DIAGNOSIS SYSTEM

DESCRIPTION

The ECU contains a built–in self–diagnosis system which detects troubles within the engine signal network and flashes a ”CHECK ENGINE” warning light on the instrument panel.
By analyzing various signals as shown in the later table (pages FI–108 and FI–109) the ECU detects system malfunctions which are related to the various operating parameter sensors to actuator. The ECU stores the failure code associated with the detected failure until the diagnosis system is cleared by removing the STOP fuse with ignition switch off.
A ”CHECK ENGINE” warning light on the instrument panel informs the driver that a malfunction has been detected.
The light goes off 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 off.

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 follows:

1. Initial conditions
   (a) Battery voltage approx. 12 V
   (b) Throttle valve fully closed (throttle position sensor IDL points closed)
   (c) Transmission in neutral range
   (d) Accessories switched OFF
2. Turn the ignition switch ON. Do not start the engine.
3. Using SST, connect terminals TE1 and E1 of the check connector.

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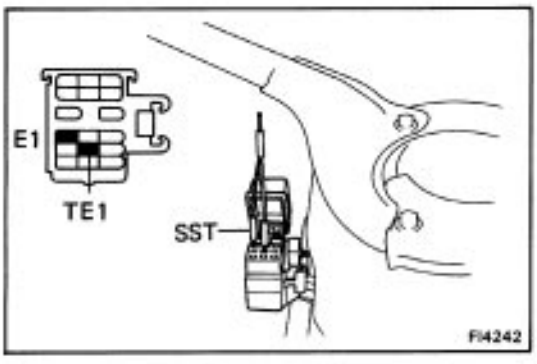
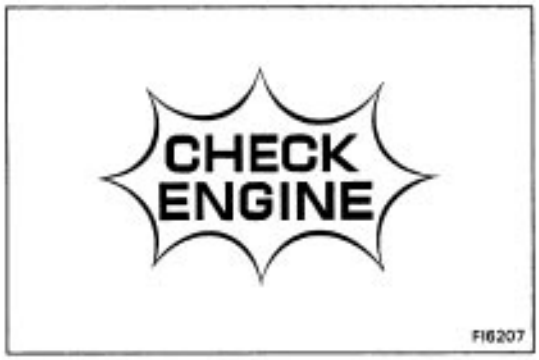
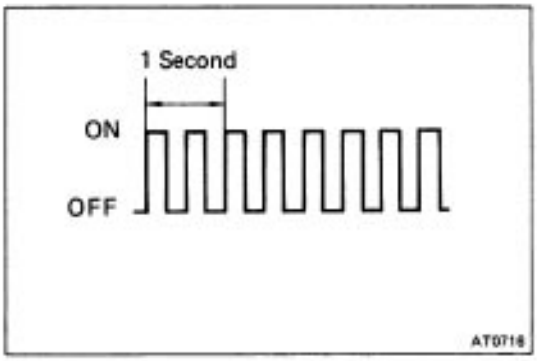
HINT: The check connector is located near the air flow meter.





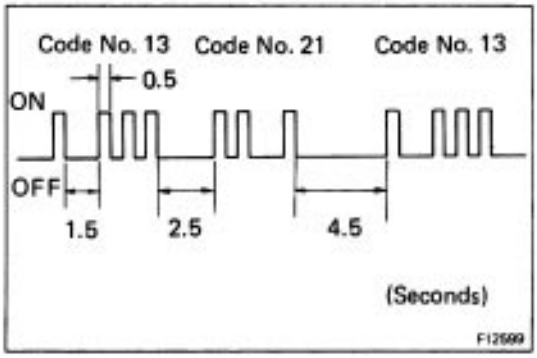
4. Read the diagnostic code as indicated by the number of flashes of the ”CHECK ENGINE” warning light.



Diagnostic code (See pages FI–108 and FI–109)

(a) Normal System Operation (no malfunction)

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



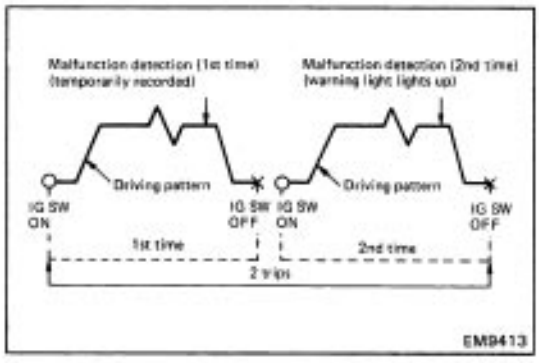
(b) Malfunction Code Indication

- The light will blink a number of times equal to the malfunction code indication as follows:

1. Between the first digit and second digit, 1.5 seconds.
2. Between code and code, 2.5 seconds.
3. Between all malfunction codes, 4.5 seconds.

The diagnostic code series will be repeated as long as the check connector terminals TE1 and E1 are connected.

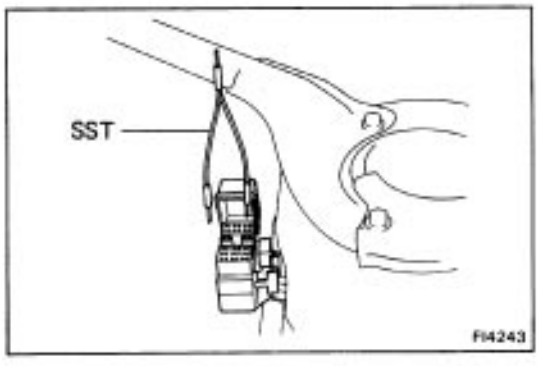
HINT: In the event of a number of trouble codes, indication will begin from the small value and continue to the larger in order.



(c) (2 trip detection logic)

Diagnostic codes 21, 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 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 1st time and 2nd time).



5. After the diagnostic check, remove SST from the check connector.

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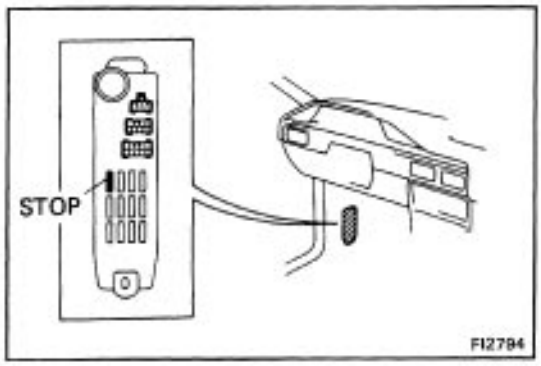


CANCELLING DIAGNOSTIC CODE

1. After repair of the trouble area, the diagnostic code retained in memory by the ECU must be cancelled out by removing the fuse STOP (15 A), located behind driver's kick panel, 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 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 on engine components requiring removal of the battery terminal, a check must first be made to see if a diagnostic code has been recorded.

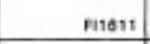
2. After cancellation, perform a road test, to confirm that a "normal" code (No. 1) is now read on the "CHECK ENGINE" warning light.

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

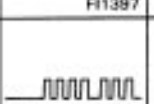
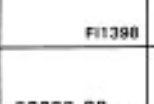
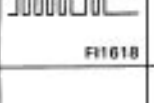
DIAGNOSIS INDICATION

1. Including "normal", the ECU is programmed with the following 15 (Federal and Canada) or 17 (California) diagnostic codes.
2. When 2 or more codes are indicated, the lowest number (code) will appear first.
3. All detected diagnostic codes, except 51 and 53, will be retained in memory by the ECU from the time of detection until cancelled out.
4. Once the malfunction is cleared, the "CHECK ENGINE" warning light on the instrument panel will go off but the diagnostic code(s) remain stored in ECU memory (except) for codes 51 and 53).

