# AUTOMATIC TRANSMISSION

# SECTION AT

**MODIFICATION NOTICE:**
The A/T model (RE4R01A) has been added.

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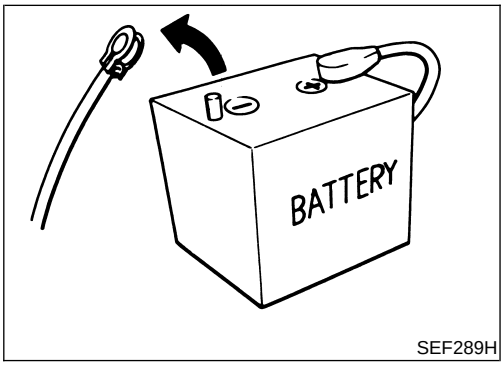
## Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

NEAT0001

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 in a frontal collision. The SRS system composition which is available to NISSAN MODEL D22 is as follows (The composition varies according to the destination and optional equipment.):
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-tensioner, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
Information necessary to service the system safely is included in the **RS section** of this Service Manual.

**WARNING:**

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral Cable and wiring harnesses (except “SEAT BELT PRE-TENSIONER”) covered with yellow insulation either just before the harness connectors or for the complete harness are related to the SRS.**

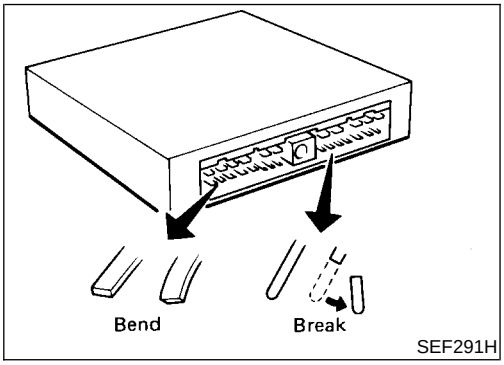


SEF289H

## Precautions

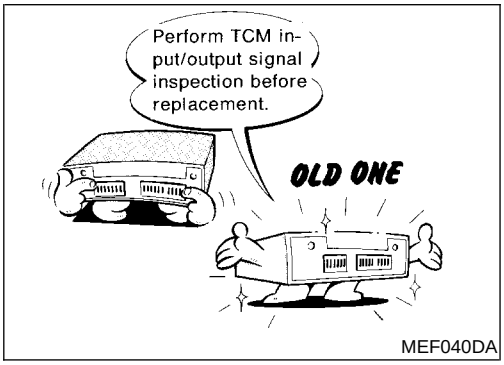
NEAT0003

- **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.**



SEF291H

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



MEF040DA

- **Before replacing TCM, perform TCM input/output signal inspection and make sure whether TCM functions properly or not. (See page AT-81.)**

- 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.
- 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.
- 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 under "Changing A/T Fluid" in the MA section when changing A/T fluid.



## Service Notice or Precautions

NEAT0004

### FAIL-SAFE

NEAT0004S01

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 or A/T CHECK indicator lamp blinks for about 8 seconds. (For "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)", refer to AT-34.)
Fail-Safe may occur without electrical circuit damage if the vehicle is driven under extreme conditions (such as excessive wheel spin followed by sudden braking). To recover normal shift pattern, turn the ignition key "OFF" for 5 seconds, then "ON".

The blinking of the O/D OFF or A/T CHECK 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-47).
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

NEAT0004S04

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

## Wiring Diagrams and Trouble Diagnosis

NEAT0005

When you read wiring diagrams, refer to the followings:

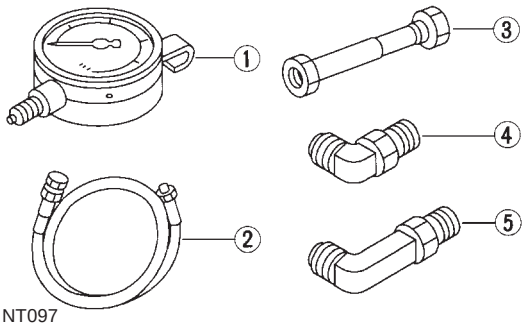
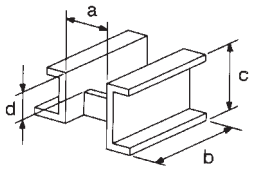
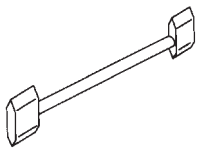
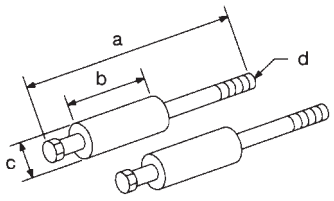
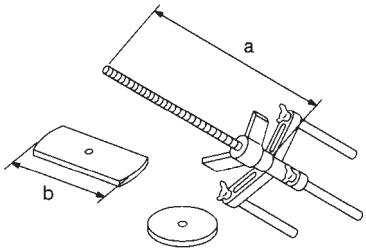
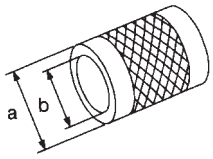
- "HOW TO READ WIRING DIAGRAMS" in GI section
- "POWER SUPPLY ROUTING" for power distribution circuit in EL section

When you perform trouble diagnosis, refer to the followings:

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

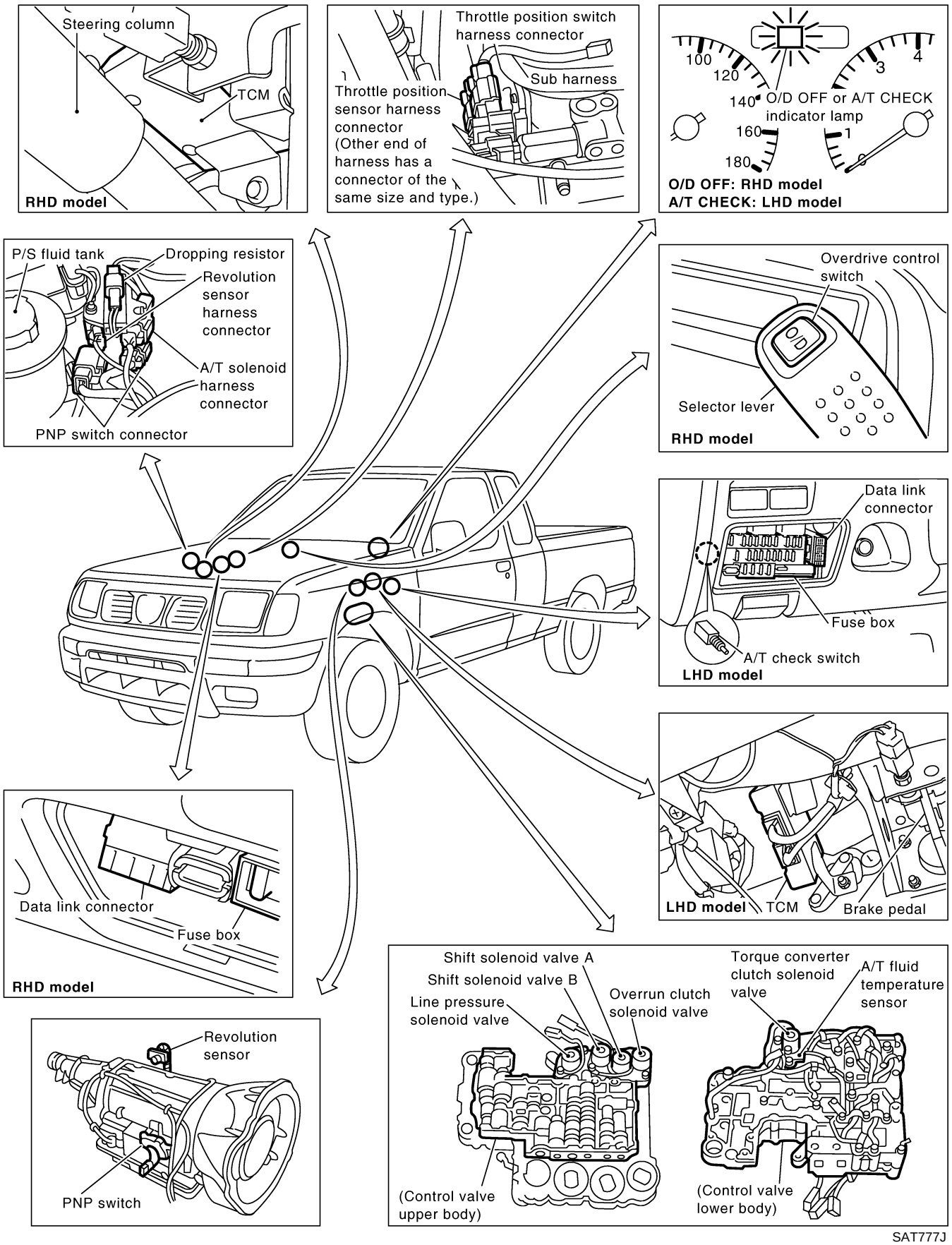
## Special Service Tools

NEAT0006

| Tool number<br>Tool name | Description | |
|---|---|---|
| ST2505S001<br>Oil pressure gauge set<br>1 ST25051001<br>Oil pressure gauge<br>2 ST25052000<br>Hose<br>3 ST25053000<br>Joint pipe<br>4 ST25054000<br>Adapter<br>5 ST25055000<br>Adapter |  NT097 | Measuring line pressure |
| ST07870000<br>Transmission case stand |  NT421 | Disassembling and assembling A/T<br>**a: 182 mm (7.17 in)**<br>**b: 282 mm (11.10 in)**<br>**c: 230 mm (9.06 in)**<br>**d: 100 mm (3.94 in)** |
| KV31102100<br>Torque converter one-way clutch check tool |  NT098 | Checking one-way clutch in torque converter |
| ST25850000<br>Sliding hammer |  NT422 | Removing oil pump assembly<br>**a: 179 mm (7.05 in)**<br>**b: 70 mm (2.76 in)**<br>**c: 40 mm (1.57 in) dia.**<br>**d: M12 x 1.75P** |
| KV31102400<br>Clutch spring compressor |  NT423 | Removing and installing clutch return springs<br>**a: 320 mm (12.60 in)**<br>**b: 174 mm (6.85 in)** |
| ST33200000<br>Drift |  NT091 | Installing oil pump housing oil seal Installing rear oil seal<br>**a: 60 mm (2.36 in) dia.**<br>**b: 44.5 mm (1.752 in) dia.** |

# A/T Electrical Parts Location

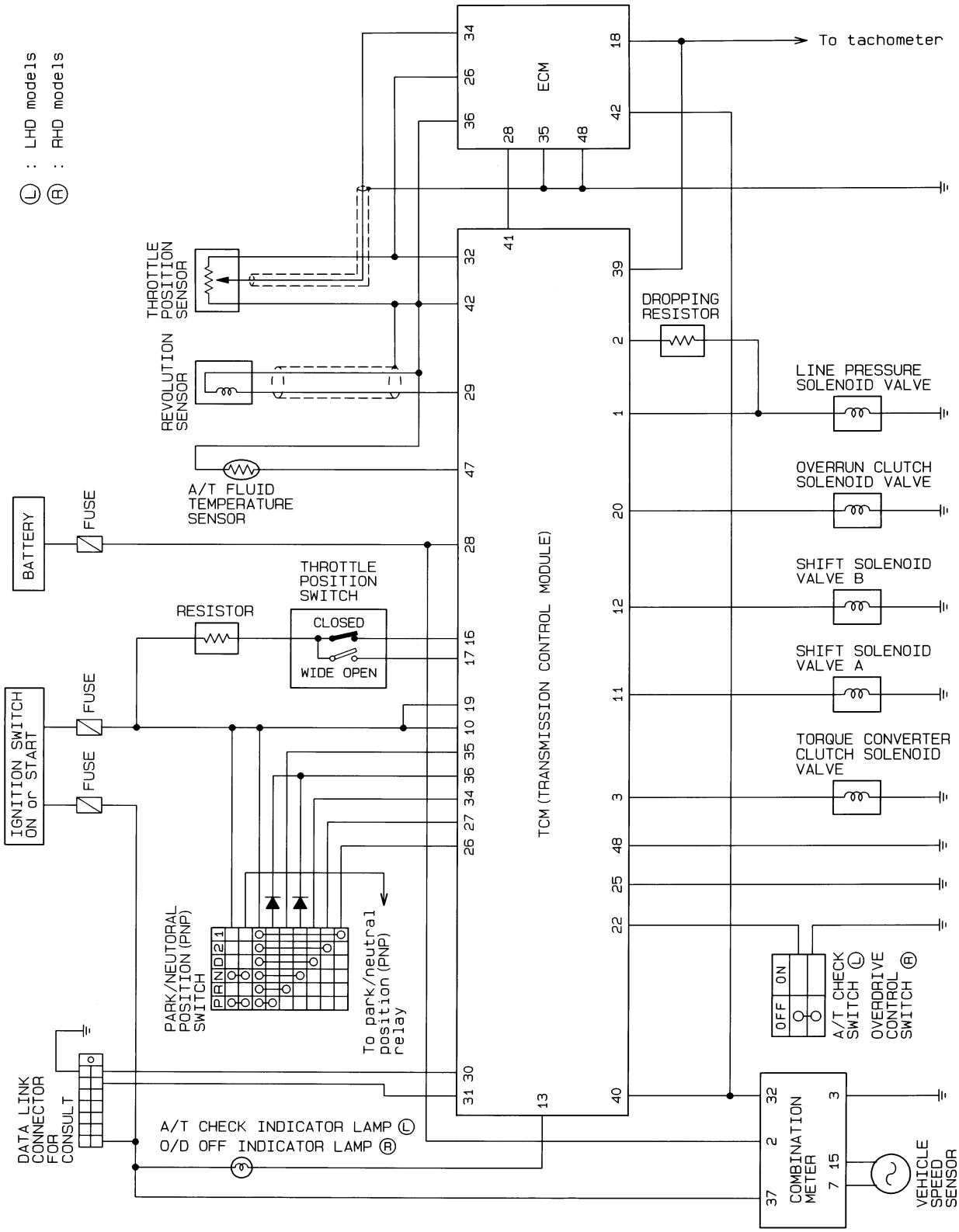
NEAT0007




SAT777J

## Circuit Diagram

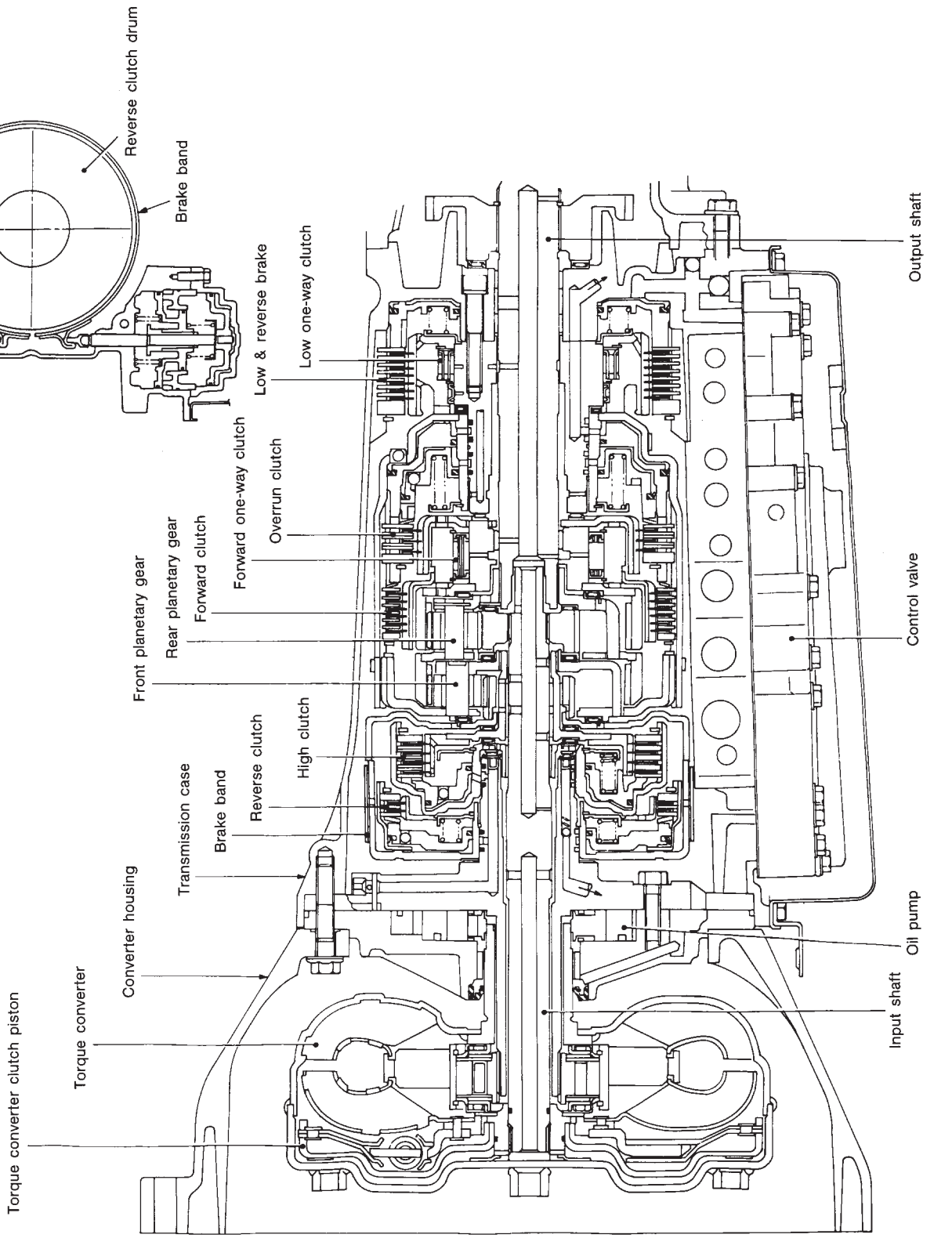
NEAT0008




HAT053

## Cross-sectional View

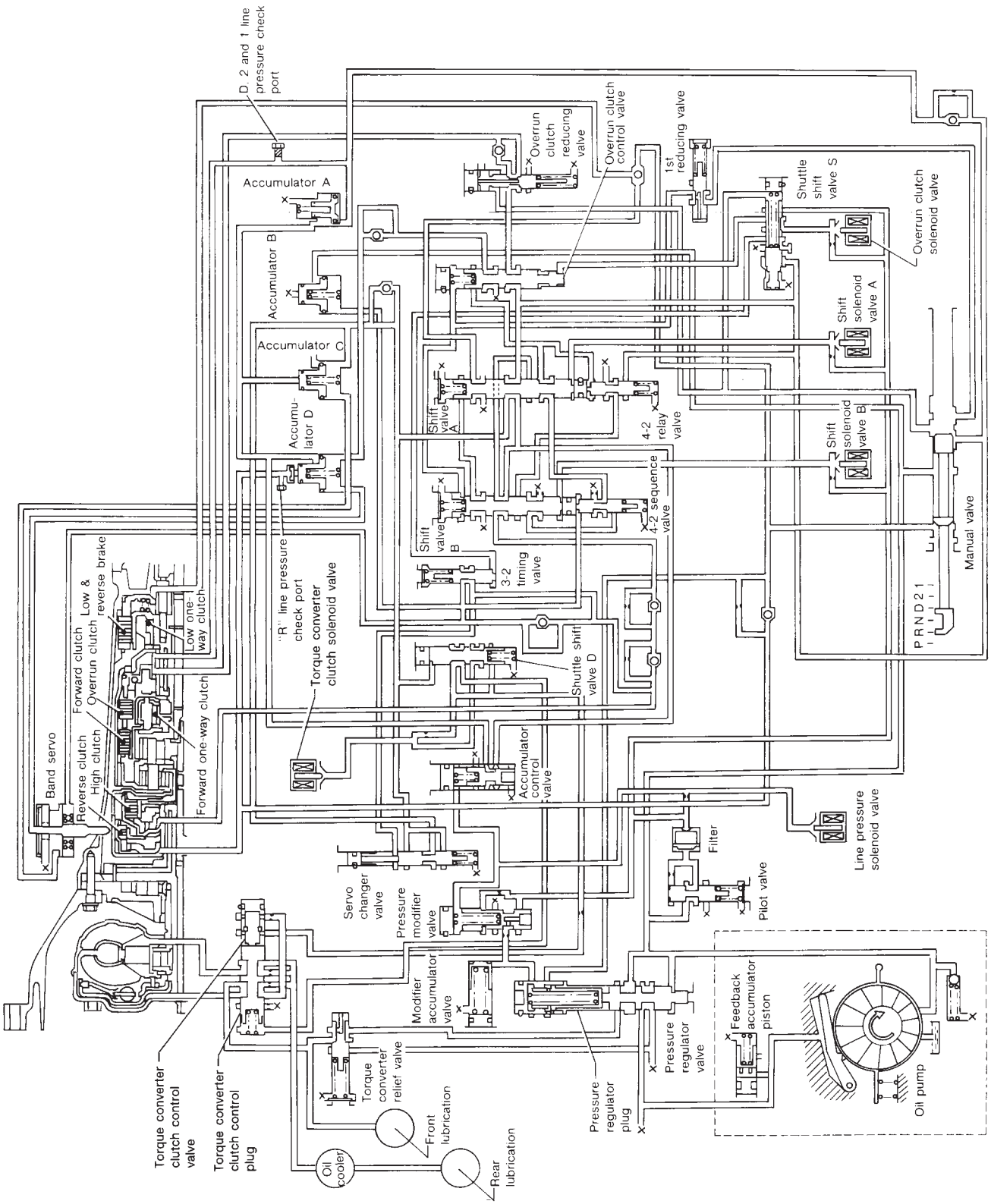
NEAT0010




SAT125BA

# Hydraulic Control Circuit

NEAT0011




SAT624GA

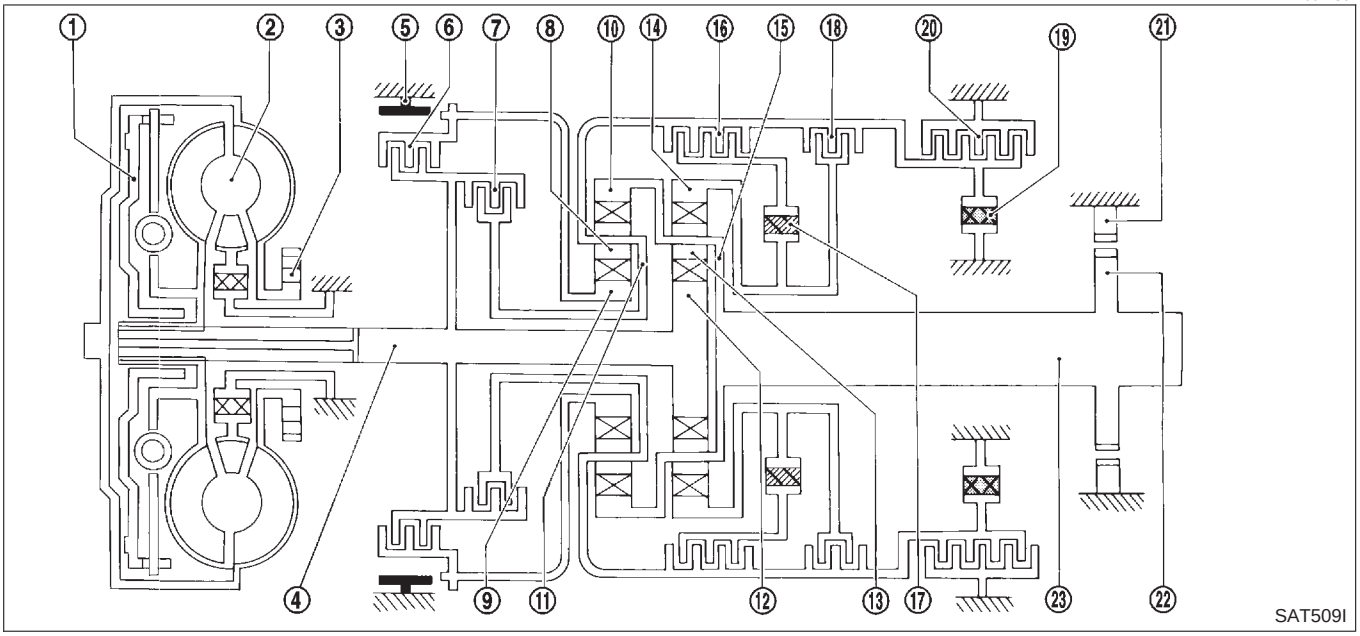
# Shift Mechanism

NEAT0012

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

NEAT0012S01




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

## FUNCTION OF CLUTCH AND BRAKE

NEAT0012S02

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

## CLUTCH AND BAND CHART

NEAT0012S03

| Shift position | | Reverse clutch | High clutch | Forward clutch | Overrun clutch | Band servo | | | Forward one-way clutch | Low one-way clutch | Low & reverse brake | Lock-up | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2nd apply | 3rd release | 4th apply | | | | | |
| P | | | | | | | | | | | | | PARK POSITION |
| R | | ○ | | | | | | | | | ○ | | REVERSE POSITION |
| N | | | | | | | | | | | | | NEUTRAL POSITION |
| D*4 | 1st | | | ○ | *1D | | | | B | B | | | Automatic shift 1 ⇔ 2 ⇔ 3 ⇔ 4 |
| | 2nd | | | ○ | *1A | ○ | | | B | | | | |
| | 3rd | | ○ | ○ | *1A | *2C | C | | B | | | *5○ | |
| | 4th | | ○ | C | | *3C | C | ○ | | | | ○ | |
| 2 | 1st | | | ○ | ○ | | | | B | B | | | Automatic shift 1 ⇔ 2 |
| | 2nd | | | ○ | ○ | ○ | | | B | | | | |
| 1 | 1st | | | ○ | ○ | | | | B | 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.

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

○ : Operates.

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

B: Operates during "progressive" acceleration.

C: Operates but does not affect power transmission.

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

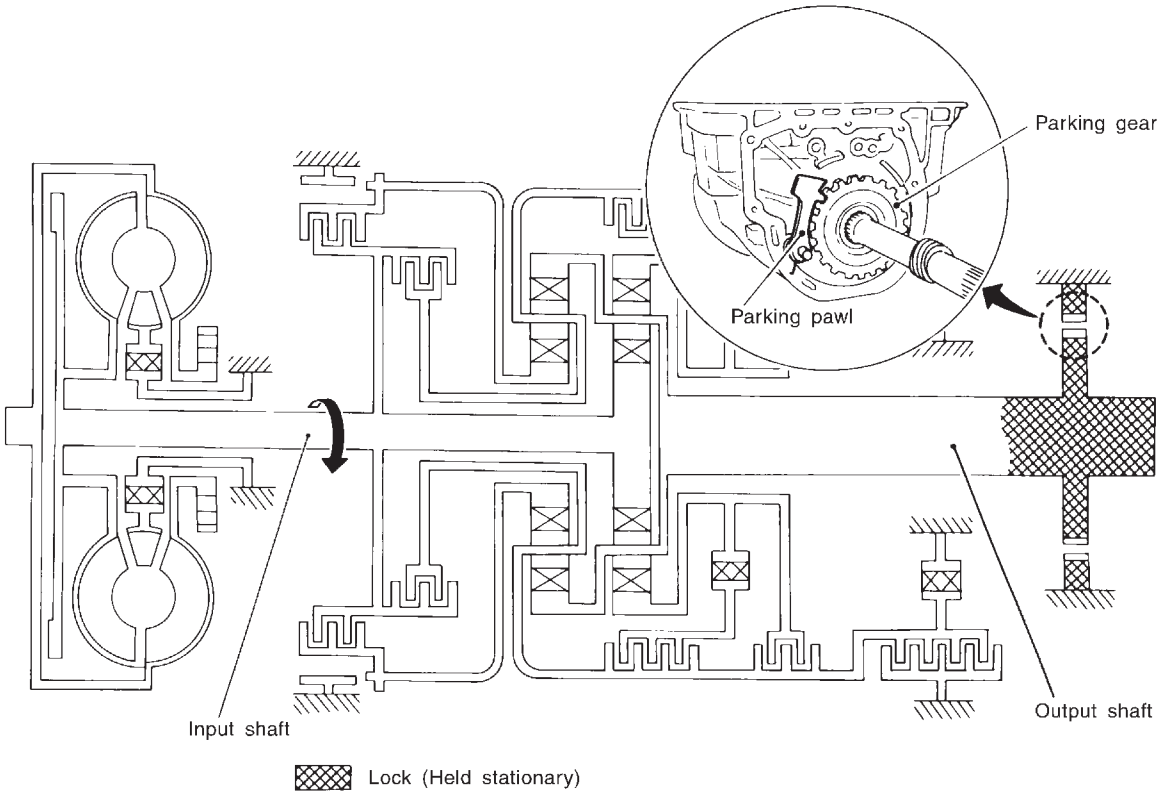
## POWER TRANSMISSION

=NEAT0012S04

### "N" and "P" Positions

NEAT0012S0401

- "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.

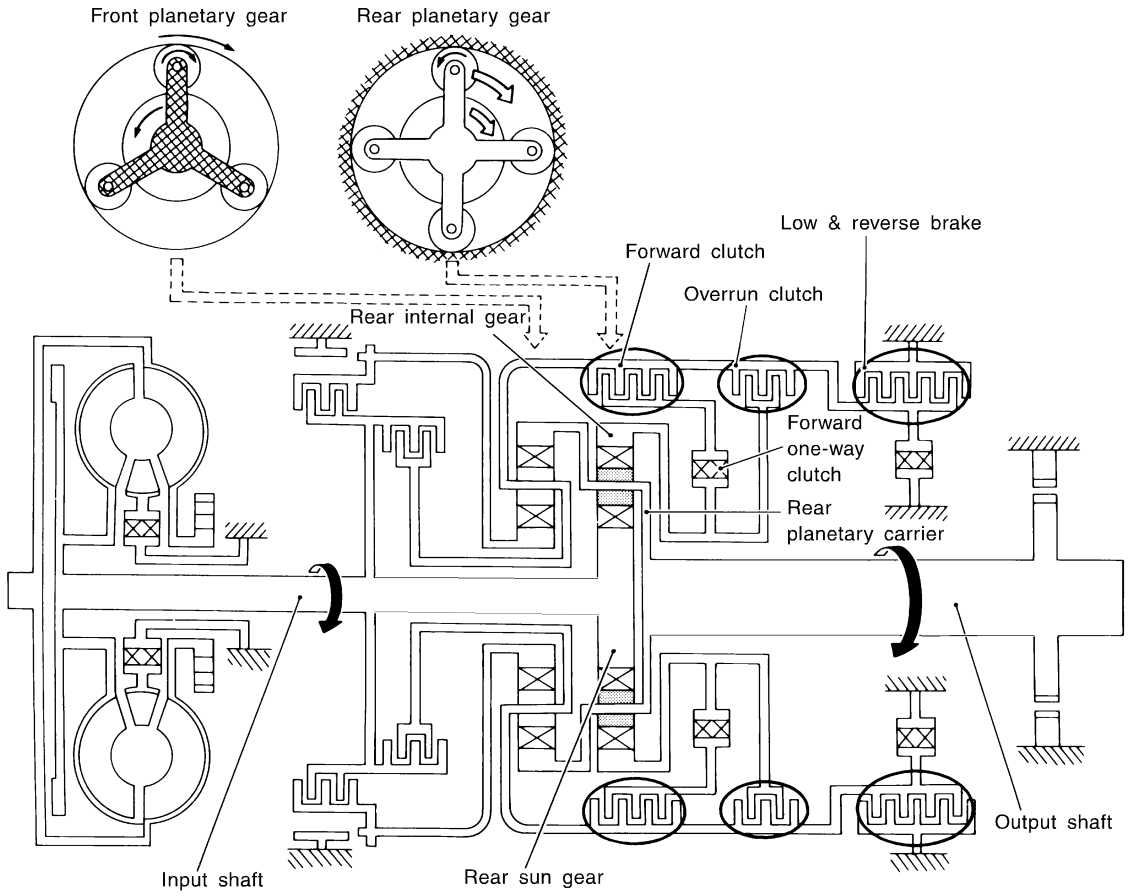



SAT039J

## "$1_1$" Position

=NEAT0012S0406

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




**Power flow**

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

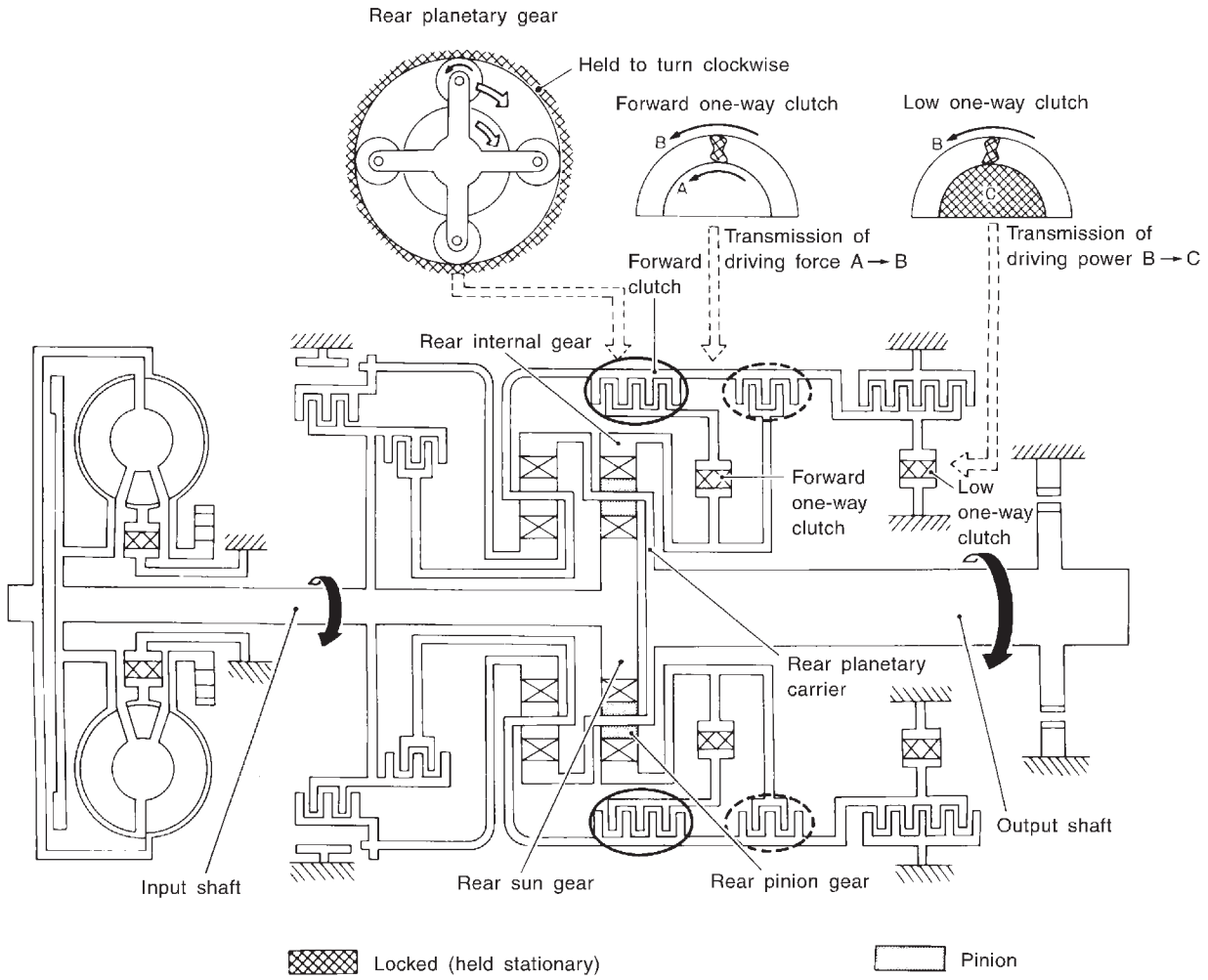
SAT100J

*Shift Mechanism (Cont'd)*

## "$D_1$" and "$2_1$" Positions

=NEAT0012S0402

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




**Power flow**

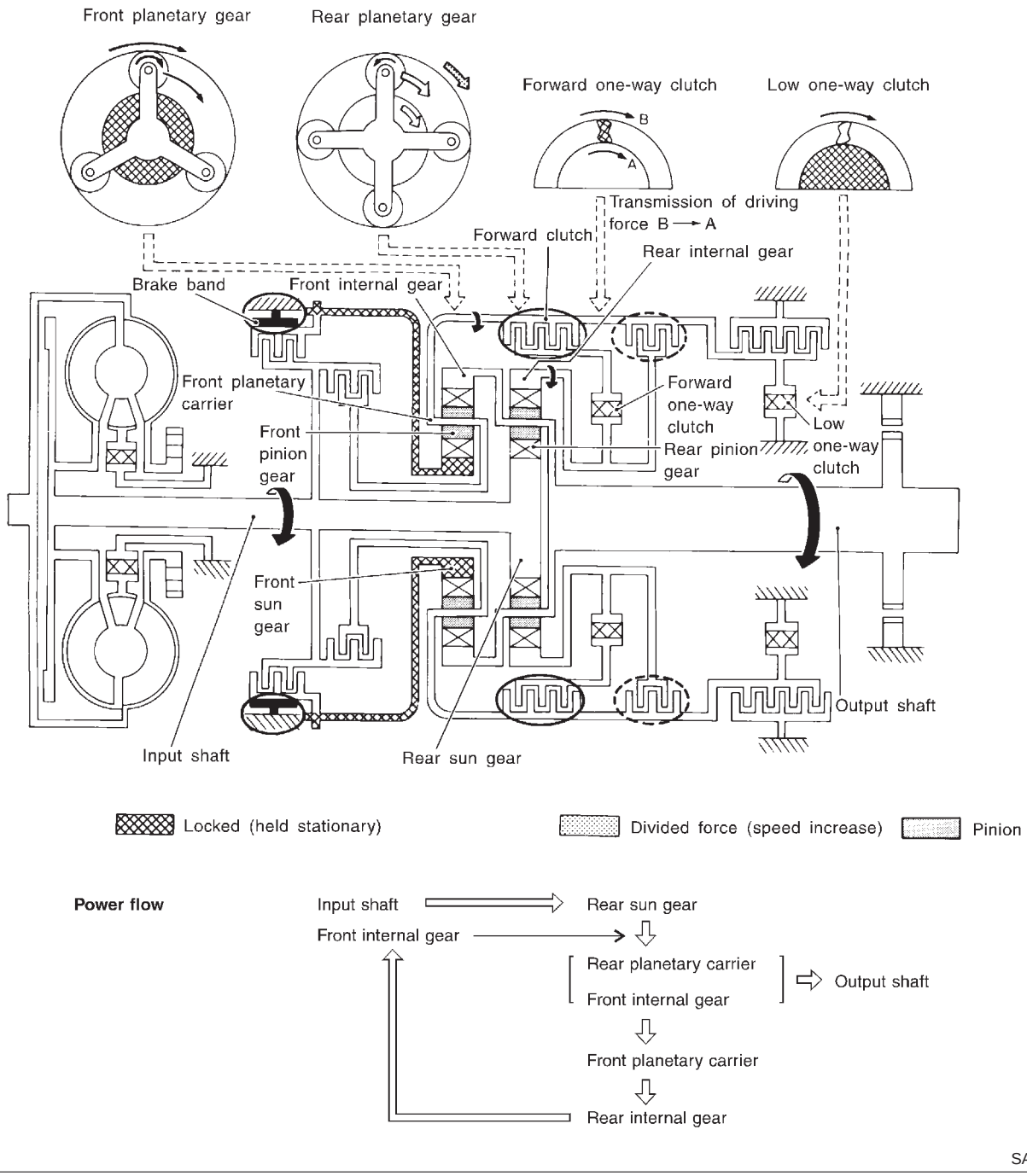
Input shaft
⇩
Rear sun gear
⇩
Rear pinion gear
⇩
Rear planetary carrier → Output shaft

SAT096J

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

=NEAT0012S0403

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

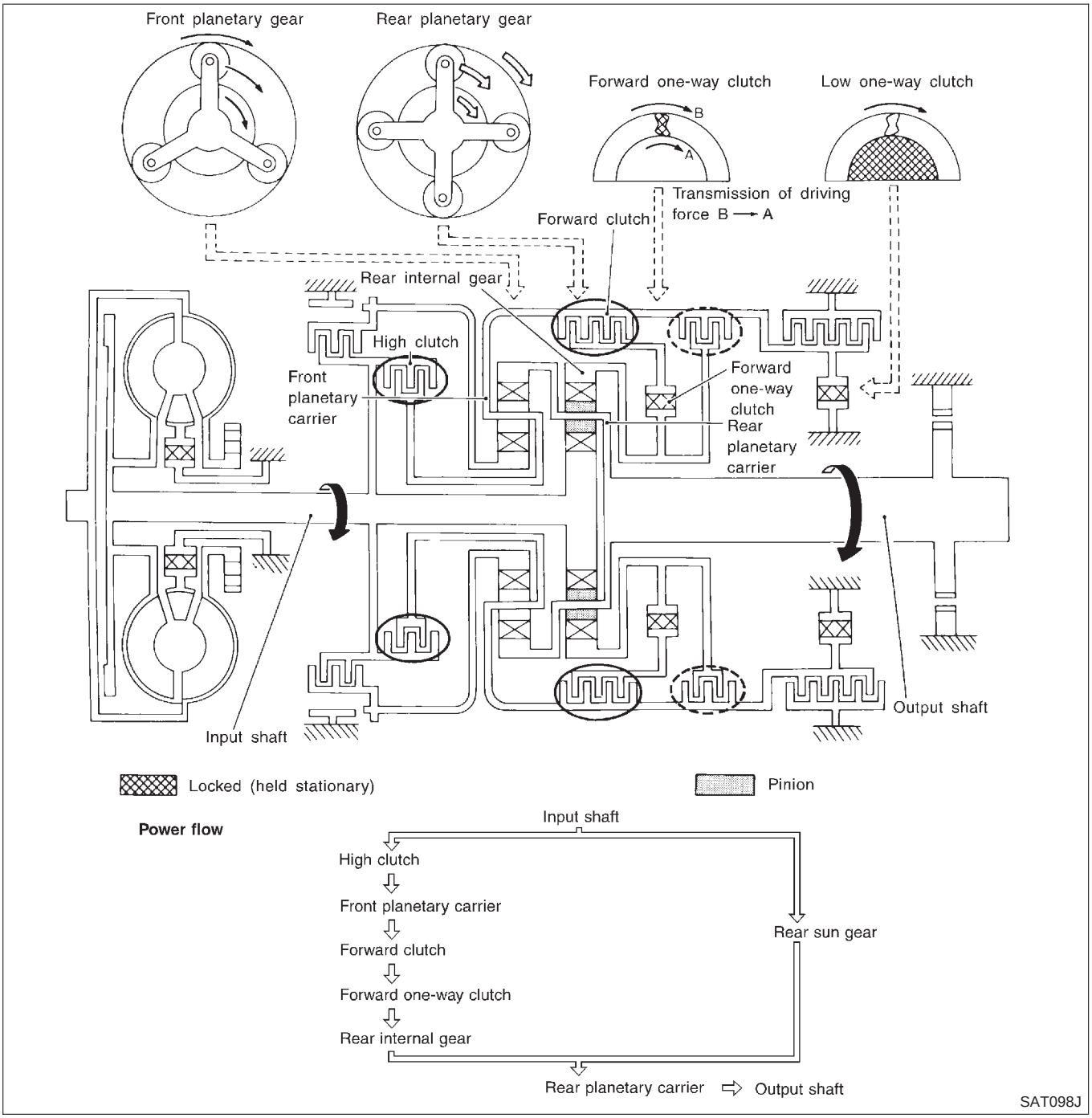



SAT097J

## "$D_3$" Position

=NEAT0012S0404

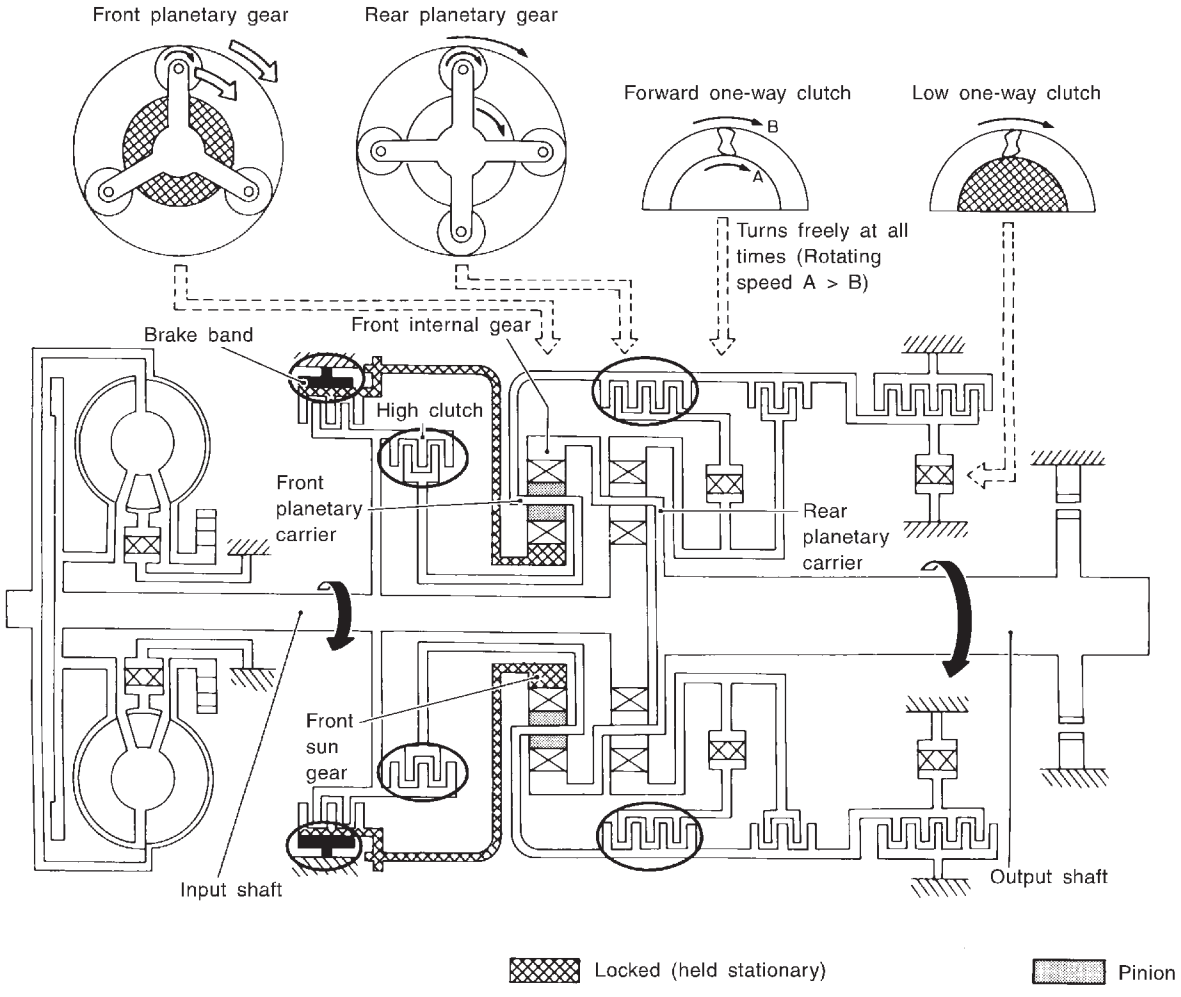
| | |
|---|---|
| **High clutch**<br>**Forward clutch**<br>**Forward one-way clutch** | Input power is transmitted to front planetary carrier through high clutch. And front planetary carrier is connected to rear internal gear by operation of forward clutch and forward one-way clutch.<br>This rear internal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



## "$D_4$" (OD) Position

=NEAT0012S0405

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




**Power flow**

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

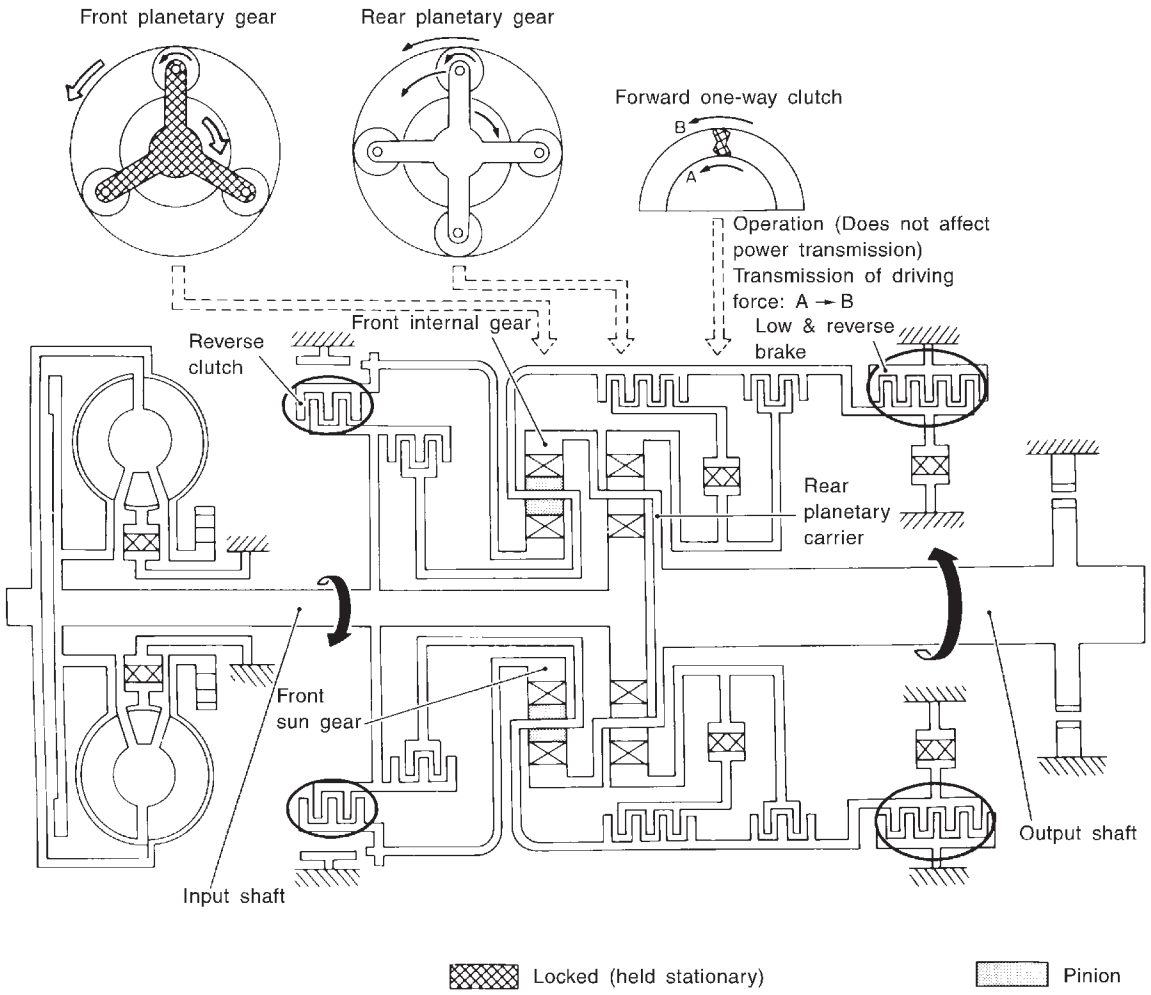
Front internal gear
⇩
Rear planetary carrier
⇩
Output shaft

SAT099J

## "R" Position

=NEAT0012S0407

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




**Power flow**

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

SAT101J

# Control System

=NEAT0013

## OUTLINE

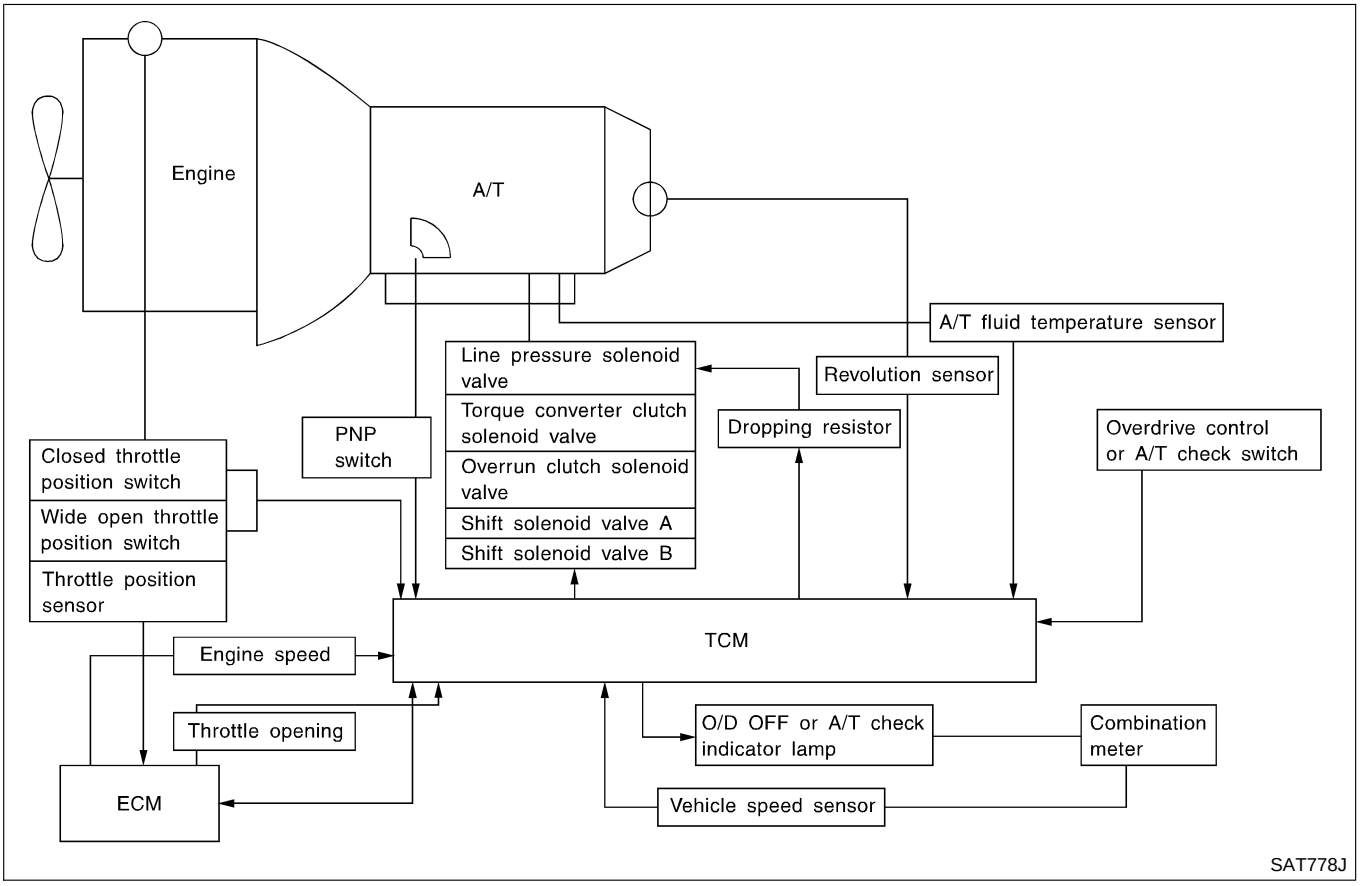
NEAT0013S01

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

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

## CONTROL SYSTEM

NEAT0013S02



## TCM FUNCTION

=NEAT0013S03

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

NEAT0013S04

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

# Control Mechanism

NEAT0180

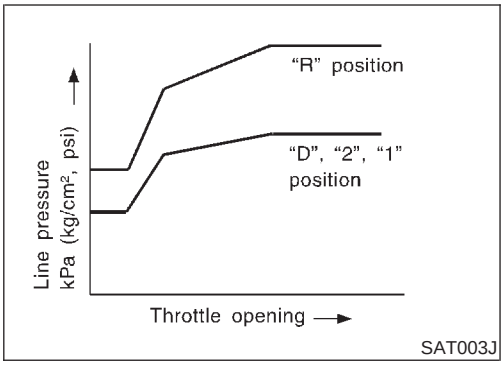
## LINE PRESSURE CONTROL

NEAT0180S01

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.

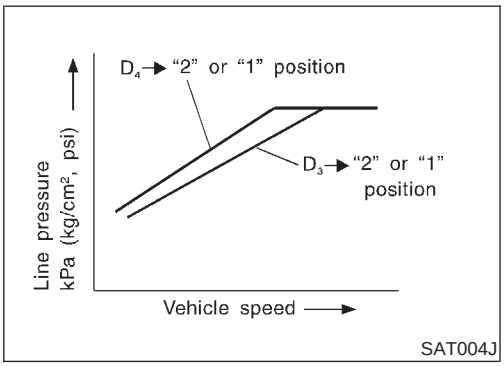
Hydraulic pressure on the clutch and brake is electronically controlled through the line pressure solenoid valve to accommodate engine torque. This results in smooth shift operation.




## Normal Control

NEAT0180S0101

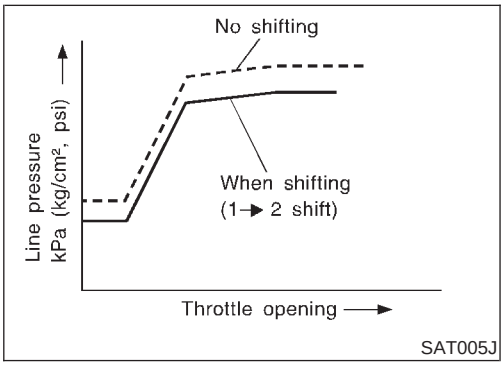
The line pressure to throttle opening characteristics is set for suitable clutch operation.




## Back-up Control (Engine brake)

NEAT0180S0102

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




## During Shift Change

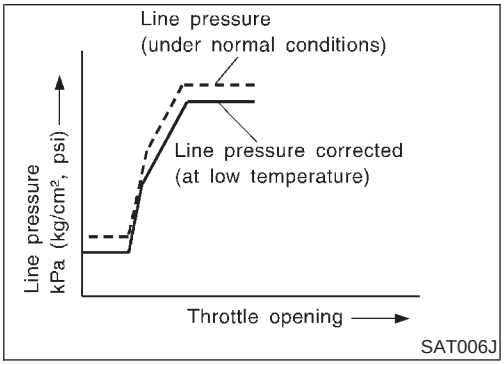
NEAT0180S0103

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.

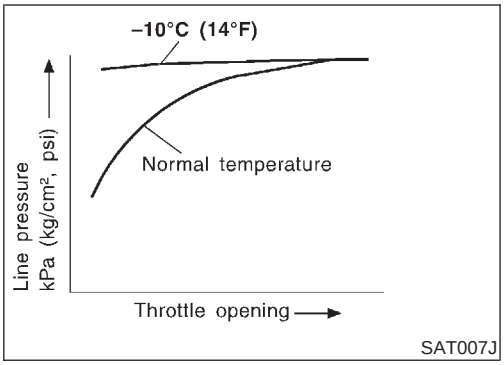
## At Low Fluid Temperature

NEAT0180S0104

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




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

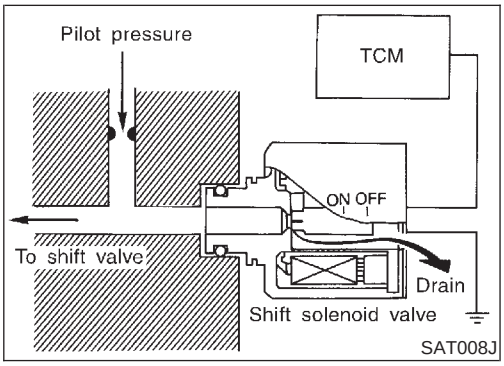



- Line pressure is increased to a maximum irrespective of the throttle opening when fluid temperature drops to −10°C (14°F). This pressure rise is adopted to prevent a delay in clutch and brake operation due to extreme drop of fluid viscosity at low temperature.

## SHIFT CONTROL

NEAT0180S02

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




### Control of Shift Solenoid Valves A and B

NEAT0180S0201

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

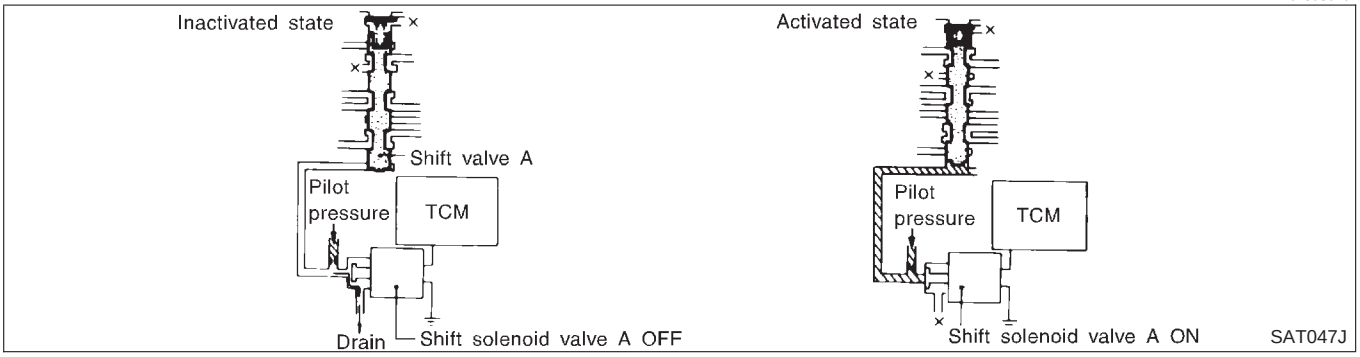
The shift solenoid valve performs simple ON-OFF operation. When set to "ON", the drain circuit closes and pilot pressure is applied to the shift valve.

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

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

### Control of Shift Valves A and B

NEAT0180S0202



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

NEAT0180S03

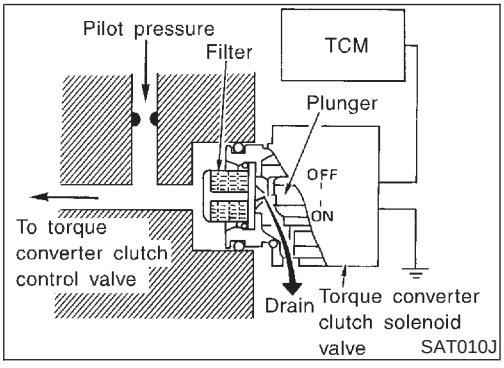
The torque converter clutch piston in the torque converter is locked to eliminate torque converter slip to increase power transmission efficiency. The solenoid valve is controlled by an ON-OFF duty signal sent from the TCM. The signal is converted to oil pressure signal which controls the torque converter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

### Conditions for Lock-up Operation

NEAT0180S0301

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

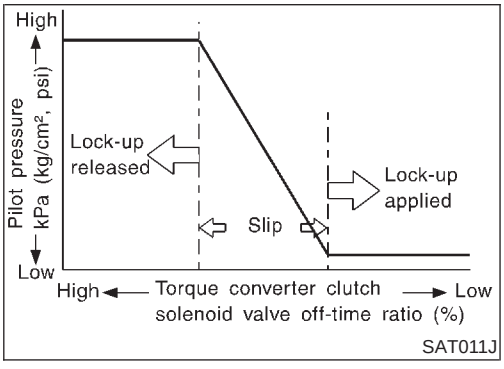
| | | |
|---|---|---|
| Overdrive control switch | ON | OFF |
| Selector lever | "D" position | |
| Gear position | $D_4$ | $D_3$ |
| Vehicle speed sensor | More than set value | |
| Throttle position sensor | Less than set opening | |
| Closed throttle position switch | OFF | |
| A/T fluid temperature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




### Torque Converter Clutch Solenoid Valve Control

NEAT0180S0302

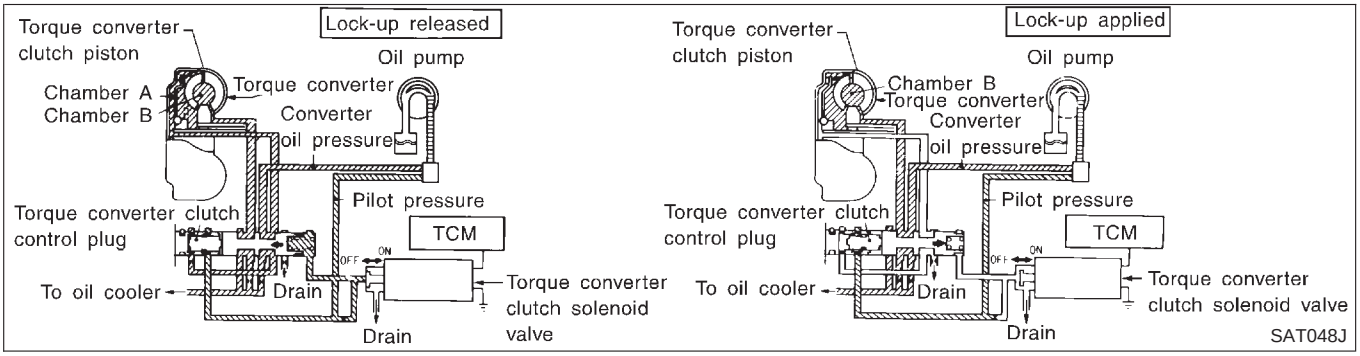
The torque converter clutch solenoid valve is controlled by the TCM. The plunger closes the drain circuit during the "OFF" period, and opens the circuit during the "ON" period. If the percentage of OFF-time increases in one cycle, the pilot pressure drain time is reduced and pilot pressure remains high.
The torque converter clutch piston is designed to slip to adjust the ratio of ON-OFF, thereby reducing lock-up shock.




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

## Torque Converter Clutch Control Valve Operation

NEAT0180S0303




**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)

NEAT0180S04

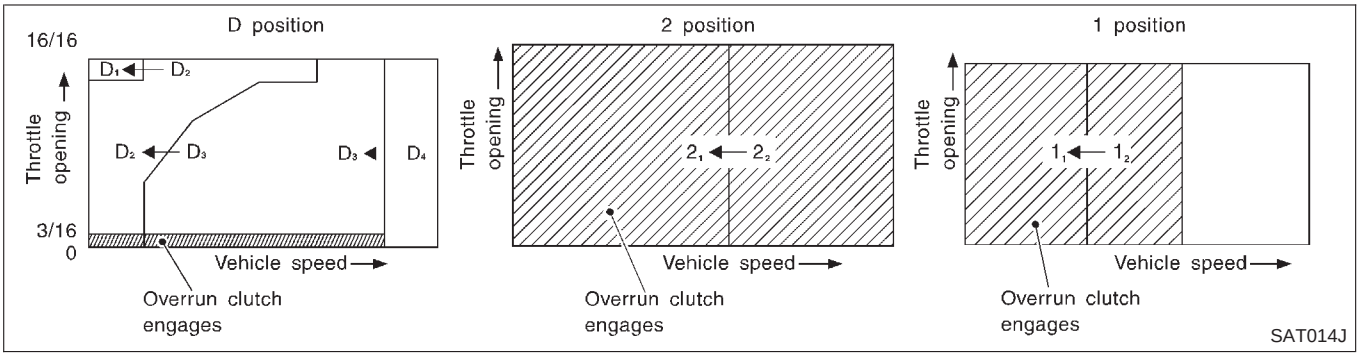
Forward one-way clutch is used to reduce shifting shocks in down-shifting operations. This clutch transmits engine torque to the wheels. However, drive force from the wheels is not transmitted to the engine because the one-way clutch rotates idle. This means the engine brake is not effective.

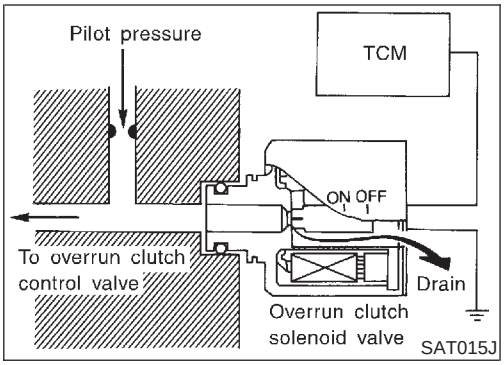
The overrun clutch operates when the engine brake is needed.

## Overrun Clutch Operating Conditions

NEAT0180S0401

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

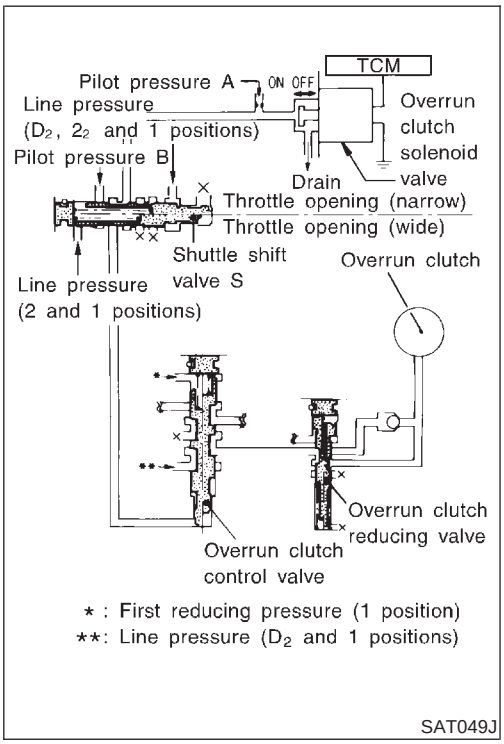





## Overrun Clutch Solenoid Valve Control

NEAT0180S0402

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

NEAT0180S0403

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

NEAT0181

## FUNCTION OF CONTROL VALVE

NEAT0181S01

| Valve name | Function |
|---|---|
| • Pressure regulator valve<br>• Pressure regulator plug<br>• 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<br>Accumulator control sleeve | Regulate accumulator backpressure to pressure suited to driving conditions. |
| Manual valve | Directs line pressure to oil circuits corresponding to select positions.<br>Hydraulic pressure drains when the shift lever is in Neutral. |

*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.).<br>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.).<br>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.<br>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.<br>To maintain adequate flowrate 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.<br>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.<br>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.)<br>● 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. |

## CONSULT

NEAT0184

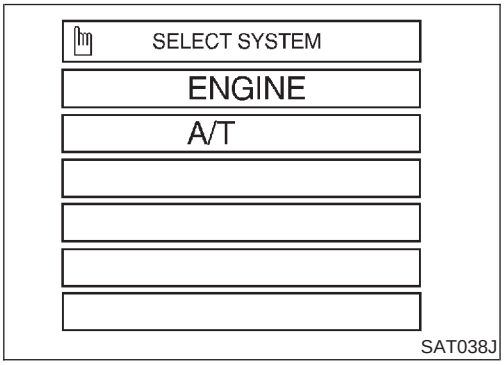
After performing “SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT)” (AT-29), place check marks for results on the “DIAGNOSTIC WORKSHEET”, AT-45. Reference pages are provided following the items.

NOTICE:

1) The CONSULT electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
   Check for time difference between actual shift timing and the CONSULT display. If the difference is noticeable, mechanical parts (except solenoids, sensors, etc.) may be malfunctioning. Check mechanical parts using applicable diagnostic procedures.
2) Shift schedule (which implies gear position) displayed on CONSULT and that indicated in Service Manual may differ slightly. This occurs because of the following reasons:

- Actual shift schedule has more or less tolerance or allowance,
- Shift schedule indicated in Service Manual refers to the point where shifts start, and
- Gear position displayed on CONSULT indicates the point where shifts are completed.

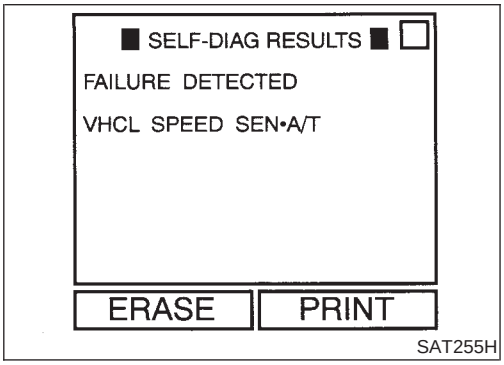
3) Shift solenoid valve “A” or “B” is displayed on CONSULT at the start of shifting. Gear position is displayed upon completion of shifting (which is computed by TCM).
4) Additional CONSULT information can be found in the Operation Manual supplied with the CONSULT unit.




### SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT)

NEAT0184S01

1. Turn on CONSULT and touch “A/T” for TCM self-diagnosis.
   If A/T is not displayed, check TCM power supply and ground circuit. Refer to AT-81. If result is NG, refer to EL section (“POWER SUPPLY ROUTING”).




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

*CONSULT (Cont'd)*

## SELF-DIAGNOSTIC RESULT TEST MODE

NEAT0184S02

| Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" test mode) | | Malfunction is detected when ... | Remarks |
|---|---|---|---|
| Item | Display | | |
| No failure (NO SELF DIAGNOSTIC FAILURE INDICATED FURTHER TESTING MAY BE REQUIRED**) | | ● No failure has been detected. | |
| Initial start | | ● This is not a malfunction message (Whenever shutting off a power supply to the TCM, this message appears on the screen.) | |
| INITIAL START | — | | |
| Revolution sensor | VHCL SPEED SEN·A/T | ● TCM does not receive the proper voltage signal from the sensor. | |
| Vehicle speed sensor (Meter) | VHCL SPEED SEN·MTR | ● TCM does not receive the proper voltage signal from the sensor. | |
| Throttle position sensor Throttle position switch | THROTTLE POSI SEN | ● TCM receives an excessively low or high voltage from the sensor. | |
| Shift solenoid valve A | SHIFT SOLENOID/V A | ● TCM detects an improper voltage drop when it tries to operate the solenoid valve. | |
| Shift solenoid valve B | SHIFT SOLENOID/V B | ● TCM detects an improper voltage drop when it tries to operate the solenoid valve. | |
| Overrun clutch solenoid valve | OVERRUN CLUTCH S/V | ● TCM detects an improper voltage drop when it tries to operate the solenoid valve. | |
| T/C clutch solenoid valve | T/C CLUTCH SOL/V | ● TCM detects an improper voltage drop when it tries to operate the solenoid valve. | |
| A/T fluid temperature sensor | BATT/FLUID TEMP SEN | ● TCM receives an excessively low or high voltage from the sensor. | To be displayed in case of abnormality and when no recording is made. |
| Engine speed signal | ENGINE SPEED SIG | ● TCM does not receive the proper voltage signal from the ECM. | |
| Line pressure solenoid valve | LINE PRESSURE S/V | ● TCM detects an improper voltage drop when it tries to operate the solenoid valve. | |
| TCM (RAM) | CONTROL UNIT (RAM) | ● TCM memory (RAM) is malfunctioning. | |
| TCM (ROM) | CONTROL UNIT (ROM) | ● TCM memory (ROM) is malfunctioning. | |
| TCM (EEP ROM) | CONT UNIT (EEP ROM) | ● TCM memory (EEP ROM) is malfunctioning. | |

## DATA MONITOR MODE (A/T)

NEAT0184S03

| Item | Display | Monitor item | | Description | Remarks |
|---|---|---|---|---|---|
| | | ECU input signals | Main signals | | |
| Vehicle speed sensor 1 (A/T) (Revolution sensor) | VHCL/S SE·A/T [km/h] or [mph] | X | — | ● Vehicle speed computed from signal of revolution sensor is displayed. | When racing engine in "N" or "P" position with vehicle stationary, CONSULT data may not indicate 0 km/h (0 mph). |

*CONSULT (Cont'd)*

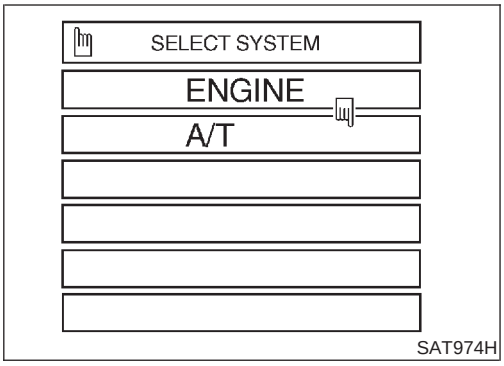
| Item | Display | Monitor item | | Description | Remarks |
|---|---|---|---|---|---|
| | | ECU input signals | Main signals | | |
| Vehicle speed sensor 2 (Meter) | VHCL/S SE·MTR [km/h] or [mph] | X | — | • Vehicle speed computed from signal of vehicle speed sensor is displayed. | Vehicle speed display may not be accurate under approx. 10 km/h (6 mph). It may not indicate 0 km/h (0 mph) when vehicle is stationary. |
| Throttle position sensor | THRTL POS SEN [V] | X | — | • Throttle position sensor signal voltage is displayed. | |
| A/T fluid temperature sensor | FLUID TEMP SE [V] | X | — | • A/T fluid temperature sensor signal voltage is displayed.<br>• Signal voltage lowers as fluid temperature rises. | |
| Battery voltage | BATTERY VOLT [V] | X | — | • Source voltage of TCM is displayed. | |
| Engine speed | ENGINE SPEED [rpm] | X | X | • Engine speed, computed from engine speed signal, is displayed. | Engine speed display may not be accurate under approx. 800 rpm. It may not indicate 0 rpm even when engine is not running. |
| Overdrive control switch | OVERDRIVE SW [ON/OFF] | X | — | • ON/OFF state computed from signal of overdrive control SW is displayed. | |
| P/N position switch | P/N POSI SW [ON/OFF] | X | — | • ON/OFF state computed from signal of P/N position SW is displayed. | |
| R position switch | R POSITION SW [ON/OFF] | X | — | • ON/OFF state computed from signal of R position SW is displayed. | |
| D position switch | D POSITION SW [ON/OFF] | X | — | • ON/OFF state computed from signal of D position SW is displayed. | |
| 2 position switch | 2 POSITION SW [ON/OFF] | X | — | • ON/OFF status, computed from signal of 2 position SW, is displayed. | |
| 1 position switch | 1 POSITION SW [ON/OFF] | X | — | • ON/OFF status, computed from signal of 1 position SW, is displayed. | |
| ASCD cruise signal | ASCD·CRUISE [ON/OFF] | X | — | • Status of ASCD cruise signal is displayed.<br>ON ... Cruising state<br>OFF ... Normal running state | • This is displayed even when no ASCD is mounted. |
| ASCD OD cut signal | ASCD OD CUT [ON/OFF] | X | — | • Status of ASCD OD release signal is displayed.<br>ON ... OD released<br>OFF ... OD not released | • This is displayed even when no ASCD is mounted. |

*CONSULT (Cont'd)*

| Item | Display | Monitor item | | Description | Remarks |
|---|---|---|---|---|---|
| | | ECU input signals | Main signals | | |
| Kickdown switch | KICKDOWN SW [ON/OFF] | X | — | • ON/OFF status, computed from signal of kickdown SW, is displayed. | • This is displayed even when no kickdown switch is equipped. |
| Closed throttle position switch | CLOSED THL/SW [ON/OFF] | X | — | • ON/OFF status, computed from signal of closed throttle position SW, is displayed. | |
| Wide open throttle position switch | W/O THRL/P-SW [ON/OFF] | X | — | • ON/OFF status, computed from signal of wide open throttle position SW, is displayed. | |
| Gear position | GEAR | — | X | • Gear position data used for computation by TCM, is displayed. | |
| Selector lever position | SLCT LVR POSI | — | X | • Selector lever position data, used for computation by TCM, is displayed. | • A specific value used for control is displayed if fail-safe is activated due to error. |
| Vehicle speed | VEHICLE SPEED [km/h] or [mph] | — | X | • Vehicle speed data, used for computation by TCM, is displayed. | |
| Throttle position | THROTTLE POSI [/8] | — | X | • Throttle position data, used for computation by TCM, is displayed. | • A specific value used for control is displayed if fail-safe is activated due to error. |
| Line pressure duty | LINE PRES DTY [%] | — | X | • Control value of line pressure solenoid valve, computed by TCM from each input signal, is displayed. | |
| Torque converter clutch solenoid valve duty | TCC S/V DUTY [%] | — | X | • Control value of torque converter clutch solenoid valve, computed by TCM from each input signal, is displayed. | |
| Shift solenoid valve A | SHIFT S/V A [ON/OFF] | — | X | • Control value of shift solenoid valve A, computed by TCM from each input signal, is displayed. | Control value of solenoid is displayed even if solenoid circuit is disconnected. The "OFF" signal is displayed if solenoid circuit is shorted. |
| Shift solenoid valve B | SHIFT S/V B [ON/OFF] | — | X | • Control value of shift solenoid valve B, computed by TCM from each input signal, is displayed. | |
| Overrun clutch solenoid valve | OVERRUN/C S/V [ON/OFF] | — | X | • Control value of overrun clutch solenoid valve computed by TCM from each input signal is displayed. | |
| Self-diagnosis display lamp (O/D OFF or A/T CHECK indicator lamp) | SELF-D DP LMP [ON/OFF] | — | X | • Control status of O/D OFF or A/T CHECK indicator lamp is displayed. | |

X: Applicable

—: Not applicable

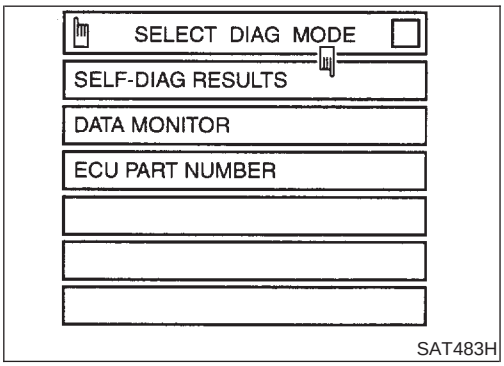


SAT974H

## HOW TO ERASE SELF-DIAGNOSTIC RESULTS (WITH CONSULT)

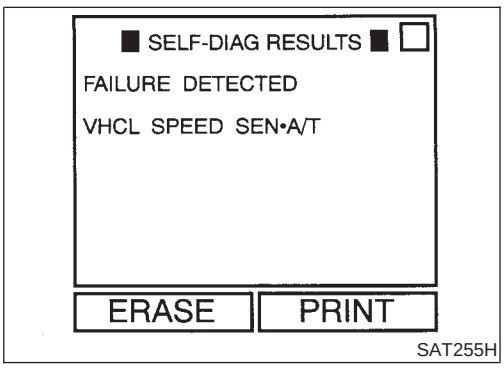
NEAT0184S07

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



SAT483H

3. Touch "SELF-DIAG RESULTS".



SAT255H

4. Touch "ERASE". (The self-diagnostic results will be erased.)

## Diagnostic Procedure Without CONSULT

NEAT0206

### SELF-DIAGNOSTIC PROCEDURE (WITHOUT CONSULT)

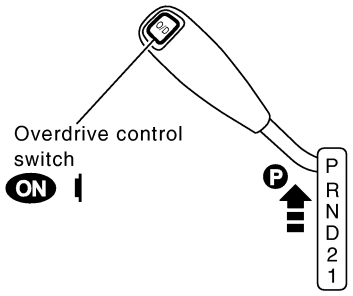
NEAT0206S03

### For RHD Model

NEAT0206S0302

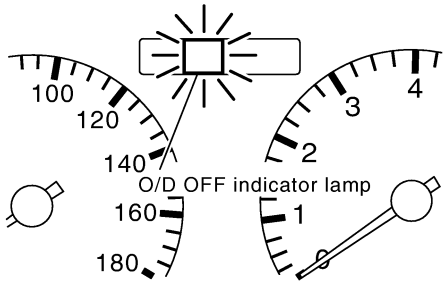
| 1 | CHECK O/D OFF INDICATOR LAMP | |
|---|---|---|

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




SAT779J

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



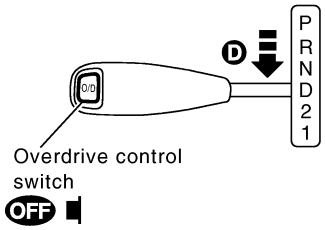

SAT780J

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to “1. O/D OFF or A/T CHECK Indicator Lamp Does Not Come On”, AT-145. |

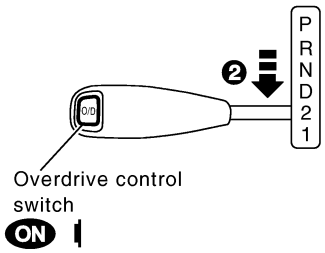
| 2 | JUDGEMENT PROCEDURE STEP 1 |
|---|---|

1. Turn ignition switch to "OFF" position.
2. Turn ignition switch to "ACC" position.
3. Move selector lever from "P" to "D" position.
4. Turn ignition switch to "OFF" position.
5. Set overdrive control switch in "OFF" position.




SAT781J

6. Turn ignition switch to "ON" position (Do not start engine.).
7. Wait 2 seconds.
8. Move selector lever to "2" position.
9. Set overdrive control switch in "ON" position.

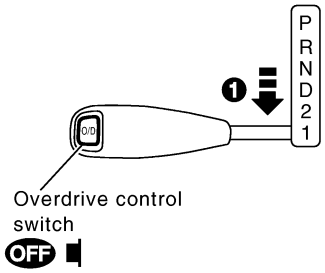



SAT782J

| ▶ | GO TO 3. |
|---|---|

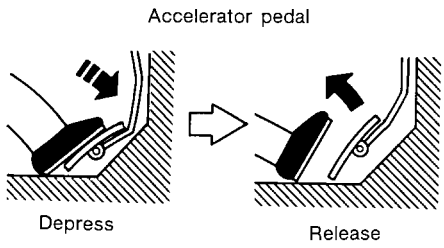
| 3 | JUDGEMENT PROCEDURE STEP 2 |
|---|---|

1. Move selector lever to "1" position.
2. Set overdrive control switch in "OFF" position.




SAT783J

3. Depress accelerator pedal fully and release it.

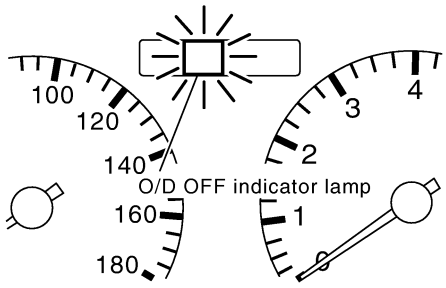



SAT981F

| ▶ | GO TO 4. |
|---|---|

| 4 | CHECK SELF-DIAGNOSIS CODE |
|---|---|

Check O/D OFF indicator lamp.
Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE, AT-40.




SAT780J

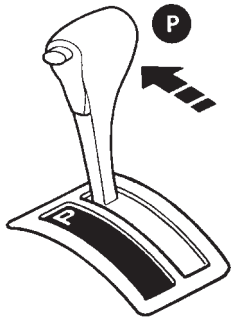
| ▶ | **DIAGNOSIS END** |
|---|---|

## For LHD Model

NEAT0206S0303

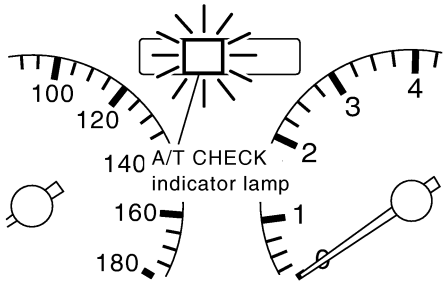
| 1 | CHECK A/T CHECK INDICATOR LAMP |
|---|---|

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




SAT163C

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



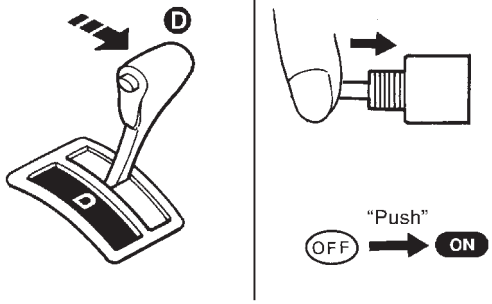

SAT794J

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to "1. O/D OFF or A/T CHECK Indicator Lamp Does Not Come On", AT-145. |

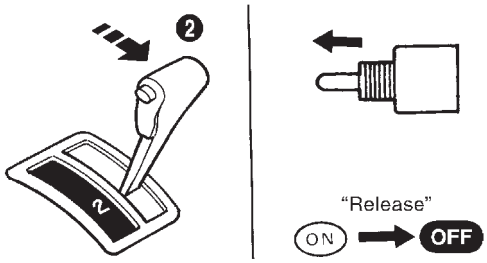
| 2 | JUDGEMENT PROCEDURE STEP 1 |
|---|---|

1. Turn ignition switch to "OFF" position.
2. Turn ignition switch to "ACC" position.
3. Move selector lever from "P" to "D" position.
4. Push A/T check switch to "ON" position. Refer to AT-8.
5. Turn ignition switch to "ON" position. (Do not start engine.)




