

1UR-FSE ENGINE CONTROL SYSTEM > SFI SYSTEM > P0300 Random / Multiple Cylinder Misfire Detected / P0301 Cylinder 1 Misfire Detected / P0302 Cylinder 2 Misfire Detected / P0303 Cylinder 3 Misfire Detected / P0304 Cylinder 4 Misfire Detected / P0305 Cylinder 5 Misfire Detected / P0306 Cylinder 6 Misfire Detected / P0307 Cylinder 7 Misfire Detected / P0308 Cylinder 8 Misfire Detected

INSPECTION PROCEDURE

HINT:

- If any DTCs other than misfire DTCs are output, troubleshoot those DTCs first.
- Read freeze frame data using the Techstream. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- If the misfire does not recur when the vehicle is brought to the workshop, reproduce the conditions stored in the ECM as freeze frame data.
- If the misfire still cannot be reproduced even though the conditions stored in the ECM as freeze frame data have been reproduced, one of the following factors is considered to be a possible cause of the problem:
 1. There was insufficient fuel in the tank.
 2. Improper fuel is used.
 3. The spark plugs have been contaminated.
 4. The problem requires further diagnosis.
- After finishing repairs, check the misfire counts of the cylinders (Cylinder #1 Misfire Count to Cylinder #8 Misfire Count).
- Be sure to confirm that no misfiring cylinder DTCs are set again by conducting the confirmation driving pattern after finishing repairs.
- For 6 and 8 cylinder engines, the ECM intentionally does not set the specific misfiring cylinder DTCs at high engine RPM. If misfires occur only in high engine RPM areas, only DTC P0300 is set.
In the event of DTC P0300 being present, perform the following operations:
 1. Clear the DTC (Refer to 1UR-FSE ENGINE CONTROL SYSTEM > SFI SYSTEM > DTC CHECK / CLEAR(200909 -)).
 2. Start the engine and conduct the confirmation driving pattern.
 3. Read the misfiring rates of each cylinder or DTC(s) using the Techstream.
 4. Repair the cylinder(s) that has a high misfiring rate or is indicated by the DTC.
 5. After finishing repairs, conduct the confirmation driving pattern again, in order to verify that DTC P0300 is not set.
- When one of Short FT #1, Long FT #1, Short FT #2 or Long FT #2 in the freeze frame data is outside the range of +/-20%, the air-fuel ratio may be Rich (-20% or less) or Lean (+20% or more).
- When the Coolant Temp in the freeze frame data is less than 75°C (167°F), the misfire have occurred only while warming up the engine.
- An extremely imbalanced drive wheel, which causes body vibration, may cause misfire DTCs detection.

1. CHECK ANY OTHER DTC OUTPUT (IN ADDITION TO MISFIRE DTCS)

- a. Connect the Techstream to the DLC3.
- b. Turn the engine switch on (IG).
- c. Turn the Techstream on.

- d. Enter the following menus: Powertrain / Engine / Trouble Codes.
- e. Read DTCs.

Result:

Display (DTC output)	Proceed to
P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 and/or P0308	A
P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 and/or P0308 and other DTCs	B

HINT:

If any DTCs other than P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 and P0308 are output, troubleshoot those DTCs first.



B

GO TO DTC CHART (Refer to 1UR-FSE ENGINE CONTROL SYSTEM > SFI SYSTEM > DIAGNOSTIC TROUBLE CODE CHART(200909 -))



A

2. READ VALUE USING TECHSTREAM (MISFIRE RPM AND MISFIRE LOAD)

- a. Connect the Techstream to the DLC3.
- b. Turn the engine switch on (IG) and turn the Techstream on.
- c. Enter the following menus: Powertrain / Engine / Data List / Misfire / Misfire RPM and Misfire Load.
- d. Read and note the Misfire RPM and Misfire Load values.

HINT:

The Misfire RPM and Misfire Load values indicate the vehicle conditions under which the misfire occurred.



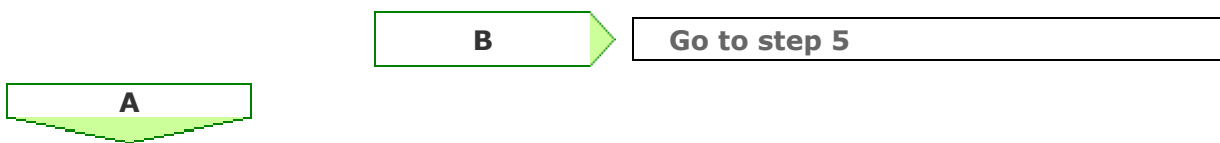
NEXT

3. READ VALUE USING TECHSTREAM

- a. Connect the Techstream to the DLC3.
- b. Turn the engine switch on (IG) and turn the Techstream on.
- c. Enter the following menus: Powertrain / Engine / Data List / Catalyst OT MF F/C.
- d. Read the valve displayed on the Techstream.

Result:

Data List	Techstream Display	Proceed to
Catalyst OT MF F/C	Avail	A
	Not Avl	B



4. PERFORM ACTIVE TEST USING TECHSTREAM

- a. Connect the Techstream to the DLC3.
- b. Turn the engine switch on (IG) and turn the Techstream on.
- c. Enter the following menus: Powertrain / Engine / Active Test / Prohibit the Catalyst OT Misfire Prevent F/C.
- d. Perform the Active Test.

NOTICE:

When performing the Active Test, make sure the vehicle is stopped and either idling or being revved within 3000 rpm.



5. CHECK VENTILATION HOSE (HOSE CONNECTIONS)

OK:

Ventilation hose is connected correctly and is not damaged.



REPAIR OR REPLACE VENTILATION HOSE (Refer to 1UR-FSE EMISSION CONTROL > EMISSION CONTROL SYSTEM > ON-VEHICLE INSPECTION (20909 -))



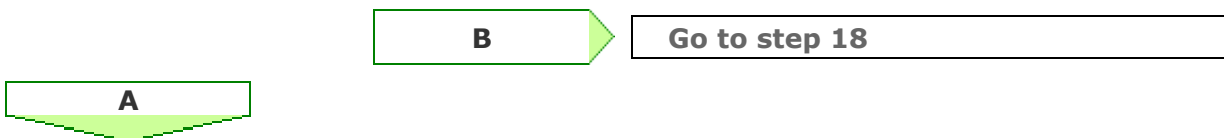
6. CHECK MISFIRE COUNT OF PORT INJECTION

- a. Connect the Techstream to the DLC3.
- b. Turn the engine switch on (IG).

- c. Turn the Techstream on.
- d. Clear DTCs (Refer to 1UR-FSE ENGINE CONTROL SYSTEM > SFI SYSTEM > DTC CHECK / CLEAR(200909 -)).
- e. Enter the following menus: Powertrain / Engine / Active Test / Control the Injection Way / Port. (Procedure "A")
- f. Allow the engine to idle.
- g. Monitor all of the misfire count values that are displayed on the Techstream: Powertrain / Engine / Data List / Misfire / Cylinder #1 Misfire Count to Cylinder #8 Misfire Count. If no misfire counts occur for any of the cylinders, perform the following procedure: (Procedure "B")
 - i. Move the gear selector lever to the D position.
 - ii. Repeat procedure "A" to "B" above.
 - iii. Monitor all of the misfire count values that are displayed on the Techstream.

Result:

Misfire count	Proceed to
1 or 2 cylinders have misfire counts	A
3 cylinders or more have misfire counts	A
There are no misfire counts	B



7. CHECK MISFIRE COUNT OF DIRECT INJECTION

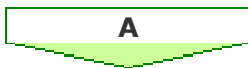
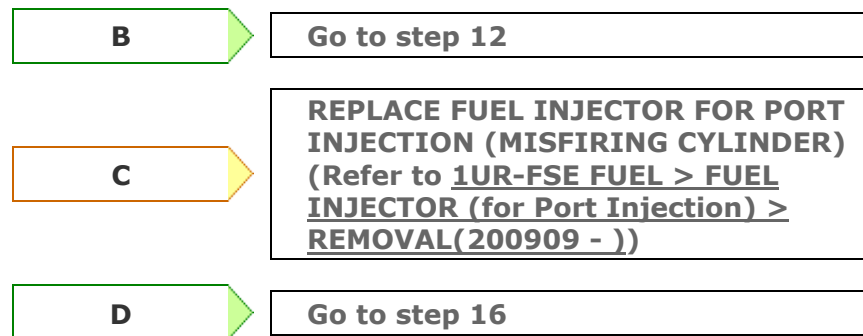
- a. Connect the Techstream to the DLC3.
- b. Turn the engine switch on (IG).
- c. Turn the Techstream on.
- d. Clear DTCs (Refer to 1UR-FSE ENGINE CONTROL SYSTEM > SFI SYSTEM > DTC CHECK / CLEAR(200909 -)).
- e. Enter the following menus: Powertrain / Engine / Active Test / Control the Injection Way / Direct. (Procedure "A")
- f. Allow the engine to idle.
- g. Monitor all of the misfire count values that are displayed on the Techstream: Powertrain / Engine / Data List / Misfire / Cylinder #1 Misfire Count to Cylinder #8 Misfire Count. If no misfire counts occur for any of the cylinders, perform the following procedure: (Procedure

"B")

- i. Move the gear selector lever to the D position.
- ii. Repeat procedure "A" to "B" above.
- iii. Monitor all of the misfire count values that are displayed on the Techstream.

Result:

Misfire Count		Proceed to
Port	Direct	
1 or 2 cylinders have misfire counts	1 or 2 cylinders have misfire counts	A
3 cylinders or more have misfire counts	3 cylinders or more have misfire counts	B
1 or 2 cylinders have misfire counts	There are no misfire counts	C
3 cylinders or more have misfire counts	There are no misfire counts	D



8. CHECK SPARK PLUG

- a. Remove the ignition coil and the spark plug of the misfiring cylinder.
- b. Measure the spark plug electrode gap (Refer to 1UR-FSE IGNITION > IGNITION SYSTEM > ON-VEHICLE INSPECTION(200909 -)).



9. CHECK FOR SPARK AND IGNITION

- a. Disconnect the injector connectors, in order to prevent the engine from starting.

- b. Install the spark plug to the ignition coil.
- c. Attach the spark plug assembly to the cylinder head cover.
- d. Crank the engine for less than 2 seconds and check the spark.

OK:

Sparks jump across the electrode gap.

- e. Reconnect the injector connectors.

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Go to step 11

OK

10. CHECK CYLINDER COMPRESSION PRESSURE (MALFUNCTIONING CYLINDER)

- a. Measure the cylinder compression pressure of the misfiring cylinder (Refer to 1UR-FSE ENGINE MECHANICAL > ENGINE (for 2WD) > ON-VEHICLE INSPECTION(200909 -)).

OK

REPLACE ECM (Refer to 1UR-FSE ENGINE CONTROL SYSTEM > ECM > REMOVAL(200909 -))

NG

CHECK ENGINE TO DETERMINE CAUSE OF LOW COMPRESSION

11. CHANGE TO NORMAL SPARK PLUG AND CHECK SPARK OF MISFIRING CYLINDER

- a. Change the installed spark plug to a spark plug that functions normally.
- b. Perform a spark test.

CAUTION:

Always disconnect each injector connector.

NOTICE:

Do not crank the engine for more than 2 seconds.

- i. Install the spark plug to the ignition coil and connect the ignition coil connector.
- ii. Disconnect the injector connector.
- iii. Ground the spark plug.
- iv. Check if sparks occur while the engine is being cranked.

OK:
Sparks jump across the electrode gap.

NG

REPLACE IGNITION COIL ASSEMBLY THEN CONFIRM THAT THERE IS NO MISFIRE (Refer to 1UR-FSE IGNITION > IGNITION COIL AND SPARK PLUG > REMOVAL(200909 -))

OK

REPLACE SPARK PLUG (Refer to 1UR-FSE IGNITION > IGNITION COIL AND SPARK PLUG > REMOVAL(200909 -))

12. CHECK AIR INDUCTION SYSTEM

- a. Check the air induction system for vacuum leakage.

