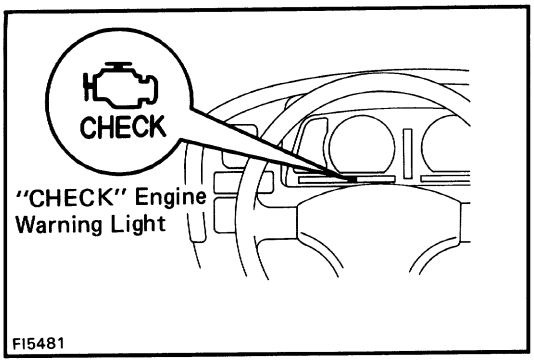
DIAGNOSIS SYSTEM DESCRIPTION

The ECU contains a built–in self–diagnosis system by which troubles with the engine signal network are detected and a "CHECK" engine warning light on the instrument panel flashes.

By analyzing various signals as shown in the later tables (See pages FI–24, FI–25), the ECU detects system malfunctions which are related to the various operating parameter sensors or actuator. The ECU stores the failure code associated with the detected failure until the diagnosis system is cleared by removing the EFI fuse with the ignition switch OFF.

The "CHECK" engine warning light on the instrument panel informs the driver that a malfunction has been detected. The light goes out automatically when the malfunction has been cleared.



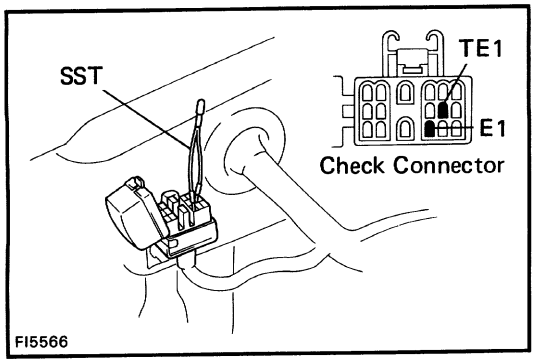
"CHECK" ENGINE WARNING LIGHT CHECK

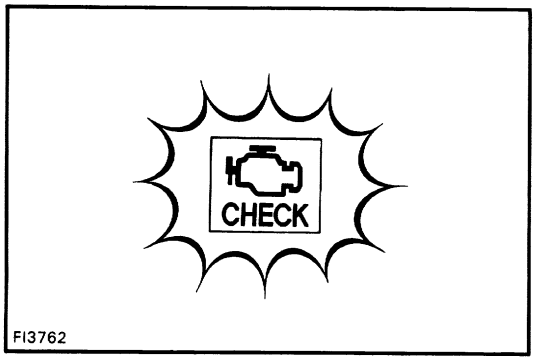
1. The "CHECK" engine warning light will come on when the ignition switch is placed at ON and the engine is not running.
2. When the engine is started, the "CHECK" engine warning light should go out.
   If the light remains on, the diagnosis system has detected a malfunction or abnormality in the system.

OUTPUT OF DIAGNOSTIC CODES

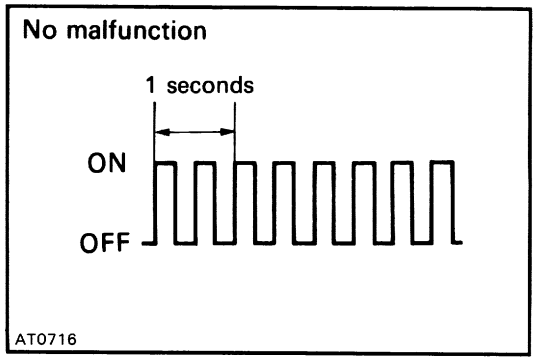
To obtain an output of diagnostic codes, proceed as follow:

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
   (e) Engine at normal operating temperature
2. Turn the ignition switch to ON. Do not start the engine.
3. Using SST, connect terminals TE1 and E1 of the check connector.
   SST 09843–18020





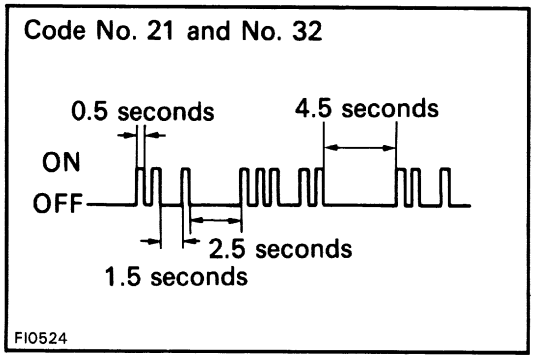
4. Read the diagnostic code as indicated by the number of flashes of the "CHECK" engine warning light.



Diagnostic Codes (See pages FI–24, FI–25)

(a) Normal System Operation (no malfunction)

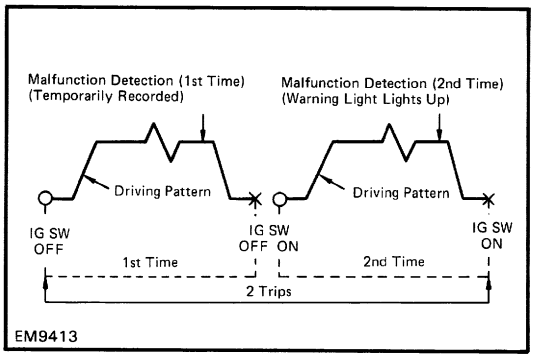
- The light will alternately blink ON and OFF 2 times per second.



(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 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.
- 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 check connector are connected.

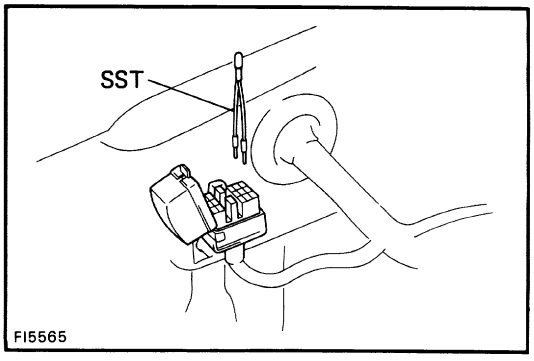
HINT: In the event of a number of trouble codes, indication will begin from the smaller value and continue to the larger.



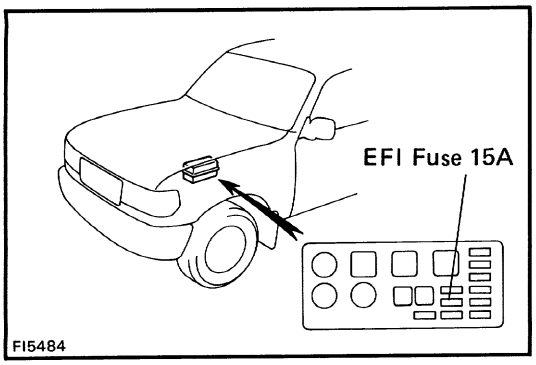
(c) (2 trip detection logic)

Diagnostic codes 25, 26, 27 and 71 use "2 trip detection logic". With this logic, when a malfunctions is first detected, the malfunction is temporarily stored in the ECU memory. If the same case is detected again during the second drive test, this second detection causes the "CHECK" Engine Warning Light to light up.

The 2 trip repeats the same mode a 2nd time. (However, the ignition switch must be turned OFF between the 1 st time and 2nd time.) In the Test Mode, the "CHECK" Engine Warning Light lights up the 1st time a malfunction is detected.



5. After the diagnosis check, remove SST.
SST 09843–18020



CANCELLING DIAGNOSTIC CODE

1. After repair of the trouble area, the diagnostic code retained in memory by the ECU must be cancelled out by removing the EFI fuse (15A) for 30 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 code is not cancelled out, it will be retained by the ECU and appear along with a new code in the event of future trouble.
- If it is necessary to work engine components requiring removal of the battery terminal, a check must first be made to see if a diagnostic code has been recorded.

