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)

DESCRIPTION

Flat type knock sensors (non-resonant type) have structures that can detect vibrations over a wide band of frequencies: between approximately 6 kHz and 15 kHz.

A knock sensor is fitted onto the engine block to detect engine knocking.

The knock sensor contains a piezoelectric element which generates a voltage when it becomes deformed. The voltage is generated when the engine block vibrates due to knocking. Any occurrence of engine knocking can be suppressed by delaying the ignition timing.

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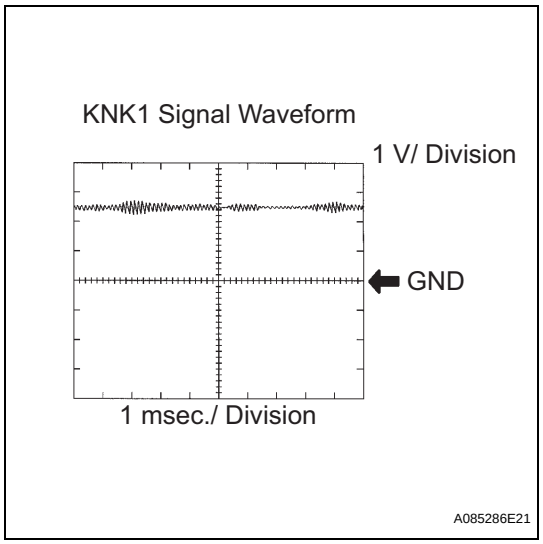
DTC No.	DTC Detection Conditions	Trouble Areas
P0327	Output voltage of knock sensor less than 0.5 V (1 trip detection logic)	• Short in knock sensor circuit • Knock sensor • ECM
P0328	Output voltage of knock sensor more than 4.5 V (1 trip detection logic)	• Open in knock sensor circuit • Knock sensor • ECM

HINT:

When any of DTCs P0327 and P0328 are set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is delayed to its maximum retardation. Fail-safe mode continues until the ignition switch is turned OFF.

Reference: Inspection using an oscilloscope



The correct waveform is as shown.

Items	Contents
Terminals	KNK1 - EKNK
Equipment Settings	1 V/Division 1 msec./Division
Conditions	Keep engine speed at 4,000 rpm with warm engine

MONITOR DESCRIPTION

If the output voltage transmitted by the knock sensor remains low or high for more than 1 second, the ECM interprets this as a malfunction in the sensor circuit, and sets a DTC.
The monitor for DTCs P0327 and P0328 begins to run when 5 seconds have elapsed since the engine was started.
If the malfunction is not repaired successfully, either DTC P0327 or P0328 is set 5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0327: Knock sensor range check (Low voltage) P0328: Knock sensor range check (High voltage)
Required Sensors/Components (Main)	Knock sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	1 second
MIL Operation	Immediate
Sequence of Operation	None

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TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
Battery voltage	10.5 V or more
Time after engine start	5 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

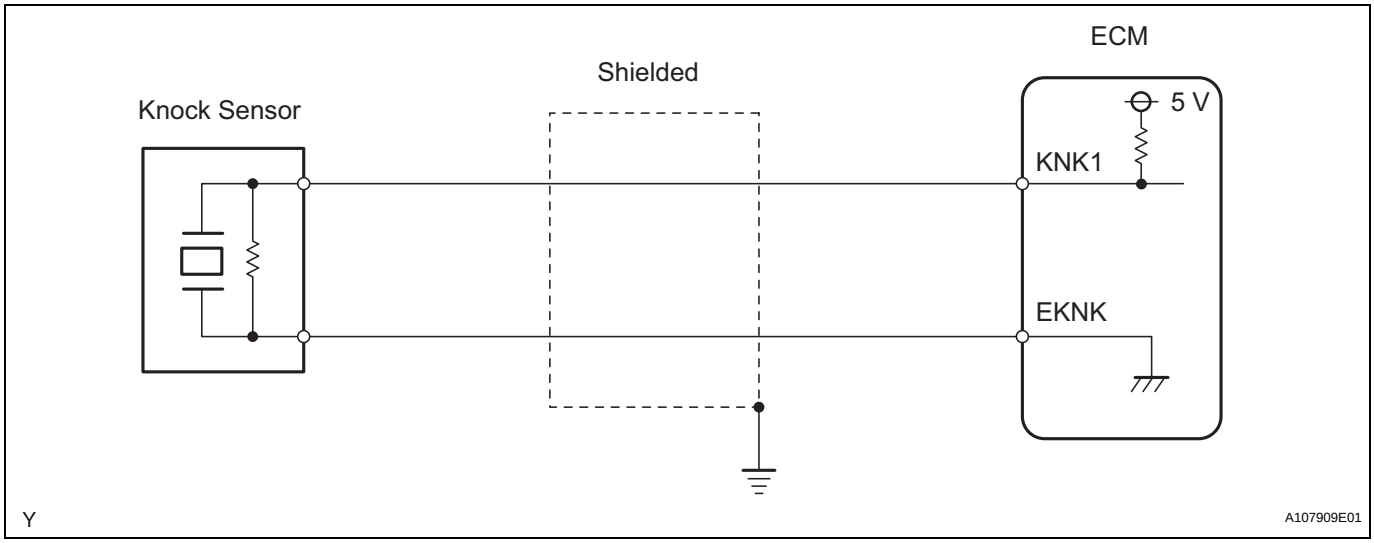
Knock Sensor Range Check (Low voltage) P0327:

Knock sensor voltage	Less than 0.5 V

Knock Sensor Range Check (High voltage) P0328:

Knock sensor voltage	More than 4.5 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, 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 VALUE USING INTELLIGENT TESTER (KNOCK FB VAL)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester ON.
(c) Warm up the engine.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / USER DATA / KNOCK FB VAL.
(e) Read the values displayed on the tester while driving the vehicle.
Standard:
The values change.
HINT

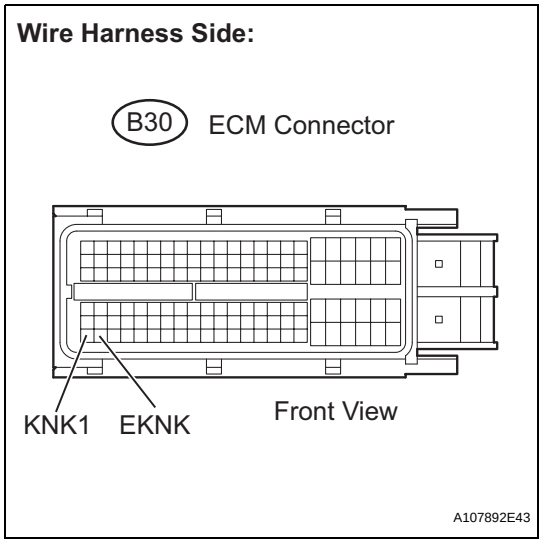
Malfunction does not occur	Knock Feedback Values change
Malfunctions occur	Knock Feedback Values do not change

HINT:
The knock feedback value change can be confirmed by running the engine at high load, for example, by activating the air conditioning system and revving up the engine.

OK → **CHECK FOR INTERMITTENT PROBLEMS**

NG

2	CHECK HARNESS AND CONNECTOR (ECM - KNOCK SENSOR)



(a) Disconnect the B30 ECM connector.
(b) Measure the resistance between the terminals.
Standard

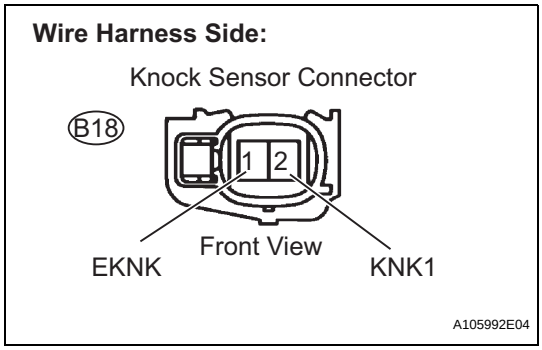
Tester Connections	Specified Conditions
B30-110 (KNK1) - B30-111 (EKNK)	120 to 280 kΩ at 20°C (68°F)

(c) Reconnect the ECM connector.

NG → **Go to step 4**

OK

3	INSPECT ECM (KNK1 VOLTAGE)



(a) Disconnect the B18 knock sensor connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the knock sensor terminals.

Standard voltage

Tester Connections	Specified Conditions
B18-2 (KNK1) - B18-1 (EKNK)	4.5 to 5.5 V

(d) Reconnect the knock sensor connector.

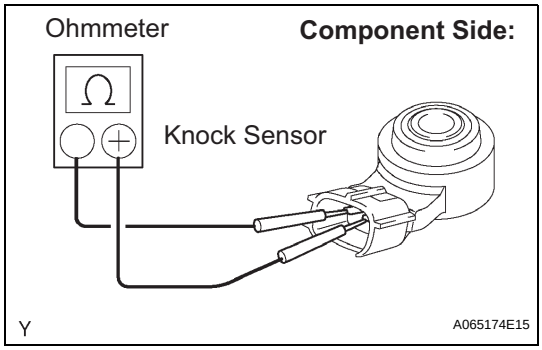
NOTICE:
Fault may be intermittent. Check the wire harness and connectors carefully and retest.

NG → **REPLACE ECM**

OK

CHECK FOR INTERMITTENT PROBLEMS

4	INSPECT KNOCK SENSOR



(a) Remove the knock sensor.
(b) Measure the resistance between the terminals.

Standard resistance

Tester Connections	Specified Conditions
2 (KNK1) - 1 (EKNK)	120 to 280 kΩat 20°C (68°F)

(c) Reinstall the knock sensor.

NG → **REPLACE KNOCK SENSOR**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR