

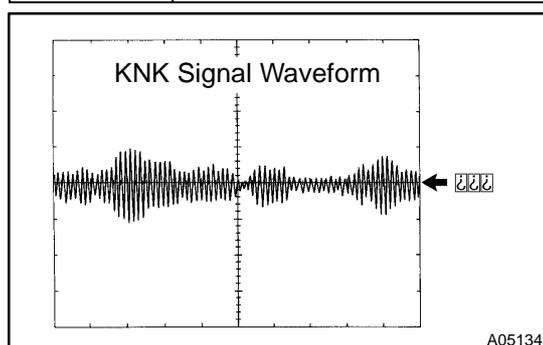
DTC	P0325	KNOCK SENSOR 1 CIRCUIT (BANK 1 OR SINGLE SENSOR)
DTC	P0327	KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)
DTC	P0328	KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR)
DTC	P0330	KNOCK SENSOR 2 CIRCUIT (BANK 2)
DTC	P0332	KNOCK SENSOR 2 CIRCUIT LOW INPUT (BANK 2)
DTC	P0333	KNOCK SENSOR 2 CIRCUIT HIGH INPUT (BANK 2)

CIRCUIT DESCRIPTION

A flat type knock sensor (non-resonant type) 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
P0325	Output voltage of the knock sensor 1 decreases beyond a threshold. (Threshold varies according to an engine speed.)	<ul style="list-style-type: none"> • Knock sensor 1 • Knock sensor 1 (loose) • ECM
P0330	Output voltage of the knock sensor 2 decreases beyond a threshold. (Threshold varies according to an engine speed.)	<ul style="list-style-type: none"> • Knock sensor 2 • Knock sensor 2 (loose) • ECM
P0327 P0332	Output voltage the knock sensor 1 and 2 are 0.5 V or less.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Open in knock sensor 1 and 2 circuit • Knock sensor 1 and 2 • ECM

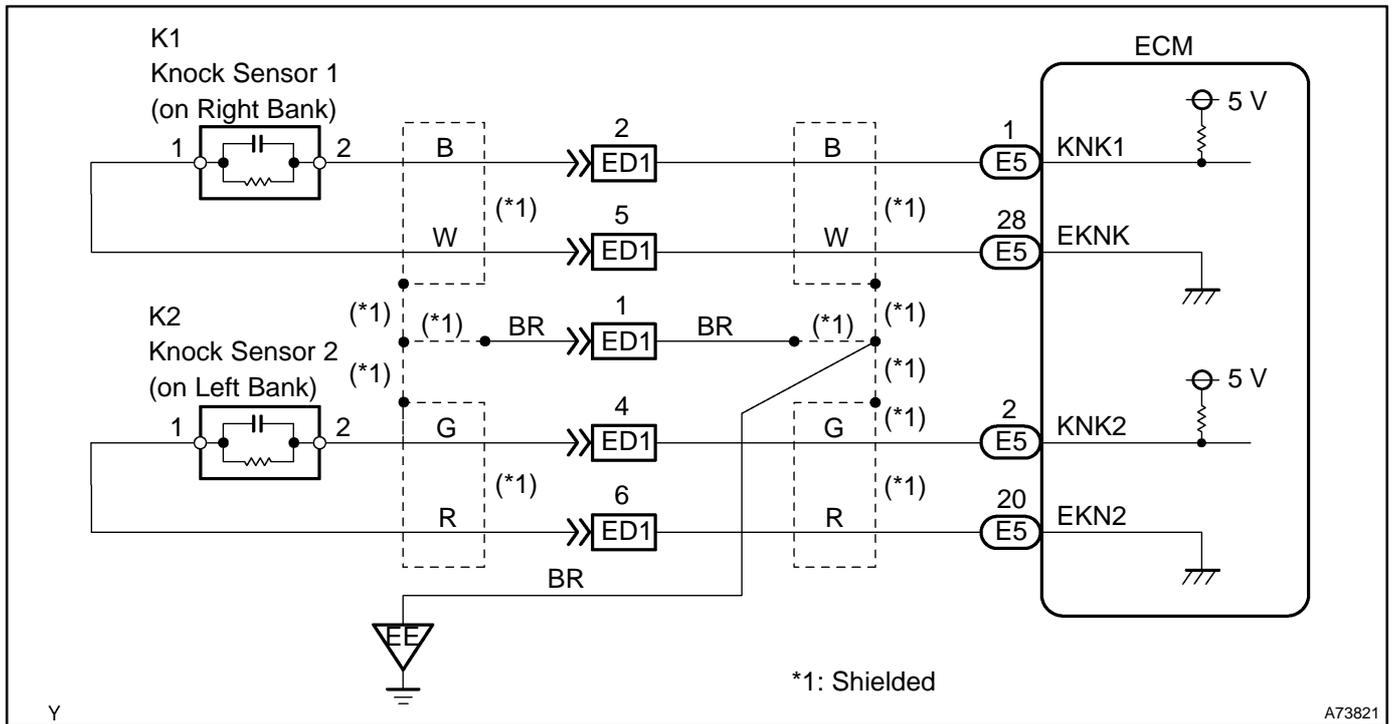


Reference:

The correct waveform is as shown.

