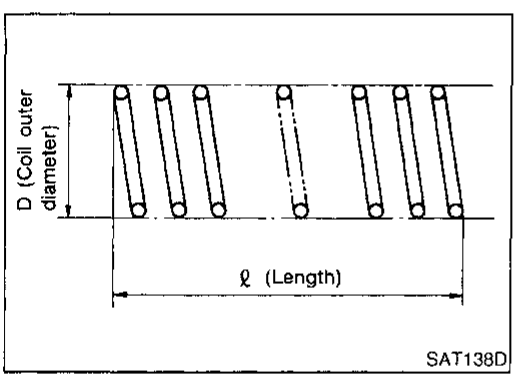
- Check wire netting of oil strainer for damage.



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

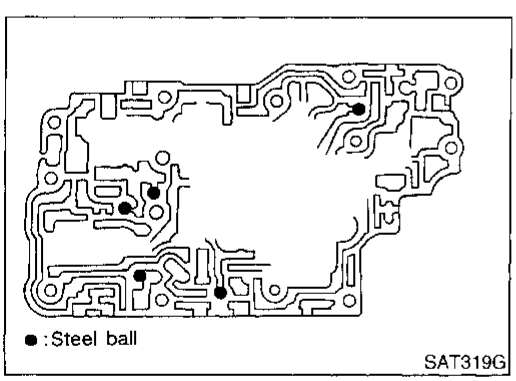
NCAT0131S04

- 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)

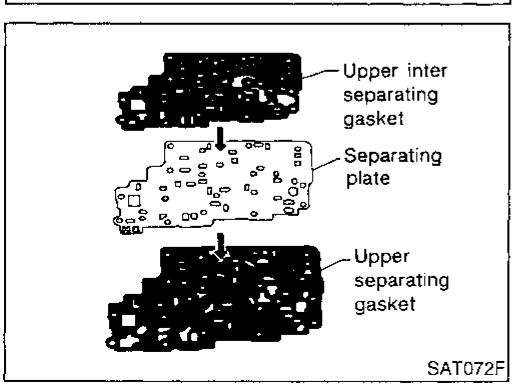


ASSEMBLY

NCAT0132

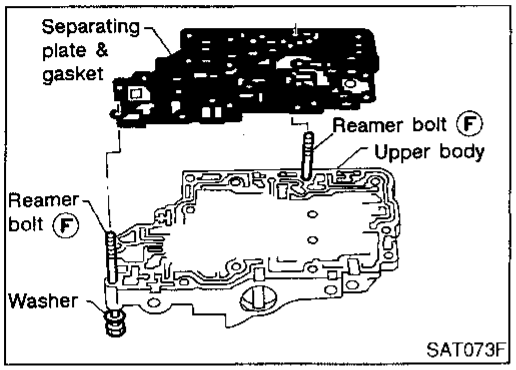
1. Install upper, inter and lower body.

a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

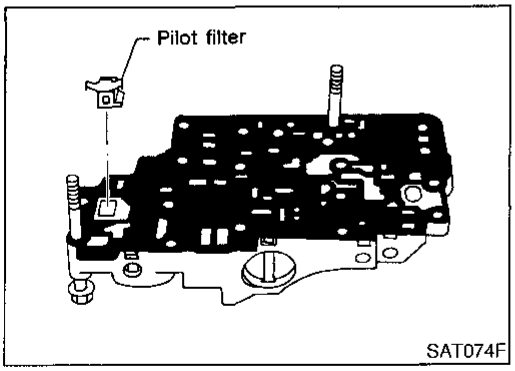


b. Install upper separating gasket, upper inter separating gasket and upper separating plate in order shown in illustration.

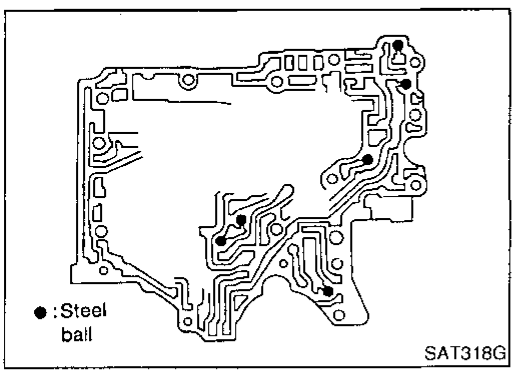
- **Always use new gaskets.**



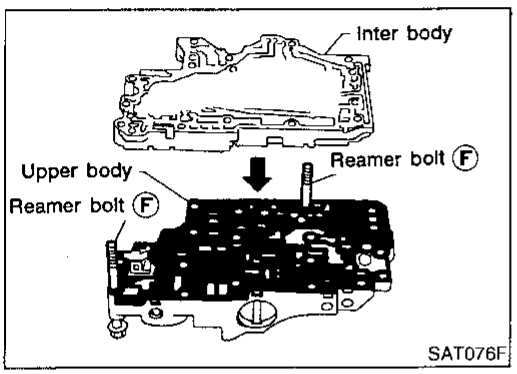
c. Install reamer bolts **F** from bottom of upper body. Using reamer bolts as guides, install separating plate and gaskets as a seat.



d. Install pilot filter.

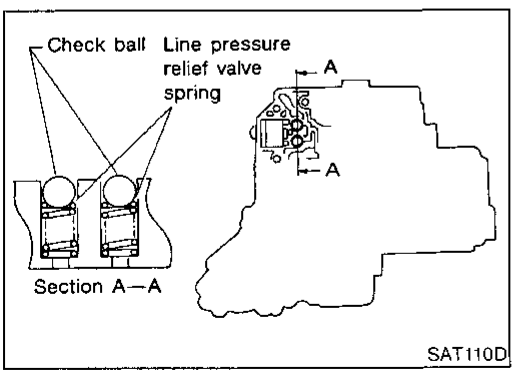


e. Place inter body as shown in the illustration. Install steel balls in their proper positions.

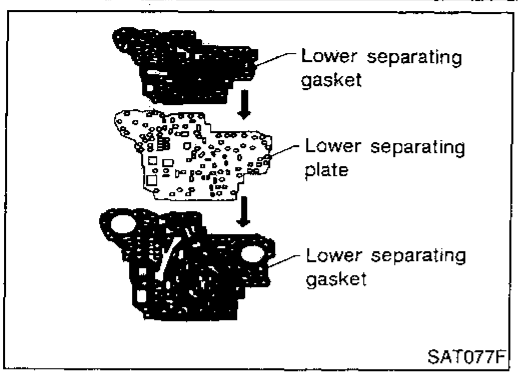


f. Install inter body on upper body using reamer bolts **F** as guides.

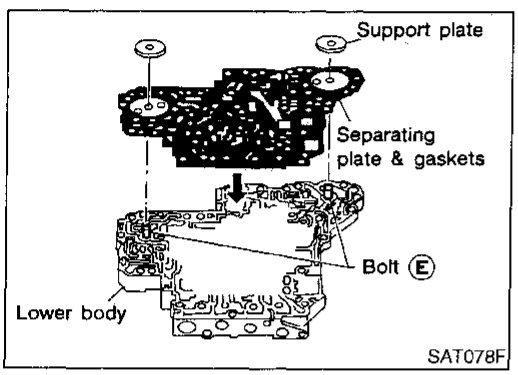
- **Be careful not to dislocate or drop steel balls.**



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

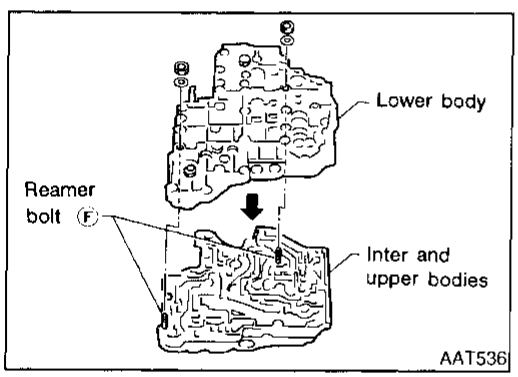


h. Install lower separating gasket, inner separating gasket and lower separating plate in order shown in the illustration.

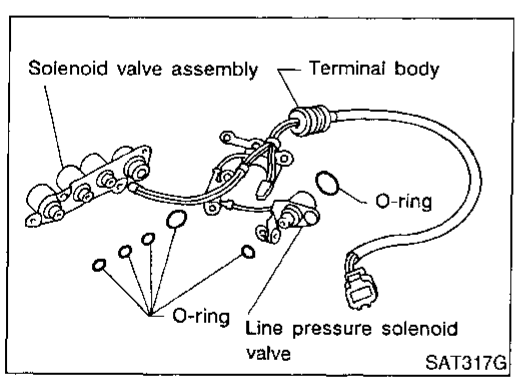


i. Install bolts **E** from bottom of lower body. Using bolt **E** as guides, install separating plate and gaskets as a set.

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.



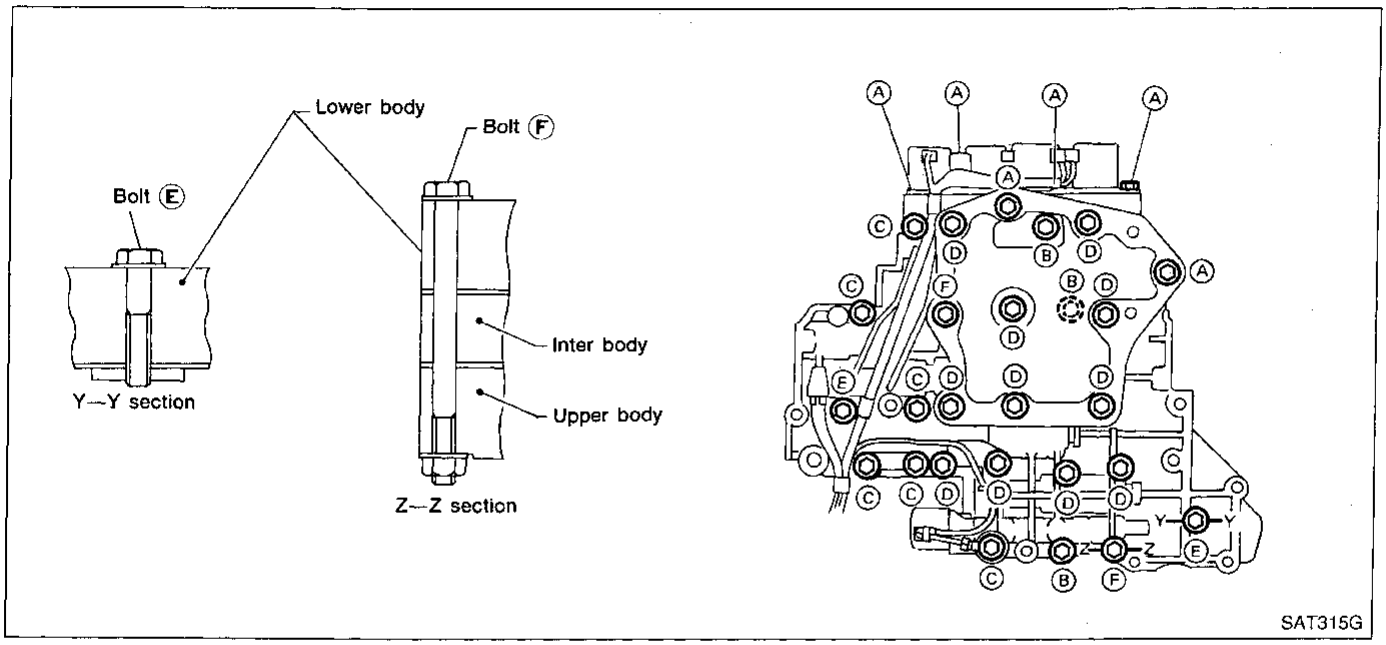
2. Install O-rings to solenoid valves and terminal body.

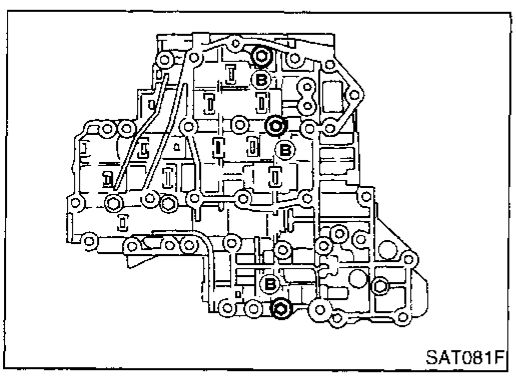
- **Apply ATF to O-rings.**

3. Install and tighten bolts.

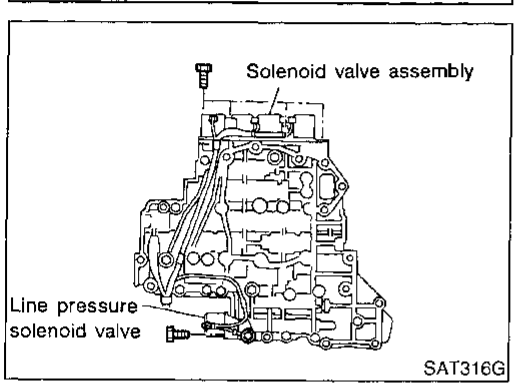
Bolt length, number and location:

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

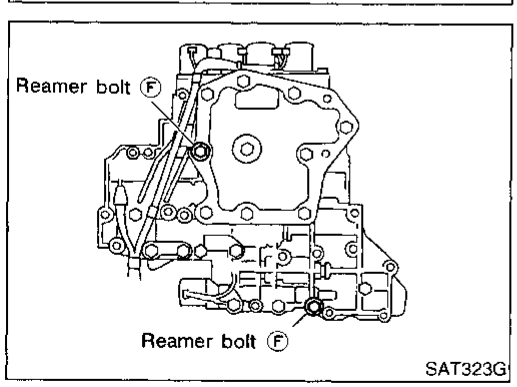




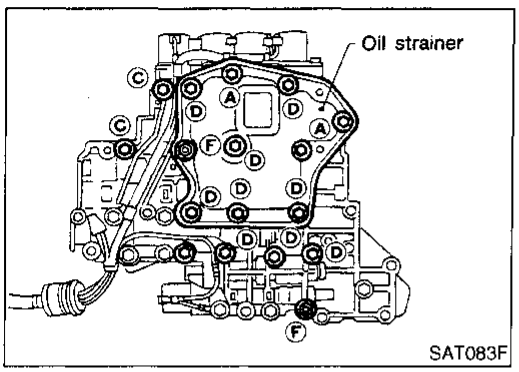
a. Install and tighten bolts **B** to specified torque.
: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



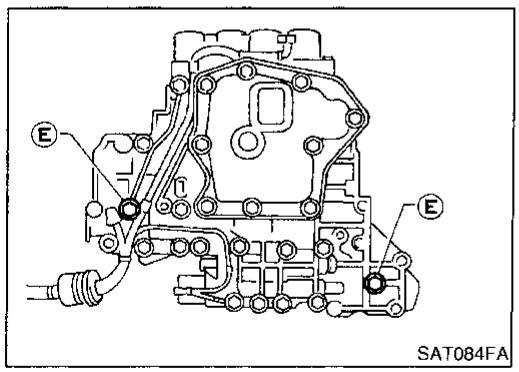
b. Install solenoid valve assembly and line pressure solenoid valve to lower body.



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



e. Tighten bolts **A**, **C**, **D** and **F** to specified torque.
: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



f. Tighten bolts **E** to specified torque.
: 3.4 - 4.4 N·m (0.35 - 0.45 kg-m, 30.4 - 39.1 in-lb)

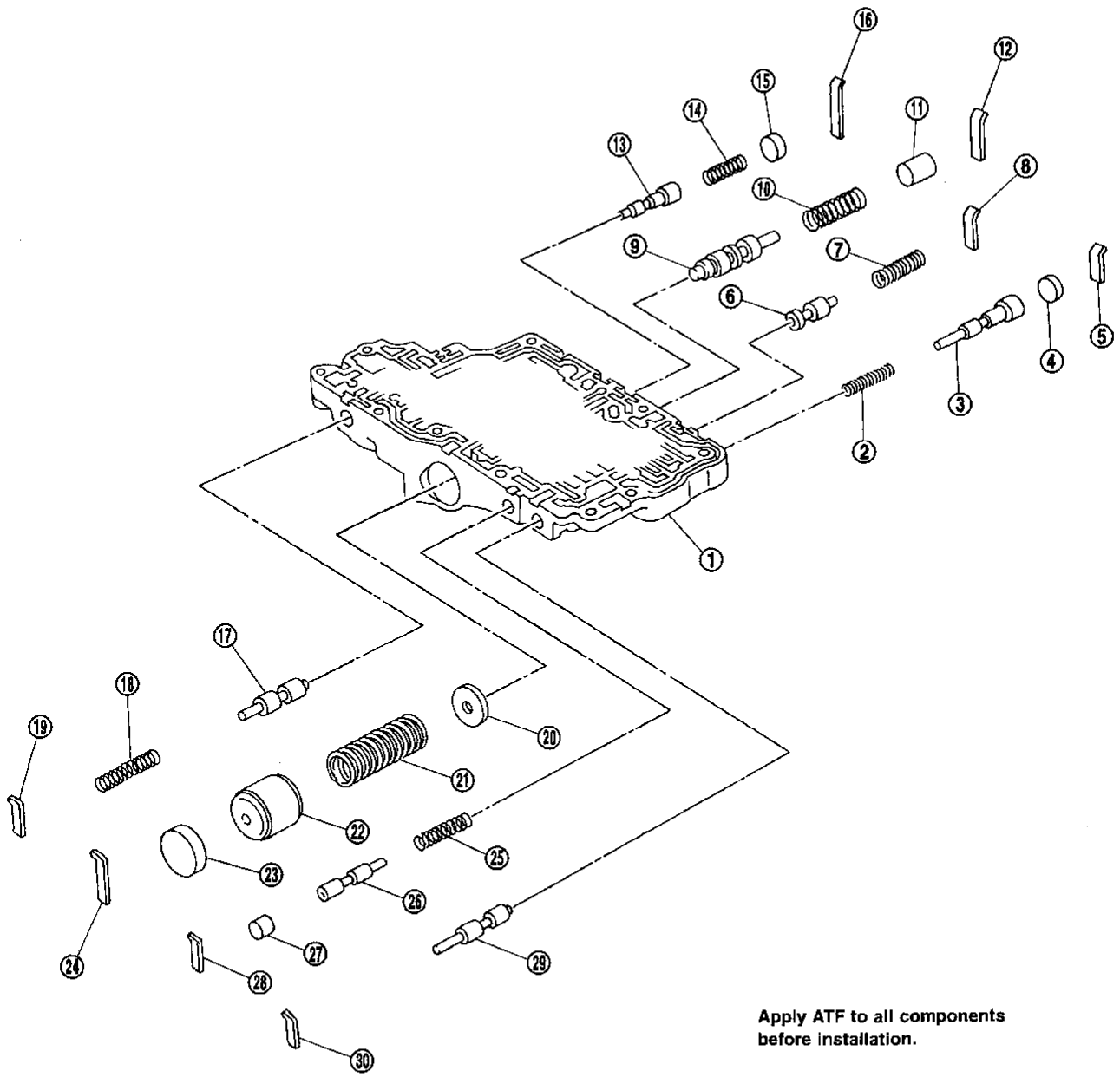
Control Valve Upper Body

COMPONENTS

=NCAT0133

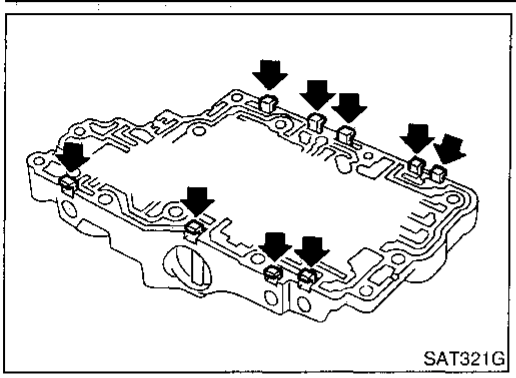
Numbers preceding valve springs correspond with those shown in SDS table on page AT-344.

SEC. 317



SAT483J

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

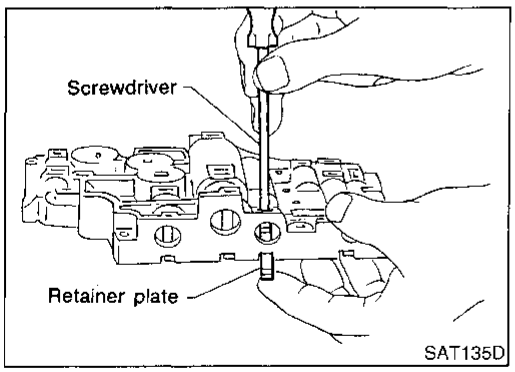

SAT321G

DISASSEMBLY

NCAT0134

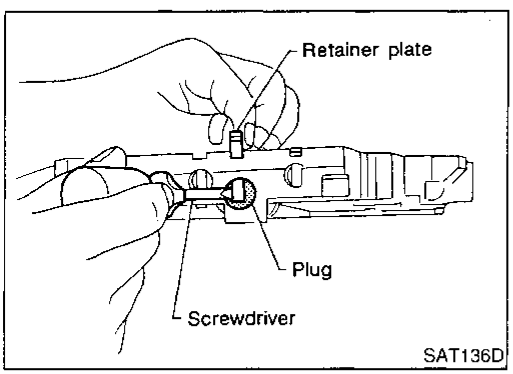
1. Remove valves at retainer plates.

- **Do not use a magnetic "hand".**



SAT135D

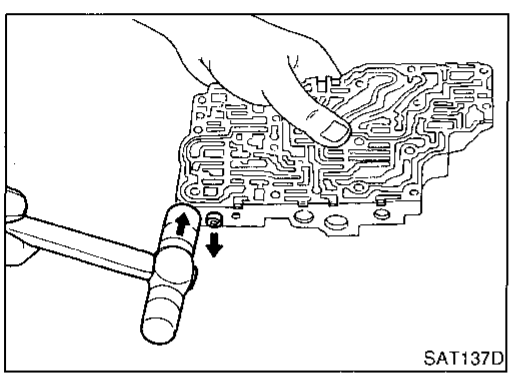
a. Use a screwdriver to remove retainer plates.



SAT136D

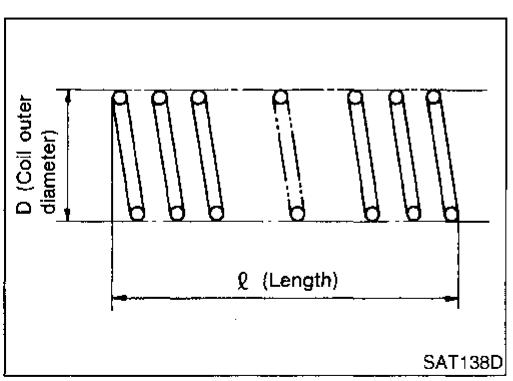
b. Remove retainer plates while holding spring, plugs or sleeves.

- **Remove plugs slowly to prevent internal parts from jumping out.**


SAT137D

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.**



SAT138D

INSPECTION

NCAT0135

Valve Spring

NCAT0135S01

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

  Inspection standard:

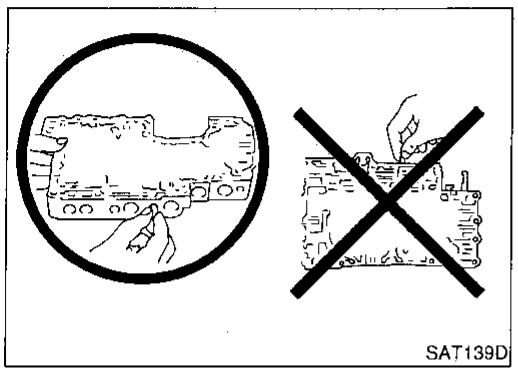
  Refer to SDS, AT-344.

- Replace valve springs if deformed or fatigued.

Control Valves

NCAT0135S02

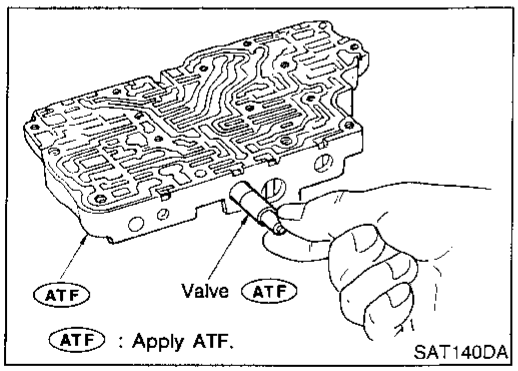
- Check sliding surfaces of valves, sleeves and plugs.


SAT139D

ASSEMBLY

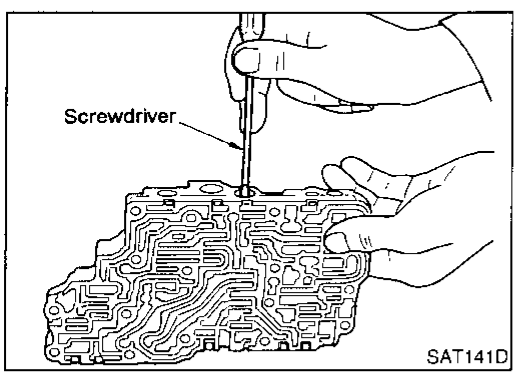
NCAT0136

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



SAT140DA

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.**



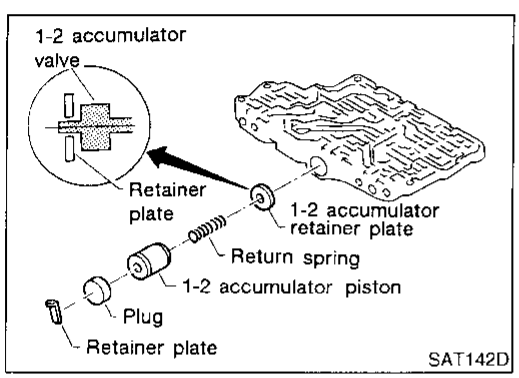
SAT141D

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

1-2 Accumulator Valve

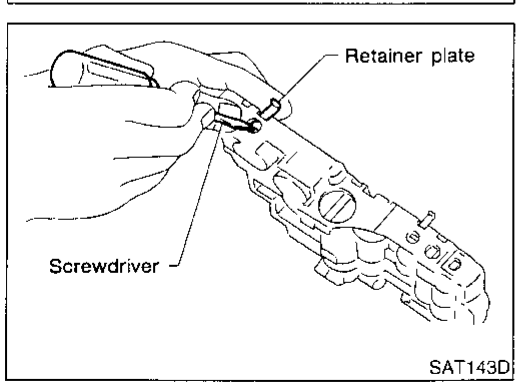
NCAT0136S01

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

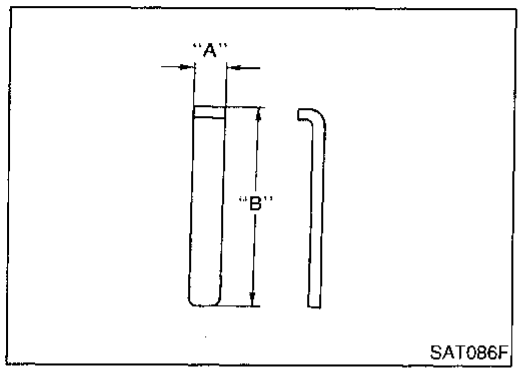


SAT142D

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



SAT143D



Retainer Plate (for control valve upper body)

NCAT0136S02

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		
1st reducing valve	28		21.5 (0.846)
Overrun clutch reducing valve	5		24.0 (0.945)
Torque converter relief valve	8		21.5 (0.846)
Torque converter clutch control valve	12		28.0 (1.102)
2-3 timing valve	30		21.5 (0.846)

- Install proper retainer plates.

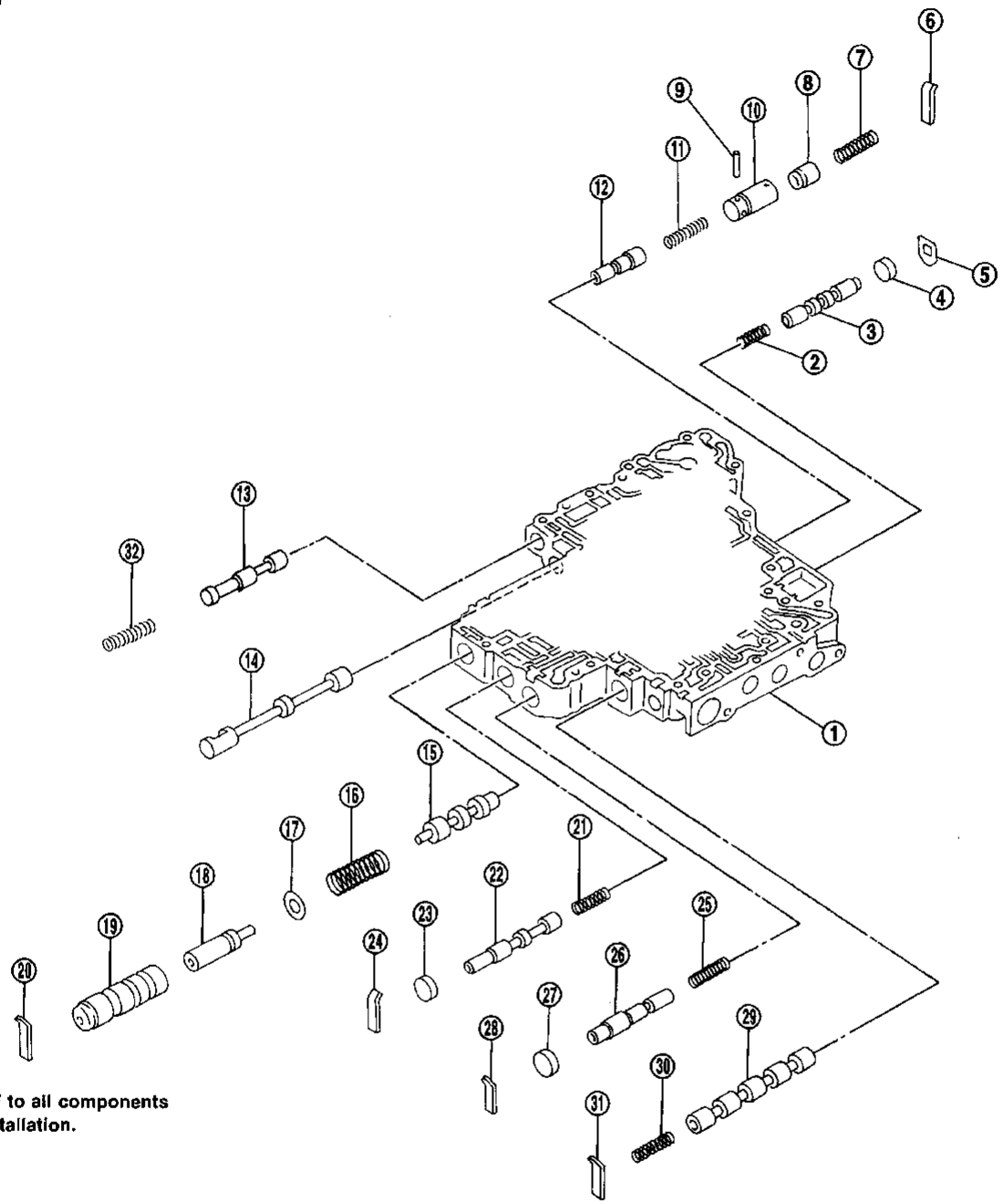
Control Valve Lower Body

COMPONENTS

=NCAT0137

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

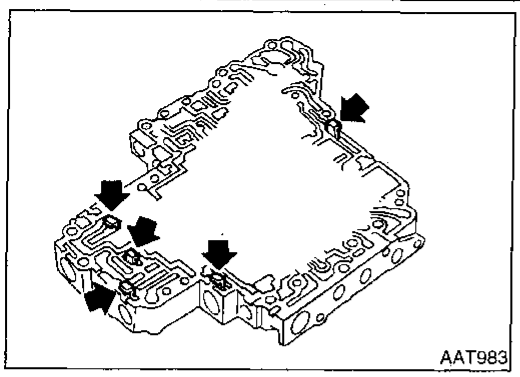
SEC. 317



Apply ATF to all components before installation.

SAT484J

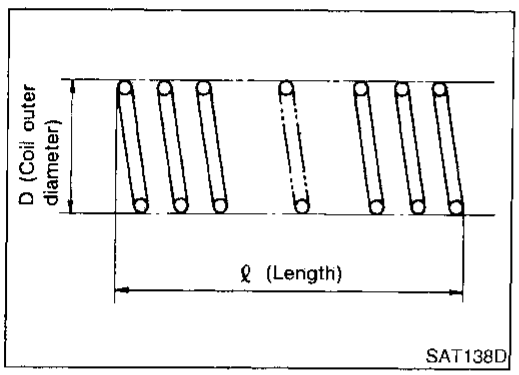
1. Control valve lower body
2. Return spring
3. Shift valve B
4. Plug
5. Retainer plate
6. Retainer plate
7. Return spring
8. Piston
9. Parallel pin
10. Sleeve
11. Return spring
12. Pressure modifier valve
13. Plug
14. Manual valve
15. Pressure regulator valve
16. Return spring
17. Spring seat
18. Plug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


AAT983

DISASSEMBLY

NCAT0138

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



SAT138D

INSPECTION

NCAT0139

Valve Springs

NCAT0139S01

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.

  Inspection standard:

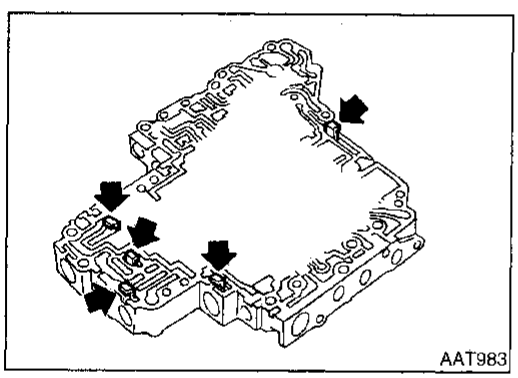
  Refer to SDS, AT-344.

- Replace valve springs if deformed or fatigued.

Control Valves

NCAT0139S02

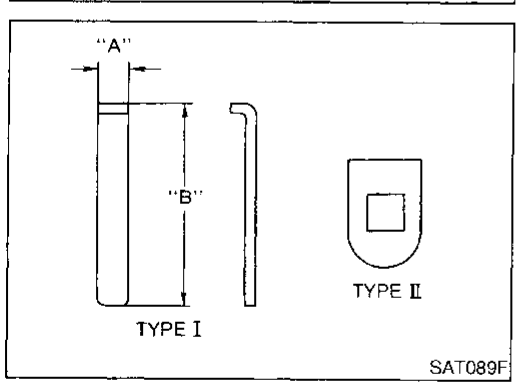
- Check sliding surfaces of control valves, sleeves and plugs for damage.


AAT983

ASSEMBLY

NCAT0140

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



SAT089F

Retainer Plate (for control valve lower body)

NCAT0140S01

Unit: mm (in)

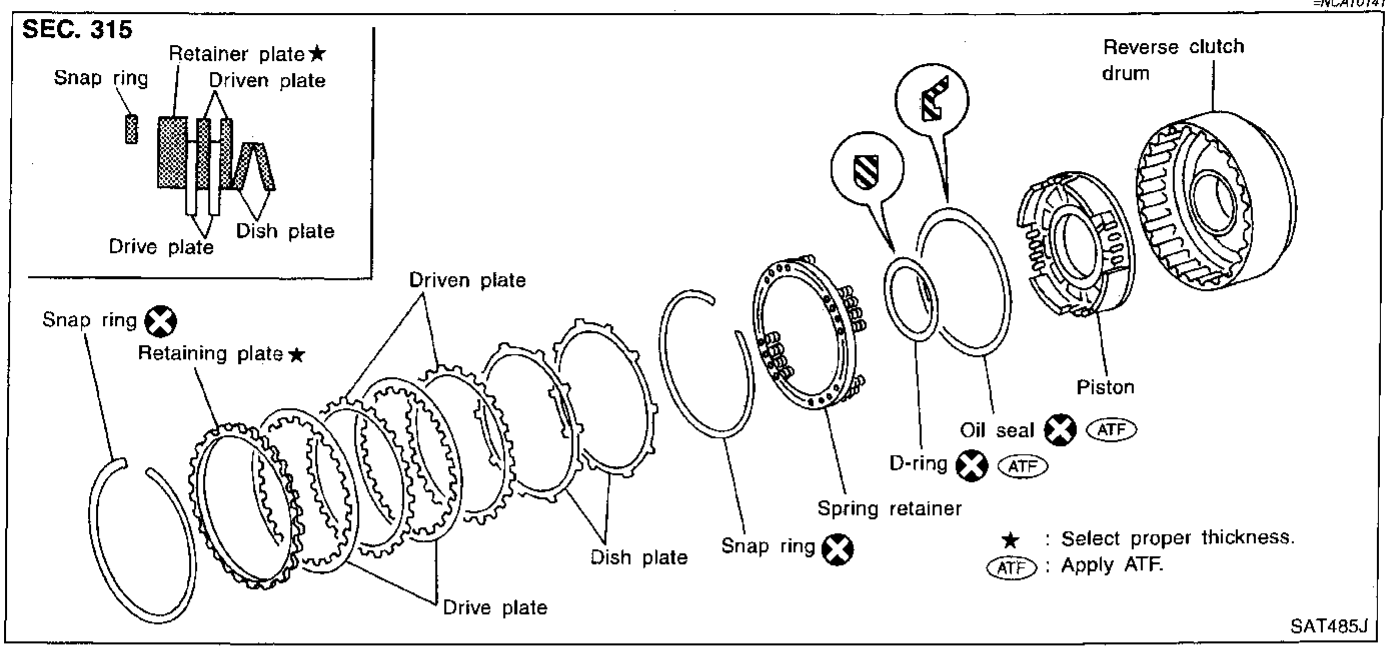
Name of control valve and plug	No.	Length A	Length B	Type
Pressure regulator valve	20	6.0 (0.236)	28.0 (1.102)	I
Accumulator control valve	28			
Shift valve A	31			
Overrun clutch control valve	24			
Pressure modifier valve	6			
Shift valve B	5	—	—	II

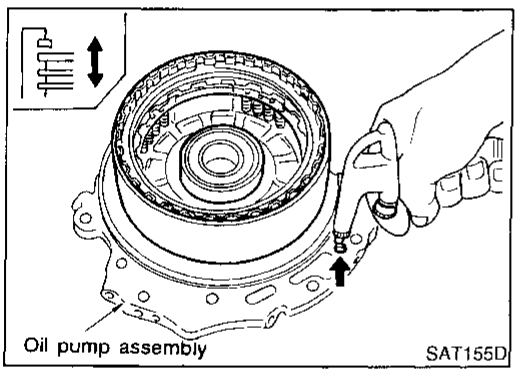
- Install proper retainer plates.

Reverse Clutch

COMPONENTS

=NCAT0141





DISASSEMBLY

NCAT0142

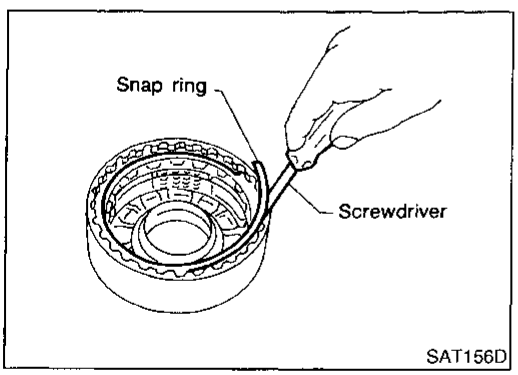
1. Check operation of reverse clutch.

a. Install seal ring onto drum support of oil pump cover and install reverse clutch assembly. Apply compressed air to oil hole.

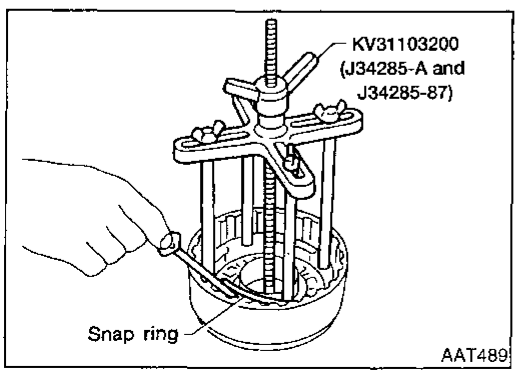
b. Check to see that retaining plate moves to snap ring.

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.



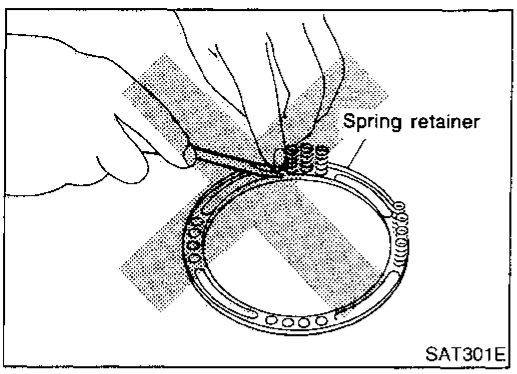
2. Remove snap ring.
3. Remove drive plates, driven plates, retaining plate, and dish plates.



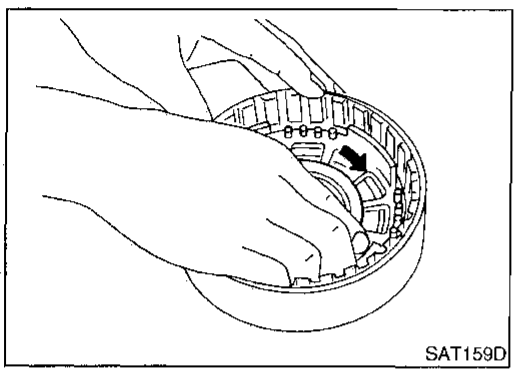
4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.

- **Set Tool directly above springs.**
- **Do not expand snap ring excessively.**

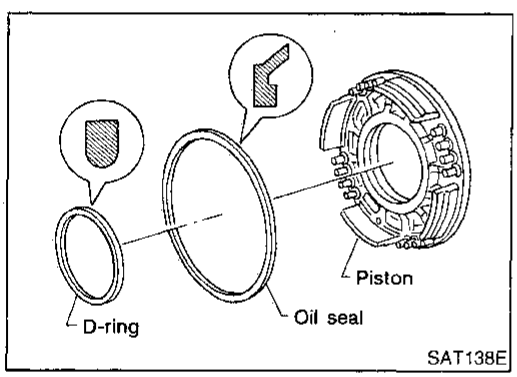
5. Remove spring retainer and return springs.



- **Do not remove return springs from spring retainer.**



6. Remove piston from reverse clutch drum by turning it.



7. Remove D-ring and oil seal from piston.

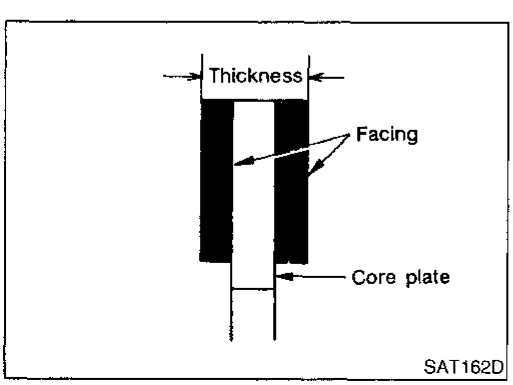
INSPECTION

NCAT0143

Reverse Clutch Snap Ring, Spring Retainer and Return Springs

NCAT0143S01

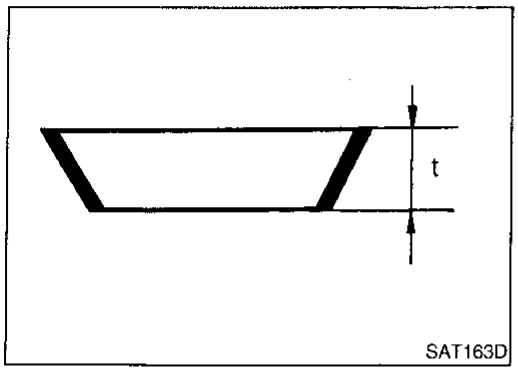
- Check for deformation, fatigue or damage.
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**



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.

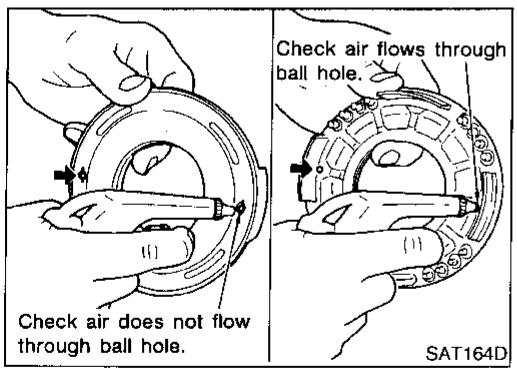


Reverse Clutch Dish Plates

NCAT0143S03

- Check for deformation or damage.
- Measure thickness of dish plate.

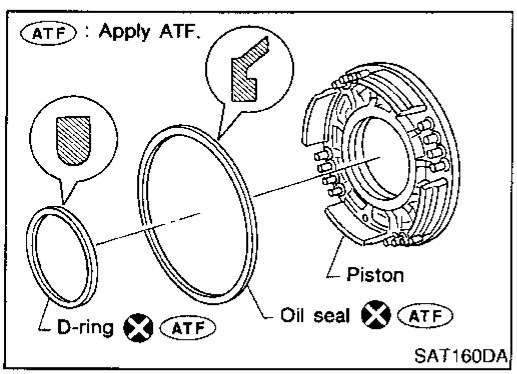
  Thickness of dish plate "t": 2.8 mm (0.110 in)
- If deformed or fatigued, replace.



Reverse Clutch Piston

NCAT0143S04

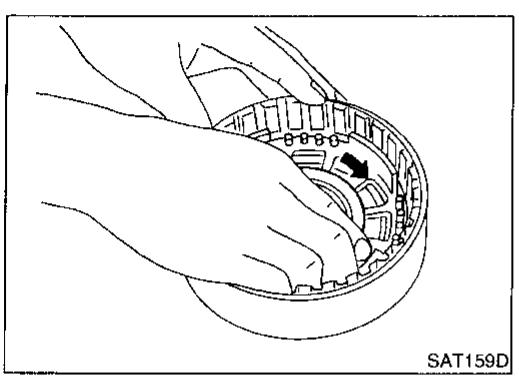
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure that there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure air leaks past ball.



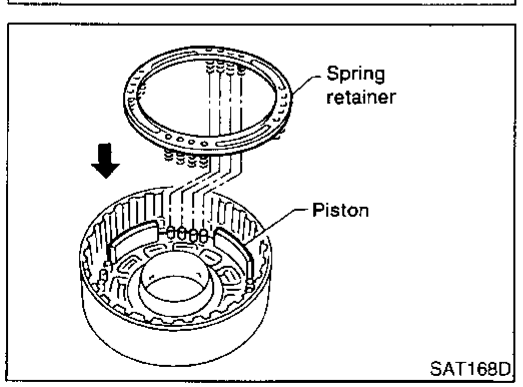
ASSEMBLY

NCAT0144

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

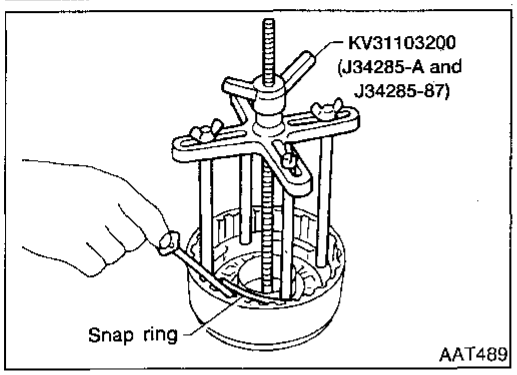


2. Install piston assembly by turning it slowly.
- **Apply ATF to inner surface of drum.**

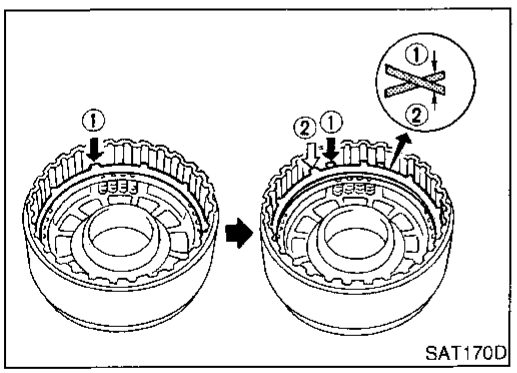


3. Install return springs and spring retainer on piston.

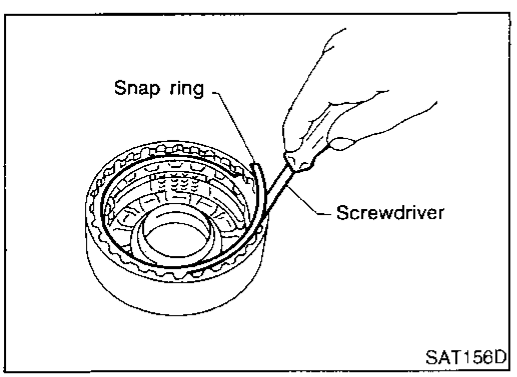
Reverse Clutch (Cont'd)



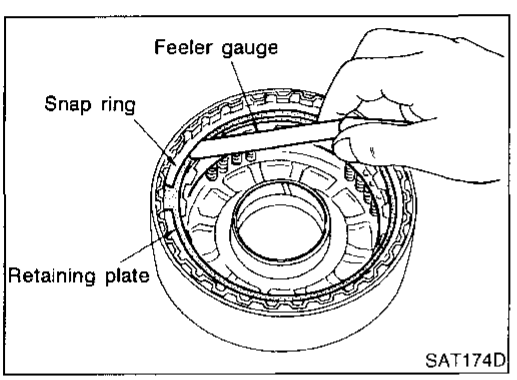
4. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly above return springs.**



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.



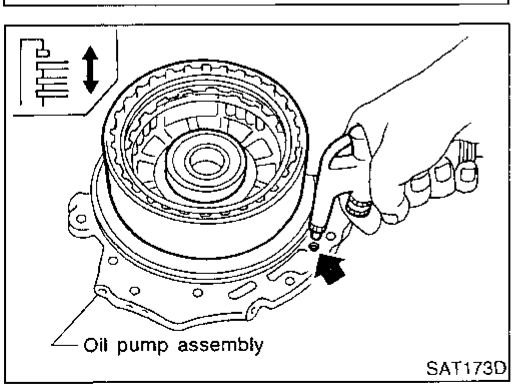
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

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.

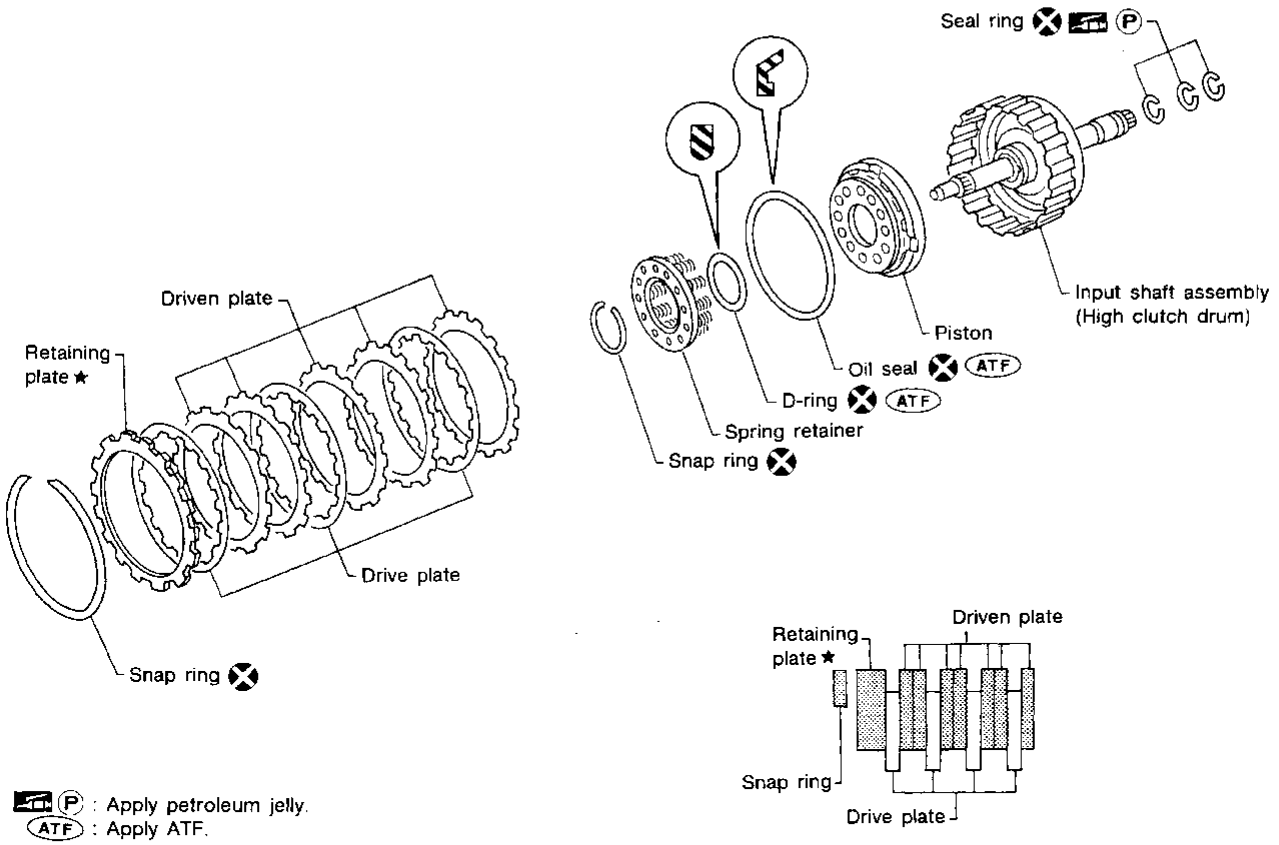
High Clutch

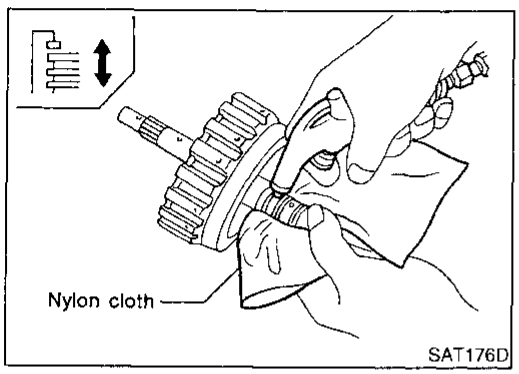
COMPONENTS

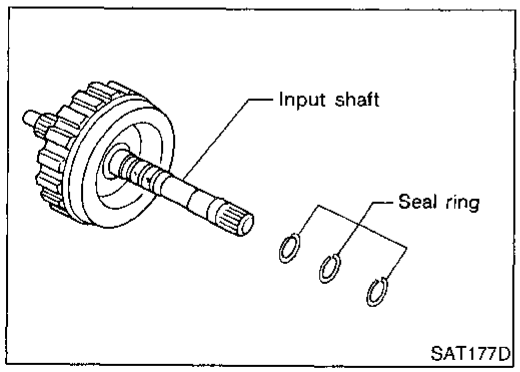
NCAT0145

SEC. 315

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







DISASSEMBLY

NCAT0146

1. Check operation of high clutch.

a. Apply compressed air to oil hole of input shaft.

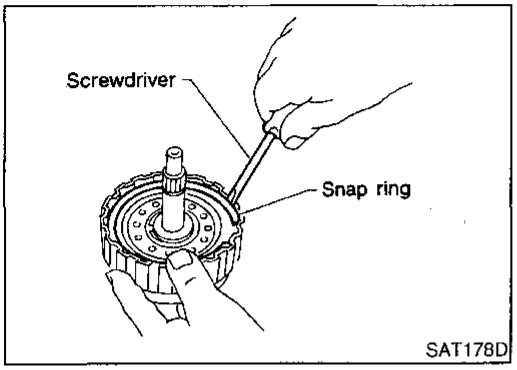
- **Stop up a hole on opposite side of input shaft.**

b. Check to see that retaining plate moves to snap ring.

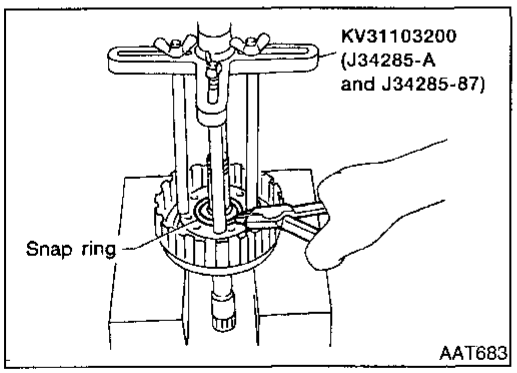
c. If retaining plate does not contact snap ring:

- 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.

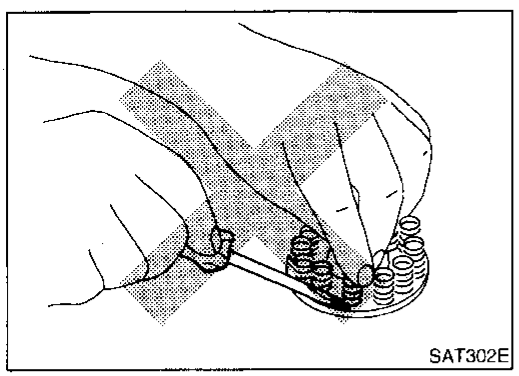


3. Remove snap ring.
4. Remove drive plates, driven plates and retaining plate.

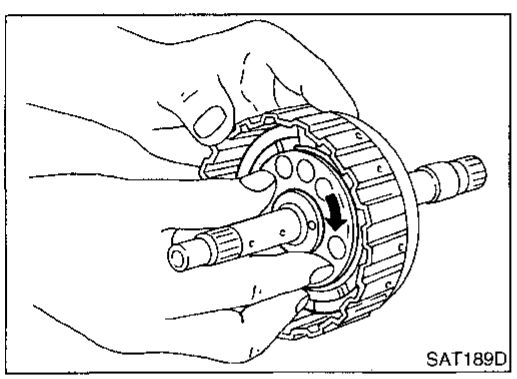


5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.
- **Set Tool directly above springs.**
- **Do not expand snap ring excessively.**

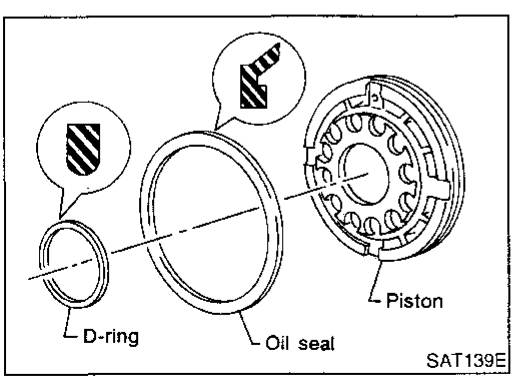
6. Remove spring retainer and return springs.



- **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.

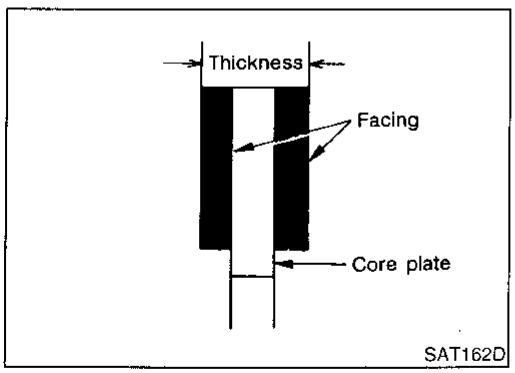
INSPECTION

NCAT0147

Reverse Clutch Snap Ring, Spring Retainer and Return Springs

NCAT0147S01

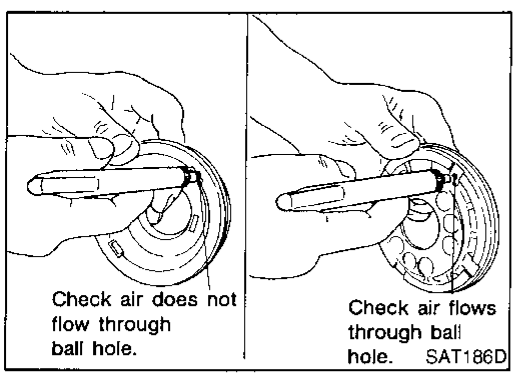
- Check for deformation, fatigue or damage.
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**



High Clutch Drive Plates

NCAT0147S02

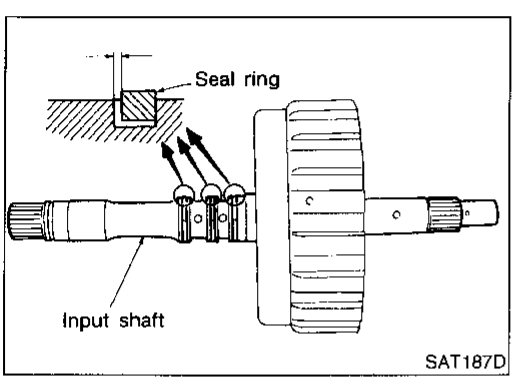
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value: 1.6 mm (0.063 in)
  Wear limit: 1.4 mm (0.055 in)
- If not within wear limit, replace.



High Clutch Piston

NCAT0147S03

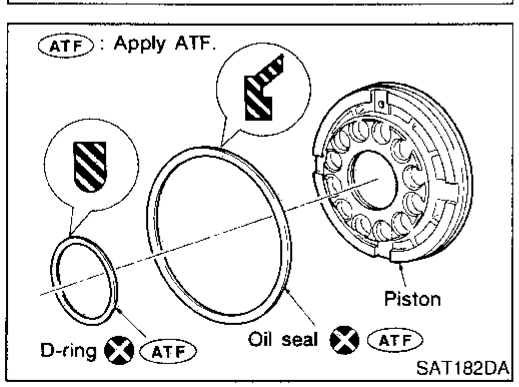
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure air leaks past ball.



Seal Ring Clearance

NCAT0147S04

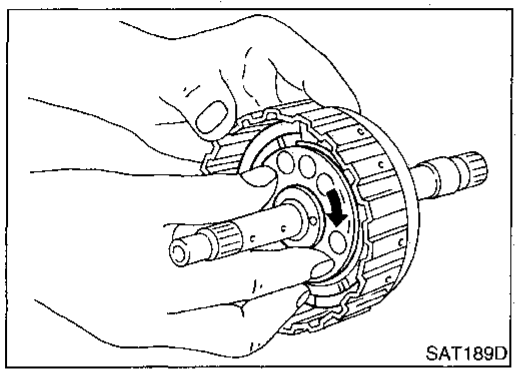
- Install new seal rings onto input shaft.
- Measure clearance between seal ring and ring groove.
  Standard clearance:
  0.08 - 0.23 mm (0.0031 - 0.0091 in)
  Allowable limit:
  0.23 mm (0.0091 in)
- If not within wear limit, replace input shaft assembly.



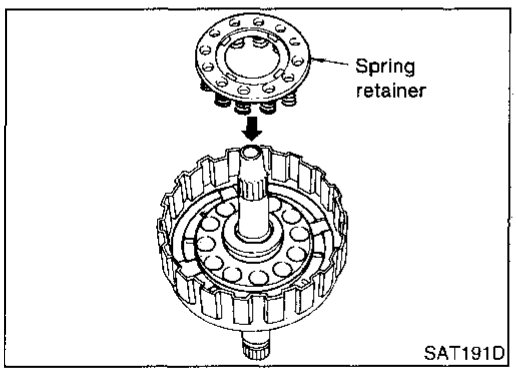
ASSEMBLY

NCAT0148

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

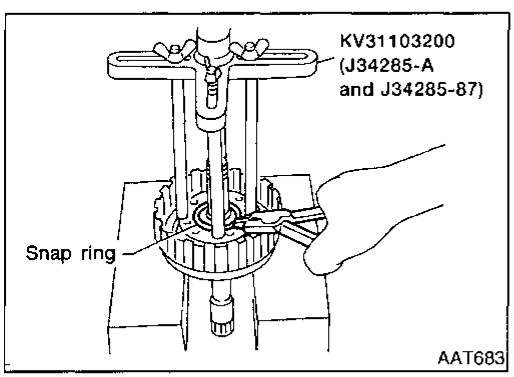

SAT189D

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



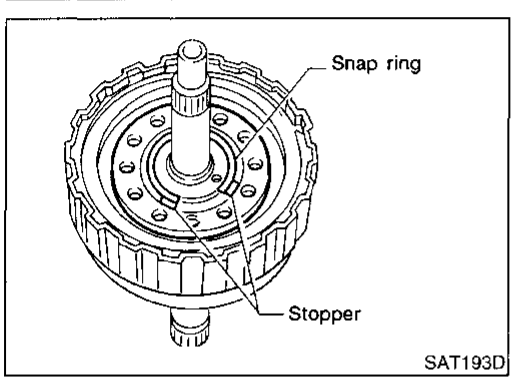
SAT191D

3. Install return springs and spring retainer on piston.



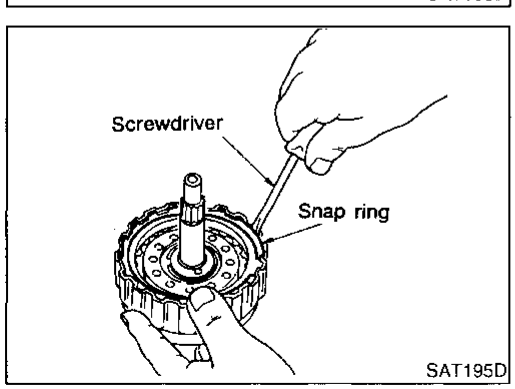
AAT683

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



SAT193D

- **Do not align snap ring gap with spring retainer stopper.**

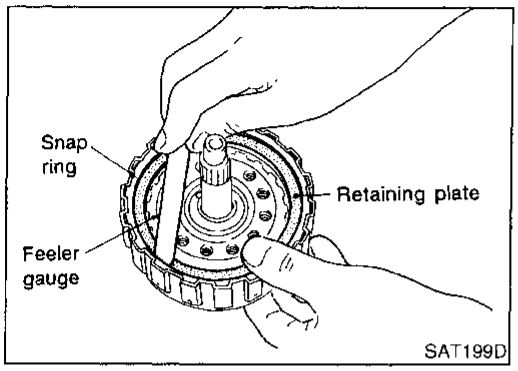


SAT195D

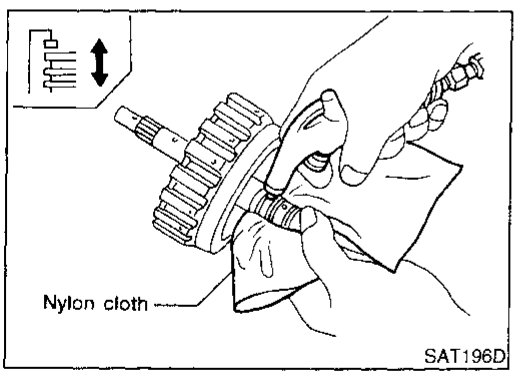
5. Install drive plates, driven plates and retaining plate.

