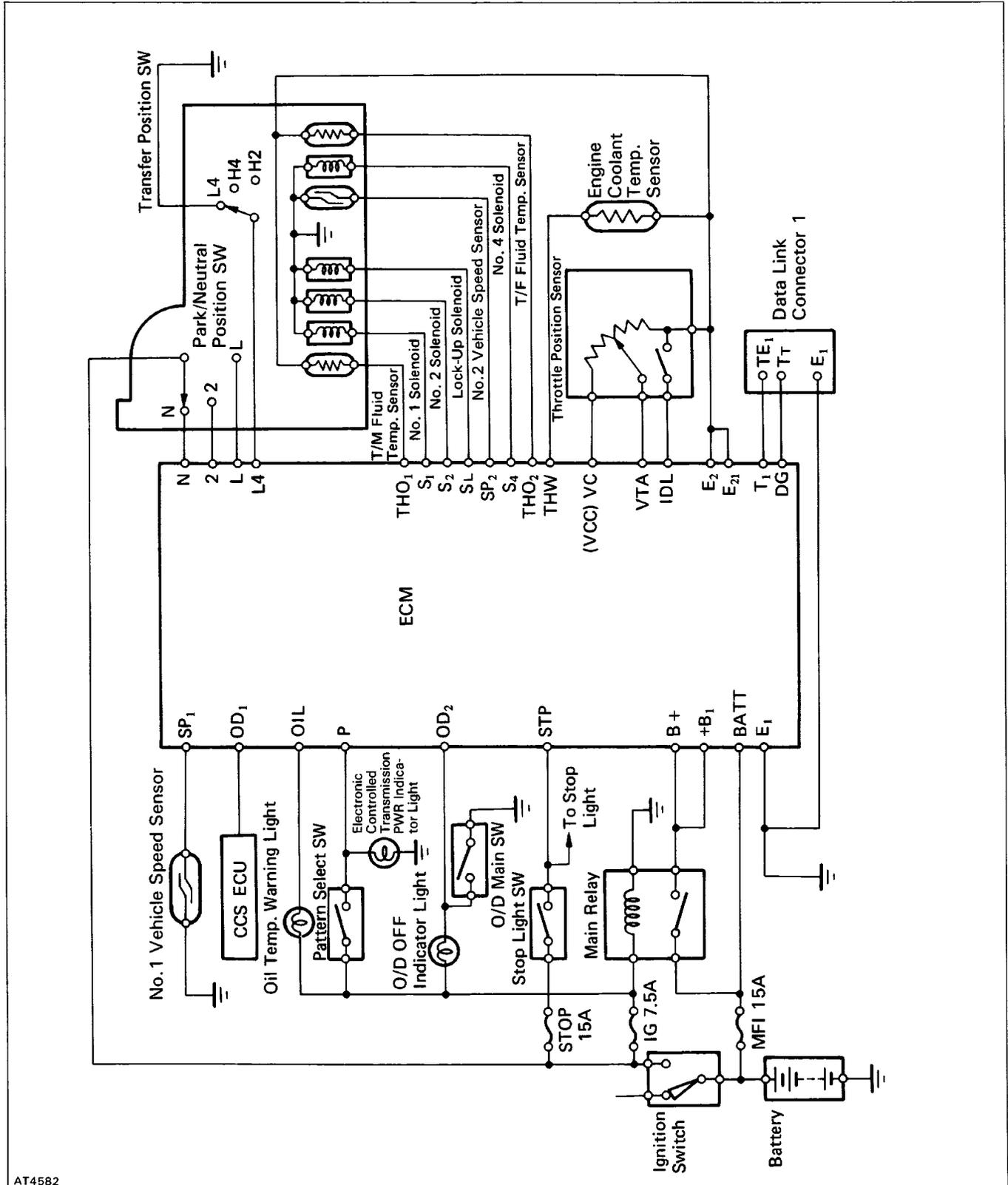


# Electronic Control System

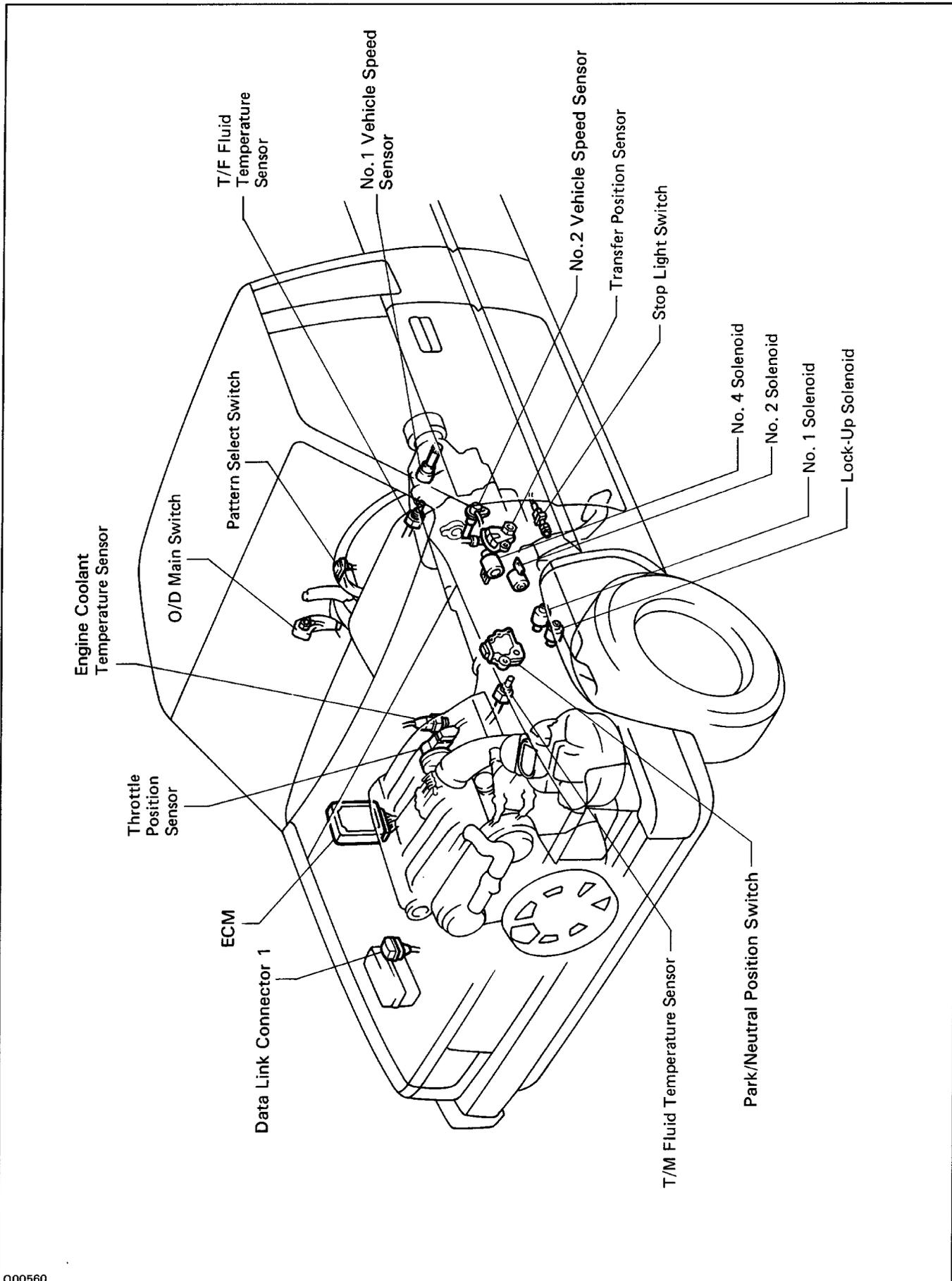
## PRECAUTION

Do not open the cover or the case of the ECM and various computer unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)

