AUTOMATIC TRANSMISSION

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Alphabetical & P No. Index for DTC

NBAT0179

ALPHABETICAL INDEX FOR DTC

NBAT0179S01

Items (CONSULT-II screen terms)	DTC CONSULT-II GST*1	Reference page
A/T 1ST GR FNCTN	P0731	AT-121
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A/T 3RD GR FNCTN	P0733	AT-133
A/T 4TH GR FNCTN	P0734	AT-139
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ATF TEMP SEN/CIRC	P0710	AT-106
ENGINE SPEED SIG	P0725	AT-117
L/PRESS SOL/CIRC	P0745	AT-162
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PNP SW/CIRC	P0705	AT-100
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SFT SOL B/CIRC*2	P0755	AT-172
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TP SEN/CIRC A/T*2	P1705	AT-176
VEH SPD SEN/CIR AT*3	P0720	AT-112

*1: These numbers are prescribed by SAE J2012.

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

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

P NO. INDEX FOR DTC

=NBAT0179S02

DTC CONSULT-II GST*1	Items (CONSULT-II screen terms)	Reference page
P0705	PNP SW/CIRC	AT-100
P0710	ATF TEMP SEN/CIRC	AT-106
P0720	VEH SPD SEN/CIR AT*3	AT-112
P0725	ENGINE SPEED SIG	AT-117
P0731	A/T 1ST GR FNCTN	AT-121
P0732	A/T 2ND GR FNCTN	AT-127
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P0744	A/T TCC S/V FNCTN	AT-154
P0745	L/PRESS SOL/CIRC	AT-162
P0750	SFT SOL A/CIRC*2	AT-168
P0755	SFT SOL B/CIRC*2	AT-172
P1705	TP SEN/CIRC A/T*2	AT-176
P1760	O/R CLTCH SOL/CIRC	AT-185

*1: These numbers are prescribed by SAE J2012.

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

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

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

NBAT0001

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

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

● For a side collision
  The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

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

WARNING:
● **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized INFINITI dealer.**
● **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
● **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow harness connector (and with yellow harness protector or yellow insulation tape before the harness connectors).**
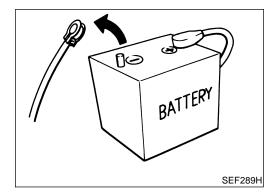
Precautions for On Board Diagnostic (OBD) System of A/T and Engine

NBAT0002

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

CAUTION:
● **Be sure to turn the ignition switch "OFF" and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
● **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to an open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
● **Be sure to route and secure the harnesses properly after work. Interference of the harness with a bracket, etc. may cause the MIL to light up due to a short circuit.**
● **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to a malfunction of the EGR system or fuel injection system, etc.**
● **Be sure to erase the unnecessary malfunction information (repairs completed) from the TCM and ECM before returning the vehicle to the customer.**
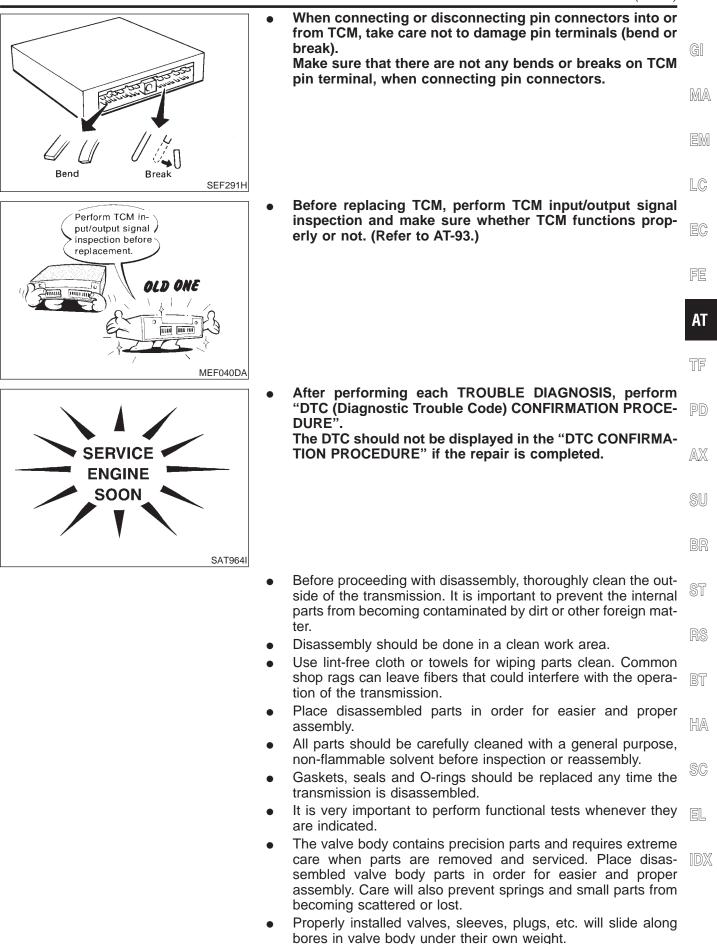
SEF289H

Precautions

NBAT0003

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

PRECAUTIONS

Bend   Break

SEF291H

● **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.

Perform TCM input/output signal inspection before replacement.

OLD ONE

MEF040DA

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

SERVICE ENGINE SOON

SAT964I

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

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

AT-7

- Before assembly, apply a coat of recommended ATF to all parts. Apply petroleum jelly to protect O-rings and seals, or hold bearings and washers in place during assembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to "ATF COOLER SERVICE", AT-9.
- After overhaul, refill the transmission with new ATF.
- When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF cooling system.
  Always follow the procedures when changing A/T fluid. Refer to MA-22, "Changing A/T Fluid".

Service Notice or Precautions

NBAT0004

FAIL-SAFE

NBAT0004S01

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

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

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

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

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

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

The SELF-DIAGNOSIS results will be as follows:

The first SELF-DIAGNOSIS will indicate damage to the vehicle speed sensor or the revolution sensor.

During the next SELF-DIAGNOSIS, performed after checking the sensor, no damages will be indicated.

TORQUE CONVERTER SERVICE

NBAT0004S04

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

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

The torque converter should not be replaced if:

- The fluid has an odor, is discolored, and there is no evidence of metal or clutch facing particles.

AT-8

PRECAUTIONS

● The threads in one or more of the converter bolt holes are damaged.

● Transmission failure did not display evidence of damaged or worn internal parts, steel particles or clutch plate lining material in unit and inside the fluid filter.

● Vehicle has been exposed to high mileage (only). The exception may be where the torque converter clutch dampener plate lining has seen excess wear by vehicles operated in heavy and/or constant traffic, such as taxi, delivery or police use.

ATF COOLER SERVICE

NBAT0004S02

Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer.

Replace radiator lower tank (which includes ATF cooler) with a new one and flush cooler line using cleaning solvent and compressed air. Refer to LC-21, "REMOVAL AND INSTALLATION".

OBD-II SELF-DIAGNOSIS

NBAT0004S03

● A/T self-diagnosis is performed by the TCM in combination with the ECM. The results can be read through the blinking pattern of the O/D OFF indicator or the malfunction indicator lamp (MIL). Refer to the table on AT-38 for the indicator used to display each self-diagnostic result.

● The self-diagnostic results indicated by the MIL are automatically stored in both the ECM and TCM memories.
Always perform the procedure "HOW TO ERASE DTC" on AT-35 to complete the repair and avoid unnecessary blinking of the MIL.

● The following self-diagnostic items can be detected using ECM self-diagnostic results mode* only when the O/D OFF indicator lamp does not indicate any malfunctions.

– PNP switch

– A/T 1st, 2nd, 3rd, or 4th gear function

– A/T TCC S/V function (lock-up)

*: For details of OBD-II, refer to EC-71, "Introduction".

● **Certain systems and components, especially those related to OBD, may use the new style slide-locking type harness connector. For description and how to disconnect, refer to EL-6, "Description".**

Wiring Diagrams and Trouble Diagnosis

NBAT0005

When you read wiring diagrams, refer to the following:

● GI-11, "HOW TO READ WIRING DIAGRAMS".

● EL-10, "POWER SUPPLY ROUTING" for power distribution circuit.

When you perform trouble diagnosis, refer to the following:

● GI-35, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES".

● GI-24, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".
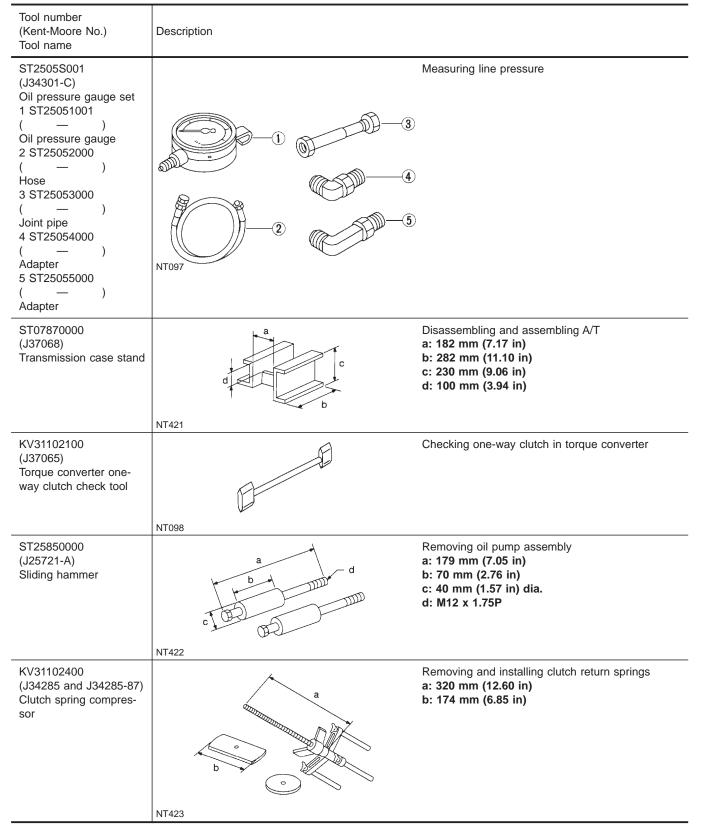
Special Service Tools

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

NBAT0006

Tool number (Kent-Moore No.) Tool name	Description
ST2505S001 (J34301-C) Oil pressure gauge set 1 ST25051001 (—) Oil pressure gauge 2 ST25052000 (—) Hose 3 ST25053000 (—) Joint pipe 4 ST25054000 (—) Adapter 5 ST25055000 (—) Adapter	Measuring line pressure NT097
ST07870000 (J37068) Transmission case stand	Disassembling and assembling A/T **a: 182 mm (7.17 in)** **b: 282 mm (11.10 in)** **c: 230 mm (9.06 in)** **d: 100 mm (3.94 in)** NT421
KV31102100 (J37065) Torque converter one-way clutch check tool	Checking one-way clutch in torque converter NT098
ST25850000 (J25721-A) Sliding hammer	Removing oil pump assembly **a: 179 mm (7.05 in)** **b: 70 mm (2.76 in)** **c: 40 mm (1.57 in) dia.** **d: M12 x 1.75P** NT422
KV31102400 (J34285 and J34285-87) Clutch spring compressor	Removing and installing clutch return springs **a: 320 mm (12.60 in)** **b: 174 mm (6.85 in)** NT423

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

AT-11

A/T Electrical Parts Location

NBAT0007

T/F dropping resistor

Front

A/T dropping resistor

Air duct

Throttle position sensor harness connector

Throttle position switch harness connector

A/T OIL TEMP

BRAKE

O/D OFF indicator lamp

Overdrive control switch

Data link connector

Brake pedal

CONSULT-II

Remove heat insulator.

Revolution sensor harness connector

A/T solenoid valve harness connector

Heat insulator

PNP switch harness connector

Turbine revolution sensor harness connector

2WD

Revolution sensor

Turbine revolution sensor

PNP switch

4WD

Revolution sensor

Turbine revolution sensor

PNP switch

Engine hood opener cable

TCM

Shift solenoid valve A
Shift solenoid valve B
Line pressure solenoid valve

Overrun clutch solenoid valve

A/T fluid temperature sensor

A/T fluid temperature switch

Torque converter clutch solenoid valve

(Control valve upper body)

(Control valve lower body)

SAT124K

Circuit Diagram

NBAT0008

4W : With 4—wheel drive
IC : With ICC
OI : Without ICC

ECM
91
58
86
56
25
111
82
114
32
41
33

THROTTLE POSITION SENSOR

REAR REVOLUTION SENSOR
42
39
To tachometer
25
29
48

A/T FLUID TEMPERATURE SENSOR
47

A/T DROPPING RESISTOR
2
LINE PRESSURE SOLENOID VALVE
1

TURBINE REVOLUTION SENSOR
38
OVERRUN CLUTCH SOLENOID VALVE
20

SHIFT SOLENOID VALVE B
12

DATA LINK CONNECTOR
30
31
SHIFT SOLENOID VALVE A
11

TCM (TRANSMISSION CONTROL MODULE)

TRANSFER CONTROL UNIT (4W)
29
4W
46
TORQUE CONVERTER CLUTCH SOLENOID VALVE
3

THROTTLE POSITION SWITCH
CLOSED
16
17
WIDE OPEN
IC

A/T DEVICE (OVERDRIVE CONTROL SWITCH)
22

FUSE

FUSE
10
19
36
35

IGNITION SWITCH ON or START

A/T FLUID TEMP. 4W
A/T FLUID TEMPERATURE SWITCH 4W
4W
1
4

PARK/NEUTRAL POSITION SWITCH
P R N D 2 1
26 27 34 35
28
13
O/D OFF
61

FUSE
45
40
13
18
24
66

To starting system
To back-up lamp

ASCD CONTROL UNIT: OI
16
10
6

UNIFIED METER CONTROL UNIT (With odo/trip meter)
COMBINATION METER

BATTERY
FUSE
15
63
59

FUSE

STOP LAMP SWITCH
ICC UNIT: IC
53
61
55
62
63
67
59

ABS ACTUATOR AND ELECTRIC UNIT
19

MAT138B

AT-13

Cross-sectional View

NBAT0010

Reverse clutch drum

Brake band

Brake band

Output shaft

Low & reverse brake

Low one-way clutch

Forward one-way clutch

Overrun clutch

Forward clutch

Rear planetary gear

Front planetary gear

Reverse clutch

High clutch

Brake band

Transmission case

Converter housing

Torque converter

Torque converter clutch piston

Control valve

Oil pump

Input shaft

SAT150K

AT-14

Hydraulic Control Circuit

NBAT0011

D, 2 and 1 line pressure check port

N-D accumulator

Overrun clutch reducing valve

1st reducing valve

1-2 accumulator

2-3 accumulator

Overrun clutch control valve

Shuttle shift valve S

Overrun clutch solenoid valve

Shift solenoid valve A

3-4 (N-R) accumulator

Shift valve A

4-2 relay valve

Shift solenoid valve B

Shift valve B

4-2 sequence valve

Manual valve

Low & reverse brake

"R" line pressure check port

3-2 timing valve

PRND21

Forward clutch

Overrun clutch

Low one-way clutch

Torque converter clutch solenoid valve

Shuttle shift valve D

Accumulator control valve

Band servo

Reverse clutch

High clutch

Forward one-way clutch

Torque converter clutch control valve

Torque converter clutch control plug

Lock-up solenoid

Servo changer valve

Filter

Pilot valve

Line pressure solenoid valve

Torque converter relief valve

Front lubrication

Rear lubrication

Pressure modifier valve

Modifier accumulator valve

Pressure regulator plug

Pressure regulator valve

Feedback accumulator piston

Oil pump

Oil cooler

SAT706K

Shift Mechanism

NBAT0012

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

It also employs an optimum shift control and superwide gear ratios. They improve starting performance and acceleration during medium and high-speed operation.

Two one-way clutches are also employed: one is used for the forward clutch and the other for the low clutch. These one-way clutches, combined with four accumulators, reduce shifting shock to a minimum.

CONSTRUCTION

NBAT0012S01

SAT509I

1. Torque converter clutch piston
2. Torque converter
3. Oil pump
4. Input shaft
5. Brake band
6. Reverse clutch
7. High clutch
8. Front pinion gear

9. Front sun gear
10. Front internal gear
11. Front planetary carrier
12. Rear sun gear
13. Rear pinion gear
14. Rear internal gear
15. Rear planetary carrier
16. Forward clutch

17. Forward one-way clutch
18. Overrun clutch
19. Low one-way clutch
20. Low & reverse brake
21. Parking pawl
22. Parking gear
23. Output shaft

FUNCTION OF CLUTCH AND BRAKE

NBAT0012S02

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

CLUTCH AND BAND CHART

NBAT0012S03

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

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

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

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

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

○ : 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

=NBAT0012S04

"N" and "P" Positions
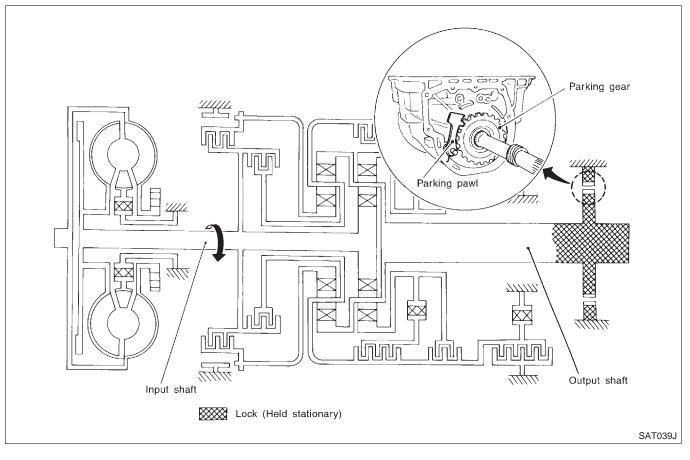
NBAT0012S0401
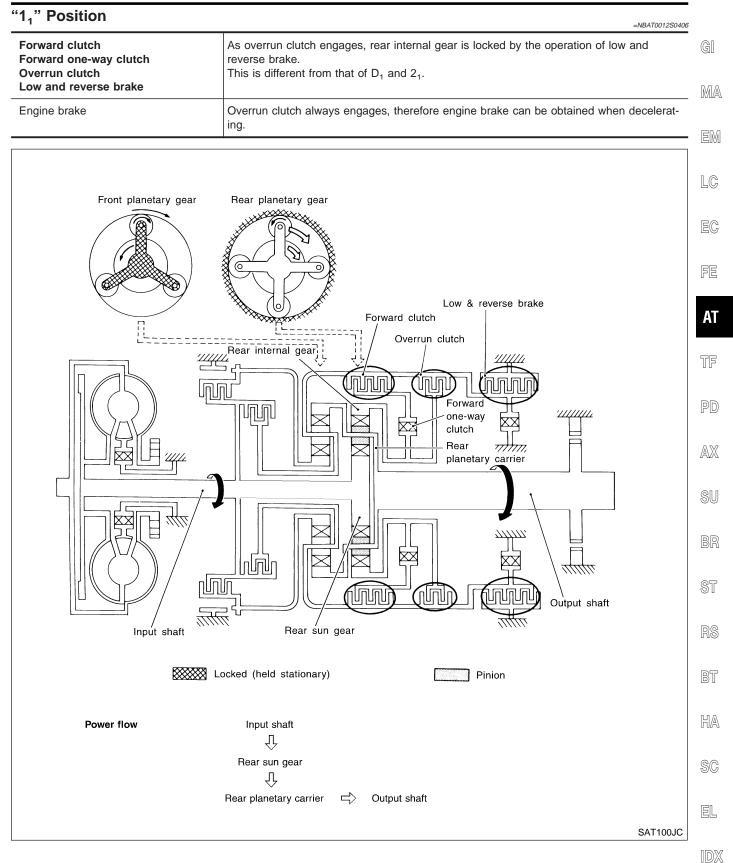
● "N" position
No control members operate. Power from the input shaft is not transmitted to the output shaft since the clutch does not operate.

● "P" position
Similar to the "N" position, no control members operate. The parking pawl interconnected with the select lever engages with the parking gear to mechanically hold the output shaft so that the power train is locked.

Parking gear

Parking pawl

Input shaft

Output shaft

▨▨▨ Lock (Held stationary)

SAT039J

"1_1" Position

=NBAT0012S0406

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.

Front planetary gear
Rear planetary gear

Low & reverse brake
Forward clutch
Overrun clutch
Rear internal gear
Forward one-way clutch
Rear planetary carrier
Input shaft
Rear sun gear
Output shaft

Locked (held stationary)
Pinion

Power flow

Input shaft
⇩
Rear sun gear
⇩
Rear planetary carrier ⇨ Output shaft

SAT100JC

Shift Mechanism (Cont'd)

"D_1" and "2_1" Positions

=NBAT0012S0402

Forward one-way clutch **Forward clutch** **Low one-way clutch**	Rear internal gear is locked to rotate counterclockwise because of the functioning of these three clutches. (Start-up at D_1)
Overrun clutch engagement conditions (Engine brake)	D_1: Overdrive control switch in "OFF" Throttle opening less than 3/16 2_1: Throttle opening less than 3/16 At D_1 and 2_1 positions, engine brake is not activated due to free turning of low one-way clutch.

SAT096J

"D$_2$", "2$_2$" and "1$_2$" Positions

=NBAT0012S0403

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 in "OFF" Throttle opening less than 3/16 2$_2$: Throttle opening less than 3/16 1$_2$: Always engaged

SAT097J

"D₃" Position

=NBAT0012S0404

High clutch **Forward clutch** **Forward one-way clutch**	Input power is transmitted to front planetary carrier through high clutch. And front planetary carrier is connected to rear internal gear by operation of forward clutch and forward one-way clutch. This rear internal gear rotation and another input (the rear sun gear) accompany rear planetary carrier to turn at the same speed.
Overrun clutch engagement conditions	D₃: Overdrive control switch in "OFF" Throttle opening less than 3/16

SAT098J

AT-22

"D$_4$" (OD) Position
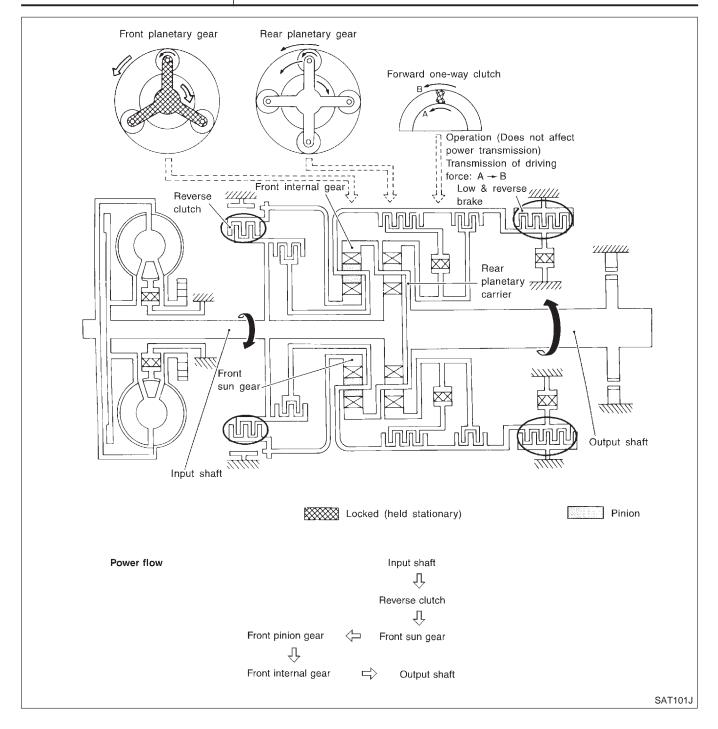
=NBAT0012S0405

High clutch **Brake band** **Forward clutch** (Does not affect power transmission)	Input power is transmitted to front carrier through high clutch. This front planetary carrier turns around the sun gear which is fixed by brake band and makes front internal gear (output) turn faster.
Engine brake	At 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

SAT099J

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

Shift Mechanism (Cont'd)

"R" Position

=NBAT0012S0407

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.

Front planetary gear   Rear planetary gear

Forward one-way clutch

B

A

Operation (Does not affect power transmission)
Transmission of driving force: A → B

Reverse clutch

Front internal gear

Low & reverse brake

Rear planetary carrier

Front sun gear

Output shaft

Input shaft

Locked (held stationary)   Pinion

Power flow

Input shaft
⇩
Reverse clutch
⇩
Front pinion gear ⇐ Front sun gear
⇩
Front internal gear ⇒ Output shaft

SAT101J

Control System

=NBAT0013

OUTLINE

NBAT0013S01
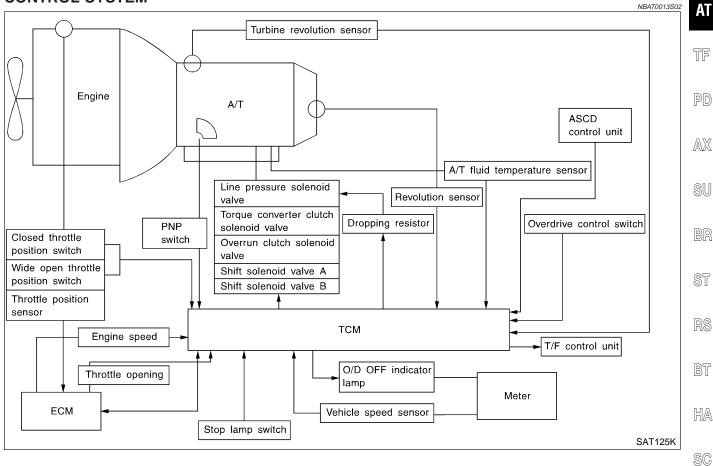
The automatic transmission senses vehicle operating conditions through various sensors. It always controls the optimum shift position and reduces shifting and lock-up shocks.

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

CONTROL SYSTEM

NBAT0013S02

SAT125K

TCM FUNCTION

=NBAT0013S03

The function of the TCM is to:

- Receive input signals sent from various switches and sensors.
- Determine required line pressure, shifting point, lock-up operation, and engine brake operation.
- Send required output signals to the respective solenoids.

INPUT/OUTPUT SIGNAL OF TCM

NBAT0013S04

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

Control Mechanism

NBAT0180

LINE PRESSURE CONTROL

NBAT0180S01
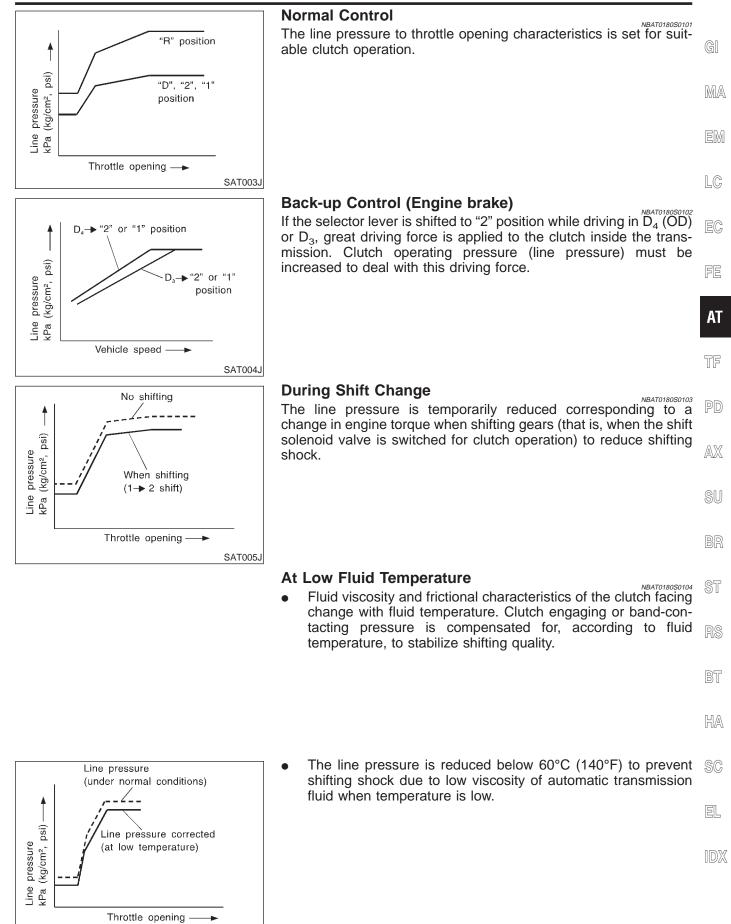
TCM has the various line pressure control characteristics to meet the driving conditions.

An ON-OFF duty signal is sent to the line pressure solenoid valve based on TCM characteristics.
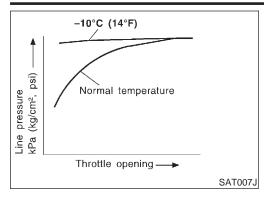
Hydraulic pressure on the clutch and brake is electronically controlled through the line pressure solenoid valve to accommodate engine torque. This results in smooth shift operation.

SAT003J

Normal Control

NBAT0180S0101

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

SAT004J

Back-up Control (Engine brake)

NBAT0180S0102

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.

SAT005J

During Shift Change

NBAT0180S0103

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

NBAT0180S0104

- 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.

SAT006J

- 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.

SAT007J

- 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

NBAT0180S02

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.

SAT008J

Control of Shift Solenoid Valves A and B

NBAT0180S0201
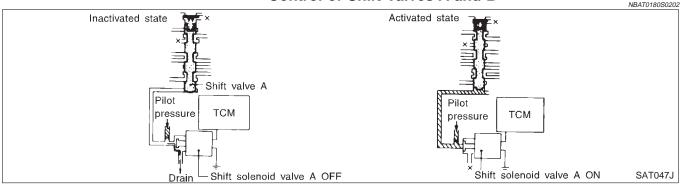
The TCM activates shift solenoid valves A and B according to signals from the throttle position sensor and revolution sensor to select the optimum gear position on the basis of the shift schedule memorized in the TCM.

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

[Relation between shift solenoid valves A and B and gear positions]

Shift solenoid valve	Gear position				
	D_1, 2_1, 1_1	D_2, 2_2, 1_2	D_3	D_4 (OD)	N-P
A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)	ON (Closed)
B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)

Control of Shift Valves A and B

NBAT0180S0202

SAT047J

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

NBAT0180S03

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

Conditions for Lock-up Operation

NBAT0180S0301
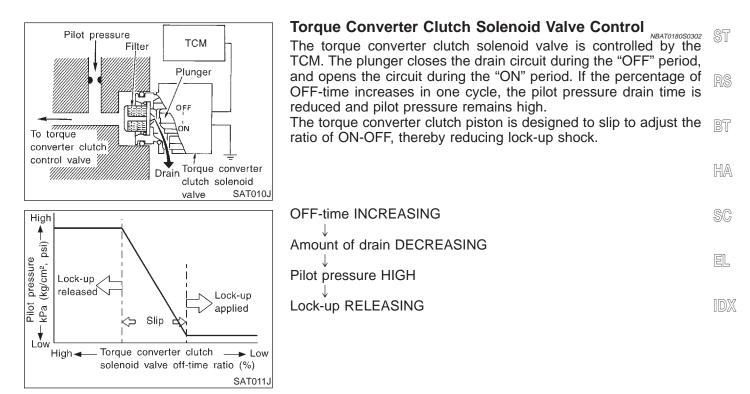
When vehicle is driven in 3rd or 4th gear position, vehicle speed and throttle opening are detected. If the detected values fall within the lock-up zone memorized in the TCM, lock-up is performed.

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)	

SAT010J

Torque Converter Clutch Solenoid Valve Control

NBAT0180S0302

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

SAT011J

Torque Converter Clutch Control Valve Operation
NBAT0180S0303

SAT048J

Lock-up Released
The OFF-duration of the torque converter clutch solenoid valve is long, and pilot pressure is high. The pilot pressure pushes the end face of the torque converter clutch control valve in combination with spring force to move the valve to the left. As a result, converter pressure is applied to chamber A (torque converter clutch piston release side). Accordingly, the torque converter clutch piston remains unlocked.

Lock-up Applied
When the OFF-duration of the torque converter clutch solenoid valve is short, pilot pressure drains and becomes low. Accordingly, the control valve moves to the right by the pilot pressure of the other circuit and converter pressure. As a result, converter pressure is applied to chamber B, keeping the torque converter clutch piston applied.

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

OVERRUN CLUTCH CONTROL (ENGINE BRAKE CONTROL)
NBAT0180S04
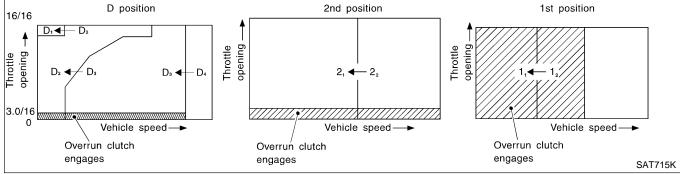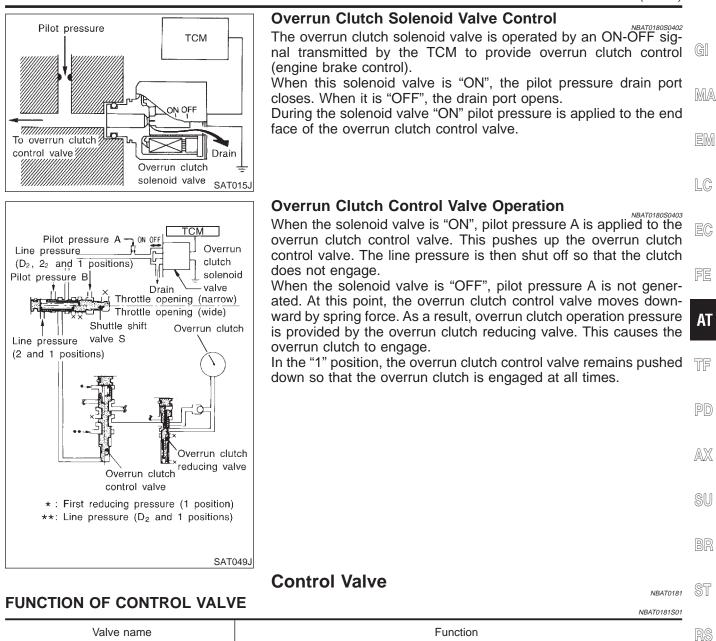
Forward one-way clutch is used to reduce shifting shocks in downshifting operations. This clutch transmits engine torque to the wheels. However, drive force from the wheels is not transmitted to the engine because the one-way clutch rotates idle. This means the engine brake is not effective.

The overrun clutch operates when the engine brake is needed.

Overrun Clutch Operating Conditions
NBAT0180S0401

	Gear position	Throttle opening
"D" position	D_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

SAT715K

SAT015J

Overrun Clutch Solenoid Valve Control

NBAT0180S0402

The overrun clutch solenoid valve is operated by an ON-OFF signal transmitted by the TCM to provide overrun clutch control (engine brake control).

When this solenoid valve is "ON", the pilot pressure drain port closes. When it is "OFF", the drain port opens.

During the solenoid valve "ON" pilot pressure is applied to the end face of the overrun clutch control valve.

Overrun Clutch Control Valve Operation

NBAT0180S0403

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

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

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

* : First reducing pressure (1 position)
**: Line pressure (D_2 and 1 positions)

SAT049J

Control Valve

NBAT0181

FUNCTION OF CONTROL VALVE

NBAT0181S01

Valve name	Function
• Pressure regulator valve • Pressure regulator plug • Pressure regulator sleeve plug	Regulate oil discharged from the oil pump to provide optimum line pressure for all driving conditions.
Pressure modifier valve	Used as a signal supplementary valve to the pressure regulator valve. Regulates pressure-modifier pressure (signal pressure) which controls optimum line pressure for all driving conditions.
Modifier accumulator piston	Smooths hydraulic pressure regulated by the pressure modifier valve to prevent pulsations.
Pilot valve	Regulates line pressure to maintain a constant pilot pressure level which controls lock-up mechanism, overrun clutch, 3-2 timing required for shifting.
Accumulator control valve Accumulator control sleeve	Regulate accumulator back-pressure to pressure suited to driving conditions.
Manual valve	Directs line pressure to oil circuits corresponding to select positions. Hydraulic pressure drains when the shift lever is in Neutral.

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

Control Valve (Cont'd)

Valve name	Function
Shift valve A	Simultaneously switches three oil circuits using output pressure of shift solenoid valve A to meet driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve B.
Shift valve B	Simultaneously switches three oil circuits using output pressure of shift solenoid valve B in relation to driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve A.
Shuttle shift valve S	Switches hydraulic circuits to provide 3-2 timing control and overrun clutch control in relation to the throttle opening. Inactivates the overrun clutch to prevent interlocking in 4th gear when the throttle is wide open.
Overrun clutch control valve	Switches hydraulic circuits to prevent engagement of the overrun clutch simultaneously with application of the brake band in 4th gear. (Interlocking occurs if the overrun clutch engages during D_4 gear operation.)
4-2 relay valve	Memorizes that the transmission is in 4th gear. Prevents the transmission from downshifting from 4th gear to 3rd and then to 2nd in combination with 4-2 sequence valve and shift valves A and B when downshifting from 4th to 2nd gear.
4-2 sequence valve	Prevents band servo pressure from draining before high clutch operating pressure and band servo releasing pressure drain (from the same circuit) during downshifting from 4th to 2nd gear.
Servo charger valve	An accumulator and a one-way orifice are used in the 2nd gear band servo oil circuit to dampen shifting shock when shifting from 1st to 2nd gear. To maintain adequate flow rate when downshifting from 4th or 3rd gear to 2nd gear, the servo charger valve directs 2nd gear band servo hydraulic pressure to the circuit without going through the one-way orifice when downshifting from 3rd or a higher gear.
3-2 timing valve	Prevents a late operation of the brake band when shifting selector lever from "D" to "1" or "2" position while driving in D_3.
"1" reducing valve	Reduces low & reverse brake pressure to dampen engine-brake shock when downshifting from the "1" position 2nd gear to 1st gear.
Overrun clutch reducing valve	Reduces oil pressure directed to the overrun clutch and prevents engine-brake shock. In "1" and "2" positions, line pressure acts on the overrun clutch reducing valve to increase the pressure-regulating point, with resultant engine brake capability.
Torque converter relief valve	Prevents an excessive rise in torque converter pressure.
Torque converter clutch control valve, torque converter clutch control plug and torque converter clutch control sleeve	Activate or inactivate the lock-up function. Also provide smooth lock-up through transient application and release of the lock-up system.
Shuttle shift valve D	Switches hydraulic circuits so that output pressure of the torque converter clutch solenoid valve acts on the lock-up valve in the "D" position of 2nd, 3rd and 4th gears. (In the "D" position 1st gear, lock-up is inhibited.) ● Lock-up control is not affected in "D" position 2nd, 3rd or 4th gears, unless output pressure of the torque converter clutch solenoid valve is generated by a signal from the control unit.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Introduction

NBAT0014

The A/T system has two self-diagnostic systems.

The first is the emission-related on board diagnostic system (OBD-II) performed by the TCM in combination with the ECM. The malfunction is indicated by the MIL (malfunction indicator lamp) and is stored as a DTC in the ECM memory but not the TCM memory.

The second is the TCM original self-diagnosis indicated by the O/D OFF indicator lamp. The malfunction is stored in the TCM memory. The detected items are overlapped with OBD-II self-diagnostic items. For detail, refer to AT-38.

OBD-II Function for A/T System

NBAT0182

The ECM provides emission-related on board diagnostic (OBD-II) functions for the A/T system. One function is to receive a signal from the TCM used with OBD-related parts of the A/T system. The signal is sent to the ECM when a malfunction occurs in the corresponding OBD-related part. The other function is to indicate a diagnostic result by means of the MIL (malfunction indicator lamp) on the instrument panel. Sensors, switches and solenoid valves are used as sensing elements.

The MIL automatically illuminates in One or Two Trip Detection Logic when a malfunction is sensed in relation to A/T system parts.

One or Two Trip Detection Logic of OBD-II

NBAT0015

ONE TRIP DETECTION LOGIC

NBAT0015S01

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

NBAT0015S02

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

If the same malfunction as that experienced during the first test drive is sensed during the second test drive, the MIL will illuminate. — Second Trip

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

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

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

OBD-II Diagnostic Trouble Code (DTC)

NBAT0016

HOW TO READ DTC AND 1ST TRIP DTC

NBAT0016S01

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

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

These DTCs are prescribed by SAE J2012.

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

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

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

AT-33

```
            SELECT SYSTEM

               A/T

              ENGINE




                              SAT014K
```

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

```
         SELF-DIAG RESULTS

    DTC RESULTS      TIME

      PNP SW/CIRC
       [P0705]        0




                              SAT015K
```

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

```
         SELF-DIAG RESULTS

    DTC RESULTS      TIME

      PNP SW/CIRC
       [P0705]        1 t




                              SAT016K
```

Freeze Frame Data and 1st Trip Freeze Frame Data

NBAT0016S0101

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

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data, and the data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For detail, refer to EC-96, "CONSULT-II".

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

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

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

HOW TO ERASE DTC

NBAT0016S02

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

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

The following emission-related diagnostic information is cleared from the ECM memory when erasing DTC related to OBD-II. For details, refer to EC-72, "Emission-related Diagnostic Information".

- **Diagnostic trouble codes (DTC)**

- **1st trip diagnostic trouble codes (1st trip DTC)**
- **Freeze frame data**
- **1st trip freeze frame data**

- **System readiness test (SRT) codes**
- **Test values**
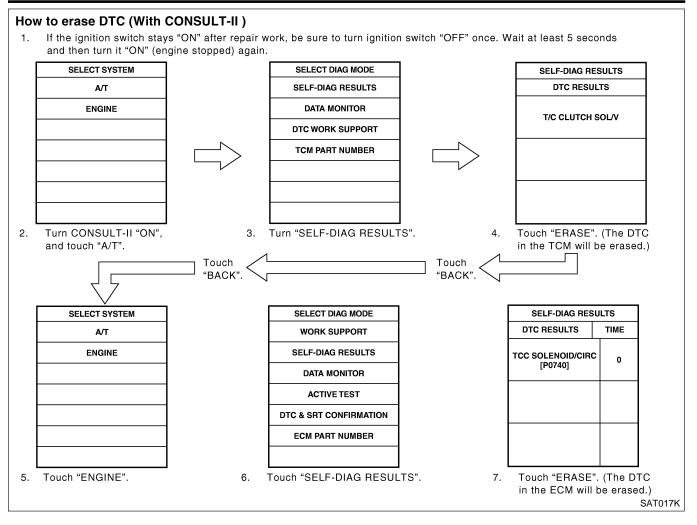
HOW TO ERASE DTC (WITH CONSULT-II)

NBAT0016S03

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

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Turn CONSULT-II "ON" and touch "A/T".

3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". (The DTC in the TCM will be erased.) Then touch "BACK" twice.

5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

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

SELECT SYSTEM
A/T
ENGINE

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

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

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

3. Turn "SELF-DIAG RESULTS".

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

Touch "BACK".

Touch "BACK".

SELECT SYSTEM
A/T
ENGINE

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

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

5. Touch "ENGINE".

6. Touch "SELF-DIAG RESULTS".

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

SAT017K

HOW TO ERASE DTC (WITH GST)

NBAT0016S04

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-46. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with Generic Scan Tool (GST). For details, refer to EC-110, "DESCRIPTION".

HOW TO ERASE DTC (NO TOOLS)

NBAT0016S05

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-46. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

SAT964I

Malfunction Indicator Lamp (MIL)

=NBAT0183

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
- If the MIL does not light up, refer to EL-10, "Schematic". (Or refer to EC-714, "Wiring Diagram".)
2. When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction. For detail, refer to EC-71, "Introduction".

CONSULT-II

NBAT0184

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

NOTICE:

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

2) Shift schedule (which implies gear position) displayed on CONSULT-II and that indicated in Service Manual may differ slightly. This occurs because of the following reasons:
- Actual shift schedule has more or less tolerance or allowance,
- Shift schedule indicated in Service Manual refers to the point where shifts start, and
- Gear position displayed on CONSULT-II indicates the point where shifts are completed.

3) Shift solenoid valve "A" or "B" is displayed on CONSULT-II at the start of shifting. Gear position is displayed upon completion of shifting (which is computed by TCM).

4) Additional CONSULT-II information can be found in the Operation Manual supplied with the CONSULT-II unit.

Ⓔ SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)

NBAT0184S01

1. Turn on CONSULT-II and touch "ENGINE" for OBD-II detected items or touch "A/T" for TCM self-diagnosis. If A/T is not displayed, check TCM power supply and ground circuit. Refer to AT-93. If result is NG, refer to EL-10, "Schematic".

SELECT SYSTEM
A/T
ENGINE

SAT014K

AT-37

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

```
┌─────────────────────────┐
│      REAL-TIME DIAG      │
├─────────────────────────┤
│      ENG SPEED SIG       │
├─────────────────────────┤
│                         │
├─────────────────────────┤
│                         │
├─────────────────────────┤
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│                         │
└─────────────────────────┘
                  SAT987J
```

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

SELF-DIAGNOSTIC RESULT TEST MODE

NBAT0184S02

Detected items (Screen terms for CONSULT-II, "SELF-DIAG RESULTS" test mode)		Malfunction is detected when ...	TCM self-diagnosis — Available by O/D OFF indicator lamp	OBD-II (DTC) — Available by malfunction indicator lamp*2, "ENGINE" on CONSULT-II or GST
"A/T"	"ENGINE"			
PNP switch circuit		• TCM does not receive the correct voltage signal (based on the gear position) from the switch.	—	P0705
—	PNP SW/CIRC			
Revolution sensor		• TCM does not receive the proper voltage signal from the sensor.	X	P0720
VHCL SPEED SEN·A/T	VEH SPD SEN/CIR AT			
Vehicle speed sensor (Meter)		• TCM does not receive the proper voltage signal from the sensor.	X	—
VHCL SPEED SEN·MTR	—			
A/T 1st gear function		• A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	—	P0731*1
—	A/T 1ST GR FNCTN			
A/T 2nd gear function		• A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	—	P0732*1
—	A/T 2ND GR FNCTN			
A/T 3rd gear function		• A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	—	P0733*1
—	A/T 3RD GR FNCTN			
A/T 4th gear function		• A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	—	P0734*1
—	A/T 4TH GR FNCTN			
A/T TCC S/V function (lock-up)		• A/T cannot perform lock-up even if electrical circuit is good.	—	P0744*1
—	A/T TCC S/V FNCTN			
Shift solenoid valve A		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0750
SHIFT SOLENOID/V A	SFT SOL A/CIRC			
Shift solenoid valve B		• TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0755
SHIFT SOLENOID/V B	SFT SOL B/CIRC			

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Detected items (Screen terms for CONSULT-II, "SELF-DIAG RESULTS" test mode)		Malfunction is detected when ...	TCM self-diagnosis ⟨O/D OFF⟩ Available by O/D OFF indicator lamp	OBD-II (DTC) ⟨SERVICE ENGINE SOON⟩ Available by malfunction indicator lamp*2, "ENGINE" on CONSULT-II or GST
"A/T"	"ENGINE"			
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			
Engine control		● The ECM-AT communication line is open or shorted.	X	EC-473, EC-657
A/T COMM LINE	—			
Turbine revolution sensor		● TCM does not receive the proper voltage signal from the sensor.	X	—
TURBINE REV	—			
TCM (RAM)		● TCM memory (RAM) is malfunctioning.	X	—
CONTROL UNIT (RAM)	—			
TCM (ROM)		● TCM memory (ROM) is malfunctioning.	X	—
CONTROL UNIT (ROM)	—			
TCM (EEP ROM)		● TCM memory (EEP ROM) is malfunctioning.	X	—
CONTROL UNIT (EEP ROM)	—			
Initial start		● This is not a malfunction message (Whenever shutting off a power supply to the TCM, this message appears on the screen.)	X	—
INITIAL START	—			
No failure (NO DTC IS DETECTED FURTHER TESTING MAY BE REQUIRED)		● No failure has been detected.	X	X

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-87, "DESCRIPTION".

DATA MONITOR MODE (A/T)

NBAT0184S03

Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
Vehicle speed sensor 1 (A/T) (Revolution sensor)	VHCL/S SE·A/T [km/h] or [mph]	X	—	● Vehicle speed computed from signal of revolution sensor is displayed.	When racing engine in "N" or "P" position with vehicle stationary, CONSULT-II data may not indicate 0 km/h (0 mph).
Vehicle speed sensor 2 (Meter)	VHCL/S SE·MTR [km/h] or [mph]	X	—	● Vehicle speed computed from signal of vehicle speed sensor is displayed.	Vehicle speed display may not be accurate under approx. 10 km/h (6 mph). It may not indicate 0 km/h (0 mph) when vehicle is stationary.
Throttle position sensor	THRTL POS SEN [V]	X	—	● Throttle position sensor signal voltage is displayed.	
A/T fluid temperature sensor	FLUID TEMP SE [V]	X	—	● A/T fluid temperature sensor signal voltage is displayed. ● Signal voltage lowers as fluid temperature rises.	
Battery voltage	BATTERY VOLT [V]	X	—	● Source voltage of TCM is displayed.	
Engine speed	ENGINE SPEED [rpm]	X	X	● Engine speed, computed from engine speed signal, is displayed.	Engine speed display may not be accurate under approx. 800 rpm. It may not indicate 0 rpm even when engine is not running.
Turbine revolution sensor	TURBINE REV [rpm]	X	—	● Turbine revolution computed from signal of turbine revolution sensor is displayed.	Error may occur under approx. 800 rpm and will not indicate 0 rpm even if engine is not running.
Overdrive control switch	OVERDRIVE SW [ON/OFF]	X	—	● ON/OFF state computed from signal of overdrive control SW is displayed.	
PN position switch	PN POSI SW [ON/OFF]	X	—	● ON/OFF state computed from signal of PN 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.	
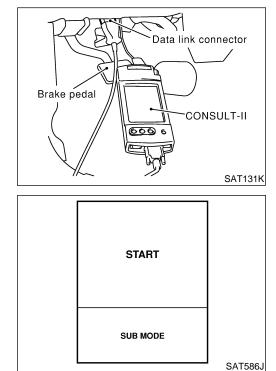
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
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.	
Stop lamp switch	BRAKE SW [ON/OFF]	X	—	● ON/OFF status is displayed. ON ... Brake pedal is depressed. OFF ... Brake pedal is released.	
Gear position	GEAR	—	X	● Gear position data used for computation by TCM, is displayed.	
Selector lever position	SLCT LVR POSI	—	X	● Selector lever position data, used for computation by TCM, is displayed.	● A specific value used for control is displayed if fail-safe is activated due to error.
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	● Vehicle speed data, used for computation by TCM, is displayed.	
Throttle position	THROTTLE POSI [/8]	—	X	● Throttle position data, used for computation by TCM, is displayed.	● A specific value used for control is displayed if fail-safe is activated due to error.
Line pressure duty	LINE PRES DTY [%]	—	X	● Control value of line pressure solenoid valve, computed by TCM from each input signal, is displayed.	

AT-41

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

X: Applicable

—: Not applicable

SAT131K

SAT586J
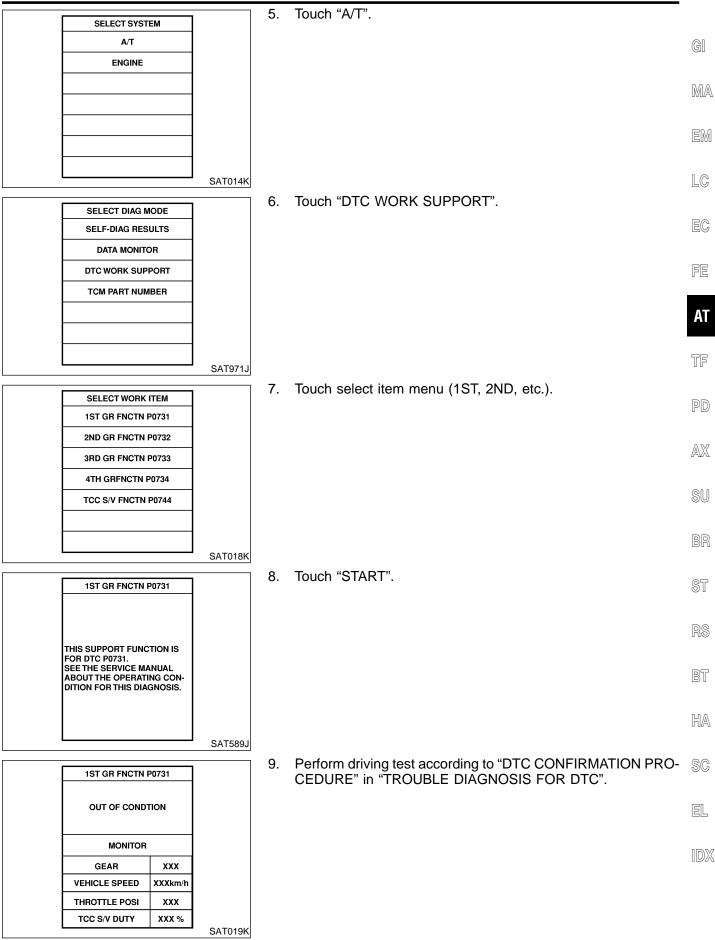
DTC WORK SUPPORT MODE WITH CONSULT-II

NBAT0184S04

CONSULT-II Setting Procedure

NBAT0184S0401
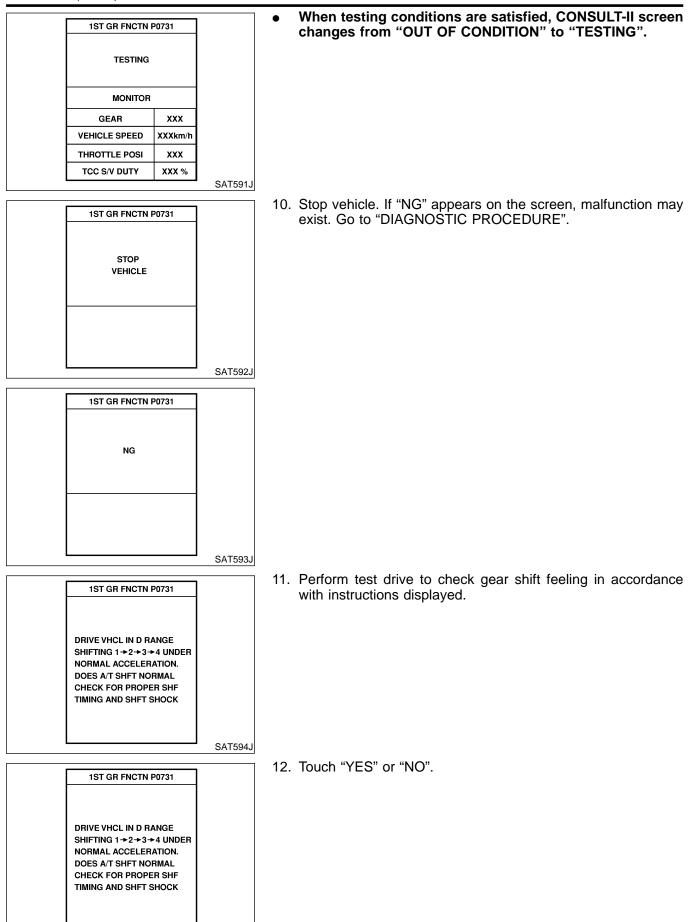
1. Turn ignition switch "OFF".
2. Connect CONSULT-II to data link connector, which is located in instrument lower panel on driver side.

