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

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

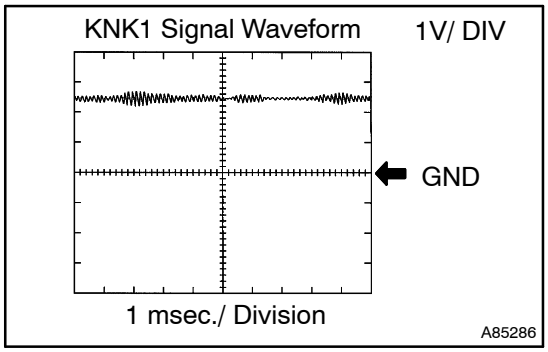
DTC	P0328	KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR)

CIRCUIT DESCRIPTION

A flat type knock sensor (non–resonant type) has the structure that can detect vibration in a wider band of the frequency from about 6 kHz to 15 kHz and has the following features.
Knock sensors are fitted on the cylinder block to detect engine knocking.
The knock sensor contains a piezoelectric element which generates voltage when it becomes deformed. The generation of the voltage occurs when the cylinder block vibrates due to the knocking. If the engine knocking occurs, in order to suppress it, the ignition timing is retarded.

DTC No.	DTC Detecting Condition	Trouble Area
P0325	Knock sensor signal level remains at low for more than 10 seconds	• Open or short in knock sensor circuit • Knock sensor (under–torqued or looseness) • ECM
P0327	Output voltage of the knock sensor is 0.5 V or less	• Short in knock sensor circuit • Knock sensor • ECM
P0328	Output voltage of the knock sensor is 4.5 V or more	• Open in knock sensor circuit • Knock sensor • ECM

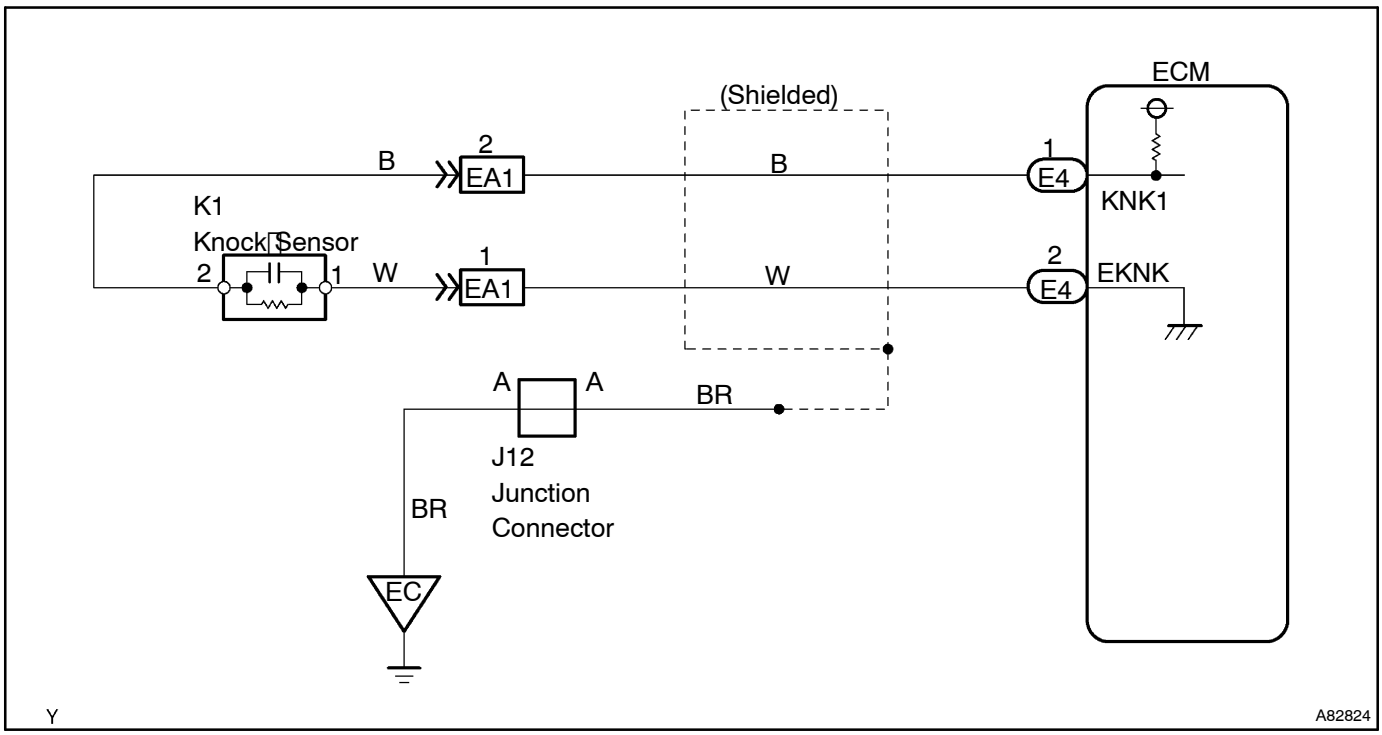
HINT:
If the ECM detects the DTC P0325,P0327 and P0328, it enters fail–safe mode in which the corrective retarded angle value is set to its maximum value.



Reference: Inspection by using an oscilloscope.

(1) After warming up, run the engine at 4,000 rpm, check the waveform between terminals KNK1 and EKNK of the ECM connector.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when 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 DTCS

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Clear the DTCs (see page 05–25).
(f) Put the engine in inspection mode (see page 05–1).
(g) Warm up the engine.
(h) Run the engine at 2,500 rpm for 10 seconds or more.
(i) Read DTCs.

Result:

Display (DTC output)	Proceed to
P0325	A
P0325, P0327 and/or P0328	B
No output	C

B	Go to step 3
C	CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)

A

2 INSPECT KNOCK SENSOR

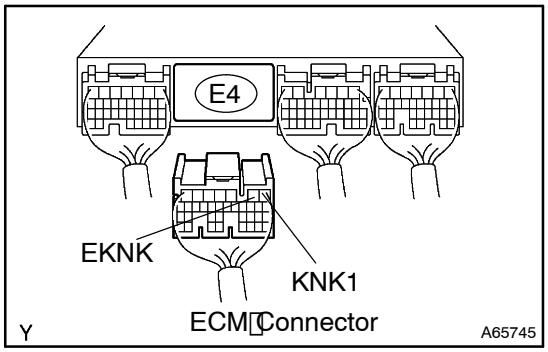
(a) Check the knock sensor installation.
OK:
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

NG → **SECURELY REINSTALL SENSOR**

OK

REPLACE KNOCK SENSOR (See page 10–20)

3 CHECK HARNESS AND CONNECTOR (ECM – KNOCK SENSOR)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance between the terminals of the E4 ECM connector.
Standard:

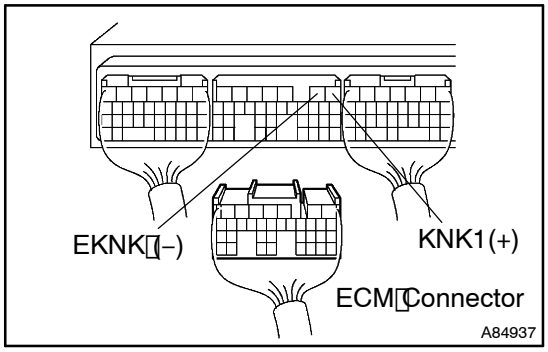
Tester Connection	Specified Condition
KNK1 (E4–1) – EKNK (E4–2)	120 to 280 kΩ at 20°C (68°F)

(c) Reconnect the ECM connector.

NG → **Go to step 5**

OK

4 INSPECT ECM (KNK1 – EKNK VOLTAGE)



(a) Disconnect the E4 ECM connector.
(b) Turn the power switch ON (IG).
(c) Measure the voltage between the terminals of the E4 ECM terminals.
Standard:

Tester Connection	Specified Condition
KNK1 (E4–1) – EKNK (E4–2)	4.5 to 5.5 V

(d) Reconnect the ECM connector.

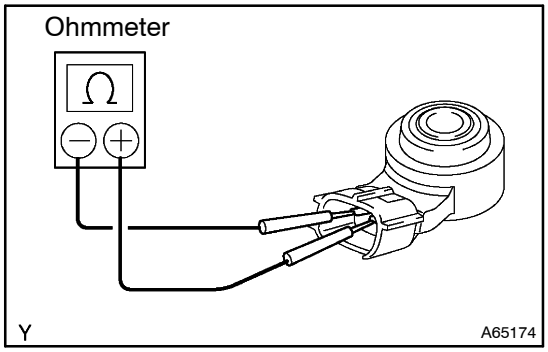
NG → **REPLACE ECM (See page 10–24)**

OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05–14)

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

5 INSPECT KNOCK SENSOR



(a) Remove the knock sensor.

(b) Measure the resistance between the terminals.

Standard:

Tester Connection	Specified Condition
KNK1 (K1–2) – E KNK (K1–1)	120 to 280 kΩ at 20°C (68°F)

(c) Reinstall the knock sensor.

NG → **REPLACE KNOCK SENSOR** (See page 10–20)

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR