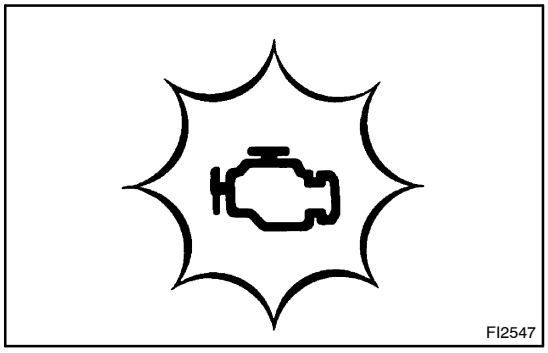

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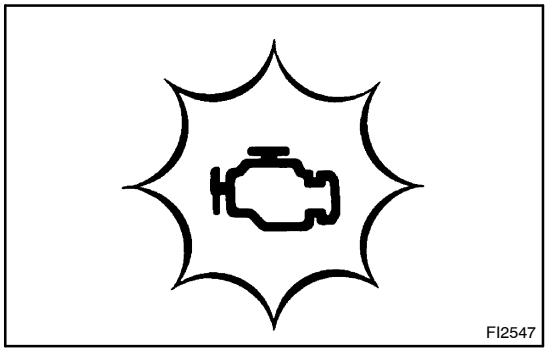
05A7Y-01

PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Description

- The engine ECM contains a built-in self-diagnosis system by which troubles with the engine signal network are detected and a check engine warning light (MIL) in the combination meter lights up.
- By analyzing various signals as shown in the later table (See page 05–884) the ECM detects system malfunctions relating to the sensors or actuators.
- In the normal mode, the self-diagnosis system monitors 4 items, indicated by code No. as shown in 05–884. A check engine warning light (MIL) informs the driver that a malfunction has been detected. The ECM stores the code(s) until it is cleared by removing the EFI fuse with the ignition switch off.
- The diagnostic trouble code can be read by the number of blinks of the check engine warning light (MIL) 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.
- In the test mode, 5 items, indicated by code No. as shown in 05–884 are monitored. If a malfunction is detected in any one of the systems indicated by code Nos. 38, 61, 62, 63 and 64 the ECM lights the check engine warning light (MIL) to warn the technician that malfunction has been detected. In this case, TE2 and E1 terminals on the check connector should be connected as shown later. (See page 05–875)
- 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. This also applies to the normal mode. The diagnostic mode (normal or test) and the output of the check engine warning light (MIL) can be selected by connecting the TE1, TE2, and E1 terminals on the check connector, 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 05–875)



2. INSPECT DIAGNOSIS (Normal Mode)

(a) Check the check engine warning light (MIL).

(1) The check engine warning light (MIL) will light up when the ignition switch is turned ON and the engine is not running.

HINT:

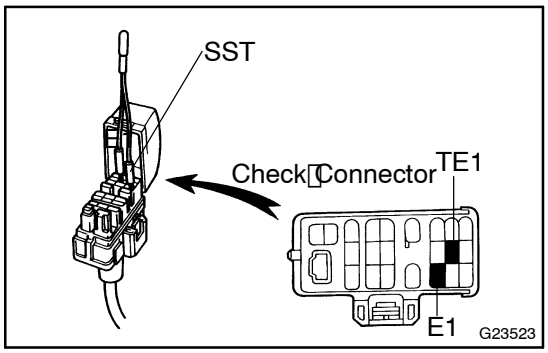
If the check engine warning light (MIL) does not light up, proceed to troubleshooting of the combination meter.

(2) When the engine is started, the check engine warning light (MIL) should go off.

If the light remains on, the diagnosis system has detected a malfunction or abnormality in the system.