SAT212J

6. Move selector lever to "2" position.
7. Release A/T check switch. (Turn to "OFF" position.)

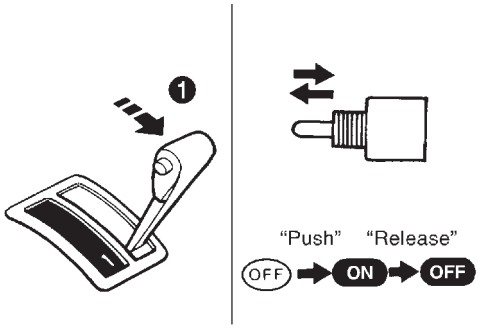



SAT213J

| ▶ | GO TO 3. |
|---|---|

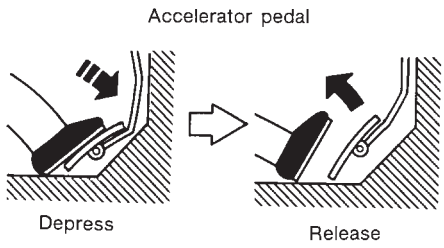
| 3 | JUDGEMENT PROCEDURE STEP 2 |
|---|---|

1. Move selector lever to "1" position.
2. Push A/T check switch to "ON" position and release it. (Turn to "OFF" position.)




SAT214J

3. Depress accelerator pedal fully and release it.

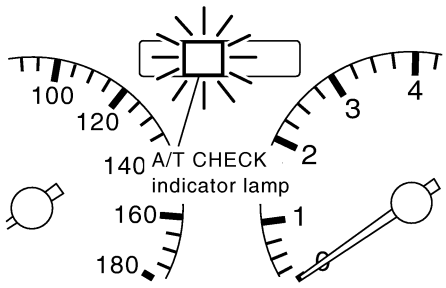



SAT981F

| ▶ | GO TO 4. |
|---|---|

| 4 | CHECK SELF-DIAGNOSIS CODE |
|---|---|

Check A/T CHECK indicator lamp.
Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE, AT-40.




SAT794J

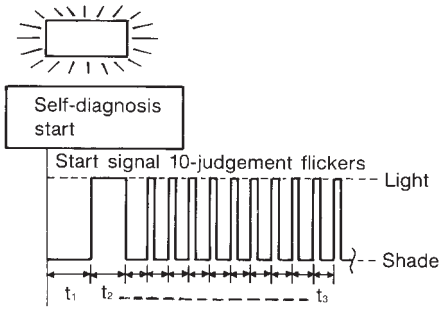
| ▶ | **DIAGNOSIS END** |
|---|---|

## JUDGEMENT OF SELF-DIAGNOSIS CODE

NEAT0206S04

O/D OFF or A/T CHECK indicator lamp:

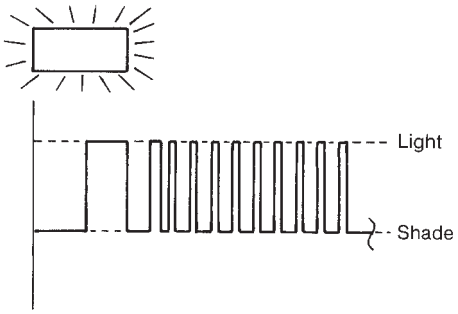
All judgement flickers are same.




SAT819H

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

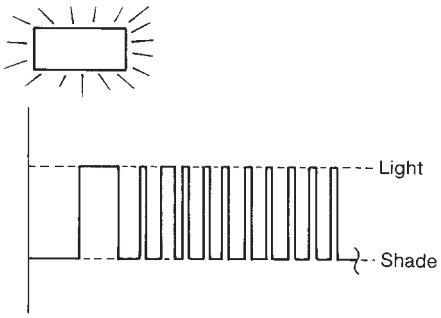
1st judgement flicker is longer than others.




SAT794H

Revolution sensor circuit is short-circuited or disconnected.
⇒ **Go to VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR), AT-88.**

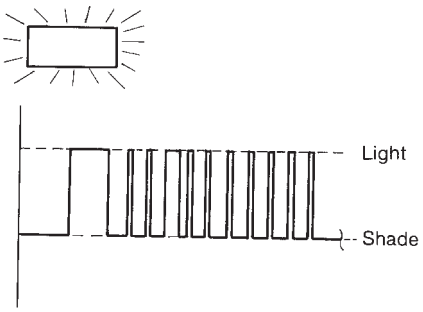
2nd judgement flicker is longer than others.




SAT795H

Vehicle speed sensor circuit is short-circuited or disconnected.
⇒ **Go to VEHICLE SPEED SENSOR·MTR, AT-92.**

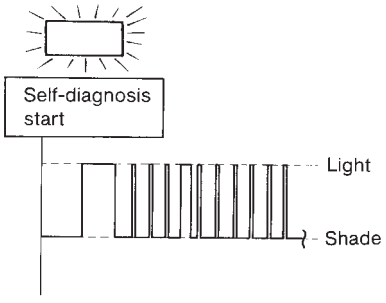
3rd judgement flicker is longer than others.




SAT796H

Throttle position sensor circuit is short-circuited or disconnected.
⇒ **Go to THROTTLE POSITION SENSOR, AT-95.**

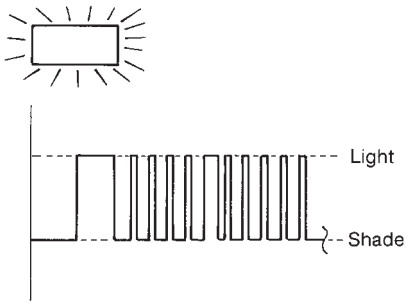
4th judgement flicker is longer than others.




SAT797H

Shift solenoid valve A circuit is short-circuited or disconnected.
⇒ **Go to SHIFT SOLENOID VALVE A, AT-104.**

5th judgement flicker is longer than others.

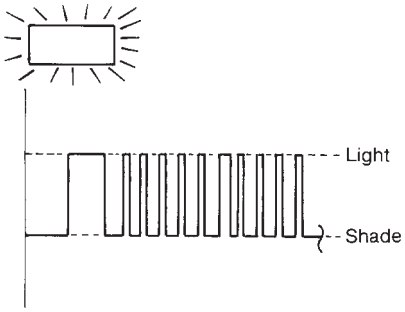



SAT798H

Shift solenoid valve B circuit is short-circuited or disconnected.
⇒ **Go to SHIFT SOLENOID VALVE B, AT-108.**

O/D OFF or A/T CHECK indicator lamp:

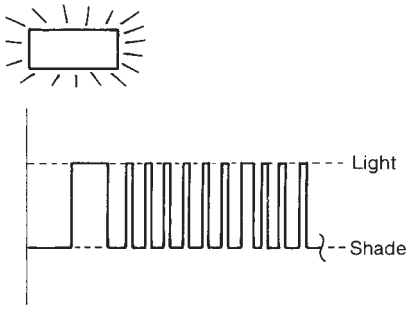
6th judgement flicker is longer than others.




SAT799H

Overrun clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to OVERRUN CLUTCH SOLENOID VALVE, AT-112.**

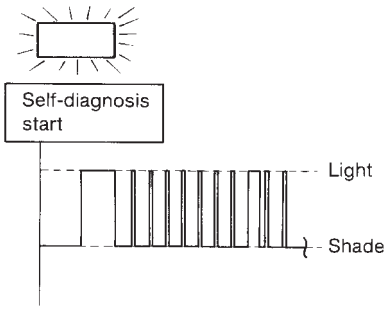
7th judgement flicker is longer than others.




SAT800H

Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to TORQUE CONVERTER CLUTCH SOLENOID VALVE, AT-116.**

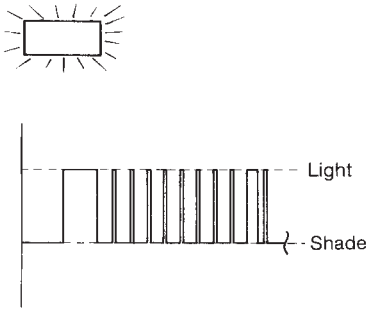
8th judgement flicker is longer than others.




SAT801H

A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged.
⇒ **Go to A/T FLUID TEMPERATURE SENSOR AND TCM POWER SOURCE, AT-121.**

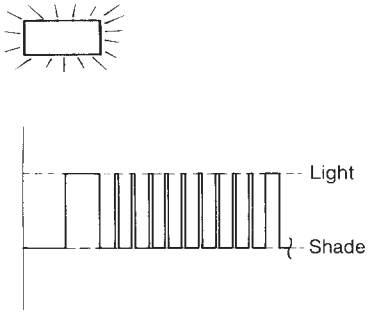
9th judgement flicker is longer than others.




SAT802H

Engine speed signal circuit is short-circuited or disconnected.
⇒ **Go to ENGINE SPEED SIGNAL, AT-127.**

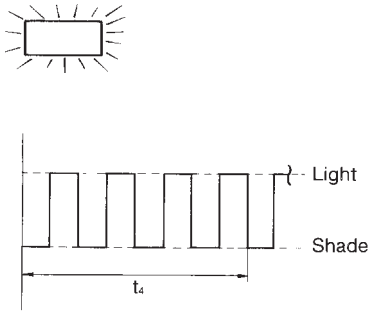
10th judgement flicker is longer than others.




SAT803H

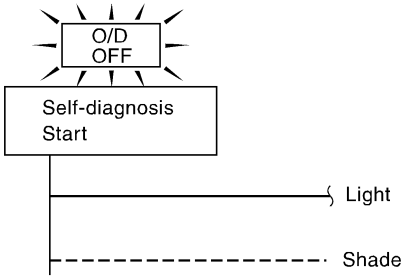
Line pressure solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to LINE PRESSURE SOLENOID VALVE, AT-131.**

Flickers as shown below.




SAT804H

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.)

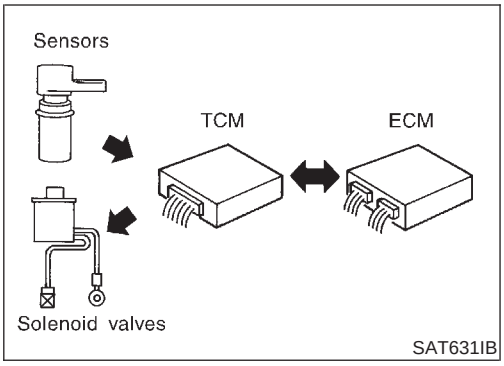
| O/D OFF or A/T CHECK indicator lamp: | |
|---|---|
| Lamp comes on.<br>  <br><br>SAT736J<br>PNP switch, overdrive control switch, A/T check switch or throttle position switch circuit is disconnected or TCM is damaged.<br>⇒ **Go to 22. TCM Self-diagnosis Does Not Activate (PNP, OVERDRIVE CONTROL, A/T CHECK AND THROTTLE POSITION SWITCHES), AT-183.** | |

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

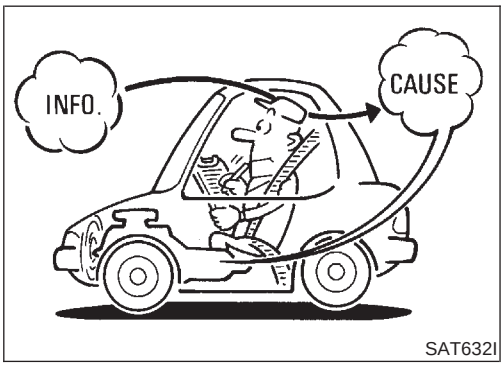
## ⊗ HOW TO ERASE SELF-DIAGNOSTIC RESULTS (WITHOUT CONSULT)

NEAT0206S05

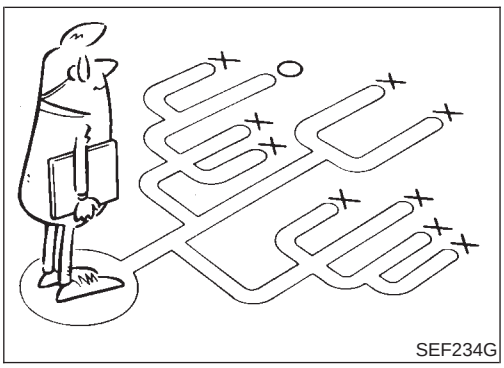
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait for at least 5 seconds and then turn it "ON" again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)". Refer to AT-34.
3. Turn ignition switch "OFF". (The self-diagnostic results will be erased.)



SAT631IB



SAT632I


SEF234G

## Introduction

NEAT0019

The TCM receives a signal from the vehicle-speed sensor, throttle (accelerator) position sensor or inhibitor switch and provides shift control or lock-up control via solenoid valves.

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

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

A visual check only may not find the cause of the problems. A road test with CONSULT or a circuit tester connected should be performed. Follow the “Work Flow”. Refer to AT-47.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic Worksheet” like the example (AT-45) should be used.

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

Also check related Service bulletins.

## DIAGNOSTIC WORKSHEET

*=NEAT0019S01*

### Information From Customer

*NEAT0019S0101*

**KEY POINTS**

**WHAT** ..... Vehicle & A/T model
**WHEN**..... Date, Frequencies
**WHERE**..... Road conditions
**HOW**..... Operating conditions, Symptoms

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

## Diagnostic Worksheet

=NEAT0019S0102

| | | | |
|---|---|---|---|
| 1. | ☐ Read the Fail-safe and listen to customer complaints. | | AT-5 |
| 2. | ☐ A/T FLUID CHECK | | AT-49 |
| | ☐ Leakage (Follow specified procedure)<br>☐ Fluid condition<br>☐ Fluid level | | |
| 3. | ☐ Perform STALL TEST and LINE PRESSURE TEST. | | AT-49, AT-52 |
| | ☐ Stall test — Mark possible damaged components/others. | | |
| | ☐ Torque converter one-way clutch<br>☐ Reverse clutch<br>☐ Forward clutch<br>☐ Overrun clutch<br>☐ Forward one-way clutch | ☐ Low & reverse brake<br>☐ Low one-way clutch<br>☐ Engine<br>☐ Line pressure is low<br>☐ Clutches and brakes except high clutch and brake band are OK | |
| | ☐ Line pressure test — Suspected parts: | | |
| 4. | ☐ Perform all ROAD TEST and mark required procedures. | | AT-53 |
| 4-1. | Check before engine is started. | | AT-54 |
| | ☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items. | | |
| | ☐ Vehicle speed sensor·A/T (Revolution sensor), AT-88.<br>☐ Vehicle speed sensor·MTR, AT-92.<br>☐ Throttle position sensor, AT-95.<br>☐ Shift solenoid valve A, AT-104.<br>☐ Shift solenoid valve B, AT-108.<br>☐ Overrun clutch solenoid valve, AT-112.<br>☐ Torque converter clutch solenoid valve, AT-116.<br>☐ A/T fluid temperature sensor and TCM power source, AT-121.<br>☐ Engine speed signal, AT-127.<br>☐ Line pressure solenoid valve, AT-131.<br>☐ Control unit (RAM), control unit (ROM), AT-137.<br>☐ Control unit (EEP ROM), AT-139.<br>☐ PNP, overdrive control, A/T check and throttle (accelerator) position switches, AT-145.<br>☐ Battery<br>☐ Others | | |
| 4-2. | Check at idle | | AT-56 |
| | ☐ 1. O/D OFF or A/T CHECK Indicator Lamp Does Not Come On, AT-145.<br>☐ 2. Engine Cannot Be Started In "P" And "N" Position, AT-147.<br>☐ 3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed, AT-148.<br>☐ 4. In "N" Position, Vehicle Moves, AT-149.<br>☐ 5. Large Shock. "N" → "R" Position, AT-151.<br>☐ 6. Vehicle Does Not Creep Backward In "R" Position, AT-153.<br>☐ 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position, AT-156. | | |

| | | | |
|---|---|---|---|
| 4. | 4-3. | Cruise test | AT-57, AT-61 |
| | | Part-1 | |
| | | ☐ 8. Vehicle Cannot Be Started From $D_1$, AT-159.<br>☐ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-162.<br>☐ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-165.<br>☐ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-168.<br>☐ 12. A/T Does Not Perform Lock-up, AT-171.<br>☐ 13. A/T Does Not Hold Lock-up Condition, AT-173.<br>☐ 14. Lock-up Is Not Released, AT-175.<br>☐ 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$), AT-176. | |
| | | Part-2 | AT-65 |
| | | ☐ 16. Vehicle Does Not Start From $D_1$, AT-178.<br>☐ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-162.<br>☐ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-165.<br>☐ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-168. | |
| | | Part-3 | AT-67 |
| | | ☐ 17. A/T Does Not Shift: $D_2 \rightarrow D_1$ When Depressing Accelerator Pedal, AT-179.<br>☐ 18. A/T Does Not Shift: $D_4 \rightarrow D_3$ When Overdrive Control Switch "ON" → "OFF", AT-180.<br>☐ 15. Engine Speed Does Not Return To Idle (Engine Brake In $D_3$), AT-176.<br>☐ 19. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever "D" → "2" Position, AT-181.<br>☐ 15. Engine Speed Does Not Return To Idle (Engine Brake In $2_2$), AT-176.<br>☐ 20. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever "2" → "1" Position, AT-182.<br>☐ 21. Vehicle Does Not Decelerate By Engine Brake, AT-183.<br>☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items. | |
| | | | ☐ Vehicle speed sensor·A/T (Revolution sensor), AT-88.<br>☐ Vehicle speed sensor·MTR, AT-92.<br>☐ Throttle (accelerator) position sensor, AT-95.<br>☐ Shift solenoid valve A, AT-104.<br>☐ Shift solenoid valve B, AT-108.<br>☐ Overrun clutch solenoid valve, AT-112.<br>☐ Torque converter clutch solenoid valve, AT-116.<br>☐ A/T fluid temperature sensor and TCM power source, AT-121.<br>☐ Engine speed signal, AT-127.<br>☐ Line pressure solenoid valve, AT-131.<br>☐ Control unit (RAM), control unit (ROM), AT-137.<br>☐ Control unit (EEP ROM), AT-139.<br>☐ PNP, overdrive control, A/T check and throttle (accelerator) position switches, AT-145.<br>☐ Battery<br>☐ Others | |
| 5. | ☐ For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts. | | AT-30 |
| 6. | ☐ Perform all ROAD TEST and re-mark required procedures. | | AT-53 |
| 7. | ☐ Perform the Diagnostic Procedures for all remaining items marked NG. Repair or replace the damaged parts.<br>Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the component inspection orders.) | | AT-81<br>AT-70 |
| 8. | ☐ Erase self-diagnosis code from TCM memories. | | AT-33, AT-42 |

## Work Flow

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

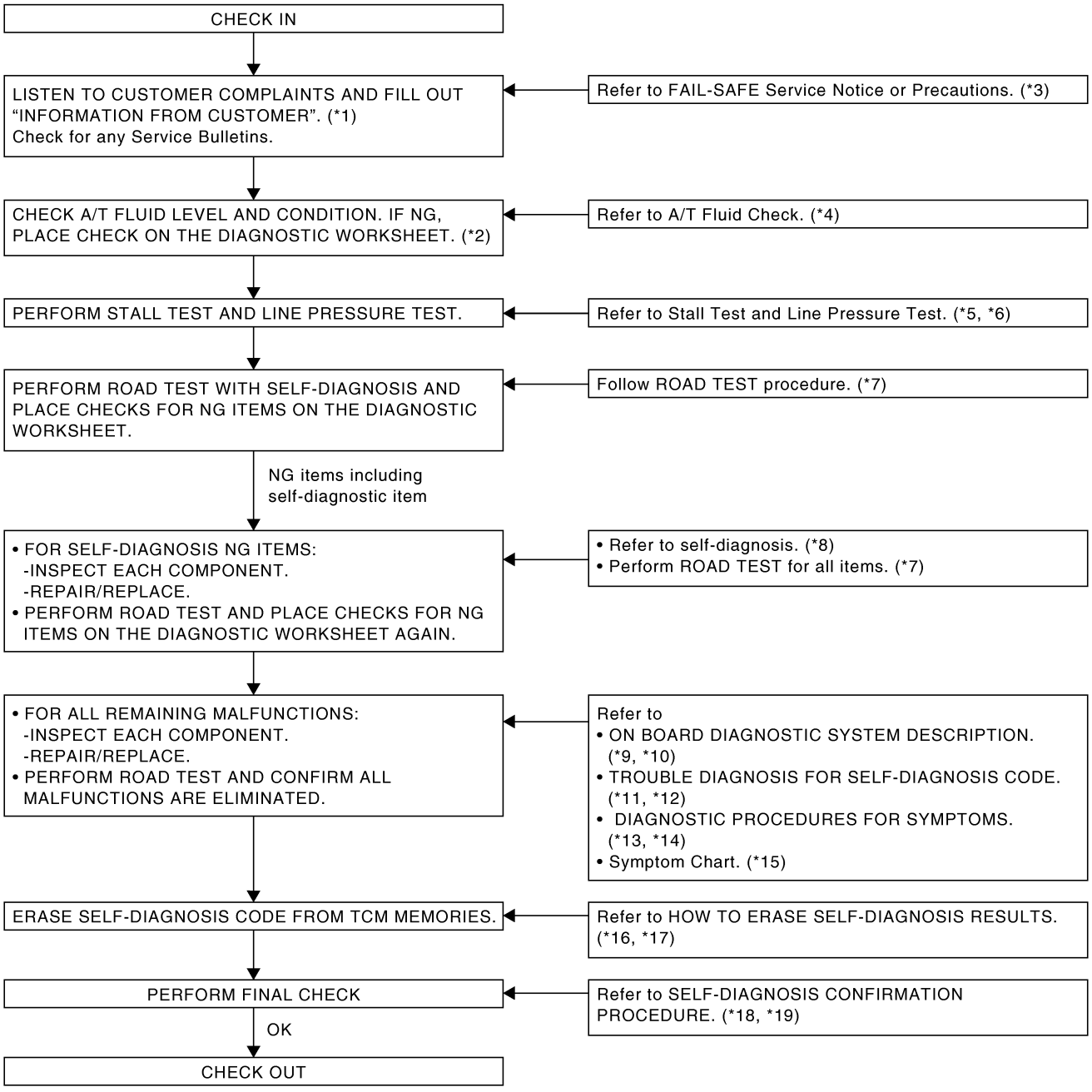
=NEAT0020

NEAT0020S01

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-44) and “DIAGNOSTIC WORKSHEET” (AT-45), to perform the best troubleshooting possible.

## WORK FLOW CHART

=NEAT0020S02




SAT731J

*1: AT-44
*2: AT-45
*3: AT-5
*4: AT-49
*5: AT-49
*6: AT-52
*7: AT-53
*8: AT-29
*9: AT-29
*10: AT-42
*11: AT-85
*12: AT-139
*13: AT-141
*14: AT-183
*15: AT-70
*16: AT-33
*17: AT-42
*18: AT-88
*19: AT-139

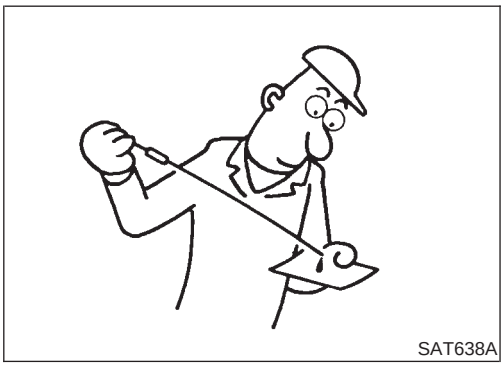
# A/T Fluid Check

NEAT0021

## FLUID LEAKAGE CHECK

NEAT0021S01

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

NEAT0021S02

| 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

NEAT0021S03

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

# Stall Test

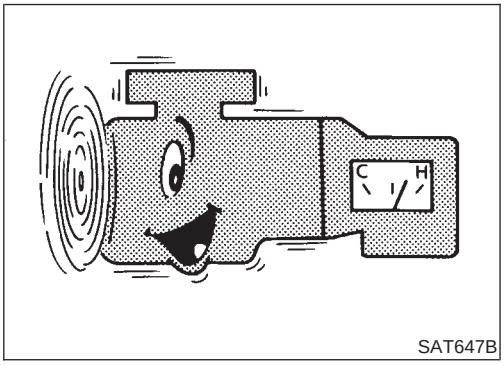
NEAT0022

## STALL TEST PROCEDURE

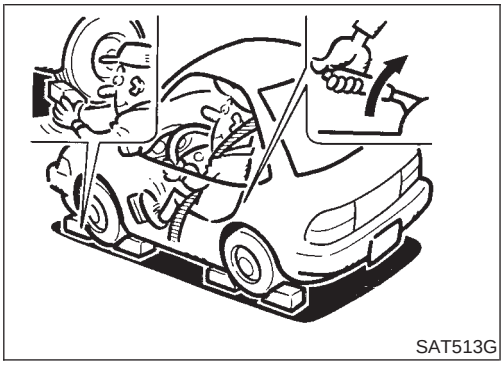
NEAT0022S01

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)**



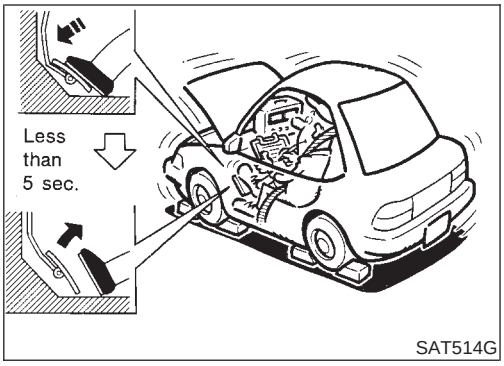
SAT647B


SAT513G

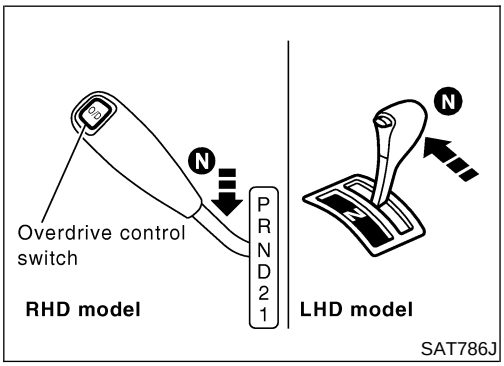
3. Set parking brake and block wheels.
4. Install a tachometer where it can be seen by driver during test.

- **It is good practice to put a mark on point of specified engine rpm on indicator.**

*Stall Test (Cont'd)*



SAT514G



SAT786J

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 less than 5 seconds.**

**Stall revolution:**
**2,090 - 2,290 rpm**

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

NEAT0022S02

The test result and possible damaged components relating to each result are shown in the illustration. In order to pinpoint the possible damaged components, follow the WORK FLOW shown in AT-47.

**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.**

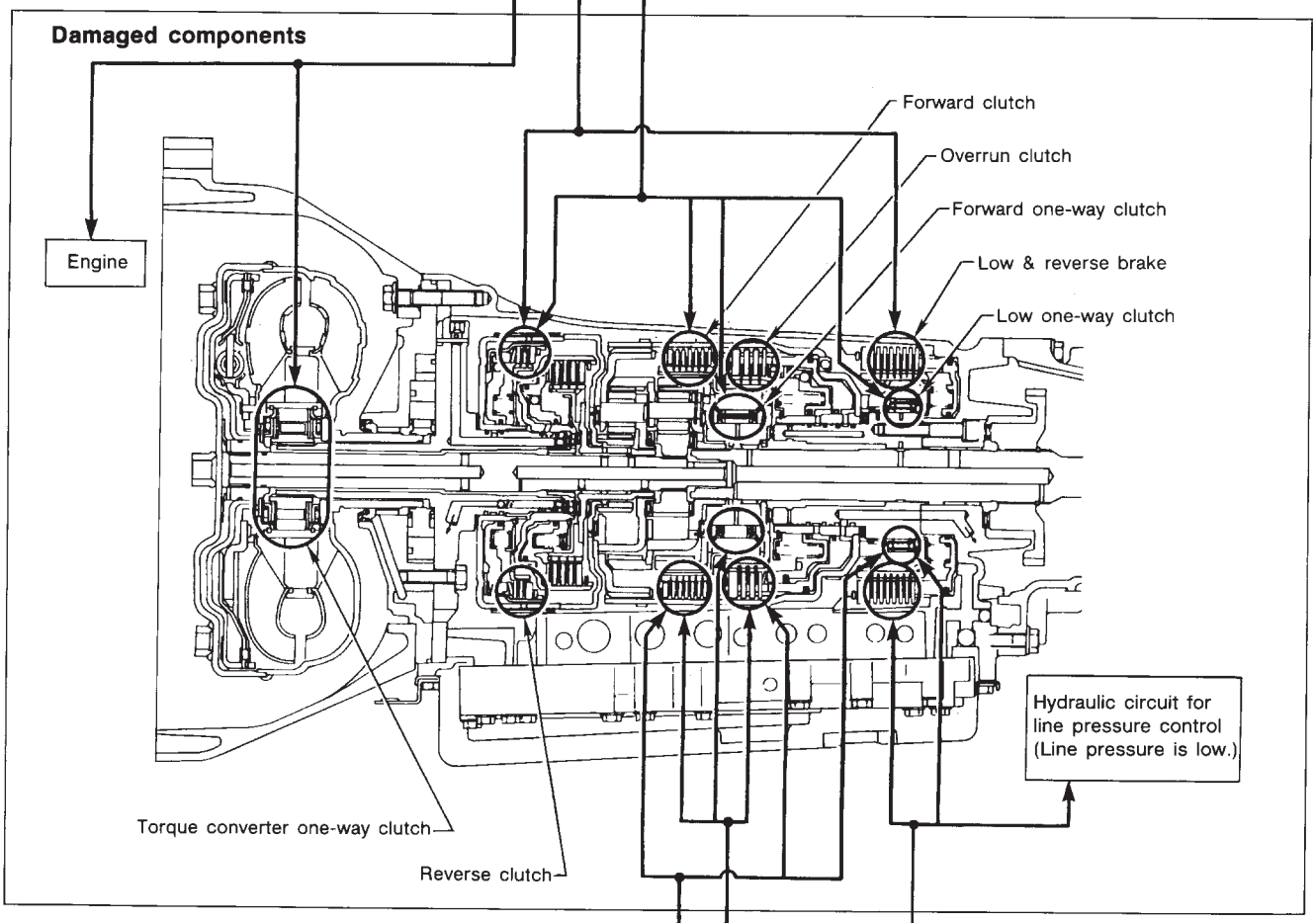
- Slippage occurs in 3rd and 4th gears in "D" position. ..... High clutch slippage
- Slippage occurs in 2nd and 4th gear in "D" position. ..... Brake band slippage

**Stall revolution less than specifications:**

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

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

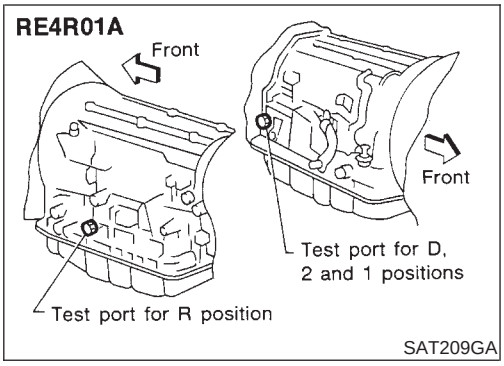
O : Stall revolution is normal.
H : Stall revolution is higher than specified.
L : Stall revolution is lower than specified.




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

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

SAT392H

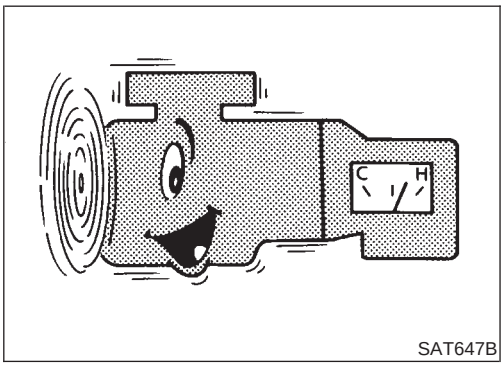


SAT209GA

## Line Pressure Test

NEAT0023

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



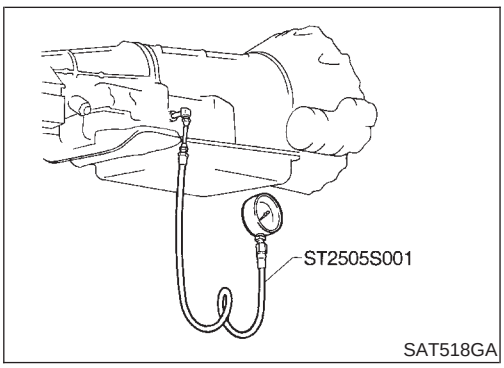
SAT647B

### LINE PRESSURE TEST PROCEDURE

NEAT0023S01

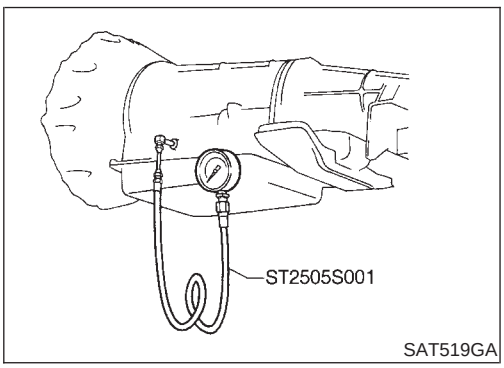
1. Check A/T fluid and engine oil levels. If necessary, add fluid and oil.
2. Drive vehicle for approx. 10 minutes or until fluid and oil reach operating temperature.

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

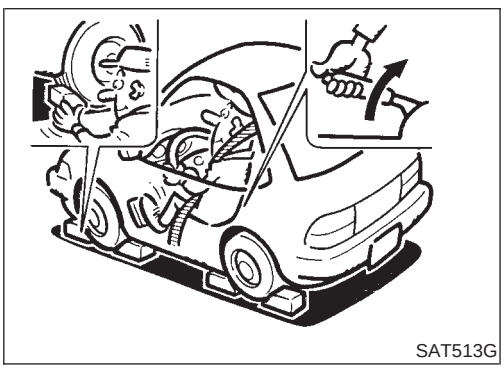


SAT518GA

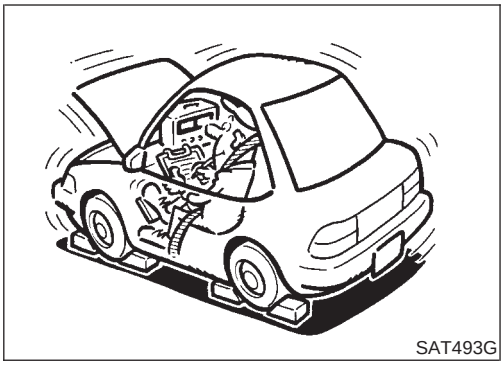
3. Install pressure gauge to corresponding line pressure port.



SAT519GA


SAT513G

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


SAT493G

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

**Line pressure:**
**Refer to SDS, AT-282.**

## JUDGEMENT OF LINE PRESSURE TEST

NEAT0023S02

| Judgement | | Suspected parts |
|---|---|---|
| At idle | Line pressure is low in all positions. | • Oil pump wear<br>• Control piston damage<br>• Pressure regulator valve or plug sticking<br>• Spring for pressure regulator valve damaged<br>• Fluid pressure leakage between oil strainer and pressure regulator valve<br>• Clogged strainer |
| | Line pressure is low in particular position. | • Fluid pressure leakage between manual valve and particular clutch<br>• For example, line pressure is:<br>— Low in "R" and "1" positions, but<br>— Normal in "D" and "2" positions.<br>Then, fluid leakage exists at or around low and reverse brake circuit.<br>Refer to "CLUTCH AND BAND CHART", AT-13. |
| | Line pressure is high. | • Mal-adjustment of throttle position sensor<br>• Fluid temperature sensor damaged<br>• Line pressure solenoid valve sticking<br>• Short circuit of line pressure solenoid valve circuit<br>• Pressure modifier valve sticking<br>• Pressure regulator valve or plug sticking<br>• Open in dropping resistor circuit |
| At stall speed | Line pressure is low. | • Mal-adjustment of throttle position sensor<br>• Line pressure solenoid valve sticking<br>• Short circuit of line pressure solenoid valve circuit<br>• Pressure regulator valve or plug sticking<br>• Pressure modifier valve sticking<br>• Pilot valve sticking |

**ROAD TEST PROCEDURE**

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

SAT786A

# Road Test

NEAT0024

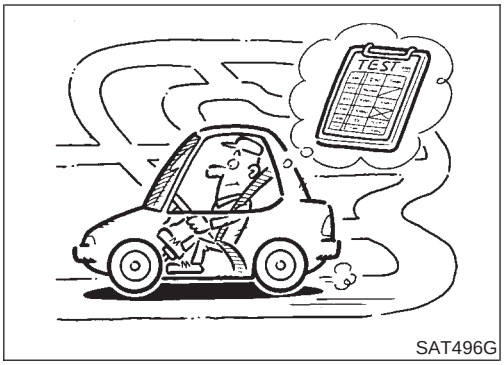
## DESCRIPTION

NEAT0024S01

- 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

*Road Test (Cont'd)*



SAT496G

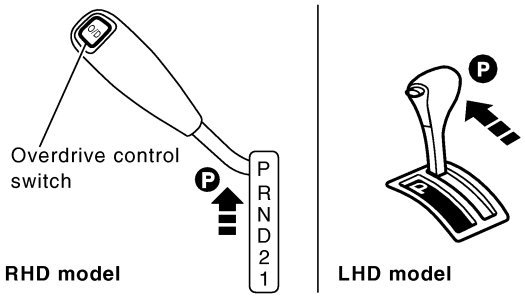
- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items until specified symptom is found. Troubleshoot items which check out No Good after road test. Refer to "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" and "TROUBLE DIAGNOSES FOR SYMPTOMS", AT-29 - AT-42 and AT-141 - AT-183.

## 1. CHECK BEFORE ENGINE IS STARTED

NEAT0024S02

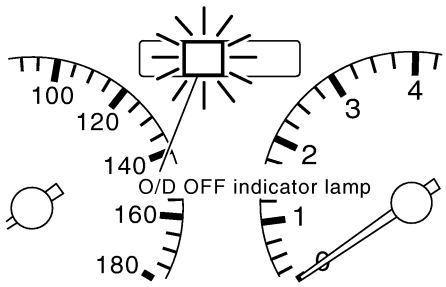
| 1 | CHECK O/D OFF OR A/T CHECK INDICATOR LAMP STEP 1 |
|---|---|

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.



SAT795J

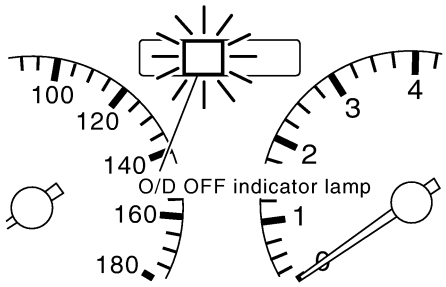
4. Turn ignition switch to "ON" position. (Do not start engine.)
5. Does O/D OFF or A/T CHECK indicator lamp come on for about 2 seconds?



SAT796J

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to "1. O/D OFF or A/T CHECK Indicator Lamp Does Not Come On", AT-145. |

| 2 | CHECK O/D OFF OR A/T CHECK INDICATOR LAMP STEP 2 | |
|---|---|---|
| Does O/D OFF or A/T CHECK indicator lamp flicker for about 8 seconds?<br>  <br><br>SAT796J | | |
| **Yes or No** | | |
| Yes | ▶ | Perform self-diagnosis. Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-34. |
| No | ▶ | GO TO 3. |

| 3 | CHECK NG ITEM | |
|---|---|---|
| 1. Turn ignition switch to "OFF" position.<br>2. Perform self-diagnosis and note NG items.<br>Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-34. | | |
| | ▶ | Go to "2. Check at idle", AT-56. |

## 2. CHECK AT IDLE

=NEAT0024S03

| 1 | CHECK ENGINE START |
|---|---|

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

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-147. |

| 2 | CHECK ENGINE START |
|---|---|

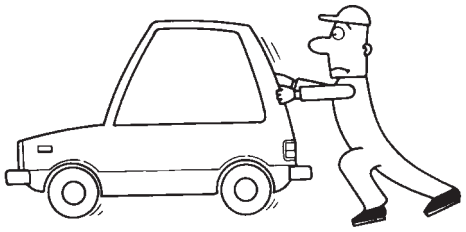
1. Turn ignition switch to "OFF" position.
2. Move selector lever to "D", "1", "2" or "R" position.
3. Turn ignition switch to start position.
4. Is engine started?

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-147. |
| No | ▶ | GO TO 3. |

| 3 | CHECK VEHICLE MOVE |
|---|---|

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



SAT796A

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | Go to "3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed", AT-148. |
| No | ▶ | GO TO 4. |

| 4 | CHECK VEHICLE MOVE |
|---|---|

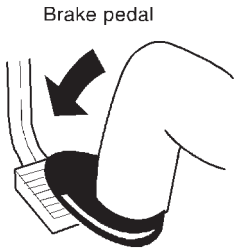
1. Apply parking brake.
2. Move selector lever to "N" position.
3. Turn ignition switch to "START" position and start engine.
4. Release parking brake.
5. Does vehicle move forward or backward?

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | Go to "4. In "N" Position, Vehicle Moves", AT-149. |
| No | ▶ | GO TO 5. |

| 5 | CHECK SHIFT SHOCK |
|---|---|

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




SAT082J

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | Go to "5. Large Shock. "N" → "R" Position", AT-151. |
| No | ▶ | GO TO 6. |

| 6 | CHECK VEHICLE MOVE |
|---|---|

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

**Yes or No**

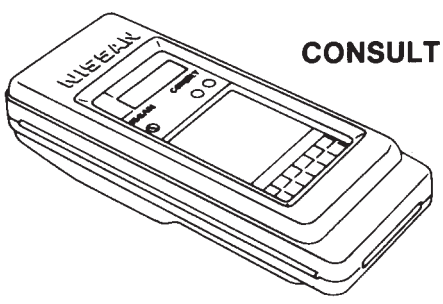
| | | |
|---|---|---|
| Yes | ▶ | GO TO 7. |
| No | ▶ | Go to "6. Vehicle Does Not Creep Backward In "R" Position", AT-153. |

| 7 | CHECK VEHICLE MOVE |
|---|---|

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

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | Go to "3. Cruise test", AT-57. |
| No | ▶ | Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position", AT-156. |




SMA185C

## 3. CRUISE TEST

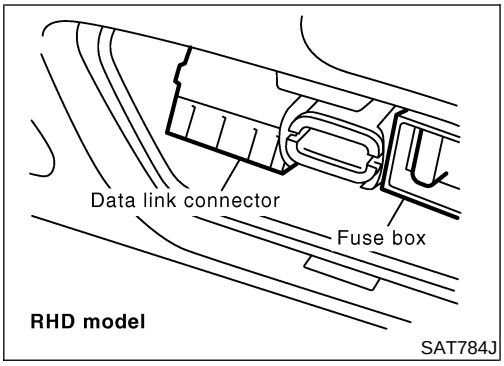
NEAT0024S04

- Check all items listed in Parts 1 through 3.

### With CONSULT

NEAT0024S0401

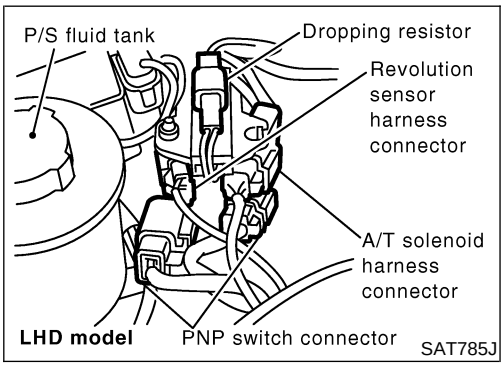
- Using CONSULT, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per "Shift Schedule".



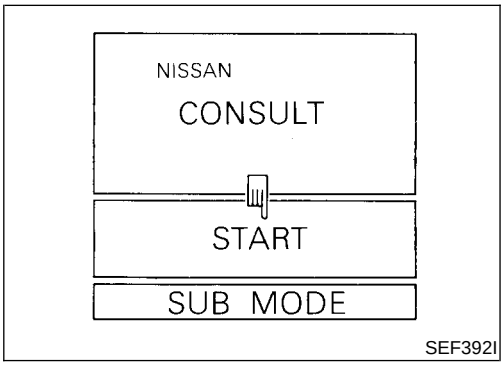

## CONSULT Setting Procedure

NEAT0024S0402

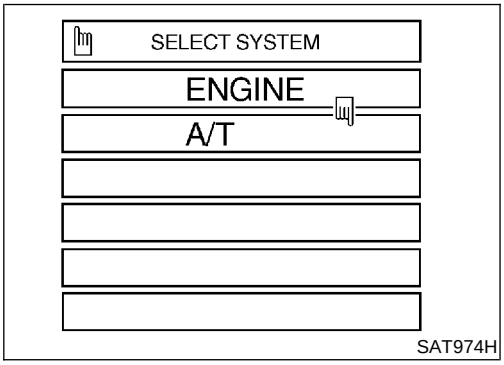
1. Turn ignition switch "OFF".
2. Connect "CONSULT" to Data link connector which is located in instrument lower panel on driver side.



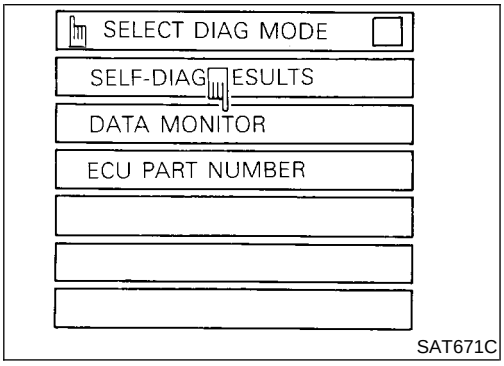

3. Turn ignition switch "ON".
4. Touch "START".

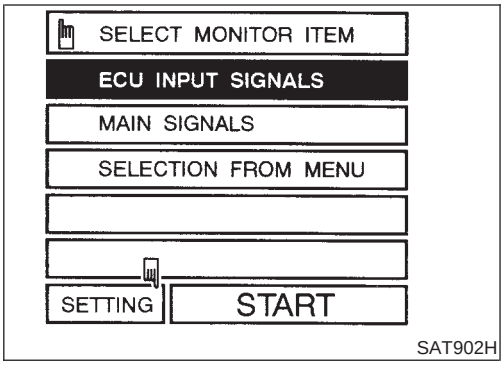



5. Touch "A/T".



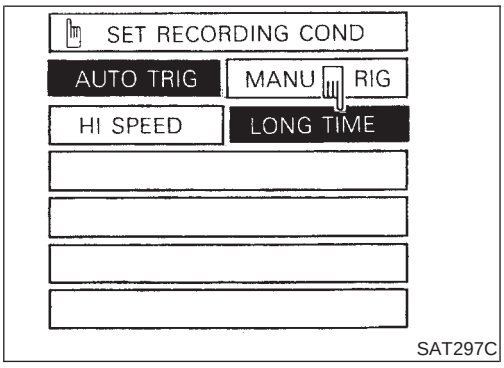

6. Touch "DATA MONITOR".





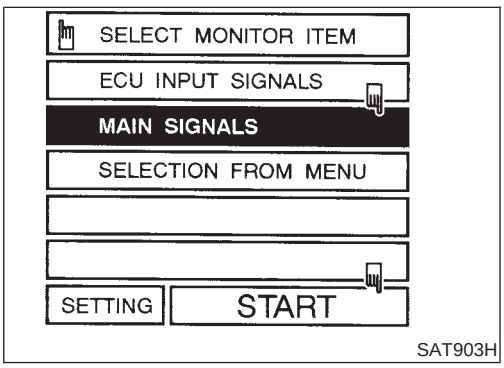
SAT902H

7. Touch "SETTING" to set recording condition.



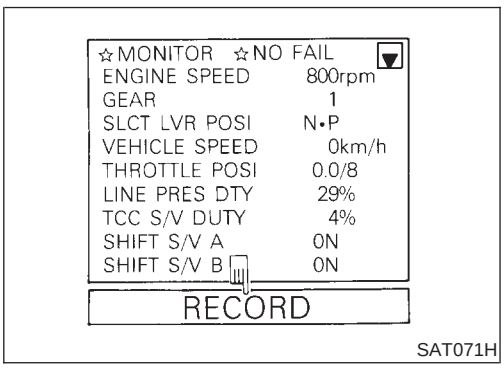
SAT297C

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



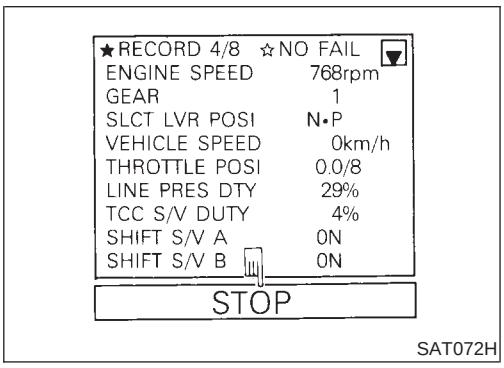
SAT903H

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



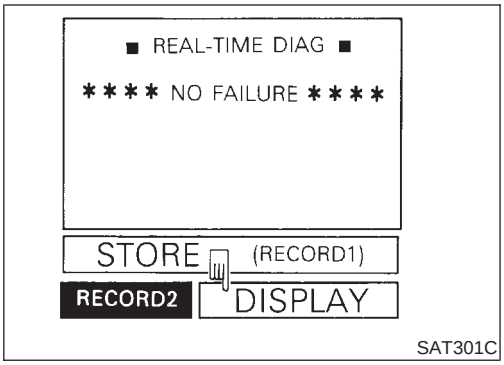
SAT071H

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



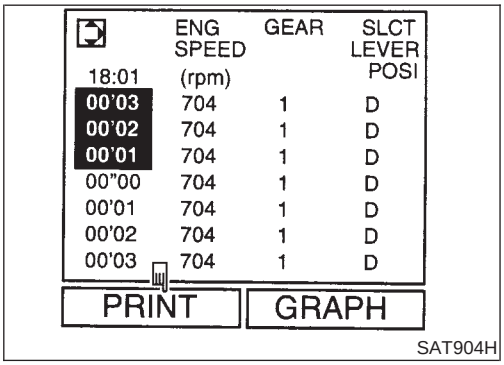
SAT072H

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



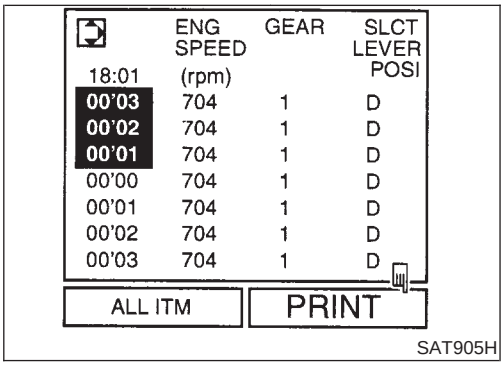
SAT301C

13. Touch "DISPLAY".



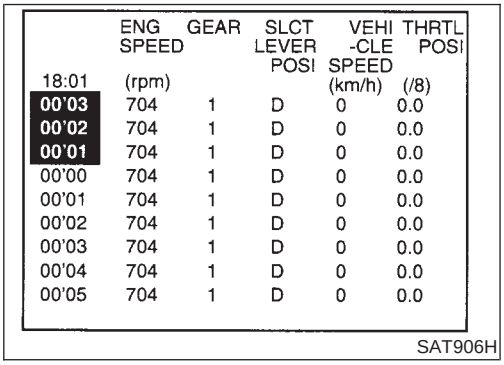
SAT904H

14. Touch "PRINT".



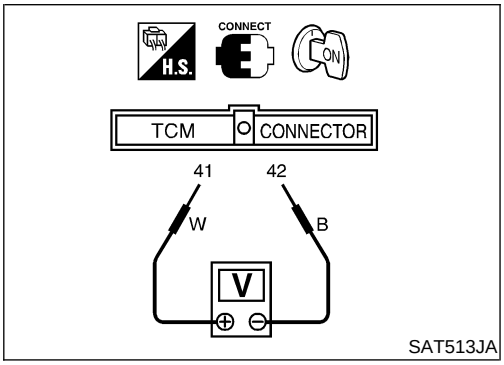
SAT905H

15. Touch "PRINT" again.



SAT906H

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



SAT513JA

### ⊗ Without CONSULT

NEAT0024S0403

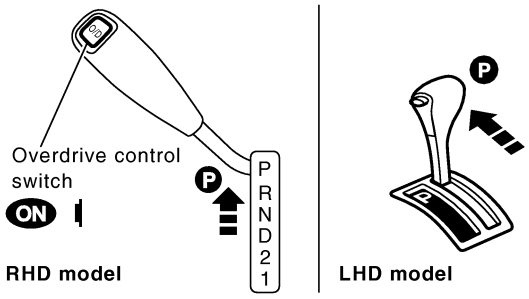
- Throttle position sensor can be checked by voltage across terminals 41 and 42 of TCM.

## Cruise Test — Part 1

=NEAT0024S0404

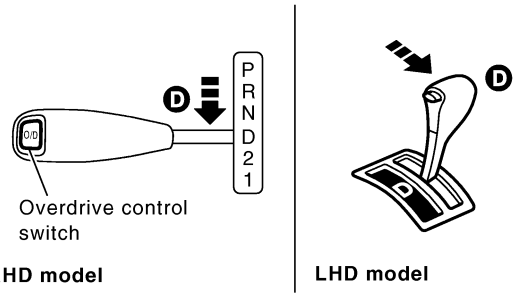
| 1 | CHECK STARTING GEAR ($D_1$) POSITION |
|---|---|

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



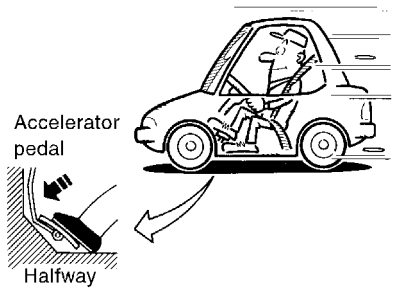

SAT797J

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




SAT787J

7. Accelerate vehicle by constantly depressing accelerator pedal halfway.




SAT953I

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

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to "8. Vehicle Cannot Be Started From $D_1$", AT-159. |

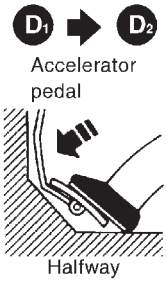
| 2 | CHECK SHIFT UP ($D_1$ TO $D_2$) |
|---|---|

Does A/T shift from $D_1$ to $D_2$ at the specified speed?

**Read gear position, throttle opening and vehicle speed.**

**Specified speed when shifting from $D_1$ to $D_2$:**

**Refer to Shift schedule, AT-282.**




SAT954I

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 3. |
| No | ▶ | Go to "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-162. |

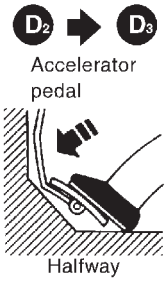
| 3 | CHECK SHIFT UP ($D_2$ TO $D_3$) |
|---|---|

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

**Read gear position, throttle opening and vehicle speed.**

**Specified speed when shifting from $D_2$ to $D_3$:**

**Refer to Shift schedule, AT-282.**




SAT955I

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 4. |
| No | ▶ | Go to "10. A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-165. |

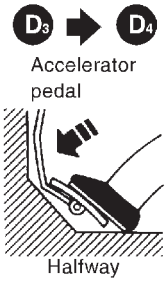
| 4 | CHECK SHIFT UP ($D_3$ TO $D_4$) |
|---|---|

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

**Read gear position, throttle opening and vehicle speed.**

**Specified speed when shifting from $D_3$ to $D_4$:**

**Refer to Shift schedule, AT-282.**




SAT956I

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 5. |
| No | ▶ | Go to "11. A/T Does Not Shift: $D_3 \rightarrow D_4$", AT-168. |

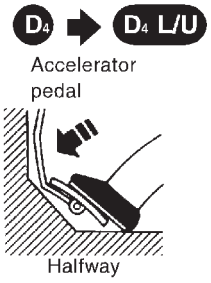
| 5 | CHECK LOCK-UP ($D_4$ TO $D_4$ L/U) |
|---|---|

Does A/T perform lock-up at the specified speed?

**Read vehicle speed, throttle position when lock-up duty becomes 94%.**

**Specified speed when lock-up occurs:**

**Refer to Shift schedule, AT-282.**




SAT957I

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 6. |
| No | ▶ | Go to "12. A/T Does Not Perform Lock-up", AT-171. |

| 6 | CHECK HOLD LOCK-UP |
|---|---|

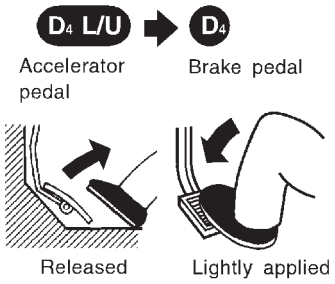
Does A/T hold lock-up condition for more than 30 seconds?

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 7. |
| No | ▶ | Go to "13. A/T Does Not Hold Lock-up Condition", AT-173. |

| 7 | CHECK LOCK-UP OFF ($D_4$ L/U TO $D_4$) |
|---|---|

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




SAT958I

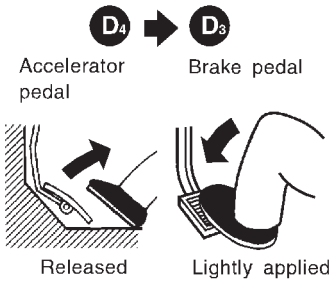
**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 8. |
| No | ▶ | Go to "14. Lock-up Is Not Released", AT-175. |

| 8 | CHECK SHIFT DOWN ($D_4$ TO $D_3$) |
|---|---|

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

**Read gear position and engine speed.**




SAT959I

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | 1. Stop vehicle.<br>2. Go to "Cruise test — Part 2", AT-65. |
| No | ▶ | Go to "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-176. |

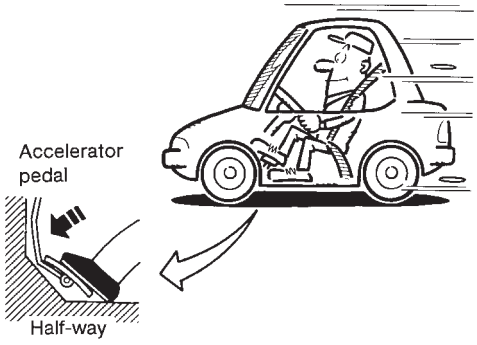
## Cruise Test — Part 2

=NEAT0024S0405

| 1 | CHECK STARTING GEAR ($D_1$) POSITION |
|---|---|

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

**Read gear position.**




SAT495G

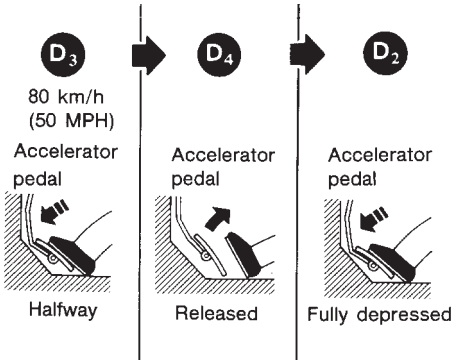
**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to "16. Vehicle Does Not Start From $D_1$", AT-178. |

| 2 | CHECK SHIFT UP AND SHIFT DOWN ($D_3$ TO $D_4$ TO $D_2$) |
|---|---|

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

**Read gear position and throttle position.**




SAT404H

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 3. |
| No | ▶ | Go to "9. A/T Does Not Shift: $D_3 \rightarrow D_4$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-162. |

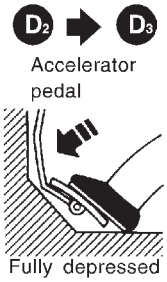
| 3 | CHECK SHIFT UP ($D_2$ TO $D_3$) |
|---|---|

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

**Read gear position, throttle position and vehicle speed.**

**Specified speed when shifting from $D_2$ to $D_3$:**

**Refer to Shift schedule, AT-282.**




SAT960I

**Yes or No**

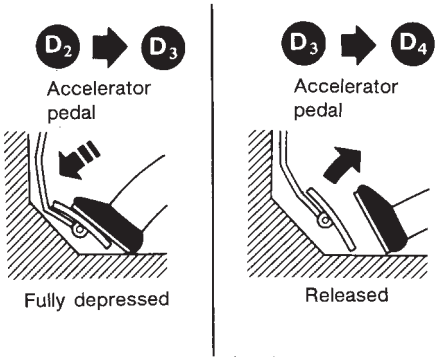
| | | |
|---|---|---|
| Yes | ▶ | GO TO 4. |
| No | ▶ | Go to "10. A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-165. |

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

Release accelerator pedal after shifting from $D_2$ to $D_3$.

Does A/T shift from $D_3$ to $D_4$ and does vehicle decelerate by engine brake?

**Read gear position, throttle position and vehicle speed.**




SAT405H

**Yes or No**

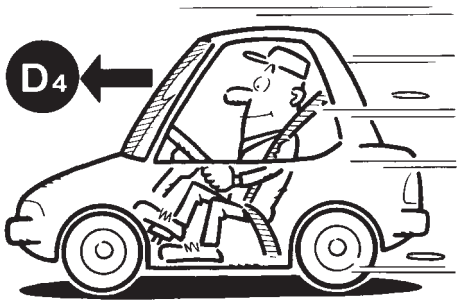
| | | |
|---|---|---|
| Yes | ▶ | 1. Stop vehicle.<br>2. Go to "Cruise test — Part 3", AT-67. |
| No | ▶ | Go to "11. A/T Does Not Shift: $D_3 \rightarrow D_4$", AT-168. |

## Cruise Test — Part 3

=NEAT0024S0406

| 1 | VEHICLE SPEED $D_4$ POSITION |
|---|---|

1. Confirm overdrive control switch is in "ON" position. (Except for LHD model)
2. Confirm selector lever is in "D" position.
3. Accelerate vehicle using half-throttle to $D_4$.



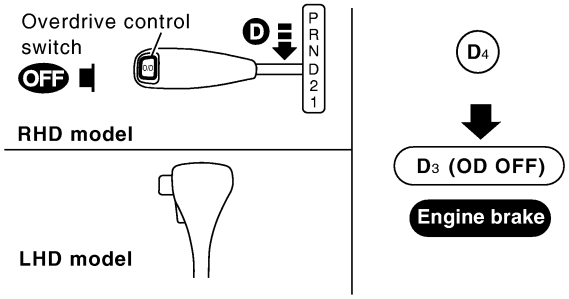

SAT812A

▶ GO TO 2.

| 2 | CHECK SHIFT DOWN ($D_4$ TO $D_3$) |
|---|---|

1. Release accelerator pedal.
2. Set overdrive control switch to "OFF" position while driving in $D_4$. (Except for LHD model)
3. Does A/T shift from $D_4$ to $D_3$ (O/D OFF)?

**Read gear position and vehicle speed.**



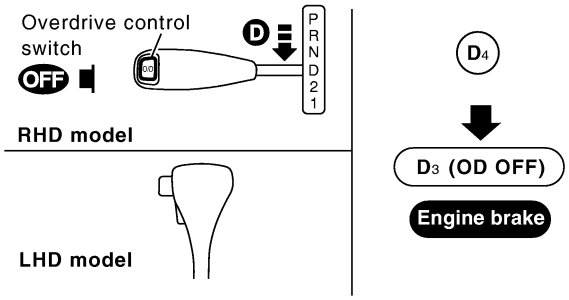

SAT788J

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 3. |
| No | ▶ | Go to "17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch "ON" → "OFF", AT-179. |

| 3 | CHECK ENGINE BRAKE |
|---|---|

Does vehicle decelerate by engine brake?




SAT788J

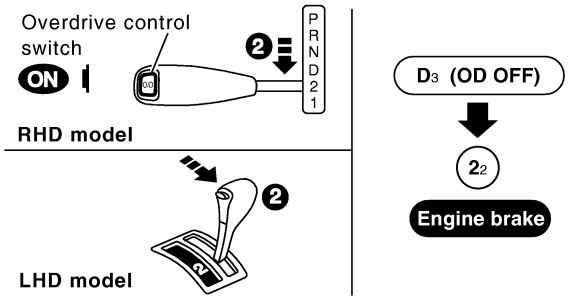
**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 4. |
| No | ▶ | Go to "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-176. |

| 4 | CHECK SHIFT DOWN ($D_3$ TO $D_2$) |
|---|---|

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

**Read gear position.**



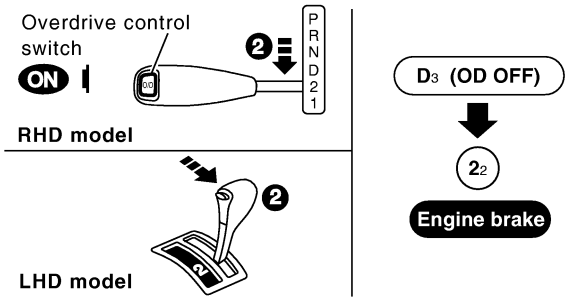

SAT789J

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 5. |
| No | ▶ | Go to "18. A/T Does Not Shift: $D_3 \rightarrow D_2$, When Selector Lever "D" → "2" Position", AT-180. |

| 5 | CHECK ENGINE BRAKE |
|---|---|

Does vehicle decelerate by engine brake?



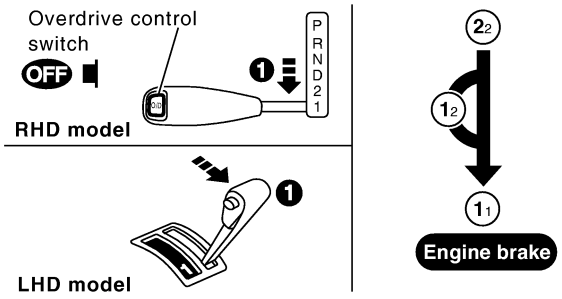

SAT789J

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 6. |
| No | ▶ | Go to "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-176. |

| 6 | CHECK SHIFT DOWN ($2_2$ TO $1_1$) |
|---|---|

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



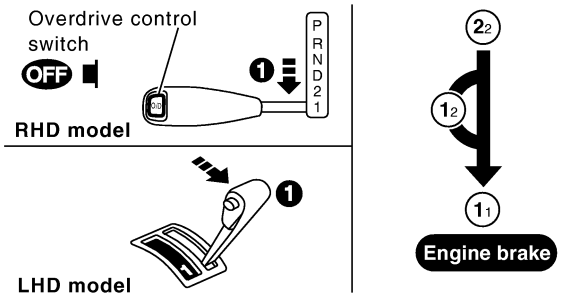

SAT790J

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 7. |
| No | ▶ | Go to "19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector lever "2" → "1" Position", AT-181. |

| 7 | CHECK ENGINE BRAKE |
|---|---|

Does vehicle decelerate by engine brake?




SAT790J

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | 1. Stop vehicle.<br>2. Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT), AT-34. |
| No | ▶ | Go to "20. Vehicle Does Not Decelerate By Engine Brake", AT-182. |

## Symptom Chart

NEAT0026

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

| Symptom | Condition | Diagnostic Item | Reference Page |
|---|---|---|---|
| Engine does not start in “N”, “P” positions.<br>AT-147 | ON vehicle | 1. Ignition switch and starter | EL and EM section |
| | | 2. Control linkage | AT-202 |
| | | 3. PNP switch | AT-202 |
| Engine starts in position other than “N” and “P” positions.<br>AT-147 | ON vehicle | 1. Control linkage | AT-202 |
| | | 2. PNP switch | AT-202 |
| Transmission noise in “P” and “N” positions. | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Line pressure | AT-52 |
| | | 3. Throttle position sensor (Adjustment) | EC section |
| | | 4. Revolution sensor and vehicle speed sensor | AT-201, AT-92 |
| | | 5. Engine speed signal | AT-127 |
| | OFF vehicle | 6. Oil pump | AT-221 |
| | | 7. Torque converter | AT-210 |
| Vehicle moves when changing into “P” position or parking gear does not disengage when shifted out of “P” position.<br>AT-147 | ON vehicle | 1. Control linkage | AT-202 |
| | OFF vehicle | 2. Parking pawl components | AT-261 |
| Vehicle runs in “N” position.<br>AT-149 | ON vehicle | 1. Control linkage | AT-202 |
| | | 2. Accumulator 3-4 (N-R) | AT-200 |
| | OFF vehicle | 3. Forward clutch | AT-244 |
| | | 4. Reverse clutch | AT-238 |
| | | 5. Overrun clutch | AT-244 |
| Vehicle will not run in “R” position (but runs in “D”, “2” and “1” positions).<br>Clutch slips.<br>Very poor acceleration.<br>AT-153 | ON vehicle | 1. Control linkage | AT-202 |
| | | 2. Line pressure | AT-52 |
| | | 3. Line pressure solenoid valve | AT-131 |
| | | 4. Control valve assembly | AT-200 |
| | OFF vehicle | 5. Reverse clutch | AT-238 |
| | | 6. High clutch | AT-242 |
| | | 7. Forward clutch | AT-244 |
| | | 8. Overrun clutch | AT-244 |
| | | 9. Low & reverse brake | AT-248 |

*Symptom Chart (Cont'd)*

| Symptom | Condition | Diagnostic Item | Reference Page |
|---|---|---|---|
| Vehicle braked when shifting into "R" position. | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Control linkage | AT-202 |
| | | 3. Line pressure | AT-52 |
| | | 4. Line pressure solenoid valve | AT-131 |
| | | 5. Control valve assembly | AT-200 |
| | OFF vehicle | 6. High clutch | AT-242 |
| | | 7. Brake band | AT-257 |
| | | 8. Forward clutch | AT-244 |
| | | 9. Overrun clutch | AT-244 |
| Sharp shock in shifting from "N" to "D" position. | ON vehicle | 1. Engine idling rpm | EC section |
| | | 2. Throttle position sensor (Adjustment) | EC section |
| | | 3. Line pressure | AT-52 |
| | | 4. A/T fluid temperature sensor | AT-129 |
| | | 5. Engine speed signal | AT-127 |
| | | 6. Line pressure solenoid valve | AT-131 |
| | | 7. Control valve assembly | AT-200 |
| | | 8. Accumulator N-D | AT-200 |
| | OFF vehicle | 9. Forward clutch | AT-244 |
| Vehicle will not run in "D" and "2" positions (but runs in "1" and "R" positions). | ON vehicle | 1. Control linkage | AT-202 |
| | OFF vehicle | 2. Low one-way clutch | AT-252 |
| Vehicle will not run in "D", "1", "2" positions (but runs in "R" position). Clutch slips. Very poor acceleration. AT-156 | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Line pressure | AT-52 |
| | | 3. Line pressure solenoid valve | AT-131 |
| | | 4. Control valve assembly | AT-200 |
| | | 5. Accumulator N-D | AT-200 |
| | OFF vehicle | 6. Reverse clutch | AT-238 |
| | | 7. High clutch | AT-242 |
| | | 8. Forward clutch | AT-244 |
| | | 9. Forward one-way clutch | AT-244 |
| | | 10. Low one-way clutch | AT-252 |

*Symptom Chart (Cont'd)*

| Symptom | Condition | Diagnostic Item | Reference Page |
|---|---|---|---|
| Clutches or brakes slip somewhat in starting. | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Control linkage | AT-202 |
| | | 3. Throttle position sensor (Adjustment) | EC section |
| | | 4. Line pressure | AT-52 |
| | | 5. Line pressure solenoid valve | AT-131 |
| | | 6. Control valve assembly | AT-200 |
| | | 7. Accumulator N-D | AT-200 |
| | | 8. Accumulator 3-4 (N-R) | AT-200 |
| | OFF vehicle | 9. Forward clutch | AT-244 |
| | | 10. Reverse clutch | AT-238 |
| | | 11. Low & reverse brake | AT-248 |
| | | 12. Oil pump | AT-221 |
| | | 13. Torque converter | AT-210 |
| Excessive creep. | ON vehicle | 1. Engine idling rpm | EC section |
| No creep at all.<br>AT-153, AT-156 | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Line pressure | AT-52 |
| | | 3. Control valve assembly | AT-200 |
| | OFF vehicle | 4. Forward clutch | AT-244 |
| | | 5. Oil pump | AT-221 |
| | | 6. Torque converter | AT-210 |
| Failure to change gear from "$D_1$" to "$D_2$". | ON vehicle | 1. PNP switch | AT-202 |
| | | 2. Control linkage | AT-202 |
| | | 3. Shift solenoid valve A | AT-104 |
| | | 4. Control valve assembly | AT-200 |
| | | 5. Revolution sensor and speed sensor | AT-201, AT-92 |
| | OFF vehicle | 6. Brake band | AT-257 |
| Failure to change gear from "$D_2$" to "$D_3$". | ON vehicle | 1. PNP switch | AT-202 |
| | | 2. Control linkage | AT-202 |
| | | 3. Shift solenoid valve B | AT-108 |
| | | 4. Control valve assembly | AT-200 |
| | | 5. Revolution sensor and speed sensor | AT-201, AT-92 |
| | OFF vehicle | 6. High clutch | AT-242 |
| | | 7. Brake band | AT-257 |

*Symptom Chart (Cont'd)*

| Symptom | Condition | Diagnostic Item | Reference Page |
|---|---|---|---|
| Failure to change gear from "$D_3$" to "$D_4$". | ON vehicle | 1. PNP switch | AT-202 |
| | | 2. Control linkage | AT-202 |
| | | 3. Shift solenoid valve A | AT-104 |
| | | 4. Revolution sensor and speed sensor | AT-201, AT-92 |
| | | 5. A/T fluid temperature sensor | AT-121 |
| | OFF vehicle | 6. Brake band | AT-257 |
| 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-162, AT-165, AT-168 | ON vehicle | 1. Throttle position sensor (Adjustment) | EC section |
| | | 2. Revolution sensor and speed sensor | AT-201, AT-92 |
| | | 3. Shift solenoid valve A | AT-104 |
| | | 4. Shift solenoid valve B | AT-108 |
| Gear change directly from "$D_1$" to "$D_3$" occurs. | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Accumulator 1-2 | AT-200 |
| | OFF vehicle | 3. Brake band | AT-257 |
| Engine stops when shifting lever into "R", "D", "2" and "1". | ON vehicle | 1. Engine idling rpm | EC section |
| | | 2. Torque converter clutch solenoid valve | AT-116 |
| | | 3. Control valve assembly | AT-200 |
| | OFF vehicle | 4. Torque converter | AT-210 |
| Too sharp a shock in change from "$D_1$" to "$D_2$". | ON vehicle | 1. Throttle position sensor (Adjustment) | EC section |
| | | 2. Line pressure | AT-52 |
| | | 3. Accumulator 1-2 | AT-200 |
| | | 4. Control valve assembly | AT-200 |
| | | 5. A/T fluid temperature sensor | AT-121 |
| | OFF vehicle | 6. Brake band | AT-257 |
| Too sharp a shock in change from "$D_2$" to "$D_3$". | ON vehicle | 1. Throttle position sensor (Adjustment) | EC section |
| | | 2. Line pressure | AT-52 |
| | | 3. Accumulator 2-3 | AT-200 |
| | | 4. Control valve assembly | AT-200 |
| | OFF vehicle | 5. High clutch | AT-242 |
| | | 6. Brake band | AT-257 |
| Too sharp a shock in change from "$D_3$" to "$D_4$". | ON vehicle | 1. Throttle position sensor (Adjustment) | EC section |
| | | 2. Line pressure | AT-52 |
| | | 3. Accumulator 3-4 (N-R) | AT-200 |
| | | 4. Control valve assembly | AT-200 |
| | OFF vehicle | 5. Brake band | AT-257 |
| | | 6. Overrun clutch | AT-244 |

*Symptom Chart (Cont'd)*

| Symptom | Condition | Diagnostic Item | Reference Page |
|---|---|---|---|
| Almost no shock or clutches slipping in change from "$D_1$" to "$D_2$". | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Throttle position sensor (Adjustment) | EC section |
| | | 3. Line pressure | AT-52 |
| | | 4. Accumulator 1-2 | AT-200 |
| | | 5. Control valve assembly | AT-200 |
| | OFF vehicle | 6. Brake band | AT-257 |
| Almost no shock or slipping in change from "$D_2$" to "$D_3$". | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Throttle position sensor (Adjustment) | EC section |
| | | 3. Line pressure | AT-52 |
| | | 4. Accumulator 2-3 | AT-200 |
| | | 5. Control valve assembly | AT-200 |
| | OFF vehicle | 6. High clutch | AT-242 |
| | | 7. Brake band | AT-257 |
| Almost no shock or slipping in change from "$D_3$" to "$D_4$". | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Throttle position sensor (Adjustment) | EC section |
| | | 3. Line pressure | AT-52 |
| | | 4. Accumulator 3-4 (N-R) | AT-200 |
| | | 5. Control valve assembly | AT-200 |
| | OFF vehicle | 6. High clutch | AT-242 |
| | | 7. Brake band | AT-257 |
| Vehicle braked by gear change from "$D_1$" to "$D_2$". | ON vehicle | 1. Fluid level | AT-49 |
| | OFF vehicle | 2. Reverse clutch | AT-238 |
| | | 3. Low & reverse brake | AT-248 |
| | | 4. High clutch | AT-242 |
| | | 5. Low one-way clutch | AT-252 |
| Vehicle braked by gear change from "$D_2$" to "$D_3$". | ON vehicle | 1. Fluid level | AT-49 |
| | OFF vehicle | 2. Brake band | AT-257 |
| Vehicle braked by gear change from "$D_3$" to "$D_4$". | ON vehicle | 1. Fluid level | AT-49 |
| | OFF vehicle | 2. Overrun clutch | AT-244 |
| | | 3. Forward one-way clutch | AT-244 |
| | | 4. Reverse clutch | AT-238 |

*Symptom Chart (Cont'd)*

| Symptom | Condition | Diagnostic Item | Reference Page |
|---|---|---|---|
| Maximum speed not attained. Acceleration poor. | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. PNP switch | AT-202 |
| | | 3. Shift solenoid valve A | AT-104 |
| | | 4. Shift solenoid valve B | AT-108 |
| | | 5. Control valve assembly | AT-200 |
| | OFF vehicle | 6. Reverse clutch | AT-238 |
| | | 7. High clutch | AT-242 |
| | | 8. Brake band | AT-257 |
| | | 9. Low & reverse brake | AT-248 |
| | | 10. Oil pump | AT-221 |
| | | 11. Torque converter | AT-210 |
| Failure to change gear from "$D_4$" to "$D_3$". | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Throttle position sensor (Adjustment) | EC section |
| | | 3. Overrun clutch solenoid valve | AT-112 |
| | | 4. Shift solenoid valve A | AT-104 |
| | | 5. Line pressure solenoid valve | AT-131 |
| | | 6. Control valve assembly | AT-200 |
| | OFF vehicle | 7. Low & reverse brake | AT-248 |
| | | 8. Overrun clutch | AT-244 |
| Failure to change gear from "$D_3$" to "$D_2$" or from "$D_4$" to "$D_2$". | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Throttle position sensor (Adjustment) | EC section |
| | | 3. Shift solenoid valve A | AT-104 |
| | | 4. Shift solenoid valve B | AT-108 |
| | | 5. Control valve assembly | AT-200 |
| | OFF vehicle | 6. High clutch | AT-242 |
| | | 7. Brake band | AT-257 |
| Failure to change gear from "$D_2$" to "$D_1$" or from "$D_3$" to "$D_1$". | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Throttle position sensor (Adjustment) | EC section |
| | | 3. Shift solenoid valve A | AT-104 |
| | | 4. Shift solenoid valve B | AT-108 |
| | | 5. Control valve assembly | AT-200 |
| | OFF vehicle | 6. Low one-way clutch | AT-252 |
| | | 7. High clutch | AT-242 |
| | | 8. Brake band | AT-257 |
| Gear change shock felt during deceleration by releasing accelerator pedal. | ON vehicle | 1. Throttle position sensor (Adjustment) | EC section |
| | | 2. Line pressure | AT-52 |
| | | 3. Overrun clutch solenoid valve | AT-112 |
| | | 4. Control valve assembly | AT-200 |

*Symptom Chart (Cont'd)*

| Symptom | Condition | Diagnostic Item | Reference Page |
|---|---|---|---|
| Too high a change point from "$D_4$" to "$D_3$", from "$D_3$" to "$D_2$", from "$D_2$" to "$D_1$". | ON vehicle | 1. Throttle position sensor (Adjustment) | EC section |
| | | 2. Revolution sensor and speed sensor | AT-201, AT-92 |
| Kickdown does not operate when depressing pedal in "$D_4$" within kick-down vehicle speed. | ON vehicle | 1. Throttle position sensor (Adjustment) | EC section |
| | | 2. Revolution sensor and speed sensor | AT-201, AT-92 |
| | | 3. Shift solenoid valve A | AT-104 |
| | | 4. Shift solenoid valve B | AT-108 |
| Kickdown operates or engine overruns when depressing pedal in "$D_4$" beyond kickdown vehicle speed limit. | ON vehicle | 1. Revolution sensor and speed sensor | AT-201, AT-92 |
| | | 2. Throttle position sensor (Adjustment) | EC section |
| | | 3. Shift solenoid valve A | AT-104 |
| | | 4. Shift solenoid valve B | AT-108 |
| Races extremely fast or slips in changing from "$D_4$" to "$D_3$" when depressing pedal. | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Throttle position sensor (Adjustment) | EC section |
| | | 3. Line pressure | AT-52 |
| | | 4. Line pressure solenoid valve | AT-131 |
| | | 5. Control valve assembly | AT-200 |
| | OFF vehicle | 6. High clutch | AT-242 |
| | | 7. Forward clutch | AT-244 |
| Races extremely fast or slips in changing from "$D_4$" to "$D_2$" when depressing pedal. | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Throttle position sensor (Adjustment) | EC section |
| | | 3. Line pressure | AT-52 |
| | | 4. Line pressure solenoid valve | AT-131 |
| | | 5. Shift solenoid valve A | AT-104 |
| | | 6. Control valve assembly | AT-200 |
| | OFF vehicle | 7. Brake band | AT-257 |
| | | 8. Forward clutch | AT-244 |
| Races extremely fast or slips in changing from "$D_3$" to "$D_2$" when depressing pedal. | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Throttle position sensor (Adjustment) | EC section |
| | | 3. Line pressure | AT-52 |
| | | 4. Line pressure solenoid valve | AT-131 |
| | | 5. Control valve assembly | AT-200 |
| | | 6. A/T fluid temperature sensor | AT-121 |
| | | 7. Accumulator 2-3 | AT-200 |
| | OFF vehicle | 8. Brake band | AT-257 |
| | | 9. Forward clutch | AT-244 |
| | | 10. High clutch | AT-242 |

*Symptom Chart (Cont'd)*

| Symptom | Condition | Diagnostic Item | Reference Page |
|---|---|---|---|
| Races extremely fast or slips in changing from "$D_4$" or "$D_3$" to "$D_1$" when depressing pedal. | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Throttle position sensor (Adjustment) | EC section |
| | | 3. Line pressure | AT-52 |
| | | 4. Line pressure solenoid valve | AT-131 |
| | | 5. Control valve assembly | AT-200 |
| | OFF vehicle | 6. Forward clutch | AT-244 |
| | | 7. Forward one-way clutch | AT-244 |
| | | 8. Low one-way clutch | AT-252 |
| Vehicle will not run in any position. | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Control linkage | AT-202 |
| | | 3. Line pressure | AT-52 |
| | | 4. Line pressure solenoid valve | AT-131 |
| | OFF vehicle | 5. Oil pump | AT-221 |
| | | 6. High clutch | AT-242 |
| | | 7. Brake band | AT-257 |
| | | 8. Low & reverse brake | AT-248 |
| | | 9. Torque converter | AT-210 |
| Transmission noise in "D", "2", "1" and "R" positions. | ON vehicle | 1. Fluid level | AT-49 |
| | OFF vehicle | 2. Torque converter | AT-210 |
| Failure to change from "$D_3$" to "2" when changing lever into "2" position. AT-176 | ON vehicle | 1. PNP switch | AT-202 |
| | | 2. Throttle position sensor (Adjustment) | EC section |
| | | 3. Torque converter clutch solenoid valve | AT-116 |
| | | 4. Shift solenoid valve B | AT-104 |
| | | 5. Shift solenoid valve A | AT-108 |
| | | 6. Control valve assembly | AT-200 |
| | | 7. Control linkage | AT-202 |
| | OFF vehicle | 8. Brake band | AT-257 |
| | | 9. Overrun clutch | AT-244 |
| Gear change from "$2_2$" to "$2_3$" in "2" position. | ON vehicle | 1. PNP switch | AT-202 |

*Symptom Chart (Cont'd)*

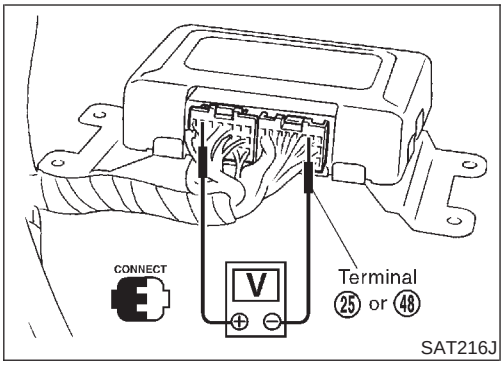
| Symptom | Condition | Diagnostic Item | Reference Page |
|---|---|---|---|
| Engine brake does not operate in "1" position.<br>AT-178 | ON vehicle | 1. PNP switch | AT-202 |
| | | 2. Control linkage | AT-202 |
| | | 3. Throttle position sensor (Adjustment) | EC section |
| | | 4. Revolution sensor and speed sensor | AT-201, AT-92 |
| | | 5. Shift solenoid valve A | AT-112 |
| | | 6. Control valve assembly | AT-200 |
| | | 7. Overrun clutch solenoid valve | AT-112 |
| | OFF vehicle | 8. Overrun clutch | AT-244 |
| | | 9. Low & reverse brake | AT-248 |
| Gear change from "$1_1$" to "$1_2$" in "1" position. | ON vehicle | 1. PNP switch | AT-202 |
| | | 2. Control linkage | AT-202 |
| Does not change from "$1_2$" to "$1_1$" in "1" position. | ON vehicle | 1. PNP switch | AT-202 |
| | | 2. Revolution sensor and speed sensor | AT-201, AT-92 |
| | | 3. Shift solenoid valve A | AT-104 |
| | | 4. Control valve assembly | AT-200 |
| | | 5. Overrun clutch solenoid valve | AT-112 |
| | OFF vehicle | 6. Overrun clutch | AT-244 |
| | | 7. Low & reverse brake | AT-248 |
| Large shock changing from "$1_2$" to "$1_1$" in "1" position. | ON vehicle | 1. Control valve assembly | AT-200 |
| | OFF vehicle | 2. Low & reverse brake | AT-248 |
| Transmission overheats. | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Engine idling rpm | AT-52 |
| | | 3. Throttle position sensor (Adjustment) | EC section |
| | | 4. Line pressure | AT-52 |
| | | 5. Line pressure solenoid valve | AT-131 |
| | | 6. Control valve assembly | AT-200 |
| | OFF vehicle | 7. Oil pump | AT-221 |
| | | 8. Reverse clutch | AT-238 |
| | | 9. High clutch | AT-242 |
| | | 10. Brake band | AT-257 |
| | | 11. Forward clutch | AT-244 |
| | | 12. Overrun clutch | AT-244 |
| | | 13. Low & reverse brake | AT-248 |
| | | 14. Torque converter | AT-210 |

*Symptom Chart (Cont'd)*

| Symptom | Condition | Diagnostic Item | Reference Page |
|---|---|---|---|
| ATF shoots out during operation. White smoke emitted from exhaust pipe during operation. | ON vehicle | 1. Fluid level | AT-49 |
| | OFF vehicle | 2. Reverse clutch | AT-238 |
| | | 3. High clutch | AT-242 |
| | | 4. Brake band | AT-257 |
| | | 5. Forward clutch | AT-244 |
| | | 6. Overrun clutch | AT-244 |
| | | 7. Low & reverse brake | AT-248 |
| Offensive smell at fluid charging pipe. | ON vehicle | 1. Fluid level | AT-49 |
| | OFF vehicle | 2. Torque converter | AT-210 |
| | | 3. Oil pump | AT-221 |
| | | 4. Reverse clutch | AT-238 |
| | | 5. High clutch | AT-242 |
| | | 6. Brake band | AT-257 |
| | | 7. Forward clutch | AT-244 |
| | | 8. Overrun clutch | AT-244 |
| | | 9. Low & reverse brake | AT-248 |
| Torque converter is not locked up. | ON vehicle | 1. Throttle position sensor (Adjustment) | EC section |
| | | 2. Revolution sensor and speed sensor | AT-201, AT-92 |
| | | 3. PNP switch | AT-202 |
| | | 4. Engine speed signal | AT-127 |
| | | 5. A/T fluid temperature sensor | AT-121 |
| | | 6. Line pressure | AT-52 |
| | | 7. Torque converter clutch solenoid valve | AT-116 |
| | | 8. Control valve assembly | AT-200 |
| | OFF vehicle | 9. Torque converter | AT-210 |
| Torque converter clutch piston slip. | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Line pressure | AT-52 |
| | | 3. Torque converter clutch solenoid valve | AT-116 |
| | | 4. Line pressure solenoid valve | AT-131 |
| | | 5. Control valve assembly | AT-200 |
| | OFF vehicle | 7. Torque converter | AT-210 |
| Lock-up point is extremely high or low. AT-171 | ON vehicle | 1. Throttle position sensor (Adjustment) | EC section |
| | | 2. Revolution sensor and speed sensor | AT-201, AT-92 |
| | | 3. Torque converter clutch solenoid valve | AT-116 |
| | | 4. Control valve assembly | AT-200 |

*Symptom Chart (Cont'd)*

| Symptom | Condition | Diagnostic Item | Reference Page |
|---|---|---|---|
| A/T does not shift to "$D_4$" when driving with overdrive control switch "ON". (Except for the Middle East) | ON vehicle | 1. Throttle position sensor (Adjustment) | EC section |
| | | 2. PNP switch | AT-202 |
| | | 3. Revolution sensor and speed sensor | AT-201, AT-92 |
| | | 4. Shift solenoid valve A | AT-104 |
| | | 5. Overrun clutch solenoid valve | AT-112 |
| | | 6. Control valve assembly | AT-200 |
| | | 7. A/T fluid temperature sensor | AT-121 |
| | | 8. Line pressure | AT-52 |
| | OFF vehicle | 9. Brake band | AT-257 |
| | | 10. Overrun clutch | AT-244 |
| Engine is stopped at "R", "D", "2" and "1" positions. | ON vehicle | 1. Fluid level | AT-49 |
| | | 2. Torque converter clutch solenoid valve | AT-116 |
| | | 3. Shift solenoid valve B | AT-108 |
| | | 4. Shift solenoid valve A | AT-104 |
| | | 5. Control valve assembly | AT-200 |



SAT216J

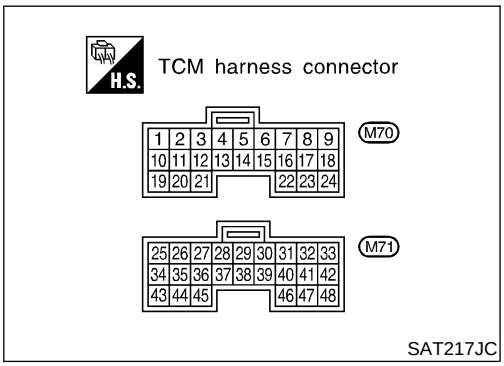
# TCM Terminals and Reference Value

=NEAT0027

## PREPARATION

NEAT0027S01

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



SAT217JC

## TCM HARNESS CONNECTOR TERMINAL LAYOUT

NEAT0027S02

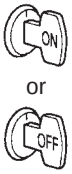
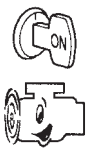
## TCM INSPECTION TABLE
**(Data are reference values.)**

NEAT0027S03

| Terminal No. | Wire color | Item | Condition | | Judgement standard |
|---|---|---|---|---|---|
| 1 | G/Y | 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. | 0.5V or less |
| 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. | 0.5V or less |
| 3 | G/OR | Torque converter clutch solenoid valve | | When A/T performs lock-up. | 8 - 15V |
| | | | | When A/T does not perform lock- up. | 1V or less |
| 4 | — | — | | — | — |
| 5 | — | — | | — | — |
| 6 | — | — | | — | — |
| 7 | — | — | | — | — |
| 8 | — | — | | — | — |
| 9 | — | — | | — | — |
| 10 | OR | Power source | | When turning ignition switch to “ON”. | Battery voltage |
| | | | | When turning ignition switch to “OFF”. | 1V or less |

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

| Terminal No. | Wire color | Item | Condition | | Judgement standard |
|---|---|---|---|---|---|
| 11 | L/W | Shift solenoid valve A | | When shift solenoid valve A operates. (When driving in "$D_1$" or "$D_4$".) | Battery voltage |
| | | | | When shift solenoid valve A does not operate. (When driving in "$D_2$" or "$D_3$".) | 1V or less |
| 12 | L/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 "$D_4$".) | 1V or less |
| 13 | G/Y | A/T CHECK indicator lamp: LHD O/D OFF indicator lamp: RHD | | When setting overdrive control (A/T check) switch in "ON" position. | Battery voltage |
| | | | | When setting overdrive control (A/T check) switch in "OFF" position. | 1V or less |
| 14 | — | — | | — | — |
| 15 | — | — | | — | — |
| 16 | OR | Closed throttle position switch (in throttle position switch) | | When releasing accelerator pedal after warming up engine. | Battery voltage |
| | | | | When depressing accelerator pedal after warming up engine. | 1V or less |
| 17 | L/Y | Wide open throttle position switch (in throttle position switch) | | When depressing accelerator pedal more than half-way after warming up engine. | Battery voltage |
| | | | | When releasing accelerator pedal after warming up engine. | 1V or less |
| 18 | — | — | | — | — |
| 19 | OR | Power source | | Same as No. 10 | |
| 20 | L/B | Overrun clutch solenoid valve | | When overrun clutch solenoid valve operates. | Battery voltage |
| | | | | When overrun clutch solenoid valve does not operate. | 1V or less |
| 21 | — | — | | — | — |
| 22 | G/Y | A/T check switch: LHD Overdrive control switch: RHD | | When setting overdrive control (A/T check) switch in "ON" position | Battery voltage |
| | | | | When setting overdrive control (A/T check) switch in "OFF" position | 1V or less |
| 23 | — | — | | — | — |

| Terminal No. | Wire color | Item | Condition | | Judgement standard |
|---|---|---|---|---|---|
| 24 | — | — | | — | — |
| 25 | B | Ground | | — | — |
| 26 | G/W | PNP switch "1" position | | When setting selector lever to "1" position. | Battery voltage |
| | | | | When setting selector lever to other positions. | 1V or less |
| 27 | L | PNP switch "2" position | | When setting selector lever to "2" position. | Battery voltage |
| | | | | When setting selector lever to other positions. | 1V or less |
| 28 | R/G | Power source (Memory back-up) |  | When turning ignition switch to "OFF". | Battery voltage |
| | | | | When turning ignition switch to "ON". | Battery voltage |
| 29 | W | Revolution sensor (Measure in AC range) | | When vehicle cruises at 30 km/h (19 MPH). | 1V or more Voltage rises gradually in response to vehicle speed. |
| | | | | When vehicle parks. | 0V |
| 30*1 | G/Y | — | | — | — |
| 31*1 | G/R | — | | — | — |
| 32 | G/B | Throttle position sensor (Power source) | | — | 4.5 - 5.5V |
| 33 | — | — | | — | — |
| 34 | G/R | PNP switch "D" position | | When setting selector lever to "D" position. | Battery voltage |
| | | | | When setting selector lever to other positions. | 1V or less |
| 35 | R/B | PNP switch "R" position | | When setting selector lever to "R" position. | Battery voltage |
| | | | | When setting selector lever to other positions. | 1V or less |
| 36 | Y | PNP switch "N" or "P" position | | When setting selector lever to "N" or "P" position. | Battery voltage |
| | | | | When setting selector lever to other positions. | 1V or less |
| 37 | — | — | | — | — |
| 38 | — | — | | — | — |
| 39 | W | Engine speed signal |  | Refer to EC section. | |

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

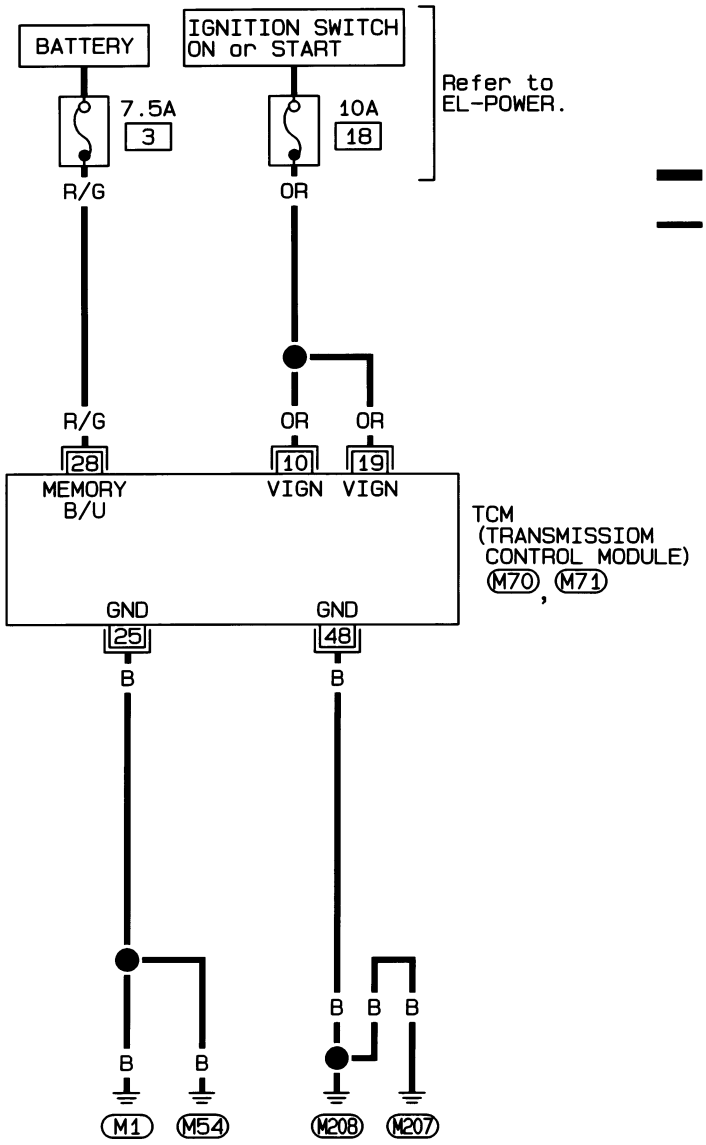
| Terminal No. | Wire color | Item | Condition | | Judgement standard |
|---|---|---|---|---|---|
| 40 | W/L | Vehicle speed sensor | | When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more. | Voltage varies between less than 1.0V and more than 4.5V. |
| 41 | W | Throttle position sensor | | When depressing accelerator pedal slowly after warming up engine.<br>(Voltage rises gradually in response to throttle position.) | Fully-closed throttle: Approximately 0.5V<br>Fully-open throttle: Approximately 4V |
| 42 | B | Throttle position sensor (Ground) | | — | — |
| 45 | — | — | | — | — |
| 46 | — | — | | — | — |
| 47 | R | A/T fluid temperature sensor | | When ATF temperature is 20°C (68°F). | Approximately 1.5V |
| | | | | When ATF temperature is 80°C (176°F). | Approximately 0.5V |
| 48 | B | Ground | | — | — |

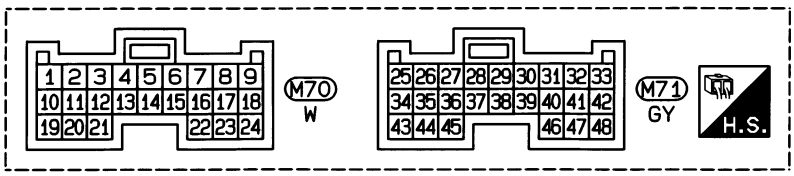
*1: These terminals are connected to the Data link connector.

