

AUTOMATIC TRANSMISSION

SECTION AT

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TROUBLE DIAGNOSIS — INDEX

Alphabetical & P No. Index for DTC

Alphabetical & P No. Index for DTC

NAAT0179

NAAT0179S01

ALPHABETICAL INDEX FOR DTC

| Items (CONSULT-II screen terms) | DTC | Reference page |
|------------------------------------|---------------------|----------------|
| | CONSULT-II GST*1 | |
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| A/T 2ND GR FNCTN | P0732 | AT-129 |
| A/T 3RD GR FNCTN | P0733 | AT-135 |
| A/T 4TH GR FNCTN | P0734 | AT-141 |
| A/T TCC S/V FNCTN | P0744 | AT-156 |
| ATF TEMP SEN/CIRC | P0710 | AT-108 |
| ENGINE SPEED SIG | P0725 | AT-119 |
| L/PRESS SOL/CIRC | P0745 | AT-165 |
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| PNP SW/CIRC | P0705 | AT-102 |
| SFT SOL A/CIRC*2 | P0750 | AT-171 |
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| TCC SOLENOID/CIRC | P0740 | AT-151 |
| TP SEN/CIRC A/T*2 | P1705 | AT-179 |
| VEH SPD SEN/CIR AT*3 | P0720 | AT-114 |

*1: These numbers are prescribed by SAE J2012.

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

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

TROUBLE DIAGNOSIS — INDEX

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

P NO. INDEX FOR DTC

=NAAT0179S02

| DTC CONSULT-II GST*1 | Items (CONSULT-II screen terms) | Reference page |
|----------------------------|------------------------------------|----------------|
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| P0710 | ATF TEMP SEN/CIRC | AT-108 |
| P0720 | VEH SPD SEN/CIR AT*3 | AT-114 |
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| P0731 | A/T 1ST GR FNCTN | AT-123 |
| P0732 | A/T 2ND GR FNCTN | AT-129 |
| P0733 | A/T 3RD GR FNCTN | AT-135 |
| P0734 | A/T 4TH GR FNCTN | AT-141 |
| P0740 | TCC SOLENOID/CIRC | AT-151 |
| P0744 | A/T TCC S/V FNCTN | AT-156 |
| P0745 | L/PRESS SOL/CIRC | AT-165 |
| P0750 | SFT SOL A/CIRC*2 | AT-171 |
| P0755 | SFT SOL B/CIRC*2 | AT-175 |
| P1705 | TP SEN/CIRC A/T*2 | AT-179 |
| 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.

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PRECAUTIONS

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

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

NAAT0001

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 composition which is available to NISSAN MODEL R50 is as follows:

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

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 NISSAN dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connector (and by yellow harness protector or yellow insulation tape before the harness connectors).

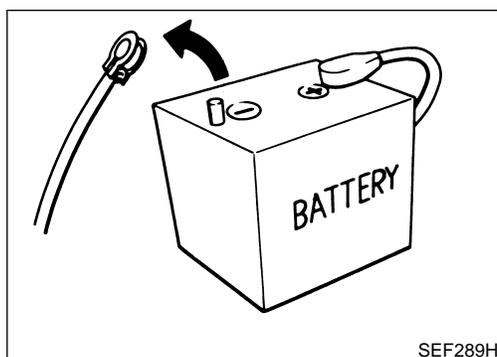
Precautions for On Board Diagnostic (OBD) System of A/T and Engine

NAAT0002

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

CAUTION:

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



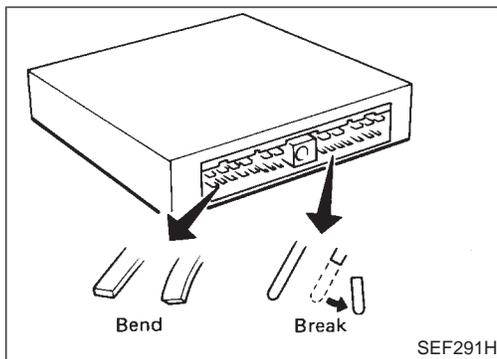
Precautions

NAAT0003

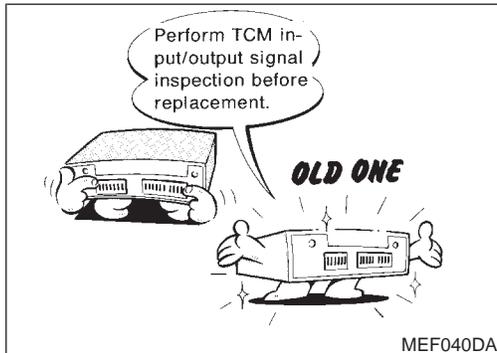
- Before connecting or disconnecting the TCM harness connector, turn ignition switch "OFF" and disconnect negative battery terminal. Failure to do so may damage the TCM. Because battery voltage is applied to TCM even if ignition switch is turned "OFF".

PRECAUTIONS

Precautions (Cont'd)



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



- Before replacing TCM, perform TCM input/output signal inspection and make sure whether TCM functions properly or not. (Refer to AT-95.)



- 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.

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PRECAUTIONS

Precautions (Cont'd)

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

Service Notice or Precautions

NAAT0004

FAIL-SAFE

NAAT0004S01

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

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

When the ignition key is turned "ON" following Fail-Safe operation, O/D OFF indicator lamp blinks for about 8 seconds. (For "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)", refer to AT-48.)

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-59).

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

NAAT0004S04

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

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

The torque converter should not be replaced if:

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

PRECAUTIONS

Service Notice or Precautions (Cont'd)

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

ATF COOLER SERVICE

NAAT0004S02

Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. EM
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-22, "REMOVAL AND INSTALLATION". LC

OBD-II SELF-DIAGNOSIS

NAAT0004S03

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

*: For details of OBD-II, refer to EC-77, "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-7, "Description".** TF

Wiring Diagrams and Trouble Diagnosis

NAAT0005

When you read wiring diagrams, refer to the following:

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

When you perform trouble diagnosis, refer to the following:

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

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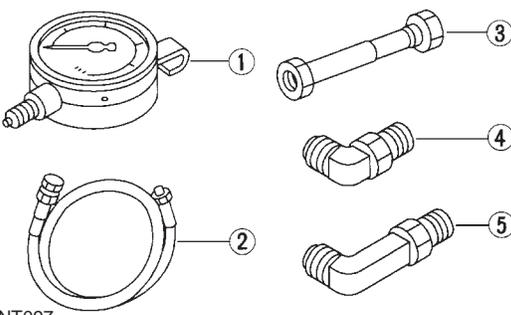
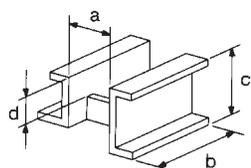
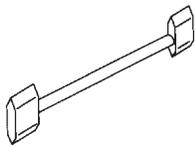
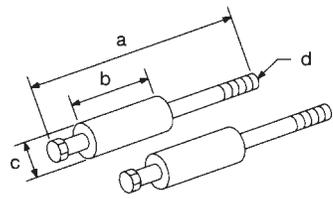
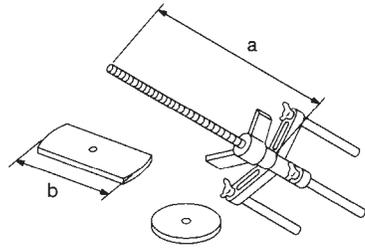
PREPARATION

Special Service Tools

Special Service Tools

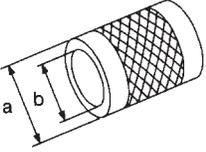
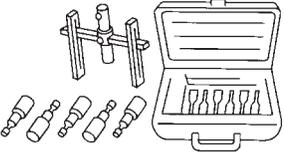
NAAT0006

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

| Tool number (Kent-Moore No.) Tool name | Description |
|---|--|
| ST2505S001 (J34301-C) Oil pressure gauge set 1 ST25051001 (—) Oil pressure gauge 2 ST25052000 (—) Hose 3 ST25053000 (—) Joint pipe 4 ST25054000 (—) Adapter 5 ST25055000 (—) Adapter | Measuring line pressure  NT097 |
| ST07870000 (J37068) Transmission case stand | Disassembling and assembling A/T 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 |

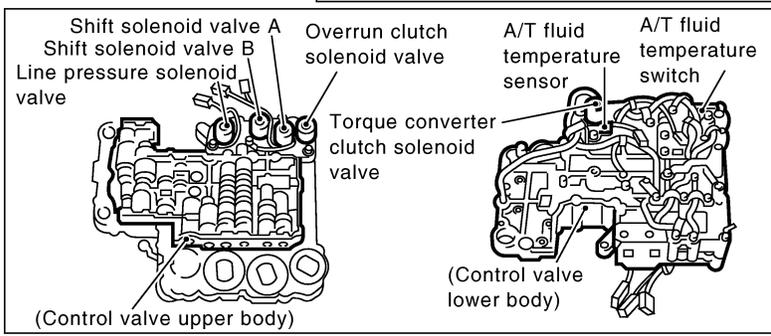
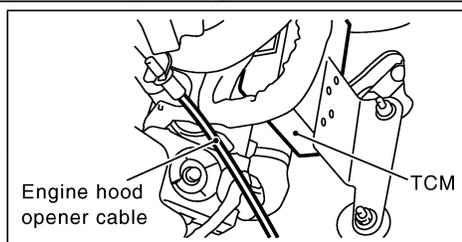
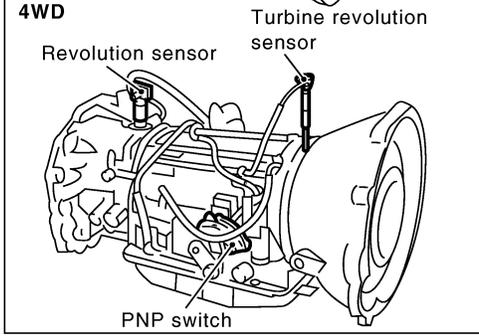
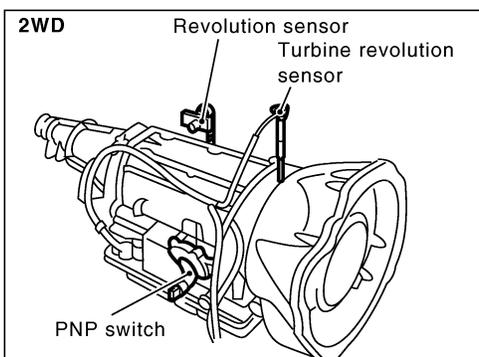
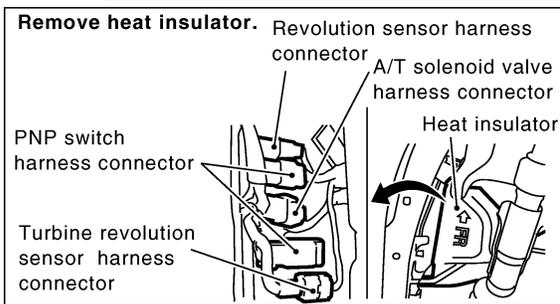
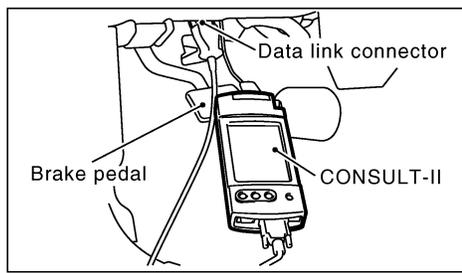
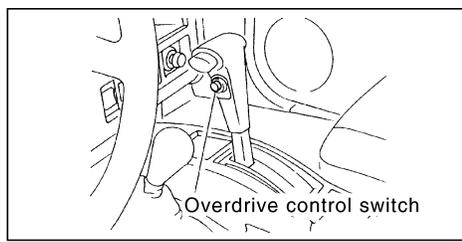
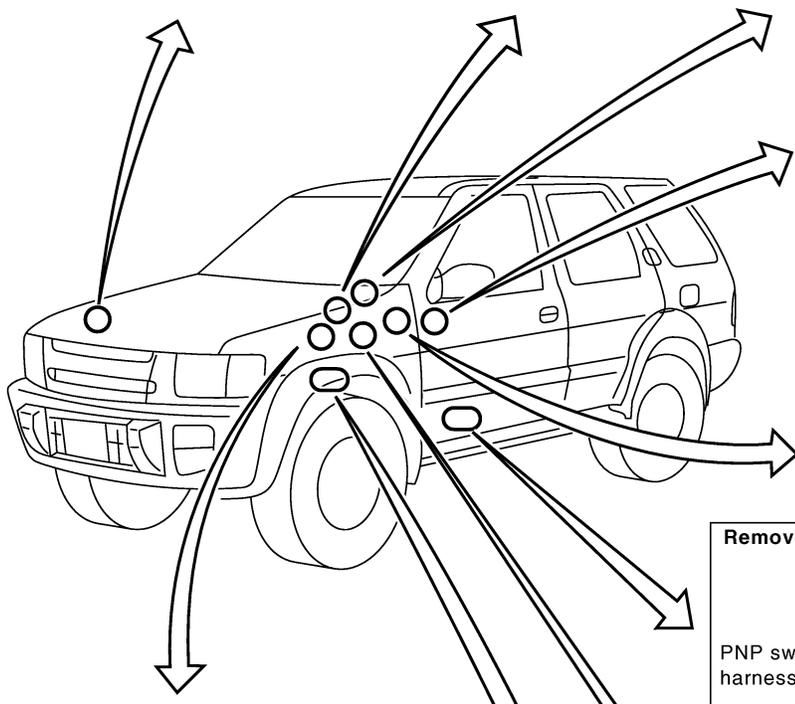
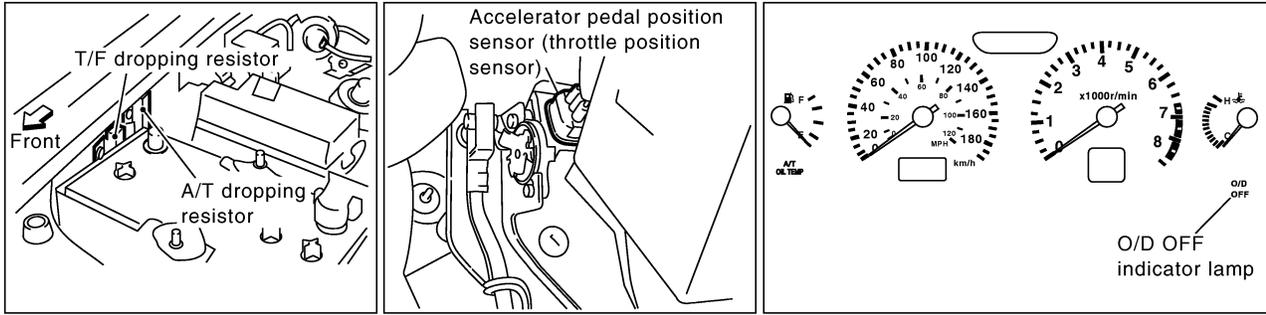
PREPARATION

Special Service Tools (Cont'd)

| Tool number (Kent-Moore No.) Tool name | Description | |
|--|--|----------------------|
| ST33200000 (J26082) Drift |  <p>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.</p> <p>NT091</p> | GI MA EM LC |
| (J34291) Shim setting gauge set |  <p>Selecting oil pump cover bearing race and oil pump thrust washer</p> <p>NT101</p> | EC FE CL MT |
| | | AT |
| | | TF |
| | | PD |
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OVERALL SYSTEM

A/T Electrical Parts Location

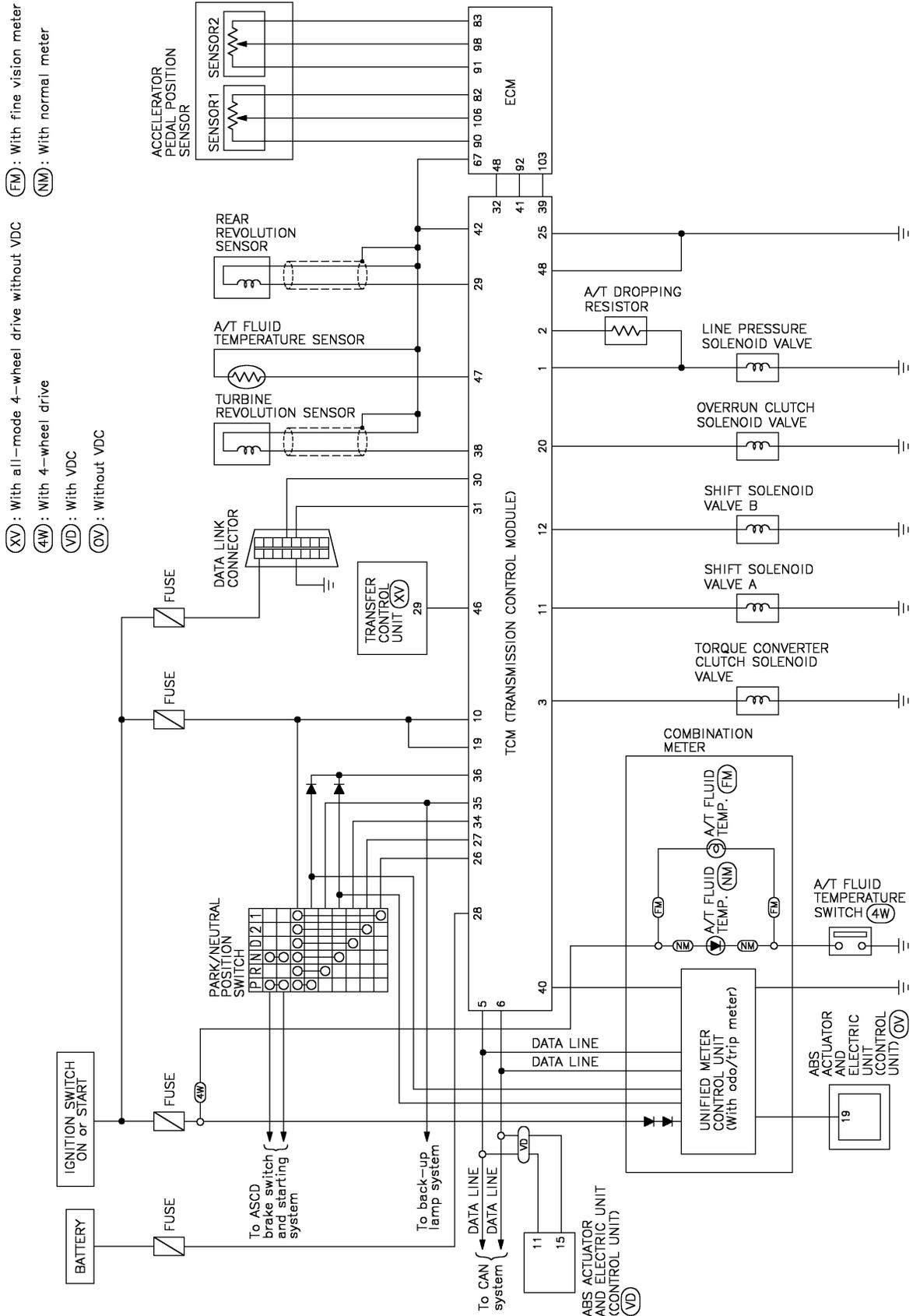


OVERALL SYSTEM

Circuit Diagram

Circuit Diagram

NAAT0008

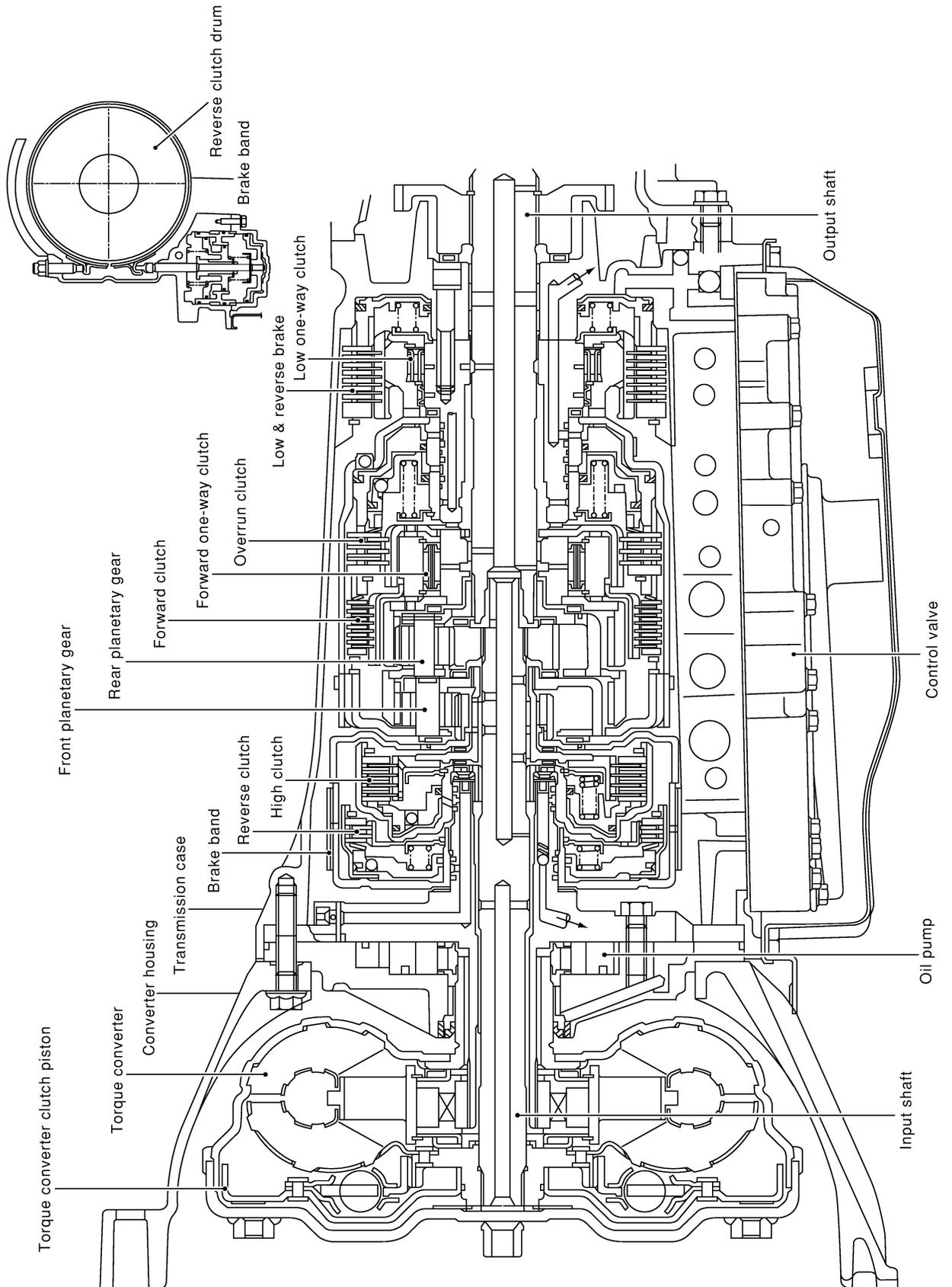


OVERALL SYSTEM

Cross-sectional View

Cross-sectional View

NAAT0010



SAT150K

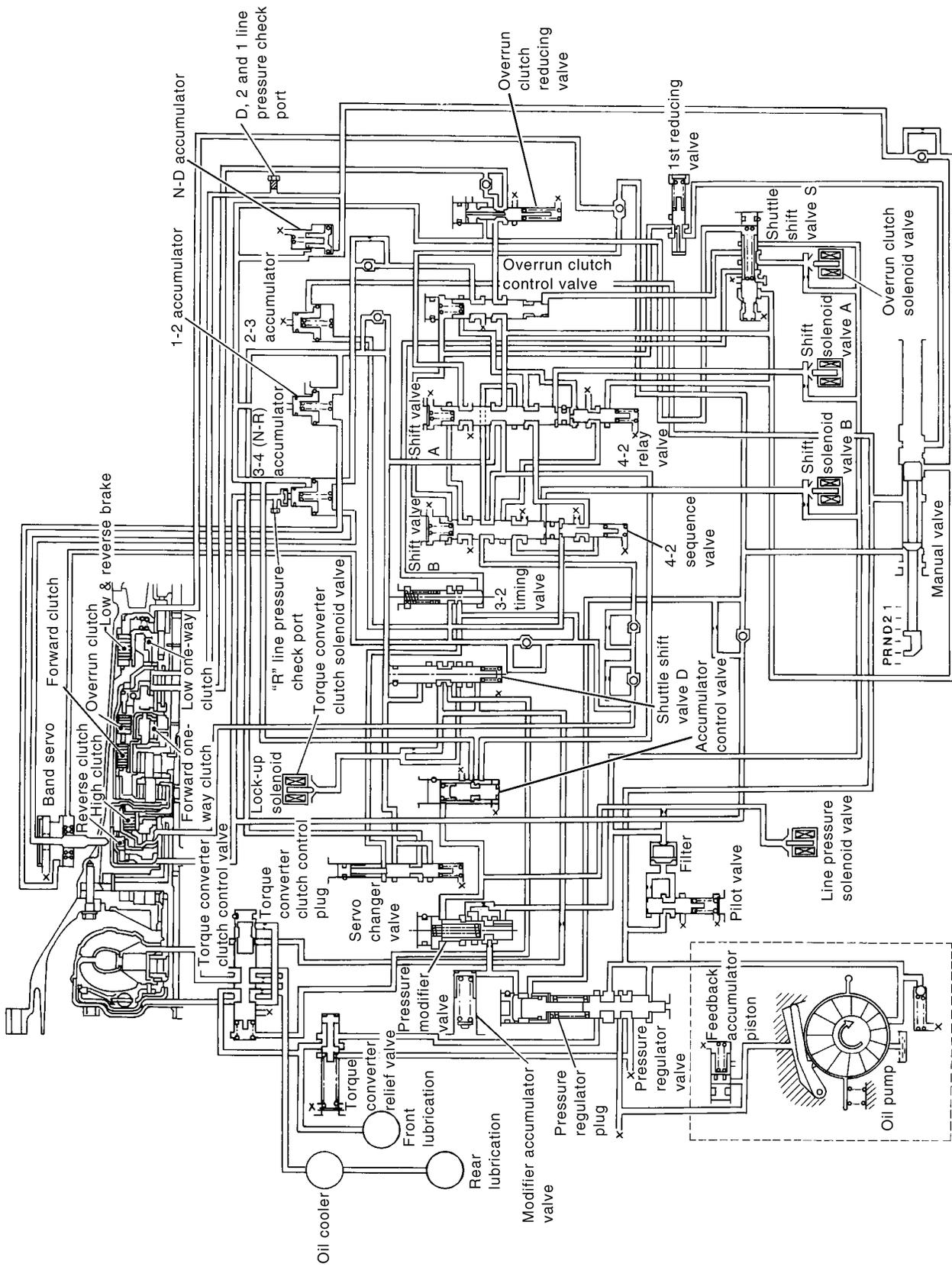
OVERALL SYSTEM

Hydraulic Control Circuit

Hydraulic Control Circuit

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OVERALL SYSTEM

Shift Mechanism

NAAT0012

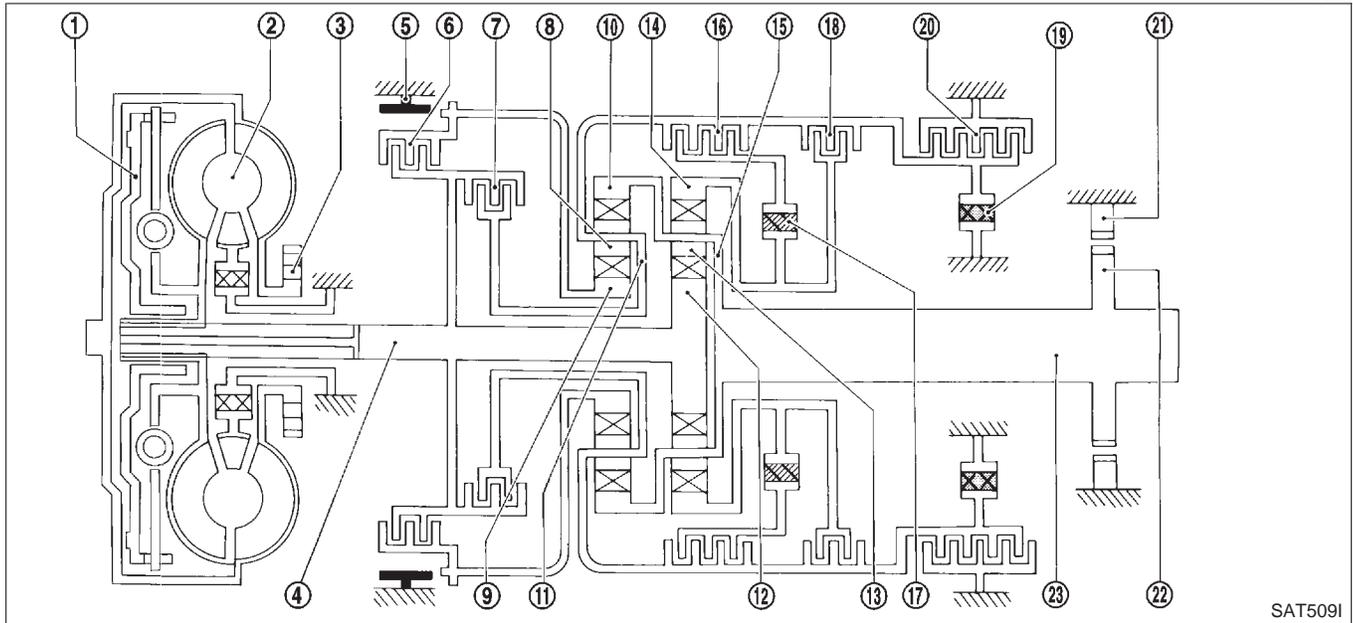
The automatic transmission uses compact, dual planetary gear systems to improve power-transmission efficiency, simplify construction and reduce weight.

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

NAAT0012S01



SAT5091

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

FUNCTION OF CLUTCH AND BRAKE

NAAT0012S02

| 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 . |

OVERALL SYSTEM

Shift Mechanism (Cont'd)

CLUTCH AND BAND CHART

NAAT0012S03

| 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 | | | | *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.

OVERALL SYSTEM

Shift Mechanism (Cont'd)

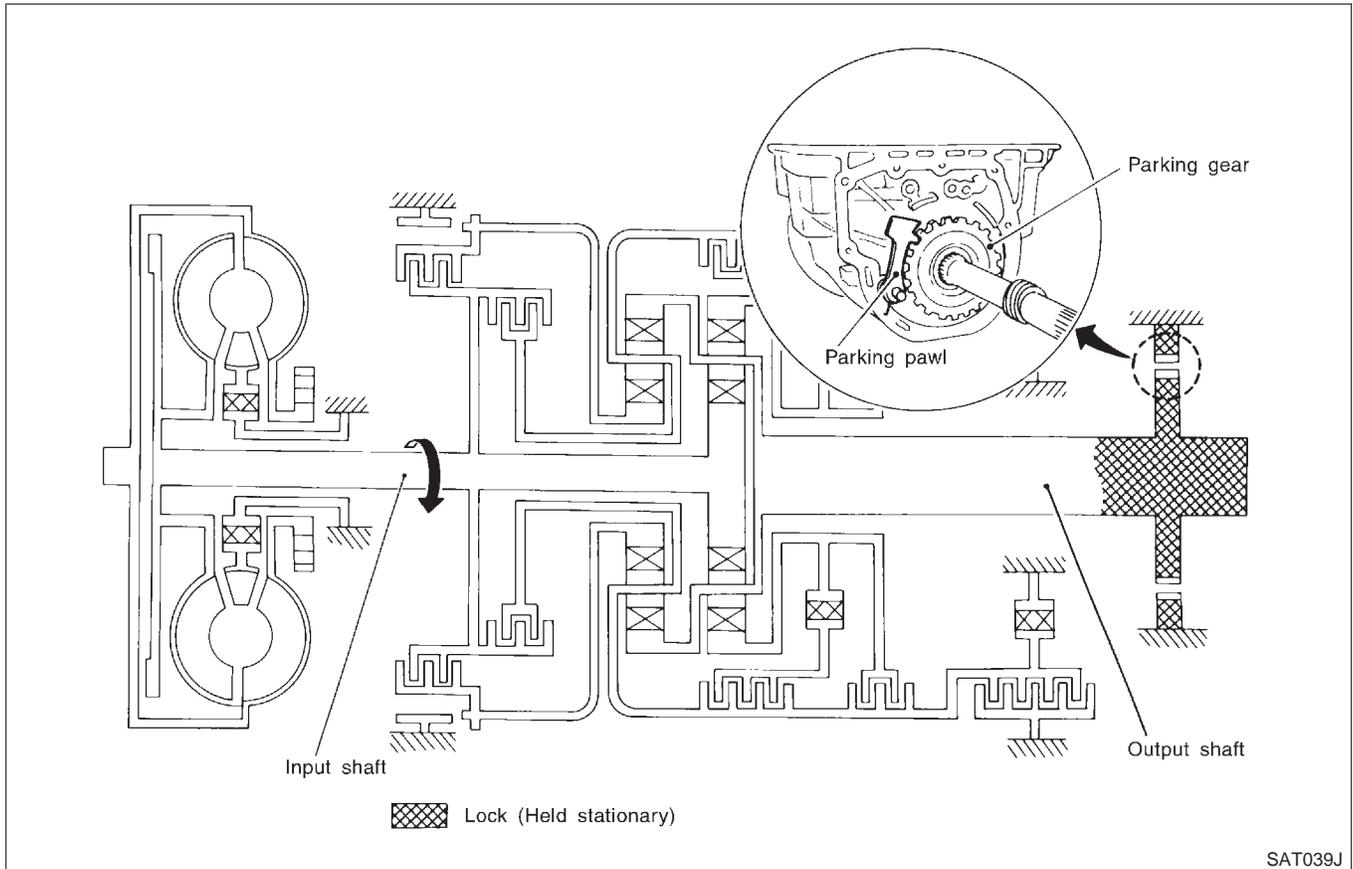
POWER TRANSMISSION

=NAAT0012S04

NAAT0012S0401

"N" and "P" Positions

- "N" position
No control members operate. Power from the input shaft is not transmitted to the output shaft since the clutch does not operate.
- "P" position
Similar to the "N" position, no control members operate. The parking pawl interconnected with the select lever engages with the parking gear to mechanically hold the output shaft so that the power train is locked.



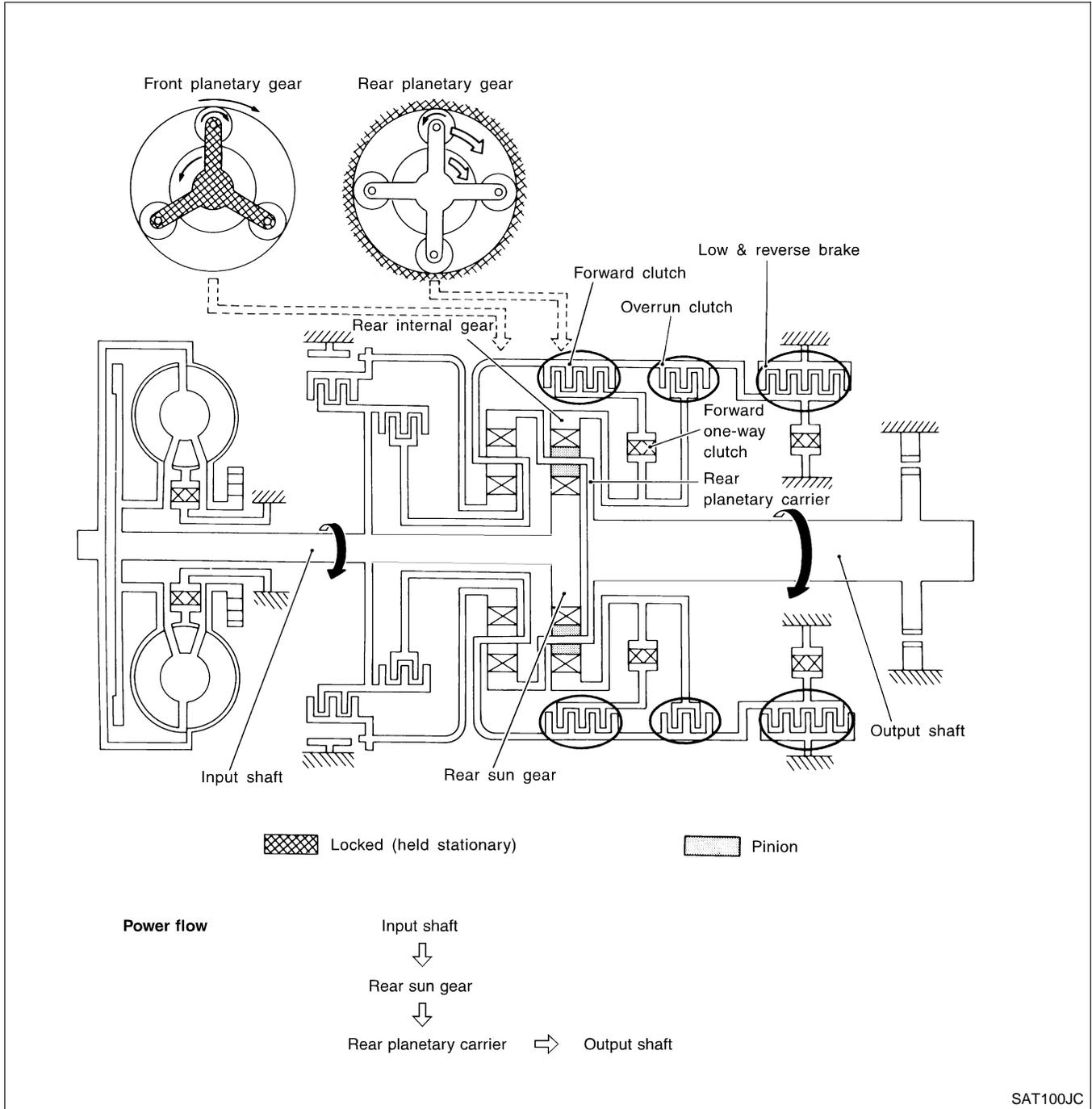
OVERALL SYSTEM

Shift Mechanism (Cont'd)

"1₁" Position

=NAAT0012S0406

| | |
|--|--|
| <p>Forward clutch Forward one-way clutch Overrun clutch Low and reverse brake</p> | <p>As overrun clutch engages, rear internal gear is locked by the operation of low and reverse brake. This is different from that of D₁ and 2₁.</p> |
| <p>Engine brake</p> | <p>Overrun clutch always engages, therefore engine brake can be obtained when decelerating.</p> |



SAT100JC

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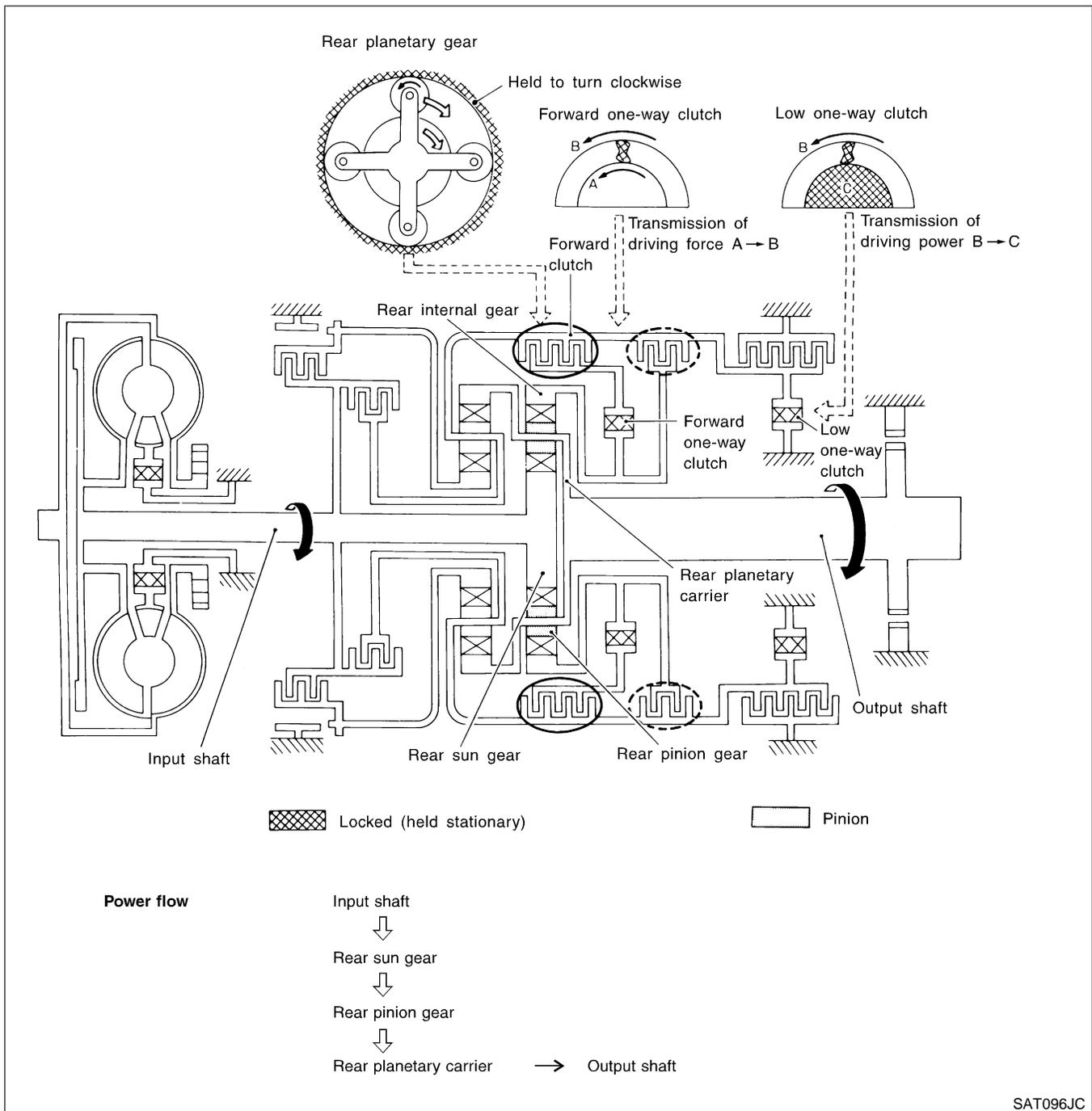
OVERALL SYSTEM

Shift Mechanism (Cont'd)

"D₁" and "2₁" Positions

=NAAT0012S0402

| | |
|--|--|
| <p>Forward one-way clutch Forward clutch Low one-way clutch</p> | <p>Rear internal gear is locked to rotate counterclockwise because of the functioning of these three clutches. (Start-up at D₁)</p> |
| <p>Overrun clutch engagement conditions (Engine brake)</p> | <p>D₁: Overdrive control switch in "OFF" Throttle opening less than 3/16 2₁: Throttle opening less than 3/16 At D₁ and 2₁ positions, engine brake is not activated due to free turning of low one-way clutch.</p> |



SAT096JC

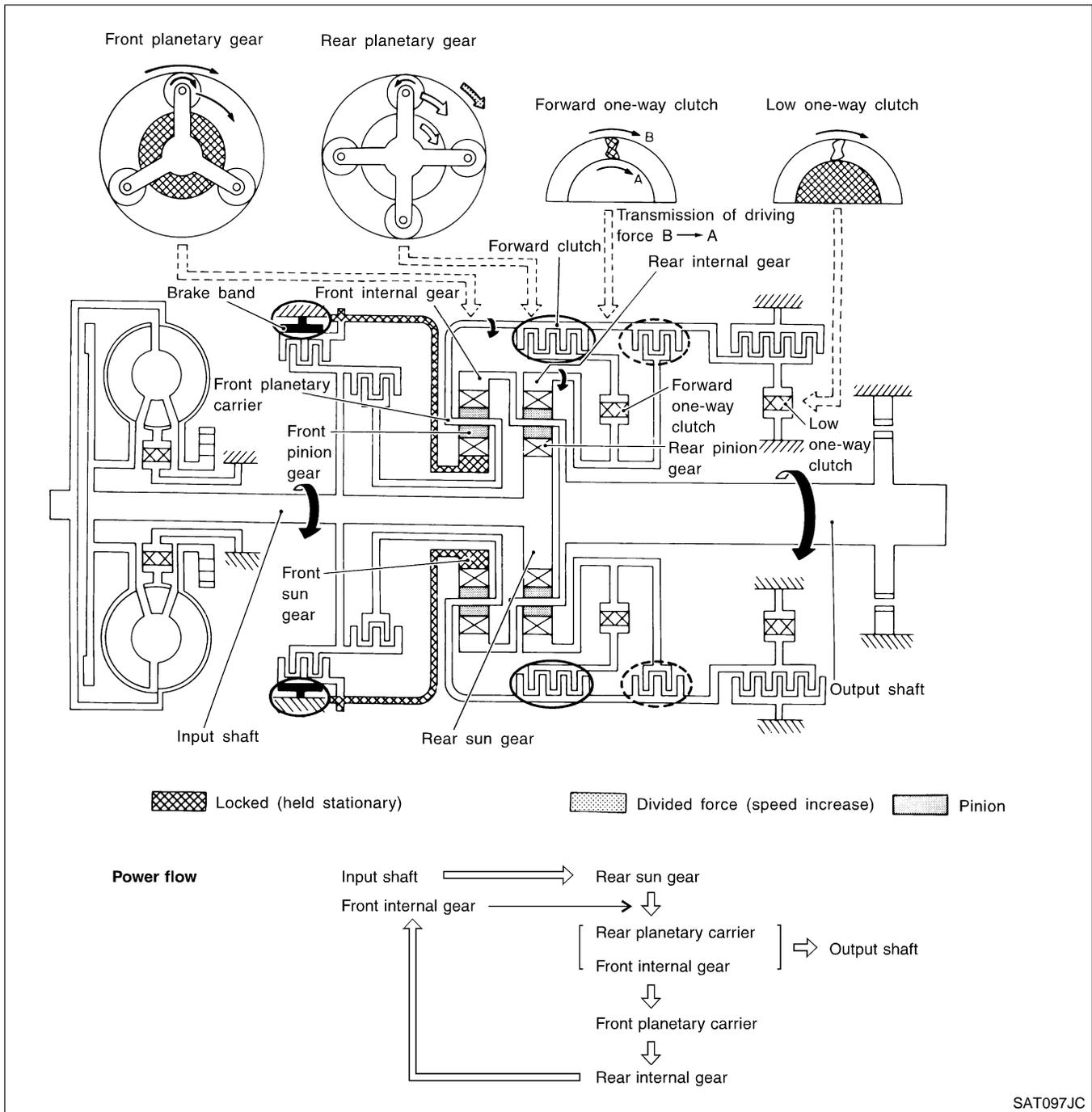
OVERALL SYSTEM

Shift Mechanism (Cont'd)

"D₂", "2₂" and "1₂" Positions

=NAAT0012S0403

| | |
|--|---|
| <p>Forward clutch Forward one-way clutch Brake band</p> | <p>Rear sun gear drives rear planetary carrier and combined front internal gear. Front internal gear now rotates around front sun gear accompanying front planetary carrier. As front planetary carrier transfers the power to rear internal gear through forward clutch and forward one-way clutch, this rotation of rear internal gear increases the speed of rear planetary carrier compared with that of the 1st speed.</p> |
| <p>Overrun clutch engagement conditions</p> | <p>D₂: Overdrive control switch in "OFF" Throttle opening less than 3/16 2₂: Throttle opening less than 3/16 1₂: Always engaged</p> |



SAT097JC

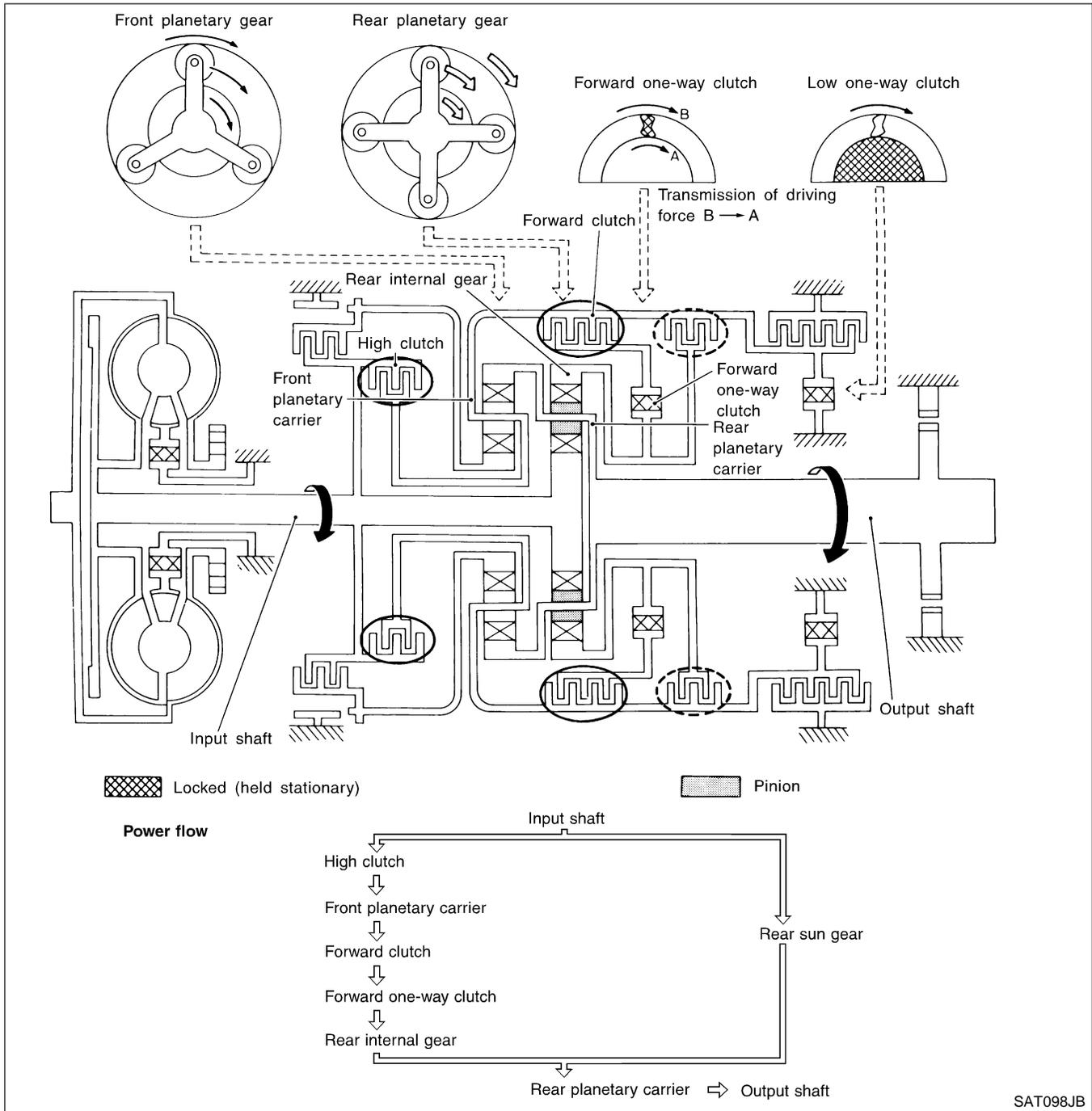
OVERALL SYSTEM

Shift Mechanism (Cont'd)

"D₃" Position

=NAAT0012S0404

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



SAT098JB

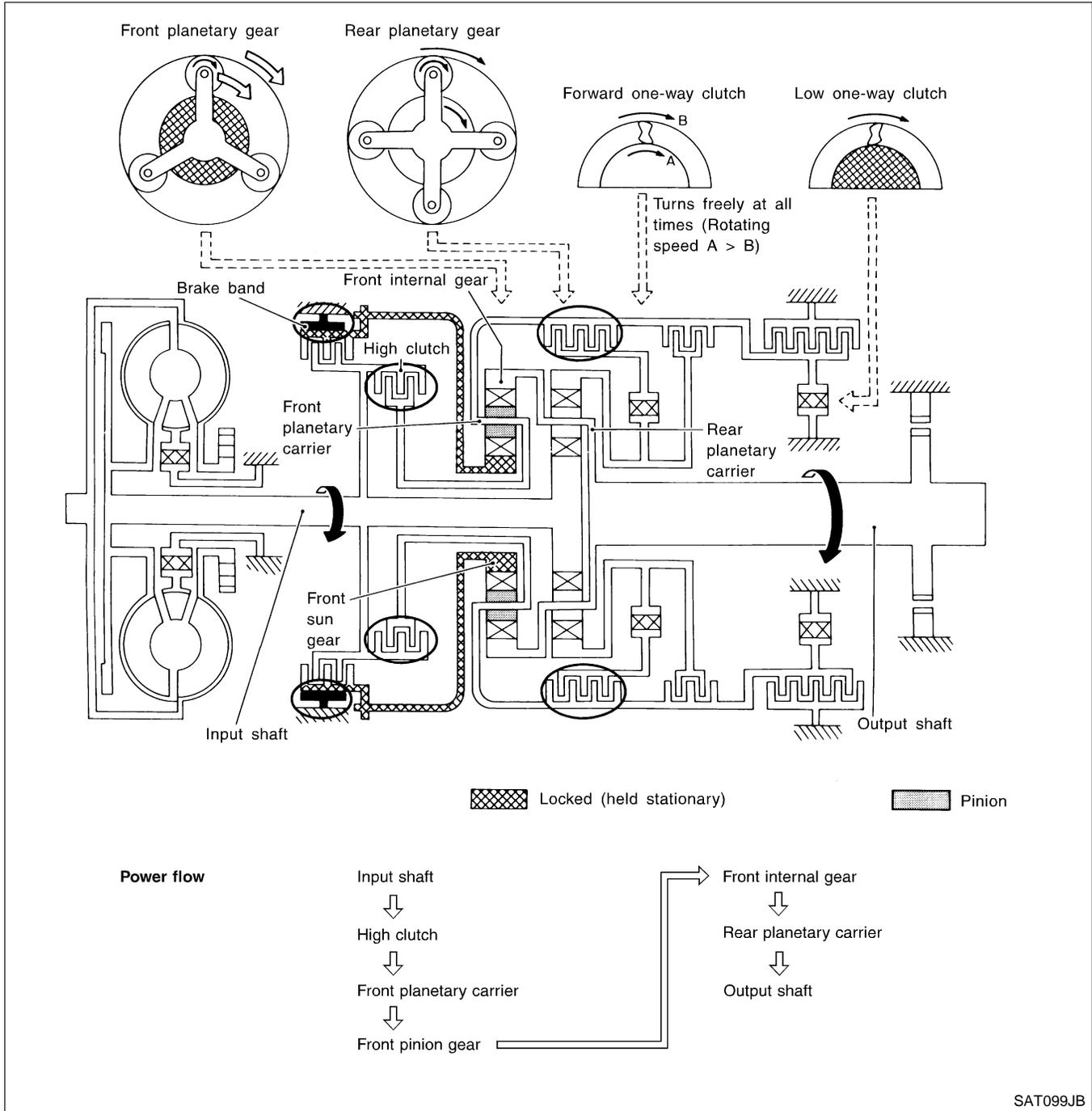
OVERALL SYSTEM

Shift Mechanism (Cont'd)

"D₄" (OD) Position

=NAAT0012S0405

| | |
|---|---|
| <p>High clutch Brake band Forward clutch (Does not affect power transmission)</p> | <p>Input power is transmitted to front carrier through high clutch. This front planetary carrier turns around the sun gear which is fixed by brake band and makes front internal gear (output) turn faster.</p> |
| <p>Engine brake</p> | <p>At D₄ position, there is no one-way clutch in the power transmission line and engine brake can be obtained when decelerating.</p> |



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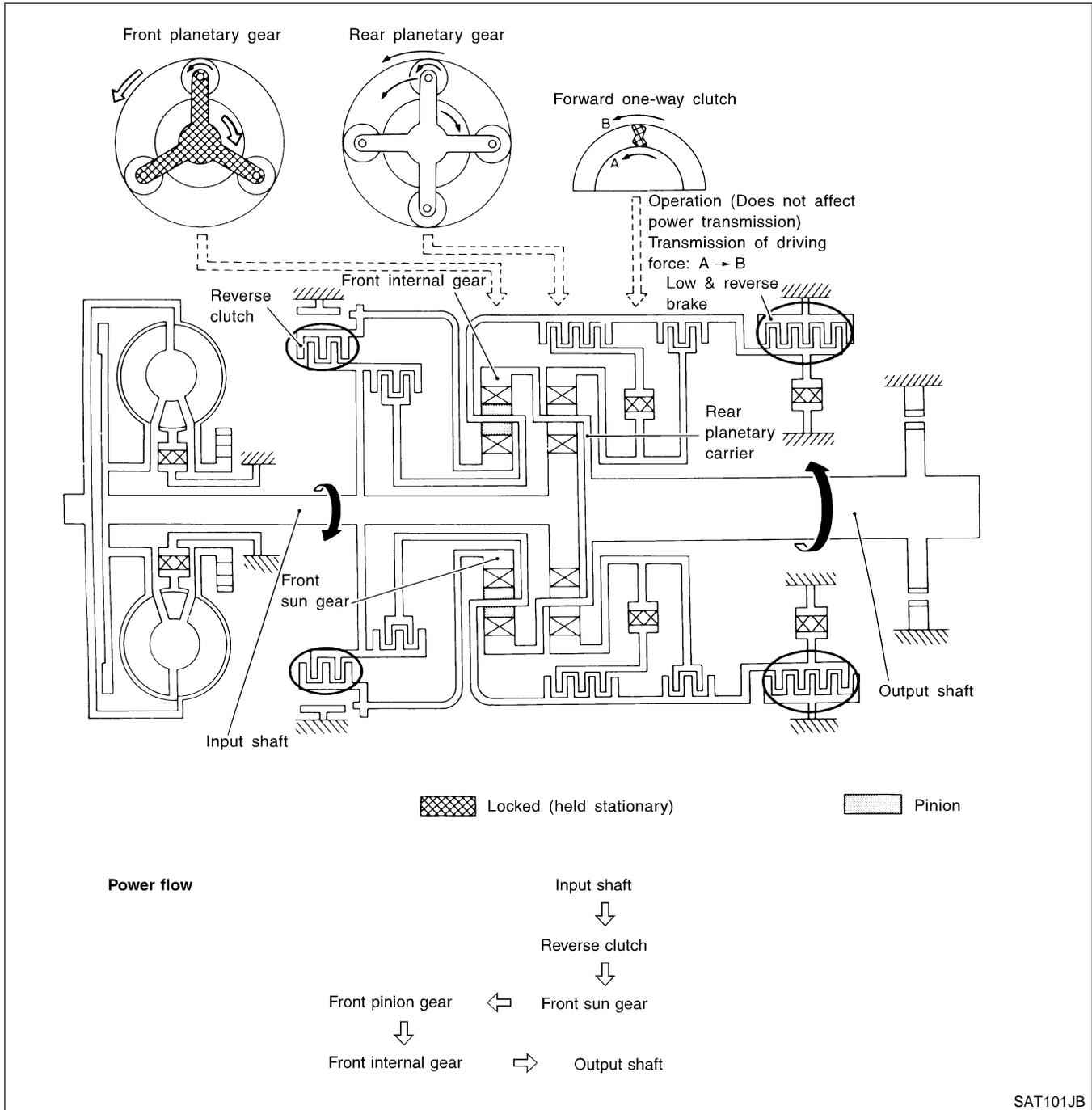
OVERALL SYSTEM

Shift Mechanism (Cont'd)

"R" Position

=NAAT0012S0407

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



SAT101JB

OVERALL SYSTEM

Control System

Control System

=NAAT0013

NAAT0013S01

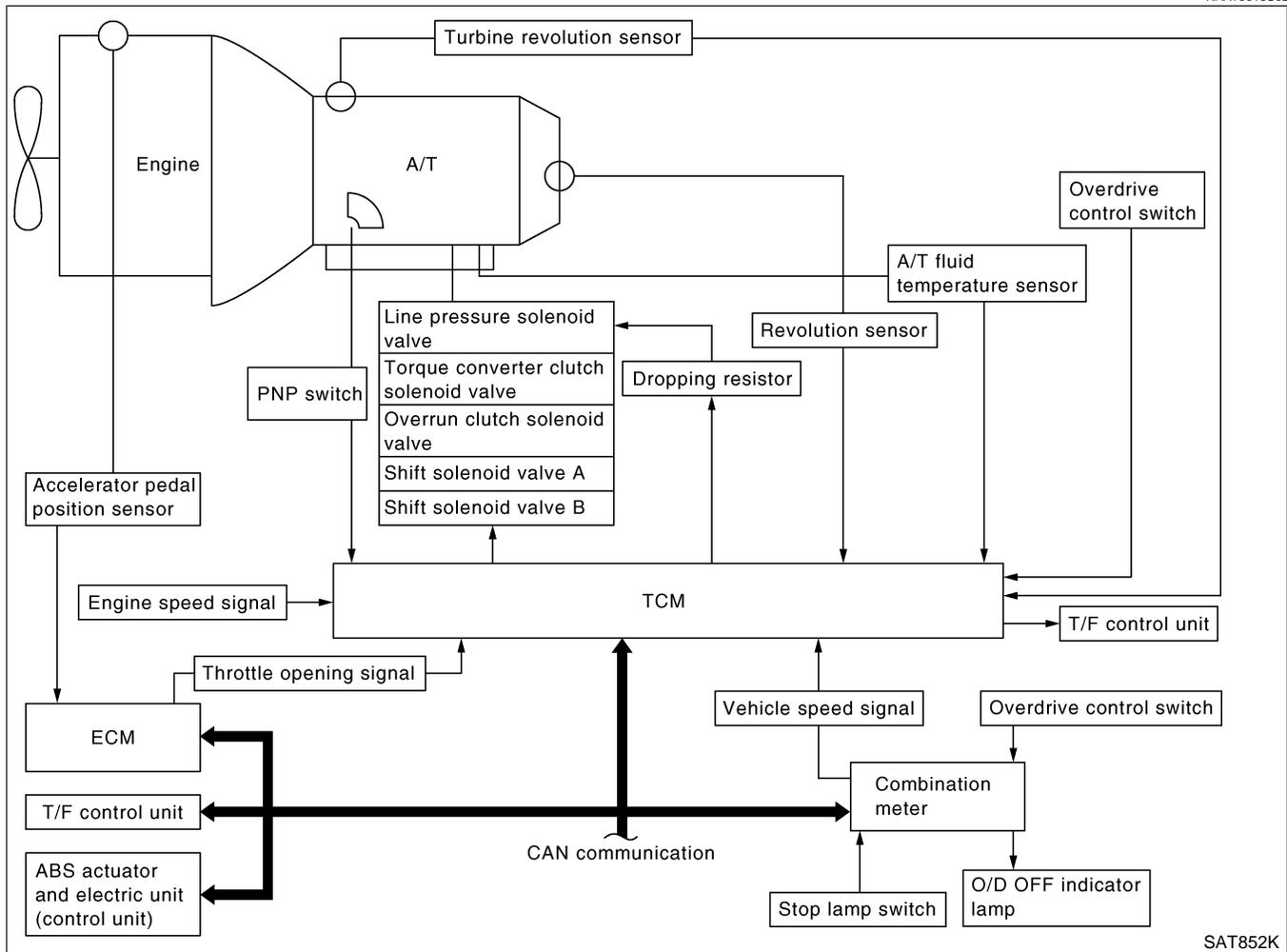
OUTLINE

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

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

CONTROL SYSTEM

NAAT0013S02



OVERALL SYSTEM

Control System (Cont'd)

TCM FUNCTION

=NAAT0013S03

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

NAAT0013S04

| | Sensors and solenoid valves | Function |
|--------|--|--|
| Input | PNP switch | Detects select lever position and sends a signal to TCM. |
| | Accelerator pedal position sensor (throttle position sensor) | Detects accelerator pedal position sensor as throttle position signal and sends a signal from ECM to TCM. |
| | Closed throttle position signal | Detects throttle valve's fully-closed position and sends a signal from ECM to TCM. |
| | Wide open throttle position signal | Detects a throttle valve position of greater than 1/2 of full throttle and sends a signal from ECM 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 signal | Used as an auxiliary vehicle speed signal. 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, from unified meter control unit to the TCM. |
| | Turbine revolution sensor | Sends an input shaft revolution signal. |
| | Stop lamp switch | Sends the lock-up release signal from unified meter control unit 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

NAAT0180

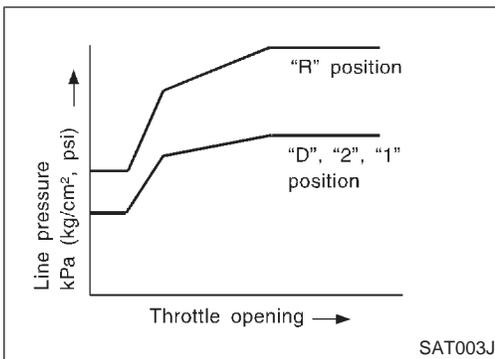
LINE PRESSURE CONTROL

NAAT0180S01

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

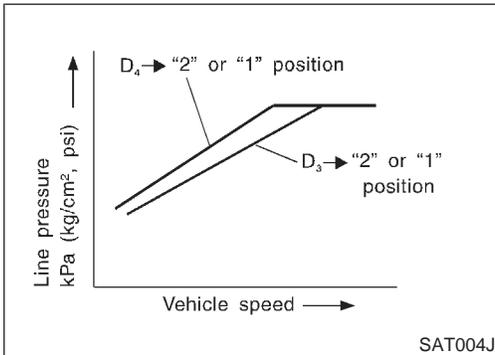
An ON-OFF duty signal is sent to the line pressure solenoid valve based on TCM characteristics.

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



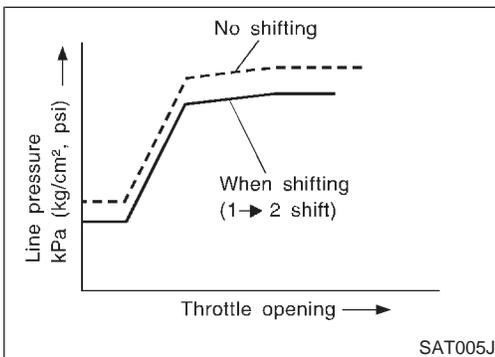
Normal Control

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



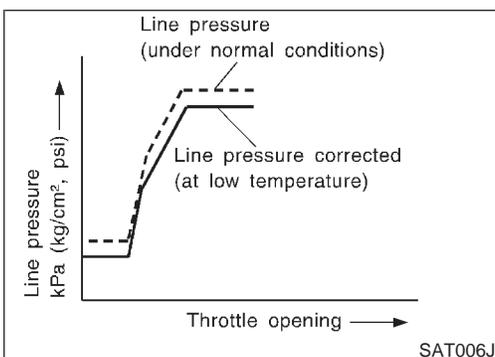
Back-up Control (Engine brake)

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



During Shift Change

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

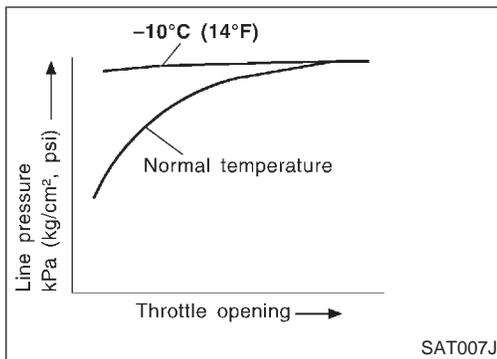
- Fluid viscosity and frictional characteristics of the clutch facing change with fluid temperature. Clutch engaging or band-contacting pressure is compensated for, according to fluid temperature, to stabilize shifting quality.

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

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OVERALL SYSTEM

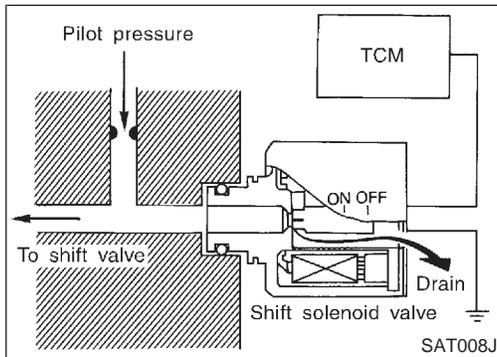
Control Mechanism (Cont'd)



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

SHIFT CONTROL

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



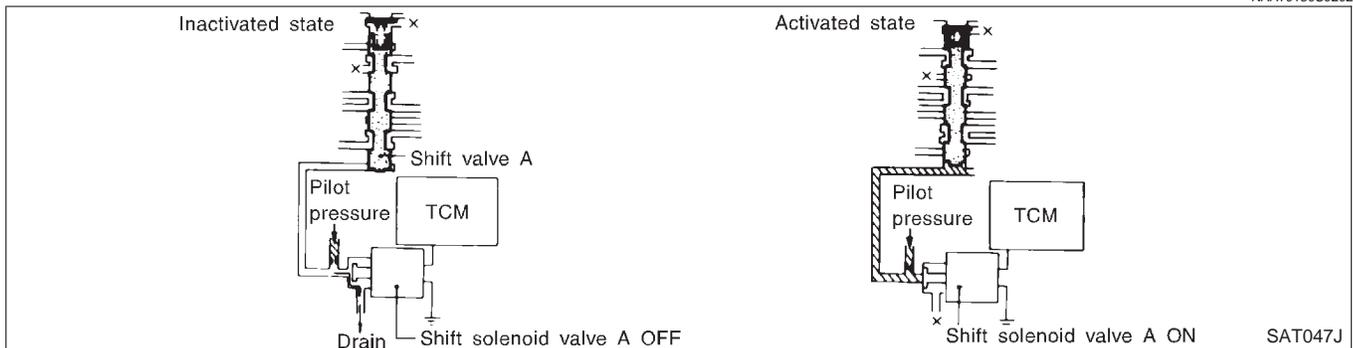
Control of Shift Solenoid Valves A and B

The TCM activates shift solenoid valves A and B according to signals from the accelerator pedal position sensor (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



Pilot pressure generated by the operation of shift solenoid valves A and B is applied to the end face of shift valves A and B. The drawing above shows the operation of shift valve B. When the shift solenoid valve is "ON", pilot pressure applied to the end face of the shift valve overcomes spring force, moving the valve upward.

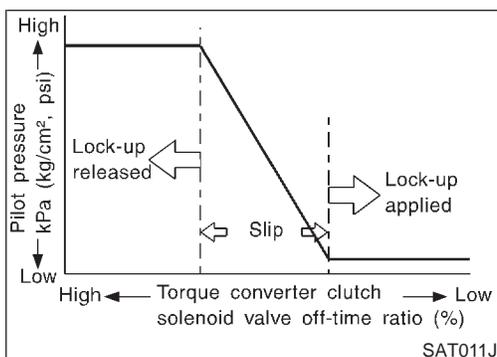
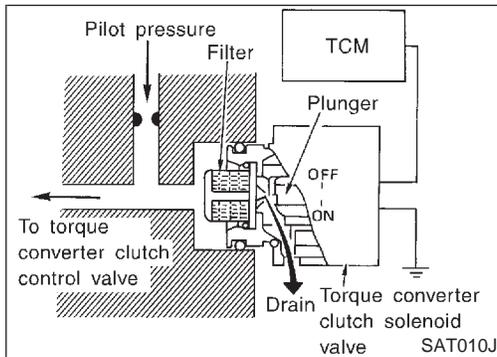
LOCK-UP CONTROL

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

Conditions for Lock-up Operation

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

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



Torque Converter Clutch Solenoid Valve Control

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

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

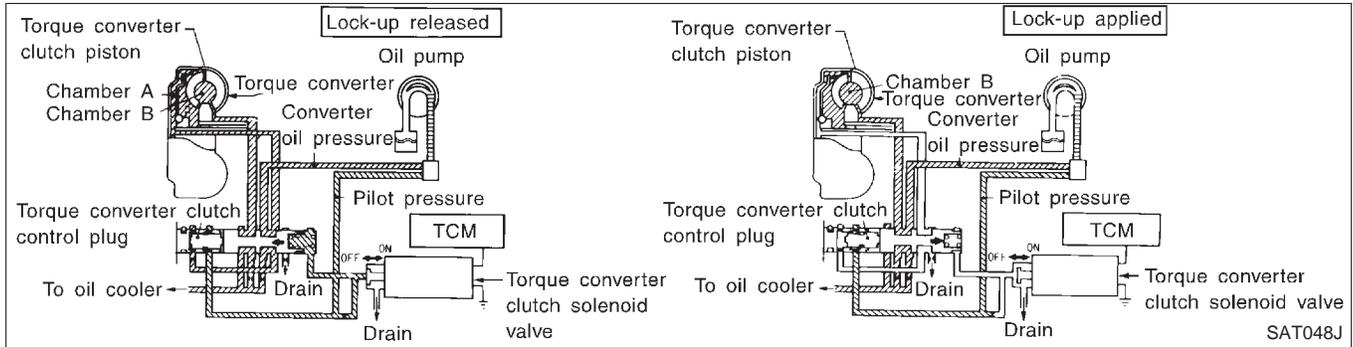
OFF-time INCREASING
 ↓
 Amount of drain DECREASING
 ↓
 Pilot pressure HIGH
 ↓
 Lock-up RELEASING

OVERALL SYSTEM

Control Mechanism (Cont'd)

Torque Converter Clutch Control Valve Operation

NAAT0180S0303



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)

NAAT0180S04

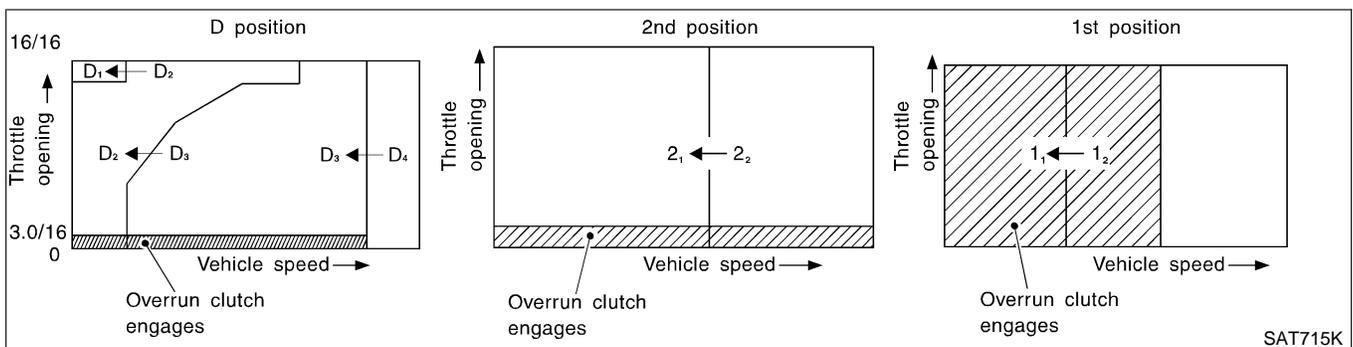
Forward one-way clutch is used to reduce shifting shocks in downshifting operations. This clutch transmits engine torque to the wheels. However, drive force from the wheels is not transmitted to the engine because the one-way clutch rotates idle. This means the engine brake is not effective.

The overrun clutch operates when the engine brake is needed.

Overrun Clutch Operating Conditions

NAAT0180S0401

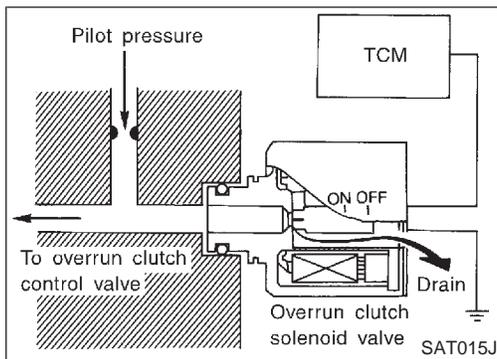
| | Gear position | Throttle opening |
|--------------|--|------------------|
| "D" position | D ₁ , D ₂ , D ₃ gear position | Less than 3/16 |
| "2" position | 2 ₁ , 2 ₂ gear position | At any position |
| "1" position | 1 ₁ , 1 ₂ gear position | |



SAT715K

OVERALL SYSTEM

Control Mechanism (Cont'd)



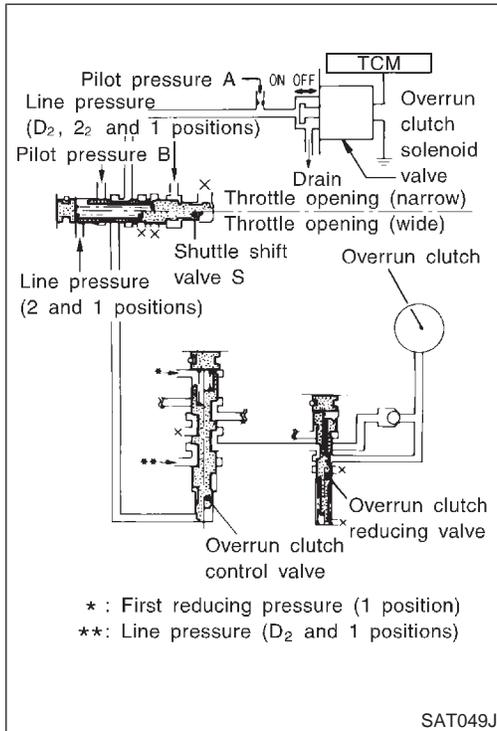
Overrun Clutch Solenoid Valve Control

NAAT0180S0402

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

NAAT0180S0403

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

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

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

Control Valve

FUNCTION OF CONTROL VALVE

NAAT0181

NAAT0181S01

| Valve name | Function |
|---|---|
| <ul style="list-style-type: none"> ● 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. |

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OVERALL SYSTEM

Control Valve (Cont'd)

| Valve name | Function |
|--|--|
| Shift valve A | Simultaneously switches three oil circuits using output pressure of shift solenoid valve A to meet driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve B. |
| Shift valve B | Simultaneously switches three oil circuits using output pressure of shift solenoid valve B in relation to driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve A. |
| Shuttle shift valve S | Switches hydraulic circuits to provide 3-2 timing control and overrun clutch control in relation to the throttle opening. Inactivates the overrun clutch to prevent interlocking in 4th gear when the throttle is wide open. |
| Overrun clutch control valve | Switches hydraulic circuits to prevent engagement of the overrun clutch simultaneously with application of the brake band in 4th gear. (Interlocking occurs if the overrun clutch engages during D 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.) <ul style="list-style-type: none"> ● 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. |

Introduction

NAAT0014

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

NAAT0182

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

NAAT0015

ONE TRIP DETECTION LOGIC

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

TWO TRIP DETECTION LOGIC

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

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

| Items | MIL | |
|---|--------------------|--------------------|
| | One trip detection | Two trip detection |
| Shift solenoid valve A — DTC: P0750 | X | |
| Shift solenoid valve B — DTC: P0755 | X | |
| Accelerator pedal position sensor (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)

NAAT0016

HOW TO READ DTC AND 1ST TRIP DTC

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.

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
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SAT014K

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

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

SAT015K

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

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

SAT016K

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM has a memory function, which stores the driving condition such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed and vehicle speed at the moment the ECM detects a malfunction. NAAT0016S0101

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-103, "CONSULT-II".

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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

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

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

HOW TO ERASE DTC

The diagnostic trouble code can be erased by CONSULT-II, GST or ECM DIAGNOSTIC TEST MODE as described following. NAAT0016S02

- 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-78, "Emission-related Diagnostic Information".

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

Ⓟ HOW TO ERASE DTC (WITH CONSULT-II)

- If a DTC is displayed for both ECM and TCM, it needs to be erased for both ECM and TCM. NAAT0016S03
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.)

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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

How to erase DTC (With CONSULT-II)

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

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
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| |

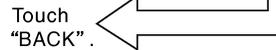
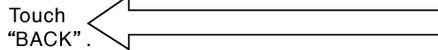
2. Turn CONSULT -II "ON", and touch "A/T".

| |
|-----------------------|
| SELECT DIAG MODE |
| SELF-DIAG RESULTS |
| DATA MONITOR |
| CAN DIAG SUPPORT MNTR |
| DTC WORK SUPPORT |
| ECU PART NUMBER |
| |
| |
| |

3. Turn "SELF-DIAG RESULTS".

| |
|-------------------|
| SELF-DIAG RESULTS |
| DTC RESULTS |
| T/C CLUTCH SOLV |
| |
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| |

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



| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
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| |

5. Touch "ENGINE".

| |
|-----------------------|
| SELECT DIAG MODE |
| WORK SUPPORT |
| SELF-DIAG RESULTS |
| DATA MONITOR |
| DATA MONITOR (SPEC) |
| CAN DIAG SUPPORT MNTR |
| ACTIVE TEST |
| |
| |

6. Touch "SELF-DIAG RESULTS".

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

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

SAT857K

HOW TO ERASE DTC (WITH GST)

NAAT0016S04

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". Refer to AT-48.
3. Select Mode 4 with Generic Scan Tool (GST). For details, refer to EC-117, "DESCRIPTION".

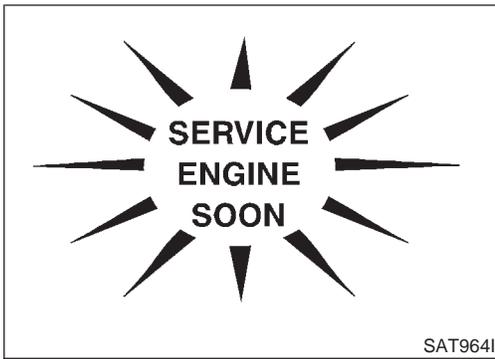
HOW TO ERASE DTC (NO TOOLS)

NAAT0016S05

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform "TCM SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-48. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Malfunction Indicator Lamp (MIL)



Malfunction Indicator Lamp (MIL)

=NAAT0183

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-130, "Schematic". (Or refer to EC-757, "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-77, "Introduction".

CONSULT-II

NAAT0184

After performing "SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)" (AT-38), place check marks for results on the "DIAGNOSTIC WORKSHEET", AT-57. 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.

FUNCTION

NAAT0184S07

| Diagnostic test mode | Function | Reference |
|--------------------------------|---|----------------|
| Self-diagnostic results | Self-diagnostic results can be read and erased quickly. | Refer to AT-38 |
| Data monitor | Input/Output data in the ECM can be read. | Refer to AT-40 |
| CAN diagnostic support monitor | The results of transmit/receive diagnosis of CAN communication can be read. | — |
| Function test | Conducted by CONSULT-II instead of a technician to determine whether each system is "OK" or "NG". | — |
| DTC work support | Select the operating condition to confirm Diagnosis Trouble Codes. | Refer to AT-44 |
| ECM part number | ECM part number can be read. | — |

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
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|----------------|
| REAL-TIME DIAG |
| ENG SPEED SIG |
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SAT987J

Ⓜ SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II) NAAT0184S01

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-95. If result is NG, refer to EL-11, "Schematic".
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

NAAT0184S02

| Detected items (Screen terms for CONSULT-II, "SELF-DIAG RESULTS" test mode) | | Malfunction is detected when ... | TCM self-diagnosis | OBD-II (DTC) |
|--|--------------------|---|--|---|
| "A/T" | "ENGINE" | |  Available by O/D OFF indicator lamp |  Available by malfunction indicator lamp*2, "ENGINE" on CONSULT-II or GST |
| PNP switch circuit | | ● TCM does not receive the correct voltage signal (based on the gear position) from the switch. | — | P0705 |
| — | PNP SW/CIRC | | | |
| Revolution sensor | | ● TCM does not receive the proper voltage signal from the sensor. | X | P0720 |
| VHCL SPEED SEN-A/T | VEH SPD SEN/CIR AT | | | |
| Vehicle speed sensor (Meter) | | ● TCM does not receive the proper voltage signal from the sensor. | X | — |
| VHCL SPEED SEN-MTR | — | | | |
| A/T 1st gear function | | ● A/T cannot be shifted to the 1st gear position even if electrical circuit is good. | — | P0731*1 |
| — | A/T 1ST GR FNCTN | | | |
| A/T 2nd gear function | | ● A/T cannot be shifted to the 2nd gear position even if electrical circuit is good. | — | P0732*1 |
| — | A/T 2ND GR FNCTN | | | |
| A/T 3rd gear function | | ● A/T cannot be shifted to the 3rd gear position even if electrical circuit is good. | — | P0733*1 |
| — | A/T 3RD GR FNCTN | | | |
| A/T 4th gear function | | ● A/T cannot be shifted to the 4th gear position even if electrical circuit is good. | — | P0734*1 |
| — | A/T 4TH GR FNCTN | | | |

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

| Detected items (Screen terms for CONSULT-II, "SELF-DIAG RESULTS" test mode) | | Malfunction is detected when ... | TCM self-diagnosis | OBD-II (DTC) |
|--|---------------------|---|--|---|
| "A/T" | "ENGINE" | |  Available by O/D OFF indicator lamp |  Available by malfunction indicator lamp*2, "ENGINE" on CON- SULT-II or GST |
| — | A/T TCC S/V FNCTN | ● A/T cannot perform lock-up even if electrical circuit is good. | — | P0744*1 |
| A/T TCC S/V function (lock-up) | | | | |
| SHIFT SOLENOID/V A | SFT SOL A/CIRC | ● TCM detects an improper voltage drop when it tries to operate the solenoid valve. | X | P0750 |
| Shift solenoid valve A | | | | |
| SHIFT SOLENOID/V B | SFT SOL B/CIRC | ● TCM detects an improper voltage drop when it tries to operate the solenoid valve. | X | P0755 |
| Shift solenoid valve B | | | | |
| OVERRUN CLUTCH S/V | O/R CLUCH SOL/ CIRC | ● TCM detects an improper voltage drop when it tries to operate the solenoid valve. | X | P1760 |
| Overrun clutch solenoid valve | | | | |
| T/C CLUTCH SOL/V | TCC SOLENOID/ CIRC | ● TCM detects an improper voltage drop when it tries to operate the solenoid valve. | X | P0740 |
| T/C clutch solenoid valve | | | | |
| LINE PRESSURE S/V | L/PRESS SOL/CIRC | ● TCM detects an improper voltage drop when it tries to operate the solenoid valve. | X | P0745 |
| Line pressure solenoid valve | | | | |
| THROTTLE POSI SEN | TP SEN/CIRC A/T | ● TCM receives an excessively low or high voltage from the sensor. | X | P1705 |
| Accelerator pedal position sensor (throttle position sensor) | | | | |
| ENGINE SPEED SIG | | ● TCM does not receive the proper voltage signal from the ECM. | X | P0725 |
| Engine speed signal | | | | |
| BATT/FLUID TEMP SEN | ATF TEMP SEN/ CIRC | ● TCM receives an excessively low or high voltage from the sensor. | X | P0710 |
| A/T fluid temperature sensor | | | | |
| CAN COMM LINE | — | ● The CAN communication line is open or shorted. | X | EC-54 |
| CAN communication | | | | |
| TURBINE REV | — | ● TCM does not receive the proper voltage signal from the sensor. | X | — |
| Turbine revolution sensor | | | | |
| CONTROL UNIT (RAM) | — | ● TCM memory (RAM) is malfunctioning. | — | — |
| TCM (RAM) | | | | |
| CONTROL UNIT (ROM) | — | ● TCM memory (ROM) is malfunctioning. | — | — |
| TCM (ROM) | | | | |

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

| Detected items (Screen terms for CONSULT-II, "SELF-DIAG RESULTS" test mode) | | Malfunction is detected when ... | TCM self-diagnosis | OBD-II (DTC) |
|--|----------|--|--------------------|--|
| "A/T" | "ENGINE" | | |  Available by O/D OFF indicator lamp |
| TCM (EEP ROM) | | ● TCM memory (EEP ROM) is malfunctioning. | — | — |
| CONTROL UNIT (EEP ROM) | — | | | |
| Initial start | | ● This is not a malfunction message (Whenever shutting off a power supply to the TCM, this message appears on the screen.) | X | — |
| INITIAL START | — | | | |
| No failure (NO DTC IS DETECTED FURTHER TESTING MAY BE REQUIRED) | | ● No failure has been detected. | X | X |

X: Applicable

—: Not applicable

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

*2: Refer to EC-94, "DESCRIPTION".

DATA MONITOR MODE (A/T)

NAAT0184S03

| Item | Display | Selection monitor item | | | Description | Remarks |
|--|----------------------------------|------------------------|--------------|---------------------|--|---|
| | | TCM INPUT SIGNALS | MAIN SIGNALS | SELECTION FROM MENU | | |
| 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. |
| Accelerator pedal position sensor (throttle position sensor) | THRTL POS SEN [V] | X | — | ▼ | ● Accelerator pedal position sensor (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. | |

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

| Item | Display | Selection monitor item | | | Description | Remarks |
|---------------------------|------------------------|------------------------|--------------|---------------------|---|--|
| | | TCM INPUT SIGNALS | MAIN SIGNALS | SELECTION FROM MENU | | |
| 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. | |
| 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 | ● Not mounted but displayed. |
| 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 | ● Not mounted but displayed. |
| 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. |

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

| Item | Display | Selection monitor item | | | Description | Remarks |
|------------------------------------|-------------------------------|------------------------|--------------|---------------------|--|--|
| | | TCM INPUT SIGNALS | MAIN SIGNALS | SELECTION FROM MENU | | |
| A/T mode switch | POWER SHIFT SW [ON/OFF] | X | — | ▼ | | ● Not mounted but displayed. |
| Closed throttle position signal | CLOSED THL/SW [ON/OFF] | X | — | ▼ | ● ON/OFF status, computed from signal of closed throttle position SW, is displayed. | ● Signal input with CAN communication |
| Wide open throttle position signal | W/O THRL/P-SW [ON/OFF] | X | — | ▼ | ● ON/OFF status, computed from signal of wide open throttle position SW, is displayed. | ● Signal input with CAN communication |
| Shift solenoid valve A | *SHIFT S/V A [ON/OFF] | — | — | ▼ | Displays status of check signal (re-input signal) for TCM control signal output. Remains unchanged when solenoid valves are open or shorted. | |
| Shift solenoid valve B | *SHIFT S/V B [ON/OFF] | — | — | ▼ | | |
| Overrun clutch solenoid valve | *OVRRUN/C S/V [ON/OFF] | — | — | ▼ | | |
| A/T mode switch | HOLD SW [ON/OFF] | X | — | ▼ | | ● Not mounted but displayed. |
| Stop lamp signal | BRAKE SW [ON/OFF] | X | — | ▼ | ● ON/OFF status is displayed. ON ... Brake pedal is depressed. OFF ... Brake pedal is released. | ● Signal input with CAN communication |
| 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. | |

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

| Item | Display | Selection monitor item | | | Description | Remarks |
|--|------------------------|------------------------|--------------|---------------------|---|--|
| | | TCM INPUT SIGNALS | MAIN SIGNALS | SELECTION FROM MENU | | |
| Torque converter clutch solenoid valve duty | TCC S/V DUTY [%] | — | X | ▼ | <ul style="list-style-type: none"> Control value of torque converter clutch solenoid valve, computed by TCM from each input signal, is displayed. | |
| Shift solenoid valve A | SHIFT S/V A [ON/OFF] | — | X | ▼ | <ul style="list-style-type: none"> Control value of shift solenoid valve A, computed by TCM from each input signal, is displayed. | Control value of solenoid is displayed even if solenoid circuit is disconnected. The "OFF" signal is displayed if solenoid circuit is shorted. |
| Shift solenoid valve B | SHIFT S/V B [ON/OFF] | — | X | ▼ | <ul style="list-style-type: none"> Control value of shift solenoid valve B, computed by TCM from each input signal, is displayed. | |
| Overrun clutch solenoid valve | OVERRUN/C S/V [ON/OFF] | — | X | ▼ | <ul style="list-style-type: none"> Control value of overrun clutch solenoid valve computed by TCM from each input signal is displayed. | |
| Self-diagnosis display lamp (O/D OFF indicator lamp) | SELF-D DP LMP [ON/OFF] | — | X | ▼ | <ul style="list-style-type: none"> Control status of O/D OFF indicator lamp is displayed. | |
| Torque converter slip ratio | TC SLIP RATIO [0.000] | — | — | ▼ | <ul style="list-style-type: none"> Ratio of engine revolution to input shaft revolution of torque converter | |
| Torque converter slip speed | TC SLIP SPEED [rpm] | — | — | ▼ | Difference in revolution between input shaft revolution and input shaft revolution of torque converter | Display doesn't indicate 0 rpm even if engine is stopped. But this isn't malfunction. |
| Voltage | Voltage [V] | — | — | ▼ | Value measured by voltage probe is displayed. | |
| Frequency | Frequency [Hz] | — | — | ▼ | Value measured by pulse probe is displayed. If measurement is impossible, "#" sign is displayed. "#" sign is also displayed at the final data value until the measurement result is obtained. | |
| Duty cycle (high) | DUTY-HI [%] | — | — | ▼ | Duty cycle value for measurement probe is displayed. | |
| Duty cycle (low) | DUTY-LOW [%] | — | — | ▼ | | |

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

| Item | Display | Selection monitor item | | | Description | Remarks |
|-------------------|---------------|------------------------|--------------|---------------------|---|---------|
| | | TCM INPUT SIGNALS | MAIN SIGNALS | SELECTION FROM MENU | | |
| Plus width (high) | PLS WIDTH-HI | — | — | ▼ | Measured pulse width of measurement probe is displayed. | |
| Plus width (low) | PLS WIDTH-LOW | — | — | ▼ | | |

X: Applicable

—: Not applicable

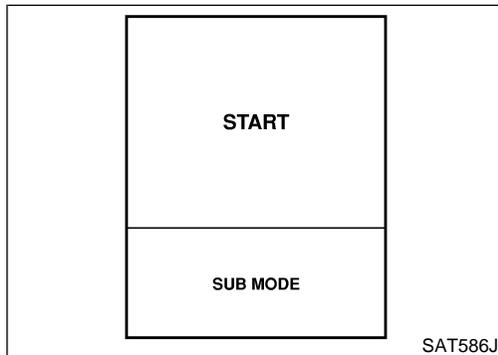
▼: Option

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

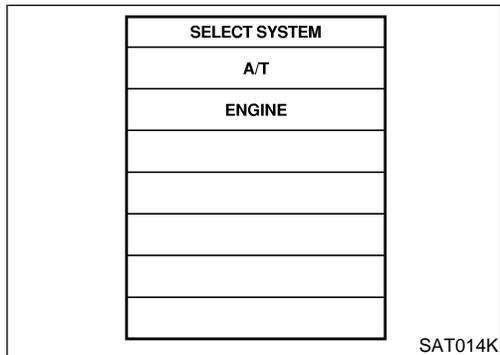
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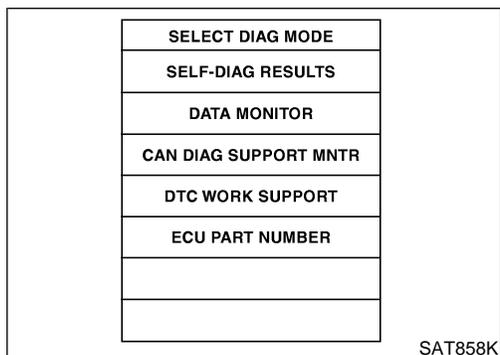
1. Turn ignition switch "OFF".
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector, which is located in instrument lower panel on driver side.



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



5. Touch "A/T".



6. Touch "DTC WORK SUPPORT".

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)

| |
|---------------------|
| 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 CONDITION FOR THIS DIAGNOSIS. |
| |
| |

SAT589J

8. Touch "START".

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

SAT019K

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

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

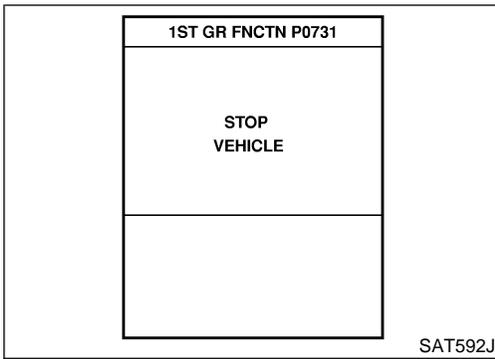
SAT591J

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

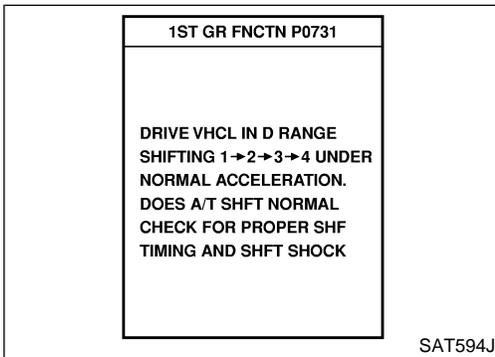
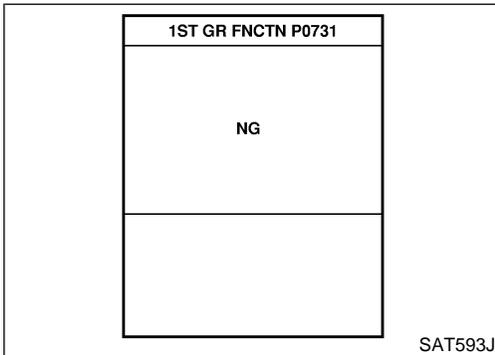
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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

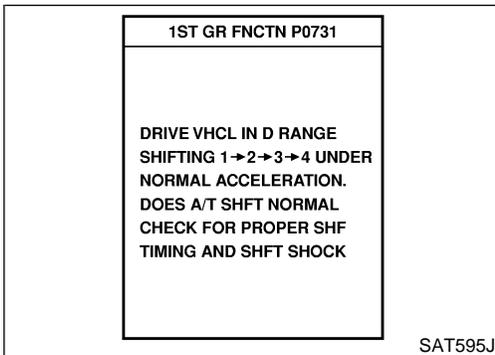
CONSULT-II (Cont'd)



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



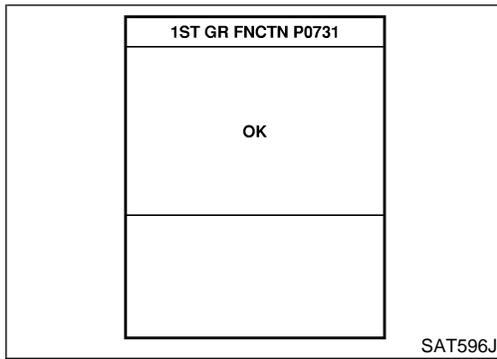
11. Perform test drive to check gear shift feeling in accordance with instructions displayed.



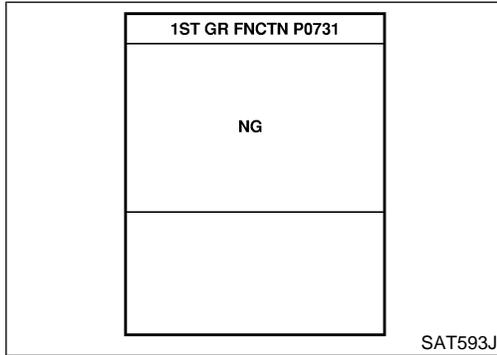
12. Touch "YES" or "NO".

