DTC	P0325/52	Knock Sensor 1 Circuit (Bank 1 or Single Sensor)

DTC	P0330/55	Knock Sensor 2 Circuit (Bank 2)

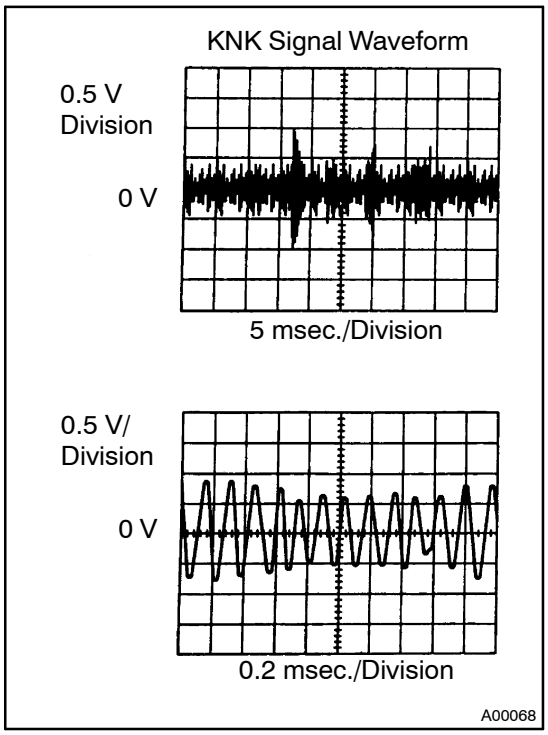
CIRCUIT DESCRIPTION

Each knock sensor is fitted to the right bank and left bank of the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed. The piezoelectric element sends a signal to the engine control ECU, when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325/52	Output voltage of the knock sensor 1 decreases beyond a threshold (threshold varies according to an engine speed) with engine speed 2,000 rpm to 5,000 rpm (1 trip detection logic)	• Open or short in knock sensor 1 circuit • Knock sensor 1 (looseness) • Engine control ECU
P0330/55	Output voltage of the knock sensor 2 decreases beyond a threshold (threshold varies according to an engine speed) with engine speed 2,000 rpm to 5,000 rpm (1 trip detection logic)	• Open or short in knock sensor 2 circuit • Knock sensor 2 (looseness) • Engine control ECU

HINT:

- Bank 1 refers to the bank that includes cylinder No. 1.
- Bank 2 refers the the bank that does not include cylinder No. 1.



Reference: INSPECTION USING OSCILLOSCOPE

- With the engine racing (4,000 rpm), check the waveform between terminals KNK 1 and KNK2 of the engine control ECU connector and body ground.

HINT:

The correct waveform is as shown.

- Spread the time on the horizontal axis, and confirm that period of the wave is 0. 13 msec. (Normal mode vibration frequency of knock sensor: 8. 1 kHz)

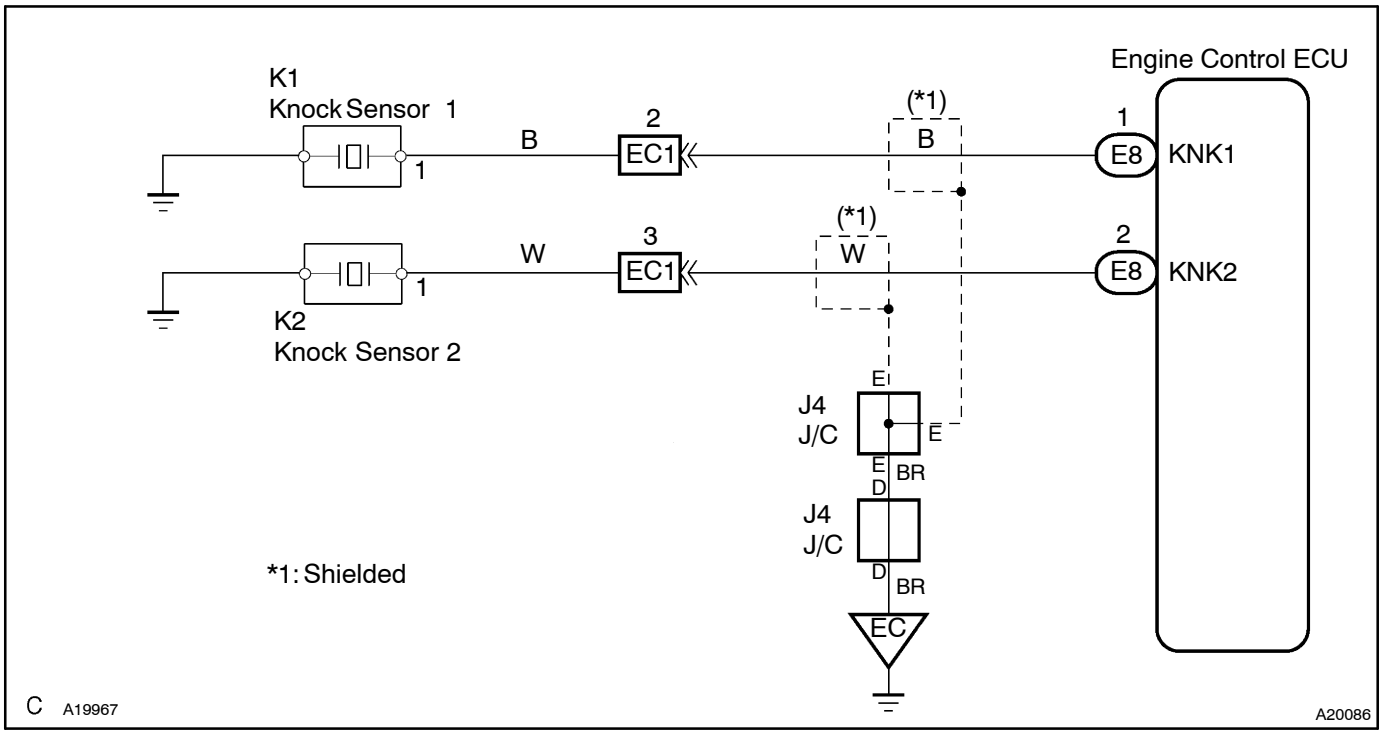
HINT:

If normal mode vibration frequency is not 8. 1 kHz, the sensor has malfunction.

MONITOR DESCRIPTION

The knock sensor located on the cylinder block, detects spark knock.
When spark knock occurs, the sensor pick –up vibrates in a specific frequency range. When the engine control ECU detects the voltage in this frequency range, it retards the ignition timing to suppress the spark knock.
The engine control ECU also senses background engine noise with the knock sensor and uses this noise to check for faults in the sensor. If the knock sensor signal level is too low for more than 10 sec., and if the knock sensor output voltage is out of normal range, the engine control ECU interprets this as a fault in the knock sensor and sets a DTC.
This monitor run after engine is warmed up (Engine Coolant Temperature (ECT) is 60 °C or more) and the vehicle is driven over 40 km/h for 1 minutes.

WIRING DIAGRAM

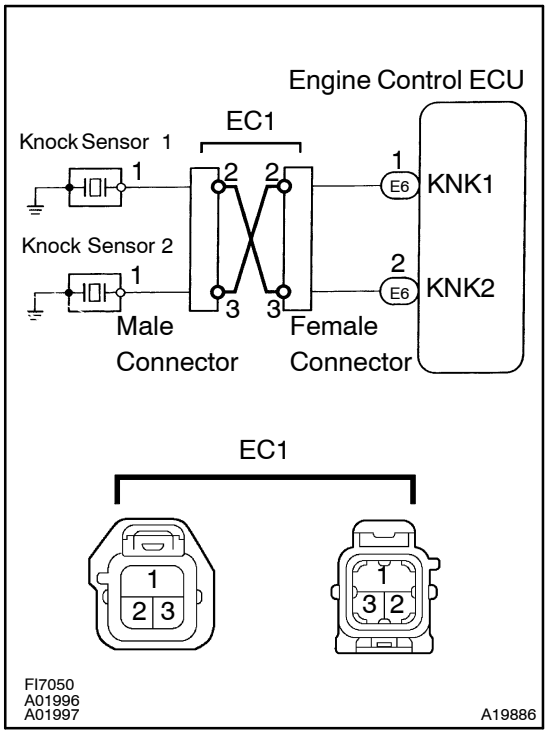


INSPECTION PROCEDURE

HINT:

- DTC P0325 is for the bank 1 knock sensor circuit.
- DTC P0330 is for the bank 2 knock sensor circuit.
- Read freeze frame data using the hand –held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air –fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Connect hand –held tester, and check knock sensor circuit.**



PREPARATION:

(a) Connect hand –held tester to the DLC3.
(b) Disconnect the EC 1 connector.
(c) Connect the terminals of the disconnected EC 1 male connector and EC 1 female as follows.

Male connector ↔ Female connector
Terminal 2 ↔ Terminal 3
Terminal 3 ↔ Terminal 2

(d) Turn ignition switch ON and push the hand –held tester main switch ON.
(e) After the engine is warmed up, perform quick racing to 4,000 rpm 3 times.

CHECK:

Check the DTC.

RESULT:

Type I	DTC same as when vehicle brought in P0325 → P0325 or P0330 → P0330
Type II	DTC different to when vehicle brought in P0325 → P0330 or P0330 → P0325

Type II	**Go to step 3.**

Type I

2	**Check for open and short in harness and connector between EC1 connector and engine control ECU (See page IN–20).**

NG → **Repair or replace harness or connector.**

OK

Replace engine control ECU (See Pub. No. RM630E, page FI–74).

3	**Check for open and short in harness and connector between EC1 connector and knock sensor (See page IN–20).**

HINT:

- If DTC P0325 has changed to P0330, check the knock sensor circuit on the bank 1 side.
- If DTC P0330 has changed to P0325, check the knock sensor circuit on the bank 2 side.

NG → **Repair or replace harness or connector.**

OK

Replace knock sensor.