## ELECTRONIC CONTROL CIRCUIT

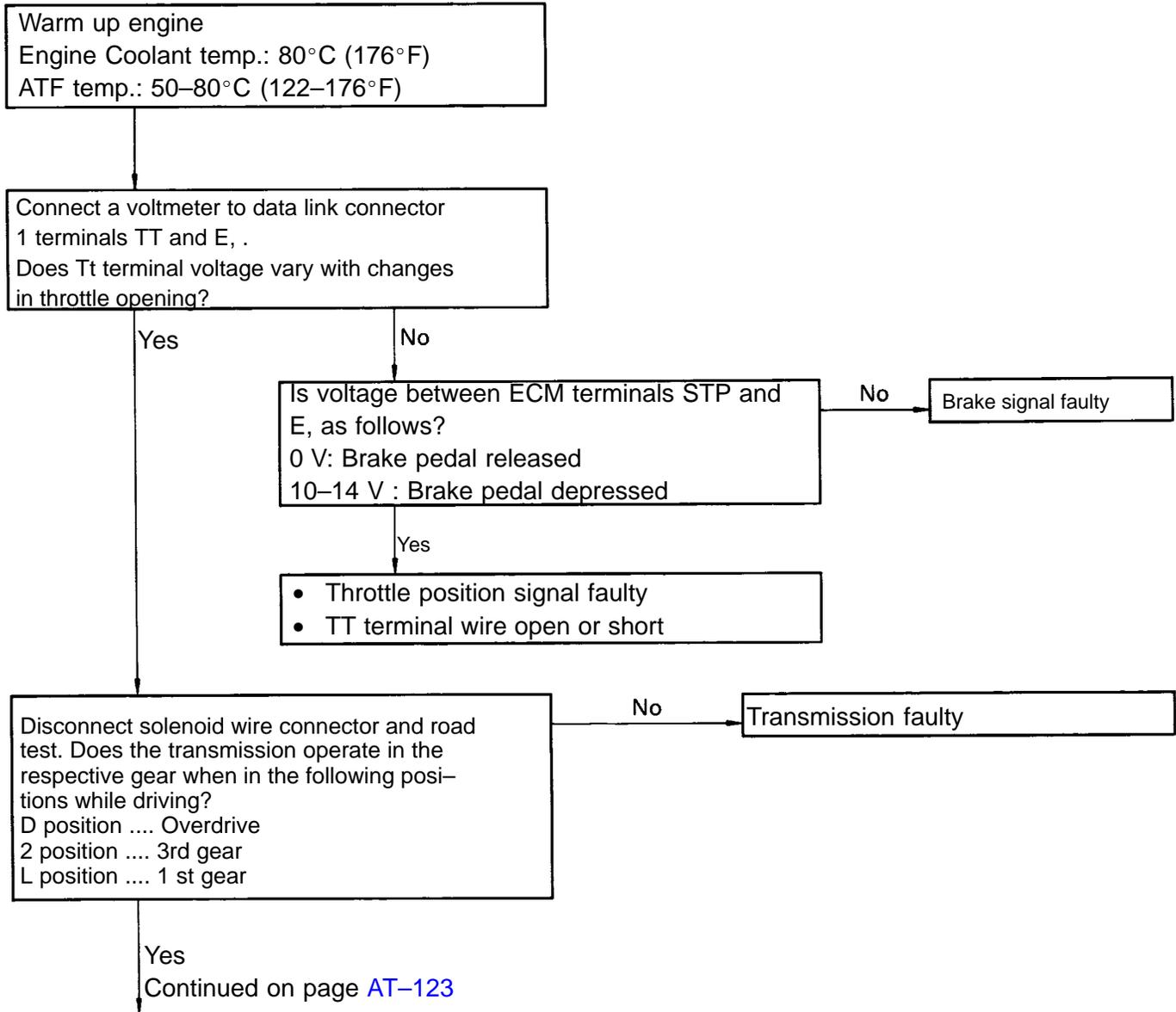


# ELECTRONIC CONTROL COMPONENTS

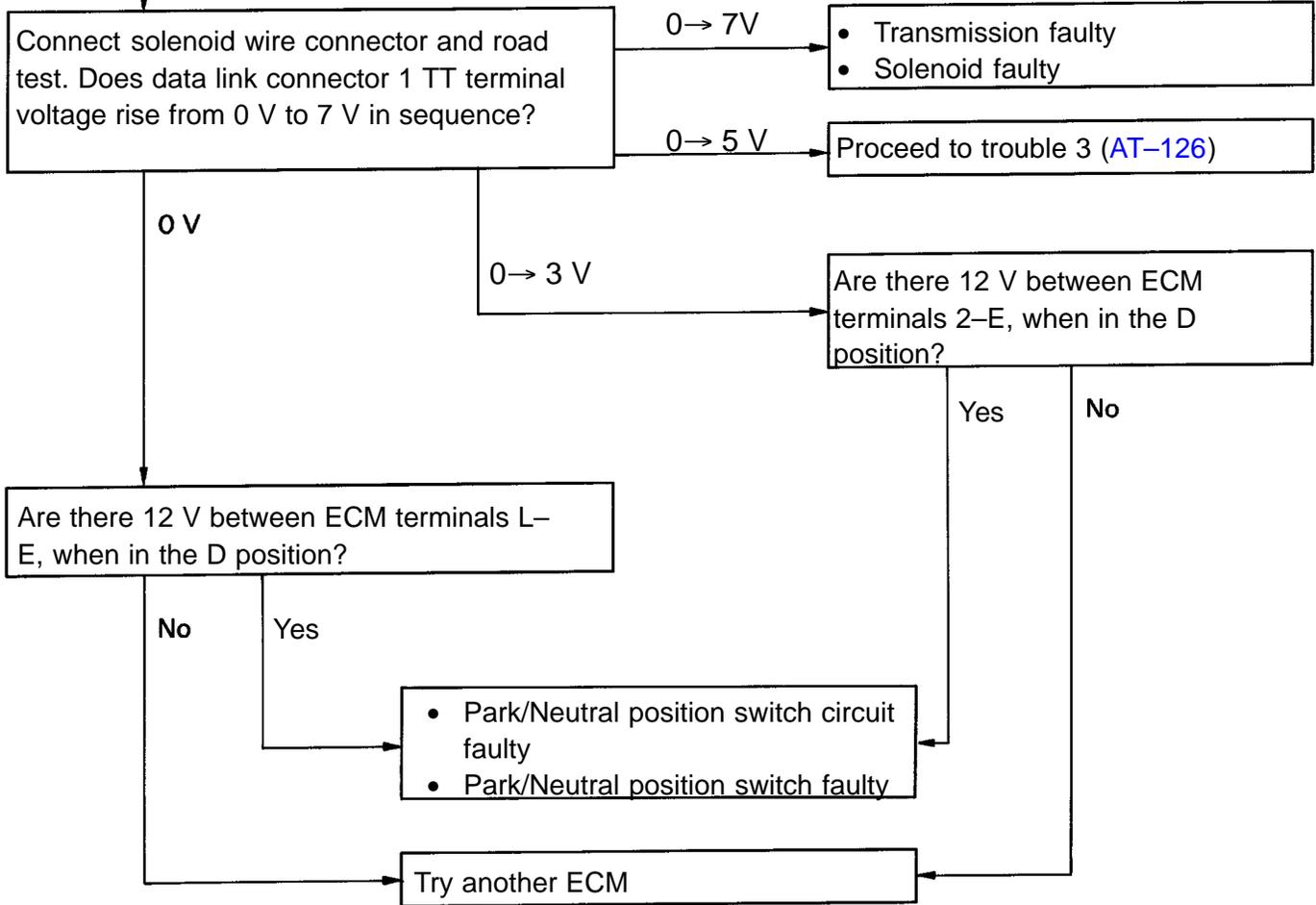


**TROUBLESHOOTING FLOW-CHART**

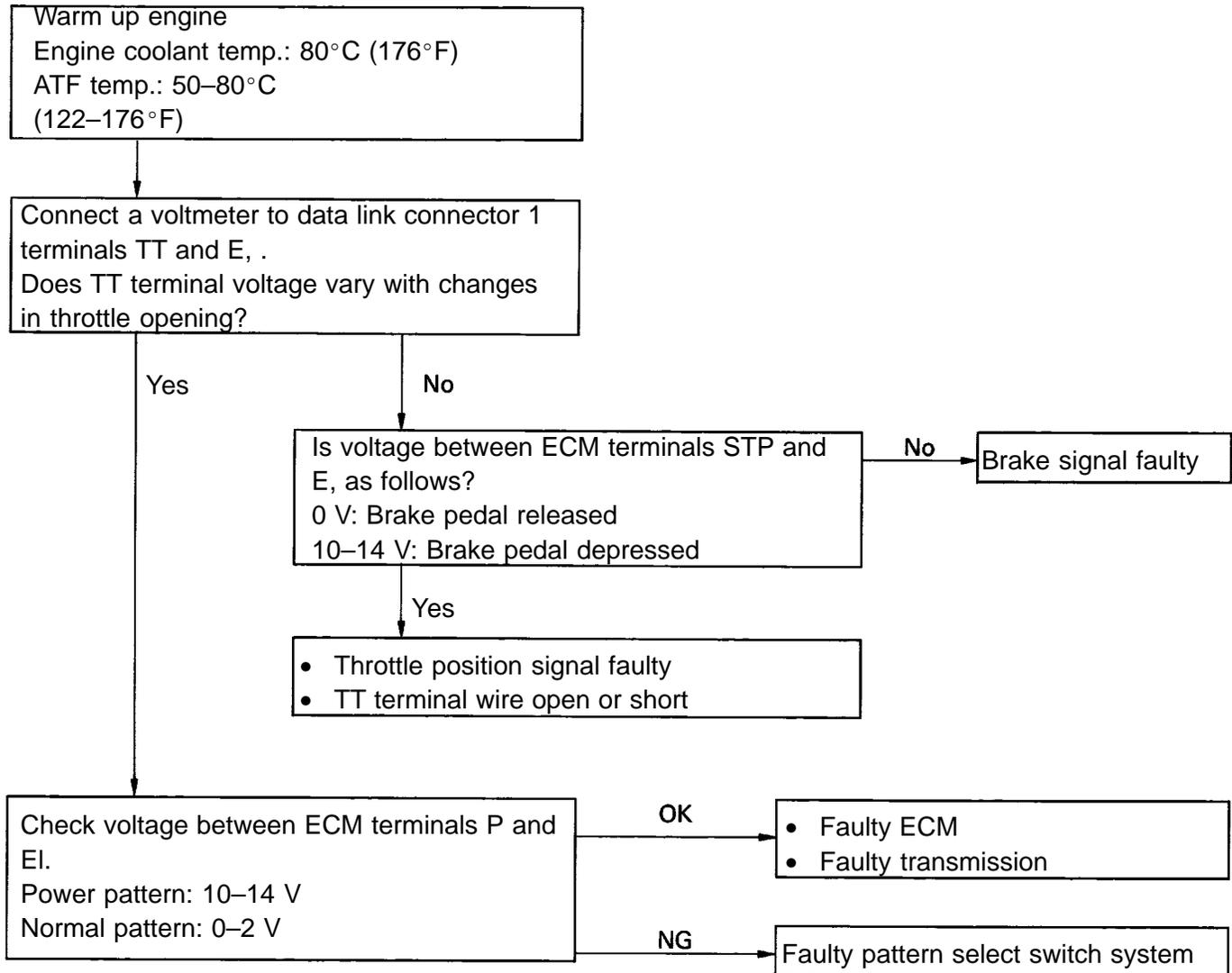
**Trouble No. 1 No Shifting**



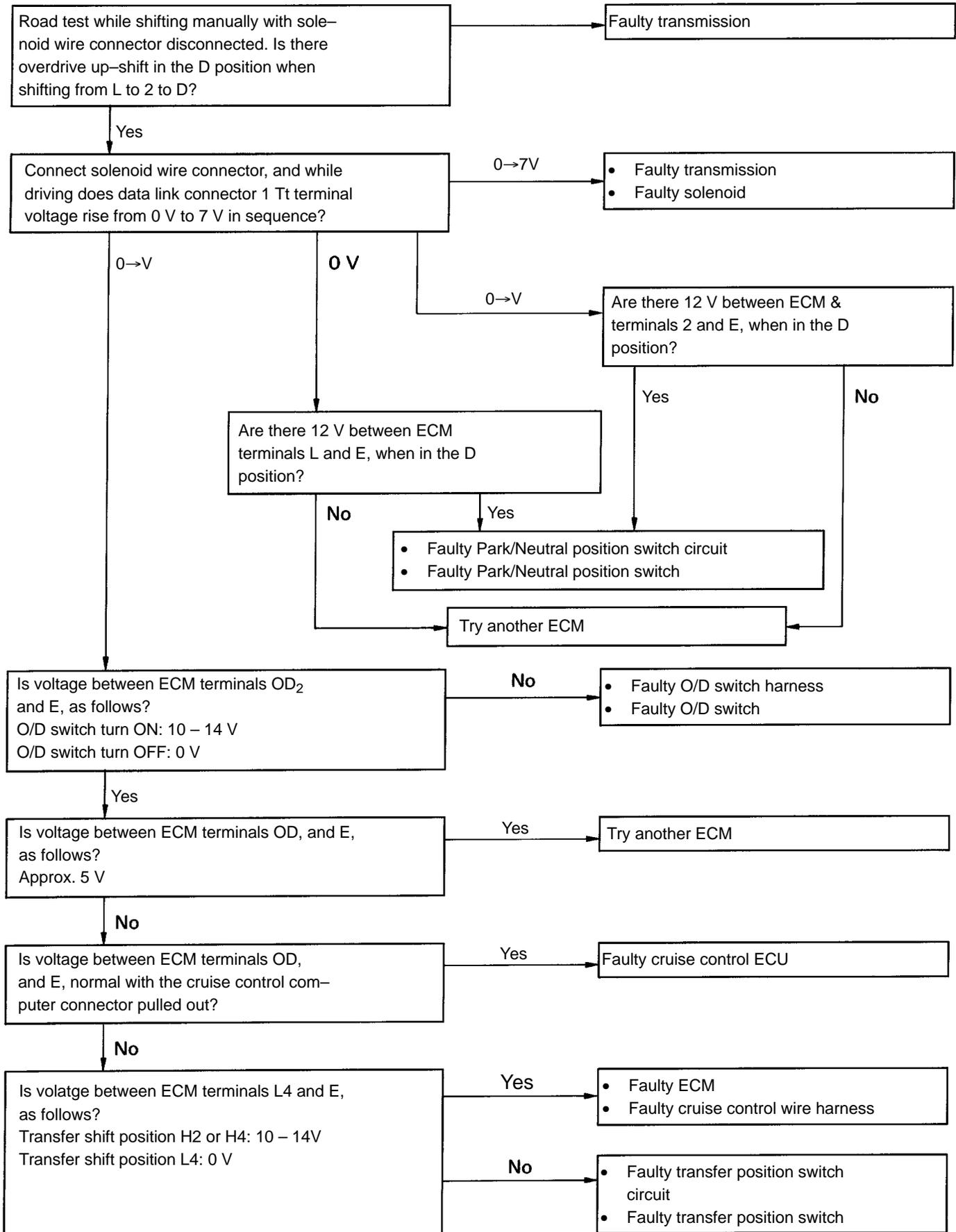
Continued from page AT-122

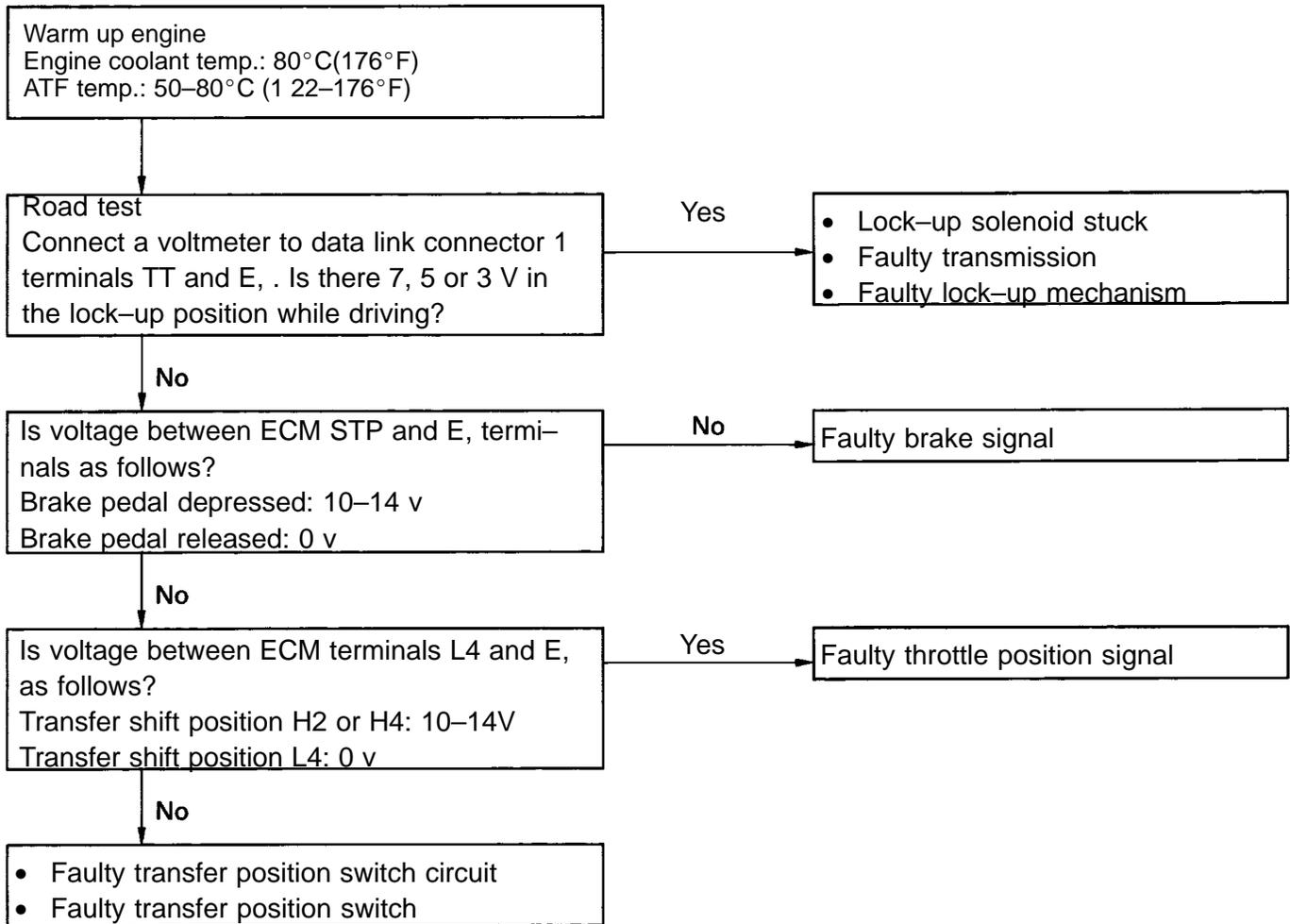


**Trouble No.2 Shift point too high or too low**

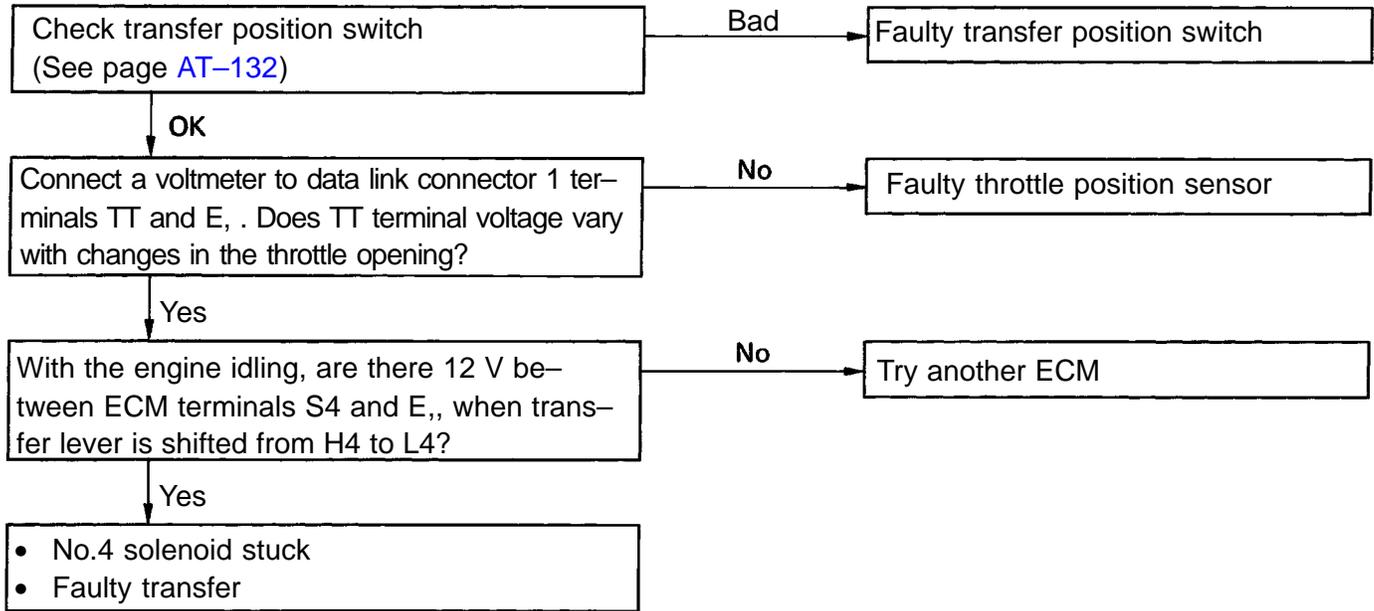


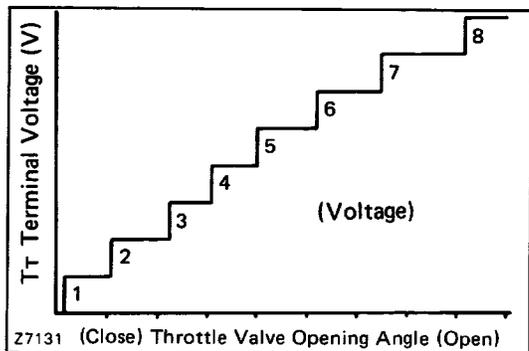
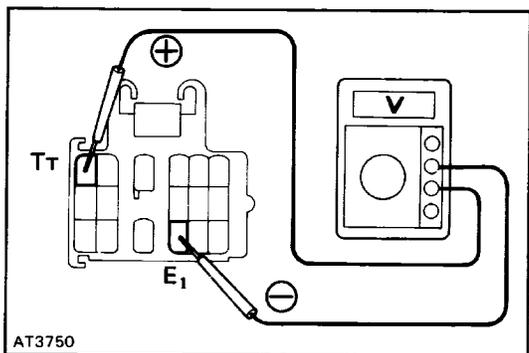
**Trouble No.3 No up-shift to overdrive (After warm-up)**



**Trouble No. 4 No lock-up (After