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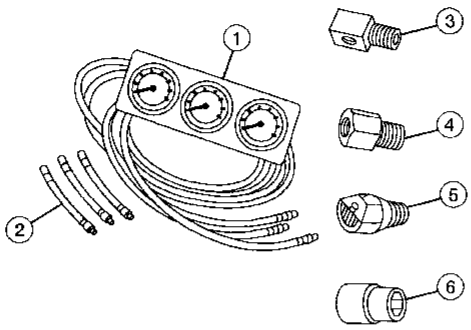
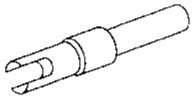
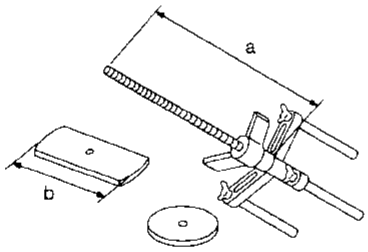
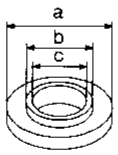
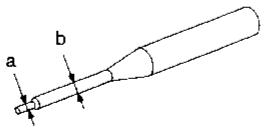
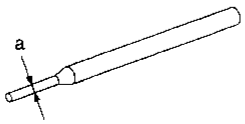
**When you read wiring diagrams:**
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

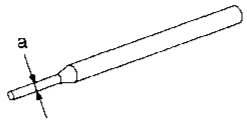
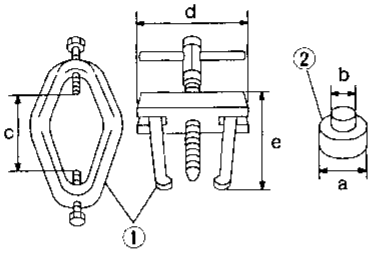
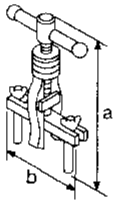
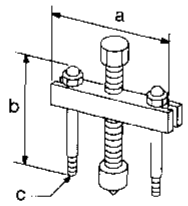
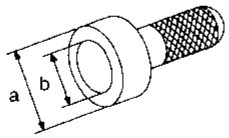
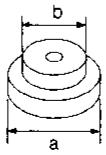
**When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".**

## Special Service Tools

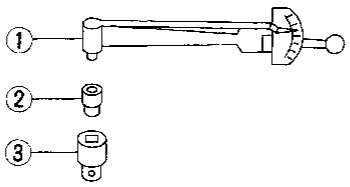
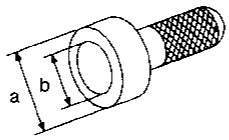
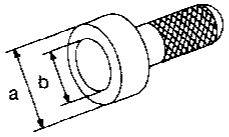
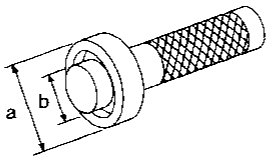
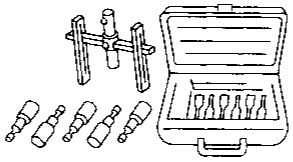
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

| Tool number<br>(Kent-Moore No.)<br>Tool name | Description | |
|---|---|---|
| (J34301-C)<br>Oil pressure gauge set<br>① (J34301-1)<br>Oil pressure gauge<br>② (J34301-2)<br>Hoses<br>③ (J34298)<br>Adapter<br>④ (J34282-2)<br>Adapter<br>⑤ (790-301-1230-A)<br>60° Adapter<br>⑥ (J34301-15)<br>Square socket |  <br>AAT896 | Measuring line pressure |
| (J39713)<br>Preload adapter |  <br>NT087 | • Selecting differential side bearing adjusting shim<br>• Checking differential side bearing preload |
| KV31102400<br>(J34285-A and<br>J34285-87)<br>Clutch spring compressor |  <br>NT423 | • Removing and installing clutch return spring<br>• Installing low and reverse brake piston<br>**a: 320 mm (12.60 in)**<br>**b: 174 mm (6.85 in)** |
| KV40100630<br>(J26092)<br>Drift |  <br>NT107 | • Installing reduction gear bearing inner race<br>• Installing idler gear bearing inner race<br>**a: 67.5 mm (2.657 in) dia.**<br>**b: 44 mm (1.73 in) dia.**<br>**c: 38.5 mm (1.516 in) dia.** |
| ST23540000<br>(J25689-A)<br>Pin punch |  <br>NT442 | Removing and installing parking rod plate and manual plate retaining pins<br>**a: 2.3 mm (0.091 in) dia.**<br>**b: 4 mm (0.16 in) dia.** |
| KV32101000<br>(J25689-A)<br>Pin punch |  <br>NT410 | Installing manual shaft retaining pin<br>**a: 4 mm (0.16 in) dia.** |

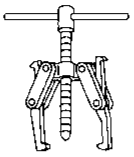
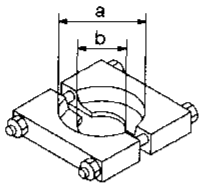
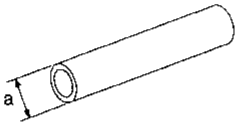
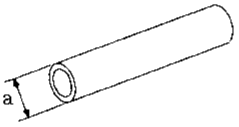
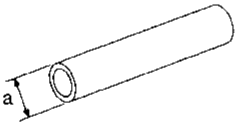
## Special Service Tools (Cont'd)

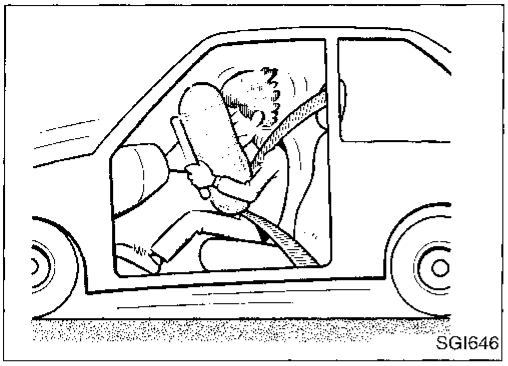
| Tool number (Kent-Moore No.) Tool name | Description | |
|---|---|---|
| ST25710000 ( — ) Pin punch |   NT410 | Aligning groove of manual shaft and hole of transmission case. **a: 2 mm (0.08 in) dia.** |
| ST3306S001 (J22888-D) Differential side bearing puller set ① ST33051001 (J22888-D) Puller ② ST33061000 (J8107-2) Adapter |   NT413 | Removing differential side bearing inner race **a: 39 mm (1.54 in) dia.** **b: 29.5 mm (1.161 in) dia.** **c: 130 mm (5.12 in)** **d: 135 mm (5.31 in)** **e: 120 mm (4.72 in)** |
| KV381054S0 (J34286) Puller |   NT414 | • Removing idler gear bearing outer race • Removing differential side oil seals • Removing differential side bearing outer race **a: 250 mm (9.84 in)** **b: 160 mm (6.30 in)** |
| ST27180001 (J25726-A) Puller |   NT424 | Removing idler gear **a: 100 mm (3.94 in)** **b: 110 mm (4.33 in)** **c: M8 x 1.25P** |
| ST30720000 (J25405) Bearing installer |   NT115 | Installing idler gear bearing outer race **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.** |
| ST35321000 ( — ) Drift |   NT073 | Installing output shaft bearing **a: 49 mm (1.93 in) dia.** **b: 41 mm (1.61 in) dia.** |

## Special Service Tools (Cont'd)

| Tool number<br>(Kent-Moore No.)<br>Tool name | Description | |
|---|---|---|
| ST3127S000<br>(See J25765-A)<br>Preload gauge<br>① GG91030000<br>(J25765-A)<br>Torque wrench<br>② HT62940000<br>( — )<br>Socket adapter<br>③ HT62900000<br>( — )<br>Socket adapter |  <br>NT124 | Checking differential side bearing preload |
| ST35271000<br>(J26091)<br>Drift |  <br>NT115 | Installing idler gear<br>**a: 72 mm (2.83 in) dia.**<br>**b: 63 mm (2.48 in) dia.** |
| ST33400001<br>(J26082)<br>Drift |  <br>NT115 | ● Installing oil pump housing oil seal<br>● Installing differential side oil seal (RH side)<br>**a: 60 mm (2.36 in) dia.**<br>**b: 47 mm (1.85 in) dia.** |
| ST33230000<br>(J25805-01)<br>Drift |  <br>NT084 | Install differential side bearing<br>**a: 51 mm (2.01 in) dia.**<br>**b: 28.5 mm (1.122 in) dia.** |
| (J34291)<br>Shim setting gauge set |  <br>NT101 | ● Selecting oil pump cover bearing race and oil pump thrust washer<br>● Selecting side gear thrust washer |

## Commercial Service Tools

| Tool name | Description | |
|---|---|---|
| Puller |  NT077 | • Removing idler gear bearing inner race<br>• Removing and installing band servo piston snap ring |
| Puller |   NT411 | Removing reduction gear bearing inner race<br>**a: 60 mm (2.36 in) dia.**<br>**b: 35 mm (1.38 in) dia.** |
| Drift |   NT083 | Installing differential side oil seal (LH side)<br>**a: 90 mm (3.54 in) dia.** |
| Drift |   NT083 | Installing needle bearing onto bearing retainer<br>**a: 36 mm (1.42 in) dia.** |
| Drift |   NT083 | Removing needle bearing from bearing retainer<br>**a: 33.5 mm (1.319 in) dia.** |


SGI646

## Precautions For Supplemental Restraint System (SRS) "AIR BAG"

The Supplemental Restraint System "Air Bag", 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 Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), 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.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses are covered with yellow insulation either just before the harness connectors or for the complete harness, for easy identification.**

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

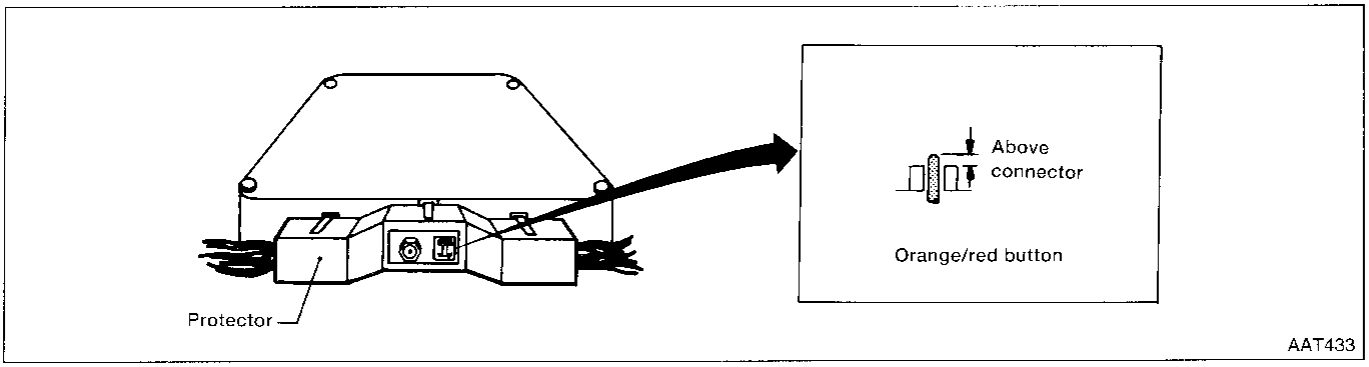
The ECM (ECCS control module) also receives the A/T malfunction results and has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

**CAUTION:**

- **Be sure to turn the ignition system OFF and disconnect the negative battery terminal before the repair or inspection work. The open/short circuit of the related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after the work. The loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure that connectors are clean and dry and that they have no bent terminals.)**
- **Be sure to route and clamp the harnesses properly after work. The interference of a harness with a bracket, etc. may cause the MIL to light up due to a short circuit.**
- **Be sure to erase the unnecessary (already fixed) malfunction information in the A/T control unit or ECM before returning the vehicle to the customer.**

## Precautions

- Before proceeding with disassembly, thoroughly clean the outside of the transaxle. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transaxle.
- Place disassembled parts in order for easier and proper assembly.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transaxle is disassembled.
- When connecting A/T control unit harness connector, tighten bolt until orange/red button is above the connector.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place removed parts in order, on a parts rack, so they can be put back in the valve body in the same positions and sequences. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed valves, sleeves, plugs, etc. will slide along their bores in the valve body under their own weight.
- Before assembly, apply a coat of recommended ATF to all parts. Petroleum jelly may be applied to O-rings and seals and used to hold small bearings and washers in place during reassembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to "ATF COOLER SERVICE" on the next page.
- After overhaul, refill the transaxle with new ATF.
- When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF cooling system.
  Always follow the procedures under "Changing A/T Fluid" in the MA section when changing A/T fluid.



## Service Notice or Precautions

### FAIL-SAFE

The A/T control unit 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 complaint may be "sluggish, or poor acceleration".
When the ignition key is turned ON under Fail-Safe operation, the O/D OFF indicator lamp blinks for about 8 seconds. (For diagnosis, refer to AT-26.)
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 O/D OFF indicator lamp blinks for about 8 seconds, but will appear only once. This indicates the Fail-safe (limp home mode) is cleared. The customer may resume normal driving.
Always follow the WORK FLOW (Refer to AT-40).
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 sensors, no damage will be indicated.

### ATF COOLER SERVICE

Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer.
VG30E engine (with RE4F04A) ... fin type cooler

Replace radiator assembly with a new one. Flush cooler lines using cleaning solvent and compressed air.

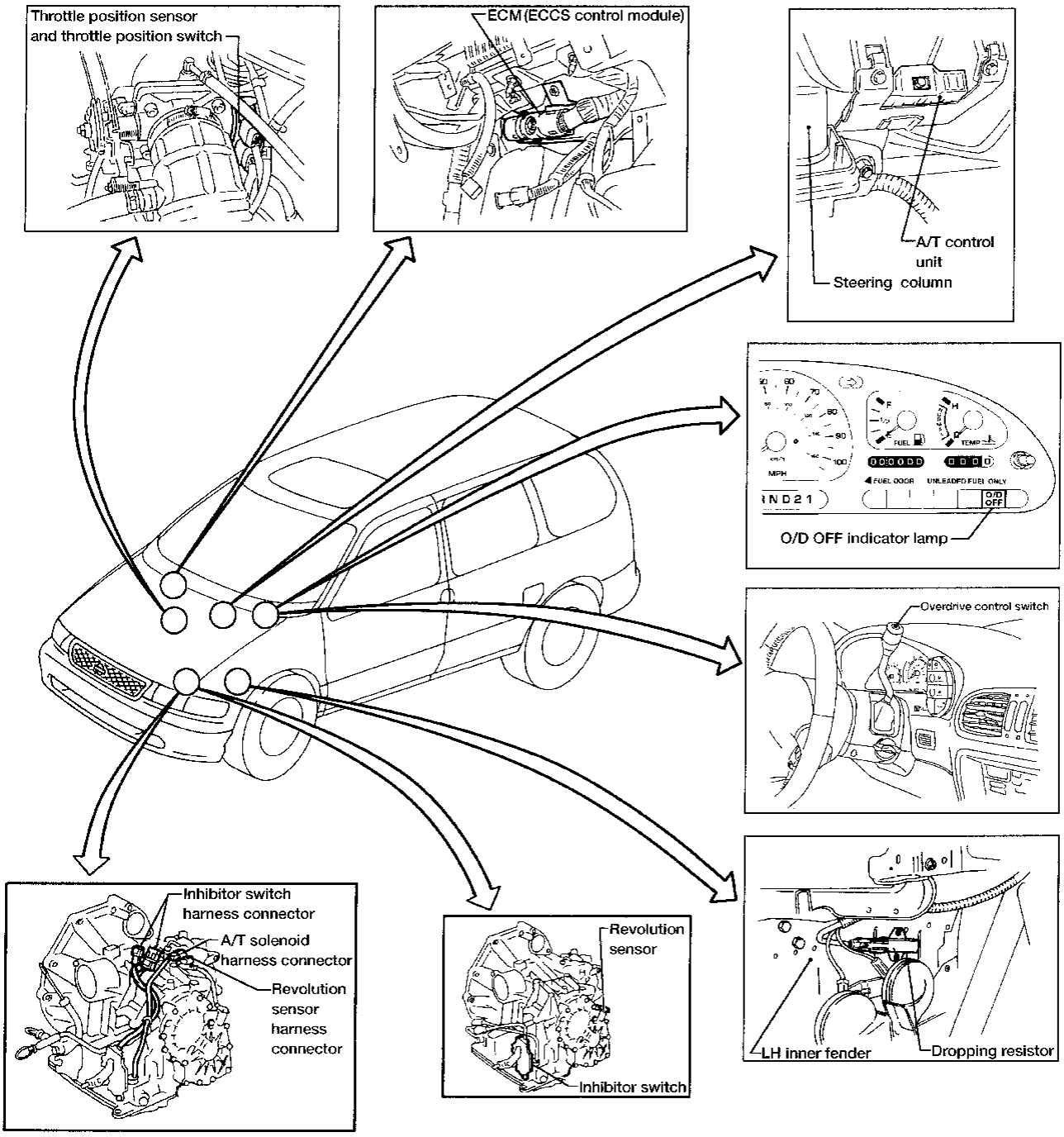
### OBD-II SELF-DIAGNOSIS

- A/T self-diagnosis is performed by the A/T control unit in combination with the ECM. The results can be read through the blinking pattern of the O/D OFF indicator or the malfunction indicator lamp (MIL). Refer to the table on AT-26 for the indicator used to display each self-diagnostic result.
- The self-diagnostic results indicated by the MIL are automatically stored in both the ECM and A/T control unit memories.

  **Always perform the procedure "HOW TO ERASE DTC". Refer to AT-24 to complete the repair and avoid unnecessary blinking of the MIL.**
- The following self-diagnostic items can be detected using ECM self-diagnostic results mode* only when the O/D OFF indicator lamp does not indicate any malfunctions.
  –Improper shifting to 1st, 2nd, 3rd, or 4th gear position.
  –Improper torque converter clutch operation.
  –Improper lock-up operation.

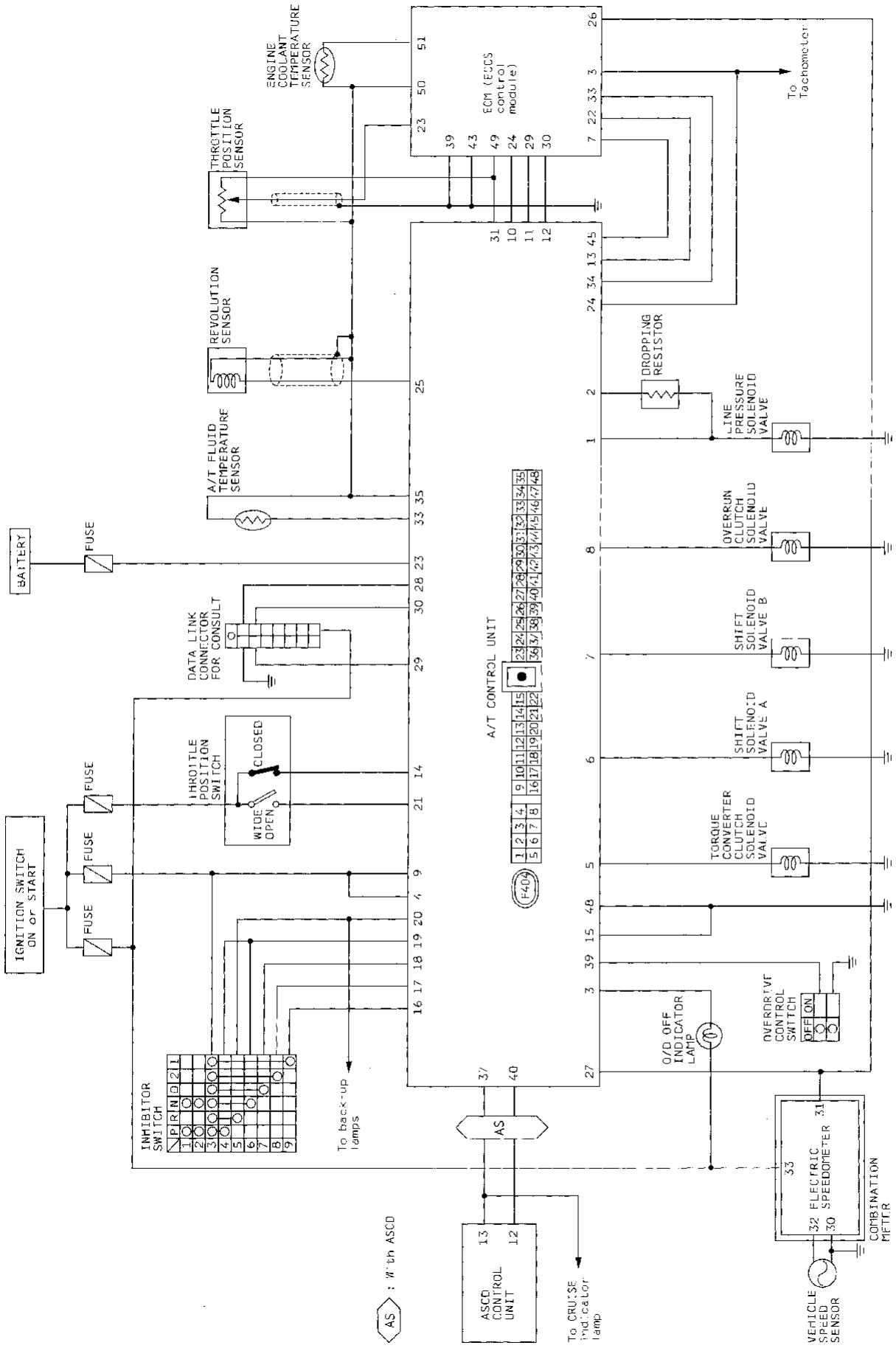
*: For details of OBD-II, refer to EC section ("ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION").

## A/T Electrical Parts Location



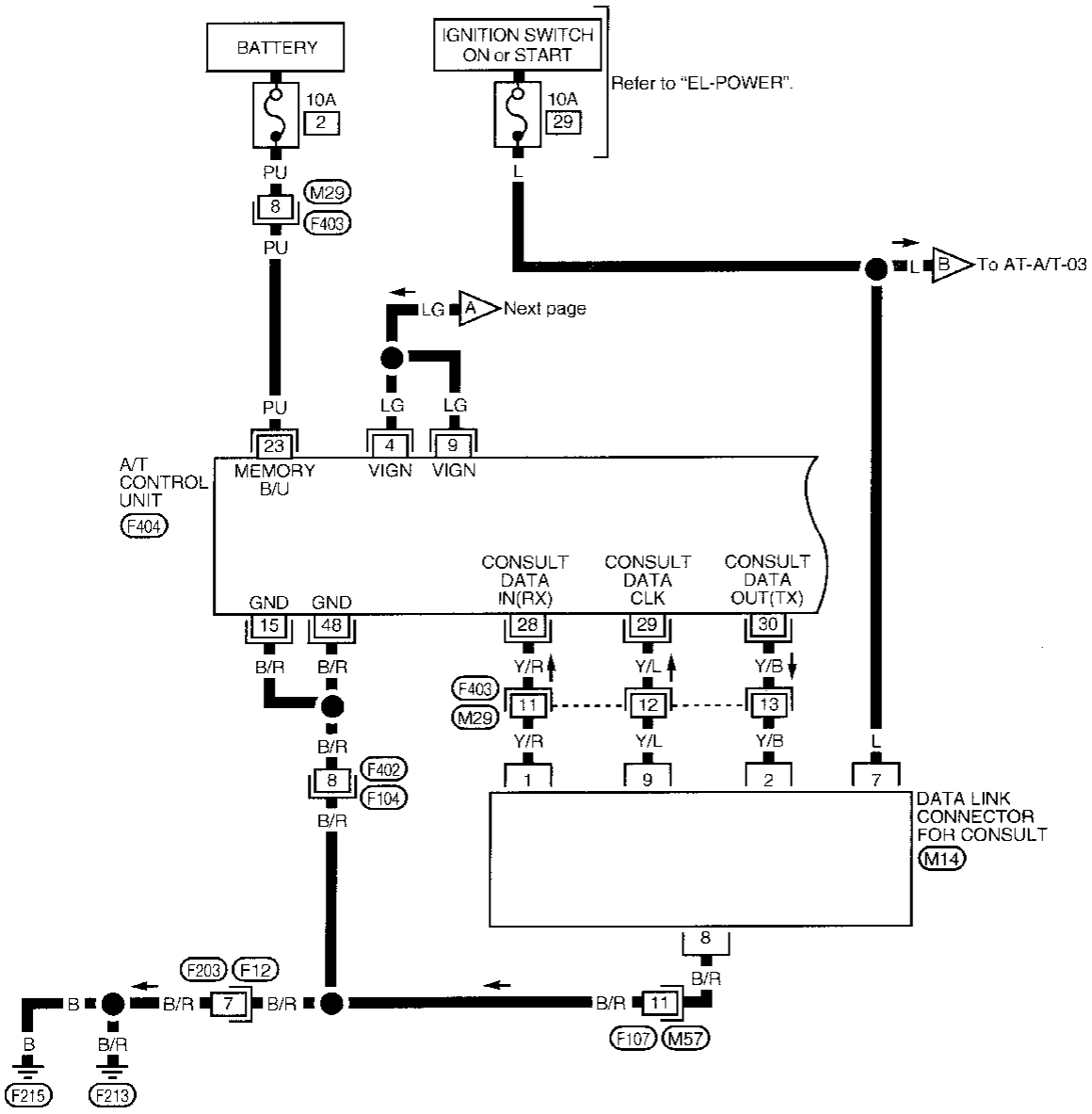

AAT792

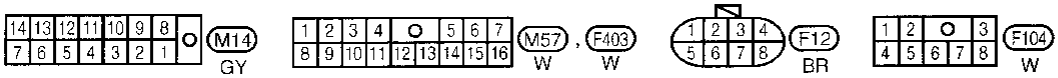
## Circuit Diagram

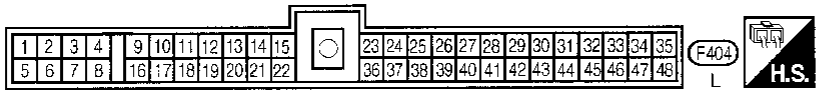


## Wiring Diagram –A/T–

AT-A/T-01



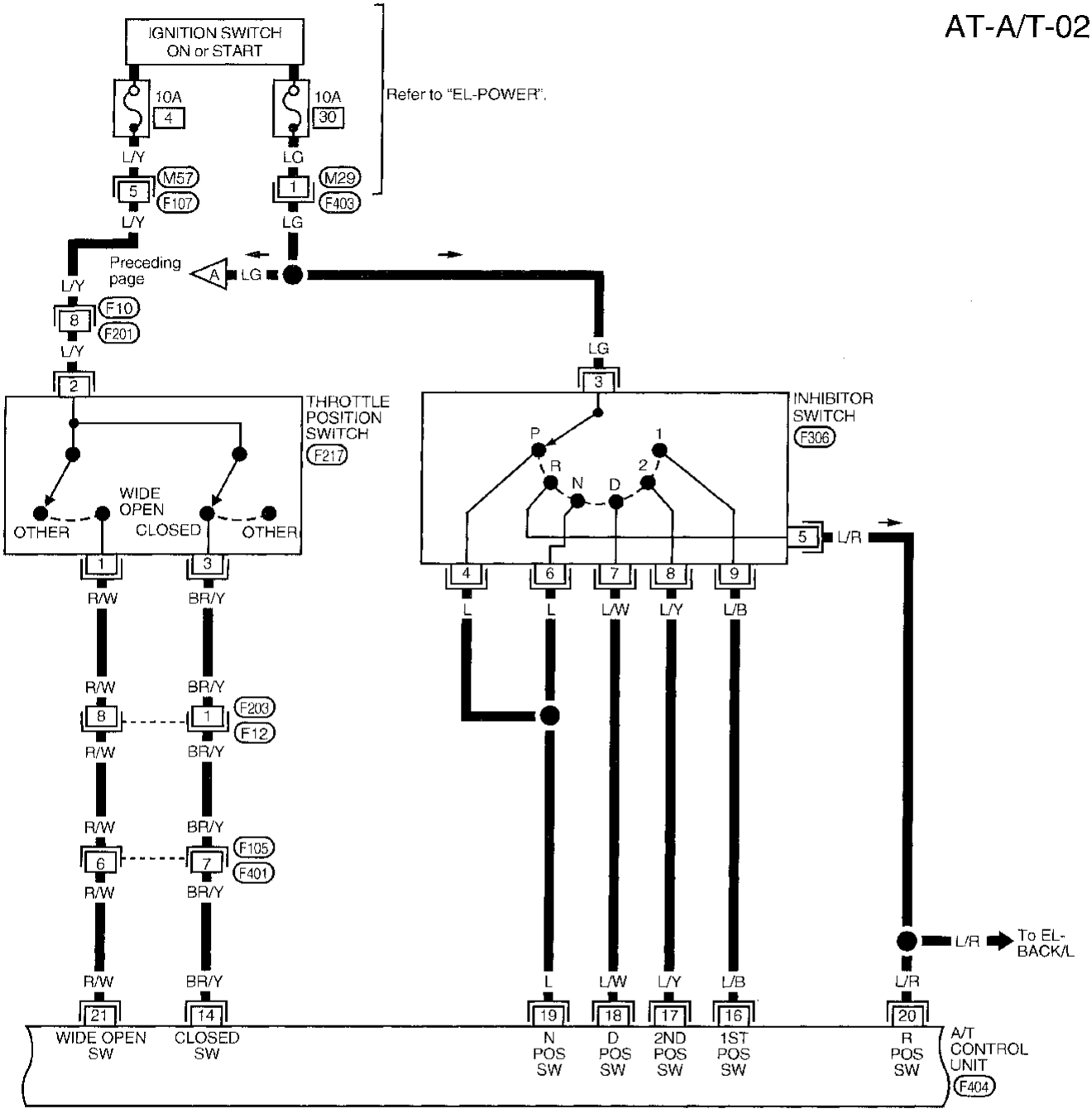



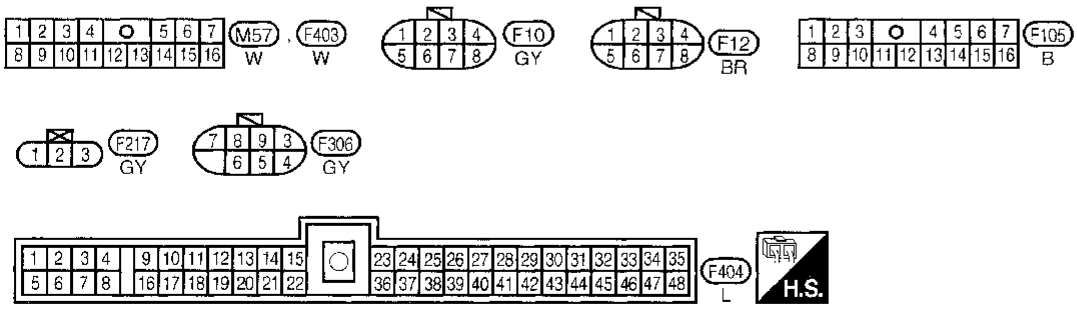




AAT900

## Wiring Diagram –A/T– (Cont'd)

AT-A/T-02

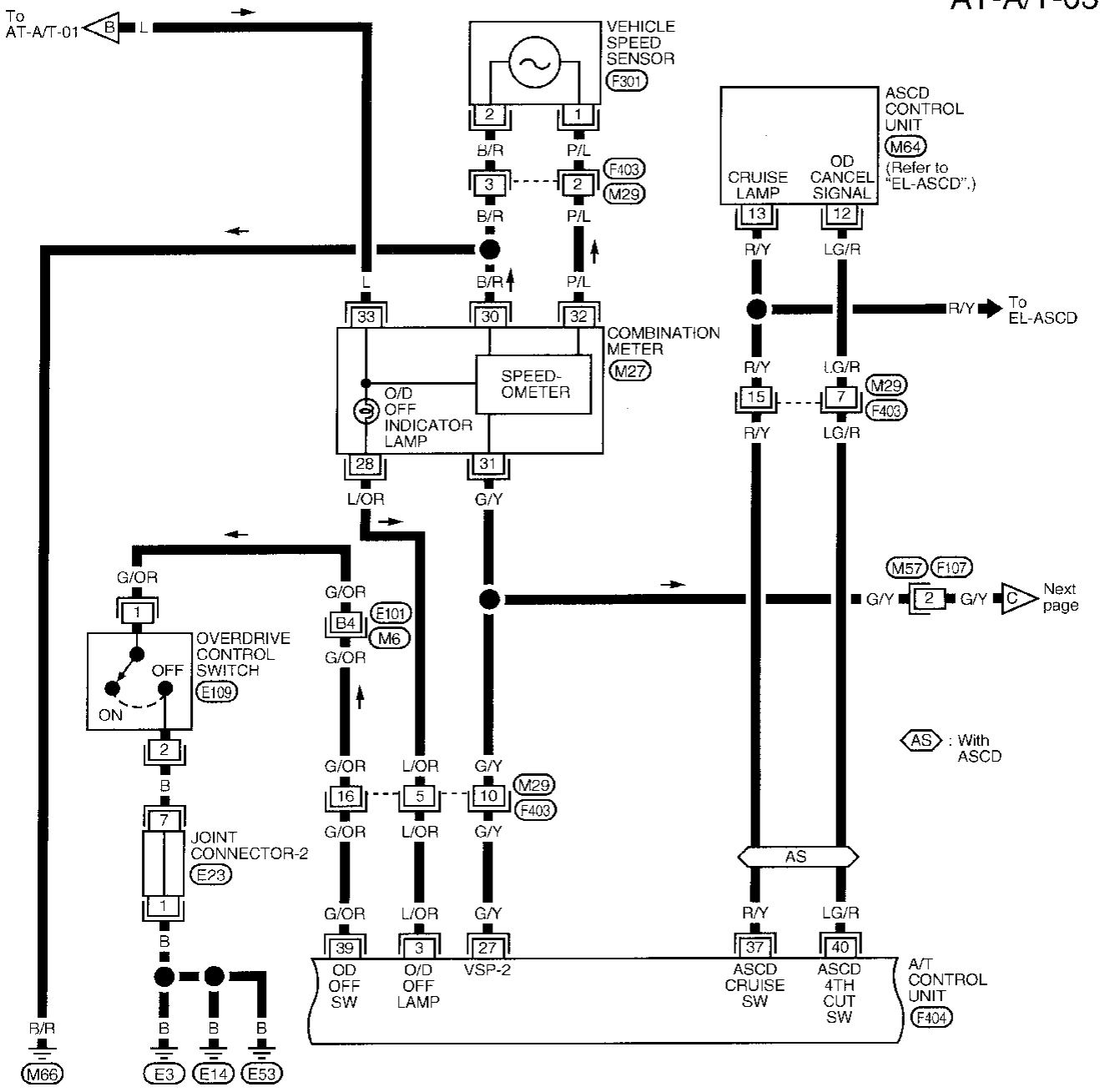


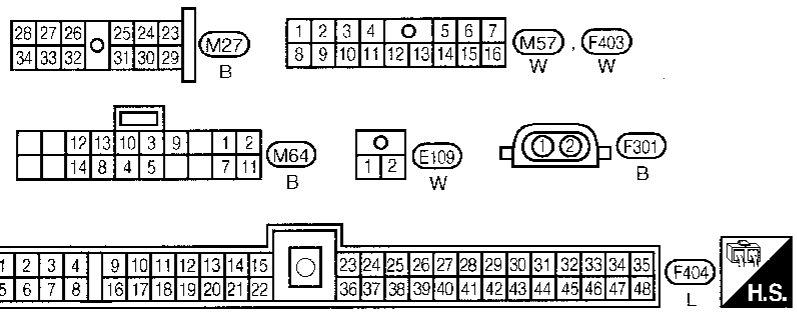




AAT901

## Wiring Diagram –A/T– (Cont'd)

AT-A/T-03



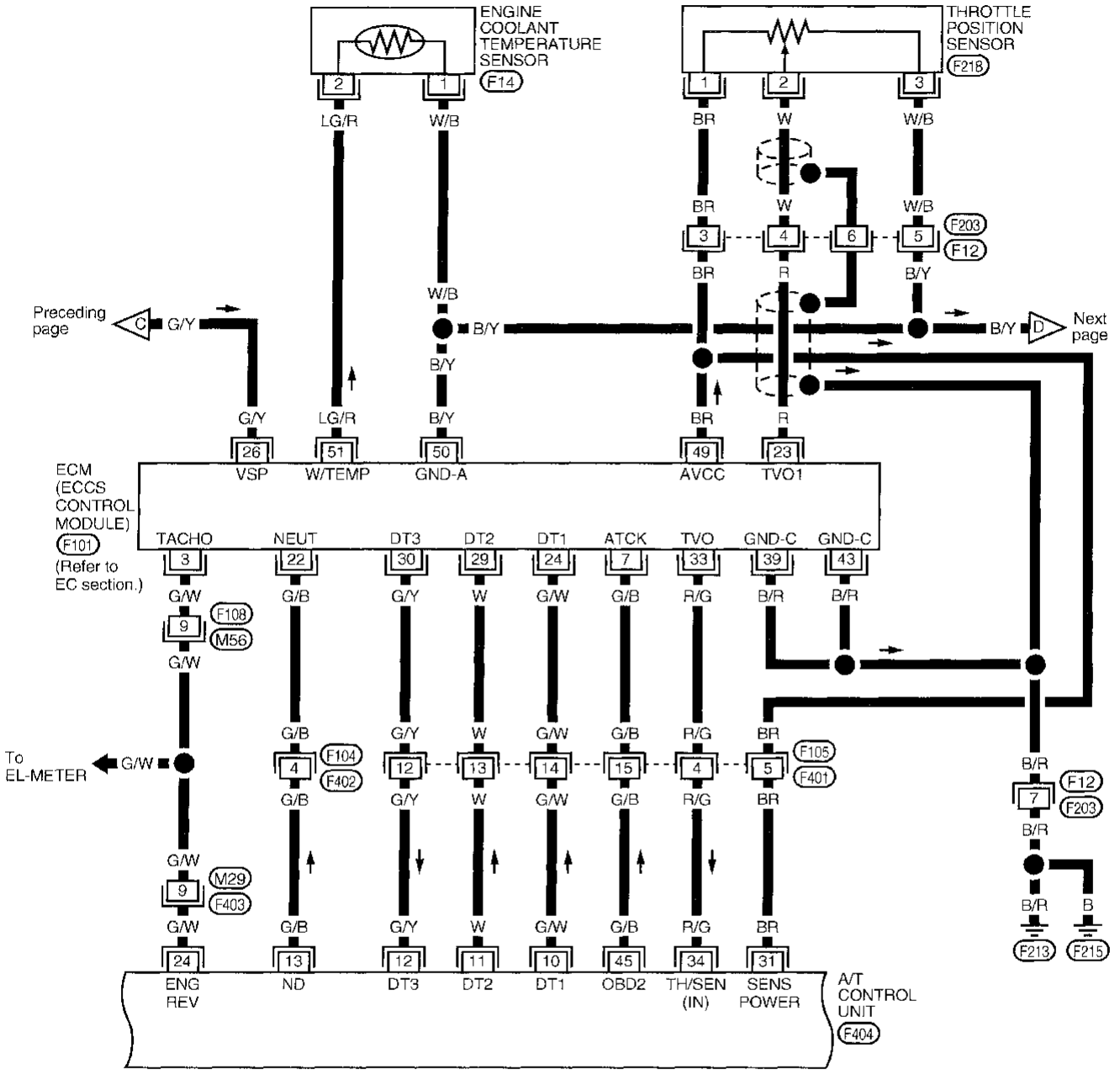



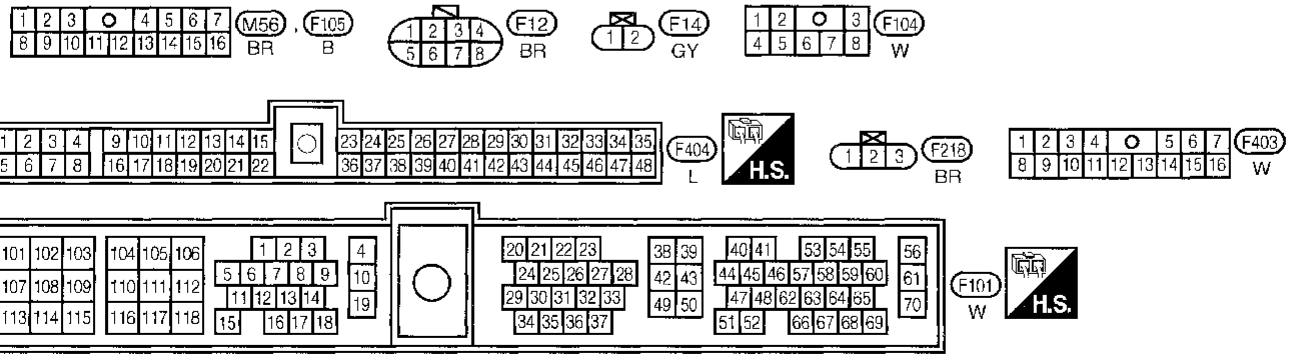

Refer to last page (Foldout page).
M6, E101
E23

AAT902

## Wiring Diagram –A/T– (Cont'd)

AT-A/T-04

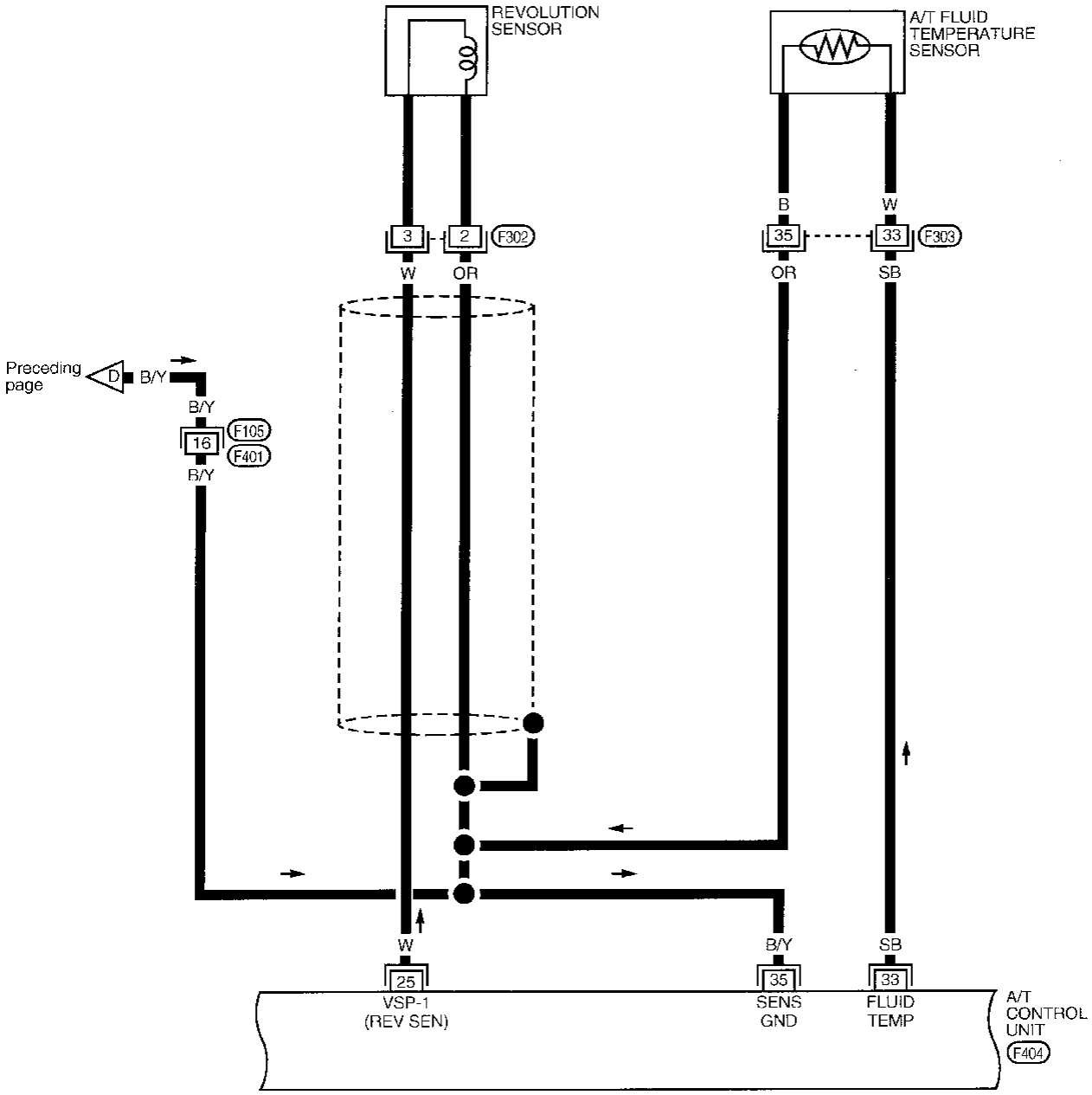


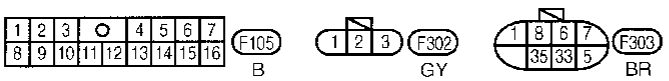



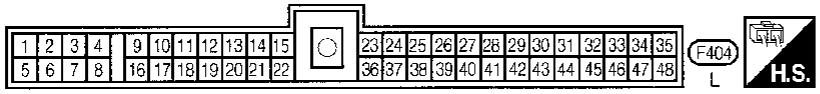

AAT903

## Wiring Diagram –A/T– (Cont'd)

AT-A/T-05



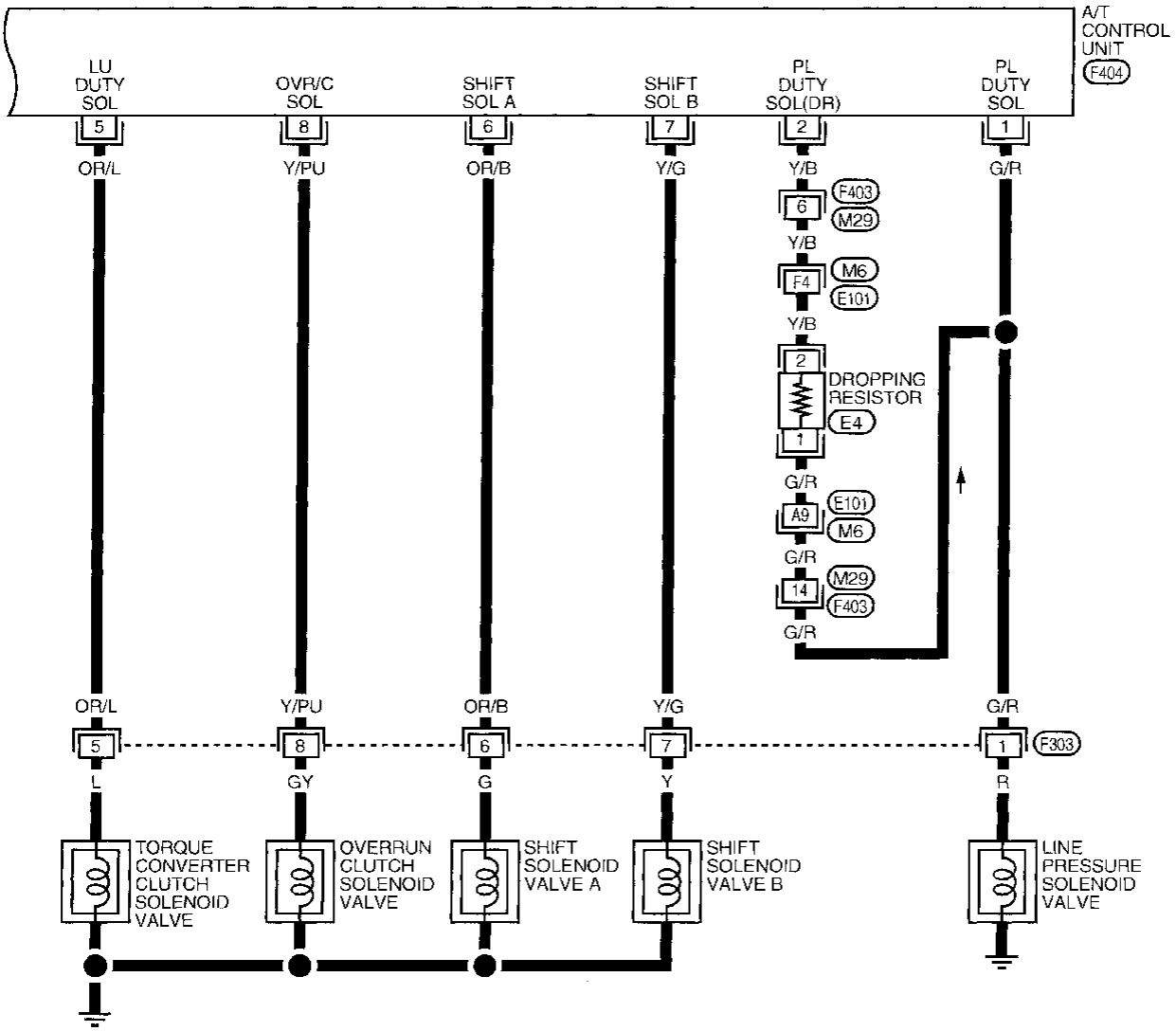



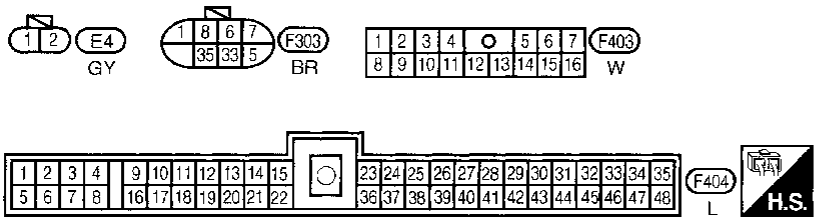

AAT904

## Wiring Diagram –A/T– (Cont'd)

AT-A/T-06

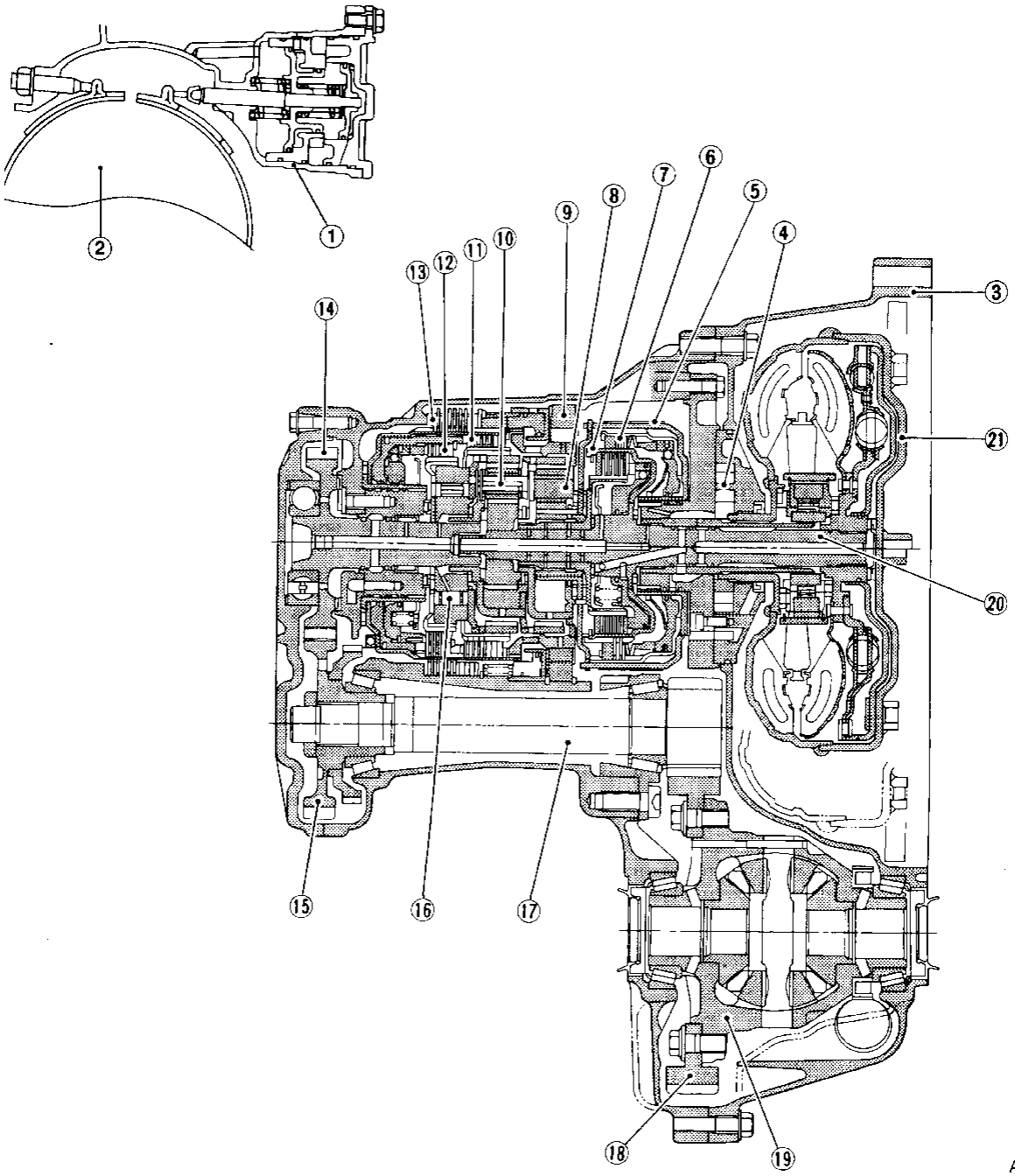



Refer to last page (Foldout page).
M6 , E101



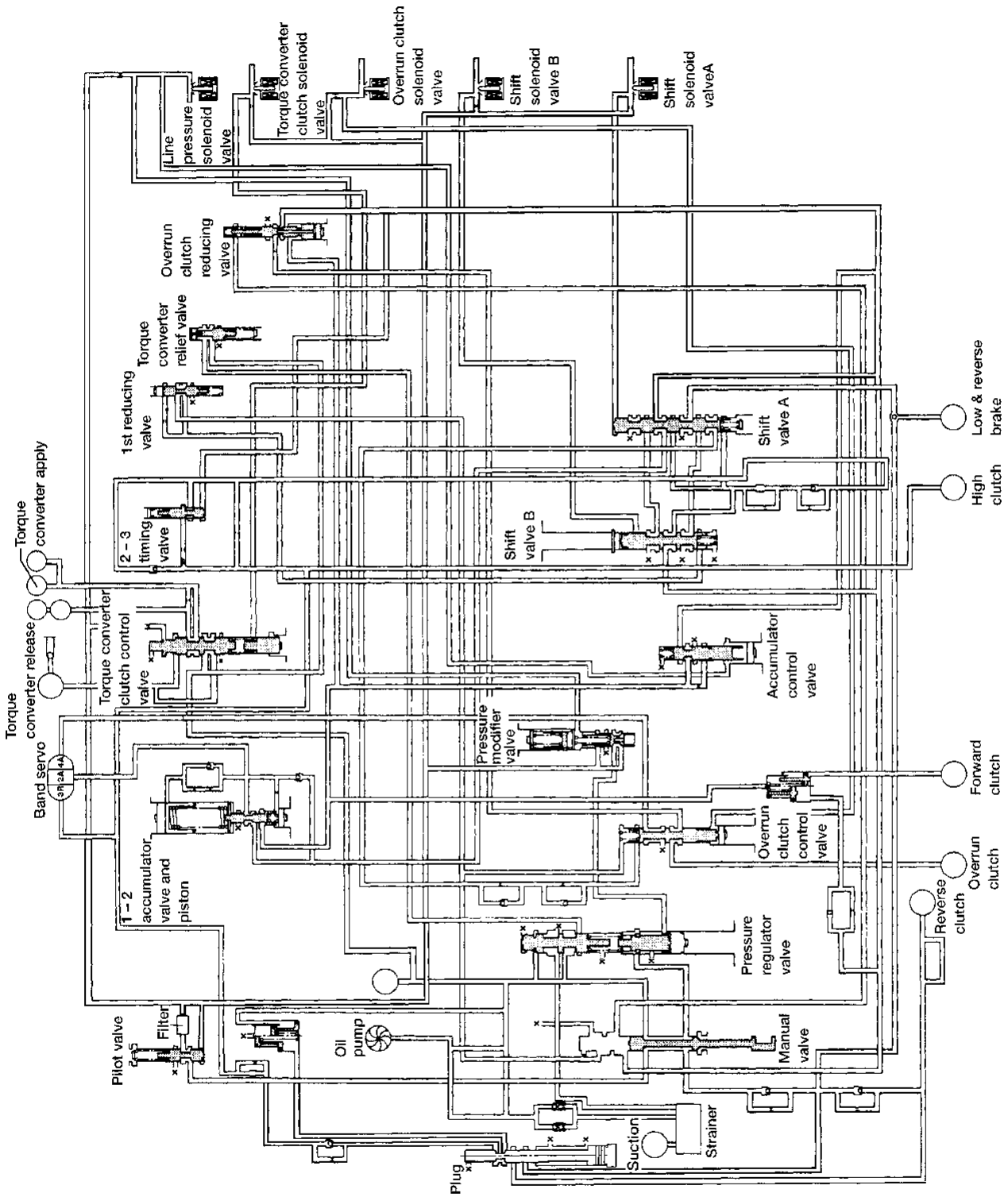

AAT905

## Cross-sectional View




① Band servo piston
② Reverse clutch drum
③ Converter housing
④ Oil pump
⑤ Brake band
⑥ Reverse clutch
⑦ High clutch
⑧ Front planetary gear
⑨ Low one-way clutch
⑩ Rear planetary gear
⑪ Forward clutch
⑫ Overrun clutch
⑬ Low & reverse brake
⑭ Output shaft
⑮ Idler gear
⑯ Forward one-way clutch
⑰ Pinion reduction gear
⑱ Final gear
⑲ Differential case
⑳ Input shaft
㉑ Torque converter

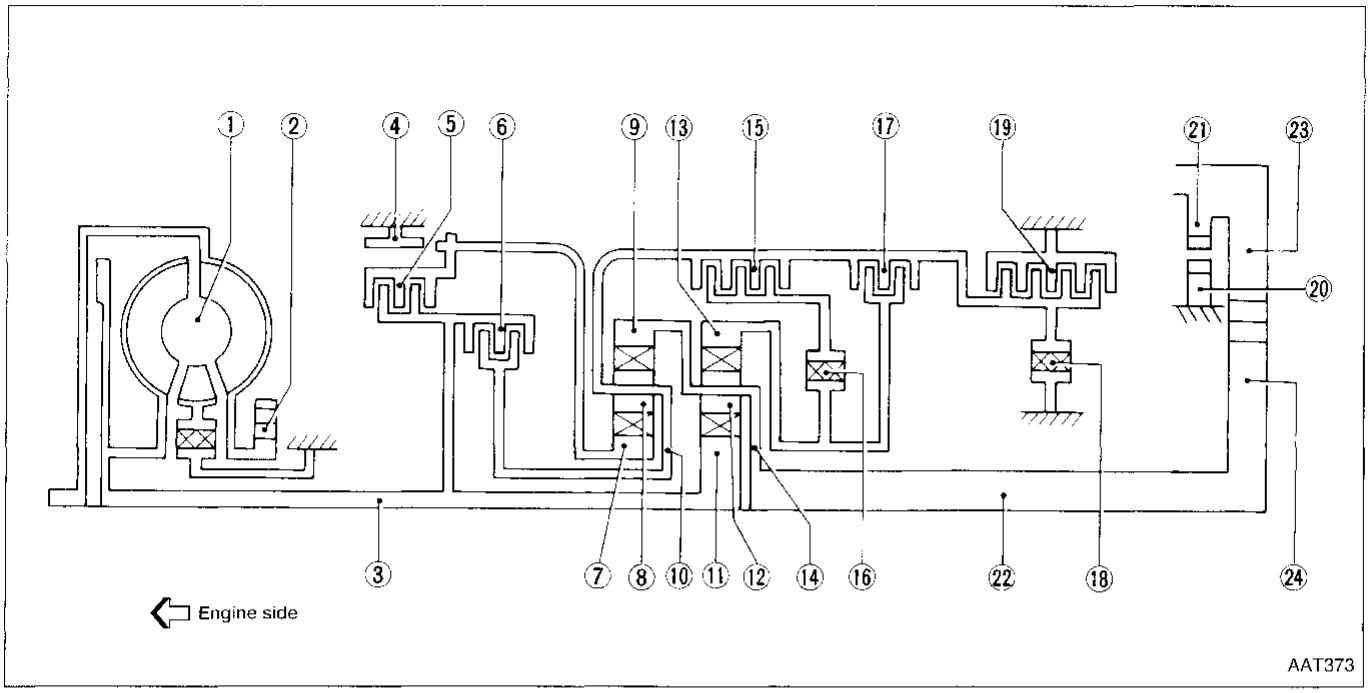
## Hydraulic Control Circuit




AAT924

## Shift Mechanism

### CONSTRUCTION




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

### FUNCTION OF CLUTCH AND BRAKE

| Clutch and brake components | Abbr. | Function |
|---|---|---|
| ⑤ Reverse clutch | R/C | To transmit input power to front sun gear ⑦. |
| ⑥ High clutch | H/C | To transmit input power to front planetary carrier ⑩. |
| ⑮ Forward clutch | F/C | To connect front planetary carrier ⑩ with forward one-way clutch ⑯. |
| ⑰ Overrun clutch | O/C | To connect front planetary carrier ⑩ with rear internal gear ⑬. |
| ④ Brake band | B/B | To lock front sun gear ⑦. |
| ⑯ Forward one-way clutch | F/O.C | When forward clutch ⑮ is engaged, to stop rear internal gear ⑬ from rotating in opposite direction against engine revolution. |
| ⑱ Low one-way clutch | L/O.C | To stop front planetary carrier ⑩ from rotating in opposite direction against engine revolution. |
| ⑲ Low & reverse brake | L & R/B | To lock front planetary carrier ⑩. |

## Shift Mechanism (Cont'd)

### OPERATION OF CLUTCH AND BRAKE

| Shift position | | Reverse clutch ⑤ | High clutch ⑥ | Forward clutch ⑮ | Overrun clutch ⑰ | Band servo 2nd apply | Band servo 3rd release | Band servo 4th apply | Forward one-way clutch ⑯ | Low one-way clutch ⑱ | Low & reverse brake ⑲ | Lock-up | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | | | | | | | | | | | | | PARK POSITION |
| R | | ○ | | | | | | | | | ○ | | REVERSE POSITION |
| N | | | | | | | | | | | | | NEUTRAL POSITION |
| D*4 | 1st | | | ○ | *1◉ | | | | ● | ● | | | Automatic shift 1 ↔ 2 ↔ 3 ↔ 4 |
| | 2nd | | | ○ | *1◎ | ○ | | | ● | | | | |
| | 3rd | | ○ | ○ | *1◎ | *2Ⓧ | Ⓧ | | ● | | | *5○ | |
| | 4th | | ○ | Ⓧ | | *3Ⓧ | Ⓧ | ○ | | | | ○ | |
| 2 | 1st | | | ○ | ○ | | | | ● | ● | | | Automatic shift 1 ↔ 2 ← 3 |
| | 2nd | | | ○ | ○ | ○ | | | ● | | | | |
| 1 | 1st | | | ○ | ○ | | | | ● | ● | ○ | | Locks (held stationary) in 1st speed 1 ← 2 ← 3 |
| | 2nd | | | ○ | ○ | ○ | | | ● | | | | |

*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.
◎ : Operates when throttle opening is less than 1/16, activating engine brake.
● : Operates during "progressive" acceleration.
Ⓧ : Operates but does not affect power transmission.
◉ : Operates when throttle opening is less than 1/16, but does not affect engine brake.

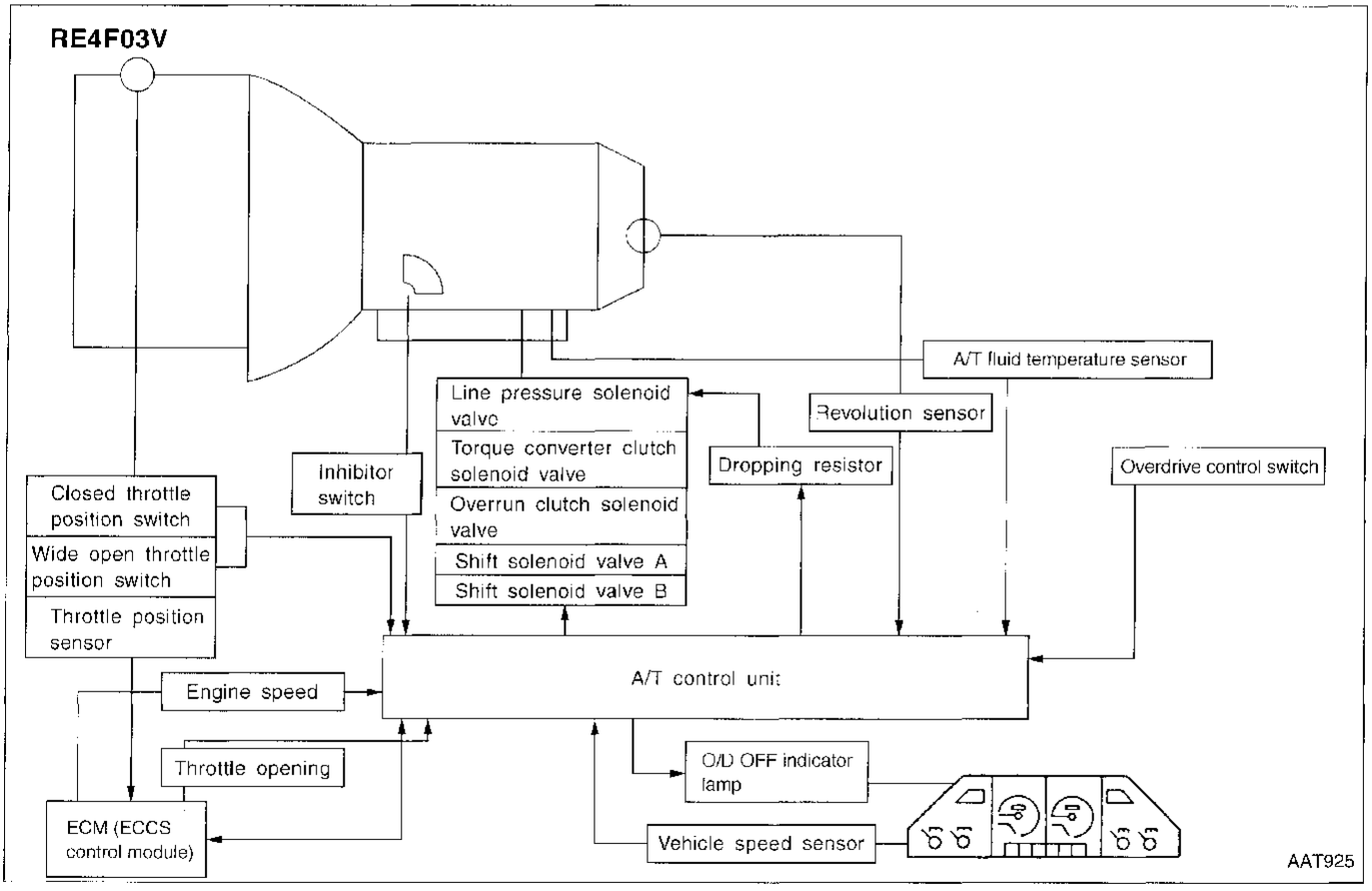
# Control System

## OUTLINE

The RE4F04A automatic transmission senses vehicle operating conditions through various sensors. It always controls the optimum shaft position and reduces shifting and lock-up shocks.

| SENSORS | CONTROL UNIT | ACTUATORS |
|---|---|---|
| Inhibitor 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 | Shift control<br>Line pressure control<br>Lock-up control<br>Overrun clutch control<br>Timing control<br>Fail-safe control<br>Self-diagnosis | 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 |

## CONTROL SYSTEM



## Control System (Cont'd)

### A/T CONTROL UNIT FUNCTION

The function of the A/T control unit 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 A/T CONTROL UNIT

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

## Introduction

The ECM (ECCS control module) provides two functions for the A/T system. One function is to receive a signal from the A/T control unit used with OBD-related parts of the A/T system. The signal is sent to the ECM when a malfunction occurs in the corresponding OBD-related part. The other function is to indicate a diagnostic result by means of the MIL (malfunction indicator lamp) on the instrument panel. Sensors, switches and solenoid valves are used as sensing elements.
The MIL automatically illuminates in One or Two Trip Detection Logic when a malfunction is sensed in relation to A/T system parts.

## One or Two Trip Detection Logic

### ONE TRIP DETECTION LOGIC

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

### TWO TRIP DETECTION LOGIC

When a malfunction is sensed during the first test drive, it is stored in the ECM memory as a 1st trip DTC (diagnostic trouble code) or 1st trip freeze frame data. At this point, the MIL will not illuminate. — First Trip
If the same malfunction as that experienced during the first test drive is sensed during the second test drive, the MIL will illuminate. — Second Trip
A/T-related parts for which the MIL illuminates during the first or second test drive are listed below.

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

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

## Diagnostic Trouble Code (DTC)

### HOW TO READ DTC

The diagnostic trouble code can be read by the following methods.
(Either code for the 1st trip or the 2nd trip can be read.)

1. The number of blinks of the malfunction indicator lamp in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 1101, 1102, 1103, 1104, etc.
   These DTCs are controlled by NISSAN.
2. CONSULT or GST (Generic Scan Tool) Examples: P0705, P0710, P0720, P0725, etc.
   These DTCs are prescribed by SAE J2012. (CONSULT also displays the malfunctioning component or system.)

- **Output of a DTC indicates a malfunction. However, Mode II and GST do not indicate whether the malfunction is still occuring or has occured in the past and has returned to normal. CONSULT can identify them. Therefore, using CONSULT (if available) is recommended.**

### HOW TO ERASE DTC

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

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

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

## Diagnostic Trouble Code (DTC) (Cont'd)

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

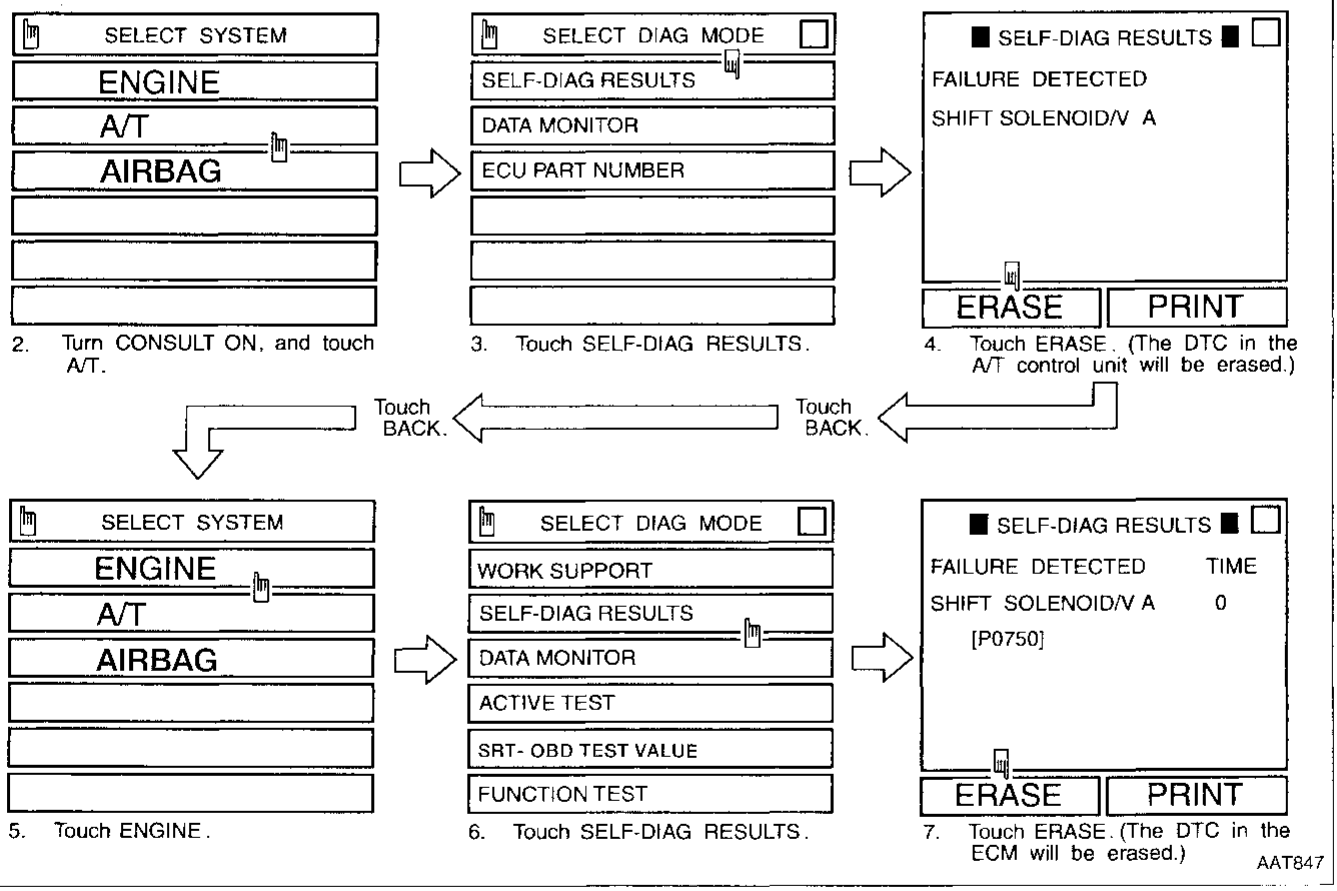
### HOW TO ERASE DTC (With CONSULT)

- **If a DTC is displayed for both ECM and A/T control unit, it needs to be erased for both ECM and A/T control unit.**
- **If diagnostic trouble code is not for A/T related items (Refer to AT-54, skip steps 2 through 4.**

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 (engine stopped) again.
2. Turn CONSULT ON, and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". (The DTC in the A/T control unit will be erased.) Then touch "BACK" twice.
5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)

**How to erase DTC (With CONSULT)**

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



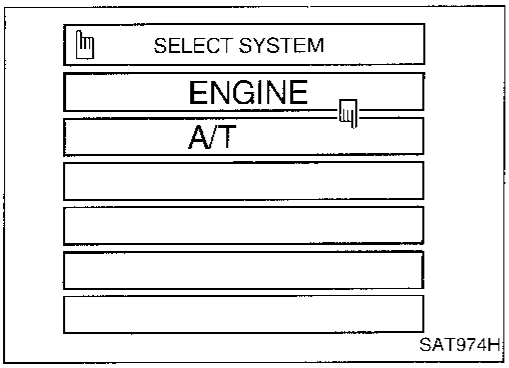
## Diagnostic Trouble Code (DTC) (Cont'd)

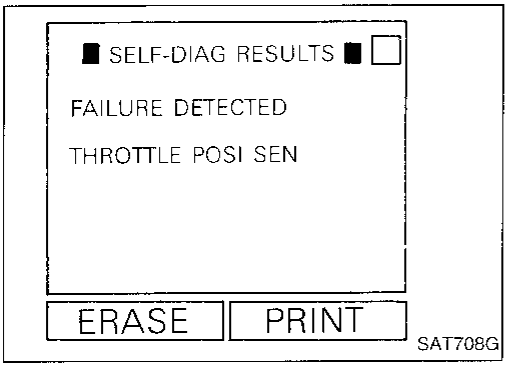
### HOW TO ERASE DTC (With GST)

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 (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-28. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 Generic Scan Tool (GST). For details, refer to EC section ("Generic Scan Tool (GST)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION").

### HOW TO ERASE DTC (No Tools)

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 (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (No Tools)" on AT-28. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. Refer to EC section ["HOW TO SWITCH DIAGNOSTIC TEST MODES", "Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].




## Self-diagnosis

After performing this procedure, place check marks for results on the "DIAGNOSTIC WORKSHEET", AT-38. Reference pages are provided following the items.

### SELF-DIAGNOSTIC PROCEDURE (With CONSULT)

1. Turn on CONSULT and touch "A/T".
   If A/T is not displayed, check A/T control unit power supply and ground circuit. Refer to AT-59. 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.

| Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" test mode) | Diagnostic trouble code No. for CONSULT or GST | Malfunction is detected when ... | Indicator for Diagnostic Results | |
|---|---|---|---|---|
| | | | O/D OFF indicator lamp (Available when "A/T" on CONSULT is touched.) | CHECK Malfunction indicator lamp*2 (Available when "ENGINE" on CONSULT is touched.) |
| Inhibitor switch circuit (INHIBITOR SWITCH) | P0705 | ● A/T control unit does not receive the correct voltage signal (based on the gear position) from the switch. | — | X |
| Revolution sensor (VHCL SPEED SEN·A/T) | P0720 | ● A/T control unit does not receive the proper voltage signal from the sensor. | X | X |
| Vehicle speed sensor (Meter) (VHCL SPEED SEN·MTR) | — | ● A/T control unit does not receive the proper voltage signal from the sensor. | X | — |
| Improper shifting to 1st gear position (A/T 1ST SIGNAL) | P0731 | ● A/T cannot be shifted to the 1st gear position even if electrical circuit is good. | — | X*1 |
| Improper shifting to 2nd gear position (A/T 2ND SIGNAL) | P0732 | ● A/T cannot be shifted to the 2nd gear position even if electrical circuit is good. | — | X*1 |
| Improper shifting to 3rd gear position (A/T 3RD SIGNAL) | P0733 | ● A/T cannot be shifted to the 3rd gear position even if electrical circuit is good. | — | X*1 |
| Improper shifting to 4th gear position (A/T 4TH SIG OR TCC) | P0734 | ● A/T cannot be shifted to the 4th gear position even if electrical circuit is good. | — | X*1 |
| Improper lock-up operation (A/T TCC SIGNAL) | P0744 | ● A/T cannot perform lock-up even if electrical circuit is good. | — | X*1 |
| Shift solenoid valve A (SHIFT SOLENOID/V A) | P0750 | ● A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve. | X | X |
| Shift solenoid valve B (SHIFT SOLENOID/V B) | P0755 | ● A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve. | X | X |

## Self-diagnosis (Cont'd)

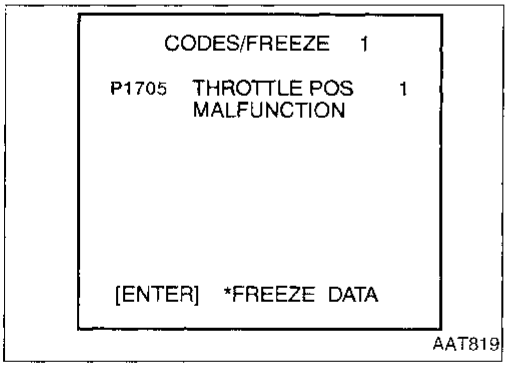
| Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" test mode) | Diagnostic trouble code No. for CONSULT or GST | Malfunction is detected when ... | Indicator for Diagnostic Results: O/D OFF indicator lamp (Available when "A/T" on CONSULT is touched.) | Indicator for Diagnostic Results: CHECK Malfunction indicator lamp*2 (Available when "ENGINE" on CONSULT is touched.) |
|---|---|---|---|---|
| Overrun clutch solenoid valve (OVERRUN CLUTCH S/V) | P1760 | ● A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve. | X | X |
| T/C clutch solenoid valve (TOR CONV CLUTCH SV) | P0740 | ● A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve. | X | X |
| Line pressure solenoid valve (LINE PRESSURE S/V) | P0745 | ● A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve. | X | X |
| Throttle position sensor Throttle position switch (THRTL POSI SEN·A/T) | P1705 | ● A/T control unit receives an excessively low or high voltage from the sensor. | X | X |
| Engine speed signal (ENGINE SPEED SIG) | P0725 | ● A/T control unit does not receive the proper voltage signal from the ECM. | X | X |
| A/T fluid temperature sensor (FLUID TEMP SENSOR) | P0710 | ● A/T control unit receives an excessively low or high voltage from the sensor. | X | X |
| Initial start (INITIAL START) | | ● This is not a malfunction message (Whenever shutting off a power supply to the control unit, this message appears on the screen.) | X | — |
| No failure (NO SELF DIAGNOSTIC FAILURE INDICATED FURTHER TESTING MAY BE REQUIRED**) | | ● No failure has been detected. | X | X |

X : Applicable

– : Not applicable

*1 : These malfunctions cannot be displayed by MIL (CHECK) if another malfunction is assigned to the O/D OFF indicator lamp (O/D OFF).

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

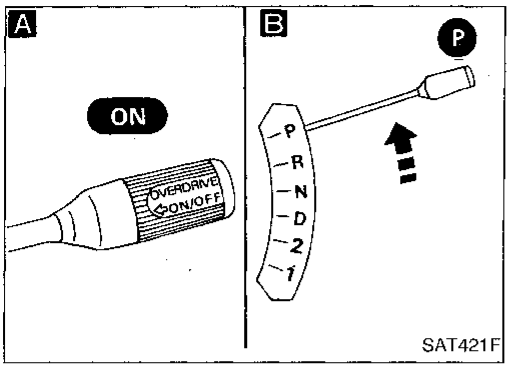


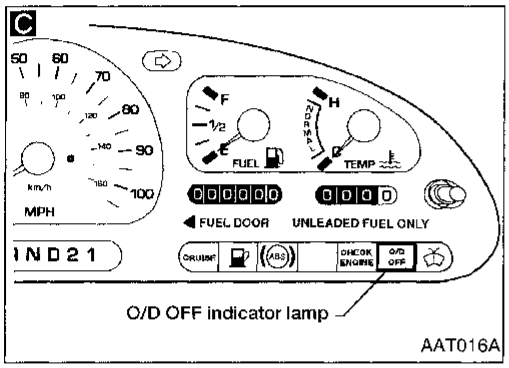

### SELF-DIAGNOSTIC PROCEDURE (With GST)

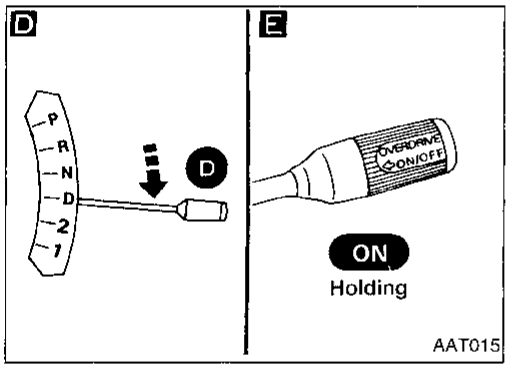
Refer to EC section ("Generic Scan Tool (GST)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION").

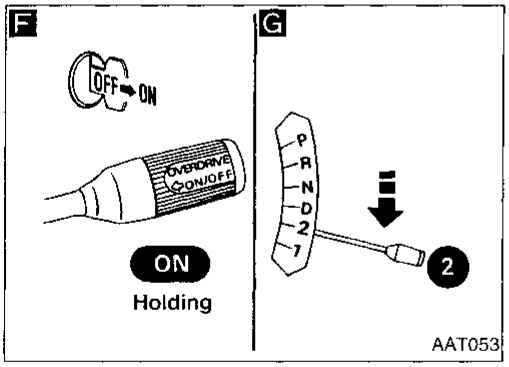
## Self-diagnosis (Cont'd)

### SELF-DIAGNOSTIC PROCEDURE (No Tools)




DIAGNOSIS START

A B C

1. Start engine and warm it up to normal engine operating temperature.
2. Turn ignition switch to OFF position. Wait for at least 5 seconds.
3. Turn ignition switch to ACC position.
4. Set overdrive control switch in ON position.
5. Move selector lever to "P" position.
6. Turn ignition switch to ON position. (Do not start engine.)
7. Does O/D OFF indicator lamp come on for about 2 seconds?

No → Stop procedure. Perform "1. O/D OFF Indicator Lamp Does Not Come On", AT-113 before proceeding.

Yes

D E

1. Turn ignition switch to OFF position.
2. Turn ignition switch to ON position. (Do not start engine.)
3. Move selector lever to "D" position.
4. Turn ignition switch to OFF position.
5. Set overdrive control switch to OFF position.
6. Turn ignition switch to ON position (Do not start engine.)

- Wait for more than 2 seconds after ignition switch ON.

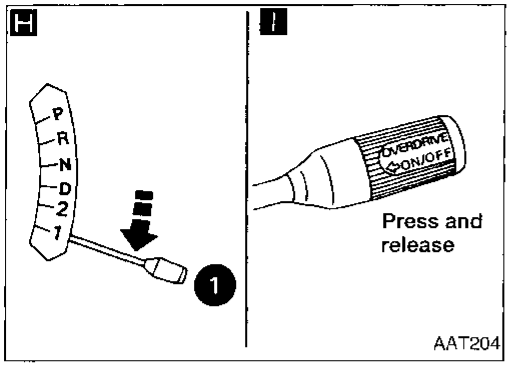
F G

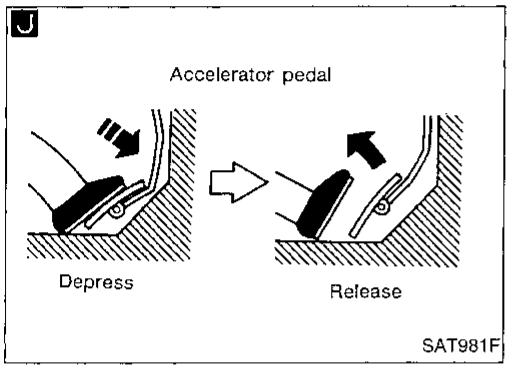
1. Move selector lever to "2" position.
2. Set overdrive control switch in ON position.

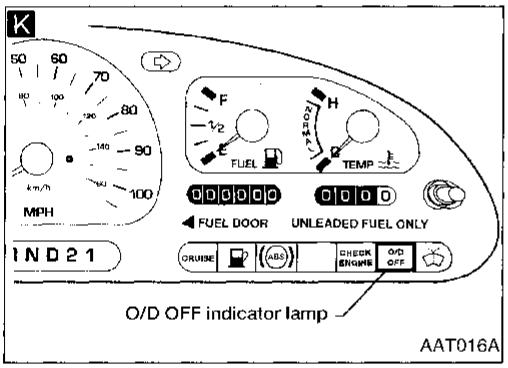
Ⓐ

(Go to next page.)

## Self-diagnosis (Cont'd)




Ⓐ

H I

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

J

Depress accelerator pedal fully and release it.

K

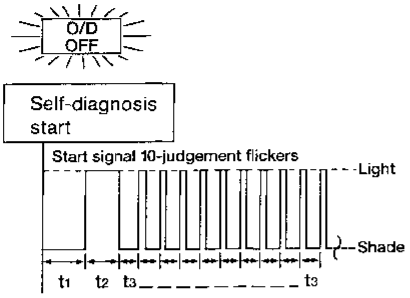
Check O/D OFF indicator lamp.
Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE on next page.

**DIAGNOSIS END**

## Self-diagnosis (Cont'd)

### JUDGEMENT OF SELF-DIAGNOSIS CODE INDICATED BY O/D OFF INDICATOR LAMP

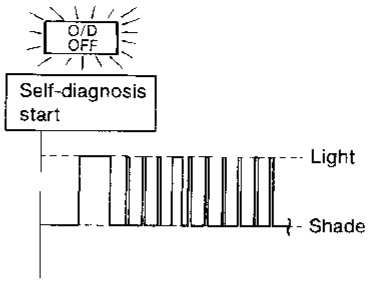
All judgement flickers are same.




AAT671

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

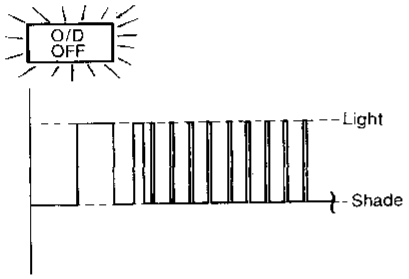
4th judgement flicker is longer than others.




SAT443F

Shift solenoid valve A circuit is short-circuited or disconnected.
➡ **Go to SHIFT SOLENOID VALVE A, AT-100.**

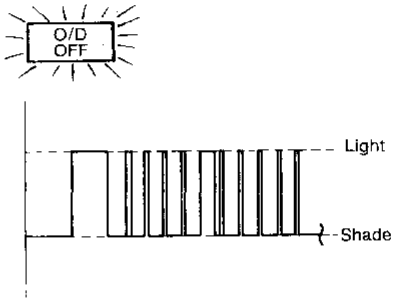
1st judgement flicker is longer than others.




SAT437F

Revolution sensor circuit is short-circuited or disconnected.
➡ **Go to VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR), AT-71.**

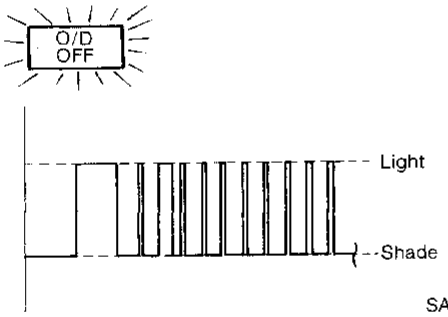
5th judgement flicker is longer than others.




SAT445F

Shift solenoid valve B circuit is short-circuited or disconnected.
➡ **Go to SHIFT SOLENOID VALVE B, AT-103.**

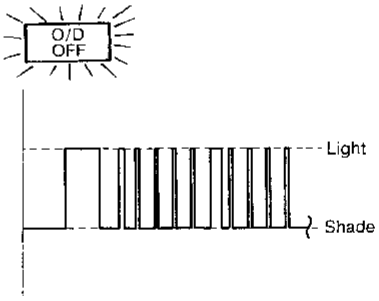
2nd judgement flicker is longer than others.




SAT439F

Vehicle speed sensor circuit is short-circuited or disconnected.
➡ **Go to VEHICLE SPEED SENSOR·MTR, AT-111.**

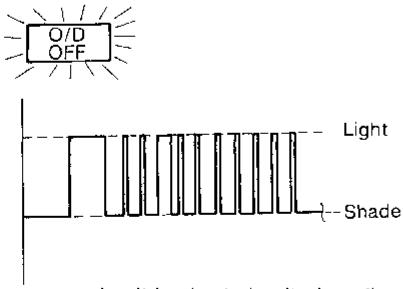
6th judgement flicker is longer than others.




SAT447F

Overrun clutch solenoid valve circuit is short-circuited or disconnected.
➡ **Go to OVERRUN CLUTCH SOLENOID VALVE, AT-108.**

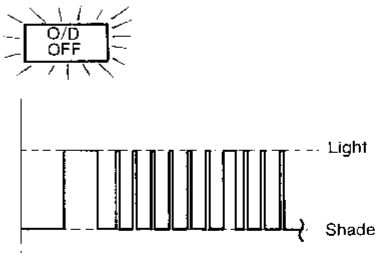
3rd judgement flicker is longer than others.




SAT441F

Throttle position sensor circuit is short-circuited or disconnected.
➡ **Go to THROTTLE POSITION SENSOR, CHECK, AT-106.**

7th judgement flicker is longer than others.

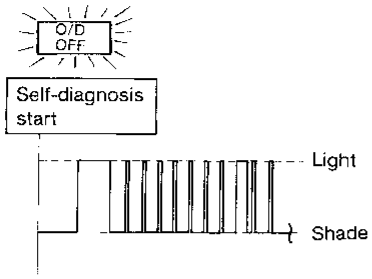
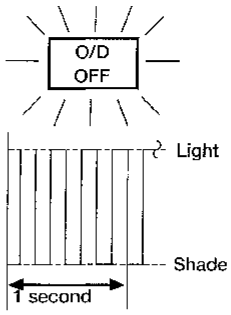
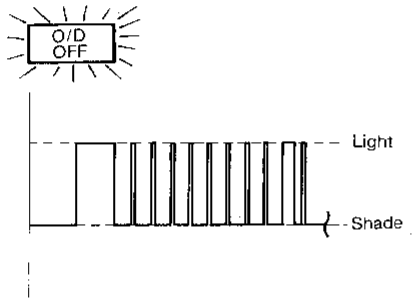
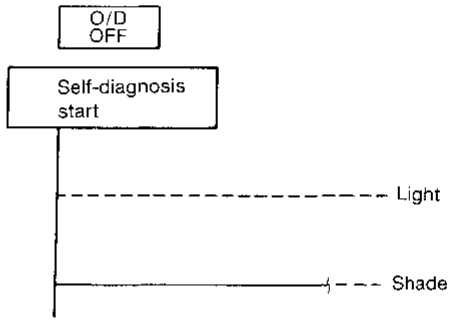
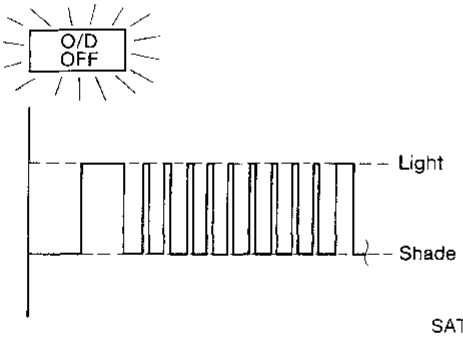



SAT449F

Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
➡ **Go to TORQUE CONVERTER CLUTCH SOLENOID VALVE, AT-89.**

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

## Self-diagnosis (Cont'd)

| | |
|---|---|
| 8th judgement flicker is longer than others.<br>  <br><br>SAT451F<br>AT fluid temperature sensor is disconnected or A/T control unit power source circuit is damaged.<br>➡ **Go to A/T FLUID TEMPERATURE SENSOR AND A/T CONTROL UNIT POWER SOURCE, AT-68.** | Flickers as shown below.<br>  <br><br>AAT549<br>Battery power is low.<br>Battery has been disconnected for a long time.<br>Battery is connected conversely.<br>This is not a problem when reconnecting A/T control unit connectors. |
| 9th judgement flicker is longer than others.<br>  <br><br>SAT453F<br>Engine speed signal circuit is short-circuited or disconnected.<br>➡ **Go to ENGINE SPEED SIGNAL, AT-73.** | Does not come on.<br>  <br><br>SAT458F<br>Inhibitor switch, overdrive control switch or throttle position switch circuit is disconnected or A/T control unit is damaged.<br>➡ **Go to INHIBITOR, OVERDRIVE CONTROL AND THROTTLE POSITION SWITCH, AT-63.** |
| 10th judgement flicker is longer than others.<br>  <br><br>SAT455F<br>Line pressure solenoid valve circuit is short-circuited or disconnected.<br>➡ **Go to LINE PRESSURE SOLENOID VALVE, AT-97.** | |

$t_4$ = 1.0 second

## Diagnosis by CONSULT

### 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 A/T control unit).
4. Additional CONSULT information can be found in the Operation Manual supplied with the CONSULT unit.

### SELF-DIAGNOSIS RESULT TEST MODE.

**Refer to AT-26.**

## Diagnosis by CONSULT (Cont'd)

### DATA MONITOR DIAGNOSTIC TEST MODE

| 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). |
| 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. | |
| Fluid temperature sensor | FLUID TEMP SEN [V] | X | — | ● Fluid temperature sensor signal voltage is displayed.<br>● Signal voltage lowers as fluid temperature rises. | |
| Battery voltage | BATTERY VOLT [V] | X | — | ● Source voltage of control unit 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 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. |
| 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. | |

## Diagnosis by CONSULT (Cont'd)

| Item | Display | Monitor item | | Description | Remarks |
|---|---|---|---|---|---|
| | | ECU input signals | Main signals | | |
| Hold switch | HOLD SW [ON/OFF] | X | — | ● ON/OFF status, computed from signal of hold SW, is displayed. | |
| Gear position | GEAR | — | X | ● Gear position data used for computation by control unit, is displayed. | |
| Selector lever position | SLCT LVR POSI | — | X | ● Selector lever position data, used for computation by control unit, 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 control unit, is displayed. | |
| Throttle position | THROTTLE POSI [/8] | — | X | ● Throttle position data, used for computation by control unit, 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 control unit 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 control unit 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 control unit from each input signal, is displayed. | Control value of solenoid is displayed even if solenoid circuit is disconnected.<br>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 control unit 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 control unit from each input signal is displayed. | |
| Self-diagnosis display lamp (O/D OFF indicator lamp) | SELF-D DP LMP [ON/OFF] | — | X | ● Control status of O/D OFF indicator lamp is displayed. | |

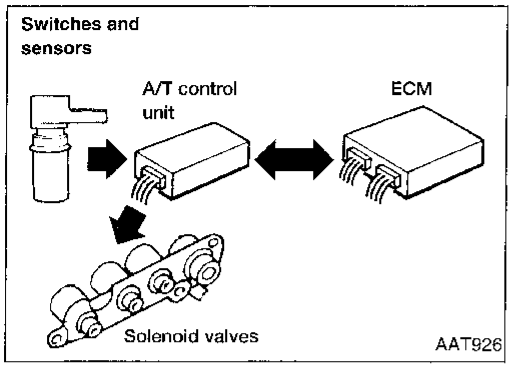
X: Applicable
—: Not applicable

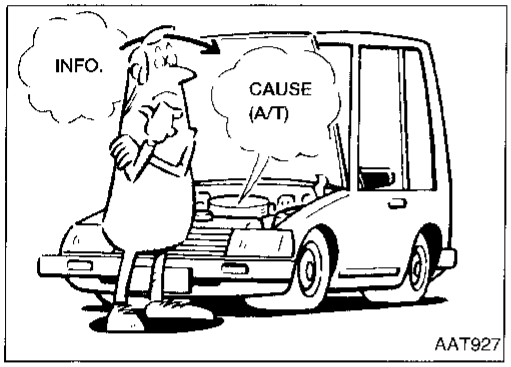
## Diagnosis by CONSULT (Cont'd)

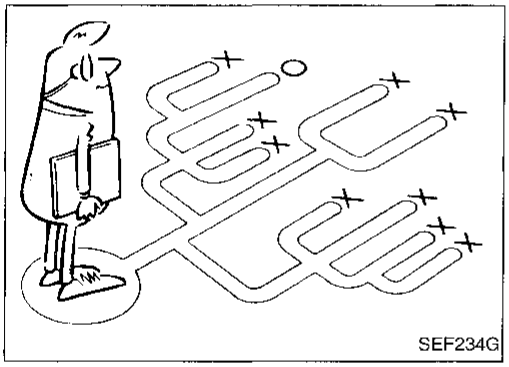
### DATA ANALYSIS

| Item | Display form | Meaning |
|---|---|---|
| Torque converter clutch solenoid valve duty | Approximately 4%<br>↓<br>Approximately 94% | Lock-up OFF<br>↓<br>Lock-up ON |
| Line pressure solenoid valve duty | Approximately 0%<br>↓<br>Approximately 95% | Low line-pressure<br>(Small throttle opening)<br>↓<br>High line-pressure<br>(Large throttle opening) |
| Throttle position sensor | Approximately 0.5V | Fully-closed throttle |
| | Approximately 4V | Fully-open throttle |
| A/T fluid temperature sensor | Approximately 1.5V<br>↓<br>Approximately 0.5V | Cold [20°C (68°F)]<br>↓<br>Hot [80°C (176°F)] |

| Gear position | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Shift solenoid valve A | ON | OFF | OFF | ON |
| Shift solenoid valve B | ON | ON | OFF | OFF |




## Introduction

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

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

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

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

A visual check only may not find the cause of the problems. A road test with CONSULT (or GST) or a circuit test should be performed. Follow the "Work Flow". Refer to AT-40.

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 on the next page should be used.

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

## Diagnostic Worksheet

### INFORMATION FROM CUSTOMER

**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 RE4F04A | Engine VG30E | 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) | |
| | ☐ Lock-up malfunction | |
| | ☐ Shift point too high or too low. | |
| | ☐ Shift shock or slip (☐ N → D ☐ Lock-up ☐ Any drive position) | |
| | ☐ Noise or vibration | |
| | ☐ No kickdown | |
| | ☐ No pattern select | |
| | ☐ Others ( ) | |
| O/D OFF indicator lamp | ☐ Blinks for about 8 seconds. | |
| | ☐ Continuously lit | ☐ Not lit |
| Malfunction indicator lamp (MIL) | ☐ Continuously lit | ☐ Not lit |

## Diagnostic Worksheet (Cont'd)

### DIAGNOSTIC WORKSHEET

| | | |
|---|---|---|
| 1. | ☐ Read the Fail-safe Remarks and listen to customer complaints. | AT-8 |
| 2. | ☐ CHECK A/T FLUID<br>☐ Leakage (Follow specified procedure)<br>☐ Fluid condition<br>☐ Fluid level | AT-41 |
| 3. | ☐ Perform all ROAD TEST and mark required procedures. | AT-41 |
| | 3-1 Check before engine is started.<br>☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.<br>☐ Inhibitor, overdrive control and throttle position switch, AT-63<br>☐ A/T fluid temperature sensor and A/T control unit power source, AT-68<br>☐ Vehicle speed sensor·A/T (Revolution sensor), AT-71<br>☐ Engine speed signal, AT-73<br>☐ Torque converter clutch solenoid valve, AT-89<br>☐ Line pressure solenoid valve, AT-97<br>☐ Shift solenoid valve A, AT-100<br>☐ Shift solenoid valve B, AT-103<br>☐ Throttle position sensor, AT-106<br>☐ Overrun clutch solenoid valve, AT-108<br>☐ Vehicle speed sensor·MTR, AT-111<br>☐ Battery, AT-31<br>☐ Others, AT-63 | AT-42 |
| | 3-2. Check at idle<br>☐ 1. O/D OFF Indicator Lamp Does Not Come On, AT-113<br>☐ 2. Engine Cannot Be Started In "P" and "N" Position, AT-114<br>☐ 3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed, AT-114<br>☐ 4. In "N" Position, Vehicle Moves, AT-115<br>☐ 5. Large Shock. "N" → "R" Position, AT-116<br>☐ 6. Vehicle Does Not Creep Backward In "R" Position, AT-117<br>☐ 7. Vehicle Does Not Creep Forward In "D", "2" or "1" Position, AT-118 | AT-43 |
| | 3-3. Cruise test<br>Part-1<br>☐ 8. Vehicle Cannot Be Started From $D_1$, AT-119<br>☐ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$ , AT-120<br>☐ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$ , AT-121<br>☐ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-122<br>☐ 12. A/T Does Not Perform Lock-up, AT-123<br>☐ 13. A/T Does Not Hold Lock-up Condition, AT-124<br>☐ 14. Lock-up Is Not Released, AT-124<br>☐ 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$), AT-125 | AT-45 |

## Diagnostic Worksheet (Cont'd)

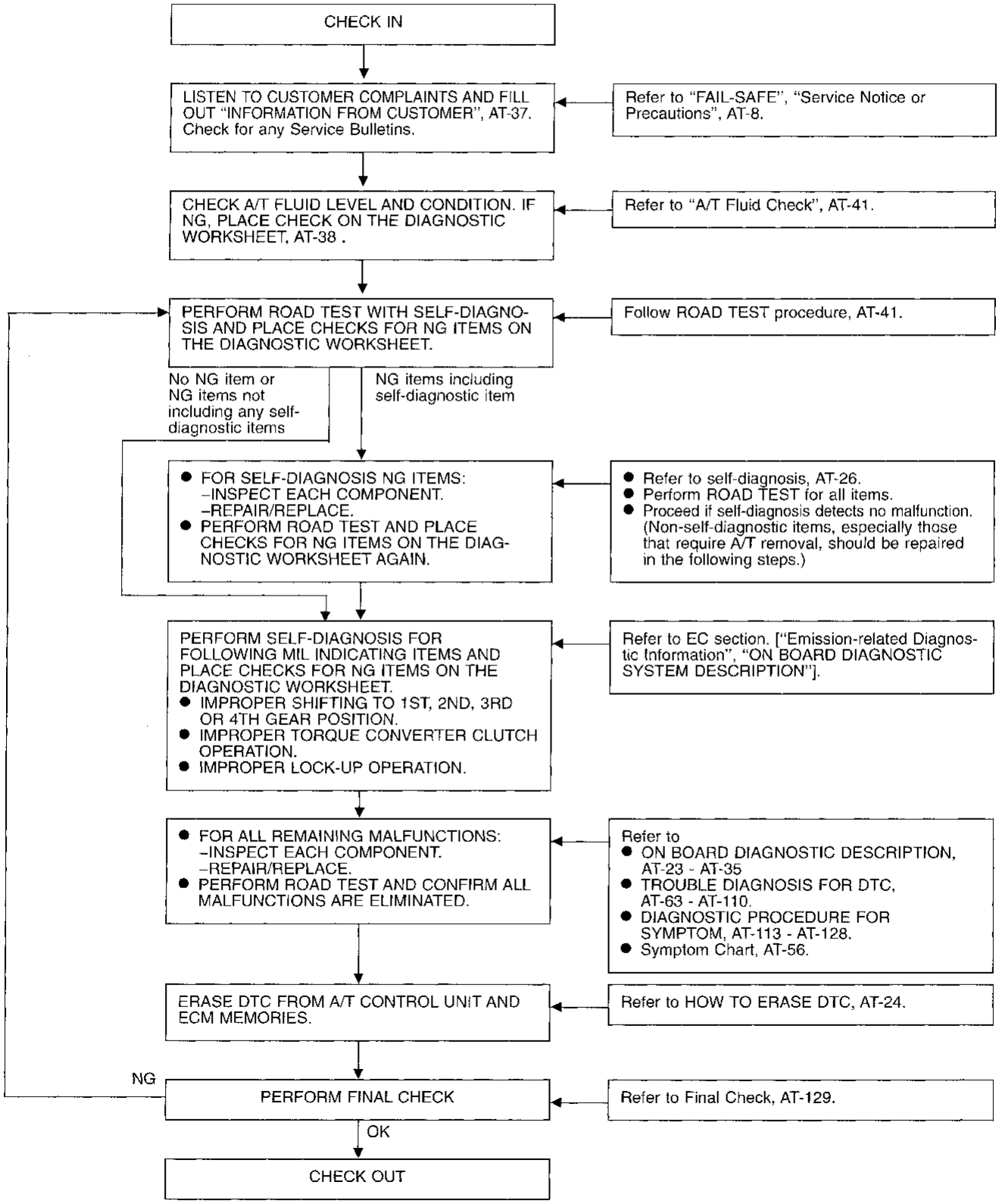
| | | |
|---|---|---|
| 3. | Part-2<br>☐ 16. Vehicle Does Not Start From $D_1$, AT-126<br>☐ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-120<br>☐ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-121<br>☐ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-122 | AT-50 |
| | Part-3<br>☐ 17. A/T Does Not Shift: $D_4 \rightarrow D_3$ When Overdrive Control Switch ON → OFF, AT-126<br>☐ 15. Engine Speed Does Not Return To Idle (Engine Brake In $D_3$), AT-125<br>☐ 18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever "D" → "2" Position, AT-127<br>☐ 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$), AT-125<br>☐ 19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever "2" → "1" Position, AT-127<br>☐ 20. Vehicle Does Not Decelerate By Engine Brake, AT-128<br>☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.<br>☐ Inhibitor, overdrive control and throttle position switch , AT-63<br>☐ A/T fluid temperature sensor and A/T control unit power source, AT-68<br>☐ Vehicle speed sensor·A/T (Revolution sensor), AT-71<br>☐ Engine speed signal, AT-73<br>☐ Torque converter clutch solenoid valve, AT-89<br>☐ Line pressure solenoid valve, AT-97<br>☐ Shift solenoid valve A, AT-100<br>☐ Shift solenoid valve B, AT-103<br>☐ Throttle position sensor, AT-106<br>☐ Overrun clutch solenoid valve, AT-108<br>☐ Vehicle speed sensor·MTR, AT-111<br>☐ Battery, AT-31<br>☐ Others, AT-63 | AT-51 |
| 4. | ☐ For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts. | AT-26 |
| 5. | ☐ Perform all ROAD TEST and re-mark required procedures. | AT-41 |
| 6. | ☐ Perform SELF-DIAGNOSIS for following MIL indicating items and check out NG items.<br>Refer to EC section ["Emission-related Diagnostic Information", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].<br>☐ DTC ( P0731, 1103) Improper shifting to 1st gear position, AT-75<br>☐ DTC ( P0732, 1104) Improper shifting to 2nd gear position, AT-78<br>☐ DTC ( P0733, 1105) Improper shifting to 3rd gear position, AT-81<br>☐ DTC ( P0734, 1106) Improper shifting to 4th gear position, AT-84<br>☐ DTC ( P0744, 1107) Improper lock-up operation, AT-92 | EC section |
| 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-59<br>AT-56 |
| 8. | ☐ Erase DTC from A/T control unit and ECM memories. | AT-24 |
| 9. | Perform FINAL CHECK.<br>☐ Stall test — Mark possible damaged components/others.<br>☐ Torque converter one-way clutch<br>☐ Reverse clutch<br>☐ Forward clutch<br>☐ Overrun clutch<br>☐ Forward one-way clutch<br>☐ 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<br>☐ Pressure test — Suspected parts: | AT-129 |

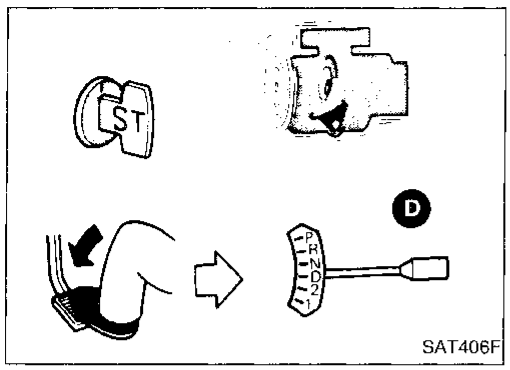
## Work Flow

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

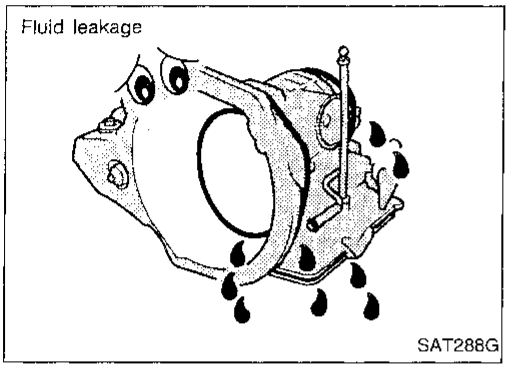
A good understanding of the malfunction conditions can make troubleshooting faster and more accurate. In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

Make good use of the two sheets provided, "INFORMATION FROM CUSTOMER" and "DIAGNOSTIC WORKSHEET", to perform the best troubleshooting possible.

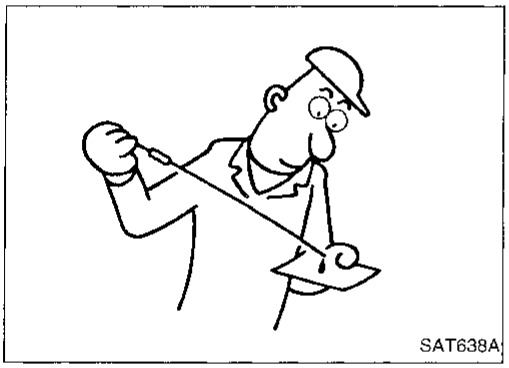




SAT406F



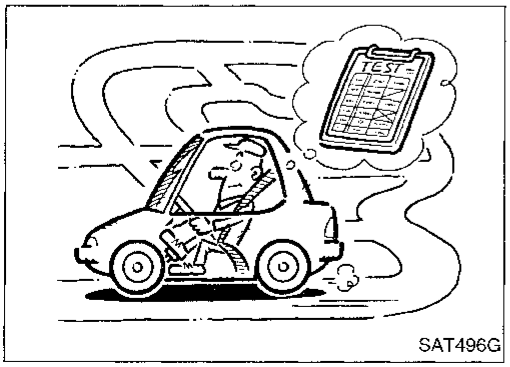
SAT288G


SAT638A

## ROAD TEST PROCEDURE

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

SAT786A



SAT496G

# A/T Fluid Check

## FLUID LEAKAGE CHECK

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

## FLUID CONDITION CHECK

| 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

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

# Road Test

## DESCRIPTION

- The purpose of a road test is to analyze overall performance and determine causes of problems.
- The road test consists of the following three parts:

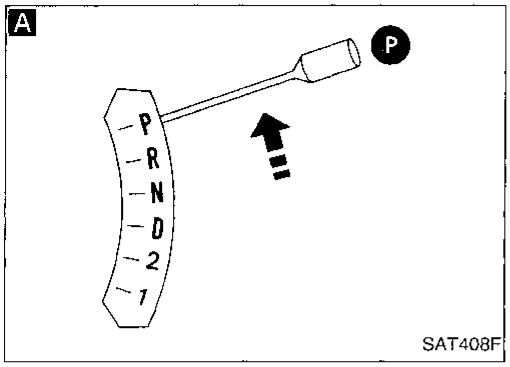
1. Check before engine is started
2. Check at idle
3. Cruise test

- Before the 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", AT-23 - AT-35 and "DIAGNOSTIC PROCEDURE FOR SYMPTOM", AT-113 - AT-128.

## Road Test (Cont'd)

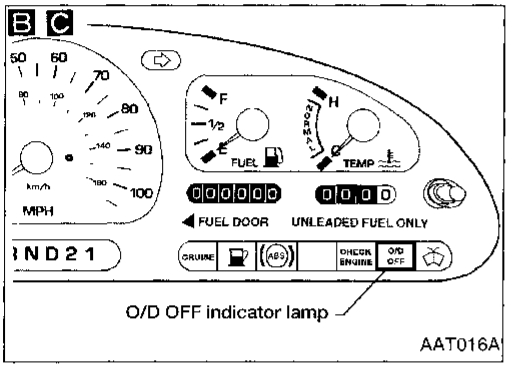
### 1. CHECK BEFORE ENGINE IS STARTED

A




SAT408F

B C




AAT016A

A B

1. Park vehicle on flat surface.
2. Turn ignition switch to OFF position.
3. Move selector lever to "P" position.
4. Set overdrive control switch to ON position.
5. Turn ignition switch to ON position. (Do not start engine.)
6. Does O/D OFF indicator lamp come on for about 2 seconds?

No → Stop ROAD TEST. Perform "1. O/D OFF Indicator Lamp Does Not Come On", AT-113 before proceeding.

Yes ↓

C

Does O/D OFF indicator lamp blink for about 8 seconds?

Yes → Perform self-diagnosis and check NG items on the DIAGNOSTIC WORKSHEET, AT-38. Refer to SELF-DIAGNOSIS PROCEDURE, AT-26.

No ↓

Turn ignition switch to OFF position. ↓

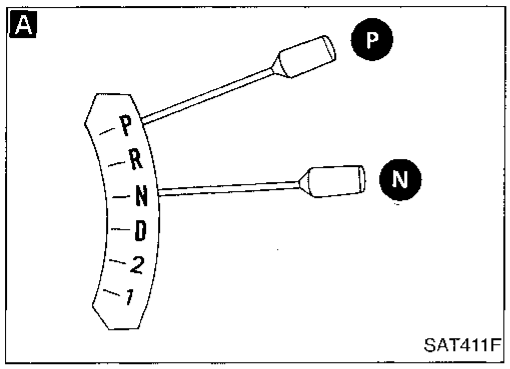
Perform self-diagnosis and note NG items. Refer to SELF-DIAGNOSIS PROCEDURE, AT-26. ↓

Go to "2. Check at idle", AT-43.

## Road Test (Cont'd)

### 2. CHECK AT IDLE

A



SAT411F

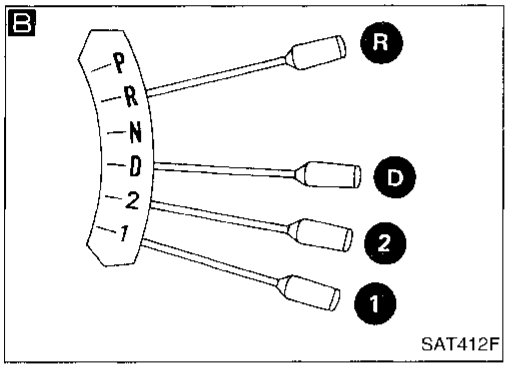
1. Park vehicle on flat surface.
2. Move selector lever to "P" position.
3. Turn ignition switch to OFF position.
4. Turn ignition switch to START position.
5. Is engine started?

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "2. Engine Cannot Be Started In "P" and "N" Position", AT-114. Continue ROAD TEST.

Yes ↓

Turn ignition switch to ACC position. ↓

B



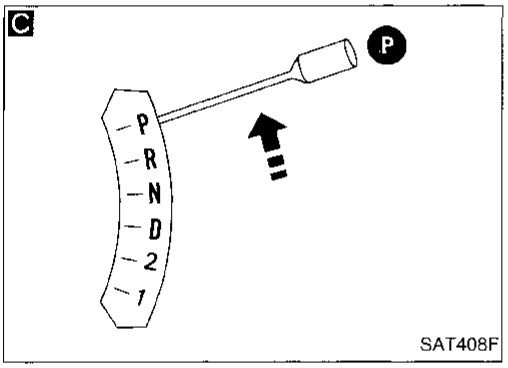
SAT412F

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

Yes → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "2. Engine Cannot Be Started In "P" and "N" Position", AT-114. Continue ROAD TEST.

No ↓

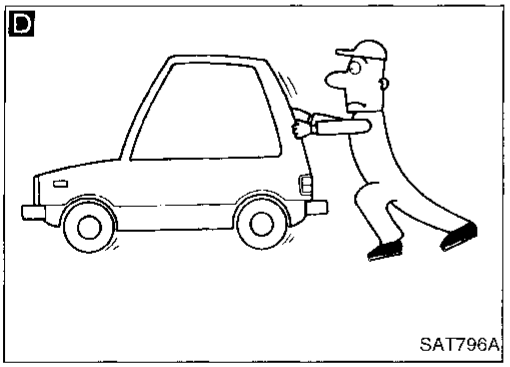
C



SAT408F

1. Move selector lever to "P" position.
2. Turn ignition switch to OFF position.
3. Release parking brake. ↓

D

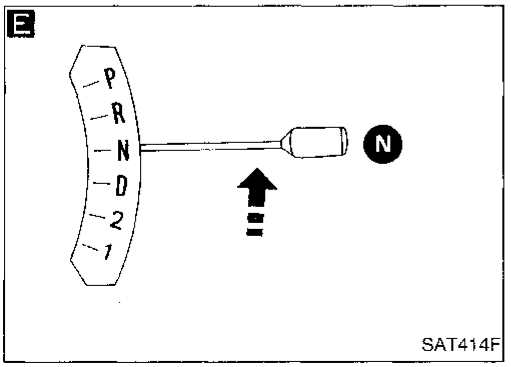

SAT796A

1. Push vehicle forward or backward.
2. Does vehicle move when it is pushed forward or backward?
3. Apply parking brake.

Yes → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed", AT-114. Continue ROAD TEST.

No ↓

E



SAT414F

1. Start engine.
2. Move selector lever to "N" position.
3. Release parking brake.
4. Does vehicle move forward or backward?

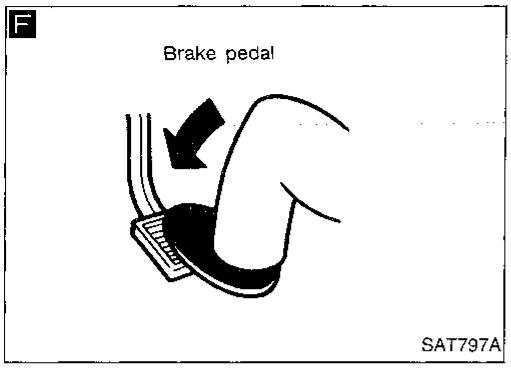
Yes → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "4. In "N" Position, Vehicle Moves", AT-115. Continue ROAD TEST.

No ↓

Ⓐ
(Go to next page.)

## Road Test (Cont'd)

F




Ⓐ

F

Apply foot brake.

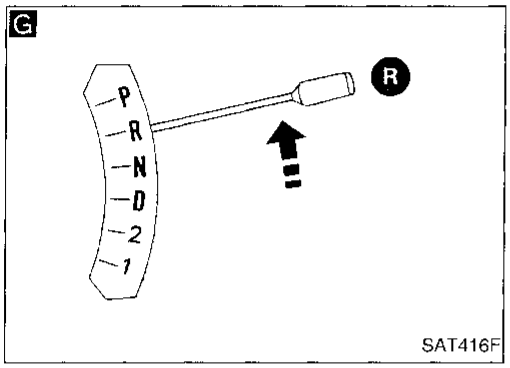
G

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

Yes → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "5. Large Shock. "N" → "R" Position", AT-116.
Continue ROAD TEST.

No

G



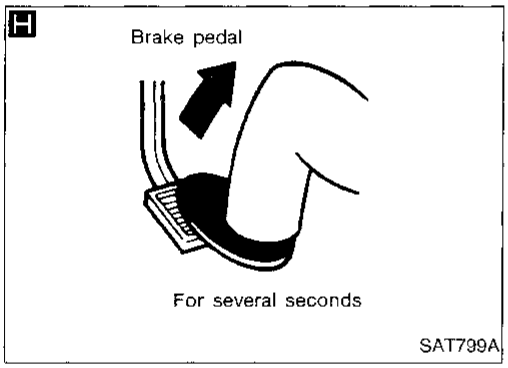

H

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

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "6. Vehicle Does Not Creep Backward In "R" Position", AT-117.
Continue ROAD TEST.

Yes

H




I

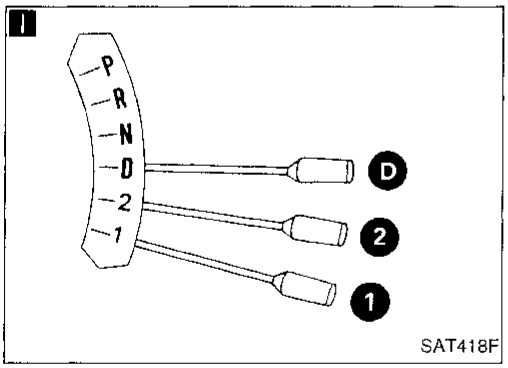
1. Move selector lever to "D", "2" and "1" positions and check if vehicle creeps forward.
2. Does vehicle creep forward in all three positions?

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "7. Vehicle Does Not Creep Forward In "D", "2" or "1" Position", AT-118.
Continue ROAD TEST.

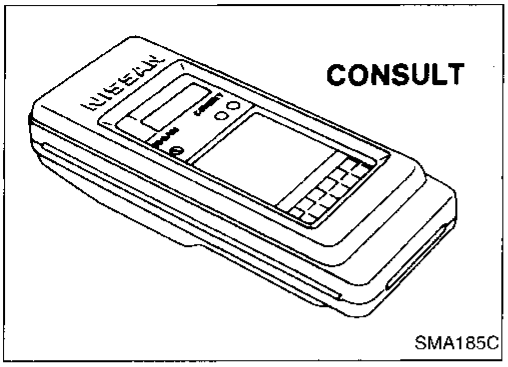
Yes

Go to "3. Cruise Test", AT-45.

I



## Road Test (Cont'd)



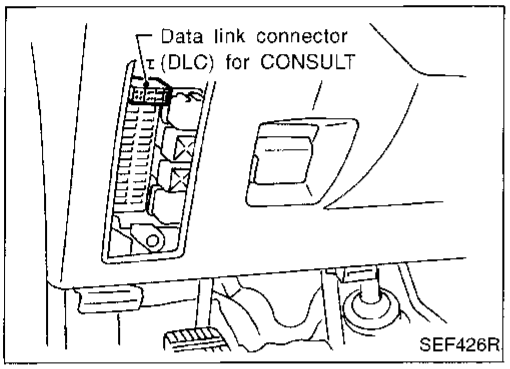
SMA185C

### 3. CRUISE TEST

- Check all items listed in Parts 1 through 3.

**With CONSULT**

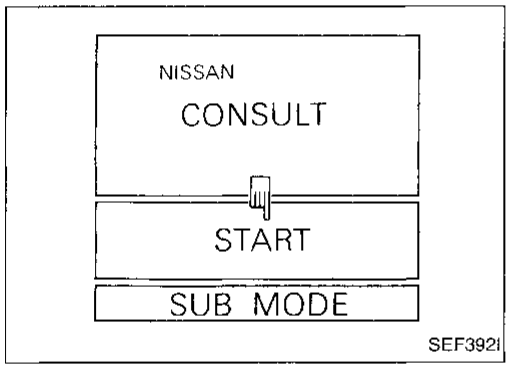
- Using CONSULT, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per "Shift Schedule".



SEF426R

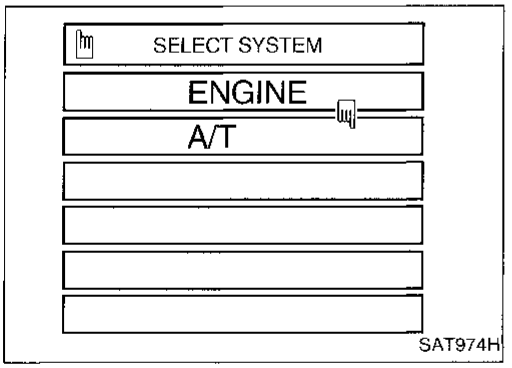
### CONSULT setting procedure

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



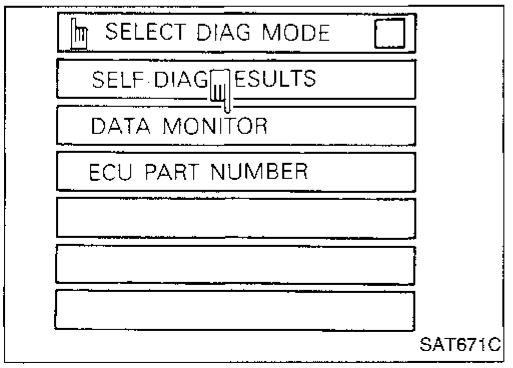
SEF392I

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



SAT974H

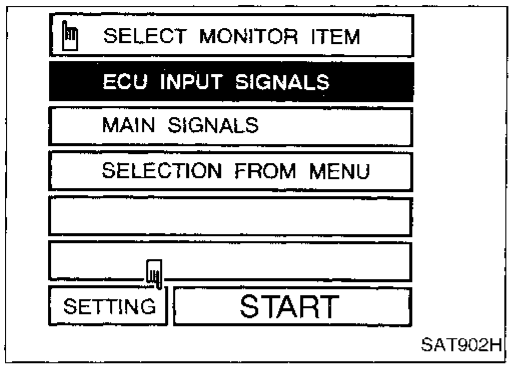
5. Touch "A/T".



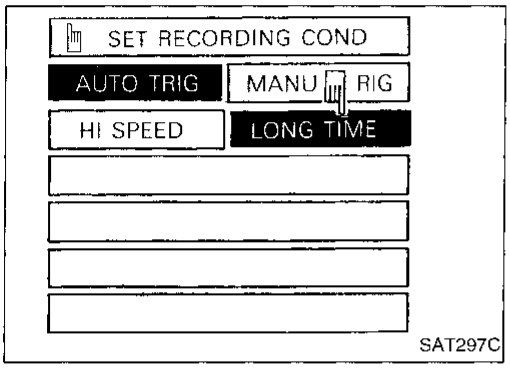
SAT671C

6. Touch "DATA MONITOR".

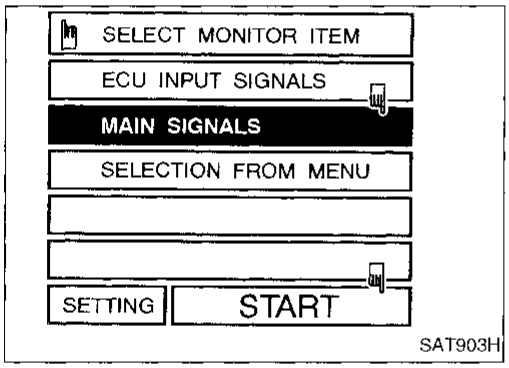
## Road Test (Cont'd)



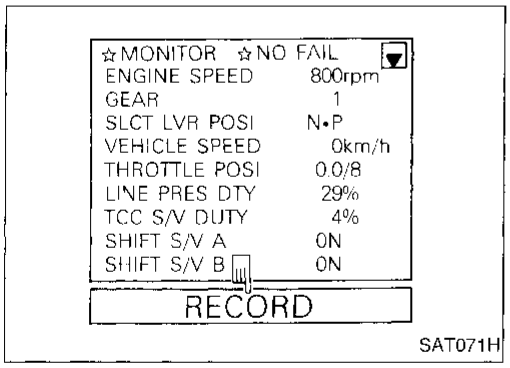

7. Touch "SETTING" to set recording condition.



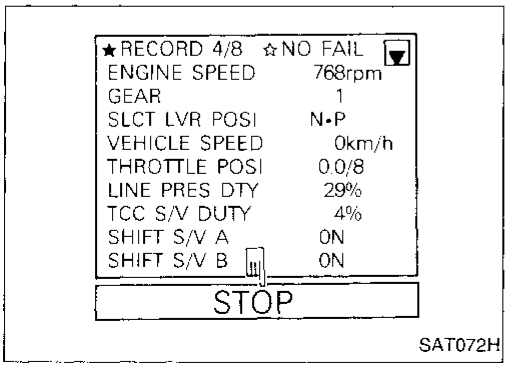

8. Touch "LONG TIME" and "ENTER" key.




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



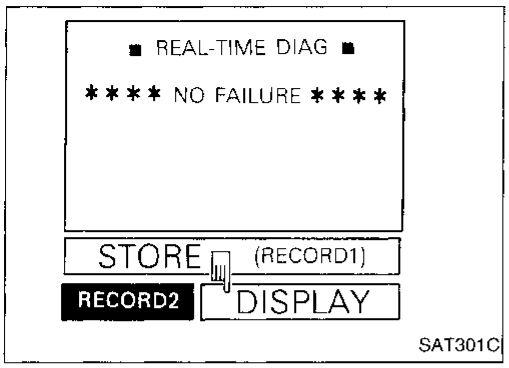

11. When performing cruise test, touch "RECORD".



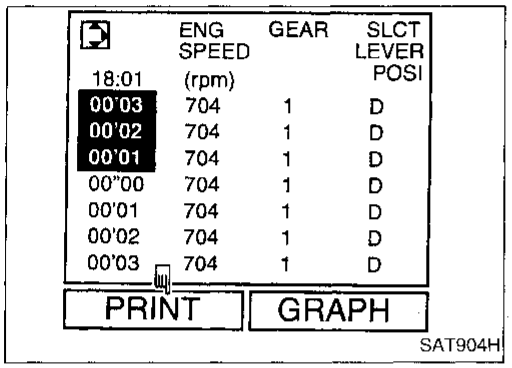

12. After finishing cruise test part 1, touch "STOP".

## Road Test (Cont'd)

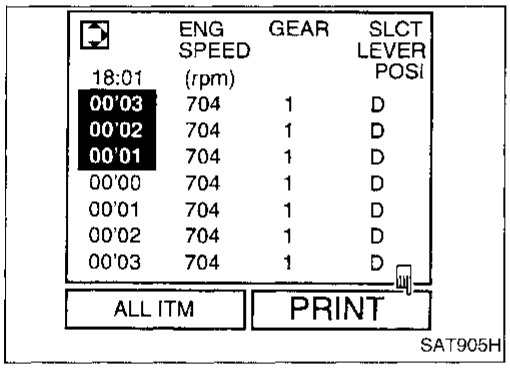
13. Touch "DISPLAY".



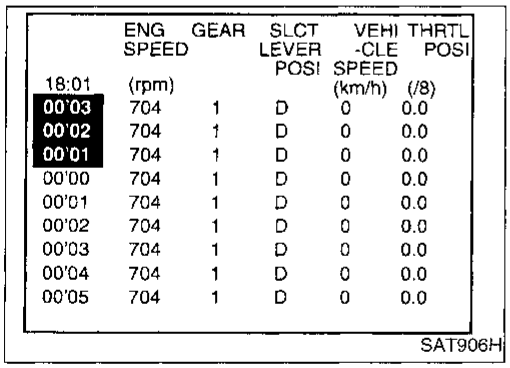

14. Touch "PRINT".




15. Touch "PRINT".

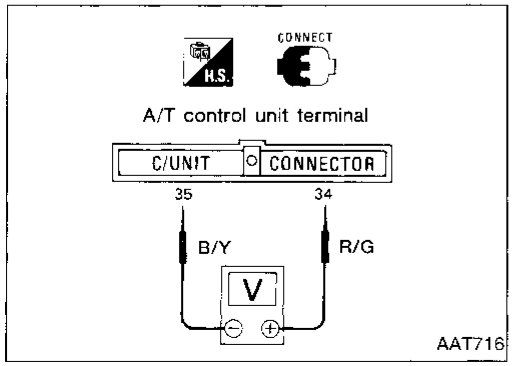



16. Check the monitor data printed out.
17. Continue cruise test part 2 and 3.



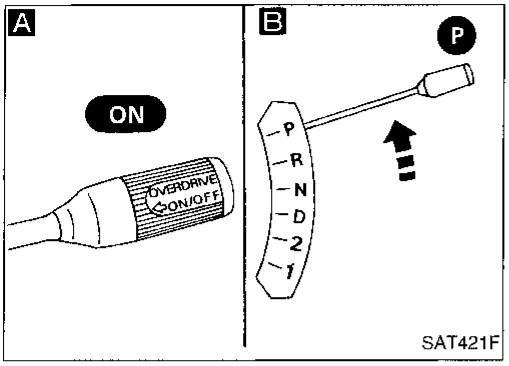

### Without CONSULT

- Throttle position can be checked by voltage across terminals ㉞ and ㉟ of A/T control unit.



## Road Test (Cont'd)

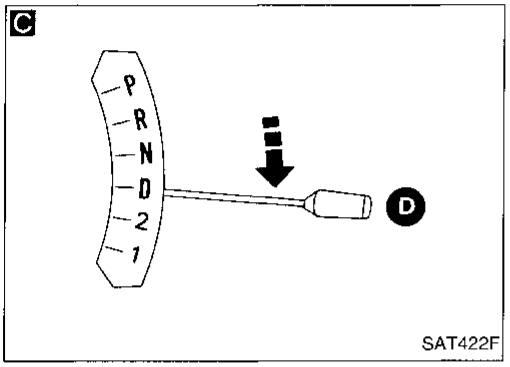
### CRUISE TEST — PART 1




1. Drive vehicle for about 10 minutes until engine oil and ATF reach operating temperature.
   **ATF operating temperature:**
   **50 - 80°C (122 - 176°F)**

A B

1. Park vehicle on flat surface.
2. Set overdrive control switch to ON position.
3. Move selector lever to "P" position.
4. Start engine.

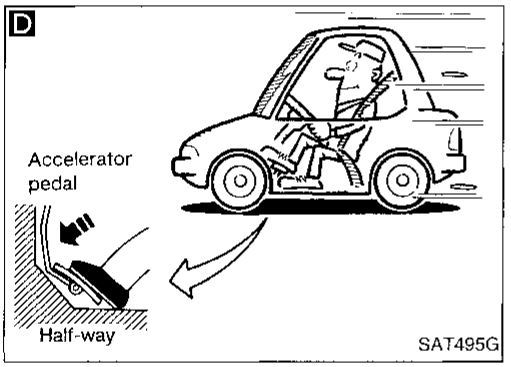



C

Move selector lever to "D" position.

D

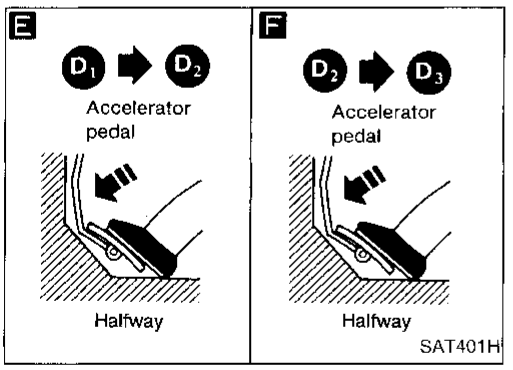
Accelerate vehicle by slowly and constantly depressing accelerator pedal halfway.




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

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "8. Vehicle Cannot Be Started From $D_1$", AT-119. Continue ROAD TEST.

Yes




E

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-52.**

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-120. Continue ROAD TEST.

Yes

F

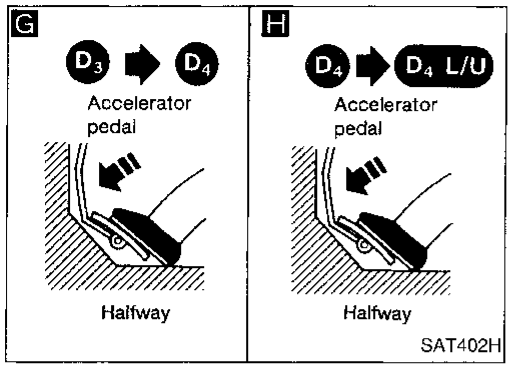
Does A/T shift from $D_2$ to $D_3$ at the specified speed?
**Read gear position, throttle position and vehicle speed.**
**Specified speed when shifting from $D_2$ to $D_3$:**
**Refer to Shift Schedule, AT-52.**

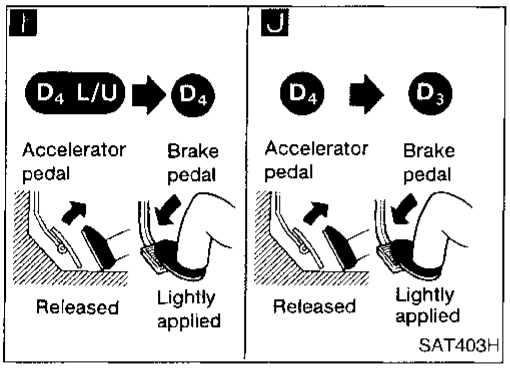
No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "10. A/T Does Not Shift: $D_2 \rightarrow D_3$", AT-121. Continue ROAD TEST.

Yes

Ⓐ
(Go to next page.)

## Road Test (Cont'd)




Ⓐ

**G**

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

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

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

**Refer to Shift Schedule, AT-52.**

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "11. A/T Does Not Shift: $D_3$ → $D_4$", AT-122.
Continue ROAD TEST.

Yes

**H**

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

**Read vehicle speed, throttle position when torque converter clutch solenoid valve duty becomes 94%.**

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

**Refer to Shift Schedule, AT-52.**

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "12. A/T Does Not Perform Lock-up", AT-123.
Continue ROAD TEST.

Yes

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

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "13. A/T Does Not Hold Lock-up Condition", AT-124.
Continue ROAD TEST.

Yes

**I**

1. Release accelerator pedal and lightly apply foot brake.
2. Is lock-up released when accelerator pedal is released and foot brake is applied?

**Read torque converter clutch solenoid valve duty 94% → 4%.**

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "14. Lock-up Is Not Released", AT-124.
Continue ROAD TEST.

Yes

**J**

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.**

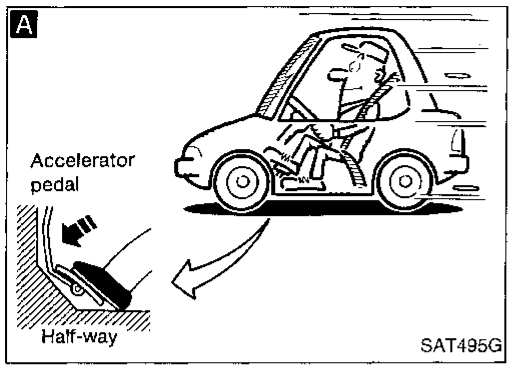
No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "15. Engine Speed Does Not Return To Idle (Light Braking $D_4$ → $D_3$)", AT-125.
Continue ROAD TEST.

Yes

1. Stop vehicle.
2. Go to "Cruise Test — Part 2", AT-50.

## Road Test (Cont'd)

### CRUISE TEST — PART 2




1. Confirm overdrive control switch is in ON position.
2. Confirm selector lever is in "D" position.

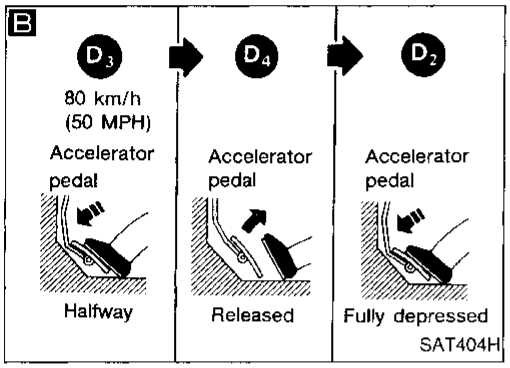
A

1. Accelerate vehicle by half throttle again.
2. Does vehicle start from $D_1$?

**Read gear position.**

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "16. Vehicle Does Not Start From $D_1$" AT-126.
Continue ROAD TEST.

Yes



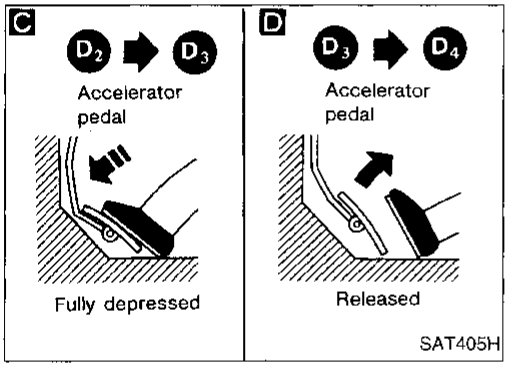

B

1. Accelerate vehicle to 80 km/h (50 MPH).
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.**

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-120.
Continue ROAD TEST.

Yes




C

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-52.**

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" AT-121.
Continue ROAD TEST.

Yes

D

1. Release accelerator pedal after shifting from $D_2$ to $D_3$.
2. 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.**

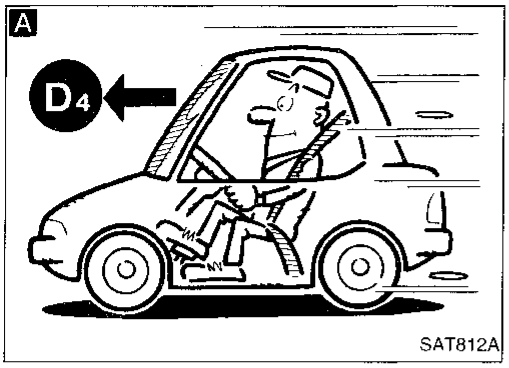
No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "11. A/T Does Not Shift: $D_3 \rightarrow D_4$", AT-122.
Continue ROAD TEST.

Yes

1. Stop vehicle.
2. Go to "Cruise Test — Part 3", AT-51.

## Road Test (Cont'd)

### CRUISE TEST — PART 3




1. Confirm overdrive control switch is in ON position.
2. Confirm selector lever is in "D" position.

A

Accelerate vehicle using half-throttle to $D_4$.

B

Release accelerator pedal.

C

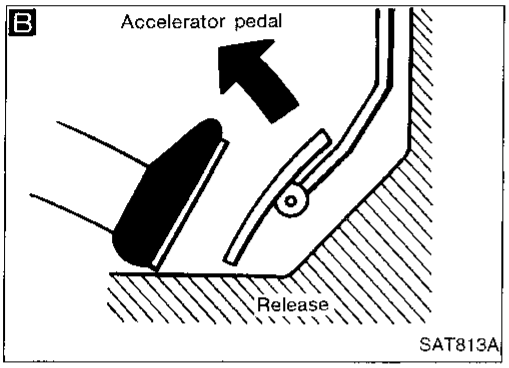
Set overdrive control switch to OFF position while driving in $D_4$.

D

Does A/T shift from $D_4$ to $D_3$ (O/D OFF)?
**Read gear position and vehicle speed.**

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch ON → OFF", AT-126. Continue ROAD TEST.

Yes

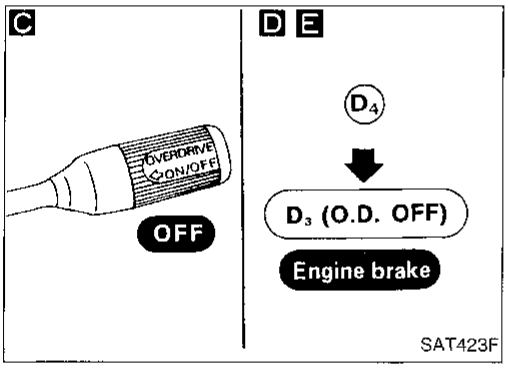



E

Does vehicle decelerate by engine brake?

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-125. Continue ROAD TEST.

Yes




F

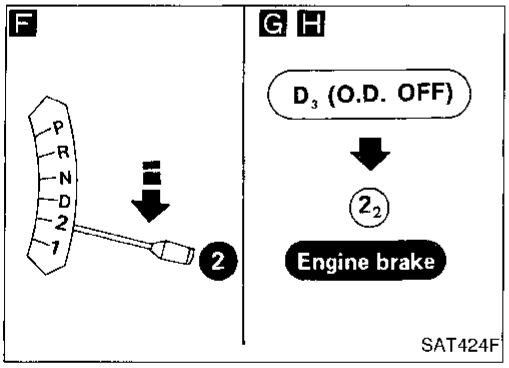
Move selector lever from "D" to "2" position while driving in $D_3$ (O/D OFF).

G

Does A/T shift from $D_3$ (O/D OFF) to $2_2$?
**Read gear position.**

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "18. A/T Does Not Shift $D_3 \rightarrow 2_2$, When Selector Lever "D" → "2" Position", AT-127. Continue ROAD TEST.

Yes

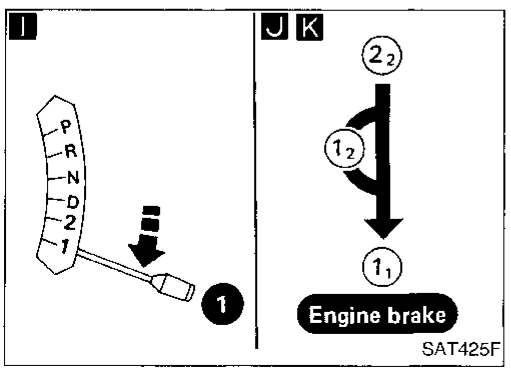



H

Does vehicle decelerate by engine brake?

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-125. Continue ROAD TEST.

Yes




I J

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

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "19. A/T Does Not Shift $2_2 \rightarrow 1_1$, When Selector Lever "2" → "1" Position", AT-127. Continue ROAD TEST.

Yes

K

Does vehicle decelerate by engine brake?

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-38 to perform "20. Vehicle Does Not Decelerate By Engine Brake", AT-128. Continue ROAD TEST.

Yes

1. Stop vehicle.
2. Perform self-diagnosis. — Refer to SELF-DIAGNOSTIC PROCEDURE, AT-26.

# Shift Schedule

## VEHICLE SPEED WHEN SHIFTING GEARS

| Throttle position | Shift pattern | Vehicle speed km/h (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | $D_1 \rightarrow D_2$ | $D_2 \rightarrow D_3$ | $D_3 \rightarrow D_4$ | $D_4 \rightarrow D_3$ | $D_3 \rightarrow D_2$ | $D_2 \rightarrow D_1$ | $1_2 \rightarrow 1_1$ |
| Full throttle | Comfort | 56 - 64 (35 - 40) | 100 - 108 (62 - 67) | 166 - 174 (103 - 108) | 158 - 166 (98 - 103) | 90 - 98 (56 - 61) | 42 - 50 (26 - 31) | 42 - 50 (26 - 31) |
| Half throttle | Comfort | 36 - 44 (22 - 27) | 63 - 71 (39 - 44) | 101 - 109 (63 - 68) | 65 - 73 (40 - 45) | 36 - 44 (22 - 27) | 8 - 16 (5 - 10) | 42 - 50 (26 - 31) |

## VEHICLE SPEED WHEN PERFORMING LOCK-UP

| Throttle position | Shift pattern | Overdrive control switch | Gear position | Vehicle speed km/h (MPH) | |
|---|---|---|---|---|---|
| | | | | Lock-up ON | Lock-up OFF |
| 2/8 | Comfort | ON | $D_4$ | 66 - 74 (41 - 46) | 63 - 71 (39 - 44) |
| | | OFF | $D_3$ | 86 - 94 (53 - 58) | 83 - 91 (52 - 57) |

NOTES

## Diagnostic Trouble Code (DTC) Chart

### A/T RELATED ITEMS

| Diagnostic trouble code No.*4 | | Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode) | Malfunction is detected when ... |
|---|---|---|---|
| CONSULT GST | ECM*3 | | |
| P0705 | 1101 | Inhibitor switch circuit (INHIBITOR SWITCH) | • A/T control unit does not receive the correct voltage signal from the switch based on the gear position. |
| P0710 | 1208 | A/T fluid temperature sensor (FLUID TEMP SENSOR) | • A/T control unit receives an excessively low or high voltage from the sensor. |
| P0720 | 1102 | Revolution sensor (VHCL SPEED SEN·A/T) | • A/T control unit does not receive the proper voltage signal from the sensor. |
| P0725 | 1207 | Engine speed signal (ENGINE SPEED SIG) | • A/T control unit does not receive the proper voltage signal from the ECM. |
| P0731 | 1103 | Improper shifting to 1st gear position (A/T 1ST SIGNAL) | • A/T cannot be shifted to the 1st gear position even if electrical circuit is good. |
| P0732 | 1104 | Improper shifting to 2nd gear position (A/T 2ND SIGNAL) | • A/T cannot be shifted to the 2nd gear position even if electrical circuit is good. |
| P0733 | 1105 | Improper shifting to 3rd gear position (A/T 3RD SIGNAL) | • A/T cannot be shifted to the 3rd gear position even if electrical circuit is good. |
| P0734 | 1106 | Improper shifting to 4th gear position (A/T 4TH SIG OR TCC*5) | • A/T cannot be shifted to the 4th gear position even if electrical circuit is good. |
| P0740 | 1204 | T/C clutch solenoid valve (TOR CONV CLUTCH SV) | • A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve. |
| P0744 | 1107 | Improper lock-up operation (A/T TCC SIGNAL) | • A/T cannot perform lock-up even if electrical circuit is good. |
| P0745 | 1205 | Line pressure solenoid valve (LINE PRESSURE S/V) | • A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve. |
| P0750 | 1108 | Shift solenoid valve A (SHIFT SOLENOID/V A) | • A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve. |
| P0755 | 1201 | Shift solenoid valve B (SHIFT SOLENOID/V B) | • A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve. |
| P1705 | 1206 | Throttle position sensor (THRTL POSI SEN·A/T) | • A/T control unit receives an excessively low or high voltage from the sensor. |
| P1760 | 1203 | Overrun clutch solenoid valve (OVERRUN CLUTCH S/V) | • A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve. |

*1: DRIVING pattern 1-6 means as follows:
Pattern 1 should meet b and c.
Pattern 2 should meet a and c.
Pattern 3 should meet a through e.
Pattern 4 should meet a and b.
Pattern 5 should meet a through c.
Pattern 6 should meet a through d.

*3: In Diagnostic Test Mode II (Self-diagnostic results)

*4: 1st trip DTC No. is the same as DTC No.

*5: DTC P0734 is applied to A/T 4th signal only even the CONSULT screen shows "A/T 4TH SIG OR TCC".

a: Selector lever is in "D" position.
b: Vehicle speed is over 10 km/h (6 MPH).
c: Throttle opening is over 1/8.
d: Engine speed is over 450 rpm.
e: A/T fluid temperature is 20 - 120°C (68 - 248°F).

## Diagnostic Trouble Code (DTC) Chart (Cont'd)

X: Applicable
—: Not applicable

| Check Items (Possible Cause) | DTC *1 Confirmation Procedure Quick Ref. | *2 "OVERALL FUNCTION CHECK" Quick Ref. | Fail Safe System | MIL Illumination | Reference Page |
|---|---|---|---|---|---|
| ● Harness or connectors (The switch circuit is open or shorted.)<br>● Inhibitor switch | DRIVING (pattern 1) | — | — | 2 trip | AT-63 |
| ● Harness or connectors (The sensor circuit is open or shorted.)<br>● Fluid temperature sensor | DRIVING (pattern 6) | — | X | 2 trip | AT-68 |
| ● Harness or connectors (The sensor circuit is open or shorted.)<br>● Revolution sensor | DRIVING (pattern 2) | — | X*8 | 2 trip*3 | AT-71 |
| ● Harness or connectors (The signal circuit is open or shorted.) | DRIVING (pattern 5) | — | X*8 | 2 trip*3 | AT-73 |
| ● Shift solenoid valve A<br>● Shift solenoid valve B<br>● Overrun clutch solenoid valve<br>● Line pressure solenoid valve<br>● Each clutch<br>● Hydraulic control circuit | DRIVING (pattern 3) | — | — | 2 trip | AT-75<br>AT-78<br>AT-81<br>AT-84 |
| ● Harness or connectors (The solenoid circuit is open or shorted.)<br>● T/C clutch solenoid valve | IGN: ON | — | X | 2 trip | AT-89 |
| ● T/C clutch solenoid valve<br>● Each clutch<br>● Hydraulic control circuit | DRIVING (pattern 3) | — | — | 2 trip | AT-92 |
| ● Harness or connectors (The solenoid circuit is open or shorted.)<br>● Line pressure solenoid valve | IGN: ON | — | X | 2 trip | AT-97 |
| ● Harness or connectors (The solenoid circuit is open or shorted.)<br>● Shift solenoid valve A | IGN: ON | — | X*7 | 1 trip | AT-100 |
| ● Harness or connectors (The solenoid circuit is open or shorted.)<br>● Shift solenoid valve B | IGN: ON | — | X*7 | 1 trip | AT-103 |
| ● Harness or connectors (The sensor circuit is open or shorted.)<br>● Throttle position sensor<br>● Throttle position switch | IGN: ON | — | X*7 | 1 trip | AT-106 |
| ● Harness or connectors (The solenoid circuit is open or shorted.)<br>● Overrun clutch solenoid valve | IGN: ON | — | X | 2 trip | AT-108 |

*1: ● This is Quick Reference of "DTC CONFIRMATION PROCEDURE".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: ● The "OVERALL FUNCTION CHECK" is a simplified and effective way to inspect a component or circuit.
In some cases, the "OVERALL FUNCTION CHECK" is used rather than a "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE".
When no DTC CONFIRMATION PROCEDURE is available, the "NG" result of the OVERALL FUNCTION CHECK can be consided to mean the same as a DTC detection.
● During an "NG" OVERALL FUNCTION CHECK, the DTC or 1st trip DTC might not be confirmed.
● This is Quick Reference of "OVERALL FUNCTION CHECK".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*7: ● When the fail-safe operation occurs, the MIL illuminates immediately.

*8: ● The MIL illuminates after A/T control unit enters the fail-safe mode in two consecutive trips, if both the "Revolution sensor" and the "Engine speed signal" meet the fail-safe condition at the same time.

# Symptom Chart

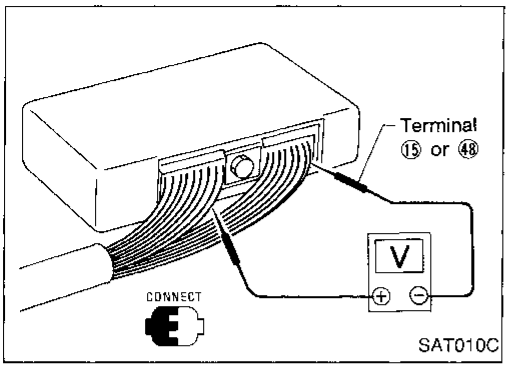
| Reference page (AT- ) | Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transaxle must be removed from the vehicle. | ON vehicle | | | | | | | | | | OFF vehicle | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Reference page (AT- ) | 41, 142 | 63 | 71, 111, 73 | 97 | 140, 100 | 103, 97 | 89, 108 | 68, 140 | 140 | 150, 166 | 184, 187 | 191, 200 | 191, 157 | 197, 209 | — |
| | | Fluid level / Control cable | Inhibitor switch / Throttle position sensor (Adjustment) | Revolution sensor and vehicle speed sensor / Engine speed signal | Engine idling rpm / Line pressure | Control valve assembly / Shift solenoid valve A | Shift solenoid valve B / Line pressure solenoid valve | Torque converter clutch solenoid valve / Overrun clutch solenoid valve | A/T fluid temperature sensor / Accumulator N-D | Accumulator servo release / Ignition switch and starter | Torque converter / Oil pump | Reverse clutch / High clutch | Forward clutch / Forward one-way clutch | Overrun clutch / Low one-way clutch | Low & reverse brake / Brake band | Parking components |
| 114 | Engine does not start in "N", "P" positions. | 2 | 3 | | | | | | | 1 | | | | | | |
| 114 | Engine starts in positions other than "N" and "P". | 1 | 2 | | | | | | | | | | | | | |
| — | Transaxle noise in "P" and "N" positions. | 1 | 3 | 4 5 | 2 | | | | | | ⑦ ⑥ | | | | | |
| 114 | Vehicle moves when changing into "P" position or parking gear does not disengage when shifted out of "P" position. | 1 | | | | | | | | | | | | | | ② |
| 115 | Vehicle runs in "N" position. | 1 | | | | | | | | | | ③ | ② | ④ | | |
| 117 | Vehicle will not run in "R" position (but runs in "D", "2" and "1" positions). Clutch slips. Very poor acceleration. | 1 | | | 2 | 4 | 3 | | | | | ⑤ ⑥ | ⑦ | ⑧ | ⑨ | |
| — | Vehicle braked when shifting into "R" position. | 1 2 | | | 3 | 5 | 4 | | | | | ⑥ | ⑧ | ⑨ | ⑦ | |
| — | Sharp shock in shifting from "N" to "D" position. | | 2 | 5 | 1 3 | 7 | 6 | | 4 8 | | | | ⑨ | | | |
| — | Vehicle will not run in "D" and "2" positions (but runs in "1" and "R" positions). | 1 | | | | | | | | | | | | ② | | |
| 118 | Vehicle will not run in "D", "1", "2" positions (but runs in "R" position). Clutch slips. Very poor acceleration. | 1 | | | 2 | 4 | 3 | | 5 | | | ⑥ ⑦ | ⑧ ⑨ | ⑩ | | |
| — | Clutches or brakes slip somewhat in starting. | 1 2 | 3 | | 4 | 6 | 5 | | 7 | | ⑫ ⑪ | ⑨ | ⑧ | | ⑩ | |
| — | Excessive creep. | | | | 1 | | | | | | | | | | | |
| 117, 118 | No creep at all. | 1 | | | 2 | 3 | | | | | ⑥ ⑤ | | ④ | | | |
| — | Failure to change gear from "$D_1$" to "$D_2$". | 2 | 1 | 5 | | 4 3 | | | | | | | | | ⑥ | |
| — | Failure to change gear from "$D_2$" to "$D_3$". | 2 | 1 | 5 | | 4 | 3 | | | | | ⑥ | | | ⑦ | |
| — | Failure to change gear from "$D_3$" to "$D_4$". | 2 | 1 | 4 | | 3 | | | 5 | | | | | | ⑥ | |
| 120, 121, 122 | Too high a gear change point from "$D_1$" to "$D_2$", from "$D_2$" to "$D_3$", from "$D_3$" to "$D_4$". | | 1 | 2 | | 3 | 4 | | | | | | | | | |
| — | Gear change directly from "$D_1$" to "$D_3$" occurs. | 1 | | | | | | | | 2 | | | | | ③ | |
| — | Engine stops when shifting lever into "R", "D", "2" and "1". | | | | 1 | 3 | | 2 | | | ④ | | | | | |
| — | Too sharp a shock in change from "$D_1$" to "$D_2$". | | 1 | | 2 | 4 | | | 5 | 3 | | | | | ⑥ | |
| — | Too sharp a shock in change from "$D_2$" to "$D_3$". | | 1 | | 2 | 3 | | | | | | ④ | | | ⑤ | |

## Symptom Chart (Cont'd)

| | | ON vehicle | | | | | | | | | OFF vehicle | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reference page (AT- ) | | 41, 142 | 63 | 71, 111, 73, | 97 | 140, 100 | 103, 97 | 89, 108 | 68, 140 | 140 | 150, 166 | 184, 187 | 191, 200 | 191, 157 | 197, 209 | — |
| Reference page (AT- ) | Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transaxle must be removed from the vehicle. | Fluid level<br>Control cable | Inhibitor switch<br>Throttle position sensor (Adjustment) | Revolution sensor and vehicle speed sensor<br>Engine speed signal | Engine idling rpm<br>Line pressure | Control valve assembly<br>Shift solenoid valve A | Shift solenoid valve B<br>Line pressure solenoid valve | Torque converter clutch solenoid valve<br>Overrun clutch solenoid valve | A/T fluid temperature sensor<br>Accumulator N-D | Accumulator servo release<br>Ignition switch and starter | Torque converter<br>Oil pump | Reverse clutch<br>High clutch | Forward clutch<br>Forward one-way clutch | Overrun clutch<br>Low one-way clutch | Low & reverse brake<br>Brake band | Parking components |
| — | Too sharp a shock in change from "$D_3$" to "$D_4$". | . . | . 1 | . . | . 2 | 3 . | . . | . . | . . | . . | . . | . . | . . | ⑤ . | . ④ | . |
| — | Almost no shock or clutches slipping in change from "$D_1$" to "$D_2$". | 1 . | . 2 | . . | . 3 | 5 . | . . | . . | . . | 4 . | . . | . . | . . | . . | . ⑥ | . |
| — | Almost no shock or slipping in change from "$D_2$" to "$D_3$". | 1 . | . 2 | . . | . 3 | 4 . | . . | . . | . . | . . | . . | . ⑤ | . . | . . | . ⑥ | . |
| — | Almost no shock or slipping in change from "$D_3$" to "$D_4$". | 1 . | . 2 | . . | . 3 | 4 . | . . | . . | . . | . . | . . | . ⑤ | . . | . . | . ⑥ | . |
| — | Vehicle braked by gear change from "$D_1$" to "$D_2$". | 1 . | . . | . . | . . | . . | . . | . . | . . | . . | . . | ② ④ | . . | . ⑤ | ③ . | . |
| — | Vehicle braked by gear change from "$D_2$" to "$D_3$". | 1 . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . ② | . |
| — | Vehicle braked by gear change from "$D_3$" to "$D_4$". | 1 . | . . | . . | . . | . . | . . | . . | . . | . . | . . | ④ . | . ③ | ② . | . . | . |
| — | Maximum speed not attained. Acceleration poor. | 1 . | 2 . | . . | . . | 5 3 | 4 . | . . | . . | . . | ⑪ ⑩ | ⑥ ⑦ | . . | . . | ⑨ ⑧ | . |
| — | Failure to change gear from "$D_4$" to "$D_3$". | 1 . | . 2 | . . | . . | 6 4 | . 5 | . 3 | . . | . . | . . | . . | . . | ⑧ . | ⑦ . | . |
| — | Failure to change gear from "$D_3$" to "$D_2$" or from "$D_4$" to "$D_2$". | 1 . | . 2 | . . | . . | 5 3 | 4 . | . . | . . | . . | . . | . ⑥ | . . | . . | . ⑦ | . |
| — | Failure to change gear from "$D_2$" to "$D_1$" or from "$D_3$" to "$D_1$". | 1 . | . 2 | . . | . . | 5 3 | 4 . | . . | . . | . . | . . | . ⑦ | . . | . ⑥ | . ⑧ | . |
| — | Gear change shock felt during deceleration by releasing accelerator pedal. | . . | . 1 | . . | . 2 | 4 . | . . | . 3 | . . | . . | . . | . . | . . | . . | . . | . |
| — | Too high a change point from "$D_4$" to "$D_3$", from "$D_3$" to "$D_2$", from "$D_2$" to "$D_1$". | . . | . 1 | 2 . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . |
| — | Kickdown does not operate when depressing pedal in "$D_4$" within kickdown vehicle speed. | . . | . 1 | 2 . | . . | . 3 | 4 . | . . | . . | . . | . . | . . | . . | . . | . . | . |
| — | Kickdown operates or engine overruns when depressing pedal in "$D_4$" beyond kickdown vehicle speed limit. | . . | . 2 | 1 . | . . | . 3 | 4 . | . . | . . | . . | . . | . . | . . | . . | . . | . |
| — | Races extremely fast or slips in changing from "$D_4$" to "$D_3$" when depressing pedal. | 1 . | . 2 | . . | . 3 | 5 . | . 4 | . . | . . | . . | . . | . ⑥ | ⑦ . | . . | . . | . |
| — | Races extremely fast or slips in changing from "$D_4$" to "$D_2$" when depressing pedal. | 1 . | . 2 | . . | . 3 | 6 5 | . 4 | . . | . . | . . | . . | . . | ⑧ . | . . | . ⑦ | . |
| — | Races extremely fast or slips in changing from "$D_3$" to "$D_2$" when depressing pedal. | 1 . | . 2 | . . | . 3 | 5 . | . 4 | . . | 6 . | . . | . . | . ⑨ | ⑧ . | . . | . ⑦ | . |
| — | Races extremely fast or slips in changing from "$D_4$" or "$D_3$" to "$D_1$" when depressing pedal. | 1 . | . 2 | . . | . 3 | 5 . | . 4 | . . | . . | . . | . . | . . | ⑥ ⑦ | . ⑧ | . . | . |
| — | Vehicle will not run in any position. | 1 2 | . . | . . | . 3 | . . | . 4 | . . | . . | . . | ⑨ ⑤ | . ⑥ | . . | . . | ⑧ ⑦ | ⑩ |
| — | Transaxle noise in "D", "2", "1" and "R" positions. | 1 . | . . | . . | . . | . . | . . | . . | . . | . . | ② . | . . | . . | . . | . . | . |

## Symptom Chart (Cont'd)

| | | ON vehicle | | | | | | | | | | OFF vehicle | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reference page (AT- ) | | 41, 142 | 63 | 71, 111, 73, | 97 | 140, 100 | 103, 97 | 89, 108 | 68, 140 | 140 | 150, 166 | 184, 187 | 191, 200 | 191, 157 | 197, 209 | — |
| Reference page (AT- ) | Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transaxle must be removed from the vehicle. | Fluid level / Control cable | Inhibitor switch / Throttle position sensor (Adjustment) | Revolution sensor and vehicle speed sensor / Engine speed signal | Engine idling rpm / Line pressure | Control valve assembly / Shift solenoid valve A | Shift solenoid valve B / Line pressure solenoid valve | Torque converter clutch solenoid valve / Overrun clutch solenoid valve | A/T fluid temperature sensor / Accumulator N-D | Accumulator servo release / Ignition switch and starter | Torque converter / Oil pump | Reverse clutch / High clutch | Forward clutch / Forward one-way clutch | Overrun clutch / Low one-way clutch | Low & reverse brake / Brake band | Parking components |
| 127 | Failure to change from "$D_3$" to "$2_2$" when changing lever into "2" position. | . 7 | 1 2 | . . | . . | 6 5 | 4 . | . 3 | . . | . . | . . | . . | . . | ⑨ . | . ⑧ | . |
| — | Gear change from "$2_2$" to "$2_3$" in "2" position. | . . | 1 . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . |
| 127 | Engine brake does not operate in "1" position. | . 2 | 1 3 | 4 . | . . | 6 5 | . . | . 7 | . . | . . | . . | . . | . . | ⑧ . | ⑨ . | . |
| — | Gear change from "$1_1$" to "$1_2$" in "1" position. | . 2 | 1 . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . . | . |
| — | Does not change from "$1_2$" to "$1_1$" in "1" position. | . . | 1 . | 2 . | . . | 4 3 | . . | . 5 | . . | . . | . . | . . | . . | ⑥ . | ⑦ . | . |
| — | Large shock changing from "$1_2$" to "$1_1$" in "1" position. | . . | . . | . . | . . | 1 . | . . | . . | . . | . . | . . | . . | . . | . . | ② . | . |
| — | Transaxle overheats. | 1 . | . 3 | . . | 2 4 | 6 . | . 5 | . . | . . | . . | ⑭ ⑦ | ⑧ ⑨ | ⑪ . | ⑫ . | ⑬ ⑩ | . |
| — | ATF shoots out during operation. White smoke emitted from exhaust pipe during operation. | 1 . | . . | . . | . . | . . | . . | . . | . . | . . | . . | ② ③ | ⑤ . | ⑥ . | ⑦ ④ | . |
| — | Offensive smell at fluid charging pipe. | 1 . | . . | . . | . . | . . | . . | . . | . . | . . | ② ③ | ④ ⑤ | ⑦ . | ⑧ . | ⑨ ⑥ | . |
| — | Torque converter is not locked up. | . . | 3 1 | 2 4 | . 6 | 8 . | . . | 7 . | 5 . | . . | ⑨ . | . . | . . | . . | . . | . |
| — | Torque converter clutch piston slip. | 1 . | . 2 | . . | . 3 | 6 . | . 5 | 4 . | . . | . . | ⑦ . | . . | . . | . . | . . | . |
| 123 | Lock-up point is extremely high or low. | . . | . 1 | 2 . | . . | 4 . | . . | 3 . | . . | . . | . . | . . | . . | . . | . . | . |
| — | A/T does not shift to "$D_4$" when driving with overdrive control switch ON. | . . | 2 1 | 3 . | . 8 | 6 4 | . . | . 5 | 7 . | . . | . . | . . | . . | ⑩ . | . ⑨ | . |
| — | Engine is stopped at "R", "D", "2" and "1" positions. | 1 . | . . | . . | . . | 5 4 | 3 . | 2 . | . . | . . | . . | . . | . . | . . | . . | . |

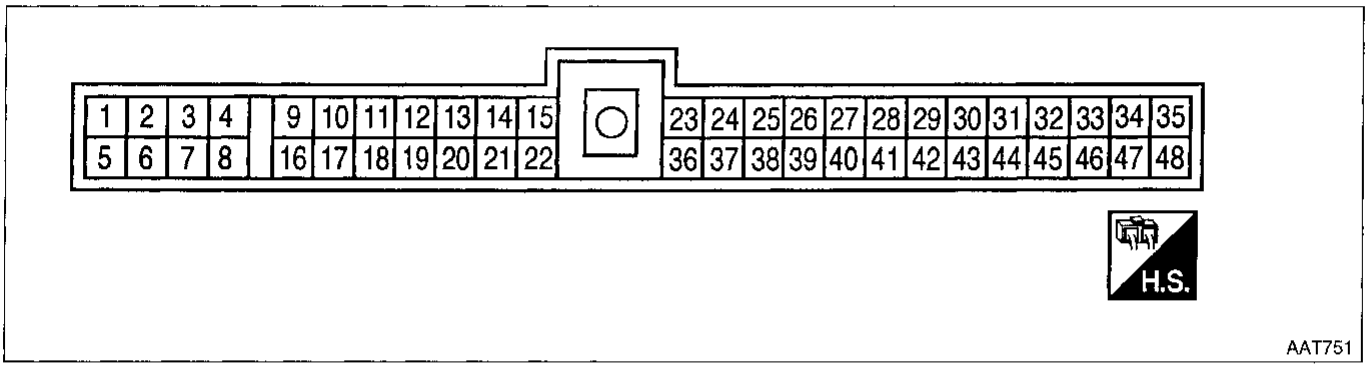



## A/T Control Unit Terminals and Reference Values

### PREPARATION

- Measure voltage between each terminal and terminal ⑮ or ㊽ by following "A/T CONTROL UNIT INSPECTION TABLE".

### A/T CONTROL UNIT HARNESS CONNECTOR TERMINAL LAYOUT




### A/T CONTROL UNIT INSPECTION TABLE

**(Data are reference values.)**

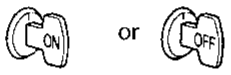
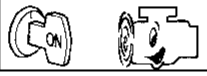
| Terminal No. | Item | Condition | | Judgement standard |
|---|---|---|---|---|
| 1 | Line pressure solenoid valve | | When releasing accelerator pedal after warming up engine. | 1.5 - 2.5V |
| | | | When depressing accelerator pedal fully after warming up engine. | 0.5V or less |
| 2 | Line pressure 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 | O/D OFF indicator lamp |  | When setting overdrive control switch in "ON" position. | Battery voltage |
| | | | When setting overdrive control switch in "OFF" position. | 1V or less |
| 4 | Power source | | When turning ignition switch to "ON". | Battery voltage |
| | | | When turning ignition switch to "OFF". | 1V or less |

## A/T Control Unit Terminals and Reference Values (Cont'd)

| Terminal No. | Item | Condition | | Judgement standard |
|---|---|---|---|---|
| 5 | Torque converter clutch solenoid valve |  | When A/T performs lock-up. | 8 - 15V |
| | | | When A/T does not perform lock-up. | 1V or less |
| 6 | 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 |
| 7 | 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 |
| 8 | Overrun clutch solenoid valve | | When overrun clutch solenoid valve operates. | Battery voltage |
| | | | When overrun clutch solenoid valve does not operate. | 1V or less |
| 9 | Power source | | Same as No. 4 | |
| 10* | DT1 | | — | — |
| 11* | DT2 | | — | — |
| 12* | DT3 | | — | — |
| 13* | "N" position signal | | When setting selector lever to "N" or "P" position. | 1V or less |
| | | | When setting selector lever to other positions. | Approximately 5V |
| 14 | 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 |
| 15 | Ground (System) | | — | — |
| 16 | Inhibitor "1" position switch |  | When setting selector lever to "1" position. | Battery voltage |
| | | | When setting selector lever to other positions. | 1V or less |
| 17 | Inhibitor "2" position switch | | When setting selector lever to "2" position. | Battery voltage |
| | | | When setting selector lever to other positions. | 1V or less |
| 18 | Inhibitor "D" position switch | | When setting selector lever to "D" position. | Battery voltage |
| | | | When setting selector lever to other positions. | 1V or less |

*: These terminals are connected to the ECM (ECCS control module) (for OBD-II).

## A/T Control Unit Terminals and Reference Values (Cont'd)

| Terminal No. | Item | Condition | | Judgement standard |
|---|---|---|---|---|
| 19 | Inhibitor "N" or "P" position switch |  | When setting selector lever to "N" or "P" position. | Battery voltage |
| | | | When setting selector lever to other positions. | 1V or less |
| 20 | Inhibitor "R" position switch | | When setting selector lever to "R" position. | Battery voltage |
| | | | When setting selector lever to other positions. | 1V or less |
| 21 | 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 |
| 22 | — | | — | — |
| 23 | Power source (Memory back-up) |  | When turning ignition switch to OFF. | Battery voltage |
| | | | When turning ignition switch to ON. | Battery voltage |
| 24 | Engine speed signal |  | When engine runs at idle speed. | 0.6 - 1.6V** |
| 25 | 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 |
| 26 | — | | — | — |
| 27 | 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 |
| 28* | — |  | — | — |
| 29* | — | | — | — |
| 30* | — | | — | — |
| 31 | Throttle position sensor (Power source) | | — | 4.5 - 5.5V |
| 32 | — | | — | — |

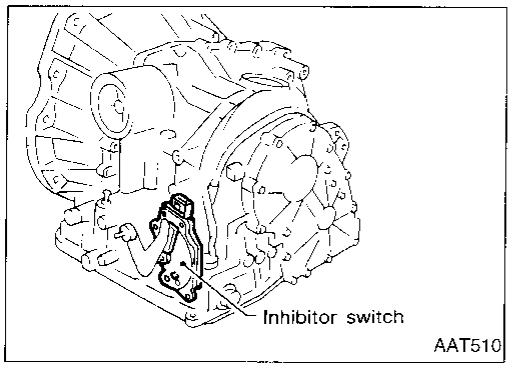
*: These terminals are connected to the Data link connector for CONSULT.

**: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope).

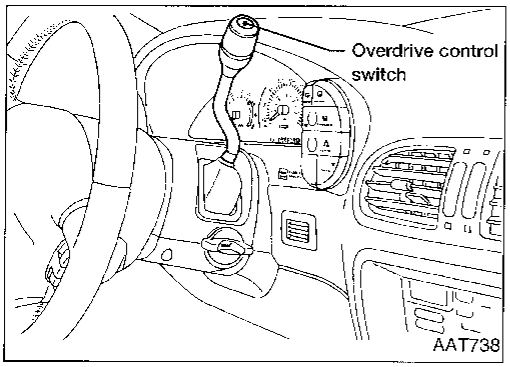
## A/T Control Unit Terminals and Reference Values (Cont'd)

| Terminal No. | Item | Condition | | Judgement standard |
|---|---|---|---|---|
| 33 | 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 |
| 34 | 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 |
| 35 | Throttle position sensor (Ground) | | — | — |
| 36 | — | | — | — |
| 37 | ASCD cruise signal |  | When ASCD cruise is being performed. ("CRUISE" light comes on.) | Battery voltage |
| | | | When ASCD cruise is not being performed. ("CRUISE" light does not come on.) | 1V or less |
| 38 | — |  | — | — |
| 39 | Overdrive control switch | | When setting overdrive control switch in ON position | Battery voltage |
| | |  | When setting overdrive control switch in OFF position | 1V or less |
| 40 | ASCD OD cut signal |  | When "ACCEL" set switch on ASCD cruise is released. | 4.5 - 5.5V |
| | | | When "ACCEL" set switch on ASCD cruise is applied. | 1V or less |
| 41 | — |  | — | — |
| 42 | — | | — | — |
| 43 | — | | — | — |
| 44 | — | | — | — |
| 45* | OBD-II output | | — | — |
| 46 | — |  | — | — |
| 47 | — | | — | — |
| 48 | Ground (System) | | — | — |

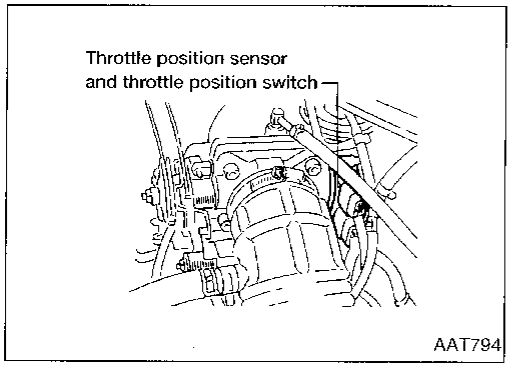
* These terminals are connected to the ECM (ECCS control module).



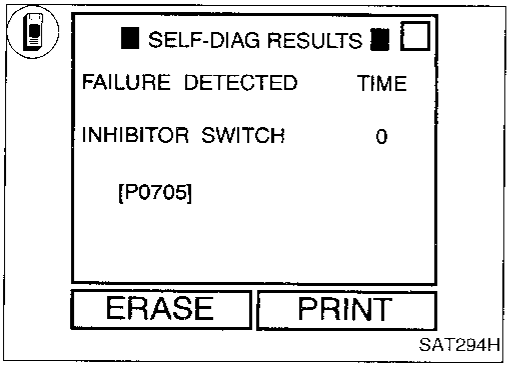
AAT510



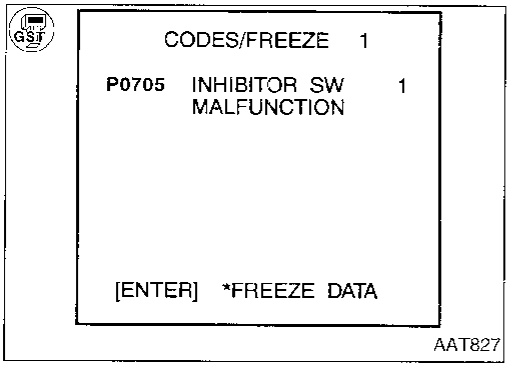
AAT738



AAT794



SAT294H



AAT827

## Inhibitor, Overdrive Control and Throttle Position Switch

### DESCRIPTION

- Inhibitor switch
  Detects the selector lever position and sends a signal to the A/T control unit.
- Overdrive control switch
  Detects the overdrive control switch position (ON or OFF) and sends a signal to the A/T control unit.
- 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 A/T control unit 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 A/T control unit when the throttle valve is fully closed.

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : INHIBITOR SWITCH<br>: P0705<br>: Does not come on | A/T control unit does not receive the correct voltage signal from the switch based on the gear position. | • Harness or connectors (The switch circuit is open or shorted.)<br>• Inhibitor switch |

### Diagnostic trouble code (DTC) confirmation procedure

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

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
3) Drive vehicle under the following conditions:
   Selector lever in "D", overdrive control switch in OFF position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 5 seconds.

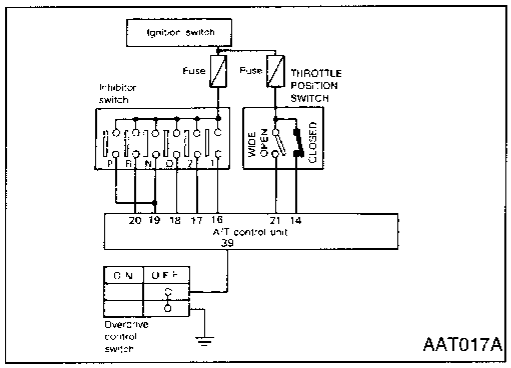
OR

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

OR

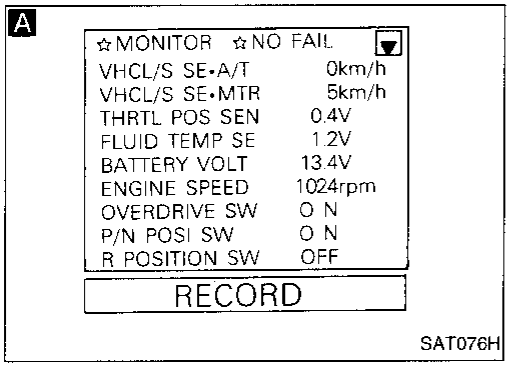
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D", overdrive control switch in OFF position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 5 seconds.
3) Perform self-diagnosis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

## Inhibitor, Overdrive Control and Throttle Position Switch (Cont'd)



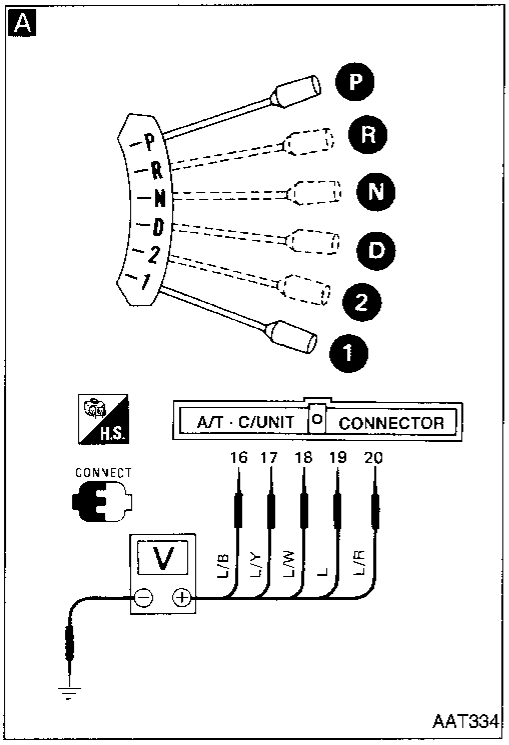

AAT017A

A




SAT076H

A




AAT334

A

**CHECK INHIBITOR SWITCH CIRCUIT.**

1. Turn ignition switch to ON position. (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out "R, N, D, 1 and 2 position switches" moving selector lever to each position. Check the signal of the selector lever position is indicated properly.

NG → Check the following items:
- Inhibitor switch. Refer to "Component Inspection", AT-67
- Harness for short or open between ignition switch and inhibitor switch (Engine control harness)
- Harness for short or open between inhibitor switch and A/T control unit (Engine control harness)

OR

(NO TOOLS)

1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between A/T control unit terminals ⑯, ⑰, ⑱, ⑲, ⑳ and ground while moving selector lever through each position.

**Voltage:**
**B: Battery voltage**
**0: 0V**

| Lever position | Terminal No. | | | | |
|---|---|---|---|---|---|
| | ⑲ | ⑳ | ⑱ | ⑰ | ⑯ |
| 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** |

OK

Ⓐ

(Go to next page.)

## Inhibitor, Overdrive Control and Throttle Position Switch (Cont'd)

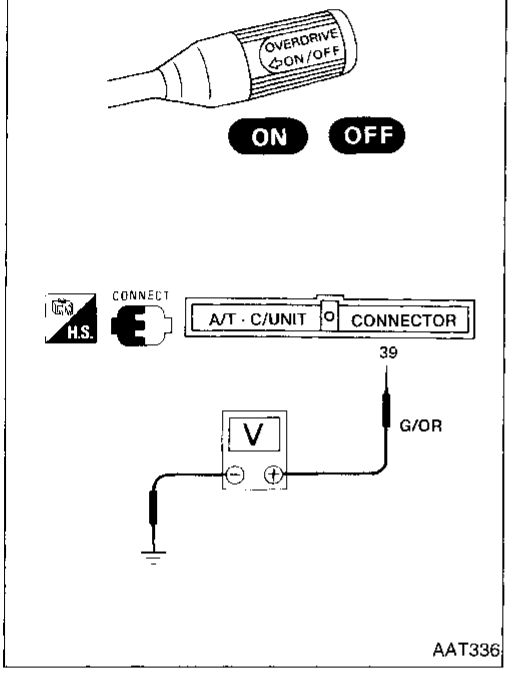
B

| ☆MONITOR | ☆NO FAIL |
|---|---|
| VHCL/S SE•A/T | 0km/h |
| VHCL/S SE•MTR | 5km/h |
| THRTL POS SEN | 0.4V |
| FLUID TEMP SE | 1.2V |
| BATTERY VOLT | 13.4V |
| ENGINE SPEED | 1024rpm |
| OVERDRIVE SW | O N |
| P/N POSI SW | O N |
| R POSITION SW | OFF |

RECORD

SAT076H

B




AAT336

Ⓐ

B

**CHECK OVERDRIVE CONTROL SWITCH CIRCUIT.**

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in Data Monitor.
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.)

OR

NO TOOLS

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between A/T control unit terminal (39) and ground when overdrive control switch is ON and OFF.

| Overdrive control switch position | Voltage |
|---|---|
| ON | Battery voltage |
| OFF | 1V or less |

NG → Check the following items:
- Overdrive control switch. Refer to "Component Inspection", AT-67
- Harness for short or open between A/T control unit and overdrive control switch (Main harness)
- Harness of ground circuit for overdrive control switch (Engine room harness) for short or open

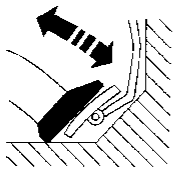
OK

Ⓑ

(Go to next page.)

## Inhibitor, Overdrive Control and Throttle Position Switch (Cont'd)

C

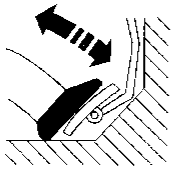


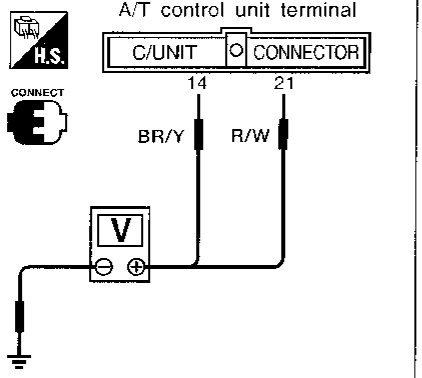
| ☆ MONITOR | ☆ NO FAIL |
|---|---|
| D POSITION SW | OFF |
| 2 POSITION SW | OFF |
| 1 POSITION SW | OFF |
| ASCD • CRUISE | OFF |
| ASCD • OD CUT | OFF |
| KICKDOWN SW | OFF |
| POWERSHIFT SW | OFF |
| CLOSED THL/SW | ON |
| W/O THRL/P-SW | OFF |

RECORD

SAT963H

C






AAT739

Ⓑ

C

**CHECK THROTTLE POSITION SWITCH CIRCUIT.**

1. Turn ignition switch to ON position. (Do not start engine.)
2. Select "ECM INPUT SIGNALS" in Data Monitor.
3. Read out "CLOSED THL/SW" and "W/O THRL/P-SW" depressing and releasing accelerator pedal. Check that 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 |

NG → Check the following items:
- Throttle position switch. Refer to "Component Inspection", AT-67
- Harness for short or open between ignition switch and throttle position switch (Engine control harness)
- Harness for short or open between throttle position switch and A/T control unit (Engine control harness)

OR

1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between A/T control unit terminals ⑭, ㉑ and ground while depressing and releasing accelerator pedal slowly. (after warming up engine)

| Accelerator pedal condition | Voltage | |
|---|---|---|
| | Terminal No. ⑭ | Terminal No. ㉑ |
| Released | Battery voltage | 1V or less |
| Fully depressed | 1V or less | Battery voltage |

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-63.

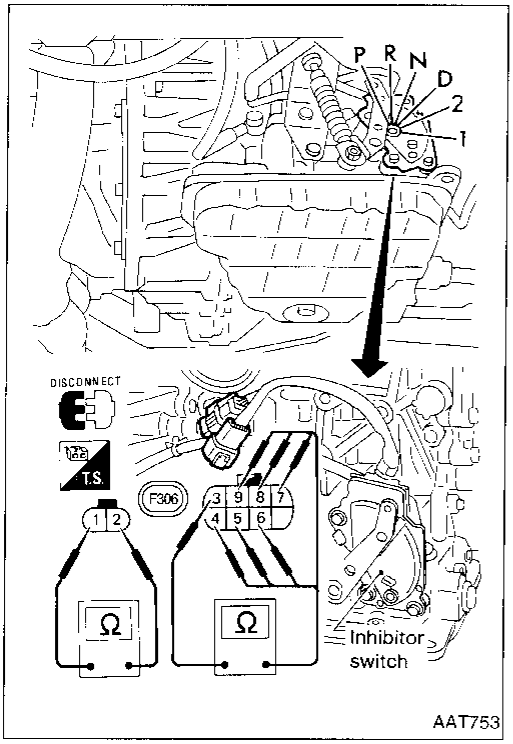
NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

**INSPECTION END**

## Inhibitor, Overdrive Control and Throttle Position Switch (Cont'd)

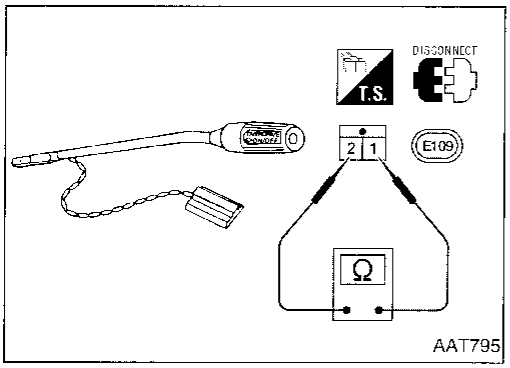
### COMPONENTS INSPECTION




#### Inhibitor switch

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

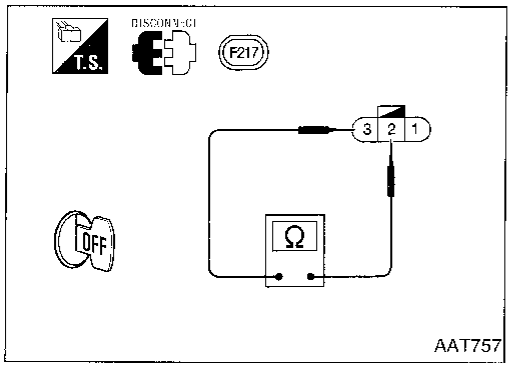
| Lever position | Terminal No. |
|---|---|
| P | ③ — ④, ① — ② |
| R | ③ — ⑤ |
| N | ③ — ⑥, ① — ② |
| D | ③ — ⑦ |
| 2 | ③ — ⑧ |
| 1 | ③ — ⑨ |




#### Overdrive control switch

- Check continuity between two terminals.

| Overdrive control switch position | Continuity |
|---|---|
| ON | No |
| OFF | Yes |



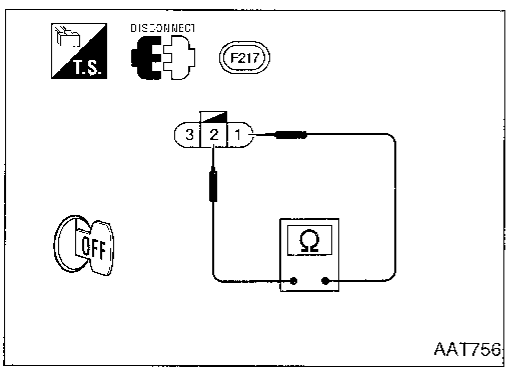

#### Throttle position switch

##### Closed throttle position switch (idle position)

- Check continuity between terminals ② and ③.

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

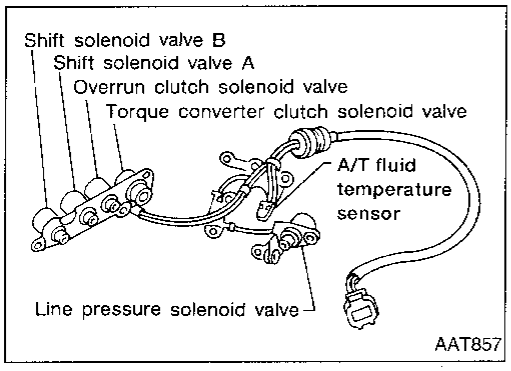
- To adjust closed throttle position switch, Refer to EC section "Basic Inspection", "TROUBLE DIAGNOSIS - General Description").

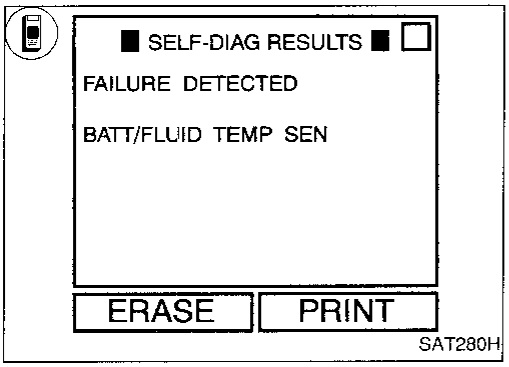


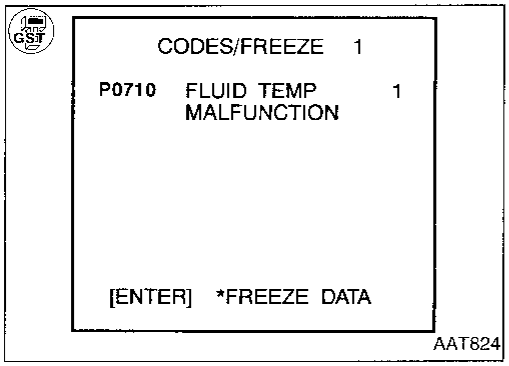

##### Wide open throttle position switch

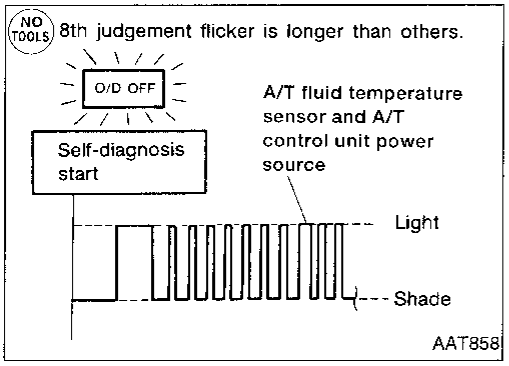
- Check continuity between terminals ① and ②.

| Accelerator pedal condition | Continuity |
|---|---|
| Released | No |
| Depressed (fully) | Yes |




## A/T Fluid Temperature Sensor and A/T Control Unit Power Source

### DESCRIPTION

The A/T fluid temperature sensor detects the ATF temperature and sends a signal to the A/T control unit.

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : BATT/FLUID TEMP<br>: P0710<br>: 8th judgement flicker | A/T control unit 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 |

### Diagnostic Trouble Code (DTC) confirmation procedure

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

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle under the following conditions:
   Selector lever in "D", 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.

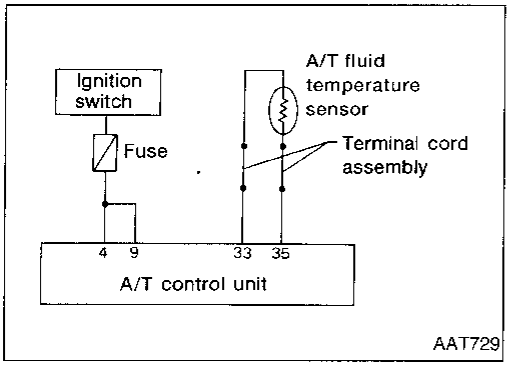
OR

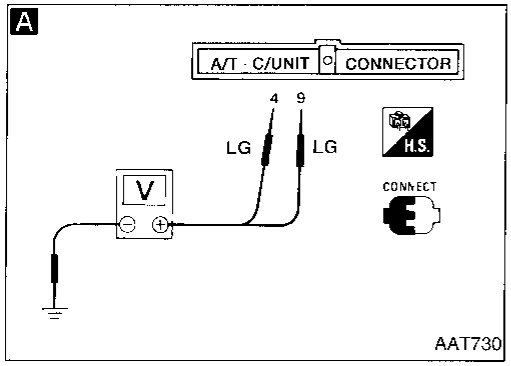
1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D", vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes.
3) Select "MODE 7" with GST.

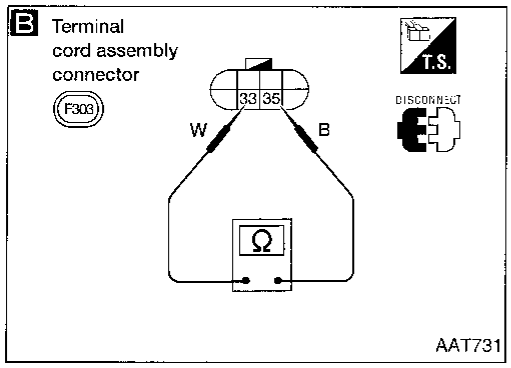
OR

1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D", 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 (No Tools), AT-28.

## A/T Fluid Temperature Sensor and A/T Control Unit Power Source (Cont'd)




**A**

**CHECK A/T CONTROL UNIT POWER SOURCE.**

1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between A/T control unit terminals ④, ⑨ and ground.
   **Battery voltage should exist.**

NG → Check the following items:
- Harness for short or open between ignition switch and A/T control unit (Main harness)
- Ignition switch and fuse Refer to EL section "POWER SUPPLY ROUTING".

OK ↓

**B**

**CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY.**

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminals ㉝ and ㉟ when A/T is cold.
   **Resistance:**
   **Cold [20°C (68°F)]**
   **Approximately 2.5 kΩ**
4. Reinstall any part removed.

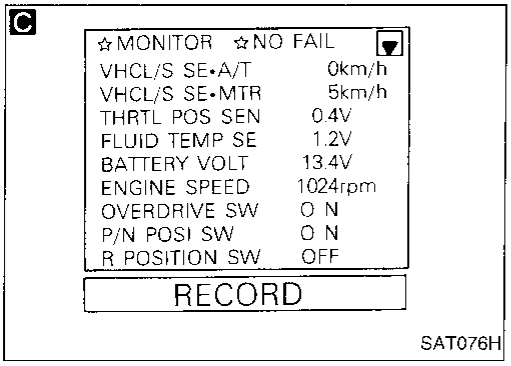
NG → 1. Remove oil pan.
2. Check the following items:
- A/T fluid temperature sensor (Refer to " Components Inspection", on the next page.)
- Harness of terminal cord assembly for short or open

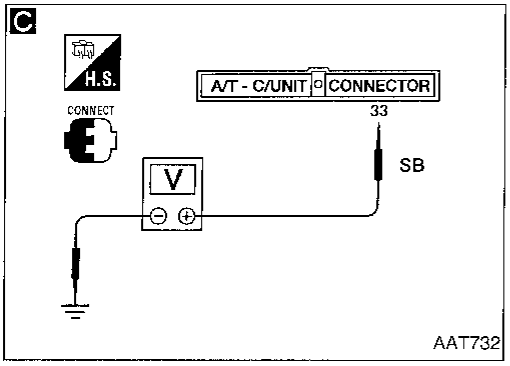
OK ↓

Ⓐ

(Go to next page.)

## A/T Fluid Temperature Sensor and A/T Control Unit Power Source (Cont'd)




Ⓐ

**CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR.**

1. Start engine.
2. Select "ECU INPUT SIGNALS" in Data Monitor.
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**

NG → Check the following item:
- Harness for short or open between A/T control unit and terminal cord assembly (Engine control harness)

OR

1. Start engine.
2. Check voltage between A/T control unit terminal ㉝ and ground while warming up A/T.

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

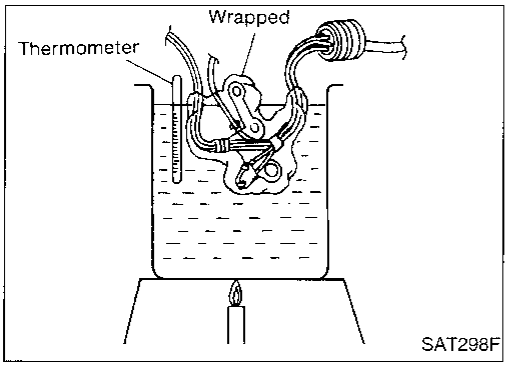
OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-68.

NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

**INSPECTION END**

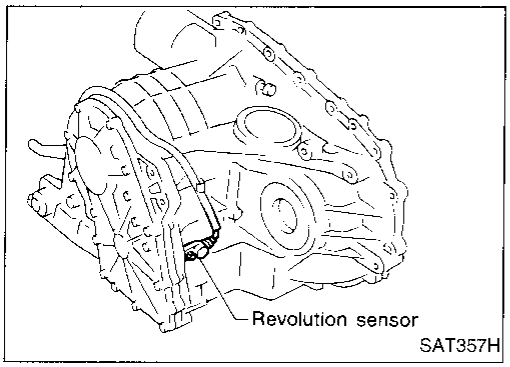



## COMPONENT INSPECTION

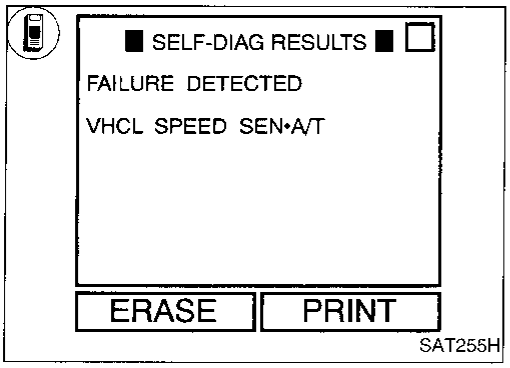
### A/T fluid temperature sensor

- For removal, refer to AT-140.
- Check resistance between terminals ㉝ and ㉟ while changing temperature as shown at left.

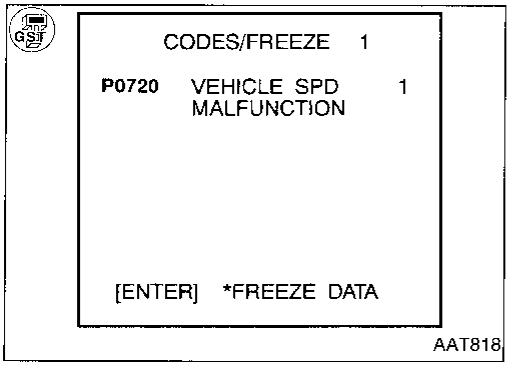
| Temperature °C (°F) | Resistance (Approx.) |
|---|---|
| 20 (68) | 2.5 kΩ |
| 80 (176) | 0.3 kΩ |



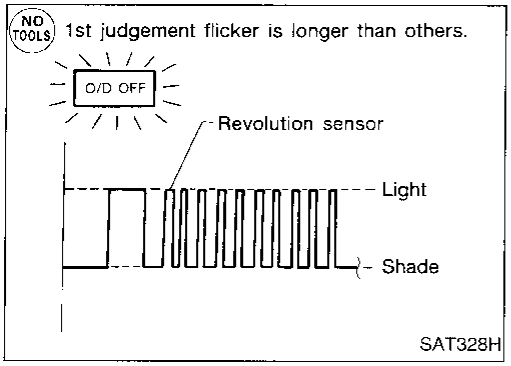
SAT357H



SAT255H



AAT818



SAT328H

# Vehicle Speed Sensor·A/T (Revolution Sensor)

## DESCRIPTION

The revolution sensor detects the revolution of the idler gear and emits a pulse signal. The pulse signal is sent to the A/T control unit which converts it into vehicle speed.

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : VHCL SPEED SEN·A/T<br>: P0720<br>: 1st judgement flicker | A/T control unit does not receive the proper voltage signal from the sensor. | • Harness or connectors (The sensor circuit is open or shorted.)<br>• Revolution sensor |

## Diagnostic Trouble Code (DTC) confirmation procedure

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

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle under the following conditions:
Selector lever in "D", 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.

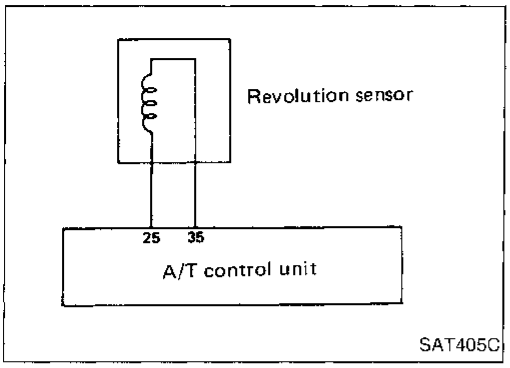
OR

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

OR

1) Start engine.
2) Drive vehicle under the following conditions:
Selector lever in "D", 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 (No Tools), AT-28.

## Vehicle Speed Sensor·A/T (Revolution Sensor) (Cont'd)




**CHECK REVOLUTION SENSOR.**
Refer to "COMPONENT INSPECTION", on this page.

NG → Repair or replace revolution sensor.

OK ↓

A

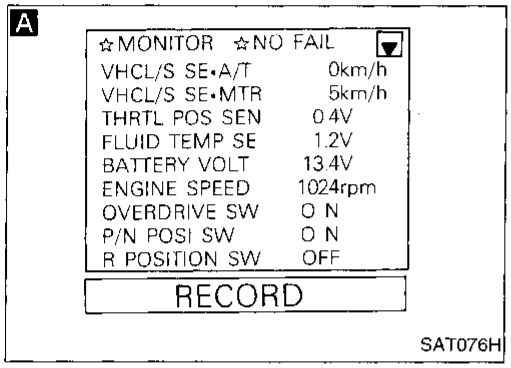
**CHECK INPUT SIGNAL.**

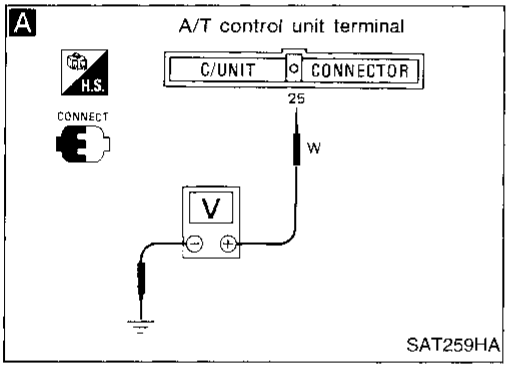
1. Start engine.
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out the value of "VHCL/S SE·A/T" while driving.
   Check the value changes according to driving speed.

NG → Check the following items:
- Harness for short or open between A/T control unit and revolution sensor (Engine control harness)
- Harness for short or open between revolution sensor and ECM (Engine control harness)
- Ground circuit for ECM Refer to EC section "TROUBLE DIAGNOSIS FOR POWER SUPPLY".

OR

1. Start engine.
2. Check voltage between A/T control unit terminal (25) 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.)**



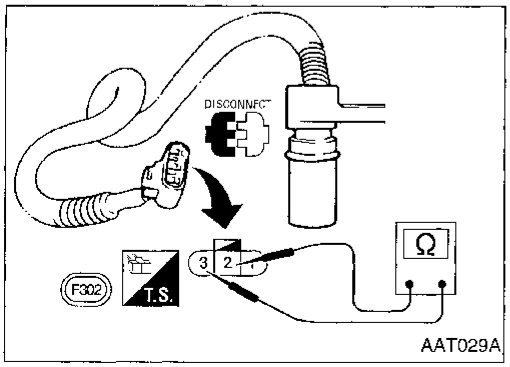

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-71.

NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

**INSPECTION END**

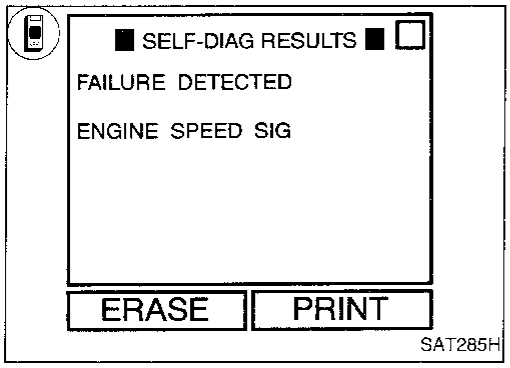


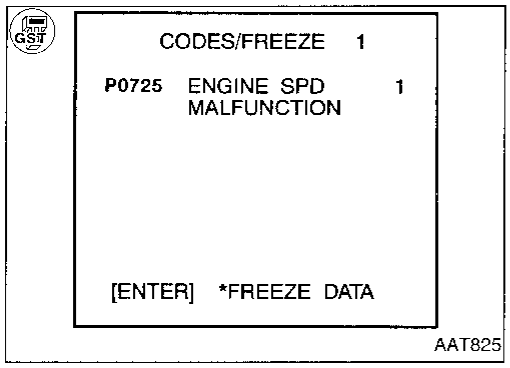

## COMPONENT INSPECTION

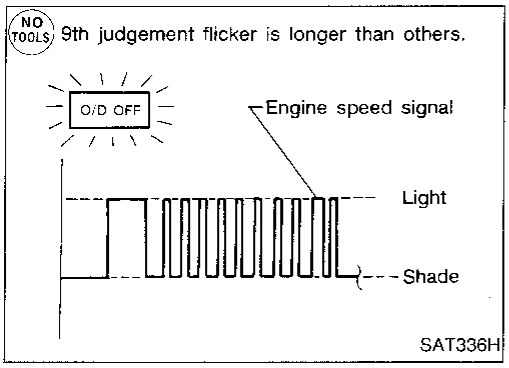
### Revolution sensor

- For Removal, refer to AT-141.
- Check resistance between terminals ② and ③.

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




## Engine Speed Signal

### DESCRIPTION

The engine speed signal is sent from the ECM to the A/T control unit.

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : ENGINE SPEED SIG<br>: P0725<br>: 9th judgement flicker | A/T control unit does not receive the proper voltage signal from ECM. | ● Harness or connectors (The sensor circuit is open or shorted.) |

### Diagnostic Trouble Code (DTC) confirmation procedure

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

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle under the following conditions:
Selector lever in "D", 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.

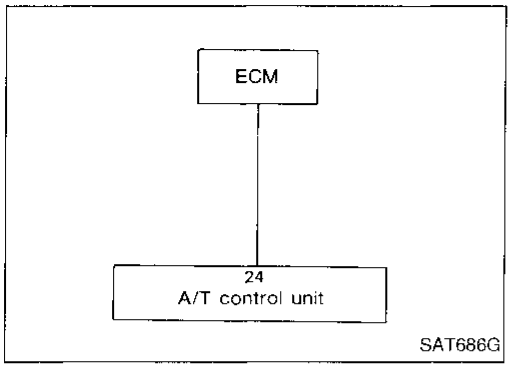
OR

1) Start engine.
2) Drive vehicle under the following conditions:
Selector lever in "D", 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) Select "MODE 7" with GST.

OR

1) Start engine.
2) Drive vehicle under the following conditions:
Selector lever in "D", 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 (No Tools), AT-28.

## Engine Speed Signal (Cont'd)

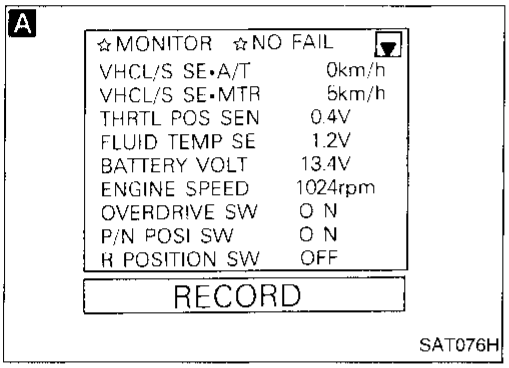



Perform diagnostic test mode II (self-diagnostic results) for engine control. Check ignition signal circuit condition.

NG → Check ignition signal circuit for engine control. Refer to EC section ["Ignition signal (DTC:0201)", "TROUBLE DIAGNOSIS FOR DTC P1320"].

OK

A




**CHECK INPUT SIGNAL.**

1. Start engine.
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out the value of "ENGINE SPEED". Check engine speed changes according to throttle position.

OR

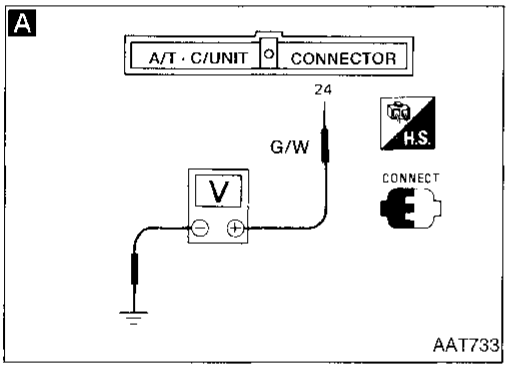
1. Start engine.
2. Check voltage between A/T control unit terminal ㉔ and ground.

**Voltage: 0.9 - 4.5V**

NG → Check the following items:
- Harness for short or open between A/T control unit and ignition coil
- Resistor
- Ignition coil

Refer to EC section ["Ignition signal (DTC:0201)", "TROUBLE DIAGNOSIS FOR DTC P1320"].

OK

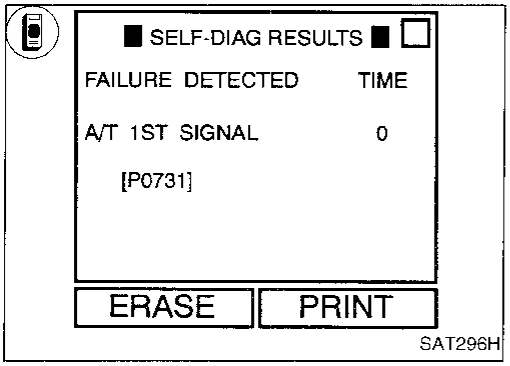


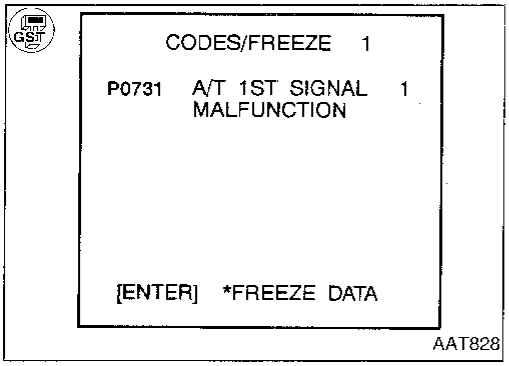

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-73.

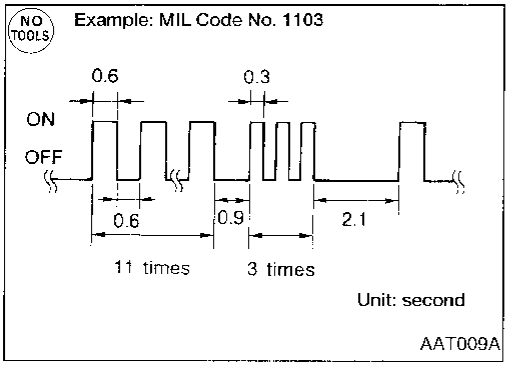
NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

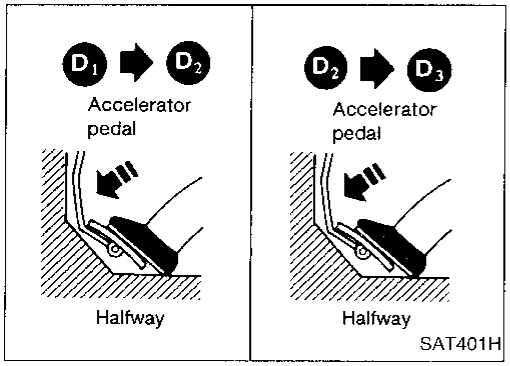
OK

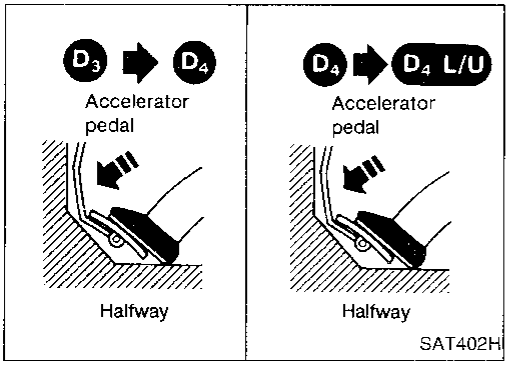
**INSPECTION END**




# Improper Shifting to 1st Gear Position

## DESCRIPTION

- This is one of the items indicated by the MIL.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into first gear position as instructed by the A/T control unit. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

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

## Diagnostic Trouble Code (DTC) confirmation procedure

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

1) Start engine and warm up ATF.
2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-52.

OR

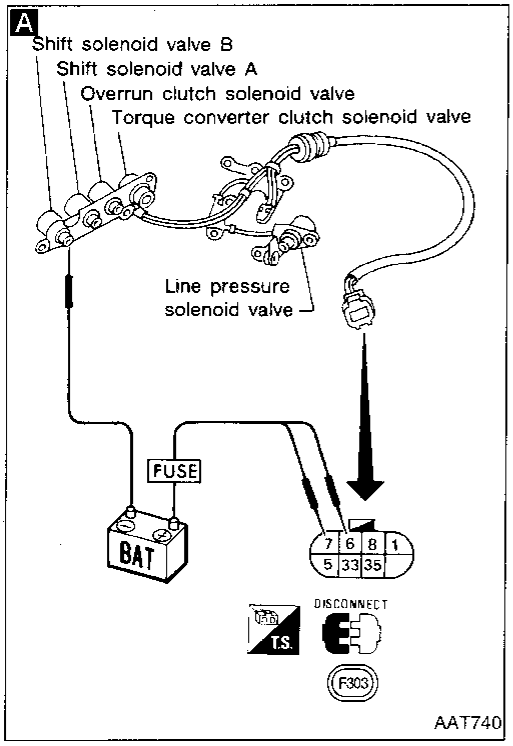
1) Start engine and warm up ATF.
2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-52.
3) Select "MODE 7" with GST.

OR

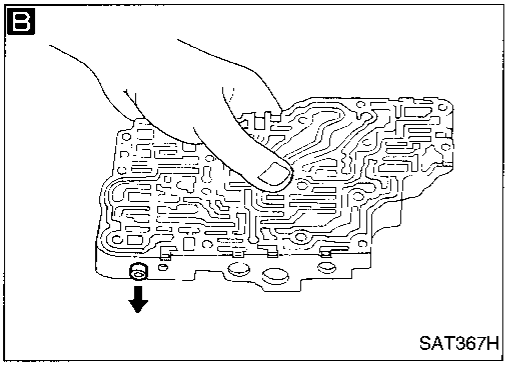
1) Start engine and warm up ATF.
2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-52.
3) Perform self-diagnosis for ECM.
   Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

## Improper Shifting to 1st Gear Position (Cont'd)

A




B




A

**CHECK SHIFT SOLENOID VALVE.**
1. Remove control valve assembly. Refer to AT-140.
2. Check shift solenoid valve operation.
   - Shift solenoid valve "A"
   - Shift solenoid valve "B"

   Refer to "Components Inspection", on the next page.

NG → Repair or replace shift solenoid valve assembly.

OK ↓

B

**CHECK CONTROL VALVE.**
1. Disassemble control valve assembly. Refer to AT-170.
2. Check to ensure that:
   - Valve, sleeve and plug slide along valve bore under their own weight.
   - Valve, sleeve and plug are free from burrs, dents and scratches.
   - Control valve springs are free from damage, deformation and fatigue.
   - Hydraulic line is free from obstacles.

NG → Repair control valve assembly.

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-75.

NG → Check control valve again. Repair or replace control valve assembly.

OK ↓

**INSPECTION END**

## Improper Shifting to 1st Gear Position (Cont'd)

### COMPONENT INSPECTION

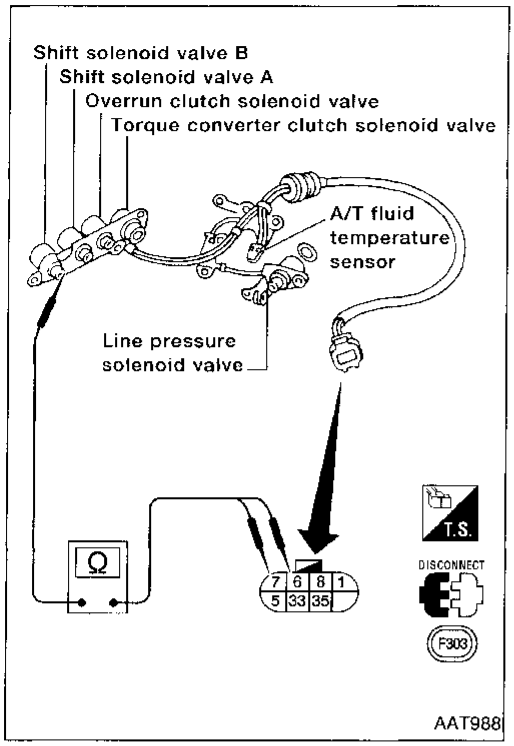
#### Shift solenoid valve A and B

- For Removal and Installation, Refer to AT-140.

**Resistance check**

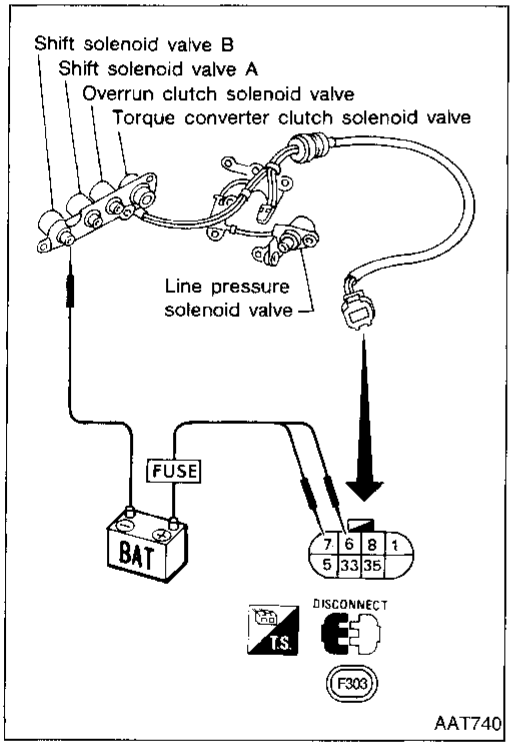
- Check resistance between two terminals.

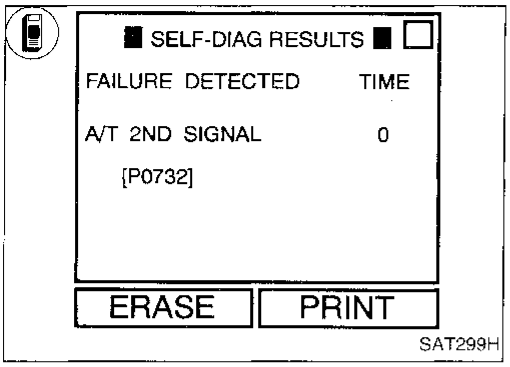
| Solenoid valve | Terminal No. | | Resistance (Approx.) |
|---|---|---|---|
| Shift solenoid valve "A" | ⑥ | Ground (Bracket) | 20 - 30Ω |
| Shift solenoid valve "B" | ⑦ | | |

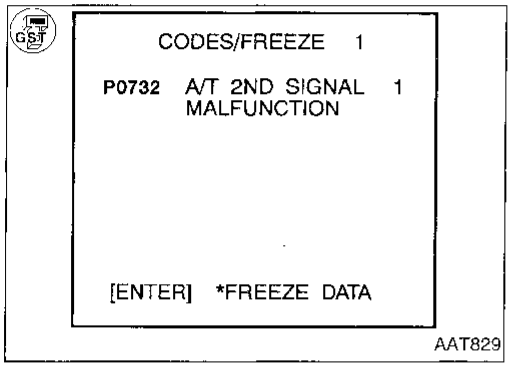


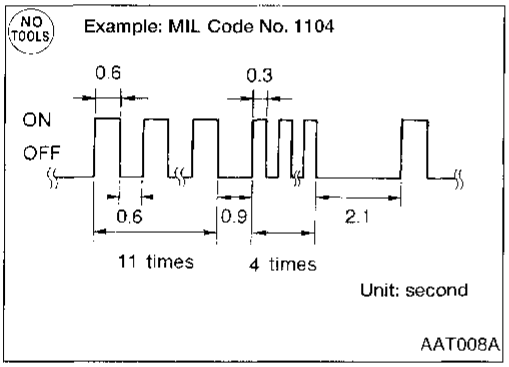

**Operation check**

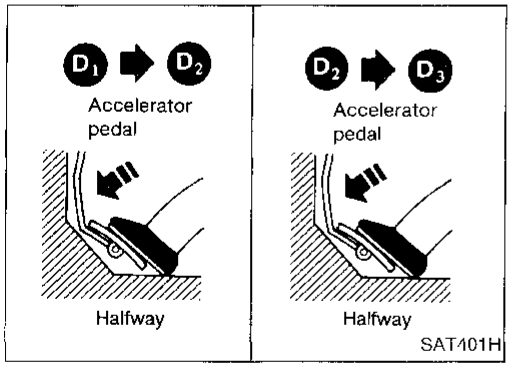
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground (bracket).

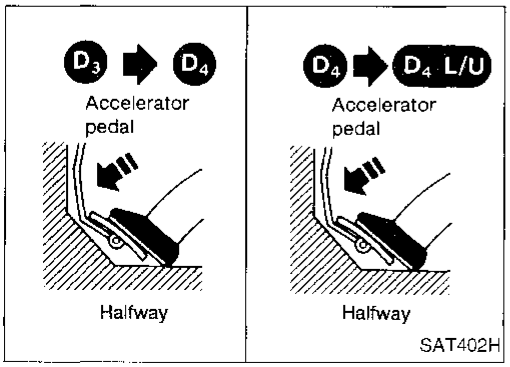





## Improper Shifting to 2nd Gear Position

### DESCRIPTION

- This is one of the items indicated by the MIL.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into second gear position as instructed by the A/T control unit. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : A/T 2ND SIGNAL<br>: P0732<br>: MIL Code No. 1104 | A/T cannot be shifted to the 1st gear position even if electrical circuit is good. | • Shift solenoid valve B<br>• Each clutch<br>• Hydraulic control circuit |

### Diagnostic Trouble Code (DTC) confirmation procedure

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

1) Start engine and warm up ATF.
2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-52.

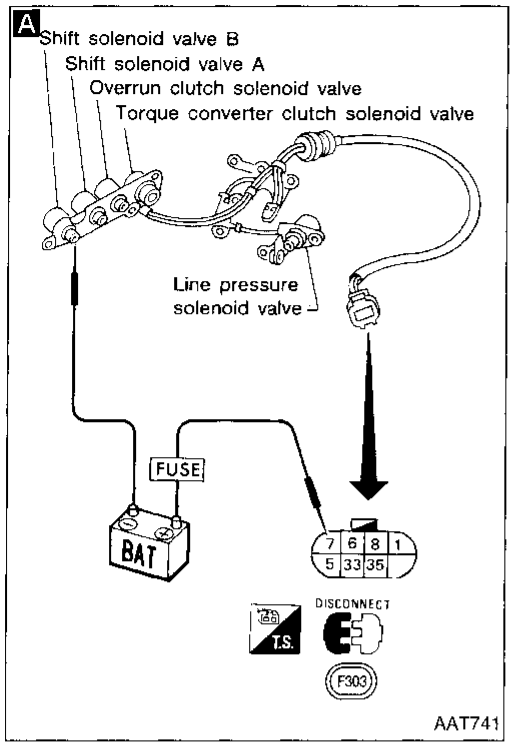
OR

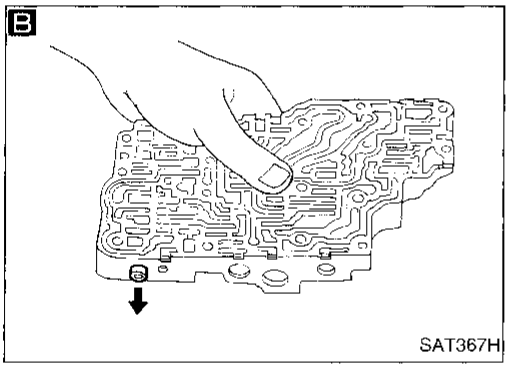
1) Start engine and warm up ATF.
2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-52.
3) Select "MODE 7" with GST.

OR

1) Start engine and warm up ATF.
2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-52.
3) Perform self-diagnosis for ECM.
   Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

## Improper Shifting to 2nd Gear Position (Cont'd)




A

**CHECK SHIFT SOLENOID VALVE.**
1. Remove control valve assembly. Refer to AT-140.
2. Check shift solenoid valve operation.
   - Shift solenoid valve B

   Refer to "Component Inspection", on the next page.

NG → Repair or replace shift solenoid valve assembly.

OK ↓

B

**CHECK CONTROL VALVE.**
1. Disassemble control valve assembly. Refer to AT-170.
2. Check to ensure that:
   - Valve, sleeve and plug slide along valve bore under their own weight.
   - Valve, sleeve and plug are free from burrs, dents and scratches.
   - Control valve springs are free from damage, deformation and fatigue.
   - Hydraulic line is free from obstacles.

NG → Repair control valve assembly.

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-78.

NG → Check control valve again. Repair or replace control valve assembly.

OK ↓

**INSPECTION END**

## Improper Shifting to 2nd Gear Position (Cont'd)

### COMPONENT INSPECTION

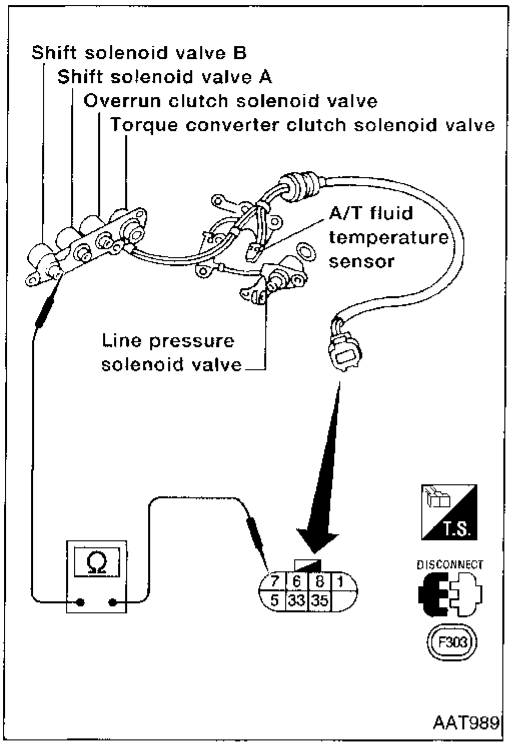
### Shift solenoid valve B

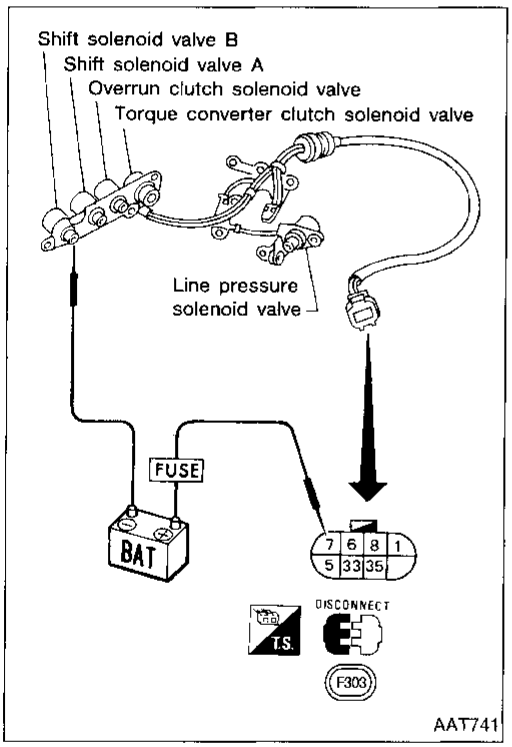
- For Removal and Installation, Refer to AT-140.

**Resistance check**

- Check resistance between two terminals.

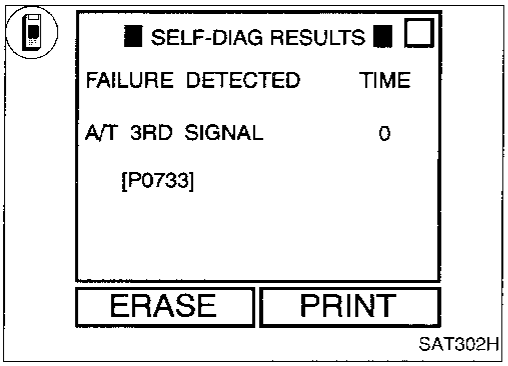
| Solenoid valve | Terminal No. | | Resistance (Approx.) |
|---|---|---|---|
| Shift solenoid valve "B" | ⑦ | Ground (Bracket) | 20 - 30Ω |

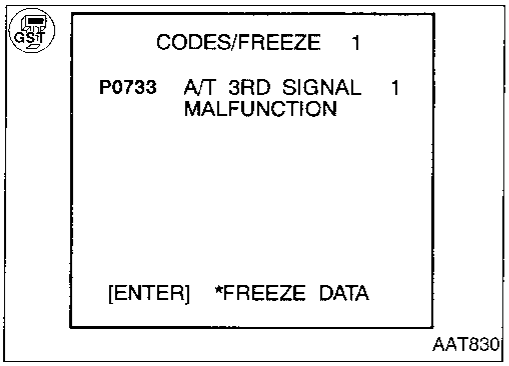


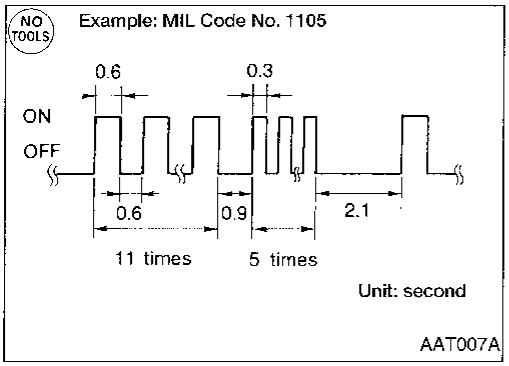



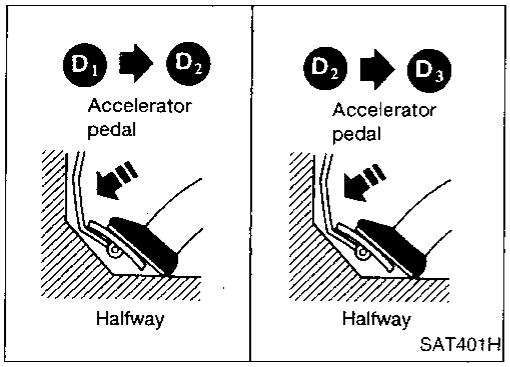

**Operation check**

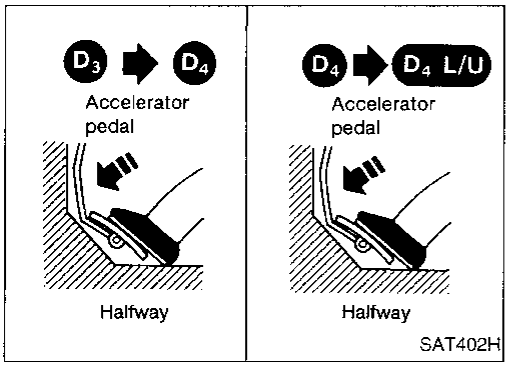
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground (bracket).




## Improper Shifting to 3rd Gear Position

### DESCRIPTION

- This is one of the items indicated by the MIL.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into third gear position as instructed by the A/T control unit. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning servo piston or brake band, etc.

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : A/T 3RD SIGNAL<br>: P0732<br>: MIL Code No. 1105 | A/T cannot be shifted to the 3rd gear position even if electrical circuit is good. | • Shift solenoid valve A<br>• Each clutch<br>• Hydraulic control circuit |

### Diagnostic Trouble Code (DTC) confirmation procedure

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

1) Start engine and warm up ATF.
2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-52.

OR

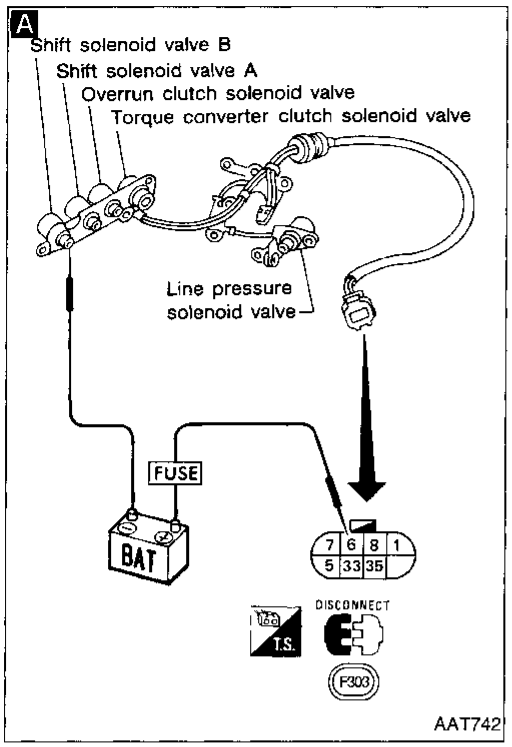
1) Start engine and warm up ATF.
2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-52.
3) Select "MODE 7" with GST.

OR

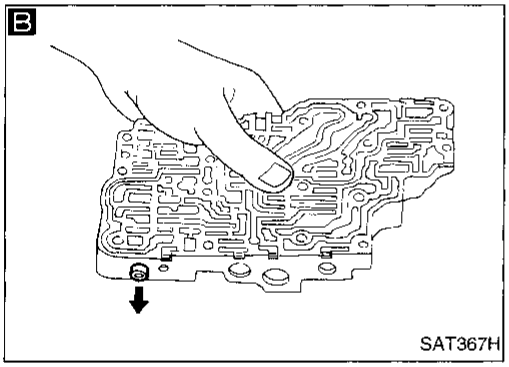
1) Start engine and warm up ATF.
2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-52.
3) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

## Improper Shifting to 3rd Gear Position (Cont'd)

A




B




A

**CHECK SHIFT SOLENOID VALVE.**
1. Remove control valve assembly. Refer to AT-140.
2. Check shift solenoid valve operation.
   - Shift solenoid valve "A"

   Refer to "Component Inspection", on the next page.

NG → Repair or replace shift solenoid valve assembly.

OK ↓

B

**CHECK CONTROL VALVE.**
1. Disassemble control valve assembly. Refer to AT-170.
2. Check to ensure that:
   - Valve, sleeve and plug slide along valve bore under their own weight.
   - Valve, sleeve and plug are free from burrs, dents and scratches.
   - Control valve springs are free from damage, deformation and fatigue.
   - Hydraulic line is free from obstacles.

NG → Repair control valve assembly.

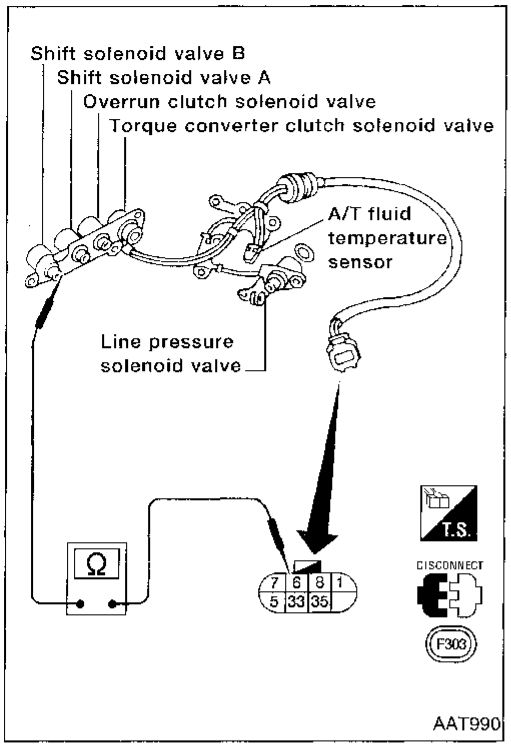
OK ↓

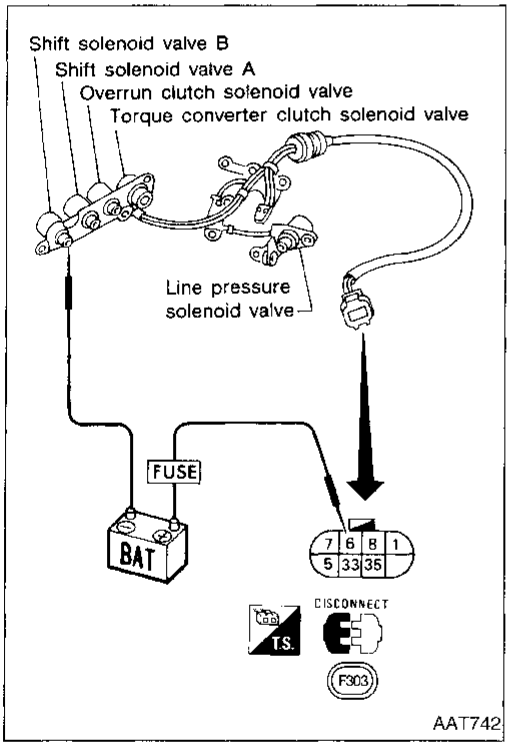
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-81.

NG → Check control valve again. Repair or replace control valve assembly.

OK ↓

**INSPECTION END**




## Improper Shifting to 3rd Gear Position (Cont'd)

### COMPONENT INSPECTION

### Shift solenoid valve A

- For Removal and Installation, Refer to AT-140.

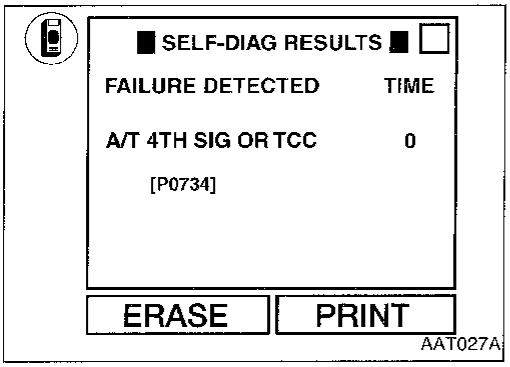
**Resistance check**

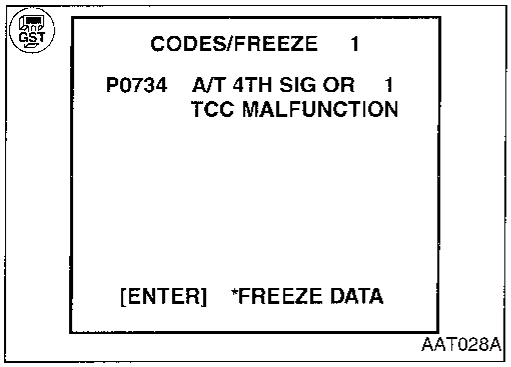
- Check resistance between two terminals.

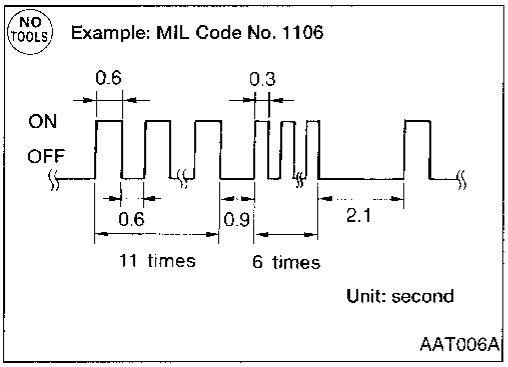
| Solenoid valve | Terminal No. | | Resistance (Approx.) |
|---|---|---|---|
| Shift solenoid valve "A" | ⑥ | Ground (Bracket) | 20 - 30Ω |

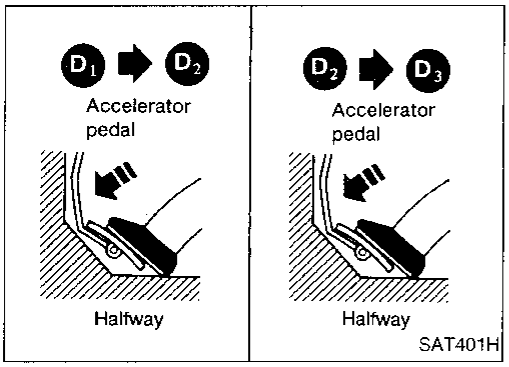
**Operation check**

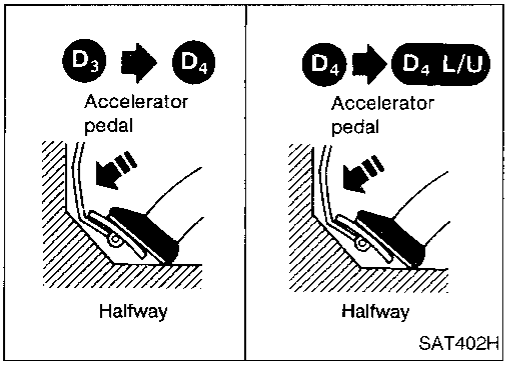
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground (bracket).




## Improper Shifting to the 4th Gear Position or Improper Torque Converter Clutch

### DESCRIPTION

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

| Diagnostic trouble code | Malfunction is detected when ... | Check items (Possible cause) |
|---|---|---|
| : A/T 4TH SIG OR TCC<br>: P0734<br>: MIL Code No. 1106 | A/T cannot be shifted to the 4th gear position even if electrical circuit is good. | ● Shift solenoid valve A<br>● Shift solenoid valve B<br>● Overrun clutch solenoid valve<br>● Line pressure solenoid valve<br>● Each clutch<br>● Hydraulic control circuit |

### Diagnostic Trouble Code (DTC) confirmation procedure

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

1) Start engine and warm up ATF.
2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-52.

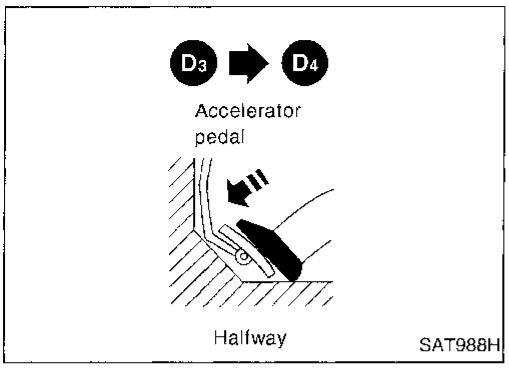
OR

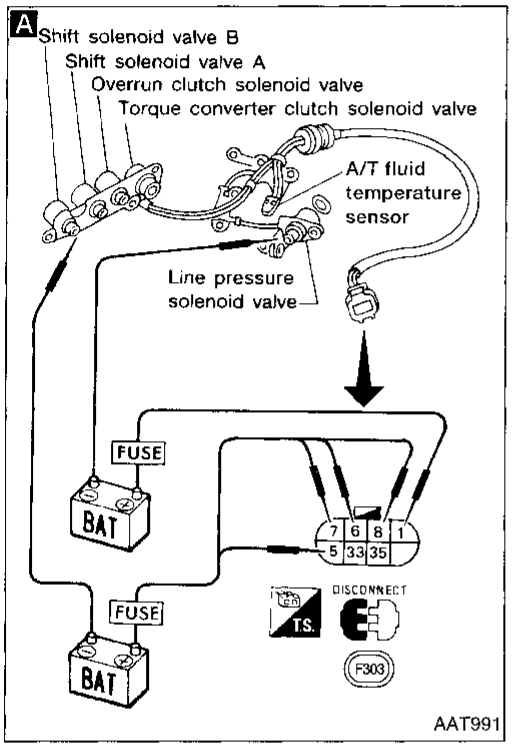
1) Start engine and warm up ATF.
2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-52.
3) Select "MODE 7" with GST.

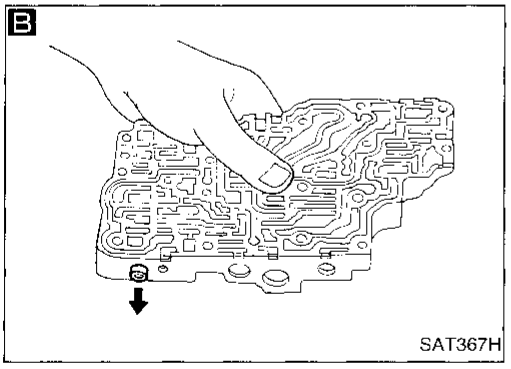
OR

1) Start engine and warm up ATF.
2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-52.
3) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

## Improper Shifting to the 4th Gear Position or Improper Torque Converter Clutch (Cont'd)




During "Cruise Test — Part 1", AT-48, does A/T shift from $D_3$ to $D_4$ at the specified speed?

Yes → Go to Ⓑ, AT-87 and check for proper lock-up.

No ↓

Perform pressure test. Refer to AT-132.

NG → Go to Ⓐ, AT-86.

OK ↓

A

**CHECK SOLENOID VALVES.**

1. Remove control valve assembly. Refer to AT-140.
2. Check solenoid valve assembly operation. Refer to "Component Inspection", AT-96.

NG → Replace solenoid valve assembly.

OK ↓

B

**CHECK CONTROL VALVE.**

1. Disassemble control valve assembly. Refer to AT-170.
2. Check to ensure that:

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

NG → Repair control valve.

OK ↓

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

NG → Check control valve again. Repair or replace control valve assembly.

OK ↓

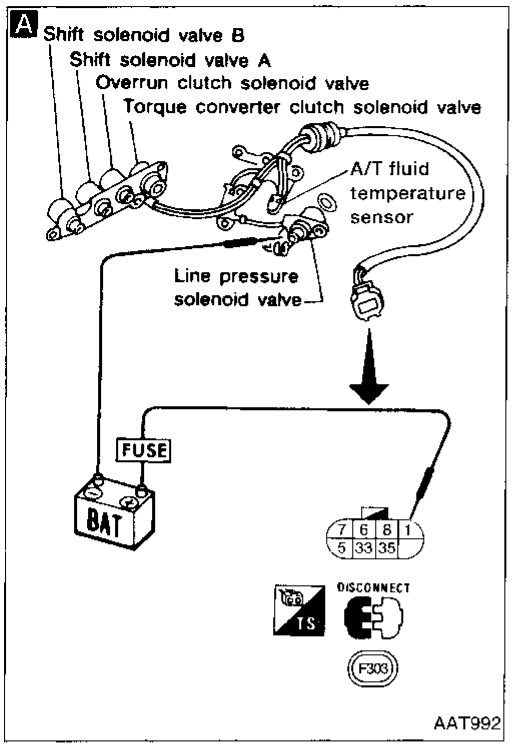
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-84.

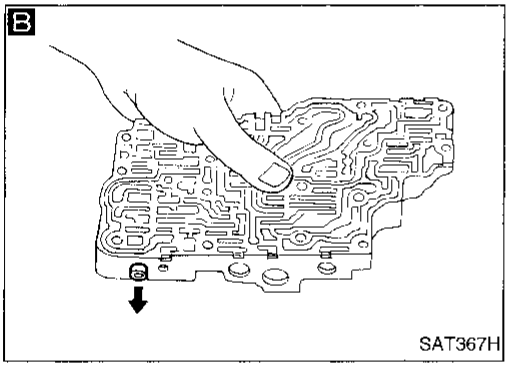
NG → Go to Ⓑ, AT-87 and check for proper lock-up.

OK ↓

**INSPECTION END**

## Improper Shifting to the 4th Gear Position or Improper Torque Converter Clutch (Cont'd)




Ⓐ

**A**

**CHECK LINE PRESSURE SOLENOID VALVE.**
1. Remove control valve assembly. Refer to AT-140.
2. Check line pressure solenoid valve operation. Refer to "Component Inspection", AT-96.

NG → Replace solenoid valve assembly.

OK ↓

**B**

**CHECK CONTROL VALVE.**
1. Disassemble control valve assembly. Refer to AT-170.
2. Check line pressure circuit valves for sticking.
- Pressure regulator valve
- Pilot valve
- Pressure modifier valve

NG → Repair control valve.

OK ↓

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

NG → Check control valve again. Repair or replace control valve assembly.

OK ↓

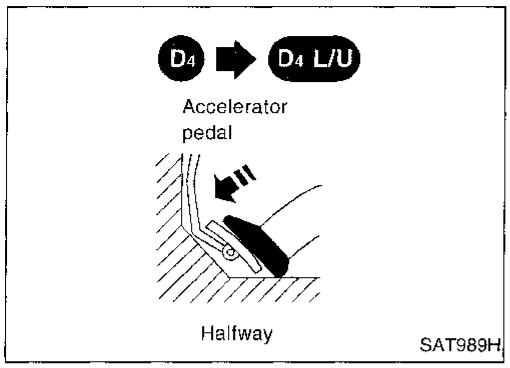
Perform Diagnostic Trouble Code (DTC) confirmation procedure AT-84.

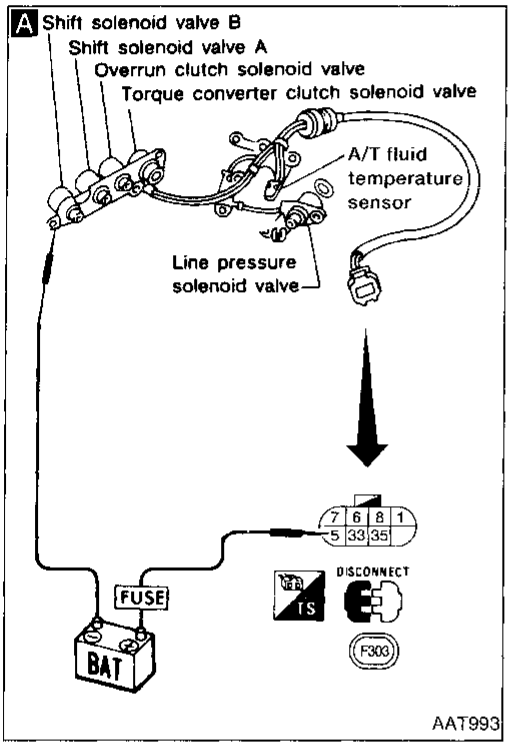
NG → Go to Ⓑ, AT-87 and check for proper lock-up.

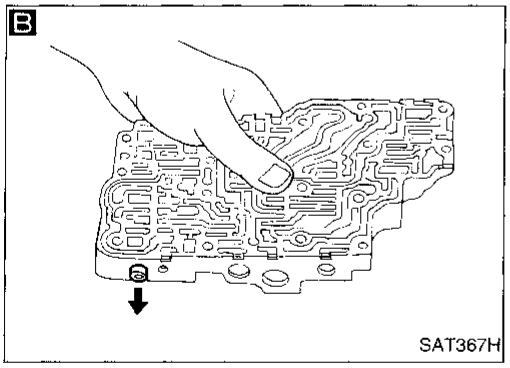
OK ↓

**INSPECTION END**

## Improper Shifting to the 4th Gear Position or Improper Torque Converter Clutch (Cont'd)




Ⓑ

During "Cruise Test — Part 1", AT-48, does A/T perform lock-up at the specified speed?
- Yes → Perform "Cruise Test — Part 1" again and return to the start point of this flow chart.
- No ↓

A

**CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE.**
1. Remove control valve assembly. Refer to AT-140.
2. Check torque converter clutch solenoid valve operation. Refer to "Component Inspection", on the next page.

- NG → Replace solenoid valve assembly.
- OK ↓

B

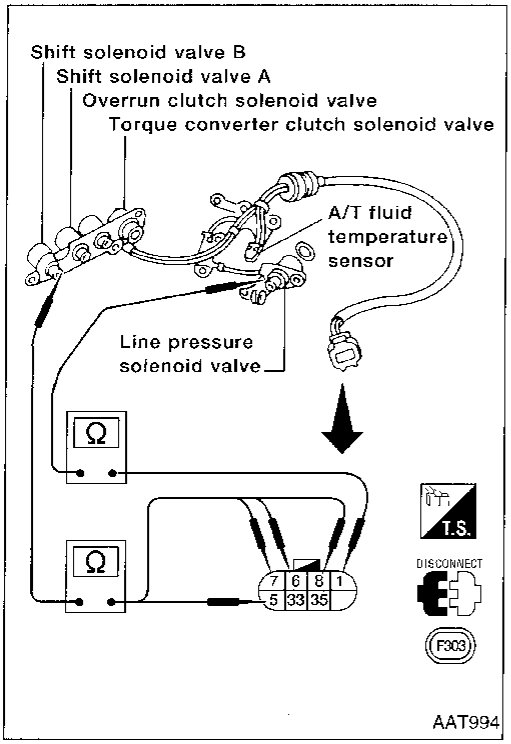
**CHECK CONTROL VALVE.**
1. Disassemble control valve assembly. Refer to AT-170.
2. Check control valves for sticking.
- Torque converter clutch control valve
- Torque converter clutch relief valve

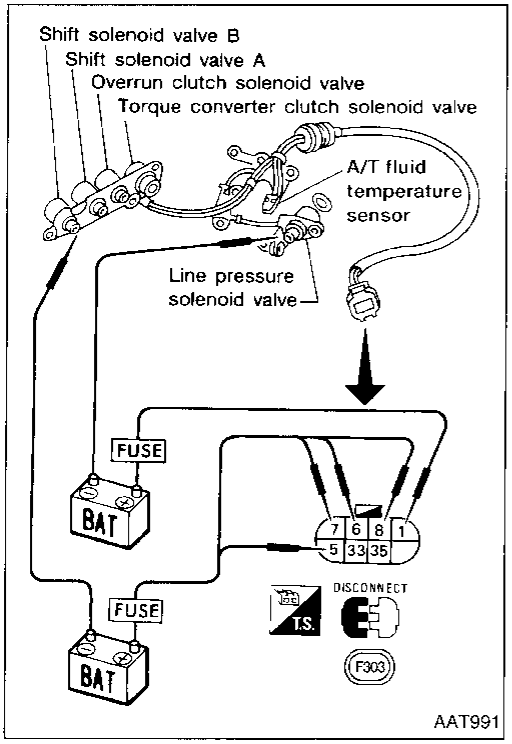
- NG → Repair control valve
- OK ↓

Does A/T perform lock-up at the specified speed?
- No → Check control valve again. Repair or replace control valve assembly.
- Yes ↓

Perform "Diagnostic Trouble Code (DTC) confirmation procedure", AT-84.
- NG → Perform "Cruise test — Part 1" again and return to the start point of this flow chart.
- OK ↓

**INSPECTION END**




## Improper Shifting to the 4th Gear Position or Improper Torque Converter Clutch (Cont'd)

### COMPONENT INSPECTION

### Solenoid valves

- For Removal and Installation, Refer to AT-140.

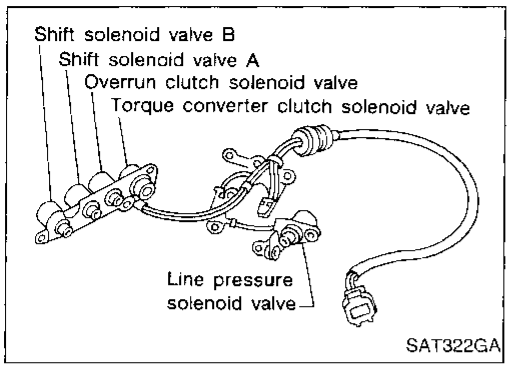
**Resistance check**

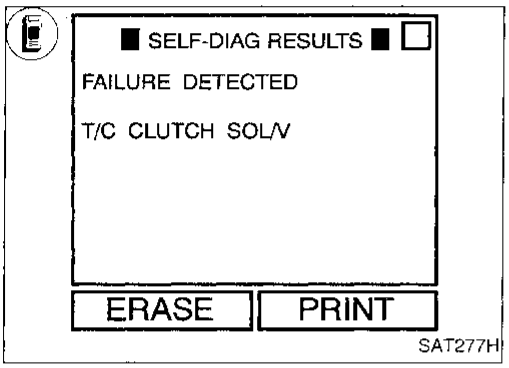
- Check resistance between two terminals.

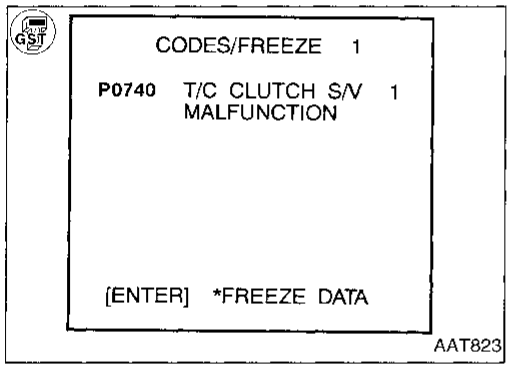
| Solenoid valve | Terminal No. | | Resistance (Approx.) |
|---|---|---|---|
| Shift solenoid valve "A" | ⑥ | Ground (Bracket) | 20 - 30Ω |
| Shift solenoid valve "B" | ⑦ | | |
| Overrun clutch solenoid valve | ⑧ | | |
| Line pressure solenoid valve | ① | | 2.5 - 5Ω |
| Torque converter clutch solenoid valve | ⑤ | | 10 - 16Ω |

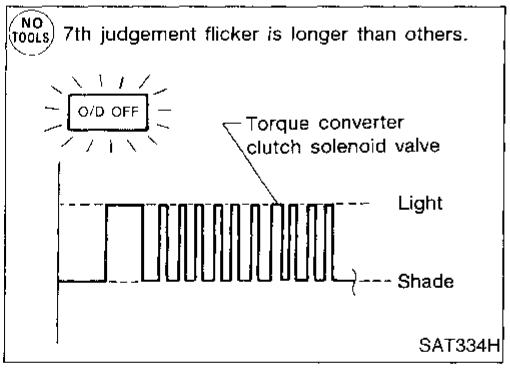
**Operation check**

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




## Torque Converter Clutch Solenoid Valve

### DESCRIPTION

The torque converter clutch solenoid valve is activated, with the gear in $D_4$, by the A/T control unit 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 ATF temperature is too low.

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : T/C CLUTCH SOL/V<br>: P0740<br>: 7th judgement flicker | A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve. | • Harness or connectors (The solenoid circuit is open or shorted.)<br>• T/C clutch solenoid valve |

### Diagnostic Trouble Code (DTC) confirmation procedure

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

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.

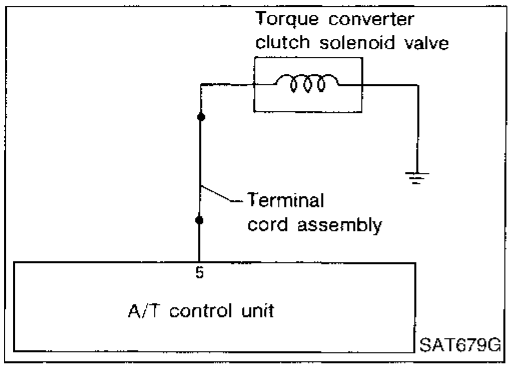
OR

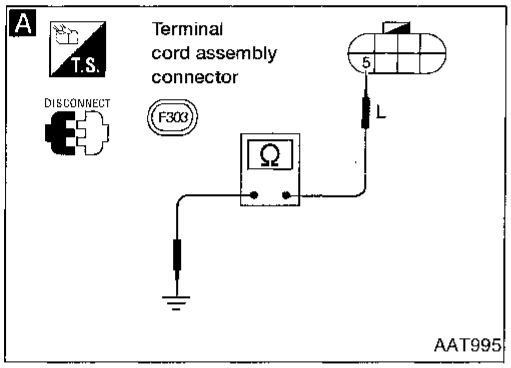
1) Start engine.
2) Drive vehicle in $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up position.
3) Select "MODE 7" with GST.

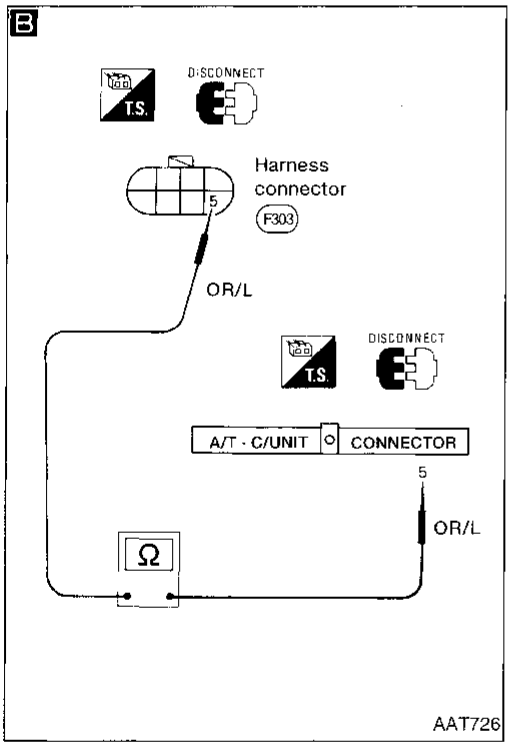
OR

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 (No Tools), AT-28.

## Torque Converter Clutch Solenoid Valve (Cont'd)




**A**

**CHECK GROUND CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑤ and ground.
   **Resistance: 10 - 16Ω**

NG →
1. Remove oil pan. Refer to "ON-VEHICLE SERVICE", AT-140.
2. Check the following items:
- Torque converter clutch solenoid valve (Refer to "Component Inspection", on the next page.)
- Harness of terminal cord assembly for short or open

OK ↓

**B**

**CHECK POWER SOURCE CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑤ and A/T control unit harness connector terminal ⑤.
   **Resistance:**
   **Approximately 0Ω**
4. Reinstall any part removed.

NG → Repair or replace harness between A/T control unit and terminal cord assembly. (Engine control harness)

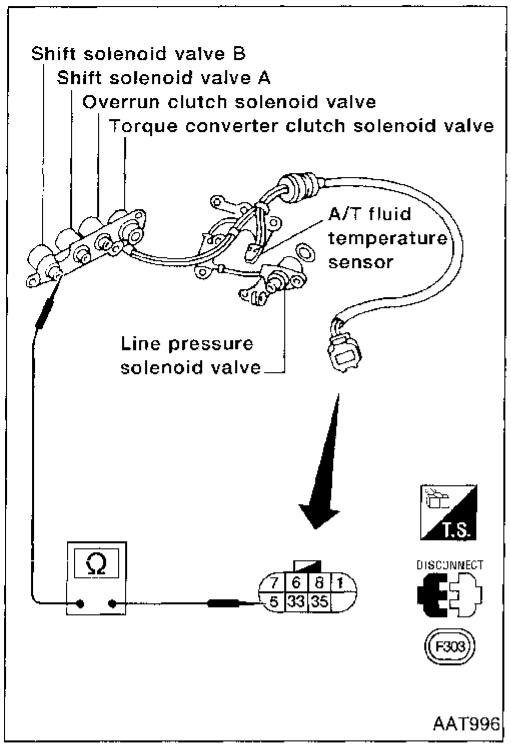
OK ↓

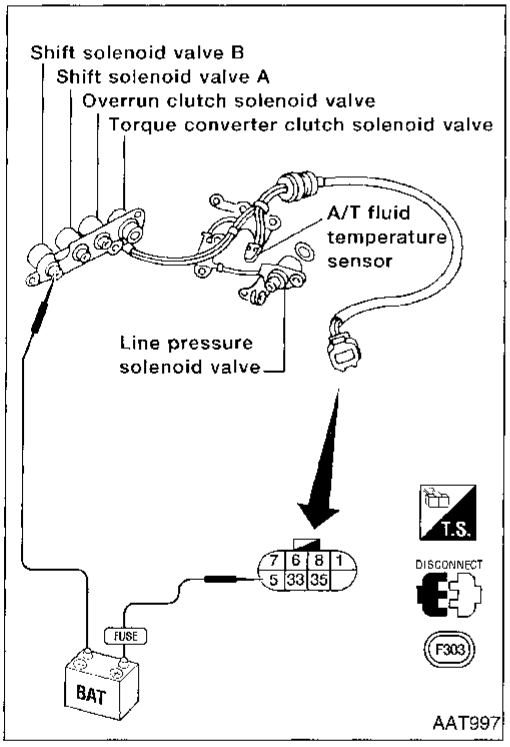
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-89.

NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

**INSPECTION END**




# Torque Converter Clutch Solenoid Valve (Cont'd)

## COMPONENT INSPECTION

### Torque converter clutch solenoid valve

- For Removal and Installation, Refer to AT-140.

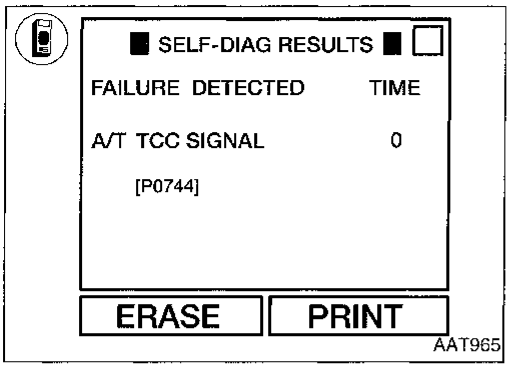
**Resistance check**

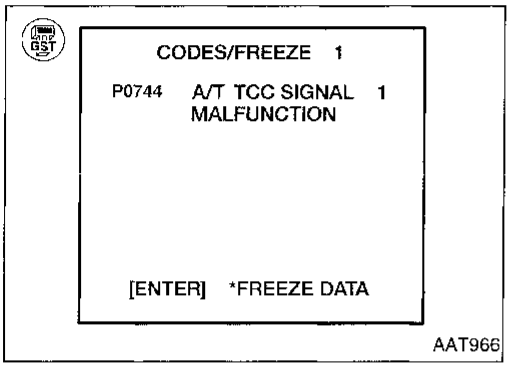
- Check resistance between two terminals.

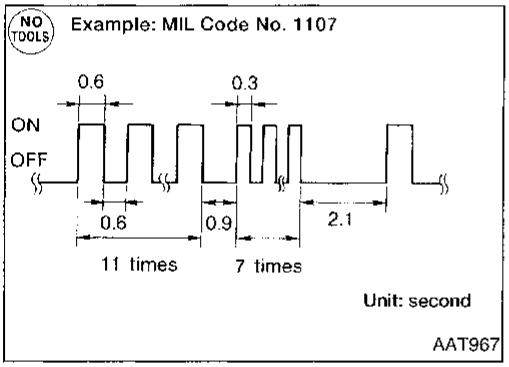
| Solenoid valve | Terminal No. | | Resistance (Approx.) |
|---|---|---|---|
| Torque converter clutch solenoid valve | ⑤ | Ground (Bracket) | 10 - 16Ω |

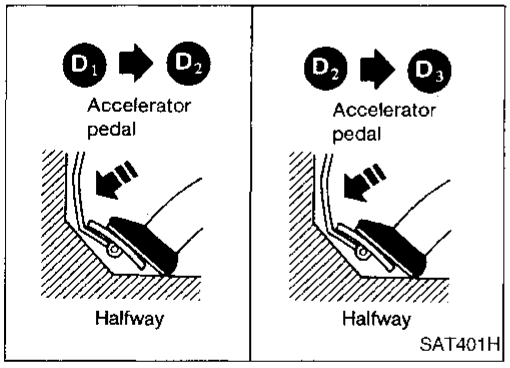
**Operation check**

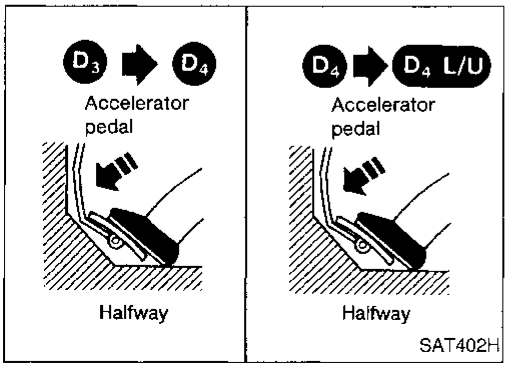
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground (bracket).




## Improper Lock-up Operation

### DESCRIPTION

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

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : A/T TCC SIGNAL<br>: P0744<br>: MIL Code No. 1107 | A/T cannot perform lock-up even if electrical circuit is good. | • Torque converter clutch solenoid valve<br>• Each clutch<br>• Hydraulic control circuit |

### Diagnostic Trouble Code (DTC) confirmation procedure

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

1) Start engine and warm up ATF.
2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-52.

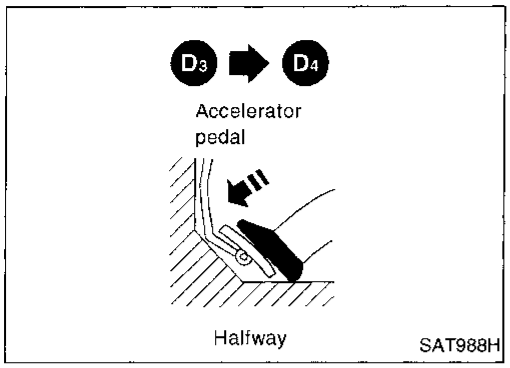
OR

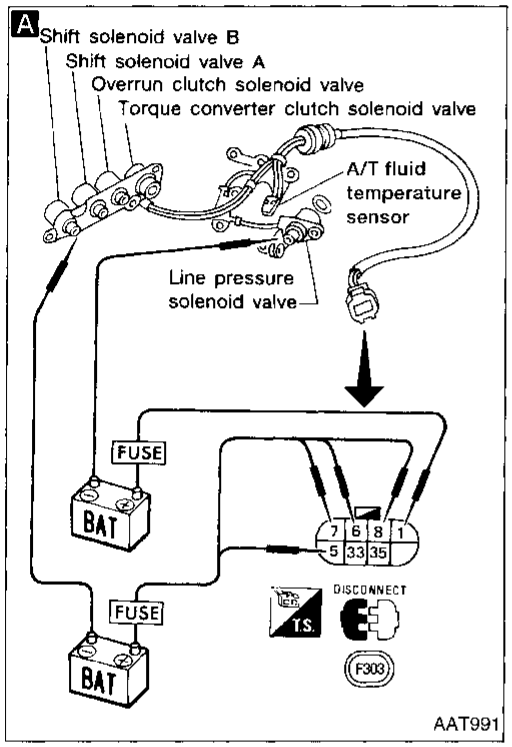
1) Start engine and warm up ATF.
2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-52.
3) Select "MODE 7" with GST.

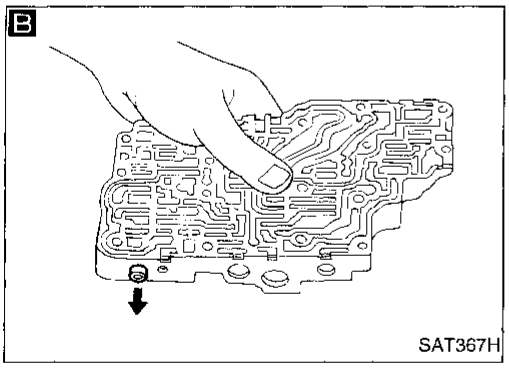
OR

1) Start engine and warm up ATF.
2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-52.
3) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

## Improper Lock-up Operation (Cont'd)




During "Cruise Test — Part 1", AT-48, does A/T shift from $D_3$ to $D_4$ at the specified speed?

Yes → Go to Ⓑ, AT-95 and check for proper lock-up.

No ↓

Perform pressure test. Refer to AT-132.

NG → Go to Ⓐ, AT-94.

OK ↓

A

**CHECK SOLENOID VALVES.**
1. Remove control valve assembly. Refer to AT-140.
2. Check solenoid valve assembly operation. Refer to "Component Inspection", AT-96.

NG → Replace solenoid valve assembly.

OK ↓

B

**CHECK CONTROL VALVE.**
1. Disassemble control valve assembly. Refer to AT-170.
2. Check to ensure that:
- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.

NG → Repair control valve.

OK ↓

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

NG → Check control valve again. Repair or replace control valve assembly.

OK ↓

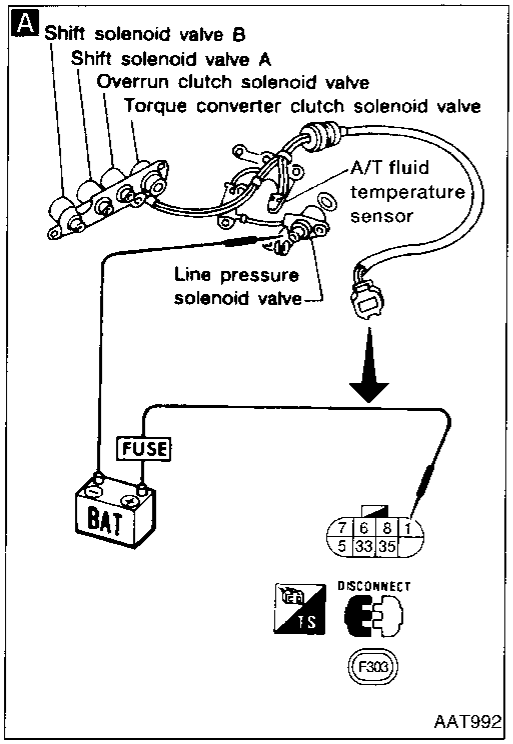
Perform "Diagnostic Trouble Code (DTC) confirmation procedure, AT-92.

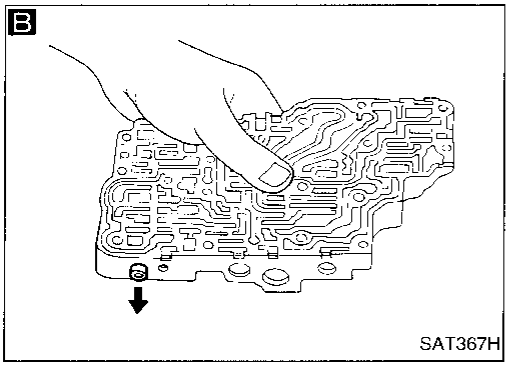
NG → Go to Ⓑ, AT-95 and check for proper lock-up.

OK ↓

**INSPECTION END**

## Improper Lock-up Operation (Cont'd)




Ⓐ

**A**

**CHECK LINE PRESSURE SOLENOID VALVE.**
1. Remove control valve assembly. Refer to AT-140.
2. Check line pressure solenoid valve operation. Refer to "Component Inspection", AT-96.

NG → Replace solenoid valve assembly.

OK ↓

**B**

**CHECK CONTROL VALVE.**
1. Disassemble control valve assembly. Refer to AT-170.
2. Check line pressure circuit valves for sticking.
- Pressure regulator valve
- Pilot valve
- Pressure modifier valve

NG → Repair control valve.

OK ↓

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

NG → Check control valve again. Repair or replace control valve assembly.

OK ↓

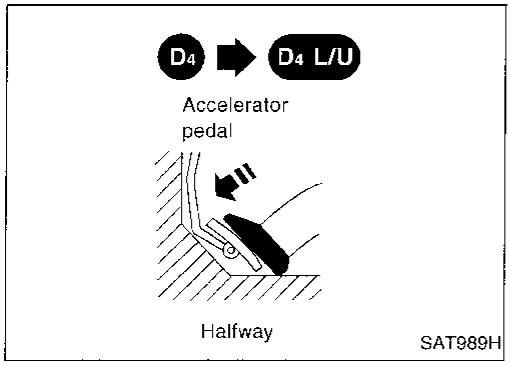
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-92.

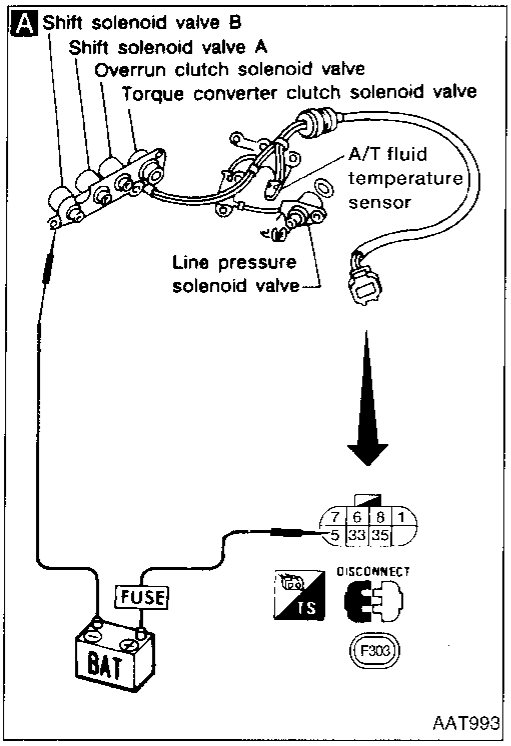
NG → Go to Ⓑ, AT-95 and check for proper lock-up.

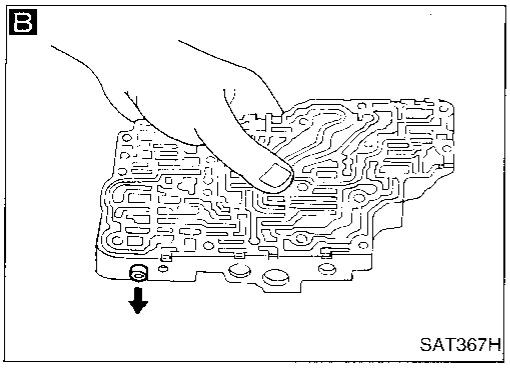
OK ↓

**INSPECTION END**

## Improper Lock-up Operation (Cont'd)




Ⓑ

During "Cruise Test — Part 1", AT-48, does A/T perform lock-up at the specified speed?
- Yes → Perform "Cruise Test — Part 1" again and return to the start point of this flow chart.
- No ↓

**A**

**CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE.**
1. Remove control valve assembly. Refer to AT-140.
2. Check torque converter clutch solenoid valve operation. Refer to "Component Inspection", AT-96.

- NG → Replace solenoid valve assembly.
- OK ↓

**B**

**CHECK CONTROL VALVE.**
1. Disassemble control valve assembly. Refer to AT-170.
2. Check control valves for sticking.
- Torque converter clutch control valve
- Torque converter clutch relief valve

- NG → Repair control valve
- OK ↓

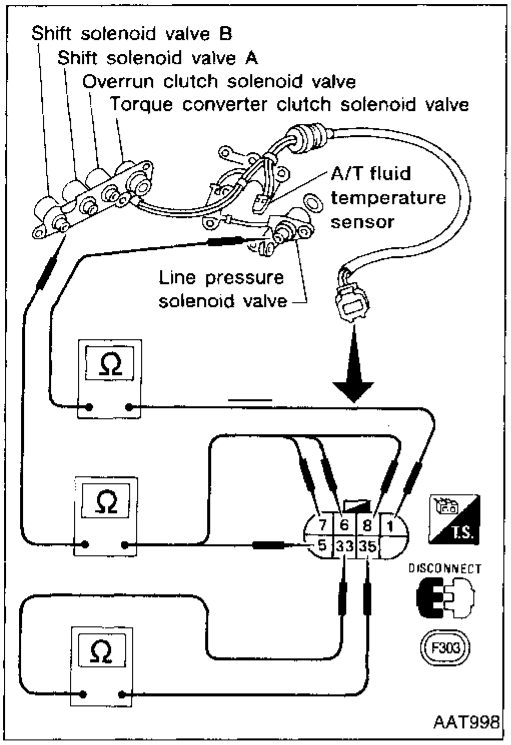
Does A/T perform lock-up at the specified speed?
- No → Check control valve again. Repair or replace control valve assembly.
- Yes ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-92.
- NG → Perform "Cruise Test — Part 1" again and return to the start point of this flow chart.
- OK ↓

**INSPECTION END**

## Improper Lock-up Operation (Cont'd)

### COMPONENT INSPECTION



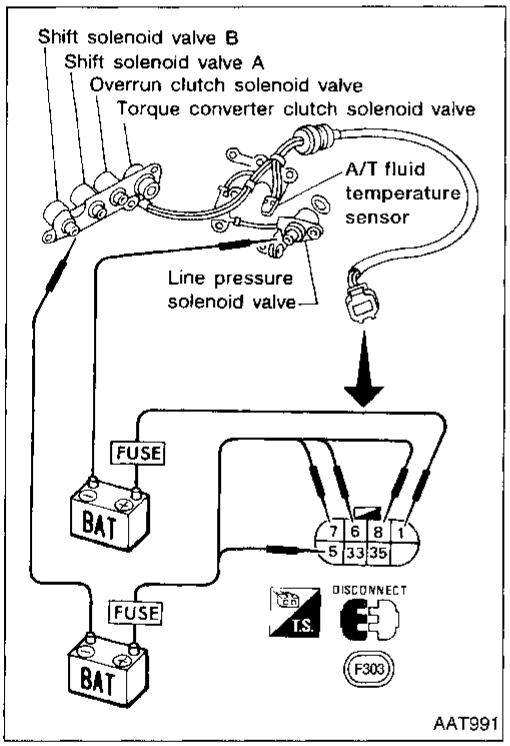

### Solenoid valves

- For Removal and Installation, Refer to AT-140.

**Resistance check**

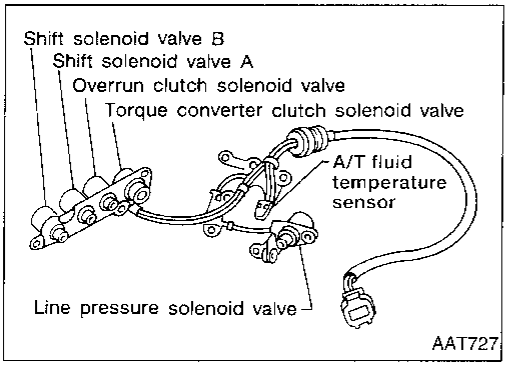
- Check resistance between two terminals.

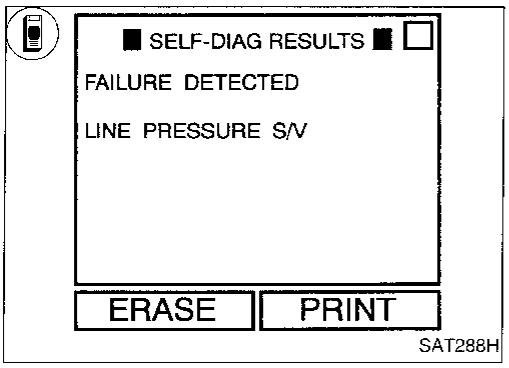
| Solenoid valve | Terminal No. | | Resistance (Approx.) |
|---|---|---|---|
| Shift solenoid valve "A" | ⑥ | Ground (Bracket) | 20 - 30Ω |
| Shift solenoid valve "B" | ⑦ | | |
| Overrun clutch solenoid valve | ⑧ | | |
| Line pressure solenoid valve | ① | | 2.5 - 5Ω |
| Torque converter clutch solenoid valve | ⑤ | | 10 - 16Ω |

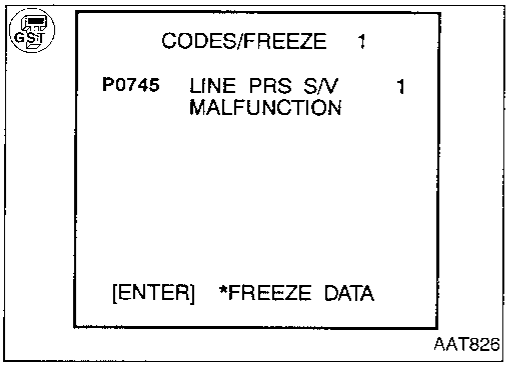


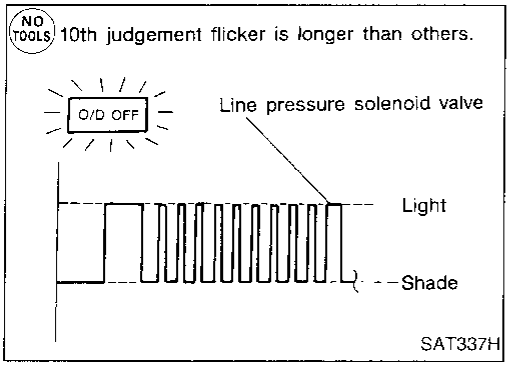

**Operation check**

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




## Line Pressure Solenoid Valve

### DESCRIPTION

The line pressure solenoid valve regulates the oil pump discharge pressure to suit the driving condition in response to a signal sent from the A/T control unit.

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : LINE PRESSURE S/V<br>: P0745<br>: 10th judgement flicker | A/T control unit detects the 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 |

### Diagnostic Trouble Code (DTC) confirmation procedure

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

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.

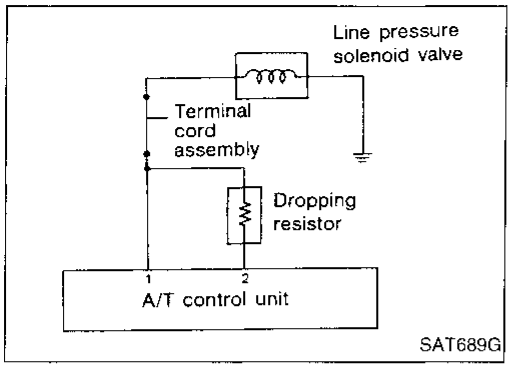
OR

1) Start engine.
2) With brake pedal depressed, shift the lever from P → N → D → N → P.
3) Select "MODE 7" with GST.

OR

1) Start engine.
2) With brake pedal depressed, shift the lever from P → N → D → N → P.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-28.

## Line Pressure Solenoid Valve (Cont'd)

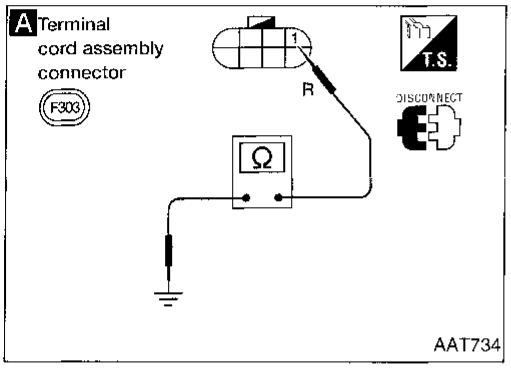



**A**

**CHECK GROUND CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ① and ground.
   **Resistance: 2.5 - 5Ω**

NG →
1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-140.
2. Check the following items:
- Line pressure solenoid valve (Refer to "Component Inspection", on the next page.)
- Harness in terminal cord assembly for short or open

OK ↓

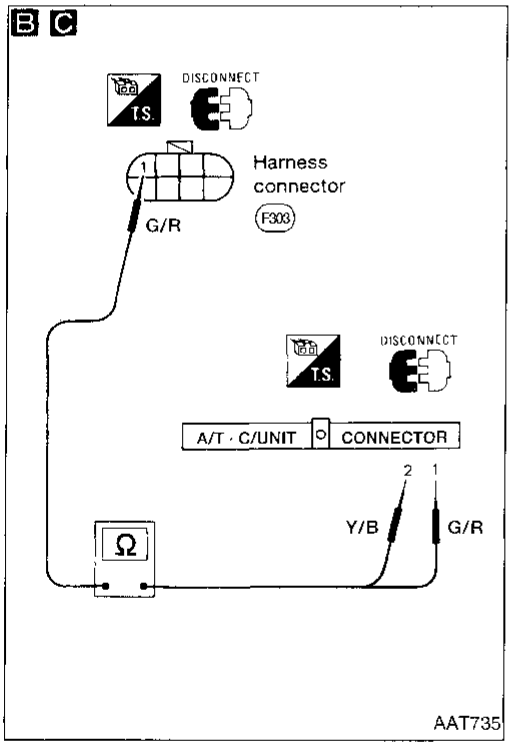



**B**

**CHECK POWER SOURCE CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ① and A/T control unit harness connector terminal ②.
   **Resistance: 11.2 - 12.8Ω**

NG →
Check the following items:
- Dropping resistor (Refer to "Component Inspection", on the next page.)
- Harness for short or open between A/T control unit terminal ② and terminal cord assembly (Engine control harness)

OK ↓




**C**

**CHECK POWER SOURCE CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Check resistance between terminal ① and A/T control unit harness connector terminal ①.
   **Resistance:**
   **Approximately 0Ω**
3. Reinstall any part removed.

NG →
Repair or replace harness between A/T control unit terminal ① and terminal cord assembly.

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-97.

NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

**INSPECTION END**

## Line Pressure Solenoid Valve (Cont'd)

### COMPONENT INSPECTION

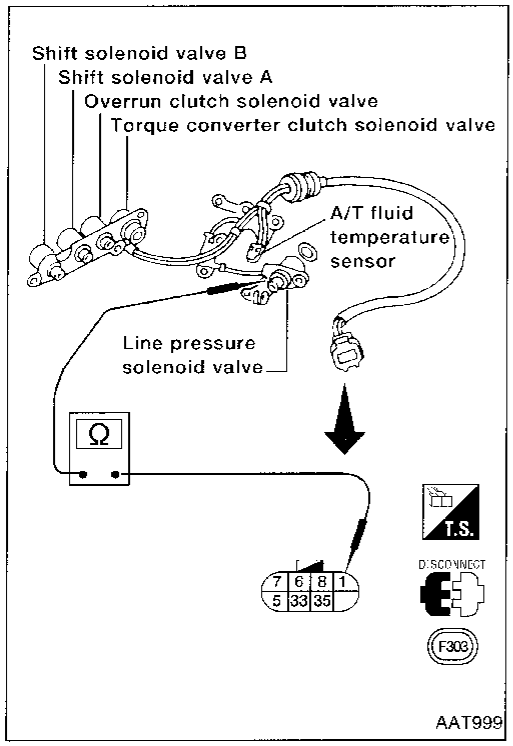
#### Line pressure solenoid valve

- For Removal and Installation, Refer to AT-140.

**Resistance check**

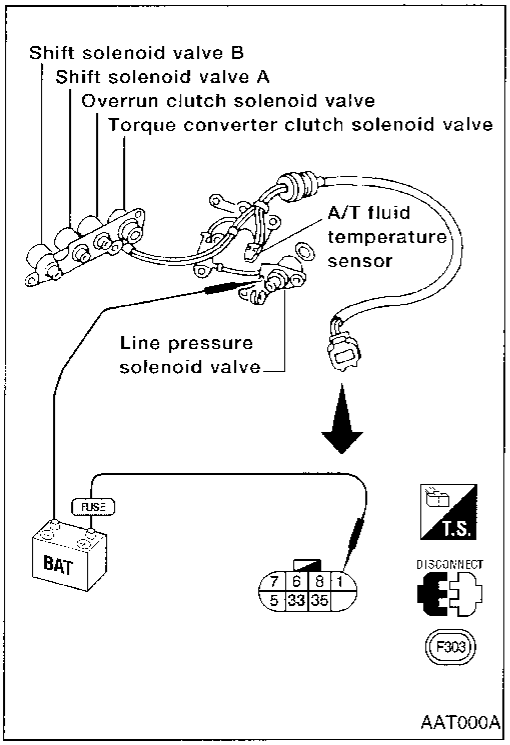
- Check resistance between two terminals.

| Solenoid valve | Terminal No. | | Resistance (Approx.) |
|---|---|---|---|
| Line pressure solenoid valve | ① | Ground (Bracket) | 2.5 - 5Ω |



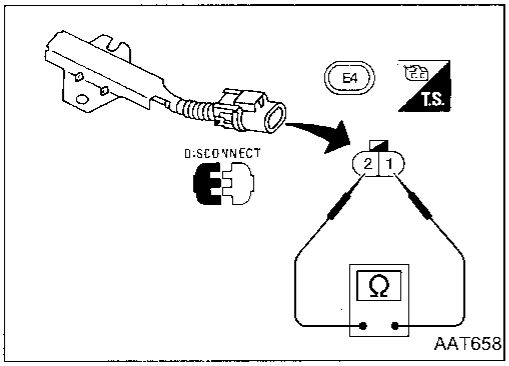

**Operation check**

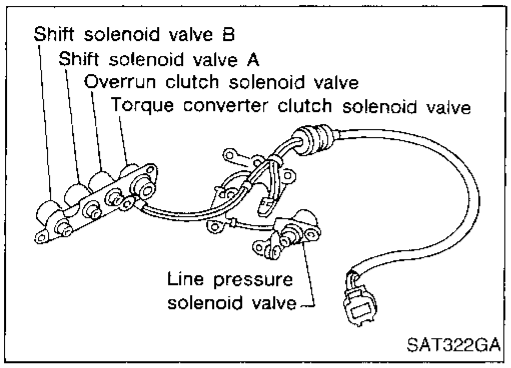
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground (bracket).

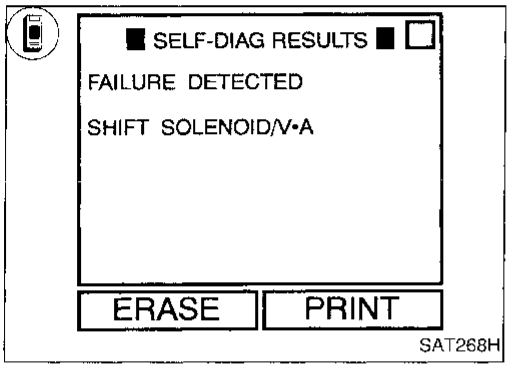


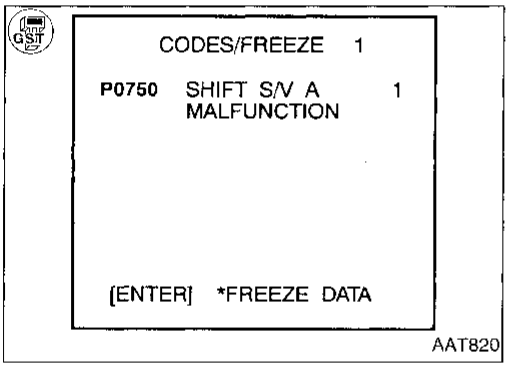

**Dropping resistor**

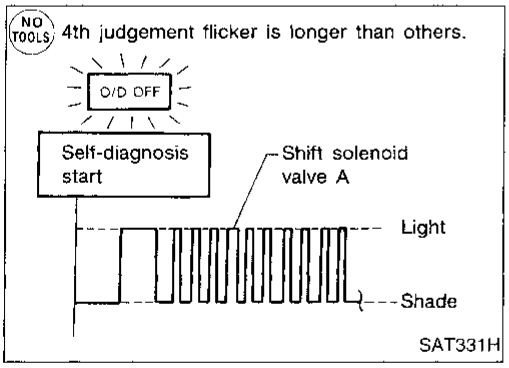
- Check resistance between two terminals.
  **Resistance: 11.2 - 12.8Ω**






## Shift Solenoid Valve A

### DESCRIPTION

Shift solenoid valves A and B are turned ON or OFF by the A/T control unit in response to signals sent from the inhibitor 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 | OFF | OFF | ON |
| Shift solenoid valve "B" | ON | ON | OFF | OFF |

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : SHIFT SOLENOID/ V-A<br>: P0750<br>: 4th judgement flicker | A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve. | • Harness or connectors (The solenoid circuit is open or shorted.)<br>• Shift solenoid valve "A" |

### Diagnostic Trouble Code (DTC) confirmation procedure

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

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

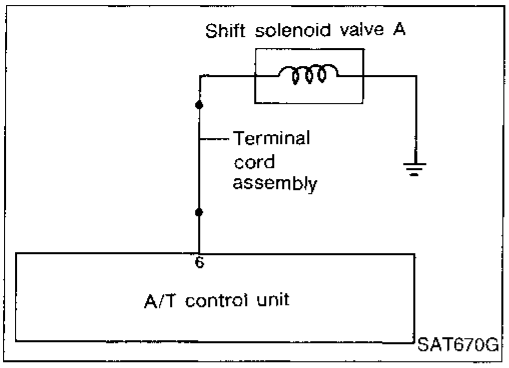
OR

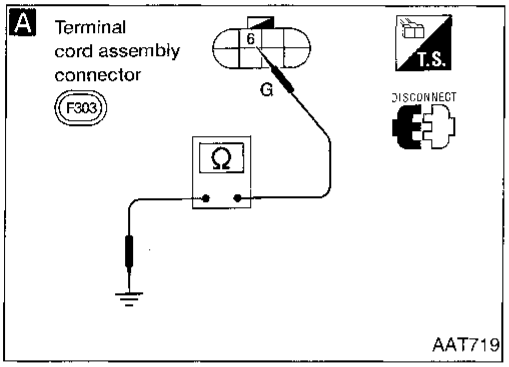
1) Start engine.
2) Drive vehicle in $D_1 \rightarrow D_2$ position.
3) Select "MODE 7" with GST.

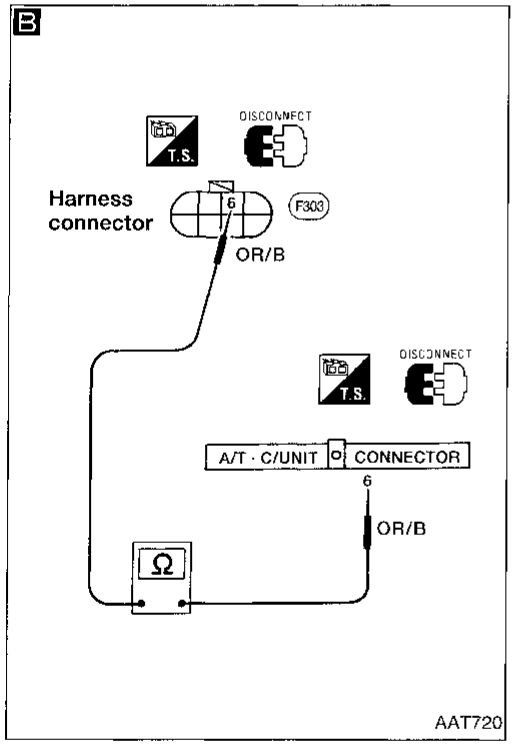
OR

1) Start engine.
2) Drive vehicle in $D_1 \rightarrow D_2$ position.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-28.

## Shift Solenoid Valve A (Cont'd)




A

**CHECK GROUND CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑥ and ground.
   **Resistance: 20 - 30Ω**

NG →
1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
   - Shift solenoid valve A (Refer to "Component Inspection", on the next page.)
   - Harness for short or open of terminal cord assembly

OK ↓

B

**CHECK POWER SOURCE CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑥ and A/T control unit harness connector terminal ⑥.
   **Resistance:**
   **Approximately 0Ω**
4. Reinstall any part removed.

NG → Repair or replace harness between A/T control unit and terminal cord assembly. (Engine control harness)

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-100.

NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

**INSPECTION END**

## Shift Solenoid Valve A (Cont'd)

### COMPONENT INSPECTION

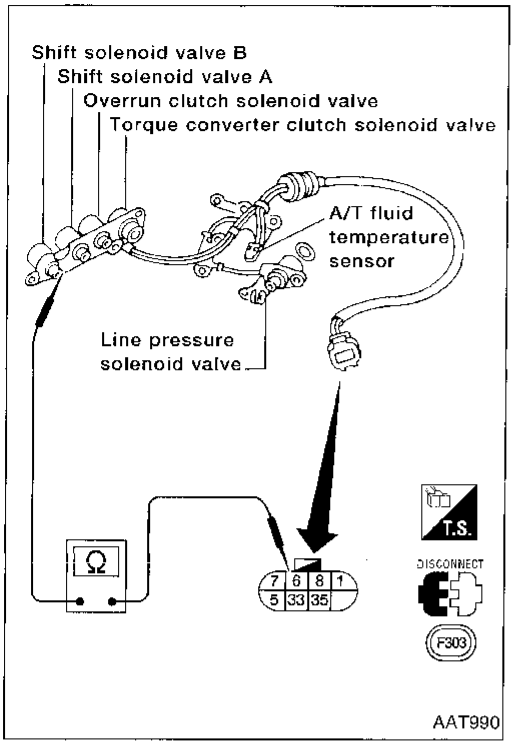
#### Shift solenoid valve A

- For Removal and Installation, Refer to AT-140.

**Resistance check**

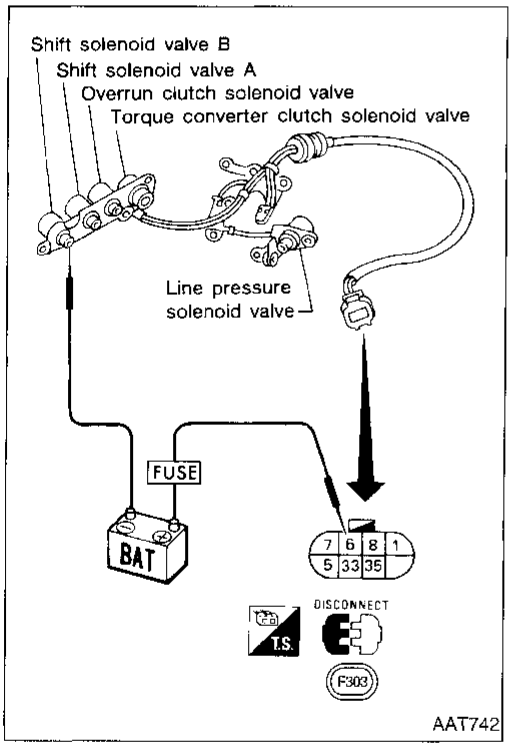
- Check resistance between two terminals.

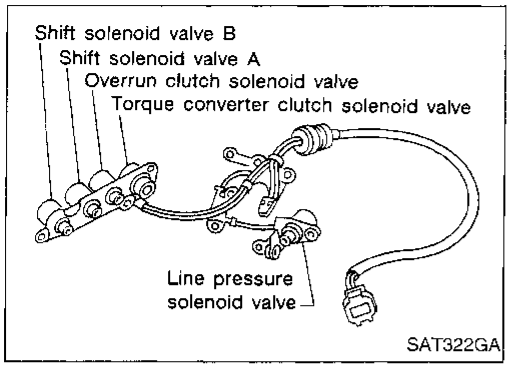
| Solenoid valve | Terminal No. | | Resistance (Approx.) |
|---|---|---|---|
| Shift solenoid valve "A" | ⑥ | Ground (Bracket) | 20 - 30Ω |

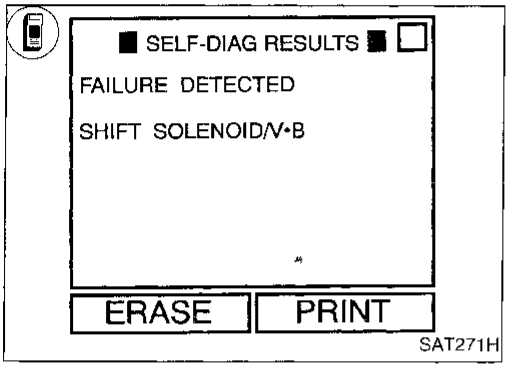


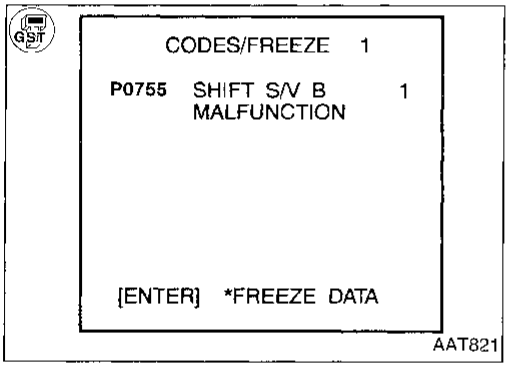

**Operation check**

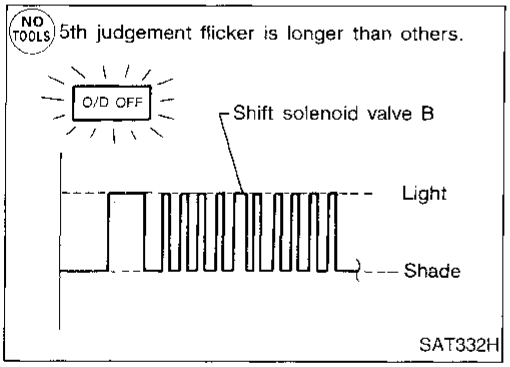
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground (bracket).






## Shift Solenoid Valve B

### DESCRIPTION

Shift solenoid valves A and B are turned ON or OFF by the A/T control unit in response to signals sent from the inhibitor 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 | OFF | OFF | ON |
| Shift solenoid valve "B" | ON | ON | OFF | OFF |

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : SHIFT SOLENOID/ V·B<br>: P0755<br>: 5th judgement flicker | A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve. | • Harness or connectors (The solenoid circuit is open or shorted.)<br>• Shift solenoid valve "B" |

### Diagnostic Trouble Code (DTC) confirmation procedure

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

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

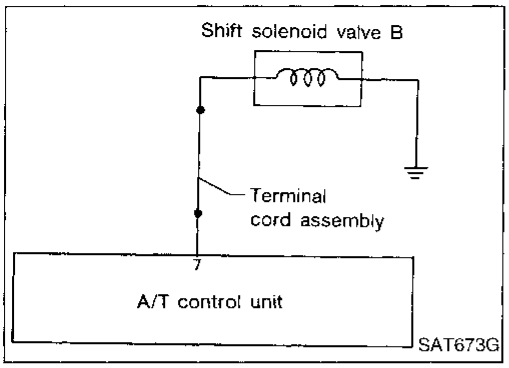
OR

1) Start engine.
2) Drive vehicle in $D_1 \rightarrow D_2 \rightarrow D_3$ position.
3) Select "MODE 7" with GST.

OR

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 (No Tools), AT-28.

## Shift Solenoid Valve B (Cont'd)

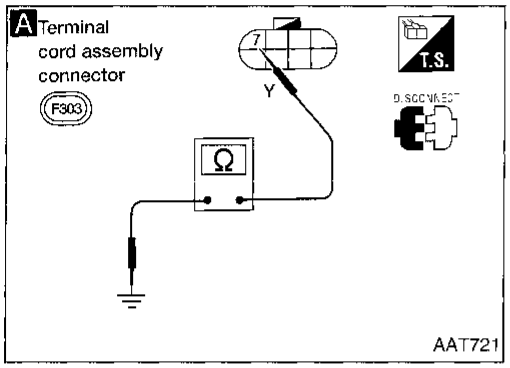



A

**CHECK GROUND CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑦ and ground.
   **Resistance: 20 - 30Ω**

NG →
1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
- Shift solenoid valve B (Refer to "Component Inspection", on the next page.)
- Harness of terminal cord assembly for short or open

OK ↓




B

**CHECK POWER SOURCE CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑦ and A/T control unit harness connector terminal ⑦.
   **Resistance:**
   **Approximately 0Ω**
4. Reinstall any part removed.

NG → Repair or replace harness between A/T control unit and terminal cord assembly. (Engine control harness)

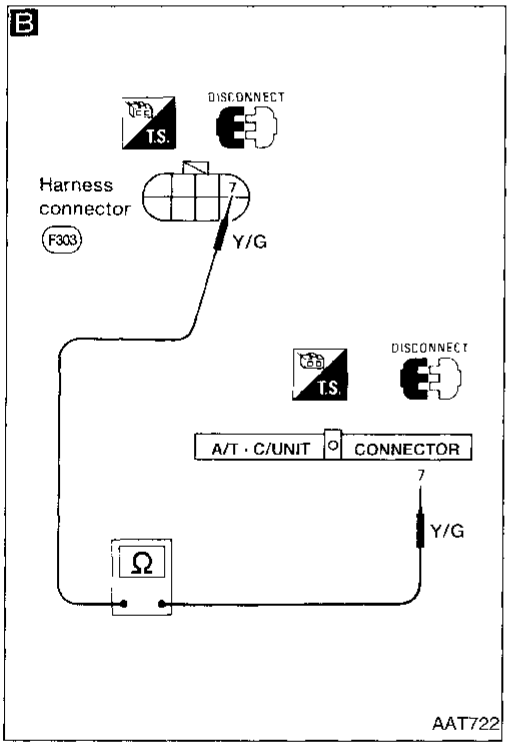
OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-103.

NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

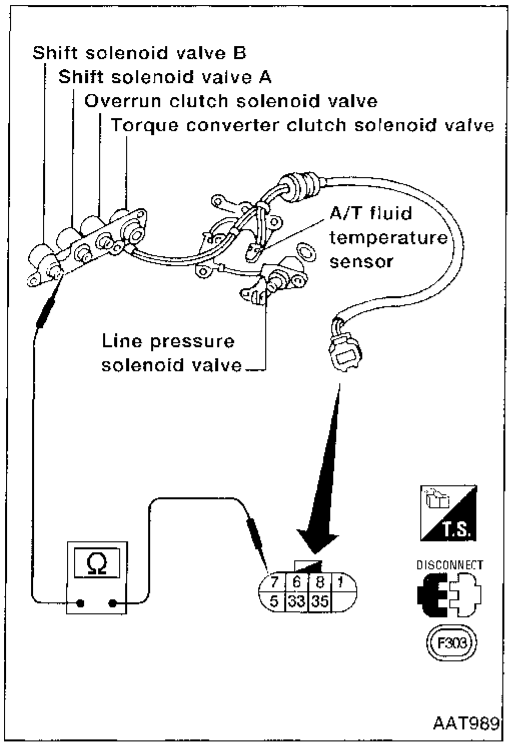
**INSPECTION END**



## Shift Solenoid Valve B (Cont'd)

### COMPONENT INSPECTION

#### Shift solenoid valve B

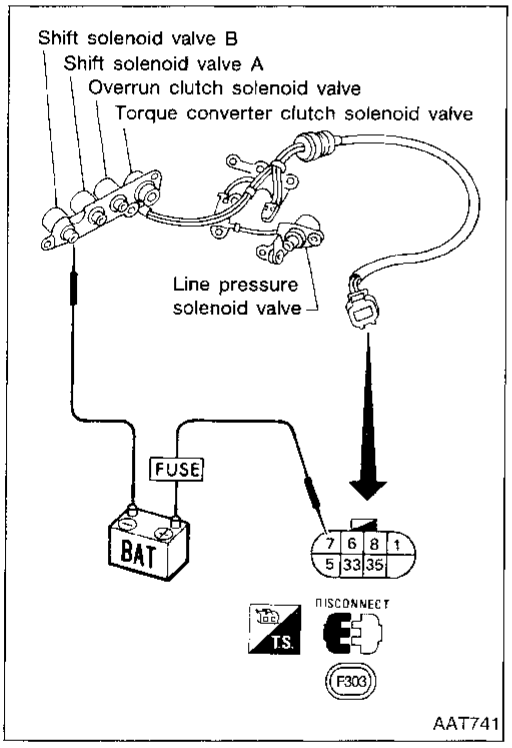



- For Removal and Installation, Refer to AT-140.

**Resistance check**

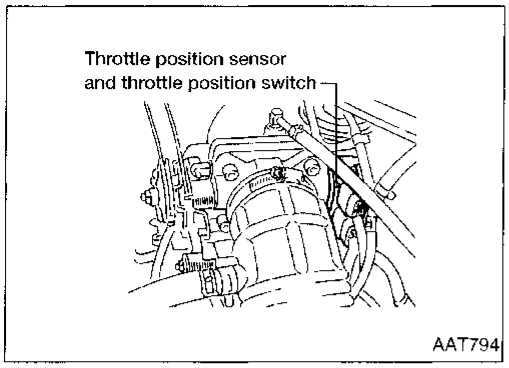
- Check resistance between two terminals.

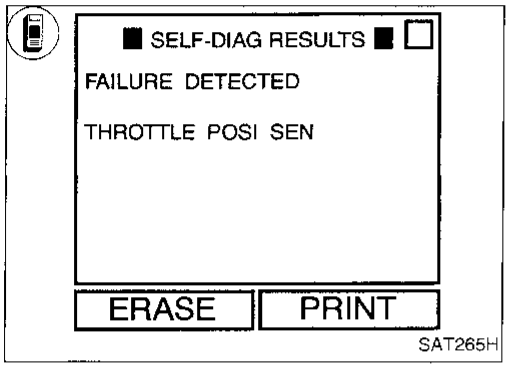
| Solenoid valve | Terminal No. | | Resistance (Approx.) |
|---|---|---|---|
| Shift solenoid valve "B" | ⑦ | Ground (Bracket) | 20 - 30Ω |

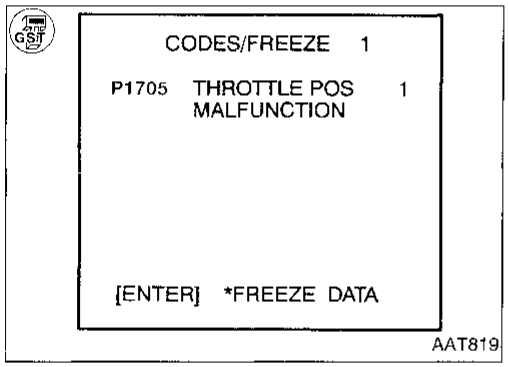


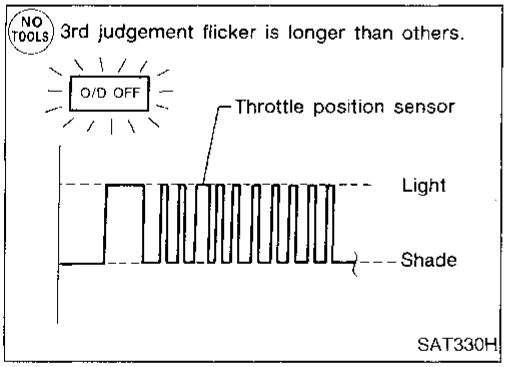

**Operation check**

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




# Throttle Position Sensor

## DESCRIPTION

The throttle position sensor detects the throttle valve position and sends a signal to the A/T control unit.

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : THROTTLE POSITION<br>: P1705<br>: 3rd judgement flicker | A/T control unit receives an excessively low or high voltage from the sensor. | • Harness or connectors (The sensor circuit is open or shorted.)<br>• Throttle position sensor |

## Diagnostic Trouble Code (DTC) confirmation procedure

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

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle under the following conditions:
   Selector lever in "D", 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.

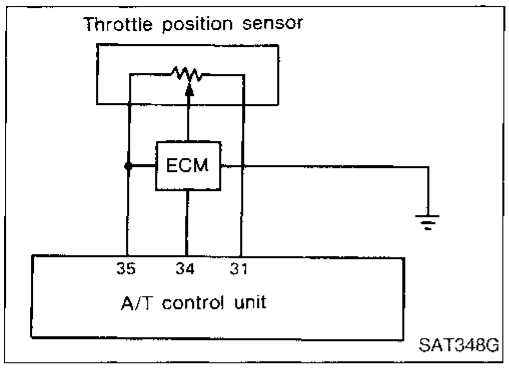
OR

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

OR

1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D", 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 (No Tools), AT-28.

## Throttle Position Sensor (Cont'd)

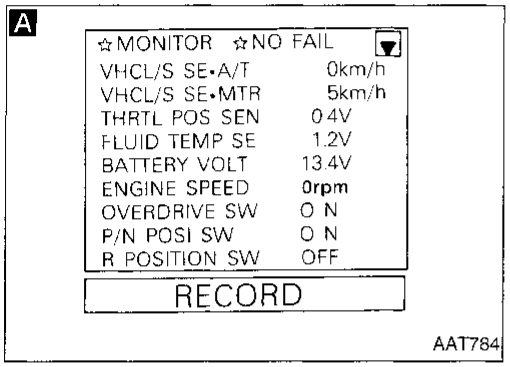



Perform diagnostic test mode II (self-diagnostic results) for engine control. Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

NG → Check throttle position sensor circuit for engine control. Refer to EC section ["Throttle Position Sensor (DTC: 0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].

OK ↓

A



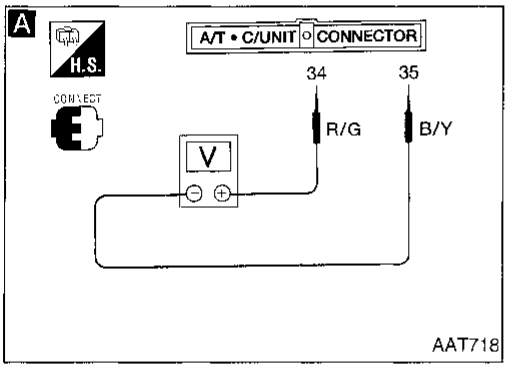

**CHECK INPUT SIGNAL.**

1. Turn ignition switch to ON position. (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out the value of "THRTL POS SEN".

**Voltage:**
**Fully-closed throttle:**
**Approximately 0.5V**
**Fully-open throttle:**
**Approximately 4V**

NG → Check harness for short or open between ECM and A/T control unit regarding throttle position sensor circuit (Main harness).

OR




1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between A/T control unit terminals (34) and (35) 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)**

OK ↓

CHECK THROTTLE POSITION SWITCH. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705", "CHECK THROTTLE POSITION SWITCH CIRCUIT" AT-66.

NG → Repair or replace damaged parts.

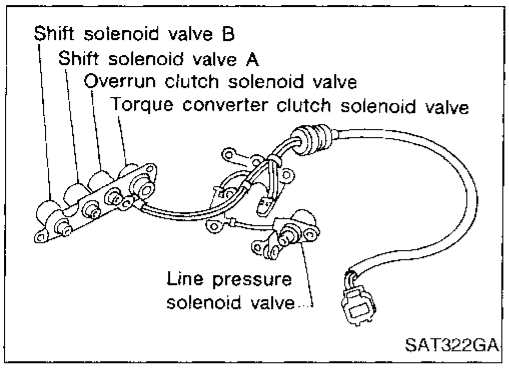
OK ↓

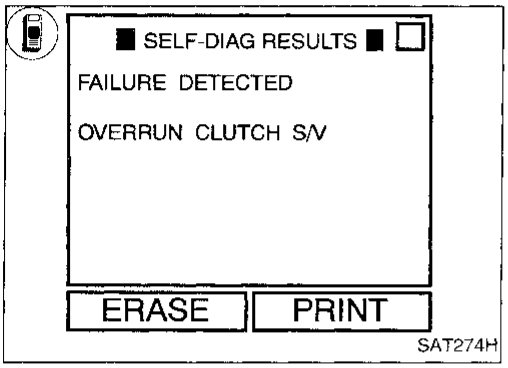
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-106.

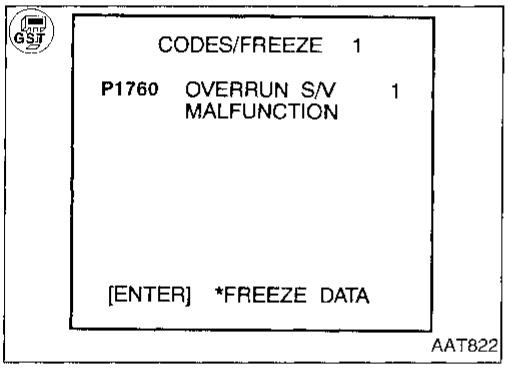
NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

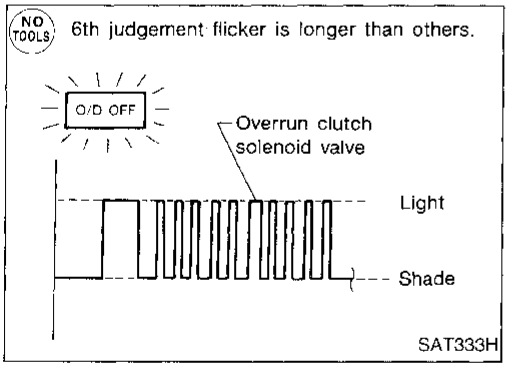
OK ↓

**INSPECTION END**




## Overrun Clutch Solenoid Valve

### DESCRIPTION

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

| Diagnostic trouble code | Malfunction is detected when ... | Check item (Possible cause) |
|---|---|---|
| : OVERRUN CLUTCH S/V<br>: P1760<br>: 6th judgement flicker | A/T control unit detects the 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 |

### Diagnostic Trouble Code (DTC) confirmation procedure

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

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

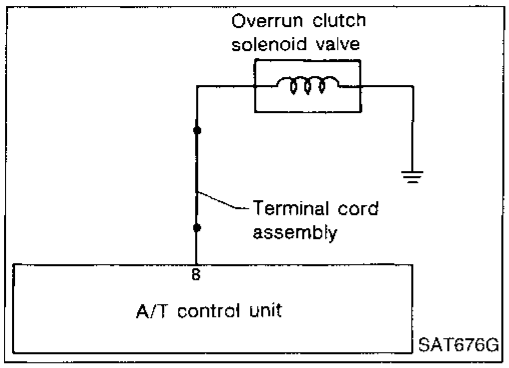
OR

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

OR

1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D", 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 (No Tools), AT-28.

## Overrun Clutch Solenoid Valve (Cont'd)

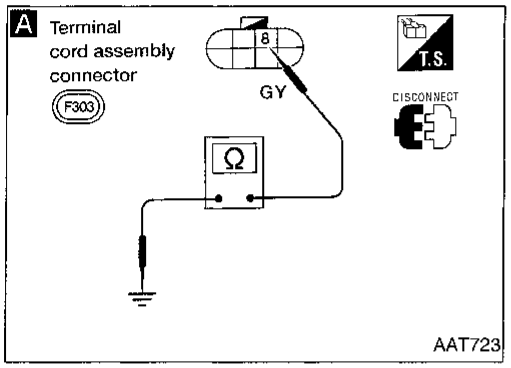



A

**CHECK GROUND CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑧ and ground.
   **Resistance: 20 - 30Ω**

NG →
1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-140.
2. Check the following items:
- Overrun clutch solenoid valve (Refer to "Components Inspection", on the next page.)
- Harness of terminal cord assembly for short or open

OK ↓

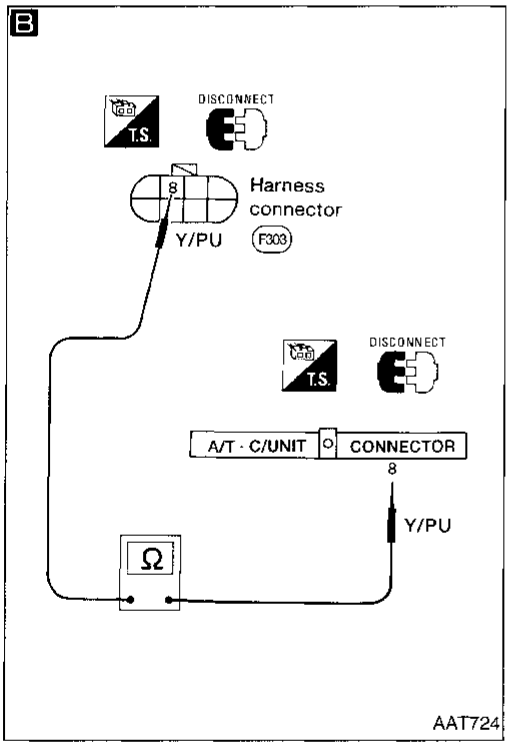



B

**CHECK POWER SOURCE CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑧ and A/T control unit harness connector terminal ⑧.
   **Resistance:**
   **Approximately 0Ω**
4. Reinstall any part removed.

NG →
Repair or replace harness between A/T control unit and terminal cord assembly. (Engine control harness)

OK ↓




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

NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

**INSPECTION END**

## Overrun Clutch Solenoid Valve (Cont'd)

### COMPONENT INSPECTION

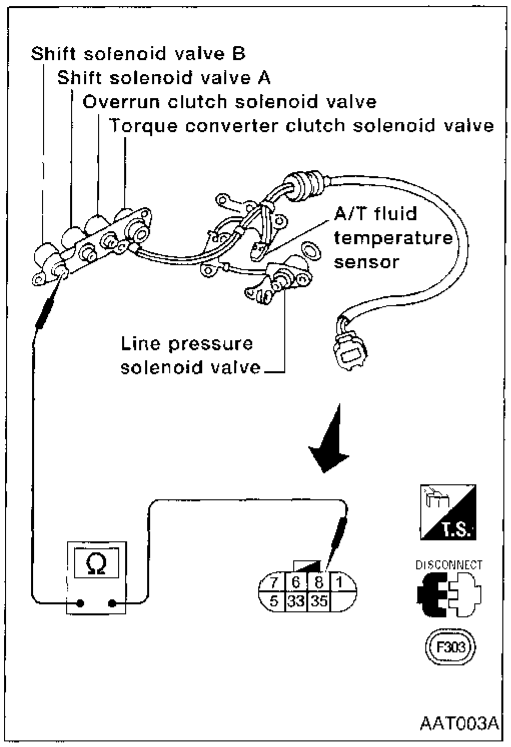
#### Overrun clutch solenoid valve

- For Removal and Installation, Refer to AT-140.

**Resistance check**

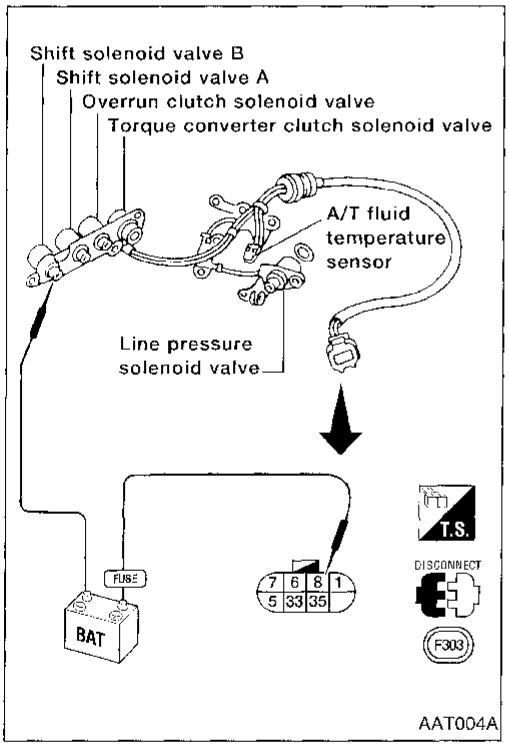
- Check resistance between two terminals.

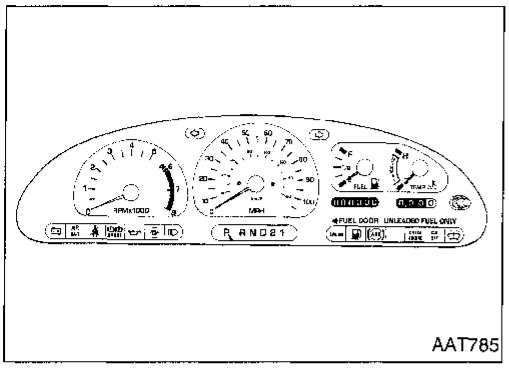
| Solenoid valve | Terminal No. | | Resistance (Approx.) |
|---|---|---|---|
| Overrun clutch solenoid valve | ⑧ | Ground (Bracket) | 20 - 30Ω |

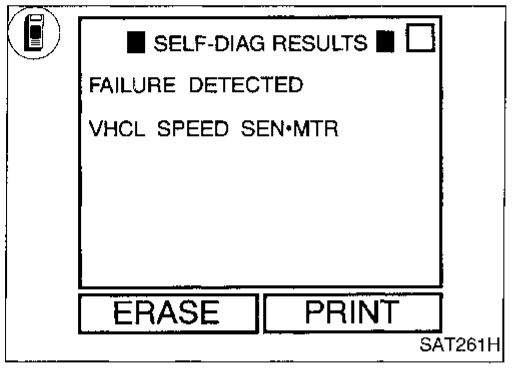


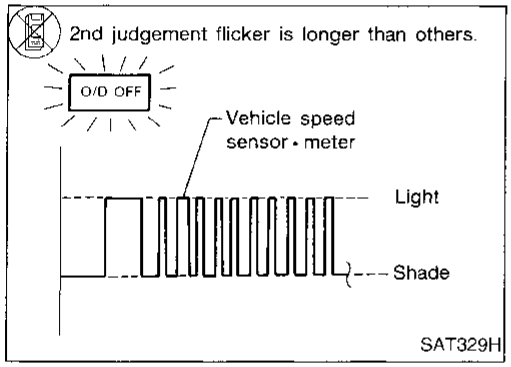

**Operation check**

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






## Vehicle Speed Sensor·MTR

### DESCRIPTION

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

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

### Diagnostic Trouble Code (DTC) confirmation procedure

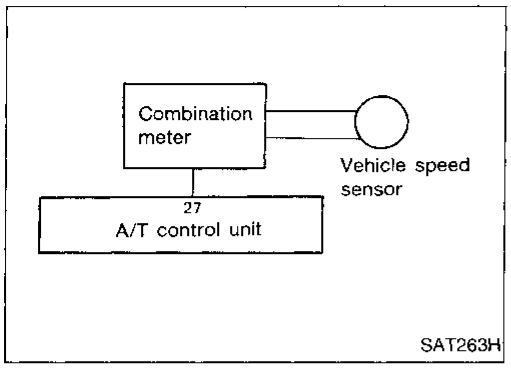
After the repair, perform the following procedure to confirm that the malfunction is eliminated.

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

OR

1) Start engine.
2) Drive vehicle under the following conditions:
   Selector lever in "D" and vehicle speed higher than 20 km/h (12 MPH).
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-28.

## Vehicle Speed Sensor·MTR (Cont'd)




A

**CHECK INPUT SIGNAL.**

1. Start engine.
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out the value of "VHCL/S SE·MTR" while driving.
   Check that the value changes according to driving speed.

NG → Check the following items:
- Vehicle speed sensor and ground circuit for vehicle speed sensor Refer to EL section ("METERS AND GAUGES").
- Harness for short or open between A/T control unit and vehicle speed sensor (Main harness)

OR

1. Start engine.
2. Check voltage between A/T control unit terminal (27) and ground while driving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.
   **Voltage:**
   **Voltage varies between less than 1V and more than 4.5V**

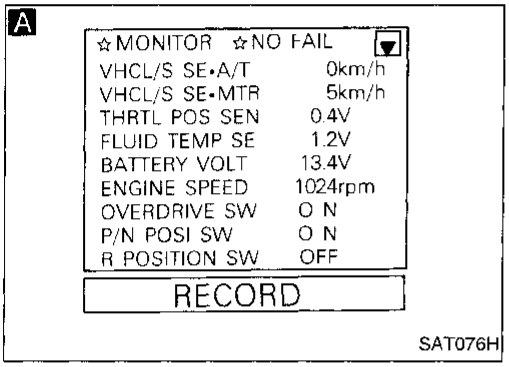
OK ↓

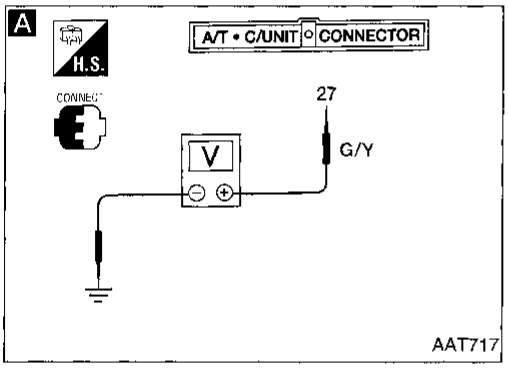
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-111.

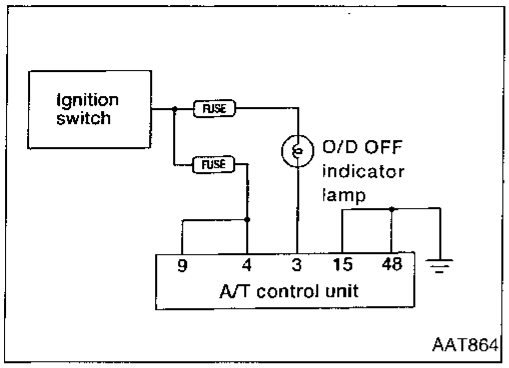
NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

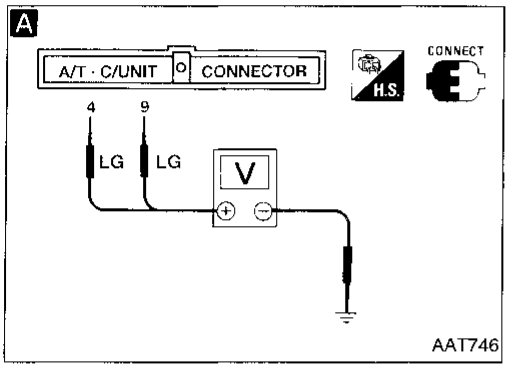
OK ↓

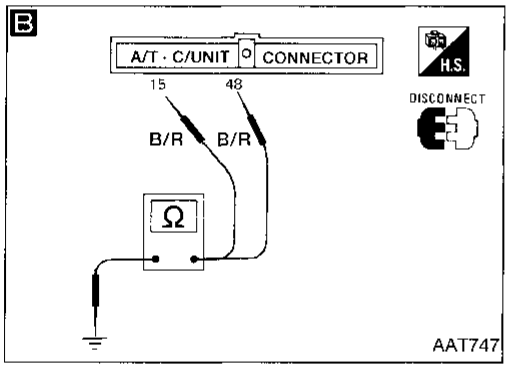
**INSPECTION END**

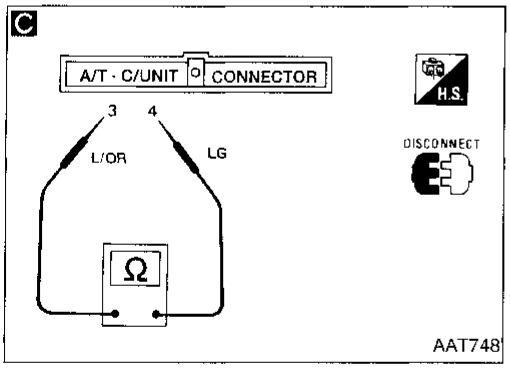





# 1. O/D OFF Indicator Lamp Does Not Come On

## SYMPTOM:

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

**A**

**CHECK A/T CONTROL UNIT POWER SOURCE.**
1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between A/T control unit terminals ④, ⑨ and ground.
   **Battery voltage should exist.**

NG → Check the following items:
- Harness for short or open between ignition switch and A/T control unit (Main harness)
- Ignition switch and fuse Refer to EL section ("POWER SUPPLY ROUTING").

OK ↓

**B**

**CHECK A/T CONTROL UNIT GROUND CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between A/T control unit harness connector terminals ⑮, ㊽ and ground.
   **Resistance:**
   **Approximately 0Ω**

NG → Check harness for short or open between A/T control unit and ground.

OK ↓

**C**

**CHECK LAMP CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Check resistance between A/T control unit harness connector terminals ③ and ④.
   **Resistance: 50 - 100Ω**
3. Reinstall any part removed.

NG → Check the following items.
- O/D OFF indicator lamp (Refer to EL section.)
- Harness for short or open between ignition switch and O/D OFF indicator lamp (Main harness)
- Harness for short or open between O/D OFF indicator lamp and A/T control unit

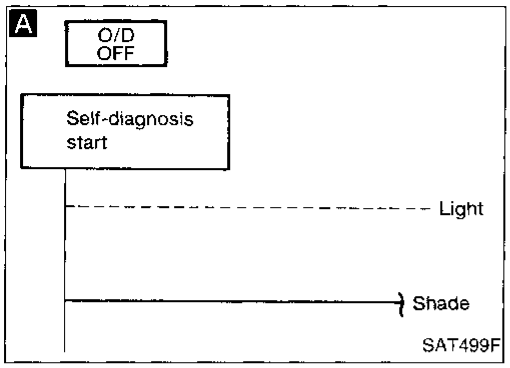
OK ↓

Check again.

NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

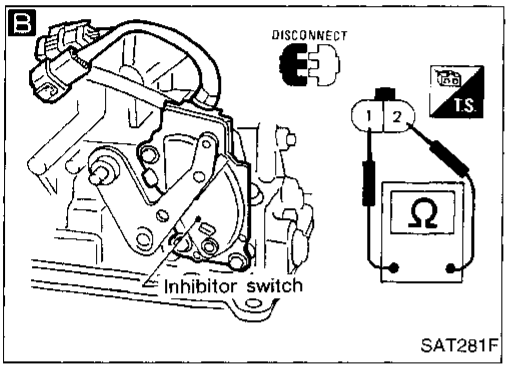
**INSPECTION END**




## 2. Engine Cannot Be Started in "P" and "N" Position

### SYMPTOM:

- **Engine cannot be started with selector lever in "P" or "N" position.**
- **Engine can be started with selector lever in "D", "2", "1" or "R" position.**




Does "ECU INPUT SIGNALS" in Data Monitor show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705", AT-63.

OR

A

Does self-diagnosis show damage to inhibitor switch circuit?

No

B

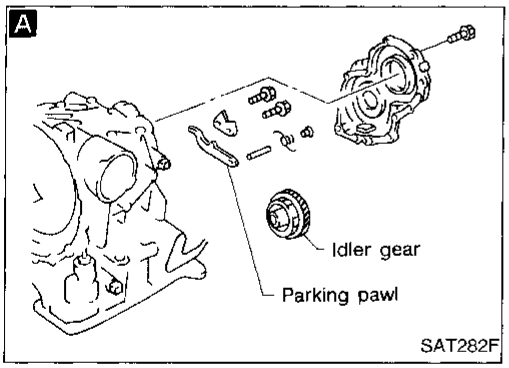
Check for short or open between inhibitor switch connector terminals ① and ②. Refer to "Component Inspection", AT-67. — NG → Repair or replace inhibitor switch.

OK

Check starting system. Refer to EL section ("System Description", "STARTING SYSTEM"). — NG → Repair or replace damaged parts.

OK

**INSPECTION END**




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

### SYMPTOM:

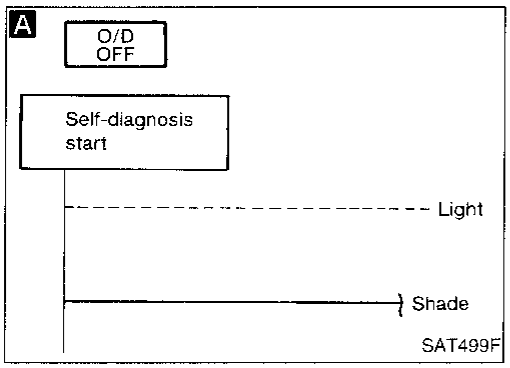
**Vehicle moves when it is pushed forward or backward with selector lever in "P" position.**

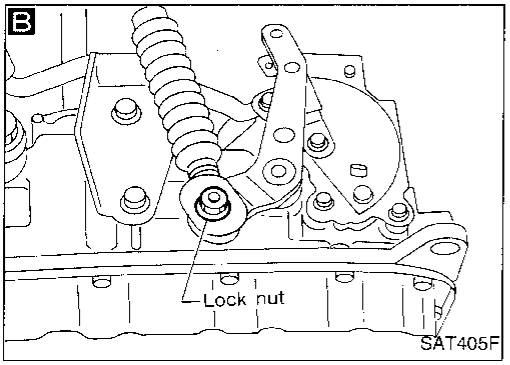
A

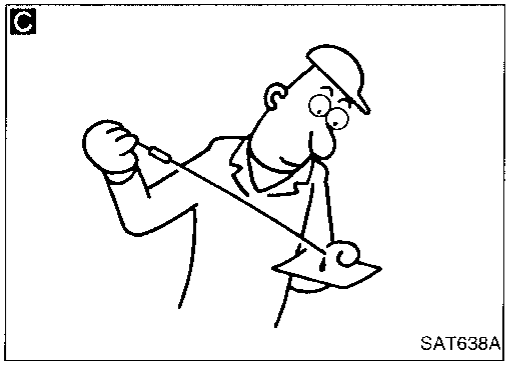
Check parking components. Refer to AT-164. — NG → Repair or replace damaged parts.

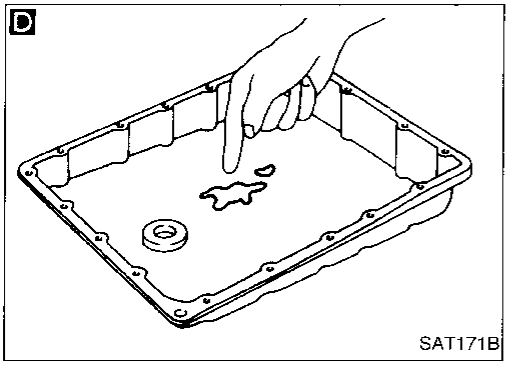
OK

**INSPECTION END**




## 4. In "N" Position, Vehicle Moves

**SYMPTOM:**

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

Does "ECU INPUT SIGNALS" in Data Monitor show damage to inhibitor switch circuit? —Yes→ Check inhibitor switch circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705", AT-63.

OR

A

Does self-diagnosis show damage to inhibitor switch circuit?

No ↓

Check control cable. Refer to "ON-VEHICLE SERVICE", AT-142. —NG→ B Adjust control cable. Refer to "ON-VEHICLE SERVICE", AT-142.

OK ↓

C

Check A/T fluid level again. —NG→ Refill ATF.

OK ↓

D

1. Remove oil pan.
2. Check A/T fluid condition. —NG→
   1. Disassemble A/T.
   2. Check the following items:
      - Forward clutch assembly
      - Overrun clutch assembly
      - Reverse clutch assembly

OK ↓

Check again. —NG→
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

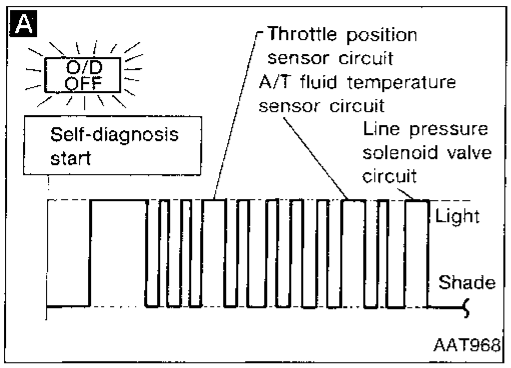
**INSPECTION END**

## 5. Large Shock "N" → "R" Position

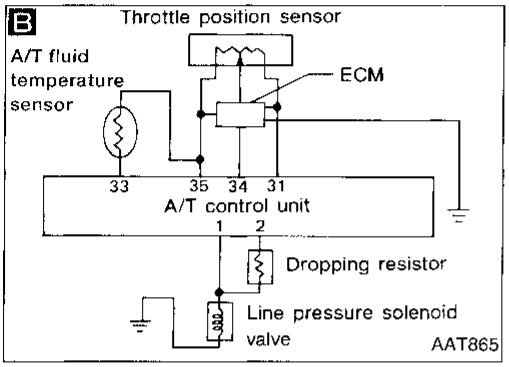
### SYMPTOM:

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

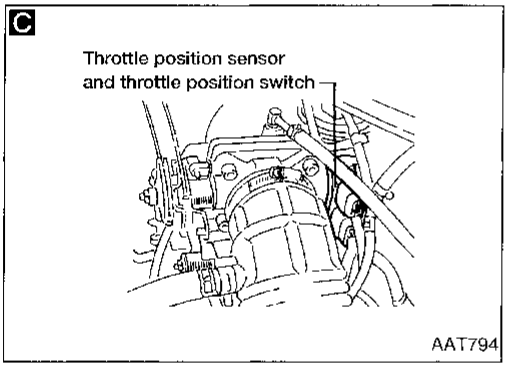
A



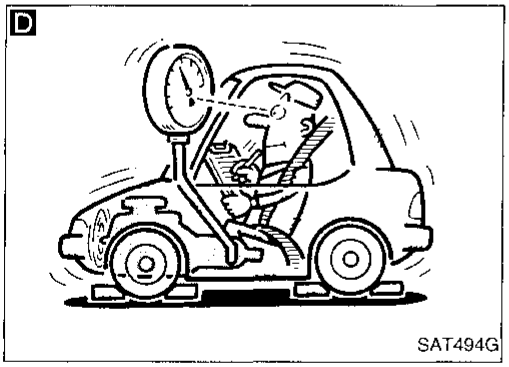

B




C




D




A

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

Yes → B

B

Check damaged circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0710, P0745 or P1705", AT-68, AT-97 or AT-106.

No ↓

C

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

NG → Repair or replace throttle position sensor.

OK ↓

D

Check line pressure at idle with selector lever in "D" position. Refer to AT-132.

NG →
1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

OK ↓

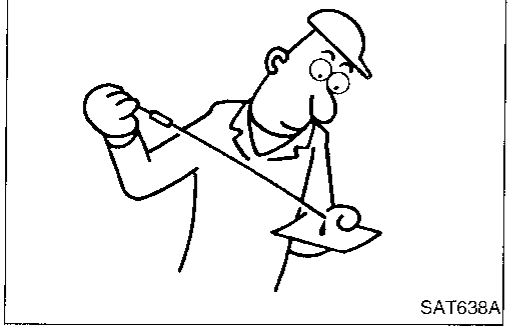
Check again.

NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

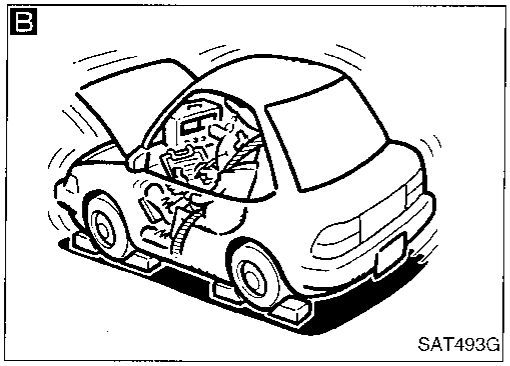
**INSPECTION END**

A



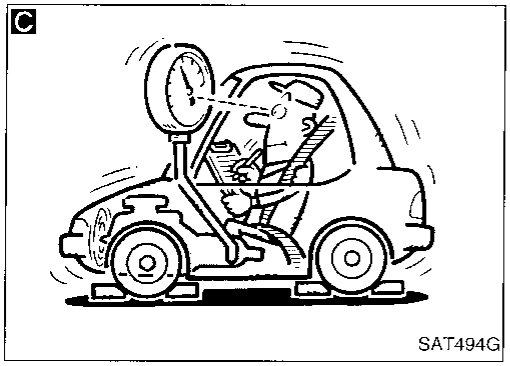
SAT638A

B



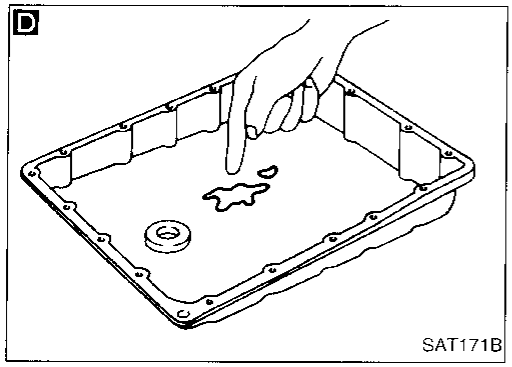
SAT493G

C



SAT494G

D



SAT171B

## 6. Vehicle Does Not Creep Backward in "R" Position

### SYMPTOM:

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

A

Check A/T fluid level again.

NG → Refill ATF.

OK ↓

B

Check stall revolution with selector lever in "1" and "R" positions.

NG in both "1" and "R" positions → Ⓐ

1. Remove control valve assembly. Refer to AT-140.
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve
3. Disassemble A/T.
4. Check the following items:
- Oil pump assembly
- Torque converter
- Reverse clutch assembly
- High clutch assembly
- Low & reverse brake assembly
- Low one-way clutch

OK

OK in "1" position
NG in "R" position

1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve
3. Disassemble A/T.
4. Check the following items:
- Oil pump assembly
- Torque converter
- Reverse clutch assembly
- High clutch assembly

C

Check line pressure at idle with selector lever in "R" position. Refer to AT-132.

NG →

1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve
3. Disassemble A/T.
4. Check the following item:
- Oil pump assembly

OK ↓

D

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

NG → Ⓐ (See above)

OK ↓

Check again.

NG →

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

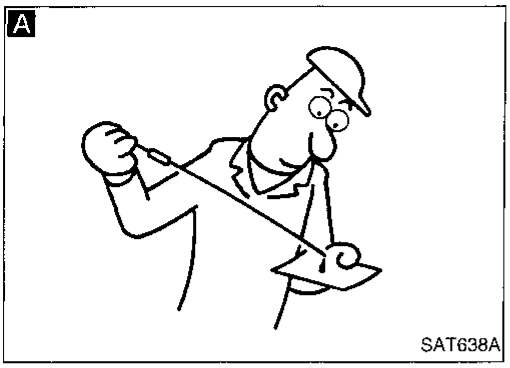
OK ↓

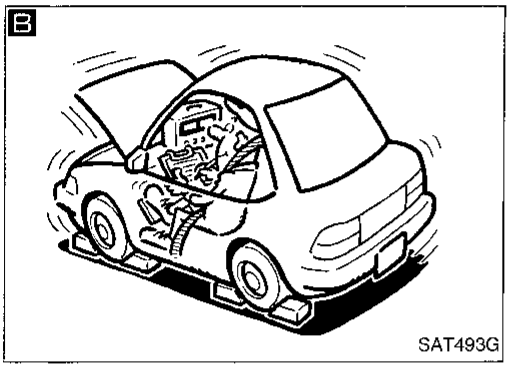
**INSPECTION END**

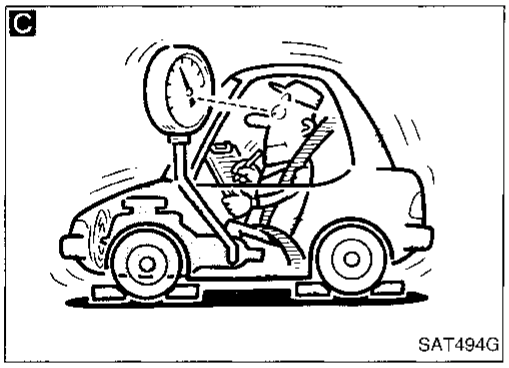
## 7. Vehicle Does Not Creep Forward In "D", "2" or "1" Position

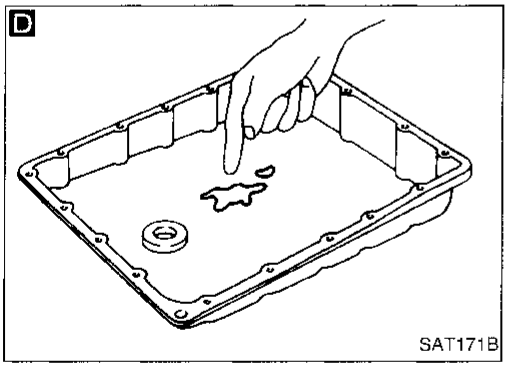
**SYMPTOM:**

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




A

Check A/T fluid level again. — NG → Refill ATF.

OK ↓

B

Check stall revolution with selector lever in "D" position. Refer to "STALL TESTING", AT-129. — NG → 1. Remove control valve assembly. Refer to AT-140. 2. Check the following items:
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T
4. Check the following items:
- Oil pump assembly
- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- Low & reverse brake assembly
- Torque converter

OK ↓

C

Check line pressure at idle with selector lever in "D" position. Refer to AT-132.

OK ↓ / NG → 1. Remove control valve assembly. Refer to AT-140. 2. Check the following items:
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T
4. Check the following item:
- Oil pump assembly

D

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

NG → Ⓐ (See above)

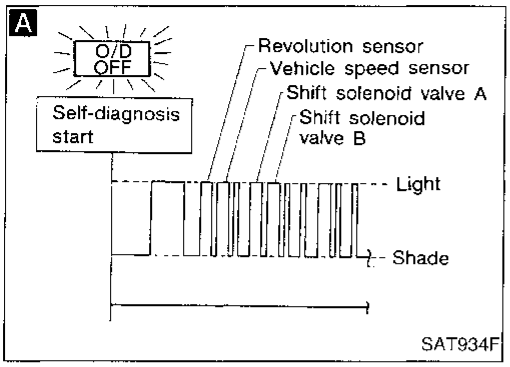
OK ↓

Check again. — NG → 1. Perform A/T control unit input/output signal inspection. 2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

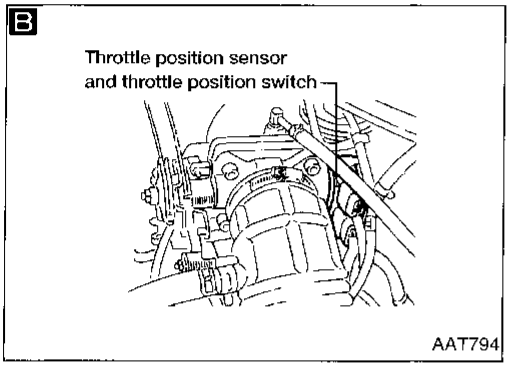
**INSPECTION END**

A



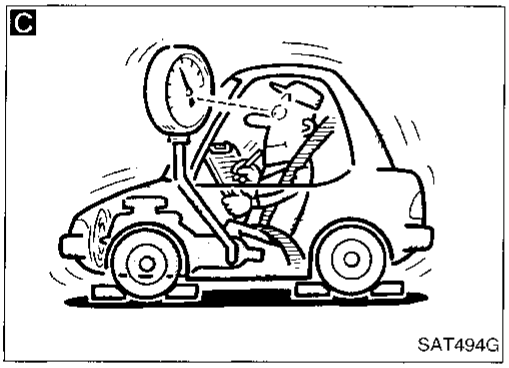

SAT934F

B



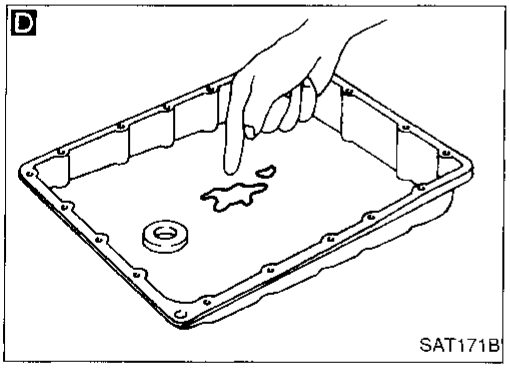

AAT794

C



SAT494G

D



SAT171B

## 8. Vehicle Cannot Be Started From $D_1$

### SYMPTOM:

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

Is 6. Vehicle Creeps Forward In "R" Position OK?

No → Go to 6. Vehicle Creeps Forward In "R" Position, , AT-117.

Yes

A

Does self-diagnosis show damage to revolution sensor, shift solenoid A, B or vehicle speed sensor after cruise test?

Yes → Check damaged circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0720, P0750, P0755 or VHCL SPEED SEN·MTR", AT-71, AT-100, AT-103.

No

B

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

NG → Repair or replace throttle position sensor.

OK

C

Check line pressure at stall point with selector lever in "D" position. Refer to AT-132.

NG →
1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check the following items:
- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- High clutch assembly
- Torque converter
- Oil pump assembly

OK

D

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

NG → (same items as above)

OK

1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK

OK

Check again.

NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK

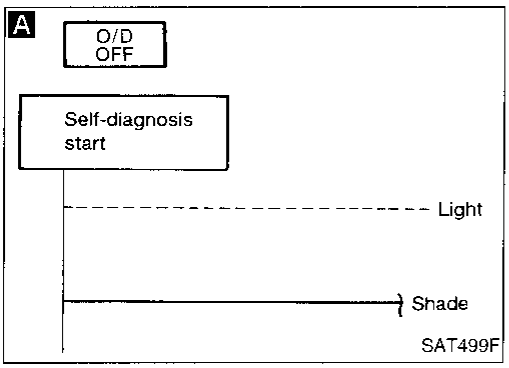
**INSPECTION END**

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

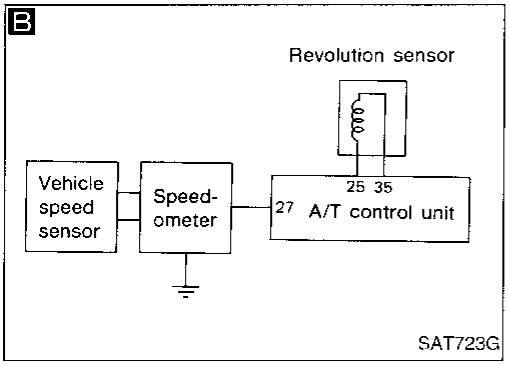
**SYMPTOM:**

- **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.**

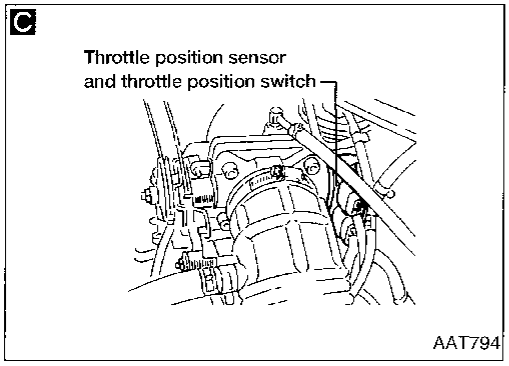
A



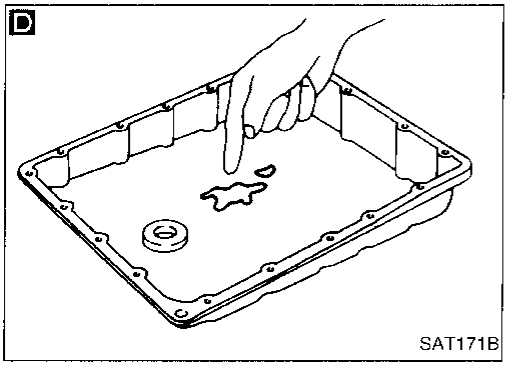

B




C




D




Are 7. Vehicle Does Not Creep Forward In "D", "2" or "1" Position and 8. Vehicle Cannot Be Started From $D_1$ OK?

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-118 or AT-119.

Yes ↓

Does "ECU INPUT SIGNALS" in Data Monitor show damage to inhibitor switch circuit?

Yes → Check inhibitor switch circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705", AT-63.

OR

A

Does self-diagnosis show damage to inhibitor switch circuit?

No ↓

B

Check revolution sensor and vehicle speed sensor circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0720 and VHCL SPEED SEN·MTR ", AT-71.

NG → Repair or replace revolution sensor and vehicle speed sensor circuits.

OK ↓

C

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

NG → Repair or replace throttle position sensor.

OK ↓

D

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

NG → 1. Remove control valve. Refer to AT-140.
2. Check the following items:
- Shift valve A
- Shift solenoid valve A
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check the following items:
- Servo piston assembly
- Brake band
- Oil pump assembly

OK ↓

1. Remove control valve. Refer to AT-140.
2. Check the following items:
- Shift valve A
- Shift solenoid valve A
- Pilot valve
- Pilot filter

OK ↓

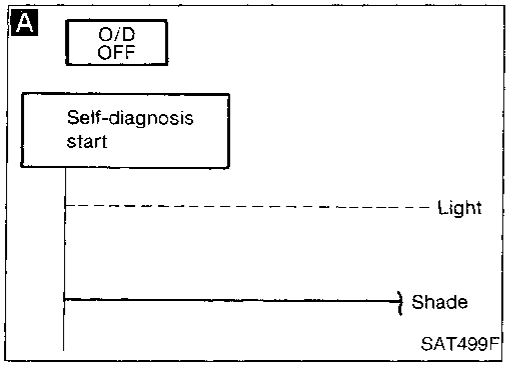
OK ← (from 4. Check the following items)

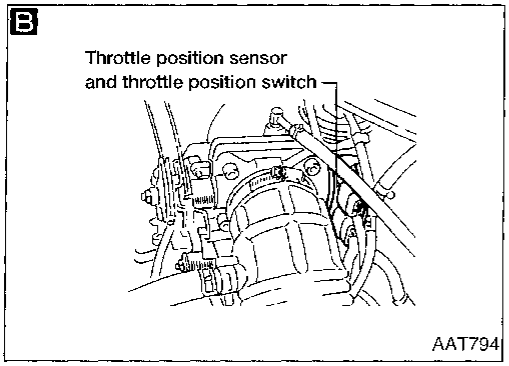
Check again.

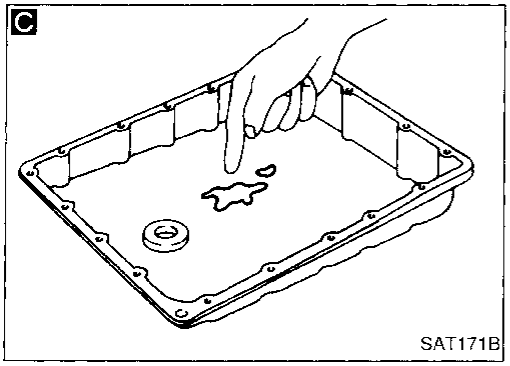
NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

**INSPECTION END**




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

**SYMPTOM:**

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

Are 7. Vehicle Does Not Creep Forward In "D", "2" or "1" Position and 8. Vehicle Cannot Be Started From $D_1$ OK?

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-118 or AT-119.

Yes ↓

Does "ECU INPUT SIGNALS" in Data Monitor show damage to inhibitor switch circuit?

Yes → Check inhibitor switch circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705 , AT-63.

OR

A

Does self-diagnosis show damage to inhibitor switch circuit?

No ↓

B

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

NG → Repair or replace throttle position sensor.

OK ↓

C

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

NG → 1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check the following items:
- Servo piston assembly
- High clutch assembly
- Oil pump assembly

OK ↓

1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter

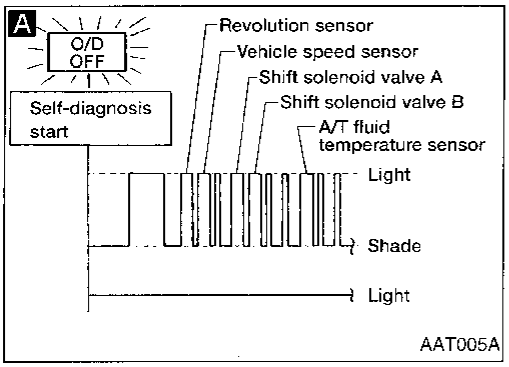
OK ↓

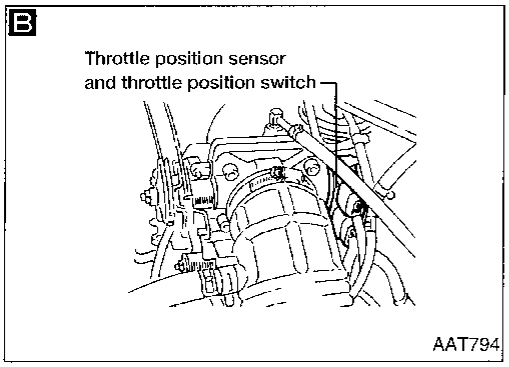
Check again.

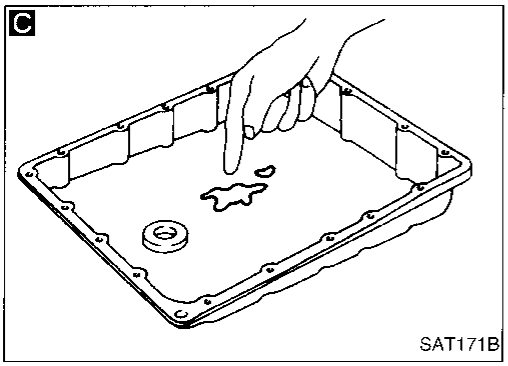
NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

**INSPECTION END**




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

**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.**

Are 7. Vehicle Does Not Creep Forward In "D", "2" or "1" Position and 8. Vehicle Cannot Be Started From $D_1$ OK?

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-118 or AT-119.

Yes ↓

**A**

Does self-diagnosis, after cruise test, show damage to any of the following circuits?
- Inhibitor switch
- Overdrive control switch
- A/T fluid temperature sensor
- Revolution sensor
- Shift solenoid valve A or B
- Vehicle speed sensor

Yes → Check damaged circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705, P0710, P0720, P0750, P0755 or VHCL SPEED SEN·MTR".

No ↓

**B**

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

NG → Repair or replace throttle position sensor.

OK ↓

**C**

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

NG → 1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
- Shift valve B
- Overrun clutch control valve
- Shift solenoid valve B
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check the following items:
- Servo piston assembly
- Brake band
- Torque converter
- Oil pump assembly

OK ↓

1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
- Shift valve B
- Overrun clutch control valve
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK ↓

OK ←

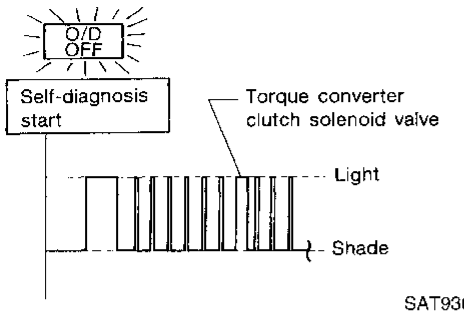
Check again.

NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

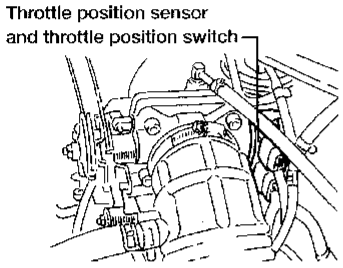
**INSPECTION END**

A




SAT936F

B




AAT794

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

**SYMPTOM:**

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

A

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

Yes → Check torque converter clutch solenoid valve circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0740", AT-89.

No

B

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

NG → Repair or replace throttle position sensor.

OK

1. Remove control valve. Refer to AT-140.
2. Check following items:
- Torque converter clutch control valve
- Torque converter relief valve
- Torque converter clutch solenoid valve
- Pilot valve
- Pilot filter

NG → Repair or replace damaged parts.

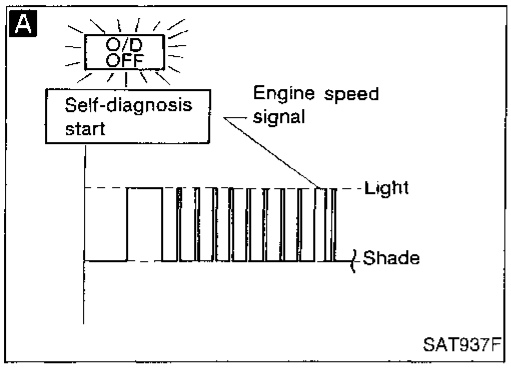
OK

Check again.

NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK

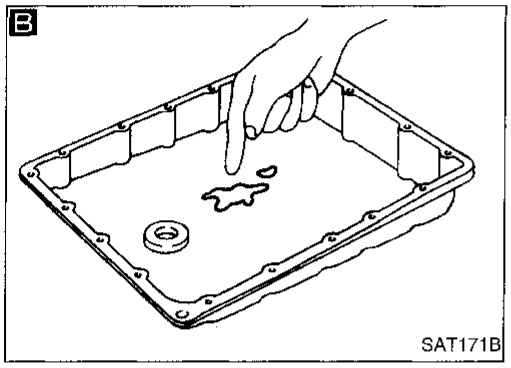
**INSPECTION END**




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

### SYMPTOM:

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




A

Does self-diagnosis show damage to engine speed signal circuit after cruise test?

Yes → Check engine speed signal circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0725", AT-73.

No

B

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

NG → 1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
- Torque converter clutch control valve
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check torque converter and oil pump assembly.

OK

1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
- Torque converter clutch control valve
- Pilot valve
- Pilot filter

OK

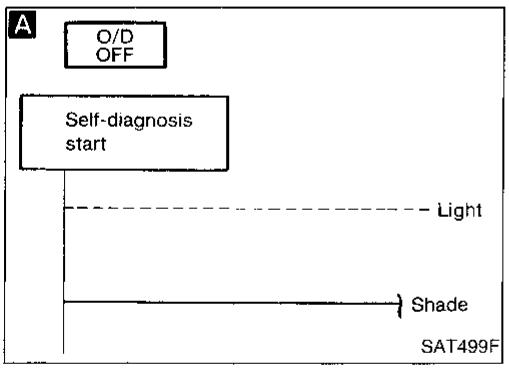
OK

Check again.

NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK

**INSPECTION END**




## 14. Lock-up Is Not Released

### SYMPTOM:

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

Does "ECU INPUT SIGNALS" in Data Monitor show damage to closed throttle position switch circuit?

Yes → Check closed throttle position switch circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705", AT-63.

OR

A

Does self-diagnosis show damage to closed throttle position switch circuit?

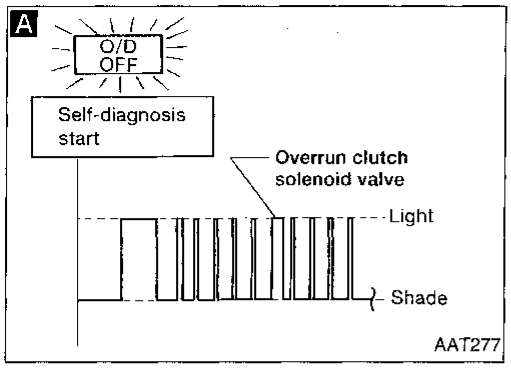
No

Check again.

NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK

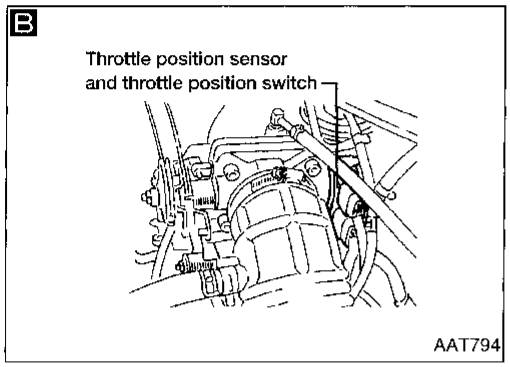
**INSPECTION END**

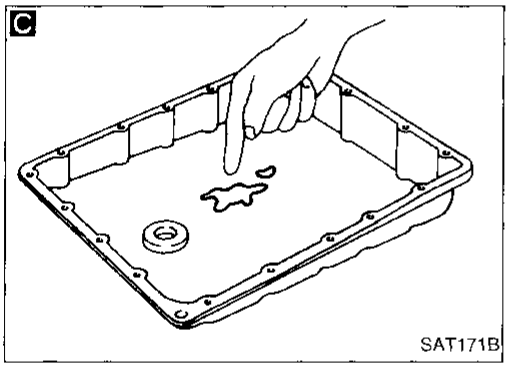



## 15. Engine Speed Does Not Return to Idle (Light Braking $D_4 \rightarrow D_3$)

**SYMPTOM:**

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




A

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

Yes → Check overrun clutch solenoid valve circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P1760", AT-108.

No ↓

B

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

NG → Repair or replace throttle position sensor.

OK ↓

C

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

NG → 1. Remove control valve assembly. Refer to AT-140.
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 ↓

1. Remove control valve assembly. Refer to AT-140.
2. Check the following items:
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

OK ↓

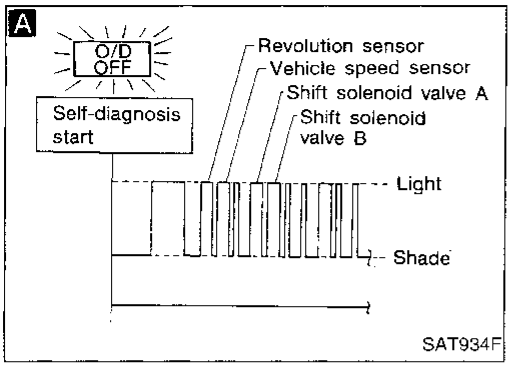
OK ↓

Check again.

NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

**INSPECTION END**




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

### SYMPTOM:

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

A

Does self-diagnosis show damage to revolution sensor, shift solenoid valve A or B or vehicle speed sensor after cruise test?

Yes → Check damaged circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0720, P0750, P0755 or VHCL SPEED SEN·MTR", AT-71, AT-100, AT-103.

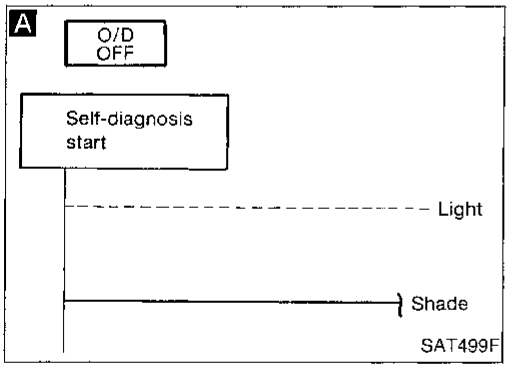
No ↓

Check again.

NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

Go to 8. Vehicle Cannot Be Started From $D_1$, AT-119.




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

### SYMPTOM:

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

Does "ECU INPUT SIGNALS" in Data Monitor show damage to overdrive control switch circuit?

Yes → Check overdrive control switch circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705, AT-63.

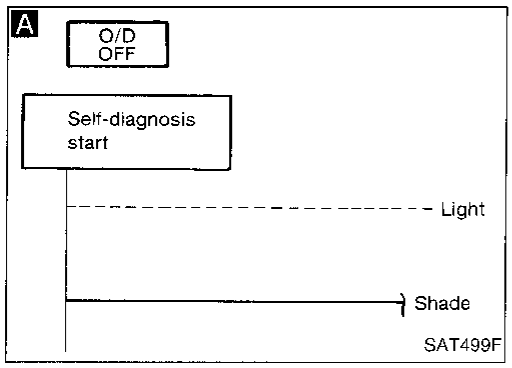
OR

A

Does self-diagnosis show damage to overdrive control switch circuit?

No ↓

Go to 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-121.




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

**SYMPTOM:**

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

Does "ECU INPUT SIGNALS" in Data Monitor show damage to inhibitor switch circuit?

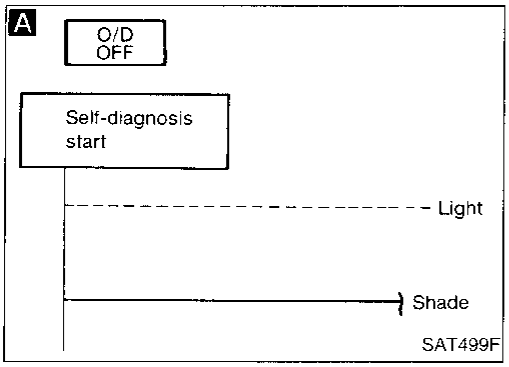
Yes → Check inhibitor switch circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705", AT-63.

OR

A

Does self-diagnosis show damage to inhibitor switch circuit?

No → Go to 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-120.




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

**SYMPTOM:**

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

Does "ECU INPUT SIGNALS" in Data Monitor show damage to inhibitor switch circuit?

Yes → Check inhibitor switch circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705", AT-63.

OR

A

Does self-diagnosis show damage to inhibitor switch circuit?

No → Check again.

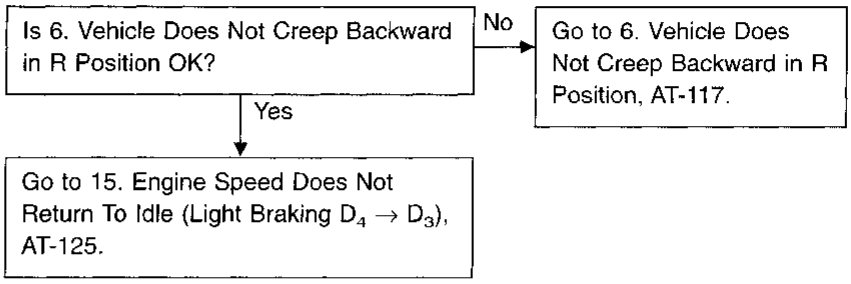
NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

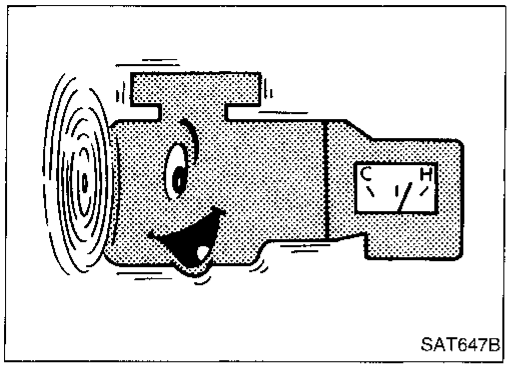
OK → INSPECTION END

## 20. Vehicle Does Not Decelerate By Engine Brake

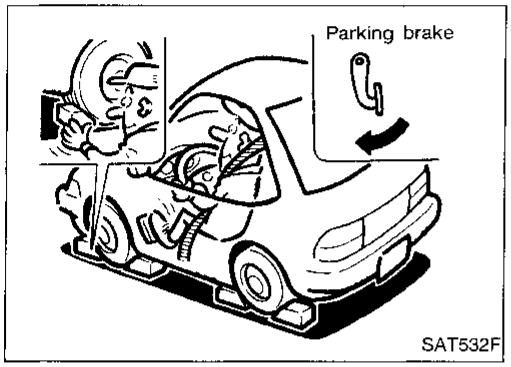
### SYMPTOM:

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

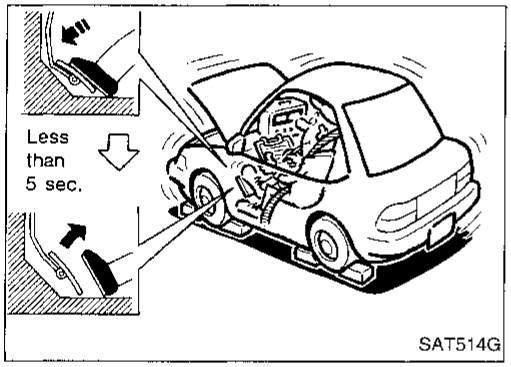




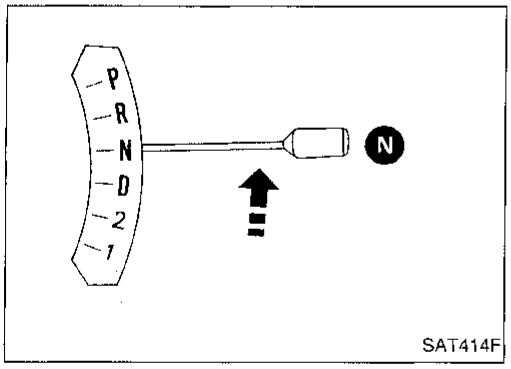
SAT647B



SAT532F



SAT514G



SAT414F

## Final Check

### STALL TESTING

### Stall test procedure

1. Check A/T and engine fluid levels. If necessary, add.
2. Drive vehicle for approx. 10 minutes or until engine oil and ATF reach operating temperature.
   **ATF operating temperature:**
   **50 - 80°C (122 - 176°F)**
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 indicating point of specified engine rpm on indicator.**

5. Start engine, apply foot brake, and place selector lever in "D" position.
6. Accelerate to wide-open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.

- **During test, never hold throttle wide-open for more than 5 seconds.**
  **Stall revolution:**
  **1,800 - 2,100 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.

## Final Check (Cont'd)

### JUDGEMENT OF STALL TEST

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 chart shown in AT-40.

**Note:**

**Stall revolution is too high in "D", "2" or "1" position:**

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

**Stall revolution is too high in "R" position:**

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

**Stall revolution within specifications:**

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

**CAUTION:**

**Be careful since automatic transmission 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.

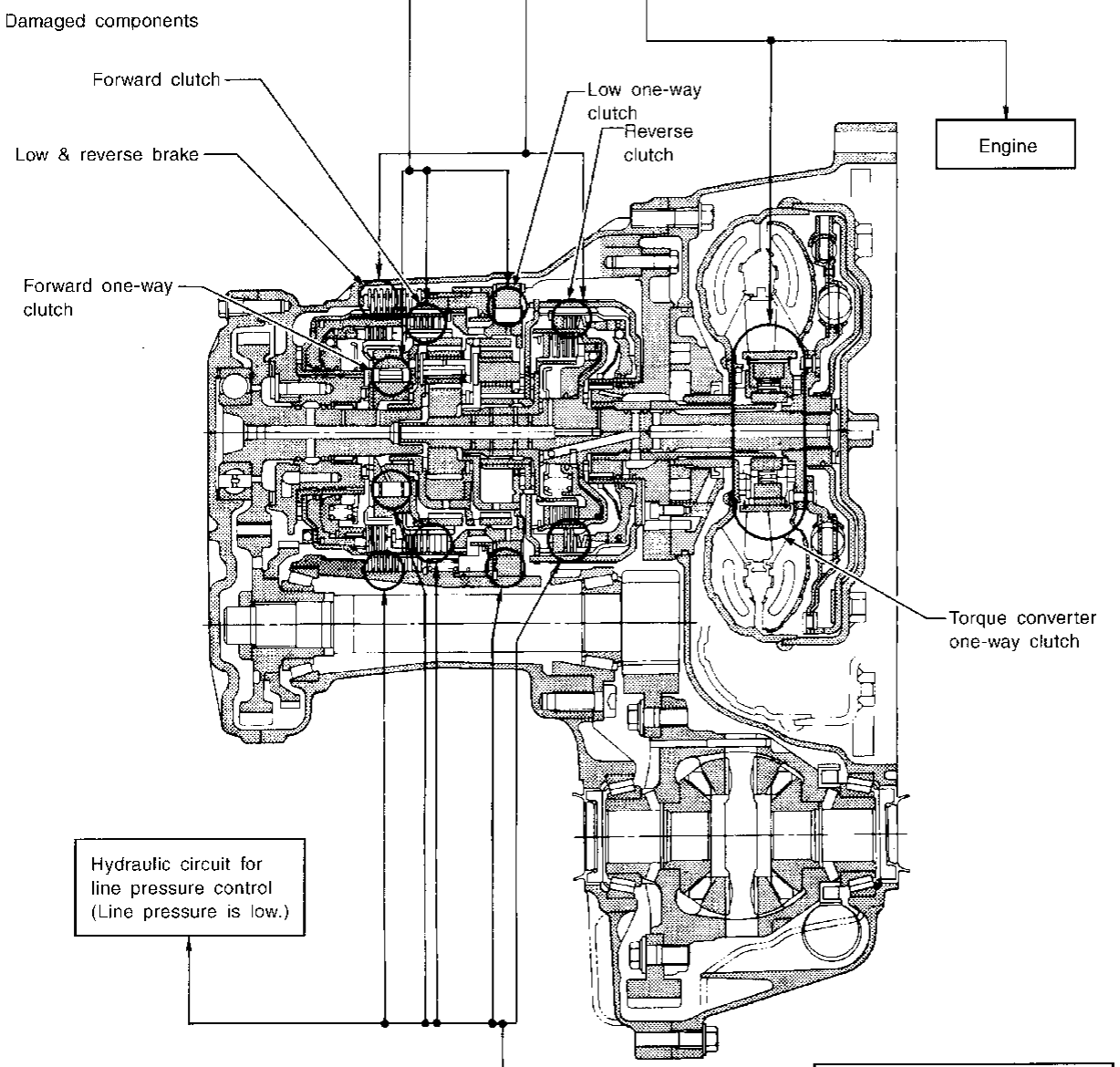
**Stall revolution less than specifications:**

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

## JUDGEMENT OF STALL TEST

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

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

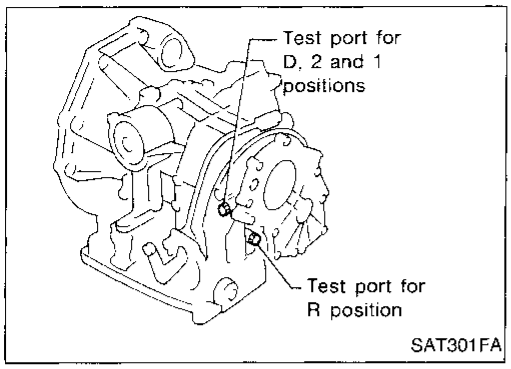



| D | H | O |
|---|---|---|
| 2 | H | O |
| 1 | H | O |
| R | H | O |
| Selector lever position | Judgement | |

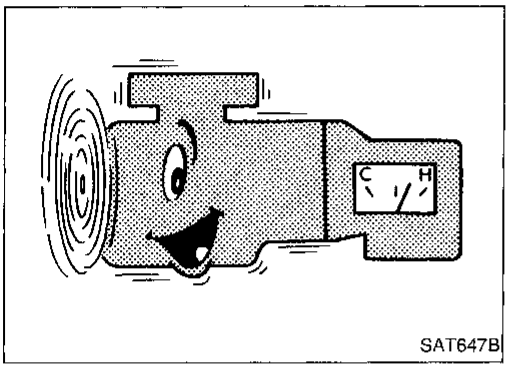
SAT987H

## Final Check (Cont'd)

### PRESSURE TESTING

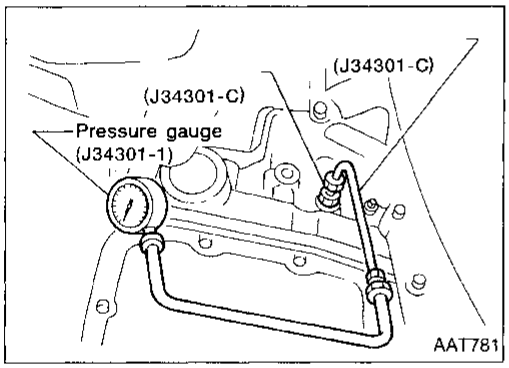



- Location of pressure test ports.
- **Always replace pressure plugs as they are self-sealing bolts.**

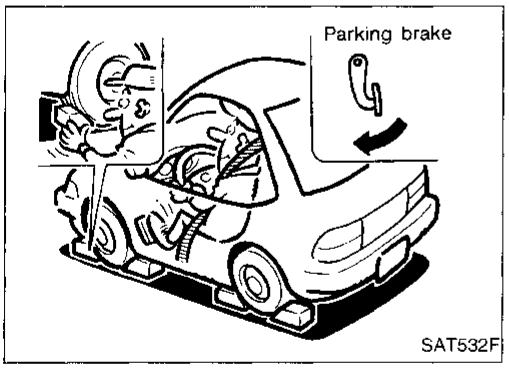



### Line pressure test procedure

1. Check A/T and engine fluid levels. If necessary, add fluid.
2. Drive vehicle for approx. 10 minutes or until engine oil and ATF reach operating temperature.
   **ATF operating temperature:**
   **50 - 80°C (122 - 176°F)**

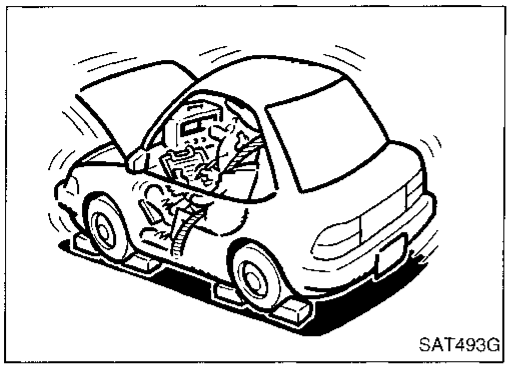



3. Install pressure gauge to corresponding line pressure port.




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

## Final Check (Cont'd)


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-237.**

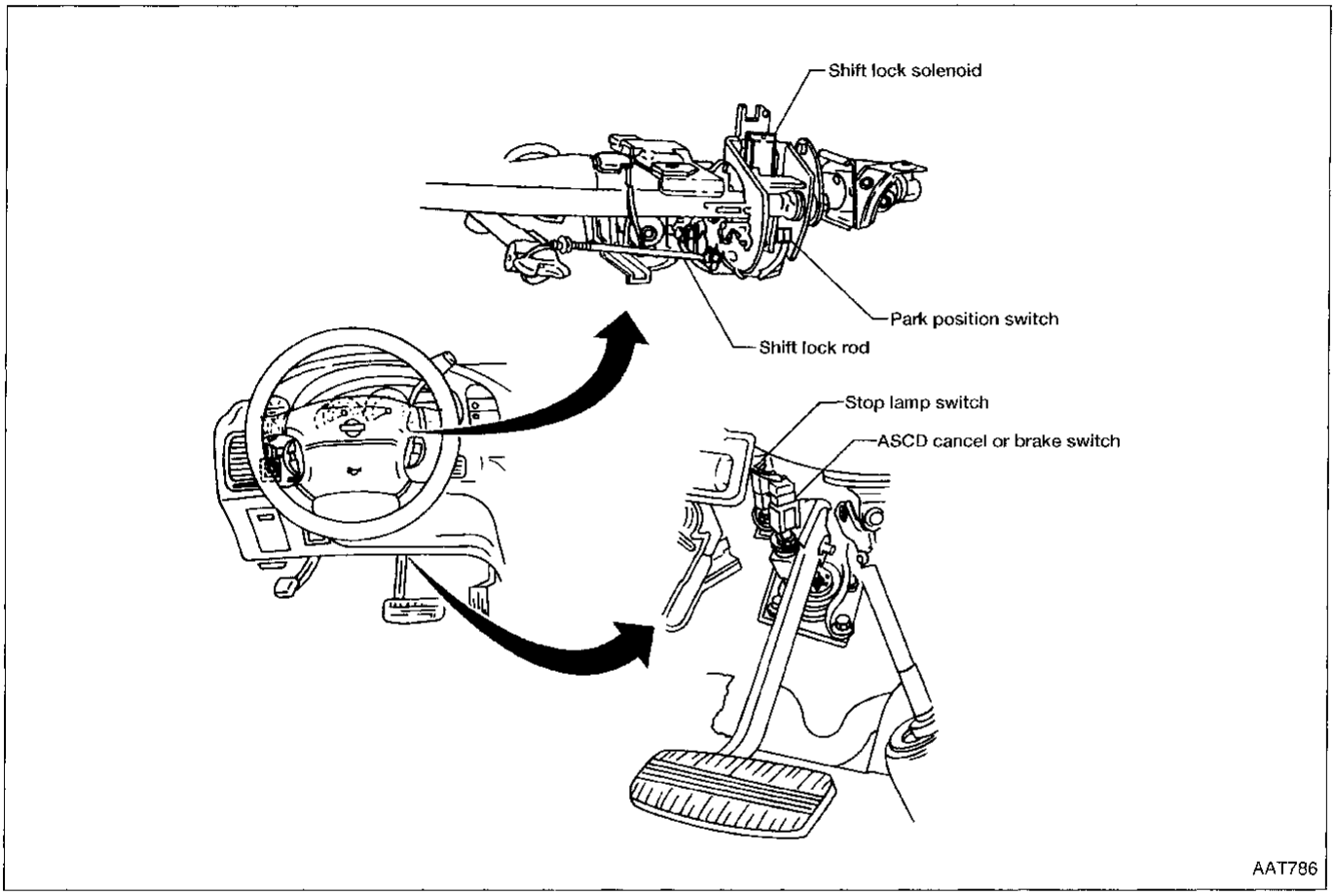
### JUDGEMENT OF LINE PRESSURE TEST

| 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>Therefore, fluid leakage exists at or around low and reverse brake circuit.<br>Refer to "OPERATION OF CLUTCH AND BRAKE", AT-20. |
| | Line pressure is high. | ● Maladjustment 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. | ● Maladjustment 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 |

## Description

- 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.

### Shift Lock System Electrical Parts Location

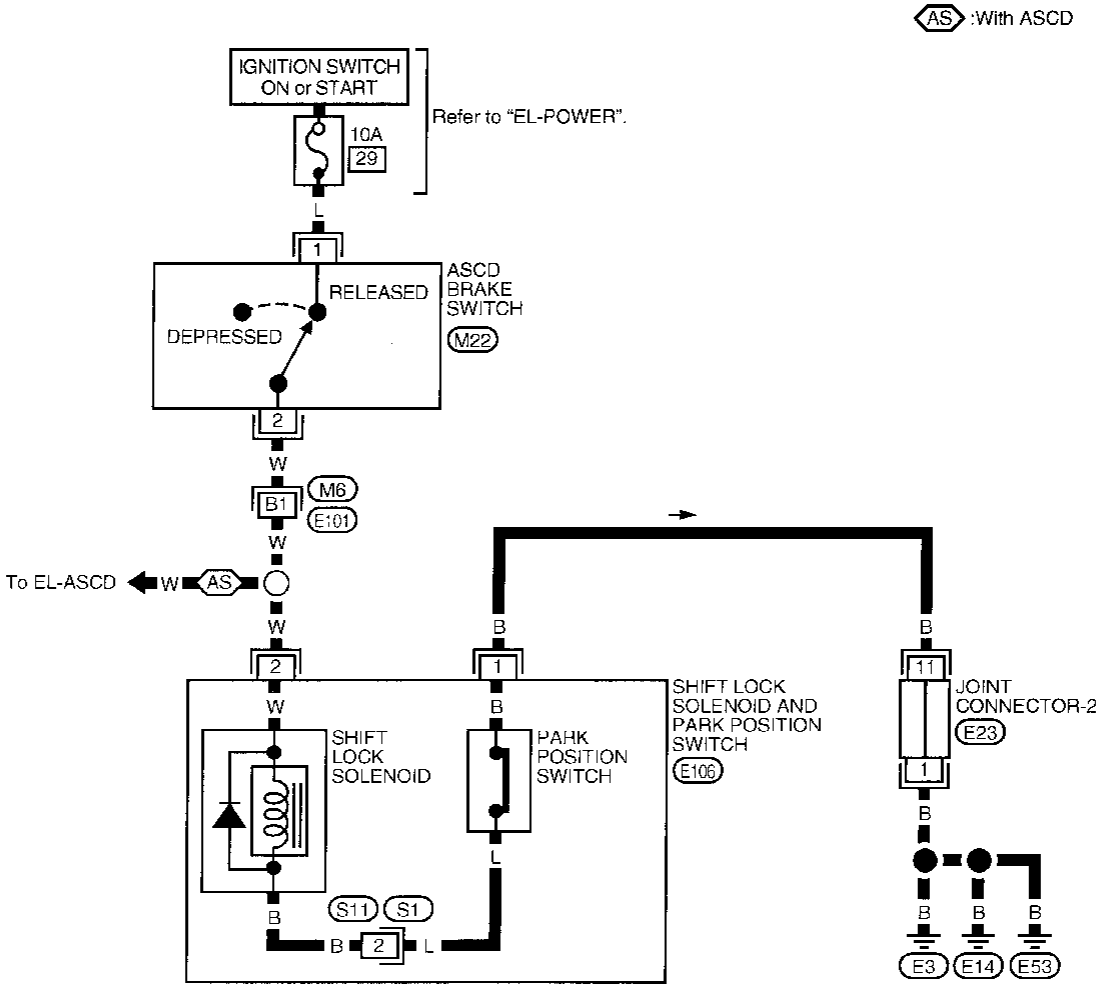


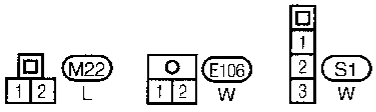

## Removal — Shift Lock Solenoid

1. Remove lower instrument cover LH and knee protector.
2. Remove heater duct.
3. Remove steering column covers.
4. Disconnect position indicator wire.
5. Remove four nuts attaching steering column.
6. Disconnect shift lock rod.
7. Remove shift control cable.
8. Disconnect ignition switch connector.
9. Remove two bolts attaching shift control tube and remove shift control tube.
10. Remove two screws from shift lock solenoid and two screws from park position switch.

## Wiring Diagram –SHIFT–

AT-SHIFT-01




Refer to last page (Foldout page).
M6, E101
E23

## Diagnostic Procedure

**SYMPTOM 1:**

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

**SYMPTOM 2:**

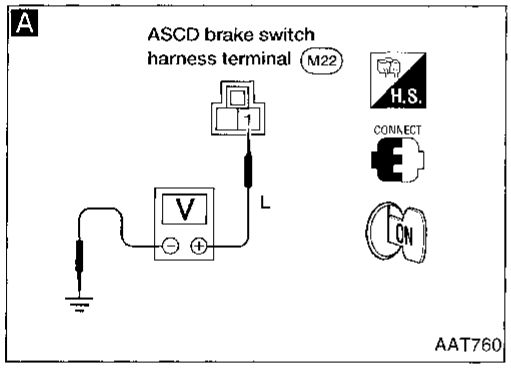
**Ignition key cannot be removed when selector lever is set to "P" position. It can be removed when selector lever is set to any position except "P".**

Check selector lever position indicator and selector lever for damage.

NG → Check selector lever. Refer to "ON-VEHICLE SERVICE — Inhibitor Switch and Control Cable Adjustment", AT-141.

OK ↓

A




**CHECK POWER SOURCE.**

1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between ASCD brake switch harness terminal ① and ground.

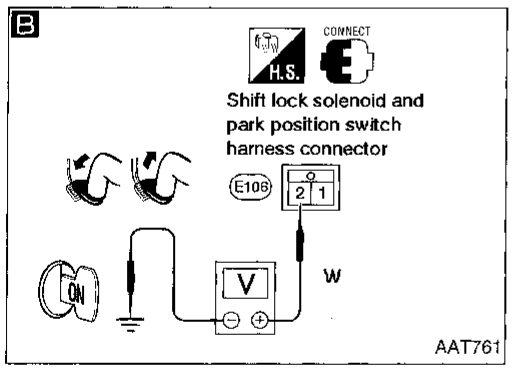
**Voltage: Battery voltage**

NG → Check the following items:

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

OK ↓

B




**CHECK INPUT SIGNAL (ASCD BRAKE SWITCH).**

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

- Check voltage between shift lock solenoid and park position switch harness terminal ② and ground.

| Brake pedal | Voltage |
|---|---|
| Depressed | 0V |
| Released | Battery voltage |

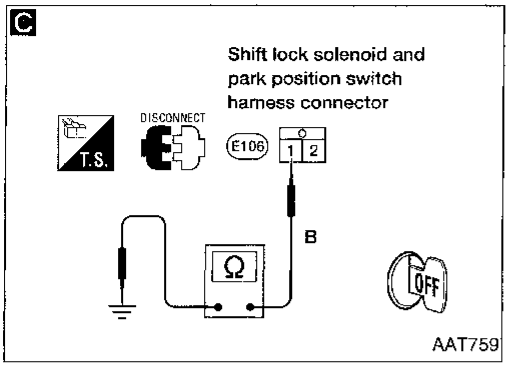
NG → Check the following items:

1. Harness for short or open between shift lock solenoid and park position switch harness connector ② and ASCD brake switch harness connector ②
2. ASCD brake switch (Refer to "Component Check", AT-139.)

OK ↓

Ⓐ

## Diagnostic Procedure (Cont'd)




Ⓐ

C

**CHECK GROUND CIRCUIT.**
1. Turn ignition switch to OFF position.
2. Disconnect shift lock solenoid and park position switch harness connector.
3. Check continuity between shift lock solenoid and park position switch harness terminal ① and ground.

NG → 1. Repair harness or connector. 2. Check joint connector-2.

OK ↓

**CHECK PARK POSITION SWITCH.**
(Refer to "Component Check", AT-139.)

NG → Replace park position switch.

OK ↓

**CHECK SHIFT LOCK SOLENOID.**
(Refer to "Component Check", AT-139.)

NG → Replace shift lock solenoid.

OK ↓

Reconnect shift lock solenoid and park position switch harness connector.

