DI8ZU–02

DTC	P0300	Random/Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

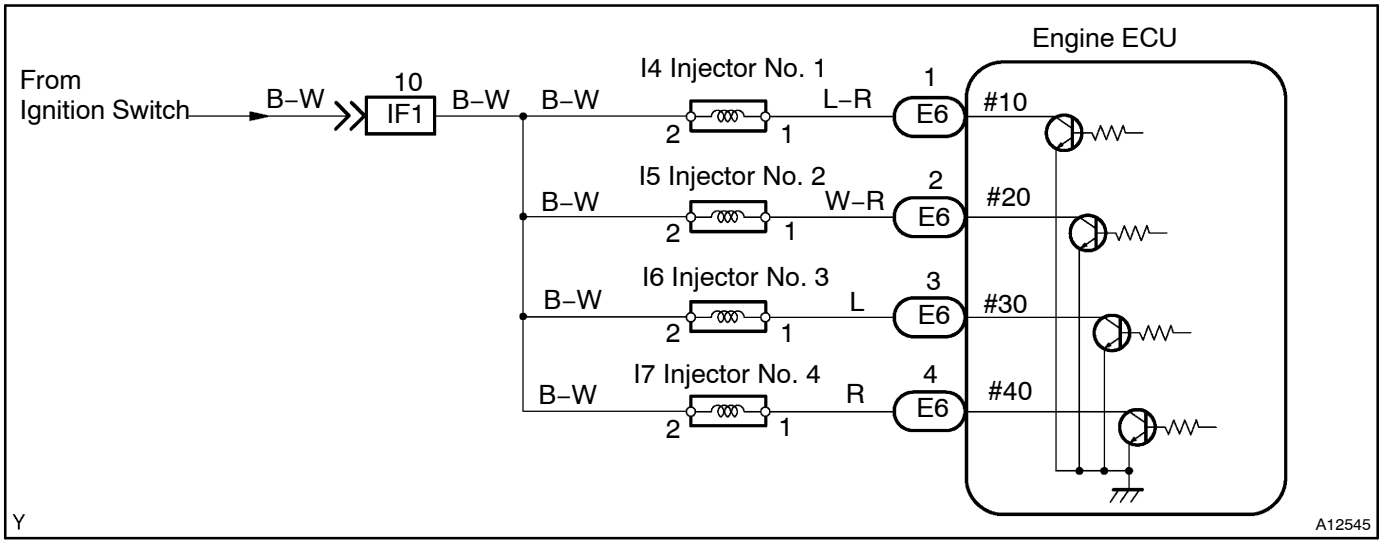
CIRCUIT DESCRIPTION

Misfire: The engine ECU uses the crankshaft position sensor and camshaft position sensor to monitor changes in the crankshaft rotation of each cylinder.
The engine ECU counts the number of times that the engine speed change rate indicates that misfire has occurred. when the misfire rate equals or exceeds the count of the indication that the engine condition has deteriorated, the check engine warning light will light up.
If the misfire rate is high enough and the driving conditions causes the catalyst to overheat, when misfiring occurs, the engine warning light will blinks

DTC No.	DTC Detection Condition	Trouble Area
P0300	Misfiring of random cylinders is detected during any particular 200 or 1,000 revolutions	• Open or short in engine wire • Connector connection • Vacuum hose connection • Ignition system • Injector • Fuel pressure • EGR system • Air flow meter • Water temperature sensor • Compression pressure • Valve clearance • Valve timing • Engine ECU
P0301 P0302 P0303 P0304	For any particular 200 revolutions for engine, misfiring is detected, which can cause catalyst to overheating (This causes engine warning light to blink) (2 trip detection logic)	
	For any particular 1,000 revolutions of engine, misfiring is detected which causes a deterioration in emissions (2 trip detection logic)	

HINT:
When the 2 or more codes for a misfiring cylinder are recorded repeatedly but no random misfire code is recorded, it indicates that the misfires were detected and recorded at different times.

