

DIAGNOSIS SYSTEM (3S–GTE and 5S–FE)

DESCRIPTION

The ECM contains a built-in, self-diagnosis system by which troubles with the engine signal network are detected and a malfunction indicator lamp on the combination meter lights up.

By analyzing various signals shown in the later table (See page [FI-44](#) or 50) the ECM detects system malfunctions relating to the sensors or actuators.

The self-diagnosis system has two modes, a normal mode and a test mode.

If a malfunction is detected when in the normal mode, the ECM lights up the malfunction indicator lamp to inform the driver of the occurrence of a malfunction. (For some codes the lamp does not come on.) The lamp goes off automatically when the malfunction has been repaired. But the diagnostic trouble code(s) remains stored in the ECM memory. The ECM stores the code(s) until it is cleaned by removing the EFI fuse with the ignition switch off.

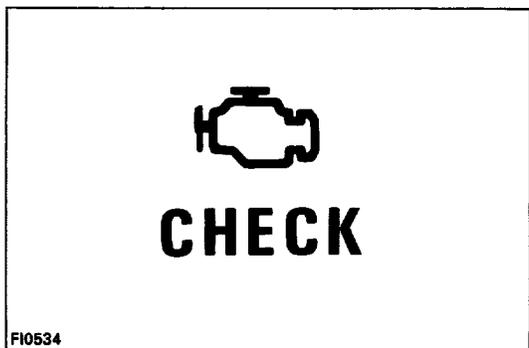
The diagnostic trouble code can be read by the number of blinks of the malfunction indicator lamp when TE1 and E1 terminals of the data link connector 1 are connected. When 2 or more codes are indicated, the lowest number (code) will appear first.

If a malfunction is detected when in the test mode, the ECM lights up the malfunction indicator lamp to inform the technician of the occurrence of a malfunction (except for code Nos.42, 43 and 51). In this case, TE2 and E1 terminals of the data link connector 1 should be connected as shown later. (See page [FI-42](#))

In the test mode, even if the malfunction is corrected, the malfunction code is stored in the ECM memory even when the ignition switch is off (except code Nos.42, 43 and 51).

This also applies in the normal mode. The diagnostic mode (normal or test) and the output of the malfunction indicator lamp can be selected by connecting the TE1, TE2 and E1 terminals of the data link connector 1, as shown later.

A test mode function has been added to the functions of the self-diagnosis system of the normal mode for the purpose of detecting malfunctions such as poor contact, which are difficult to detect in the normal mode. This function fills up the self-diagnosis system. The test mode can be implemented by the technician following the appropriate procedures of check terminal connection and operation described later. (See page [FI-44](#) or 50)



MALFUNCTION INDICATOR LAMP CHECK

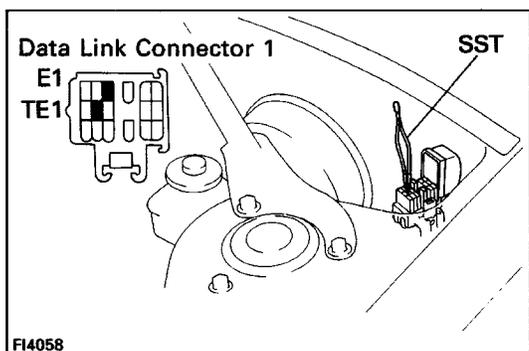
1. The malfunction indicator lamp will come on when the ignition switch is placed at ON and the engine is not running.
2. When the engine is started, the malfunction indicator lamp should go off.
If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

OUTPUT OF DIAGNOSTIC TROUBLE CODES

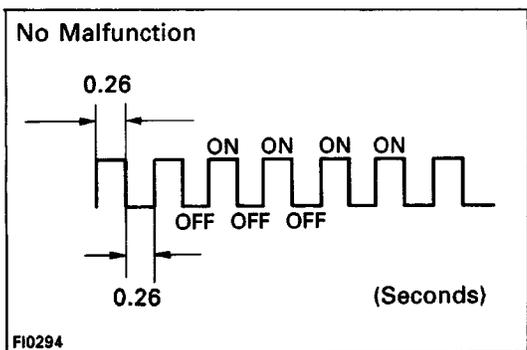
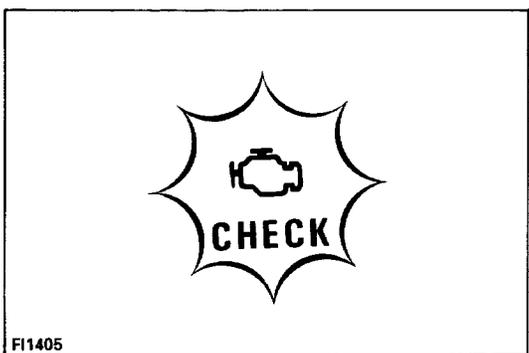
(Normal mode)

To obtain an output of diagnostic trouble codes, proceed as follows:

1. Initial conditions
 - (a) Battery voltage 11 V or more
 - (b) Throttle valve fully closed (throttle position sensor IDL points closed)
 - (c) Transmission in neutral position
 - (d) Accessories switched OFF.
 - (e) Engine at normal operating temperature
2. Turn the ignition switch ON. Do not start the engine.
3. Using SST, connect terminals TE1 and E1 of the data link connector 1.
SST 09843-18020

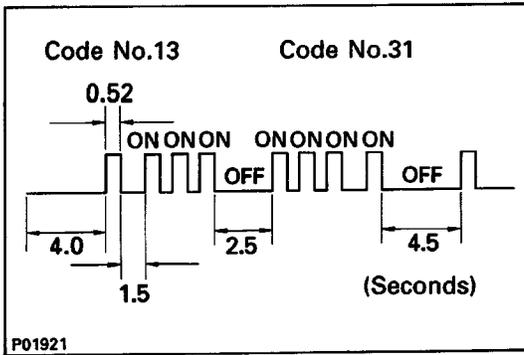


4. Read the diagnostic trouble code as indicated by the number of flashes of the malfunction indicator lamp.



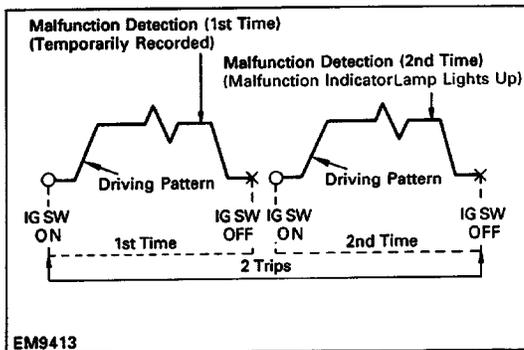
Diagnostic Trouble Codes (See page [FI-44](#) or 50)

- (a) Normal System Operation (no malfunction)
 - The lamp will alternately blink ON and OFF at 0.26-second intervals.



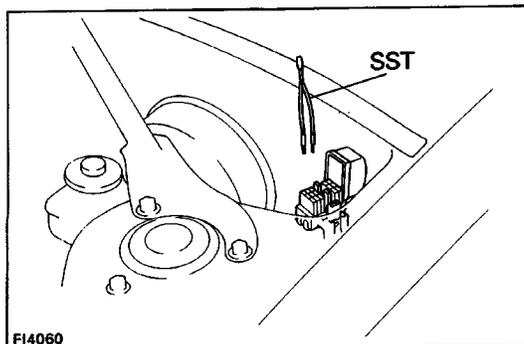
(b) Malfunction Code Indication

- In the event of a malfunction, the light will blink every 0.5 seconds. The first number of blinks will equal the first digit of a 2-digit diagnostic trouble code and, after a 1.5-second pause, the 2nd number of blinks will equal the 2nd. If there are two or more codes, there will be a 2.5-second pause between each code.
- After all the codes have been output, there will be a 4.5-second pause and they will all be repeated as long as the terminals TE1 and E1 of the data link connector 1 are connected.
HINT: In the event of a number of trouble codes, indication will begin from the smaller value and continue to the larger.



(c) (2 Trip Detection Logic)

Diagnostic trouble codes 25, 26, 27 and 71 use "2 trip detection logic". With this logic, when a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same case is detected again during the second drive test, this second detection causes the Malfunction Indicator Lamp to light up. The 2 trip repeats the same mode a 2nd time. (However, the ignition switch must be turned OFF between the 1st time and 2nd time.) In the Test Mode, the Malfunction Indicator Lamp lights up the 1st time a malfunction is detected.



5. After the diagnostic check, remove the SST.
SST 09843-18020

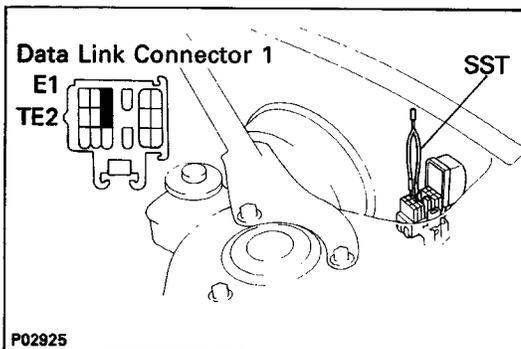
(Test mode)**HINT:**

- Compared to the normal mode, the test mode has high sensing ability to detect malfunctions.
- It can also detect malfunctions in the starter signal circuit, air conditioning signal and park/neutral position switch signal.
- Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the test mode.

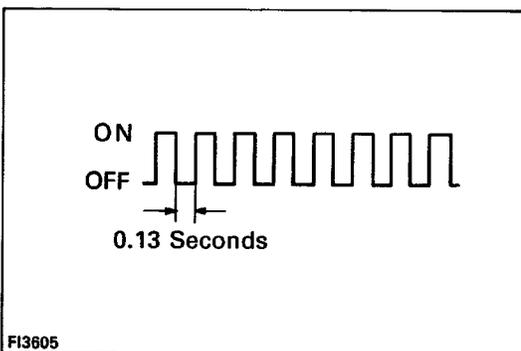
To obtain an output of diagnostic trouble code, proceed as follows:

1. Initial conditions

- (a) Battery voltage 11 volts or more
- (b) Throttle valve fully closed (throttle position sensor IDL points closed)
- (c) Transmission in neutral position
- (d) Accessories switched OFF

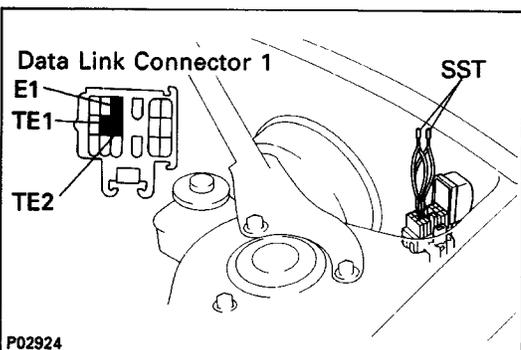


2. First, using SST, connect terminals TE2 and E1 of the data link connector 1, then turn the ignition switch on to begin the diagnosis in the test mode.
SST 09843-18020

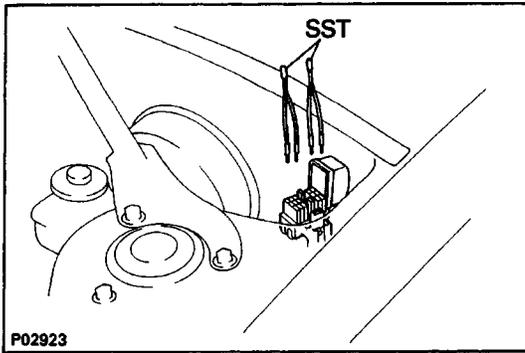


HINT: To confirm that the test mode is operating, check that the malfunction indicator lamp flashes when the ignition switch is turned ON.

3. Start the engine and drive the vehicle at a speed of 10 km/h (6 mph) or higher.
4. Simulate the conditions of the malfunction described by the customer.



5. Using SST, connect terminals TE1 and E1 of the data link connector 1.
SST 09843-18020
6. Read the diagnostic trouble code as indicated by the number of flashes of the malfunction indicator lamp.
(See page [FI-40](#))

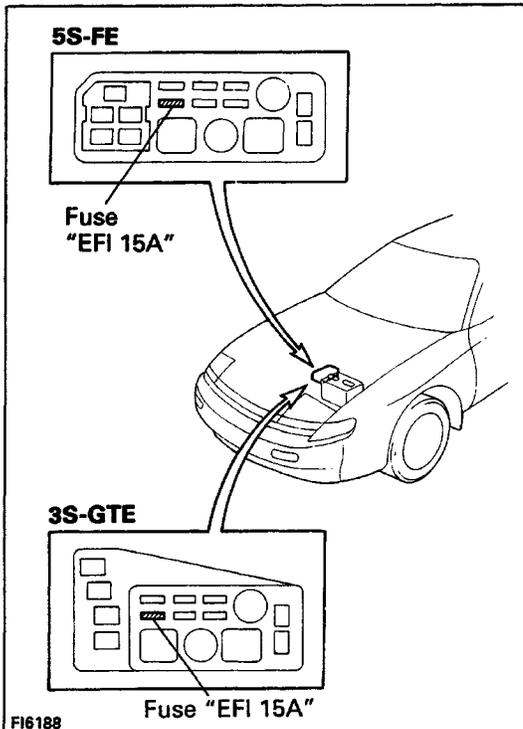


7. After the diagnostic check, remove SST.

SST 09843-18020

HINT:

- The test mode will not start if terminals TE2 and E1 are connected after the ignition switch is turned on.
- The starter signal and vehicle speed signal will be diagnosed by the ECM as malfunctions, and code Nos.42, and 43 will be output, if the operation in 3 above is not performed.



CANCELLING DIAGNOSTIC TROUBLE CODE

1. After repair of the trouble area, the diagnostic trouble code retained in memory by the ECM must be cancelled out by removing the fuse "EFI 15A" for 10 seconds or more, depending on ambient temperature (the lower the temperature, the longer the fuse must be left out) with the ignition switch OFF.

HINT:

- Cancellation can also be done by removing the battery negative (-) terminal, but in this case, other memory systems (clock, etc.) will also be cancelled out.
- If the diagnostic trouble code is not cancelled out, it will be retained by the ECM and appear along with a new code in the event of future trouble.
- If it is necessary to work on engine components requiring removal of the battery terminal, a check must first be made to see if a diagnostic trouble code has been recorded.

2. After cancellation, perform road test of the vehicle to check that a normal code is now read on the malfunction indicator lamp.

If the same diagnostic trouble code appears, it indicates that the trouble area has not been repaired thoroughly.

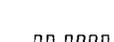
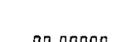
DIAGNOSIS INDICATION

1. When 2 or more codes are indicated, the lowest number (code) will appear first.
2. All detected diagnostic trouble codes, except code No.51 and No.53, will be retained in memory by the ECM from the time of detection until cancelled out.
3. Once the malfunction is cleared, the malfunction indicator lamp on the combination meter will go off but the diagnostic trouble code(s) remain stored in ECM memory (except for codes No.43, No.51 and No.53).

DIAGNOSTIC TROUBLE CODES (3S-GTE)

HINT:

- If a malfunction is detected during the diagnostic trouble code check, refer to the circuit indicated in the table, and turn to the corresponding page.
- Your readings may vary from the parameters listed in the table, depending on the instruments used.

| Code No. | Number of blinks Malfunction Indicator Lamp | System | *1 Malfunction Indicator Lamp | | Diagnosis | Trouble Area | Memory | See Page |
|----------|---|------------------------------------|-------------------------------|-----------|---|--|--------|----------------|
| | | | Normal Mode | Test Mode | | | | |
| — |  FI1401 | Normal | — | — | No trouble code is recorded. | — | — | — |
| 12 |  FI1606 | RPM Signal | ON | N.A. | <ul style="list-style-type: none"> • No G1, G2 or NE signal is input to the ECM for 2 secs. or more after STA turns ON. • Open in G - circuit. | <ul style="list-style-type: none"> • Open or short in NE, G circuit • Distributor • Open or short in STA circuit • ECM | ○ | 1G-4 FI-84 |
| 13 |  FI1607 | RPM Signal | ON | ON | NE signal is not input to ECM for 0.1 sec. or more when engine speed is 1,000 rpm or more. | <ul style="list-style-type: none"> • Open or short in NE circuit • Distributor • ECM | ○ | 1G-4 |
| 14 |  FI1608 | Ignition Signal | ON | N.A. | IG signal from igniter is not input to ECM for 8 - 11 consecutive ignition. | <ul style="list-style-type: none"> • Open or short in IGF or IGT circuit from igniter to ECM • Igniter • ECM | ○ | FI-85 |
| 21 |  FI1609 | Oxygen Sensor Signal | ON | N.A. | Open or short in heater circuit of oxygen sensor for 0.5 sec. or more. (HT) | <ul style="list-style-type: none"> • Open or short in heater circuit of oxygen sensor • Oxygen sensor heater • ECM | ○ | FI-90 |
| | | | | ON | At normal driving speed (below 60 mph and engine speed is above 1,500 rpm), amplitude of oxygen sensor signal (OX1) is reduced to between 0.35 - 0.70 V continuously for 60 secs. or more. *6 (2 trip detection logic) (Exc. Calif.) | <ul style="list-style-type: none"> • Open or short in oxygen sensor circuit • Oxygen sensor • ECM | | |
| 22 |  FI1610 | Engine Coolant Temp. Sensor Signal | ON | ON | Open or short in engine coolant temp. sensor circuit for 0.5 sec. or more. (THW) | <ul style="list-style-type: none"> • Open or short in engine coolant temp. sensor circuit • Engine coolant temp. sensor • ECM | ○ | FI-83 |
| 24 |  FI1611 | Intake Air Temp. Sensor Signal | *3 ON | ON | Open or short in intake air temp. sensor circuit for 0.5 sec. or more. (THA) | <ul style="list-style-type: none"> • Open or short in intake air temp. sensor circuit • Intake air temp. sensor • ECM | ○ | FI-82 |
| 25 |  FI2562 | Air-Fuel Ratio Lean Malfunction | ON | ON | (1) Oxygen sensor output in less than 0.45 V for at least 90 secs. when oxygen sensor is warmed up (racing at 1,500 rpm). (only for code 25) *4 | <ul style="list-style-type: none"> • Engine ground bolt loose • Open in E1 circuit • Open in injector circuit • Fuel line pressure (Injector blockage, etc.) • Open or short in oxygen sensor circuit • Oxygen sensor • Ignition system • Engine coolant temp. sensor • Volume air flow meter (air intake) • ECM | ○ | FI-81 FI-90 |
| | | | | ON | (2) When the oxygen sensor signal oscillates beyond 0.45 V more than 15 times within a 4 sec. period at idle and at engine coolant temperature of 60°C (140°F) or above. *4 (3) When the air-fuel compensation value fluctuates more than 20% from the ECM set range within an 80 sec. period, at engine coolant temperature of 60°C (140°F) or above. *6 (2 trip detection logic) (1) - (3) | <ul style="list-style-type: none"> • Engine ground bolt loose • Open in E1 circuit • Short in injector circuit • Fuel line pressure (Injector leakage, etc.) • Open or short in cold start injector circuit • Cold start injector • Open or short in oxygen sensor circuit • Oxygen sensor • Volume air flow meter • Compression pressure • ECM | | |
| 26 |  FI2563 | Air-Fuel Ratio Rich Malfunction | ON | ON | (1) Oxygen sensor output in less than 0.45 V for at least 90 secs. when oxygen sensor is warmed up (racing at 1,500 rpm). (only for code 25) *4 (2) When the oxygen sensor signal oscillates beyond 0.45 V more than 15 times within a 4 sec. period at idle and at engine coolant temperature of 60°C (140°F) or above. *4 (3) When the air-fuel compensation value fluctuates more than 20% from the ECM set range within an 80 sec. period, at engine coolant temperature of 60°C (140°F) or above. *6 (2 trip detection logic) (1) - (3) | <ul style="list-style-type: none"> • Engine ground bolt loose • Open in E1 circuit • Short in injector circuit • Fuel line pressure (Injector leakage, etc.) • Open or short in cold start injector circuit • Cold start injector • Open or short in oxygen sensor circuit • Oxygen sensor • Volume air flow meter • Compression pressure • ECM | ○ | FI-81 FI-90 |

DIAGNOSTIC TROUBLE CODES (3S-GTE) (Cont'd)