OK:
No leakage from air induction system.

NG

REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

13. READ VALUE USING TECHSTREAM (COOLANT TEMP)

- a. Connect the Techstream to the DLC3.
- b. Turn the engine switch on (IG).
- c. Turn the Techstream on.
- d. Enter the following menus: Powertrain / Engine / Data List / All Data / Coolant Temp.
- e. Read the Data List twice, when the engine is both cold and warmed up.

Standard:
With cold engine:
Same as ambient air temperature.
With warm engine:
Between 75°C and 95°C (167°F and 203°F).

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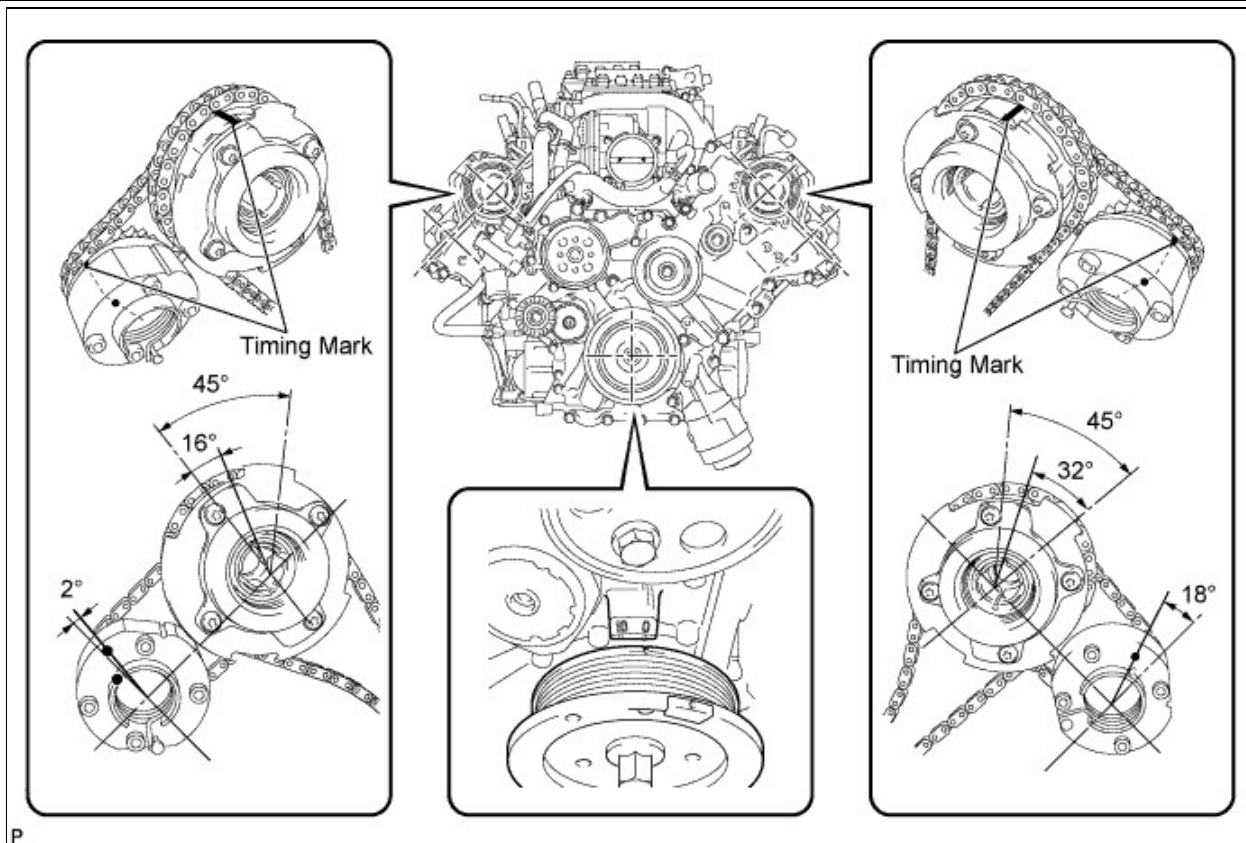
REPLACE ENGINE COOLANT TEMPERATURE SENSOR (Refer to 1UR-FSE ENGINE CONTROL SYSTEM > ENGINE COOLANT TEMPERATURE)