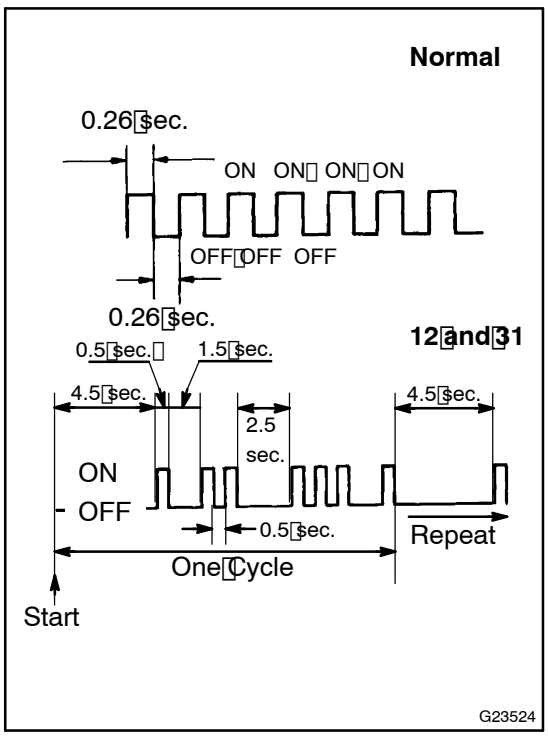
(b) Check the DTC.

(1) Turn the ignition switch ON.



(2) Using SST, connect terminals TE1 and E1 of the check connector.

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(3) Read the DTC from check engine warning light (MIL).

As an example, the blinking patterns for codes; normal, 12 and 31 are as shown in the illustration.

HINT:

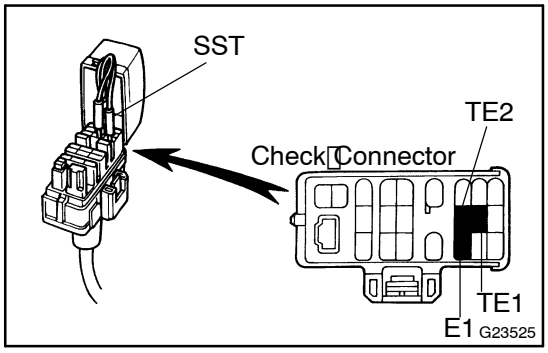
If a DTC is not output, check the TE1 terminal circuit (See page 05–73).

(4) Check the details of the malfunction using the DTC chart on page 05–884.

(5) After completing the check, disconnect the SST from terminals TE1 and E1, and turn off the display.

HINT:

In the event of 2 or more malfunction codes, indication will begin from the smallest numbered code to the largest.



3. INSPECT DIAGNOSIS (Test Mode)

HINT:

Compared to the normal mode, the test mode has an increased sensing ability to detect malfunctions.

The same diagnostic items which are detected in the normal mode can also be detected in the test mode.

(a) Check the DTC.

(1) Initial conditions.

- Battery voltage 11 V or more
- Throttle valve fully closed
- Transmission in neutral position
- A/C switched OFF

(2) Turn the ignition switch OFF.

(3) Using SST, connect terminals TE2 and E1 of the check connector.

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(4) Turn the ignition switch ON.

HINT:

- To confirm that the test mode is operating, check that the check engine warning light (MIL) flashes when the ignition switch is turned ON.
- If the check engine warning light (MIL) does not flash, refer to diagnostic chart for the TE2 terminal circuit on page 05–73.

(5) Start the engine.

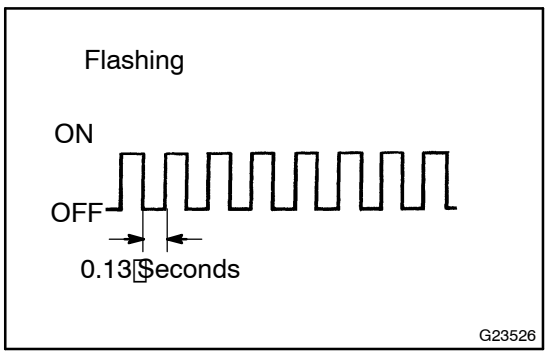
(6) Simulate the conditions of the malfunction described by the customer.

(7) After the road test, using SST, connect terminals TE1 and E1 of the check connector.

SST 09843–18020

(8) Read the DTC on check engine warning light (MIL) in the combination meter.

(9) After completing the check, disconnect the SST from terminals TE1, TE2 and E1, and turn off the display.



HINT:

- The test mode will not start if terminals TE2 and E1 are connected after the ignition switch is turned ON.
- When vehicle speed is 5 km/h (3 mph) or below, DTC 42 (Vehicle speed signal) is output, but this is not abnormal.

(b) Clear the DTC.

(1) After repairing the trouble areas, the DTC retained in the ECM memory must be cleared out by removing the EFI fuse from Fusible link block for 10 seconds or more with the ignition switch turned 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 it is necessary to work on engine components requiring removal of the negative (–) terminal cable from the battery, a check must first be made to see if a diagnostic trouble code has been recorded.
  (2) After cancellation, road test the vehicle to check that a normal code is now read on the check engine warning light (MIL).
  If the same DTCs appears, it indicates that the trouble area has not been repaired thoroughly.

4. PROBLEM SYMPTOM CONFIRMATION

(a) Taking into consideration the results of the customer problem analysis, try to reproduce the symptoms of the trouble. If the problem is that the transmission does not shift up, shift down, or the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and simulate the problem symptoms.

5. ROAD TEST

NOTICE:

Perform the test at normal operating ATF temperature: 50 – 80°C (122 – 176°F).

(a) D range test
Shift into the D range and fully depress the accelerator pedal and check the following points:
(1) Check up–shift operation.
1 → 2, 2 → 3 and 3 → O/D up–shift take place, at the shift point shown in the automatic shift schedule (See page 03–67).

HINT:

- O/D Gear Up–shift Prohibition Control (1. Coolant temp. is 55°C (131°F) or less. 2. Vehicle speed is 80 km/h (50 mph) or less.)
- O/D Gear Lock–up Prohibition Control (1. Brake pedal is depressed. 2. Accelerator pedal is released)
- When the 2nd start switch is on, there is no 1→2 up–shift and 2→1 down–shift.

(2) Check for shift shock and slip.
Check for shock and slip at the 1 → 2, 2 → 3 and 3 → O/D up–shift.
(3) Check for abnormal noises and vibration.
Drive in D range lock–up or O/D gear and check for abnormal noises and vibration.

HINT:

The check for the cause of abnormal noises and vibration must be done very thoroughly as it could also be sure to loss of balance in the differential, torque converter, etc..

(4) Check kick–down operation.
While running in the D range, 2nd, 3rd and O/D gears, check to see that the possible kick–down vehicle speed limits for 2 → 1, 3 → 2 and O/D → 3 kick–downs conform to those indicated on the automatic shift schedule (See page 03–67).
(5) Check abnormal shock and slip at kick–down.
(6) Check the lock–up mechanism.
- Drive in D range O/D gear, at a steady speed (lock–up ON) of about 80 km/h (50 mph).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

If there is a big jump in engine speed, there is no lock–up.

(b) 2 range test

Shift into the 2 range and fully depress the accelerator pedal and check the following points:

(1) Check up–shift operation.

Check to see that the 1 → 2 up–shift takes place and that the shift point conforms to the automatic shift schedule (See page 03–67).

HINT:

There is no O/D up–shift and lock–up in the 2 range.

(2) Check engine braking.

While running in the 2 range and 2nd gear, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration, and for shock at up–shift and down–shift.

(c) L range test

Shift into the L range and fully depress the accelerator pedal and check the following points:

(1) Check no up–shift.

While running in the L range, check that there is no up–shift to 2nd gear.

(2) Check engine braking.

While running in the L range, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration.

