

<b>DTC</b>	<b>P0300</b>	<b>Random/Multiple Cylinder Misfire Detected</b>
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<b>DTC</b>	<b>P0301</b>	<b>Cylinder 1 Misfire Detected</b>
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<b>DTC</b>	<b>P0302</b>	<b>Cylinder 2 Misfire Detected</b>
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<b>DTC</b>	<b>P0303</b>	<b>Cylinder 3 Misfire Detected</b>
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<b>DTC</b>	<b>P0304</b>	<b>Cylinder 4 Misfire Detected</b>
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## CIRCUIT DESCRIPTION

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

The ECM 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 MIL lights up.

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

### HINT:

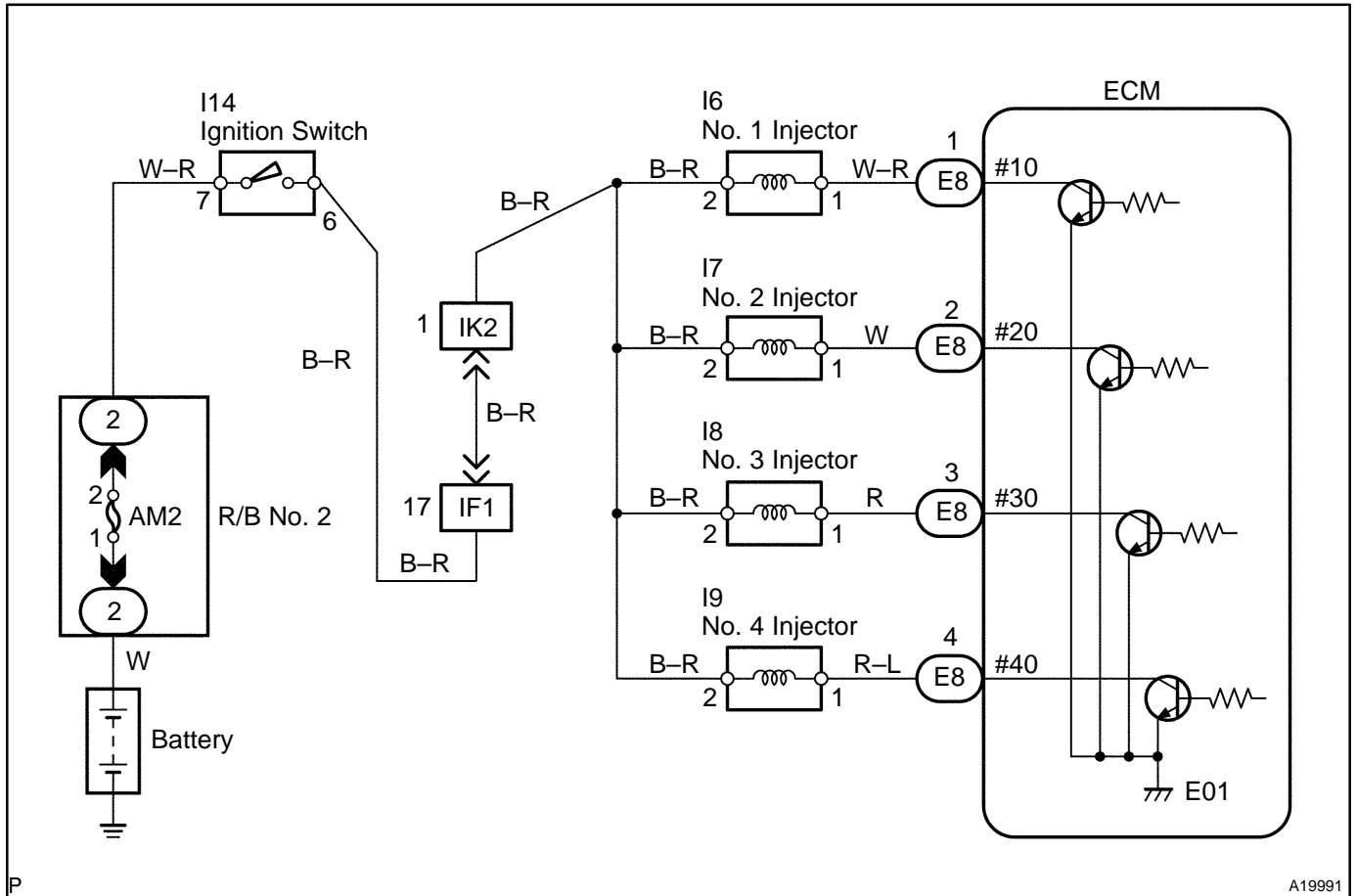
- For any particular 200 revolutions of engine, misfiring is detected, which can cause catalyst to overheat (This cause MIL to blink. 1trip detection logic).
- For any particular 1,000 revolutions of engine, misfiring is detected, which causes deterioration in emissions (This cause MIL to light up. 2trip detection logic).

