

DIAGNOSIS SYSTEM DESCRIPTION

EG42-11

EG

The ECU contains a built-in self-diagnosis system by which troubles with the engine signal network are detected and the check engine warning light on the combination meter lights up. By analyzing various signals as shown in the later table (See page EG-182) the ECU detects system malfunctions relating to the sensors or actuators.

The self-diagnosis system has 2 modes, a normal mode and a test mode.

If a malfunction is detected when in the normal mode, the ECU lights up the check engine warning light to inform the driver of the occurrence of a malfunction. (For some codes the light does not come on.) The light goes OFF automatically when the malfunction has been repaired. But the diagnostic code(s) remains stored in the ECU memory. The ECU stores the code(s) until it is cleared by removing the EFI fuse with the ignition switch OFF.

The diagnostic code can be read by the number of blinks of the check engine warning light when TE1 and E1 terminals on the check connector 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 ECU lights up the check engine warning light 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 on the check connector should be connected as shown later. (See page EG-179).

In the test mode, even if the malfunction is corrected, the malfunction code is stored in the ECU 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 check engine warning light can be selected by connecting the TE1, TE2 and E1 terminals on the check connector, as shown later. (See page EG-179)

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 EG-179)

EG427-21



"CHECK" Engine Warning Light

PG0771

CHECK ENGINE WARNING LIGHT CHECK

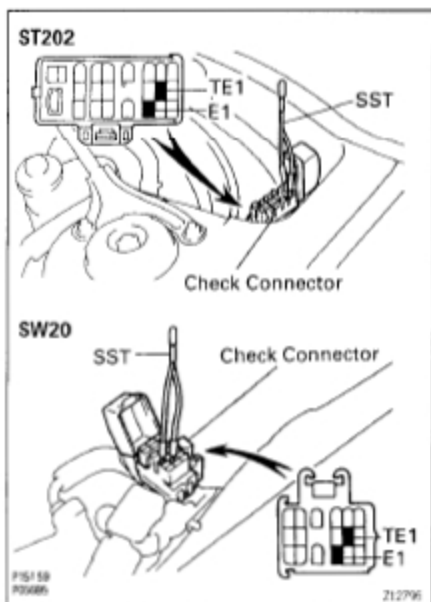
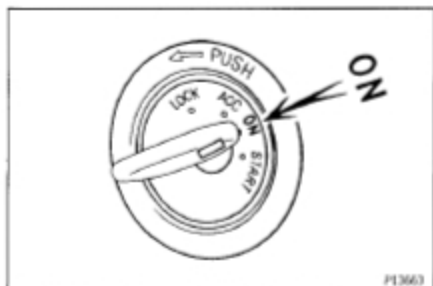
1. The check engine warning light will come on when the ignition switch is at ON and the engine is not running.
2. When the engine is started, the check engine warning light should go off.
If the light remains on, the diagnosis system has detected a malfunction or abnormality in the system.

DIAGNOSTIC CODES OUTPUT**(Normal mode)**

To obtain an output of diagnostic 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) Accessories switched OFF
 - (d) Engine at normal operating temperature
2. Turn the ignition switch ON.

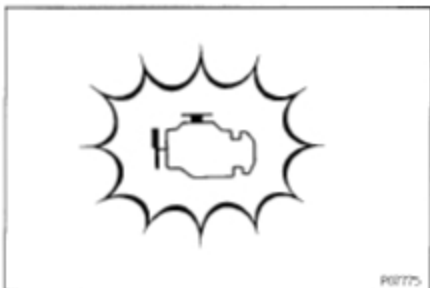
NOTICE: Do not start the engine.

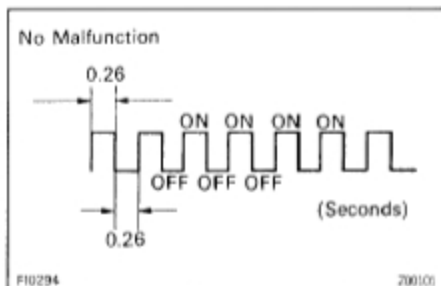


3. Using SST, connect terminals TE1 and E1 of the check connector.

SST 09843-18020

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

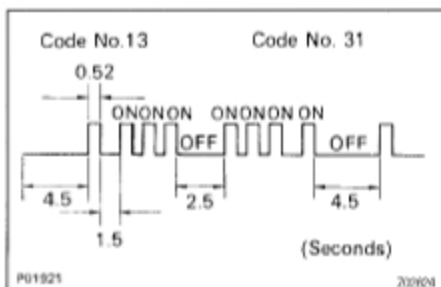




Diagnostic Codes (See page EG-182)

(a) Normal System Operation (no malfunction)

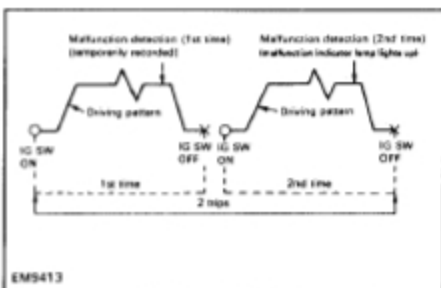
- The light will alternately blink ON and OFF at 0.26 second intervals.