DIAGNOSTIC CODES

Code No.	Number of blinks "CHECK ENGINE" Warning Light	System	* 1 "CHECK ENGINE" Warning light	Diagnosis	Trouble Area	*2 Memory	See Page
–	 FI1401	Normal	–	Output when no other code is recorded.	———	–	–
12	 FI1389	RPM Signal	ON	No G or NE signal is input to the ECU for 2 secs. or more after STA turns ON.	• Open or short in NE, G circuit • Distributor • Open or short in STA circuit • ECU	○	IG–3 FI–123
13	 FI1390	RPM Signal	ON	NE signal is not input to ECU for 300 msec. or more when engine speed is 1500 rpm or more.	• Open or short in NE circuit • Distributor • ECU	○	IG–3
14	 FI1391	Ignition Signal	ON	IGF signal from igniter is not input to ECU for 4 consecutive ignition.	• Open or short in IGF or IGT circuit from igniter to ECU • Igniter • ECU	○	FI–124
21	FI1400	Main Oxygen Sensor Signal	ON	(1) Open or short in heater circuit of main oxygen sensor for 500 msec. or more. (HT) (2) At normal driving speed (below 60 mph and engine speed is above 1900 rpm), amplitude of main oxygen sensor signal (OX1) is reduced to between 0.35–0.70 V continuously for 60 secs. or more. *6 (2 trip detection logic) (2)	• Open or short in heater circuit of main oxygen sensor • Main oxygen sensor heater • ECU ——— • Open or short in main oxygen sensor circuit • Main oxygen sensor • ECU	○	FI–126 FI–127
22	 FI1392	Water Temp. Sensor Signal	ON	Open or short in water temp. sensor circuit for 500 msec. or more. (THW)	• Open or short in water temp. sensor circuit. • Water temp. sensor • ECU	○	FI–122
24	 FI1611	Intake Air Temp. Sensor Signal	*3 ON	Open or short in intake air temp. sensor circuit for 500 msec. or more. (THA)	• Open or short in intake air temp. circuit. • Intake air temp. sensor • ECU	○	FI–121
25	 FI2562	Air–Fuel Ratio Lean Malfunction	ON	(1) Oxygen sensor output in less than 0.45 V for at least 120 secs. when oxygen sensor is warmed up (racing at 2000 rpm). (only for code 25) *4 (2) When air–fuel ratio feedback correction value or adaptive control value continues at the upper (lean) or lower (rich) limit for a certain period of time or adaptive control value is not renewed for a certain period of time. *4 (3) When marked variation is detected in engine revolutions for each cylinder during idle switch on and feedback condition. Furthermore, when idle switch is off, air–fuel ratio feedback compensation values are deviating. *6 (2 trip detection logic) (1) – (3)	• 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 • Water temp. sensor • Air flow meter • ECU	○	FI–119 FI–126 FI–127
26	FI2563	Air–Fuel Ratio Rich Malfunction	ON		• 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 • Water temp. sensor • Air flow meter • Compression pressure • ECU	○	

DIAGNOSTIC CODES (Cont'd)

Code No.	Number of blinks "CHECK ENGINE" Warning Light	System	* 1 "CHECK ENGINE" Warning light	Diagnosis	Trouble Area	*2 Memory	See Page
*5 27	 FI3294	Sub–Oxygen Sensor Signal	ON	When sub–oxygen sensor is warmed up and full acceleration continues 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) * 6 (2 trip detection logic)	• Short or open in sub–oxygen sensor circuit. • Sub–oxygen sensor • ECU	○	FI–126
31	 FI1394	Air Flow Meter Signal	ON	Open or short detected continuously for 500 msec. or more in air flow meter circuit. • Open – VC or E2 • Short – VC–E2 or VS–VC	• Open or short in air flow meter circuit • Air flow meter • ECU	○	FI–118
41	 FI1396	Throttle Position Sensor Signal	*3 ON	Open or short detected in throttle position sensor signal (VTA) for 500 msec. or more.	• Open or short in throttle position sensor circuit • Throttle position sensor • ECU	○	FI–116
42	 FI1397	Vehicle Speed Sensor Signal	OFF	SPD signal is not input to the ECU for at least 8 seconds during high load driving with engine speed between 2500 rpm and 5500 rpm.	• Open or short in vehicle speed sensor circuit • Vehicle speed sensor • ECU	○	–
43	 FI1398	Starter Signal	OFF	Starter signal (STA) is not input to ECU even once until engine reaches 800 rpm or more when cranking.	• Open or short in starter signal circuit. • Open or short in IG SW circuit. • ECU	○	FI–123
52	 FI1618	Knock Sensor Signal	ON	With engine speed between 1950 rpm – 6450 rpm, signal from knock sensor is not input to ECU for revolution. (KNK)	• Open or short knock sensor circuit. • Knock sensor • ECU	○	–
53	 FI1619	Knock Control Signal	ON	Engine control computer (for knock control) malfunction is detected.	• ECU	×	–
*5 71	 FI2622	EGR System Mal–function	ON	EGR gas temp. sensor signal (THG) is below total temp. of intake air temp. plus 55°C (99°F) after driving for 420 seconds in EGR operation range. * 6 (2 trip detection logic)	• Open in EGR gas temp. sensor circuit • Open in VSV circuit for EGR • EGR vacuum hose disconnected, valve stuck • ECU • Clogged in EGR gas passage	○	FI–128
51	 FI1399	Switch Condition Signal	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 IDL circuit • Neutral start switch circuit • Accelerator pedal, cable • ECU	×	FI–116 FI–125

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 ENGINE" Warning Light does not light up during malfunction diagnosis, even if a malfunction is detected.