DTC No.	DTC Detection Condition	Trouble Area
P0300	Misfiring of random cylinders is detected	<ul style="list-style-type: none"> <li>• Open or short in engine wire</li> <li>• Connector connection</li> </ul>
P0301 P0302 P0303 P0304	Misfiring of each cylinder is detected	<ul style="list-style-type: none"> <li>• Vacuum hose connection</li> <li>• Ignition system</li> <li>• Injector</li> <li>• Fuel pressure</li> <li>• EGR system (Only for 3RZ-FE)</li> <li>• Mass air flow meter</li> <li>• Engine coolant temp. sensor</li> <li>• Compression pressure</li> <li>• Valve clearance</li> <li>• Valve timing</li> <li>• PCV hose connection</li> <li>• PCV hose</li> <li>• ECM</li> </ul>

## 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

- Connect the hand-held tester or OBD II scan tool.
- Record DTC and the freeze frame data.
- Use the hand-held tester to set to the check mode (See page DI-3).
- Read the value on the misfire counter for each cylinder when idling. If the value is displayed on the misfire counter, skip the following procedure of confirmation driving.
- 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 the DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD for the following period of time in the data list. Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from check (test) mode to normal mode. So all DTCs, etc., are erased.

Engine Speed	Time
Idling	3 min. 30 sec. or more
1,000 rpm	3 min. or more
2,000 rpm	1 min. 30 sec. or more
3,000 rpm	1 min. or more

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

**INSPECTION PROCEDURE**

**HINT:**

- If DTCs besides misfire are memorized simultaneously, first perform the troubleshooting for them.
- Read freeze frame data using the hand-held tester or the OBD II scan tool, as 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.
- When the vehicle is brought to the workshop and the misfire is not occurred, misfire can be confirmed by reproducing the condition of the freeze frame data. Also, after finishing the repair, confirm that there is no misfire (See the confirmation driving pattern).
- On 6 and 8 cylinder engines, misfiring cylinder identification is disabled at high engine speed and only an general misfire fault code P0300 is stored instead of a cylinder specific misfire fault code (i. e., P0301 – P0308). Under the following conditions, only P0300 code may be stored. Misfire starts in the high engine speed area or Misfire occurs only in the high engine speed area. Therefore, when a general misfire fault code (i.e., P0300) is only stored, erase the DTCs after read freeze frame data with the hand-held tester or OBD II scan tool. Start the engine and drive the confirmation patten (See the CONFIRMATION DRIVING PATTERN) and read the value of the misfire ratio for each cylinder (or DTC). Perform the repair correspond to the high misfire ratio cylinder (or the misfiring cylinder indicated by DTC). After completing the repair, confirm no misfire is occurring by driving the confirmation 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 or misfire only during warming up.
- If the misfire cannot be reproduced, the reason may be because of the driving with lack or fuel, the use of improper fuel, a stain on ignition plug, etc.
- Be sure to check the value on the misfire counter after the repair.

<b>1</b>	<b>Are there any other codes (besides DTC P0300, P0301, P0302, P0303 or P0304) being output?</b>
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**HINT:**

If any other code besides DTC (P0300, P0301, P0302, P0303 or P0304) output, perform the troubleshoot on that DTC.

<b>YES</b>	<b>Go to relevant DTC chart (See page <a href="#">DI-231</a>).</b>
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<b>NO</b>
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<b>2</b>	<b>Check wire harness, connector and vacuum hose in engine room.</b>
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**CHECK:**

- (a) Check the connection conditions of wire harness and connector.
- (b) Check the disconnection, piping and break of vacuum hose.

<b>NG</b>	<b>Repair or replace, then confirm that there is no misfire (See confirmation driving pattern).</b>
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<b>OK</b>
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<b>3</b>	<b>Check connection of PCV hose.</b>
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<b>NG</b>	<b>Repair or replace PCV hose.</b>
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<b>OK</b>
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<b>4</b>	<b>Connect hand-held tester, and read the number of misfire.</b>
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**PREPARATION:**

- (a) Connect the hand-held tester to the DLC3.
- (b) Turn the ignition switch ON and push the hand-held tester main switch ON.
- (c) Select the item "DIAGNOSIS/ ENHANCED OBD II/DATA LIST/ALL/CYL #1 – CYL #4".
- (d) Start the engine.

