

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

A flat type knock sensor (non-resonant type) can detect vibrations in a wide band of frequency (about 6 kHz to 15 kHz) and has the following features:

- Knock sensors are fitted on the cylinder block to detect the engine knocking.
- The sensor contains a piezoelectric element which generates a voltage, 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 of the knock sensor 1 or 2 is 0.5 V or less (1 trip detection logic)	<ul style="list-style-type: none"> • Short in knock sensor 1 or 2 circuit • Knock sensor 1 or 2 • ECM
P0328 P0333	Output voltage of the knock sensor 1 or 2 is 4.5 V or more (1 trip detection logic)	<ul style="list-style-type: none"> • Open in knock sensor 1 or 2 circuit • Knock sensor 1 or 2 • ECM

MONITOR DESCRIPTION

The knock sensor, located on the cylinder block, detects spark knock. When spark knock occurs, the sensor picks up vibrations in a specific frequency range. When the ECM detects the voltage in this frequency range, it retards the ignition timing to suppress the spark knock.

The ECM 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 seconds, and if the knock sensor output voltage is out of normal range, the ECM interprets this as a fault in the knock sensor and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0327: Knock Sensor (Bank 1) Range Check (Low voltage) P0328: Knock Sensor (Bank 1) Range Check (High voltage) P0332: Knock Sensor (Bank 2) Range Check (Low voltage) P0333: Knock Sensor (Bank 2) Range Check (High voltage)
Required sensors / components (Main)	Knock Sensor
Required sensors / components (Related)	MAF meter, CKP sensor, ECT sensor
Frequency of operation	Continuous
Duration	1 second
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-377
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Knock Sensor Range Check P0327, P0328, P0332, P0330:

Battery voltage	10.5 V or more
Time after engine start	5 seconds or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

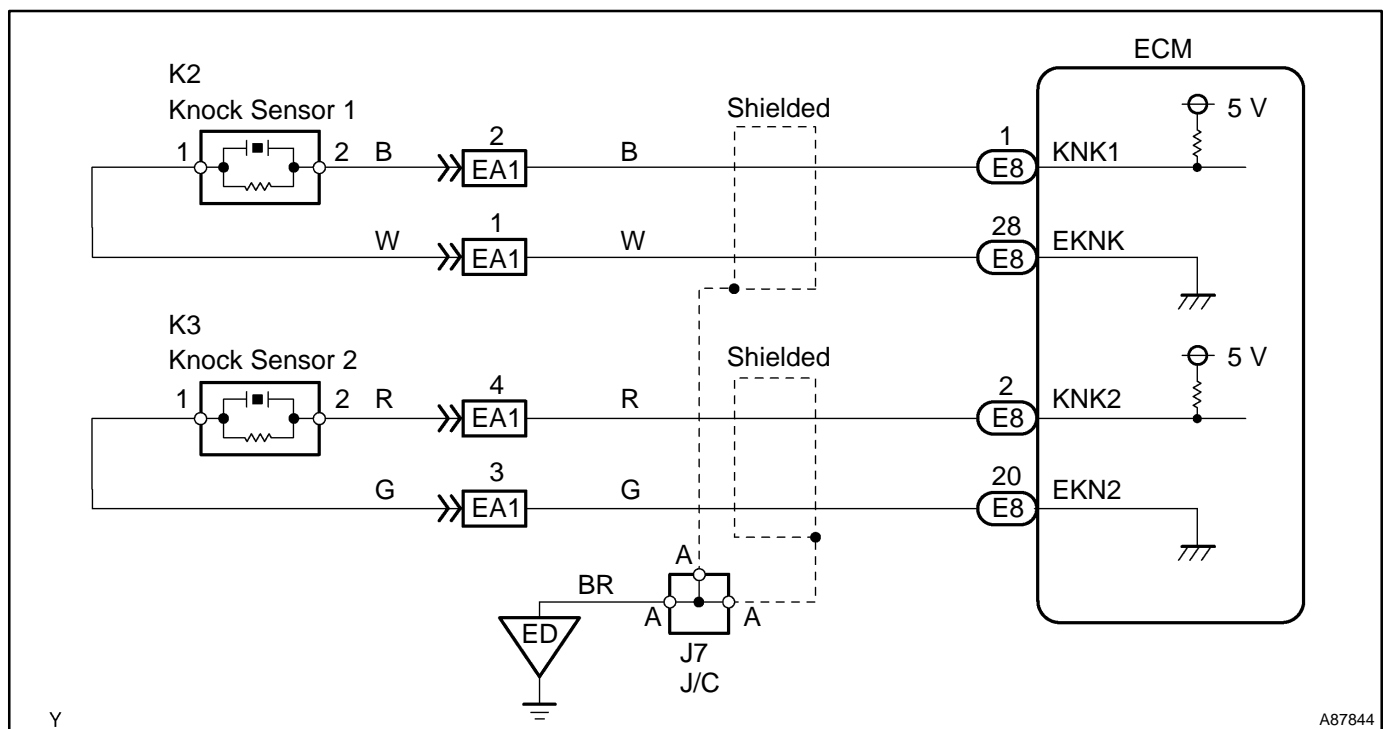
Knock Sensor Range Check (Low voltage) P0327, P0332:

Knock sensor Voltage	Less than 0.5 V
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Knock Sensor Range Check (High voltage) P0328, P0333:

Knock sensor voltage	More than 4.5 V
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WIRING DIAGRAM

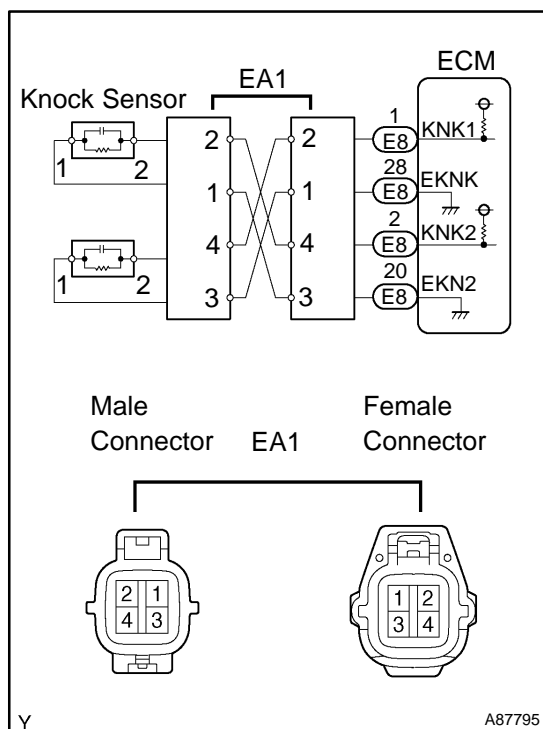


INSPECTION PROCEDURE

HINT:

- DTC P0327 and P0328 are for the bank 1 knock sensor circuit.
- DTC P0332 and P0333 are for the bank 2 knock sensor circuit.
- Read freeze frame data using the hand-held tester or the OBD II scan tool. 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)



- Disconnect the EA1 connector.
- Using lead wires, connect the EA1 terminals as follows.

Male Connector - Female Connector	
Terminal 2	Terminal 4
Terminal 1	Terminal 3
Terminal 4	Terminal 2
Terminal 3	Terminal 1

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

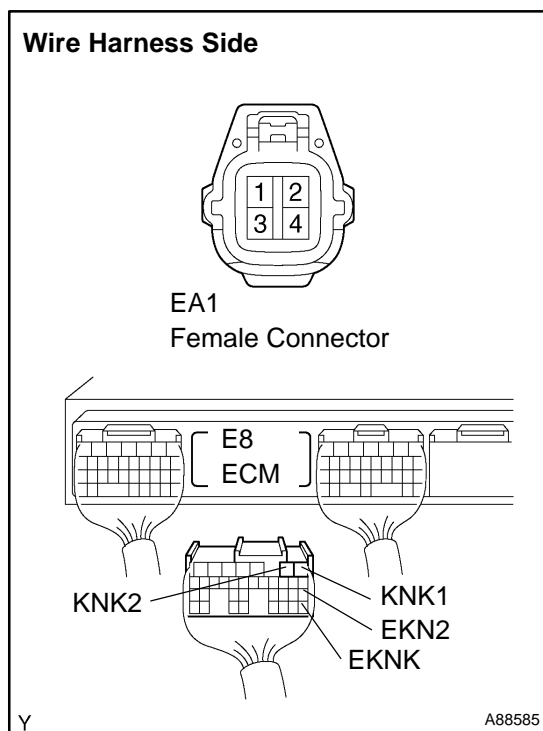
Result:

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	B

B Go to step 4

A

2 CHECK WIRE HARNESS (EA1 CONNECTOR - ECM)



- Disconnect the EA1 connector.
- Disconnect the E8 ECM connector.
- Check the resistance of the wire harness side connector.