Take care with the order and direction of plates.

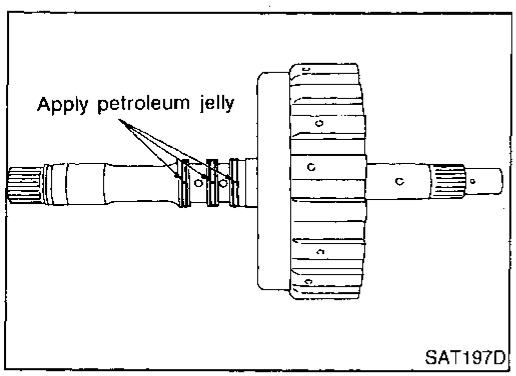
6. Install snap ring.



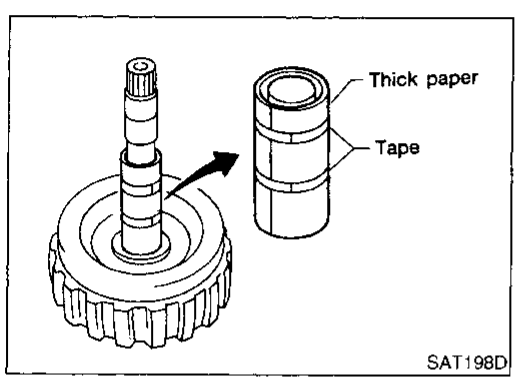
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard: 1.4 - 1.8 mm (0.055 - 0.071 in)
   Allowable limit: 2.6 mm (0.102 in)
   Retaining plate:
   Refer to SDS, AT-344.



8. Check operation of high clutch.
   Refer to "DISASSEMBLY", "High Clutch", AT-285.



9. Install seal rings to input shaft.
   - **Apply petroleum jelly to seal rings.**

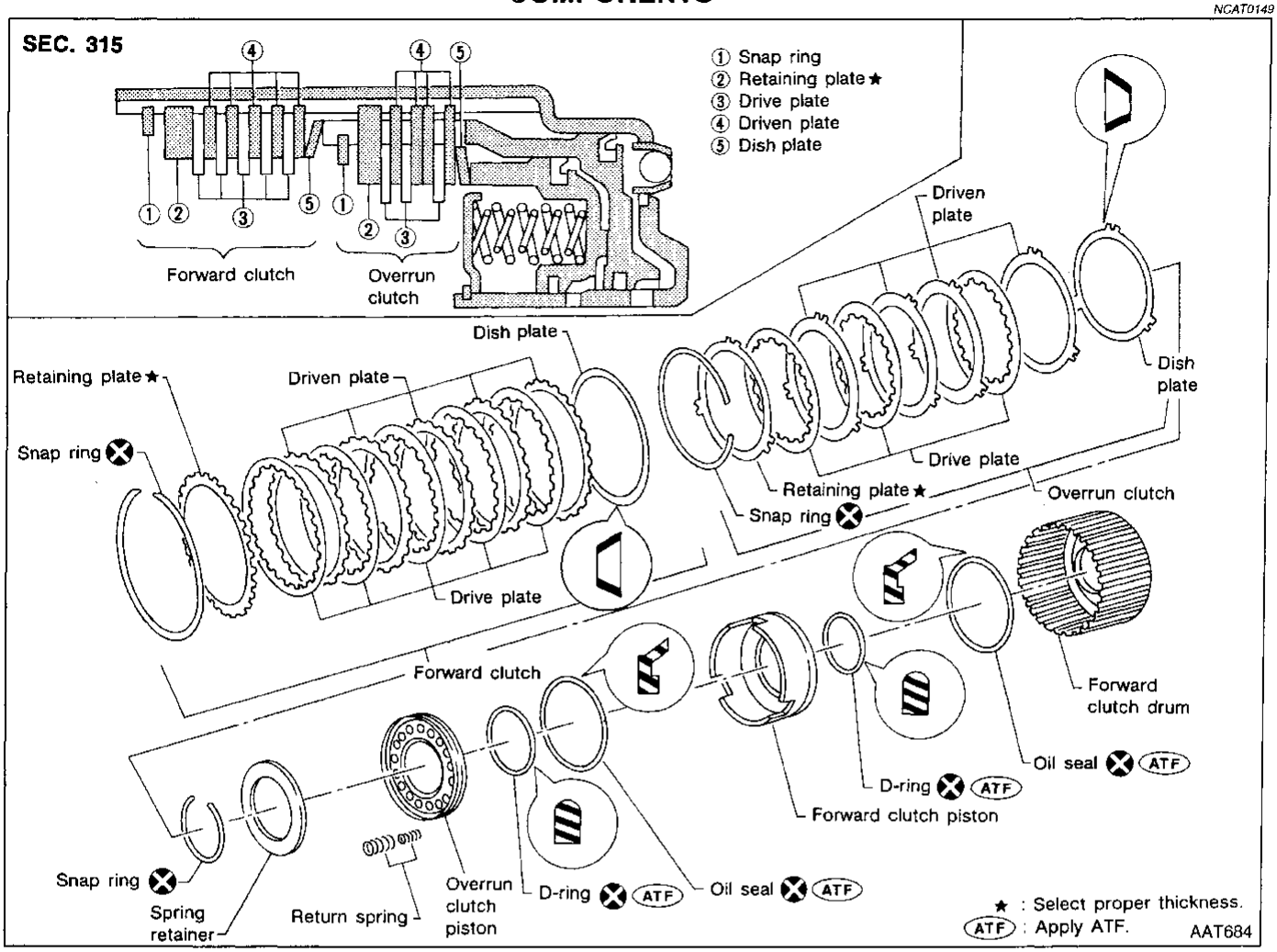


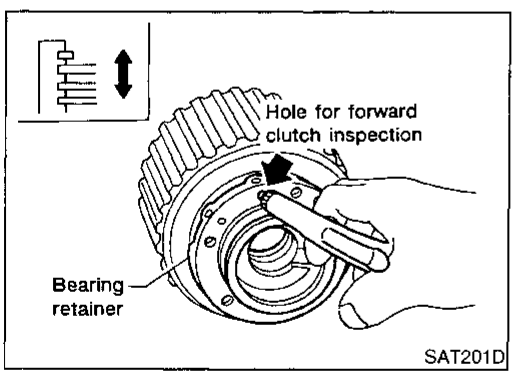
- **Roll paper around seal rings to prevent seal rings from spreading.**

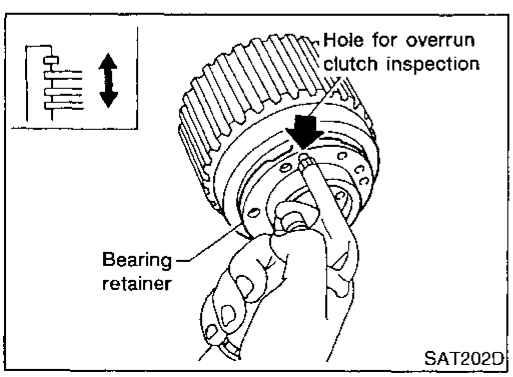
Forward Clutch and Overrun Clutch

COMPONENTS

NCAT0149







DISASSEMBLY

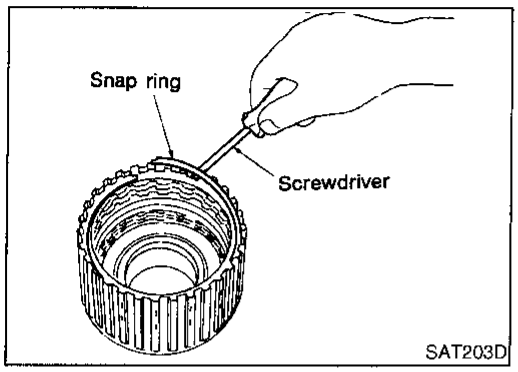
NCAT0150

1. Check operation of forward clutch and overrun clutch.

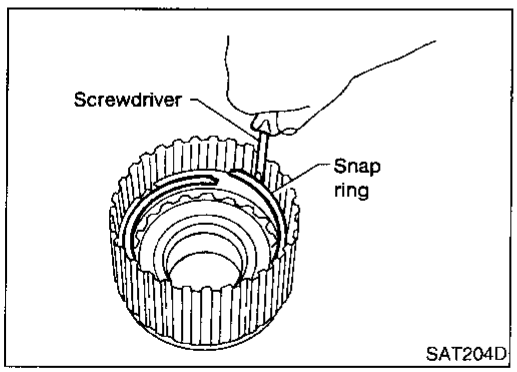
a. Install bearing retainer on forward clutch drum.
b. Apply compressed air to oil hole of forward clutch drum.
c. Check to see that retaining plate moves to snap ring.

d. If retaining plate does not contact snap ring:

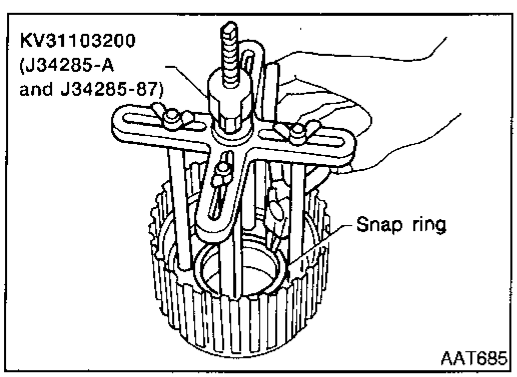
- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.



2. Remove snap ring for forward clutch.
3. Remove drive plates, driven plates, retaining plate and dish plate for forward clutch.

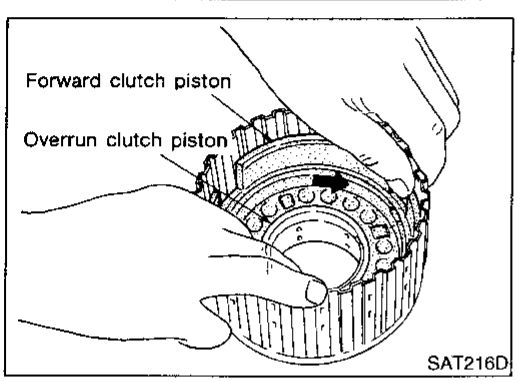


4. Remove snap ring for overrun clutch.
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.

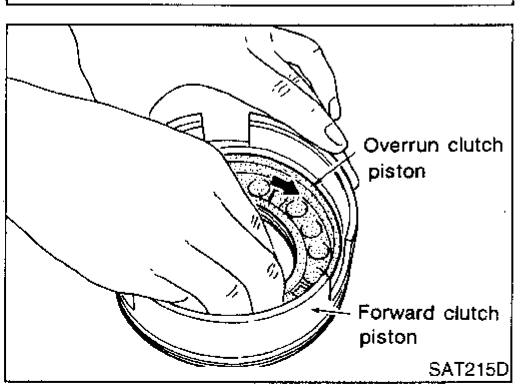


6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.
- **Set Tool directly above return springs.**
- **Do not expand snap ring excessively.**

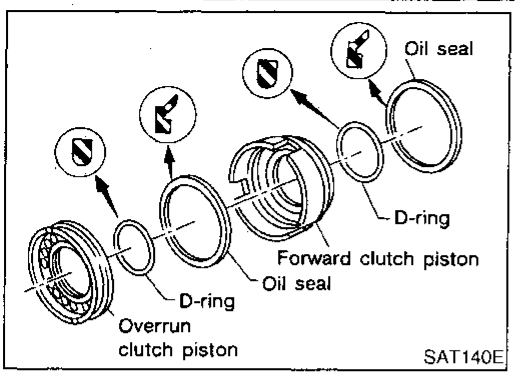
7. Remove spring retainer and return springs.



8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.



9. Remove overrun clutch piston from forward clutch piston by turning it.



10. Remove D-rings and oil seals from forward clutch piston and overrun clutch piston.

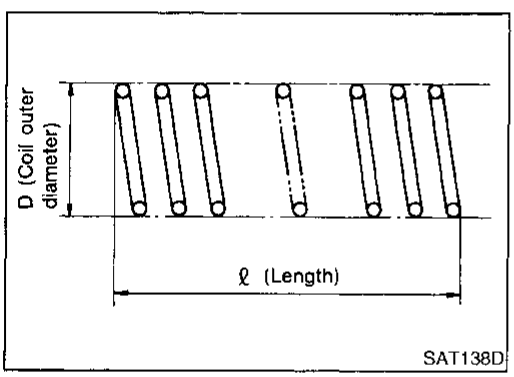
INSPECTION

NCAT0151

Snap Rings and Spring Retainer

NCAT0151S01

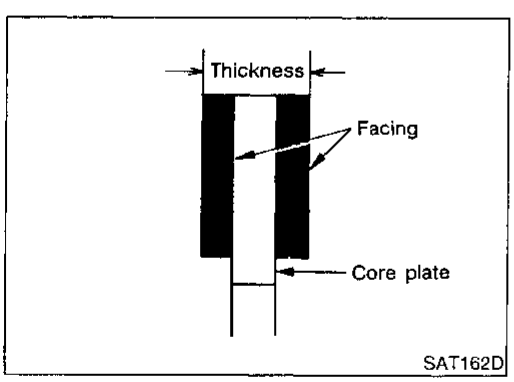
- Check for deformation, fatigue or damage.



Forward Clutch and Overrun Clutch Return Springs

NCAT0151S02

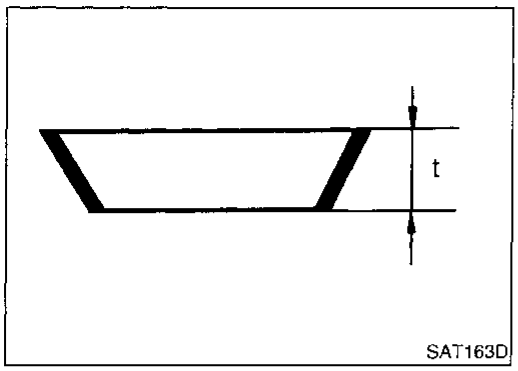
- Check for deformation or damage.
- Measure free length and outer diameter.
  Inspection standard:
  Refer to SDS, AT-346.
- Replace if deformed or fatigued.



Forward Clutch and Overrun Clutch Drive Plates

NCAT0151S03

- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Forward clutch
  Standard value: 1.8 mm (0.071 in)
  Wear limit: 1.6 mm (0.063 in)
  Overrun clutch
  Standard value: 1.6 mm (0.063 in)
  Wear limit: 1.4 mm (0.055 in)
- If not within wear limit, replace.



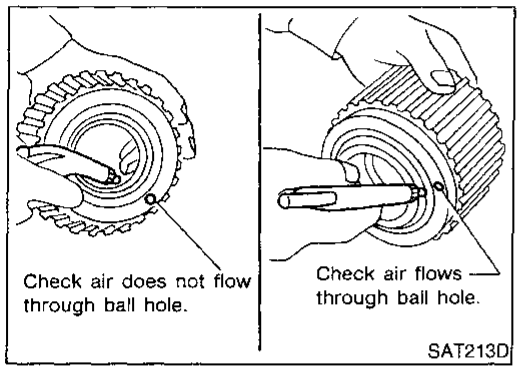
Forward Clutch and Overrun Clutch Dish Plates

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)

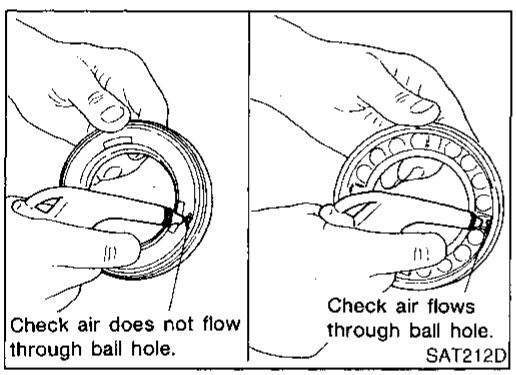
- If deformed or fatigued, replace.



Forward Clutch Drum

NCAT0151S05

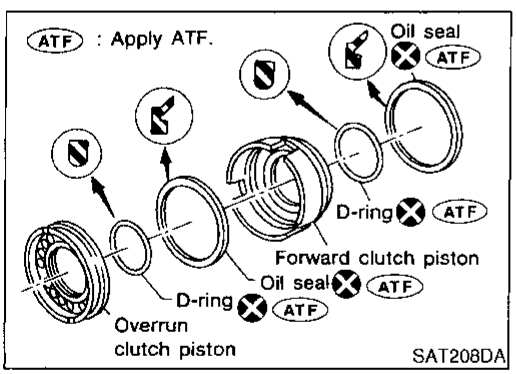
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole from outside of forward clutch drum. Make sure air leaks past ball.
- Apply compressed air to oil hole from inside of forward clutch drum. Make sure there is no air leakage.



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.

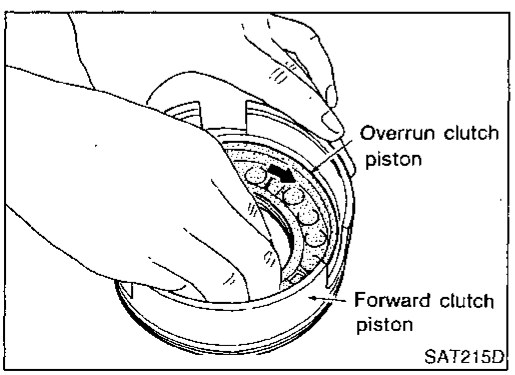


ASSEMBLY

NCAT0152

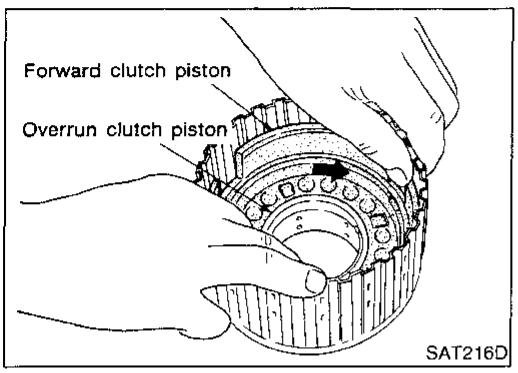
1. Install D-rings and oil seals on forward clutch piston and overrun clutch piston.

- **Take care with direction of oil seal.**
- **Apply ATF to both parts.**

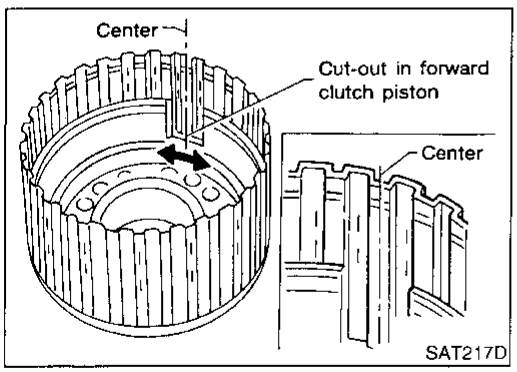


2. Install overrun clutch piston assembly on forward clutch piston while turning it slowly.

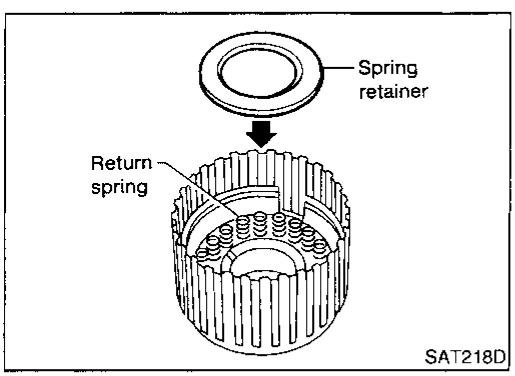
- **Apply ATF to inner surface of forward clutch piston.**



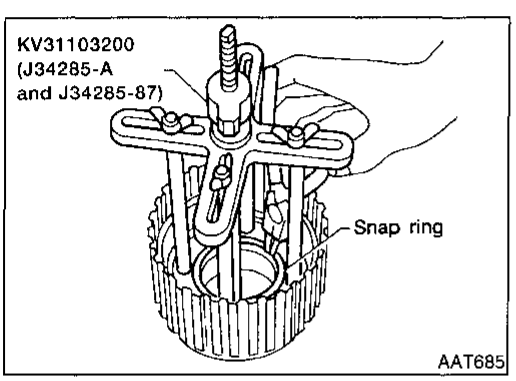
3. Install forward clutch piston assembly on forward clutch drum while turning it slowly.
- **Apply ATF to inner surface of drum.**



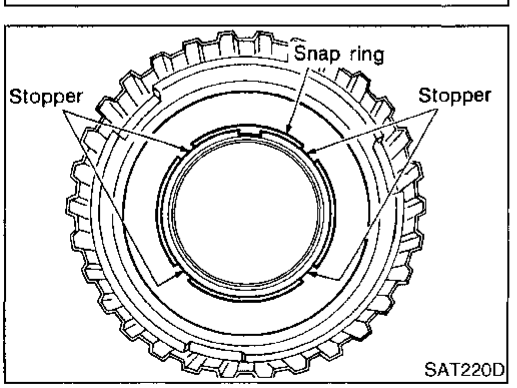
4. Align notch in forward clutch piston with groove in forward clutch drum.



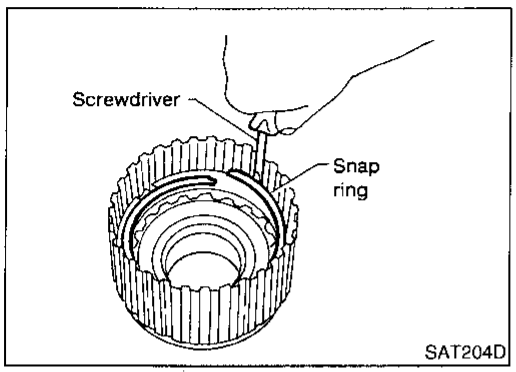
5. Install return spring on piston.
6. Install spring retainer on return springs.



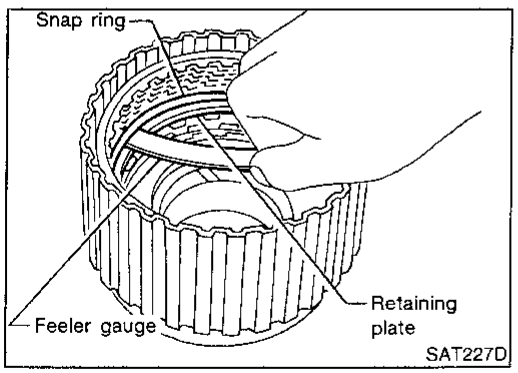
7. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly above return springs.**



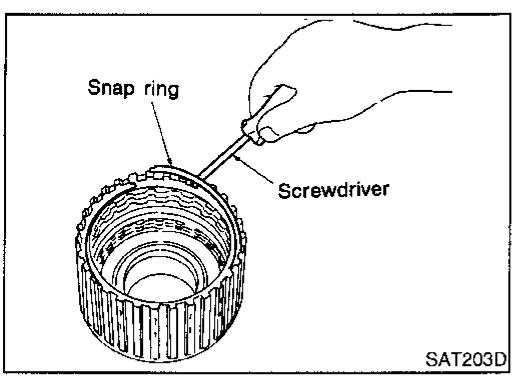
- **Do not align snap ring gap with spring retainer stopper.**



8. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
9. Install snap ring for overrun clutch.



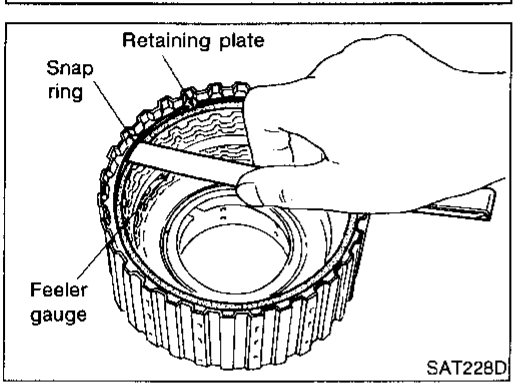
10. Measure clearance between overrun clutch retaining plate and snap ring.
    If not within allowable limit, select proper retaining plate.
    Specified clearance:
    Standard: 1.0 - 1.4 mm (0.039 - 0.055 in)
    Allowable limit: 2.0 mm (0.079 in)
    Overrun clutch retaining plate:
    Refer to SDS, AT-345.



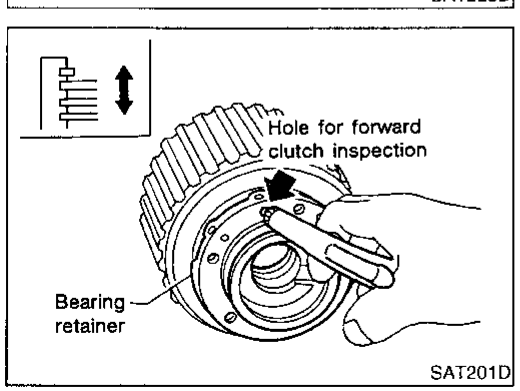
11. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.

Take care with the order and direction of plates.

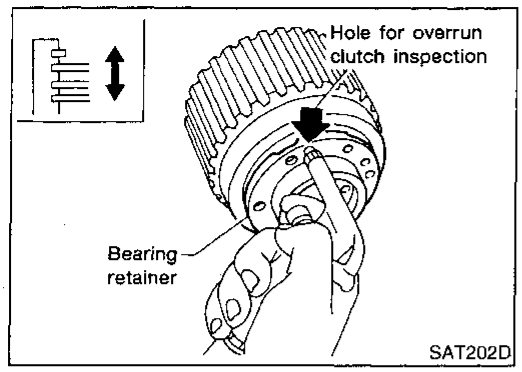
12. Install snap ring for forward clutch.



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.



14. Check operation of forward clutch.
    Refer to AT-290.

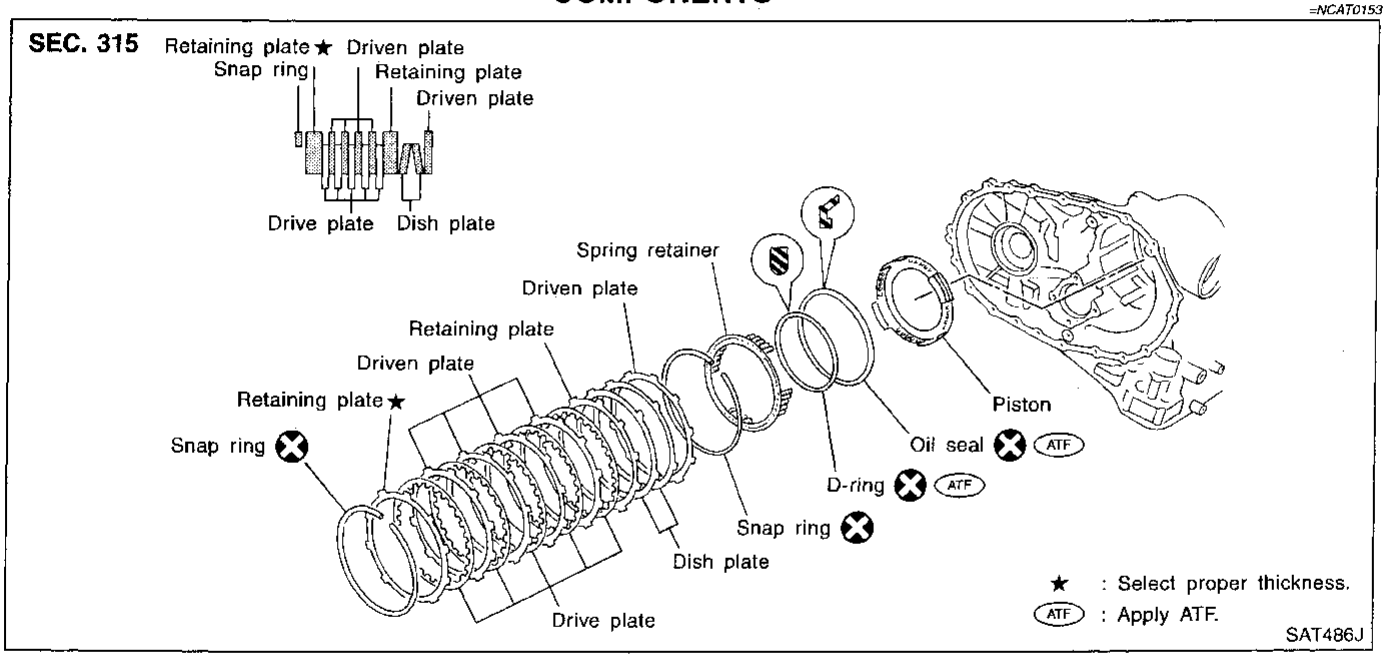


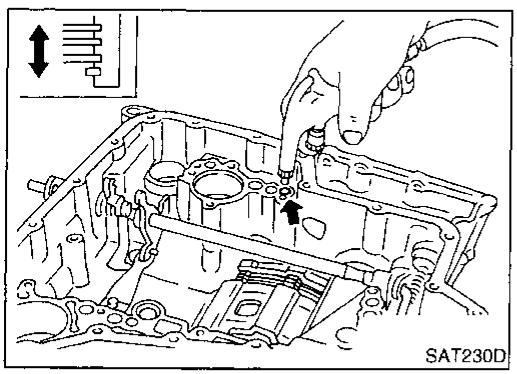
15. Check operation of overrun clutch.
    Refer to "DISASSEMBLY" in "Forward Clutch and Overrun Clutch", AT-290.

Low & Reverse Brake

COMPONENTS

=NCAT0153





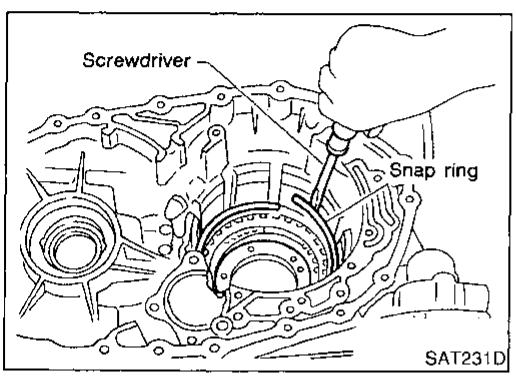
DISASSEMBLY

NCAT0154

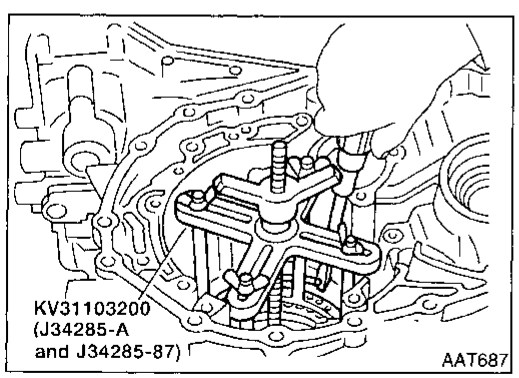
1. Check operation of low & reverse brake.

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.



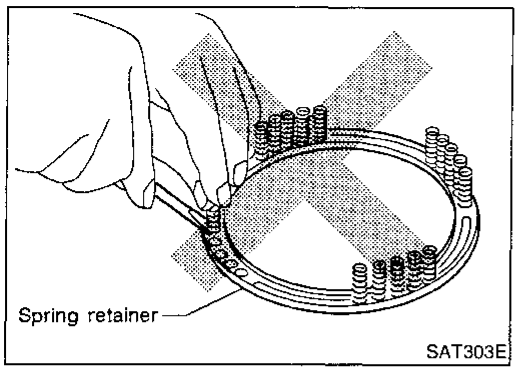
2. Stand transmission case.
3. Remove snap ring.
4. Remove drive plates, driven plates, retaining plate from transmission case.



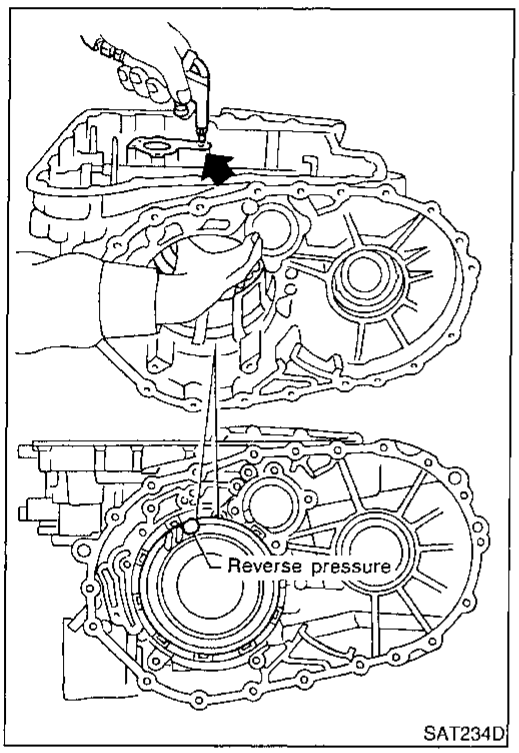
5. Set Tool on spring retainer and remove snap ring while compressing return springs.

- **Set Tool directly above return springs.**
- **Do not expand snap ring excessively.**

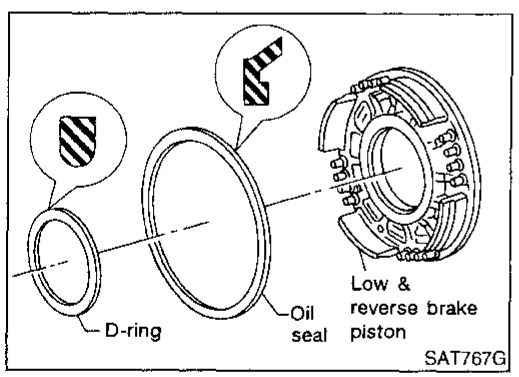
6. Remove spring retainer and return springs.



- **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.

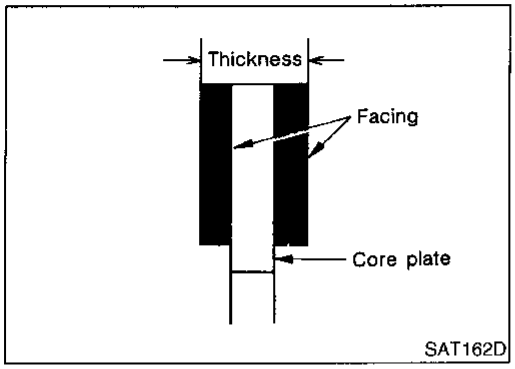
INSPECTION

NCAT0155

Low & Reverse Clutch Snap Ring, Spring Retainer and Return Springs

NCAT0155S01

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



Low & Reverse Brake Drive Plates

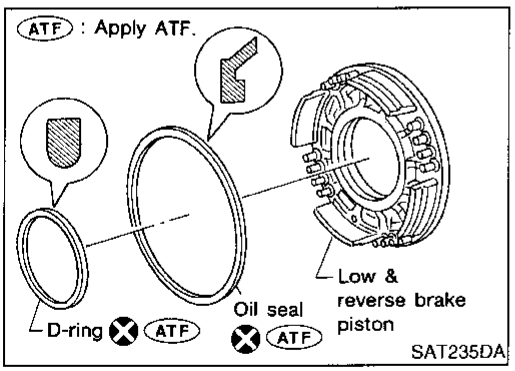
NCAT0155S02

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

  Thickness of drive plate:

  Standard value: 2.0 mm (0.079 in)

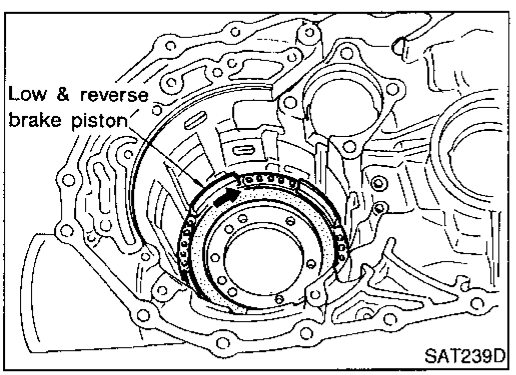
  Wear limit: 1.8 mm (0.071 in)
- If not within wear limit, replace.



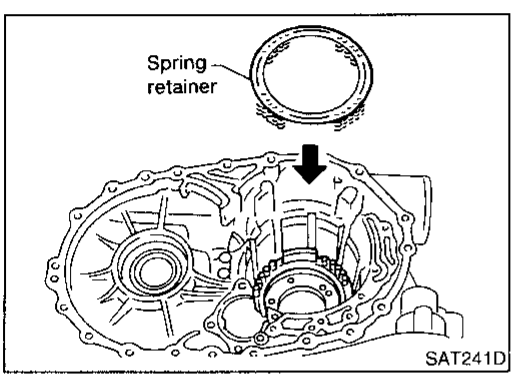
ASSEMBLY

NCAT0156

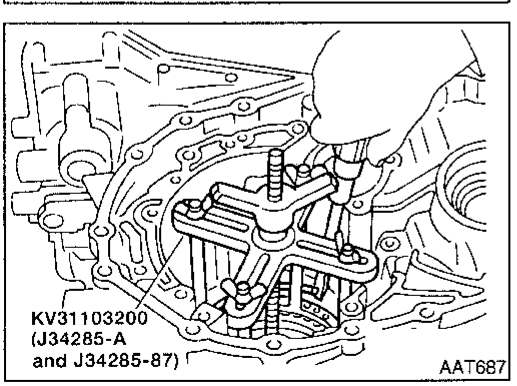
1. Install D-ring and oil seal on piston.
- **Take care with the direction of the oil seal.**
- **Apply ATF to both parts.**



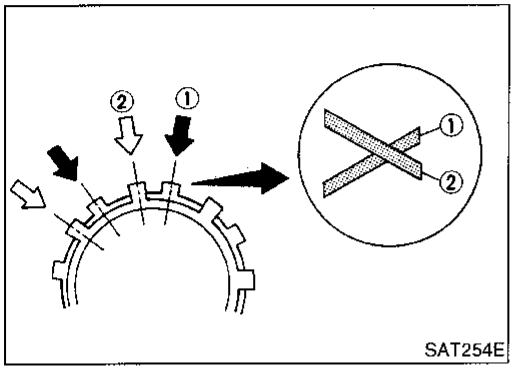
2. Stand transmission case.
3. Install piston assembly on transmission case while turning it slowly.
- **Apply ATF to inner surface of transmission case.**



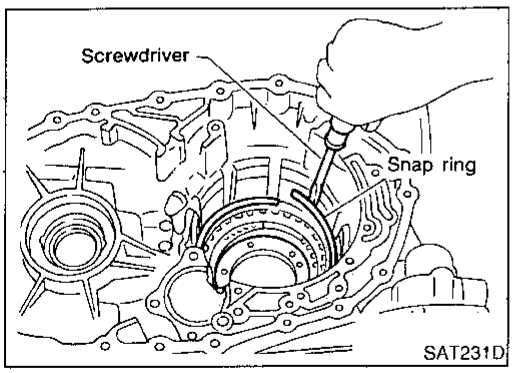
4. Install return springs and spring retainer on piston.



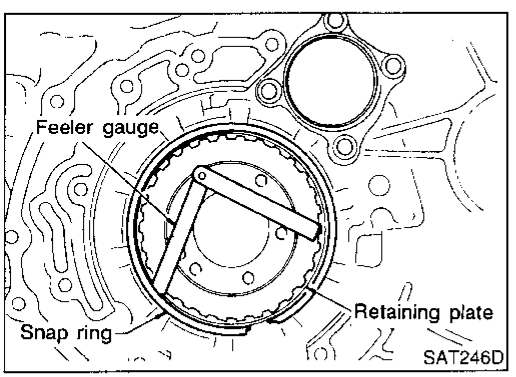
5. Install snap ring while compressing return springs.
- **Set Tool directly above return springs.**



6. Install drive plates, driven plates, retaining plates and dished plates.
- **Do not align the projections on the two dished plates.**
- **Make sure to put the plates in the correct order and direction.**

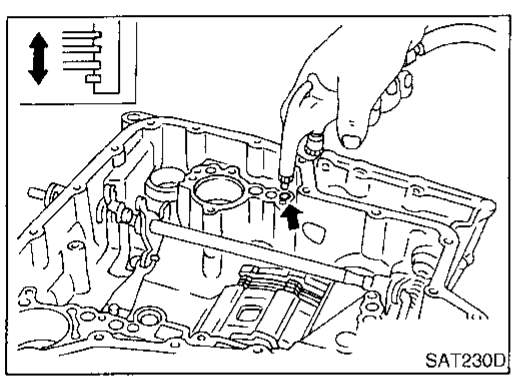


7. Install snap ring.



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.



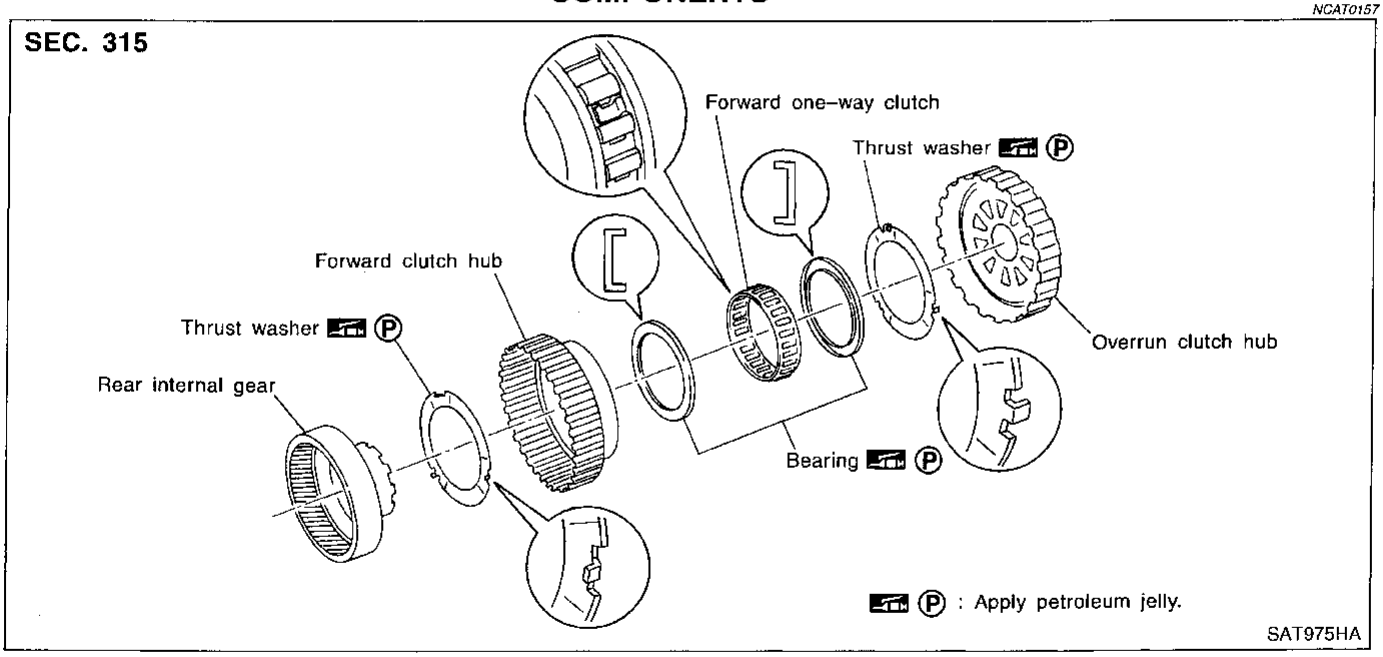
9. Check operation of low & reverse brake.
Refer to "DISASSEMBLY", "Low & Reverse Brake", AT-297.

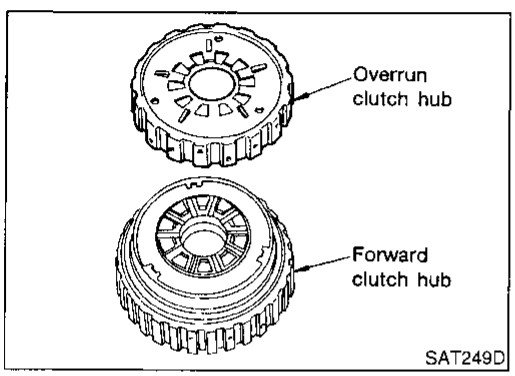
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

COMPONENTS

NCAT0157

SEC. 315

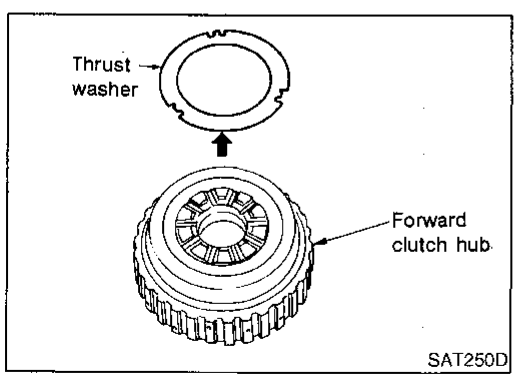




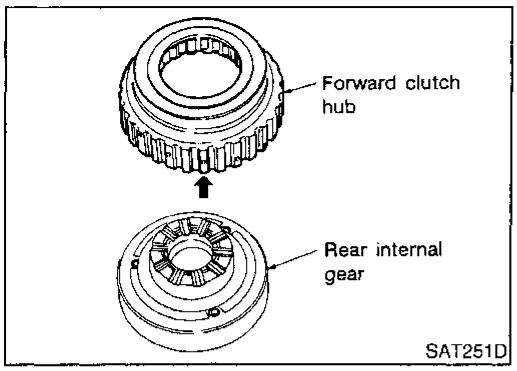
DISASSEMBLY

NCAT0158

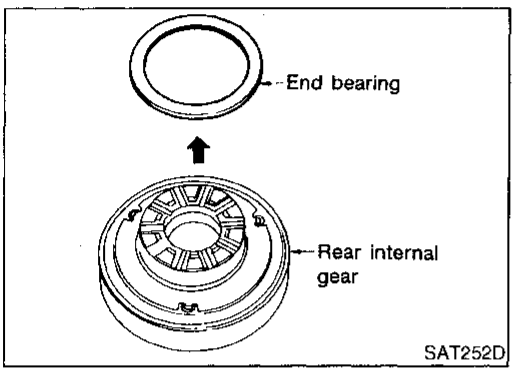
1. Remove snap ring from overrun clutch hub.
2. Remove overrun clutch hub from forward clutch hub.



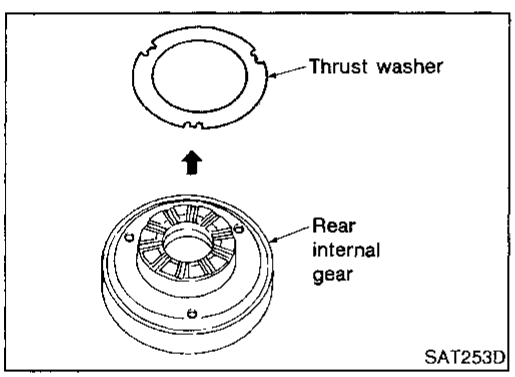
3. Remove thrust washer from forward clutch hub.



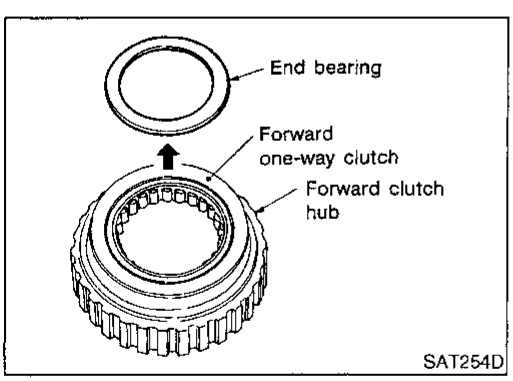
4. Remove forward clutch hub from rear internal gear.



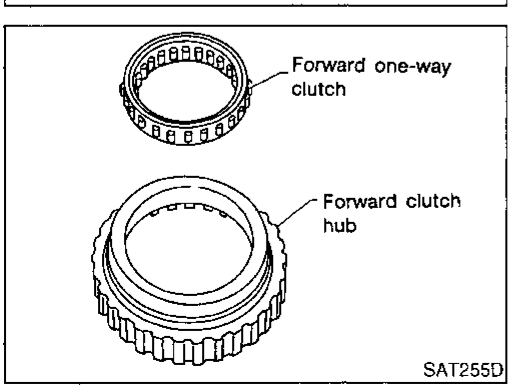
5. Remove end bearing from rear internal gear.



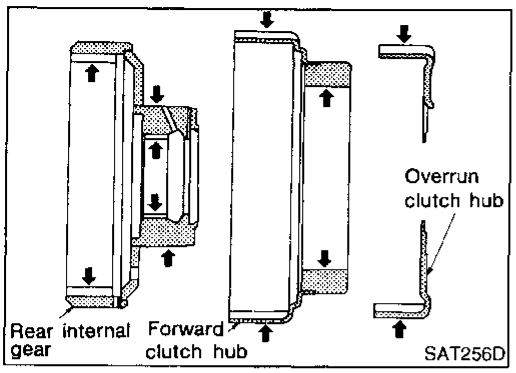
6. Remove thrust washer from rear internal gear.



7. Remove end bearing from forward one-way clutch.



8. Remove one-way clutch from forward clutch hub.



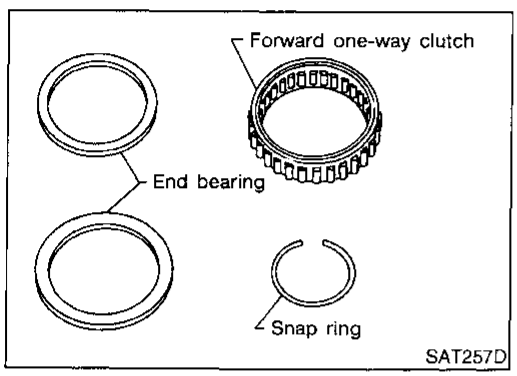
INSPECTION

NCAT0159

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

NCAT0159S01

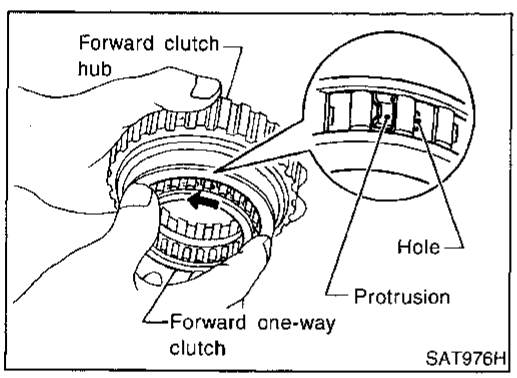
- Check rubbing surfaces for wear or damage.



Snap Ring, End Bearings and Forward One-way Clutch

NCAT0159S02

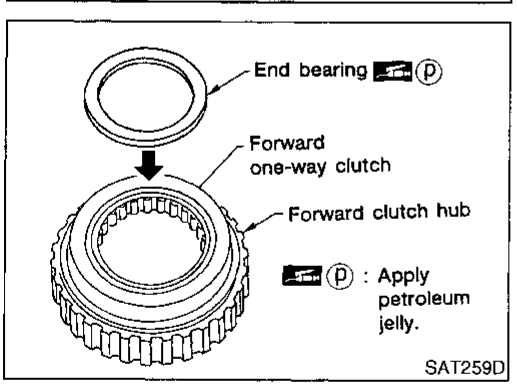
- Check snap ring and end bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.



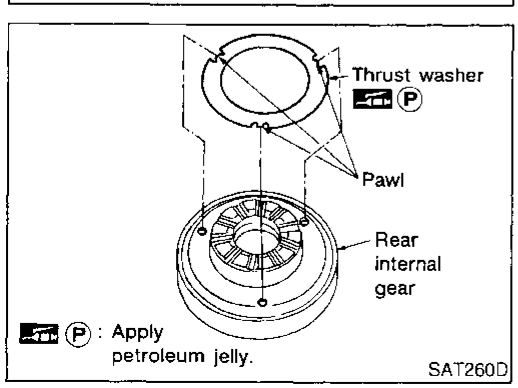
ASSEMBLY

NCAT0160

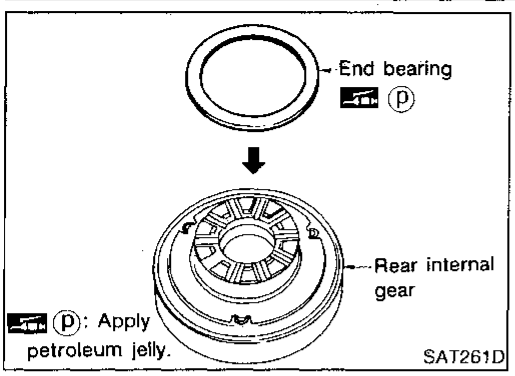
1. Install forward one-way clutch on forward clutch.
- **Take care with the direction of forward one-way clutch.**



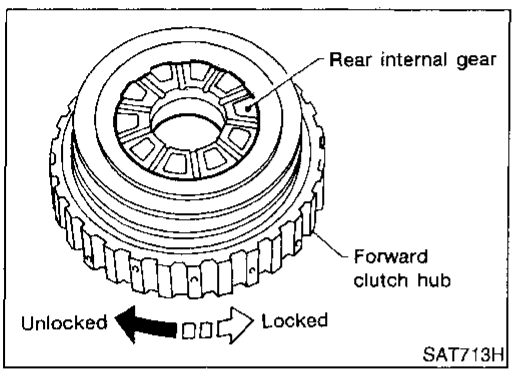
2. Install end bearing on forward one-way clutch.
- **Apply petroleum jelly to end bearing.**



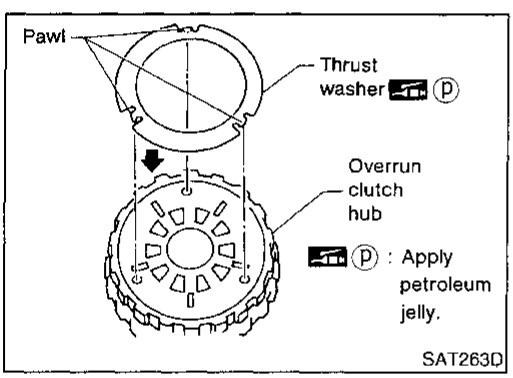
3. Install thrust washer on rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Align pawls of thrust washer with holes of rear internal gear.**



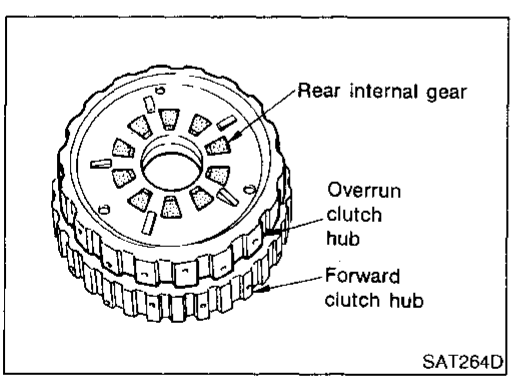
4. Install end bearing on rear internal gear.
- **Apply petroleum jelly to end bearing.**



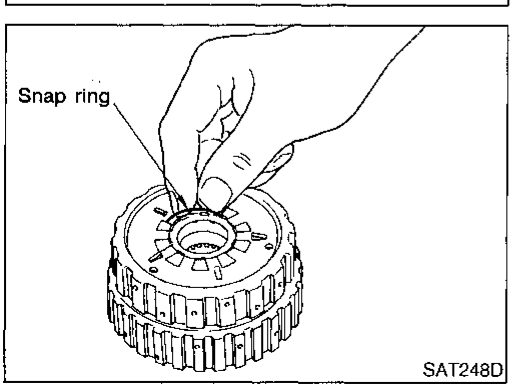
5. Install forward clutch hub on rear internal gear.
- **Check operation of forward one-way clutch.**
  Hold rear internal gear and turn forward clutch hub. Check forward clutch hub for correct locking and unlocking directions.
- **If not as shown in illustration, check installation direction of forward one-way clutch.**



6. Install thrust washer and overrun clutch hub.
- **Apply petroleum jelly to thrust washer.**
- **Align pawls of thrust washer with holes of overrun clutch hub.**



7. Install overrun clutch hub on rear internal gear.
- **Align projections of rear internal gear with holes of overrun clutch hub.**

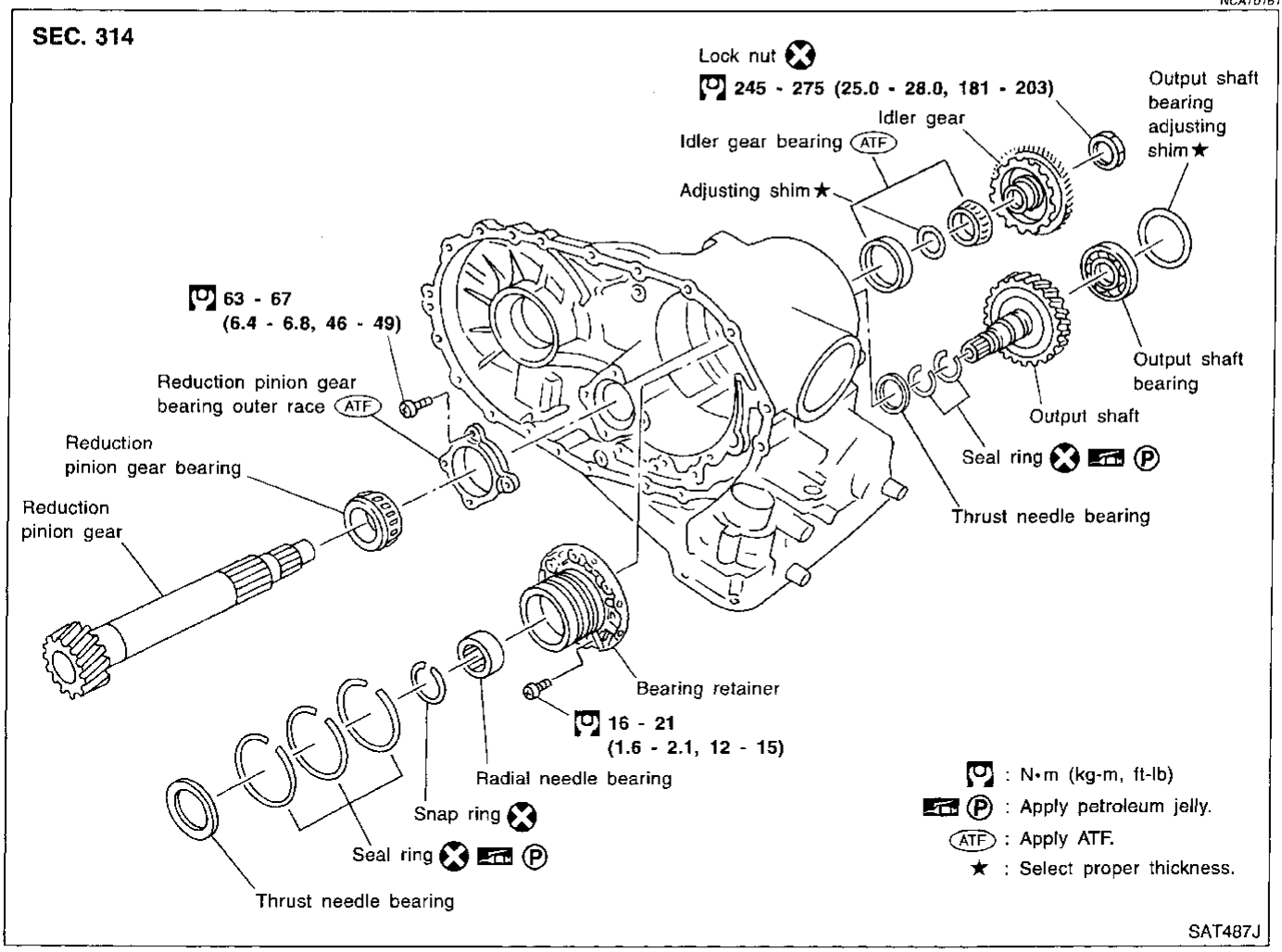


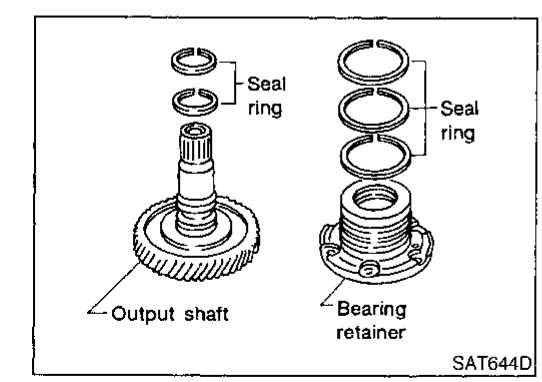
8. Install snap ring to groove of rear internal gear.

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer

COMPONENTS

NCAT0161

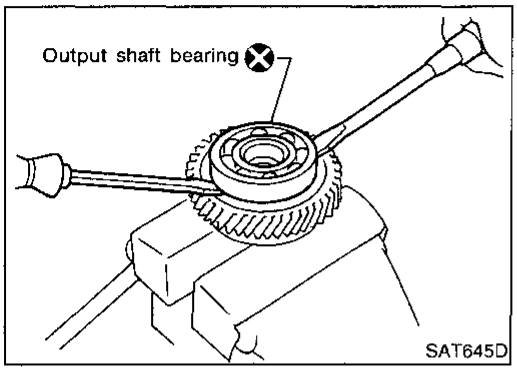




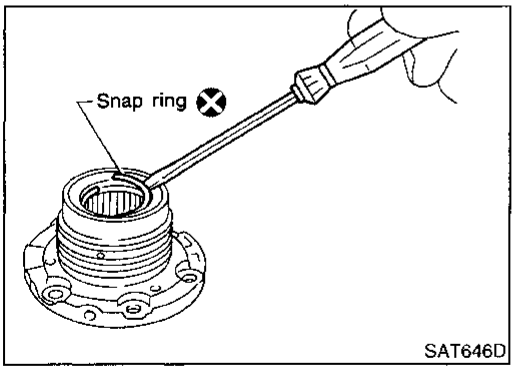
DISASSEMBLY

NCAT0162

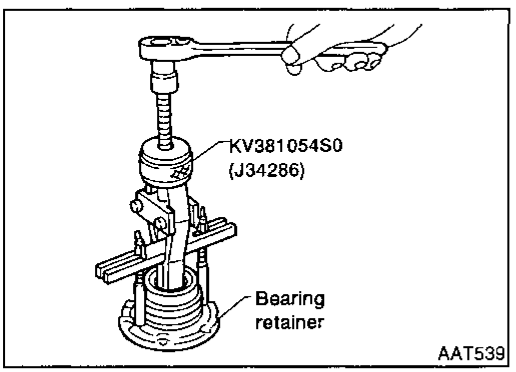
1. Remove seal rings from output shaft and bearing retainer.



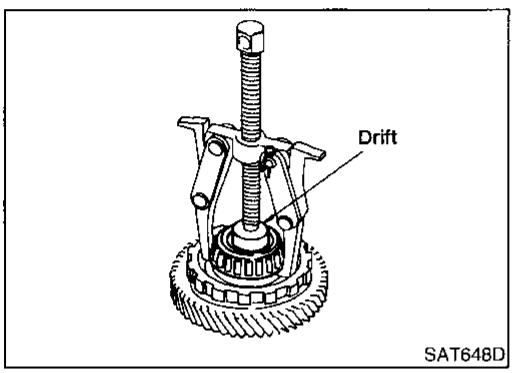
2. Remove output shaft bearing with screwdrivers.
- **Always replace bearing with a new one when removed.**
- **Do not damage output shaft.**



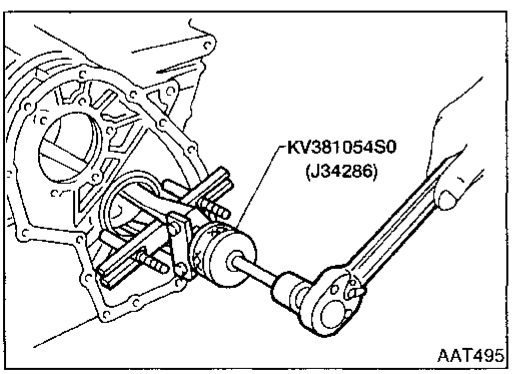
3. Remove snap ring from bearing retainer.



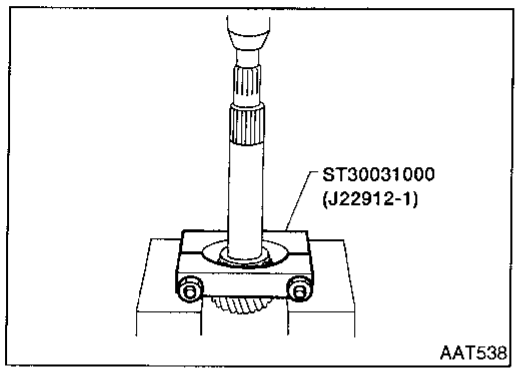
4. Remove needle bearing from bearing retainer.



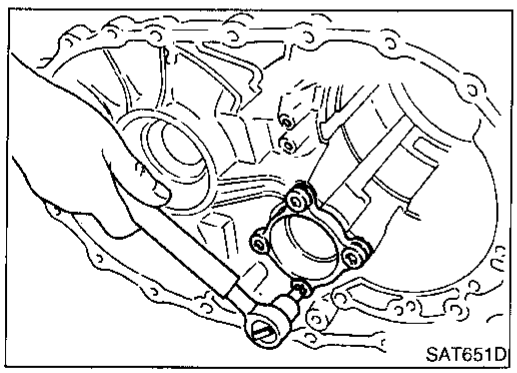
5. Remove idler gear bearing inner race from idler gear.