2. After cancellation, perform a road test of the vehicle to check that a ”normal” code is now read on the ”CHECK” engine warning light.

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

DIAGNOSIS INDICATION

1. Including ”’normal”, the ECU is programmed with the following 17 (Ex. California vehicles) or 18 (California vehicles) diagnostic codes.
2. When 2 or more codes are indicated, the lowest number (code) will appear first.
3. All detected diagnostic codes, except code No.51, will be retained in memory by the ECU from the time of detection until cancellation.
4. Once the malfunction is cleared, the ”CHECK” engine warning light on the instrument panel will go out but the diagnostic code(s) remains stored in ECU memory (except for code No.51).

DIAGNOSTIC CODES

HINT:

- If a malfunction is detected during the diagnostic 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 chart depending on the instruments used.

Code No.	Number of Check engine blinks	System	*1 "CHECK" Engine Warning Light	Diagnosis	Trouble area	*2 Memory	See page
—	 FI1604	Normal	—	No malfunctions detected.	—	—	—
12	 FI1606	RPM Signal	ON	No "NE" or "G" signal to ECU within 2 seconds after cranking the engine.	• Distributor circuit • Distributor • Starter signal circuit • ECU	○	IG–4
13	 FI1607	RPM Signal	ON	No "NE" signal to ECU when engine speed is above 1,000 rpm.	• Distributor circuit • Distributor • ECU	○	—
14	 FI1608	Ignition Signal	ON	No "IGF" signal to ECU 6 – 8 times in succession.	• Igniter and ignition coil circuit • Igniter and ignition coil • ECU	○	FI–45
21	 FI1609	Oxygen Sensor Signal	ON	During air–fuel ratio feedback correction, voltage output from the oxygen sensor does not exceed a set value on the lean side and the rich side continuously for a certain period. *6 (2 trip detection logic)	• Oxygen sensor circuit • Oxygen sensor • ECU	○	FI–48
		Oxygen Sensor Heater Signal		Open or short circuit in oxygen sensor heater.	• Oxygen sensor heater circuit • Oxygen sensor heater • ECU		
22	 FI1610	Water Temp. Sensor Signal	ON	Open or short circuit in water temp. sensor signal.	• Water temp. sensor circuit • Water temp. sensor • ECU	○	FI–41
24	 FI1611	Intake Air Temp. Sensor Signal	ON*3	Open or short circuit in intake air temp. sensor signal.	• Intake air temp. sensor circuit • Intake air temp. sensor • ECU	○	FI–40
25	 FI2562	Air–fuel Ratio Lean Malfunction	ON	(1) Oxygen sensor output at 2,500 rpm is less than 0.45 V for at least 20 seconds when warmed up. Applies only to code 25 and for California models, excepting high–altitude areas. *4 (2) When the oxygen sensor signal oscillates beyond 0.45 V more than 60 times within a 5–second period while driving at speeds above 15 km/h at coolant temperature of 70°C (158°F) or above. *4 (3) When the air/fuel compensation value fluctuates more than 15 percent from the ECU nominal value within a 50–second period, at coolant temprature of 70°C (158°F) or above. *6 (2 trip detection logic) (1) ~ (3)	• Injector circuit • Injector • Fuel line pressure • Air flow meter • Air induction system • Oxygen sensor circuits • Oxygen sensors • Igition system • ECU	○	—
26	 FI2563	Air–fuel Ratio Rich Malfunction	ON		• Injector circuit • Injector • Fuel line pressure • Air flow meter • Cold start injector • ECU	○	—

DIAGNOSTIC CODES (Cont'd)