Standard:

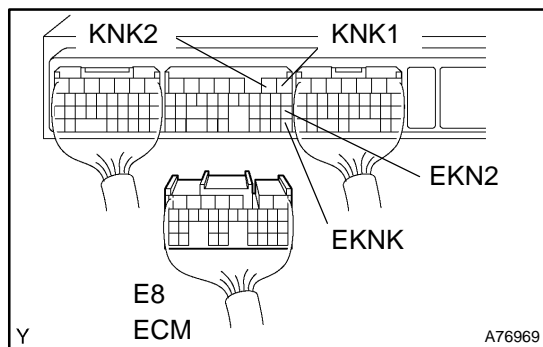
Tester Connection	Specified Condition
2 of EA1 female connector - E8-1 (KNK1) 1 of EA1 female connector - E8-28 (EKNK) 4 of EA1 female connector - E8-2 (KNK2) 3 of EA1 female connector - E8-20 (EKN2)	Below 1 Ω
2 of EA1 female connector or E8-1 (KNK1) - Body ground 1 of EA1 female connector or E8-28 (EKNK) - Body ground 4 of EA1 female connector or E8-2 (KNK2) - Body ground 3 of EA1 female connector or E8-20 (EKN2) - Body ground	10 kΩ or higher

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

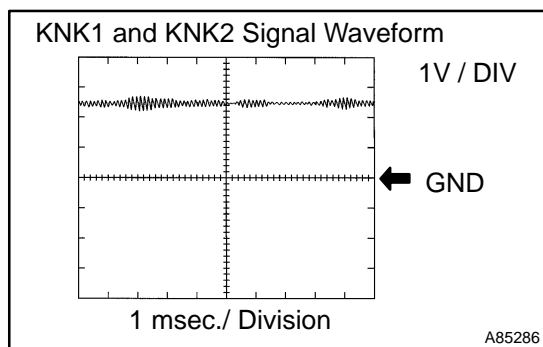
3 INSPECT ECM



- Disconnect the E8 ECM connector.
- Turn the ignition switch ON.
- Check the voltage of the ECM terminals.

Voltage:

Tester Connection	Specified Condition
E8-1 (KNK1) - E8-28 (EKNK)	4.5 to 5.5 V
E8-2 (KNK2) - E8-20 (EKN2)	



HINT:

Reference: Inspection using the oscilloscope.

After warming up, run the engine at 4,000 rpm, and check the waveform of the ECM connector.

Standard:

Tester Connection	Specified Condition
E8-1 (KNK1) - E8-28 (EKNK)	Correct waveform is as shown
E8-2 (KNK2) - E8-20 (EKN2)	

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REPLACE ECM (See page 10-24)

OK

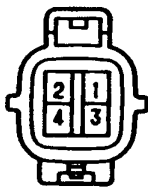
CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)

NOTICE:

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

4 INSPECT KNOCK SENSOR

Wire Harness Side



EA1
Male Connector

- Disconnect the EA1 connector.
- Check the resistance between the terminals of the EA1 male connector.

Standard:

Tester Connection	Specified Condition
2 - 1 of EA1 male connector	120 to 280 kΩ
4 - 3 of EA1 male connector	

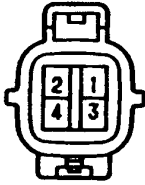
OK

**CHECK FOR INTERMITTENT PROBLEMS
(See page 05-370)**

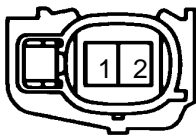
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5 CHECK WIRE HARNESS

Wire Harness Side



EA1
Male Connector



K2 (Bank 1)
K3 (Bank 2)
Knock Sensor

Y
A73938
A610.31

A85847

HINT:

- If DTC P0327 has changed to P0328, or if DTC P0332 has changed to P0333, check the knock sensor circuit on the bank 1 side.
- If DTC P0332 has changed to P0327, or if DTC P0333 has changed to P0338, check the knock sensor circuit on the bank 2 side.

- (a) Disconnect the EA1 connector.
- (b) Disconnect the K2 or K3 knock sensor connector.
- (c) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
2 of EA1 male connector - K2-2 1 of EA1 male connector - K2-1 4 of EA1 male connector - K3-2 3 of EA1 male connector - K3-1	Below 1 Ω
2 of EA1 male connector or K2-2 - Body ground 1 of EA1 male connector or K2-1 - Body ground 4 of EA1 male connector or K3-2 - Body ground 3 of EA1 male connector or K3-1 - Body ground	10 k Ω or higher

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REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE KNOCK SENSOR (See page 10-20)