↓

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

↓

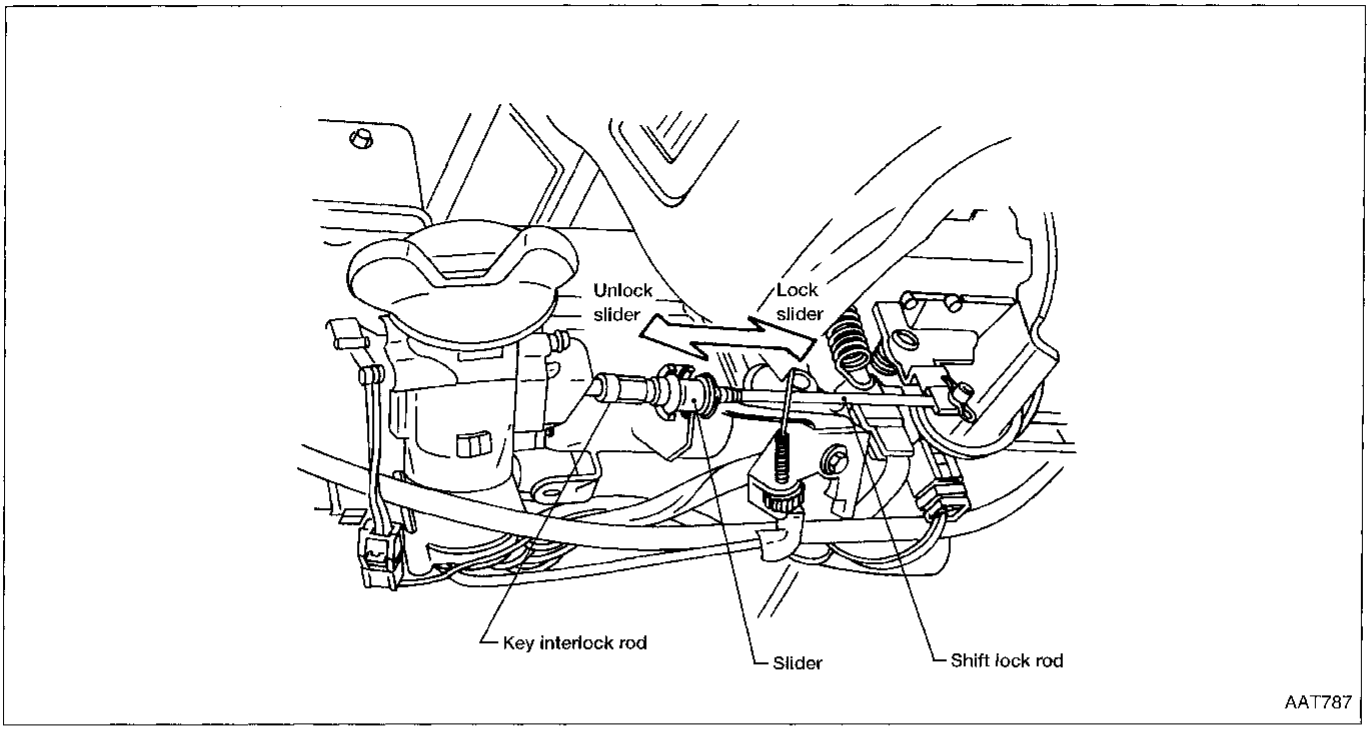
Recheck shift lock operation.

NG → 1. Perform shift lock solenoid and park position switch input/output signal inspection test. 2. If NG, recheck harness connector connection.

OK ↓

INSPECTION END

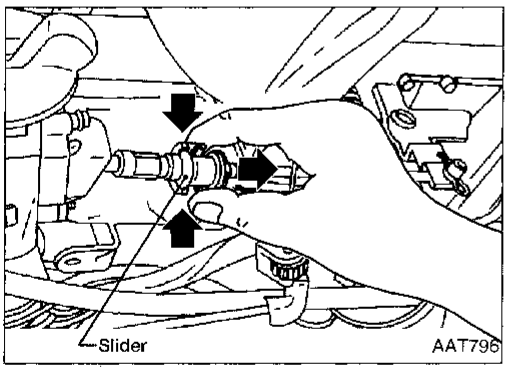
## Shift Lock Rod




### REMOVAL

1. Turn ignition key to ACC position.
2. Unlock slider by squeezing lock tabs.
3. Remove shift lock rod from key interlock rod.

- For removal of key interlock rod, refer to ST section ("Disassembly and Assembly", "STEERING WHEEL AND STEERING COLUMN").

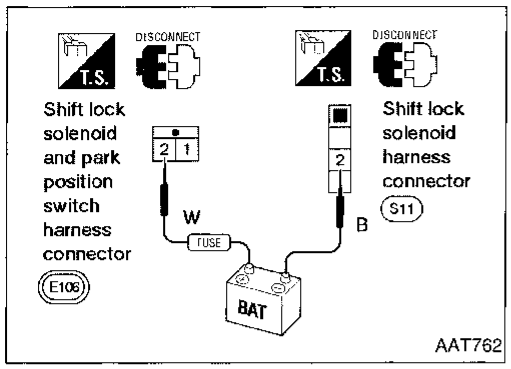


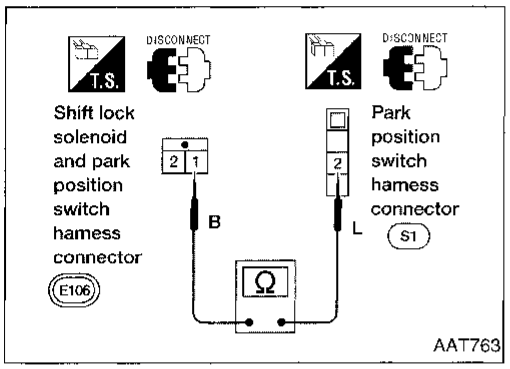

### INSTALLATION AND ADJUSTMENT

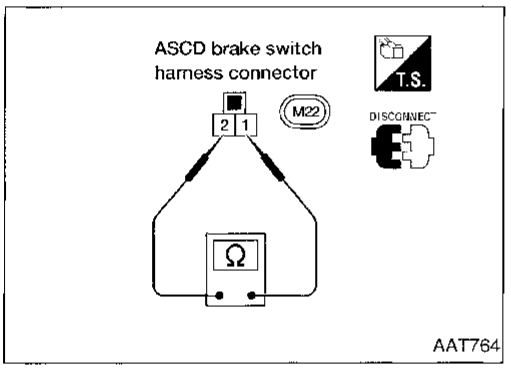
1. Place selector lever in Park "P" position.
2. Turn ignition key to ACC position.
3. Insert shift lock rod into slider.
4. Grab key interlock rod and push toward shift lock rod to adjust.

**Do not hold shift lock rod.**

5. Lock slider into position.
6. Test shift lock operation.




## Component Check

### SHIFT LOCK SOLENOID

- Check operation by applying battery voltage to shift lock solenoid and park position switch and shift lock solenoid harness terminal.

### PARK POSITION SWITCH

- Check continuity between shift lock solenoid and park position switch harness terminal ① and park position switch harness terminal ②.

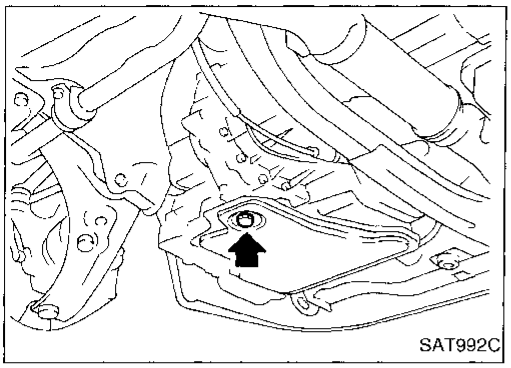
| Condition | Continuity |
|---|---|
| When selector lever is set in "P" position and selector lever button is released | Yes |
| Except above | No |

### ASCD BRAKE SWITCH

- Check continuity between terminals ① and ②.

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

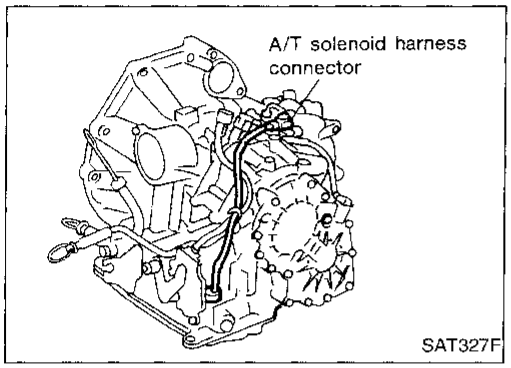
**Check ASCD brake switch after adjusting brake pedal — refer to BR section ("Adjustment", "BRAKE PEDAL AND BRACKET").**



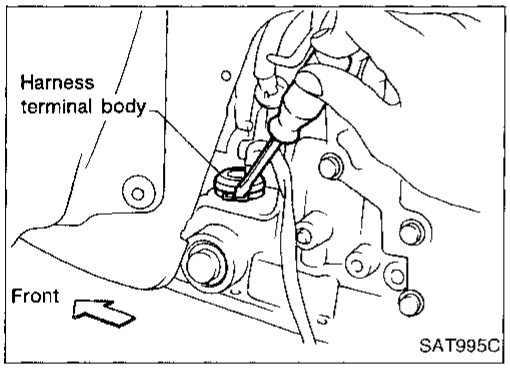

## Control Valve Assembly and Accumulator

### REMOVAL

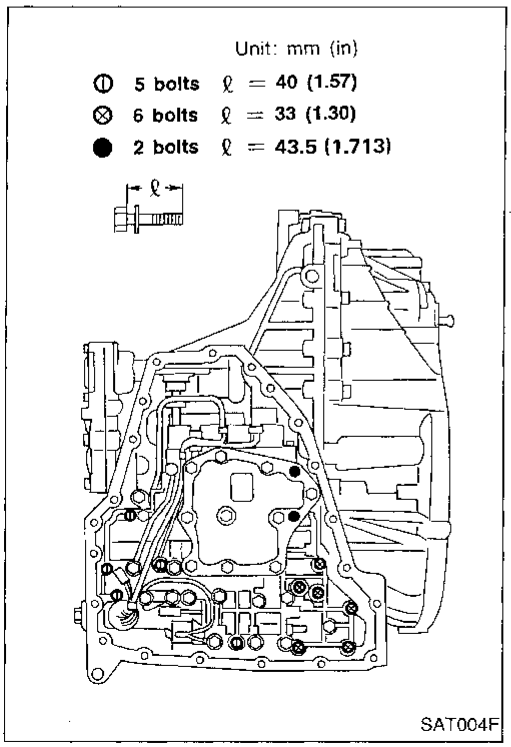
1. Drain ATF from transaxle.
2. Remove oil pan and gasket.




3. Disconnect A/T solenoid harness connector.




4. Remove stopper ring from terminal cord assembly harness terminal body.
5. Remove terminal cord assembly harness from transmission case by pushing on terminal body.

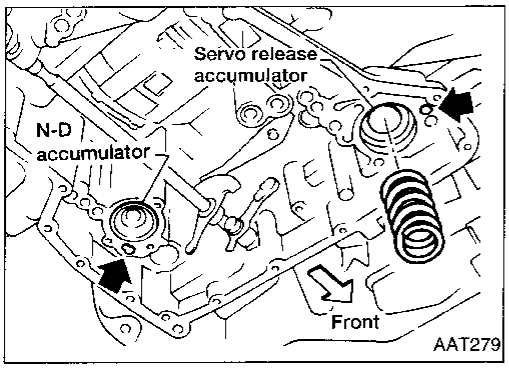



6. Remove control valve assembly by removing fixing bolts ①, ⊗ and ●.
   Bolt length, number and location are shown in the illustration.

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

7. Disassemble and inspect control valve assembly if necessary. Refer to AT-170.

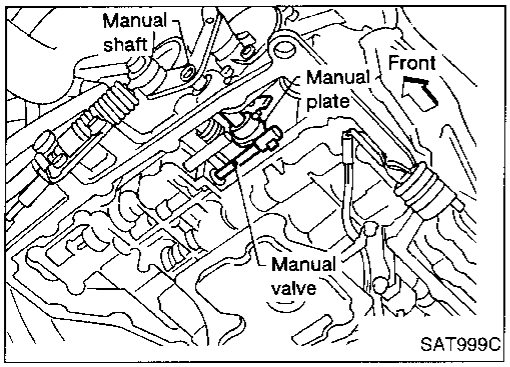
## Control Valve Assembly and Accumulator (Cont'd)



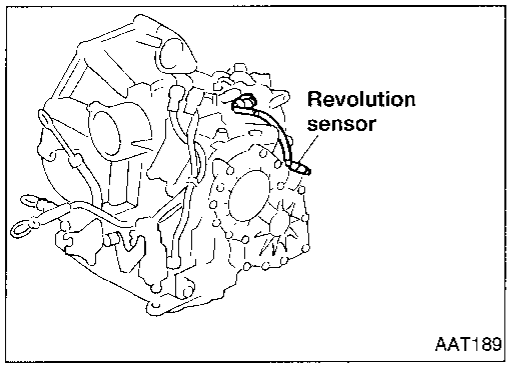

8. Remove servo release and N-D accumulators by applying compressed air if necessary.
- **Hold each piston with a rag.**

### INSTALLATION

- **Set manual shaft in Neutral, then align manual plate with groove in manual valve.**
- **After installing control valve assembly, make sure that the selector lever can be moved to all positions.**

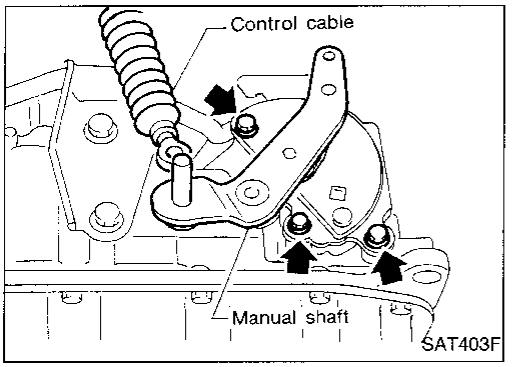



## Revolution Sensor Replacement

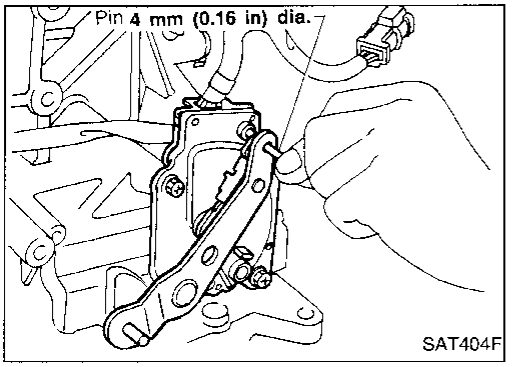



1. Remove under cover.
2. Remove revolution sensor from A/T.
3. Reinstall any part removed.
- **Always use new sealing parts.**

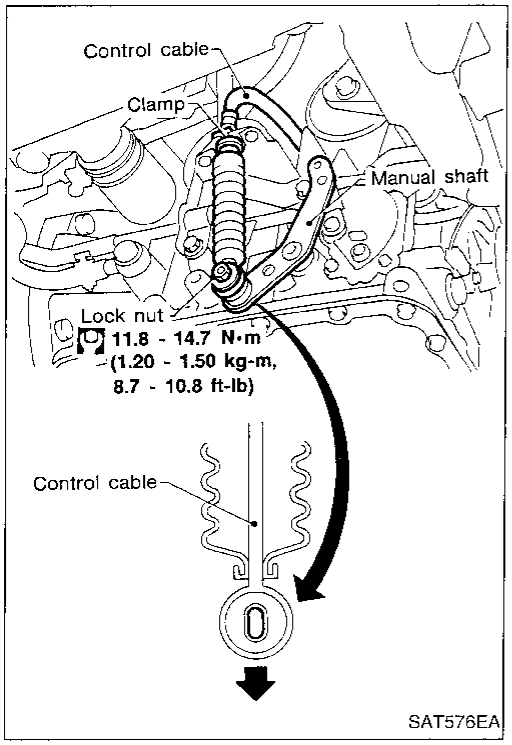
## Inhibitor Switch Adjustment




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



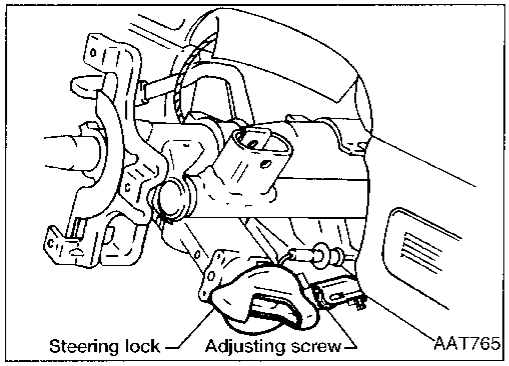

4. Insert pin into adjustment holes in both inhibitor switch and manual shaft as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of inhibitor switch. Refer to AT-67.




## Control Cable Adjustment

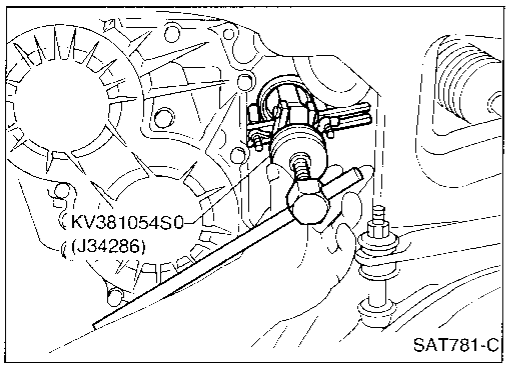
Move selector lever from the "P" position to the "1" position. You should be able to feel the detents in each position. If the detents cannot be felt or the pointer indicating the position is improperly aligned, the control cable needs adjustment.

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



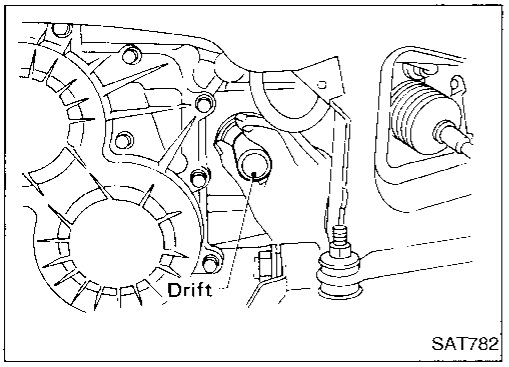

## Position Indicator Adjustment

1. Remove column cover.
2. Turn position indicator adjusting screw.

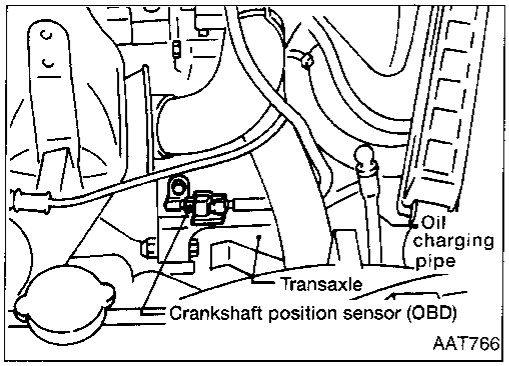



## Differential Side Oil Seal Replacement

1. Remove drive shaft assembly. Refer to FA section ("Removal", "FRONT AXLE — Drive Shaft").
2. Remove oil seal.

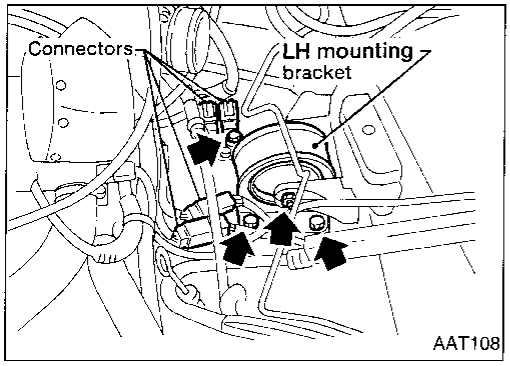



3. Install oil seal.
- **Apply ATF before installing.**
4. Reinstall any part removed.




## Removal

**CAUTION:**
**When removing the transaxle assembly from engine, first remove the crankshaft position sensor (OBD) from the assembly.**
**Be careful not to damage sensor edge.**

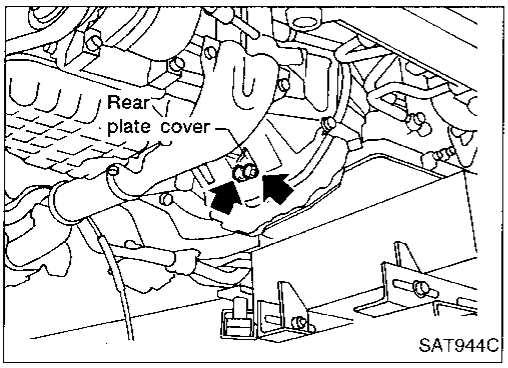


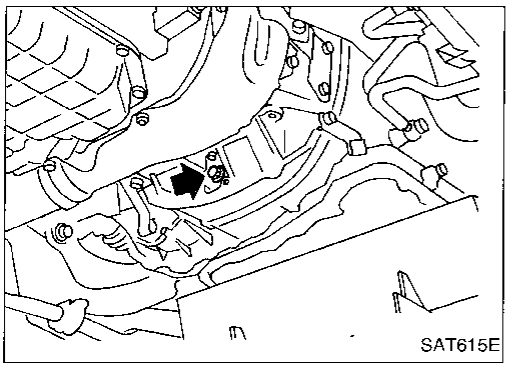

1. Remove battery and bracket.
2. Remove air cleaner and resonator.
3. Disconnect terminal cord assembly harness connector and inhibitor switch harness connectors.
4. Disconnect harness connectors of revolution sensor and vehicle speed sensor.
5. Remove crankshaft position sensor (OBD) from transaxle.
6. Remove LH mounting bracket from transaxle and body.
7. Disconnect control cable at transaxle side.
8. Drain ATF.
9. Remove drive shafts. Refer to FA section ("Removal", "FRONT AXLE — Drive Shaft").
10. Disconnect oil cooler piping.
11. Remove starter motor from transaxle.
12. Support engine by placing a jack under oil pan.

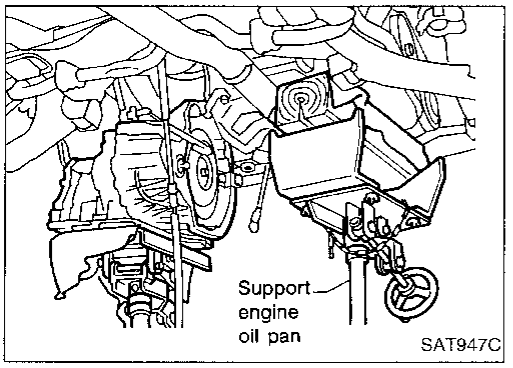
**Do not place jack under oil pan drain plug.**

13. Remove center member.
14. Remove rear plate cover and bolts securing torque converter to drive plate.

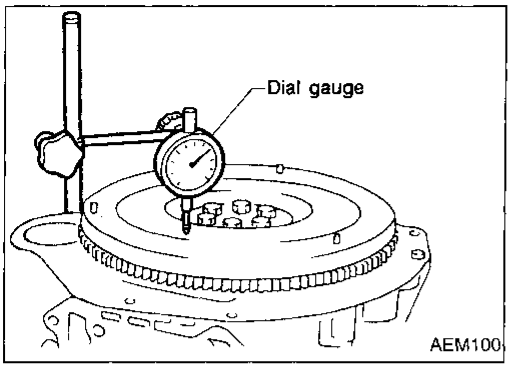
**Rotate crankshaft for access to securing bolts.**



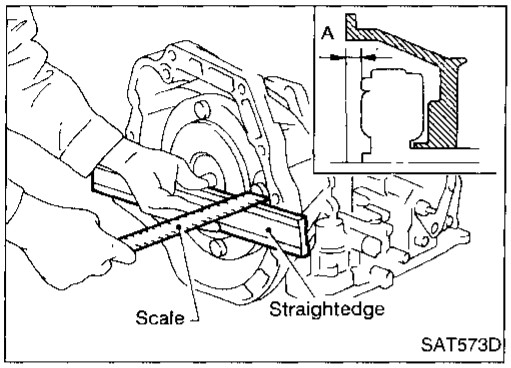




15. Support transaxle with a jack.
16. Remove bolts fixing A/T to engine.
17. Lower transaxle while supporting it with a jack.

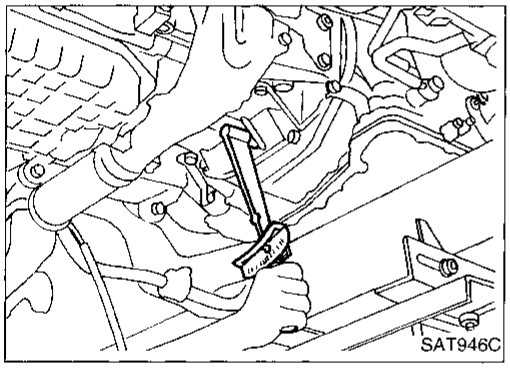



## Installation

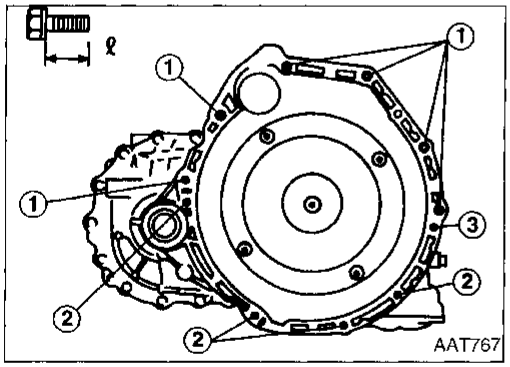
- Drive plate runout
  **CAUTION:**
  **Do not allow any magnetic materials to contact the ring gear teeth.**
  **Maximum allowable runout:**
  **Refer to EM section ("Inspection", "CYLINDER BLOCK").**
  If this runout is out of allowance, replace drive plate and ring gear.




- When connecting torque converter to transaxle, measure distance "A" to be certain that they are correctly assembled.
  **Distance "A":**
  **14 mm (0.55 in) or more**



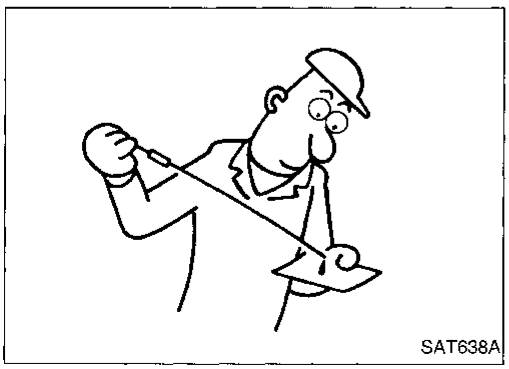

- Install bolts fixing converter to drive plate.
- **With converter installed, rotate crankshaft several turns to check that transaxle rotates freely without binding.**




- Tighten bolts securing transaxle.

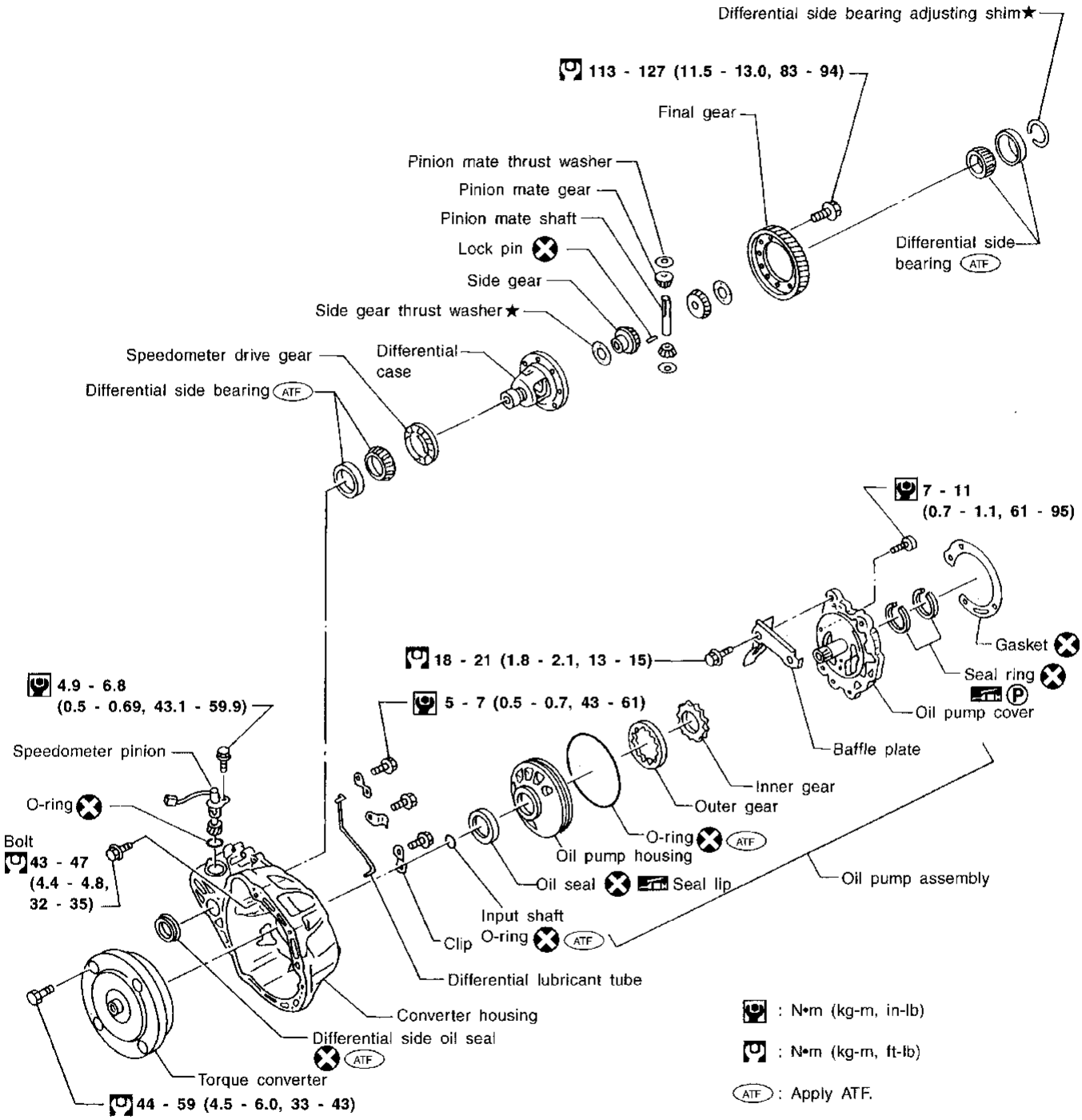
| Bolt No. | Tightening torque N·m (kg-m, ft-lb) | ℓ mm (in) |
|---|---|---|
| ① | 39 - 49 (4.0 - 5.0, 29 - 36) | 60 (2.36) |
| ② | 30 - 40 (3.1 - 4.1, 22 - 30) | 25 (0.98) |
| ③* | 30 - 40 (3.1 - 4.1, 22 - 30) | 25 (0.98) |

*: TORX bolt

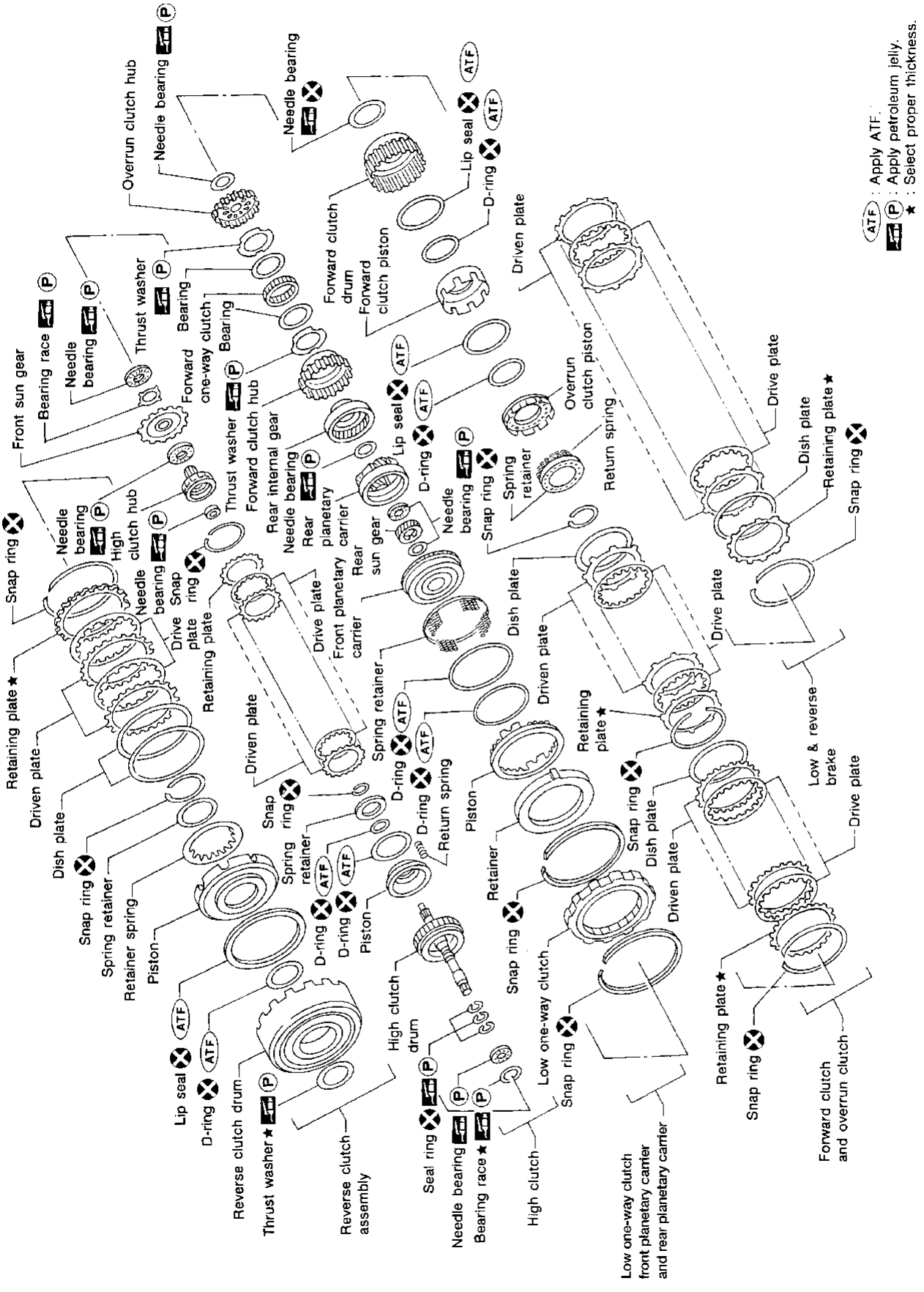



- Check fluid level in transaxle.
- Move selector lever through all positions to be sure that transaxle operates correctly.
  With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R" position. A slight shock should be felt by hand gripping selector each time transaxle is shifted.
- Perform road test. Refer to AT-41.

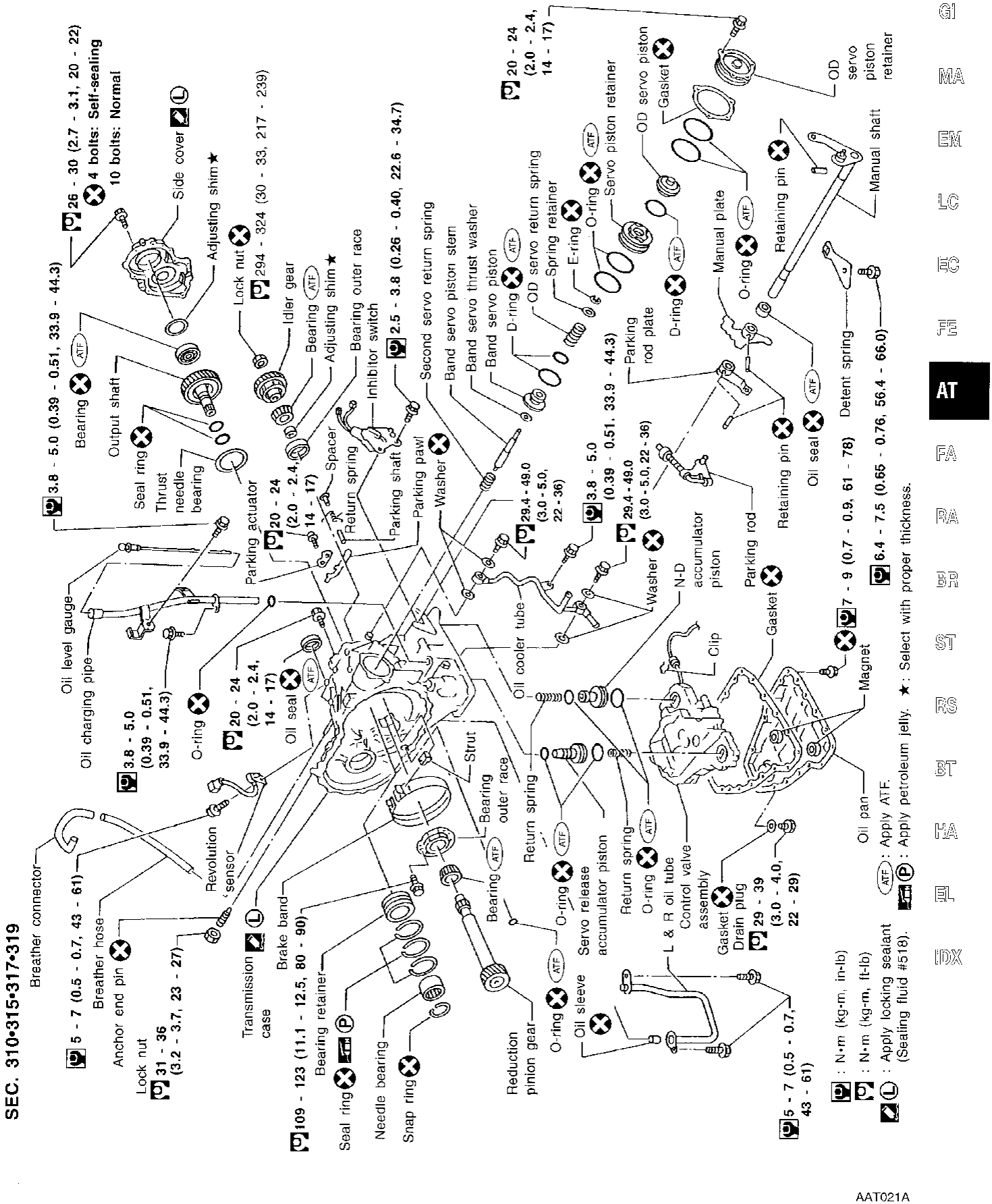
SEC. 311•313•327•381




AAT768

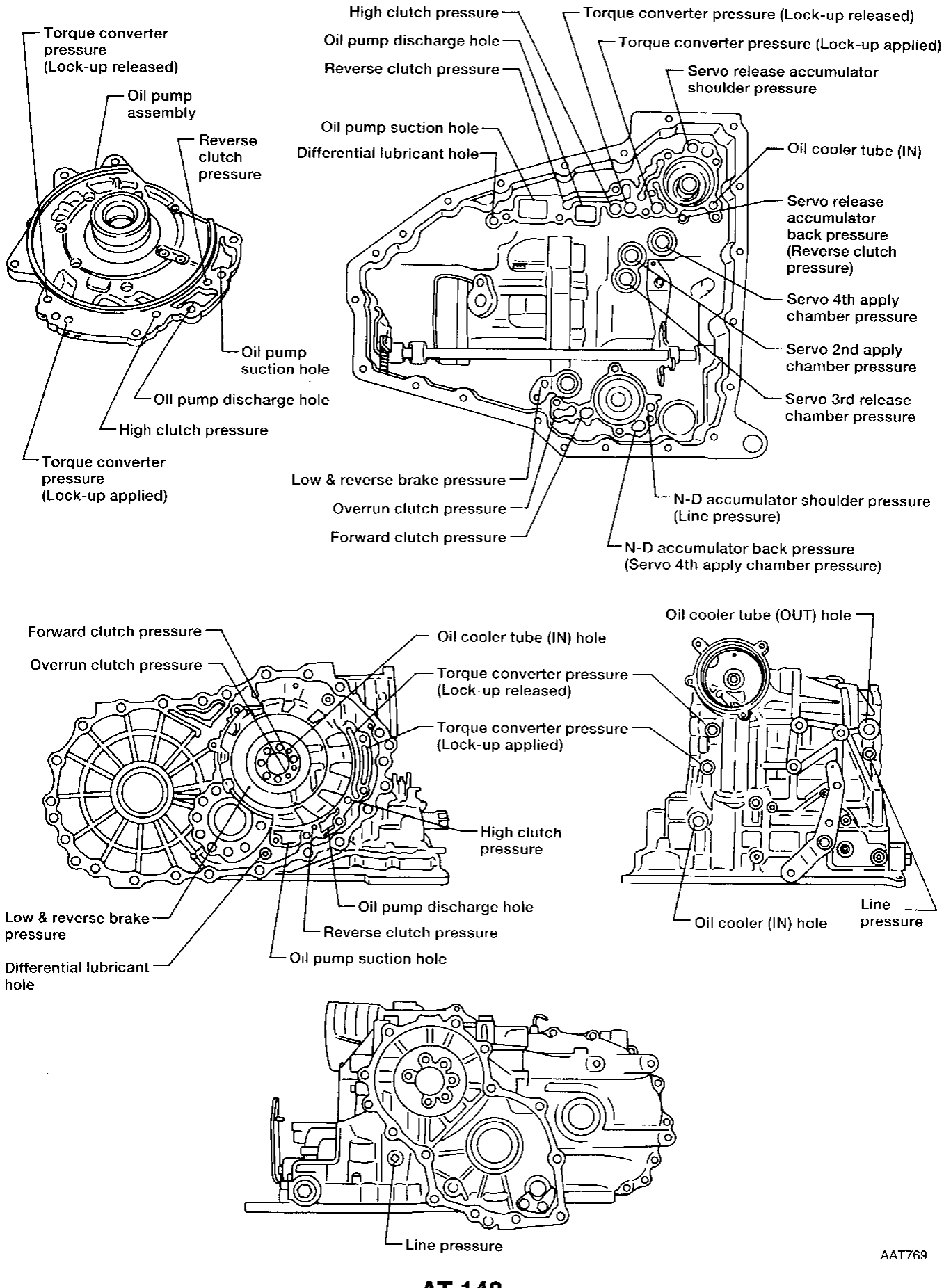

Front sun gear
Bearing race
Needle bearing
Thrust washer
Overrun clutch hub
Needle bearing
Bearing
Forward one-way clutch
Bearing
Forward clutch drum
Forward clutch piston
Needle bearing
Lip seal
D-ring
Driven plate
Snap ring
Needle bearing
High clutch hub
Needle bearing
Drive plate
Snap ring
Retaining plate
Thrust washer
Forward clutch hub
Rear internal gear
Needle bearing
Rear planetary carrier
Rear sun gear
Lip seal
D-ring
Needle bearing
Snap ring
Spring retainer
Return spring
Overrun clutch piston
Drive plate
Dish plate
Retaining plate
Snap ring
Retaining plate
Driven plate
Drive plate
Front planetary carrier
Spring retainer
Dish plate
Driven plate
Retaining plate
Drive plate
Driven plate
Dish plate
Snap ring
Spring retainer
Retainer spring
Piston
Snap ring
Spring retainer
D-ring
D-ring
D-ring
D-ring
Return spring
Piston
Retainer
Snap ring
Dish plate
Driven plate
Low & reverse brake
Drive plate
Lip seal
D-ring
Reverse clutch drum
Thrust washer
Reverse clutch assembly
High clutch drum
Seal ring
Needle bearing
Bearing race
High clutch
Low one-way clutch
Snap ring
Low one-way clutch front planetary carrier and rear planetary carrier
Retaining plate
Snap ring
Forward clutch and overrun clutch
ATF : Apply ATF.
P : Apply petroleum jelly.
★ : Select proper thickness.

AAT020A


SEC. 310•315•317•319
Breather connector
5 - 7 (0.5 - 0.7, 43 - 61)
Breather hose
Anchor end pin
Lock nut
31 - 36 (3.2 - 3.7, 23 - 27)
Transmission case
Revolution sensor
Brake band
109 - 123 (11.1 - 12.5, 80 - 90)
Bearing retainer
Seal ring
Needle bearing
Snap ring
Reduction pinion gear
O-ring
Oil sleeve
Oil charging pipe
Oil level gauge
3.8 - 5.0 (0.39 - 0.51, 33.9 - 44.3)
O-ring
20 - 24 (2.0 - 2.4, 14 - 17)
Oil seal
Strut
Bearing outer race
Bearing
O-ring
Servo release accumulator piston
Return spring
Return spring
O-ring
L & R oil tube
Control valve assembly
Gasket
Drain plug
29 - 39 (3.0 - 4.0, 22 - 29)
5 - 7 (0.5 - 0.7, 43 - 61)
Bearing
Output shaft
Seal ring
Thrust needle bearing
3.8 - 5.0 (0.39 - 0.51, 33.9 - 44.3)
26 - 30 (2.7 - 3.1, 20 - 22)
4 bolts: Self-sealing
10 bolts: Normal
Side cover
Adjusting shim★
Lock nut
294 - 324 (30 - 33, 217 - 239)
Idler gear
Bearing
Adjusting shim★
Spacer
Parking actuator
20 - 24 (2.0 - 2.4, 14 - 17)
Return spring
Bearing outer race
Inhibitor switch
2.5 - 3.8 (0.26 - 0.40, 22.6 - 34.7)
Parking shaft
Parking pawl
Washer
Second servo return spring
Band servo piston stem
Band servo thrust washer
Band servo piston
D-ring
OD servo return spring
Spring retainer
E-ring
O-ring
Servo piston retainer
Parking rod plate
20 - 24 (2.0 - 2.4, 14 - 17)
OD servo piston
Gasket
OD servo piston retainer
D-ring
Manual plate
O-ring
Retaining pin
Manual shaft
Detent spring
Oil seal
Retaining pin
Parking rod
Gasket
Clip
N-D accumulator piston
Washer
29.4 - 49.0 (3.0 - 5.0, 22 - 36)
3.8 - 5.0 (0.39 - 0.51, 33.9 - 44.3)
29.4 - 49.0 (3.0 - 5.0, 22 - 36)
Oil cooler tube
Oil pan
Magnet
7 - 9 (0.7 - 0.9, 61 - 78)
6.4 - 7.5 (0.65 - 0.76, 56.4 - 66.0)
: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)
: Apply locking sealant (Sealing fluid #518).
: Apply ATF.
: Apply petroleum jelly.
★: Select with proper thickness.

AAT021A

## Oil Channel


Torque converter pressure (Lock-up released)
Oil pump assembly
Reverse clutch pressure
Oil pump suction hole
Oil pump discharge hole
High clutch pressure
Torque converter pressure (Lock-up applied)
High clutch pressure
Oil pump discharge hole
Reverse clutch pressure
Oil pump suction hole
Differential lubricant hole
Torque converter pressure (Lock-up released)
Torque converter pressure (Lock-up applied)
Servo release accumulator shoulder pressure
Oil cooler tube (IN)
Servo release accumulator back pressure (Reverse clutch pressure)
Servo 4th apply chamber pressure
Servo 2nd apply chamber pressure
Servo 3rd release chamber pressure
Low & reverse brake pressure
Overrun clutch pressure
Forward clutch pressure
N-D accumulator shoulder pressure (Line pressure)
N-D accumulator back pressure (Servo 4th apply chamber pressure)
Forward clutch pressure
Overrun clutch pressure
Oil cooler tube (IN) hole
Torque converter pressure (Lock-up released)
Torque converter pressure (Lock-up applied)
High clutch pressure
Low & reverse brake pressure
Differential lubricant hole
Oil pump discharge hole
Reverse clutch pressure
Oil pump suction hole
Oil cooler tube (OUT) hole
Oil cooler (IN) hole
Line pressure
Line pressure
AAT769

# Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings

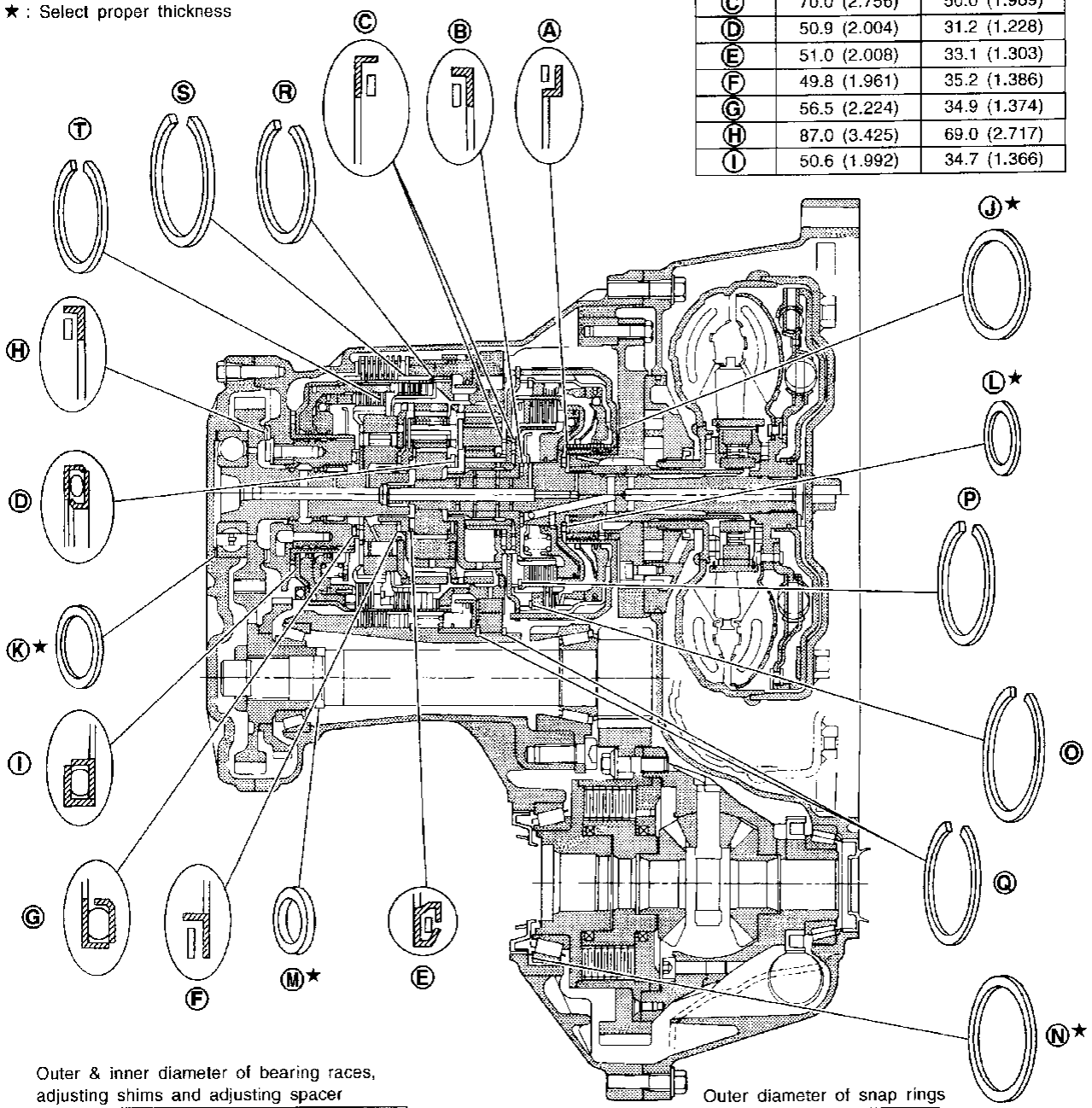
Outer diameter of thrust washers

| Item number | Outer diameter mm (in) |
|---|---|
| Ⓙ★ | 76.0 (2.992) |
| Ⓚ★ | 80.0 (3.150) |

★ : Select proper thickness

Outer and inner diameter of needle bearings

| Item number | Outer diameter mm (in) | Inner diameter mm (in) |
|---|---|---|
| Ⓐ | 49.8 (1.961) | 35.2 (1.386) |
| Ⓑ | 41.8 (1.646) | 23.1 (0.909) |
| Ⓒ | 70.0 (2.756) | 50.0 (1.969) |
| Ⓓ | 50.9 (2.004) | 31.2 (1.228) |
| Ⓔ | 51.0 (2.008) | 33.1 (1.303) |
| Ⓕ | 49.8 (1.961) | 35.2 (1.386) |
| Ⓖ | 56.5 (2.224) | 34.9 (1.374) |
| Ⓗ | 87.0 (3.425) | 69.0 (2.717) |
| Ⓘ | 50.6 (1.992) | 34.7 (1.366) |




Outer & inner diameter of bearing races, adjusting shims and adjusting spacer

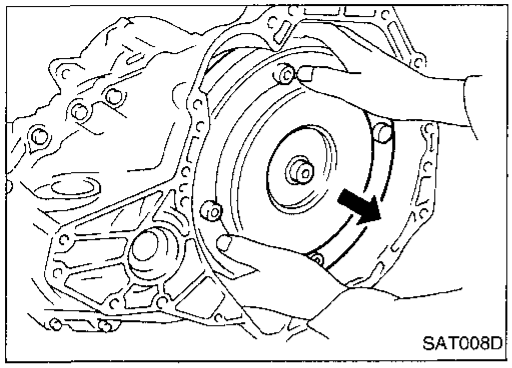
| Item number | Outer diameter mm (in) | Inner diameter mm (in) |
|---|---|---|
| Ⓛ★ | 51.0 (2.008) | 36.0 (1.417) |
| Ⓜ★ | 38.0 (1.496) | 28.1 (1.106) |
| Ⓝ★ | 75.0 (2.953) | 68.0 (2.677) |

★ : Select proper thickness

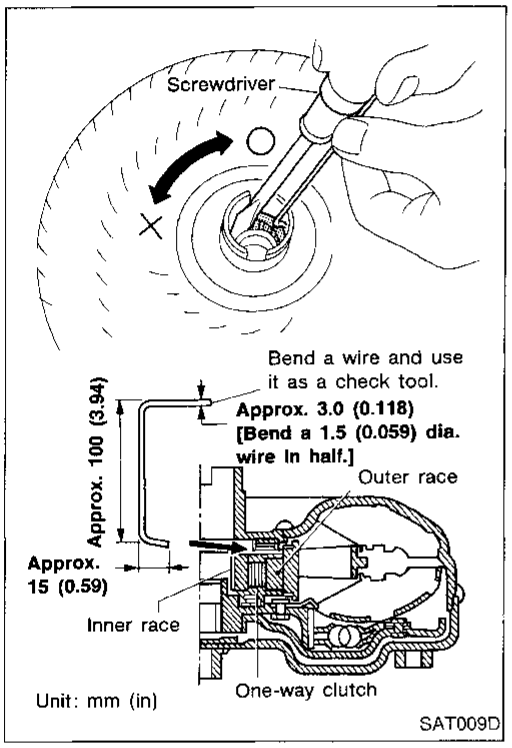
Outer diameter of snap rings

| Item number | Outer diameter mm (in) |
|---|---|
| Ⓞ | 150 (5.91) |
| Ⓟ | 119.1 (4.689) |
| Ⓠ | 182.8 (7.197) |
| Ⓡ | 144.8 (5.701) |
| Ⓢ | 173.8 (6.843) |
| Ⓣ | 133.9 (5.272) |

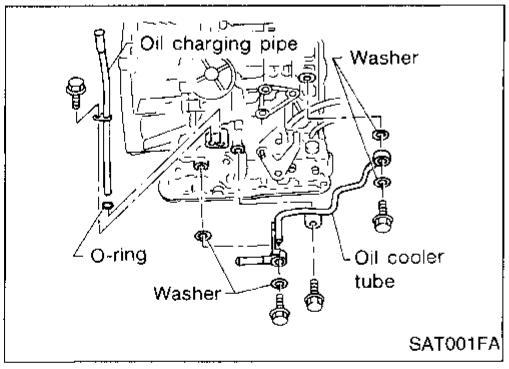
AAT022A



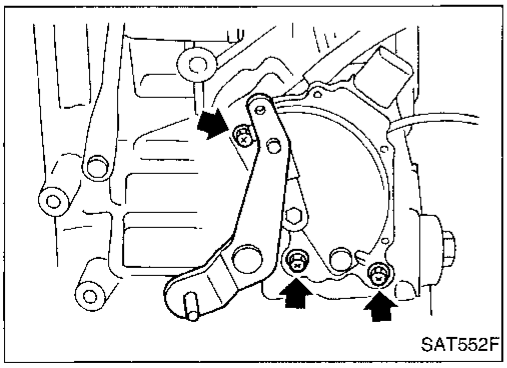

1. Drain ATF through drain plug.
2. Remove torque converter.



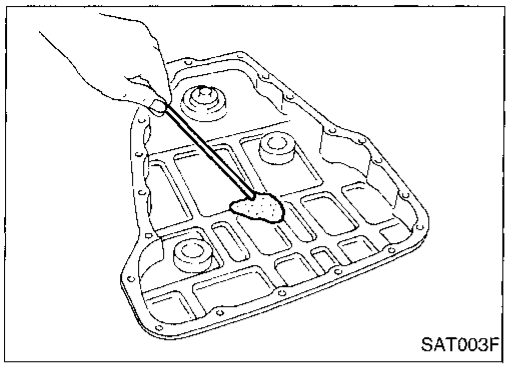

3. Check torque converter one-way clutch using check tool as shown at left.
a. Insert check tool into the groove of bearing support built into one-way clutch outer race.
b. When fixing bearing support with check tool, rotate one-way clutch spline using screwdriver.
c. Check that inner race rotates clockwise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




4. Remove oil charging pipe and oil cooler tube.

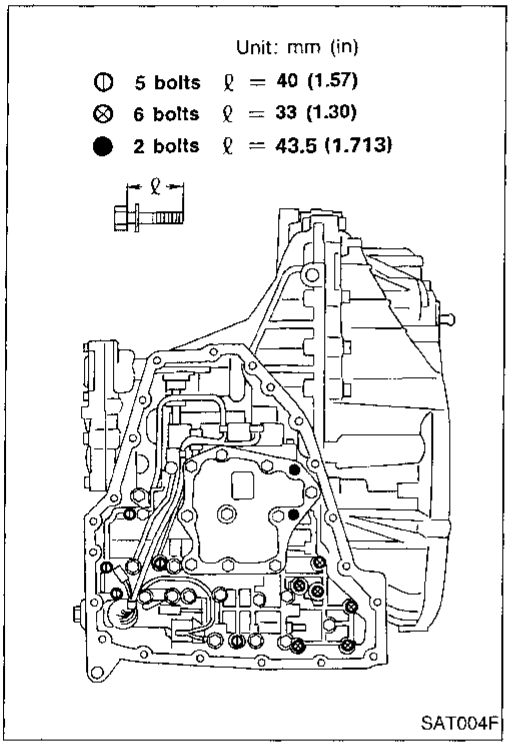



5. Set manual shaft to position "P".
6. Remove inhibitor switch.

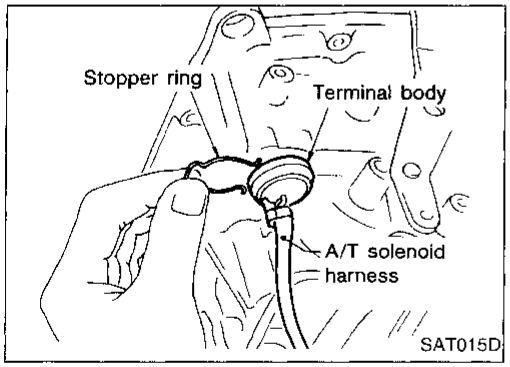

SAT003F

7. Remove oil pan and oil pan gasket.
- **Do not reuse oil pan bolts.**
8. Check foreign materials in oil pan to help determine causes 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 can inhibit pump pressure.
- **If frictional material is detected, replace radiator after repair of A/T. Refer to LC section ("Radiator", "ENGINE COOLING SYSTEM").**
9. Remove control valve assembly according to the following procedures.

a. Remove control valve assembly mounting bolts ⓘ, ⓧ and ●.

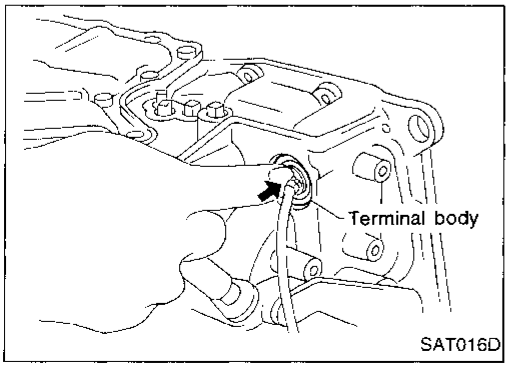


SAT004F



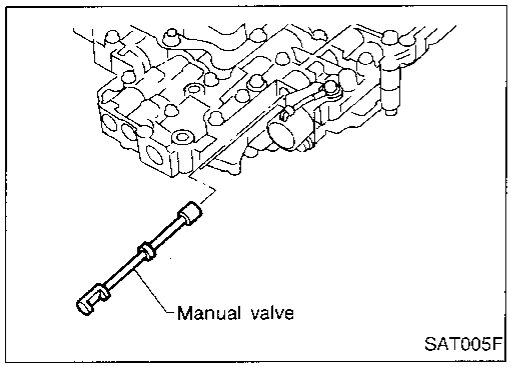
SAT015D

b. Remove stopper ring from terminal body.

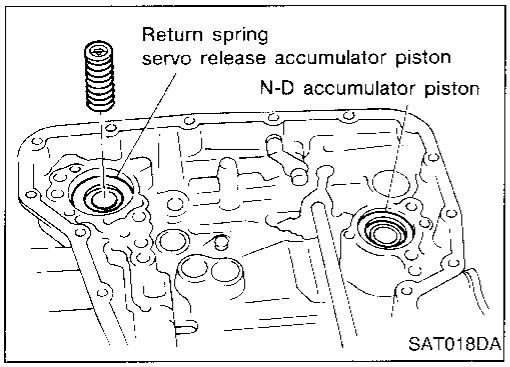


SAT016D

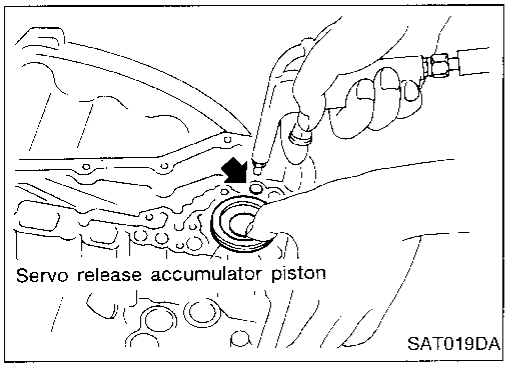
c. Push terminal body into transmission case and draw out solenoid harness.



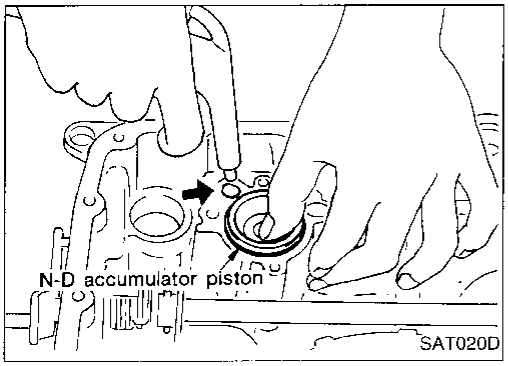

10. Remove manual valve from control valve assembly.



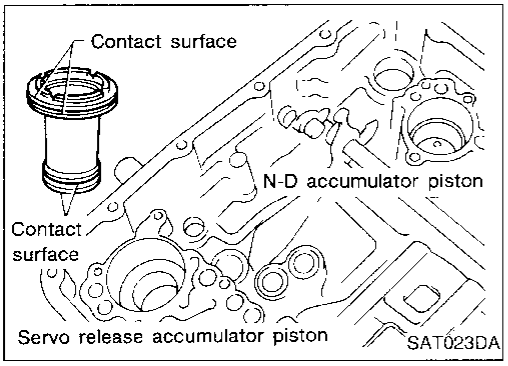

11. Remove return spring from servo release accumulator piston.



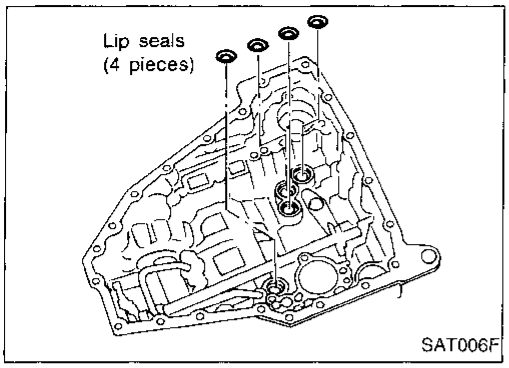

12. Remove servo release accumulator piston with compressed air.
13. Remove O-rings from servo release accumulator piston.



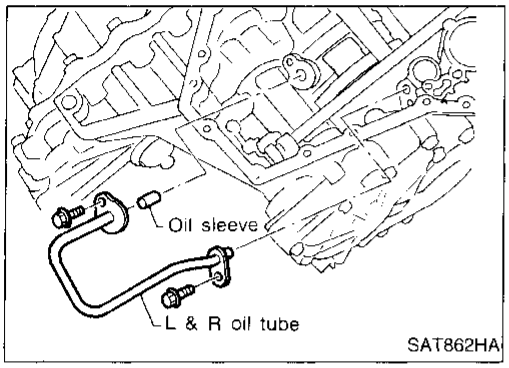

14. Remove N-D accumulator piston and return spring with compressed air.
15. Remove O-rings from N-D accumulator piston.



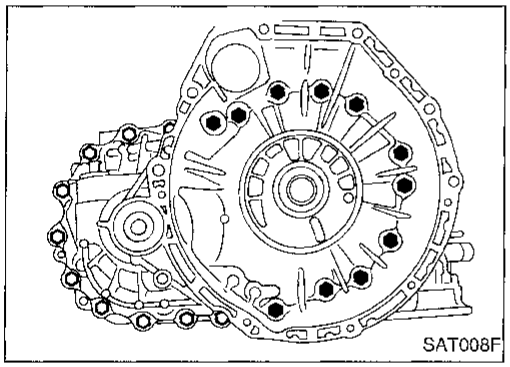

16. Check accumulator pistons and contact surface of transmission case for damage.
17. Check accumulator return springs for damage and free length.



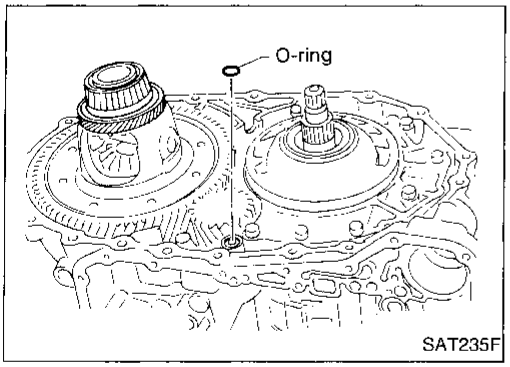

18. Remove lip seals.



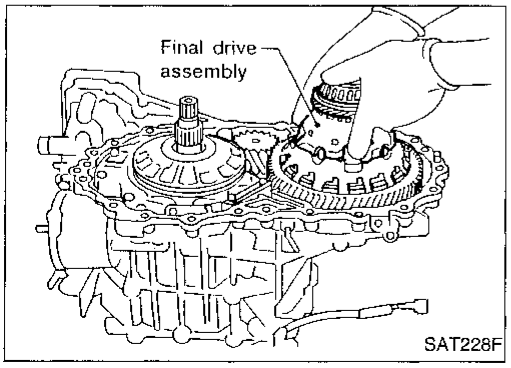

19. Remove L & R oil tube and oil sleeve.



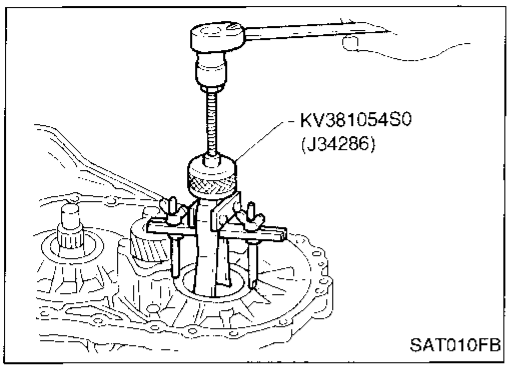

20. Remove converter housing according to the following procedures.
a. Remove converter housing mounting bolts.
b. Remove converter housing by tapping it lightly.



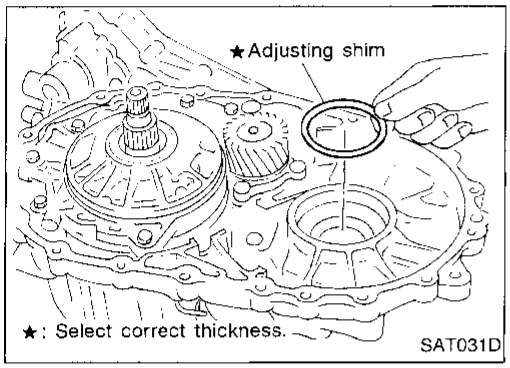

c. Remove O-ring from differential oil port.



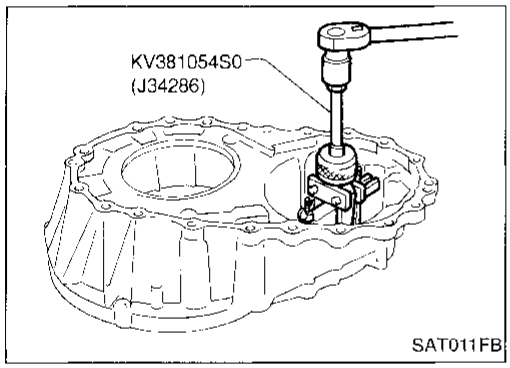

21. Remove final drive assembly from transmission case.



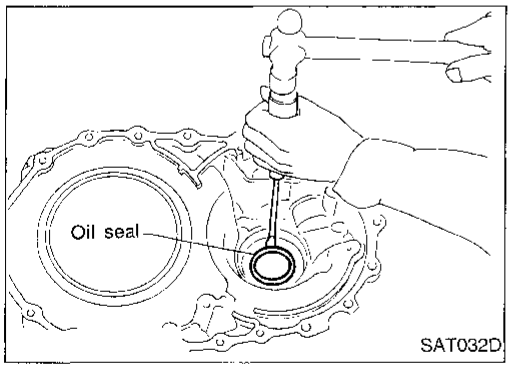

22. Remove differential side bearing outer race from transmission case.



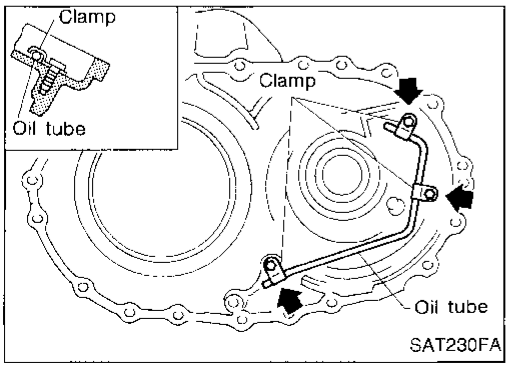

23. Remove differential side bearing adjusting shim from transmission case.



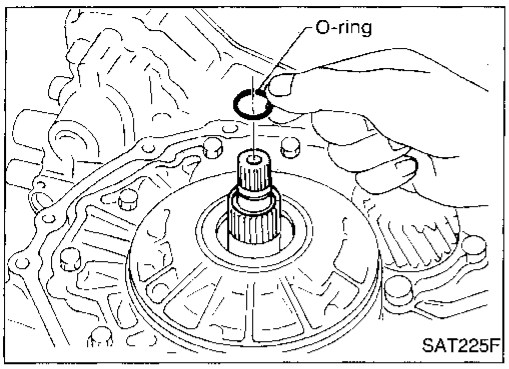

24. Remove differential side bearing outer race from converter housing.



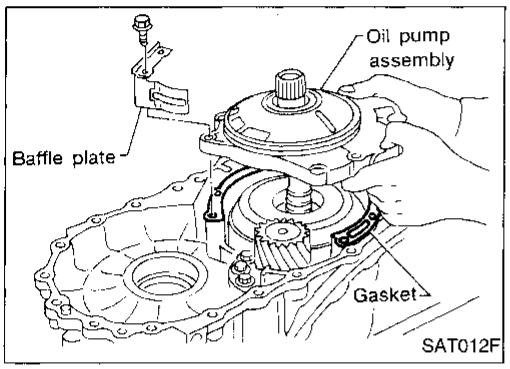

25. Remove oil seal with screwdriver from converter housing.
- **Be careful not to damage case.**



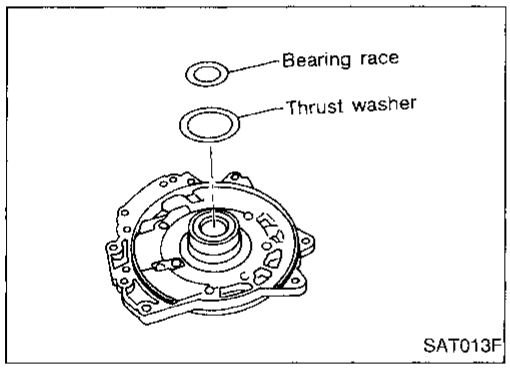

26. Remove oil tube from converter housing.



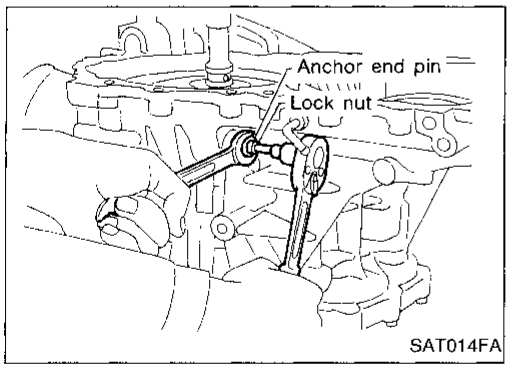

27. Remove oil pump according to the following procedures.
a. Remove O-ring from input shaft.



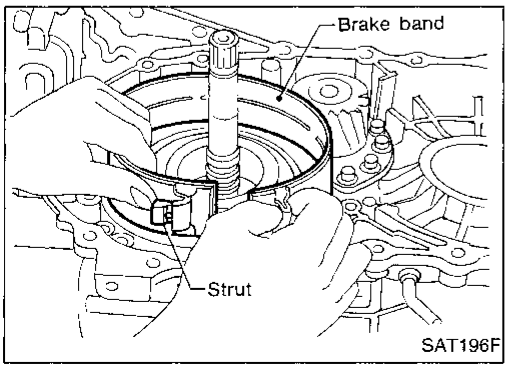

b. Remove oil pump assembly, baffle plate and gasket from transmission case.



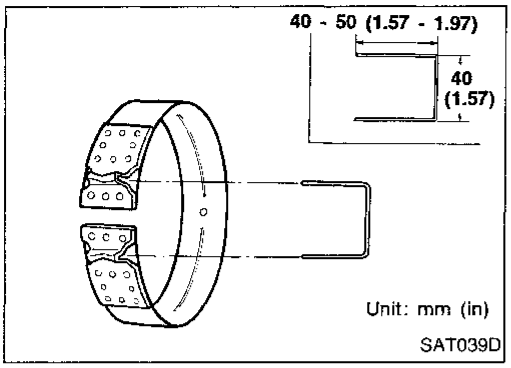

c. Remove thrust washer and bearing race from oil pump assembly.



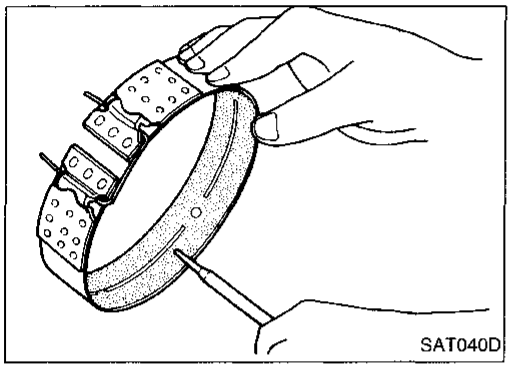

28. Remove brake band according to the following procedures.
a. Loosen lock nut, then back off anchor end pin.
- **Do not reuse anchor end pin.**



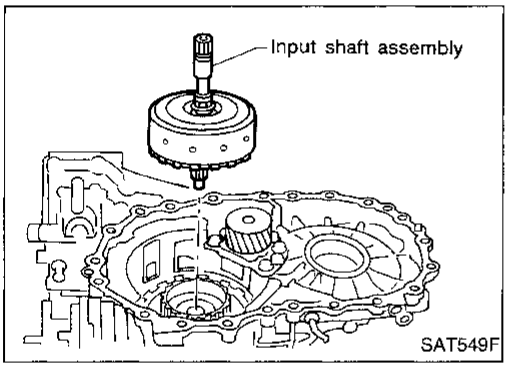

b. Remove brake band and strut from transmission case.



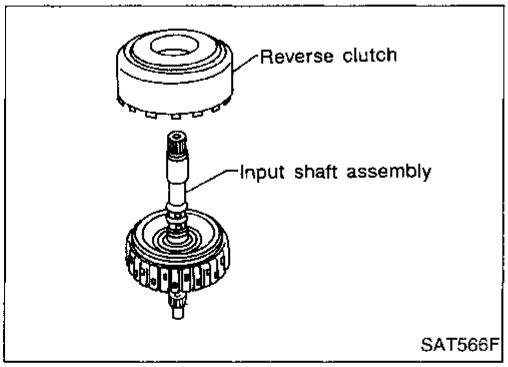

- **To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at left.**
  **Leave the clip in position after removing the brake band.**



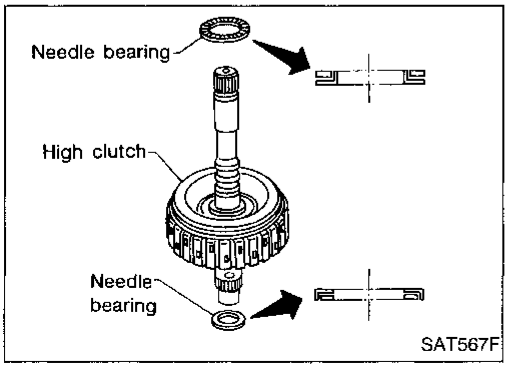

c. Check brake band facing for damage, cracks, wear or burns.



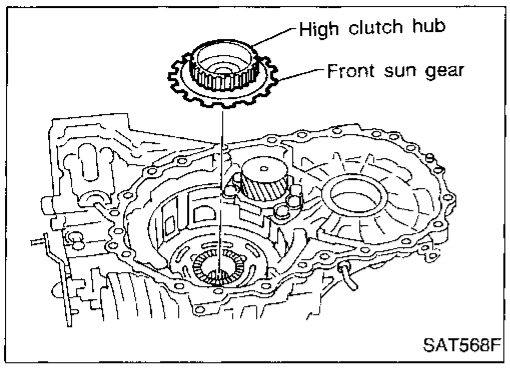

29. Remove input shaft assembly (high clutch) and reverse clutch according to the following procedures.
a. Remove input shaft assembly (high clutch) with reverse clutch.



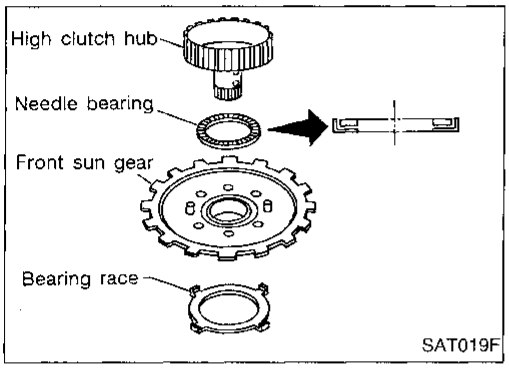

b. Remove input shaft assembly (high clutch) from reverse clutch.



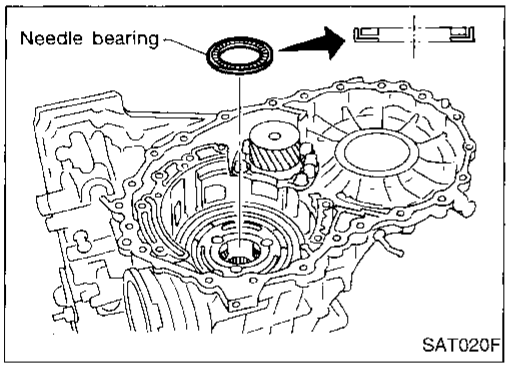

c. Remove needle bearings from high clutch drum and check for damage or wear.



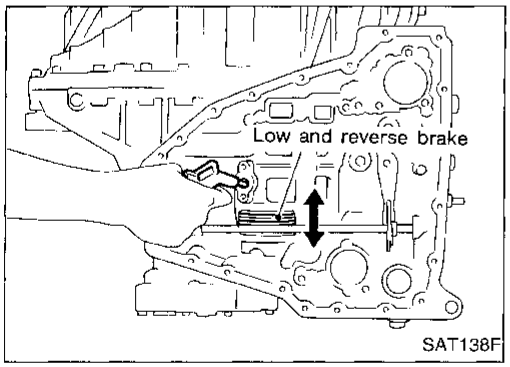

d. Remove high clutch hub and front sun gear from transmission case.



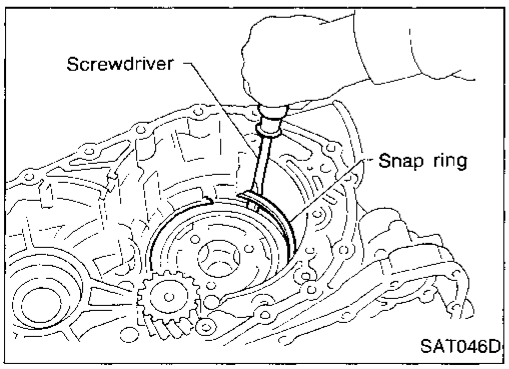

e. Remove front sun gear and needle bearing from high clutch hub and check for damage or wear.
f. Remove bearing race from front sun gear and check for damage or wear.



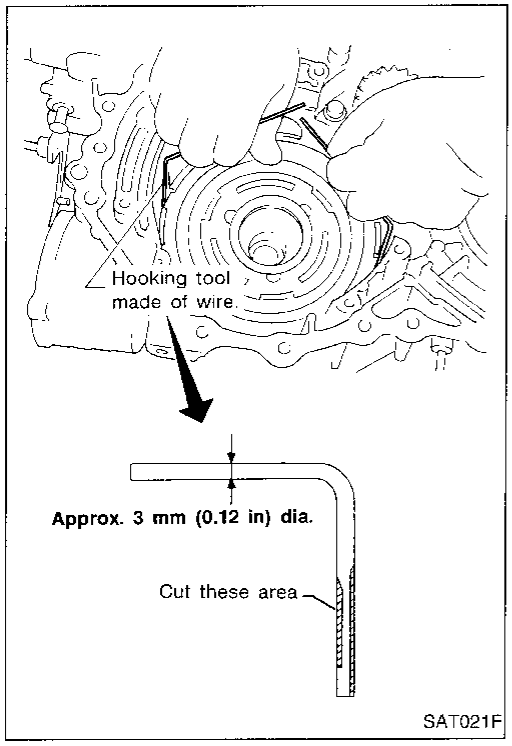

30. Remove needle bearing from transmission case and check for damage or wear.



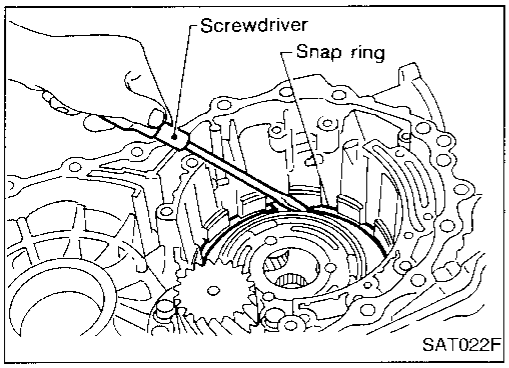

31. Apply compressed air and check to see that low and reverse brake operates.



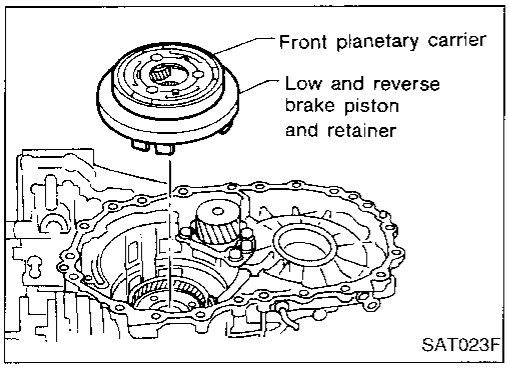

32. Remove low one-way clutch and front planetary carrier assembly according to the following procedures.
a. Remove snap ring with flat-bladed screwdriver.



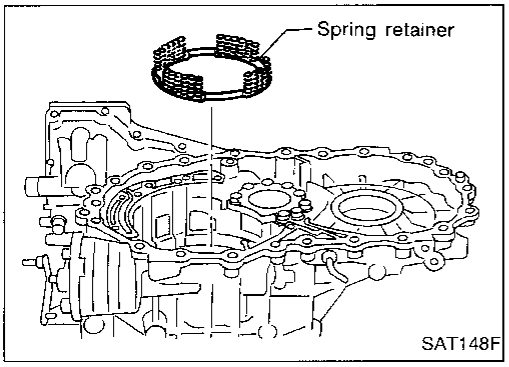

b. Remove low one-way clutch with a hook made of wire.




c. Remove snap ring with flat-bladed screwdriver.

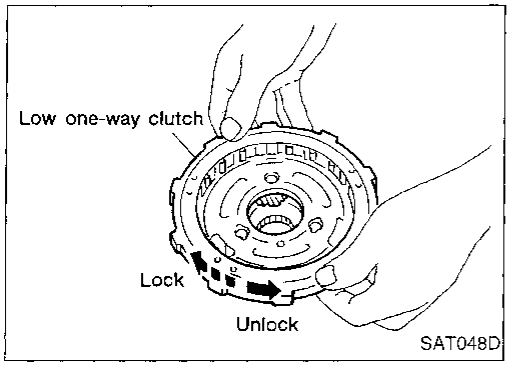



d. Remove front planetary carrier with low and reverse brake piston and retainer.

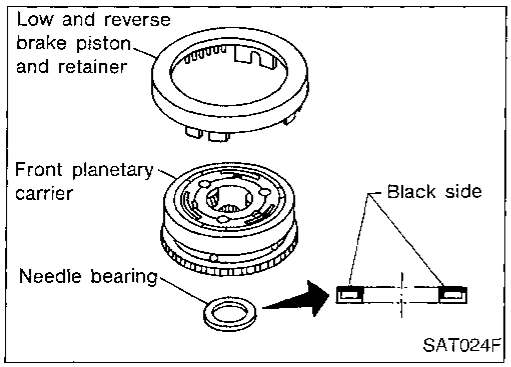



e. Remove low and reverse brake spring retainer.

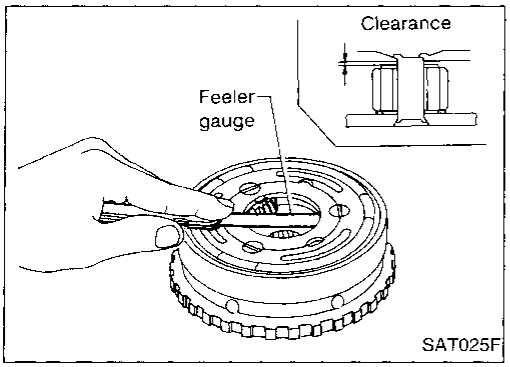
- **Do not remove return springs from spring retainer.**




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




g. Remove needle bearing, low and reverse brake piston and retainer from front planetary carrier.




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

i. Check clearance between planetary gears and planetary carrier with feeler gauge.

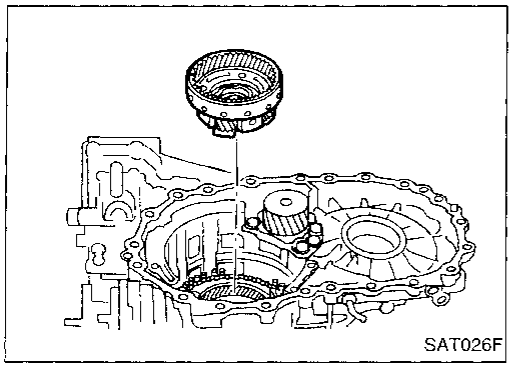
**Standard clearance:**

**0.20 - 0.70 mm (0.0079 - 0.0276 in)**

**Allowable limit:**

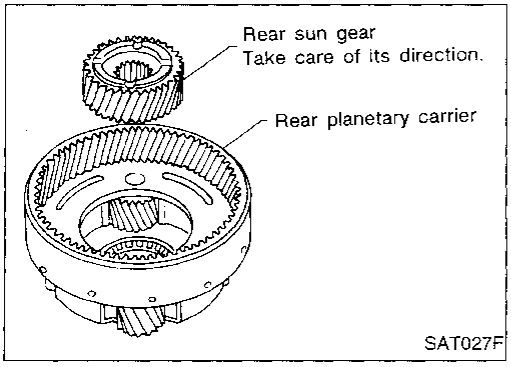
**0.80 mm (0.0315 in)**

Replace front planetary carrier if the clearance exceeds allowable limit.

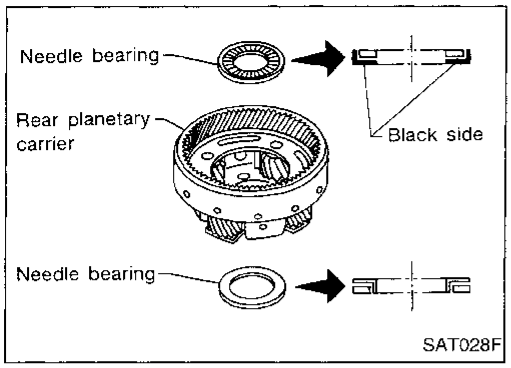



33. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.

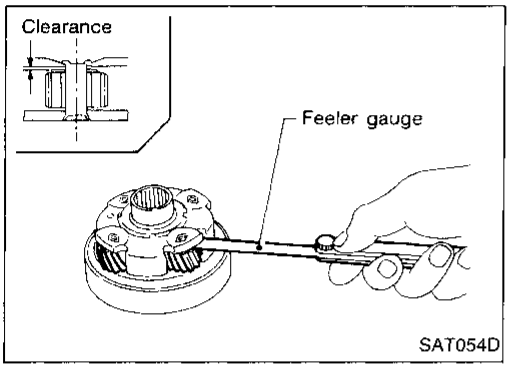
a. Remove rear planetary carrier assembly from transmission case.




b. Remove rear sun gear from rear planetary carrier.



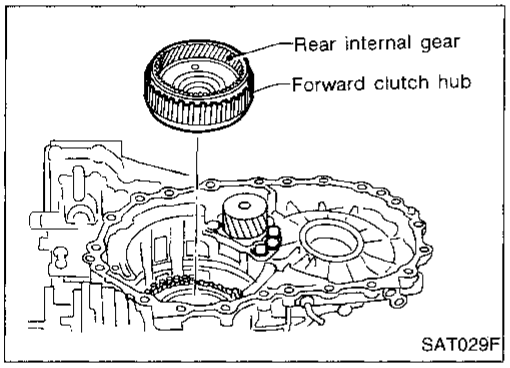

c. Remove needle bearings from rear planetary carrier assembly.



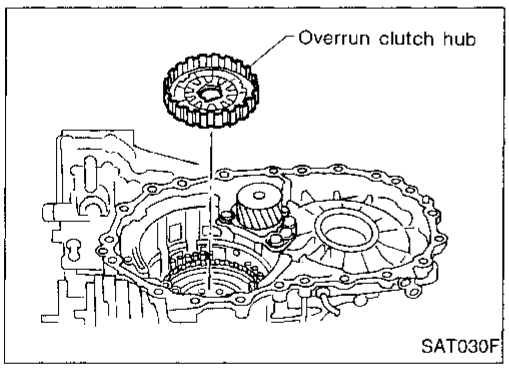

d. Check rear planetary carrier, rear sun gear and needle bearings for damage or wear.
e. Check clearance between pinion washer and rear planetary carrier with feeler gauge.

**Standard clearance:**
**0.20 - 0.70 mm (0.0079 - 0.0276 in)**
**Allowable limit:**
**0.80 mm (0.0315 in)**

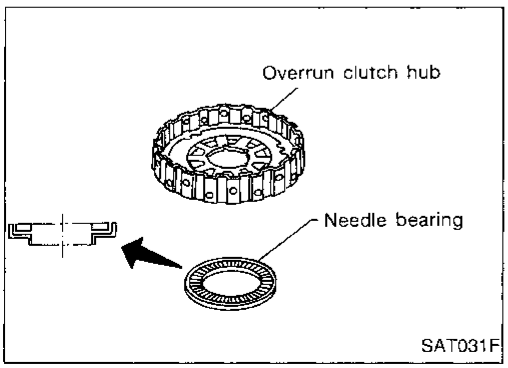
Replace rear planetary carrier if clearance exceeds the allowable limit.



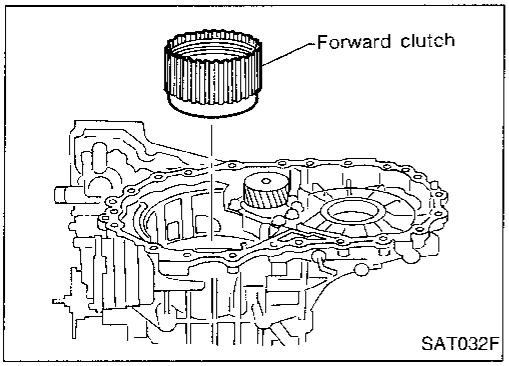

34. Remove rear internal gear and forward clutch hub from transmission case.



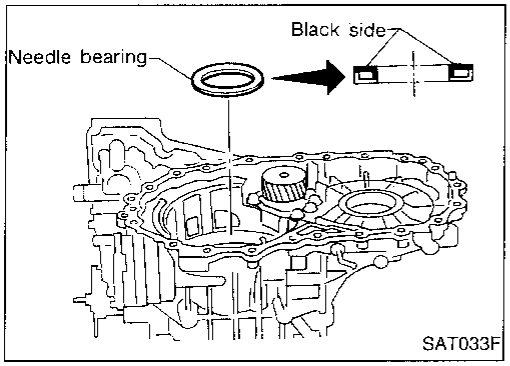

35. Remove overrun clutch hub from transmission case.



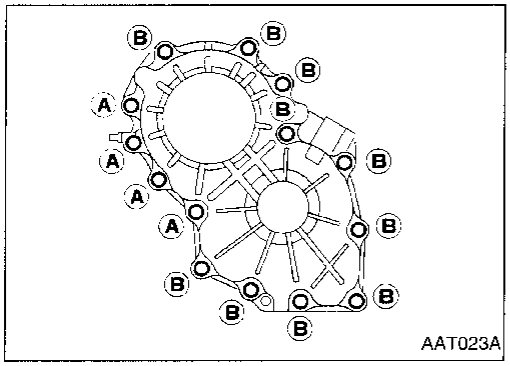

36. Remove needle bearing from overrun clutch hub and check for damage or wear.




37. Remove forward clutch assembly from transmission case.



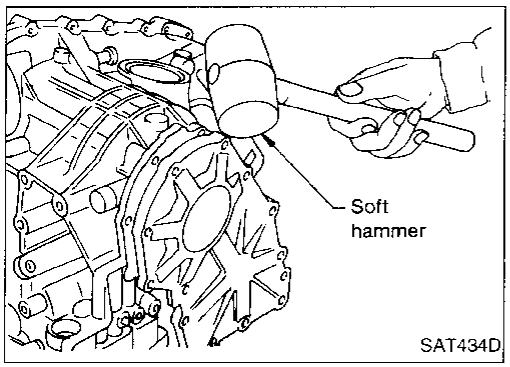

38. Remove needle bearing from transmission case.




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

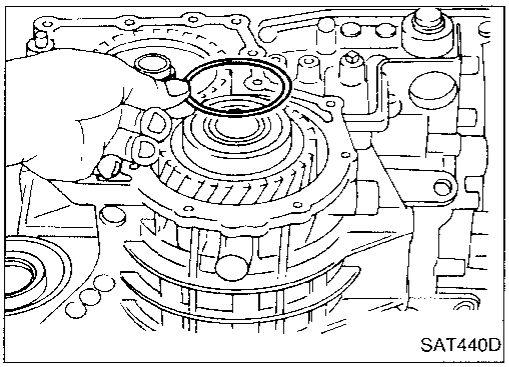
a. Remove side cover bolts.

- **Do not mix bolts Ⓐ and Ⓑ.**
- **Always replace bolts Ⓐ as they are self-sealing bolts.**

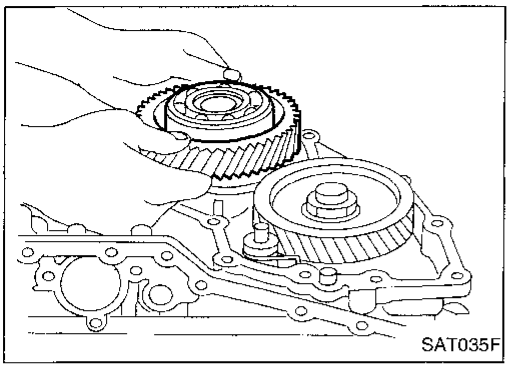



b. Remove side cover by lightly tapping it with a soft hammer.

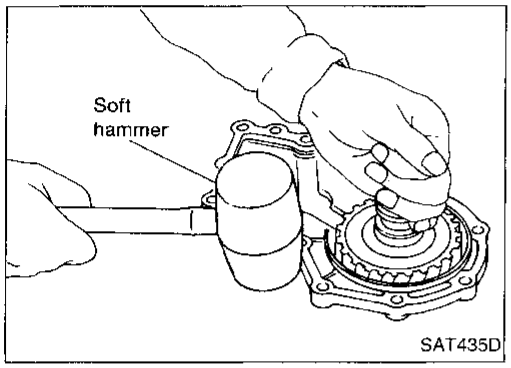
- **Be careful not to drop output shaft assembly. It might come out when removing side cover.**



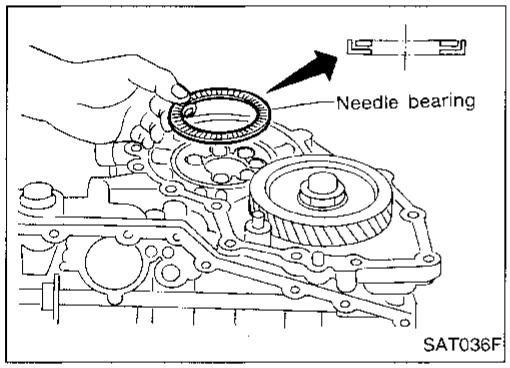

c. Remove adjusting shim.



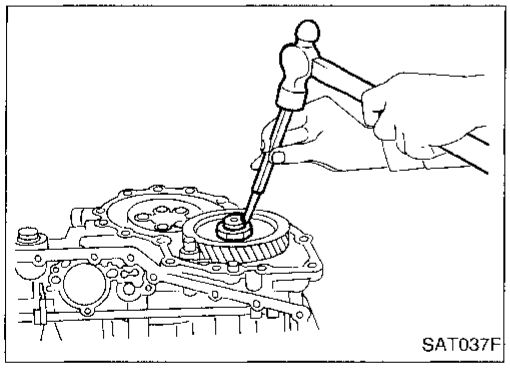

d. Remove output shaft assembly.



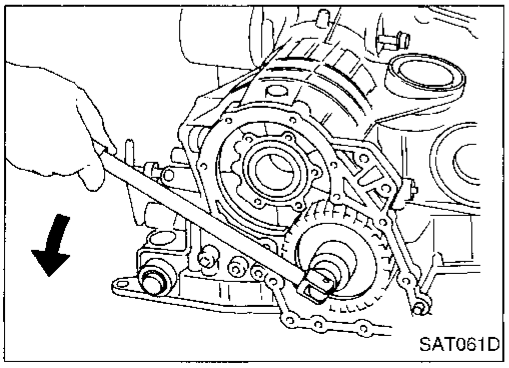

- If output shaft assembly came off with side cover, tap cover with a soft hammer to separate.



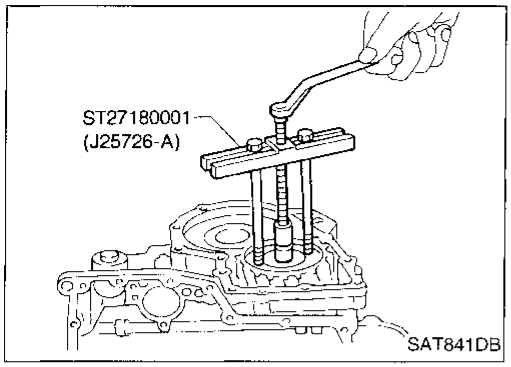

e. Remove needle bearing.



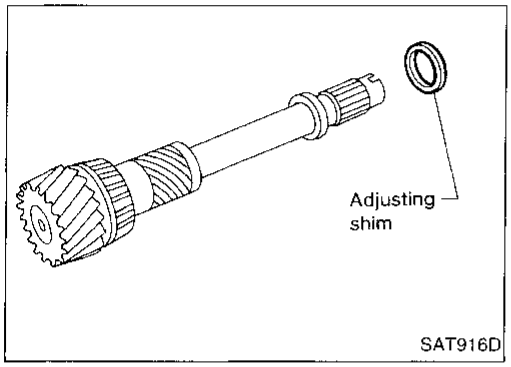

40. Disassemble reduction gear according to the following procedures.
a. Set manual shaft to position "P" to fix idler gear.
b. Unlock idler gear lock nut using a pin punch.