6. Remove idler gear bearing outer race from transmission case.



7. Press out reduction pinion gear bearing from reduction pinion gear.



8. Remove reduction pinion gear bearing outer race from transmission case.

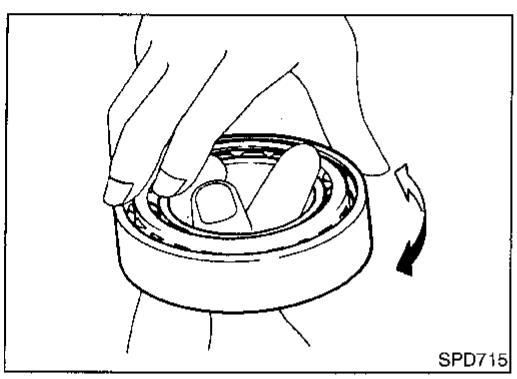
INSPECTION

NCAT0163

Output Shaft, Idler Gear and Reduction Pinion Gear

NCAT0163S01

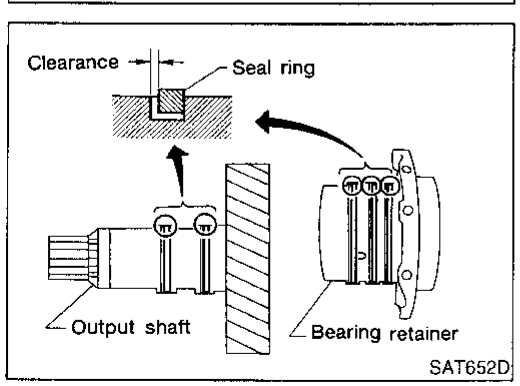
- Check shafts for cracks, wear or bending.
- Check gears for wear, chips and cracks.



Bearing

NCAT0163S02

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**



Seal Ring Clearance

NCAT0163S03

- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.

  Standard clearance:

  0.10 - 0.25 mm (0.0039 - 0.0098 in)

  Allowable limit:

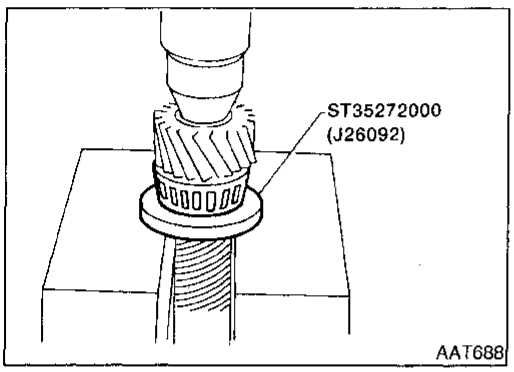
  0.25 mm (0.0098 in)
- If not within allowable limit, replace output shaft.
- Install new seal rings to bearing retainer.

- 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.

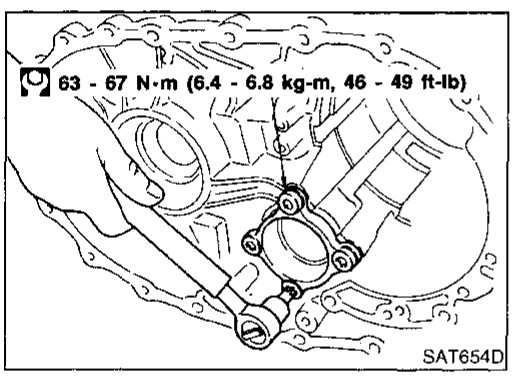
ASSEMBLY

NCAT0164

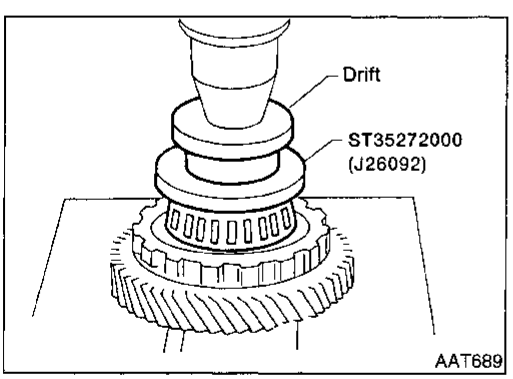
1. Press reduction pinion gear bearing on reduction pinion gear.



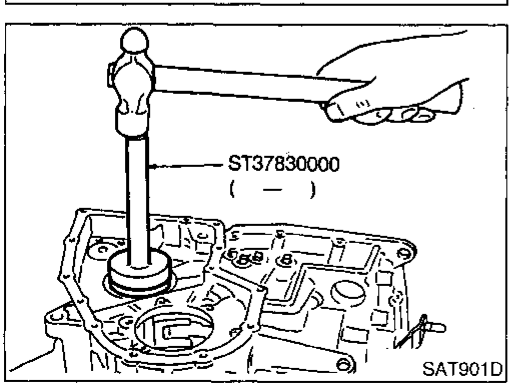
2. Install reduction pinion gear bearing outer race on transmission case.

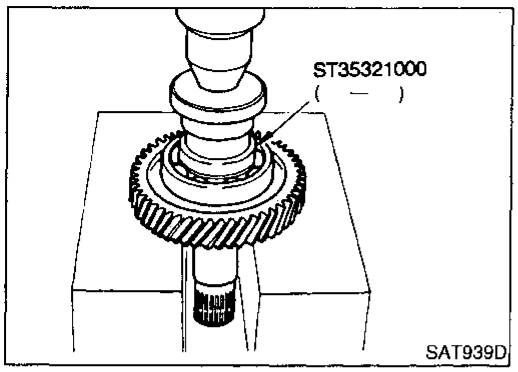


3. Press idler gear bearing inner race on idler gear.

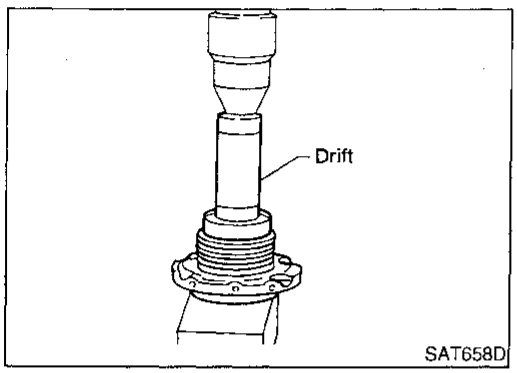


4. Install idler gear bearing outer race on transmission case.

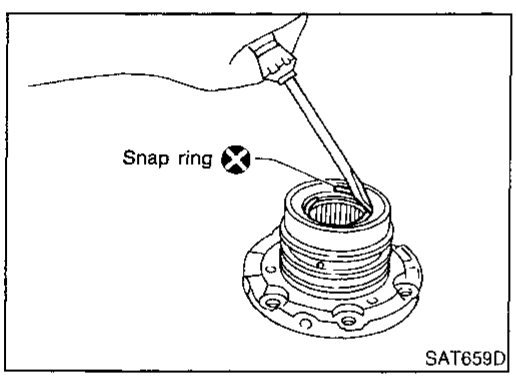




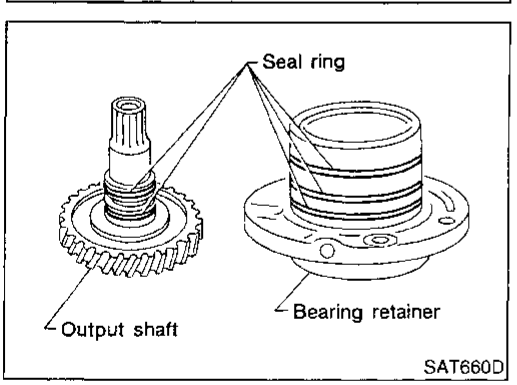
5. Press output shaft bearing on output shaft.



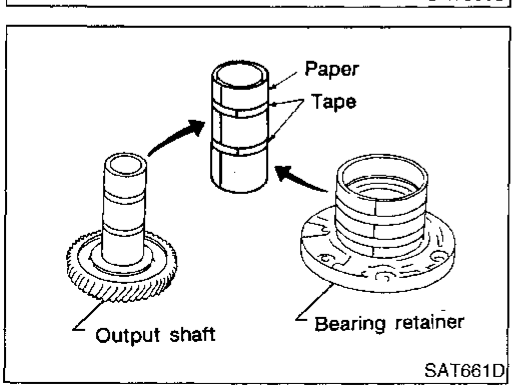
6. Press needle bearing on bearing retainer.



7. Install snap ring to bearing retainer.



8. After packing ring grooves with petroleum jelly, carefully install new seal rings on output shaft and bearing retainer.

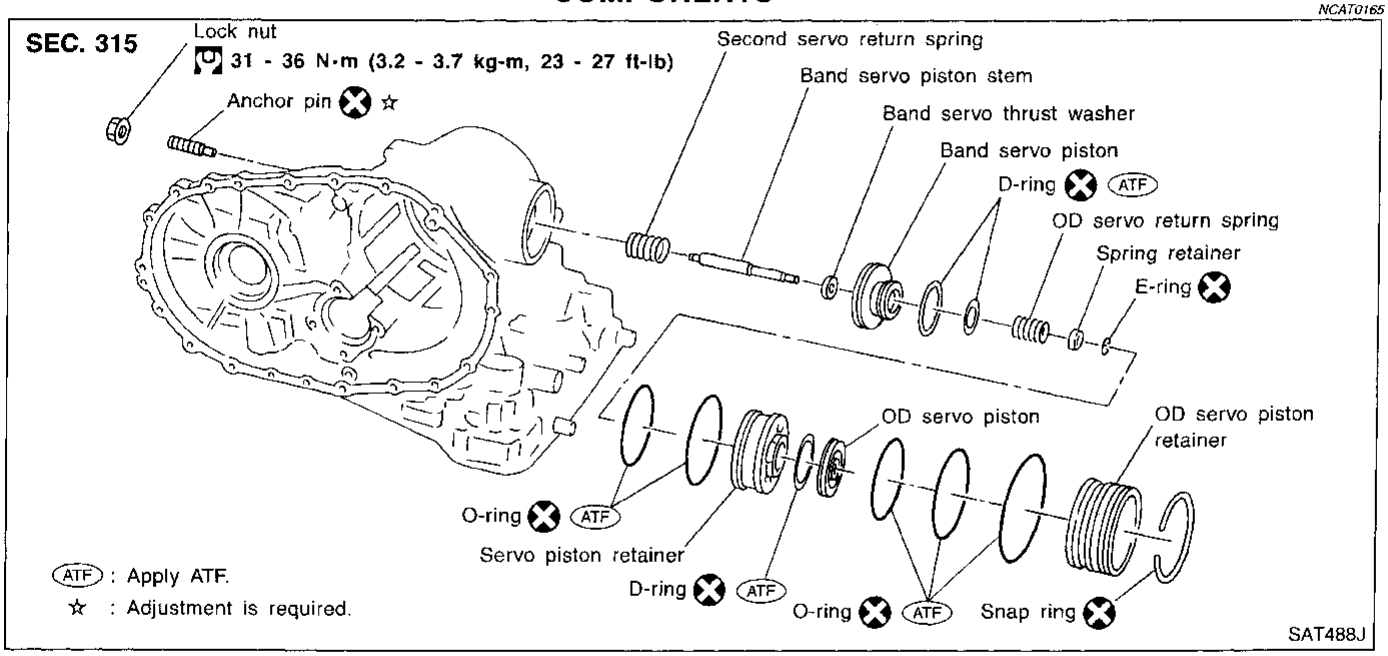


- **Roll paper around seal rings to prevent seal rings from spreading.**

Band Servo Piston Assembly

COMPONENTS

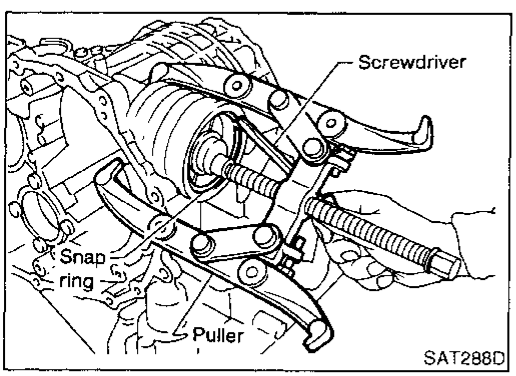
NCAT0165



DISASSEMBLY

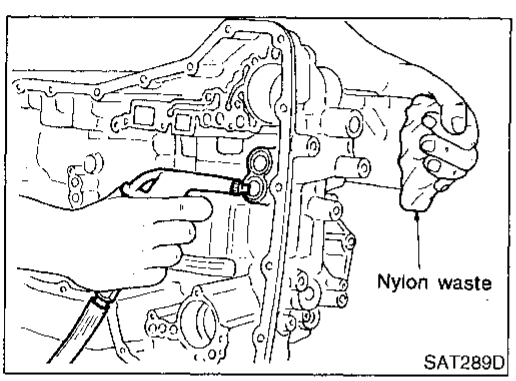
NCAT0166

1. Remove band servo piston snap ring.



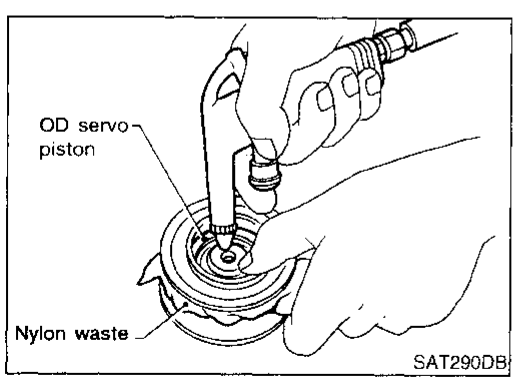
2. Apply compressed air to oil hole in transmission case to remove OD servo piston retainer and band servo piston assembly.

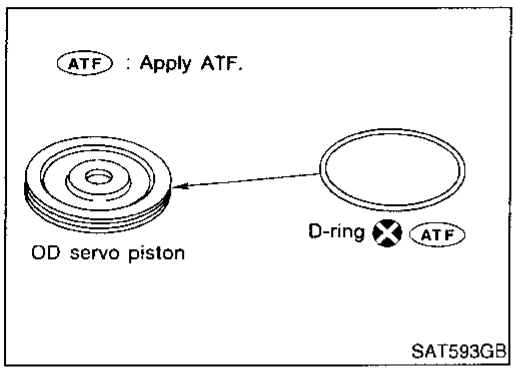
- **Hold band servo piston assembly with a rag or nylon waste.**



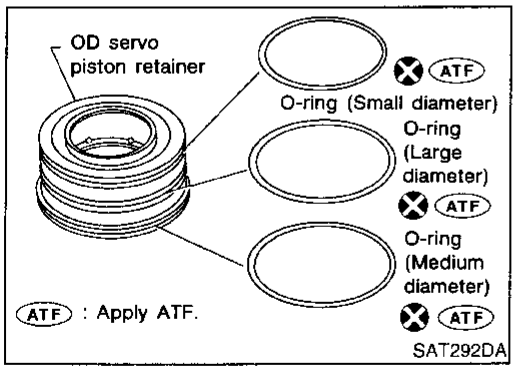
3. Apply compressed air to oil hole in OD servo piston retainer to remove OD servo piston from retainer.

- **Hold OD servo piston while applying compressed air.**

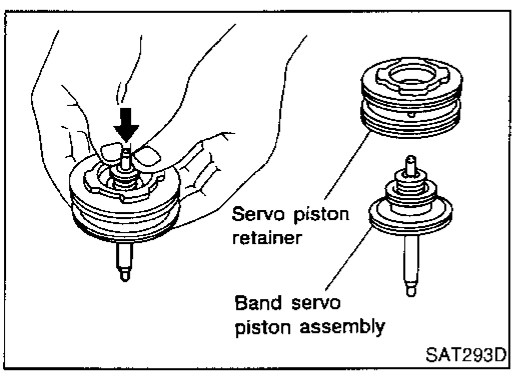




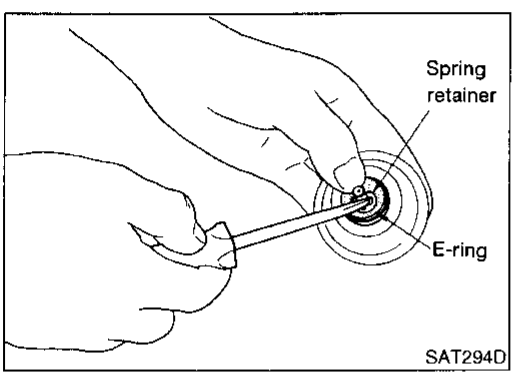
4. Remove D-ring from OD servo piston.



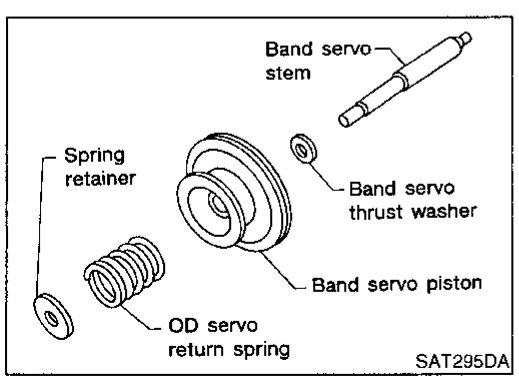
5. Remove O-rings from OD servo piston retainer.



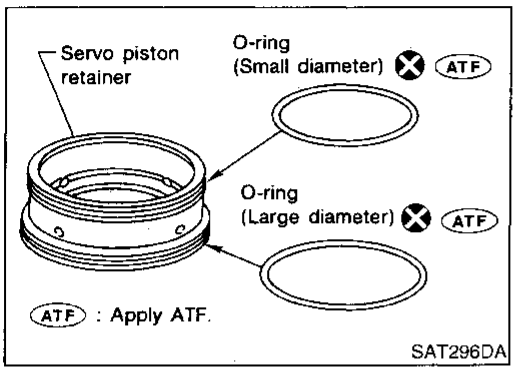
6. Remove band servo piston assembly from servo piston retainer by pushing it forward.



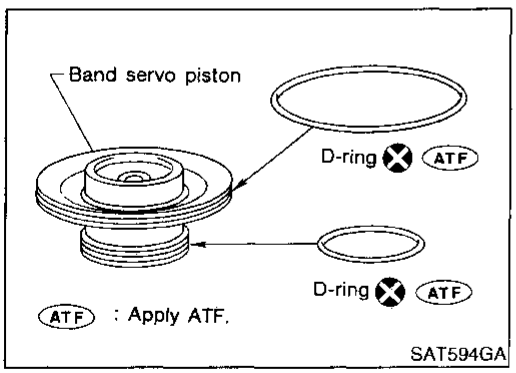
7. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.



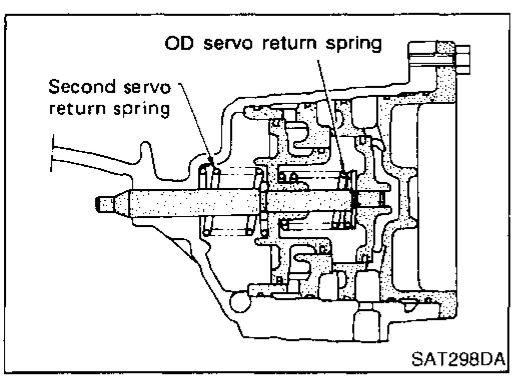
8. Remove OD servo return spring, band servo thrust washer and band servo piston stem from band servo piston.



9. Remove O-rings from servo piston retainer.



10. Remove D-rings from band servo piston.



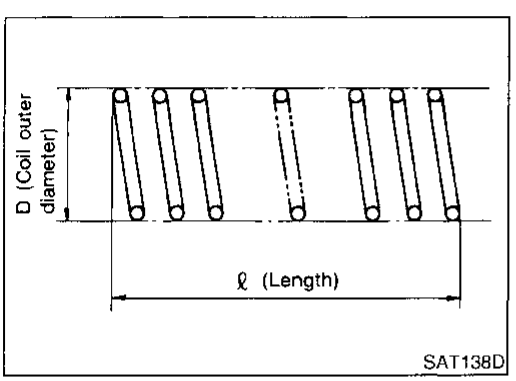
INSPECTION

NCAT0167

Pistons, Retainers and Piston Stem

NCAT0167S01

- Check frictional surfaces for abnormal wear or damage.

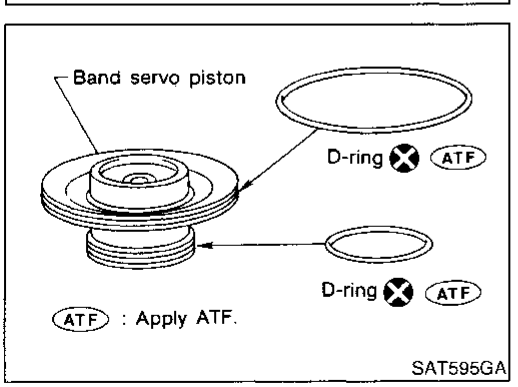


Return Springs

NCAT0167S02

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

Band servo inspection standard:
Refer to SDS, AT-353.

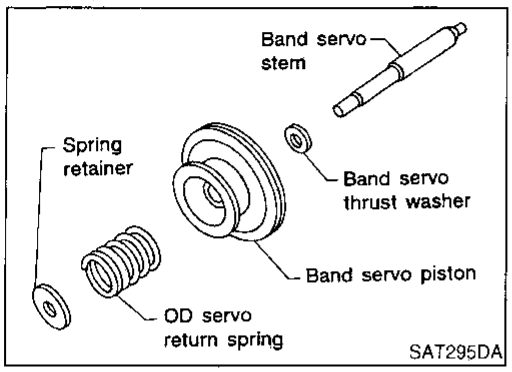


ASSEMBLY

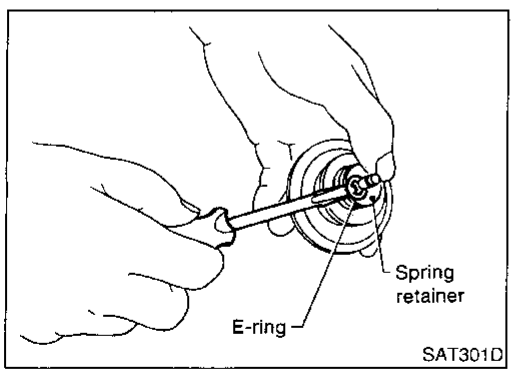
NCAT0168

1. Install D-rings to servo piston retainer.

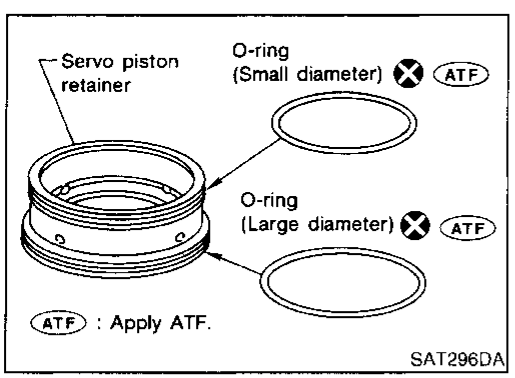
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**



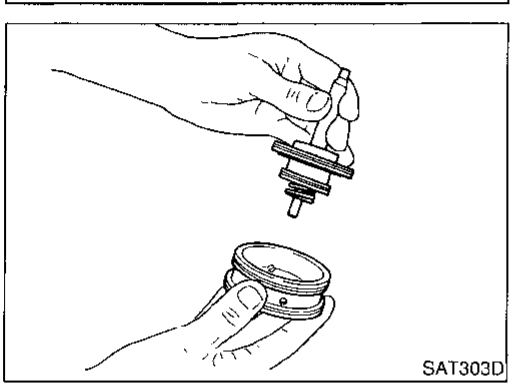
2. Install band servo piston stem, band servo thrust washer, OD servo return spring and spring retainer to band servo piston.



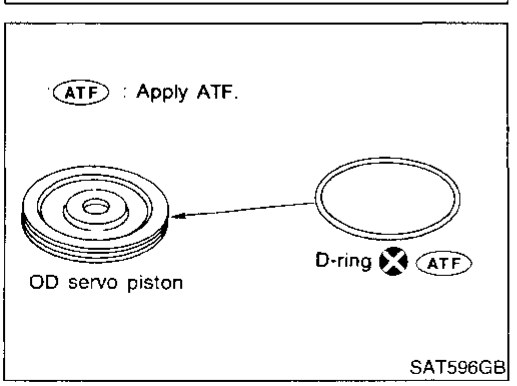
3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



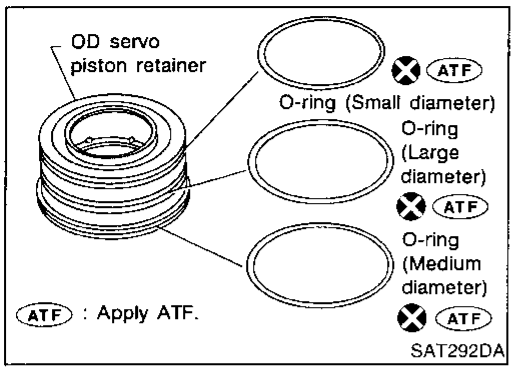
4. Install O-rings to servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to the positions of the O-rings.**



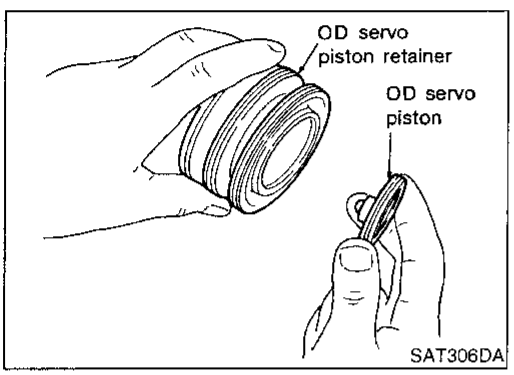
5. Install band servo piston assembly to servo piston retainer by pushing it inward.



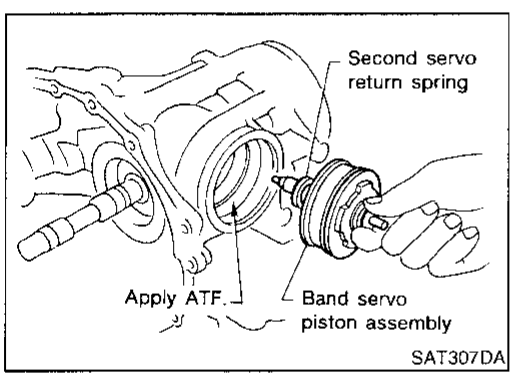
6. Install D-ring to OD servo piston.
- **Apply ATF to D-ring.**



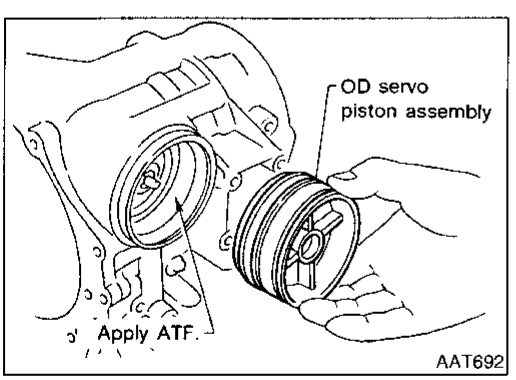
7. Install O-rings to OD servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to the positions of the O-rings.**



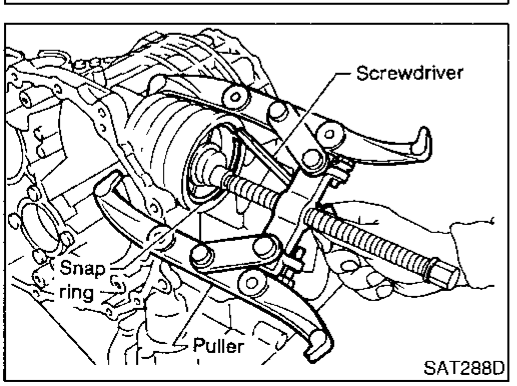
8. Install OD servo piston to OD servo piston retainer.



9. Install band servo piston assembly and 2nd servo return spring to transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**



10. Install OD servo piston assembly to transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**

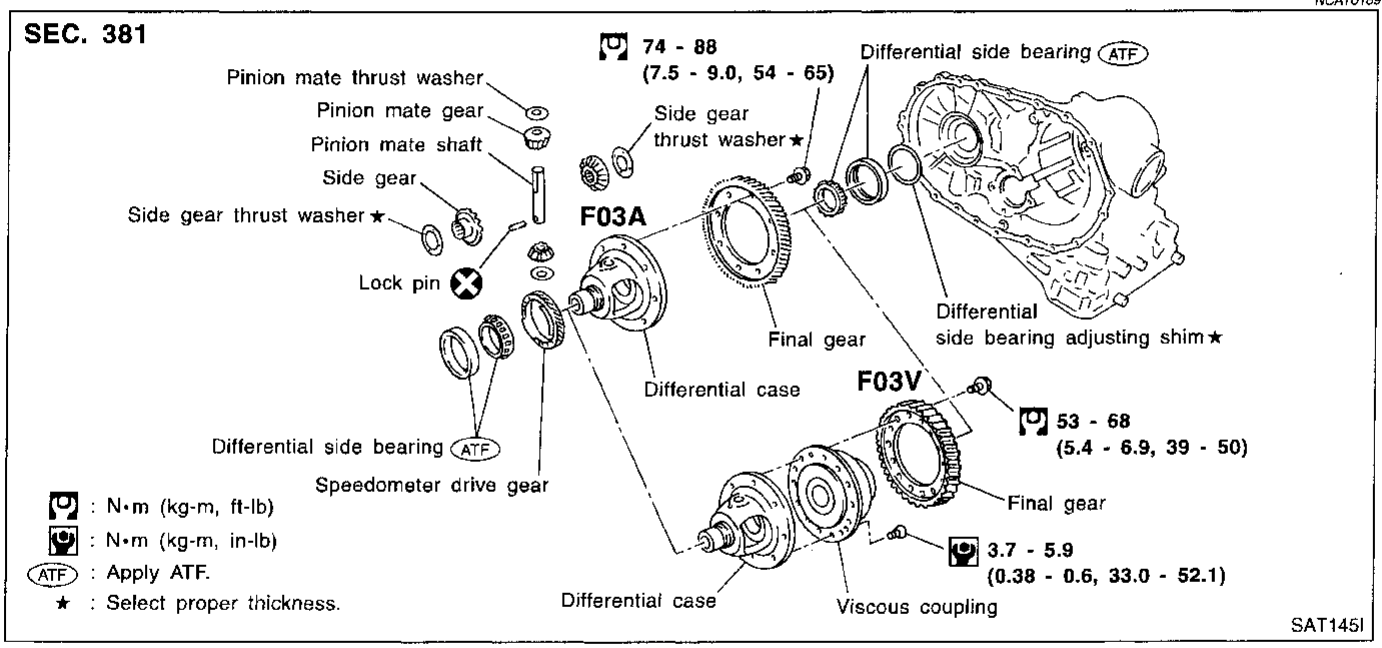


11. Install band servo piston snap ring to transmission case.

Final Drive

COMPONENTS

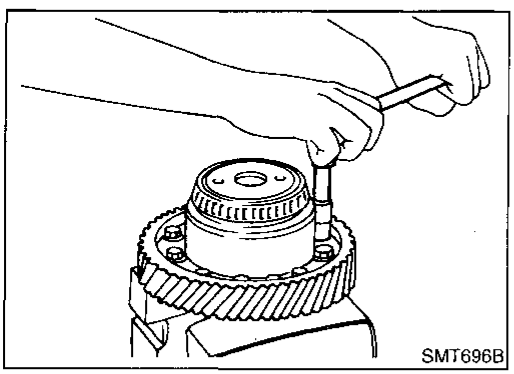
NCAT0169



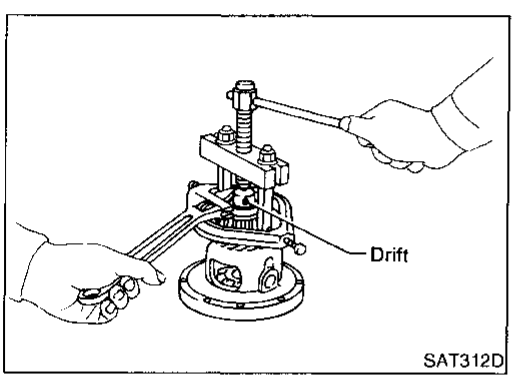
DISASSEMBLY

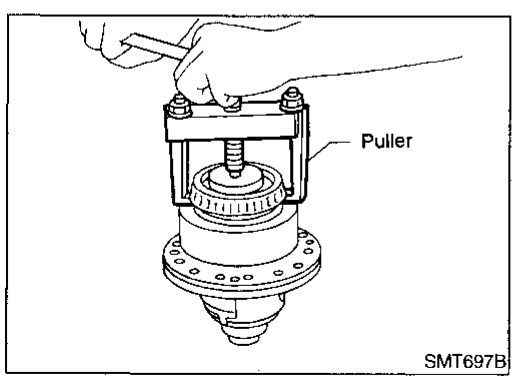
NCAT0170

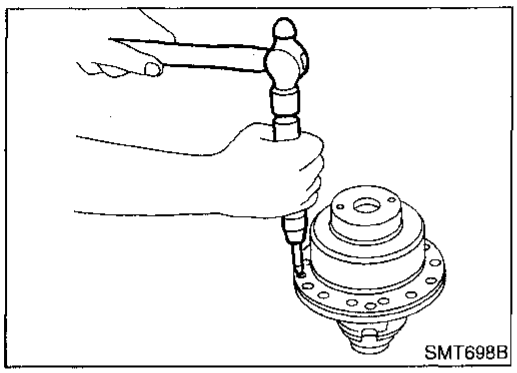
1. Remove final gear.