**CHECK:**

Read the number of misfire on the hand-held tester.

**HINT:**

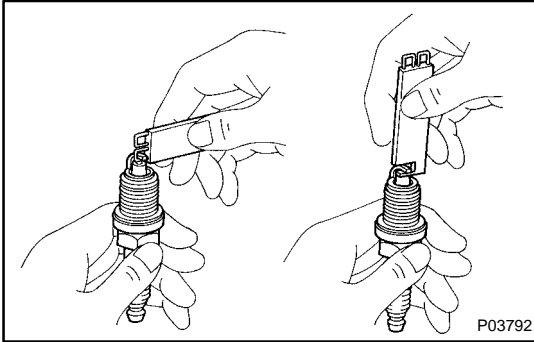
When a misfire is not reproduced, be sure to branch below based on the stored DTC.

**RESULT:**

High Misfire Rate Cylinder	Proceed to
1 or 2 cylinders	Type I
More than 3 cylinders	Type II

<b>Type II</b>	<b>Go to step 16.</b>
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<b>Type I</b>
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**5 Check spark plug and spark of misfiring cylinder (See page IG-1).**
**PREPARATION:**

- (a) Remove the ignition coil.
- (b) Remove the spark plug.

**CHECK:**

- (a) Check spark plug type.
- (b) Check the electrode for carbon deposits.
- (c) Check the electrode gap.

**OK:****(a) Recommended spark plug:**

DENSO made	K16R-U11
NGK made	BKR5EYA-11

**(b)**

**No large carbon deposit present.**

**Not wet with gasoline or oil.**

**(c)**

**Correct electrode gap for new spark plug:**

**1.0 – 1.1 mm (0.039 – 0.043 in.)**

**PREPARATION:**

- (a) Install the spark plug to the ignition coil, and connect the ignition coil the connector.
- (b) Disconnect injector connector.
- (c) Ground the spark plug.

**CHECK:**

Check if spark occurs while engine is being cranked.

**NOTICE:**

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

**OK:**

**Spark jumps across electrode gap.**

**OK**

**Go to step 8.**

**NG**

<b>6</b>	<b>Change normal spark plug and check spark of misfiring cylinder.</b>
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**PREPARATION:**

- (a) Disconnect the spark plug.
- (b) Replace the normal spark plug.
- (c) Install the spark plug to the ignition coil, and connect the ignition coil the connector.
- (d) Disconnect the injector connector.
- (e) Ground the spark plug.

**CHECK:**

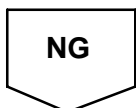
Check if spark occurs while the engine is being cranked.

**NOTICE:**

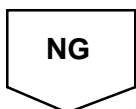
To prevent excess fuel from being injected from the injectors during this test, don't crank the engine for more than 5 – 10 seconds at a time.

**OK:**

Spark jumps across electrode gap.

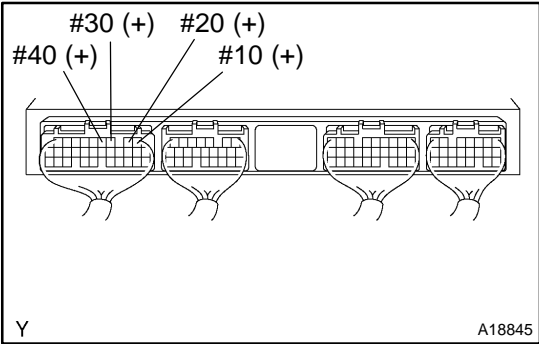


<b>7</b>	<b>Check for open and short in harness and connector between misfire cylinder of ignition coil with igniter and ECM (See page <a href="#">IN-28</a>).</b>
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Repair or replace harness or connector (See page [IN-28](#)).

**8 Check voltage of ECM terminals for injector of failed cylinder.**



**PREPARATION:**

- (a) Remove the glove compartment (See page SF-55).
- (b) Turn the ignition switch ON.