| Code No. | Number of blinks Malfunction Indicator Lamp | System | .1 Malfunction Indicator Lamp | | Diagnosis | Trouble Area | *2 Memory | See Page |
|----------|---|---------------------------------------|-------------------------------|-----------|--|---|-----------|------------|
| | | | Normal Mode | Test Mode | | | | |
| 31 | FI1612 | Volume Air Flow Meter Signal | ON | ON | At idling, open or short detected continuously for 0.5 sec. or more in volume air flow meter circuit. • Open - VC • Short - VC-E2 | • Open or short in volume air flow meter circuit | ○ | FI-80 |
| 32 | FI1613 | Volume Air Flow Meter Signal | ON | ON | Open or short detected continuously for 0.5 sec. or more in volume air flow meter circuit. • Open - E2 • Short - VS-VC | • Volume air flow meter • ECM | ○ | FI-80 |
| 34 | BE3933 | Turbo-charging Pressure Signal | ON | N.A. | Abnormal over charge during high load driving. | • Open or short in turbocharging pressure sensor circuit • Turbocharging pressure sensor | ○ | - |
| 35 | BE3933 | Turbo-charging Pressure sensor Signal | ON | ON | Open or short detected continuously for 0.5 sec. or more in turbocharging pressure sensor signal circuit. (PIM) | • Turbocharger • ECM | ○ | F • -88 |
| 41 | FI1614 | Throttle Position Sensor Signal | *3 ON | ON | Open or short detected in throttle position sensor signal (VTA) for 0.5 sec. or more. IDL contact is ON and VTA output exceeds 1.5 V. | • Open or short in throttle position sensor circuit • Throttle position sensor • ECM | ○ | FI-78 |
| 42 | FI1615 | Vehicle Speed Sensor Signal | OFF | OFF | SPD signal is not input to the ECM for at least 8 seconds during high load driving with engine speed between 2,500 rpm and 5,000 rpm | • Open or short in vehicle speed sensor circuit • Vehicle speed sensor • ECM | ○ | - |
| 43 | FI1616 | Starter Signal | N.A. | OFF | Starter signal (STA) is not input to ECM even once until engine reaches 800 rpm or more when cranking. | • Open or short in starter signal circuit • Open or short in IG SW or main relay circuit • ECM | X | FI-84 |
| 52 | FI1618 | Knock Sensor Signal | ON | N.A. | With engine speed between 1,600 rpm and 7,200 rpm, signal from knock sensor is not input to ECM for 2 revolutions (KNK) | • Open or short in knock sensor circuit • Knock sensor (looseness, etc.) • ECM | ○ | - |
| 53 | FI1619 | Knock Control Signal | ON | N.A. | Engine speed is between 700 rpm and 7,200 rpm and ECM (for knock control) malfunction is detected. | • ECM | X | - |
| 71 | FI2622 | EGR System Mal-function | ON | ON | 120 secs. from start of EGR operation, EGR gas temp. is less than 80°C OWN with coolant temp. 80°C (176°F) or more. *6 (2 trip detection logic) | • Open in EGR gas temp. sensor circuit • Open in VSV circuit for EGR • EGR vacuum hose disconnected, valve stuck • Clogged in EGR gas passage • ECM | ○ | FI-91 |
| 51 | FI1617 | Switch Condition Signal | N.A. | OFF | Displayed when A/C is ON or IDL contact OFF with the check terminals E1 and TE1 connected. | • A/C switch circuit • Throttle position sensor IOL circuit • Accelerator pedal, cable • ECM | X | FI-78 |

REMARKS:

*1: "ON" displayed in the diagnosis mode column indicates that the Malfunction Indicator Lamp is lighted up when a malfunction is detected.

"OFF" indicates that the "CHECK" does not light up during malfunction diagnosis, even if a malfunction is detected.

"N.A." indicates that the item is not included in malfunction diagnosis.

*2: "0" in the memory column indicates that a diagnostic trouble code is recorded in the ECM memory when a malfunction occurs. "X" indicates

that a diagnostic trouble code is not recorded in the ECM memory even if a malfunction occurs.

Accordingly, output of diagnostic results is performed with the ignition switch ON.

*3: The Malfunction indicator lamp comes on if malfunction occurs only for California specifications.

*4: No. (2) and (3) in the diagnostic contents of codes No.25 and 26 apply to California specification vehicles only, while (1) applies to all models.

*5: Code 71 is used only for California specifications.

*6: "2 trip detection logic" (See page FI-40)

DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (3S-GTE)

Purpose of the driving pattern.

- (a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
- (b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

| Code No. | 21 | Oxygen Sensor Circuit |
|--|----|-----------------------|
| Malfunction: Deterioration of Oxygen Sensor | | |
| | | |
| <p>P01713</p> <ol style="list-style-type: none"> (1) Disconnect the EFI fuse (15 A) for 10 seconds or more, with ignition switch OFF. (2) Initiate test mode: Connect terminals TE2 and E1 of data link connector 1 with ignition switch OFF. (3) Start the engine and warm the engine up with all accessory switches OFF. (4) After the engine is warmed up, let it idle for 3 minutes. (5) Accelerate gradually and maintain at approximately 1,500 rpm, or within the 1,300 to 1,700 rpm range. Turn the A/C on, and drive in "D" for automatic, or in case of manual transmission, upshift appropriately. Shift carefully so that the engine speed would not fall below 1,200 rpm. Depress the accelerator pedal gradually and maintain a steady speed to avoid engine braking. (6) Maintain the vehicle speed at 40 – 50 mph. Keep the vehicle running for 1 – 2 minutes after starting acceleration. <p>HINT: If any malfunction is detected, the malfunction indicator lamp will light up during step (6).</p> <p>NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.</p> | | |

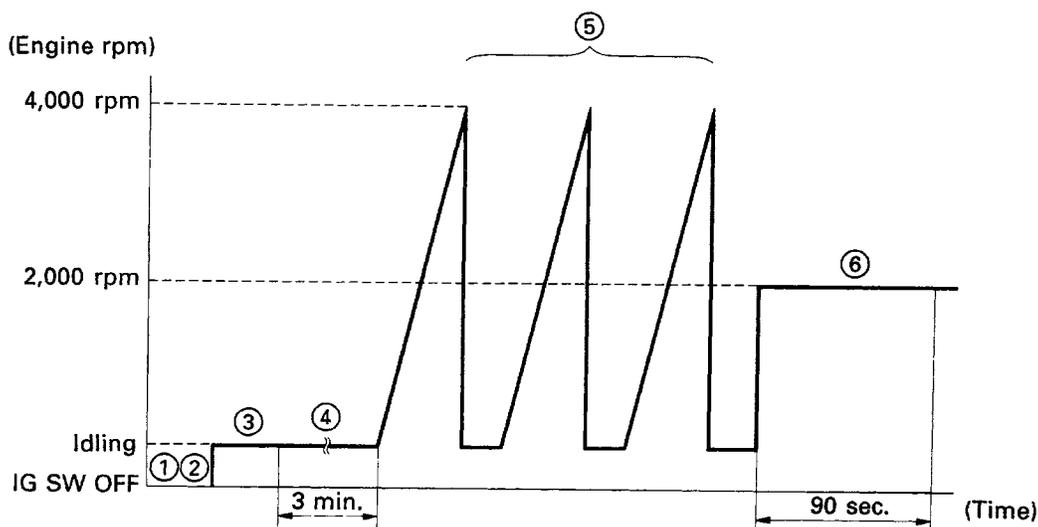
DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (3S-GTE) (Cont'd)

Purpose of the driving pattern.

- (a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
- (b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

| | | |
|-----------------|-----------|--|
| Code No. | 25 | Air-Fuel Ratio Lean Malfunction |
| | 26 | Air-Fuel Ratio Rich Malfunction |

Malfunction: Open or Short in Main Oxygen Sensor



P02491

- ① Disconnect the EFI fuse (15 A) for 10 seconds or more, with ignition switch OFF.
- ② Initial test mode: Connect terminal TE2 and E1 of data link connector 1 with ignition switch OFF.
- ③ Start the engine and warm the engine up, with all accessory switches OFF.
- ④ After the engine is warmed up, let it idle for 3 minutes.
- ⑤ Accelerate rapidly to 4,000 rpm three times.
- ⑥ Maintain at 2,000 rpm for 90 seconds.

HINT: If a malfunction is detected, the malfunction indicator lamp will light up during step (6).

NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

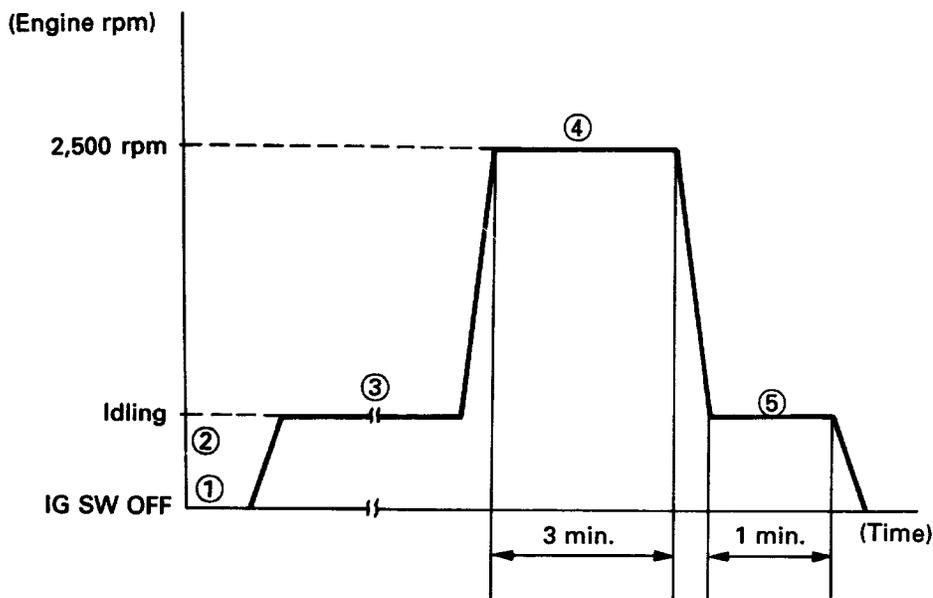
DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (3S-GTE) (Cont'd)

Purpose of the driving pattern.

- (a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
- (b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

| | | |
|-----------------|-----------|---|
| Code No. | 25 | Air-Fuel Ratio Lean Malfunction (California) |
| | 26 | Air-Fuel Ratio Rich Malfunction (California) |

Malfunction: open or Short in Injector Leak, Blockage, Loose Engine Earth Bolt



P01711

HINT: When start this test, coolant temp. is 35°C (95°F) or less and A/C switch OFF.
Before this test, check the feedback voltage for oxygen sensor.

- (1) Disconnect the ER fuse (15 A) for 10 seconds or more, with ignition switch OFF.
- (2) Initiate test mode: Connect terminals TE2 and E1 of check connector with ignition switch OFF.
- (3) Start the engine and warm the engine up.
- (4) After the engine is warmed up, maintain at 2,500 rpm for 3 minutes.
- (5) Let it idle for 1 minute.

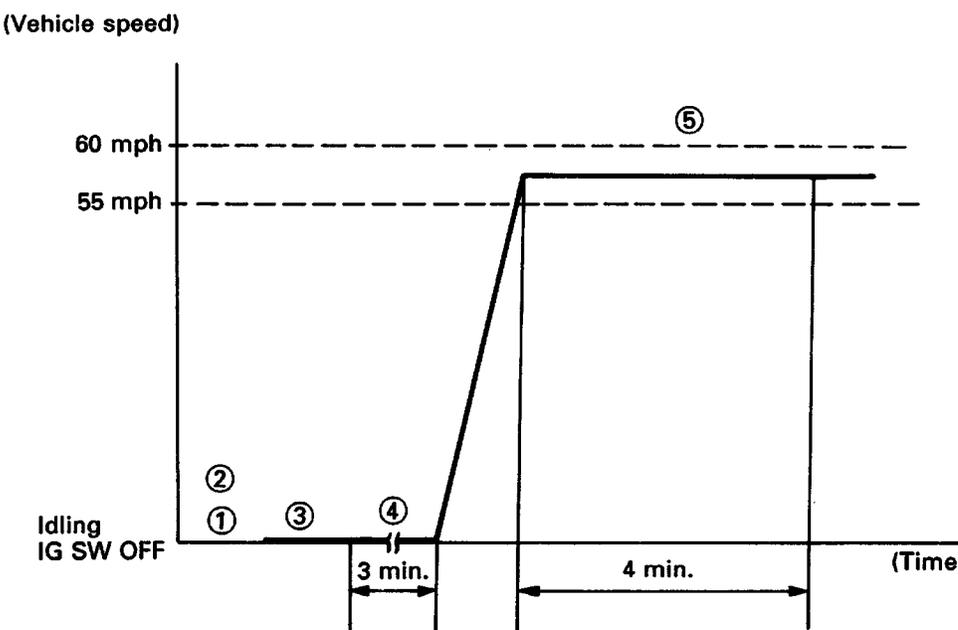
HINT: If any malfunction is detected, the malfunction indicator lamp will light up during step (5).

NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (3S-GTE) (Cont'd)

Purpose of the driving pattern.

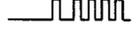
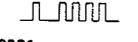
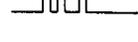
- (a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
- (b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

| Code No. | 71 | EGR System Malfunction (California) |
|--|----|-------------------------------------|
| <p>Malfunction: Short in VSV Circuit for EGR, Loose EGR Hose, Valve Stuck</p> <p>(Vehicle speed)</p>  <p>P01712</p> <p>HINT: When start this test, engine coolant temp. is 35°C (95°F) or less and A/C switch OFF.</p> <ol style="list-style-type: none"> (1) Disconnect the fuse EFI (15 A) for 10 seconds or more, with ignition switch OFF. (2) Initiate test mode: Connect terminals TE2 and E1 of data link connector 1 with ignition switch OFF. (3) Start engine and warm engine up. (4) After engine is warmed up, let it idle for 2 minutes. (5) With the A/C switch OFF and transmission in 5th gear, drive at 55 – 60 mph for 4 minutes. <p>HINT: If any malfunction is detected, the malfunction indicator lamp will light up during step (5).</p> <p>NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.</p> | | |

DIAGNOSTIC TROUBLE CODES (5S-FE)

HINT:

- If a malfunction is detected during the diagnostic trouble code check, refer to the circuit indicated in the table, and turn to the corresponding page.
- Your readings may vary from the parameters listed in the table, depending on the instruments used.

