DTC	P0325	KNOCK SENSOR 1 CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC	P0327	KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)

DTC	P0328	KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR)

DTC	P0330	KNOCK SENSOR 2 CIRCUIT (BANK 2)

DTC	P0332	KNOCK SENSOR 2 CIRCUIT LOW INPUT (BANK 2)

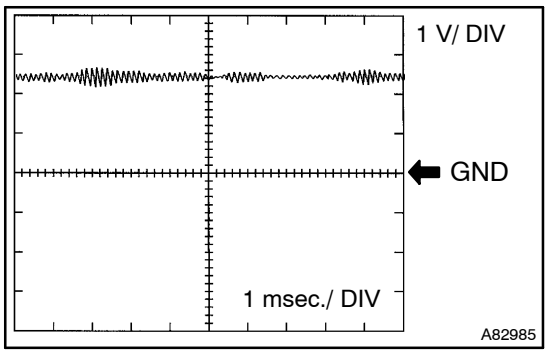
DTC	P0333	KNOCK SENSOR 2 CIRCUIT HIGH INPUT (BANK 2)

CIRCUIT DESCRIPTION

A flat type knock sensor (non–resonant type) can detect vibration in a wide band of frequency (6 kHz to 15 kHz).

The sensor, located on the cylinder block, detects spark knock. When a spark knock occurs, the knock sensor picks up vibrations in a specific frequency range. When the ECM detects signal voltage in this frequency range, it retards the ignition timing to suppress the knocking. The ECM also senses background engine noise with the knock sensor and uses this noise to check for faults in the sensor.

DTC No.	DTC Detection Condition	Trouble Area
P0325 P0330	Output voltage of knock sensor decreases beyond threshold (threshold varies according to engine RPM) (1 trip detection logic)	• Knock sensor • Knock sensor (loose) • ECM
P0327 P0332	Output voltage of knock sensor is 0.5 V or less (1 trip detection logic)	• Short in knock sensor circuit • Knock sensor • ECM
P0328 P0333	Output voltage of knock sensor is 4.5 V or more (1 trip detection logic)	• Open in knock sensor circuit • Knock sensor • ECM



Reference: Inspection using an oscilloscope.
The correct waveform is as shown.

Item	Details
Terminal	KNK1 – EKNK or KNK2 – EKN2
Equipment Settings	1 V/Division, 1 msec./Division
Condition	After warming up the engine, keep the engine speed at 4,000 rpm.