(d) R range test

Shift into the R range and fully depress the accelerator pedal and check for slipping.

CAUTION:

Before conducting this test ensure that the test area is free from people and obstruction.

(e) P range test.

Stop the vehicle on a grade (more than 5°) and after shifting into the P range, release the parking brake. Then, check to see that the parking lock pawl holds the vehicle in place.

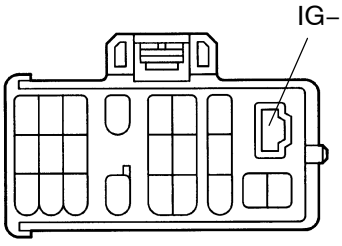
6. MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transmission and engine by measuring the stall speeds in the D and R ranges.

NOTICE:

- **Do the test at normal operating ATF temperature 50 – 80 °C (122 – 176 °F).**
- **Do not continuously run this test for longer than 5 seconds.**
- **To ensure safety, do this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**



Check Connector

G23527

(1) Chock the 4 wheels.

(2) Connect the tachometer to terminal IG– of check connector with SST.

SST 09843–18020

(3) Fully apply the parking brake.

(4) Keep your left foot pressing firmly on the brake pedal.

(5) Start the engine.

(6) Shift into the D range. Press all the way down on the accelerator pedal with your right foot.

(7) Quickly read the stall speed at this time.

Stall speed: 2,000 ± 150 rpm

(8) Do the same test in the R range.

Stall speed: 2,000 ± 150 rpm

Evaluation:

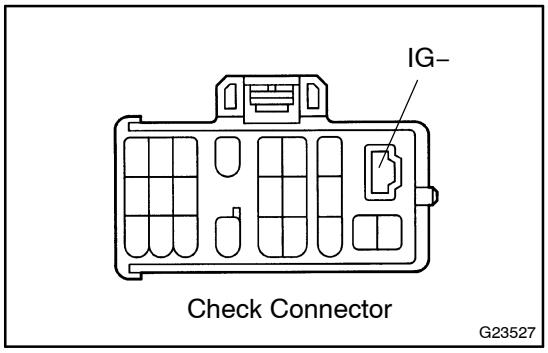
Problem	Possible cause
(a) Stall speed low in D and R ranges	• Engine output may be insufficient • Stator one–way clutch is operating properly HINT: If the value is larger or smaller than the specified value by 600 rpm or more, the torque converter could be faulty.
(b) Stall speed high in D range	• Line pressure too low • Forward clutch slipping • No. 2 one–way clutch not operating properly • O/D one–way clutch not operating properly
(c) Stall speed high in R range	• Line pressure too low • Direct clutch slipping • 1st & reverse brake slipping • O/D one–way clutch not operating properly
(d) Stall speed high in D and R ranges	• Line pressure too low • Improper fluid level • O/D one–way clutch not operating properly

(b) Measure the time lag.

(1) When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the direct clutch, forward clutch, and 1st and reverse brake.

NOTICE:

- **Do the test at normal operating ATF temperature 50 – 80 °C (122 – 176 °F).**
- **Be sure to allow 1 minute interval between tests.**
- **Take 3 measurements and take the average value.**



(2) Chock the 4 wheels.

(3) Connect the tachometer to terminal IG– of check connector with SST.

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(4) Start engine and check idle speed.

Idle speed: 700 ± 50 rpm (In N range and A/C OFF)

(5) Shift the lever from N to D range. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

Time lag: N → D less than 1.2 seconds

(6) In the same way, measure the time lag for N → R.

Time lag: N → R less than 1.5 seconds

Evaluation (If N → D or N → R time lag is longer than the specified):

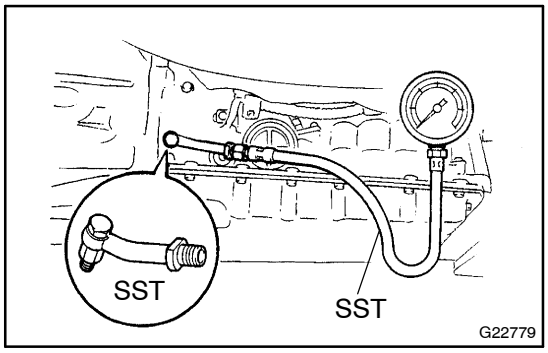
Problem	Possible cause
N → D time lag is longer	• Line pressure too low • Forward clutch worn • O/D one–way clutch not operating properly
N → R time lag is longer	• Line pressure too low • Direct clutch worn • 1st & reverse brake worn • O/D one–way clutch not operating properly

7. HYDRAULIC TEST

(a) Measure the line pressure.

NOTICE:

- **Do the test at normal operation ATF temperature 50 – 80 °C (122 – 176 °F).**
- **The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stopper outside the vehicle while the other is doing the test.**
- **Be careful to prevent SST's hose from interfering with the exhaust pipe.**



(1) Warm up the ATF.
(2) Remove the test plug on the front side of the transmission case and connect SST.
SST 09992–00095 (09992– 00231, 09992–00271)
(3) Fully apply the parking brake and chock the 4 wheels.
(4) Start the engine and check idling speed.
(5) Keep your left foot pressing firmly on the brake pedal and shift into D range.
(6) Measure the line pressure when the engine is idling.
(7) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.
(8) In the same way, do the test in R range.

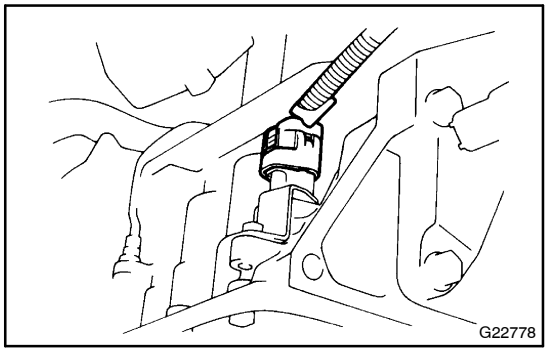
Specified line pressure:

Condition	D range kPa (kgf / cm^2, psi)	R range kPa (kgf / cm^2, psi)
Idling	376 – 436 (3.8 – 4.4, 54 – 63)	534 – 634 (5.4 – 6.5, 77 – 92)
Stall	997 – 1,117 (10.2 – 11.4, 145 – 162)	1,235 – 1,575 (12.6 – 16.1, 179 – 229)

If the measured pressure is not up to the specified value, recheck the throttle cable adjustment and retest.

Evaluation:

Problem	Possible cause
If the measured values at all ranges are higher	• Throttle cable out of adjustment • Throttle valve defect • Regulator valve detective
If the measured values at all ranges are lower	• Throttle cable out of adjustment • Throttle valve defect • Regulator valve detective • Oil pump defective • O/D direct clutch defect
If pressure is low in the D range only	• D range circuit fluid leak • Forward clutch defective
If pressure is low in the R range only	• R range circuit fluid leak • Direct clutch defective • 1st & reverse brake defective



8. MANUAL SHIFTING TEST

HINT:

By this test, it can be determined whether the trouble is within the electrical circuit or is a mechanical problem in the transmission.

(a) Disconnect the transmission wire connector.

(b) Inspect the manual driving operation.

Check that the shift and gear ranges correspond to the table below.

While driving, shift through the L, 2 and D ranges.

Check that the gear change corresponds to the shift range.

Shift range	Gear position
D	O/D
2	3rd
L	1st
R	Reverse
P	Pawl Lock

HINT:

If the L, 2 and D range gear positons are difficult to distinguish, do the above road test.

If any abnormality is found in the above test, the problem is in the transmission itself.

(c) Connect the transmission wire connector.

(d) Clear the DTC.