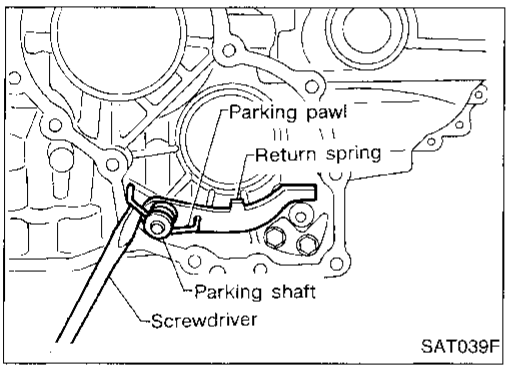

c. Remove idler gear lock nut.
- **Do not reuse idler gear lock nut.**



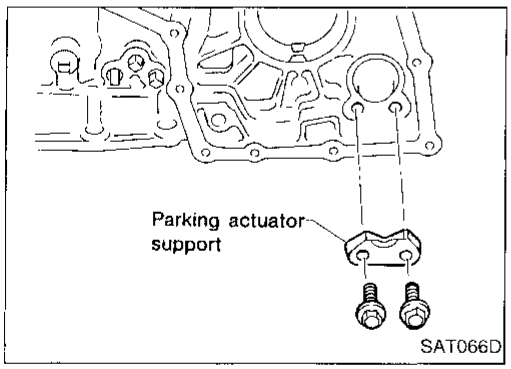

d. Remove idler gear with puller.



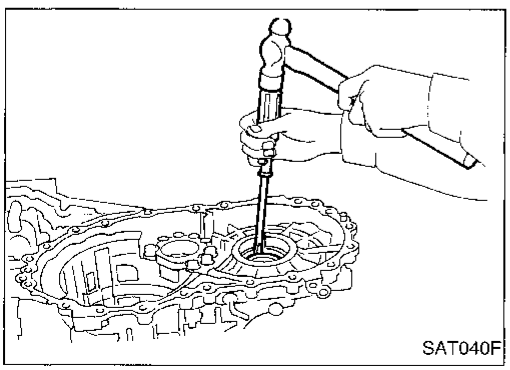

e. Remove reduction pinion gear.
f. Remove adjusting shim from reduction pinion gear.




41. Remove return spring from parking shaft with screwdriver.
42. Draw out parking shaft and remove parking pawl from transmission case.
43. Check parking pawl and shaft for damage or wear.

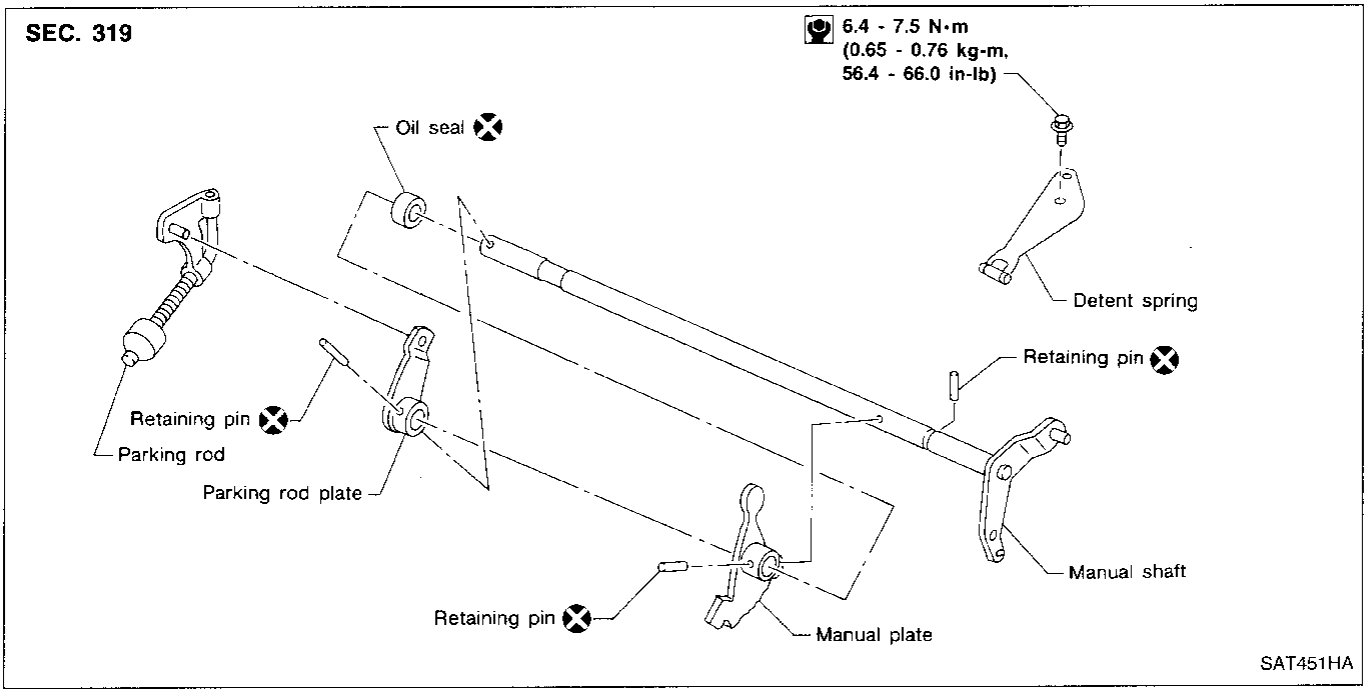


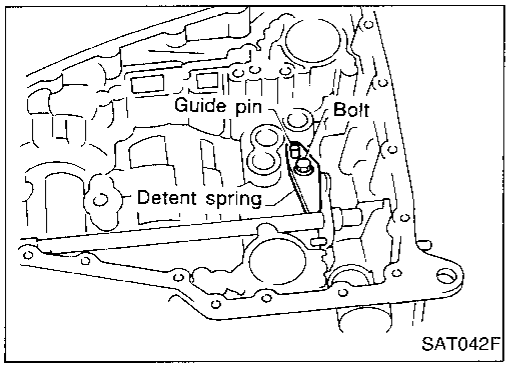

44. Remove parking actuator support from transmission case.
45. Check parking actuator support for damage or wear.




46. Remove side oil seal with screwdriver from transmission case.

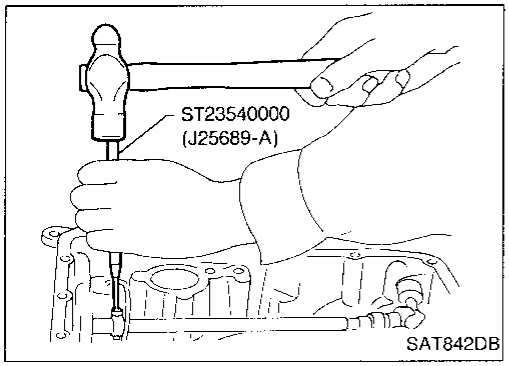
## Manual Shaft



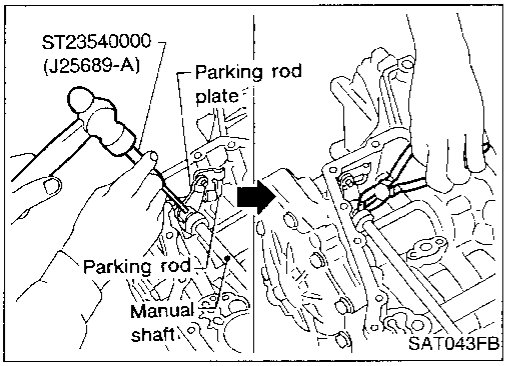




### REMOVAL

1. Remove detent spring from transmission case.

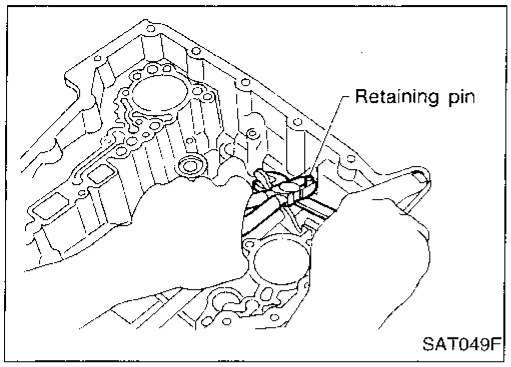



2. Drive out manual plate retaining pin.

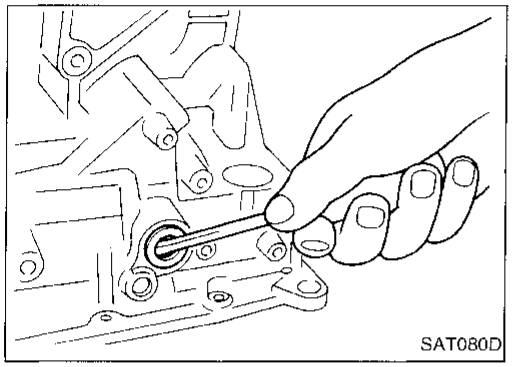



3. Drive and pull out parking rod plate retaining pin.
4. Remove parking rod plate from manual shaft.
5. Draw out parking rod from transmission case.

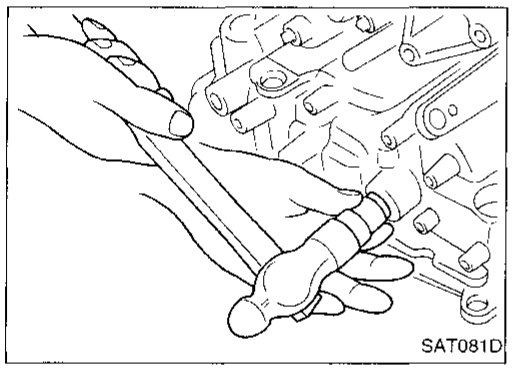
## Manual Shaft (Cont'd)




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




8. Remove manual shaft oil seal.

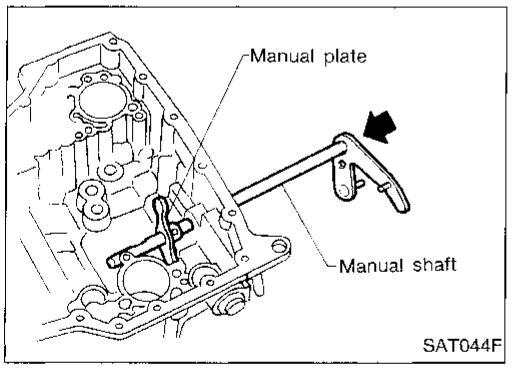



### INSPECTION

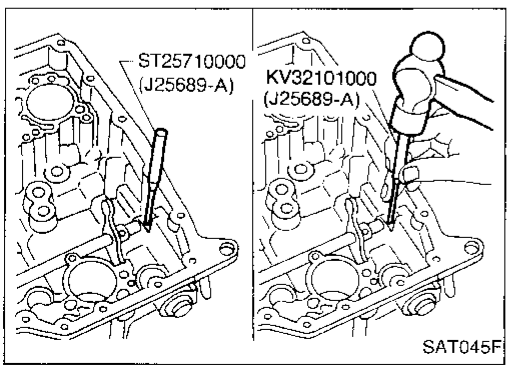
- Check component parts for wear or damage. Replace if necessary.

### INSTALLATION

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

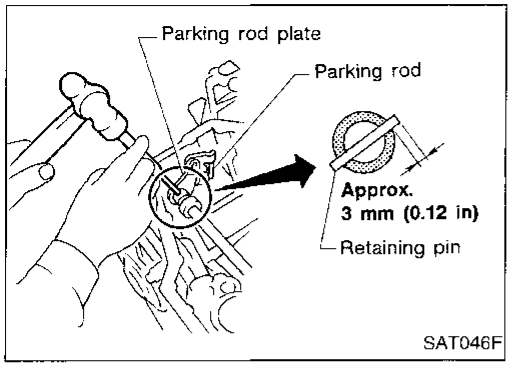



2. Install manual shaft and manual plate.



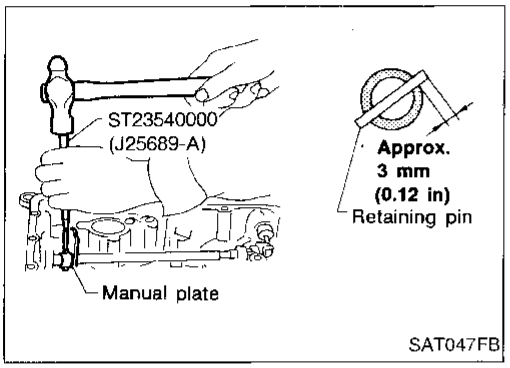

3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin up to bottom of hole.

## Manual Shaft (Cont'd)



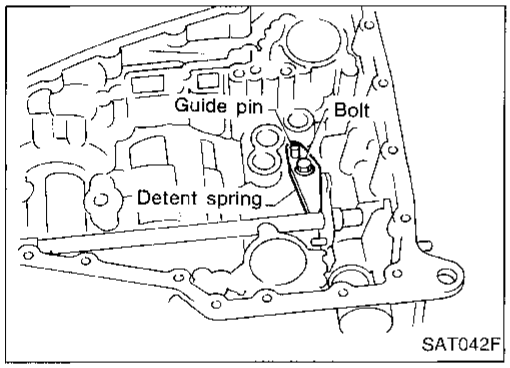

5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft and drive retaining pin.

**Both ends of pin should protrude.**



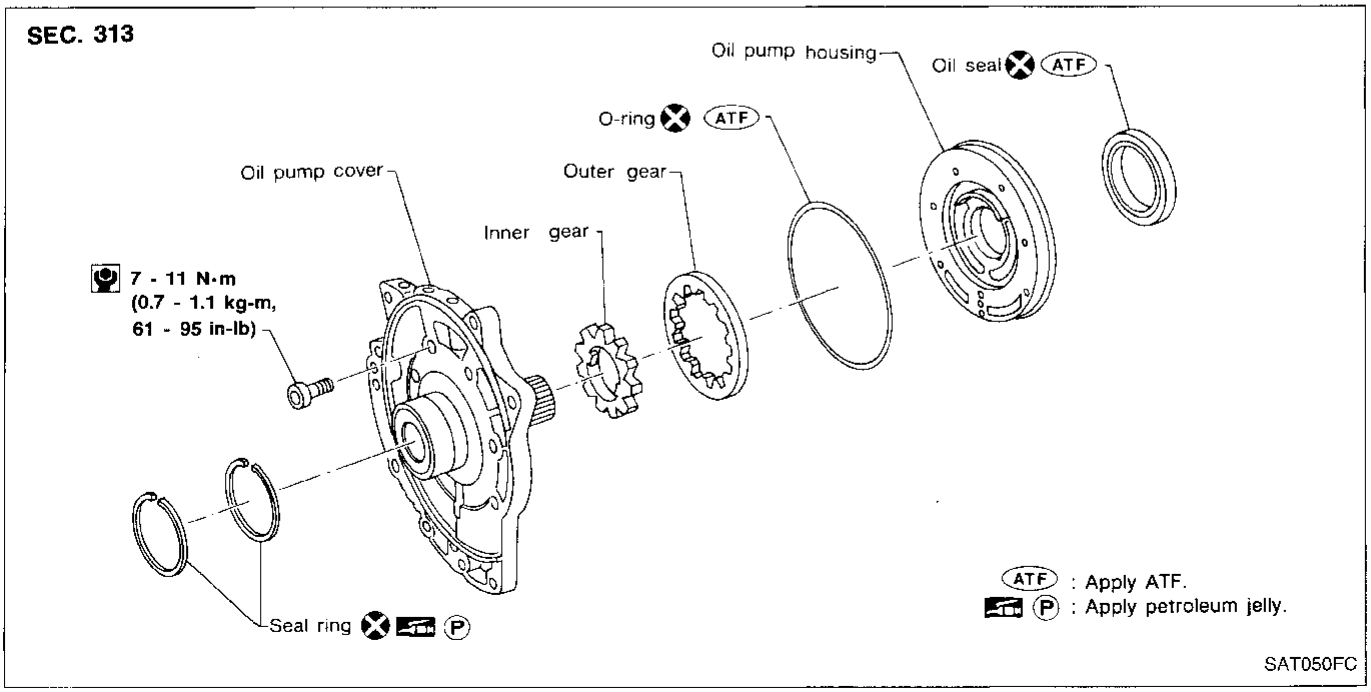

7. Drive manual plate retaining pin.

**Both ends of pin should protrude.**



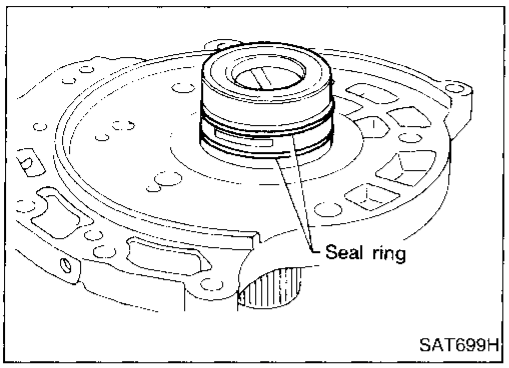

8. Install detent spring.

## Oil Pump

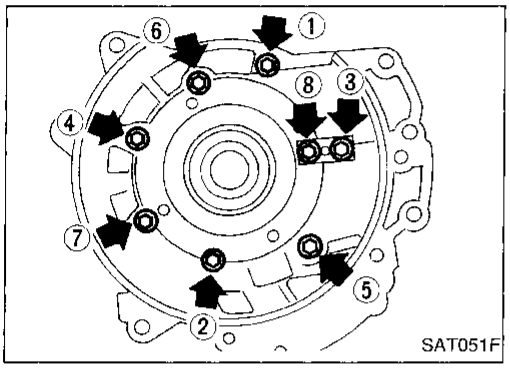


## Oil Pump (Cont'd)

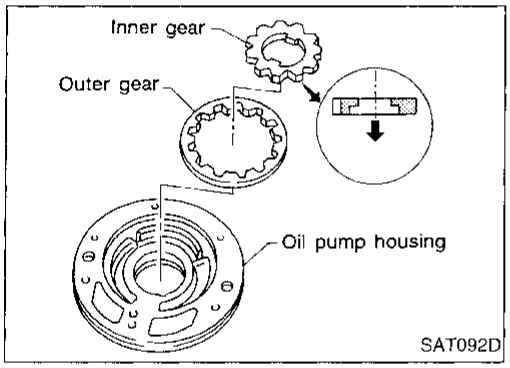
### DISASSEMBLY



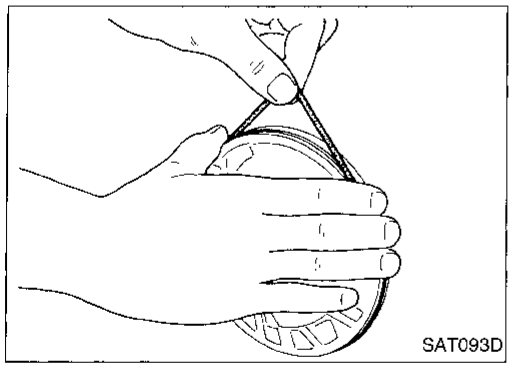

1. Remove seal rings.



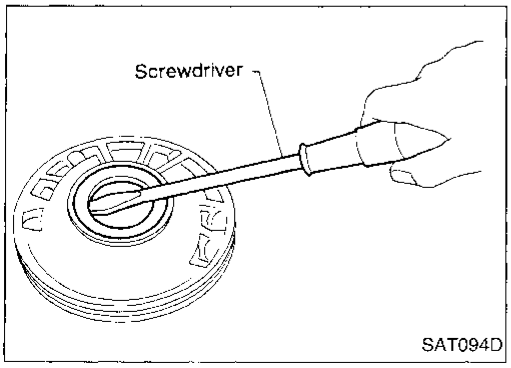

2. Loosen bolts in a crisscross pattern and remove oil pump cover.




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




4. Remove O-ring from oil pump housing.



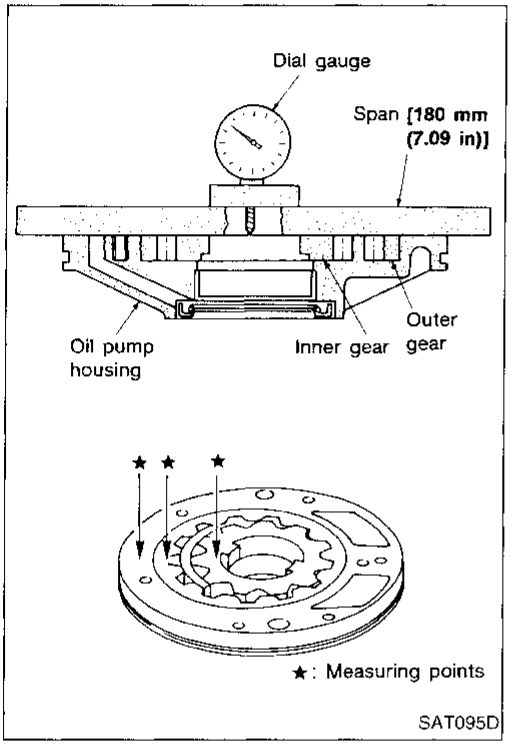

5. Remove oil pump housing oil seal.

## Oil Pump (Cont'd)

### INSPECTION

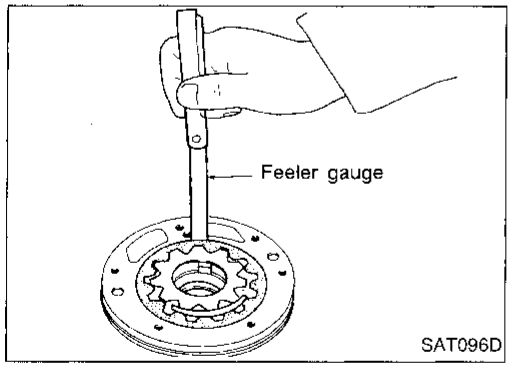
**Oil pump housing, oil pump cover, inner gear and outer gear**

- Check for wear or damage.

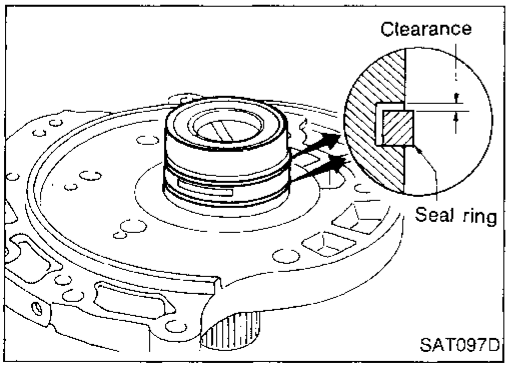



**Side clearance**

- Measure side clearance of inner and outer gears in at least four places around each outside edge. Maximum measured values should be within specified positions.
  **Standard clearance:**
  **0.030 - 0.050 mm (0.0012 - 0.0020 in)**
- If clearance is less than standard, select inner and outer gear as a set so that clearance is within specifications.
  **Inner and outer gear:**
  **Refer to SDS, AT-241.**
- If clearance is more than standard, replace whole oil pump assembly except oil pump cover.




- Measure clearance between outer gear and oil pump housing.
  **Standard clearance:**
  **0.111 - 0.181 mm (0.0044 - 0.0071 in)**
  **Allowable limit:**
  **0.181 mm (0.0071 in)**
- If not within allowable limit, replace whole oil pump assembly except oil pump cover.

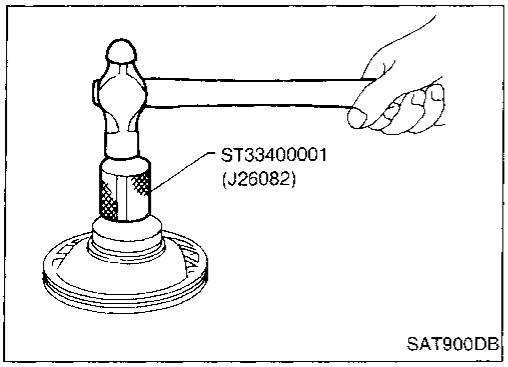



**Seal ring clearance**

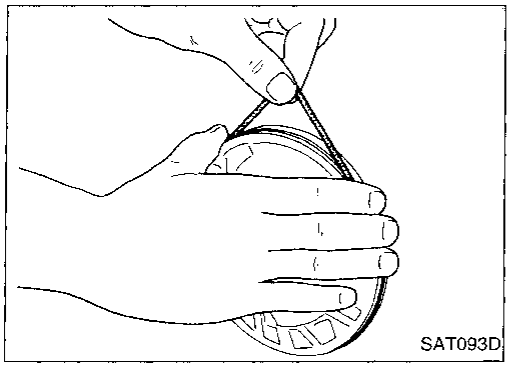
- Measure clearance between seal ring and ring groove.
  **Standard clearance:**
  **0.1 - 0.25 mm (0.0039 - 0.0098 in)**
  **Allowable limit:**
  **0.25 mm (0.0098 in)**
- If not within allowable limit, replace oil pump cover assembly.

## Oil Pump (Cont'd)

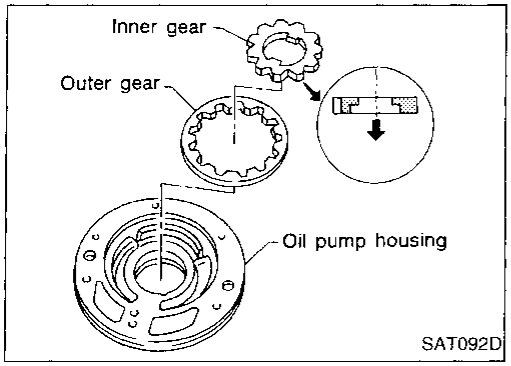
### ASSEMBLY



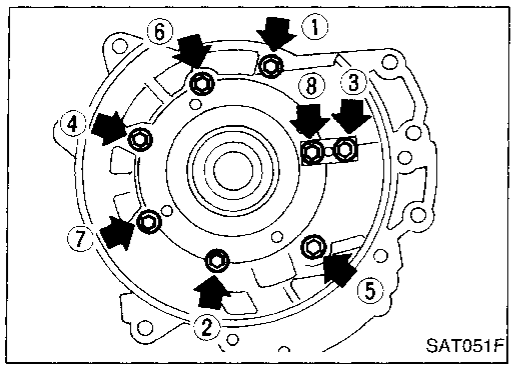

1. Install oil seal on oil pump housing.



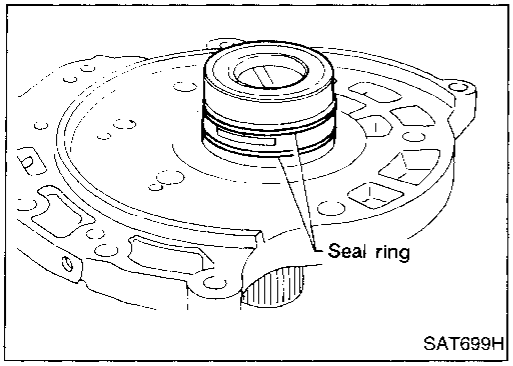

2. Install O-ring on oil pump housing.
- **Apply ATF to O-ring.**




3. Install inner and outer gears on oil pump housing.
- **Be careful of direction of inner gear.**



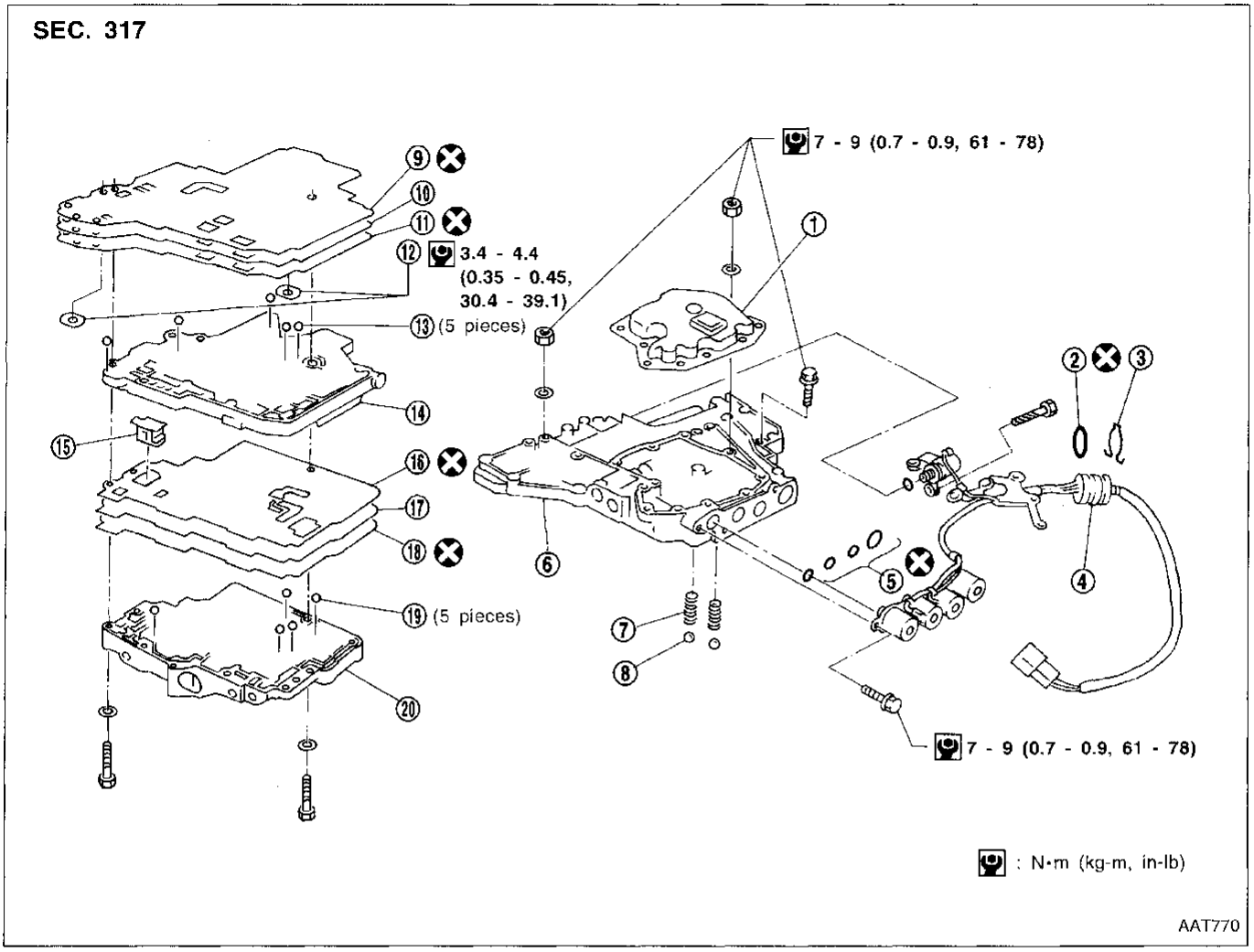

4. Install oil pump cover on oil pump housing.
a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly on oil pump housing assembly, then remove masking tape.
b. Tighten bolts in a crisscross pattern.




5. Install new seal rings carefully after packing ring groove with petroleum jelly.
- **Do not spread gap of seal ring excessively while installing. The ring may be deformed.**

## Control Valve Assembly

SEC. 317




① Oil strainer
② O-ring
③ Clip
④ Terminal body
⑤ O-rings
⑥ Control valve lower body
⑦ Oil cooler relief valve spring
⑧ Check ball
⑨ Lower separating gasket
⑩ Separating plate
⑪ Lower inter separating gasket
⑫ Support plate
⑬ Steel ball
⑭ Control valve inter body
⑮ Pilot filter
⑯ Upper inter separating gasket
⑰ Separating plate
⑱ Upper separating gasket
⑲ Steel ball
⑳ Control valve upper body

### DISASSEMBLY

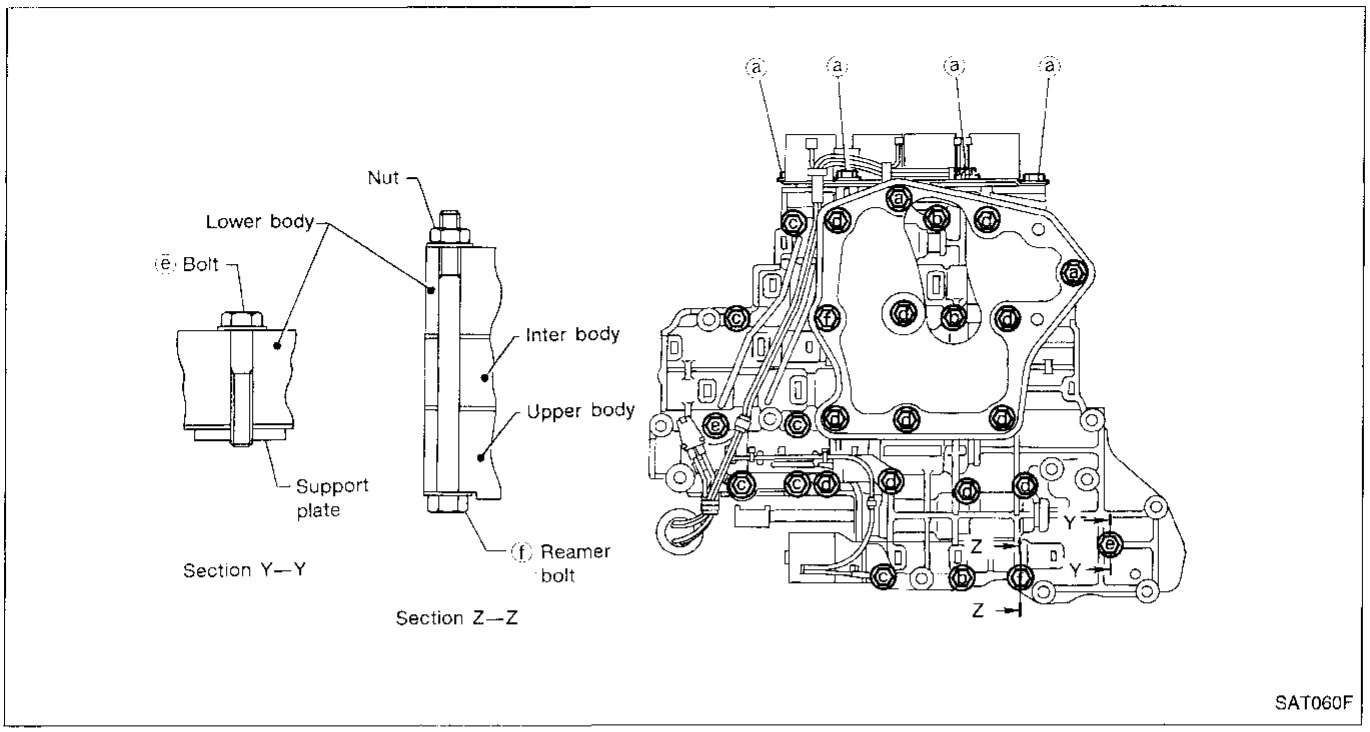
Disassemble upper, inter and lower bodies.

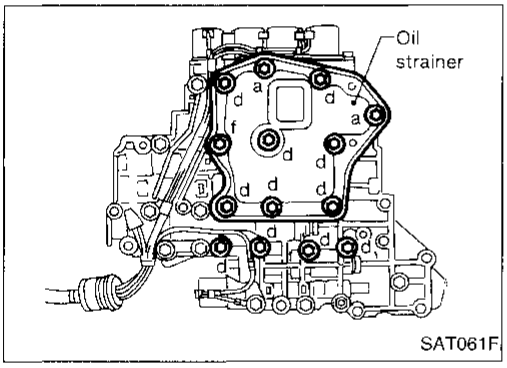
**Bolt length, number and location:**

| Bolt symbol | a | b | c | d | e | f |
|---|---|---|---|---|---|---|
| Bolt length "ℓ" mm (in) | 13.5 (0.531) | 58.0 (2.283) | 40.0 (1.575) | 66.0 (2.598) | 33.0 (1.299) | 78.0 (3.071) |
| Number of bolts | 6 | 3 | 6 | 11 | 2 | 2 |

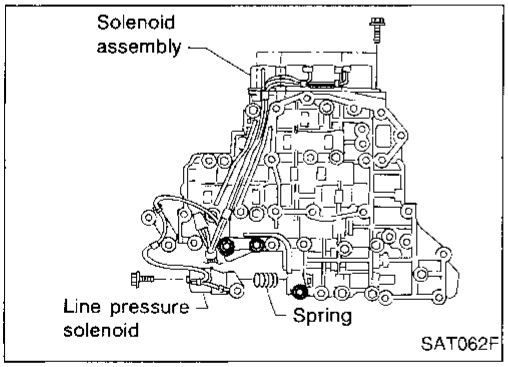
f: Reamer bolt and nut.

## Control Valve Assembly (Cont'd)

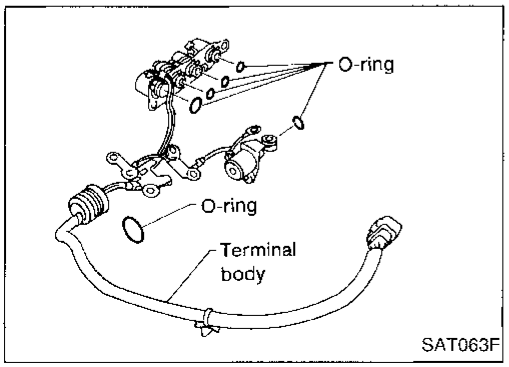



a. Remove bolts ⓐ, ⓓ and nut ⓕ and remove oil strainer from control valve assembly.

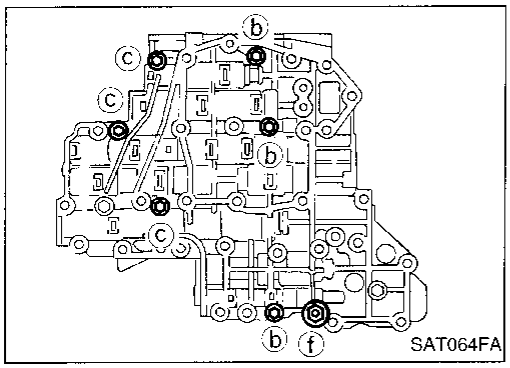



b. Remove solenoid valve assembly and line pressure solenoid valve from control valve assembly.

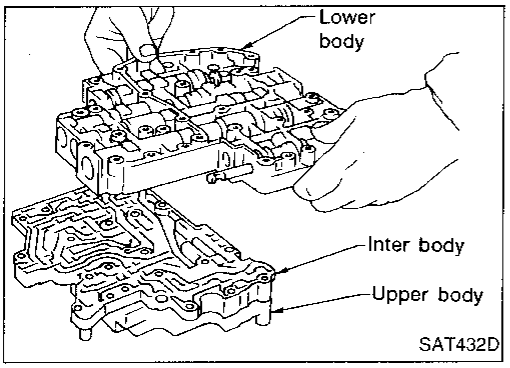



c. Remove O-rings from solenoid valves and terminal body.

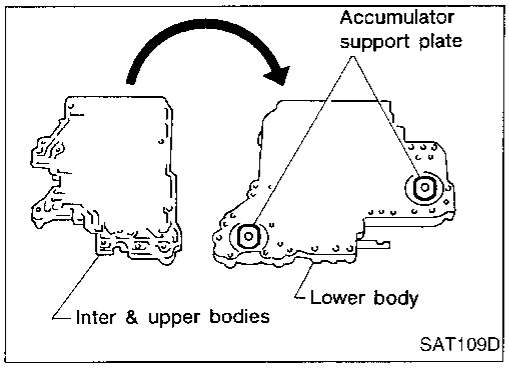
## Control Valve Assembly (Cont'd)



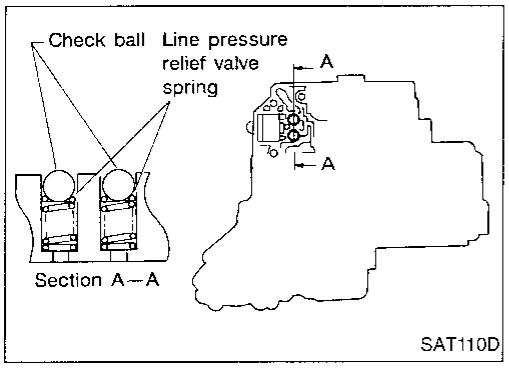

d. Place upper body facedown, and remove bolts ⓑ, ⓒ and nut ⓕ.




e. Remove inter body from lower body.

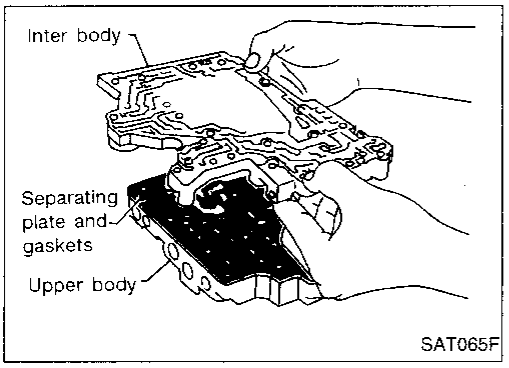



f. Turn over lower body, and remove accumulator support plate.



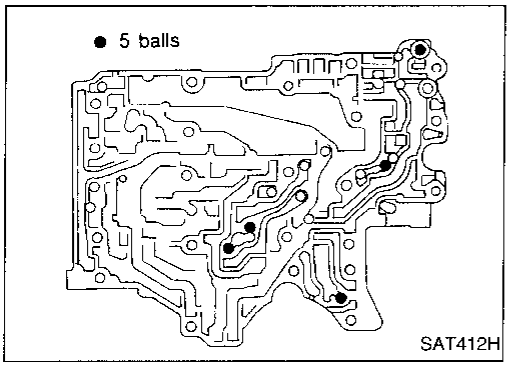

g. Remove bolts ⓔ, separating plate and separating gasket from lower body.
h. Remove steel balls and relief valve springs from lower body.

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



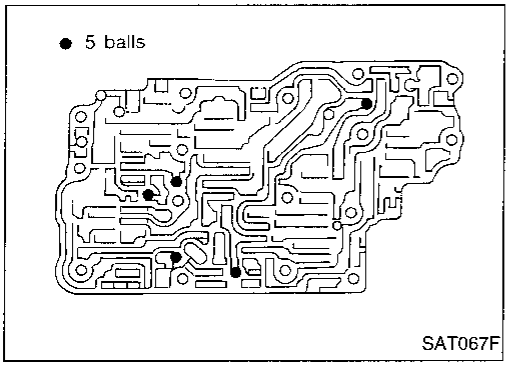

i. Remove inter body from upper body.

## Control Valve Assembly (Cont'd)



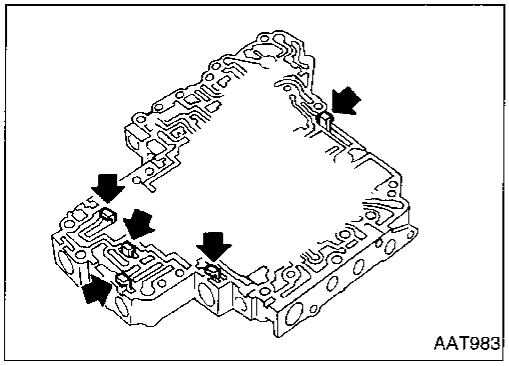

j. Check to see that steel balls are properly positioned in inter body and then remove them.

- **Be careful not to lose steel balls.**




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

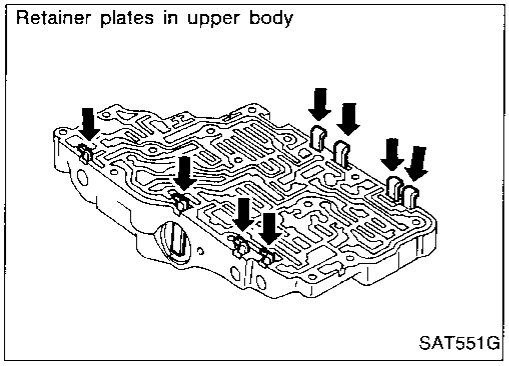
- **Be careful not to lose steel balls.**




### INSPECTION

#### Lower and upper bodies

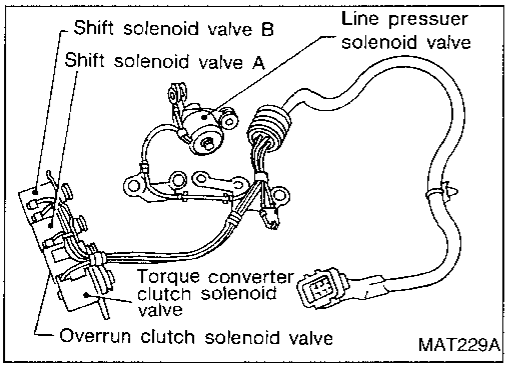
- Check to see that retainer plates are properly positioned in lower body.




- Check to see that retainer plates are properly positioned in upper body.
- **Be careful not to lose these parts.**

#### Oil strainer

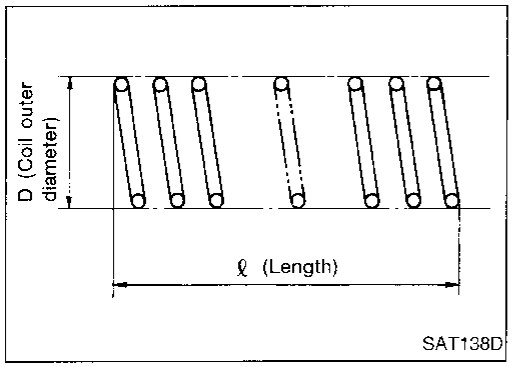
- Check wire netting of oil strainer for damage.




#### Shift solenoid valves A and B, line pressure solenoid valve, torque converter clutch solenoid valve and overrun clutch solenoid valve.

- Measure resistance. Refer to AT-88.

## Control Valve Assembly (Cont'd)



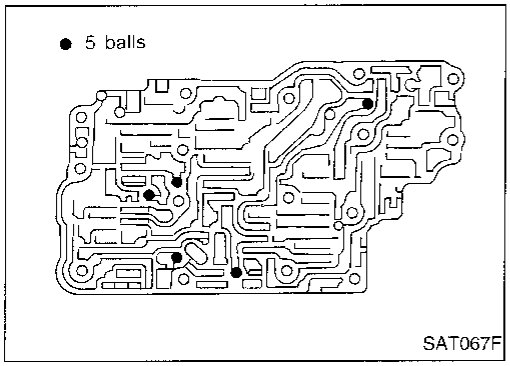

### Oil cooler relief valve spring.

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

**Inspection standard:**

Unit: mm (in)

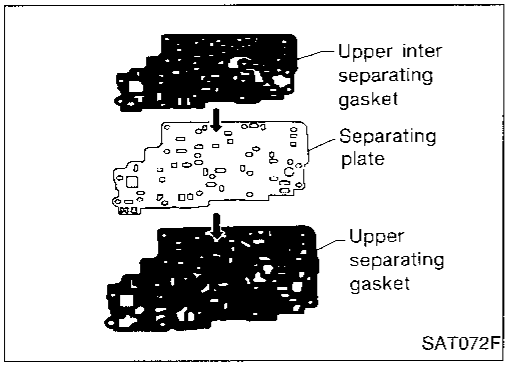
| Part No. | ℓ | D |
|---|---|---|
| 31872-31X00 | 17.02 (0.6701) | 8.0 (0.315) |



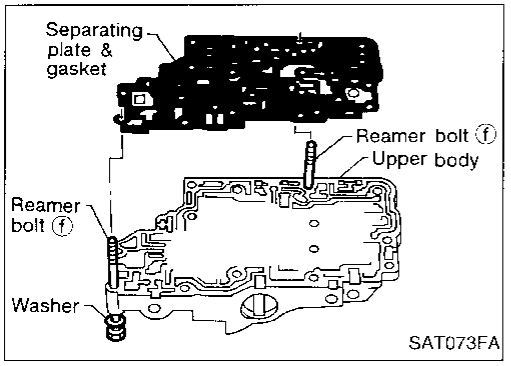

### ASSEMBLY

1. Install upper, inter and lower body.

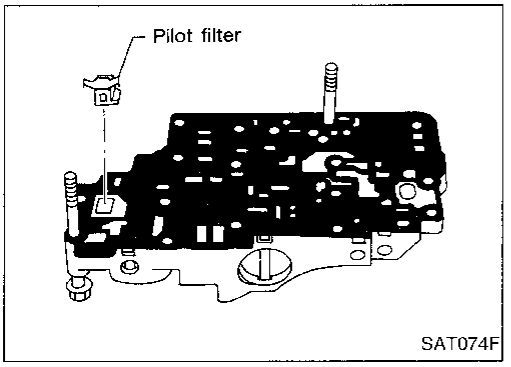
a. Place oil circuit of upper body face up. Install steel balls in their proper positions.




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

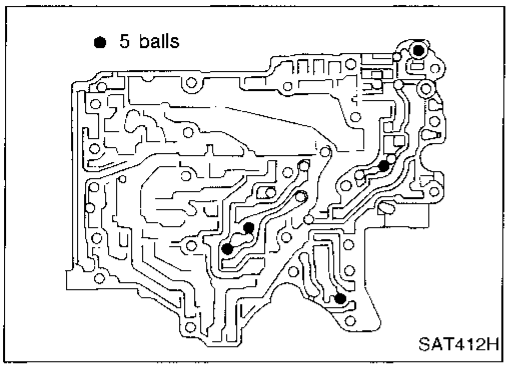



c. Install reamer bolts ⓕ from bottom of upper body. Using reamer bolts as guides, install separating plate and gaskets as a set.

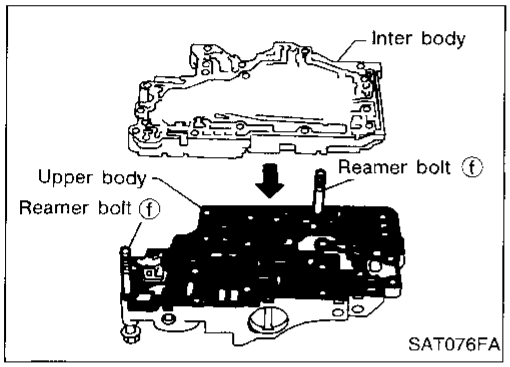



d. Install pilot filter.

## Control Valve Assembly (Cont'd)

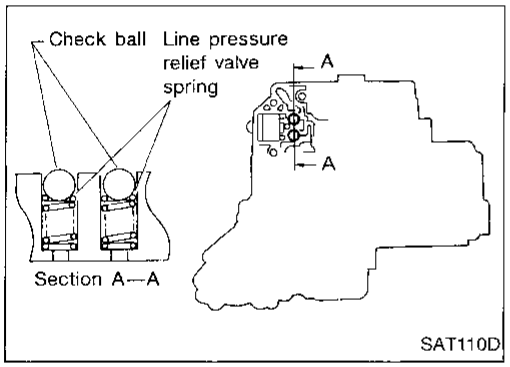



e. Place lower body as shown in illustration (side of inter body face up). Install steel balls in their proper positions.

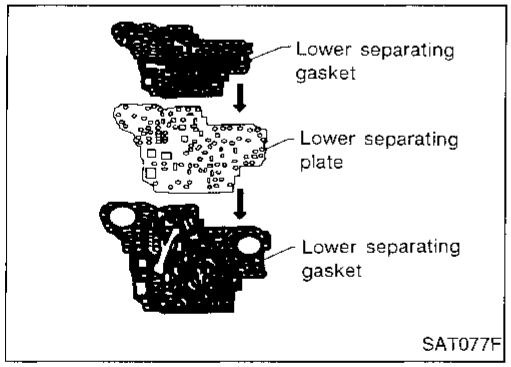



f. Install inter body on upper body using reamer bolts ⓕ as guides.

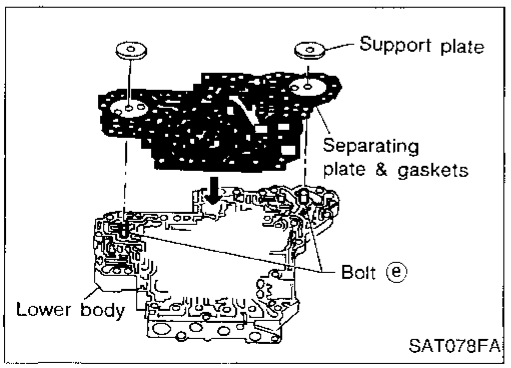
- **Be careful not to dislocate or drop steel balls.**




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

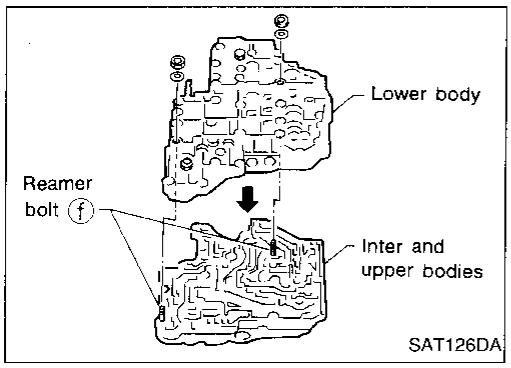



h. Install lower separating gasket, inter separating gasket and lower separating plate in order shown in illustration.

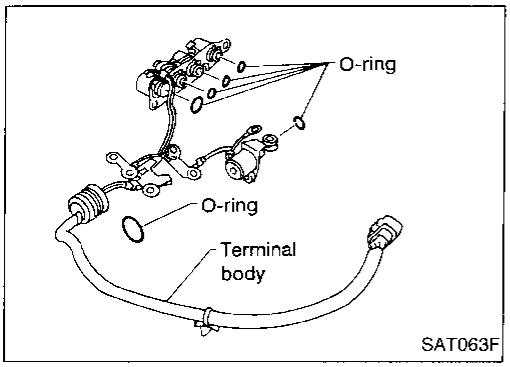



i. Install bolts ⓔ from bottom of lower body. Using bolt ⓔ as guides, install separating plate and gaskets as a set.
j. Temporarily install support plates on lower body.

## Control Valve Assembly (Cont'd)




k. Install lower body on inter body using reamer bolts (f) as guides and tighten reamer bolts (f) slightly.



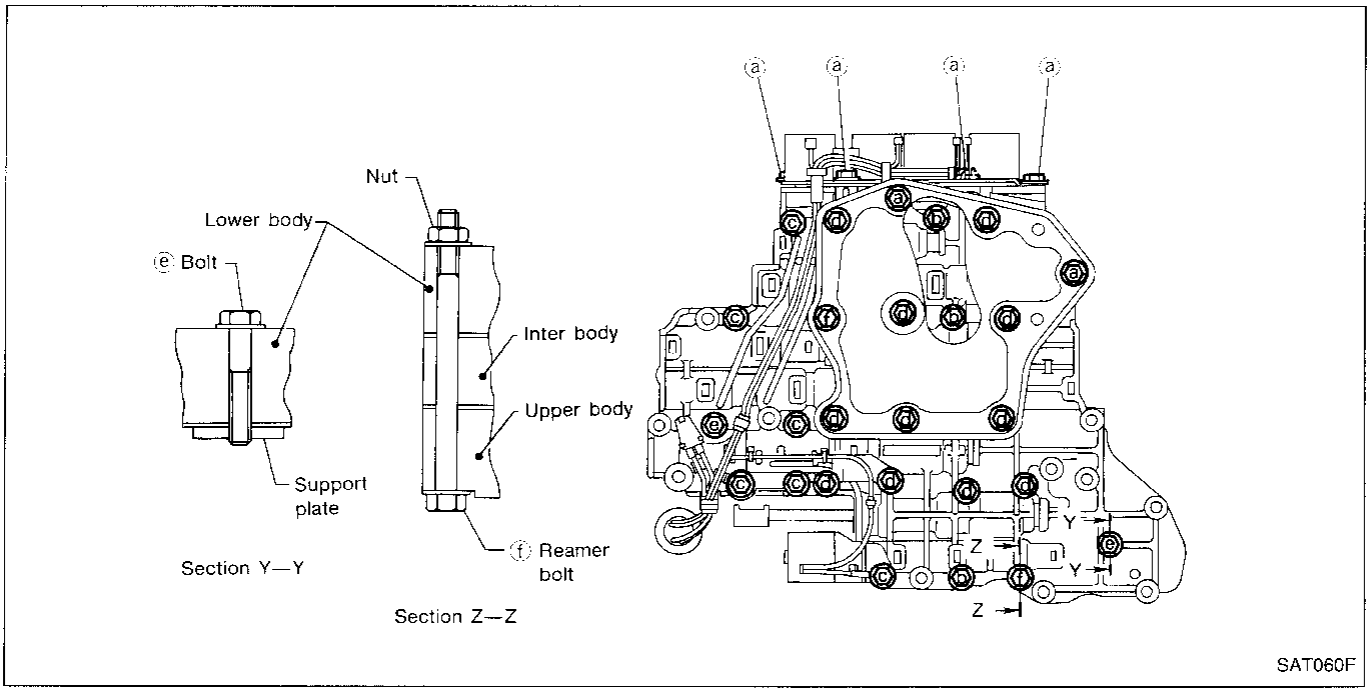

2. Install O-rings to solenoid valves and terminal body.

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

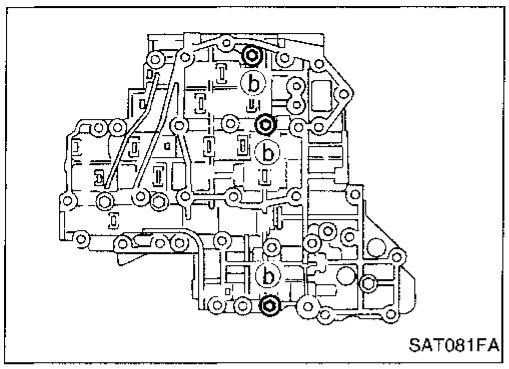
3. Install and tighten bolts.

**Bolt length, number and location:**

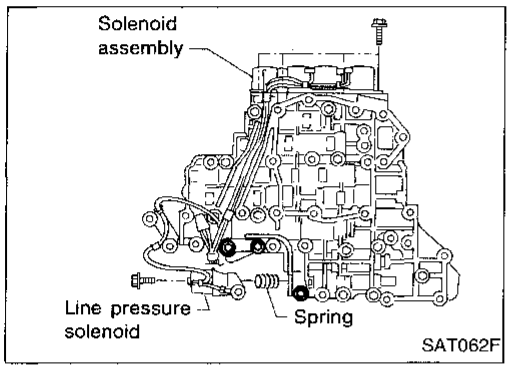
| Bolt symbol | (a) | (b) | (c) | (d) | (e) | (f) |
|---|---|---|---|---|---|---|
| Bolt length "ℓ" mm (in) | 13.5 (0.531) | 58.0 (2.283) | 40.0 (1.575) | 66.0 (2.598) | 33.0 (1.299) | 78.0 (3.071) |
| Number of bolts | 6 | 3 | 6 | 11 | 2 | 2 |



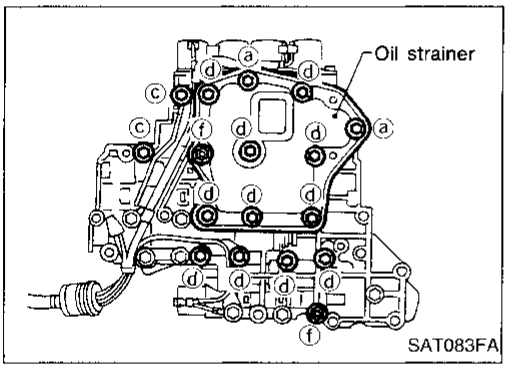
## Control Valve Assembly (Cont'd)



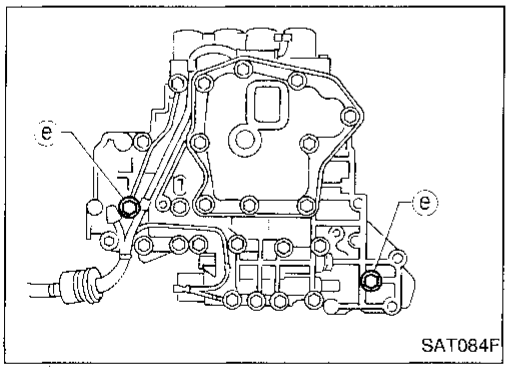

a. Install and tighten bolts ⓑ to specified torque.
**: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)**




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

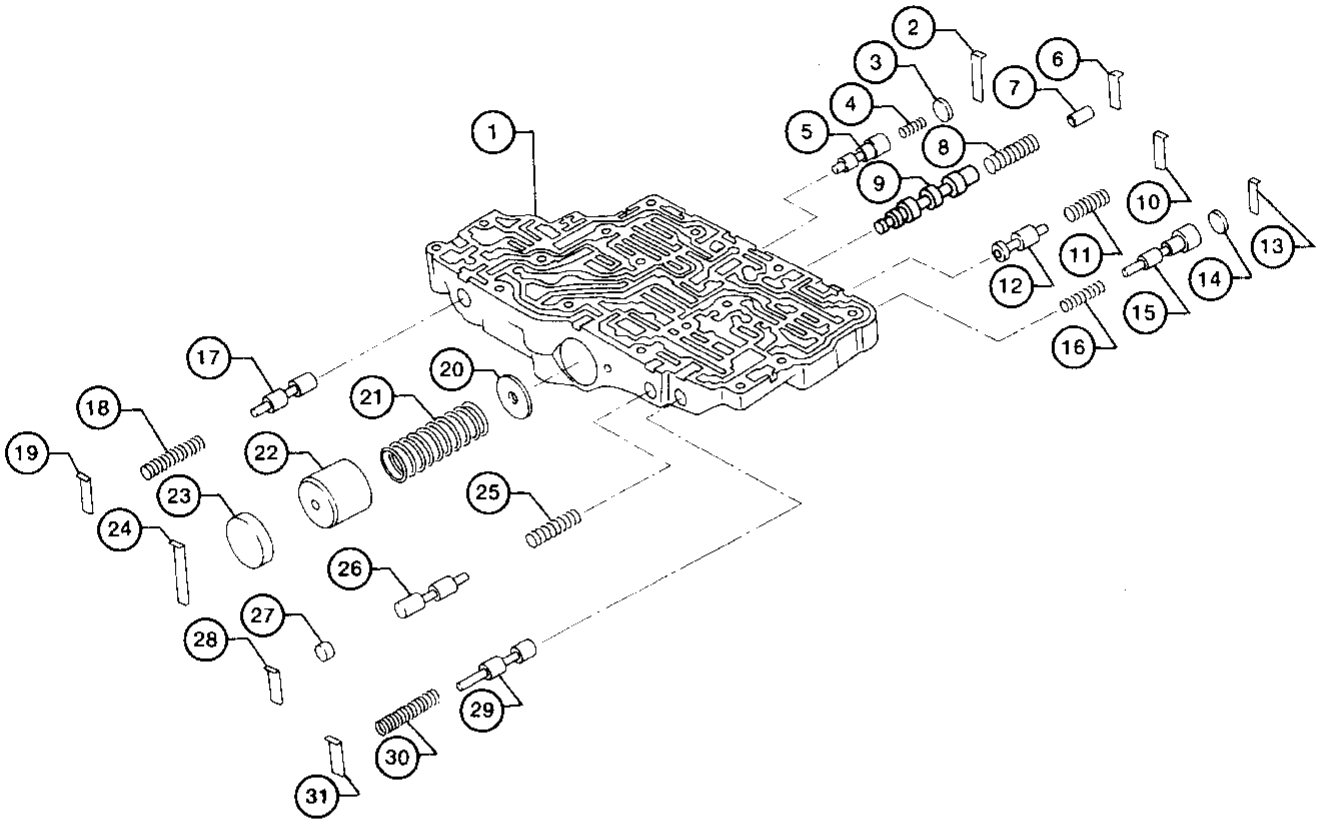



c. Set oil strainer, then tighten bolts ⓐ, ⓒ, ⓓ and nuts ⓕ to specified torque.
**: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)**




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

## Control Valve Upper Body



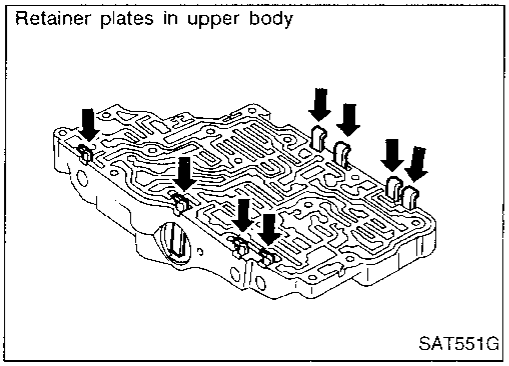

AAT771

**Apply ATF to all components before installation.**

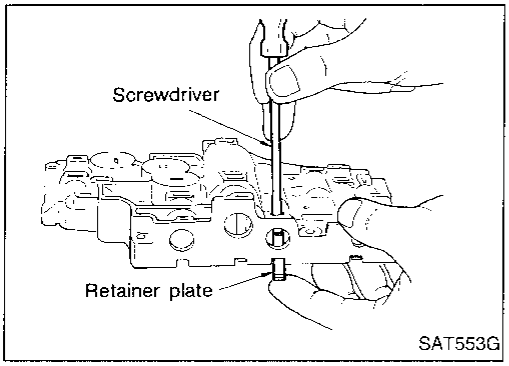
1. Upper body
2. Retainer plate
3. Plug
4. Return spring
5. 1-2 accumulator valve
6. Retainer plate
7. Plug
8. Return spring
9. Torque converter clutch control valve
10. Retainer plate
11. Return spring
12. Torque converter relief valve
13. Retainer plate
14. Plug
15. Overrun clutch reducing valve
16.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

## Control Valve Upper Body (Cont'd)

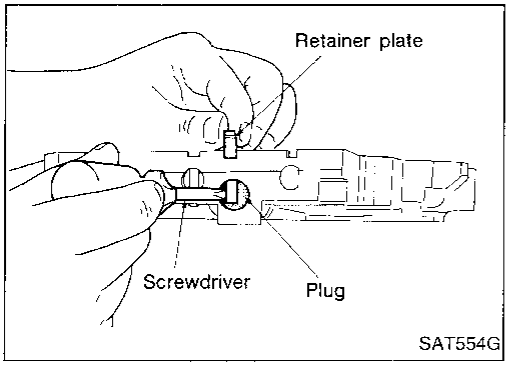
### DISASSEMBLY



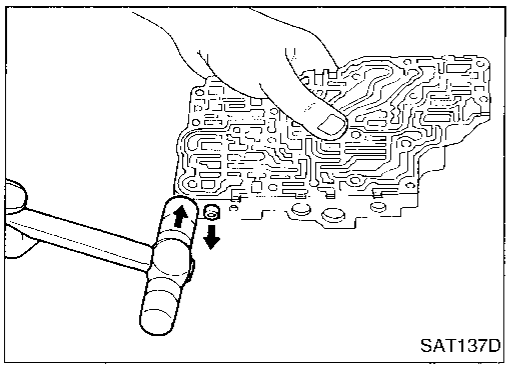

1. Remove valves at retainer plates.
- **Do not use a magnetic "hand".**



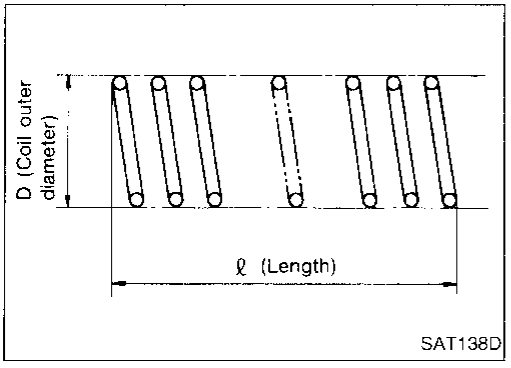

a. Use a screwdriver to remove retainer plates.




b. Remove retainer plates while holding spring, plugs or sleeves.
- **Remove plugs slowly to prevent internal parts from jumping out.**




c. Place mating surface of valve body face down, and remove internal parts.
- **If a valve is hard to remove, place valve body face down and lightly tap it with a soft hammer.**
- **Be careful not to drop or damage valves and sleeves.**




### INSPECTION

#### Valve spring

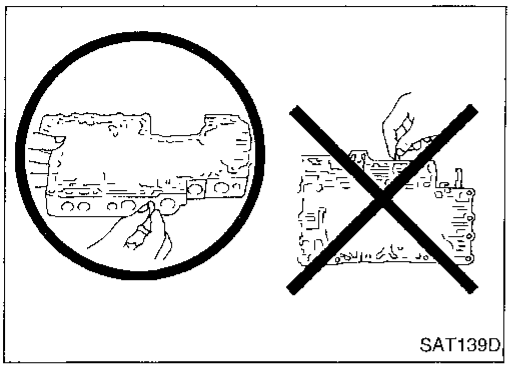
- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.
  **Inspection standard:**
  **Refer to SDS, AT-238.**
- Replace valve springs if deformed or fatigued.

#### Control valves

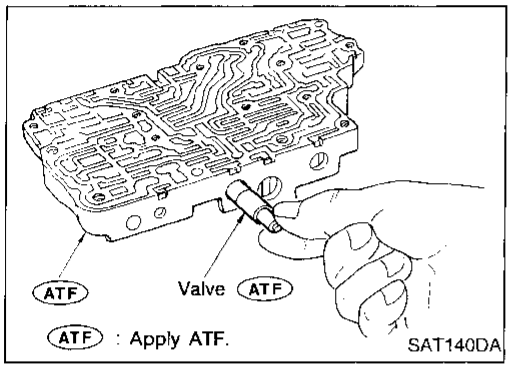
- Check sliding surfaces of valves, sleeves and plugs.

## Control Valve Upper Body (Cont'd)

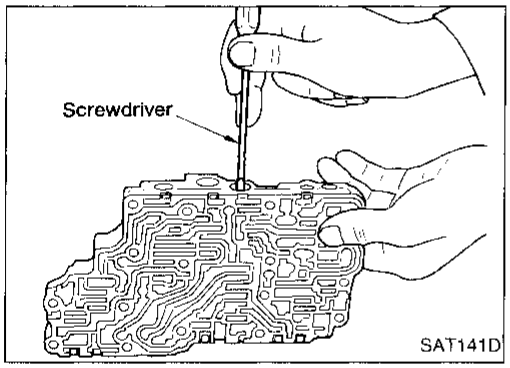
### ASSEMBLY



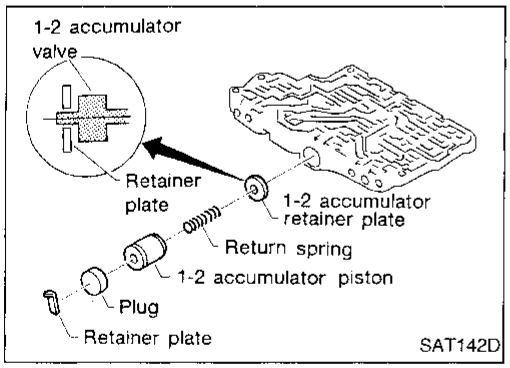

- **Lay control valve body down when installing valves. Do not stand the control valve body upright.**




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

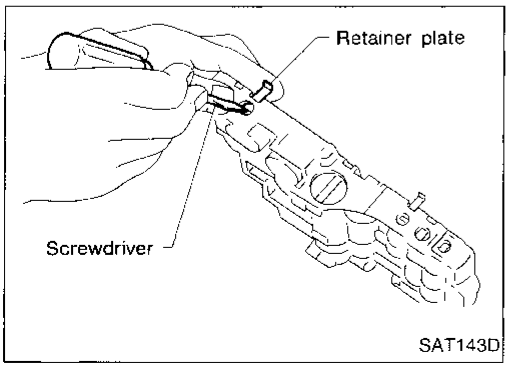



- Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.



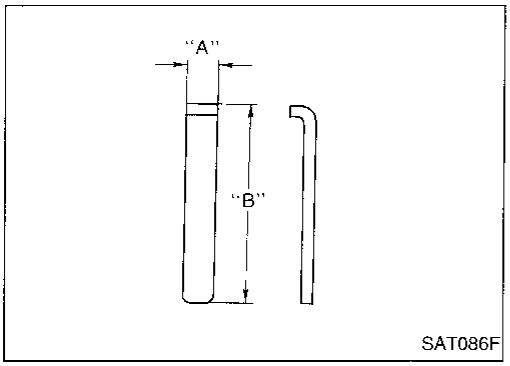

**1-2 accumulator valve**

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




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

## Control Valve Upper Body (Cont'd)




### Retainer plate

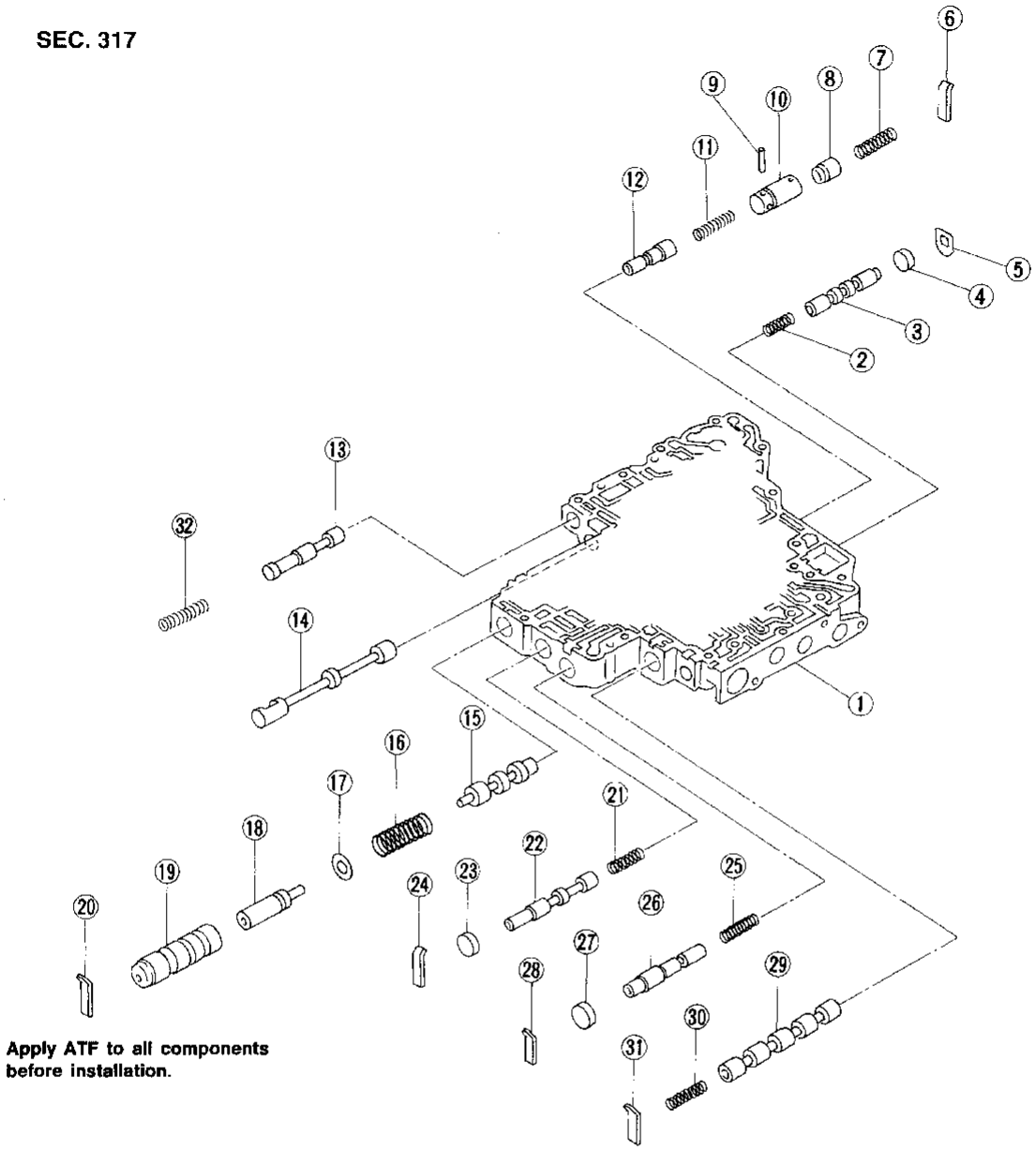
Unit: mm (in)

| Name of control valve | Length A | Length B |
|---|---|---|
| Pilot valve | 6.0 (0.236) | 21.5 (0.846) |
| 1st reducing valve | | |
| Torque converter relief valve | | |
| 2-3 timing valve | | |
| Overrun clutch reducing valve | | 24.0 (0.945) |
| Torque converter clutch control valve | | 28.0 (1.102) |
| 1-2 accumulator valve | | 38.5 (1.516) |
| 1-2 accumulator piston valve | | |

- Install proper retainer plates.

## Control Valve Lower Body

SEC. 317

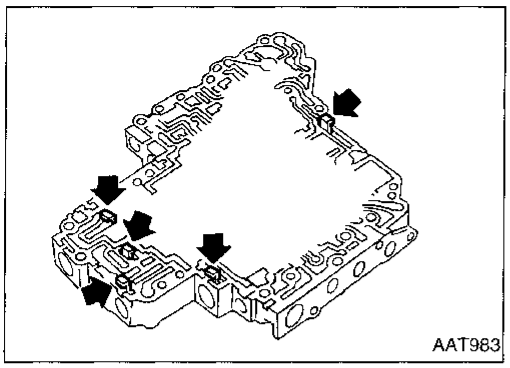



AAT946

Numbers preceding valve springs correspond with those shown in SDS table on page AT-238.

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

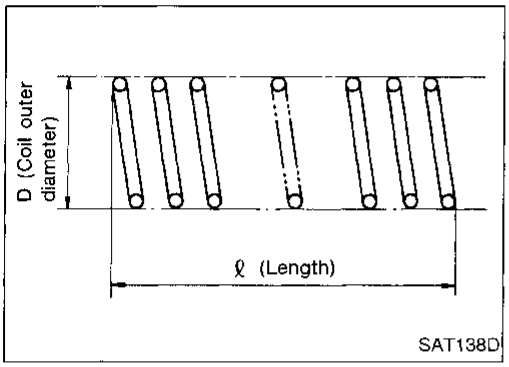
## Control Valve Lower Body (Cont'd)




### DISASSEMBLY

Remove valves at retainer plate.

For removal procedures, refer to "DISASSEMBLY", "Control Valve Upper Body", AT-179.



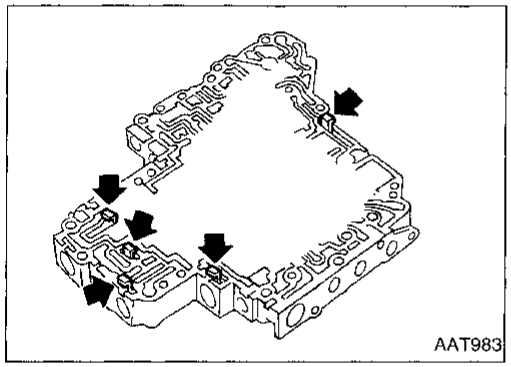

### INSPECTION

#### Valve springs

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.
  **Inspection standard:**
  **Refer to SDS, AT-238.**
- Replace valve springs if deformed or fatigued.

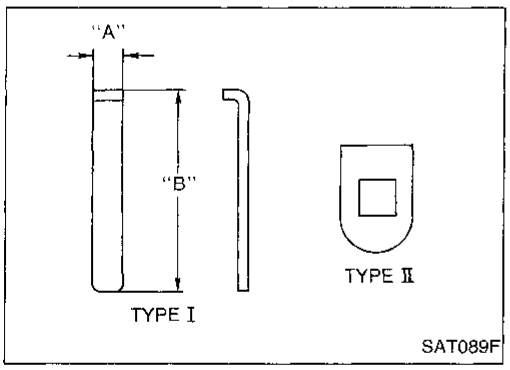
#### Control valves

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




### ASSEMBLY

- Install control valves.
  For installation procedures, refer to "ASSEMBLY", "Control Valve Upper Body", AT-180.



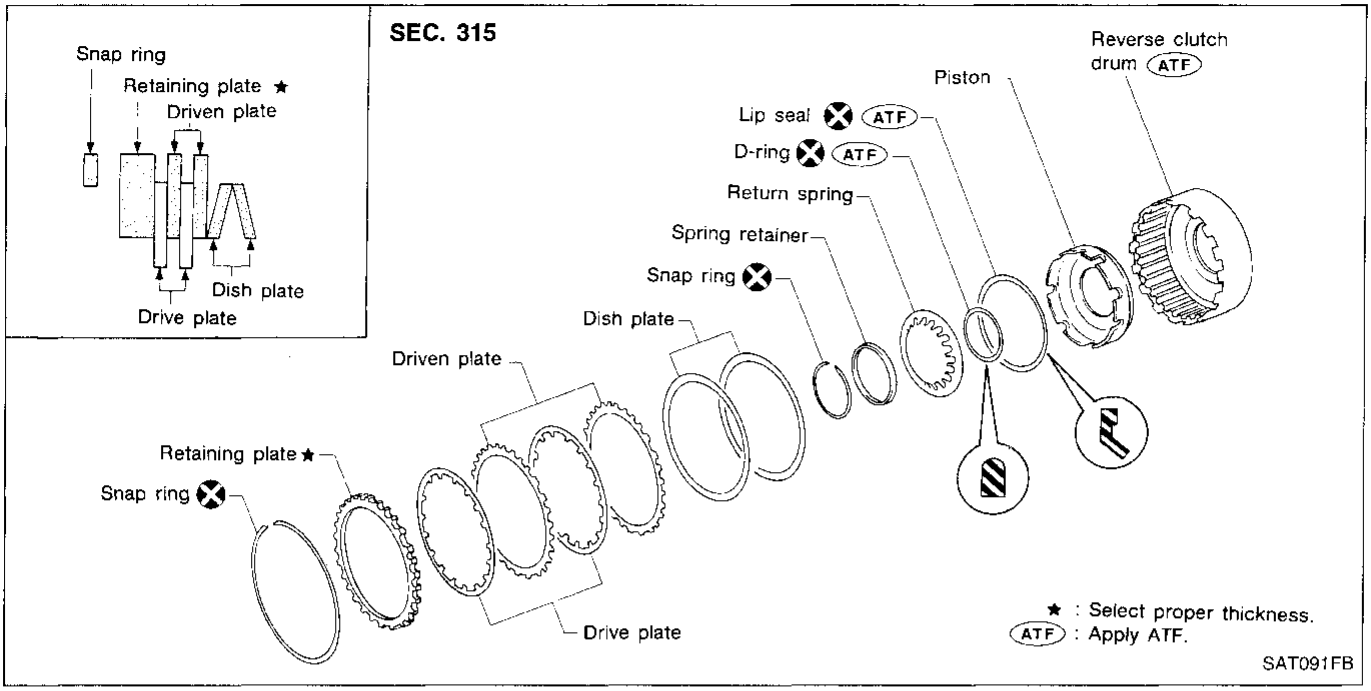

#### Retainer plate

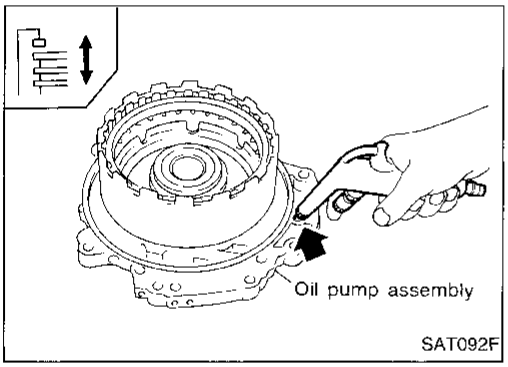
Unit: mm (in)

| Name of control valve and plug | Length A | Length B | Type |
|---|---|---|---|
| Pressure regulator valve | 6.0 (0.236) | 28.0 (1.102) | I |
| Accumulator control valve | | | |
| Shift valve A | | | |
| Overrun clutch control valve | | | |
| Pressure modifier valve | | | |
| Shift valve B | — | — | II |

- Install proper retainer plates.

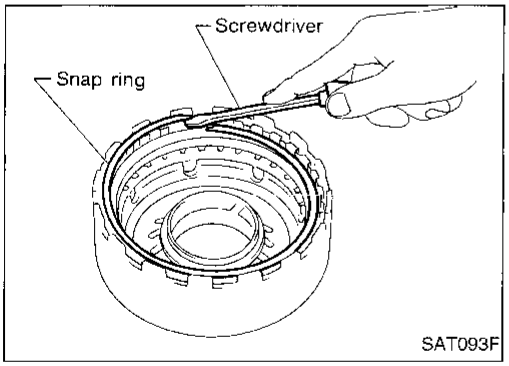
## Reverse Clutch



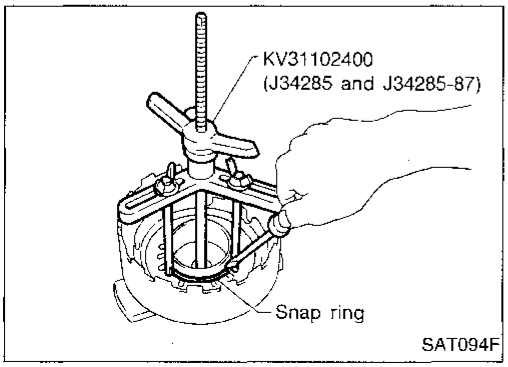




### DISASSEMBLY

1. Check operation of reverse clutch
a. Install seal ring onto drum support of oil pump cover and install reverse clutch assembly. Apply compressed air to oil hole.
b. Check to see that retaining plate moves to snap ring.
c. If retaining plate does not contact snap ring:
- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.

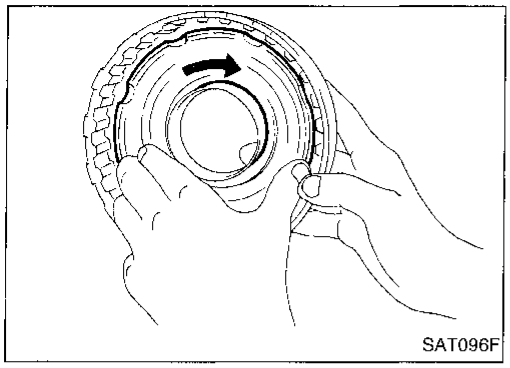



2. Remove snap ring.
3. Remove drive plates, driven plates, retaining plate, and dish plates.

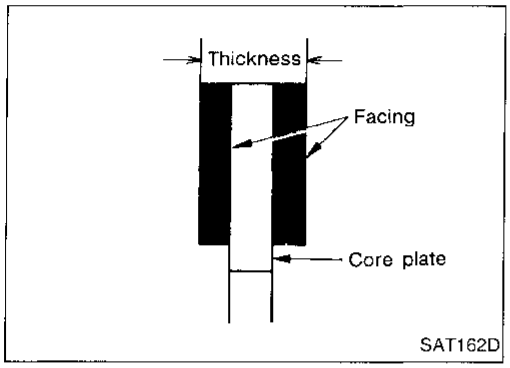



4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.
- **Set Tool directly over springs.**
- **Do not expand snap ring excessively.**
5. Remove spring retainer and return springs.

## Reverse Clutch (Cont'd)


SAT096F

6. Remove piston from reverse clutch drum by turning it.
7. Remove D-ring and lip seal from piston.



SAT162D

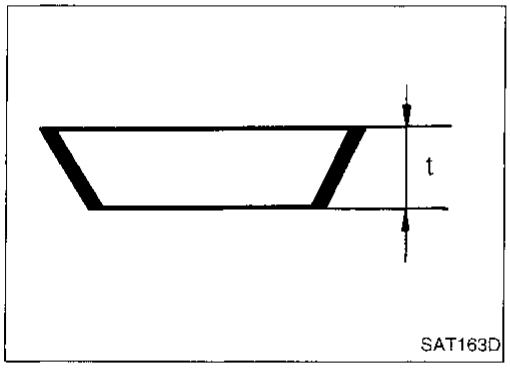
### INSPECTION

#### Reverse clutch snap ring, spring retainer and return springs

- Check for deformation, fatigue or damage.
  If necessary, replace.

#### Reverse clutch drive plates

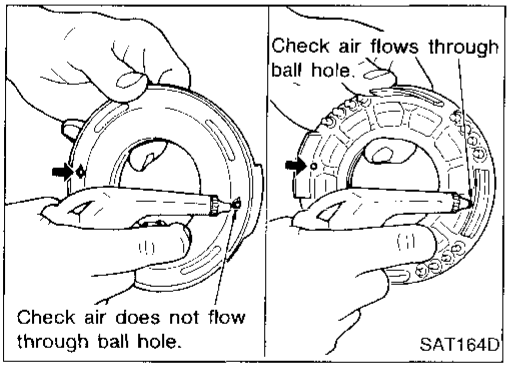
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  **Thickness of drive plate:**
  **Standard value: 1.6 mm (0.063 in)**
  **Wear limit: 1.4 mm (0.055 in)**
- If not within wear limit, replace.



SAT163D

#### Reverse clutch dish plates

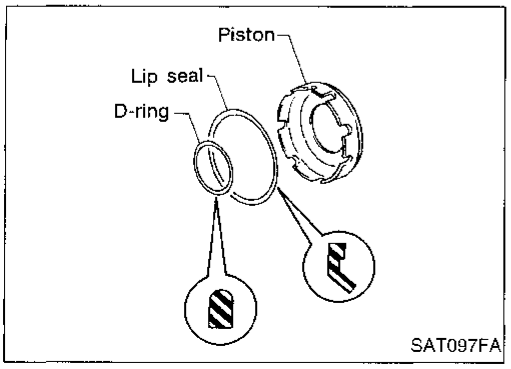
- Check for deformation or damage.
- Measure thickness of dish plate.
  **Thickness of dish plate: 3.08 mm (0.1213 in)**
- If deformed or fatigued, replace.



SAT164D

#### Reverse clutch piston

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



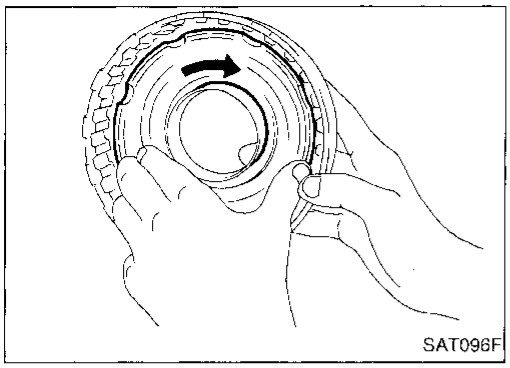
SAT097FA

### ASSEMBLY

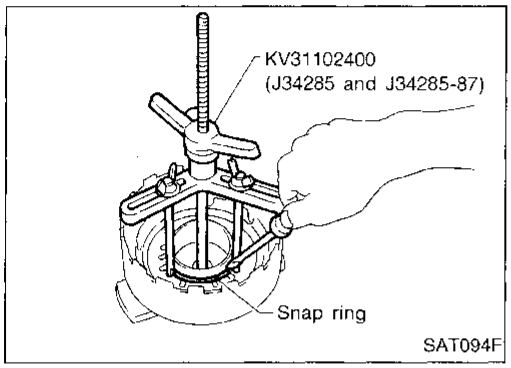
1. Install D-ring and lip seal on piston.

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

## Reverse Clutch (Cont'd)

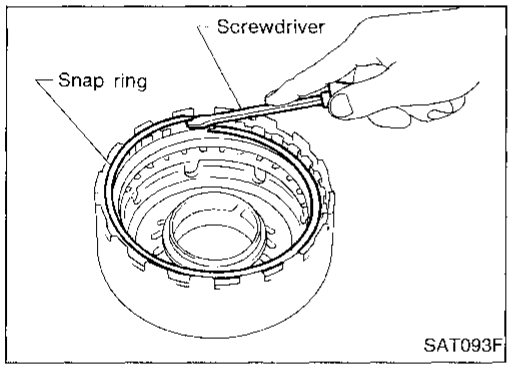

SAT096F

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



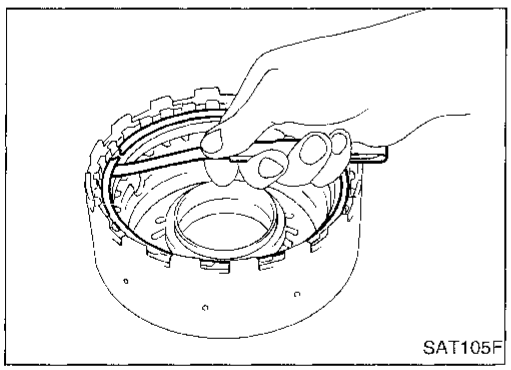
SAT094F

3. Install return springs and spring retainer on piston.
4. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly over return springs.**

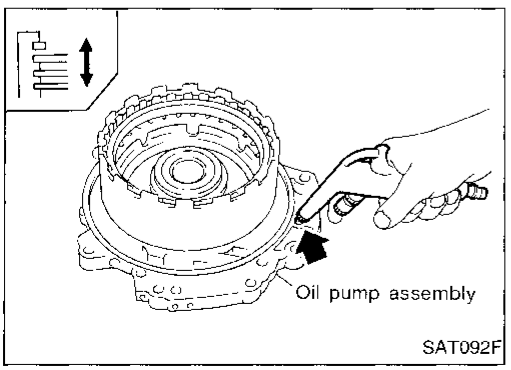


SAT093F

5. Install drive plates, driven plates, retaining plate and dish plates.
- **Take care with order of plates.**
6. Install snap ring.


SAT105F

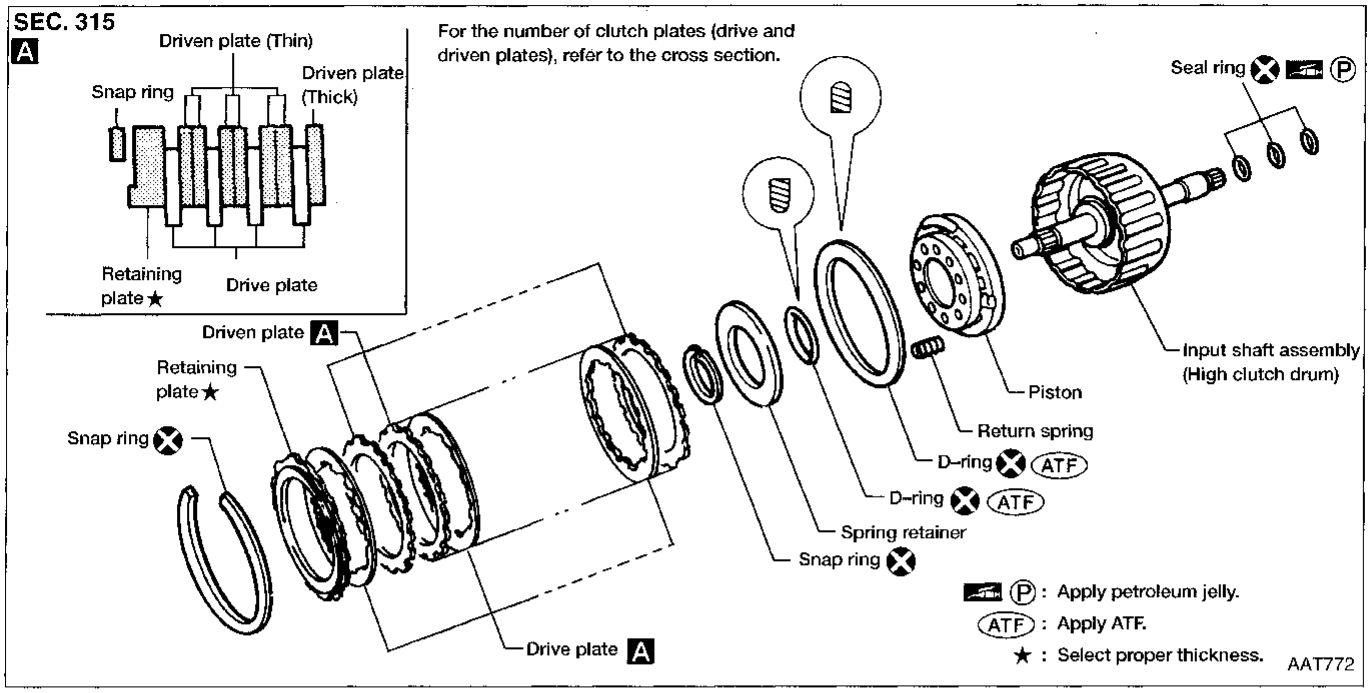
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   **Specified clearance:**
   **Standard 0.5 - 0.8 mm (0.020 - 0.031 in)**
   **Allowable limit 1.2 mm (0.047 in)**
   **Retaining plate:**
   **Refer to SDS, AT-239.**

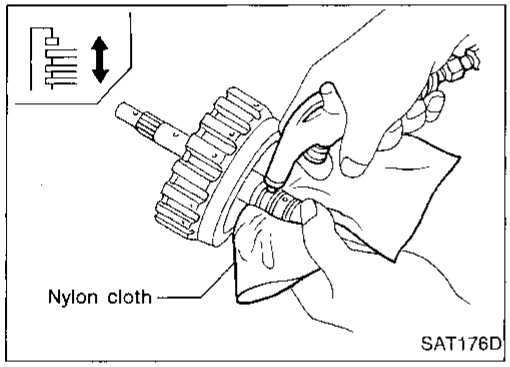


SAT092F

8. Check operation of reverse clutch.
   Refer to "DISASSEMBLY", "Reverse Clutch", AT-184.

## High Clutch




### DISASSEMBLY

1. Check operation of high clutch.

a. Apply compressed air to oil hole of input shaft with nylon cloth.

- **Stop up hole on opposite side of input shaft with nylon cloth.**

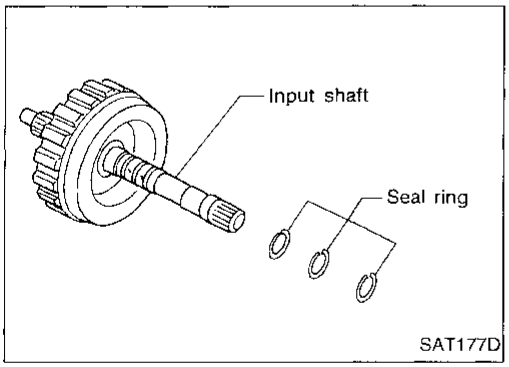
b. Check to see that retaining plate moves to snap ring.

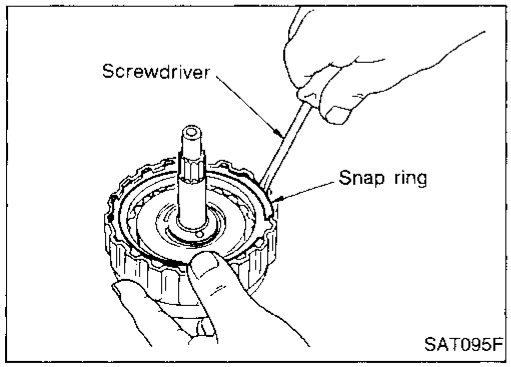
c. If retaining plate does not contact snap ring:

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

2. Remove seal rings from input shaft.

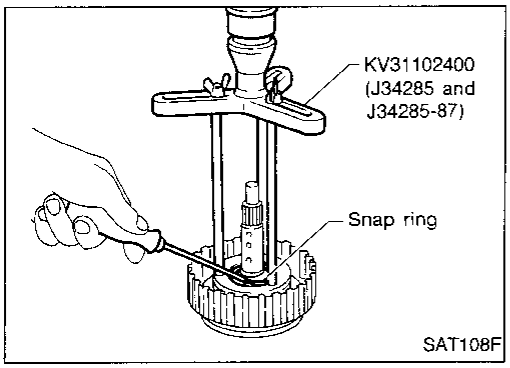
- **Always replace when removed.**



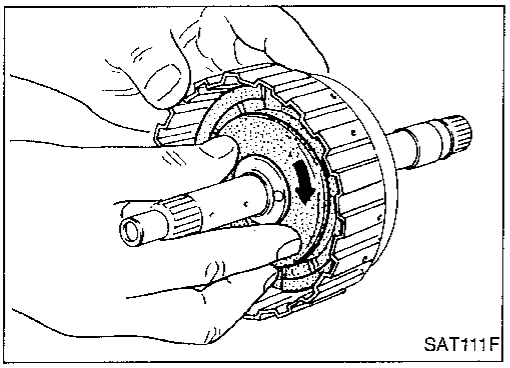

3. Remove snap ring.
4. Remove drive plates, driven plates and retaining plate.

## High Clutch (Cont'd)

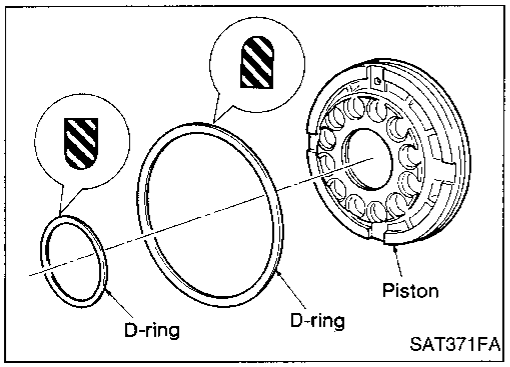



5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.
- **Set Tool directly over springs.**
- **Do not expand snap ring excessively.**

6. Remove spring retainer and return springs.




7. Remove piston from high clutch drum by turning it.

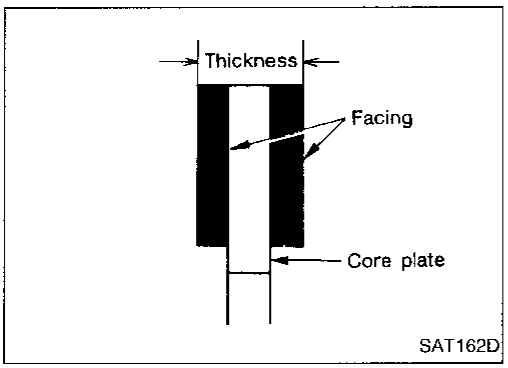



8. Remove D-rings from piston.

### INSPECTION

**High clutch snap ring, spring retainer and return springs.**

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

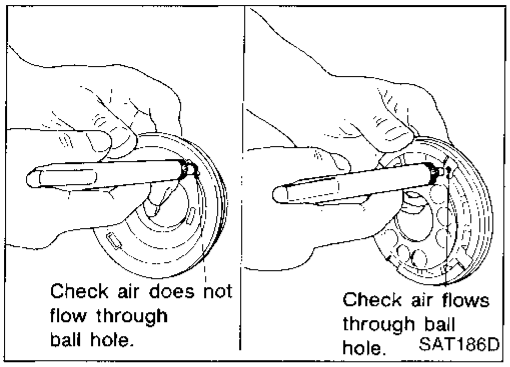



**High clutch drive plates**

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

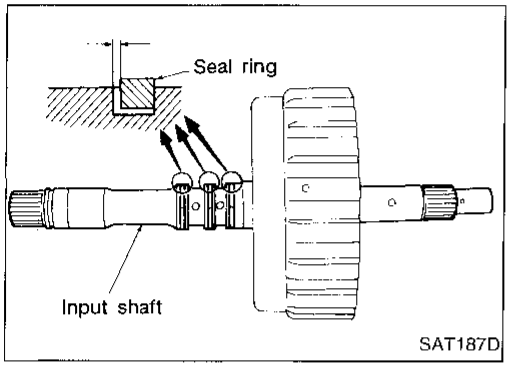
## High Clutch (Cont'd)

### High clutch piston



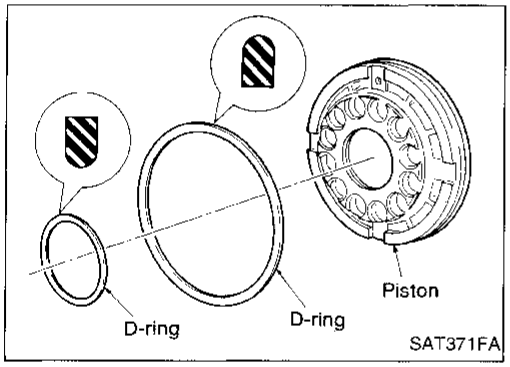

- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure that air leaks past ball.