| Code No. | Number of blinks Malfunction Indicator Lamp | System | Malfunction Indicator Lamp | | Diagnosis | Trouble Area | *2 Memory | See Page |
|--------------|---|---|----------------------------|-----------|--|---|-----------|-------------------------------------|
| | | | Normal Mode | Test Mode | | | | |
| — |  FI1401 | Normal | — | — | No trouble code is recorded. code is recorded. | — | — | — |
| 12 |  FI1806 | RPM Signal | ON | N.A. | (1) No NE signal is input to ECM for 2 secs. or more after STA turns ON. (2) No G signal is input to ECM for 3 secs. or more between 600 – 4,000 rpm. | <ul style="list-style-type: none"> • Open or short in NE, G circuit • Distributor • Open or short in STA circuit • ECM | ○ | IG-4 FI-102 FI-1 IS |
| 13 |  FI1607 | RPM Signal | ON | ON | (1) NE signal is not input to ECM for 0.3 secs. or more when engine speed is 1,500 rpm or more. (2) No G signal is input ECM for 4 NE signal. (Test mode only) | <ul style="list-style-type: none"> • Open or short in NE circuit • Distributor • ECM | ○ | IG-4 |
| 14 |  FI1608 | Ignition Signal | ON | N.A. | IG signal from igniter is not input to ECM for 4 – 5 consecutive ignition | <ul style="list-style-type: none"> • Open or short in IGF or IGT circuit from igniter to ECM • Igniter • ECM | ○ | FI-103 FI-119 |
| 16 (AT only) |  BE3931 | Electronic Controlled Transmission Control Signal | ON | N.A. | Normal signal is not output from ECM CPU. | <ul style="list-style-type: none"> • ECM | ○ | — |
| 21 |  FI1609 | Main Oxygen Sensor Signal | ON | N.A. | At normal driving speed (below 60 mph and engine speed is above 1,500 rpm), amplitude of oxygen sensor signal (OX) is reduced to between 0.35 – 0.70 V continuously for 60 secs. or more. | <ul style="list-style-type: none"> • Open or short in oxygen sensor circuit • Oxygen sensor • ECM | ○ | FI-106 FI-122 |
| 22 |  FI1610 | Engine Coolant Temp. Sensor Signal | ON | ON | Open or short in engine coolant temp. sensor circuit for 0.5 sec. or more. (THW) | <ul style="list-style-type: none"> • Open or short in engine coolant temp. sensor circuit • Engine coolant temp. sensor • ECM | ○ | FI-101 FI-117 |
| 24 |  FI1611 | Intake Air Temp. Sensor Signal | x3 ON | ON | Open or short in intake air temp. sensor circuit for 0.5 sec. or more. (THA) | <ul style="list-style-type: none"> • Open or short in intake air temp. sensor circuit • Intake air temp. sensor • ECM | ○ | FI-100 FI-116 |
| 25 |  FI2562 | Air-Fuel Ratio Lean Malfunction | ON | ON | (1) Oxygen sensor output is less than 0.45 V for at least 90 secs. when oxygen sensor is warmed up (racing at 2,000 rpm). – only for code 25 (2) When the engine speed varies by more than 20 rpm over the preceding crankshaft position period during a period of 20 seconds during idling with the engine coolant temp. 60°C (140°F) or more. *6 (2 trip detection logic) (1) and (2) | <ul style="list-style-type: none"> • Engine ground bolt loose • Open in E1 circuit • Open in injector circuit • Fuel line pressure (Injector blockage, etc.) • Open or short in oxygen sensor circuit • Oxygen sensor • Ignition system • Engine coolant temp. sensor • Vacuum sensor • ECM | ○ | FI-99 FI-106 FI-115 FI-122 |
| 26* |  FI2563 | Air-Fuel Ratio Rich Malfunction | ON | ON | (1) Oxygen sensor output is less than 0.45 V for at least 90 secs. when oxygen sensor is warmed up (racing at 2,000 rpm). – only for code 25 (2) When the engine speed varies by more than 20 rpm over the preceding crankshaft position period during a period of 20 seconds during idling with the engine coolant temp. 60°C (140°F) or more. *6 (2 trip detection logic) (1) and (2) | <ul style="list-style-type: none"> • Engine ground bolt loose • Open in E1 circuit • Short in injector circuit • Fuel line pressure (Injector leakage, etc.) • Open or short in cold start injector circuit • Cold start injector • Open or short in oxygen sensor circuit • Oxygen sensor • Engine coolant temp. sensor • Vacuum sensor • Compression pressure • ECM | ○ | FI-99 FI-106 FI-115 FI-122 |

DIAGNOSTIC TROUBLE CODES (5S-FE) (Cont'd)

| Code No. | Number of blinks Malfunction Indicator Lamp | System | Malfunction Indicator Lamp | | Diagnosis | Trouble Area | w2 Memory | See page |
|----------|---|---------------------------------|----------------------------|-----------|--|--|-----------|-------------------|
| | | | Normal Mode | Test Mode | | | | |
| 27*4 |  FI3294 | Sub-Oxygen Sensor Signal | ON | ON | When sub-oxygen sensor is warmed up and full acceleration continued for 2 seconds, output of main oxygen sensor is 0.45 V or more (rich) and output of sub-oxygen sensor is 0.45 V or less (lean). (OX2) *5 (2 trip detection logic) | <ul style="list-style-type: none"> Short or open in sub-oxygen sensor circuit Sub-oxygen sensor ECM | ○ | FI-106 FI-122 |
| 31 |  FI1612 | Vacuum Sensor Signal | ON | ON | Open or short detected continuously for 0.5 sec. or more in vacuum sensor circuit (PIM) | <ul style="list-style-type: none"> Open or short in vacuum sensor circuit Vacuum sensor ECM | ○ | FI-98 FI-114 |
| 41 |  FI1614 | Throttle Position Sensor Signal | ON*3 | ON | Open or short detected continuously for 0.5 sec. or more in throttle sensor (VTA) circuit. | <ul style="list-style-type: none"> Open or short in throttle position sensor circuit Throttle position sensor ECM | ○ | FI-96 FI-112 |
| 42 |  FI1615 | Vehicle Speed Sensor Signal | OFF | OFF | (Mfr) SPD signal is not input to ECM for at least 8 seconds during high load driving with engine speed between 3,100 rpm and 5,000 rpm. (AIT) PNP OFF and engine speed 3,100 rpm or more | <ul style="list-style-type: none"> Open or short in vehicle speed sensor circuit Vehicle speed sensor ECM | ○ | — |
| 43 |  FI1616 | Starter Signal | N.A. | OFF | No starter signal is not input to ECM even once after ignition. | <ul style="list-style-type: none"> Open or short in starter signal circuit Open or short in IG SW or main relay circuit ECM | X | FI-102 FI-118 |
| 52 |  FI1618 | Knock Sensor Signal | ON | N.A. | In area of knock control signal from knock sensor is not input to ECM for 6 revolutions. (KNK) | <ul style="list-style-type: none"> Open or short in knock sensor circuit Knock sensor (looseness, etc.) ECM | ○ | — |
| 71 *4 |  FI2622 | EGR System Malfunction | ON | ON | 50 seconds from start of EGR operation, EGR gas temp. is less than 70°C with engine coolant temp. 80°C (176°) or more. | <ul style="list-style-type: none"> Open in EGR gas temp sensor circuit Open in VSV circuit for EGR EGR vacuum hose disconnected, valve stuck Clogged in EGR gas passage ECM | ○ | FI-1 o7 FI-123 |
| 51 |  FI1617 | Switch Condition Signal | N.A. | OFF | Displayed when A/C is ON IDI contact OFF or shift position in "R", "D", "2", or N1" positions with the check terminals EI and TE1 connected. | <ul style="list-style-type: none"> A/C switch circuit Throttle position sensor IDL circuit Neutral start switch circuit Accelerator pedal, cable ECM | X | FI-96 FI-122 |

REMARKS:

"ON" displayed in the diagnosis trouble mode column indicates that the Malfunction Indicator Lamp is lighted up when a malfunction is detected. "OFF" indicates that the Malfunction Indicator Lamp does not light up during malfunction diagnosis, even if a malfunction is detected. "N.A." indicates that the item is not included in malfunction diagnosis.