warm-up)**

**Trouble No.5    Transfer gear no change L4 from H4**





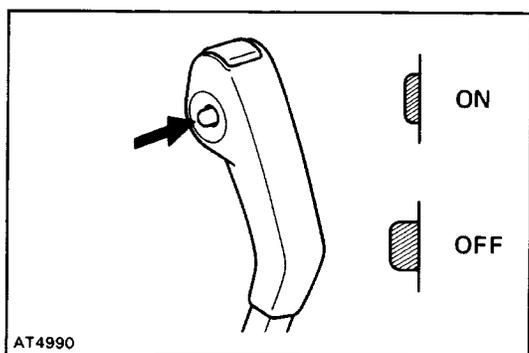
## INSPECTION OF TT TERMINAL VOLTAGE

### 1. INSPECT THROTTLE POSITION SENSOR SIGNAL

- (a) Turn the ignition switch to ON. Do not start the engine.
- (b) Connect a voltmeter to data link connector 1 terminals Tt and E<sub>1</sub>.
- (c) While slowly depressing the accelerator pedal, check that TT terminal voltage rises in sequence. If the voltage does not change in proportion to the throttle opening angle, there is a malfunction in the throttle position sensor or circuit.

### 2. INSPECT BRAKE SIGNAL

- (a) Depress the accelerator pedal until the TT terminal indicates 8 V.
