

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
DTC	P0305	Cylinder 5 Misfire Detected
DTC	P0306	Cylinder 6 Misfire Detected
DTC	P0307	Cylinder 7 Misfire Detected
DTC	P0308	Cylinder 8 Misfire Detected

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, which indicates that the engine condition has deteriorated and the MIL lights up.

If the misfire rate is extremely high, the driving conditions will cause catalyst to overheat and the MIL blinks when misfiring occurs.

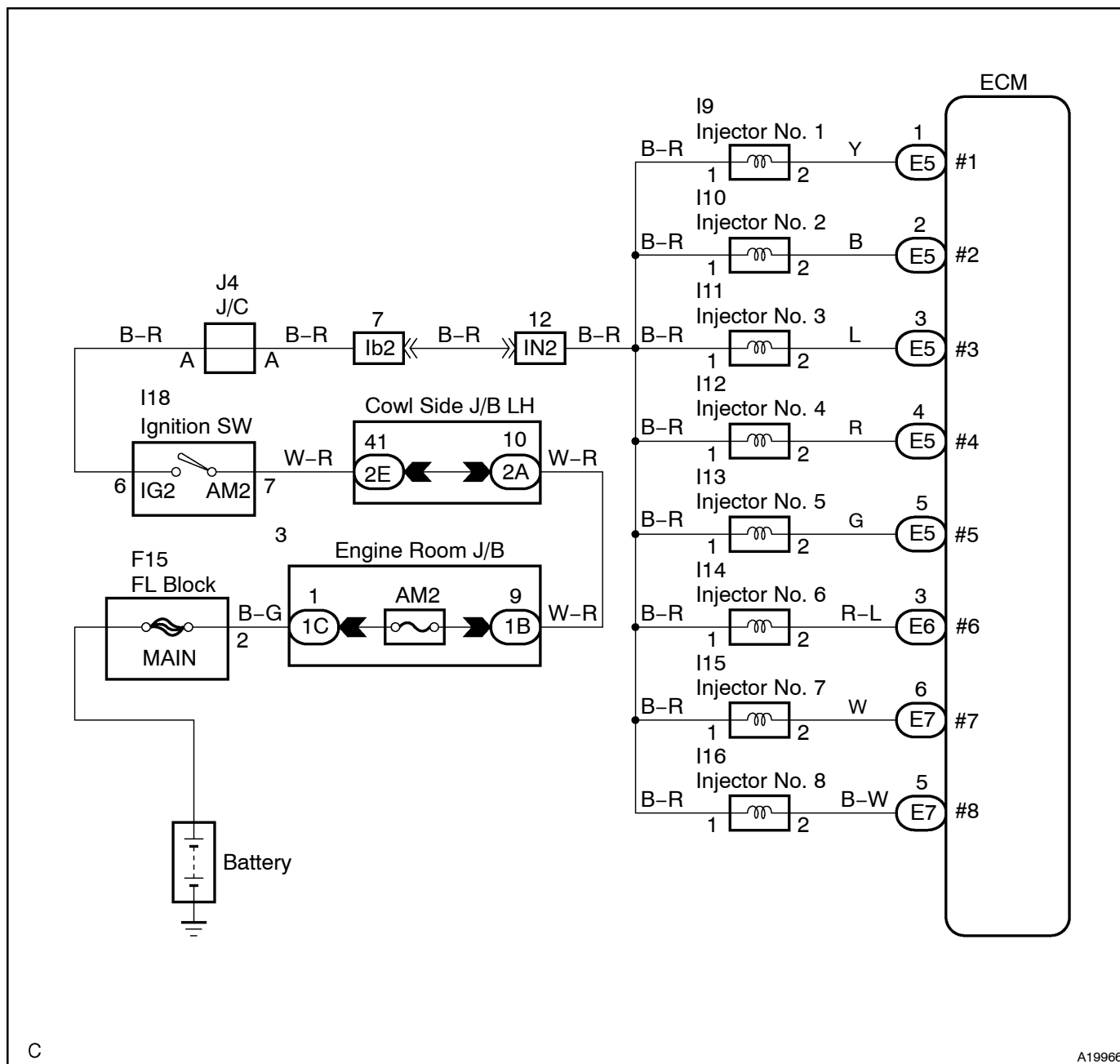
DIAGNOSTICS - ENGINE

DTC No.	DTC Detecting Condition	Trouble Area
P0300	Misfiring of random cylinders is detected during any particular 200 or 1,000 revolutions MIL to blink: 1trip detection logic MIL to light up: 2 trip detection logic	• Open or short in engine wire • Connector connection • Vacuum hose connection • Ignition system
P0301 P0302 P0303 P0304	For any particular 200 revolutions of engine, misfiring is detected which can cause catalyst overheating (This cause MIL to blink, 1trip detection logic)	• Injector • Fuel pressure • Mass air flow meter • Engine coolant temp. sensor
P0305 P0306 P0307 P0308	For any particular 1,000 revolutions of engine, misfiring is detected which causes a deterioration in emissions (This cause MIL to light up, 2 trip detection logic)	• Compression pressure • Valve clearance • Valve timing • PCV piping

HINT:

When codes for a misfiring cylinder are recorded repeatedly but no random misfire code is included, 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](#)).
- 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 the ENGINE SPD, CALC LOAD in the freeze frame data or the 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 the MISFIRE RPM, MISFIRE LOAD in the data list for the following period of time.
- 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 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

- (f) Check whether misfire occurs 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 is case that DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.
- Read freeze frame data using hand-held tester or the OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, this 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).
- 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 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 beside 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 while 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.
- Be sure to check the value on the misfire counter after the repair.

Hand-held tester:

1	Are there any other codes (besides DTC P0300, DTC P0301, DTC P0302, DTC P0303, DTC P0304, DTC P0305, P0306, P0307 or P0308) being output?
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YESGo to relevant DTC chart (See page [DI-24](#)).**NO**

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

NG

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

OK

3	Check connection of PCV piping.
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NG

Repair or replace PCV piping.

OK

4	Connect hand-held tester, and read the number of misfire.
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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) Start the engine.

CHECK:

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

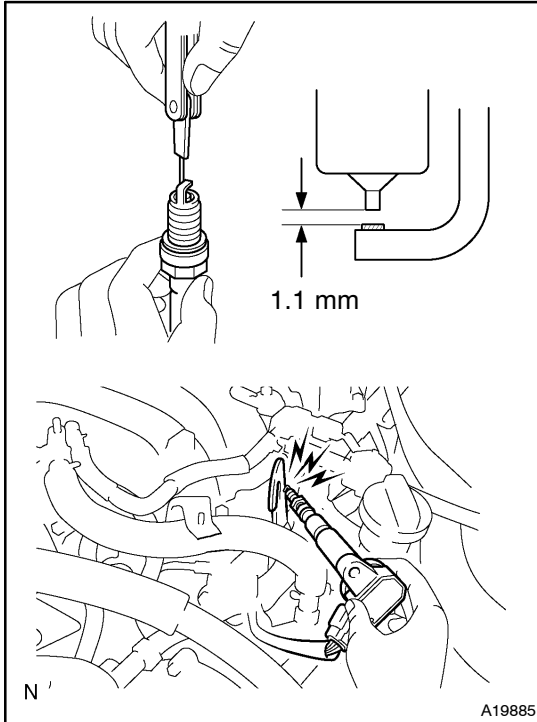
HINT:

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 II**Go to step 15.****Type I**

5**Check spark plug and spark of misfiring cylinder.****PREPARATION:**

- (a) Disconnect the ignition coil with igniter (See page [IG-6](#)).
- (b) Remove the spark plug.

CHECK:

- (a) Check the spark plug type (See page [IG-1](#)).
- (b) Check the electrode gap.

OK:

- (a) **Recommended spark plug is installed.**
- (b) **Electrode gap is 1.1 mm (0.043 in.).**

PREPARATION:

- (a) Disconnect the ignition coil with igniter connector, and disconnect the ignition coil with igniter (See page [IG-6](#)).
- (b) Remove the spark plug.
- (c) Install the spark plug to the ignition coil with igniter, and connect the ignition coil with igniter connector.
- (d) Disconnect the injector connector.
- (e) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

NOTICE:

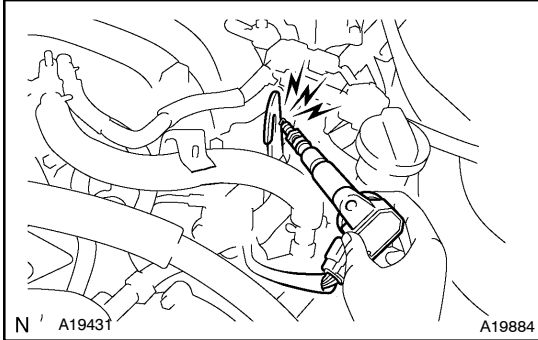
To prevent excess fuel from being injected from the injectors during this test, don't crank the engine for more than 5 – 10 seconds at a time.

OK:

Spark jumps across electrode gap.

OK**Go to step 8.****NG**

6 Check normal spark plug and spark of misfiring cylinder.



PREPARATION:

- (a) Disconnect the spark plug.
- (b) Change the normal spark plug.
- (c) Install the 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.

OK

Replace spark plug.

NG

7 Check for open and short in harness and connector between ignition coil with igniter and ECM (See page IN-36).

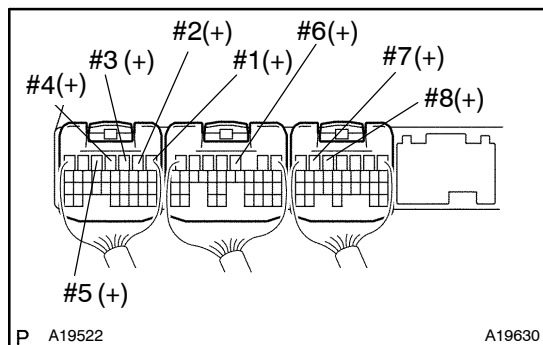
OK

Replace ignition coil with igniter, then confirm that there is no misfire.

NG

Repair or replace harness or connector (See page IN-36).

8 Check voltage of ECM terminal for injector of misfiring cylinder.



PREPARATION:

- Remove the glove compartment door (See page [SF-60](#)).
- Turn the ignition switch ON.

CHECK:

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

OK:

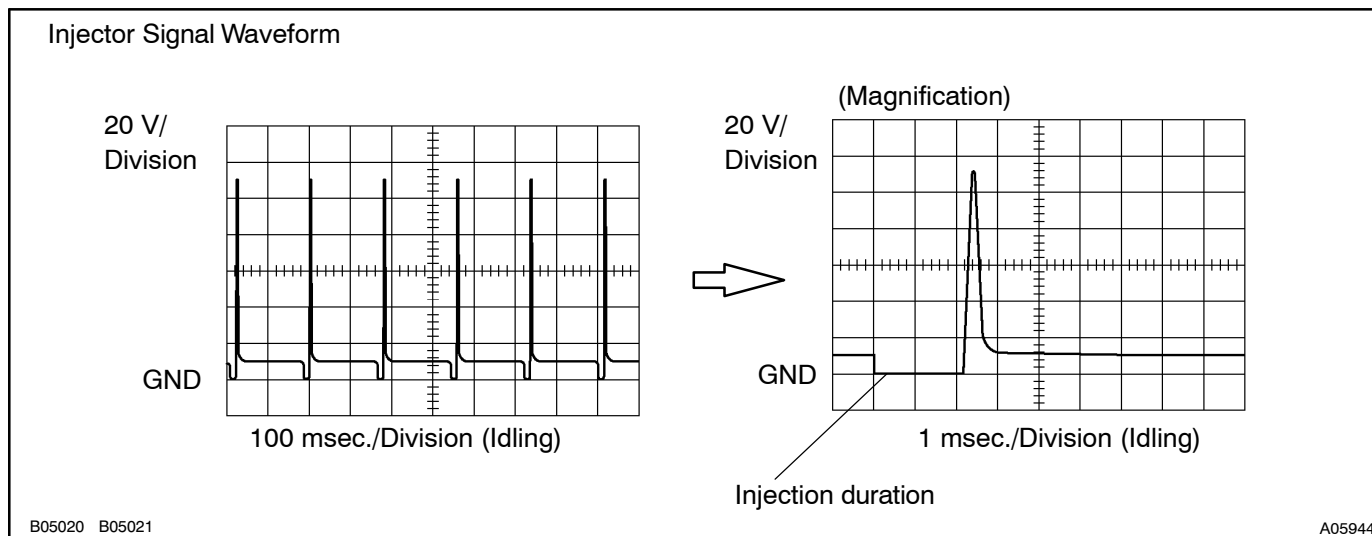
Voltage: 9 – 14 V

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 resistance of injector of misfiring cylinder (See page [SF-19](#)).

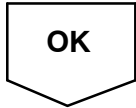
NG

Replace injector.

OK

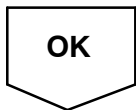
10	Check for open and short in harness and connector between ignition SW and injector, injector and ECM of misfiring cylinder (See page IN-36).
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NG	Repair or replace harness or connector.
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11	Check injector injection of misfiring cylinder (See page SF-24).
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NG	Repair or replace.
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12	Check compression pressure of misfiring cylinder (See page EM-3).
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NG	Repair or replace.
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13	Check valve clearance of misfiring cylinder (See page EM-4).
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NG	Adjust valve clearance.
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14	Switch the step by the number of misfire cylinder (Refer the result of Step 3).
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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

15	Check valve timing (Check for loose and jumping teeth of timing belt) (See page EM-22).
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NG

Adjust valve timing (Repair or replace timing belt).

