

DTC	P0300/93	Random/Multiple Cylinder Misfire Detected
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DTC	P0301/93	Cylinder 1 Misfire Detected
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DTC	P0302/93	Cylinder 2 Misfire Detected
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DTC	P0303/93	Cylinder 3 Misfire Detected
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DTC	P0304/93	Cylinder 4 Misfire Detected
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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 check engine warning light lights up.

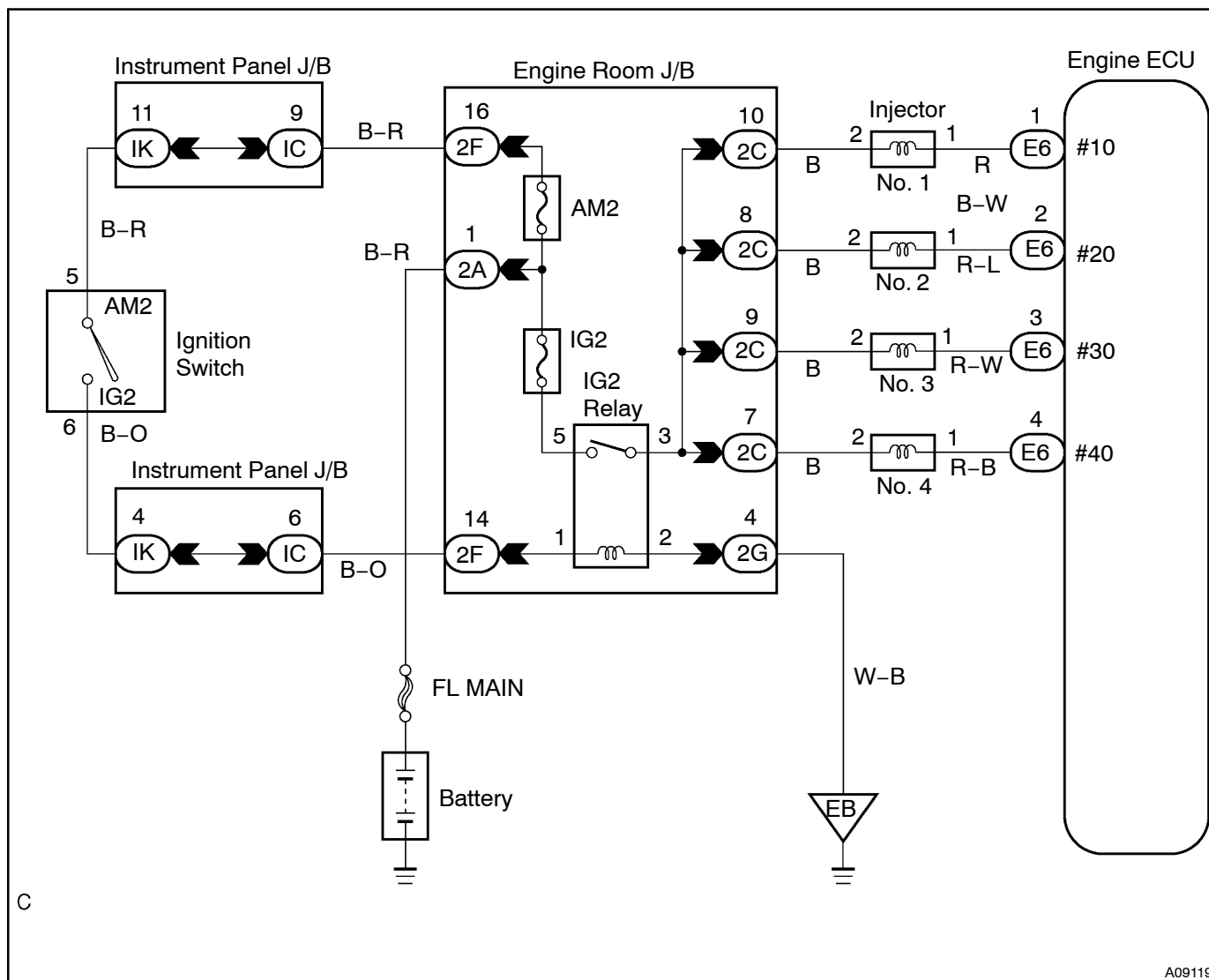
If the misfire rate is high enough and the driving conditions will cause catalyst overheating, the check engine warning light blinks when misfiring occurs.

DTC No.	DTC Detecting Condition	Trouble Area
P0300/93	Misfiring of random cylinders is detected during any particular 200 or 1,000 revolutions	• Ignition system • Injector • Fuel pressure • Compression pressure • Valve clearance • Valve timing • Air flow meter • Water temp. sensor • Open or short in engine wire • Connector connection • Engine ECU
P0301/93 P0302/93 P0303/93 P0304/93	For any particular 200 revolutions for engine, misfiring is detected which can cause catalyst overheating (This causes MIL 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



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CONFIRMATION DRIVING PATTERN

- Connect the hand-held tester.
- Record DTC and the freeze frame data.
- Use the hand-held tester to set to Check Mode. (See page DI-4)
- 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
1000 rpm	3 minutes or more
2000 rpm	1 minutes 30 seconds or more
3000 rpm	1 minutes or more

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

INSPECTION PROCEDURE

HINT:

- If 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 data 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 warmed up or not, the air-fuel ratio 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 or freeze frame data. Also, after finishing the repair, confirm that there is no misfire. (See the 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 $\pm 20\%$, 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 warming 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 ignition plug, and etc.

1 Check wire harness, connector and vacuum hose in engine room.

CHECK:

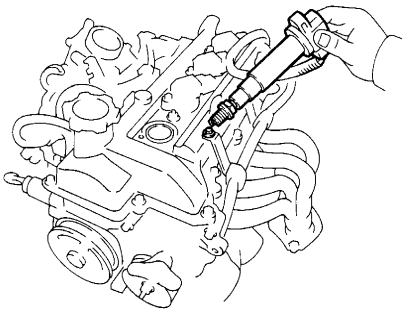
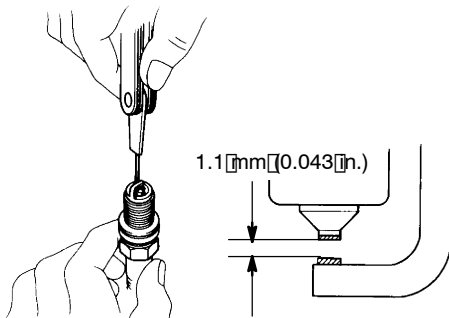
- Check the connection conditions of wire harness and connector.
- Check the disconnection, piping and break or vacuum hose.

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

OK

2 Check spark plug and spark of misfiring cylinder.



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PREPARATION:

Remove the spark plug (See page IG-1).

CHECK:

- Check the electrode of carbon deposits electrode.
- Check the electrode gap.

OK:

- No large carbon deposit present.
Not wet with gasoline or oil.
- Electrode gap: 1.1 mm (0.043 in.)

PREPARATION:

- Install the spark plug to the ignition coil.
- Disconnect the injector connector.
- Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

NOTICE:

To prevent excess fuel being injected from the injectors during this test, don't crank the engine for more than 5 ~ 10 seconds at a time.

OK:

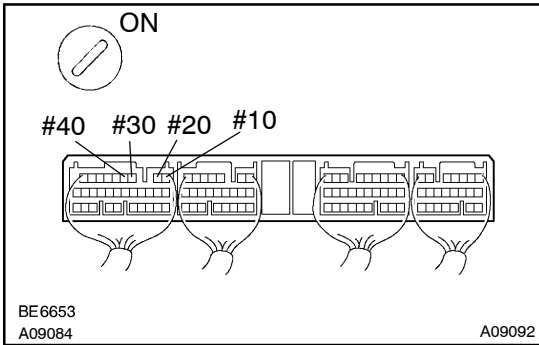
Spark jumps across electrode gap.

NG

Replace or check ignition system (See page IG-1).

OK

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



PREPARATION:

- Remove the cover from the engine ECU.
- Turn the ignition switch ON.

CHECK:

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

OK:

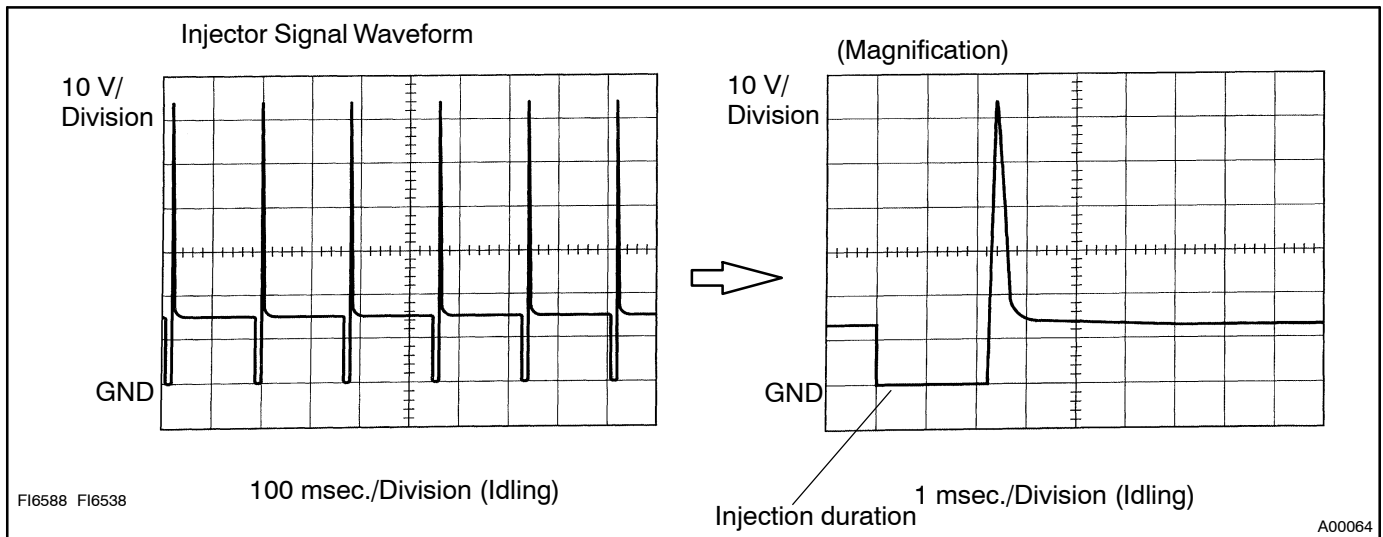
Voltage: 9 – 14 V

Reference: INSPECTION USING OSCILLOSCOPE

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

HINT:

The correct waveforms are as shown.



OK

Go to step 5.

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4 Check resistance of injector of misfiring cylinder (See page FI-18).

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Replace injector.

OK

Check for open and short in harness and connector between injector and engine ECU (See page N-20).

5 Check fuel pressure (See page FI-6).

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Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page FI-1).

OK

6 Check injector injection (See page FI-22).

NG

Replace injector.

OK

7 Check air flow meter and water temp. sensor (See pages FI-28 and FI-55).

NG

Repair or replace.

OK

Check compression pressure, valve clearance and valve timing.