

<b>DTC</b>	<b>P0300</b>	<b>Random/Multiple Cylinder Misfire Detected</b>
<b>DTC</b>	<b>P0301</b>	<b>Cylinder 1 Misfire Detected</b>
<b>DTC</b>	<b>P0302</b>	<b>Cylinder 2 Misfire Detected</b>
<b>DTC</b>	<b>P0303</b>	<b>Cylinder 3 Misfire Detected</b>
<b>DTC</b>	<b>P0304</b>	<b>Cylinder 4 Misfire Detected</b>
<b>DTC</b>	<b>P0305</b>	<b>Cylinder 5 Misfire Detected</b>
<b>DTC</b>	<b>P0306</b>	<b>Cylinder 6 Misfire Detected</b>
<b>DTC</b>	<b>P0307</b>	<b>Cylinder 7 Misfire Detected</b>
<b>DTC</b>	<b>P0308</b>	<b>Cylinder 8 Misfire Detected</b>

### **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.

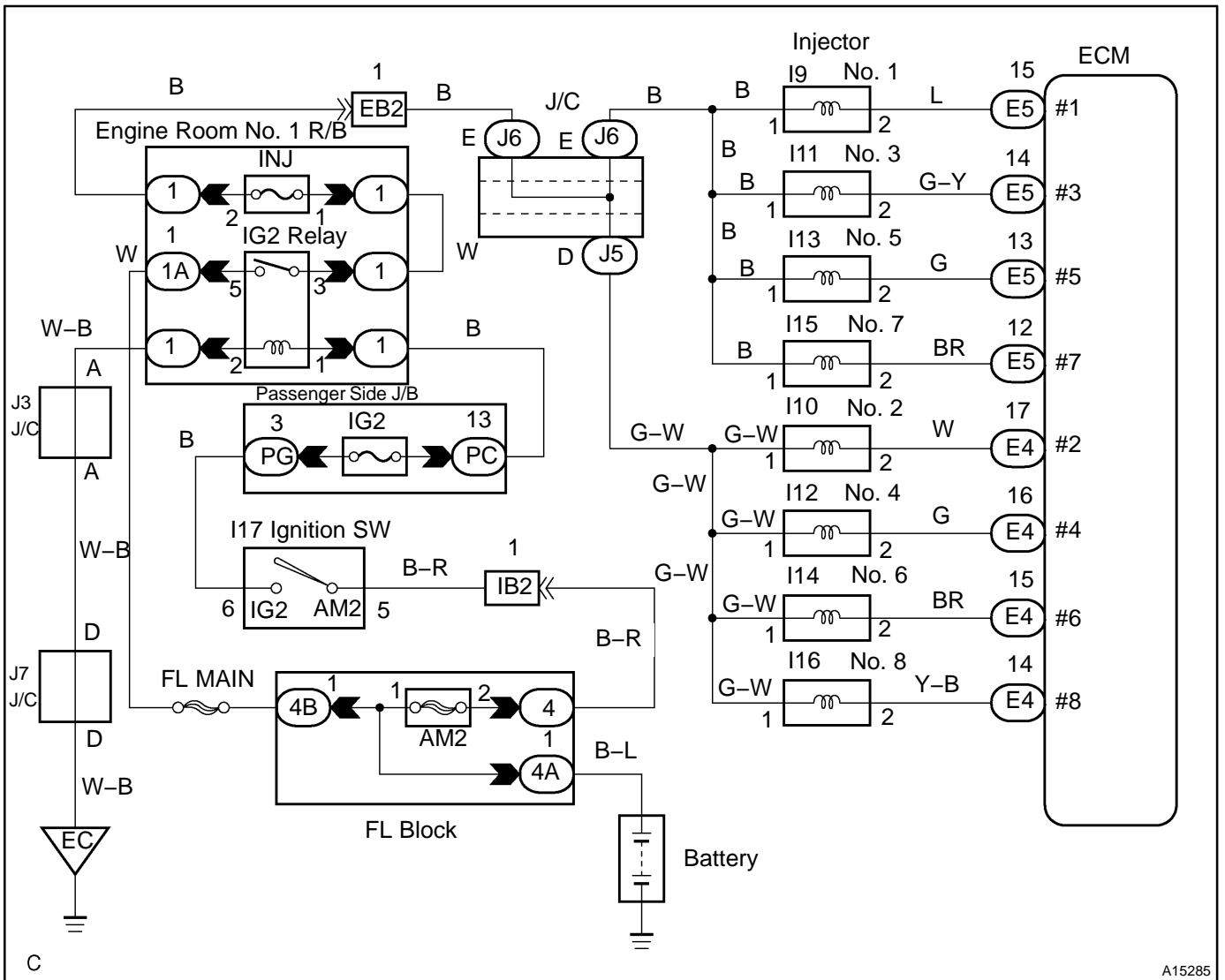
DIAGNOSTICS - ENGINE

DTC No.	DTC Detecting Condition	Trouble Area
P0300	Misfiring of random cylinders is detected during any particular 200 or 1,000 revolutions 1 trip detection logic: MIL to blink 2 trip detection logic: MIL to light up	<ul style="list-style-type: none"> <li>• Open or short in engine wire</li> <li>• Connector connection</li> <li>• Vacuum hose connection</li> <li>• Ignition system</li> <li>• Injector</li> </ul>
P0301 P0302 P0303 P0304	For any particular 200 revolutions of engine, misfiring is detected which can cause catalyst overheating (This causes MIL to blink)	<ul style="list-style-type: none"> <li>• Fuel pressure</li> <li>• Mass air flow meter</li> <li>• Engine coolant temp. sensor</li> <li>• Compression pressure</li> </ul>
P0305 P0306 P0307 P0308	For any particular 1,000 revolutions of the engine, misfiring is detected which causes a deterioration in emissions (2 trip detection logic)	<ul style="list-style-type: none"> <li>• Valve clearance</li> <li>• Valve timing</li> <li>• PCV piping</li> <li>• ECM</li> </ul>

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