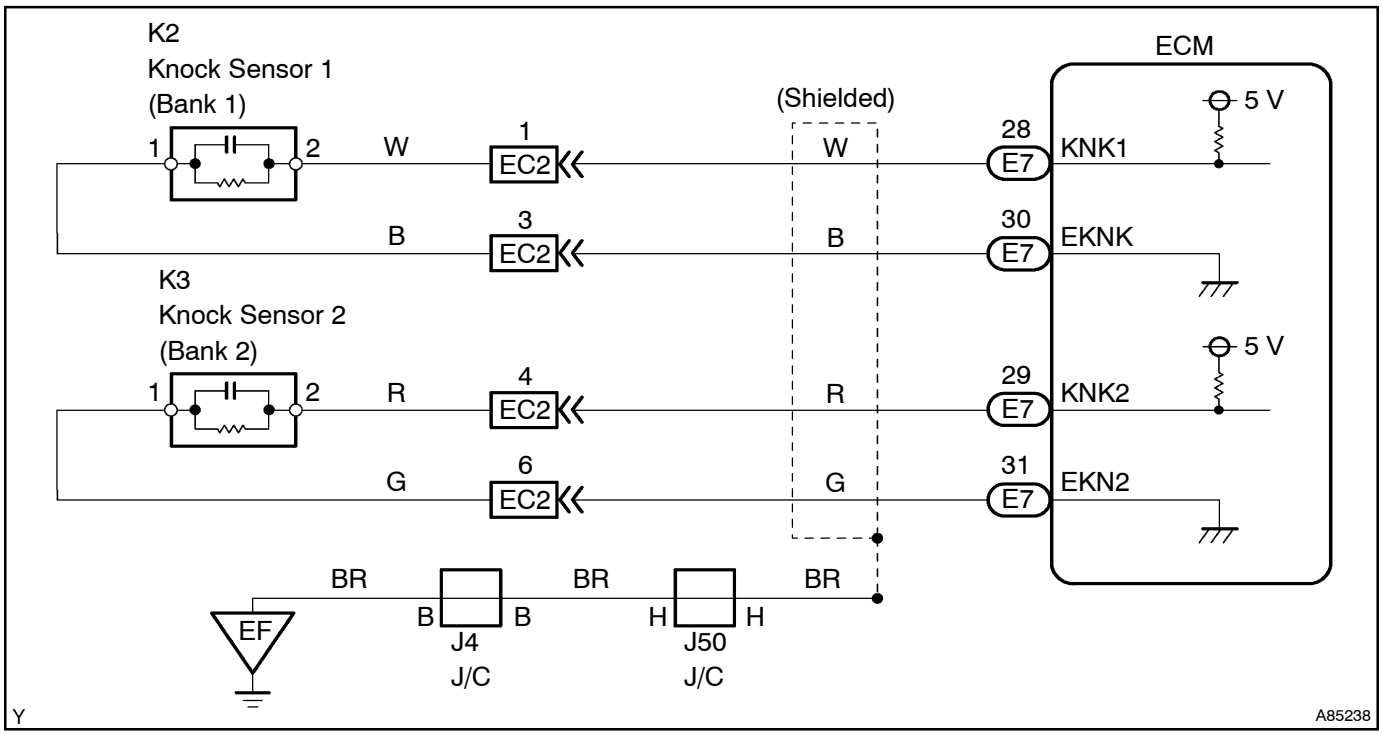
MONITOR DESCRIPTION

If the output signal remains low or high for more than 10 seconds, the ECM interprets this as a fault in the knock sensor and sets a DTC.

The monitor for DTC P0327, P0328, P0332 and P0333 run after the engine is started and 5 seconds have passed.

The monitors for DTC P0325 and P0330 run after the engine is warmed up (Engine Coolant Temperature (ECT) is 60°C or more) and the vehicle is driven over 40 km/h for 1 minute.

WIRING DIAGRAM

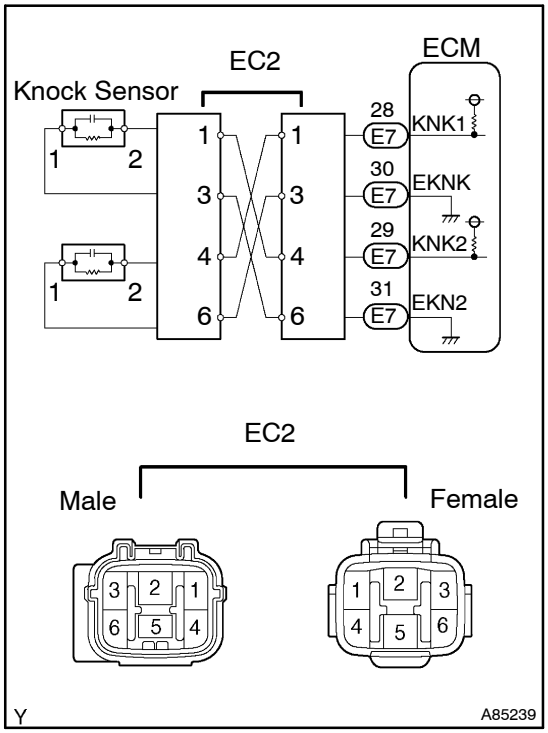


INSPECTION PROCEDURE

HINT:

- DTC P0325, P0327 and P0328 are for the bank 1 knock sensor circuit.
- DTC P0330, P0332 and P0333 are for the bank 2 knock sensor circuit.
- Read freeze frame data using the Intelligent Tester II. 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, and other data from the time the malfunction occurred.

1 READ OUTPUT DTC (CHECK KNOCK SENSOR CIRCUIT)



(a) Disconnect the EC2 connector.
(b) Using lead wires, connect the EC2 terminals as follows.