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN

(a) Connect the hand–held tester.
(b) Record DTC and the freeze frame data.
(c) Use the hand–held tester to set to the check mode (See page DI–3).
(d) Drive the vehicle several times with the engine speed, load and its range shown with ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the data list.

If you have no hand–held tester, turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again.

HINT:

In order to memorize DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the data list for the following period of time.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1,000 rpm	3 minutes or more
2,000 rpm	1 minute 30 seconds or more
3,000 rpm	1 minute or more

(e) Check whether there is misfire or not by monitoring DTC and the freeze frame data. After that, record them.
(f) Turn the ignition switch OFF and wait at least 5 seconds.

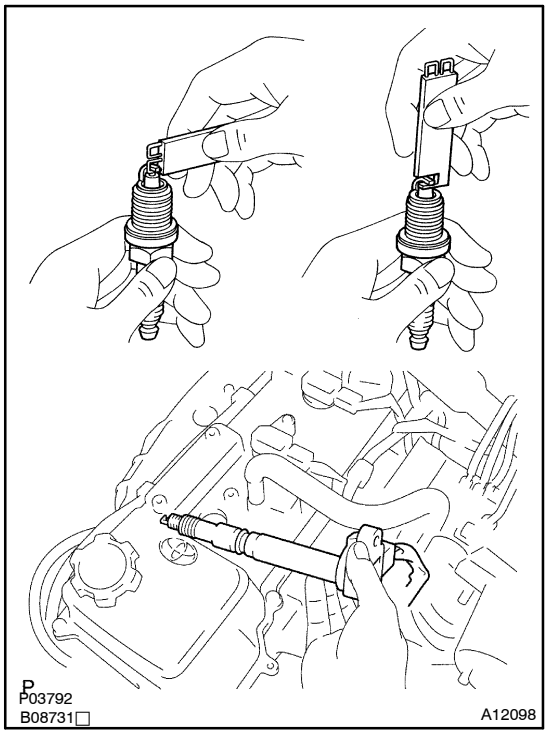
INSPECTION PROCEDURE

HINT:

- If some DTCs besides misfire are memorized simultaneously, first perform the troubleshooting for them.
- Read freeze frame data using the hand–held tester. Because freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.
- If the misfire does not occur, when the vehicle is brought to the workshop, misfire can be confirmed by reproducing the condition of freeze frame data. Also, after the repair, confirm that there is no misfire (See the confirmation driving pattern).

- When any of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is over the range of ±20 %, there is a possibility that the air–fuel ratio is inclining either to RICH (–20 % or less) or LEAN (+20 % or more).
- When COOLANT TEMP in the freeze frame data is less than 80°C (176°F), there is a possibility of misfire only during warmed up.
- If the misfire cannot be reproduced, the reason may be because of the driving with lack of fuel, the use of improper fuel, a stain of the ignition plug, and etc.

1	**Check spark plug and spark of misfiring cylinder.**



PREPARATION:
(a) Disconnect the ignition coil.
(b) Remove the spark plug.

CHECK:
(a) Check the electrode for carbon deposits.
(b) Check the electrode gap.

OK:

(a) No large carbon deposit present.
Not wet with gasoline or oil.
(b) Electrode gap: 1.3 mm (0.051 in.)

PREPARATION:
(a) Install the spark plug to the ignition coil.
(b) Disconnect the injector connector.
(c) Ground the spark plug.

CHECK:
Check if spark occurs while the engine is being cranked.

NOTICE:
To prevent excess fuel from being injected from the injectors during this test, do not crank the engine for more than 5 – 10 seconds at a time.

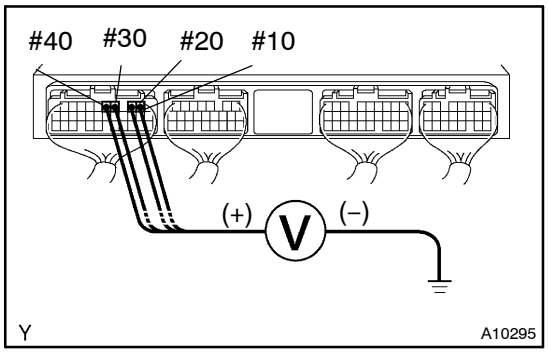
OK:

Spark jumps across electrode gap.