Code No.	Number of Check engine blinks	System	*1 "CHECK" Engine Warning Light	Diagnosis	Trouble area	*2 Memory	See page
28	 FI2698	No. 2 Oxygen Sensor Signal / No. 2 Oxygen Sensor Heater	ON	Same as code No. 21	Same as code No. 21	○	FI–48
31	 FI1612	Air Flow Meter Signal	ON	Open circuit in VC and VS signal or short circuit between VS and E2 when idle contacts are closed.	• Air flow meter circuit • Air flow meter • EC U	○	FI–39
32	 FI1613	Air Flow Meter Signal	ON	Open circuit in E2 or short circuit between VC and VS.	• Air flow meter circuit • Air flow meter • ECU	○	FI–39
35	 FI2699	HAC Sensor Signal	ON	Open circuit in altitude compensation sensor signal.	• ECU	○	—
41	 FI1614	Throttle Position Sensor Signal	ON*3	Open or short circuit in throttle position sensor signal.	• Throttle position sensor circuit • Throttle position sensor • ECU	○	FI–39
42	 FI1615	Vehicle Speed Sensor Signal	OFF	No "SPD" signal for 8 seconds when engine speed is between 2,000 rpm and 5,000 rpm and coolant temp. is below 80°C (176°F) except when racing the engine.	• Vehicle speed sensor circuit • Vehicle speed sensor • ECU	○	—
43	 FI1616	Starter Signal	OFF	No "STA" signal to ECU until engine speed reaches 800 rpm with vehicle not moving	• Ignition switch circuit • Ignition switch • ECU	○	FI–43
*5 71	 FI2622	EGR System Malfunction	ON	30 secs. from start of EGR operation, EGR gas temp. is less than 100°C (212°F) with coolant temp. 60°C (140°F) or more. *6 (2 trip detection logic).	• EGR valve • EGR hose • EGR gas temp. sensor circuit • EGR gas temp. sensor • VSV for EGR • VSV circuit for EGR • ECU	○	FI–49
51	 FI1617	Switch Condition Signal	OFF	No "IDL" signal, "NSW" signal or "A/C" signal to ECU, with the check terminals E1 and TE1 connected.	• A/C switch circuit • A/C switch • A/C amplifire • Throttle position sensor circuit • Throttle position sensor • Neutral start switch • Acceleration pedal and cable • ECU	×	—

REMARKS

*1: "ON" displayed in the diagnosis mode column indicates that the "CHECK" engine Warning Light 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.

*2: "○" in the memory column indicates that a diagnostic code is recorded in the ECU memory when a malfunction occurs. "x" indicates that a diagnostic code is not recorded in the ECU memory even if a malfunction occurs. Accordingly, output of diagnostic results is performed with the IG SW ON.

*3: The "CHECK" engine Warning Light comes on if malfunction occurs only for California specifications. (except High altitude area)

*4: No. (2) (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–22)

DIAGNOSIS CODE DETECTION DRIVING PATTERN

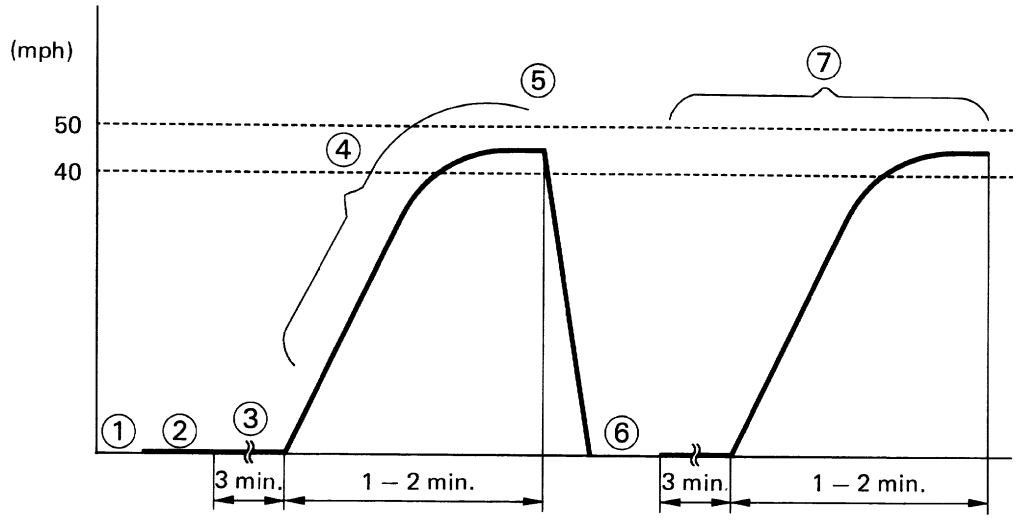
Purpose of the driving pattern.