*2: "0" in the memory column indicates that a diagnostic trouble code is recorded in the ECM memory when a malfunction occurs. "X" indicates that a diagnostic trouble code is not recorded in the ECM memory even if a malfunction occurs. Accordingly, output of diagnostic results in normal or test mode is performed with the ignition switch ON.

*3: The Malfunction Indicator Lamp comes on if malfunction occurs only for California specifications.

*4: Code 26, 27 and 71 is used only for California specifications.

*5: "2 trip detection logic" (See page FI-40.)

DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (5S-FE)

Purpose of the driving pattern.

- (a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
- (b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

| Code No. | 21 | Main Oxygen Sensor Circuit |
|---|----|----------------------------|
| <p data-bbox="142 520 768 552">Malfunction: Deterioration of Oxygen Sensor</p> <div data-bbox="337 615 1239 1209"> <p>The graph plots vehicle speed against time. The vertical axis represents speed in miles per hour (mph), with dashed lines at 40 mph and 50 mph. The horizontal axis represents time. The driving pattern is divided into several stages: (1) Ignition switch OFF, (2) Engine start, (3) Engine warm-up, (4) 3-minute idle period, (5) Gradual acceleration from idle to 40 mph and then to 50 mph, and (6) Maintenance of 40-50 mph for 1-2 minutes.</p> </div> <p data-bbox="167 1234 228 1255">P01713</p> <ol style="list-style-type: none"> <li data-bbox="147 1293 1235 1325">(1) Disconnect the EFI fuse (15 A) for 10 seconds or more, with ignition switch OFF. <li data-bbox="147 1331 1312 1398">(2) Initiate test mode: Connect terminals TE2 and E1 of data link connector 1 with ignition switch OFF. <li data-bbox="147 1404 1157 1436">(3) Start the engine and warm the engine up with all accessory switches OFF. <li data-bbox="147 1442 894 1474">(4) After the engine is warmed up, let it idle for 3 minutes. <li data-bbox="147 1480 1317 1667">(5) Accelerate gradually and maintain at approximately 1,500 rpm, or within the 1,300 to 1,700 rpm range. Turn the A/C on, and drive in "D" for automatic, or in case of manual transmission, upshift appropriately. Shift carefully so that the engine speed would not fall below 1,200 rpm. Depress the accelerator pedal gradually and maintain a steady speed to avoid engine braking. <li data-bbox="147 1673 1089 1740">(6) Maintain the vehicle speed at 40 – 50 mph. Keep the vehicle running for 1 – 2 minutes after starting acceleration. <p data-bbox="147 1787 1378 1818">HINT: If any malfunction is detected, the malfunction indicator lamp will light up during step (6).</p> <p data-bbox="147 1850 1328 1881">NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.</p> | | |

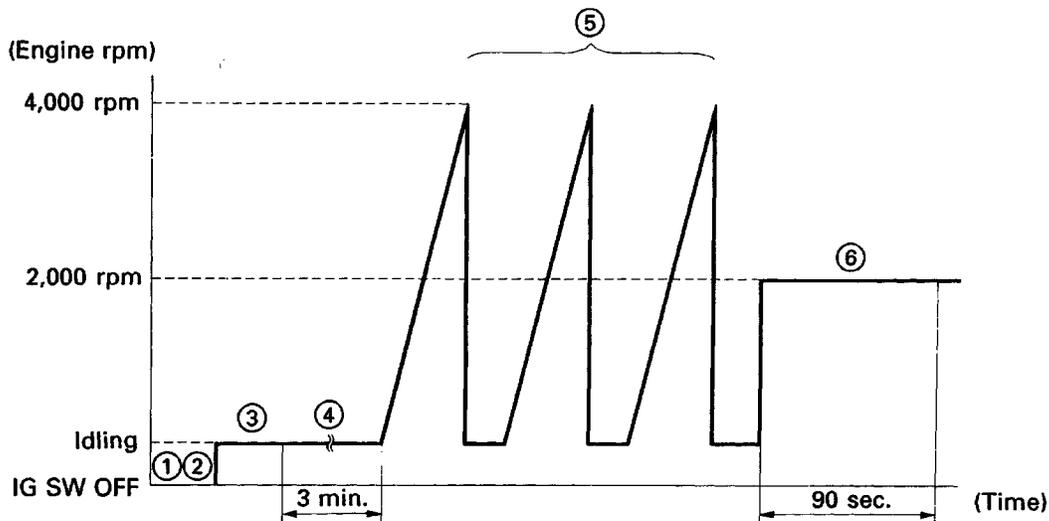
DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (5S-FE) (Cont'd)

Purpose of the driving pattern.

- (a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
 (b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

| | | |
|-----------------|-----------|--|
| Code No. | 25 | Air-Fuel Ratio Lean Malfunction |
| | 26 | Air-Fuel Ratio Rich Malfunction |

Malfunction: Open or Short in Main Oxygen Sensor



P02491

- (1) Disconnect the EFI fuse (15 A) for 10 seconds or more, with ignition switch OFF.
- (2) Initial test mode: Connect terminals TE2 and E1 of data link connector 1 with ignition switch OFF.
- (3) Start the engine and warm the engine up, with all accessory switches OFF.
- (4) After the engine is warmed up, let it idle for 3 minutes.
- (5) Accelerate rapidly to 4,000 rpm three times.
- (6) Maintain at 2,000 rpm for 90 seconds.

HINT: If a malfunction is detected, the malfunction indicator lamp will light up during step (6).

NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

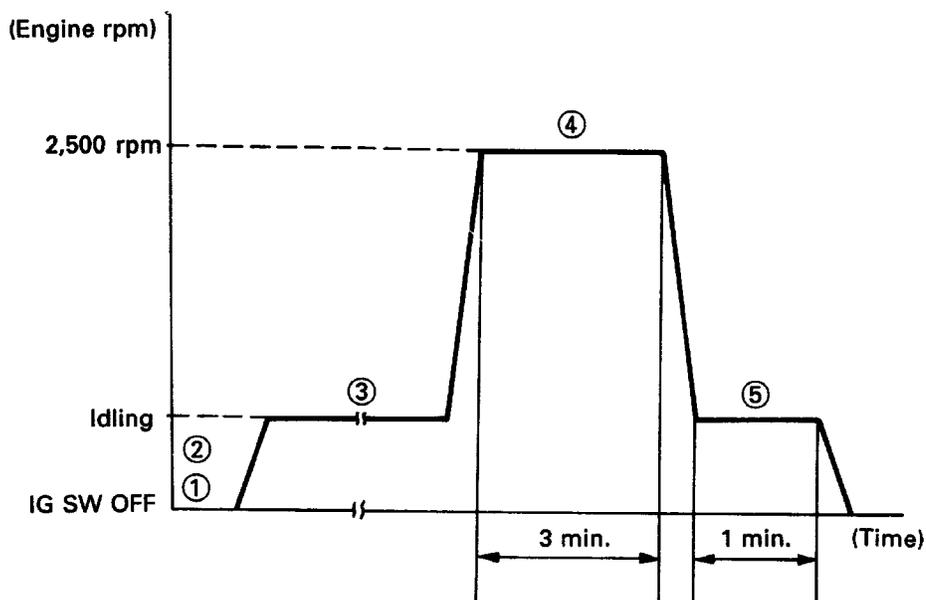
DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (5S-FE) (Cont'd)

Purpose of the driving pattern.