SENSOR > REMOVAL(200909 -)**OK****14. INSPECT MASS AIR FLOW METER (BANK 1 AND BANK 2)**

- a. Inspect the mass air flow meter (Refer to 1UR-FSE ENGINE CONTROL SYSTEM > MASS AIR FLOW METER > ON-VEHICLE INSPECTION(200909 -)).

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REPLACE MASS AIR FLOW METER
 (Refer to 1UR-FSE ENGINE CONTROL SYSTEM > MASS AIR FLOW METER > REMOVAL(200909 -))

OK**15. CHECK VALVE TIMING**

- a. Remove the cylinder head cover bank 1 and bank 2.
- b. Turn the crankshaft pulley, and align its groove with the timing mark "0" of the timing chain cover.
- c. Rotate the crankshaft pulley and align its notch to timing mark 0 of the timing chain cover. Check that the timing marks of the camshaft timing gears and camshaft timing exhaust gears are at the positions shown in the illustration.

OK:

Timing marks on camshaft timing gears are aligned as shown in the illustration.

- d. Reinstall the cylinder head cover.

NG

ADJUST VALVE TIMING (Refer to 1UR-FSE ENGINE MECHANICAL > TIMING CHAIN > INSTALLATION (200909 -))

OK

REPLACE ECM (Refer to 1UR-FSE ENGINE CONTROL SYSTEM > ECM > REMOVAL (200909 -))

16. CHECK FUEL PRESSURE (LOW PRESSURE SIDE)

- a. Check the fuel pressure (low pressure side) (Refer to 1UR-FSE FUEL > FUEL SYSTEM > ON-VEHICLE INSPECTION(200909 -)).

OK

REPLACE FUEL INJECTOR FOR PORT INJECTION (Refer to 1UR-FSE FUEL > FUEL INJECTOR (for Port Injection) > REMOVAL(200909 -))

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17. CHECK FUEL PUMP OPERATION

- a. Check the fuel pump operation (Refer to 1UR-FSE FUEL > FUEL PUMP > INSPECTION (200909 -)).

OK

CHECK AND REPLACE FUEL SYSTEM (PRESSURE REGULATOR, PIPE LINE AND FILTER)

NG

REPLACE FUEL PUMP (Refer to 1UR-FSE FUEL > FUEL PUMP > REMOVAL (200909 -))

18. CHECK MISFIRE COUNT OF DIRECT INJECTION

- a. Connect the Techstream to the DLC3.
- b. Turn the engine switch on (IG).
- c. Turn the Techstream on.

- d. Clear DTCs.
- e. Enter the following menus: Powertrain / Engine / Active Test / Control the Injection Way / Direct. (Procedure "A")
- f. Allow the engine to idle.
- g. Monitor all of the misfire count values that are displayed on the Techstream: Powertrain / Engine / Data List / Misfire / Cylinder #1 Misfire Count to Cylinder #8 Misfire Count. If no misfire counts occur for any of the cylinders, perform the following procedure: (Procedure "B")
 - i. Move the gear selector lever to the D position.
 - ii. Repeat procedure "A" to "B" above.
 - iii. Monitor all of the misfire count values that are displayed on the Techstream.

Result:

Misfire Count		Proceed to
Port	Direct	
There are no misfire counts	1 or 2 cylinders have misfire counts	A
There are no misfire counts	3 cylinders or more have misfire counts	B
There are no misfire counts	There are no misfire counts	C



**REPLACE FUEL INJECTOR FOR DIRECT INJECTION (MISFIRING CYLINDER)
 (Refer to 1UR-FSE FUEL > FUEL INJECTOR (for Direct Injection) > REMOVAL (200909 -))**

19. CHECK FUEL PRESSURE SENSOR

- a. Connect the Techstream to the DLC3.
- b. Turn the engine switch on (IG) and turn the Techstream on.
- c. Start the engine.
- d. Enter the following menus: Powertrain / Engine / Data List / All Data / Fuel Press.
- e. While revving the engine, check that the fuel pressure fluctuates.