(a) To simulate diagnosis code detecting procedure after diagnosis code is recorded.

(b) To verify that the repair has corrected the problem and that the diagnostic code is no longer stored.

Diag. Code	21,28	Oxygen Sensor Circuit

Malfunction: Main Oxygen Sensor Deterioration



(1) Disconnect the EFI fuse (15A) for 10 seconds or more, with ignition switch OFF.
Reinstall the fuse.

(2) Start the engine and warm the engine up with all ACC switch OFF.

(3) After the engine is warmed up, let it idle for 3 minutes.

(4) Acclerate gradually and maintain at approximately 1500 rpm, or within the 1300 to 1700 rpm range. Turn the A/C on, and drive in "D" for automatic, or in case of manual transmission, up–shift appropriately. Shift carefully so that the engine speed would not fall below 1200 rpm. De–press the accelerator pedal gradually and maintain a steady speed to avoid engine braking.

(5) Maintain the vehicle speed at 40–50 mph.
Keep the vehicle running for 1 to 2 minutes after starting acceleration.

(6) After driving, stop at a safe place and turn the ignition switch off for 3 seconds or more.

(7) Start the engine and repeat steps (3), (4), and (5).

HINT: If a malfunction is detected the "CHECK" engine warning light will light up during step(7).

NOTICE: If this procedure is not strictly followed, it would not be possible to detect the malfunctions.

DIAGNOSIS CODE DETECTION DRIVING PATTERN

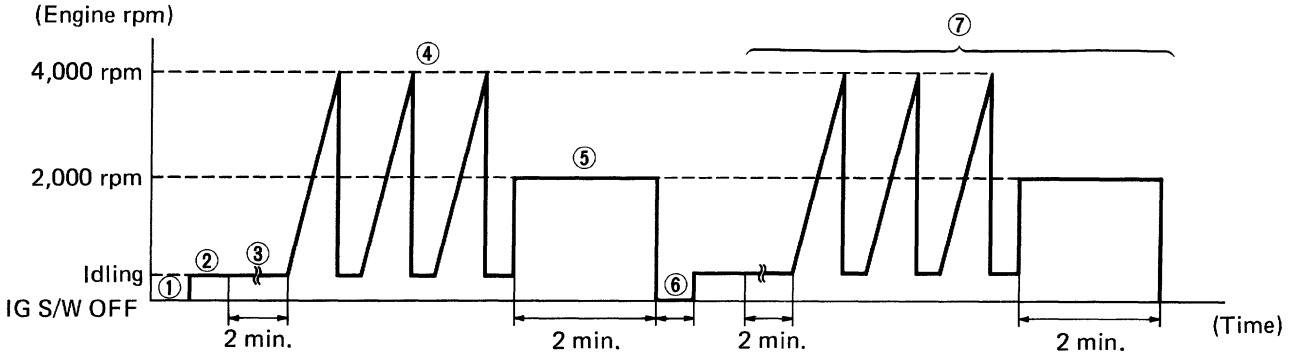
Purpose of the driving pattern.

(a) To simulate diagnosis code detecting procedure after diagnosis code is recorded.

(b) To verify that the repair has corrected the problem and that the diagnostic code is no longer stored.