- Connect the hand-held tester or OBD II scan tool to the DLC3.
- Record DTC and the freeze frame data.
- Use the hand-held tester to set to the Check Mode (See page DI-3).
- 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

- Check whether there is misfire or not by monitoring DTC and the freeze frame data. After that, record them.
- 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 hand-held tester or 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.
- If the misfire does not occur when the vehicle is brought to the workshop, 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 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 over 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  $80^{\circ}\text{C}$  ( $176^{\circ}\text{F}$ ), there is a possibility of misfire only during warming up (the engine).
- If the misfire cannot be reproduced, the reason may be because of driving the vehicle with lack of fuel, use of improper fuel, a stain on the ignition plug, etc.
- Be sure to check the value on the misfire counter after the repair.

**1** Are there any other codes (besides DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 or P0308) being output?

**YES** Go to relevant DTC chart (See page [DI-15](#)).

**NO**

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

**CHECK:**  
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**

**3** Check connection of PCV piping.

**NG** Repair or replace PCV piping.

**OK**

**4** Connect hand-held tester, and read the number of misfire.

**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) 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:**

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

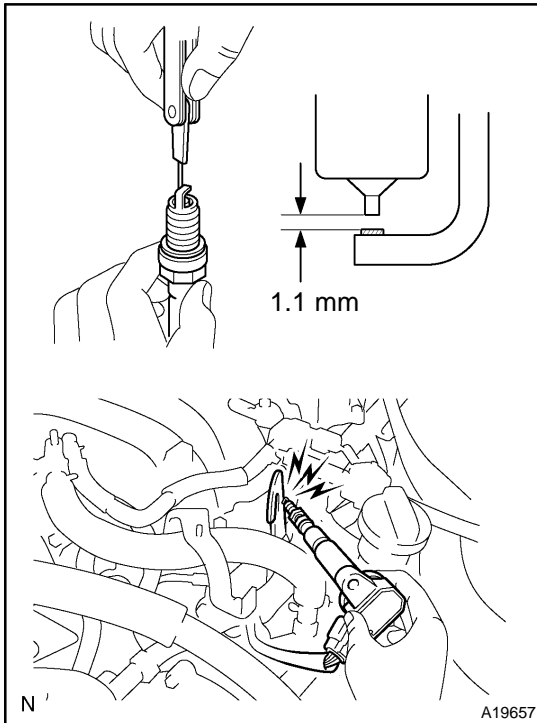
Type I

Go to step 5.

Type II

Go to step 14.

5

Check spark plug and spark of misfiring cylinder (See page [IG-1](#)).**PREPARATION:**

Remove the spark plug.

**CHECK:**

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

**OK:**

(a) Twin ground electrodes type

Recommended spark plug:

**DENSO made SK20R11**

(b) No large carbon deposit present

Not wet with gasoline or oil

(c) Electrode gap: 1.1 mm (0.043 in.)

**PREPARATION:**

- (a) Install the spark plug to the high-tension cord or 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, don't crank the engine for more than 5 – 10 seconds at a time.

**OK:**

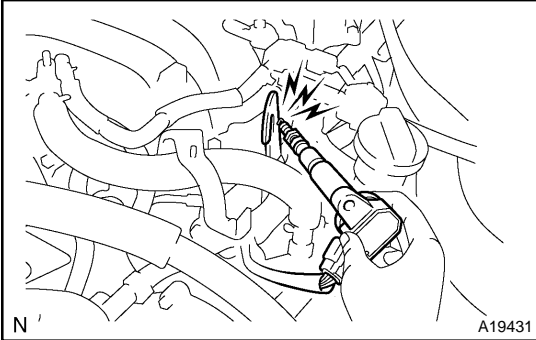
Spark jumps across electrode gap.

NG

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

OK

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

- (a) Disconnect the spark plug.
- (b) Change the normal spark plug.
- (c) Install the normal spark plug to the ignition coil with igniter.
- (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>OK</b>	<b>Replace spark plug.</b>
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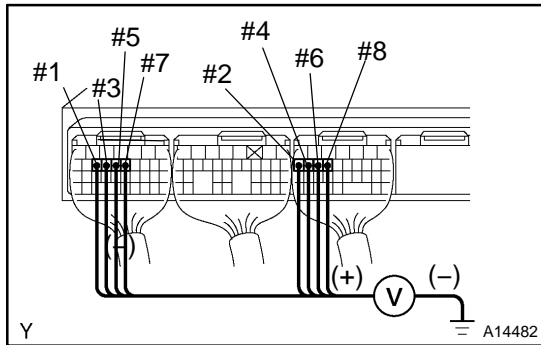
<b>NG</b>
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<b>7</b>	<b>Check for open and short in harness and connector between ignition coil and ECM (See page <a href="#">IN-34</a>).</b>
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<b>OK</b>	<b>Replace ignition coil with igniter, then confirm that there is no misfire.</b>
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<b>NG</b>
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**8 Check voltage of ECM terminal for injector of failed cylinder.**



**PREPARATION:**

- (a) Remove the engine room ECU cover (See page [SF-86](#)).
- (b) Turn the ignition switch ON.