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

```
SELECT SYSTEM

A/T

ENGINE
```
SAT014K

5. Touch "A/T".

```
SELECT DIAG MODE

SELF-DIAG RESULTS

DATA MONITOR

DTC WORK SUPPORT

TCM PART NUMBER
```
SAT971J

6. Touch "DTC WORK SUPPORT".

```
SELECT WORK ITEM

1ST GR FNCTN P0731

2ND GR FNCTN P0732

3RD GR FNCTN P0733

4TH GRFNCTN P0734

TCC S/V FNCTN P0744
```
SAT018K

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

```
1ST GR FNCTN P0731




THIS SUPPORT FUNCTION IS
FOR DTC P0731.
SEE THE SERVICE MANUAL
ABOUT THE OPERATING CON-
DITION FOR THIS DIAGNOSIS.
```
SAT589J

8. Touch "START".

```
1ST GR FNCTN P0731


OUT OF CONDTION


MONITOR
```
GEAR	XXX
VEHICLE SPEED	XXXkm/h
THROTTLE POSI	XXX
TCC S/V DUTY	XXX %

SAT019K

9. Perform driving test according to "DTC CONFIRMATION PRO-CEDURE" in "TROUBLE DIAGNOSIS FOR DTC".

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

```
1ST GR FNCTN P0731


          TESTING


          MONITOR
```

GEAR	XXX
VEHICLE SPEED	XXXkm/h
THROTTLE POSI	XXX
TCC S/V DUTY	XXX %

SAT591J

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

```
1ST GR FNCTN P0731




          STOP
         VEHICLE


```

SAT592J

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

```
1ST GR FNCTN P0731




           NG


```

SAT593J

```
1ST GR FNCTN P0731




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

```

SAT594J

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

```
1ST GR FNCTN P0731




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

```

SAT595J

12. Touch "YES" or "NO".

AT-44

1ST GR FNCTN P0731

OK

SAT596J

1ST GR FNCTN P0731

NG

SAT593J

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

DTC WORK SUPPORT MODE

NBAT0184S05

DTC work support item	Description	Check item
1ST GR FNCTN P0731	Following items for "A/T 1st gear function (P0731)" can be confirmed. ● 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
4TH GR FNCTN P0734	Following items for "A/T 4th gear function (P0734)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Shift solenoid valve B ● Overrun clutch solenoid valve ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit
TCC S/V FNCTN P0744	Following items for "A/T TCC S/V function (lock-up) (P0744)" can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Torque converter clutch solenoid valve ● Each clutch ● Hydraulic control circuit

Diagnostic Procedure Without CONSULT-II
NBAT0206

(GST) OBD-II SELF-DIAGNOSTIC PROCEDURE (WITH GST)
NBAT0206S01

Refer to EC-110, "DESCRIPTION".

(NO TOOLS) OBD-II SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)
NBAT0206S02

Refer to EC-87, "DESCRIPTION".

SAT491J

SAT132K

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

Preparation
NBAT0206S0301
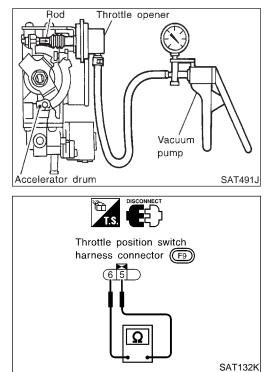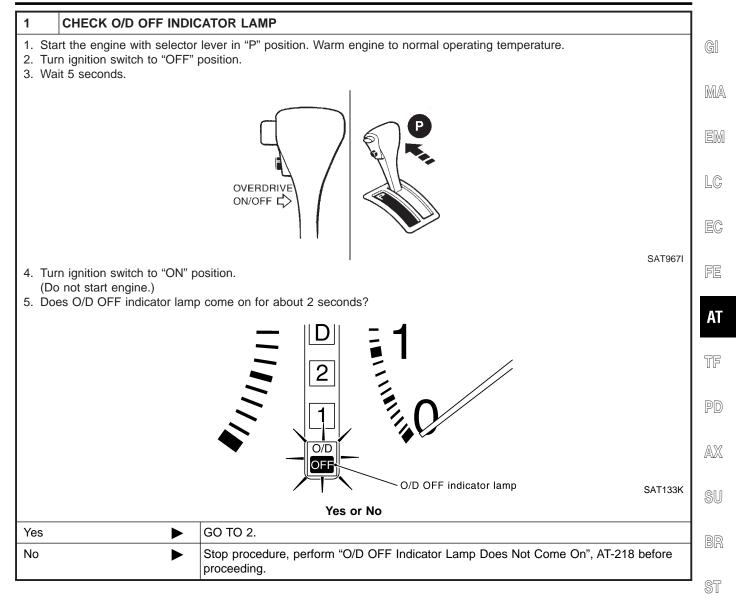
1. Turn ignition switch to "OFF" position.
2. Connect the handy type vacuum pump to the throttle opener and apply vacuum −25.3 kPa (−190 mmHg, −7.48 inHg).
3. Disconnect the throttle position switch harness connector.
4. Turn ignition switch to "ON" position.
5. Check continuity of the closed throttle position switch.
   Continuity should exist.
   (If continuity does not exist, check throttle opener and closed throttle position switch. Then increase vacuum until closed throttle position switch shows continuity.)
6. Go to "DIAGNOSIS START" on next page.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

1	CHECK O/D OFF INDICATOR LAMP

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

OVERDRIVE
ON/OFF ⇨

P

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?

O/D OFF indicator lamp

SAT133K

Yes or No

Yes	▶	GO TO 2.
No	▶	Stop procedure, perform "O/D OFF Indicator Lamp Does Not Come On", AT-218 before proceeding.

AT-47

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Procedure Without CONSULT-II (Cont'd)

2	JUDGEMENT PROCEDURE STEP 1

1. Turn ignition switch to "OFF" position.
2. Push shift lock release button.
3. Move selector lever from "P" to "D" position.
4. Turn ignition switch to "ON" position. (Do not start engine.)
5. Wait 3 seconds.
6. Push the overdrive control switch in "O/D OFF" position (the O/D OFF indicator lamp will be "ON") If O/D OFF indicator lamp does not come on, go to step 5 on AT-256.
7. Turn ignition switch to "OFF" position.

SAT968I

8. Turn ignition switch to "ON" position (Do not start engine.).
9. Push the overdrive control switch in "O/D ON" position (the O/D OFF indicator lamp will be "OFF").
10. Wait 2 seconds.
11. Move selector lever to "2" position.
12. Push the overdrive control switch in "O/D OFF" position (the O/D OFF indicator lamp will be "ON").
13. Push the overdrive control switch in "O/D OFF" position (the O/D OFF indicator lamp will be "OFF").

SAT969I

▶	GO TO 3.

3	JUDGEMENT PROCEDURE STEP 2

1. Move selector lever to "1" position.
2. Push the overdrive control switch in "O/D OFF" position (the O/D OFF indicator lamp will be "ON").
3. Push the overdrive control switch in "O/D ON" position (the O/D OFF indicator lamp will be "OFF").
4. Push the overdrive control switch in "O/D OFF" position (the O/D OFF indicator lamp will be "ON").

OVERDRIVE
ON/OFF ⇨

SAT970I

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

Accelerator pedal

Depress   Release

SAT981F

▶	GO TO 4.

4	CHECK SELF-DIAGNOSIS CODE

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

D
2
1
O/D
OFF   O/D OFF indicator lamp

SAT133K

▶	DIAGNOSIS END

AT-49

JUDGEMENT OF SELF-DIAGNOSIS CODE

NBAT0206S04

O/D OFF indicator lamp:

All judgement flickers are same.	1st judgement flicker is longer than others.

Self-diagnosis start

Start signal 12-judgement flickers

Light

Shade

t₁ t₂ t₃ t₃ t₃ t₃ t₃ t₃ t₃ t₃

SAT666I

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

SAT667I

Revolution sensor circuit is short-circuited or disconnected.
⇒ **Go to DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR), AT-112.**

2nd judgement flicker is longer than others.

3rd judgement flicker is longer than others.

Light

Shade

SAT668I

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

SAT669I

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

4th judgement flicker is longer than others.

5th judgement flicker is longer than others.

Self-diagnosis start

Light

Shade

SAT670I

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

SAT671I

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

O/D OFF indicator lamp:

6th judgement flicker is longer than others.

Light

Shade

SAT672I

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

7th judgement flicker is longer than others.

Light

Shade

SAT673I

Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE, AT-149.**

8th judgement flicker is longer than others.

Self-diagnosis start

Light

Shade

SAT674I

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

9th judgement flicker is longer than others.

Light

Shade

SAT675I

Engine speed signal circuit is short-circuited or disconnected.
⇒ **Go to DTC P0725 ENGINE SPEED SIGNAL, AT-117.**

10th judgement flicker is longer than others.

Light

Shade

SAT676I

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

11th judgement flicker is longer than others.

Light

Shade

SAT677I

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

AT-51

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Procedure Without CONSULT-II (Cont'd)

O/D OFF indicator lamp:

12th judgement flicker is longer than others.	Flickers as shown below.

Light

Shade

SAT678I

Light

Shade

t_4

SAT679I

The ECM-A/T communication line is open or shorted. ⇒ **Go to DTC A/T Communication Line, AT-207.**	Battery power is low. Battery has been disconnected for a long time. Battery is connected conversely. (When reconnecting TCM connectors. — This is not a problem.)

Lamp comes off.

Self-diagnosis
Start

Light

Shade

SAT717K

PNP switch, overdrive control switch or throttle position switch
circuit is disconnected or TCM is damaged.
⇒ **Go to TCM Self-diagnosis Does Not Activate (PNP,
OVERDRIVE CONTROL AND THROTTLE POSITION
SWITCHES CIRCUIT CHECKS), AT-256.**

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

AT-52

SAT631IB

SAT632I

SEF234G

Introduction

NBAT0019

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

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

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

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

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

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

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

Also check related Service bulletins.

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

Introduction (Cont'd)

DIAGNOSTIC WORKSHEET
Information From Customer
KEY POINTS

=NBAT0019S01

NBAT0019S0101

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

Introduction (Cont'd)

Diagnostic Worksheet

=NBAT0019S0102

1.	☐ Read the Fail-safe Remarks and listen to customer complaints.	AT-8
2.	☐ CHECK A/T FLUID	AT-59
	☐ Leakage (Follow specified procedure) ☐ Fluid condition ☐ Fluid level	
3.	Perform STALL TEST and LINE PRESSURE TEST.	AT-59, AT-62
	☐ Stall test — Mark possible damaged components/others.	
	☐ Torque converter one-way clutch ☐ Low & reverse brake ☐ Reverse clutch ☐ Low one-way clutch ☐ Forward clutch ☐ Engine ☐ Overrun clutch ☐ Line pressure is low ☐ Forward one-way clutch ☐ Clutches and brakes except high clutch and brake band are OK	
	☐ Pressure test — Suspected parts:	
4.	☐ Perform all ROAD TEST and mark required procedures.	AT-63
4-1.	Check before engine is started.	AT-64
	☐ O/D OFF Indicator Lamp Does Not Come On, AT-218. ☐ SELF-DIAGNOSTIC PROCEDURE - Mark detected items.	
	☐ DTC P0705 PNP switch, AT-100. ☐ DTC P0710 A/T fluid temperature sensor, AT-106. ☐ DTC P0720 Vehicle speed sensor·A/T (Revolution sensor), AT-112. ☐ DTC P0725 Engine speed signal, AT-117. ☐ DTC P0740 Torque converter clutch solenoid valve, AT-149. ☐ DTC P0745 Line pressure solenoid valve, AT-162. ☐ DTC P0750 Shift solenoid valve A, AT-168. ☐ DTC P0755 Shift solenoid valve B, AT-172. ☐ DTC P1705 Throttle position sensor, AT-176. ☐ DTC P1760 Overrun clutch solenoid valve, AT-185. ☐ DTC BATT/FLUID TEMP SEN (A/T fluid temperature sensor and TCM power source), AT-190. ☐ DTC Vehicle speed sensor·MTR, AT-197. ☐ DTC Turbine revolution sensor, AT-202. ☐ DTC A/T communication line, AT-207. ☐ DTC Control unit (RAM), control unit (ROM), AT-211. ☐ DTC Control unit (EEP ROM), AT-213. ☐ PNP, overdrive control and throttle position switches, AT-256. ☐ Battery ☐ Others	
4-2.	Check at idle	AT-66
	☐ Engine Cannot Be Started In "P" And "N" Position, AT-221. ☐ In "P" Position, Vehicle Moves Forward Or Backward When Pushed, AT-223. ☐ In "N" Position, Vehicle Moves, AT-224. ☐ Large Shock. "N" → "R" Position, AT-226. ☐ Vehicle Does Not Creep Backward In "R" Position, AT-227. ☐ Vehicle Does Not Creep Forward In "D", "2" Or "1" Position, AT-230.	
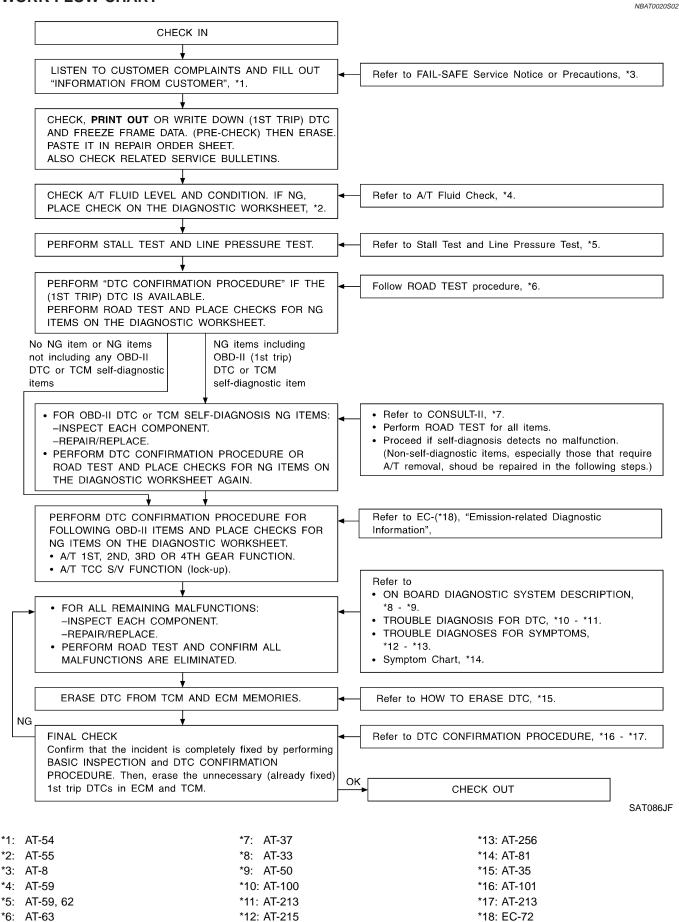
4.	4-3.	Cruise test	AT-67
			AT-71
		Part-1	
		□ Vehicle Cannot Be Started From D_1, AT-233. □ A/T Does Not Shift: $D_1 \to D_2$ Or Does Not Kickdown: $D_4 \to D_2$, AT-236. □ A/T Does Not Shift: $D_2 \to D_3$, AT-239. □ A/T Does Not Shift: $D_3 \to D_4$, AT-242. □ A/T Does Not Perform Lock-up, AT-245. □ A/T Does Not Hold Lock-up Condition, AT-247. □ Lock-up Is Not Released, AT-249. □ Engine Speed Does Not Return To Idle (Light Braking $D_4 \to D_3$), AT-250.	
		Part-2	AT-75
		□ Vehicle Does Not Start From D_1, AT-252. □ A/T Does Not Shift: $D_1 \to D_2$ Or Does Not Kickdown: $D_4 \to D_2$, AT-236. □ A/T Does Not Shift: $D_2 \to D_3$, AT-239. □ A/T Does Not Shift: $D_3 \to D_4$, AT-242.	
		Part-3	AT-77
		□ A/T Does Not Shift: $D_4 \to D_3$ When Overdrive Control Switch "ON" → "OFF", AT-253 □ Engine Speed Does Not Return To Idle (Engine Brake In D_3), AT-250. □ A/T Does Not Shift: $D_3 \to 2_2$, When Selector Lever "D" → "2" Position, AT-254. □ Engine Speed Does Not Return To Idle (Engine Brake In 2_2), AT-250. □ A/T Does Not Shift: $2_2 \to 1_1$, When Selector Lever "2" → "1" Position, AT-255. □ Vehicle Does Not Decelerate By Engine Brake, AT-255. □ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.	

		□ DTC P0705 PNP switch, AT-100.
		    □ DTC P0710 A/T fluid temperature sensor, AT-106.
		    □ DTC P0720 Vehicle speed sensor·A/T (Revolution sensor), AT-112.
		    □ DTC P0725 Engine speed signal, AT-117.
		    □ DTC P0740 Torque converter clutch solenoid valve, AT-149.
		    □ DTC P0745 Line pressure solenoid valve, AT-162.
		    □ DTC P0750 Shift solenoid valve A, AT-168.
		    □ DTC P0755 Shift solenoid valve B, AT-172.
		    □ DTC P1705 Throttle position sensor, AT-176.
		    □ DTC P1760 Overrun clutch solenoid valve, AT-185.
		    □ DTC BATT/FLUID TEMP SEN (A/T fluid temperature sensor and TCM power source), AT-190.
		    □ DTC Vehicle speed sensor·MTR, AT-197.
		    □ DTC Turbine revolution sensor, AT-202.
		    □ DTC A/T communication line, AT-207.
		    □ DTC Control unit (RAM), control unit (ROM), AT-211.
		    □ DTC Control unit (EEP ROM), AT-213.
		    □ PNP, overdrive control and throttle position switches, AT-256.
		    □ Battery
		    □ Others	

5.		□ For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.	AT-38
6.		□ Perform all ROAD TEST and re-mark required procedures.	AT-63
7.		□ Perform DTC CONFIRMATION PROCEDURE for following MIL indicating items and check out NG items. Refer to EC-72, "Emission-related Diagnostic Information".	EC-72

		□ DTC (P0731, 1103) A/T 1st gear function, AT-121.
		    □ DTC (P0732, 1104) A/T 2nd gear function, AT-127.
		    □ DTC (P0733, 1105) A/T 3rd gear function, AT-133.
		    □ DTC (P0734, 1106) A/T 4th gear function, AT-139.
		    □ DTC (P0744, 1107) A/T TCC S/V function (lock-up), AT-154.	

8.		□ Perform the Diagnostic Procedures for all remaining items marked NG. Repair or replace the damaged parts. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the component inspection orders.)	AT-81
9.		□ Erase DTC from TCM and ECM memories.	AT-35

Work Flow

HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

NBAT0020

NBAT0020S01

A good understanding of the malfunction conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

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

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

WORK FLOW CHART

NBAT0020S02

```
┌─────────────────────────────────────────────┐
│                 CHECK IN                      │
└─────────────────────────────────────────────┘
                      │
                      ▼
┌─────────────────────────────────────────────┐        ┌──────────────────────────────────────────────────┐
│ LISTEN TO CUSTOMER COMPLAINTS AND FILL OUT    │◄───────│ Refer to FAIL-SAFE Service Notice or Precautions, *3.│
│ "INFORMATION FROM CUSTOMER", *1.              │        └──────────────────────────────────────────────────┘
└─────────────────────────────────────────────┘
                      │
                      ▼
┌─────────────────────────────────────────────┐
│ CHECK, PRINT OUT OR WRITE DOWN (1ST TRIP) DTC │
│ AND FREEZE FRAME DATA. (PRE-CHECK) THEN ERASE.│
│ PASTE IT IN REPAIR ORDER SHEET.               │
│ ALSO CHECK RELATED SERVICE BULLETINS.         │
└─────────────────────────────────────────────┘
                      │
                      ▼
┌─────────────────────────────────────────────┐        ┌──────────────────────────────────────────────────┐
│ CHECK A/T FLUID LEVEL AND CONDITION. IF NG,   │◄───────│ Refer to A/T Fluid Check, *4.                        │
│ PLACE CHECK ON THE DIAGNOSTIC WORKSHEET, *2.  │        └──────────────────────────────────────────────────┘
└─────────────────────────────────────────────┘
                      │
                      ▼
┌─────────────────────────────────────────────┐        ┌──────────────────────────────────────────────────┐
│ PERFORM STALL TEST AND LINE PRESSURE TEST.    │◄───────│ Refer to Stall Test and Line Pressure Test, *5.      │
└─────────────────────────────────────────────┘        └──────────────────────────────────────────────────┘
                      │
                      ▼
┌─────────────────────────────────────────────┐        ┌──────────────────────────────────────────────────┐
│ PERFORM "DTC CONFIRMATION PROCEDURE" IF THE   │◄───────│ Follow ROAD TEST procedure, *6.                      │
│ (1ST TRIP) DTC IS AVAILABLE.                  │        └──────────────────────────────────────────────────┘
│ PERFORM ROAD TEST AND PLACE CHECKS FOR NG     │
│ ITEMS ON THE DIAGNOSTIC WORKSHEET.            │
└─────────────────────────────────────────────┘
```

No NG item or NG items not including any OBD-II DTC or TCM self-diagnostic items

NG items including OBD-II (1st trip) DTC or TCM self-diagnostic item

```
┌─────────────────────────────────────────────┐        ┌──────────────────────────────────────────────────┐
│ • FOR OBD-II DTC or TCM SELF-DIAGNOSIS NG     │◄───────│ • Refer to CONSULT-II, *7.                           │
│   ITEMS:                                      │        │ • Perform ROAD TEST for all items.                   │
│   –INSPECT EACH COMPONENT.                    │        │ • Proceed if self-diagnosis detects no malfunction.  │
│   –REPAIR/REPLACE.                            │        │   (Non-self-diagnostic items, especially those that  │
│ • PERFORM DTC CONFIRMATION PROCEDURE OR       │        │   require A/T removal, shoud be repaired in the      │
│   ROAD TEST AND PLACE CHECKS FOR NG ITEMS ON  │        │   following steps.)                                  │
│   THE DIAGNOSTIC WORKSHEET AGAIN.             │        └──────────────────────────────────────────────────┘
└─────────────────────────────────────────────┘
                      │
                      ▼
┌─────────────────────────────────────────────┐        ┌──────────────────────────────────────────────────┐
│ PERFORM DTC CONFIRMATION PROCEDURE FOR        │◄───────│ Refer to EC-(*18), "Emission-related Diagnostic      │
│ FOLLOWING OBD-II ITEMS AND PLACE CHECKS FOR   │        │ Information",                                        │
│ NG ITEMS ON THE DIAGNOSTIC WORKSHEET.         │        └──────────────────────────────────────────────────┘
│ • A/T 1ST, 2ND, 3RD OR 4TH GEAR FUNCTION.     │
│ • A/T TCC S/V FUNCTION (lock-up).             │
└─────────────────────────────────────────────┘
                      │                                  ┌──────────────────────────────────────────────────┐
                      ▼                                  │ Refer to                                            │
┌─────────────────────────────────────────────┐        │ • ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION,           │
│ • FOR ALL REMAINING MALFUNCTIONS:             │◄───────│   *8 - *9.                                          │
│   –INSPECT EACH COMPONENT.                    │        │ • TROUBLE DIAGNOSIS FOR DTC, *10 - *11.             │
│   –REPAIR/REPLACE.                            │        │ • TROUBLE DIAGNOSES FOR SYMPTOMS,                   │
│ • PERFORM ROAD TEST AND CONFIRM ALL           │        │   *12 - *13.                                        │
│   MALFUNCTIONS ARE ELIMINATED.                │        │ • Symptom Chart, *14.                               │
└─────────────────────────────────────────────┘        └──────────────────────────────────────────────────┘
                      │
                      ▼
┌─────────────────────────────────────────────┐        ┌──────────────────────────────────────────────────┐
│ ERASE DTC FROM TCM AND ECM MEMORIES.          │◄───────│ Refer to HOW TO ERASE DTC, *15.                      │
└─────────────────────────────────────────────┘        └──────────────────────────────────────────────────┘
                      │
NG                    ▼
┌─────────────────────────────────────────────┐        ┌──────────────────────────────────────────────────┐
│ FINAL CHECK                                   │◄───────│ Refer to DTC CONFIRMATION PROCEDURE, *16 - *17.      │
│ Confirm that the incident is completely fixed │        └──────────────────────────────────────────────────┘
│ by performing BASIC INSPECTION and DTC        │
│ CONFIRMATION PROCEDURE. Then, erase the       │  OK    ┌──────────────────────────────────────────────────┐
│ unnecessary (already fixed) 1st trip DTCs in  │───────►│                  CHECK OUT                          │
│ ECM and TCM.                                  │        └──────────────────────────────────────────────────┘
└─────────────────────────────────────────────┘
```

SAT086JF

*1: AT-54	*7: AT-37	*13: AT-256
*2: AT-55	*8: AT-33	*14: AT-81
*3: AT-8	*9: AT-50	*15: AT-35
*4: AT-59	*10: AT-100	*16: AT-101
*5: AT-59, 62	*11: AT-213	*17: AT-213
*6: AT-63	*12: AT-215	*18: EC-72

A/T Fluid Check

NBAT0021

FLUID LEAKAGE CHECK

NBAT0021S01

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

SAT638A

FLUID CONDITION CHECK

NBAT0021S02

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

FLUID LEVEL CHECK

NBAT0021S03

Refer to MA-22, "Checking A/T Fluid".
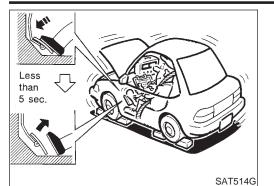
SAT647B

Stall Test

NBAT0022

STALL TEST PROCEDURE

NBAT0022S01

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

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

SAT513G

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

AT-59

Less than 5 sec.

SAT514G

N

SAT771B
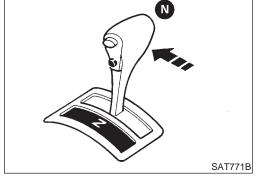
5. Start engine, apply foot brake, and place selector lever in "D" position.
6. Accelerate to wide open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.
● **During test, never hold throttle wide open for more than 5 seconds.**

Stall revolution:
Refer to SDS, AT-355.

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

JUDGEMENT OF STALL TEST

NBAT0022S02

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

NOTE:

Stall revolution is too high in "D" or "2" position:
● Slippage occurs in 1st gear but not in 2nd and 3rd gears. ..... Low one-way clutch slippage
● Slippage occurs at the following gears:
  1st through 3rd gears in "D" position and engine brake functions. ..... Overrun clutch slippage
  1st and 2nd gears in "2" position and engine brake functions with accelerator pedal released (fully closed throttle). ..... Forward clutch or forward one-way clutch slippage

Stall revolution is too high in "R" position:
● Engine brake does not function in "1" position. ..... Low & reverse brake slippage
● Engine brake functions in "1" position. ..... Reverse clutch slippage

Stall revolution within specifications:
● Vehicle does not achieve speed of more than 80 km/h (50 MPH). ..... One-way clutch seizure in torque converter housing
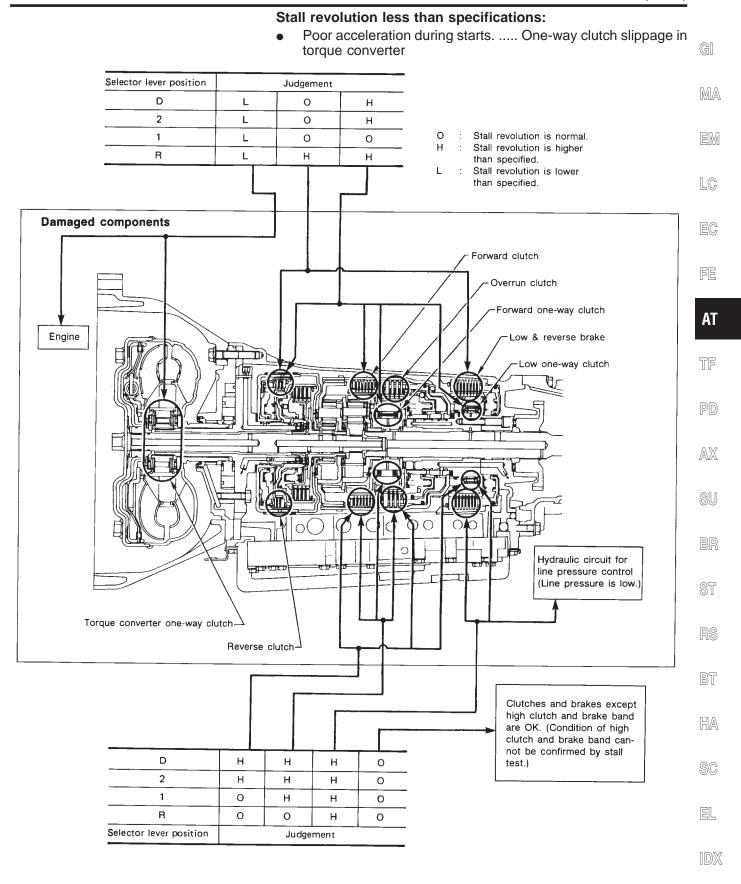
CAUTION:
Be careful since automatic fluid temperature increases abnormally.
● Slippage occurs in 3rd and 4th gears in "D" position. ..... High clutch slippage
● Slippage occurs in 2nd and 4th gear in "D" position. ..... Brake band slippage
● Engine brake does not function in 2nd and 3rd gears in "D" position, 2nd gear in 2nd position, and 1st position. ..... Overrun clutch slippage

Stall revolution less than specifications:

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

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

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

Damaged components

Engine

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

Torque converter one-way clutch

Reverse clutch

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

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

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

SAT392H

RE4R01A
Front
Front
Test port for D, 2 and 1 positions
Test port for R position

SAT209GA

Line Pressure Test

NBAT0023

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

SAT647B
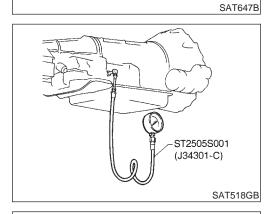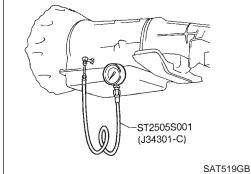
LINE PRESSURE TEST PROCEDURE
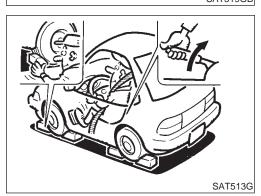
NBAT0023S01

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

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

ST2505S001 (J34301-C)

SAT518GB

3. Install pressure gauge to corresponding line pressure port.

ST2505S001 (J34301-C)

SAT519GB

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

SAT513G

AT-62

SAT493G

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-355.

JUDGEMENT OF LINE PRESSURE TEST

NBAT0023S02

	Judgement	Suspected parts
At idle	Line pressure is low in all positions.	● Oil pump wear ● Control piston damage ● Pressure regulator valve or plug sticking ● Spring for pressure regulator valve damaged ● Fluid pressure leakage between oil strainer and pressure regulator valve ● Clogged strainer
	Line pressure is low in particular position.	● Fluid pressure leakage between manual valve and particular clutch ● For example, line pressure is: — Low in "R" and "1" positions, but — Normal in "D" and "2" positions. Then, fluid leakage exists at or around low and reverse brake circuit. Refer to "CLUTCH AND BAND CHART", AT-17.
	Line pressure is high.	● Mal-adjustment of throttle position sensor ● Fluid temperature sensor damaged ● Line pressure solenoid valve sticking ● Short circuit of line pressure solenoid valve circuit ● Pressure modifier valve sticking ● Pressure regulator valve or plug sticking ● Open in dropping resistor circuit
At stall speed	Line pressure is low.	● Mal-adjustment 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 PROCEDURE

1. Check before engine is started.

⬇

2. Check at idle.

⬇

3. Cruise test.

SAT786A

Road Test

NBAT0024

DESCRIPTION

NBAT0024S01

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

AT-63

SAT496G
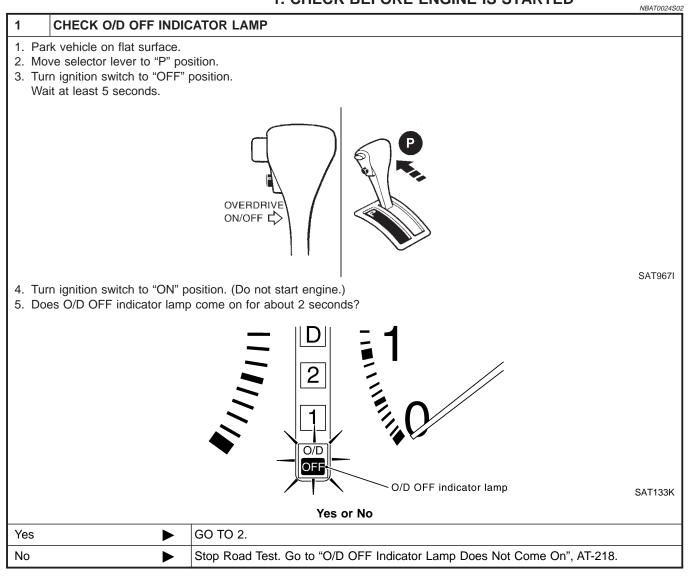
- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items until specified symptom is found. Troubleshoot items which check out No Good after road test. Refer to "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" and "TROUBLE DIAGNOSES FOR SYMPTOMS", AT-33 - AT-50 and AT-215 - AT-256.

1. CHECK BEFORE ENGINE IS STARTED

NBAT0024S02

1	CHECK O/D OFF INDICATOR LAMP

1. Park vehicle on flat surface.
2. Move selector lever to "P" position.
3. Turn ignition switch to "OFF" position.
   Wait at least 5 seconds.

OVERDRIVE ON/OFF ➡

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?

O/D OFF indicator lamp

SAT133K

Yes or No

Yes	▶	GO TO 2.
No	▶	Stop Road Test. Go to "O/D OFF Indicator Lamp Does Not Come On", AT-218.

2	CHECK O/D OFF INDICATOR LAMP	
Does O/D OFF indicator lamp flicker for about 8 seconds? O/D OFF indicator lamp SAT133K **Yes or No**		
Yes	▶	TCM is under Fail-Safe mode. Perform self-diagnosis. Refer to TCM SELF-DIAGNOSIS PROCEDURE, AT-37, 46.
No	▶	GO TO 3.

3	CHECK NG ITEM	
1. Turn ignition switch to "OFF" position. 2. Perform self-diagnosis and note NG items. Refer to TCM SELF-DIAGNOSIS PROCEDURE, AT-37.		
	▶	Go to "2. CHECK AT IDLE", AT-66.

AT-65

2. CHECK AT IDLE

=NBAT0024S03

1	CHECK ENGINE START

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

Yes or No

Yes	▶	GO TO 2.
No	▶	Go to "Engine Cannot Be Started In "P" and "N" Position", AT-221.

2	CHECK ENGINE START

1. Turn ignition switch to "OFF" position.
2. Move selector lever to "D", "1", "2" or "R" position.
3. Turn ignition switch to start position.
4. Is engine started?

Yes or No

Yes	▶	Go to "Engine Cannot Be Started In "P" and "N" Position", AT-221.
No	▶	GO TO 3.

3	CHECK VEHICLE MOVE

1. Turn ignition switch to "OFF" position.
2. Move selector lever to "P" position.
3. Release parking brake.
4. Push vehicle forward or backward.
5. Does vehicle move when it is pushed forward or backward?
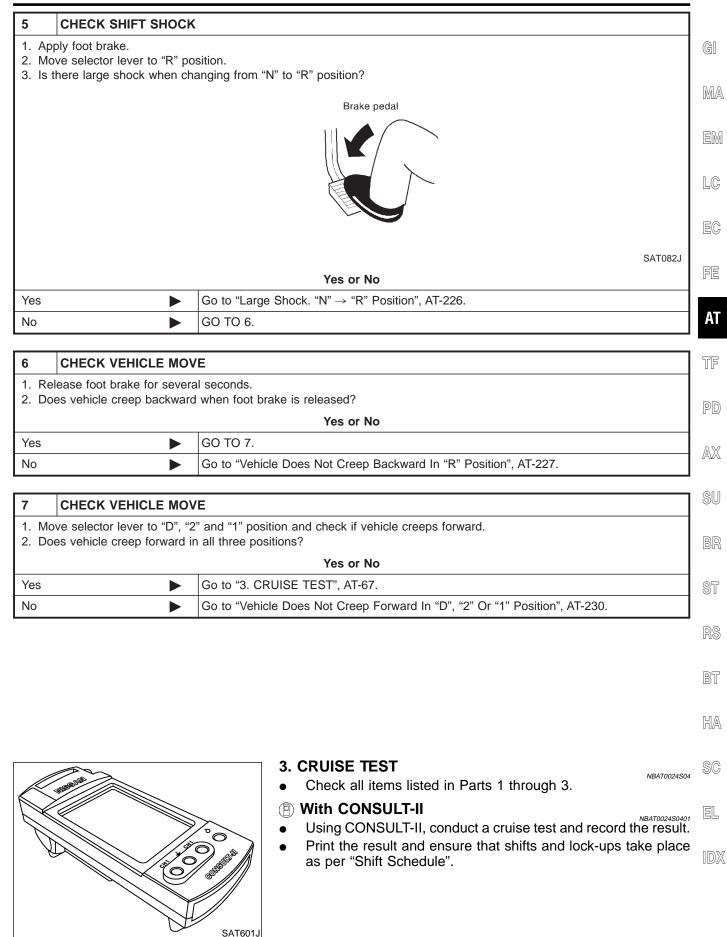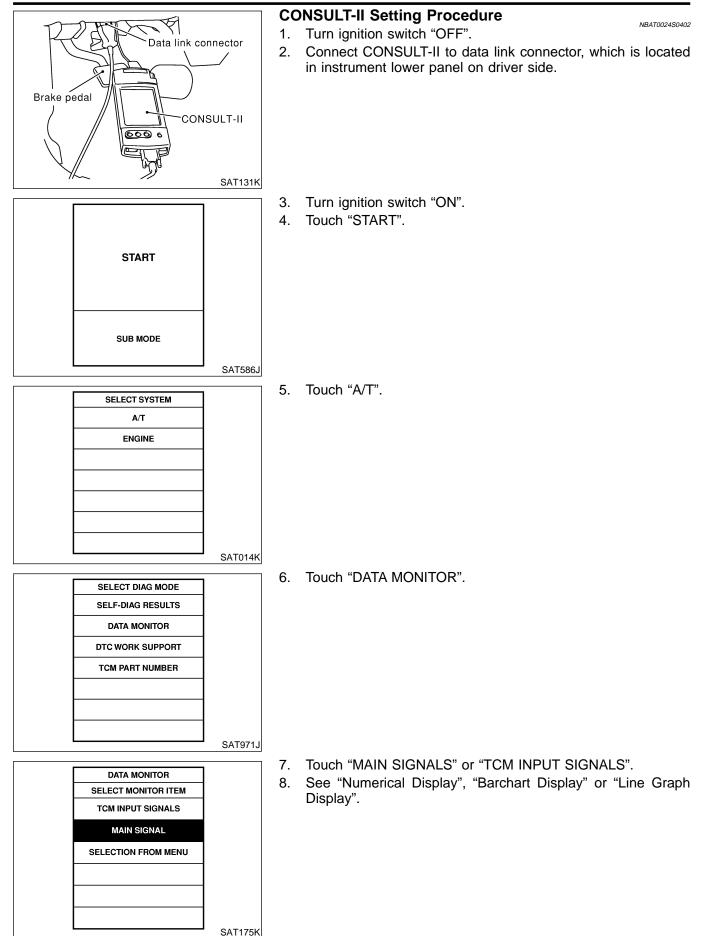
SAT796A

Yes or No

Yes	▶	Go to "In "P" Position, Vehicle Moves Forward Or Backward When Pushed", AT-223.
No	▶	GO TO 4.

4	CHECK VEHICLE MOVE

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

Yes or No

Yes	▶	Go to "In "N" Position, Vehicle Moves", AT-224.
No	▶	GO TO 5.

5	CHECK SHIFT SHOCK

1. Apply foot brake.
2. Move selector lever to "R" position.
3. Is there large shock when changing from "N" to "R" position?

Brake pedal

SAT082J

Yes or No

Yes	▶	Go to "Large Shock. "N" → "R" Position", AT-226.
No	▶	GO TO 6.

6	CHECK VEHICLE MOVE

1. Release foot brake for several seconds.
2. Does vehicle creep backward when foot brake is released?

Yes or No

Yes	▶	GO TO 7.
No	▶	Go to "Vehicle Does Not Creep Backward In "R" Position", AT-227.

7	CHECK VEHICLE MOVE

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

Yes or No

Yes	▶	Go to "3. CRUISE TEST", AT-67.
No	▶	Go to "Vehicle Does Not Creep Forward In "D", "2" Or "1" Position", AT-230.

3. CRUISE TEST

NBAT0024S04

● Check all items listed in Parts 1 through 3.

Ⓑ With CONSULT-II

NBAT0024S0401

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

SAT601J

Road Test (Cont'd)

CONSULT-II Setting Procedure

NBAT0024S0402

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

Data link connector

Brake pedal

CONSULT-II

SAT131K

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

START

SUB MODE

SAT586J

5. Touch "A/T".

SELECT SYSTEM

A/T

ENGINE

SAT014K

6. Touch "DATA MONITOR".

SELECT DIAG MODE

SELF-DIAG RESULTS

DATA MONITOR

DTC WORK SUPPORT

TCM PART NUMBER

SAT971J

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

DATA MONITOR

SELECT MONITOR ITEM

TCM INPUT SIGNALS

MAIN SIGNAL

SELECTION FROM MENU

SAT175K

AT-68

SET RECORDING CONDITION

AUTO TRIG

MANU TRIG

TRIGGER POINT

‹‹ ››
0% 20% 40% 60% 80% 100%

Recording Speed

MIN   MAX
‹‹
/64 /32 /16 /8 /4 /2 FULL

SAT973J

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

10. Touch "Start".

DATA MONITOR

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

SAT134K

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

DATA MONITOR

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

SAT135K

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

REAL-TIME DIAG

ENG SPEED SIG

SAT987J

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

STORE

SYSTEM	SAVE REC DATA

SAT974J

Road Test (Cont'd)

Trigger	VHCL S/SEN A/T	VHCL S/SEN MTR	THRTL POSI SEN
	km/h	km/h	V

SAT975J

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

⊗ **Without CONSULT-II**

NBAT0024S0403

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

SAT513JG

Cruise Test — Part 1

=NBAT0024S0404

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.

OVERDRIVE ON/OFF ⇨

SAT001J

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

SAT952I

7. Accelerate vehicle by constantly depressing accelerator pedal halfway.

Accelerator pedal

Halfway

SAT953I

8. Does vehicle start from D$_1$?
   Ⓑ **Read gear position.**

Yes or No

Yes	▶	GO TO 2.
No	▶	Go to "Vehicle Cannot Be Started From D$_1$", AT-233.

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-355.

D$_1$ ➡ D$_2$
Accelerator pedal

Halfway

SAT954I

Yes or No

Yes	▶	GO TO 3.
No	▶	Go to "A/T Does Not Shift: D$_1$ → D$_2$ or Does Not Kickdown: D$_4$ → D$_2$", AT-236.

3	CHECK SHIFT UP (D$_2$ TO D$_3$)

Does A/T shift from D$_2$ to D$_3$ at the specified speed?
⊟ **Read gear position, throttle opening and vehicle speed.**
　Specified speed when shifting from D$_2$ to D$_3$:
　　Refer to Shift schedule, AT-355.

D$_2$ ➡ D$_3$
Accelerator pedal

Halfway

SAT955I

Yes or No

Yes	▶	GO TO 4.
No	▶	Go to "A/T Does Not Shift: D$_2$ → D$_3$", AT-239.

4	CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?
Read gear position, throttle opening and vehicle speed.
  Specified speed when shifting from D_3 to D_4:
   Refer to Shift schedule, AT-355.

D_3 ➡ D_4

Accelerator
pedal

Halfway

SAT956I

Yes or No

Yes	▶	GO TO 5.
No	▶	Go to "A/T Does Not Shift: $D_3 \rightarrow D_4$", AT-242.

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-355.

D_4 ➡ D_4 L/U

Accelerator
pedal

Halfway

SAT957I

Yes or No

Yes	▶	GO TO 6.
No	▶	Go to "A/T Does Not Perform Lock-up", AT-245.

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 "A/T Does Not Hold Lock-up Condition", AT-247.

AT-73
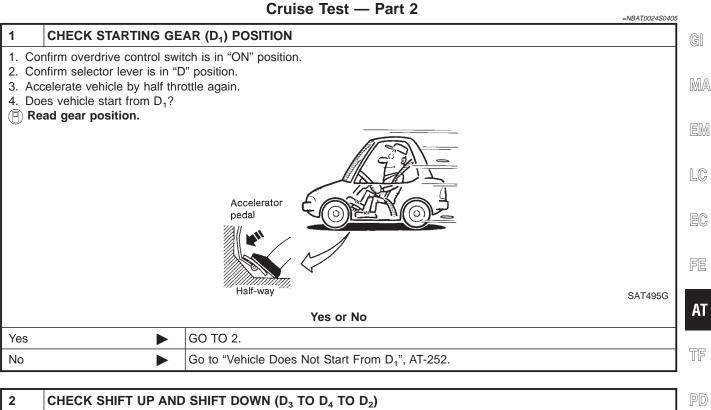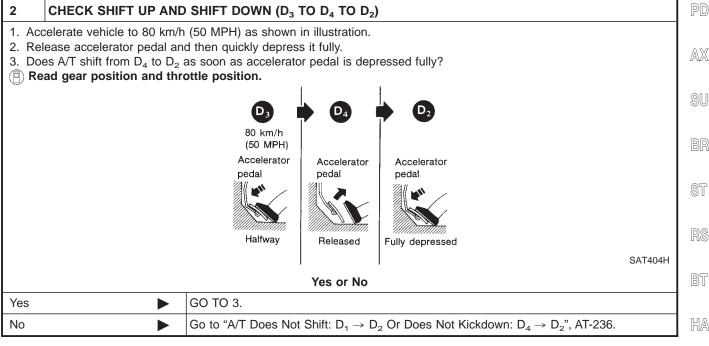
7	CHECK LOCK-UP OFF (D$_4$ L/U TO D$_4$)

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

D$_4$ L/U ➡ **D$_4$**

Accelerator pedal | Brake pedal

Released | Lightly applied

SAT958I

Yes or No

Yes	▶	GO TO 8.
No	▶	Go to "Lock-up Is Not Released", AT-249.

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.

D$_4$ ➡ **D$_3$**

Accelerator pedal | Brake pedal

Released | Lightly applied

SAT959I

Yes or No

Yes	▶	1. Stop vehicle. 2. Go to "Cruise Test — Part 2", AT-75.
No	▶	Go to "Engine Speed Does Not Return To Idle (Light Braking D$_4$ → D$_3$)", AT-250.

Cruise Test — Part 2

=NBAT0024S0405

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.**

Accelerator pedal

Half-way

SAT495G

Yes or No

Yes	▶	GO TO 2.
No	▶	Go to "Vehicle Does Not Start From D_1", AT-252.

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.**

D_3 ➡ D_4 ➡ D_2

80 km/h (50 MPH)
Accelerator pedal

Accelerator pedal

Accelerator pedal

Halfway

Released

Fully depressed

SAT404H

Yes or No

Yes	▶	GO TO 3.
No	▶	Go to "A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-236.

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-355.

D$_2$ ➡ D$_3$
Accelerator pedal

Fully depressed

SAT960I

Yes or No

Yes	▶	GO TO 4.
No	▶	Go to "A/T Does Not Shift: D$_2$ → D$_3$", AT-239.

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.

D$_2$ ➡ D$_3$
Accelerator pedal

Fully depressed

D$_3$ ➡ D$_4$
Accelerator pedal

Released

SAT405H

Yes or No

Yes	▶	1. Stop vehicle. 2. Go to "Cruise Test — Part 3", AT-77.
No	▶	Go to "A/T Does Not Shift: D$_3$ → D$_4$", AT-242.

Cruise Test — Part 3

=NBAT0024S0406

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.
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.

SAT999IA

Yes or No

Yes	▶	GO TO 3.
No	▶	Go to "A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch "ON" $\rightarrow$ "OFF"", AT-253.

AT-77

3	CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

D_4

D_3 (O/D OFF)

Engine brake

SAT999IA

Yes or No

Yes	▶	GO TO 4.
No	▶	Go to "Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-250.

4	CHECK SHIFT DOWN (D_3 TO 2_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.

D_3 (O/D OFF)

2_2

Engine brake

SAT791GB

Yes or No

Yes	▶	GO TO 5.
No	▶	Go to "A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever "D" $\rightarrow$ "2" Position", AT-254.

5	CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

D_3 (O/D OFF)

2_2

Engine brake

SAT791GB

Yes or No

Yes	▶	GO TO 6.
No	▶	Go to "Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-250.

6	CHECK SHIFT DOWN (2_2 TO 1_1)

1. Move selector lever from "2" to "1" position while driving in 2_2.
2. Does A/T shift from 2_2 to 1_1 position?

2_2

1_2

1_1

Engine brake

SAT778B

Yes or No

Yes	▶	GO TO 7.
No	▶	Go to "A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector lever "2" $\rightarrow$ "1" Position", AT-255.

7	CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

SAT778B

Yes or No

Yes	▶	1. Stop vehicle. 2. Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II), AT-37, TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.
No	▶	Go to "Vehicle Does Not Decelerate By Engine Brake", AT-255.

Symptom Chart

NBAT0233

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

Items	Symptom	Condition	Diagnostic Item	Reference Page
No Lock-up Engagement/TCC Inoperative	Torque converter is not locked up.	ON vehicle	1. Throttle position sensor	AT-176
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-112, 197
			3. Engine speed signal	AT-117
			4. A/T fluid temperature sensor	AT-106
			5. Line pressure test	AT-62
			6. Torque converter clutch solenoid valve	AT-149
			7. Control valve assembly	AT-272
		OFF vehicle	8. Torque converter	AT-285
	Torque converter clutch piston slip.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor	AT-176
			3. Line pressure test	AT-62
			4. Torque converter clutch solenoid valve	AT-149
			5. Line pressure solenoid valve	AT-162
			6. Control valve assembly	AT-272
		OFF vehicle	7. Torque converter	AT-285
	Lock-up point is extremely high or low. AT-245	ON vehicle	1. Throttle position sensor	AT-176
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-112, 197
			3. Torque converter clutch solenoid valve	AT-149
			4. Control valve assembly	AT-272
Shift Shock	Sharp shock in shifting from N to D position.	ON vehicle	1. Engine idling rpm	EC-715
			2. Throttle position sensor	AT-176
			3. Line pressure test	AT-62
			4. A/T fluid temperature sensor	AT-106
			5. Engine speed signal	AT-117
			6. Line pressure solenoid valve	AT-162
			7. Control valve assembly	AT-272
			8. Accumulator N-D	AT-272
		OFF vehicle	9. Turbine revolution sensor	AT-202
			10. Forward clutch	AT-319

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Items	Symptom	Condition	Diagnostic Item	Reference Page
Shift Shock	Too sharp a shock in change from D_1 to D_2.	ON vehicle	1. Throttle position sensor	AT-176
			2. Line pressure test	AT-62
			3. Accumulator servo release	AT-272
			4. Control valve assembly	AT-272
			5. A/T fluid temperature sensor	AT-106
		OFF vehicle	6. Brake band	AT-332
	Too sharp a shock in change from D_2 to D_3.	ON vehicle	1. Throttle position sensor	AT-176
			2. Line pressure test	AT-62
			3. Control valve assembly	AT-272
			4. A/T fluid temperature sensor	AT-106
		OFF vehicle	5. High clutch	AT-316
			6. Brake band	AT-332
	Too sharp a shock in change from D_3 to D_4.	ON vehicle	1. Throttle position sensor	AT-176
			2. Line pressure test	AT-62
			3. Control valve assembly	AT-272
			4. A/T fluid temperature sensor	AT-106
		OFF vehicle	5. Brake band	AT-332
			6. Overrun clutch	AT-319
	Gear change shock felt during deceleration by releasing accelerator pedal.	ON vehicle	1. Throttle position sensor	AT-176
			2. Line pressure test	AT-62
			3. Control valve assembly	AT-272
			4. A/T fluid temperature sensor	AT-106
	Large shock changing from 1_2 to 1_1 in 1 position.	ON vehicle	1. Control valve assembly	AT-272
		ON vehicle	2. Low & reverse brake	AT-323

Items	Symptom	Condition	Diagnostic Item	Reference Page
Improper Shift Timing	Too high a gear change point from D_1 to D_2, from D_2 to D_3, from D_3 to D_4. AT-236, 239, 242	ON vehicle	1. Throttle position sensor	AT-176
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-112, 197
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172
	Gear change directly from D_1 to D_3 occurs.	ON vehicle	1. Fluid level	AT-59
			2. Accumulator servo release	AT-272
		OFF vehicle	3. Brake band	AT-332
	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	AT-176
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-112, 197
	Kickdown does not operate when depressing pedal in D_4 within kick-down vehicle speed.	ON vehicle	1. Throttle position sensor	AT-176
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-112, 197
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172
	Kickdown operates or engine overruns when depressing pedal in D_4 beyond kick-down vehicle speed limit.	ON vehicle	1. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-112, 197
			2. Throttle position sensor	AT-176
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172
	Gear change from 2_2 to 2_3 in 2 position.	ON vehicle	1. Park/neutral position (PNP) switch	AT-100
			2. Manual control linkage adjustment	AT-275
	Gear change from 1_1 to 1_2 in 1 position.	ON vehicle	1. Park/neutral position (PNP) switch	AT-100
			2. Manual control linkage adjustment	AT-275

AT-83

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
No Down Shift	Failure to change gear from D_4 to D_3.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor	AT-176
			3. Overrun clutch solenoid valve	AT-185
			4. Shift solenoid valve A	AT-168
			5. Line pressure solenoid valve	AT-162
			6. Control valve assembly	AT-272
		OFF vehicle	7. Brake band	AT-332
			8. Overrun clutch	AT-319
	Failure to change gear from D_3 to D_2 or from D_4 to D_2.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor	AT-176
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172
			5. Control valve assembly	AT-272
		OFF vehicle	6. High clutch	AT-316
			7. Brake band	AT-332
	Failure to change gear from D_2 to D_1 or from D_3 to D_1.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor	AT-176
			3. Shift solenoid valve A	AT-168
			4. Shift solenoid valve B	AT-172
			5. Control valve assembly	AT-272
		OFF vehicle	6. Low one-way clutch	AT-327
			7. High clutch	AT-316
			8. Brake band	AT-332
	Failure to change from D_3 to 2_2 when changing lever into 2 position. AT-250	ON vehicle	1. Throttle position sensor	EC-206
			2. Shift solenoid valve B	AT-172
			3. Control valve assembly	AT-272
			4. Manual control linkage adjustment	AT-275
		OFF vehicle	5. Brake band	AT-332
	Does not change from 1_2 to 1_1 in 1 position.	ON vehicle	1. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-112, 197
			2. Shift solenoid valve A	AT-168
			3. Control valve assembly	AT-272
		OFF vehicle	4. Low one-way clutch	AT-327
			5. Brake band	AT-332
			6. Low & reverse brake	AT-323

AT-84

Items	Symptom	Condition	Diagnostic Item	Reference Page
No Up Shift	Failure to change gear from D_1 to D_2.	ON vehicle	1. Manual control linkage adjustment	AT-275
			2. Shift solenoid valve A	AT-168
			3. Control valve assembly	AT-272
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-112, 197
		OFF vehicle	5. Brake band	AT-332
	Failure to change gear from D_2 to D_3.	ON vehicle	1. Manual control linkage adjustment	AT-275
			2. Shift solenoid valve B	AT-172
			3. Control valve assembly	AT-272
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-112, 197
		OFF vehicle	5. High clutch	AT-316
			6. Brake band	AT-332
	Failure to change gear from D_3 to D_4.	ON vehicle	1. Park/neutral position (PNP) switch	AT-100
			2. Overdrive control switch	AT-262
			3. Shift solenoid valve A	AT-168
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-112, 197
			5. A/T fluid temperature sensor	AT-106
		OFF vehicle	6. Brake band	AT-332
	A/T does not shift to D_4 when driving with overdrive control switch ON.	ON vehicle	1. Throttle position sensor	EC-206
			2. Park/neutral position (PNP) switch	AT-100
			3. Overdrive control switch	AT-262
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-112, 197
			5. Shift solenoid valve A	AT-168
			6. Overrun clutch solenoid valve	AT-185
			7. Control valve assembly	AT-272
			8. A/T fluid temperature sensor	AT-106
			9. Line pressure solenoid valve	AT-162
		OFF vehicle	10. Brake band	AT-332
			11. Overrun clutch	AT-319

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Vehicle will not run in R position (but runs in D, 2 and 1 positions). Clutch slips. Very poor acceleration. AT-227	ON vehicle	1. Manual control linkage adjustment	AT-275
			2. Stall test	AT-59
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
			5. Control valve assembly	AT-272
		OFF vehicle	6. Reverse clutch	AT-313
			7. High clutch	AT-316
			8. Forward clutch	AT-319
			9. Overrun clutch	AT-319
			10. Low & reverse brake	AT-323
	Vehicle will not run in D and 2 positions (but runs in 1 and R positions).	ON vehicle	1. Manual control linkage adjustment	AT-275
		OFF vehicle	2. Low one-way clutch	AT-327

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Vehicle will not run in D, 1, 2 positions (but runs in R position). Clutch slips. Very poor acceleration. AT-230	ON vehicle	1. Fluid level	AT-59
			2. Stall test	AT-59
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
			5. Control valve assembly	AT-272
			6. Accumulator N-D	AT-272
		OFF vehicle	7. Reverse clutch	AT-313
			8. High clutch	AT-316
			9. Forward clutch	AT-319
			10. Forward one-way clutch	AT-329
			11. Low one-way clutch	AT-327
	Clutches or brakes slip somewhat in starting.	ON vehicle	1. Fluid level	AT-59
			2. Manual control linkage adjustment	AT-275
			3. Throttle position sensor	AT-176
			4. Line pressure test	AT-62
			5. Line pressure solenoid valve	AT-162
			6. Control valve assembly	AT-272
			7. Accumulator N-D	AT-272
			8. Shift solenoid valve A	AT-168
			9. Shift solenoid valve B	AT-172
		OFF vehicle	10. Forward clutch	AT-319
			11. Reverse clutch	AT-313
			12. Low & reverse brake	AT-323
			13. Oil pump	AT-296
			14. Torque converter	AT-285
	No creep at all. AT-227, 230	ON vehicle	1. Fluid level	AT-59
			2. Line pressure test	AT-62
			3. Control valve assembly	AT-272
		OFF vehicle	4. Forward clutch	AT-319
			5. Oil pump	AT-296
			6. Torque converter	AT-285
	Almost no shock or clutches slipping in change from D_1 to D_2.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor	AT-176
			3. Line pressure test	AT-62
			4. Accumulator servo release	AT-272
			5. Control valve assembly	AT-272
		OFF vehicle	6. Brake band	AT-332

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AT-87

Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Almost no shock or slipping in change from D_2 to D_3.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor	AT-176
			3. Line pressure test	AT-62
			4. Control valve assembly	AT-272
		OFF vehicle	5. High clutch	AT-316
			6. Brake band	AT-332
	Almost no shock or slipping in change from D_3 to D_4.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor	AT-176
			3. Line pressure test	AT-62
			4. Control valve assembly	AT-272
		OFF vehicle	5. Brake band	AT-332
	Races extremely fast or slips in changing from D_4 to D_3 when depressing pedal.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor	EC-206
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
			5. Shift solenoid valve A	AT-168
			6. Control valve assembly	AT-272
		OFF vehicle	7. Brake band	AT-332
			8. Forward clutch	AT-319
	Races extremely fast or slips in changing from D_4 to D_2 when depressing pedal.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor	AT-176
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
			5. Shift solenoid valve A	AT-168
			6. Shift solenoid valve B	AT-172
			7. Control valve assembly	AT-272
		OFF vehicle	8. Brake band	AT-332
			9. Forward clutch	AT-319
	Races extremely fast or slips in changing from D_3 to D_2 when depressing pedal.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor	AT-176
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
			5. Shift solenoid valve B	AT-172
			6. Control valve assembly	AT-272
		OFF vehicle	7. Brake band	AT-332
			8. High clutch	AT-316

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Races extremely fast or slips in changing from D_4 or D_3 to D_1 when depressing pedal.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor	AT-176
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
			5. Shift solenoid valve A	AT-168
			6. Shift solenoid valve B	AT-172
			7. Control valve assembly	AT-272
		OFF vehicle	8. Forward clutch	AT-319
			9. Forward one-way clutch	AT-329
			10. Low one-way clutch	AT-327
	Vehicle will not run in any position.	ON vehicle	1. Fluid level	AT-59
			2. Manual control linkage adjustment	AT-275
			3. Line pressure test	AT-62
			4. Line pressure solenoid valve	AT-162
		OFF vehicle	5. Oil pump	AT-296
			6. Torque converter	AT-285
			7. Parking pawl components	AT-336
NOT USED	Engine cannot be started in P and N positions. AT-221	ON vehicle	1. Ignition switch and starter	EL-10, and SC-10
			2. Manual control linkage adjustment	AT-275
			3. Park/neutral position (PNP) switch	AT-100
	Engine starts in positions other than P and N. AT-221	ON vehicle	1. Manual control linkage adjustment	AT-275
			2. Park/neutral position (PNP) switch	AT-100
	Transmission noise in P and N positions.	ON vehicle	1. Fluid level	AT-59
			2. Line pressure test	AT-62
			3. Throttle position sensor	AT-176
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-112, 197
			5. Engine speed signal	AT-117
		OFF vehicle	6. Oil pump	AT-296
			7. Torque converter	AT-285
	Vehicle moves when changing into P position or parking gear does not disengage when shifted out of P position. AT-223	ON vehicle	1. Manual control linkage adjustment	AT-275
		OFF vehicle	2. Parking pawl components	AT-336

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Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	Vehicle runs in N position. AT-224	ON vehicle	1. Manual control linkage adjustment	AT-275
		OFF vehicle	2. Forward clutch	AT-319
			3. Reverse clutch	AT-313
			4. Overrun clutch	AT-319
	Vehicle braked when shifting into R position.	ON vehicle	1. Fluid level	AT-59
			2. Line pressure test	AT-62
			3. Line pressure solenoid valve	AT-162
			4. Control valve assembly	AT-272
		OFF vehicle	5. High clutch	AT-316
			6. Brake band	AT-332
			7. Forward clutch	AT-319
			8. Overrun clutch	AT-319
	Excessive creep.	ON vehicle	1. Engine idling rpm	EC-715
	Engine stops when shifting lever into R, D, 2 and 1.	ON vehicle	1. Engine idling rpm	EC-715
			2. Torque converter clutch solenoid valve	AT-149
			3. Control valve assembly	AT-272
		OFF vehicle	4. Torque converter	AT-285
	Vehicle braked by gear change from D_1 to D_2.	ON vehicle	1. Fluid level	AT-59
		OFF vehicle	2. Reverse clutch	AT-313
			3. Low & reverse brake	AT-323
			4. High clutch	AT-316
			5. Low one-way clutch	AT-327
	Vehicle braked by gear change from D_2 to D_3.	ON vehicle	1. Fluid level	AT-59
		OFF vehicle	2. Brake band	AT-332
	Vehicle braked by gear change from D_3 to D_4.	ON vehicle	1. Fluid level	AT-59
		OFF vehicle	2. Overrun clutch	AT-319
			3. Forward one-way clutch	AT-329
			4. Reverse clutch	AT-313

AT-90

Items	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	Maximum speed not attained. Acceleration poor.	ON vehicle	1. Fluid level	AT-59
			2. Throttle position sensor	AT-176
			3. Park/neutral position (PNP) switch	AT-100
			4. Shift solenoid valve A	AT-168
			5. Shift solenoid valve B	AT-172
			6. Control valve assembly	AT-272
		OFF vehicle	7. Reverse clutch	AT-313
			8. High clutch	AT-316
			9. Brake band	AT-332
			10. Low & reverse brake	AT-323
			11. Oil pump	AT-296
			12. Torque converter	AT-285
	Transmission noise in D, 2, 1 and R positions.	ON vehicle	1. Fluid level	AT-59
		ON vehicle	2. Torque converter	AT-285
	Engine brake does not operate in "1" position. AT-252	ON vehicle	1. Park/neutral position (PNP) switch	AT-100
			2. Manual control linkage adjustment	AT-275
			3. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-112, 197
			4. Control valve assembly	AT-272
			5. Overrun clutch solenoid valve	AT-185
		OFF vehicle	6. Overrun clutch	AT-319
			7. Low & reverse brake	AT-323
	Transmission overheats.	ON vehicle	1. Fluid level	AT-59
			2. Engine idling rpm	EC-715
			3. Throttle position sensor	AT-176
			4. Line pressure test	AT-62
			5. Line pressure solenoid valve	AT-162
			6. Control valve assembly	AT-272
		OFF vehicle	7. Oil pump	AT-296
			8. Reverse clutch	AT-313
			9. High clutch	AT-316
			10. Brake band	AT-332
			11. Forward clutch	AT-319
			12. Overrun clutch	AT-319
			13. Low & reverse brake	AT-323
			14. Torque converter	AT-285

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Symptom Chart (Cont'd)

Items	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	ON vehicle	1. Fluid level	AT-59
		OFF vehicle	2. Reverse clutch	AT-313
			3. High clutch	AT-316
			4. Brake band	AT-332
			5. Forward clutch	AT-319
			6. Overrun clutch	AT-319
			7. Low & reverse brake	AT-323
	Offensive smell at fluid charging pipe.	ON vehicle	1. Fluid level	AT-59
		OFF vehicle	2. Torque converter	AT-285
			3. Oil pump	AT-296
			4. Reverse clutch	AT-313
			5. High clutch	AT-316
			6. Brake band	AT-332
			7. Forward clutch	AT-319
			8. Overrun clutch	AT-319
			9. Low & reverse brake	AT-323

AAT475A

SAT217JB

TCM Terminals and Reference Value

=NBAT0027

PREPARATION

NBAT0027S01

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

TCM HARNESS CONNECTOR TERMINAL LAYOUT

NBAT0027S02

TCM INSPECTION TABLE

NBAT0027S03

(Data are reference values.)

Terminal No.	Wire color	Item		Condition	Judgement standard (Approx.)
1	GY	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	BR/Y	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V
3	G/OR	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	0V
10	W/R	Power source		When turning ignition switch to "ON".	Battery voltage
				When turning ignition switch to "OFF".	0V

AT-93

Terminal No.	Wire color	Item		Condition	Judgement standard (Approx.)
11	L/W	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in "D$_1$" or "D$_4$".)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in "D$_2$" or "D$_3$".)	0V
12	L/R	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D$_1$" or "D$_2$".)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in "D$_3$" or "D$_4$".)	0V
13	GY/B	O/D OFF indicator lamp		When setting overdrive control switch in "ON" position.	Battery voltage
				When setting overdrive control switch in "OFF" position.	0V
16	OR/W	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine. Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.	Battery voltage
				When depressing accelerator pedal after warming up engine. Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.	0V
17	OR/B	Wide open throttle position switch (in throttle position switch)		When depressing accelerator pedal more than half-way after warming up engine.	Battery voltage
				When releasing accelerator pedal after warming up engine.	0V
18	B/Y	ASCD cruise signal		When ASCD cruise is being performed. ("CRUISE" light comes on.)	Battery voltage
				When ASCD cruise is not being performed. ("CRUISE" light does not comes on.)	0V
19	W/R	Power source	or	Same as No. 10	
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	0V
22	GY	Overdrive control switch		When setting overdrive control switch in "ON" position	Battery voltage
				When setting overdrive control switch in "OFF" position	0V
24	W/G	ASCD OD cut signal		When "ACCEL" set switch on ASCD cruise is released.	5 - 10V
				When "ACCEL" set switch on ASCD cruise is applied.	Less than 2V
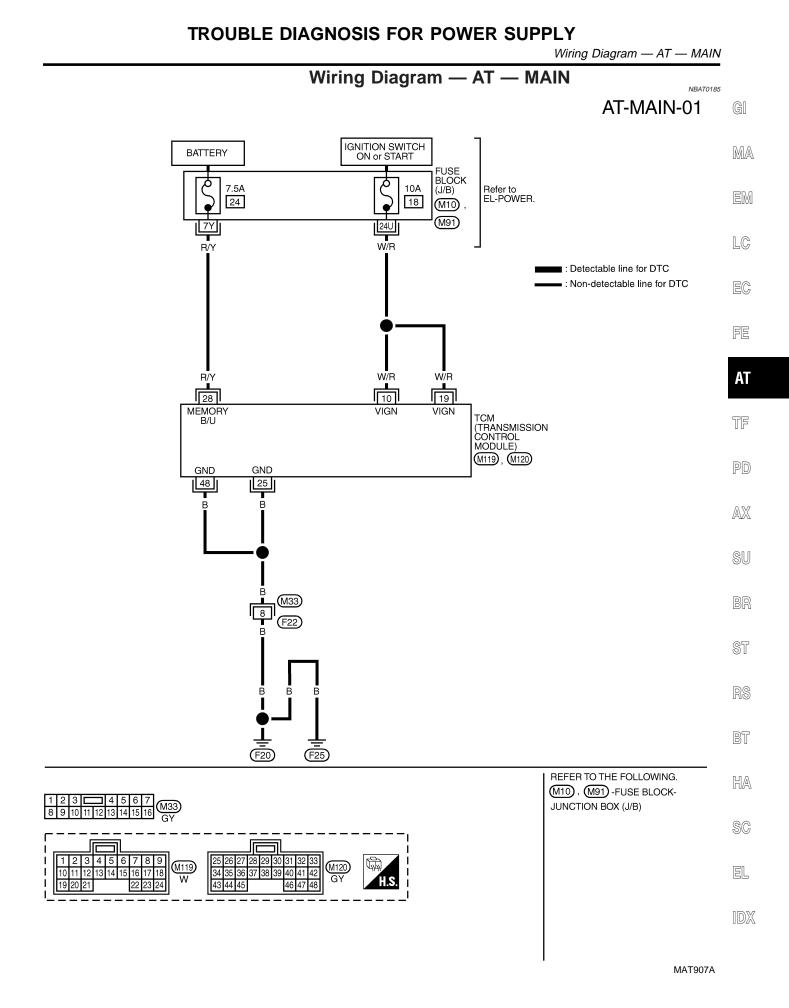
AT-94

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
25	B	Ground		—	0V
26	L/Y	PNP switch "1" position		When setting selector lever to "1" position.	Battery voltage
				When setting selector lever to other positions.	0V
27	G/W	PNP switch "2" position		When setting selector lever to "2" position.	Battery voltage
				When setting selector lever to other positions.	0V
28	R/Y	Power source (Memory back-up)	or	When turning ignition switch to "OFF".	Battery voltage
				When turning ignition switch to "ON".	Battery voltage
29	W	Revolution sensor (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
				When vehicle parks.	0V
30*2	W	(RX)		—	—
31*2	L	(TX)		—	—
32	P/B	Throttle position sensor (Power source)	or	Ignition switch "ON".	4.5 - 5.5V
				Ignition switch "OFF".	0V
33*1	G/R	LAN		—	—
34	L	PNP switch "D" position		When setting selector lever to "D" position.	Battery voltage
				When setting selector lever to other positions.	0V
35	Y	PNP switch "R" position		When setting selector lever to "R" position.	Battery voltage
				When setting selector lever to other positions.	0V
36	P	PNP switch "N" or "P" position		When setting selector lever to "N" or "P" position.	Battery voltage
				When setting selector lever to other positions.	0V
38	W	Turbine revolution sensor (Measure in AC range)		When engine is running at 1,000 rpm	1.2V Voltage rises gradually in response to engine speed.
39	W/B	Engine speed signal		Refer to EC-139, "ECM INSPECTION TABLE".	—
40	W/L	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1.0V and more than 4.5V.

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TCM Terminals and Reference Value (Cont'd)

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
41	P/L	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.5V - 0.7V Fully-open throttle: 4V
42	B	Throttle position sensor (Ground)		—	0V
45	G/Y	Stop lamp switch		When depressing brake pedal	Battery voltage
				When releasing brake pedal	0V
46	W/G	Transfer control unit		—	—
47	R	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.5V
				When ATF temperature is 80°C (176°F).	0.5V
48	B	Ground		—	0V

*1: These terminals are connected to the ECM.

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

Wiring Diagram — AT — MAIN

NBAT0185

AT-MAIN-01

BATTERY

IGNITION SWITCH
ON or START

FUSE
BLOCK
(J/B)
(M10) ,
(M91)

Refer to
EL-POWER.

7.5A
24

10A
18

7Y

24U

R/Y

W/R

■ : Detectable line for DTC

▬ : Non-detectable line for DTC

R/Y

W/R

W/R

28

10

19

MEMORY
B/U

VIGN

VIGN

TCM
(TRANSMISSION
CONTROL
MODULE)
(M119) , (M120)

GND

GND

48

25

B

B

B

M33
8
F22
B

B   B   B

F20   F25

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

1	2	3		4	5	6	7	M33
8	9	10	11	12	13	14	15	16	GY

1	2	3	4	5	6	7	8	9	M119		25	26	27	28	29	30	31	32	33	M120	
10	11	12	13	14	15	16	17	18	W		34	35	36	37	38	39	40	41	42	GY	
19	20	21				22	23	24			43	44	45			46	47	48		

H.S.

MAT907A

AT-97

TCM TERMINALS AND REFERENCE VALUE

NBAT0185S01

Remarks: Specification data are reference values.

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

Diagnostic Procedure
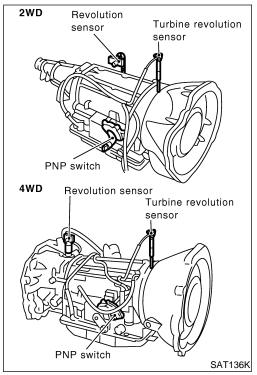
NBAT0223

1	CHECK TCM POWER SOURCE STEP 1

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM harness connector M119, M120 terminals 10, 19, 28 and ground.

CONNECT H.S. ON

TCM CONNECTOR

10, 19, 28

Voltage:
Battery voltage

V

SAT611J

OK or NG

OK	▶	GO TO 2.
NG	▶	GO TO 3.

AT-98

2	CHECK TCM POWER SOURCE STEP 2

1. Turn ignition switch to OFF position.
2. Check voltage between TCM harness connector M120 terminal 28 and ground.

TCM CONNECTOR
28

Voltage:
Battery voltage

SAT612JI

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING ITEM

Check the following items:
- Harness for short or open between ignition switch and TCM harness connector M119, M120 terminals 10, 19 and 28
- Ignition switch and 10A or 7.5A fuse [No. 18 or 24, located in the fuse block (J/B)]
  Refer to EL-10, "Schematic".

OK or NG

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

4	CHECK TCM GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between TCM harness connector M120 terminals 25, 48 and ground. Refer to wiring diagram — AT — MAIN.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

OK or NG

OK	▶	INSPECTION END
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

2WD Revolution sensor   Turbine revolution sensor

PNP switch

4WD Revolution sensor   Turbine revolution sensor

PNP switch

SAT136K

Description

NBAT0028

● The PNP switch assemble includes a transmission range switch.

● The transmission range switch detects the selector position and sends a signal to the TCM.

TCM TERMINALS AND REFERENCE VALUE

NBAT0028S02

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

NBAT0028S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
⊡ : PNP SW/CIRC ⊛ : P0705	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

```
┌─────────────────────────────┐
│       SELECT SYSTEM         │
├─────────────────────────────┤
│            A/T              │
├─────────────────────────────┤
│           ENGINE            │
├─────────────────────────────┤
│                             │
├─────────────────────────────┤
│                             │
├─────────────────────────────┤
│                             │
├─────────────────────────────┤
│                             │
├─────────────────────────────┤
│                             │
└─────────────────────────────┘
                      SAT014K
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┌─────────────────────────────┐
│      SELECT DIAG MODE       │
├─────────────────────────────┤
│       WORK SUPPORT          │
├─────────────────────────────┤
│     SELF-DIAG RESULTS       │
├─────────────────────────────┤
│       DATA MONITOR          │
├─────────────────────────────┤
│       ACTIVE TEST           │
├─────────────────────────────┤
│   DTC & SRT CONFIRMATION    │
├─────────────────────────────┤
│      ECM PART NUMBER        │
├─────────────────────────────┤
│                             │
└─────────────────────────────┘
                      SAT020K
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DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0028S01

CAUTION:
Always drive vehicle at a safe speed.

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

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

Ⓕ **With CONSULT-II**
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
3) Start engine and maintain the following conditions for at least 5 consecutive seconds.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.3V
   Selector lever: D position (OD "ON" or "OFF")

ⒼⓈⓉ **With GST**
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — PNP/SW

NBAT0186

AT-PNP/SW-01

IGNITION SWITCH
ON or START

FUSE
BLOCK
(J/B)
10A
18
(M10)

Refer to
EL-POWER.

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

24U

W/R

W/R
18 (M71)
(B51)
W/R

W/R

B/Y → To SC-START

3

B/Y

2

PARK/NEUTRAL
POSITION
SWITCH
(B65) , (B66)

P   R   N   D   2   1   P   R   N   D   2   1

4   5   6   7   8   9   1
R/B   Y   G/B   L   G/W   L/Y   B

B → To SC-START

R/B   Y   G/B   L   G/W   L/Y

R/B   Y   (B51)   G/B   L   G/W   L/Y
10 (B88) 13   (M71)   14   15   16   17
(M100)
R/B   Y   G/B   L   G/W   L/Y

3

DIODE
R/B 1   (M12)

To EL-BACK/L ← Y

2

Y   P   L   G/W   L/Y
35   36   34   27   26
R-SW   N-SW   D-SW   2-SW   1-SW

TCM
(TRANSMISSION
CONTROL MODULE)
(M120)

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

1 2 3 (M12)
GY

25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41 42   (M120)
43 44 45   46 47 48   GY

H.S.

1 2 3 4 5 ◇ 6 7 8 9 10 (B51)
11 12 13 14 15 16 17 18 19 20 21 22 23 24   W

7 8 9 3 (B65)
6 5 4   GY

2 1 (B66)
GY

1 2 3 4 ◇ 5 6 7 8 (B88)
9 10 11 12 13 14 15 16 17 18 19 20   GY

MAT128B

AT-102

DTC P0705 PARK/NEUTRAL POSITION SWITCH

Diagnostic Procedure

NBAT0029

1	CHECK PNP SWITCH CIRCUIT (WITH CONSULT-II)

With CONSULT-II
1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out "P", "R", "N", "D", "2" and "1" position switches moving selector lever to each position. Check the signal of the selector lever position is indicated properly.

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

SAT643J

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

2	CHECK PNP SWITCH CIRCUIT (WITHOUT CONSULT-II)

Without CONSULT-II
1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between TCM harness connector M120 terminals 26, 27, 34, 35, 36 and ground while moving selector lever through each position.

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

MTBL0205

TCM | CONNECTOR

26, 27, 34, 35, 36

H.S.

CONNECT

SAT517J

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

Yes	▶	GO TO 4.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING ITEM

Check the following items:
- PNP switch
  Refer to "Component Inspection", AT-104.
- Harness for short or open between ignition switch and PNP switch
- Harness for short or open between PNP switch and TCM
- Diode (P, N position)
- Ignition switch and 10A fuse [No. 18, located in the fuse block (J/B)]
  Refer to EL-10, "Schematic".

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

4	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-101.

OK or NG		
OK	▶	INSPECTION END
NG	▶	GO TO 5.

5	CHECK TCM INSPECTION

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

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

SAT517GB

SAT843BG

Component Inspection

NBAT0030

PARK/NEUTRAL POSITION SWITCH

NBAT0030S02

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

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

AT-104

SAT807B

SAT386HC

2. If NG, check again with manual control linkage disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control linkage. Refer to AT-275.

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-275.
6. If NG on step 4, replace PNP switch.

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

Description

Torque converter clutch solenoid valve
A/T fluid temperature sensor
(Control valve lower body)

SAT342HA

SAT021J

Description

NBAT0031

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

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NBAT0031S04

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	Approximately 2.5 kΩ ↓ Approximately 0.3 kΩ

TCM TERMINALS AND REFERENCE VALUE

NBAT0031S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
42	B	Throttle position sensor (Ground)		—	0V
47	R	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.5V
				When ATF temperature is 80°C (176°F).	0.5V

ON BOARD DIAGNOSIS LOGIC

NBAT0031S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: ATF TEMP SEN/CIRC : P0710	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

```
┌─────────────────────────────┐
│      SELECT SYSTEM          │
├─────────────────────────────┤
│           A/T               │
├─────────────────────────────┤
│         ENGINE              │
├─────────────────────────────┤
│                             │
├─────────────────────────────┤
│                             │
├─────────────────────────────┤
│                             │
├─────────────────────────────┤
│                             │
├─────────────────────────────┤
│                             │
└─────────────────────────────┘
                      SAT014K
```

```
┌─────────────────────────────┐
│      SELECT DIAG MODE       │
├─────────────────────────────┤
│       WORK SUPPORT          │
├─────────────────────────────┤
│     SELF-DIAG RESULTS       │
├─────────────────────────────┤
│       DATA MONITOR          │
├─────────────────────────────┤
│        ACTIVE TEST          │
├─────────────────────────────┤
│   DTC & SRT CONFIRMATION    │
├─────────────────────────────┤
│      ECM PART NUMBER        │
├─────────────────────────────┤
│                             │
└─────────────────────────────┘
                      SAT020K
```

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0031S01

CAUTION:
Always drive vehicle at a safe speed.

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

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

Ⓔ **With CONSULT-II**
1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
2) Start engine and maintain the following conditions for at least 10 minutes (Total). (It is not necessary to maintain continuously.)
   CMPS·RPM (REF): 450 rpm or more
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (OD "ON")

Ⓖ **With GST**
Follow the procedure "With CONSULT-II".

AT-107

Wiring Diagram — AT — FTS

NBAT0187

AT-FTS-01

A/T FLUID
TEMPERATURE
SENSOR

TERMINAL
CORD
ASSEMBLY

8 ── (B64) ── 9

R   B

▬▬▬ : Detectable line for DTC

──── : Non-detectable line for DTC

R   (B51)   B
10 ─ (M71) ─ 9
R   B

B ▬ 16 ▬ B/P
(M33)   (F22)

R   B   B/P

47   42   58

FLUID   SENS   TCM
TEMP   GND   (TRANSMISSION
SENS   CONTROL
           MODULE)
           (M120)

GND-A

ECM
(F24)

1	2	3		4	5	6	7	(M33)
8	9	10	11	12	13	14	15	16	GY

25	26	27	28	29	30	31	32	33	(M120)
34	35	36	37	38	39	40	41	42	GY
43	44	45				46	47	48	

H.S.

1	2	3	4	5			6	7	8	9	10	(B51)
11	12	13	14	15	16	17	18	19	20	21	22	23	24	W

6	4	3	2	(B64)
10	9	8	7	BR

REFER TO THE FOLLOWING.
(F24) -ELECTRICAL UNITS

MAT909A
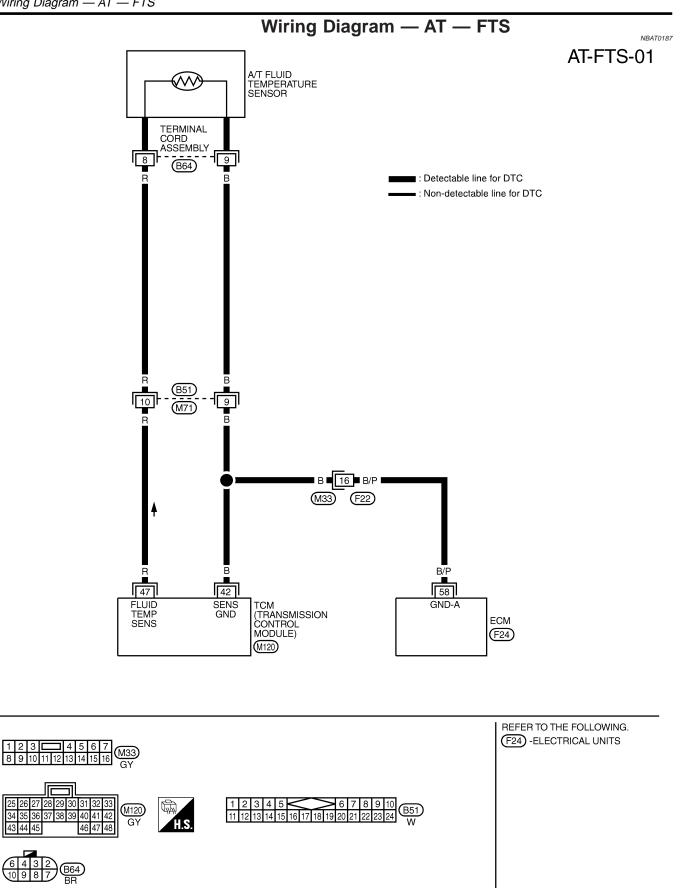
DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Diagnostic Procedure

NBAT0032

1	INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 6.

2	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II)

⊟ **With CONSULT-II**
1. Start engine.
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out the value of "FLUID TEMP SE".
   Voltage:
     Cold [20°C (68°F)] → Hot [80°C (176°F)]:
       Approximately 1.5V → 0.5V

```
          DATA MONITOR
      ┌─────────────────┬──────────┐
      │   MONITORING    │          │
      ├─────────────────┼──────────┤
      │ VHCL/S SE-A/T    XXX km/h  │
      │ VHCL/S SE-MTR    XXX km/h  │
      │ THRTL POS SEN    XXX V     │
      │ FLUID TEMP SE    XXX V     │
      │ BATTERY VOLT     XXX V     │
      └────────────────────────────┘
```

SAT614J

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING ITEM

Check the following item:
- Harness for short to ground or short to power or open between TCM, ECM and terminal cord assembly
- Ground circuit for ECM.
  Refer to EC-154, "Wiring Diagram".

OK or NG

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

AT-109

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

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector on the right side of transfer assmebly.
3. Check resistance between terminals 8 and 9 when A/T is cold [20°C (68°F)].

SAT697I

Is resistance approx. 2.5 kΩ?

Yes	▶	GO TO 7.
No	▶	GO TO 5.

5	DETECT MALFUNCTIONING ITEM

1. Remove oil pan.
2. Check the following items:
● A/T fluid temperature sensor
   Refer to "Component Inspection", AT-111.
● Harness of terminal cord assembly for short or open

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

6	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)

⊗ **Without CONSULT-II**
1. Start engine.
2. Check voltage between TCM harness connector M120 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

SAT518JC

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

7	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-107.	
OK or NG	
OK	▶	INSPECTION END
NG	▶	GO TO 8.

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

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

Thermometer
Wrapped

SAT716K

Component Inspection
A/T FLUID TEMPERATURE SENSOR

NBAT0033

NBAT0033S01

● For removal, refer to AT-272.
● Check resistance between terminals 8 and 9 while changing temperature as shown at left.

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

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

2WD Revolution sensor · Turbine revolution sensor · PNP switch

4WD Revolution sensor · Turbine revolution sensor · PNP switch

SAT136K

Description

NBAT0034

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

TCM TERMINALS AND REFERENCE VALUE

NBAT0034S02
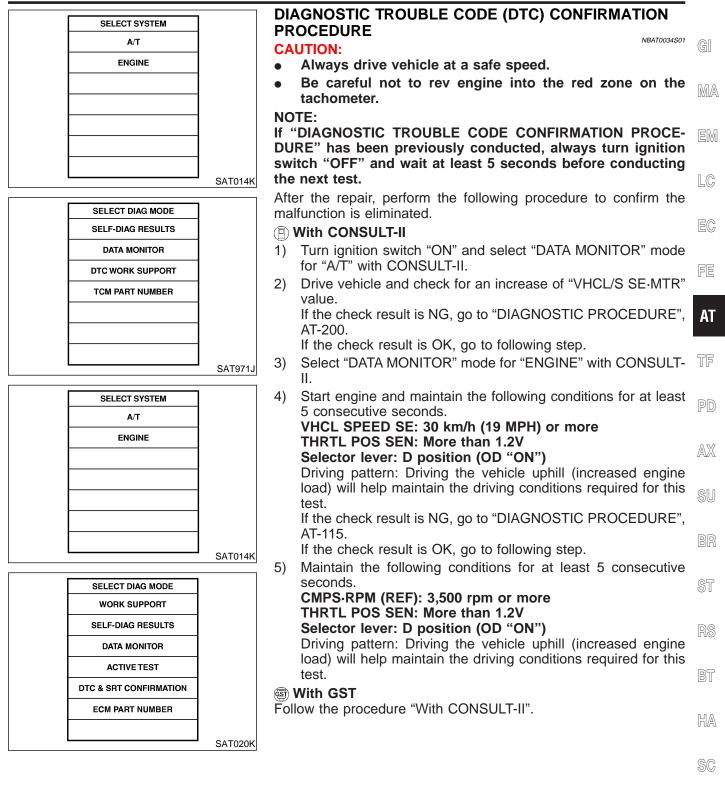
Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

NBAT0034S03
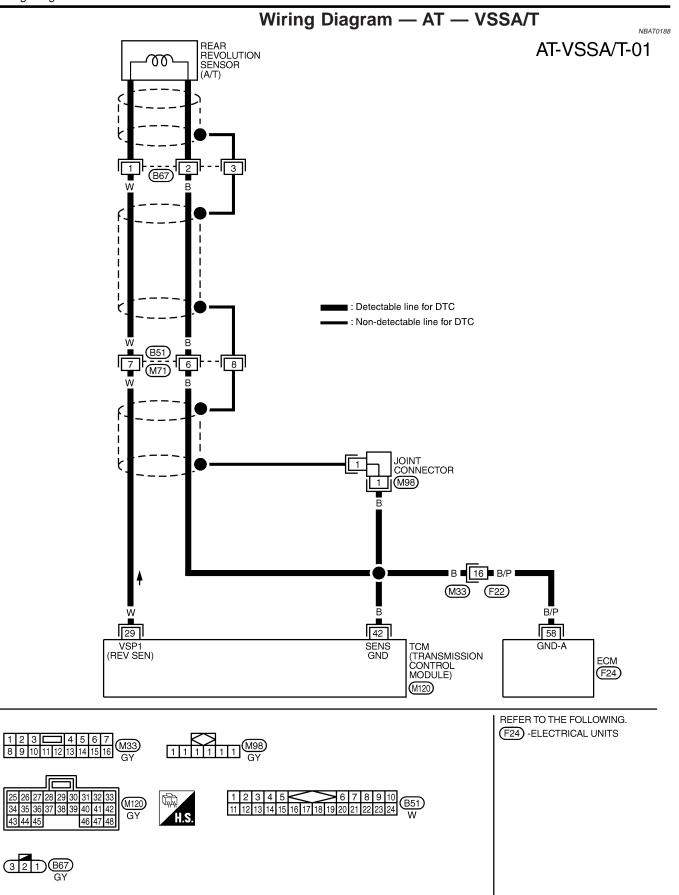
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
🔧 : VEH SPD SEN/CIR AT	TCM does not receive the proper voltage signal from the sensor.	● Harness or connectors (The sensor circuit is open or shorted.) ● Revolution sensor
🔧 : P0720		

AT-112

SELECT SYSTEM
A/T
ENGINE

SAT014K

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

SAT971J

SELECT SYSTEM
A/T
ENGINE

SAT014K

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

SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0034S01

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

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

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

 With CONSULT-II

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

2) Drive vehicle and check for an increase of "VHCL/S SE·MTR" value.
   If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-200.
   If the check result is OK, go to following step.

3) Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.

4) Start engine and maintain the following conditions for at least 5 consecutive seconds.
   VHCL SPEED SE: 30 km/h (19 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (OD "ON")
   Driving pattern: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.
   If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-115.
   If the check result is OK, go to following step.

5) Maintain the following conditions for at least 5 consecutive seconds.
   CMPS·RPM (REF): 3,500 rpm or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (OD "ON")
   Driving pattern: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.

 With GST
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — VSSA/T

NBAT0188

AT-VSSA/T-01

REAR
REVOLUTION
SENSOR
(A/T)

■ : Detectable line for DTC

▬ : Non-detectable line for DTC

| 1 | (B67) | 2 | --- | 3 |

W   B

| 7 | (B51) (M71) | 6 | --- | 8 |

W   B

W   B

JOINT
CONNECTOR
(M98)

B

B | 16 | B/P
(M33) (F22)

W   B   B/P

| 29 | | 42 | | 58 |

VSP1
(REV SEN)   SENS
GND   GND-A

TCM
(TRANSMISSION
CONTROL
MODULE)
(M120)   ECM
(F24)

REFER TO THE FOLLOWING.
(F24) -ELECTRICAL UNITS

| 1 | 2 | 3 | | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
(M33)
GY

| 1 | 1 | 1 | 1 | 1 | 1 |
(M98)
GY

25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42
43	44	45				46	47	48
(M120)
GY

H.S.

| 1 | 2 | 3 | 4 | 5 | | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
(B51)
W

| 3 | 2 | 1 |
(B67)
GY

MAT910A

AT-114

Diagnostic Procedure

NBAT0035

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

2	CHECK INPUT SIGNAL (WITH CONSULT-II)	
With CONSULT-II 1. Start engine. 2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II. 3. Read out the value of "VHCL/S SE·A/T" while driving. Check the value changes according to driving speed.		
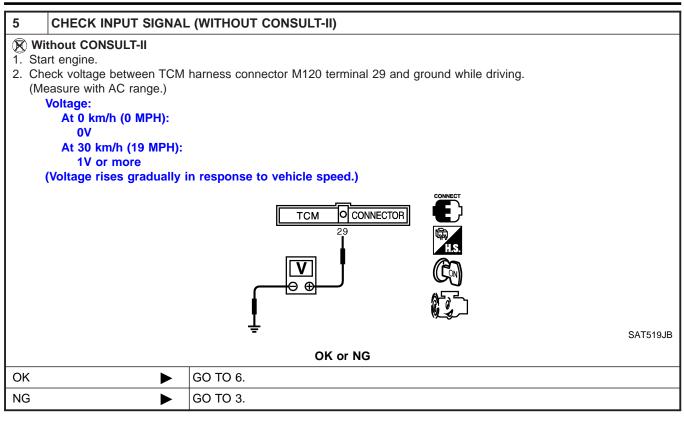
```
          DATA MONITOR
      ┌──────────────────┬──────┐
      │    MONITORING    │      │
      ├──────────────────┼──────┤
      │ VHCL/S SE-A/T   XXX km/h │
      │                          │
      │ VHCL/S SE-MTR   XXX km/h │
      │                          │
      │ THRTL POS SEN    XXX V    │
      │                          │
      │ FLUID TEMP SE    XXX V    │
      │                          │
      │ BATTERY VOLT     XXX V    │
      └──────────────────────────┘
```

SAT614J

	OK or NG	
OK	▶	GO TO 6.
NG	▶	GO TO 3.

3	CHECK REVOLUTION SENSOR	
Refer to "Component Inspection", AT-116.		
	OK or NG	
OK	▶	GO TO 4.
NG	▶	Repair or replace revolution sensor.

4	DETECT MALFUNCTIONING ITEM	
Check the following items: ● Harness for short or open between TCM and revolution sensor ● Harness for short or open between revolution sensor and ECM ● Ground circuit for ECM Refer to EC-154, "WIRING DIAGRAM".		
	OK or NG	
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

AT-115

5	CHECK INPUT SIGNAL (WITHOUT CONSULT-II)

⊗ **Without CONSULT-II**
1. Start engine.
2. Check voltage between TCM harness connector M120 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.)

TCM | CONNECTOR

29

CONNECT

V

SAT519JB

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 3.

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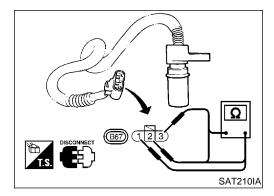
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-113.

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 7.

7	CHECK TCM INSPECTION

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

OK or NG

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

B67 | 1 2 3

DISCONNECT

T.S.

Ω

SAT210IA

Component Inspection
REVOLUTION SENSOR

NBAT0036

NBAT0036S01

- For removal, refer to AT-272.
- Check resistance between terminals 1, 2 and 3.

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

AT-116

Description

NBAT0037

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

TCM TERMINALS AND REFERENCE VALUE

NBAT0037S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
39	W/B	Engine speed signal		Refer to EC-139, "ECM INSPECTION TABLE".	—

ON BOARD DIAGNOSIS LOGIC

NBAT0037S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: ENGINE SPEED SIG : P0725	TCM does not receive the proper voltage signal from ECM.	• Harness or connectors (The sensor circuit is open or shorted.)

SELECT SYSTEM

A/T

ENGINE

SAT014K

SELECT DIAG MODE

WORK SUPPORT

SELF-DIAG RESULTS

DATA MONITOR

ACTIVE TEST

DTC & SRT CONFIRMATION

ECM PART NUMBER

SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0037S01

CAUTION:
Always drive vehicle at a safe speed.

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

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

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

With GST
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — ENGSS

NBAT0189

AT-ENGSS-01

ECM
(F24)

TACHO
25
W/G

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

W/G (F23)
7
(M32)
W

W ▶ To EL-METER

W/B
39
TACHO   TCM
(TRANSMISSION
CONTROL
MODULE)
(M120)

REFER TO THE FOLLOWING.
(F24) - ELECTRICAL UNITS

1	2	3	4	5	6		7	8	9	10	11	(M32)
12	13	14	15	16	17	18	19	20	21	22	23	24

BR

25	26	27	28	29	30	31	32	33	(M120)
34	35	36	37	38	39	40	41	42	
43	44	45				46	47	48	

GY   **H.S.**

MAT911A

DTC P0725 ENGINE SPEED SIGNAL

Diagnostic Procedure

NBAT0038

1	CHECK DTC WITH ECM	

● Check P code with CONSULT-II.
  Turn ignition switch "ON" and select "SELF-DIAG RESULTS" mode for "ENGINE" with CONSULT-II.
  Refer to EC-87, "DESCRIPTION".		

OK or NG		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 4.
NG	▶	Check ignition signal circuit for engine control. Refer to EC-671, "Component Description".

2	CHECK INPUT SIGNAL (WITH CONSULT-II)	
🖳 **With CONSULT-II** 1. Start engine. 2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II. 3. Read out the value of "ENGINE SPEED". Check engine speed changes according to throttle position.		

DATA MONITOR	
MONITORING	
ENGINE SPEED	XXX rpm
TURBINE REV	XXX rpm
OVERDRIVE SW	ON
PN POSI SW	OFF
R POSITION SW	OFF

SAT645J

Refer to EC-139**, "ECM INSPECTION TABLE".**

Yes	▶	GO TO 5.
No	▶	GO TO 3.

3	DETECT MALFUNCTIONING ITEM	
Check the following items: ● Harness for short or open between TCM and ECM ● Resistor ● Ignition coil Refer to EC-671, "Component Description".		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair or replace damaged parts.

AT-119

Diagnostic Procedure (Cont'd)

4	CHECK INPUT SIGNAL (WITHOUT CONSULT-II)

⊠ **Without CONSULT-II**
1. Start engine.
2. Check voltage between TCM harness connector M120 terminal 39 and ground.

SAT520JF

Refer to EC-139**, "ECM INSPECTION TABLE".**

Yes	▶	GO TO 5.
No	▶	GO TO 3.

5	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-117.

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 6.

6	CHECK TCM INSPECTION

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

OK or NG

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

DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

Description

NBAT0039

- 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

NBAT0039S02

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

NBAT0039S03

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

Torque converter slip ratio = A x C/B

A: Output shaft revolution signal from revolution sensor

B: Engine speed signal from ECM

C: Gear ratio determined as gear position which TCM supposes

If the actual gear position is higher than the position (1st) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.

This malfunction will be caused when either shift solenoid valve A is stuck open or shift solenoid valve B is stuck open.
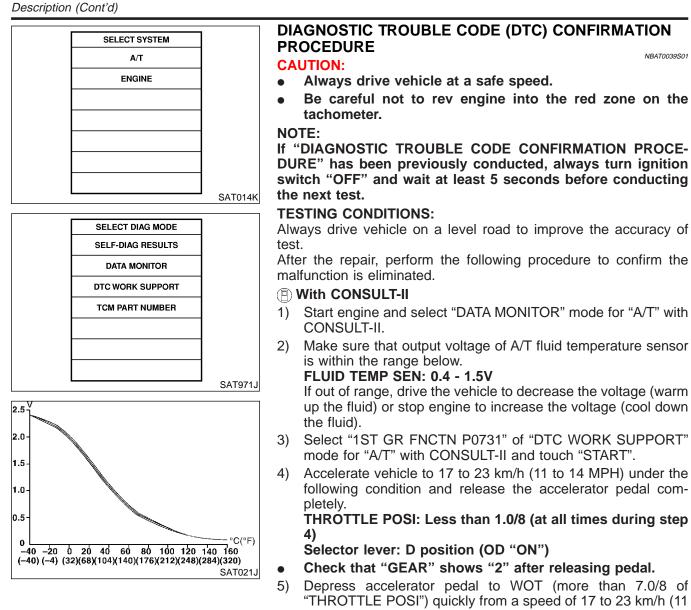
	1	2	3	4
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve A stuck open	2*	2	3	3
In case of gear position with shift solenoid valve B stuck open	4*	3	3	4

*: P0731 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
⊡ : A/T 1ST GR FNCTN 🔧 : P0731	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

AT-121

Description (Cont'd)

SELECT SYSTEM

A/T
ENGINE

SAT014K

SELECT DIAG MODE

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

SAT971J

SAT021J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0039S01

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

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

TESTING CONDITIONS:
Always drive vehicle on a level road to improve the accuracy of test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

☐ **With CONSULT-II**

1) Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3) Select "1ST GR FNCTN P0731" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4) Accelerate vehicle to 17 to 23 km/h (11 to 14 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD "ON")
   ● **Check that "GEAR" shows "2" after releasing pedal.**
5) Depress accelerator pedal to WOT (more than 7.0/8 of "THROTTLE POSI") quickly from a speed of 17 to 23 km/h (11 to 14 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-125.
   If "STOP VEHICLE" appears on CONSULT-II screen, go to the following step.
   ● **Check that "GEAR" shows "1" when depressing accelera-tor pedal to WOT.**
   ● **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0731 is shown, refer to appli-cable "TROUBLE DIAGNOSIS FOR DTC".**
6) Stop vehicle.
7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)
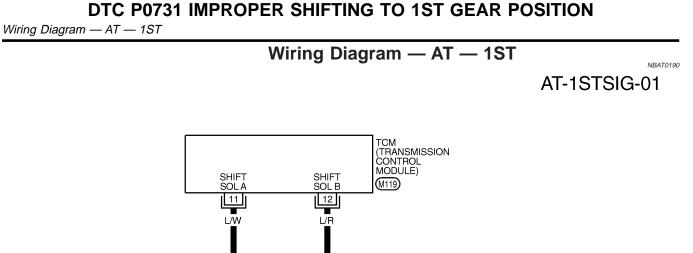
Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists	1 → 2 → 3 → 4
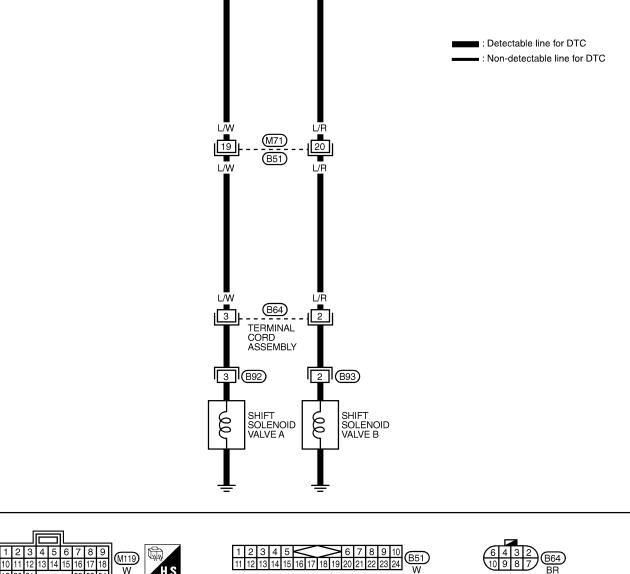
Malfunction for P0731 exists.	$2 \rightarrow 2 \rightarrow 3 \rightarrow 3$
	$4 \rightarrow 3 \rightarrow 3 \rightarrow 4$

8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
   Refer to "DIAGNOSTIC PROCEDURE", AT-125.
   Refer to shift schedule, AT-355.

⊛ With GST
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — 1ST

NBAT0190

AT-1STSIG-01

TCM
(TRANSMISSION
CONTROL
MODULE)
(M119)

SHIFT SOL A — 11
SHIFT SOL B — 12

L/W
L/R

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

L/W — 19 — (M71)/(B51) — 20 — L/R
L/W
L/R

L/W — 3 — (B64) — 2 — L/R
TERMINAL
CORD
ASSEMBLY

3 (B92)
2 (B93)

SHIFT
SOLENOID
VALVE A

SHIFT
SOLENOID
VALVE B

1	2	3	4	5	6	7	8	9		(M119) W	H.S.
10	11	12	13	14	15	16	17	18
19	20	21					22	23	24

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |10| (B51) W |
|11|12|13|14|15|16|17|18|19|20|21|22|23|24|

| 6 | 4 | 3 | 2 | (B64) BR |
|10| 9 | 8 | 7 |

| 3 | 4 | (B92) * | | 6 | 2 | (B93) * |

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

MAT731A

DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

Diagnostic Procedure

NBAT0040

1	CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-272.
2. Check shift solenoid valve operation.
● Shift solenoid valve A
● Shift solenoid valve B
Refer to "Component Inspection", AT-126.

SAT648I

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-300.
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-122.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Check transmission inner parts. (Clutch, brake etc.)

AT-125

Component Inspection

SAT649I

SAT648I

Component Inspection

=NBAT0041

SHIFT SOLENOID VALVE A AND B

NBAT0041S01

● For removal, refer to AT-272.

Resistance Check

NBAT0041S0101

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

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

Operation Check

NBAT0041S0102

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

Description

NBAT0042

- 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

NBAT0042S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
12	L/R	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D$_1$" or "D$_2$".)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in "D$_3$" or "D$_4$".)	0V

ON BOARD DIAGNOSIS LOGIC

NBAT0042S03

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

Torque converter slip ratio = A x C/B

A: Output shaft revolution signal from revolution sensor

B: Engine speed signal from ECM

C: Gear ratio determined as gear position which TCM supposes

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

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

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

*: P0732 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
ⓟ : A/T 2ND GR FNCTN ⓖⓢⓣ : P0732	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

Description (Cont'd)

```
        SELECT SYSTEM

         A/T

         ENGINE



                          SAT014K
```

```
       SELECT DIAG MODE

       SELF-DIAG RESULTS

       DATA MONITOR

       DTC WORK SUPPORT

       TCM PART NUMBER



                          SAT971J
```

```
V
2.5
2.0
1.5
1.0
0.5
0                              °C(°F)
  −40 −20  0  20  40  60  80 100 120 140 160
 (−40) (−4) (32)(68)(104)(140)(176)(212)(248)(284)(320)
                          SAT021J
```

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0042S01

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

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

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

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

🔲 **With CONSULT-II**

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

2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).

3) Select "2ND GR FNCTN P0732" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".

4) Accelerate vehicle to 40 to 45 km/h (25 to 28 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD "ON")
● **Check that "GEAR" shows "3" or "4" after releasing pedal.**
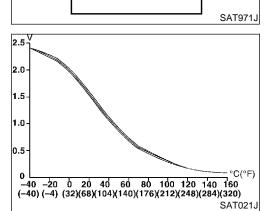
5) Depress accelerator pedal to WOT (more than 7.0/8 of "THROTTLE POSI") quickly from a speed of 40 to 45 km/h (25 to 28 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-131.
   If "STOP VEHICLE" appears on CONSULT-II screen, go to following step.
● **Check that "GEAR" shows "2" when depressing accelerator pedal to WOT.**
● **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0732 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".**

6) Stop vehicle.

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

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

8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".) Refer to "DIAGNOSTIC PROCEDURE", AT-131. Refer to shift schedule, AT-355.

🔘 **With GST**
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — 2ND

NBAT0191

AT-2NDSIG-01

TCM
(TRANSMISSION
CONTROL
MODULE)
M119

SHIFT
SOL B

12

L/R

▬▬ : Detectable line for DTC

── : Non-detectable line for DTC

L/R
20 M71
B51
L/R

L/R
2 B64
TERMINAL
CORD
ASSEMBLY

2 B93

SHIFT
SOLENOID
VALVE B

1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18
19 20 21 22 23 24
M119
W

H.S.

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20 21 22 23 24
B51
W

6 4 3 2
10 9 8 7
B64
BR

6 2 B93 *

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

MAT732A

AT-130
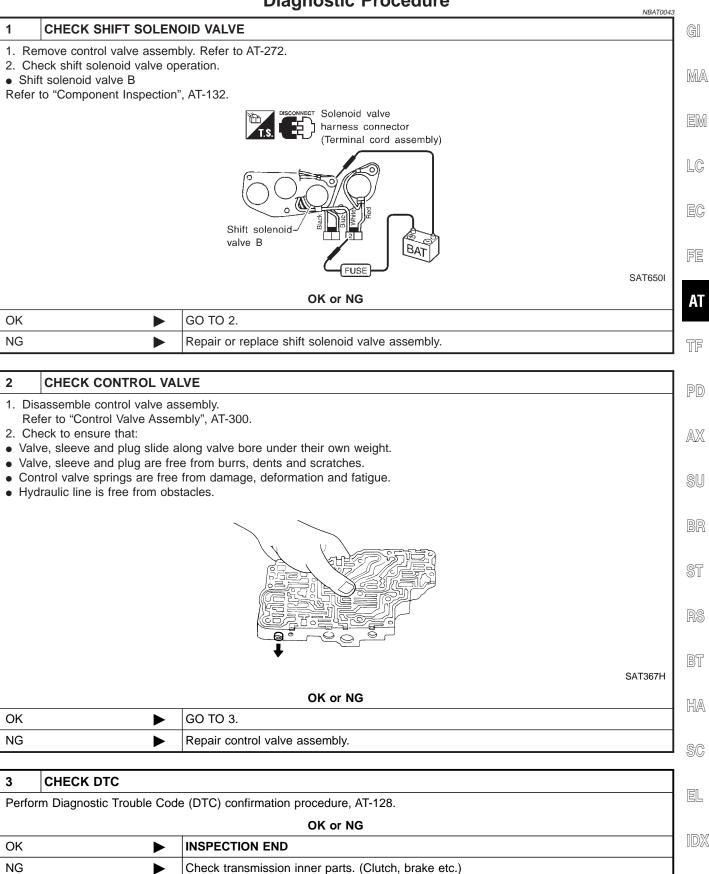
DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

Diagnostic Procedure

NBAT0043

1	CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-272.
2. Check shift solenoid valve operation.
● Shift solenoid valve B
Refer to "Component Inspection", AT-132.

SAT650I

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-300.
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-128.

OK or NG

OK	▶	INSPECTION END
NG	▶	Check transmission inner parts. (Clutch, brake etc.)

AT-131

Component Inspection

SAT651I

SAT650I

Component Inspection
NBAT0044
SHIFT SOLENOID VALVE B
NBAT0044S01
● For removal, refer to AT-272.

Resistance Check
NBAT0044S0101
● Check resistance between terminal 2 and ground.

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

Operation Check
NBAT0044S0102
● Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 2 and ground.

DTC P0733 IMPROPER SHIFTING TO 3RD GEAR POSITION

Description

Description

NBAT0045

- 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

NBAT0045S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
11	L/W	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in "D$_1$" or "D$_4$".)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in "D$_2$" or "D$_3$".)	0V

ON BOARD DIAGNOSIS LOGIC

NBAT0045S03

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

Torque converter slip ratio = A x C/B

A: Output shaft revolution signal from revolution sensor

B: Engine speed signal from ECM

C: Gear ratio determined as gear position which TCM supposes

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

This malfunction will be caused when shift solenoid valve A is stuck closed.
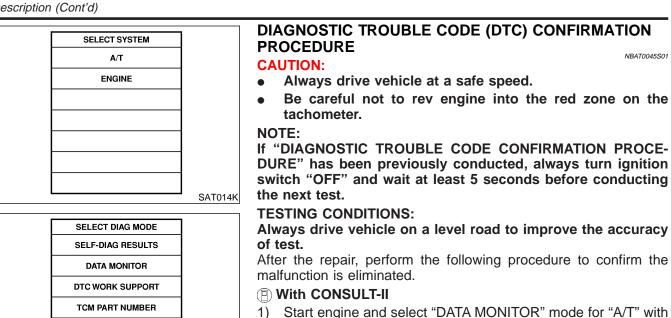
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve A stuck closed	1	1	4*	4

*: P0733 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
(P) : A/T 3RD GR FNCTN (GST) : P0733	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

AT-133

Description (Cont'd)

```
SELECT SYSTEM

A/T

ENGINE




```
SAT014K

```
SELECT DIAG MODE

SELF-DIAG RESULTS

DATA MONITOR

DTC WORK SUPPORT

TCM PART NUMBER



```
SAT971J

SAT021J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0045S01

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 PROCE-DURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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

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

With CONSULT-II

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

2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).

3) Select "3RD GR FNCTN P0733" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".

4) Accelerate vehicle to 60 to 75 km/h (37 to 47 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD "ON")
   - **Check that "GEAR" shows "4" after releasing pedal.**

5) Depress accelerator pedal steadily with 3.5/8 - 4.5/8 of "THROTTLE POSI" from a speed of 60 to 75 km/h (37 to 47 MPH) until "TESTING" changes to "STOP VEHICLE" or "COM-PLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-137.
   If "STOP VEHICLE" appears on CONSULT-II screen, go to following step.
   - **Check that "GEAR" shows "3" when depressing accelera-tor pedal with 3.5/8 - 4.5/8 of "THROTTLE POSI".**
   - **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0733 is shown, refer to appli-cable "TROUBLE DIAGNOSIS FOR DTC".**

6) Stop vehicle.

7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)
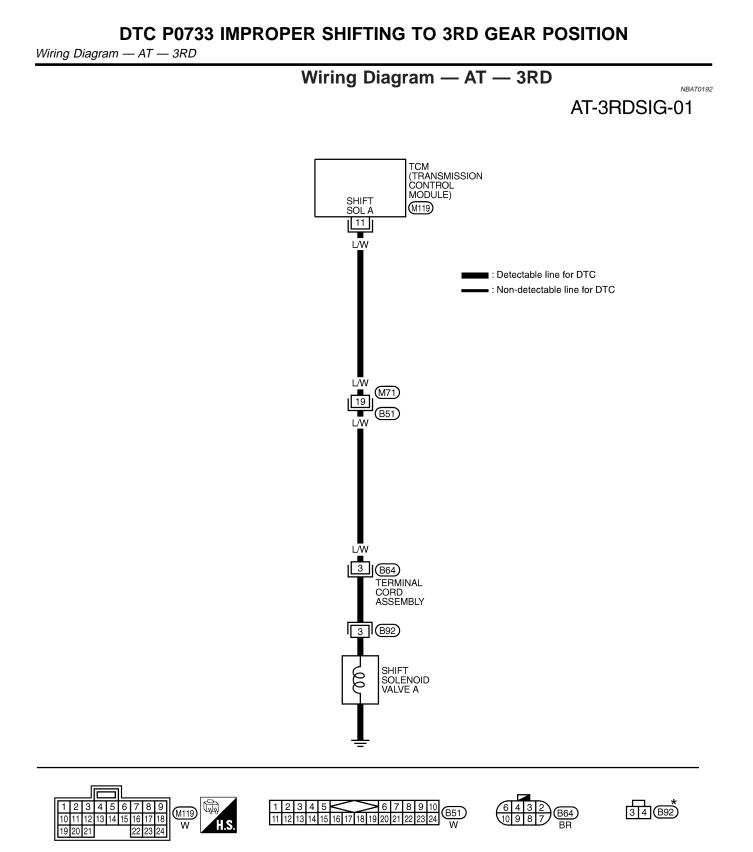
Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists.	1 → 2 → 3 → 4
Malfunction for P0733 exists.	1 → 1 → 4 → 4

8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".) Refer to "DIAGNOSTIC PROCEDURE", AT-137.
    Refer to shift schedule, AT-355.

(GST) **With GST**

Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — 3RD

NBAT0192

AT-3RDSIG-01

```
        ┌─────────────┐  TCM
        │             │  (TRANSMISSION
        │             │  CONTROL
        │             │  MODULE)
        │  SHIFT      │  (M119)
        │  SOL A      │
        │   ┌──┐      │
        └───┤11├──────┘
            └──┘
            L/W
             │
             │
             │
            L/W  ┌─────┐
           ┌──┐  (M71)
           │19│
           └──┘  (B51)
            L/W
             │
             │
            L/W
           ┌──┐ (B64)
           │ 3│
           └──┘ TERMINAL
                CORD
                ASSEMBLY
           ┌──┐ (B92)
           │ 3│
           └──┘
         ┌──────┐
         │  ⌇   │ SHIFT
         │      │ SOLENOID
         │      │ VALVE A
         └──────┘
             │
             ⏚
```

■■■■ : Detectable line for DTC

──── : Non-detectable line for DTC

```
┌─────────────────┐
│1│2│3│4│5│6│7│8│9│  (M119)
│10│11│12│13│14│15│16│17│18│  W
│19│20│21│      │22│23│24│
└─────────────────┘
```
H.S.