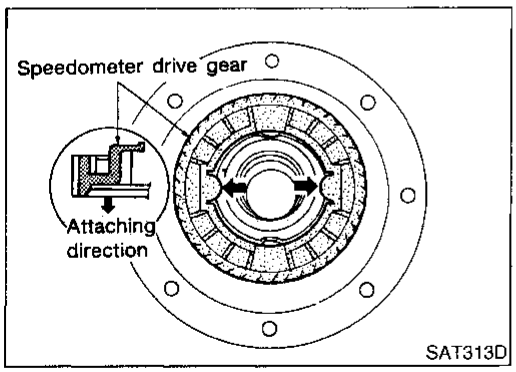
2. Press out differential side bearings.



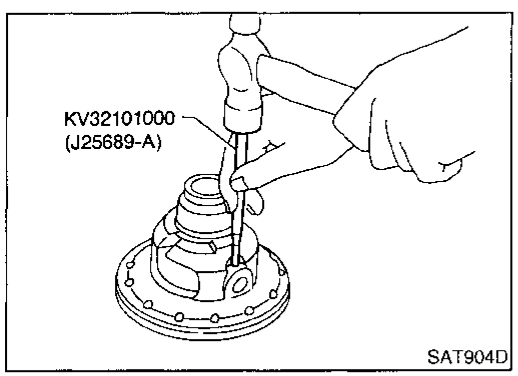




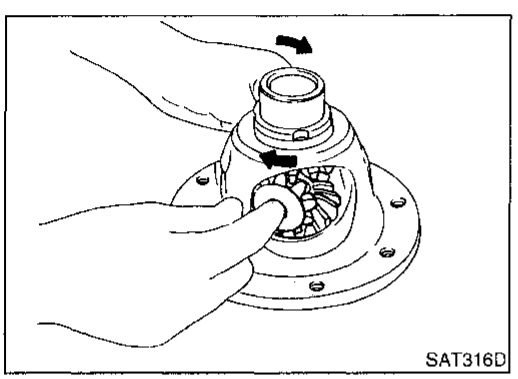
3. Remove viscous coupling — RE4F03V.



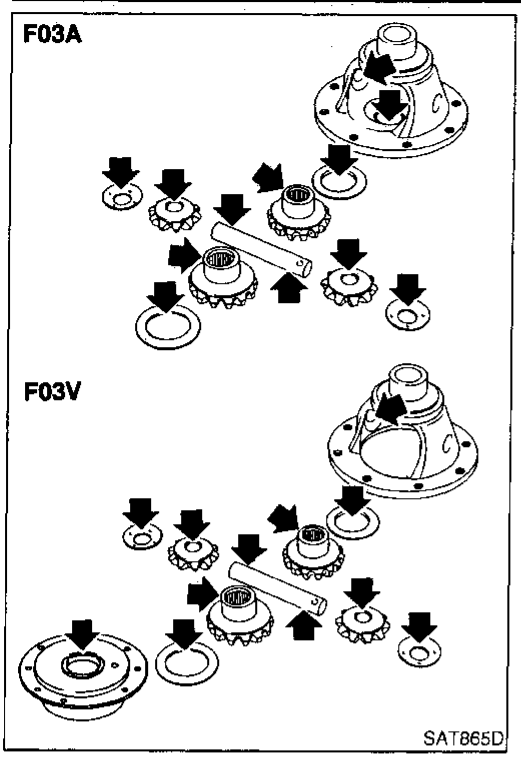
4. Remove speedometer drive gear.



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.



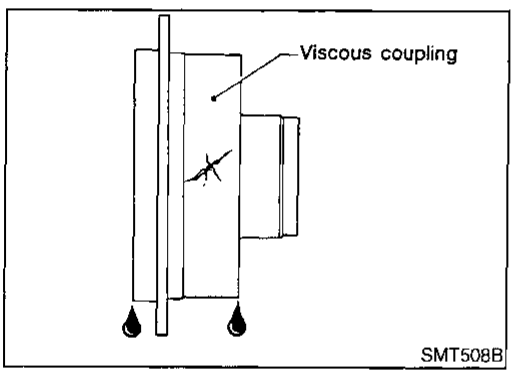
INSPECTION

NCAT0171

Gear, Washer, Shaft and Case

NCAT0171S01

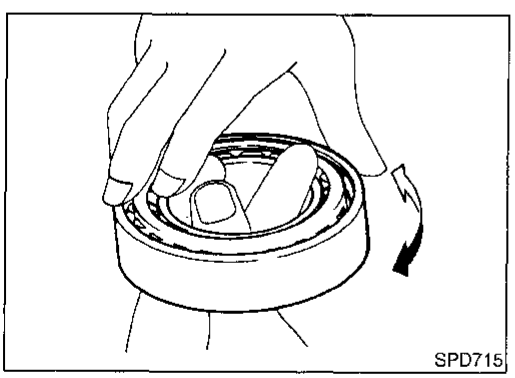
- Check mating surfaces of differential case, side gears, pinion mate gears and viscous coupling.
- Check washers for wear.



Viscous Coupling — RE4F03V

NCAT0171S02

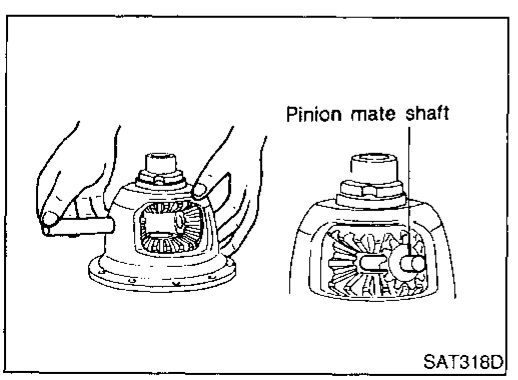
- Check case for cracks.
- Check silicone oil for leakage.



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.**



ASSEMBLY

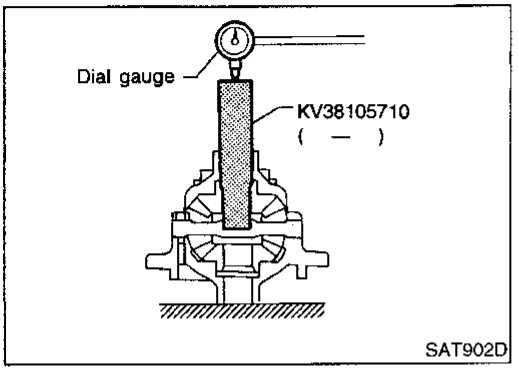
NCAT0172

— RE4F03A —

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.**



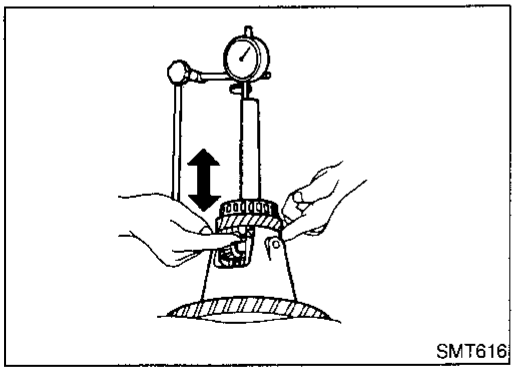
3. Measure clearance between side gear and differential case with washers using the following procedure.

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:

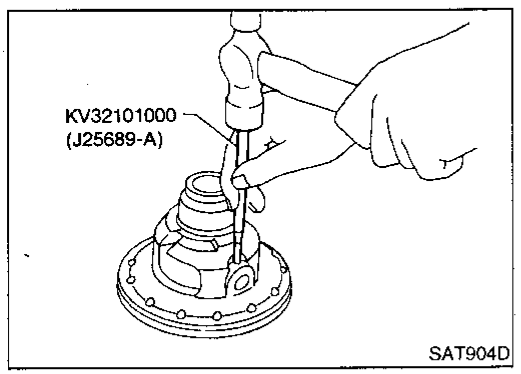
0.1 - 0.2 mm (0.004 - 0.008 in)



c. If not within specification adjust clearance by changing thickness of side gear thrust washers.

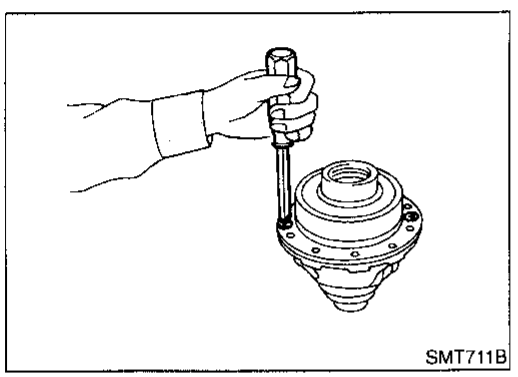
Side gear thrust washer:

Refer to SDS, AT-347.

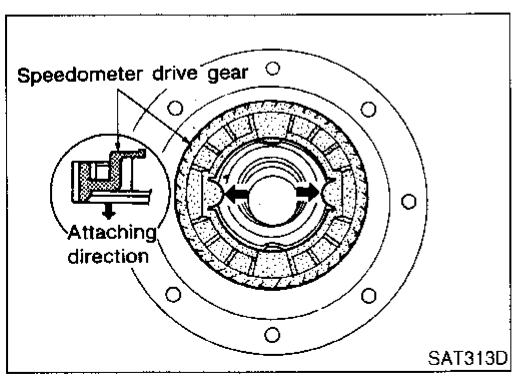


4. Install lock pin.

- **Make sure that lock pin is flush with case.**

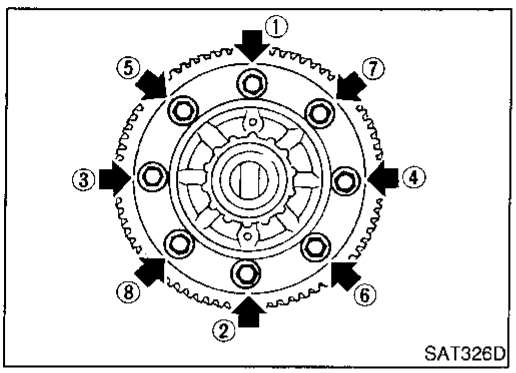


5. Install side gear (viscous coupling side) on differential case and then install viscous coupling — RE4F03V.



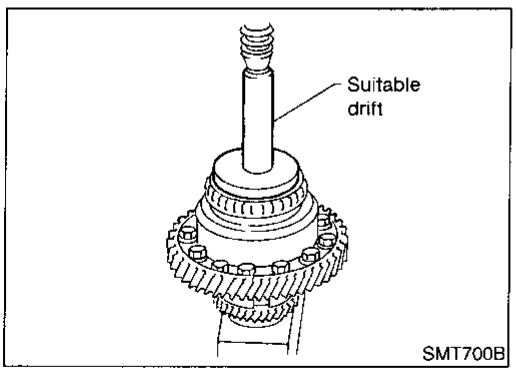
6. Install speedometer drive gear on differential case.

- **Align the projection of speedometer drive gear with the groove of differential case.**



SAT326D

7. Install final gear and tighten fixing bolts in numerical order.



SMT700B

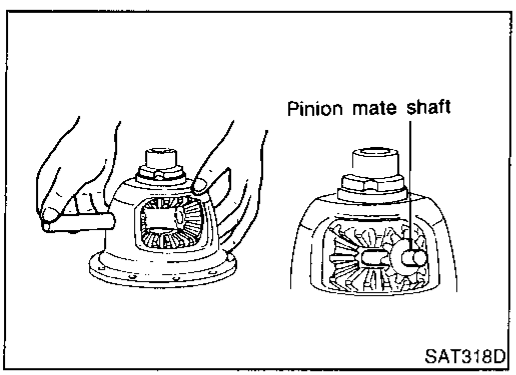
8. Press on differential side bearings.

— 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.**



SAT318D

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.

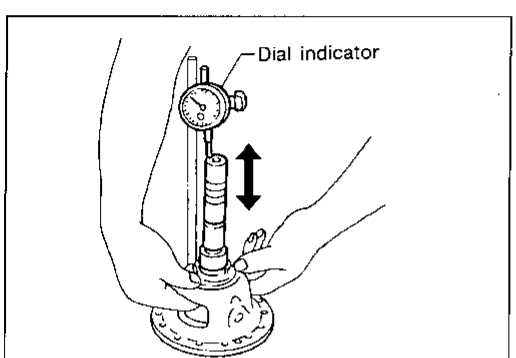
   Clearance between side gear and differential case with washers:

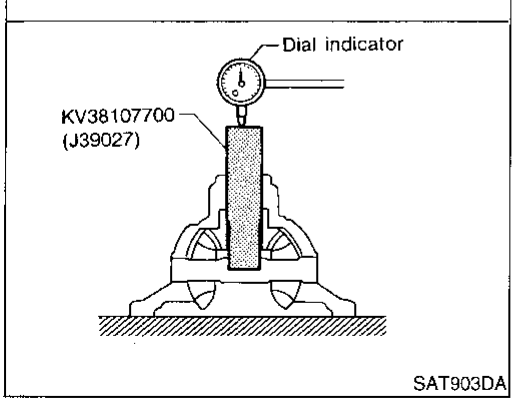
   0.1 - 0.2 mm (0.004 - 0.008 in)

3) If not within specification adjust clearance by changing thickness of side gear thrust washer.

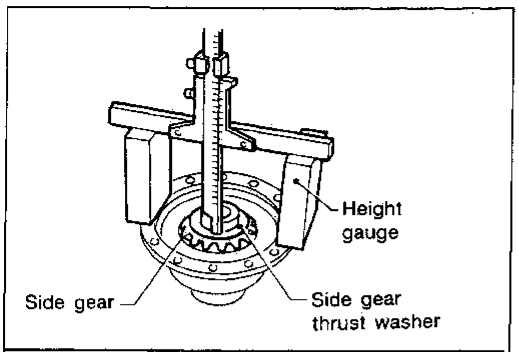
   Side gear thrust washers for differential case side:

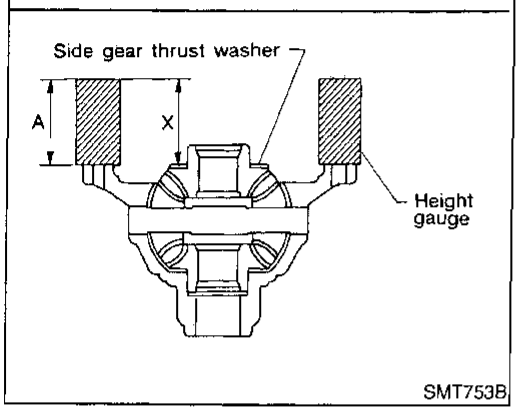
   Refer to SDS, AT-347.





SAT903DA



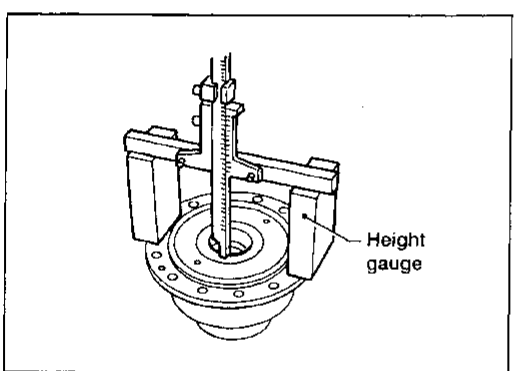


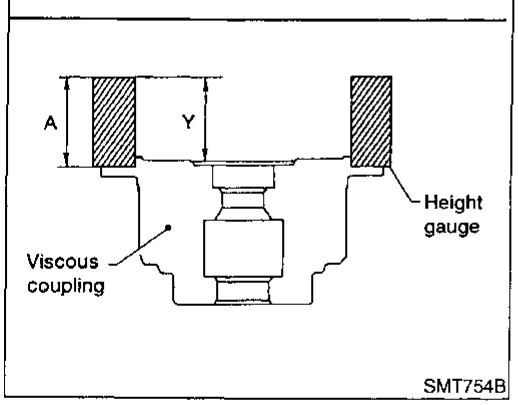
Viscous Coupling Side

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.

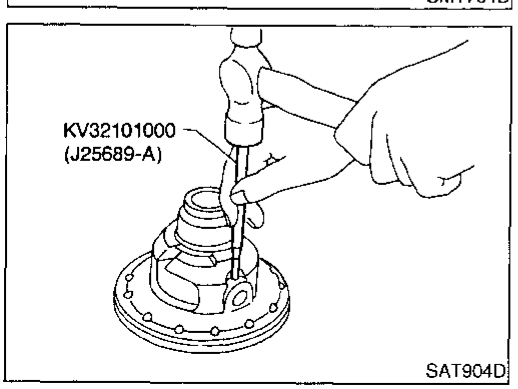
- **Measure dimension Y in at least two places.**

Clearance between side gear and viscous coupling = X + Y – 2A: 0.1 - 0.2 mm (0.004 - 0.008 in)

A: Height of gauge

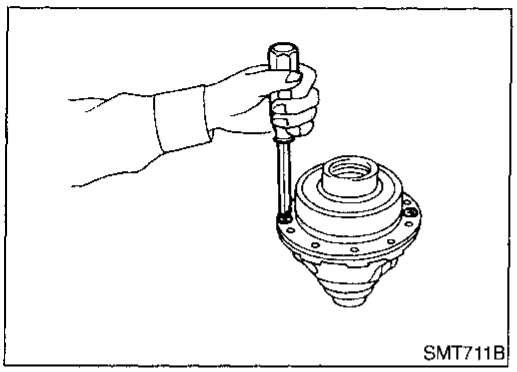
4) If not within specification, adjust clearance by changing thickness of side gear thrust washer.

Side gear thrust washers for viscous coupling side:
Refer to SDS, AT-347.

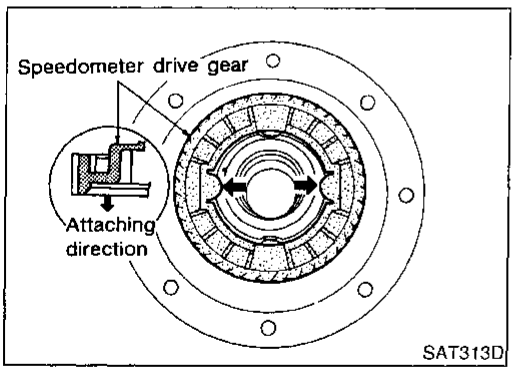


4. Install lock pin.

- **Make sure that lock pin is flush with case.**

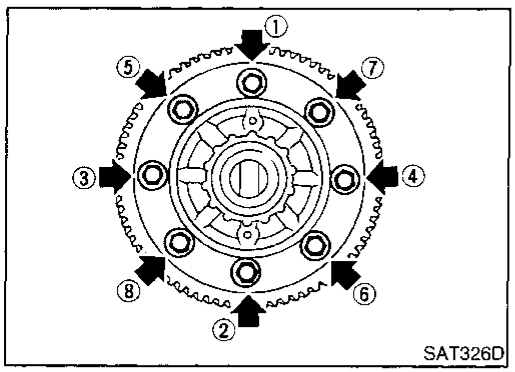

SMT711B

5. Install side gear (viscous coupling side) on differential case and then install viscous coupling — RE4F03V.



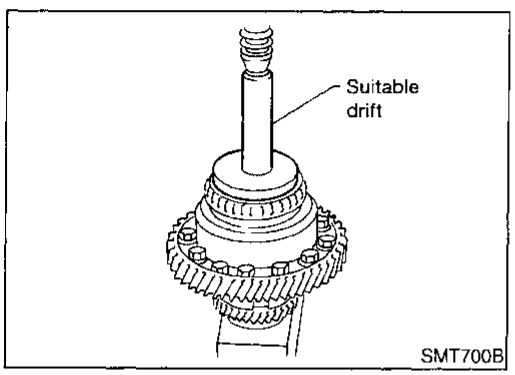
SAT313D

6. Install speedometer drive gear on differential case.
- **Align the projection of speedometer drive gear with the groove of differential case.**



SAT326D

7. Install final gear and tighten fixing bolts in numerical order.



SMT700B

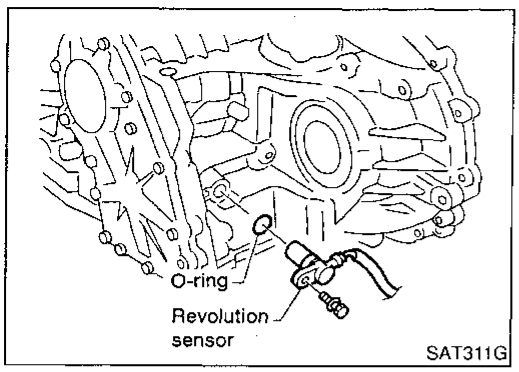
8. Press on differential side bearings.

Assembly (1)

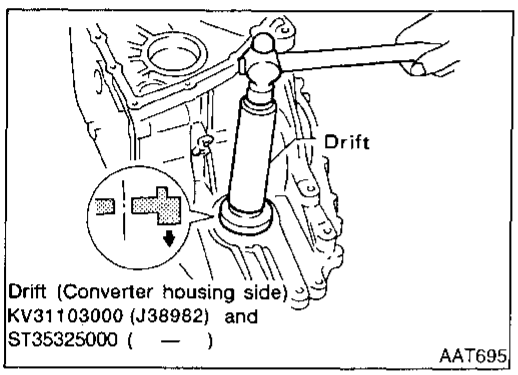
NCAT0173

1. Install revolution sensor onto transmission case.

Always use new sealing parts.

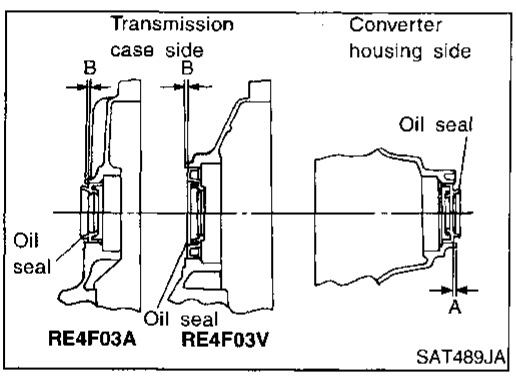


2. Install differential side oil seals on transmission case and converter housing, so that "A" and "B" are within specifications.



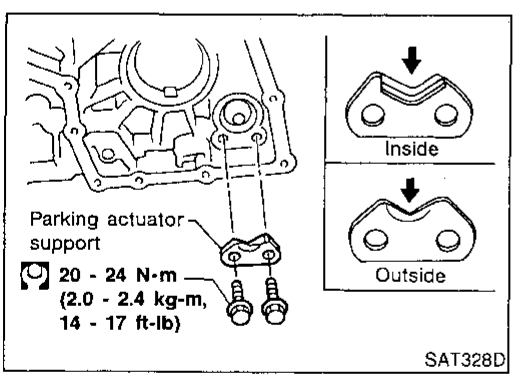
Unit: mm (in)

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

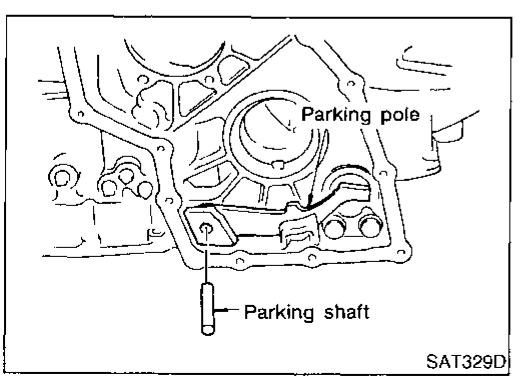


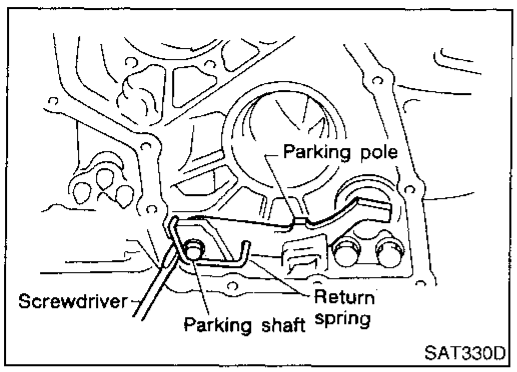
3. Install parking actuator support to transmission case.

- **Pay attention to direction of parking actuator support.**



4. Install parking pawl on transmission case and fix it with parking shaft.





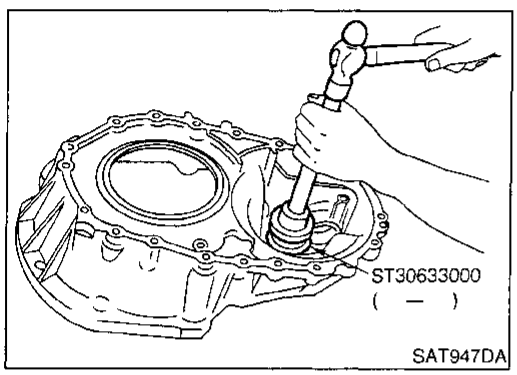
5. Install return spring.

Adjustment (1)

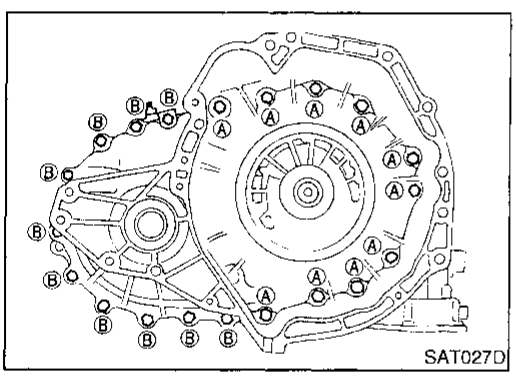
NCAT0174

DIFFERENTIAL SIDE BEARING PRELOAD

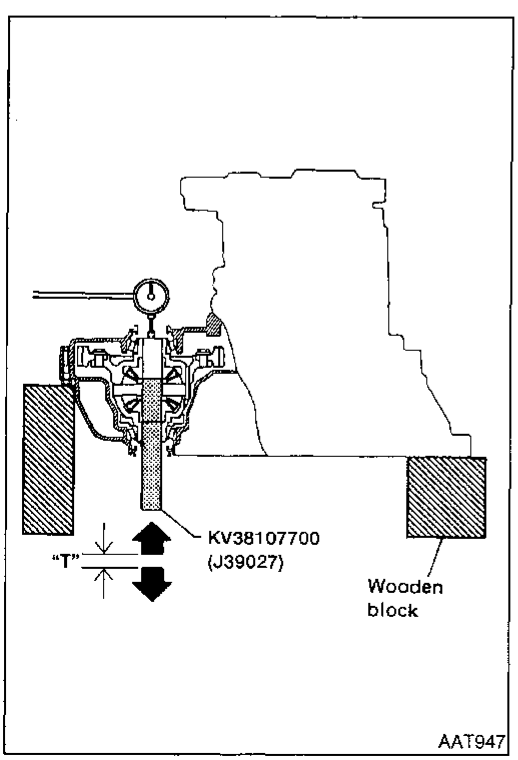
NCAT0174S01



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.

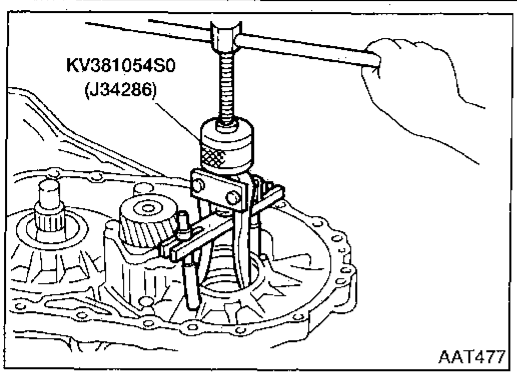
   Differential side bearing preload "T":

   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.

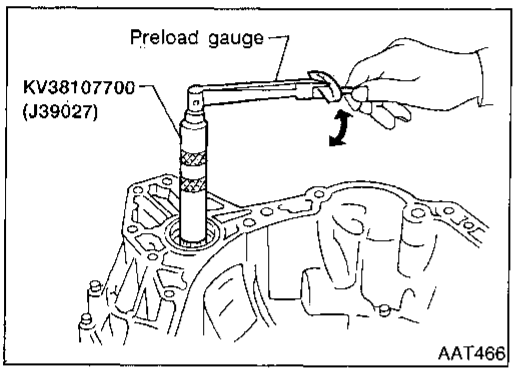
   Differential side bearing adjusting shim:

   Refer to SDS, AT-348.

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):

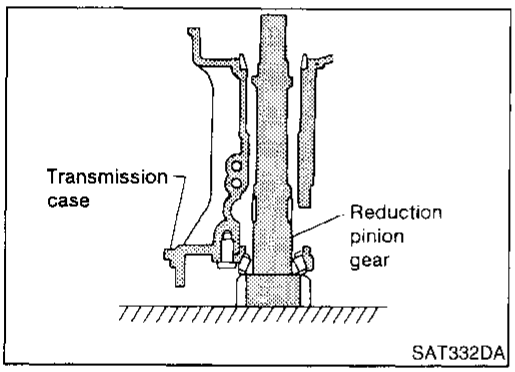
  0.49 - 1.08 N·m (5.0 - 11.0 kg-cm, 4.3 - 9.5 in-lb)
- **When old bearing is used again, turning torque will be slightly less than the above.**
- **Make sure torque is close to the specified range.**

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.

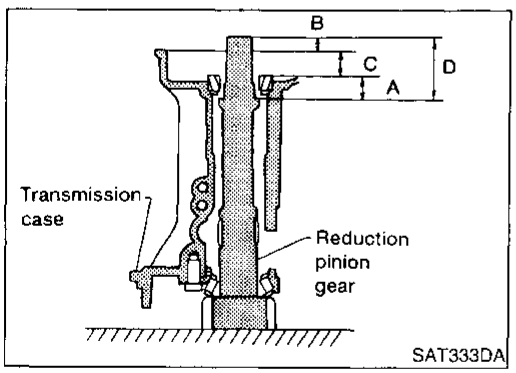


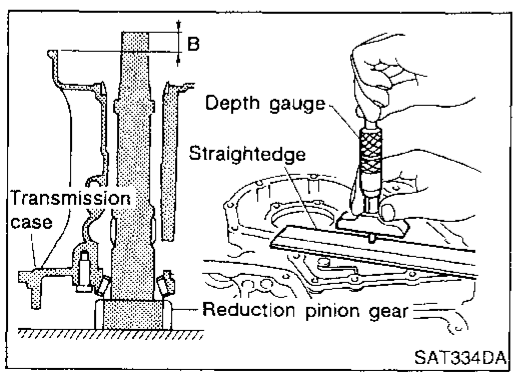
b. Place idler gear bearing on transmission case.

c. Measure dimensions "B" "C" and "D" and calculate dimension "A".

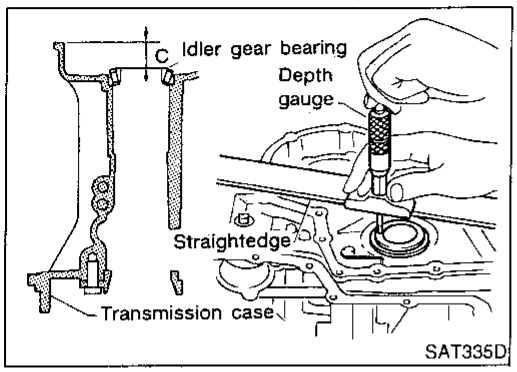
A = D – (B + C)

"A": Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction pinion gear.

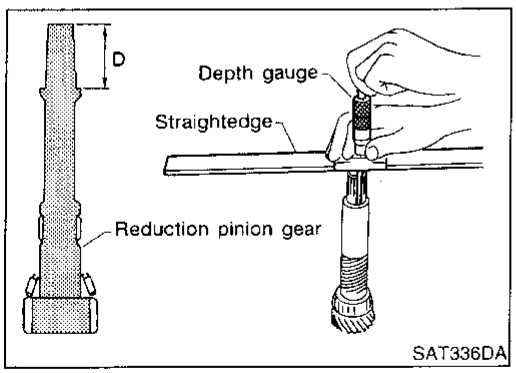




- Measure dimension "B" between the end of reduction pinion gear and the surface of transmission case.
- **Measure dimension "B" in at least two places.**

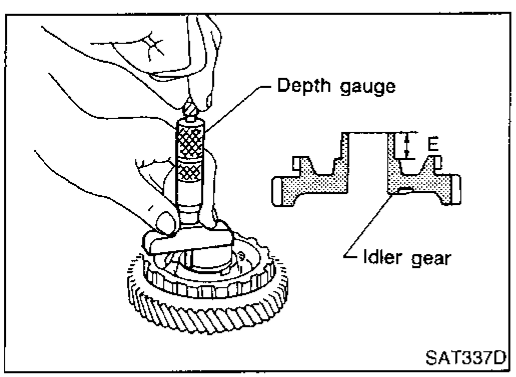


- Measure dimension "C" between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension "C" in at least two places.**



- Measure dimension "D" between the end of reduction pinion gear and the adjusting shim mating surface of reduction pinion gear.
- **Measure dimension "D" in at least two places.**
- Calculate dimension "A".