Standard:
Idling:
3000 to 5000 kPa

**2000 rpm (No load):
7000 to 9000 kPa**

HINT:

The A/C switch and all accessory switches should be OFF, and the transmission gear selector lever should be in the N or P position, and the engine should be fully warmed up.

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REPAIR OR REPLACE FUEL SYSTEM FOR HIGH PRESSURE (REFER TO DTC P0087 OR P0088) (Refer to 1UR-FSE ENGINE CONTROL SYSTEM > SFI SYSTEM > P0087(200909 -))

OK

20. READ VALUE USING TECHSTREAM

- a. Connect the Techstream to the DLC3.
- b. Start the engine and turn the Techstream on.
- c. Enter the following menus: Powertrain / Engine / Active Test / Control the Injection way / Direct.

HINT:

The A/C switch and all accessory switches should be OFF, and the transmission gear selector lever should be in the N or P position, and the engine should be fully warmed up.

- d. Read the value: Data List / A/F Control System / Short FT #1, Long FT #1, Short FT #2, Long FT #2 and Fuel Pump Duty (D4).

Result:

Item			Proceed to
Fuel Pump Duty (D4)	Short FT #1 + Long FT #1	Short FT #2 + Long FT #2	
40% or more	-20% or less	-20% or less	A
10% or less	+20% or more	+20% or more	A
40% or more	+20% or more	+20% or more	B
10% or less	-20% or less	-20% or less	C
10% to 40%	-	-	D

B

REPLACE FUEL PRESSURE SENSOR (Refer to 1UR-FSE FUEL > FUEL PRESSURE SENSOR > REMOVAL (200909 -))

C

REPLACE ECM (Refer to 1UR-FSE ENGINE CONTROL SYSTEM > ECM > REMOVAL(200909 -))

D

REPLACE FUEL INJECTOR FOR DIRECT INJECTION (MALFUNCTIONING CYLINDER INJECTOR) (Refer to 1UR-FSE FUEL > FUEL INJECTOR (for Direct Injection) > REMOVAL(200909 -))

A

REPLACE FUEL PRESSURE SENSOR (Refer to 1UR-FSE FUEL > FUEL PRESSURE SENSOR > REMOVAL(200909 -))

21. CHECK MISFIRE COUNT

- a. Connect the Techstream to the DLC3.
- b. Turn the engine switch on (IG).
- c. Turn the Techstream on.
- d. Clear DTCs (Refer to 1UR-FSE ENGINE CONTROL SYSTEM > SFI SYSTEM > DTC CHECK / CLEAR(200909 -)).
- e. Enter the following menus: Powertrain / Engine / Data List / All Data / Misfire RPM, Misfire Load, Cylinder #1 Misfire Count to Cylinder #8 Misfire Count and Injection Way.
- f. Drive the vehicle with Misfire RPM and Misfire Load.
- g. Monitor all of the misfire count values or DTCs and Injection Way displayed on the Techstream.

Result:

Misfire count	Injection Way	Proceed to
There are no misfire counts	-	A
1 or 2 cylinders have misfire counts	Either	B
3 cylinders or more have misfire counts	Either	C
1 or 2 cylinders have misfire counts	Direct	D
3 cylinders or more have misfire counts	Direct	E

B

Go to step 8

C

Go to step 12

D

REPLACE FUEL INJECTOR FOR DIRECT INJECTION (MALFUNCTIONING CYLINDER INJECTOR) (Refer to 1UR-FSE FUEL > FUEL INJECTOR (for Direct Injection) > REMOVAL(200909 -))

E

Go to step 19

A

CHECK FOR INTERMITTENT PROBLEMS (Refer to 1UR-FSE ENGINE CONTROL SYSTEM > SFI SYSTEM > CHECK FOR INTERMITTENT PROBLEMS(200909 -))