Male connector – Female connector
Terminal 1 – Terminal 4
Terminal 3 – Terminal 6
Terminal 4 – Terminal 1
Terminal 6 – Terminal 3

(c) Warm up the engine.
(d) Run the engine at 3,000 rpm for 10 seconds or more.
(e) Check the DTC.

Result:

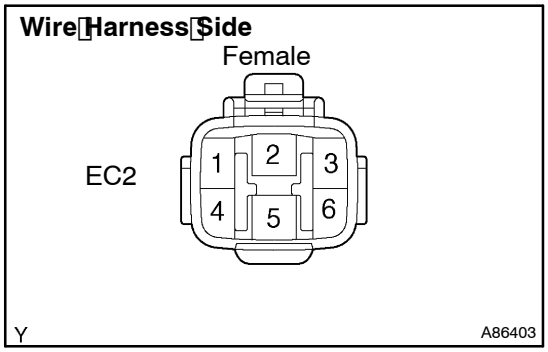
Display	Proceed to
DTC same as when vehicle brought in P0325, P0327, P0328 → P0325, P0327, P0328 or P0330, P0332, P0333 → P0330, P0332, P0333	A
DTC different from when vehicle brought in P0325 → P0330 or P0330 → P0325	B
DTC different from when vehicle brought in P0327, P0328 → P0332, P0333 or P0332, P0333 → P0327, P0328	C

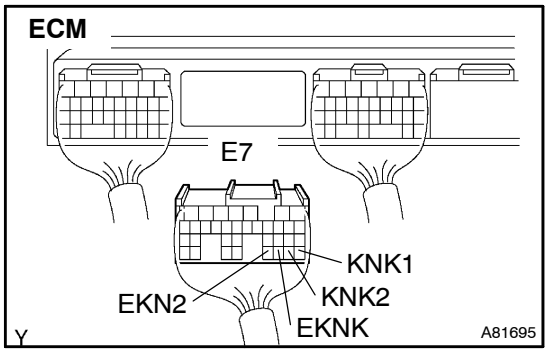
B → **Go to step 4**

C → **Go to step 5**

A

2 CHECK WIRE HARNESS (EC2 CONNECTOR – ECM)





(a) Disconnect the EC2 connector.
(b) Disconnect the E7 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

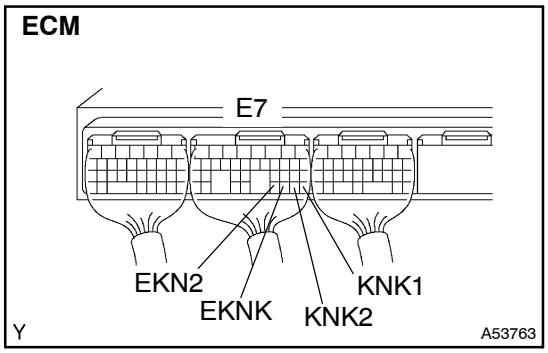
Standard:

Tester Connection	Specified Condition
EC2 female connector 1 – E7–28 (KNK1)	Below 1 Ω
EC2 female connector 3 – E7–30 (EKNK)	Below 1 Ω
EC2 female connector 4 – E7–29 (KNK2)	Below 1 Ω
EC2 female connector 6 – E7–31 (EKN2)	Below 1 Ω
EC2 female connector 1 or E7–28 (KNK1) – Body ground	10 kΩ or higher
EC2 female connector 3 or E7–30 (EKNK) – Body ground	10 kΩ or higher
EC2 female connector 4 or E7–29 (KNK2) – Body ground	10 kΩ or higher
EC2 female connector 6 or E7–31 (EKN2) – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3 INSPECT ECM



(a) Reconnect the E7 ECM connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage of the ECM terminals.

Standard:

Tester Connection	Specified Condition
E7–28 (KNK1) – E7–30 (EKNK)	4.5 to 5.5 V
E7–29 (KNK2) – E7–31 (EKN2)	4.5 to 5.5 V

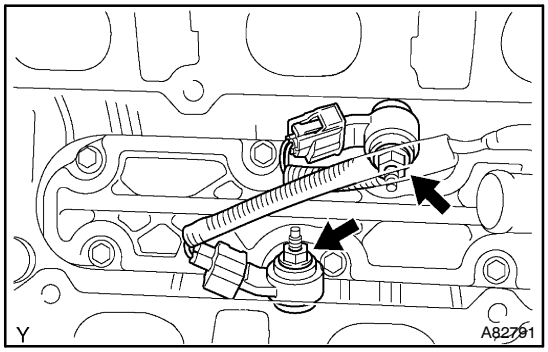
NG → **REPLACE ECM (See page 10–21)**

OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05–11)

NOTICE:
Fault may be intermittent. Check harness and connectors carefully and retest.

4 INSPECT KNOCK SENSOR



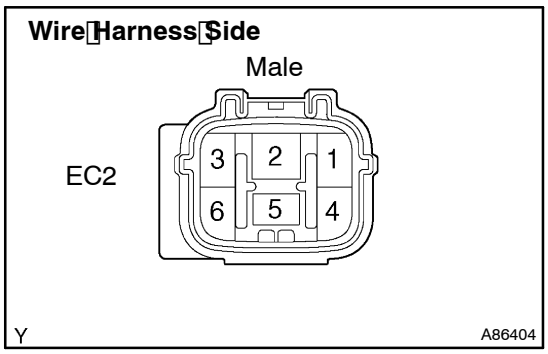
(a) Check the knock sensor installation.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

NG → **TIGHTEN SENSOR**

OK

REPLACE KNOCK SENSOR (See page 10–12)

5 INSPECT KNOCK SENSOR



(a) Disconnect the EC2 connector.
(b) Measure the resistance of the EC2 male connector.
Standard:

Tester Connection	Specified Condition
EC2 male connector 1 – 3	120 to 280 kΩ
EC2 male connector 4 – 6	120 to 280 kΩ

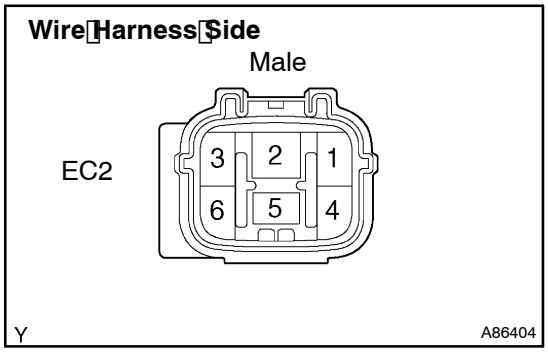
OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–11)**

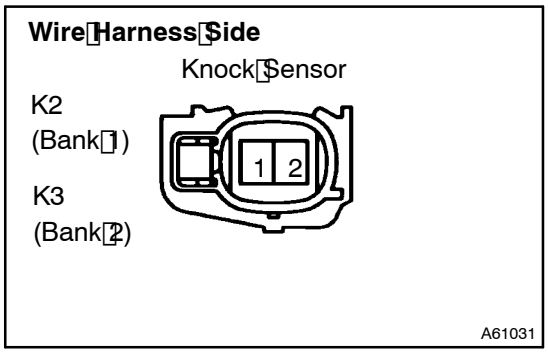
NG

6	CHECK WIRE HARNESS

HINT:

- If DTC P0327 or P0328 has changed to P0332 or P0333, check the knock sensor circuit on the bank 1 side.
- If DTC P0332 or P0333 has changed to P0327 or P0328, check the knock sensor circuit on the bank 2 side.





(a) Disconnect the EC2 connector.
(b) Disconnect the K2 or K3 knock sensor connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
EC2 male connector 1 – K2–2	Below 1 Ω
EC2 male connector 3 – K2–1	Below 1 Ω
EC2 male connector 4 – K3–2	Below 1 Ω
EC2 male connector 6 – K3–1	Below 1 Ω
EC2 male connector 1 or K2–2 – Body ground	10 kΩ or higher
EC2 male connector 3 or K2–1 – Body ground	10 kΩ or higher
EC2 male connector 4 or K3–2 – Body ground	10 kΩ or higher
EC2 male connector 6 or K3–1 – Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE KNOCK SENSOR (See page 10–12)