**CHECK:**

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

**OK:**

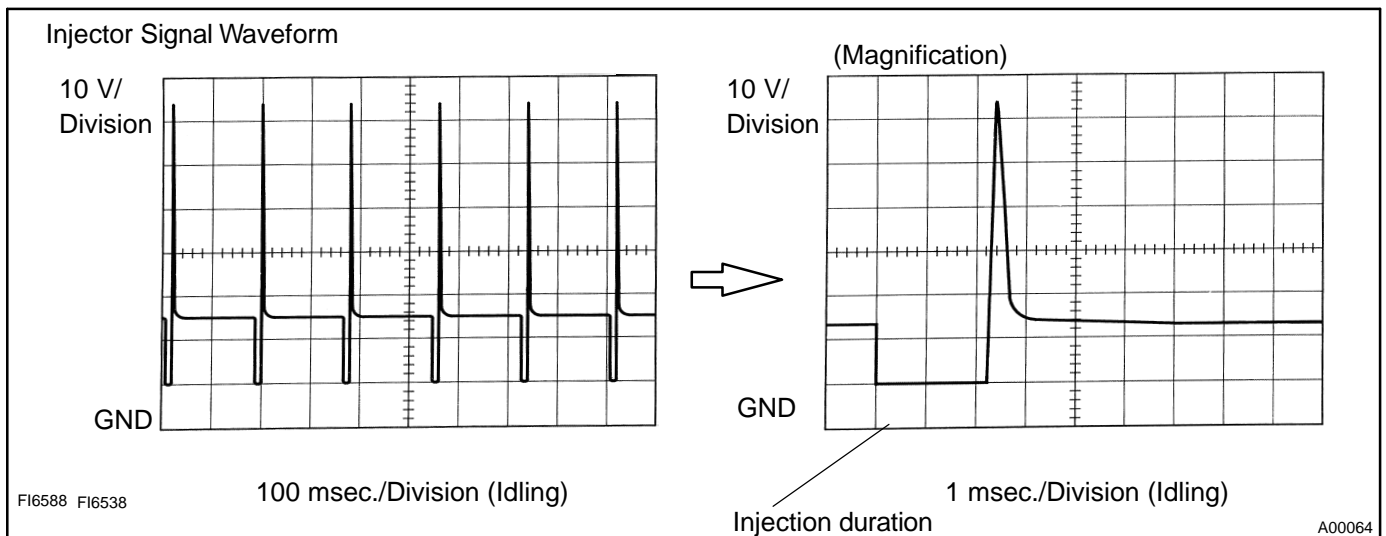
**Voltage: 9 - 14 V**

**Reference: INSPECTION USING OSCILLOSCOPE**

With the engine idling, check the waveform between terminals #1 - #8 and E01 of the ECM connectors.

**HINT:**

The correct waveform is as shown.



**OK** → **Go to step 11.**

**NG**

**9 Check spark plug and spark of misfiring cylinder (See page [IG-1](#)).**

**NG** → **Replace injector.**

**OK**

<b>10</b>	<b>Check for open and short in harness and connector between TG2 and injector, injector and ECM of misfiring cylinder (See page <a href="#">IN-34</a>).</b>
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<b>NG</b>	<b>Repair or replace harness or connector.</b>
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<b>OK</b>
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<b>11</b>	<b>Check injector injection of misfiring cylinder (See page <a href="#">SF-23</a>).</b>
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<b>NG</b>	<b>Replace injector.</b>
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<b>OK</b>
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<b>12</b>	<b>Check compression pressure of misfiring cylinder (See page <a href="#">SF-23</a>).</b>
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<b>NG</b>	<b>Repair or replace.</b>
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<b>OK</b>
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<b>13</b>	<b>Check valve clearance of misfiring cylinder (See page <a href="#">EM-5</a>).</b>
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<b>NG</b>	<b>Repair valve clearance.</b>
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<b>OK</b>
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<b>14</b>	<b>Check result of step 4 switch step by number of misfire cylinder.</b>
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High misfire rate cylinder	Proceed to
1 or 2 cylinders	A
more than 3 cylinders	B

<b>B</b>	<b>Check for intermittent problems.</b>
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<b>A</b>
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<b>15</b>	<b>Check valve timing (See page <a href="#">EM-23</a>).</b>
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<b>NG</b>	<b>Adjust valve timing.</b>
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<b>OK</b>
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<b>16</b>	<b>Check fuel pressure (See page <a href="#">SF-5</a>).</b>
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<b>NG</b>	<b>Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page <a href="#">SF-1</a>).</b>
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<b>OK</b>
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<b>17</b>	<b>Check mass air flow meter (See page <a href="#">SF-33</a>) and engine coolant temperature sensor (See page <a href="#">SF-75</a>).</b>
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<b>NG</b>	<b>Repair or replace.</b>
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<b>OK</b>
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**18**    **Check result of step 4 switch step by number of misfire cylinder.**

High misfire rate cylinder	Proceed to
1 or 2 cylinders	A
more than 3 cylinders	B

**B**    **Check for intermittent problems.**

**A**

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