Diag. Code 25	**Air–Fuel Ratio Lean Malfunction**
Diag. Code 26	**Air–Fuel Ratio Rich Malfunction**

Malfunction: Open or Short in Oxygen Sensor



P02492

① Disconnect the EFI fuse (15A) for 10 seconds or more, with ignition switch OFF.

② Start and warm up the engine.

③ After the engine is warmed up, let it idle for 2 minutes.

④. Rev the engine to 4,000 rpm three times.

⑤. Accelerate and maintain at 2,000 rpm for 2 minutes

⑥. Turn the ignition switch off for 10 seconds.

⑦. Start the engine and repeat steps (2), (3), (4), and (5).

HINT: If a malfunction is detected the ”CHECK” engine warning light will light up during step (7).

NOTICE: If this procedure is not strictly followed, it would not be possible to detect the malfunctions.

DIAGNOSIS CODE DETECTION DRIVING PATTERN

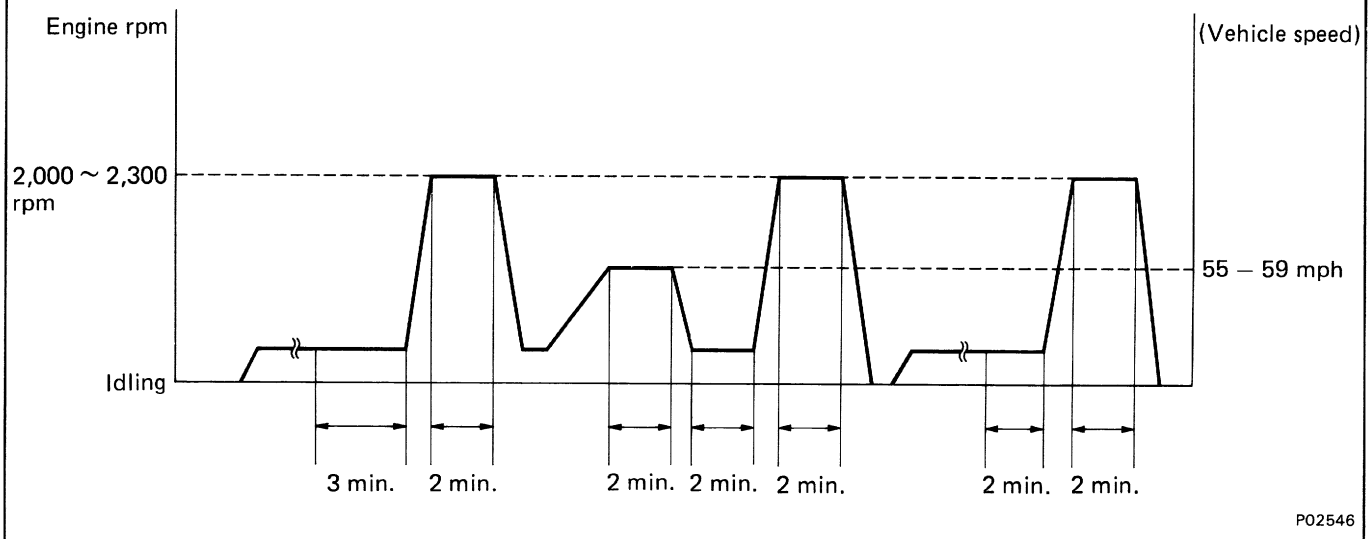
Purpose of the driving pattern.

(a) To simulate diagnosis code detecting procedure after diagnosis code is recorded.

(b) To verify that the repair has corrected the problem and that the diagnostic code is no longer stored.