(b) Malfunction Code Indication

- In the event of a malfunction, the light will blink every 0.52 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 code.
- After all the codes have been output, there will be a 4.5 second pause and they will all be repeated as long the terminals TE1 and E1 of the check connector are connected.

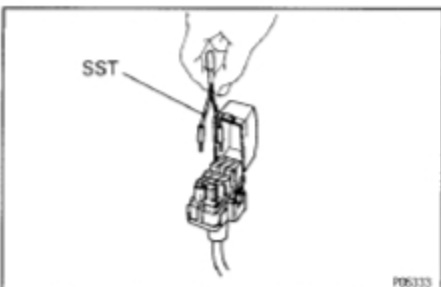
HINT: In the event of a number of codes, indication will begin from the smaller value and continue to the larger.



(c) 2 Trip Detection Logic

Diagnostic codes 21 and 25 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.) In the Test Mode, the check engine warning light lights up the 1st time a malfunction is detected.

- After the diagnosis check, remove the SST from the check connector.
SST 09843-18020



CODE	DIAGNOSIS	DETECTION	AREA
1	NORMAL	Check Engine' warning light will flash continuously.	NIL
12	RPM signal 1	[G1, G2, Ne] When no RPM signal (G, Ne) to the ECU after or while cranking for more than 2 seconds. [G-] When more than 6 G1 AND G2 signal was input within 2 pulse of G1 computer signal.	<ul style="list-style-type: none"> • Writngs and connectors (crankshaft position & starter signal systems) • Distributor • ECU
13	RPM signal 2	[Ne] When no RPM signal (Ne) to the ECU with engine speed above 1000 rpm.	<ul style="list-style-type: none"> • Writngs and connectors (crankshaft position signal systems) • Distributor • ECU
14	Ignition signal	[IGf, IGt] When no IGf signals to the ECU (constantly 6 times).	<ul style="list-style-type: none"> • Writngs and connectors (igniter +B, IGf, IGt) & (ignition coil +B) • Igniter • Ignition coil • ECU
21	O2 sensor signal	[Ox] When the O2 sensor voltage crosses the 0.45V line and is leaning towards either 0.35V (lean) or 0.70V (rich) side for over 60 seconds while the speed is below 100km/h with engine speed of above 1500 rpm. [HT] (O2 sensor heater) When no response from the heater or low output level (below 1.5) for over 0.5 seconds.	<ul style="list-style-type: none"> • O2 sensor • Fuel system (injector, fuel pump) • Ignition system (ignitor, plugs) • Intake air system (air flow meter) • ECU
22	Coolant temperature signal	[THW, EZ] Whenever a short circuit or a circuit detachment in the coolant temperature sensor is detected for over 0.5 seconds.	<ul style="list-style-type: none"> • Writngs and connectors (coolant temp systems) • Coolant temp sensor • ECU
24	Intake air temperature signal	[THA, EZ] Whenever a short circuit or a circuit detachment in the intake air temperature sensor is detected for over 0.5 seconds.	<ul style="list-style-type: none"> • Writngs and connectors (Intake air systems) • Intake air temp sensor • ECU
25	Lean error	[Ox] When no 'rich' signals were sent by the O2 sensor for over 60 seconds while the car is travelling at speeds under 100km/h with engine speed is above 1500 rpm with the coolant temperature above 70 centigrade.	<ul style="list-style-type: none"> • Writngs and connectors (O2 sensor) • Fuel system (injector, fuel pressure) • Air flow meter • Coolant temp sensor
31	Turbo pressure sensor signal	[PIM, VC, EZ] Whenever a short circuit or a circuit detachment in the turbo pressure sensor is detected for over 0.5 seconds.	<ul style="list-style-type: none"> • Writngs and connectors (turbo pressure sensor systems) • Turbo pressure sensor • ECU
34	Boost pressure	[PIM, VC, EZ] Whenever a fuel cut had occurred as a result of abnormal boost pressure for over 0.1 seconds.	<ul style="list-style-type: none"> • Writngs and connectors (turbo pressure sensor systems) • Turbo pressure sensor • ECU
41	Primary throttle position sensor	[VTA1, VC, IDL1, EZ] Whenever a short circuit or a circuit detachment in the primary throttle position sensor is detected for over 0.5 seconds.	<ul style="list-style-type: none"> • Writngs and connectors (Primary throttle position systems) • Primary throttle position sensor • ECU
42	Speed sensor signal	[SPD] When the speed sensor sent 0km/h signal to the ECU for more than 8 seconds while the engine speed is between 2000 rpm and 4000 rpm.	<ul style="list-style-type: none"> • Writngs and connectors (speed sensor systems) • Speed sensor • Air flow meter • ECU
47	Secondary throttle position sensor	[VTA1, VC, IDL2, EZ] Whenever a short circuit or a circuit detachment in the secondary throttle position sensor is detected for over 0.5 seconds.	<ul style="list-style-type: none"> • Writngs and connectors (secondary throttle position systems) • Secondary throttle position sensor • ECU
52	Knock sensor signal	[KNK] When a short circuit or a circuit detachment was detected in the knock sensor or its connectors while the engine speed is between 2750 rpm and 7200 rpm.	<ul style="list-style-type: none"> • Writngs and connectors (knock sensor systems) • Knock sensor • ECU
53	Knock management	When the knock management part of the ECU fails while the engine speed is between 700 rpm and 7200 rpm.	<ul style="list-style-type: none"> • ECU

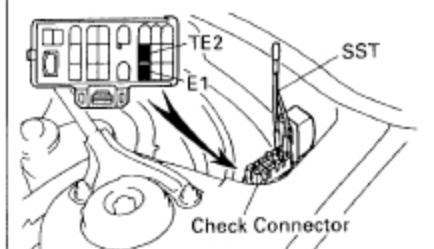
(Test mode)**HINT:**

- 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 and air conditioner signal.
- Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the test mode.

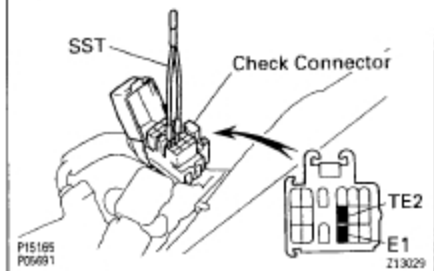
To obtain an output of diagnostic codes, proceed as follows:

1. Initial conditions
 - (a) Battery voltage 11 V or more
 - (b) Accessories switched OFF
 - (c) Engine at normal operating temperature

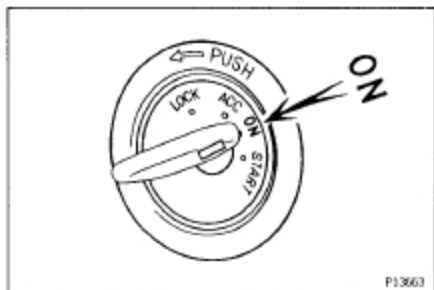
ST202



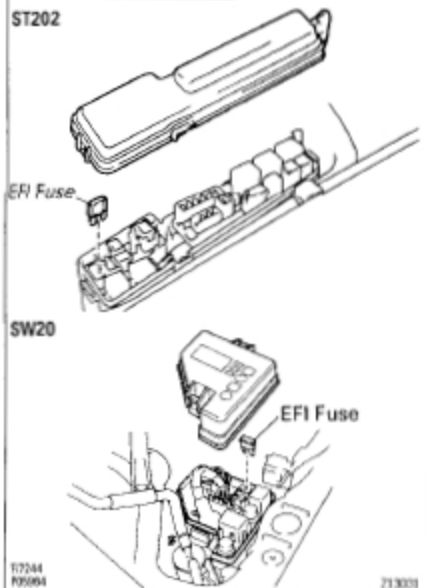
SW20



2. First, using SST, connect terminals TE2 and E1 of the check connector.
SST 09843-18020



3. Turn the ignition switch ON to begin the diagnosis in the test mode.



DIAGNOSTIC CODE CANCELLATION

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 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 negative (—) terminal cable from the battery, 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 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. When 2 or more codes are indicated, the lowest numbered code will appear first.
2. All detected diagnostic codes, except code Nos. 42, 43 and 51 under the test mode will be retained in memory by the ECU from the time of detection until cancelled out.
3. Once malfunction is cleared, the check engine warning light on the combination meter will go off but the diagnostic code(s) remains stored in ECU memory (except for code Nos. 42, 43 and 51 under the test mode).