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

CONSULT-II (Cont'd)



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



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DTC WORK SUPPORT MODE

NAAT0184S05

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

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Procedure Without CONSULT-II

Diagnostic Procedure Without CONSULT-II

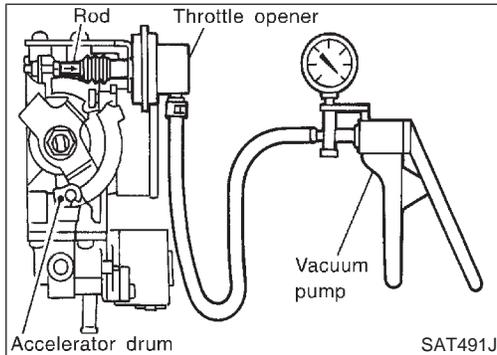
 **OBD-II SELF-DIAGNOSTIC PROCEDURE (WITH GST)** NAAT0206
NAAT0206S01

Refer to EC-117, "DESCRIPTION".

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

Refer to EC-94, "DESCRIPTION".

NAAT0206S02



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

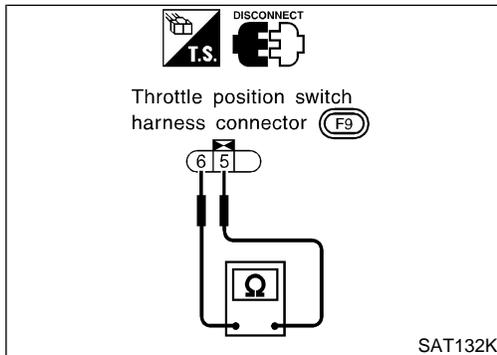
Preparation

1. Turn ignition switch to "OFF" position.
2. Connect the handy type vacuum pump to the throttle opener and apply vacuum -25.3 kPa (-190 mmHg, -7.48 inHg).
3. Disconnect the throttle position switch harness connector.
4. Turn ignition switch to "ON" position.
5. Check continuity of the closed throttle position switch.

Continuity should exist.

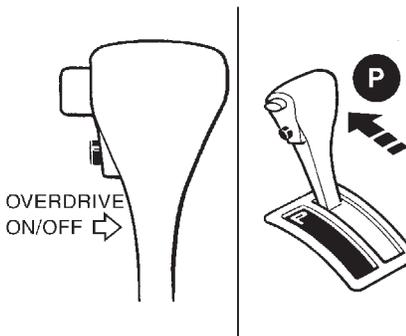
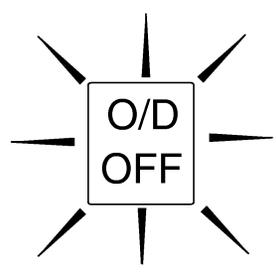
(If continuity does not exist, check throttle opener and closed throttle position switch. Then increase vacuum until closed throttle position switch shows continuity.)

6. Go to "DIAGNOSIS START" on next page.



ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Procedure Without CONSULT-II (Cont'd)

| | | |
|--|-------------------------------------|--|
| 1 | CHECK O/D OFF INDICATOR LAMP | |
| <p>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.</p> | | |
| <div style="display: flex; justify-content: center; align-items: center;">  </div> <p style="text-align: right;">SAT967I</p> | | |
| <p>4. Turn ignition switch to "ON" position. (Do not start engine.) 5. Does O/D OFF indicator lamp come on for about 2 seconds?</p> | | |
| <div style="display: flex; justify-content: center; align-items: center;">  </div> <p style="text-align: center;">O/D OFF indicator lamp</p> <p style="text-align: right;">SAT204K</p> <p style="text-align: center;">Yes or No</p> | | |
| Yes | ▶ | GO TO 2. |
| No | ▶ | Stop procedure. Perform "O/D OFF Indicator Lamp Does Not Come On", AT-218 before proceeding. |

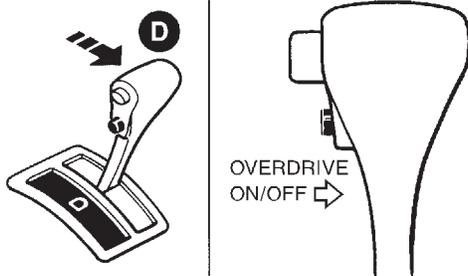
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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Procedure Without CONSULT-II (Cont'd)

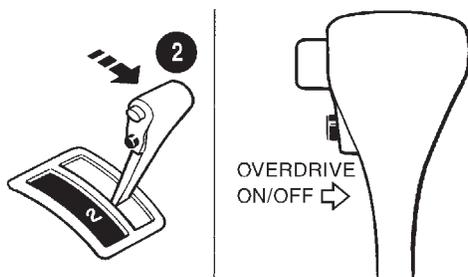
2 JUDGEMENT PROCEDURE STEP 1

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-255.
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.

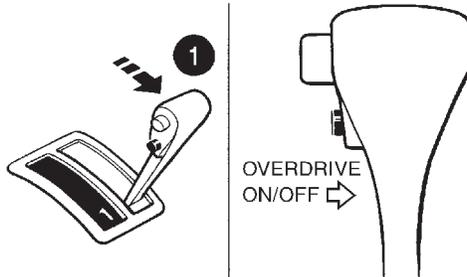
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Procedure Without CONSULT-II (Cont'd)

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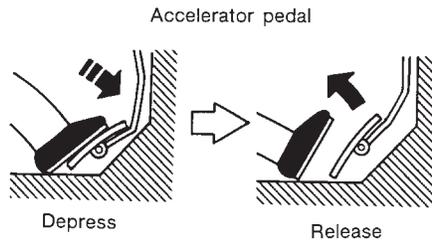
3 JUDGEMENT PROCEDURE STEP 2

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").



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").

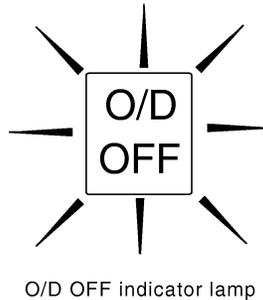


SAT981F

▶ GO TO 4.

4 CHECK SELF-DIAGNOSIS CODE

Check O/D OFF indicator lamp.
Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE, AT-52.



O/D OFF indicator lamp

SAT204K

▶ DIAGNOSIS END

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

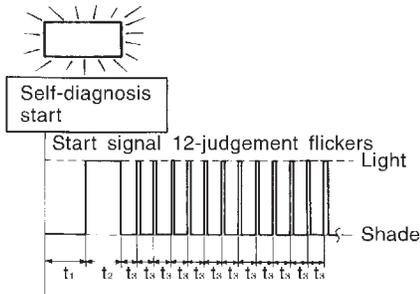
Diagnostic Procedure Without CONSULT-II (Cont'd)

JUDGEMENT OF SELF-DIAGNOSIS CODE

NAAT0206S04

O/D OFF indicator lamp:

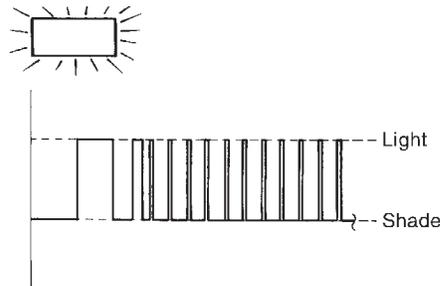
All judgement flickers are same.



SAT666I

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

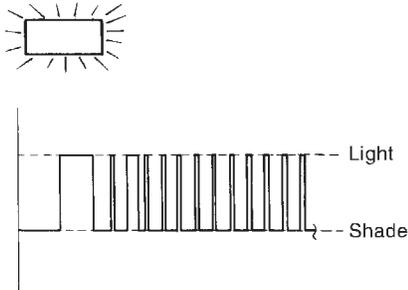
1st judgement flicker is longer than others.



SAT667I

Revolution sensor circuit is short-circuited or disconnected.
⇒ Go to DTC P0720 VEHICLE SPEED SENSOR-A/T (REVOLUTION SENSOR), AT-114.

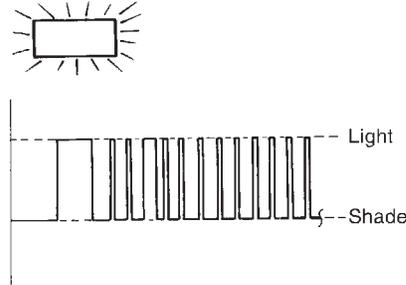
2nd judgement flicker is longer than others.



SAT668I

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

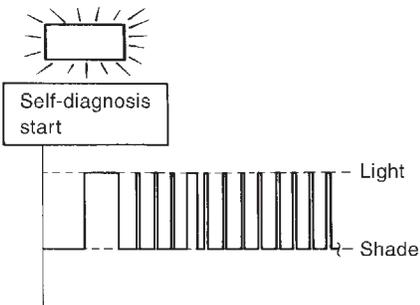
3rd judgement flicker is longer than others.



SAT669I

Accelerator pedal position sensor circuit is short-circuited or disconnected.
⇒ Go to DTC P1705 ACCELERATOR PEDAL POSITION SENSOR, AT-179.

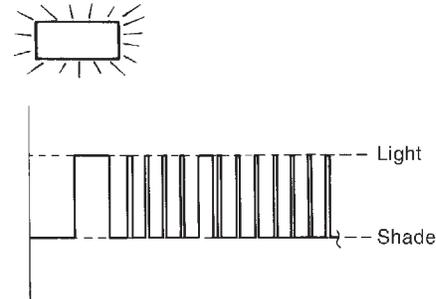
4th judgement flicker is longer than others.



SAT670I

Shift solenoid valve A circuit is short-circuited or disconnected.
⇒ Go to DTC P0750 SHIFT SOLENOID VALVE A, AT-171.

5th judgement flicker is longer than others.



SAT671I

Shift solenoid valve B circuit is short-circuited or disconnected.
⇒ Go to DTC P0755 SHIFT SOLENOID VALVE B, AT-175.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Procedure Without CONSULT-II (Cont'd)

O/D OFF indicator lamp:

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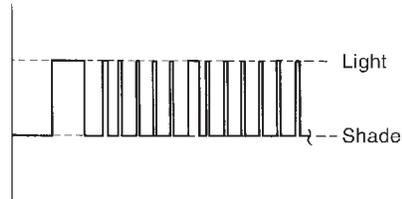
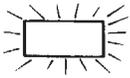
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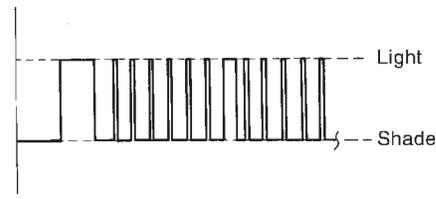
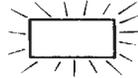
6th judgement flicker is longer than others.



SAT672I

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

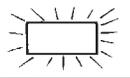
7th judgement flicker is longer than others.



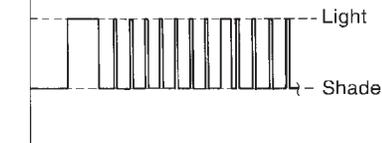
SAT673I

Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
 ⇒ Go to DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE, AT-151.

8th judgement flicker is longer than others.



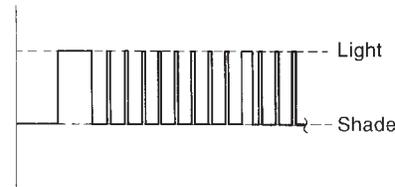
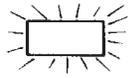
Self-diagnosis start



SAT674I

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

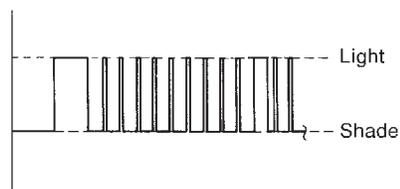
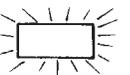
9th judgement flicker is longer than others.



SAT675I

Engine speed signal circuit is short-circuited or disconnected.
 ⇒ Go to DTC P0725 ENGINE SPEED SIGNAL, AT-119.

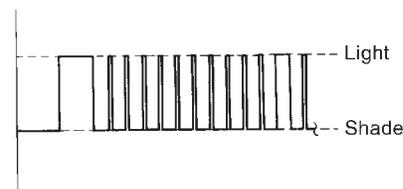
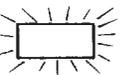
10th judgement flicker is longer than others.



SAT676I

Turbine revolution sensor circuit is short-circuited or disconnected.
 ⇒ Go to DTC Turbine Revolution Sensor, AT-206.

11th judgement flicker is longer than others.



SAT677I

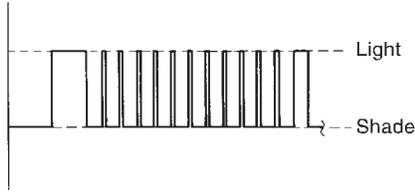
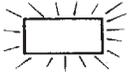
Line pressure solenoid valve circuit is short-circuited or disconnected.
 ⇒ Go to DTC P0745 LINE PRESSURE SOLENOID VALVE, AT-165.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnostic Procedure Without CONSULT-II (Cont'd)

O/D OFF indicator lamp:

12th judgement flicker is longer than others.

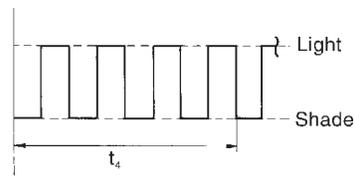
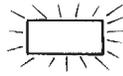


SAT678I

CAN communication line is open or shorted.

⇒ **Go to DTC U1000 CAN COMMUNICATION LINE, AT-203.**

Flickers as shown below.



SAT679I

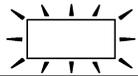
Battery power is low.

Battery has been disconnected for a long time.

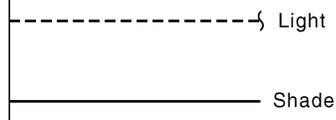
Battery is connected conversely.

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

Lamp comes off.



Self diagnosis
Start

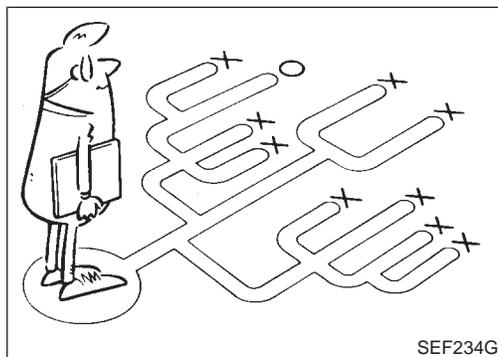
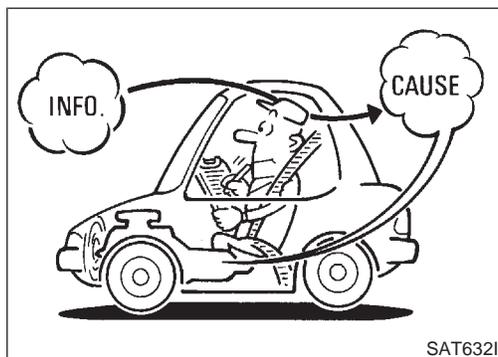
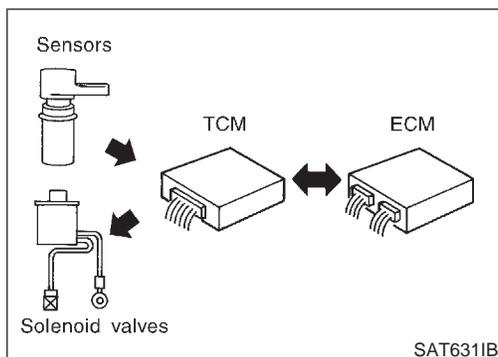


SAT705K

Park/neutral position (PNP) switch, overdrive control switch, closed throttle position signal or wide-open throttle position signal circuit is disconnected or TCM is damaged.

⇒ **Go to 21. TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Accelerator Pedal Position Sensor Circuit Checks), AT-255.**

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



Introduction

NAAT0019

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 an incident that occurs intermittently rather than continuously. Most intermittent incidents 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 incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the "Work Flow". Refer to AT-59.

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 incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic Worksheet" like the example (AT-57) should be used.

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

Also check related Service bulletins.

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TROUBLE DIAGNOSIS — INTRODUCTION

Introduction (Cont'd)

Diagnostic Worksheet

=NAAT0019S0102

| | | |
|------|---|-----------------|
| 1. | <input type="checkbox"/> Read the Fail-safe Remarks and listen to customer complaints. | AT-8 |
| 2. | <input type="checkbox"/> CHECK A/T FLUID <input type="checkbox"/> Leakage (Follow specified procedure) <input type="checkbox"/> Fluid condition <input type="checkbox"/> Fluid level | AT-61 |
| 3. | Perform STALL TEST and LINE PRESSURE TEST. <input type="checkbox"/> Stall test — Mark possible damaged components/others. <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <input type="checkbox"/> Torque converter one-way clutch <input type="checkbox"/> Reverse clutch <input type="checkbox"/> Forward clutch <input type="checkbox"/> Overrun clutch <input type="checkbox"/> Forward one-way clutch </div> <div style="width: 45%;"> <input type="checkbox"/> Low & reverse brake <input type="checkbox"/> Low one-way clutch <input type="checkbox"/> Engine <input type="checkbox"/> Line pressure is low <input type="checkbox"/> Clutches and brakes except high clutch and brake band are OK </div> </div> <input type="checkbox"/> Pressure test — Suspected parts: | AT-61, AT-64 |
| 4. | <input type="checkbox"/> Perform all ROAD TEST and mark required procedures. | AT-65 |
| 4-1. | Check before engine is started. <input type="checkbox"/> O/D OFF Indicator Lamp Does Not Come On, AT-218. <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE - Mark detected items. <input type="checkbox"/> DTC P0705 PNP switch, AT-102. <input type="checkbox"/> DTC P0710 A/T fluid temperature sensor, AT-108. <input type="checkbox"/> DTC P0720 Vehicle speed sensor-A/T (Revolution sensor), AT-114. <input type="checkbox"/> DTC P0725 Engine speed signal, AT-119. <input type="checkbox"/> DTC P0740 Torque converter clutch solenoid valve, AT-151. <input type="checkbox"/> DTC P0745 Line pressure solenoid valve, AT-165. <input type="checkbox"/> DTC P0750 Shift solenoid valve A, AT-171. <input type="checkbox"/> DTC P0755 Shift solenoid valve B, AT-175. <input type="checkbox"/> DTC P1705 Accelerator pedal position sensor, AT-179. <input type="checkbox"/> DTC P1760 Overrun clutch solenoid valve, AT-185. <input type="checkbox"/> DTC BATT/FLUID TEMP SEN (A/T fluid temperature sensor and TCM power source), AT-190. <input type="checkbox"/> DTC Vehicle speed sensor-MTR, AT-197. <input type="checkbox"/> DTC Turbine revolution sensor, AT-206. <input type="checkbox"/> DTC U1000 CAN communication line, AT-203. <input type="checkbox"/> DTC Control unit (RAM), control unit (ROM), AT-211. <input type="checkbox"/> DTC Control unit (EEP ROM), AT-213. <input type="checkbox"/> PNP, overdrive control and accelerator pedal position sensor, AT-255. <input type="checkbox"/> Battery <input type="checkbox"/> Others | AT-66 |
| 4-2. | Check at idle <input type="checkbox"/> Engine Cannot Be Started In "P" And "N" Position, AT-220. <input type="checkbox"/> In "P" Position, Vehicle Moves Forward Or Backward When Pushed, AT-221. <input type="checkbox"/> In "N" Position, Vehicle Moves, AT-222. <input type="checkbox"/> Large Shock. "N" → "R" Position, AT-224. <input type="checkbox"/> Vehicle Does Not Creep Backward In "R" Position, AT-226. <input type="checkbox"/> Vehicle Does Not Creep Forward In "D", "2" Or "1" Position, AT-229. | AT-68 |

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TROUBLE DIAGNOSIS — INTRODUCTION

Introduction (Cont'd)

| | | | |
|----|------|--|-----------------|
| 4. | 4-3. | Cruise test | AT-69 AT-73 |
| | | Part-1 | |
| | | <input type="checkbox"/> Vehicle Cannot Be Started From D ₁ , AT-232. <input type="checkbox"/> A/T Does Not Shift: D ₁ → D ₂ Or Does Not Kickdown: D ₄ → D ₂ , AT-235. <input type="checkbox"/> A/T Does Not Shift: D ₂ → D ₃ , AT-238. <input type="checkbox"/> A/T Does Not Shift: D ₃ → D ₄ , AT-241. <input type="checkbox"/> A/T Does Not Perform Lock-up, AT-244. <input type="checkbox"/> A/T Does Not Hold Lock-up Condition, AT-246. <input type="checkbox"/> Lock-up Is Not Released, AT-248. <input type="checkbox"/> Engine Speed Does Not Return To Idle (Light Braking D ₄ → D ₃), AT-249. | |
| | | Part-2 | AT-77 |
| | | Part-3 | AT-79 |
| | | <input type="checkbox"/> A/T Does Not Shift: D ₄ → D ₃ When Overdrive Control Switch "ON" → "OFF", AT-252 <input type="checkbox"/> Engine Speed Does Not Return To Idle (Engine Brake In D ₃), AT-249. <input type="checkbox"/> A/T Does Not Shift: D ₃ → 2 ₂ , When Selector Lever "D" → "2" Position, AT-253. <input type="checkbox"/> Engine Speed Does Not Return To Idle (Engine Brake In 2 ₂), AT-249. <input type="checkbox"/> A/T Does Not Shift: 2 ₂ → 1 ₁ , When Selector Lever "2" → "1" Position, AT-254. <input type="checkbox"/> Vehicle Does Not Decelerate By Engine Brake, AT-255. <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items. | |
| | | <input type="checkbox"/> DTC P0705 PNP switch, AT-102. <input type="checkbox"/> DTC P0710 A/T fluid temperature sensor, AT-108. <input type="checkbox"/> DTC P0720 Vehicle speed sensor-A/T (Revolution sensor), AT-114. <input type="checkbox"/> DTC P0725 Engine speed signal, AT-119. <input type="checkbox"/> DTC P0740 Torque converter clutch solenoid valve, AT-151. <input type="checkbox"/> DTC P0745 Line pressure solenoid valve, AT-165. <input type="checkbox"/> DTC P0750 Shift solenoid valve A, AT-171. <input type="checkbox"/> DTC P0755 Shift solenoid valve B, AT-175. <input type="checkbox"/> DTC P1705 Accelerator pedal position sensor, AT-179. <input type="checkbox"/> DTC P1760 Overrun clutch solenoid valve, AT-185. <input type="checkbox"/> DTC BATT/FLUID TEMP SEN (A/T fluid temperature sensor and TCM power source), AT-190. <input type="checkbox"/> DTC Vehicle speed sensor-MTR, AT-197. <input type="checkbox"/> DTC Turbine revolution sensor, AT-206. <input type="checkbox"/> DTC U1000 CAN communication line, AT-203. <input type="checkbox"/> DTC Control unit (RAM), control unit (ROM), AT-211. <input type="checkbox"/> DTC Control unit (EEP ROM), AT-213. <input type="checkbox"/> PNP, overdrive control and accelerator pedal position sensor, AT-255. <input type="checkbox"/> Battery <input type="checkbox"/> Others | |
| 5. | | <input type="checkbox"/> For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts. | AT-38 |
| 6. | | <input type="checkbox"/> Perform all ROAD TEST and re-mark required procedures. | AT-65 |
| 7. | | <input type="checkbox"/> Perform DTC CONFIRMATION PROCEDURE for following MIL indicating items and check out NG items. Refer to EC-78, "Emission-related Diagnostic Information". | EC-78 |
| | | <input type="checkbox"/> DTC (P0731, 1103) A/T 1st gear function, AT-123. <input type="checkbox"/> DTC (P0732, 1104) A/T 2nd gear function, AT-129. <input type="checkbox"/> DTC (P0733, 1105) A/T 3rd gear function, AT-135. <input type="checkbox"/> DTC (P0734, 1106) A/T 4th gear function, AT-141. <input type="checkbox"/> DTC (P0744, 1107) A/T TCC S/V function (lock-up), AT-156. | |
| 8. | | <input type="checkbox"/> Perform the Diagnostic Procedures for all remaining items marked NG. Repair or replace the damaged parts. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the component inspection orders.) | AT-95 AT-100 |
| 9. | | <input type="checkbox"/> Erase DTC from TCM and ECM memories. | AT-35 |

Work Flow

HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

NAAT0020

NAAT0020S01

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-56) and "DIAGNOSTIC WORKSHEET" (AT-57), to perform the best troubleshooting possible.

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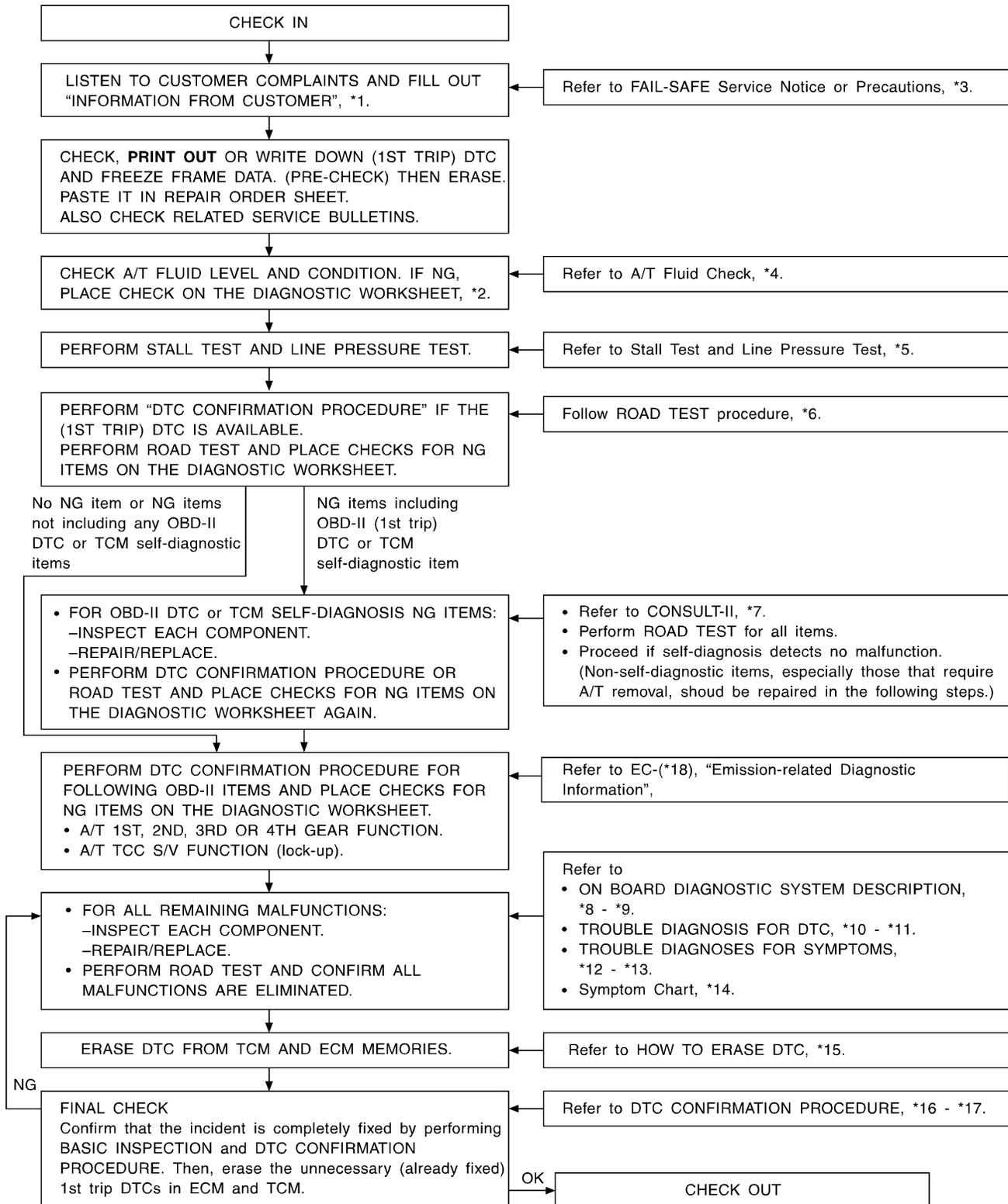
IDX

TROUBLE DIAGNOSIS — INTRODUCTION

Work Flow (Cont'd)

NAAT0020S02

WORK FLOW CHART



SAT086JF

*1: AT-56

*2: AT-57

*3: AT-8

*4: AT-61

*5: AT-61, 64

*6: AT-65

*7: AT-37

*8: AT-33

*9: AT-52

*10: AT-102

*11: AT-213

*12: AT-215

*13: AT-255

*14: AT-83

*15: AT-35

*16: AT-103

*17: AT-213

*18: EC-78

A/T Fluid Check

NAAT0021

FLUID LEAKAGE CHECK

NAAT0021S01

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

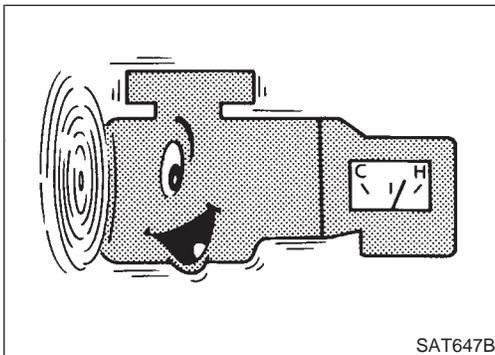
NAAT0021S02

| 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

NAAT0021S03

Refer to MA-22, “Checking A/T Fluid”.



SAT647B

Stall Test

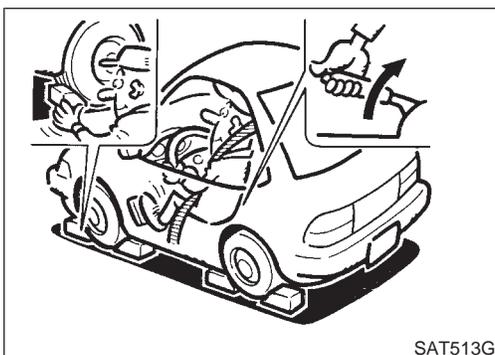
NAAT0022

STALL TEST PROCEDURE

NAAT0022S01

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)**



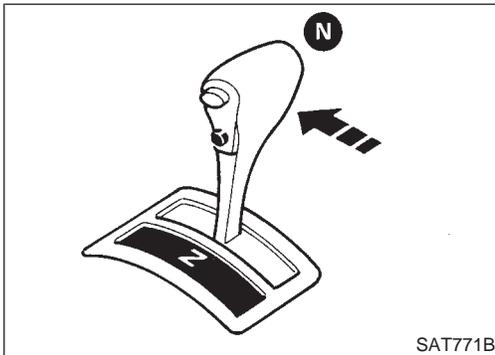
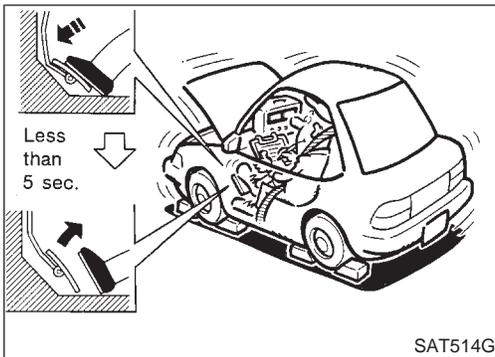
SAT513G

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.

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TROUBLE DIAGNOSIS — BASIC INSPECTION

Stall Test (Cont'd)



5. Start engine, apply foot brake, and place selector lever in “D” position.
6. Accelerate to wide open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.
 - **During test, never hold throttle wide open for more than 5 seconds.**
 - Stall revolution:
Refer to SDS, AT-353.
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

NAAT0022S02

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-59.

NOTE:

Stall revolution is too high in “D” or “2” position:

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

Stall revolution is too high in “R” position:

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

Stall revolution within specifications:

- Vehicle does not achieve speed of more than 80 km/h (50 MPH). One-way clutch seizure in torque converter housing

CAUTION:

Be careful since automatic fluid temperature increases abnormally.

- Slippage occurs in 3rd and 4th gears in “D” position. High clutch slippage
- Slippage occurs in 2nd and 4th gear in “D” position. Brake band slippage
- Engine brake does not function in 2nd and 3rd gears in “D” position, 2nd gear in 2nd position, and 1st position. Over-run clutch slippage

TROUBLE DIAGNOSIS — BASIC INSPECTION

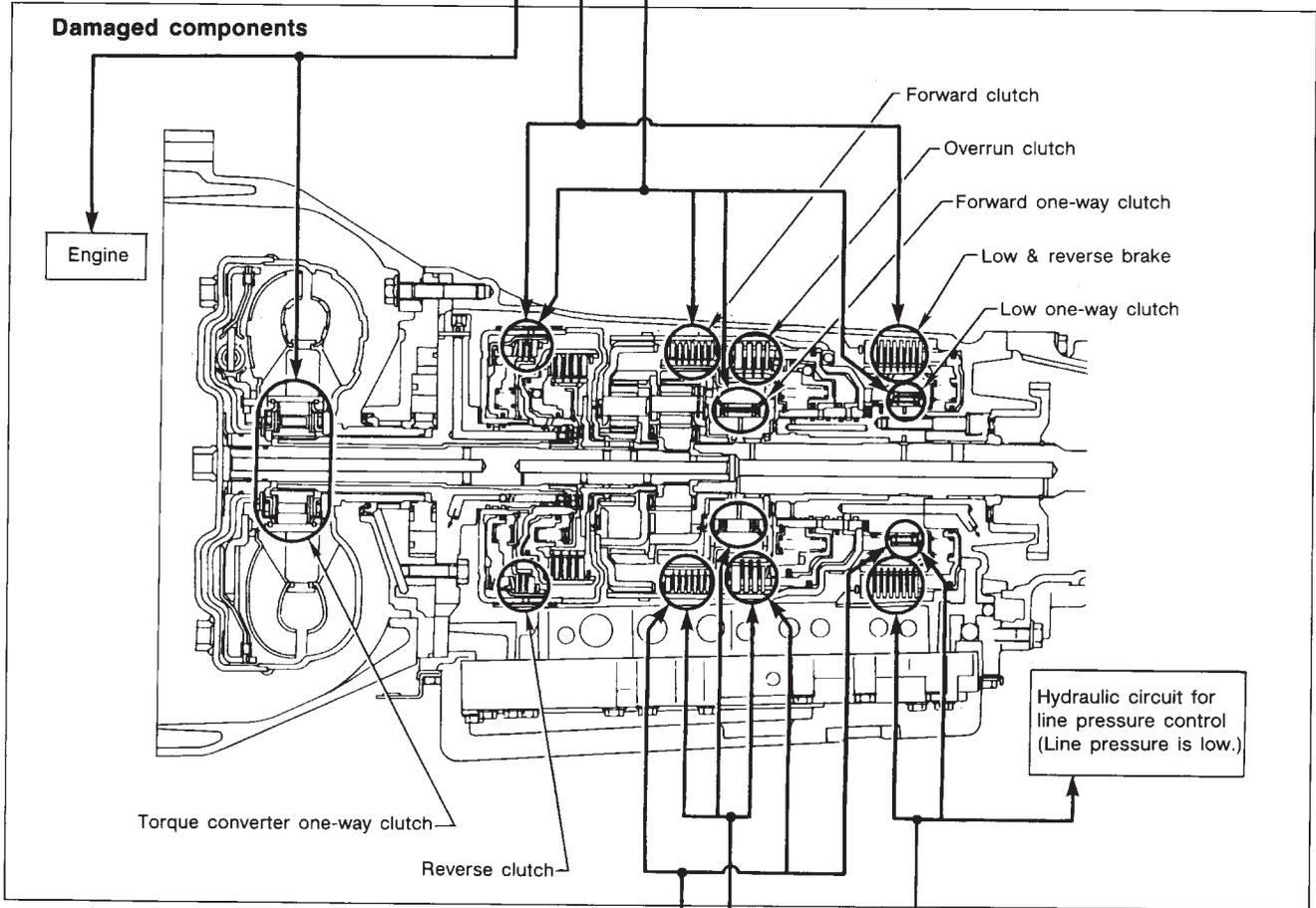
Stall Test (Cont'd)

Stall revolution less than specifications:

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

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

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



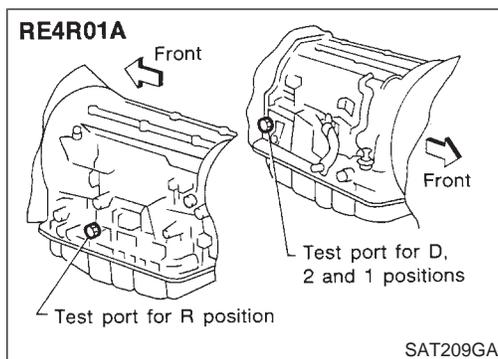
| D | H | H | H | O |
|-------------------------|-----------|---|---|---|
| 2 | H | H | H | O |
| 1 | O | H | H | O |
| R | O | O | H | O |
| Selector lever position | Judgement | | | |

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

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TROUBLE DIAGNOSIS — BASIC INSPECTION

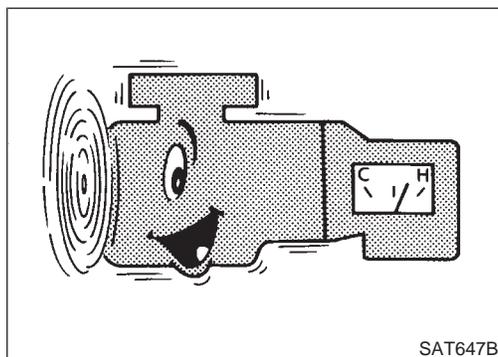
Line Pressure Test



Line Pressure Test

NAAT0023

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

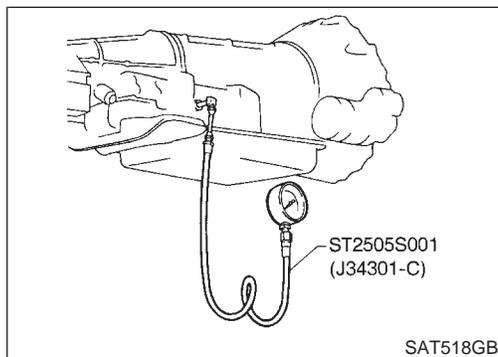


LINE PRESSURE TEST PROCEDURE

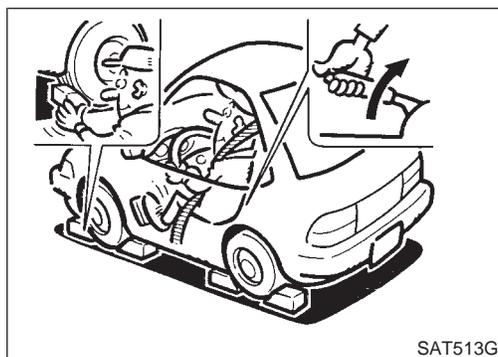
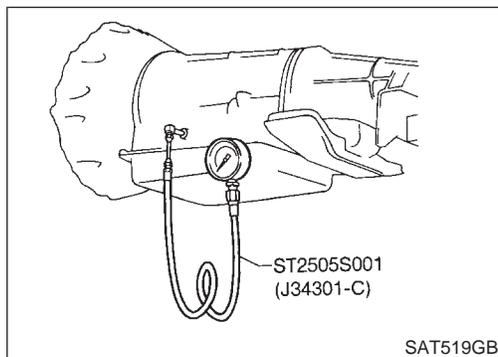
NAAT0023S01

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

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



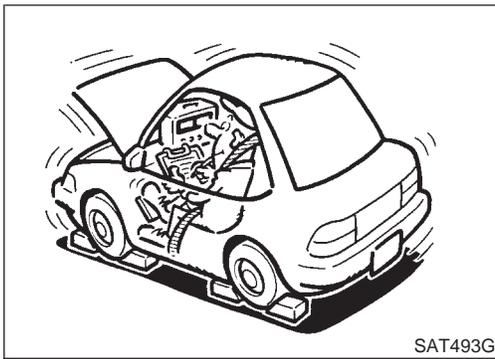
3. Install pressure gauge to corresponding line pressure port.



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

TROUBLE DIAGNOSIS — BASIC INSPECTION

Line Pressure Test (Cont'd)



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

Line pressure:
Refer to SDS, AT-353.

JUDGEMENT OF LINE PRESSURE TEST

NAAT0023S02

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

DESCRIPTION

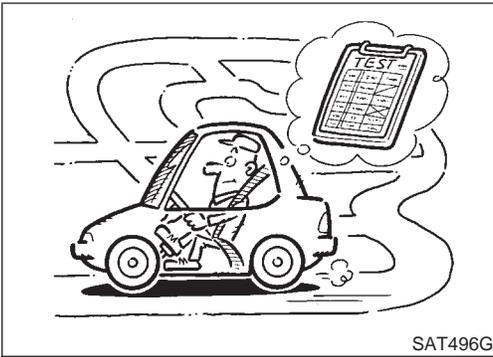
NAAT0024

NAAT0024S01

- 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

TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)



- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items until specified symptom is found. Troubleshoot items which check out No Good after road test. Refer to "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" and "TROUBLE DIAGNOSES FOR SYMPTOMS", AT-33 - AT-52 and AT-215 - AT-255.

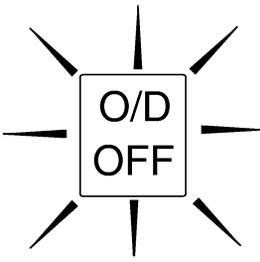
1. CHECK BEFORE ENGINE IS STARTED

NAAT0024S02

| | |
|--|--|
| 1 | CHECK O/D OFF INDICATOR LAMP |
| <p>1. Park vehicle on flat surface. 2. Move selector lever to "P" position. 3. Turn ignition switch to "OFF" position. Wait at least 5 seconds.</p> | |
| | |
| SAT967I | |
| <p>4. Turn ignition switch to "ON" position. (Do not start engine.) 5. Does O/D OFF indicator lamp come on for about 2 seconds?</p> | |
| <p>O/D OFF indicator lamp</p> | |
| SAT204K | |
| Yes or No | |
| Yes | ▶ GO TO 2. |
| No | ▶ Stop Road Test. Go to "O/D OFF Indicator Lamp Does Not Come On", AT-218. |

TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

| | | |
|---|-------------------------------------|--|
| 2 | CHECK O/D OFF INDICATOR LAMP | |
| Does O/D OFF indicator lamp flicker for about 8 seconds? | | |
|  <p style="text-align: center;">O/D OFF indicator lamp</p> | | |
| SAT204K | | |
| Yes or No | | |
| Yes | ▶ | Perform self-diagnosis. Refer to TCM SELF-DIAGNOSIS PROCEDURE (No Tools), AT-48. |
| 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 (No Tools), AT-48. | | |
| | ▶ | Go to "2. CHECK AT IDLE", AT-68. |

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TROUBLE DIAGNOSIS — BASIC INSPECTION

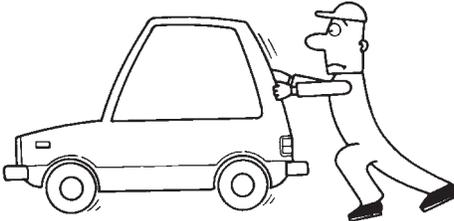
Road Test (Cont'd)

2. CHECK AT IDLE

=NAAT0024S03

| | | |
|---|---------------------------|---|
| 1 | CHECK ENGINE START | |
| <ol style="list-style-type: none"> 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-220. |

| | | |
|---|---------------------------|---|
| 2 | CHECK ENGINE START | |
| <ol style="list-style-type: none"> 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-220. |
| No | ▶ | GO TO 3. |

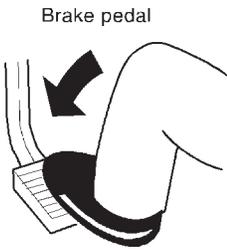
| | | |
|---|---------------------------|---|
| 3 | CHECK VEHICLE MOVE | |
| <ol style="list-style-type: none"> 1. Turn ignition switch to "OFF" position. 2. Move selector lever to "P" position. 3. Release parking brake. 4. Push vehicle forward or backward. 5. Does vehicle move when it is pushed forward or backward? | | |
|  | | |
| Yes or No | | |
| Yes | ▶ | Go to "In "P" Position, Vehicle Moves Forward Or Backward When Pushed", AT-221. |
| No | ▶ | GO TO 4. |

SAT796A

| | | |
|---|---------------------------|---|
| 4 | CHECK VEHICLE MOVE | |
| <ol style="list-style-type: none"> 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-222. |
| No | ▶ | GO TO 5. |

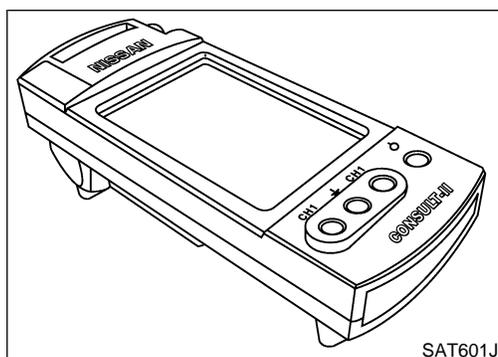
TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

| | | |
|--|--------------------------|--|
| 5 | CHECK SHIFT SHOCK | |
| <ol style="list-style-type: none"> 1. Apply foot brake. 2. Move selector lever to "R" position. 3. Is there large shock when changing from "N" to "R" position? | | |
|  | | |
| SAT082J | | |
| Yes or No | | |
| Yes | ▶ | Go to "Large Shock. "N" → "R" Position", AT-224. |
| No | ▶ | GO TO 6. |

| | | |
|---|---------------------------|--|
| 6 | CHECK VEHICLE MOVE | |
| <ol style="list-style-type: none"> 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-226. |

| | | |
|---|---------------------------|---|
| 7 | CHECK VEHICLE MOVE | |
| <ol style="list-style-type: none"> 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 "CRUISE TEST", AT-69. |
| No | ▶ | Go to "Vehicle Does Not Creep Forward In "D", "2" Or "1" Position", AT-229. |



3. CRUISE TEST

- Check all items listed in Parts 1 through 3.

NAAT0024S04

With CONSULT-II

NAAT0024S0401

- 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".

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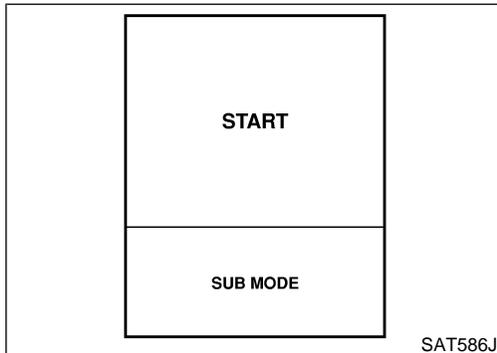
TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

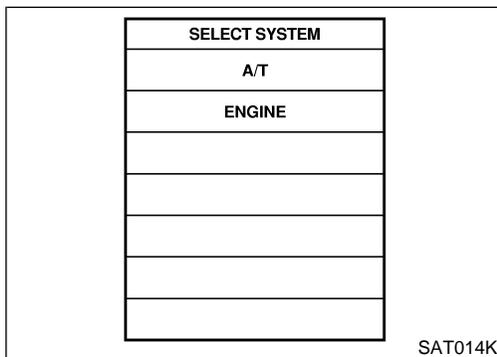
CONSULT-II Setting Procedure

NAAT0024S0402

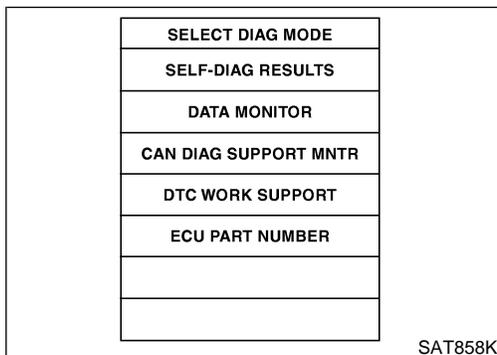
1. Turn ignition switch "OFF".
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector, which is located in instrument lower panel on driver side.



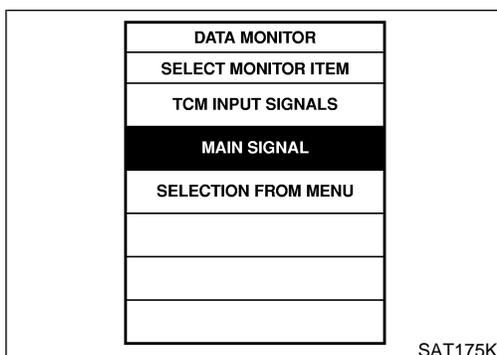
3. Turn ignition switch "ON".
4. Touch "START".



5. Touch "A/T".



6. Touch "DATA MONITOR".



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

TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

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

SAT973J

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

| | |
|---------------|----------|
| 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 | |
| | |
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SAT987J

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

| | |
|--------|---------------|
| STORE | |
| SYSTEM | SAVE REC DATA |
| | |
| | |

SAT974J

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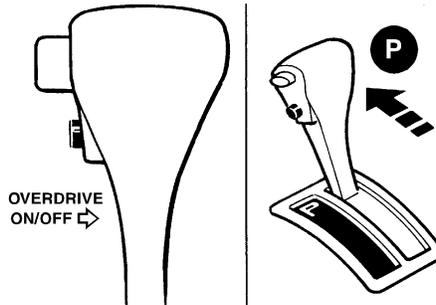
Cruise Test — Part 1

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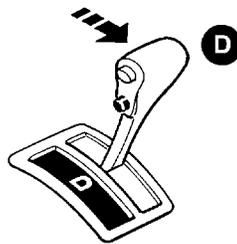
1 CHECK STARTING GEAR (D₁) POSITION

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



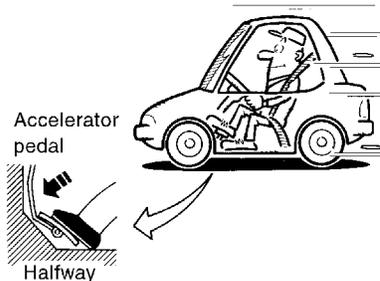
SAT001J

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



SAT952I

7. Accelerate vehicle by constantly depressing accelerator pedal halfway.



SAT953I

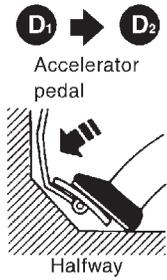
8. Does vehicle start from D₁?
 Read gear position.

Yes or No

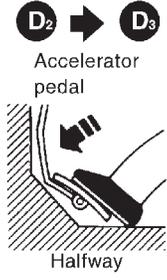
| | | |
|-----|---|---|
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to "Vehicle Cannot Be Started From D ₁ ", AT-232. |

TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

| | | |
|--|--|---|
| 2 | CHECK SHIFT UP (D₁ TO D₂) | |
| Does A/T shift from D ₁ to D ₂ at the specified speed? <input type="checkbox"/> Read gear position, throttle opening and vehicle speed. Specified speed when shifting from D ₁ to D ₂ : Refer to Shift schedule, AT-353. | | |
|  | | |
| 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-235. |

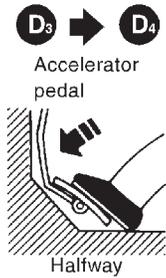
SAT954I

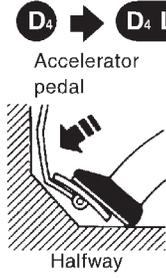
| | | |
|--|--|---|
| 3 | CHECK SHIFT UP (D₂ TO D₃) | |
| Does A/T shift from D ₂ to D ₃ at the specified speed? <input type="checkbox"/> Read gear position, throttle opening and vehicle speed. Specified speed when shifting from D ₂ to D ₃ : Refer to Shift schedule, AT-353. | | |
|  | | |
| Yes or No | | |
| Yes | ▶ | GO TO 4. |
| No | ▶ | Go to "A/T Does Not Shift: D ₂ → D ₃ ", AT-238. |

SAT955I

TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

| | | |
|---|--|---|
| 4 | CHECK SHIFT UP (D₃ TO D₄) | |
| Does A/T shift from D ₃ to D ₄ at the specified speed? Ⓢ Read gear position, throttle opening and vehicle speed. Specified speed when shifting from D ₃ to D ₄ : Refer to Shift schedule, AT-353. | | |
|  | | |
| Yes or No | | |
| Yes | ▶ | GO TO 5. |
| No | ▶ | Go to "A/T Does Not Shift: D ₃ → D ₄ ", AT-241. |

| | | |
|---|---|---|
| 5 | CHECK LOCK-UP (D₄ TO D₄ L/U) | |
| Does A/T perform lock-up at the specified speed? Ⓢ Read vehicle speed, throttle position when lock-up duty becomes 94%. Specified speed when lock-up occurs: Refer to Shift schedule, AT-353. | | |
|  | | |
| Yes or No | | |
| Yes | ▶ | GO TO 6. |
| No | ▶ | Go to "A/T Does Not Perform Lock-up", AT-244. |

| | | |
|---|---------------------------|--|
| 6 | CHECK HOLD LOCK-UP | |
| Does A/T hold lock-up condition for more than 30 seconds? <p style="text-align: center;">Yes or No</p> | | |
| Yes | ▶ | GO TO 7. |
| No | ▶ | Go to "A/T Does Not Hold Lock-up Condition", AT-246. |

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TROUBLE DIAGNOSIS — BASIC INSPECTION

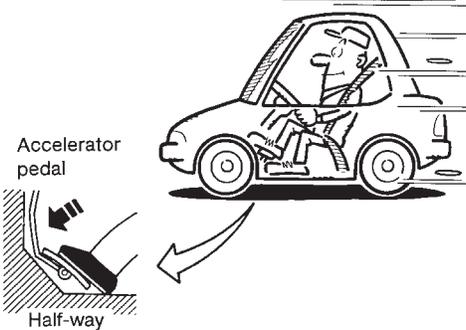
Road Test (Cont'd)

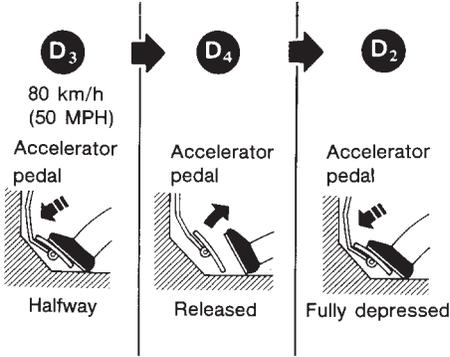
| | | |
|--|---|--|
| 7 | CHECK LOCK-UP OFF (D₄ L/U TO D₄) | |
| <p>1. Release accelerator pedal. 2. Is lock-up released when accelerator pedal is released?</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SAT958I</p> | | |
| Yes or No | | |
| Yes | ▶ | GO TO 8. |
| No | ▶ | Go to "Lock-up Is Not Released", AT-248. |

| | | |
|---|--|--|
| 8 | CHECK SHIFT DOWN (D₄ TO D₃) | |
| <p>1. Decelerate vehicle by applying foot brake lightly. 2. Does engine speed return to idle smoothly when A/T is shifted from D₄ to D₃?</p> <p> Read gear position and engine speed.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SAT959I</p> | | |
| Yes or No | | |
| Yes | ▶ | 1. Stop vehicle. 2. Go to "Cruise Test — Part 2", AT-77. |
| No | ▶ | Go to "Engine Speed Does Not Return To Idle (Light Braking D ₄ → D ₃)", AT-249. |

Cruise Test — Part 2

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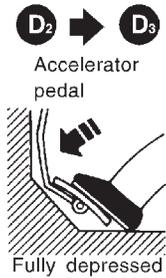
| | | |
|------------------|---|---|
| 1 | CHECK STARTING GEAR (D₁) POSITION | <p>1. Confirm overdrive control switch is in "ON" position.</p> <p>2. Confirm selector lever is in "D" position.</p> <p>3. Accelerate vehicle by half throttle again.</p> <p>4. Does vehicle start from D₁?</p> <p><input type="checkbox"/> Read gear position.</p> <div style="text-align: center;">  <p>Accelerator pedal Half-way</p> </div> <p style="text-align: right;">SAT495G</p> |
| Yes or No | | |
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to "Vehicle Does Not Start From D ₁ ", AT-251. |

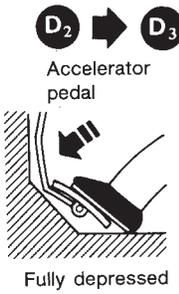
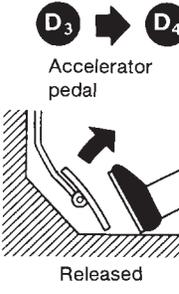
| | | |
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| 2 | CHECK SHIFT UP AND SHIFT DOWN (D₃ TO D₄ TO D₂) | <p>1. Accelerate vehicle to 80 km/h (50 MPH) as shown in illustration.</p> <p>2. Release accelerator pedal and then quickly depress it fully.</p> <p>3. Does A/T shift from D₄ to D₂ as soon as accelerator pedal is depressed fully?</p> <p><input type="checkbox"/> Read gear position and throttle position.</p> <div style="text-align: center;">  <p>D₃ D₄ D₂</p> <p>80 km/h (50 MPH)</p> <p>Accelerator pedal Accelerator pedal Accelerator pedal</p> <p>Halfway Released Fully depressed</p> </div> <p style="text-align: right;">SAT404H</p> |
| Yes or No | | |
| Yes | ▶ | GO TO 3. |
| No | ▶ | Go to "A/T Does Not Shift: D ₃ → D ₄ , AT-241 Or Does Not Kickdown: D ₄ → D ₂ ", AT-235. |

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TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

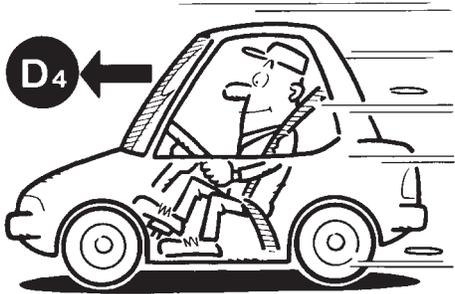
| | | | |
|------------------|--|---|--|
| 3 | CHECK SHIFT UP (D₂ TO D₃) | <p>Does A/T shift from D₂ to D₃ at the specified speed?</p> <p> Read gear position, throttle position and vehicle speed. Specified speed when shifting from D₂ to D₃: Refer to Shift schedule, AT-353.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT960I</p> | |
| Yes or No | | | |
| Yes | ▶ | GO TO 4. | |
| No | ▶ | Go to “A/T Does Not Shift: D ₂ → D ₃ ”, AT-238. | |

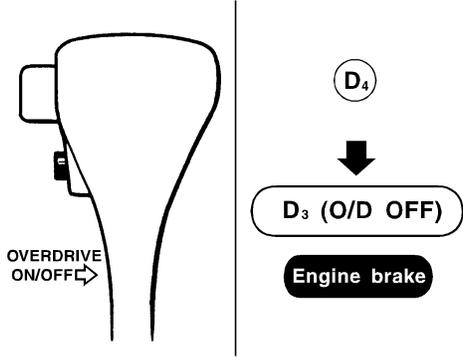
| | | | |
|------------------|---|---|--|
| 4 | CHECK SHIFT UP (D₃ TO D₄) AND ENGINE BRAKE | <p>Release accelerator pedal after shifting from D₂ to D₃.</p> <p>Does A/T shift from D₃ to D₄ and does vehicle decelerate by engine brake?</p> <p> Read gear position, throttle position and vehicle speed.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <p style="text-align: right;">SAT405H</p> | |
| Yes or No | | | |
| Yes | ▶ | <ol style="list-style-type: none"> 1. Stop vehicle. 2. Go to “Cruise test — Part 3”, AT-79. | |
| No | ▶ | Go to “A/T Does Not Shift: D ₃ → D ₄ ”, AT-241. | |

Cruise Test — Part 3

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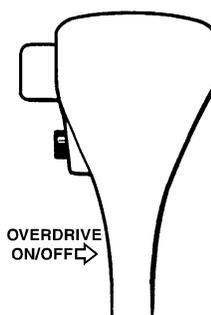
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| | | |
|----------|---|--|
| 1 | VEHICLE SPEED D₄ POSITION | <ol style="list-style-type: none"> 1. Confirm overdrive control switch is in "ON" position. 2. Confirm selector lever is in "D" position. 3. Accelerate vehicle using half-throttle to D₄. <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: right;">SAT812A</p> |
| ▶ | | GO TO 2. |

| | | |
|----------|--|---|
| 2 | CHECK SHIFT DOWN (D₄ TO D₃) | <ol style="list-style-type: none"> 1. Release accelerator pedal. 2. Set overdrive control switch to "OFF" position while driving in D₄. 3. Does A/T shift from D₄ to D₃ (O/D OFF)? <p><input type="checkbox"/> Read gear position and vehicle speed.</p> <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: center;">Yes or No</p> |
| Yes | ▶ | GO TO 3. |
| No | ▶ | Go to "A/T Does Not Shift: D ₄ → D ₃ , When Overdrive Control Switch "ON" → "OFF", AT-252. |

TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

| 3 | CHECK ENGINE BRAKE | | |
|---|---------------------------|--|--|
| Does vehicle decelerate by engine brake? | | | |
| <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: center;"> <p>ⓓ₄</p> <p>↓</p> <p>D₃ (O/D OFF)</p> <p>Engine brake</p> </div> </div> | | | |
| Yes or No | | | |
| Yes | ▶ | GO TO 4. | |
| No | ▶ | Go to “Engine Speed Does Not Return To Idle (Light Braking D ₄ → D ₃)”, AT-249. | |

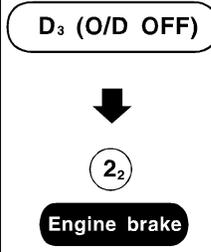
SAT999IA

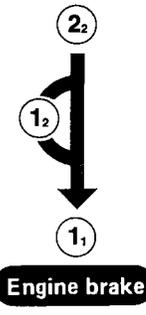
| 4 | CHECK SHIFT DOWN (D₃ TO 2₂) | | |
|--|--|---|--|
| 1. Move selector lever from “D” to “2” position while driving in D ₃ (O/D OFF). 2. Does A/T shift from D ₃ (O/D OFF) to 2 ₂ ? ⓘ Read gear position. | | | |
| <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: center;"> <p>D₃ (O/D OFF)</p> <p>↓</p> <p>ⓓ₂</p> <p>Engine brake</p> </div> </div> | | | |
| Yes or No | | | |
| Yes | ▶ | GO TO 5. | |
| No | ▶ | Go to “A/T Does Not Shift: D ₃ → 2 ₂ , When Selector Lever “D” → “2” Position”, AT-253. | |

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TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

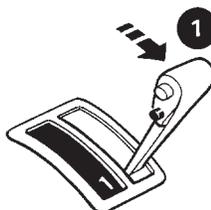
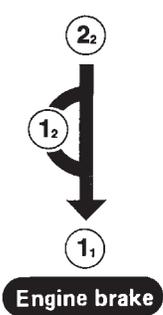
| | | | |
|---|---------------------------|--|----------|
| 5 | CHECK ENGINE BRAKE | | |
| Does vehicle decelerate by engine brake? | | | |
|  | |  | SAT791GB |
| Yes or No | | | |
| Yes | ▶ | GO TO 6. | |
| No | ▶ | Go to "Engine Speed Does Not Return To Idle (Light Braking D ₄ → D ₃)", AT-249. | |

| | | | |
|--|--|---|---------|
| 6 | CHECK SHIFT DOWN (2₂ TO 1₁) | | |
| 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? | | | |
|  | |  | SAT778B |
| Yes or No | | | |
| Yes | ▶ | GO TO 7. | |
| No | ▶ | Go to "A/T Does Not Shift: 2 ₂ → 1 ₁ , When Selector lever "2" → "1" Position", AT-254. | |

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TROUBLE DIAGNOSIS — BASIC INSPECTION

Road Test (Cont'd)

| | | |
|---|---------------------------|--|
| 7 | CHECK ENGINE BRAKE | |
| Does vehicle decelerate by engine brake? | | |
| <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p style="text-align: center; margin-top: 10px;">Yes or No</p> | | |
| SAT778B | | |
| Yes | ▶ | <ol style="list-style-type: none"> 1. Stop vehicle. 2. Perform self-diagnosis. Refer to TCM SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-48. |
| No | ▶ | Go to “Vehicle Does Not Decelerate By Engine Brake”, AT-255. |

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart

Symptom Chart

NAAT0233

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. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR | AT-114, 197 |
| | | | 3. Park/neutral position (PNP) switch adjustment | AT-272 |
| | | | 4. Engine speed signal | AT-119 |
| | | | 5. A/T fluid temperature sensor | AT-108 |
| | | | 6. Line pressure test | AT-64 |
| | | | 7. Torque converter clutch solenoid valve | AT-151 |
| | | | 8. Control valve assembly | AT-269 |
| | | OFF vehicle | 9. Torque converter | AT-283 |
| | Torque converter clutch piston slip. | ON vehicle | 1. Fluid level | AT-61 |
| | | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 3. Line pressure test | AT-64 |
| | | | 4. Torque converter clutch solenoid valve | AT-151 |
| | | | 5. Line pressure solenoid valve | AT-165 |
| | | | 6. Control valve assembly | AT-269 |
| | | OFF vehicle | 7. Torque converter | AT-283 |
| Lock-up point is extremely high or low. AT-244 | ON vehicle | 1. Accelerator pedal position sensor (throttle position sensor) | AT-179 | |
| | | 2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR | AT-114, 197 | |
| | | 3. Torque converter clutch solenoid valve | AT-151 | |
| | | 4. Control valve assembly | AT-269 | |
| Shift Shock | ON vehicle | 1. Engine idling rpm | EC-758 | |
| | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 | |
| | | 3. Line pressure test | AT-64 | |
| | | 4. A/T fluid temperature sensor | AT-108 | |
| | | 5. Engine speed signal | AT-119 | |
| | | 6. Line pressure solenoid valve | AT-165 | |
| | | 7. Control valve assembly | AT-269 | |
| | | 8. Accumulator N-D | AT-269 | |
| | | OFF vehicle | 9. Turbine revolution sensor | AT-206 |
| | | | 10. Forward clutch | AT-317 |

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

| Items | Symptom | Condition | Diagnostic Item | Reference Page |
|---|--|---------------------------|---|----------------|
| Shift Shock | Too sharp a shock in change from D ₁ to D ₂ . | ON vehicle | 1. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 2. Line pressure test | AT-64 |
| | | | 3. Accumulator servo release | AT-269 |
| | | | 4. Control valve assembly | AT-269 |
| | | | 5. A/T fluid temperature sensor | AT-108 |
| | | OFF vehicle | 6. Brake band | AT-330 |
| | Too sharp a shock in change from D ₂ to D ₃ . | ON vehicle | 1. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 2. Line pressure test | AT-64 |
| | | | 3. Control valve assembly | AT-269 |
| | | OFF vehicle | 4. High clutch | AT-314 |
| | | | 5. Brake band | AT-330 |
| | Too sharp a shock in change from D ₃ to D ₄ . | ON vehicle | 1. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 2. Line pressure test | AT-64 |
| | | | 3. Control valve assembly | AT-269 |
| | | OFF vehicle | 4. Brake band | AT-330 |
| | | | 5. Overrun clutch | AT-317 |
| | Gear change shock felt during deceleration by releasing accelerator pedal. | ON vehicle | 1. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 2. Line pressure test | AT-64 |
| | | | 3. Overrun clutch solenoid valve | AT-185 |
| | | | 4. Control valve assembly | AT-269 |
| Large shock changing from 1 ₂ to 1 ₁ in 1 position. | ON vehicle | 1. Control valve assembly | AT-269 | |
| | ON vehicle | 2. Low & reverse brake | AT-321 | |

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

| 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-235, 238, 241 | ON vehicle | 1. Accelerator pedal position sensor (throttle position sensor) | AT-179 | GI |
| | | | 2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR | AT-114, 197 | MA |
| | | | 3. Shift solenoid valve A | AT-171 | EM |
| | | | 4. Shift solenoid valve B | AT-175 | LC |
| | Gear change directly from D ₁ to D ₃ occurs. | ON vehicle | 1. Fluid level | AT-61 | |
| | | OFF vehicle | 2. Accumulator servo release | AT-269 | EC |
| | 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 | 3. Brake band | AT-330 | |
| | | | 1. Accelerator pedal position sensor (throttle position sensor) | AT-179 | FE |
| | Kickdown does not operate when depressing pedal in D ₄ within kick-down vehicle speed. | ON vehicle | 2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR | AT-114, 197 | CL |
| | | | 1. Accelerator pedal position sensor (throttle position sensor) | AT-179 | MT |
| | | | 2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR | AT-114, 197 | AT |
| | | | 3. Shift solenoid valve A | AT-171 | TF |
| Improper Shift Timing | Kickdown operates or engine overruns when depressing pedal in D ₄ beyond kick-down vehicle speed limit. | ON vehicle | 4. Shift solenoid valve B | AT-175 | |
| | | | 1. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR | AT-114, 197 | PD |
| | | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 | AX |
| | | | 3. Shift solenoid valve A | AT-171 | SU |
| | Gear change from 2 ₂ to 2 ₃ in 2 position. | ON vehicle | 4. Shift solenoid valve B | AT-175 | BR |
| | | | 1. Park/neutral position (PNP) switch adjustment | AT-272 | |
| | Gear change from 1 ₁ to 1 ₂ in 1 position. | ON vehicle | 1. Park/neutral position (PNP) switch adjustment | AT-272 | ST |
| | | | 2. Manual control linkage adjustment | AT-272 | |

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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-61 |
| | | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 3. Overrun clutch solenoid valve | AT-185 |
| | | | 4. Shift solenoid valve A | AT-171 |
| | | | 5. Line pressure solenoid valve | AT-165 |
| | | | 6. Control valve assembly | AT-269 |
| | | OFF vehicle | 7. Low & reverse brake | AT-321 |
| | | | 8. Overrun clutch | AT-317 |
| | Failure to change gear from D ₃ to D ₂ or from D ₄ to D ₂ . | ON vehicle | 1. Fluid level | AT-61 |
| | | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 3. Shift solenoid valve A | AT-171 |
| | | | 4. Shift solenoid valve B | AT-175 |
| | | | 5. Control valve assembly | AT-269 |
| | | OFF vehicle | 6. High clutch | AT-314 |
| | | | 7. Brake band | AT-330 |
| | Failure to change gear from D ₂ to D ₁ or from D ₃ to D ₁ . | ON vehicle | 1. Fluid level | AT-61 |
| | | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 3. Shift solenoid valve A | AT-179 |
| 4. Shift solenoid valve B | | | AT-175 | |
| 5. Control valve assembly | | | AT-269 | |
| OFF vehicle | | 6. Low one-way clutch | AT-325 | |
| | | 7. High clutch | AT-314 | |
| | | 8. Brake band | AT-330 | |

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

| Items | Symptom | Condition | Diagnostic Item | Reference Page |
|---------------|--|------------------------|--|----------------|
| No Down Shift | Failure to change from D ₃ to 2 ₂ when changing lever into 2 position. AT-249 | ON vehicle | 1. Park/neutral position (PNP) switch adjustment | AT-272 |
| | | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 3. Overrun clutch solenoid valve | AT-185 |
| | | | 4. Shift solenoid valve B | AT-175 |
| | | | 5. Shift solenoid valve A | AT-171 |
| | | | 6. Control valve assembly | AT-269 |
| | | | 7. Manual control linkage adjustment | AT-272 |
| | OFF vehicle | 8. Brake band | AT-330 | |
| | | 9. Overrun clutch | AT-317 | |
| | Does not change from 1 ₂ to 1 ₁ in 1 position. | ON vehicle | 1. Park/neutral position (PNP) switch adjustment | AT-272 |
| | | | 2. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR | AT-114, 197 |
| | | | 3. Shift solenoid valve A | AT-171 |
| | | | 4. Control valve assembly | AT-269 |
| | | | 5. Overrun clutch solenoid valve | AT-185 |
| OFF vehicle | | 6. Overrun clutch | AT-317 | |
| | | 7. Low & reverse brake | AT-321 | |
| No Up Shift | Failure to change gear from D ₁ to D ₂ . | ON vehicle | 1. Park/neutral position (PNP) switch adjustment | AT-272 |
| | | | 2. Manual control linkage adjustment | AT-272 |
| | | | 3. Shift solenoid valve A | AT-171 |
| | | | 4. Control valve assembly | AT-269 |
| | | | 5. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR | AT-114, 197 |
| | | OFF vehicle | 6. Brake band | AT-330 |
| | Failure to change gear from D ₂ to D ₃ . | ON vehicle | 1. Park/neutral position (PNP) switch adjustment | AT-272 |
| | | | 2. Manual control linkage adjustment | AT-272 |
| | | | 3. Shift solenoid valve B | AT-175 |
| | | | 4. Control valve assembly | AT-269 |
| | | | 5. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR | AT-114, 197 |
| | | OFF vehicle | 6. High clutch | AT-314 |
| | | | 7. Brake band | AT-330 |

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

| Items | Symptom | Condition | Diagnostic Item | Reference Page | |
|----------------------------------|---|------------------------|--|--|-------------|
| No Up Shift | Failure to change gear from D ₃ to D ₄ . | ON vehicle | 1. Park/neutral position (PNP) switch adjustment | AT-272 | |
| | | | 2. Manual control linkage adjustment | AT-272 | |
| | | | 3. Shift solenoid valve A | AT-171 | |
| | | | 4. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR | AT-114, 197 | |
| | | | 5. A/T fluid temperature sensor | AT-108 | |
| | | OFF vehicle | 6. Brake band | AT-330 | |
| | A/T does not shift to D ₄ when driving with overdrive control switch ON. | | ON vehicle | 1. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | | 2. Park/neutral position (PNP) switch adjustment | AT-272 |
| | | | | 3. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR | AT-114, 197 |
| | | | | 4. Shift solenoid valve A | AT-171 |
| 5. Overrun clutch solenoid valve | | | | AT-185 | |
| 6. Control valve assembly | | | | AT-269 | |
| 7. A/T fluid temperature sensor | | | | AT-108 | |
| 8. Line pressure solenoid valve | | | | AT-165 | |
| | | | OFF vehicle | 9. Brake band | AT-330 |
| | | | | 10. Overrun clutch | AT-317 |
| 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-226 | ON vehicle | 1. Manual control linkage adjustment | AT-272 | |
| | | | 2. Line pressure test | AT-64 | |
| | | | 3. Line pressure solenoid valve | AT-165 | |
| | | | 4. Control valve assembly | AT-269 | |
| | | | OFF vehicle | 5. Reverse clutch | AT-311 |
| | | 6. High clutch | | AT-314 | |
| | | 7. Forward clutch | | AT-317 | |
| | | 8. Overrun clutch | | AT-317 | |
| | | 9. Low & reverse brake | | AT-321 | |
| | Vehicle will not run in D and 2 positions (but runs in 1 and R positions). | ON vehicle | 1. Manual control linkage adjustment | AT-272 | |
| OFF vehicle | | 2. Low one-way clutch | AT-325 | | |

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

| Items | Symptom | Condition | Diagnostic Item | Reference Page |
|--|--|---|---|----------------|
| Slips/Will Not Engage | Vehicle will not run in D, 1, 2 positions (but runs in R position). Clutch slips. Very poor acceleration. AT-229 | ON vehicle | 1. Fluid level | AT-61 |
| | | | 2. Line pressure test | AT-64 |
| | | | 3. Line pressure solenoid valve | AT-165 |
| | | | 4. Control valve assembly | AT-269 |
| | | | 5. Accumulator N-D | AT-269 |
| | | OFF vehicle | 6. Reverse clutch | AT-311 |
| | | | 7. High clutch | AT-314 |
| | | | 8. Forward clutch | AT-317 |
| | | | 9. Forward one-way clutch | AT-327 |
| | | | 10. Low one-way clutch | AT-325 |
| | Clutches or brakes slip somewhat in starting. | ON vehicle | 1. Fluid level | AT-61 |
| | | | 2. Manual control linkage adjustment | AT-272 |
| | | | 3. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 4. Line pressure test | AT-64 |
| | | | 5. Line pressure solenoid valve | AT-165 |
| | | | 6. Control valve assembly | AT-269 |
| | | | 7. Accumulator N-D | AT-269 |
| | | OFF vehicle | 8. Forward clutch | AT-317 |
| | | | 9. Reverse clutch | AT-311 |
| | | | 10. Low & reverse brake | AT-321 |
| 11. Oil pump | | | AT-294 | |
| 12. Torque converter | | | AT-283 | |
| No creep at all. AT-226, 229 | ON vehicle | 1. Fluid level | AT-61 | |
| | | 2. Line pressure test | AT-64 | |
| | | 3. Control valve assembly | AT-269 | |
| | OFF vehicle | 4. Forward clutch | AT-317 | |
| | | 5. Oil pump | AT-294 | |
| | | 6. Torque converter | AT-283 | |
| Almost no shock or clutches slipping in change from D ₁ to D ₂ . | ON vehicle | 1. Fluid level | AT-61 | |
| | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 | |
| | | 3. Line pressure test | AT-64 | |
| | | 4. Accumulator servo release | AT-269 | |
| | | 5. Control valve assembly | AT-269 | |
| | OFF vehicle | 6. Brake band | AT-330 | |

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

| Items | Symptom | Condition | Diagnostic Item | Reference Page |
|--|--|---|---|----------------|
| Slips/Will Not Engage | Almost no shock or slipping in change from D ₂ to D ₃ . | ON vehicle | 1. Fluid level | AT-61 |
| | | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 3. Line pressure test | AT-64 |
| | | | 4. Control valve assembly | AT-269 |
| | | OFF vehicle | 5. High clutch | AT-314 |
| | | | 6. Forward clutch | AT-317 |
| | Almost no shock or slipping in change from D ₃ to D ₄ . | ON vehicle | 1. Fluid level | AT-61 |
| | | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 3. Line pressure test | AT-64 |
| | | | 4. Control valve assembly | AT-269 |
| | | OFF vehicle | 5. High clutch | AT-314 |
| | | | 6. Brake band | AT-330 |
| | Races extremely fast or slips in changing from D ₄ to D ₃ when depressing pedal. | ON vehicle | 1. Fluid level | AT-61 |
| | | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 3. Line pressure test | AT-64 |
| | | | 4. Line pressure solenoid valve | AT-165 |
| | | | 5. Control valve assembly | AT-269 |
| | | OFF vehicle | 6. High clutch | AT-314 |
| | | | 7. Forward clutch | AT-317 |
| | Races extremely fast or slips in changing from D ₄ to D ₂ when depressing pedal. | ON vehicle | 1. Fluid level | AT-61 |
| | | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 3. Line pressure test | AT-64 |
| | | | 4. Line pressure solenoid valve | AT-165 |
| | | | 5. Shift solenoid valve A | AT-171 |
| 6. Control valve assembly | | | AT-269 | |
| OFF vehicle | | 7. Brake band | AT-330 | |
| | | 8. Forward clutch | AT-317 | |
| Races extremely fast or slips in changing from D ₃ to D ₂ when depressing pedal. | ON vehicle | 1. Fluid level | AT-61 | |
| | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 | |
| | | 3. Line pressure test | AT-64 | |
| | | 4. Line pressure solenoid valve | AT-165 | |
| | | 5. Control valve assembly | AT-269 | |
| | | 6. A/T fluid temperature sensor | AT-108 | |

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

| Items | Symptom | Condition | Diagnostic Item | Reference Page | |
|-----------------------|--|-----------------------------|--|------------------|----|
| Slips/Will Not Engage | Races extremely fast or slips in changing from D ₃ to D ₂ when depressing pedal. | OFF vehicle | 7. Brake band | AT-330 | GI |
| | | | 8. Forward clutch | AT-317 | MA |
| | | | 9. High clutch | AT-314 | EM |
| | 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-61 | LC |
| | | | 2. Accelerator pedal position sensor (throttle position sensor) | AT-179 | EC |
| | | | 3. Line pressure test | AT-64 | FE |
| | | | 4. Line pressure solenoid valve | AT-165 | CL |
| | | | 5. Control valve assembly | AT-269 | MT |
| | | OFF vehicle | 6. Forward clutch | AT-317 | AT |
| | | | 7. Forward one-way clutch | AT-327 | TF |
| | | | 8. Low one-way clutch | AT-325 | PD |
| | Vehicle will not run in any position. | ON vehicle | 1. Fluid level | AT-61 | AX |
| | | | 2. Manual control linkage adjustment | AT-272 | SU |
| | | | 3. Line pressure test | AT-64 | BR |
| | | | 4. Line pressure solenoid valve | AT-165 | ST |
| OFF vehicle | | 5. Oil pump | AT-294 | RS | |
| | | 6. High clutch | AT-314 | BT | |
| | | 7. Brake band | AT-330 | HA | |
| | | 8. Low & reverse brake | AT-321 | SC | |
| | | 9. Torque converter | AT-283 | EL | |
| | | 10. Parking pawl components | AT-334 | IDX | |
| NOT USED | Engine cannot be started in P and N positions. AT-220 | ON vehicle | 1. Ignition switch and starter | EL-16, and SC-10 | |
| | | | 2. Manual control linkage adjustment | AT-272 | |
| | | | 3. Park/neutral position (PNP) switch adjustment | AT-272 | |
| | Engine starts in positions other than P and N. AT-220 | ON vehicle | 1. Manual control linkage adjustment | AT-272 | |
| | | | 2. Park/neutral position (PNP) switch adjustment | AT-272 | |
| | Transmission noise in P and N positions. | ON vehicle | 1. Fluid level | AT-61 | |
| | | | 2. Line pressure test | AT-64 | |
| | | | 3. Accelerator pedal position sensor (throttle position sensor) | AT-179 | |
| | | | 4. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR | AT-114, 197 | |
| | | | 5. Engine speed signal | AT-119 | |
| OFF vehicle | | 6. Oil pump | AT-294 | | |
| | | 7. Torque converter | AT-283 | | |

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

| Items | Symptom | Condition | Diagnostic Item | Reference Page |
|---|--|---------------------------|---|----------------|
| NOT USED | Vehicle moves when changing into P position or parking gear does not disengage when shifted out of P position. AT-221 | ON vehicle | 1. Manual control linkage adjustment | AT-272 |
| | | OFF vehicle | 2. Parking pawl components | AT-334 |
| | Vehicle runs in N position. AT-222 | ON vehicle | 1. Manual control linkage adjustment | AT-272 |
| | | | 2. Forward clutch | AT-317 |
| | | OFF vehicle | 3. Reverse clutch | AT-311 |
| | | | 4. Overrun clutch | AT-317 |
| | Vehicle braked when shifting into R position. | ON vehicle | 1. Fluid level | AT-61 |
| | | | 2. Manual control linkage adjustment | AT-272 |
| | | | 3. Line pressure test | AT-64 |
| | | | 4. Line pressure solenoid valve | AT-165 |
| | | | 5. Control valve assembly | AT-269 |
| | | OFF vehicle | 6. High clutch | AT-314 |
| | | | 7. Brake band | AT-330 |
| | | | 8. Forward clutch | AT-317 |
| | | | 9. Overrun clutch | AT-317 |
| | Excessive creep. | ON vehicle | 1. Engine idling rpm | EC-758 |
| | Engine stops when shifting lever into R, D, 2 and 1. | ON vehicle | 1. Engine idling rpm | EC-758 |
| | | | 2. Torque converter clutch solenoid valve | AT-151 |
| | | | 3. Control valve assembly | AT-269 |
| | | OFF vehicle | 4. Torque converter | AT-283 |
| Vehicle braked by gear change from D ₁ to D ₂ . | ON vehicle | 1. Fluid level | AT-61 | |
| | OFF vehicle | 2. Reverse clutch | AT-311 | |
| | | 3. Low & reverse brake | AT-321 | |
| | | 4. High clutch | AT-314 | |
| | | 5. Low one-way clutch | AT-325 | |
| Vehicle braked by gear change from D ₂ to D ₃ . | ON vehicle | 1. Fluid level | AT-61 | |
| | OFF vehicle | 2. Brake band | AT-330 | |
| Vehicle braked by gear change from D ₃ to D ₄ . | ON vehicle | 1. Fluid level | AT-61 | |
| | OFF vehicle | 2. Overrun clutch | AT-317 | |
| | | 3. Forward one-way clutch | AT-327 | |
| | | 4. Reverse clutch | AT-311 | |

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

| Items | Symptom | Condition | Diagnostic Item | Reference Page | |
|----------------------------------|--|------------------------|--|----------------|-----------|
| NOT USED | Maximum speed not attained. Acceleration poor. | ON vehicle | 1. Fluid level | AT-61 | GI |
| | | | 2. Park/neutral position (PNP) switch adjustment | AT-272 | MA |
| | | | 3. Shift solenoid valve A | AT-171 | EM |
| | | | 4. Shift solenoid valve B | AT-175 | |
| | | | 5. Control valve assembly | AT-269 | LC |
| | | OFF vehicle | 6. Reverse clutch | AT-311 | |
| | | | 7. High clutch | AT-314 | EC |
| | | | 8. Brake band | AT-330 | |
| | | | 9. Low & reverse brake | AT-321 | FE |
| | | | 10. Oil pump | AT-294 | |
| | | | 11. Torque converter | AT-283 | CL |
| | Transmission noise in D, 2, 1 and R positions. | ON vehicle | 1. Fluid level | AT-61 | MT |
| | | ON vehicle | 2. Torque converter | AT-283 | |
| | Engine brake does not operate in "1" position. AT-251 | ON vehicle | 1. Park/neutral position (PNP) switch adjustment | AT-272 | AT |
| | | | 2. Manual control linkage adjustment | AT-272 | TF |
| | | | 3. Accelerator pedal position sensor (throttle position sensor) | AT-179 | |
| | | | 4. Vehicle speed sensor-A/T (Revolution sensor) and vehicle speed sensor-MTR | AT-114, 197 | PD |
| 5. Shift solenoid valve A | | | AT-171 | AX | |
| 6. Control valve assembly | | | AT-269 | | |
| 7. Overrun clutch solenoid valve | | | AT-185 | SU | |
| OFF vehicle | | 8. Overrun clutch | AT-317 | | |
| | | 9. Low & reverse brake | AT-321 | BR | |

ST
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IDX

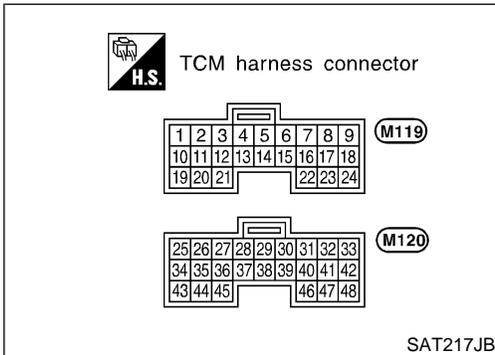
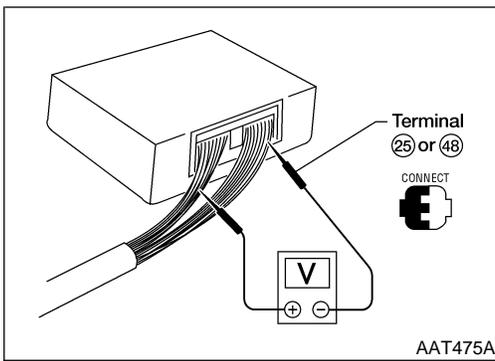
TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Chart (Cont'd)

| Items | Symptom | Condition | Diagnostic Item | Reference Page |
|---|--|---|---|----------------|
| NOT USED | Transmission overheats. | ON vehicle | 1. Fluid level | AT-61 |
| | | | 2. Engine idling rpm | EC-758 |
| | | | 3. Accelerator pedal position sensor (throttle position sensor) | AT-179 |
| | | | 4. Line pressure test | AT-64 |
| | | | 5. Line pressure solenoid valve | AT-165 |
| | | | 6. Control valve assembly | AT-269 |
| | | OFF vehicle | 7. Oil pump | AT-294 |
| | | | 8. Reverse clutch | AT-311 |
| | | | 9. High clutch | AT-314 |
| | | | 10. Brake band | AT-330 |
| | | | 11. Forward clutch | AT-317 |
| | | | 12. Overrun clutch | AT-317 |
| | | | 13. Low & reverse brake | AT-321 |
| | | | 14. Torque converter | AT-283 |
| | ATF shoots out during operation. White smoke emitted from exhaust pipe during operation. | ON vehicle | 1. Fluid level | AT-61 |
| | | OFF vehicle | 2. Reverse clutch | AT-311 |
| | | | 3. High clutch | AT-314 |
| | | | 4. Brake band | AT-330 |
| | | | 5. Forward clutch | AT-317 |
| | | | 6. Overrun clutch | AT-317 |
| | | | 7. Low & reverse brake | AT-321 |
| | Offensive smell at fluid charging pipe. | ON vehicle | 1. Fluid level | AT-61 |
| | | OFF vehicle | 2. Torque converter | AT-283 |
| | | | 3. Oil pump | AT-294 |
| | | | 4. Reverse clutch | AT-311 |
| | | | 5. High clutch | AT-314 |
| | | | 6. Brake band | AT-330 |
| | | | 7. Forward clutch | AT-317 |
| 8. Overrun clutch | | | AT-317 | |
| 9. Low & reverse brake | | | AT-321 | |
| Engine is stopped at R, D, 2 and 1 positions. | ON vehicle | 1. Fluid level | AT-61 | |
| | | 2. Torque converter clutch solenoid valve | AT-151 | |
| | | 3. Shift solenoid valve B | AT-175 | |
| | | 4. Shift solenoid valve A | AT-171 | |
| | | 5. Control valve assembly | AT-269 | |

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

TCM Terminals and Reference Value



TCM Terminals and Reference Value

=NAAT0027

PREPARATION

NAAT0027S01

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

TCM HARNESS CONNECTOR TERMINAL LAYOUT

NAAT0027S02

TCM INSPECTION TABLE

NAAT0027S03

(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 |
| 5 | L | CAN (high) | | — | |
| 6 | R | CAN (low) | | — | |
| 10 | W/R | Power source | | When turning ignition switch to "ON". | Battery voltage |
| | | | | When turning ignition switch to "OFF". | 0V |

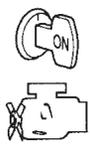
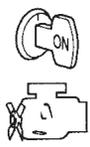
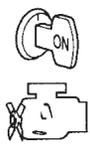
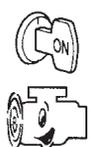
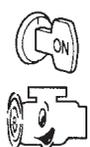
TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

TCM Terminals and Reference Value (Cont'd)

| Terminal No. | Wire color | Item | Condition | Judgement standard (Approx.) | |
|--------------|------------|---|--|---|---|
| 11 | L/W | Shift solenoid valve A |  | When shift solenoid valve A operates. (When driving in "D 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 |
| 19 | W/R | Power source |   | Same as No. 10 | |
| 20 | L/B | Overrun clutch solenoid valve |  | When overrun clutch solenoid valve operates. | Battery voltage |
| | | | | When overrun clutch solenoid valve does not operate. | 0V |
| 25 | B | Ground |  | — | |
| 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* | W | Data link connector (RX) |  or  | — | — |
| 31* | L | Data link connector (TX) | | — | — |
| 32 | P/B | Sensor power | | Ignition switch "ON". | 4.5 - 5.5V |
| | | | Ignition switch "OFF". | 0V | |

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

TCM Terminals and Reference Value (Cont'd)

| Terminal No. | Wire color | Item | Condition | Judgement standard (Approx.) | |
|--------------|------------|--|---|---|---|
| 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/G | Engine speed signal |  | Refer to EC-141, "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. |
| 41 | P/L | Accelerator pedal position sensor (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 | Sensor ground | | — | 0V |
| 46 | W/G | Transfer control unit |  | Refer to TF section, "Transfer Control Unit Terminals and Reference Value". | — |
| 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 |

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

CAN COMMUNICATION

System Description

System Description

NAAT0234

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only. Refer to EL-409.

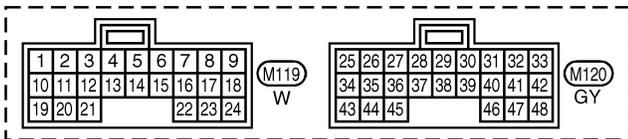
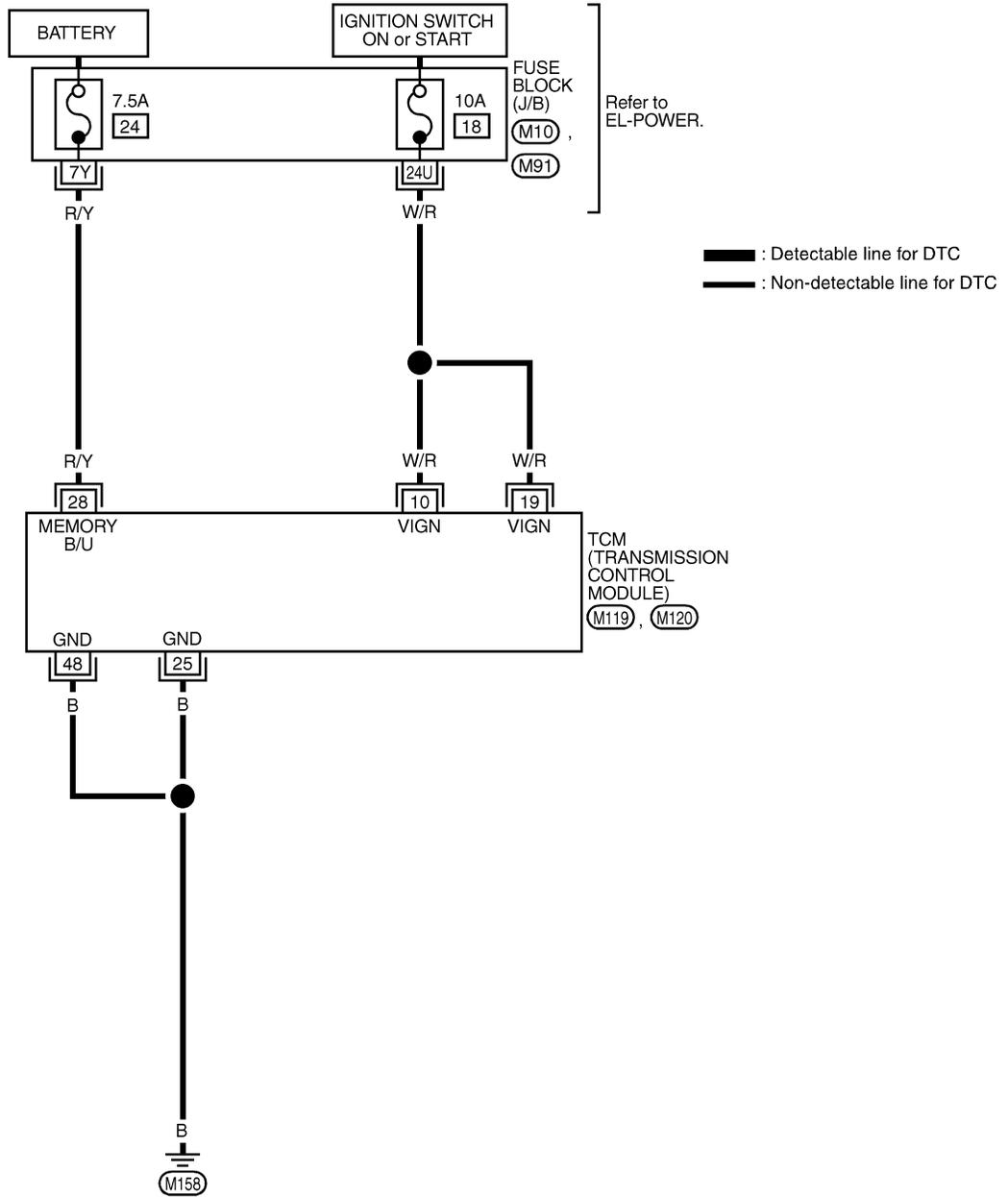
TROUBLE DIAGNOSIS FOR POWER SUPPLY

Wiring Diagram — AT — MAIN

Wiring Diagram — AT — MAIN

NAAT0185

AT-MAIN-01



REFER TO THE FOLLOWING.

M10, M91 - FUSE BLOCK-JUNCTION BOX (J/B)

MAT311B

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
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TROUBLE DIAGNOSIS FOR POWER SUPPLY

Wiring Diagram — AT — MAIN (Cont'd)

TCM TERMINALS AND REFERENCE VALUE

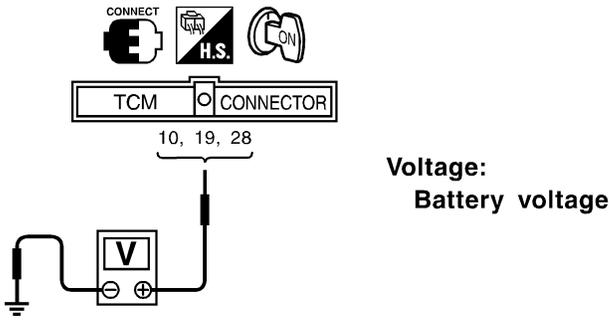
NAA70185S01

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

Diagnostic Procedure

NAA70223

| 1 | | CHECK TCM POWER SOURCE STEP 1 |
|---|---|-------------------------------|
| <p>1. Turn ignition switch to ON position. (Do not start engine.)</p> <p>2. Check voltage between TCM harness connector M119, M120 terminals 10, 19, 28 and ground.</p> | | |
|  <p>Voltage: Battery voltage</p> | | |
| OK or NG | | |
| OK | ▶ | GO TO 2. |
| NG | ▶ | GO TO 3. |

SAT611J

TROUBLE DIAGNOSIS FOR POWER SUPPLY

Diagnostic Procedure (Cont'd)

| | | |
|--|--------------------------------------|----------|
| 2 | CHECK TCM POWER SOURCE STEP 2 | |
| <p>1. Turn ignition switch to OFF position. 2. Check voltage between TCM harness connector M120 terminal 28 and ground.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SAT612JC</p> | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | GO TO 3. |

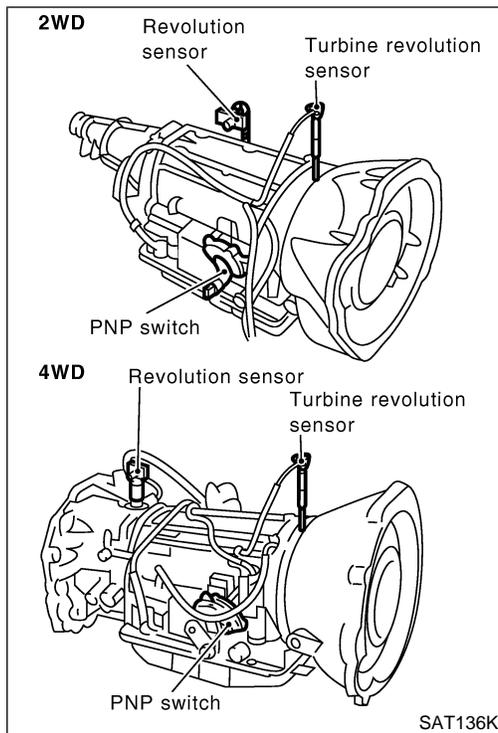
| | | |
|---|-----------------------------------|----------------------------------|
| 3 | DETECT MALFUNCTIONING ITEM | |
| <p>Check the following items:</p> <ul style="list-style-type: none"> ● Harness for short or open between ignition switch and TCM harness connector M119, M120 terminals 10, 19 and 28 (Main harness) ● Ignition switch and 10A or 7.5A fuse [No. 18 or 24, located in the fuse block (J/B)] Refer to EL-11, "Schematic". <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair or replace damaged parts. |

| | | |
|---|---------------------------------|--|
| 4 | CHECK TCM GROUND CIRCUIT | |
| <p>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.</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | Repair open circuit or short to ground or short to power in harness or connectors. |

GI
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 EM
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 CL
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 AX
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 EL
 IDX

DTC P0705 PARK/NEUTRAL POSITION SWITCH

Description



Description

NAAT0028

- 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

NAAT0028S02

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

NAAT0028S03

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

DTC P0705 PARK/NEUTRAL POSITION SWITCH

Description (Cont'd)

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
| |
| |
| |
| |

SAT014K

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

SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0028S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

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

With CONSULT-II

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

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

THRTL POS SEN: More than 1.3V

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

With GST

Follow the procedure "With CONSULT-II".

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

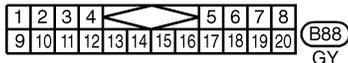
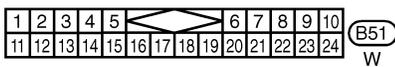
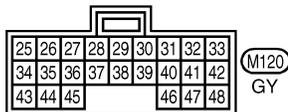
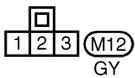
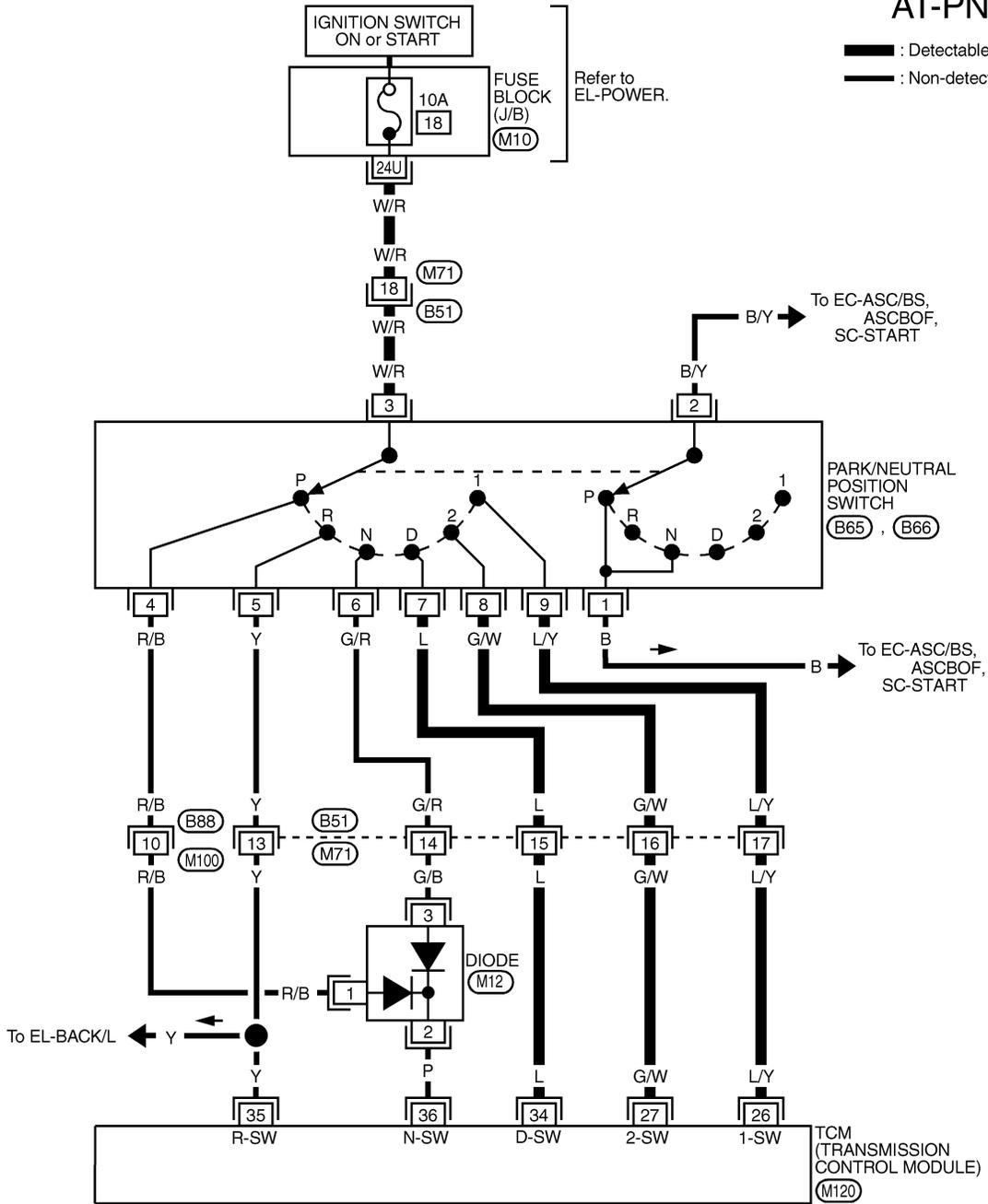
DTC P0705 PARK/NEUTRAL POSITION SWITCH

Wiring Diagram — AT — PNP/SW

Wiring Diagram — AT — PNP/SW

NAAT0186

AT-PNP/SW-01



REFER TO THE FOLLOWING.

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

MAT500B

DTC P0705 PARK/NEUTRAL POSITION SWITCH

Diagnostic Procedure

Diagnostic Procedure

NAAT0029

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
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IDX

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

| 2 | CHECK PNP SWITCH CIRCUIT (WITHOUT CONSULT-II) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|----------|----------------|-----------|----------|--|--|--|----|----|----|----|----|------|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|
| <p> Without CONSULT-II</p> <ol style="list-style-type: none"> Turn ignition switch to "ON" position. (Do not start engine.) Check voltage between TCM harness connector M120 terminals 26, 27, 34, 35, 36 and ground while moving selector lever through each position. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Lever position</th> <th colspan="5">Terminals</th> </tr> <tr> <th>36</th> <th>35</th> <th>34</th> <th>27</th> <th>26</th> </tr> </thead> <tbody> <tr> <td>P, N</td> <td style="text-align: center;">B</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>R</td> <td style="text-align: center;">0</td> <td style="text-align: center;">B</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>D</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">B</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>2</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">B</td> <td style="text-align: center;">0</td> </tr> <tr> <td>1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">B</td> </tr> </tbody> </table> | | | Lever position | Terminals | | | | | 36 | 35 | 34 | 27 | 26 | P, N | B | 0 | 0 | 0 | 0 | R | 0 | B | 0 | 0 | 0 | D | 0 | 0 | B | 0 | 0 | 2 | 0 | 0 | 0 | B | 0 | 1 | 0 | 0 | 0 | 0 | B |
| 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 4. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No | ▶ | GO TO 3. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

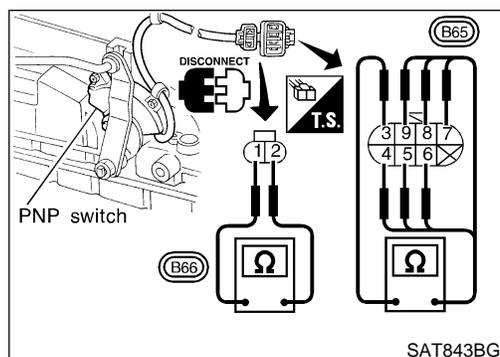
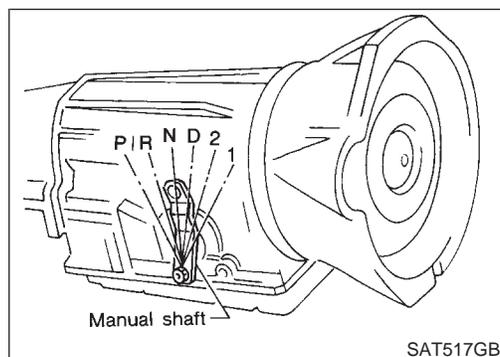
DTC P0705 PARK/NEUTRAL POSITION SWITCH

Diagnostic Procedure (Cont'd)

| | | |
|---|-----------------------------------|----------------------------------|
| 3 | DETECT MALFUNCTIONING ITEM | |
| <p>Check the following items:</p> <ul style="list-style-type: none"> ● PNP switch Refer to "Component Inspection", AT-106. ● Harness for short or open between ignition switch and PNP switch (Main harness) ● Harness for short or open between PNP switch and TCM (Main harness) ● Diode (P, N position) ● Ignition switch and 10A fuse [No. 18, located in the fuse block (J/B)] Refer to EL-11, "Schematic". <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair or replace damaged parts. |

| | | |
|---|------------------|-----------------------|
| 4 | CHECK DTC | |
| <p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-103.</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | GO TO 5. |

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



Component Inspection PARK/NEUTRAL POSITION SWITCH

NAAT0030

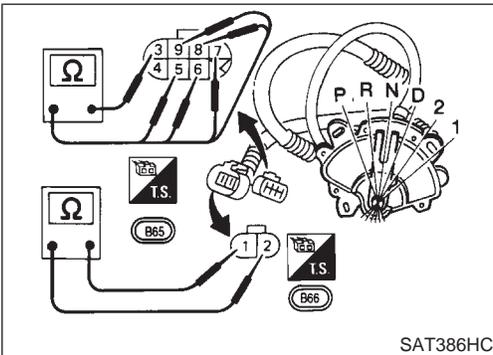
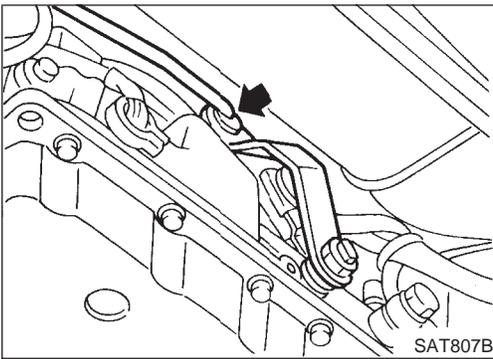
NAAT0030S02

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 | |

DTC P0705 PARK/NEUTRAL POSITION SWITCH

Component Inspection (Cont'd)

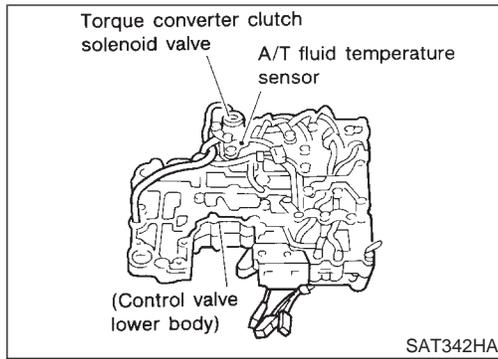


2. If NG, check again with manual control linkage disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control linkage. Refer to AT-272.
4. If NG on step 2, remove PNP switch from A/T and check continuity of PNP switch terminals. Refer to step 1.
5. If OK on step 4, adjust PNP switch. Refer to AT-272.
6. If NG on step 4, replace PNP switch.

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DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

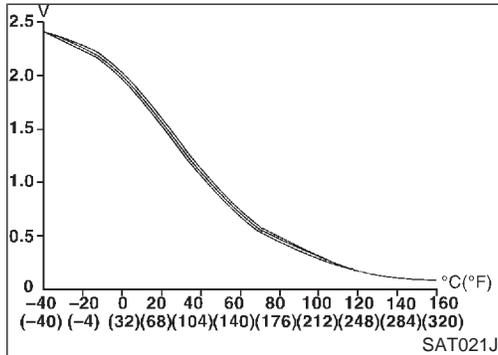
Description



Description

NAAT0031

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

NAAT0031S04

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)] |

TCM TERMINALS AND REFERENCE VALUE

NAAT0031S02

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

NAAT0031S03

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|--|--|
| P ₁ : ATF TEMP SEN/CIRC P ₀₇₁₀ | TCM receives an excessively low or high voltage from the sensor. | <ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) A/T fluid temperature sensor |

DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Description (Cont'd)

| |
|---------------|
| 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

NAAT0031S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

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

Ⓜ With CONSULT-II

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

CMPS-RPM (REF): 450 rpm or more

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

THRTL POS SEN: More than 1.2V

Selector lever: D position (OD "ON")

Ⓜ With GST

Follow the procedure "With CONSULT-II".

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DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

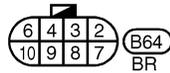
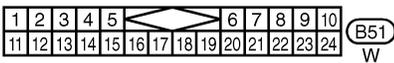
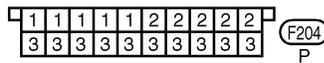
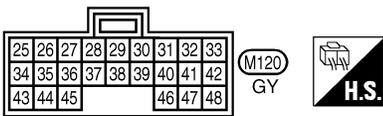
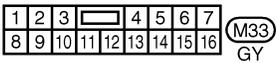
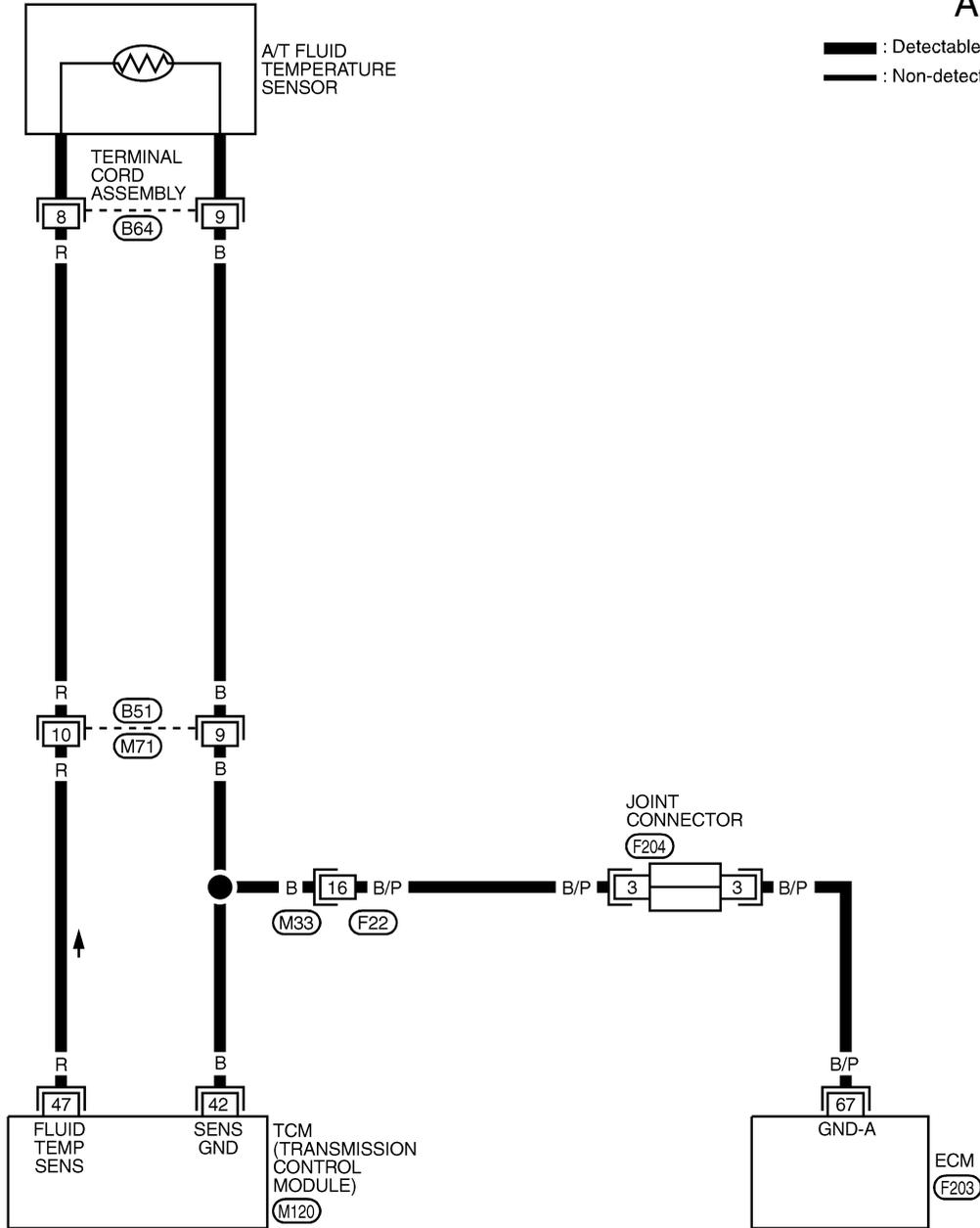
Wiring Diagram — AT — FTS

Wiring Diagram — AT — FTS

NAAT0187

AT-FTS-01

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



REFER TO THE FOLLOWING.
(F203) - ELECTRICAL UNITS

MAT313B

DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Diagnostic Procedure

Diagnostic Procedure

NAAT0032

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

| | | |
|--|-----------------------------------|----------------------------------|
| 3 | DETECT MALFUNCTIONING ITEM | |
| <p>Check the following item:</p> <ul style="list-style-type: none"> Harness for short to ground or short to power or open between TCM, ECM and terminal cord assembly (Main harness) Ground circuit for ECM. <p>Refer to EC-157, "Wiring Diagram".</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair or replace damaged parts. |

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DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Diagnostic Procedure (Cont'd)

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

| | |
|---|------------------------------------|
| 5 | DETECT MALFUNCTIONING ITEM |
| <ol style="list-style-type: none"> Remove oil pan. Check the following items: <ul style="list-style-type: none"> A/T fluid temperature sensor Refer to "Component Inspection", AT-113. Harness of terminal cord assembly for short or open | |
| OK or NG | |
| OK | ▶ GO TO 7. |
| NG | ▶ Repair or replace damaged parts. |

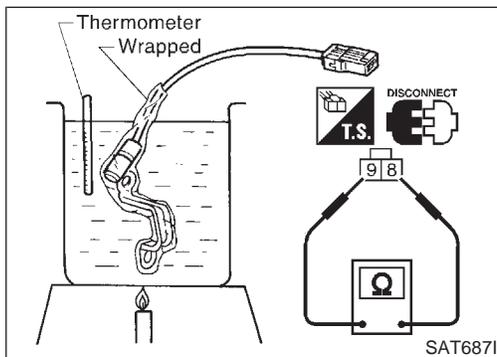
| | |
|--|--|
| 6 | CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II) |
| <p> Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Check voltage between TCM harness connector M120 terminal 47 and ground while warming up A/T. <p>Voltage: Cold [20°C (68°F)] → Hot [80°C (176°F)]: Approximately 1.5V → 0.5V</p> | |
| | |
| SAT518J | |
| OK or NG | |
| OK | ▶ GO TO 4. |
| NG | ▶ GO TO 3. |

DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

Diagnostic Procedure (Cont'd)

| | | |
|---|------------------|-----------------------|
| 7 | CHECK DTC | |
| Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-109. | | |
| 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. |



Component Inspection A/T FLUID TEMPERATURE SENSOR

NAAT0033

NAAT0033S01

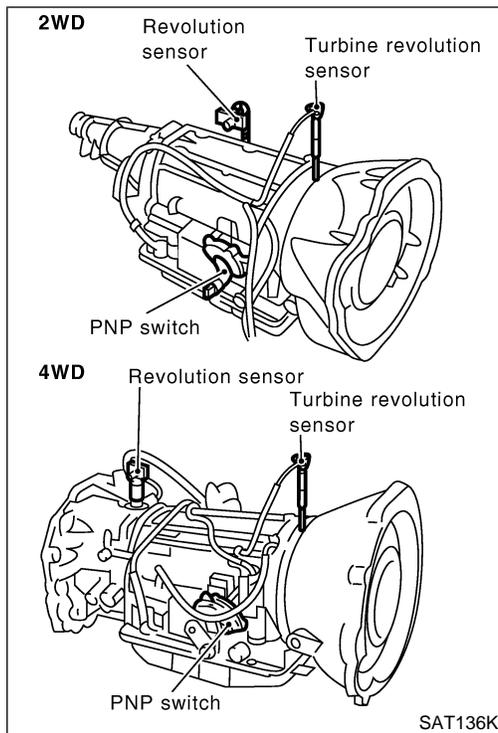
- For removal, refer to AT-269.
- Check resistance between terminals 8 and 9 while changing temperature as shown at left.

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

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

Description



Description

NAAT0034

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

NAAT0034S02

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 | Sensor ground |  | 0V |

ON BOARD DIAGNOSIS LOGIC

NAAT0034S03

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

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

Description (Cont'd)

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
| |
| |
| |
| |

SAT014K

| |
|-----------------------|
| SELECT DIAG MODE |
| SELF-DIAG RESULTS |
| DATA MONITOR |
| CAN DIAG SUPPORT MNTR |
| DTC WORK SUPPORT |
| ECU PART NUMBER |
| |
| |

SAT858K

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
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SAT014K

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|------------------------|
| 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

NAAT0034S01

CAUTION:

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

NOTE:

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

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

With CONSULT-II

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
- 2) Drive vehicle and check for an increase of "VHCL/S SE-MTR" value.
If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-200.
If the check result is OK, go to following step.
- 3) Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
- 4) Start engine and maintain the following conditions for at least 5 consecutive seconds.
VHCL SPEED SE: 30 km/h (19 MPH) or more
THRTL POS SEN: More than 1.2V
Selector lever: D position (OD "ON")
Driving pattern: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.
If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-117.
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".

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

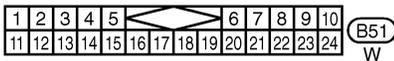
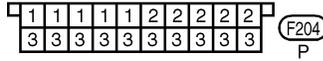
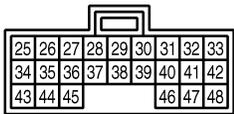
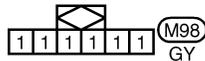
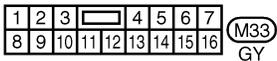
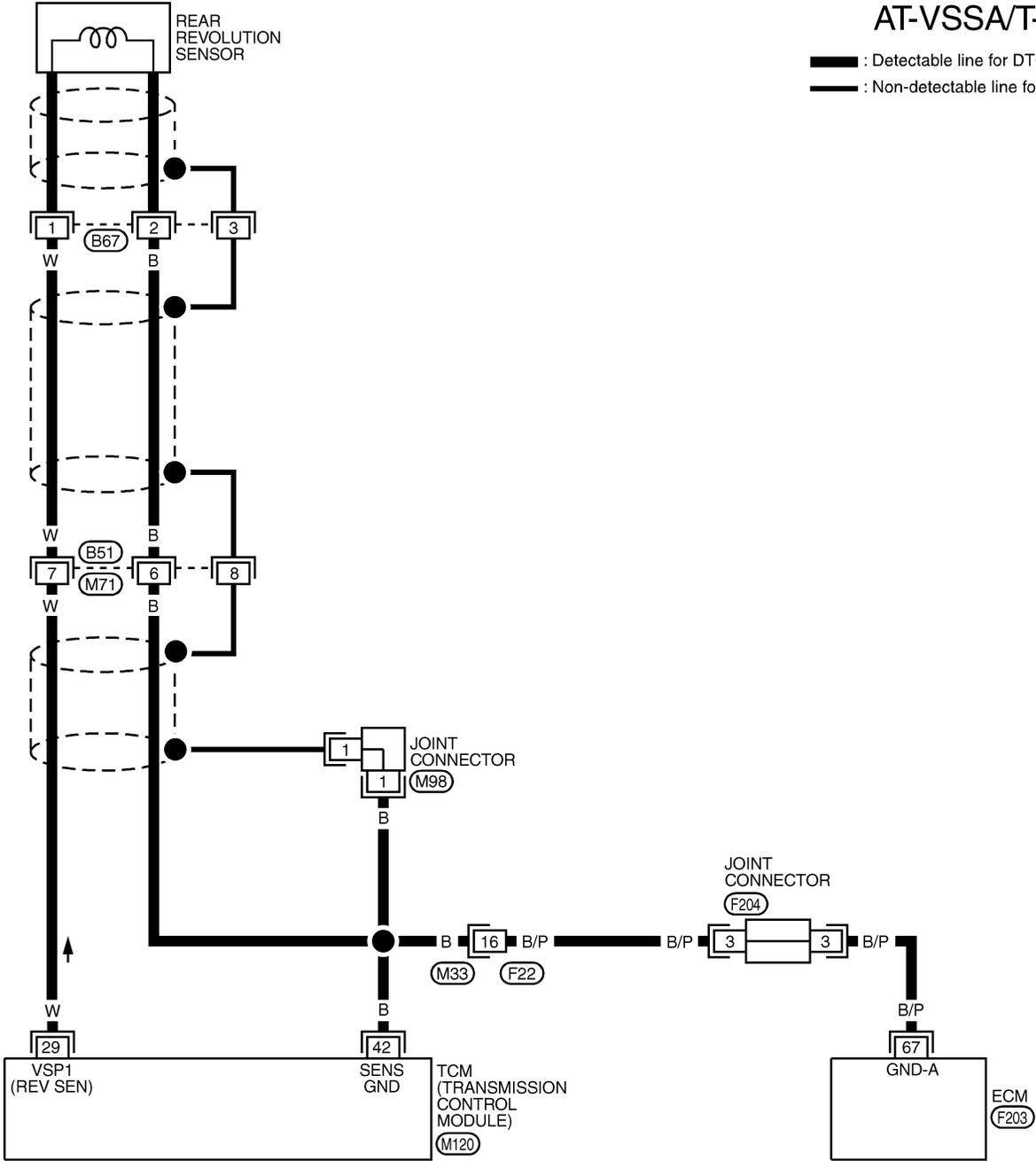
Wiring Diagram — AT — VSSA/T

Wiring Diagram — AT — VSSA/T

NAAT0188

AT-VSSA/T-01

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



REFER TO THE FOLLOWING.
 (F203) - ELECTRICAL UNITS

MAT314B

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

Diagnostic Procedure

Diagnostic Procedure

NAAT0035

| | | |
|---------------------------|-------------------------|--|
| 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) | | | | | | | | | | | | | | | |
|---|---|--|--------------|--|------------|--|---------------|----------|---------------|----------|---------------|-------|---------------|-------|--------------|-------|
| <p> With CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II. Read out the value of "VHCL/S SE-A/T" while driving. Check the value changes according to driving speed. | | | | | | | | | | | | | | | | |
| <table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th></th> </tr> </thead> <tbody> <tr> <td>VHCL/S SE-A/T</td> <td>XXX km/h</td> </tr> <tr> <td>VHCL/S SE-MTR</td> <td>XXX km/h</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>FLUID TEMP SE</td> <td>XXX V</td> </tr> <tr> <td>BATTERY VOLT</td> <td>XXX V</td> </tr> </tbody> </table> | | | DATA MONITOR | | MONITORING | | VHCL/S SE-A/T | XXX km/h | VHCL/S SE-MTR | XXX km/h | THRTL POS SEN | XXX V | FLUID TEMP SE | XXX V | BATTERY VOLT | XXX V |
| DATA MONITOR | | | | | | | | | | | | | | | | |
| MONITORING | | | | | | | | | | | | | | | | |
| VHCL/S SE-A/T | XXX km/h | | | | | | | | | | | | | | | |
| VHCL/S SE-MTR | XXX km/h | | | | | | | | | | | | | | | |
| THRTL POS SEN | XXX V | | | | | | | | | | | | | | | |
| FLUID TEMP SE | XXX V | | | | | | | | | | | | | | | |
| BATTERY VOLT | XXX V | | | | | | | | | | | | | | | |
| SAT614J | | | | | | | | | | | | | | | | |
| OK or NG | | | | | | | | | | | | | | | | |
| OK ▶ | GO TO 6. | | | | | | | | | | | | | | | |
| NG ▶ | GO TO 3. | | | | | | | | | | | | | | | |

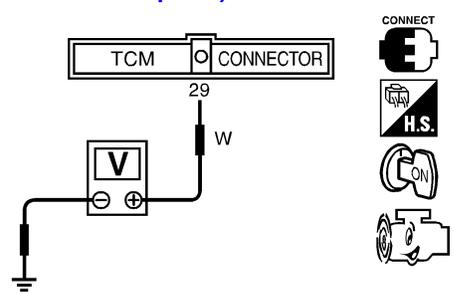
| | | |
|--|--------------------------------------|--|
| 3 | CHECK REVOLUTION SENSOR | |
| Refer to "Component Inspection", AT-118. | | |
| OK or NG | | |
| OK ▶ | GO TO 4. | |
| NG ▶ | Repair or replace revolution sensor. | |

| | | |
|---|-----------------------------------|--|
| 4 | DETECT MALFUNCTIONING ITEM | |
| <p>Check the following items:</p> <ul style="list-style-type: none"> ● Harness for short or open between TCM and revolution sensor. ● Harness for short or open between revolution sensor and ECM. ● Ground circuit for ECM <p>Refer to EC-157, "WIRING DIAGRAM".</p> | | |
| OK or NG | | |
| OK ▶ | GO TO 6. | |
| NG ▶ | Repair or replace damaged parts. | |

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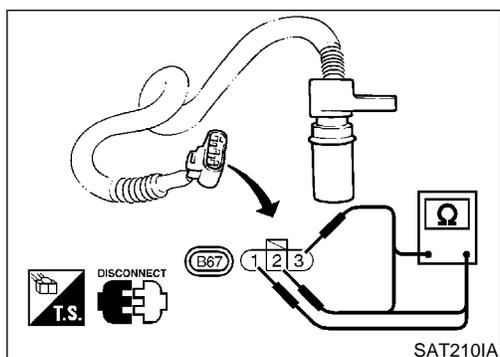
DTC P0720 VEHICLE SPEED SENSOR-A/T (REVOLUTION SENSOR)

Diagnostic Procedure (Cont'd)

| | |
|--|--|
| 5 | CHECK INPUT SIGNAL (WITHOUT CONSULT-II) |
| <p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Check voltage between TCM harness connector M120 terminal 29 and ground while driving. (Measure with AC range.) <p>Voltage:</p> <p style="padding-left: 20px;">At 0 km/h (0 MPH): 0V</p> <p style="padding-left: 20px;">At 30 km/h (19 MPH): 1V or more</p> <p>(Voltage rises gradually in response to vehicle speed.)</p> | |
|  | |
| OK or NG | |
| OK | ▶ GO TO 6. |
| NG | ▶ GO TO 3. |

| | |
|---|-------------------------|
| 6 | CHECK DTC |
| Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-115. | |
| OK or NG | |
| OK | ▶ INSPECTION END |
| NG | ▶ GO TO 7. |

| | |
|--|------------------------------------|
| 7 | CHECK TCM INSPECTION |
| <ol style="list-style-type: none"> Perform TCM input/output signal inspection. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. | |
| OK or NG | |
| OK | ▶ INSPECTION END |
| NG | ▶ Repair or replace damaged parts. |



Component Inspection REVOLUTION SENSOR

NAAT0036

NAAT0036S01

- For removal, refer to AT-269.
- Check resistance between terminals 1, 2 and 3.

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

DTC P0725 ENGINE SPEED SIGNAL

Description

Description

The engine speed signal is sent from the ECM to the TCM. NAAT0037

TCM TERMINALS AND REFERENCE VALUE

NAAT0037S02

Remarks: Specification data are reference values.

| Terminal No. | Wire color | Item | Condition | Judgement standard (Approx.) |
|--------------|------------|---------------------|---|------------------------------|
| 39 | W/G | Engine speed signal |  <p>Refer to EC-141, "ECM INSPECTION TABLE".</p> | — |

ON BOARD DIAGNOSIS LOGIC

NAAT0037S03

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|--|--|
|  : ENGINE SPEED SIG  : P0725 | TCM does not receive the proper voltage signal from ECM. | <ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) |

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
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| |
| |

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

NAAT0037S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

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

With CONSULT-II

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

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

THRTL POS SEN: More than 1.2V

Selector lever: D position (OD "ON")

With GST

Follow the procedure "With CONSULT-II".

DTC P0725 ENGINE SPEED SIGNAL

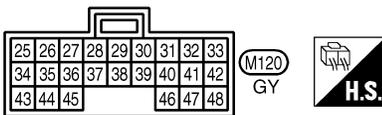
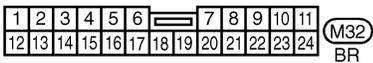
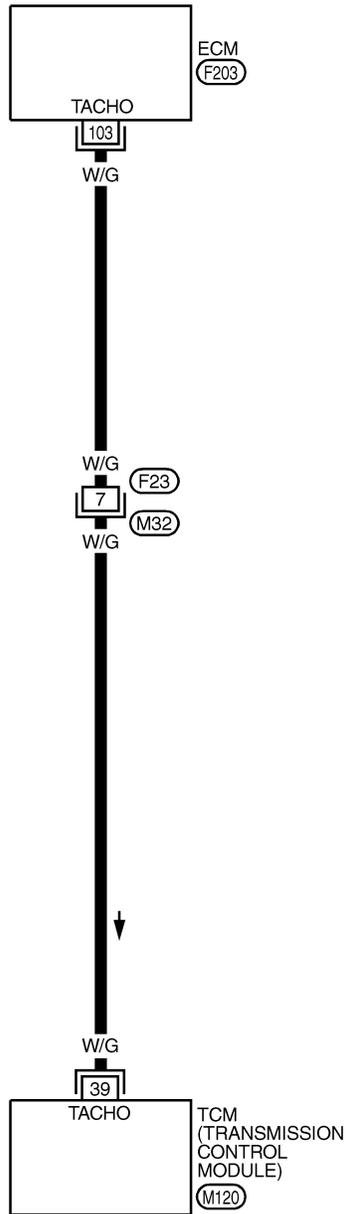
Wiring Diagram — AT — ENGSS

Wiring Diagram — AT — ENGSS

NAAT0189

AT-ENGSS-01

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



REFER TO THE FOLLOWING.
 (F203) - ELECTRICAL UNITS

MAT315B

DTC P0725 ENGINE SPEED SIGNAL

Diagnostic Procedure

Diagnostic Procedure

NAAT0038

| | | |
|---|---------------------------|---|
| 1 | CHECK DTC WITH ECM | |
| <ul style="list-style-type: none"> Check P code with CONSULT-II. Turn ignition switch "ON" and select "SELF-DIAG RESULTS" mode for "ENGINE" with CONSULT-II. Refer to EC-94, "DESCRIPTION". <p style="text-align: center;">OK or NG</p> | | |
| OK (With CONSULT-II) | ▶ | GO TO 2. |
| OK (Without CONSULT-II) | ▶ | GO TO 4. |
| NG | ▶ | Check ignition signal circuit for engine control. Refer to EC-714, "Component Description". |

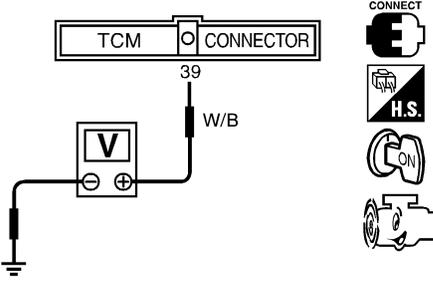
| 2 | CHECK INPUT SIGNAL (WITH CONSULT-II) | | | | | | | | | | | | | | | |
|--|---|----------|--------------|--|------------|--|--------------|---------|-------------|---------|--------------|----|------------|-----|---------------|-----|
| <p> With CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II. Read out the value of "ENGINE SPEED". Check engine speed changes according to throttle position. | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th></th> </tr> </thead> <tbody> <tr> <td>ENGINE SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>TURBINE REV</td> <td>XXX rpm</td> </tr> <tr> <td>OVERDRIVE SW</td> <td>ON</td> </tr> <tr> <td>PN POSI SW</td> <td>OFF</td> </tr> <tr> <td>R POSITION SW</td> <td>OFF</td> </tr> </tbody> </table> | | | DATA MONITOR | | MONITORING | | ENGINE SPEED | XXX rpm | TURBINE REV | XXX rpm | OVERDRIVE SW | ON | PN POSI SW | OFF | R POSITION SW | OFF |
| DATA MONITOR | | | | | | | | | | | | | | | | |
| MONITORING | | | | | | | | | | | | | | | | |
| ENGINE SPEED | XXX rpm | | | | | | | | | | | | | | | |
| TURBINE REV | XXX rpm | | | | | | | | | | | | | | | |
| OVERDRIVE SW | ON | | | | | | | | | | | | | | | |
| PN POSI SW | OFF | | | | | | | | | | | | | | | |
| R POSITION SW | OFF | | | | | | | | | | | | | | | |
| SAT645J | | | | | | | | | | | | | | | | |
| Refer to EC-141, "ECM INSPECTION TABLE". | | | | | | | | | | | | | | | | |
| Yes | ▶ | GO TO 5. | | | | | | | | | | | | | | |
| No | ▶ | GO TO 3. | | | | | | | | | | | | | | |

| | | |
|---|-----------------------------------|----------------------------------|
| 3 | DETECT MALFUNCTIONING ITEM | |
| <p>Check the following items:</p> <ul style="list-style-type: none"> Harness for short or open between TCM and ECM Resistor Ignition coil <p>Refer to EC-714, "Component Description".</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 5. |
| NG | ▶ | Repair or replace damaged parts. |

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DTC P0725 ENGINE SPEED SIGNAL

Diagnostic Procedure (Cont'd)

| | | |
|---|--|----------|
| 4 | CHECK INPUT SIGNAL (WITHOUT CONSULT-II) | |
| <p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Check voltage between TCM harness connector M120 terminal 39 and ground. | | |
|  | | |
| SAT520J | | |
| Refer to EC-141, "ECM INSPECTION TABLE". | | |
| Yes | ▶ | GO TO 5. |
| No | ▶ | GO TO 3. |

| | | |
|---|------------------|-----------------------|
| 5 | CHECK DTC | |
| Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-119. | | |
| OK or NG | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | GO TO 6. |

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

DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

Description

Description

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

NAAT0039

| 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

NAAT0039S02

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

NAAT0039S03

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

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

A: Output shaft revolution signal from revolution sensor

B: Engine speed signal from ECM

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

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

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

*: P0731 is detected.

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|-------------------------|--|--|
| : A/T 1ST GR FNCTN | A/T cannot be shifted to the 1st gear position even if electrical circuit is good. | <ul style="list-style-type: none"> • Shift solenoid valve A • Shift solenoid valve B • Each clutch • Hydraulic control circuit |
| : P0731 | | |

DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

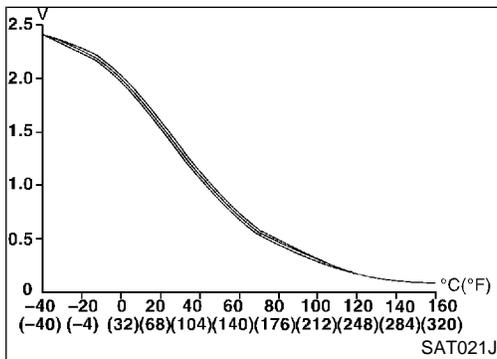
Description (Cont'd)

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
| |
| |
| |
| |

SAT014K

| |
|-----------------------|
| SELECT DIAG MODE |
| SELF-DIAG RESULTS |
| DATA MONITOR |
| CAN DIAG SUPPORT MNTR |
| DTC WORK SUPPORT |
| ECU PART NUMBER |
| |
| |

SAT858K



DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0039S01

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 "1ST GR FNCTN P0731" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
- 4) Accelerate vehicle to 10 to 20 km/h (6 to 12 MPH) under the following condition and release the accelerator pedal completely.

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

Selector lever: D position (OD "ON")

- Check that "GEAR" shows "2" after releasing pedal.
- 5) Depress accelerator pedal to WOT (more than 7.0/8 of "THROTTLE POSI") quickly from a speed of 10 to 20 km/h (6 to 12 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)

If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-127.

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

- Check that "GEAR" shows "1" when depressing accelerator pedal to WOT.
 - If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0731 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".
- 6) Stop vehicle.
 - 7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

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

DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

Description (Cont'd)

| | | |
|-------------------------------|---------------|----|
| Malfunction for P0731 exists. | 2 → 2 → 3 → 3 | GI |
| | 4 → 3 → 3 → 4 | MA |

- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".)
Refer to "DIAGNOSTIC PROCEDURE", AT-127.
Refer to shift schedule, AT-353.



With GST

Follow the procedure "With CONSULT-II".

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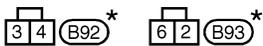
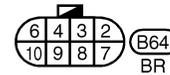
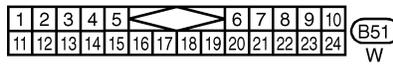
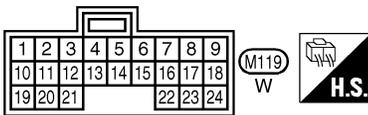
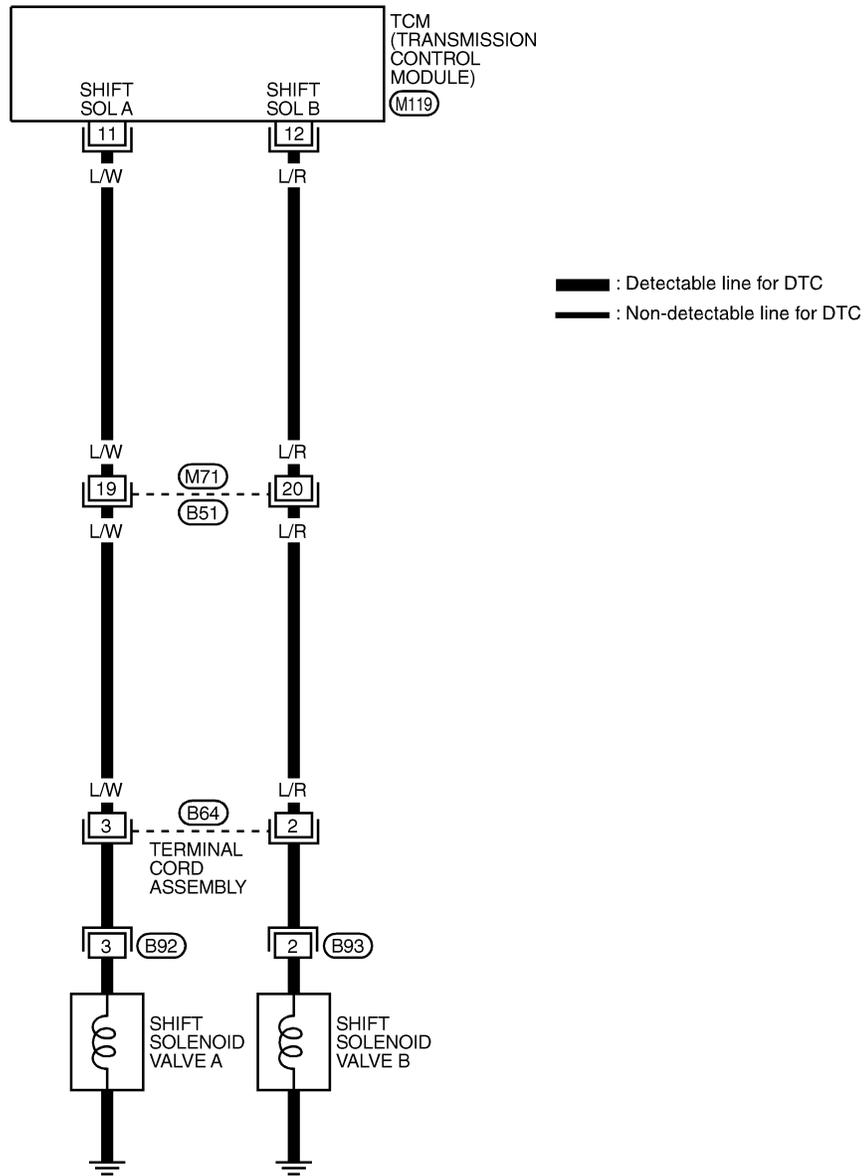
DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

Wiring Diagram — AT — 1ST

Wiring Diagram — AT — 1ST

NAAT0190

AT-1STSIG-01



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

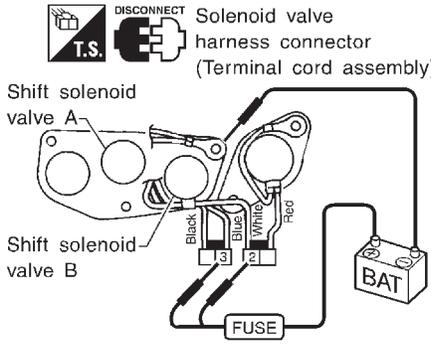
MAT731A

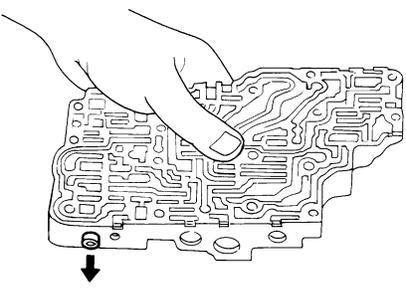
DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

Diagnostic Procedure

Diagnostic Procedure

NAAT0040

| | | | |
|----------|-----------------------------------|---|---------|
| 1 | CHECK SHIFT SOLENOID VALVE | <p>1. Remove control valve assembly. Refer to AT-269.</p> <p>2. Check shift solenoid valve operation.</p> <ul style="list-style-type: none"> ● Shift solenoid valve A ● Shift solenoid valve B <p>Refer to "Component Inspection", AT-128.</p> <div style="text-align: center;">  <p>OK or NG</p> </div> | SAT648I |
| OK | ▶ | GO TO 2. | |
| NG | ▶ | Repair or replace shift solenoid valve assembly. | |

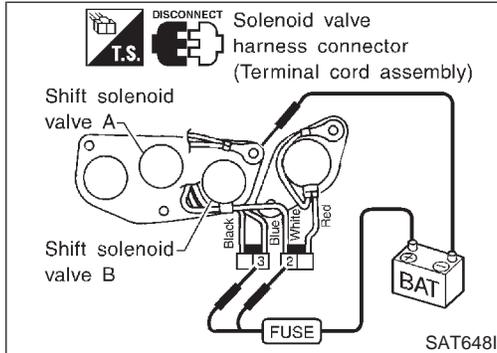
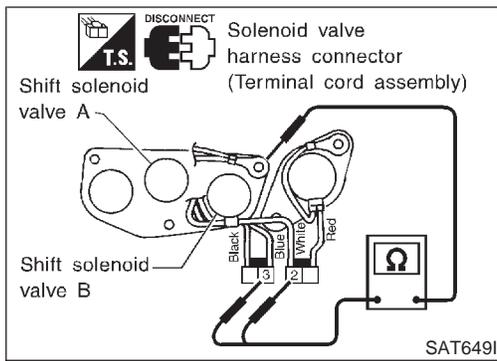
| | | | |
|----------|----------------------------|---|---------|
| 2 | CHECK CONTROL VALVE | <p>1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-298.</p> <p>2. Check to ensure that:</p> <ul style="list-style-type: none"> ● Valve, sleeve and plug slide along valve bore under their own weight. ● Valve, sleeve and plug are free from burrs, dents and scratches. ● Control valve springs are free from damage, deformation and fatigue. ● Hydraulic line is free from obstacles. <div style="text-align: center;">  <p>OK or NG</p> </div> | SAT367H |
| OK | ▶ | GO TO 3. | |
| NG | ▶ | Repair control valve assembly. | |

| | | | |
|----------|------------------|---|--|
| 3 | CHECK DTC | <p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-124.</p> <p style="text-align: center;">OK or NG</p> | |
| OK | ▶ | INSPECTION END | |
| NG | ▶ | Check control valve again. Repair or replace control valve assembly. | |

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DTC P0731 IMPROPER SHIFTING TO 1ST GEAR POSITION

Component Inspection



Component Inspection

SHIFT SOLENOID VALVE A AND B

=NAAT0041

NAAT0041S01

- For removal, refer to AT-269.

Resistance Check

NAAT0041S0101

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

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

Operation Check

NAAT0041S0102

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

DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

Description

Description

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NAAT0042
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction. MA
- 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. EM

| 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

NAAT0042S02

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

NAAT0042S03

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. PD

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

| 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. SU

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|--|--|--|
|  : A/T 2ND GR FNCTN | A/T cannot be shifted to the 2nd gear position even if electrical circuit is good. | <ul style="list-style-type: none"> • Shift solenoid valve B • Each clutch • Hydraulic control circuit |
|  : P0732 | | |

DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

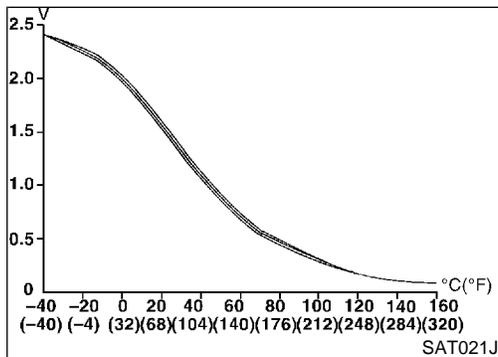
Description (Cont'd)

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
| |
| |
| |
| |

SAT014K

| |
|-----------------------|
| SELECT DIAG MODE |
| SELF-DIAG RESULTS |
| DATA MONITOR |
| CAN DIAG SUPPORT MNTR |
| DTC WORK SUPPORT |
| ECU PART NUMBER |
| |
| |

SAT858K



DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0042S01

CAUTION:

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

NOTE:

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

TESTING CONDITIONS:

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

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

④ With CONSULT-II

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

FLUID TEMP SEN: 0.4 - 1.5V

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

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

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

Selector lever: D position (OD "ON")

- Check that "GEAR" shows "3" or "4" after releasing pedal.
- 5) Depress accelerator pedal to WOT (more than 7.0/8 of "THROTTLE POSI") quickly from a speed of 25 to 30 km/h (16 to 19 MPH) until "TESTING" changes to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)

If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-133.

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 |

DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

Description (Cont'd)

- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".) Refer to "DIAGNOSTIC PROCEDURE", AT-133. Refer to shift schedule, AT-353.



With GST

Follow the procedure "With CONSULT-II".

GI

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PD

AX

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BR

ST

RS

BT

HA

SC

EL

IDX

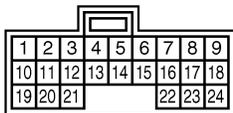
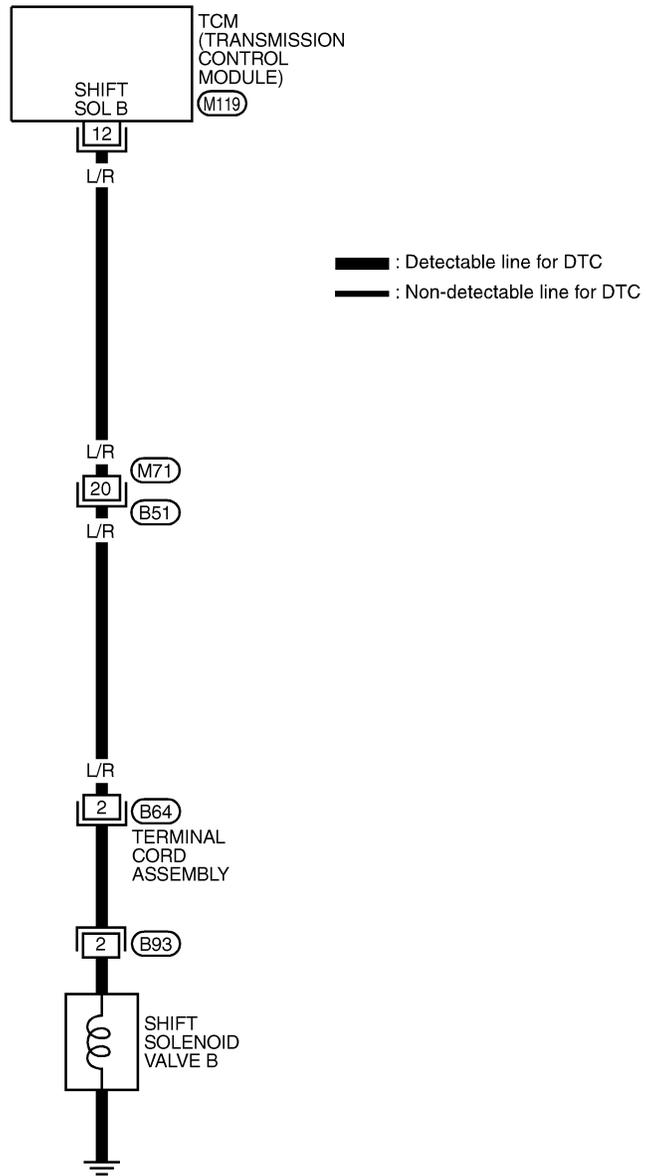
DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

Wiring Diagram — AT — 2ND

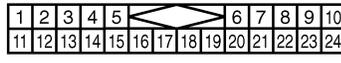
Wiring Diagram — AT — 2ND

NAAT0191

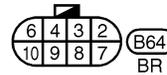
AT-2NDSIG-01



(M119)
W



(B51)
W



(B64)
BR



(B93)*

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

MAT732A

DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

Diagnostic Procedure

Diagnostic Procedure

NAAT0043

| | | | |
|----------|-----------------------------------|---|----|
| 1 | CHECK SHIFT SOLENOID VALVE | <p>1. Remove control valve assembly. Refer to AT-269.</p> <p>2. Check shift solenoid valve operation.</p> <ul style="list-style-type: none"> ● Shift solenoid valve B <p>Refer to "Component Inspection", AT-134.</p> <div style="text-align: center;"> <p>Solenoid valve harness connector (Terminal cord assembly)</p> <p>Shift solenoid valve B</p> <p>BAT</p> <p>FUSE</p> <p>SAT650I</p> <p>OK or NG</p> </div> | GI |
| OK | ▶ | GO TO 2. | MA |
| NG | ▶ | Repair or replace shift solenoid valve assembly. | EM |

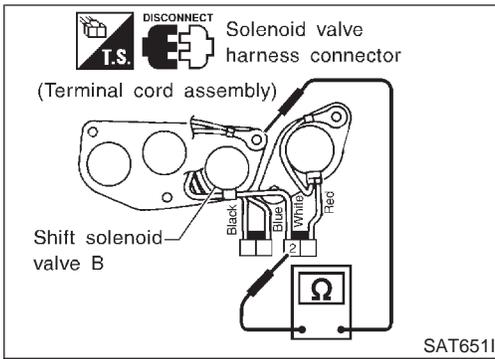
| | | | |
|----------|----------------------------|---|----|
| 2 | CHECK CONTROL VALVE | <p>1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-298.</p> <p>2. Check to ensure that:</p> <ul style="list-style-type: none"> ● Valve, sleeve and plug slide along valve bore under their own weight. ● Valve, sleeve and plug are free from burrs, dents and scratches. ● Control valve springs are free from damage, deformation and fatigue. ● Hydraulic line is free from obstacles. <div style="text-align: center;"> <p>SAT367H</p> <p>OK or NG</p> </div> | LC |
| OK | ▶ | GO TO 3. | EC |
| NG | ▶ | Repair control valve assembly. | FE |

| | | | |
|----------|------------------|---|----|
| 3 | CHECK DTC | <p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-130.</p> <p style="text-align: center;">OK or NG</p> | CL |
| OK | ▶ | INSPECTION END | MT |
| NG | ▶ | Check control valve again. Repair or replace control valve assembly. | AT |

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DTC P0732 IMPROPER SHIFTING TO 2ND GEAR POSITION

Component Inspection



Component Inspection SHIFT SOLENOID VALVE B

NAAT0044

NAAT0044S01

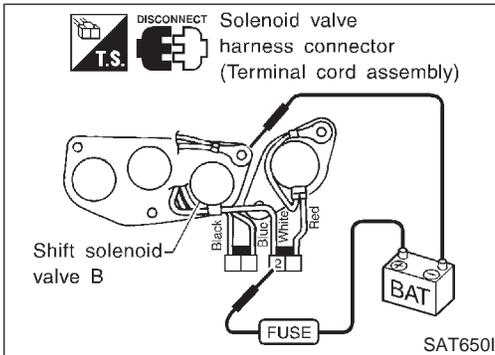
- For removal, refer to AT-269.

Resistance Check

NAAT0044S0101

- Check resistance between terminal 2 and ground.

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



Operation Check

NAAT0044S0102

- 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

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NAAT0045
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction. MA
- 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. EM

| 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

NAAT0045S02

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

NAAT0045S03

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. PD

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

| 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. SU

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

DTC P0733 IMPROPER SHIFTING TO 3RD GEAR POSITION

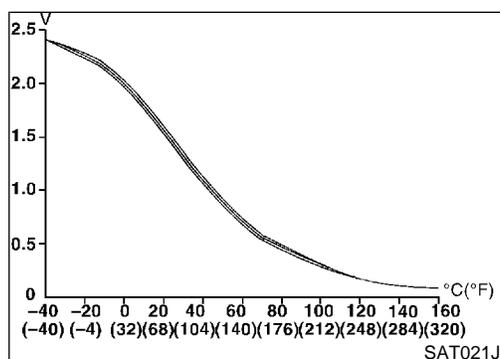
Description (Cont'd)

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
| |
| |
| |
| |

SAT014K

| |
|-----------------------|
| SELECT DIAG MODE |
| SELF-DIAG RESULTS |
| DATA MONITOR |
| CAN DIAG SUPPORT MNTR |
| DTC WORK SUPPORT |
| ECU PART NUMBER |
| |
| |

SAT858K



DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0045S01

CAUTION:

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

NOTE:

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

TESTING CONDITIONS:

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

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

④ With CONSULT-II

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

FLUID TEMP SEN: 0.4 - 1.5V

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

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

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

Selector lever: D position (OD "ON")

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

If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-139.

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

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

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

DTC P0733 IMPROPER SHIFTING TO 3RD GEAR POSITION

Description (Cont'd)

- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".) Refer to "DIAGNOSTIC PROCEDURE", AT-139.
Refer to shift schedule, AT-353.



With GST

Follow the procedure "With CONSULT-II".

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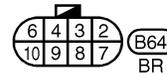
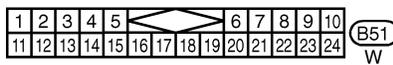
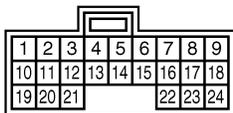
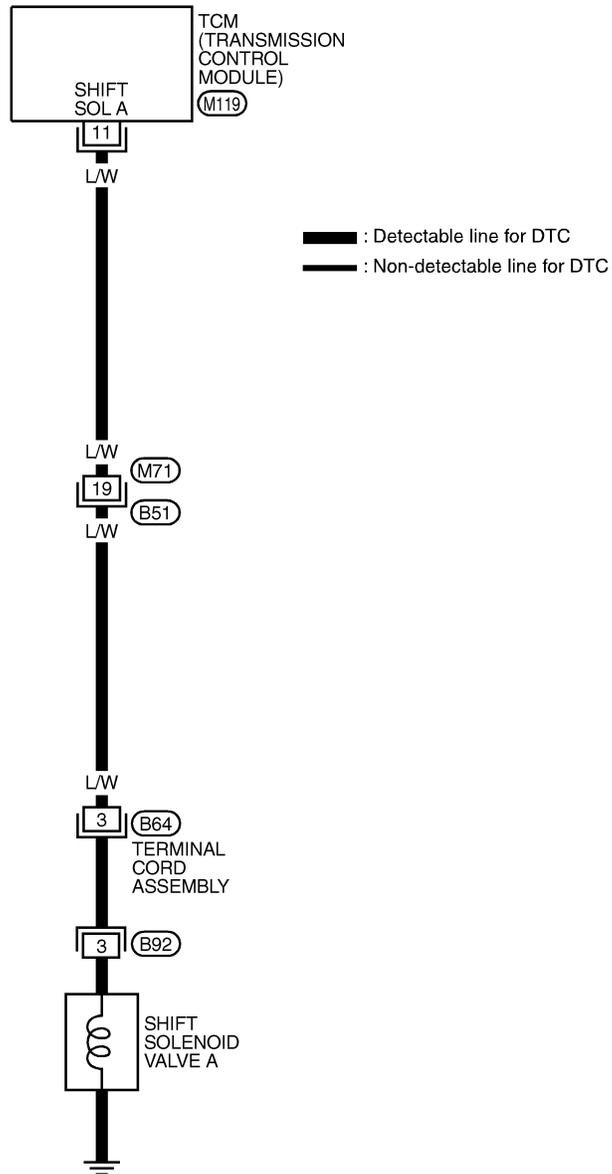
DTC P0733 IMPROPER SHIFTING TO 3RD GEAR POSITION

Wiring Diagram — AT — 3RD

Wiring Diagram — AT — 3RD

NAAT0192

AT-3RDSIG-01



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

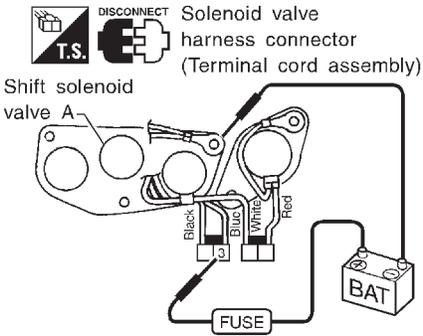
MAT733A

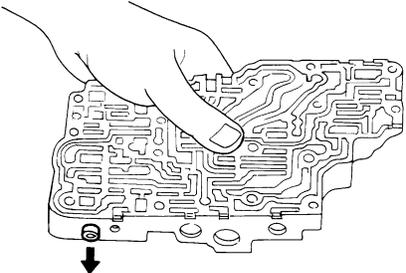
DTC P0733 IMPROPER SHIFTING TO 3RD GEAR POSITION

Diagnostic Procedure

Diagnostic Procedure

NAAT0046

| | | | |
|----------|-----------------------------------|---|----|
| 1 | CHECK SHIFT SOLENOID VALVE | <p>1. Remove control valve assembly. Refer to AT-269.</p> <p>2. Check shift solenoid valve operation.</p> <ul style="list-style-type: none"> Shift solenoid valve A <p>Refer to "Component Inspection", AT-140.</p> <div style="text-align: center;">  <p>Solenoid valve harness connector (Terminal cord assembly)</p> <p>Shift solenoid valve A</p> <p>Black White Red</p> <p>FUSE</p> <p>BAT</p> <p>SAT653I</p> </div> <p style="text-align: center;">OK or NG</p> | GI |
| OK | ▶ | GO TO 2. | MA |
| NG | ▶ | Repair or replace shift solenoid valve assembly. | EM |

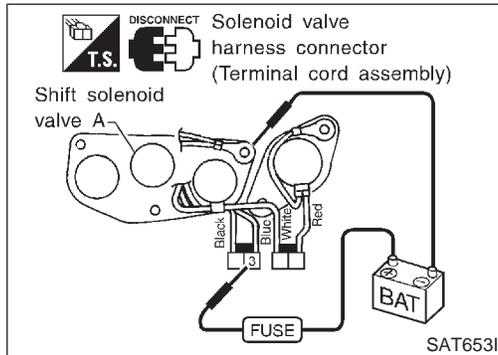
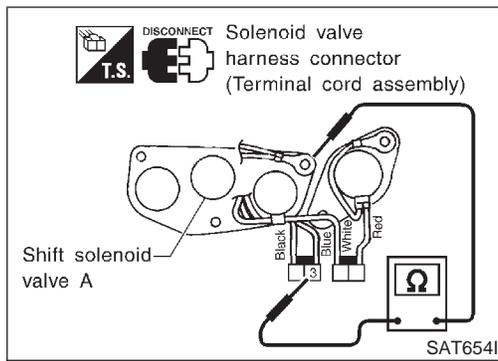
| | | | |
|----------|----------------------------|--|----|
| 2 | CHECK CONTROL VALVE | <p>1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-298.</p> <p>2. Check to ensure that:</p> <ul style="list-style-type: none"> Valve, sleeve and plug slide along valve bore under their own weight. Valve, sleeve and plug are free from burrs, dents and scratches. Control valve springs are free from damage, deformation and fatigue. Hydraulic line is free from obstacles. <div style="text-align: center;">  <p>SAT367H</p> </div> <p style="text-align: center;">OK or NG</p> | LC |
| OK | ▶ | GO TO 3. | EC |
| NG | ▶ | Repair control valve assembly. | FE |

| | | | |
|----------|------------------|---|----|
| 3 | CHECK DTC | <p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-136.</p> <p style="text-align: center;">OK or NG</p> | CL |
| OK | ▶ | INSPECTION END | MT |
| NG | ▶ | Check control valve again. Repair or replace control valve assembly. | AT |

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DTC P0733 IMPROPER SHIFTING TO 3RD GEAR POSITION

Component Inspection



Component Inspection SHIFT SOLENOID VALVE A

NAAT0047

NAAT0047S01

- For removal, refer to AT-269.

Resistance Check

NAAT0047S0101

- Check resistance between terminal 3 and ground.

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

Operation Check

NAAT0047S0102

- 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

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NAAT0048
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction. MA
- This malfunction is detected when the A/T does not shift into fourth gear position or the torque converter clutch does not lock up as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc. EM
LC
EC

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NAAT0048S04

Remarks: Specification data are reference values.

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

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

TCM TERMINALS AND REFERENCE VALUE

NAAT0048S02

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 |

DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Description (Cont'd)

ON BOARD DIAGNOSIS LOGIC

=NAAT0048S03

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

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

A: Output shaft revolution signal from revolution sensor

B: Engine speed signal from ECM

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

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

DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

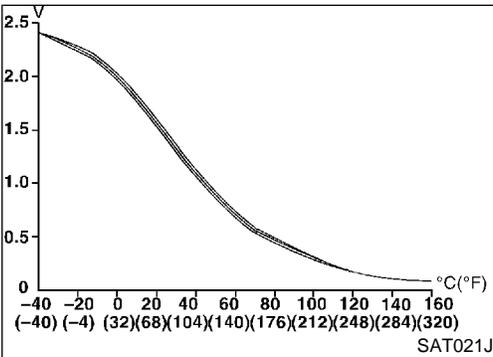
Description (Cont'd)

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
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| |
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| |
| |

SAT014K

| |
|-----------------------|
| SELECT DIAG MODE |
| SELF-DIAG RESULTS |
| DATA MONITOR |
| CAN DIAG SUPPORT MNTR |
| DTC WORK SUPPORT |
| ECU PART NUMBER |
| |
| |

SAT858K



DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0048S01

CAUTION:

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

NOTE:

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

TESTING CONDITIONS:

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

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

⑤ With CONSULT-II

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

FLUID TEMP SEN: 0.4 - 1.5V

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

- 3) Select "4TH GR FNCTN P0734" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
- 4) Accelerate vehicle to 55 to 65 km/h (34 to 40 MPH) under the following condition and release the accelerator pedal completely.

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

Selector lever: D position (OD "ON")

- Check that "GEAR" shows "3" after releasing pedal.
- 5) Depress accelerator pedal steadily with 1.0/8 - 2.0/8 of "THROTTLE POSI" from a speed of 55 to 65 km/h (34 to 40 MPH) until "TESTING" has turned to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
If the check result NG appears on CONSULT-II screen, go to "DIAGNOSTIC PROCEDURE", AT-146.
If "STOP VEHICLE" appears on CONSULT-II screen, go to following step.
- Check that "GEAR" shows "4" when depressing accelerator pedal with 1.0/8 - 2.0/8 of "THROTTLE POSI".
 - If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAG RESULTS" for "ENGINE". In case a 1st trip DTC other than P0734 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".
- 6) Stop vehicle.
 - 7) Follow the instruction displayed. (Check for normal shifting referring to the table below.)

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

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DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Description (Cont'd)

- 8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".) Refer to "DIAGNOSTIC PROCEDURE", AT-146.
Refer to shift schedule, AT-353.



With GST

Follow the procedure "With CONSULT-II".

DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

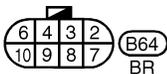
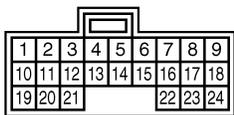
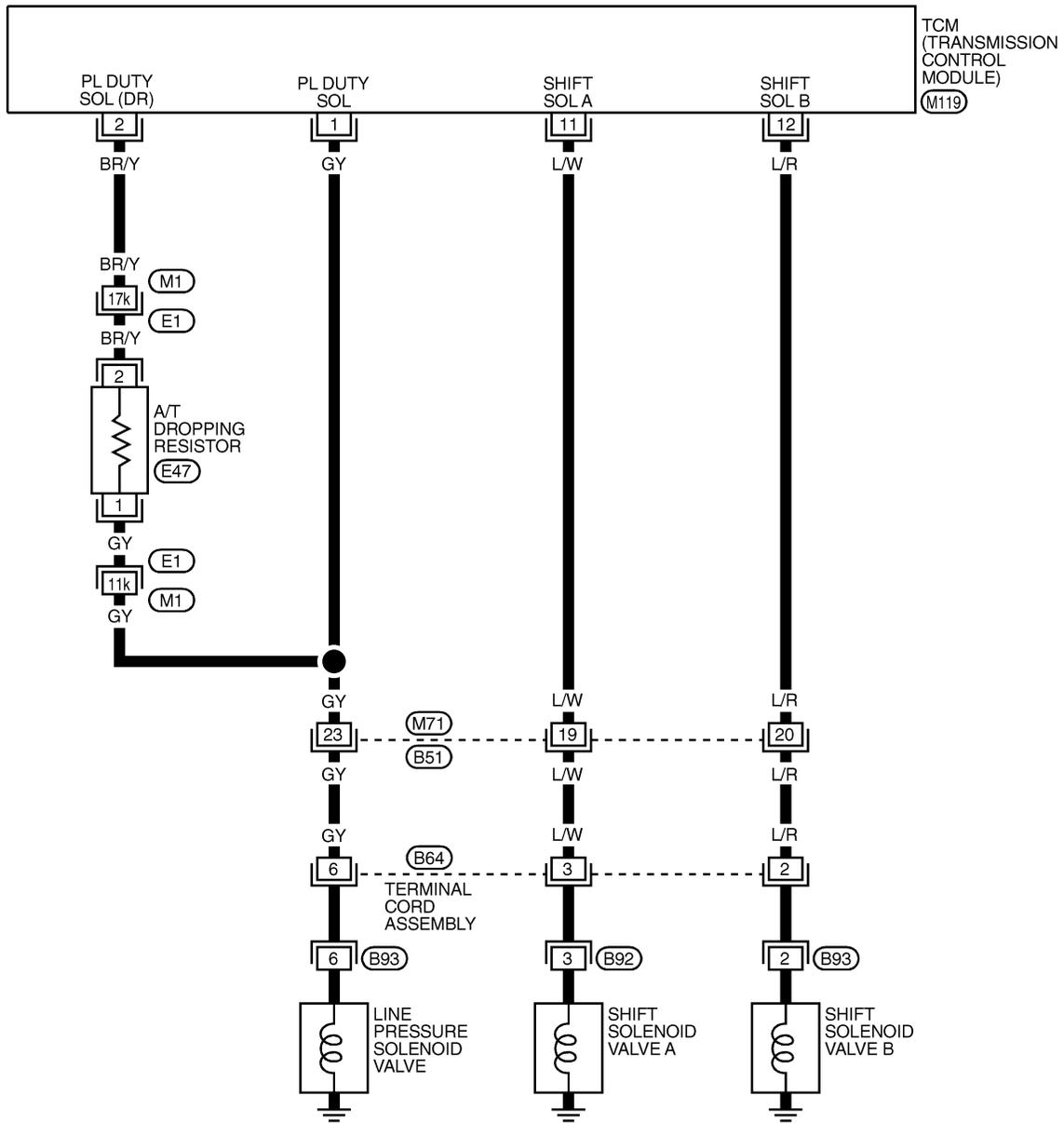
Wiring Diagram — AT — 4TH

Wiring Diagram — AT — 4TH

NAAT0193

AT-4THSIG-01

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



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

REFER TO THE FOLLOWING.

(E1) -SUPER MULTIPLE JUNCTION (SMJ)

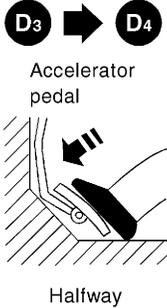
MAT912A

DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Diagnostic Procedure

Diagnostic Procedure

NAAT0049

| | |
|---|--|
| 1 | CHECK SHIFT UP (D₃ TO D₄) |
| During "Cruise test — Part 1", AT-73. Does A/T shift from D ₃ to D ₄ at the specified speed? | |
|  <p>Accelerator pedal</p> <p>Halfway</p> | |
| Yes or No | |
| Yes | ▶ GO TO 9. |
| No | ▶ GO TO 2. |

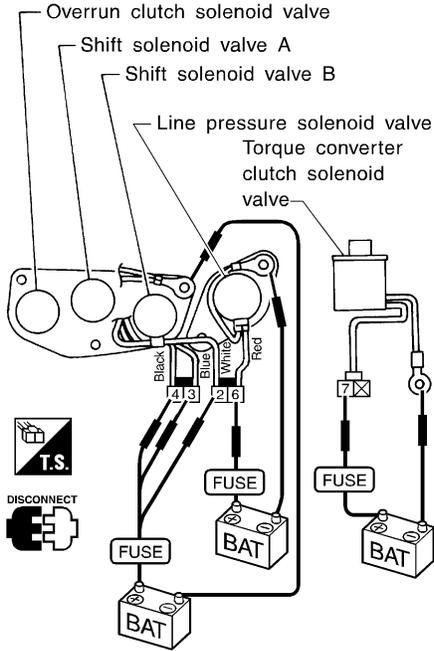
SAT988H

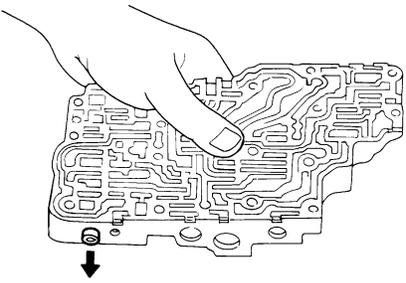
| | |
|---|----------------------------|
| 2 | CHECK LINE PRESSURE |
| Perform line pressure test. Refer to AT-64. | |
| OK or NG | |
| OK | ▶ GO TO 3. |
| NG | ▶ GO TO 6. |

DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Diagnostic Procedure (Cont'd)

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| | | |
|----------|------------------------------|--|
| 3 | CHECK SOLENOID VALVES | <p>1. Remove control valve assembly. Refer to AT-269.</p> <p>2. Refer to "Component Inspection", AT-150.</p> <div style="text-align: center;">  </div> |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Replace solenoid valve assembly. |

| | | |
|----------|----------------------------|--|
| 4 | CHECK CONTROL VALVE | <p>1. Disassemble control valve assembly. Refer to AT-298.</p> <p>2. Check to ensure that:</p> <ul style="list-style-type: none"> ● Valve, sleeve and plug slide along valve bore under their own weight. ● Valve, sleeve and plug are free from burrs, dents and scratches. ● Control valve springs are free from damage, deformation and fatigue. ● Hydraulic line is free from obstacles. <div style="text-align: center;">  </div> |
| OK | ▶ | GO TO 5. |
| NG | ▶ | Repair control valve. |

DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Diagnostic Procedure (Cont'd)

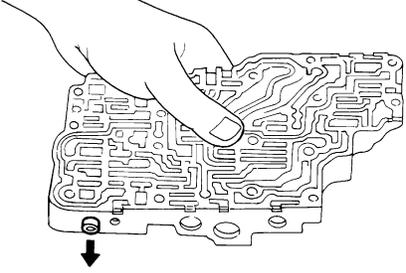
| | | |
|--|--|--|
| 5 | CHECK SHIFT UP (D₃ TO D₄) | |
| Does A/T shift from D ₃ to D ₄ at the specified speed? | | |
| Yes or No | | |
| Yes | ▶ | GO TO 9. |
| No | ▶ | Check control valve again. Repair or replace control valve assembly. |

| | | |
|---|---|----------------------------------|
| 6 | CHECK LINE PRESSURE SOLENOID VALVE | |
| <ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to AT-269. 2. Refer to "Component Inspection", AT-150. | | |
| | | |
| OK or NG | | |
| OK | ▶ | GO TO 7. |
| NG | ▶ | Replace solenoid valve assembly. |

SAT158J

DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Diagnostic Procedure (Cont'd)

| | | |
|--|----------------------------|-----------------------|
| 7 | CHECK CONTROL VALVE | |
| <p>1. Disassemble control valve assembly. Refer to AT-298.</p> <p>2. Check line pressure circuit valves for sticking.</p> <ul style="list-style-type: none"> ● Pressure regulator valve ● Pilot valve ● Pressure modifier valve | | |
|  | | |
| SAT367H | | |
| OK or NG | | |
| OK | ▶ | GO TO 8. |
| NG | ▶ | Repair control valve. |

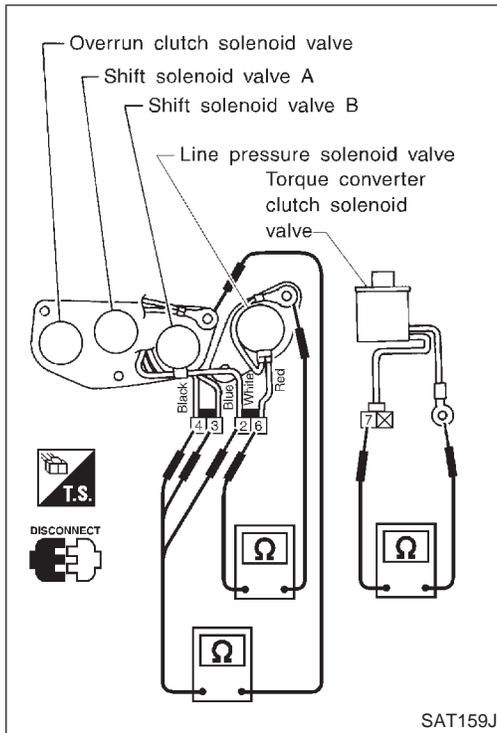
| | | |
|--|--|--|
| 8 | CHECK SHIFT UP (D₃ TO D₄) | |
| Does A/T shift from D ₃ to D ₄ at the specified speed? | | |
| OK or NG | | |
| OK | ▶ | GO TO 9. |
| NG | ▶ | Check control valve again. Repair or replace control valve assembly. |

| | | |
|---|------------------|--|
| 9 | CHECK DTC | |
| Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-143. | | |
| OK or NG | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | Perform "Cruise test — Part 1" again and return to the start point of this flow chart. |

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DTC P0734 IMPROPER SHIFTING TO 4TH GEAR POSITION

Component Inspection



Component Inspection

NAAT0050

SOLENOID VALVES

NAAT0050S01

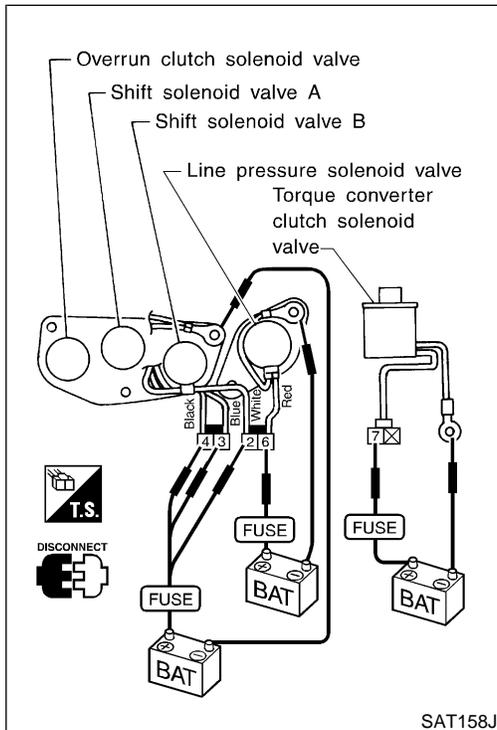
- For removal, refer to AT-269.

Resistance Check

NAAT0050S0101

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

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



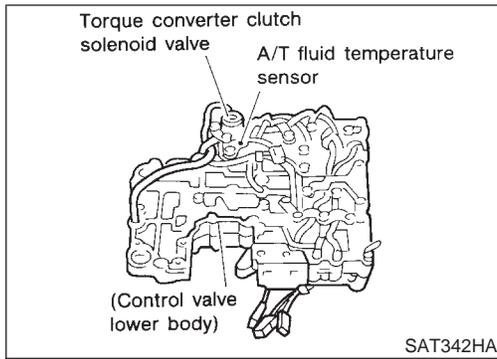
Operation Check

NAAT0050S0102

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

DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Description



Description

NAAT0051

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

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

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

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NAAT0051S02

Remarks: Specification data are reference values.

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

TCM TERMINALS AND REFERENCE VALUE

NAAT0051S03

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

NAAT0051S04

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

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DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Description (Cont'd)

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
| |
| |
| |
| |

SAT014K

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

SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0051S01

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".

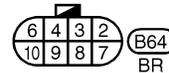
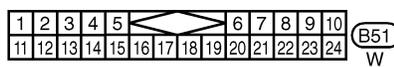
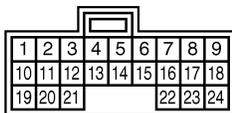
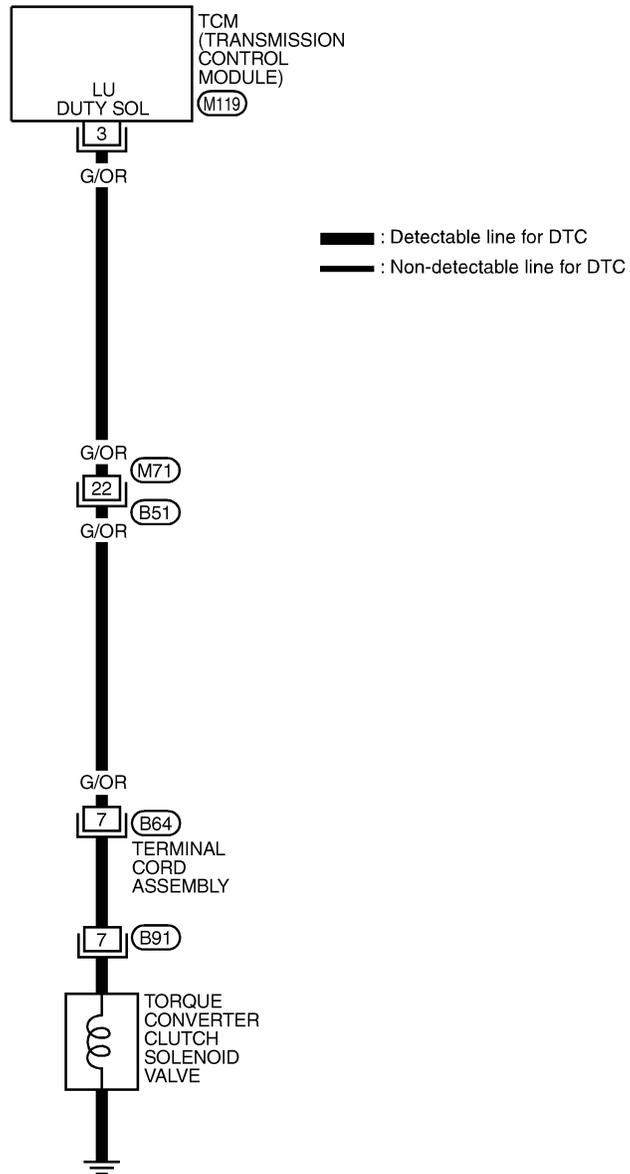
DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Wiring Diagram — AT — TCV

Wiring Diagram — AT — TCV

NAAT0194

AT-TCV-01



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

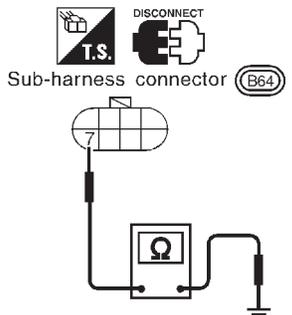
MAT735A

DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Diagnostic Procedure

Diagnostic Procedure

NAAT0052

| | | |
|--|-------------------------------|----------|
| 1 | CHECK VALVE RESISTANCE | |
| <p>1. Turn ignition switch to "OFF" position. 2. Disconnect terminal cord assembly connector on the right side of transfer assembly. 3. Check resistance between terminal 7 and ground.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Is resistance approx. 10 - 20Ω?</p> | | |
| Yes | ▶ | GO TO 3. |
| No | ▶ | GO TO 2. |

SAT156J

| | | |
|---|------------------------------|--|
| 2 | CHECK VALVE OPERATION | |
| <p>1. Remove oil pan. Refer to AT-269. 2. Check the following items: ● Torque converter clutch solenoid valve Refer to "Component Inspection", AT-155. ● Harness of terminal cord assembly for short or open</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 3. |
| NG | ▶ | Repair open circuit or short to ground or short to power in harness or connectors. |

| | | |
|---|-------------------------|--|
| 3 | CHECK RESISTANCE | |
| <p>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.</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair open circuit or short to ground or short to power in harness or connectors. |

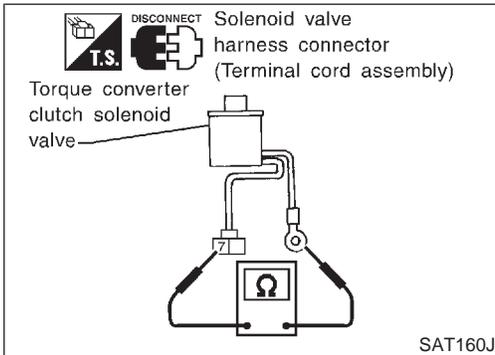
| | | |
|---|------------------|-----------------------|
| 4 | CHECK DTC | |
| <p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-152.</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | GO TO 5. |

DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Diagnostic Procedure (Cont'd)

| | | |
|--|-----------------------------|----------------------------------|
| 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. |

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Component Inspection

TORQUE CONVERTER CLUTCH SOLENOID VALVE

NAAT0053

NAAT0053S01

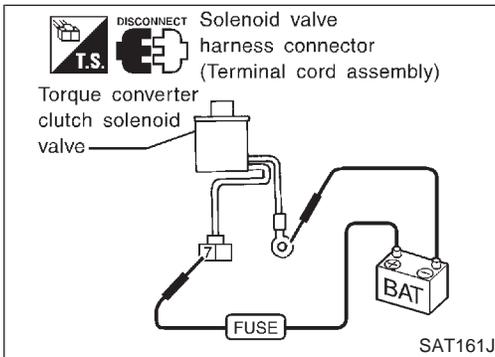
- For removal, refer to AT-269.

Resistance Check

NAAT0053S0101

- Check resistance between terminal 7 and ground.

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



Operation Check

NAAT0053S0102

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

DTC P0744 IMPROPER LOCK-UP OPERATION

Description

Description

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis. NAAT0054
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into fourth gear position or the torque converter clutch does not lock up as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NAAT0054S02

Remarks: Specification data are reference values.

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

TCM TERMINALS AND REFERENCE VALUE

NAAT0054S03

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

NAAT0054S04

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

DTC P0744 IMPROPER LOCK-UP OPERATION

Description (Cont'd)

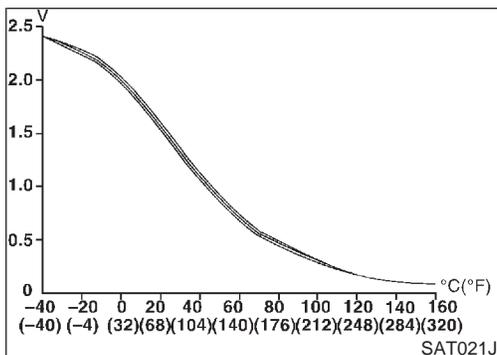
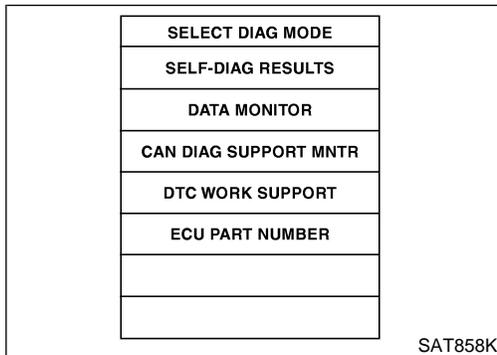
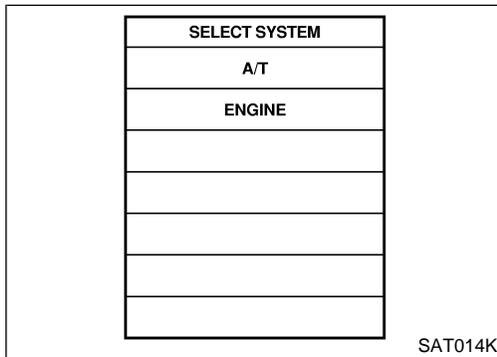
diagnosis malfunction.

This malfunction will be caused when shift solenoid valve B, line pressure solenoid valve and torque converter clutch solenoid valve are stuck closed.

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

*: P0744 is detected.

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



DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0054S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

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

With CONSULT-II

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

FLUID TEMP SEN: 0.4 - 1.5V

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

- 3) Select “TCC S/V FNCTN P0744” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.

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

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

Selector lever: D position (OD “ON”)

TCC S/V DUTY: More than 94%

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

- Check that “GEAR” shows “4”.
- For shift schedule, refer to SDS, AT-353.

DTC P0744 IMPROPER LOCK-UP OPERATION

Description (Cont'd)

- If “TESTING” does not appear on CONSULT-II for a long time, select “SELF-DIAG RESULTS”. In case a 1st trip DTC other than P0744 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.
- 5) Make sure that “OK” is displayed. (If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”.)
Refer to “DIAGNOSTIC PROCEDURE”, AT-160.
Refer to shift schedule, AT-353.



With GST

Follow the procedure “With CONSULT-II”.

DTC P0744 IMPROPER LOCK-UP OPERATION

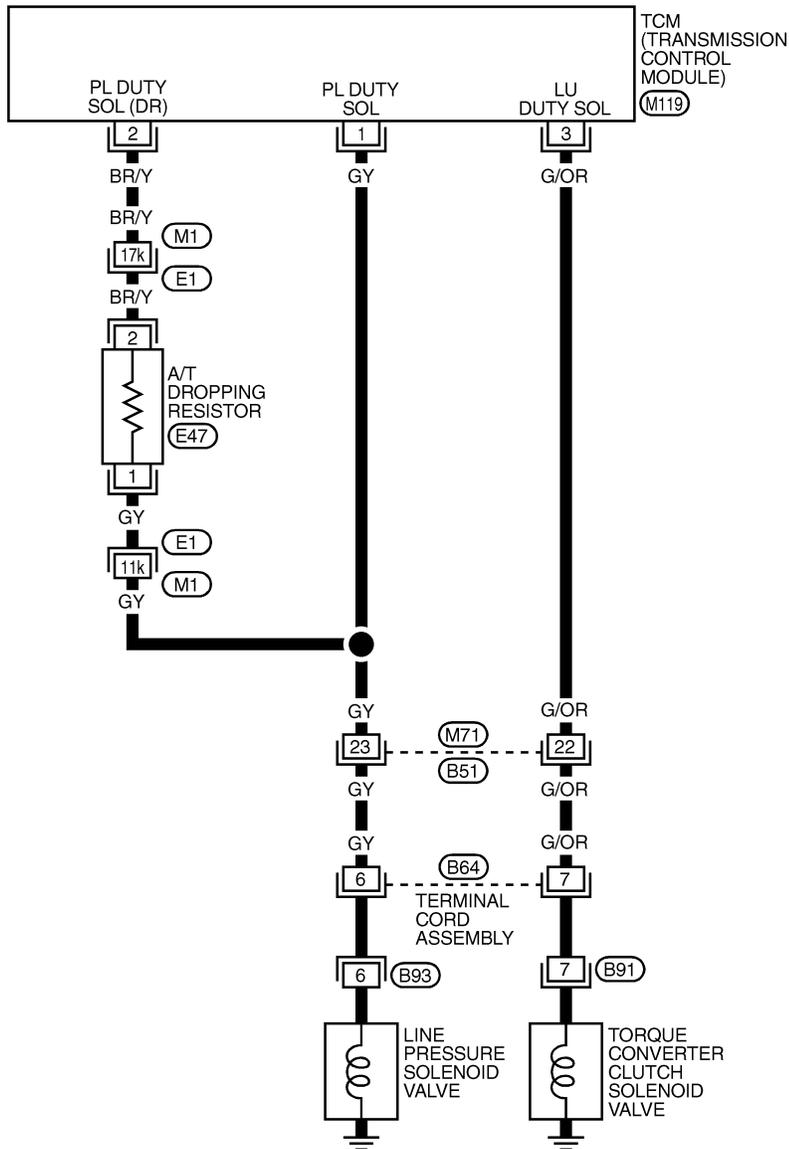
Wiring Diagram — AT — TCCSIG

Wiring Diagram — AT — TCCSIG

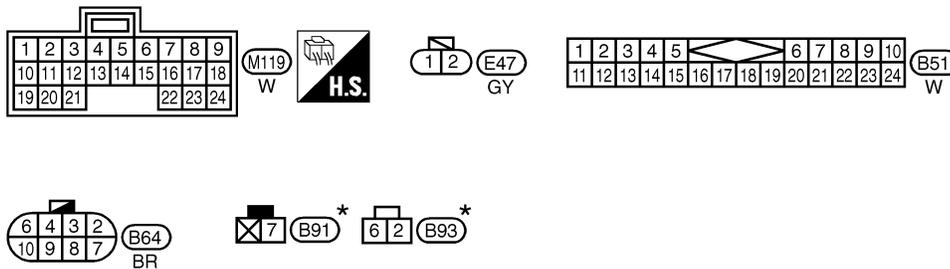
NAAT0195

AT-TCCSIG-01

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



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REFER TO THE FOLLOWING.

(E1) -SUPER MULTIPLE JUNCTION (SMJ)

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

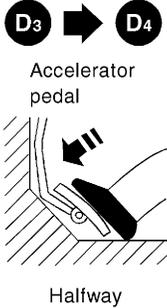
MAT913A

DTC P0744 IMPROPER LOCK-UP OPERATION

Diagnostic Procedure

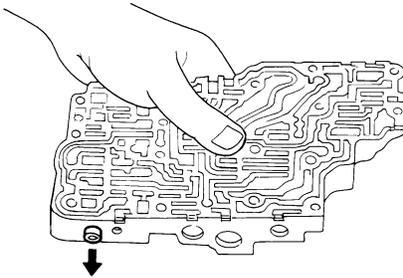
Diagnostic Procedure

=NAAT0055

| | | |
|--|--|--|
| 1 | CHECK SHIFT UP (D₃ TO D₄) | |
| <p>During "Cruise test — Part 1", AT-73. Does A/T shift from D₃ to D₄ at the specified speed?</p> <div style="text-align: center;">  <p>Accelerator pedal</p> <p>Halfway</p> </div> <p>Yes or No</p> | | |
| Yes | ▶ | <ul style="list-style-type: none"> ● GO TO 10. ● And check for proper lock-up. |
| No | ▶ | GO TO 2. |

SAT988H

| | | |
|---|----------------------------|----------|
| 2 | CHECK LINE PRESSURE | |
| <p>Perform line pressure test. Refer to AT-64.</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 3. |
| NG | ▶ | GO TO 6. |

| | | |
|---|----------------------------|-----------------------|
| 3 | CHECK CONTROL VALVE | |
| <p>1. Disassemble control valve assembly. Refer to AT-298. 2. Check to ensure that:</p> <ul style="list-style-type: none"> ● Valve, sleeve and plug slide along valve bore under their own weight. ● Valve, sleeve and plug are free from burrs, dents and scratches. ● Control valve springs are free from damage, deformation and fatigue. ● Hydraulic line is free from obstacles. <div style="text-align: center;">  </div> <p style="text-align: right;">OK or NG</p> | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair control valve. |

SAT367H

DTC P0744 IMPROPER LOCK-UP OPERATION

Diagnostic Procedure (Cont'd)

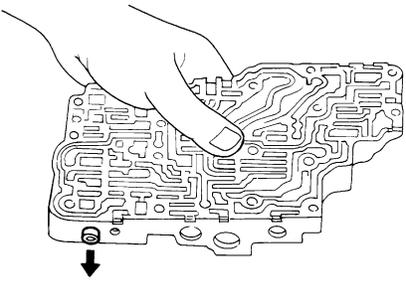
| | |
|--|--|
| 4 | CHECK SHIFT UP (D₃ TO D₄) |
| Does A/T shift from D ₃ to D ₄ at the specified speed? | |
| Yes or No | |
| Yes | ▶ GO TO 5. |
| No | ▶ Check control valve again. Repair or replace control valve assembly. |

| | |
|---|--|
| 5 | CHECK DTC |
| Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-157. | |
| OK or NG | |
| OK | ▶ INSPECTION END |
| NG | ▶ <ul style="list-style-type: none"> GO TO 10. And check for proper lock-up. |

| | |
|---|---|
| 6 | CHECK LINE PRESSURE SOLENOID VALVE |
| <ol style="list-style-type: none"> Remove control valve assembly. Refer to AT-269. Check line pressure solenoid valve operation. Refer to AT-164. | |
| <p style="text-align: right;">SAT158J</p> | |
| OK or NG | |
| OK | ▶ GO TO 7. |
| NG | ▶ Replace solenoid valve assembly. |

DTC P0744 IMPROPER LOCK-UP OPERATION

Diagnostic Procedure (Cont'd)

| | | |
|--|----------------------------|-----------------------|
| 7 | CHECK CONTROL VALVE | |
| <p>1. Disassemble control valve assembly. Refer to AT-298. 2. Check line pressure circuit valves for sticking.</p> <ul style="list-style-type: none"> ● Pressure regulator valve ● Pilot valve ● Pressure modifier valve | | |
|  | | |
| SAT367H | | |
| OK or NG | | |
| OK | ▶ | GO TO 8. |
| NG | ▶ | Repair control valve. |

| | | |
|--|--|--|
| 8 | CHECK SHIFT UP (D₃ TO D₄) | |
| Does A/T shift from D ₃ to D ₄ at the specified speed? | | |
| Yes or No | | |
| Yes | ▶ | GO TO 9. |
| No | ▶ | Check control valve again. Repair or replace control valve assembly. |

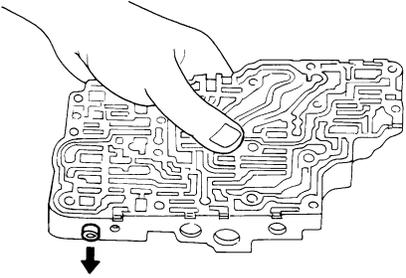
| | | |
|---|------------------|--|
| 9 | CHECK DTC | |
| Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-157. | | |
| OK or NG | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | <ul style="list-style-type: none"> ● GO TO 10. ● And check for proper lock-up. |

| | | |
|---|--------------------------------|--|
| 10 | CHECK LOCK-UP CONDITION | |
| During "Cruise test — Part 1", AT-73. 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 | |
| <p>1. Remove control valve assembly. Refer to AT-269. 2. Check torque converter clutch solenoid valve operation. Refer to AT-164.</p> | | |
| OK or NG | | |
| OK | ▶ | GO TO 12. |
| NG | ▶ | Replace solenoid valve assembly. |

DTC P0744 IMPROPER LOCK-UP OPERATION

Diagnostic Procedure (Cont'd)

| | | |
|---|----------------------------|----------------------|
| 12 | CHECK CONTROL VALVE | |
| <p>1. Disassemble control valve assembly. Refer to AT-298. 2. Check control valves for sticking.</p> <ul style="list-style-type: none"> ● Torque converter clutch control valve ● Torque converter clutch relief valve | | |
|  | | |
| SAT367H | | |
| OK or NG | | |
| OK | ▶ | GO TO 13. |
| NG | ▶ | Repair control valve |

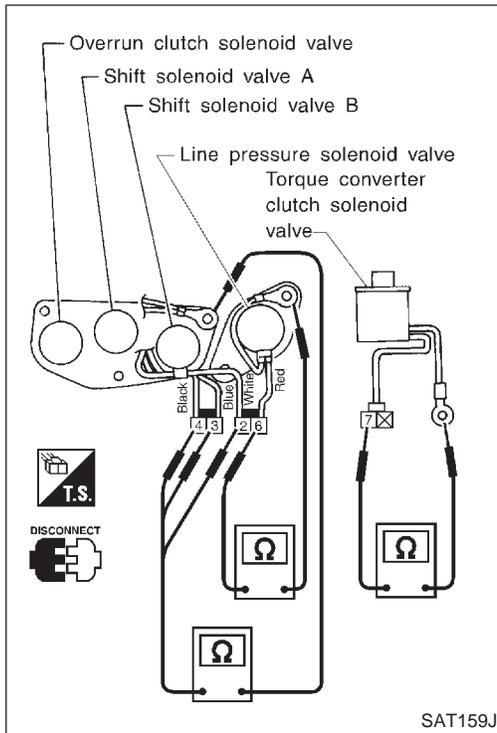
| | | |
|--|--------------------------------|--|
| 13 | CHECK LOCK-UP CONDITION | |
| Does A/T perform lock-up at the specified speed? | | |
| Yes or No | | |
| Yes | ▶ | GO TO 14. |
| No | ▶ | Check control valve again. Repair or replace control valve assembly. |

| | | |
|---|------------------|--|
| 14 | CHECK DTC | |
| Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-157. | | |
| OK or NG | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | Perform "Cruise test — Part 1" again and return to the start point of this flow chart. |

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DTC P0744 IMPROPER LOCK-UP OPERATION

Component Inspection



Component Inspection

NAAT0056

SOLENOID VALVES

NAAT0056S01

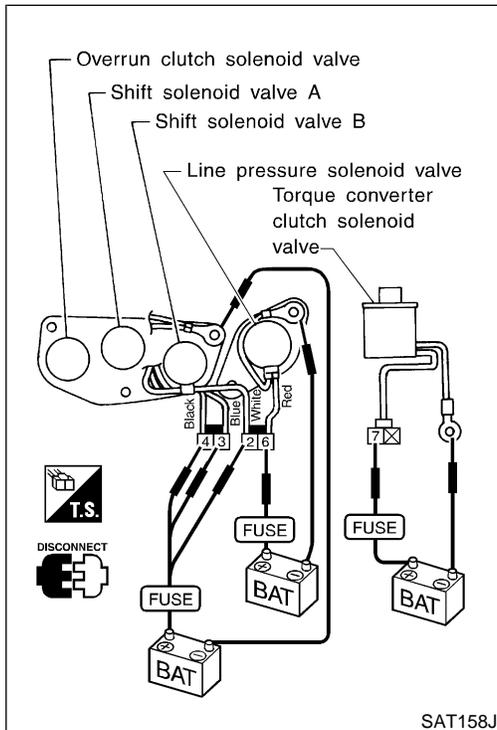
- For removal, refer to AT-269.

Resistance Check

NAAT0056S0101

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

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



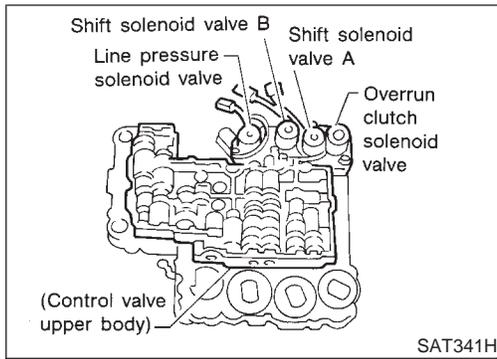
Operation Check

NAAT0056S0102

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

DTC P0745 LINE PRESSURE SOLENOID VALVE

Description



Description

NAAT0057

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

NAAT0057S02

Remarks: Specification data are reference values.

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

NOTE:

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

TCM TERMINALS AND REFERENCE VALUE

NAAT0057S03

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

NAAT0057S04

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|--|---|--|
|  : L/PRESS SOL/CIRC | TCM detects an improper voltage drop when it tries to operate the solenoid valve. | <ul style="list-style-type: none"> • Harness or connectors (The solenoid circuit is open or shorted.) • Line pressure solenoid valve |
|  : P0745 | | |

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DTC P0745 LINE PRESSURE SOLENOID VALVE

Description (Cont'd)

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
| |
| |
| |
| |

SAT014K

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

SAT020K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0057S01

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".

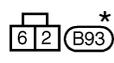
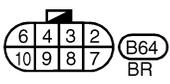
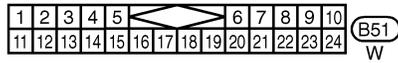
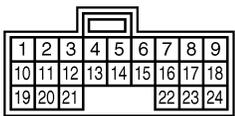
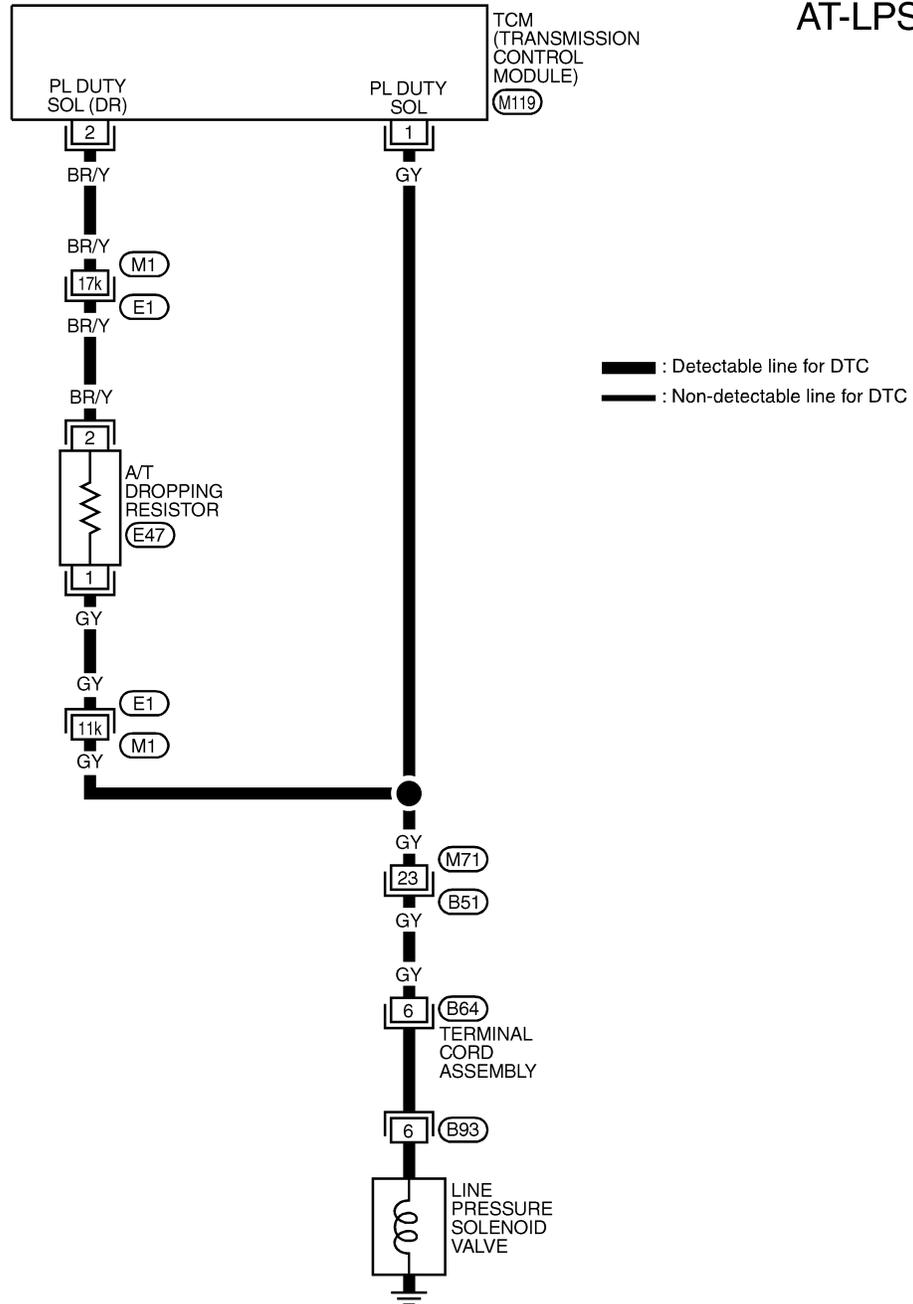
DTC P0745 LINE PRESSURE SOLENOID VALVE

Wiring Diagram — AT — LPSV

Wiring Diagram — AT — LPSV

NAAT0196

AT-LPSV-01



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

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

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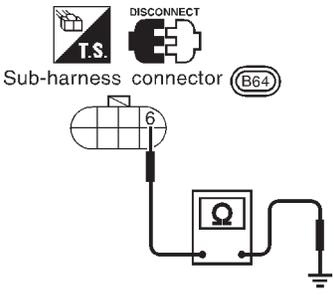
MAT914A

DTC P0745 LINE PRESSURE SOLENOID VALVE

Diagnostic Procedure

Diagnostic Procedure

NAAT0058

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

| 2 | | CHECK VALVE OPERATION |
|---|---|----------------------------------|
| <p>1. Remove control valve assembly. Refer to AT-269.</p> <p>2. Check the following items:</p> <ul style="list-style-type: none">● Line pressure solenoid valve Refer to "Component Inspection", AT-170.● Harness of terminal cord assembly for short or open <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 3. |
| NG | ▶ | Repair or replace damaged parts. |

DTC P0745 LINE PRESSURE SOLENOID VALVE

Diagnostic Procedure (Cont'd)

| | |
|--|---|
| 3 | CHECK POWER SOURCE AND DROPPING RESISTOR CIRCUIT |
| <p>1. Turn ignition switch to "OFF" position. 2. Disconnect TCM harness connector. 3. Check resistance between sub-harness connector B64 terminal 6 and TCM harness connector M119 terminal 2.</p> | |
| | |
| SAT522J | |
| Is resistance approx. 11.2 - 12.8Ω? | |
| Yes | ▶ GO TO 5. |
| No | ▶ GO TO 4. |

| | |
|--|------------------------------------|
| 4 | DETECT MALFUNCTIONING ITEM |
| <p>Check the following items:</p> <ul style="list-style-type: none"> ● Dropping resistor Refer to "Component Inspection", AT-170. ● Harness for short or open between TCM harness connector M119 terminal 2 and terminal cord assembly (Main harness) | |
| OK or NG | |
| OK | ▶ GO TO 5. |
| NG | ▶ Repair or replace damaged parts. |

| | |
|---|--|
| 5 | CHECK POWER SOURCE CIRCUIT |
| <p>1. Turn ignition switch to "OFF" position. 2. Check continuity between terminal 6 and TCM harness connector M119 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.</p> | |
| Yes | ▶ GO TO 6. |
| No | ▶ Repair or replace harness between TCM terminal 1 and terminal cord assembly. |

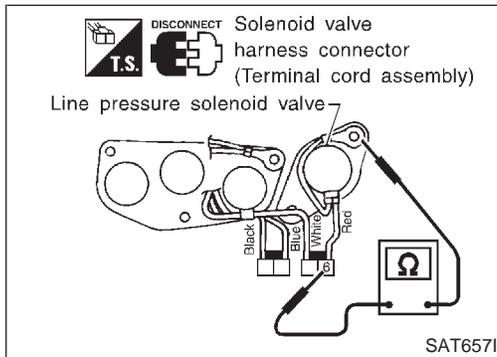
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DTC P0745 LINE PRESSURE SOLENOID VALVE

Diagnostic Procedure (Cont'd)

| | |
|---|-------------------------|
| 6 | CHECK DTC |
| Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-166. | |
| 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

LINE PRESSURE SOLENOID VALVE

NAAT0059

NAAT0059S01

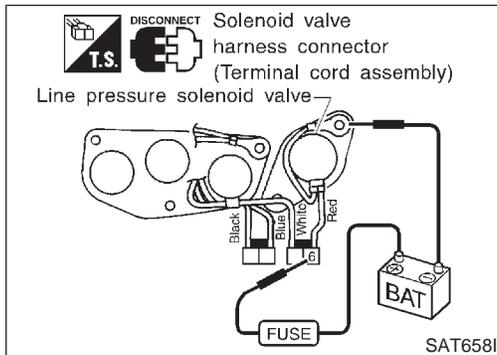
- For removal, refer to AT-269.

Resistance Check

NAAT0059S0101

- Check resistance between terminal 6 and ground.

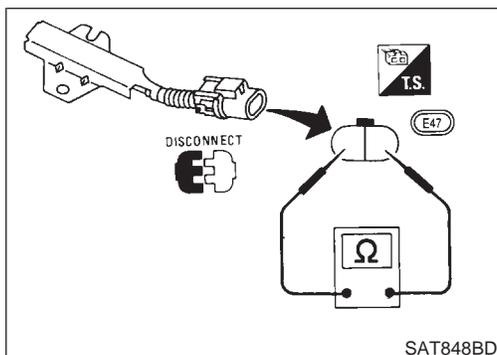
| Solenoid valve | Terminal No. | | Resistance (Approx.) |
|------------------------------|--------------|--------|----------------------|
| Line pressure solenoid valve | 6 | Ground | 2.5 - 5Ω |



Operation Check

NAAT0059S0102

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



DROPPING RESISTOR

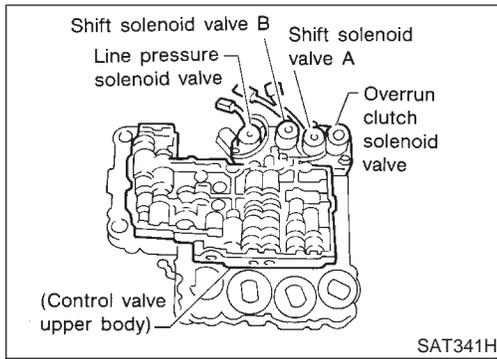
NAAT0059S02

- Check resistance between two terminals.

Resistance: 11.2 - 12.8Ω

DTC P0750 SHIFT SOLENOID VALVE A

Description



Description

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

NAAT0060

| 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

NAAT0060S02

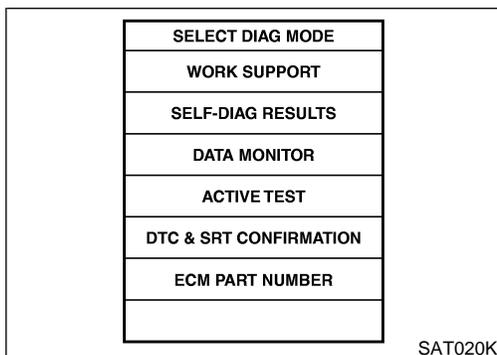
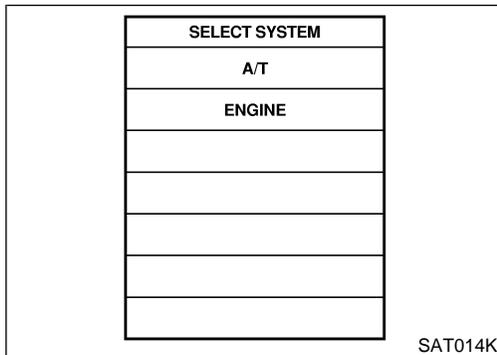
Remarks: Specification data are reference values.

| 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

NAAT0060S03

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



DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0060S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

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

ⓘ With CONSULT-II

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

ⓘ With GST

Follow the procedure "With CONSULT-II".

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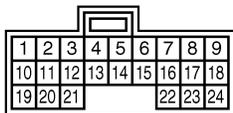
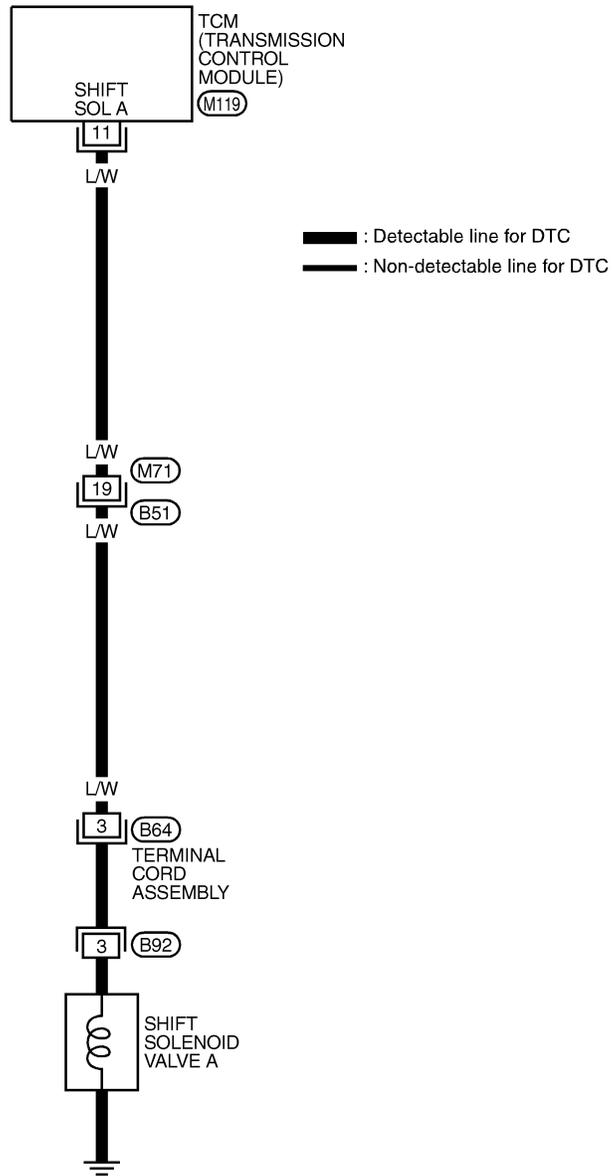
DTC P0750 SHIFT SOLENOID VALVE A

Wiring Diagram — AT — SSV/A

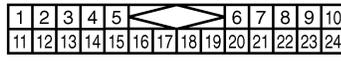
Wiring Diagram — AT — SSV/A

NAAT0197

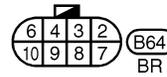
AT-SSV/A-01



(M119)
W



(B51)
W



(B64)
BR



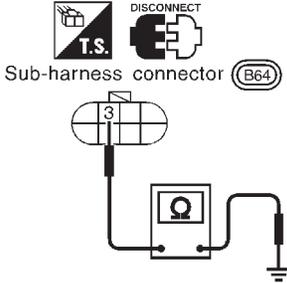
(B92)
*

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

MAT738A

Diagnostic Procedure

NAAT0061

| | | | |
|---|-------------------------------|---|----------|
| 1 | CHECK VALVE RESISTANCE | | |
| <p>1. Turn ignition switch to "OFF" position. 2. Disconnect terminal cord assembly connector on the right side of transfer assembly. 3. Check resistance between terminal 3 and ground.</p> <div style="text-align: center;">  <p style="text-align: center;">Sub-harness connector (B64)</p> </div> <p style="text-align: right;">SAT164J</p> <p style="text-align: center;">Is resistance approx. 20 - 40Ω?</p> | | | |
| Yes | | ▶ | GO TO 3. |
| No | | ▶ | GO TO 2. |

| | | | |
|--|------------------------------|---|----------------------------------|
| 2 | CHECK VALVE OPERATION | | |
| <p>1. Remove control valve assembly. Refer to AT-269. 2. Check the following items:</p> <ul style="list-style-type: none"> ● Shift solenoid valve A Refer to "Component Inspection", AT-174. ● Harness of terminal cord assembly for short or open <p style="text-align: center;">OK or NG</p> | | | |
| OK | | ▶ | GO TO 3. |
| NG | | ▶ | Repair or replace damaged parts. |

| | | | |
|--|-----------------------------------|---|--|
| 3 | CHECK POWER SOURCE CIRCUIT | | |
| <p>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.</p> <p style="text-align: center;">OK or NG</p> | | | |
| OK | | ▶ | GO TO 4. |
| NG | | ▶ | Repair open circuit or short to ground or short to power in harness or connectors. |

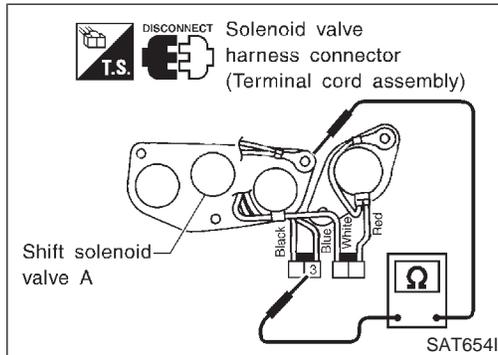
| | | | |
|---|------------------|---|-----------------------|
| 4 | CHECK DTC | | |
| <p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-171.</p> <p style="text-align: center;">OK or NG</p> | | | |
| OK | | ▶ | INSPECTION END |
| NG | | ▶ | GO TO 5. |

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DTC P0750 SHIFT SOLENOID VALVE A

Diagnostic Procedure (Cont'd)

| | |
|--|------------------------------------|
| 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. |



Component Inspection SHIFT SOLENOID VALVE A

NAAT0062

NAAT0062S01

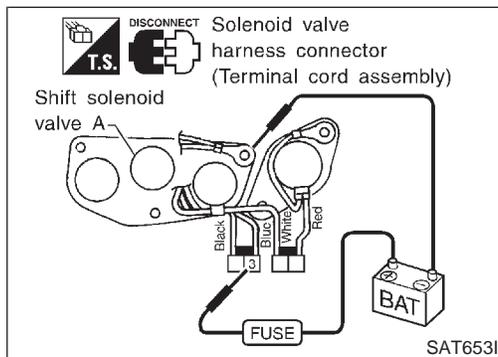
- For removal, refer to AT-269.

Resistance Check

NAAT0062S0101

- Check resistance between terminal 3 and ground.

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



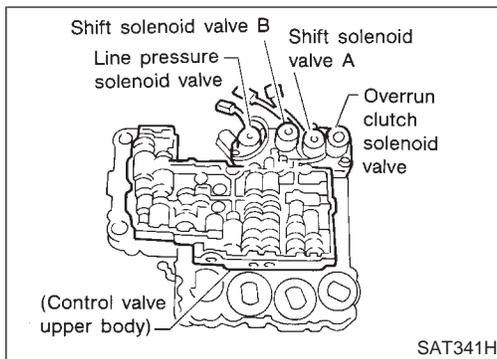
Operation Check

NAAT0062S0102

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

DTC P0755 SHIFT SOLENOID VALVE B

Description



Description

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

NAAT0063

| 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

NAAT0063S02

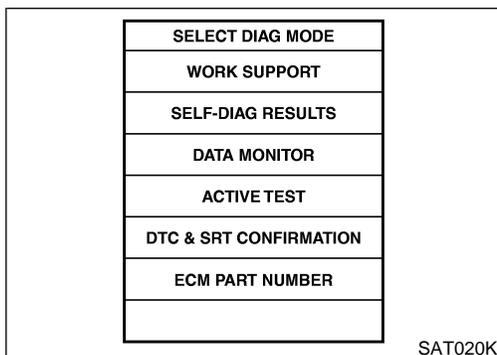
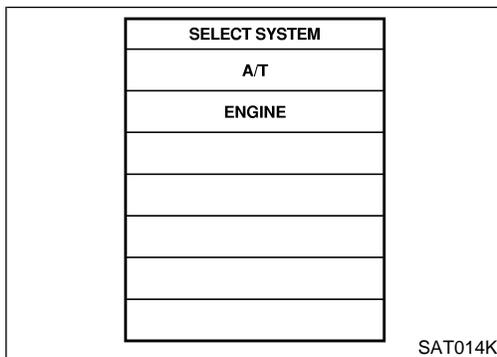
Remarks: Specification data are reference values.

| 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

NAAT0063S03

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



DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0063S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

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

With CONSULT-II

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

With GST

Follow the procedure "With CONSULT-II".

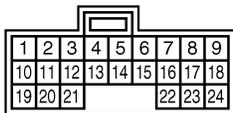
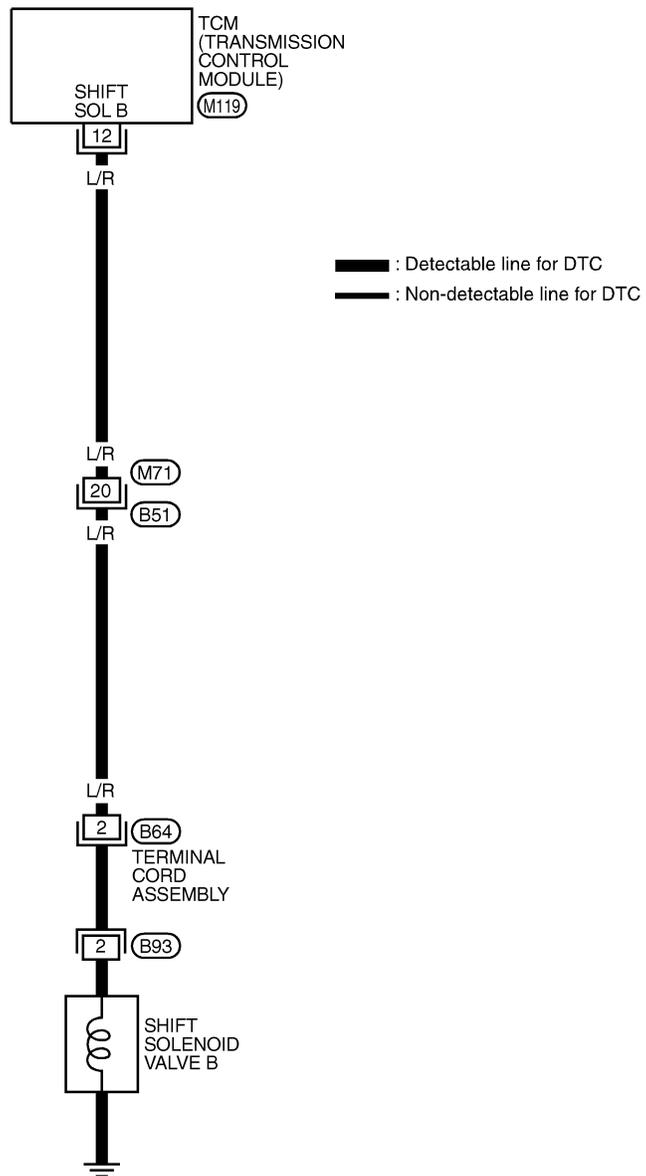
DTC P0755 SHIFT SOLENOID VALVE B

Wiring Diagram — AT — SSV/B

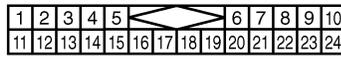
Wiring Diagram — AT — SSV/B

NAAT0198

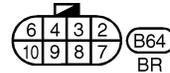
AT-SSV/B-01



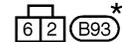
(M119)
W



(B51)
W



(B64)
BR



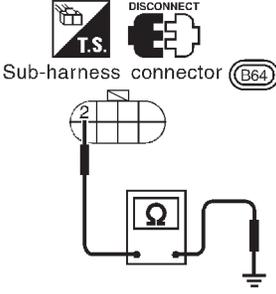
(B93)*

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

MAT739A

Diagnostic Procedure

NAAT0064

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

| | | | |
|--|------------------------------|---|----------------------------------|
| 2 | CHECK VALVE OPERATION | | |
| <p>1. Remove control valve assembly. Refer to AT-269. 2. Check the following items:</p> <ul style="list-style-type: none"> ● Shift solenoid valve B Refer to "Component Inspection", AT-178. ● Harness of terminal cord assembly for short or open <p style="text-align: center;">OK or NG</p> | | | |
| OK | | ▶ | GO TO 3. |
| NG | | ▶ | Repair or replace damaged parts. |

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

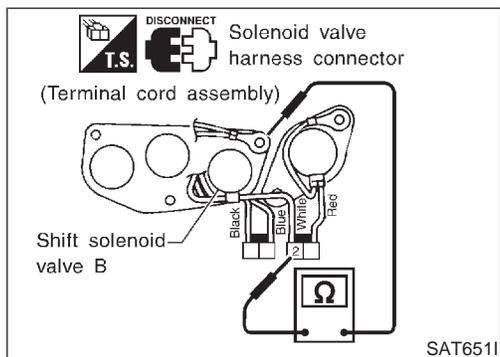
| | | | |
|---|------------------|---|-----------------------|
| 4 | CHECK DTC | | |
| <p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-175.</p> <p style="text-align: center;">OK or NG</p> | | | |
| OK | | ▶ | INSPECTION END |
| NG | | ▶ | GO TO 5. |

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DTC P0755 SHIFT SOLENOID VALVE B

Diagnostic Procedure (Cont'd)

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



Component Inspection SHIFT SOLENOID VALVE B

NAAT0065

NAAT0065S01

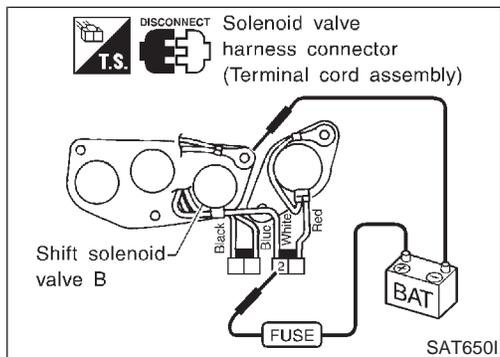
- For removal, refer to AT-269.

Resistance Check

NAAT0065S0101

- Check resistance between terminal 2 and ground.

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



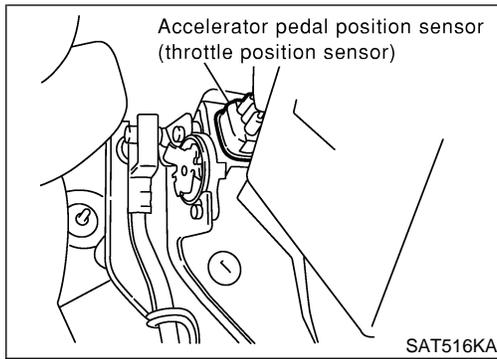
Operation Check

NAAT0065S0102

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

DTC P1705 ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR)

Description



Description

The accelerator pedal position sensor is part of the system that controls throttle position. Accelerator pedal position signal is sent to the ECM. And the signal is also sent to TCM as throttle valve position signal.

NAAT0236

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NAAT0236S01

Remarks: Specification data are reference values.

| Monitor item | Condition | Specification |
|--|-----------------------|--------------------|
| Accelerator pedal position sensor (throttle position sensor) | Fully-closed throttle | Approximately 0.5V |
| | Fully-open throttle | Approximately 4V |

TCM TERMINALS AND REFERENCE VALUE

NAAT0236S02

Remarks: Specification data are reference values.

| Terminal No. | Wire color | Item | Condition | Judgement standard (Approx.) |
|--------------|------------|--|---|--|
| 32 | P/B | Sensor power | Ignition switch ON. | 4.5 - 5.5V |
| | | | Ignition switch OFF. | 0V |
| 41 | P/L | Accelerator pedal position sensor (throttle position sensor) | When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.) | Fully-closed throttle: 0.5V Fully-open throttle: 4V |
| 42 | B | Sensor ground | — | 0V |

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DTC P1705 ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR)

On Board Diagnosis Logic

On Board Diagnosis Logic

Diagnostic trouble code TP SEN/CIRC A/T with CONSULT-II or P1705 without CONSULT-II is detected when TCM receives an excessively low or high voltage from the ECM. =NAAT0237

Possible Cause

Check the following items. NAAT0239

- Harness or connectors
(The sensor circuit is open or shorted.)
- Accelerator pedal position sensor (throttle position sensor)

DTC P1705 ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR)

Diagnostic Trouble Code (DTC) Confirmation Procedure

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
| |
| |
| |
| |

SAT014K

| |
|-----------------------|
| SELECT DIAG MODE |
| SELF-DIAG RESULTS |
| DATA MONITOR |
| CAN DIAG SUPPORT MNTR |
| DTC WORK SUPPORT |
| ECU PART NUMBER |
| |
| |

SAT858K

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
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| |
| |

SAT014K

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

SEF949Y

Diagnostic Trouble Code (DTC) Confirmation Procedure

NAAAT0240

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

WITH CONSULT-II

NAAAT0240S01

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

| Accelerator pedal condition | Accelerator pedal position sensor (THRTL POS SEN) |
|-----------------------------|---|
| Fully released | Less than 4.7V |
| Partially depressed | 0.1 - 4.6V |
| Fully depressed | 1.9 - 4.6V |

If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-221.

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

- 2) Turn ignition switch ON and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
- 3) 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 (electric throttle control actuator):

Approximately 3V or less

Selector lever: D position

If the check result is NG, go to "DIAGNOSTIC PROCEDURE", AT-221.

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

- 4) 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

WITH GST

NAAAT0240S02

Follow the procedure "With CONSULT-II".

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DTC P1705 ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR)

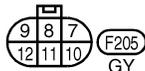
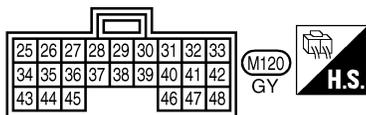
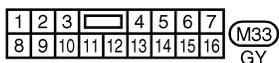
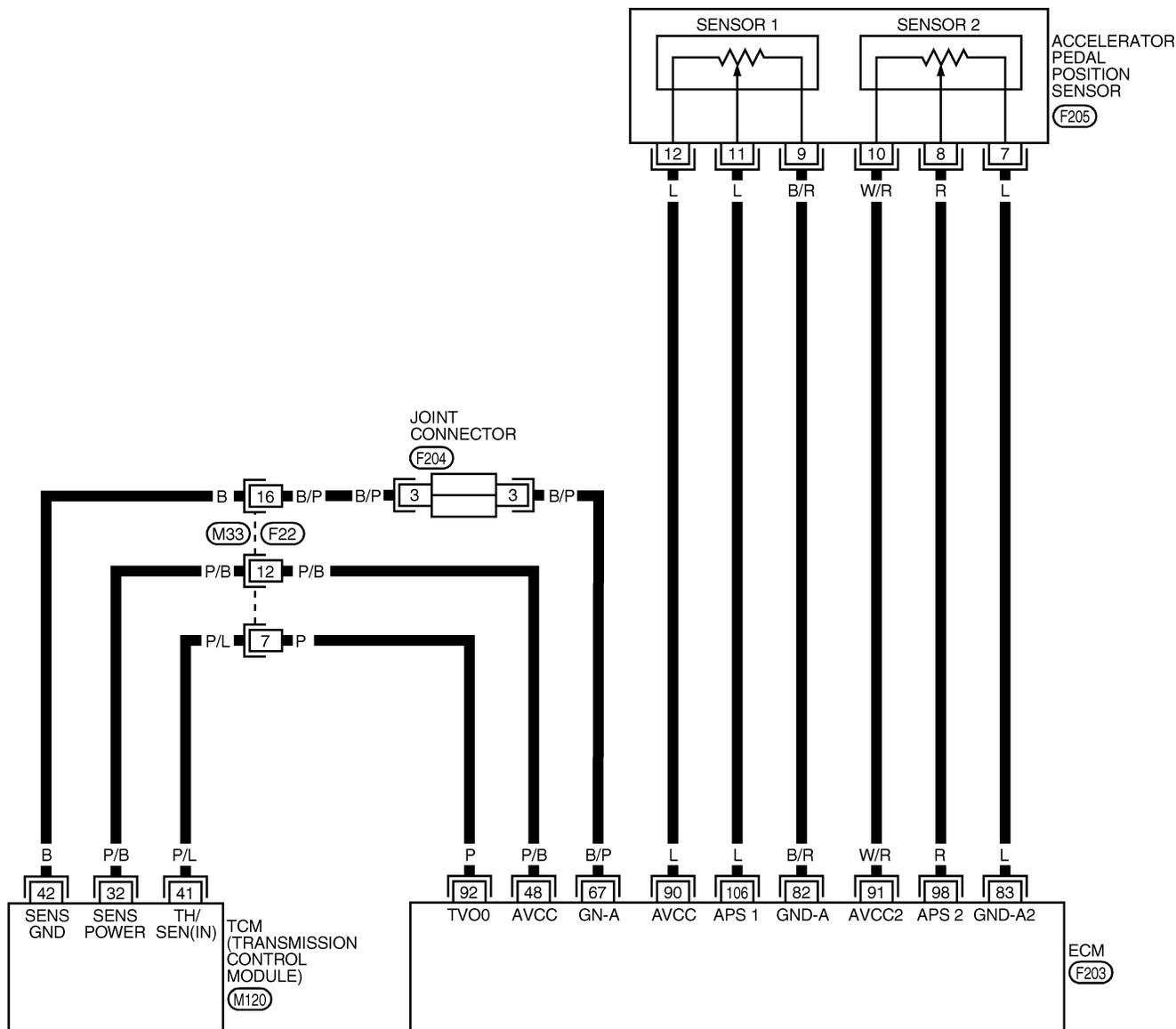
Wiring Diagram — AT — TPS

Wiring Diagram — AT — TPS

NAAT0199

AT-TPS-01

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



REFER TO THE FOLLOWING.
(F203) -ELECTRICAL UNITS

MAT316B

DTC P1705 ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR)

Diagnostic Procedure

Diagnostic Procedure

NAAT0241

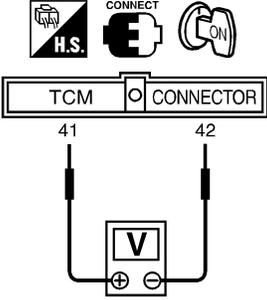
| | | |
|--|---------------------------|---|
| 1 | CHECK DTC WITH ECM | |
| <ul style="list-style-type: none"> Check P code with CONSULT-II "ENGINE". Turn ignition switch ON and select "SELF DIAGNOSTIC RESULTS" mode for "ENGINE" with CONSULT-II. Refer to EC-168, "Malfunction Indicator Lamp (MIL)". <p style="text-align: center;">OK or NG</p> | | |
| OK (with CONSULT-II) | ▶ | GO TO 2. |
| OK (without CONSULT-II) | ▶ | GO TO 3. |
| NG | ▶ | Check accelerator pedal position sensor (throttle position sensor) circuit for engine control. Refer to EC-569, "DTC P0226 APP SENSOR". |

| 2 | CHECK INPUT SIGNAL (With CONSULT-II) | | | | | | | | | | | | | | | |
|--|---|--|--------------|--|------------|--|---------------|----------|---------------|----------|---------------|-------|---------------|-------|--------------|-------|
| <p> With CONSULT-II</p> <ol style="list-style-type: none"> Turn ignition switch to ON position. (Do not start engine.) Select "TCM INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT-II. Read out the value of "THRTL POS SEN". <p>Voltage: Fully-closed throttle: Approximately 0.5V Fully-open throttle: Approximately 4V</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th></th> </tr> </thead> <tbody> <tr> <td>VHCL/S SE-A/T</td> <td>XXX km/h</td> </tr> <tr> <td>VHCL/S SE-MTR</td> <td>XXX km/h</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>FLUID TEMP SE</td> <td>XXX V</td> </tr> <tr> <td>BATTERY VOLT</td> <td>XXX V</td> </tr> </tbody> </table> <p style="text-align: right;">SAT614J</p> <p style="text-align: center;">OK or NG</p> | | | DATA MONITOR | | MONITORING | | VHCL/S SE-A/T | XXX km/h | VHCL/S SE-MTR | XXX km/h | THRTL POS SEN | XXX V | FLUID TEMP SE | XXX V | BATTERY VOLT | XXX V |
| DATA MONITOR | | | | | | | | | | | | | | | | |
| MONITORING | | | | | | | | | | | | | | | | |
| VHCL/S SE-A/T | XXX km/h | | | | | | | | | | | | | | | |
| VHCL/S SE-MTR | XXX km/h | | | | | | | | | | | | | | | |
| THRTL POS SEN | XXX V | | | | | | | | | | | | | | | |
| FLUID TEMP SE | XXX V | | | | | | | | | | | | | | | |
| BATTERY VOLT | XXX V | | | | | | | | | | | | | | | |
| OK | ▶ | GO TO 4. | | | | | | | | | | | | | | |
| NG | ▶ | Check harness for short or open between ECM and TCM regarding accelerator pedal position sensor (throttle position sensor) circuit. (Main harness) | | | | | | | | | | | | | | |

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DTC P1705 ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR)

Diagnostic Procedure (Cont'd)

| | | |
|---|--|--|
| 3 | CHECK INPUT SIGNAL (Without CONSULT-II) | |
| <p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch to ON position. (Do not start engine.) 2. Check voltage between TCM harness connector M120 terminals 41 (P/L) and 42 (B) while accelerator pedal is depressed slowly. | | |
|  | | |
| <p>Voltage:</p> <p style="padding-left: 20px;">Fully-closed throttle valve: Approximately 0.5V</p> <p style="padding-left: 20px;">Fully-open throttle valve: Approximately 4V</p> <p style="padding-left: 20px;">(Voltage rises gradually in response to throttle position.)</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Check harness for short or open between ECM and TCM regarding accelerator pedal position sensor (throttle position sensor) circuit. (Main harness) |

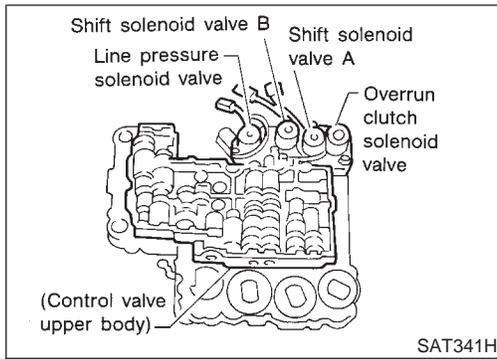
SAT349JB

| | | |
|---|------------------|-----------------------|
| 4 | CHECK DTC | |
| Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-202. | | |
| OK or NG | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | GO TO 5. |

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

DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Description



Description

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

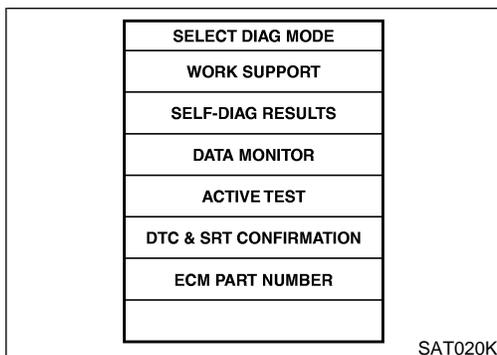
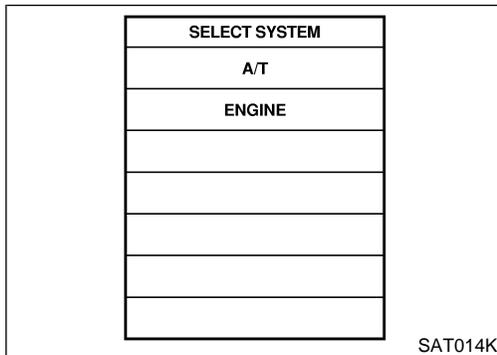
TCM TERMINALS AND REFERENCE VALUE

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

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



DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:
Always drive vehicle at a safe speed.

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

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

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

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

DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Description (Cont'd)



With GST

Follow the procedure "With CONSULT-II".

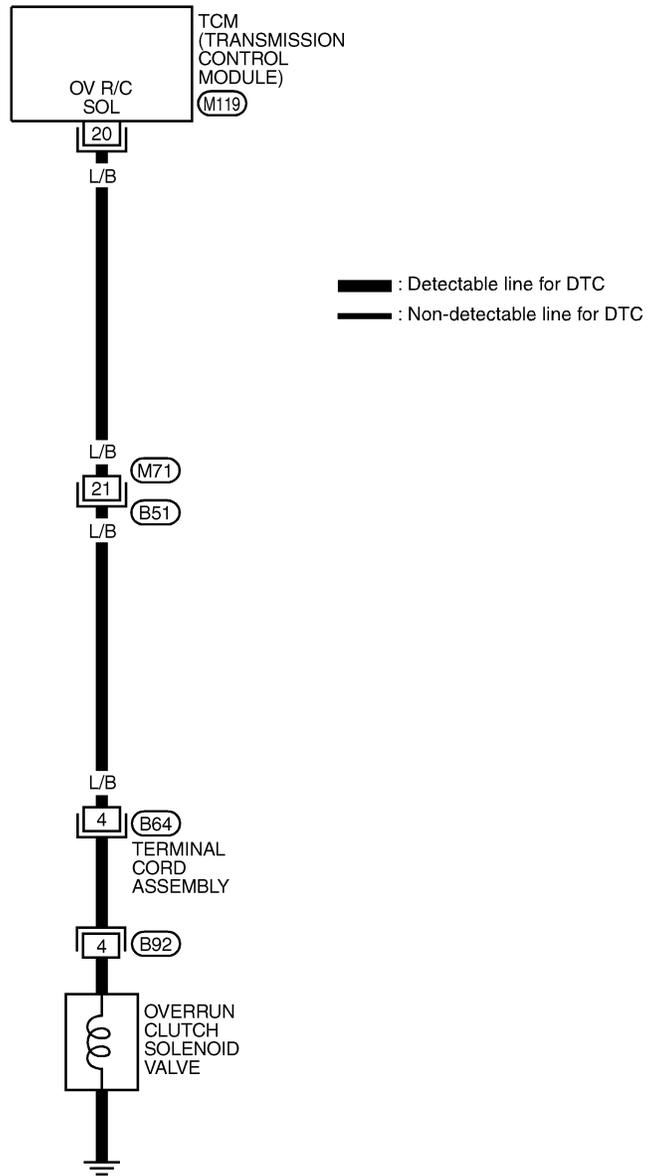
DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Wiring Diagram — AT — OVRCSV

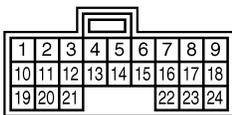
Wiring Diagram — AT — OVRCSV

NAAT0200

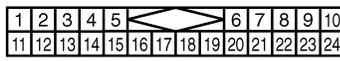
AT-OVRCSV-01



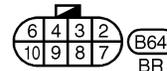
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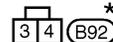
(M119)
W



(B51)
W



(B64)
BR



(B92)
*

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

MAT741A

DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Diagnostic Procedure

Diagnostic Procedure

NAAT0069

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

| | | |
|---|------------------------------|----------------------------------|
| 2 | CHECK VALVE OPERATION | |
| <p>1. Remove control valve assembly. Refer to AT-269.</p> <p>2. Check the following items:</p> <ul style="list-style-type: none"> ● Overrun clutch solenoid valve Refer to "Component Inspection", AT-189. ● Harness of terminal cord assembly for short or open <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 3. |
| NG | ▶ | Repair or replace damaged parts. |

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

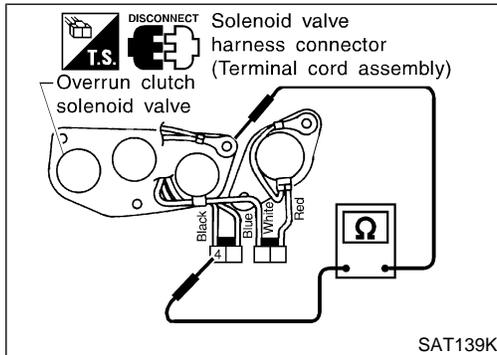
| | | |
|---|------------------|-----------------------|
| 4 | CHECK DTC | |
| <p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-185.</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | GO TO 5. |

DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

Diagnostic Procedure (Cont'd)

| | |
|--|------------------------------------|
| 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. |

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Component Inspection OVERRUN CLUTCH SOLENOID VALVE

NAAT0070

NAAT0070S01

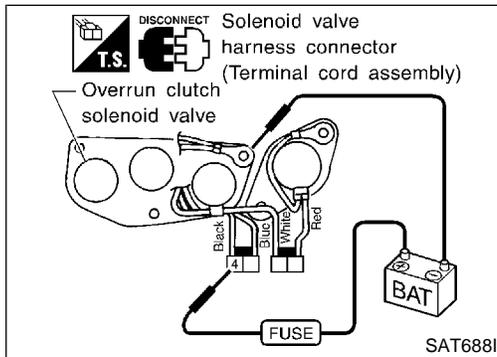
- For removal, refer to AT-269.

Resistance Check

NAAT0070S0101

- Check resistance between terminal 4 and ground.

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



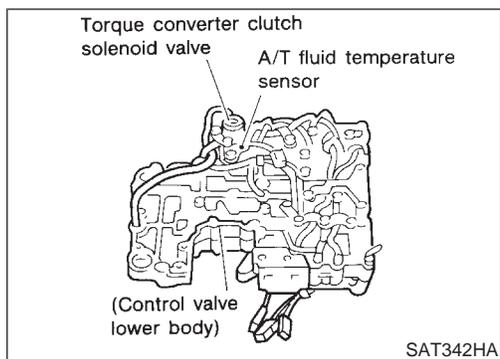
Operation Check

NAAT0070S0102

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

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

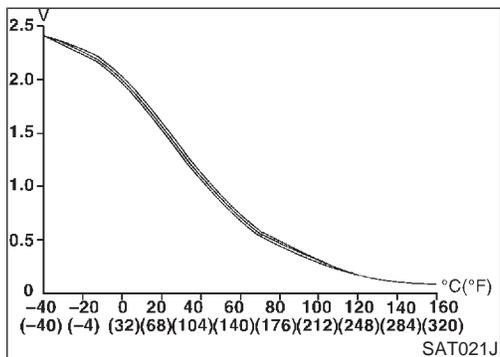
Description



Description

NAAT0172

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

NAAT0172S02

Remarks: Specification data are reference values.

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

TCM TERMINALS AND REFERENCE VALUE

NAAT0172S03

Remarks: Specification data are reference values.

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

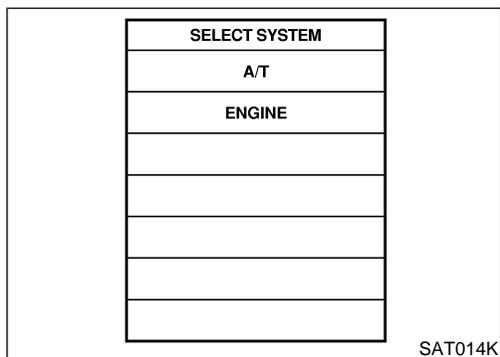
DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)

Description (Cont'd)

ON BOARD DIAGNOSIS LOGIC

NAAT0172S04

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|--|--|
| P : BATT/FLUID TEMP SEN NO TOOLS : 8th judgement flicker | TCM receives an excessively low or high voltage from the sensor. | <ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • A/T fluid temperature sensor |



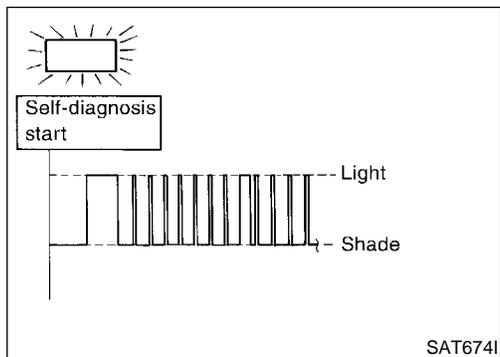
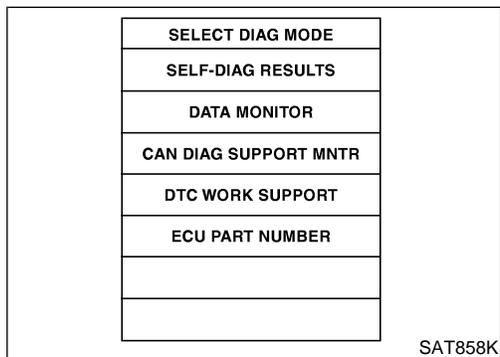
DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0172S01

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).



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-48.

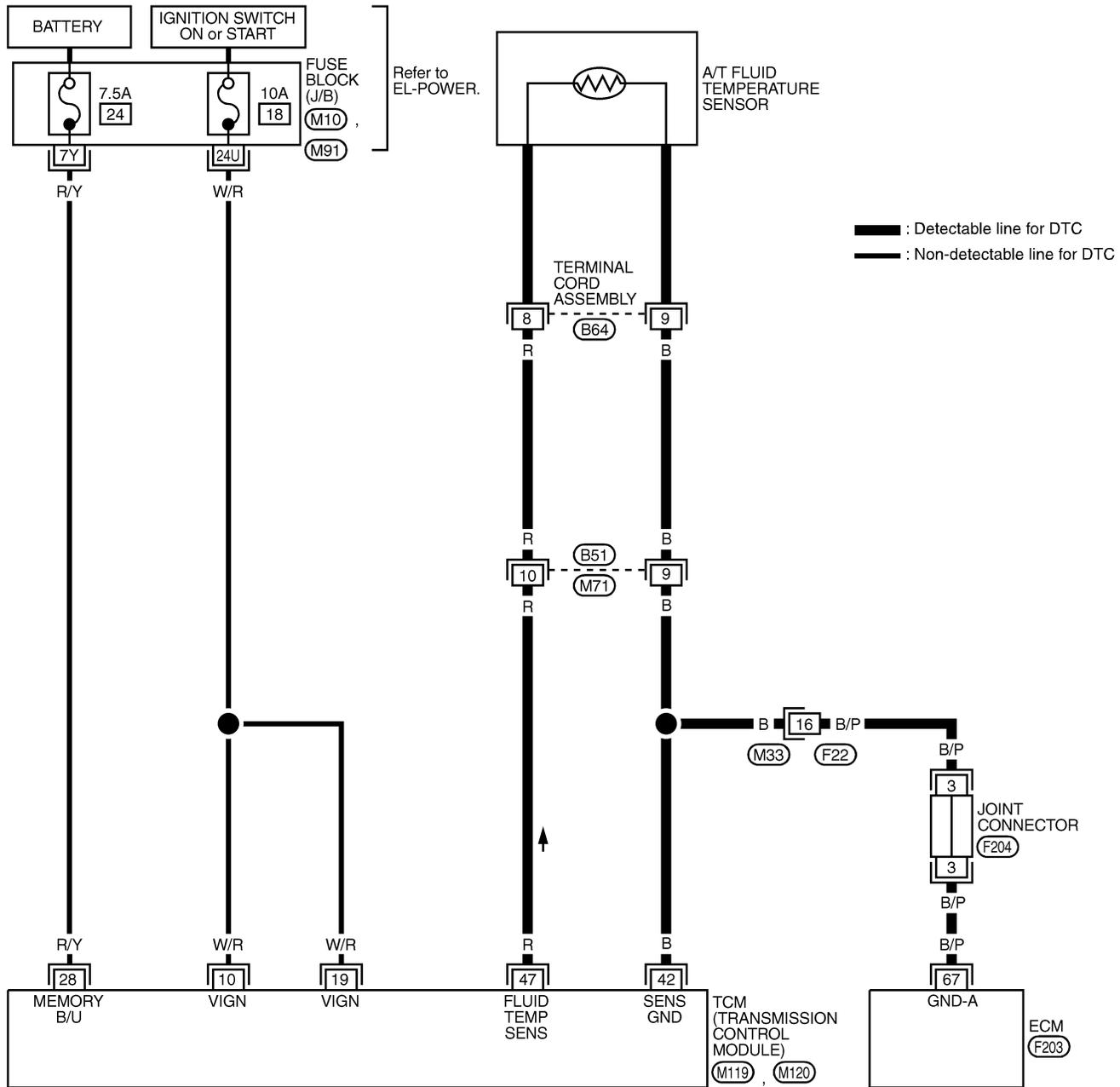
DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)

Wiring Diagram — AT — BA/FTS

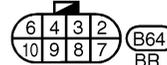
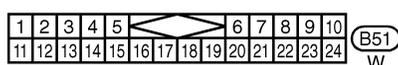
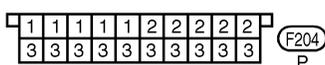
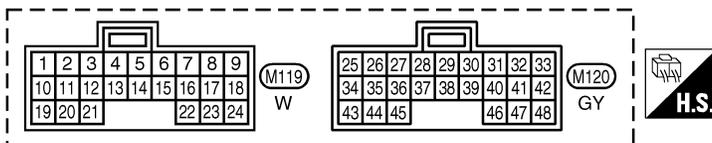
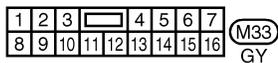
Wiring Diagram — AT — BA/FTS

NAAT0201

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)
 (F203) - ELECTRICAL UNITS

MAT317B

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

Diagnostic Procedure

Diagnostic Procedure

NAAT0173

| | | |
|-------------------------|-------------------------|----------|
| 1 | INSPECTION START | |
| Do you have CONSULT-II? | | |
| Yes or No | | |
| Yes | ▶ | GO TO 2. |
| No | ▶ | GO TO 6. |

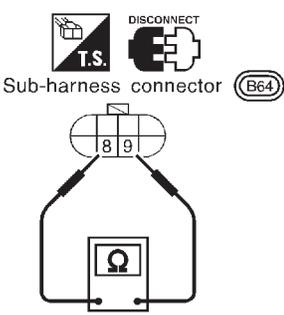
| 2 | CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II) | | | | | | | | | | | | | | | |
|---|---|----------|--------------|--|------------|--|---------------|----------|---------------|----------|---------------|-------|---------------|-------|--------------|-------|
| <p> With CONSULT-II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

| | | |
|---|-----------------------------------|----------------------------------|
| 3 | DETECT MALFUNCTIONING ITEM | |
| <p>Check the following items:</p> <ul style="list-style-type: none"> ● Harness for short to ground or short to power or open between TCM, ECM and terminal cord assembly (Main harness) ● Ground circuit for ECM. <p>Refer to EC-157, "Wiring Diagram".</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair or replace damaged parts. |

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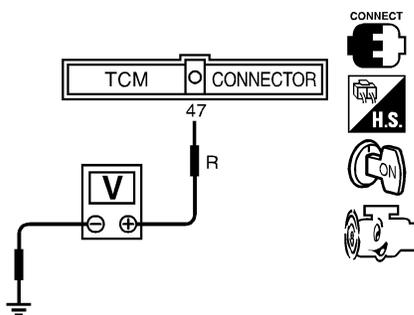
DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)

Diagnostic Procedure (Cont'd)

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

SAT697I

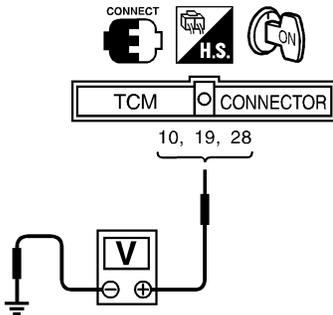
| | |
|---|------------------------------------|
| 5 | DETECT MALFUNCTIONING ITEM |
| <ol style="list-style-type: none"> Remove oil pan. Check the following items: <ul style="list-style-type: none"> A/T fluid temperature sensor Refer to "Component Inspection", AT-113. Harness of terminal cord assembly for short or open | |
| <p>OK or NG</p> | |
| OK | ▶ GO TO 7. |
| NG | ▶ Repair or replace damaged parts. |

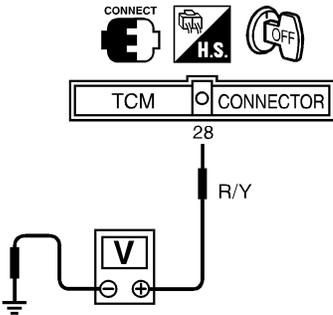
| | |
|---|--|
| 6 | CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II) |
| <p> Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Check voltage between TCM harness connector M120 terminal 47 and ground while warming up A/T. <p>Voltage: Cold [20°C (68°F)] → Hot [80°C (176°F)]: Approximately 1.5V → 0.5V</p> | |
|  | |
| <p>OK or NG</p> | |
| OK | ▶ GO TO 11. |
| NG | ▶ GO TO 3. |

SAT518J

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

Diagnostic Procedure (Cont'd)

| | | | |
|----------|--------------------------------------|---|--|
| 7 | CHECK TCM POWER SOURCE STEP 1 | <p>1. Turn ignition switch to ON position. (Do not start engine.)</p> <p>2. Check voltage between TCM harness connector M119, M120 terminals 10, 19, 28 and ground.</p> <div style="text-align: center; margin: 10px 0;">  <p style="margin-left: 100px;">Voltage: Battery voltage</p> </div> <p style="text-align: right; margin-right: 20px;">SAT611J</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p> | GI MA EM LC EC FE CL MT |
| OK | ▶ | GO TO 8. | |
| NG | ▶ | GO TO 9. | |

| | | | |
|----------|--------------------------------------|--|--|
| 8 | CHECK TCM POWER SOURCE STEP 2 | <p>1. Turn ignition switch to OFF position.</p> <p>2. Check voltage between TCM harness connector M120 terminal 28 and ground.</p> <div style="text-align: center; margin: 10px 0;">  <p style="margin-left: 100px;">Voltage: Battery voltage</p> </div> <p style="text-align: right; margin-right: 20px;">SAT612JC</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p> | AT TF PD AX SU BR ST |
| OK | ▶ | GO TO 10. | |
| NG | ▶ | GO TO 9. | |

| | | | |
|----------|-----------------------------------|--|-----------------------------------|
| 9 | DETECT MALFUNCTIONING ITEM | <p>Check the following items:</p> <ul style="list-style-type: none"> ● Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness) ● Ignition switch and 10A or 7.5A fuse [No. 18 or 24, located in the fuse block (J/B)] Refer to EL-11, "Schematic". <p style="text-align: center; margin-top: 10px;">OK or NG</p> | RS BT HA SC EL IDX |
| OK | ▶ | GO TO 10. | |
| NG | ▶ | Repair or replace damaged parts. | |

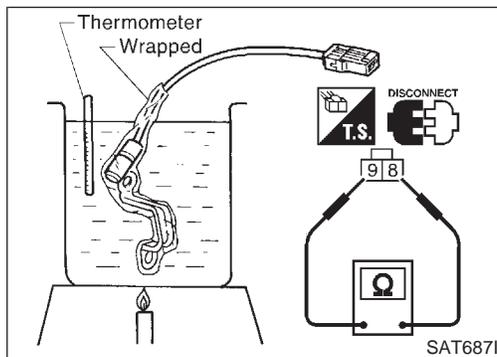
DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)

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. <p style="text-align: center;">OK or NG</p> | | |
| 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-109. <p style="text-align: center;">OK or NG</p> | | |
| 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. <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | Repair or replace damaged parts. |



Component Inspection A/T FLUID TEMPERATURE SENSOR

NAAT0174

NAAT0174S01

- For removal, refer to AT-269.
- Check resistance between terminals 8 and 9 while changing temperature as shown at left.

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

DTC VEHICLE SPEED SENSOR-MTR

Description

Description

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

NAAT0071

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TCM TERMINALS AND REFERENCE VALUE

NAAT0071S02

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

NAAT0071S03

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

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
| |
| |
| |
| |

SAT014K

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0071S01

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

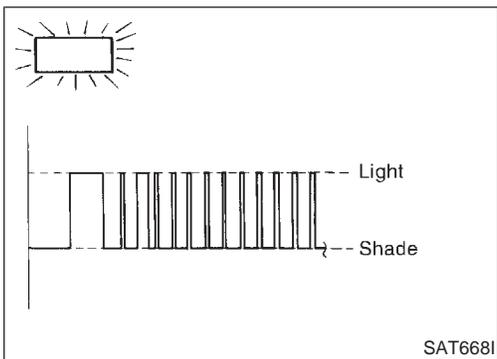
- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
- 2) Start engine and accelerate vehicle from 0 to 25 km/h (0 to 6 MPH).

| |
|-----------------------|
| SELECT DIAG MODE |
| SELF-DIAG RESULTS |
| DATA MONITOR |
| CAN DIAG SUPPORT MNTR |
| DTC WORK SUPPORT |
| ECU PART NUMBER |
| |
| |

SAT858K

DTC VEHICLE SPEED SENSOR-MTR

Description (Cont'd)



No Tools

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

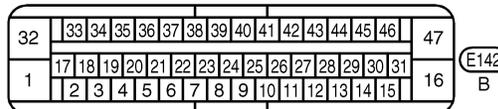
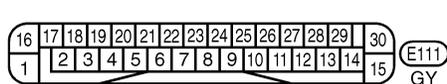
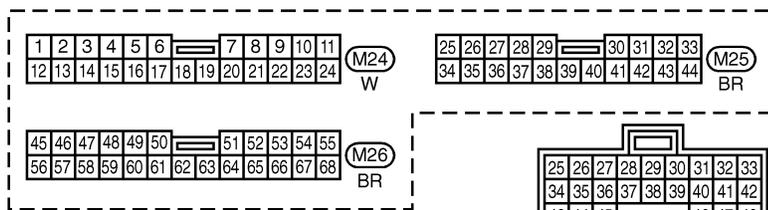
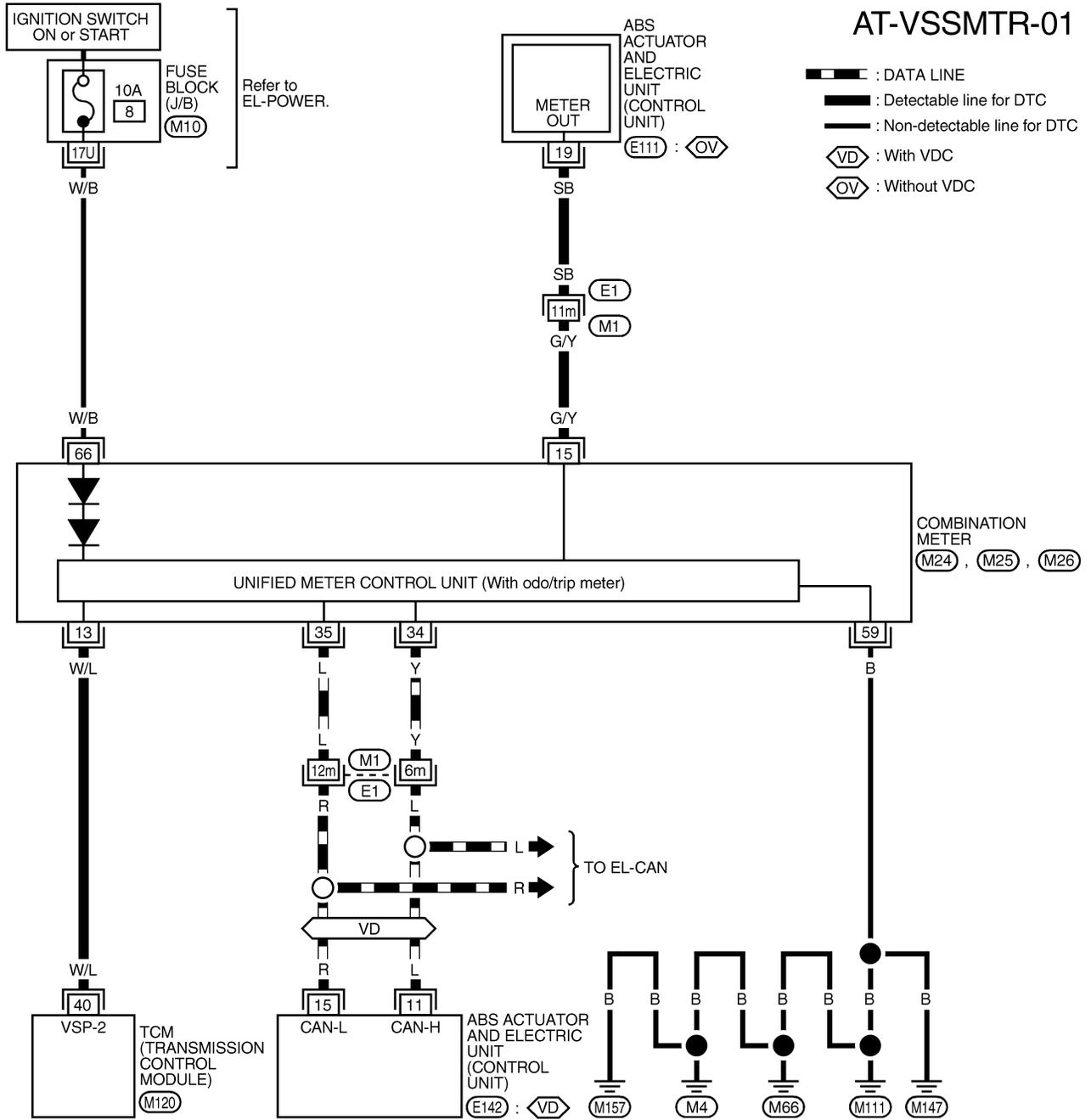
DTC VEHICLE SPEED SENSOR-MTR

Wiring Diagram — AT — VSSMTR

Wiring Diagram — AT — VSSMTR

NAAT0202

AT-VSSMTR-01



REFER TO THE FOLLOWING.

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

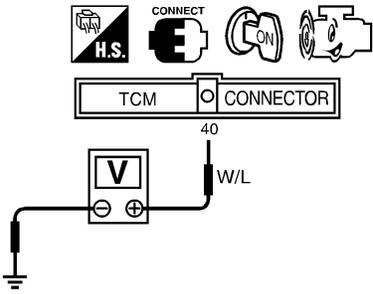
MAT501B

DTC VEHICLE SPEED SENSOR-MTR

Diagnostic Procedure

Diagnostic Procedure

NAAT0072

| 1 | CHECK INPUT SIGNAL. | | | | | | | | | | | | | | |
|--|----------------------------|--------------|--|------------|--|---------------|----------|---------------|----------|---------------|-------|---------------|-------|--------------|-------|
| <p> With CONSULT-II</p> <ol style="list-style-type: none"> 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. | | | | | | | | | | | | | | | |
| <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th></th> </tr> </thead> <tbody> <tr> <td>VHCL/S SE-A/T</td> <td>XXX km/h</td> </tr> <tr> <td>VHCL/S SE-MTR</td> <td>XXX km/h</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>FLUID TEMP SE</td> <td>XXX V</td> </tr> <tr> <td>BATTERY VOLT</td> <td>XXX V</td> </tr> </tbody> </table> | | DATA MONITOR | | MONITORING | | VHCL/S SE-A/T | XXX km/h | VHCL/S SE-MTR | XXX km/h | THRTL POS SEN | XXX V | FLUID TEMP SE | XXX V | BATTERY VOLT | XXX V |
| DATA MONITOR | | | | | | | | | | | | | | | |
| MONITORING | | | | | | | | | | | | | | | |
| VHCL/S SE-A/T | XXX km/h | | | | | | | | | | | | | | |
| VHCL/S SE-MTR | XXX km/h | | | | | | | | | | | | | | |
| THRTL POS SEN | XXX V | | | | | | | | | | | | | | |
| FLUID TEMP SE | XXX V | | | | | | | | | | | | | | |
| BATTERY VOLT | XXX V | | | | | | | | | | | | | | |
| SAT614J | | | | | | | | | | | | | | | |
| <p> Without CONSULT-II</p> <ol style="list-style-type: none"> 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. | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | |
| SAT528J | | | | | | | | | | | | | | | |
| <p>Does battery voltage vary between less than 1V and more than 4.5V?</p> | | | | | | | | | | | | | | | |
| Yes | ▶ | GO TO 3. | | | | | | | | | | | | | |
| No | ▶ | GO TO 2. | | | | | | | | | | | | | |

| | | |
|---|-----------------------------------|----------------------------------|
| 2 | DETECT MALFUNCTIONING ITEM | |
| <p>Check the following items:</p> <ul style="list-style-type: none"> ● Vehicle speed sensor and ground circuit for vehicle speed sensor Refer to EL-35, "Component Parts and Harness Connector Location". ● Harness for short or open between TCM and vehicle speed sensor (Main harness) ● Harness for short or open between ABS actuator and electrical unit and combination meter <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 3. |
| NG | ▶ | Repair or replace damaged parts. |

| | | |
|---|------------------|-----------------------|
| 3 | CHECK DTC | |
| <p>Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-197.</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | GO TO 4. |

DTC VEHICLE SPEED SENSOR-MTR

Diagnostic Procedure (Cont'd)

| | | |
|--|-----------------------------|----------------------------------|
| 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. |

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DTC U1000 CAN COMMUNICATION LINE

Description

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control units transmits/receives data but selectively reads required data only.

NAAT0242

TCM TERMINALS AND REFERENCE VALUE

NAAT0242S01

Remarks: Specification data are reference values.

| Terminal No. | Wire color | Item | Condition | | Judgement standard (Approx.) |
|--------------|------------|------------|-----------|---|------------------------------|
| 5 | L | CAN (high) | — | — | — |
| 6 | R | CAN (low) | — | — | — |

*: This terminal is connected to the ECM.

On Board Diagnosis Logic

Diagnostic trouble code CAN COMM CIRCUIT or U1000 with CONSULT-II or 12th judgement flicker without CONSULT-II is detected when TCM cannot communicate to other control unit.

NAAT0243

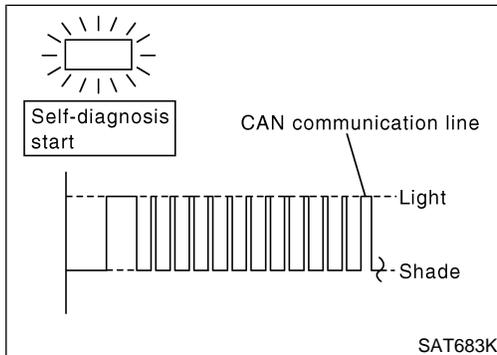
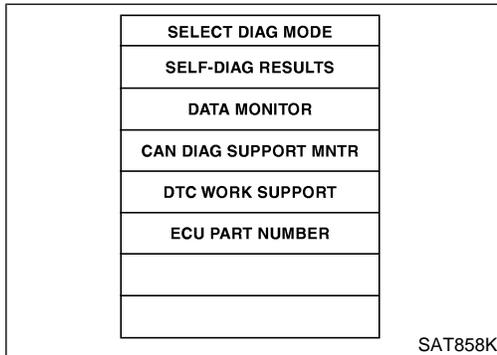
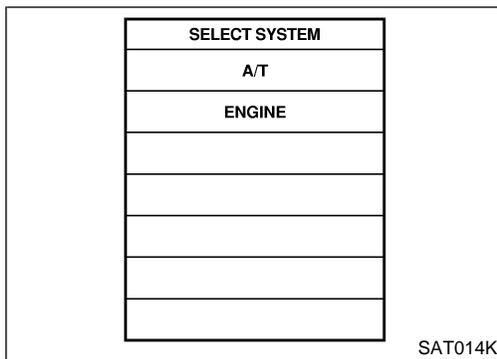
Possible Cause

Check harness or connector.
(CAN communication line is open or shorted.)

NAAT0244

DTC U1000 CAN COMMUNICATION LINE

Diagnostic Trouble Code (DTC) Confirmation Procedure



Diagnostic Trouble Code (DTC) Confirmation Procedure

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.

WITHOUT CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Wait at least 6 seconds or start engine and wait at least 6 seconds.
- 3) Perform self-diagnosis. Refer to TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS), AT-48.

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DTC U1000 CAN COMMUNICATION LINE

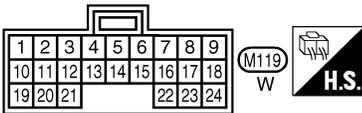
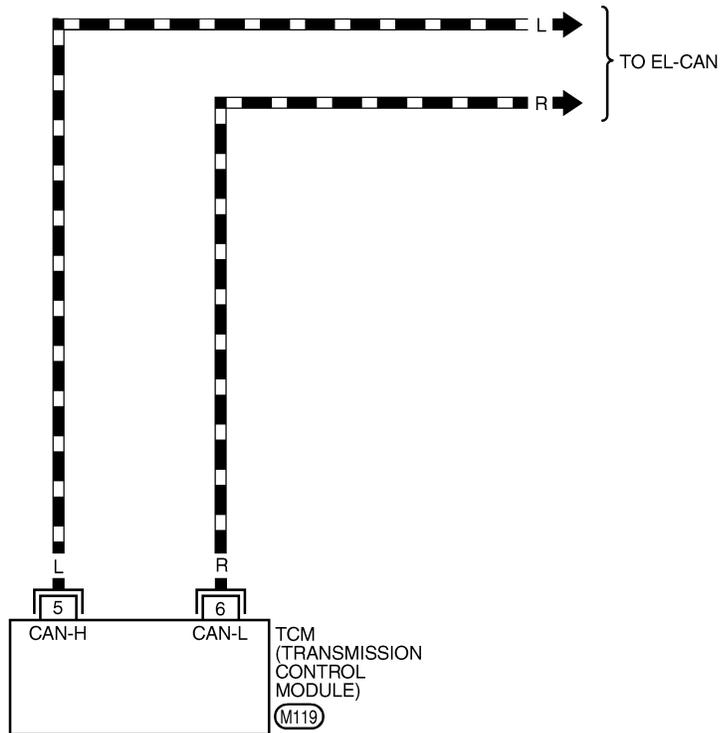
Wiring Diagram — AT — CAN

Wiring Diagram — AT — CAN

NAAT0246

AT-CAN-01

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



MAT320B

Diagnostic Procedure

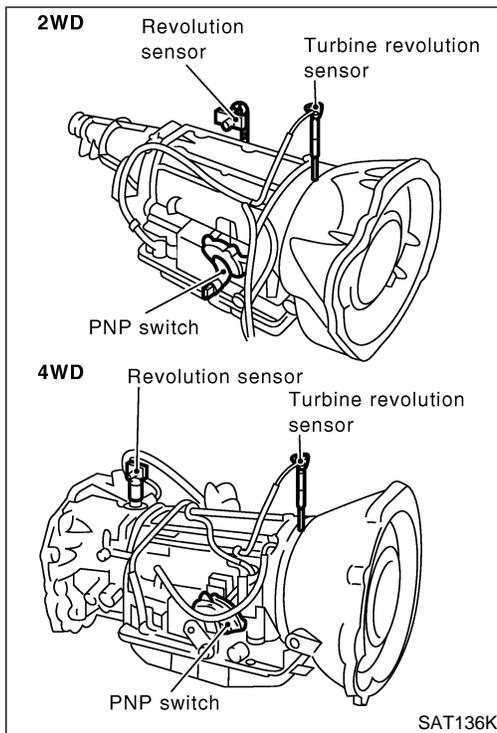
NAAT0247

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|--|-------------------|--|--|--|-------------|--|--|--|------------------|--|--|--|---------|--|--|--|--|--|--|--|--|--|--|--|-------|--|-------|--|------|------|-------|------|
| 1 | CHECK CAN COMMUNICATION CIRCUIT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch to "ON" position. (Do not start engine.) 2. Select "SELF-DIAG RESULTS" mode for "A/T" with CONSULT-II. 3. The "CAN COMM CIRCUIT" is detected. <div style="text-align: center; margin: 10px 0;"> <table border="1" style="margin: 0 auto; border-collapse: collapse;"> <tr><td colspan="4" style="text-align: center;">SELF-DIAG RESULTS</td></tr> <tr><td colspan="4" style="text-align: center;">DTC RESULTS</td></tr> <tr><td colspan="4" style="text-align: center;">CAN COMM CIRCUIT</td></tr> <tr><td colspan="4" style="text-align: center;">[U1000]</td></tr> <tr><td colspan="4" style="text-align: center;"> </td></tr> <tr><td colspan="4" style="text-align: center;"> </td></tr> <tr><td colspan="2" style="text-align: center;">ERASE</td><td colspan="2" style="text-align: center;">PRINT</td></tr> <tr><td style="text-align: center;">MODE</td><td style="text-align: center;">BACK</td><td style="text-align: center;">LIGHT</td><td style="text-align: center;">COPY</td></tr> </table> </div> <p style="text-align: right; margin-right: 20px;">PCIA0061E</p> <p style="text-align: center; margin-top: 10px;">Yes or No?</p> | | | SELF-DIAG RESULTS | | | | DTC RESULTS | | | | CAN COMM CIRCUIT | | | | [U1000] | | | | | | | | | | | | ERASE | | PRINT | | MODE | BACK | LIGHT | COPY |
| SELF-DIAG RESULTS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DTC RESULTS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CAN COMM CIRCUIT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [U1000] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| ERASE | | PRINT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MODE | BACK | LIGHT | COPY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yes | ▶ | Print out CONSULT-II screen, go to EL-409, "CAN Communication Unit". | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No | ▶ | INSPECTION END | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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DTC TURBINE REVOLUTION SENSOR

Description



Description

NAAT0224

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

NAAT0224S01

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 | Sensor ground |  — | 0V |

ON BOARD DIAGNOSIS LOGIC

NAAT0224S02

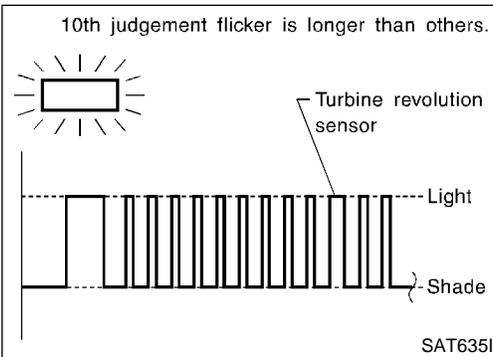
| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
|  : TURBINE REV  : 10th judgement flicker | TCM does not receive the proper voltage signal from the sensor. | <ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open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

| |
|---------------|
| SELECT SYSTEM |
| A/T |
| ENGINE |
| |
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| |

SAT014K

| |
|-----------------------|
| SELECT DIAG MODE |
| SELF-DIAG RESULTS |
| DATA MONITOR |
| CAN DIAG SUPPORT MNTR |
| DTC WORK SUPPORT |
| ECU PART NUMBER |
| |
| |

SAT858K



DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0224S03

CAUTION:

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

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

④ With CONSULT-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.

④ 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-48.

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DTC TURBINE REVOLUTION SENSOR

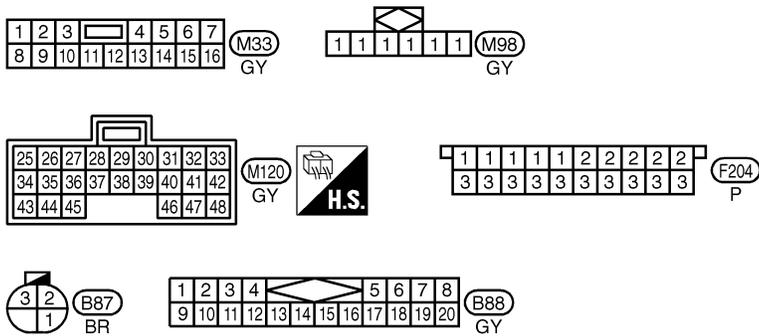
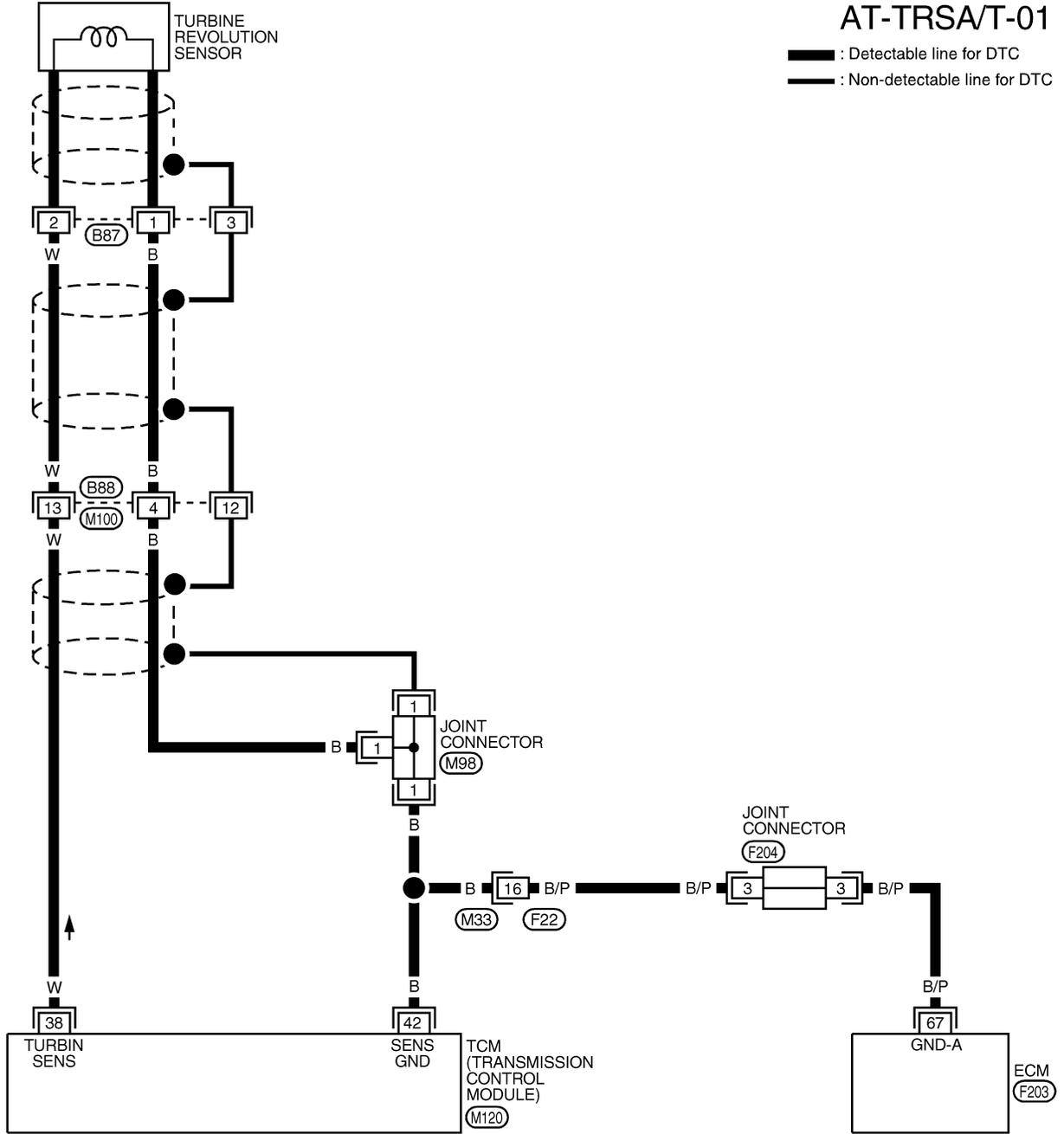
Wiring Diagram — AT — TRSA/T

Wiring Diagram — AT — TRSA/T

NAAT0225

AT-TRSA/T-01

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



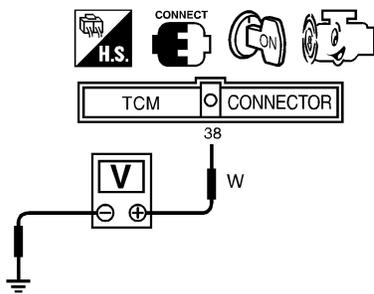
REFER TO THE FOLLOWING.
 (F203) - ELECTRICAL UNITS

MAT319B

Diagnostic Procedure

NAAT0226

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| 1 | CHECK INPUT SIGNAL | | | | | | | | | | | | | | |
|---|---------------------------|--------------|--|------------|--|--------------|---------|-------------|---------|--------------|----|------------|-----|---------------|-----|
| <p>With CONSULT-II</p> <ol style="list-style-type: none"> 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. | | | | | | | | | | | | | | | |
| <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th></th> </tr> </thead> <tbody> <tr> <td>ENGINE SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>TURBINE REV</td> <td>XXX rpm</td> </tr> <tr> <td>OVERDRIVE SW</td> <td>ON</td> </tr> <tr> <td>PN POSI SW</td> <td>OFF</td> </tr> <tr> <td>R POSITION SW</td> <td>OFF</td> </tr> </tbody> </table> | | DATA MONITOR | | MONITORING | | ENGINE SPEED | XXX rpm | TURBINE REV | XXX rpm | OVERDRIVE SW | ON | PN POSI SW | OFF | R POSITION SW | OFF |
| DATA MONITOR | | | | | | | | | | | | | | | |
| MONITORING | | | | | | | | | | | | | | | |
| ENGINE SPEED | XXX rpm | | | | | | | | | | | | | | |
| TURBINE REV | XXX rpm | | | | | | | | | | | | | | |
| OVERDRIVE SW | ON | | | | | | | | | | | | | | |
| PN POSI SW | OFF | | | | | | | | | | | | | | |
| R POSITION SW | OFF | | | | | | | | | | | | | | |
| SAT740J | | | | | | | | | | | | | | | |
| <p>Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Check voltage between TCM harness connector M120 terminal 38 and ground. (Measure in AC range.) | | | | | | | | | | | | | | | |
|  <p style="margin-left: 200px;">Approximately 1.2V (Voltage rises gradually in response to engine speed.)</p> | | | | | | | | | | | | | | | |
| SAT140K | | | | | | | | | | | | | | | |
| OK or NG | | | | | | | | | | | | | | | |
| OK | ▶ GO TO 3. | | | | | | | | | | | | | | |
| NG | ▶ GO TO 2. | | | | | | | | | | | | | | |

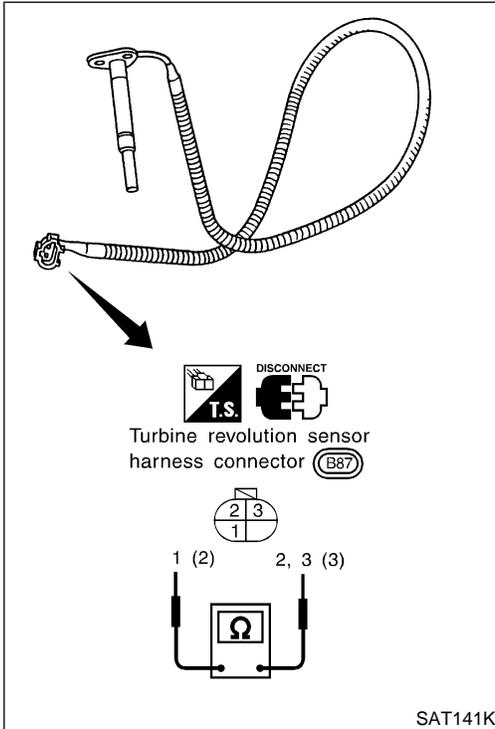
| | |
|--|------------------------------------|
| 2 | DETECT MALFUNCTIONING ITEM |
| Check harness for short or open between TCM and turbine revolution sensor. | |
| OK or NG | |
| OK | ▶ GO TO 3. |
| NG | ▶ Repair or replace damaged parts. |

| | |
|---|-------------------------|
| 3 | CHECK DTC |
| Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-207. | |
| OK or NG | |
| OK | ▶ INSPECTION END |
| NG | ▶ GO TO 4. |

DTC TURBINE REVOLUTION SENSOR

Diagnostic Procedure (Cont'd)

| | | |
|---|-----------------------------|----------------------------------|
| 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 TURBINE REVOLUTION SENSOR

NAAT0227

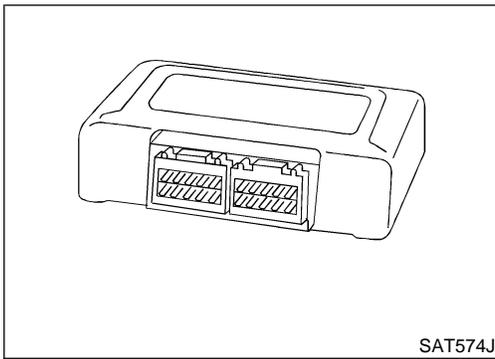
NAAT0227S01

- Check resistance between terminals 1, 2 and 3.

| Terminal No. | | Resistance (Approx.) |
|--------------|---|----------------------|
| 1 | 2 | 2.4 - 2.8 kΩ |
| 1 | 3 | No continuity |
| 2 | 3 | No continuity |

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

Description



Description

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

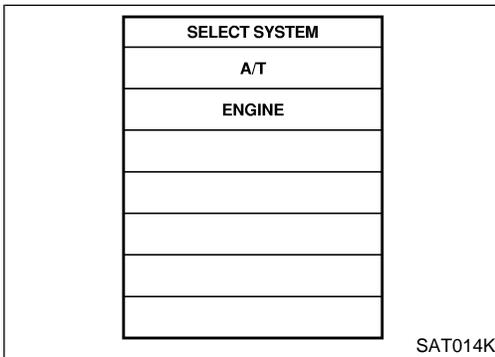
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ON BOARD DIAGNOSIS LOGIC

NAAT0207S01

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



DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

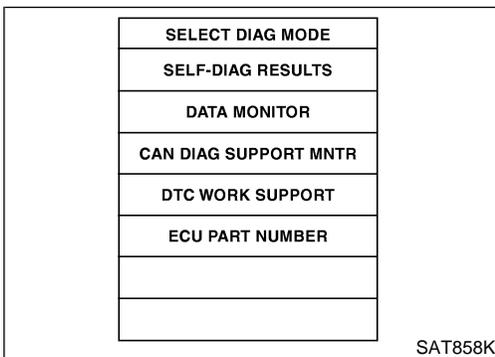
NAAT0207S02

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.

(P) 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.



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

Diagnostic Procedure

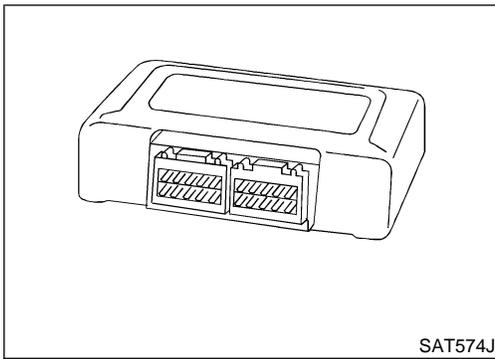
Diagnostic Procedure

=NAAT0208

| | |
|---|-------------------------|
| 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



Description

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

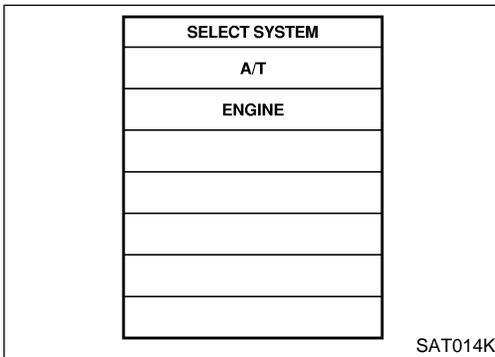
NAAT0215

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ON BOARD DIAGNOSIS LOGIC

NAAT0215S01

| 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

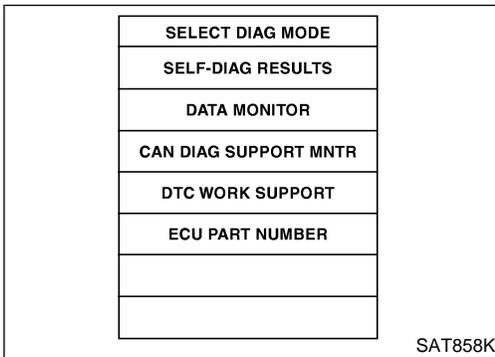
NAAT0215S02

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.



DTC CONTROL UNIT (EEP ROM)

Diagnostic Procedure

Diagnostic Procedure

=NAAT0216

| | |
|--|-------------------------|
| 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 |

TROUBLE DIAGNOSES FOR SYMPTOMS

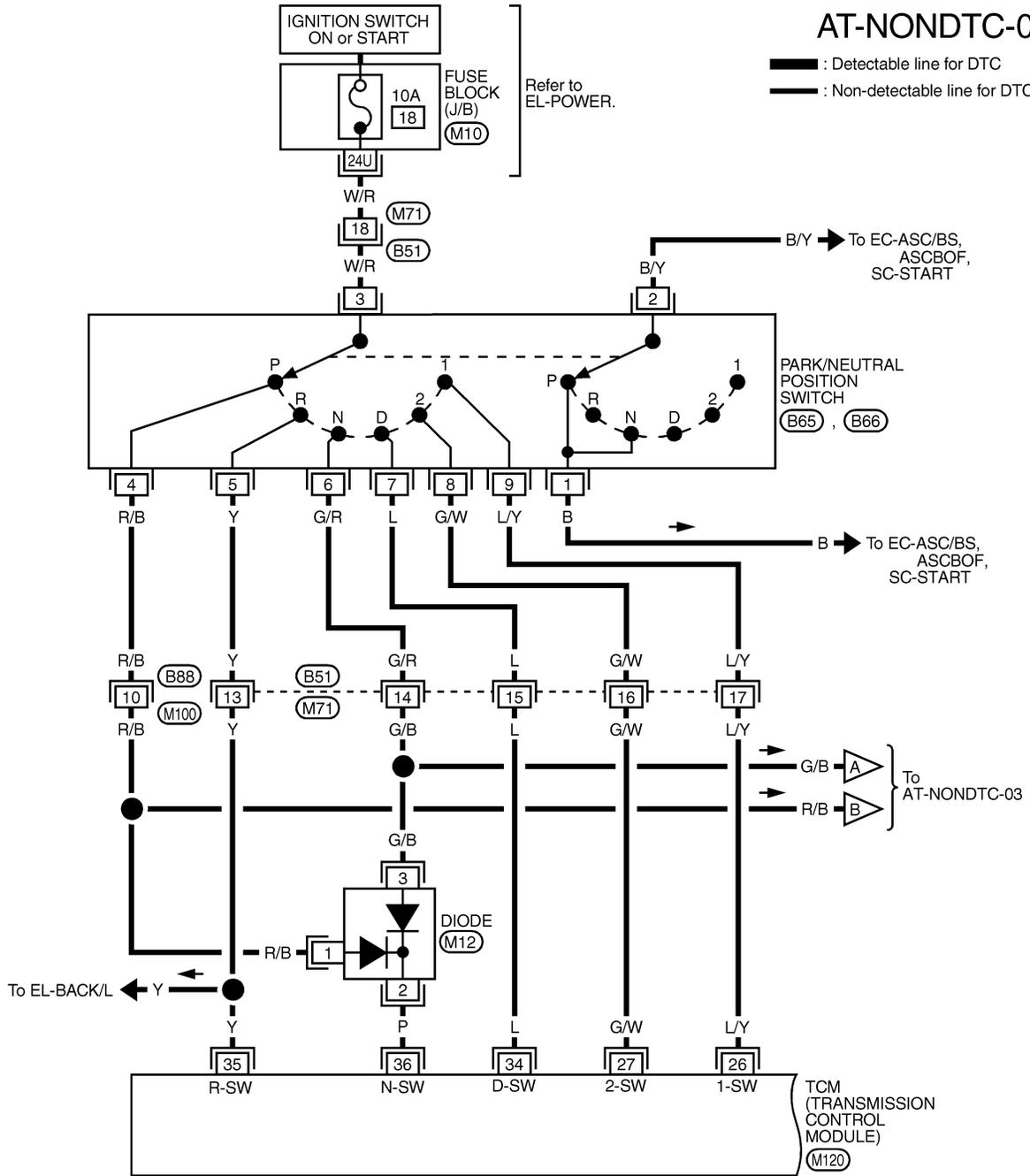
Wiring Diagram — AT — NONDTC

Wiring Diagram — AT — NONDTC

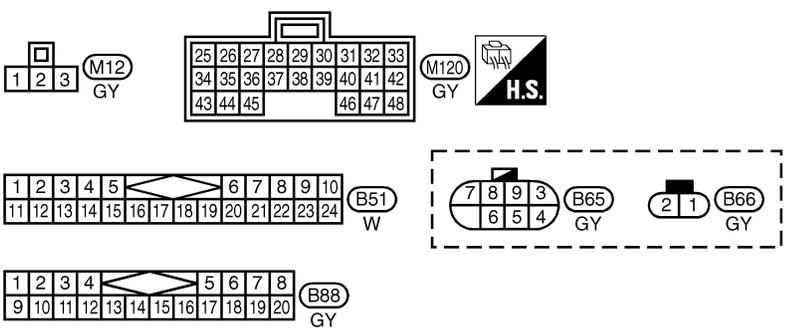
NAAT0203

AT-NONDTC-01

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



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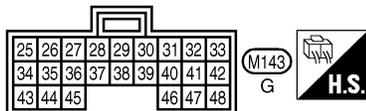
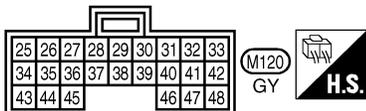
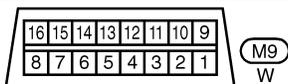
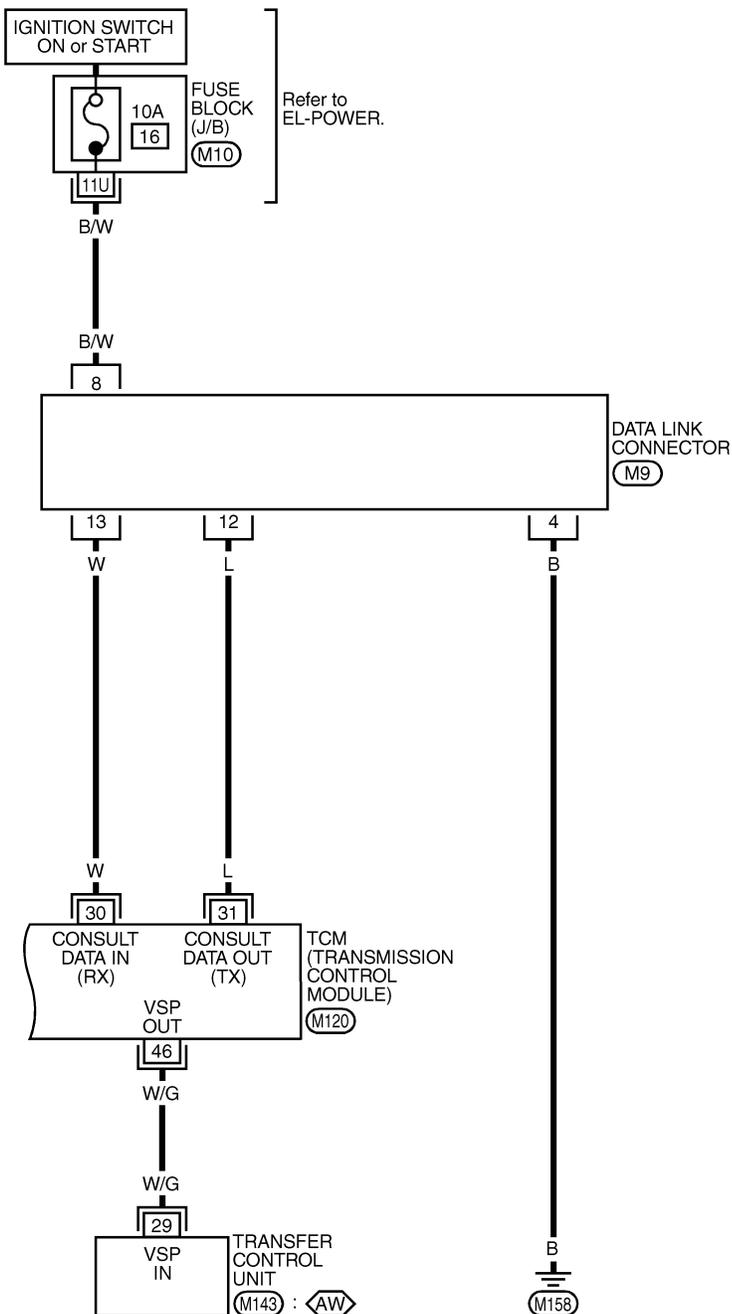
REFER TO THE FOLLOWING.
(M10) - FUSE BLOCK-
 JUNCTION BOX (J/B)

TROUBLE DIAGNOSES FOR SYMPTOMS

Wiring Diagram — AT — NONDTC (Cont'd)

AT-NONDTC-02

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



REFER TO THE FOLLOWING.