**CHECK:**

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

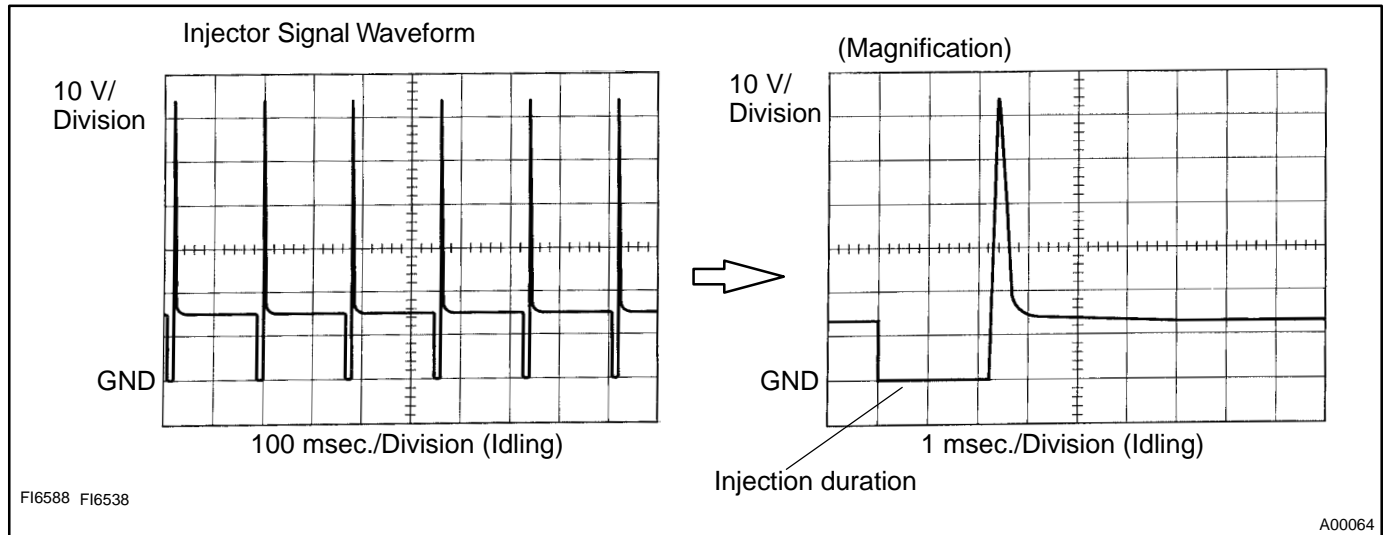
**OK:**

**Voltage: 9 – 14 V**

**Reference: INSPECTION USING OSCILLOSCOPE**

With the engine idling, check the waveform between terminals #10 – #40 and E01 of the ECM connector.  
**HINT:**

The correct waveform is as shown.



**OK** → Go to step 11.

**NG**

**9 Check resistance of injector of misfiring cylinder (See page SF-15).**

**NG** → Replace injector.

**OK**

**10** Check for open and short in harness and connector between ignition switch and injector, injector and ECM of misfiring cylinder (See page [IN-28](#))

NG

Repair or replace harness or connector.

OK

**11** Check injector injection of misfiring cylinder (See page [SF-18](#)).

NG

Replace injector.

OK

**12** Only for 3RZ-FE:  
Check EGR system (See page [EC-13](#)).

NG

Repair EGR system.

OK

**13** Check compression pressure of misfiring cylinder (See page [EM-3](#)).

NG

Repair or replace.

OK

**14** Check valve clearance of misfiring cylinder (See page [EM-5](#)).

NG

Adjust valve clearance.

OK



**15** Switch the step by the number of misfire cylinder (Refer the result of Step 4).

High Misfire Rate Cylinder	Proceed to
1 or 2 cylinders	Type I
More than 3 cylinders	Type II

**Type II** Check intermittent problems (See page [DI-3](#)).

**Type I**

**16** Check valve timing (Check for loose and jumping teeth of timing chain) (See page [EM-22](#)).

**NG** Adjust valve timing (Repair or replace timing belt).

**OK**

**17** Check fuel pressure (See page [SF-5](#)).

**NG** Check and repair fuel pump, pressure regulator, fuel pipe line and filter.

**OK**

**18** Check mass air flow meter (See page [SF-25](#)).

**NG** Repair mass air flow meter.

**OK**

<b>19</b>	<b>Check engine coolant temp. sensor (See page <a href="#">SF-47</a>).</b>
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<b>NG</b>	<b>Replace engine coolant temp. sensor.</b>
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<b>OK</b>
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<b>20</b>	<b>Switch the step by the number of misfire cylinder (Refer the result of Step 4).</b>
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High Misfire Rate Cylinder	Proceed to
1 or 2 cylinders	Type I
More than 3 cylinders	Type II

<b>Type II</b>	<b>Go to step 5.</b>
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<b>Type I</b>
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<b>Check intermittent problems (See page <a href="#">DI-3</a>).</b>
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