OK

16	Check fuel pressure (See page SF-7).
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NG

Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page [SF-1](#)).

OK

17	Check mass air flow meter (See page SF-32).
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NG

Repair mass air flow meter.

OK

18	Check engine coolant temp. sensor (See page SF-50).
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NG

Replace engine coolant temp. sensor.

OK

19	Switch the step by the number of misfire cylinder (Refer the result of Step 3).
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High Misfire Rate Cylinder	Proceed to
1 or 2 cylinders	Type I
More than 3 cylinders	Type II

Type II

Go to step 5.

Type I

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

OBD II scan tool (excluding hand-held tester):

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

Go to relevant DTC chart (See page [DI-24](#)).

NO

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

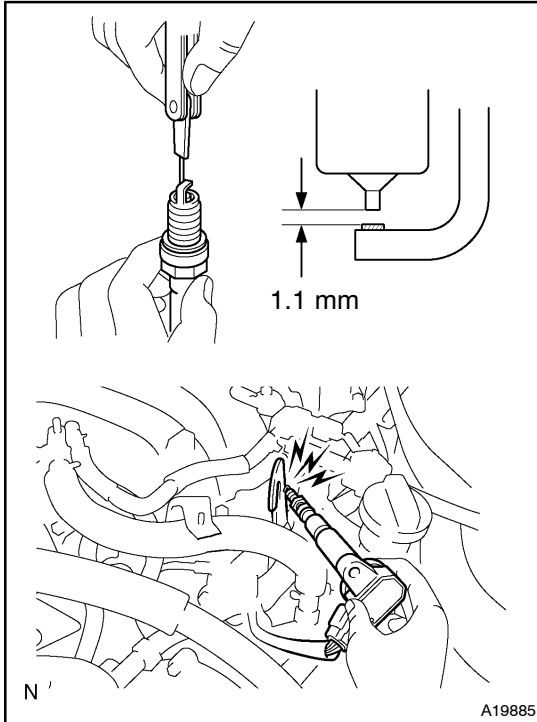
- (a) Check the connection conditions of wire harness and connector.
- (b) Check the disconnection, piping and break of vacuum hose.

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

3	Check connection of PCV piping.
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NG**Repair or replace PCV piping.****OK**

4

Check spark plug and spark of misfiring cylinder.**PREPARATION:**

- (a) Disconnect the ignition coil with igniter (See page [IG-6](#)).
- (b) Remove the spark plug.

CHECK:

- (a) Check the spark plug type (See page [IG-1](#)).
- (b) Check the electrode gap.

OK:

- (a) **Recommended spark plug is installed.**
- (b) **Electrode gap is 1.1 mm (0.043 in.).**

PREPARATION:

- (a) Disconnect the ignition coil with igniter connector, and disconnect the ignition coil with igniter (See page [IG-6](#)).
- (b) Remove the spark plug.
- (c) Install the spark plug to the ignition coil with igniter, and connect the ignition coil with igniter 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:

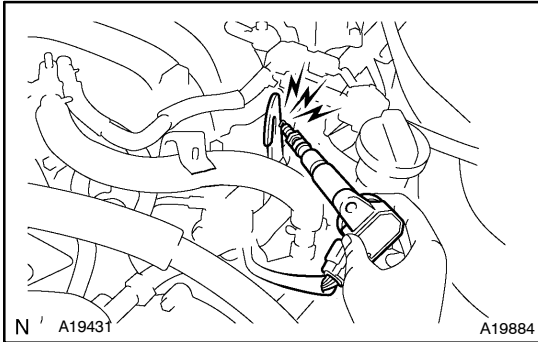
Spark jumps across electrode gap.

OK

Go to step 7.

NG

5 Check normal spark plug and spark of misfiring cylinder.



PREPARATION:

- (a) Disconnect the spark plug.
- (b) Change the normal spark plug.
- (c) Install the 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.

OK

Replace spark plug.

NG

6 Check for open and short in harness and connector between ignition coil with igniter and ECM (See page [IN-36](#)).

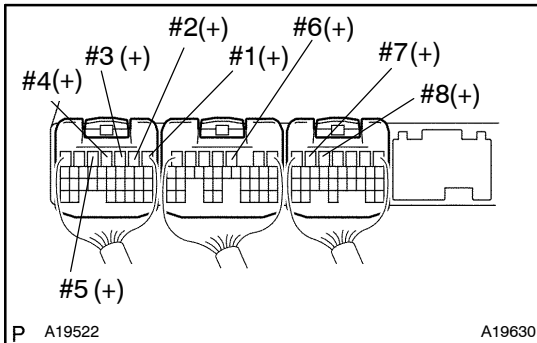
OK

Replace ignition coil with igniter, then confirm that there is no misfire.

NG

Repair or replace harness or connector.

7 Check voltage of ECM terminal for injector of misfiring cylinder.



PREPARATION:

- Remove the glove compartment door (See page [SF-60](#)).
- Turn the ignition switch ON.

CHECK:

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

OK:

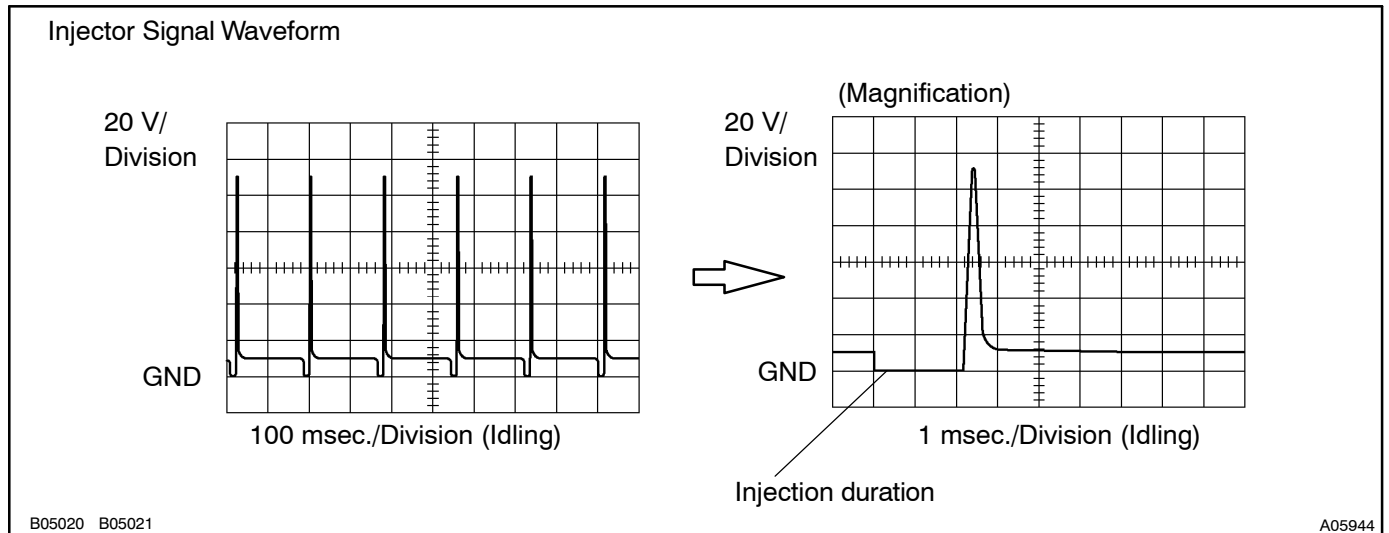
Voltage: 9 – 14 V

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 10.

NG

8 Check resistance of injector of misfiring cylinder (See page [SF-19](#)).

NG

Replace injector.

OK

9	Check for open and short in harness and connector between ignition SW and injector, injector and ECM of misfiring cylinder (See page IN-36).
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NG

Repair or replace harness or connector.

OK

10	Check injector injection of misfiring cylinder (See page SF-24).
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NG

Repair or replace.

OK

11	Check compression pressure of misfiring cylinder (See page EM-3).
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NG

Repair or replace.

OK

12	Check valve clearance of misfiring cylinder (See page EM-4).
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NG

Adjust valve clearance.

OK

13	Check valve timing (Check for loose and jumping teeth of timing belt) (See page EM-22).
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NG

Adjust valve timing (Repair or replace timing belt).

OK

14 Check fuel pressure (See page [SF-7](#)).

NG

Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page [SF-1](#)).

OK

15 Check mass air flow meter (See page [SF-32](#)).

NG

Repair mass air flow meter.

OK

16 Check engine coolant temp. sensor (See page [SF-50](#)).

NG

Replace engine coolant temp. sensor.

OK

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