NG → **Replace or check ignition system (See page IG–1).**

OK

2	Check voltage of engine ECU terminals for injector of failed cylinder.



PREPARATION:

(a) Remove the glove compartment.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between the applicable terminal of the engine ECU connector and the body ground.

OK:

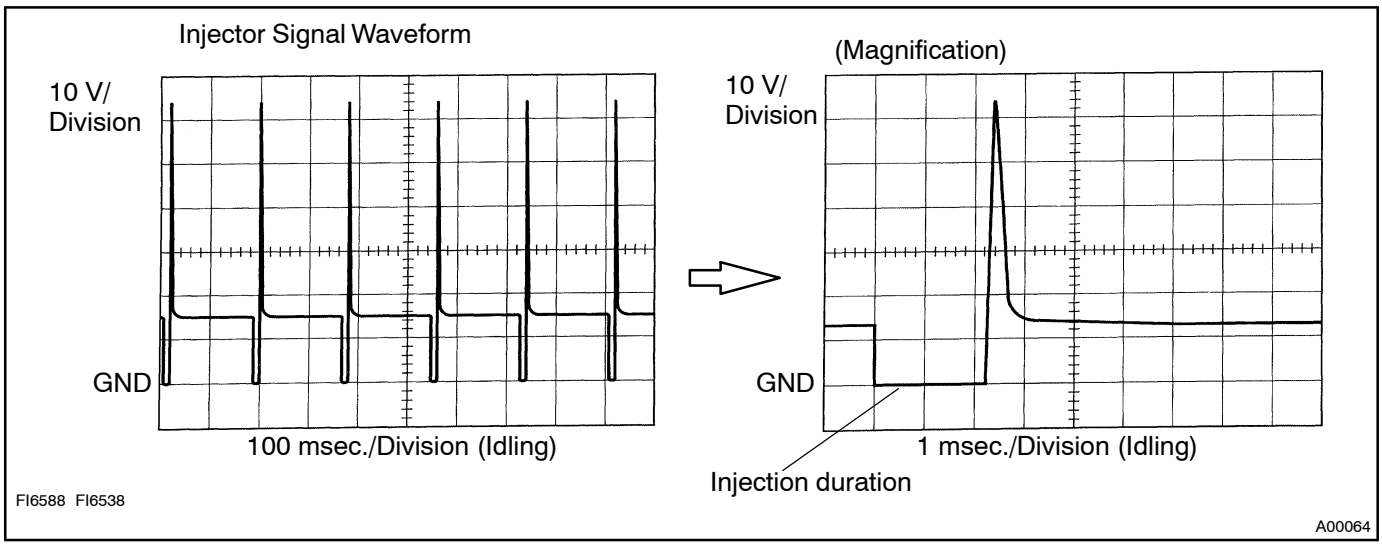
Voltage: 9 – 14 V

Reference: INSPECTION USING OSCILLOSCOPE

With the engine idling, check the waveform between terminals #10 – #40 and E01 of the engine ECU connector.

HINT:

The correct waveform is shown in the illustration.



OK	Go to step 4.

NG

3	Check resistance of injector of misfiring cylinder (See Pub. No. RM521E).

NG	Replace injector.

OK

Check for open and short in harness and connector between injector and engine ECU (See page IN–19).

4	Check fuel pressure (See page FI–1 of Pub. No. RM652E).

NG → Check and repair fuel pump, fuel pipe line and filter (See page FI–1 of Pub. No. RM652E).

OK

5	Check injector injection (See Pub No. RM521E).

NG → Replace injector.

OK

6	Check EGR system (See page DI–80).

NG → Repair EGR system.

OK

7	Check air flow meter (See page DI–23) and engine coolant temperature sensor (See page DI–37).

NG → Repair or replace.

OK

Check compression pressure(See Pub No. RM521E), valve clearance(See Pub No. RM521E) and valve timing (See page DI–3).