DI63Z–03

DTC	P0300/93	Random/Multiple Cylinder Misfire Detected

DTC	P0301/93	Cylinder 1 Misfire Detected

DTC	P0302/93	Cylinder 2 Misfire Detected

DTC	P0303/93	Cylinder 3 Misfire Detected

DTC	P0304/93	Cylinder 4 Misfire Detected

DTC	P0305/93	Cylinder 5 Misfire Detected

DTC	P0306/93	Cylinder 6 Misfire Detected

CIRCUIT DESCRIPTION

Misfire: The engine ECU uses the crankshaft position sensor and camshaft position sensor to monitor changes in the crankshaft rotation for each cylinder.

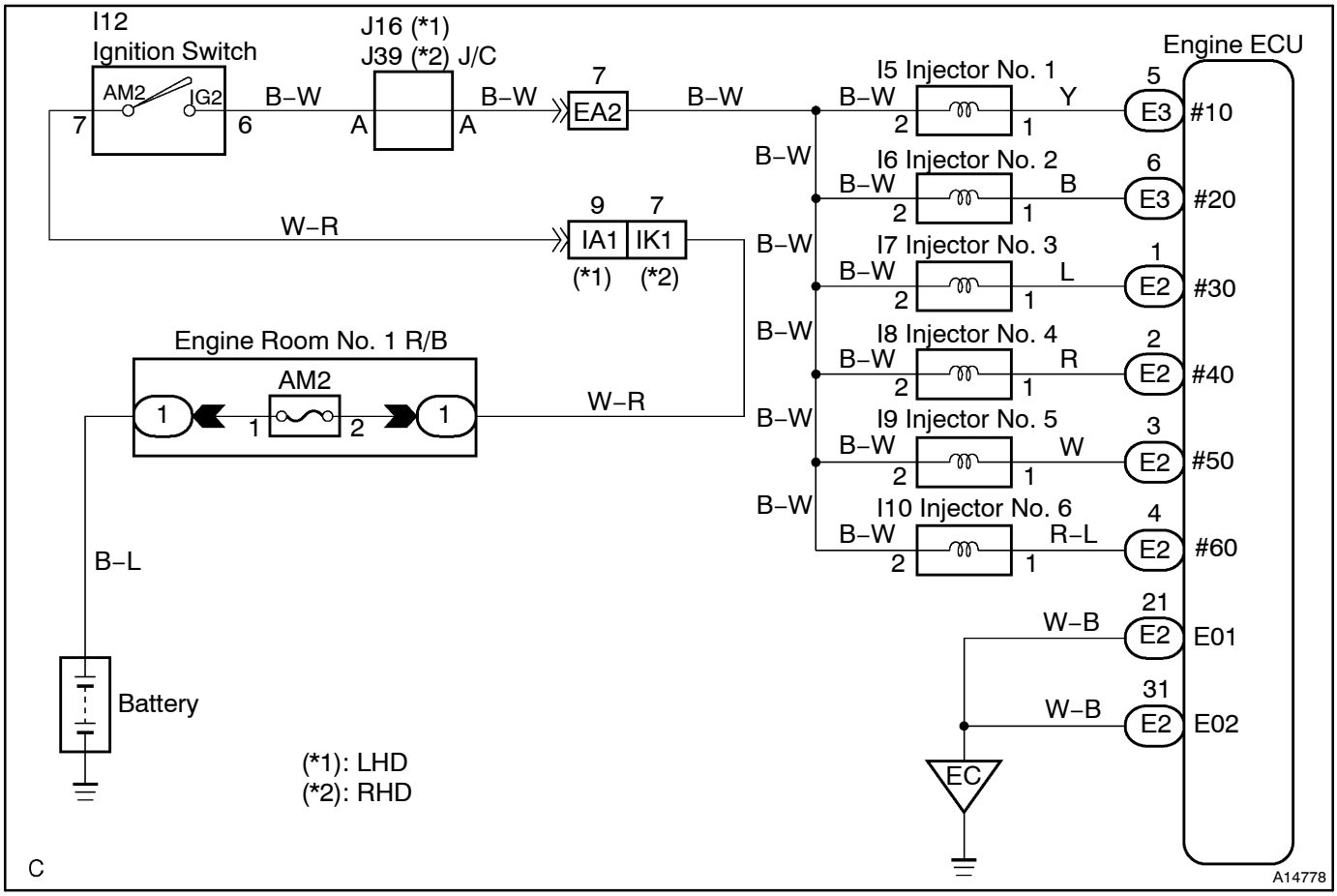
The engine ECU counts the number of times the engine speed change rate indicates that misfire has occurred. And when the misfire rate equals or exceeds the count indicating that the engine condition has deteriorated, the CHK ENG lights up.

If the misfire rate is high enough and the driving conditions will cause catalyst overheating, the CHK ENG blinks when misfiring occurs.