Diag. Code 25	**Air–Fuel Ratio Lean Malfunction (California)**
Diag. Code 26	**Air–Fuel Ratio Rich Malfunction (California)**

Malfunction: Open or Short in Injector Leak, Blockage



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

1. Disconnect the EFI fuse (15A) for 10 seconds or more, with ignition switch OFF.
2. Start and warm up the engine.
3. After the engine is warmed up, let it idle for 3 minutes.
   (After the engine has started, do not depress the accelerator pedal.)
4. Accelerate and maintain at 2,000 to 2,300 rpm for 2 minutes.
5. Drive the vehicle at 55 to 60 mph for 2 minutes.
6. Stop at a safe place and idle for 2 minutes.
7. Accelerate and maintain at 2,000 to 2,300 rpm for 2 minutes.
8. Turn the ignition switch OFF for 3 seconds or more.
9. Start and warm up the engine.
10. After the engine is warmed up, repeat steps 6 and 7.

HINT: If a malfunction is detected the ”CHECK” engine warning light will light up during step 10.

NOTICE: If this procedure is not strictly followed, it would not be possible to detect the malfunc–tions.

DIAGNOSIS CODE DETECTION DRIVING PATTERN

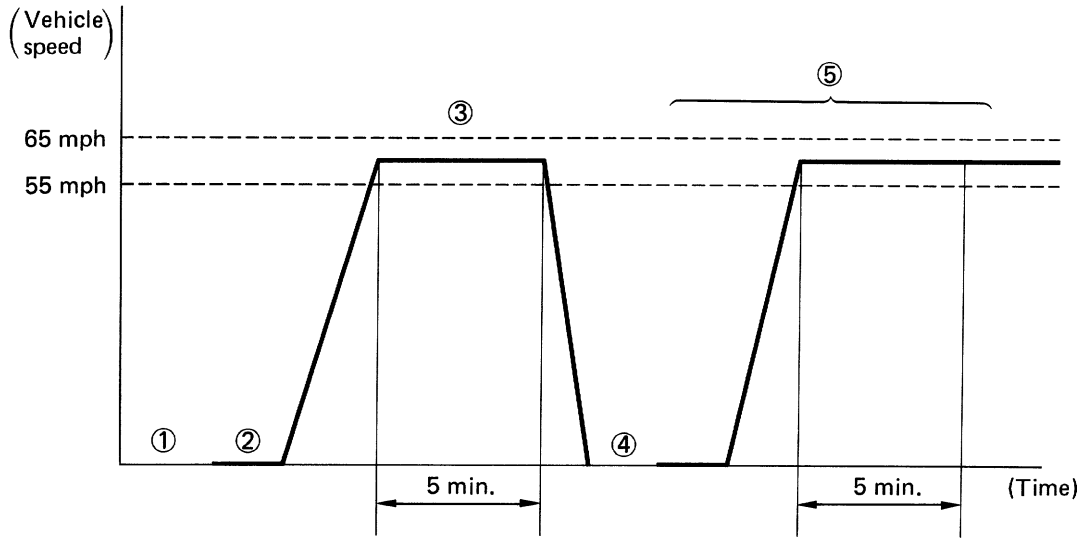
Purpose of the driving pattern.

(a) To simulate diagnosis code detecting procedure after diagnosis code is recorded.

(b) To verify that the repair has corrected the problem and that the diagnostic code is no longer stored.

Diag. Code 71	EGR System Malfunction (California)

