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)

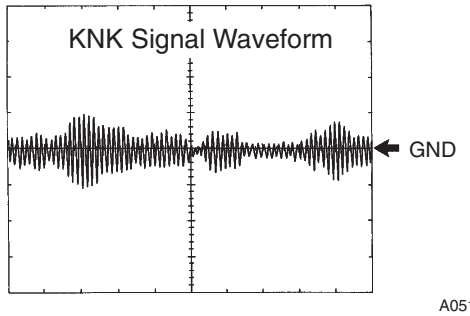
DTC	P0332	KNOCK SENSOR 2 CIRCUIT LOW INPUT (BANK 2)

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

CIRCUIT DESCRIPTION

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

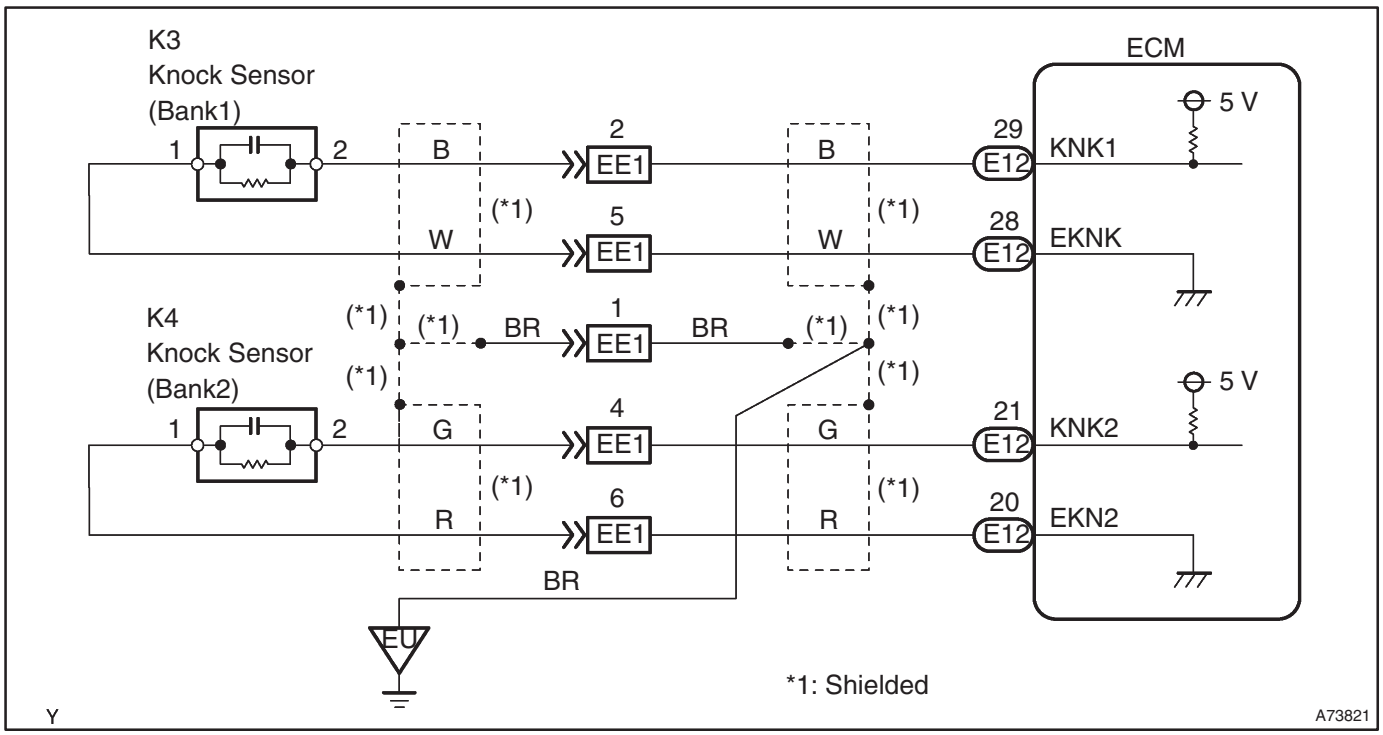
DTC No.	DTC Detection Condition	Trouble Area
P0327 P0332	Output voltage the knock sensor 1 and 2 are 0.5 V or less.	• Short in knock sensor 1 and 2 circuit • Knock sensor 1 and 2 • ECM
P0328 P0333	Output voltage the knock sensor 1 and 2 are 4.5 V or more.	• Open in knock sensor 1 and 2 circuit • Knock sensor 1 and 2 • ECM



Reference:
The correct waveform is as shown on the left.

Item	Contents
Terminal	KNK1 – EKNK or KNK2 – EKN2
Equipment Set	0.01 to 10 V/ DIV, 0.01 to 10 msec./ DIV
Condition	After warming up the engine, keep the engine speed 4,000 rpm.

WIRING DIAGRAM

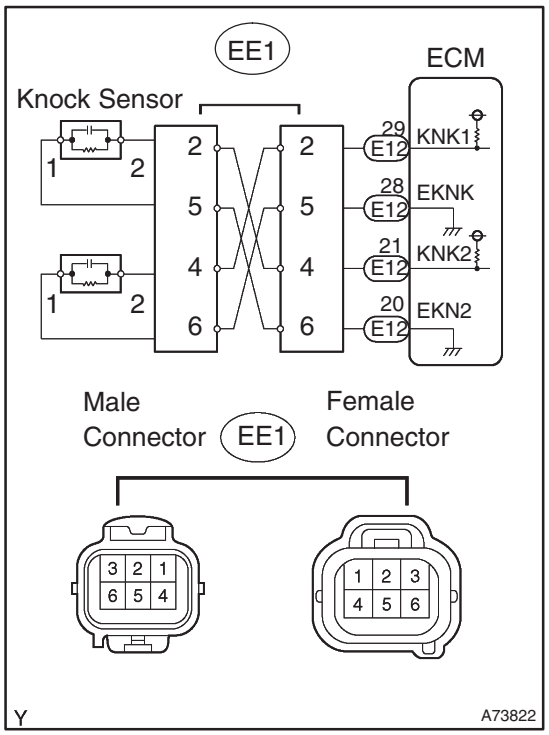


INSPECTION PROCEDURE

HINT:

- DTC P0325, P0327 and P0328 is for the bank1 knock sensor circuit.
- DTC P0330, P0332 and P0333 is for the bank2 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 EE1 connector.
(b) Using lead wires, connect the EE1 connectors as follows.

Male connector – Female connector
Terminal 2 – Terminal 4
Terminal 5 – Terminal 6
Terminal 4 – Terminal 2
Terminal 6 – Terminal 5

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

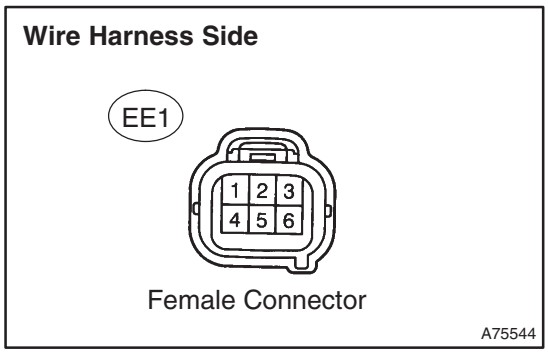
Result :

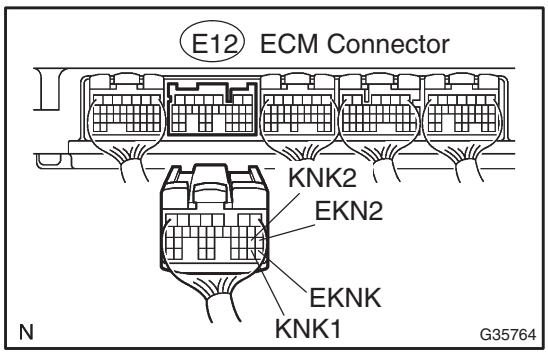
Display	Proceed to
DTC same as when vehicle brought in P0327, P0328 → P0327, P0328 or P0332, P0333 → P0332, P0333	A
DTC different from when vehicle brought in P0327, P0328 → P0332, P0333 or P0332, P0333 → P0327, P0328	C

B → **Go to step 4**

A

2 CHECK HARNESS AND CONNECTOR(EE1 CONNECTOR – ECM)





(a) Disconnect the EE1 connector.
(b) Disconnect the E12 ECM connector.
(c) Check for resistance between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
EE1 female connector 2 – KNK1 (E12–29)	Below 1 Ω
EE1 female connector 5 – EKNK (E12–28)	Below 1 Ω
EE1 female connector 4 – KNK2 (E12–21)	Below 1 Ω
EE1 female connector 6 – EKN2 (E12–20)	Below 1 Ω

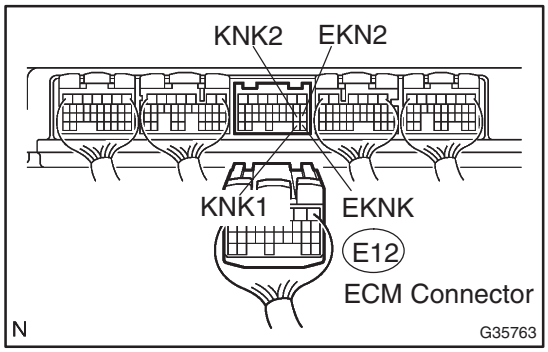
Standard (Check for short):

Symbols (Terminal No.)	Specified condition
EE1 female connector 2 or KNK1 (E12–29) – Body ground	10 kΩ or higher
EE1 female connector 5 or EKNK (E12–28) – Body ground	10 kΩ or higher
EE1 female connector 4 or KNK2 (E12–21) – Body ground	10 kΩ or higher
EE1 female connector 6 or EKN2 (E12–20) – Body ground	10 kΩ or higher

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

OK

3 INSPECT ECM



(a) Disconnect the E12 ECM connector.
(b) Turn the ignition switch to ON.
(c) Check the voltage between the ECM side terminals.

Voltage:

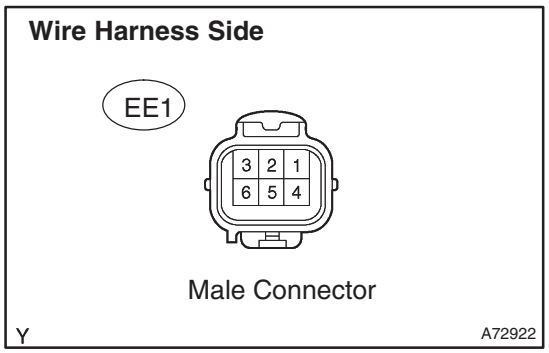
Symbols (Terminal No.)	Specified condition
KNK1 (E12–29) – EKNK (E12–28)	4.5 to 5.5 V
KNK2 (E12–21) – EKN2 (E12–20)	4.5 to 5.5 V

NG → **REPLACE ECM (See Pub. No. RM1017E, page 10–11)**

OK

CHECK AND REPLACE ECM (See page 01–36)

4 INSPECT KNOCK SENSOR



(a) Disconnect the EE1 connector.
(b) Check the resistance between the terminals of the EE1 male connector.

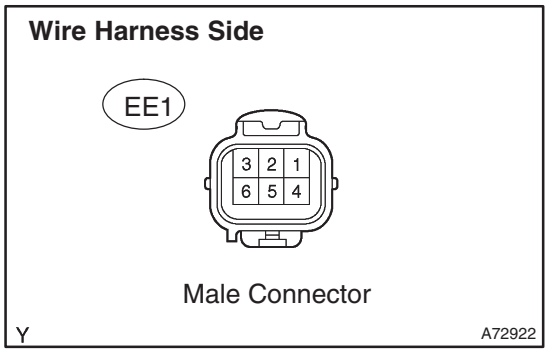
Resistance:

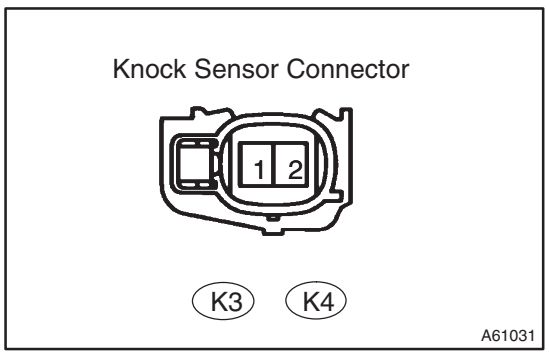
Terminal No.	Specified condition
EE1 male connector 2 – 5	120 to 280 kΩ
EE1 male connector 4 – 6	120 to 280 kΩ

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–199)**

NG

5 CHECK HARNESS AND CONNECTOR(EE1 CONNECTOR – KNOCK SENSOR)





HINT:
- If DTC P0327, P0328 has changed to P0332, P0333 check the knock sensor circuit on the bank1 side.
- If DTC P0332, P0333 has changed to P0327, P0328 check the knock sensor circuit on the bank2 side.

(a) Disconnect the EE1 connector.
(b) Disconnect the K3 and K4 knock sensor connectors.
(c) Check for resistance between the wire harness side connectors.

Standard (Check for open):

Terminal No.	Specified condition
EE1 male connector 2 – K3–2	Below 1 Ω
EE1 male connector 5 – K3–1	Below 1 Ω
EE1 male connector 4 – K4–2	Below 1 Ω
EE1 male connector 6 – K4–1	Below 1 Ω

Standard (Check for short):

Terminal No.	Specified condition
EE1 male connector 2 or K3–2 – Body ground	10 kΩ or higher
EE1 male connector 5 or K3–1 – Body ground	10 kΩ or higher
EE1 male connector 4 or K4–2 – Body ground	10 kΩ or higher
EE1 male connector 6 or K4–1 – Body ground	10 kΩ or higher

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

OK

REPLACE KNOCK SENSOR (See page 10–14)