## Wiring Diagram — AT — MAIN

NEAT0185

AT-MAIN-01



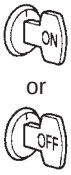




HAT054

## TCM TERMINALS AND REFERENCE VALUE

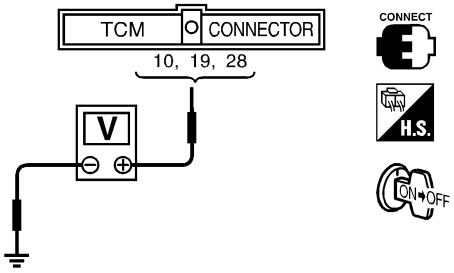
NEAT0185S01

Remarks: Specification data are reference values.

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

| 1 | CHECK TCM POWER SOURCE |
|---|---|

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




SAT514J

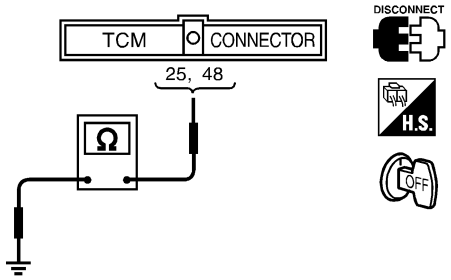
3. Turn ignition switch to "OFF" position.
4. Check voltage between TCM terminal 28 and ground.
   **Voltage: Battery voltage**

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 2. |
| NG | ▶ | **Check the following items:**<br>● Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness)<br>● Ignition switch and fuse<br>Refer to EL section ("POWER SUPPLY ROUTING"). |

| 2 | CHECK TCM GROUND CIRCUIT |
|---|---|

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

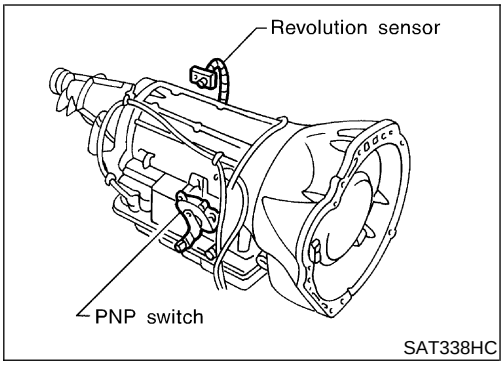



SAT515J

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

**OK or NG**

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




## Description

NEAT0034

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

NEAT0034S02

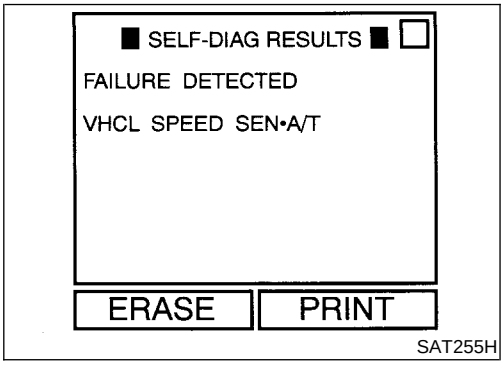
Remarks: Specification data are reference values.

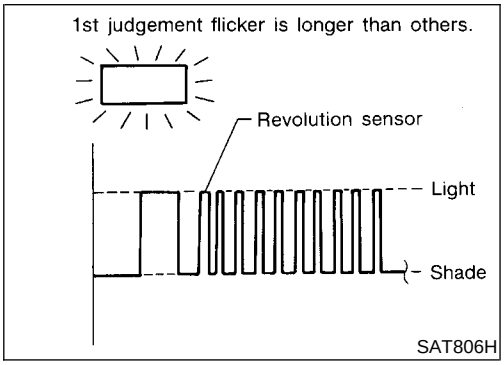
| Terminal No. | Wire color | Item | Condition | | Judgement standard |
|---|---|---|---|---|---|
| 29 | W | Revolution sensor (Measure in AC range) | | When vehicle cruises at 30 km/h (19 MPH). | 1V or more Voltage rises gradually in response to vehicle speed. |
| | | | | When vehicle parks. | 0V |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

### ON BOARD DIAGNOSIS LOGIC

NEAT0034S03

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| (CONSULT) : VHCL SPEED SEN·A/T | TCM does not receive the proper voltage signal from the sensor. | • Harness or connectors (The sensor circuit is open or shorted.)<br>• Revolution sensor |
| (GST) : 1st judgement flicker | | |




### SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE

NEAT0034S04

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

#### (CONSULT) WITH CONSULT

NEAT0034S05

1) Start engine.
2) Select “SELF-DIAG RESULTS” mode with CONSULT.
3) Drive vehicle under the following conditions:
   Selector lever in “D” position, vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.

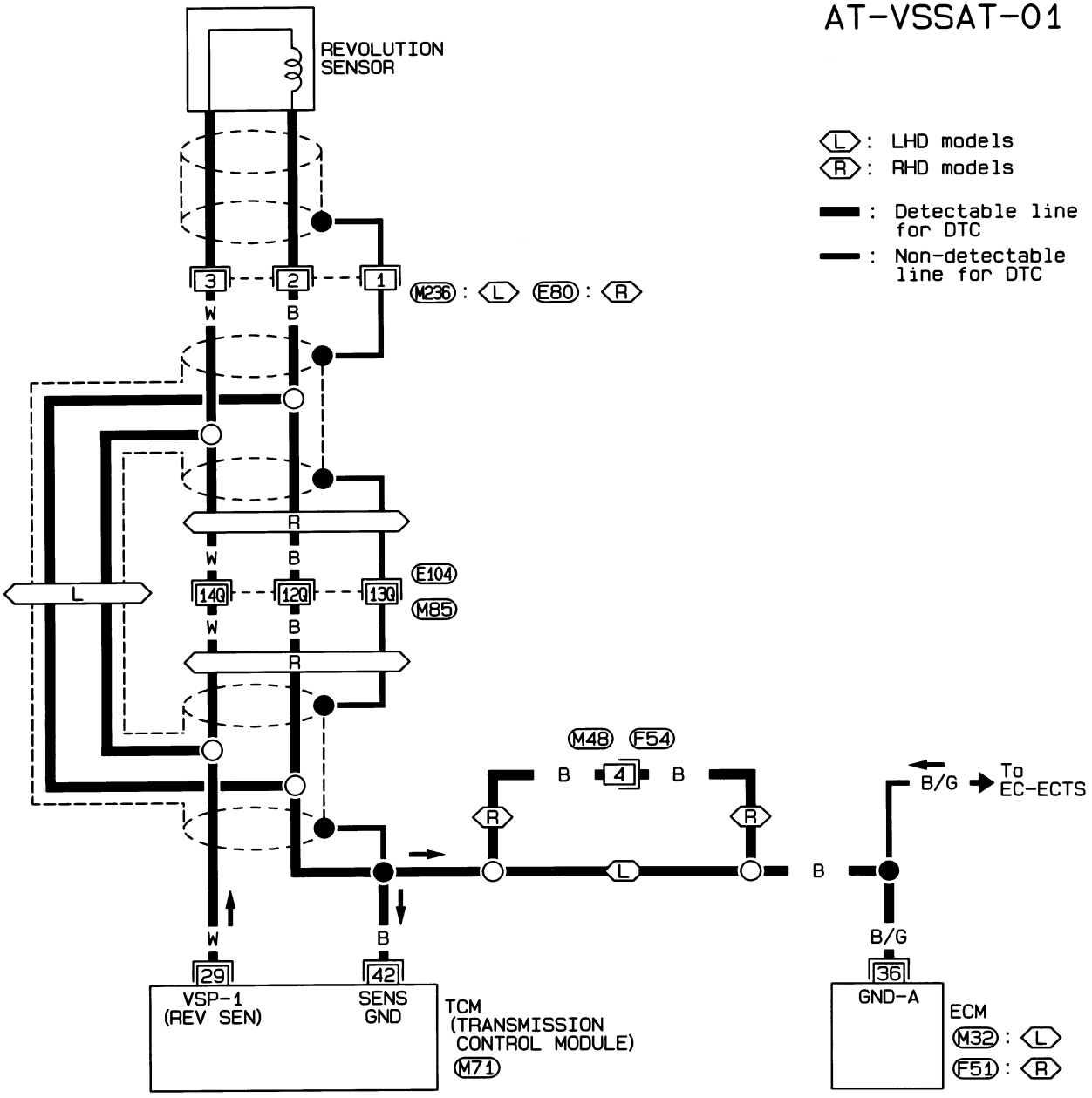
#### (NO CONSULT) WITHOUT CONSULT

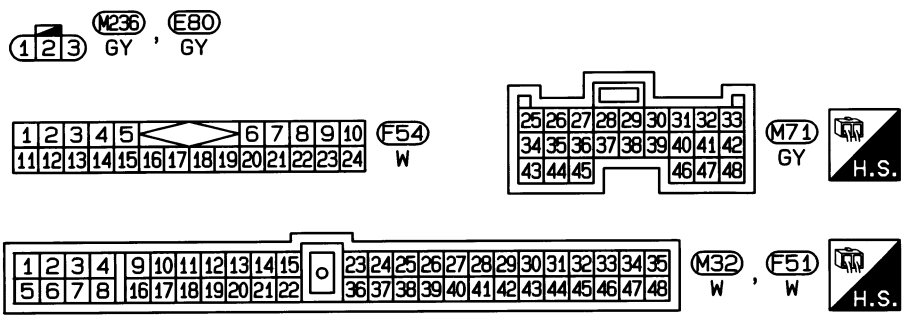
NEAT0034S06

1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in “D” position, vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT), AT-34.

## Wiring Diagram — AT — VSSA/T

NEAT0188




Refer to last page (Foldout page).
M85 , E104

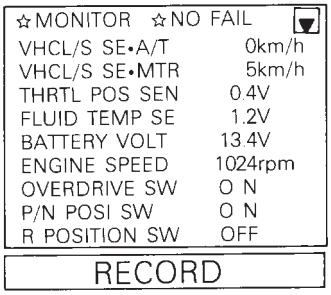
HAT055

## Diagnostic Procedure

NEAT0035

| 1 | CHECK REVOLUTION SENSOR | |
|---|---|---|
| Refer to “Component Inspection”, AT-91. | | |
| **OK or NG** | | |
| OK (With CONSULT) | ▶ | GO TO 2. |
| OK (Without CONSULT) | ▶ | GO TO 3. |
| NG | ▶ | Repair or replace revolution sensor. |

| 2 | CHECK INPUT SIGNAL (WITH CONSULT) | |
|---|---|---|
| **With CONSULT**<br>1. Start engine.<br>2. Select “ECU INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT.<br>3. Read out the value of “VHCL/S SE·A/T” while driving.<br>Check the value changes according to driving speed. | | |
| **OK or NG** | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | **Check the following items:**<br>● Harness for short or open between TCM and revolution sensor (Main harness)<br>● Harness for short or open between revolution sensor and ECM (Main harness)<br>● Ground circuit for ECM<br>Refer to EC section (“TROUBLE DIAGNOSIS FOR POWER SUPPLY”). |

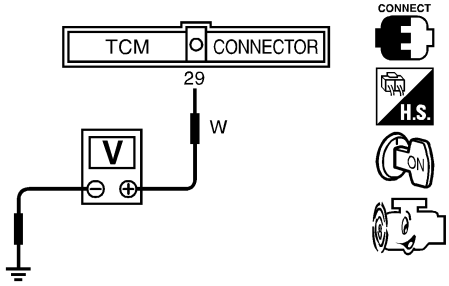



SAT076H

| 3 | CHECK INPUT SIGNAL (WITHOUT CONSULT) |
|---|---|

**Without CONSULT**
1. Start engine.
2. Check voltage between TCM terminal 29 and ground while driving.
   (Measure with AC range.)

**Voltage:**
**At 0 km/h (0 MPH):**
**0V**
**At 30 km/h (19 MPH):**
**1V or more**
**(Voltage rises gradually in response to vehicle speed.)**




SAT519J

**OK or NG**

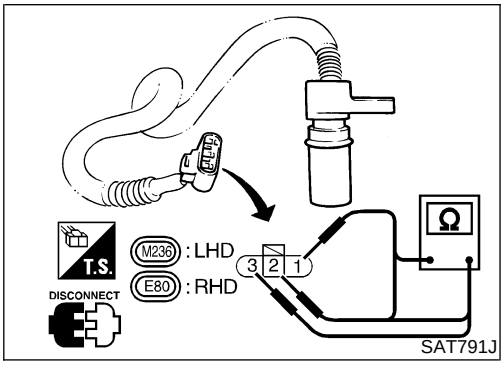
| | | |
|---|---|---|
| OK | ▶ | GO TO 4. |
| NG | ▶ | **Check the following items:**<br>● Harness for short or open between TCM and revolution sensor (Main harness)<br>● Harness for short or open between revolution sensor and ECM (Main harness)<br>● Ground circuit for ECM<br>Refer to EC section ("TROUBLE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

| 4 | CHECK DTC |
|---|---|

Perform Self-diagnosis Code confirmation procedure, AT-88.

**OK or NG**

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




SAT791J

## Component Inspection

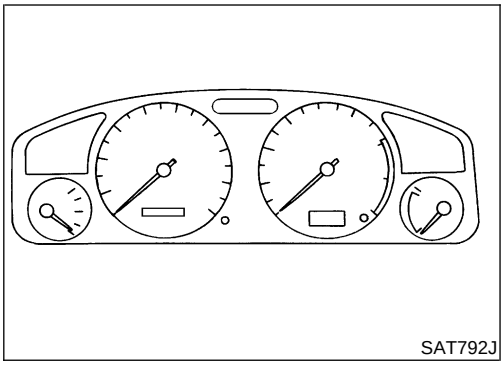
NEAT0036

### REVOLUTION SENSOR

NEAT0036S01

- For removal, refer to AT-200.
- Check resistance between terminals 1, 2 and 3.

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


SAT792J

## Description

NEAT0217

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

### TCM TERMINALS AND REFERENCE VALUE

NEAT0217S01

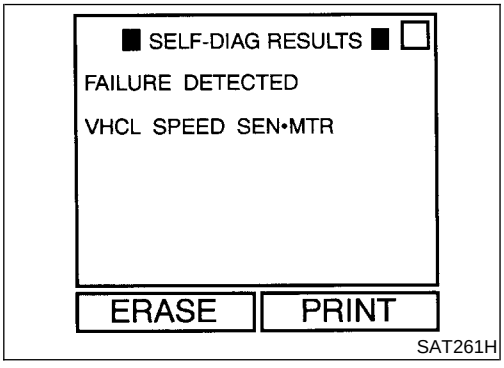
Remarks: Specification data are reference values.

| Terminal No. | Wire color | Item | Condition | | Judgement standard |
|---|---|---|---|---|---|
| 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 |

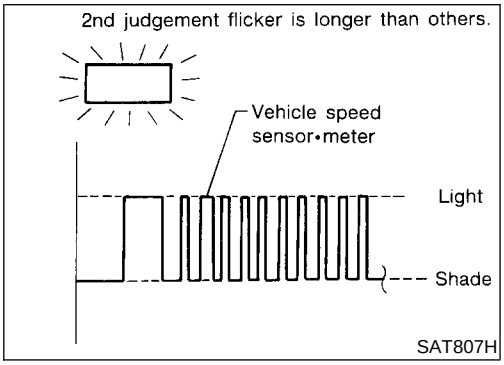
### ON BOARD DIAGNOSIS LOGIC

NEAT0217S02

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



SAT261H



SAT807H

### SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE

NEAT0217S04

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

#### WITH CONSULT

NEAT0217S05

1) Start engine.
2) Select “SELF-DIAG RESULTS” mode with CONSULT.
3) Drive vehicle under the following conditions:
   Selector lever in “D” position and vehicle speed higher than 20 km/h (12 MPH).

#### WITHOUT CONSULT

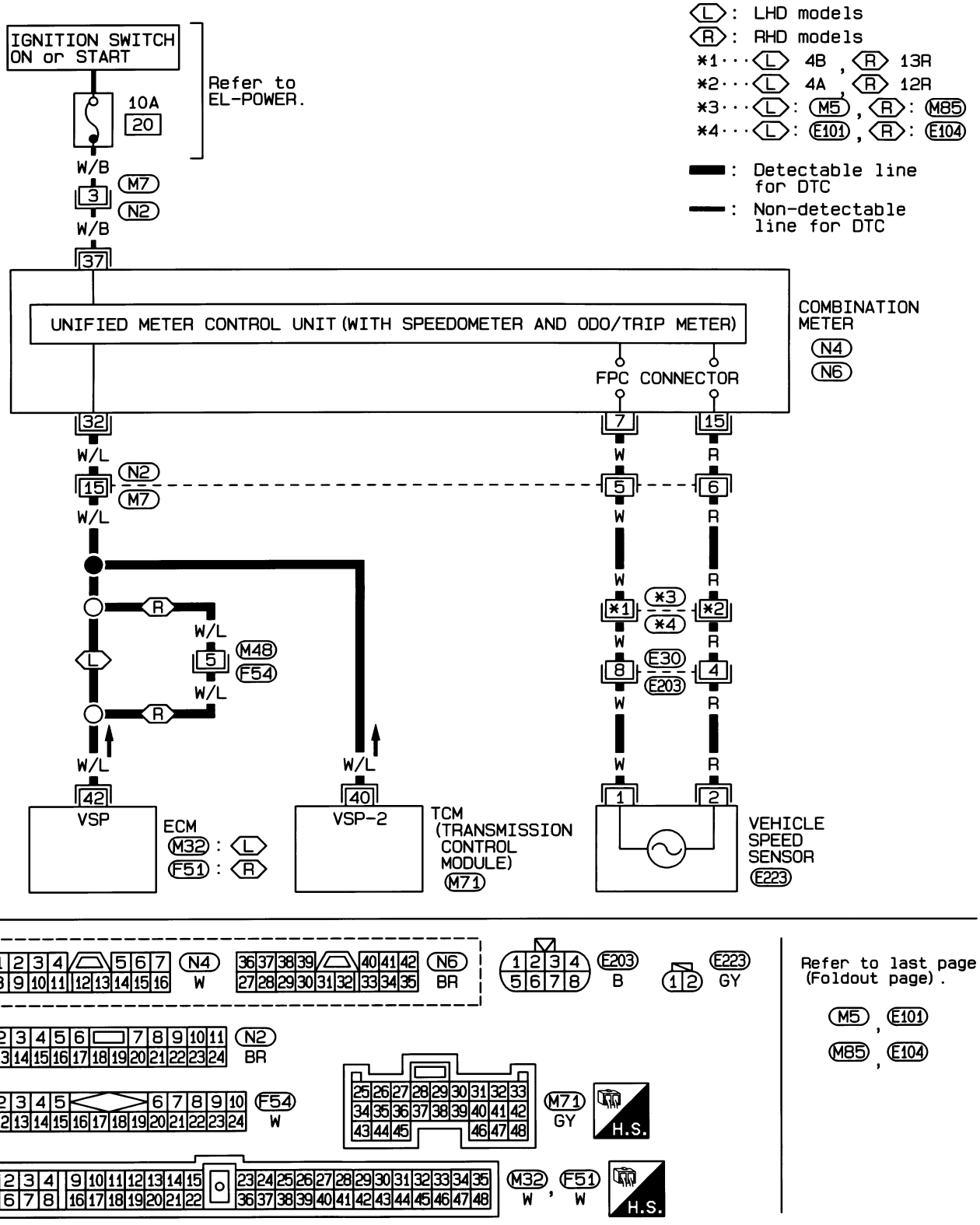
NEAT0217S06

1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in “D” position and vehicle speed higher than 20 km/h (12 MPH).
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT), AT-34.

## Wiring Diagram — AT — VSSMTR

NEAT0218

AT-VSSMTR-01




HAT056

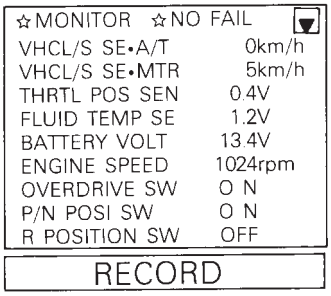
## Diagnostic Procedure

NEAT0219

| 1 | CHECK INPUT SIGNAL. |
|---|---|

**With CONSULT**

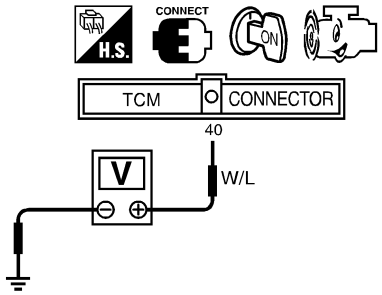
1. Start engine.
2. Select “ECU INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT.
3. Read out the value of “VHCL/S SE·MTR” while driving.
   Check the value changes according to driving speed.




SAT076H

**Without CONSULT**

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




SAT528J

**Does battery voltage vary between less than 1V and more than 4.5V?**

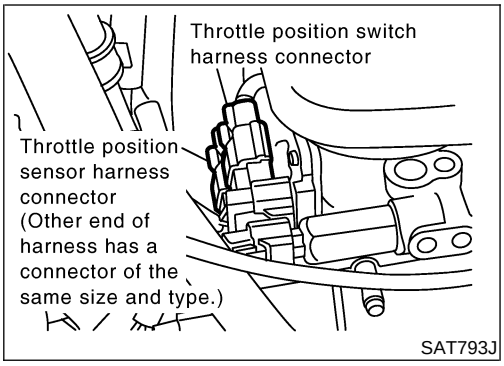
| | | |
|---|---|---|
| Yes | ▶ | GO TO 2. |
| No | ▶ | **Check the following items:**<br>● Vehicle speed sensor and ground circuit for vehicle speed sensor Refer to EL section (“METERS AND GAUGES”).<br>● Harness for short or open between TCM and vehicle speed sensor (Main harness) |

| 2 | CHECK DTC |
|---|---|

Perform Self-diagnosis Code confirmation procedure, AT-92.

**OK or NG**

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




## Description

NEAT0220

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

### CONSULT REFERENCE VALUE IN DATA MONITOR MODE

NEAT0220S01

Remarks: Specification data are reference values.

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

### TCM TERMINALS AND REFERENCE VALUE

NEAT0220S02

Remarks: Specification data are reference values.

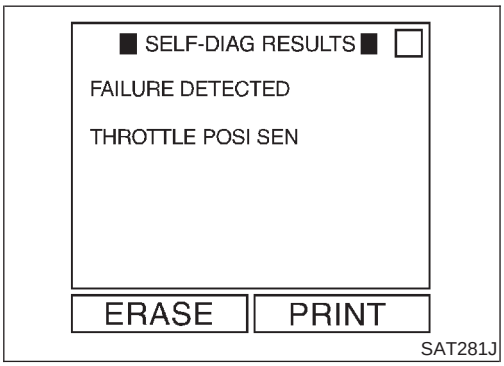
| Terminal No. | Wire color | Item | Condition | | Judgement standard |
|---|---|---|---|---|---|
| 16 | OR | Closed throttle position switch (in throttle position switch) | | When releasing accelerator pedal after warming up engine. | Battery voltage |
| | | | | When depressing accelerator pedal after warming up engine. | 1V or less |
| 17 | L/Y | Wide open throttle position switch (in throttle position switch) | | When depressing accelerator pedal more than half-way after warming up engine. | Battery voltage |
| | | | | When releasing accelerator pedal after warming up engine. | 1V or less |
| 32 | G/B | Throttle position sensor (Power source) | | — | 4.5 - 5.5V |
| 41 | W | Throttle position sensor | | When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.) | Fully-closed throttle: Approximately 0.5V Fully-open throttle: Approximately 4V |
| 42 | B | Throttle position sensor (Ground) | | — | — |

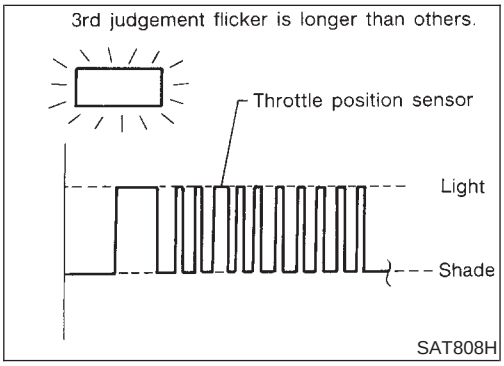
*Description (Cont'd)*

## ON BOARD DIAGNOSIS LOGIC

=NEAT0220S03

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : THROTTLE POSI SEN | TCM receives an excessively low or high voltage from the sensor. | • Harness or connectors (The solenoid circuit is open or shorted.)<br>• Throttle position sensor<br>• Throttle position switch |
| : 3rd judgement flicker | | |




## SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE

NEAT0220S05

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

### WITH CONSULT

NEAT0220S06

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

### WITHOUT CONSULT

NEAT0220S07

1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D" position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 3 seconds.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT), AT-34.

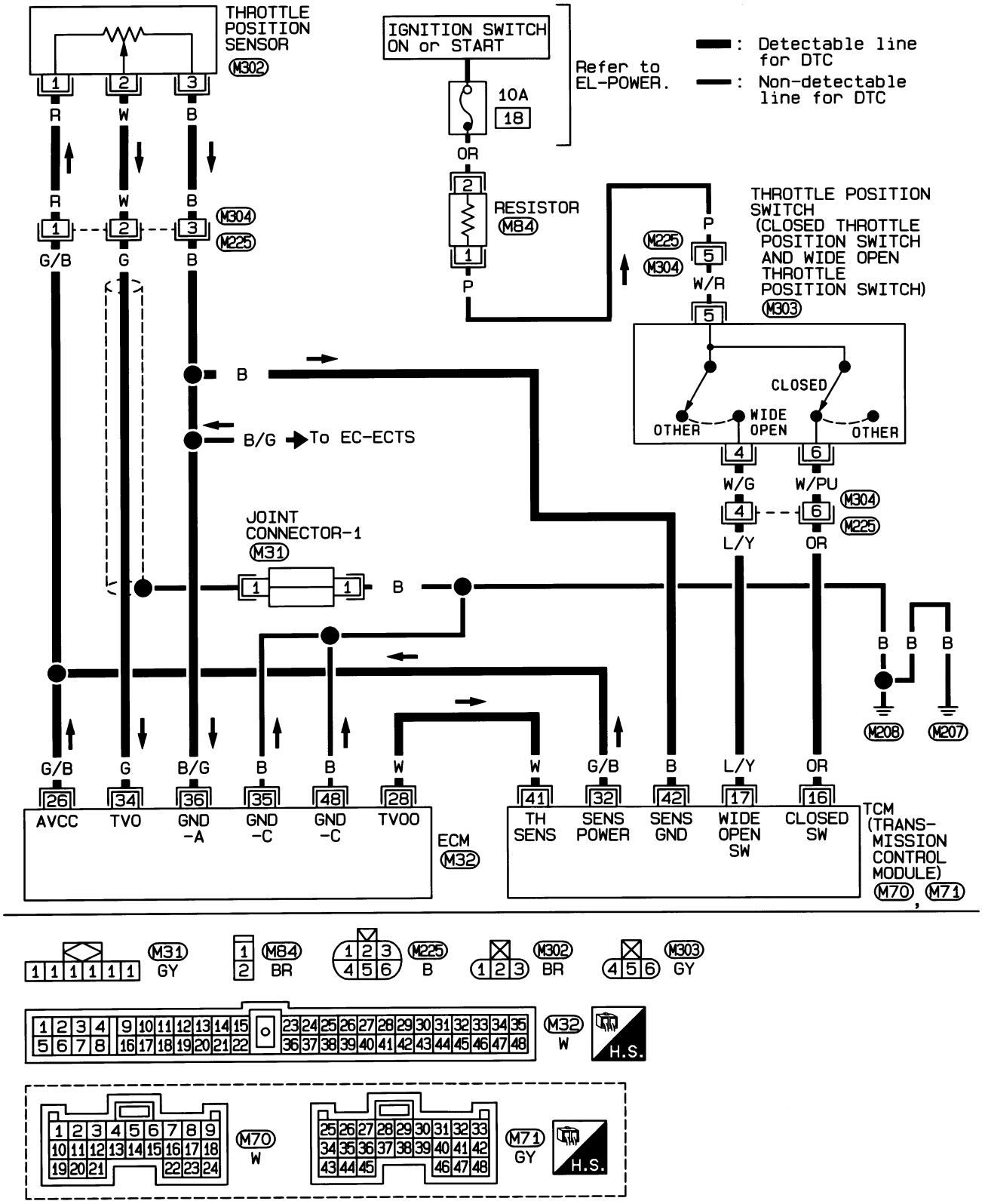
## Wiring Diagram — AT — TPS

NEAT0221

**— LHD MODEL —**

NEAT0221S01

AT-TPS-01

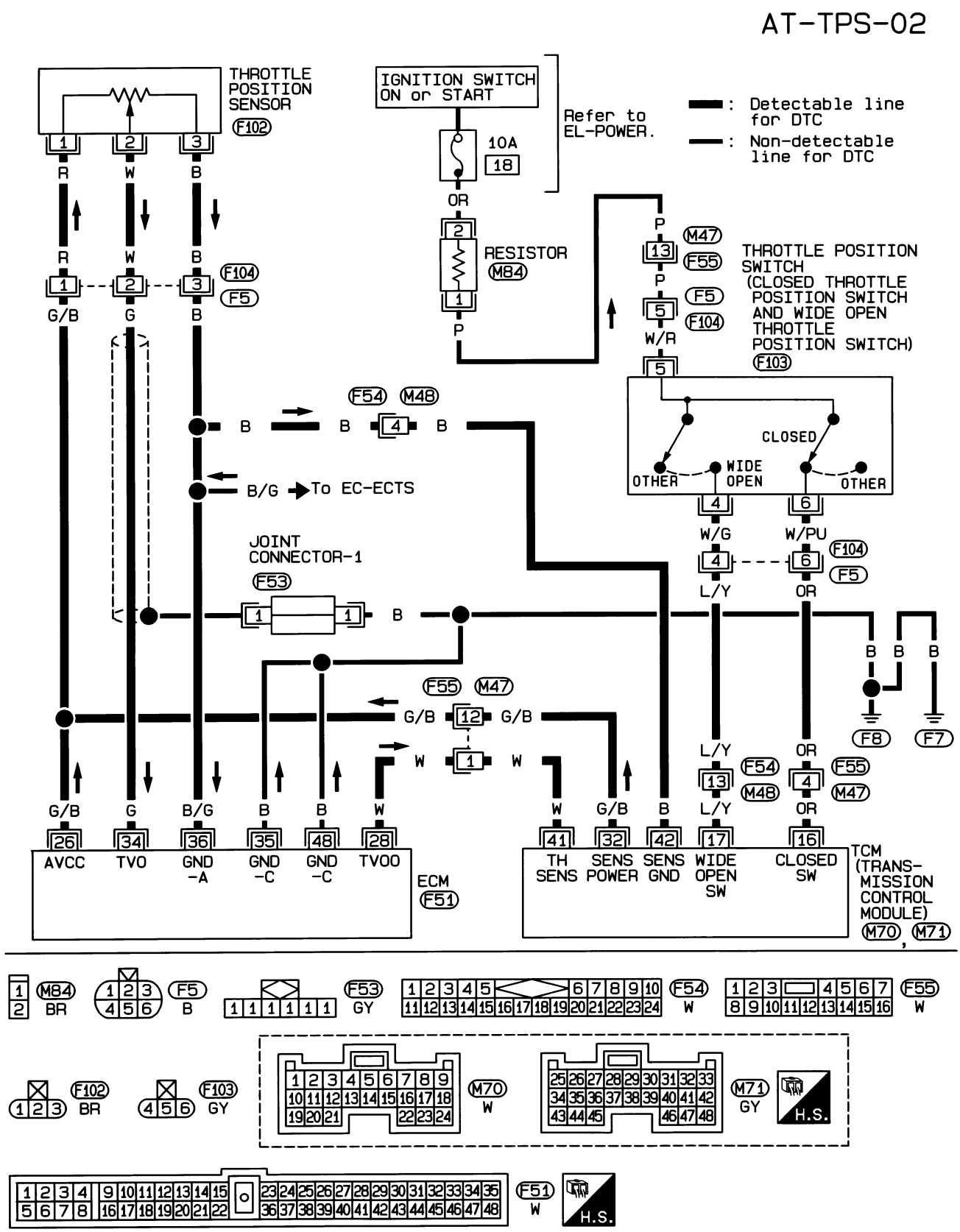



HAT057

*Wiring Diagram — AT — TPS (Cont'd)*

**— RHD MODEL —**

NEAT0221S02




HAT069

## Diagnostic Procedure

NEAT0222

| 1 | CHECK DTC WITH ECM | |
|---|---|---|
| Perform diagnostic test mode II (self-diagnostic results) for engine control. Refer to EC section [“Malfunction Indicator Lamp (MIL)”, “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION”]. | | |
| **OK or NG** | | |
| OK | ▶ | GO TO 2. |
| NG | ▶ | Check throttle position sensor circuit for engine control. Refer to EC section (“DTC P0120 THROTTLE POSITION SENSOR”). |

*Diagnostic Procedure (Cont'd)*

| 2 | CHECK INPUT SIGNAL |
|---|---|

**With CONSULT**

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT.
3. Read out the value of "THRTL POS SEN".

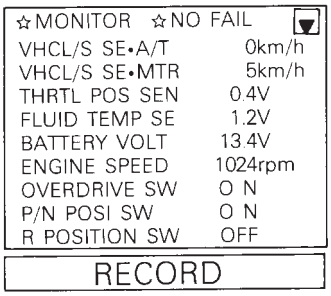
**Voltage:**

**Fully-closed throttle:**

**Approximately 0.5V**

**Fully-open throttle:**

**Approximately 4V**




SAT076H

**Without CONSULT**

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

**Voltage:**

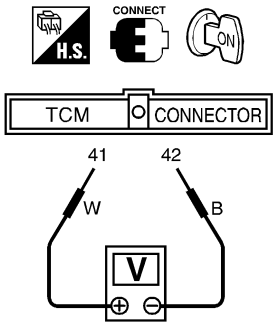
**Fully-closed throttle valve:**

**Approximately 0.5V**

**Fully-open throttle valve:**

**Approximately 4V**

**(Voltage rises gradually in response to throttle position.)**




SAT513JA

**OK or NG**

| | | |
|---|---|---|
| OK (With CONSULT) | ▶ | GO TO 3. |
| OK (Without CONSULT) | ▶ | GO TO 4. |
| NG | ▶ | Check harness for short or open between ECM and TCM regarding throttle position sensor circuit. (Main harness) |

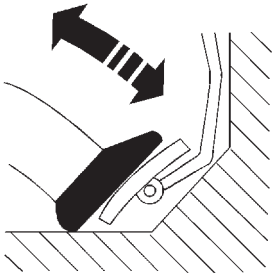
| 3 | CHECK THROTTLE POSITION SWITCH CIRCUIT (With CONSULT) |
|---|---|

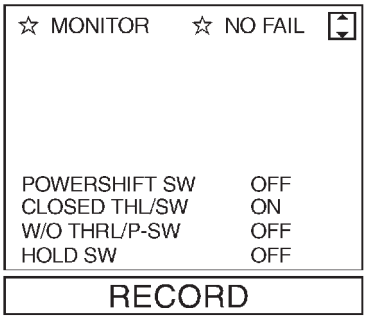
**With CONSULT**

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

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

MTBL0011






SAT052I

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 5. |
| NG | ▶ | **Check the following items:**<br>● Throttle position switch<br>Refer to "Component Inspection", AT-103.<br>● Harness for short or open between ignition switch and throttle position switch (Main harness)<br>● Harness for short or open between throttle position switch and TCM (Main harness) |

*Diagnostic Procedure (Cont'd)*

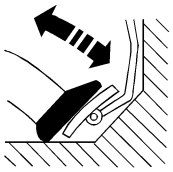
| 4 | CHECK THROTTLE POSITION SWITCH CIRCUIT (Without CONSULT) |
|---|---|

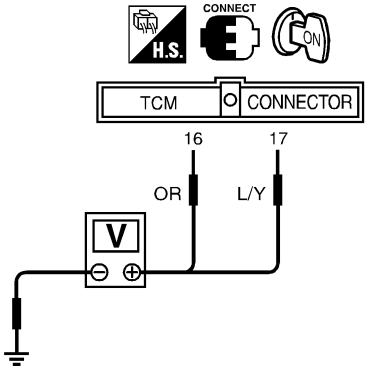
**Without CONSULT**

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

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

MTBL0206






SAT526JA

**OK or NG**

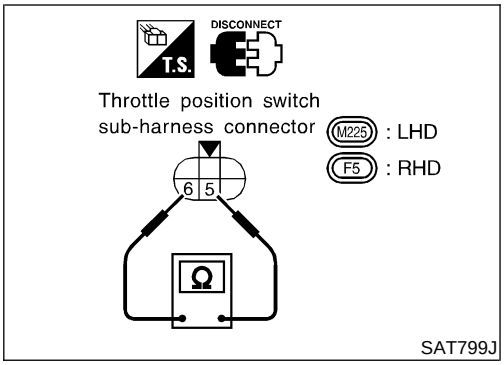
| | | |
|---|---|---|
| OK | ▶ | GO TO 5. |
| NG | ▶ | **Check the following items:**<br>● Throttle position switch<br>Refer to "Component Inspection", AT-103.<br>● Harness for short or open between ignition switch and throttle position switch (Main harness)<br>● Harness for short or open between throttle position switch and TCM (Main harness) |

| 5 | CHECK DTC |
|---|---|

Perform Self-diagnosis Code confirmation procedure, AT-96.

**OK or NG**

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




# Component Inspection

NEAT0223

## THROTTLE POSITION SWITCH

NEAT0223S01

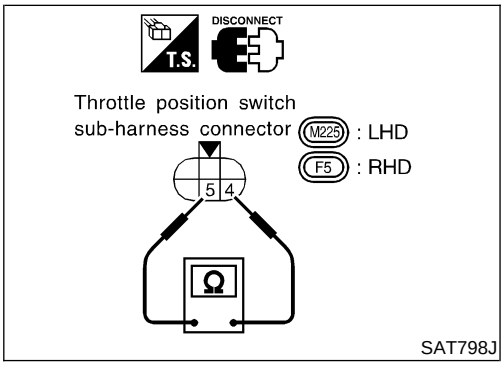
### Closed Throttle Position Switch (Idle position)

NEAT0223S0101

- Check continuity between terminals 5 and 6.

| Accelerator pedal condition | Continuity |
|---|---|
| Released | Yes |
| Depressed | No |

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

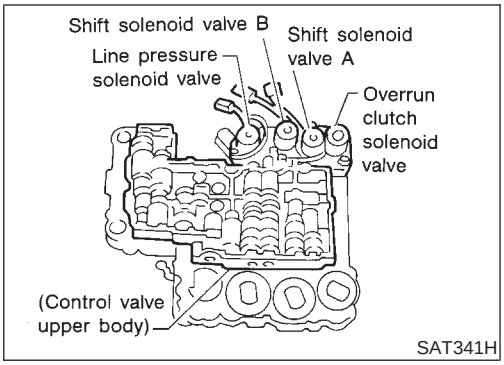



### Wide Open Throttle Position Switch

NEAT0223S0102

- Check continuity between terminals 4 and 5.

| Accelerator pedal condition | Continuity |
|---|---|
| Released | No |
| Depressed | Yes |




## Description

NEAT0224

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

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

## TCM TERMINALS AND REFERENCE VALUE

NEAT0224S01

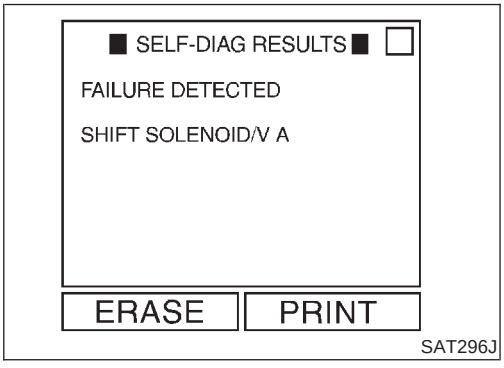
Remarks: Specification data are reference values.

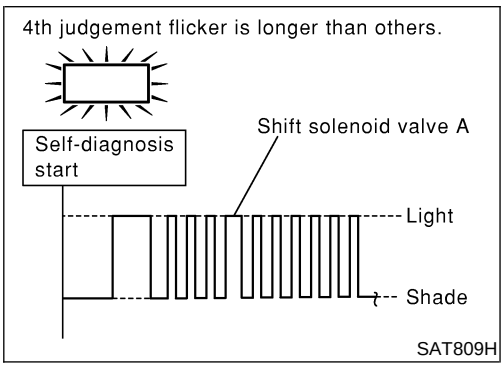
| Terminal No. | Wire color | Item | Condition | | Judgement standard |
|---|---|---|---|---|---|
| 11 | L/W | Shift solenoid valve A | | When shift solenoid valve A operates. (When driving in “$D_1$” or “$D_4$”.) | Battery voltage |
| | | | | When shift solenoid valve A does not operate. (When driving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

## ON BOARD DIAGNOSIS LOGIC

NEAT0224S02

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : SHIFT SOLENOID/V A | TCM detects an improper voltage drop when it tires to operate the solenoid valve. | • Harness or connectors (The solenoid circuit is open or shorted.)<br>• Shift solenoid valve A |
| : 4th judgement flicker | | |




## SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE

NEAT0224S04

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

### WITH CONSULT

NEAT0224S05

1) Start engine.
2) Select “SELF-DIAG RESULTS” mode with CONSULT.
3) Drive vehicle in $D_1 \rightarrow D_2$ position.

### WITHOUT CONSULT

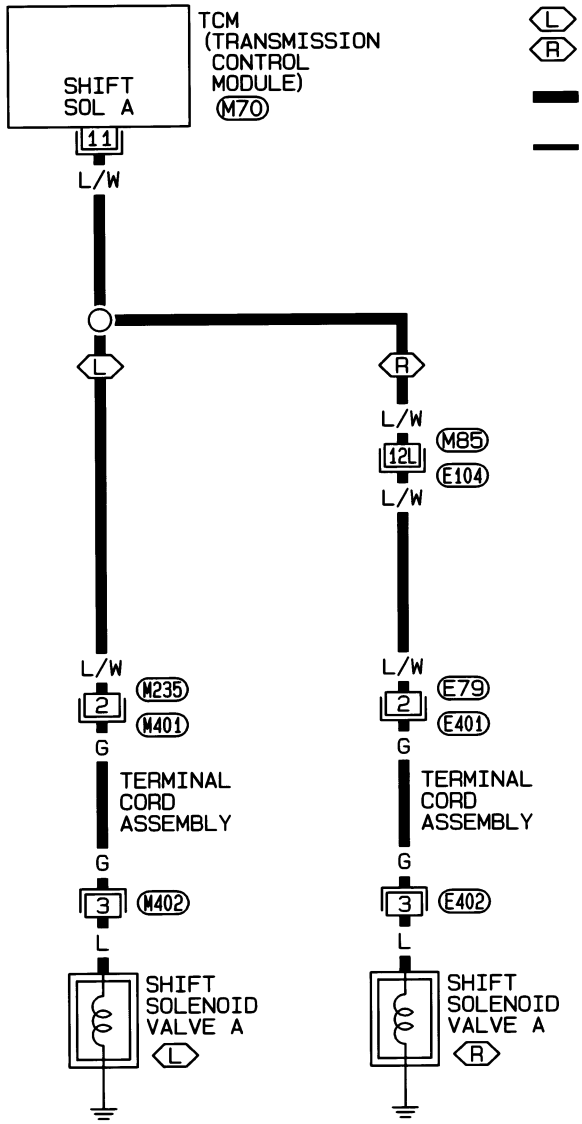
NEAT0224S06

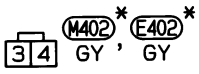
1) Start engine.
2) Drive vehicle in $D_1 \rightarrow D_2$ position.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT), AT-34.

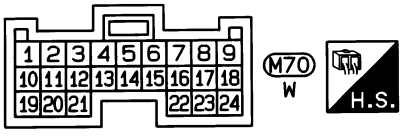
## Wiring Diagram — AT — SSV/A

NEAT0225

AT-SSV/A-01






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

Refer to last page (Foldout page).

M85, E104

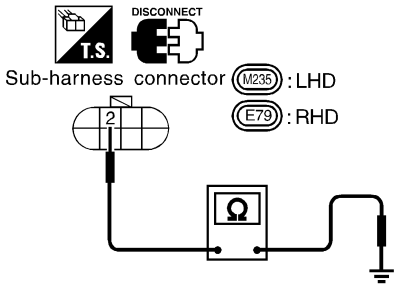
HAT058

## Diagnostic Procedure

NEAT0226

| 1 | CHECK GROUND CIRCUIT |
|---|---|

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal 2 and ground.



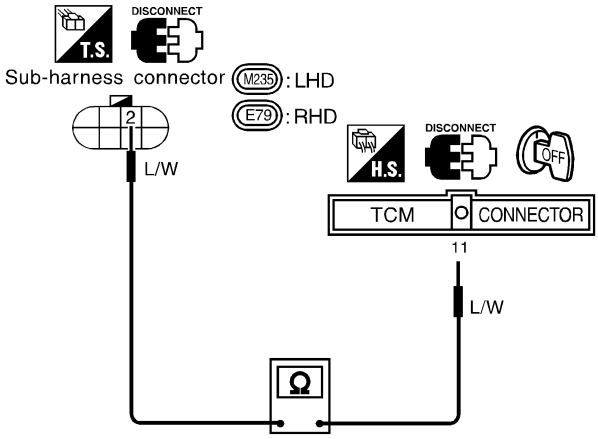

SAT800J

**Is resistance approx. 20 - 40Ω?**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 2. |
| No | ▶ | 1. Remove control valve assembly.<br>Refer to AT-200.<br>2. Check the following items:<br>● Shift solenoid valve A<br>Refer to “Component Inspection”, AT-107.<br>● Harness of terminal cord assembly for short or open |

| 2 | CHECK POWER SOURCE CIRCUIT |
|---|---|

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 2 and TCM harness connector terminal 11.



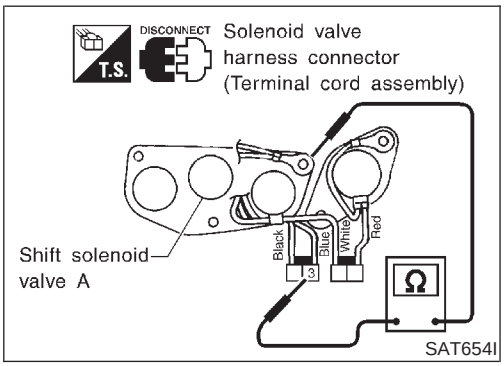

SAT801J

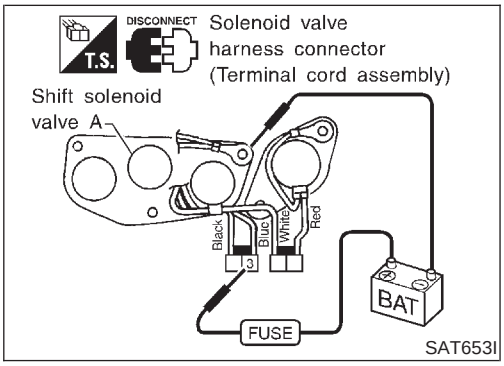
If OK, check harness for short to ground and short to power.

**Is resistance approx. 0Ω?**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 3. |
| No | ▶ | Repair open circuit or short to ground or short to power in harness or connectors. |

| 3 | CHECK DTC | |
|---|---|---|
| Perform Self-diagnosis Code confirmation procedure, AT-104. | | |
| **OK or NG** | | |
| OK | ▶ | **INSPECTION END** |
| NG | ▶ | 1. Perform TCM input/output signal inspection.<br>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. |




# Component Inspection

## SHIFT SOLENOID VALVE A

NEAT0227

NEAT0227S01

- For removal, refer to AT-200.

### Resistance Check

NEAT0227S0101

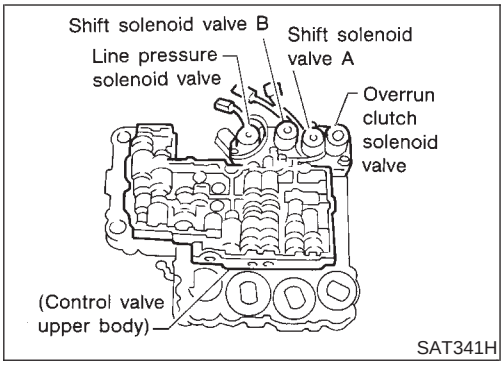
- Check resistance between terminal 3 and ground.

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

### Operation Check

NEAT0227S0102

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




## Description

NEAT0228

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

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

## TCM TERMINALS AND REFERENCE VALUE

NEAT0228S01

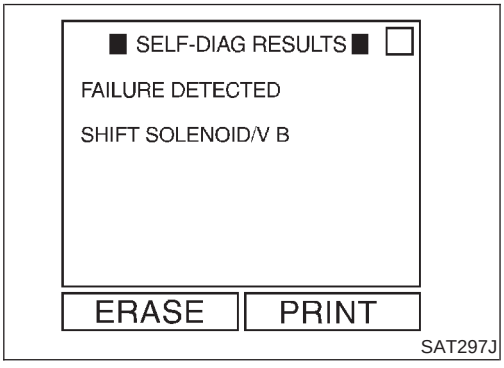
Remarks: Specification data are reference values.

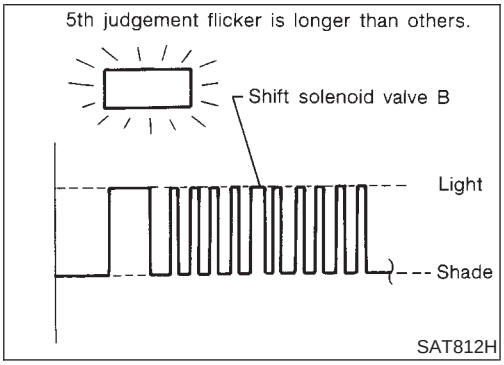
| Terminal No. | Wire color | Item | Condition | | Judgement standard |
|---|---|---|---|---|---|
| 12 | L/R | Shift solenoid valve B | | When shift solenoid valve B operates. (When driving in “$D_1$” or “$D_2$”.) | Battery voltage |
| | | | | When shift solenoid valve B does not operate. (When driving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

## ON BOARD DIAGNOSIS LOGIC

NEAT0228S02

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| (M) : SHIFT SOLENOID/V B | TCM detects an improper voltage drop when it tires to operate the solenoid valve. | • Harness or connectors (The solenoid circuit is open or shorted.)<br>• Shift solenoid valve B |
| (X) : 5th judgement flicker | | |




## SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE

NEAT0228S04

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

### (M) WITH CONSULT

NEAT0228S05

1) Start engine.
2) Select “SELF-DIAG RESULTS” mode with CONSULT.
3) Drive vehicle in $D_1 \rightarrow D_2 \rightarrow D_3$ position.

### (X) WITHOUT CONSULT

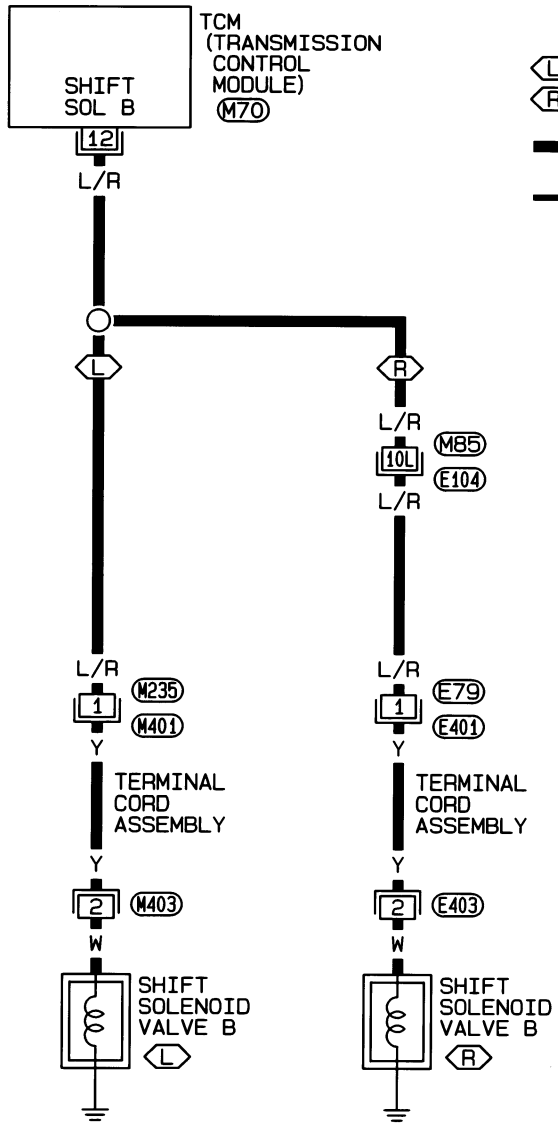
NEAT0228S06

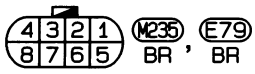
1) Start engine.
2) Drive vehicle in $D_1 \rightarrow D_2 \rightarrow D_3$ position.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT), AT-34.

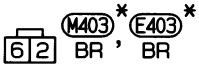
## Wiring Diagram — AT — SSV/B

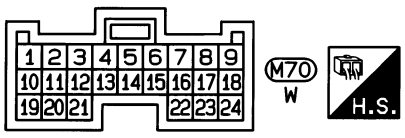
NEAT0229

AT-SSV/B-01




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

Refer to last page (Foldout page).

M85, E104

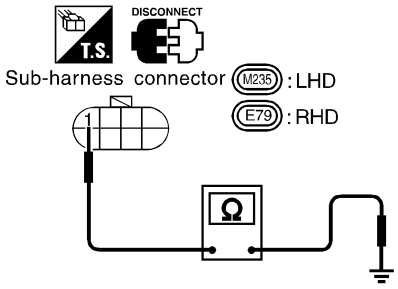
HAT059

## Diagnostic Procedure

NEAT0230

| 1 | CHECK GROUND CIRCUIT |
|---|---|

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal 1 and ground.



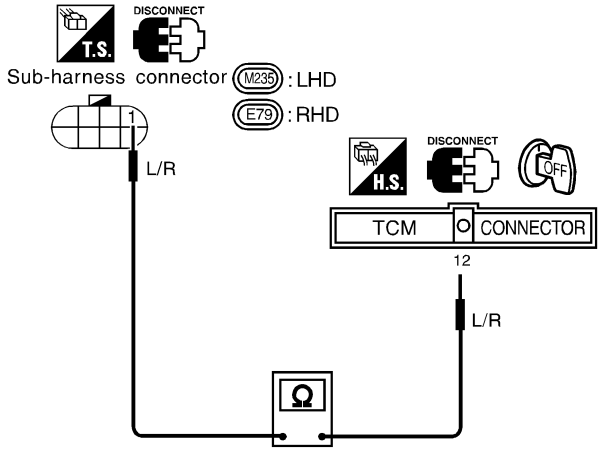

SAT802J

**Is resistance approx. 20 - 40Ω?**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 2. |
| No | ▶ | 1. Remove control valve assembly. Refer to AT-200.<br>2. Check the following items:<br>● Shift solenoid valve B Refer to “Component Inspection”, AT-111.<br>● Harness of terminal cord assembly for short or open |

| 2 | CHECK POWER SOURCE CIRCUIT |
|---|---|

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 1 and TCM harness connector terminal 12.



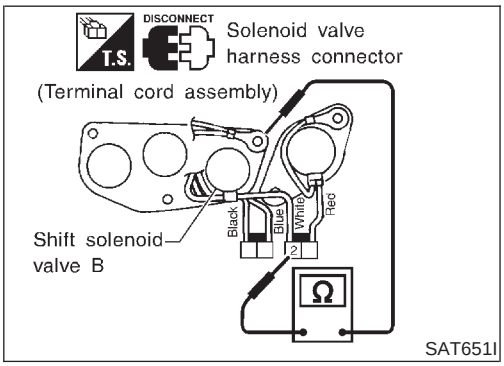

SAT803J

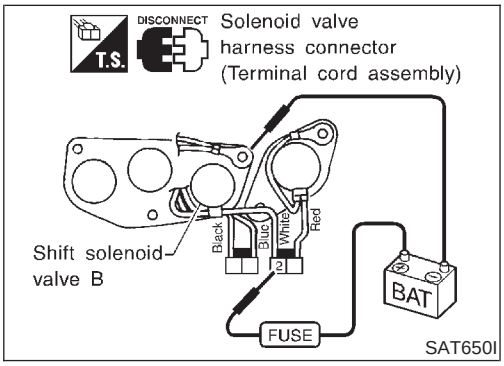
If OK, check harness for short to ground and short to power.

**Is resistance approx. 0Ω?**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 3. |
| No | ▶ | Repair open circuit or short to ground or short to power in harness or connectors. |

| 3 | CHECK DTC | |
|---|---|---|
| Perform Self-diagnosis Code confirmation procedure, AT-108. | | |
| **OK or NG** | | |
| OK | ▶ | **INSPECTION END** |
| NG | ▶ | 1. Perform TCM input/output signal inspection.<br>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. |




# Component Inspection

## SHIFT SOLENOID VALVE B

NEAT0231

NEAT0231S01

- For removal, refer to AT-200.

### Resistance Check

NEAT0231S0101

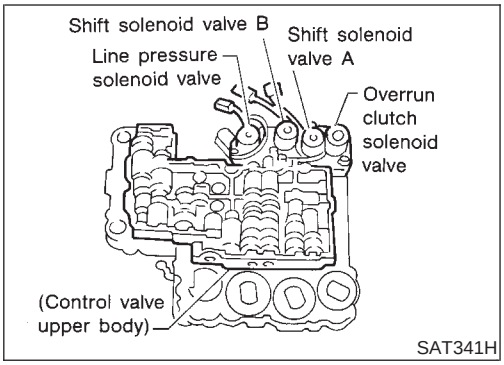
- Check resistance between terminal 2 and ground.

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

### Operation Check

NEAT0231S0102

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




## Description

NEAT0232

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

### TCM TERMINALS AND REFERENCE VALUE

NEAT0232S01

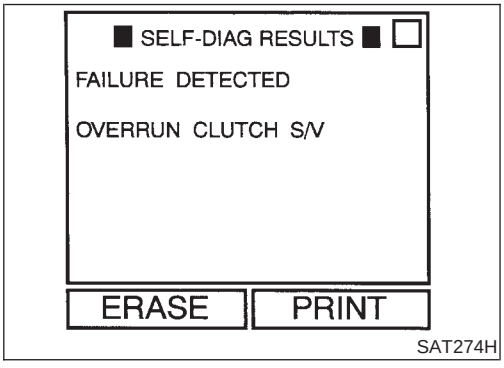
Remarks: Specification data are reference values.

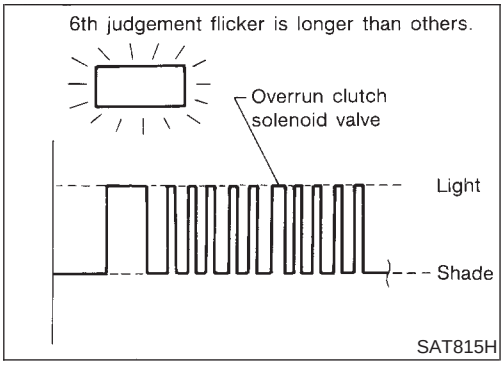
| Terminal No. | Wire color | Item | Condition | | Judgement standard |
|---|---|---|---|---|---|
| 20 | L/B | Overrun clutch solenoid valve | | When overrun clutch solenoid valve operates. | Battery voltage |
| | | | | When overrun clutch solenoid valve does not operate. | 1V or less |

### ON BOARD DIAGNOSIS LOGIC

NEAT0232S02

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : OVERRUN CLUTCH S/V | TCM detects an improper voltage drop when it tries to operate the solenoid valve. | • Harness or connectors (The solenoid circuit is open or shorted.)<br>• Overrun clutch solenoid valve |
| : 6th judgement flicker | | |




### SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE

NEAT0232S04

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

#### WITH CONSULT

NEAT0232S05

1) Start engine.
2) Select “SELF-DIAG RESULTS” mode with CONSULT.
3) Drive vehicle under the following conditions:
   Selector lever in “D” position, overdrive control switch in “OFF” position and vehicle speed higher than 10 km/h (6 MPH).

#### WITHOUT CONSULT

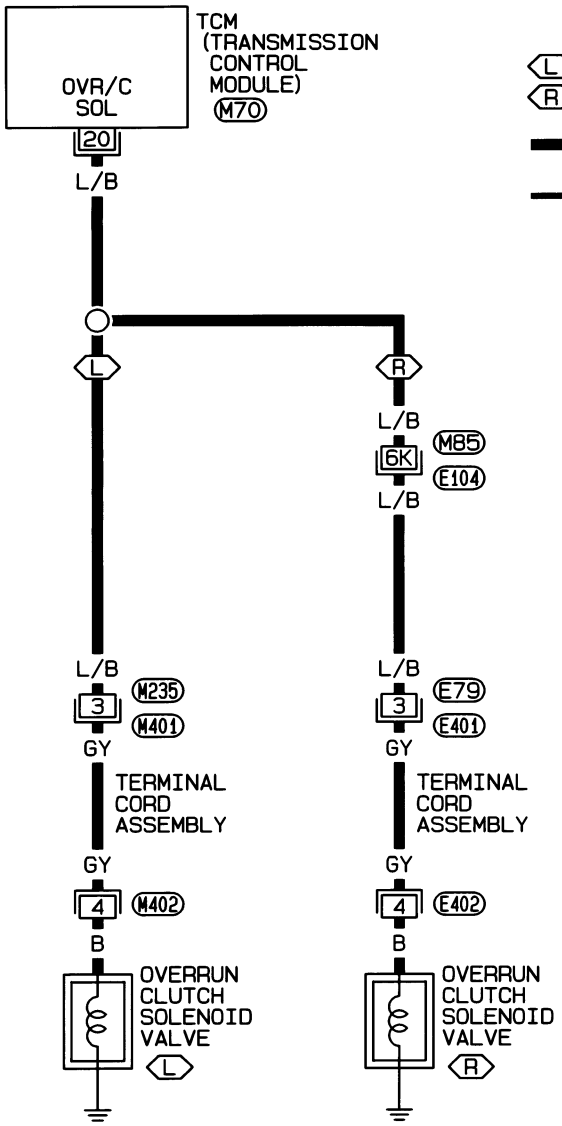
NEAT0232S06

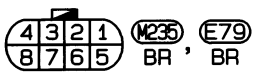
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in “D” position, overdrive control switch in “OFF” position and vehicle speed higher than 10 km/h (6 MPH).
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT), AT-34.

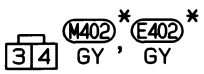
## Wiring Diagram — AT — OVRCSV

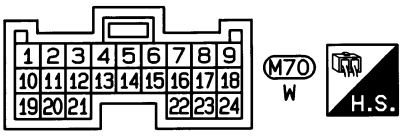
NEAT0233

AT-OVRCSV-01




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

Refer to last page
(Foldout page).

M85, E104

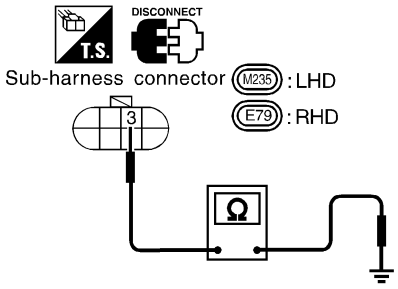
HAT060

## Diagnostic Procedure

NEAT0234

| 1 | CHECK GROUND CIRCUIT |
|---|---|

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal 3 and ground.



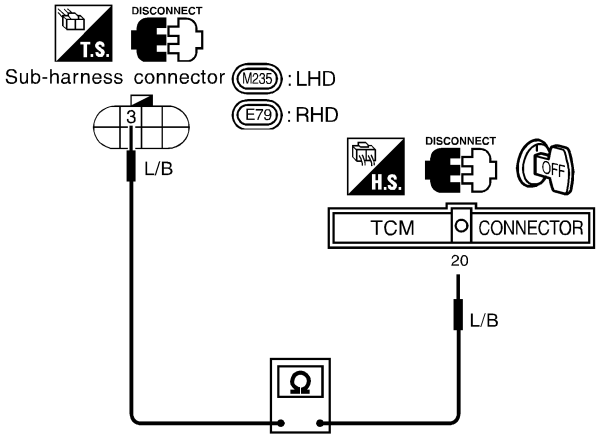

SAT804J

**Is resistance approx. 20 - 40Ω?**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 2. |
| No | ▶ | 1. Remove control valve assembly. Refer to AT-200.<br>2. Check the following items:<br>● Overrun clutch solenoid valve Refer to “Component Inspection”, AT-115.<br>● Harness of terminal cord assembly for short or open |

| 2 | CHECK POWER SOURCE CIRCUIT |
|---|---|

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 3 and TCM harness connector terminal 20.



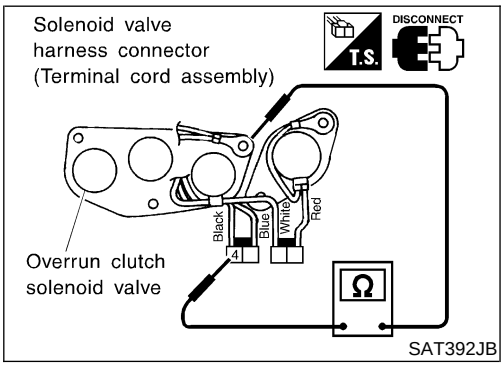

SAT805J

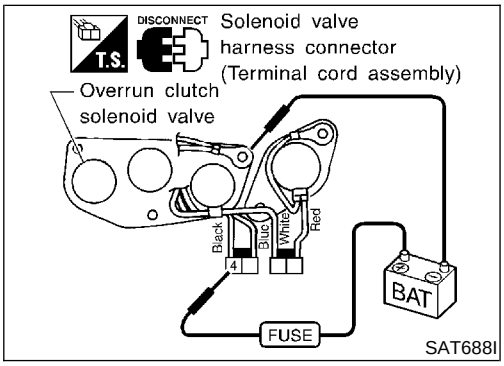
If OK, check harness for short to ground and short to power.

**Is resistance approx 0Ω?**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 3. |
| No | ▶ | Repair open circuit or short to ground or short to power in harness or connectors. |

| 3 | CHECK DTC | |
|---|---|---|
| Perform Self-diagnosis Code confirmation procedure, AT-112. | | |
| **OK or NG** | | |
| OK | ▶ | **INSPECTION END** |
| NG | ▶ | 1. Perform TCM input/output signal inspection.<br>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. |




## Component Inspection

### OVERRUN CLUTCH SOLENOID VALVE

NEAT0235

NEAT0235S01

- For removal, refer to AT-200.

### Resistance Check

NEAT0235S0101

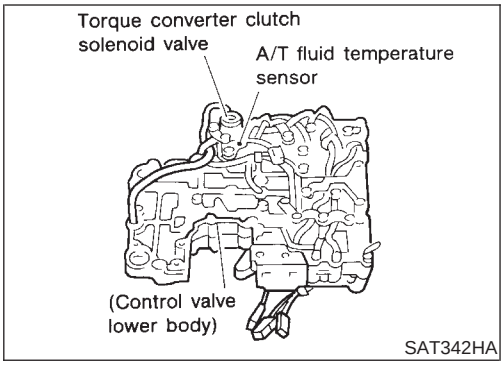
- Check resistance between terminal 4 and ground.

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

### Operation Check

NEAT0235S0102

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




## Description

NEAT0236

The torque converter clutch solenoid valve is activated, with the gear in "$D_4$", by the TCM in response to signals sent from the vehicle speed and throttle position sensors. Lock-up piston operation will then be controlled.
Lock-up operation, however, is prohibited when A/T fluid temperature is too low.
When the accelerator pedal is depressed (less than 2/8) in lock-up condition, the engine speed should not change abruptly. If there is a big jump in engine speed, there is no lock-up.

## CONSULT REFERENCE VALUE IN DATA MONITOR MODE

NEAT0236S01

Remarks: Specification data are reference values.

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

## TCM TERMINALS AND REFERENCE VALUE

NEAT0236S02

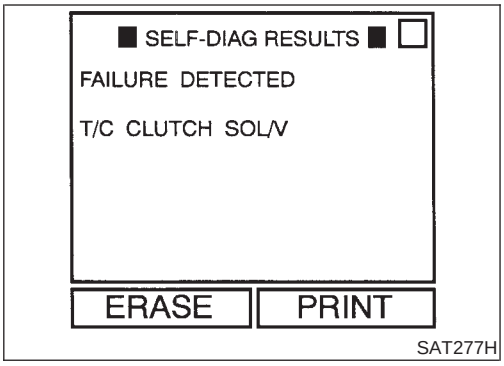
Remarks: Specification data are reference values.

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

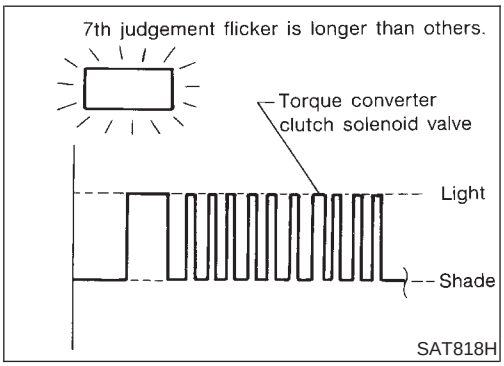
## ON BOARD DIAGNOSIS LOGIC

NEAT0236S03

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : T/C CLUTCH SOL/V | TCM detects an improper voltage drop when it tires to operate the solenoid valve. | • Harness or connectors (The solenoid circuit is open or shorted.)<br>• Torque converter clutch solenoid valve |
| : 7th judgement flicker | | |



SAT277H



SAT818H

## SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE

NEAT0236S05

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

### WITH CONSULT

NEAT0236S06

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle in $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up position.

### WITHOUT CONSULT

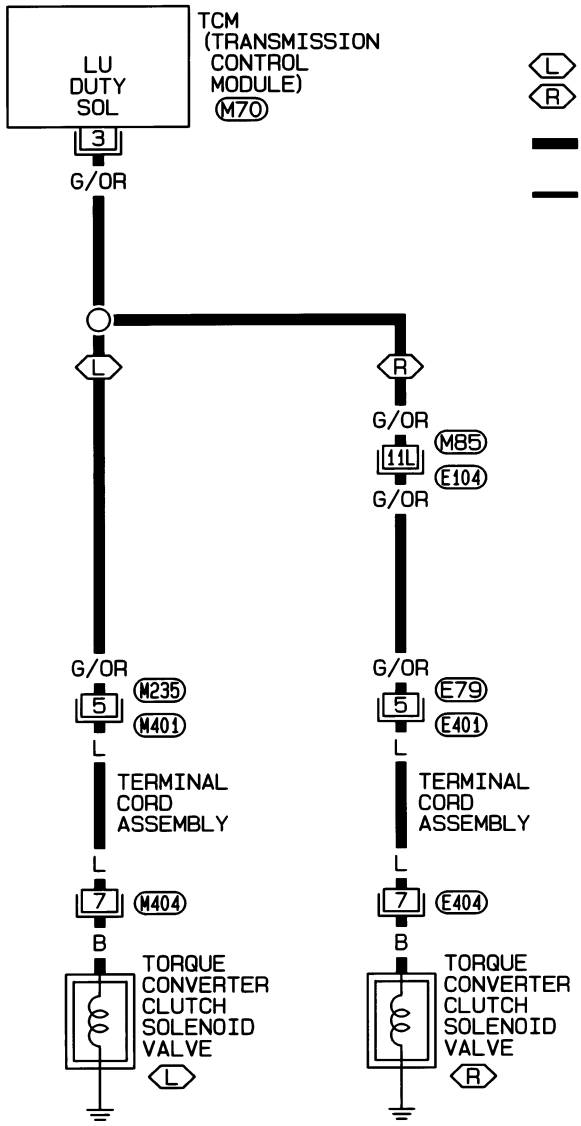
NEAT0236S07

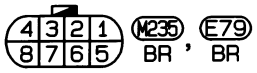
1) Start engine.
2) Drive vehicle in $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up position.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT), AT-34.

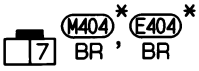
## Wiring Diagram — AT — TCV

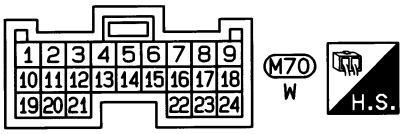
NEAT0237

AT-TCV-01




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

Refer to last page (Foldout page).

M85, E104

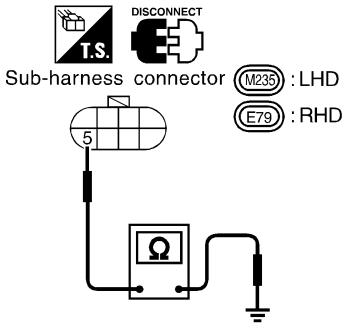
HAT061

## Diagnostic Procedure

NEAT0238

| 1 | CHECK GROUND CIRCUIT |
|---|---|

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal 5 and ground.



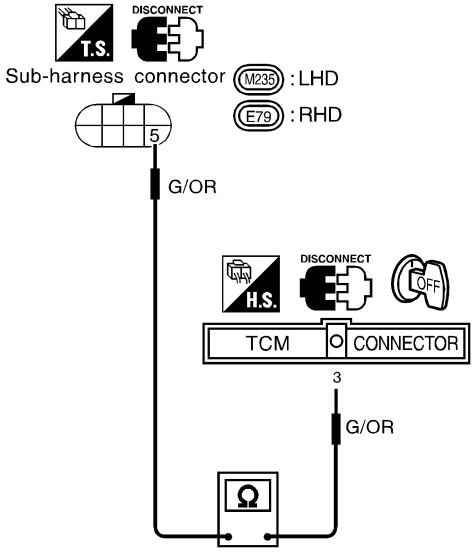

SAT336IA

**Is resistance approx. 10 - 20 Ω?**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 2. |
| No | ▶ | 1. Remove oil pan. Refer to AT-200.<br>2. Check the following items:<br>● Torque converter clutch solenoid valve<br>Refer to “Component Inspection”, AT-120.<br>● Harness of terminal cord assembly for short or open |

| 2 | CHECK RESISTANCE |
|---|---|

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 5 and TCM harness connector terminal 3.




SAT538JA

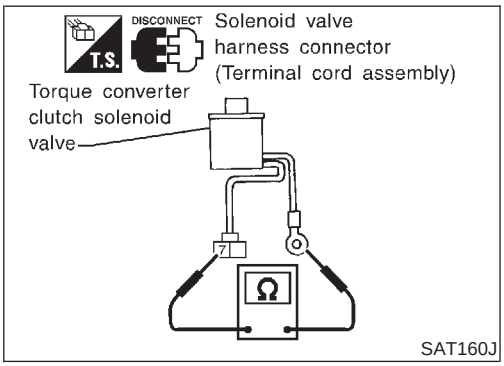
If OK, check harness for short to ground and short to power.

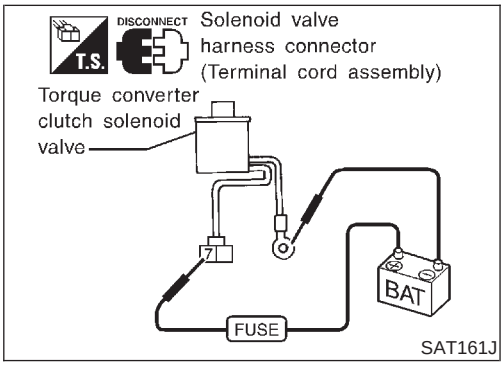
**Is resistance approx. 0Ω?**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 3. |
| No | ▶ | Repair open circuit or short to ground or short to power in harness or connectors. |

*Diagnostic Procedure (Cont'd)*

| 3 | CHECK DTC | |
|---|---|---|
| Perform Self-diagnosis Code confirmation procedure, AT-117. | | |
| **OK or NG** | | |
| OK | ▶ | **INSPECTION END** |
| NG | ▶ | 1. Perform TCM input/output signal inspection.<br>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. |




## Component Inspection

NEAT0239

### TORQUE CONVERTER CLUTCH SOLENOID VALVE

NEAT0239S01

- For removal, refer to AT-200.

### Resistance Check

NEAT0239S0101

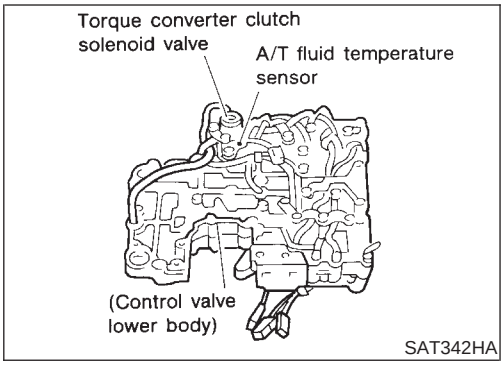
- Check resistance between terminal 7 and ground.

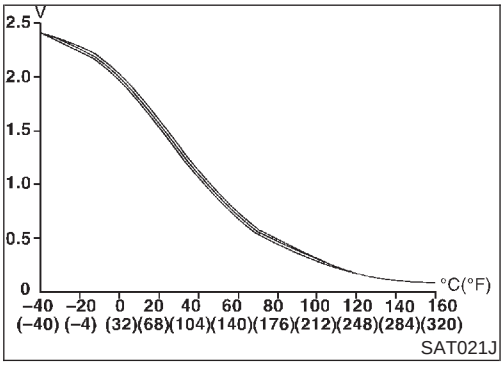
| Solenoid valve | Terminal No. | | Resistance (Approx.) |
|---|---|---|---|
| Torque converter clutch solenoid valve | 7 | Ground | 10 - 20Ω |

### Operation Check

NEAT0239S0102

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




## Description

NEAT0240

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

## CONSULT REFERENCE VALUE IN DATA MONITOR MODE

NEAT0240S01

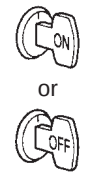
Remarks: Specification data are reference values.

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

## TCM TERMINALS AND REFERENCE VALUE

NEAT0240S02

Remarks: Specification data are reference values.

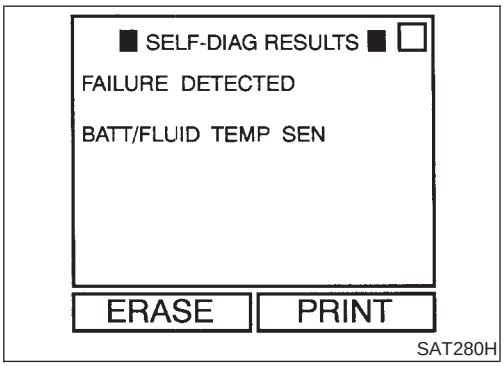
| Terminal No. | Wire color | Item | Condition | | Judgement standard |
|---|---|---|---|---|---|
| 10 | W/B: LHD<br>OR: RHD | Power source | | When turning ignition switch to “ON”. | Battery voltage |
| | | | | When turning ignition switch to “OFF”. | 1V or less |
| 19 | W/B | Power source | | Same as No. 10 | |
| 28 | R/G | 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) | | — | — |
| 47 | R | A/T fluid temperature sensor | | When ATF temperature is 20°C (68°F). | Approximately 1.5V |
| | | | | When ATF temperature is 80°C (176°F). | Approximately 0.5V |

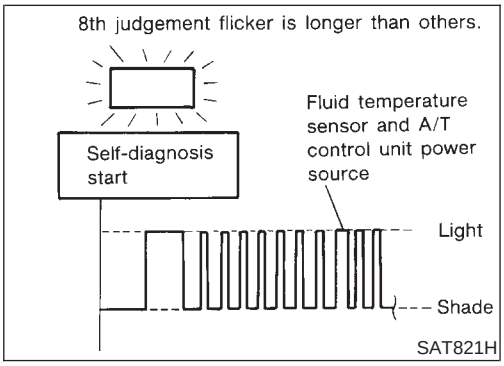
*Description (Cont'd)*

## ON BOARD DIAGNOSIS LOGIC

NEAT0240S03

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




## SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE

NEAT0240S05

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

### WITH CONSULT

NEAT0240S06

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

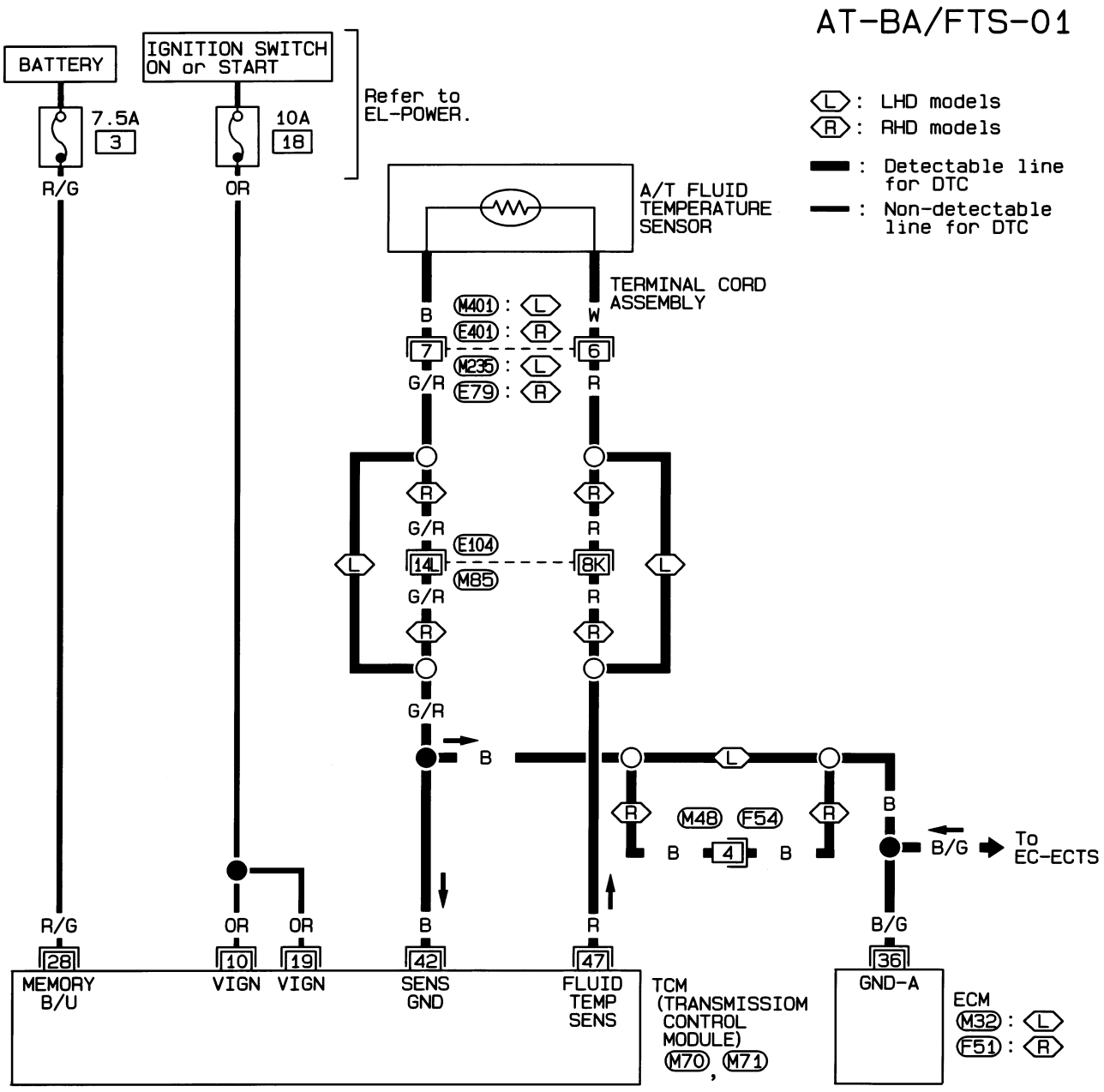
### WITHOUT CONSULT

NEAT0240S07

1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D" position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT), AT-34.

## Wiring Diagram — AT — BA/FTS

NEAT0241



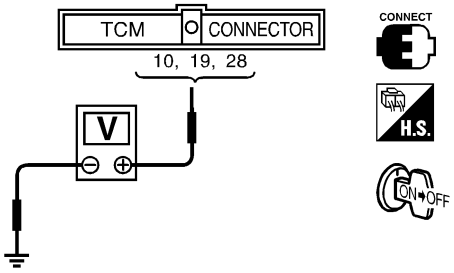

HAT062

## Diagnostic Procedure

NEAT0242

| 1 | CHECK TCM POWER SOURCE |
|---|---|

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




SAT514J

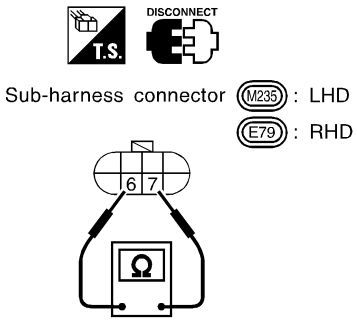
3. Turn ignition switch to “OFF” position.
4. Check voltage between TCM terminal 42 and ground.
   **Voltage: Battery voltage**

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 2. |
| NG | ▶ | **Check the following items:**<br>● Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness)<br>● Ignition switch and fuse<br>Refer to EL section (“POWER SUPPLY ROUTING”). |

| 2 | CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY |
|---|---|

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector on the right side of transfer assembly.
3. Check resistance between terminals 6 and 7 when A/T is cold [20°C (68°F)].




SAT734J

**Is resistance approx. 2.5 kΩ?**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 3. |
| No | ▶ | 1. Remove oil pan.<br>2. Check the following items:<br>● A/T fluid temperature sensor<br>Refer to “Component Inspection”, AT-126.<br>● Harness of terminal cord assembly for short or open |

| 3 | CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR |
|---|---|

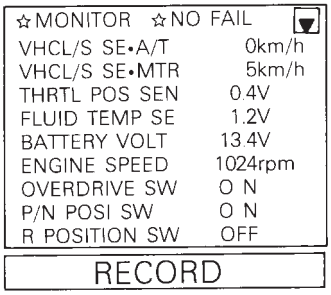
**With CONSULT**

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

**Voltage:**

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

**Approximately 1.5V → 0.5V**




SAT076H

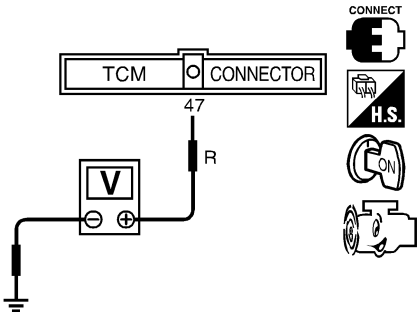
**Without CONSULT**

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

**Voltage:**

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

**Approximately 1.5V → 0.5V**




SAT518J

**OK or NG**

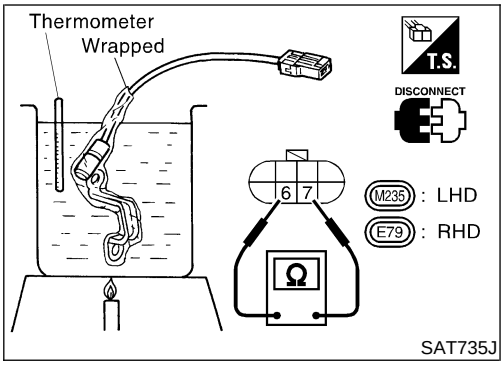
| | | |
|---|---|---|
| OK | ▶ | GO TO 4. |
| NG | ▶ | **Check the following item:**<br>● Harness for short or open between TCM and terminal cord assembly (Main harness) |

| 4 | CHECK DTC |
|---|---|

Perform Diagnostic Trouble Code (DTC) confirmation Procedure, AT-122.

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | **INSPECTION END** |
| NG | ▶ | ● Perform TCM input/output signal inspection.<br>● If NG, recheck TCM pin terminals for damage or loose connection with harness connector. |




## Component Inspection

NEAT0243

### A/T FLUID TEMPERATURE SENSOR

NEAT0243S01

- For removal, refer to AT-200.
- Check resistance between terminals 6 and 7 while changing temperature as shown at left.

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

## Description

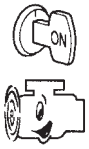
NEAT0244

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

### TCM TERMINALS AND REFERENCE VALUE

NEAT0244S01

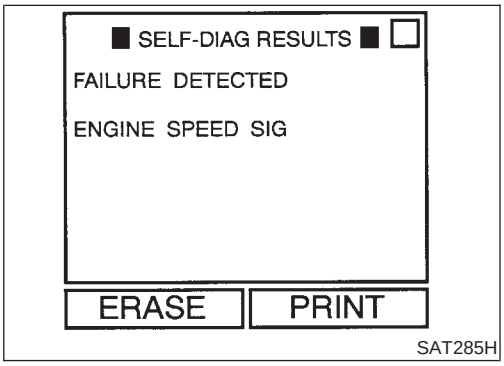
Remarks: Specification data are reference values.

| Terminal No. | Wire color | Item | Condition | | Judgement standard |
|---|---|---|---|---|---|
| 39 | W | Engine speed signal |  | Refer to EC section. | |

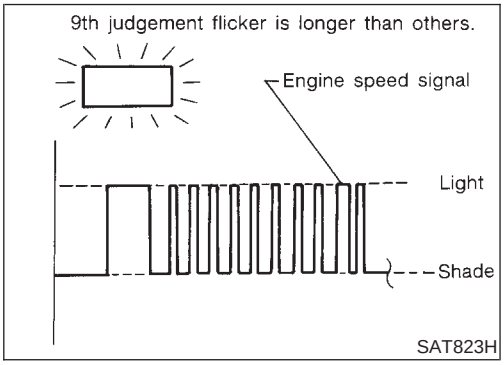
### ON BOARD DIAGNOSIS LOGIC

NEAT0244S02

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : ENGINE SPEED SIG | TCM does not receive the proper voltage signal from ECM. | • Harness or connectors (The sensor circuit is open or shorted.) |
| : 9th judgement flicker | | |



SAT285H



SAT823H

### SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE

NEAT0244S04

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

#### WITH CONSULT

NEAT0244S05

1) Start engine.
2) Select “SELF-DIAG RESULTS” mode with CONSULT.
3) Drive vehicle under the following conditions:
   Selector lever in “D” position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 10 seconds.

#### WITHOUT CONSULT

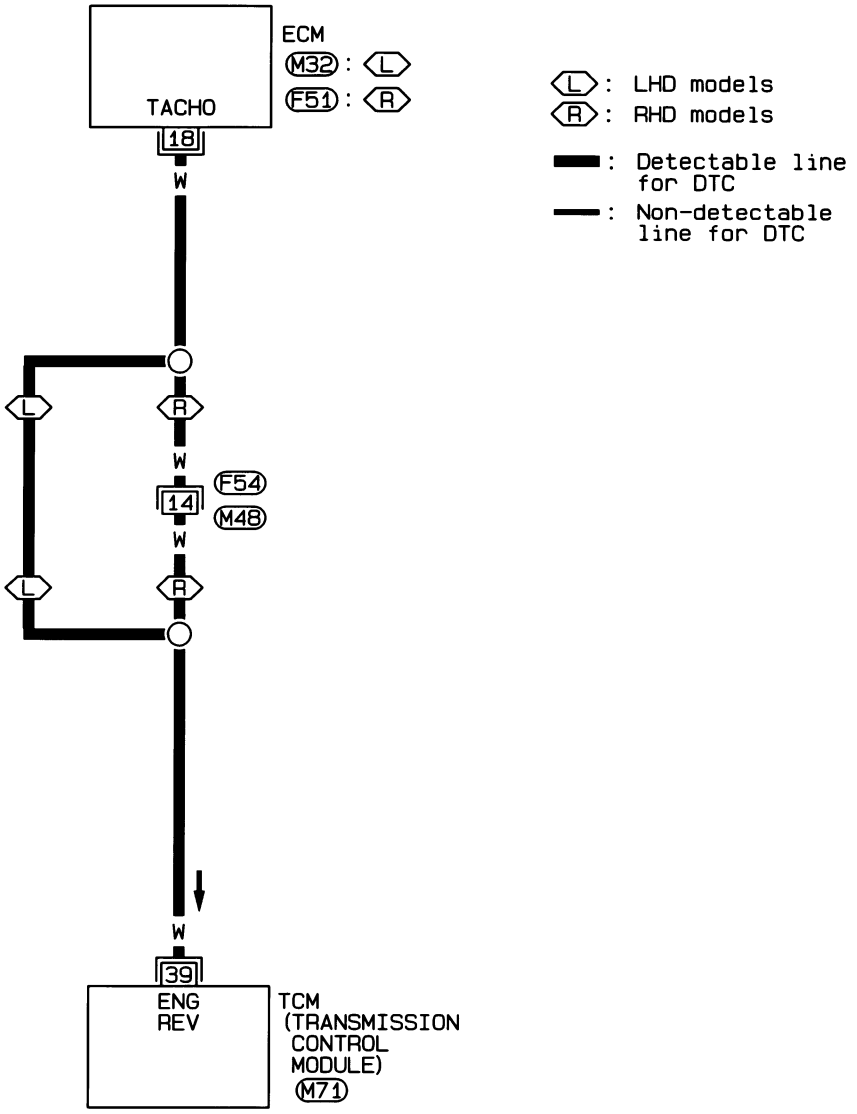
NEAT0244S06

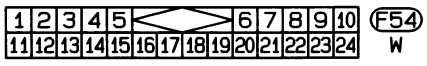
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in “D” position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 10 seconds.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT), AT-34.

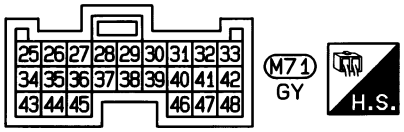
## Wiring Diagram — AT — ENGSS

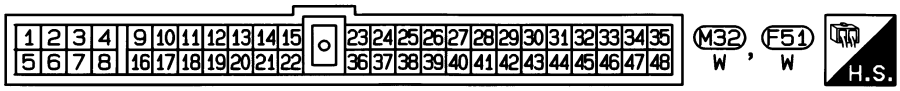
NEAT0245

AT-ENGSS-01



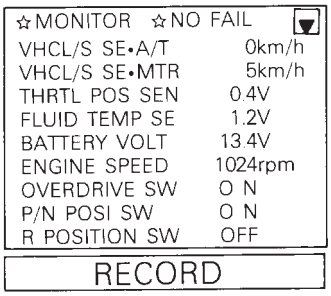

HAT063

## Diagnostic Procedure

NEAT0246

| 1 | CHECK DTC WITH ECM | |
|---|---|---|
| Perform diagnostic test mode II (self-diagnostic results) for engine control. Check ignition signal circuit condition. | | |
| **OK or NG** | | |
| OK (With CONSULT) | ▶ | GO TO 2. |
| OK (Without CONSULT) | ▶ | GO TO 3. |
| NG | ▶ | Check ignition signal circuit for engine control. Refer to EC section (“DTC P1320 IGNITION SIGNAL”). |

| 2 | CHECK INPUT SIGNAL (WITH CONSULT) | |
|---|---|---|
| **With CONSULT**<br>1. Start engine.<br>2. Select “ECU INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT.<br>3. Read out the value of “ENGINE SPEED”.<br>Check engine speed changes according to throttle position. | | |
| **OK or NG** | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | **Check the following items:**<br>● Harness for short or open between TCM and ECM<br>● Resistor<br>● Ignition coil<br>Refer to EC section (“DTC P1320 IGNITION SIGNAL”). |



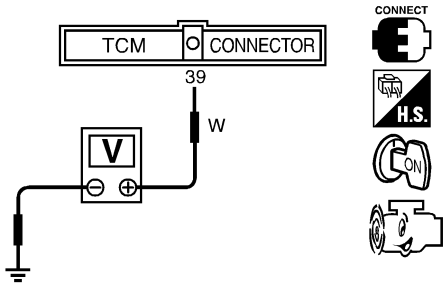

SAT076H

*Diagnostic Procedure (Cont'd)*

| 3 | CHECK INPUT SIGNAL (WITHOUT CONSULT) |
|---|---|

**Without CONSULT**

1. Start engine.
2. Check voltage between TCM terminal 39 and ground.




SAT520JB

**Does battery voltage (idle speed) 0.5 - 2.5V?**

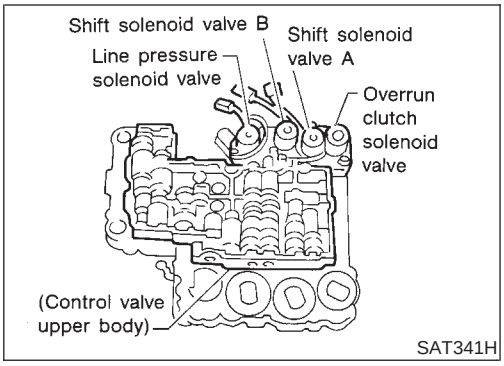
| | | |
|---|---|---|
| Yes | ▶ | GO TO 4. |
| No | ▶ | **Check the following items:**<br>● Harness for short or open between TCM and ECM<br>● Resistor<br>● Ignition coil<br>Refer to EC section ("DTC P1320 IGNITION SIGNAL"). |

| 4 | CHECK DTC |
|---|---|

Perform Self-diagnosis Code confirmation procedure, AT-127.

**OK or NG**

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




## Description

NEAT0247

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

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

## CONSULT REFERENCE VALUE IN DATA MONITOR MODE

NEAT0247S01

Remarks: Specification data are reference values.

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

NEAT0247S02

Remarks: Specification data are reference values.

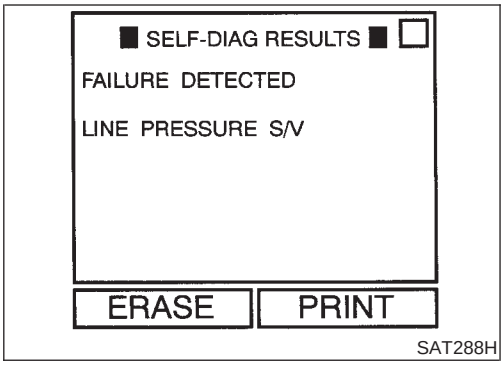
| Terminal No. | Wire color | Item | Condition | | Judgement standard |
|---|---|---|---|---|---|
| 1 | G/Y | Line pressure solenoid valve | | When releasing accelerator pedal after warming up engine. | 1.5 - 2.5V |
| | | | | When depressing accelerator pedal fully after warming up engine. | 0.5V or less |
| 2 | 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. | 0.5V or less |

## ON BOARD DIAGNOSIS LOGIC

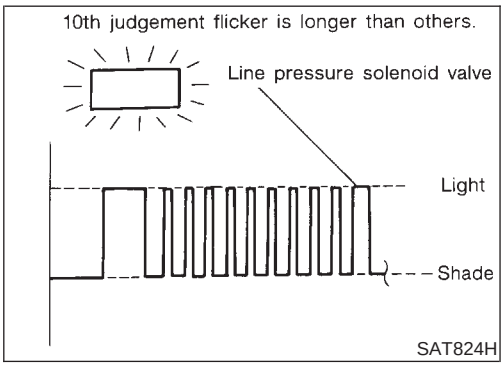
NEAT0247S03

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : LINE PRESSURE S/V<br>: 10th judgement flicker | TCM detects an improper voltage drop when it tries to operate the solenoid valve. | • Harness or connectors (The solenoid circuit is open or shorted.)<br>• Line pressure solenoid valve |

*Description (Cont'd)*



SAT288H



SAT824H

## SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE

NEAT0247S05

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

### WITH CONSULT

NEAT0247S06

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) With brake pedal depressed, shift the lever from "P" → "N" → "D" → "N" → "P" positions.

### WITHOUT CONSULT

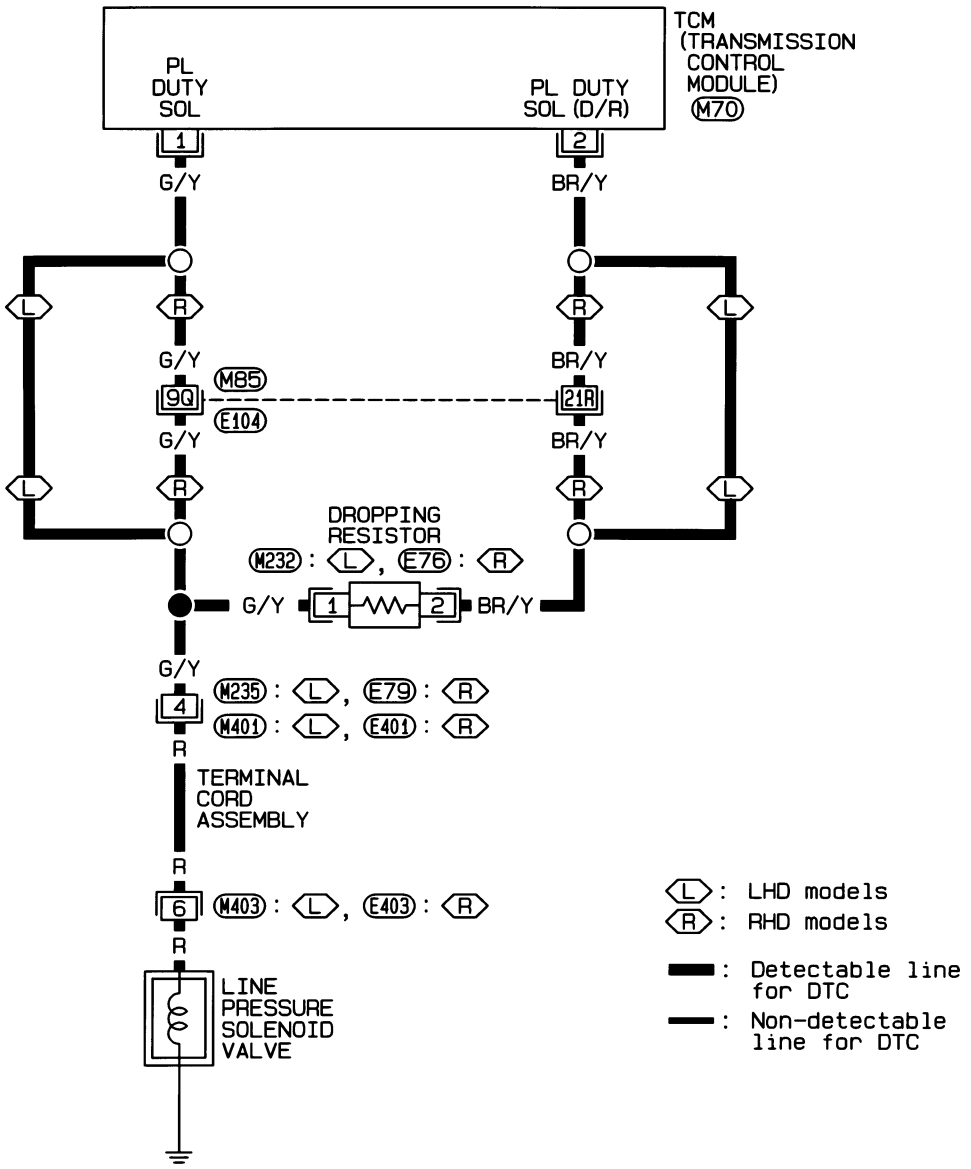
NEAT0247S07

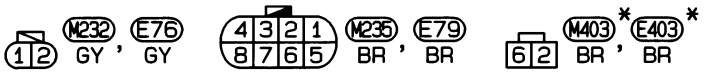
1) Start engine.
2) With brake pedal depressed, shift the lever from "P" → "N" → "D" → "N" → "P" positions.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSTIC PROCEDURE (Without CONSULT), AT-34.

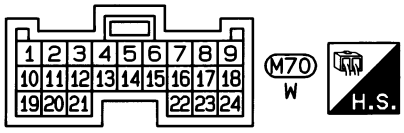
## Wiring Diagram — AT — LPSV

NEAT0248

AT-LPSV-01




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

Refer to last page (Foldout page).

M85, E104

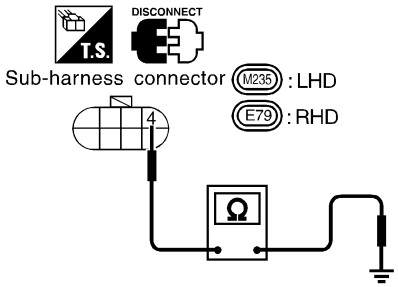
HAT064

## Diagnostic Procedure

NEAT0249

| 1 | CHECK GROUND CIRCUIT |
|---|---|

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal 4 and ground.



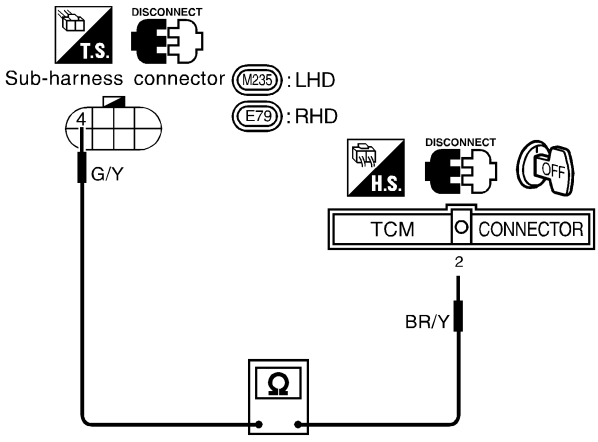

SAT806J

**Is resistance approx. 2.5 - 5Ω?**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 2. |
| No | ▶ | 1. Remove control valve assembly.<br>Refer to AT-200.<br>2. Check the following items:<br>● Line pressure solenoid valve<br>Refer to “Component Inspection”, AT-135.<br>● Harness of terminal cord assembly for short or open |

| 2 | CHECK POWER SOURCE CIRCUIT |
|---|---|

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



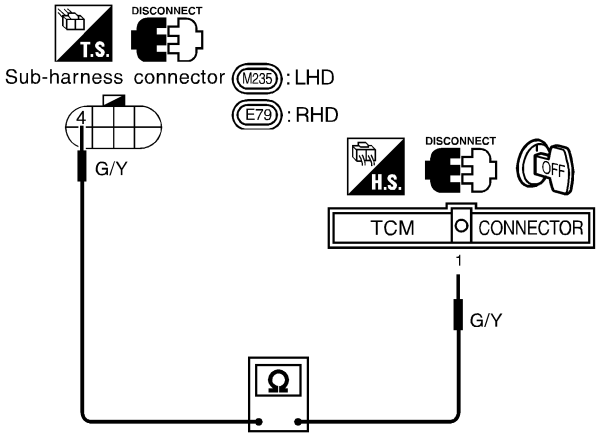

SAT807J

**Is resistance approx. 11.2 - 12.8Ω?**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 3. |
| No | ▶ | **Check the following items:**<br>● Dropping resistor<br>Refer to “Component Inspection”, AT-135.<br>● Harness for short or open between TCM terminal 2 and terminal cord assembly (Main harness) |

| 3 | CHECK POWER SOURCE CIRCUIT |
|---|---|

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




SAT808J

**Is resistance approx. 0Ω?**

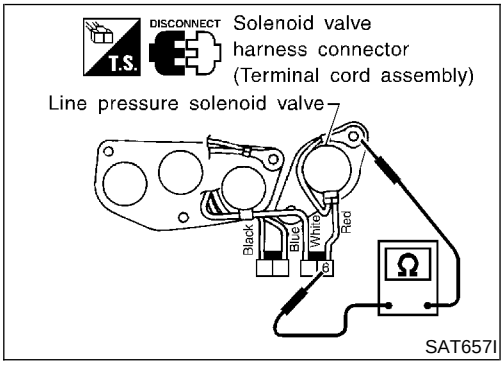
| | | |
|---|---|---|
| Yes | ▶ | GO TO 4. |
| No | ▶ | Repair or replace harness between TCM terminal 1 and terminal cord assembly. |

| 4 | CHECK DTC |
|---|---|

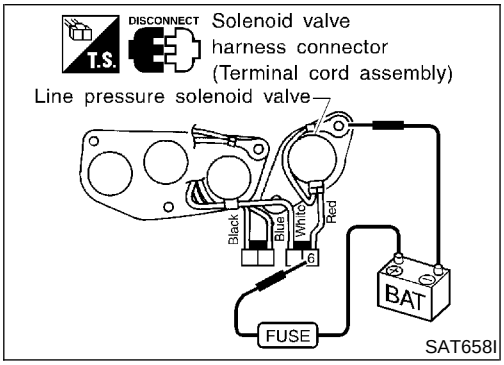
Perform Self-diagnosis Code confirmation procedure, AT-132.

**OK or NG**

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




SAT657I




SAT658I

## Component Inspection

NEAT0250

### LINE PRESSURE SOLENOID VALVE

NEAT0250S01

- For removal, refer to AT-200.

### Resistance Check

NEAT0250S0101

- Check resistance between terminal 6 and ground.

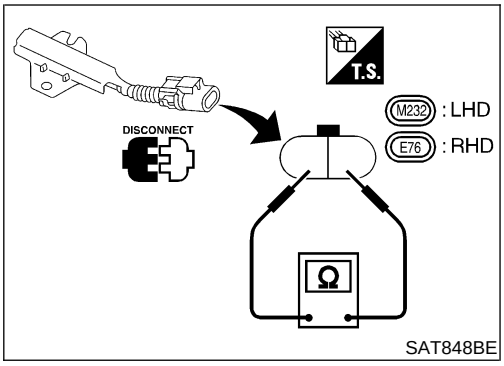
| Solenoid valve | Terminal No. | | Resistance (Approx.) |
|---|---|---|---|
| Line pressure solenoid valve | 6 | Ground | 2.5 - 5Ω |

### Operation Check

NEAT0250S0102

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

*Component Inspection (Cont'd)*

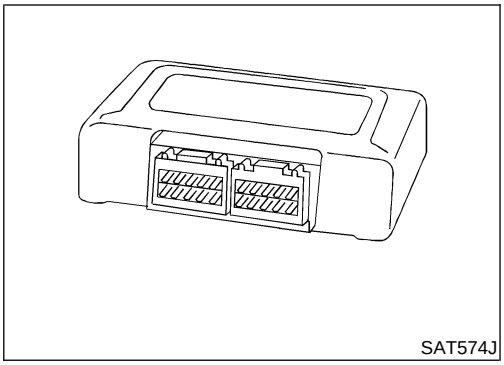



## DROPPING RESISTOR

NEAT0250S02

- Check resistance between two terminals.

  **Resistance: 11.2 - 12.8Ω**


SAT574J

## Description

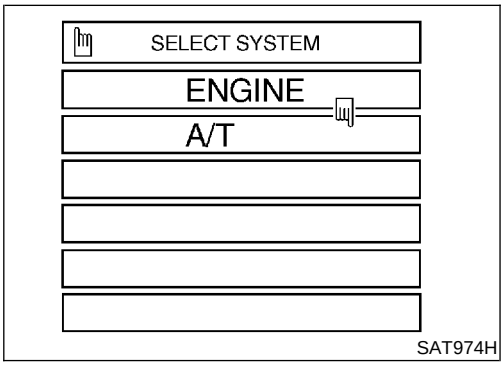
NEAT0207

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

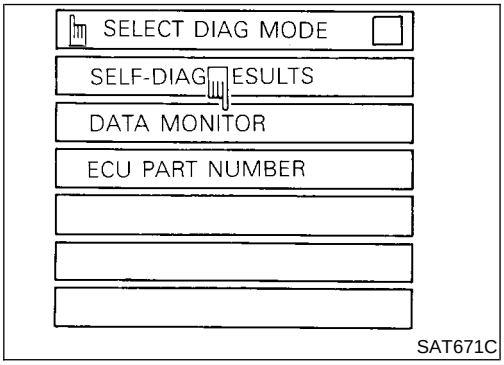
### ON BOARD DIAGNOSIS LOGIC

NEAT0207S01

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



SAT974H



SAT671C

### SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE

NEAT0207S02

**NOTE:**
**If "SELF-DIAGNOSIS 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

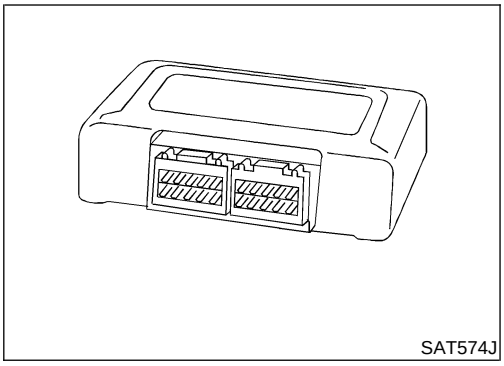
NEAT0207S03

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

## Diagnostic Procedure

=NEAT0208

| 1 | CHECK DTC | |
|---|---|---|
| **With CONSULT**<br>1. Turn ignition switch “ON” and select “SELF DIAG RESULTS” mode for A/T with CONSULT.<br>2. Touch “ERASE”.<br>Perform Self-diagnosis Code confirmation procedure.<br>See previous page.<br>**Is the “CONTROL UNIT (RAM) or CONTROL UNIT (ROM)” displayed again?** | | |
| Yes | ▶ | Replace TCM. |
| No | ▶ | **INSPECTION END** |


SAT574J

## Description

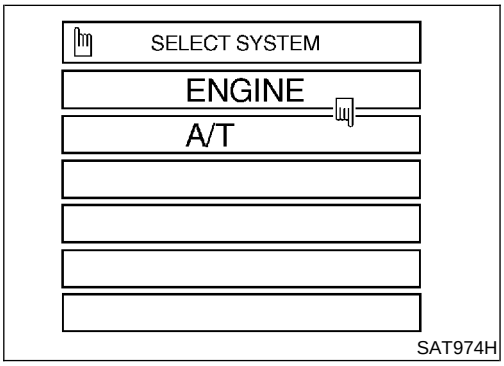
NEAT0215

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

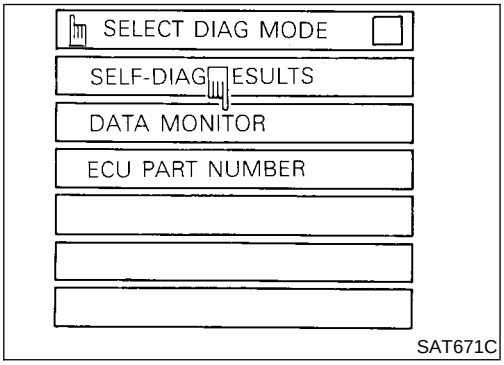
### ON BOARD DIAGNOSIS LOGIC

NEAT0215S01

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : CONT UNIT (EEP ROM) | TCM memory (EEP ROM) is malfunctioning. | TCM |



SAT974H



SAT671C

### SELF-DIAGNOSIS CODE CONFIRMATION PROCEDURE

NEAT0215S02

**NOTE:**
**If "SELF-DIAGNOSIS 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

NEAT0215S03

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

## Diagnostic Procedure

=NEAT0216

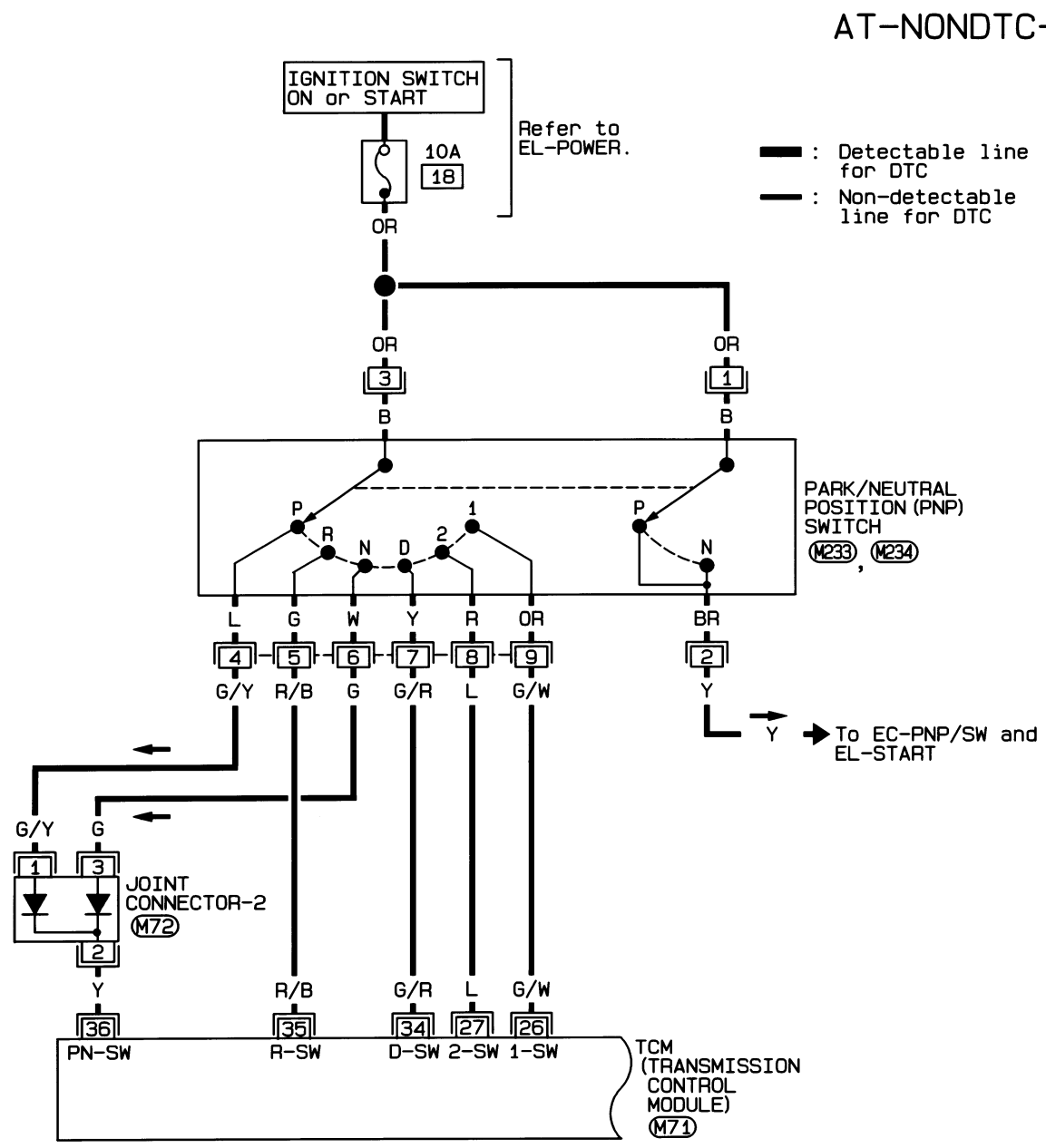
| 1 | CHECK DTC | |
|---|---|---|
| **With CONSULT**<br>1. Turn ignition switch “ON” and select “SELF DIAG RESULTS” mode for A/T with CONSULT.<br>2. Move selector lever to “R” position.<br>3. Depress accelerator pedal (Full throttle position).<br>4. Touch “ERASE”.<br>5. Turn ignition switch “OFF” position for 10 seconds.<br>Perform Self-diagnosis Code confirmation procedure.<br>See previous page.<br>**Is the “CONT UNIT (EEP ROM)” displayed again?** | | |
| Yes | ▶ | Replace TCM. |
| No | ▶ | **INSPECTION END** |

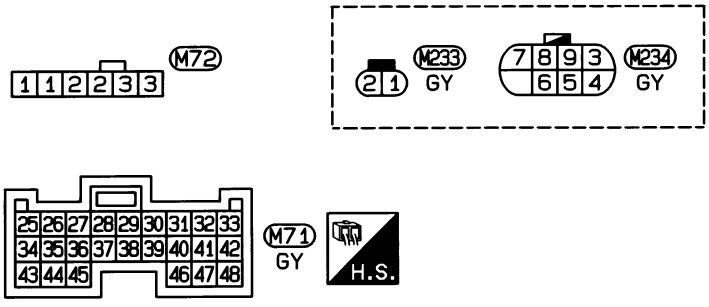
## Wiring Diagram — AT — NONDTC

NEAT0203

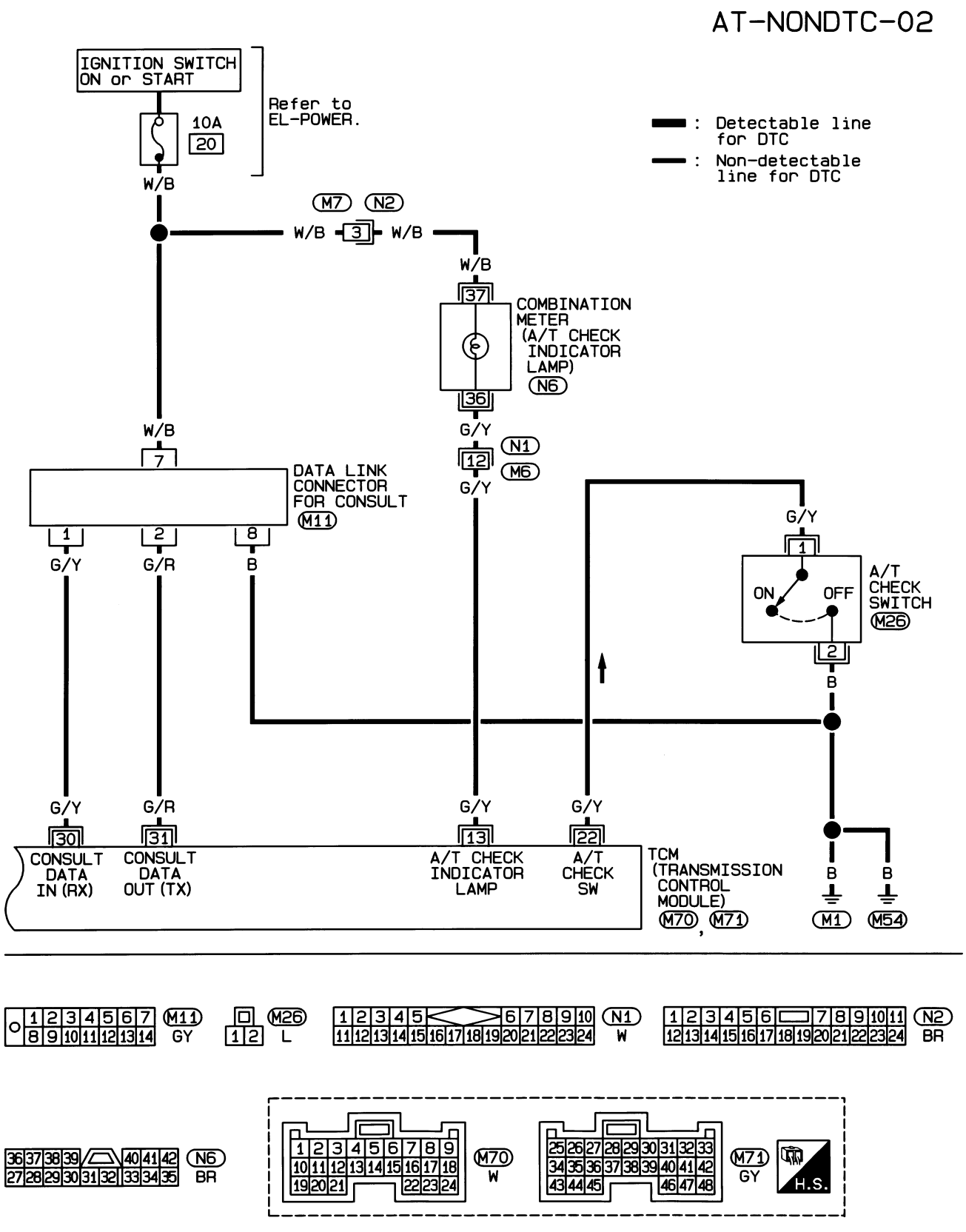
NEAT0203S01

**— LHD MODEL —**



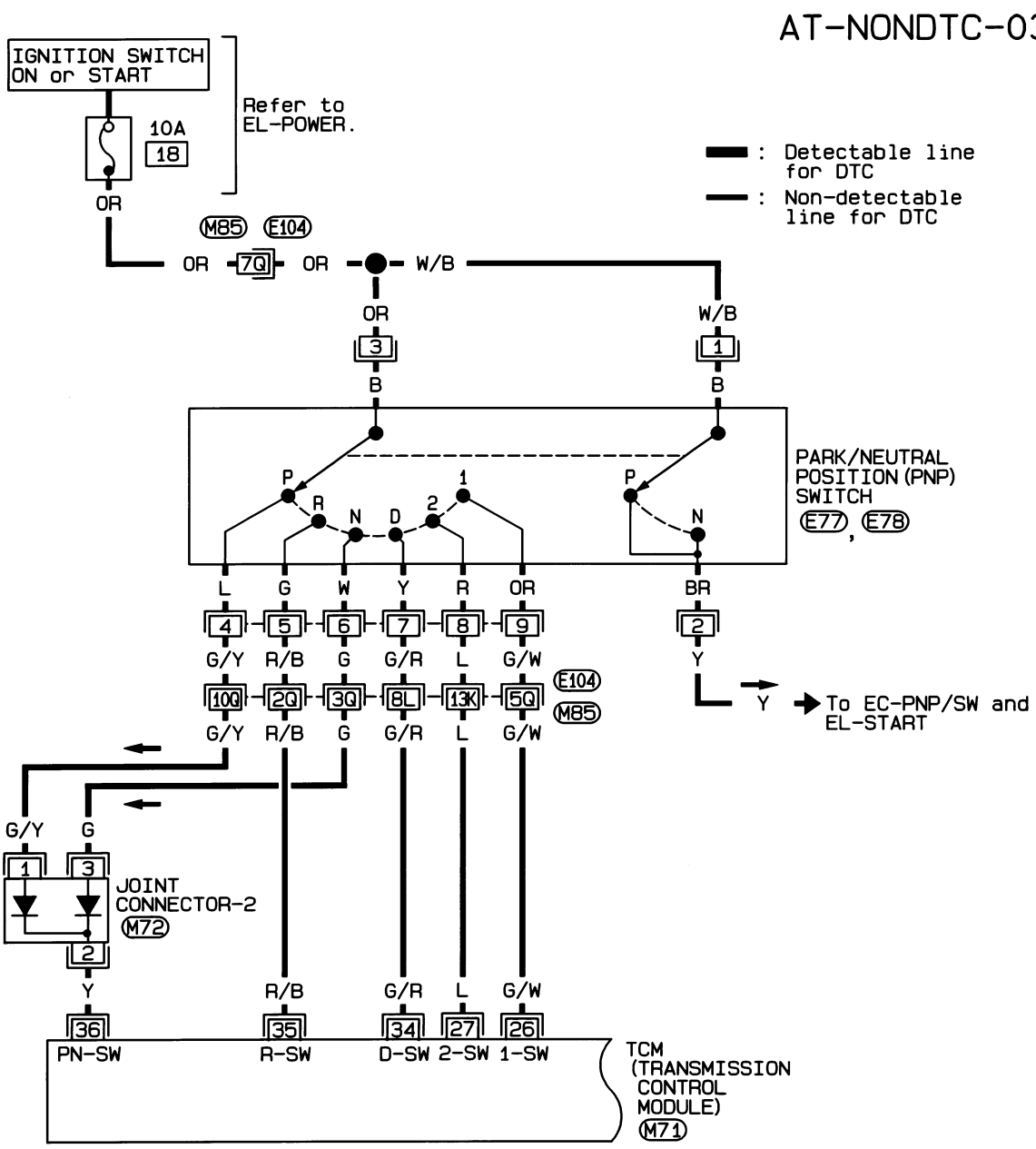

HAT065

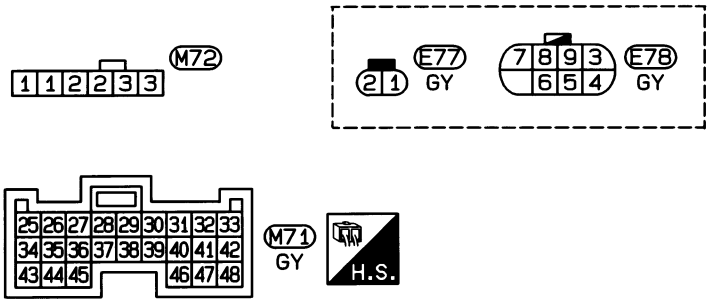

AT-NONDTC-02
IGNITION SWITCH ON or START
Refer to EL-POWER.
10A
20
W/B
: Detectable line for DTC
: Non-detectable line for DTC
M7
N2
W/B
3
W/B
W/B
37
COMBINATION METER (A/T CHECK INDICATOR LAMP)
N6
36
G/Y
N1
12
M6
G/Y
W/B
7
DATA LINK CONNECTOR FOR CONSULT
M11
1
2
8
G/Y
G/R
B
G/Y
1
A/T CHECK SWITCH
M26
ON
OFF
2
B
G/Y
G/R
G/Y
G/Y
30
31
13
22
CONSULT DATA IN (RX)
CONSULT DATA OUT (TX)
A/T CHECK INDICATOR LAMP
A/T CHECK SW
TCM (TRANSMISSION CONTROL MODULE)
M70, M71
B
B
M1
M54
M11 GY
M26 L
N1 W
N2 BR
N6 BR
M70 W
M71 GY
H.S.

HAT066

## — RHD MODEL —

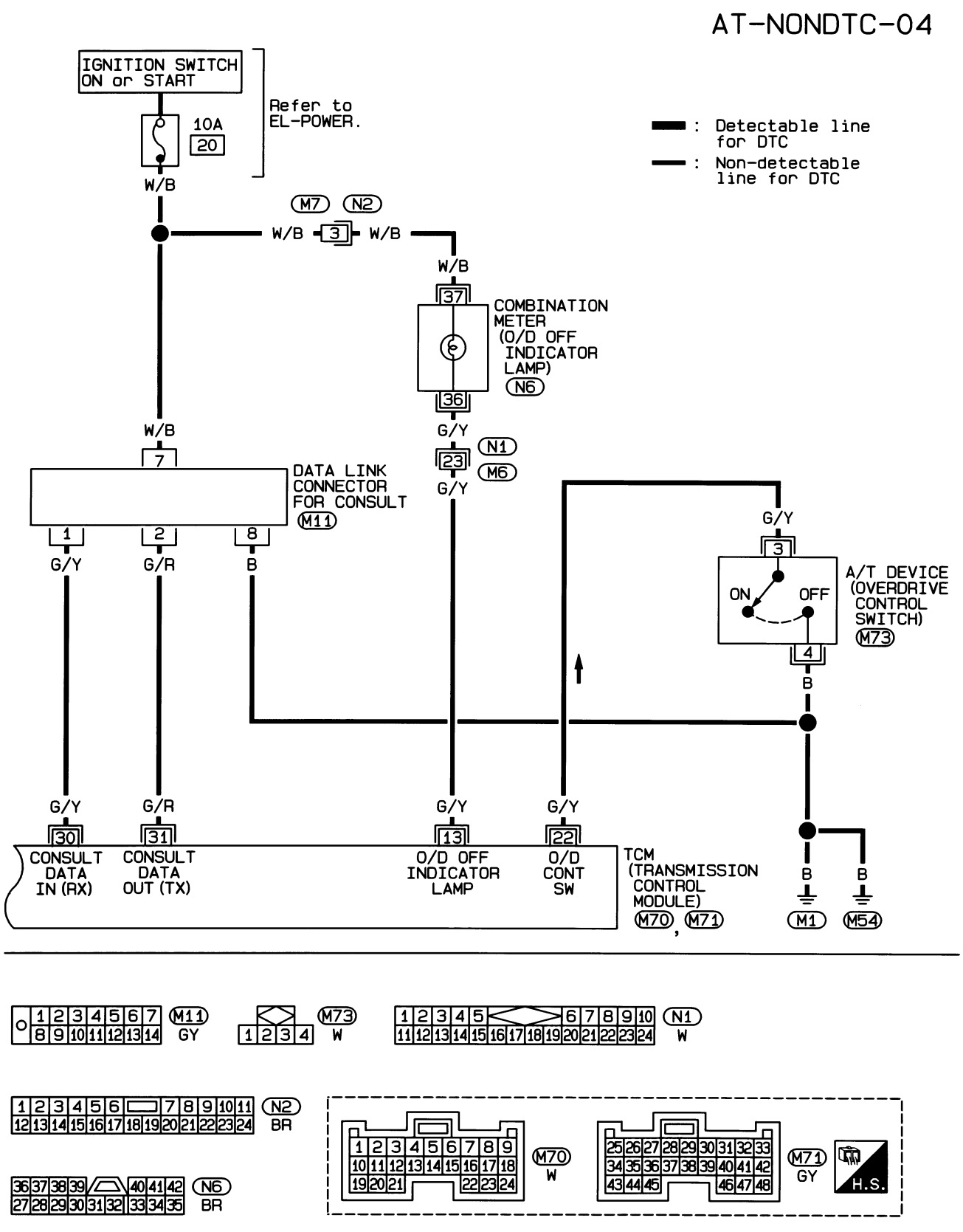
NEAT0203S02




Refer to last page (Foldout page).
M85, E104

HAT067


AT-NONDTC-04
IGNITION SWITCH ON or START
Refer to EL-POWER.
10A
20
W/B
: Detectable line for DTC
: Non-detectable line for DTC
M7
N2
W/B
3
W/B
W/B
37
COMBINATION METER (O/D OFF INDICATOR LAMP)
N6
36
G/Y
N1
23
M6
G/Y
W/B
7
DATA LINK CONNECTOR FOR CONSULT
M11
1
2
8
G/Y
G/R
B
G/Y
3
ON
OFF
A/T DEVICE (OVERDRIVE CONTROL SWITCH)
M73
4
B
G/Y
G/R
G/Y
G/Y
30
31
13
22
CONSULT DATA IN (RX)
CONSULT DATA OUT (TX)
O/D OFF INDICATOR LAMP
O/D CONT SW
TCM (TRANSMISSION CONTROL MODULE)
M70, M71
B
B
M1
M54
M11 GY
M73 W
N1 W
N2 BR
N6 BR
M70 W
M71 GY
H.S.

HAT068

## 1. O/D OFF or A/T CHECK Indicator Lamp Does Not Come On

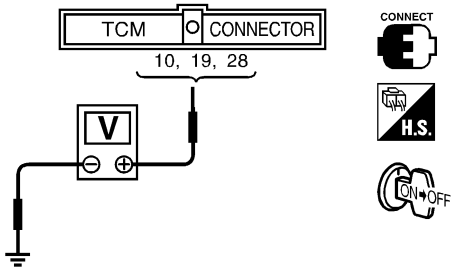
NEAT0073

**SYMPTOM:**

**O/D OFF or A/T CHECK indicator lamp does not come on for about 2 seconds when turning ignition switch to “ON”.**

| 1 | CHECK TCM POWER SOURCE |
|---|---|

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




SAT514J

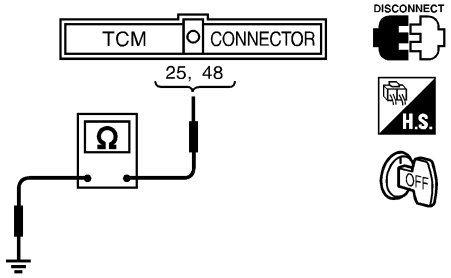
3. Turn ignition switch to “OFF” position.
4. Check voltage between TCM terminal 28 and ground.
   **Voltage: Battery voltage**

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 2. |
| NG | ▶ | **Check the following items:**<br>● Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness)<br>● Refer to “Wiring Diagram — AT — MAIN”, AT-85.<br>● Ignition switch and fuse<br>Refer to EL section (“POWER SUPPLY ROUTING”). |

| 2 | CHECK TCM GROUND CIRCUIT |
|---|---|

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

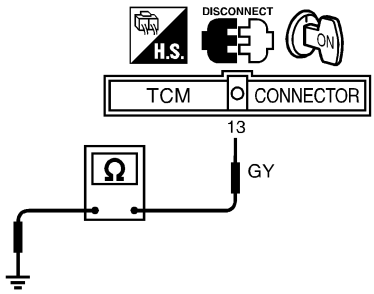



SAT515J

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

**Is resistance approx. 0Ω?**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 3. |
| No | ▶ | ● Repair open circuit or short to ground or short to power in harness or connectors.<br>● Refer to “Wiring Diagram — AT — MAIN”, AT-85. |

| 3 | CHECK LAMP CIRCUIT | |
|---|---|---|
| 1. Turn ignition switch to "ON" position.<br>2. Set overdrive control or A/T check switch to "ON" position.<br>3. Check voltage between TCM terminals 13 and ground.<br>  <br><br>SAT529J<br>**Does battery voltage exist?** | | |
| Yes | ▶ | GO TO 4. |
| No | ▶ | **Check the following items.**<br>● Fuse<br>● O/D OFF or A/T CHECK indicator lamp<br>Refer to EL section ("WARNING LAMPS").<br>● Harness for short or open between ignition switch and O/D OFF or A/T CHECK indicator lamp (Main harness)<br>● Refer to EL section ("POWER SUPPLY ROUTING").<br>● Harness for short or open between O/D OFF or A/T CHECK indicator lamp and TCM |

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

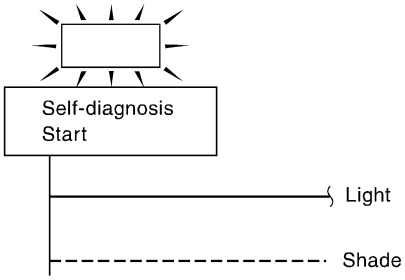
## 2. Engine Cannot Be Started In “P” and “N” Position

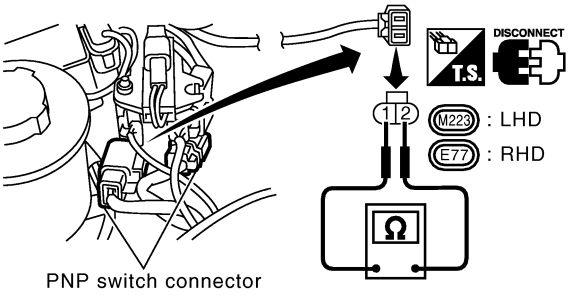
=NEAT0074

**SYMPTOM:**

**Engine cannot be started with selector lever in “P” or “N” position.**

**Engine cannot be started with selector lever in “P”Engine can be started with selector lever in “D”, “2”, “1” or “R” position.**

| 1 | CHECK PNP SWITCH CIRCUIT | |
|---|---|---|
| **With CONSULT**<br>Does “ECU INPUT SIGNALS” in Data Monitor show damage to PNP switch circuit?<br>**Without CONSULT**<br>Does self-diagnosis show damage to PNP switch circuit?<br>  <br><br>SAT809J<br>**Yes or No** | | |
| Yes | ▶ | Check PNP switch circuit. Refer to AT-183. |
| 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-191.<br>  <br><br>SAT810J<br>**OK or NG** | | |
| OK | ▶ | GO TO 3. |
| NG | ▶ | Repair or replace PNP switch. |

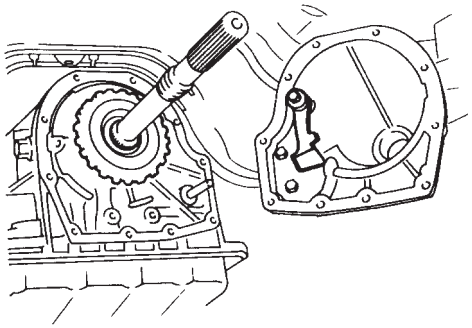
| 3 | CHECK STARTING SYSTEM | |
|---|---|---|
| Check starting system. Refer to EL section (“System Description”, “STARTING SYSTEM”).<br>**OK or NG** | | |
| OK | ▶ | **INSPECTION END** |
| NG | ▶ | Repair or replace damaged parts. |

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

=NEAT0075

**SYMPTOM:**

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

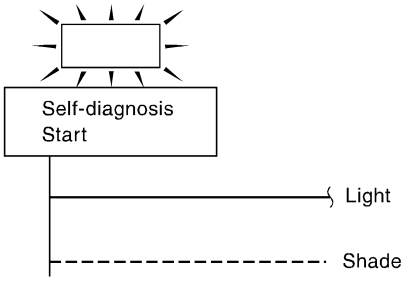
| 1 | CHECK PARKING COMPONENTS | |
|---|---|---|
| Check parking components.<br>Refer to “Parking Pawl Components”, AT-261.<br>  <br>SAT133B | | |
| **OK or NG** | | |
| OK | ▶ | **INSPECTION END** |
| NG | ▶ | Repair or replace damaged parts. |

## 4. In “N” Position, Vehicle Moves

=NEAT0076

**SYMPTOM:**

**Vehicle moves forward or backward when selecting “N” position.**

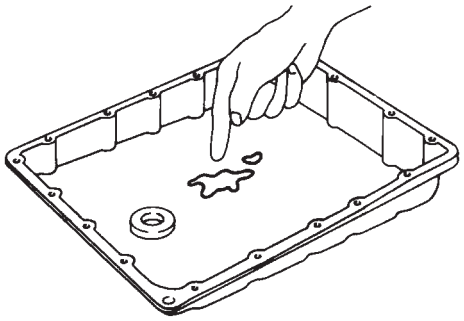
| 1 | CHECK PNP SWITCH CIRCUIT | |
|---|---|---|
| **With CONSULT**<br>Does “ECU INPUT SIGNALS” in Data Monitor show damage to PNP switch circuit? | | |
| **Without CONSULT**<br>Does self-diagnosis show damage to PNP switch circuit?<br>  <br><br>SAT809J | | |
| **Yes or No** | | |
| Yes | ▶ | Check PNP switch circuit. Refer to AT-183. |
| No | ▶ | GO TO 2. |

| 2 | CHECK CONTROL LINKAGE | |
|---|---|---|
| Check control linkage. Refer to AT-202. | | |
| **OK or NG** | | |
| OK | ▶ | GO TO 3. |
| NG | ▶ | Adjust control linkage. Refer to AT-202. |

| 3 | CHECK A/T FLUID LEVEL | |
|---|---|---|
| Check A/T fluid level again.<br> <br>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.<br>2. Check the following items:<br>● Forward clutch assembly<br>● Overrun clutch assembly<br>● Reverse clutch assembly |

| 5 | CHECK SYMPTOM |
|---|---|

Check again.

**OK or NG**

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

## 5. Large Shock. “N” → “R” Position

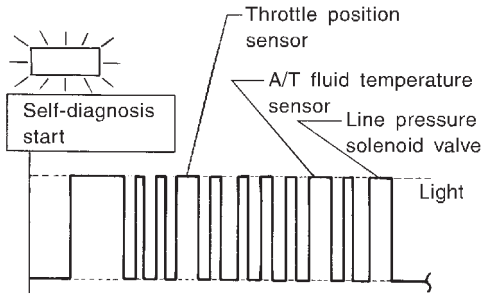
=NEAT0077

**SYMPTOM:**

**There is large shock when changing from “N” to “R” position.**

| 1 | CHECK SELF-DIAGNOSTIC RESULTS |
|---|---|

Does self-diagnosis show damage to A/T fluid temperature sensor, line pressure solenoid valve or throttle position sensor circuit?



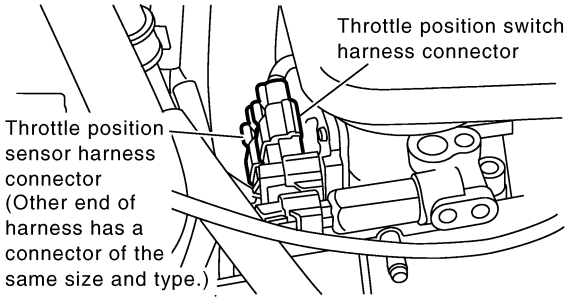

SAT831HA

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | Check damaged circuit. Refer to AT-95, AT-121 or AT-131. |
| No | ▶ | GO TO 2. |

| 2 | CHECK THROTTLE POSITION SENSOR |
|---|---|

Check throttle position sensor. Refer to EC section (“DTC 43 THROTTLE POSITION SENSOR”).



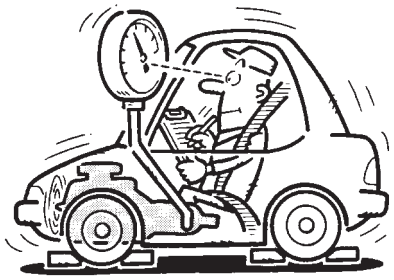

SAT811J

**OK or NG**

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

| 3 | CHECK LINE PRESSURE |
|---|---|

Check line pressure at idle with selector lever in "D" position. Refer to "LINE PRESSURE TEST", AT-52.



SAT494G

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 4. |
| NG | ▶ | 1. Remove control valve assembly. Refer to AT-200.<br>2. Check the following items:<br>● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)<br>● Line pressure solenoid valve |

| 4 | CHECK SYMPTOM |
|---|---|

Check again.

**OK or NG**

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

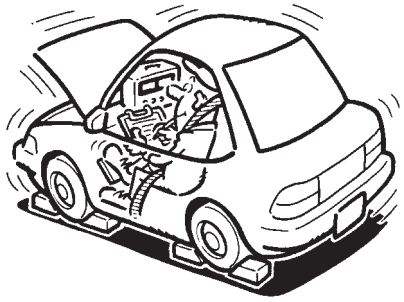
## 6. Vehicle Does Not Creep Backward In “R” Position

=NEAT0078

**SYMPTOM:**

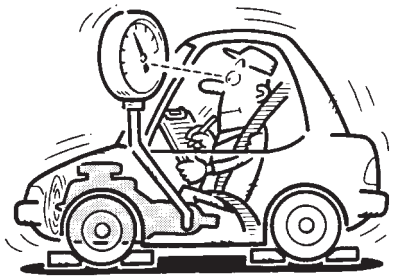
**Vehicle does not creep backward when selecting “R” position.**

| 1 | CHECK A/T FLUID LEVEL | |
|---|---|---|
| Check A/T fluid level again.<br> <br>SAT638A<br>**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.<br>Refer to AT-282.<br>  <br>SAT493G<br>**OK or NG** | | |
| OK | ▶ | GO TO 3. |
| OK in “1” position, NG in “R” position | ▶ | 1. Remove control valve assembly. Refer to “ON-VEHICLE SERVICE”, AT-200.<br>2. Check the following items:<br>● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)<br>● Line pressure solenoid valve<br>3. Disassemble A/T.<br>4. Check the following items:<br>● Oil pump assembly<br>● Torque converter<br>● Reverse clutch assembly<br>● High clutch assembly |
| NG in both “1” and “R” positions | ▶ | GO TO 6. |

| 3 | CHECK LINE PRESSURE |
|---|---|

Check line pressure at idle with selector lever in "R" position. Refer to "LINE PRESSURE TEST", AT-52.



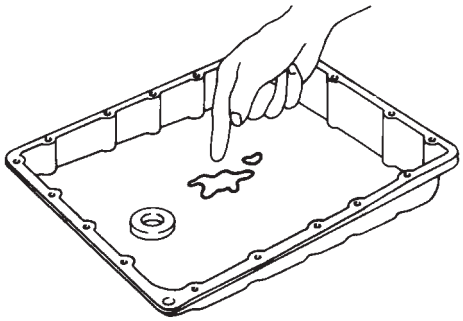
SAT494G

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 4. |
| NG | ▶ | 1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-200.<br>2. Check the following items:<br>● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)<br>● Line pressure solenoid valve<br>3. Disassemble A/T.<br>4. Check the following items:<br>● Oil pump assembly |

| 4 | CHECK A/T FLUID CONDITION |
|---|---|

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



SAT171B

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 5. |
| NG | ▶ | GO TO 6. |

| 5 | CHECK SYMPTOM |
|---|---|

Check again.

**OK or NG**

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

| 6 | DETECT MALFUNCTIONING ITEM |
|---|---|
| 1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-200.<br>2. Check the following items:<br>● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)<br>● Line pressure solenoid valve<br>3. Disassemble A/T.<br>4. Check the following items:<br>● Oil pump assembly<br>● Torque converter<br>● Reverse clutch assembly<br>● High clutch assembly<br>● Low & reverse brake assembly<br>● Low one-way clutch | |
| ▶ | Repair or replace damaged parts. |

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

=NEAT0079

**SYMPTOM:**

**Vehicle does not creep forward when selecting “D”, “2” or “1” position.**

| 1 | CHECK A/T FLUID LEVEL |
|---|---|

Check A/T fluid level again.

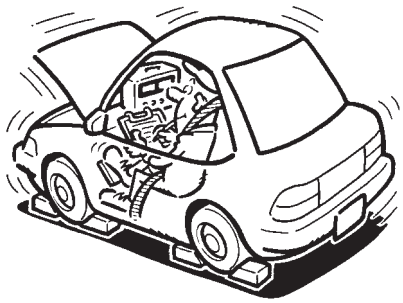
SAT638A

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 2. |
| NG | ▶ | Refill ATF. |

| 2 | CHECK STALL TEST |
|---|---|

Check stall revolution with selector lever in “D” position.
Refer to “STALL TEST”, AT-49.



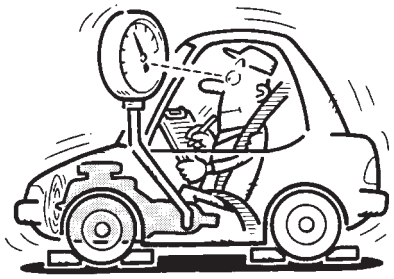
SAT493G

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 3. |
| NG | ▶ | GO TO 6. |

| 3 | CHECK LINE PRESSURE |
|---|---|

Check line pressure at idle with selector lever in "R" position.
Refer to "LINE PRESSURE TEST", AT-52.



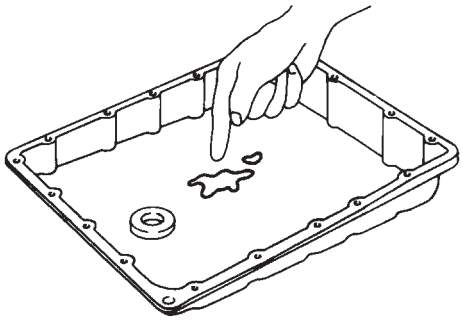
SAT494G

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 4. |
| NG | ▶ | 1. Remove control valve assembly. Refer to AT-200.<br>2. Check the following items:<br>● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)<br>● Line pressure solenoid valve<br>3. Disassemble A/T.<br>4. Check the following items:<br>● Oil pump assembly |

| 4 | CHECK A/T FLUID CONDITION |
|---|---|

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



SAT171B

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 5. |
| NG | ▶ | GO TO 6. |

| 5 | CHECK SYMPTOM |
|---|---|

Check again.

**OK or NG**

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

*7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position (Cont’d)*

| 6 | DETECT MALFUNCTIONING ITEM |
|---|---|
| 1. Remove control valve assembly. Refer to “ON-VEHICLE SERVICE”, AT-200.<br>2. Check the following items:<br>● Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)<br>● Line pressure solenoid valve<br>3. Disassemble A/T.<br>4. Check the following items:<br>● Oil pump assembly<br>● Forward clutch assembly<br>● Forward one-way clutch<br>● Low one-way clutch<br>● Low & reverse brake assembly<br>● Torque converter | |
| ▶ | Repair or replace damaged parts. |

# 8. Vehicle Cannot Be Started From $D_1$

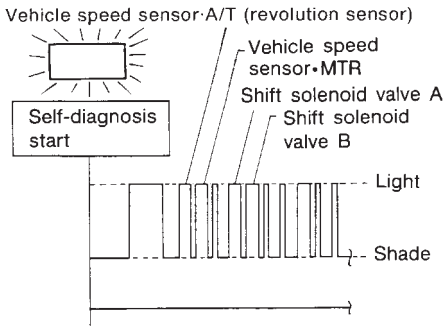
=NEAT0080

**SYMPTOM:**

**Vehicle cannot be started from $D_1$ on Cruise test — Part 1.**

| 1 | CHECK SYMPTOM | |
|---|---|---|
| Is “6. Vehicle Does Not Creep Backward In “R” Position” OK? | | |
| **Yes or No** | | |
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to “6. Vehicle Does Not Creep Backward In “R” Position”, AT-153. |

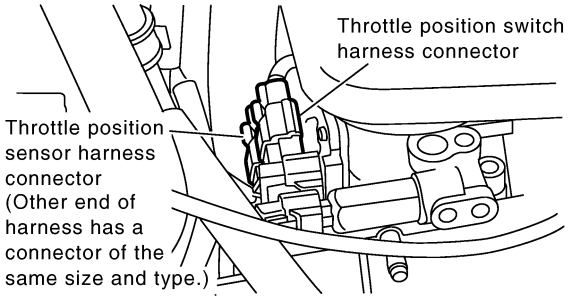
| 2 | CHECK SELF-DIAGNOSTIC RESULTS | |
|---|---|---|
| Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test? | | |




SAT934FB

| **Yes or No** | | |
|---|---|---|
| Yes | ▶ | Check damaged circuit. Refer to AT-88, AT-92, AT-104 or AT-108. |
| No | ▶ | GO TO 3. |

| 3 | CHECK THROTTLE POSITION SENSOR | |
|---|---|---|
| Check throttle position sensor. Refer to EC section (“DTC P0120 THROTTLE POSITION SENSOR”). | | |

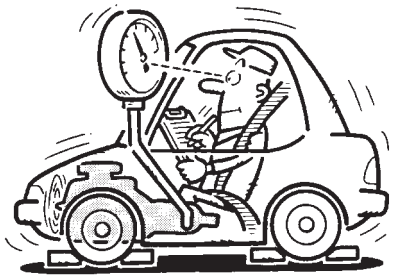



SAT811J

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

| 4 | CHECK LINE PRESSURE |
|---|---|

Check line pressure at stall point with selector lever in "D" position.
Refer to "LINE PRESSURE TEST", AT-52.



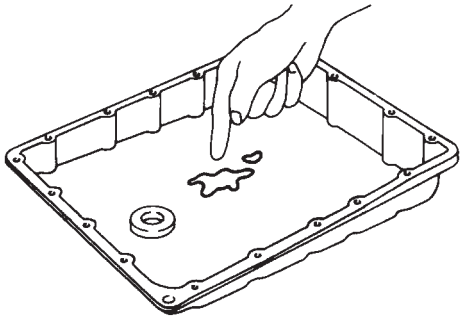
SAT494G

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 5. |
| NG | ▶ | GO TO 8. |

| 5 | CHECK A/T FLUID CONDITION |
|---|---|

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



SAT171B

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 6. |
| NG | ▶ | GO TO 8. |

| 6 | DETECT MALFUNCTIONING ITEM |
|---|---|

1. Remove control valve assembly.
   Refer to AT-200.
2. Check the following items:

- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter

**OK or NG**

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

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

| 8 | DETECT MALFUNCTIONING ITEM |
|---|---|
| 1. Remove control valve assembly.<br>Refer to AT-200.<br>2. Check the following items:<br>● Shift valve A<br>● Shift valve B<br>● Shift solenoid valve A<br>● Shift solenoid valve B<br>● Pilot valve<br>● Pilot filter<br>3. Disassemble A/T.<br>4. Check the following items:<br>● Forward clutch assembly<br>● Forward one-way clutch<br>● Low one-way clutch<br>● High clutch assembly<br>● Torque converter<br>● Oil pump assembly<br>**OK or NG** | |
| OK ▶ | GO TO 7. |
| NG ▶ | Repair or replace damaged parts. |

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

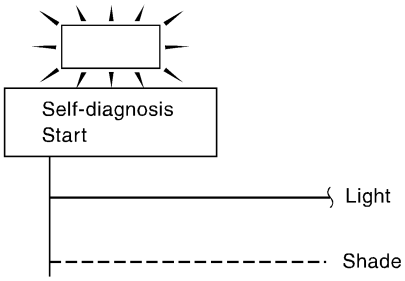
=NEAT0081

**SYMPTOM:**

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

| 1 | CHECK SYMPTOM | |
|---|---|---|
| Are "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "8. Vehicle Cannot Be Started From $D_1$" OK? | | |
| **Yes or No** | | |
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position" and "8. Vehicle Cannot Be Started From $D_1$", AT-156, 159. |

| 2 | CHECK PNP SWITCH CIRCUIT | |
|---|---|---|
| **With CONSULT**<br>Does "ECU INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit? | | |
| **Without CONSULT**<br>Does self-diagnosis show damage to PNP switch circuit? | | |
| **Yes or No** | | |
| Yes | ▶ | Check PNP switch circuit. Refer to AT-183. |
| No | ▶ | GO TO 3. |

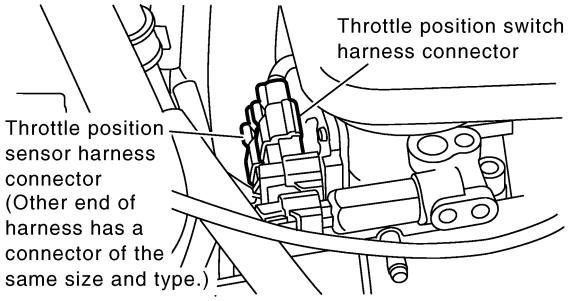



SAT809J

| 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 AT-88, AT-92. | | |
| **OK or NG** | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair or replace vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuits. |

| 4 | CHECK THROTTLE POSITION SENSOR |
|---|---|

Check throttle position sensor. Refer to EC section ("DTC 43 THROTTLE POSITION SENSOR").



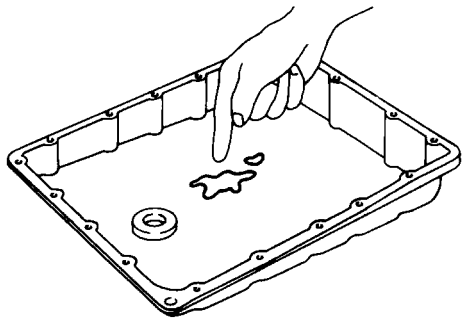

SAT811J

**OK or NG**

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

| 5 | CHECK A/T FLUID CONDITION |
|---|---|

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



SAT171B

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 6. |
| NG | ▶ | GO TO 8. |

| 6 | DETECT MALFUNCTIONING ITEM |
|---|---|

1. Remove control valve. Refer to AT-200.
2. Check the following items:
- Shift valve A
- Shift solenoid valve A
- Pilot valve
- Pilot filter

**OK or NG**

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

| 7 | CHECK SYMPTOM | |
|---|---|---|
| Check again.<br>**OK or NG** | | |
| OK | ▶ | **INSPECTION END** |
| NG | ▶ | 1. Perform TCM input/output signal inspection.<br>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-200.<br>2. Check the following items:<br>● Shift valve A<br>● Shift solenoid valve A<br>● Pilot valve<br>● Pilot filter<br>3. Disassemble A/T.<br>4. Check the following items:<br>● Servo piston assembly<br>● Brake band<br>● Oil pump assembly<br>**OK or NG** | | |
| OK | ▶ | GO TO 7. |
| NG | ▶ | Repair or replace damaged parts. |

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

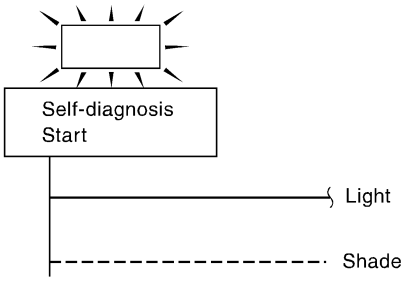
=NEAT0082

**SYMPTOM:**

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

| 1 | CHECK SYMPTOM | |
|---|---|---|
| Are “7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position” and “8. Vehicle Cannot Be Started From $D_1$” OK? | | |
| **Yes or No** | | |
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to “7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position” and “8. Vehicle Cannot Be Started From $D_1$”, AT-156, 159. |

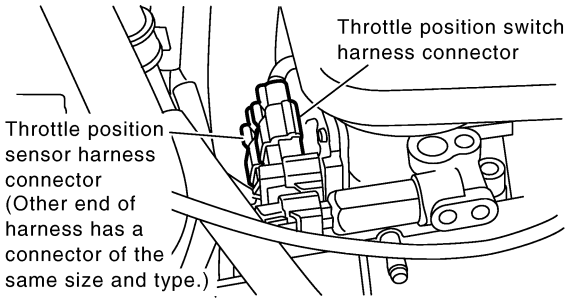
| 2 | CHECK PNP SWITCH CIRCUIT | |
|---|---|---|
| **With CONSULT**<br>Does “ECU INPUT SIGNALS” in Data Monitor show damage to PNP switch circuit? | | |
| **Without CONSULT**<br>Does self-diagnosis show damage to PNP switch circuit? | | |




SAT809J

| **Yes or No** | | |
|---|---|---|
| Yes | ▶ | Check PNP switch circuit. Refer to AT-183. |
| No | ▶ | GO TO 3. |

| 3 | CHECK THROTTLE POSITION SENSOR | |
|---|---|---|
| Check throttle position sensor. Refer to EC section (“DTC 43 THROTTLE POSITION SENSOR”). | | |

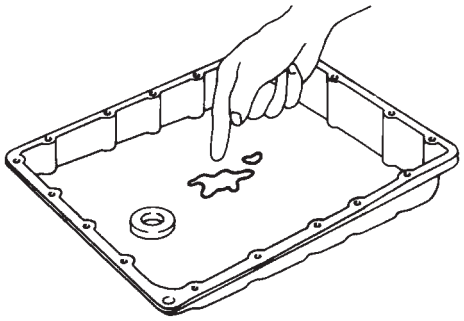



SAT811J

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

| 4 | CHECK A/T FLUID CONDITION |
|---|---|

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



SAT171B

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 5. |
| NG | ▶ | GO TO 7. |

| 5 | DETECT MALFUNCTIONING ITEM |
|---|---|

1. Remove control valve Assembly. Refer to AT-200.
2. Check the following items:
- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter

**OK or NG**

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

| 6 | CHECK SYMPTOM |
|---|---|

Check again.

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | **INSPECTION END** |
| NG | ▶ | 1. Perform TCM input/output signal inspection.<br>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-200.<br>2. Check the following items:<br>● Shift valve B<br>● Shift solenoid valve B<br>● Pilot valve<br>● Pilot filter<br>3. Disassemble A/T.<br>4. Check the following items:<br>● Servo piston assembly<br>● High clutch assembly<br>● Oil pump assembly | | |
| **OK or NG** | | |
| OK | ▶ | GO TO 6. |
| NG | ▶ | Repair or replace damaged parts. |

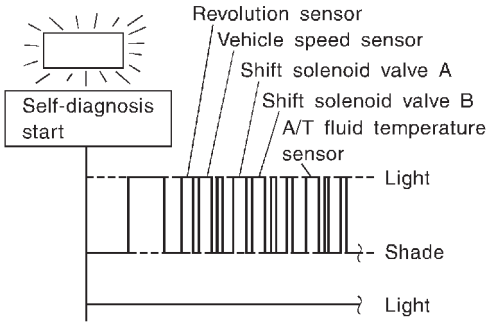
## 11. A/T Does Not Shift: $D_3 \rightarrow D_4$

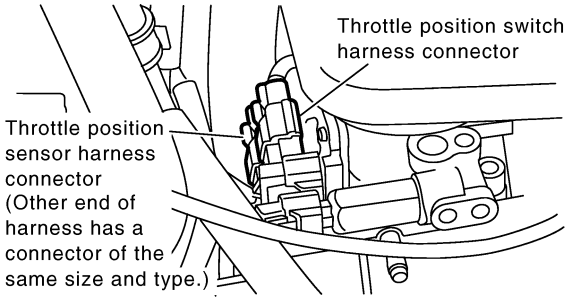
=NEAT0083

**SYMPTOM:**

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

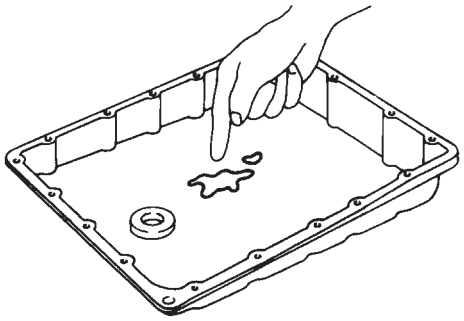
| 1 | CHECK SYMPTOM | |
|---|---|---|
| Are “7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position” and “8. Vehicle Cannot Be Started From $D_1$” OK? | | |
| **Yes or No** | | |
| Yes | ▶ | GO TO 2. |
| No | ▶ | Go to “7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position” and “8. Vehicle Cannot Be Started From $D_1$”, AT-156, 159. |

| 2 | CHECK SELF-DIAGNOSTIC RESULTS | |
|---|---|---|
| **With CONSULT**<br>Does self-diagnosis, after cruise test, show damage to any of the following circuits?<br>● PNP switch<br>● Overdrive control switch<br>● A/T fluid temperature sensor<br>● Revolution sensor<br>● Shift solenoid valve A or B<br>● Vehicle speed sensor | | |
|  <br>SAT833HA | | |
| **Yes or No** | | |
| Yes | ▶ | Check damaged circuit. Refer to AT-88, AT-92, AT-104, AT-108, AT-121 or 183. |
| No | ▶ | GO TO 3. |

| 3 | CHECK THROTTLE POSITION SENSOR | |
|---|---|---|
| Check throttle position sensor. Refer to EC section (“DTC 43 THROTTLE POSITION SENSOR”). | | |
|  <br>SAT811J | | |
| **OK or NG** | | |
| OK | ▶ | GO TO 4. |
| NG | ▶ | Repair or replace throttle position sensor. |

| 4 | CHECK A/T FLUID CONDITION |
|---|---|

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



SAT171B

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 5. |
| NG | ▶ | GO TO 7. |

| 5 | DETECT MALFUNCTIONING ITEM |
|---|---|

1. Remove control valve Assembly. Refer to AT-200.
2. Check the following items:
- Shift valve B
- Overrun clutch control valve
- Shift solenoid valve B
- Pilot valve
- Pilot filter

**OK or NG**

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

| 6 | CHECK SYMPTOM |
|---|---|

Check again.

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | **INSPECTION END** |
| NG | ▶ | 1. Perform TCM input/output signal inspection.<br>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-200.<br>2. Check the following items:<br>● Shift valve B<br>● Overrun clutch control valve<br>● Shift solenoid valve B<br>● Pilot valve<br>● Pilot filter<br>3. Disassemble A/T.<br>4. Check the following items:<br>● Servo piston assembly<br>● Brake band<br>● Torque converter<br>● Oil pump assembly | | |
| **OK or NG** | | |
| OK | ▶ | GO TO 6. |
| NG | ▶ | Repair or replace damaged parts. |

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

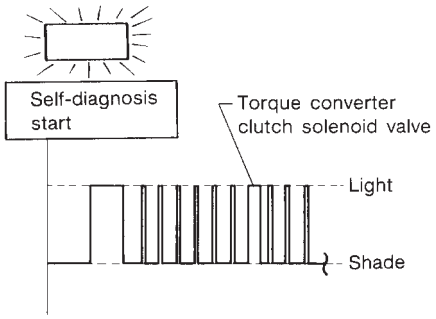
=NEAT0084

**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?



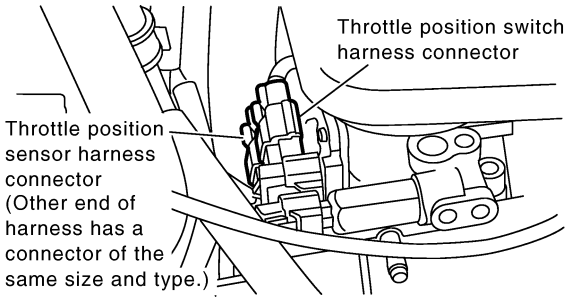

SAT844H

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | Check torque converter clutch solenoid valve circuit. Refer to AT-116. |
| No | ▶ | GO TO 2. |

| 2 | CHECK THROTTLE POSITION SENSOR |
|---|---|

Check throttle position sensor. Refer to EC section (“DTC 43 THROTTLE POSITION SENSOR”).




SAT811J

**OK or NG**

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

| 3 | DETECT MALFUNCTIONING ITEM |
|---|---|

1. Remove control valve. Refer to AT-200.
2. Check following items:

- Torque converter clutch control valve
- Torque converter relief valve
- Torque converter clutch solenoid valve
- Pilot valve
- Pilot filter

**OK or NG**

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

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

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

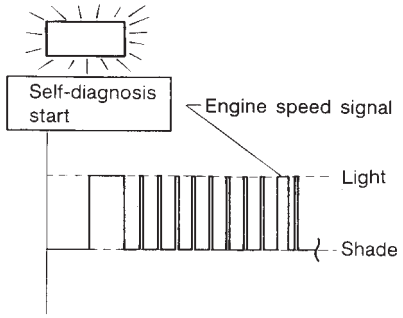
=NEAT0085

**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?



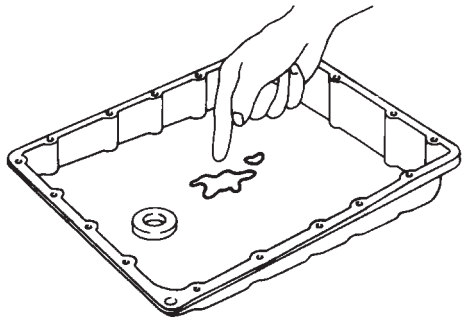

SAT835H

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | Check engine speed signal circuit. Refer to AT-127. |
| No | ▶ | GO TO 2. |

| 2 | CHECK A/T FLUID CONDITION |
|---|---|

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



SAT171B

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 3. |
| NG | ▶ | GO TO 5. |

| 3 | DETECT MALFUNCTIONING ITEM |
|---|---|

1. Remove control valve assembly. Refer to AT-200.
2. Check the following items:
- Torque converter clutch control valve
- Pilot valve
- Pilot filter

**OK or NG**

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

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

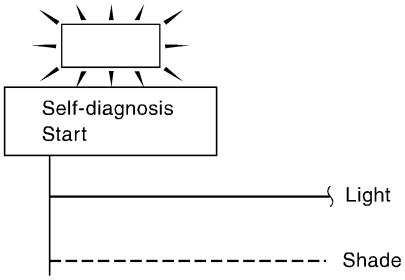
| 5 | DETECT MALFUNCTIONING ITEM |
|---|---|
| 1. Remove control valve assembly. Refer to AT-200.<br>2. Check the following items:<br>● Torque converter clutch control valve<br>● Pilot valve<br>● Pilot filter<br>3. Disassemble A/T.<br>4. Check torque converter and oil pump assembly.<br>**OK or NG** | |
| OK ▶ | GO TO 4. |
| NG ▶ | Repair or replace damaged parts. |

## 14. Lock-up Is Not Released

=NEAT0086

**SYMPTOM:**

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

| 1 | CHECK THROTTLE POSITION SWITCH CIRCUIT | |
|---|---|---|
| **With CONSULT**<br>Does “ECU INPUT SIGNALS” in Data Monitor show damage to closed throttle position switch circuit? | | |
| **Without CONSULT**<br>Does self-diagnosis show damage to closed throttle position switch circuit?<br>  <br><br>SAT809J | | |
| **Yes or No** | | |
| Yes | ▶ | Check closed throttle position switch circuit. Refer to AT-183. |
| No | ▶ | GO TO 2. |

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

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

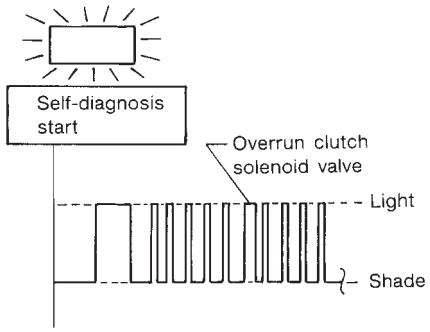
=NEAT0087

**SYMPTOM:**

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

| 1 | CHECK SELF-DIAGNOSTIC RESULTS |
|---|---|

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



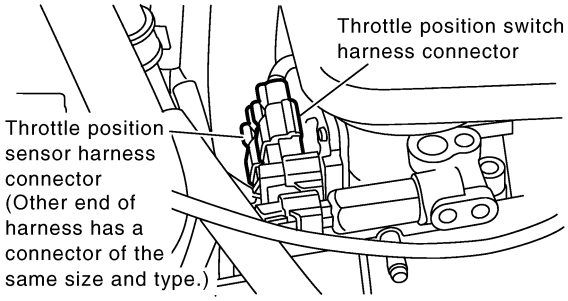

SAT836H

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | Check overrun clutch solenoid valve circuit. Refer to AT-112. |
| No | ▶ | GO TO 2. |

| 2 | CHECK THROTTLE POSITION SENSOR |
|---|---|

Check throttle position sensor. Refer to EC section ("DTC 43 THROTTLE POSITION SENSOR").



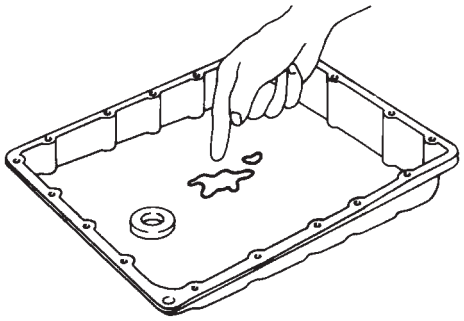

SAT811J

**OK or NG**

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

| 3 | CHECK A/T FLUID CONDITION |
|---|---|

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



SAT171B

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 4. |
| NG | ▶ | GO TO 6. |

| 4 | DETECT MALFUNCTIONING ITEM |
|---|---|

1. Remove control valve assembly. Refer to AT-200.
2. Check the following items:
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

**OK or NG**

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

| 5 | CHECK SYMPTOM |
|---|---|

Check again.

**OK or NG**

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

| 6 | DETECT MALFUNCTIONING ITEM |
|---|---|

1. Remove control valve assembly. Refer to AT-200.
2. Check the following items:
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve
3. Disassemble A/T.
4. Check the following items:
- Overrun clutch assembly
- Oil pump assembly

**OK or NG**

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

## 16. Vehicle Does Not Start From $D_1$

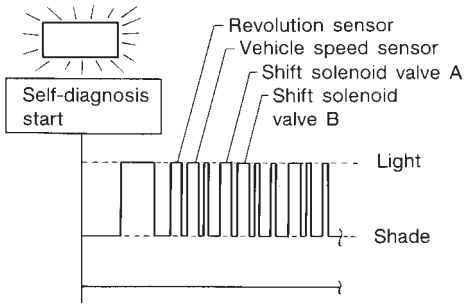
=NEAT0088

**SYMPTOM:**

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

| 1 | CHECK SELF-DIAGNOSTIC RESULTS |
|---|---|

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




SAT832H

**Yes or No**

| | | |
|---|---|---|
| Yes | ▶ | Check damaged circuit. Refer to AT-88, AT-92, AT-104 or AT-108. |
| No | ▶ | GO TO 2. |

| 2 | CHECK SYMPTOM |
|---|---|

Check again.

**OK or NG**

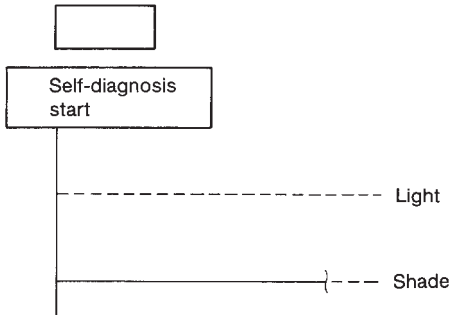
| | | |
|---|---|---|
| OK | ▶ | Go to “8. Vehicle Cannot Be Started From $D_1$”, AT-159. |
| NG | ▶ | 1. Perform TCM input/output signal inspection.<br>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. |

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

=NEAT0089

**SYMPTOM:**

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

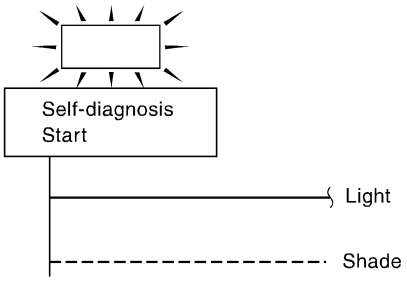
| 1 | CHECK OVERDRIVE CONTROL SWITCH CIRCUIT | |
|---|---|---|
| **With CONSULT**<br>Does "ECU INPUT SIGNALS" in Data Monitor show damage to overdrive control switch circuit? | | |
| **Without CONSULT**<br>Does self-diagnosis show damage to overdrive control switch circuit?<br>  <br><br>SAT146BA | | |
| **Yes or No** | | |
| Yes | ▶ | Check overdrive control switch circuit. Refer to AT-183. |
| No | ▶ | Go to "10. A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-165. |

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

=NEAT0090

**SYMPTOM:**

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

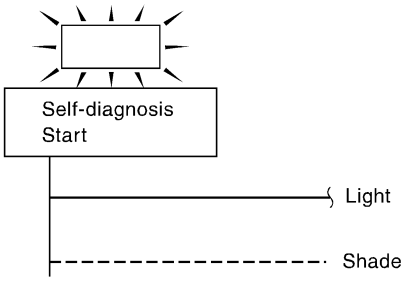
| 1 | CHECK PNP SWITCH CIRCUIT | |
|---|---|---|
| **With CONSULT**<br>Does "ECU INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?<br>**Without CONSULT**<br>Does self-diagnosis show damage to PNP switch circuit?<br>  <br><br>SAT809J<br>**Yes or No** | | |
| Yes | ▶ | Check PNP switch circuit. Refer to AT-183. |
| No | ▶ | Go to "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-162. |

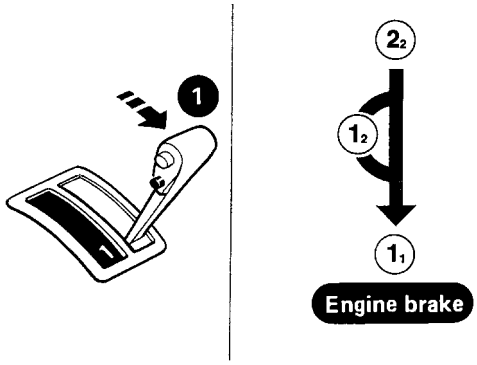
## 19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever "2" → "1" Position

=NEAT0091

**SYMPTOM:**

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

| 1 | CHECK PNP SWITCH CIRCUIT | |
|---|---|---|
| **With CONSULT**<br>Does "ECU INPUT SIGNALS" in Data Monitor show damage to PNP switch circuit?<br>**Without CONSULT**<br>Does self-diagnosis show damage to PNP switch circuit?<br>  <br><br>SAT809J<br>**Yes or No** | | |
| Yes | ▶ | Check PNP switch circuit. Refer to AT-183. |
| No | ▶ | GO TO 2. |

| 2 | CHECK SYMPTOM | |
|---|---|---|
| Check again.<br>  <br><br>SAT778B<br>**OK or NG** | | |
| OK | ▶ | **INSPECTION END** |
| NG | ▶ | 1. Perform TCM input/output signal inspection.<br>2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector. |

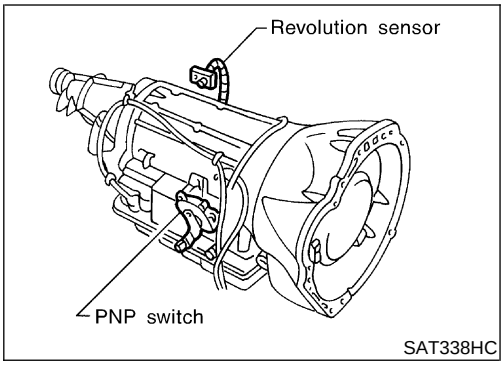
## 20. Vehicle Does Not Decelerate By Engine Brake

=NEAT0092

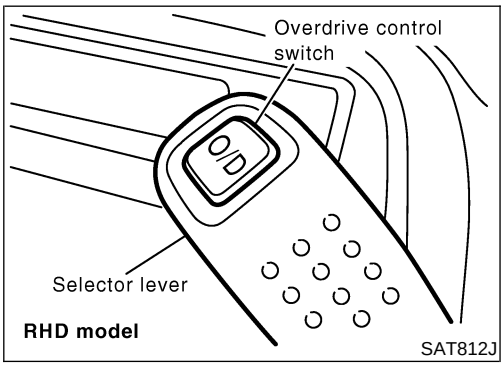
**SYMPTOM:**

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

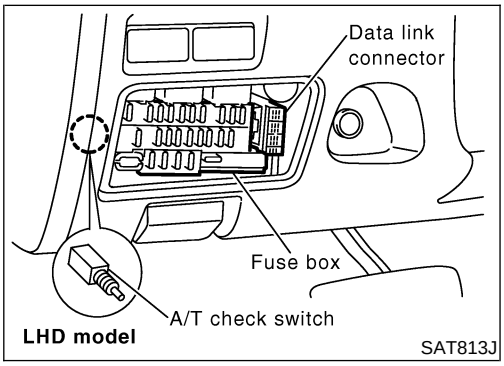
| 1 | CHECK SYMPTOM | |
|---|---|---|
| Is “6. Vehicle Does Not Creep Backward In “R” Position” OK? | | |
| **Yes or No** | | |
| Yes | ▶ | Go to “15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)”, AT-176. |
| No | ▶ | Go to “6. Vehicle Does Not Creep Backward In “R” Position”, AT-153. |



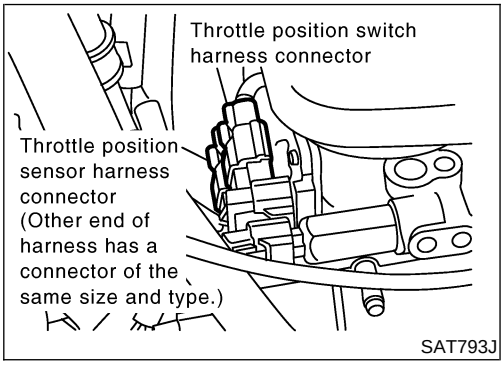
SAT338HC



SAT812J



SAT813J



SAT793J

# 21. TCM Self-diagnosis Does Not Activate (PNP, Overdrive Control, A/T Check and TP Switches Circuit Checks)

NEAT0204

## SYMPTOM:

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

## DESCRIPTION

NEAT0204S01

- 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 and A/T check switch
  Detects the overdrive control switch position (ON or OFF) and sends a signal to the TCM.
- Throttle position switch
  Consists of a wide open throttle position switch and a closed throttle position switch.
  The wide open throttle position switch sends a signal to the TCM when the throttle valve is open at least 1/2 of the full throttle position. The closed throttle position switch sends a signal to the TCM when the throttle valve is fully closed.

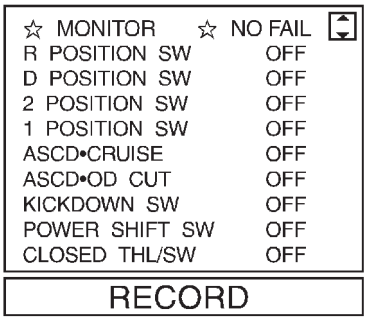
## DIAGNOSTIC PROCEDURE

=NEAT0204S03

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

| 1 | CHECK PNP SWITCH CIRCUIT (With CONSULT) |
|---|---|

**With CONSULT**
1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT.
3. Read out "P", "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.




SAT761I

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 3.(With overdrive control switch) |
| OK | ▶ | GO TO 4.(With A/T check switch) |
| OK | ▶ | GO TO 5. (With CONSULT) (With A/T check switch) |
| NG | ▶ | **Check the following items:**<br>● PNP switch<br>Refer to "Component Inspection", AT-191.<br>● Harness for short or open between ignition switch and PNP switch (Main harness)<br>● Harness for short or open between PNP switch and TCM (Main harness)<br>● Joint connector-2 |

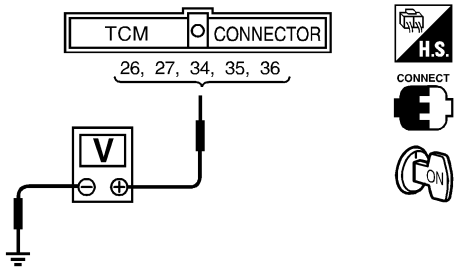
**2** **CHECK PNP SWITCH CIRCUIT (Without CONSULT)**

**Without CONSULT**

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

| 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

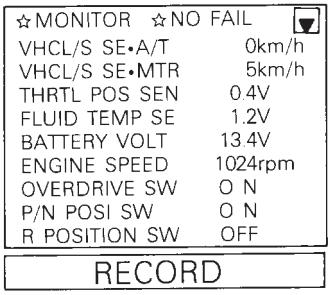
**Does battery voltage exist (B) or non-existent (0)?**

| | | |
|---|---|---|
| Yes | ▶ | GO TO 3. |
| No | ▶ | **Check the following items:**<br>● PNP switch<br>Refer to "Component Inspection", AT-191.<br>● Harness for short or open between ignition switch and PNP switch (Main harness)<br>● Harness for short or open between PNP switch and TCM (Main harness)<br>● Joint connector-2 |

| 3 | CHECK OVERDRIVE CONTROL SWITCH CIRCUIT — FOR RHD MODEL |
|---|---|

**With CONSULT**

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in "DATA MONITOR" mode for "A/T" with CONSULT.
3. Read out "OVERDRIVE SWITCH". Check the signal of the overdrive control switch is indicated properly.
   (Overdrive control switch "ON" displayed on CONSULT means overdrive "OFF".)

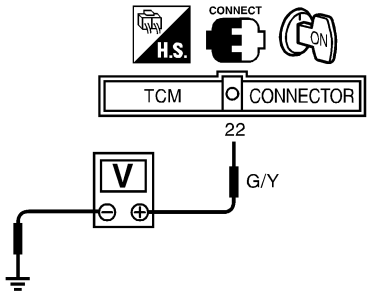



SAT076H

**Without CONSULT**

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

**Voltage:**
**Switch position "ON":**
**Battery voltage**
**Switch position "OFF":**
**1V or less**




SAT531JA

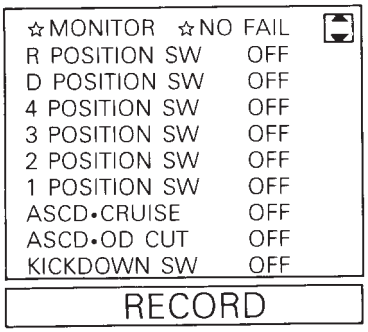
**OK or NG**

| | | |
|---|---|---|
| OK (With CONSULT) | ▶ | GO TO 6. |
| OK (Without CONSULT) | ▶ | GO TO 7. |
| NG | ▶ | **Check the following items:**<br>● Overdrive control switch<br>Refer to "Component Inspection", AT-191.<br>● Harness for short or open between TCM and overdrive control switch (Main harness)<br>● Harness for short or open of ground circuit for overdrive control switch (Main harness) |

| 4 | CHECK A/T CHECK SWITCH CIRCUIT (With CONSULT) — FOR LHD MODEL |
|---|---|

**With CONSULT**

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "ECU INPUT SIGNALS".
3. Read out "SELECTOR LEVER SW (A/T check switch)". Make sure the selector lever switch position is indicated properly.




SAT118G

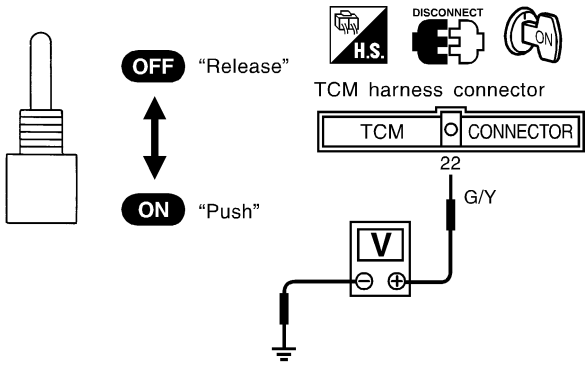
**OK or NG**

| | | |
|---|---|---|
| OK (With CONSULT) | ▶ | GO TO 6. |
| OK (Without CONSULT) | ▶ | GO TO 7. |
| NG | ▶ | **Check the following items:**<br>● A/T check switch<br>Refer to "Component Inspection", AT-192.<br>● Harness continuity between TCM and A/T check switch<br>● Harness continuity of ground circuit for A/T check switch |

| 5 | CHECK A/T CHECK SWITCH CIRCUIT (Without CONSULT) — FOR LHD MODEL |
|---|---|

**Without CONSULT**

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between TCM terminal 22 and ground when A/T check switch is "ON" and "OFF".




SAT814J

| Switch position | Voltage |
|---|---|
| ON | Battery voltage |
| OFF | 1V or less |

MTBL0372

**OK or NG**

| | | |
|---|---|---|
| OK (With CONSULT) | ▶ | GO TO 6. |
| OK (Without CONSULT) | ▶ | GO TO 7. |
| NG | ▶ | **Check the following items:**<br>● A/T check switch<br>Refer to "Component Inspection", AT-192.<br>● Harness continuity between TCM and A/T check switch<br>● Harness continuity of ground circuit for A/T check switch |

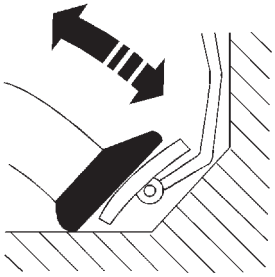
**6** **CHECK THROTTLE POSITION SWITCH CIRCUIT (With CONSULT)**

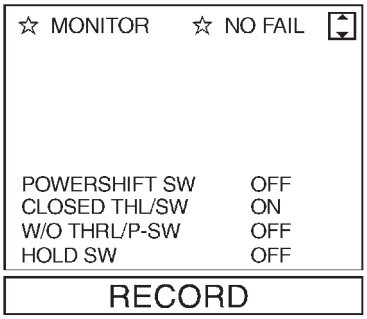
**With CONSULT**

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

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

MTBL0011






SAT052I

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 8. |
| NG | ▶ | **Check the following items:**<br>● Throttle position switch<br>Refer to "Component Inspection", AT-192.<br>● Harness for short or open between ignition switch and throttle position switch (Main harness)<br>● Harness for short or open between throttle position switch and TCM (Main harness) |

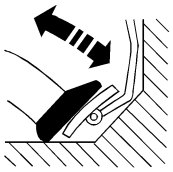
| 7 | CHECK THROTTLE POSITION SWITCH CIRCUIT (Without CONSULT) |
|---|---|

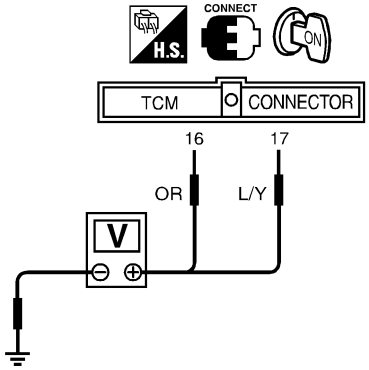
**Without CONSULT**

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

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

MTBL0206






SAT526JA

**OK or NG**

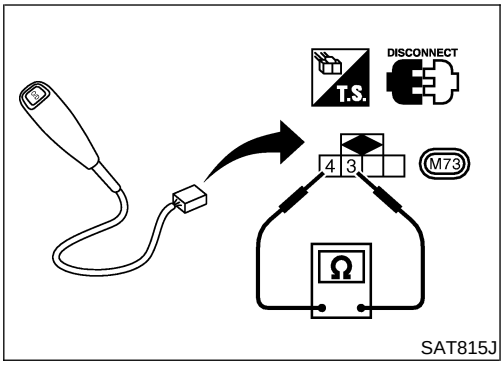
| | | |
|---|---|---|
| OK | ▶ | GO TO 8. |
| NG | ▶ | **Check the following items:**<br>● Throttle position switch<br>Refer to "Component Inspection", AT-192.<br>● Harness for short or open between ignition switch and throttle position switch (Main harness)<br>● Harness for short or open between throttle position switch and TCM (Main harness) |

| 8 | CHECK DTC |
|---|---|

Perform Diagnostic procedure, AT-184.

**OK or NG**

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



SAT815J

## COMPONENT INSPECTION

### Overdrive Control Switch — For RHD Model

NEAT0204S04

NEAT0204S0401

- Check continuity between two terminals.

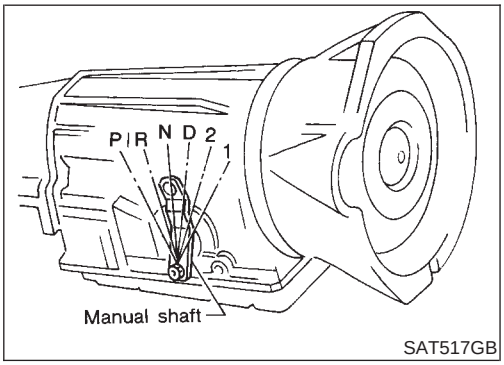
**Continuity:**

**Switch position "ON":**

**No**

**Switch position "OFF":**

**Yes**



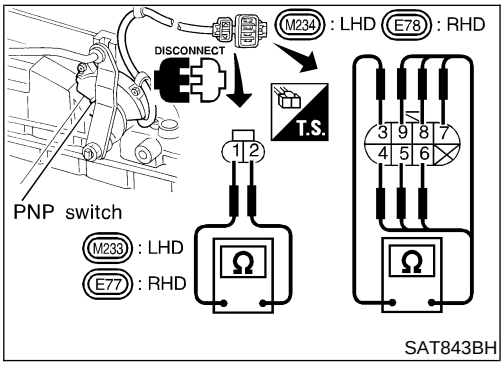
SAT517GB

### Park/Neutral Position Switch

NEAT0204S0402

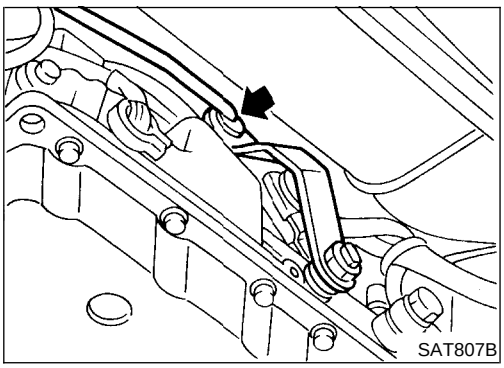
1. Check continuity between terminals 1 and 2 and between terminals 3 and 4, 5, 6, 7, 8, 9 while moving manual shaft through each position.

| 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 | |

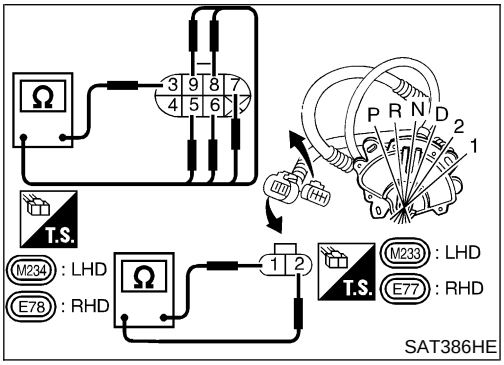


SAT843BH

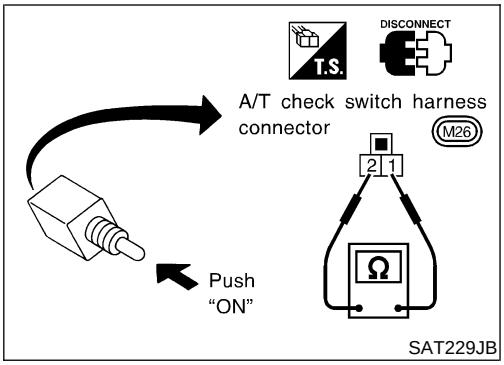
2. If NG, check again with manual control linkage disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control linkage. Refer to AT-202.


SAT807B

4. If NG on step 2, remove PNP switch from A/T and check continuity of PNP switch terminals. Refer to step 1.
5. If OK on step 4, adjust PNP switch. Refer to AT-202.
6. If NG on step 4, replace PNP switch.



SAT386HE

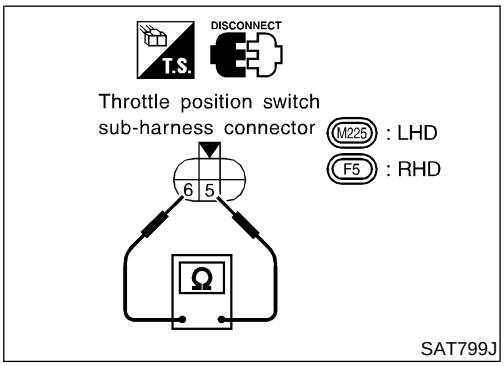



## A/T Check Switch — For LHD Model

NEAT0204S0405

- Check continuity between terminals 1 and 2.

| Switch position | Continuity |
|---|---|
| ON | Yes |
| OFF | No |




## Throttle Position Switch

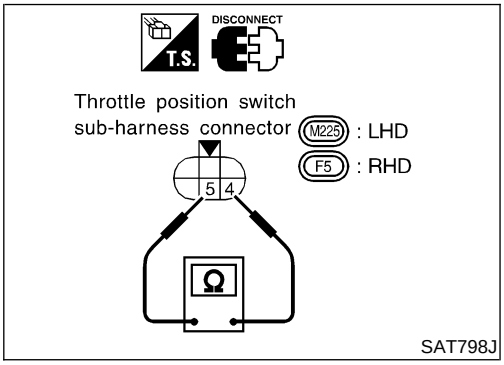
NEAT0204S0403

### Closed Throttle Position Switch (Idle Position)

- Check continuity between terminals 5 and 6.

| Accelerator pedal condition | Continuity |
|---|---|
| Released | Yes |
| Depressed | No |

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




### Wide Open Throttle Position Switch

- Check continuity between terminals 4 and 5.

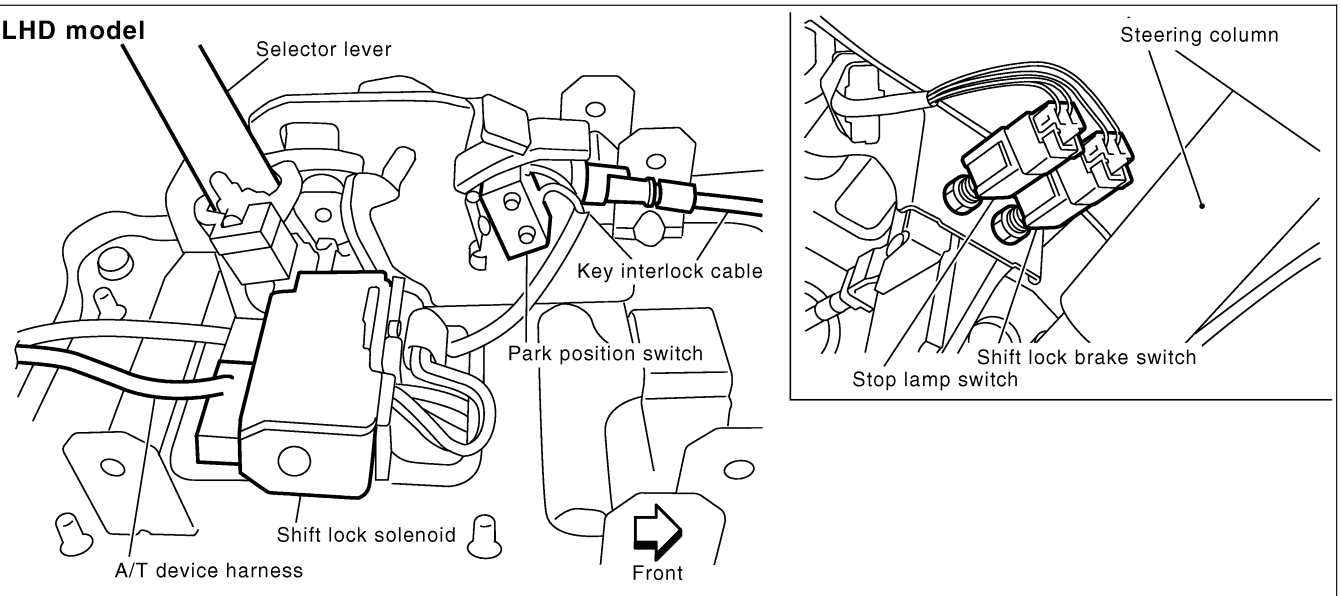
| Accelerator pedal condition | Continuity |
|---|---|
| Released | No |
| Depressed | Yes |

## Description

NEAT0093

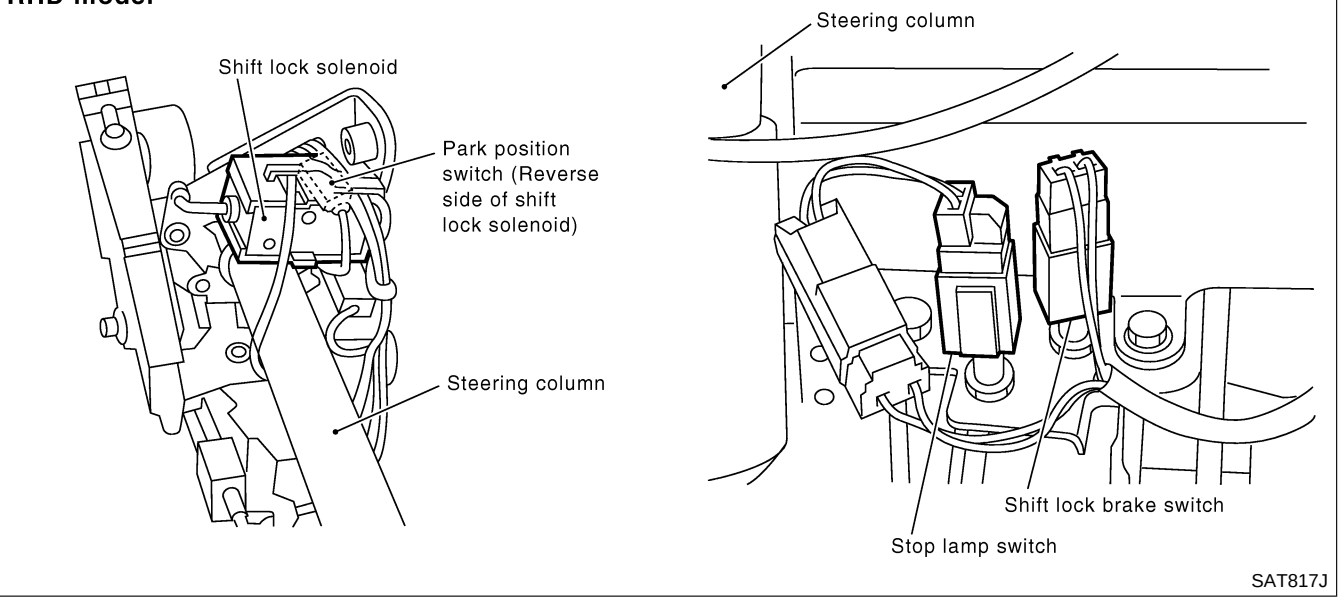
- The mechanical key interlock mechanism also operates as a shift lock:
  With the key switch turned to “ON”, the selector lever cannot be shifted from “P” (parking) to any other position unless the brake pedal is depressed.
  With the key removed, the selector lever cannot be shifted from “P” to any 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.

**LHD model**




SAT816J

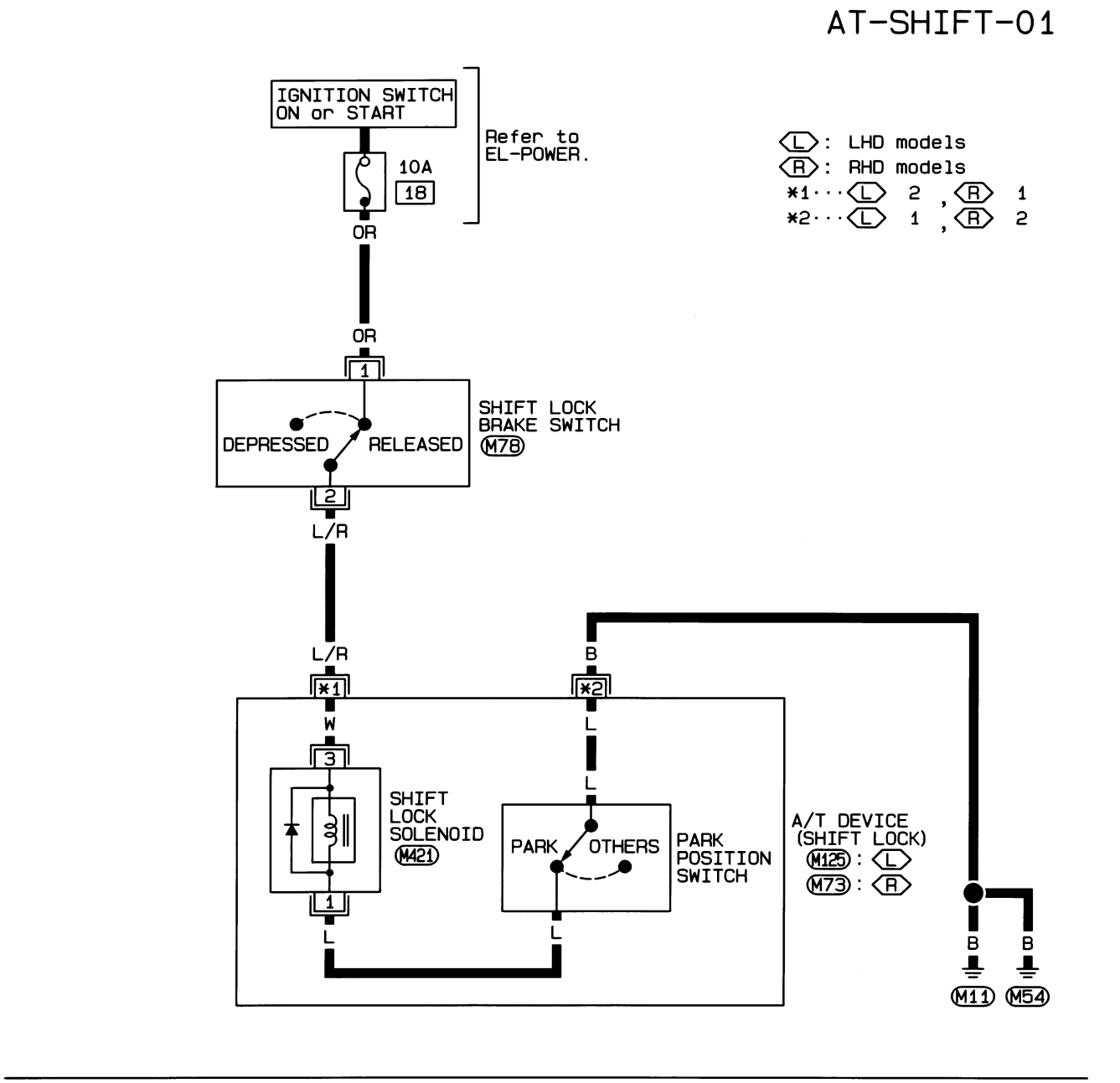
**RHD model**




SAT817J

## Wiring Diagram — SHIFT —

NEAT0094



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

HAT070

## Diagnostic Procedure

NEAT0095

**SYMPTOM 1:**

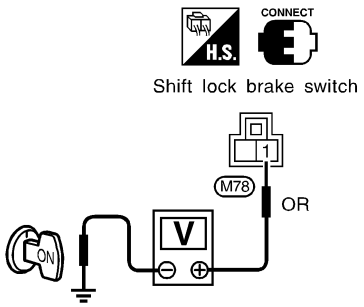
- **Selector lever cannot be moved from “P” position with key in “ON” position and brake pedal applied.**
- **Selector lever can be moved from “P” position with key in “ON” position and brake pedal released.**
- **Selector lever can be moved from “P” position when key is removed from key cylinder.**

**SYMPTOM 2:**

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

| 1 | CHECK KEY INTERLOCK CABLE | |
|---|---|---|
| Check key interlock cable for damage.<br>**OK or NG** | | |
| OK | ▶ | GO TO 2. |
| NG | ▶ | Repair key interlock cable. Refer to “Key Interlock Cable”, AT-198. |

| 2 | CHECK SELECTOR LEVER POSITION | |
|---|---|---|
| Check selector lever position for damage.<br>**OK or NG** | | |
| OK | ▶ | GO TO 3. |
| NG | ▶ | Check selector lever. Refer to “ON-VEHICLE SERVICE — Inhibitor Switch and Manual Control Linkage Adjustment”, AT-202 and AT-202. |

| 3 | CHECK POWER SOURCE | |
|---|---|---|
| 1. Turn ignition switch to “ON” position.<br>(Do not start engine.)<br>2. Check voltage between shift lock brake switch harness terminal 1 and ground.<br>  <br><br>SAT917HQ<br>**Does battery voltage exist?** | | |
| Yes | ▶ | GO TO 4. |
| No | ▶ | **Check the following items:**<br>● Harness for short or open between battery and shift lock brake switch harness terminal 1<br>● Fuse<br>● Ignition switch (Refer to EL section.) |

*Diagnostic Procedure (Cont'd)*

| 4 | CHECK INPUT SIGNAL (BRAKE SWITCH) |
|---|---|

Turn ignition switch to "ON" position.
(Do not start engine.)

- Check voltage between A/T device harness terminal 2 (1) and ground.

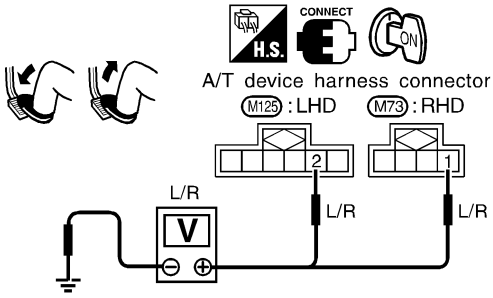
**Voltage:**

**Brake pedal depressed:**

**0V**

**Brake pedal released:**

**Battery voltage**



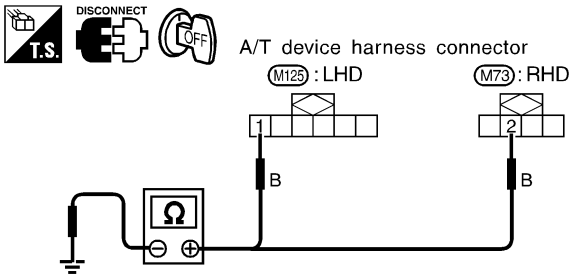

SAT818J

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 5. |
| NG | ▶ | **Check the following items:**<br>• Harness for short or open between A/T device harness connector 2 (1) and shift lock brake switch harness connector 2<br>• Shift lock brake switch<br>(Refer to "Component Check", AT-197.) |

| 5 | CHECK GROUND CIRCUIT |
|---|---|

1. Turn ignition switch to "OFF" position.
2. Disconnect A/T device harness connector.
3. Check continuity between A/T device harness terminal 1 (2) and ground.




SAT819J

**OK or NG**

| | | |
|---|---|---|
| OK | ▶ | GO TO 6. |
| NG | ▶ | Repair harness or connector. |

| 6 | CHECK PARK POSITION SWITCH |
|---|---|

(Refer to "Component Check", AT-197.)

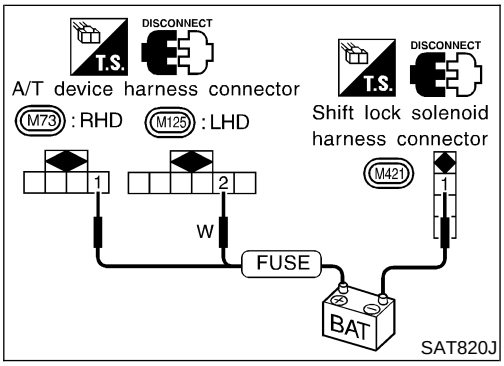
**OK or NG**

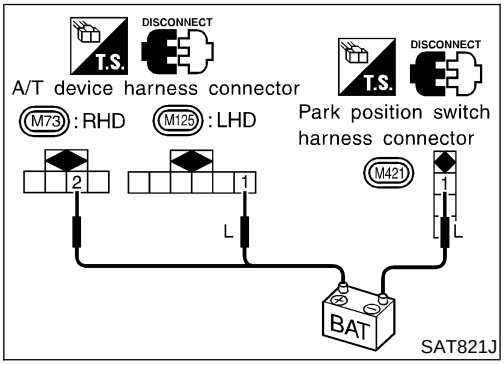
| | | |
|---|---|---|
| OK | ▶ | GO TO 7. |
| NG | ▶ | Replace park position switch. |

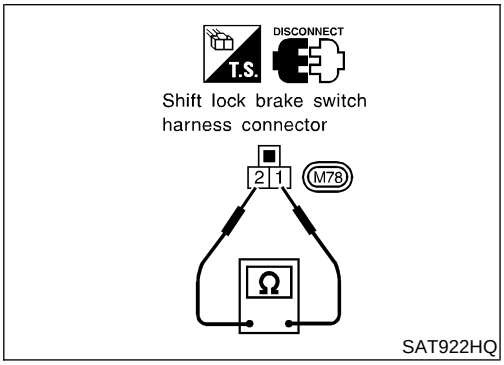
| 7 | CHECK SHIFT LOCK SOLENOID | |
|---|---|---|
| (Refer to "Component Check", AT-197.) | | |
| **OK or NG** | | |
| OK | ▶ | GO TO 8. |
| NG | ▶ | Replace shift lock solenoid. |

| 8 | CHECK SHIFT LOCK OPERATION | |
|---|---|---|
| 1. Reconnect shift lock harness connector.<br>2. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.)<br>3. Recheck shift lock operation. | | |
| **OK or NG** | | |
| OK | ▶ | **INSPECTION END** |
| NG | ▶ | 1. Perform A/T device input/output signal inspection test.<br>2. If NG, recheck harness connector connection. |






## Component Check

NEAT0096

### SHIFT LOCK SOLENOID

NEAT0096S01

- Check operation by applying battery voltage between shift lock solenoid harness connector terminal 1 and A/T device harness connector terminal 2 (1).

### PARK POSITION SWITCH

NEAT0096S02

- Check continuity between park position switch harness connector terminal 1 and A/T device harness connector terminal 1 (2).

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

### SHIFT LOCK BRAKE SWITCH

NEAT0096S03

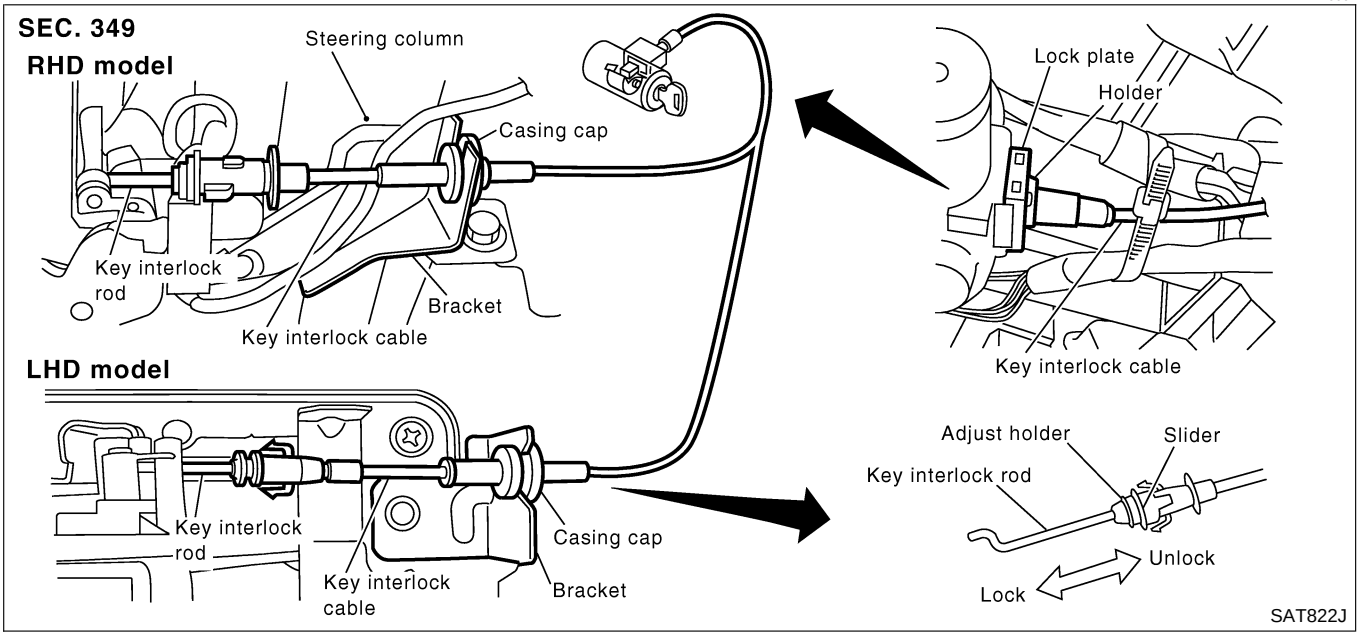
- Check continuity between shift lock brake switch harness connector terminals 1 and 2.

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

**Check shift lock brake switch after adjusting brake pedal — refer to BR section.**

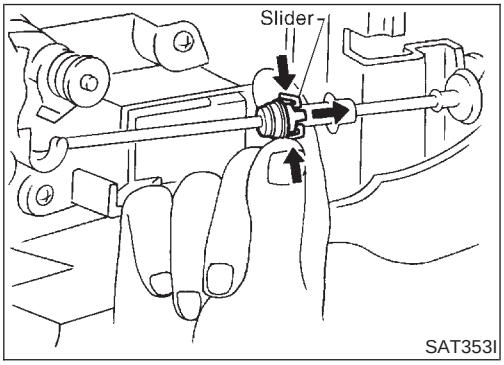
## Components

NEAT0097




**CAUTION:**

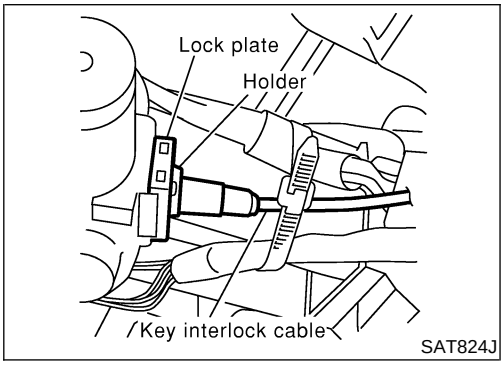
- **Install key interlock cable in such a way that it will not be damaged by sharp bends, twists or interference with adjacent parts.**
- **After installing key interlock cable to control device, make sure that casing cap and bracket are firmly secured in their positions. If casing cap can be removed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




## Removal

NEAT0098

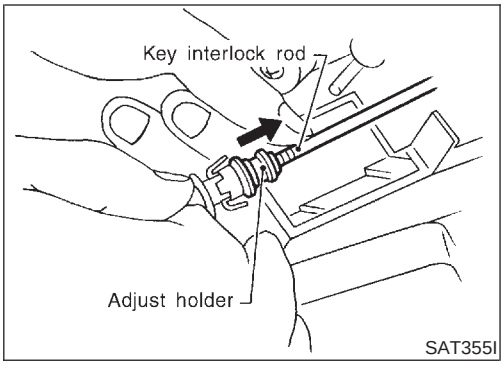
Unlock slider from adjuster holder and remove rod from cable.



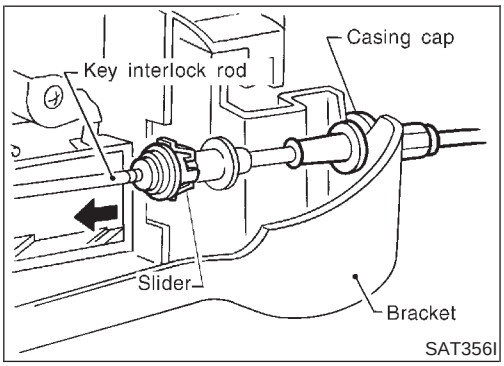

## Installation

NEAT0099

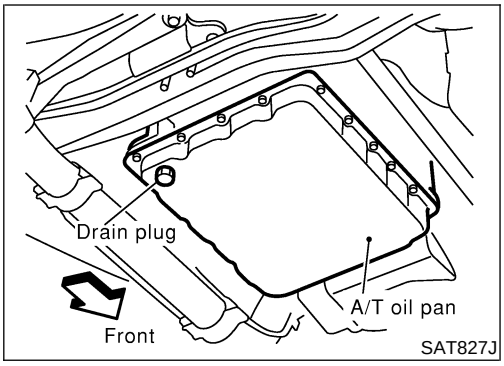
1. Set key interlock cable to steering lock assembly and install lock plate.
2. Clamp cable to steering column and fix to control cable with band.
3. Set selector lever to P position.




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.



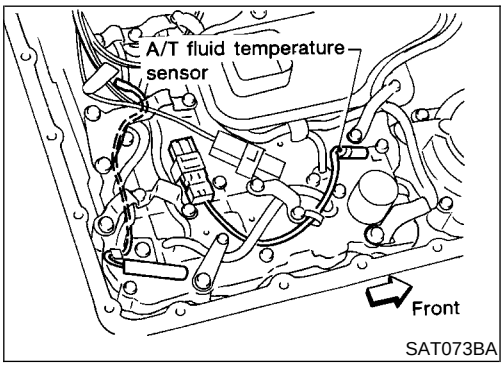

# Control Valve Assembly and Accumulators

NEAT0100

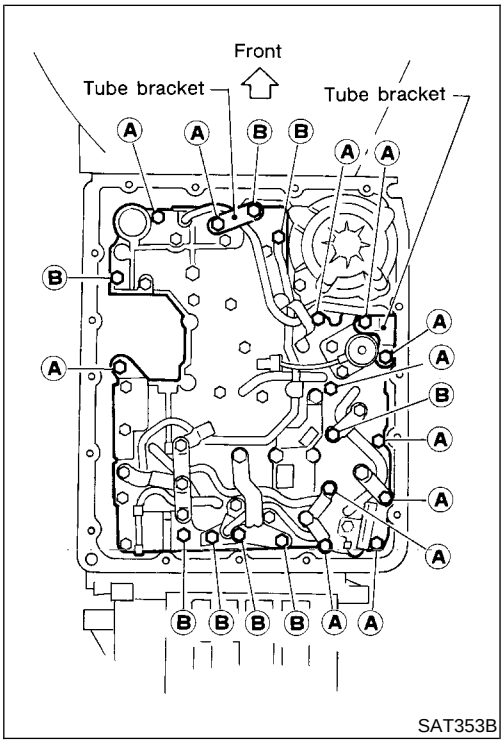
## REMOVAL

NEAT0100S01

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




3. Remove A/T fluid temperature sensor if necessary.
4. Remove oil strainer.

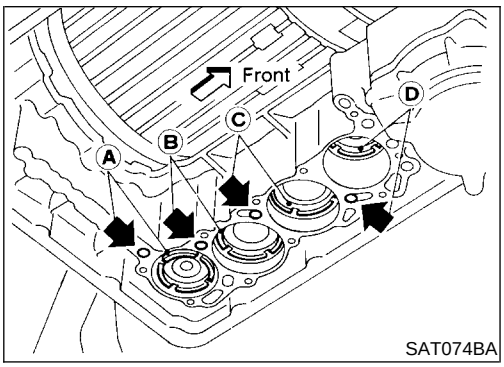



5. Remove control valve assembly by removing fixing bolts and disconnecting harness connector.

**Bolt length and location**

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

6. Remove solenoids and valves from valve body if necessary.
7. Remove terminal cord assembly if necessary.

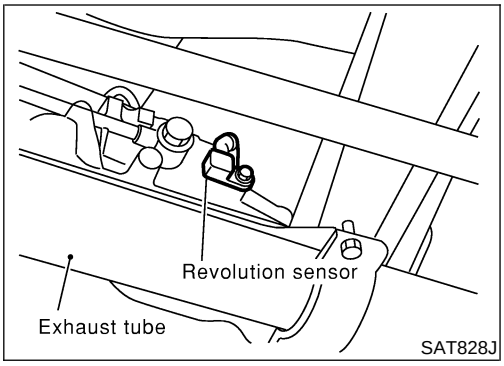



8. Remove accumulator **A, B, C** and **D** by applying compressed air if necessary.

- **Hold each piston with rag.**

9. Reinstall any part removed.

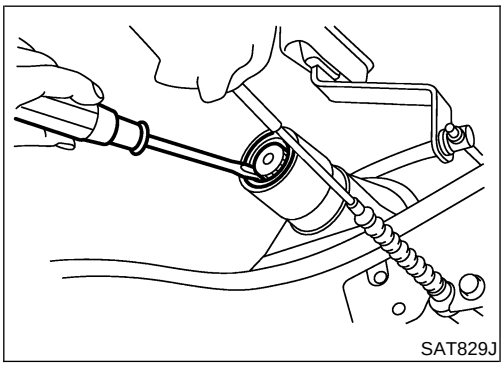
- **Always use new sealing parts.**




## Revolution Sensor Replacement

NEAT0210

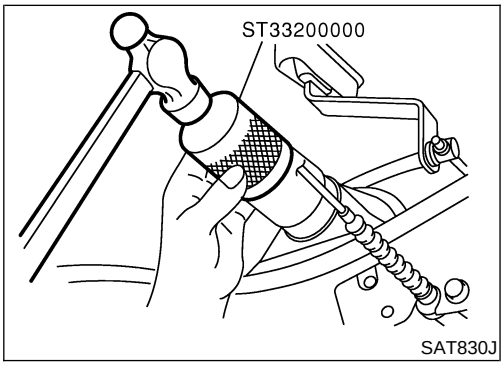
- Remove revolution sensor from A/T.
- **Always use new sealing parts.**



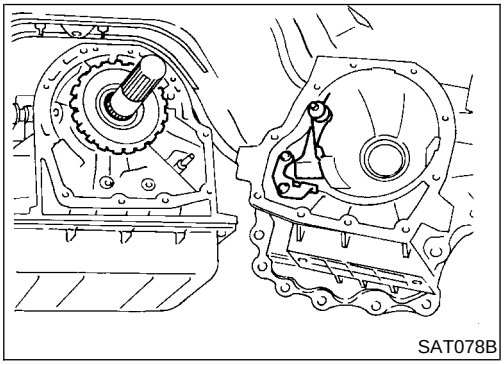

## Rear Oil Seal Replacement

NEAT0211

1. Remove propeller shaft. Refer to PD section (“Removal”, “PROPELLER SHAFT”).
2. Remove rear oil seal.



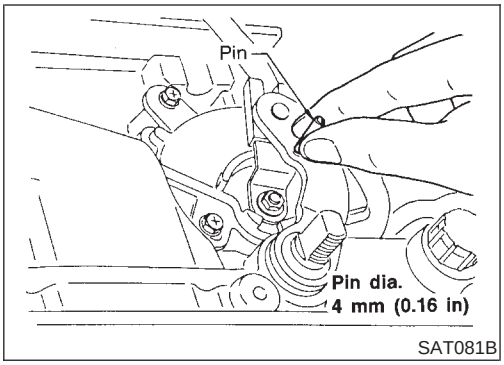

3. Install rear oil seal.
- **Apply ATF before installing.**
4. Reinstall all removed parts.
- Always use new sealing parts.




## Parking Components Inspection

NEAT0213

1. Remove propeller shaft from vehicle. Refer to PD section (“Removal”, “PROPELLER SHAFT”).
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 section (“ENGINE REMOVAL”).
4. Remove rear extension assembly.
5. Replace parking components if necessary.
6. Reinstall any part removed.
- **Always use new sealing parts.**




## Park/Neutral Position Switch Adjustment

NEAT0104

1. Remove manual control linkage from manual shaft of A/T assembly.
2. Set manual shaft of A/T assembly in “N” position.
3. Loosen PNP switch fixing bolts.
4. Insert pin into adjustment holes in both PNP switch and manual shaft of A/T assembly as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of PNP switch. Refer to “Components Inspection”, AT-191.

## Manual Control Linkage Adjustment

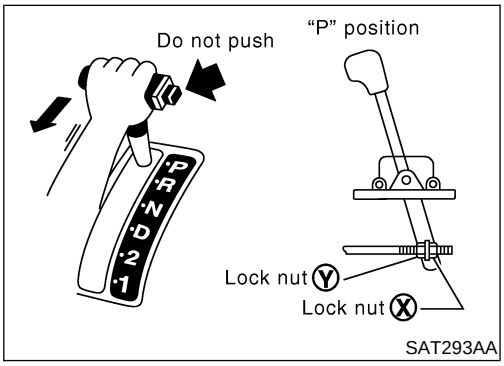
NEAT0105

### FLOOR SHIFT MODEL

NEAT0105S01

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

1. Place selector lever in “P” position.
2. Loosen lock nuts.




3. Tighten lock nut X until it touches trunnion, pulling selector lever toward “R” position side without pushing button.
4. Back off lock nut X 1 turn and tighten lock nut Y to the specified torque.

   **Lock nut**

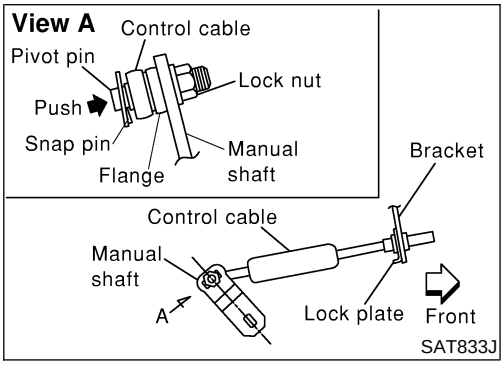
   **: 11 - 15 N·m (1.1 - 1.5 kg-m, 8 - 11 ft-lb)**
5. Move selector lever from “P” position to “1” position. Make sure that selector lever can move smoothly.

### COLUMN SHIFT MODEL

NEAT0105S02

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

1. Place selector lever in “P” position.
2. Loosen lock nuts.



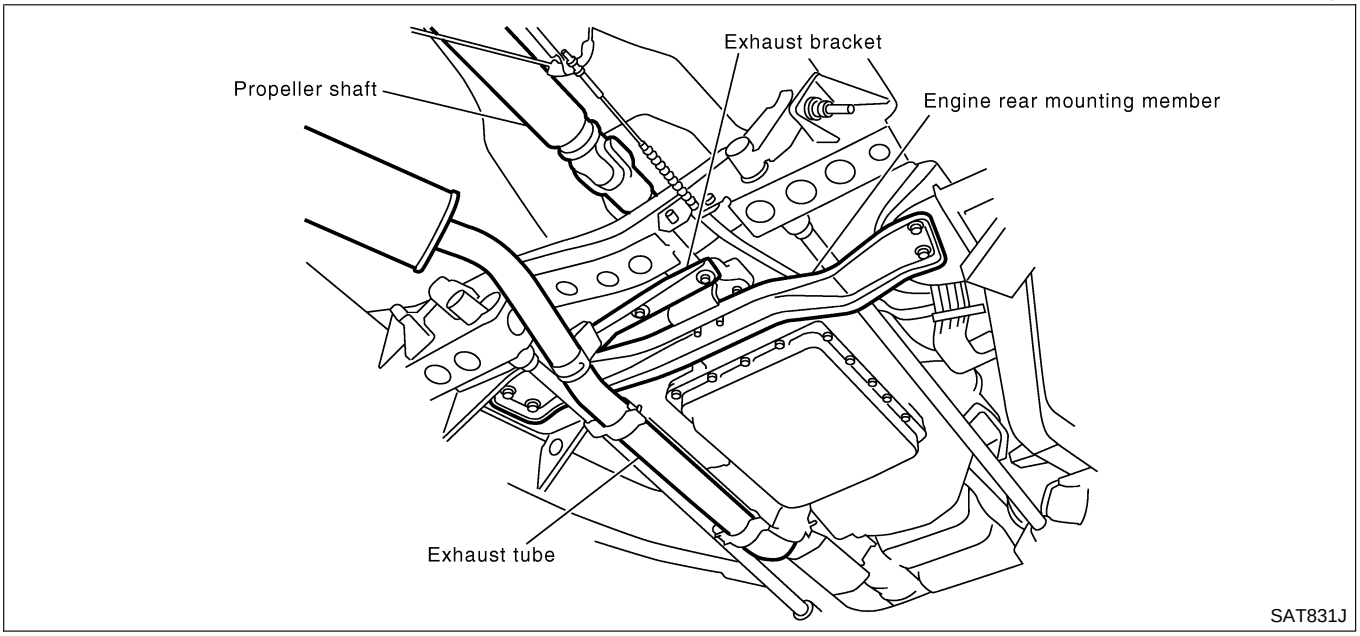

3. Push in the pivot pin until its flange hits the selector lever. Then, while holding in the pivot pin, tighten the lock nut to the specified torque.

   **Lock nut**

   **: 11 - 15 N·m (1.1 - 1.5 kg-m, 8 - 11 ft-lb)**
4. Move selector lever from “P” position to “1” position. Make sure that selector lever can move smoothly.

## Removal

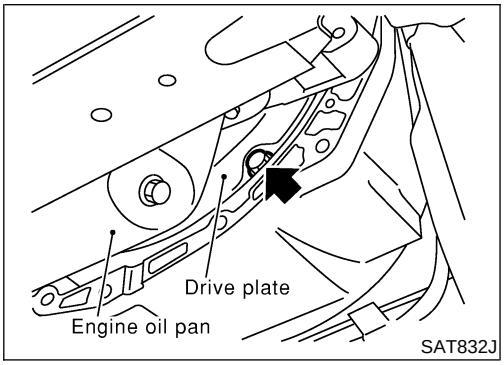
NEAT0214




1. Remove battery negative terminal.
2. Remove exhaust tube.
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 section (“Removal”, “PROPELLER SHAFT”).

- **Insert plug into rear oil seal after removing rear propeller shaft.**
- **Be careful not to damage spline, sleeve yoke and rear oil seal.**

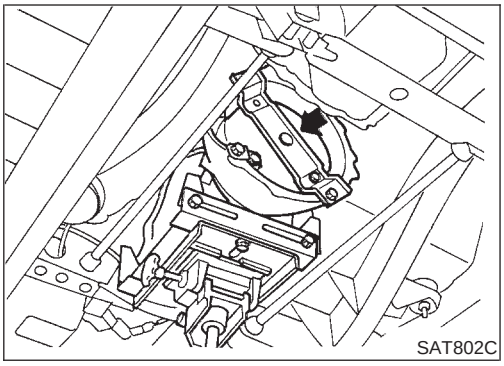
7. Remove A/T control cable from A/T assembly.
8. Disconnect PNP switch, solenoid, revolution sensor and speedometer sensor harness connectors.

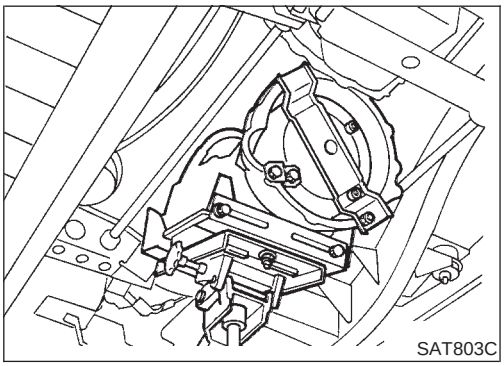



9. Remove starter motor.
10. Remove dust cover from A/T assembly.
11. Remove bolts securing torque converter to drive plate.

- **Remove the bolts by turning crankshaft.**

*Removal (Cont'd)*


SAT802C


SAT803C

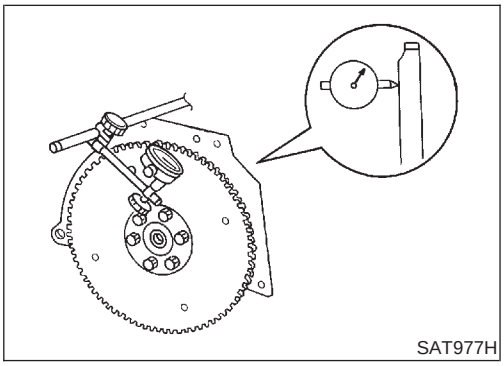
12. Support A/T with a jack.
13. Remove rear engine mounting member from body and A/T assembly. Tighten rear engine mounting member to the specified torque. Refer to EM section ("ENGINE REMOVAL").
14. Remove bolts securing A/T assembly to engine.

- **Secure torque converter to prevent it from dropping.**
- **Secure A/T assembly to a jack.**

15. Lower A/T assembly.

## Installation

NEAT0107

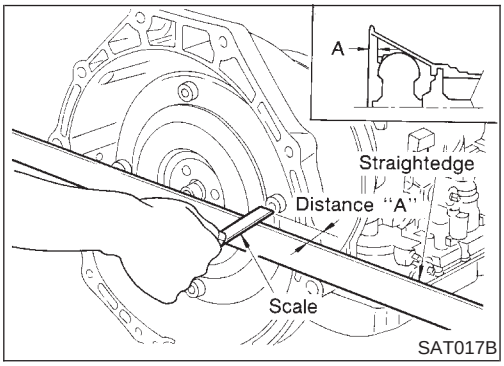

SAT977H

1. Drive plate runout

**Maximum allowable runout:**

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

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

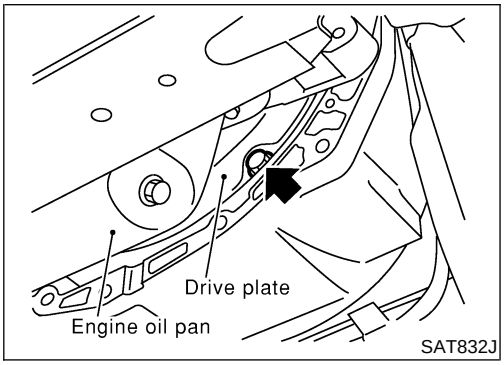


SAT017B

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

**Distance "A":**

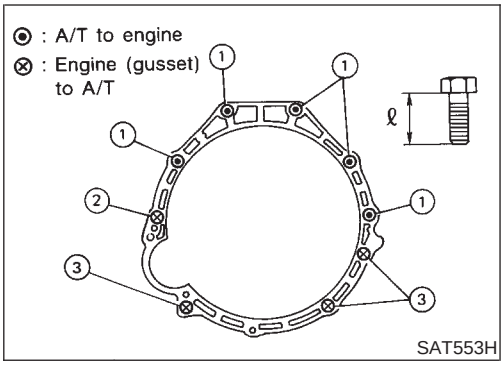
**26.0 mm (1.024 in) or more**

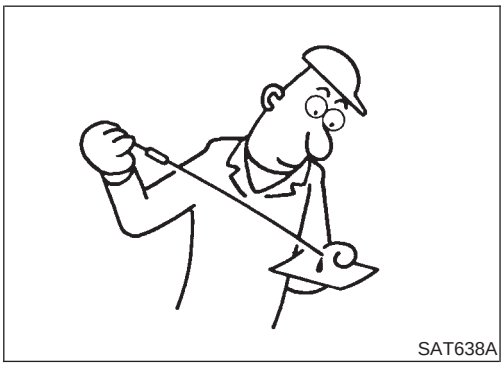


SAT832J

3. 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.**




4. Tighten bolts securing transmission.

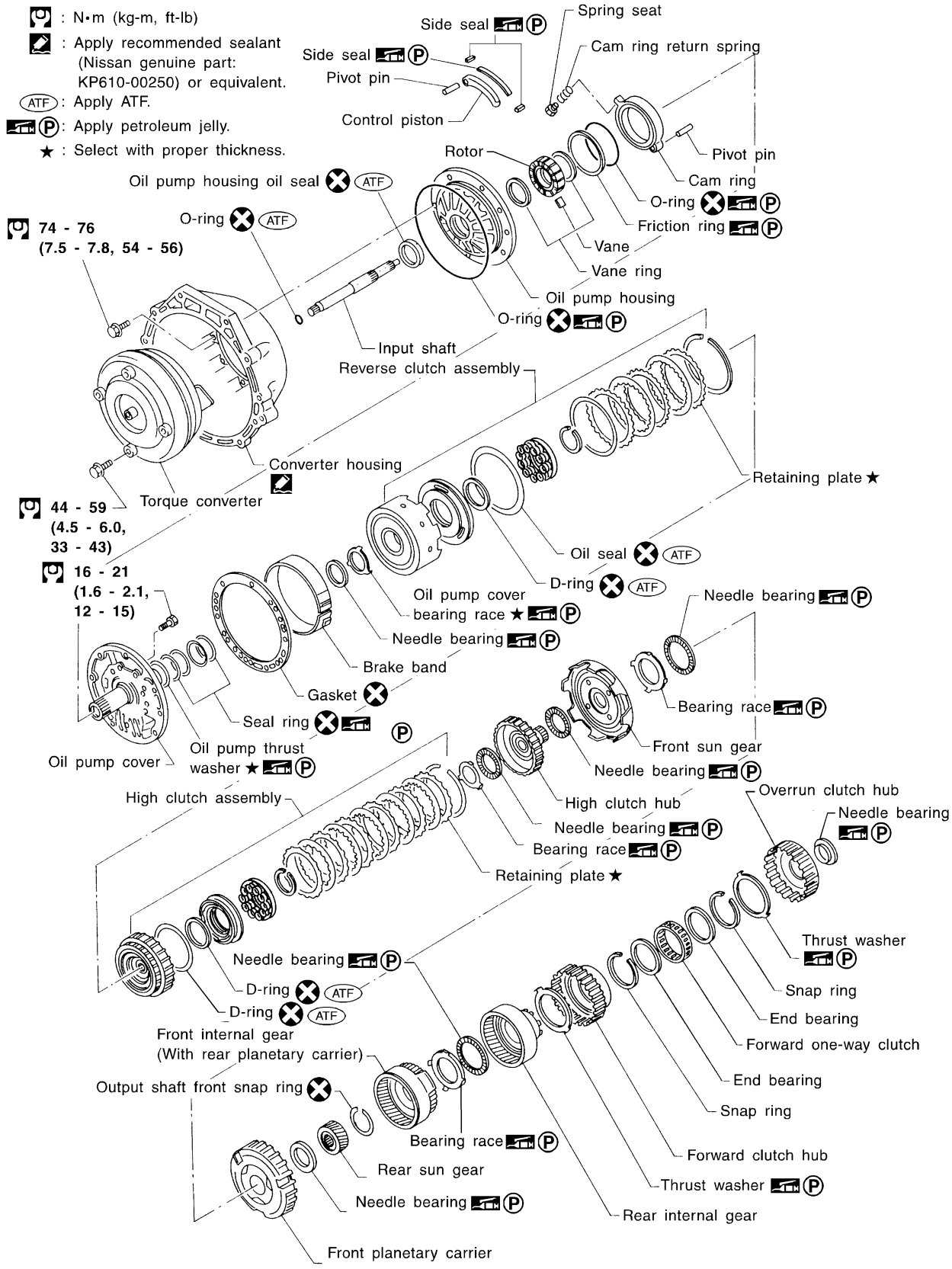
| Bolt No. | Tightening torque N·m (kg-m, ft-lb) | Bolt length "ℓ" mm (in) |
|---|---|---|
| 1 | 39 - 49 (4.0 - 5.0, 29 - 36) | 47.5 (1.870) |
| 2 | 39 - 49 (4.0 - 5.0, 29 - 36) | 58.0 (2.283) |
| 3 | 29 - 39 (3.0 - 4.0, 22 - 29) | 25.0 (0.984) |
| Gusset to engine | 29 - 39 (3.0 - 4.0, 22 - 29) | 20.0 (0.787) |

5. Reinstall any part removed.
6. Check fluid level in transmission.
7. 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.
8. Perform road test. Refer to "ROAD TEST", AT-53.

## Components

NEAT0108

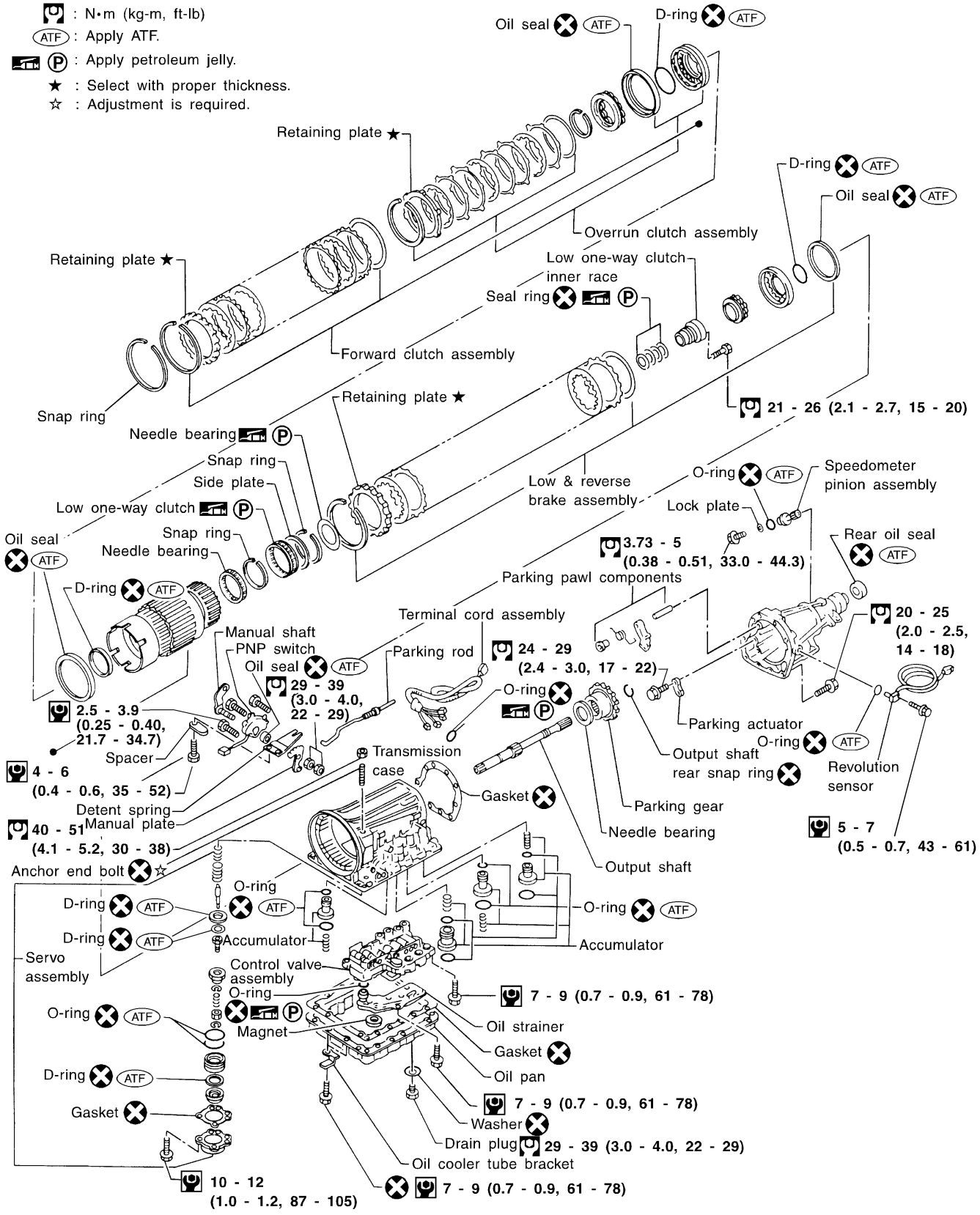
**SEC. 311•313•315**




SAT147JC

**SEC. 311•315•317**

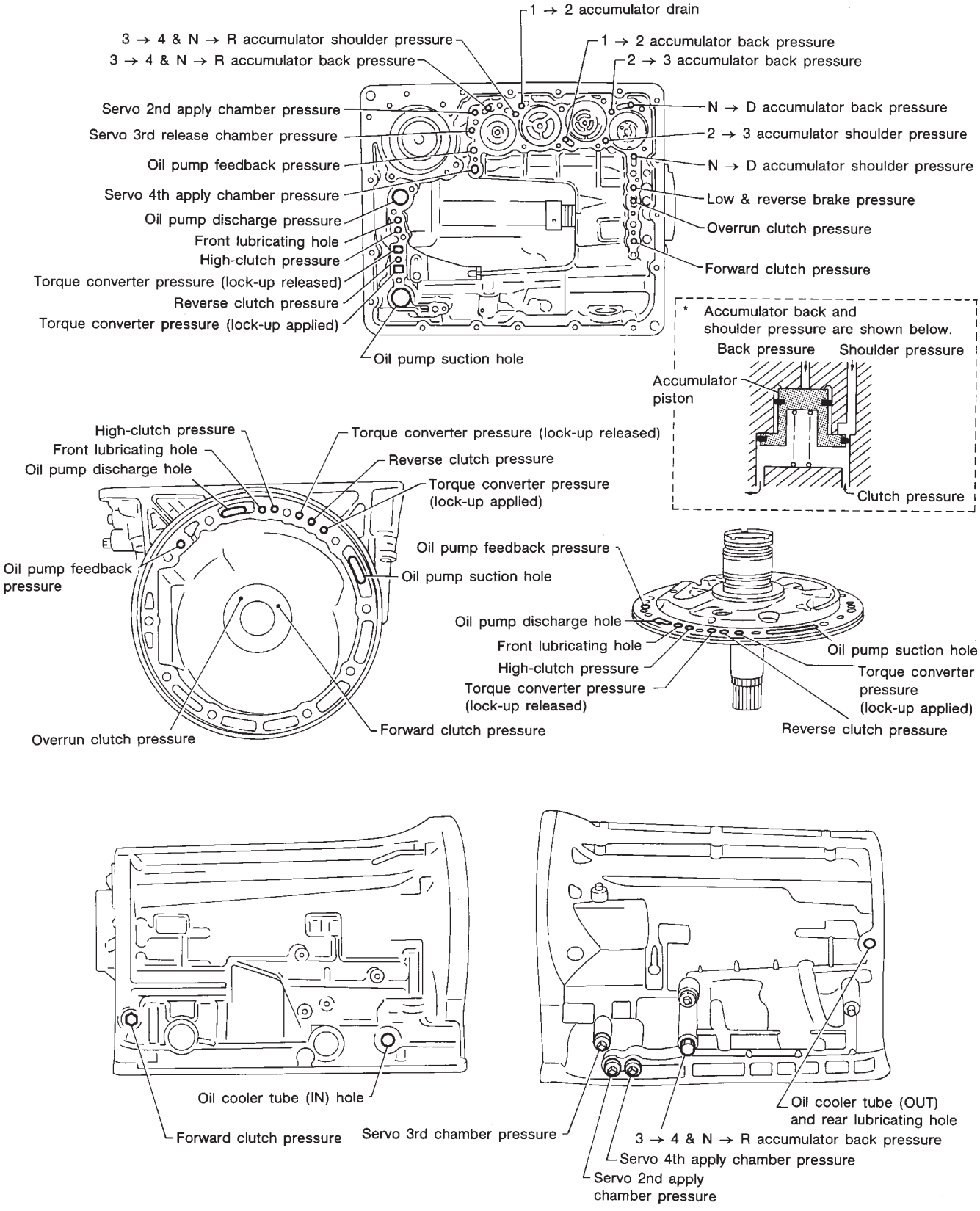
: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)
ATF : Apply ATF.
Ⓟ : Apply petroleum jelly.
★ : Select with proper thickness.
☆ : Adjustment is required.




SAT834J

# Oil Channel

NEAT0109




SAT185B

# Locations of Needle Bearings, Thrust Washers and Snap Rings

NEAT0110

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

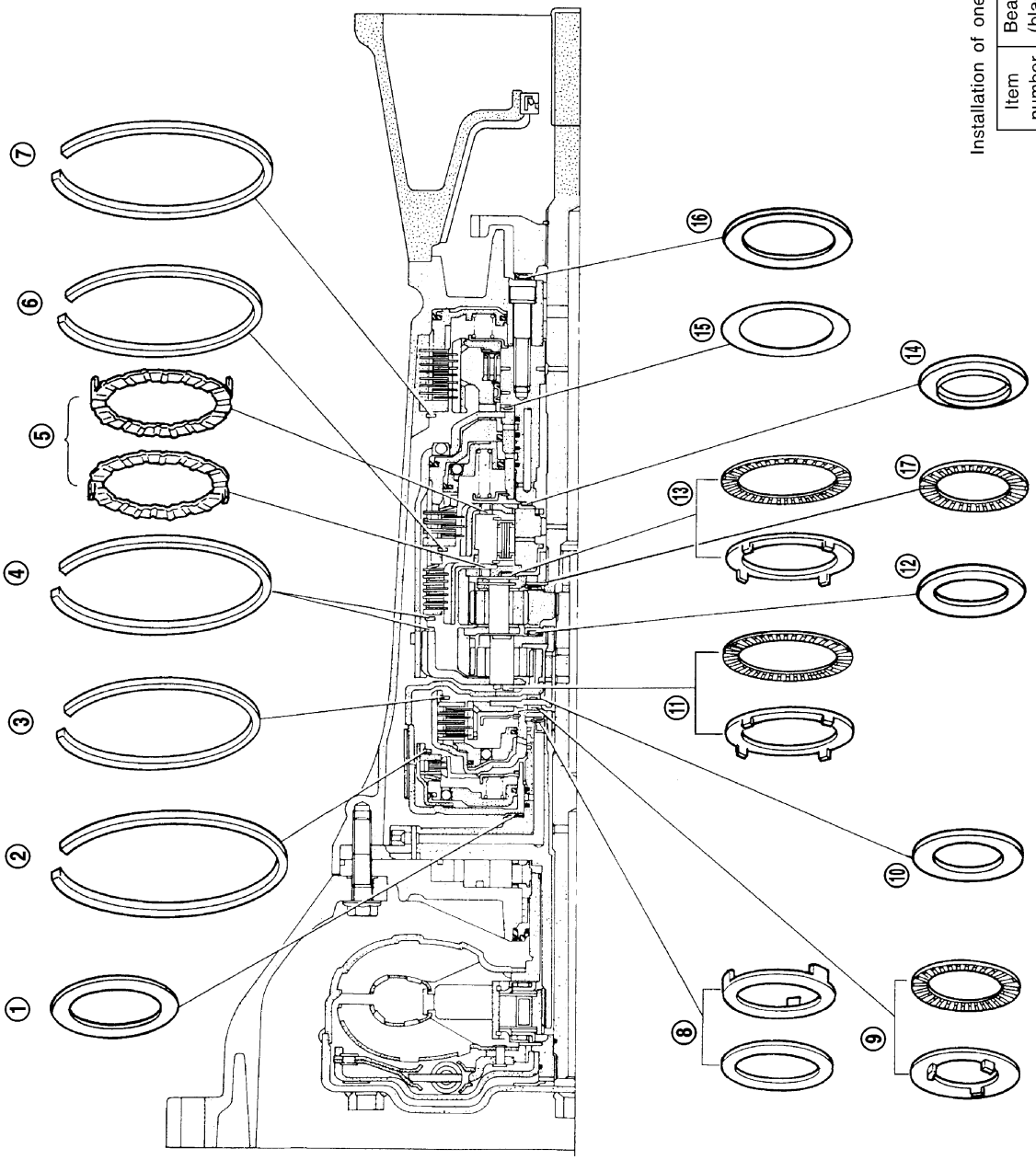
| Item number | Outer diameter mm (in) |
|---|---|
| ⑧ | 47 (1.85) |
| ⑨ | 53 (2.09) |
| ⑪ | 78 (3.07) |
| ⑫ | 53 (2.09) |
| ⑬ | 78 (3.07) |
| ⑭ | 59 (2.32) |
| ⑮ | 78 (3.07) |
| ⑯ | 64 (2.52) |
| ⑰ | 53 (2.09) |

Installation of one-piece bearings

| Item number | Bearing race (black) location |
|---|---|
| ⑩ | Front |
| ⑫ | Front |
| ⑮ | Rear side |
| ⑯ | Rear side |

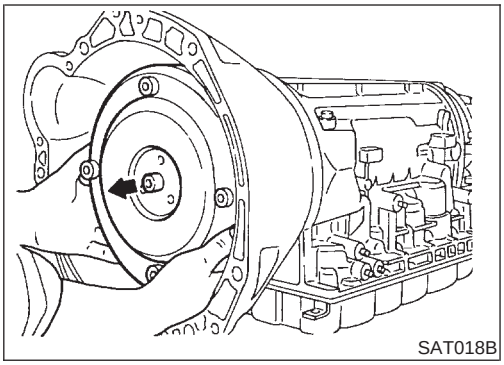
Inner diameter of bearing races

| Item number | Outer diameter mm (in) |
|---|---|
| ⑪ | 58 (2.283) |
| ⑬ | 58 (2.283) |

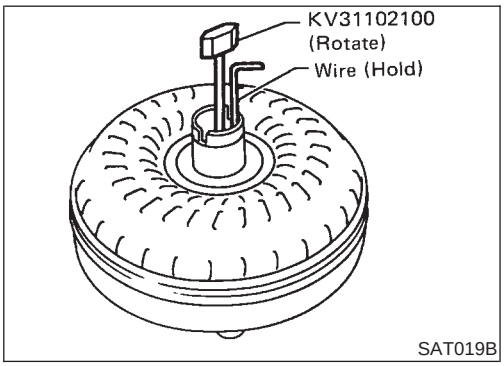



SAT140JA

# DISASSEMBLY


SAT018B

1. Drain ATF through drain plug.
2. Remove torque converter by holding it firmly and turning while pulling straight out.



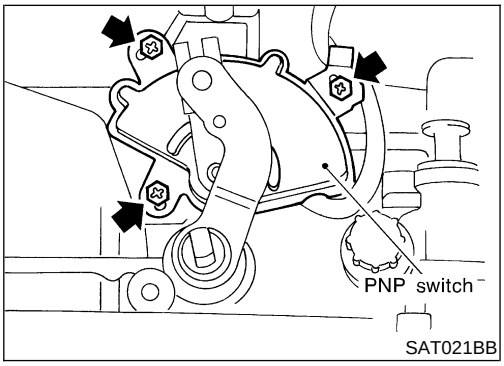
SAT019B

3. Check torque converter one-way clutch.

a. Insert Tool into spline of one-way clutch inner race.

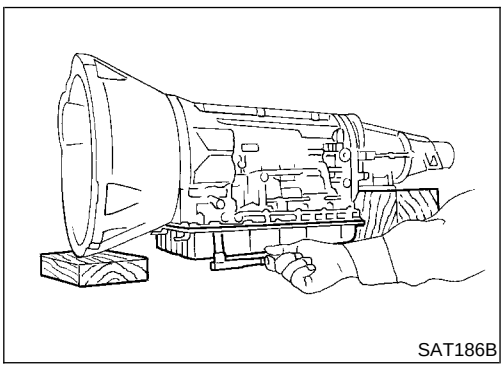
b. Hook bearing support unitized with one-way clutch outer race with suitable wire.

c. Check that one-way clutch inner race rotates only clockwise with Tool while holding bearing support with wire.



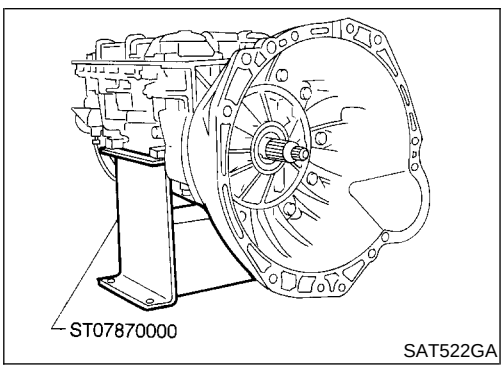
SAT021BB

4. Remove PNP switch from transmission case.


SAT186B

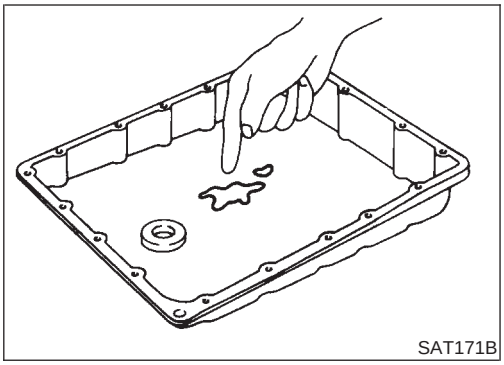
5. Remove oil pan.

- Always place oil pan straight down so that foreign particles inside will not move.

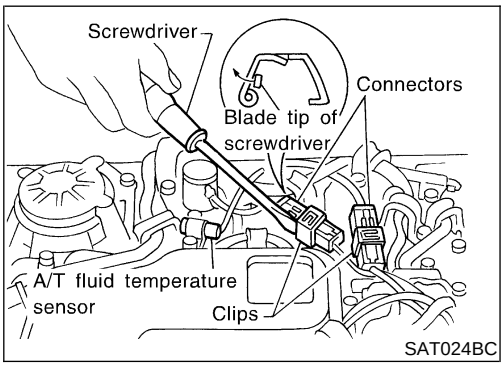


SAT522GA

6. Place transmission into Tool with the control valve facing up.

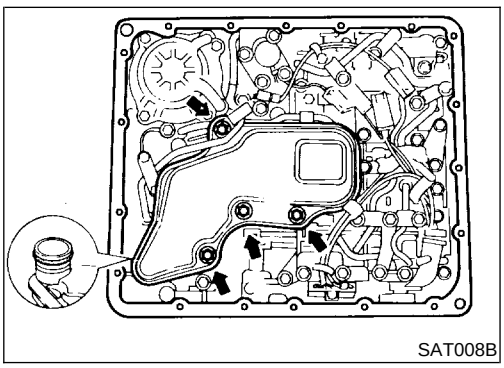

SAT171B

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

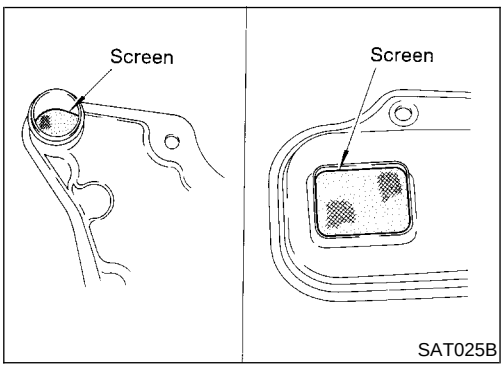


SAT024BC

8. Remove torque converter clutch solenoid valve and A/T fluid temperature sensor connectors.
- **Be careful not to damage connector.**

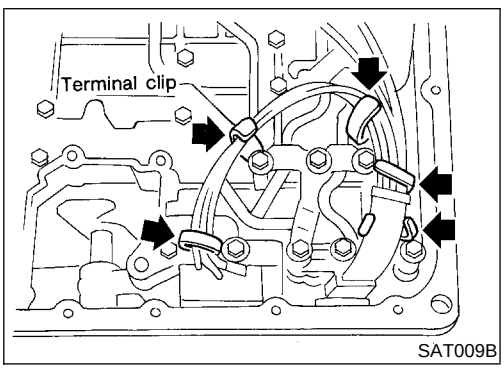

SAT008B

9. Remove oil strainer.
a. Remove oil strainer from control valve assembly. Then remove O-ring from oil strainer.



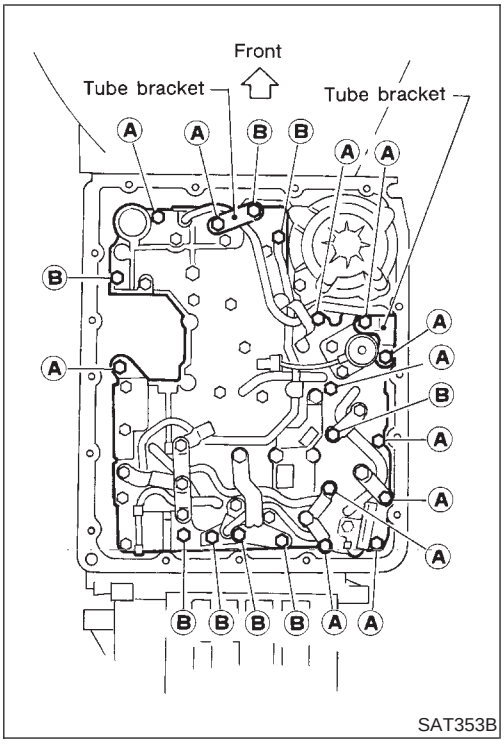
SAT025B

b. Check oil strainer screen for damage.



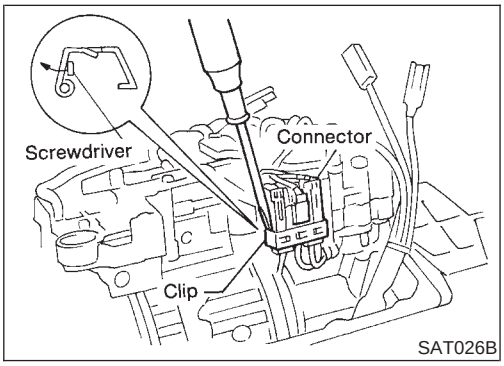
SAT009B

10. Remove control valve assembly.
a. Straighten terminal clips to free terminal cords then remove terminal clips.



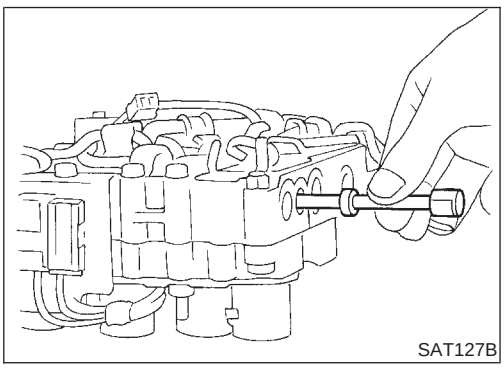

b. Remove bolts A and B, and remove control valve assembly from transmission.

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

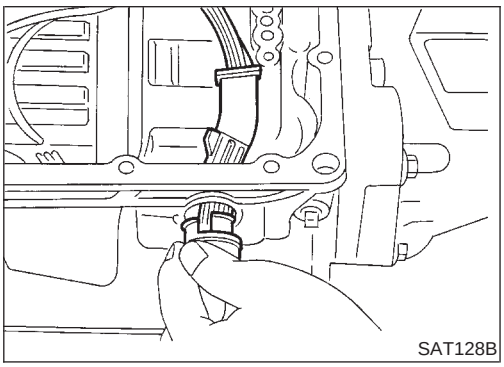



c. Remove solenoid connector.

- **Be careful not to damage connector.**

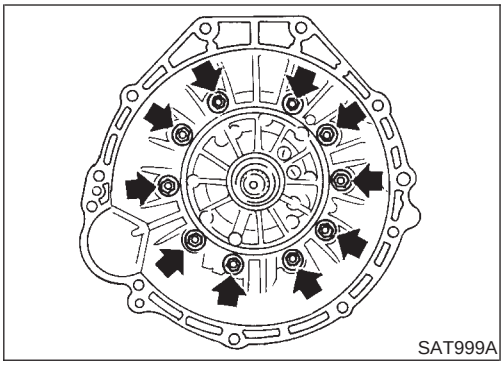



d. Remove manual valve from control valve assembly.

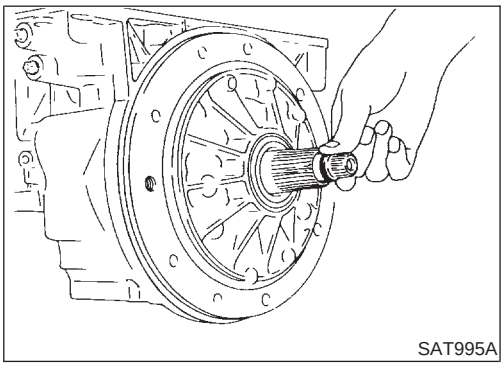



11. Remove terminal cord assembly from transmission case while pushing on stopper.

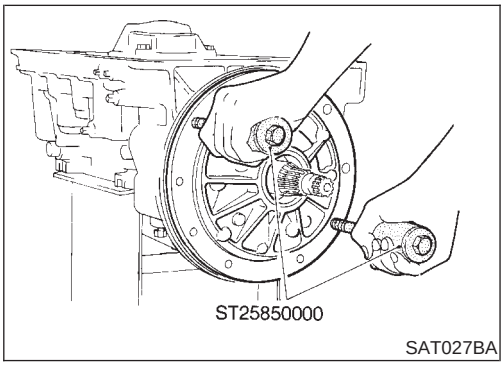
- **Be careful not to damage cord.**
- **Do not remove terminal cord assembly unless it is damaged.**


SAT999A

12. Remove converter housing from transmission case.
- **Be careful not to scratch converter housing.**

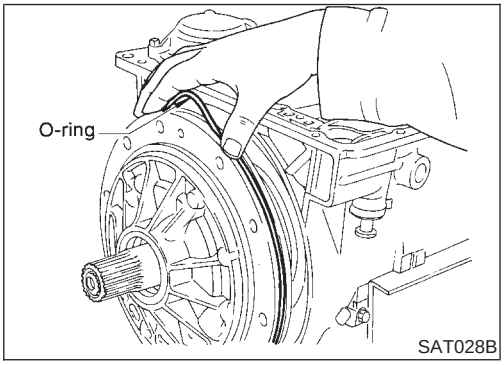

SAT995A

13. Remove O-ring from input shaft.



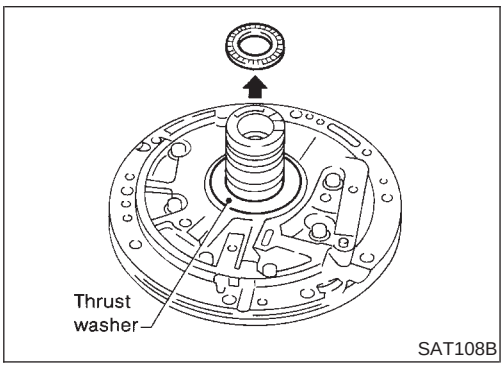
SAT027BA

14. Remove oil pump assembly.
a. Attach Tool to oil pump assembly and extract it evenly from transmission case.



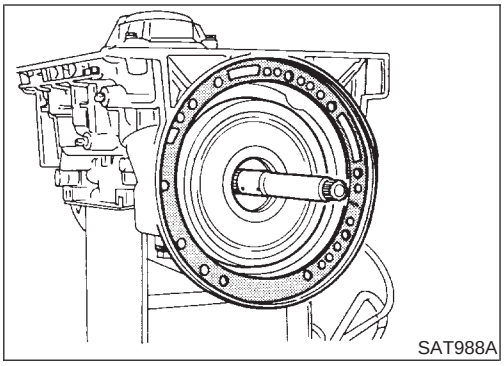
SAT028B

b. Remove O-ring from oil pump assembly.
c. Remove traces of sealant from oil pump housing.
- **Be careful not to scratch pump housing.**

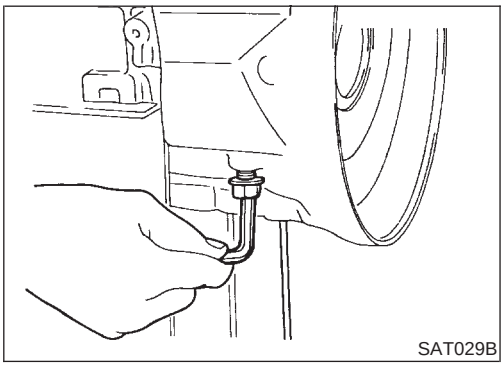


SAT108B

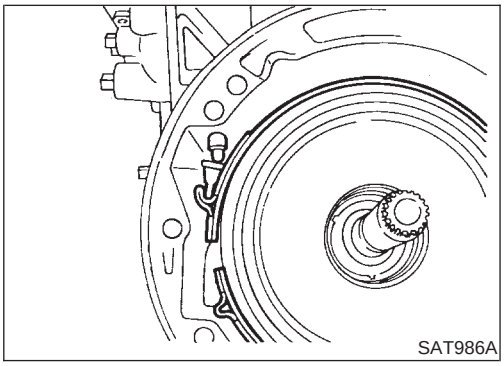
d. Remove needle bearing and thrust washer from oil pump assembly.


SAT988A

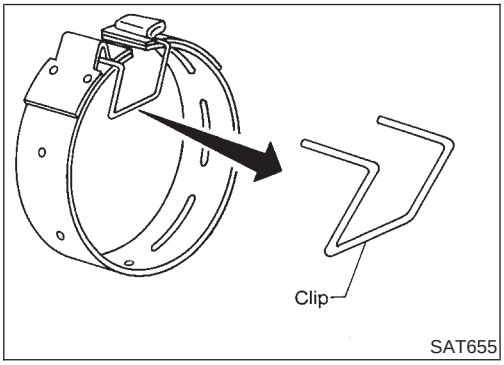
15. Remove input shaft and oil pump gasket.


SAT029B

16. Remove brake band and band strut.
a. Loosen lock nut and remove band servo anchor end pin from transmission case.

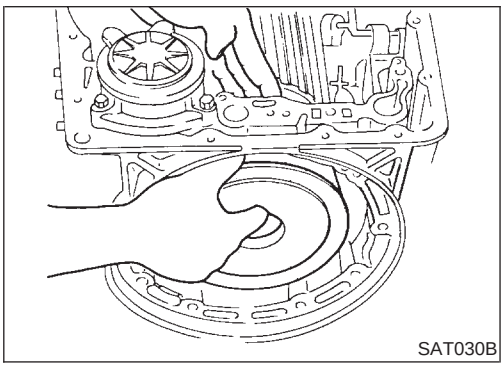

SAT986A

b. Remove brake band and band strut from transmission case.

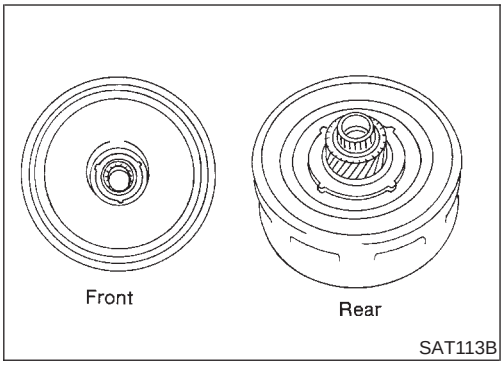


SAT655

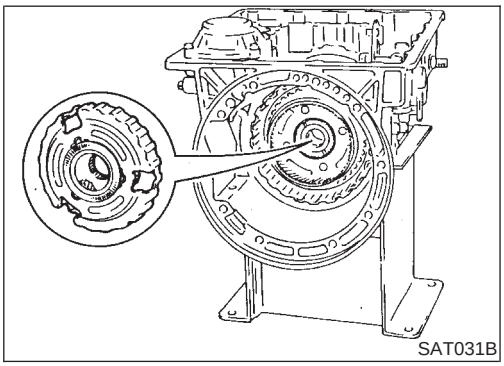
c. Hold brake band in a circular shape with clip.


SAT030B

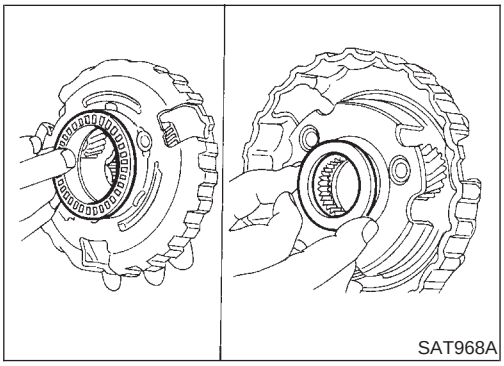
17. Remove front side clutch and gear components.
a. Remove clutch pack (reverse clutch, high clutch and front sun gear) from transmission case.



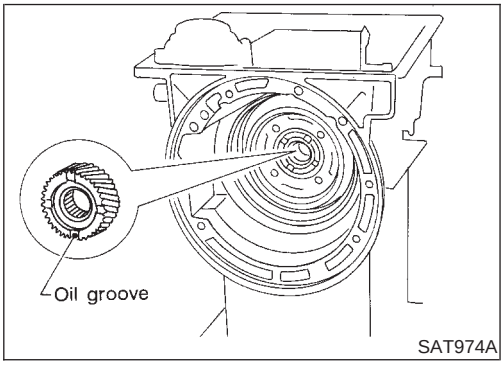

b. Remove front bearing race from clutch pack.
c. Remove rear bearing race from clutch pack.



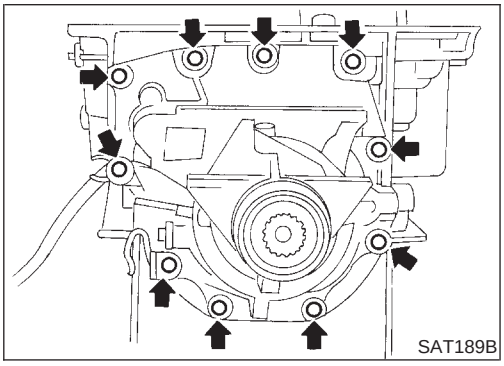

d. Remove front planetary carrier from transmission case.



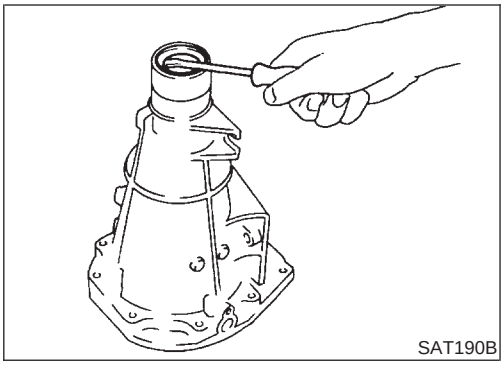

e. Remove front needle bearing from front planetary carrier.
f. Remove rear bearing from front planetary carrier.



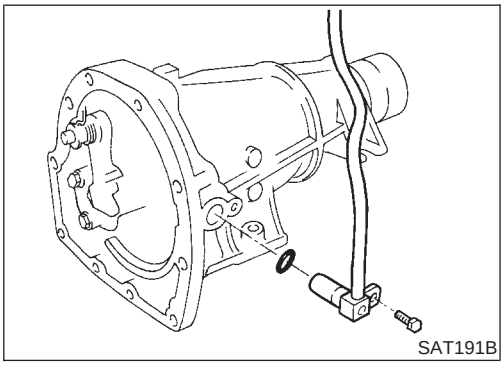

g. Remove rear sun gear from transmission case.



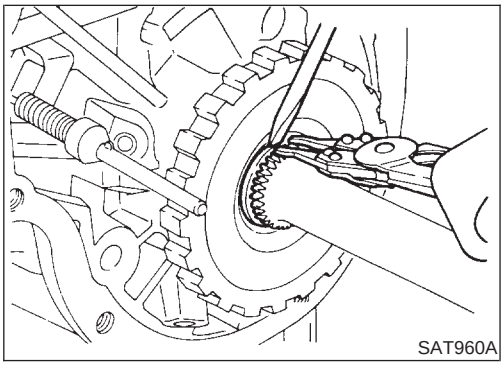

18. Remove rear extension.
a. Remove rear extension from transmission case.
b. Remove rear extension gasket from transmission case.


SAT190B

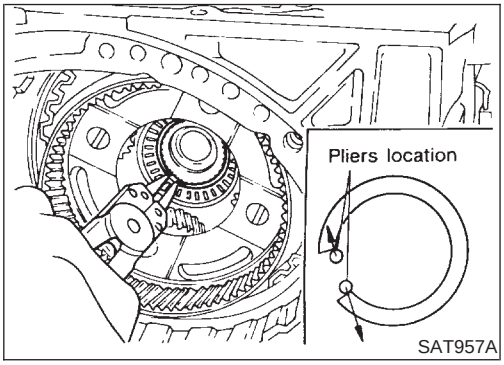
c. Remove oil seal from rear extension.
- **Be careful not to scratch rear extension.**
- **Do not remove oil seal unless it is to be replaced.**


SAT191B

d. Remove revolution sensor from rear extension.
e. Remove O-ring from revolution sensor.


SAT960A

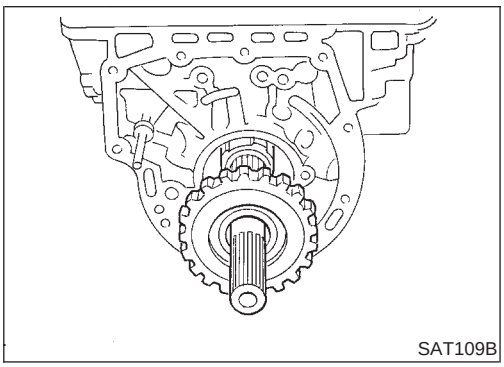
19. Remove output shaft and parking gear.
a. Remove rear snap ring from output shaft.



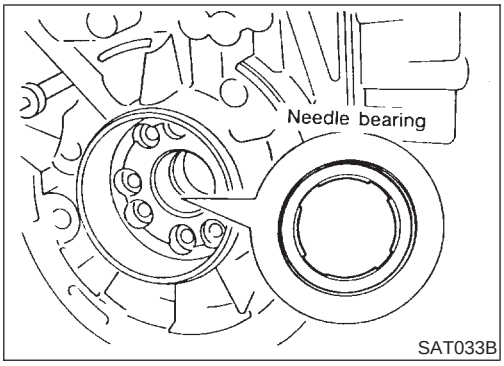
SAT957A

b. Slowly push output shaft all the way forward.
- **Do not use excessive force.**

c. Remove snap ring from output shaft.

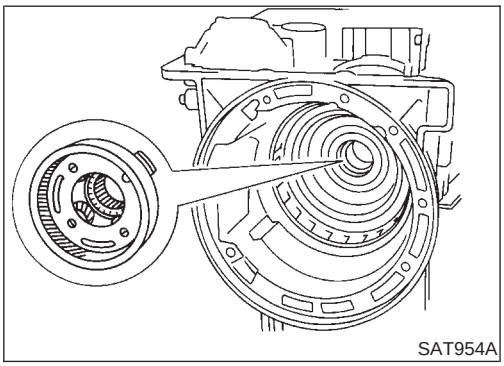

SAT109B

d. Remove output shaft and parking gear as a unit from transmission case.
e. Remove parking gear from output shaft.

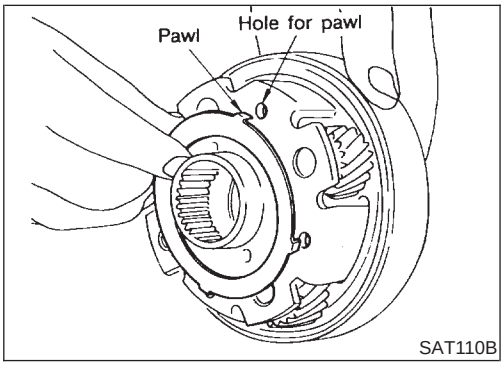


SAT033B

f. Remove needle bearing from transmission case.

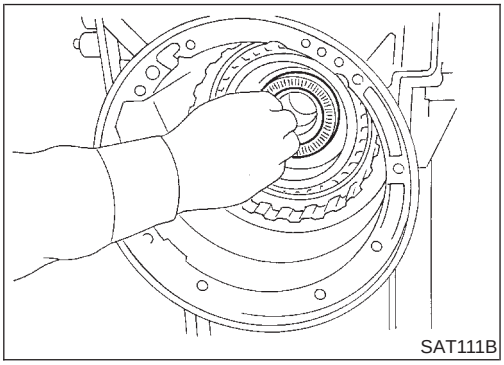

SAT954A

20. Remove rear side clutch and gear components.
a. Remove front internal gear.

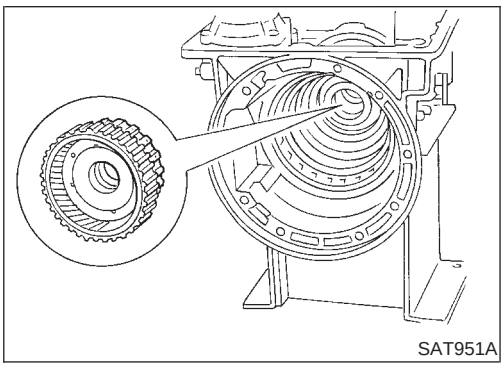


SAT110B

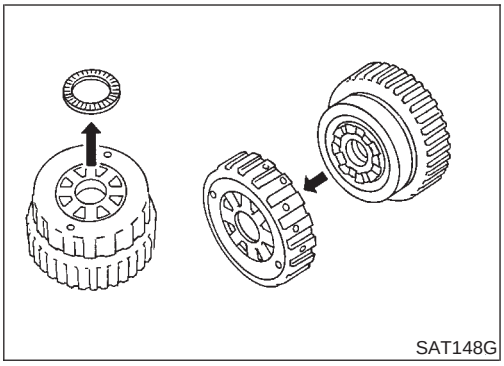
b. Remove bearing race from front internal gear.


SAT111B

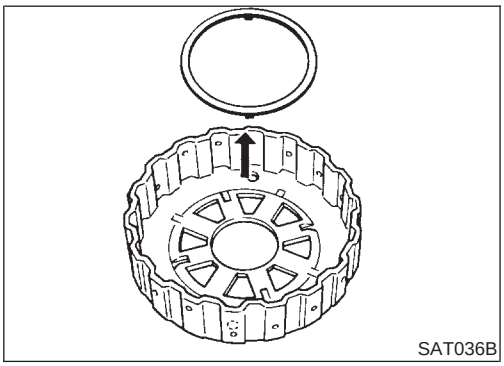
c. Remove needle bearing from rear internal gear.


SAT951A

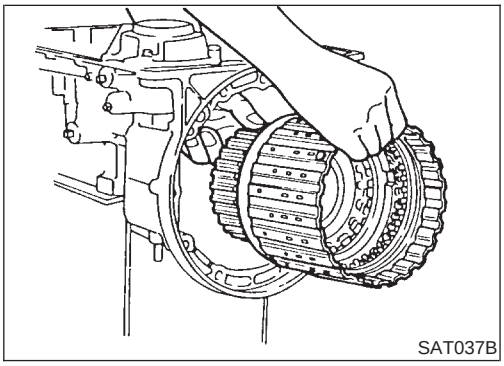
d. Remove rear internal gear, forward clutch hub and overrun clutch hub as a set from transmission case.


SAT148G

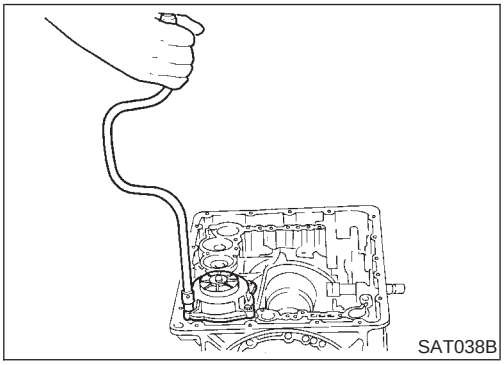
e. Remove needle bearing from overrun clutch hub.
f. Remove overrun clutch hub from rear internal gear and forward clutch hub.


SAT036B

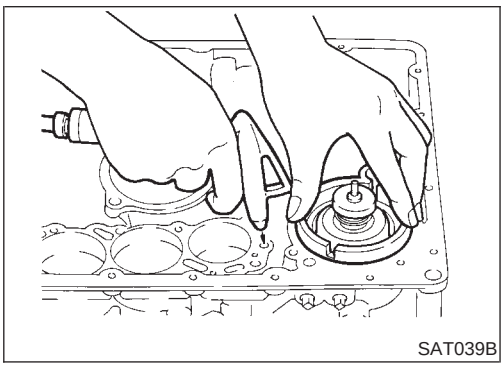
g. Remove thrust washer from overrun clutch hub.


SAT037B

h. Remove forward clutch assembly from transmission case.


SAT038B

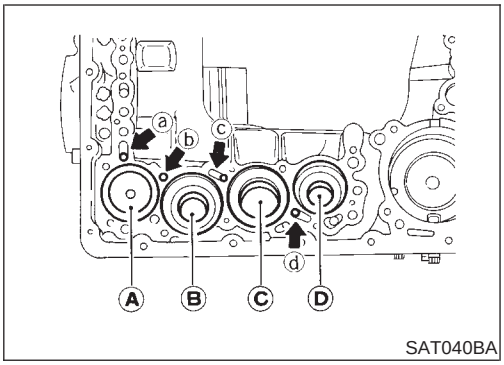
21. Remove band servo and accumulator components.
a. Remove band servo retainer from transmission case.


SAT039B

b. Apply compressed air to oil hole until band servo piston comes out of transmission case.

- **Hold piston with a rag and gradually direct air to oil hole.**

c. Remove return springs.

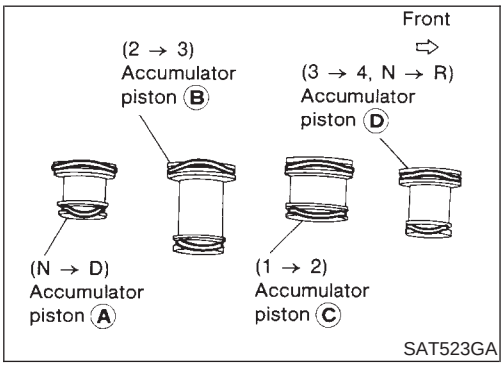


SAT040BA

d. Remove springs from accumulator pistons B, C and D.
e. Apply compressed air to each oil hole until piston comes out.

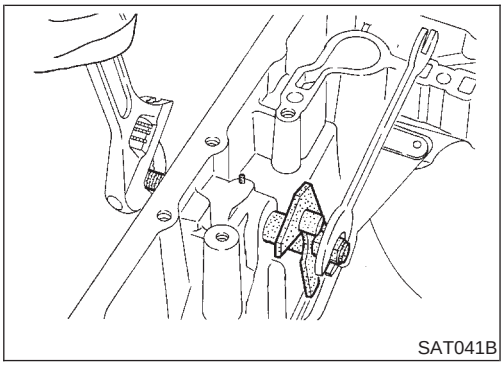
- **Hold piston with a rag and gradually direct air to oil hole.**

| Identification of accumulator pistons | A | B | C | D |
|---|---|---|---|---|
| Identification of oil holes | a | b | c | d |

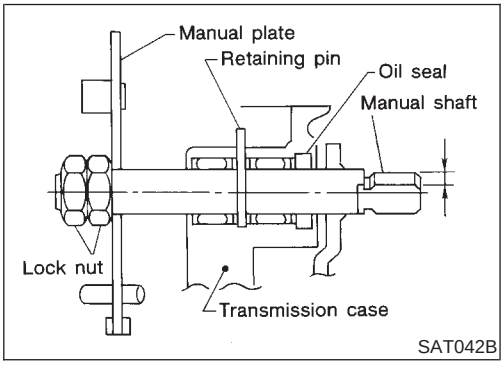


SAT523GA

f. Remove O-ring from each piston.

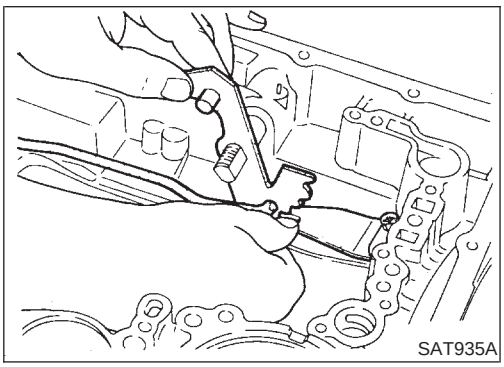

SAT041B

22. Remove manual shaft components, if necessary.
a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.

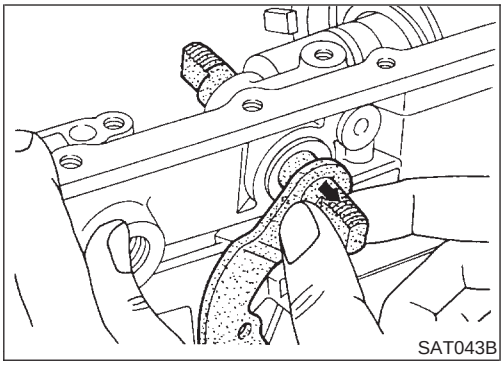


SAT042B

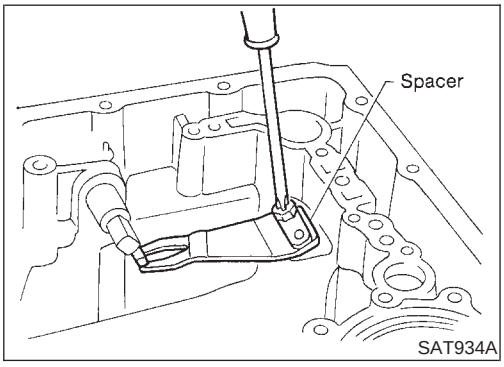
b. Remove retaining pin from transmission case.


SAT935A

c. While pushing detent spring down, remove manual plate and parking rod from transmission case.

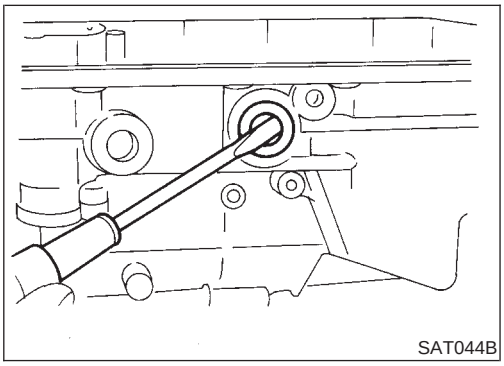

SAT043B

d. Remove manual shaft from transmission case.



SAT934A

e. Remove spacer and detent spring from transmission case.

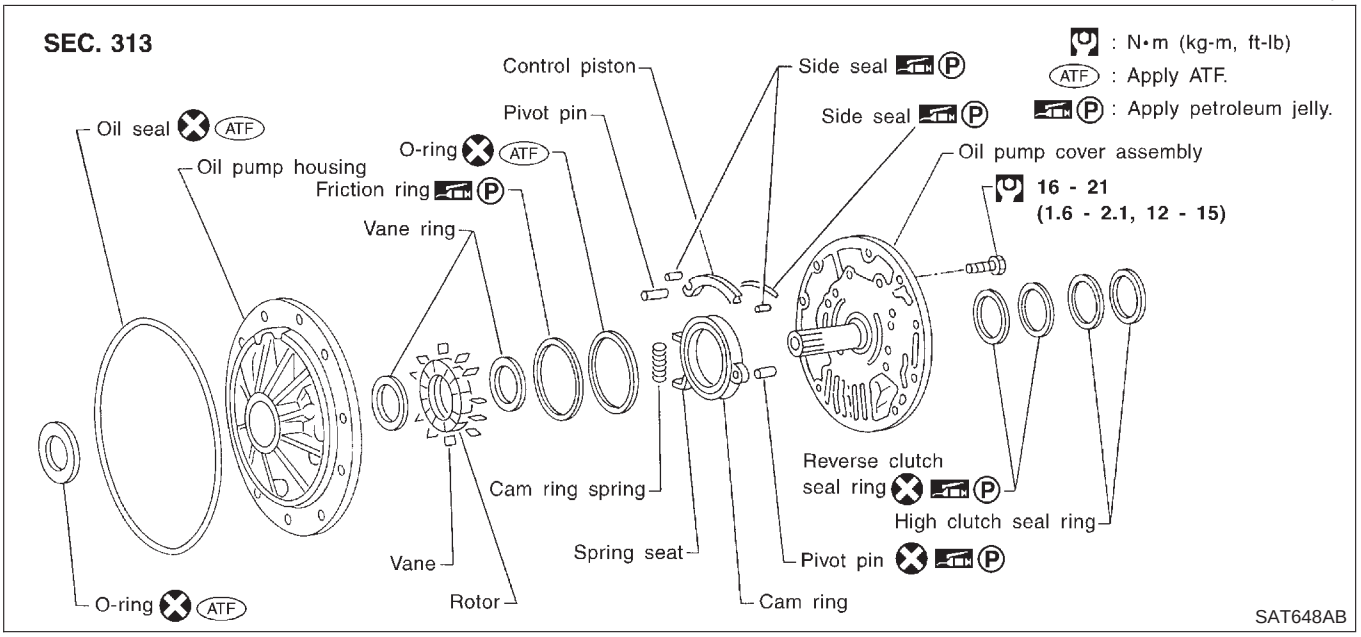

SAT044B

f. Remove oil seal from transmission case.

# Oil Pump

## COMPONENTS

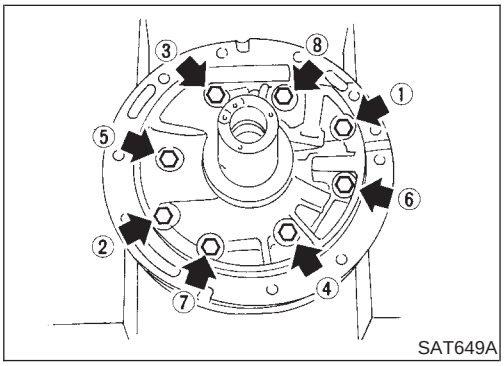
NEAT0112




## DISASSEMBLY

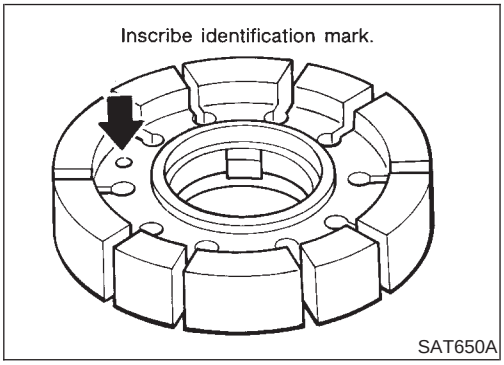
NEAT0113

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



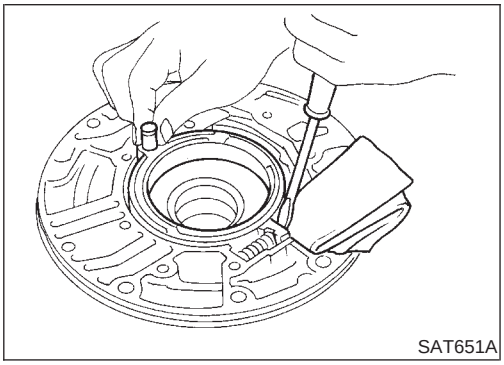

2. Remove rotor, vane rings and vanes.

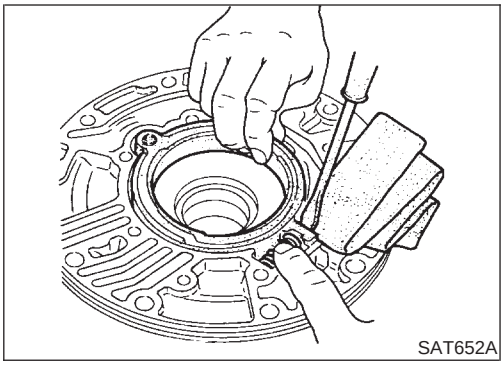
- **Inscribe a mark on back of rotor for identification of fore-aft direction when reassembling rotor. Then remove rotor.**



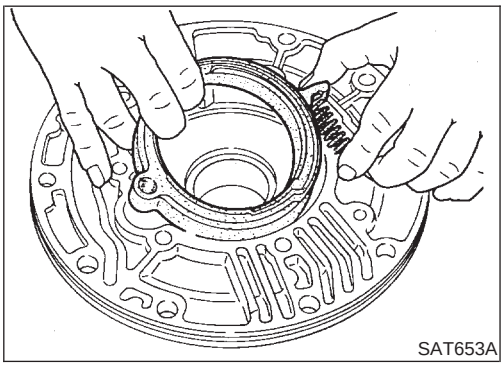

3. While pushing on cam ring remove pivot pin.

- **Be careful not to scratch oil pump housing.**

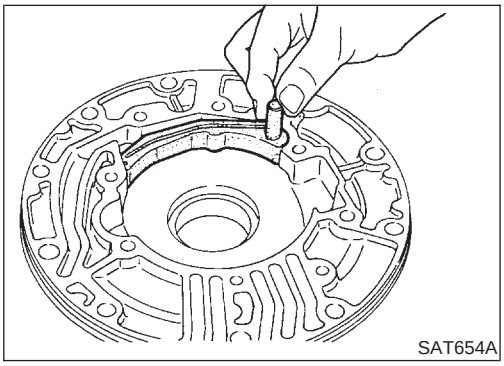



SAT652A

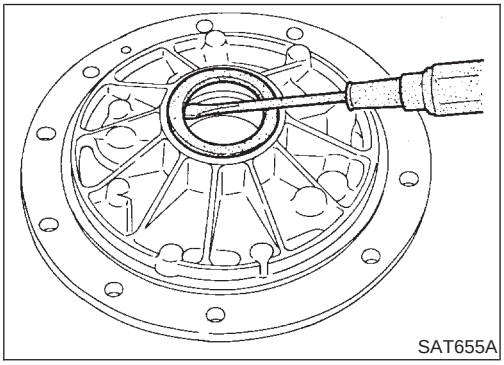
4. While holding cam ring and spring lift out cam ring spring.
- **Be careful not to damage oil pump housing.**
- **Hold cam ring spring to prevent it from jumping.**


SAT653A

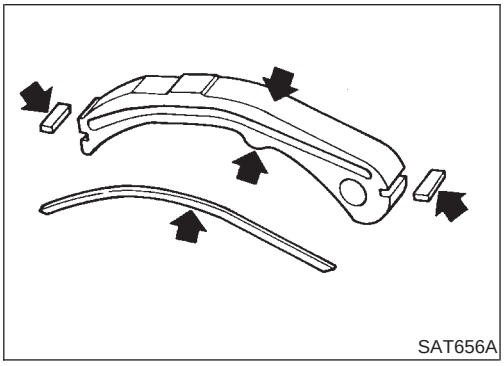
5. Remove cam ring and cam ring spring from oil pump housing.


SAT654A

6. Remove pivot pin from control piston and remove control piston assembly.


SAT655A

7. Remove oil seal from oil pump housing.
- **Be careful not to scratch oil pump housing.**


SAT656A

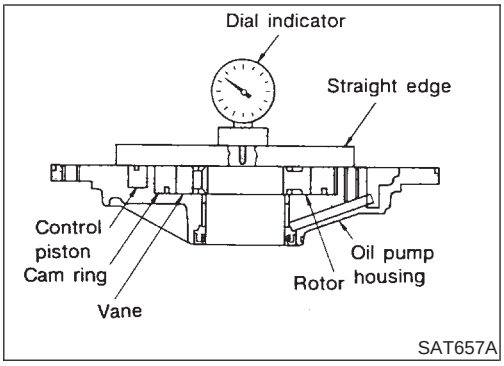
## INSPECTION

NEAT0114

### Oil Pump Cover, Rotor, Vanes, Control Piston, Side Seals, Cam Ring and Friction Ring

NEAT0114S01

- Check for wear or damage.



SAT657A

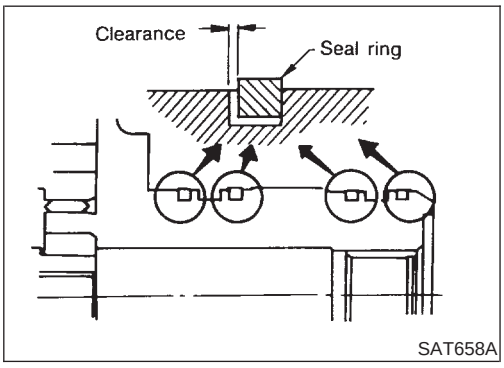
## Side Clearances

NEAT0114S02

- 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-286.**
- If not within standard clearance, replace oil pump assembly except oil pump cover assembly.



SAT658A

## Seal Ring Clearance

NEAT0114S03

- Measure clearance between seal ring and ring groove.

  **Standard clearance:**

  **0.10 - 0.25 mm (0.0039 - 0.0098 in)**

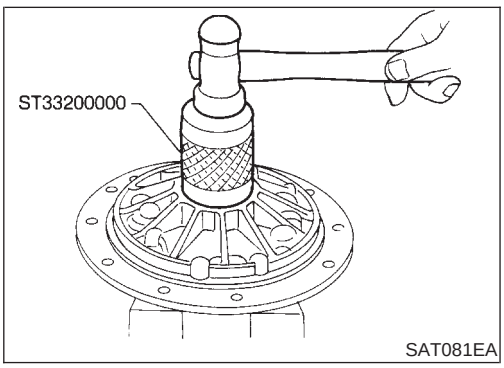
  **Wear limit:**

  **0.25 mm (0.0098 in)**
- If not within wear limit, replace oil pump cover assembly.

## ASSEMBLY

NEAT0115

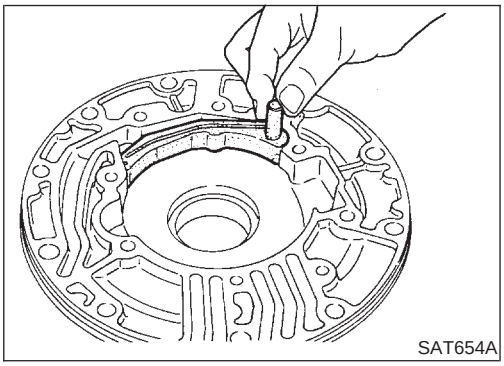
1. Drive oil seal into oil pump housing.
- **Apply ATF to outer periphery and lip surface.**



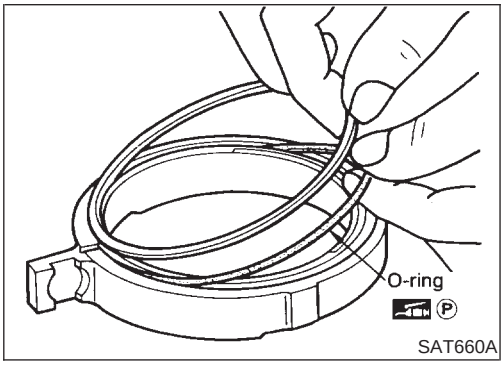
SAT081EA

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.**

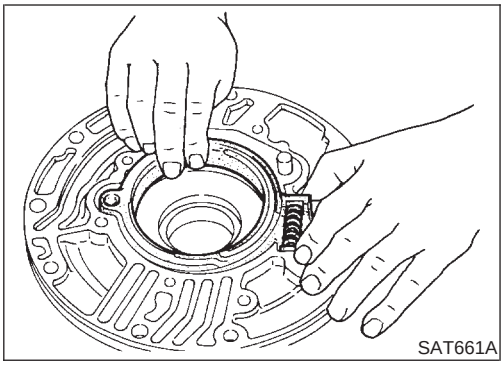
b. Install control piston on oil pump.


SAT654A

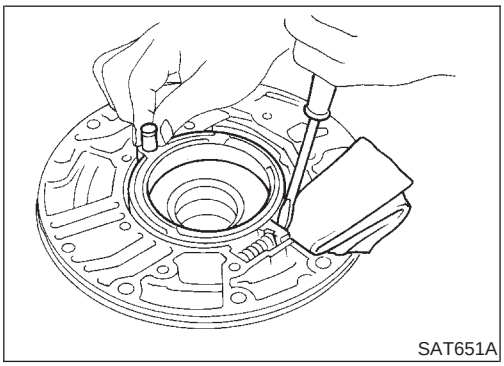
c. Install O-ring and friction ring on cam ring.
- **Apply petroleum jelly to O-ring.**



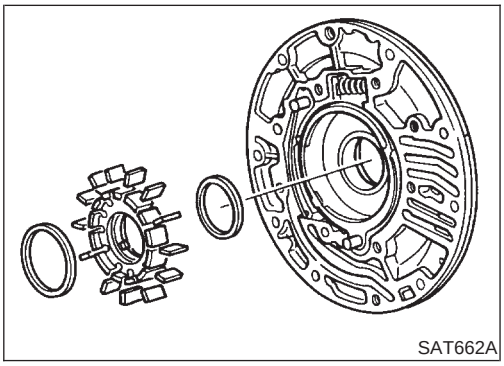
SAT660A


SAT661A

d. Assemble cam ring, cam ring spring and spring seat. Install spring by pushing it against pump housing.

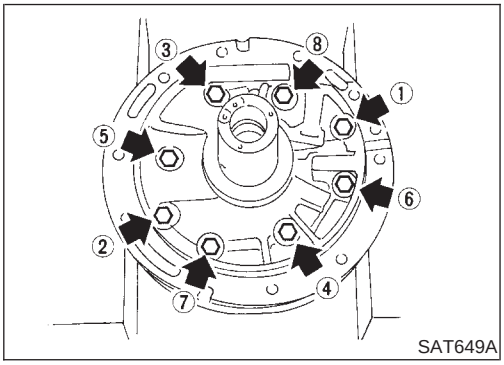

SAT651A

e. While pushing on cam ring install pivot pin.


SAT662A

3. Install rotor, vanes and vane rings.

- **Pay attention to direction of rotor.**

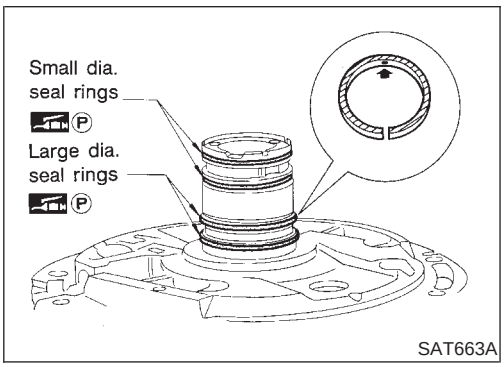


SAT649A

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.



SAT663A

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**

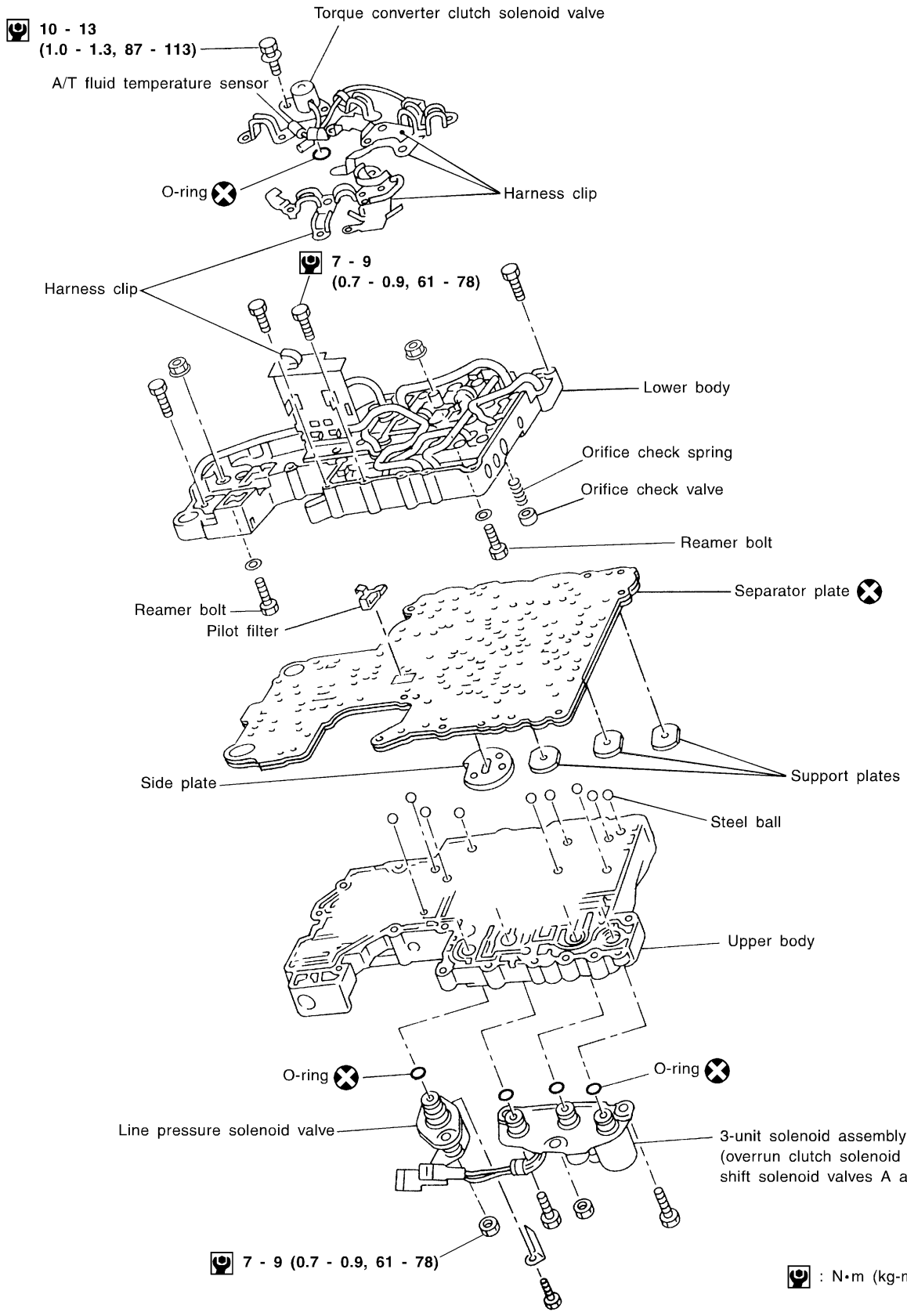
- **Do not spread gap of seal ring excessively while installing. It may deform ring.**

# Control Valve Assembly

## COMPONENTS

NEAT0116

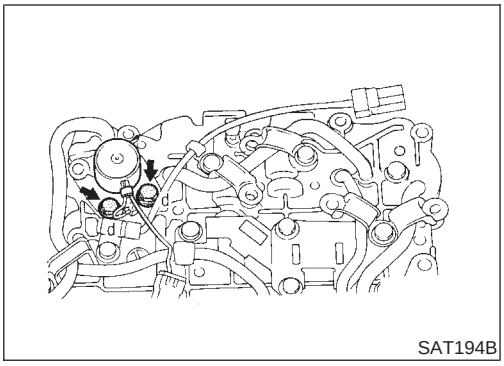
**SEC. 317**



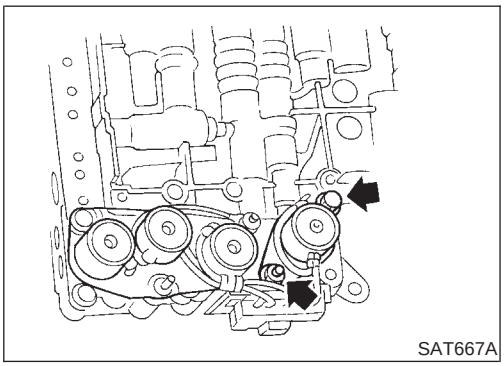

SAT534J

## DISASSEMBLY

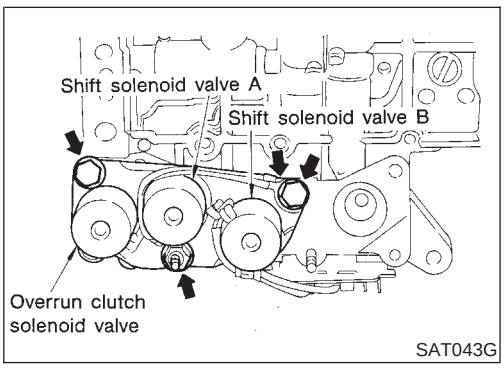
NEAT0117


SAT194B

1. Remove solenoids.
a. Remove torque converter clutch solenoid valve and side plate from lower body.
b. Remove O-ring from solenoid.

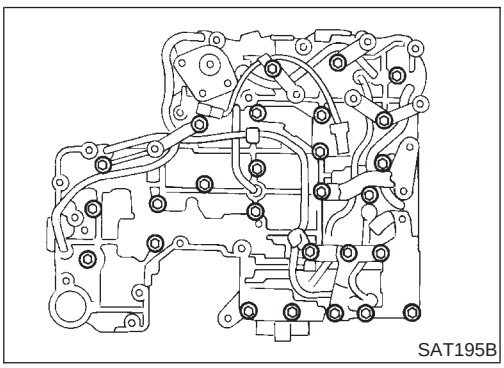

SAT667A

c. Remove line pressure solenoid valve from upper body.
d. Remove O-ring from solenoid.



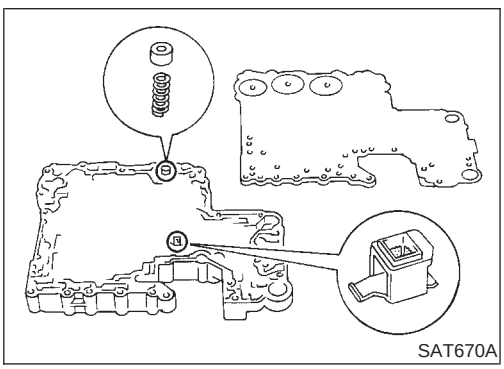
SAT043G

e. Remove 3-unit solenoid assembly from upper body.
f. Remove O-rings from solenoids.

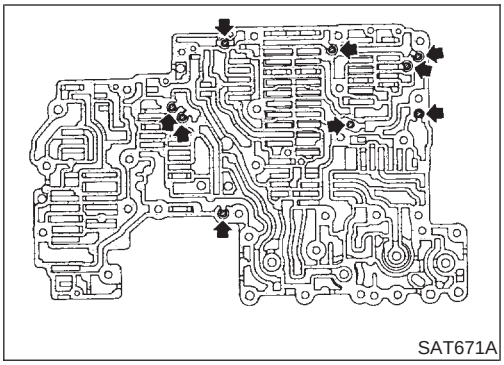

SAT195B

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.**


SAT670A

c. Place lower body facedown, and remove separator plate.
d. Remove pilot filter, orifice check valve and orifice check spring.


SAT671A

e. Check to see that steel balls are properly positioned in upper body. Then remove them from upper body.

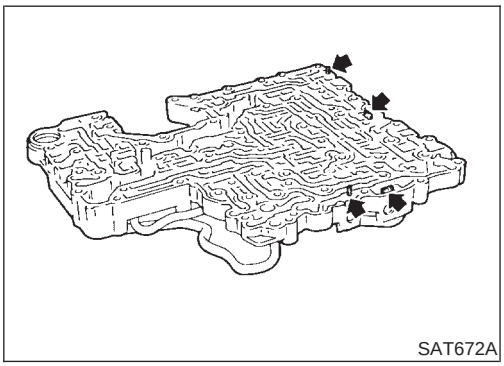
## INSPECTION

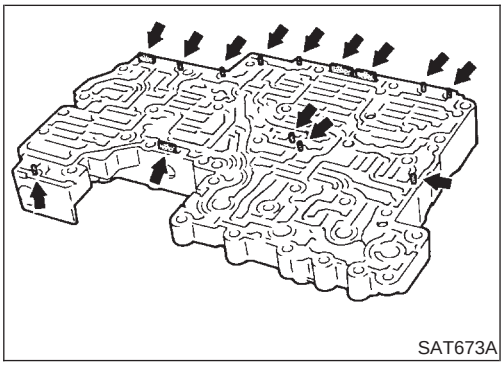
NEAT0118

### Lower and Upper Bodies

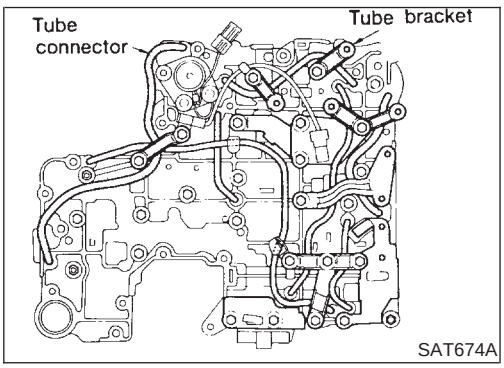
NEAT0118S01

- Check to see that there are pins and retainer plates in lower body.


SAT672A

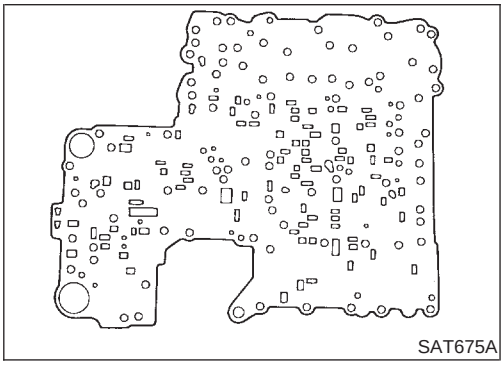

SAT673A

- Check to see that there are pins and retainer plates in upper body.
- **Be careful not to lose these parts.**



SAT674A

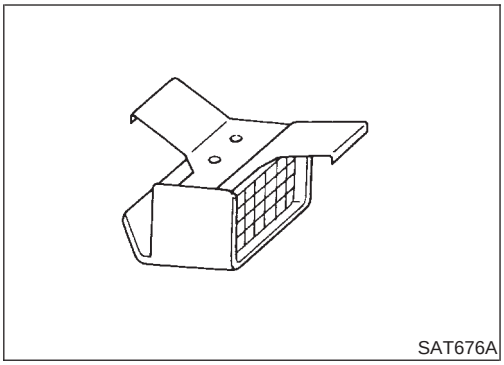
- Check to make sure that oil circuits are clean and free from damage.
- Check tube brackets and tube connectors for damage.


SAT675A

### Separator Plate

NEAT0118S02

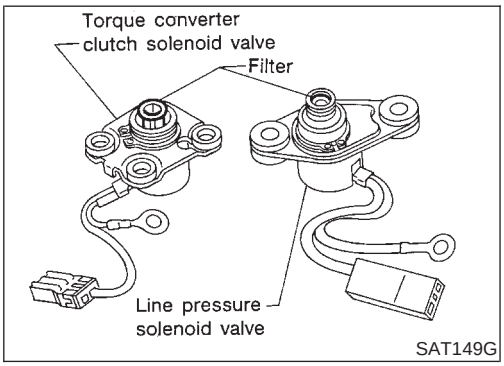
- Make sure that separator plate is free of damage and not deformed and oil holes are clean.


SAT676A

## Pilot Filter

NEAT0118S03

- Check to make sure that filter is not clogged or damaged.



SAT149G

## Torque Converter Clutch Solenoid Valve

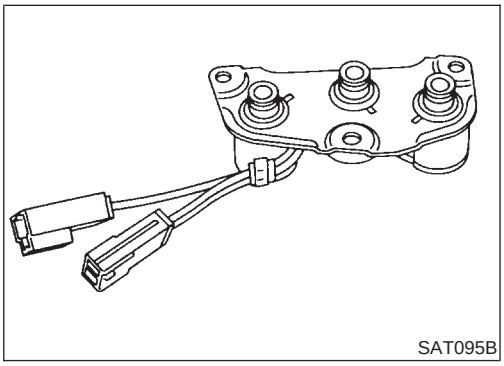
NEAT0118S04

- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Component Inspection", AT-116.

## Line Pressure Solenoid Valve

NEAT0118S05

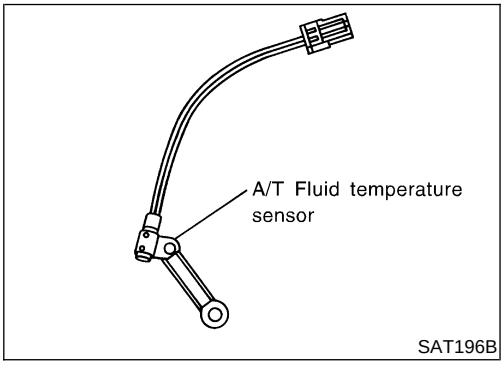
- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Component Inspection", AT-131.


SAT095B

## 3-Unit Solenoid Assembly (Overrun Clutch Solenoid Valve and Shift Solenoid Valves A and B)

NEAT0118S06

- Measure resistance of each solenoid. Refer to "Component Inspection", AT-104, AT-108, AT-112.

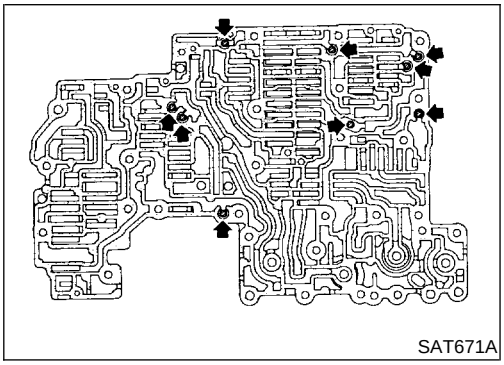


SAT196B

## A/T Fluid Temperature Sensor

NEAT0118S07

- Measure resistance. Refer to "Component Inspection", AT-121.

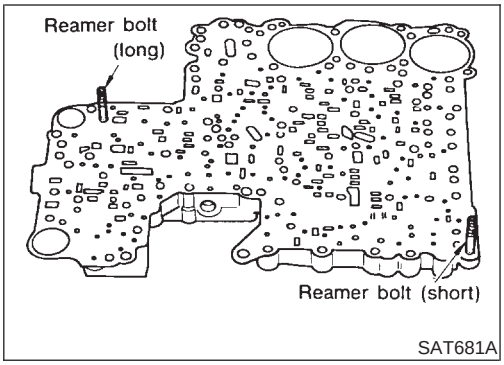

SAT671A

## ASSEMBLY

NEAT0119

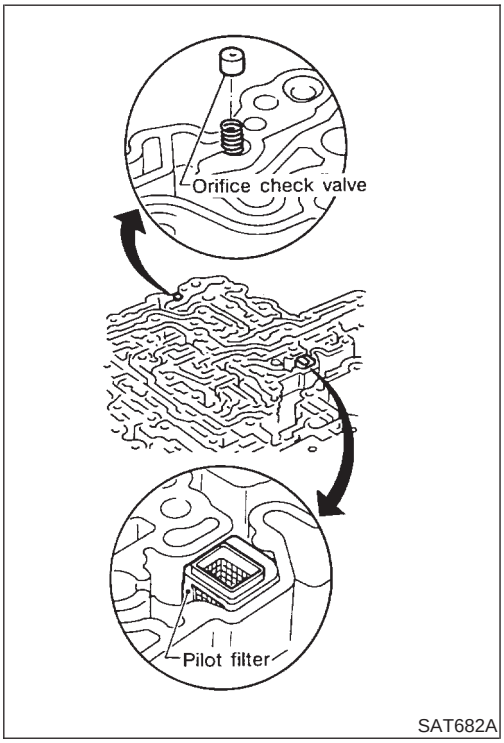
1. Install upper and lower bodies.

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



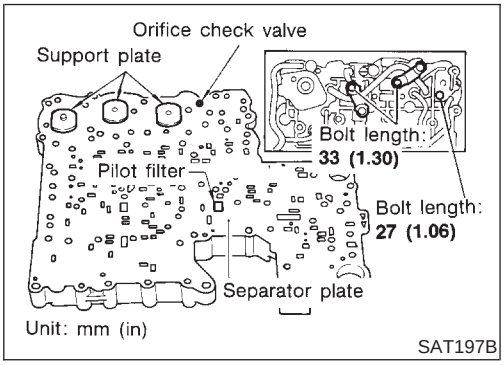
SAT681A

b. Install reamer bolts from bottom of upper body.



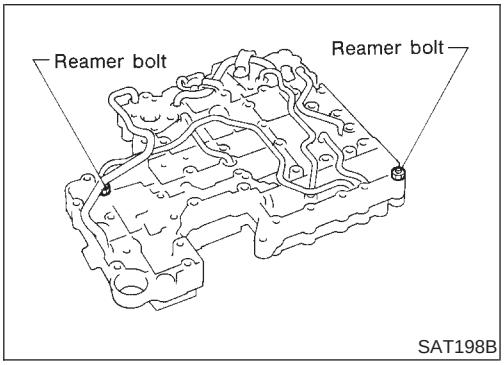
SAT682A

c. Place oil circuit of lower body face up. Install orifice check spring, orifice check valve and pilot filter.



SAT197B

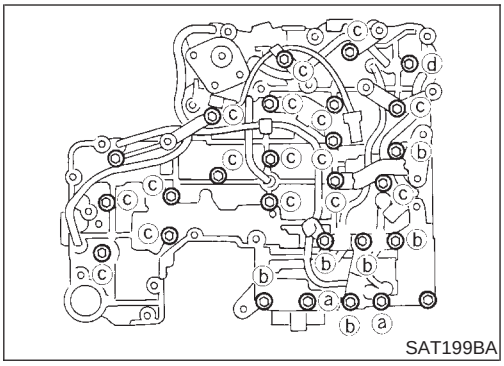
d. Install lower separator plate on lower body.
e. Install and temporarily tighten support plates, A/T fluid temperature sensor and tube brackets.



SAT198B

f. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.

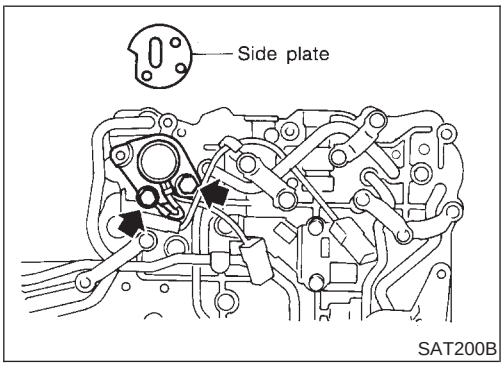
- **Be careful not to dislocate or drop steel balls, orifice check spring, orifice check valve and pilot filter.**




g. Install and temporarily tighten bolts and tube brackets in their proper locations.

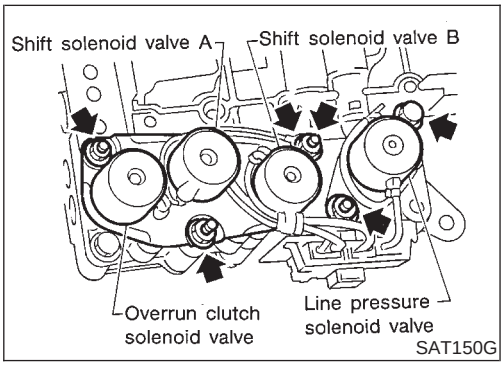
**Bolt length and location:**

| 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.

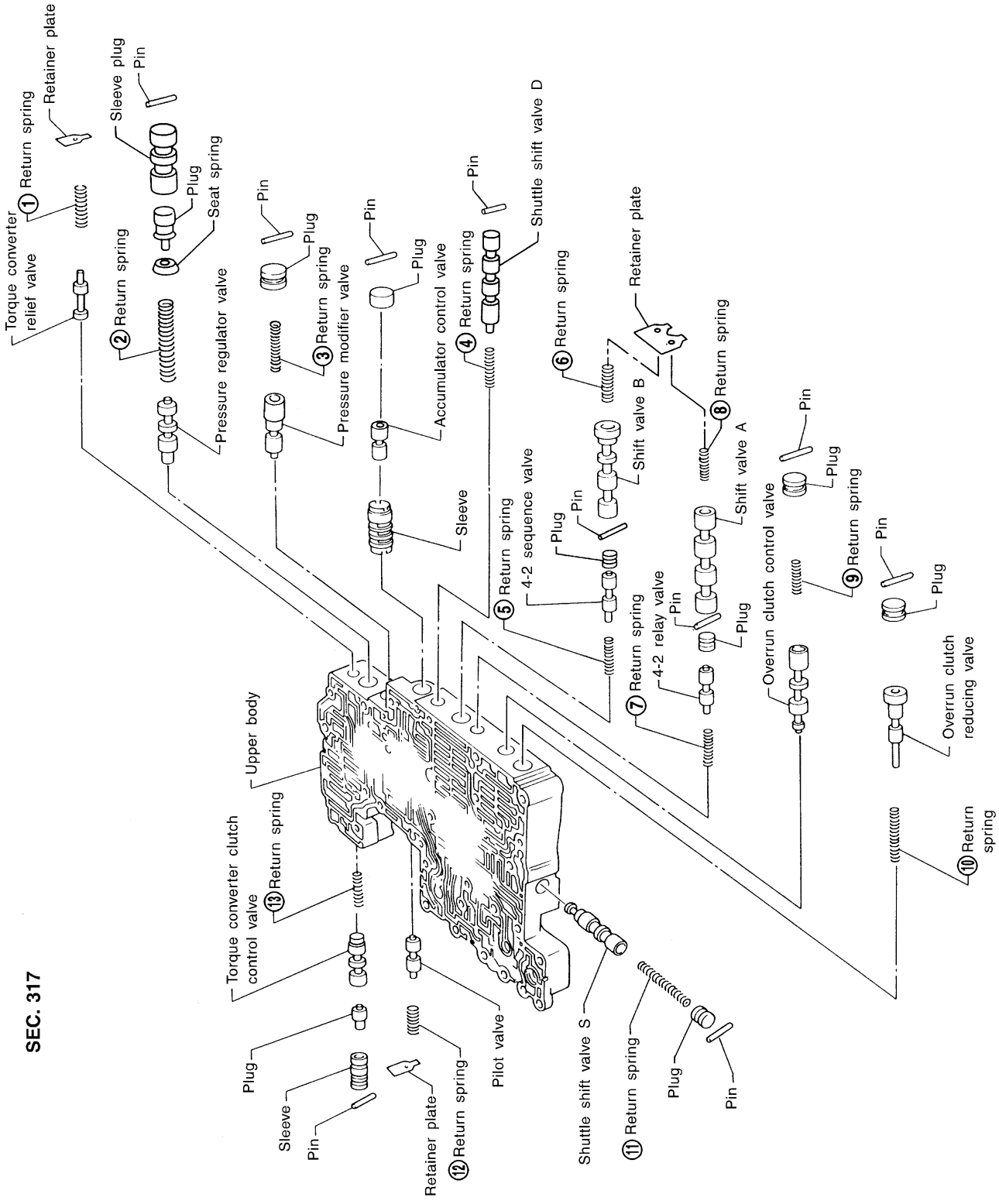
c. Attach O-ring and install line pressure solenoid valve onto upper body.

3. Tighten all bolts.

# Control Valve Upper Body

## COMPONENTS

NEAT0120

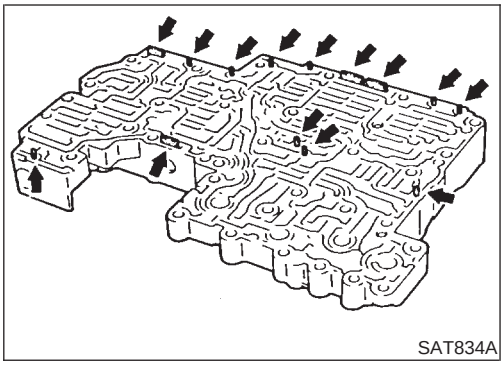



SAT142JA

Apply ATF to all components before their installation.
Numbers preceding valve springs correspond with those shown in SDS on page AT-283.

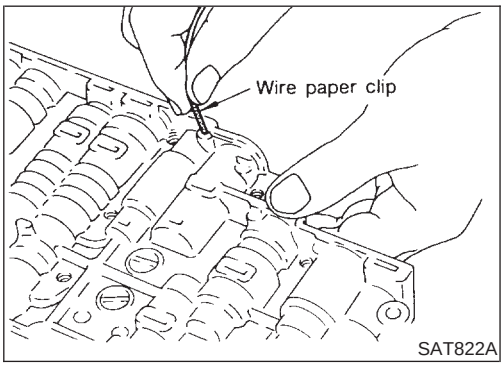
## DISASSEMBLY

NEAT0121


SAT834A

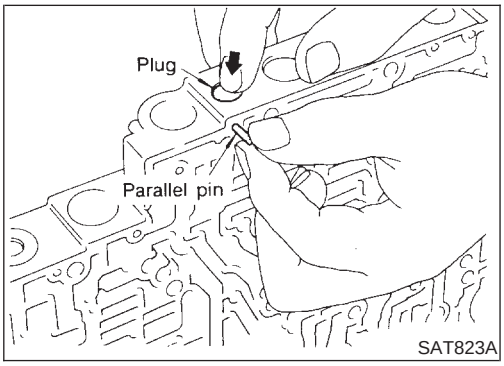
1. Remove valves at parallel pins.

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



SAT822A

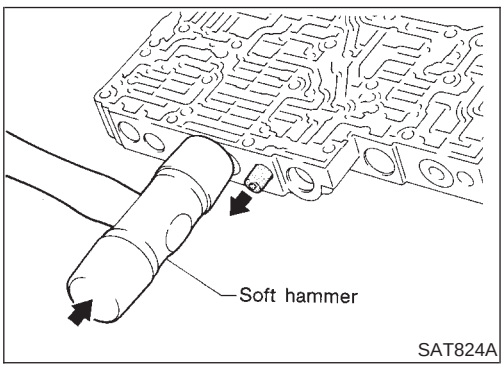
a. Use a wire paper clip to push out parallel pins.



SAT823A

b. Remove parallel pins while pressing their corresponding plugs and sleeves.

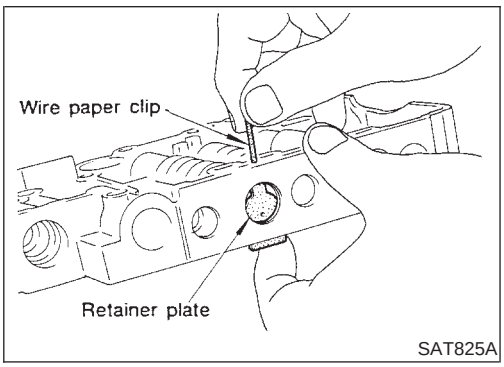
- **Remove plug slowly to prevent internal parts from jumping out.**



SAT824A

c. Place mating surface of valve facedown, and remove internal parts.

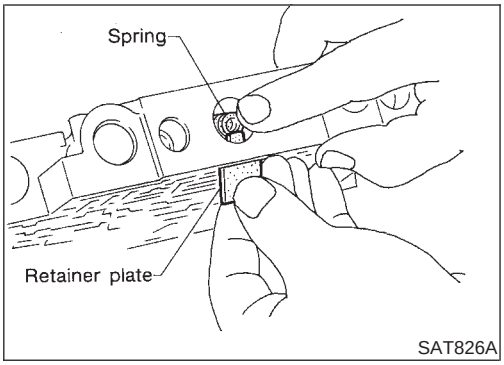
- **If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer.**
- **Be careful not to drop or damage valves and sleeves.**



SAT825A

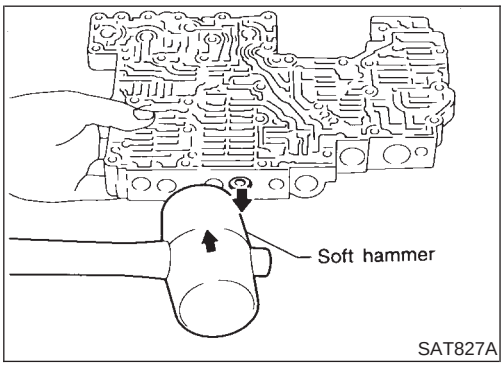
2. Remove valves at retainer plates.

a. Pry out retainer plate with wire paper clip.



SAT826A

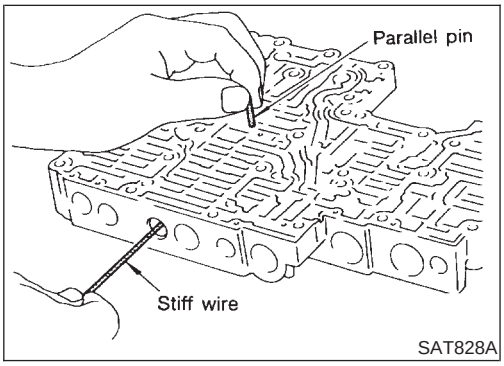
b. Remove retainer plates while holding spring.



SAT827A

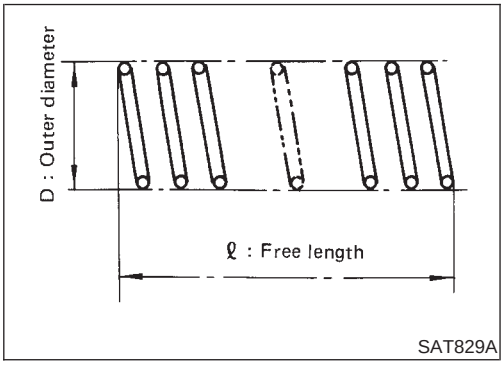
c. Place mating surface of valve facedown, and remove internal parts.

- **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.**



SAT828A

- 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.**



SAT829A

## INSPECTION

NEAT0122

### Valve Springs

NEAT0122S01

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

  **Inspection standard:**

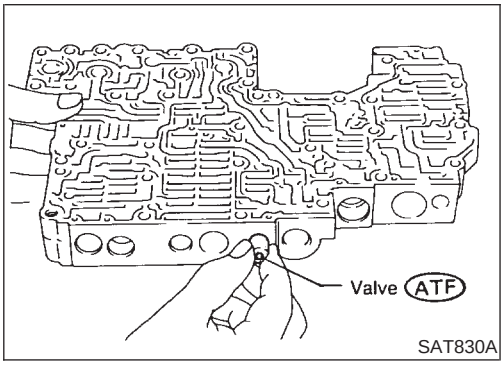
  **Refer to SDS, AT-283.**

- Replace valve springs if deformed or fatigued.

### Control Valves

NEAT0122S02

- Check sliding surfaces of valves, sleeves and plugs.



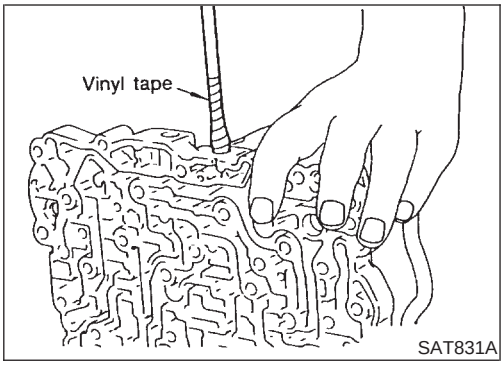
SAT830A

## ASSEMBLY

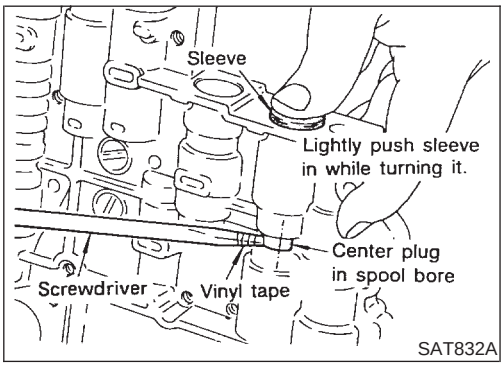
NEAT0123

1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.

- **Be careful not to scratch or damage valve body.**

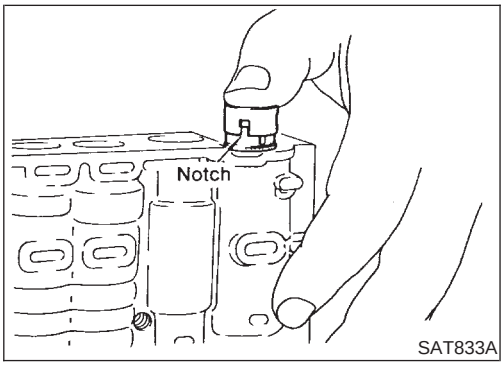



- Wrap a small screwdriver with vinyl tape and use it to insert the valves into proper position.



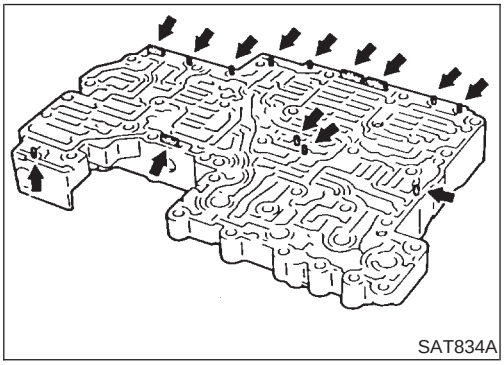

**Pressure regulator valve**

- If pressure regulator plug is not centered properly, sleeve cannot be inserted into bore in upper body. If this happens, use vinyl tape wrapped screwdriver to center sleeve until it can be inserted.
- Turn sleeve slightly while installing.

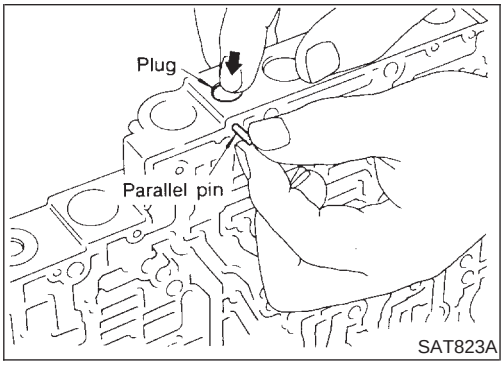



**Accumulator control plug**

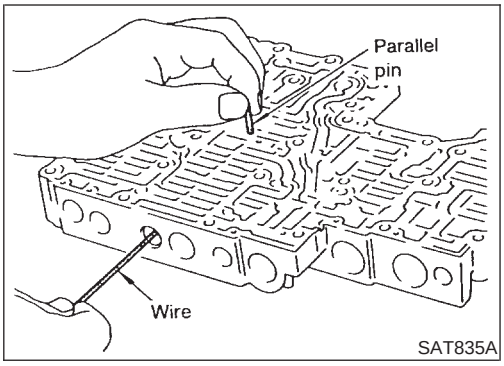
- Align protrusion of accumulator control sleeve with notch in plug.
- Align parallel pin groove in plug with parallel pin, and install accumulator control valve.




2. Install parallel pins and retainer plates.

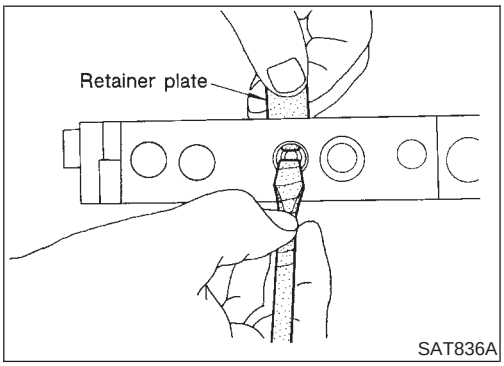



- **While pushing plug, install parallel pin.**




**4-2 sequence valve and relay valve**

- Push 4-2 sequence valve and relay valve with wire wrapped in vinyl tape to prevent scratching valve body. Install parallel pins.

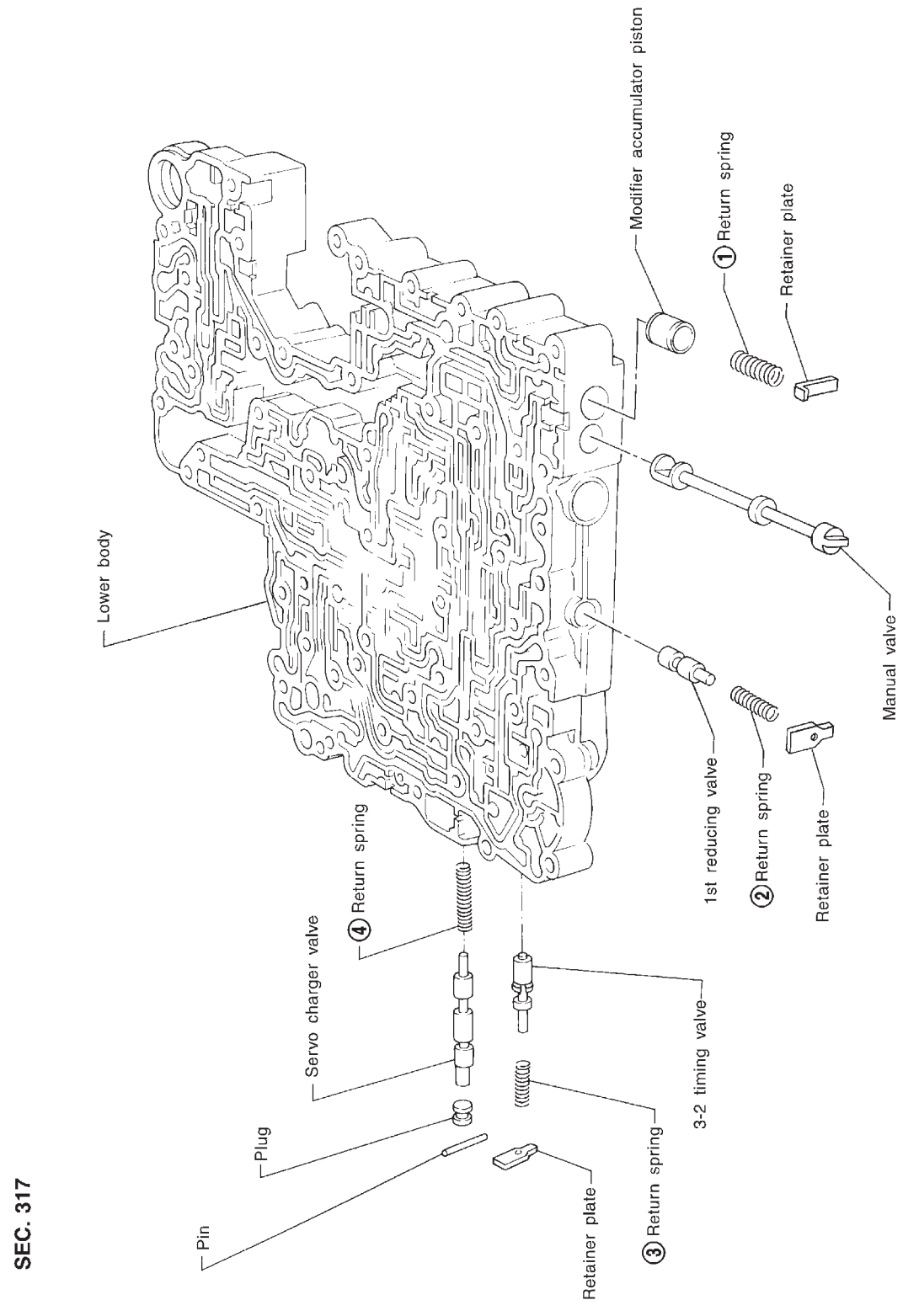



- Insert retainer plate while pushing spring.

# Control Valve Lower Body

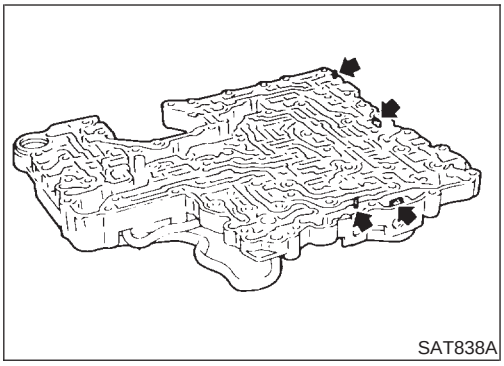
## COMPONENTS

NEAT0124




SAT966I

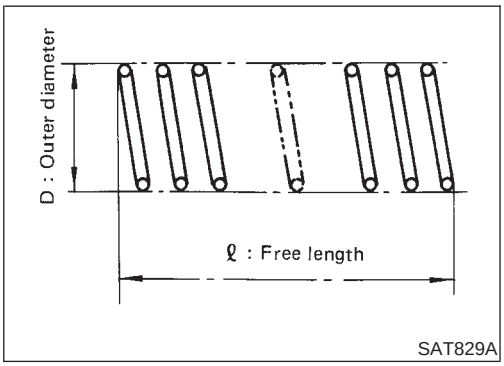
Apply ATF to all components before their installation.
Numbers preceding valve springs correspond with those shown in SDS on page AT-283.


SAT838A

## DISASSEMBLY

NEAT0125

1. Remove valves at parallel pins.
2. Remove valves at retainer plates.
   For removal procedures, refer to "DISASSEMBLY" of Control Valve Upper Body.



SAT829A

## INSPECTION

NEAT0126

### Valve Springs

NEAT0126S01

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

  **Inspection standard:**

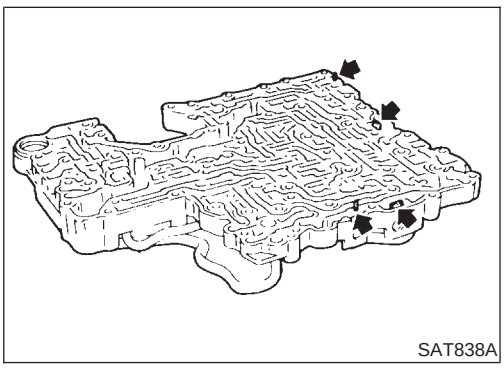
  **Refer to SDS, AT-283.**

- Replace valve springs if deformed or fatigued.

### Control Valves

NEAT0126S02

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


SAT838A

## ASSEMBLY

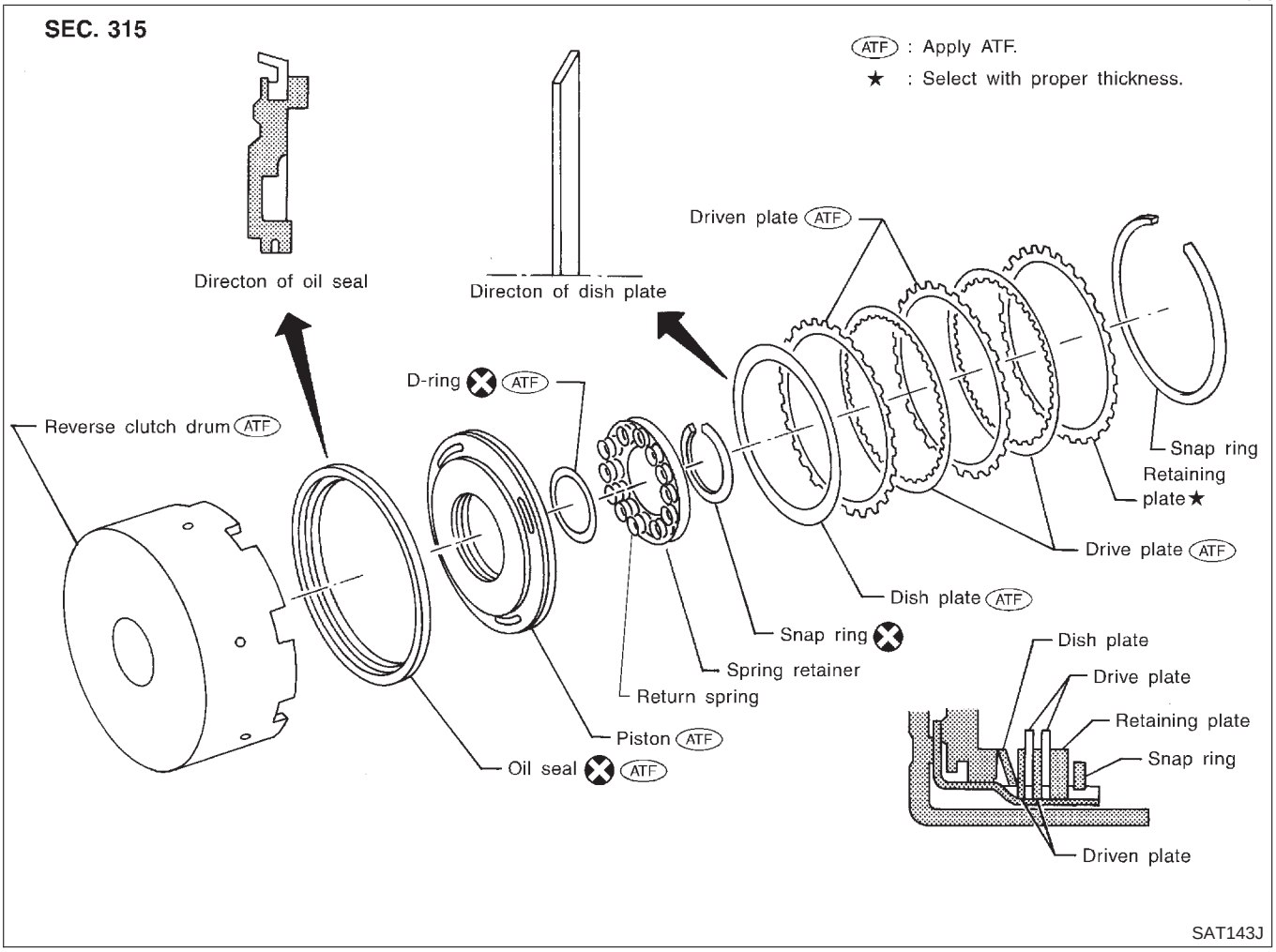
NEAT0127

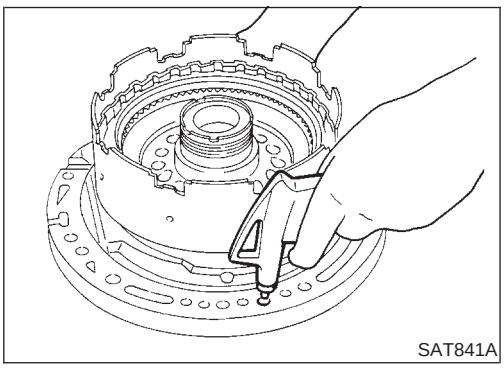
- Install control valves.
  For installation procedures, refer to "ASSEMBLY" of Control Valve Upper Body, AT-233.

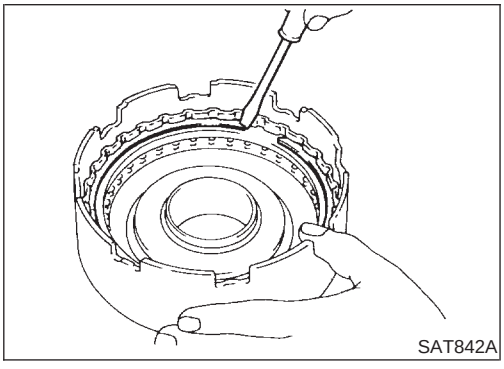
# Reverse Clutch

## COMPONENTS

NEAT0128





SAT841A


SAT842A

## DISASSEMBLY

NEAT0129

1. Check operation of reverse clutch.

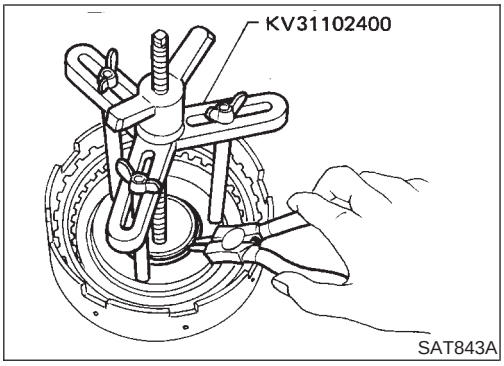
a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.

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

c. If retaining plate does not contact snap ring,

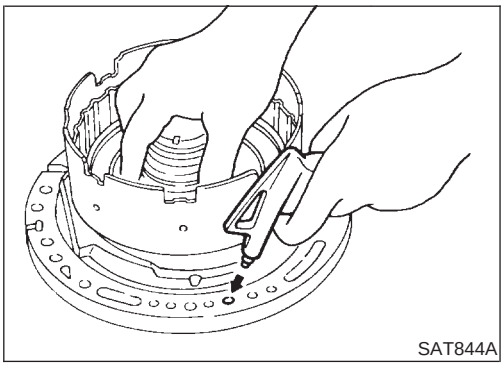
- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.

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



SAT843A

3. Remove snap ring from clutch drum while compressing clutch springs.
- **Do not expand snap ring excessively.**
4. Remove spring retainer and return spring.


SAT844A

5. Install seal ring onto oil pump cover and install reverse clutch drum. While holding piston, gradually apply compressed air to oil hole until piston is removed.
- **Do not apply compressed air abruptly.**
6. Remove D-ring and oil seal from piston.

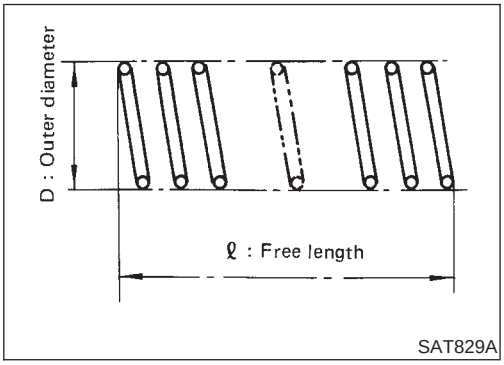
## INSPECTION

NEAT0130

### Reverse Clutch Snap Ring and Spring Retainer

NEAT0130S01

- Check for deformation, fatigue or damage.



SAT829A

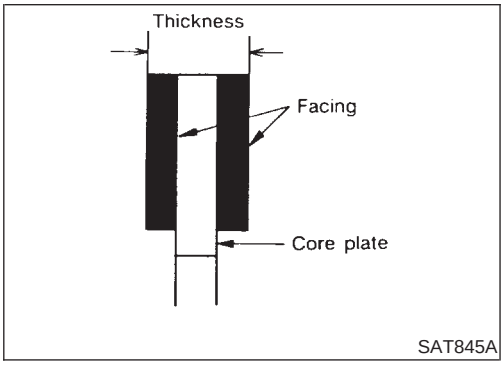
### Reverse Clutch Return Springs

NEAT0130S02

- Check for deformation or damage. Also measure free length and outside diameter.

**Inspection standard:**

**Refer to SDS, AT-283.**



SAT845A

### Reverse Clutch Drive Plates

NEAT0130S03

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

**Thickness of drive plate:**

**Standard value: 1.90 - 2.05 mm (0.0748 - 0.0807 in)**

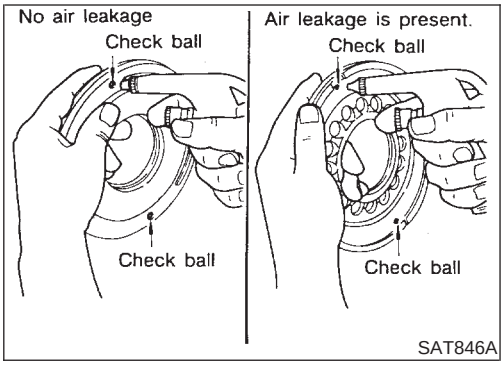
**Wear limit: 1.80 mm (0.0709 in)**

- If not within wear limit, replace.

### Reverse Clutch Dish Plate

NEAT0130S04

- Check for deformation or damage.




## Reverse Clutch Piston

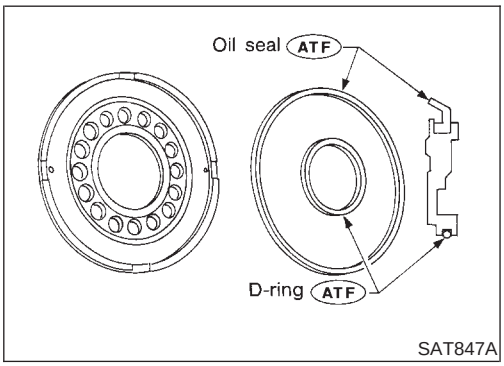
NEAT0130S05

- 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.

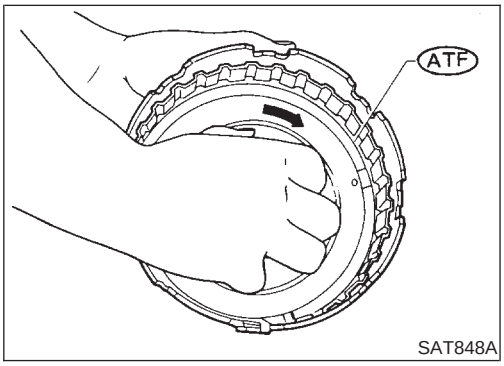
## ASSEMBLY

NEAT0131

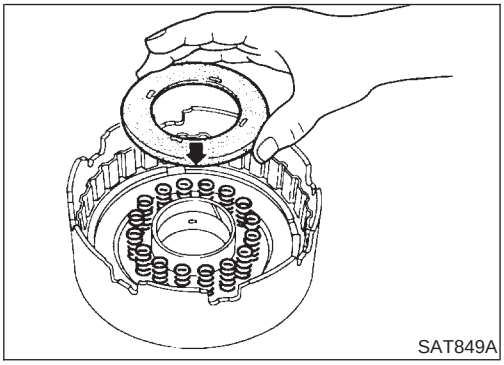
1. Install D-ring and oil seal on piston.
- **Apply ATF to both parts.**



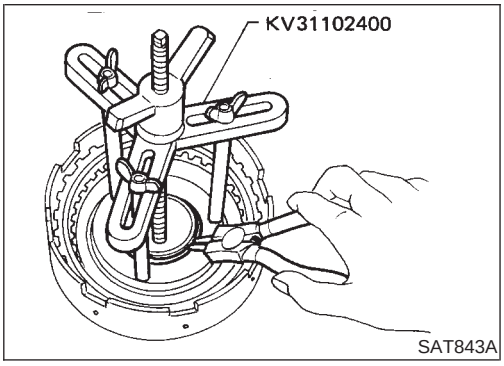

2. Install piston assembly by turning it slowly and evenly.
- **Apply ATF to inner surface of drum.**

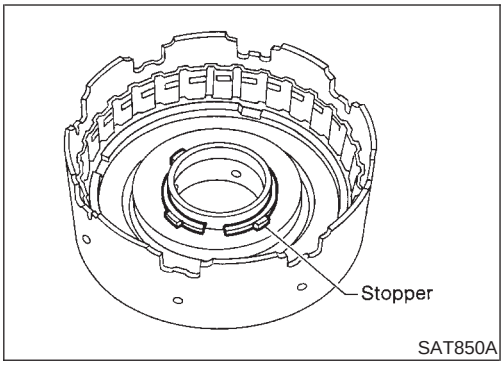



3. Install return springs and spring retainer.



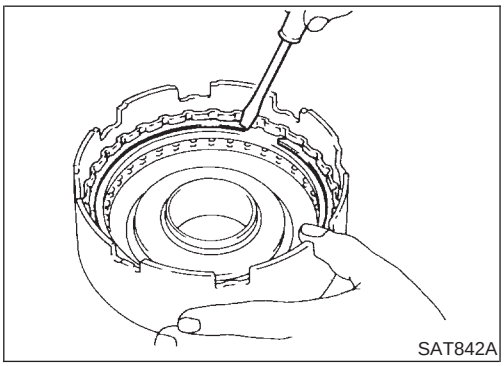

4. Install snap ring while compressing clutch springs.



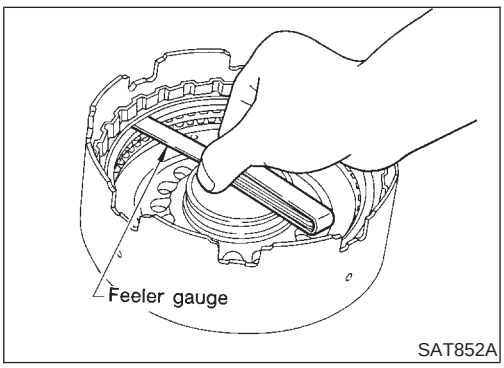


SAT850A

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


SAT842A

5. Install drive plates, driven plates, retaining plate and dish plate.
6. Install snap ring.



SAT852A

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

**Specified clearance:**

**Standard**

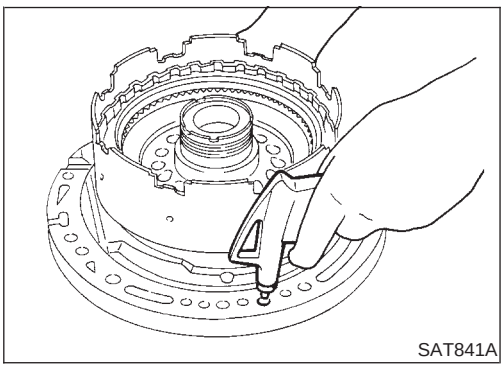
**0.5 - 0.8 mm (0.020 - 0.031 in)**

**Allowable limit**

**1.2 mm (0.047 in)**

**Retaining plate:**

**Refer to SDS, AT-284.**


SAT841A

8. Check operation of reverse clutch.
Refer to "DISASSEMBLY" of Reverse Clutch, AT-238.

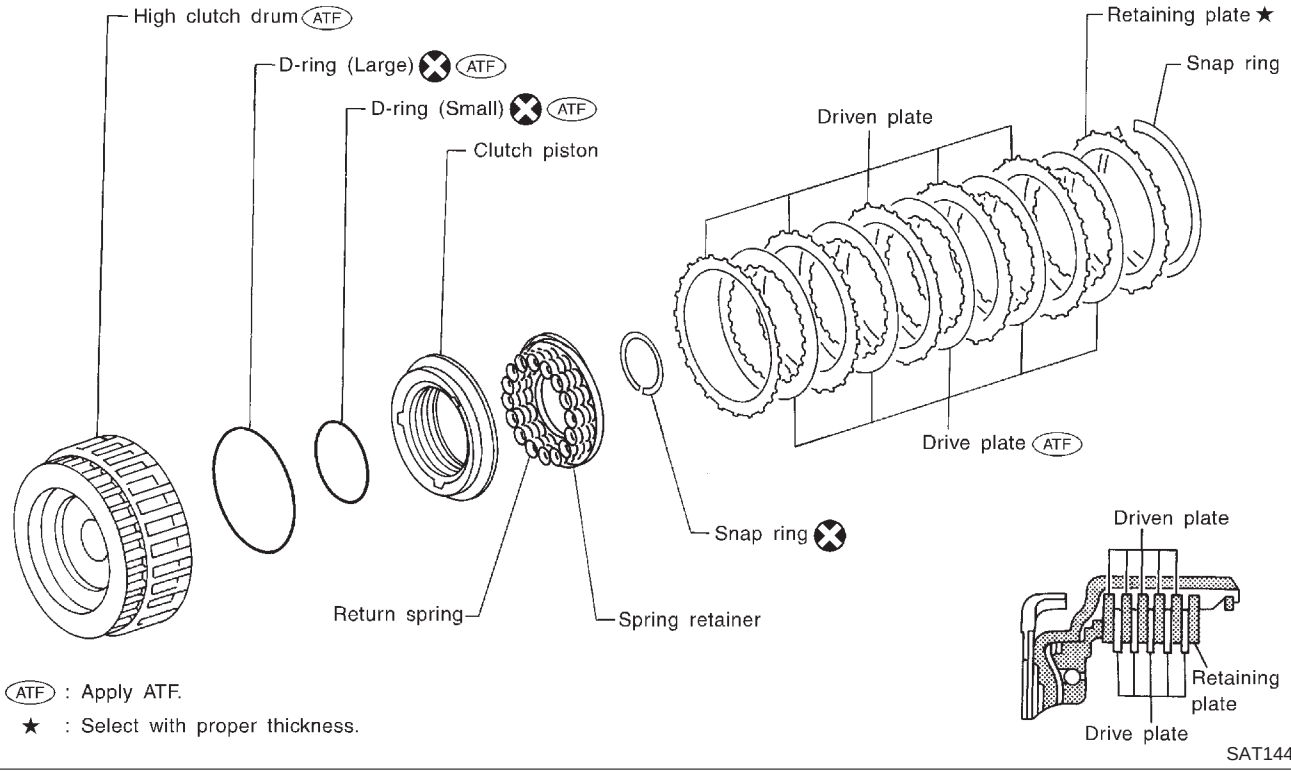
# High Clutch

## COMPONENTS

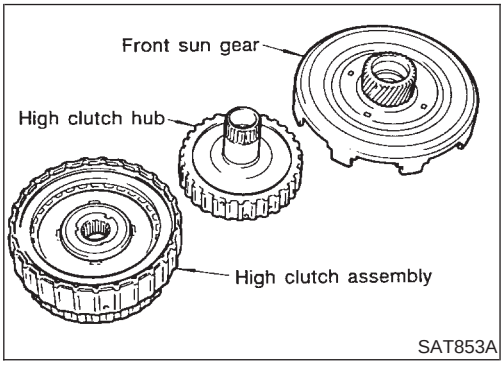
NEAT0132

**SEC. 315**

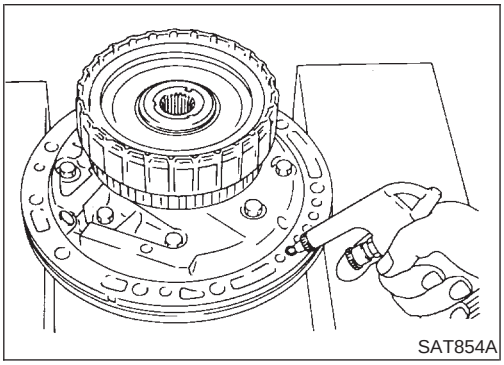
**For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section.**




SAT144J




SAT853A



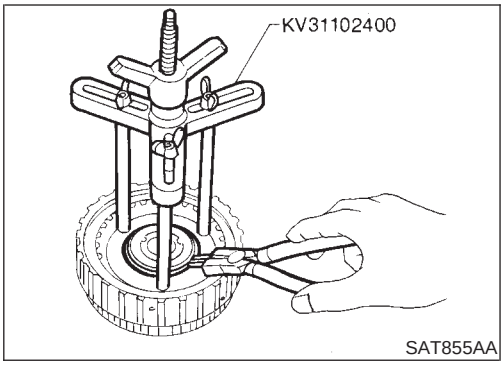
SAT854A

## DISASSEMBLY AND ASSEMBLY

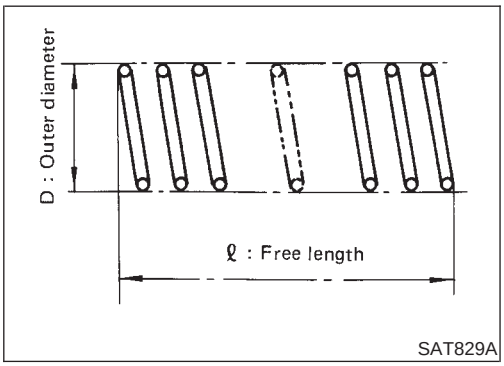
NEAT0133

Service procedures for high clutch are essentially the same as those for reverse clutch, with the following exception:

- Check of high clutch operation



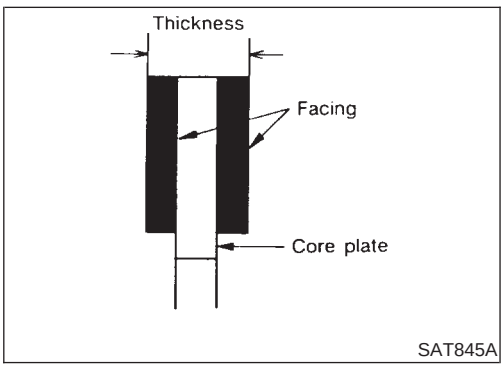

- Removal and installation of return spring




- Inspection of high clutch return springs

  **Inspection standard:**

  **Refer to SDS, AT-283.**




- Inspection of high clutch drive plate

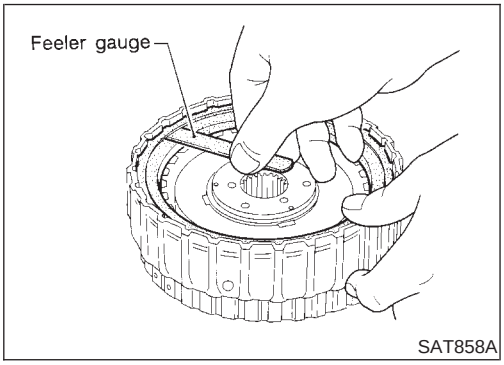
  **Thickness of drive plate:**

  **Standard**

  **1.52 - 1.67 mm (0.0598 - 0.0657 in)**

  **Wear limit**

  **1.40 mm (0.0551 in)**




- 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-284.**

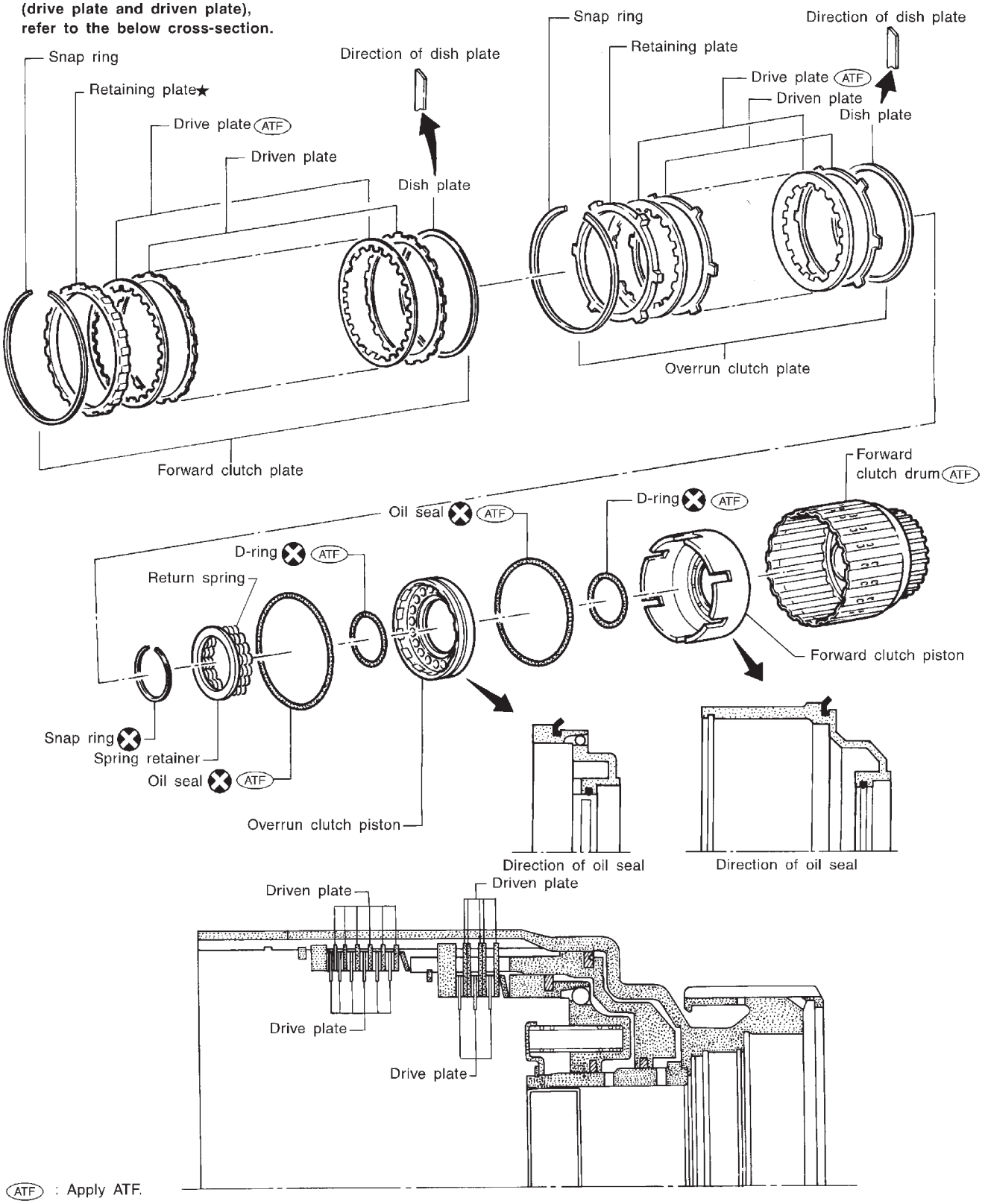
# Forward and Overrun Clutches

## COMPONENTS

NEAT0134

**SEC. 315**

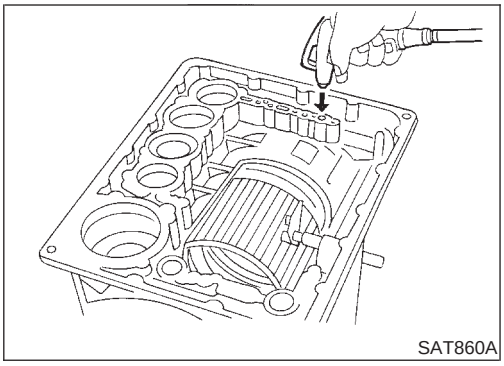
**For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section.**




(ATF) : Apply ATF.

★ : Select with proper thickness.

SAT145J

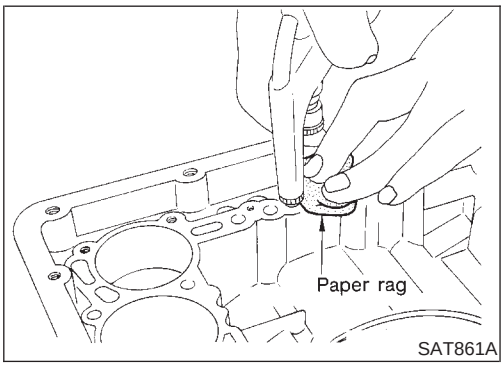

SAT860A

## DISASSEMBLY AND ASSEMBLY

NEAT0135

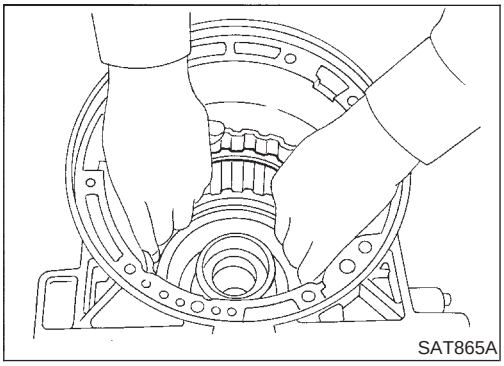
Forward and overrun clutches are serviced essentially the same way as reverse clutch is serviced. However, note the following exceptions.

- Check of forward clutch operation

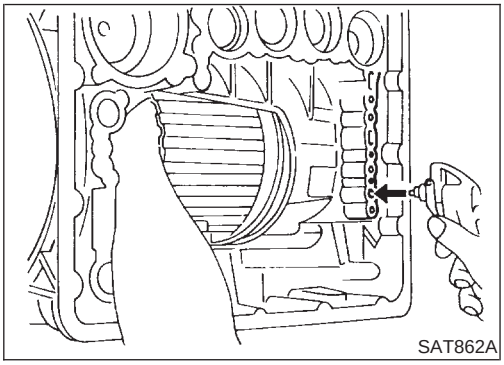


SAT861A

- Check of overrun clutch operation

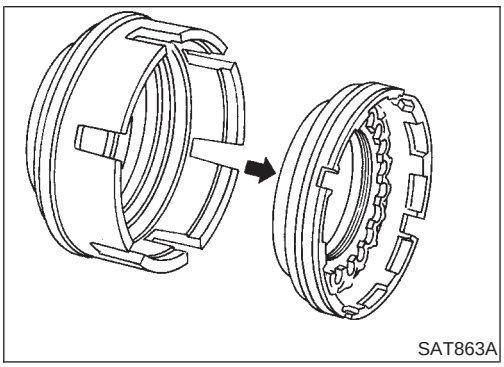

SAT865A

- Removal of forward clutch drum
  Remove forward clutch drum from transmission case by holding snap ring.

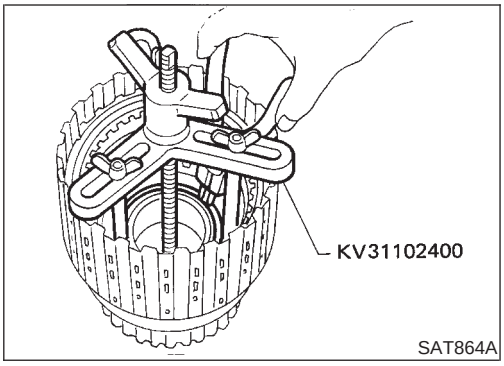

SAT862A

- Removal of forward clutch and overrun clutch pistons

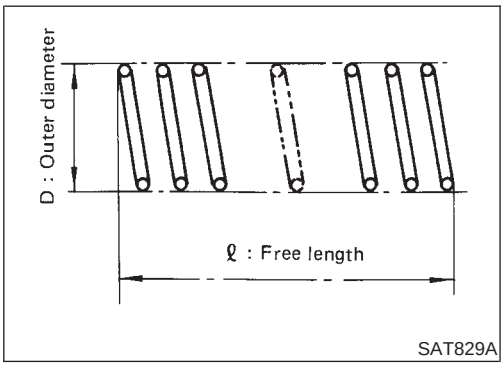
a) While holding overrun clutch piston, gradually apply compressed air to oil hole.


SAT863A

b) Remove overrun clutch from forward clutch.



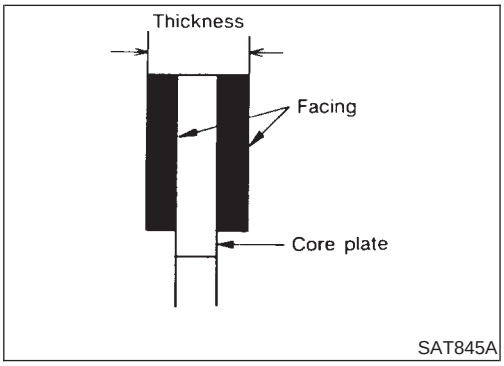

- Removal and installation of return springs




- Inspection of forward clutch and overrun clutch return springs

**Inspection standard:**

**Refer to SDS, AT-283.**




- Inspection of forward clutch drive plates

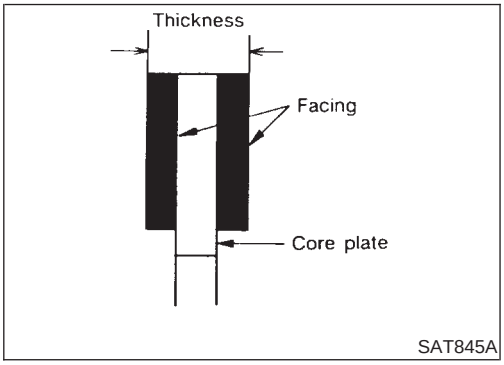
**Thickness of drive plate:**

**Standard**

**1.52 - 1.67 mm (0.0598 - 0.0657 in)**

**Wear limit**

**1.40 mm (0.0551 in)**




- Inspection of overrun clutch drive plates

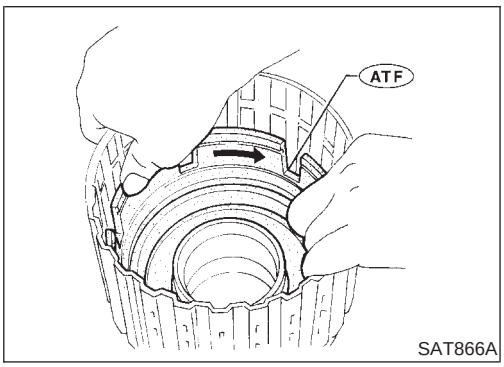
**Thickness of drive plate:**

**Standard**

**1.90 - 2.05 mm (0.0748 - 0.0807 in)**

**Wear limit**

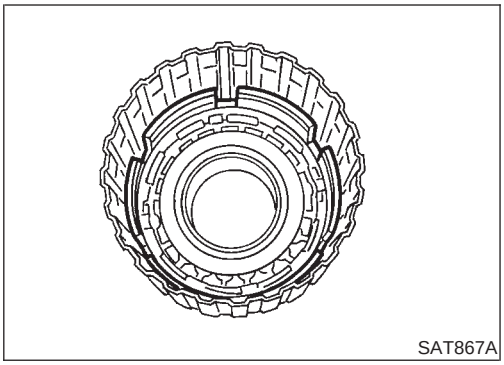
**1.80 mm (0.0709 in)**



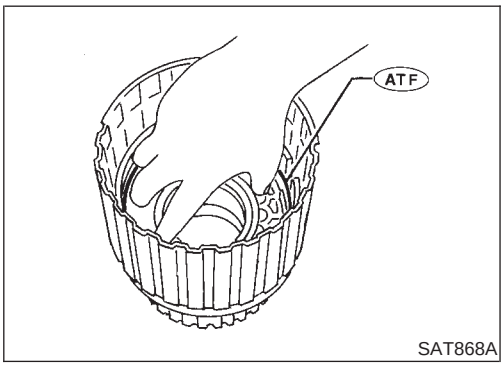

- Installation of forward clutch piston and overrun clutch piston

a) Install forward clutch piston by turning it slowly and evenly.

- **Apply ATF to inner surface of clutch drum.**


SAT867A

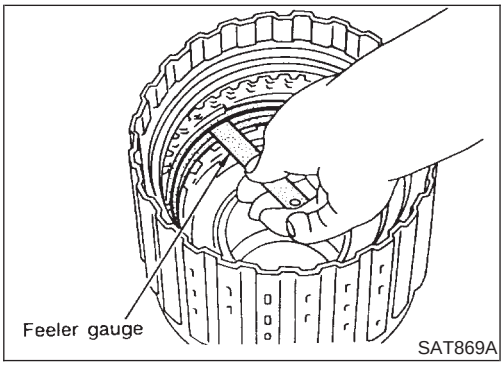
- **Align notch in forward clutch piston with groove in forward clutch drum.**



SAT868A

b) Install overrun clutch by turning it slowly and evenly.

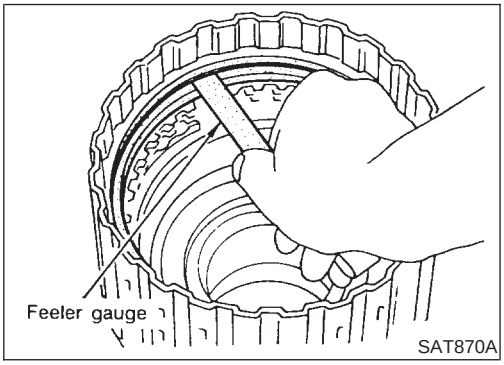
- **Apply ATF to inner surface of forward clutch piston.**



SAT869A

- Measurement of clearance between retaining plate and snap ring of overrun clutch

**Specified clearance:**
**Standard**
**1.0 - 1.4 mm (0.039 - 0.055 in)**
**Allowable limit**
**2.0 mm (0.079 in)**
**Retaining plate:**
**Refer to SDS, AT-285.**



SAT870A

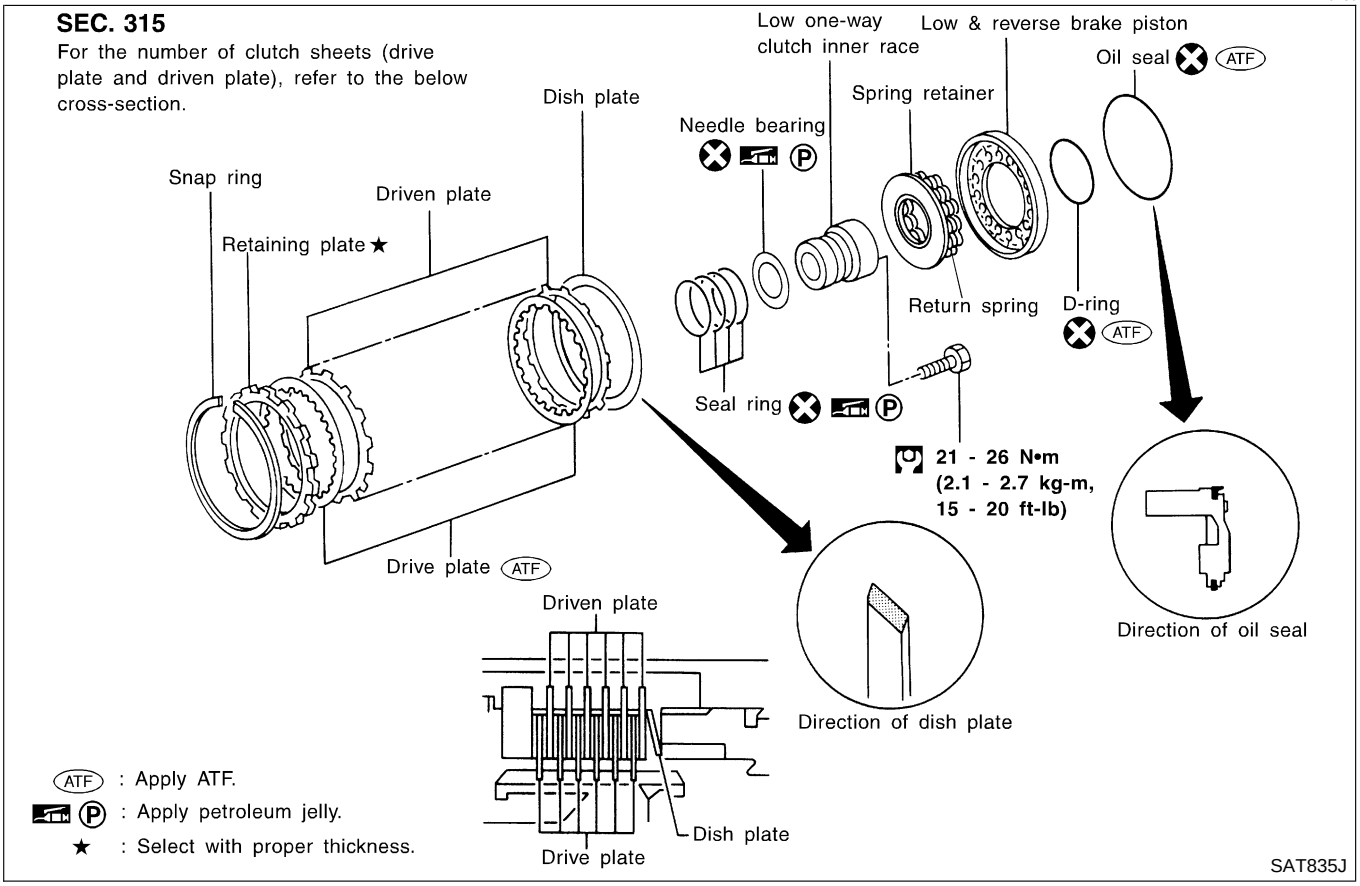
- Measurement of clearance between retaining plate and snap ring of forward clutch

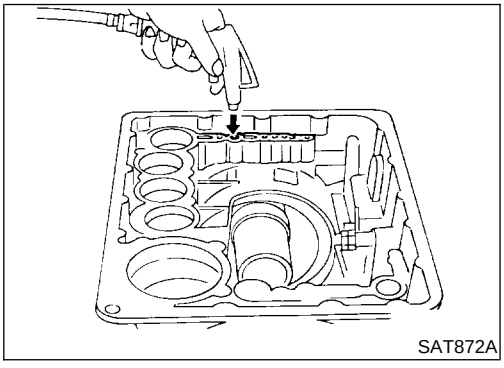
**Specified clearance:**
**Standard**
**0.35 - 0.75 mm (0.0138 - 0.0295 in)**
**Allowable limit**
**1.95 mm (0.0768 in)**
**Retaining plate:**
**Refer to SDS, AT-285.**

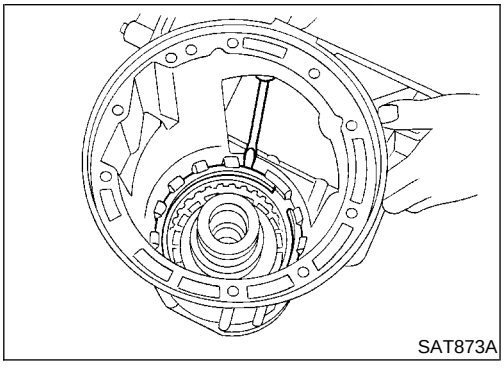
# Low & Reverse Brake

## COMPONENTS

NEAT0136




## DISASSEMBLY

NEAT0137

1. Check operation of low and reverse brake.

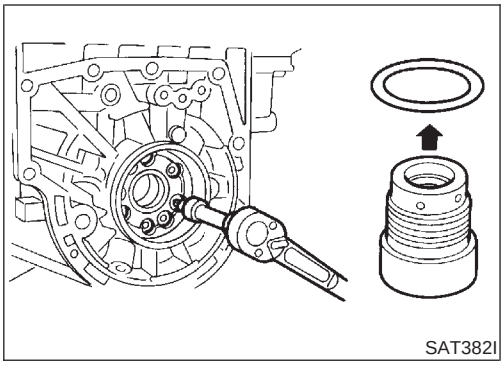
a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.

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

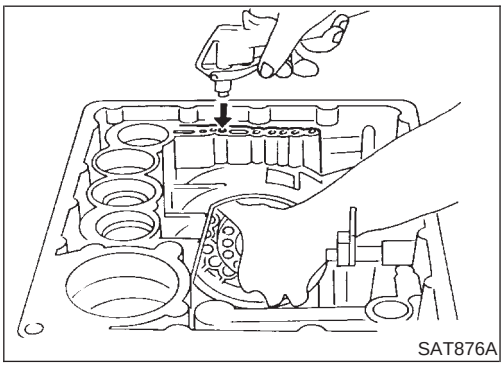
c. If retaining plate does not contact snap ring,

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

2. Remove snap ring, low and reverse brake drive plates, driven plates and dish plate.


SAT382I

3. Remove low one-way clutch inner race, spring retainer and return spring from transmission case.
4. Remove seal rings from low one-way clutch inner race.
5. Remove needle bearing from low one-way clutch inner race.


SAT876A

6. Remove low and reverse brake piston using compressed air.
7. Remove oil seal and D-ring from piston.

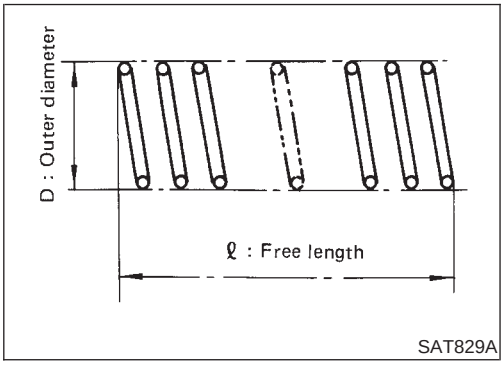
## INSPECTION

NEAT0138

### Low and Reverse Brake Snap Ring and Spring Retainer

NEAT0138S01

- Check for deformation, or damage.



SAT829A

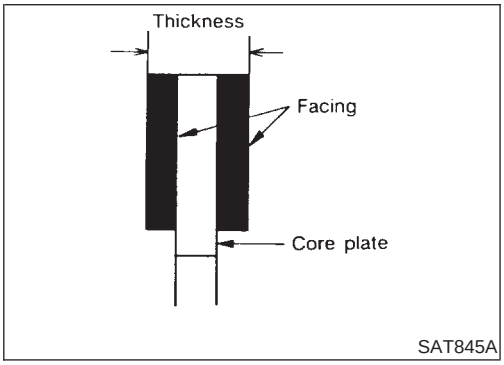
### Low and Reverse Brake Return Springs

NEAT0138S02

- Check for deformation or damage. Also measure free length and outside diameter.

**Inspection standard:**

**Refer to SDS, AT-283.**



SAT845A

### Low and Reverse Brake Drive Plates

NEAT0138S03

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

**Thickness of drive plate:**

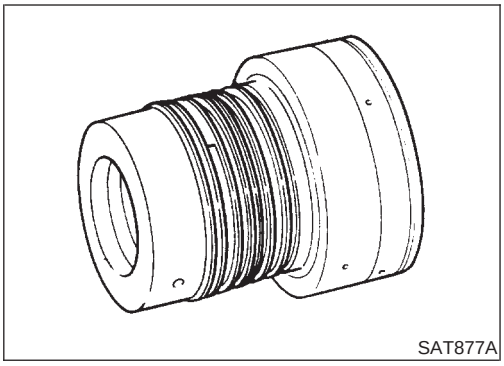
**Standard value**

**1.52 - 1.67 mm (0.0598 - 0.0657 in)**

**Wear limit**

**1.40 mm (0.0551 in)**

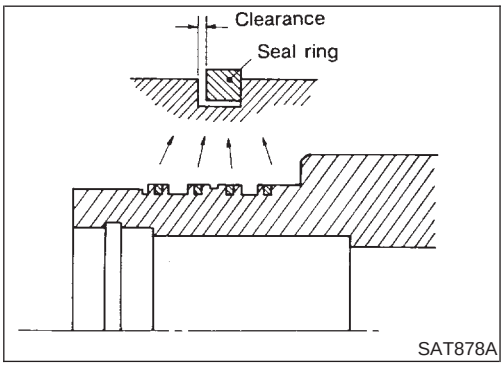
- If not within wear limit, replace.


SAT877A

## Low One-way Clutch Inner Race

NEAT0138S04

- Check frictional surface of inner race for wear or damage.



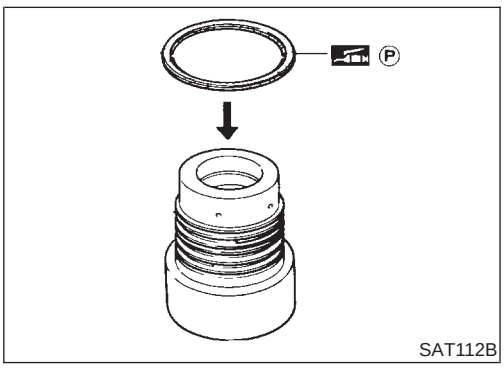
SAT878A

- Install a new seal rings onto low one-way clutch inner race.
- **Be careful not to expand seal ring gap excessively.**
- Measure seal ring-to-groove clearance.

  **Inspection standard:**

  **Standard value: 0.10 - 0.25 mm (0.0039 - 0.0098 in)**

  **Allowable limit: 0.25 mm (0.0098 in)**
- If not within allowable limit, replace low one-way clutch inner race.

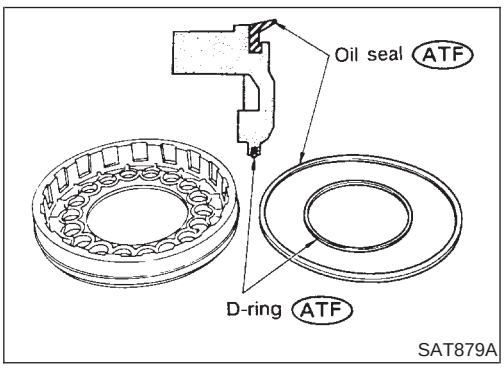


SAT112B

## ASSEMBLY

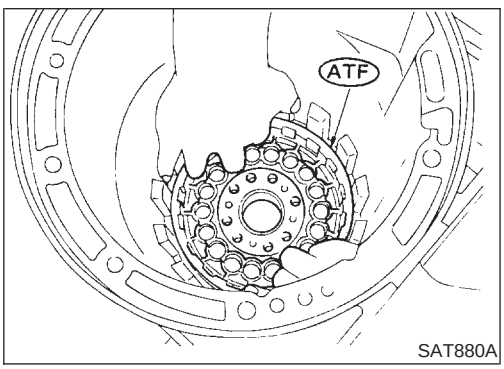
NEAT0139

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.**



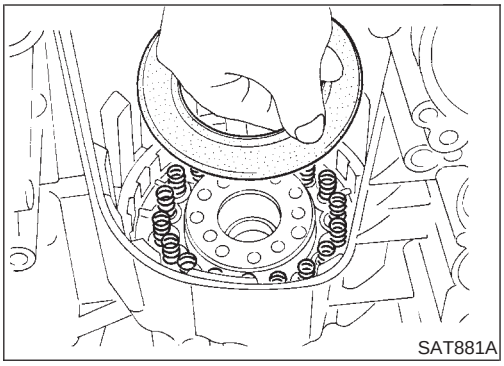
SAT879A

2. Install oil seal and D-ring onto piston.
- **Apply ATF to oil seal and D-ring.**

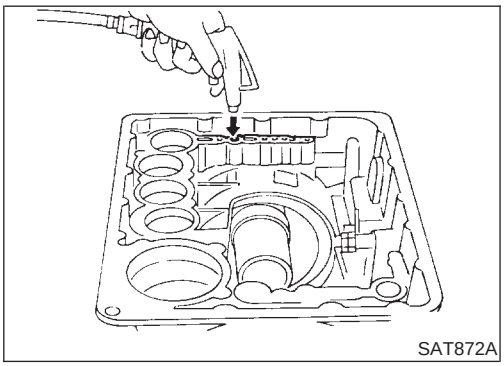


SAT880A

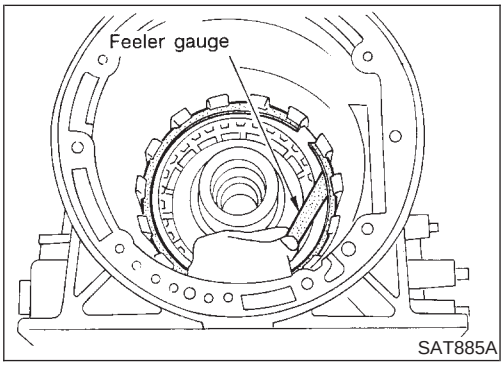
3. Install piston by rotating it slowly and evenly.
- **Apply ATF to inner surface of transmission case.**


SAT881A

4. Install return springs, spring retainer and low one-way clutch inner race onto transmission case.
5. Install dish plate, low and reverse brake drive plates, driven plates and retaining plate.
6. Install snap ring on transmission case.


SAT872A

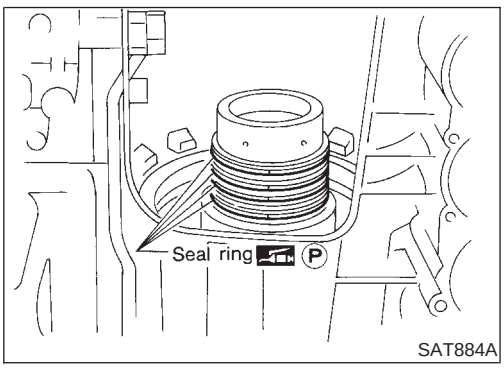
7. Check operation of low and reverse brake clutch piston. Refer to "DISASSEMBLY", AT-248.



SAT885A

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

**Specified clearance:**
**Standard**
**0.8 - 1.1 mm (0.031 - 0.043 in)**
**Allowable limit**
**2.3 mm (0.091 in)**
**Retaining plate:**
**Refer to SDS, AT-286.**



SAT884A

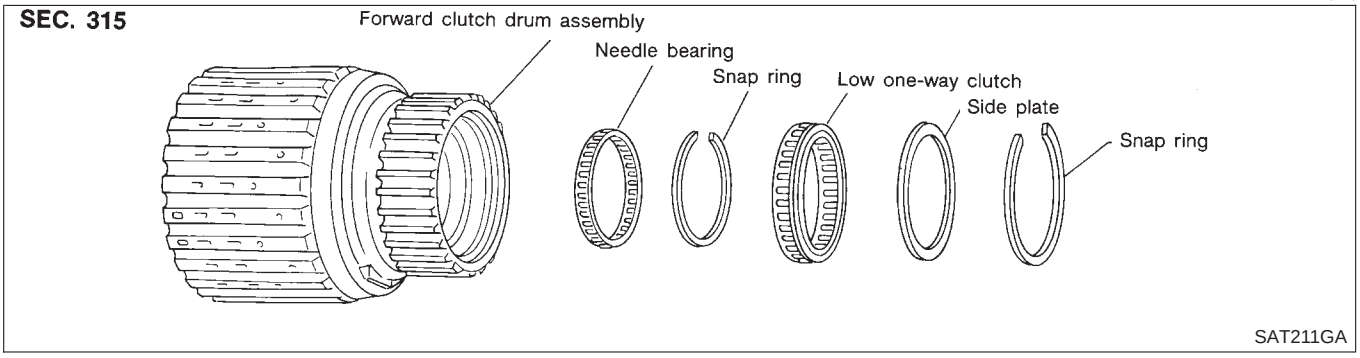
9. Install low one-way clutch inner race seal ring.

- **Apply petroleum jelly to seal ring.**
- **Make sure seal rings are pressed firmly into place and held by petroleum jelly.**

# Forward Clutch Drum Assembly

## COMPONENTS

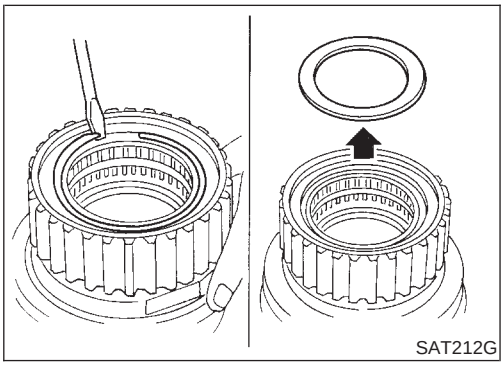
NEAT0140



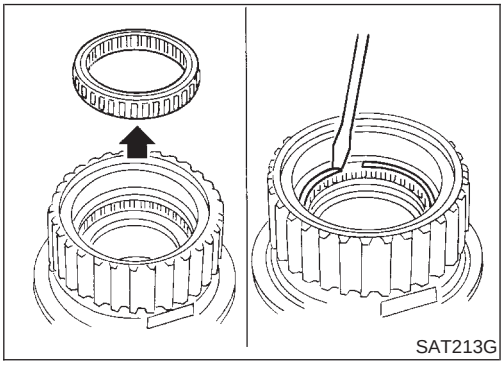

## DISASSEMBLY

NEAT0141

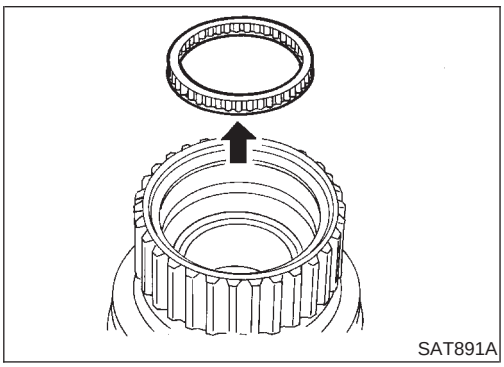
1. Remove snap ring from forward clutch drum.
2. Remove side plate from forward clutch drum.

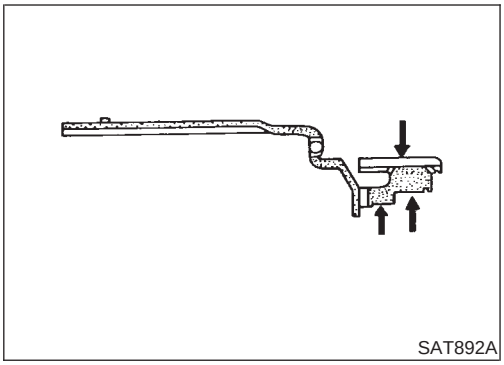



3. Remove low one-way clutch from forward clutch drum.
4. Remove snap ring from forward clutch drum.




5. Remove needle bearing from forward clutch drum.




SAT892A

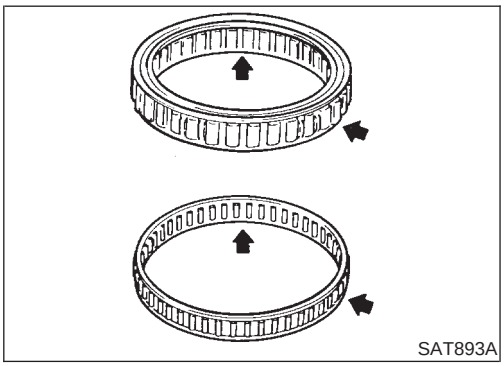
## INSPECTION

NEAT0142

### Forward Clutch Drum

NEAT0142S01

- Check spline portion for wear or damage.
- Check frictional surfaces of low one-way clutch and needle bearing for wear or damage.


SAT893A

### Needle Bearing and Low One-way Clutch

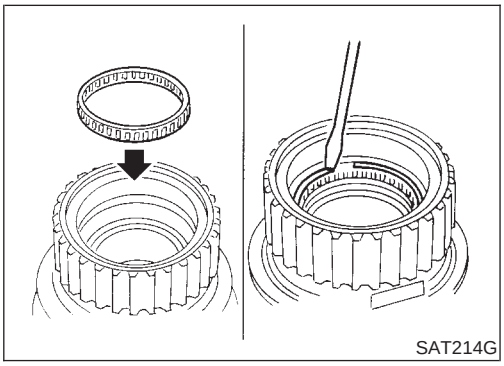
NEAT0142S02

- Check frictional surface for wear or damage.

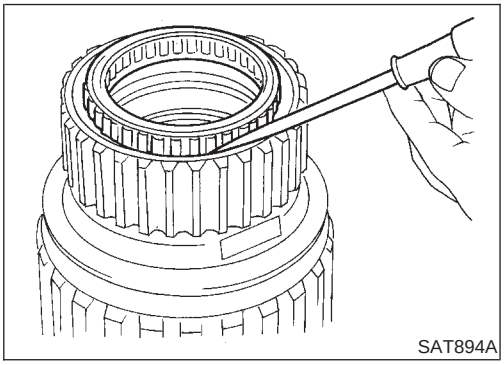
## ASSEMBLY

NEAT0143

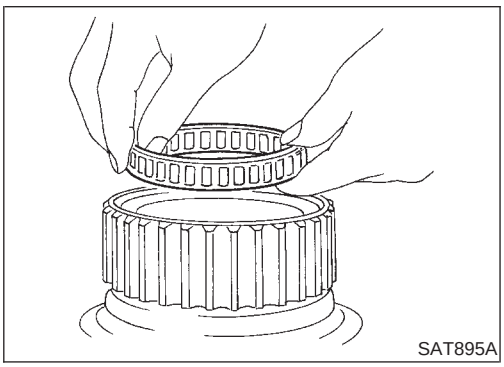
1. Install needle bearing in forward clutch drum.
2. Install snap ring onto forward clutch drum.

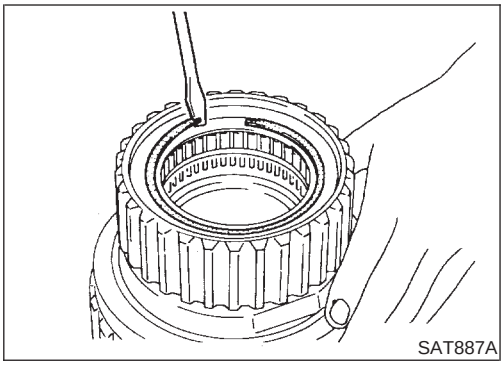

SAT214G

3. Install low one-way clutch onto forward clutch drum by pushing the roller in evenly.


SAT894A

- **Install low one-way clutch with flange facing rearward.**


SAT895A

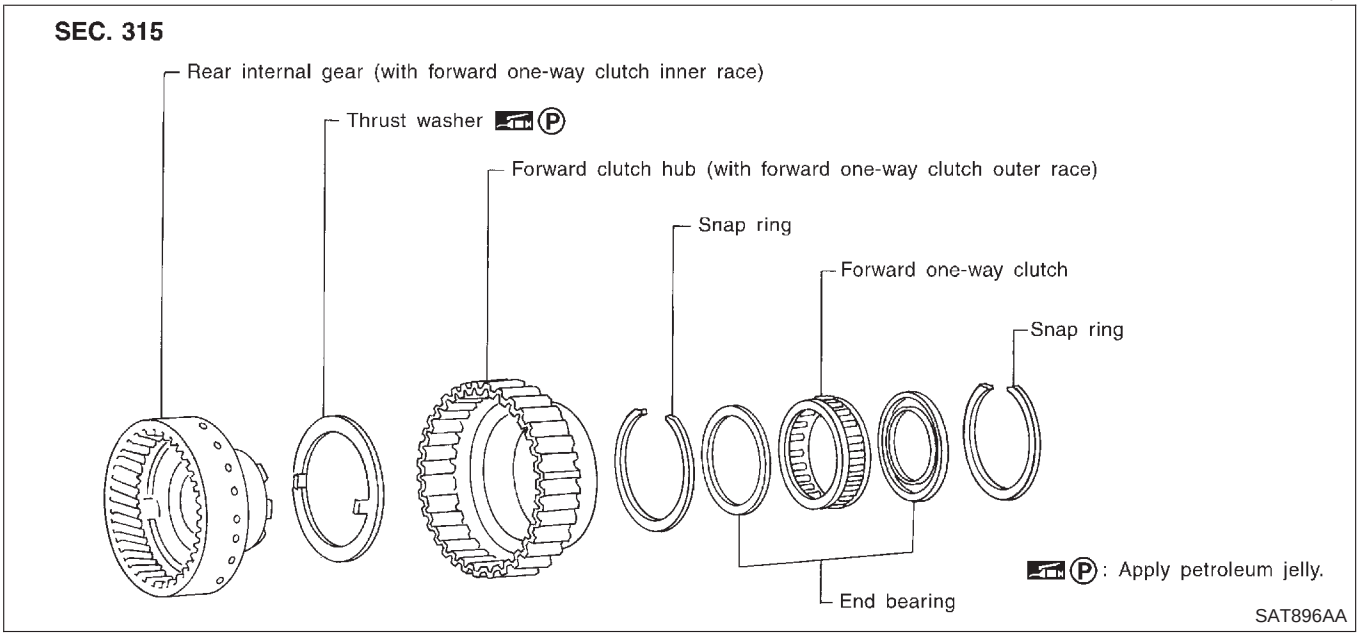

SAT887A

4. Install side plate onto forward clutch drum.
5. Install snap ring onto forward clutch drum.

## Rear Internal Gear and Forward Clutch Hub

### COMPONENTS

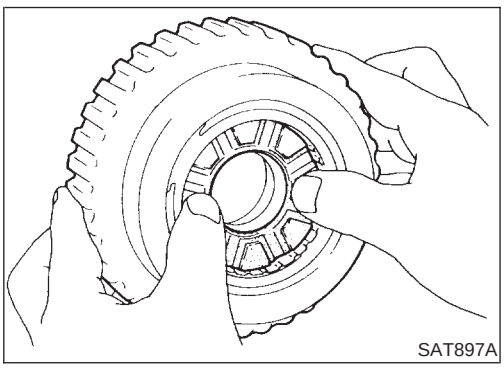
NEAT0144



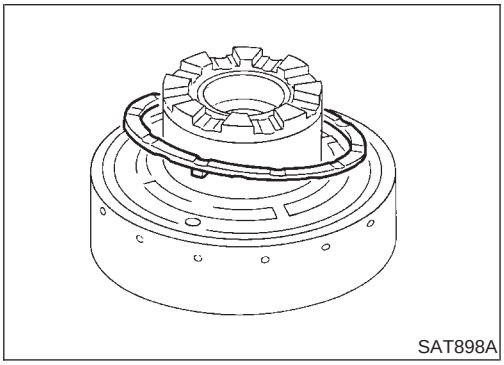

### DISASSEMBLY

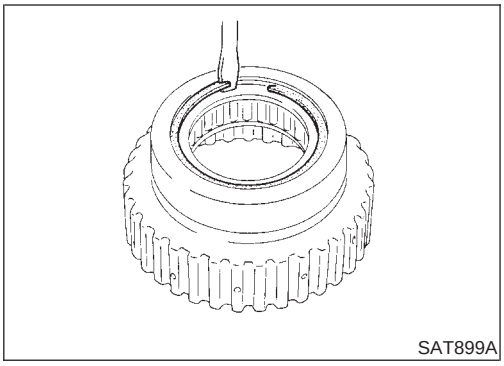
NEAT0145

1. Remove rear internal gear by pushing forward clutch hub forward.

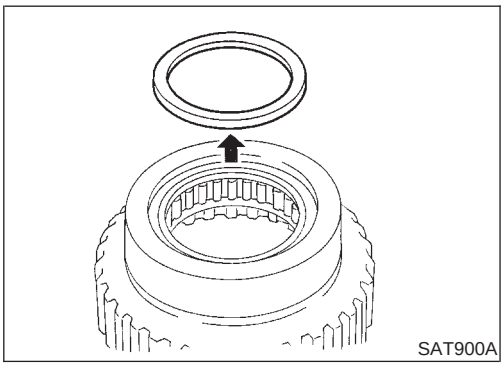

SAT897A

2. Remove thrust washer from rear internal gear.

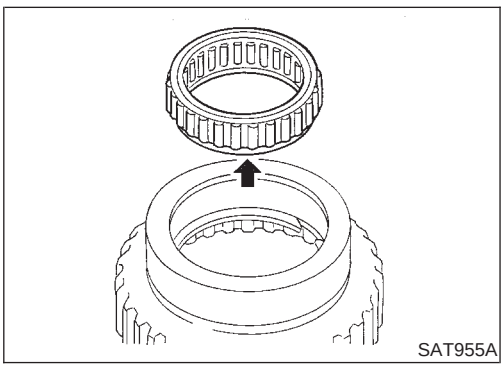

SAT898A


SAT899A

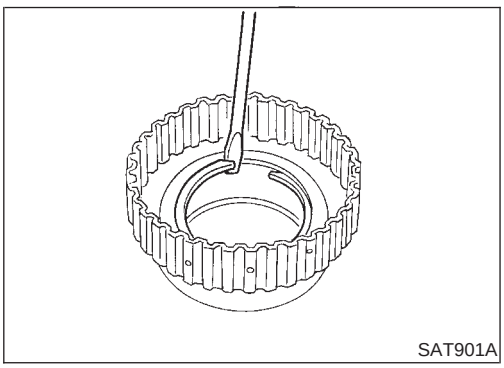
3. Remove snap ring from forward clutch hub.


SAT900A

4. Remove end bearing.


SAT955A

5. Remove forward one-way clutch and end bearing as a unit from forward clutch hub.


SAT901A

6. Remove snap ring from forward clutch hub.

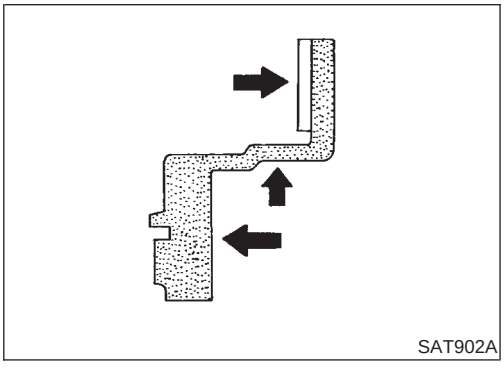
## INSPECTION

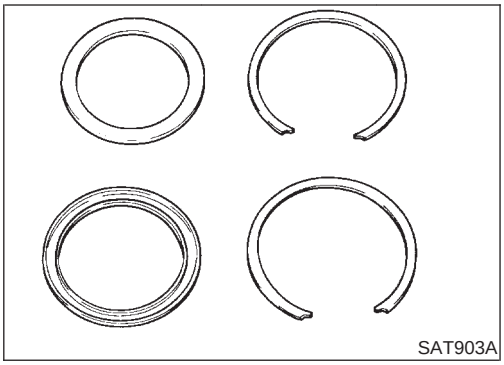
NEAT0146

### Rear Internal Gear and Forward Clutch Hub

NEAT0146S01

- 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.

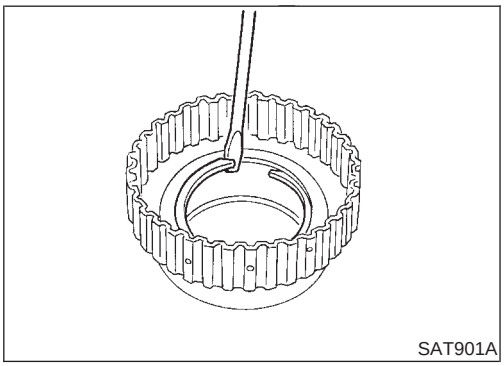

SAT902A


SAT903A

## Snap Ring and End Bearing

NEAT0146S02

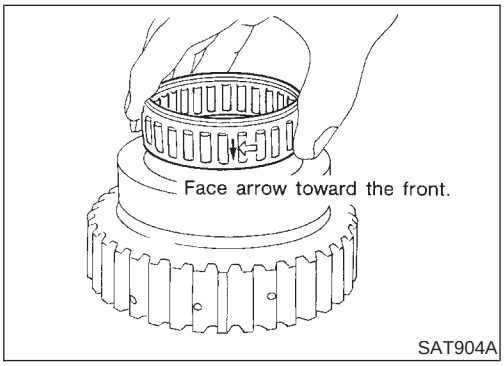
- Check for deformation or damage.


SAT901A

## ASSEMBLY

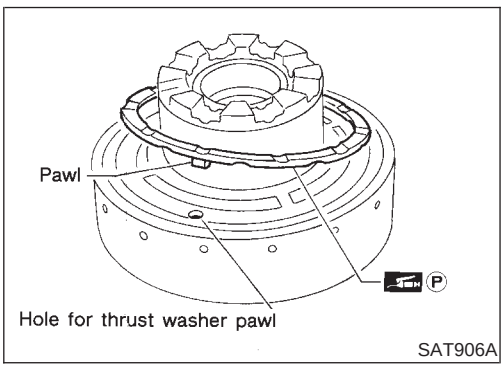
NEAT0147

1. Install snap ring onto forward clutch hub.
2. Install end bearing.



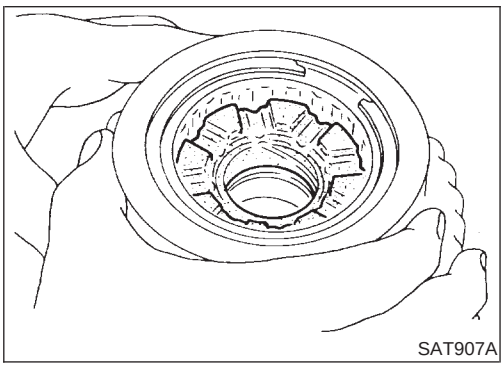
SAT904A

3. Install forward one-way clutch onto clutch hub.
- **Install forward one-way clutch with flange facing rearward.**
4. Install end bearing.
5. Install snap ring onto forward clutch hub.

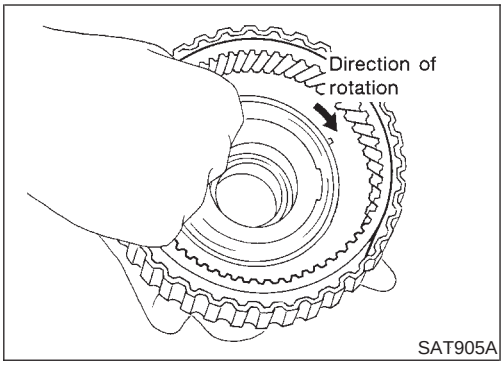


SAT906A

6. Install thrust washer onto rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Securely insert pawls of thrust washer into holes in rear internal gear.**


SAT907A

7. Position forward clutch hub in rear internal gear.

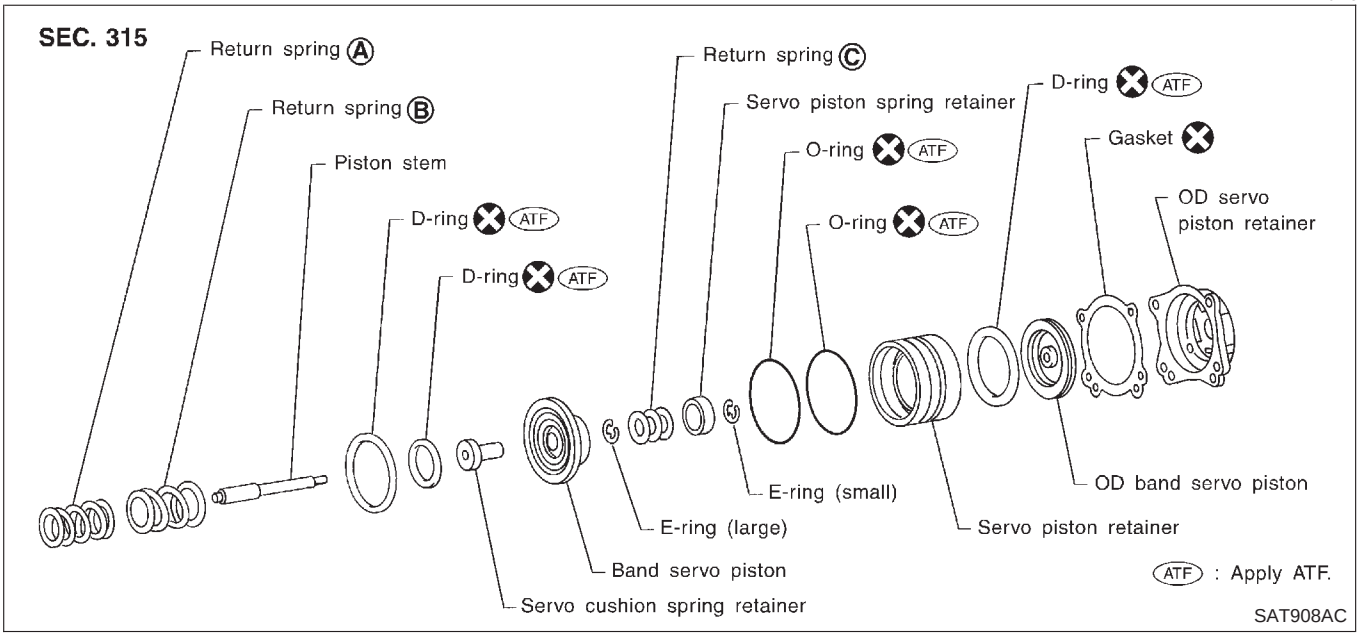



8. After installing, check to assure that forward clutch hub rotates clockwise.

## Band Servo Piston Assembly

### COMPONENTS

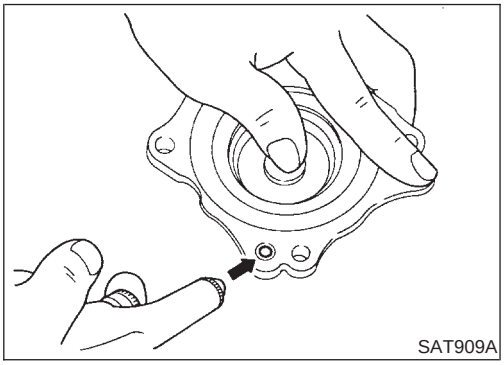
NEAT0148



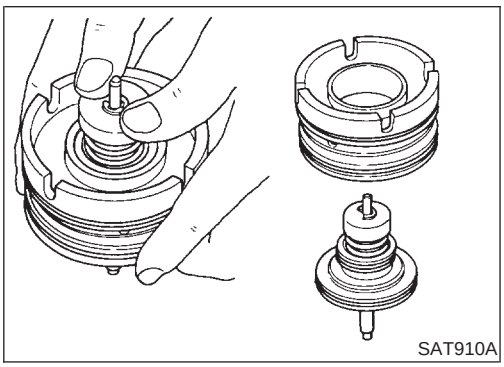

### DISASSEMBLY

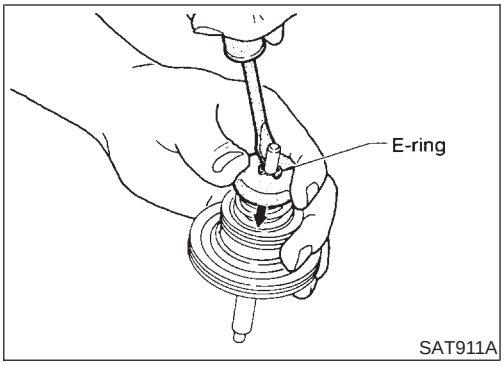
NEAT0149

1. Block one oil hole in OD servo piston retainer and the center hole in OD band servo piston.
2. Apply compressed air to the other oil hole in piston retainer to remove OD band servo piston from retainer.
3. Remove D-ring from OD band servo piston.

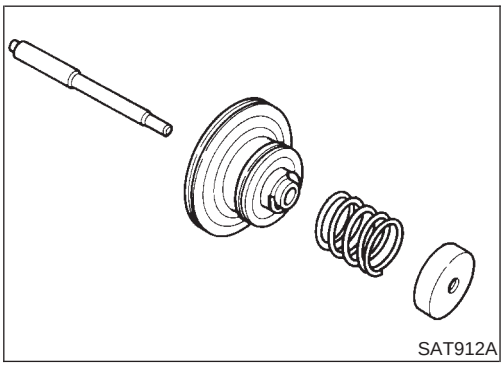



4. Remove band servo piston assembly from servo piston retainer by pushing it forward.

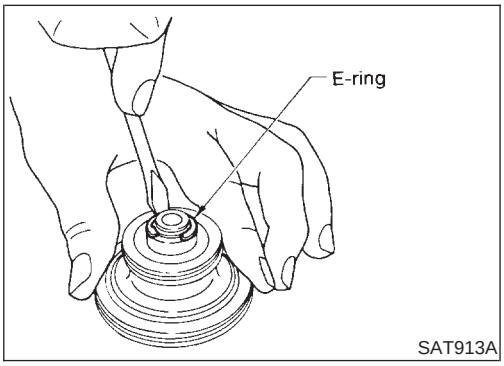




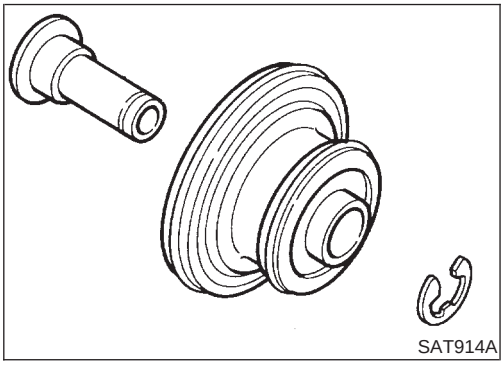

5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.