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



P02544

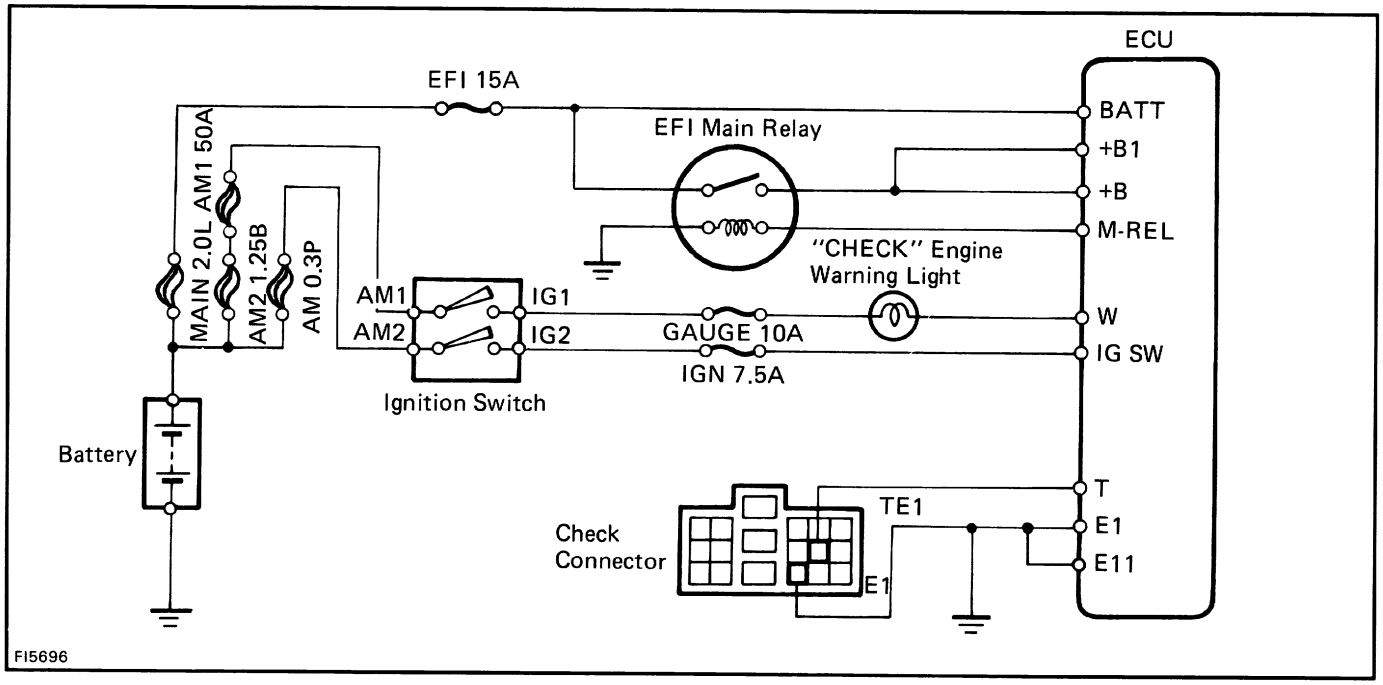
1. Disconnect the EFI fuse (15A) for 10 seconds or more, with ignition switch OFF.
2. Start and warm up the engine.
3. With the transmission in ”D” range and A/C switch OFF, drive at 55–65 mph for 5 minutes.
4. Stop at a safe place and turn the ignition switch OFF for 3 seconds or more.
5. Start the engine and repeat steps 2 and 3.

HINT: If a malfunction is detected the ”CHECK” engine warning light will light up during step 5.

NOTICE: If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.

If this procedure is not strictly followed, it would not be possible to detect the malfunctions.

INSPECTION OF DIAGNOSIS CIRCUIT



1.

Does "CHECK" engine warning light come on when ignition switch is at ON? — YES → System Normal

NO

Does "CHECK" engine warning light come on when ECU terminal W is grounded to the body? — YES → Check wiring between ECU terminal E1 and body ground. — OK → Try another ECU.

NO

BAD → Repair or replace.

Check bulb, fuse and wiring between ECU and ignition switch.

BAD

Repair or replace.

2.

Does "CHECK" engine warning light go off when the engine is started? — YES → System Normal

NO

Check wiring between ECU and "CHECK" engine warning light. — BAD → Repair.

OK

Is there diagnostic code output when check connector terminals TE1 and E1 are connected? — NO → Check wiring between ECU terminal T and check connector terminal TE1, and ECU terminal E1 and check connector terminal E1.

YES

OK

Does "CHECK" engine warning light go out after repair according to malfunction code? — NO → Further repair required.

Try another ECU.

YES

System OK → Cancel out diagnostic code.