  - (b) Depress the brake pedal and check the voltage reading from the TT terminal.
    - Brake pedal depressed ..... 0 V
    - Brake pedal released ..... 8 V
- If not as indicated, there is a malfunction in either the stop light switch or circuit.



### 3. INSPECT EACH UP-SHIFT POSITION

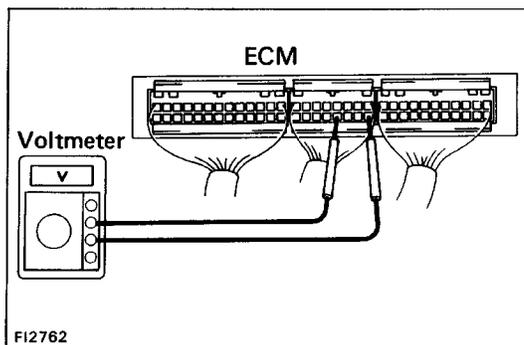
- (a) Warm up the engine.
  - Engine Coolant temperature: 800C (1760F)**
- (b) Turn the O/D switch to "ON".
- (c) Place the pattern select switch in "Normal" and the shift lever into the D position.
- (d) During a road test (above 10 km/h or 6 mph) check that voltage at the TT terminal is as indicated below for each up-shift position.

If the voltage rises from 0 V to 7 V in the sequence shown, the control system is okay.

The chart on the left shows the voltmeter reading and corresponding gears.

HINT: Determine the gear position by a light shock or change in engine rpm when shifting. The lock-up clutch will turn ON only infrequently during normal 2nd and 3rd gear operation. To trigger this action, press the accelerator pedal to 50% or more of its stroke. At less than 50%, the voltage may change in the sequence 2 V-4 V-6 V-7V.

| T <sub>T</sub> Terminal (V) | Gear Position |
|-----------------------------|---------------|
| 0                           | 1st           |
| 2                           | 2nd           |
| 3                           | 2nd Lock-up   |
| 4                           | 3rd           |
| 5                           | 3rd Lock-up   |
| 6                           | O/D           |
| 7                           | O/D Lock-up   |

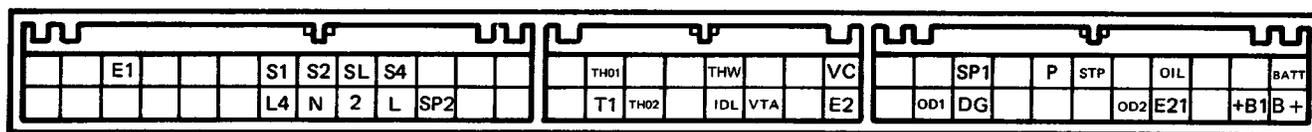


### INSPECTION OF ELECTRONIC CONTROL COMPONENTS

#### 1. INSPECT VOLTAGE OF ECM CONNECTOR

- (a) Remove the cowl side trim of passenger side.
- (b) Turn on the ignition switch.
- (c) Measure the voltage at each terminal.

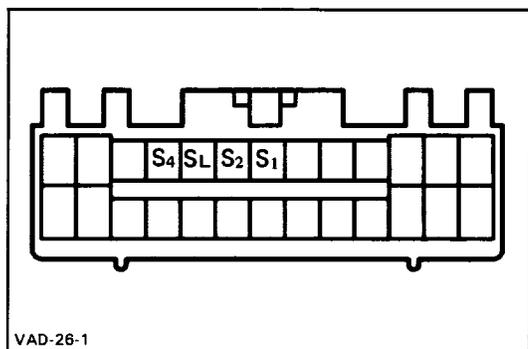
FI2762



FI2796

| Terminal   | Measuring condition               | Voltage i V j  |        |
|--|-----------------------------------|----------------|--------|
| S <sub>1</sub> - E <sub>1</sub>                  | -                                 | 10 - 14        |        |
| S <sub>2</sub> , S <sub>L</sub> - E <sub>1</sub> | -                                 | 0              |        |
| S <sub>4</sub> - E <sub>1</sub>                  | Transfer shift position H2 or H4  | 0              |        |
|  | Transfer shift position L4        | 10 - 14        |        |
| P - E <sub>1</sub>                               | PWR pattern                       | 10 - 14        |        |
|  | NORM pattern                      | 0 - 2          |        |
| STP - E <sub>1</sub>                             | Brake pedal is depressed          | 10 - 14        |        |
|  | Brake pedal is released           | 0              |        |
| THW - E <sub>2</sub> (E <sub>21</sub> )          | Engine Coolant temp. 80°C (176°F) | 0.1 - 1.0      |        |
| IDL - E <sub>2</sub> (E <sub>21</sub> )          | Throttle valve fully closed       | 0              |        |
|  | Throttle valve open               | 10 - 14        |        |
| VTA - E <sub>2</sub> (E <sub>21</sub> )          | Throttle valve fully closed       | 0.1 - 1.0      |        |
|  | Throttle valve fully open         | 3 - 5          |        |
| VC (VCC) - E <sub>2</sub> (E <sub>21</sub> )     | -                                 | 4 - 6          |        |
| OD <sub>1</sub> - E <sub>1</sub>                 | -                                 | 5              |        |
| OD <sub>2</sub> - E <sub>1</sub>                 | O/D main switch turned ON         | 10 - 14        |        |
|  | O/D main switch turned OFF        | 0              |        |
| SP <sub>1</sub> - E <sub>1</sub>                 | Cruise control main switch OFF    | Standing still | 0 or 5 |
|  |                                   | Vehicle moving | 2 - 3  |
| SP <sub>2</sub> - E <sub>1</sub>                 | Standing still                    | 0 or 5         |        |
|  | Vehicle moving                    | 2 - 3          |        |

| Terminal   | Measuring condition              | Voltage (V) |
|--|----------------------------------|-------------|
| N - E <sub>1</sub>   | N position                       | 10 - 14     |
|  | Except N position                | 0 - 2       |
| 2 - E <sub>1</sub>   | 2 position                       | 10 - 14     |
|  | Except 2 position                | 0 - 2       |
| L - E <sub>1</sub>   | L position                       | 10 - 14     |
|  | Except L position                | 0 - 2       |
| L <sub>4</sub> - E <sub>1</sub>  | Transfer shift position H2 or H4 | 10 - 14     |
|  | Transfer shift position L4       | 0           |
| OIL - E <sub>1</sub>   | -                                | 10 - 14     |
| THO <sub>1</sub> , THO <sub>2</sub> - E <sub>2</sub><br>THO (E <sub>21</sub> ) | Fluid temp. 20°C (68°F)          | 4 - 5       |
| B+ (+B <sub>1</sub> ) - E <sub>1</sub>   | -                                | 10 - 14     |
| BATT - E <sub>1</sub>  | -                                | 10 - 14     |

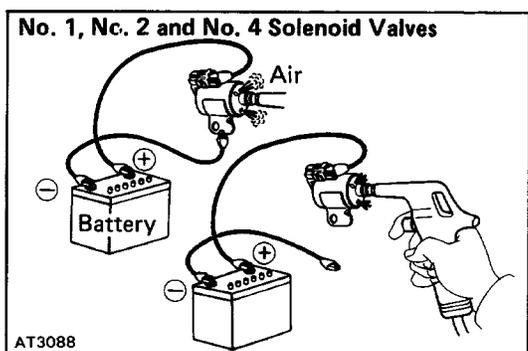


## 2. INSPECT SOLENOID

- Disconnect the connector from the ECM.
- Measure the resistance between S<sub>1</sub>, S<sub>2</sub>, S<sub>L</sub>, S<sub>4</sub> and ground.

**Resistance: 11-15Ω**

- Apply battery positive voltage to each terminal. Check that an operation noise can be heard from the solenoid.



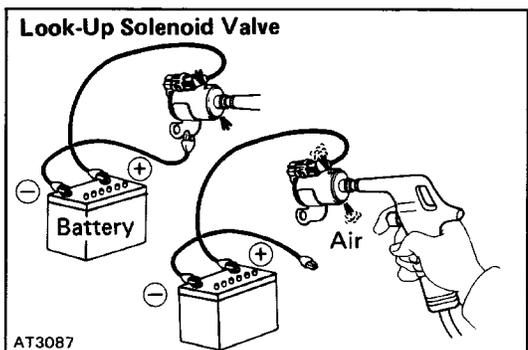
## 3. CHECK SOLENOID SEALS

If there is foreign material in the solenoid valve, there will be no fluid control even with solenoid operation.

- Check No. 1, No. 2 and No. 4 solenoid valves.

Check that the solenoid valves do not leak when low-pressure compressed air is applied.

When supply battery positive voltage to the solenoids, check that the solenoid valves open.



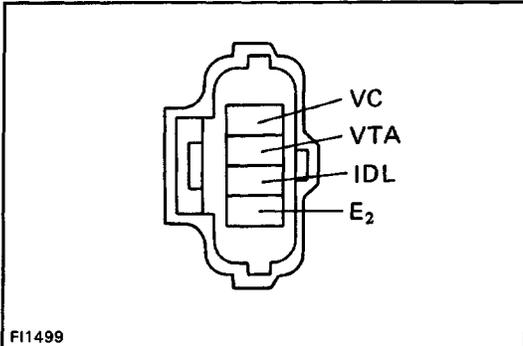
- Check the lock-up solenoid valve.