### Seal ring clearance

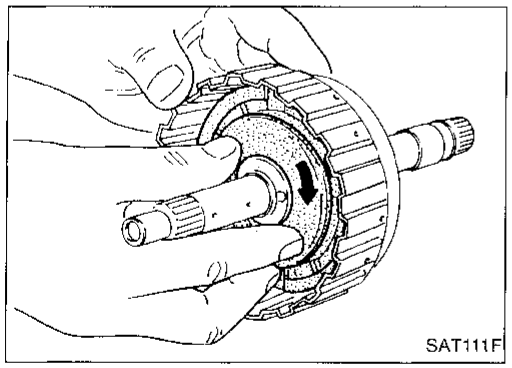



- Measure clearance between seal ring and ring groove.
  **Standard clearance: 0.08 - 0.23 mm (0.0031 - 0.0091 in)**
  **Allowable limit: 0.23 mm (0.0091 in)**
- If not within allowable limit, replace input shaft assembly.

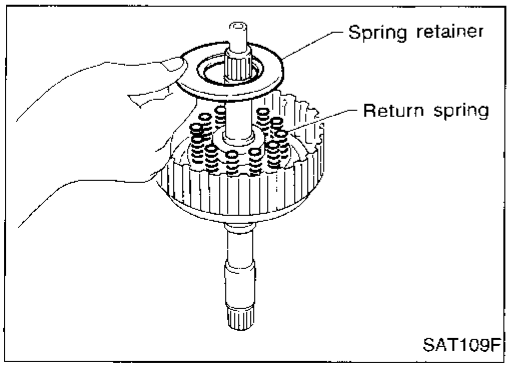
### ASSEMBLY




1. Install D-rings on piston.
- **Apply ATF to both parts.**

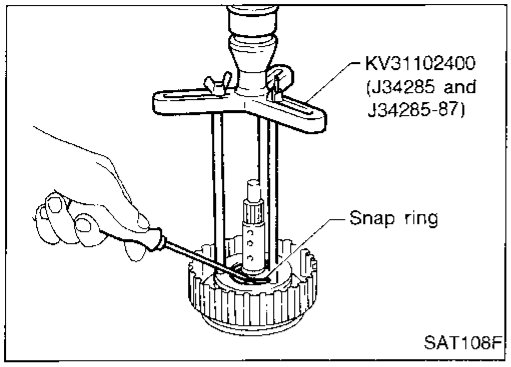



2. Install piston assembly by turning it slowly.
- **Apply ATF to inner surface of drum.**



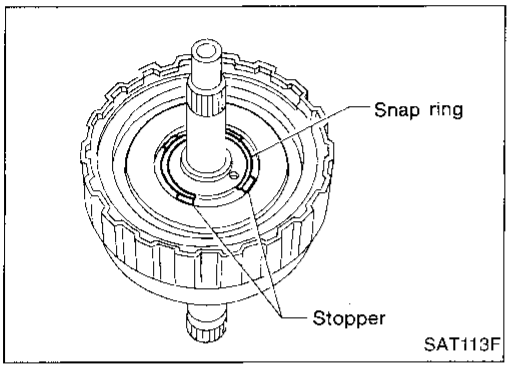

3. Install return springs and spring retainer on piston.

## High Clutch (Cont'd)

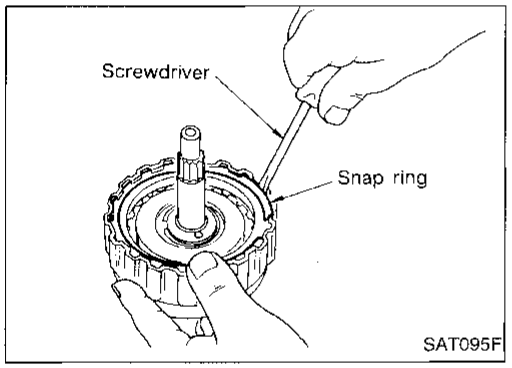



4. Set Tool on spring retainer and install snap ring while compressing return springs.

- **Set Tool directly over return springs.**



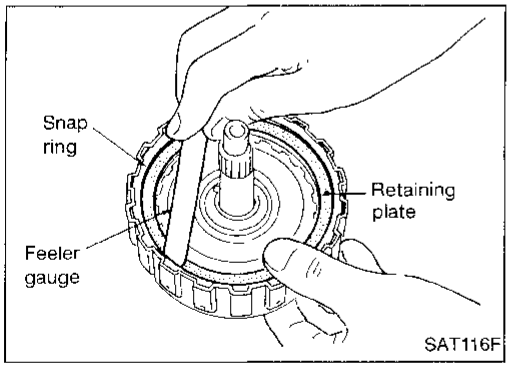

- **Do not align snap ring gap with spring retainer stopper.**



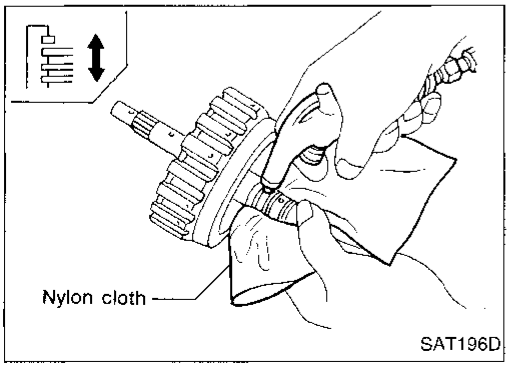

5. Install drive plates, driven plates and retaining plate.

- **Take care with direction of retaining plate and order of plates.**

6. Install snap ring.

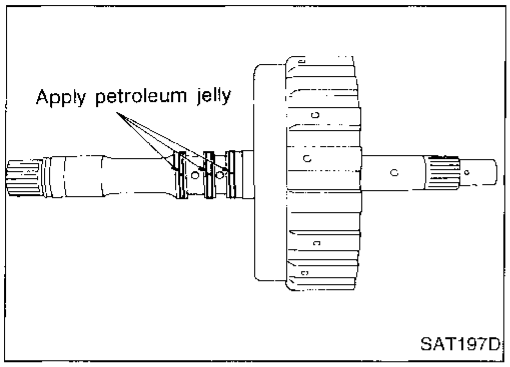



7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   **Specified clearance:**
   **Standard 1.8 - 2.2 mm (0.071 - 0.087 in)**
   **Allowable limit 3.0 mm (0.118 in)**
   **Retaining plate:**
   **Refer to SDS, AT-239.**

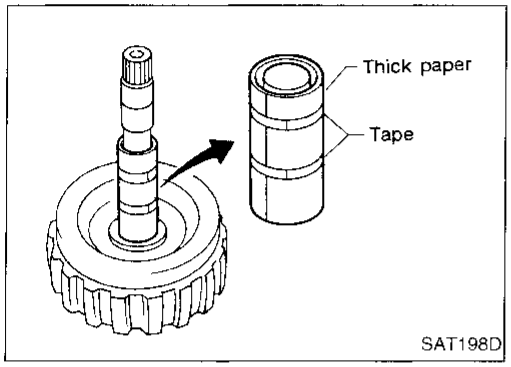



8. Check operation of high clutch.
   Refer to "DISASSEMBLY", "High Clutch", AT-187.

## High Clutch (Cont'd)

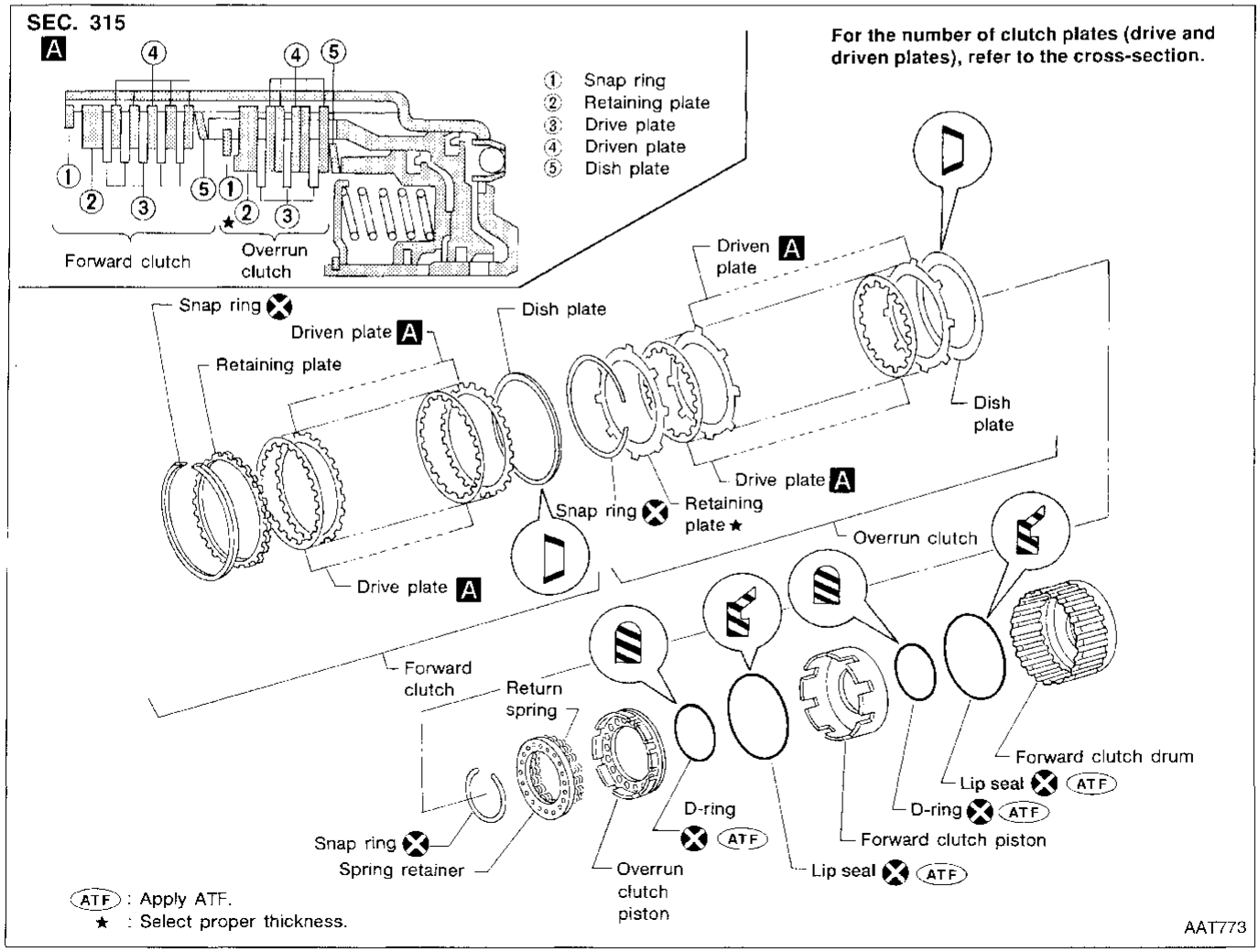



9. Install seal rings to input shaft.
- **Apply petroleum jelly to seal rings.**
- **Always replace when removed.**



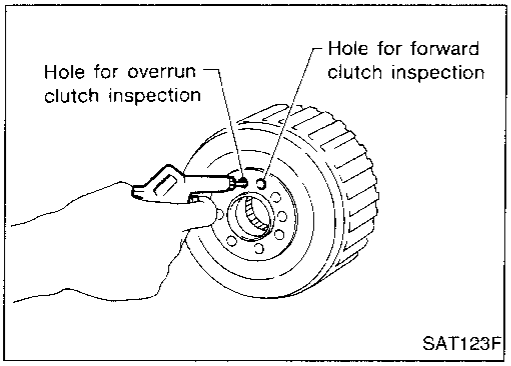

- **Roll paper around seal rings to prevent seal rings from spreading.**

## Forward Clutch and Overrun Clutch



## Forward Clutch and Overrun Clutch (Cont'd)

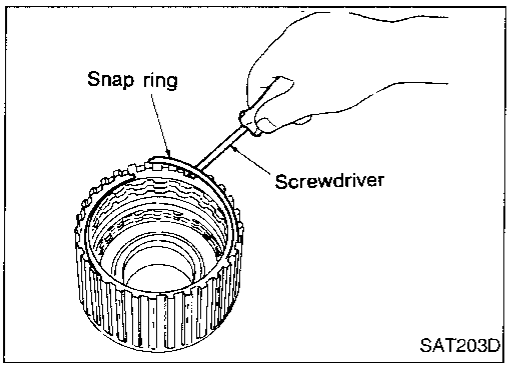
### DISASSEMBLY



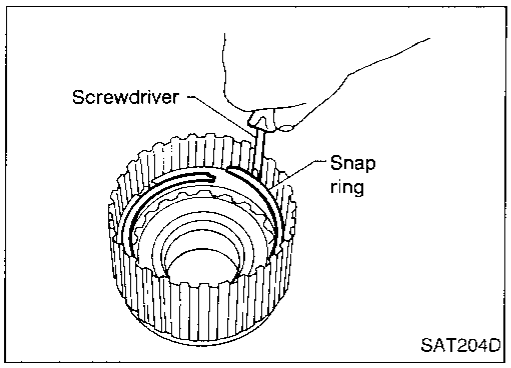

1. Check operation of forward clutch and overrun clutch.

a. Install bearing retainer on forward clutch drum.
b. Apply compressed air to oil hole of forward clutch drum.
c. Check to see that retaining plate moves to snap ring.
d. If retaining plate does not contact snap ring:

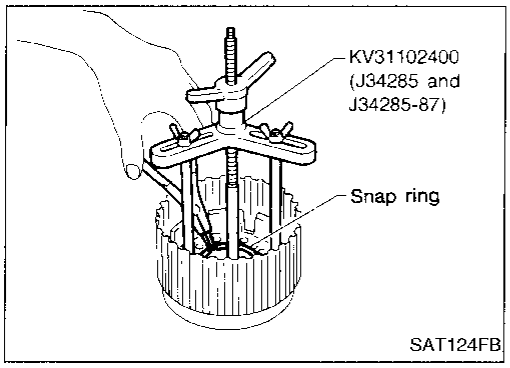
- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.




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




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

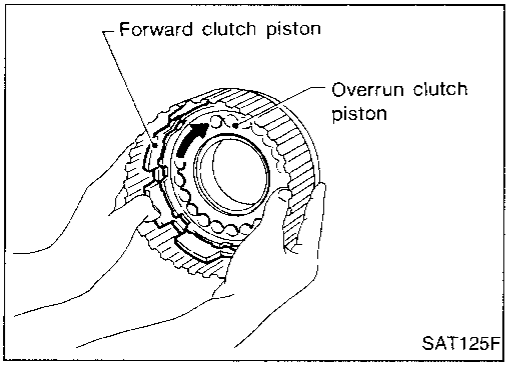



6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.

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

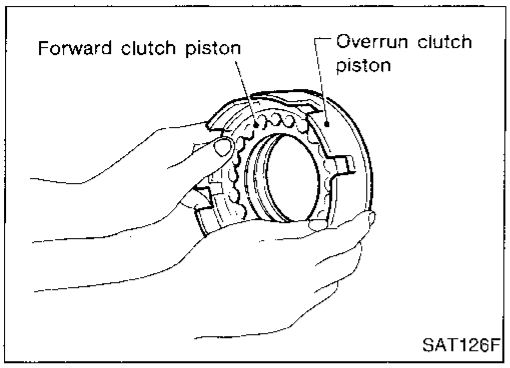
7. Remove spring retainer and return springs.

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

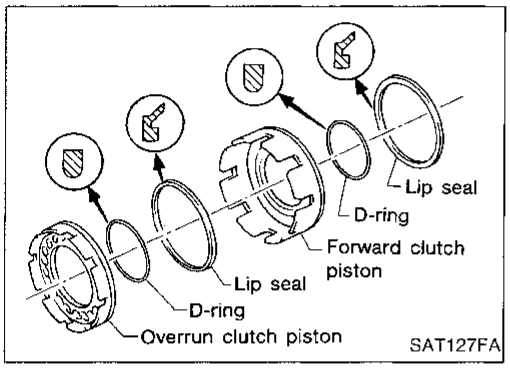



8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.

## Forward Clutch and Overrun Clutch (Cont'd)




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

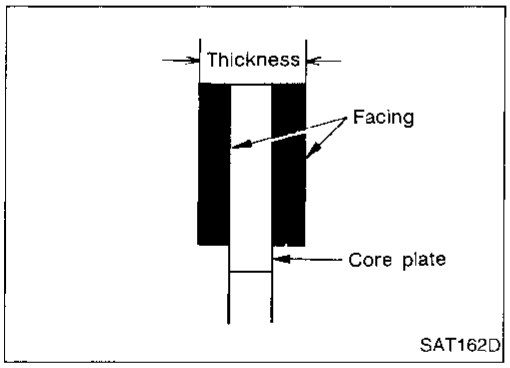



10. Remove D-rings and lip seals from forward clutch piston and overrun clutch piston.

### INSPECTION

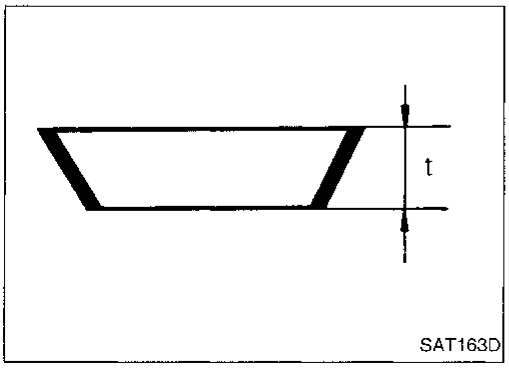
#### Snap rings, spring retainer and return springs

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




#### Forward clutch and overrun clutch drive plates

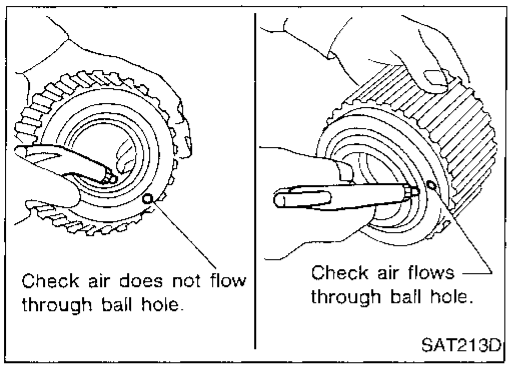
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  **Thickness of drive plate:**
  **Forward clutch**
  **Standard value: 1.6 mm (0.063 in)**
  **Wear limit: 1.4 mm (0.055 in)**
  **Overrun clutch**
  **Standard value: 1.6 mm (0.063 in)**
  **Wear limit: 1.4 mm (0.055 in)**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




#### Forward clutch and overrun clutch dish plates

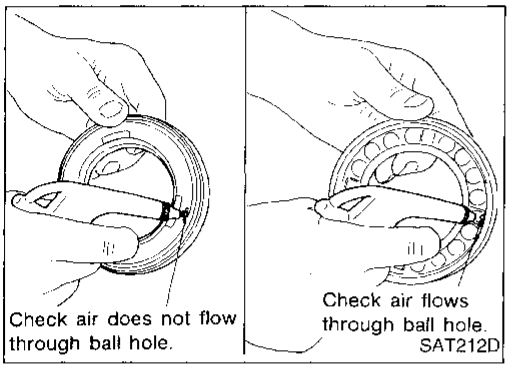
- Check for deformation or damage.
- Measure thickness of dish plate.
  **Thickness of dish plate:**
  **Forward clutch 2.7 mm (0.106 in)**
  **Overrun clutch 2.7 mm (0.106 in)**
- If deformed or fatigued, replace.

## Forward Clutch and Overrun Clutch (Cont'd)




### Forward clutch drum

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



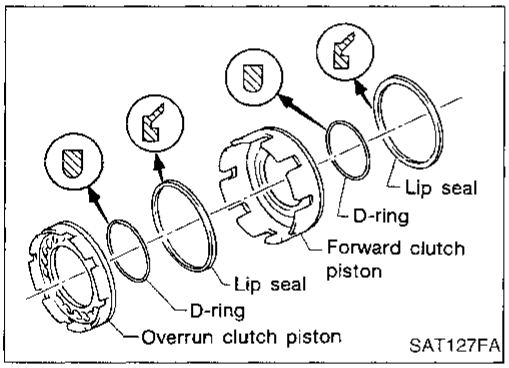

### Overrun clutch piston

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

### ASSEMBLY

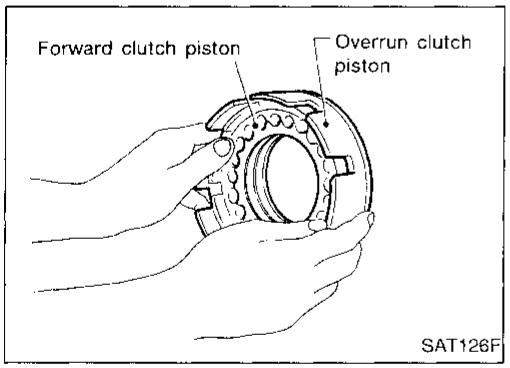
1. Install D-rings and lip seals on forward clutch piston and overrun clutch piston.

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



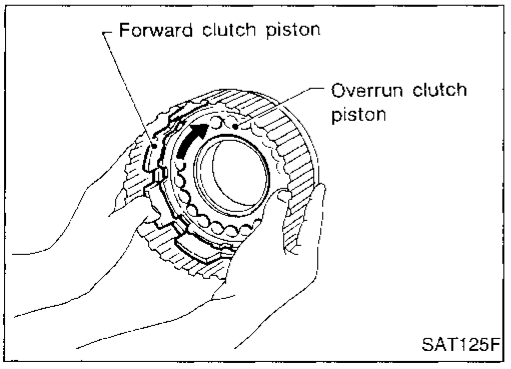

2. Install overrun clutch piston assembly on forward clutch piston by turning it slowly.

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

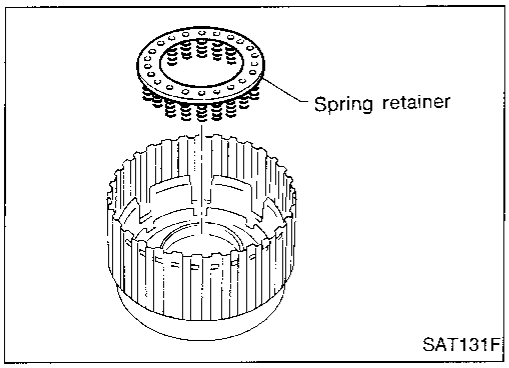



3. Install forward clutch piston assembly on forward clutch drum by turning it slowly.

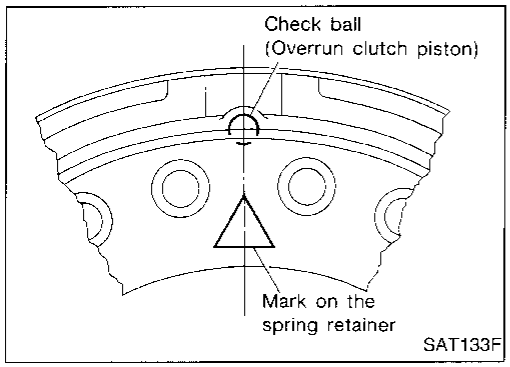
- **Apply ATF to inner surface of drum.**



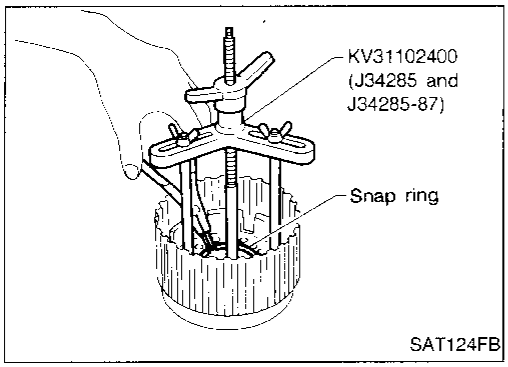
## Forward Clutch and Overrun Clutch (Cont'd)



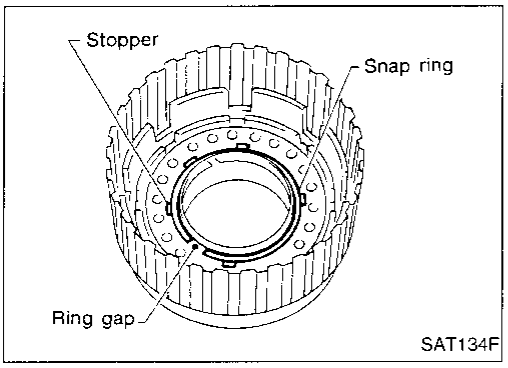

4. Install return spring on overrun clutch piston.



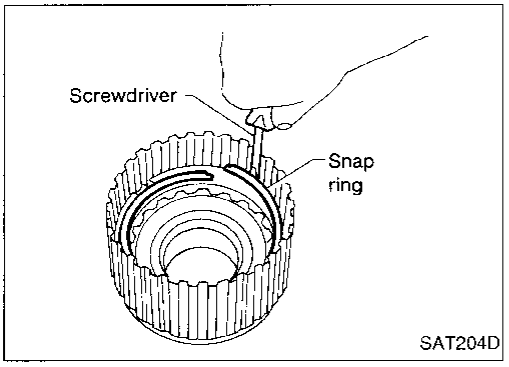

- Align the mark on spring retainer with check ball in overrun clutch piston.




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

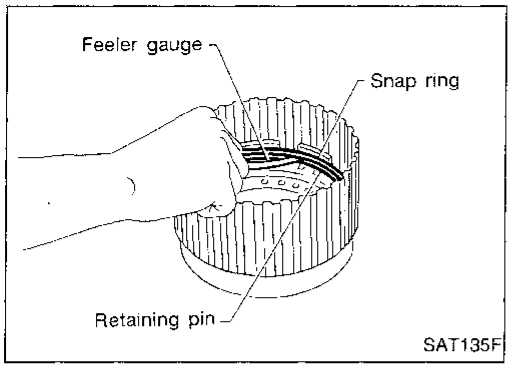



- **Do not align snap ring gap with spring retainer stopper.**

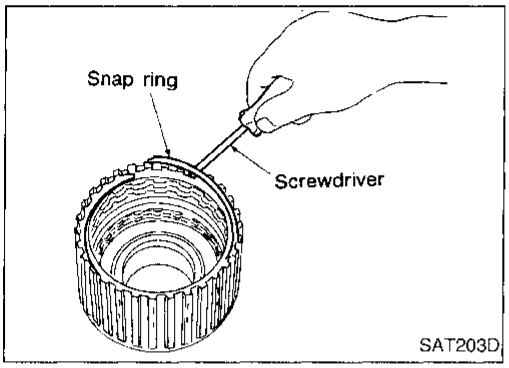



6. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
- **Take care with order of plates.**
7. Install snap ring for overrun clutch.

## Forward Clutch and Overrun Clutch (Cont'd)

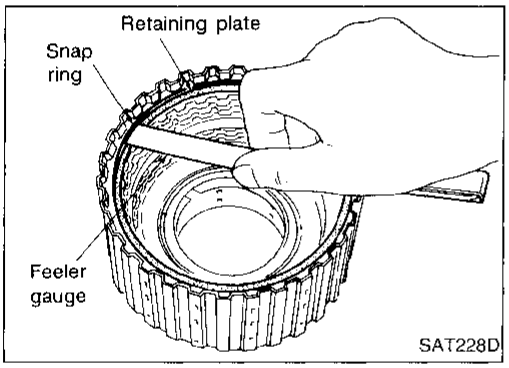



8. Measure clearance between overrun clutch retaining plate and snap ring.
   If not within allowable limit, select proper retaining plate.
   **Specified clearance:**
   **Standard 0.7 - 1.1 mm (0.028 - 0.043 in)**
   **Allowable limit 1.7 mm (0.067 in)**
   **Overrun clutch retaining plate:**
   **Refer to SDS, AT-239.**

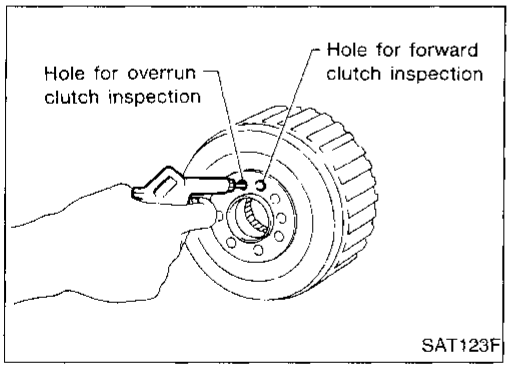



9. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.
- **Take care with order of plates.**

10. Install snap ring for forward clutch.

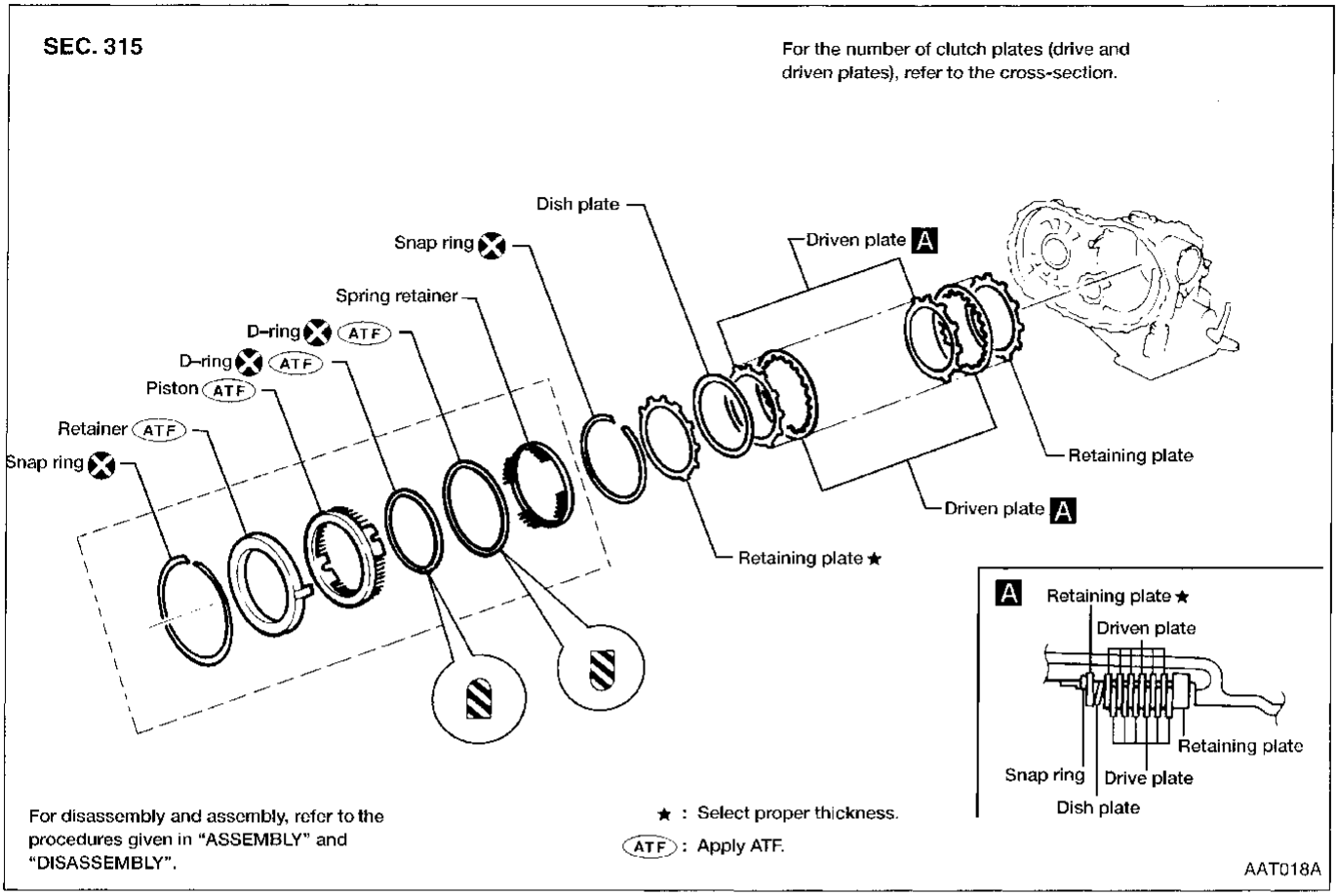


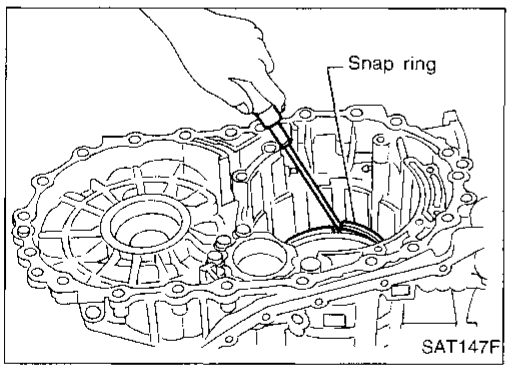

11. Measure clearance between forward clutch retaining plate and snap ring.
    If not within allowable limit, select proper retaining plate.
    **Specified clearance:**
    **Standard 0.45 - 0.85 mm (0.0177 - 0.0335 in)**
    **Allowable limit 1.65 mm (0.0650 in)**
    **Forward clutch retaining plate:**
    **Refer to SDS, AT-239.**

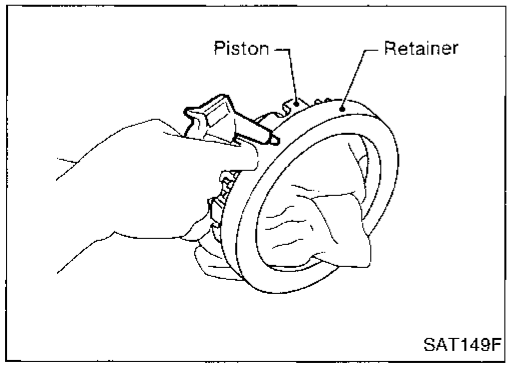



12. Check operation of forward clutch.
    Refer to "DISASSEMBLY", "Forward Clutch and Overrun Clutch", AT-192.
13. Check operation of overrun clutch.
    Refer to "DISASSEMBLY", "Forward Clutch and Overrun Clutch", AT-192.

## Low & Reverse Brake



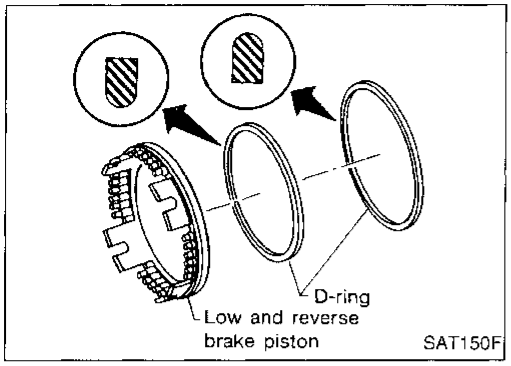




### DISASSEMBLY

1. Check operation of low & reverse brake.
a. Apply compressed air to oil hole of transmission case.
b. Check to see that retaining plate moves to snap ring.
c. If retaining plate does not contact snap ring:
- D-ring might be damaged.
- Oil seal might be damaged.
- Fluid might be leaking past piston check ball.

2. In order to remove piston, apply compressed air to oil hole of retainer while holding piston.
- **Apply air gradually and allow piston to come out evenly.**

## Low & Reverse Brake (Cont'd)

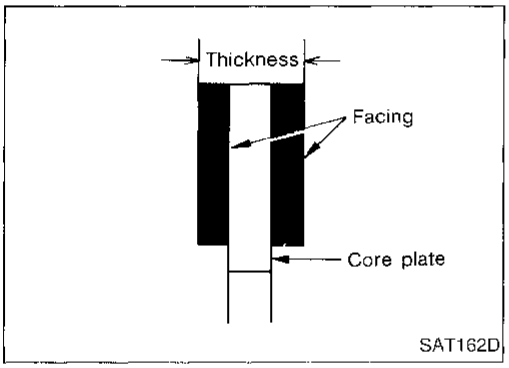



3. Remove D-rings from piston.

### INSPECTION

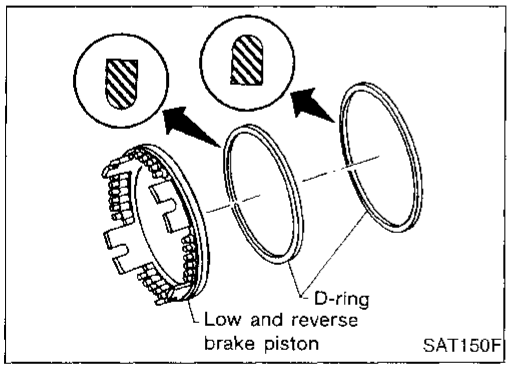
**Low & reverse clutch snap ring, spring retainer and return springs**

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



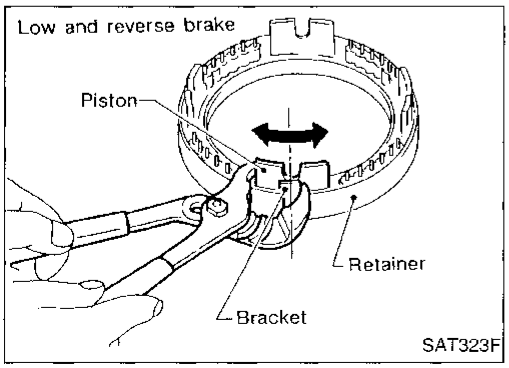

**Low & reverse brake drive plate**

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



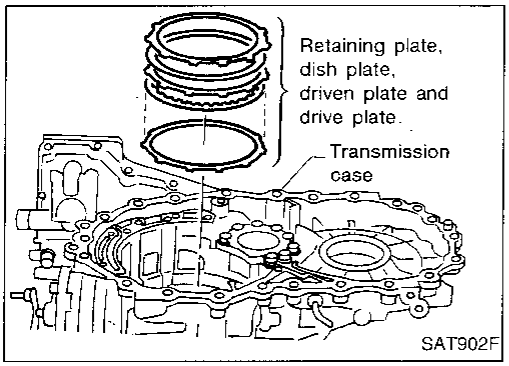

### ASSEMBLY

1. Install D-rings on piston.
- **Apply ATF to both parts.**

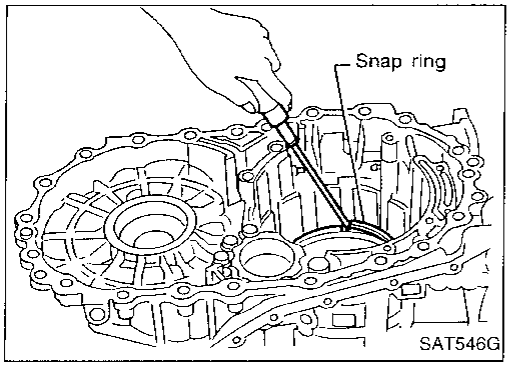



2. Set and align piston with retainer.
- **This operation is required in order to engage the protrusions of piston to return springs correctly. Further procedures are given in "ASSEMBLY".**

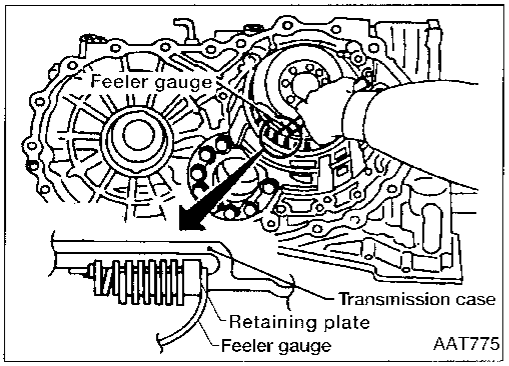
## Low & Reverse Brake (Cont'd)




3. Install driven plates, drive plates, retaining plate and dish plate on transmission case.
   - **Take care with order of plates and direction of dish plate.**

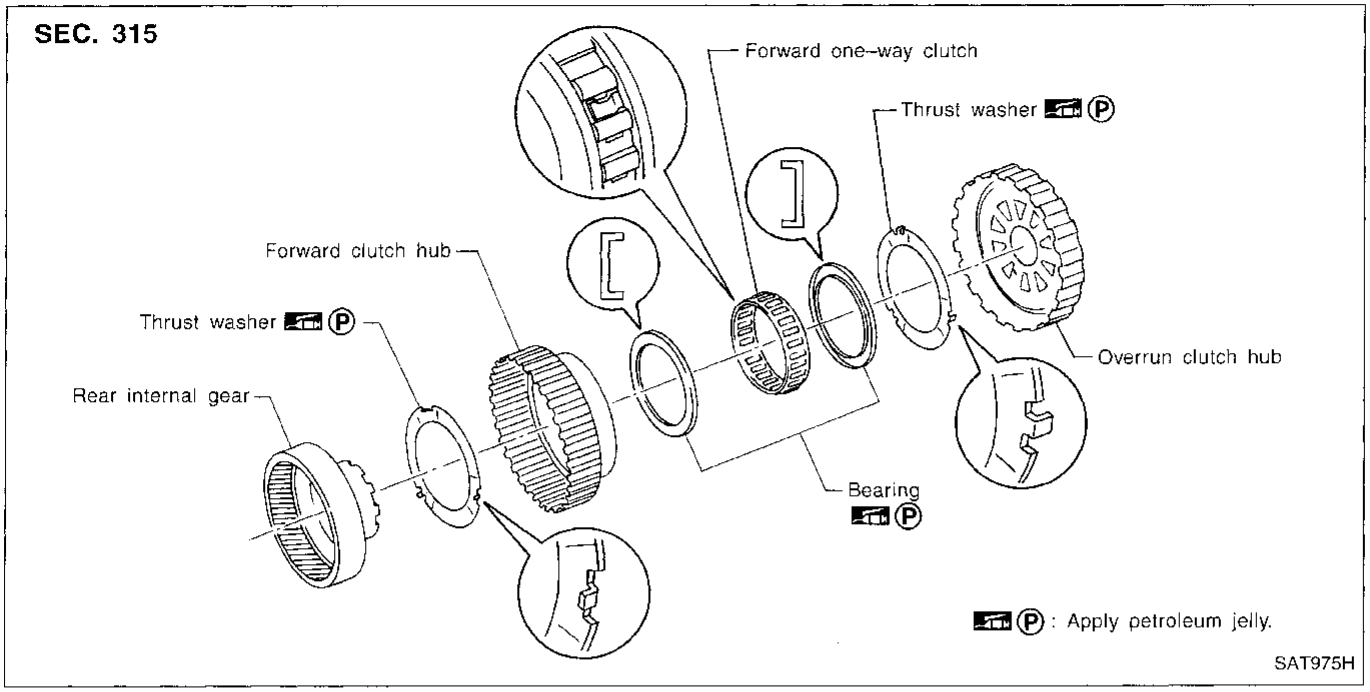


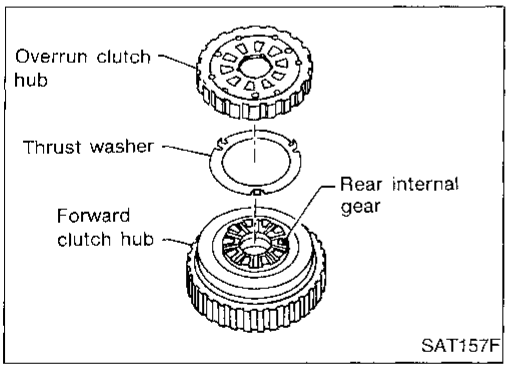

4. Install snap ring.




5. Measure clearance between retaining plate and transmission case. If not within allowable limit, select proper retaining plate. (front side)
   **Specified clearance:**
   **Standard 1.7 - 2.1 mm (0.067 - 0.083 in)**
   **Allowable limit 3.3 mm (0.130 in)**
   **Retaining plate:**
   **Refer to SDS, AT-240.**

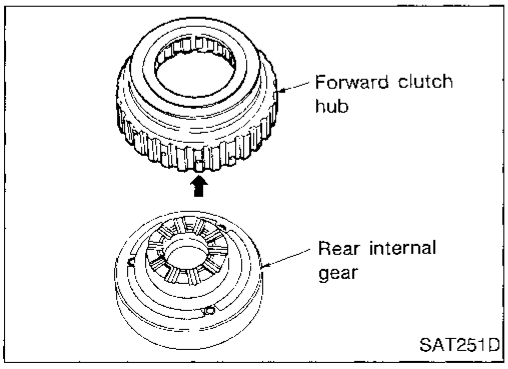
## Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub



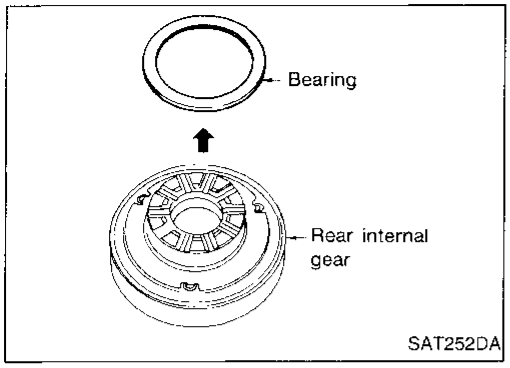

### DISASSEMBLY

1. Remove overrun clutch hub and thrust washer from forward clutch hub.

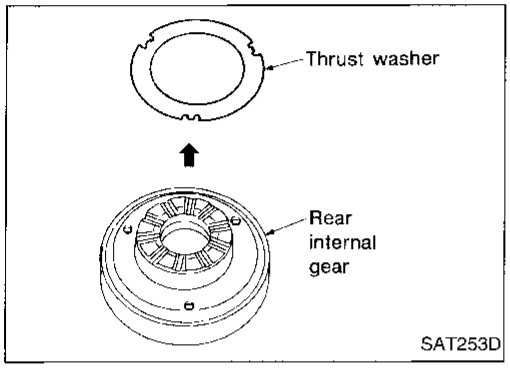



2. Remove forward clutch hub from rear internal gear.

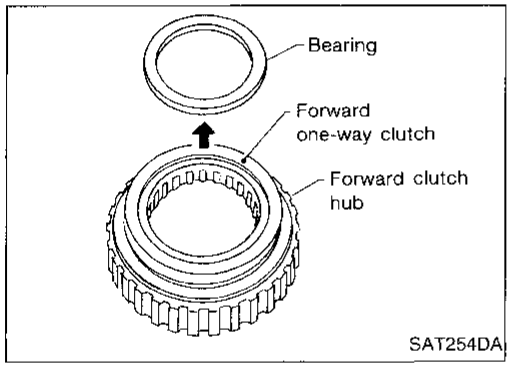
## Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



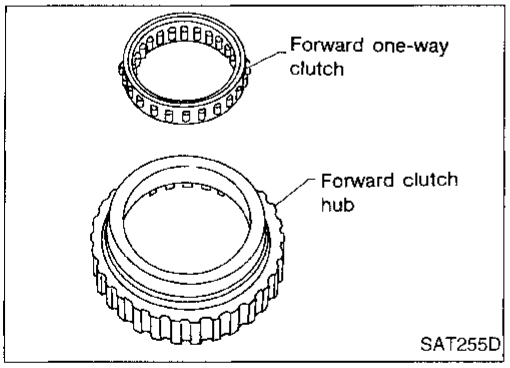

3. Remove bearing from rear internal gear.



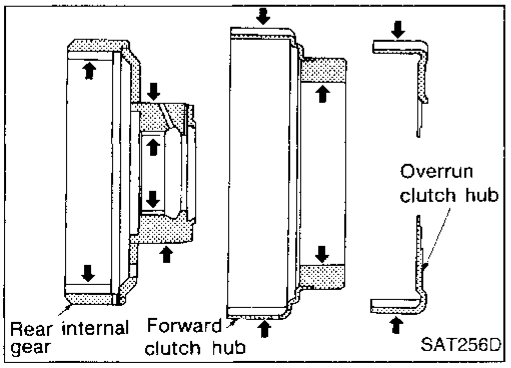

4. Remove thrust washer from rear internal gear.




5. Remove bearing from forward one-way clutch.




6. Remove forward one-way clutch from forward clutch hub.




### INSPECTION

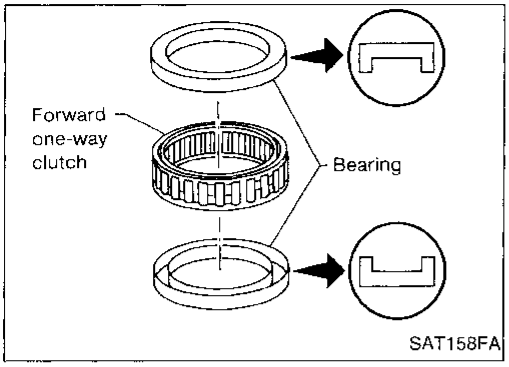
#### Rear internal gear, forward clutch hub and overrun clutch hub

- Check rubbing surfaces for wear or damage.

## Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)

### Bearings and forward one-way clutch

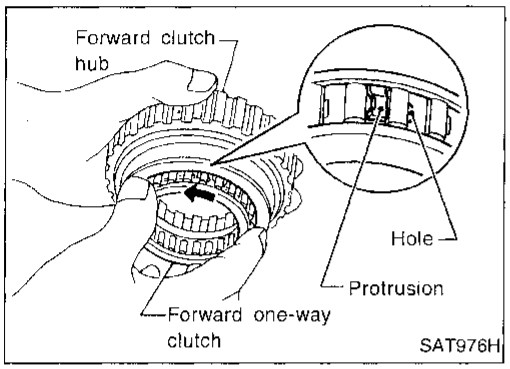
- Check bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.




### ASSEMBLY

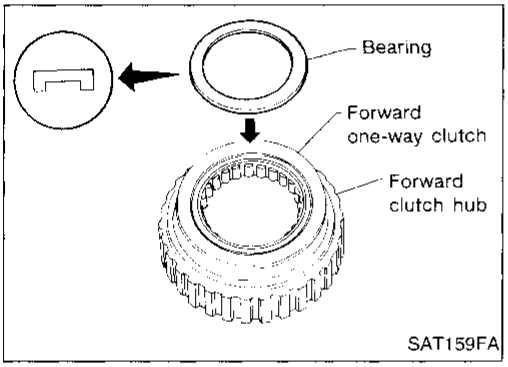
1. Install forward one-way clutch on forward clutch.

- **Take care with the direction of forward one-way clutch.**



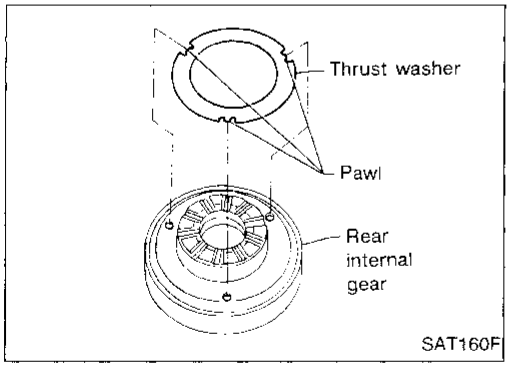

2. Install bearing on forward one-way clutch.

- **Apply petroleum jelly to bearing.**



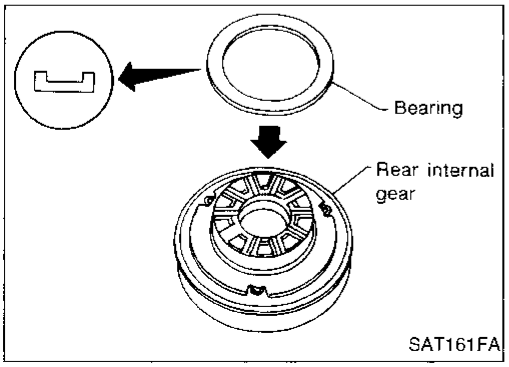

3. Install thrust washer on rear internal gear.

- **Apply petroleum jelly to thrust washer.**
- **Align hooks of thrust washer with holes of rear internal gear.**

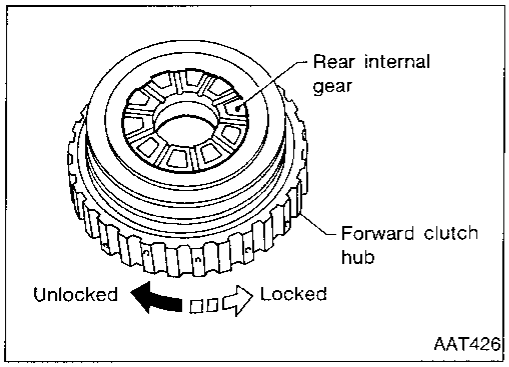



4. Install bearing on rear internal gear.

- **Apply petroleum jelly to bearing.**

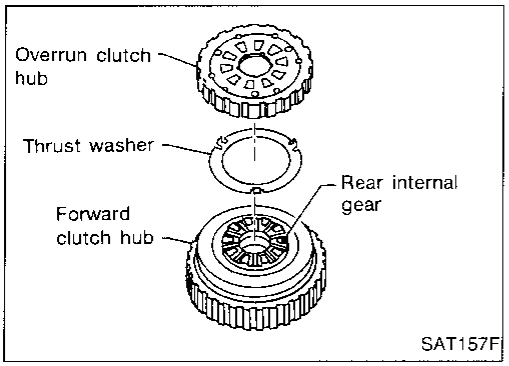


## Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)




5. Install forward clutch hub on rear internal gear.

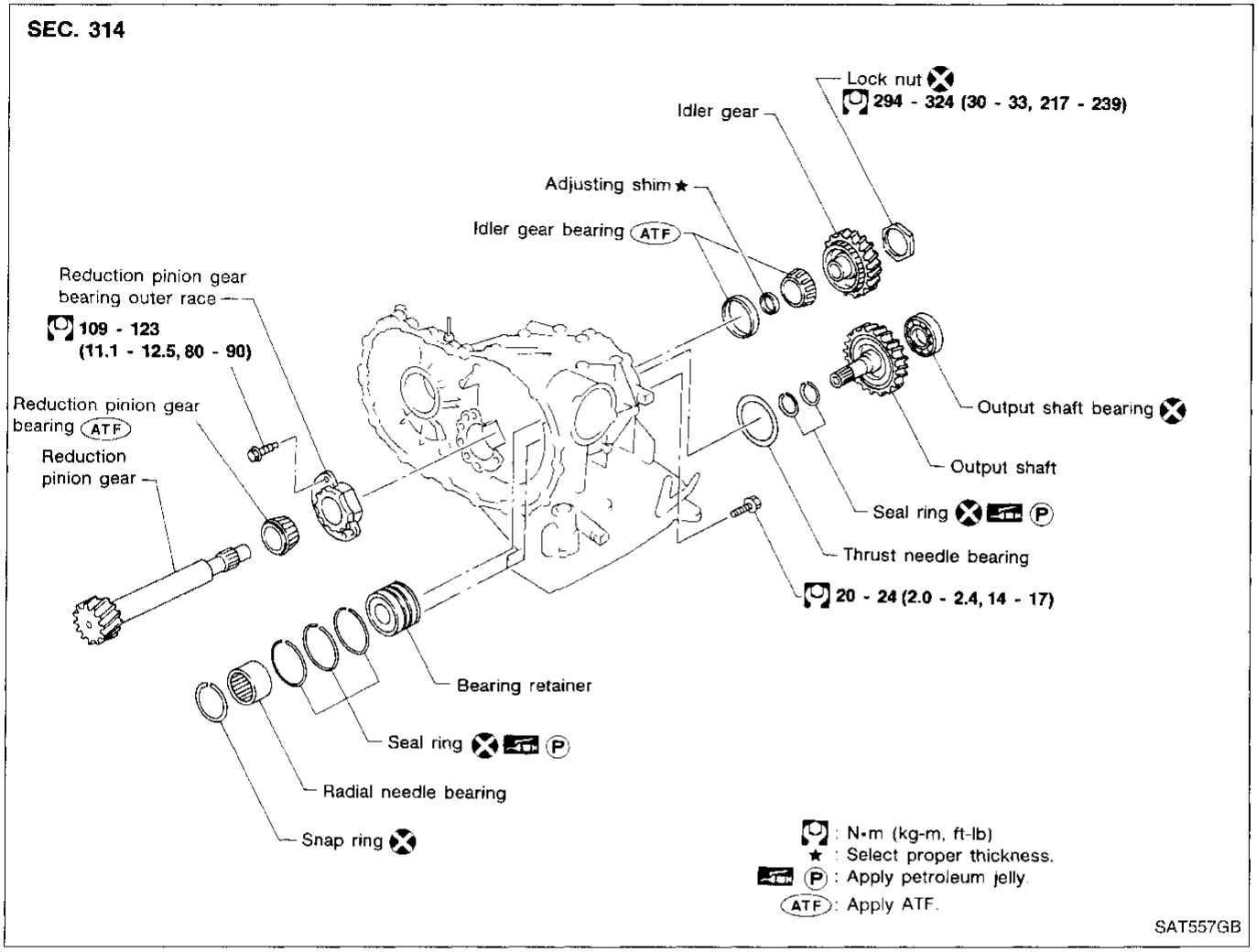
- **Check operation of forward one-way clutch.**
  **Hold rear internal gear and turn forward clutch hub. Check forward clutch hub for correct locking and unlocking directions.**
- **If not as shown in illustration, check installation direction of forward one-way clutch.**

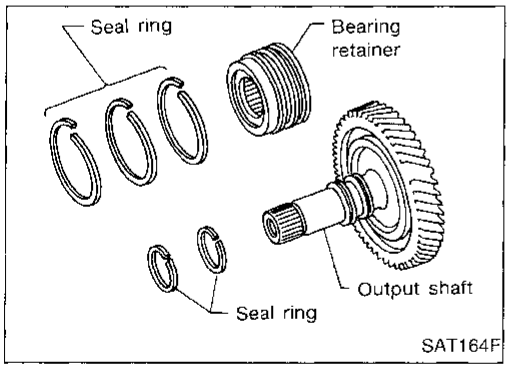



6. Install thrust washer and overrun clutch hub.

- **Apply petroleum jelly to thrust washer.**
- **Align hooks of thrust washer with holes of overrun clutch hub.**
- **Align projections of rear internal gear with holes of overrun clutch hub.**

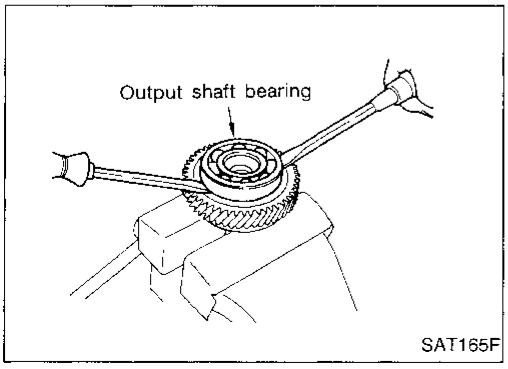
## Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer




### DISASSEMBLY

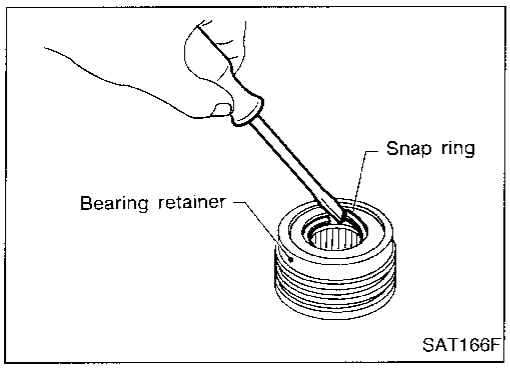
1. Remove seal rings from output shaft and bearing retainer.



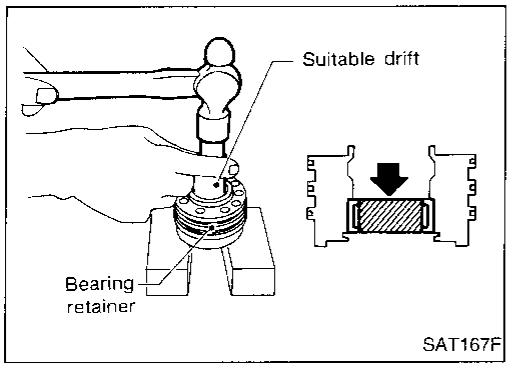

2. Remove output shaft bearing with screwdrivers.

- **Always replace removed bearing with a new one.**
- **Do not damage output shaft.**

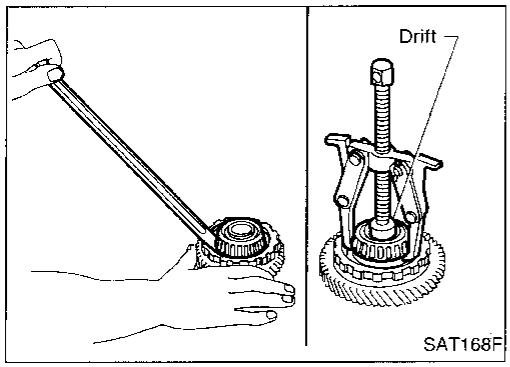
## Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)



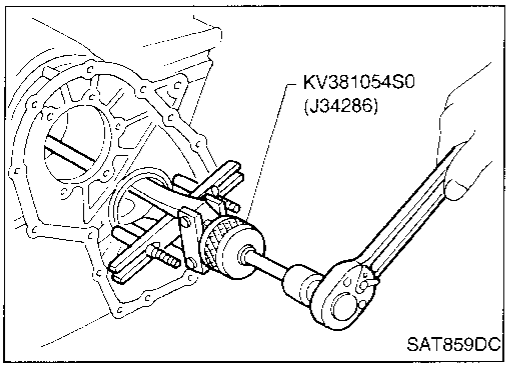

3. Remove snap ring from bearing retainer.



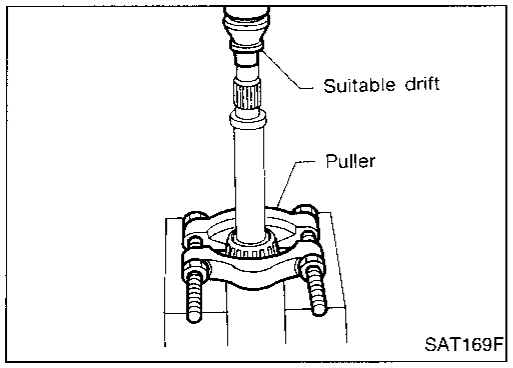

4. Remove needle bearing from bearing retainer.



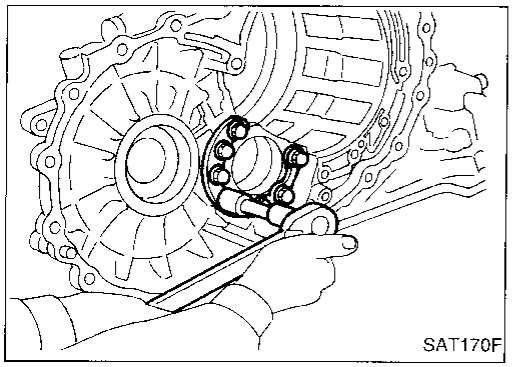

5. Remove idler gear bearing inner race from idler gear.




6. Remove idler gear bearing outer race from transmission case.




7. Press out reduction pinion gear bearing inner race from reduction pinion gear.


SAT170F

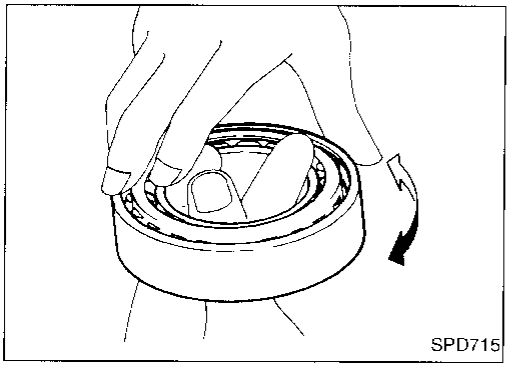
## Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)

8. Remove reduction pinion gear bearing outer race from transmission case.

### INSPECTION

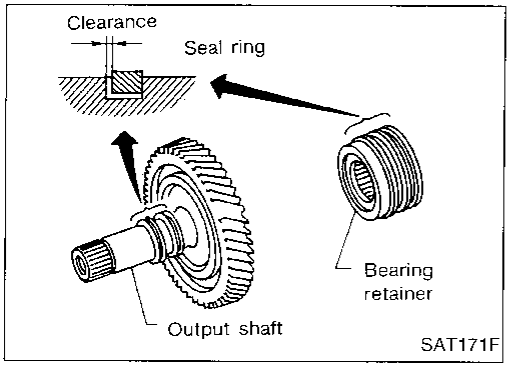
#### Output shaft, idler gear and reduction pinion gear

- Check shafts for cracks, wear or bending.
- Check gears for wear, chips and cracks.


SPD715

#### Bearing

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**



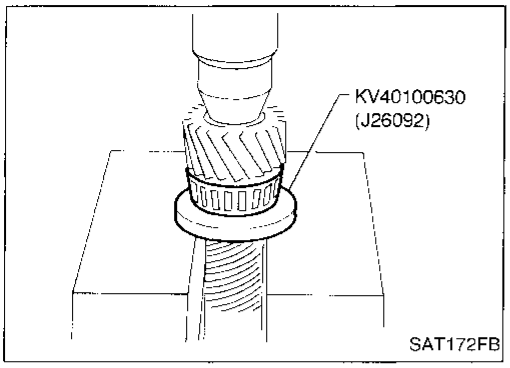
SAT171F

#### Seal ring clearance

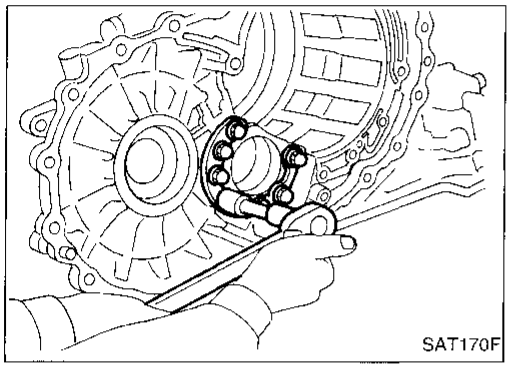
- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.
  **Standard clearance:**
  **0.10 - 0.25 mm (0.0039 - 0.0098 in)**
  **Allowable limit:**
  **0.25 mm (0.0098 in)**
- If not within allowable limit, replace output shaft.
- Install new seal rings to bearing retainer.
- Measure clearance between seal ring and ring groove of bearing retainer.
  **Standard clearance:**
  **0.10 - 0.30 mm (0.0039 - 0.0118 in)**
  **Allowable limit:**
  **0.30 mm (0.0118 in)**
- If not within allowable limit, replace bearing retainer.

## Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)

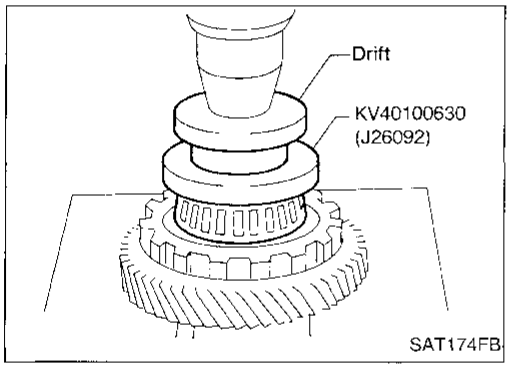
### ASSEMBLY



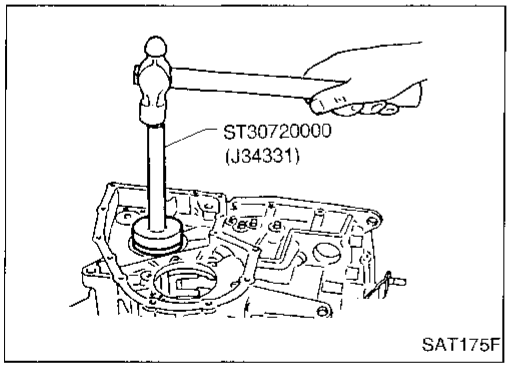

1. Press reduction pinion gear bearing inner race on reduction pinion gear.



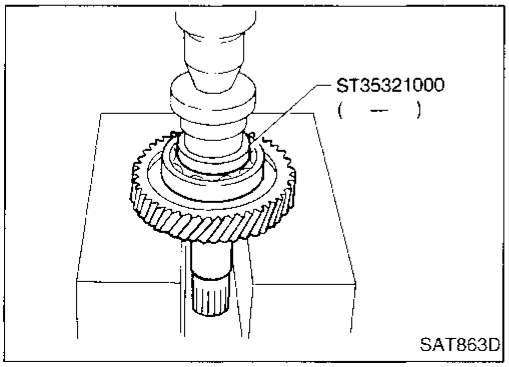

2. Install reduction pinion gear bearing outer race on transmission case.




3. Press idler gear bearing inner race on idler gear.

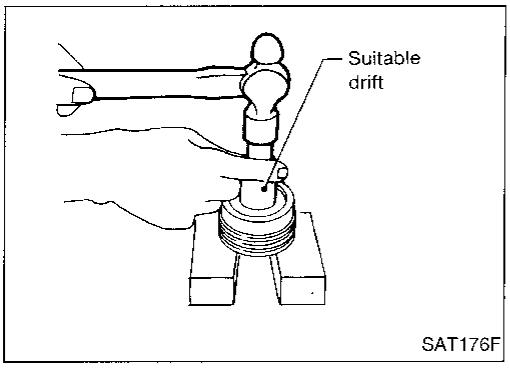



4. Install idler gear bearing outer race on transmission case.

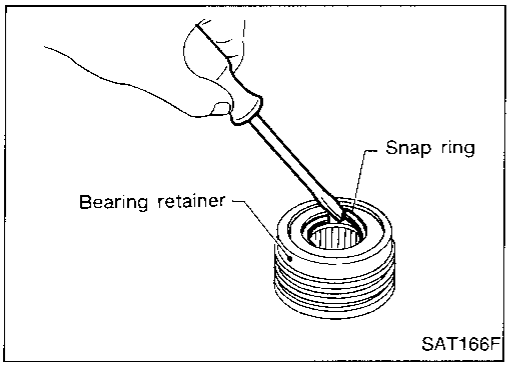



5. Press output shaft bearing on output shaft.

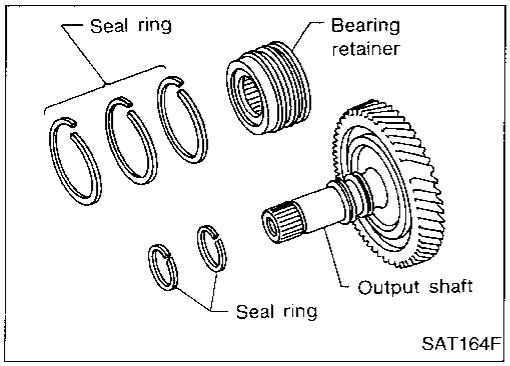
## Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer (Cont'd)



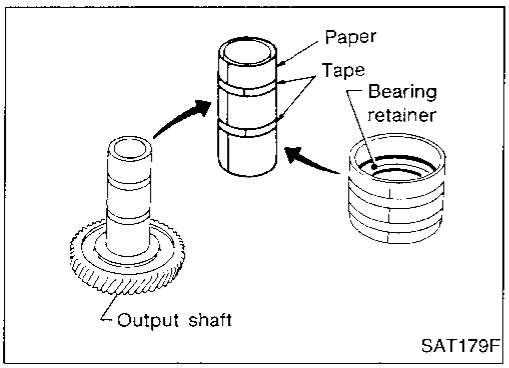

6. Press needle bearing on bearing retainer.




7. Install snap ring to bearing retainer.

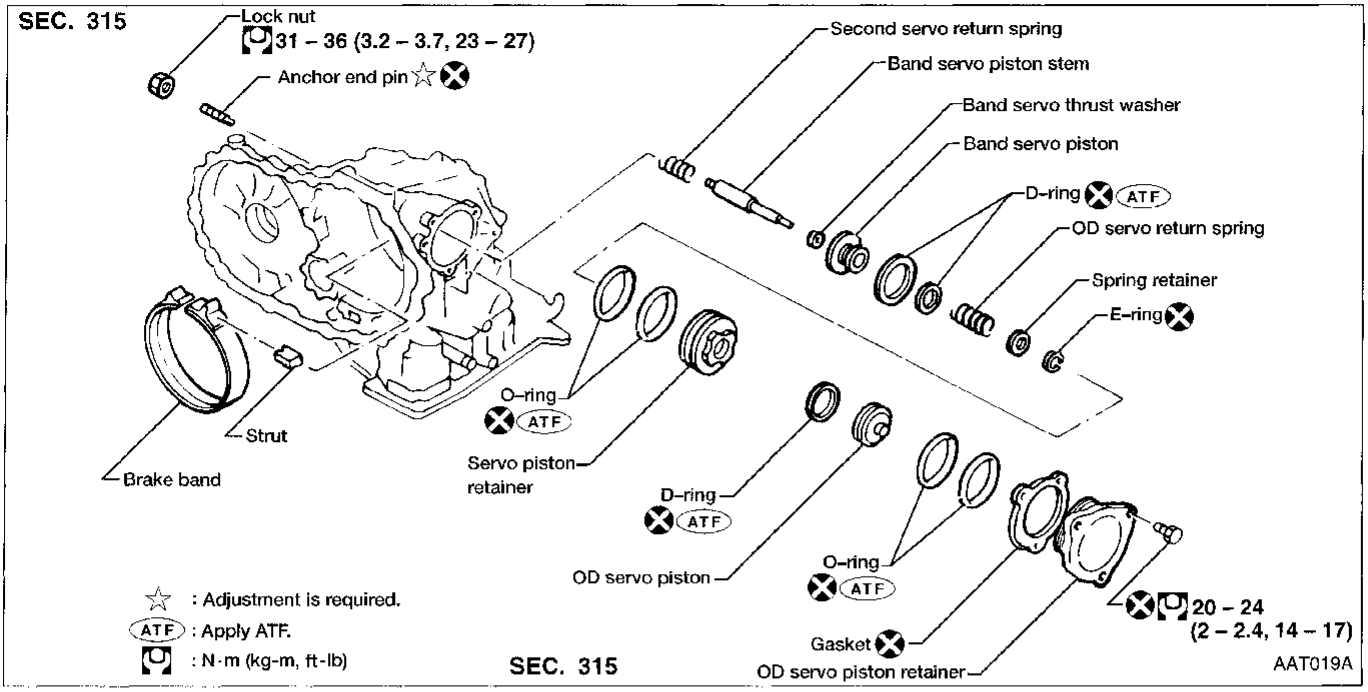


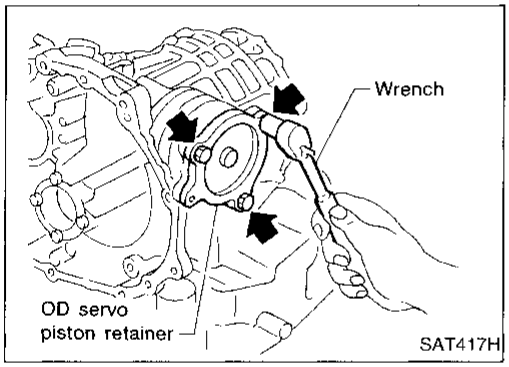

8. After packing ring grooves with petroleum jelly, carefully install new rings on output shaft and bearing retainer.




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

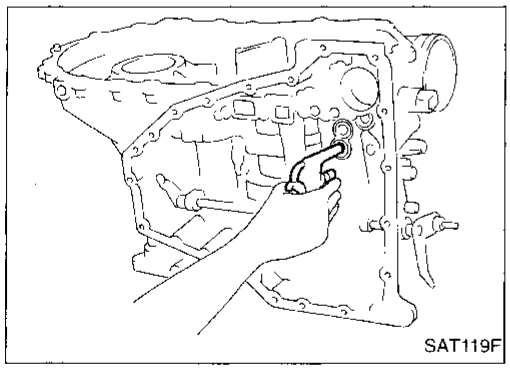
## Band Servo Piston Assembly



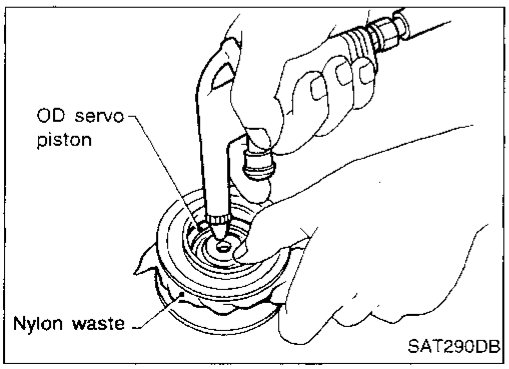




### DISASSEMBLY

1. Remove band servo piston fixing bolts.

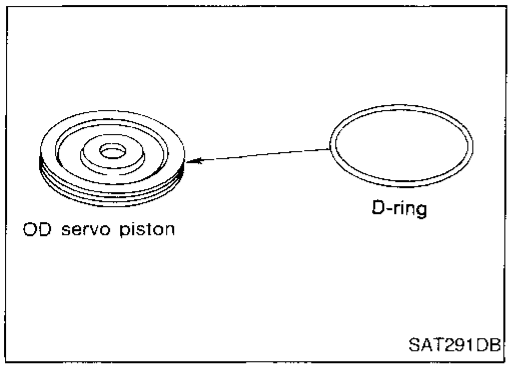



2. Apply compressed air to oil hole in transmission case to remove OD servo piston retainer and band servo piston assembly.
   - **Hold band servo piston assembly with a rag or nylon waste.**

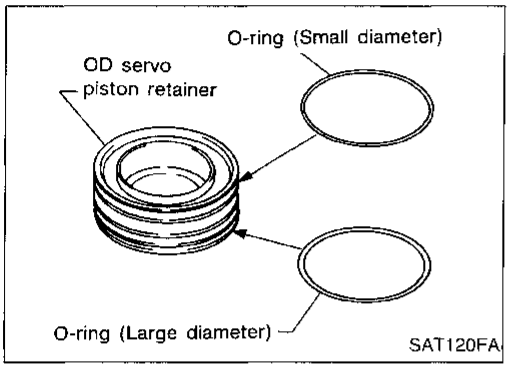



3. Apply compressed air to oil hole in OD servo piston retainer to remove OD servo piston from retainer.
   - **Hold OD servo piston while applying compressed air.**

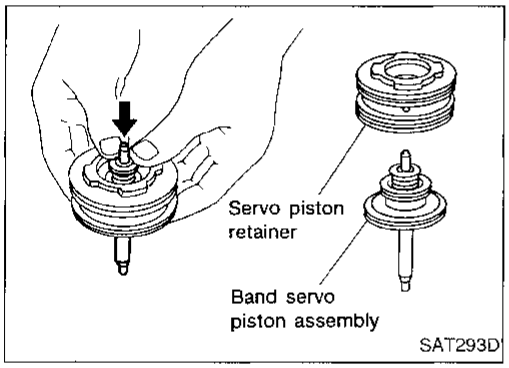
## Band Servo Piston Assembly (Cont'd)



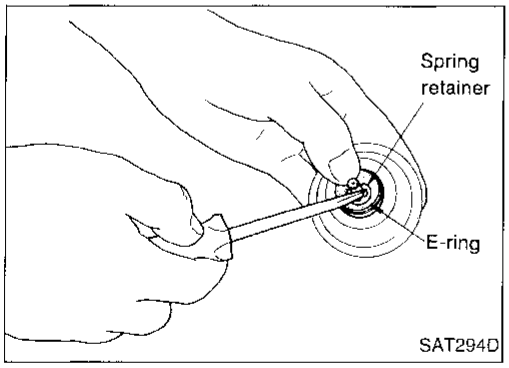

4. Remove D-ring from OD servo piston.



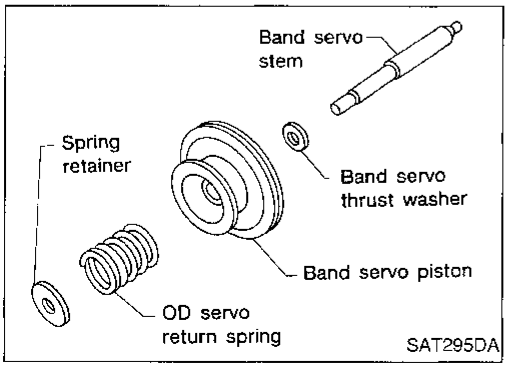

5. Remove O-rings from OD servo piston retainer.




6. Remove band servo piston assembly from servo piston retainer by pushing it forward.

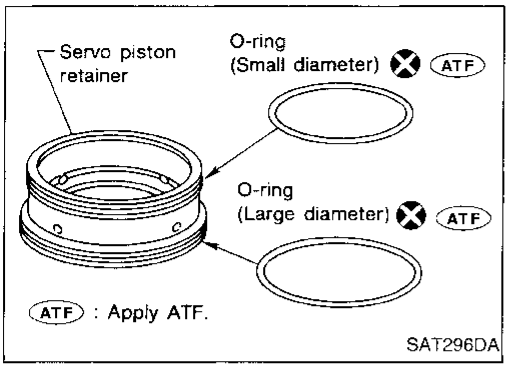



7. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

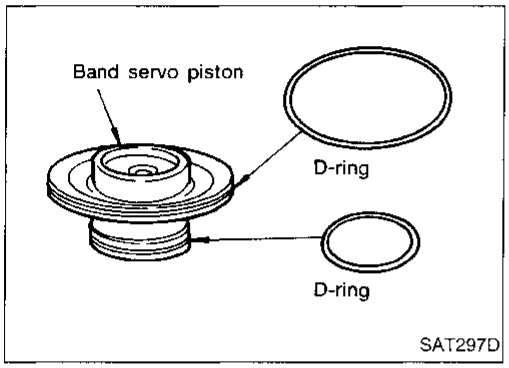



8. Remove OD servo return spring, band servo thrust washer and band servo piston stem from band servo piston.

## Band Servo Piston Assembly (Cont'd)




9. Remove O-rings from servo piston retainer.

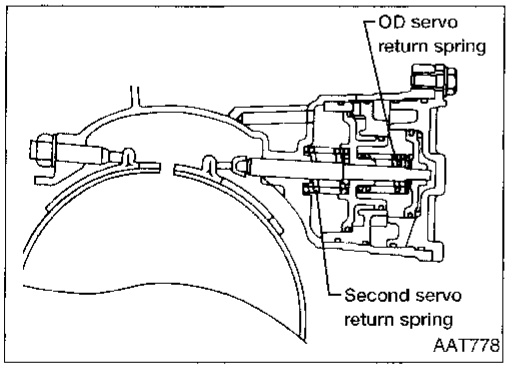



10. Remove D-rings from band servo piston.

### INSPECTION

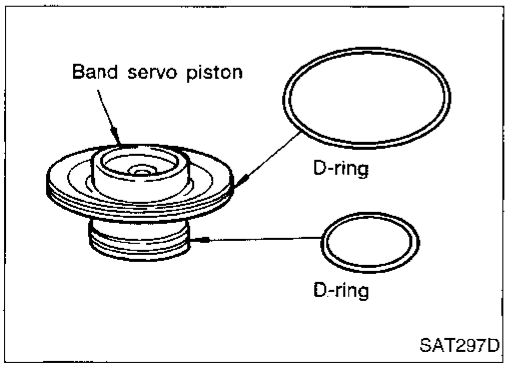
#### Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.




#### Return springs

- Check for deformation or damage.
- Measure free length and outer diameter.
  **Inspection standard:**
  **Refer to SDS, AT-242.**

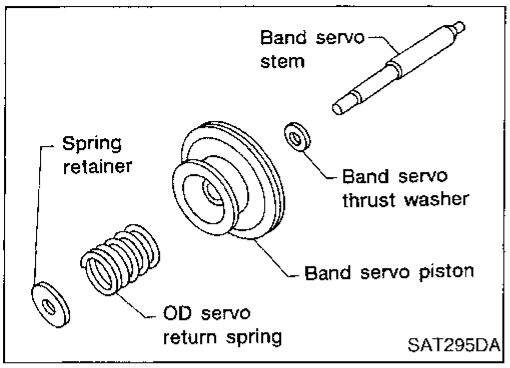



### ASSEMBLY

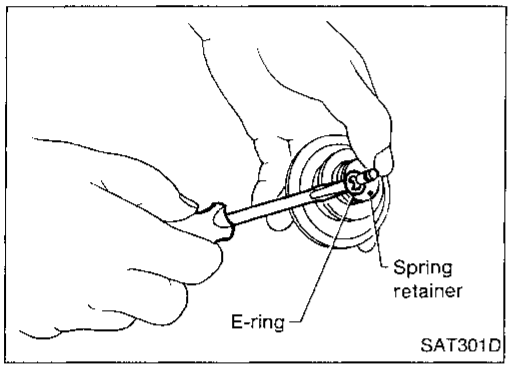
1. Install D-rings to servo piston retainer.

- **Apply ATF to D-rings.**
- **Pay attention to position of each O-ring.**

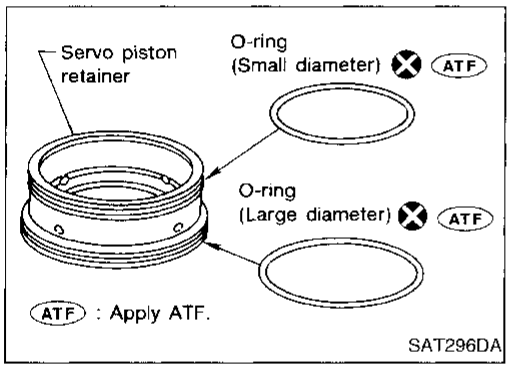
## Band Servo Piston Assembly (Cont'd)



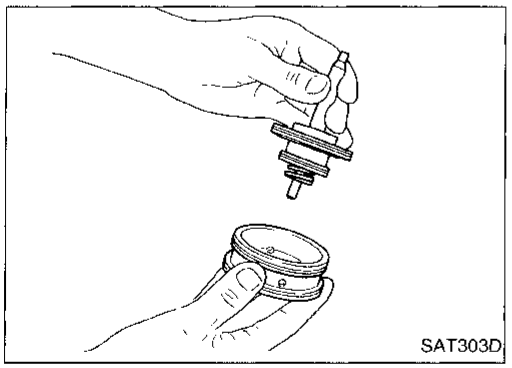

2. Install band servo piston stem, band servo thrust washer, OD servo return spring and spring retainer to band servo piston.



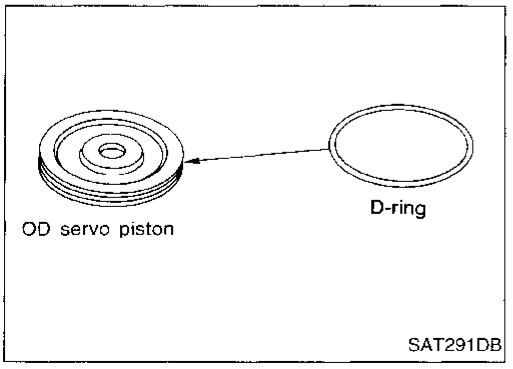

3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.




4. Install O-rings to servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**

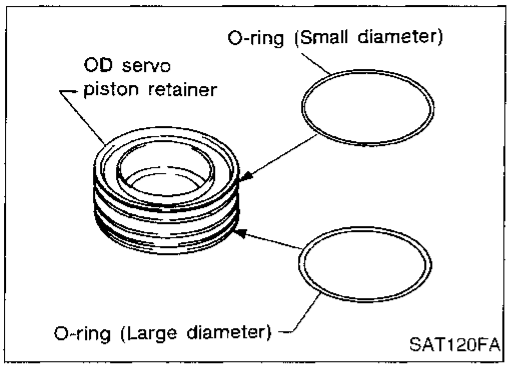



5. Install band servo piston assembly to servo piston retainer by pushing it inward.

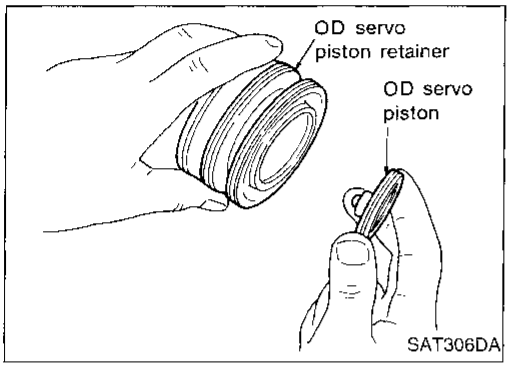



6. Install D-ring to OD servo piston.
- **Apply ATF to D-ring.**

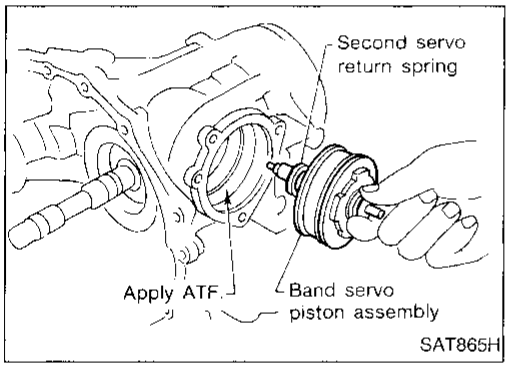
## Band Servo Piston Assembly (Cont'd)



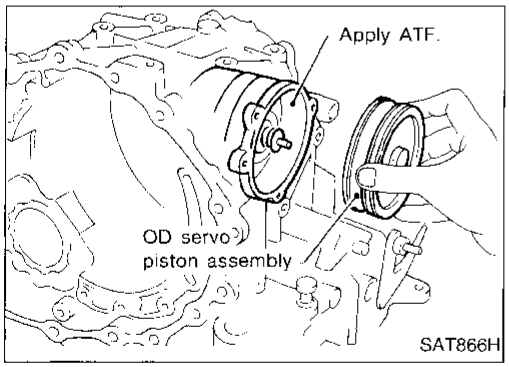

7. Install O-rings to OD servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**



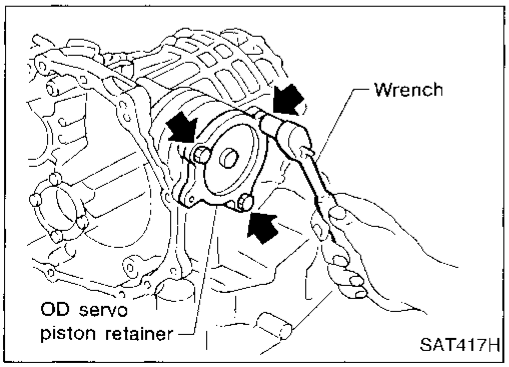

8. Install OD servo piston to OD servo piston retainer.




9. Install band servo piston assembly and 2nd servo return spring to transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**

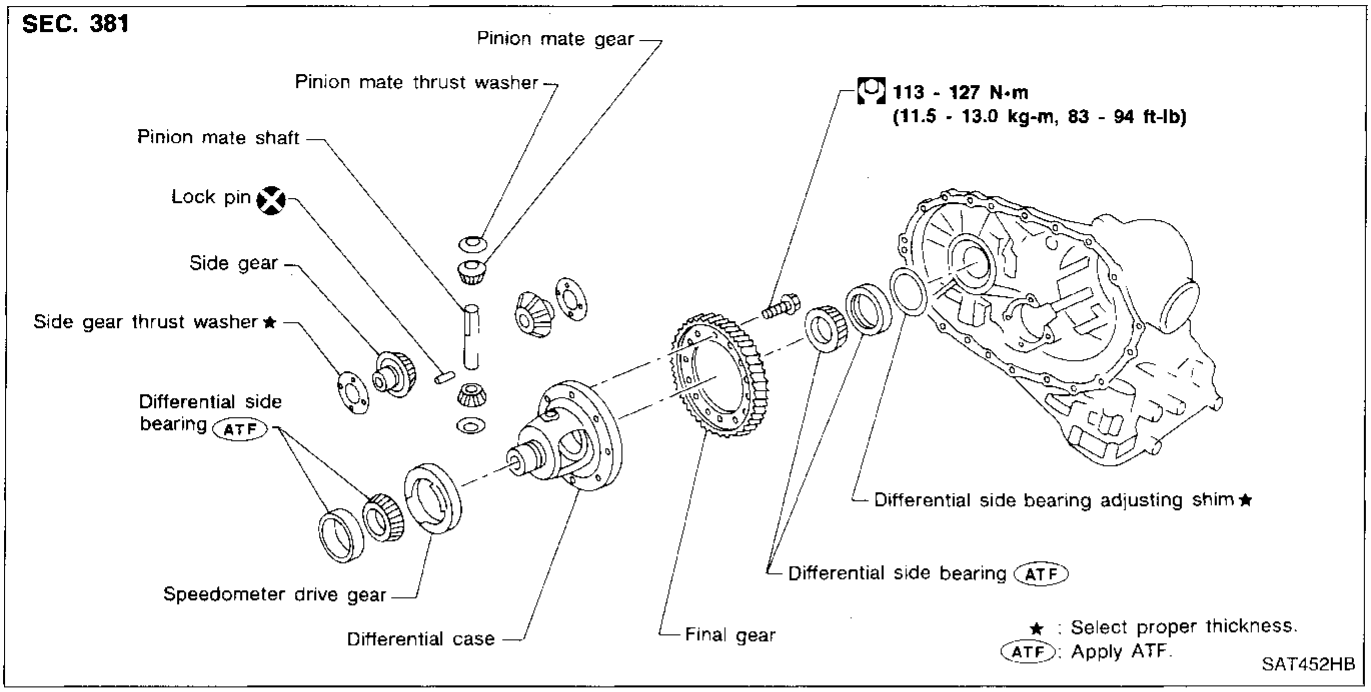


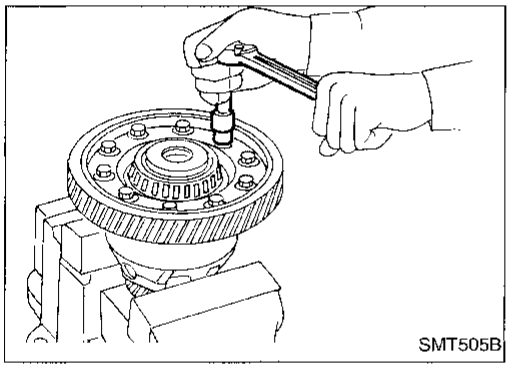

10. Install OD band servo piston assembly to transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**




11. Install band servo piston snap ring to transmission case.

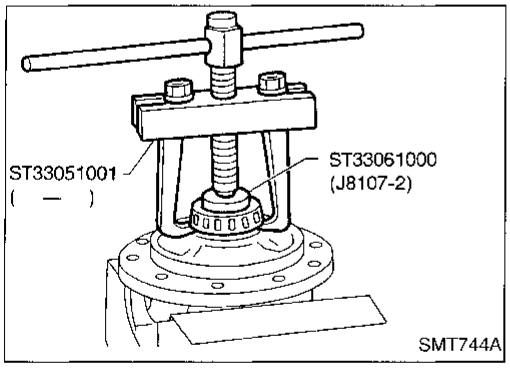
## Final Drive



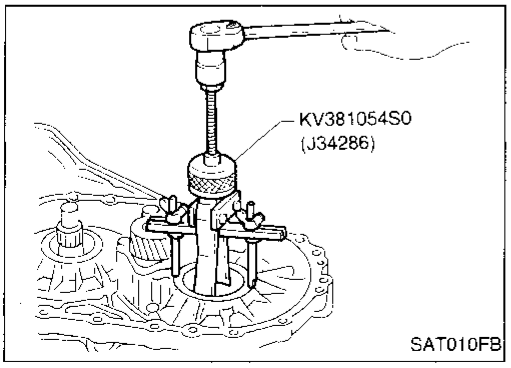

### DISASSEMBLY

1. Remove final gear.



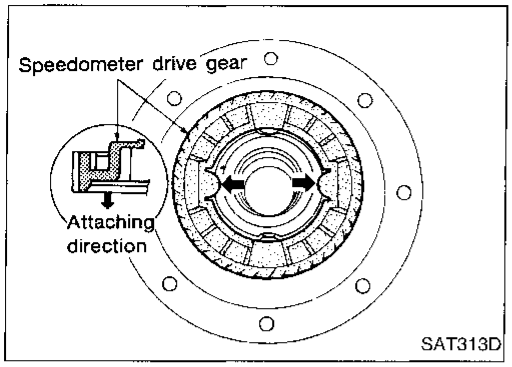

2. Press out differential side bearings.

- **Be careful not to mix up the right and left bearings.**

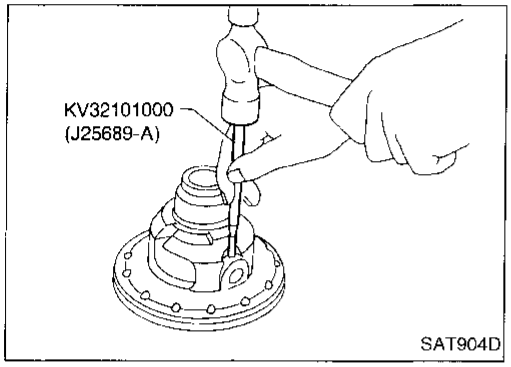



3. Remove differential side bearing outer race, and side bearing adjusting shim from transmission case.

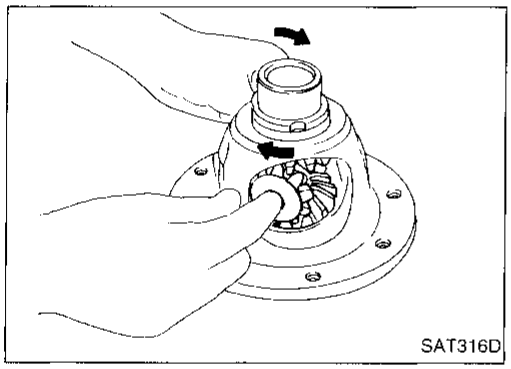
## Final Drive (Cont'd)



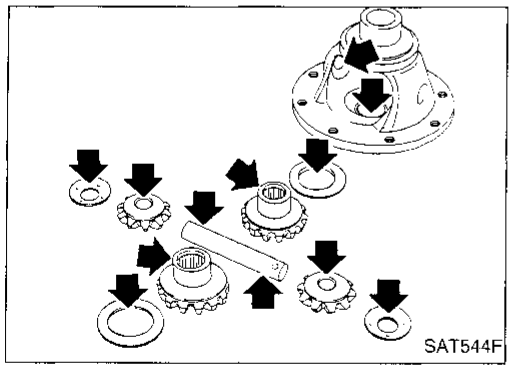

4. Remove speedometer drive gear.




5. Drive out pinion mate shaft lock pin.



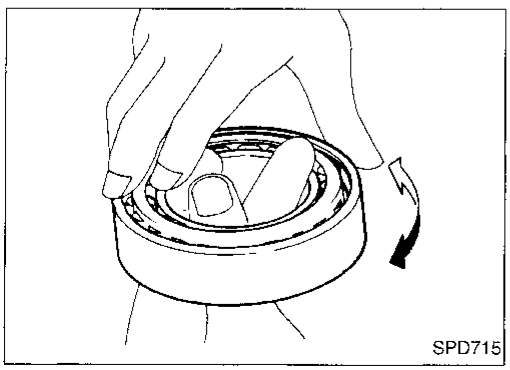

6. Draw out pinion mate shaft lock pin.
7. Remove pinion mate gears and side gears.




### INSPECTION

#### Gear, washer, shaft and case

- Check mating surfaces of differential case, side gears and pinion mate gears.
- Check washers for wear.

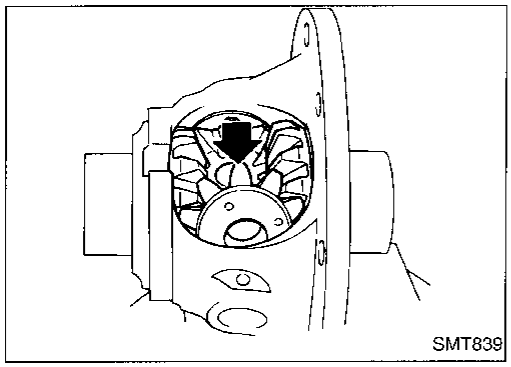



#### Bearings

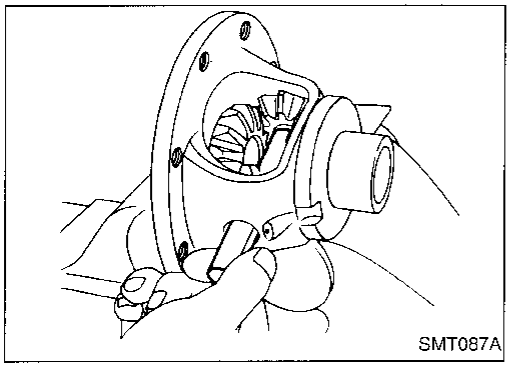
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**

## Final Drive (Cont'd)

### ASSEMBLY

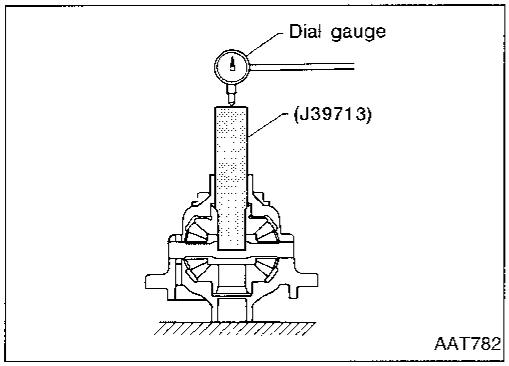



1. Attach side gear thrust washers to side gears, then install pinion mate thrust washers and pinion mate gears in place.



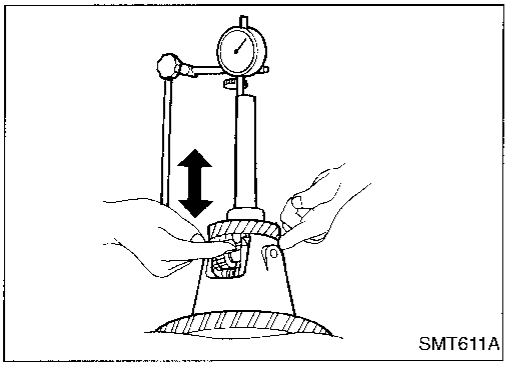

2. Insert pinion mate shaft.

- **When inserting, be careful not to damage pinion mate thrust washers.**




3. Measure clearance between side gear and differential case with washers following the procedure below:

a. Set Tool and dial indicator on side gear.




b. Move side gear up and down to measure dial indicator deflection. Always measure indicator deflection on both side gears.

**Clearance between side gear and differential case with washers:**

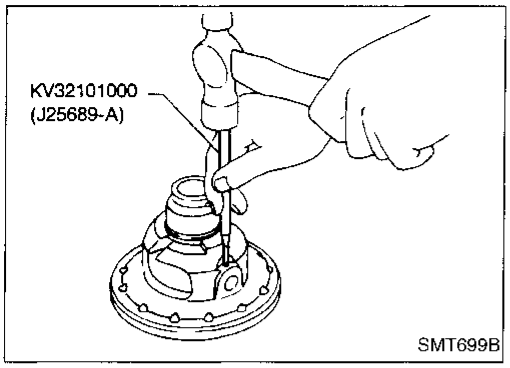
**0.1 - 0.2 mm (0.004 - 0.008 in)**

c. If not within specification, adjust clearance by changing thickness of side gear thrust washers.

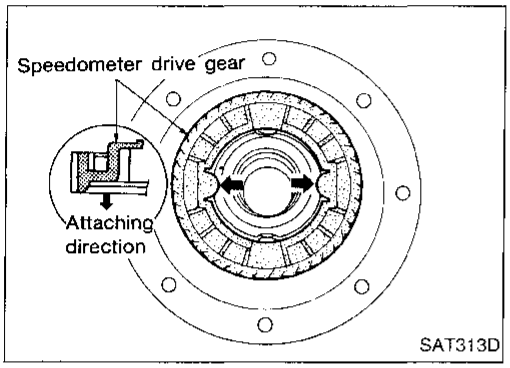
**Side gear thrust washer:**

**Refer to SDS, AT-240.**

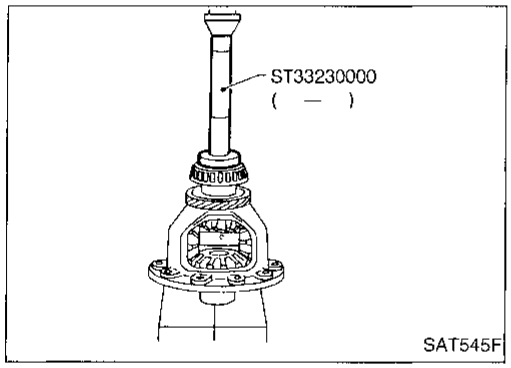
## Final Drive (Cont'd)



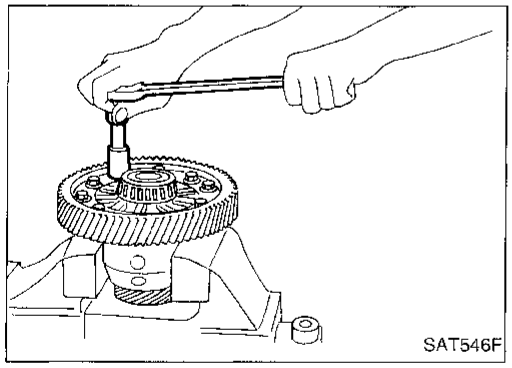

4. Install lock pin.
- **Make sure that lock pin is flush with case.**



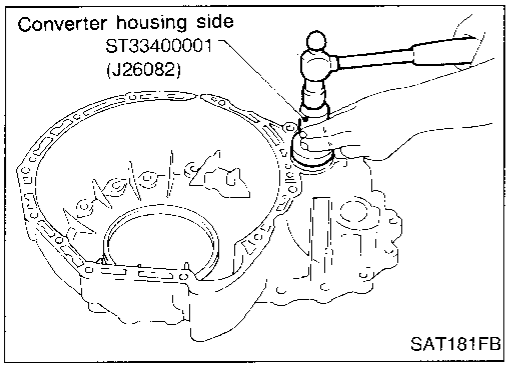

5. Install speedometer drive gear on differential case.
- **Align the projection of speedometer drive gear with the groove of differential case.**




6. Press on differential side bearings.

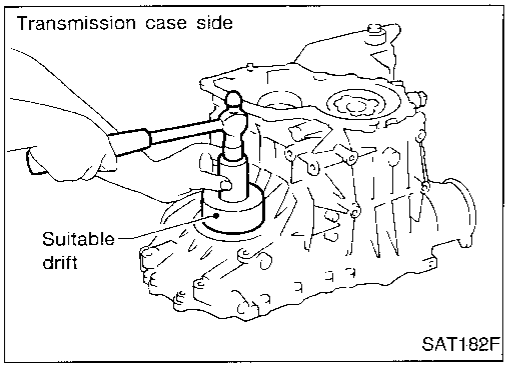


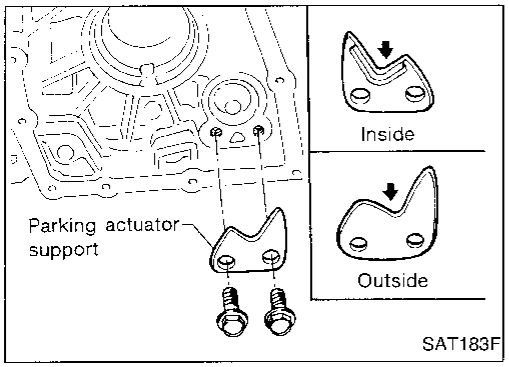

7. Install final gear and tighten fixing bolts in a crisscross pattern.



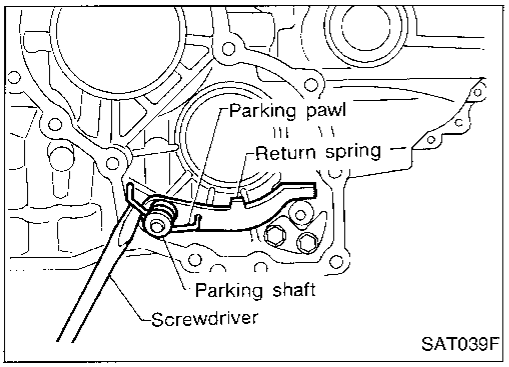

## Assembly 1

1. Install differential side oil seals on transmission case and converter housing.

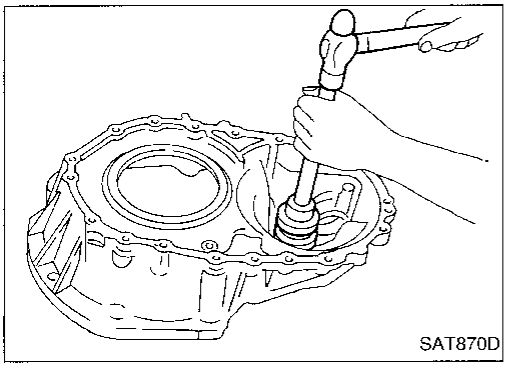



2. Install parking actuator support to transmission case.
- **Pay attention to direction of parking actuator support.**




3. Install parking pawl on transmission case and fix it with parking shaft.
4. Install return spring.

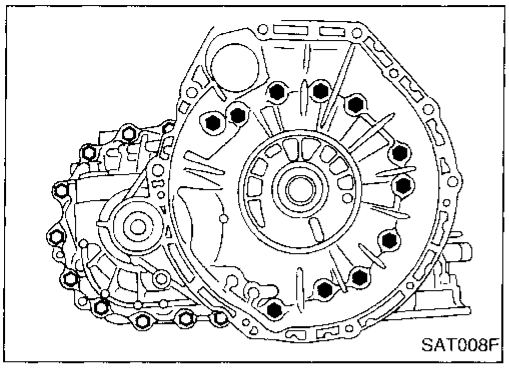



## Adjustment 1

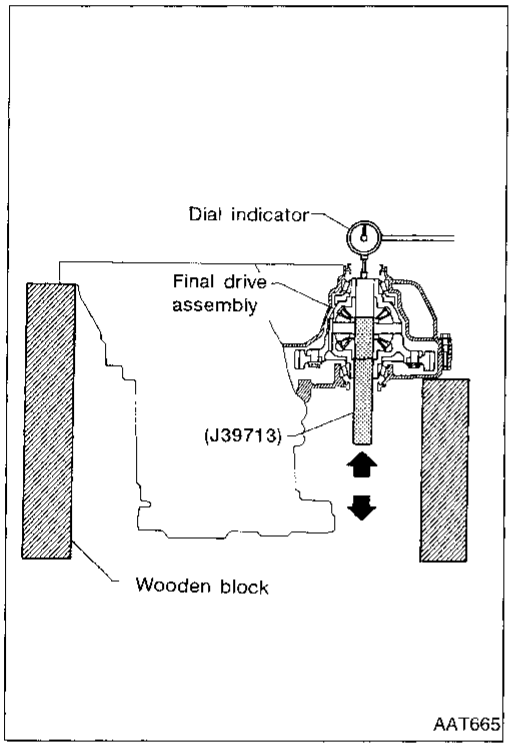
### DIFFERENTIAL SIDE BEARING PRELOAD

1. Install differential side bearing outer race without adjusting shim on transmission case.
2. Install differential side bearing outer race on converter housing.

## Adjustment 1 (Cont'd)




3. Place final drive assembly on transmission case.
4. Install transmission case on converter housing and tighten transmission case fixing bolts to the specified torque.

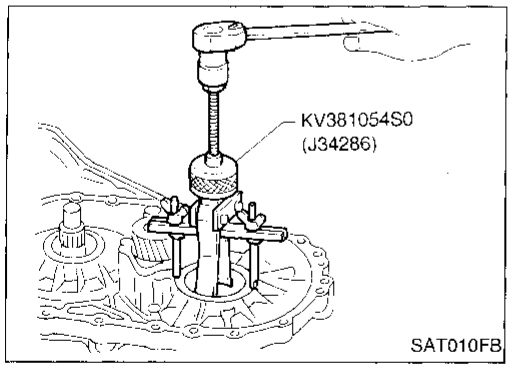



5. Attach dial indicator on differential case at converter housing side.
6. Insert Tool into differential side gear from transmission case side.
7. Move Tool up and down and measure dial indicator deflection.
8. Select proper thickness of differential side bearing adjusting shim(s).

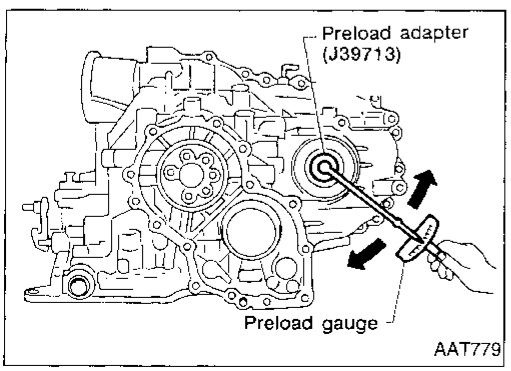
**Suitable shim thickness = Dial indicator deflection + Specified bearing preload**

**Differential side bearing adjusting shim:**
**Refer to SDS, AT-240.**

**Bearing preload:**
**0.05 - 0.09 mm (0.0020 - 0.0035 in)**




9. Remove converter housing from transmission case.
10. Remove final drive assembly from transmission case.
11. Remove differential side bearing outer race from transmission case.
12. Reinstall differential side bearing outer race and shim(s) selected from SDS table on transmission case.
13. Reinstall converter housing on transmission case and tighten transmission case fixing bolts to the specified torque.

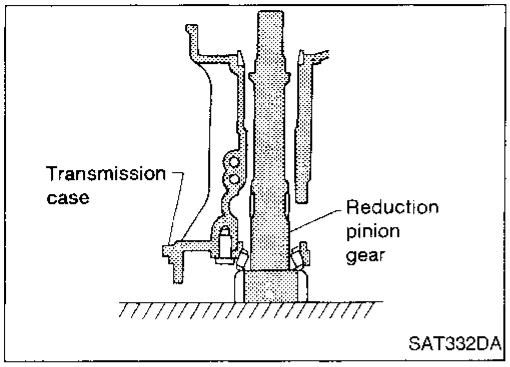



14. Insert Tool into differential side gear and measure turning torque of final drive assembly.

- **Turn final drive assembly in both directions several times to seat bearing rollers correctly.**
  **Turning torque of final drive assembly (New bearing):**
  **0.78 - 1.37 N·m (8.0 - 14.0 kg-cm, 6.9 - 12.2 in-lb)**
- **When old bearing is used again, turning torque will be slightly less than the above.**
- **Make sure torque is close to the specified position.**

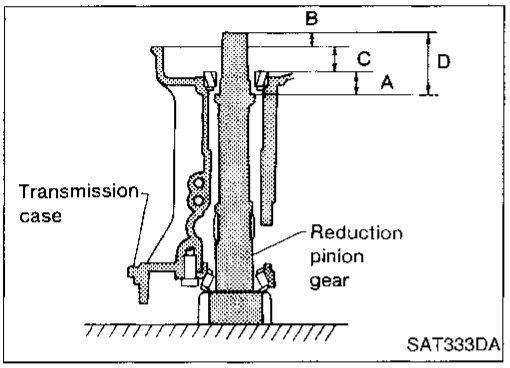
## Adjustment 1 (Cont'd)

### REDUCTION PINION GEAR BEARING PRELOAD




1. Remove transmission case and final drive assembly from converter housing.
2. Select proper thickness of reduction pinion gear bearing adjusting shim using the following procedures.

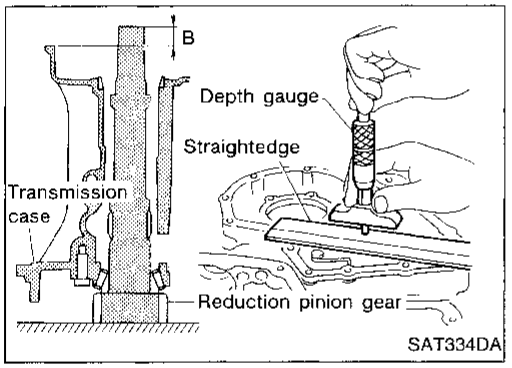
a. Place reduction pinion gear on transmission case as shown.



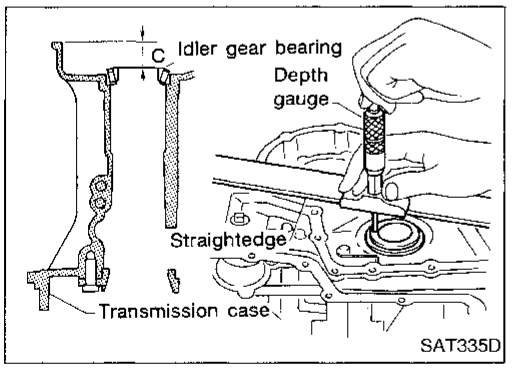

b. Place idler gear bearing on transmission case.
c. Measure dimensions "B" "C" and "D" and calculate dimension "A".

**A = D − (B + C)**

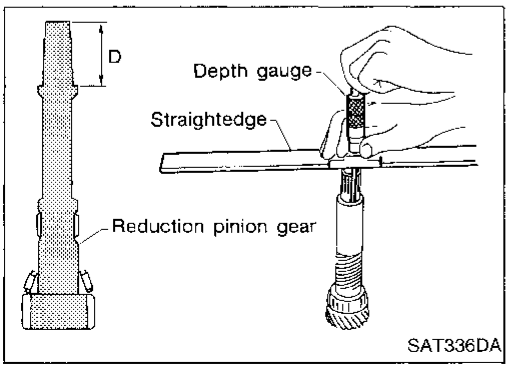
**"A": Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction pinion gear.**




- Measure dimension "B" between the end of reduction pinion gear and the surface of transmission case.
- **Measure dimension "B" in at least two places.**



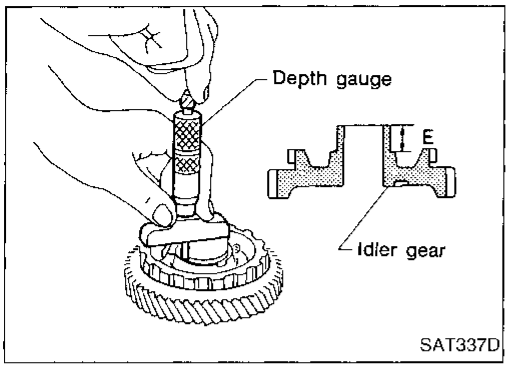

- Measure dimension "C" between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension "C" in at least two places.**




- Measure dimension "D" between the end of reduction pinion gear and the adjusting shim mating surface of reduction pinion gear.
- **Measure dimension "D" in at least two places.**
- Calculate dimension "A".

**A = D − (B + C)**

## Adjustment 1 (Cont'd)




d. Measure dimension "E" between the end of idler gear and the idler gear bearing inner race mating surface of idler gear.

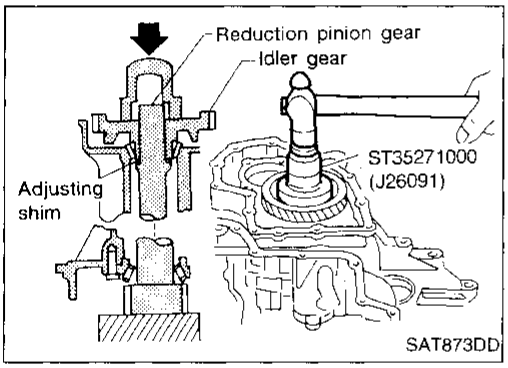
- **Measure dimension "E" in at least two places.**

e. Select proper thickness of reduction pinion gear bearing adjusting shim.

**Proper shim thickness = A – E – 0.5 mm (0.0020 in)***

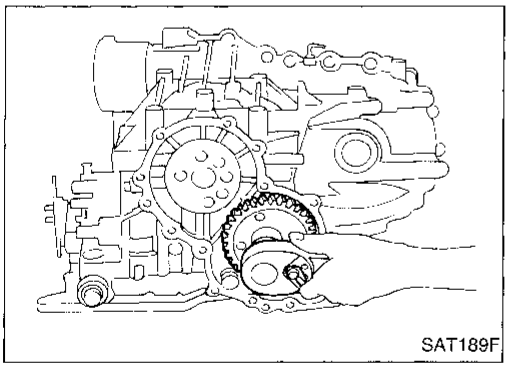
(* ... Bearing preload)

**Reduction pinion gear bearing adjusting shim:**
**Refer to SDS, AT-242.**



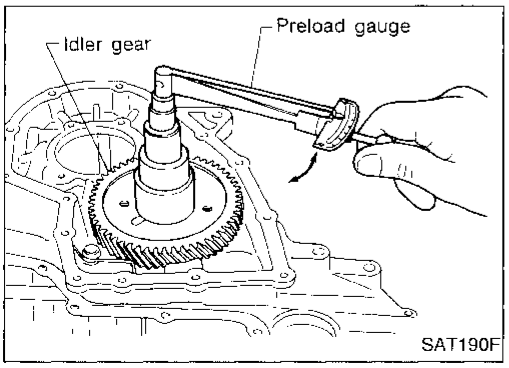

3. Install reduction pinion gear and reduction pinion gear bearing adjusting shim selected in step 2-e on transmission case.
4. Press idler gear bearing inner race on idler gear.
5. Press idler pinion gear on reduction pinion gear.

- **Press idler gear until idler gear fully contacts adjusting shim.**




6. Tighten idler gear lock nut to the specified torque.

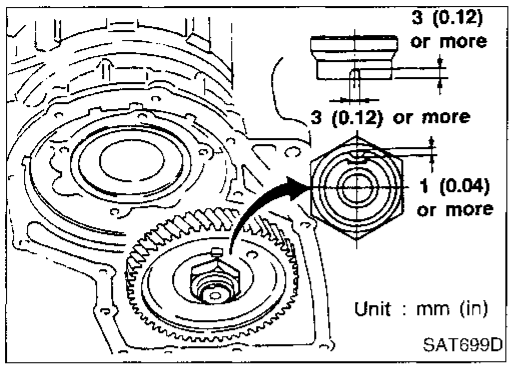
- **Lock idler gear with parking pawl when tightening lock nut.**



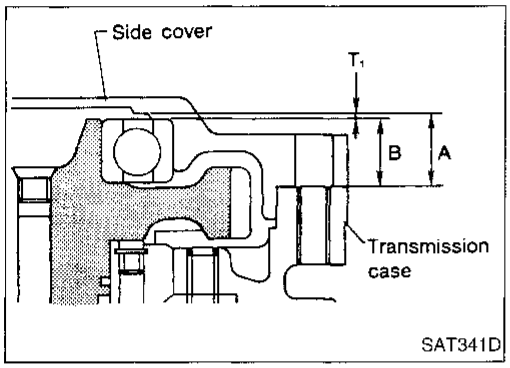

7. Measure turning torque of reduction pinion gear.

- **When measuring turning torque, turn reduction pinion gear in both directions several times to seat bearing rollers correctly.**
  **Turning torque of reduction pinion gear:**
  **0.05 - 0.39 N·m (0.5 - 4.0 kg-cm, 0.43 - 3.47 in-lb)**
- **If turning torque is out of specification, decrease or increase thickness of reduction pinion gear bearing adjusting shim.**

## Adjustment 1 (Cont'd)

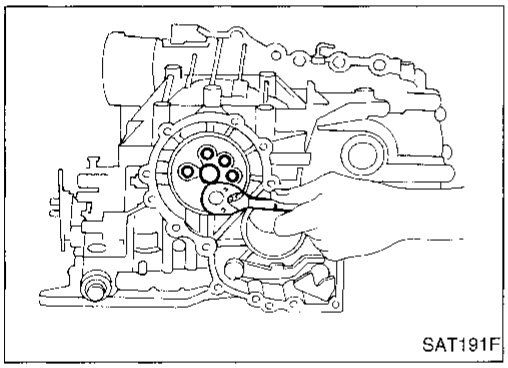



8. After properly adjusting turning torque, clinch idler gear lock nut as shown.

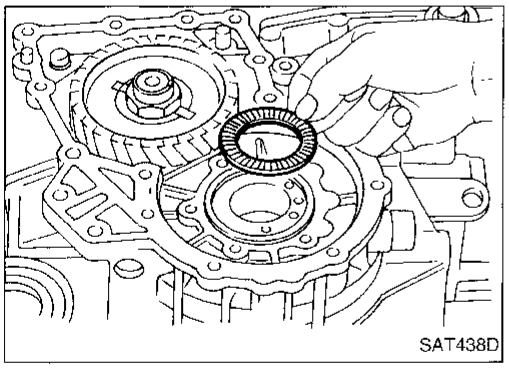



### OUTPUT SHAFT END PLAY

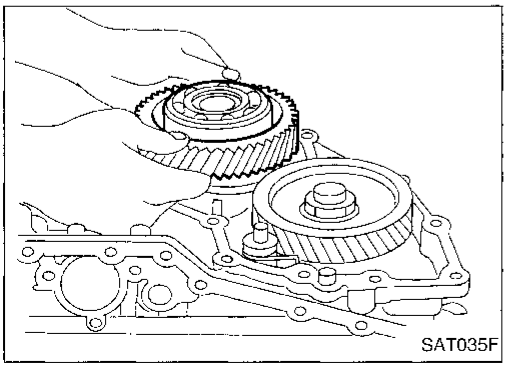
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.




1. Install bearing retainer for output shaft.

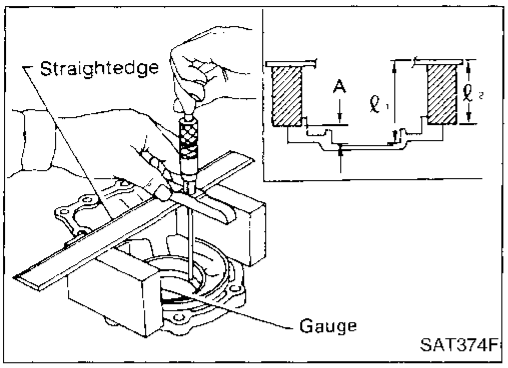



2. Install output shaft thrust needle bearing on bearing retainer.




3. Install output shaft on transmission case.

## Adjustment 1 (Cont'd)

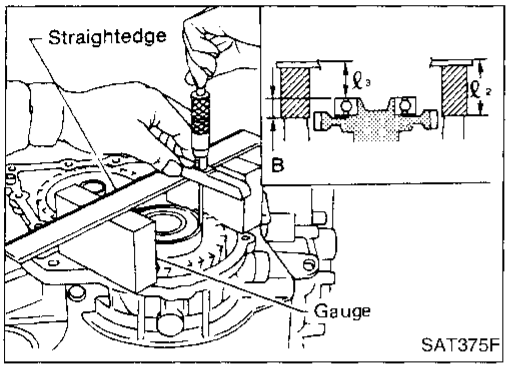



4. Measure dimensions "$\ell_1$" and "$\ell_2$" at side cover and then calculate dimension "A".

- **Measure dimension "$\ell_1$" and "$\ell_2$" in at least two places.**

**"A": Distance between transmission case fitting surface and adjusting shim mating surface.**

**$A = \ell_1 - \ell_2$ $\ell_2$: Height of gauge**

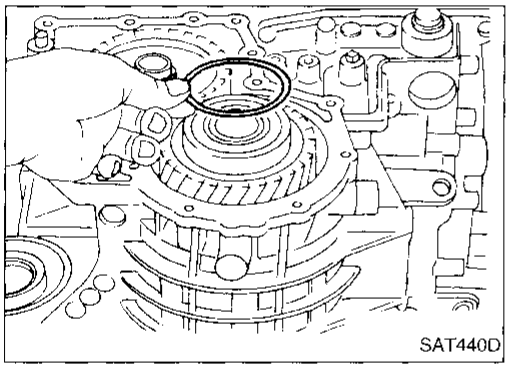



5. Measure dimensions "$\ell_2$" and "$\ell_3$" and then calculate dimension "B".

**Measure "$\ell_2$" and "$\ell_3$" in at least two places.**

**"B": Distance between the end of output shaft bearing outer race and the side cover fitting surface of transmission case.**

**$B = \ell_2 - \ell_3$ $\ell_2$: Height of gauge**

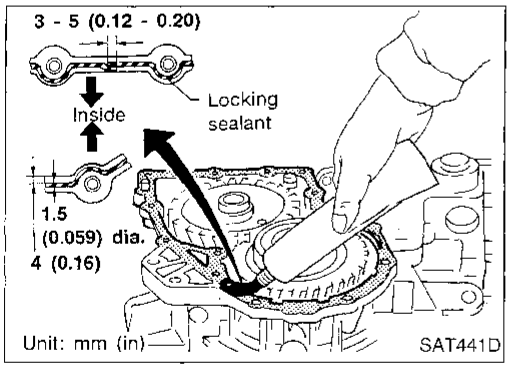



6. Select proper thickness of adjusting shim so that output shaft end play (clearance between side cover and output shaft bearing) is within specifications.

**Output shaft end play (A – B):**
**0 - 0.15 mm (0 - 0.0059 in)**

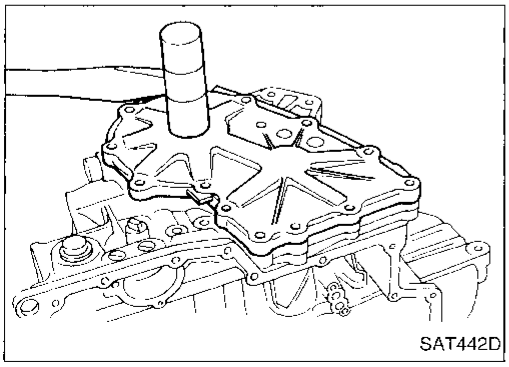
**Output shaft end play adjusting shim:**
**Refer to SDS, AT-243.**

7. Install adjusting shim on output shaft bearing.



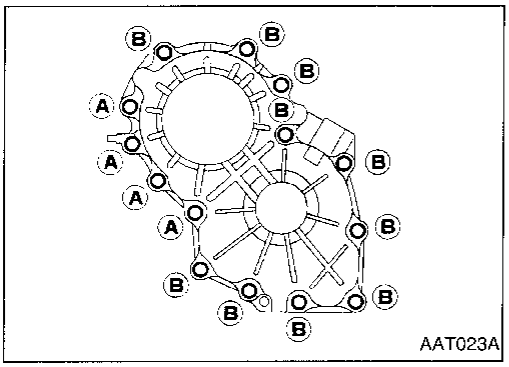

## Assembly 2

1. Apply locking sealant to transmission case as shown in illustration.



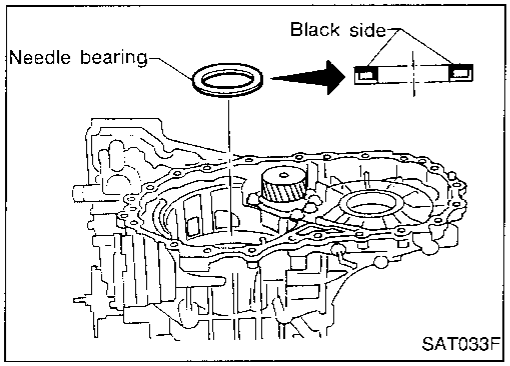

2. Set side cover on transmission case.

## Assembly 2 (Cont'd)



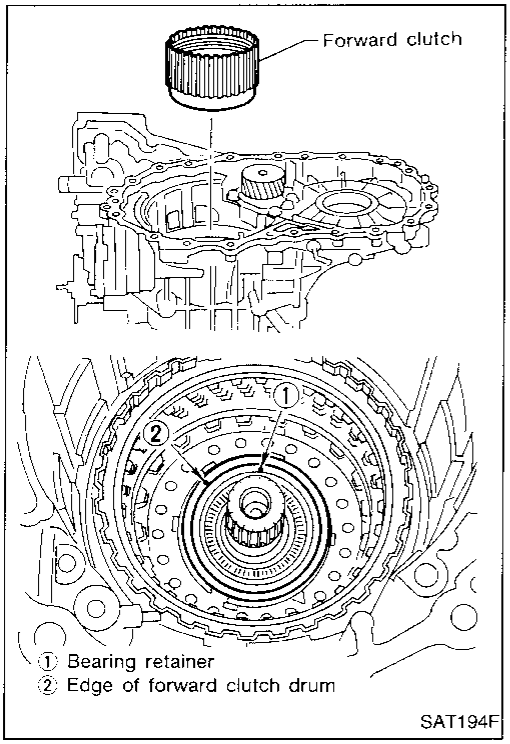

3. Tighten side cover fixing bolts to specified torque.

- **Do not mix bolts Ⓐ and Ⓑ.**
- **Always replace bolts Ⓐ as they are self-sealing bolts.**



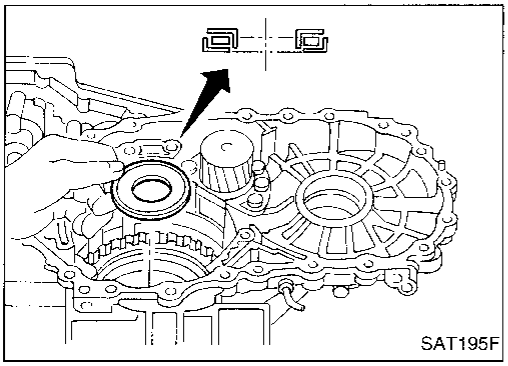

4. Remove paper rolled around bearing retainer.
5. Install thrust washer on bearing retainer.

- **Apply petroleum jelly to thrust washer.**




6. Install forward clutch assembly.

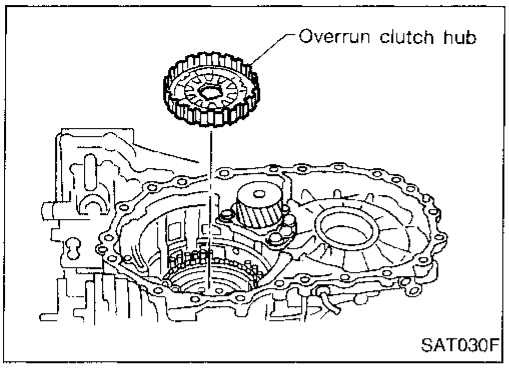
- **Align teeth of low & reverse brake drive plates before installing.**
- **Make sure that bearing retainer seal rings are not spread.**
- **If forward clutch assembly is correctly seated, points ① and ② are at almost same level.**



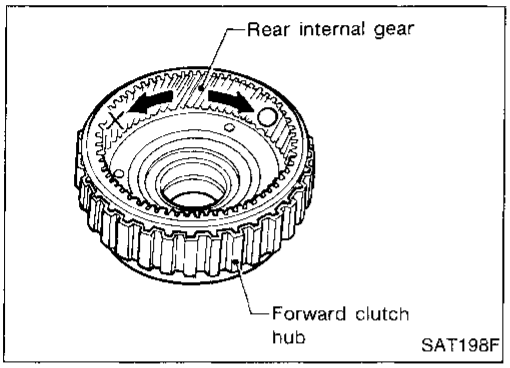

7. Install thrust needle bearing on bearing retainer.

- **Apply petroleum jelly to thrust needle bearing.**
- **Pay attention to direction of thrust needle bearing.**

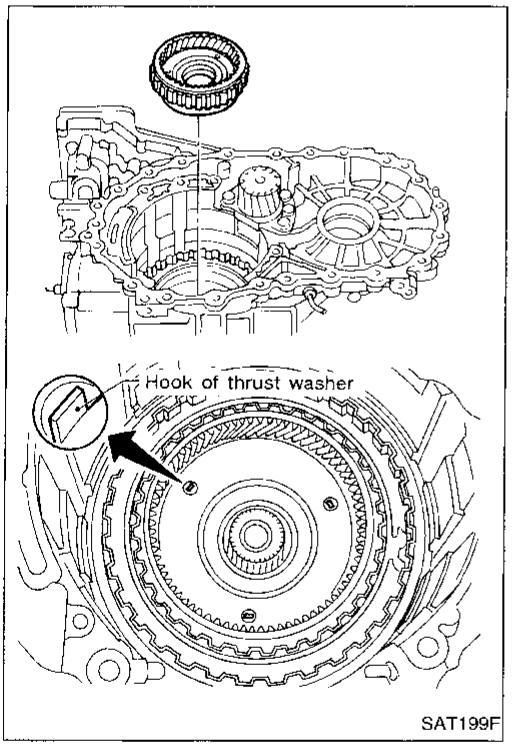
## Assembly 2 (Cont'd)



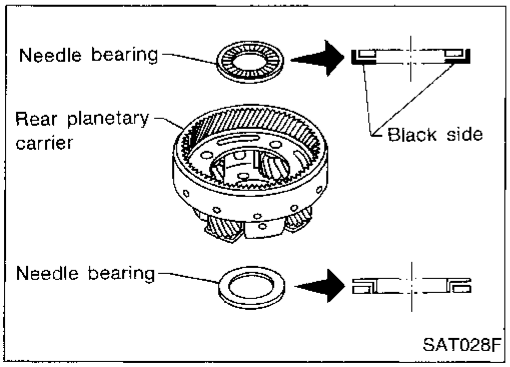

8. Install overrun clutch hub.
- **Apply petroleum jelly to thrust washers.**
- **Align teeth of overrun clutch drive plates before installing.**




9. Hold forward clutch hub and turn rear internal gear. Check overrun clutch hub for correct directions of lock and unlock.
- **If not shown as illustration, check installed direction of forward one-way clutch.**



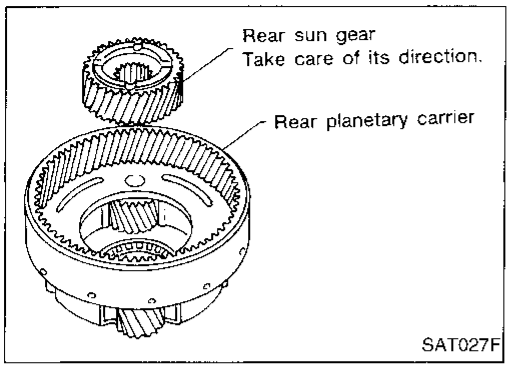

10. Install forward clutch hub and rear internal gear assembly.
- **Align teeth of forward clutch drive plates before installing.**
- **Check three hooks of thrust washer are correctly aligned after installing.**




11. Install rear planetary carrier assembly and rear sun gear according to the following procedures.

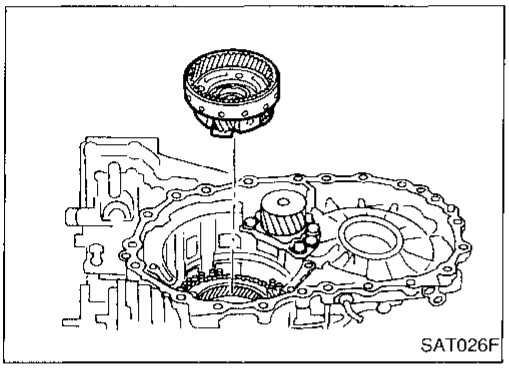
a. Install needle bearings on rear planetary carrier.
- **Apply petroleum jelly to needle bearings.**
- **Pay attention to direction of needle bearings.**

## Assembly 2 (Cont'd)

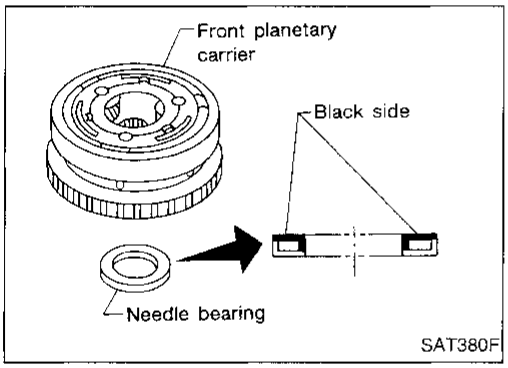



b. Install rear sun gear on rear planetary carrier.

- **Pay attention to direction of rear sun gear.**

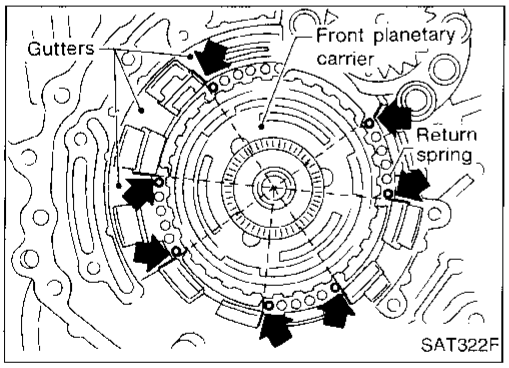



c. Install rear planetary carrier on transmission case.



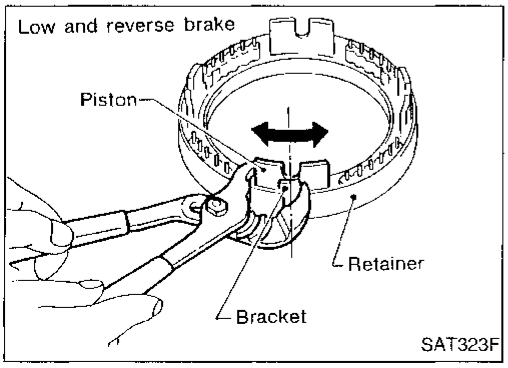

12. Install thrust needle bearing on front planetary carrier, then install them together on transmission case.

- **Apply petroleum jelly to thrust needle bearing.**
- **Pay attention to direction of thrust needle bearing.**



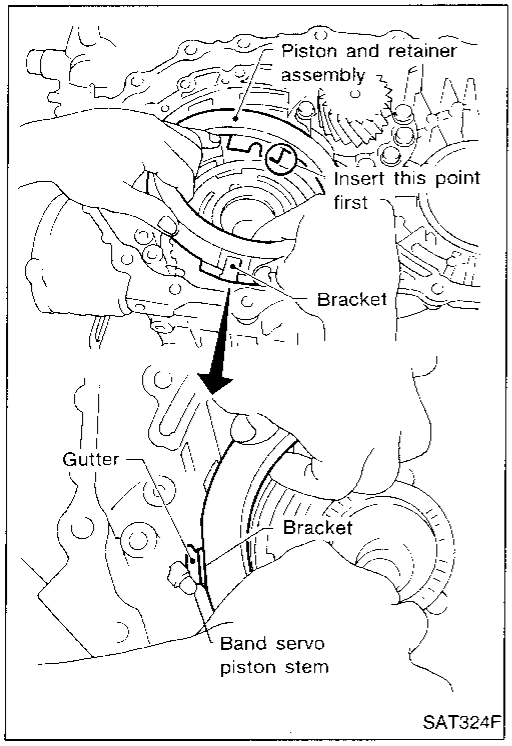

13. Install low and reverse brake piston according to the following procedures.

a. Set and align return springs to transmission case gutters as shown in illustration.



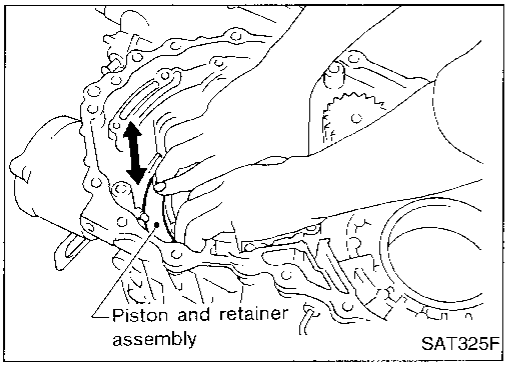

b. Set and align piston with retainer.

## Assembly 2 (Cont'd)



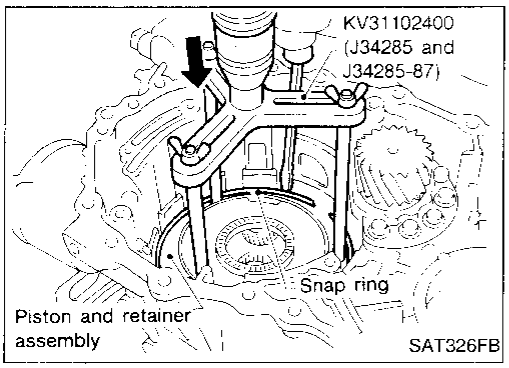

c. Install piston and retainer assembly on the transmission case.

- **Align bracket to specified gutter as indicated in illustration.**

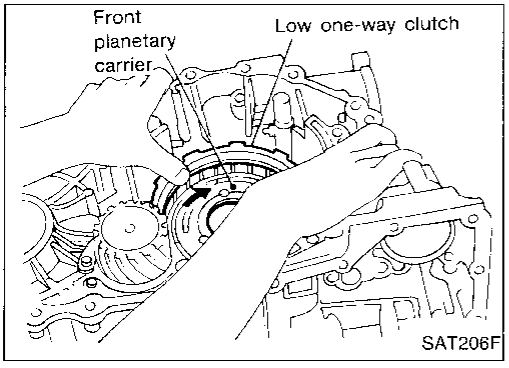



d. Check that each protrusion of piston is correctly set to corresponding return spring as follows.

**Push piston and retainer assembly evenly and confirm they move smoothly.**
**If they cannot move smoothly, remove piston and retainer assembly and align return spring correctly as instructed in step "a".**

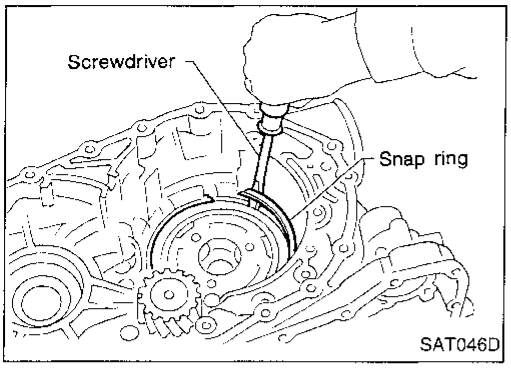



e. Push down piston and retainer assembly and install snap ring.

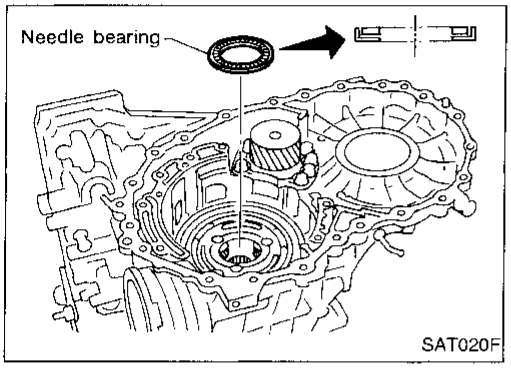



14. Install low one-way clutch to front planetary carrier by turning carrier in the direction of the arrow shown.

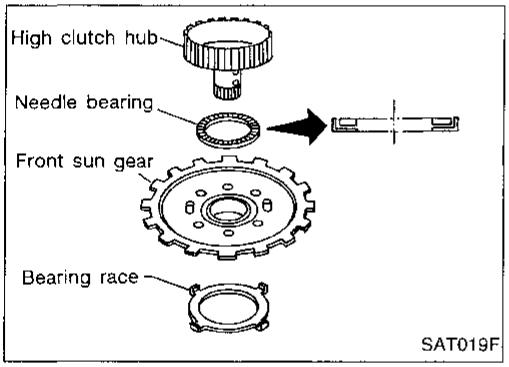
## Assembly 2 (Cont'd)



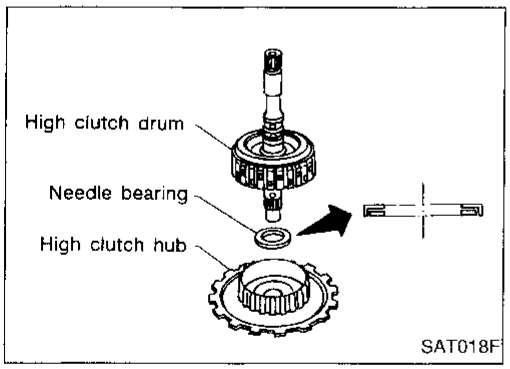

15. Install snap ring with screwdriver.
- **Forward clutch and bearing must be correctly installed for snap ring to fit groove of transmission case.**



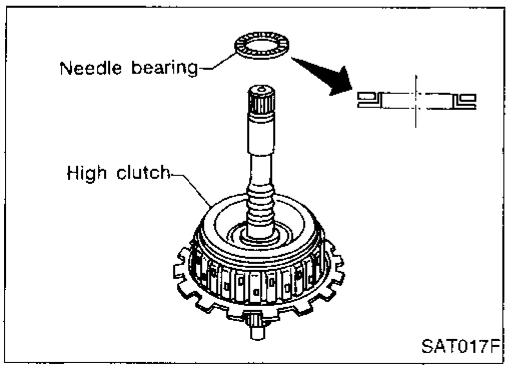

16. Install needle bearing on transmission case.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**




17. Install bearing race, needle bearing and high clutch hub on front sun gear.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**

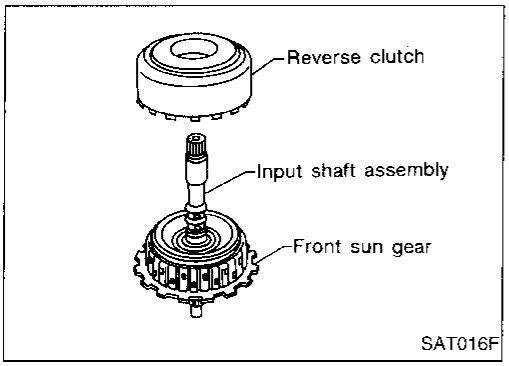



18. Install needle bearing and high clutch drum on high clutch hub.

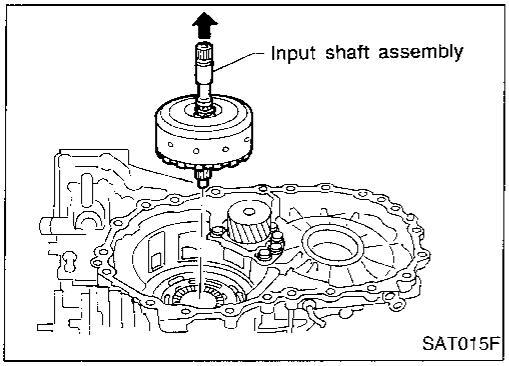



19. Install needle bearing on high clutch drum.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**

## Assembly 2 (Cont'd)




20. Remove paper rolled around input shaft.
21. Install input shaft assembly in reverse clutch.
- **Align teeth of reverse clutch drive plates before installing.**

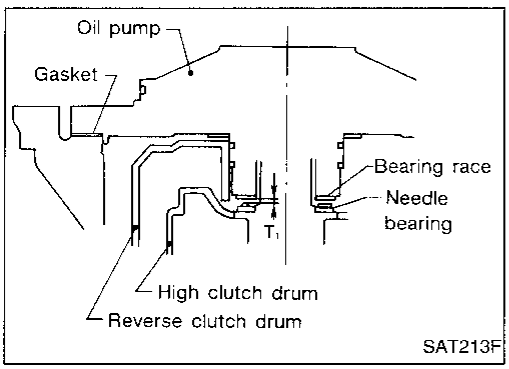



22. Install reverse clutch assembly on transmission case.
- **Align teeth of high clutch drive plates before installing.**

## Adjustment 2

When any parts listed below are replaced, adjust total end play and reverse clutch end play.

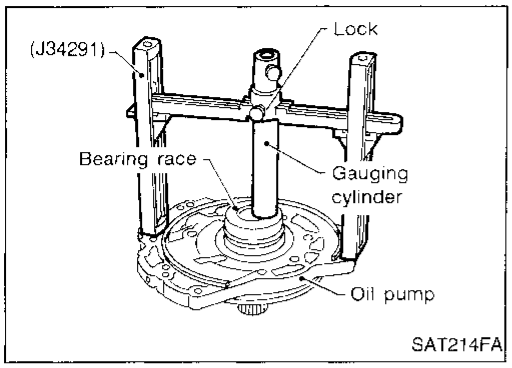
| Part name | Total end play | Reverse clutch end play |
|---|---|---|
| Transmission case | ● | ● |
| Overrun clutch hub | ● | ● |
| Rear internal gear | ● | ● |
| Rear planetary carrier | ● | ● |
| Rear sun gear | ● | ● |
| Front planetary carrier | ● | ● |
| Front sun gear | ● | ● |
| High clutch hub | ● | ● |
| High clutch drum | ● | ● |
| Oil pump cover | ● | ● |
| Reverse clutch drum | — | ● |



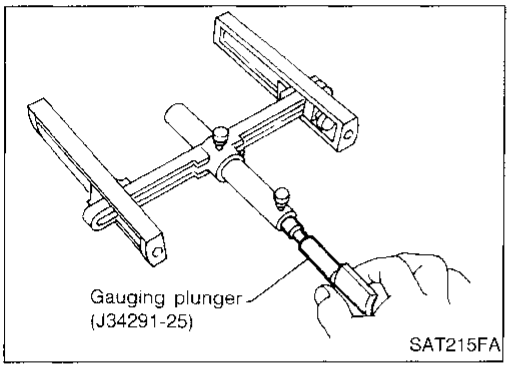

### TOTAL END PLAY

1. Adjust total end play "$T_1$".

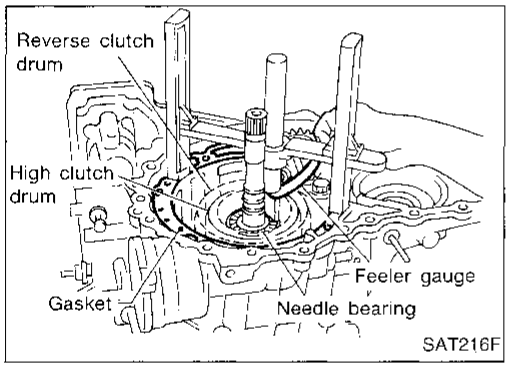
## Adjustment 2 (Cont'd)




a. With original bearing race installed, place Tool onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly. The gauging cylinder should rest on top of bearing race. Lock gauging cylinder in place with set screw.




b. Install gauging plunger into cylinder.




c. With needle bearing installed on high clutch drum, place Tool legs on machined surface of transmission case (with gasket). Then allow plunger to rest on needle bearing.

d. Measure gap between cylinder and plunger. This measurement should give exact total end play.

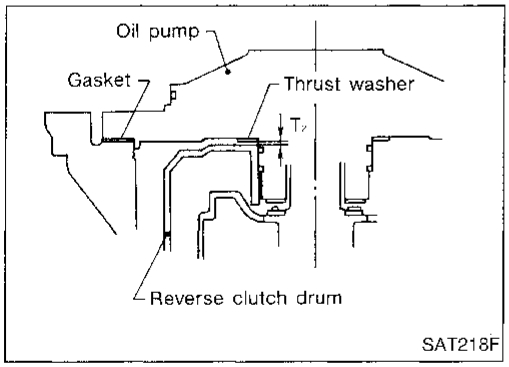
**Total end play "$T_1$":**

**0.25 - 0.55 mm (0.0098 - 0.0217 in)**

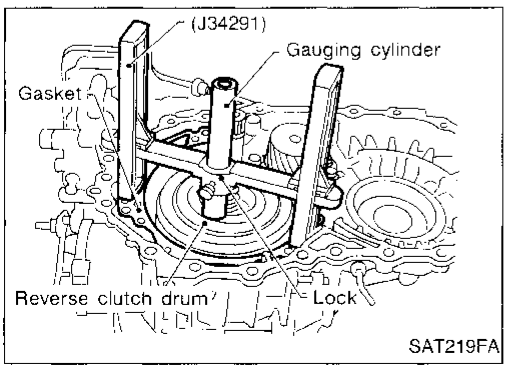
- If end play is out of specification, decrease or increase thickness of bearing race as necessary.

**Available bearing race:**

**Refer to SDS, AT-243.**

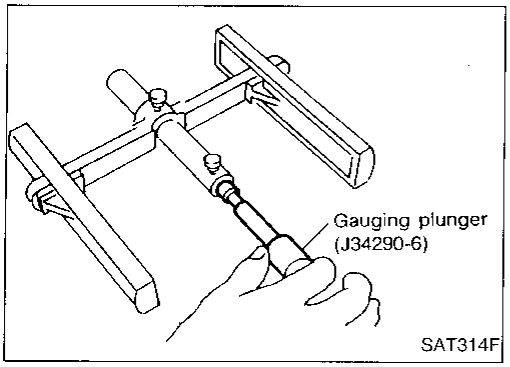



2. Adjust reverse clutch drum end play "$T_2$".




a. Place Tool on machined surface of transmission case (with gasket). Then allow gauging cylinder to rest on reverse clutch drum. Lock cylinder in place with set screw.

## Adjustment 2 (Cont'd)

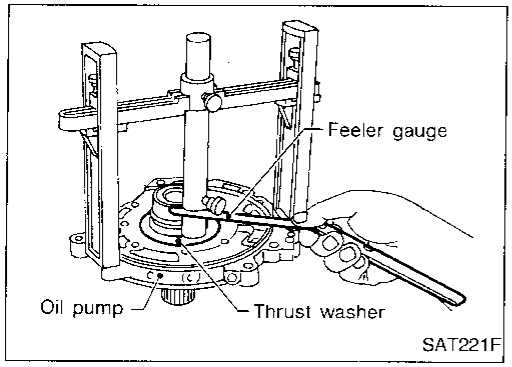



b. Install gauging plunger into cylinder.
c. With original thrust washer installed on oil pump, place Tool legs onto machined surface of oil pump assembly. Then allow plunger to rest on thrust washer.
d. Measure gap between cylinder and plunger with feeler gauge. This measurement should give exact reverse clutch drum end play.

**Reverse clutch drum end play "$T_2$":**
**0.55 - 0.90 mm (0.0217 - 0.0354 in)**

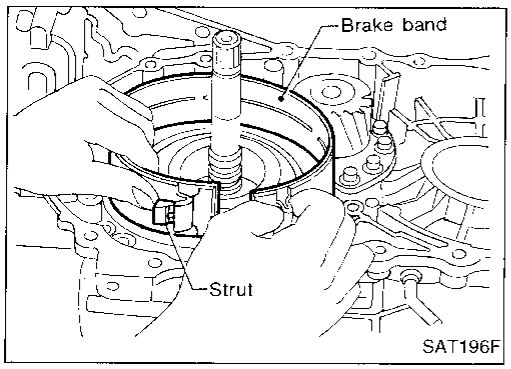
- If end play is out of specification, decrease or increase thickness of thrust washer as necessary.

**Available thrust washer:**
**Refer to SDS, AT-242.**




## Assembly 3

1. Install anchor end pin and lock nut on transmission case.
2. Place brake band on outside of reverse clutch drum. Tighten anchor end pin just enough so that brake band is evenly fitted on reverse clutch drum.

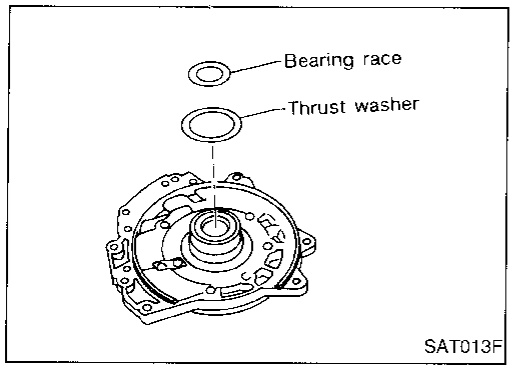



3. Place bearing race selected in total end play adjustment step on oil pump cover.

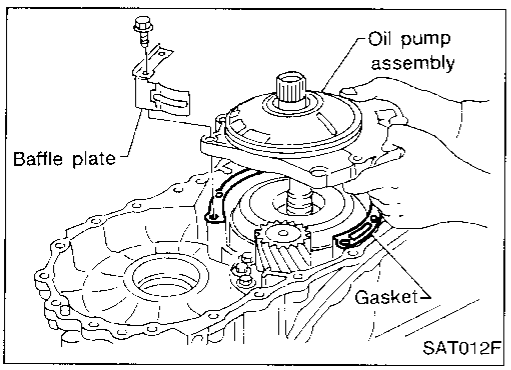
- **Apply petroleum jelly to bearing race.**

4. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.

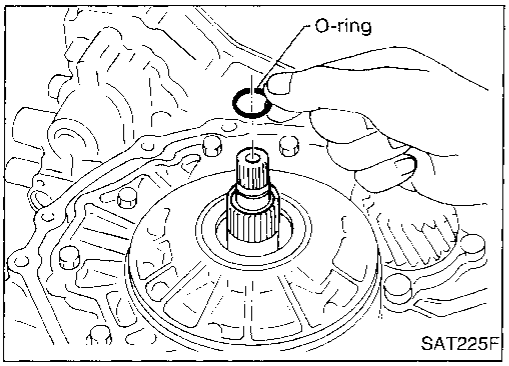
- **Apply petroleum jelly to thrust washer.**



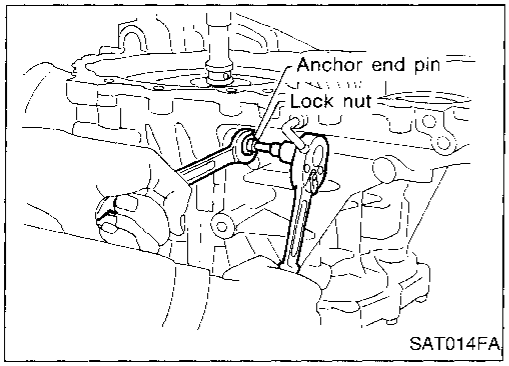

5. Install oil pump assembly, baffle plate and gasket on transmission case.
6. Tighten oil pump fixing bolts to the specified torque.



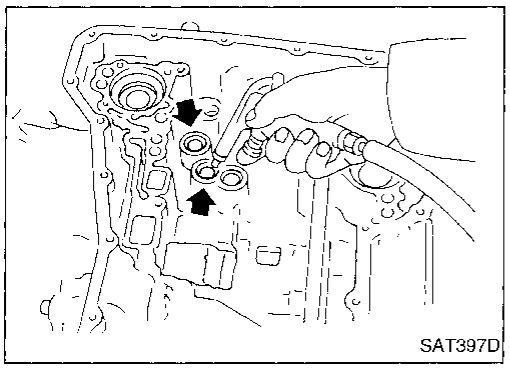
## Assembly 3 (Cont'd)



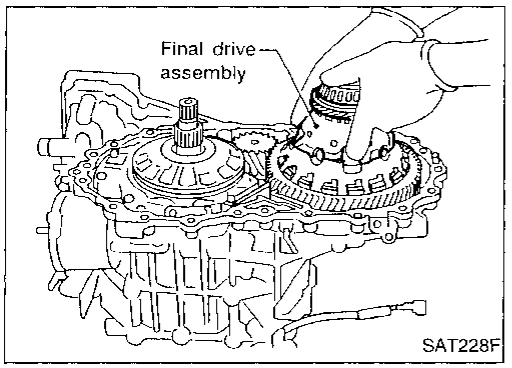

7. Install O-ring to input shaft.
- **Apply ATF to O-ring.**



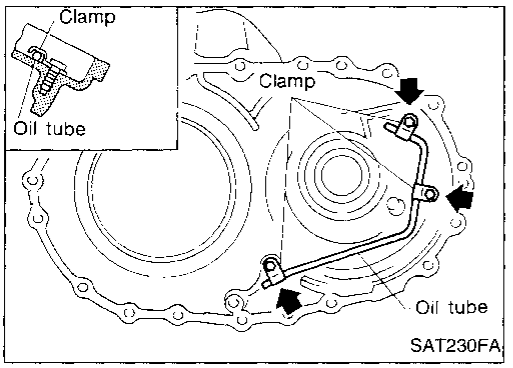

8. Adjust brake band.
a. Tighten anchor end pin to the specified torque.
   **Anchor end pin:**
   **: 3.9 - 5.9 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)**
b. Back off anchor end pin two and a half turns.
c. While holding anchor end pin, tighten lock nut
   **Lock nut:**
   **: 31 - 36 N·m (3.2 - 3.7 kg-m, 23 - 27 ft-lb)**




9. Apply compressed air to oil holes of transmission case and check operation of brake band.

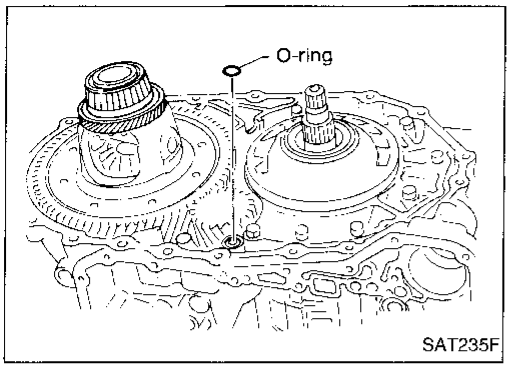



10. Install final drive assembly on transmission case.

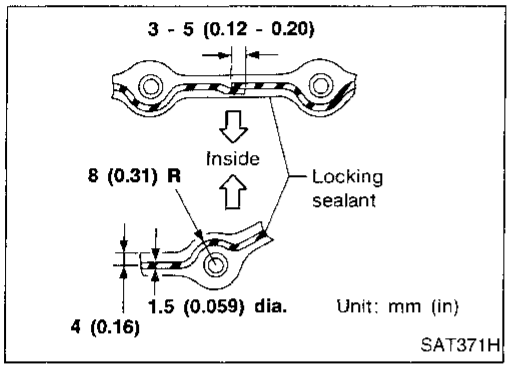



11. Install oil tube on converter housing.

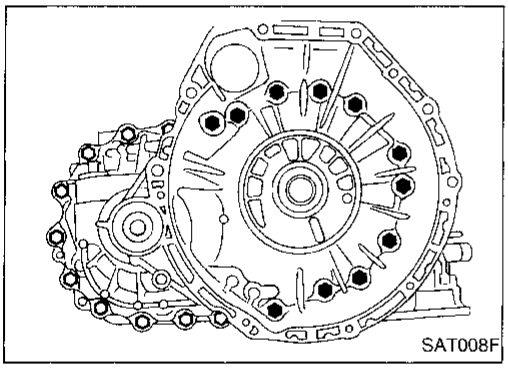
## Assembly 3 (Cont'd)

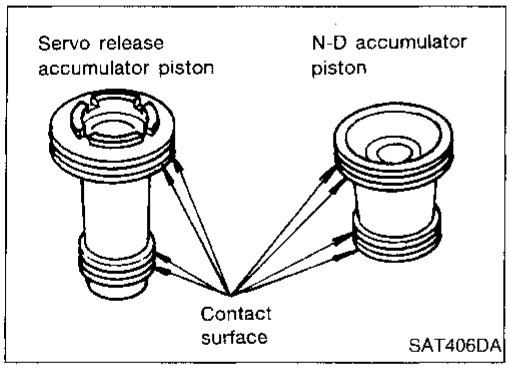



12. Install O-ring on differential oil port of transmission case.

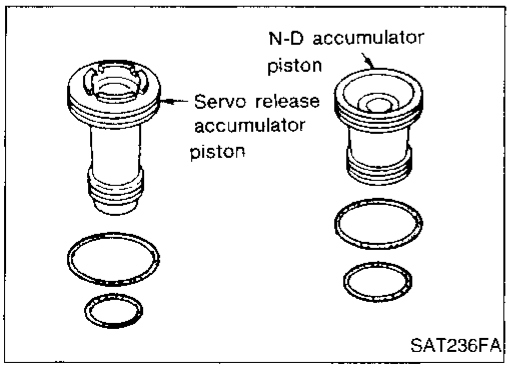



13. Install converter housing on transmission case.
- **Apply locking sealant to mating surface of converter housing.**



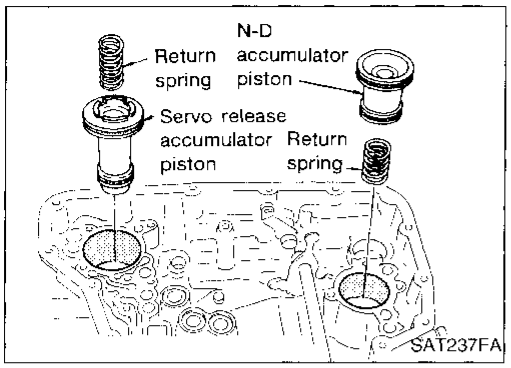




14. Install accumulator piston.
a. Check contact surface of accumulator piston for damage.




b. Install O-rings on accumulator piston.
- **Apply ATF to O-rings.**
  **Accumulator piston O-rings:**
  **Refer to SDS, AT-242.**

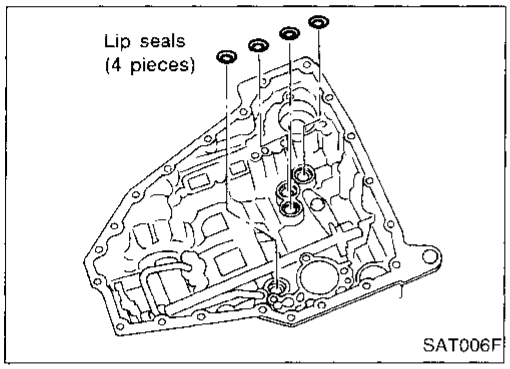
## Assembly 3 (Cont'd)




c. Install accumulator pistons and return springs on transmission case.

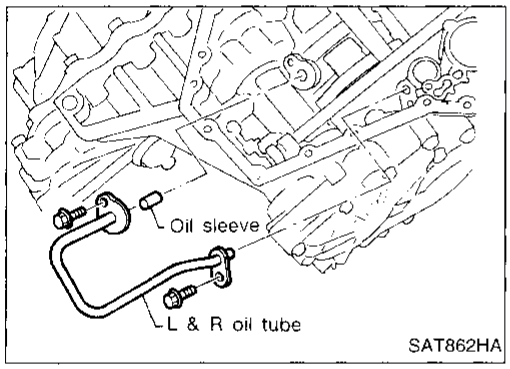
- **Apply ATF to inner surface of transmission case.**

**Return springs:**
**Refer to SDS, AT-242.**

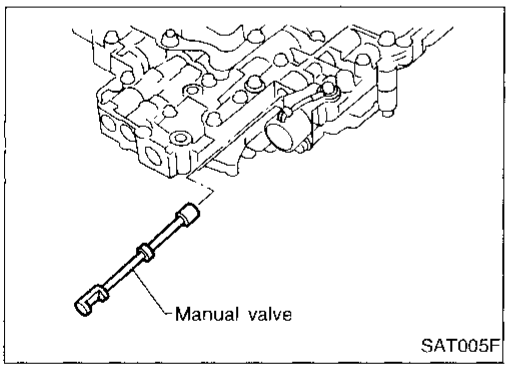



15. Install lip seals for band servo oil holes on transmission case.

- **Apply petroleum jelly to lip seals.**

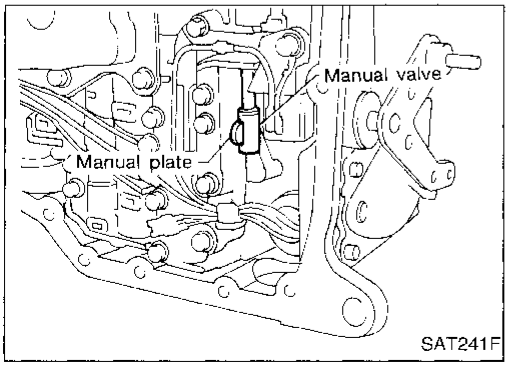



16. Install L & R oil tube and oil sleeve.



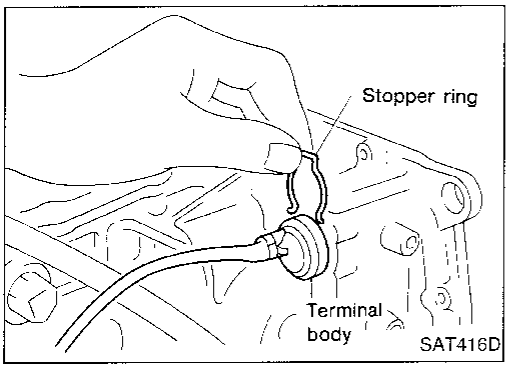

17. Install control valve assembly.
a. Insert manual valve into control valve assembly.

- **Apply ATF to manual valve.**

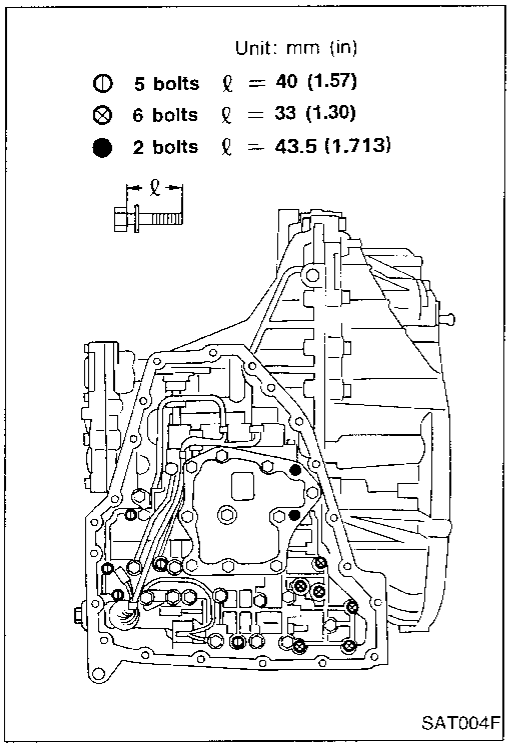



b. Set manual shaft in "N" position.
c. Install control valve assembly on transmission case while aligning manual valve with manual plate.

## Assembly 3 (Cont'd)



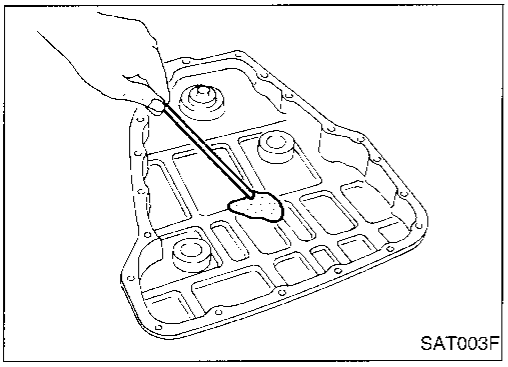

d. Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.
e. Install stopper ring to terminal body.




f. Tighten bolts ⊖, ⊗ and ●.

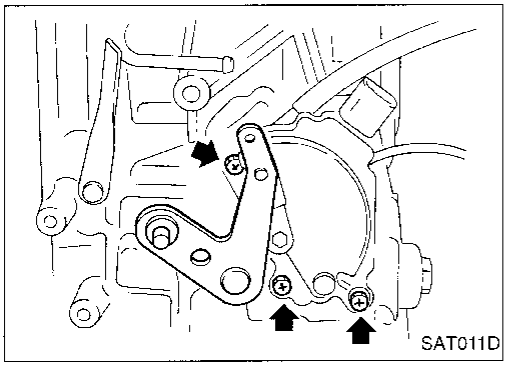
**Bolt length, number and location:**

| Bolt | ⊖ | ⊗ | ● |
|---|---|---|---|
| Bolt length "ℓ" mm (in) | 40.0 (1.575) | 33.0 (1.299) | 43.5 (1.713) |
| Number of bolts | 5 | 6 | 2 |



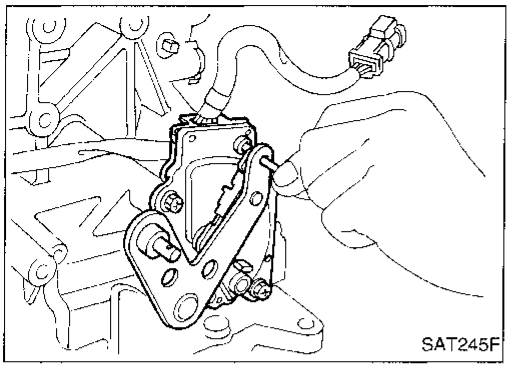

18. Install oil pan.
a. Attach a magnet to oil pan.
b. Install new oil pan gasket on transmission case.
c. Install oil pan on transmission case.
- **Always replace oil pan bolts. They are self-sealing bolts.**
- **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**

d. Tighten drain plug to the specified torque.

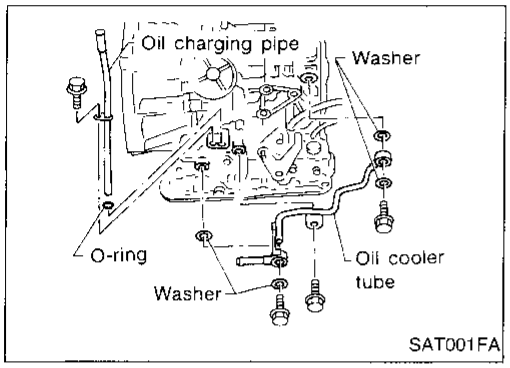



19. Install inhibitor switch.
a. Set manual shaft in "P" position.
b. Temporarily install inhibitor switch on manual shaft.
c. Move selector lever to "N" position.

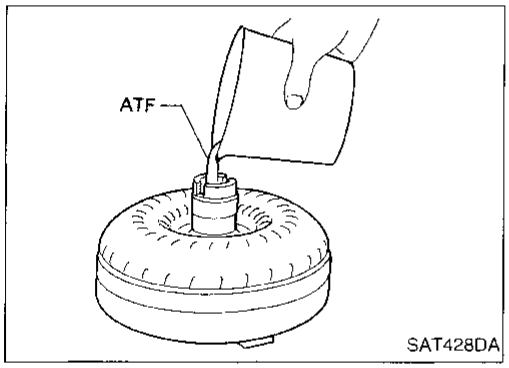
## Assembly 3 (Cont'd)




d. Use a 4 mm (0.16 in) pin for this adjustment.
1) Insert the pin straight into the manual shaft adjustment hole.
2) Rotate inhibitor switch until the pin can also be inserted straight into hole in inhibitor switch.
e. Tighten inhibitor switch fixing bolts.
f. Remove pin from adjustment hole after adjusting inhibitor switch.

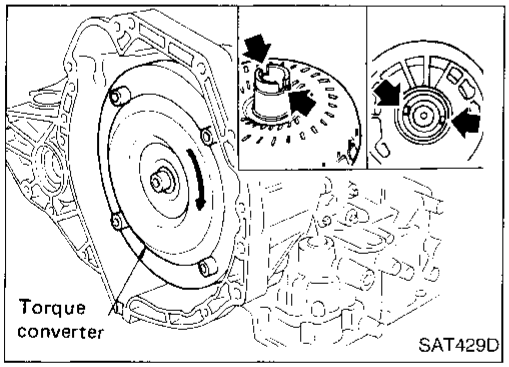



20. Install oil charging pipe and oil cooler tube to transmission case.

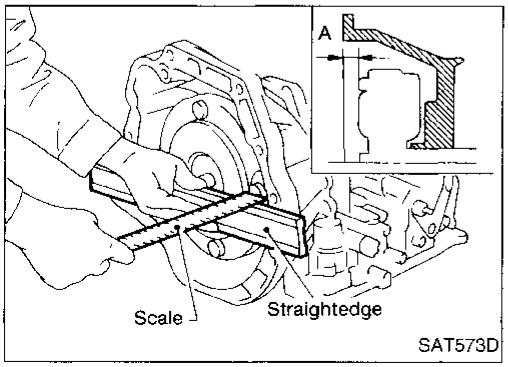



21. Install torque converter.
a. Pour ATF into torque converter.

- **Approximately 1 liter (1-1/8 US qt, 7/8 Imp qt) of fluid are required for a new torque converter.**
- **When reusing old torque converter, add the same amount of fluid as was drained.**




b. Install torque converter while aligning notches of torque converter with notches of oil pump.




c. Measure distance "A" to check that torque converter is in proper position.
**Distance "A": 14 mm (0.55 in) or more**

## General Specifications

| | |
|---|---|
| Engine | VG30E |
| Automatic transaxle model | RE4F04A |
| Automatic transaxle assembly | |
| Model code number | 80X62 |
| Transaxle gear ratio | |
| 1st | 2.785 |
| 2nd | 1.545 |
| 3rd | 1.000 |
| 4th | 0.694 |
| Reverse | 2.272 |
| Final drive | 3.861 |
| Recommended oil | Nissan Matic "D" (Continental U.S. and Alaska) or Genuine Nissan Automatic Transmission Fluid (Canada)*1 |
| Oil capacity ℓ (US qt, Imp qt) | 9.4 (10, 8-1/4) |

*1: Refer to MA section ("Fluids and Lubricants", "RECOMMENDED FLUIDS AND LUBRICANTS").

## Specifications and Adjustments

### VEHICLE SPEED WHEN SHIFTING GEARS

| Throttle position | Shift pattern | Vehicle speed km/h (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | $D_1 \rightarrow D_2$ | $D_2 \rightarrow D_3$ | $D_3 \rightarrow D_4$ | $D_4 \rightarrow D_3$ | $D_3 \rightarrow D_2$ | $D_2 \rightarrow D_1$ | $1_2 \rightarrow 1_1$ |
| Full throttle | Comfort | 56 - 64 (35 - 40) | 100 - 108 (62 - 67) | 166 - 174 (103 - 108) | 158 - 166 (98 - 103) | 90 - 98 (56 - 61) | 42 - 50 (26 - 31) | 42 - 50 (26 - 31) |
| Half throttle | Comfort | 36 - 44 (22 - 27) | 63 - 71 (39 - 44) | 101 - 109 (63 - 69) | 65 - 73 (40 - 45) | 36 - 44 (22 - 27) | 8 - 16 (5 - 10) | 42 - 50 (26 - 31) |

### VEHICLE SPEED WHEN PERFORMING LOCK-UP

| Throttle position | Shift pattern | OD switch | Gear position | Vehicle speed km/h (MPH) | |
|---|---|---|---|---|---|
| | | | | Lock-up ON | Lock-up OFF |
| 2/8 | Comfort | ON | $D_4$ | 66 - 74 (41 - 46) | 63 - 71 (39 - 44) |
| | | OFF | $D_3$ | 86 - 94 (53 - 58) | 83 - 91 (52 - 57) |

### STALL REVOLUTION

| Engine | Stall revolution rpm |
|---|---|
| VG30E | 1,800 - 2,100 |

### LINE PRESSURE

| Engine speed rpm | Line pressure kPa (kg/cm², psi) | |
|---|---|---|
| | D, 2 and 1 positions | R position |
| Idle | 726 (7.4, 105) | 1,138 (11.6, 165) |
| Stall | 1,236 (12.6, 179) | 1,922 (19.6, 279) |

## Specifications and Adjustments (Cont'd)

## CONTROL VALVES

### Control valve and plug return springs

Unit: mm (in)

| Parts | | | Item | | |
|---|---|---|---|---|---|
| | | | Part No. | Free length | Outer diameter |
| Upper body | ⑱ | Pilot valve spring | 31742-80X14 | 36.0 (1.417) | 8.1 (0.319) |
| | ④ | 1-2 accumulator valve spring | 31742-80X10 | 20.5 (0.807) | 7.0 (0.276) |
| | ㉑ | 1-2 accumulator piston spring | 31742-80X19 | 49.3 (1.941) | 19.6 (0.772) |
| | ㉕ | 1st reducing valve spring | 31742-80X05 | 27.0 (1.063) | 7.0 (0.276) |
| | ㉚ | 2-3 timing valve spring | 31742-80X18 | 30.5 (1.201) | 6.6 (0.260) |
| | ⑯ | Overrun clutch reducing valve spring | 31742-80X15 | 37.5 (1.476) | 6.9 (0.272) |
| | ⑪ | Torque converter relief valve spring | 31742-80X07 | 31.0 (1.220) | 9.0 (0.354) |
| | ⑧ | Torque converter clutch control valve | 31742-80X17 | 39.5 (1.555) | 11.0 (0.433) |
| Lower body | ⑯ | Pressure regulator valve spring | 31742-80X13 | 45.0 (1.772) | 15.0 (0.591) |
| | ㉑ | Overrun clutch control valve spring | 31762-80X00 | 21.7 (0.854) | 7.0 (0.276) |
| | ㉕ | Accumulator control valve spring | 31742-80X02 | 22.0 (0.866) | 6.5 (0.256) |
| | ㉚ | Shift valve A spring | 31762-80X00 | 21.7 (0.854) | 7.0 (0.276) |
| | ② | Shift valve B spring | 31762-80X00 | 21.7 (0.854) | 7.0 (0.276) |
| | ⑦ | Pressure modifier valve spring | 31742-41X15 | 30.5 (1.201) | 9.8 (0.386) |
| | ⑪ | | 31742-80X16 | 32.0 (1.260) | 6.9 (0.272) |
| | ㉜ | Plug spring | 31742-80X11 | 17.0 (0.669) | 10.7 (0.421) |

## Specifications and Adjustments (Cont'd)

## CLUTCHES AND BRAKES

**Reverse clutch**

| | |
|---|---|
| Number of drive plates | 2 |
| Number of driven plates | 2 |
| Drive plate thickness mm (in) | |
| Standard | 1.6 (0.063) |
| Allowable limit | 1.4 (0.055) |
| Clearance mm (in) | |
| Standard | 0.5 - 0.8 (0.020 - 0.031) |
| Allowable limit | 1.2 (0.047) |

| Thickness of retaining plates | Thickness mm (in) | Part number |
|---|---|---|
| | 6.6 (0.260) | 31537-80X05 |
| | 6.8 (0.268) | 31537-80X06 |
| | 7.0 (0.276) | 31537-80X07 |
| | 7.2 (0.283) | 31537-80X08 |
| | 7.4 (0.291) | 31537-80X09 |
| | 7.6 (0.299) | 31537-80X20 |
| | 7.8 (0.307) | 31537-80X21 |

**High clutch**

| | |
|---|---|
| Number of drive plates | 4 |
| Number of driven plates | 6 + 1 |
| Drive plate thickness mm (in) | |
| Standard | 1.6 (0.063) |
| Allowable limit | 1.4 (0.055) |
| Clearance mm (in) | |
| Standard | 1.8 - 2.2 (0.071 - 0.087) |
| Allowable limit | 3.0 (0.118) |

| Thickness of retaining plates | Thickness mm (in) | Part number |
|---|---|---|
| | 3.0 (0.118) | 31537-81X10 |
| | 3.2 (0.126) | 31537-81X11 |
| | 3.4 (0.134) | 31537-81X12 |
| | 3.6 (0.142) | 31537-81X13 |
| | 3.8 (0.150) | 31537-81X14 |

**Forward clutch**

| | |
|---|---|
| Number of drive plates | 5 |
| Number of driven plates | 5 |
| Drive plate thickness mm (in) | |
| Standard | 1.6 (0.063) |
| Allowable limit | 1.4 (0.055) |
| Clearance mm (in) | |
| Standard | 0.45 - 0.85 (0.0177 - 0.0335) |
| Allowable limit | 1.85 (0.0728) |

| Thickness of retaining plates | Thickness mm (in) | Part number |
|---|---|---|
| | 3.2 (0.126) | 31537-80X76 |
| | 3.4 (0.134) | 31537-80X75 |
| | 3.6 (0.142) | 31537-80X70 |
| | 3.8 (0.150) | 31537-80X71 |
| | 4.0 (0.157) | 31537-80X72 |
| | 4.2 (0.165) | 31537-80X73 |
| | 4.4 (0.173) | 31537-80X74 |

**Overrun clutch**

| | |
|---|---|
| Number of drive plates | 3 |
| Number of driven plates | 5 |
| Drive plate thickness mm (in) | |
| Standard | 1.6 (0.063) |
| Allowable limit | 1.4 (0.055) |
| Clearance mm (in) | |
| Standard | 0.7 - 1.1 (0.028 - 0.043) |
| Allowable limit | 1.7 (0.067) |

| Thickness of retaining plates | Thickness mm (in) | Part number |
|---|---|---|
| | 3.0 (0.118) | 31537-80X65 |
| | 3.2 (0.126) | 31537-80X66 |
| | 3.4 (0.134) | 31537-80X67 |
| | 3.6 (0.142) | 31537-80X68 |
| | 3.8 (0.150) | 31537-80X69 |

## Specifications and Adjustments (Cont'd)

| | | | |
|---|---|---|---|
| Low & reverse brake | | | |
| Number of drive plates | | 6 | |
| Number of driven plates | | 6 | |
| Drive plate thickness mm (in) | | | |
| | Standard | 1.8 (0.071) | |
| | Allowable limit | 1.6 (0.063) | |
| Clearance mm (in) | | | |
| | Standard | 1.7 - 2.1 (0.067 - 0.083) | |
| | Allowable limit | 3.3 (0.130) | |
| Thickness of retaining plates | | Thickness mm (in) | Part number |
| | | 2.0 (0.079) | 31667-80X00 |
| | | 2.2 (0.087) | 31667-80X01 |
| | | 2.4 (0.094) | 31667-80X02 |
| | | 2.6 (0.102) | 31667-80X03 |
| | | 2.8 (0.110) | 31667-80X04 |
| | | 3.0 (0.118) | 31667-80X05 |
| | | 3.2 (0.126) | 31667-80X06 |
| | | 3.4 (0.134) | 31667-80X07 |
| | | 5.4 (0.213) | 31677-80X08 |
| Brake band | | | |
| Anchor end pin tightening torque N·m (kg-m, in-lb) | | 3.9 - 5.9 (0.4 - 0.6, 35 - 52) | |
| Number of returning revolutions for anchor end pin | | 2.5 | |
| Lock nut tightening torque N·m (kg-m, ft-lb) | | 31 - 36 (3.2 - 3.7, 23 - 27) | |

## FINAL DRIVE

### Differential side gear clearance

| | |
|---|---|
| Clearance between side gear and differential case with washer mm (in) | 0.1 - 0.2 (0.004 - 0.008) |

### Differential side gear thrust washers

| Thickness mm (in) | Part number |
|---|---|
| 0.75 (0.0295) | 38424-81X00 |
| 0.80 (0.0315) | 38424-81X01 |
| 0.85 (0.0335) | 38424-81X02 |
| 0.90 (0.0354) | 38424-81X03 |
| 0.95 (0.0374) | 38424-81X04 |

### Differential side bearing preload adjusting shims

| Thickness mm (in) | Part number |
|---|---|
| 0.48 (0.0189) | 31438-80X00 |
| 0.52 (0.0205) | 31438-80X01 |
| 0.56 (0.0220) | 31438-80X02 |
| 0.60 (0.0236) | 31438-80X03 |
| 0.64 (0.0252) | 31438-80X04 |
| 0.68 (0.0268) | 31438-80X05 |
| 0.72 (0.0283) | 31438-80X06 |
| 0.76 (0.0299) | 31438-80X07 |
| 0.80 (0.0315) | 31438-80X08 |
| 0.84 (0.0331) | 31438-80X09 |
| 0.88 (0.0346) | 31438-80X10 |
| 0.92 (0.0362) | 31438-80X11 |

### Bearing preload

| | |
|---|---|
| Differential side bearing preload mm (in) | 0.05 - 0.09 (0.0020 - 0.0035) |

### Turning torque

| | |
|---|---|
| Turning torque of final drive assembly N·m (kg-cm, in-lb) | 0.78 - 1.37 (8.0 - 14.0, 6.9 - 12.2) |

### Clutch and brake return springs

Unit: mm (in)

| Parts | Free length | Outer diameter |
|---|---|---|
| Forward clutch (Overrun clutch) (22 pcs) | 21.4 (0.843) | 10.3 (0.406) |
| High clutch (12 pcs) | 22.5 (0.886) | 10.8 (0.425) |
| Low & reverse brake (24 pcs) | 24.1 (0.949) | 6.6 (0.260) |

## PLANETARY CARRIER AND OIL PUMP

**Planetary carrier**

Clearance between planetary carrier and pinion washer mm (in)

| | |
|---|---|
| Standard | 0.20 - 0.70 (0.0079 - 0.0276) |
| Allowable limit | 0.80 (0.0315) |

**Oil pump**

Oil pump side clearance mm (in): 0.030 - 0.050 (0.0012 - 0.0020)

Thickness of inner gears and outer gears

| Inner gear | |
|---|---|
| Thickness mm (in) | Part number |
| 11.99 - 12.0 (0.4720 - 0.4724) | 31346-80X00 |
| 11.98 - 11.99 (0.4717 - 0.4720) | 31346-80X01 |
| 11.97 - 11.98 (0.4713 - 0.4717) | 31346-80X02 |

| Outer gear | |
|---|---|
| Thickness mm (in) | Part number |
| 11.99 - 12.0 (0.4720 - 0.4724) | 31347-80X00 |
| 11.98 - 11.99 (0.4717 - 0.4720) | 31347-80X01 |
| 11.97 - 11.98 (0.4713 - 0.4717) | 31347-80X02 |

Clearance between oil pump housing and outer gear mm (in)

| | |
|---|---|
| Standard | 0.111 - 0.181 (0.0044 - 0.0071) |
| Allowable limit | 0.181 (0.0071) |

Oil pump cover seal ring clearance mm (in)

| | |
|---|---|
| Standard | 0.1 - 0.25 (0.0039 - 0.0098) |
| Allowable limit | 0.25 (0.0098) |

## INPUT SHAFT

Input shaft seal ring clearance mm (in)

| | |
|---|---|
| Standard | 0.08 - 0.23 (0.0031 - 0.0091) |
| Allowable limit | 0.23 (0.0091) |

## REDUCTION PINION GEAR

### Turning torque

| | |
|---|---|
| Turning torque of reduction pinion gear N·m (kg-cm, in-lb) | 0.05 - 0.39 (0.5 - 4.0, 0.43 - 3.47) |

## Reduction pinion gear bearing adjusting shims

| Thickness mm (in) | Part number |
|---|---|
| 5.10 (0.2008) | 31439-81X05 |
| 5.12 (0.2016) | 31439-81X06 |
| 5.14 (0.2024) | 31439-81X07 |
| 5.16 (0.2031) | 31439-81X08 |
| 5.18 (0.2039) | 31439-81X09 |
| 5.20 (0.2047) | 31439-81X10 |
| 5.22 (0.2055) | 31439-81X11 |
| 5.24 (0.2063) | 31439-81X12 |
| 5.26 (0.2071) | 31439-81X13 |
| 5.28 (0.2079) | 31439-81X14 |
| 5.30 (0.2087) | 31439-81X15 |
| 5.32 (0.2094) | 31439-81X16 |
| 5.34 (0.2102) | 31439-81X17 |
| 5.36 (0.2110) | 31439-81X18 |
| 5.38 (0.2118) | 31439-81X19 |
| 5.40 (0.2126) | 31439-81X20 |
| 5.42 (0.2134) | 31439-81X21 |
| 5.44 (0.2142) | 31439-81X22 |
| 5.46 (0.2150) | 31439-81X23 |
| 5.48 (0.2157) | 31439-81X24 |
| 5.50 (0.2165) | 31439-81X46 |
| 5.52 (0.2173) | 31439-81X47 |
| 5.54 (0.2181) | 31439-81X48 |
| 5.56 (0.2189) | 31439-81X49 |
| 5.58 (0.2197) | 31439-81X60 |
| 5.60 (0.2205) | 31439-81X61 |
| 5.62 (0.2213) | 31439-81X62 |
| 5.64 (0.2220) | 31439-81X63 |
| 5.66 (0.2228) | 31439-81X64 |
| 5.68 (0.2236) | 31439-81X65 |
| 5.70 (0.2244) | 31439-81X66 |
| 5.72 (0.2252) | 31439-81X67 |
| 5.74 (0.2260) | 31439-81X68 |
| 5.76 (0.2268) | 31439-81X69 |
| 5.78 (0.2276) | 31439-81X70 |
| 5.80 (0.2283) | 31439-81X71 |
| 5.82 (0.2291) | 31439-81X72 |
| 5.84 (0.2299) | 31439-81X73 |
| 5.86 (0.2307) | 31439-81X74 |
| 5.88 (0.2315) | 31439-81X75 |
| 5.90 (0.2323) | 31439-81X76 |
| 5.92 (0.2331) | 31439-81X77 |
| 5.94 (0.2339) | 31439-81X78 |
| 5.96 (0.2346) | 31439-81X79 |
| 5.98 (0.2354) | 31439-81X80 |
| 6.00 (0.2362) | 31439-81X81 |
| 6.02 (0.2370) | 31439-81X82 |
| 6.04 (0.2378) | 31439-81X83 |
| 6.06 (0.2386) | 31439-81X84 |
| 6.08 (0.2394) | 31439-82X00 |
| 6.10 (0.2402) | 31439-82X01 |
| 6.12 (0.2409) | 31439-82X02 |
| 6.14 (0.2417) | 31439-82X03 |
| 6.16 (0.2425) | 31439-82X04 |
| 6.18 (0.2433) | 31439-82X05 |
| 6.20 (0.2441) | 31439-82X06 |
| 6.22 (0.2449) | 31439-82X07 |
| 6.24 (0.2457) | 31439-82X08 |
| 6.26 (0.2465) | 31439-82X09 |
| 6.28 (0.2472) | 31439-82X10 |

## REVERSE CLUTCH END PLAY

| | |
|---|---|
| Reverse clutch end play mm (in) | 0.55 - 0.90 (0.0217 - 0.0354) |

## Thrust washers for adjusting reverse clutch drum end play

| Thickness mm (in) | Part number |
|---|---|
| 0.80 (0.0315) | 31508-80X13 |
| 0.95 (0.0374) | 31508-80X14 |
| 1.10 (0.0433) | 31508-80X15 |
| 1.25 (0.0492) | 31508-80X16 |
| 1.40 (0.0551) | 31508-80X17 |
| 1.55 (0.0610) | 31508-80X18 |
| 1.70 (0.0669) | 31508-80X19 |
| 1.85 (0.0728) | 31508-80X20 |

## ACCUMULATOR

### O-ring

Unit: mm (in)

| Accumulator | Inner diameter (Small) | Inner diameter (Large) |
|---|---|---|
| Servo release accumulator | 26.9 (1.059) | 44.2 (1.740) |
| N-D accumulator | 34.6 (1.362) | 39.4 (1.551) |

### Return spring

Unit: mm (in)

| Accumulator | Free length | Outer diameter |
|---|---|---|
| Servo release accumulator | 52.5 (2.067) | 20.4 (0.803) |
| N-D accumulator | 43.5 (1.713) | 27.0 (1.063) |

## BAND SERVO

### Return spring

Unit: mm (in)

| Return spring | Free length | Outer diameter |
|---|---|---|
| 2nd servo return spring | 32.5 (1.280) | 25.9 (1.020) |
| OD servo return spring | 31.0 (1.220) | 21.7 (0.854) |

## Specifications and Adjustments (Cont'd)

### REMOVAL AND INSTALLATION

Unit: mm (in)

| | |
|---|---|
| Distance between end of converter housing and torque converter | 14 (0.55) |

### OUTPUT SHAFT

#### Seal ring clearance

| | |
|---|---|
| Output shaft seal ring clearance mm (in) | |
| Standard | 0.10 - 0.25 (0.0039 - 0.0098) |
| Allowable limit | 0.25 (0.0098) |

#### End play

| | |
|---|---|
| Output shaft end play mm (in) | 0 - 0.15 (0 - 0.0059) |

#### Output shaft adjusting shims

| Thickness mm (in) | Part number |
|---|---|
| 0.80 (0.0315) | 31438-80X60 |
| 0.84 (0.0331) | 31438-80X61 |
| 0.88 (0.0346) | 31438-80X62 |
| 0.92 (0.0362) | 31438-80X63 |
| 0.96 (0.0378) | 31438-80X64 |
| 1.00 (0.0394) | 31438-80X65 |
| 1.04 (0.0409) | 31438-80X66 |
| 1.08 (0.0425) | 31438-80X67 |
| 1.12 (0.0441) | 31438-80X68 |
| 1.16 (0.0457) | 31438-80X69 |
| 1.20 (0.0472) | 31438-80X70 |

### BEARING RETAINER

#### Seal ring clearance

| | |
|---|---|
| Bearing retainer seal ring clearance mm (in) | |
| Standard | 0.10 - 0.30 (0.0039 - 0.0118) |
| Allowable limit | 0.30 (0.0118) |

### TOTAL END PLAY

| | |
|---|---|
| Total end play mm (in) | 0.25 - 0.55 (0.0098 - 0.0217) |

#### Bearing race for adjusting total end play

| Thickness mm (in) | Part number |
|---|---|
| 0.8 (0.031) | 31435-80X00 |
| 1.0 (0.039) | 31435-80X01 |
| 1.2 (0.047) | 31435-80X02 |
| 1.4 (0.055) | 31435-80X03 |
| 1.6 (0.063) | 31435-80X04 |
| 1.8 (0.071) | 31435-80X05 |
| 2.0 (0.079) | 31435-80X06 |
| 0.9 (0.035) | 31435-80X09 |
| 1.1 (0.043) | 31435-80X10 |
| 1.3 (0.051) | 31435-80X11 |
| 1.5 (0.059) | 31435-80X12 |
| 1.7 (0.067) | 31435-80X13 |
| 1.9 (0.075) | 31435-80X14 |