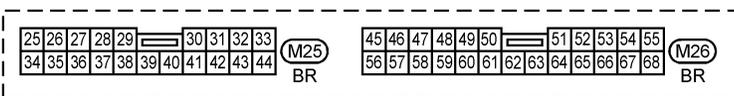
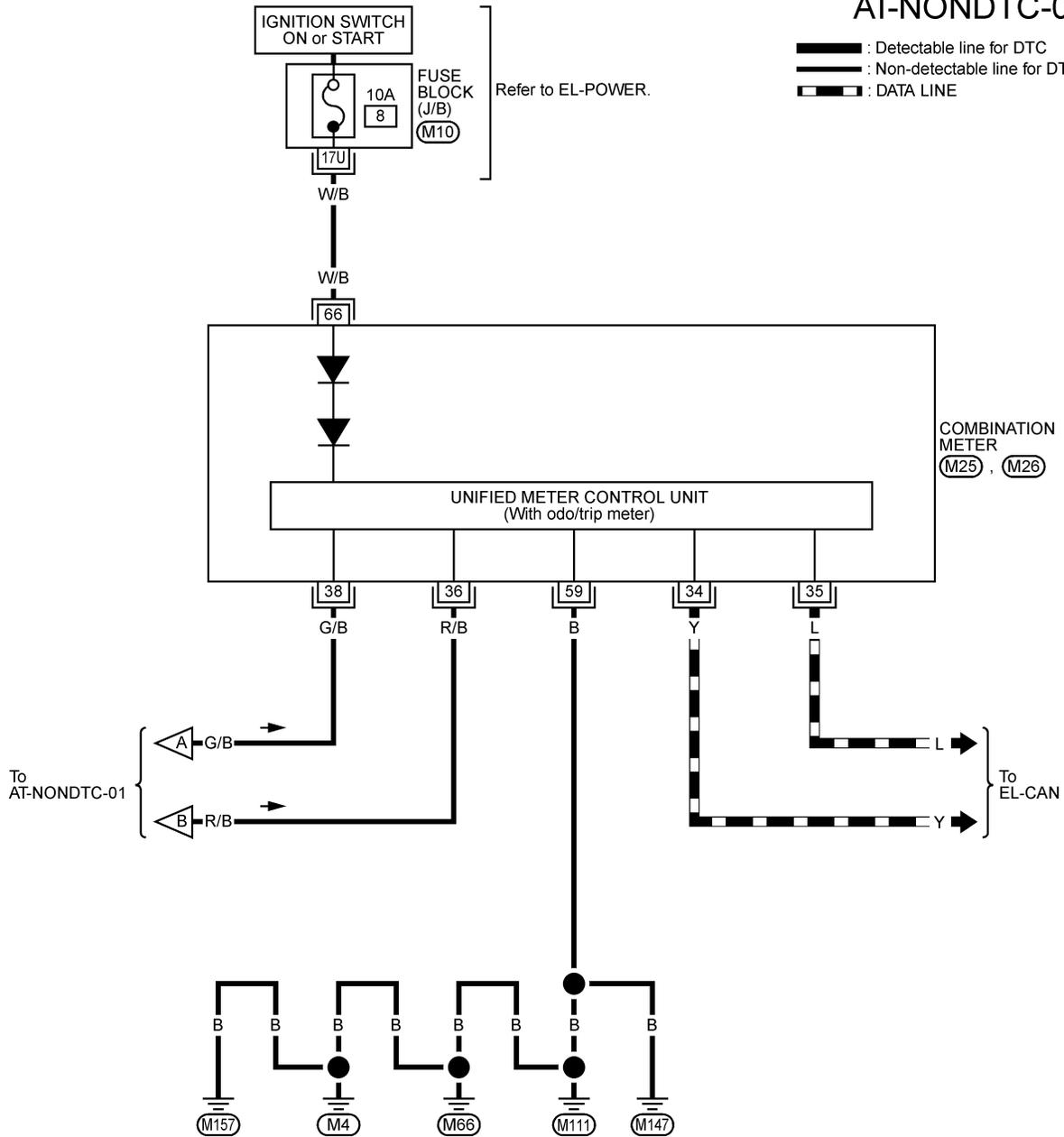
M10 - FUSE BLOCK-JUNCTION BOX (J/B)

TROUBLE DIAGNOSES FOR SYMPTOMS

Wiring Diagram — AT — NONDTC (Cont'd)

AT-NONDTC-03

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



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

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TROUBLE DIAGNOSES FOR SYMPTOMS

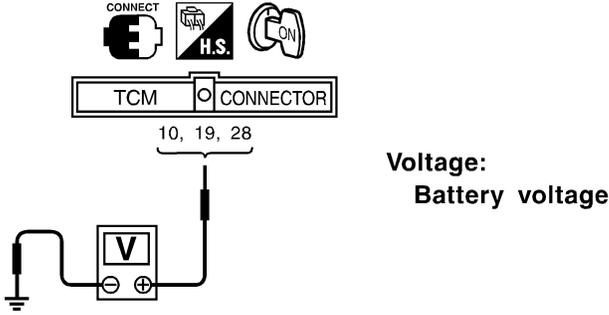
O/D OFF Indicator Lamp Does Not Come On

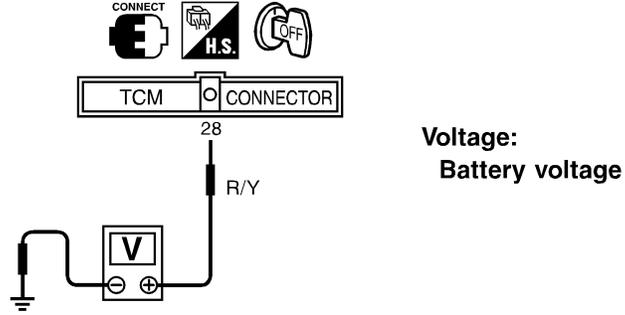
O/D OFF Indicator Lamp Does Not Come On

NAAT0073

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 | | |
| <p>1. Turn ignition switch to ON position. (Do not start engine.)</p> <p>2. Check voltage between TCM harness connector M119, M120 terminals 10, 19, 28 and ground.</p> | | | |
|  | | | |
| OK or NG | | | |
| OK | ▶ | GO TO 2. | |
| NG | ▶ | GO TO 3. | |

| | | | |
|--|--------------------------------------|----------|--|
| 2 | CHECK TCM POWER SOURCE STEP 2 | | |
| <p>1. Turn ignition switch to OFF position.</p> <p>2. Check voltage between TCM harness connector M120 terminal 28 and ground.</p> | | | |
|  | | | |
| OK or NG | | | |
| OK | ▶ | GO TO 4. | |
| NG | ▶ | GO TO 3. | |

| | | | |
|--|-----------------------------------|----------------------------------|--|
| 3 | DETECT MALFUNCTIONING ITEM | | |
| <p>Check the following items:</p> <ul style="list-style-type: none"> ● Harness for short or open between ignition switch and TCM harness connector M119, M120 terminals 10, 19 and 28 (Main harness) ● Ignition switch and 10A or 7.5A fuse [No. 18 or 24, located in the fuse block (J/B)] Refer to EL-11, "Schematic". | | | |
| OK or NG | | | |
| OK | ▶ | GO TO 4. | |
| NG | ▶ | Repair or replace damaged parts. | |

TROUBLE DIAGNOSES FOR SYMPTOMS

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

| | | |
|---|---------------------------------|--|
| 4 | CHECK TCM GROUND CIRCUIT | |
| <p>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.</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 5. |
| NG | ▶ | Repair open circuit or short to ground or short to power in harness or connectors. |

| | | |
|--|----------------------------------|----------------------------------|
| 5 | CHECK MALFUNCTIONING ITEM | |
| <p>Check the following items:</p> <ul style="list-style-type: none"> ● Fuse ● O/D OFF indicator lamp ● Harness for short or open between ignition switch and O/D OFF indicator lamp ● Harness for short or open between O/D OFF indicator lamp and TCM <p style="text-align: center;">OK or NG</p> | | |
| Yes | ▶ | GO TO 6. |
| No | ▶ | Repair or replace damaged parts. |

| | | |
|--|----------------------|-----------------------|
| 6 | CHECK SYMPTOM | |
| <p>Check again.</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | GO TO 7. |

| | | |
|--|-----------------------------|----------------------------------|
| 7 | CHECK TCM INSPECTION | |
| <p>1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | Repair or replace damaged parts. |

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TROUBLE DIAGNOSES FOR SYMPTOMS

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

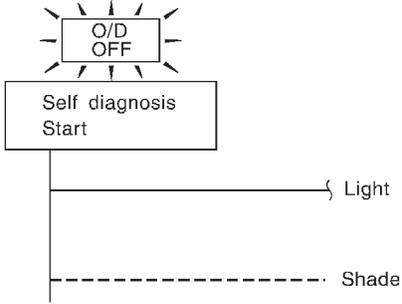
Engine Cannot Be Started In "P" and "N" Position

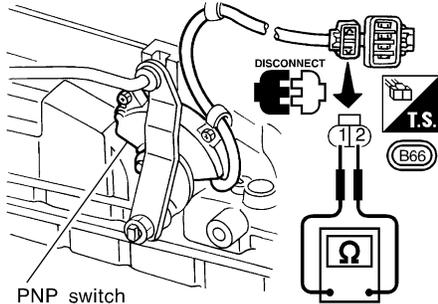
=NAAT0074

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 | |
| <p> With CONSULT-II Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?</p> | | |
| <p> Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit?</p> | | |
|  | | |
| SAT367J | | |
| Yes or No | | |
| Yes | ▶ | Check PNP switch circuit. Refer to "DTC P0705", AT-102. |
| 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-106. | | |
|  | | |
| SAT838BB | | |
| OK or NG | | |
| OK | ▶ | GO TO 3. |
| NG | ▶ | Repair or replace PNP switch. |

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

TROUBLE DIAGNOSES FOR SYMPTOMS

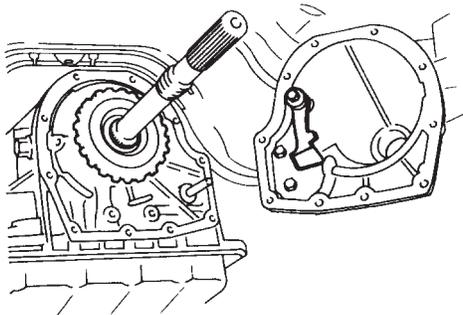
In "P" Position, Vehicle Moves Forward Or Backward When Pushed

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

=NAAT0075

SYMPTOM:

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

| | | | |
|-----------------|---------------------------------|--|--|
| 1 | CHECK PARKING COMPONENTS | <p>Check parking components. Refer to "Parking Pawl Components", AT-334.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT133B</p> | |
| OK or NG | | | |
| OK | ▶ | INSPECTION END | |
| NG | ▶ | Repair or replace damaged parts. | |

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TROUBLE DIAGNOSES FOR SYMPTOMS

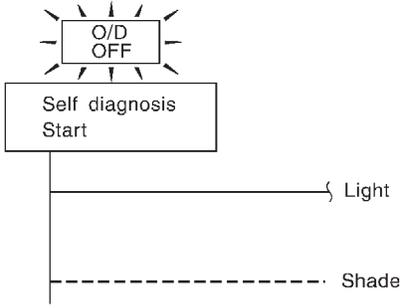
In "N" Position, Vehicle Moves

In "N" Position, Vehicle Moves

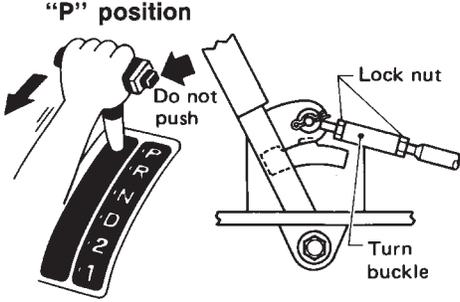
=NAAT0076

SYMPTOM:

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

| | |
|---|---|
| 1 | CHECK PNP SWITCH CIRCUIT |
| <p> With CONSULT-II Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?</p> | |
| <p> Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit?</p> | |
|  | |
| Yes or No | |
| Yes | ▶ Check PNP switch circuit. Refer to "DTC P0705", AT-102. |
| No | ▶ GO TO 2. |

SAT367J

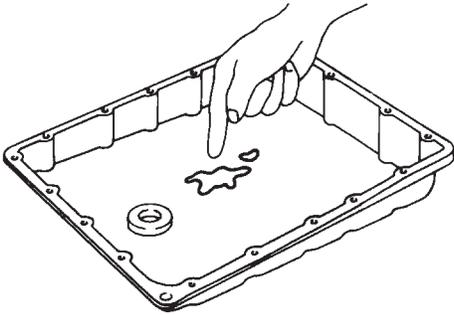
| | |
|---|--|
| 2 | CHECK CONTROL LINKAGE |
| Check control linkage. Refer to AT-272. | |
| <p>"P" position</p>  | |
| OK or NG | |
| OK | ▶ GO TO 3. |
| NG | ▶ Adjust control linkage. Refer to AT-272. |

SAT032G

TROUBLE DIAGNOSES FOR SYMPTOMS

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

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

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

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

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TROUBLE DIAGNOSES FOR SYMPTOMS

Large Shock. "N" → "R" Position

Large Shock. "N" → "R" Position

=NAAT0077

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 accelerator pedal position sensor circuit? | | |
| | | |
| SAT579IC | | |
| Yes or No | | |
| Yes | ▶ | Check damaged circuit. Refer to "DTC P0710, DTC P0745 or DTC P1705", AT-108, 165 or 179. |
| No | ▶ | GO TO 2. |

| | | |
|--|---|---|
| 2 | CHECK ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR) | |
| Check accelerator pedal position sensor (throttle position sensor). Refer to EC section. | | |
| | | |
| SAT516KA | | |
| OK or NG | | |
| OK | ▶ | GO TO 3. |
| NG | ▶ | Repair or replace accelerator pedal position sensor (throttle position sensor). |

TROUBLE DIAGNOSES FOR SYMPTOMS

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

| | | |
|---|----------------------------|--|
| 3 | CHECK LINE PRESSURE | |
| <p>Check line pressure at idle with selector lever in "D" position. Refer to "LINE PRESSURE TEST", AT-64.</p> | | |
|  | | |
| SAT494G | | |
| OK or NG | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | <ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to AT-269. 2. Check the following items: <ul style="list-style-type: none"> ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve |

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

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TROUBLE DIAGNOSES FOR SYMPTOMS

Vehicle Does Not Creep Backward In "R" Position

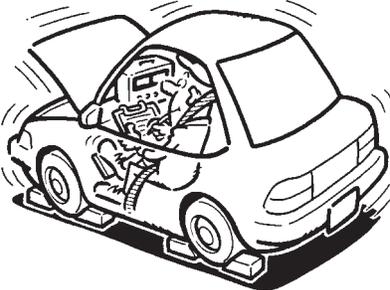
Vehicle Does Not Creep Backward In "R" Position

=NAAT0078

SYMPTOM:

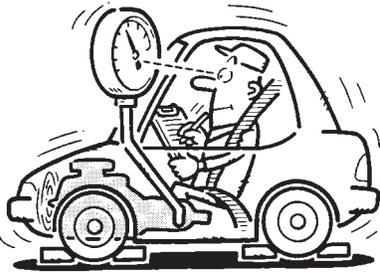
Vehicle does not creep backward when selecting "R" position.

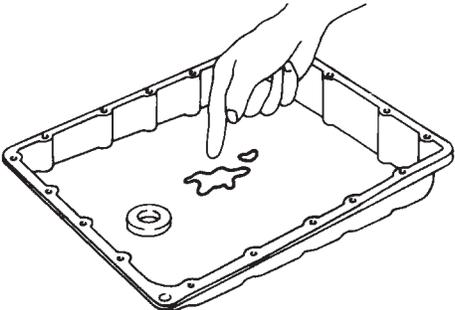
| | | |
|---|------------------------------|-------------|
| 1 | CHECK A/T FLUID LEVEL | |
| Check A/T fluid level again. | | |
|  | | |
| SAT638A | | |
| OK or NG | | |
| OK | ▶ | GO TO 2. |
| NG | ▶ | Refill ATF. |

| | | |
|--|-------------------------|--|
| 2 | CHECK STALL TEST | |
| Check stall revolution with selector lever in "1" and "R" positions. Refer to AT-353. | | |
|  | | |
| SAT493G | | |
| OK or NG | | |
| OK | ▶ | GO TO 3. |
| OK in "1" position, NG in "R" position | ▶ | <ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-269. 2. Check the following items: <ul style="list-style-type: none"> ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> ● Oil pump assembly ● Torque converter ● Reverse clutch assembly ● High clutch assembly |
| NG in both "1" and "R" positions | ▶ | GO TO 6. |

TROUBLE DIAGNOSES FOR SYMPTOMS

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

| | | |
|----------|----------------------------|---|
| 3 | CHECK LINE PRESSURE | <p>Check line pressure at idle with selector lever in "R" position. Refer to "LINE PRESSURE TEST", AT-64.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT494G</p> <p style="text-align: center;">OK or NG</p> |
| OK | ▶ | GO TO 4. |
| NG | ▶ | <ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-269. 2. Check the following items: <ul style="list-style-type: none"> ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> ● Oil pump assembly |

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

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

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TROUBLE DIAGNOSES FOR SYMPTOMS

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

| 6 | DETECT MALFUNCTIONING ITEM |
|---|---|
| | <ol style="list-style-type: none">1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-269.2. Check the following items:<ul style="list-style-type: none">● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)● Line pressure solenoid valve3. Disassemble A/T.4. Check the following items:<ul style="list-style-type: none">● Oil pump assembly● Torque converter● Reverse clutch assembly● High clutch assembly● Low & reverse brake assembly● Low one-way clutch |
| | <p style="text-align: right;">▶ Repair or replace damaged parts.</p> |

TROUBLE DIAGNOSES FOR SYMPTOMS

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

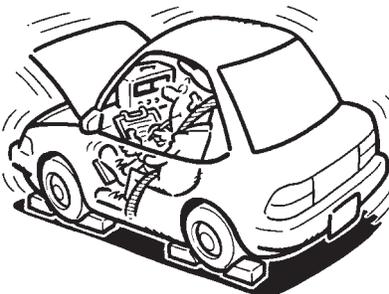
Vehicle Does Not Creep Forward In "D", "2" Or "1" Position

=NAAT0079

SYMPTOM:

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

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

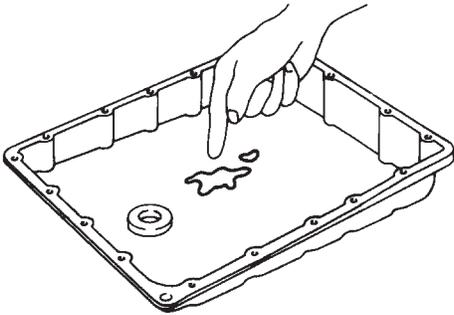
| | | | |
|----------|-------------------------|---|--|
| 2 | CHECK STALL TEST | <p>Check stall revolution with selector lever in "D" position. Refer to "STALL TEST", AT-61.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT493G</p> <p style="text-align: center;">OK or NG</p> | |
| OK | ▶ | GO TO 3. | |
| NG | ▶ | GO TO 6. | |

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TROUBLE DIAGNOSES FOR SYMPTOMS

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

| | | |
|---|----------------------------|---|
| 3 | CHECK LINE PRESSURE | |
| <p>Check line pressure at idle with selector lever in "R" position. Refer to "LINE PRESSURE TEST", AT-64.</p> | | |
|  | | |
| SAT494G | | |
| OK or NG | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | <ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to AT-269. 2. Check the following items: <ul style="list-style-type: none"> ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> ● Oil pump assembly |

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

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

TROUBLE DIAGNOSES FOR SYMPTOMS

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

| | |
|----------|---|
| 6 | DETECT MALFUNCTIONING ITEM |
| | <p>1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-269.</p> <p>2. Check the following items:</p> <ul style="list-style-type: none"> ● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) ● Line pressure solenoid valve <p>3. Disassemble A/T.</p> <p>4. Check the following items:</p> <ul style="list-style-type: none"> ● Oil pump assembly ● Forward clutch assembly ● Forward one-way clutch ● Low one-way clutch ● Low & reverse brake assembly ● Torque converter |
| ▶ | Repair or replace damaged parts. |

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TROUBLE DIAGNOSES FOR SYMPTOMS

Vehicle Cannot Be Started From D₁

Vehicle Cannot Be Started From D₁

=NAAT0080

SYMPTOM:

Vehicle cannot be started from D₁ 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-226. |

| | | |
|---|--------------------------------------|--|
| 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? | | |
| | | |
| Yes or No | | |
| Yes | ▶ | Check damaged circuit. Refer to "DTC P0720, DTC P0750, DTC P0755 or VEHICLE SPEED SENSOR. MTR", AT-114, 171, 175 or 197. |
| No | ▶ | GO TO 3. |

SAT686I

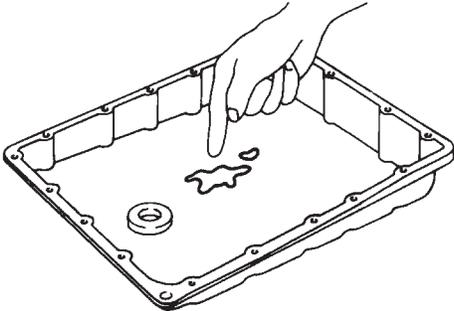
| | | |
|--|---|---|
| 3 | CHECK ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR) | |
| Check accelerator pedal position sensor (throttle position sensor). Refer to EC section. | | |
| | | |
| OK or NG | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair or replace accelerator pedal position sensor (throttle position sensor). |

SAT516KA

TROUBLE DIAGNOSES FOR SYMPTOMS

Vehicle Cannot Be Started From D₁ (Cont'd)

| | | |
|--|----------------------------|----------|
| 4 | CHECK LINE PRESSURE | |
| <p>Check line pressure at stall point with selector lever in "D" position. Refer to "LINE PRESSURE TEST", AT-64.</p> | | |
|  | | |
| SAT494G | | |
| OK or NG | | |
| OK | ▶ | GO TO 5. |
| NG | ▶ | GO TO 8. |

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

| | | |
|--|-----------------------------------|----------------------------------|
| 6 | DETECT MALFUNCTIONING ITEM | |
| <p>1. Remove control valve assembly. Refer to AT-269.</p> <p>2. Check the following items:</p> <ul style="list-style-type: none"> ● Shift valve A ● Shift valve B ● Shift solenoid valve A ● Shift solenoid valve B ● Pilot valve ● Pilot filter | | |
| OK or NG | | |
| OK | ▶ | GO TO 7. |
| NG | ▶ | Repair or replace damaged parts. |

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TROUBLE DIAGNOSES FOR SYMPTOMS

Vehicle Cannot Be Started From D₁ (Cont'd)

| | | |
|--------------|----------------------|--|
| 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-269. | | |
| 2. Check the following items: <ul style="list-style-type: none"> ● Shift valve A ● Shift valve B ● Shift solenoid valve A ● Shift solenoid valve B ● Pilot valve ● Pilot filter | | |
| 3. Disassemble A/T. | | |
| 4. Check the following items: <ul style="list-style-type: none"> ● Forward clutch assembly ● Forward one-way clutch ● Low one-way clutch ● High clutch assembly ● Torque converter ● Oil pump assembly | | |
| OK or NG | | |
| OK | ▶ | GO TO 7. |
| NG | ▶ | Repair or replace damaged parts. |

TROUBLE DIAGNOSES FOR SYMPTOMS

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

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

=NAAT0081

SYMPTOM:

**A/T does not shift from D₁ to D₂ at the specified speed.
A/T does not shift from D₄ to D₂ when depressing accelerator pedal fully at the specified speed.**

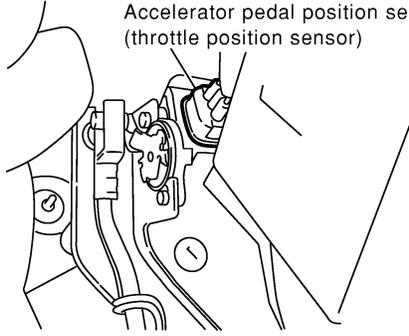
| | | |
|---|----------------------|---|
| 1 | CHECK SYMPTOM | |
| Are "Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "Vehicle Cannot Be Started From D ₁ " OK? | | |
| Yes or No | | |
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to "Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "Vehicle Cannot Be Started From D ₁ ", AT-229, 232. |

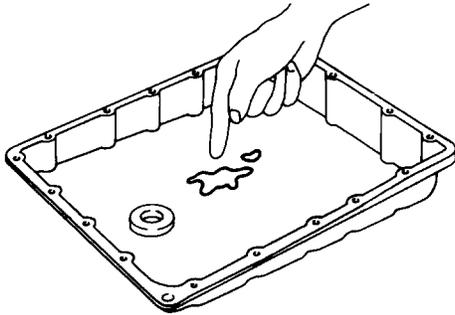
| | | |
|---|---------------------------------|---|
| 2 | CHECK PNP SWITCH CIRCUIT | |
| <input checked="" type="checkbox"/> With CONSULT-II Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit? | | |
| <input type="checkbox"/> Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit? | | |
| Lamp comes off. | | |
| | | |
| SAT705K | | |
| Yes or No | | |
| Yes | ▶ | Check PNP switch circuit. Refer to "DTC P0705", AT-102. |
| No | ▶ | GO TO 3. |

| | | |
|--|--|---|
| 3 | 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-114, 197. | | |
| OK or NG | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair or replace vehicle speed sensor-A/T (revolution sensor) and vehicle speed sensor-MTR circuits. |

TROUBLE DIAGNOSES FOR SYMPTOMS

A/T Does Not Shift: D₁ → D₂ Or Does Not Kickdown: D₄ → D₂ (Cont'd)

| | | |
|---|---|---|
| 4 | CHECK ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR) | |
| <p>Check accelerator pedal position sensor (throttle position sensor). Refer to EC section.</p> <div style="text-align: center;">  <p>Accelerator pedal position sensor (throttle position sensor)</p> </div> <p style="text-align: right;">SAT516KA</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 5. |
| NG | ▶ | Repair or replace accelerator pedal position sensor (throttle position sensor). |

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

| | | |
|--|-----------------------------------|----------------------------------|
| 6 | DETECT MALFUNCTIONING ITEM | |
| <p>1. Remove control valve. Refer to AT-269. 2. Check the following items:</p> <ul style="list-style-type: none"> ● Shift valve A ● Shift solenoid valve A ● Pilot valve ● Pilot filter <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 7. |
| NG | ▶ | Repair or replace damaged parts. |

TROUBLE DIAGNOSES FOR SYMPTOMS

A/T Does Not Shift: D₁ → D₂ Or Does Not Kickdown: D₄ → D₂ (Cont'd)

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

| | | |
|---|-----------------------------------|----------------------------------|
| 8 | DETECT MALFUNCTIONING ITEM | |
| 1. Remove control valve. Refer to AT-269. 2. Check the following items: <ul style="list-style-type: none"> ● Shift valve A ● Shift solenoid valve A ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> ● Servo piston assembly ● Brake band ● Oil pump assembly | | |
| OK or NG | | |
| OK | ▶ | GO TO 7. |
| NG | ▶ | Repair or replace damaged parts. |

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TROUBLE DIAGNOSES FOR SYMPTOMS

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

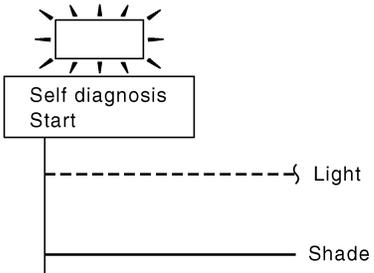
A/T Does Not Shift: $D_2 \rightarrow D_3$

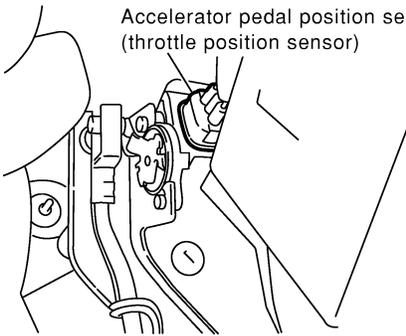
=NAAT0082

SYMPTOM:

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

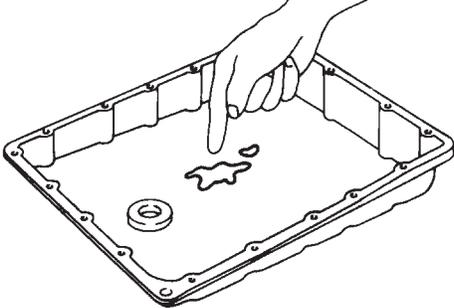
| | | |
|--|----------------------|--|
| 1 | CHECK SYMPTOM | |
| Are "Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "Vehicle Cannot Be Started From D_1 " OK? | | |
| Yes or No | | |
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to "Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "Vehicle Cannot Be Started From D_1 ", AT-229, 232. |

| | | |
|--|---------------------------------|---|
| 2 | CHECK PNP SWITCH CIRCUIT | |
| <input type="checkbox"/> With CONSULT-II Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit? | | |
| <input checked="" type="checkbox"/> Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit? | | |
| Lamp comes off. | | |
|  | | |
| SAT705K | | |
| Yes or No | | |
| Yes | ▶ | Check PNP switch circuit. Refer to "DTC P0705", AT-102. |
| No | ▶ | GO TO 3. |

| | | |
|--|---|---|
| 3 | CHECK ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR) | |
| Check accelerator pedal position sensor (throttle position sensor). Refer to EC section. | | |
|  | | |
| SAT516KA | | |
| OK or NG | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair or replace accelerator pedal position sensor (throttle position sensor). |

TROUBLE DIAGNOSES FOR SYMPTOMS

A/T Does Not Shift: D₂ → D₃ (Cont'd)

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

| | | |
|---|-----------------------------------|----------------------------------|
| 5 | DETECT MALFUNCTIONING ITEM | |
| <p>1. Remove control valve Assembly. Refer to AT-269. 2. Check the following items:</p> <ul style="list-style-type: none"> ● Shift valve B ● Shift solenoid valve B ● Pilot valve ● Pilot filter <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 6. |
| NG | ▶ | Repair or replace damaged parts. |

| | | |
|--|----------------------|--|
| 6 | CHECK SYMPTOM | |
| <p>Check again.</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | <p>1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.</p> |

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TROUBLE DIAGNOSES FOR SYMPTOMS

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

| 7 | DETECT MALFUNCTIONING ITEM |
|----|---|
| | <p>1. Remove control valve Assembly. Refer to AT-269.</p> <p>2. Check the following items:</p> <ul style="list-style-type: none">● Shift valve B● Shift solenoid valve B● Pilot valve● Pilot filter <p>3. Disassemble A/T.</p> <p>4. Check the following items:</p> <ul style="list-style-type: none">● Servo piston assembly● High clutch assembly● Oil pump assembly <p style="text-align: right;">OK or NG</p> |
| OK | ▶ GO TO 6. |
| NG | ▶ Repair or replace damaged parts. |

TROUBLE DIAGNOSES FOR SYMPTOMS

A/T Does Not Shift: D₃ → D₄

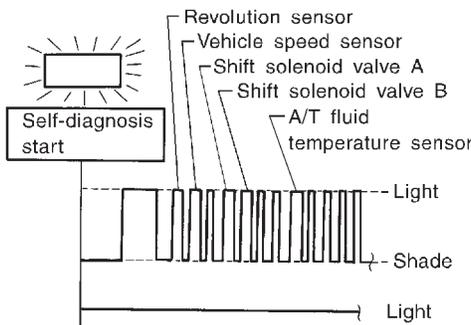
A/T Does Not Shift: D₃ → D₄

=NAAT0083

SYMPTOM:

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

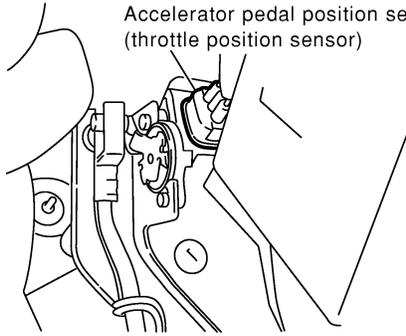
| | | |
|---|----------------------|---|
| 1 | CHECK SYMPTOM | |
| Are "Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "Vehicle Cannot Be Started From D ₁ " OK? | | |
| Yes or No | | |
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to "Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "Vehicle Cannot Be Started From D ₁ ", AT-229, 232. |

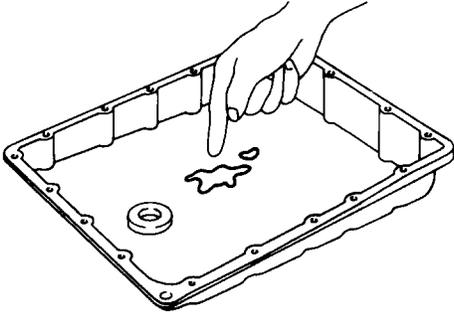
| | | |
|--|--------------------------------------|---|
| 2 | CHECK SELF-DIAGNOSTIC RESULTS | |
| <p> With CONSULT-II Does self-diagnosis, after cruise test, show damage to any of the following circuits?</p> <ul style="list-style-type: none"> ● Inhibitor switch ● Overdrive control switch ● A/T fluid temperature sensor ● Revolution sensor ● Shift solenoid valve A or B ● Vehicle speed sensor | | |
|  | | |
| Yes or No | | |
| Yes | ▶ | Check damaged circuit. Refer to "DTC P0705, P0710, P0720, P0750, P0755 or VHCL SPEED SEN-MTR", AT-102, 108, 114, 171, 175 or 197. |
| No | ▶ | GO TO 3. |

SAT580I

TROUBLE DIAGNOSES FOR SYMPTOMS

A/T Does Not Shift: D₃ → D₄ (Cont'd)

| | | |
|---|---|---|
| 3 | CHECK ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR) | |
| <p>Check accelerator pedal position sensor (throttle position sensor). Refer to EC section.</p> <div style="text-align: center;">  <p>Accelerator pedal position sensor (throttle position sensor)</p> </div> <p style="text-align: right;">SAT516KA</p> <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair or replace accelerator pedal position sensor (throttle position sensor). |

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

| | | |
|---|-----------------------------------|----------------------------------|
| 5 | DETECT MALFUNCTIONING ITEM | |
| <p>1. Remove control valve Assembly. Refer to AT-269. 2. Check the following items:</p> <ul style="list-style-type: none"> ● Shift valve B ● Overrun clutch control valve ● Shift solenoid valve B ● Pilot valve ● Pilot filter <p style="text-align: center;">OK or NG</p> | | |
| OK | ▶ | GO TO 6. |
| NG | ▶ | Repair or replace damaged parts. |

TROUBLE DIAGNOSES FOR SYMPTOMS

A/T Does Not Shift: D₃ → D₄ (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-269. 2. Check the following items: <ul style="list-style-type: none"> ● Shift valve B ● Overrun clutch control valve ● Shift solenoid valve B ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check the following items: <ul style="list-style-type: none"> ● Servo piston assembly ● Brake band ● Torque converter ● Oil pump assembly | | |
| OK or NG | | |
| OK | ▶ | GO TO 6. |
| NG | ▶ | Repair or replace damaged parts. |

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TROUBLE DIAGNOSES FOR SYMPTOMS

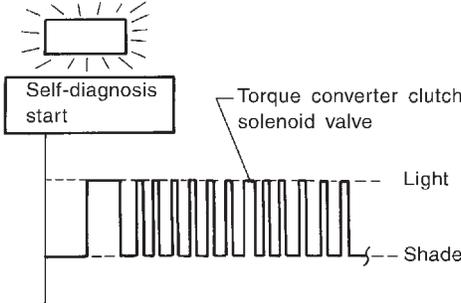
A/T Does Not Perform Lock-up

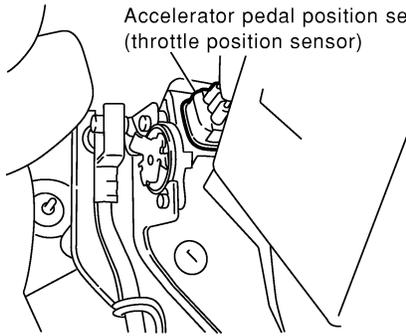
A/T Does Not Perform Lock-up

=NAAT0084

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-151. |
| No | ▶ | GO TO 2. |

| | | |
|--|---|---|
| 2 | CHECK ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR) | |
| Check accelerator pedal position sensor (throttle position sensor). Refer to EC section. | | |
|  | | |
| SAT516KA | | |
| OK or NG | | |
| OK | ▶ | GO TO 3. |
| NG | ▶ | Repair or replace accelerator pedal position sensor (throttle position sensor). |

| | | |
|--|-----------------------------------|----------------------------------|
| 3 | DETECT MALFUNCTIONING ITEM | |
| 1. Remove control valve. Refer to AT-269. 2. Check following items: <ul style="list-style-type: none"> ● Torque converter clutch control valve ● Torque converter relief valve ● Torque converter clutch solenoid valve ● Pilot valve ● Pilot filter | | |
| OK or NG | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair or replace damaged parts. |

TROUBLE DIAGNOSES FOR SYMPTOMS

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

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

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TROUBLE DIAGNOSES FOR SYMPTOMS

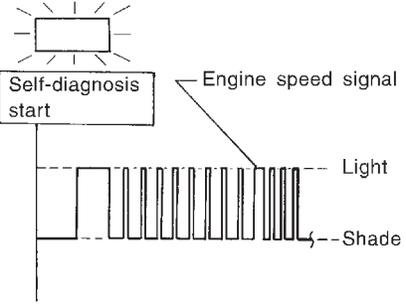
A/T Does Not Hold Lock-up Condition

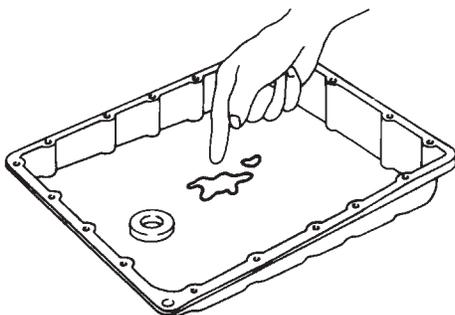
A/T Does Not Hold Lock-up Condition

=NAAT0085

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-119. |
| No | ▶ | GO TO 2. |

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

| | | |
|---|-----------------------------------|----------------------------------|
| 3 | DETECT MALFUNCTIONING ITEM | |
| <ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to AT-269. 2. Check the following items: <ul style="list-style-type: none"> ● Torque converter clutch control valve ● Pilot valve ● Pilot filter | | |
| OK or NG | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair or replace damaged parts. |

TROUBLE DIAGNOSES FOR SYMPTOMS

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

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

| | | |
|--|-----------------------------------|----------------------------------|
| 5 | DETECT MALFUNCTIONING ITEM | |
| <ol style="list-style-type: none"> 1. Remove control valve assembly. Refer to AT-269. 2. Check the following items: <ul style="list-style-type: none"> ● Torque converter clutch control valve ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check torque converter and oil pump assembly. | | OK or NG |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair or replace damaged parts. |

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TROUBLE DIAGNOSES FOR SYMPTOMS

Lock-up Is Not Released

Lock-up Is Not Released

=NAAT0086

SYMPTOM:

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

| | | |
|--|--|--|
| 1 | CHECK ACCELERATOR PEDAL POSITION SENSOR CIRCUIT | |
| <p><input type="checkbox"/> With CONSULT-II Does "TCM INPUT SIGNALS" in Data Monitor show damage to closed throttle position switch circuit?</p> | | |
| <p><input checked="" type="checkbox"/> Without CONSULT-II Does self-diagnosis show damage to closed throttle position switch circuit?</p> <p style="text-align: center;">Lamp comes off.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SAT705K</p> | | |
| Yes or No | | |
| Yes | ▶ | Check accelerator pedal position sensor circuit. Refer to "DTC P1705", AT-179. |
| No | ▶ | GO TO 2. |

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

TROUBLE DIAGNOSES FOR SYMPTOMS

Engine Speed Does Not Return To Idle (Light Braking D₄ → D₃)

Engine Speed Does Not Return To Idle (Light Braking D₄ → D₃)

=NAAT0087

SYMPTOM:

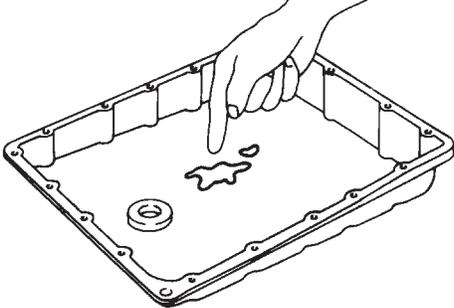
- Engine speed does not smoothly return to idle when A/T shifts from D₄ to D₃.
- Vehicle does not decelerate by engine brake when turning overdrive control switch OFF.
- Vehicle does not decelerate by engine brake when shifting A/T from “D” to “2” position.

| | | |
|---|--------------------------------------|--|
| 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 ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR) | |
| Check accelerator pedal position sensor (throttle position sensor). Refer to EC section. | | |
| | | |
| SAT516KA | | |
| OK or NG | | |
| OK | ▶ | GO TO 3. |
| NG | ▶ | Repair or replace accelerator pedal position sensor (throttle position sensor). |

TROUBLE DIAGNOSES FOR SYMPTOMS

Engine Speed Does Not Return To Idle (Light Braking D₄ → D₃) (Cont'd)

| | | |
|--|----------------------------------|----------|
| 3 | CHECK A/T FLUID CONDITION | |
| <p>1. Remove oil pan. 2. Check A/T fluid condition.</p> | | |
|  | | |
| SAT171B | | |
| OK or NG | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | GO TO 6. |

| | | |
|--|-----------------------------------|----------------------------------|
| 4 | DETECT MALFUNCTIONING ITEM | |
| <p>1. Remove control valve assembly. Refer to AT-269. 2. Check the following items:</p> <ul style="list-style-type: none"> ● Overrun clutch control valve ● Overrun clutch reducing valve ● Overrun clutch solenoid valve | | |
| OK or NG | | |
| OK | ▶ | GO TO 5. |
| NG | ▶ | Repair or replace damaged parts. |

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

| | | |
|--|-----------------------------------|----------------------------------|
| 6 | DETECT MALFUNCTIONING ITEM | |
| <p>1. Remove control valve assembly. Refer to AT-269. 2. Check the following items:</p> <ul style="list-style-type: none"> ● Overrun clutch control valve ● Overrun clutch reducing valve ● Overrun clutch solenoid valve <p>3. Disassemble A/T. 4. Check the following items:</p> <ul style="list-style-type: none"> ● Overrun clutch assembly ● Oil pump assembly | | |
| OK or NG | | |
| OK | ▶ | GO TO 5. |
| NG | ▶ | Repair or replace damaged parts. |

TROUBLE DIAGNOSES FOR SYMPTOMS

Vehicle Does Not Start From D₁

Vehicle Does Not Start From D₁

NAAT0088

SYMPTOM:

Vehicle does not start from D₁ 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-114, 171, 175 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-232. | |
| NG | ▶ | <ol style="list-style-type: none"> 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. | |

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TROUBLE DIAGNOSES FOR SYMPTOMS

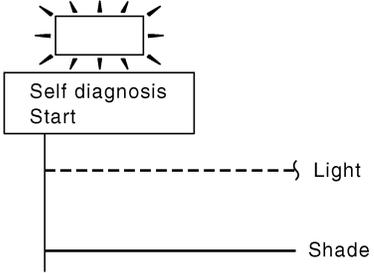
A/T Does Not Shift: D₄ → D₃, When Overdrive Control Switch "ON" → "OFF"

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

=NAAT0089

SYMPTOM:

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

| | |
|--|---|
| 1 | CHECK OVERDRIVE CONTROL SWITCH CIRCUIT |
| <p><input type="checkbox"/> With CONSULT-II Does "TCM INPUT SIGNALS" in Data Monitor show damage to overdrive control switch circuit?</p> | |
| <p><input checked="" type="checkbox"/> Without CONSULT-II Does self-diagnosis show damage to overdrive control switch circuit?</p> <p style="text-align: center;">Lamp comes off.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT705K</p> | |
| Yes or No | |
| Yes | ▶ Check overdrive control switch circuit. Refer to AT-255. |
| No | ▶ Go to "A/T Does Not Shift: D ₂ → D ₃ ", AT-238. |

TROUBLE DIAGNOSES FOR SYMPTOMS

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

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

=NAAT0090

SYMPTOM:

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

| | | |
|---|---------------------------------|--|
| 1 | CHECK PNP SWITCH CIRCUIT | |
| <p><input type="checkbox"/> With CONSULT-II Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?</p> | | |
| <p><input checked="" type="checkbox"/> Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit?</p> <p style="text-align: center;">Lamp comes off.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SAT705K</p> | | |
| Yes or No | | |
| Yes | ▶ | Check PNP switch circuit. Refer to "DTC P0705", AT-102. |
| No | ▶ | Go to "A/T Does Not Shift: D ₁ → D ₂ Or Does Not Kickdown: D ₄ → D ₂ ", AT-235. |

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TROUBLE DIAGNOSES FOR SYMPTOMS

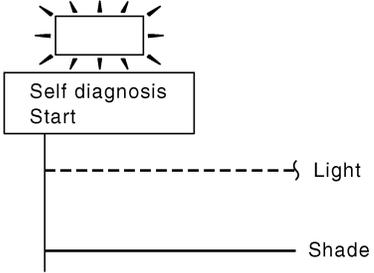
A/T Does Not Shift: 2₂ → 1₁, When Selector Lever "2" → "1" Position

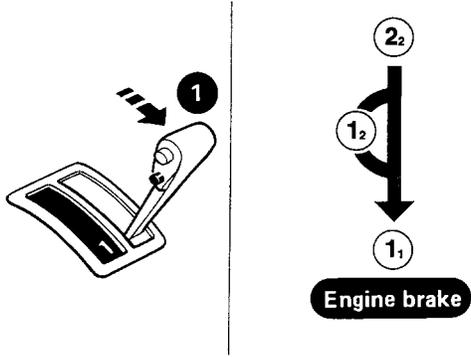
A/T Does Not Shift: 2₂ → 1₁, When Selector Lever "2" → "1" Position

=NAAT0091

SYMPTOM:

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

| | |
|--|---|
| 1 | CHECK PNP SWITCH CIRCUIT |
| <p> With CONSULT-II Does "TCM INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?</p> | |
| <p> Without CONSULT-II Does self-diagnosis show damage to PNP switch circuit?</p> <p style="text-align: center;">Lamp comes off.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SAT705K</p> | |
| Yes or No | |
| Yes | ▶ Check PNP switch circuit. Refer to "DTC P0705", AT-102. |
| No | ▶ GO TO 2. |

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

TROUBLE DIAGNOSES FOR SYMPTOMS

Vehicle Does Not Decelerate By Engine Brake

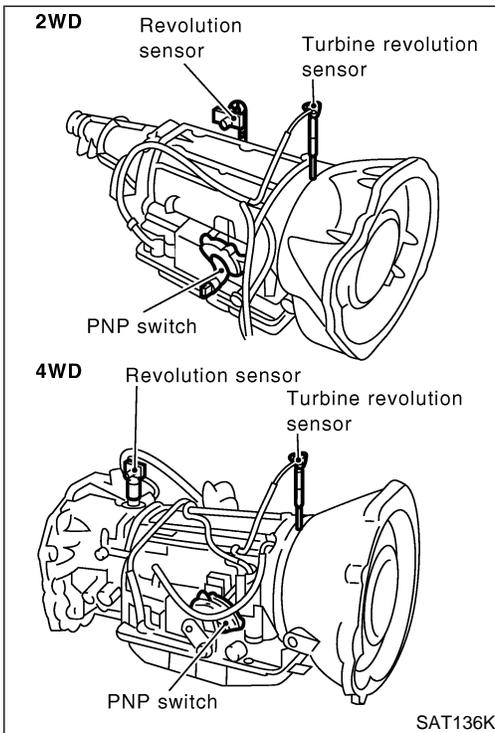
Vehicle Does Not Decelerate By Engine Brake

NAAT0092

SYMPTOM:

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

| | | |
|--|----------------------|--|
| 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 → D ₃)", AT-249. |
| No | ▶ | Go to "Vehicle Does Not Creep Backward In "R" Position", AT-226. |



TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Accelerator Pedal Position Sensor Circuit Checks)

NAAT0204

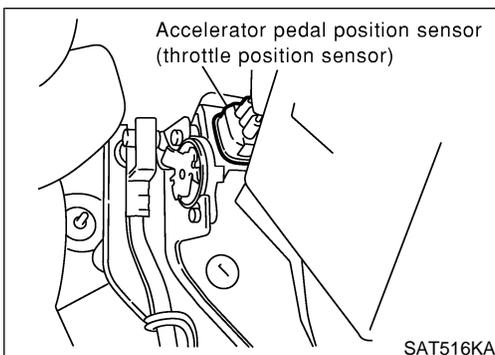
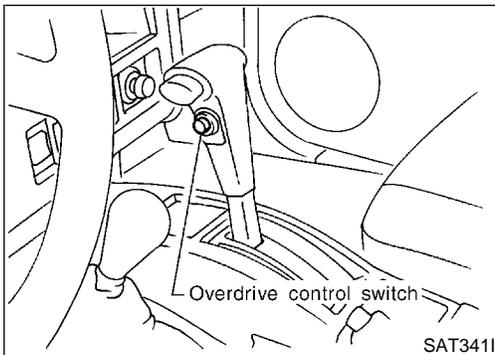
SYMPTOM:

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

DESCRIPTION

NAAT0204S01

- 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.
- Closed throttle position signal and wide-open throttle position signal
ECM judges throttle opening based on a signal from accelerator pedal position sensor, and sends the signal via CAN communication to TCM.



TROUBLE DIAGNOSES FOR SYMPTOMS

TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Accelerator Pedal Position Sensor Circuit Checks) (Cont'd)

DIAGNOSTIC PROCEDURE

=NAAT0204S03

NOTE:

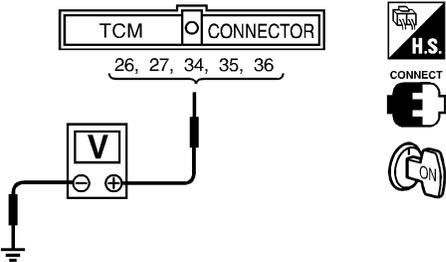
The diagnostic procedure includes inspections for the overdrive control and throttle position switch circuits.

| | | |
|---------------------------|-------------------------|--|
| 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) | | | | | | | | | | | | | | | |
|---|---|--|--------------|--|------------|--|------------|-----|---------------|-----|---------------|-----|---------------|----|---------------|-----|
| <p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 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. | | | | | | | | | | | | | | | | |
| <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th></th> </tr> </thead> <tbody> <tr> <td>PN POSI SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>R POSITION SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>D POSITION SW</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>2 POSITION SW</td> <td style="text-align: center;">ON</td> </tr> <tr> <td>1 POSITION SW</td> <td style="text-align: center;">OFF</td> </tr> </tbody> </table> | | | DATA MONITOR | | MONITORING | | PN POSI SW | OFF | R POSITION SW | OFF | D POSITION SW | OFF | 2 POSITION SW | ON | 1 POSITION SW | OFF |
| DATA MONITOR | | | | | | | | | | | | | | | | |
| MONITORING | | | | | | | | | | | | | | | | |
| PN POSI SW | OFF | | | | | | | | | | | | | | | |
| R POSITION SW | OFF | | | | | | | | | | | | | | | |
| D POSITION SW | OFF | | | | | | | | | | | | | | | |
| 2 POSITION SW | ON | | | | | | | | | | | | | | | |
| 1 POSITION SW | OFF | | | | | | | | | | | | | | | |
| SAT643J | | | | | | | | | | | | | | | | |
| OK or NG | | | | | | | | | | | | | | | | |
| OK ▶ | GO TO 5. | | | | | | | | | | | | | | | |
| NG ▶ | GO TO 4. | | | | | | | | | | | | | | | |

TROUBLE DIAGNOSES FOR SYMPTOMS

TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Accelerator Pedal Position Sensor Circuit Checks) (Cont'd)

| 3 | CHECK PNP SWITCH CIRCUIT (Without CONSULT-II) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|----------------|-----------|----------|----------|--|--|----|----|----|----|----|------|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|---|---|---|---|---|---|----------|
| <p>⊗ Without CONSULT-II</p> <p>1. Turn ignition switch to "ON" position. (Do not start engine.)</p> <p>2. Check voltage between TCM harness connector M120 terminals 26, 27, 34, 35, 36 and ground while moving selector lever through each position.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="margin: auto;"> <thead> <tr> <th rowspan="2">Lever position</th> <th colspan="5">Terminals</th> </tr> <tr> <th>36</th> <th>35</th> <th>34</th> <th>27</th> <th>26</th> </tr> </thead> <tbody> <tr> <td>P, N</td> <td style="text-align: center;">B</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>R</td> <td style="text-align: center;">0</td> <td style="text-align: center;">B</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>D</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">B</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>2</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">B</td> <td style="text-align: center;">0</td> </tr> <tr> <td>1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">B</td> </tr> </tbody> </table> | | Lever position | Terminals | | | | | 36 | 35 | 34 | 27 | 26 | P, N | B | 0 | 0 | 0 | 0 | R | 0 | B | 0 | 0 | 0 | D | 0 | 0 | B | 0 | 0 | 2 | 0 | 0 | 0 | B | 0 | 1 | 0 | 0 | 0 | 0 | B |
| 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 6. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No | ▶ GO TO 4. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | |
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| 4 | DETECT MALFUNCTIONING ITEM |
| <p>Check the following items:</p> <ul style="list-style-type: none"> ● PNP switch Refer to "Component Inspection", AT-260. ● 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 (With CONSULT-II) | ▶ GO TO 5. |
| OK (Without CONSULT-II) | ▶ GO TO 6. |
| NG | ▶ Repair or replace damaged parts. |

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TROUBLE DIAGNOSES FOR SYMPTOMS

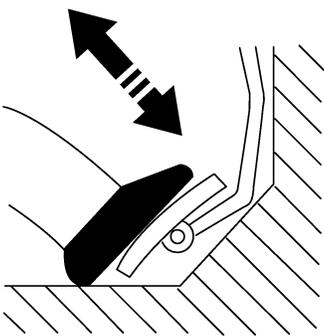
TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Accelerator Pedal Position Sensor Circuit Checks) (Cont'd)

| 5 | CHECK OVERDRIVE CONTROL SWITCH CIRCUIT | | | | | | | | | | | | | | | |
|---|---|----------|--------------|--|------------|--|--------------|---------|-------------|---------|--------------|----|------------|-----|---------------|-----|
| <p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 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".) | | | | | | | | | | | | | | | | |
| <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="text-align: center;">MONITORING</th> <th style="text-align: center;"></th> </tr> </thead> <tbody> <tr> <td>ENGINE SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>TURBINE REV</td> <td>XXX rpm</td> </tr> <tr> <td>OVERDRIVE SW</td> <td>ON</td> </tr> <tr> <td>PN POSI SW</td> <td>OFF</td> </tr> <tr> <td>R POSITION SW</td> <td>OFF</td> </tr> </tbody> </table> | | | DATA MONITOR | | MONITORING | | ENGINE SPEED | XXX rpm | TURBINE REV | XXX rpm | OVERDRIVE SW | ON | PN POSI SW | OFF | R POSITION SW | OFF |
| DATA MONITOR | | | | | | | | | | | | | | | | |
| MONITORING | | | | | | | | | | | | | | | | |
| ENGINE SPEED | XXX rpm | | | | | | | | | | | | | | | |
| TURBINE REV | XXX rpm | | | | | | | | | | | | | | | |
| OVERDRIVE SW | ON | | | | | | | | | | | | | | | |
| PN POSI SW | OFF | | | | | | | | | | | | | | | |
| R POSITION SW | OFF | | | | | | | | | | | | | | | |
| SAT645J | | | | | | | | | | | | | | | | |
| OK or NG | | | | | | | | | | | | | | | | |
| OK (With CONSULT-II) | ▶ | GO TO 7. | | | | | | | | | | | | | | |
| NG | ▶ | GO TO 6. | | | | | | | | | | | | | | |

| | | |
|--|-----------------------------------|----------------------------------|
| 6 | DETECT MALFUNCTIONING ITEM | |
| <p>Check the following items:</p> <ul style="list-style-type: none"> ● Overdrive control switch Refer to "Component Inspection", AT-260. ● Harness for short or open between TCM and overdrive control switch (Main harness) ● Harness for short or open of ground circuit for overdrive control switch (Main harness) | | |
| OK or NG | | |
| OK (With CONSULT-II) | ▶ | GO TO 7. |
| OK (Without CONSULT-II) | ▶ | GO TO 8. |
| NG | ▶ | Repair or replace damaged parts. |

TROUBLE DIAGNOSES FOR SYMPTOMS

TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Accelerator Pedal Position Sensor Circuit Checks) (Cont'd)

| 7 | CHECK ACCELERATOR PEDAL POSITION SENSOR CIRCUIT (With CONSULT-II) | | | | | | | | | | | | | | | |
|---|--|---------------|-----------------------------|--------------|------------|---------------|---------------|----------|---------------|-----|-----------------|-----|---------|-----|----------|----|
| <p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 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-48. 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. | | | | | | | | | | | | | | | | |
| <table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th rowspan="2" style="padding: 2px;">Accelerator pedal condition</th> <th colspan="2" style="padding: 2px;">Data monitor</th> </tr> <tr> <th style="padding: 2px;">CLOSED THL/SW</th> <th style="padding: 2px;">W/O THRL/P-SW</th> </tr> <tr> <td style="padding: 2px;">Released</td> <td style="padding: 2px;">ON</td> <td style="padding: 2px;">OFF</td> </tr> <tr> <td style="padding: 2px;">Fully depressed</td> <td style="padding: 2px;">OFF</td> <td style="padding: 2px;">ON</td> </tr> </table> | | | Accelerator pedal condition | Data monitor | | CLOSED THL/SW | W/O THRL/P-SW | Released | ON | OFF | Fully depressed | OFF | ON | | | |
| Accelerator pedal condition | Data monitor | | | | | | | | | | | | | | | |
| | CLOSED THL/SW | W/O THRL/P-SW | | | | | | | | | | | | | | |
| Released | ON | OFF | | | | | | | | | | | | | | |
| Fully depressed | OFF | ON | | | | | | | | | | | | | | |
| <div style="display: flex; justify-content: space-around; align-items: center;">  <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="padding: 2px;">DATA MONITOR</th> </tr> <tr> <th style="padding: 2px;">MONITORING</th> <th style="padding: 2px;"></th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">POWERSHIFT SW</td> <td style="padding: 2px;">OFF</td> </tr> <tr> <td style="padding: 2px;">CLOSED THL/SW</td> <td style="padding: 2px;">OFF</td> </tr> <tr> <td style="padding: 2px;">W/O THRL/P-SW</td> <td style="padding: 2px;">OFF</td> </tr> <tr> <td style="padding: 2px;">HOLD SW</td> <td style="padding: 2px;">OFF</td> </tr> <tr> <td style="padding: 2px;">BRAKE SW</td> <td style="padding: 2px;">ON</td> </tr> </tbody> </table> </div> | | | DATA MONITOR | | MONITORING | | POWERSHIFT SW | OFF | CLOSED THL/SW | OFF | W/O THRL/P-SW | OFF | HOLD SW | OFF | BRAKE SW | ON |
| DATA MONITOR | | | | | | | | | | | | | | | | |
| MONITORING | | | | | | | | | | | | | | | | |
| POWERSHIFT SW | OFF | | | | | | | | | | | | | | | |
| CLOSED THL/SW | OFF | | | | | | | | | | | | | | | |
| W/O THRL/P-SW | OFF | | | | | | | | | | | | | | | |
| HOLD SW | OFF | | | | | | | | | | | | | | | |
| BRAKE SW | ON | | | | | | | | | | | | | | | |
| MTBL0011 SAT646J | | | | | | | | | | | | | | | | |
| OK or NG | | | | | | | | | | | | | | | | |
| OK | ▶ | GO TO 9. | | | | | | | | | | | | | | |
| NG | ▶ | GO TO 8. | | | | | | | | | | | | | | |

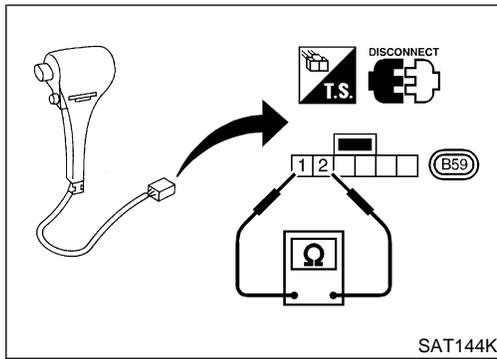
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| | | |
|--|-----------------------------------|----------------------------------|
| 8 | DETECT MALFUNCTIONING ITEM | |
| <p>Check the following items:</p> <ul style="list-style-type: none"> ● Accelerator pedal position sensor ● Harness for short or open between ignition switch and accelerator pedal position sensor (Main harness) ● Harness for short or open between accelerator pedal position sensor and ECM (Main harness) | | |
| OK or NG | | |
| OK | ▶ | GO TO 9. |
| NG | ▶ | Repair or replace damaged parts. |

| | | |
|--|-----------------------------|----------------------------------|
| 9 | CHECK TCM INSPECTION | |
| <ol style="list-style-type: none"> 1. Perform TCM input/output signal inspection. 2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. | | |
| OK or NG | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | Repair or replace damaged parts. |

TROUBLE DIAGNOSES FOR SYMPTOMS

TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Accelerator Pedal Position Sensor Circuit Checks) (Cont'd)



COMPONENT INSPECTION

Overdrive Control Switch

NAAT0204S04

NAAT0204S0401

- Check continuity between two terminals.

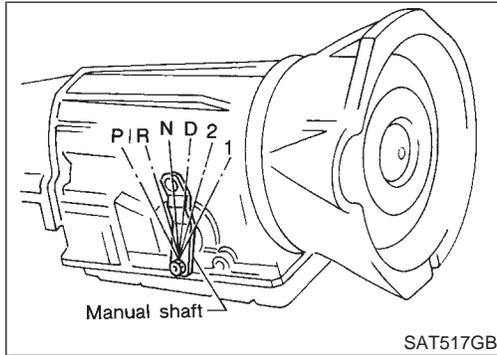
Continuity:

Switch position "ON":

No

Switch position "OFF":

Yes

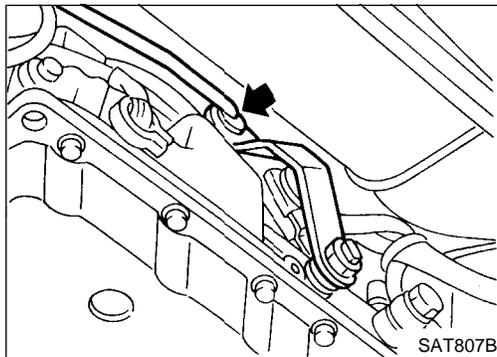
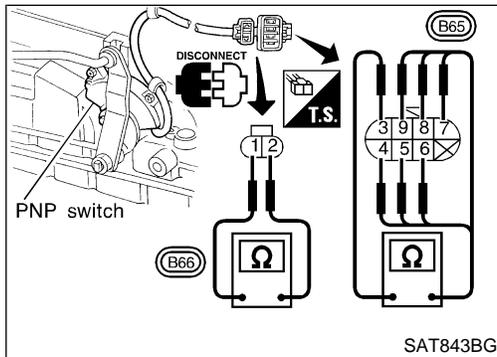


Park/Neutral Position Switch

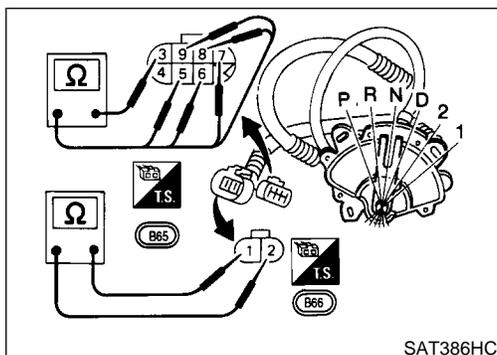
NAAT0204S0402

- 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 | |



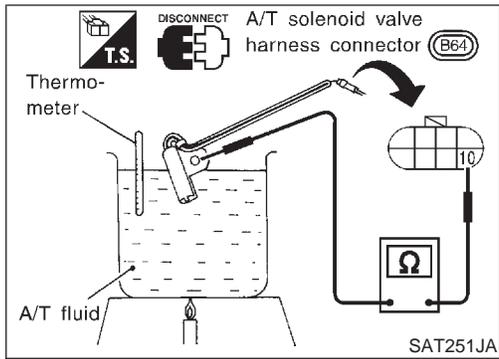
- If NG, check again with manual control linkage disconnected from manual shaft of A/T assembly. Refer to step 1.
- If OK on step 2, adjust manual control linkage. Refer to AT-272.



- If NG on step 2, remove PNP switch from A/T and check continuity of PNP switch terminals. Refer to step 1.
- If OK on step 4, adjust PNP switch. Refer to AT-272.
- If NG on step 4, replace PNP switch.

TROUBLE DIAGNOSES FOR SYMPTOMS

TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control and Accelerator Pedal Position Sensor Circuit Checks) (Cont'd)



A/T Fluid Temperature Switch

NAAT0204S0404

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 |

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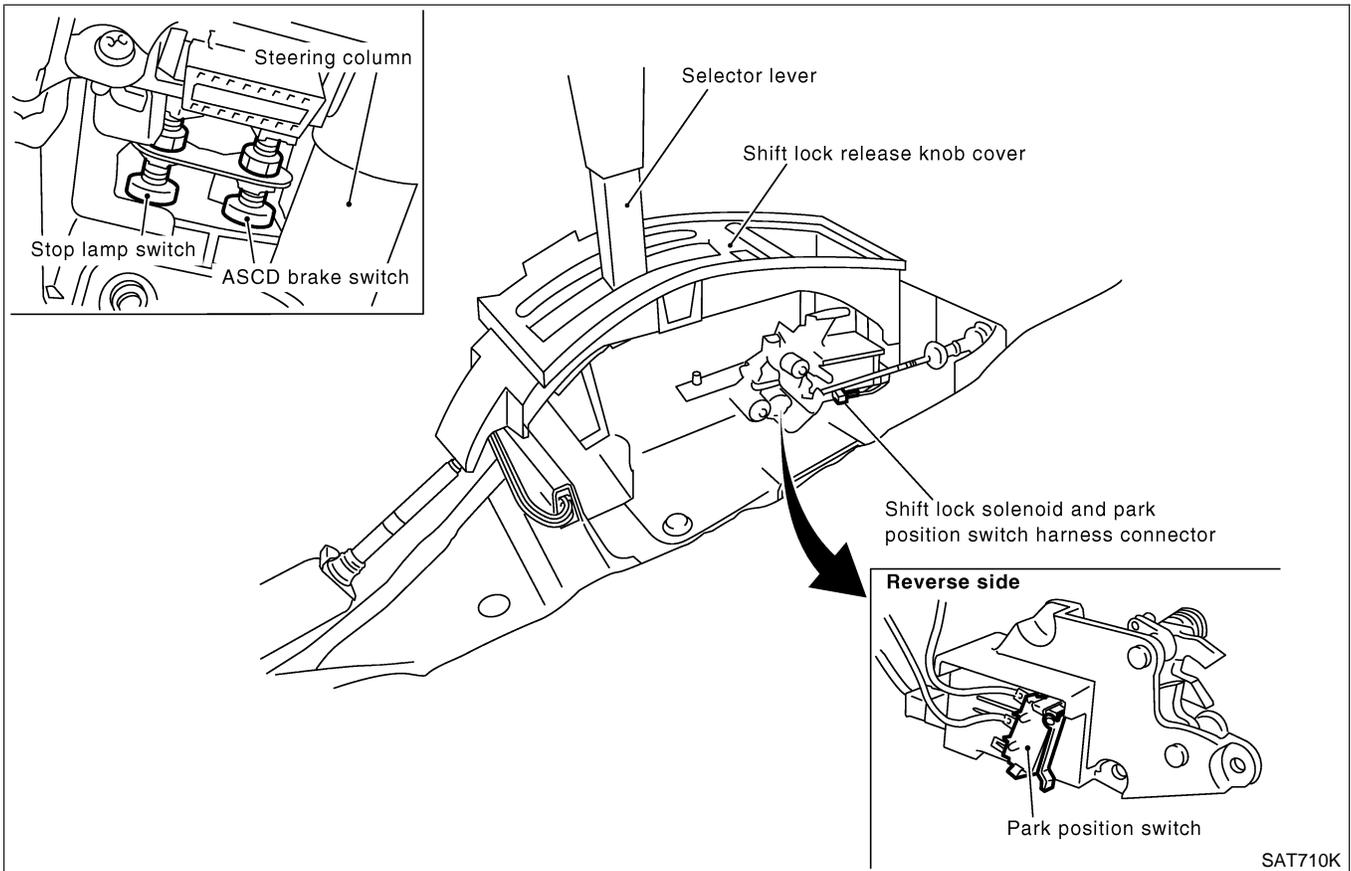
A/T SHIFT LOCK SYSTEM

Description

Description

NAAT0093

- 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.



SAT710K

A/T SHIFT LOCK SYSTEM

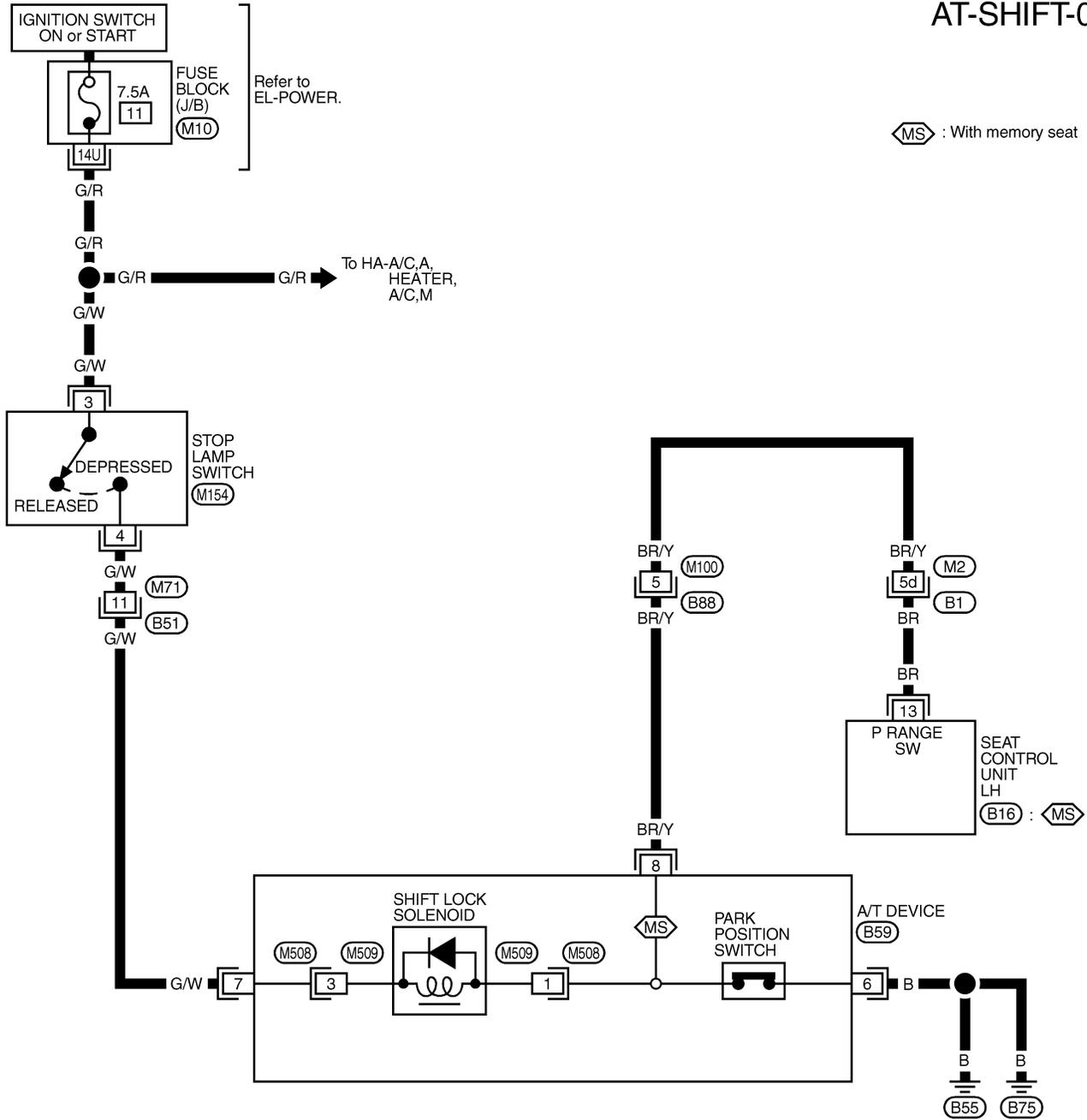
Wiring Diagram — SHIFT —

Wiring Diagram — SHIFT —

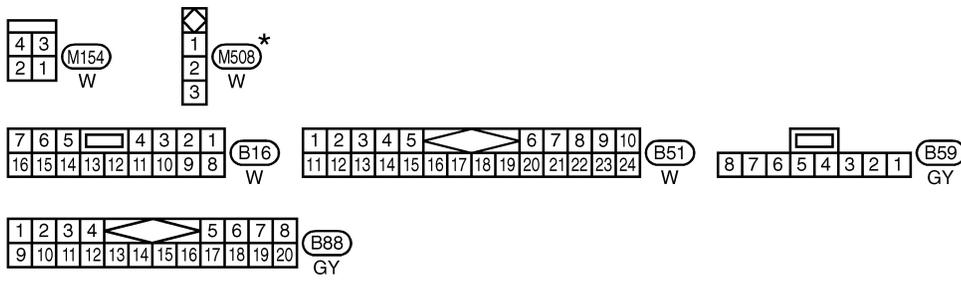
NAAT0094

AT-SHIFT-01

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MS : With memory seat



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

REFER TO THE FOLLOWING.

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

MAT323B

A/T SHIFT LOCK SYSTEM

Diagnostic Procedure

NAAT0095

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.

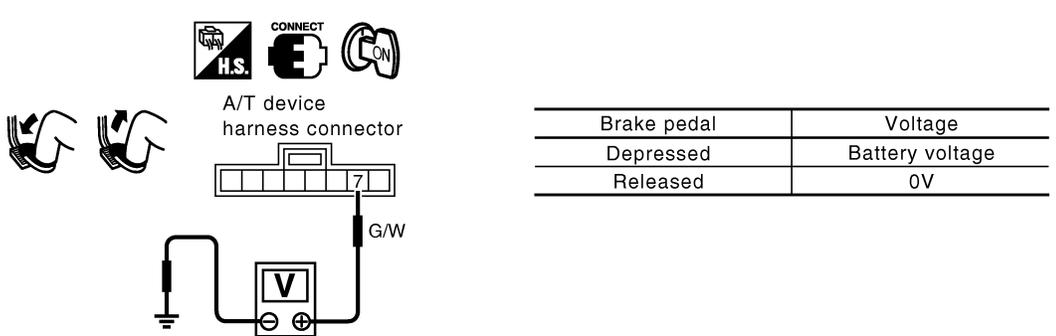
SYMPTOM 2:

Ignition key cannot be removed when selector lever is set to “P” position.

Ignition key can be removed when selector lever is set to any position except “P”.

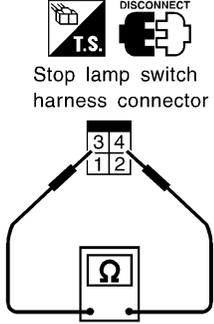
| | | |
|---------------------------------------|----------------------------------|---|
| 1 | CHECK KEY INTERLOCK CABLE | |
| Check key interlock cable for damage. | | |
| OK or NG | | |
| OK | ▶ | GO TO 2. |
| NG | ▶ | Repair key interlock cable. Refer to “Key Interlock Cable”, AT-267. |

| | | |
|---|--------------------------------------|--|
| 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-272 and AT-272. |

| | | |
|---|---------------------------|----------|
| 3 | CHECK POWER SOURCE | |
| <p>1. Turn ignition switch to ON position. (Do not start engine.)</p> <p>2. Check voltage between A/T device harness terminal 7 (G/W) and ground.</p> | | |
|  | | |
| SAT684KB | | |
| OK or NG | | |
| OK | ▶ | GO TO 5. |
| NG | ▶ | GO TO 4. |

A/T SHIFT LOCK SYSTEM

Diagnostic Procedure (Cont'd)

| 4 | DETECT MALFUNCTIONING ITEM | | | | | | |
|---|------------------------------------|-----------|------------|-------------------------------|-----|------------------------------|----|
| <p>Check the following items:</p> <ol style="list-style-type: none"> 1. 7.5A fuse [No. 11, located in the fuse block (J/B)] 2. Ignition switch (Refer to EL-11, "Schematic".) 3. Harness for short or open between battery and stop lamp switch harness connector 3 (G/W) 4. Harness for short or open between stop lamp switch harness connector 4 (G/W) and A/T device harness connector 7 (G/W) 5. Diode 6. Stop lamp switch <ol style="list-style-type: none"> a. Check continuity between connector terminals 3 and 4. | | | | | | | |
|  | | | | | | | |
| <p>Stop lamp switch harness connector</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 50%;">Condition</th> <th style="width: 50%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>When brake pedal is depressed</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>When brake pedal is released</td> <td style="text-align: center;">No</td> </tr> </tbody> </table> | | Condition | Continuity | When brake pedal is depressed | Yes | When brake pedal is released | No |
| Condition | Continuity | | | | | | |
| When brake pedal is depressed | Yes | | | | | | |
| When brake pedal is released | No | | | | | | |
| <p>Check stop lamp switch after adjusting brake pedal — refer to BR-13, "Adjustment".</p> <p>OK or NG</p> | | | | | | | |
| OK | ▶ GO TO 5. | | | | | | |
| NG | ▶ Repair or replace damaged parts. | | | | | | |

| | |
|--|--|
| 5 | CHECK GROUND CIRCUIT |
| <ol style="list-style-type: none"> 1. Turn ignition switch to OFF position. 2. Disconnect A/T device harness connector. 3. Check continuity between A/T device harness connector terminal 6 (B) and ground. Refer to wiring diagram — SHIFT —. <p style="margin-left: 20px;">Continuity should exist.</p> <p style="margin-left: 20px;">If OK, check harness for short to ground and short to power.</p> | |
| <p>OK or NG</p> | |
| OK | ▶ GO TO 6. |
| NG | ▶ Repair open circuit or short to ground or short to power in harness or connectors. |

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A/T SHIFT LOCK SYSTEM

Diagnostic Procedure (Cont'd)

| 6 | CHECK PARK POSITION SWITCH | | | | | | |
|--|-----------------------------------|-------------------------------|------------|--|-----|--------------|----|
| <ul style="list-style-type: none"> Check continuity between A/T device harness connector B59 terminal 6 and park position switch harness connector M508 terminal 1. | | | | | | | |
| | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;">Condition</th> <th style="width: 30%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>When selector lever is set in "P" position and selector lever button is released</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>Except above</td> <td style="text-align: center;">No</td> </tr> </tbody> </table> | | Condition | Continuity | When selector lever is set in "P" position and selector lever button is released | Yes | Except above | No |
| Condition | Continuity | | | | | | |
| When selector lever is set in "P" position and selector lever button is released | Yes | | | | | | |
| Except above | No | | | | | | |
| SAT713K | | | | | | | |
| OK or NG | | | | | | | |
| OK | ▶ | GO TO 7. | | | | | |
| NG | ▶ | Replace park position switch. | | | | | |

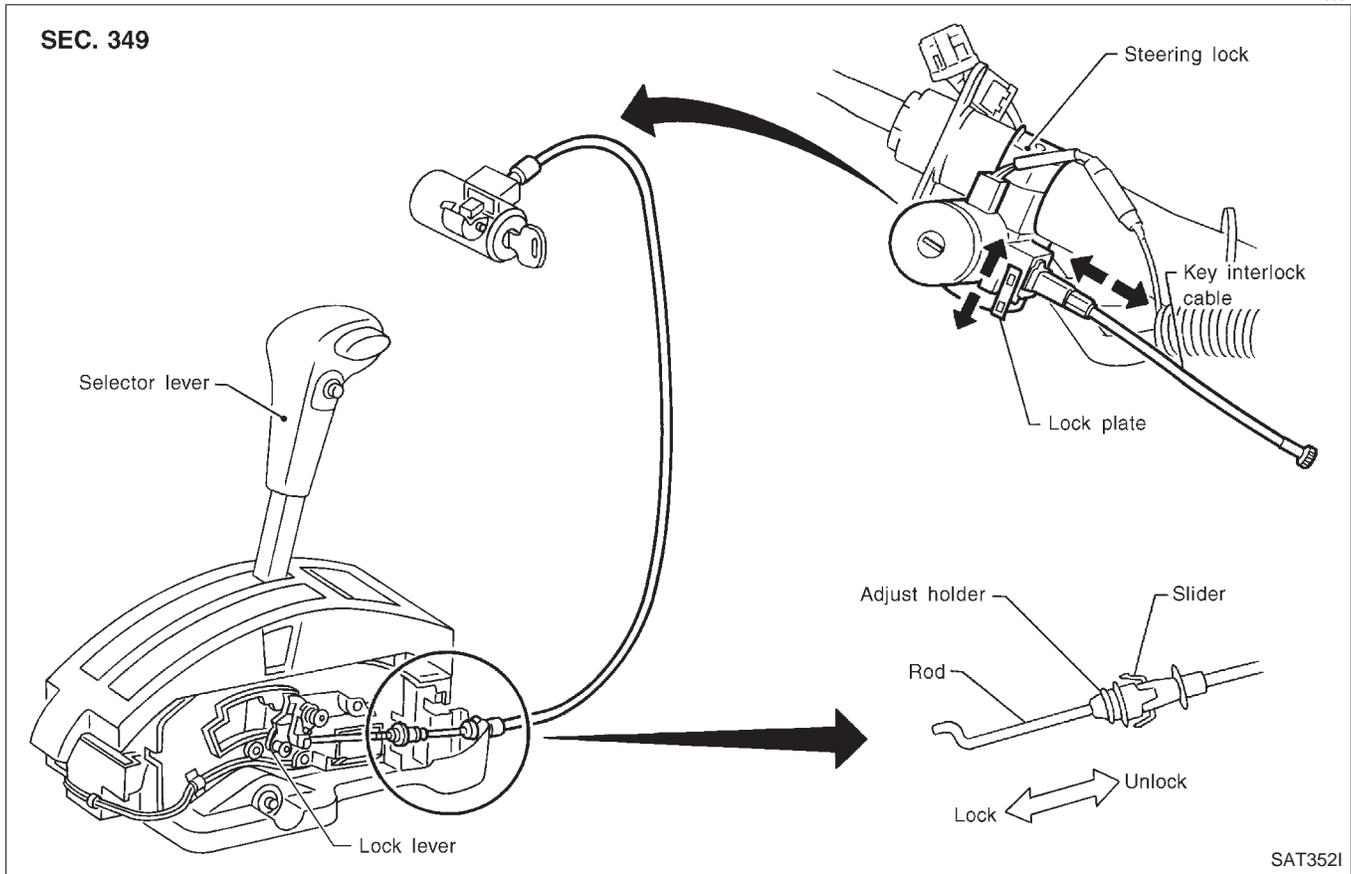
| 7 | CHECK SHIFT LOCK SOLENOID | |
|--|----------------------------------|------------------------------|
| <ul style="list-style-type: none"> Check operation by applying battery voltage shift lock solenoid harness connector terminals 1 and 3. | | |
| | | |
| SAT762J | | |
| OK or NG | | |
| OK | ▶ | GO TO 8. |
| NG | ▶ | Replace shift lock solenoid. |

| 8 | CHECK SHIFT LOCK OPERATION | |
|--|-----------------------------------|-----------------------|
| <ol style="list-style-type: none"> Reconnect shift lock harness connector. Turn ignition switch from OFF to ON position. (Do not start engine.) Recheck shift lock operation. | | |
| OK or NG | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | GO TO 9. |

| 9 | CHECK A/T DEVICE INSPECTION | |
|---|------------------------------------|----------------------------------|
| <ol style="list-style-type: none"> Perform A/T device input/output signal inspection test. If NG, recheck harness connector connection. | | |
| OK or NG | | |
| OK | ▶ | INSPECTION END |
| NG | ▶ | Repair or replace damaged parts. |

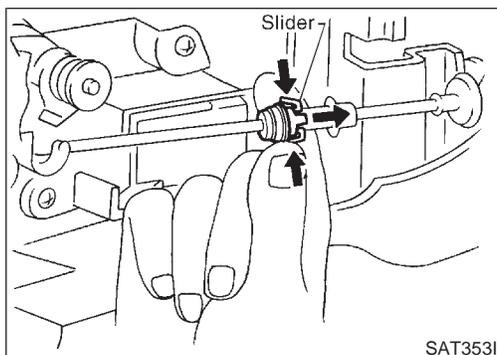
Components

NAAT0097



CAUTION:

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



Removal

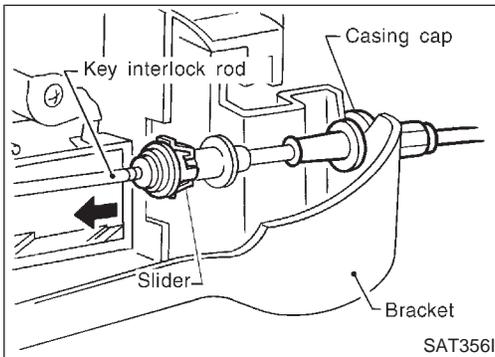
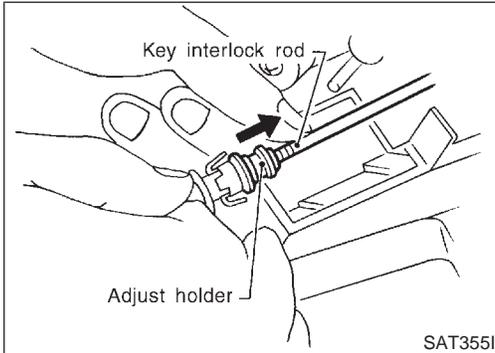
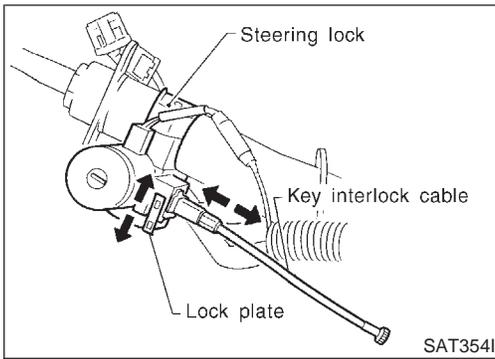
Unlock slider from adjuster holder and remove rod from cable.

NAAT0098

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KEY INTERLOCK CABLE

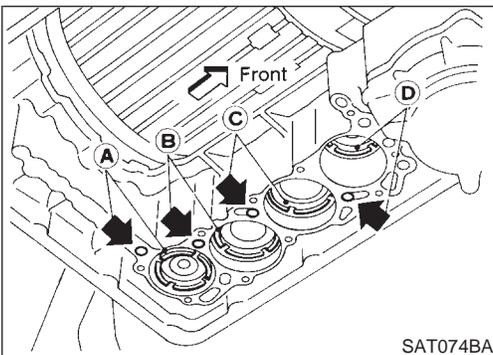
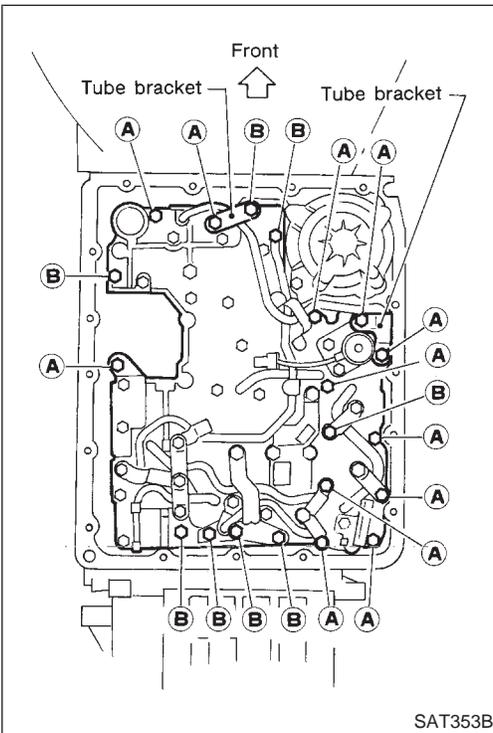
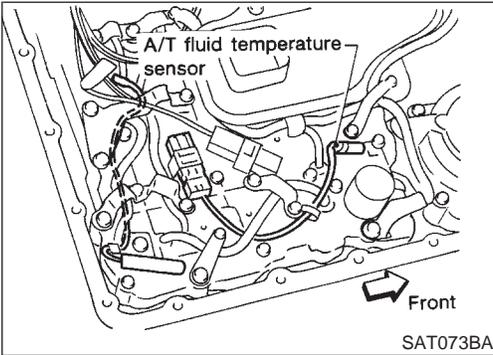
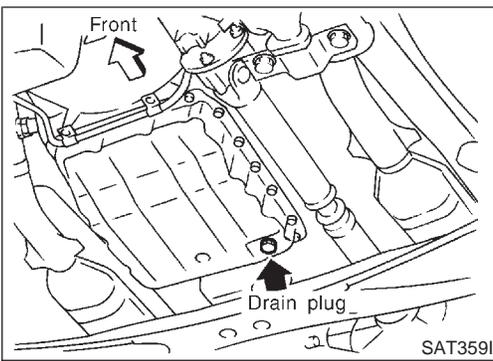
Installation



Installation

NAAT0099

1. Set key interlock cable to steering lock assembly and install lock plate.
2. Clamp cable to steering column and fix to control cable with band.
3. Set selector lever to P position.
4. Insert interlock rod into adjuster holder.
5. Install casing cap to bracket.
6. Move slider in order to fix adjuster holder to interlock rod.



Control Valve Assembly and Accumulators

NAAT0100

NAAT0100S01

REMOVAL

1. Remove exhaust front tube.
2. Remove oil pan and gasket and drain ATF.
3. Remove A/T fluid temperature sensor if necessary.
4. Remove oil strainer.
5. Remove control valve assembly by removing fixing bolts and disconnecting harness connector.
6. Remove solenoids and valves from valve body if necessary.
7. Remove terminal cord assembly if necessary.
8. Remove accumulator **A**, **B**, **C** and **D** by applying compressed air if necessary.

- **Hold each piston with rag.**
- **Always use new sealing parts.**

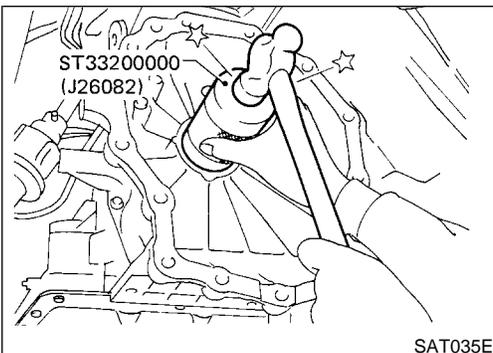
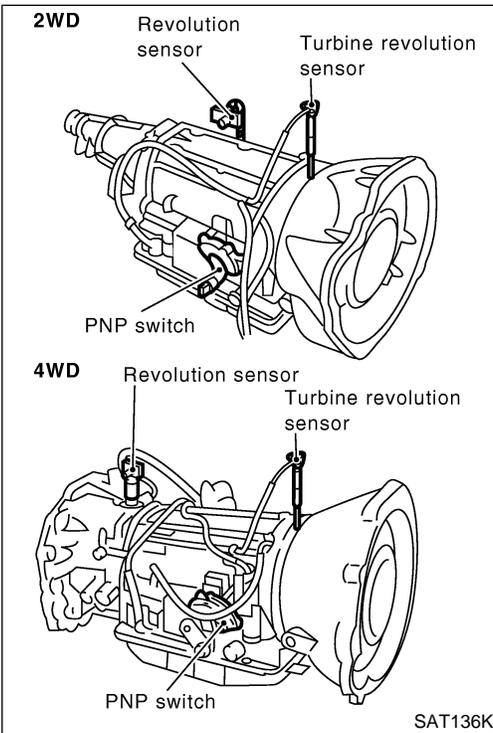
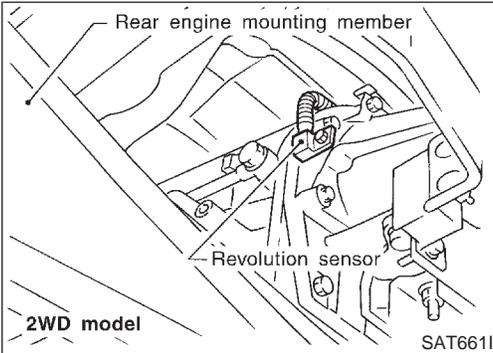
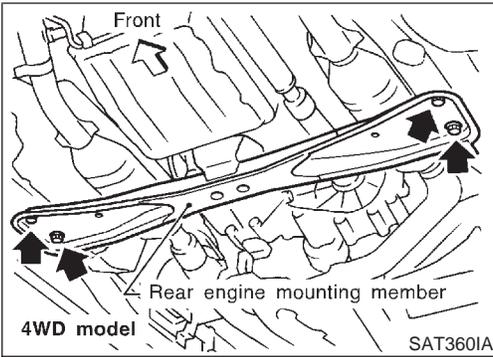
Bolt length and location

| Bolt symbol | ℓ mm (in) |
|-------------|-----------|
| A | 33 (1.30) |
| B | 45 (1.77) |

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ON-VEHICLE SERVICE

Revolution Sensor Replacement



Revolution Sensor Replacement

NAAT0210

— 4WD MODEL —

NAAT0210S01

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-64, "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 —

NAAT0210S02

- Remove revolution sensor from A/T.
- **Always use new sealing parts.**

Turbine Revolution Sensor Replacement

NAAT0231

1. Remove A/T assembly, Refer to "Removal", AT-273.
 2. Remove turbine revolution sensor from A/T assembly upper side.
 3. Reinstall any part removed.
- **Always use new sealing parts.**

Rear Oil Seal Replacement

NAAT0211

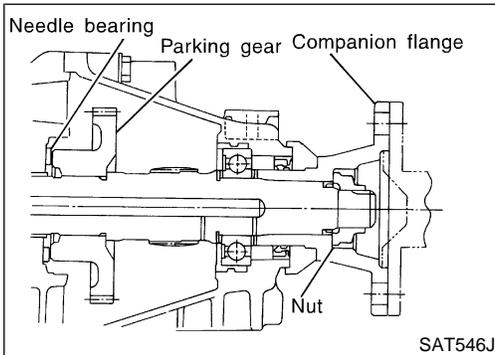
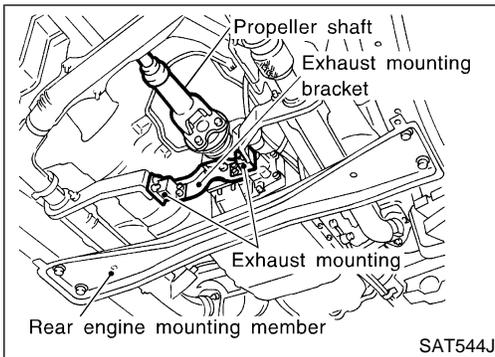
— 4WD MODEL —

NAAT0211S01

1. Remove transfer case from vehicle. Refer to TF-155, "Removal".
 2. Remove rear oil seal.
 3. Install rear oil seal.
- **Apply ATF before installing.**
 - 4. Reinstall any part removed.

ON-VEHICLE SERVICE

Rear Oil Seal and Companion Flange Oil Seal Replacement



Rear Oil Seal and Companion Flange Oil Seal Replacement

— 2WD MODEL —

NAAT0212

NAAT0212S01

NOTE:

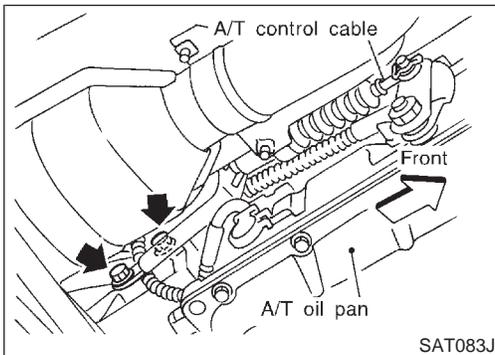
Replace rear extension assembly as a single unit because it cannot be disassembled.

1. Remove propeller shaft. Refer to PD-5, "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-64, "Rear Engine Mounting".
6. Remove rear extension assembly.
 - a. Remove parking gear and needle bearing.