*2: "O" 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.

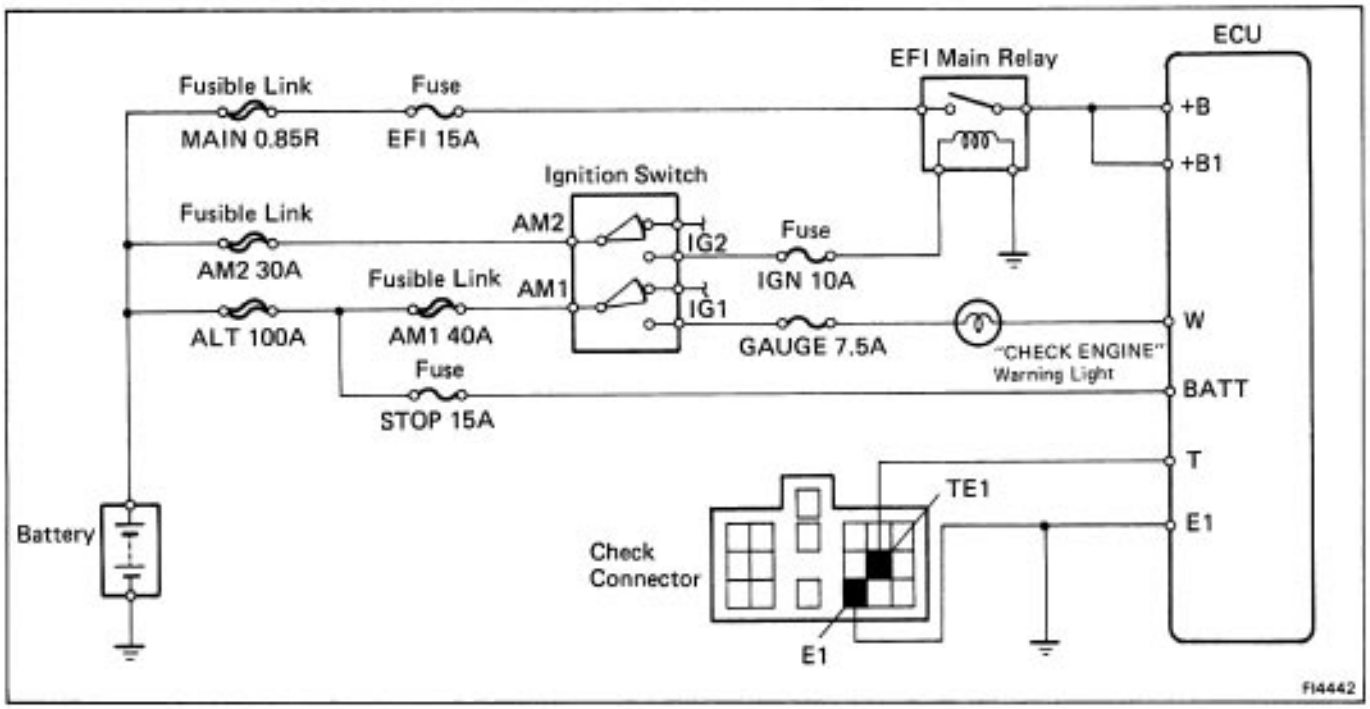
*3: The "CHECK ENGINE" Warning Light comes on if malfunction occurs only for California specifications.

*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: Codes 27 and 71 are used only for California specifications.

*6: "2 trip detection logic" (See page FI–106.)

INSPECTION OF DIAGNOSIS SYSTEM 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
    - BAD → Repair or replace
  - NO → 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 both 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.
      - OK → Try another ECU.
    - YES → Does "CHECK ENGINE" warning light go off after repair according to malfunction code?
      - NO → Further repair required
      - YES → System OK
        - NO → Cancel out diagnostic code.