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

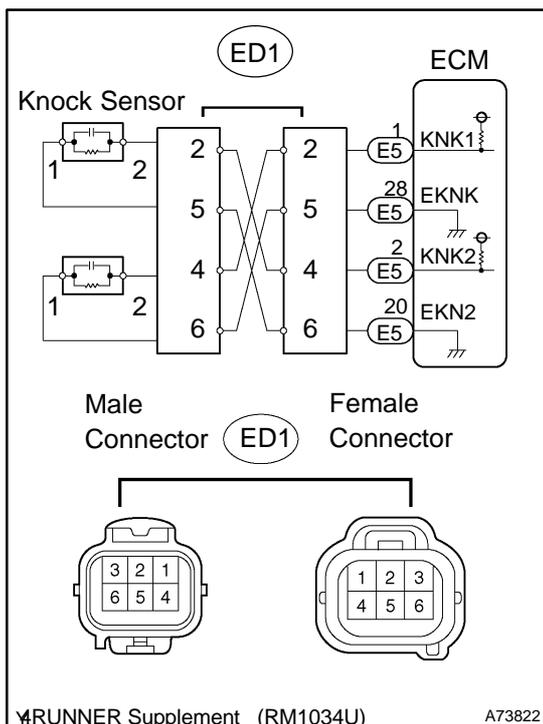


INSPECTION PROCEDURE

HINT:

- DTC P0325, P0327 and P0328 are for the right bank knock sensor circuit.
- DTC P0330, P0332 and P0333 are for the left bank knock sensor circuit.
- Read freeze frame data using the hand-held tester or the OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1 READ OUTPUT DTC(CHECK KNOCK SENSOR CIRCUIT)



- Disconnect the ED1 connector.
- Using lead wires, connect the ED1 connectors as follows.

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

- Warm up the engine.
- Race the engine to 3,000 rpm for 10 seconds or more.
- Check the DTC.

Result :

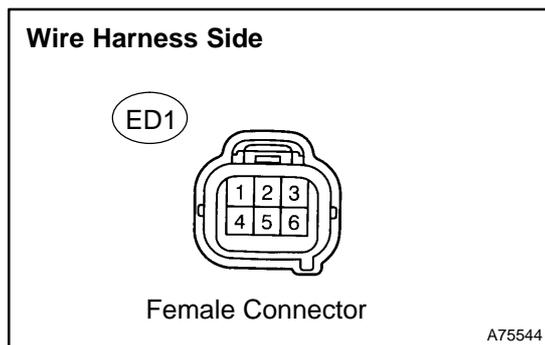
Display	Proceed to
DTC same as when vehicle brought in P0325, P0327, P0328 → P0325, P0327, P0328 or P0330, P0332, P0333 → P0330, P0332, P0333	A
DTC different from when vehicle brought in P0325 → P0330 or P0330 → P0325	B
DTC different from when vehicle brought in P0327, P0328 → P0332, P0333 or P0332,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

B → Go to step 4

C → Go to step 5

A

2 CHECK HARNESS AND CONNECTOR(ED1 CONNECTOR - ECM)



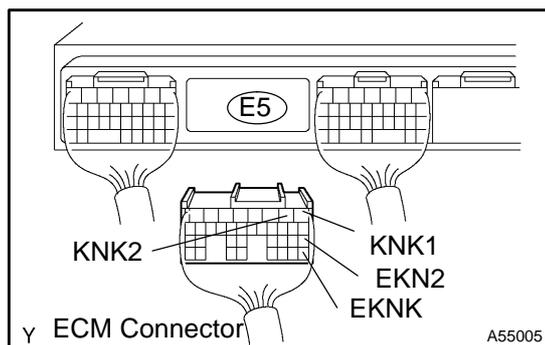
- (a) Disconnect the ED1 connector.
- (b) Disconnect the E5 ECM connector.
- (c) Check for continuity between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
ED1 female connector 2 - KNK1 (E5-1)	Continuity
ED1 female connector 5 - EKNK (E5-28)	
ED1 female connector 4 - KNK2 (E5-2)	
ED1 female connector 6 - EKN2 (E5-20)	

Standard (Check for short):

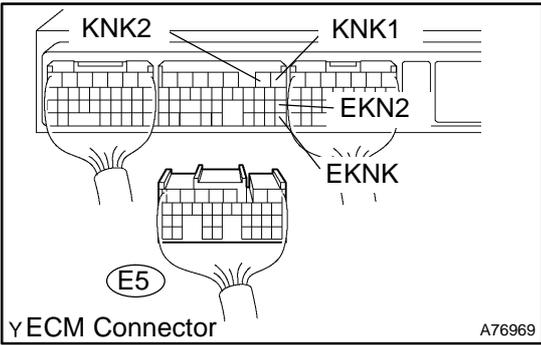
Symbols (Terminal No.)	Specified condition
ED1 female connector 2 or KNK1 (E5-1) - Body ground	No Continuity
ED1 female connector 5 or EKNK (E5-28) - Body ground	
ED1 female connector 4 or KNK2 (E5-2) - Body ground	
ED1 female connector 6 or EKN2 (E5-20) - Body ground	