CAUTION:

Insert your hand between rear extension and transmission case. Detach rear extension assembly while holding parking gear and needle bearing by hand.

7. Reinstall any part removed.
- Always use new sealing parts.



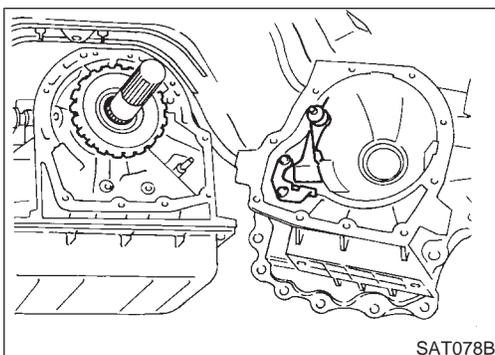
Parking Components Inspection

— 4WD MODEL —

NAAT0213

NAAT0213S01

1. Remove propeller shaft. Refer to PD-5, "Components".
2. Remove transfer case from vehicle. Refer to TF-155, "Removal".
3. Remove A/T control cable bracket from transmission case.



4. Support A/T assembly with a jack.
5. Remove adapter case from transmission case.
6. Replace parking components if necessary.
7. Reinstall any part removed.
- Always use new sealing parts.

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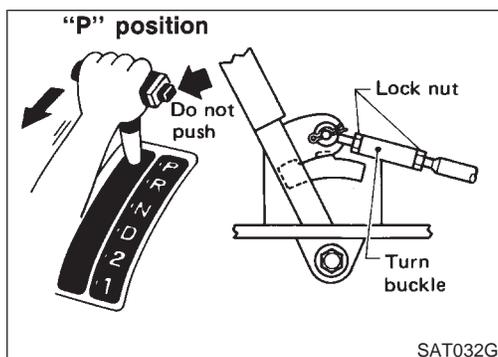
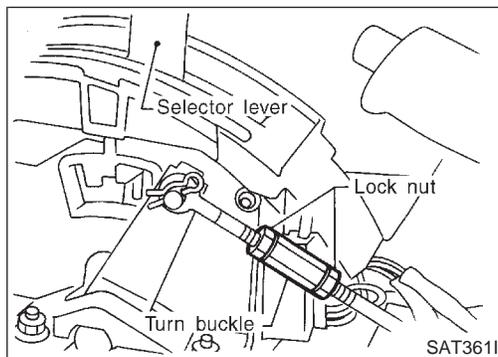
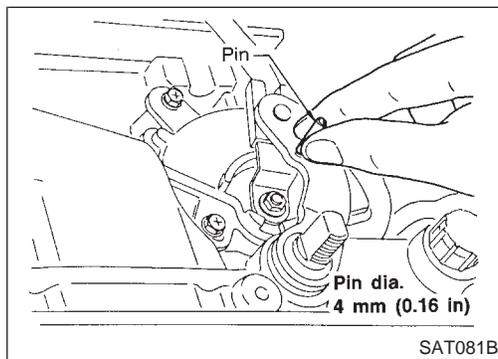
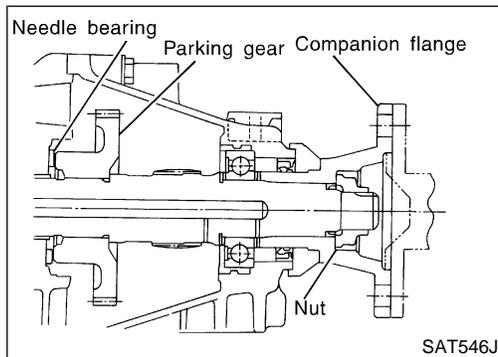
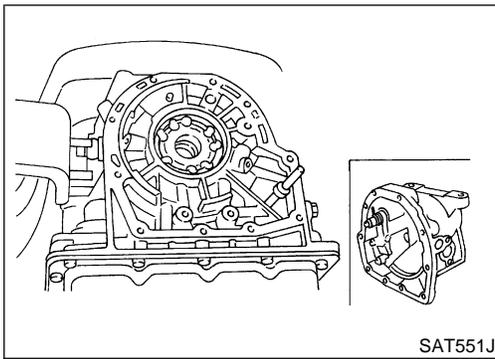
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ON-VEHICLE SERVICE

Parking Components Inspection (Cont'd)



— 2WD MODEL —

1. Remove propeller shaft from vehicle. Refer to PD-5, "Components". NAAT0213S02
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-64, "Rear Engine Mounting".

4. Remove rear extension assembly.
 - a. Remove parking gear and needle bearing.

CAUTION:

Insert your hand between rear extension and transmission case. Detach rear extension assembly while holding parking gear and needle bearing by hand.

5. Replace parking components if necessary.
6. Reinstall any part removed.
- Always use new sealing parts.

Park/Neutral Position Switch Adjustment

1. Remove manual control linkage from manual shaft of A/T assembly. NAAT0104
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-106.

Manual Control Linkage Adjustment

Move selector lever from "P" position to "1" position. You should be able to feel the detents in each position. If the detents cannot be felt or the pointer indicating the position is improperly aligned, the linkage needs adjustment. NAAT0105

1. Place selector lever in "P" position.
2. Loosen lock nuts.
3. Tighten turn buckle until aligns with inner cable, pulling selector lever toward "R" position side without pushing button.
4. Back off turn buckle 1 turn and tighten lock nuts to the specified torque.

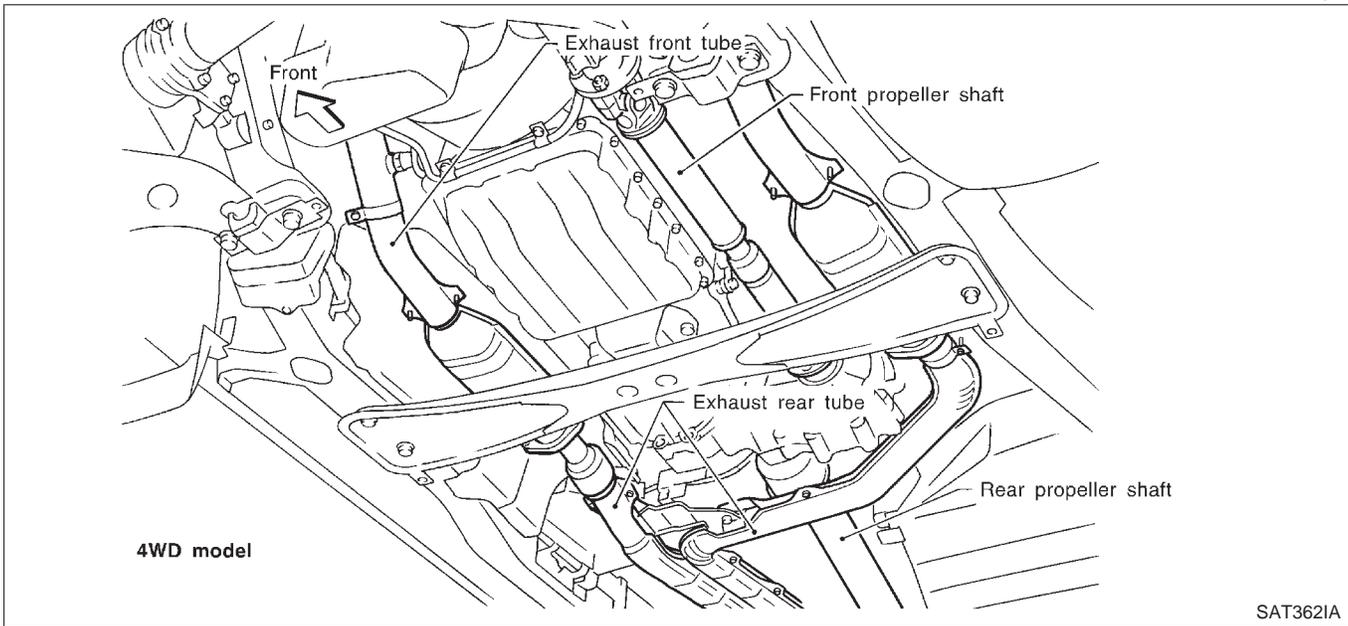
Lock nut:

: 4.4 - 5.9 N-m (0.45 - 0.60 kg-m, 39.1 - 52.1 in-lb)

5. Move selector lever from "P" position to "1" position. Make sure that selector lever can move smoothly.

Removal

NAAT0214



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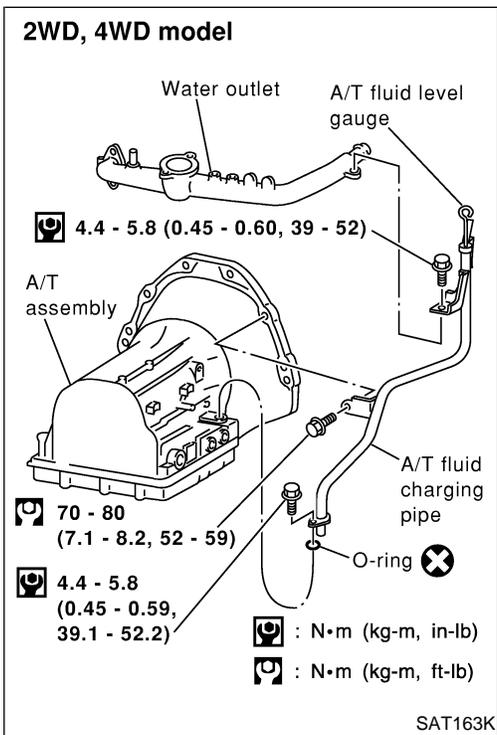
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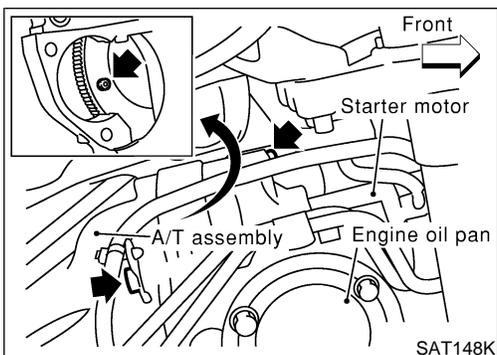
CAUTION:

When removing the A/T assembly from engine, first remove the crankshaft position sensor (OBD) from the A/T assembly lower side.

Be careful not to damage sensor edge.

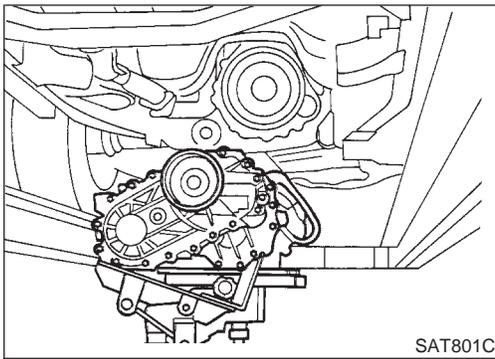
— 4WD MODEL —

1. Remove battery negative terminal.
2. Remove exhaust front and rear tubes.
3. Remove fluid charging pipe from A/T assembly.
4. Remove oil cooler pipe from A/T assembly.
5. Plug up openings such as the fluid charging pipe hole, etc.
6. Remove propeller shaft. Refer to PD-5, "Components".
7. Remove transfer control linkage from transfer. Refer to TF-155, "Removal".
- Insert plug into rear oil seal after removing rear propeller shaft.
- Be careful not to damage spline, sleeve yoke and rear oil seal.
8. Remove A/T control cable from A/T assembly.
9. Disconnect A/T solenoid, PNP switch, turbine revolution, revolution and speedometer sensor harness connectors.
10. Remove starter motor. Refer to SC-19, "Removal and Installation".
11. Remove bolts securing torque converter to drive plate.
- Remove the bolts by turning crankshaft.

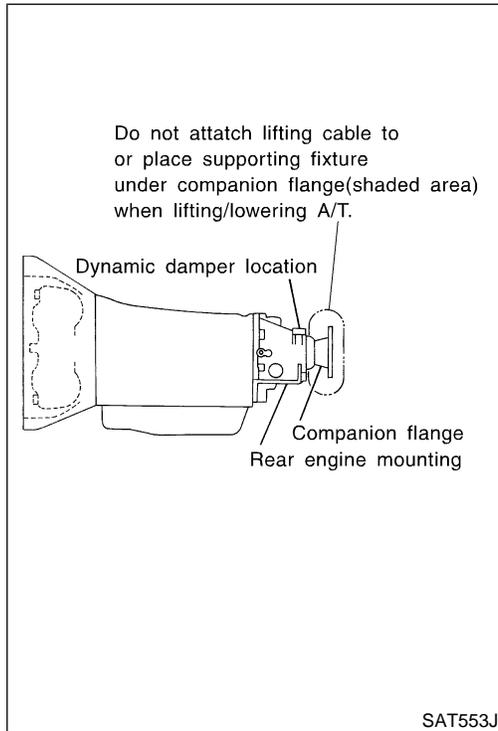


REMOVAL AND INSTALLATION

Removal (Cont'd)



12. Support A/T and transfer assembly with a jack.
13. Remove rear engine mounting member from body and A/T assembly. Tighten rear engine mounting member to the specified torque. Refer to EM-64, "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.



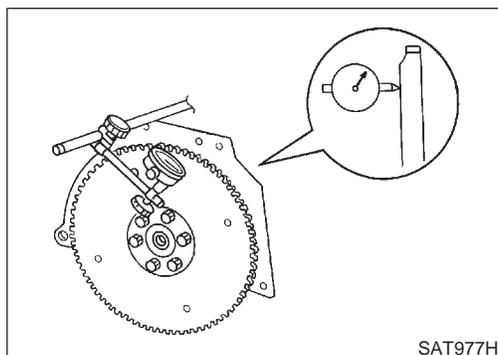
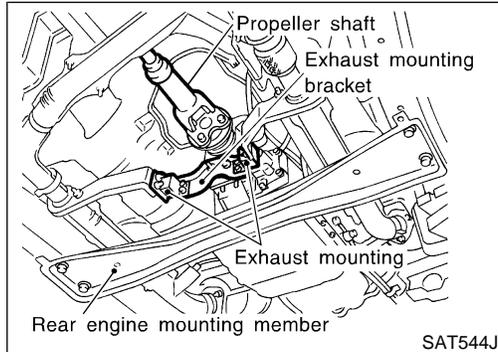
— 2WD MODEL —

NAAT0214S02

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-5, "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-19, "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-64, "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.



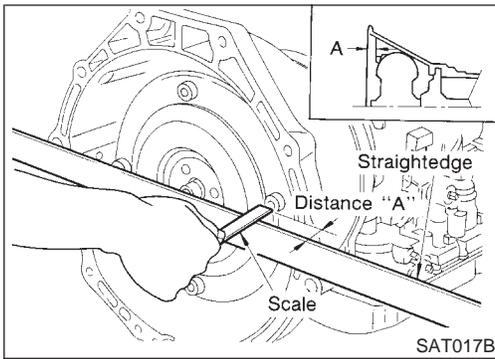
Installation

NAAT0107

- Drive plate runout
 - **Maximum allowable runout:**
Refer to EM-76, "FLYWHEEL/DRIVE PLATE RUNOUT".
- If this runout is out of specification, replace drive plate with ring gear.

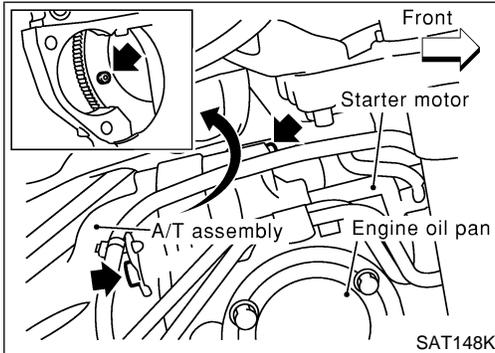
REMOVAL AND INSTALLATION

Installation (Cont'd)

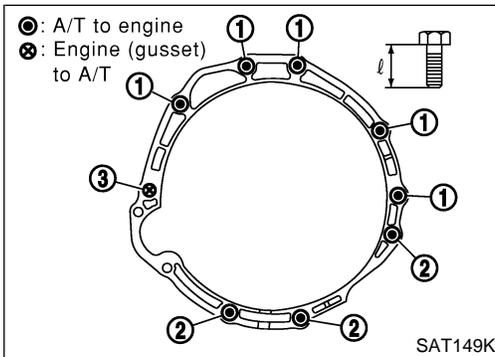


- When connecting torque converter to transmission, measure distance "A" to be certain that they are correctly assembled.

Distance "A":
25.0 mm (0.984 in) or more



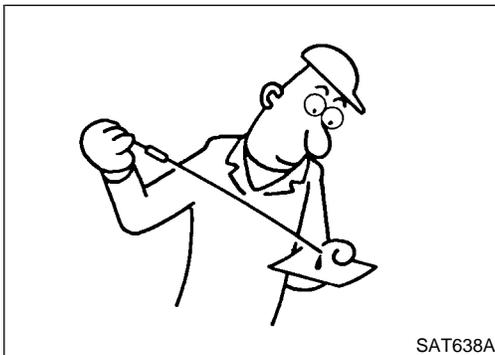
- Install converter to drive plate.
- After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.**



- Tighten bolts securing transmission.

| Bolt No. | Tightening torque N·m (kg·m, ft·lb) | Bolt length "ℓ" mm (in) |
|----------|--|----------------------------|
| 1 | 70 - 80 (7.1 - 8.2, 52 - 59) | 65 (2.56) |
| 2 | 29 - 39 (3.0 - 4.0, 22 - 29) | 40 (1.57) |
| 3 | 70 - 80 (7.1 - 8.2, 52 - 59) | 55 (2.17) |

- Reinstall any part removed.



- Check fluid level in transmission.
- Move selector lever through all positions to be sure that transmission operates correctly. With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R" positions. A slight shock should be felt by hand gripping selector each time transmission is shifted.
- Perform road test. Refer to "ROAD TEST", AT-65.

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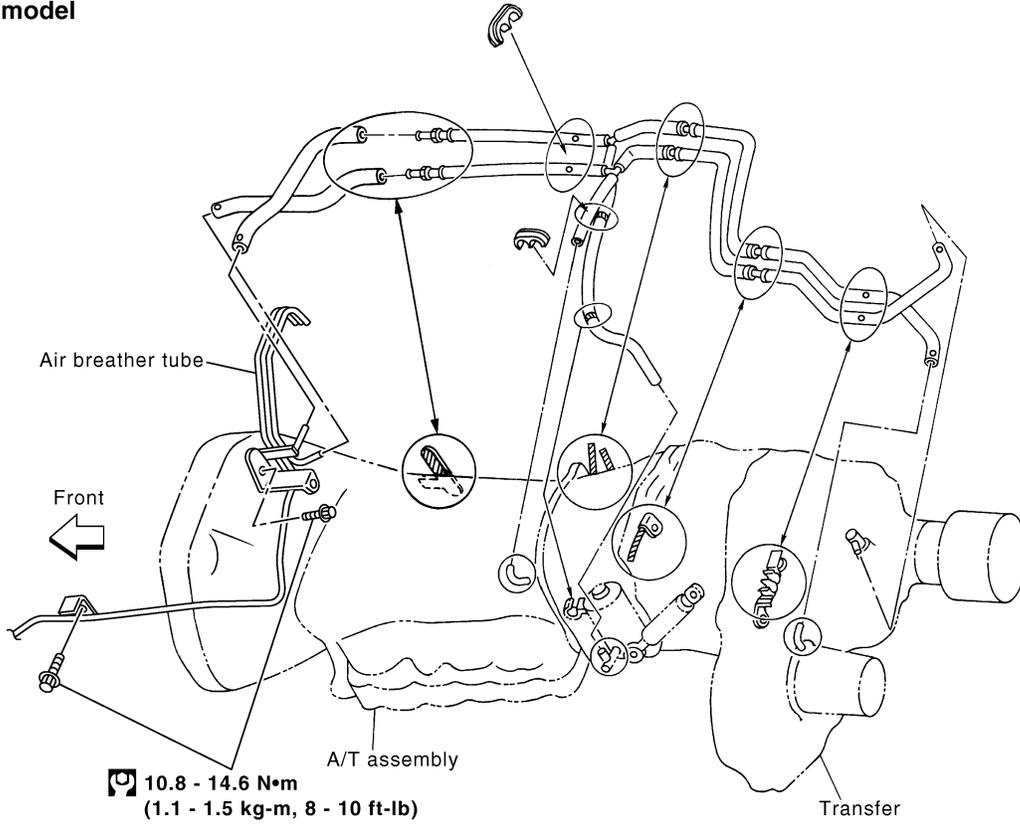
REMOVAL AND INSTALLATION

Installation (Cont'd)

AIR BREATHER HOSE

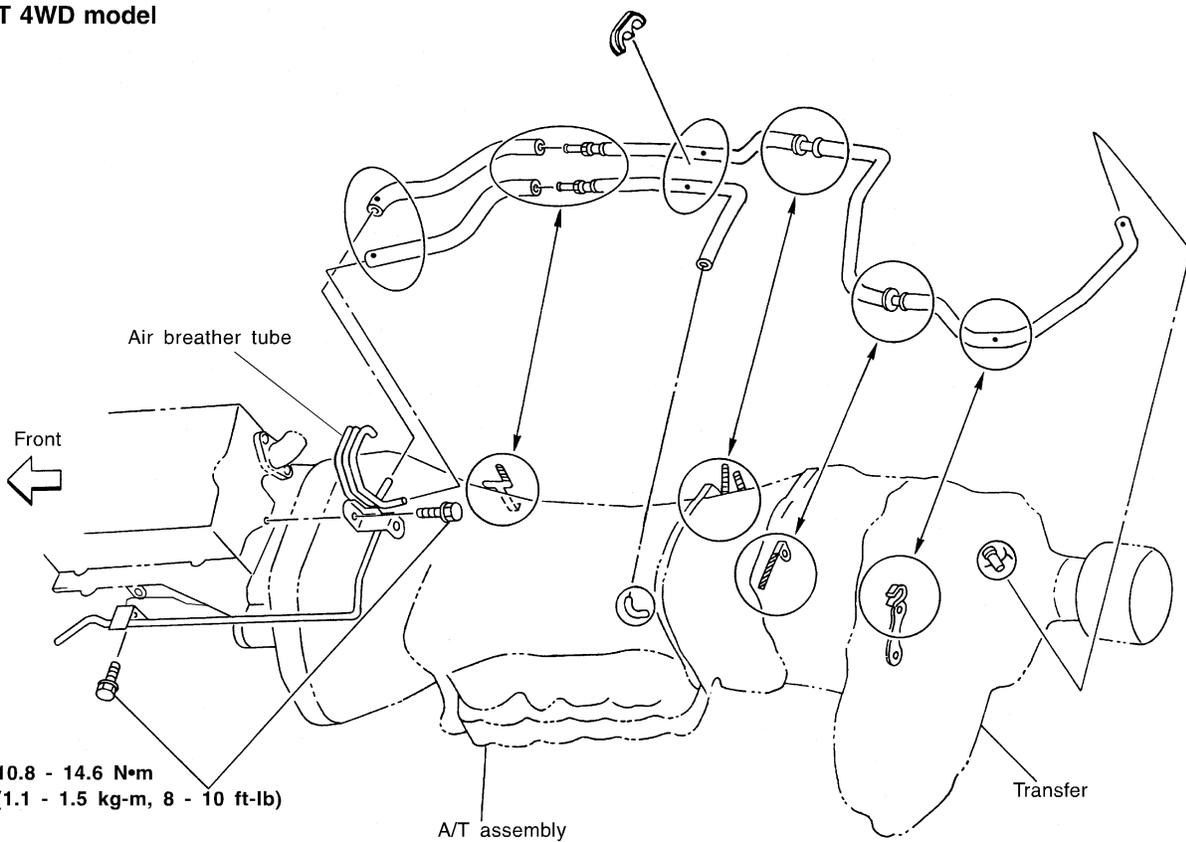
NAAT0107S01

F/T 4WD model



SAT662K

P/T 4WD model

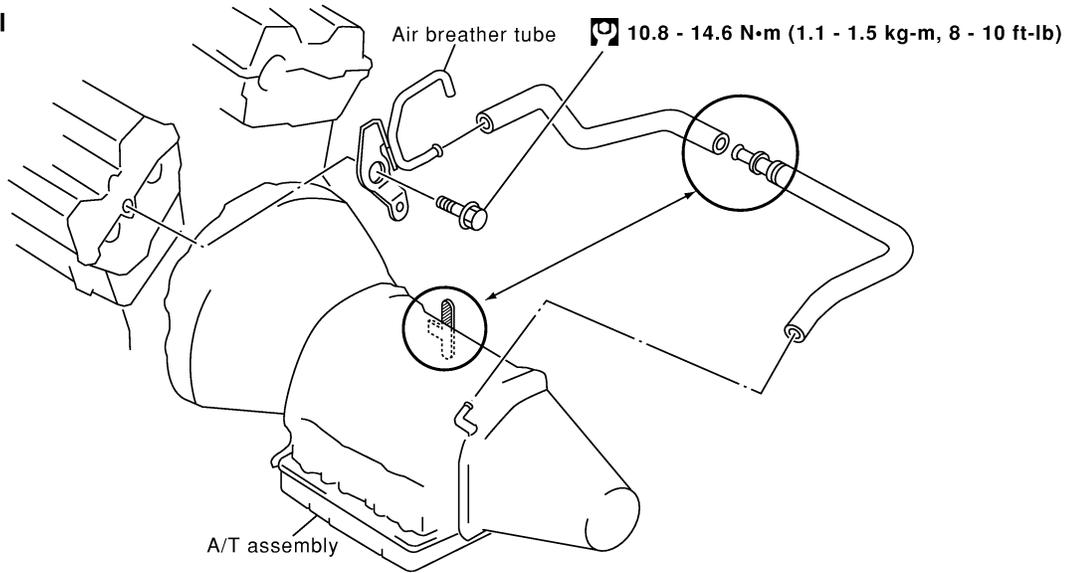


SAT206KA

REMOVAL AND INSTALLATION

Installation (Cont'd)

2WD model



SAT153K

- GI
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- EM
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- MT
- AT**
- TF
- PD
- AX
- SU
- BR
- ST
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- BT
- HA
- SC
- EL
- IDX

OVERHAUL

Components

SEC. 311•313•315

: N•m (kg-m, ft-lb)

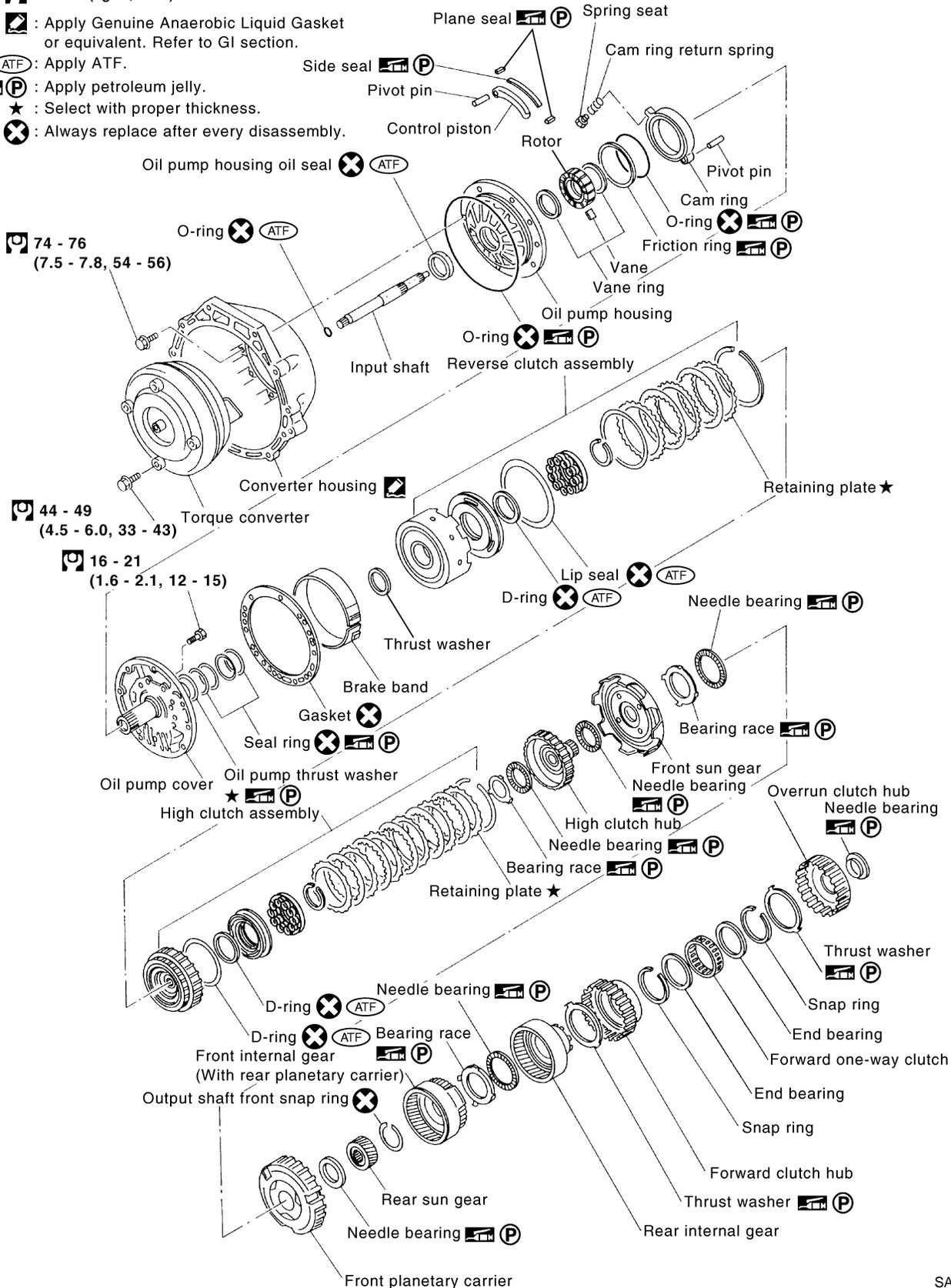
: Apply Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI section.

: Apply ATF.

(P) : Apply petroleum jelly.

★ : Select with proper thickness.

: Always replace after every disassembly.



OVERHAUL

Components (Cont'd)

SEC. 311•315•317 4WD model

: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

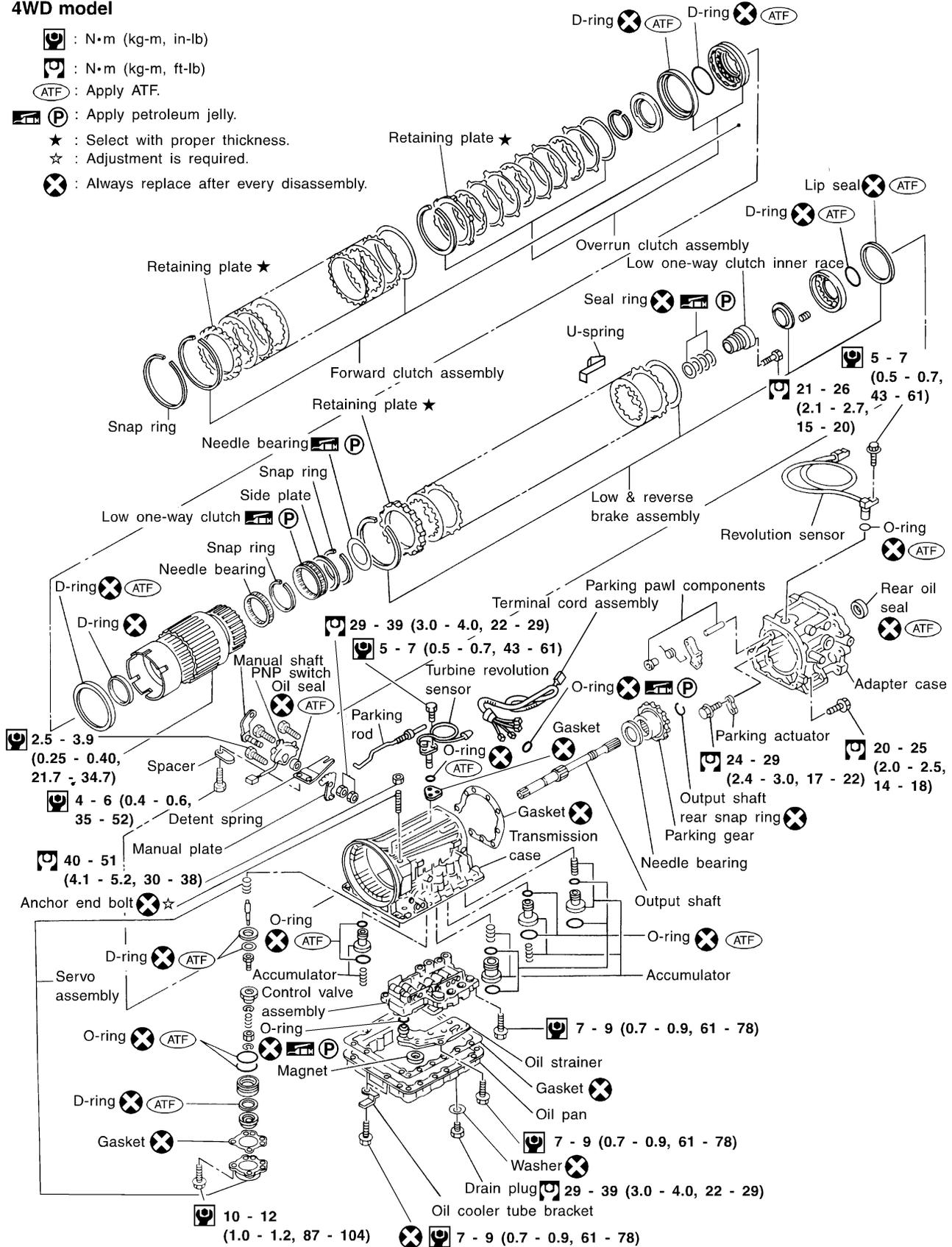
: Apply ATF.

: Apply petroleum jelly.

★ : Select with proper thickness.

☆ : Adjustment is required.

: Always replace after every disassembly.



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SAT671KA

OVERHAUL

Components (Cont'd)

SEC. 311•315•317 2WD model

: N•m (kg-m, in-lb)

: N•m (kg-m, ft-lb)

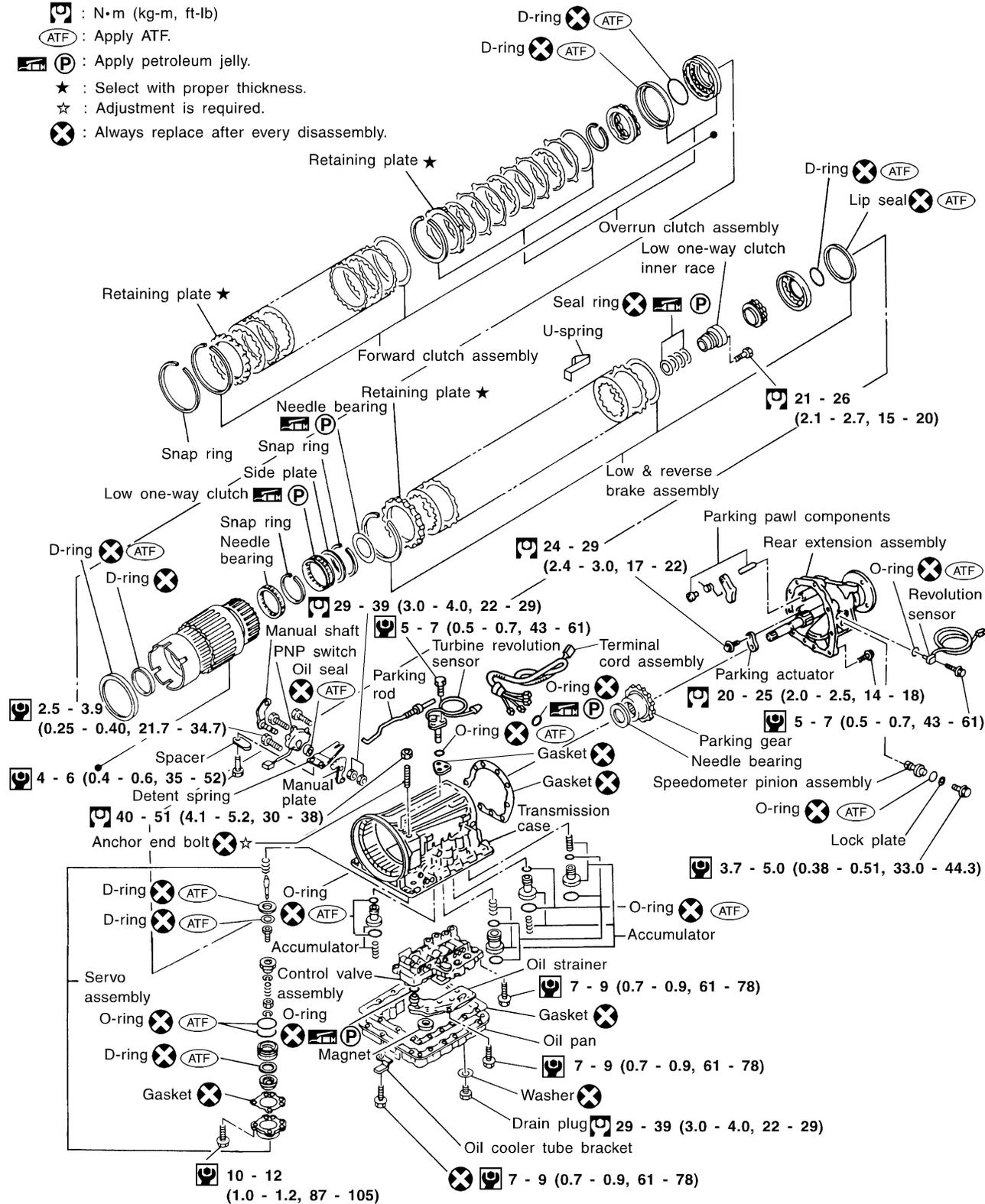
: Apply ATF.

: Apply petroleum jelly.

★ : Select with proper thickness.

☆ : Adjustment is required.

: Always replace after every disassembly.



SAT672KA

Oil Channel

NAAT0109

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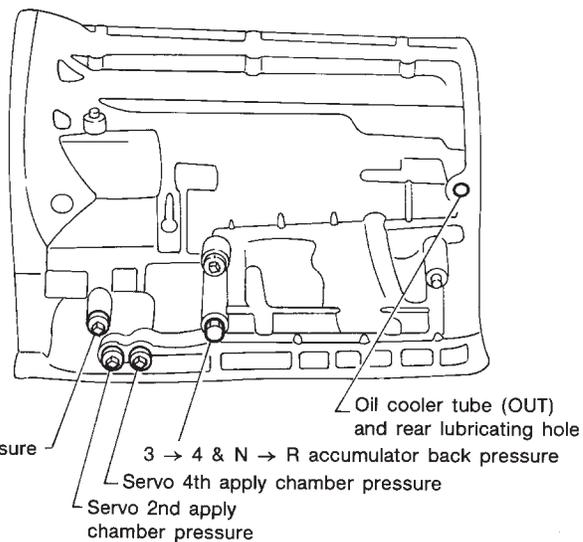
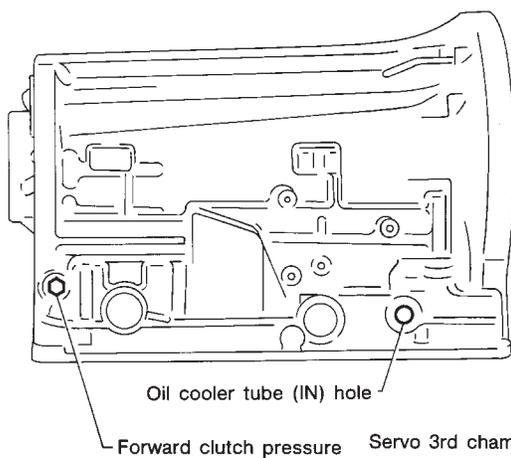
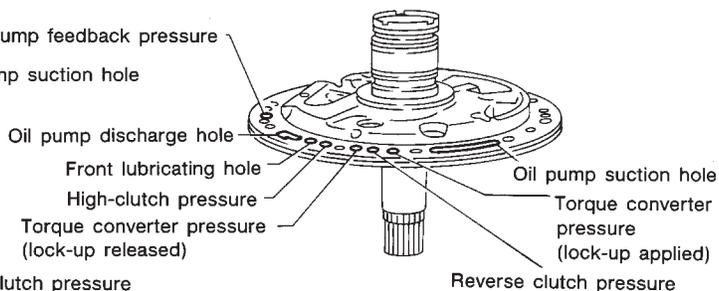
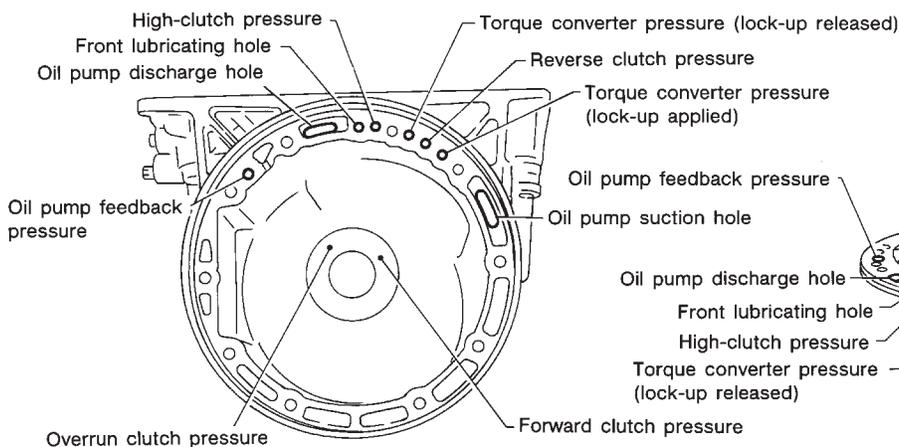
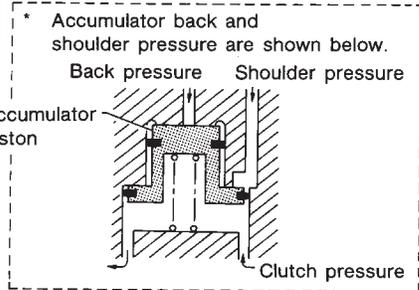
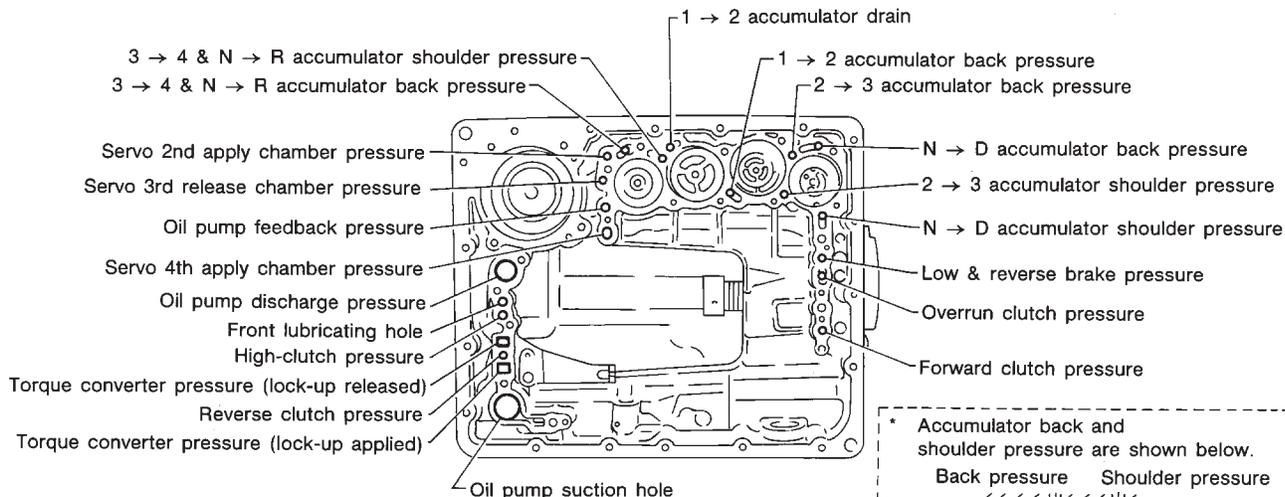
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SAT185B

OVERHAUL

Locations of Needle Bearings, Thrust Washers and Snap Rings

Locations of Needle Bearings, Thrust Washers and Snap Rings

NAA70110

Outer diameter of snap rings

| Item number | Outer diameter mm (in) |
|-------------|------------------------|
| ② | 161.0 (6.34) |
| ③ | 140.1 (5.52) |
| ④ | 156.4 (6.16) |
| ⑥ | 142.0 (5.59) |
| ⑦ | 159.2 (6.27) |

Thrust washers

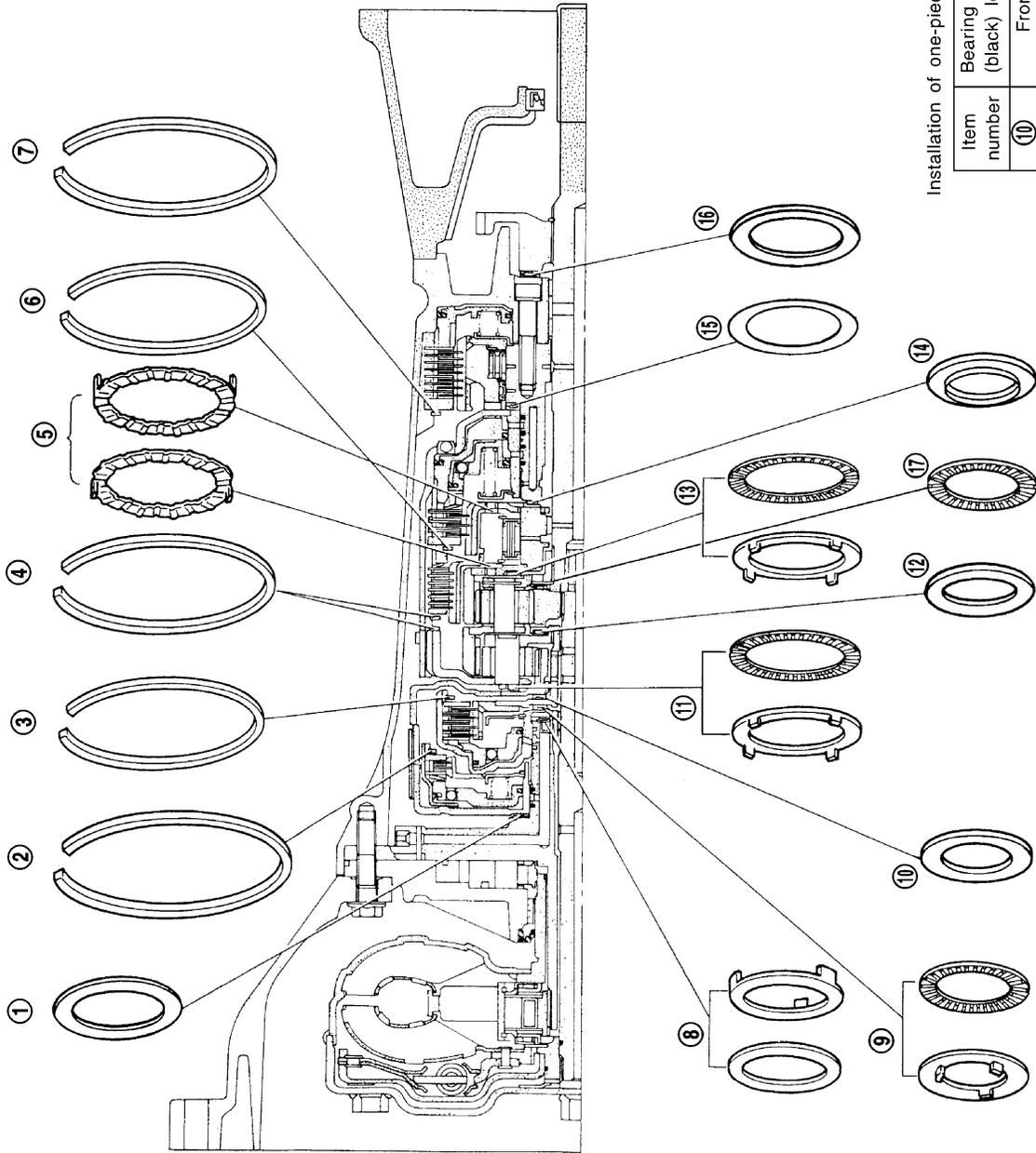
| Item number | Color |
|-------------|-------|
| ① | Black |
| ⑤ | White |

Outer diameter of needle bearings

| Item number | Outer diameter mm (in) |
|-------------|------------------------|
| ⑧ | 47 (1.85) |
| ⑨ | 53 (2.09) |
| ⑪ | 75 (2.95) |
| ⑫ | 53 (2.09) |
| ⑬ | 75 (2.95) |
| ⑭ | 57 (2.24) |
| ⑮ | 78.1 (3.075) |
| ⑯ | 64 (2.52) |
| ⑰ | 53 (2.09) |

Inner diameter of bearing races

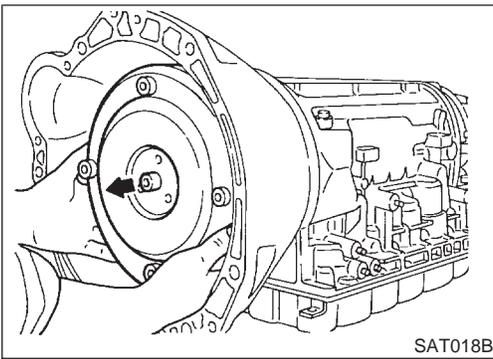
| Item number | Outer diameter mm (in) |
|-------------|------------------------|
| ⑪ | 58.8 (2.315) |
| ⑬ | 58.8 (2.315) |



Installation of one-piece bearings

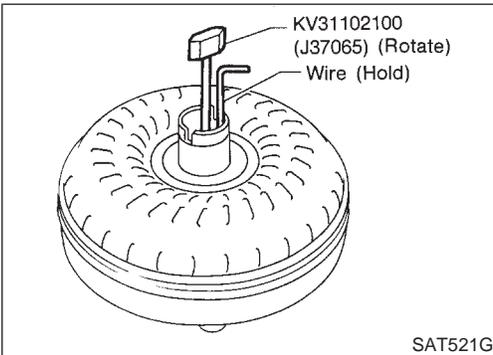
| Item number | Bearing race (black) location |
|-------------|-------------------------------|
| ⑩ | Front |
| ⑫ | Front |
| ⑮ | Rear side |
| ⑯ | Rear side |

DISASSEMBLY



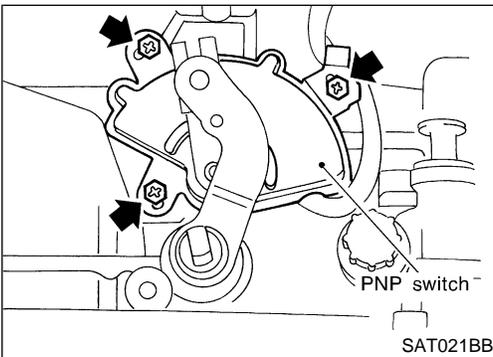
1. Drain ATF through drain plug.
2. Remove turbine revolution sensor.
3. Remove torque converter by holding it firmly and turning while pulling straight out.

GI
MA
EM
LC



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.

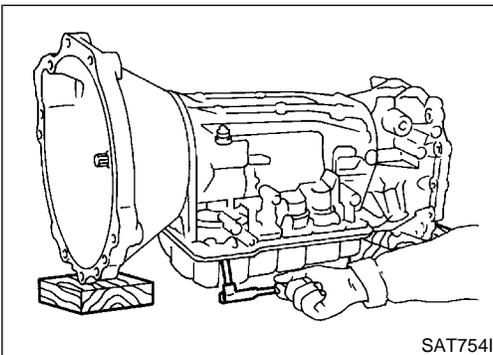
EC
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5. Remove PNP switch from transmission case.

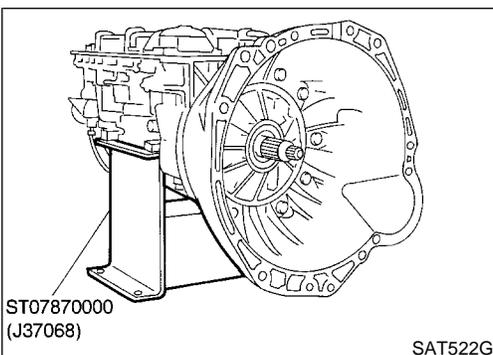
AT

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6. Remove oil pan.
 - Always place oil pan straight down so that foreign particles inside will not move.

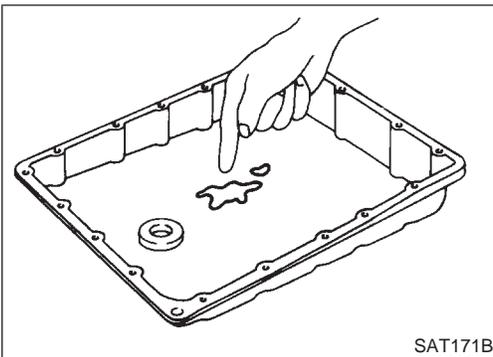
BR
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7. Place transmission into Tool with the control valve facing up.

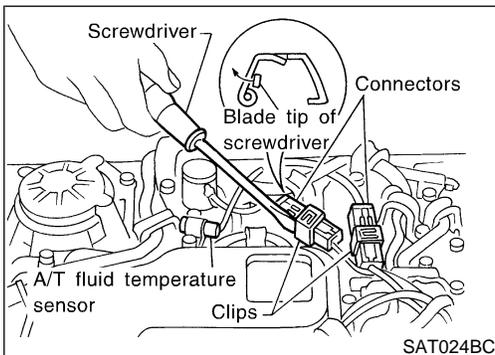
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DISASSEMBLY



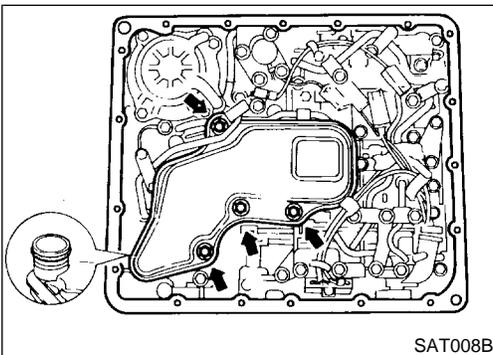
8. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves, 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-22, "REMOVAL AND INSTALLATION".**

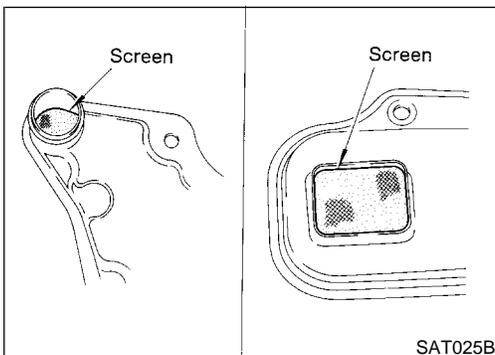


9. Remove torque converter clutch solenoid valve and A/T fluid temperature sensor connectors.

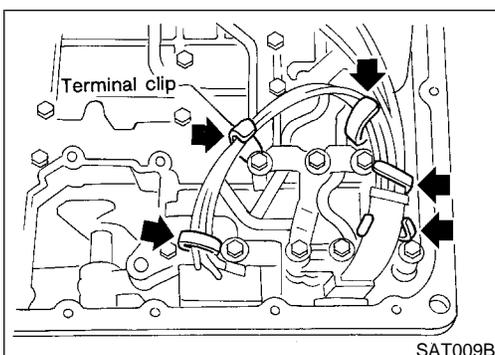
- **Be careful not to damage connector.**



10. Remove oil strainer.
 - a. Remove oil strainer from control valve assembly. Then remove O-ring from oil strainer.

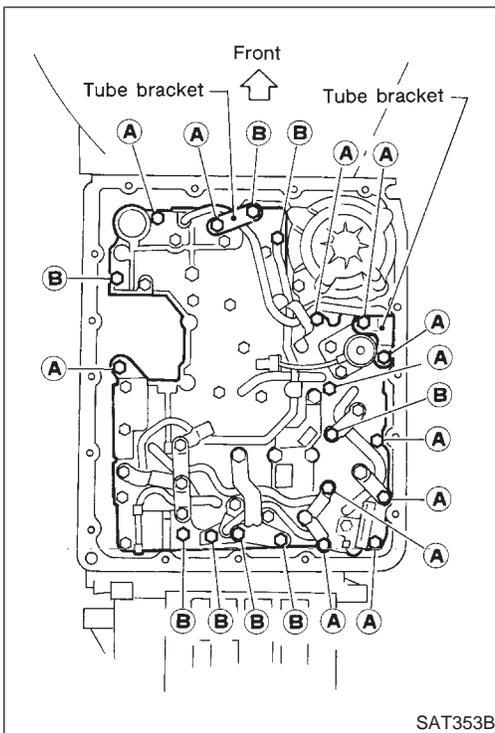


- b. Check oil strainer screen for damage.



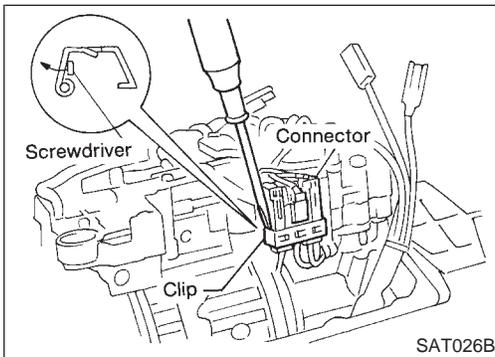
11. Remove control valve assembly.
 - a. Straighten terminal clips to free terminal cords then remove terminal clips.

DISASSEMBLY

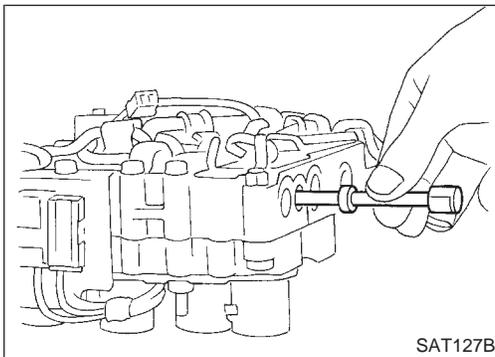


- b. Remove bolts A and B, and remove control valve assembly from transmission.

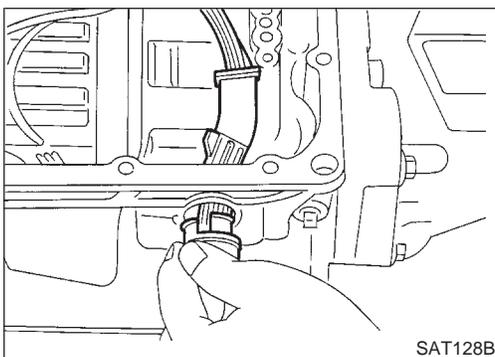
| Bolt symbol | Length mm (in) |
|-------------|----------------|
| A | 33 (1.30) |
| B | 45 (1.77) |



- c. Remove solenoid connector.
 ● **Be careful not to damage connector.**



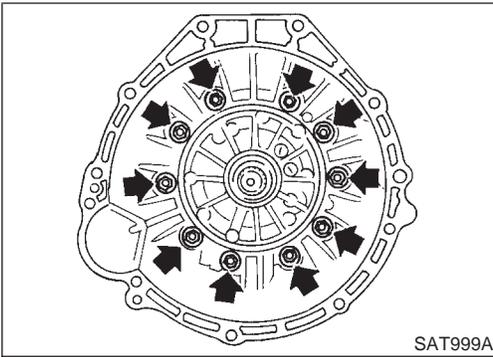
- d. Remove manual valve from control valve assembly.



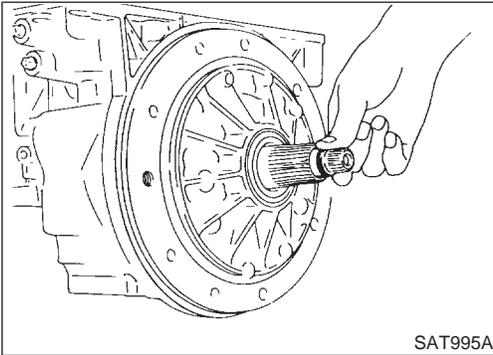
12. Remove terminal cord assembly from transmission case while pushing on stopper.
 ● **Be careful not to damage cord.**
 ● **Do not remove terminal cord assembly unless it is damaged.**

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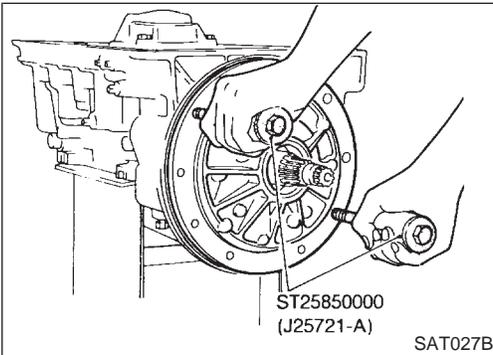
DISASSEMBLY



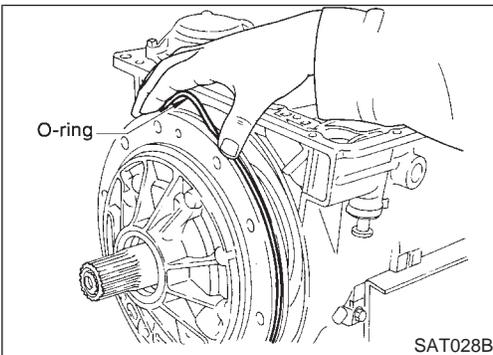
13. Remove converter housing from transmission case.
- Be careful not to scratch converter housing.



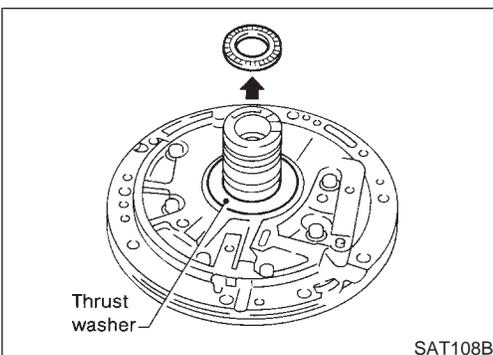
14. Remove O-ring from input shaft.



15. Remove oil pump assembly.
- a. Attach Tool to oil pump assembly and extract it evenly from transmission case.

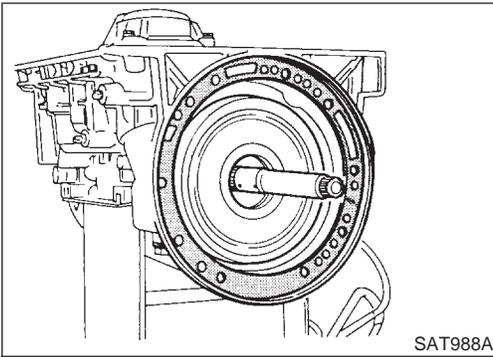


- b. Remove O-ring from oil pump assembly.
- c. Remove traces of sealant from oil pump housing.
- Be careful not to scratch pump housing.

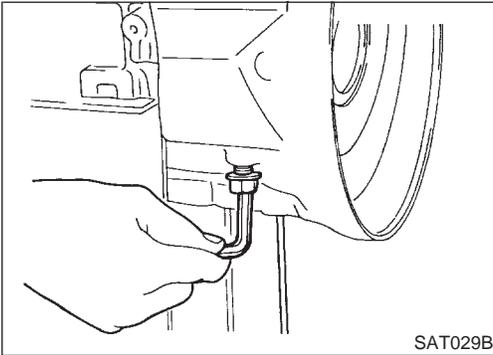


- d. Remove needle bearing and thrust washer from oil pump assembly.

DISASSEMBLY

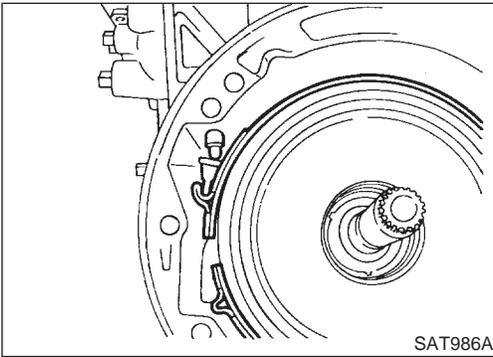


16. Remove input shaft and oil pump gasket.

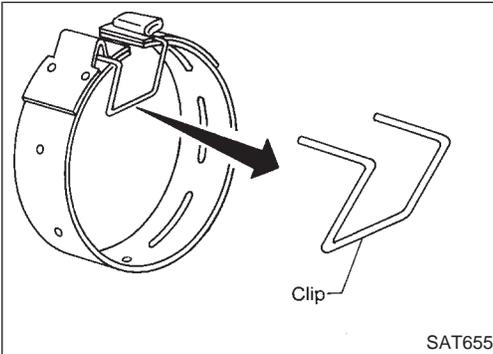


17. Remove brake band and band strut.

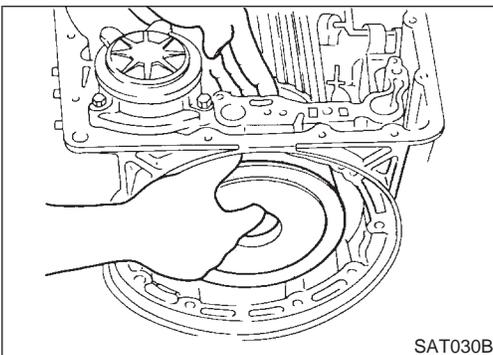
a. Loosen lock nut and remove band servo anchor end pin from transmission case.



b. Remove brake band and band strut from transmission case.



c. Hold brake band in a circular shape with clip.



18. Remove front side clutch and gear components.

a. Remove clutch pack (reverse clutch, high clutch and front sun gear) from transmission case.

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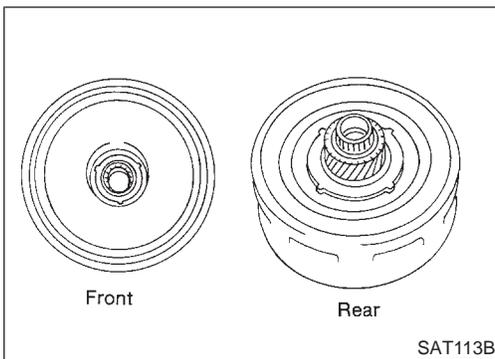
HA

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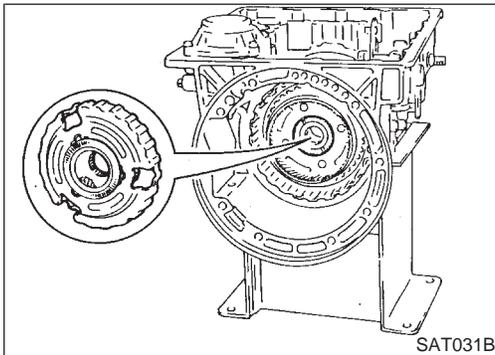
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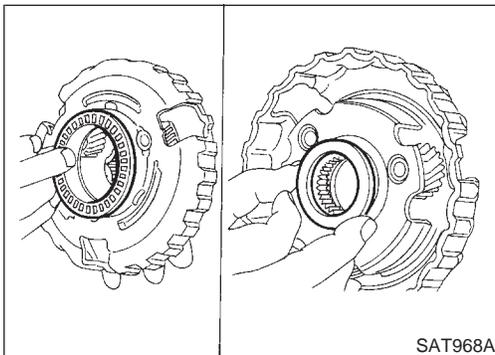
DISASSEMBLY



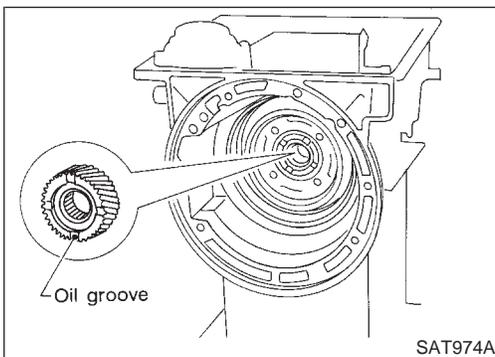
- b. Remove front bearing race from clutch pack.
- c. Remove rear bearing race from clutch pack.



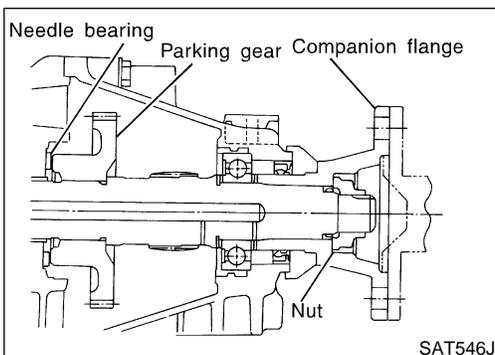
- d. Remove front planetary carrier from transmission case.



- e. Remove front needle bearing from front planetary carrier.
- f. Remove rear bearing from front planetary carrier.



- g. Remove rear sun gear from transmission case.



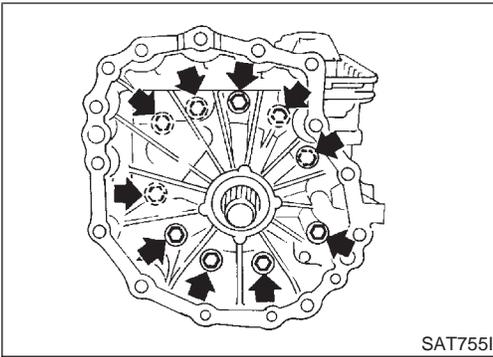
- 19. Remove rear extension assembly (2WD model only).

- a. Remove rear extension assembly.
- b. Remove parking gear and needle bearing.

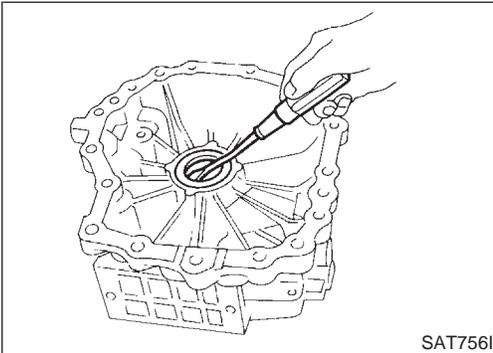
CAUTION:
 Insert your hand between rear extension and transmission case. Detach rear extension assembly while holding parking gear and needle bearing by hand.

- c. Remove rear extension gasket.

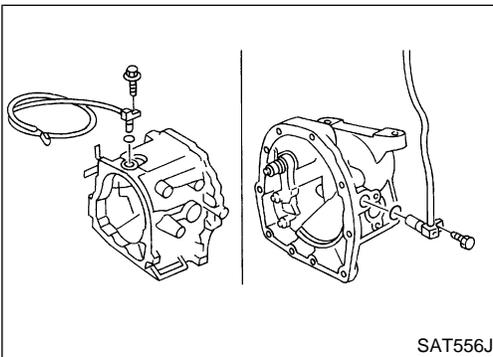
DISASSEMBLY



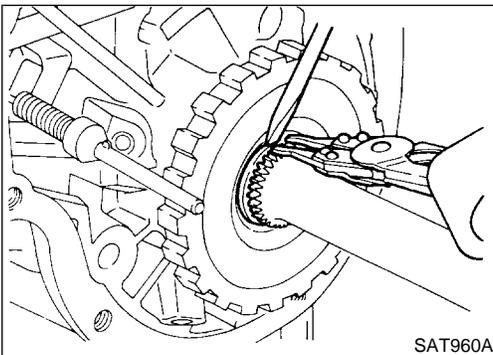
20. Remove adapter case (4WD model only).
 - a. Remove adapter case from transmission case.
 - b. Remove adapter case gasket from transmission case.



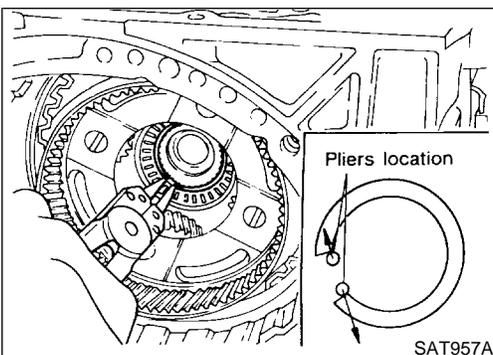
- c. Remove oil seal from adapter case.
 - **Be careful not to scratch adapter case.**
 - **Do not remove oil seal unless it is to be replaced.**



21. Remove revolution sensor from rear extension or adapter case.
 - a. Remove O-ring from revolution sensor.



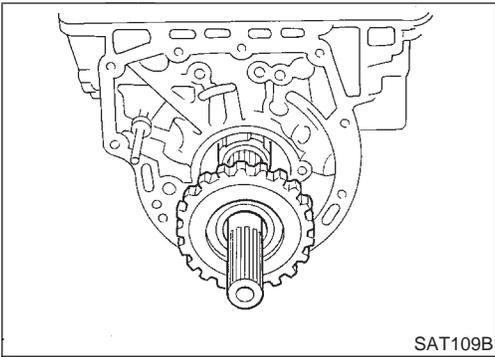
22. Remove output shaft and parking gear (4WD model only).
 - a. Remove rear snap ring from output shaft.



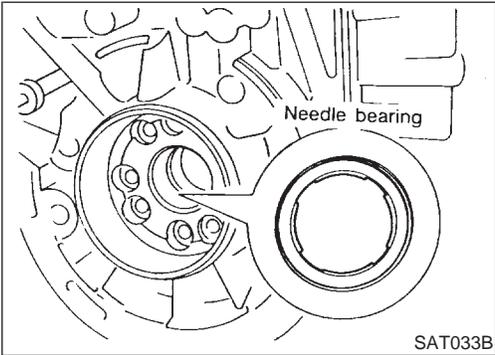
- b. Slowly push output shaft all the way forward.
 - **Do not use excessive force.**
- c. Remove snap ring from output shaft.

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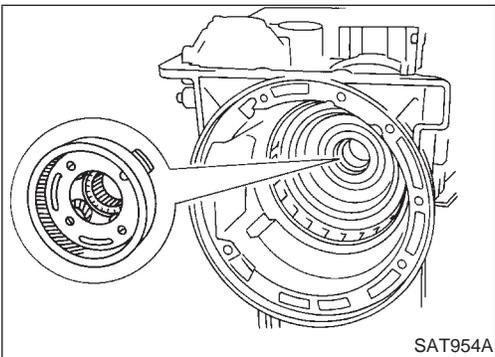
DISASSEMBLY



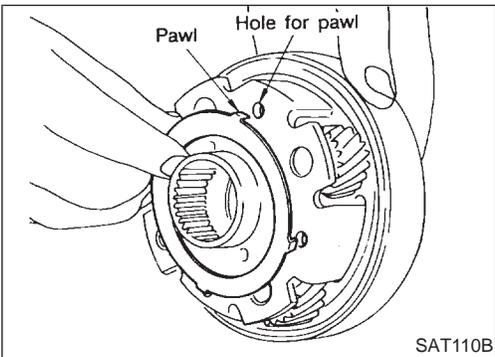
- d. Remove output shaft and parking gear as a unit from transmission case.
- e. Remove parking gear from output shaft.



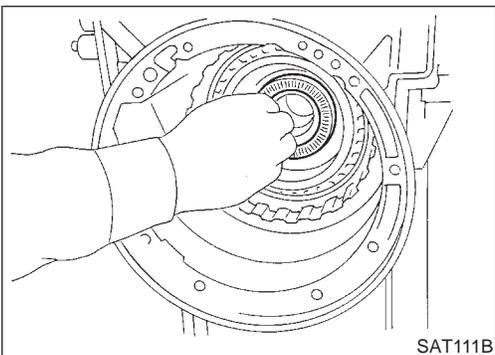
- f. Remove needle bearing from transmission case.



- 23. Remove rear side clutch and gear components.
 - a. Remove front internal gear.

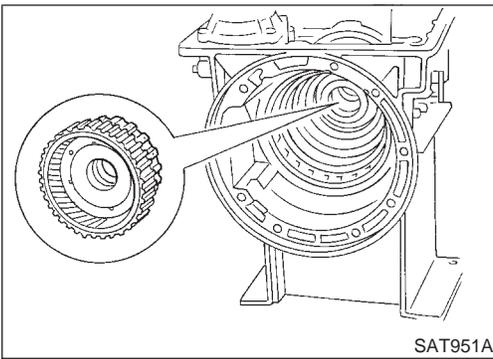


- b. Remove bearing race from front internal gear.



- c. Remove needle bearing from rear internal gear.

DISASSEMBLY



- d. Remove rear internal gear, forward clutch hub and overrun clutch hub as a set from transmission case.

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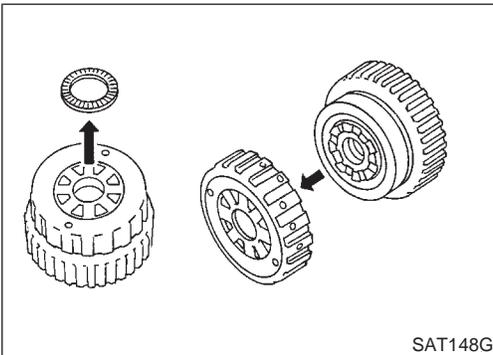
EC

- e. Remove needle bearing from overrun clutch hub.
f. Remove overrun clutch hub from rear internal gear and forward clutch hub.

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SAT148G

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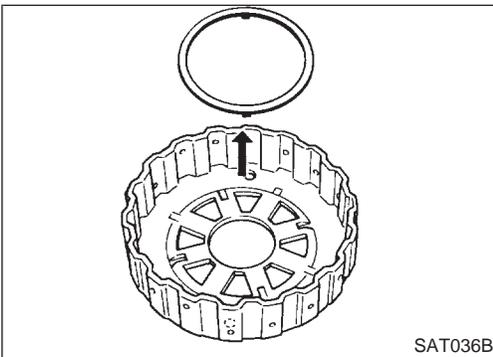
- g. Remove thrust washer from overrun clutch hub.

TF

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SAT036B

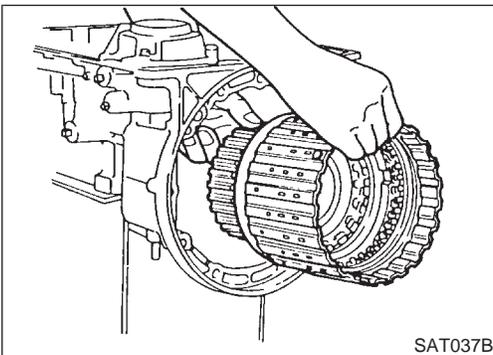
- h. Remove forward clutch assembly from transmission case.

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SAT037B

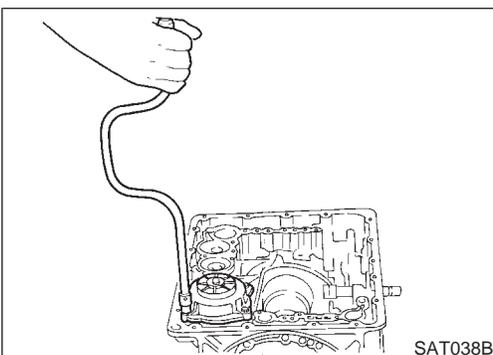
24. Remove band servo and accumulator components.
a. Remove band servo retainer from transmission case.

HA

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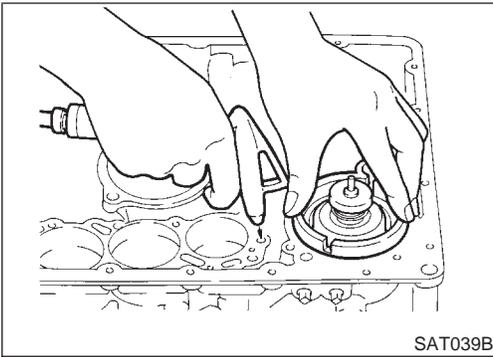
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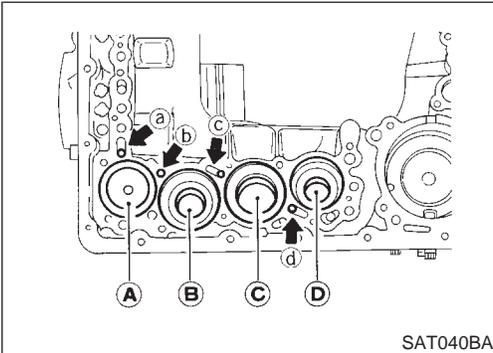


SAT038B

DISASSEMBLY

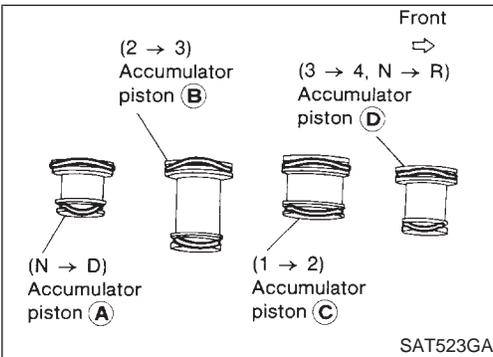


- b. Apply compressed air to oil hole until band servo piston comes out of transmission case.
- **Hold piston with a rag and gradually direct air to oil hole.**
- c. Remove return springs.

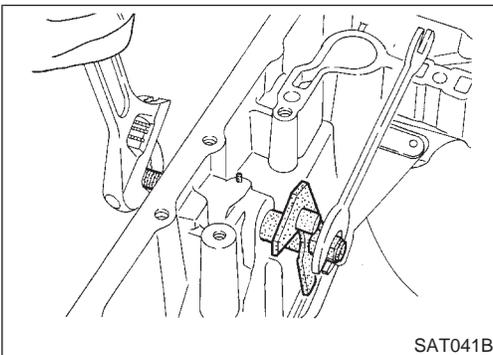


- d. Remove springs from accumulator pistons B, C and D.
- e. Apply compressed air to each oil hole until piston comes out.
- **Hold piston with a rag and gradually direct air to oil hole.**

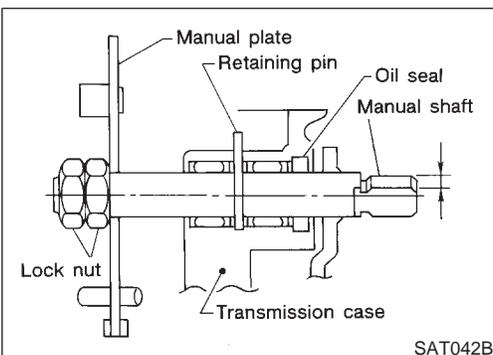
| | | | | |
|---------------------------------------|---|---|---|---|
| Identification of accumulator pistons | A | B | C | D |
| Identification of oil holes | a | b | c | d |



- f. Remove O-ring from each piston.

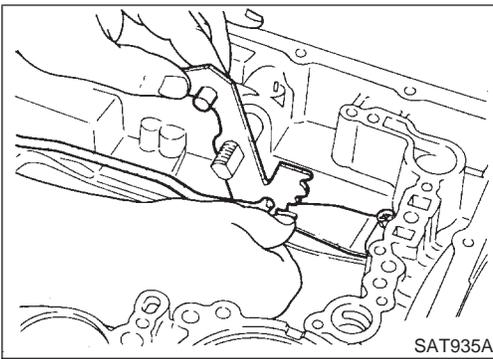


- 25. Remove manual shaft components, if necessary.
- a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.



- b. Remove retaining pin from transmission case.

DISASSEMBLY



- c. While pushing detent spring down, remove manual plate and parking rod from transmission case.

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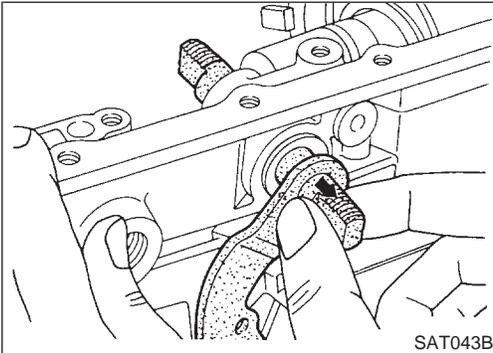
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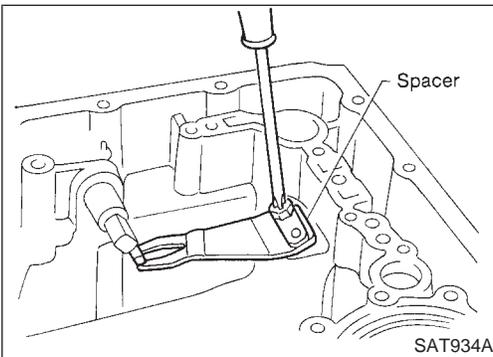
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- d. Remove manual shaft from transmission case.

AT



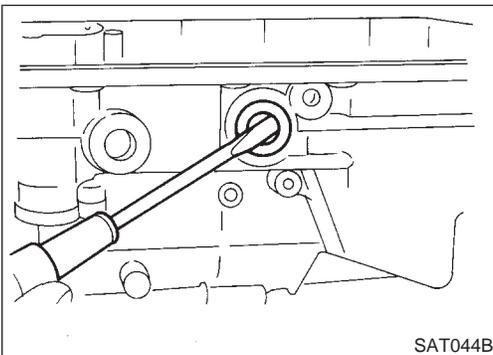
- e. Remove spacer and detent spring from transmission case.

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- f. Remove oil seal from transmission case.

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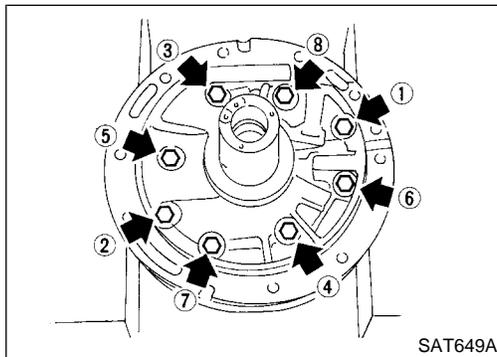
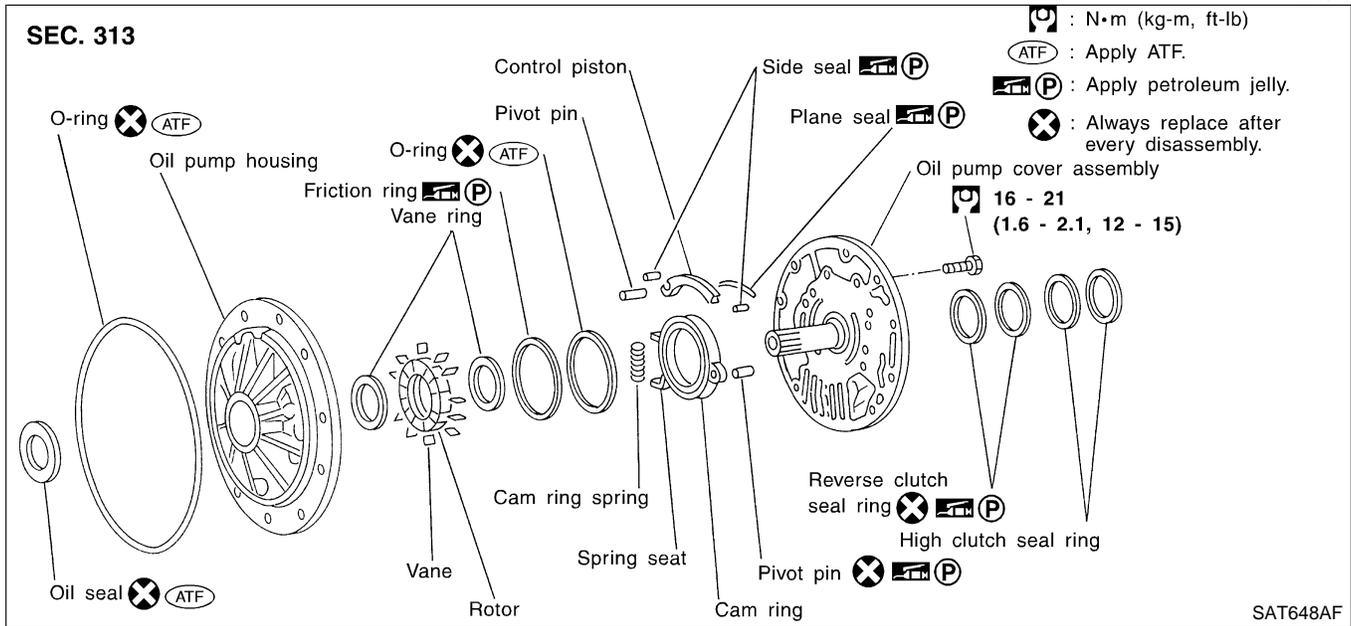
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REPAIR FOR COMPONENT PARTS

Oil Pump COMPONENTS

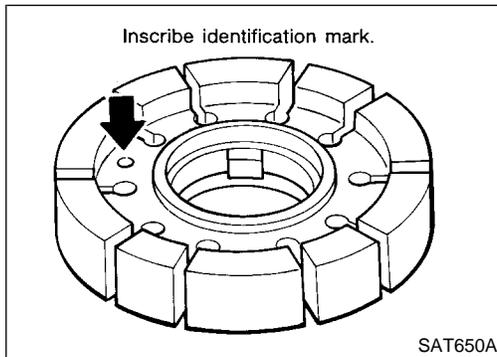
NAAT0112



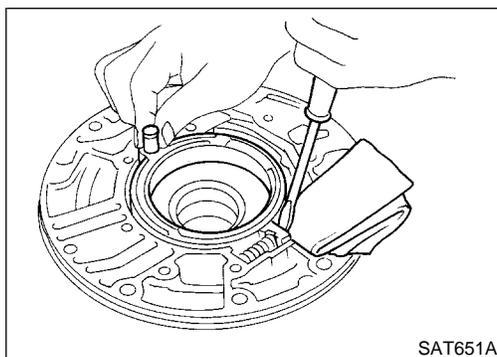
DISASSEMBLY

NAAT0113

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



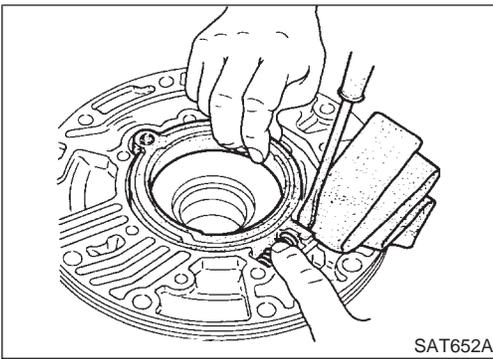
2. Remove rotor, vane rings and vanes.
 - **Inscribe a mark on back of rotor for identification of fore-aft direction when reassembling rotor. Then remove rotor.**



3. While pushing on cam ring remove pivot pin.
 - **Be careful not to scratch oil pump housing.**

REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)



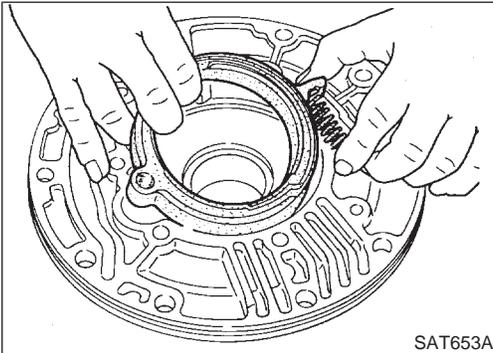
4. While holding cam ring and spring lift out cam ring spring.
 - Be careful not to damage oil pump housing.
 - Hold cam ring spring to prevent it from jumping.

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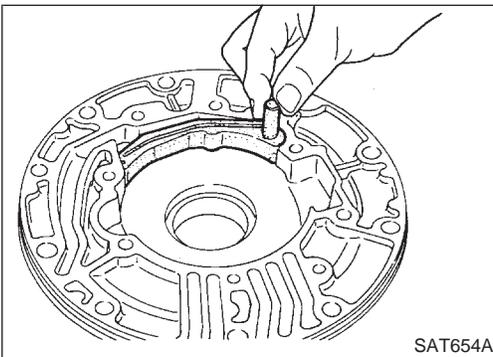
5. Remove cam ring and cam ring spring from oil pump housing.

EC

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6. Remove pivot pin from control piston and remove control piston assembly.

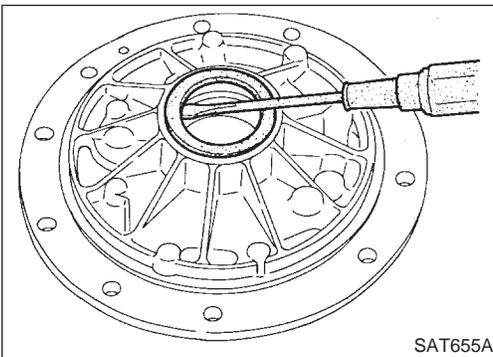
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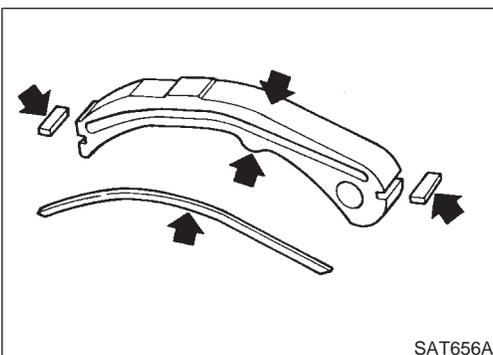
7. Remove oil seal from oil pump housing.
 - Be careful not to scratch oil pump housing.

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INSPECTION

Oil Pump Cover, Rotor, Vanes, Control Piston, Side

NAAT0114

HA

- Check for wear or damage.

NAAT0114S01

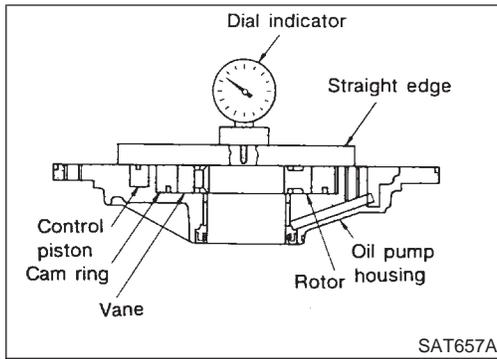
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REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)



Side Clearances

- Measure side clearances between end of oil pump housing and cam ring, rotor, vanes and control piston. Measure in at least four places along their circumferences. Maximum measured values should be within specified positions.
- **Before measurement, check that friction rings, O-ring, control piston side seals and cam ring spring are removed.**

Standard clearance (Cam ring, rotor, vanes and control piston):

Refer to SDS, AT-357.

- If not within standard clearance, replace oil pump assembly except oil pump cover assembly.

Seal Ring Clearance

- Measure clearance between seal ring and ring groove.

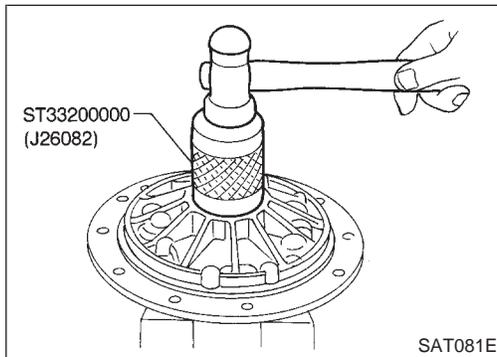
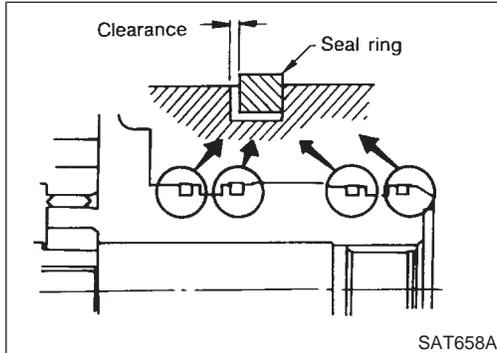
Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Wear limit:

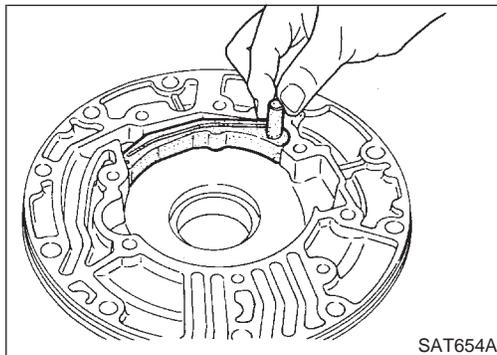
0.25 mm (0.0098 in)

- If not within wear limit, replace oil pump cover assembly.

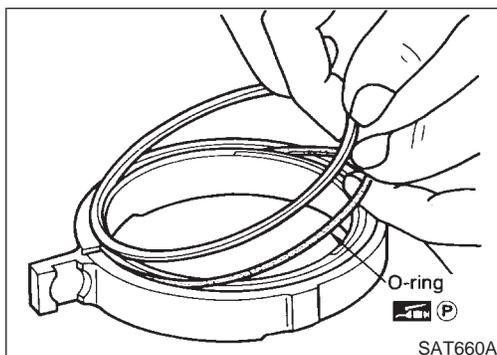


ASSEMBLY

1. Drive oil seal into oil pump housing.
 - **Apply ATF to outer periphery and lip surface.**



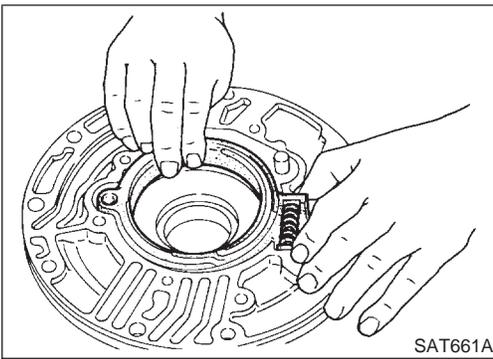
2. Install cam ring in oil pump housing by the following
 - a. Install side seal on control piston.
 - **Pay attention to its direction — Black surface goes toward control piston.**
 - **Apply petroleum jelly to side seal.**
 - b. Install control piston on oil pump.



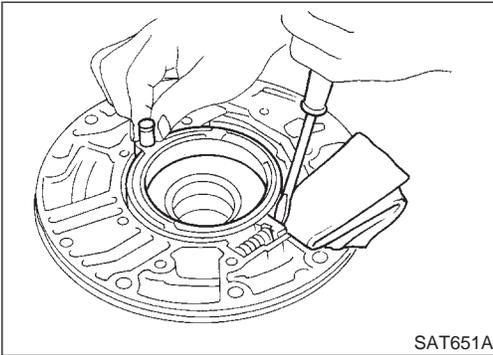
- c. Install O-ring and friction ring on cam ring.
 - **Apply petroleum jelly to O-ring.**

REPAIR FOR COMPONENT PARTS

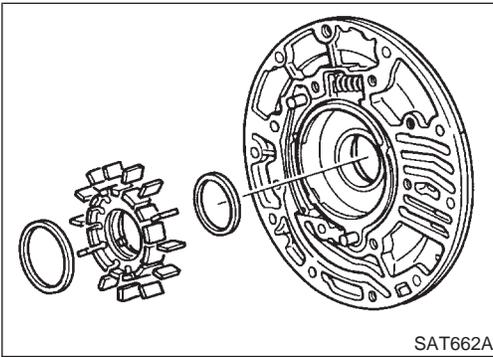
Oil Pump (Cont'd)



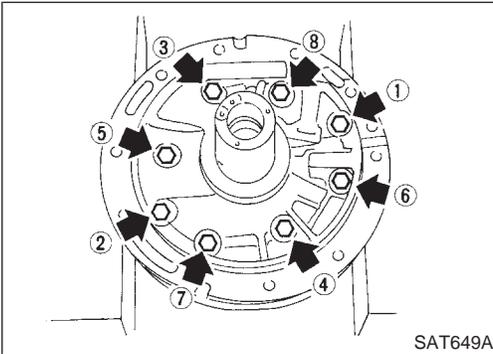
- d. Assemble cam ring, cam ring spring and spring seat. Install spring by pushing it against pump housing.