- (a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
- (b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

| | | |
|-----------------|-----------|---|
| Code No. | 25 | Air-Fuel Ratio Lean Malfunction (California) |
| | 26 | Air-Fuel Ratio Rich Malfunction (California) |

Malfunction: Open or Short in Oxygen Sensor, Open or Short in Injector Leak, Blockage, Loose Engine Earth Bolt



P01711

HINT: Before this test, check the feedback voltage for oxygen sensor.

- (1) Disconnect the EFI fuse (15 A) for 10 seconds or more, with ignition switch OFF.
- (2) Initiate test mode: Connect terminals TE2 and E1 of data link connector 1 with ignition switch OFF.
- (3) Start the engine and warm the engine up.
- (4) After the engine is warmed up, maintain at 2,500 rpm for 3 minutes.
- (5) Let it idle for 1 minute.

HINT: If any malfunction is detected, the malfunction indicator lamp will light up during step 0.

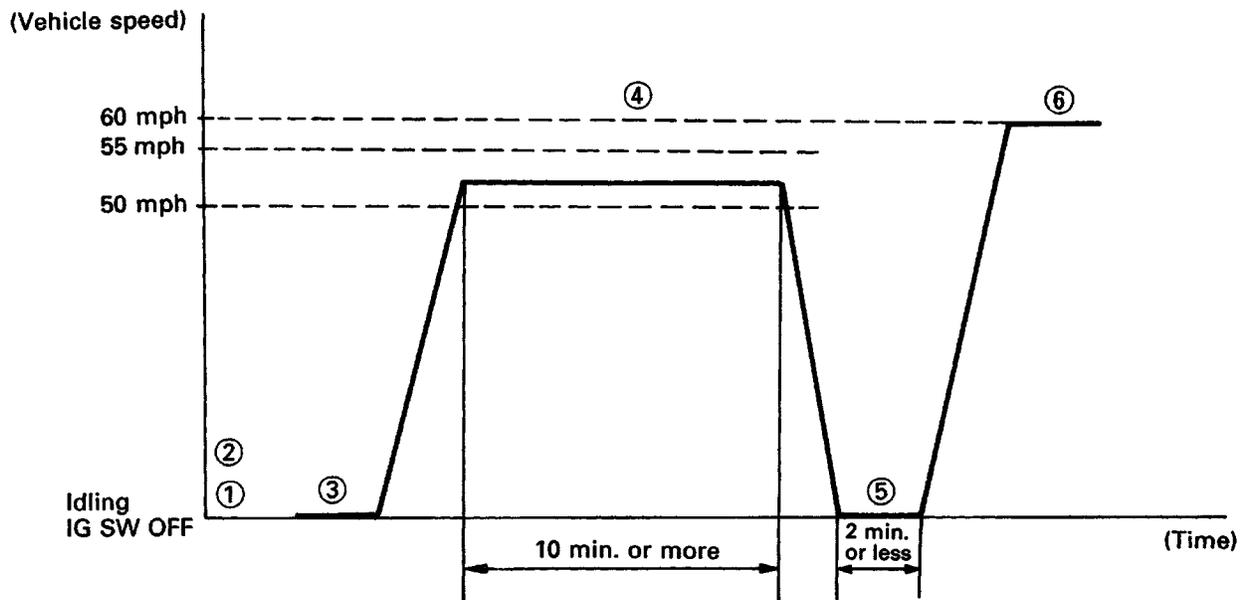
NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (5S-FE) (Cont'd)

Purpose of the driving pattern.

- (a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
- (b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

| | | |
|-----------------|-----------|---|
| Code No. | 27 | Sub-Oxygen Sensor Circuit (California) |
|-----------------|-----------|---|

Malfunction: Open or Short in Sub-Oxygen Sensor

P01714

- (1) Disconnect the EFI fuse (15 A) for 10 seconds or more, with ignition switch OFF.
- (2) Initiate test mode: Connect terminals TE2 and E1 of data link connector 1 with ignition switch OFF.
- (3) Start the engine and warm the engine up, with all accessory switches OFF.
- (4) After the engine is warmed up, let it drive at 50 – 55 mph for 10 minutes or more.
- (5) After driving, stop at a safe place and perform idling for 2 minutes or less.
- (6) After performing the idling in (5), perform acceleration to 60 mph with the throttle fully open.

HINT: If any malfunction is detected, the malfunction indicator lamp will light up during step (6).

NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

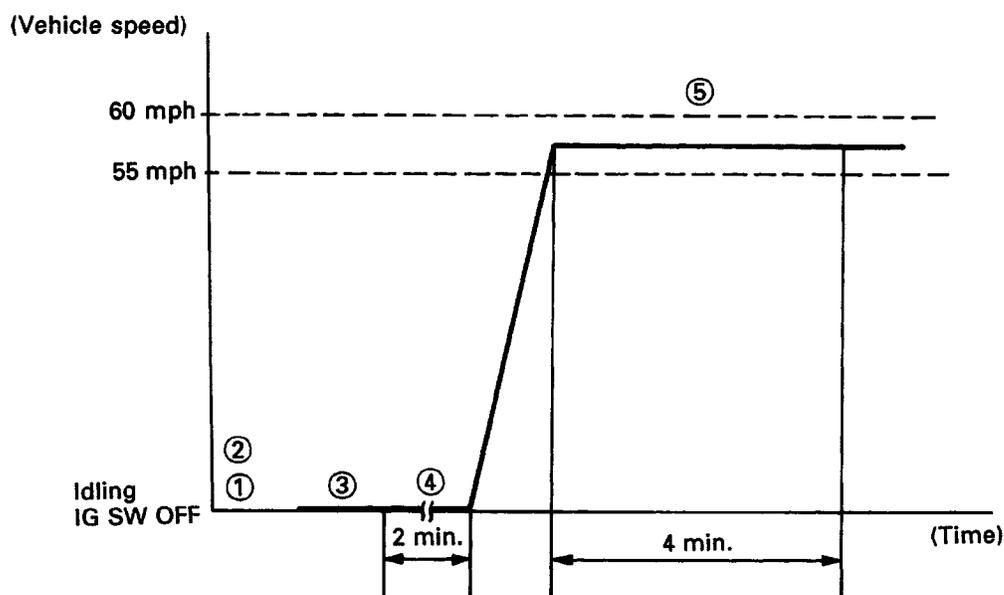
DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (5S-FE) (Cont'd)

Purpose of the driving pattern.

- (a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
- (b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

| | | |
|-----------------|-----------|--|
| Code No. | 71 | EGR System Malfunction (California) |
|-----------------|-----------|--|

Malfunction: Short in VSV Circuit for EGR, Loose EGR Hose, Valve Stuck



P01712

- (1) Disconnect the fuse EFI (15 A) for 10 seconds or more, with ignition switch OFF.
- (2) Initiate test mode: Connect terminals TE2 and E1 of data link connector 1 with ignition switch OFF.
- (3) Start engine and warm engine up.
- (4) After engine is warmed up, let it idle for 3 minutes.
- (5) With the A/C switch OFF and transmission in 5th gear ("D" position for AM, drive at 55 – 60 mph for 4 minutes.

HINT: If any malfunction is detected, the malfunction indicator lamp will light up during step (5).

NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

INSPECTION OF DIAGNOSIS CIRCUIT