  A = D – (B + C)



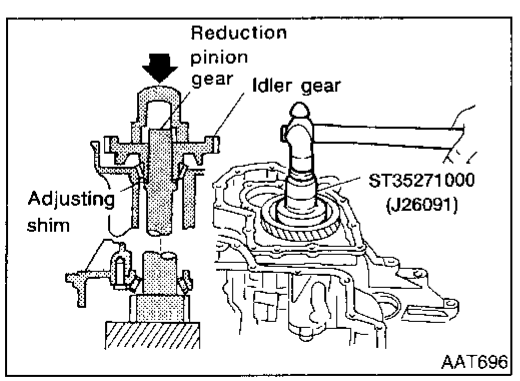
d. Measure dimension "E" between the end of idler gear and the idler gear bearing inner race mating surface of idler gear.
- **Measure dimension "E" in at least two places.**

e. Calculate "T" and select proper thickness of reduction pinion gear bearing adjusting shim using SDS table as a guide.

   T = A – E

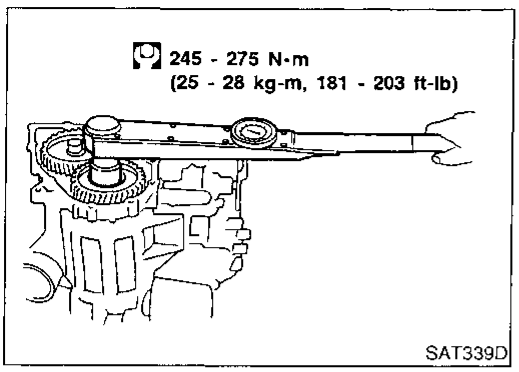
   Reduction pinion gear bearing adjusting shim:

   Refer to SDS, AT-351.

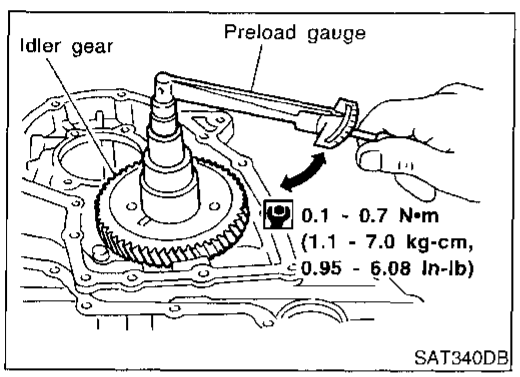


3. Install reduction pinion gear and reduction pinion gear bearing adjusting shim selected in step 2-e on transmission case.
4. Press idler gear bearing inner race on idler gear.
5. Press idler gear on reduction pinion gear.
- **Press idler gear so that idler gear can be locked by parking pawl.**

Adjustment (1) (Cont'd)

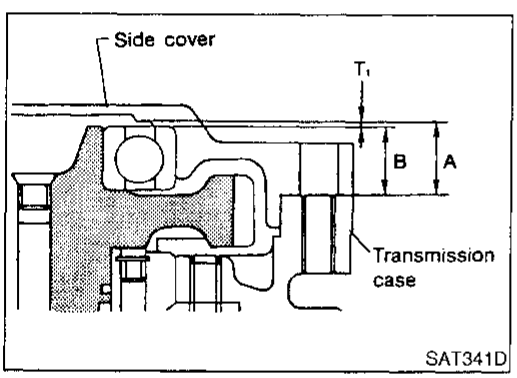


6. Tighten idler gear lock nut to the specified torque.
- **Lock idler gear with parking pawl when tightening lock nut.**



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.**

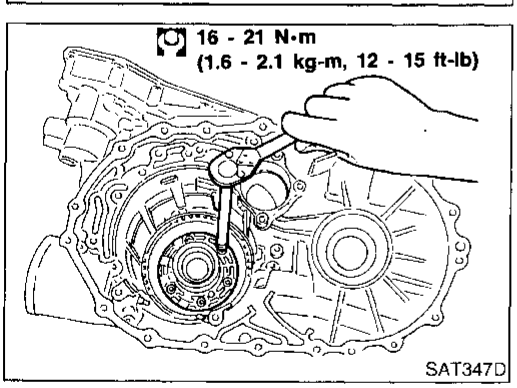
Turning torque of reduction pinion gear:
0.1 - 0.7 N·m (1.1 - 7.0 kg-cm, 0.95 - 6.08 in-lb)



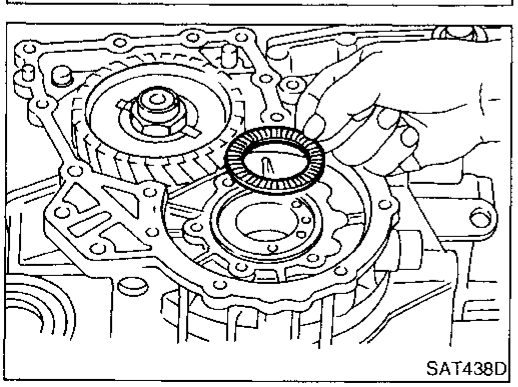
OUTPUT SHAFT END PLAY

NCAT0174S03

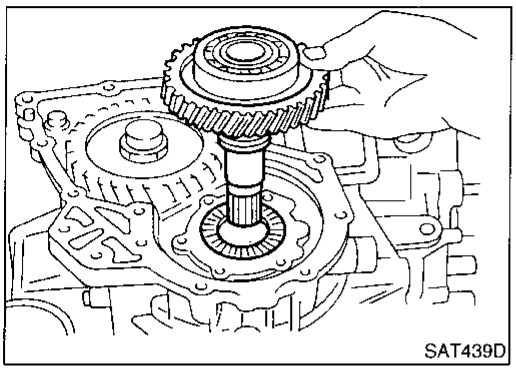
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



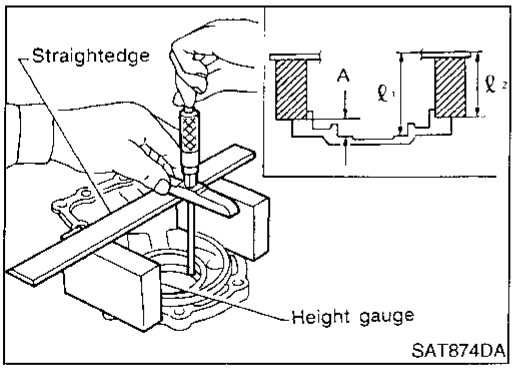
1. Install bearing retainer for output shaft.



2. Install output shaft thrust needle bearing on bearing retainer.


SAT439D

3. Install output shaft on transmission case.



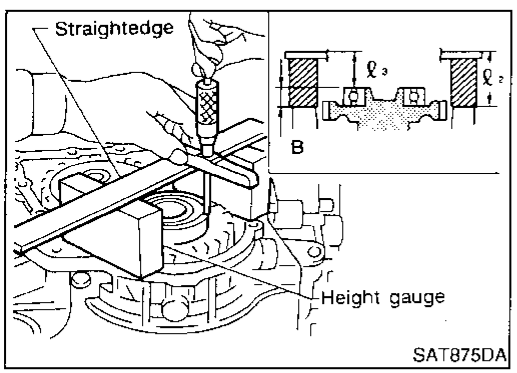
SAT874DA

4. Measure dimensions "ℓ_1" and "ℓ_2" at side cover and then calculate dimension "A".
- **Measure dimension "ℓ_1" and "ℓ_2" in at least two places**

"A": Distance between transmission case fitting surface and adjusting shim mating surface

$A = \ell_1 - \ell_2$

ℓ_2: Height of gauge



SAT875DA

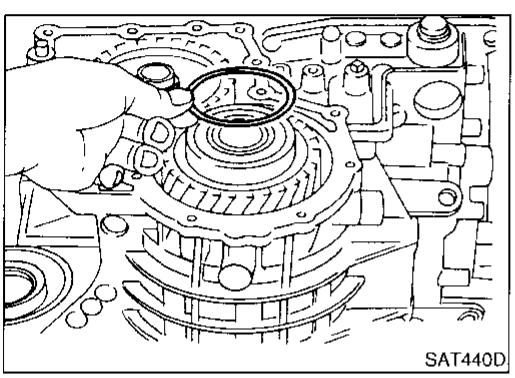
5. Measure dimensions "ℓ_2" and "ℓ_3" and then calculate dimension "B".

Measure "ℓ_2" and "ℓ_3" in at least two places.

"B": Distance between the end of output shaft bearing outer race and the side cover fitting surface of transmission case

$B = \ell_2 - \ell_3$

ℓ_2: Height of gauge


SAT440D

6. Select proper thickness of adjusting shim so that output shaft end play (clearance between side cover and output shaft bearing) is within specifications.

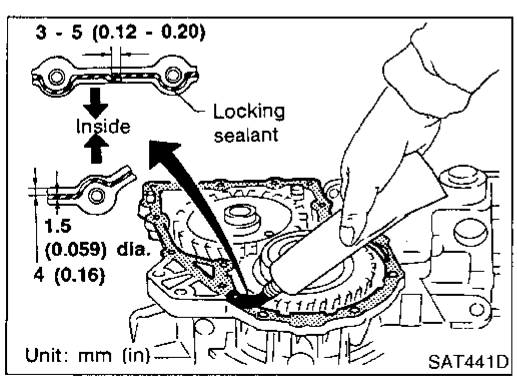
Output shaft end play (A – B):

0 - 0.5 mm (0 - 0.020 in)

Output shaft end play adjusting shim:

Refer to SDS, AT-352.

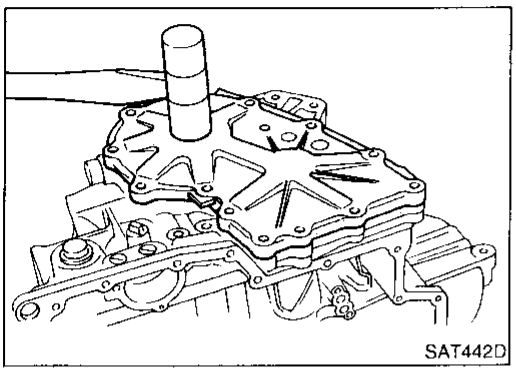
7. Install adjusting shim on output shaft bearing.



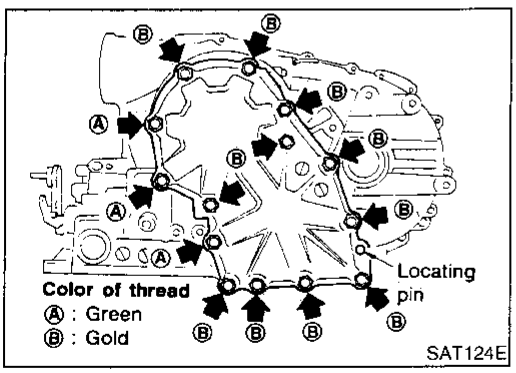
SAT441D

8. Apply locking sealant to transmission case as shown in illustration.

Adjustment (1) (Cont'd)


SAT442D

9. Install side cover on transmission case.
- **Apply locking sealant to the mating surface of transmission case.**



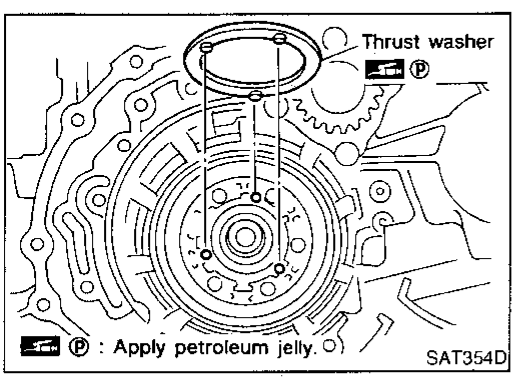
SAT124E

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)

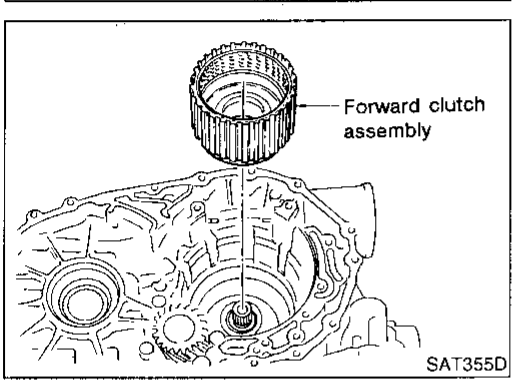
NCAT0175

1. Remove paper rolled around bearing retainer.
2. Install thrust washer on bearing retainer.
- **Apply petroleum jelly to thrust washer.**



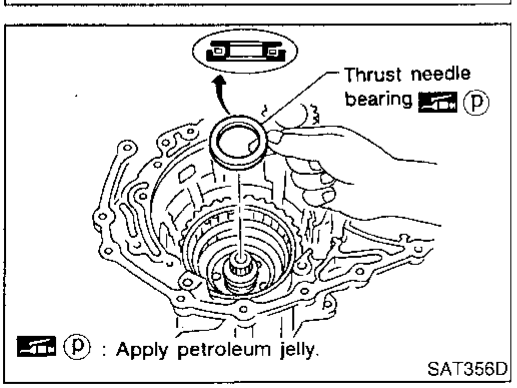
SAT354D

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.**

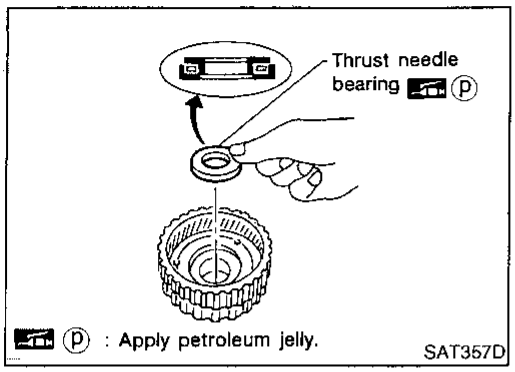


SAT355D

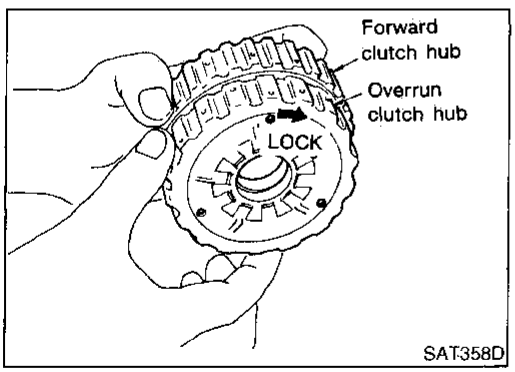
4. Install thrust needle bearing on bearing retainer.
- **Apply petroleum jelly to thrust bearing.**
- **Pay attention to direction of thrust needle bearing.**



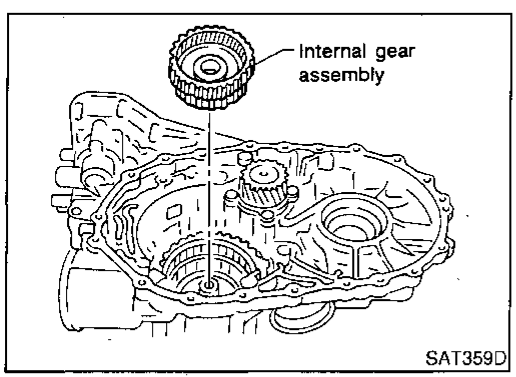
SAT356D



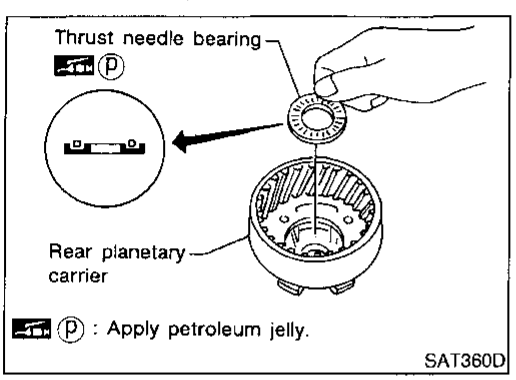
5. Install thrust needle bearing on rear internal gear.
- **Apply petroleum jelly to thrust needle bearing.**
- **Pay attention to direction of thrust needle bearing.**



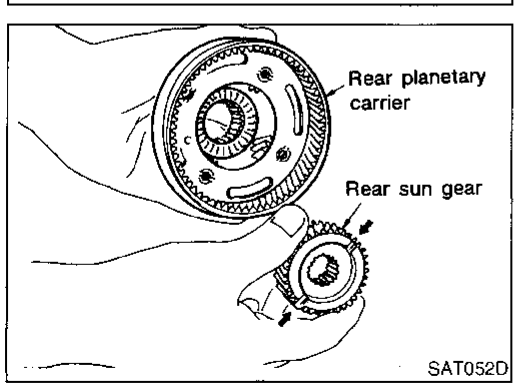
6. Hold forward clutch hub and turn overrun clutch hub. Check overrun clutch hub for directions of lock and unlock.
- If not as shown in illustration, check installed direction of forward one-way clutch.



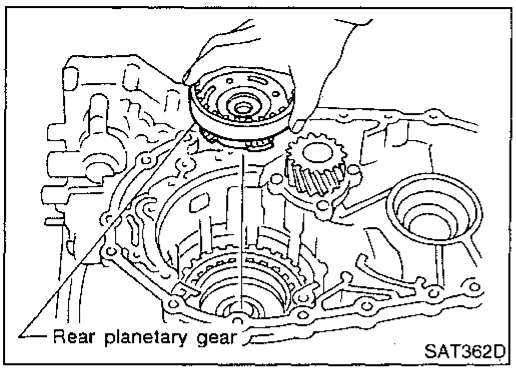
7. Install rear internal gear assembly.
- **Align teeth of forward clutch and overrun clutch drive plate.**



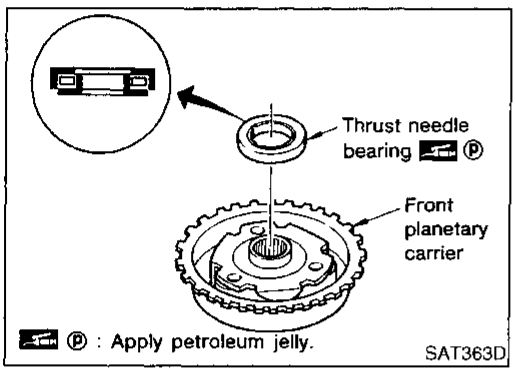
8. Install needle bearing on rear planetary carrier.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



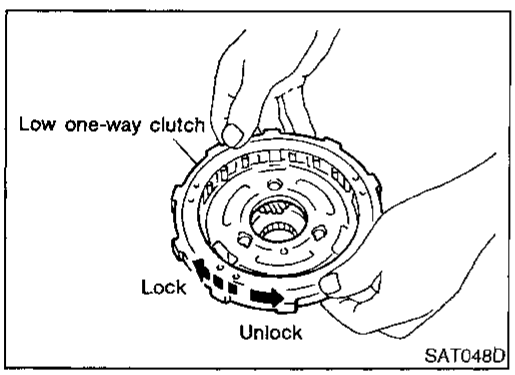
9. Install rear sun gear on rear planetary carrier.
- **Pay attention to direction of rear sun gear.**



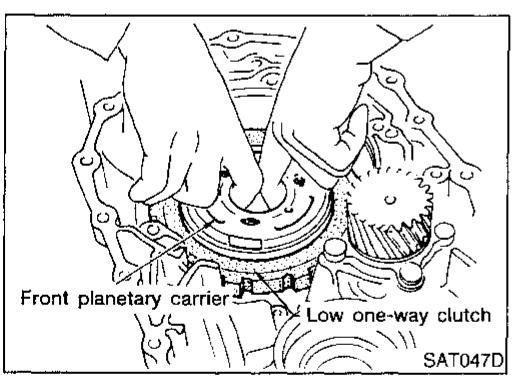
10. Install rear planetary carrier on transmission case.



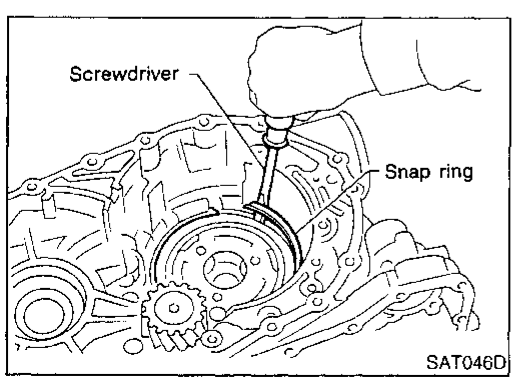
11. Install thrust needle bearing on front planetary carrier.
- **Apply petroleum jelly to thrust needle bearing.**
- **Pay attention to direction of thrust needle bearing.**



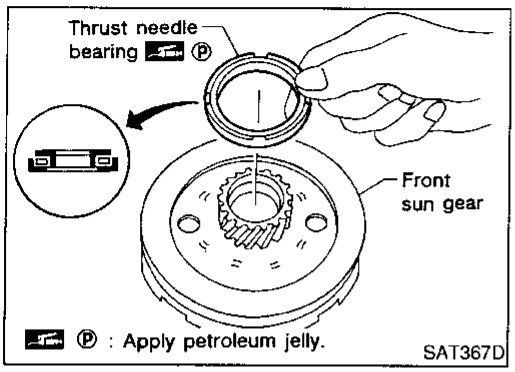
12. Install low one-way clutch to front planetary carrier by turning it in the direction of the arrow as shown.
13. While holding front planetary carrier, turn low one-way clutch. Check low one-way clutch for correct directions of lock and unlock.



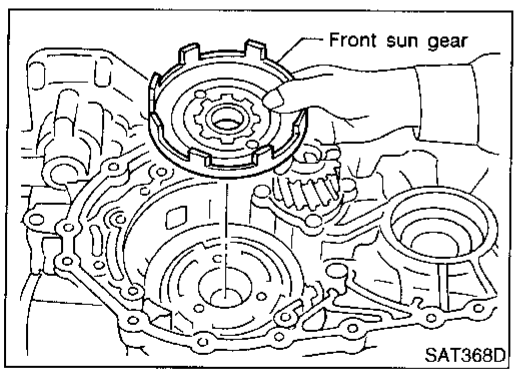
14. Install front planetary carrier assembly on transmission case.



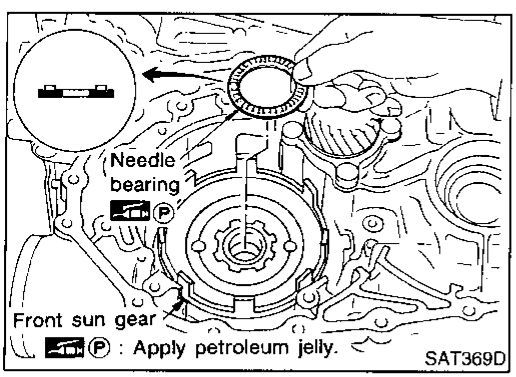
15. Install snap ring with screwdriver.
- **Forward clutch and bearings must be correctly installed for snap ring to fit groove of transmission case.**



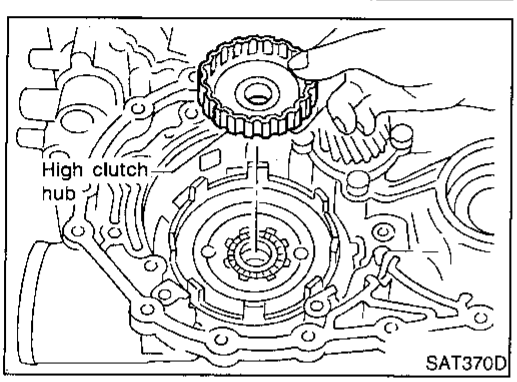
16. Install needle bearing on front sun gear.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



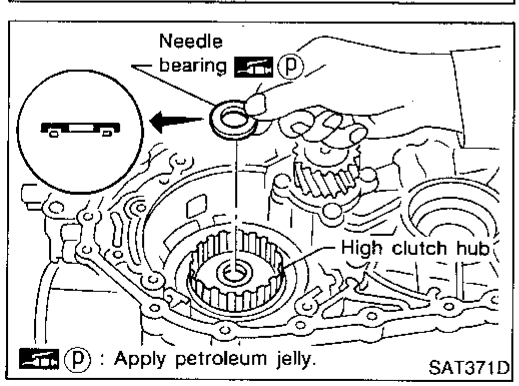
17. Install front sun gear on front planetary carrier.



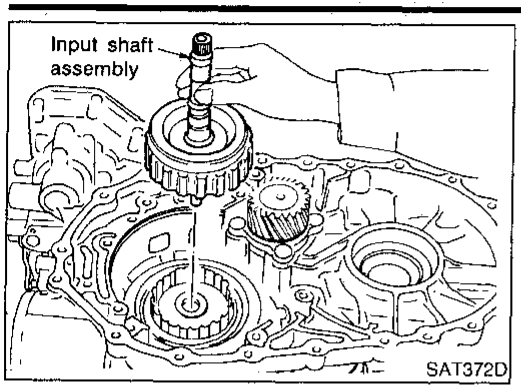
18. Install needle bearing on front sun gear.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



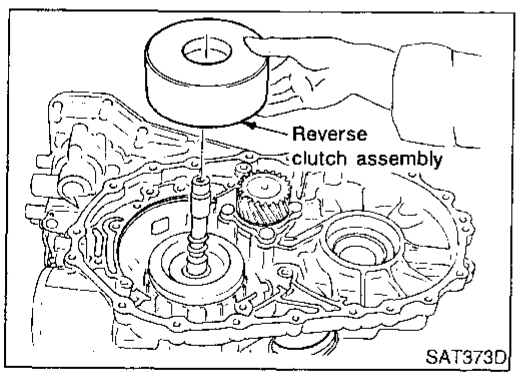
19. Install high clutch hub on front sun gear.



20. Install needle bearing on high clutch hub.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



21. Remove paper rolled around input shaft.
22. Install input shaft assembly.
- **Align teeth of high clutch drive plates before installing.**



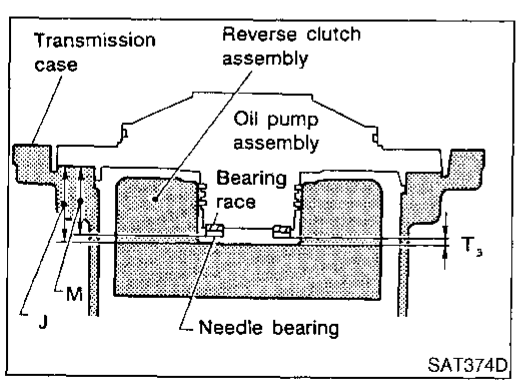
23. Install reverse clutch assembly.
- **Align teeth of reverse clutch drive plates before installing.**

Adjustment (2)

NCAT0176

When any parts listed below are replaced, adjust total end play and reverse clutch end play.

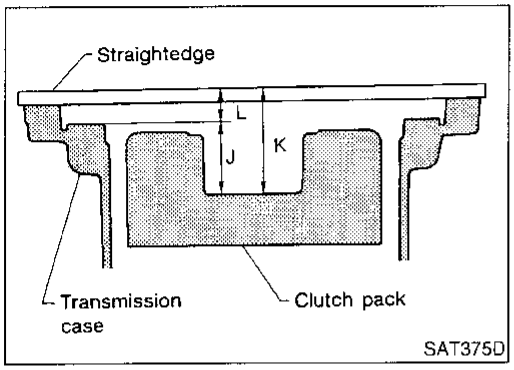
Part name	Total end play	Reverse clutch end play
Transmission case	•	•
Overrun clutch hub	•	•
Rear internal gear	•	•
Rear planetary carrier	•	•
Rear sun gear	•	•
Front planetary carrier	•	•
Front sun gear	•	•
High clutch hub	•	•
High clutch drum	•	•
Oil pump cover	•	•
Reverse clutch drum	—	•



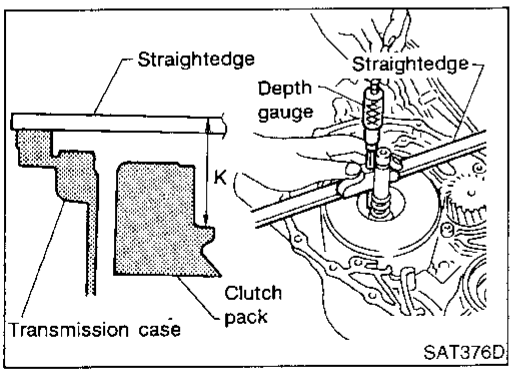
TOTAL END PLAY

NCAT0176S01

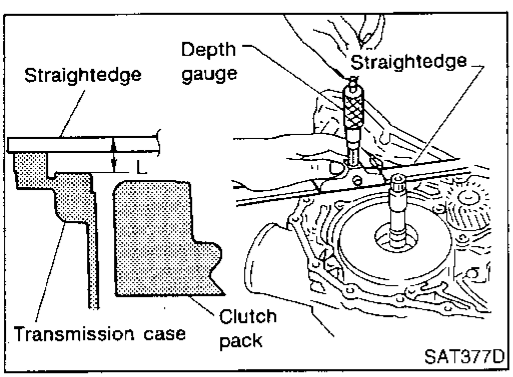
- Measure clearance between reverse clutch drum and needle bearing for oil pump cover.
- Select proper thickness of bearing race so that end play is within specifications.



1. Measure dimensions "K" and "L" and then calculate dimension "J".



a. Measure dimension "K".

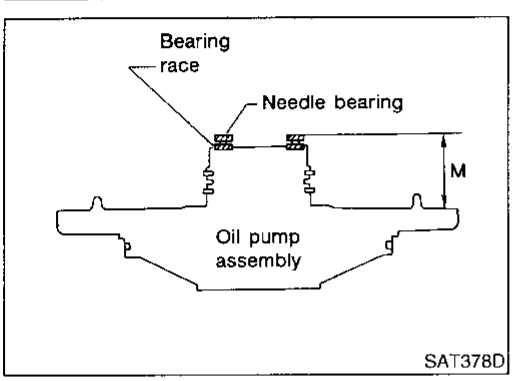


b. Measure dimension "L".

c. Calculate dimension "J".

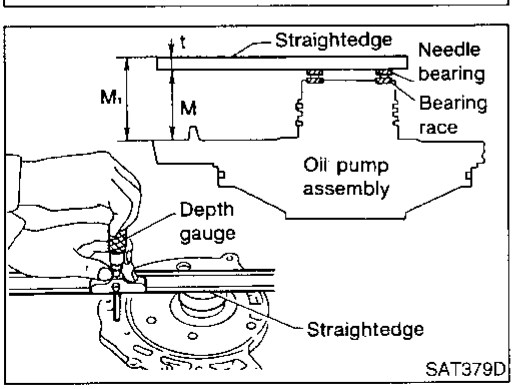
"J": Distance between oil pump fitting surface of transmission case and needle bearing mating surface of high clutch drum

J = K – L



2. Measure dimension "M".

a. Place bearing race and needle bearing on oil pump assembly.

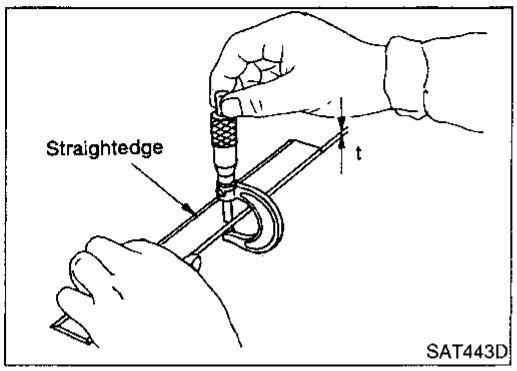


b. Measure dimension "M".

"M": Distance between transmission case fitting surface and needle bearing on oil pump cover

"M_1": Indication of gauge

Adjustment (2) (Cont'd)



c. Measure thickness of straightedge "t".
$M = M_1 - t$

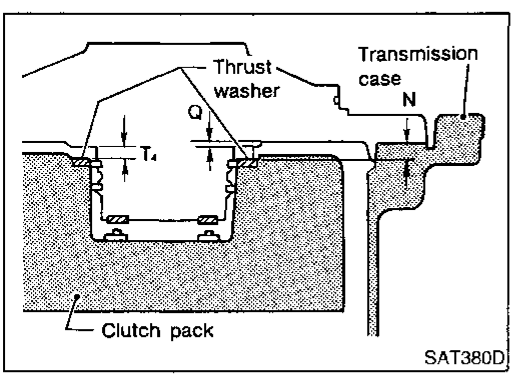
3. Adjust total end play "T_3".
$T_3 = J - M$
Total end play "T_3":
0.25 - 0.55 mm (0.0098 - 0.0217 in)

- Select proper thickness of bearing race so that total end play is within specifications.
Bearing races: Refer to SDS, AT-353.

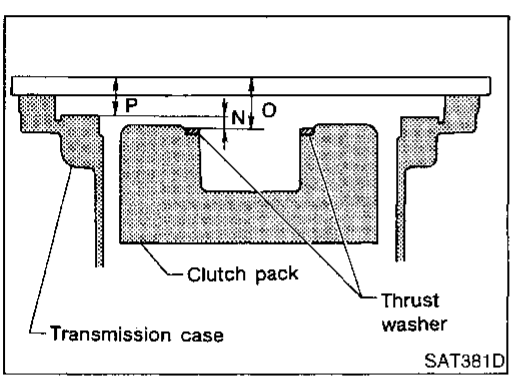
REVERSE CLUTCH END PLAY

NCAT0176S02

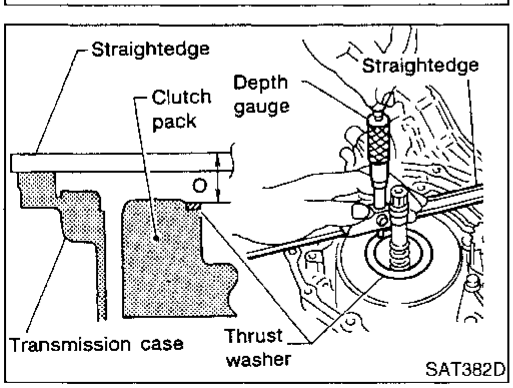
- Measure clearance between oil pump cover and thrust washer for reverse clutch drum.
- Select proper thickness of thrust washer so that end play is within specifications.

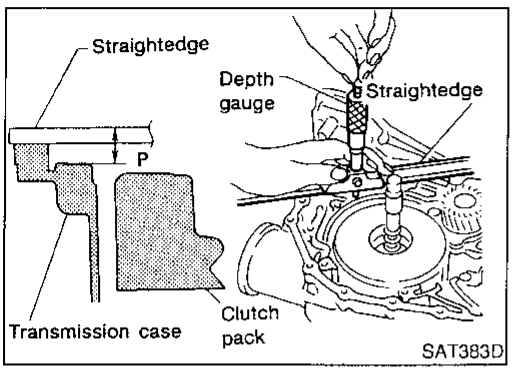


1. Measure dimensions "O" and "P" and then calculate dimension "N".



a. Place thrust washer on reverse clutch drum.
b. Measure dimension "O".





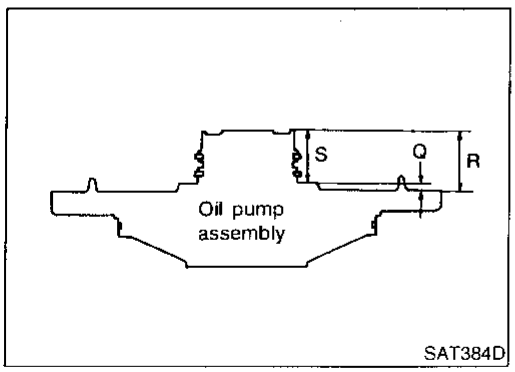
c. Measure dimension "P".

d. Calculate dimension "N".

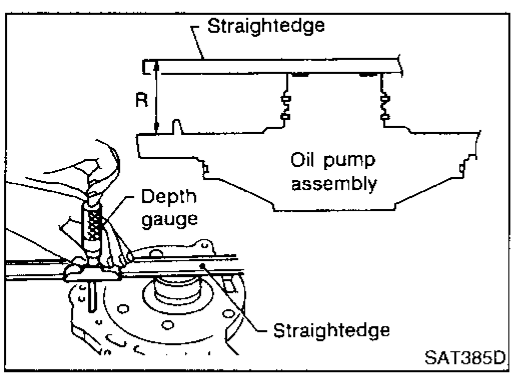
"N": Distance between oil pump fitting surface of transmission case and thrust washer on reverse clutch drum

N = O – P

2. Measure dimensions "R" and "S" and then calculate dimension "Q".



a. Measure dimension "R".

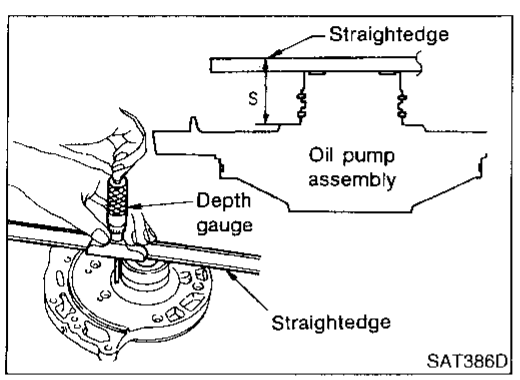


b. Measure dimension "S".

c. Calculate dimension "Q".

"Q": Distance between transmission case fitting surface and thrust washer mating surface

Q = R – S



3. Adjust reverse clutch end play "T_4".

T_4 = N – Q

Reverse clutch end play:

0.65 - 1.00 mm (0.0256 - 0.0394 in)

- Select proper thickness of thrust washer so that reverse clutch end play is within specifications.

Thrust washer: Refer to SDS, AT-353.

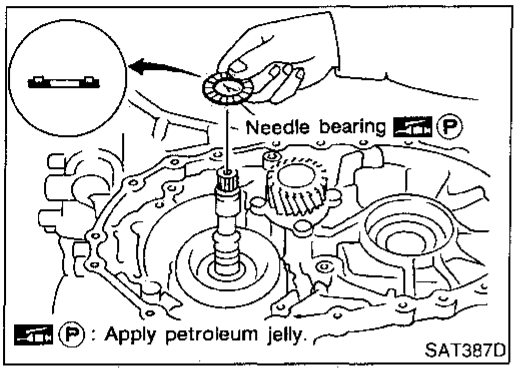
Assembly (3)

NCAT0177

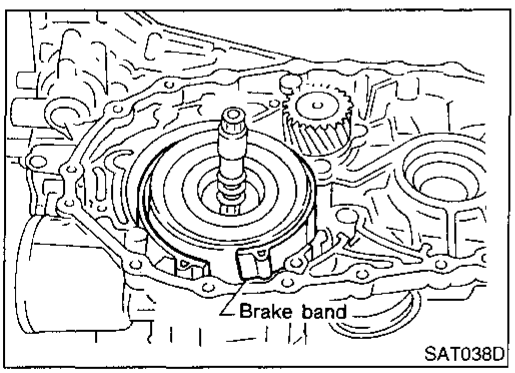
1. Remove reverse clutch assembly and install needle bearing on high clutch assembly.

- **Pay attention to direction of needle bearing.**

2. Install reverse clutch assembly.

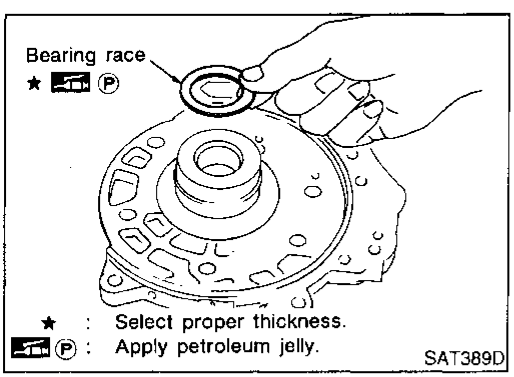


3. Install anchor end pin and lock nut on transmission case.
4. Place brake band on outside of reverse clutch drum. Tighten anchor end pin just enough so that brake band is evenly fitted on reverse clutch drum.



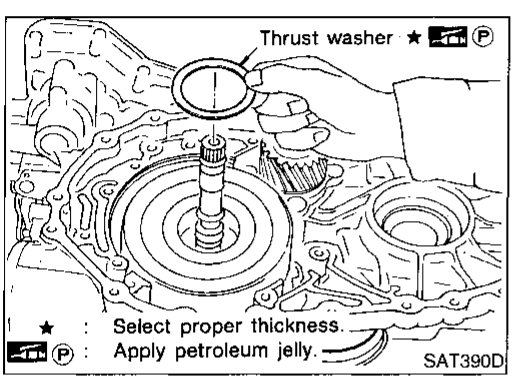
5. Place bearing race selected in total end play adjustment step on oil pump cover.

- **Apply petroleum jelly to bearing race.**

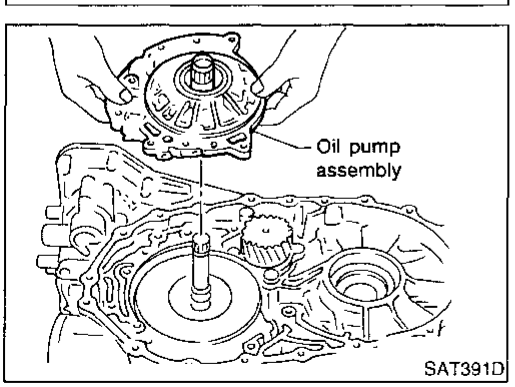


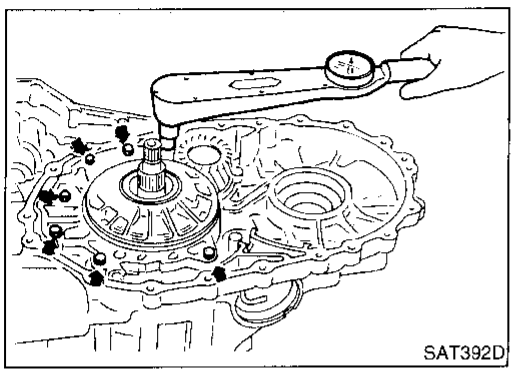
6. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.

- **Apply petroleum jelly to thrust washer.**

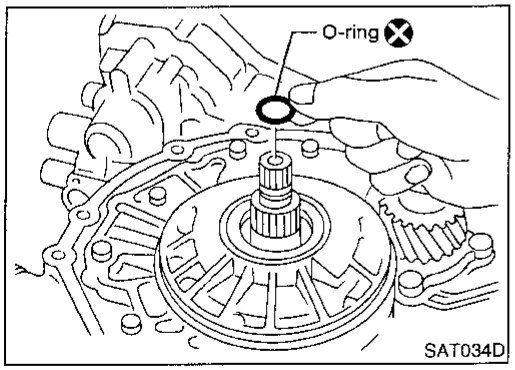


7. Install oil pump assembly on transmission case.



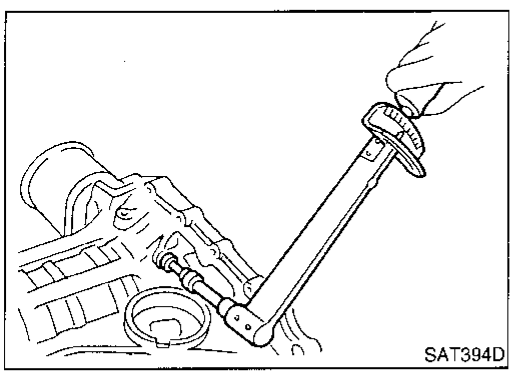

SAT392D

8. Tighten oil pump fixing bolts to specified torque.

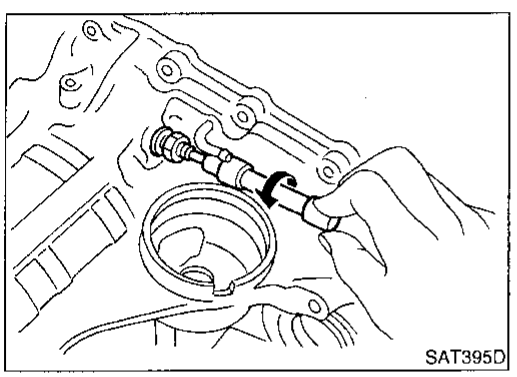


SAT034D

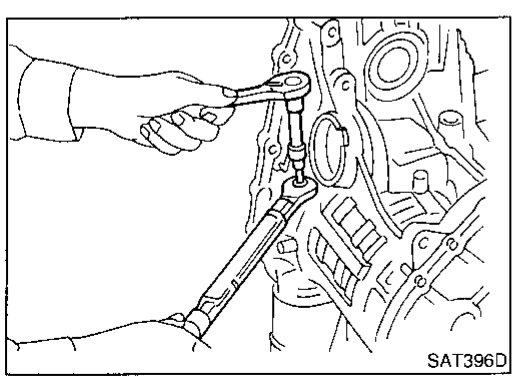
9. Install O-ring to input shaft.
- **Apply ATF to O-ring.**


SAT394D

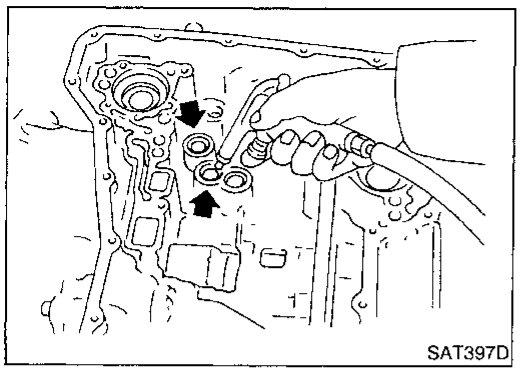
10. Adjust brake band.
a. Tighten anchor end pin to specified torque.
Anchor end pin:
: 3.9 - 5.9 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)


SAT395D

b. Back off anchor end pin two and a half turns.


SAT396D

c. While holding anchor end pin, tighten lock nut.

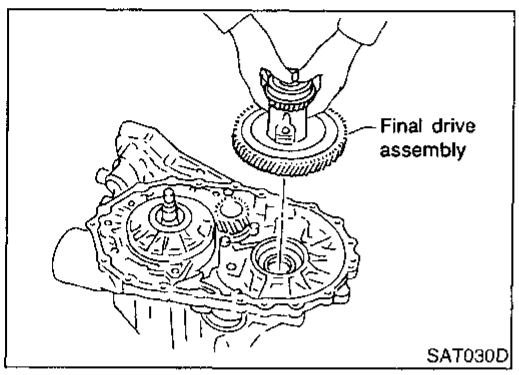

SAT397D

11. Apply compressed air to oil holes of transmission case and check operation of brake band.

Assembly (4)

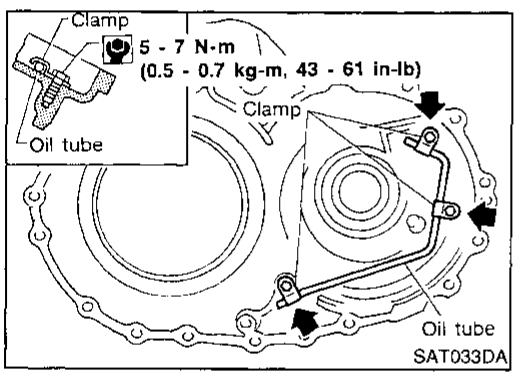
NCAT0178

1. Install final drive assembly on transmission case.



SAT030D

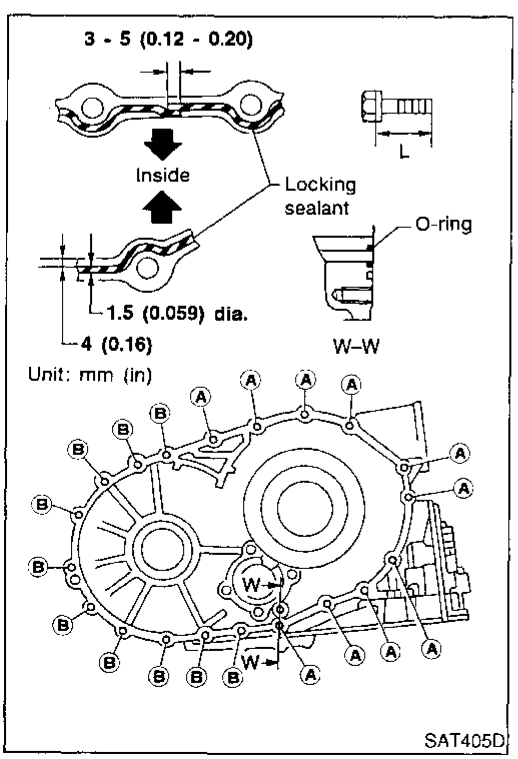
2. Install oil tube on converter housing.



SAT033DA

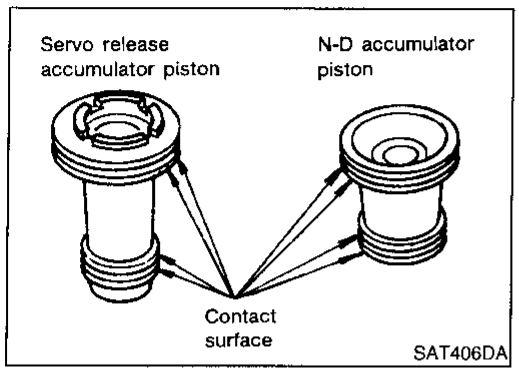
3. Install O-ring on differential oil port of transmission case.
4. Install converter housing on transmission case.

- **Apply locking sealant to mating surface of converter housing.**



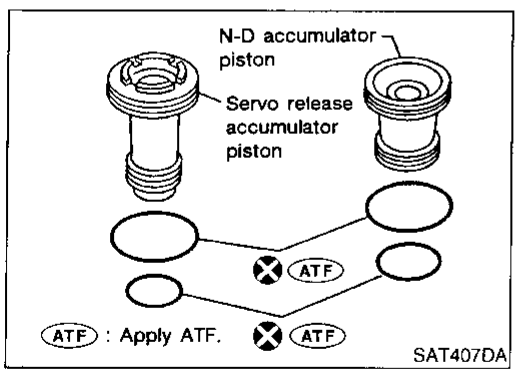
SAT405D

Bolt	Length mm (in)
A	32.8 (1.291)
B	40 (1.57)



5. Install accumulator piston.

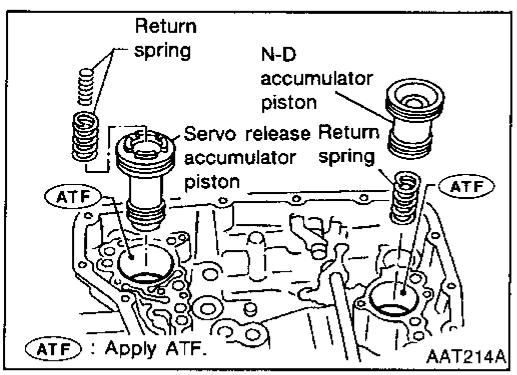
a. Check contact surface of accumulator piston for damage.



b. Install O-rings on accumulator piston.

- Apply ATF to O-rings.

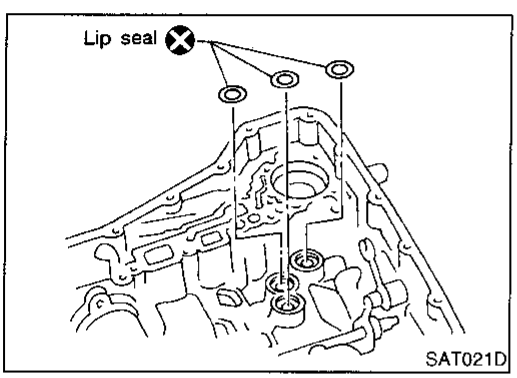
Accumulator piston O-rings:
Refer to SDS, AT-353.



c. Install accumulator pistons and return springs on transmission case.

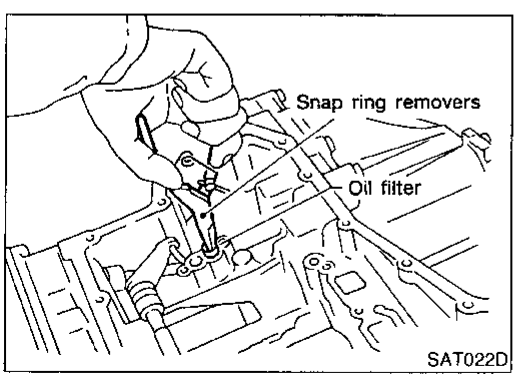
- **Apply ATF to inner surface of transmission case.**

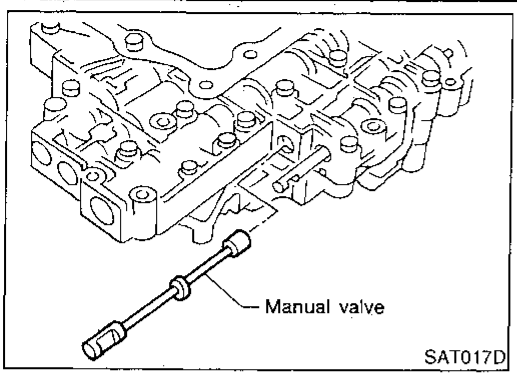
Return springs:
Refer to SDS, AT-353.



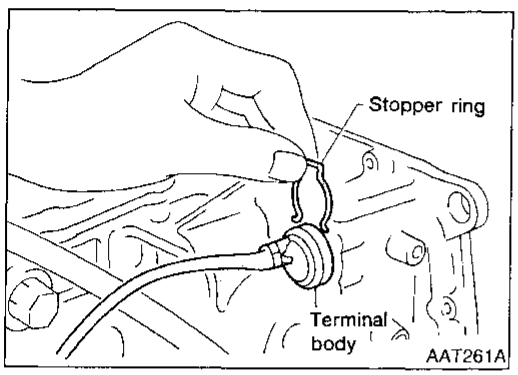
6. Install lip seals for band servo oil holes on transmission case.

- **Apply petroleum jelly to lip seals.**

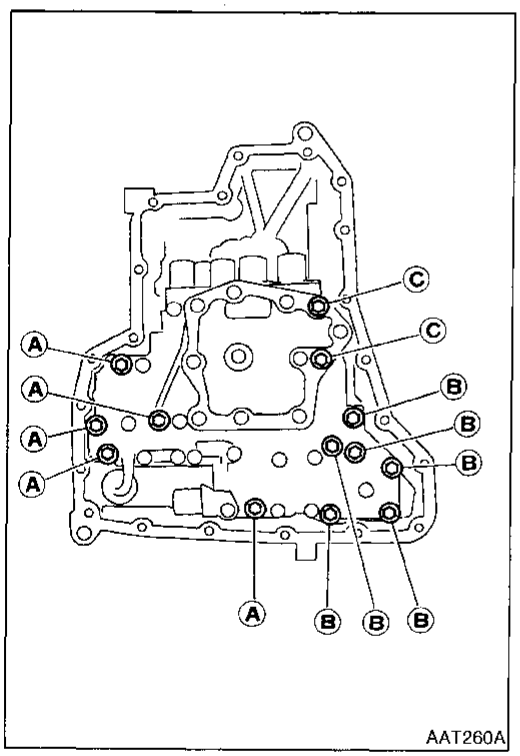




7. Install control valve assembly.
a. Insert manual valve into control valve assembly.
- **Apply ATF to manual valve.**



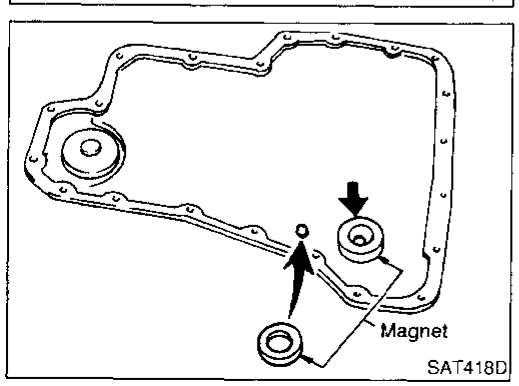
b. Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.
c. Install stopper ring to terminal body.



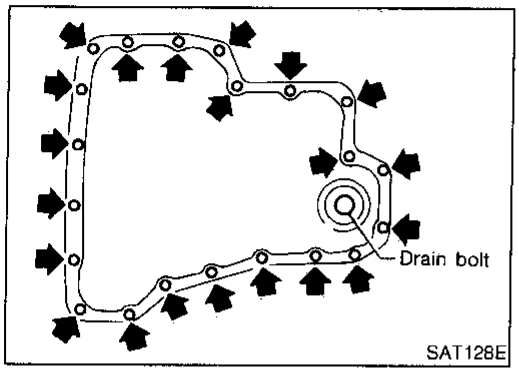
d. Tighten bolts **A**, **B** and **C**.
: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)

Bolt length, number and location

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

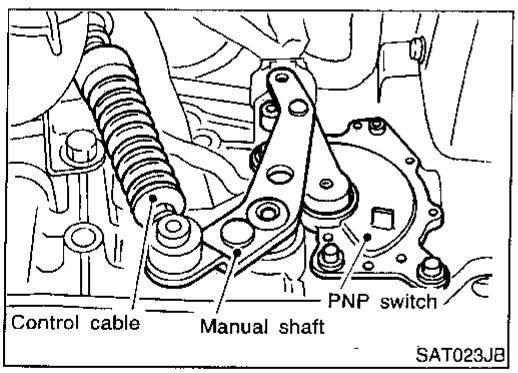


8. Install oil pan.
a. Attach magnet to oil pan.

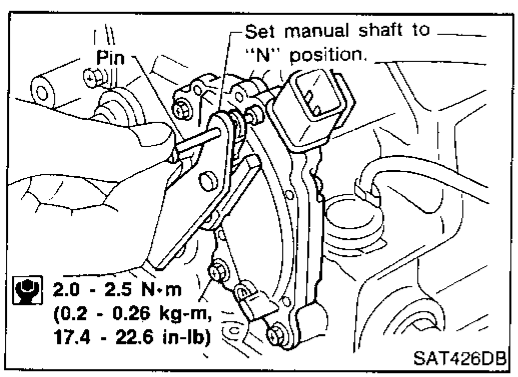


b. Install new oil pan gasket on transmission case.
c. Install oil pan on transmission case.
- **Always replace oil pan bolts as they are self-sealing bolts.**
- **Tighten the four bolts in a criss-cross pattern to prevent dislocation of gasket.**

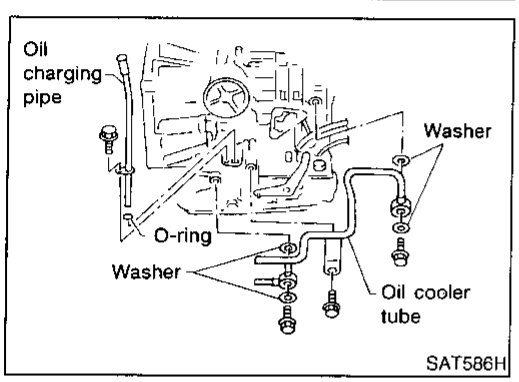
d. Tighten drain plug to specified torque.



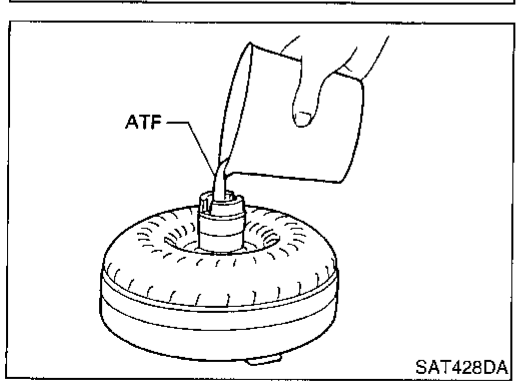
9. Install PNP switch.
a. Set manual shaft in "P" position.
b. Temporarily install PNP switch on manual shaft.
c. Move selector lever to "N" position.



d. Use a 4 mm (0.157 in) pin for this adjustment.
1) Insert the pin straight into the manual shaft adjustment hole.
2) Rotate PNP switch until the pin can also be inserted straight into hole in PNP switch.
e. Tighten PNP switch fixing bolts.
f. Remove pin from adjustment hole after adjusting PNP switch.

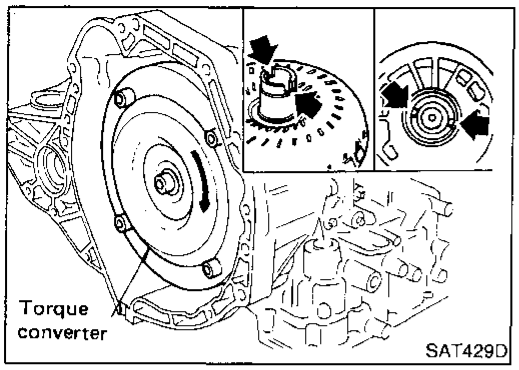


10. Install oil charging pipe and oil cooler tube to transmission case.

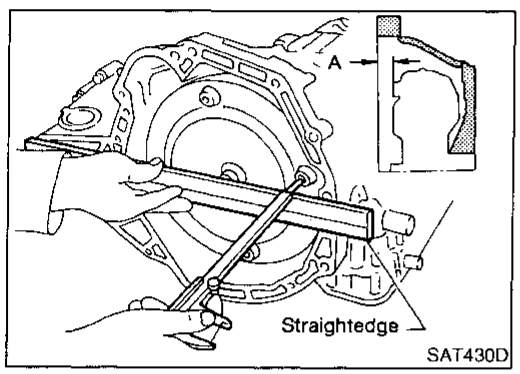


11. Install torque converter.
a. Pour ATF into torque converter.
- **Approximately 1 liter (1-1/8 US qt, 7/8 Imp qt) of fluid is required for a new torque converter.**
- **When reusing old torque converter, add the same amount of fluid as was drained.**

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

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

NCAT0180

VEHICLE SPEED WHEN SHIFTING GEARS

NCAT0180S01

Throttle position	Shift pattern	Vehicle speed km/h (MPH)						
		$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
Full throttle	Comfort	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/cm², 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)

Control Valves

CONTROL VALVE AND PLUG RETURN SPRINGS

NCAT0183

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

REVERSE CLUTCH

NCAT0184

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)

	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

FORWARD CLUTCH

NCAT0184S03

Number of drive plates		5
Number of driven plates		5
Drive plate thickness mm (in)	Standard	1.8 (0.071)
	Allowable limit	1.6 (0.063)
Clearance mm (in)	Standard	0.45 - 0.85 (0.0177 - 0.0335)
	Allowable limit	1.85 (0.0728)

	Thickness 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

OVERRUN CLUTCH

NCAT0184S04

Number of drive plates		3
Number of driven plates		4
Drive plate thickness mm (in)	Standard	1.6 (0.063)
	Allowable limit	1.4 (0.055)
Clearance mm (in)	Standard	1.0 - 1.4 (0.039 - 0.055)
	Allowable limit	2.0 (0.079)

	Thickness 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

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)	Outer	26.6 (1.047)	10.6 (0.417)	31505-31X02
	Inner	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)
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)

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

Input Shaft

NCAT0187

Unit: mm (in)

Input shaft seal ring clearance	Standard	0.08 - 0.23 (0.0031 - 0.0091)
	Allowable limit	0.23 (0.0091)

Planetary Carrier

NCAT0188

Unit: mm (in)

Clearance between planetary carrier and pinion washer	Standard	0.15 - 0.70 (0.0059 - 0.0276)
	Allowable limit	0.80 (0.0315)

Final Drive

DIFFERENTIAL SIDE GEAR CLEARANCE

NCAT0189

NCAT0189S01

Clearance between side gear and differential case with washer	0.1 - 0.2 mm (0.004 - 0.008 in)

DIFFERENTIAL SIDE GEAR THRUST WASHERS (FOR RE4F03A)

NCAT0189S02

Thickness mm (in)	Part number
0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115

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
0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115
Location	Viscous coupling side
Thickness mm (in)	Part number
0.70 - 0.75 (0.0276 - 0.0295)	38424-D2110
0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115
1.00 - 1.05 (0.0394 - 0.0413)	38424-D2116
1.05 - 1.10 (0.0413 - 0.0433)	38424-D2117
1.10 - 1.15 (0.0433 - 0.0453)	38424-D2118
1.15 - 1.20 (0.0453 - 0.0472)	38424-D2119
1.20 - 1.25 (0.0472 - 0.0492)	38424-D2120
1.25 - 1.30 (0.0492 - 0.0512)	38424-D2121
1.30 - 1.35 (0.0512 - 0.0531)	38424-D2122

BEARING PRELOAD

NCAT0189S03

Differential side bearing preload "T"	0.04 - 0.09 mm (0.0016 - 0.0035 in)

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)

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

TABLE FOR SELECTING DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS (FOR RE4F03A)

NCAT0189S06

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)

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

NCAT0190

BEARING PRELOAD

NCAT0190S01

Reduction pinion gear bearing preload	0.05 mm (0.0020 in)

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)

REDUCTION PINION GEAR BEARING ADJUSTING SHIMS

NCAT0190S03

Thickness mm (in)	Part number
1.74 (0.0685)	31438-31X16
1.78 (0.0701)	31438-31X17
1.82 (0.0717)	31438-31X18
1.86 (0.0732)	31438-31X19
1.90 (0.0748)	31438-31X20
1.92 (0.0756)	31439-31X60
1.94 (0.0764)	31438-31X21
1.96 (0.0772)	31439-31X61
1.98 (0.0780)	31438-31X22
2.00 (0.0787)	31439-31X62
2.02 (0.0795)	31438-31X23
2.04 (0.0803)	31439-31X63
2.06 (0.0811)	31438-31X24
2.08 (0.0819)	31439-31X64
2.10 (0.0827)	31438-31X60
2.12 (0.0835)	31439-31X65
2.14 (0.0843)	31438-31X61
2.16 (0.0850)	31439-31X66
2.18 (0.0858)	31438-31X62
2.20 (0.0866)	31439-31X67
2.22 (0.0874)	31438-31X63
2.24 (0.0882)	31439-31X68
2.26 (0.0890)	31438-31X64
2.28 (0.0898)	31439-31X69
2.30 (0.0906)	31438-31X65
2.34 (0.0921)	31438-31X66
2.38 (0.0937)	31438-31X67
2.42 (0.0953)	31438-31X68
2.46 (0.0969)	31438-31X69
2.50 (0.0984)	31438-31X70
2.54 (0.1000)	31438-31X71
2.58 (0.1016)	31438-31X72
2.62 (0.1031)	31438-31X73
2.66 (0.1047)	31438-31X74

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)

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)

Total End Play

NCAT0193

Total end play "T_3"	0.25 - 0.55 mm (0.0098 - 0.0217 in)

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

Reverse Clutch End Play

NCAT0194

Reverse clutch end play "T_4"	0.65 - 1.00 mm (0.0256 - 0.0394 in)

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

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

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

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

Removal and Installation

NCAT0197

Unit: mm (in)

Distance between end of converter housing and torque converter	15.9 (0.626) or more