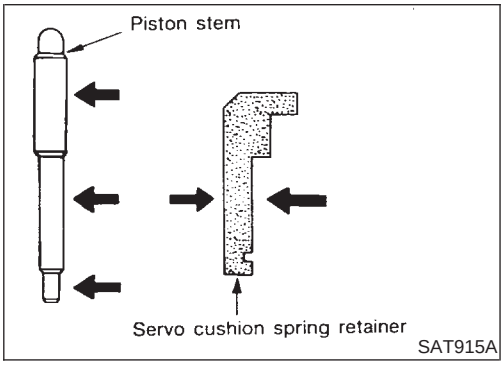

6. Remove servo piston spring retainer, return spring C and piston stem from band servo piston.




7. Remove E-ring from band servo piston.




8. Remove servo cushion spring retainer from band servo piston.
9. Remove D-rings from band servo piston.
10. Remove O-rings from servo piston retainer.



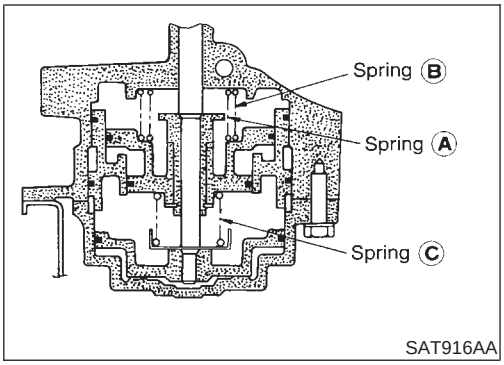

## INSPECTION

NEAT0150

### Pistons, Retainers and Piston Stem

NEAT0150S01

- Check frictional surfaces for abnormal wear or damage.



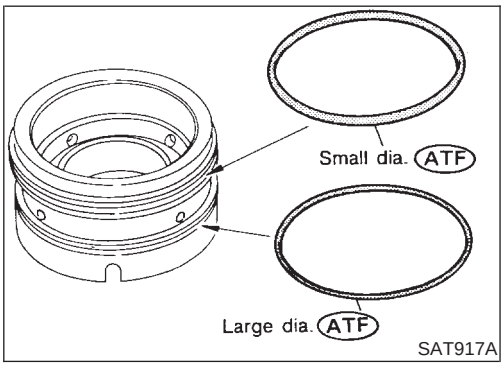
SAT916AA

## Return Springs

NEAT0150S02

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

**Inspection standard:**
**Refer to SDS, AT-283.**

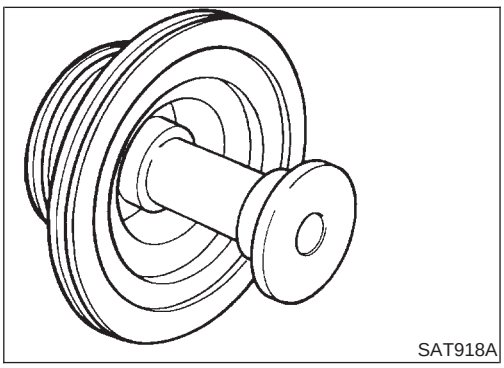


SAT917A

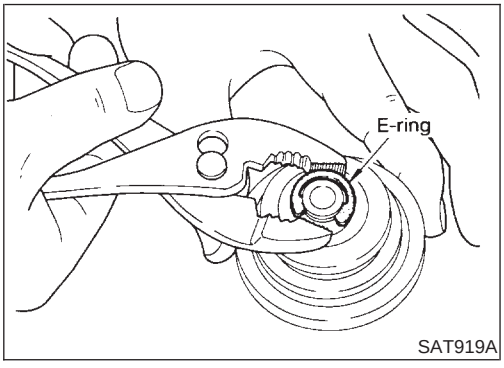
## ASSEMBLY

NEAT0151

1. Install O-rings onto servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**

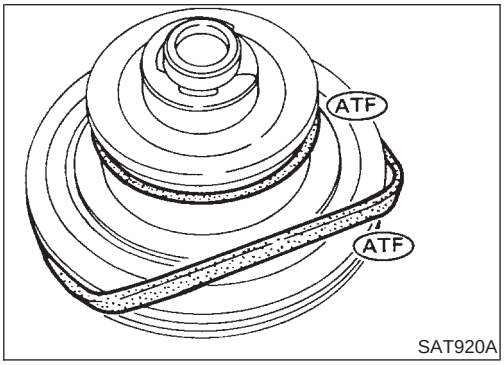

SAT918A

2. Install servo cushion spring retainer onto band servo piston.



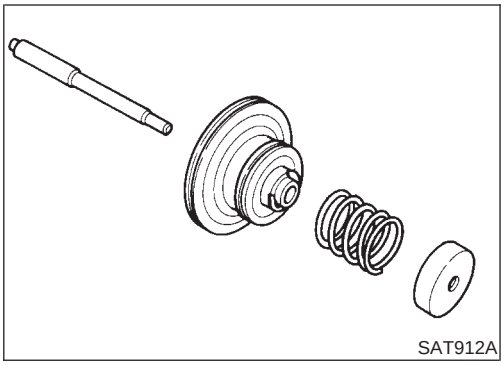
SAT919A

3. Install E-ring onto servo cushion spring retainer.

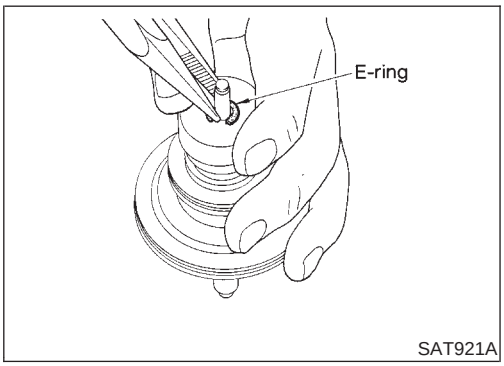


SAT920A

4. Install D-rings onto band servo piston.
- **Apply ATF to D-rings.**

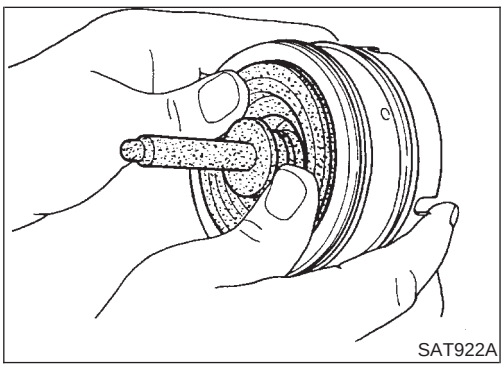

SAT912A

5. Install servo piston spring retainer, return spring C and piston stem onto band servo piston.

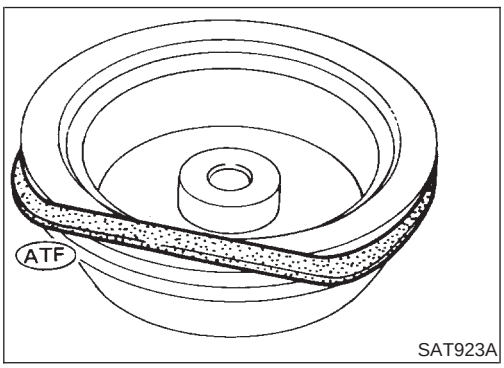


SAT921A

6. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.

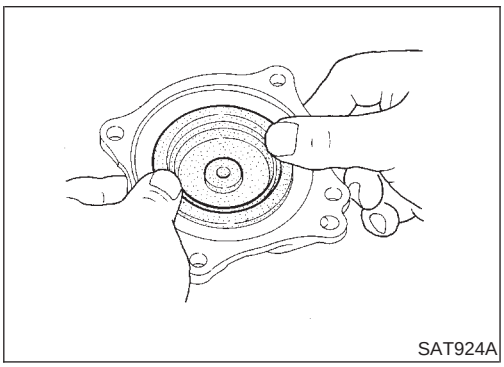

SAT922A

7. Install band servo piston assembly onto servo piston retainer by pushing it inward.



SAT923A

8. Install D-ring on OD band servo piston.
- **Apply ATF to D-ring.**


SAT924A

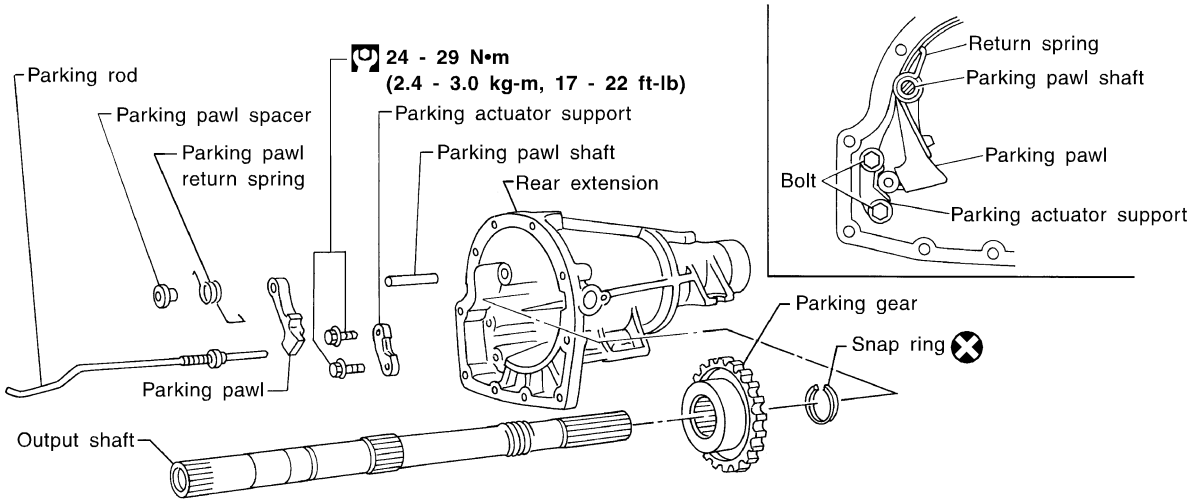
9. Install OD band servo piston onto servo piston retainer by pushing it inward.

# Parking Pawl Components

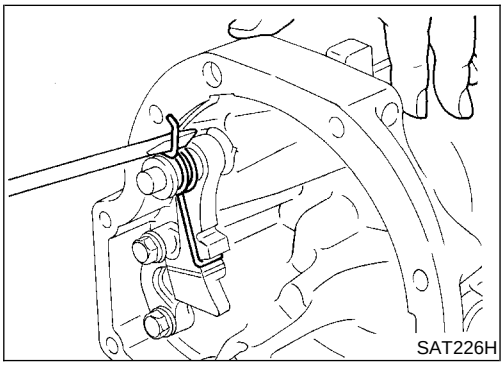
## COMPONENTS

NEAT0152

**SEC. 311•314**




SAT836J

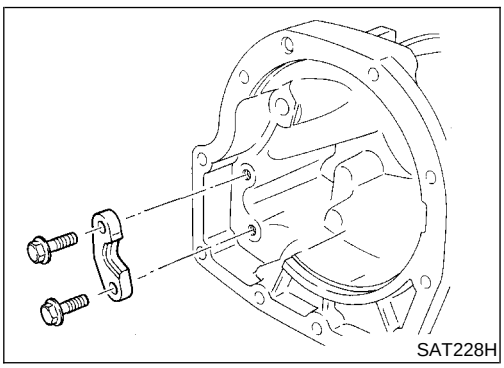


SAT226H

## DISASSEMBLY

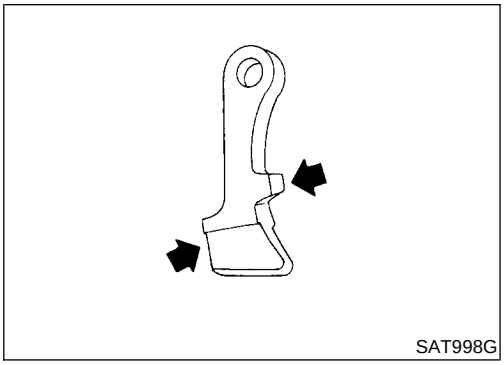
NEAT0153

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.



SAT228H

4. Remove parking actuator support from adapter case.



SAT998G

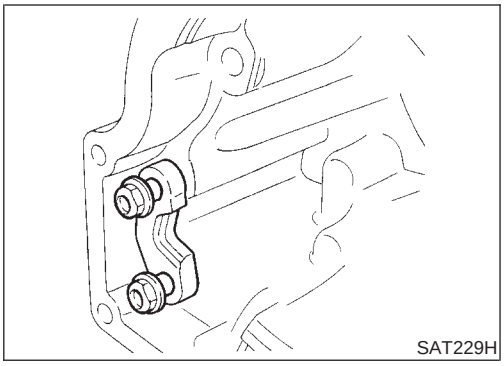
## INSPECTION

NEAT0209

### Parking Pawl and Parking Actuator Support

NEAT0209S01

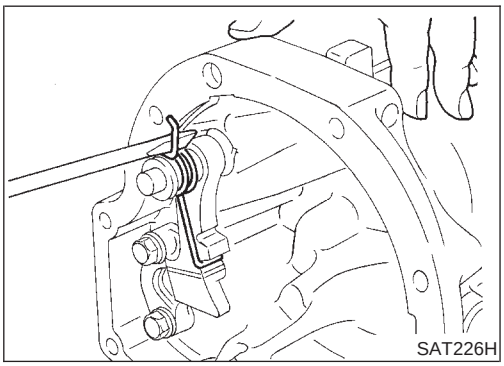
- Check contact surface of parking rod for wear.


SAT229H

## ASSEMBLY

NEAT0154

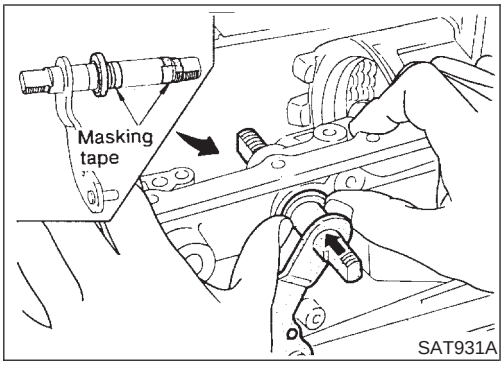
1. Install parking actuator support onto adapter case.
2. Insert parking pawl shaft into adapter case.
3. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.


SAT226H

4. Bend return spring upward and install it onto adapter case.

## Assembly (1)

NEAT0155



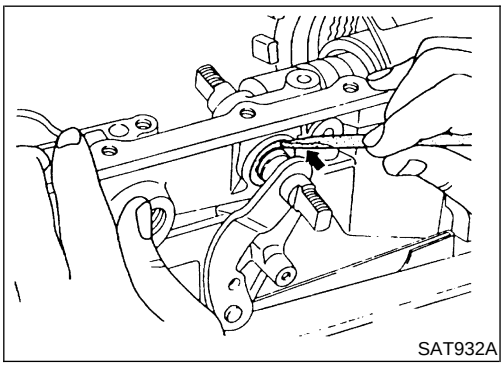

1. Install manual shaft components.

a. Install oil seal onto manual shaft.

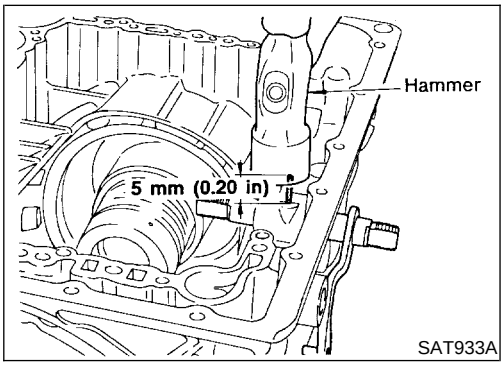
- **Apply ATF to oil seal.**
- **Wrap threads of manual shaft with masking tape.**

b. Insert manual shaft and oil seal as a unit into transmission case.

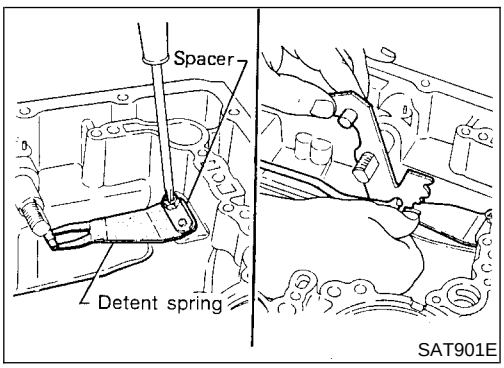
c. Remove masking tape.




d. Push oil seal evenly and install it onto transmission case.

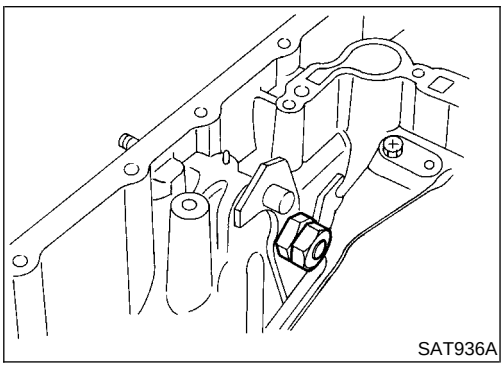



e. Align groove in shaft with retaining pin hole, then retaining pin into position as shown in figure at left.



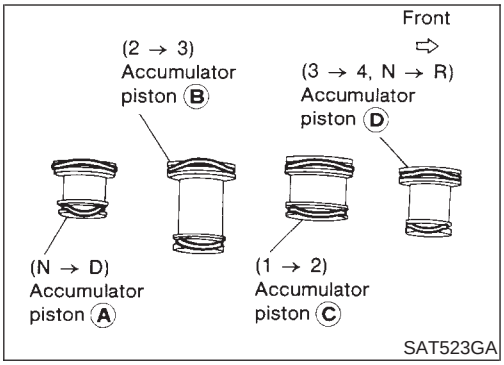

f. Install detent spring and spacer.

g. While pushing detent spring down, install manual plate onto manual shaft.




h. Install lock nuts onto manual shaft.

*Assembly (1) (Cont'd)*

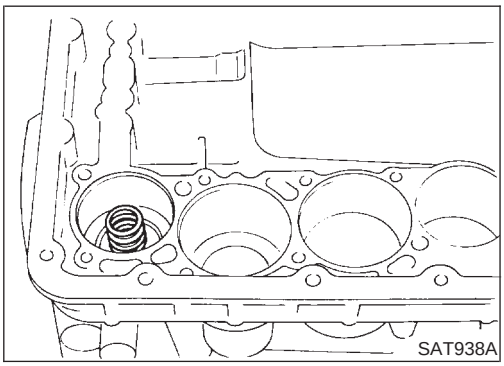



2. Install accumulator piston.
a. Install O-rings onto accumulator piston.
- **Apply ATF to O-rings.**

**Accumulator piston O-rings**

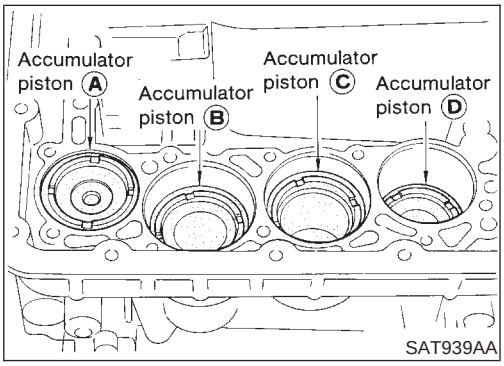
Unit: mm (in)

| 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) |

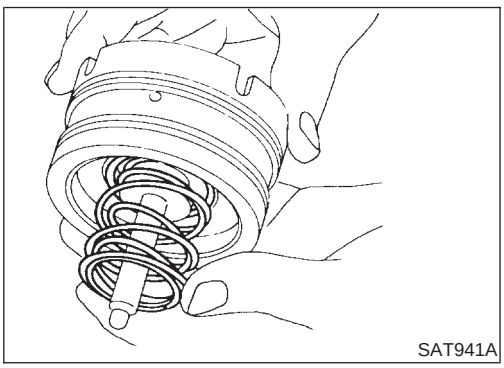



b. Install return spring for accumulator A onto transmission case.

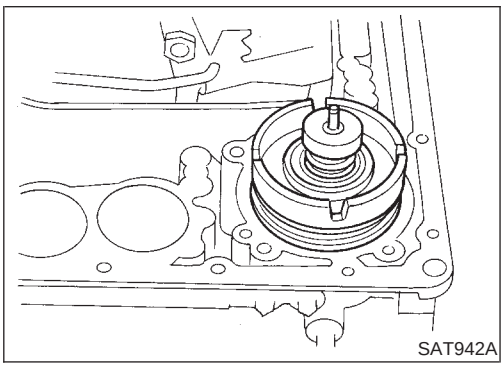
**Free length of return spring:**
**Refer to SDS, AT-283.**




c. Install accumulator pistons A, B, C and D.
- **Apply ATF to transmission case.**

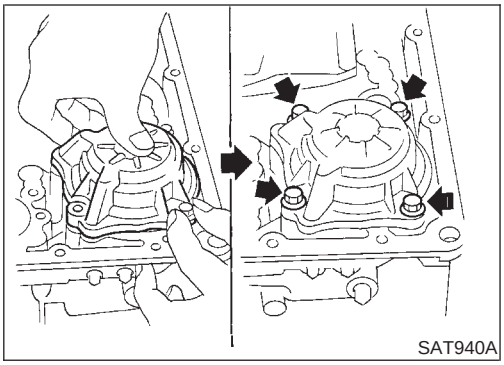



3. Install band servo piston.
a. Install return springs onto servo piston.

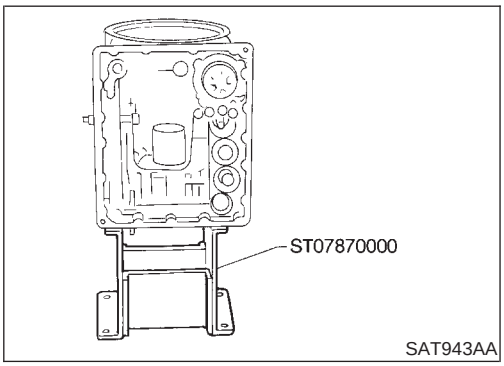



b. Install band servo piston onto transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**

c. Install gasket for band servo onto transmission case.

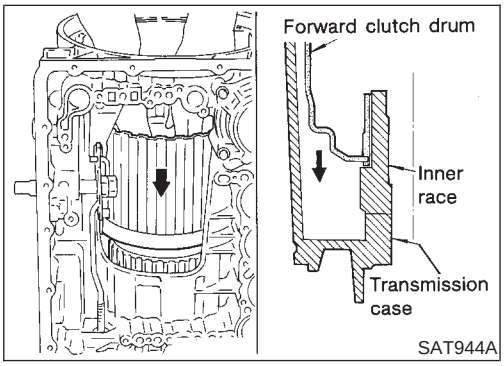

SAT940A

d. Install band servo retainer onto transmission case.



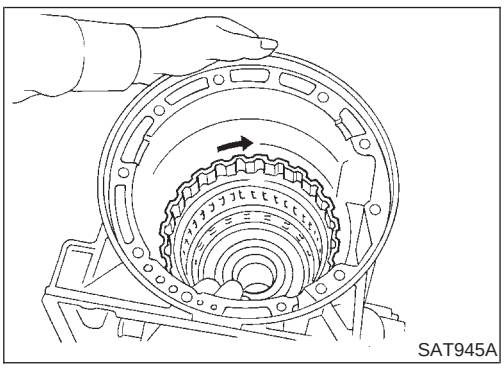
SAT943AA

4. Install rear side clutch and gear components.
a. Place transmission case in vertical position.

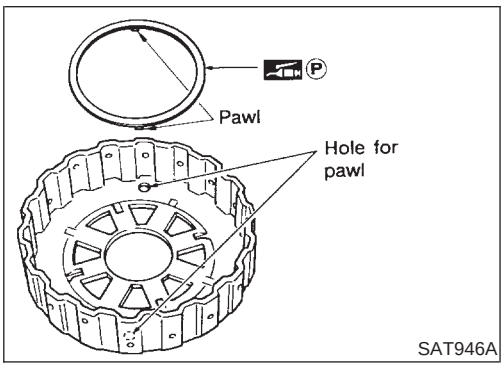


SAT944A

b. Slightly lift forward clutch drum assembly. Then slowly rotate it clockwise until its hub passes fully over clutch inner race inside transmission case.

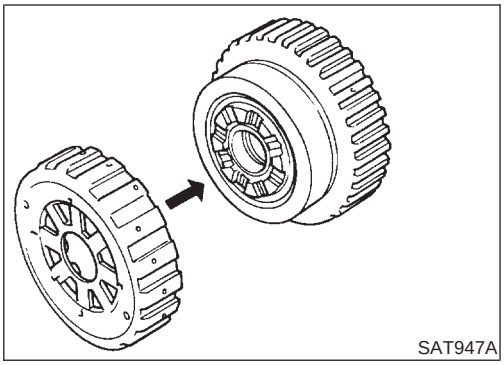

SAT945A

c. Check to be sure that rotation direction of forward clutch assembly is correct.

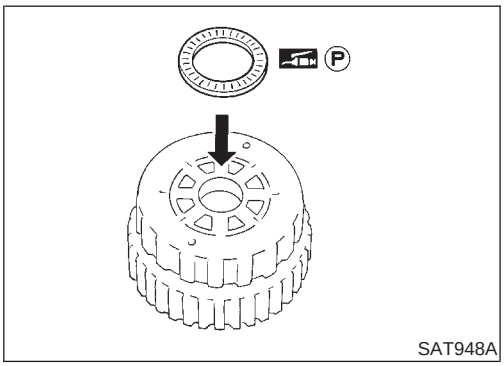


SAT946A

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.**

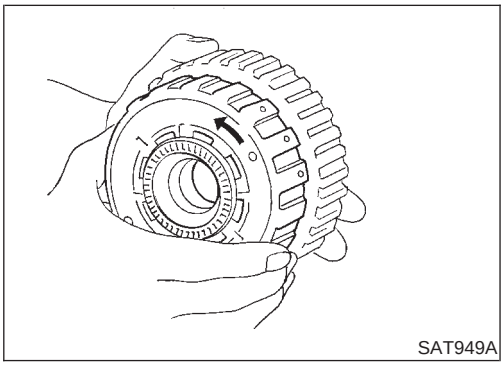

SAT947A

e. Install overrun clutch hub onto rear internal gear assembly.

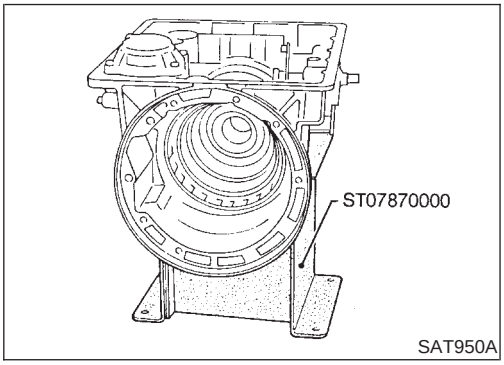


SAT948A

f. Install needle bearing onto rear of overrun clutch hub.
- **Apply petroleum jelly to needle bearing.**

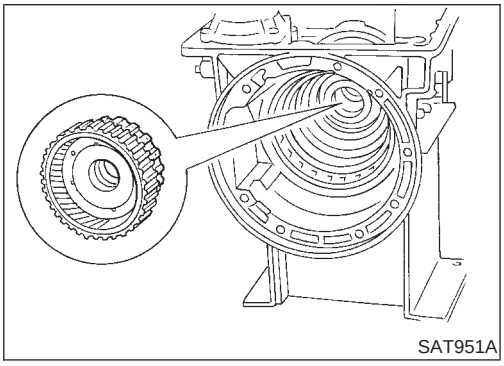

SAT949A

g. Check that overrun clutch hub rotates as shown while holding forward clutch hub.

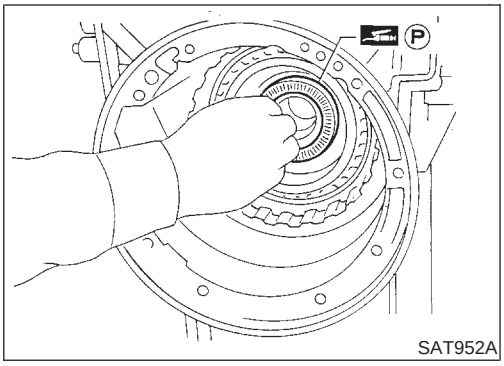


SAT950A

h. Place transmission case into horizontal position.


SAT951A

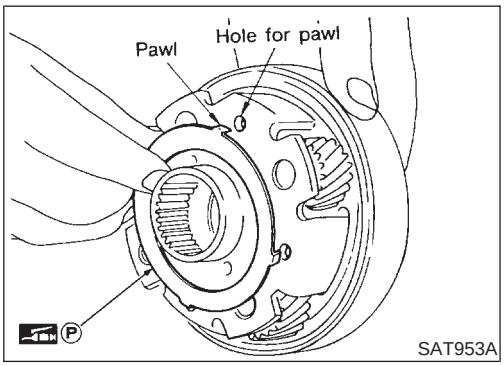
i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.



SAT952A

j. Install needle bearing onto rear internal gear.

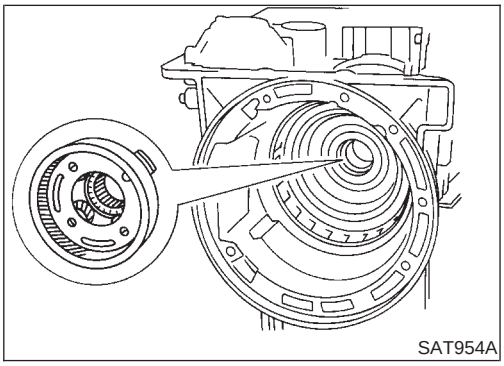
- **Apply petroleum jelly to needle bearing.**



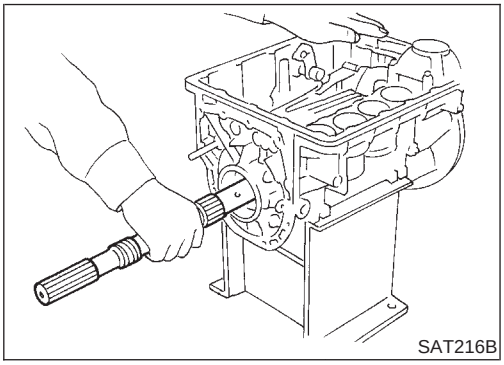
SAT953A

k. Install bearing race onto rear of front internal gear.

- **Apply petroleum jelly to bearing race.**
- **Securely engage pawls of bearing race with holes in front internal gear.**


SAT954A

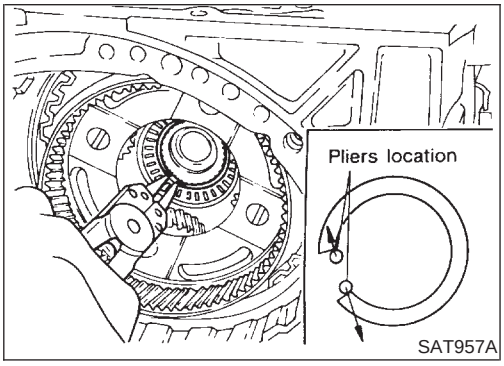
l. Install front internal gear on transmission case.


SAT216B

5. Install output shaft and parking gear.

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.**

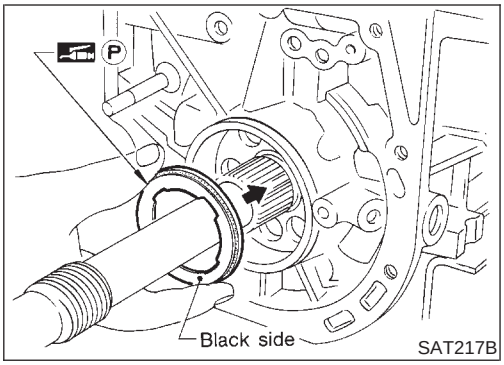


SAT957A

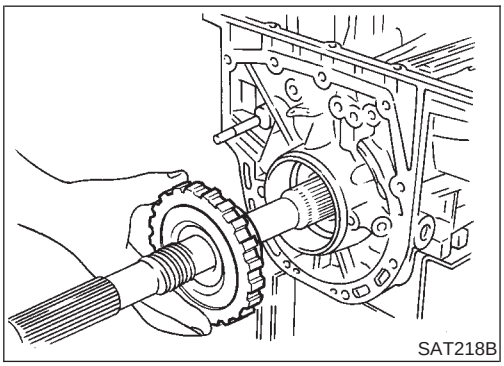
b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.

- **Check to be sure output shaft cannot be removed in rear direction.**

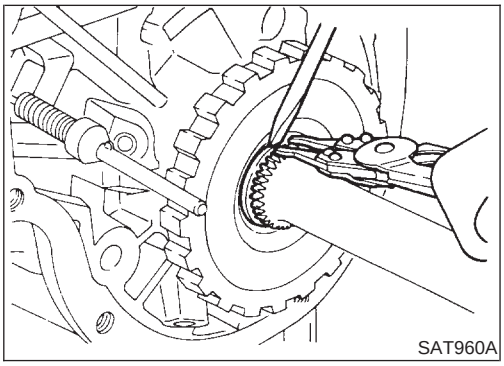
*Assembly (1) (Cont'd)*



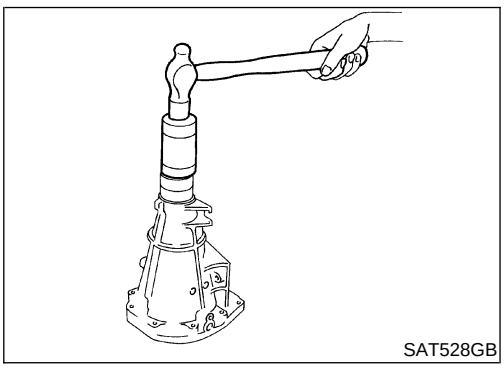

c. Install needle bearing on transmission case.
- **Pay attention to its direction — Black side goes to rear.**
- **Apply petroleum jelly to needle bearing.**



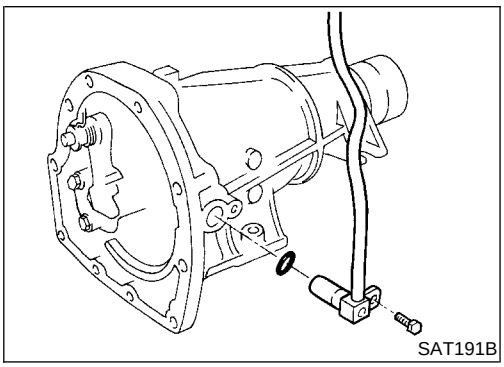

d. Install parking gear on transmission case.




e. Install snap ring on rear of output shaft.
- **Check to be sure output shaft cannot be removed in forward direction.**

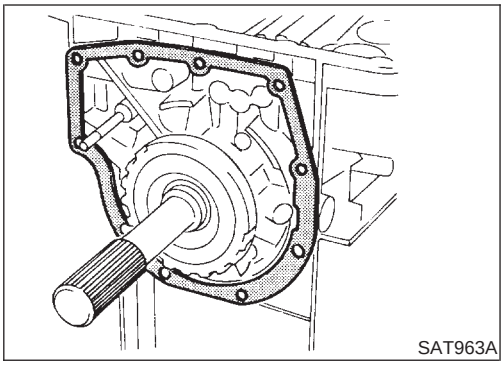



6. Install rear extension.
a. Install oil seal on rear extension.
- **Apply ATF to oil seal.**

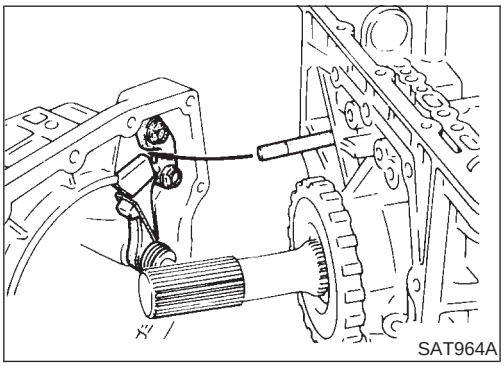



b. Install O-ring on revolution sensor.
- **Apply ATF to O-ring.**

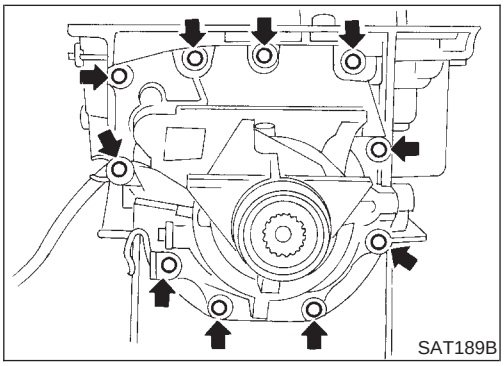
c. Install revolution sensor on adapter case.


SAT963A

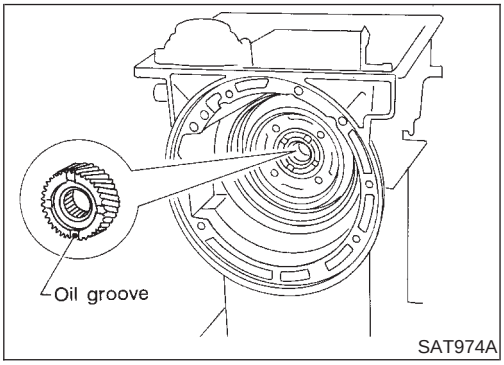
d. Install adapter case gasket on transmission case.


SAT964A

e. Install parking rod on transmission case.

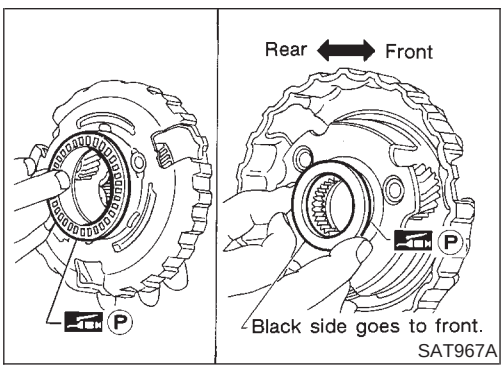

SAT189B

f. Install rear extension on transmission case.



SAT974A

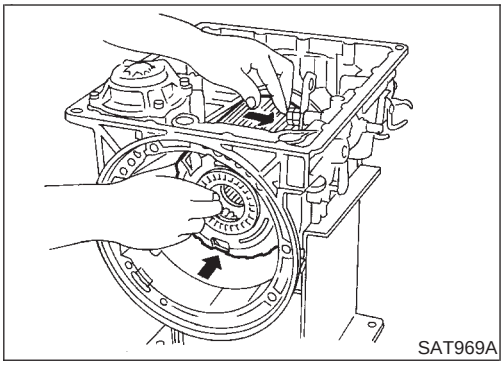
7. Install front side clutch and gear components.
a. Install rear sun gear on transmission case.
- **Pay attention to its direction.**



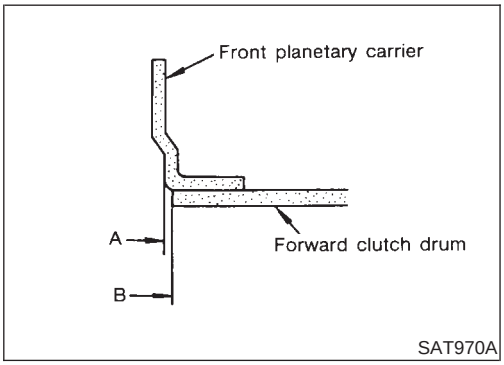
SAT967A

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.**

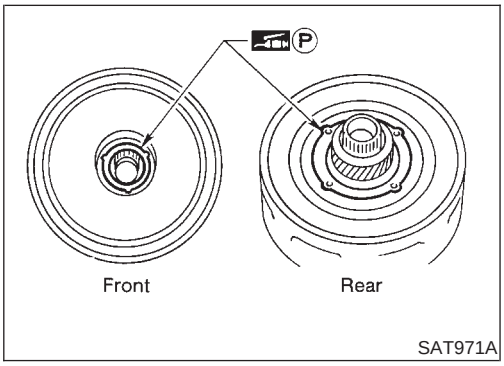

SAT969A

d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.



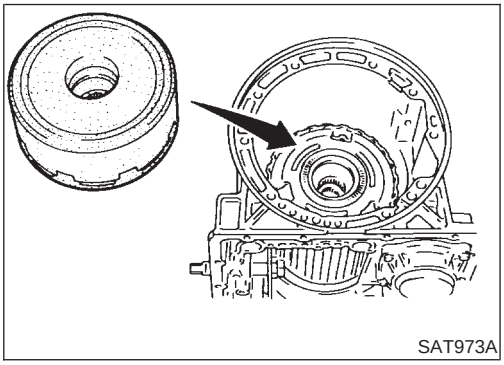
SAT970A

- **Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.**



SAT971A

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.**


SAT973A

f. Install clutch pack into transmission case.

## Adjustment

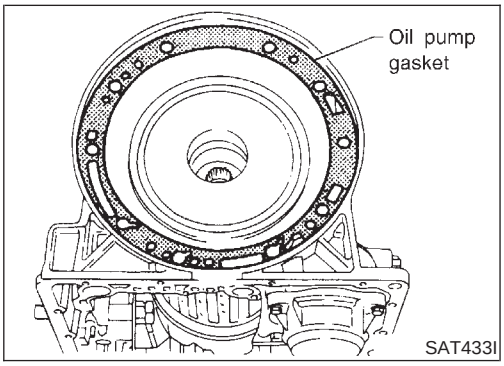
=NEAT0156

When any parts listed in the following table are replaced, total end play or reverse clutch end play must be adjusted.

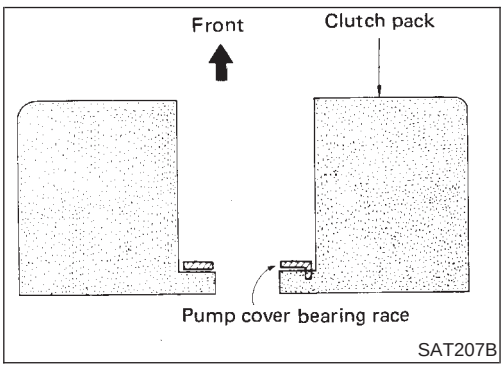
| Part name | Total end play | Reverse clutch end play |
|---|---|---|
| Transmission case | ● | ● |
| Low one-way clutch inner race | ● | ● |
| Overrun clutch hub | ● | ● |
| Rear internal gear | ● | ● |
| Rear planetary carrier | ● | ● |
| Rear sun gear | ● | ● |
| Front planetary carrier | ● | ● |
| Front sun gear | ● | ● |
| High clutch hub | ● | ● |
| High clutch drum | ● | ● |
| Oil pump cover | ● | ● |
| Reverse clutch drum | — | ● |

1. Adjust total end play.

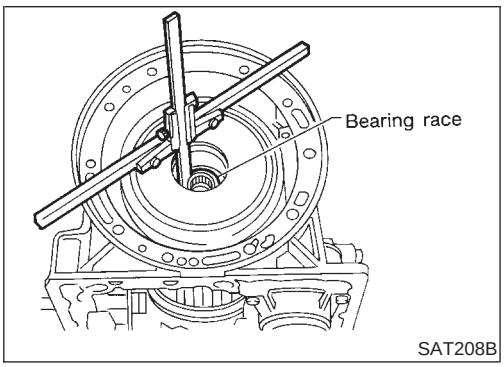
a. Install new oil pump gasket on transmission case.



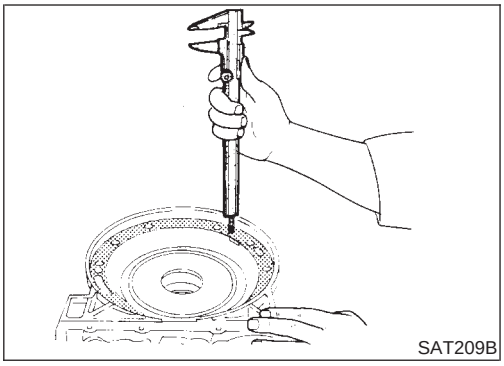

b. Install pump cover bearing race on clutch pack.



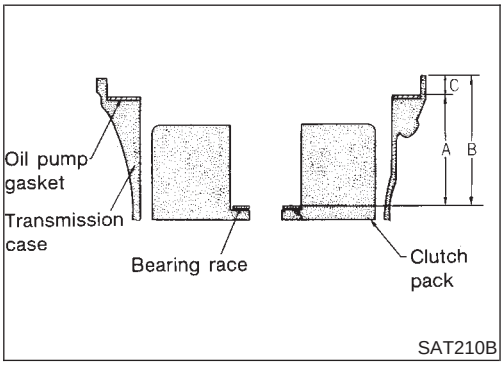

c. Measure distance “B” between front end of transmission case and oil pump cover bearing race.



*Adjustment (Cont'd)*


SAT209B

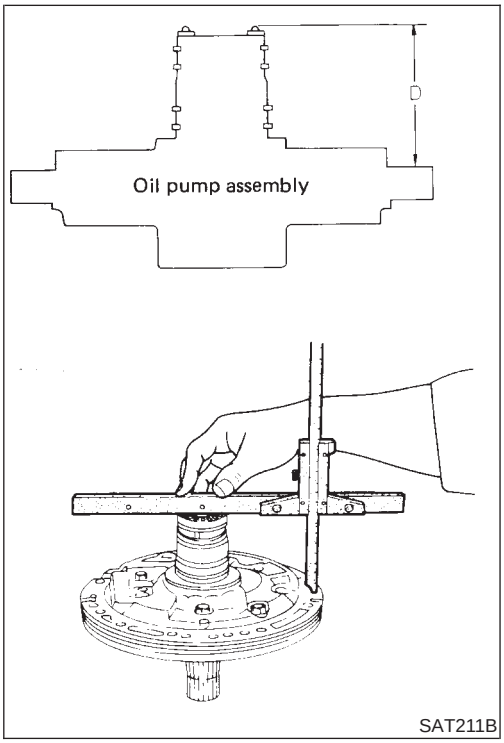
d. Measure distance "C" between front end of transmission case and oil pump gasket.



SAT210B

e. Determine dimension "A" by using the following equation.

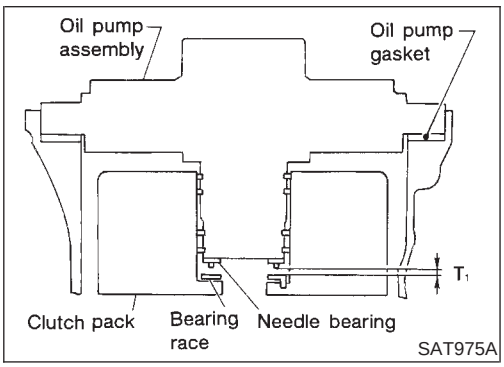
**A = B − C**



SAT211B

f. Install needle bearing on oil pump assembly.

g. Measure distance "D" between needle bearing and machined surface of oil pump cover assembly.



SAT975A

h. Determine total end play "$T_1$" by using the following equation.

**$T_1$ = A − D − 0.1**

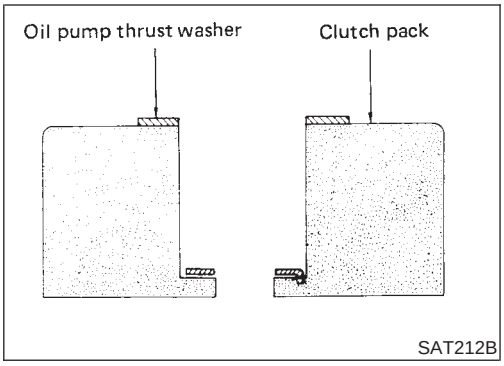
**Total end play "$T_1$":**

**0.25 - 0.55 mm (0.0098 - 0.0217 in)**

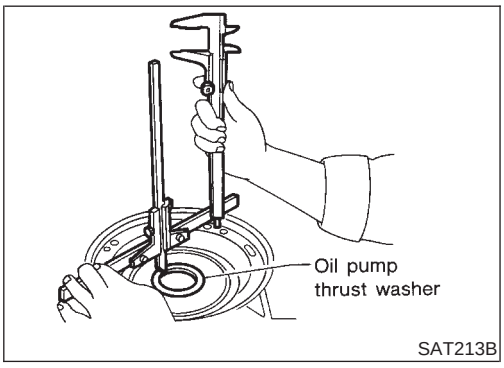
- If end play is out of specification, decrease or increase thickness of oil pump cover bearing race as necessary.

**Available oil pump cover bearing race:**

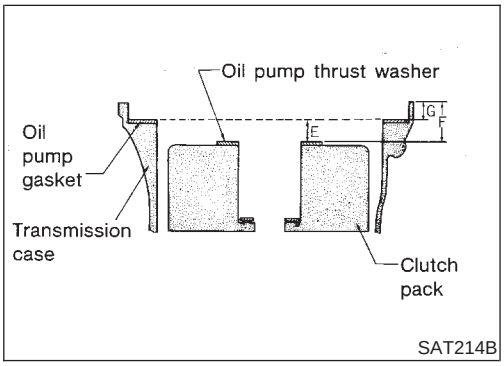
**Refer to SDS, AT-286.**



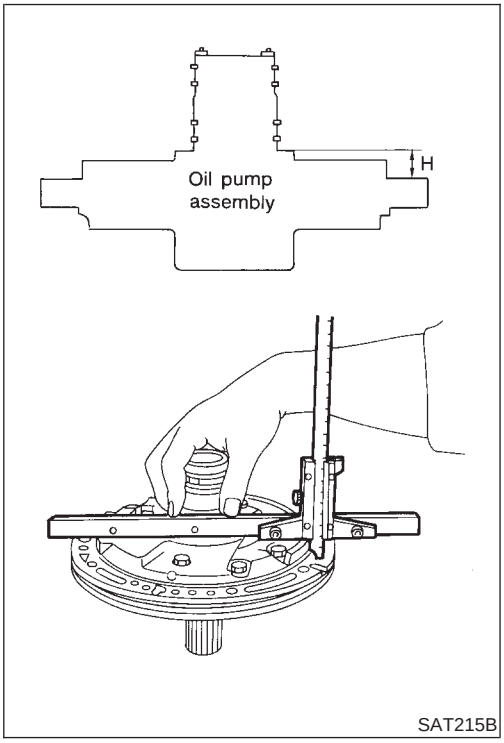

2. Adjust reverse clutch drum end play.
a. Install oil pump thrust washer on clutch pack.




b. Measure distance "F" between front end of transmission case and oil pump thrust washer.
c. Measure distance "G" between front end of transmission case and gasket.

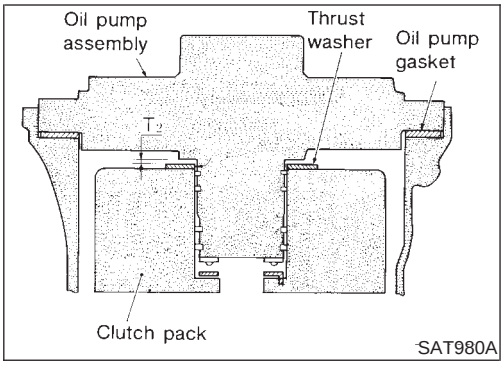



d. Determine dimension "E" by using the following equation.
**E = F − G**




e. Measure distance "H".

*Adjustment (Cont'd)*




f. Determine reverse clutch drum end play "$T_2$" by using the following equation.

**$T_2 = E - H - 0.1$**

**Reverse clutch drum end play "$T_2$":**

**0.55 - 0.90 mm (0.0217 - 0.0354 in)**

- If end play is out of specification, decrease or increase thickness of oil pump thrust washer as necessary.

**Available oil pump thrust washer:**

**Refer to SDS, AT-287.**

3. Remove any part installed to adjust end plays.

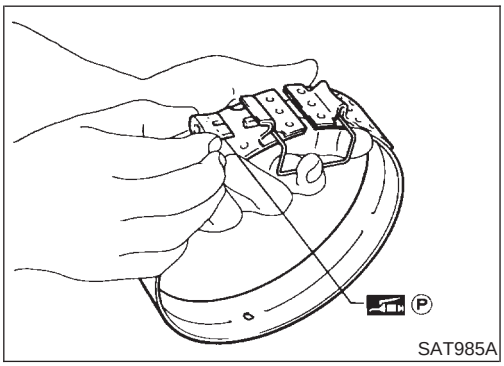
## Assembly (2)

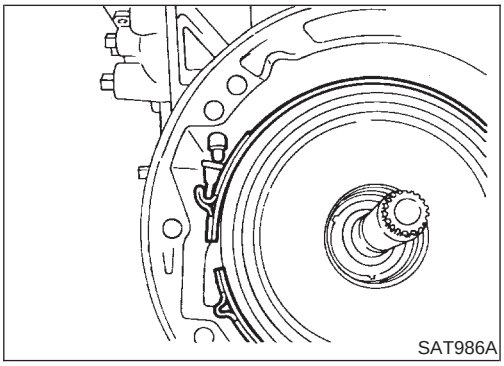
NEAT0157

1. Install brake band and band strut.

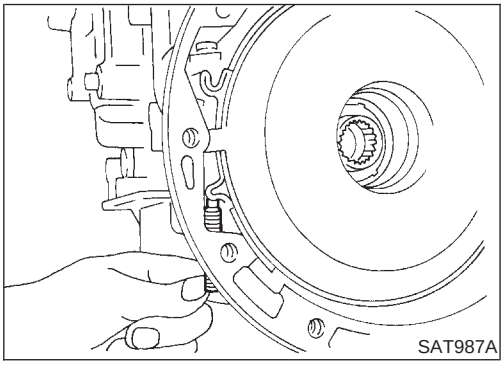
a. Install band strut on brake band.

- **Apply petroleum jelly to band strut.**

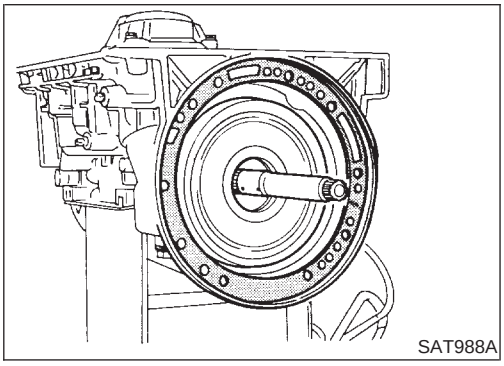



b. Place brake band on periphery of reverse clutch drum, and insert band strut into end of band servo piston stem.



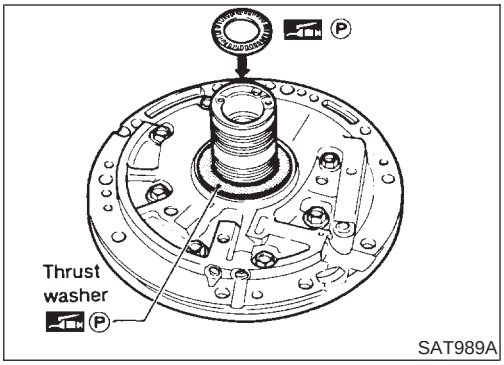

c. Install anchor end bolt on transmission case. Then, tighten anchor end bolt just enough so that reverse clutch drum (clutch pack) will not tilt forward.




2. Install input shaft on transmission case.

- **Pay attention to its direction — O-ring groove side is front.**

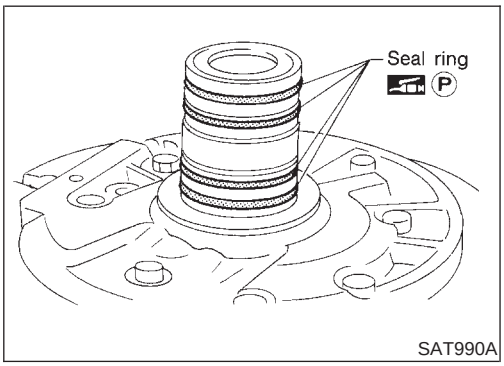
3. Install gasket on transmission case.



SAT989A

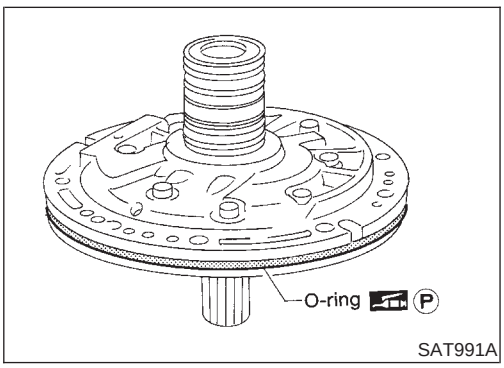
4. Install oil pump assembly.
a. Install needle bearing on oil pump assembly.
- **Apply petroleum jelly to the needle bearing.**

b. Install selected thrust washer on oil pump assembly.
- **Apply petroleum jelly to thrust washer.**



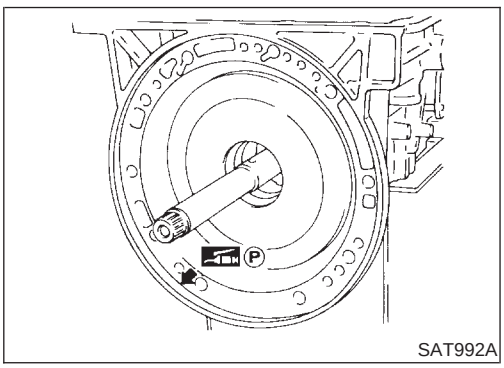
SAT990A

c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit.



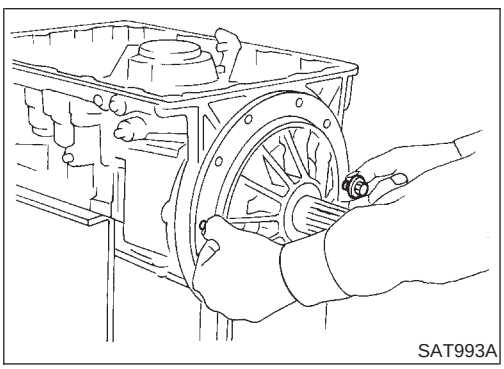
SAT991A

d. Install O-ring on oil pump assembly.
- **Apply petroleum jelly to O-ring.**



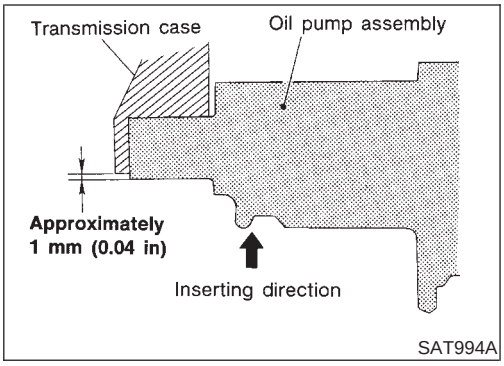
SAT992A

e. Apply petroleum jelly to mating surface of transmission case and oil pump assembly.


SAT993A

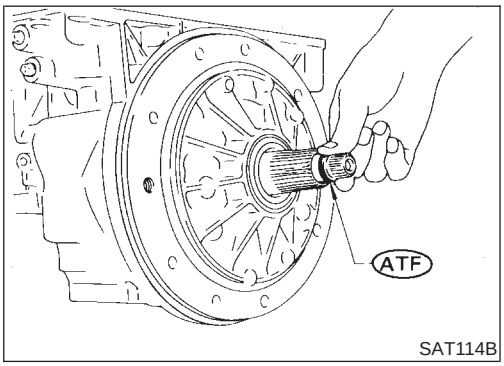
f. Install oil pump assembly.
- **Install two converter housing securing bolts in bolt holes in oil pump assembly as guides.**

*Assembly (2) (Cont'd)*



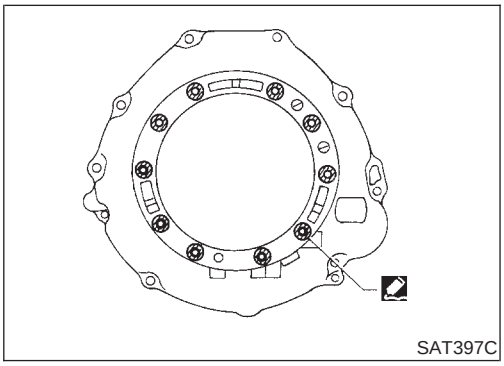
SAT994A

- **Insert oil pump assembly to the specified position in transmission, as shown at left.**

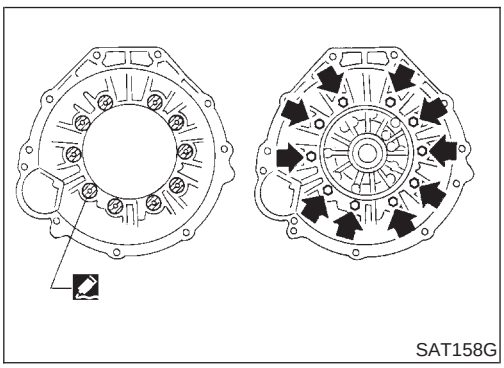


SAT114B

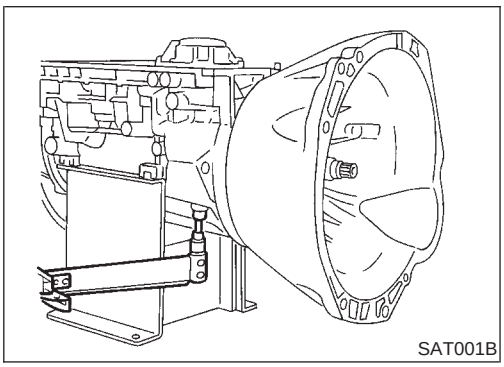
5. Install O-ring on input shaft.
- **Apply ATF to O-rings.**


SAT397C

6. Install converter housing.
a. Apply recommended sealant (Nissan genuine part: KP610-00250 or equivalent) to outer periphery of bolt holes in converter housing.
- **Do not apply too much sealant.**


SAT158G

b. Apply recommended sealant (Nissan genuine part: KP610-00250 or equivalent) to seating surfaces of bolts that secure front of converter housing.
c. Install converter housing on transmission case.

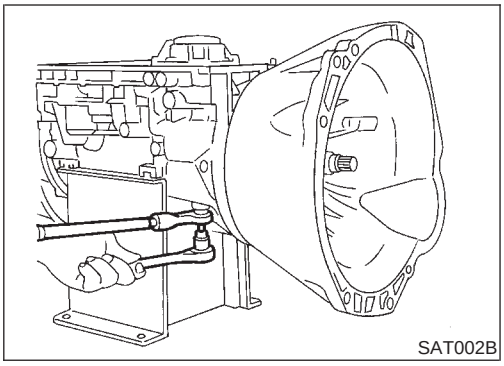

SAT001B

7. Adjust brake band.
a. Tighten anchor end bolt to specified torque.

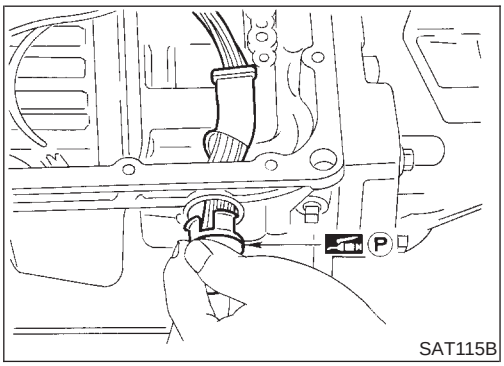
**Anchor end bolt:**

**: 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.


SAT002B

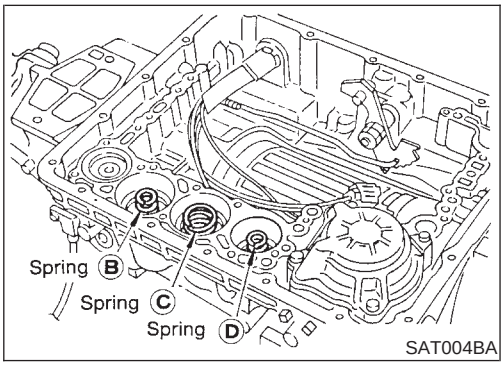
c. While holding anchor end bolt, tighten lock nut.



SAT115B

8. Install terminal cord assembly.
a. Install O-ring on terminal cord assembly.
- **Apply petroleum jelly to O-ring.**

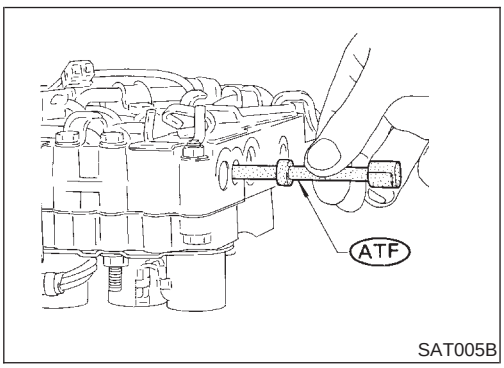
b. Compress terminal cord assembly stopper and install terminal cord assembly on transmission case.



SAT004BA

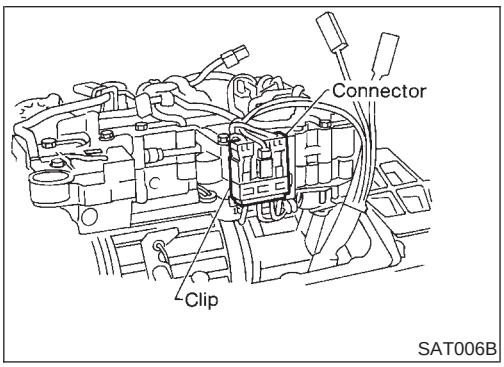
9. Install control valve assembly.
a. Install accumulator piston return springs B, C and D.

**Free length of return springs:**
**Refer to SDS, AT-283.**



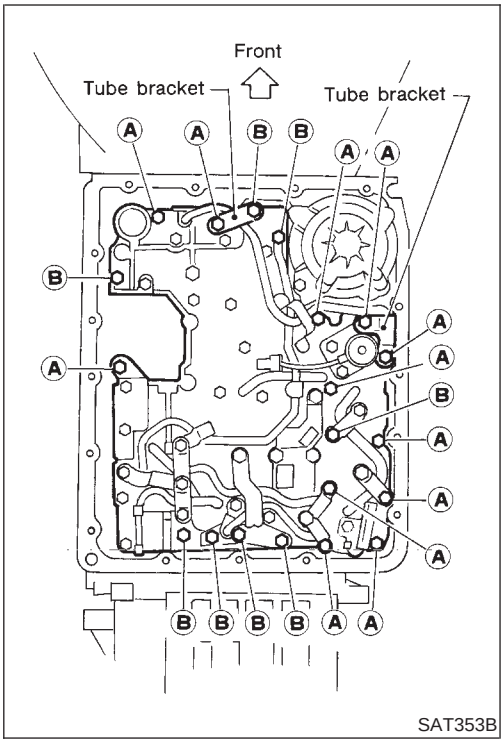
SAT005B

b. Install manual valve on control valve.
- **Apply ATF to manual valve.**



SAT006B

c. Place control valve assembly on transmission case. Connect solenoid connector for upper body.
d. Install connector clip.

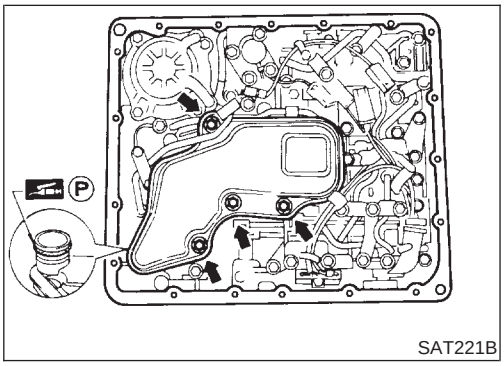


SAT353B

e. Install control valve assembly on transmission case.
f. Install connector tube brackets and tighten bolts A and B.

- **Check that terminal assembly does not catch.**

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

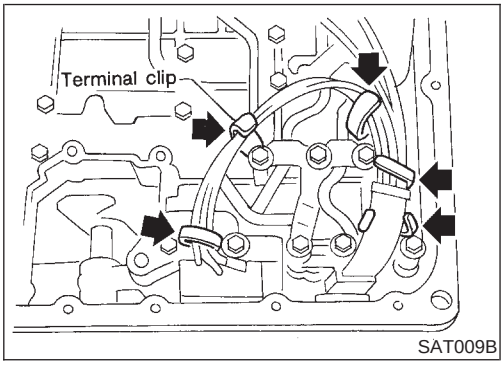


SAT221B

g. Install O-ring on oil strainer.

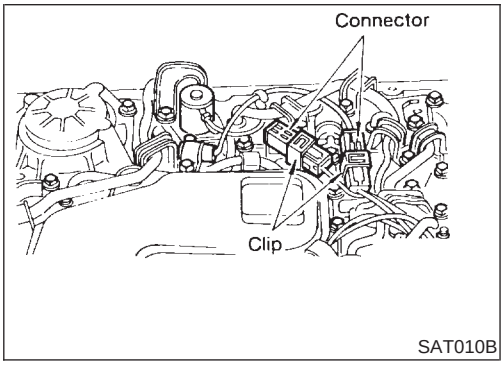
- **Apply petroleum jelly to O-ring.**

h. Install oil strainer on control valve.



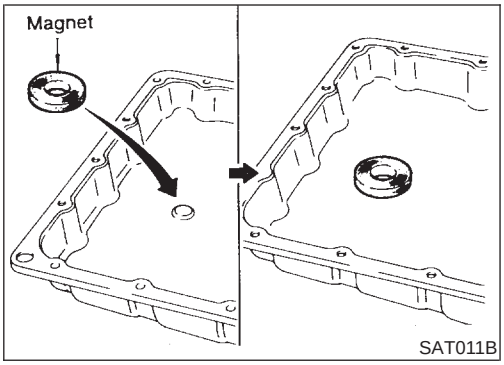
SAT009B

i. Securely fasten terminal harness with clips.

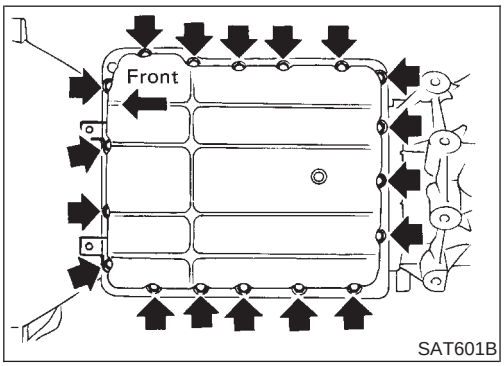


SAT010B

j. Install torque converter clutch solenoid valve and A/T fluid temperature sensor connectors.

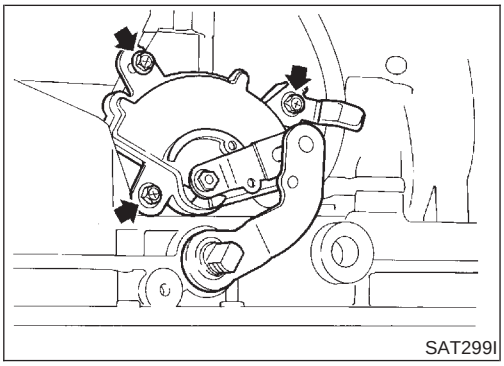



10. Install oil pan.
a. Attach a magnet to oil pan.

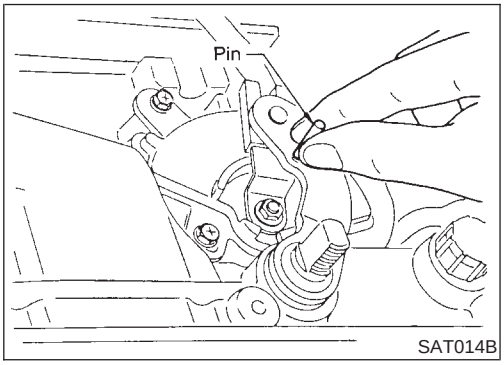



b. Install new oil pan gasket on transmission case.
c. Install oil pan and bracket on transmission case.
- **Always replace oil pan bolts as they are self-sealing bolts.**
- **Before installing bolts, remove traces of sealant and oil from mating surface and thread holes.**
- **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**

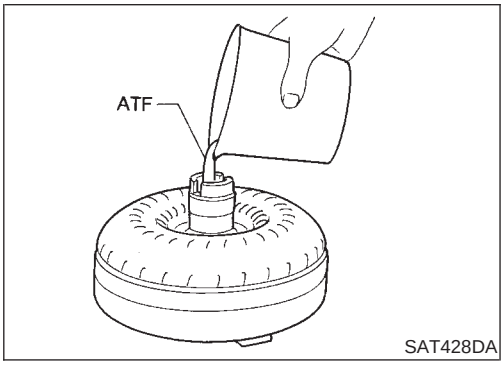
d. Tighten drain plug.




11. Install PNP switch.
a. Check that manual shaft is in "1" position.
b. Temporarily install PNP switch on manual shaft.
c. Move manual shaft to "N".

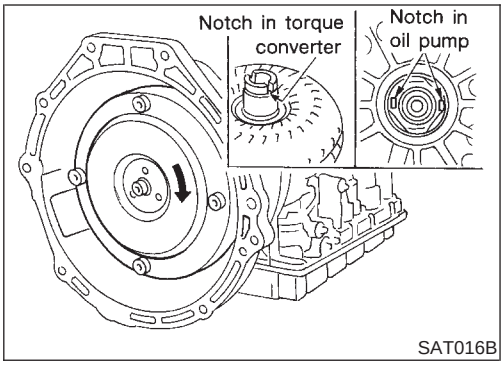



d. Tighten bolts while inserting 4.0 mm (0.157 in) dia. pin vertically into locating holes in PNP switch and manual shaft.

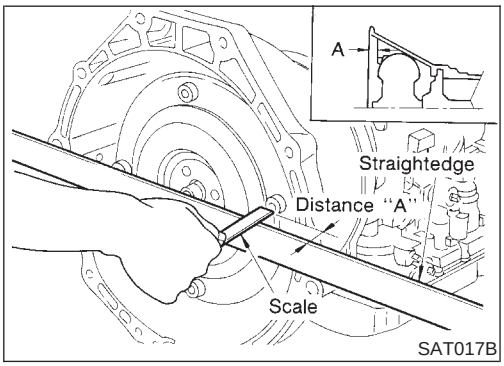



12. Install torque converter.
a. Pour ATF into torque converter.
- **Approximately 2 liters (2-1/8 US qt, 1-3/4 Imp qt) of fluid are required for a new torque converter.**
- **When reusing old torque converter, add the same amount of fluid as was drained.**

*Assembly (2) (Cont'd)*




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":**

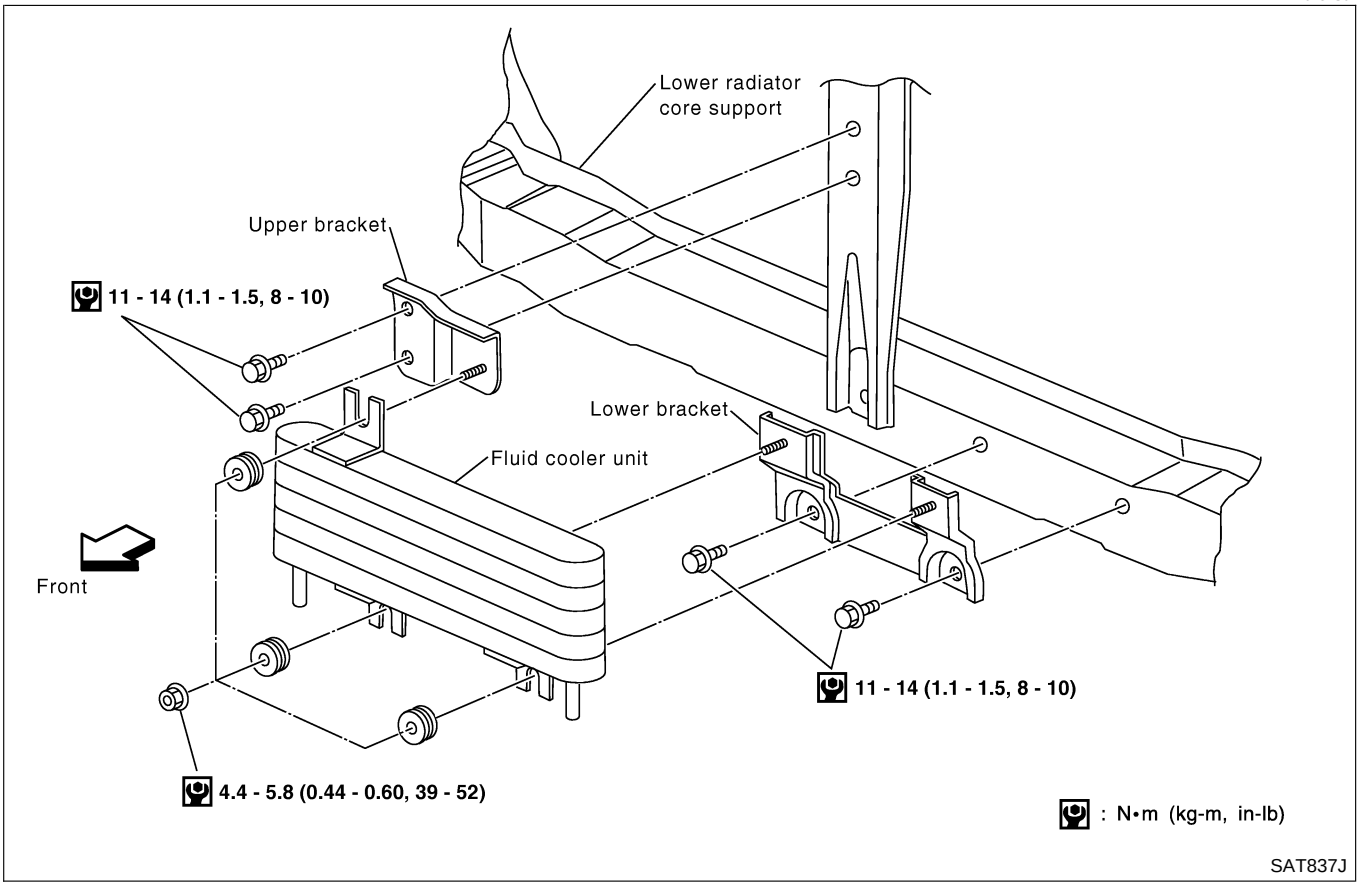
**26.0 mm (1.024 in) or more**

# A/T Fluid Cooler

## COMPONENTS

NEAT0251

NEAT0251S01




## REMOVAL AND INSTALLATION

NEAT0251S02

1. Disconnect fluid hoses from fluid cooler unit.
2. Remove fluid cooler unit.
3. Remove fluid cooler bracket.
4. Remove clips securing fluid hose (cooler unit to radiator) and loosen hose clamps, then remove the fluid hose.
5. Loosen clamps securing fluid hose (A/T assembly to fluid cooler), then remove the fluid hose.

- Reverse the removal procedure to install the A/T fluid cooler unit. Refer to the component drawing and specified tightening torque.
- Check A/T fluid level and refill if necessary. Refer to MA section (“CHASSIS AND BODY MAINTENANCE”).

## General Specifications

NEAT0160

| | | | |
|---|---|---|---|
| Applied model | | RHD | LHD |
| | | KA24DE | |
| | | 2WD | |
| Automatic transmission model | | RE4R01A | |
| Transmission model code number | | 4EX09 | 4EX10 |
| 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 | | Genuine Nissan ATF or equivalent*1 | |
| Fluid capacity | | 8.1ℓ (7-1/8 Imp qt) | |

*1: Refer to MA section (“Fluids and Lubricants”, “RECOMMENDED FLUIDS AND LUBRICANTS”).

## Shift Schedule

NEAT0178

### VEHICLE SPEED WHEN SHIFTING GEARS THROTTLE POSITION

NEAT0178S01

| Throttle position | Vehicle speed km/h (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | $D_1 \rightarrow D_2$ | $D_2 \rightarrow D_3$ | $D_3 \rightarrow D_4$ | $D_4 \rightarrow D_3$ | $D_3 \rightarrow D_2$ | $D_2 \rightarrow D_1$ | $1_2 \rightarrow 1_1$ |
| Full throttle | 46 - 50 (29 - 31) | 87 - 95 (54 - 59) | 145 - 150 (90 - 93) | 136 - 146 (85 - 91) | 79 - 87 (49 - 54) | 43 - 47 (27 - 29) | 44 - 48 (27 - 30) |
| Half throttle | 37 - 41 (23 - 25) | 68 - 74 (42 - 46) | 145 - 150 (90 - 93) | 86 - 94 (53 - 58) | 38 - 44 (24 - 27) | 7 - 11 (4 - 7) | 44 - 48 (27 - 30) |

### VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

NEAT0178S02

| Throttle position | Overdrive control switch [Shift position] | Vehicle speed km/h (MPH) | |
|---|---|---|---|
| | | Lock-up “ON” | Lock-up “OFF” |
| Full throttle | ON [$D_4$] | 141 - 149 (88 - 93) | 137 - 145 (85 - 90) |
| | OFF [$D_3$]*1 | 86 - 94 (53 - 58) | 83 - 91 (52 - 57) |
| Half throttle | ON [$D_4$] | 141 - 149 (88 - 93) | 112 - 120 (70 - 75) |
| | OFF [$D_3$]*1 | 86 - 94 (53 - 58) | 83 - 91 (52 - 57) |

*1: RHD model only

## Stall Revolution

NEAT0163

| | |
|---|---|
| Stall revolution rpm | 2,090 - 2,290 |

## Line Pressure

NEAT0164

| 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) |

## Return Springs

NEAT0165

Unit: mm (in)

| Parts | | | Item | | |
|---|---|---|---|---|---|
| | | | Part No.* | Free length | Outer diameter |
| Control valve | Upper body | Torque converter relief valve spring | 31742-41X23 | 38.0 (1.496) | 9.0 (0.354) |
| | | Pressure regulator valve spring | 31742-41X24 | 44.02 (1.7331) | 14.0 (0.551) |
| | | Pressure modifier valve spring | 31742-41X19 | 31.95 (1.2579) | 6.8 (0.268) |
| | | Accumulator control valve spring | — | — | — |
| | | Shuttle shift valve D spring | 31762-41X01 | 25.0 (0.984) | 7.0 (0.276) |
| | | 4-2 sequence valve spring | 31756-41X00 | 29.1 (1.146) | 6.95 (0.2736) |
| | | Shift valve B spring | 31762-41X01 | 25.0 (0.984) | 7.0 (0.276) |
| | | 4-2 relay valve spring | 31756-41X00 | 29.1 (1.146) | 6.95 (0.2736) |
| | | Shift valve A spring | 31762-41X01 | 25.0 (0.984) | 7.0 (0.276) |
| | | Overrun clutch control valve spring | 31762-41X03 | 23.6 (0.929) | 7.0 (0.276) |
| | | Overrun clutch reducing valve spring | 31742-41X20 | 32.5 (1.280) | 7.0 (0.276) |
| | | Shuttle shift valve S spring | 31762-41X04 | 51.0 (2.008) | 5.65 (0.2224) |
| | | Pilot valve spring | 31742-41X13 | 25.7 (1.012) | 9.0 (0.354) |
| | | Torque converter clutch control valve spring | 31742-41X22 | 18.5 (0.728) | 13.0 (0.512) |
| | Lower body | Modifier accumulator valve spring | 31742-27X70 | 31.4 (1.236) | 9.8 (0.386) |
| | | 1st reducing valve spring | 31756-41X05 | 25.4 (1.000) | 6.75 (0.2657) |
| | | 3-2 timing valve spring | 31742-41X06 | 23.0 (0.906) | 6.7 (0.264) |
| | | Servo charger valve spring | 31742-41X06 | 23.0 (0.906) | 6.7 (0.264) |
| Reverse clutch | | 16 pcs | 31521-41X02 (Assembly) | 19.7 (0.7756) | 11.6 (0.457) |
| 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 | 31605-41X05 | 45.6 (1.795) | 34.3 (1.350) |
| | | Spring B | 31605-41X00 | 53.8 (2.118) | 40.3 (1.587) |
| | | Spring C | 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 | 31605-41X10 | 66.0 (2.598) | 20.0 (0.787) |
| | | Accumulator C | 31605-41X09 | 45.0 (1.772) | 29.3 (1.154) |
| | | Accumulator D | 31605-41X06 | 58.4 (2.299) | 17.3 (0.681) |

*: Always check with the Parts Department for the latest parts information.

# Accumulator O-ring

NEAT0166

| 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

NEAT0167

## REVERSE CLUTCH

NEAT0167S01

| Code number | | 4EX09 | 4EX10 |
|---|---|---|---|
| Number of drive plates | | 2 | |
| Number of driven plates | | 2 | |
| 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* |
| | | 4.8 (0.189)<br>5.0 (0.197)<br>5.2 (0.205)<br>5.4 (0.213)<br>5.6 (0.220) | 31537-42X02<br>31537-42X03<br>31537-42X04<br>31537-42X05<br>31537-42X06 |

*: Always check with the Parts Department for the latest parts information.

## HIGH CLUTCH

NEAT0167S02

| Code number | | 4EX09 | 4EX10 |
|---|---|---|---|
| Number of drive plates | | 5 | |
| Number of driven plates | | 5 | |
| 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* |
| | | 3.4 (0.134)<br>3.6 (0.142)<br>3.8 (0.150)<br>4.0 (0.157)<br>4.2 (0.165)<br>4.4 (0.173)<br>4.6 (0.181)<br>4.8 (0.189) | 31537-41X71<br>31537-41X61<br>31537-41X62<br>31537-41X63<br>31537-41X64<br>31537-41X65<br>31537-41X66<br>31537-41X67 |

*: Always check with the Parts Department for the latest parts information.

## FORWARD CLUTCH

NEAT0167S03

| | | | |
|---|---|---|---|
| Code number | | 4EX09 | 4EX10 |
| Number of drive plates | | 6 | |
| 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 | 0.35 - 0.75 (0.0138 - 0.0295) | |
| | Allowable limit | 1.95 (0.0768) | |
| Thickness of retaining plate | | Thickness mm (in) | Part number* |
| | | 8.0 (0.315) | 31537-41X00 |
| | | 8.1 (0.319) | 31537-42X60 |
| | | 8.2 (0.323) | 31537-41X01 |
| | | 8.3 (0.327) | 31537-42X61 |
| | | 8.4 (0.331) | 31537-41X02 |
| | | 8.5 (0.335) | 31537-42X62 |
| | | 8.6 (0.339) | 31537-41X03 |
| | | 8.7 (0.343) | 31537-42X63 |
| | | 8.8 (0.346) | 31537-41X04 |
| | | 8.9 (0.350) | 31537-42X64 |
| | | 9.0 (0.354) | 31537-41X05 |
| | | 9.1 (0.358) | 31537-42X65 |
| | | 9.2 (0.362) | 31537-41X06 |

*: Always check with the Parts Department for the latest parts information.

## OVERRUN CLUTCH

NEAT0167S04

| | | | |
|---|---|---|---|
| Code number | | 4EX09 | 4EX10 |
| 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.

## LOW & REVERSE BRAKE

NEAT0167S05

| | | | |
|---|---|---|---|
| Code number | | 4EX09 | 4EX10 |
| Number of drive plates | | 6 | |
| 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 | 0.8 - 1.1 (0.031 - 0.043) | |
| | Allowable limit | 2.3 (0.091) | |
| Thickness of retaining plate | | Thickness mm (in) | Part number* |
| | | 7.0 (0.276) | 31667-41X12 |
| | | 7.2 (0.283) | 31667-41X13 |
| | | 7.4 (0.291) | 31667-41X14 |
| | | 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 |

*: Always check with the Parts Department for the latest parts information.

## BRAKE BAND

NEAT0167S06

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

NEAT0168

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

NEAT0169

| | | |
|---|---|---|
| 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) | Part number* |
| | 0.8 (0.031) | 31435-41X01 |
| | 1.0 (0.039) | 31435-41X02 |
| | 1.2 (0.047) | 31435-41X03 |
| | 1.4 (0.055) | 31435-41X04 |
| | 1.6 (0.063) | 31435-41X05 |
| | 1.8 (0.071) | 31435-41X06 |
| | 2.0 (0.079) | 31435-41X07 |

*: Always check with the Parts Department for the latest parts information.

## Reverse Clutch Drum End Play

NEAT0170

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

NEAT0171

| | | | |
|---|---|---|---|
| Manual control linkage | Number of returning revolutions for lock nut | RHD | LHD |
| | | 1 | 2 |
| | Lock nut tightening torque | 11 - 14 N·m (1.1 - 1.5 kg-m, 8 - 10 ft-lb) | |
| Distance between end of converter housing and torque converter | | 26.0 mm (1.024 in) or more | |