```
┌──────────────────────────────┐
│1│2│3│4│5│◇│6│7│8│9│10│  (B51)
│11│12│13│14│15│16│17│18│19│20│21│22│23│24│  W
└──────────────────────────────┘
```

```
┌─────────┐
│6│4│3│2│  (B64)
│10│9│8│7│  BR
└─────────┘
```

```
        *
┌─────┐
│3│4│  (B92)
└─────┘
```

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

MAT733A
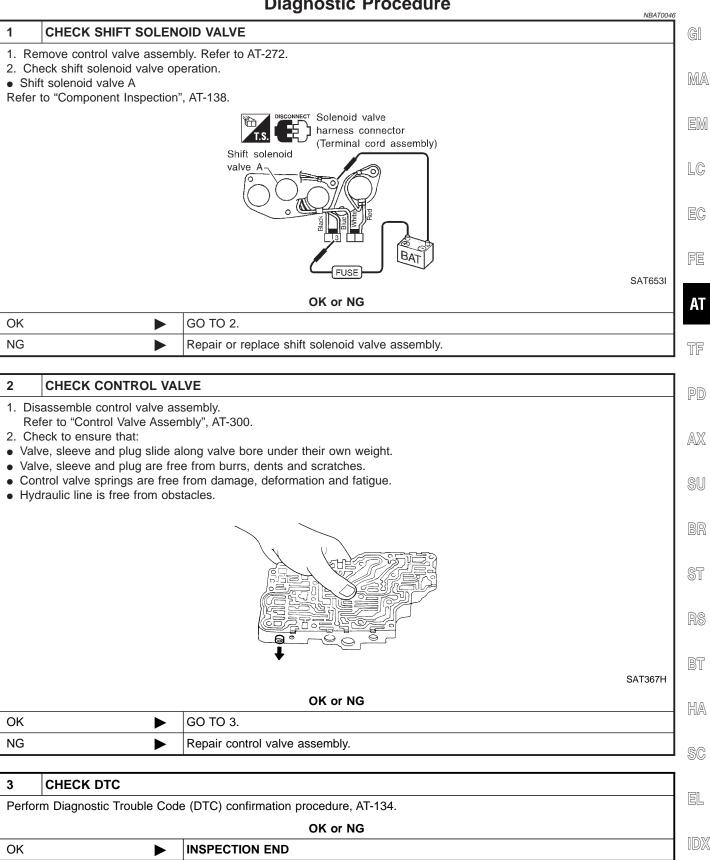
DTC P0733 IMPROPER SHIFTING TO 3RD GEAR POSITION

Diagnostic Procedure

Diagnostic Procedure

NBAT0046

GI

MA

1	CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-272.
2. Check shift solenoid valve operation.
● Shift solenoid valve A
Refer to "Component Inspection", AT-138.

SAT653I

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-300.
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-134.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Check transmission inner parts. (Clutch, brake, etc.)

AT-137

Component Inspection

SAT654I

SAT653I

Component Inspection

NBAT0047

SHIFT SOLENOID VALVE A

NBAT0047S01

- For removal, refer to AT-272.

Resistance Check

NBAT0047S0101

- Check resistance between terminal 3 and ground.

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

Operation Check

NBAT0047S0102

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

DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Description

Description

NBAT0048

● 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 as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NBAT0048S04

Remarks: Specification data are reference values.

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

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

TCM TERMINALS AND REFERENCE VALUE

NBAT0048S02

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition	Judgement standard (Approx.)
1	GY	Line pressure solenoid valve	When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
			When depressing accelerator pedal fully after warming up engine.	0V
2	BR/Y	Line pressure solenoid valve (with dropping resistor)	When releasing accelerator pedal after warming up engine.	5 - 14V
			When depressing accelerator pedal fully after warming up engine.	0V
11	L/W	Shift solenoid valve A	When shift solenoid valve A operates. (When driving in "D_1" or "D_4".)	Battery voltage
			When shift solenoid valve A does not operate. (When driving in "D_2" or "D_3".)	0V
12	L/R	Shift solenoid valve B	When shift solenoid valve B operates. (When driving in "D_1" or "D_2".)	Battery voltage
			When shift solenoid valve B does not operate. (When driving in "D_3" or "D_4".)	0V

AT-139

Description (Cont'd)

ON BOARD DIAGNOSIS LOGIC

=NBAT0048S03

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

Torque converter slip ratio = A x C/B

A: Output shaft revolution signal from revolution sensor

B: Engine speed signal from ECM

C: Gear ratio determined as gear position which TCM supposes

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

This malfunction will be caused when shift solenoid valve B, line pressure solenoid valve are stuck closed and shift solenoid valve A is stuck open.
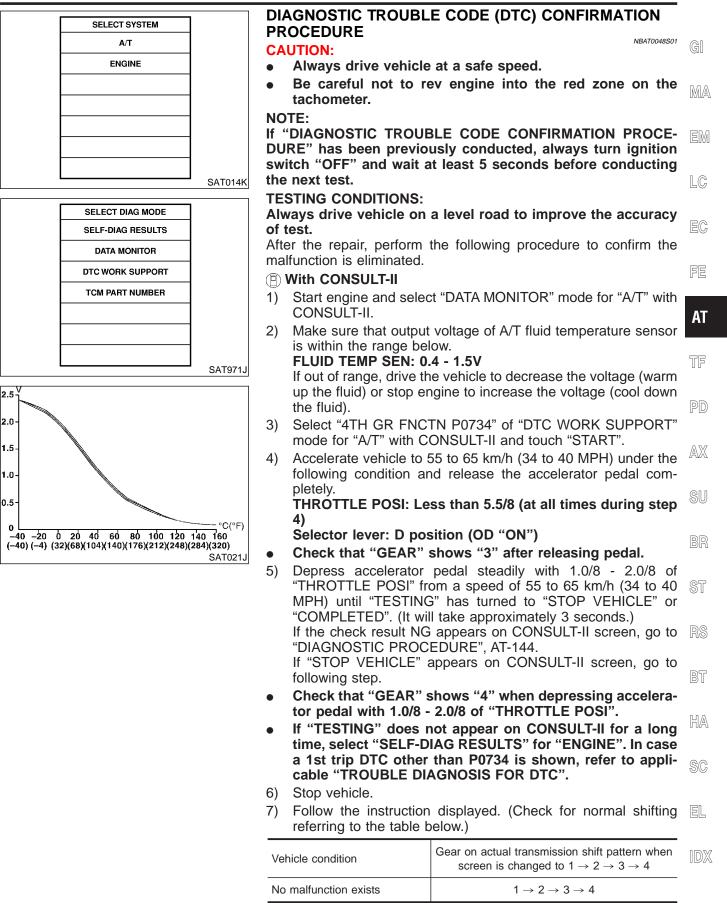
Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve B stuck closed	1	2	2	1*

*: P0734 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
⊡ : A/T 4TH GR FNCTN ⓖⓢⓣ : P0734	A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	● Shift solenoid valve A ● Shift solenoid valve B ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit

```
SELECT SYSTEM

A/T

ENGINE
```
SAT014K

```
SELECT DIAG MODE

SELF-DIAG RESULTS

DATA MONITOR

DTC WORK SUPPORT

TCM PART NUMBER
```
SAT971J

SAT021J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0048S01

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

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

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

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

With CONSULT-II

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

2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).

3) Select "4TH GR FNCTN P0734" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".

4) Accelerate vehicle to 55 to 65 km/h (34 to 40 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 5.5/8 (at all times during step 4)
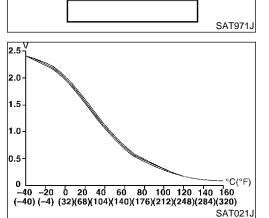   **Selector lever: D position (OD "ON")**
   - **Check that "GEAR" shows "3" after releasing pedal.**

5) Depress accelerator pedal steadily with 1.0/8 - 2.0/8 of "THROTTLE POSI" from a speed of 55 to 65 km/h (34 to 40 MPH) until "TESTING" has turned to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-144.
   If "STOP VEHICLE" appears on CONSULT-II screen, go to following step.
   - **Check that "GEAR" shows "4" when depressing accelerator pedal with 1.0/8 - 2.0/8 of "THROTTLE POSI".**
   - **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0734 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".**

6) Stop vehicle.

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

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

Description (Cont'd)

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
Malfunction for P0734 exists. (Solenoid valve A is stuck open.) (Solenoid valve B is stuck closed.)	2 → 2 → 3 → 3 1 → 2 → 2 → 1

8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".) Refer to "DIAGNOSTIC PROCEDURE", AT-144.
   Refer to shift schedule, AT-355.

ⒼⓈⓉ **With GST**
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — 4TH

NBAT0193

AT-4THSIG-01

■ : Detectable line for DTC

━━ : Non-detectable line for DTC

TCM (TRANSMISSION CONTROL MODULE) (M119)

PL DUTY SOL (DR)	PL DUTY SOL	SHIFT SOL A	SHIFT SOL B
2	1	11	12
BR/Y	GY	L/W	L/R

BR/Y (M1)

17k (E1)

BR/Y

2

A/T DROPPING RESISTOR (E47)

1

GY (E1)

11k (M1)

GY

GY (M71) / (B51) — 23 — 19 — 20

GY — L/W — L/R

GY (B64) — 6 — 3 — 2

TERMINAL CORD ASSEMBLY

6 (B93)   3 (B92)   2 (B93)

LINE PRESSURE SOLENOID VALVE

SHIFT SOLENOID VALVE A

SHIFT SOLENOID VALVE B

REFER TO THE FOLLOWING.
(E1) -SUPER MULTIPLE JUNCTION (SMJ)

| 1 2 3 4 5 6 7 8 9 |
| 10 11 12 13 14 15 16 17 18 |
| 19 20 21   22 23 24 |

(M119) W

H.S.

1 2 (E47) GY

| 1 2 3 4 5 6 7 8 9 10 |
| 11 12 13 14 15 16 17 18 19 20 21 22 23 24 |

(B51) W

| 6 4 3 2 |
| 10 9 8 7 |

(B64) BR

3 4 (B92) *

6 2 (B93) *

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

MAT912A

Diagnostic Procedure

1	CHECK SHIFT UP (D_3 TO D_4)

During "Cruise test – Part 1", AT-71.
Does A/T shift from D_3 to D_4 at the specified speed?

D_3 ➡ D_4

Accelerator
pedal

Halfway

SAT988H

Yes or No

Yes	▶	GO TO 9.
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 6.

DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Diagnostic Procedure (Cont'd)

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

3	CHECK SOLENOID VALVES

1. Remove control valve assembly. Refer to AT-272.
2. Refer to "Component Inspection", AT-148.

Overrun clutch solenoid valve
Shift solenoid valve A
Shift solenoid valve B
Line pressure solenoid valve
Torque converter clutch solenoid valve

Black
Blue
White
Red

4 3 2 6

T.S.

DISCONNECT

7

FUSE

FUSE

FUSE

BAT

BAT

BAT

SAT158J

OK or NG

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

4	CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-300.
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.

AT-145

Diagnostic Procedure (Cont'd)

5		CHECK SHIFT UP (D$_3$ TO D$_4$)
Does A/T shift from D$_3$ to D$_4$ at the specified speed?		
Yes or No		
Yes	▶	GO TO 9.
No	▶	Check transmission inner parts. (Clutch, brake, etc.)

6		CHECK LINE PRESSURE SOLENOID VALVE
1. Remove control valve assembly. Refer to AT-272. 2. Refer to "Component Inspection", AT-148. SAT158J		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace solenoid valve assembly.

7	CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-300.
2. Check line pressure circuit valves for sticking.
- Pressure regulator valve
- Pilot valve
- Pressure modifier valve

SAT367H

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair control valve.

8	CHECK SHIFT UP (D_3 TO D_4)

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

OK or NG

OK	▶	GO TO 9.
NG	▶	Check transmission inner parts. (Clutch, brake, etc.)

9	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-141.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Perform "Cruise test — Part 1" again and return to the start point of this flow chart.

AT-147

SAT159J

Component Inspection
NBAT0050
SOLENOID VALVES
NBAT0050S01
● For removal, refer to AT-272.

Resistance Check
NBAT0050S0101
● Check resistance between terminals (3, 2 or 6) and ground.

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

SAT158J

Operation Check
NBAT0050S0102
● Check solenoid valve by listening for its operating sound while applying battery voltage to the terminals (3, 2 or 6) and ground.

Torque converter clutch solenoid valve
A/T fluid temperature sensor
(Control valve lower body)

SAT342HA

Description

NBAT0051

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-II REFERENCE VALUE IN DATA MONITOR MODE

NBAT0051S02

Remarks: Specification data are reference values.

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

TCM TERMINALS AND REFERENCE VALUE

NBAT0051S03

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

NBAT0051S04

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

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

Description (Cont'd)

```
┌─────────────────────────────┐
│      SELECT SYSTEM          │
├─────────────────────────────┤
│            A/T              │
├─────────────────────────────┤
│          ENGINE             │
├─────────────────────────────┤
│                             │
├─────────────────────────────┤
│                             │
├─────────────────────────────┤
│                             │
├─────────────────────────────┤
│                             │
├─────────────────────────────┤
│                             │
└─────────────────────────────┘
                     SAT014K
```

```
┌─────────────────────────────┐
│     SELECT DIAG MODE        │
├─────────────────────────────┤
│      WORK SUPPORT           │
├─────────────────────────────┤
│    SELF-DIAG RESULTS        │
├─────────────────────────────┤
│      DATA MONITOR           │
├─────────────────────────────┤
│       ACTIVE TEST           │
├─────────────────────────────┤
│   DTC & SRT CONFIRMATION    │
├─────────────────────────────┤
│     ECM PART NUMBER         │
├─────────────────────────────┤
│                             │
└─────────────────────────────┘
                     SAT020K
```

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0051S01

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

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

With CONSULT-II
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II and wait at least 1 second.
3) Start engine and maintain the following conditions for at least 5 consecutive seconds.
   VHCL SPEED SE: 80 km/h (50 MPH) or more
   THROTTLE POSI: 0.5/8 - 1.0/8
   Selector lever: D position
   Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.

With GST
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — TCV

NBAT0194

AT-TCV-01

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

TCM (TRANSMISSION CONTROL MODULE)

LU DUTY SOL (M119)

3

G/OR

▬ : Detectable line for DTC

━ : Non-detectable line for DTC

G/OR (M71)
22
(B51)
G/OR

G/OR

7 (B64)
TERMINAL CORD ASSEMBLY

7 (B91)

TORQUE CONVERTER CLUTCH SOLENOID VALVE

M119 W

H.S.

B51 W

B64 BR

★ 7 B91

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

MAT735A

Diagnostic Procedure

NBAT0052

1	CHECK VALVE RESISTANCE

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector on the right side of transfer assembly.
3. Check resistance between terminal 7 and ground.

SAT156J

Is resistance approx. 10 - 20Ω?

Yes	▶	GO TO 3.
No	▶	GO TO 2.

2	CHECK VALVE OPERATION

1. Remove oil pan. Refer to AT-272.
2. Check the following items:
- Torque converter clutch solenoid valve
  Refer to "Component Inspection", AT-153.
- Harness of terminal cord assembly for short or open

OK or NG

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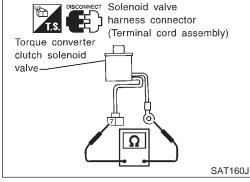
3	CHECK RESISTANCE

1. Turn ignition switch to "OFF" position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 7 and TCM harness connector terminal 3. Refer to wiring diagram — AT — TCV.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.
4. 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-150.

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 5.

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

SAT160J

SAT161J

Component Inspection

TORQUE CONVERTER CLUTCH SOLENOID VALVE
NBAT0053
NBAT0053S01
- For removal, refer to AT-272.

Resistance Check
NBAT0053S0101
- Check resistance between terminal 7 and ground.

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

Operation Check
NBAT0053S0102
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 7 and ground.

DTC P0744 IMPROPER LOCK-UP OPERATION

Description

NBAT0054

- 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 torque converter clutch does not lock up as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NBAT0054S02

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

NBAT0054S03

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item		Condition	Judgement standard (Approx.)
1	GY	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	BR/Y	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V
3	G/OR	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	0V

ON BOARD DIAGNOSIS LOGIC

NBAT0054S04

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

Torque converter slip ratio = A x C/B

A: Output shaft revolution signal from revolution sensor

B: Engine speed signal from ECM

C: Gear ratio determined as gear position which TCM supposes

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

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

```
┌─────────────────────┐
│    SELECT SYSTEM    │
├─────────────────────┤
│        A/T          │
├─────────────────────┤
│      ENGINE         │
├─────────────────────┤
│                     │
├─────────────────────┤
│                     │
├─────────────────────┤
│                     │
├─────────────────────┤
│                     │
├─────────────────────┤
│                     │
└─────────────────────┘
             SAT014K
```

```
┌─────────────────────┐
│   SELECT DIAG MODE  │
├─────────────────────┤
│  SELF-DIAG RESULTS  │
├─────────────────────┤
│    DATA MONITOR     │
├─────────────────────┤
│  DTC WORK SUPPORT   │
├─────────────────────┤
│  TCM PART NUMBER    │
├─────────────────────┤
│                     │
├─────────────────────┤
│                     │
├─────────────────────┤
│                     │
└─────────────────────┘
             SAT971J
```

SAT021J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0054S01

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

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

🔲 **With CONSULT-II**

1) Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3) Select "TCC S/V FNCTN P0744" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4) Accelerate vehicle to more than 80 km/h (50 MPH) and maintain the following condition continuously until "TESTING" has turned to "COMPLETED". (It will take approximately 30 seconds after "TESTING" shows.)
   THROTTLE POSI: 1.0/8 - 2.0/8 (at all times during step 4)
   Selector lever: D position (OD "ON")
   TCC S/V DUTY: More than 94%
   VHCL/S SE·A/T: Constant speed of more than 80 km/h (50 MPH)
● **Check that "GEAR" shows "4".**
● **For shift schedule, refer to SDS, AT-355.**
● **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAG RESULTS". In case a 1st trip DTC other than P0744 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".**
5) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
   Refer to "DIAGNOSTIC PROCEDURE", AT-157.
   Refer to shift schedule, AT-355.

🔣 **With GST**
Follow the procedure "With CONSULT-II".
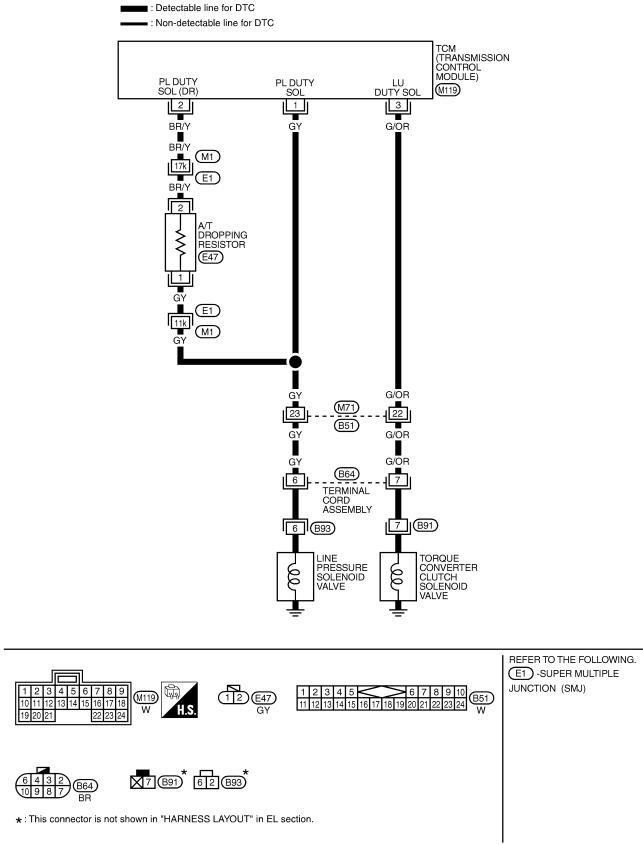
Wiring Diagram — AT — TCCSIG

AT-TCCSIG-01

■ : Detectable line for DTC

■ : Non-detectable line for DTC

TCM
(TRANSMISSION
CONTROL
MODULE)
M119

PL DUTY SOL (DR) — 2 — BR/Y

PL DUTY SOL — 1 — GY

LU DUTY SOL — 3 — G/OR

BR/Y
M1
17k
E1
BR/Y

2
A/T DROPPING RESISTOR
E47
1

GY
E1
11k
M1
GY

GY
23 — M71 / B51 — 22
GY — G/OR

GY
6 — B64 — 7
TERMINAL CORD ASSEMBLY
GY — G/OR

6 B93 — 7 B91

LINE PRESSURE SOLENOID VALVE

TORQUE CONVERTER CLUTCH SOLENOID VALVE

REFER TO THE FOLLOWING.
E1 -SUPER MULTIPLE JUNCTION (SMJ)

| 1 2 3 4 5 6 7 8 9 |
| 10 11 12 13 14 15 16 17 18 |
| 19 20 21 | 22 23 24 |
M119
W

H.S.

1 2 E47 GY

| 1 2 3 4 5 | 6 7 8 9 10 |
| 11 12 13 14 15 16 17 18 19 20 21 22 23 24 |
B51
W

6 4 3 2
10 9 8 7
B64
BR

⊠ 7 B91 *

6 2 B93 *

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

MAT913A

DTC P0744 IMPROPER LOCK-UP OPERATION

Diagnostic Procedure

=NBAT0055

1	CHECK SHIFT UP (D$_3$ TO D$_4$)

During "Cruise test – Part 1", AT-71.
Does A/T shift from D$_3$ to D$_4$ at the specified speed?

D$_3$ ➡ D$_4$

Accelerator
pedal

Halfway

SAT988H

Yes or No

Yes	▶	• GO TO 10.
		• 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 6.

3	CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-300.
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 4.
NG	▶	Repair control valve.

AT-157

Diagnostic Procedure (Cont'd)

4		CHECK SHIFT UP (D$_3$ TO D$_4$)
Does A/T shift from D$_3$ to D$_4$ at the specified speed?		
Yes or No		
Yes	►	GO TO 5.
No	►	Check transmission inner parts. (Clutch, brake, etc.)
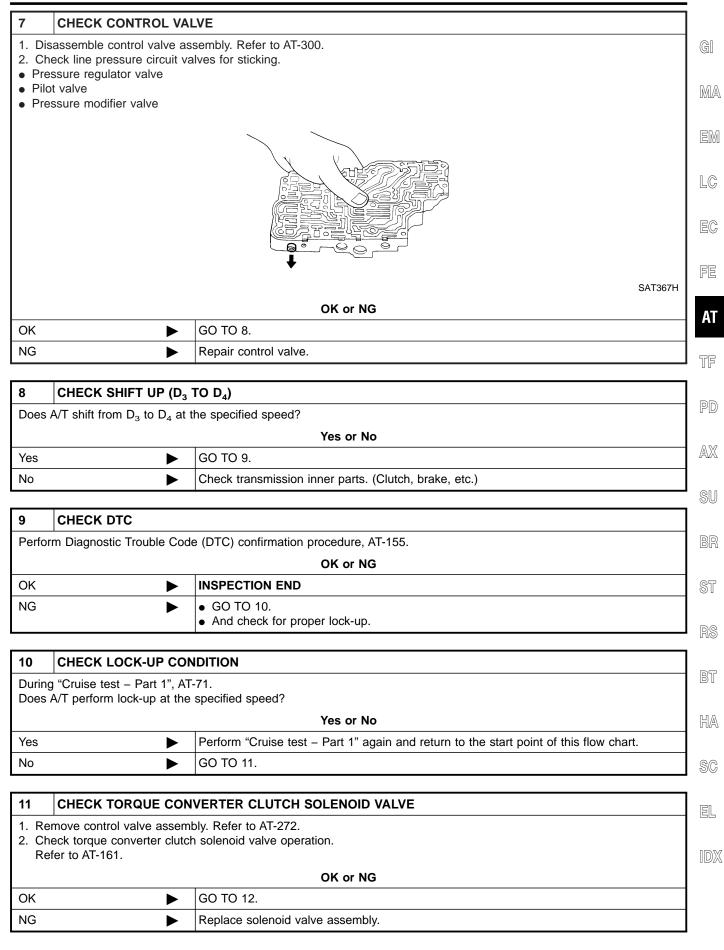
5		CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-155.		
OK or NG		
OK	►	**INSPECTION END**
NG	►	● GO TO 10. ● And check for proper lock-up.

6		CHECK LINE PRESSURE SOLENOID VALVE
1. Remove control valve assembly. Refer to AT-272. 2. Check line pressure solenoid valve operation. Refer to AT-161.		

Overrun clutch solenoid valve
Shift solenoid valve A
Shift solenoid valve B
Line pressure solenoid valve
Torque converter clutch solenoid valve

Black Blue White Red

4 3 2 6 7

T.S.

DISCONNECT

FUSE FUSE FUSE

BAT BAT BAT

SAT158J

		OK or NG
OK	►	GO TO 7.
NG	►	Replace solenoid valve assembly.

DTC P0744 IMPROPER LOCK-UP OPERATION

7	CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-300.
2. Check line pressure circuit valves for sticking.
- Pressure regulator valve
- Pilot valve
- Pressure modifier valve

SAT367H

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair control valve.

8	CHECK SHIFT UP (D$_3$ TO D$_4$)

Does A/T shift from D$_3$ to D$_4$ at the specified speed?

Yes or No

Yes	▶	GO TO 9.
No	▶	Check transmission inner parts. (Clutch, brake, etc.)

9	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-155.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	• GO TO 10. • And check for proper lock-up.

10	CHECK LOCK-UP CONDITION

During "Cruise test – Part 1", AT-71.
Does A/T perform lock-up at the specified speed?

Yes or No

Yes	▶	Perform "Cruise test – Part 1" again and return to the start point of this flow chart.
No	▶	GO TO 11.

11	CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-272.
2. Check torque converter clutch solenoid valve operation.
   Refer to AT-161.

OK or NG

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

AT-159

Diagnostic Procedure (Cont'd)

12	CHECK CONTROL VALVE
1. Disassemble control valve assembly. Refer to AT-300. 2. Check control valves for sticking. ● Torque converter clutch control valve ● Torque converter clutch relief valve SAT367H **OK or NG**	
OK ▶	GO TO 13.
NG ▶	Repair control valve

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

14	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-155. **OK or NG**	
OK ▶	INSPECTION END
NG ▶	Perform "Cruise test — Part 1" again and return to the start point of this flow chart.

Component Inspection
NBAT0056

SOLENOID VALVES
NBAT0056S01

- For removal, refer to AT-272.

Resistance Check
NBAT0056S0101

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

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

Operation Check
NBAT0056S0102
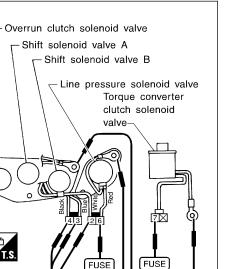
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminals (6 or 7) and ground.

Overrun clutch solenoid valve
Shift solenoid valve A
Shift solenoid valve B
Line pressure solenoid valve
Torque converter clutch solenoid valve
Black Blue White Red
4 3 2 6
7
T.S.
DISCONNECT
Ω Ω Ω
SAT159J

Overrun clutch solenoid valve
Shift solenoid valve A
Shift solenoid valve B
Line pressure solenoid valve
Torque converter clutch solenoid valve
Black Blue White Red
4 3 2 6
7
T.S.
DISCONNECT
FUSE FUSE
FUSE BAT BAT
BAT
SAT158J

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

DTC P0745 LINE PRESSURE SOLENOID VALVE

Shift solenoid valve B Shift solenoid valve A
Line pressure solenoid valve
Overrun clutch solenoid valve
(Control valve upper body)

SAT341H

Description

NBAT0057

The line pressure solenoid valve regulates the oil pump discharge pressure to suit the driving condition in response to a signal sent from the TCM.

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

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NBAT0057S02

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Line pressure solenoid valve duty	Small throttle opening (Low line pressure) ↓ 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

NBAT0057S03

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item		Condition	Judgement standard (Approx.)
1	GY	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	BR/Y	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V

ON BOARD DIAGNOSIS LOGIC

NBAT0057S04

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
🔲 : L/PRESS SOL/CIRC 🔘 : P0745	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

SELECT SYSTEM

A/T

ENGINE

SAT014K

SELECT DIAG MODE

WORK SUPPORT

SELF-DIAG RESULTS

DATA MONITOR

ACTIVE TEST

DTC & SRT CONFIRMATION

ECM PART NUMBER

SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0057S01

NOTE:

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

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

Ⓔ **With CONSULT-II**

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

2) Depress accelerator pedal completely and wait at least 1 second.

Ⓖ **With GST**

Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — LPSV

NBAT0196

AT-LPSV-01

TCM (TRANSMISSION CONTROL MODULE) (M119)

PL DUTY SOL (DR)
2
BR/Y

PL DUTY SOL
1
GY

BR/Y (M1)
17k
(E1)
BR/Y

BR/Y
2
A/T DROPPING RESISTOR (E47)
1
GY

GY (E1)
11k
(M1)
GY

GY
23 (M71)
(B51)
GY

GY
6 (B64)
TERMINAL CORD ASSEMBLY

6 (B93)

LINE PRESSURE SOLENOID VALVE

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

| 1 2 3 4 5 6 7 8 9 |
| 10 11 12 13 14 15 16 17 18 |
| 19 20 21   22 23 24 |
(M119) W

H.S.

1 2 (E47) GY

| 1 2 3 4 5   6 7 8 9 10 |
| 11 12 13 14 15 16 17 18 19 20 21 22 23 24 |
(B51) W

6 4 3 2
10 9 8 7 (B64) BR

6 2 (B93) *

REFER TO THE FOLLOWING.
(E1) -SUPER MULTIPLE JUNCTION (SMJ)

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

MAT914A

AT-164

DTC P0745 LINE PRESSURE SOLENOID VALVE

Diagnostic Procedure

NBAT0058

1	CHECK VALVE RESISTANCE

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector on the right side of transfer assembly.
3. Check resistance between terminal 6 and ground.

Sub-harness connector (B64)

SAT162J

Is resistance approx. 2.5 - 5Ω?

Yes	▶	GO TO 3.
No	▶	GO TO 2.

2	CHECK VALVE OPERATION

1. Remove control valve assembly.
   Refer to AT-272.
2. Check the following items:
- Line pressure solenoid valve
  Refer to "Component Inspection", AT-167.
- Harness of terminal cord assembly for short or open

OK or NG

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

AT-165

Diagnostic Procedure (Cont'd)

3	CHECK POWER SOURCE AND DROPPING RESISTOR CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 6 and TCM harness connector terminal 2.

Sub-harness connector B64

TCM CONNECTOR

SAT522JB

Is resistance approx. 11.2 - 12.8Ω?

Yes	▶	GO TO 5.
No	▶	GO TO 4.

4	DETECT MALFUNCTIONING ITEM
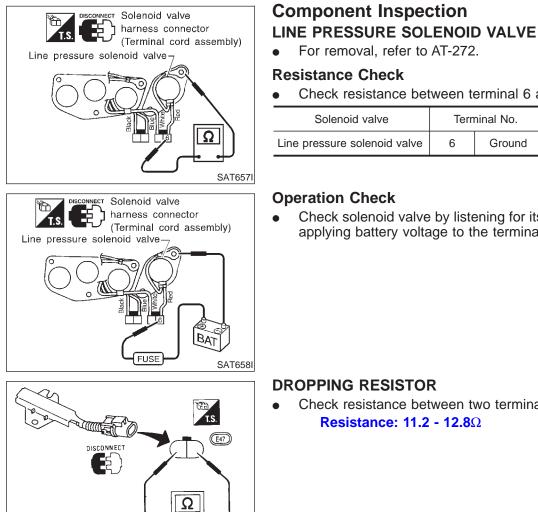
Check the following items:
- Dropping resistor
  Refer to "Component Inspection", AT-167.
- Harness for short or open between TCM terminal 2 and terminal cord assembly

OK or NG

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

5	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Check continuity between terminal 6 and TCM harness connector terminal 1. Refer to wiring diagram — AT — LPSV.
   Continuity should exist.
   If OK, check harness for short to ground or to power.
3. Reinstall any part removed.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace harness between TCM terminal 1 and terminal cord assembly.

6	CHECK DTC
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-163.	

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 7.

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

OK or NG

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

SAT657I

SAT658I

SAT848BD

Component Inspection
LINE PRESSURE SOLENOID VALVE
NBAT0059
NBAT0059S01
● For removal, refer to AT-272.

Resistance Check
NBAT0059S0101
● Check resistance between terminal 6 and ground.

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

Operation Check
NBAT0059S0102
● Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal 6 and ground.
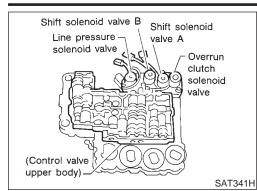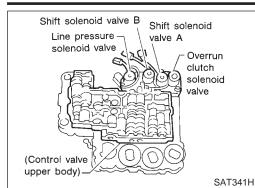
DROPPING RESISTOR
NBAT0059S02
● Check resistance between two terminals.
   Resistance: 11.2 - 12.8Ω

AT-167

DTC P0750 SHIFT SOLENOID VALVE A

Shift solenoid valve B
Line pressure solenoid valve
Shift solenoid valve A
Overrun clutch solenoid valve
(Control valve upper body)

SAT341H

Description
NBAT0060

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
NBAT0060S02

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC
NBAT0060S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: SFT SOL A/CIRC	TCM detects an improper voltage drop when it tires to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.)
: P0750		• Shift solenoid valve A

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

SELECT SYSTEM
A/T
ENGINE

SAT014K

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

SAT020K

CAUTION:
NBAT0060S01
Always drive vehicle at a safe speed.
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCE-DURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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

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

With GST
Follow the procedure "With CONSULT-II".

AT-168

Wiring Diagram — AT — SSV/A

NBAT0197

AT-SSV/A-01

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

TCM
(TRANSMISSION
CONTROL
MODULE)

SHIFT
SOL A
M119

11

L/W

■■■ : Detectable line for DTC

—— : Non-detectable line for DTC

L/W

19 M71
    B51

L/W

L/W

3 B64

TERMINAL
CORD
ASSEMBLY

3 B92

SHIFT
SOLENOID
VALVE A

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21				22	23	24

M119
W

H.S.

1	2	3	4	5		6	7	8	9	10
11	12	13	14	15	16	17	18	19	20	21	22	23	24

B51
W

| 6 | 4 | 3 | 2 |
| 10 | 9 | 8 | 7 |

B64
BR

| 3 | 4 |

* B92

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

MAT738A

Diagnostic Procedure

NBAT0061

1	CHECK VALVE RESISTANCE

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector on the right side of transfer assembly.
3. Check resistance between terminal 3 and ground.

SAT164J

Is resistance approx. 20 - 40Ω?

Yes	▶	GO TO 3.
No	▶	GO TO 2.

2	CHECK VALVE OPERATION

1. Remove control valve assembly.
   Refer to AT-272.
2. Check the following items:
- Shift solenoid valve A
  Refer to "Component Inspection", AT-171.
- Harness of terminal cord assembly for short or open

OK or NG

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

3	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 3 and TCM harness connector terminal 11. Refer to wiring diagram — AT — SSV/A.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.
4. 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
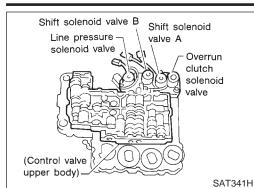
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-168.

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 5.

5	CHECK TCM INSPECTION

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

OK or NG

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

SAT654I

SAT653I

Component Inspection

NBAT0062

SHIFT SOLENOID VALVE A

NBAT0062S01

● For removal, refer to AT-272.

Resistance Check

NBAT0062S0101

● Check resistance between terminal 3 and ground.

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

Operation Check

NBAT0062S0102

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

DTC P0755 SHIFT SOLENOID VALVE B

Shift solenoid valve B
Shift solenoid valve A
Line pressure solenoid valve
Overrun clutch solenoid valve
(Control valve upper body)

SAT341H

Description
NBAT0063

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
NBAT0063S02

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC
NBAT0063S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
⊡ : SFT SOL B/CIRC 🔧 : P0755	TCM detects an improper voltage drop when it tires to operate the solenoid valve.	● Harness or connectors (The solenoid circuit is open or shorted.) ● Shift solenoid valve B

SELECT SYSTEM
A/T
ENGINE

SAT014K

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

SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE
NBAT0063S01

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

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

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

🔧 **With GST**
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — SSV/B

NBAT0198

AT-SSV/B-01

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

TCM
(TRANSMISSION
CONTROL
MODULE)
M119

SHIFT
SOL B

12

L/R

▬▬▬ : Detectable line for DTC

▬▬▬ : Non-detectable line for DTC

L/R

20   M71

B51

L/R

L/R

2   B64

TERMINAL
CORD
ASSEMBLY

2   B93

SHIFT
SOLENOID
VALVE B

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21			22	23	24	

M119
W

H.S.

| 1 | 2 | 3 | 4 | 5 | | 6 | 7 | 8 | 9 | 10 |
|11 |12 |13 |14 |15 |16 |17 |18 |19 |20 |21 |22 |23 |24 |

B51
W

| 6 | 4 | 3 | 2 |
|10 | 9 | 8 | 7 |

B64
BR

6 2   B93 *

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

MAT739A

AT-173

DTC P0755 SHIFT SOLENOID VALVE B

Diagnostic Procedure

NBAT0064

1	CHECK VALVE RESISTANCE

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector on the right side of transfer assembly.
3. Check resistance between terminal 2 and ground.

SAT166J

Is resistance approx. 20 - 40Ω?

Yes	▶	GO TO 3.
No	▶	GO TO 2.

2	CHECK VALVE OPERATION

1. Remove control valve assembly.
   Refer to AT-272.
2. Check the following items:
- Shift solenoid valve B
  Refer to "Component Inspection", AT-175.
- Harness of terminal cord assembly for short or open

OK or NG

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

3	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 2 and TCM harness connector terminal 12. Refer to wiring diagram — AT — SSV/B.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.
4. Reinstall any part removed.

Is resistance approx. 0Ω?

Yes	▶	GO TO 4.
No	▶	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-172.

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 5.

AT-174

5	CHECK TCM INSPECTION

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

OK or NG

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

SAT651I

SAT650I

Component Inspection

NBAT0065

SHIFT SOLENOID VALVE B

NBAT0065S01

- For removal, refer to AT-272.

Resistance Check

NBAT0065S0101

- Check resistance between terminal 2 and ground.

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

Operation Check

NBAT0065S0102

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

DTC P1705 THROTTLE POSITION SENSOR

Description

Throttle position sensor harness connector

Air duct

Throttle position switch harness connector

SAT142K

Description

NBAT0066

- Throttle position sensor
  The throttle position sensor detects the throttle valve position and sends a signal to the TCM.

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

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NBAT0066S02

Remarks: Specification data are reference values.

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

TCM TERMINALS AND REFERENCE VALUE

NBAT0066S03

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

NBAT0066S04

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

SELECT SYSTEM
A/T
ENGINE

SAT014K

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

SAT971J

SELECT SYSTEM
A/T
ENGINE

SAT014K

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

SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0066S01

CAUTION:
Always drive vehicle at a safe speed.

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

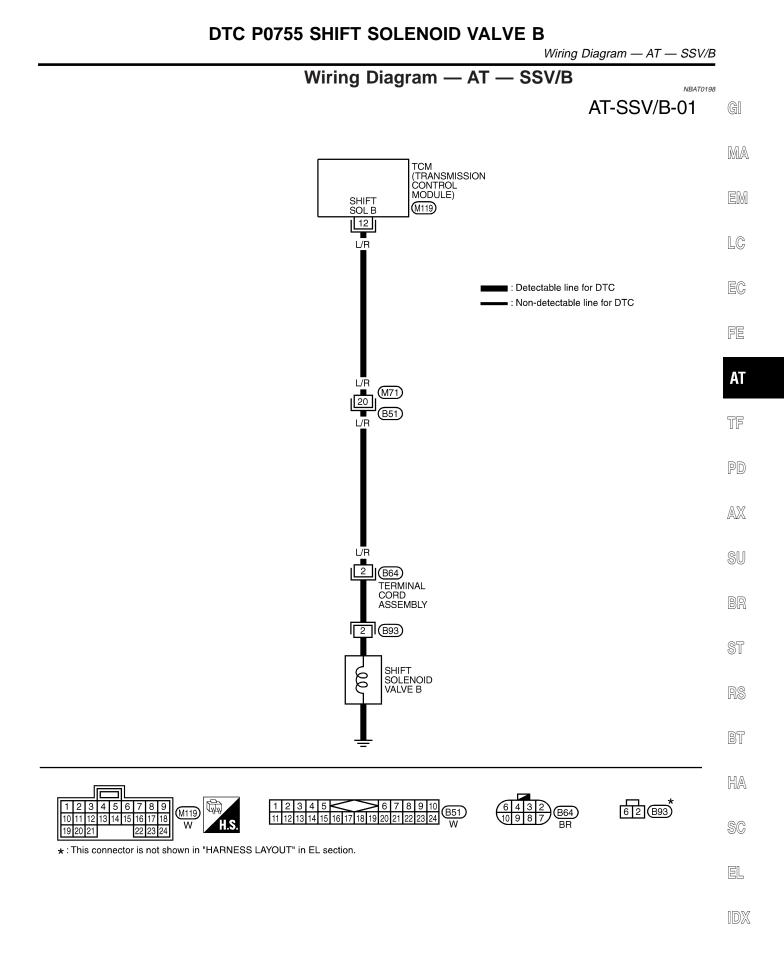After the repair, perform the following procedure to confirm the malfunction is eliminated.

⬚ **With CONSULT-II**

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

2) Apply vacuum to the throttle opener, then check the following. Refer to steps 1 and 2 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.

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

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

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

4) Start engine and maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
VHCL SPEED SE: 10 km/h (6 MPH) or more
THRTL POS SEN: Approximately 3V or less
Selector lever: D position (OD "ON")
If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-180.
If the check result is OK, go to following step.

5) Maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
VHCL SPEED SE: 10 km/h (6 MPH) or more
Accelerator pedal: Wide open throttle
Selector lever: D position (OD "ON")

AT-177

Description (Cont'd)

GST With GST
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — TPS

NBAT0199

AT-TPS-01

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

IGNITION SWITCH
ON or START

FUSE BLOCK
(J/B)
(M10)

10A
16

Refer to EL-POWER.

10U

R/Y

(M32)

17

(F23)

R/Y

R/Y

■ : Detectable line for DTC

■ : Non-detectable line for DTC

5

THROTTLE
POSITION
SWITCH
(F9)

WIDE
OPEN

OTHER   OTHER

CLOSED

4   6

OR/B   OR/L

THROTTLE
POSITION
SENSOR
(F8)

3 2 1

B/P R P/B

OR/B   OR/W   B/P   P/B   P

13   (F23)   12   16   (F22)   12   7
     (M32)   (M33)

OR/B   OR/W   B   P/B   P/L

OR/B   OR/W   B   P/B   P/L   P   P/B   R   B/P   OR/L

17   16   42   32   41   82   111   91   58   56

FULL   IDLE   SENS   SENS   TH   TCM   TV00   AVCC   TV0   GND-A   IDLE   ECM
SW   SW   GND   POWER   SENS   (TRANSMISSION   SW   (F24)
                                                CONTROL
                                                MODULE)
                                                (M119) , (M120)

REFER TO THE FOLLOWING.

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

(F24) - ELECTRICAL UNITS

F43

1	2	3	4	5	6		7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22	23	24

(M32)
BR

1	2	3		4	5	6	7
8	9	10	11	12	13	14	15	16

(M33)
GY

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21			22	23	24	

(M119)
W

25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42
43	44	45			46	47	48	

(M120)
GY

H.S.

1	2	3

(F8)
BR

4	5	6

(F9)
GY

MAT251B

AT-179

Diagnostic Procedure

1	CHECK DTC WITH ECM

- Check P code CONSULT-II "ENGINE".
  Turn ignition switch "ON" and select "SELF-DIAG RESULTS" mode for "ENGINE" with CONSULT-II.
  Refer to EC-87, "DESCRIPTION".

OK or NG

OK	▶	GO TO 2.
NG	▶	Check throttle position sensor circuit for engine control. Refer to EC-206, "Description".

DTC P1705 THROTTLE POSITION SENSOR

2	CHECK INPUT SIGNAL

With CONSULT-II
1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out the value of "THRTL POS SEN".
   Voltage:
       Fully-closed throttle:
           Approximately 0.5 - 0.7V
       Fully-open throttle:
           Approximately 4V

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

SAT614J

Without CONSULT-II
1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between TCM harness connector M120 terminals 41 and 42 while accelerator pedal is depressed slowly.
   Voltage:
       Fully-closed throttle valve:
           Approximately 0.5 - 0.7V
       Fully-open throttle valve:
           Approximately 4V
   (Voltage rises gradually in response to throttle position.)

SAT513JH

OK or NG

OK (With CONSULT-II)	▶	GO TO 3.
OK (Without CONSULT-II)	▶	GO TO 5.
NG	▶	Check harness for short or open between ECM and TCM regarding throttle position sensor circuit.

AT-181

Diagnostic Procedure (Cont'd)

3	CHECK THROTTLE POSITION SWITCH CIRCUIT (With CONSULT-II)

With CONSULT-II
1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Apply vacuum to the throttle opener, then check the following. Refer to steps 1 and 2 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.
4. Read out "CLOSED THL/SW" and "W/O THRL/P-SW" depressing and releasing accelerator pedal.
   Check the signal of throttle position switch is indicated properly.

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

MTBL0011

DATA MONITOR	
MONITORING	
POWERSHIFT SW	OFF
CLOSED THL/SW	OFF
W/O THRL/P-SW	OFF
HOLD SW	OFF
BRAKE SW	ON

SAT646J

OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING ITEM

Check the following items:
- Throttle position switch
  Refer to "Component Inspection", AT-184.
- Harness for short or open between ignition switch and throttle position switch
- Harness for short or open between throttle position switch and TCM

OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

DTC P1705 THROTTLE POSITION SENSOR

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

⊗ **Without CONSULT-II**
1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between TCM harness connector M119 terminals 16, 17 and ground while depressing, and releasing accelerator pedal slowly. (after warming up engine)
   [Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.]

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

MTBL0519

SAT526JF

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 4.

6	CHECK DTC

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

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 7.

7	CHECK TCM INSPECTION

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

OK or NG

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

Component Inspection

Throttle position switch harness connector F9

SAT132K

Component Inspection
NBAT0205

THROTTLE POSITION SWITCH
NBAT0205S01

Closed Throttle Position Switch (Idle position)
NBAT0205S0101

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

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

● To adjust closed throttle position switch, refer to EC-465, "Component Description".

Throttle position switch harness connector F9

SAT137K

Wide Open Throttle Position Switch
NBAT0205S0102

● Check continuity between terminals 4 and 5.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

AT-184

DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Shift solenoid valve B — Shift solenoid valve A
Line pressure solenoid valve — Overrun clutch solenoid valve
(Control valve upper body)
SAT341H

Description
NBAT0068

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

TCM TERMINALS AND REFERENCE VALUE
NBAT0068S02

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC
NBAT0068S03

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: O/R CLTCH SOL/CIRC : P1760	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

SELECT SYSTEM
A/T
ENGINE
SAT014K

SELECT DIAG MODE
WORK SUPPORT
SELF-DIAG RESULTS
DATA MONITOR
ACTIVE TEST
DTC & SRT CONFIRMATION
ECM PART NUMBER
SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE
NBAT0068S01

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCE-DURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve accuracy of test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

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

AT-185

Description (Cont'd)

🄶🅂🅃 With GST
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — OVRCSV

NBAT0200

AT-OVRCSV-01

TCM
(TRANSMISSION
CONTROL
MODULE)
(M119)

OV R/C
SOL

20

L/B

██████ : Detectable line for DTC

────── : Non-detectable line for DTC

L/B
21 (M71)
(B51)
L/B

L/B
4 (B64)
TERMINAL
CORD
ASSEMBLY

4 (B92)

OVERRUN
CLUTCH
SOLENOID
VALVE

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21				22	23	24

(M119) W   H.S.

1	2	3	4	5		6	7	8	9	10
11	12	13	14	15	16	17	18	19	20	21	22	23	24

(B51) W

6	4	3	2
10	9	8	7

(B64) BR

*
3	4

(B92)

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

MAT741A

Diagnostic Procedure

NBAT0069

1	CHECK VALVE RESISTANCE

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector on the right side of transfer assembly.
3. Check resistance between terminal 4 and ground.

SAT170J

Is resistance approx. 20 - 40Ω?

Yes	▶	GO TO 3.
No	▶	GO TO 2.

2	CHECK VALVE OPERATION

1. Remove control valve assembly.
   Refer to AT-272.
2. Check the following items:
- Overrun clutch solenoid valve
  Refer to "Component Inspection", AT-189.
- Harness of terminal cord assembly for short or open

OK or NG

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

3	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 20. Refer to wiring diagram — AT — OVRCSV.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.
4. 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
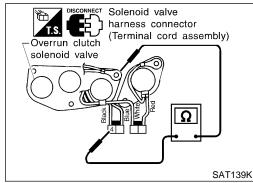
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-185.

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 5.

DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

AT

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

SAT139K

SAT688I

Component Inspection

OVERRUN CLUTCH SOLENOID VALVE

NBAT0070

NBAT0070S01

● For removal, refer to AT-272.

Resistance Check

NBAT0070S0101

● Check resistance between terminal 4 and ground.

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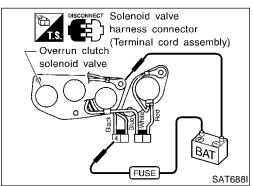
Operation Check

NBAT0070S0102

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

AT-189
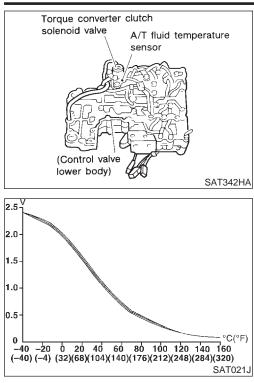
Description

NBAT0172

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

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NBAT0172S02

Remarks: Specification data are reference values.

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

TCM TERMINALS AND REFERENCE VALUE

NBAT0172S03

Remarks: Specification data are reference values.

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

AT-190

ON BOARD DIAGNOSIS LOGIC

NBAT0172S04

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
⊞ : BATT/FLUID TEMP SEN	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
(NO TOOLS) : 8th judgement flicker		

SELECT SYSTEM

A/T

ENGINE

SAT014K

SELECT DIAG MODE

SELF-DIAG RESULTS

DATA MONITOR

DTC WORK SUPPORT

TCM PART NUMBER

SAT971J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0172S01

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

⊞ **With CONSULT-II**

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

Self-diagnosis start

Light

Shade

SAT674I

(NO TOOLS) **No Tools**

1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D" position, vehicle speed higher than 20 km/h (12 MPH).
3) Perform self-diagnosis.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

Wiring Diagram — AT — BA/FTS

NBAT0201

AT-BA/FTS-01

: Detectable line for DTC

: Non-detectable line for DTC

REFER TO THE FOLLOWING.

M10 , M91 - FUSE BLOCK -
JUNCTION BOX (J/B)

F24 - ELECTRICAL UNITS

MAT916A

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

Diagnostic Procedure

NBAT0173

1	INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 6.

2	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II)

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

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

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

SAT614J

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING ITEM

Check the following items:
- 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-665, "Wiring Diagram".

OK or NG

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

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

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

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector on the right side of transfer assmebly.
3. Check resistance between terminals 8 and 9 when A/T is cold [20°C (68°F)].

Sub-harness connector (B64)

SAT697I

Is resistance approx. 2.5 kΩ?

Yes	▶	GO TO 7.
No	▶	GO TO 5.

5	DETECT MALFUNCTIONING ITEM

1. Remove oil pan.
2. Check the following items:
- A/T fluid temperature sensor
  Refer to "Component Inspection", AT-111.
- Harness of terminal cord assembly for short or open

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

6	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)

⊗ **Without CONSULT-II**
1. Start engine.
2. Check voltage between TCM harness connector M120 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

TCM CONNECTOR
47

SAT518JC

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 3.

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

7	CHECK TCM POWER SOURCE STEP 1

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM harness connector M119, M120 terminals 10, 19, 28 and ground.

TCM CONNECTOR
10, 19, 28

Voltage:
Battery voltage

SAT611J

OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 9.

8	CHECK TCM POWER SOURCE STEP 2

1. Turn ignition switch to OFF position.
2. Check voltage between TCM harness connector M120 terminal 28 and ground.

TCM CONNECTOR
28

Voltage:
Battery voltage

SAT612JI

OK or NG		
OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING ITEM

Check the following items:
- Harness for short or open between ignition switch and TCM terminals 10, 19 and 28
- Ignition switch and 10A or 7.5A fuse [No. 18 or 24, located in the fuse block (J/B)]
  Refer to EL-10, "Schematic".

OK or NG		
OK	▶	GO TO 10.
NG	▶	Repair or replace damaged parts.

AT-195

Diagnostic Procedure (Cont'd)

10	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. Refer to wiring diagram — AT — MAIN.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

11	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-107.

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 12.

12	CHECK TCM INSPECTION

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

OK or NG

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

SAT716K

Component Inspection

A/T FLUID TEMPERATURE SENSOR

NBAT0174

NBAT0174S01

- For removal, refer to AT-272.
- Check resistance between terminals 8 and 9 while changing temperature as shown at left.

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

DTC VEHICLE SPEED SENSOR·MTR

Description

NBAT0071

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

NBAT0071S02

Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

NBAT0071S03

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

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0071S01

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

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

With CONSULT-II
1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2) Start engine and accelerate vehicle from 0 to 25 km/h (0 to 6 MPH).
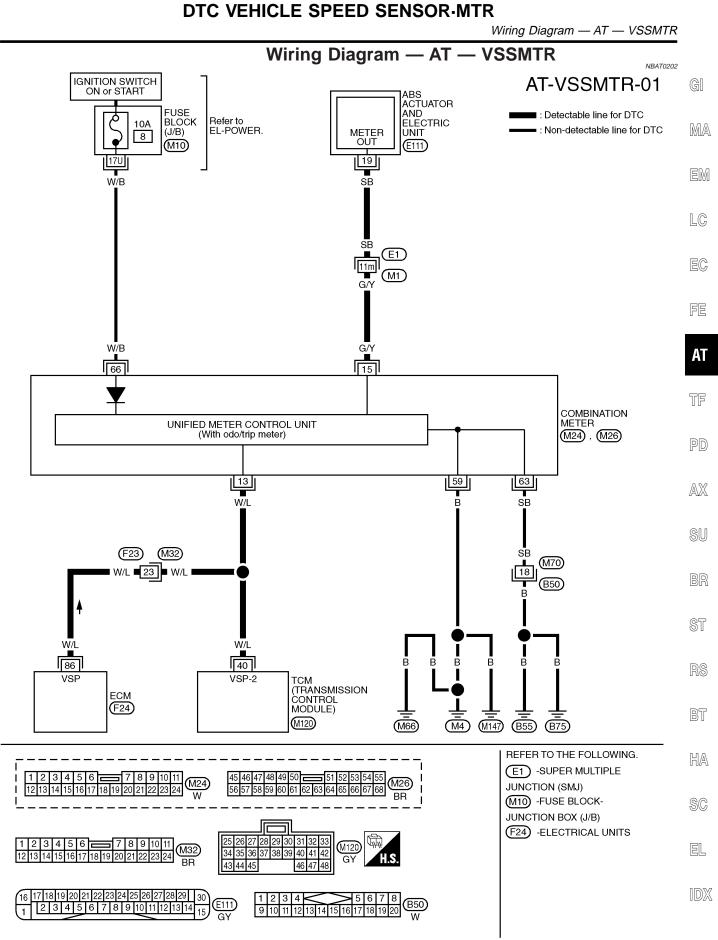
SELECT SYSTEM
A/T
ENGINE

SAT014K

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

SAT971J

AT-197

Light

Shade

SAT668I

○ **No Tools**

1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D" position and vehicle speed higher than 25 km/h (16 MPH).
3) Perform self-diagnosis.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.

Wiring Diagram — AT — VSSMTR

NBAT0202

AT-VSSMTR-01

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

IGNITION SWITCH ON or START

FUSE BLOCK (J/B) (M10)

10A
8

17U

Refer to EL-POWER.

W/B

: Detectable line for DTC

: Non-detectable line for DTC

ABS ACTUATOR AND ELECTRIC UNIT (E111)

METER OUT

19

SB

SB (E1)

11m (M1)

G/Y

W/B

66

G/Y

15

UNIFIED METER CONTROL UNIT
(With odo/trip meter)

COMBINATION METER
(M24), (M26)

13

W/L

59

B

63

SB

SB (M70)

18 (B50)

B

(F23) (M32)

W/L 23 W/L

W/L

86

VSP

ECM
(F24)

W/L

40

VSP-2

TCM (TRANSMISSION CONTROL MODULE)
(M120)

B   B   B   B   B   B

(M66) (M4) (M147)   (B55) (B75)

REFER TO THE FOLLOWING.

(E1) -SUPER MULTIPLE JUNCTION (SMJ)

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

(F24) -ELECTRICAL UNITS

1	2	3	4	5	6		7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22	23	24

(M24) W

45	46	47	48	49	50		51	52	53	54	55
56	57	58	59	60	61	62	63	64	65	66	67	68

(M26) BR

1	2	3	4	5	6		7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22	23	24

(M32) BR

25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42
43	44	45				46	47	48

(M120) GY

H.S.

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

(E111) GY

1	2	3	4		5	6	7	8
9	10	11	12	13	14	15	16	17	18	19	20

(B50) W

MAT031B

Diagnostic Procedure

NBAT0072

1	CHECK INPUT SIGNAL.

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

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

SAT614J

Without CONSULT-II
1. Start engine.
2. Check voltage between TCM harness connector M120 terminal 40 and ground while driving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.

TCM CONNECTOR
40

SAT528JC

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

Yes	▶	GO TO 3.
No	▶	GO TO 2.

2	DETECT MALFUNCTIONING ITEM

Check the following items:
- Power and ground circuit for combination meter
  Refer to EL-33, "Component Parts and Harness Connector Location".
- Harness for short or open between TCM and combination meter
- Harness for short or open between ABS actuator and electrical unit and combination meter

OK or NG

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

3	CHECK DTC

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

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 4.

AT

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

DTC TURBINE REVOLUTION SENSOR

SAT136K

Description

NBAT0224
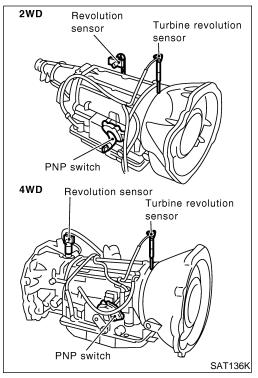
The turbine revolution sensor detects input shaft rpm (revolutions per minute). It is located on the input side of the automatic transmission. The vehicle speed sensor A/T (Revolution sensor) is located on the output side of the automatic transmission. With the two sensors, input and output shaft rpms are accurately detected. The result is optimal shift timing during deceleration and improved shifting.

TCM TERMINALS AND REFERENCE VALUE

NBAT0224S01
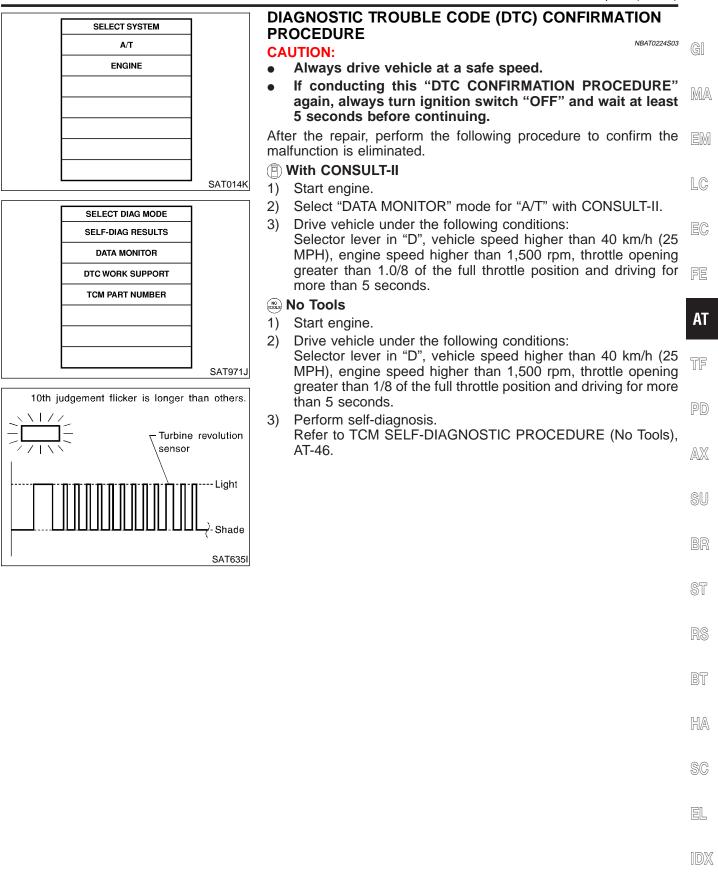
Remarks: Specification data are reference values.

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

ON BOARD DIAGNOSIS LOGIC

NBAT0224S02

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

SELECT SYSTEM
A/T
ENGINE

SAT014K

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

SAT971J

10th judgement flicker is longer than others.

Turbine revolution sensor

Light

Shade

SAT635I

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0224S03

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

After the repair, perform the following procedure to confirm the malfunction is eliminated.
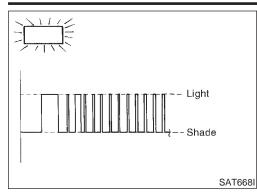
With CONSULT-II
1) Start engine.
2) Select "DATA MONITOR" mode for "A/T" with CONSULT-II.
3) Drive vehicle under the following conditions:
   Selector lever in "D", vehicle speed higher than 40 km/h (25 MPH), engine speed higher than 1,500 rpm, throttle opening greater than 1.0/8 of the full throttle position and driving for more than 5 seconds.

No Tools
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D", vehicle speed higher than 40 km/h (25 MPH), engine speed higher than 1,500 rpm, throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.
3) Perform self-diagnosis.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

Wiring Diagram — AT — TRSA/T

NBAT0225

AT-TRSA/T-01

TURBINE
REVOLUTION
SENSOR

■ : Detectable line for DTC

━ : Non-detectable line for DTC

JOINT
CONNECTOR
(M98)

(M33) (F22)

TURBIN
SENS
38
W

SENS
GND
42
B

TCM
(TRANSMISSION
CONTROL
MODULE)
(M120)

GND-A
58
B/P

ECM
(F24)

1	2	3		4	5	6	7
8	9	10	11	12	13	14	15	16

(M33)
GY

1 1 1 1 1 1 1 (M98)
GY

25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42
43	44	45				46	47	48

(M120)
GY

H.S.

3 2
1
(B87)
BR

1	2	3	4			5	6	7	8
9	10	11	12	13	14	15	16	17	18	19	20

(B88)
GY

MAT923A

AT-204

DTC TURBINE REVOLUTION SENSOR

Diagnostic Procedure

NBAT0226

1	CHECK INPUT SIGNAL

With CONSULT-II
1. Start engine.
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out the value of "TURBINE REV". Check the value changes according to engine speed.

DATA MONITOR	
MONITORING	
ENGINE SPEED	XXX rpm
TURBINE REV	XXX rpm
OVERDRIVE SW	ON
PN POSI SW	OFF
R POSITION SW	OFF

SAT740J

Without CONSULT-II
1. Start engine.
2. Check voltage between TCM harness connector M120 terminal 38 and ground. (Measure in AC range.)

TCM | CONNECTOR
38

V

Approximately 1.2V
(Voltage rises gradually in
response to engine speed.)

SAT140KB

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING ITEM

Check harness for short or open between TCM and turbine revolution sensor.

OK or NG

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

3	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-203.

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 4.

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

Component Inspection

NBAT0227

TURBINE REVOLUTION SENSOR

NBAT0227S01

● Check resistance between terminals 1, 2 and 3.

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

Turbine revolution sensor
harness connector (B87)

1 (2)   2, 3 (3)

SAT141K

DTC A/T COMMUNICATION LINE

Description

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

TCM TERMINALS AND REFERENCE VALUE

NBAT0228S01

Remarks: Specification data are reference values.

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

*: This terminal is connected to the ECM.

ON BOARD DIAGNOSIS LOGIC

NBAT0228S02

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

Description (Cont'd)

SELECT SYSTEM

A/T

ENGINE

SAT014K

SELECT DIAG MODE

SELF-DIAG RESULTS

DATA MONITOR

DTC WORK SUPPORT

TCM PART NUMBER

SAT971J

A/T communication line

Light

Shade

SAT682I

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0228S03

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

With CONSULT-II
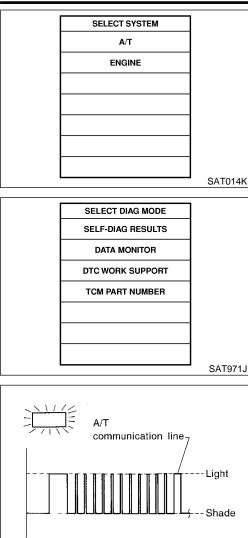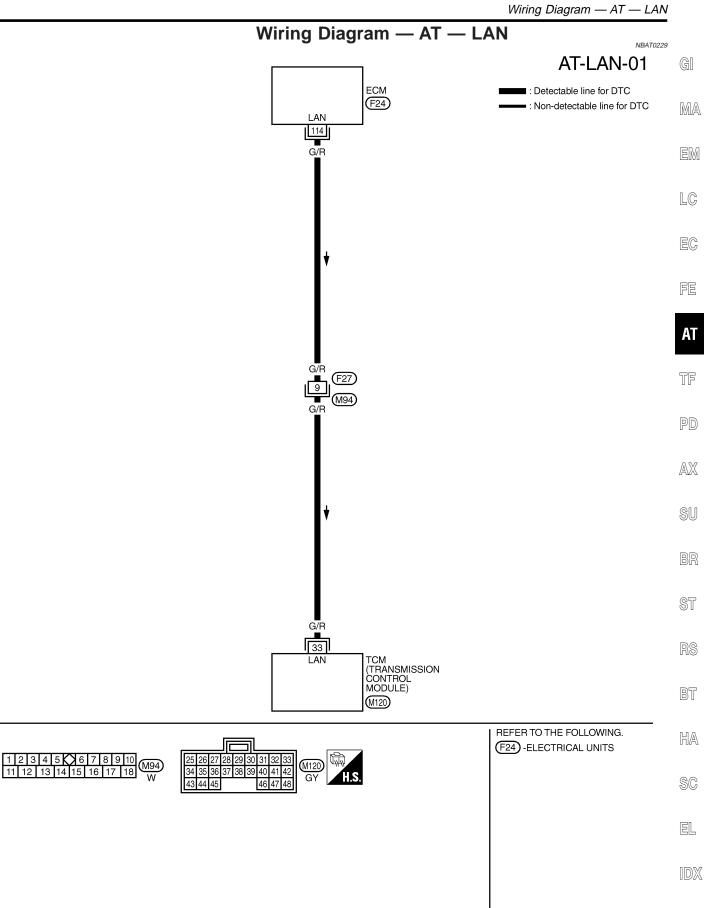
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode for "A/T" with CONSULT-II.
3) Wait at least 6 seconds or start engine and wait for at least 6 seconds.

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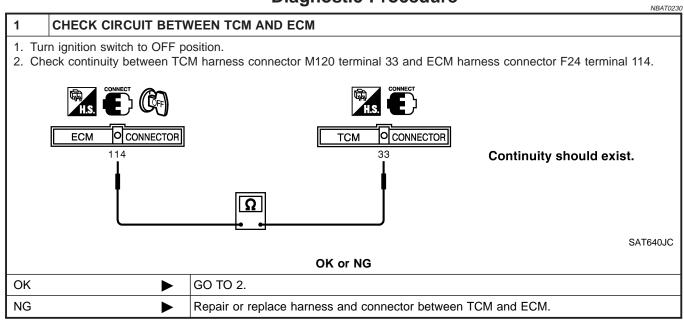
1) Turn ignition switch "ON".
2) Wait at least 6 seconds or start engine and wait for at least 6 seconds.
3) Perform self-diagnosis.
   Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-46.

Wiring Diagram — AT — LAN

NBAT0229

AT-LAN-01

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

■ : Detectable line for DTC

━ : Non-detectable line for DTC

ECM
F24

LAN
114

G/R

G/R   F27
9
M94
G/R

G/R
33

LAN
TCM
(TRANSMISSION
CONTROL
MODULE)
M120

REFER TO THE FOLLOWING.
F24 -ELECTRICAL UNITS

1	2	3	4	5	◇	6	7	8	9	10	M94
11	12	13	14	15		16	17	18			W

25	26	27	28	29	30	31	32	33	M120
34	35	36	37	38	39	40	41	42	GY
43	44	45				46	47	48	

H.S.

MAT922A

DTC A/T COMMUNICATION LINE

Diagnostic Procedure

NBAT0230

1	CHECK CIRCUIT BETWEEN TCM AND ECM

1. Turn ignition switch to OFF position.
2. Check continuity between TCM harness connector M120 terminal 33 and ECM harness connector F24 terminal 114.

ECM CONNECTOR
114

TCM CONNECTOR
33

Ω

Continuity should exist.

SAT640JC

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace harness and connector between TCM and ECM.

2	CHECK DTC WITH ECM STEP 1

Perform self-diagnosis for engine control. Refer to EC-87, "DESCRIPTION".

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	CHECK DTC WITH ECM STEP 2

Check ECM. Refer to EC-473 and EC-657, "System Description" and "Component Description".

OK or NG

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

4	CHECK DTC

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-208.

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 5.
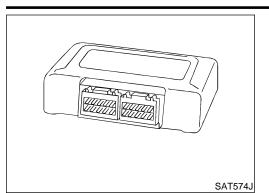
5	CHECK TCM INSPECTION

If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

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

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

Description

SAT574J

Description

NBAT0207

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

NBAT0207S01

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

SAT014K

SAT971J

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0207S02

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

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

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

AT-211

Diagnostic Procedure

<div align="right"><i>=NBAT0208</i></div>

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

DTC CONTROL UNIT (EEP ROM)

Description

NBAT0215

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

SAT574J

ON BOARD DIAGNOSIS LOGIC

NBAT0215S01

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

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NBAT0215S02

NOTE:

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

⬚ **With CONSULT-II**

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

SELECT SYSTEM

A/T

ENGINE

SAT014K

SELECT DIAG MODE

SELF-DIAG RESULTS

DATA MONITOR

DTC WORK SUPPORT

TCM PART NUMBER

SAT971J

AT-213

DTC CONTROL UNIT (EEP ROM)

Diagnostic Procedure

<div align="right">=NBAT0216</div>

1	CHECK DTC
With CONSULT-II 1. Turn ignition switch "ON" and select "SELF DIAG RESULTS" mode for A/T with CONSULT-II. 2. Move selector lever to "R" position. 3. Depress accelerator pedal (Full throttle position). 4. Touch "ERASE". 5. Turn ignition switch "OFF" position for 10 seconds. PERFORM DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE. See previous page. **Is the "CONTROL UNIT (EEP ROM)" displayed again?**	
Yes ▶	Replace TCM.
No ▶	**INSPECTION END**

Wiring Diagram — AT — NONDTC

NBAT0203

AT-NONDTC-01

■ : Detectable line for DTC

■ : Non-detectable line for DTC

BATTERY

IGNITION SWITCH
ON or START

FUSE BLOCK (J/B)
M10

10A [14]

10A [18]

Refer to EL-POWER.

39U R/B

24U W/R

W/R M71

18 B51

W/R

B/Y → To SC-START

W/R 3

B/Y 2

R/B 1

STOP LAMP SWITCH M31

DEPRESSED

RELEASED

PARK/NEUTRAL POSITION SWITCH
B65 , B66

P R N D 2 1

P R N D 2 1

2 G/Y

4 R/B

5 Y

6 G/B

7 L

8 G/W

9 L/Y

1 B

B → To SC-START

R/B B88
10 M100
R/B

Y 13
Y

B51
14 M71
G/B

L 15
L

G/W 16
G/W

L/Y 17
L/Y

3

DIODE M12

R/B 1

To EL-BACK/L ← Y

2

G/Y 45
BRAKE SW

Y 35
R-SW

P 36
N-SW

L 34
D-SW

G/W 27
2-SW

L/Y 26
1-SW

TCM (TRANSMISSION CONTROL MODULE) M120

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

1 2 3 M12 GY

1 2 M31 B

25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41 42
43 44 45 | 46 47 48
M120 GY

H.S.

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20 21 22 23 24
B51 W

7 8 9 3
6 5 4
B65 GY

2 1 B66 GY

1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16 17 18 19 20
B88 GY

MAT129B

AT-215

AT-NONDTC-02

███ : Detectable line for DTC

▬ : Non-detectable line for DTC

⟨4W⟩ : With 4-wheel drive

⟨IC⟩ : With ICC

⟨OI⟩ : Without ICC

REFER TO THE FOLLOWING.

(M10) -FUSE BLOCK-

JUNCTION BOX (J/B)

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

MAT252B

AT-216

AT-NONDTC-03

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

IGNITION SWITCH
ON or START

FUSE BLOCK (J/B) (M10)

10A 16
10A 8

Refer to EL-POWER.

■ : Detectable line for DTC
▬ : Non-detectable line for DTC
◁4W▷ : With 4-wheel drive

10U R/Y
17U W/B

R/Y (M32)
17 (F23)
R/Y

W/B 1
W/B 66

COMBINATION METER (M24), (M26)

A/T OIL TEMP. ◁4W▷
O/D OFF

R/Y 5

4 Y/B
61 GY/B

THROTTLE POSITION SWITCH (F9)

WIDE OPEN   OTHER
OTHER   CLOSED

Y/B 3 (M100) (B88) Y/B

GY 1

A/T DEVICE (OVERDRIVE CONTROL SWITCH) (B59)
ON   OFF

4 OR/B
6 OR/L

10 (B64) Y/B
TERMINAL CORD ASSEMBLY

2 B

OR/W

13 (F23) 12
(M32)

GY (B88)
2 (M100)
GY

A/T FLUID TEMPERATURE SWITCH ◁4W▷
LOW   HIGH

B

OR/B
OR/W

B   B
(B55) (B75)

OR/L

56 IDLE
ECM (F24)

17 FULL SW
16 IDLE SW

GY/B 13 O/D OFF INDICATOR LAMP
GY 22 O/D CONT SW

TCM (TRANSMISSION CONTROL MODULE) (M119)

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

| 1 2 3 4 5 6 ▢ 7 8 9 10 11 | (M24) |
| 12 13 14 15 16 17 18 19 20 21 22 23 24 | W |

| 45 46 47 48 49 50 ▢ 51 52 53 54 55 | (M26) |
| 56 57 58 59 60 61 62 63 64 65 66 67 68 | BR |

| 1 2 3 4 5 6 ▢ 7 8 9 10 11 | (M32) |
| 12 13 14 15 16 17 18 19 20 21 22 23 24 | BR |

1 2 3 4 5 6 7 8 9	(M119)
10 11 12 13 14 15 16 17 18	W
19 20 21 22 23 24	

H.S.

| 4 5 6 | (F9) |
| GY |

| 8 7 6 5 4 3 2 1 | (B59) GY |

| 6 4 3 2 | (B64) |
| 10 9 8 7 | BR |

| 1 2 3 4   5 6 7 8 | (B88) |
| 9 10 11 12 13 14 15 16 17 18 19 20 | GY |

MAT253B

AT-217

O/D OFF Indicator Lamp Does Not Come On

NBAT0073

SYMPTOM:

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

1	CHECK TCM POWER SOURCE STEP 1

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM harness connector M119, M120 terminals 10, 19, 28 and ground.

TCM CONNECTOR

10, 19, 28

Voltage:
    Battery voltage

SAT611J

OK or NG

OK	▶	GO TO 2.
NG	▶	GO TO 3.

2	CHECK TCM POWER SOURCE STEP 2

1. Turn ignition switch to OFF position.
2. Check voltage between TCM harness connector M120 terminal 28 and ground.

TCM CONNECTOR

28

Voltage:
    Battery voltage

SAT612JI

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING ITEM

Check the following items:
- Harness for short or open between ignition switch and TCM terminals 10, 19 and 28
- Ignition switch and 10A or 7.5A fuse [No. 18 or 24, located in the fuse block (J/B)]
  Refer to EL-10, "Schematic".

OK or NG

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

4	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. Refer to wiring diagram — AT — MAIN.
    Continuity should exist.
  If OK, check harness for short to ground and short to power.		

OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK LAMP CIRCUIT	
1. Turn ignition switch to "ON" position. 2. Check voltage between TCM harness connector M119 terminal 13 and ground.		

SAT732K

Does battery voltage exist?		
Yes	▶	GO TO 7.
No	▶	GO TO 6.

6	CHECK MALFUNCTIONING ITEM	
Check the following items: ● Fuse ● O/D OFF indicator lamp ● Harness for short or open between ignition switch and O/D OFF indicator lamp ● Refer to EL-10, "Schematic". ● Harness for short or open between O/D OFF indicator lamp and TCM		
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	▶	GO TO 8.
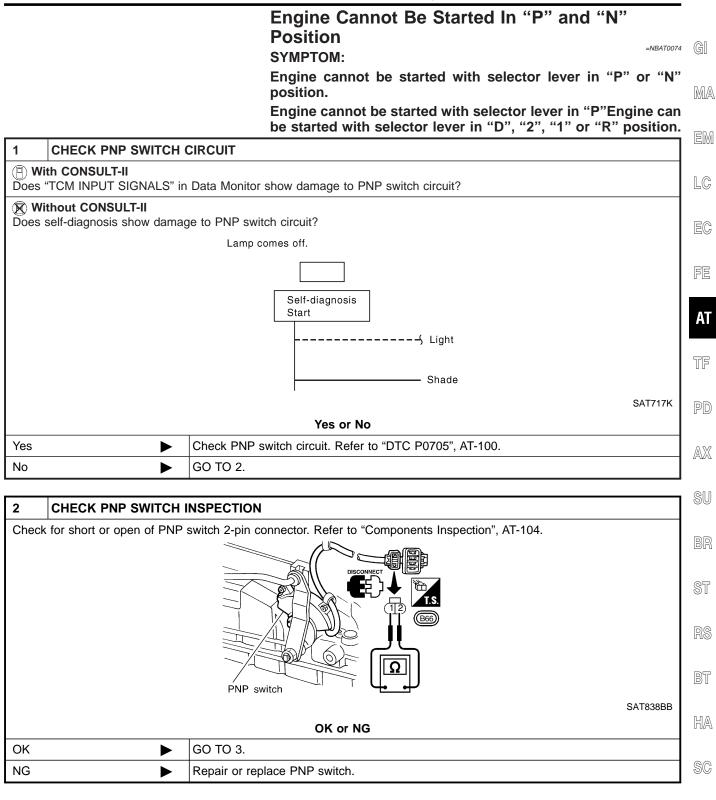
8	CHECK TCM INSPECTION	
1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.		
OK or NG		
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.

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

=NBAT0074

SYMPTOM:

Engine cannot be started with selector lever in "P" or "N" position.

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

1	CHECK PNP SWITCH CIRCUIT

With CONSULT-II
Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?

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

Lamp comes off.

Self-diagnosis Start

Light

Shade

SAT717K

Yes or No

Yes	▶	Check PNP switch circuit. Refer to "DTC P0705", AT-100.
No	▶	GO TO 2.

2	CHECK PNP SWITCH INSPECTION

Check for short or open of PNP switch 2-pin connector. Refer to "Components Inspection", AT-104.

DISCONNECT

T.S.

1 2

B66

Ω

PNP switch

SAT838BB

OK or NG

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

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Engine Cannot Be Started In "P" and "N" Position (Cont'd)

3	CHECK CONTROL LINKAGE	
Check control linkage. Refer to AT-275.		

"P" position — Do not push — Lock nut — Turn buckle

SAT032G

OK or NG

OK	▶	GO TO 4.
NG	▶	Adjust control linkage. Refer to AT-275.

4	CHECK STARTING SYSTEM	
Check starting system. Refer to SC-10, "System Description".		

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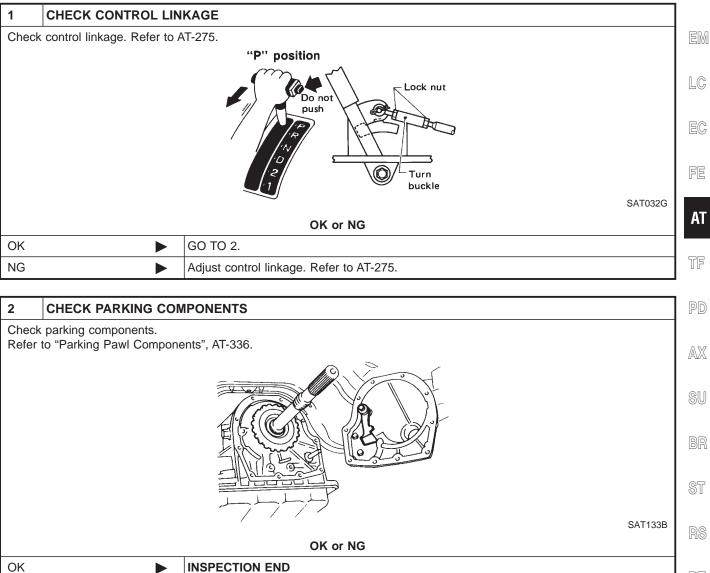
OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.

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

=NBAT0075

SYMPTOM:

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

1	CHECK CONTROL LINKAGE

Check control linkage. Refer to AT-275.

SAT032G

OK or NG

OK	▶	GO TO 2.
NG	▶	Adjust control linkage. Refer to AT-275.

2	CHECK PARKING COMPONENTS

Check parking components.
Refer to "Parking Pawl Components", AT-336.

SAT133B

OK or NG

OK	▶	INSPECTION END
NG	▶	Repair or replace damaged parts.
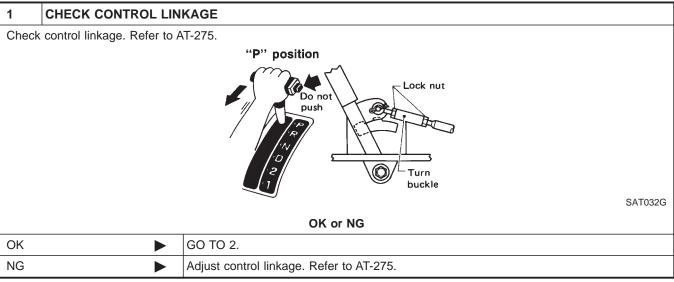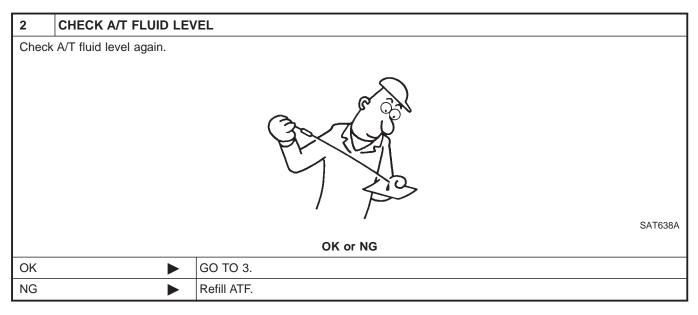
In "N" Position, Vehicle Moves

SYMPTOM:
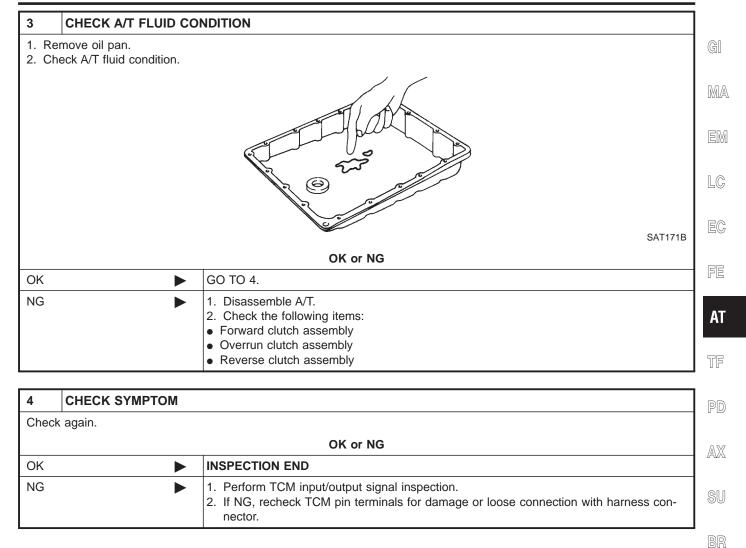
=NBAT0076

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

1	CHECK CONTROL LINKAGE

Check control linkage. Refer to AT-275.

"P" position

Do not push

Lock nut

Turn buckle

SAT032G

OK or NG

OK	▶	GO TO 2.
NG	▶	Adjust control linkage. Refer to AT-275.

2	CHECK A/T FLUID LEVEL

Check A/T fluid level again.

SAT638A

OK or NG

OK	▶	GO TO 3.
NG	▶	Refill ATF.

TROUBLE DIAGNOSES FOR SYMPTOMS

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	▶	1. Disassemble A/T. 2. Check the following items: ● Forward clutch assembly ● Overrun clutch assembly ● Reverse clutch assembly

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.

Large Shock. "N" → "R" Position

=NBAT0077

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?

SAT579I

Yes or No

Yes	▶	Check damaged circuit. Refer to "DTC P0710, DTC P0745 or DTC P1705", AT-106, 162 or 176.
No	▶	GO TO 2.

2	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 3.
NG	▶	1. Remove control valve assembly. Refer to AT-272. 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	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.

Vehicle Does Not Creep Backward In "R" Position

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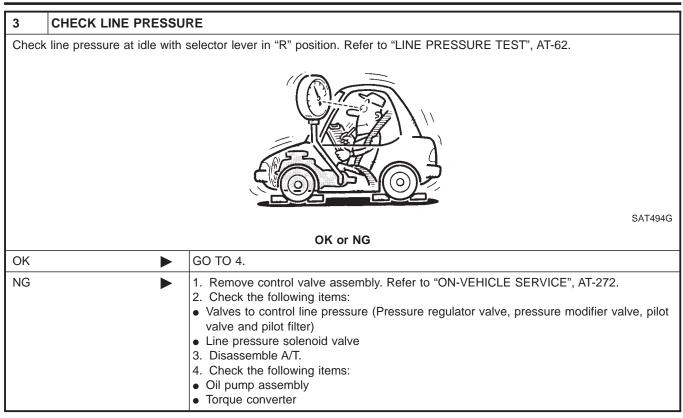
Vehicle does not creep backward when selecting "R" position.

=NBAT0078

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. Refer to AT-355.	

SAT493G

OK or NG

OK	▶	GO TO 4.
OK in "1" position, NG in "R" position	▶	1. Disassemble A/T. 2. Check the following items: ● Reverse clutch assembly
NG in both "1" and "R" positions	▶	GO TO 3.

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-272. 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

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.

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.

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6	DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-272.
2. Check the following items:
● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
● Line pressure solenoid valve
3. Disassemble A/T.
4. Check the following items:
● Oil pump assembly
● Torque converter
● Reverse clutch assembly
● High clutch assembly
● Low & reverse brake assembly
● Low one-way clutch

▶	Repair or replace damaged parts.
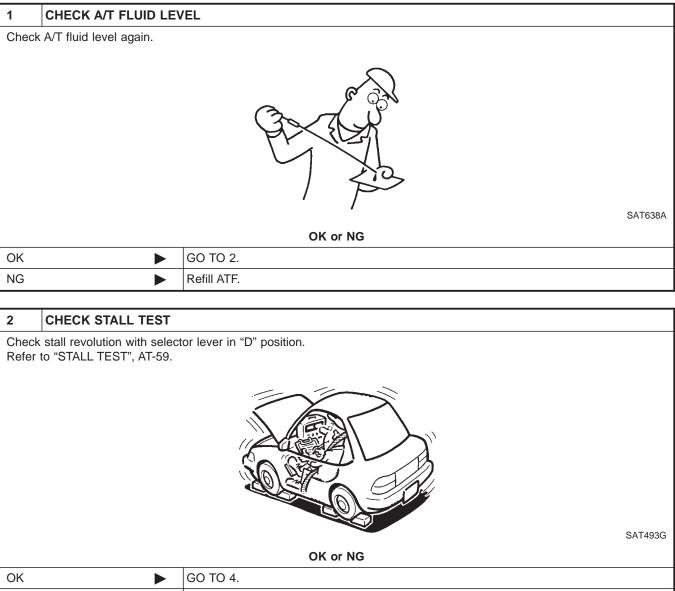
Vehicle Does Not Creep Forward In "D", "2" Or "1" Position

=NBAT0079

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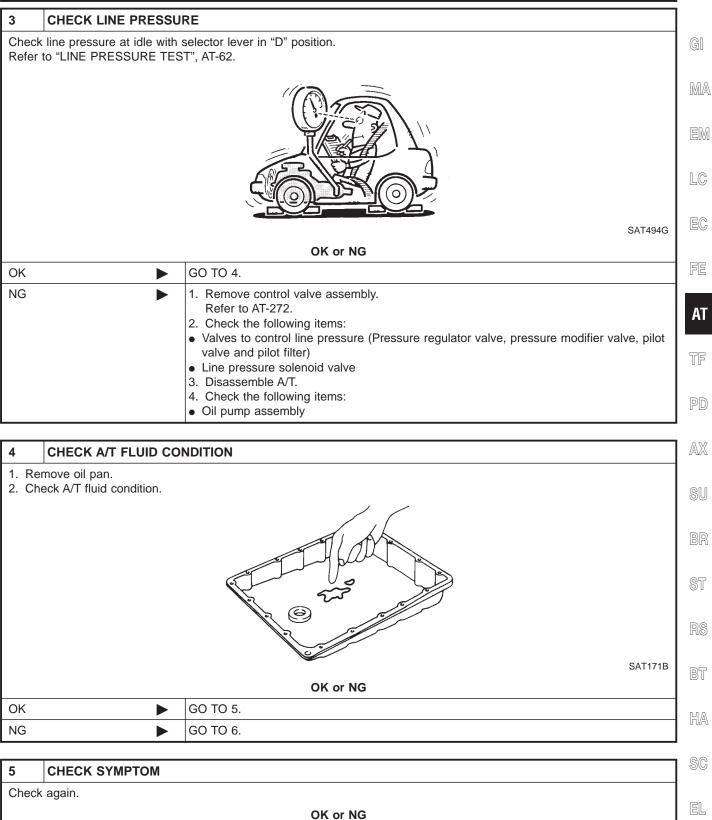
Vehicle does not creep forward when selecting "D", "2" or "1" position.

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-59.	

SAT493G

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

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-272. 2. Check the following items: ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: ● Oil pump assembly

4	CHECK A/T FLUID CONDITION

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

SAT171B

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 6.

5	CHECK SYMPTOM

Check again.

OK or NG

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

AT-231

6	DETECT MALFUNCTIONING ITEM
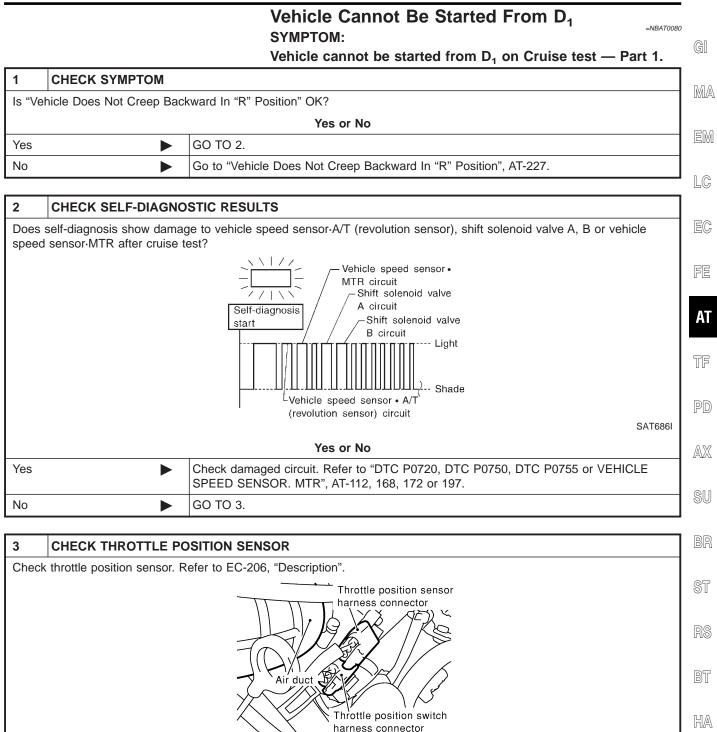
1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-272.
2. Check the following items:
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve
3. Disassemble A/T.
4. Check the following items:
- Oil pump assembly
- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- Low & reverse brake assembly
- Torque converter

	▶	Repair or replace damaged parts.

Vehicle Cannot Be Started From D$_1$

=NBAT0080

SYMPTOM:

Vehicle cannot be started from D$_1$ on Cruise test — Part 1.

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

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?		

Self-diagnosis start

Vehicle speed sensor • MTR circuit

Shift solenoid valve A circuit

Shift solenoid valve B circuit

Light

Shade

Vehicle speed sensor • A/T (revolution sensor) circuit

SAT686I

	Yes or No	
Yes	▶	Check damaged circuit. Refer to "DTC P0720, DTC P0750, DTC P0755 or VEHICLE SPEED SENSOR. MTR", AT-112, 168, 172 or 197.
No	▶	GO TO 3.

3	CHECK THROTTLE POSITION SENSOR	
Check throttle position sensor. Refer to EC-206, "Description".		

Throttle position sensor harness connector

Air duct

Throttle position switch harness connector

SAT142K

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

Vehicle Cannot Be Started From D₁ (Cont'd)

4	CHECK LINE PRESSURE

Check line pressure at stall point with selector lever in "D" position.
Refer to "LINE PRESSURE TEST", AT-62.

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-272.
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.

TROUBLE DIAGNOSES FOR SYMPTOMS

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

8	DETECT MALFUNCTIONING ITEM	
1. Remove control valve assembly. Refer to AT-272. 2. Check the following items: ● Shift valve A ● Shift valve B ● Shift solenoid valve A ● Shift solenoid valve B ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check the following items: ● Forward clutch assembly ● Forward one-way clutch ● Low one-way clutch ● High clutch assembly ● Torque converter ● Oil pump assembly		
	OK or NG	
OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

AT-235

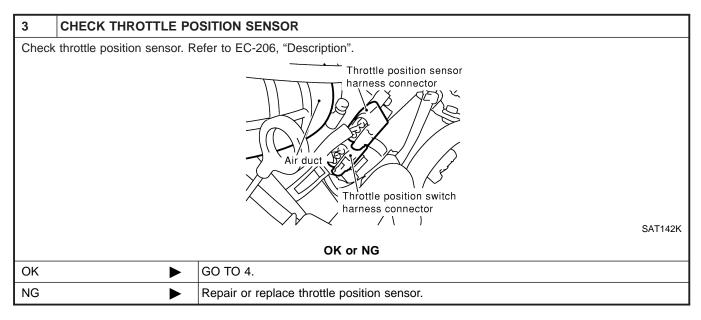## A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$
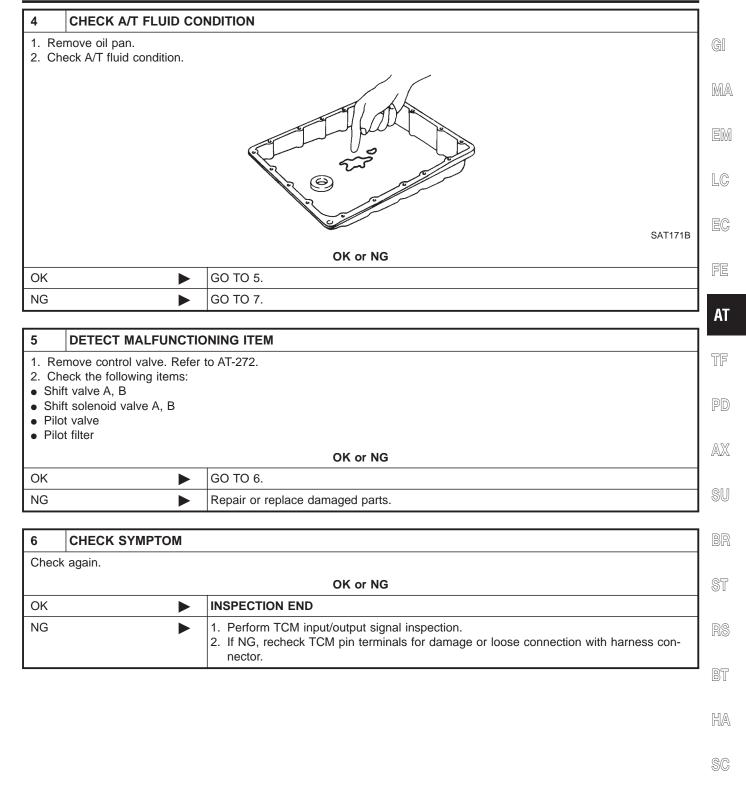
=NBAT0081

SYMPTOM:

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

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

2	CHECK VEHICLE SPEED SENSOR·A/T AND VEHICLE SPEED SENSOR·MTR CIRCUIT	
Check vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuit. Refer to "DTC P0720 and VEHICLE SPEED SENSOR·MTR", AT-112, 197.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuits.

3	CHECK THROTTLE POSITION SENSOR	
Check throttle position sensor. Refer to EC-206, "Description".		

Throttle position sensor harness connector

Air duct

Throttle position switch harness connector

SAT142K

	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. Refer to AT-272. 2. Check the following items: ● Shift valve A, B ● Shift solenoid valve A, B ● Pilot valve ● Pilot filter **OK or NG**		
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

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

AT-237

7	DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-272.
2. Check the following items:
- Shift valve A, B
- Shift solenoid valve A, B
- 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 6.
NG	▶	Repair or replace damaged parts.

TROUBLE DIAGNOSES FOR SYMPTOMS

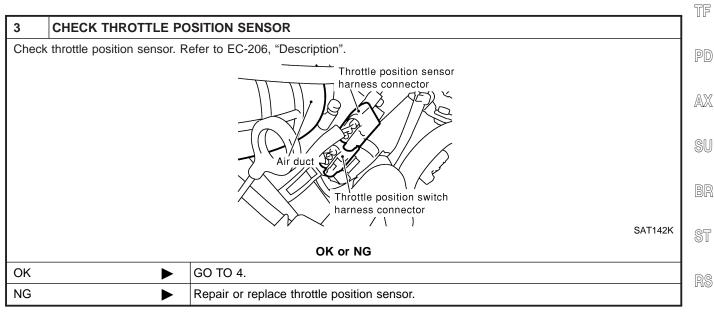## A/T Does Not Shift: $D_2 \to D_3$

SYMPTOM: =NBAT0082

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

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

2	CHECK VEHICLE SPEED SENSOR·A/T AND VEHICLE SPEED SENSOR·MTR CIRCUIT	
Check vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuit. Refer to "DTC P0720 and VEHICLE SPEED SENSOR·MTR", AT-112, 197.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuits.

3	CHECK THROTTLE POSITION SENSOR	
Check throttle position sensor. Refer to EC-206, "Description".		

Throttle position sensor harness connector
Air duct
Throttle position switch harness connector

SAT142K

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

AT-239

A/T Does Not Shift: D$_2$ → D$_3$ (Cont'd)

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-272.
2. Check the following items:
- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.

6	CHECK SYMPTOM

Check again.

OK or NG

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

7	DETECT MALFUNCTIONING ITEM

1. Remove control valve Assembly. Refer to AT-272.
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 5.
NG	▶	Repair or replace damaged parts.

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

=NBAT0083

SYMPTOM:

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

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

2	CHECK SELF-DIAGNOSTIC RESULTS	
With CONSULT-II Does self-diagnosis, after cruise test, show damage to any of the following circuits? ● Inhibitor switch ● Overdrive control switch ● A/T fluid temperature sensor ● Revolution sensor ● Shift solenoid valve A or B ● Vehicle speed sensor SAT580I		
Yes or No		
Yes	▶	Check damaged circuit. Refer to "DTC P0705, P0710, P0720, P0750, P0755 or VHCL SPEED SEN·MTR", AT-100, 106, 112, 168, 172 or 197.
No	▶	GO TO 3.

TROUBLE DIAGNOSES FOR SYMPTOMS

3	CHECK THROTTLE POSITION SENSOR	

Check throttle position sensor. Refer to EC-206, "Description".

Throttle position sensor harness connector

Air duct

Throttle position switch harness connector

SAT142K

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-272.
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.

AT-243

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-272. 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.

A/T Does Not Perform Lock-up

=NBAT0084

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?

SAT581I

Yes or No

Yes	▶	Check torque converter clutch solenoid valve circuit. Refer to "DTC P0740", AT-149.
No	▶	GO TO 2.

2	CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-206, "Description".

SAT142K

OK or NG

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

3	CHECK VEHICLE SPEED SENSOR

Check vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sesnor·MTR. Refer to AT-112, 197.

OK or NG

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

4	CHECK A/T FLUID TEMPERATURE SENSOR

Check A/T fluid temperature sensor. Refer to AT-190.

OK or NG

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

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

5	CHECK ENGINE SPEED SIGNAL	
Check engine speed signal. Refer to AT-117.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or replace damaged parts.
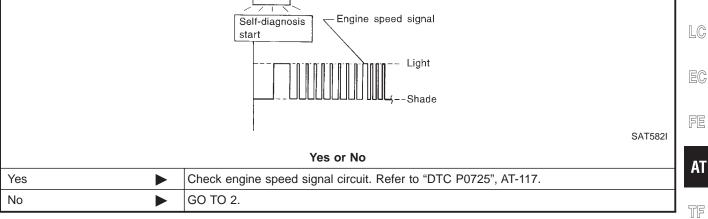
6	DETECT MALFUNCTIONING ITEM	
1. Remove control valve. Refer to AT-272. 2. Check following items: ● Torque converter clutch control valve ● Torque converter relief valve ● Torque converter clutch solenoid valve ● Pilot valve ● Pilot filter		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

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.

AT-246

A/T Does Not Hold Lock-up Condition

=NBAT0085

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?

SAT582I

Yes or No

Yes	▶	Check engine speed signal circuit. Refer to "DTC P0725", AT-117.
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-272.
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.

AT-247

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-272. 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.

Lock-up Is Not Released

=NBAT0086

SYMPTOM:

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

1	CHECK THROTTLE POSITION SWITCH CIRCUIT

With CONSULT-II
Does "TCM INPUT SIGNALS" in Data Monitor show damage to closed throttle position switch circuit?

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

Lamp comes off.

Self-diagnosis
Start

---- Light

Shade

SAT717K

Yes or No

Yes	▶	Check closed throttle position switch circuit. Refer to "DTC P1705", AT-176.
No	▶	GO TO 2.

2	CHECK SYMPTOM

Check again.

OK or NG

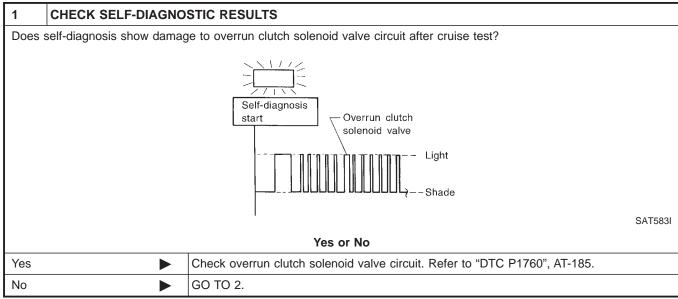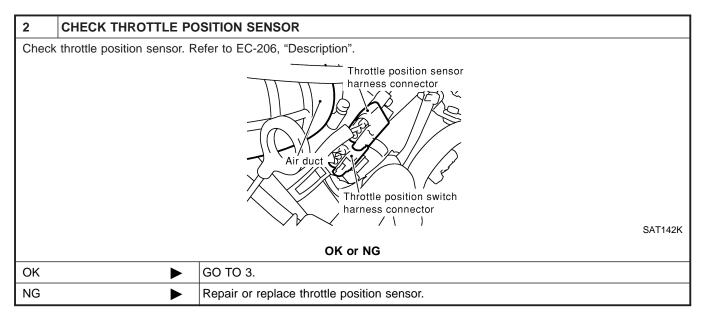| OK	▶	INSPECTION END
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)
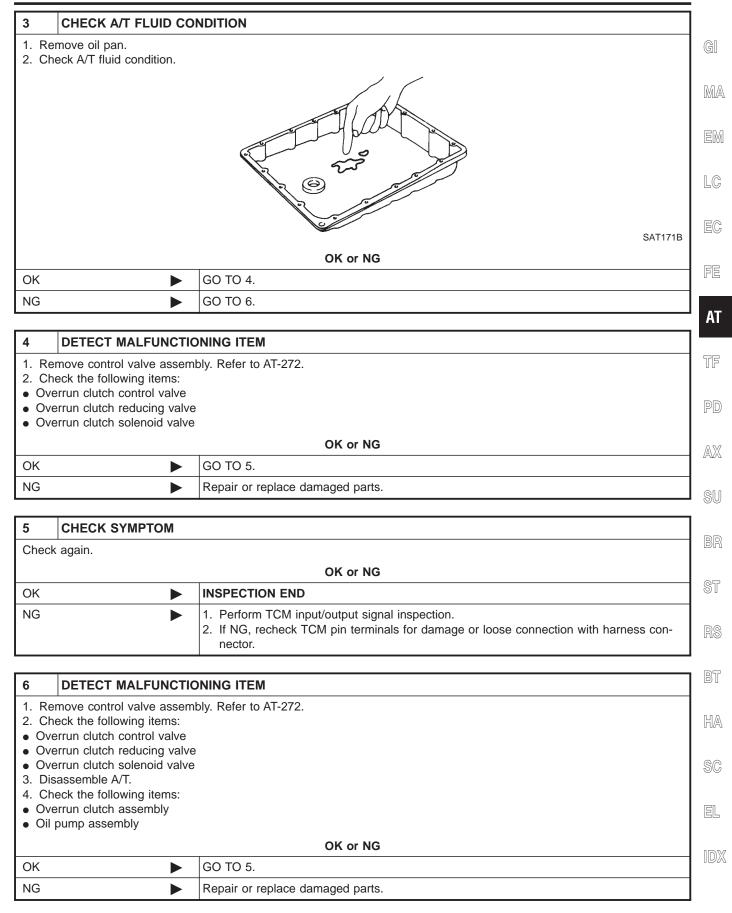
=NBAT0087

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?

SAT583I

Yes or No

Yes	▶	Check overrun clutch solenoid valve circuit. Refer to "DTC P1760", AT-185.
No	▶	GO TO 2.

2	CHECK THROTTLE POSITION SENSOR

Check throttle position sensor. Refer to EC-206, "Description".

SAT142K

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-272.
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-272.
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.

Vehicle Does Not Start From D_1

NBAT0088

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?

SAT686I

Yes or No

Yes	▶	Check damaged circuit. Refer to "DTC P0720, P0750, P0755 or VHCL SPEED SEN·MTR", AT-112, 176, 172 or 197.
No	▶	GO TO 2.

2	CHECK SYMPTOM
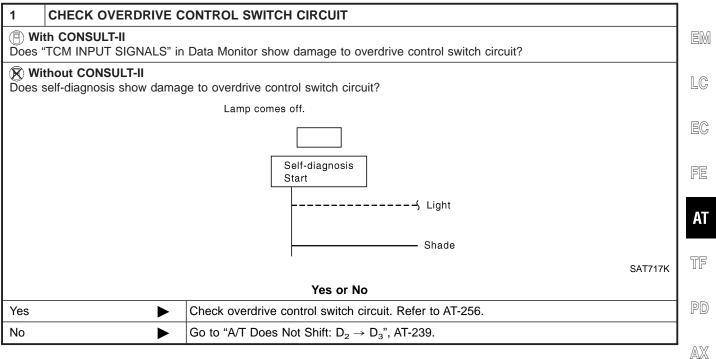
Check again.

OK or NG

OK	▶	Go to "Vehicle Cannot Be Started From D_1", AT-233.
NG	▶	1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

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

=NBAT0089

SYMPTOM:

A/T does not shift from D_4 to D_3 when changing overdrive control switch to "OFF" position.
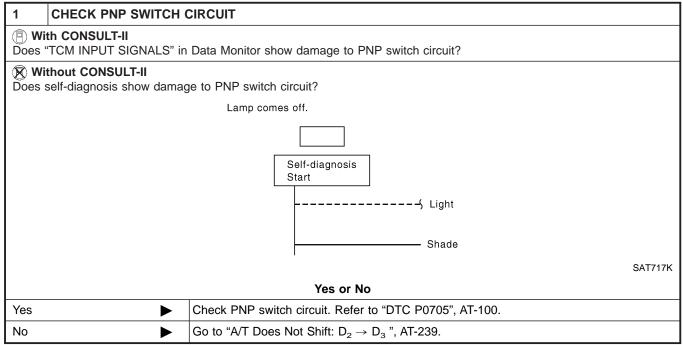
1	CHECK OVERDRIVE CONTROL SWITCH CIRCUIT

With CONSULT-II

Does "TCM INPUT SIGNALS" in Data Monitor show damage to overdrive control switch circuit?

Without CONSULT-II

Does self-diagnosis show damage to overdrive control switch circuit?

Lamp comes off.

Self-diagnosis
Start

---------------------- Light

———————————————— Shade

SAT717K

Yes or No

Yes	▶	Check overdrive control switch circuit. Refer to AT-256.
No	▶	Go to "A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-239.

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

=NBAT0090

SYMPTOM:

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

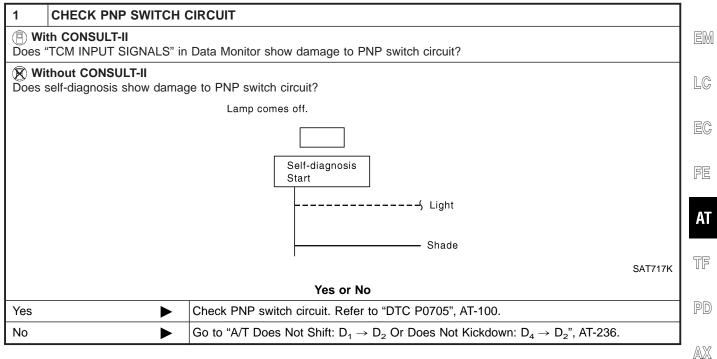| 1	CHECK PNP SWITCH CIRCUIT

⊡ With CONSULT-II
Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?

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

Lamp comes off.

Self-diagnosis Start

Light

Shade

SAT717K

Yes or No

Yes	▶	Check PNP switch circuit. Refer to "DTC P0705", AT-100.
No	▶	Go to "A/T Does Not Shift: $D_2 \rightarrow D_3$ ", AT-239.

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

=NBAT0091

SYMPTOM:

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

1	CHECK PNP SWITCH CIRCUIT

With CONSULT-II
Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?

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

Lamp comes off.

Self-diagnosis Start

Light

Shade

SAT717K

Yes or No

Yes	▶	Check PNP switch circuit. Refer to "DTC P0705", AT-100.
No	▶	Go to "A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-236.

Vehicle Does Not Decelerate By Engine Brake

NBAT0092

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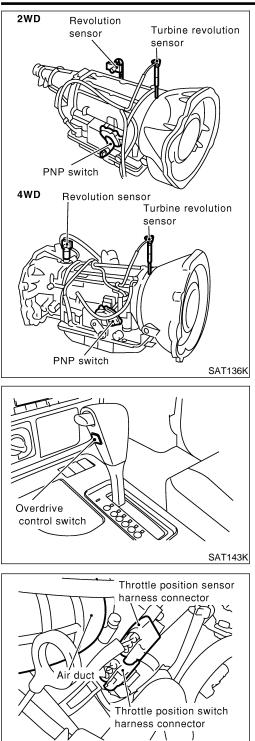
Vehicle does not decelerate by engine brake when shifting from 2_2 (1_2) to 1_1.

1	CHECK SYMPTOM

Is "Vehicle Does Not Creep Backward In "R" Position" OK?

Yes or No

Yes	▶	Go to "Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-250.
No	▶	Go to "Vehicle Does Not Creep Backward In "R" Position", AT-227.

SAT136K

SAT143K

SAT142K

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

NBAT0204

SYMPTOM:

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

DESCRIPTION

NBAT0204S01

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

AT-256

DIAGNOSTIC PROCEDURE

=NBAT0204S03

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

1	INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes (With CONSULT-II)	▶	GO TO 2.
No (Without CONSULT-II)	▶	GO TO 3.

2	CHECK PNP SWITCH CIRCUIT (With CONSULT-II)

With CONSULT-II
1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out "P", "R", "N", "D", "2" and "1" position switches moving selector lever to each position. Check the signal of the selector lever position is indicated properly.

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

SAT643J

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

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

3	CHECK PNP SWITCH CIRCUIT (Without CONSULT-II)

ⓧ **Without CONSULT-II**
1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between TCM harness connector M120 terminals 26, 27, 34, 35, 36 and ground while moving selector lever through each position.

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

MTBL0205

SAT517J

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

Yes	▶	GO TO 5.
No	▶	GO TO 4.

4	DETECT MALFUNCTIONING ITEM

Check the following items:
- PNP switch
  Refer to "Component Inspection", AT-262.
- 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)

OK or NG

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

5	CHECK OVERDRIVE CONTROL SWITCH CIRCUIT

With CONSULT-II

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Read out "OVERDRIVE SWITCH". Check the signal of the overdrive control switch is indicated properly.
   (Overdrive control switch "ON" displayed on CONSULT-II means overdrive "OFF".)

DATA MONITOR	
MONITORING	
ENGINE SPEED	XXX rpm
TURBINE REV	XXX rpm
OVERDRIVE SW	ON
PN POSI SW	OFF
R POSITION SW	OFF

SAT645J

Without CONSULT-II

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between TCM harness connector M120 terminal 22 and ground when overdrive control switch is "ON" and "OFF".
   Voltage:
   Switch position "ON":
   Battery voltage
   Switch position "OFF":
   1V or less

H.S.   CONNECT   ON

TCM	CONNECTOR

22

V

SAT531JD

OK or NG

OK (With CONSULT-II)	▶	GO TO 7.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	GO TO 6.

AT-259

6	DETECT MALFUNCTIONING ITEM

Check the following items:
- Overdrive control switch
  Refer to "Component Inspection", AT-262.
- Harness for short or open between TCM and overdrive control switch
- Harness for short or open of ground circuit for overdrive control switch

<div align="center">OK or NG</div>

OK (With CONSULT-II)	▶	GO TO 7.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	Repair or replace damaged parts.

7	CHECK THROTTLE POSITION SWITCH CIRCUIT (With CONSULT-II)

⌨ **With CONSULT-II**
1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Apply vacuum to the throttle opener, then check the following. Refer to steps 1 and 2 of "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.
4. Read out "CLOSED THL/SW" and "W/O THRL/P-SW" depressing and releasing accelerator pedal.
   Check the signal of throttle position switch is indicated properly.

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

MTBL0011

DATA MONITOR	
MONITORING	
POWERSHIFT SW	OFF
CLOSED THL/SW	OFF
W/O THRL/P-SW	OFF
HOLD SW	OFF
BRAKE SW	ON

SAT646J

<div align="center">OK or NG</div>

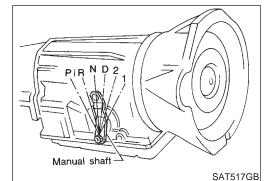| OK	▶	GO TO 10.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING ITEM

Check the following items:
- Throttle position switch
  Refer to "Component Inspection", AT-263.
- Harness for short or open between throttle position switch and TCM

<div align="center">OK or NG</div>

OK	▶	GO TO 10.
NG	▶	Repair or replace damaged parts.

9	CHECK THROTTLE POSITION SWITCH CIRCUIT (Without CONSULT-II)

⊗ **Without CONSULT-II**
1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between TCM harness connector M119 terminals 16, 17 and ground while depressing, and releasing accelerator pedal slowly. (after warming up engine)
   [Refer to "Preparation", "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", AT-46.]

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

MTBL0519

SAT526J

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 8.

10	CHECK DTC

Perform Diagnostic procedure, AT-257.

OK or NG

OK	▶	INSPECTION END
NG	▶	GO TO 11.

11	CHECK TCM INSPECTION

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

OK or NG

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

SAT144K

COMPONENT INSPECTION

NBAT0204S04
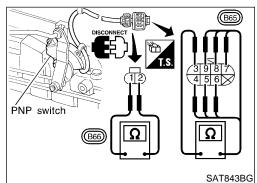
Overdrive Control Switch

NBAT0204S0401

● Check continuity between two terminals.

Continuity:

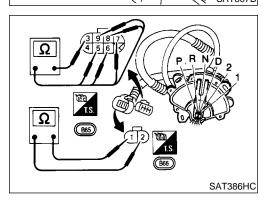**Switch position "ON":**
No

Switch position "OFF":
Yes

Park/Neutral Position Switch

NBAT0204S0402

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

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

SAT517GB

Manual shaft

PNP switch

SAT843BG

2. If NG, check again with manual control linkage disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control linkage. Refer to AT-275.

SAT807B

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-275.
6. If NG on step 4, replace PNP switch.

SAT386HC

Throttle Position Switch

NBAT0204S0403

Closed Throttle Position Switch (Idle Position)

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

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

- To adjust closed throttle position switch, refer to EC-465, "Component Description".

Throttle position switch harness connector (F9)

SAT132K

Wide Open Throttle Position Switch

- Check continuity between terminals 4 and 5.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

Throttle position switch harness connector (F9)

SAT137K

A/T Fluid Temperature Switch

NBAT0204S0404

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

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

A/T solenoid valve harness connector (B64)

Thermometer

A/T fluid

SAT251JA

AT-263

Description

NBAT0093

- The mechanical key interlock mechanism also operates as a shift lock:

  With the key switch turned to "ON", the selector lever cannot be shifted from "P" (parking) to any other position unless the brake pedal is depressed.
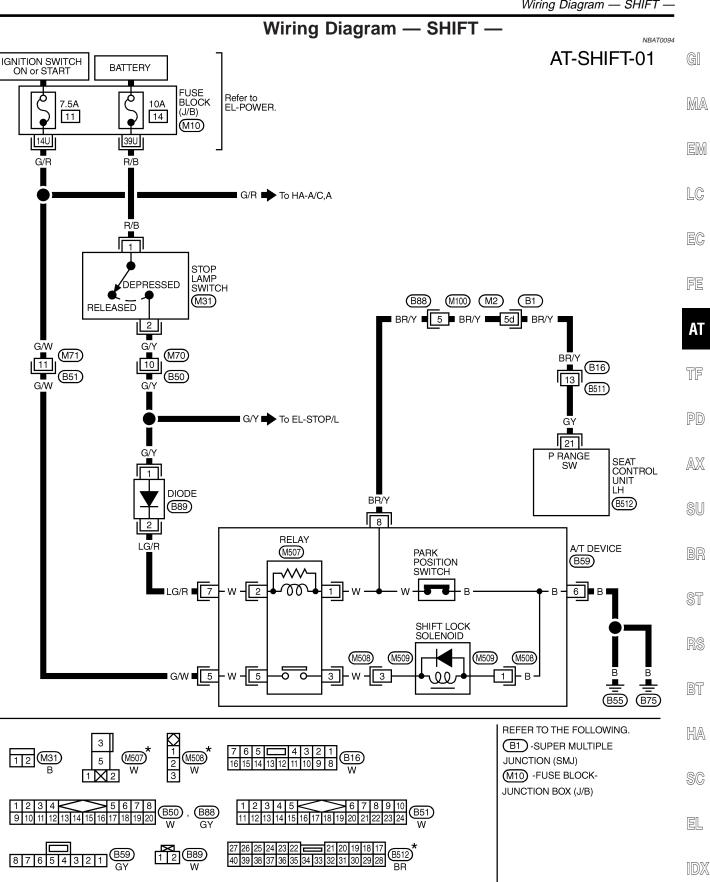
  With the key removed, the selector lever cannot be shifted from "P" to any other position.

  The key cannot be removed unless the selector lever is placed in "P".

- The shift lock and key interlock mechanisms are controlled by the ON-OFF operation of the shift lock solenoid and by the operation of the rotator and slider located inside the key cylinder, respectively.

Steering column

Selector lever

Shift lock release knob cover

Stop lamp switch

ASCD brake switch

Shift lock solenoid and park position switch harness connector

Relay

A/T device harness connector

Reverse side

Park position switch

SAT145K

A/T SHIFT LOCK SYSTEM

Wiring Diagram — SHIFT —

NBAT0094

AT-SHIFT-01

MAT260B

REFER TO THE FOLLOWING.
(B1) -SUPER MULTIPLE JUNCTION (SMJ)
(M10) -FUSE BLOCK- JUNCTION BOX (J/B)

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

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

Diagnostic Procedure

SYMPTOM 1:

● **Selector lever cannot be moved from "P" position with key in "ON" position and brake pedal applied.**

● **Selector lever can be moved from "P" position with key in "ON" position and brake pedal released.**

● **Selector lever can be moved from "P" position when key is removed from key cylinder.**

SYMPTOM 2:

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

1	CHECK KEY INTERLOCK CABLE	
Check key interlock cable for damage.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair key interlock cable. Refer to "Key Interlock Cable", AT-270.

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 Manual Control Linkage Adjustment", AT-275 and AT-275.
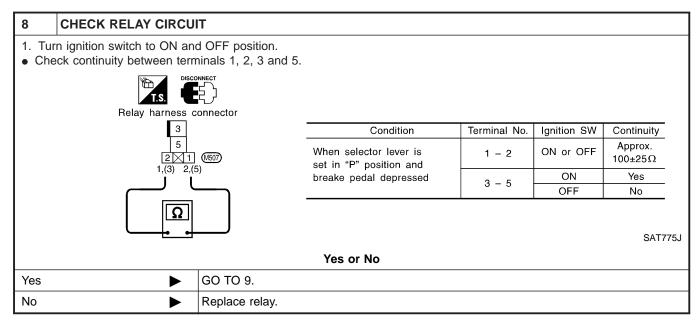
3	CHECK POWER SOURCE	
1. Turn ignition switch to ON position. (Do not start engine.) 2. Check voltage between A/T device harness terminal 5 and ground.		

A/T device harness terminal (B59)

Voltage:
  Battery voltage

G/W

SAT758JA

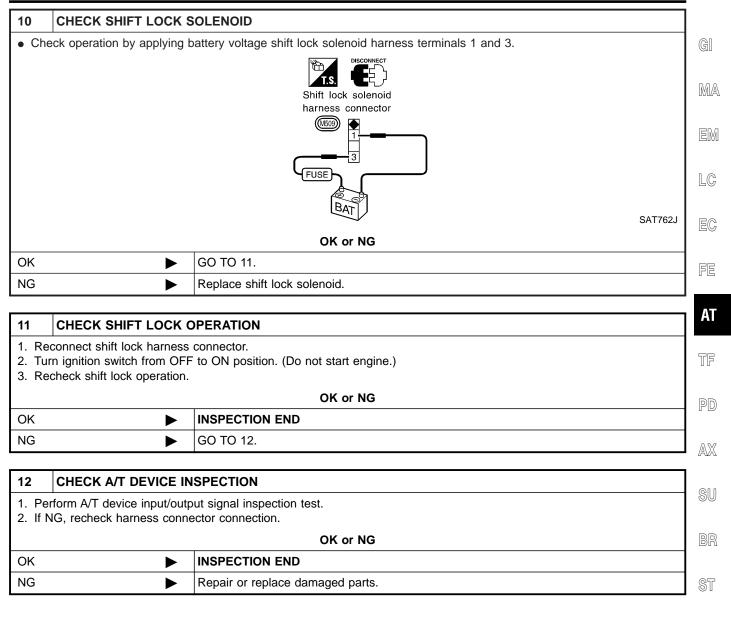|		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.
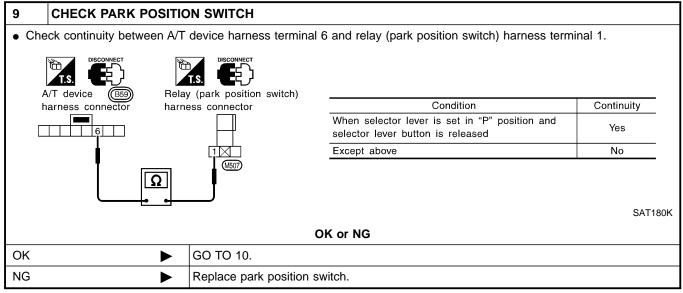
A/T SHIFT LOCK SYSTEM

4	DETECT MALFUNCTIONING ITEM

Check the following items:
1. Harness for short or open between ignition switch and A/T device harness terminal 5
2. 7.5A fuse [No. 11, located in the fuse block (J/B)]
3. Ignition switch (Refer to EL-10, "Schematic".)

OK or NG

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

5	CHECK INPUT SIGNAL A/T DEVICE

Turn ignition switch to OFF position.
● Check voltage between A/T device harness terminal 7 and ground.

A/T device (B59) harness terminal

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

LG/R

SAT179K

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING ITEM

Check the following items:
1. Harness for short or open between battery and stop lamp switch harness connector 1
2. Harness for short or open between stop lamp switch harness connector 2 and A/T device harness connector 7
3. Diode
4. 10A fuse [No. 14, located in the fuse block (J/B)]
5. Stop lamp switch
a. Check continuity between terminals 1 and 2.

Stop lamp switch harness connector

2 1 (M31)

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

SAT146K

Check stop lamp switch after adjusting brake pedal — refer to BR-12, "Adjustment".

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair or replace damaged parts.

Diagnostic Procedure (Cont'd)

7	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. Refer to wiring diagram — SHIFT —.
   Continuity should exist.
   If OK, check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK RELAY CIRCUIT

1. Turn ignition switch to ON and OFF position.
● Check continuity between terminals 1, 2, 3 and 5.

Relay harness connector

Condition	Terminal No.	Ignition SW	Continuity
When selector lever is set in "P" position and breake pedal depressed	1 – 2	ON or OFF	Approx. 100±25Ω
	3 – 5	ON	Yes
		OFF	No

SAT775J

Yes or No

Yes	▶	GO TO 9.
No	▶	Replace relay.

9	CHECK PARK POSITION SWITCH

● Check continuity between A/T device harness terminal 6 and relay (park position switch) harness terminal 1.

A/T device harness connector

Relay (park position switch) harness connector

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

SAT180K

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace park position switch.

AT-268

10	CHECK SHIFT LOCK SOLENOID

● Check operation by applying battery voltage shift lock solenoid harness terminals 1 and 3.

Shift lock solenoid
harness connector

(M509)

FUSE

BAT

SAT762J

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace shift lock solenoid.

11	CHECK SHIFT LOCK OPERATION

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

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 12.

12	CHECK A/T DEVICE INSPECTION

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

OK or NG

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

Components

NBAT0097

SEC. 349

Steering lock

Selector lever

Lock plate

Key interlock
cable

Adjust holder   Slider

Rod

Unlock

Lock

Lock lever

SAT147K

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

NBAT0098

Unlock slider from adjuster holder and remove rod from cable.

Slider

SAT353I

AT-270

Installation

NBAT0099

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

4. Insert interlock rod into adjuster holder.

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

SAT359I
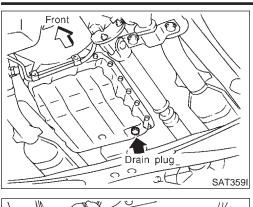
Control Valve Assembly and Accumulators
NBAT0100

REMOVAL
NBAT0100S01

1. Remove exhaust front tube.
2. Remove oil pan and gasket and drain ATF.

SAT073BA

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

SAT353B

5. Remove control valve assembly by removing fixing bolts and disconnecting harness connector.
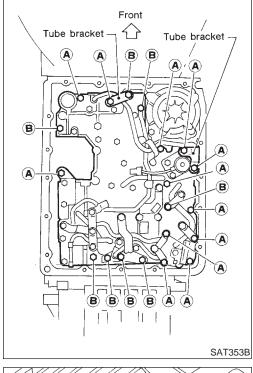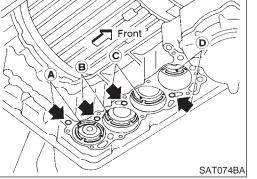
Bolt length and location

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

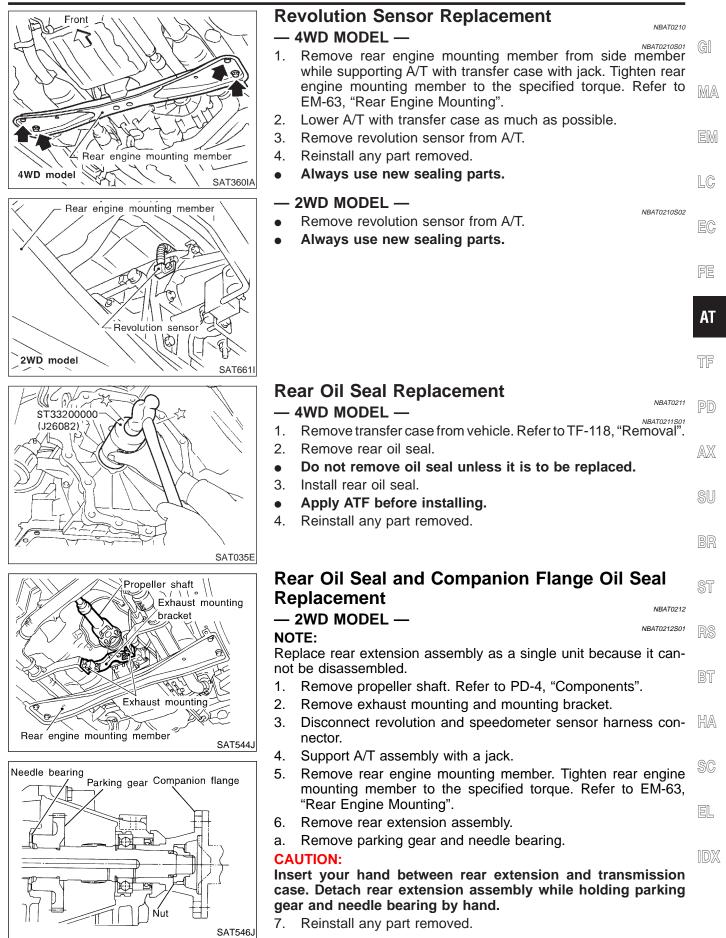6. Remove solenoids and valves from valve body if necessary.
7. Remove terminal cord assembly if necessary.

SAT074BA

8. Remove accumulator **A, B, C** and **D** by applying compressed air if necessary.
- **Hold each piston with rag.**
9. Reinstall any part removed.
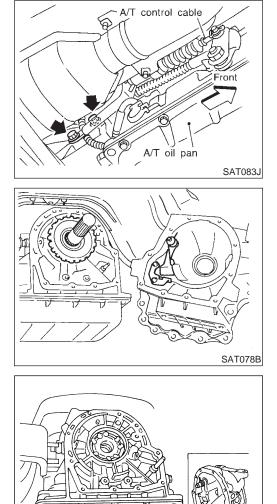- **Always use new sealing parts.**

AT-272

4WD model

SAT360IA

2WD model

SAT661I

SAT035E

SAT544J

SAT546J

Revolution Sensor Replacement

NBAT0210

— 4WD MODEL —

NBAT0210S01

1. Remove rear engine mounting member from side member while supporting A/T with transfer case with jack. Tighten rear engine mounting member to the specified torque. Refer to EM-63, "Rear Engine Mounting".

2. Lower A/T with transfer case as much as possible.

3. Remove revolution sensor from A/T.

4. Reinstall any part removed.

● **Always use new sealing parts.**

— 2WD MODEL —

NBAT0210S02

● Remove revolution sensor from A/T.

● **Always use new sealing parts.**

Rear Oil Seal Replacement

NBAT0211

— 4WD MODEL —

NBAT0211S01

1. Remove transfer case from vehicle. Refer to TF-118, "Removal".

2. Remove rear oil seal.

● **Do not remove oil seal unless it is to be replaced.**

3. Install rear oil seal.

● **Apply ATF before installing.**

4. Reinstall any part removed.

Rear Oil Seal and Companion Flange Oil Seal Replacement

NBAT0212

— 2WD MODEL —

NBAT0212S01

NOTE:

Replace rear extension assembly as a single unit because it cannot be disassembled.

1. Remove propeller shaft. Refer to PD-4, "Components".

2. Remove exhaust mounting and mounting bracket.

3. Disconnect revolution and speedometer sensor harness connector.

4. Support A/T assembly with a jack.

5. Remove rear engine mounting member. Tighten rear engine mounting member to the specified torque. Refer to EM-63, "Rear Engine Mounting".

6. Remove rear extension assembly.

a. Remove parking gear and needle bearing.

CAUTION:

Insert your hand between rear extension and transmission case. Detach rear extension assembly while holding parking gear and needle bearing by hand.

7. Reinstall any part removed.

AT-273

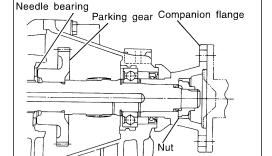● Always use new sealing parts.

SAT083J

Parking Components Inspection

NBAT0213

— 4WD MODEL —

NBAT0213S01

1. Remove propeller shaft. Refer to PD-4, "Components".
2. Remove transfer case from vehicle. Refer to TF-118, "Removal".
3. Remove A/T control cable bracket from transmission case.

SAT078B

4. Support A/T assembly with a jack.
5. Remove adapter case from transmission case.
6. Replace parking components if necessary.
7. Reinstall any part removed.
● **Always use new sealing parts.**

— 2WD MODEL —

NBAT0213S02

1. Remove propeller shaft from vehicle. Refer to PD-4, "Components".
2. Support A/T assembly with a jack.
3. Remove rear engine mounting member. Tighten rear engine mounting member to the specified torque. Refer to EM-63, "Rear Engine Mounting".

SAT551J

4. Remove rear extension assembly.
a. Remove parking gear and needle bearing.
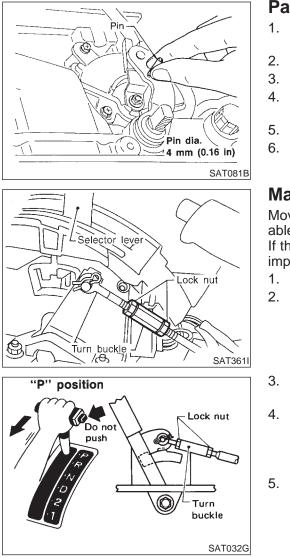
CAUTION:
Insert your hand between rear extension and transmission case. Detach rear extension assembly while holding parking gear and needle bearing by hand.

5. Replace parking components if necessary.
6. Reinstall any part removed.
● **Always use new sealing parts.**

SAT546J

AT-274

SAT081B

SAT361I

SAT032G

Park/Neutral Position Switch Adjustment
NBAT0104
1. Remove manual control linkage from manual shaft of A/T assembly.
2. Set manual shaft of A/T assembly in "N" position.
3. Loosen PNP switch fixing bolts.
4. Insert pin into adjustment holes in both PNP switch and manual shaft of A/T assembly as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of PNP switch. Refer to "Components Inspection", AT-104.

Manual Control Linkage Adjustment
NBAT0105
Move selector lever from "P" position to "1" position. You should be able to feel the detents in each position.
If the detents cannot be felt or the pointer indicating the position is improperly aligned, the linkage needs adjustment.
1. Place selector lever in "P" position.
2. Loosen lock nuts.

3. Tighten turn buckle until aligns with inner cable, pulling selector lever toward "R" position side without pushing button.
4. Back off turn buckle 1 turn and tighten lock nuts to the specified torque.
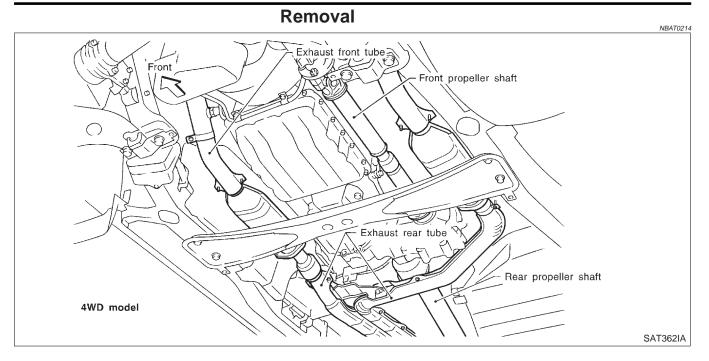
   Lock nut:
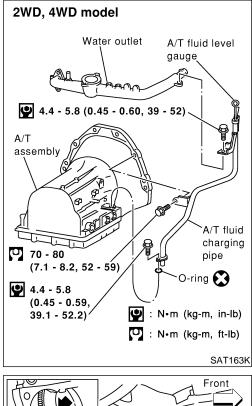   🔧 **: 4.4 - 5.9 N·m (0.45 - 0.60 kg-m, 39.1 - 52.1 in-lb)**
5. Move selector lever from "P" position to "1" position. Make sure that selector lever can move smoothly.
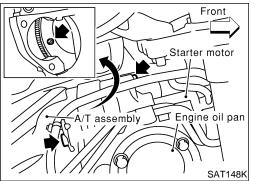
GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

AT-275

Removal

NBAT0214

4WD model

SAT362IA

2WD, 4WD model

Water outlet

A/T fluid level gauge

🔧 4.4 - 5.8 (0.45 - 0.60, 39 - 52)

A/T assembly

🔩 70 - 80 (7.1 - 8.2, 52 - 59)

🔧 4.4 - 5.8 (0.45 - 0.59, 39.1 - 52.2)

A/T fluid charging pipe

O-ring ✖

🔧 : N•m (kg-m, in-lb)

🔩 : N•m (kg-m, ft-lb)

SAT163K

Front

Starter motor

A/T assembly

Engine oil pan

SAT148K

CAUTION:
When removing the A/T assembly from engine, first remove the crankshaft position sensor from the A/T assembly lower side.
Be careful not to damage sensor edge.
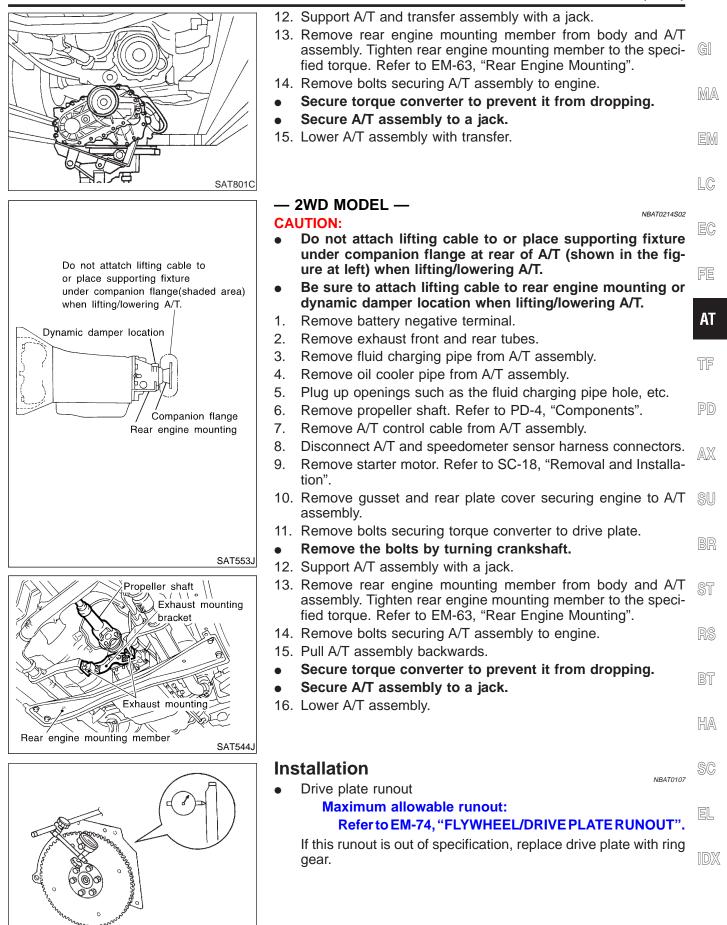
— 4WD MODEL —

NBAT0214S01

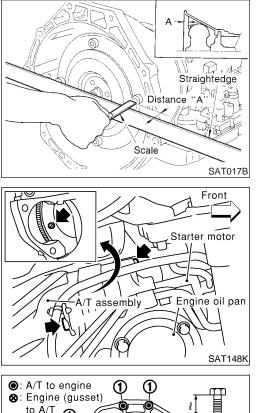1. Remove battery negative terminal.
2. Remove exhaust front and rear tubes.
3. Remove fluid charging pipe from A/T assembly.
4. Remove oil cooler pipe from A/T assembly.
5. Plug up openings such as the fluid charging pipe hole, etc.
6. Remove propeller shaft. Refer to PD-4, "Components".
7. Remove transfer control linkage from transfer. Refer to TF-118, "Removal".
● **Insert plug into rear oil seal after removing rear propeller shaft.**
● **Be careful not to damage spline, sleeve yoke and rear oil seal.**
8. Remove A/T control cable from A/T assembly. Refer to AT-275.
9. Disconnect A/T solenoid, PNP switch, turbine revolution, revolution and speedometer sensor harness connectors.

10. Remove starter motor. Refer to SC-18, "Removal and Installation".
11. Remove bolts securing torque converter to drive plate.
● **Remove the bolts by turning crankshaft.**

AT-276

SAT801C

Do not attatch lifting cable to or place supporting fixture under companion flange(shaded area) when lifting/lowering A/T.

Dynamic damper location

Companion flange
Rear engine mounting

SAT553J

Propeller shaft
Exhaust mounting bracket
Exhaust mounting
Rear engine mounting member
SAT544J

SAT977H

12. Support A/T and transfer assembly with a jack.
13. Remove rear engine mounting member from body and A/T assembly. Tighten rear engine mounting member to the specified torque. Refer to EM-63, "Rear Engine Mounting".
14. Remove bolts securing A/T assembly to engine.
● **Secure torque converter to prevent it from dropping.**
● **Secure A/T assembly to a jack.**
15. Lower A/T assembly with transfer.

— 2WD MODEL —
NBAT0214S02

CAUTION:
● **Do not attach lifting cable to or place supporting fixture under companion flange at rear of A/T (shown in the figure at left) when lifting/lowering A/T.**
● **Be sure to attach lifting cable to rear engine mounting or dynamic damper location when lifting/lowering A/T.**
1. Remove battery negative terminal.
2. Remove exhaust front and rear tubes.
3. Remove fluid charging pipe from A/T assembly.
4. Remove oil cooler pipe from A/T assembly.
5. Plug up openings such as the fluid charging pipe hole, etc.
6. Remove propeller shaft. Refer to PD-4, "Components".
7. Remove A/T control cable from A/T assembly.
8. Disconnect A/T and speedometer sensor harness connectors.
9. Remove starter motor. Refer to SC-18, "Removal and Installation".
10. Remove gusset and rear plate cover securing engine to A/T assembly.
11. Remove bolts securing torque converter to drive plate.
● **Remove the bolts by turning crankshaft.**
12. Support A/T assembly with a jack.
13. Remove rear engine mounting member from body and A/T assembly. Tighten rear engine mounting member to the specified torque. Refer to EM-63, "Rear Engine Mounting".
14. Remove bolts securing A/T assembly to engine.
15. Pull A/T assembly backwards.
● **Secure torque converter to prevent it from dropping.**
● **Secure A/T assembly to a jack.**
16. Lower A/T assembly.

Installation
NBAT0107
● Drive plate runout
    Maximum allowable runout:
        Refer to EM-74, "FLYWHEEL/DRIVE PLATE RUNOUT".
    If this runout is out of specification, replace drive plate with ring gear.
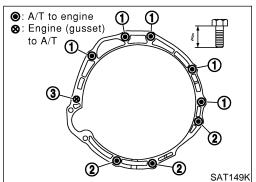
AT-277

SAT017B

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

   Distance "A":
   25.0 mm (0.984 in) or more

SAT148K

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

SAT149K
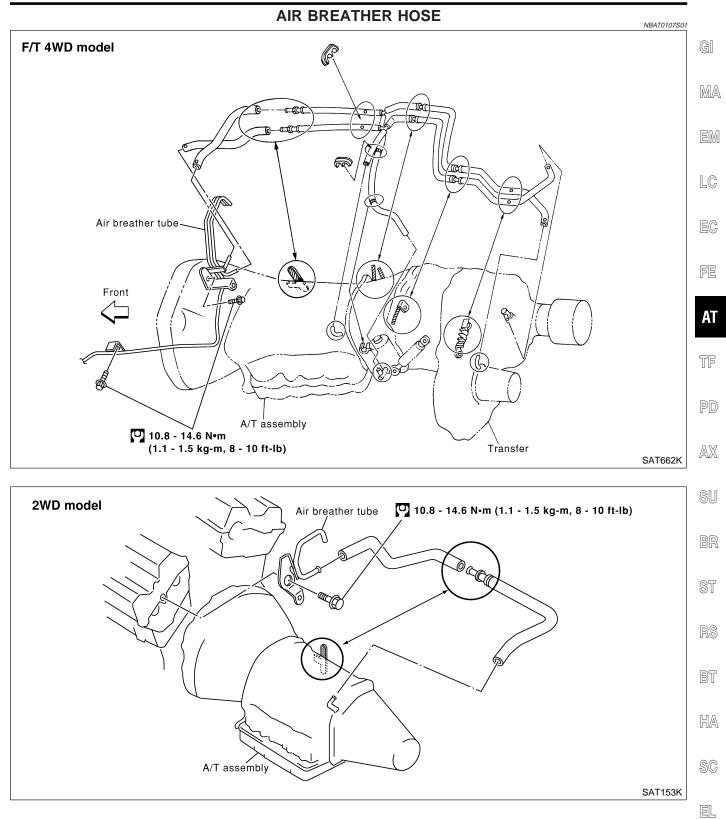
● Tighten bolts securing transmission.

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	Bolt length "ℓ" mm (in)
1	70 - 80 (7.1 - 8.2, 52 - 59)	65 (2.56)
2	70 - 80 (7.1 - 8.2, 52 - 59)	55 (2.17)
3	29 - 39 (3.0 - 4.0, 22 - 29)	40 (1.57)

● Reinstall any part removed.

SAT638A

● Check fluid level in transmission.
● Move selector lever through all positions to be sure that transmission operates correctly.
   With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R" positions. A slight shock should be felt by hand gripping selector each time transmission is shifted.
● Perform road test. Refer to "ROAD TEST", AT-63.
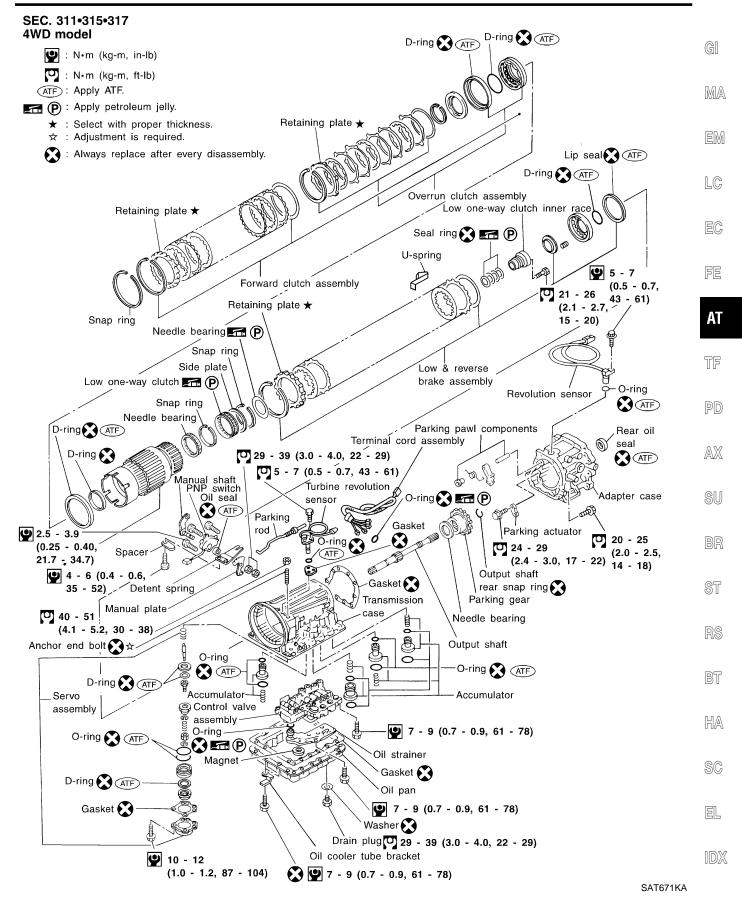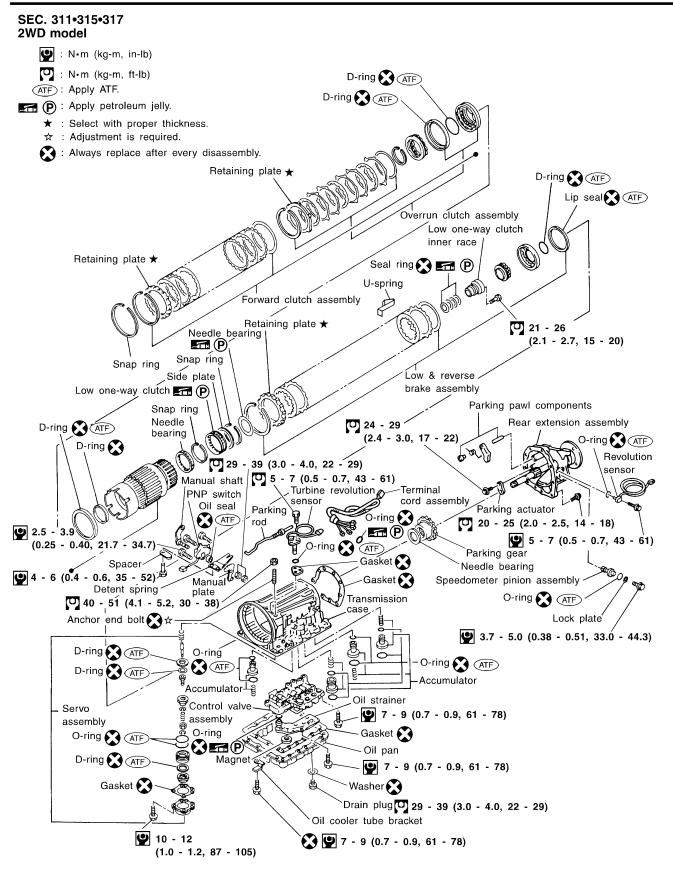
AT-278

AIR BREATHER HOSE

F/T 4WD model

Air breather tube

Front

A/T assembly

🔧 10.8 - 14.6 N·m
(1.1 - 1.5 kg-m, 8 - 10 ft-lb)

Transfer

SAT662K

2WD model

Air breather tube   🔧 10.8 - 14.6 N·m (1.1 - 1.5 kg-m, 8 - 10 ft-lb)

A/T assembly

SAT153K

Components

NBAT0108

SEC. 311•313•315

[symbol] : N•m (kg-m, ft-lb)

[symbol] : Apply Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI section.

(ATF) : Apply ATF.

[symbol] (P) : Apply petroleum jelly.

★ : Select with proper thickness.

[symbol] : Always replace after every disassembly.

Plane seal [symbol] (P)   Spring seat

Side seal [symbol] (P)   Cam ring return spring

Pivot pin   Cam ring

Control piston   Rotor   Pivot pin

Oil pump housing oil seal [symbol] (ATF)   Cam ring

O-ring [symbol] (ATF)   O-ring [symbol] [symbol] (P)

Friction ring [symbol] (P)

74 - 76
(7.5 - 7.8, 54 - 56)   Vane

Vane ring

Oil pump housing

O-ring [symbol] [symbol] (P)

Input shaft   Reverse clutch assembly

Converter housing [symbol]

44 - 49   Torque converter
(4.5 - 6.0, 33 - 43)

Retaining plate ★

16 - 21
(1.6 - 2.1, 12 - 15)

Lip seal [symbol] (ATF)

D-ring [symbol] (ATF)   Needle bearing [symbol] (P)

Thrust washer

Brake band

Bearing race [symbol] (P)

Gasket [symbol]   Front sun gear

Seal ring [symbol] [symbol] (P)   Needle bearing   Overrun clutch hub

Oil pump thrust washer   High clutch hub   Needle bearing

Oil pump cover   ★ [symbol] (P)   Needle bearing [symbol] (P)   [symbol] (P)

High clutch assembly   Needle bearing [symbol] (P)

Bearing race [symbol] (P)   Thrust washer

Retaining plate ★   [symbol] (P)

Snap ring

End bearing

D-ring [symbol] (ATF)   Needle bearing [symbol] (P)   Forward one-way clutch

D-ring [symbol] (ATF)   Bearing race   End bearing

Front internal gear   [symbol] (P)   Snap ring
(With rear planetary carrier)

Output shaft front snap ring [symbol]   Forward clutch hub

Thrust washer [symbol] (P)

Rear sun gear   Rear internal gear

Needle bearing [symbol] (P)

Front planetary carrier

SAT712K

AT-280

SEC. 311•315•317
4WD model

: N•m (kg-m, in-lb)

: N•m (kg-m, ft-lb)

ATF : Apply ATF.

P : Apply petroleum jelly.

★ : Select with proper thickness.

☆ : Adjustment is required.

✗ : Always replace after every disassembly.

D-ring

D-ring

Retaining plate ★

Retaining plate ★

Lip seal ATF

D-ring ATF

Overrun clutch assembly

Low one-way clutch inner race

Seal ring P

Forward clutch assembly

U-spring

Retaining plate ★

Snap ring

Needle bearing P

Snap ring

Side plate

Low one-way clutch P

Snap ring

Needle bearing

D-ring ATF

D-ring

Manual shaft
PNP switch
Oil seal ATF

Low & reverse
brake assembly

Revolution sensor

O-ring ATF

Rear oil seal ATF

5 - 7 (0.5 - 0.7, 43 - 61)

21 - 26 (2.1 - 2.7, 15 - 20)

29 - 39 (3.0 - 4.0, 22 - 29)

5 - 7 (0.5 - 0.7, 43 - 61)

Turbine revolution sensor

Parking pawl components

Terminal cord assembly

O-ring P

Adapter case

Parking actuator

20 - 25 (2.0 - 2.5, 14 - 18)

2.5 - 3.9 (0.25 - 0.40, 21.7 - 34.7)

Spacer

Parking rod

O-ring ATF

Gasket

24 - 29 (2.4 - 3.0, 17 - 22)

Output shaft rear snap ring

4 - 6 (0.4 - 0.6, 35 - 52)

Detent spring

Gasket

Parking gear

Transmission case

Manual plate

Needle bearing

40 - 51 (4.1 - 5.2, 30 - 38)

Output shaft

Anchor end bolt ✗ ☆

O-ring ATF

O-ring ATF

D-ring ATF

Servo assembly

Accumulator
Control valve assembly

Accumulator

O-ring P

7 - 9 (0.7 - 0.9, 61 - 78)

O-ring ATF

Magnet

Oil strainer

Gasket

D-ring ATF

Oil pan

7 - 9 (0.7 - 0.9, 61 - 78)

Gasket

Washer

Drain plug 29 - 39 (3.0 - 4.0, 22 - 29)

Oil cooler tube bracket

10 - 12 (1.0 - 1.2, 87 - 104)

7 - 9 (0.7 - 0.9, 61 - 78)

SAT671KA

AT-281

SEC. 311•315•317
2WD model

🔧 : N•m (kg-m, in-lb)

🔧 : N•m (kg-m, ft-lb)

(ATF) : Apply ATF.

⬛ (P) : Apply petroleum jelly.

★ : Select with proper thickness.

☆ : Adjustment is required.

✖ : Always replace after every disassembly.

D-ring ✖ (ATF)

D-ring ✖ (ATF)

Retaining plate ★

D-ring ✖ (ATF)

Lip seal ✖ (ATF)

Overrun clutch assembly

Low one-way clutch inner race

Retaining plate ★

Seal ring ✖ ⬛ (P)

U-spring

Forward clutch assembly

Retaining plate ★

🔧 21 - 26 (2.1 - 2.7, 15 - 20)

Needle bearing ⬛ (P)

Snap ring

Snap ring

Side plate

Low one-way clutch ⬛ (P)

Snap ring

Needle bearing

Low & reverse brake assembly

🔧 24 - 29 (2.4 - 3.0, 17 - 22)

Parking pawl components

Rear extension assembly

O-ring ✖ (ATF)

Revolution sensor

D-ring ✖ (ATF)

D-ring ✖

🔧 29 - 39 (3.0 - 4.0, 22 - 29)

🔧 5 - 7 (0.5 - 0.7, 43 - 61)

Manual shaft

PNP switch

Oil seal ✖ (ATF)

Parking rod

Turbine revolution sensor

Terminal cord assembly

Parking actuator

O-ring ✖

🔧 20 - 25 (2.0 - 2.5, 14 - 18)

🔧 5 - 7 (0.5 - 0.7, 43 - 61)

🔧 2.5 - 3.9 (0.25 - 0.40, 21.7 - 34.7)

O-ring ✖ (ATF)

Gasket ✖

Parking gear

Needle bearing

Speedometer pinion assembly

Spacer

Gasket ✖

O-ring ✖ (ATF)

🔧 4 - 6 (0.4 - 0.6, 35 - 52)

Detent spring

Manual plate

Transmission case

Lock plate

🔧 40 - 51 (4.1 - 5.2, 30 - 38)

Anchor end bolt ✖ ☆

🔧 3.7 - 5.0 (0.38 - 0.51, 33.0 - 44.3)

D-ring ✖ (ATF)

O-ring ✖ (ATF)

D-ring ✖ (ATF)

Accumulator

O-ring ✖ (ATF)

Accumulator

Servo assembly

Control valve assembly

Oil strainer

O-ring ✖ (ATF)

O-ring ✖

🔧 7 - 9 (0.7 - 0.9, 61 - 78)

D-ring ✖ (ATF)

Magnet ⬛ (P)

Gasket ✖

Oil pan

Gasket ✖

🔧 7 - 9 (0.7 - 0.9, 61 - 78)

Washer ✖

Drain plug 🔧 29 - 39 (3.0 - 4.0, 22 - 29)

Oil cooler tube bracket

🔧 10 - 12 (1.0 - 1.2, 87 - 105)

✖ 🔧 7 - 9 (0.7 - 0.9, 61 - 78)

SAT672KA

AT-282

Oil Channel

NBAT0109

1 → 2 accumulator drain

3 → 4 & N → R accumulator shoulder pressure

3 → 4 & N → R accumulator back pressure

1 → 2 accumulator back pressure

2 → 3 accumulator back pressure

Servo 2nd apply chamber pressure

Servo 3rd release chamber pressure

Oil pump feedback pressure

Servo 4th apply chamber pressure

Oil pump discharge pressure

Front lubricating hole

High-clutch pressure

Torque converter pressure (lock-up released)

Reverse clutch pressure

Torque converter pressure (lock-up applied)

Oil pump suction hole

N → D accumulator back pressure

2 → 3 accumulator shoulder pressure

N → D accumulator shoulder pressure

Low & reverse brake pressure

Overrun clutch pressure

Forward clutch pressure

* Accumulator back and shoulder pressure are shown below.

Back pressure   Shoulder pressure

Accumulator piston

Clutch pressure

High-clutch pressure

Front lubricating hole

Oil pump discharge hole

Oil pump feedback pressure

Torque converter pressure (lock-up released)

Reverse clutch pressure

Torque converter pressure (lock-up applied)

Oil pump feedback pressure

Oil pump suction hole

Oil pump discharge hole

Front lubricating hole

High-clutch pressure

Torque converter pressure (lock-up released)

Oil pump suction hole

Torque converter pressure (lock-up applied)

Overrun clutch pressure

Forward clutch pressure

Reverse clutch pressure

Oil cooler tube (IN) hole

Forward clutch pressure

Servo 3rd chamber pressure

Oil cooler tube (OUT) and rear lubricating hole

3 → 4 & N → R accumulator back pressure

Servo 4th apply chamber pressure

Servo 2nd apply chamber pressure

SAT185B

AT-283

Locations of Needle Bearings, Thrust Washers and Snap Rings

NBAT0110

Outer diameter of snap rings

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

Thrust washers

Item number	Color
1	Black
5	White

Outer diameter of needle bearings

Item number	Outer diameter mm (in)
8	47 (1.85)
9	53 (2.09)
11	75 (2.95)
12	53 (2.09)
13	75 (2.95)
14	57 (2.24)
15	78.1 (3.075)
16	64 (2.52)
17	53 (2.09)

Inner diameter of bearing races

Item number	Outer diameter mm (in)
11	58.8 (2.315)
13	58.8 (2.315)

Installation of one-piece bearings

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

SAT140JB

DISASSEMBLY

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

SAT018B

4. Check torque converter one-way clutch.
a. Insert Tool into spline of one-way clutch inner race.
b. Hook bearing support unitized with one-way clutch outer race with suitable wire.
c. Check that one-way clutch inner race rotates only clockwise with Tool while holding bearing support with wire.

KV31102100
(J37065) (Rotate)
Wire (Hold)

SAT521G

5. Remove PNP switch from transmission case.

PNP switch

SAT021BB

6. Remove oil pan.
● Always place oil pan straight down so that foreign particles inside will not move.

SAT754I

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

ST07870000
(J37068)

SAT522G

AT-285

SAT171B
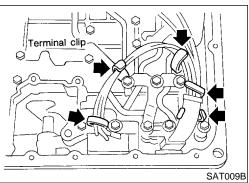
8. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves, servo, and clutches to stick and may inhibit pump pressure.

● **If frictional material is detected, replace radiator after repair of A/T. Refer to LC-21, "REMOVAL AND INSTALLATION".**

SAT024BC

9. Remove torque converter clutch solenoid valve and A/T fluid temperature sensor connectors.
● **Be careful not to damage connector.**

SAT008B
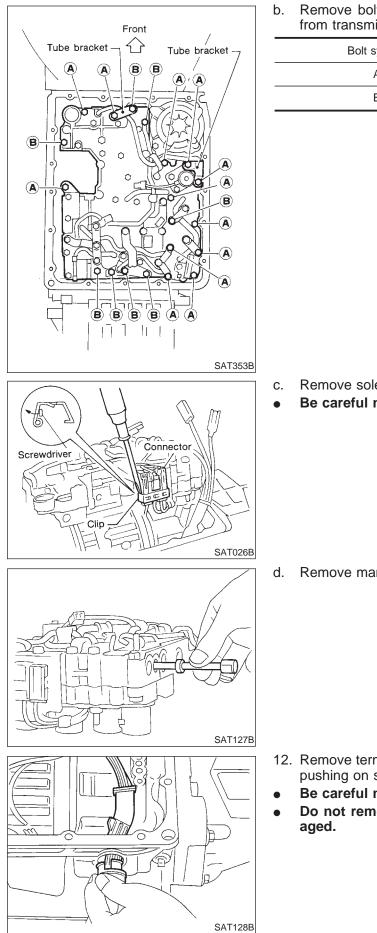
10. Remove oil strainer.
a. Remove oil strainer from control valve assembly. Then remove O-ring from oil strainer.

SAT025B

b. Check oil strainer screen for damage.

SAT009B
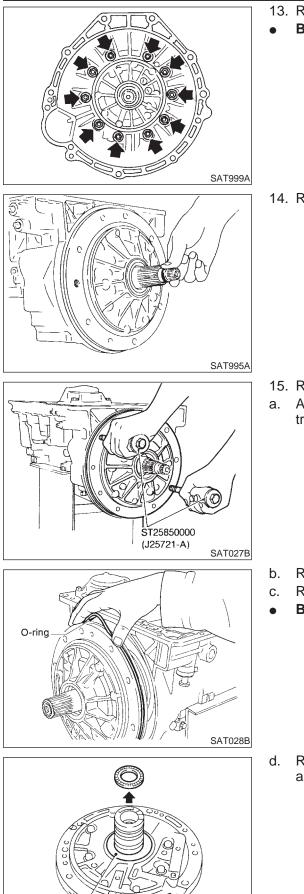
11. Remove control valve assembly.
a. Straighten terminal clips to free terminal cords then remove terminal clips.

AT-286

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

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

SAT353B

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

SAT026B

d. Remove manual valve from control valve assembly.

SAT127B

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

SAT128B

AT-287

SAT999A

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

SAT995A
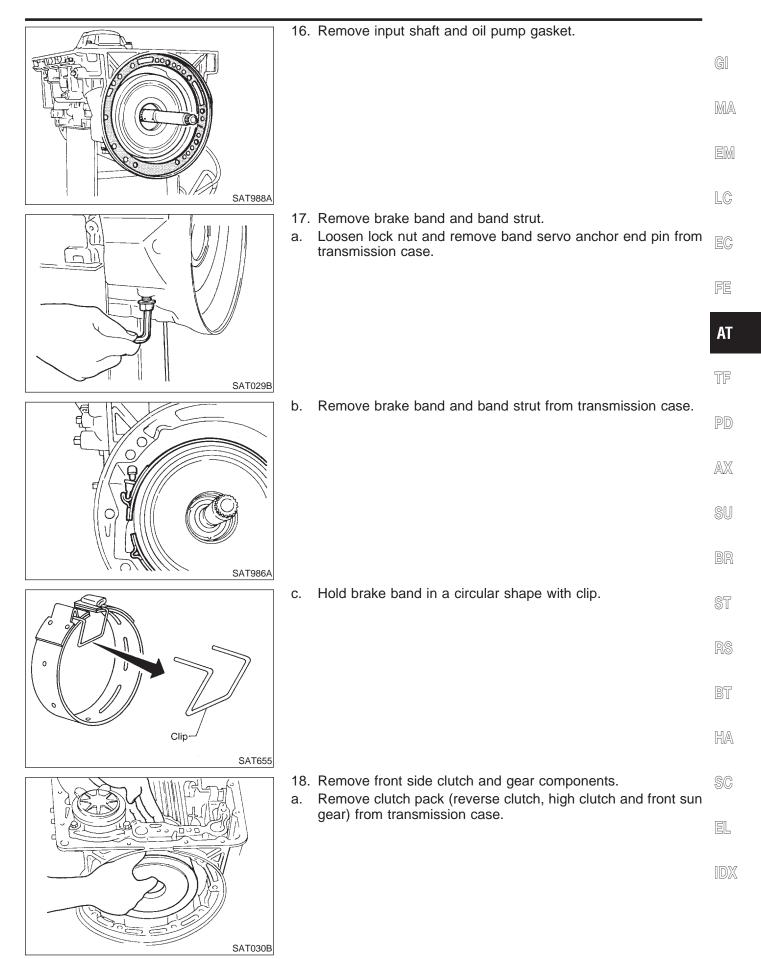
14. Remove O-ring from input shaft.

ST25850000
(J25721-A)
SAT027B
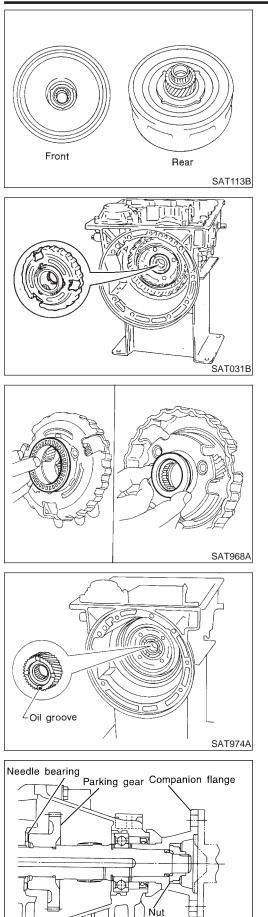
15. Remove oil pump assembly.
a. Attach Tool to oil pump assembly and extract it evenly from transmission case.

O-ring
SAT028B

b. Remove O-ring from oil pump assembly.
c. Remove traces of sealant from oil pump housing.
● **Be careful not to scratch pump housing.**

Thrust washer
SAT108B

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

16. Remove input shaft and oil pump gasket.

SAT988A

17. Remove brake band and band strut.
a. Loosen lock nut and remove band servo anchor end pin from transmission case.

SAT029B

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

SAT986A

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

Clip

SAT655

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

SAT030B

AT-289

SAT113B

b. Remove front bearing race from clutch pack.
c. Remove rear bearing race from clutch pack.

d. Remove front planetary carrier from transmission case.

SAT031B

SAT968A

e. Remove front needle bearing from front planetary carrier.
f. Remove rear bearing from front planetary carrier.

g. Remove rear sun gear from transmission case.

SAT974A
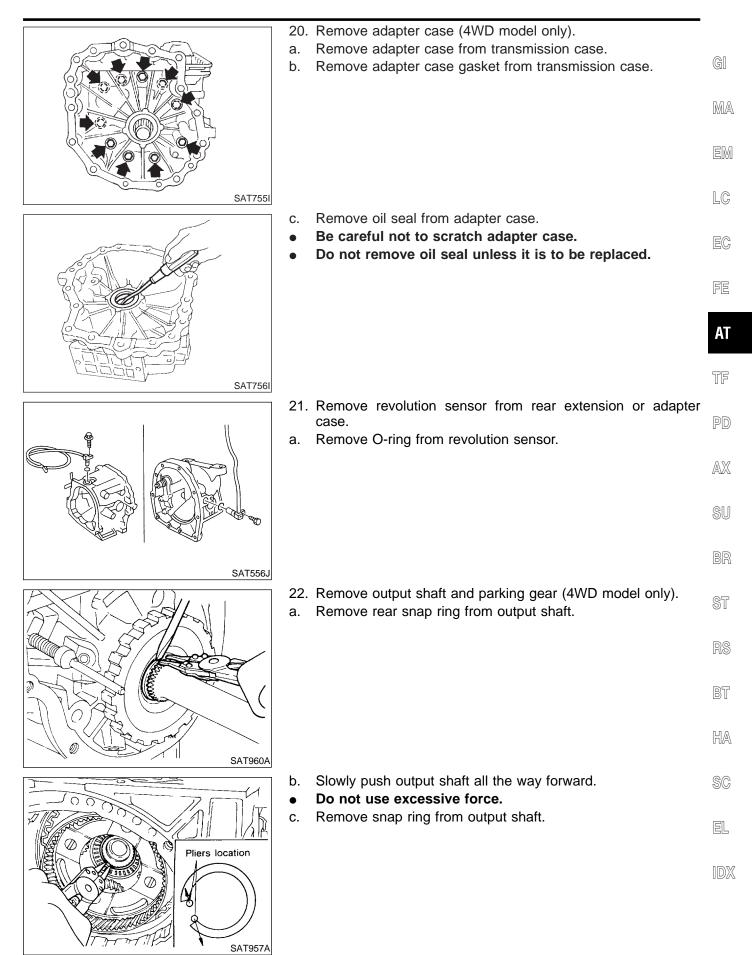
19. Remove rear extension assembly (2WD model only).
a. Remove rear extension assembly.
b. Remove parking gear and needle bearing.
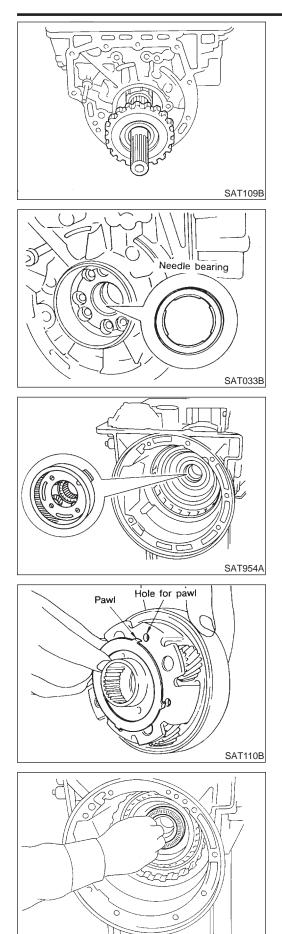
CAUTION:
Insert your hand between rear extension and transmission case. Detach rear extension assembly while holding parking gear and needle bearing by hand.

c. Remove rear extension gasket.

SAT546J

AT-290

DISASSEMBLY

20. Remove adapter case (4WD model only).
a. Remove adapter case from transmission case.
b. Remove adapter case gasket from transmission case.

SAT755I

c. Remove oil seal from adapter case.
● **Be careful not to scratch adapter case.**
● **Do not remove oil seal unless it is to be replaced.**

SAT756I

21. Remove revolution sensor from rear extension or adapter case.
a. Remove O-ring from revolution sensor.

SAT556J

22. Remove output shaft and parking gear (4WD model only).
a. Remove rear snap ring from output shaft.

SAT960A

b. Slowly push output shaft all the way forward.
● **Do not use excessive force.**
c. Remove snap ring from output shaft.

Pliers location

SAT957A

AT-291

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

e. Remove parking gear from output shaft.

SAT109B
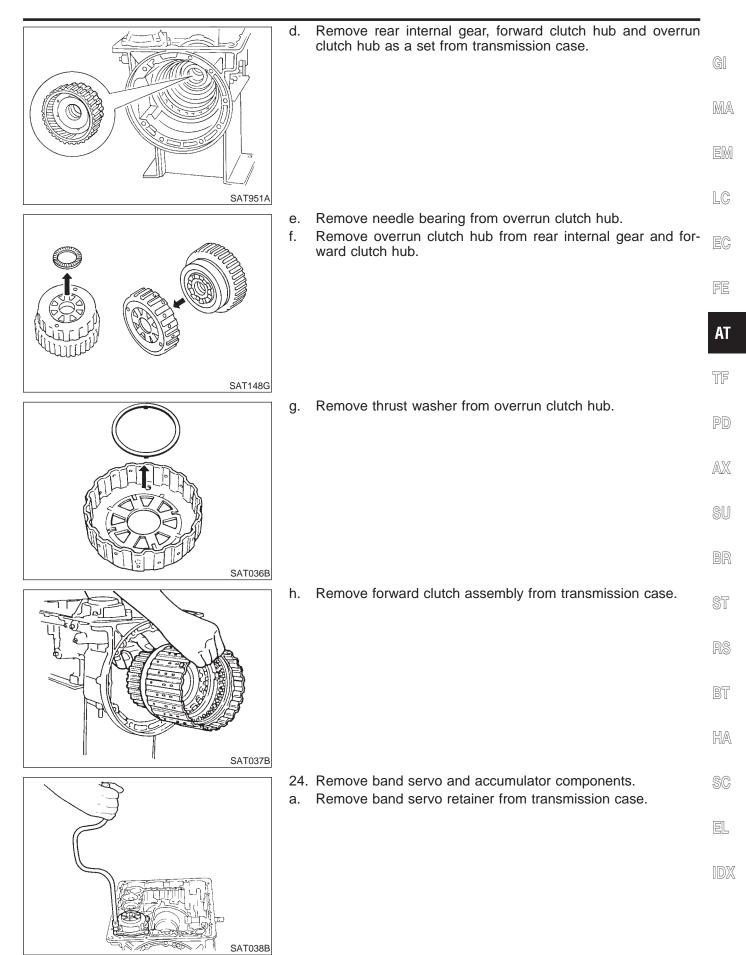
f. Remove needle bearing from transmission case.

SAT033B
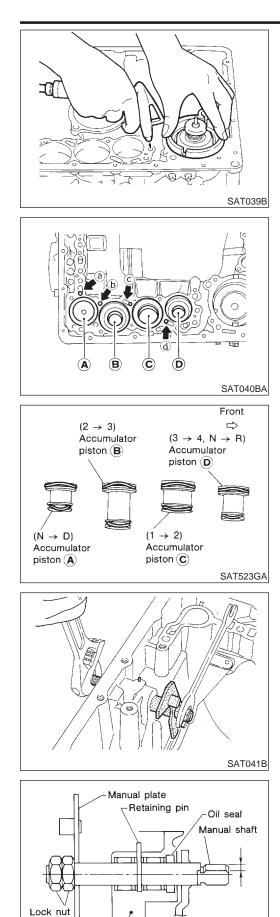
23. Remove rear side clutch and gear components.

a. Remove front internal gear.

SAT954A

b. Remove bearing race from front internal gear.

SAT110B

c. Remove needle bearing from rear internal gear.

SAT111B

SAT951A

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

SAT148G

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

SAT036B

g. Remove thrust washer from overrun clutch hub.

SAT037B

h. Remove forward clutch assembly from transmission case.

SAT038B

24. Remove band servo and accumulator components.
a. Remove band servo retainer from transmission case.

AT-293

SAT039B

b. Apply compressed air to oil hole until band servo piston comes out of transmission case.

● **Hold piston with a rag and gradually direct air to oil hole.**

c. Remove return springs.

SAT040BA
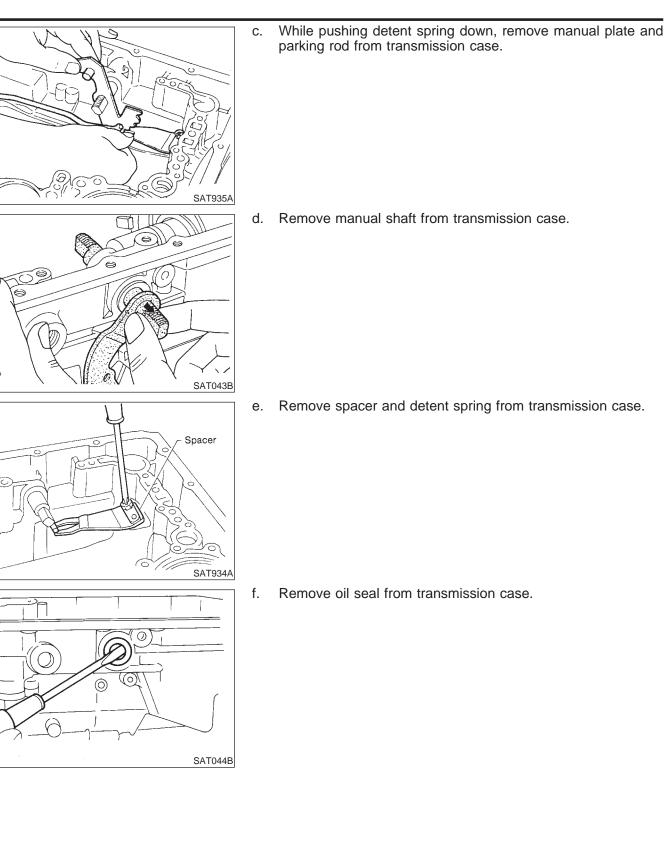
d. Remove springs from accumulator pistons B, C and D.

e. Apply compressed air to each oil hole until piston comes out.

● **Hold piston with a rag and gradually direct air to oil hole.**

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

Front

(2 → 3)
Accumulator piston **B**

(3 → 4, N → R)
Accumulator piston **D**

(N → D)
Accumulator piston **A**

(1 → 2)
Accumulator piston **C**

SAT523GA

f. Remove O-ring from each piston.

SAT041B

25. Remove manual shaft components, if necessary.

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

Manual plate
Retaining pin
Oil seal
Manual shaft
Lock nut
Transmission case

SAT042B

b. Remove retaining pin from transmission case.

AT-294

DISASSEMBLY

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

SAT935A

d. Remove manual shaft from transmission case.

SAT043B

e. Remove spacer and detent spring from transmission case.

Spacer

SAT934A

f. Remove oil seal from transmission case.

SAT044B

AT-295

Oil Pump

COMPONENTS

NBAT0112

SEC. 313

: N·m (kg-m, ft-lb)
ATF : Apply ATF.
: Apply petroleum jelly.
: Always replace after every disassembly.

O-ring — ATF
Oil pump housing
O-ring — ATF
Friction ring
Vane ring
Control piston
Pivot pin
Side seal
Plane seal
Oil pump cover assembly
16 - 21
(1.6 - 2.1, 12 - 15)
Cam ring spring
Spring seat
Reverse clutch seal ring
High clutch seal ring
Vane
Rotor
Pivot pin
Cam ring
Oil seal — ATF

SAT648AF

DISASSEMBLY

NBAT0113

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

SAT649A
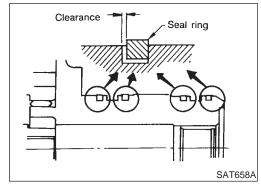
2. Remove rotor, vane rings and vanes.
   ● **Inscribe a mark on back of rotor for identification of fore-aft direction when reassembling rotor. Then remove rotor.**

Inscribe identification mark.

SAT650A

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

SAT651A

REPAIR FOR COMPONENT PARTS

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

SAT652A

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

SAT653A

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

SAT654A

7. Remove oil seal from oil pump housing.
- **Be careful not to scratch oil pump housing.**

SAT655A

INSPECTION

NBAT0114

Oil Pump Cover, Rotor, Vanes, Control Piston, Side Seals, Cam Ring and Friction Ring

NBAT0114S01

- Check for wear or damage.

SAT656A

Oil Pump (Cont'd)

SAT657A

SAT658A

SAT081E

SAT654A

SAT660A

Side Clearances

NBAT0114S02

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

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

> **Standard clearance (Cam ring, rotor, vanes and control piston):**
> **Refer to SDS, AT-359.**

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

Seal Ring Clearance

NBAT0114S03

● Measure clearance between seal ring and ring groove.
> **Standard clearance:**
> **0.10 - 0.25 mm (0.0039 - 0.0098 in)**
> **Wear limit:**
> **0.25 mm (0.0098 in)**
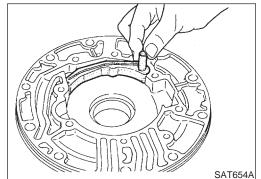
● If not within wear limit, replace oil pump cover assembly.

ASSEMBLY

NBAT0115
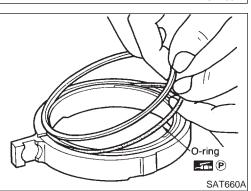
1. Drive oil seal into oil pump housing.
● **Apply ATF to outer periphery and lip surface.**
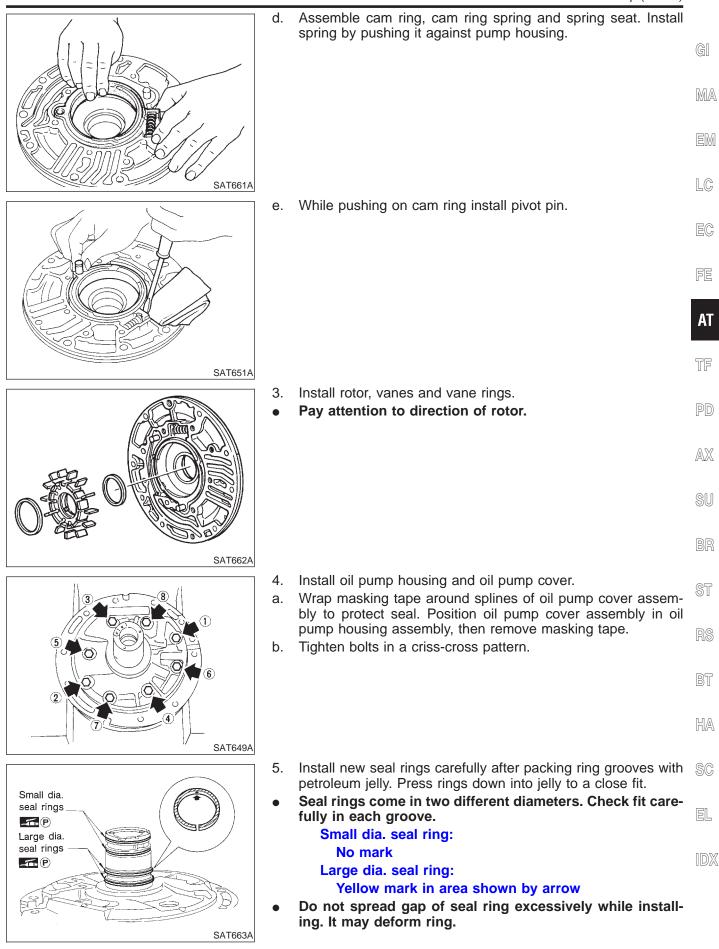
2. Install cam ring in oil pump housing by the following
a. Install side seal on control piston.
● **Pay attention to its direction — Black surface goes toward control piston.**
● **Apply petroleum jelly to side seal.**
b. Install control piston on oil pump.
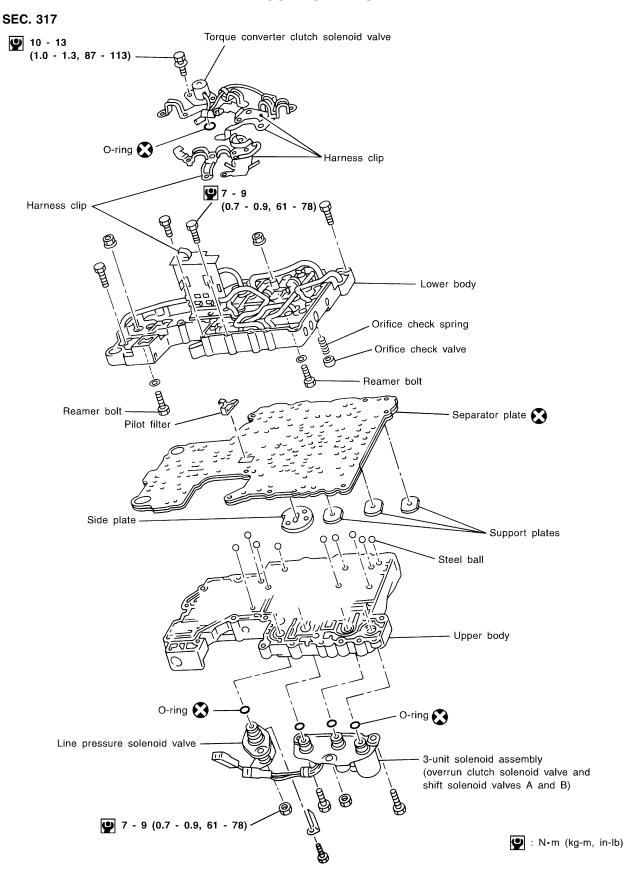
c. Install O-ring and friction ring on cam ring.
● **Apply petroleum jelly to O-ring.**

AT-298

REPAIR FOR COMPONENT PARTS

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

SAT661A

e. While pushing on cam ring install pivot pin.

SAT651A

3. Install rotor, vanes and vane rings.
● **Pay attention to direction of rotor.**

SAT662A

4. Install oil pump housing and oil pump cover.
a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly in oil pump housing assembly, then remove masking tape.
b. Tighten bolts in a criss-cross pattern.

SAT649A

5. Install new seal rings carefully after packing ring grooves with petroleum jelly. Press rings down into jelly to a close fit.
● **Seal rings come in two different diameters. Check fit carefully in each groove.**
    Small dia. seal ring:
      No mark
    Large dia. seal ring:
      Yellow mark in area shown by arrow
● **Do not spread gap of seal ring excessively while installing. It may deform ring.**

Small dia. seal rings

Large dia. seal rings

SAT663A

AT-299

Control Valve Assembly
COMPONENTS

NBAT0116

SEC. 317

10 - 13
(1.0 - 1.3, 87 - 113)

Torque converter clutch solenoid valve

O-ring ✖

Harness clip

Harness clip

7 - 9
(0.7 - 0.9, 61 - 78)

Lower body

Orifice check spring

Orifice check valve

Reamer bolt

Reamer bolt

Pilot filter

Separator plate ✖

Side plate

Support plates

Steel ball

Upper body

O-ring ✖

O-ring ✖

Line pressure solenoid valve

3-unit solenoid assembly
(overrun clutch solenoid valve and
shift solenoid valves A and B)

7 - 9 (0.7 - 0.9, 61 - 78)

: N·m (kg-m, in-lb)

SAT156K

AT-300

DISASSEMBLY

NBAT0117

1. Remove solenoids.
   a. Remove torque converter clutch solenoid valve and side plate from lower body.
   b. Remove O-ring from solenoid.

SAT194B

   c. Remove line pressure solenoid valve from upper body.
   d. Remove O-ring from solenoid.

SAT667A

   e. Remove 3-unit solenoid assembly from upper body.
   f. Remove O-rings from solenoids.

Shift solenoid valve A
Shift solenoid valve B
Overrun clutch solenoid valve

SAT043G

2. Disassemble upper and lower bodies.
   a. Place upper body facedown, and remove bolts, reamer bolts and support plates.
   b. Remove lower body, separator plate as a unit from upper body.
   ● **Be careful not to drop pilot filter, orifice check valve, spring and steel balls.**

SAT195B

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

SAT670A

AT-301

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

SAT671A

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

INSPECTION
NBAT0118

Lower and Upper Bodies
NBAT0118S01

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

SAT672A
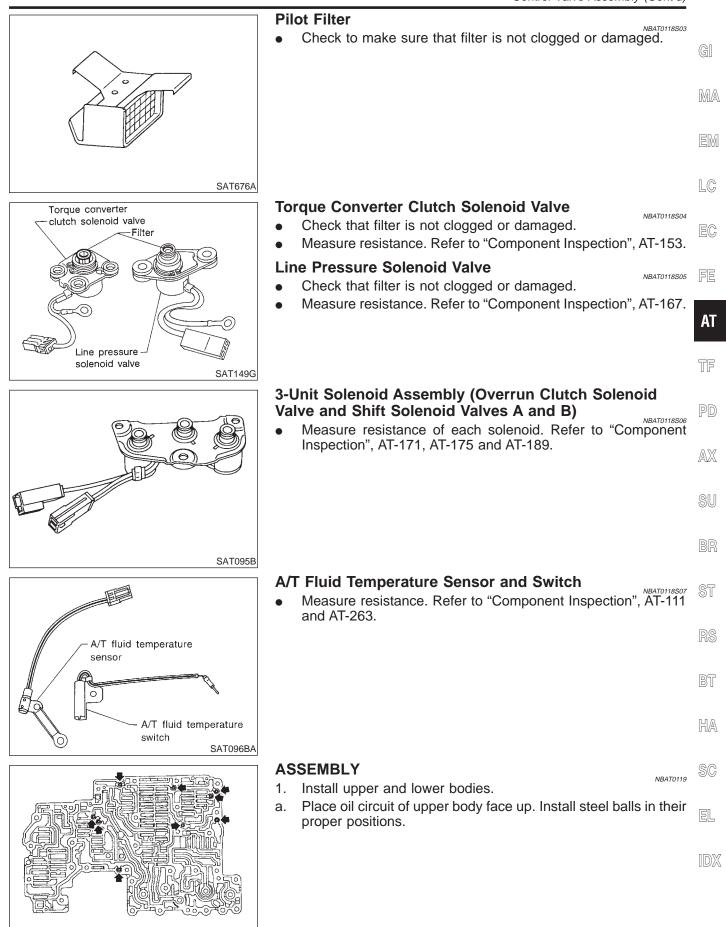
● Check to see that there are pins and retainer plates in upper body.
● **Be careful not to lose these parts.**

SAT673A

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

Tube connector   Tube bracket

SAT674A

Separator Plate
NBAT0118S02
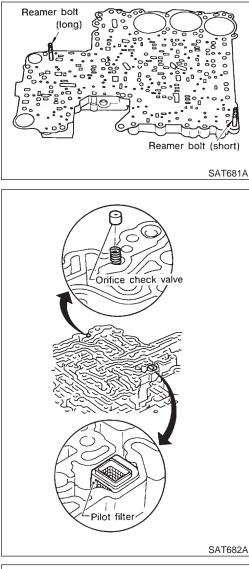
● Make sure that separator plate is free of damage and not deformed and oil holes are clean.

SAT675A

AT-302

REPAIR FOR COMPONENT PARTS

Pilot Filter
NBAT0118S03
- Check to make sure that filter is not clogged or damaged.

SAT676A

Torque Converter Clutch Solenoid Valve
NBAT0118S04
- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Component Inspection", AT-153.

Line Pressure Solenoid Valve
NBAT0118S05
- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Component Inspection", AT-167.

SAT149G

3-Unit Solenoid Assembly (Overrun Clutch Solenoid Valve and Shift Solenoid Valves A and B)
NBAT0118S06
- Measure resistance of each solenoid. Refer to "Component Inspection", AT-171, AT-175 and AT-189.

SAT095B

A/T Fluid Temperature Sensor and Switch
NBAT0118S07
- Measure resistance. Refer to "Component Inspection", AT-111 and AT-263.

SAT096BA

ASSEMBLY
NBAT0119
1. Install upper and lower bodies.
a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

SAT671A

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

SAT681A

b. Install reamer bolts from bottom of upper body.

SAT682A

c. Place oil circuit of lower body face up. Install orifice check spring, orifice check valve and pilot filter.

Unit: mm (in)

SAT197B

d. Install lower separator plate on lower body.
e. Install and temporarily tighten support plates, A/T fluid temperature sensor and tube brackets.

SAT198B

f. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.
● **Be careful not to dislocate or drop steel balls, orifice check spring, orifice check valve and pilot filter.**

SAT199BA

g. Install and temporarily tighten bolts and tube brackets in their proper locations.

Bolt length and location:

Bolt symbol	a	b	c	d
Bolt length mm (in)	70 (2.76)	50 (1.97)	33 (1.30)	27 (1.06)

Side plate

SAT200B

2. Install solenoids.

a. Attach O-ring and install torque converter clutch solenoid valve and side plates onto lower body.

Shift solenoid valve A — — Shift solenoid valve B

Overrun clutch solenoid valve

Line pressure solenoid valve

SAT150G

b. Attach O-rings and install 3-unit solenoids assembly onto upper body.

c. Attach O-ring and install line pressure solenoid valve onto upper body.

3. Tighten all bolts.

Control Valve Upper Body

COMPONENTS

NBAT0120

SEC. 317

SAT142JA

Apply ATF to all components before their installation.
Numbers preceding valve springs correspond with those shown in SDS on page AT-356.

REPAIR FOR COMPONENT PARTS

DISASSEMBLY

NBAT0121

1. Remove valves at parallel pins.
   - **Do not use a magnetic hand.**

a. Use a wire paper clip to push out parallel pins.

b. Remove parallel pins while pressing their corresponding plugs and sleeves.
   - **Remove plug slowly to prevent internal parts from jumping out.**

c. Place mating surface of valve facedown, and remove internal parts.
   - **If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer.**
   - **Be careful not to drop or damage valves and sleeves.**

2. Remove valves at retainer plates.
a. Pry out retainer plate with wire paper clip.

b. Remove retainer plates while holding spring.

SAT826A

c. Place mating surface of valve facedown, and remove internal parts.
- **If a valve is hard to remove, lightly tap valve body with a soft hammer.**
- **Be careful not to drop or damage valves, sleeves, etc.**

SAT827A

- 4-2 sequence valve and relay valve are located far back in upper body. If they are hard to remove, carefully push them out using stiff wire.
- **Be careful not to scratch sliding surface of valve with wire.**

SAT828A

INSPECTION
NBAT0122

Valve Springs
NBAT0122S01
- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.
  Inspection standard:
  Refer to SDS, AT-356.
- Replace valve springs if deformed or fatigued.

Control Valves
NBAT0122S02
- Check sliding surfaces of valves, sleeves and plugs.

SAT829A
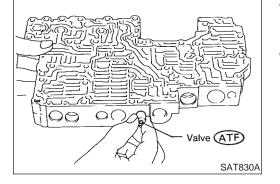
ASSEMBLY
NBAT0123
1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.
- **Be careful not to scratch or damage valve body.**

SAT830A

AT-308

REPAIR FOR COMPONENT PARTS

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

Pressure regulator valve
- If pressure regulator plug is not centered properly, sleeve cannot be inserted into bore in upper body. If this happens, use vinyl tape wrapped screwdriver to center sleeve until it can be inserted.
- Turn sleeve slightly while installing.

Accumulator control plug
- Align protrusion of accumulator control sleeve with notch in plug.
- Align parallel pin groove in plug with parallel pin, and install accumulator control valve.
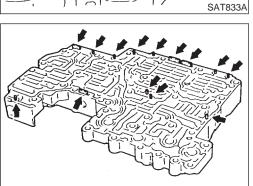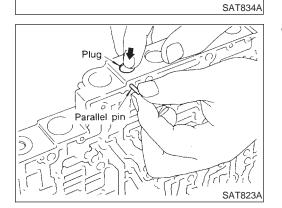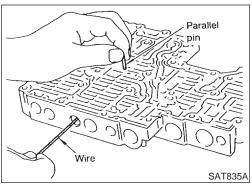
2. Install parallel pins and retainer plates.

- **While pushing plug, install parallel pin.**

AT-309
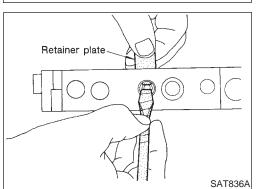
4-2 sequence valve and relay valve
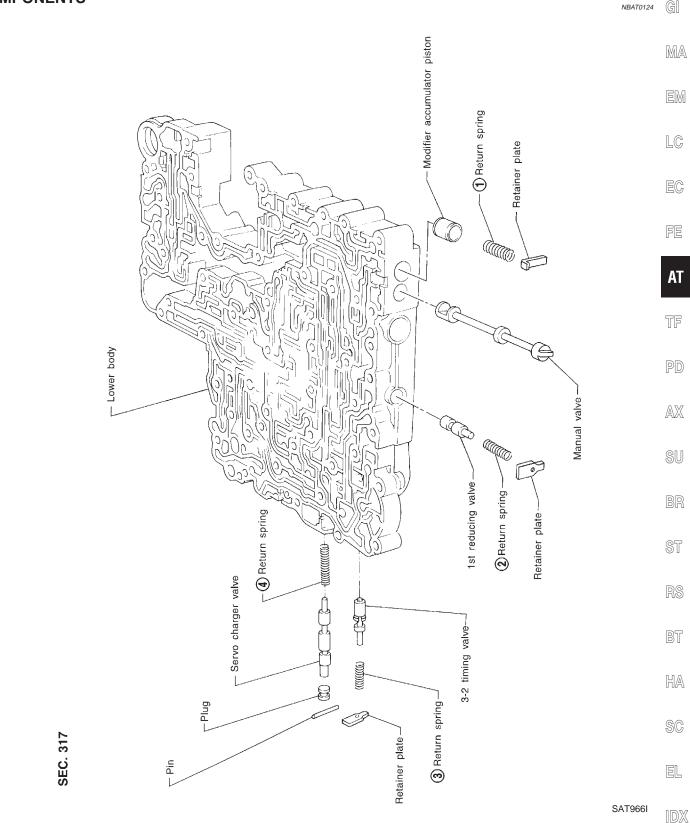
● Push 4-2 sequence valve and relay valve with wire wrapped in vinyl tape to prevent scratching valve body. Install parallel pins.

● Insert retainer plate while pushing spring.
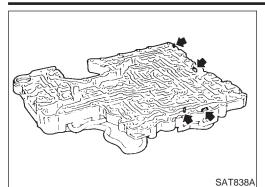
Control Valve Lower Body

COMPONENTS

NBAT0124

SEC. 317

Modifier accumulator piston

① Return spring

Retainer plate

Manual valve

1st reducing valve

② Return spring

Retainer plate

3-2 timing valve

③ Return spring

Retainer plate

Servo charger valve

④ Return spring

Lower body

Plug

Pin

SAT966I

Apply ATF to all components before their installation.
Numbers preceding valve springs correspond with those shown in SDS on page AT-356.

AT-311

Control Valve Lower Body (Cont'd)

SAT838A

DISASSEMBLY

NBAT0125
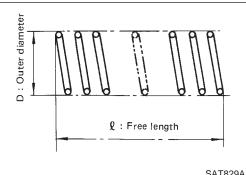
1. Remove valves at parallel pins.
2. Remove valves at retainer plates.
   For removal procedures, refer to "DISASSEMBLY" of Control Valve Upper Body.
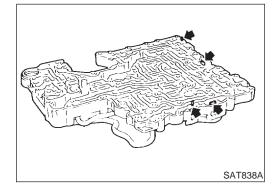
INSPECTION

NBAT0126

Valve Springs

NBAT0126S01

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

> **Inspection standard:**
> **Refer to SDS, AT-356.**

● Replace valve springs if deformed or fatigued.

SAT829A

Control Valves

NBAT0126S02

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

ASSEMBLY

NBAT0127

● Install control valves.
  For installation procedures, refer to "ASSEMBLY" of Control Valve Upper Body, AT-308.

SAT838A

Reverse Clutch
COMPONENTS

NBAT0128

SEC. 315

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

Direcion of oil seal

Direcion of dish plate

ATF : Apply ATF.

★ : Select with proper thickness.

Driven plate ATF

D-ring ⊗ ATF

Reverse clutch drum ATF

Snap ring

Retaining plate ★

Drive plate ATF

Dish plate ATF

Snap ring ⊗

Spring retainer

Piston ATF   Dish plate

Oil seal ⊗ ATF

Drive plate

Retaining plate

Snap ring

Driven plate
Model 4EX16, 4EX17

Dish plate

Drive plate

Retaining plate

Snap ring

Driven plate
Model 4EX79, 4EX80

SAT670KA

DISASSEMBLY

NBAT0129

1. Check operation of reverse clutch.
a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.
b. Check to see that retaining plate moves to snap ring.
c. If retaining plate does not contact snap ring,
● D-ring might be damaged.
● Oil seal might be damaged.
● Fluid might be leaking past piston check ball.

SAT841A

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

SAT842A

AT-313

KV31102400
(J34285 and
J34285-87)

SAT524G

3. Remove snap ring from clutch drum while compressing clutch springs.
● **Do not expand snap ring excessively.**
4. Remove spring retainer.

SAT844A

5. Install seal ring onto oil pump cover and install reverse clutch drum. While holding piston, gradually apply compressed air to oil hole until piston is removed.
● **Do not apply compressed air abruptly.**
6. Remove D-ring and oil seal from piston.

INSPECTION
NBAT0130

Reverse Clutch Snap Ring and Spring Retainer
NBAT0130S01
● Check for deformation, fatigue or damage.
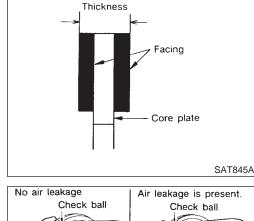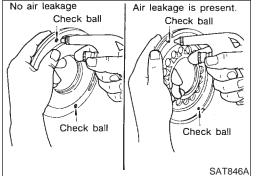
Thickness

Facing

Core plate

SAT845A

Reverse Clutch Drive Plates
NBAT0130S03
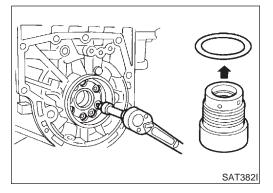● Check facing for burns, cracks or damage.
● Measure thickness of facing.
    Thickness of drive plate:
        Standard value: 1.90 - 2.05 mm (0.0748 - 0.0807 in)
        Wear limit: 1.80 mm (0.0709 in)
● If not within wear limit, replace.
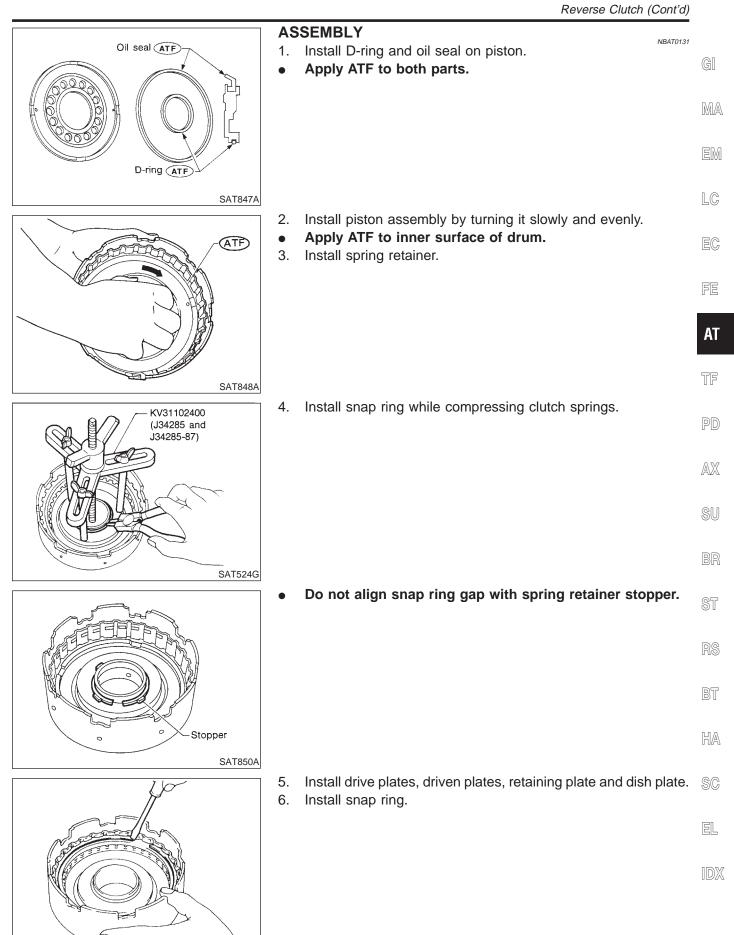
Reverse Clutch Dish Plate
NBAT0130S04
● Check for deformation or damage.
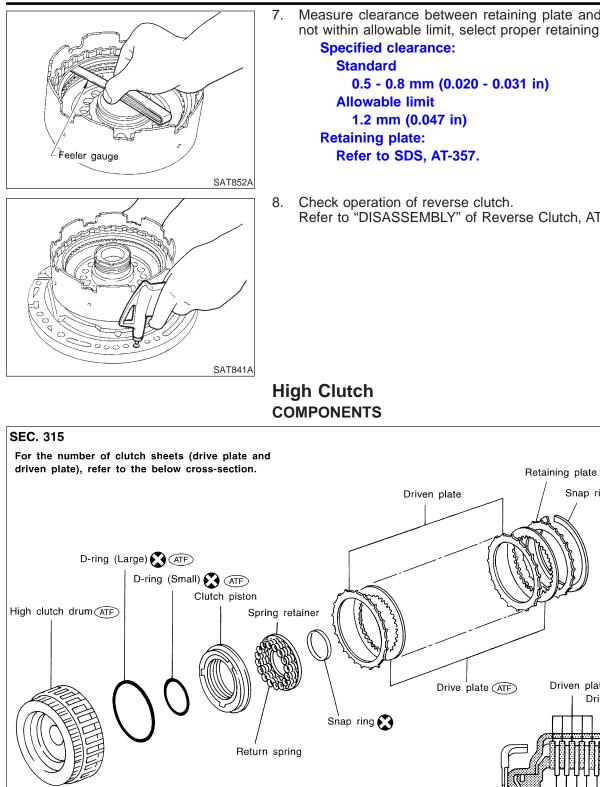
Reverse Clutch Piston
NBAT0130S05
● Shake piston to assure that balls are not seized.
● Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
● Also apply compressed air to oil hole on return spring side to assure that air leaks past ball.

No air leakage
Check ball
Check ball

Air leakage is present.
Check ball
Check ball

SAT846A

REPAIR FOR COMPONENT PARTS

ASSEMBLY

NBAT0131

1. Install D-ring and oil seal on piston.
- **Apply ATF to both parts.**

SAT847A

2. Install piston assembly by turning it slowly and evenly.
- **Apply ATF to inner surface of drum.**
3. Install spring retainer.

SAT848A

4. Install snap ring while compressing clutch springs.

KV31102400
(J34285 and
J34285-87)

SAT524G

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

Stopper

SAT850A

5. Install drive plates, driven plates, retaining plate and dish plate.
6. Install snap ring.

SAT842A

AT-315

SAT852A

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-357.

SAT841A

8. Check operation of reverse clutch.
   Refer to "DISASSEMBLY" of Reverse Clutch, AT-313.

High Clutch
COMPONENTS

NBAT0132

SEC. 315

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

Retaining plate ★

Driven plate

Snap ring

D-ring (Large) ⊗ ATF

D-ring (Small) ⊗ ATF

Clutch piston

High clutch drum ATF

Spring retainer

Drive plate ATF

Driven plate

Driven plate

Snap ring ⊗

Return spring

Retaining plate

Drive plate

⊗ : Always replace after every disassembly.

ATF : Apply ATF.

★ : Select with proper thickness.

SAT158KA

Front sun gear
High clutch hub
High clutch assembly

SAT853A

DISASSEMBLY AND ASSEMBLY

NBAT0133

Service procedures for high clutch are essentially the same as those for reverse clutch, with the following exception:

● Check of high clutch operation

SAT854A

● Removal and installation of return spring

KV31102400
(J34285 and
J34285-87)

SAT525G

● Inspection of high clutch return springs
   Inspection standard:
      Refer to SDS, AT-356.

D : Outer diameter

ℓ : Free length

SAT829A

● Inspection of high clutch drive plate
   Thickness of drive plate:
      Standard
         1.52 - 1.67 mm (0.0598 - 0.0657 in)
      Wear limit
         1.40 mm (0.0551 in)

Thickness
Facing
Core plate

SAT845A

AT-317

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

Feeler gauge

SAT858A

● Measurement of clearance between retaining plate and snap ring

Specified clearance:
Standard
1.8 - 2.2 mm (0.071 - 0.087 in)
Allowable limit
3.2 mm (0.126 in)
Retaining plate:
Refer to SDS, AT-357.