DTC No.	DTC Detecting Condition	Trouble Area
P0300/93	Misfiring of random cylinders is detected during any particular 200 or 1,000 revolutions 1 trip detection logic: CHK ENG to brink 2 trip detection logic: CHK ENG to light up	• Open or short in engine wire • Connector connection • Vacuum hose connection • Ignition system • Injector • Fuel pressure • Vacuum sensor • Water temp. sensor • Compression pressure • Valve clearance • Valve timing • Engine ECU
P0301/93 P0302/93 P0303/93 P0304/93 P0305/93 P0306/93	For any particular 200 revolutions of engine, misfiring is detected which can cause catalyst overheating (This causes CHK ENG to blink)	
	For any particular 1,000 revolutions of engine, misfiring is detected which causes a deterioration in emissions (2 trip detection logic)	

HINT:
When codes for a misfiring cylinder is 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 to the DLC3.
(b) Record DTC and the freeze frame data.
(c) Use the hand–held tester to set to the Check (Test) Mode (See page DI–17).
(d) Drive the vehicle several times with the engine speed, load and its surrounding 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 the first time. 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 it is the case that DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.
- Read freeze frame data using hand–held tester. Because freeze frame records the engine conditions when the 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.
- When the vehicle is brought to the workshop and the misfire is not occurred, misfire can be confirmed by reproducing the condition of freeze frame data. Also, after finishing the repair, confirm that there is no misfire (See confirmation driving pattern).
- When either of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is besides 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.
- In the case that 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 wire harness, connector and vacuum hose in engine room.**

CHECK:

(a) Check the connection conditions of wire harness and connector.

(b) Check the disconnection, piping and break of vacuum hose.

NG → **Repair or replace, then confirm that there is no misfire (See confirmation driving pattern).**

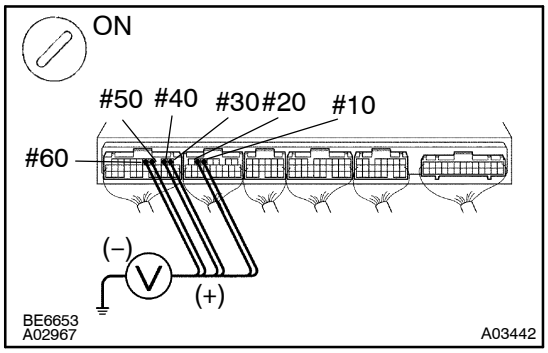
OK

2	**Check spark plug and spark of misfiring cylinder (See Pub. No. RM588E on page IG–1).**

NG → **Replace or check ignition system (See Pub No. RM588E on page IG–1).**

OK

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



PREPARATION:

(a) Remove the engine ECU hood.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between applicable terminals #10 – #60 of the engine ECU connectors and body ground.

OK:

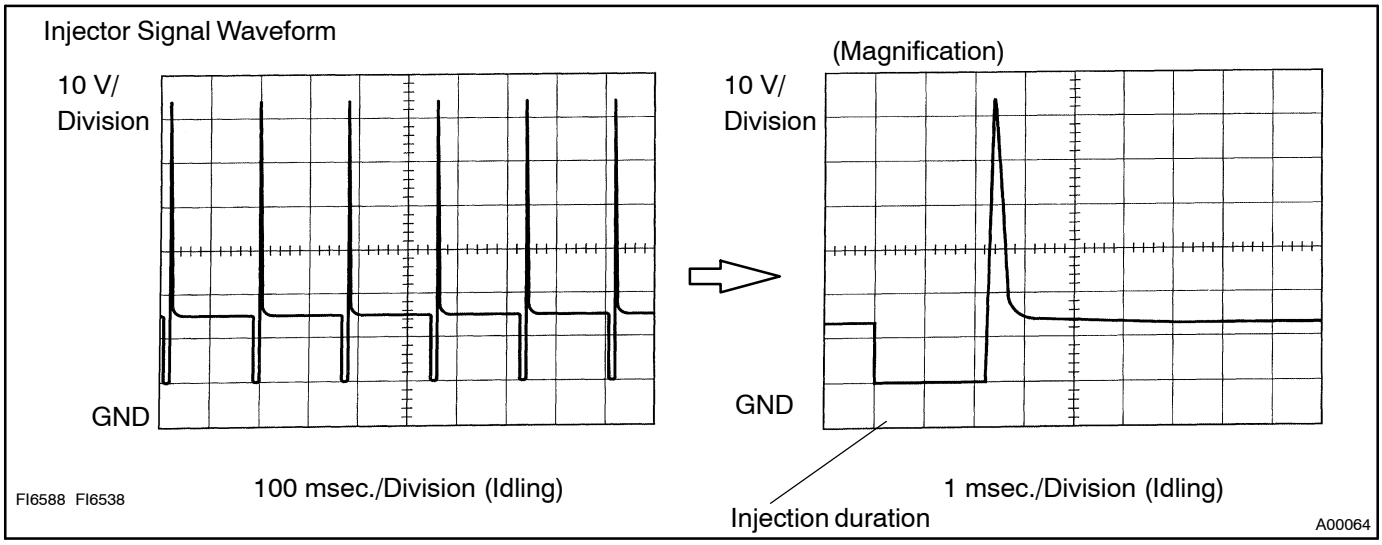
Voltage: 9 – 14 V

Reference: INSPECTION USING OSCILLOSCOPE

With the engine idling, check the waveform between terminals #10 – #60 and E01 of the engine ECU connectors.

HINT:

The correct waveform is as shown.



OK	Go to step 5.

NG

4	Check resistance of injector of misfiring cylinder (See Pub. No. EM588E on page FI–1).

NG → Replace injector.

OK →

Check for open and short in harness and connector between injector and engine ECU (See page IN–30).

5	Check fuel pressure (See Pub. No. EM588E on page FI–6).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See Pub. No. RM588E on page FI–1).

OK →

6	Check injector injection (See Pub. No. EM588E on page FI–22).

NG → Replace injector.

OK →

7	Check air flow meter (See page FI–2) and water temperature sensor (See Pub. No. EM588E on page FI–56).

NG → Repair or replace.

OK →

Check compression pressure (See Pub. No. RM588E on page EM–5), valve clearance (See Pub. No. RM588E on page EM–6) and valve timing (See Pub. No. RM588E on page EM–23).