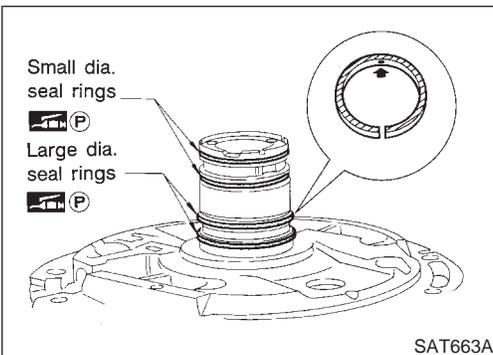
- e. While pushing on cam ring install pivot pin.



3. Install rotor, vanes and vane rings.
 ● Pay attention to direction of rotor.



4. Install oil pump housing and oil pump cover.
 a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly in oil pump housing assembly, then remove masking tape.
 b. Tighten bolts in a criss-cross pattern.



5. Install new seal rings carefully after packing ring grooves with petroleum jelly. Press rings down into jelly to a close fit.
 ● Seal rings come in two different diameters. Check fit carefully in each groove.
 Small dia. seal ring:
 No mark
 Large dia. seal ring:
 Yellow mark in area shown by arrow
 ● Do not spread gap of seal ring excessively while installing. It may deform ring.

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REPAIR FOR COMPONENT PARTS

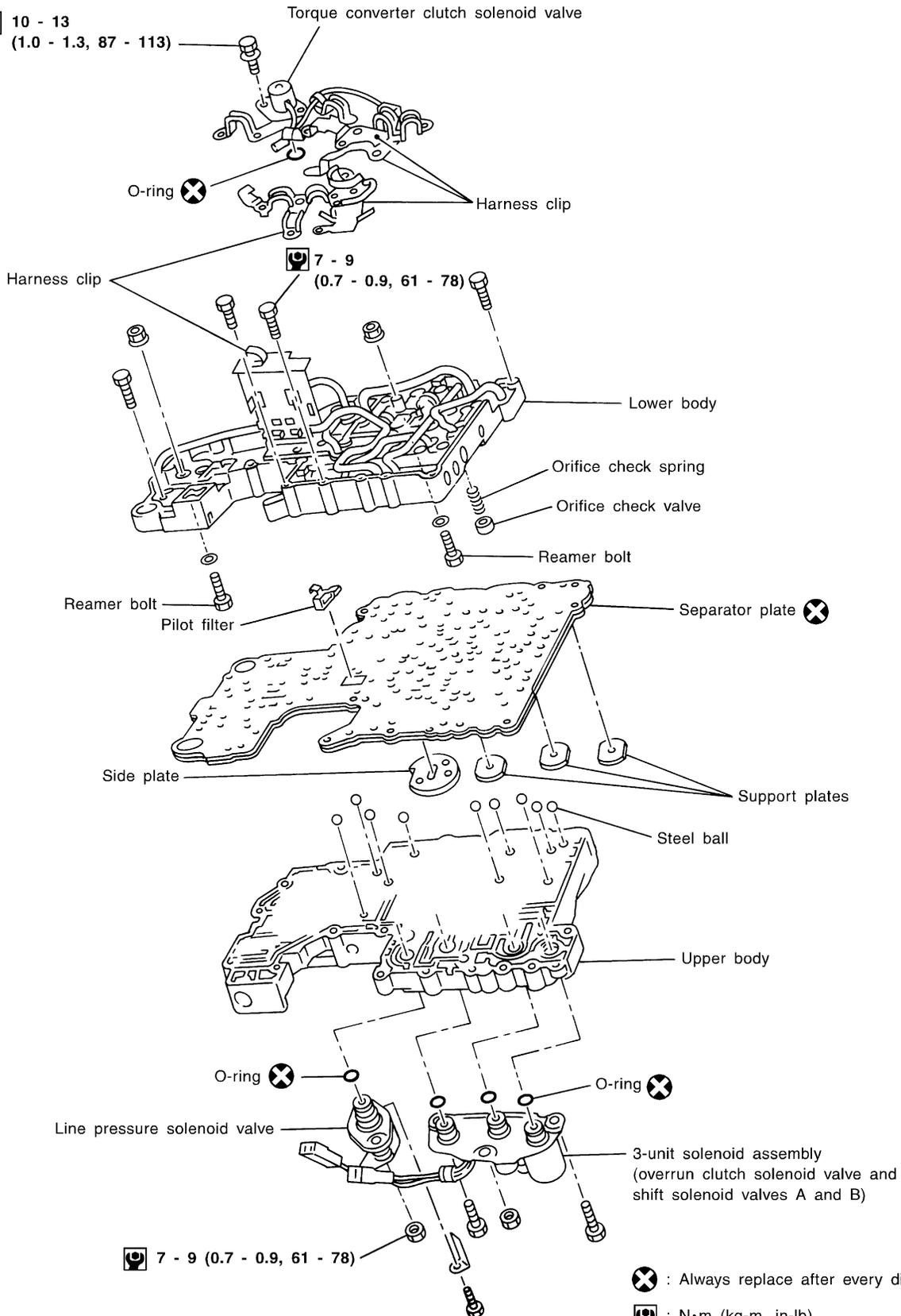
Control Valve Assembly

Control Valve Assembly COMPONENTS

NAAT0116

SEC. 317

 10 - 13
(1.0 - 1.3, 87 - 113)



 : Always replace after every disassembly.

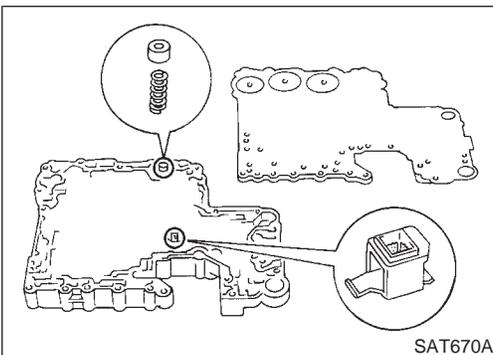
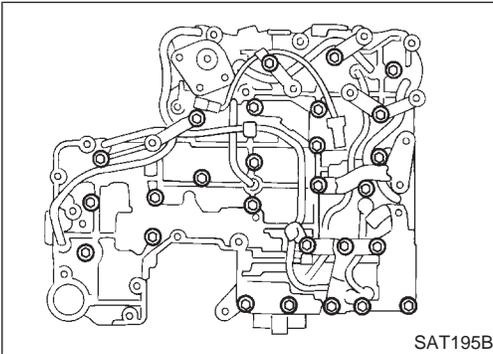
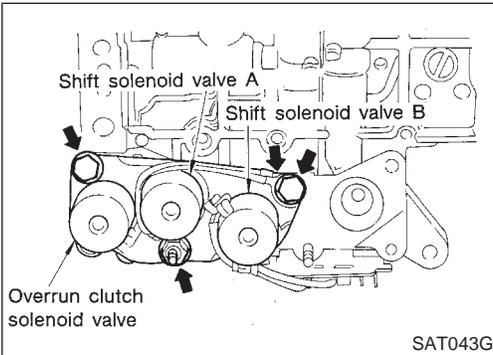
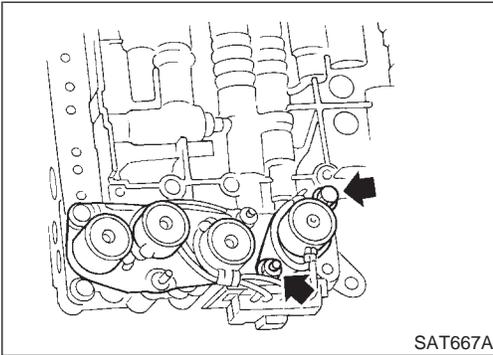
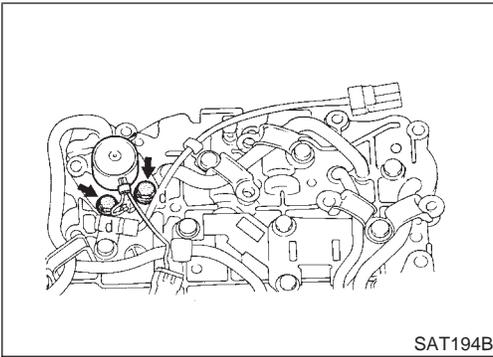
 : N•m (kg-m, in-lb)

SAT156KA

REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

NAAT0117



DISASSEMBLY

1. Remove solenoids.
 - a. Remove torque converter clutch solenoid valve and side plate from lower body.
 - b. Remove O-ring from solenoid.

- c. Remove line pressure solenoid valve from upper body.
- d. Remove O-ring from solenoid.

- e. Remove 3-unit solenoid assembly from upper body.
- f. Remove O-rings from solenoids.

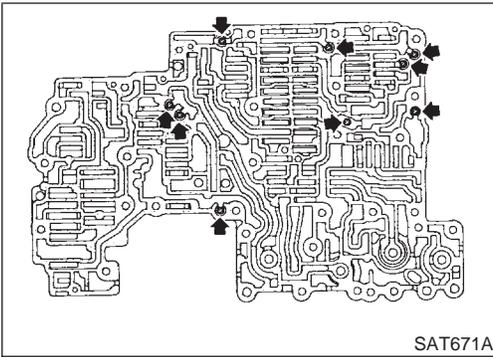
2. Disassemble upper and lower bodies.
 - a. Place upper body facedown, and remove bolts, reamer bolts and support plates.
 - b. Remove lower body, separator plate as a unit from upper body.
 - **Be careful not to drop pilot filter, orifice check valve, spring and steel balls.**

- c. Place lower body facedown, and remove separator plate.
- d. Remove pilot filter, orifice check valve and orifice check spring.

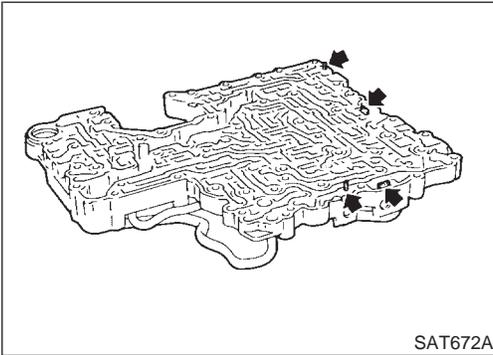
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REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)



- e. Check to see that steel balls are properly positioned in upper body. Then remove them from upper body.

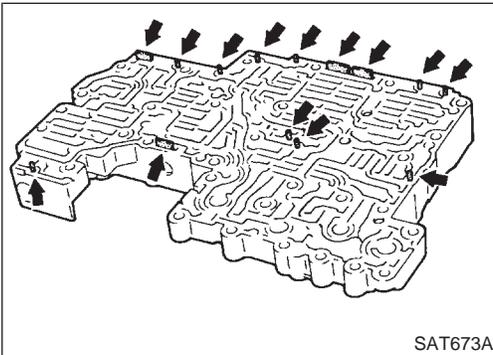


INSPECTION Lower and Upper Bodies

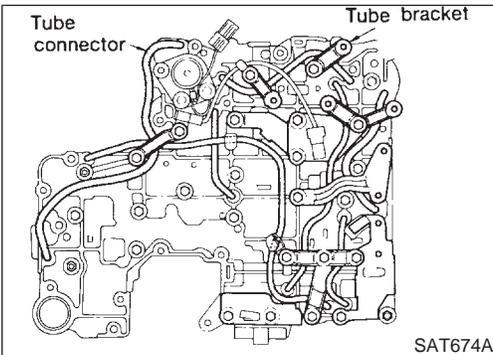
NAAT0118

NAAT0118S01

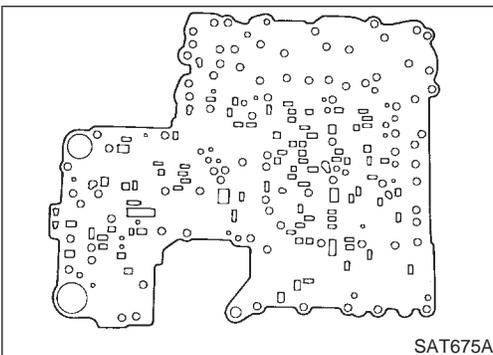
- Check to see that there are pins and retainer plates in lower body.



- Check to see that there are pins and retainer plates in upper body.
- **Be careful not to lose these parts.**



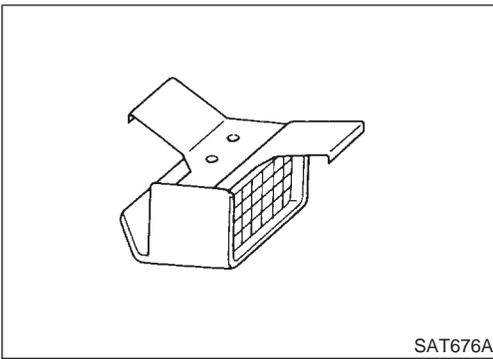
- Check to make sure that oil circuits are clean and free from damage.
- Check tube brackets and tube connectors for damage.



Separator Plate

NAAT0118S02

- Make sure that separator plate is free of damage and not deformed and oil holes are clean.



SAT676A

Pilot Filter

- Check to make sure that filter is not clogged or damaged.

NAAT0118S03

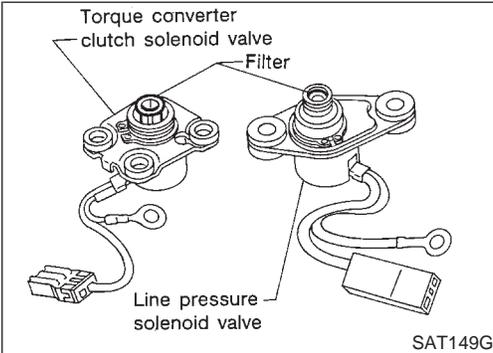
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SAT149G

Torque Converter Clutch Solenoid Valve

- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Component Inspection", AT-155.

NAAT0118S04

FE

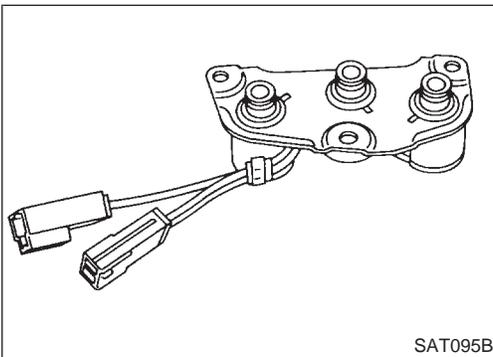
Line Pressure Solenoid Valve

- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Component Inspection", AT-170.

NAAT0118S05

CL

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SAT095B

3-Unit Solenoid Assembly (Overrun Clutch Solenoid Valve and Shift Solenoid Valves A and B)

- Measure resistance of each solenoid. Refer to "Component Inspection", AT-174, AT-178 and AT-189.

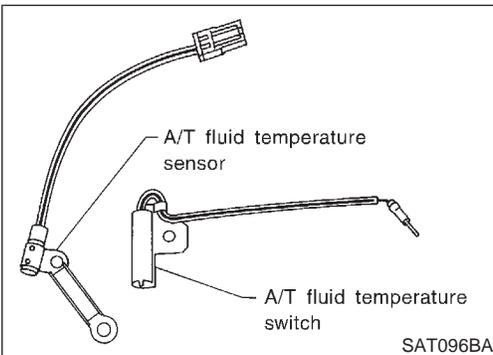
NAAT0118S06

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SAT096BA

A/T Fluid Temperature Sensor and Switch

- Measure resistance. Refer to "Component Inspection", AT-113 and AT-261.

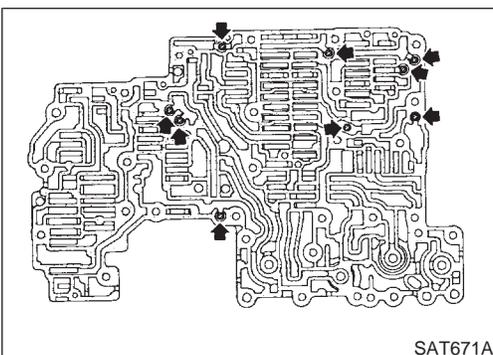
NAAT0118S07

BR

ST

RS

BT



SAT671A

ASSEMBLY

1. Install upper and lower bodies.
- a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

NAAT0119

HA

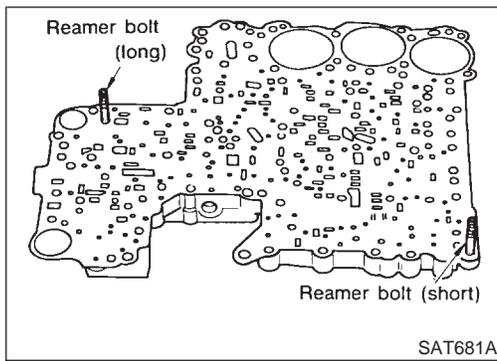
SC

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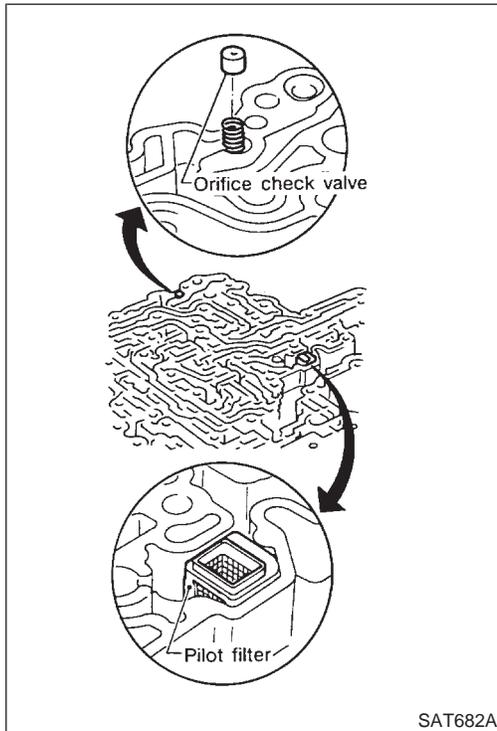
IDX

REPAIR FOR COMPONENT PARTS

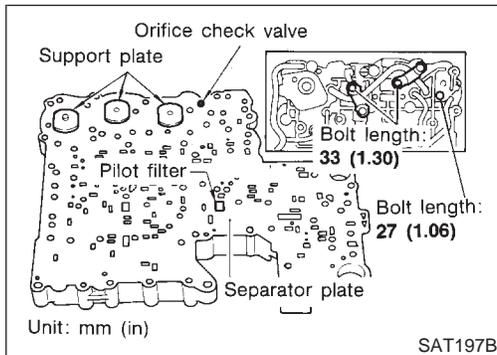
Control Valve Assembly (Cont'd)



b. Install reamer bolts from bottom of upper body.

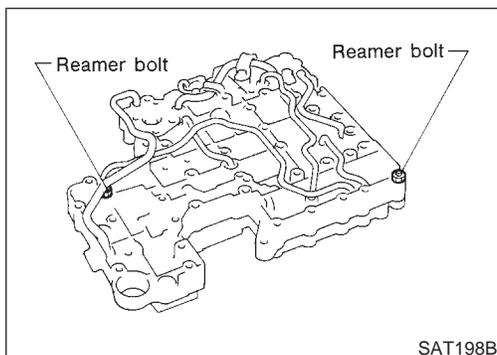


c. Place oil circuit of lower body face up. Install orifice check spring, orifice check valve and pilot filter.



d. Install lower separator plate on lower body.

e. Install and temporarily tighten support plates, A/T fluid temperature sensor and tube brackets.

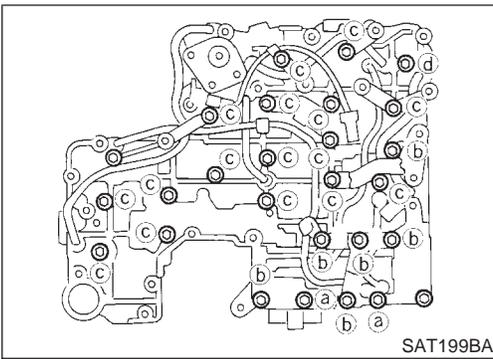


f. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.

● Be careful not to dislocate or drop steel balls, orifice check spring, orifice check valve and pilot filter.

REPAIR FOR COMPONENT PARTS

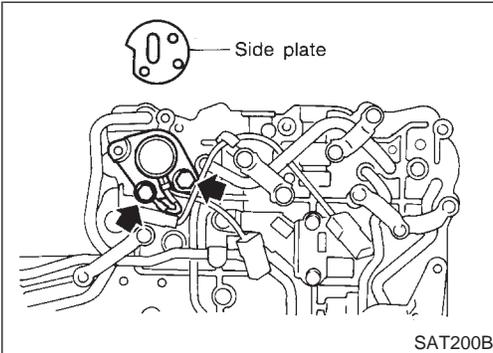
Control Valve Assembly (Cont'd)



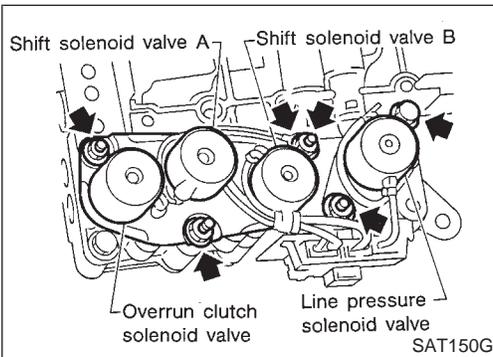
- g. Install and temporarily tighten bolts and tube brackets in their proper locations.

Bolt length and location:

| Bolt symbol | a | b | c | d |
|---------------------|-----------|-----------|-----------|-----------|
| Bolt length mm (in) | 70 (2.76) | 50 (1.97) | 33 (1.30) | 27 (1.06) |



2. Install solenoids.
- a. Attach O-ring and install torque converter clutch solenoid valve and side plates onto lower body.



- b. Attach O-rings and install 3-unit solenoids assembly onto upper body.
- c. Attach O-ring and install line pressure solenoid valve onto upper body.
3. Tighten all bolts.

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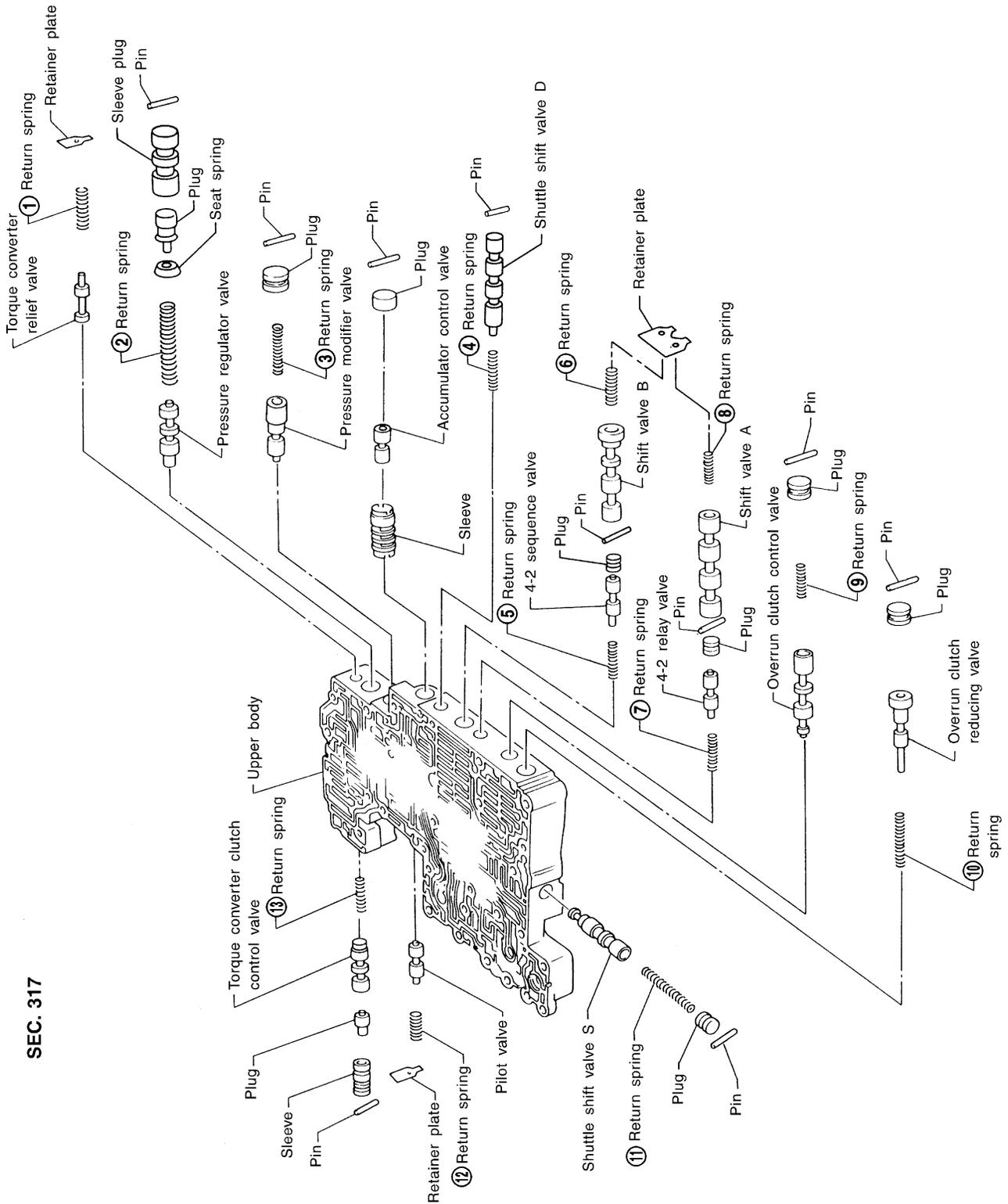
REPAIR FOR COMPONENT PARTS

Control Valve Upper Body

Control Valve Upper Body

COMPONENTS

NAAAT0120



SEC. 317

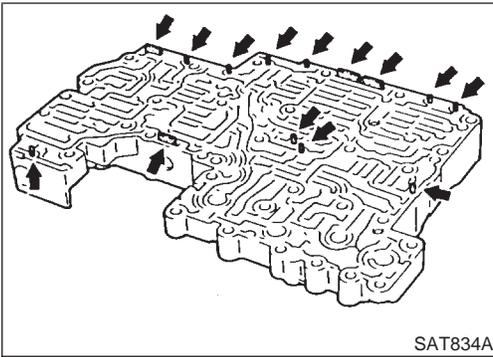
SAT142JA

Apply ATF to all components before their installation.
 Numbers preceding valve springs correspond with those shown in SDS on page AT-354.

REPAIR FOR COMPONENT PARTS

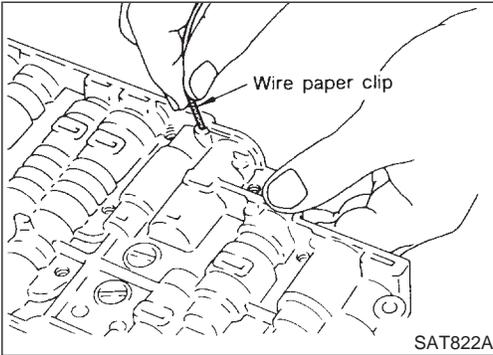
Control Valve Upper Body (Cont'd)

NAAT0121

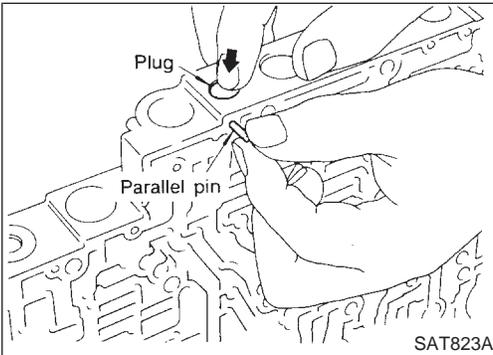


DISASSEMBLY

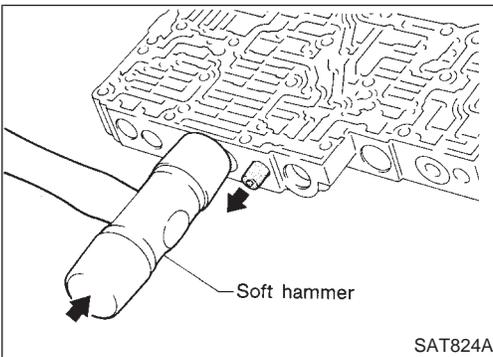
1. Remove valves at parallel pins.
 - Do not use a magnetic hand.



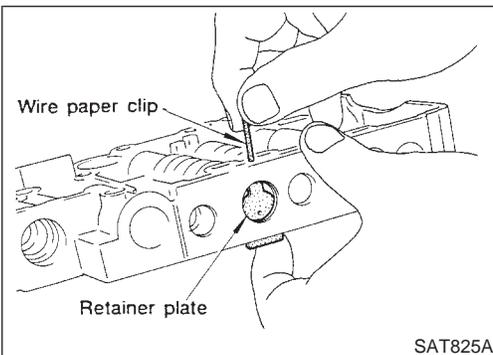
- a. Use a wire paper clip to push out parallel pins.



- b. Remove parallel pins while pressing their corresponding plugs and sleeves.
 - Remove plug slowly to prevent internal parts from jumping out.



- c. Place mating surface of valve facedown, and remove internal parts.
 - If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer.
 - Be careful not to drop or damage valves and sleeves.

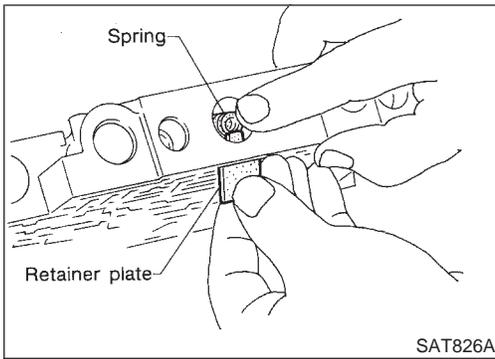


2. Remove valves at retainer plates.
 - a. Pry out retainer plate with wire paper clip.

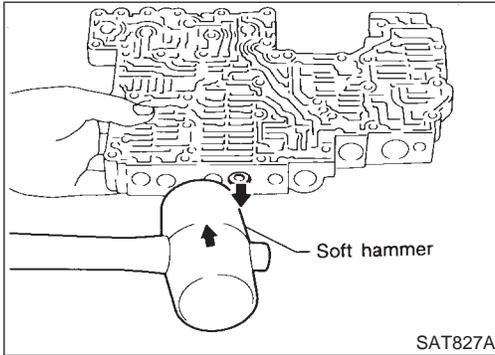
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REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

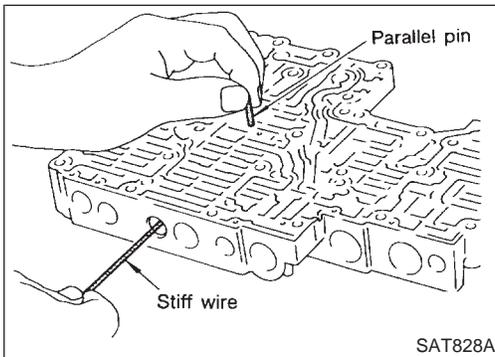


b. Remove retainer plates while holding spring.

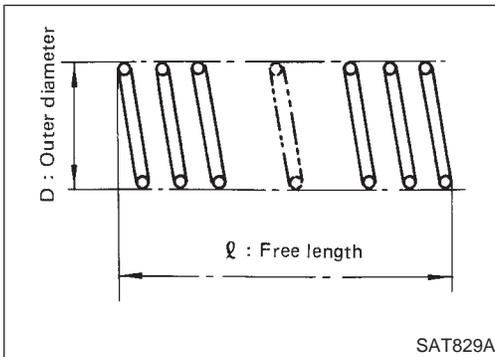


c. Place mating surface of valve facedown, and remove internal parts.

- If a valve is hard to remove, lightly tap valve body with a soft hammer.
- Be careful not to drop or damage valves, sleeves, etc.



- 4-2 sequence valve and relay valve are located far back in upper body. If they are hard to remove, carefully push them out using stiff wire.
- Be careful not to scratch sliding surface of valve with wire.



INSPECTION

Valve Springs

NAAT0122

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

Inspection standard:

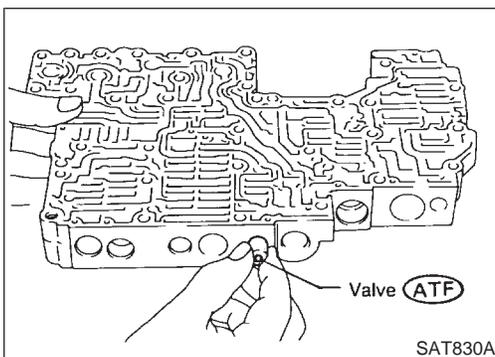
Refer to SDS, AT-354.

- Replace valve springs if deformed or fatigued.

Control Valves

NAAT0122S02

- Check sliding surfaces of valves, sleeves and plugs.



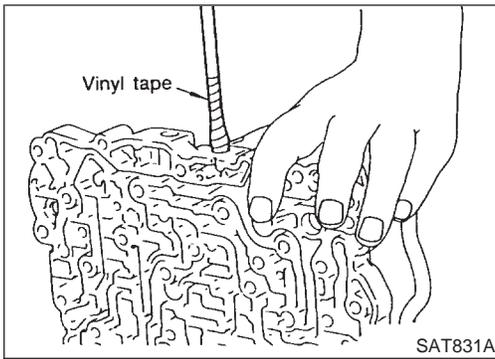
ASSEMBLY

1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.

- Be careful not to scratch or damage valve body.

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)



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

GI

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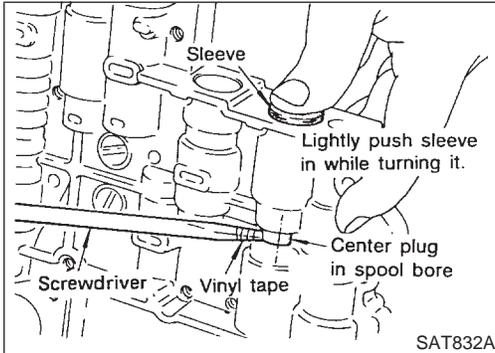
LC

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CL

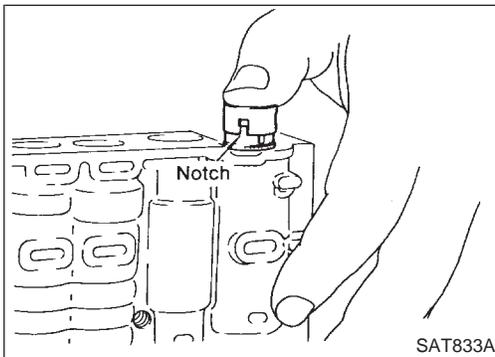
MT



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.

AT



Accumulator control plug

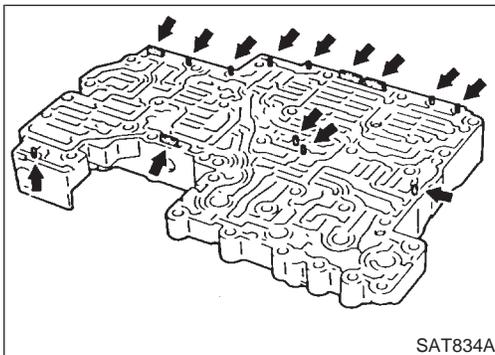
- Align protrusion of accumulator control sleeve with notch in plug.
- Align parallel pin groove in plug with parallel pin, and install accumulator control valve.

TF

PD

AX

SU



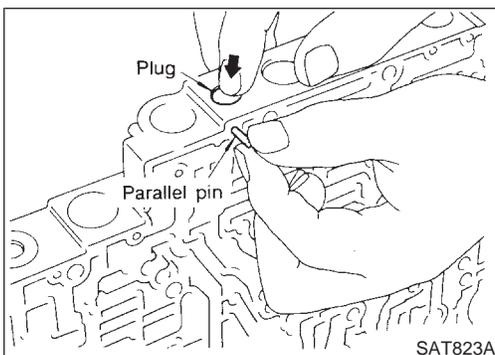
2. Install parallel pins and retainer plates.

BR

ST

RS

BT



- While pushing plug, install parallel pin.

HA

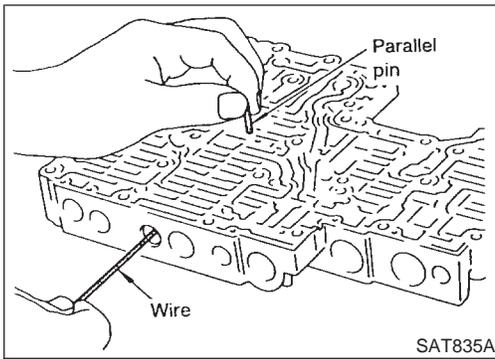
SC

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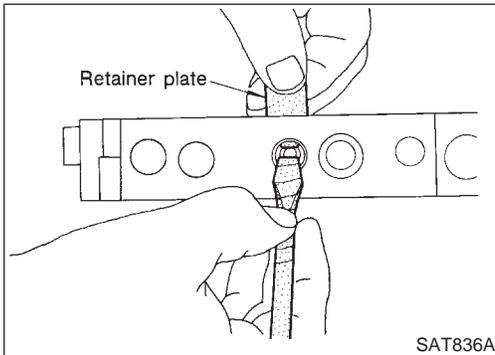
REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)



4-2 sequence valve and relay valve

- Push 4-2 sequence valve and relay valve with wire wrapped in vinyl tape to prevent scratching valve body. Install parallel pins.

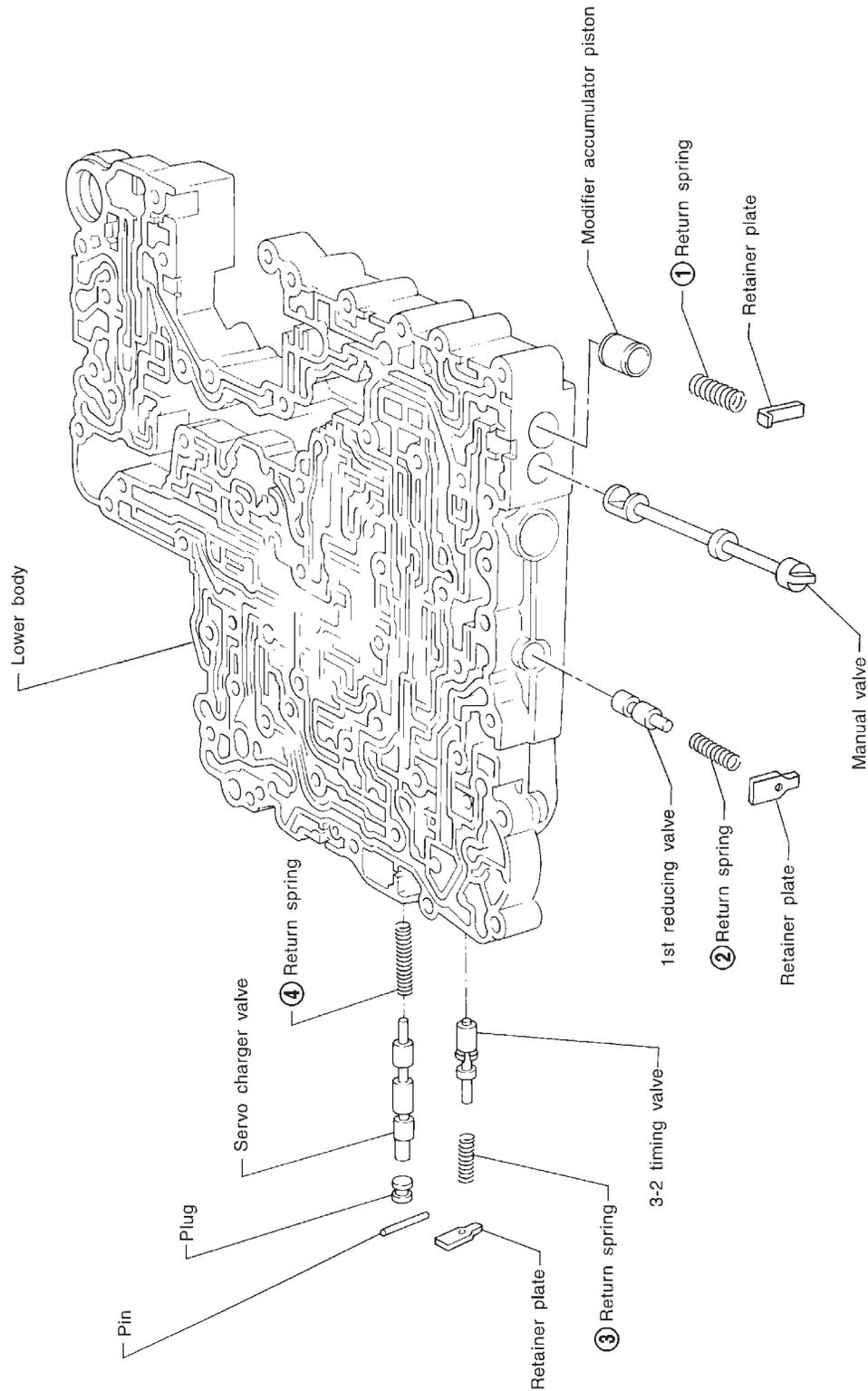


- Insert retainer plate while pushing spring.

COMPONENTS

Control Valve Lower Body

NAAT0124



SEC. 317

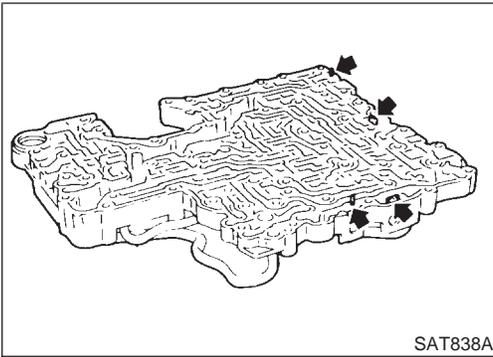
SAT966I

Apply ATF to all components before their installation.
 Numbers preceding valve springs correspond with those shown in SDS on page AT-354.

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REPAIR FOR COMPONENT PARTS

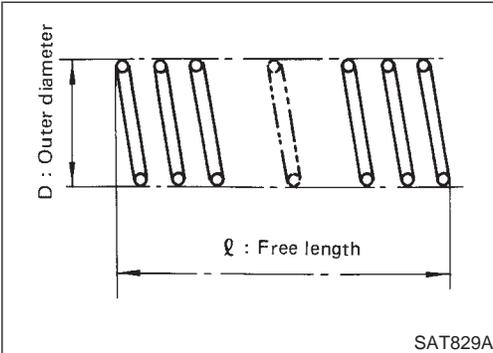
Control Valve Lower Body (Cont'd)



DISASSEMBLY

NAAT0125

1. Remove valves at parallel pins.
 2. Remove valves at retainer plates.
- For removal procedures, refer to "DISASSEMBLY" of Control Valve Upper Body.



INSPECTION

NAAT0126

Valve Springs

NAAT0126S01

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

Inspection standard:

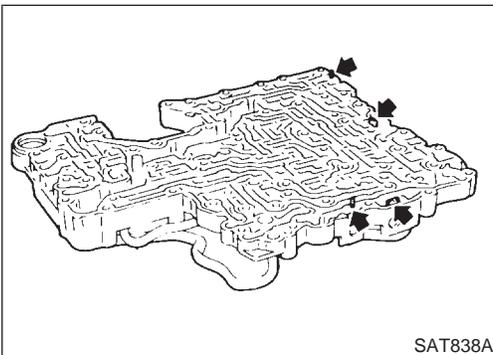
Refer to SDS, AT-354.

- Replace valve springs if deformed or fatigued.

Control Valves

NAAT0126S02

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



ASSEMBLY

NAAT0127

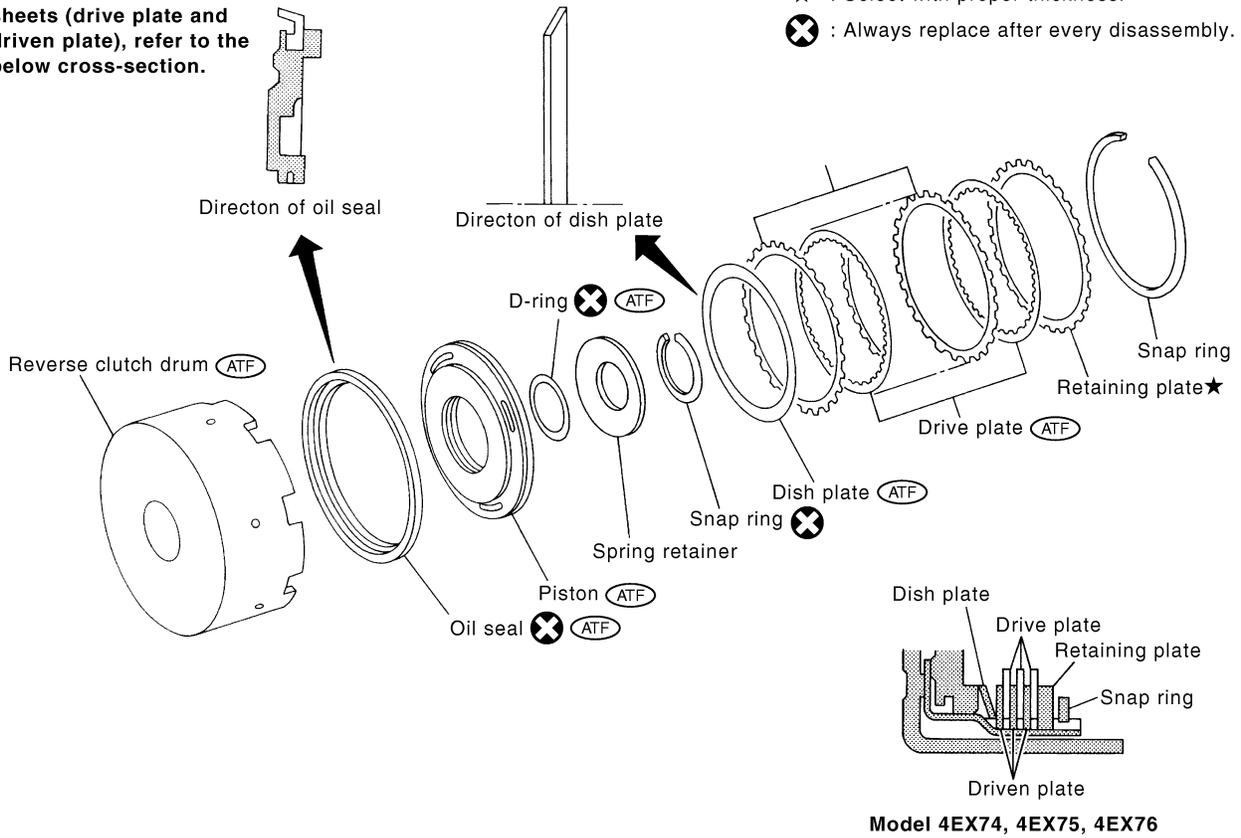
- Install control valves.
- For installation procedures, refer to "ASSEMBLY" of Control Valve Upper Body, AT-306.

Reverse Clutch COMPONENTS

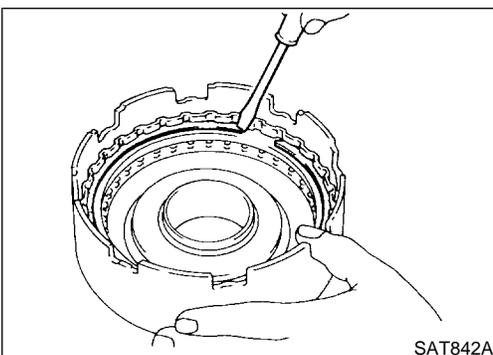
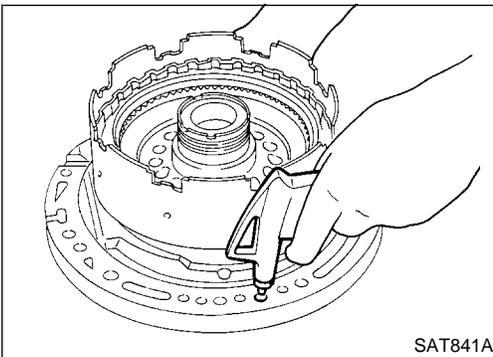
NAAT0128

SEC. 315

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



SAT699K



DISASSEMBLY

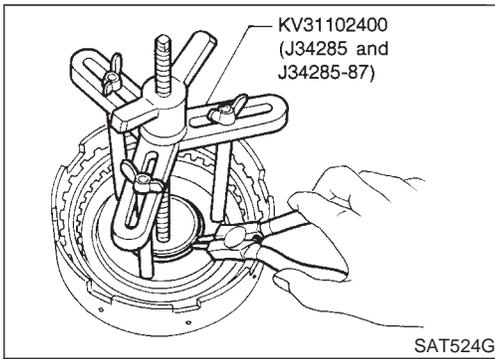
NAAT0129

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.
 - Lip seal might be damaged.
 - Fluid might be leaking past piston check ball.
2. Remove drive plates, driven plates, retaining plate, dish plate and snap ring.

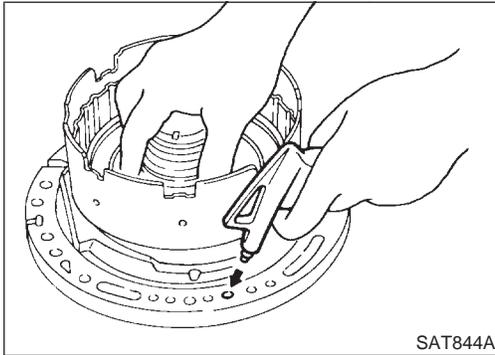
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REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)



3. Remove snap ring from clutch drum while compressing clutch springs.
 - **Do not expand snap ring excessively.**
4. Remove spring retainer.



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.

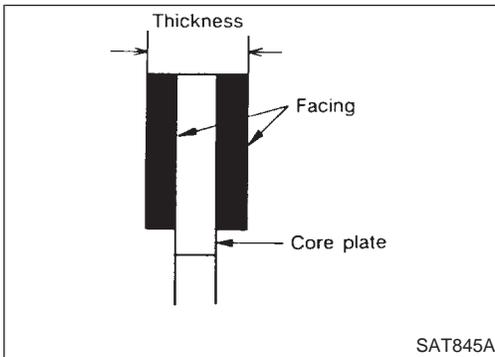
INSPECTION

Reverse Clutch Snap Ring and Spring Retainer

- Check for deformation, fatigue or damage.

NAAT0130

NAAT0130S01



Reverse Clutch Drive Plates

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

Thickness of drive plate:

Standard value: 1.90 - 2.05 mm (0.0748 - 0.0807 in)

Wear limit: 1.80 mm (0.0709 in)

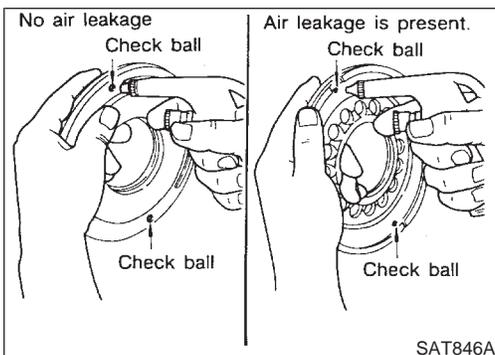
- If not within wear limit, replace.

NAAT0130S03

Reverse Clutch Dish Plate

- Check for deformation or damage.

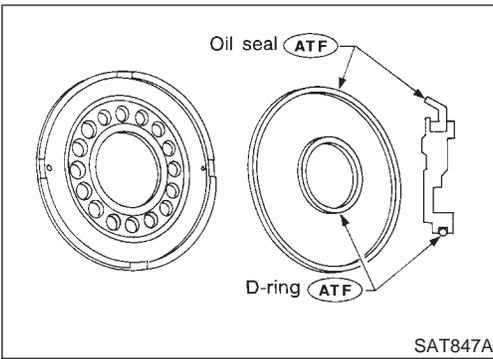
NAAT0130S04



Reverse Clutch Piston

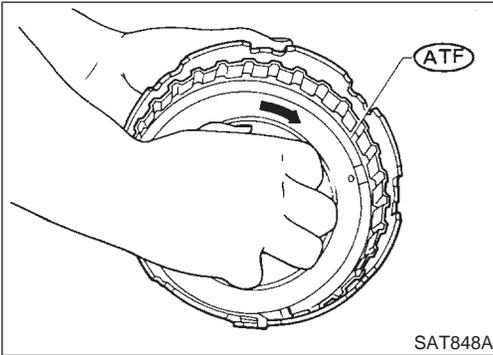
- Shake piston to assure that balls are not seized.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Also apply compressed air to oil hole on return spring side to assure that air leaks past ball.

NAAT0130S05

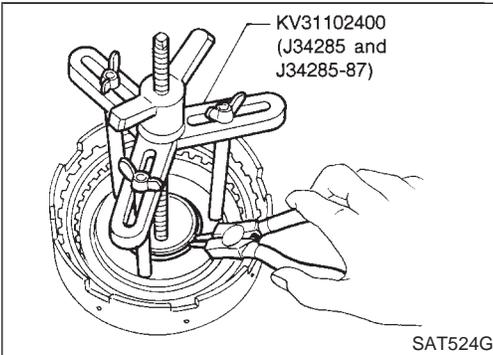


ASSEMBLY

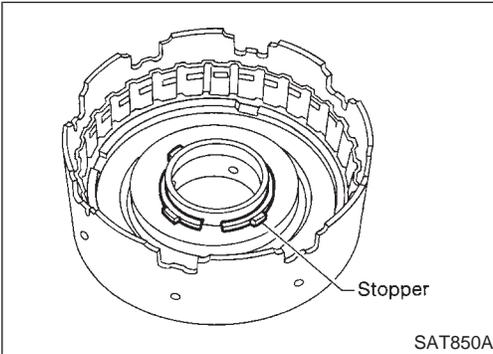
1. Install D-ring and oil seal on piston.
 - **Apply ATF to both parts.**



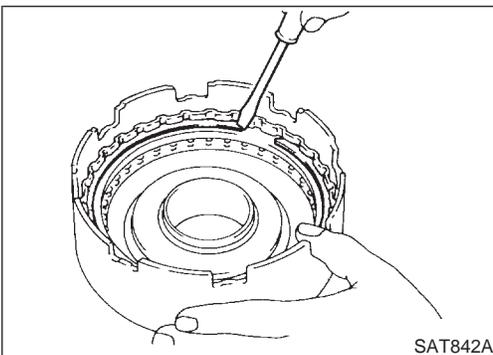
2. Install piston assembly by turning it slowly and evenly.
 - **Apply ATF to inner surface of drum.**
3. Install spring retainer.



4. Install snap ring while compressing clutch springs.



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

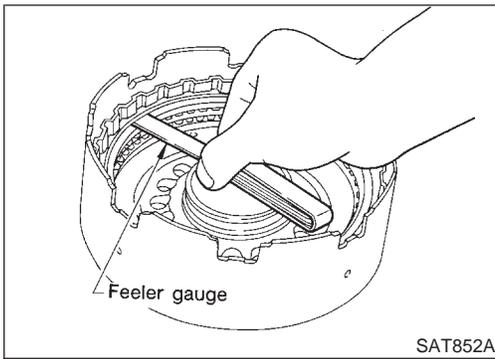


5. Install drive plates, driven plates, retaining plate and dish plate.
6. Install snap ring.

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REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)



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

Specified clearance:

Standard

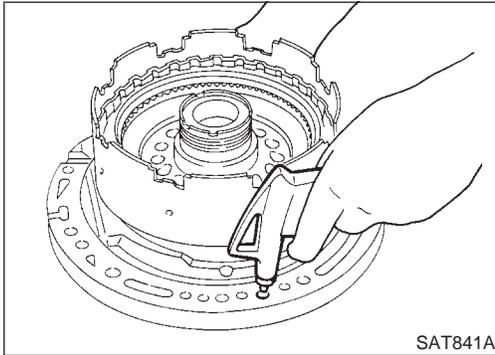
0.5 - 0.8 mm (0.020 - 0.031 in)

Allowable limit

1.2 mm (0.047 in)

Retaining plate:

Refer to SDS, AT-355.



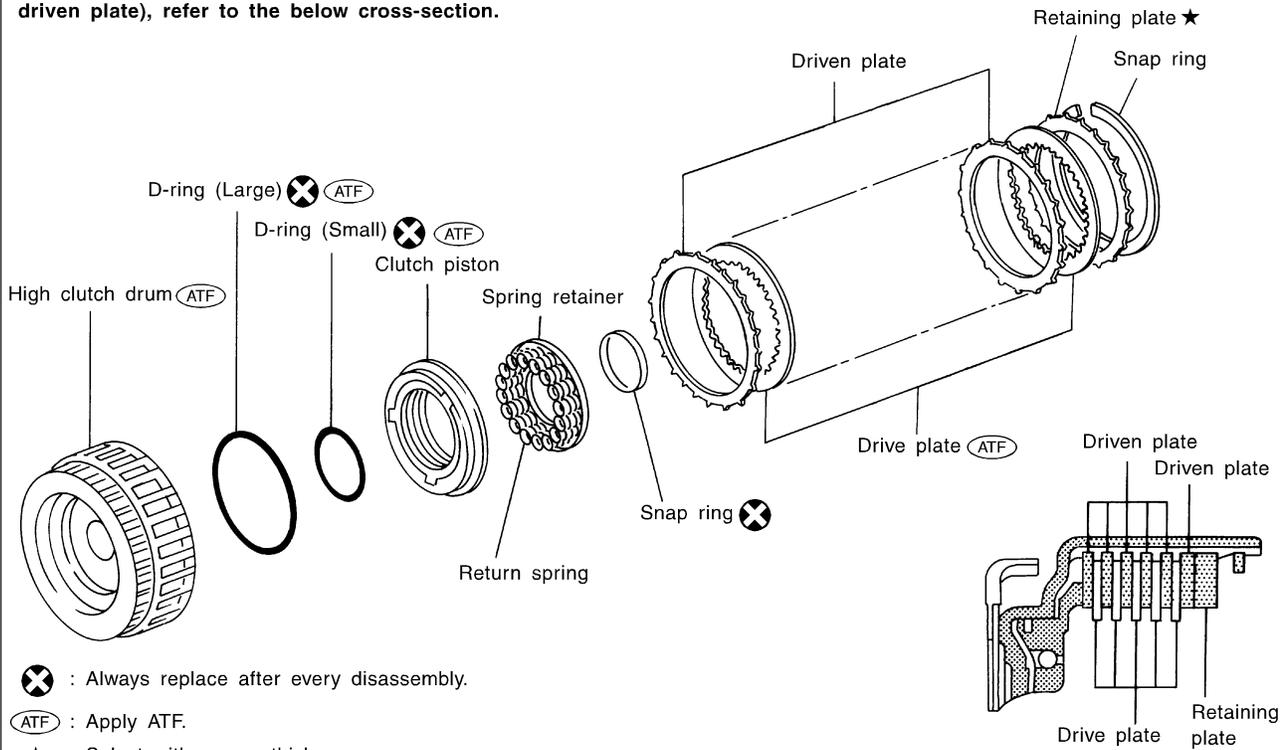
8. Check operation of reverse clutch.
Refer to "DISASSEMBLY" of Reverse Clutch, AT-311.

High Clutch COMPONENTS

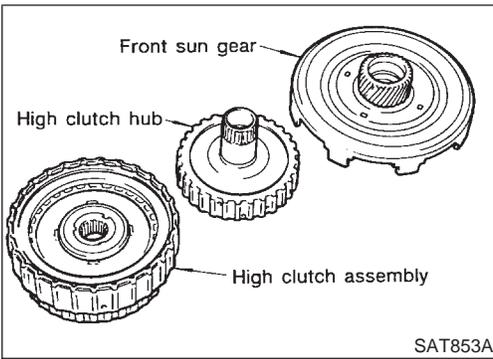
NAAAT0132

SEC. 315

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

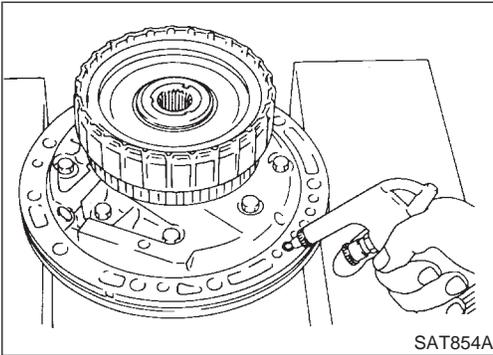


SAT158KA

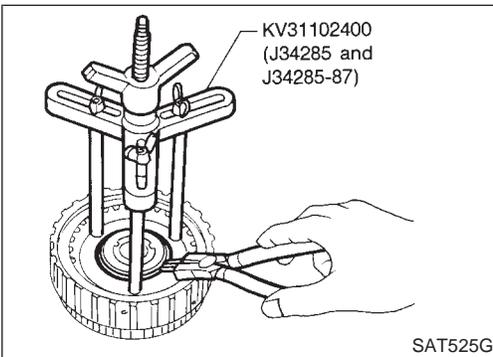


DISASSEMBLY AND ASSEMBLY

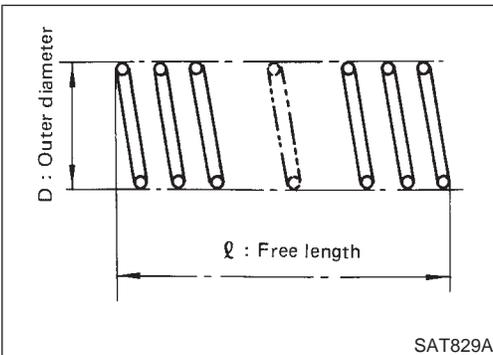
Service procedures for high clutch are essentially the same as those for reverse clutch, with the following exception:



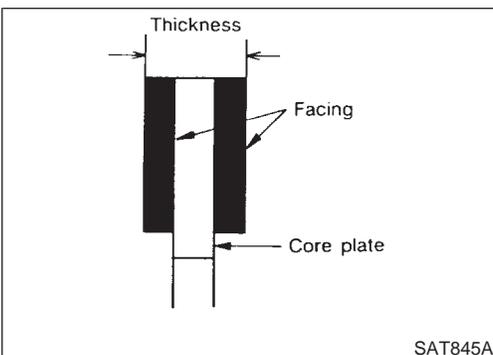
- Check of high clutch operation



- Removal and installation of return spring



- Inspection of high clutch return springs
Inspection standard:
Refer to SDS, AT-354.

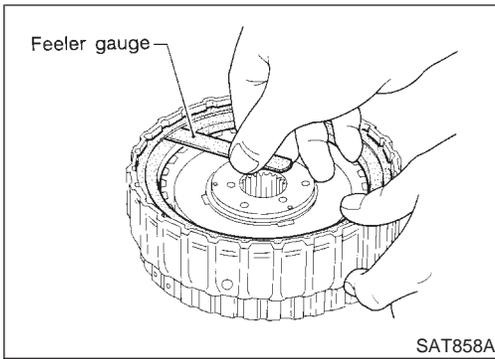


- Inspection of high clutch drive plate
Thickness of drive plate:
Standard
1.52 - 1.67 mm (0.0598 - 0.0657 in)
Wear limit
1.40 mm (0.0551 in)

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REPAIR FOR COMPONENT PARTS

High Clutch (Cont'd)



- Measurement of clearance between retaining plate and snap ring

Specified clearance:

Standard

1.8 - 2.2 mm (0.071 - 0.087 in)

Allowable limit

3.2 mm (0.126 in)

Retaining plate:

Refer to SDS, AT-355.

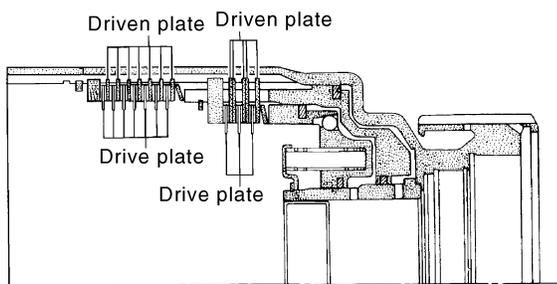
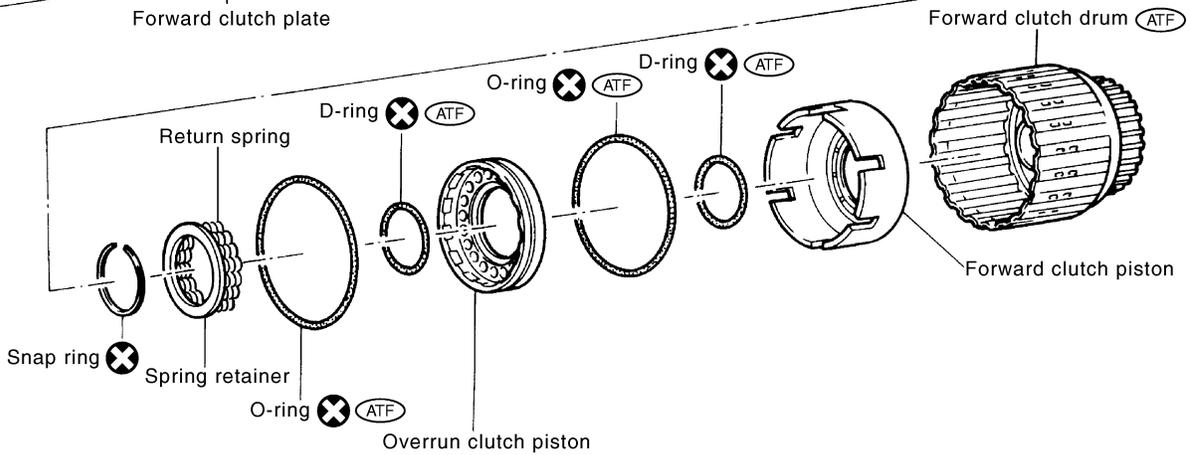
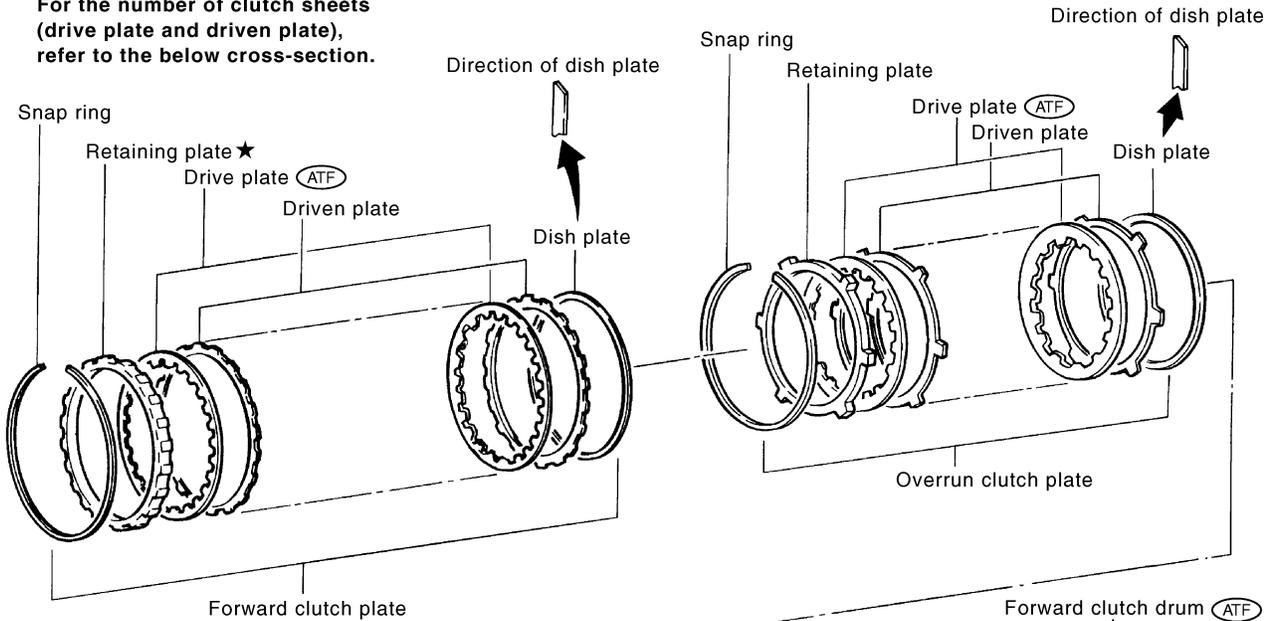
Forward and Overrun Clutches COMPONENTS

NAAT0134

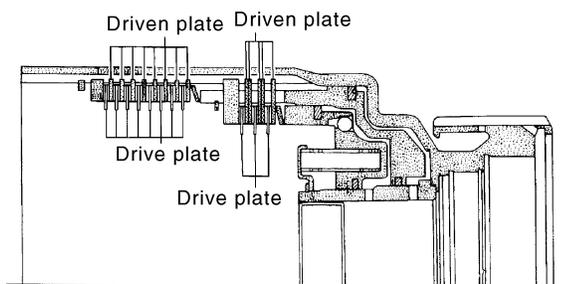
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SEC. 315

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



Model 4EX74 (2WD)



Model 4EX75, 4EX76 (4WD)

(ATF) : Apply ATF.

★ : Select with proper thickness.

⊗ : Always replace after every disassembly.

SAT711K

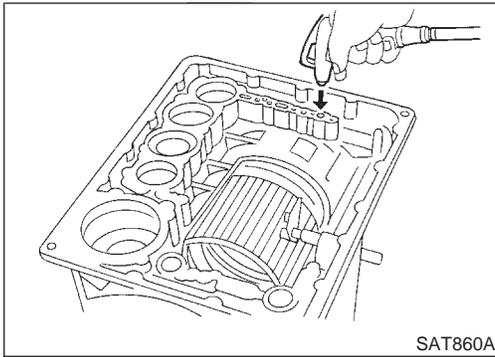
REPAIR FOR COMPONENT PARTS

Forward and Overrun Clutches (Cont'd)

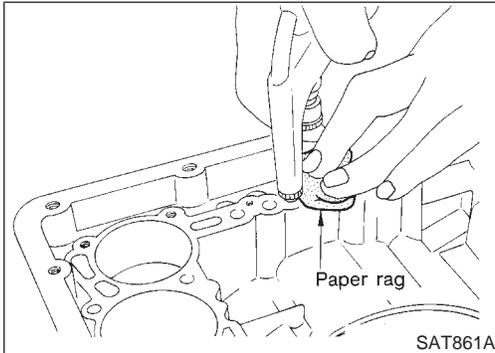
NAA70135

DISASSEMBLY AND ASSEMBLY

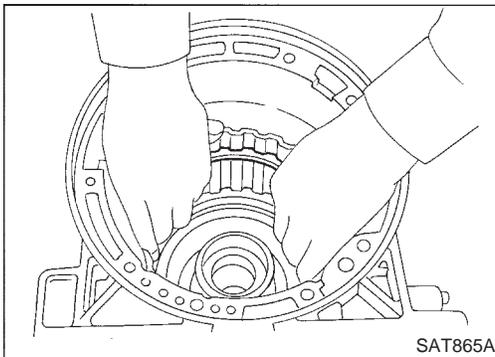
Forward and overrun clutches are serviced essentially the same way as reverse clutch is serviced. However, note the following exceptions.



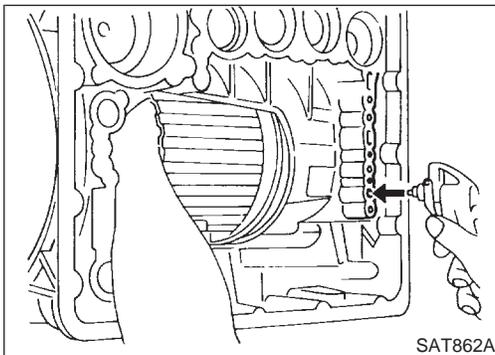
- Check of forward clutch operation



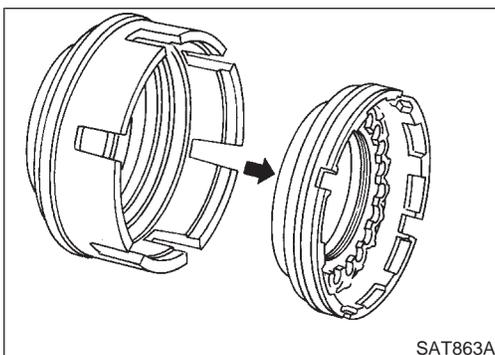
- Check of overrun clutch operation



- Removal of forward clutch drum
Remove forward clutch drum from transmission case by holding snap ring.



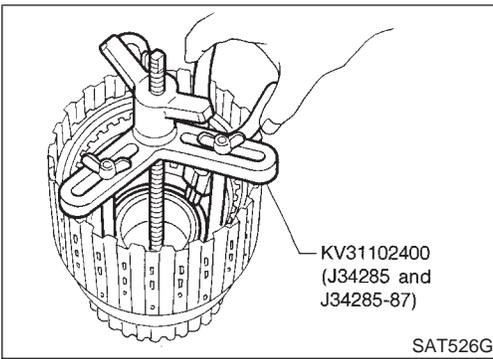
- Removal of forward clutch and overrun clutch pistons
a) While holding overrun clutch piston, gradually apply compressed air to oil hole.



- b) Remove overrun clutch from forward clutch.

REPAIR FOR COMPONENT PARTS

Forward and Overrun Clutches (Cont'd)



- Removal and installation of return springs

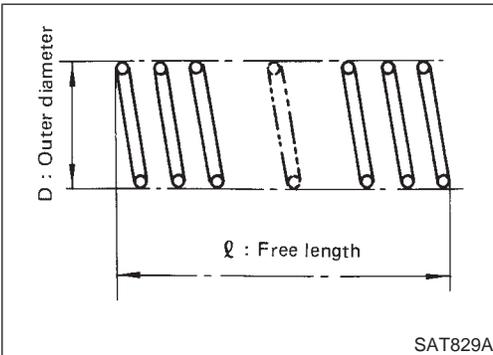
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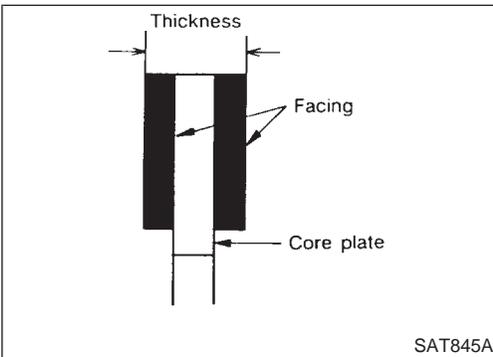
- Inspection of forward clutch and overrun clutch return springs

Inspection standard:
Refer to SDS, AT-354.

FE

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- Inspection of forward clutch drive plates

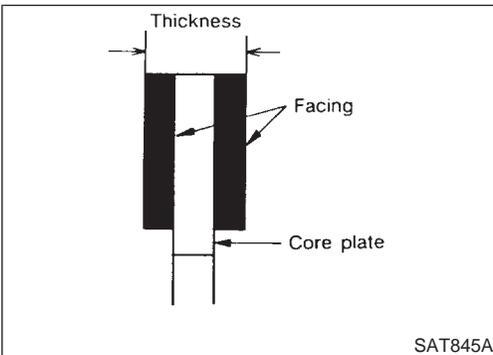
Thickness of drive plate:
Standard
1.52 - 1.67 mm (0.0598 - 0.0657 in)
Wear limit
1.40 mm (0.0551 in)

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- Inspection of overrun clutch drive plates

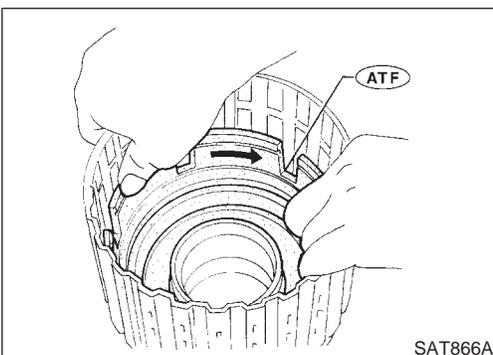
Thickness of drive plate:
Standard
1.90 - 2.05 mm (0.0748 - 0.0807 in)
Wear limit
1.80 mm (0.0709 in)

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- 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.**

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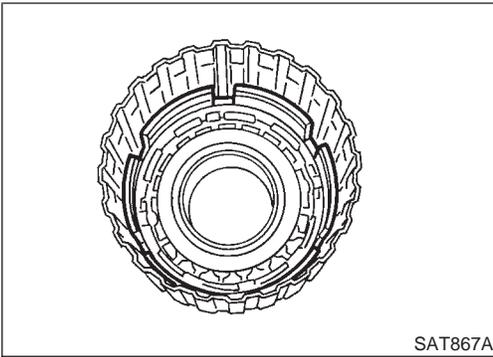
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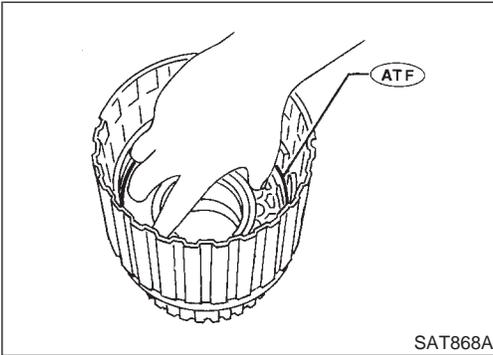
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REPAIR FOR COMPONENT PARTS

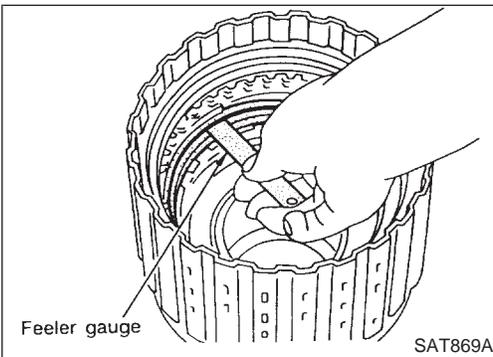
Forward and Overrun Clutches (Cont'd)



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



- b) Install overrun clutch by turning it slowly and evenly.
- Apply ATF to inner surface of forward clutch piston.



- Measurement of clearance between retaining plate and snap ring of overrun clutch

Specified clearance:

Standard

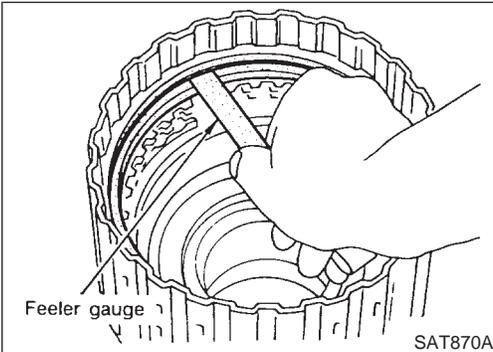
1.0 - 1.4 mm (0.039 - 0.055 in)

Allowable limit

2.0 mm (0.079 in)

Retaining plate:

Refer to SDS, AT-356.



- 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 4EX74 (2WD)

2.15 mm (0.0846 in)

Model 4EX75, 4EX76 (4WD)

2.35 mm (0.0925 in)

Retaining plate:

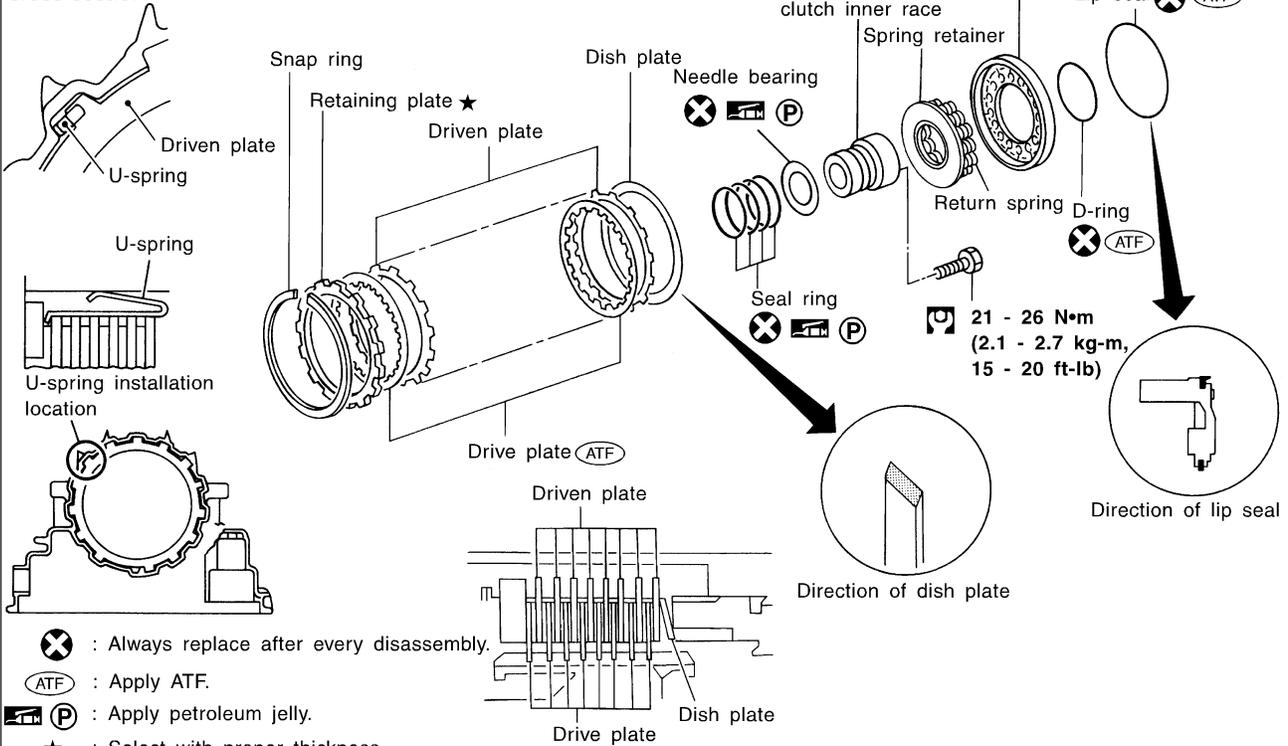
Refer to SDS, AT-356.

Low & Reverse Brake COMPONENTS

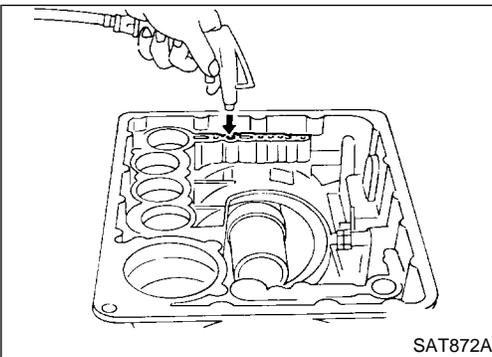
NAAT0136

SEC. 315

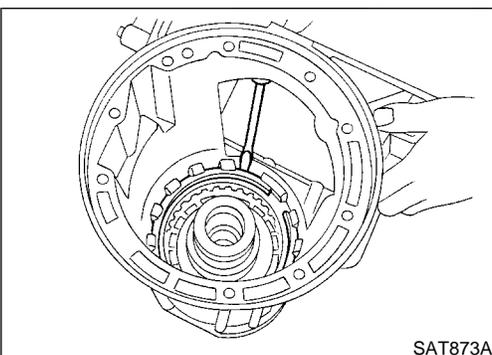
For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section.



SAT673KA



SAT872A



SAT873A

DISASSEMBLY

NAAT0137

1. Check operation of low and reverse brake.
 - a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.
 - b. Check to see that retaining plate moves to snap ring.
 - c. If retaining plate does not contact snap ring,
 - D-ring might be damaged.
 - Oil seal might be damaged.
 - Fluid might be leaking past piston check ball.
2. Remove snap ring, and then remove retaining plate, low and reverse brake drive plates, driven plates, dish plate and U-spring.

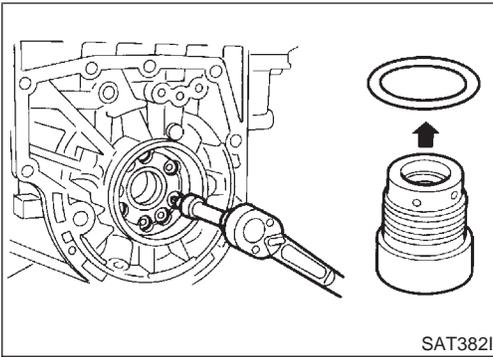
NOTE:

- 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.

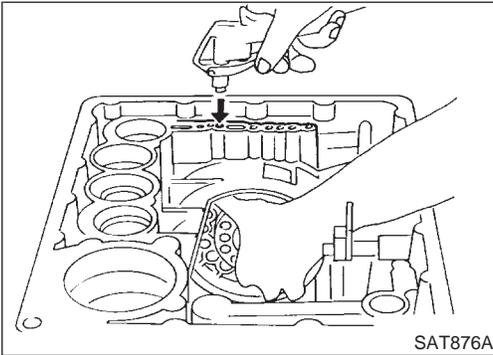
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REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)



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.



6. Remove low and reverse brake piston using compressed air.
7. Remove oil seal and D-ring from piston.

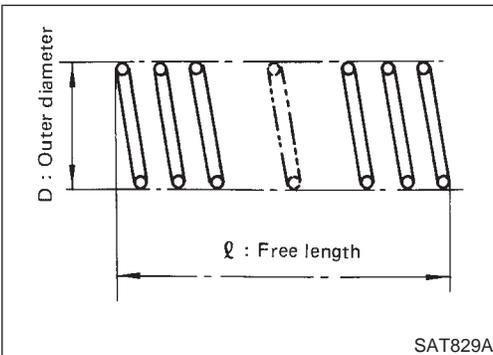
INSPECTION

Low and Reverse Brake Snap Ring and Spring Retainer

NAAT0138

NAAT0138S01

- Check for deformation, or damage.



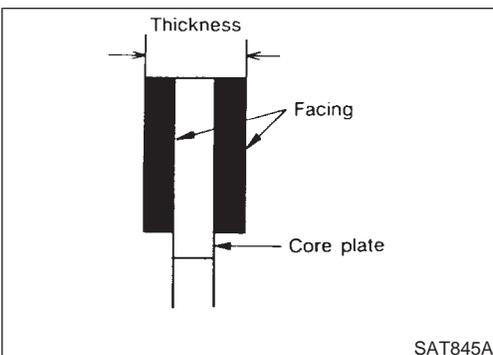
Low and Reverse Brake Return Springs

NAAT0138S02

- Check for deformation or damage. Also measure free length and outside diameter.

Inspection standard:

Refer to SDS, AT-354.



Low and Reverse Brake Drive Plates

NAAT0138S03

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

Thickness of drive plate:

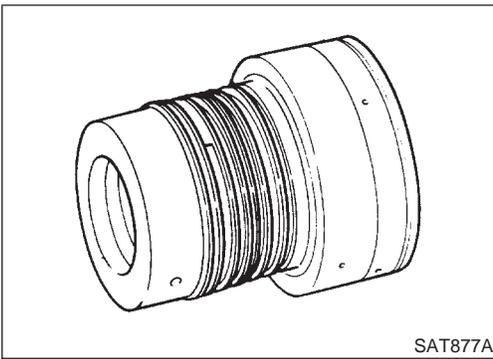
Standard value

1.90 - 2.05 mm (0.075 - 0.081 in)

Wear limit

1.40 mm (0.0551 in)

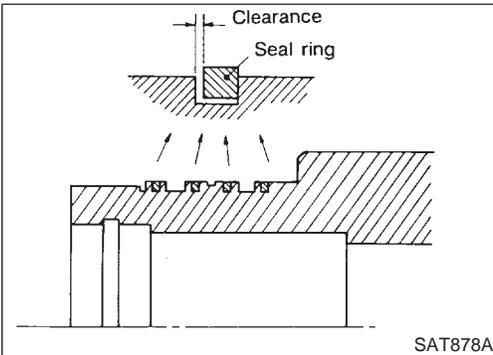
- If not within wear limit, replace.



Low One-way Clutch Inner Race

NAAT0138S04

- Check frictional surface of inner race for wear or damage.



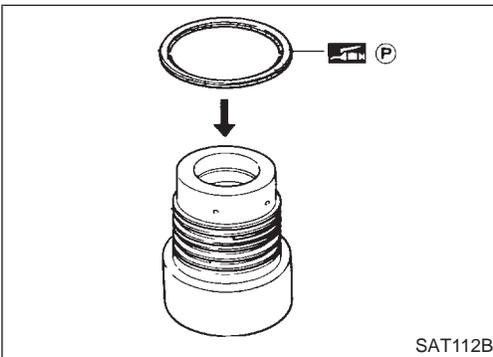
- Install a new seal rings onto low one-way clutch inner race.
- **Be careful not to expand seal ring gap excessively.**
- Measure seal ring-to-groove clearance.

Inspection standard:

Standard value: 0.10 - 0.25 mm (0.0039 - 0.0098 in)

Allowable limit: 0.25 mm (0.0098 in)

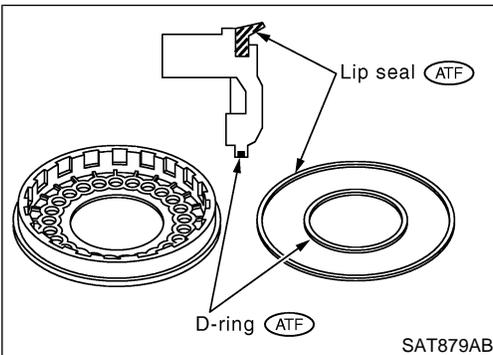
- If not within allowable limit, replace low one-way clutch inner race.



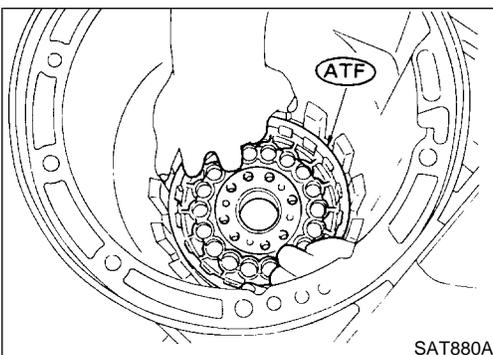
ASSEMBLY

NAAT0139

1. Install needle bearing onto one-way clutch inner race.
 - Pay attention to its direction — **Black surface goes to rear side.**
 - Apply petroleum jelly to needle bearing.



2. Install lip seal and D-ring onto piston.
 - **Apply ATF to oil seal and D-ring.**

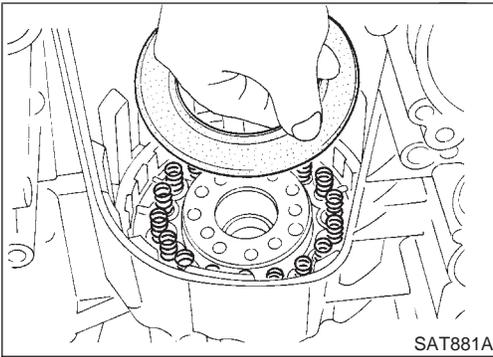


3. Install piston by rotating it slowly and evenly.
 - **Apply ATF to inner surface of transmission case.**

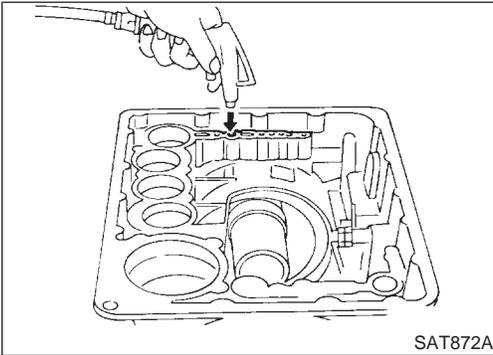
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REPAIR FOR COMPONENT PARTS

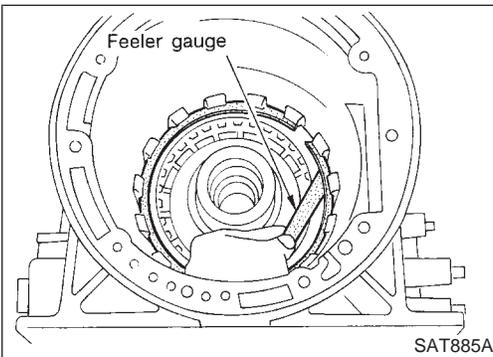
Low & Reverse Brake (Cont'd)



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.



7. Check operation of low and reverse brake clutch piston. Refer to "DISASSEMBLY", AT-321.



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

Specified clearance:

Standard

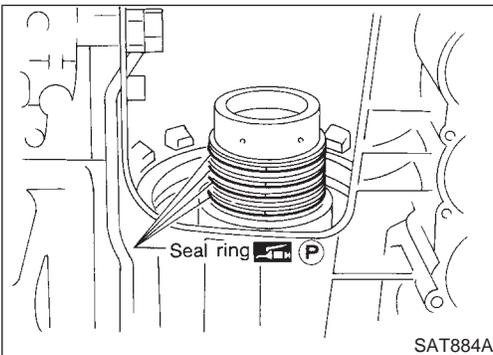
0.8 - 1.1 mm (0.031 - 0.043 in)

Allowable limit

2.7 mm (0.106 in)

Retaining plate:

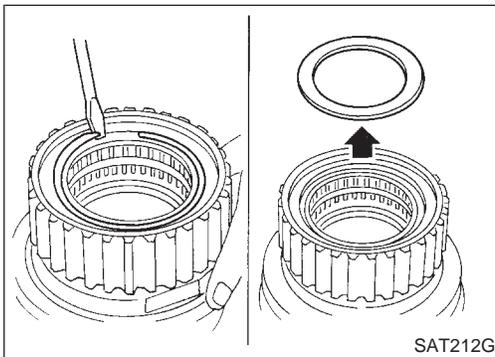
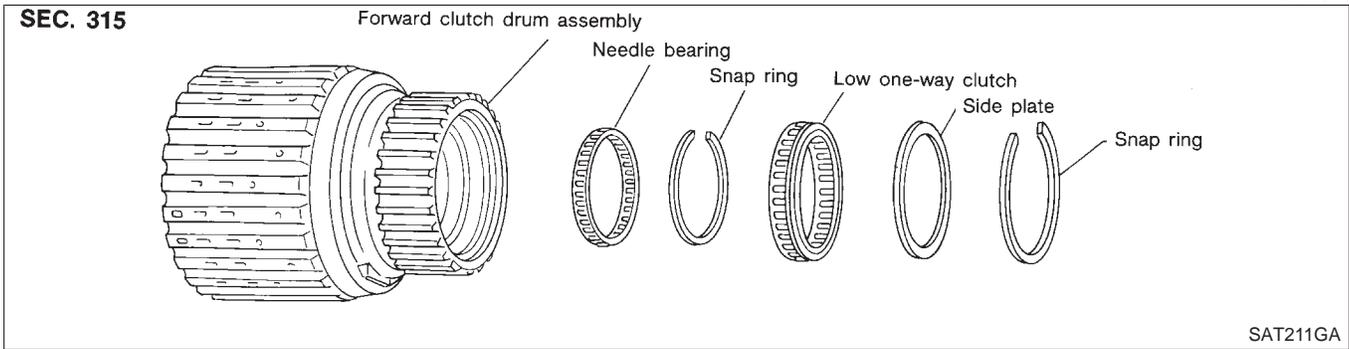
Refer to SDS, AT-357.



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.**

Forward Clutch Drum Assembly COMPONENTS

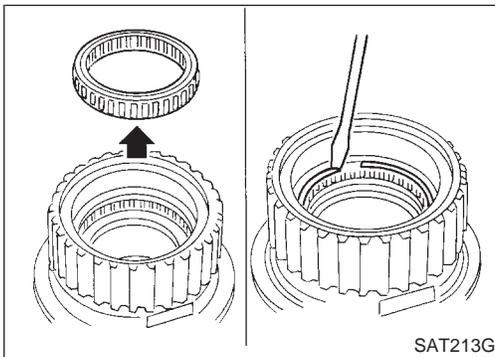
=NAAT0140



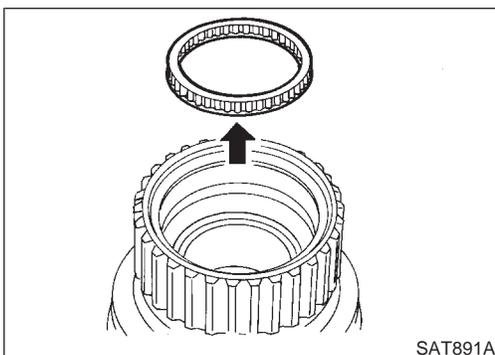
DISASSEMBLY

1. Remove snap ring from forward clutch drum.
2. Remove side plate from forward clutch drum.

NAAT0141



3. Remove low one-way clutch from forward clutch drum.
4. Remove snap ring from forward clutch drum.

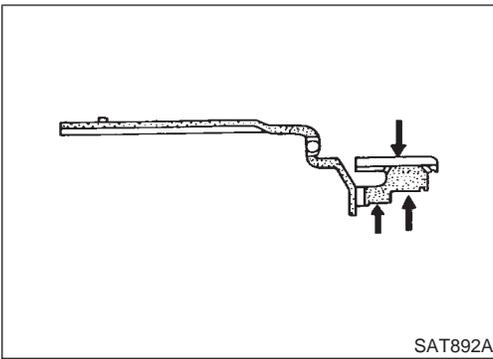


5. Remove needle bearing from forward clutch drum.

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REPAIR FOR COMPONENT PARTS

Forward Clutch Drum Assembly (Cont'd)



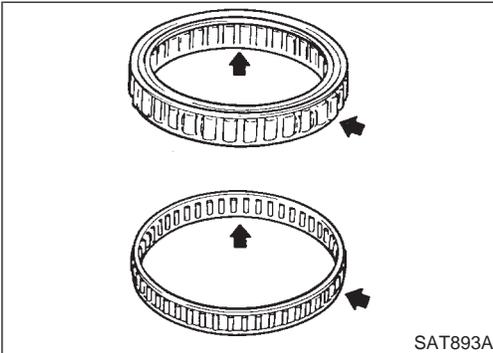
INSPECTION

Forward Clutch Drum

NAAT0142

NAAT0142S01

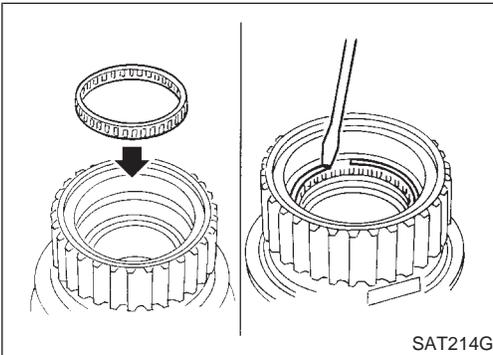
- Check spline portion for wear or damage.
- Check frictional surfaces of low one-way clutch and needle bearing for wear or damage.