Forward and Overrun Clutches
COMPONENTS

NBAT0134

SEC. 315

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

Snap ring

Retaining plate ★

Drive plate (ATF)

Driven plate

Dish plate

Direction of dish plate

Forward clutch plate

Snap ring

Retaining plate

Drive plate (ATF)

Driven plate

Direction of dish plate

Dish plate

Overrun clutch plate

Forward clutch drum (ATF)

Return spring

D-ring ✗ (ATF)

Oil seal ✗ (ATF)

D-ring ✗ (ATF)

Snap ring ✗

Spring retainer

Oil seal ✗ (ATF)

Overrun clutch piston

Forward clutch piston

Direction of oil seal

Direction of oil seal

Driven plate   Driven plate

Drive plate

Drive plate

Model 4EX16, 4EX79 (2WD)

Driven plate   Driven plate

Drive plate

Drive plate

Model 4EX17, 4EX80 (4WD)

(ATF) : Apply ATF.

★ : Select with proper thickness.

SAT674KA

AT-319

SAT860A

DISASSEMBLY AND ASSEMBLY

NBAT0135

Forward and overrun clutches are serviced essentially the same way as reverse clutch is serviced. However, note the following exceptions.

● Check of forward clutch operation

● Check of overrun clutch operation

Paper rag

SAT861A

● Removal of forward clutch drum
Remove forward clutch drum from transmission case by holding snap ring.

SAT865A

● Removal of forward clutch and overrun clutch pistons
a) While holding overrun clutch piston, gradually apply compressed air to oil hole.

SAT862A

b) Remove overrun clutch from forward clutch.

SAT863A

AT-320

KV31102400
(J34285 and
J34285-87)

SAT526G

● Removal and installation of return springs

D : Outer diameter

ℓ : Free length

SAT829A

● Inspection of forward clutch and overrun clutch return springs
   Inspection standard:
   Refer to SDS, AT-356.

Thickness

Facing

Core plate

SAT845A

● Inspection of forward clutch drive plates
   Thickness of drive plate:
   Standard
   1.52 - 1.67 mm (0.0598 - 0.0657 in)
   Wear limit
   1.40 mm (0.0551 in)

Thickness

Facing

Core plate

SAT845A

● Inspection of overrun clutch drive plates
   Thickness of drive plate:
   Standard
   1.90 - 2.05 mm (0.0748 - 0.0807 in)
   Wear limit
   1.80 mm (0.0709 in)

ATF

SAT866A

● Installation of forward clutch piston and overrun clutch piston
a) Install forward clutch piston by turning it slowly and evenly.
● **Apply ATF to inner surface of clutch drum.**

AT-321

SAT867A

- **Align notch in forward clutch piston with groove in forward clutch drum.**

SAT868A

b) Install overrun clutch by turning it slowly and evenly.
- **Apply ATF to inner surface of forward clutch piston.**

Feeler gauge

SAT869A

- Measurement of clearance between retaining plate and snap ring of overrun clutch

    Specified clearance:
    Standard
        1.0 - 1.4 mm (0.039 - 0.055 in)
    Allowable limit
        2.0 mm (0.079 in)
    Retaining plate:
        Refer to SDS, AT-358.

Feeler gauge

SAT870A

- Measurement of clearance between retaining plate and snap ring of forward clutch

    Specified clearance:
    Standard
        0.35 - 0.75 mm (0.0138 - 0.0295 in)
    Allowable limit
        Model 4EX16, 4EX79 (2WD)
            2.15 mm (0.0846 in)
        Model 4EX17, 4EX80 (4WD)
            2.35 mm (0.0925 in)
    Retaining plate:
        Refer to SDS, AT-358.

AT-322
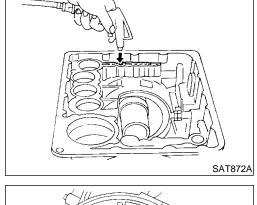
Low & Reverse Brake
COMPONENTS

NBAT0136

SEC. 315
For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section.

Driven plate
U-spring
U-spring
U-spring installation location
Snap ring
Retaining plate ★
Driven plate
Dish plate
Needle bearing
Low one-way clutch inner race
Spring retainer
Low & reverse brake piston
Lip seal ✕ (ATF)
Return spring
D-ring ✕ (ATF)
Seal ring ✕ 🔧 (P)
Drive plate (ATF)
Driven plate
Drive plate
Dish plate

21 - 26 N•m
(2.1 - 2.7 kg-m,
15 - 20 ft-lb)

Direction of lip seal
Direction of dish plate

✕ : Always replace after every disassembly.
(ATF) : Apply ATF.
🔧 (P) : Apply petroleum jelly.
★ : Select with proper thickness.

SAT673KA

DISASSEMBLY

NBAT0137

1. Check operation of low and reverse brake.
a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.
b. Check to see that retaining plate moves to snap ring.
c. If retaining plate does not contact snap ring,
● D-ring might be damaged.
● Oil seal might be damaged.
● Fluid might be leaking past piston check ball.

SAT872A

2. Remove snap ring, and then remove retaining plate, low and reverse brake drive plates, driven plates, dish plate and U-spring.
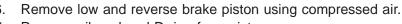
NOTE:
● U-spring can be set only at the installation position shown in component figure.
● U-spring is removed when the front driven plate is removed.

SAT873A

AT-323

SAT382I
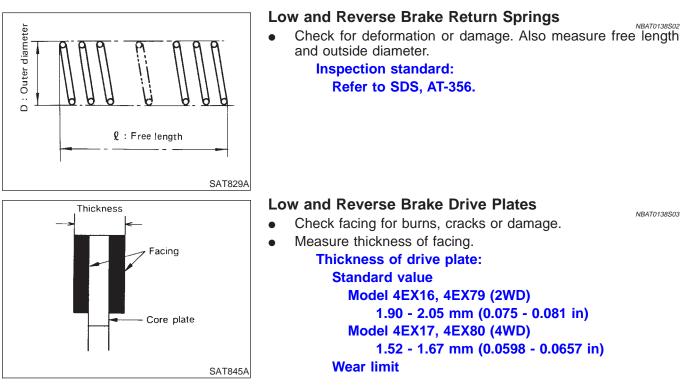
3. Remove low one-way clutch inner race, spring retainer and return spring from transmission case.
4. Remove seal rings from low one-way clutch inner race.
5. Remove needle bearing from low one-way clutch inner race.

SAT876A
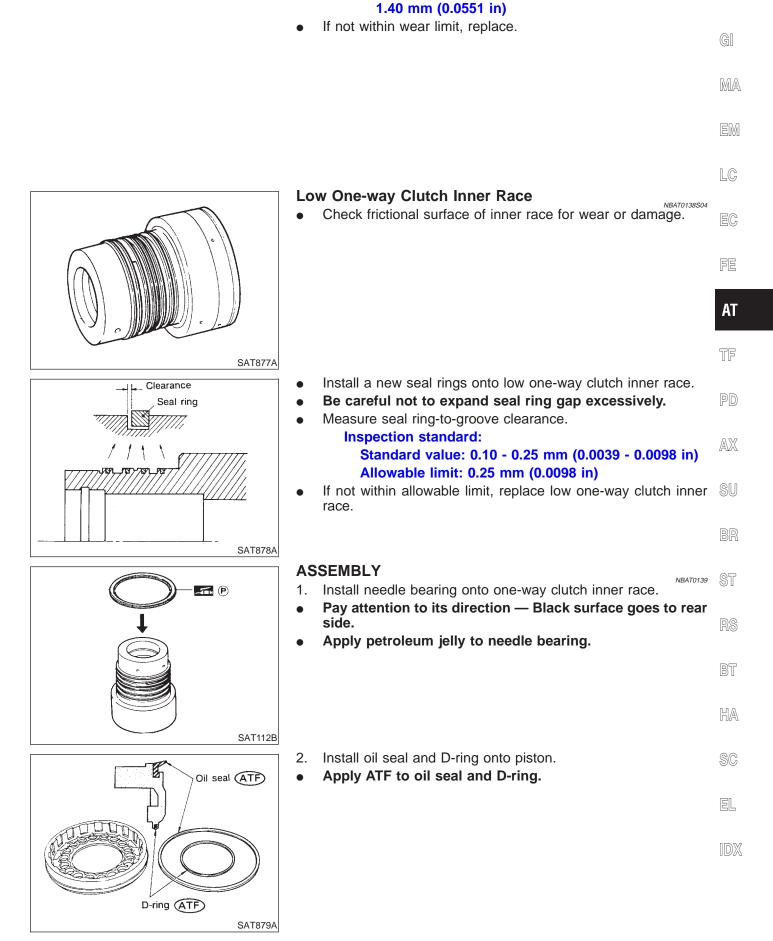
6. Remove low and reverse brake piston using compressed air.
7. Remove oil seal and D-ring from piston.

INSPECTION
Low and Reverse Brake Snap Ring and Spring Retainer
NBAT0138
NBAT0138S01
● Check for deformation, or damage.

SAT829A

Low and Reverse Brake Return Springs
NBAT0138S02
● Check for deformation or damage. Also measure free length and outside diameter.
  Inspection standard:
  Refer to SDS, AT-356.

SAT845A

Low and Reverse Brake Drive Plates
NBAT0138S03
● Check facing for burns, cracks or damage.
● Measure thickness of facing.
  Thickness of drive plate:
  Standard value
  Model 4EX16, 4EX79 (2WD)
  1.90 - 2.05 mm (0.075 - 0.081 in)
  Model 4EX17, 4EX80 (4WD)
  1.52 - 1.67 mm (0.0598 - 0.0657 in)
  Wear limit

AT-324

1.40 mm (0.0551 in)
● If not within wear limit, replace.

SAT877A

Low One-way Clutch Inner Race
NBAT0138S04
● Check frictional surface of inner race for wear or damage.

SAT878A

● Install a new seal rings onto low one-way clutch inner race.
● **Be careful not to expand seal ring gap excessively.**
● Measure seal ring-to-groove clearance.
    Inspection standard:
        Standard value: 0.10 - 0.25 mm (0.0039 - 0.0098 in)
        Allowable limit: 0.25 mm (0.0098 in)
● If not within allowable limit, replace low one-way clutch inner race.

ASSEMBLY
NBAT0139
1. Install needle bearing onto one-way clutch inner race.
● **Pay attention to its direction — Black surface goes to rear side.**
● **Apply petroleum jelly to needle bearing.**

SAT112B

2. Install oil seal and D-ring onto piston.
● **Apply ATF to oil seal and D-ring.**

SAT879A

AT-325

Low & Reverse Brake (Cont'd)

SAT880A

3. Install piston by rotating it slowly and evenly.
● **Apply ATF to inner surface of transmission case.**

SAT881A

4. Install return springs, spring retainer and low one-way clutch inner race onto transmission case.
5. Install dish plate, low and reverse brake drive plates, driven plates and U-spring, and then retaining plate.
6. Install snap ring on transmission case.

SAT872A

7. Check operation of low and reverse brake clutch piston. Refer to "DISASSEMBLY", AT-323.

Feeler gauge

SAT885A

8. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
    Specified clearance:
      Standard
        0.8 - 1.1 mm (0.031 - 0.043 in)
      Allowable limit
        2.7 mm (0.106 in)
    Retaining plate:
      Refer to SDS, AT-359.
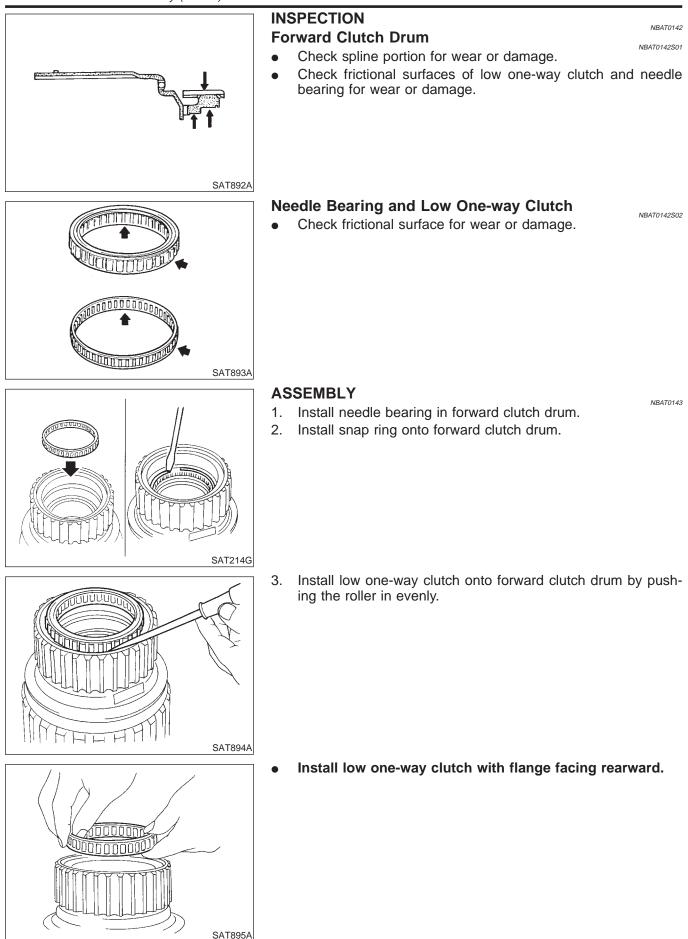
Seal ring

SAT884A
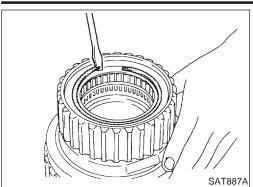
9. Install low one-way clutch inner race seal ring.
● **Apply petroleum jelly to seal ring.**
● **Make sure seal rings are pressed firmly into place and held by petroleum jelly.**

AT-326

Forward Clutch Drum Assembly
COMPONENTS

SEC. 315

Forward clutch drum assembly
Needle bearing
Snap ring
Low one-way clutch
Side plate
Snap ring

SAT211GA

SAT212G

DISASSEMBLY

NBAT0141

1. Remove snap ring from forward clutch drum.
2. Remove side plate from forward clutch drum.

SAT213G

3. Remove low one-way clutch from forward clutch drum.
4. Remove snap ring from forward clutch drum.

SAT891A

5. Remove needle bearing from forward clutch drum.

Forward Clutch Drum Assembly (Cont'd)

INSPECTION

Forward Clutch Drum

NBAT0142

NBAT0142S01

● Check spline portion for wear or damage.
● Check frictional surfaces of low one-way clutch and needle bearing for wear or damage.

SAT892A

Needle Bearing and Low One-way Clutch

NBAT0142S02

● Check frictional surface for wear or damage.

SAT893A

ASSEMBLY

NBAT0143

1. Install needle bearing in forward clutch drum.
2. Install snap ring onto forward clutch drum.

SAT214G

3. Install low one-way clutch onto forward clutch drum by pushing the roller in evenly.

SAT894A

● **Install low one-way clutch with flange facing rearward.**

SAT895A

4. Install side plate onto forward clutch drum.
5. Install snap ring onto forward clutch drum.
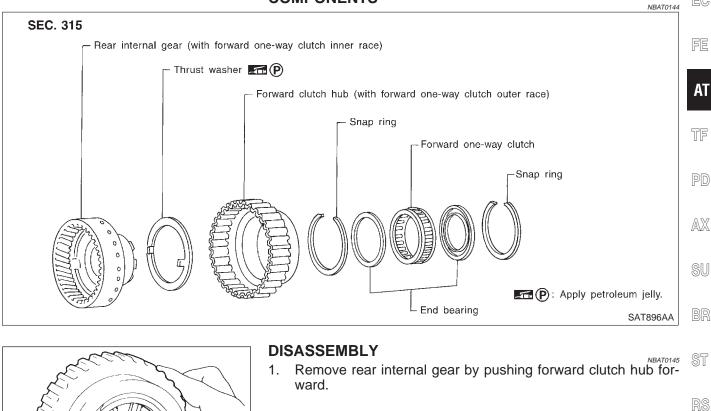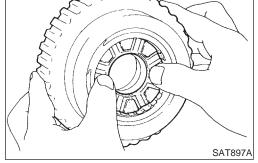
SAT887A

Rear Internal Gear and Forward Clutch Hub
COMPONENTS

NBAT0144

SEC. 315

- Rear internal gear (with forward one-way clutch inner race)
- Thrust washer 🔧 Ⓟ
- Forward clutch hub (with forward one-way clutch outer race)
- Snap ring
- Forward one-way clutch
- Snap ring
- End bearing

🔧 Ⓟ : Apply petroleum jelly.

SAT896AA

DISASSEMBLY

NBAT0145

1. Remove rear internal gear by pushing forward clutch hub forward.

SAT897A

2. Remove thrust washer from rear internal gear.

SAT898A

AT-329

SAT899A

3. Remove snap ring from forward clutch hub.

SAT900A

4. Remove end bearing.

SAT955A

5. Remove forward one-way clutch and end bearing as a unit from forward clutch hub.

SAT901A

6. Remove snap ring from forward clutch hub.

SAT902A

INSPECTION
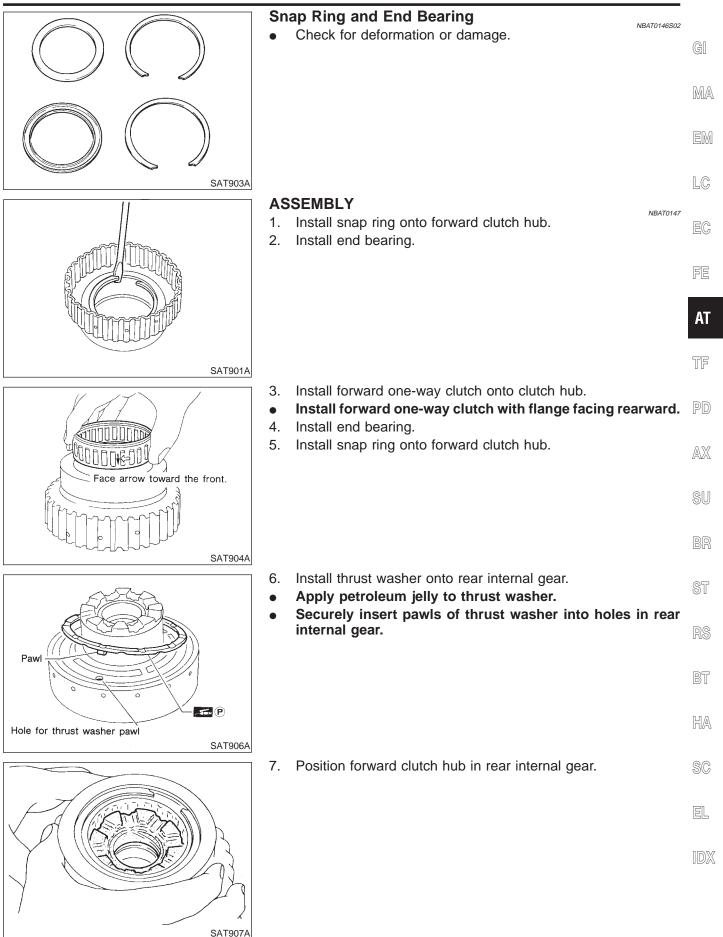
Rear Internal Gear and Forward Clutch Hub
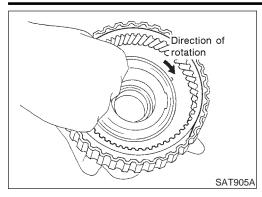
NBAT0146

NBAT0146S01

- Check gear for excessive wear, chips or cracks.
- Check frictional surfaces of forward one-way clutch and thrust washer for wear or damage.
- Check spline for wear or damage.

REPAIR FOR COMPONENT PARTS

Snap Ring and End Bearing

NBAT0146S02

- Check for deformation or damage.

SAT903A

ASSEMBLY

NBAT0147

1. Install snap ring onto forward clutch hub.
2. Install end bearing.

SAT901A

Face arrow toward the front.

SAT904A

3. Install forward one-way clutch onto clutch hub.
- **Install forward one-way clutch with flange facing rearward.**
4. Install end bearing.
5. Install snap ring onto forward clutch hub.

Pawl

Hole for thrust washer pawl

SAT906A

6. Install thrust washer onto rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Securely insert pawls of thrust washer into holes in rear internal gear.**

7. Position forward clutch hub in rear internal gear.

SAT907A

AT-331

SAT905A

8. After installing, check to assure that forward clutch hub rotates clockwise.

Band Servo Piston Assembly
COMPONENTS

NBAT0148

SEC. 315

Return spring Ⓐ
Piston stem
D-ring ✗ ATF
D-ring ✗ ATF
Return spring Ⓑ
Servo piston spring retainer
O-ring ✗ ATF
O-ring ✗ ATF
D-ring ✗ ATF
Gasket
OD servo piston retainer
E-ring (small)
E-ring (large)
Band servo piston
Servo cushion spring retainer
OD band servo piston
Servo piston retainer

✗ : Always replace after every disassembly.
ATF : Apply ATF.

SAT161KA

DISASSEMBLY

NBAT0149
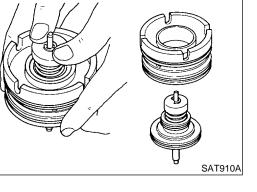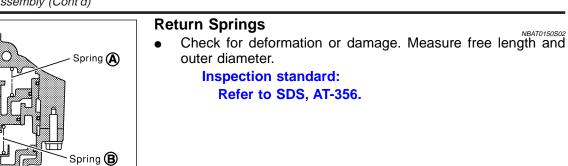
1. Block one oil hole in OD servo piston retainer and the center hole in OD band servo piston.
2. Apply compressed air to the other oil hole in piston retainer to remove OD band servo piston from retainer.
3. Remove D-ring from OD band servo piston.

SAT909A

4. Remove band servo piston assembly from servo piston retainer by pushing it forward.

SAT910A

AT-332

REPAIR FOR COMPONENT PARTS

5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

6. Remove servo piston spring retainer, return spring C and piston stem from band servo piston.

7. Remove E-ring from band servo piston.

8. Remove servo cushion spring retainer from band servo piston.
9. Remove D-rings from band servo piston.
10. Remove O-rings from servo piston retainer.

INSPECTION
NBAT0150

Pistons, Retainers and Piston Stem
NBAT0150S01
● Check frictional surfaces for abnormal wear or damage.

AT-333

Band Servo Piston Assembly (Cont'd)

SAT162K

Return Springs

NBAT0150S02

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

Inspection standard:
Refer to SDS, AT-356.

SAT917A

ASSEMBLY

NBAT0151
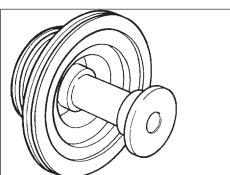
1. Install O-rings onto servo piston retainer.
● **Apply ATF to O-rings.**
● **Pay attention to position of each O-ring.**

SAT918A
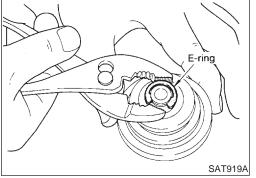
2. Install servo cushion spring retainer onto band servo piston.

SAT919A

3. Install E-ring onto servo cushion spring retainer.

SAT920A
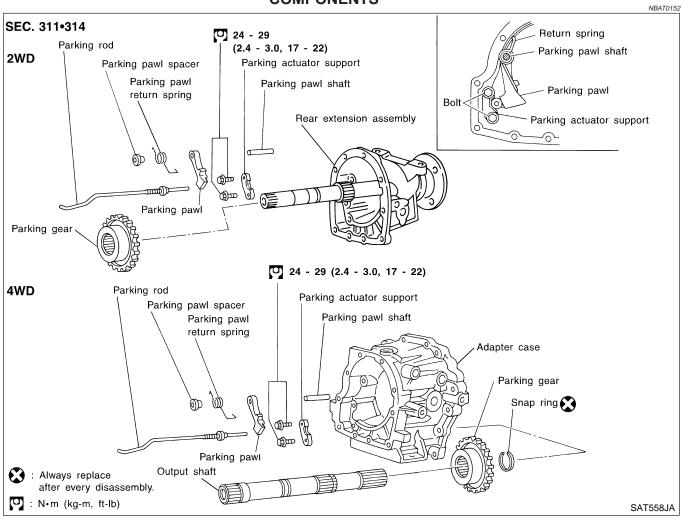
4. Install D-rings onto band servo piston.
● **Apply ATF to D-rings.**

AT-334

REPAIR FOR COMPONENT PARTS
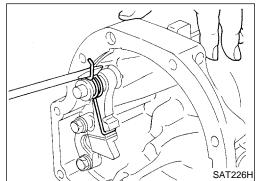
5. Install servo piston spring retainer, return spring C and piston stem onto band servo piston.

SAT912A

6. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.

E-ring

SAT921A

7. Install band servo piston assembly onto servo piston retainer by pushing it inward.

SAT922A

8. Install D-ring on OD band servo piston.
● **Apply ATF to D-ring.**

ATF

SAT923A

9. Install OD band servo piston onto servo piston retainer by pushing it inward.

SAT924A

AT-335
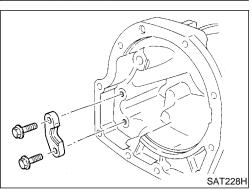
Parking Pawl Components
COMPONENTS

NBAT0152

SEC. 311•314

2WD

Parking rod
Parking pawl spacer
Parking pawl return spring
Parking gear
Parking pawl

24 - 29
(2.4 - 3.0, 17 - 22)
Parking actuator support
Parking pawl shaft
Rear extension assembly

Return spring
Parking pawl shaft
Parking pawl
Bolt
Parking actuator support

4WD

Parking rod
Parking pawl spacer
Parking pawl return spring
Parking pawl
Output shaft

24 - 29 (2.4 - 3.0, 17 - 22)
Parking actuator support
Parking pawl shaft
Adapter case
Parking gear
Snap ring ⊗

⊗ : Always replace after every disassembly.

🔧 : N•m (kg-m, ft-lb)

SAT558JA

DISASSEMBLY

NBAT0153

1. Slide return spring to the front of adapter case flange.
2. Remove return spring, parking pawl spacer and parking pawl from adapter case.
3. Remove parking pawl shaft from adapter case.

SAT226H

4. Remove parking actuator support from adapter case.

SAT228H

REPAIR FOR COMPONENT PARTS

INSPECTION
NBAT0209

Parking Pawl and Parking Actuator Support
NBAT0209S01
- Check contact surface of parking rod for wear.

Rear Extension Assembly (2WD model only)
NBAT0209S02
- Check for free play between companion flange and output shaft.
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- Check contact surface of output shaft for wear.

ASSEMBLY
NBAT0154
1. Install parking actuator support onto adapter case.
2. Insert parking pawl shaft into adapter case.
3. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.

4. Bend return spring upward and install it onto adapter case.

SAT998G

SAT229H

SAT226H

AT-337

Assembly (1)

NBAT0155

SAT931A

1. Install manual shaft components.
a. Install oil seal onto manual shaft.
- **Apply ATF to oil seal.**
- **Wrap threads of manual shaft with masking tape.**
b. Insert manual shaft and oil seal as a unit into transmission case.
c. Remove masking tape.

SAT932A

d. Push oil seal evenly and install it onto transmission case.

5 mm (0.20 in)

SAT933A

e. Align groove in shaft with retaining pin hole, then retaining pin into position as shown in figure at left.

SAT901E

f. Install detent spring and spacer.
g. While pushing detent spring down, install manual plate onto manual shaft.

SAT936A

h. Install lock nuts onto manual shaft.

AT-338

ASSEMBLY

(2 → 3) Accumulator piston Ⓑ

(3 → 4, N → R) Accumulator piston Ⓓ

(N → D) Accumulator piston Ⓐ

(1 → 2) Accumulator piston Ⓒ

Front

SAT523GA

2. Install accumulator piston.
a. Install O-rings onto accumulator piston.
● **Apply ATF to O-rings.**
Accumulator piston O-rings

Unit: mm (in)

Accumulator	A	B	C	D
Small diameter end	29 (1.14)	32 (1.26)	45 (1.77)	29 (1.14)
Large diameter end	45 (1.77)	50 (1.97)	50 (1.97)	45 (1.77)

b. Install return spring for accumulator A onto transmission case.
Free length of return spring:
Refer to SDS, AT-356.

SAT938A

c. Install accumulator pistons A, B, C and D.
● **Apply ATF to transmission case.**

Accumulator piston Ⓐ

Accumulator piston Ⓑ

Accumulator piston Ⓒ

Accumulator piston Ⓓ

SAT939AA

3. Install band servo piston.
a. Install return springs onto servo piston.

SAT941A

b. Install band servo piston onto transmission case.
● **Apply ATF to O-ring of band servo piston and transmission case.**
c. Install gasket for band servo onto transmission case.

SAT942A

AT-339

d. Install band servo retainer onto transmission case.

SAT940A

4. Install rear side clutch and gear components.
a. Place transmission case in vertical position.

ST07870000
(J37068)

SAT943A

b. Slightly lift forward clutch drum assembly. Then slowly rotate it clockwise until its hub passes fully over clutch inner race inside transmission case.

Forward clutch drum

Inner race

Transmission case

SAT944A

c. Check to be sure that rotation direction of forward clutch assembly is correct.

SAT945A

d. Install thrust washer onto front of overrun clutch hub.
- **Apply petroleum jelly to the thrust washer.**
- **Insert pawls of thrust washer securely into holes in overrun clutch hub.**

Pawl

Hole for pawl

SAT946A

ASSEMBLY

e. Install overrun clutch hub onto rear internal gear assembly.

SAT947A

f. Install needle bearing onto rear of overrun clutch hub.
● **Apply petroleum jelly to needle bearing.**

SAT948A

g. Check that overrun clutch hub rotates as shown while holding forward clutch hub.

SAT949A

h. Place transmission case into horizontal position.

ST07870000
(J37068)

SAT527G

i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.

SAT951A

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

AT-341

SAT952A

j. Install needle bearing onto rear internal gear.
● **Apply petroleum jelly to needle bearing.**

Pawl   Hole for pawl

SAT953A

k. Install bearing race onto rear of front internal gear.
● **Apply petroleum jelly to bearing race.**
● **Securely engage pawls of bearing race with holes in front internal gear.**

SAT954A

l. Install front internal gear on transmission case.

Needle bearing
Parking gear   Companion flange
Nut

SAT546J

5. Install rear extension assembly on transmission case (2WD model only).
a. Install revolution sensor on rear extension.
b. Install rear extension gasket on transmission case.
c. Install parking rod on transmission case.
d. Install parking gear and needle bearing.
● **Insert rear extension assembly into place while holding parking gear and needle bearing by hand.**

SAT216B

6. Install output shaft and parking gear (4WD model only).
a. Insert output shaft from rear of transmission case while slightly lifting front internal gear.
● **Do not force output shaft against front of transmission case.**

AT-342

ASSEMBLY

SAT957A

b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.
● **Check to be sure output shaft cannot be removed in rear direction.**

SAT217B

c. Install needle bearing on transmission case.
● **Pay attention to its direction — Black side goes to rear.**
● **Apply petroleum jelly to needle bearing.**

SAT218B

d. Install parking gear on transmission case.

SAT960A

e. Install snap ring on rear of output shaft.
● **Check to be sure output shaft cannot be removed in forward direction.**

ST33200000
(J26082)   SAT759I

7. Install adapter case (4WD model only).
a. Install oil seal on adapter case.
● **Apply ATF to oil seal.**

AT-343

SAT757I

b. Install O-ring on revolution sensor.
*   **Apply ATF to O-ring.**
c. Install revolution sensor on adapter case.

SAT963A

d. Install adapter case gasket on transmission case.

SAT964A

e. Install parking rod on transmission case.

SAT755I

f. Install adapter case on transmission case.

Oil groove

SAT974A

8. Install front side clutch and gear components.
a. Install rear sun gear on transmission case.
*   **Pay attention to its direction.**

ASSEMBLY

b. Make sure needle bearing is on front of front planetary carrier.
● **Apply petroleum jelly to needle bearing.**
c. Make sure needle bearing is on rear of front planetary carrier.
● **Apply petroleum jelly to bearing.**
● **Pay attention to its direction — Black side goes to front.**

Rear ← → Front

Black side goes to front.

SAT967A

d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.

SAT969A

● **Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.**

Front planetary carrier

A

Forward clutch drum

B

SAT970A

e. Make sure bearing races are on front and rear of clutch pack.
● **Apply petroleum jelly to bearing races.**
● **Securely engage pawls of bearing races with holes in clutch pack.**

Front   Rear

SAT971A

f. Install clutch pack into transmission case.

SAT973A

AT-345

Adjustment

=NBAT0156
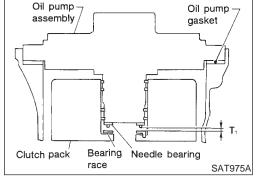
When any parts listed in the following table are replaced, total end play or reverse clutch end play must be adjusted.
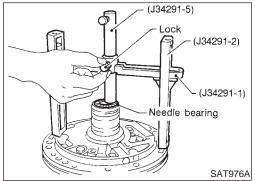
Part name	Total end play	Reverse clutch end play
Transmission case	●	●
Low one-way clutch inner race	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●	●
Reverse clutch drum	—	●
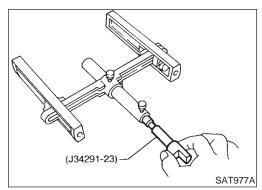
1. Adjust total end play.

   Total end play "T_1":
   0.25 - 0.55 mm (0.0098 - 0.0217 in)

Oil pump assembly — Oil pump gasket — Clutch pack — Bearing race — Needle bearing — T_1

SAT975A
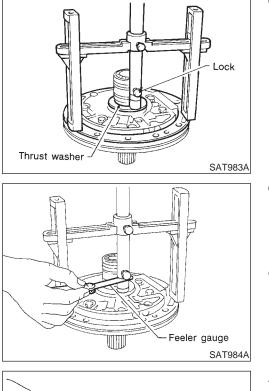
a. With needle bearing installed, place J34291-1 (bridge), J34291-2 (legs) and the J34291-5 (gauging cylinder) onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly. The gauging cylinder should rest on top of the needle bearing. Lock gauging cylinder in place with set screw.

(J34291-5) — Lock — (J34291-2) — (J34291-1) — Needle bearing

SAT976A

b. Install J34291-23 (gauging plunger) into gauging cylinder.

(J34291-23)

SAT977A

AT-346

ASSEMBLY

SAT978A

c. Install original bearing race inside reverse clutch drum. Place shim selecting gauge with its legs on machined surface of transmission case (no gasket). Allow gauging plunger to rest on bearing race. Lock gauging plunger in place with set screw.

Feeler gauge

SAT979A

d. Remove Tool and use feeler gauge to measure gap between gauging cylinder and gauging plunger. This measurement should give exact total end play.

   Total end play "T_1":
   0.25 - 0.55 mm (0.0098 - 0.0217 in)

● If end play is out of specification, decrease or increase thickness of oil pump cover bearing race as necessary.

   Available oil pump cover bearing race:
   Refer to SDS, AT-359.

Oil pump assembly   Thrust washer   Oil pump gasket

T_2

Clutch pack

SAT980A

2. Adjust reverse clutch drum end play.

   Reverse clutch drum end play "T_2":
   0.55 - 0.90 mm (0.0217 - 0.0354 in)

(J34291-1)   (J34291-2)
(J34291-5)

Lock

SAT981A

a. Place J34291-1 (bridge), J34291-2 (legs) and J34291-5 (gauging cylinder) on machined surface of transmission case (no gasket). Allow gauging cylinder to rest on front thrust surface of reverse clutch drum. Lock cylinder in place with set screw.

(J34291-23)

SAT982AA

b. Install J34291-23 (gauging plunger) into gauging cylinder.

AT-347

SAT983A

c. Install original thrust washer on oil pump. Place shim setting gauge legs onto machined surface of oil pump assembly. Allow gauging plunger to rest on thrust washer. Lock plunger in place with set screw.

SAT984A

d. Use feeler gauge to measure gap between gauging plunger and gauging cylinder. This measurement should give you exact reverse clutch drum end play.

Reverse clutch drum end play "T_2":
0.55 - 0.90 mm (0.0217 - 0.0354 in)

● If end play is out of specification, decrease or increase thickness of oil pump thrust washer as necessary.
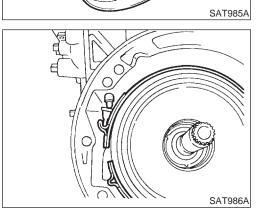
Available oil pump thrust washer:
Refer to SDS, AT-360.

Assembly (2)

NBAT0157
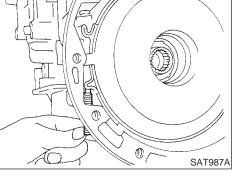
1. Install brake band and band strut.
a. Install band strut on brake band.
● **Apply petroleum jelly to band strut.**

SAT985A
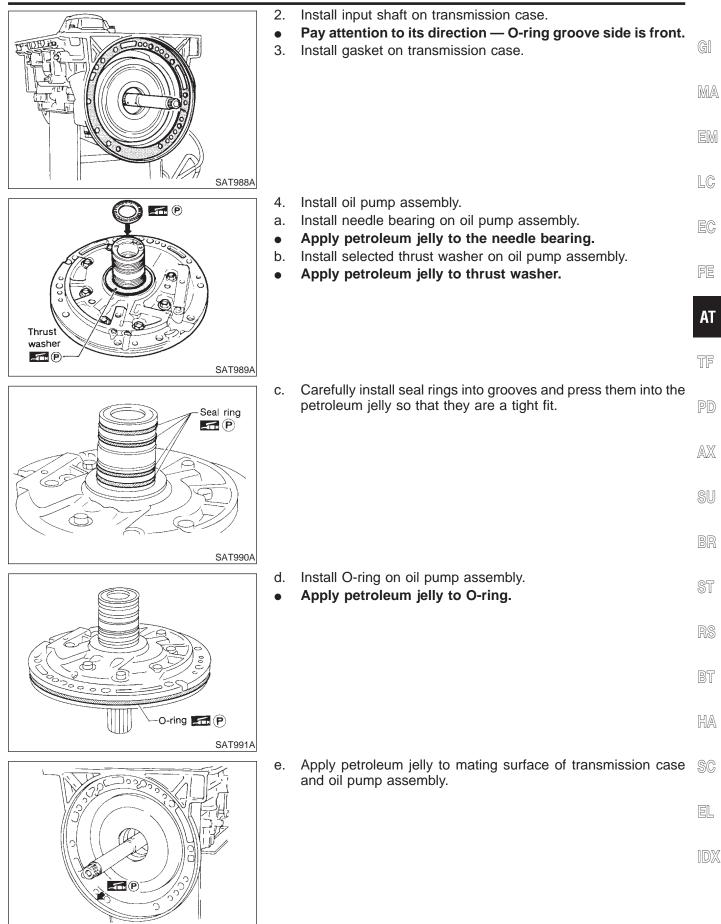
b. Place brake band on periphery of reverse clutch drum, and insert band strut into end of band servo piston stem.

SAT986A

c. Install anchor end bolt on transmission case. Then, tighten anchor end bolt just enough so that reverse clutch drum (clutch pack) will not tilt forward.

SAT987A

ASSEMBLY

2. Install input shaft on transmission case.
- **Pay attention to its direction — O-ring groove side is front.**
3. Install gasket on transmission case.

4. Install oil pump assembly.
a. Install needle bearing on oil pump assembly.
- **Apply petroleum jelly to the needle bearing.**
b. Install selected thrust washer on oil pump assembly.
- **Apply petroleum jelly to thrust washer.**

c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit.

d. Install O-ring on oil pump assembly.
- **Apply petroleum jelly to O-ring.**

e. Apply petroleum jelly to mating surface of transmission case and oil pump assembly.

AT-349

GI

MA

EM

LC

EC

FE

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

SAT993A

f.   Install oil pump assembly.

● **Install two converter housing securing bolts in bolt holes in oil pump assembly as guides.**

Transmission case   Oil pump assembly

Approximately 1 mm (0.04 in)

Inserting direction

SAT994A
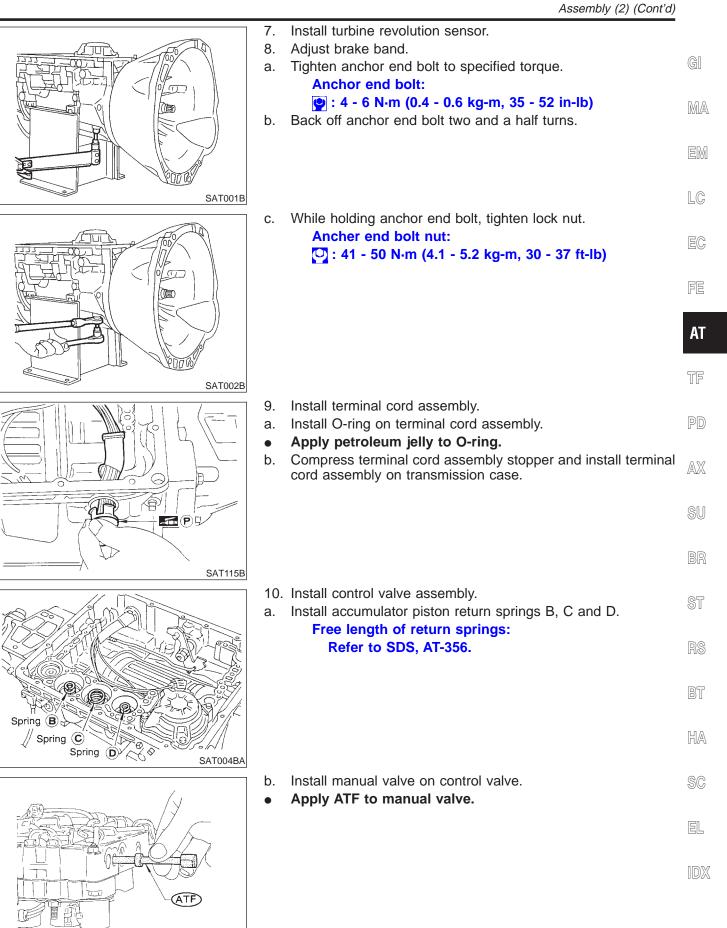
● **Insert oil pump assembly to the specified position in transmission, as shown at left.**

ATF

SAT114B

5.   Install O-ring on input shaft.

● **Apply ATF to O-rings.**

SAT397C

6.   Install converter housing.

a.   Apply recommended sealant (Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI section.) to outer periphery of bolt holes in converter housing.

● **Do not apply too much sealant.**

SAT158G

b.   Apply recommended sealant (Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI section.) to seating surfaces of bolts that secure front of converter housing.

c.   Install converter housing on transmission case.

ASSEMBLY

SAT001B

SAT002B

7. Install turbine revolution sensor.
8. Adjust brake band.
a. Tighten anchor end bolt to specified torque.
   Anchor end bolt:
   🔧 **: 4 - 6 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)**
b. Back off anchor end bolt two and a half turns.

c. While holding anchor end bolt, tighten lock nut.
   Ancher end bolt nut:
   ◎ **: 41 - 50 N·m (4.1 - 5.2 kg-m, 30 - 37 ft-lb)**

SAT115B

9. Install terminal cord assembly.
a. Install O-ring on terminal cord assembly.
● **Apply petroleum jelly to O-ring.**
b. Compress terminal cord assembly stopper and install terminal cord assembly on transmission case.

Spring Ⓑ
Spring Ⓒ
Spring Ⓓ

SAT004BA

10. Install control valve assembly.
a. Install accumulator piston return springs B, C and D.
   Free length of return springs:
   Refer to SDS, AT-356.

ATF

SAT005B

b. Install manual valve on control valve.
● **Apply ATF to manual valve.**

AT-351

SAT006B

c. Place control valve assembly on transmission case. Connect solenoid connector for upper body.
d. Install connector clip.

SAT353B

e. Install control valve assembly on transmission case.
f. Install connector tube brackets and tighten bolts A and B.
● **Check that terminal assembly does not catch.**

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

SAT221B

g. Install O-ring on oil strainer.
● **Apply petroleum jelly to O-ring.**
h. Install oil strainer on control valve.

SAT009B

i. Securely fasten terminal harness with clips.

ASSEMBLY

j. Install torque converter clutch solenoid valve and A/T fluid temperature sensor connectors.

11. Install oil pan.
a. Attach a magnet to oil pan.

b. Install new oil pan gasket on transmission case.
c. Install oil pan and bracket on transmission case.
● **Always replace oil pan bolts as they are self-sealing bolts.**
● **Before installing bolts, remove traces of sealant and oil from mating surface and thread holes.**
● **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**
d. Tighten drain plug.

12. Install PNP switch.
a. Check that manual shaft is in "1" position.
b. Temporarily install PNP switch on manual shaft.
c. Move manual shaft to "N".

d. Tighten bolts while inserting 4.0 mm (0.157 in) dia. pin vertically into locating holes in PNP switch and manual shaft.

SAT428DA

13. Install torque converter.

a. Pour ATF into torque converter.

● **Approximately 2 liters (2-1/8 US qt, 1-3/4 Imp qt) of fluid are required for a new torque converter.**

● **When reusing old torque converter, add the same amount of fluid as was drained.**
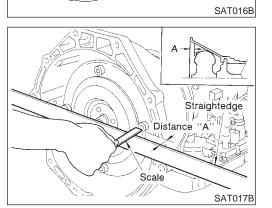
Notch in torque converter

Notch in oil pump

SAT016B

b. Install torque converter while aligning notches and oil pump.

A

Straightedge

Distance "A"

Scale

SAT017B

c. Measure distance A to check that torque converter is in proper position.

    Distance "A":

      25.0 mm (0.984 in) or more

General Specifications

Applied model		VQ35DE engine	
		2WD	4WD
Automatic transmission model		RE4R01A	
Transmission model code number		4EX16, 4EX79	4EX17, 4EX80
Stall torque ratio		2.0 : 1	
Transmission gear ratio	1st	2.785	
	2nd	1.545	
	Top	1.000	
	OD	0.694	
	Reverse	2.272	
Recommended fluid		Nissan Matic "D" (Continental U.S. and Alaska) or Genuine Nissan Automatic Transmission Fluid (Canada)*1	
Fluid capacity		8.5ℓ (9 US qt, 7-1/2 Imp qt)	

*1: Refer to MA-12, "Fluids and Lubricants".

Shift Schedule

VEHICLE SPEED WHEN SHIFTING GEARS THROTTLE POSITION

Throttle position	Vehicle speed km/h (MPH)						
	$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
Full throttle	55 - 59 (34 - 37)	105 - 113 (65 - 70)	174 - 184 (108 - 114)	170 - 180 (106 - 112)	102 - 110 (63 - 68)	43 - 47 (27 - 29)	43 - 47 (27 - 29)
Half throttle	37 - 41 (23 - 25)	71 - 79 (44 - 49)	129 - 139 (80 - 86)	81 - 91 (50 - 57)	33 - 41 (21 - 25)	12 - 16 (7 - 10)	43 - 47 (27 - 29)

VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

Throttle position	Overdrive control switch [Shift position]	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Full throttle	ON [D_4]	174 - 184 (108 - 114)	170 - 180 (106 - 112)
	OFF [D_3]	104 - 114 (65 - 71)	101 - 111 (63 - 69)
Half throttle	ON [D_4]	151 - 161 (94 - 100)	106 - 116 (66 - 72)
	OFF [D_3]	85 - 95 (53 - 59)	82 - 92 (51 - 57)

Stall Revolution

Stall revolution rpm	2,440 - 2,640

Line Pressure

Engine speed rpm	Line pressure kPa (kg/cm², psi)	
	D, 2 and 1 positions	R position
Idle	422 - 461 (4.3 - 4.7, 61 - 67)	667 - 706 (6.8 - 7.2, 97 - 102)
Stall	1,020 - 1,098 (10.4 - 11.2, 148 - 159)	1,422 - 1,500 (14.5 - 15.3, 206 - 218)

Return Springs

NBAT0165
Unit: mm (in)

Parts				Item		
				Part No.*	Free length	Outer diameter
Control valve	Upper body	1	Torque converter relief valve spring	31742-41X23	38.0 (1.496)	9.0 (0.354)
		2	Pressure regulator valve spring	31742-41X24	44.02 (1.7331)	14.0 (0.551)
		3	Pressure modifier valve spring	31742-41X19	31.95 (1.2579)	6.8 (0.268)
		—	Accumulator control valve spring	—	—	—
		4	Shuttle shift valve D spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
		5	4-2 sequence valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
		6	Shift valve B spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
		7	4-2 relay valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
		8	Shift valve A spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
		9	Overrun clutch control valve spring	31762-41X03	23.6 (0.929)	7.0 (0.276)
		10	Overrun clutch reducing valve spring	31742-41X14	38.9 (1.531)	7.0 (0.276)
		11	Shuttle shift valve S spring	31762-41X04	51.0 (2.008)	5.65 (0.2224)
		12	Pilot valve spring	31742-41X13	25.7 (1.012)	9.0 (0.354)
		13	Torque converter clutch control valve spring	31742-41X22	18.5 (0.728)	13.0 (0.512)
	Lower body	1	Modifier accumulator piston spring	31742-27X70	31.4 (1.236)	9.8 (0.386)
		2	1st reducing valve spring	31756-60X00	29.5 (1.161)	7.0 (0.276)
		3	3-2 timing valve spring	31742-41X06	23.0 (0.906)	6.7 (0.264)
		4	Servo charger valve spring	31742-41X06	23.0 (0.906)	6.7 (0.264)
Reverse clutch			—	31505-41X07	—	—
High clutch			10 pcs	31521-41X03 (Assembly)	24.2 (0.9528)	11.6 (0.457)
Forward clutch (Overrun clutch)			20 pcs	31521-41X04 (Assembly)	35.77 (1.4083)	9.7 (0.382)
Low & reverse brake			18 pcs	31655-41X00 (Assembly)	22.3 (0.878)	11.2 (0.441)
Band servo		Spring A		31605-4AX03	45.6 (1.795)	34.3 (1.350)
		Spring B		31605-41X01	29.7 (1.169)	27.6 (1.087)
Accumulator		Accumulator A		31605-41X02	43.0 (1.693)	18.0 (0.709)
		Accumulator B		31605-41X14	47.6 (1.874)	26.5 (1.043)
		Accumulator C		31605-41X09	45.0 (1.772)	29.3 (1.154)
		Accumulator D		31605-41X06	58.4 (2.299)	17.3 (0.681)

*: Always check with the Parts Department for the latest parts information.

Accumulator O-ring

NBAT0166

Accumulator	Diameter mm (in)			
	A	B	C	D
Small diameter end	29 (1.14)	32 (1.26)	45 (1.77)	29 (1.14)
Large diameter end	45 (1.77)	50 (1.97)	50 (1.97)	45 (1.77)

Clutches and Brakes

NBAT0167

REVERSE CLUTCH

NBAT0167S01

Code number		4EX16	4EX17	4EX79	4EX80
Number of drive plates		2		3	
Number of driven plates		2		3	
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)		1.90 - 2.05 (0.0748 - 0.0807)	
	Wear limit	1.80 (0.0709)		1.80 (0.0709)	
Clearance mm (in)	Standard	0.5 - 0.8 (0.020 - 0.031)		0.5 - 0.8 (0.020 - 0.031)	
	Allowable limit	1.2 (0.047)		1.2 (0.047)	
Thickness of retaining plate		Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
		4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213)	31537-42X20 31537-42X21 31537-42X22 31537-42X23 31537-42X24	4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213)	31537-42X20 31537-42X21 31537-42X22 31537-42X23 31537-42X24

*: Always check with the Parts Department for the latest parts information.

HIGH CLUTCH

NBAT0167S02

Code number		4EX16, 4EX79	4EX17, 4EX80
Number of drive plates		5	
Number of driven plates		6	
Thickness of drive plate mm (in)	Standard	1.52 - 1.67 (0.0598 - 0.0657)	
	Wear limit	1.40 (0.0551)	
Clearance mm (in)	Standard	1.8 - 2.2 (0.071 - 0.087)	
	Allowable limit	3.2 (0.126)	
Thickness of retaining plate		Thickness mm (in)	Part number*
		4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197)	31537-41X63 31537-41X64 31537-41X65 31537-41X66 31537-41X67 31537-41X68

*: Always check with the Parts Department for the latest parts information.

Clutches and Brakes (Cont'd)

FORWARD CLUTCH

NBAT0167S03

Code number		4EX16, 4EX79		4EX17, 4EX80	
Number of drive plates		7		8	
Number of driven plates		7		8	
Thickness of drive plate mm (in)	Standard	1.52 - 1.67 (0.0598 - 0.0657)			
	Wear limit	1.40 (0.0551)			
Clearance mm (in)	Standard	0.35 - 0.75 (0.0138 - 0.0295)			
	Allowable limit	2.15 (0.0846)		2.35 (0.0925)	
		Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
Thickness of retaining plate		4.6 (0.181)	31537-42X13	4.2 (0.165)	31537-42X11
		4.8 (0.189)	31537-42X14	4.4 (0.173)	31537-42X12
		5.0 (0.197)	31537-42X15	4.6 (0.181)	31537-42X13
		5.2 (0.205)	31537-4AX00	4.8 (0.189)	31537-42X14
		5.4 (0.213)	31537-4AX01	5.0 (0.197)	31537-42X15
		5.6 (0.220)	31537-4AX02	5.2 (0.205)	31537-4AX00
				5.4 (0.213)	31537-4AX01

*: Always check with the Parts Department for the latest parts information.

OVERRUN CLUTCH

NBAT0167S04

Code number		4EX16, 4EX79	4EX17, 4EX80
Number of drive plates		3	
Number of driven plates		5	
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)	
	Wear limit	1.80 (0.0709)	
Clearance mm (in)	Standard	1.0 - 1.4 (0.039 - 0.055)	
	Allowable limit	2.0 (0.079)	
		Thickness mm (in)	Part number*
Thickness of retaining plate		4.2 (0.165)	31537-41X80
		4.4 (0.173)	31537-41X81
		4.6 (0.181)	31537-41X82
		4.8 (0.189)	31537-41X83
		5.0 (0.197)	31537-41X84

*: Always check with the Parts Department for the latest parts information.

LOW & REVERSE BRAKE

NBAT0167S05

Code number		4EX16, 4EX79	4EX17, 4EX80
Number of drive plates		8	
Number of driven plates		8	
Thickness of drive plate mm (in)	Standard	1.90 - 2.05 (0.0748 - 0.0807)	1.52 - 1.67 (0.0598 - 0.0657)
	Wear limit	1.40 (0.0551)	
Clearance mm (in)	Standard	0.8 - 1.1 (0.031 - 0.043)	
	Allowable limit	2.7 (0.106)	

	Thickness mm (in)	Part number*
Thickness of retaining plate	7.6 (0.299)	31667-41X07
	7.8 (0.307)	31667-41X08
	8.0 (0.315)	31667-41X00
	8.2 (0.323)	31667-41X01
	8.4 (0.331)	31667-41X02
	8.6 (0.339)	31667-41X03
	8.8 (0.346)	31667-41X04
	9.0 (0.354)	31667-41X05
	9.2 (0.362)	31667-41X06
	9.4 (0.370)	31667-41X09
	9.6 (0.378)	31667-41X10

*: Always check with the Parts Department for the latest parts information.

BRAKE BAND

NBAT0167S06

Anchor end bolt nut tightening torque	40 - 51 N·m (4.1 - 5.2 kg-m, 30 - 38 ft-lb)
Anchor end bolt tightening torque	4 - 6 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)
Number of returning revolution for anchor end bolt	2.5

Oil Pump and Low One-way Clutch

NBAT0168
Unit: mm (in)

Oil pump clearance	Cam ring — oil pump housing	Standard	0.01 - 0.024 (0.0004 - 0.0009)
	Rotor, vanes and control piston — oil pump housing	Standard	0.03 - 0.044 (0.0012 - 0.0017)
Seal ring clearance		Standard	0.10 - 0.25 (0.0039 - 0.0098)
		Allowable limit	0.25 (0.0098)

Total End Play

NBAT0169

Total end play "T_1"	0.25 - 0.55 mm (0.0098 - 0.0217 in)	
	Thickness mm (in)	Part number*
Thickness of oil pump cover bearing race	0.8 (0.031)	31435-41X01
	1.0 (0.039)	31435-41X02
	1.2 (0.047)	31435-41X03
	1.4 (0.055)	31435-41X04
	1.6 (0.063)	31435-41X05
	1.8 (0.071)	31435-41X06
	2.0 (0.079)	31435-41X07

*: Always check with the Parts Department for the latest parts information.

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SERVICE DATA AND SPECIFICATIONS (SDS)

Reverse Clutch Drum End Play

NBAT0170

Reverse clutch drum end play "T_2"	0.55 - 0.90 mm (0.0217 - 0.0354 in)	
	Thickness mm (in)	Part number*
Thickness of oil pump thrust washer	0.9 (0.035)	31528-21X01
	1.1 (0.043)	31528-21X02
	1.3 (0.051)	31528-21X03
	1.5 (0.059)	31528-21X04
	1.7 (0.067)	31528-21X05
	1.9 (0.075)	31528-21X06

*: Always check with the Parts Department for the latest parts information.

Removal and Installation

NBAT0171

Manual control linkage	Number of returning revolutions for lock nut	2
	Lock nut tightening torque	4.4 - 5.9 N·m (0.45 - 0.60 kg-m, 39.1 - 52.1 in-lb)
Distance between end of converter housing and torque converter		25.0 mm (0.984 in) or more

Shift Solenoid Valves

NBAT0217

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

Solenoid Valves

NBAT0218

Solenoid valves	Resistance (Approx.) Ω	Terminal No.
Shift solenoid valve A	20 - 40	3
Shift solenoid valve B	20 - 40	2
Overrun clutch solenoid valve	20 - 40	4
Line pressure solenoid valve	2.5 - 5	6
Torque converter clutch solenoid valve	10 - 20	7

A/T Fluid Temperature Sensor

NBAT0219

Remarks: Specification data are reference values.

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

Turbine Revolution Sensor

NBAT0232

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

SERVICE DATA AND SPECIFICATIONS (SDS)

Revolution Sensor

NBAT0220

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

Dropping Resistor

NBAT0221

Resistance	11.2 - 12.8Ω

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