Applying 490 kPa (5 kgf/cm<sup>2</sup>, 71 psi) of compressed air, check that the solenoid valve opens.

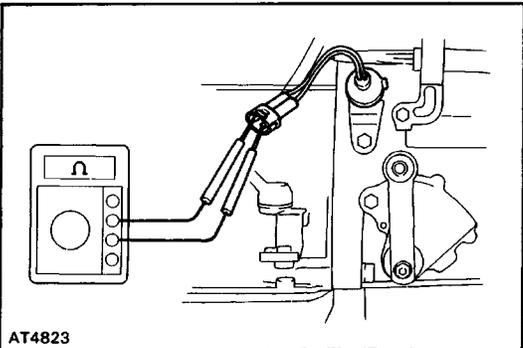
When supply battery positive voltage to the solenoid, check that the solenoid valve does not leak the air.

If a malfunction is found during voltage inspection (step 1.), inspect the components listed below.

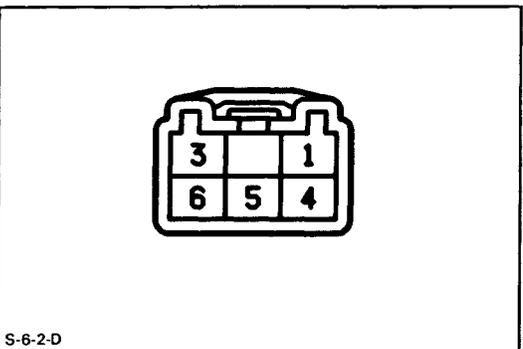
**4. INSPECT PARK/ NEUTRAL POSITION SWITCH**  
(See page AT-144)



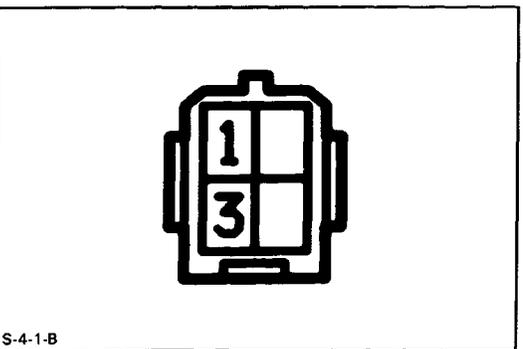
FI1499



AT4823



S-6-2-D



S-4-1-B

**5. INSPECT THROTTLE POSITION SENSOR**

Using an ohmmeter, check the resistance between each terminal.

| Terminal | Throttle valve condition | Resistance (kΩ) |
|----------|--------------------------|-----------------|
| IDL-E2   | Fully closed             | Less than 2.3   |
|          | Open                     | Infinity        |
| VC-E2    | -                        | 3.9-9.0         |
| VTA-E2   | Fully closed             | 0.47-6.1        |
|          | Fully open               | 3.1-12.1        |

**6. INSPECT NO.2 VEHICLE SPEED SENSOR**

- (a) Jack up the rear wheel on one side.
- (b) Connect an ohmmeter between the terminals.
- (c) Spin the wheel and check that the meter needle deflects from 0Ω to ∞Ω.

**7. INSPECT NO.1 VEHICLE SPEED SENSOR**

(See step 6. on page AT-131)

**8. INSPECT PATTERN SELECT SWITCH**

Using an ohmmeter, check the continuity of the terminals for each switch position.

HINT: As there are diodes inside, be careful of the tester probe polarity.

| Terminal | 4 | 6 |
|----------|---|---|
| Pattern  |   |   |
| PWR      | ○ | ○ |
| NORM     |   |   |

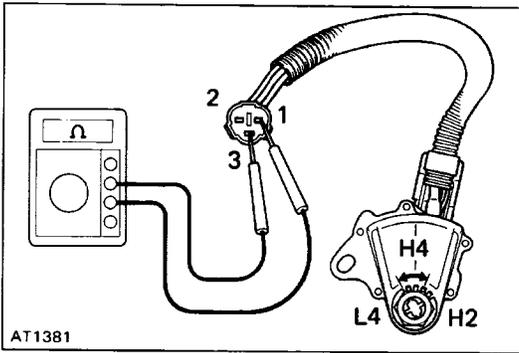
**9. INSPECT O/D SWITCH**

Using an ohmmeter, check the continuity of the terminals for each switch position.

| Terminal    | 1 | 3 |
|-------------|---|---|
| SW position |   |   |
| ON          |   |   |
| OFF         | ○ | ○ |

**10. INSPECT ENGINE COOLANT TEMPERATURE SENSOR**

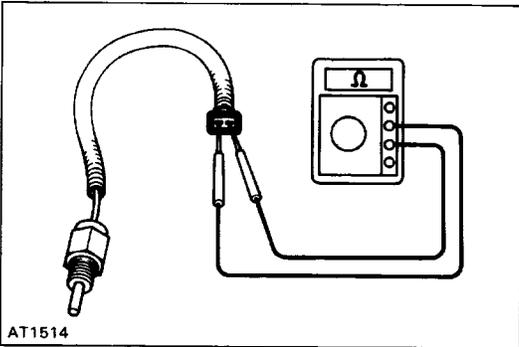
(See page FI-201 )



**11. INSPECT TRANSFER POSITION SWITCH**

Check that there is continuity between each terminal.

| Terminal       | 1 | 2 | 3 |
|----------------|---|---|---|
| Shift position |   |   |   |
| H4             | ○ | — | ○ |
| L4             | ○ | ○ | ○ |
| H2             |   |   |   |



**12. INSPECT TRANSMISSION AND TRANSFER FLUID TEMPERATURE SENSOR**

Measure the resistance between terminals.

| Oil Temperature | Resistance (Ω) |
|-----------------|----------------|
| 20°C ( 68°F)    | 5k – 20k       |
| 120°C (248°F)   | 540 – 690      |
| 150°C (302°F)   | 300 – 340      |