Needle Bearing and Low One-way Clutch

NAAT0142S02

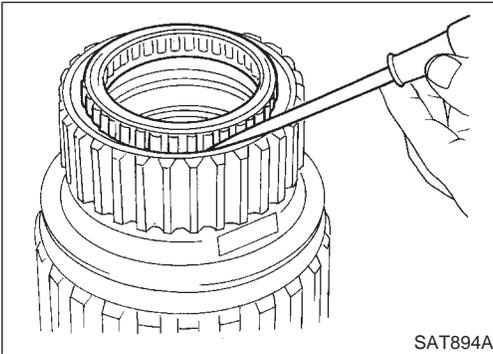
- Check frictional surface for wear or damage.



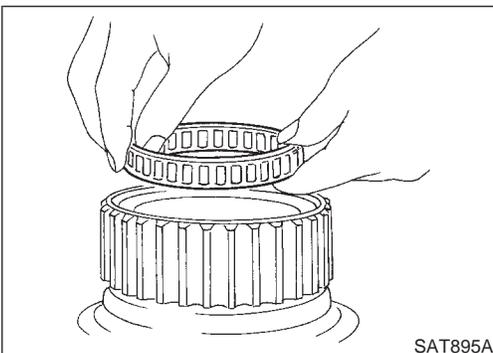
ASSEMBLY

NAAT0143

1. Install needle bearing in forward clutch drum.
2. Install snap ring onto forward clutch drum.



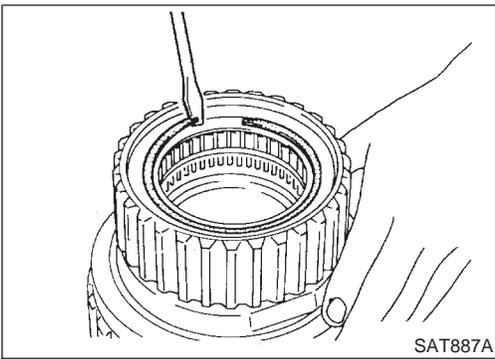
3. Install low one-way clutch onto forward clutch drum by pushing the roller in evenly.



- Install low one-way clutch with flange facing rearward.

REPAIR FOR COMPONENT PARTS

Forward Clutch Drum Assembly (Cont'd)

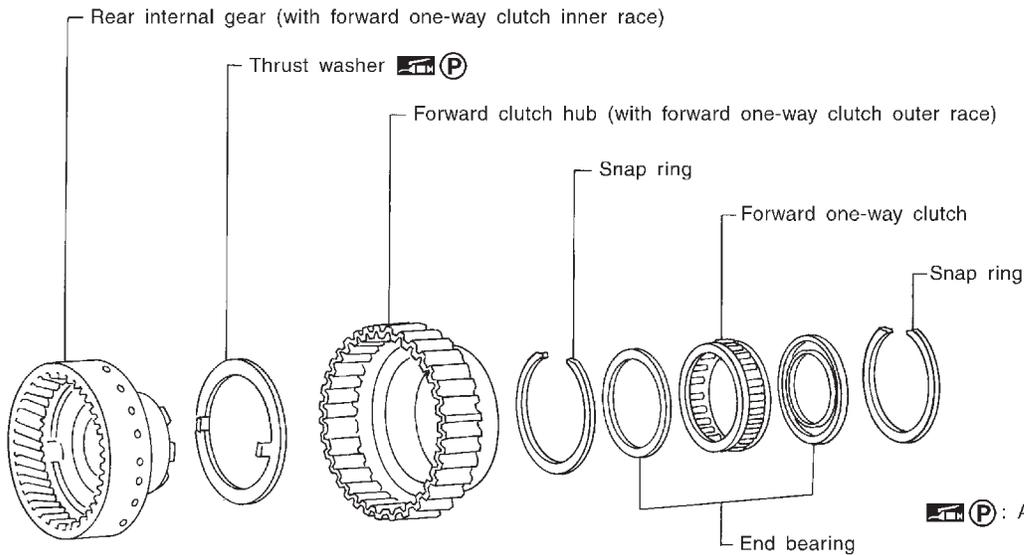


4. Install side plate onto forward clutch drum.
5. Install snap ring onto forward clutch drum.

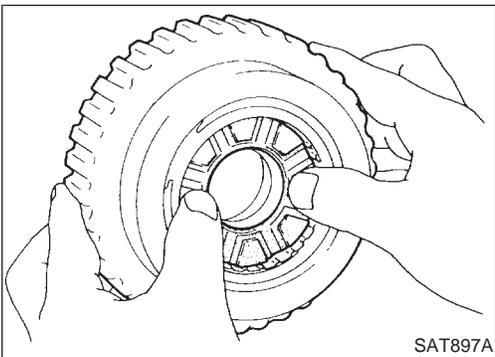
Rear Internal Gear and Forward Clutch Hub COMPONENTS

NAAT0144

SEC. 315



SAT896AA

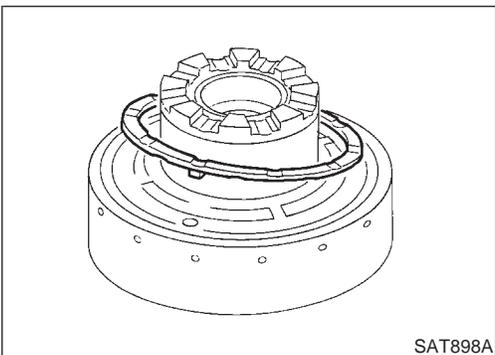


SAT897A

DISASSEMBLY

NAAT0145

1. Remove rear internal gear by pushing forward clutch hub forward.
2. Remove thrust washer from rear internal gear.

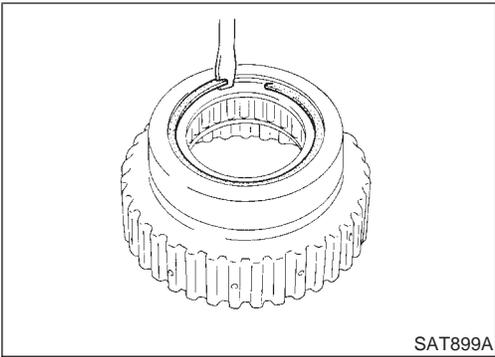


SAT898A

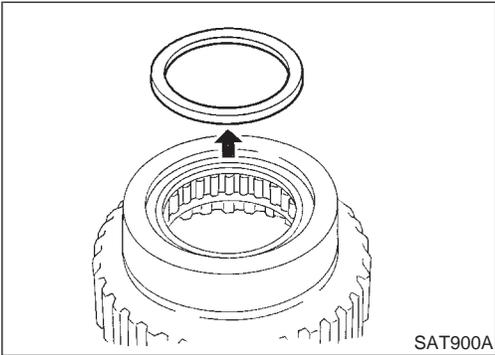
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REPAIR FOR COMPONENT PARTS

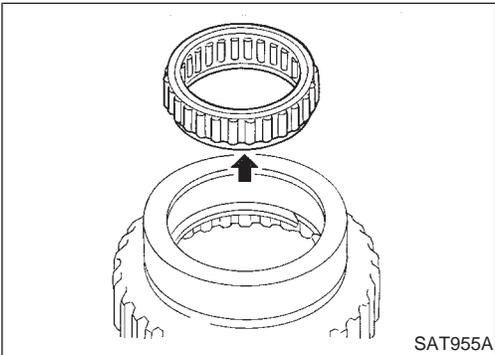
Rear Internal Gear and Forward Clutch Hub (Cont'd)



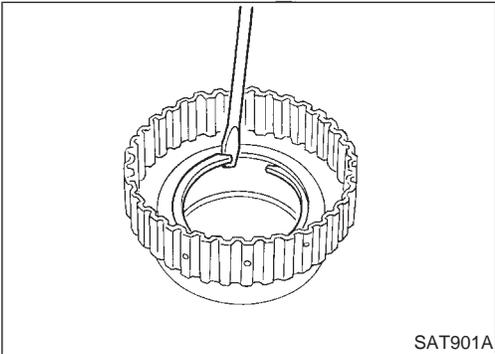
3. Remove snap ring from forward clutch hub.



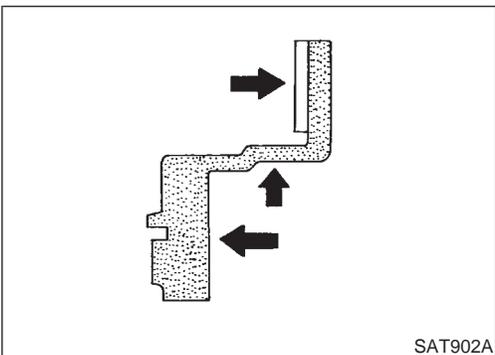
4. Remove end bearing.



5. Remove forward one-way clutch and end bearing as a unit from forward clutch hub.



6. Remove snap ring from forward clutch hub.



INSPECTION

Rear Internal Gear and Forward Clutch Hub

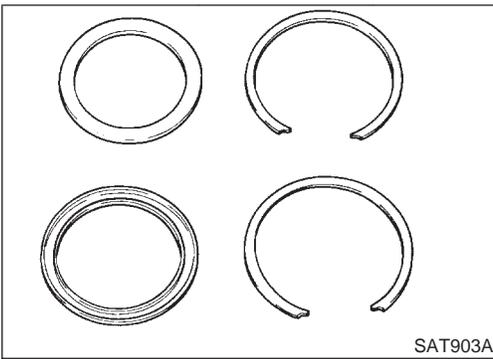
NAAT0146

NAAT0146S01

- 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

Rear Internal Gear and Forward Clutch Hub (Cont'd)



Snap Ring and End Bearing

- Check for deformation or damage.

NAAT0146S02

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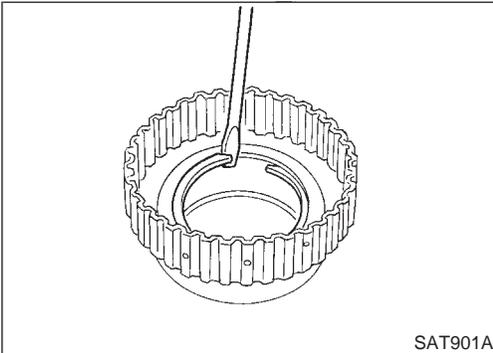
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NAAT0147

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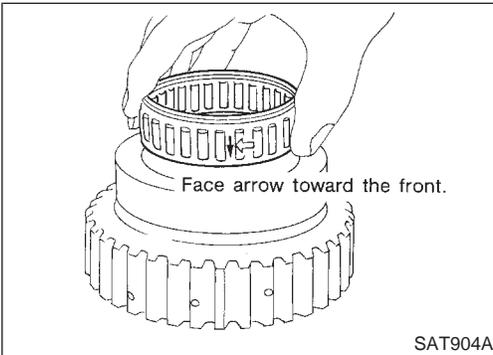
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ASSEMBLY

1. Install snap ring onto forward clutch hub.
2. Install end bearing.



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.

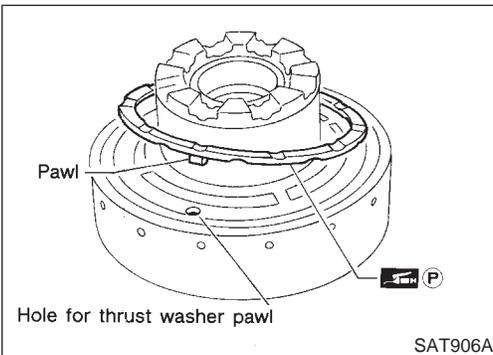
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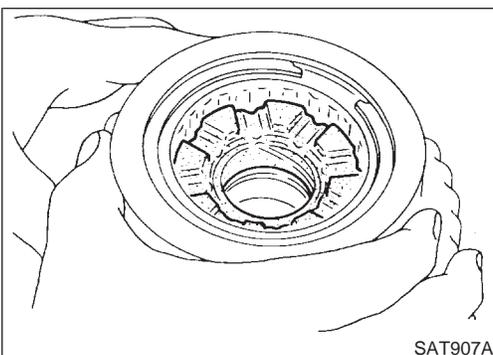
6. Install thrust washer onto rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Securely insert pawls of thrust washer into holes in rear internal gear.**

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7. Position forward clutch hub in rear internal gear.

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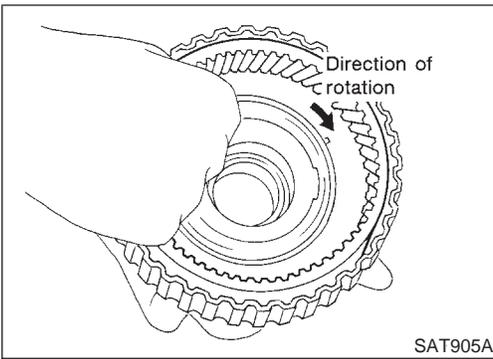
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REPAIR FOR COMPONENT PARTS

Rear Internal Gear and Forward Clutch Hub (Cont'd)

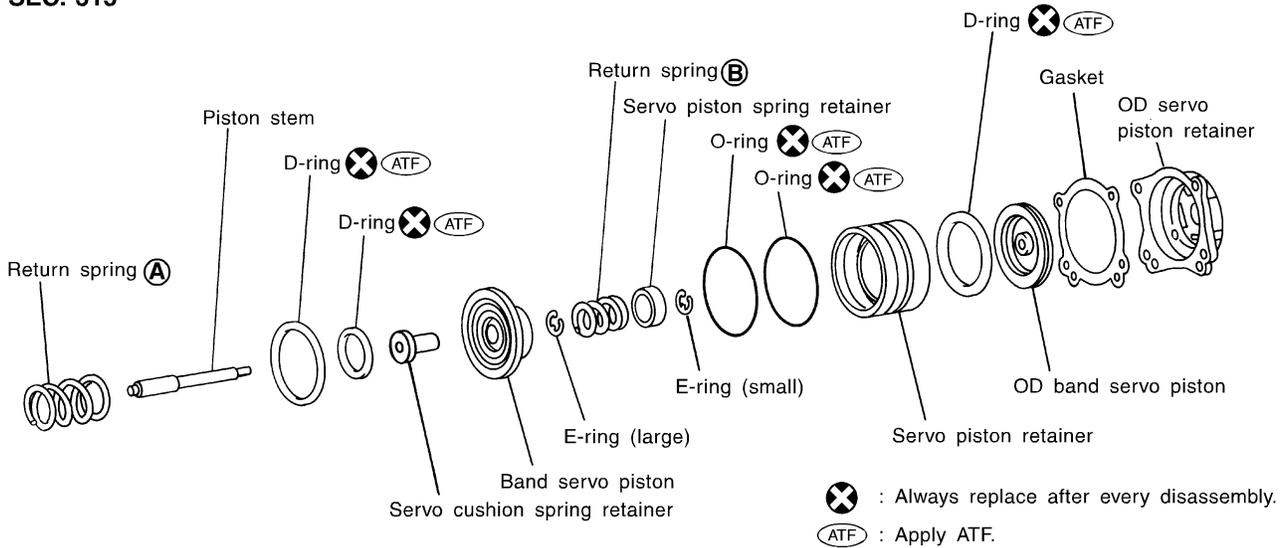


- After installing, check to assure that forward clutch hub rotates clockwise.

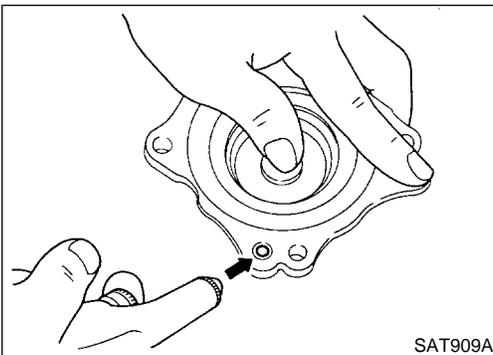
Band Servo Piston Assembly COMPONENTS

NAAT0148

SEC. 315



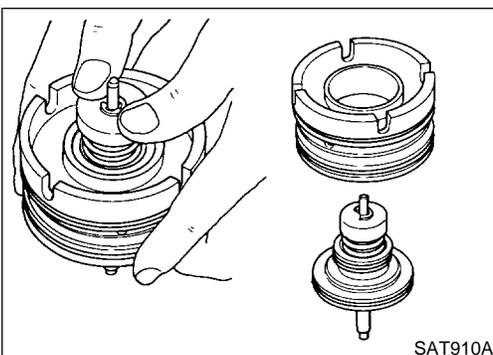
SAT161KA



DISASSEMBLY

NAAT0149

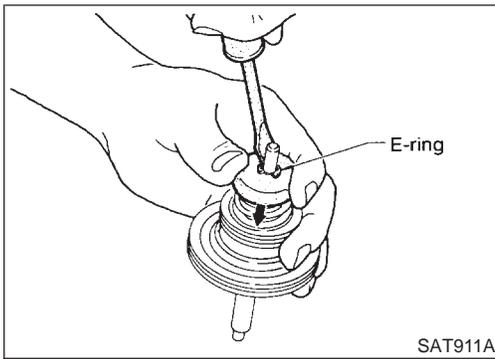
- Block one oil hole in OD servo piston retainer and the center hole in OD band servo piston.
- Apply compressed air to the other oil hole in piston retainer to remove OD band servo piston from retainer.
- Remove D-ring from OD band servo piston.



- Remove band servo piston assembly from servo piston retainer by pushing it forward.

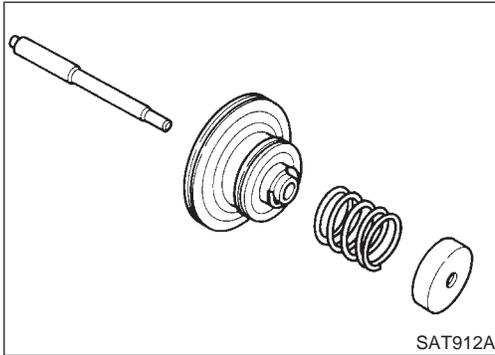
REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)



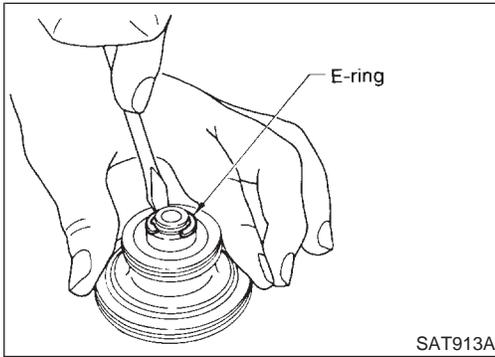
- Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

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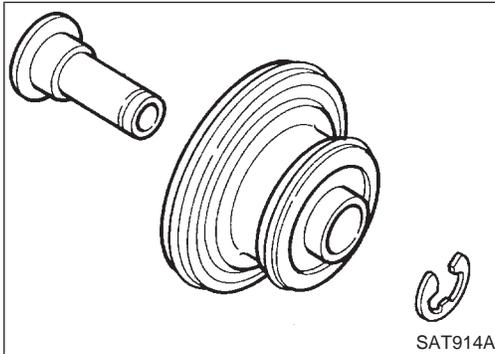
- Remove servo piston spring retainer, return spring C and piston stem from band servo piston.

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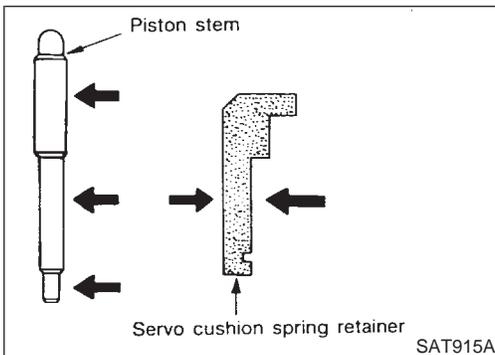
- Remove E-ring from band servo piston.

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- Remove servo cushion spring retainer from band servo piston.
- Remove D-rings from band servo piston.
- Remove O-rings from servo piston retainer.

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INSPECTION Pistons, Retainers and Piston Stem

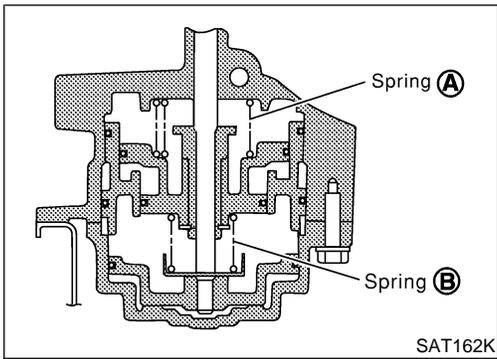
- Check frictional surfaces for abnormal wear or damage.

NAAAT0150
NAAAT0150S01

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REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)

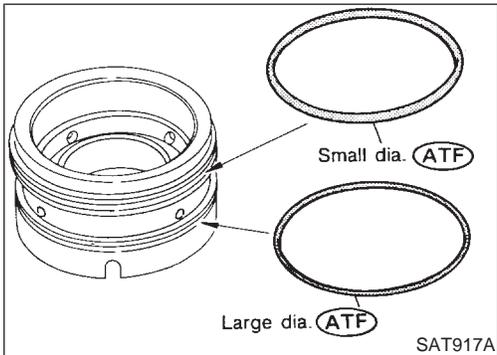


Return Springs

- Check for deformation or damage. Measure free length and outer diameter. NAAT0150S02

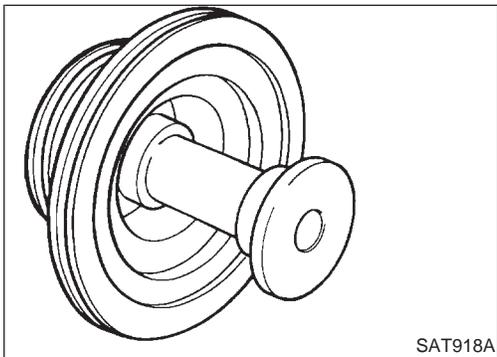
Inspection standard:

Refer to SDS, AT-354.

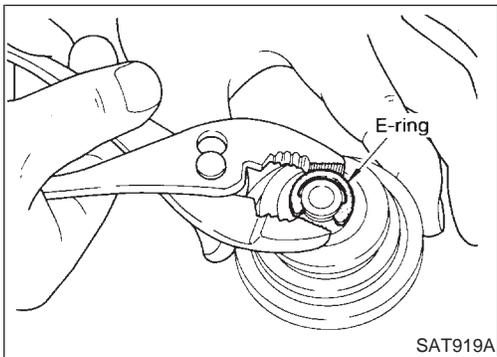


ASSEMBLY

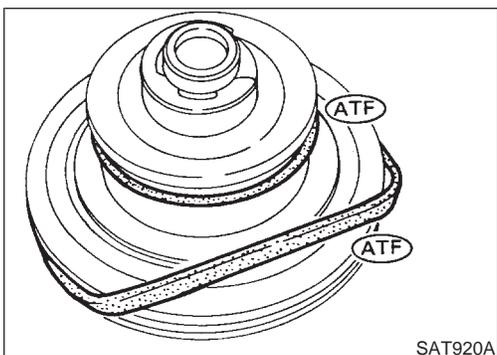
1. Install O-rings onto servo piston retainer. NAAT0151
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**



2. Install servo cushion spring retainer onto band servo piston.



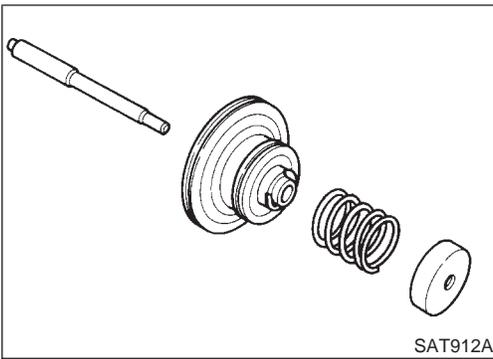
3. Install E-ring onto servo cushion spring retainer.



4. Install D-rings onto band servo piston.
- **Apply ATF to D-rings.**

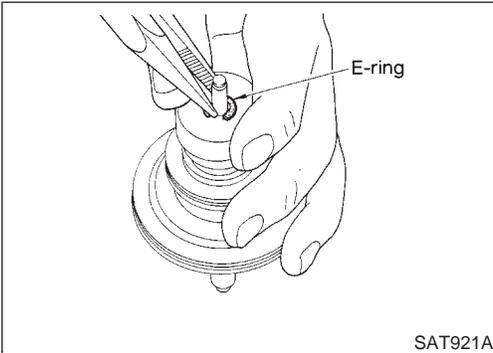
REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)



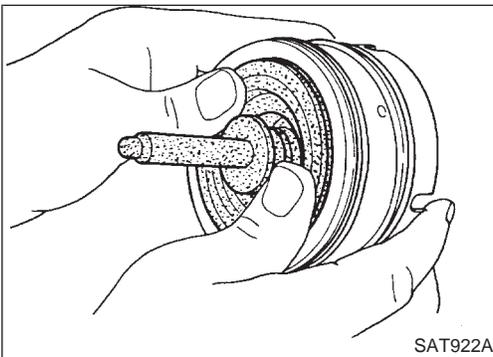
5. Install servo piston spring retainer, return spring C and piston stem onto band servo piston.

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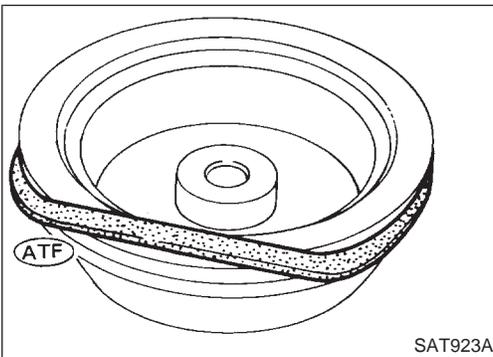
6. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.

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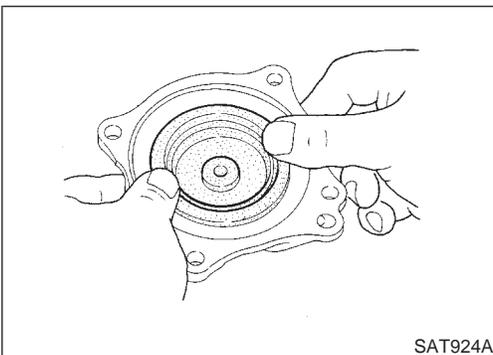
7. Install band servo piston assembly onto servo piston retainer by pushing it inward.

AT



8. Install D-ring on OD band servo piston.
 - **Apply ATF to D-ring.**

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9. Install OD band servo piston onto servo piston retainer by pushing it inward.

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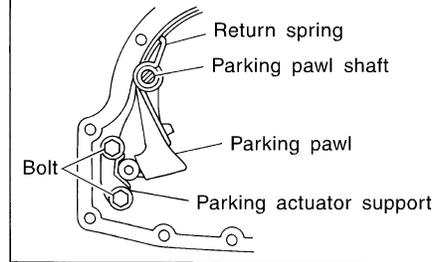
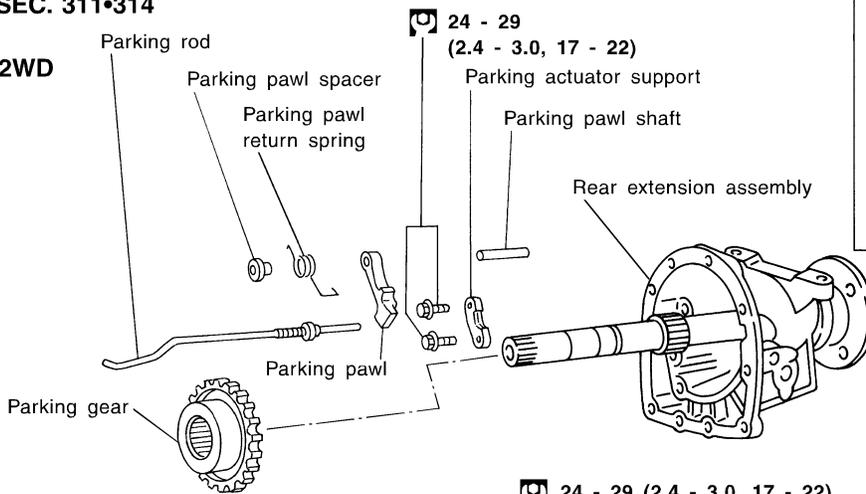
REPAIR FOR COMPONENT PARTS

Parking Pawl Components COMPONENTS

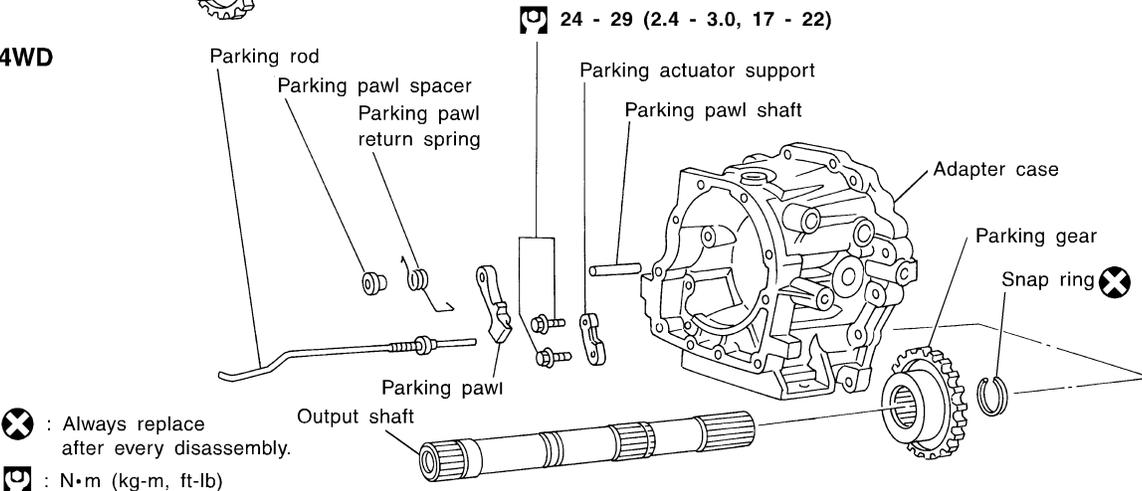
NAAT0152

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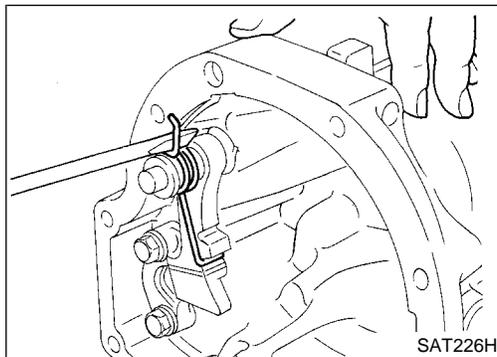
2WD



4WD



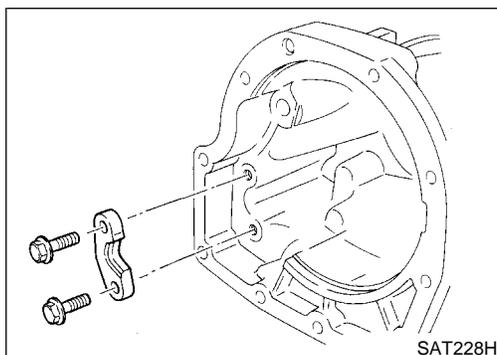
SAT558JA



DISASSEMBLY

NAAT0153

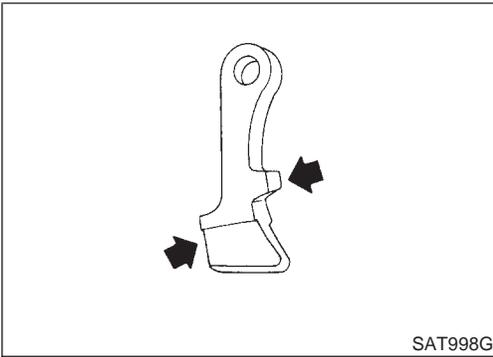
1. Slide return spring to the front of adapter case flange.
2. Remove return spring, parking pawl spacer and parking pawl from adapter case.
3. Remove parking pawl shaft from adapter case.



4. Remove parking actuator support from adapter case.

REPAIR FOR COMPONENT PARTS

Parking Pawl Components (Cont'd)



INSPECTION

Parking Pawl and Parking Actuator Support

NAAT0209

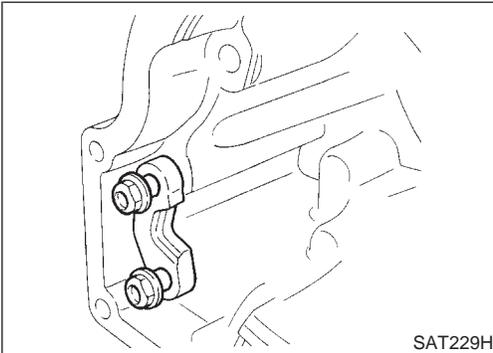
NAAT0209S01

- Check contact surface of parking rod for wear.

Rear Extension Assembly (2WD model only)

NAAT0209S02

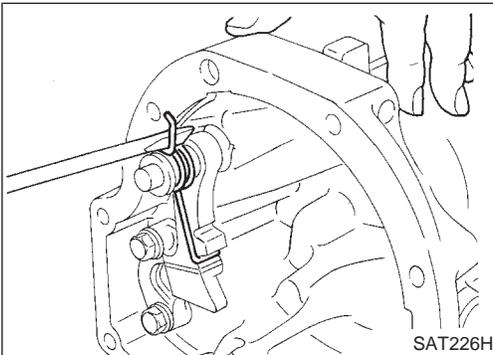
- Check for free play between companion flange and output shaft.
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- Check contact surface of output shaft for wear.



ASSEMBLY

NAAT0154

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.

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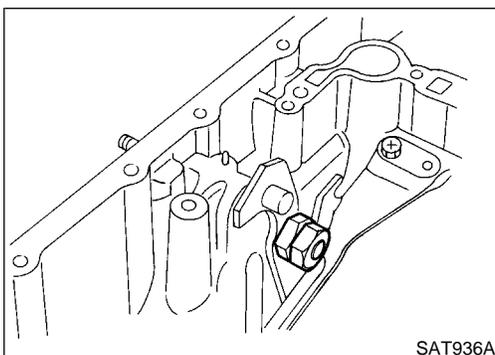
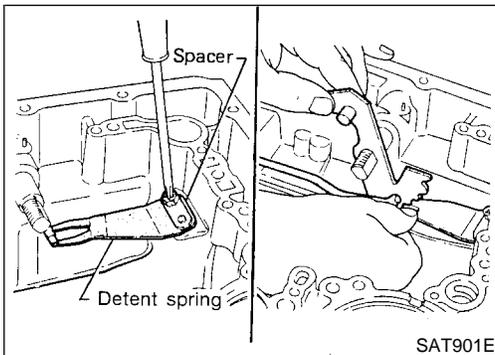
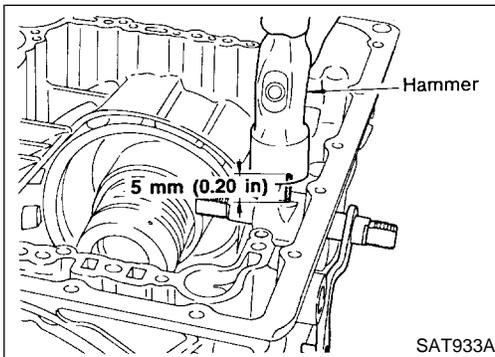
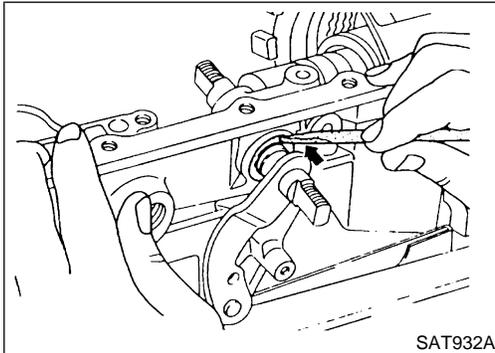
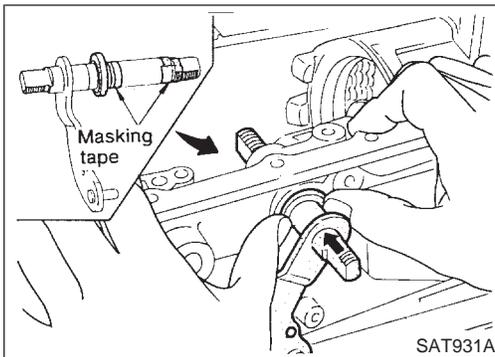
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ASSEMBLY

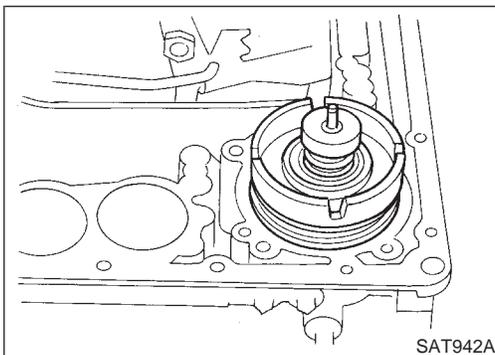
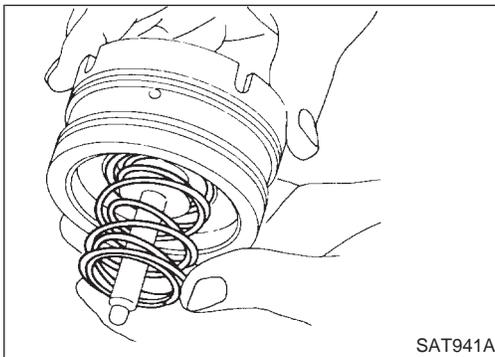
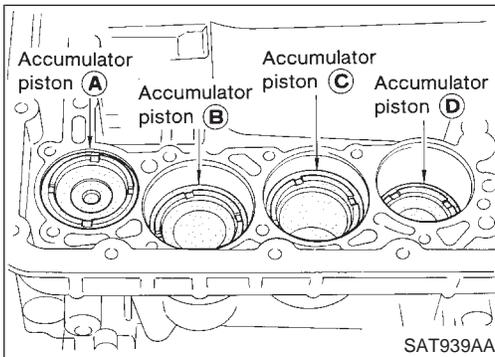
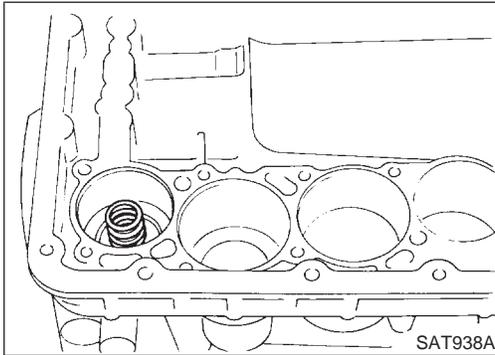
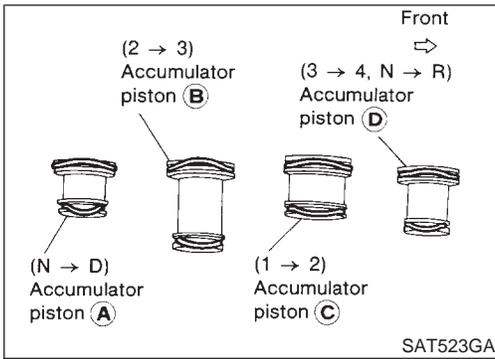
Assembly (1)

NAAT0155



Assembly (1)

1. Install manual shaft components.
 - a. Install oil seal onto manual shaft.
 - **Apply ATF to oil seal.**
 - **Wrap threads of manual shaft with masking tape.**
 - b. Insert manual shaft and oil seal as a unit into transmission case.
 - c. Remove masking tape.
- d. Push oil seal evenly and install it onto transmission case.
- e. Align groove in shaft with retaining pin hole, then retaining pin into position as shown in figure at left.
- f. Install detent spring and spacer.
- g. While pushing detent spring down, install manual plate onto manual shaft.
- h. Install lock nuts onto manual shaft.



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-354.

- c. Install accumulator pistons A, B, C and D.

● **Apply ATF to transmission case.**

3. Install band servo piston.
 - a. Install return springs onto servo piston.

- b. Install band servo piston onto transmission case.

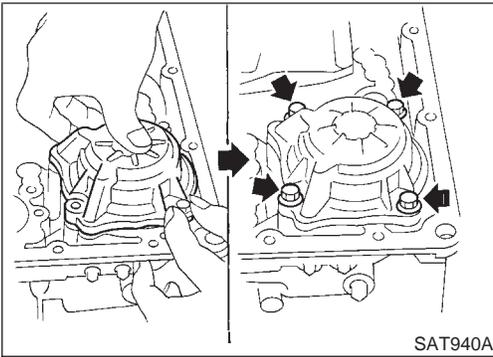
● **Apply ATF to O-ring of band servo piston and transmission case.**

- c. Install gasket for band servo onto transmission case.

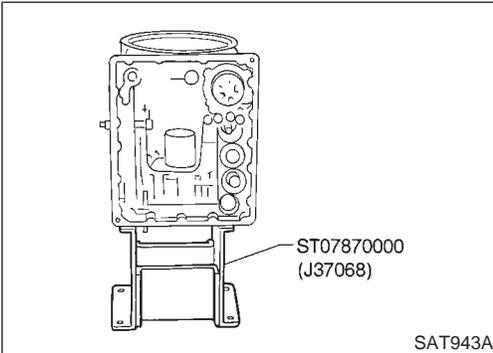
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ASSEMBLY

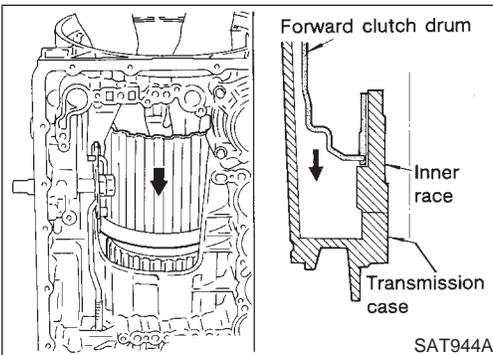
Assembly (1) (Cont'd)



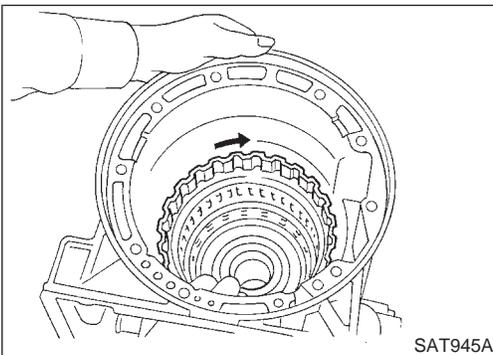
- d. Install band servo retainer onto transmission case.



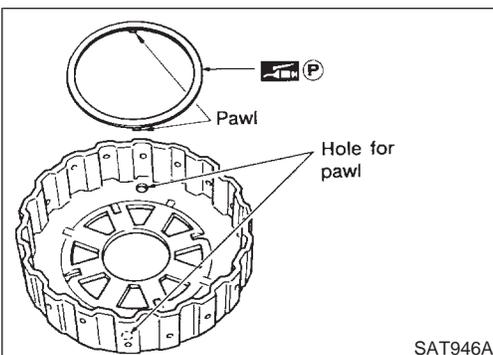
4. Install rear side clutch and gear components.
a. Place transmission case in vertical position.



- b. Slightly lift forward clutch drum assembly. Then slowly rotate it clockwise until its hub passes fully over clutch inner race inside transmission case.



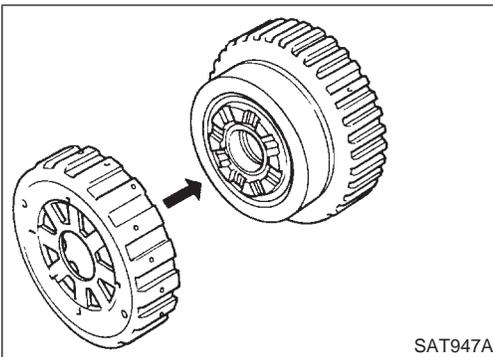
- c. Check to be sure that rotation direction of forward clutch assembly is correct.



- 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.

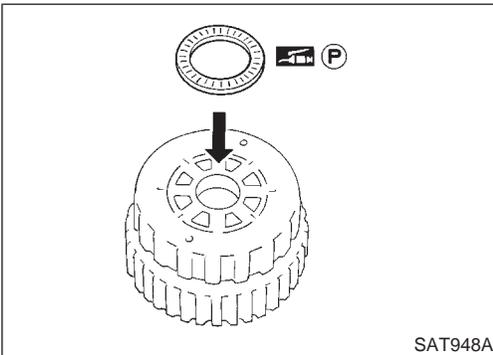
ASSEMBLY

Assembly (1) (Cont'd)



- e. Install overrun clutch hub onto rear internal gear assembly.

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- f. Install needle bearing onto rear of overrun clutch hub.
● **Apply petroleum jelly to needle bearing.**

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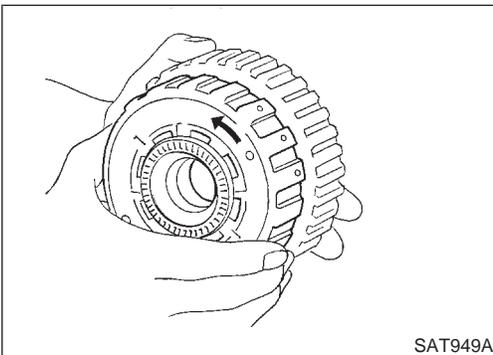
LC

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- g. Check that overrun clutch hub rotates as shown while holding forward clutch hub.

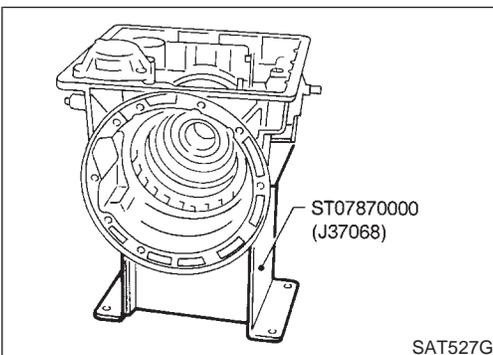
AT

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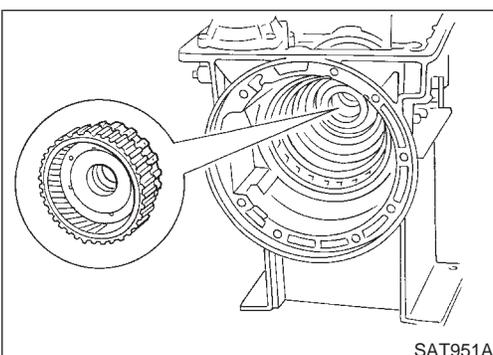
- h. Place transmission case into horizontal position.

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- i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.

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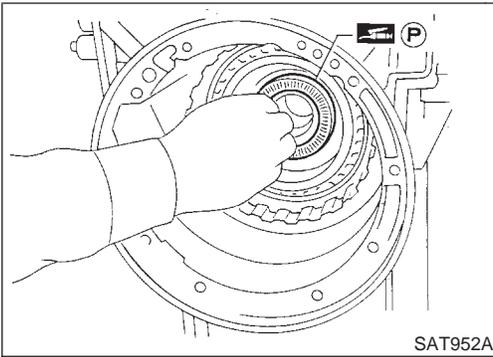
SC

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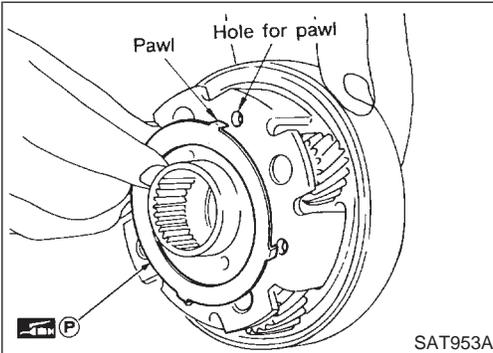
IDX

ASSEMBLY

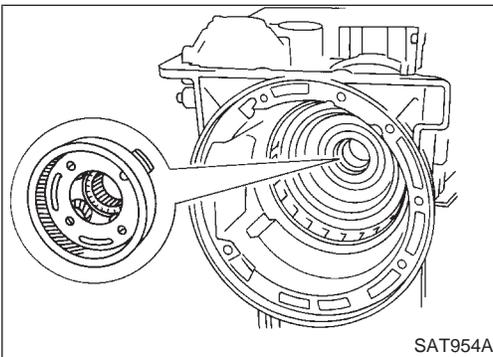
Assembly (1) (Cont'd)



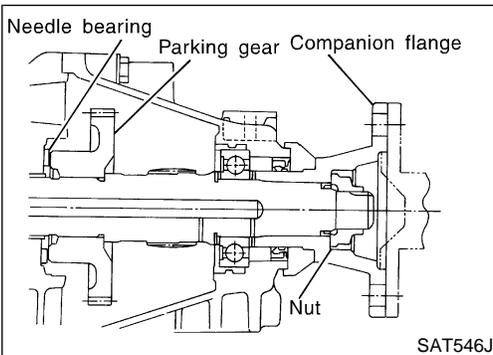
- j. Install needle bearing onto rear internal gear.
- **Apply petroleum jelly to needle bearing.**



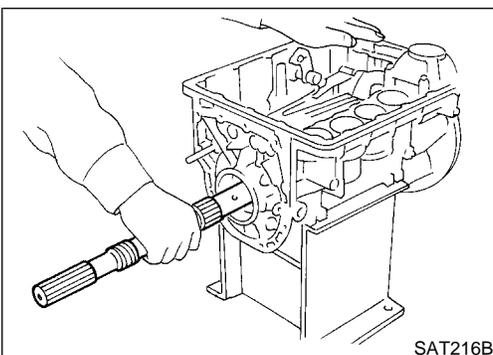
- k. Install bearing race onto rear of front internal gear.
- **Apply petroleum jelly to bearing race.**
- **Securely engage pawls of bearing race with holes in front internal gear.**



- l. Install front internal gear on transmission case.



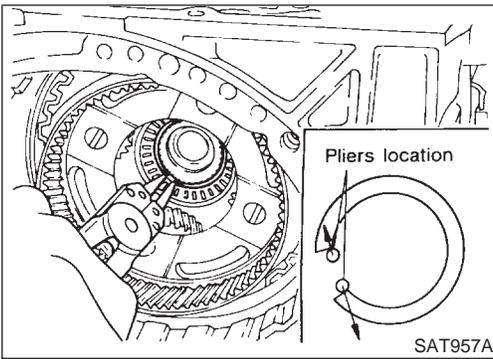
- 5. Install rear extension assembly on transmission case (2WD model only).
- a. Install revolution sensor on rear extension.
- b. Install rear extension gasket on transmission case.
- c. Install parking rod on transmission case.
- d. Install parking gear and needle bearing.
- **Insert rear extension assembly into place while holding parking gear and needle bearing by hand.**



- 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.**

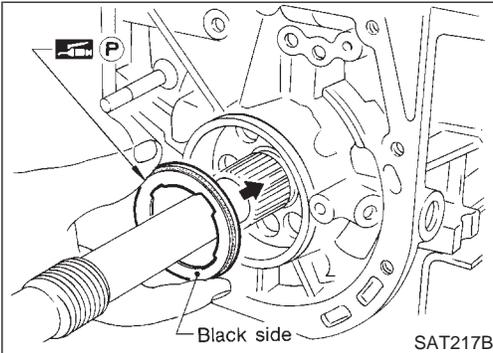
ASSEMBLY

Assembly (1) (Cont'd)



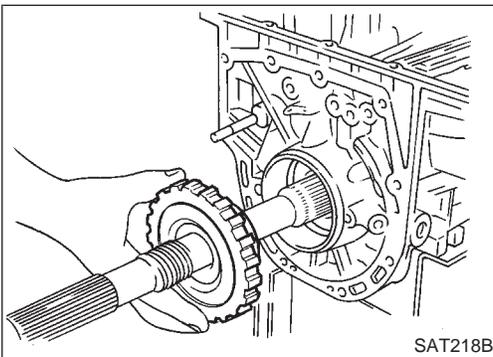
- b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.
- **Check to be sure output shaft cannot be removed in rear direction.**

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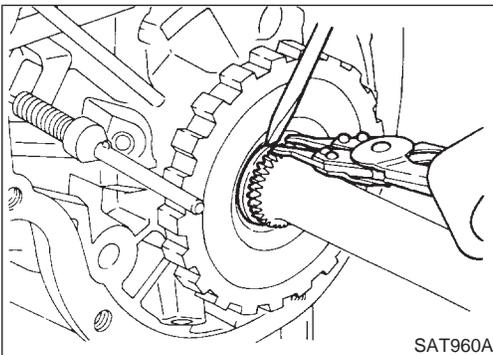
- c. Install needle bearing on transmission case.
- **Pay attention to its direction — Black side goes to rear.**
 - **Apply petroleum jelly to needle bearing.**

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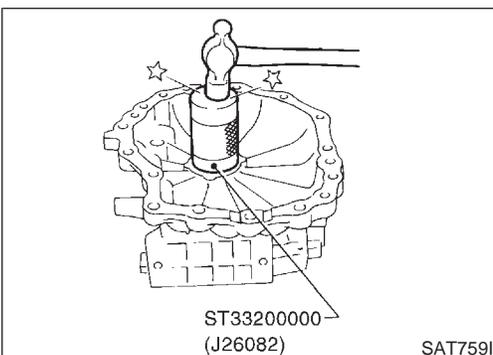
- d. Install parking gear on transmission case.

AT



- e. Install snap ring on rear of output shaft.
- **Check to be sure output shaft cannot be removed in forward direction.**

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7. Install adapter case (4WD model only).
- a. Install oil seal on adapter case.
- **Apply ATF to oil seal.**

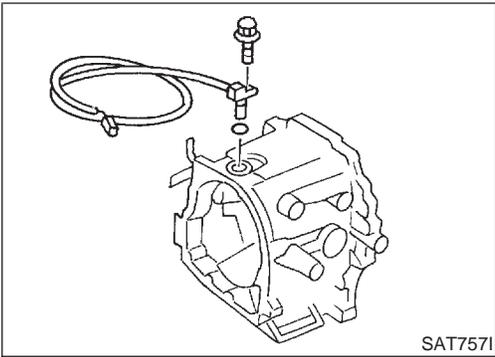
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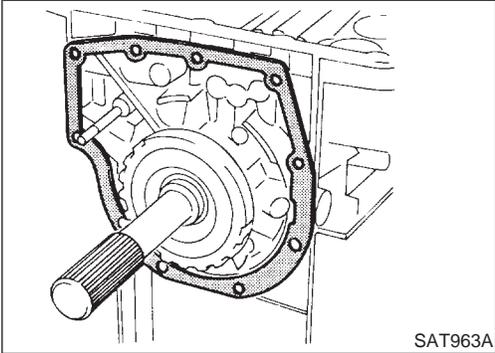
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ASSEMBLY

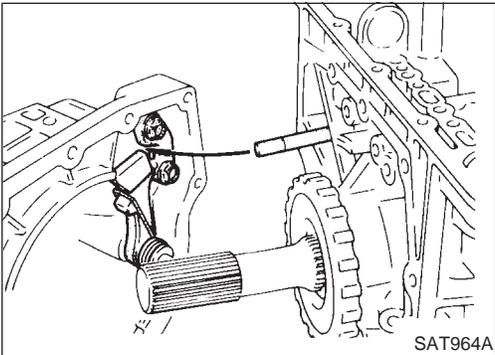
Assembly (1) (Cont'd)



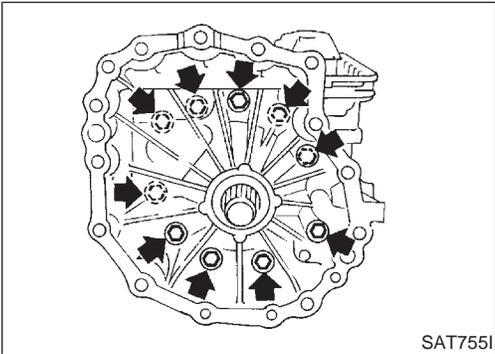
- b. Install O-ring on revolution sensor.
 - **Apply ATF to O-ring.**
- c. Install revolution sensor on adapter case.



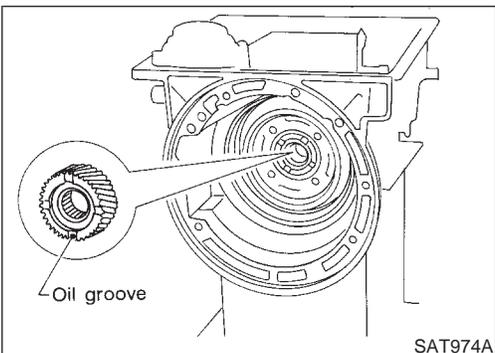
- d. Install adapter case gasket on transmission case.



- e. Install parking rod on transmission case.



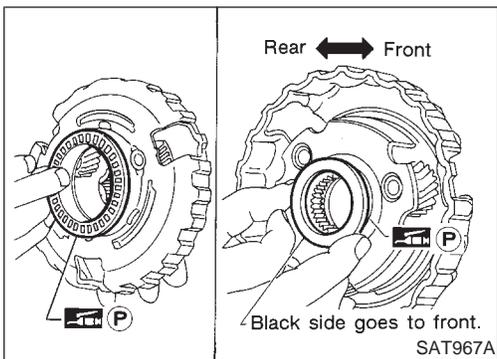
- f. Install adapter case on transmission case.



- 8. Install front side clutch and gear components.
 - a. Install rear sun gear on transmission case.
 - **Pay attention to its direction.**

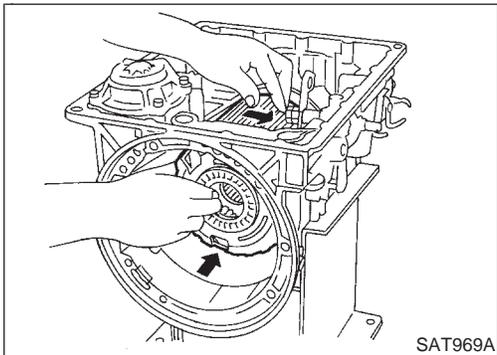
ASSEMBLY

Assembly (1) (Cont'd)



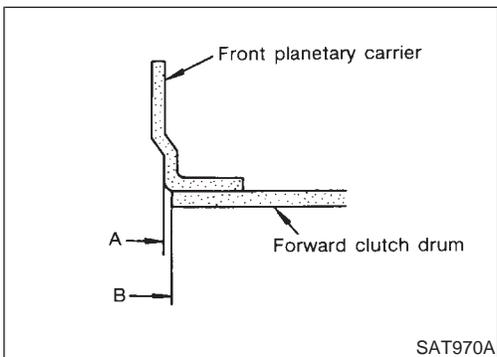
- b. Make sure needle bearing is on front of front planetary carrier.
 - **Apply petroleum jelly to needle bearing.**
- c. Make sure needle bearing is on rear of front planetary carrier.
 - **Apply petroleum jelly to bearing.**
 - **Pay attention to its direction — Black side goes to front.**

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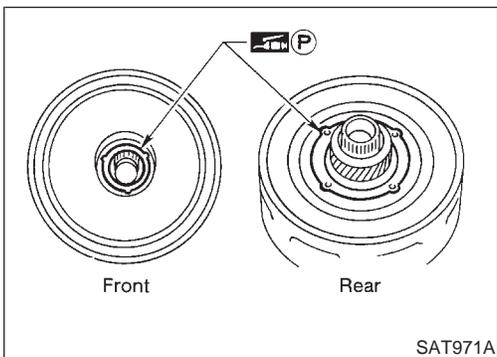
- d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.

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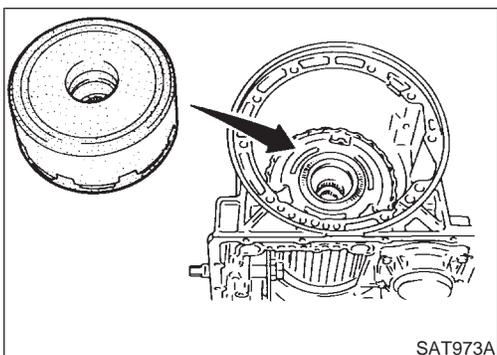
- **Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.**

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- 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.**

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- f. Install clutch pack into transmission case.

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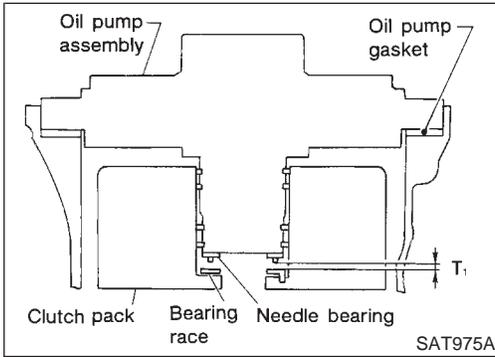
ASSEMBLY

Adjustment

=NAAT0156

When any parts listed in the following table are replaced, total end play or reverse clutch end play must be adjusted.

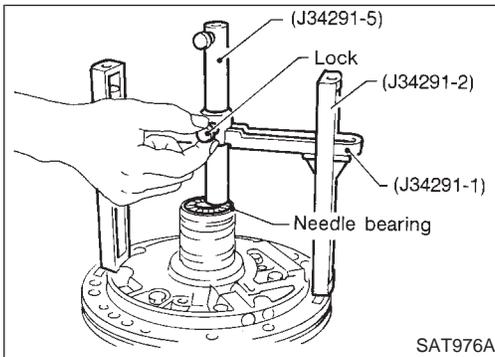
| Part name | Total end play | Reverse clutch end play |
|-------------------------------|----------------|-------------------------|
| Transmission case | • | • |
| Low one-way clutch inner race | • | • |
| Overrun clutch hub | • | • |
| Rear internal gear | • | • |
| Rear planetary carrier | • | • |
| Rear sun gear | • | • |
| Front planetary carrier | • | • |
| Front sun gear | • | • |
| High clutch hub | • | • |
| High clutch drum | • | • |
| Oil pump cover | • | • |
| Reverse clutch drum | — | • |



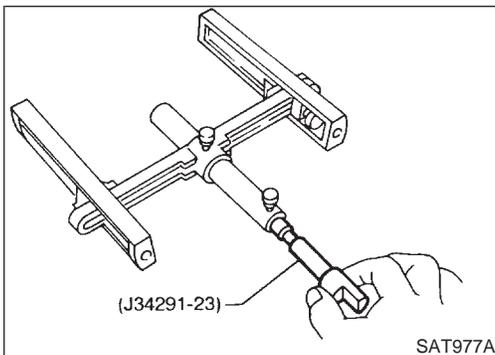
1. Adjust total end play.

Total end play "T₁":

0.25 - 0.55 mm (0.0098 - 0.0217 in)



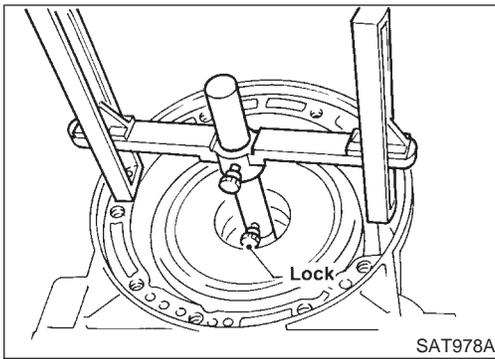
- a. With needle bearing installed, place J34291-1 (bridge), J34291-2 (legs) and the J34291-5 (gauging cylinder) onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly. The gauging cylinder should rest on top of the needle bearing. Lock gauging cylinder in place with set screw.



- b. Install J34291-23 (gauging plunger) into gauging cylinder.

ASSEMBLY

Adjustment (Cont'd)



- c. Install original bearing race inside reverse clutch drum. Place shim selecting gauge with its legs on machined surface of transmission case (no gasket). Allow gauging plunger to rest on bearing race. Lock gauging plunger in place with set screw.

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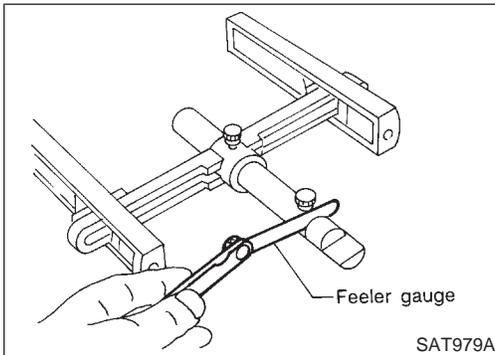
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AT



- 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 "T₁":
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-357.

TF

PD

AX

SU

BR

ST

RS

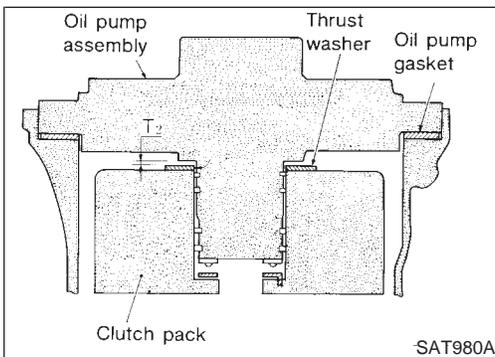
BT

HA

SC

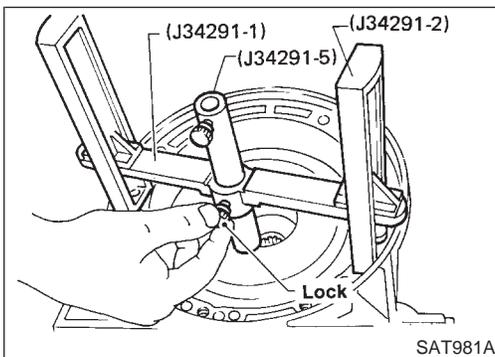
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IDX

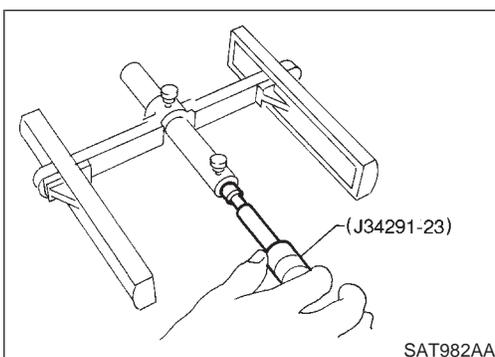


2. Adjust reverse clutch drum end play.

Reverse clutch drum end play "T₂":
0.55 - 0.90 mm (0.0217 - 0.0354 in)



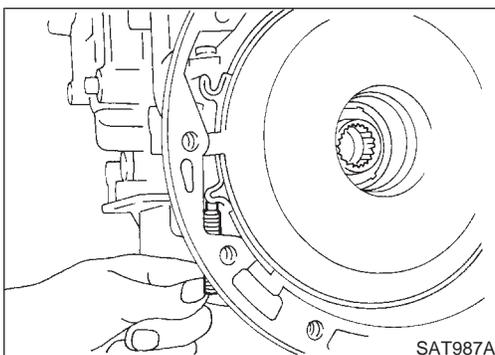
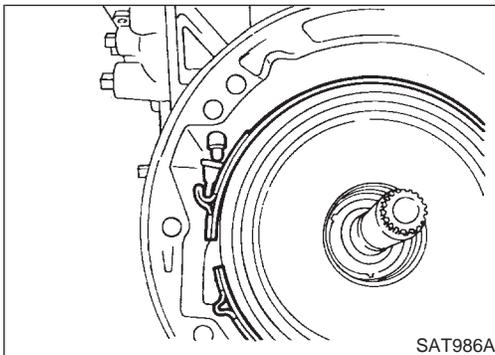
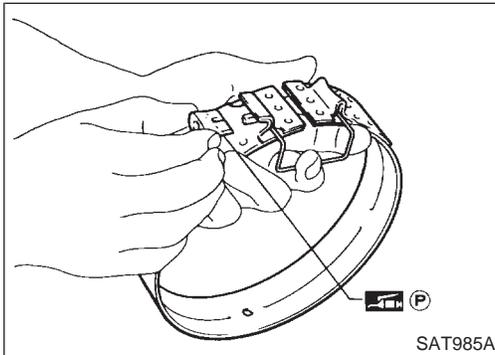
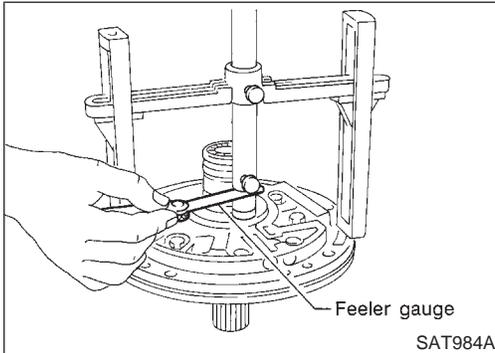
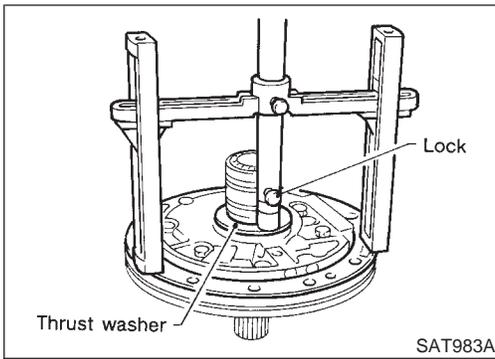
- a. Place J34291-1 (bridge), J34291-2 (legs) and J34291-5 (gauging cylinder) on machined surface of transmission case (no gasket). Allow gauging cylinder to rest on front thrust surface of reverse clutch drum. Lock cylinder in place with set screw.



- b. Install J34291-23 (gauging plunger) into gauging cylinder.

ASSEMBLY

Adjustment (Cont'd)



c. Install original thrust washer on oil pump. Place shim setting gauge legs onto machined surface of oil pump assembly. Allow gauging plunger to rest on thrust washer. Lock plunger in place with set screw.

d. Use feeler gauge to measure gap between gauging plunger and gauging cylinder. This measurement should give you exact reverse clutch drum end play.

Reverse clutch drum end play "T₂":
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-358.

Assembly (2)

NAAT0157

1. Install brake band and band strut.

a. Install band strut on brake band.

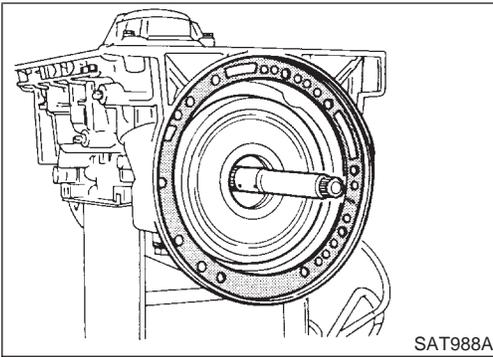
- **Apply petroleum jelly to band strut.**

b. Place brake band on periphery of reverse clutch drum, and insert band strut into end of band servo piston stem.

c. Install anchor end bolt on transmission case. Then, tighten anchor end bolt just enough so that reverse clutch drum (clutch pack) will not tilt forward.

ASSEMBLY

Assembly (2) (Cont'd)



2. Install input shaft on transmission case.
 - **Pay attention to its direction — O-ring groove side is front.**
3. Install gasket on transmission case.

GI

MA

EM

LC

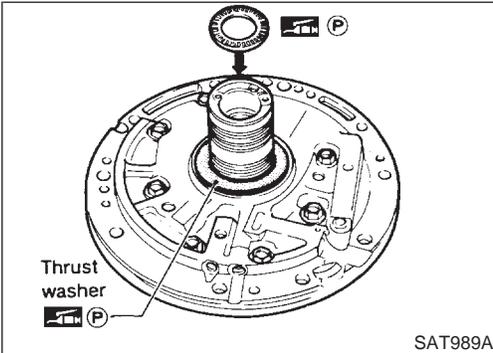
EC

FE

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AT



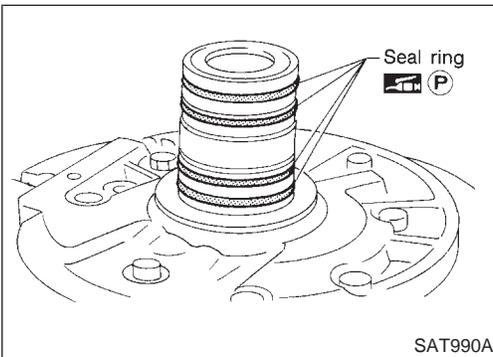
4. Install oil pump assembly.
 - a. Install needle bearing on oil pump assembly.
 - **Apply petroleum jelly to the needle bearing.**
 - b. Install selected thrust washer on oil pump assembly.
 - **Apply petroleum jelly to thrust washer.**

TF

PD

AX

SU



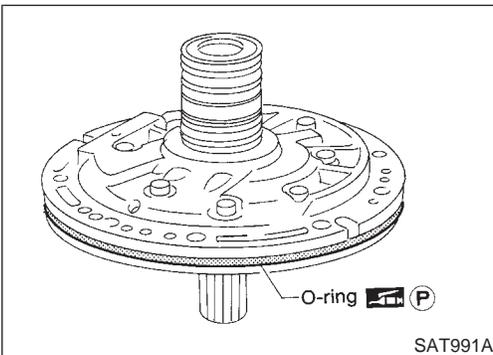
- c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit.

BR

ST

RS

BT



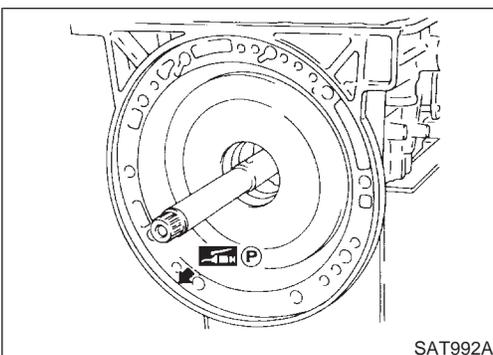
- d. Install O-ring on oil pump assembly.
 - **Apply petroleum jelly to O-ring.**

HA

SC

EL

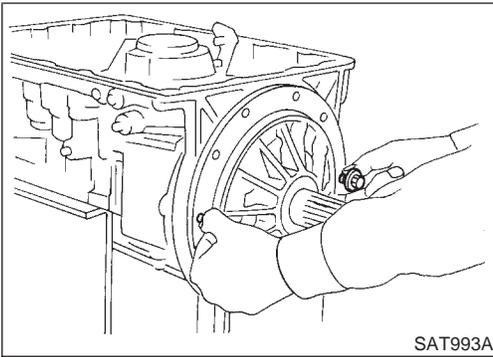
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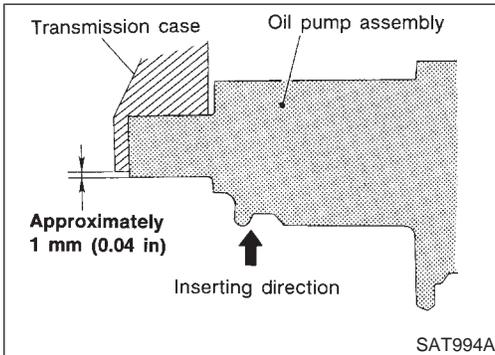
- e. Apply petroleum jelly to mating surface of transmission case and oil pump assembly.

ASSEMBLY

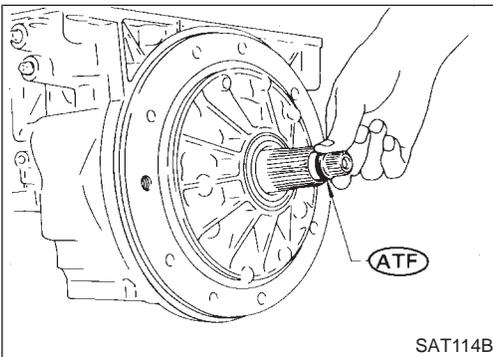
Assembly (2) (Cont'd)



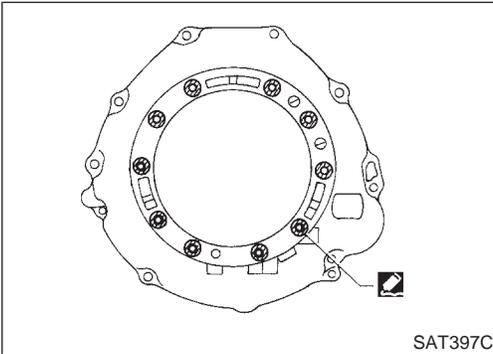
- f. Install oil pump assembly.
- Install two converter housing securing bolts in bolt holes in oil pump assembly as guides.



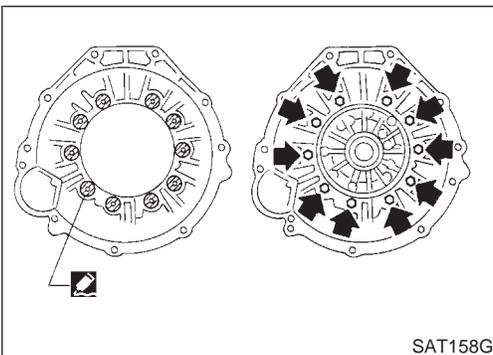
- Insert oil pump assembly to the specified position in transmission, as shown at left.



- 5. Install O-ring on input shaft.
- Apply ATF to O-rings.



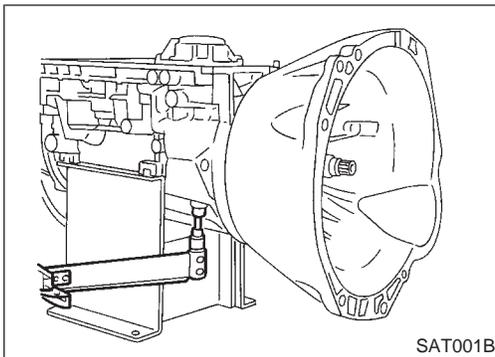
- 6. Install converter housing.
- a. Apply recommended sealant (Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI section.) to outer periphery of bolt holes in converter housing.
- Do not apply too much sealant.



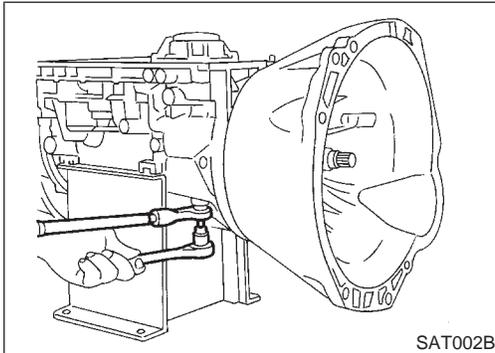
- b. Apply recommended sealant (Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI section.) to seating surfaces of bolts that secure front of converter housing.
- c. Install converter housing on transmission case.

ASSEMBLY

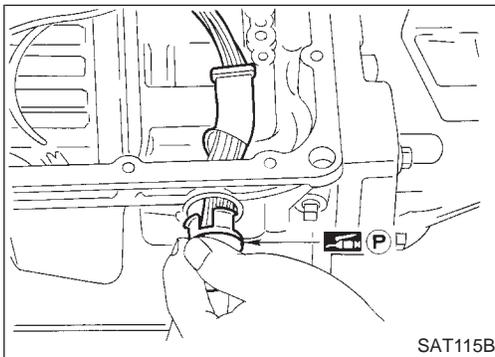
Assembly (2) (Cont'd)



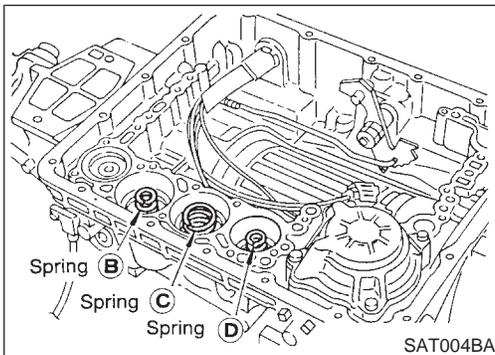
7. Install turbine revolution sensor.
8. Adjust brake band.
 - a. Tighten anchor end bolt to specified torque.
Anchor end bolt:
 : 4 - 6 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)
 - b. Back off anchor end bolt two and a half turns.



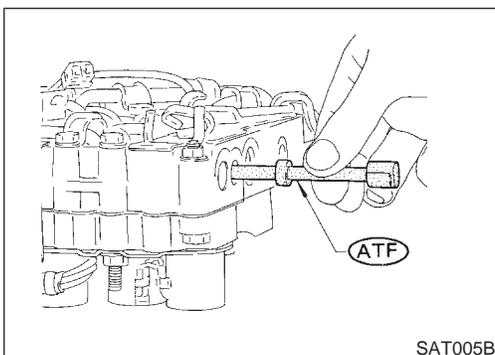
- c. While holding anchor end bolt, tighten lock nut.
Anchor end bolt nut:
 : 41 - 50 N·m (4.1 - 5.2 kg-m, 30 - 37 ft-lb)



9. Install terminal cord assembly.
 - a. Install O-ring on terminal cord assembly.
 - **Apply petroleum jelly to O-ring.**
 - b. Compress terminal cord assembly stopper and install terminal cord assembly on transmission case.



10. Install control valve assembly.
 - a. Install accumulator piston return springs B, C and D.
Free length of return springs:
Refer to SDS, AT-354.



- b. Install manual valve on control valve.
 - **Apply ATF to manual valve.**

GI

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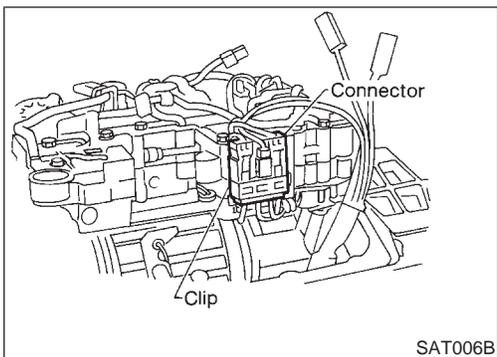
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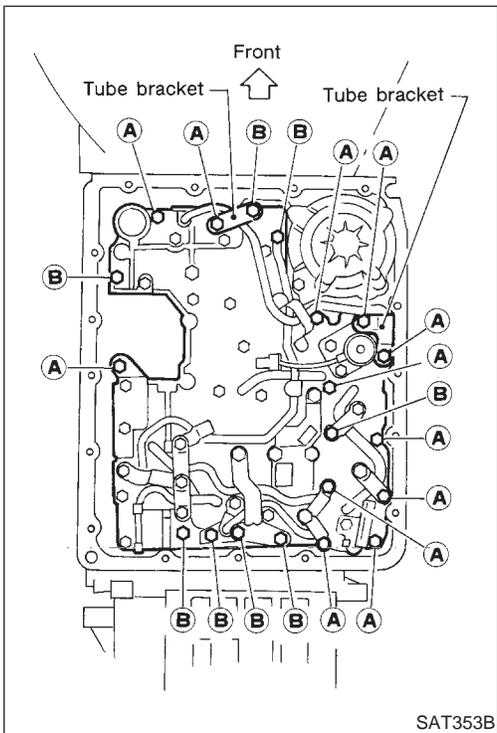
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ASSEMBLY

Assembly (2) (Cont'd)



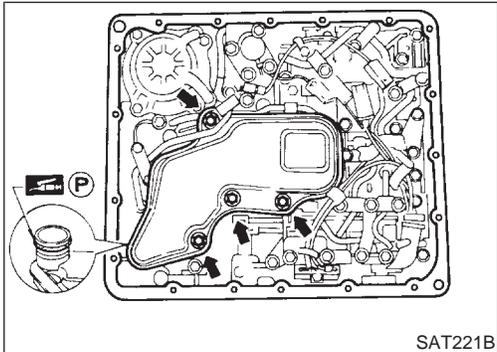
- c. Place control valve assembly on transmission case. Connect solenoid connector for upper body.
- d. Install connector clip.



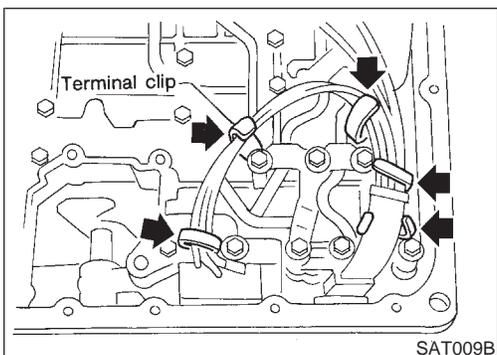
- e. Install control valve assembly on transmission case.
- f. Install connector tube brackets and tighten bolts A and B.

● **Check that terminal assembly does not catch.**

| Bolt symbol | ℓ mm (in)  ℓ |
|-------------|---|
| A | 33 (1.30) |
| B | 45 (1.77) |



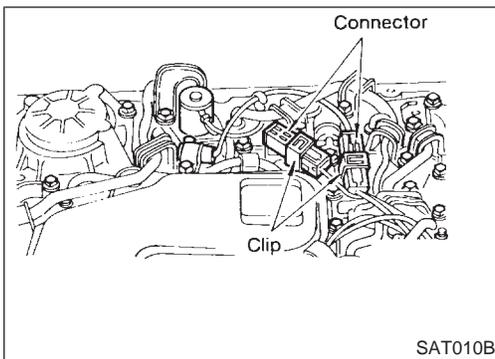
- g. Install O-ring on oil strainer.
- **Apply petroleum jelly to O-ring.**
- h. Install oil strainer on control valve.



- i. Securely fasten terminal harness with clips.

ASSEMBLY

Assembly (2) (Cont'd)



- j. Install torque converter clutch solenoid valve and A/T fluid temperature sensor connectors.

GI

MA

EM

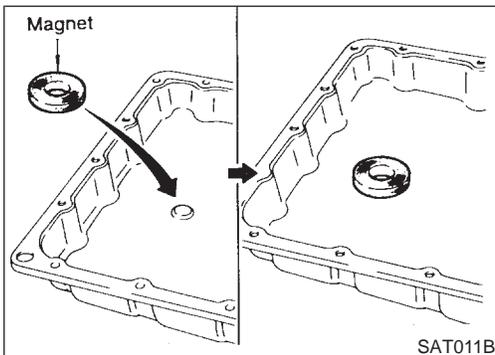
LC

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FE

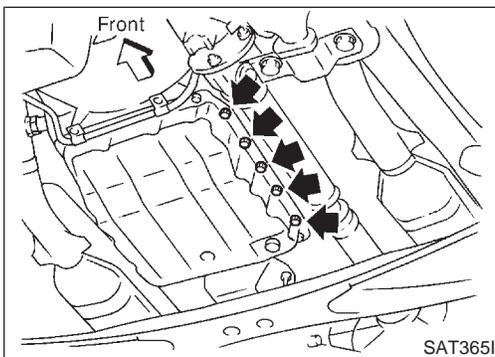
CL

MT



11. Install oil pan.
- a. Attach a magnet to oil pan.

AT



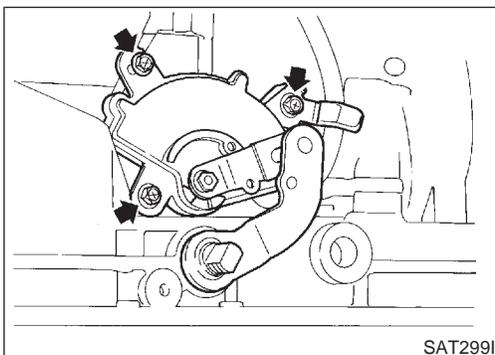
- b. Install new oil pan gasket on transmission case.
- c. Install oil pan and bracket on transmission case.
- **Always replace oil pan bolts as they are self-sealing bolts.**
 - **Before installing bolts, remove traces of sealant and oil from mating surface and thread holes.**
 - **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**
- d. Tighten drain plug.

TF

PD

AX

SU



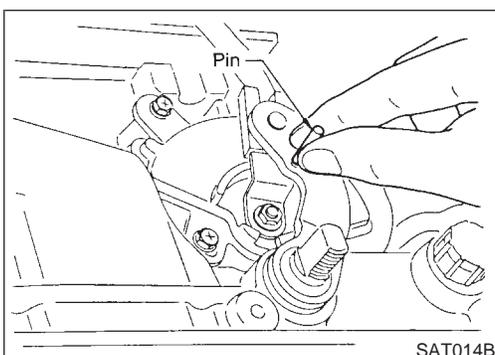
12. Install PNP switch.
- a. Check that manual shaft is in "1" position.
- b. Temporarily install PNP switch on manual shaft.
- c. Move manual shaft to "N".

BR

ST

RS

BT



- d. Tighten bolts while inserting 4.0 mm (0.157 in) dia. pin vertically into locating holes in PNP switch and manual shaft.

HA

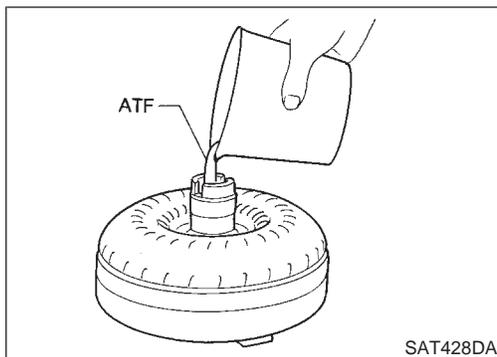
SC

EL

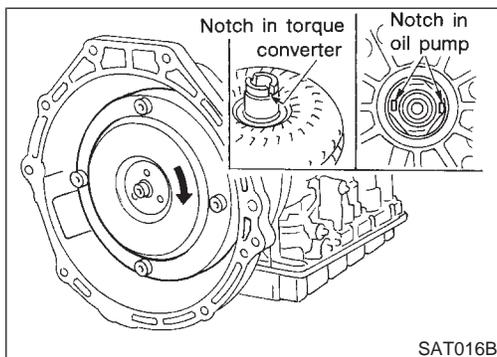
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ASSEMBLY

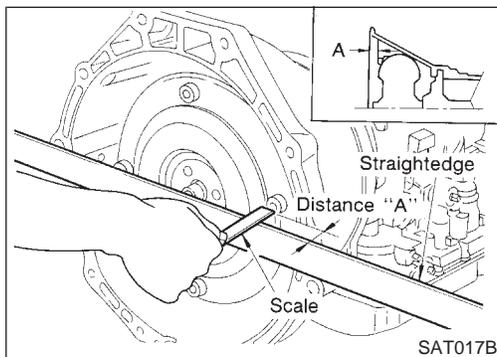
Assembly (2) (Cont'd)



13. Install torque converter.
 - a. Pour ATF into torque converter.
 - **Approximately 2 liters (2-1/8 US qt, 1-3/4 Imp qt) of fluid are required for a new torque converter.**
 - **When reusing old torque converter, add the same amount of fluid as was drained.**



- b. Install torque converter while aligning notches and oil pump.



- c. Measure distance A to check that torque converter is in proper position.

Distance "A":
25.0 mm (0.984 in) or more

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

General Specifications

NAAT0160

| | | |
|--------------------------------|--|--------------|
| Applied model | VQ35DE engine | |
| | 2WD | 4WD |
| Automatic transmission model | RE4R01A | |
| Transmission model code number | 4EX74 | 4EX75, 4EX76 |
| 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

NAAT0178

VEHICLE SPEED WHEN SHIFTING GEARS THROTTLE POSITION

NAAT0178S01

| Throttle position | Vehicle speed km/h (MPH) | | | | | | |
|-------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| | D ₁ → D ₂ | D ₂ → D ₃ | D ₃ → D ₄ | D ₄ → D ₃ | D ₃ → D ₂ | D ₂ → D ₁ | 1 ₂ → 1 ₁ |
| Full throttle | 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

NAAT0178S02

| 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

NAAT0163

| | |
|----------------------|---------------|
| Stall revolution rpm | 2,440 - 2,640 |
|----------------------|---------------|

Line Pressure

NAAT0164

| Engine speed rpm | Line pressure kPa (kg/cm ² , psi) | |
|------------------|--|--|
| | D, 2 and 1 positions | R position |
| Idle | 422 - 461 (4.3 - 4.7, 61 - 67) | 667 - 706 (6.8 - 7.2, 97 - 102) |
| Stall | 1,020 - 1,098 (10.4 - 11.2, 148 - 159) | 1,422 - 1,500 (14.5 - 15.3, 206 - 218) |

SERVICE DATA AND SPECIFICATIONS (SDS)

Return Springs

Return Springs

Unit: mm (in) ^{NAAT0165}

| 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.

SERVICE DATA AND SPECIFICATIONS (SDS)

Accumulator O-ring

Accumulator O-ring

NAAT0166

| 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

NAAT0167

REVERSE CLUTCH

NAAT0167S01

| | | |
|----------------------------------|-------------------|-------------------------------|
| Code number | 4EX74 | 4EX75, 4EX76 |
| Number of drive plates | 3 | |
| Number of driven plates | 3 | |
| Thickness of drive plate mm (in) | Standard | 1.90 - 2.05 (0.0748 - 0.0807) |
| | Wear limit | 1.80 (0.0709) |
| Clearance mm (in) | Standard | 0.5 - 0.8 (0.020 - 0.031) |
| | Allowable limit | 1.2 (0.047) |
| Thickness of retaining plate | Thickness mm (in) | Part number* |
| | 4.6 (0.181) | 31537-42X20 |
| | 4.8 (0.189) | 31537-42X21 |
| | 5.0 (0.197) | 31537-42X22 |
| | 5.2 (0.205) | 31537-42X23 |
| | 5.4 (0.213) | 31537-42X24 |

*: Always check with the Parts Department for the latest parts information.

HIGH CLUTCH

NAAT0167S02

| | | |
|----------------------------------|-------------------|-------------------------------|
| Code number | 4EX74 | 4EX75, 4EX76 |
| Number of drive plates | 5 | |
| Number of driven plates | 6 | |
| Thickness of drive plate mm (in) | Standard | 1.52 - 1.67 (0.0598 - 0.0657) |
| | Wear limit | 1.40 (0.0551) |
| Clearance mm (in) | Standard | 1.8 - 2.2 (0.071 - 0.087) |
| | Allowable limit | 3.2 (0.126) |
| Thickness of retaining plate | Thickness mm (in) | Part number* |
| | 4.0 (0.157) | 31537-41X63 |
| | 4.2 (0.165) | 31537-41X64 |
| | 4.4 (0.173) | 31537-41X65 |
| | 4.6 (0.181) | 31537-41X66 |
| | 4.8 (0.189) | 31537-41X67 |
| 5.0 (0.197) | 31537-41X68 | |

*: Always check with the Parts Department for the latest parts information.

SERVICE DATA AND SPECIFICATIONS (SDS)

Clutches and Brakes (Cont'd)

FORWARD CLUTCH

NAAT0167S03

| | | | | | | |
|----------------------------------|-------------------|-------------------------------|--------------|---------------|-------------------|--|
| Code number | | 4EX74 | 4EX75, 4EX76 | | | |
| Number of drive plates | | 7 | 8 | | | |
| Number of driven plates | | 7 | 8 | | | |
| Thickness of drive plate mm (in) | Standard | 1.52 - 1.67 (0.0598 - 0.0657) | | | | |
| | Wear limit | 1.40 (0.0551) | | | | |
| Clearance mm (in) | Standard | 0.35 - 0.75 (0.0138 - 0.0295) | | | | |
| | Allowable limit | 2.15 (0.0846) | | 2.35 (0.0925) | | |
| Thickness of retaining plate | Thickness mm (in) | | Part number* | | Thickness mm (in) | |
| | 4.6 (0.181) | | 31537-42X13 | | 4.2 (0.165) | |
| | 4.8 (0.189) | | 31537-42X14 | | 4.4 (0.173) | |
| | 5.0 (0.197) | | 31537-42X15 | | 4.6 (0.181) | |
| | 5.2 (0.205) | | 31537-4AX00 | | 4.8 (0.189) | |
| | 5.4 (0.213) | | 31537-4AX01 | | 5.0 (0.197) | |
| | 5.6 (0.220) | | 31537-4AX02 | | 5.2 (0.205) | |
| | | | | 5.4 (0.213) | | |
| | | | | 31537-4AX01 | | |

*: Always check with the Parts Department for the latest parts information.

OVERRUN CLUTCH

NAAT0167S04

| | | | | | |
|----------------------------------|-------------------|-------------------------------|--------------|-------------|--|
| Code number | | 4EX74 | 4EX75, 4EX76 | | |
| Number of drive plates | | 3 | | | |
| Number of driven plates | | 5 | | | |
| Thickness of drive plate mm (in) | Standard | 1.90 - 2.05 (0.0748 - 0.0807) | | | |
| | Wear limit | 1.80 (0.0709) | | | |
| Clearance mm (in) | Standard | 1.0 - 1.4 (0.039 - 0.055) | | | |
| | Allowable limit | 2.0 (0.079) | | | |
| Thickness of retaining plate | Thickness mm (in) | | Part number* | | |
| | 4.2 (0.165) | | 31537-41X80 | | |
| | 4.4 (0.173) | | 31537-41X81 | | |
| | 4.6 (0.181) | | 31537-41X82 | | |
| | 4.8 (0.189) | | 31537-41X83 | | |
| | | 5.0 (0.197) | | 31537-41X84 | |

*: Always check with the Parts Department for the latest parts information.

SERVICE DATA AND SPECIFICATIONS (SDS)

Clutches and Brakes (Cont'd)

LOW & REVERSE BRAKE

NAAT0167S05

| | | | |
|----------------------------------|-------------------|-------------------------------|--------------|
| Code number | | 4EX74 | 4EX75, 4EX76 |
| 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) | |
| | Wear limit | 1.40 (0.0551) | |
| Clearance mm (in) | Standard | 0.8 - 1.1 (0.031 - 0.043) | |
| | Allowable limit | 2.7 (0.106) | |
| Thickness of retaining plate | Thickness mm (in) | | Part number* |
| | 7.6 (0.299) | | 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

NAAT0167S06

| | |
|--|---|
| 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

NAAT0168
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

NAAT0169

| | | |
|--|-------------------------------------|--|
| Total end play "T ₁ " | 0.25 - 0.55 mm (0.0098 - 0.0217 in) | |
| Thickness of oil pump cover bearing race | Thickness mm (in) | |
| | 0.8 (0.031) | |
| | 1.0 (0.039) | |
| | 1.2 (0.047) | |
| | 1.4 (0.055) | |
| | 1.6 (0.063) | |
| | 1.8 (0.071) | |
| | 2.0 (0.079) | |
| | Part number* | |
| | 31435-41X01 | |
| | 31435-41X02 | |
| | 31435-41X03 | |
| | 31435-41X04 | |
| | 31435-41X05 | |
| | 31435-41X06 | |
| | 31435-41X07 | |

*: Always check with the Parts Department for the latest parts information.

SERVICE DATA AND SPECIFICATIONS (SDS)

Reverse Clutch Drum End Play

Reverse Clutch Drum End Play

NAAT0170

| | | |
|--|-------------------------------------|--------------|
| Reverse clutch drum end play "T ₂ " | 0.55 - 0.90 mm (0.0217 - 0.0354 in) | |
| Thickness of oil pump thrust washer | Thickness mm (in) | Part number* |
| | 0.9 (0.035) | 31528-21X01 |
| | 1.1 (0.043) | 31528-21X02 |
| | 1.3 (0.051) | 31528-21X03 |
| | 1.5 (0.059) | 31528-21X04 |
| | 1.7 (0.067) | 31528-21X05 |
| | 1.9 (0.075) | 31528-21X06 |

*: Always check with the Parts Department for the latest parts information.

Removal and Installation

NAAT0171

| | | |
|--|--|--|
| 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

NAAT0217

| 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

NAAT0218

| 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

NAAT0219

Remarks: Specification data are reference values.

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

Turbine Revolution Sensor

NAAT0232

| Terminal No. | | Resistance |
|--------------|---|---------------|
| 1 | 2 | 2.4 - 2.8 kΩ |
| 2 | 3 | No continuity |
| 1 | 3 | No continuity |

SERVICE DATA AND SPECIFICATIONS (SDS)

Revolution Sensor

Revolution Sensor

NAAT0220

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

Dropping Resistor

NAAT0221

| | |
|------------|--------------|
| Resistance | 11.2 - 12.8Ω |
|------------|--------------|

GI

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NOTES