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 INSPECT ECM



- (a) Disconnect the E5 ECM connector.
 - (b) Turn the ignition switch ON.
 - (c) Check the voltage between the ECM side terminals.
- Voltage:**

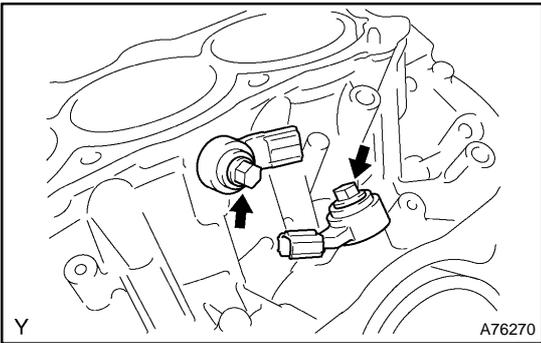
Symbols (Terminal No.)	Specified condition
KNK1 (E5-1) - EKNK (E5-28)	4.5 to 5.5 V
KNK2 (E5-2) - EKN2 (E5-20)	

NG → **REPLACE ECM**

OK

CHECK AND REPLACE ECM (See page 01-35)

4 CHECK KNOCK SENSOR



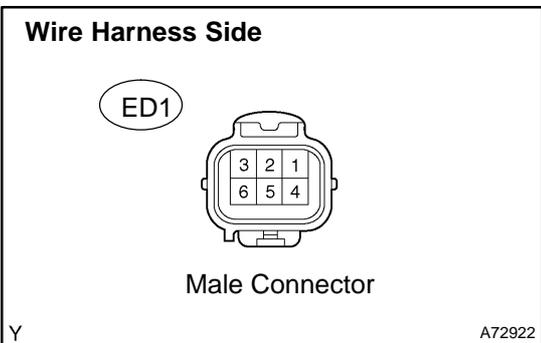
- (a) Check the knock sensor installation.
- Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)**

NG → **TIGHTEN SENSOR**

OK

REPLACE KNOCK SENSOR (See page 10-9)

5 INSPECT KNOCK SENSOR



- (a) Disconnect the ED1 connector.
 - (b) Check the resistance between the terminals of the ED1 male connector.
- Resistance:**

Terminal No.	Specified condition
ED1 male connector 2 - 5	120 to 280 kΩ
ED1 male connector 4 - 6	

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-5)**

NG

6 CHECK HARNESS AND CONNECTOR(ED1 CONNECTOR - KNOCK SENSOR)

HINT:

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

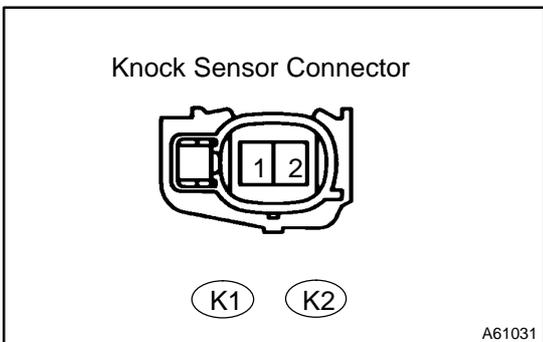
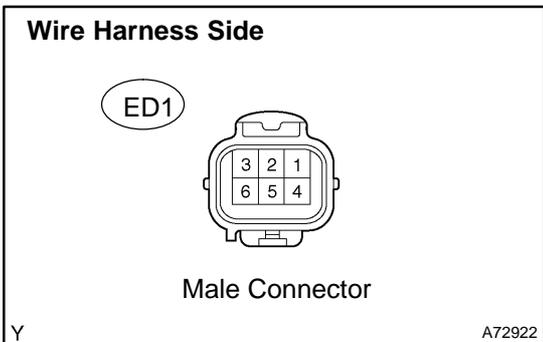
- Disconnect the ED1 connector.
- Disconnect the K1 and K2 knock sensor connectors.
- Check for continuity between the wire harness side connectors.

Standard (Check for open):

Terminal No.	Specified condition
ED1 male connector 2 - K1-2	Continuity
ED1 male connector 5 - K1-1	
ED1 male connector 4 - K2-2	
ED1 male connector 6 - K2-1	

Standard (Check for short):

Terminal No.	Specified condition
ED1 male connector 2 or K1-2 - Body ground	No continuity
ED1 male connector 5 or K1-1 - Body ground	
ED1 male connector 4 or K2-2 - Body ground	
ED1 male connector 6 or K2-1 - Body ground	



NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE KNOCK SENSOR (See page 10-9)