

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

A flat type knock sensor (non-resonant type) has a structure that can detect vibrations over a wide band of frequencies: between approximately 6 kHz and 15 kHz.

Knock sensors are fitted onto the engine block to detect engine knocking.

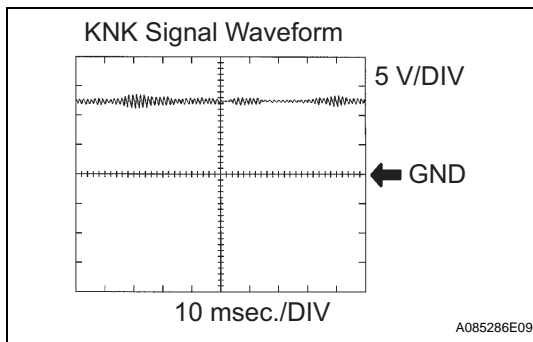
The knock sensor contains a piezoelectric element which generates a voltage when it becomes deformed.

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.

DTC No.	DTC Detection Condition	Trouble Area
P0327	Output voltage of knock sensor less than 0.5 V (1 trip detection logic)	<ul style="list-style-type: none"> • Short in knock sensor circuit • Knock sensor • ECM
P0328	Output voltage of knock sensor more than 4.5 V (1 trip detection logic)	<ul style="list-style-type: none"> • 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 to OFF.



Reference: Inspection using an oscilloscope

The correct waveform is shown.

Items	Contents
Terminals	KNK1 - EKNK
Equipment Settings	0.01 to 10 V/Division, 0.01 to 10 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, any of 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

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

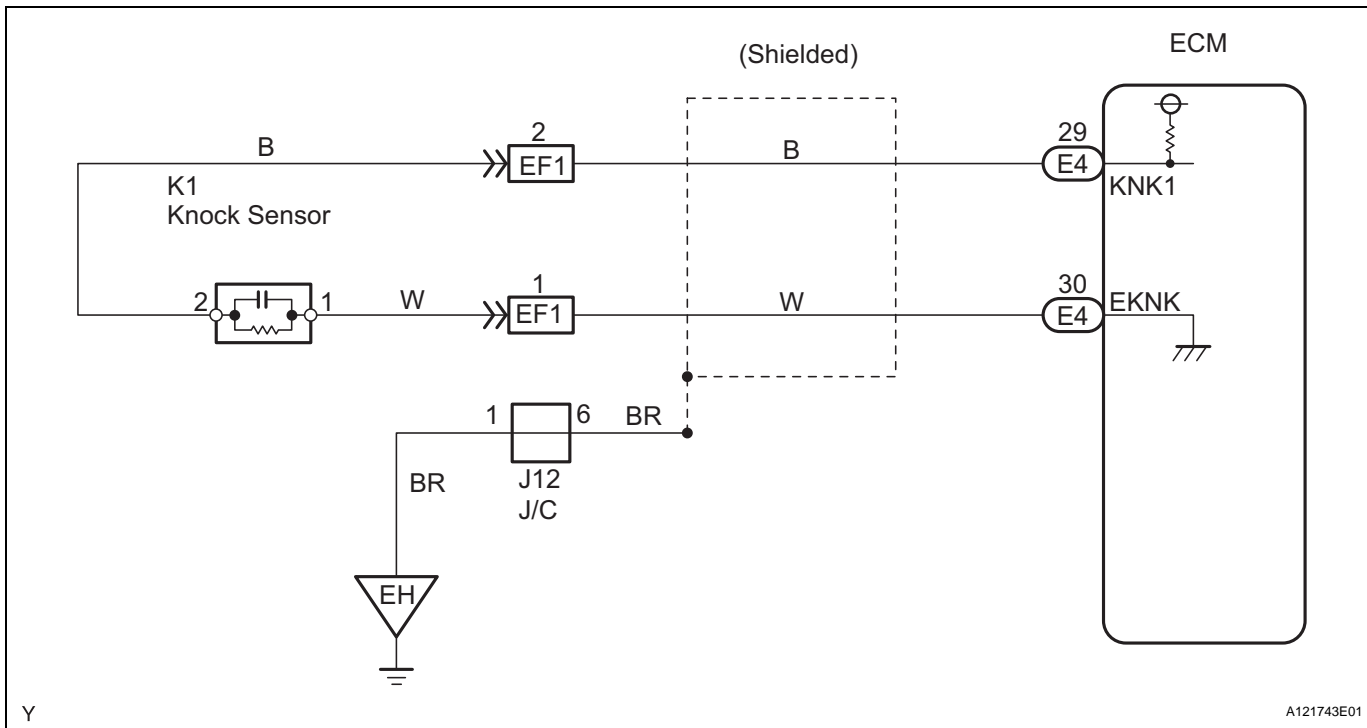
Knock Sensor Range Check (Low voltage) P0327:

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

Knock sensor voltage	More than 4.5 V
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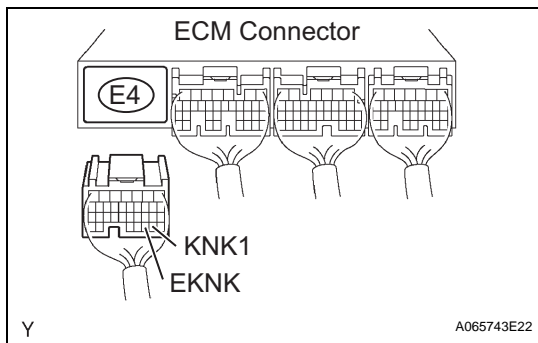
WIRING DIAGRAM



HINT:

Read freeze frame data using an intelligent tester. Freeze frame data record 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 CHECK HARNESS AND CONNECTOR (ECM - KNOCK SENSOR)



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

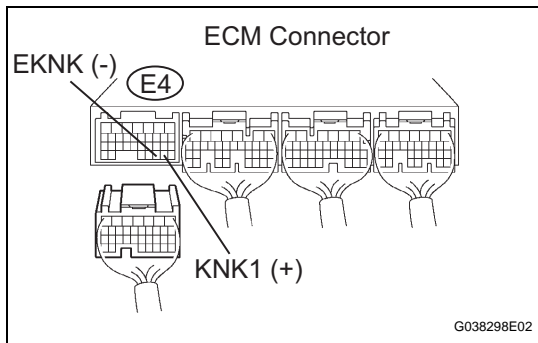
Tester Connections	Specified Conditions
KNK1 (E4-29) - EKNK (E4-30)	120 to 280 kΩ at 20 °C (68°F)

- (c) Reconnect the ECM connector.

NG → **Go to step 3**

OK

2 INSPECT ECM (KNK1 VOLTAGE)



- (a) Disconnect the ECM connector.
 - (b) Turn the ignition switch to ON.
 - (c) Measure the voltage between the ECM terminals.
- Standard Voltage**

Tester Connections	Specified Conditions
KNK1 (E4-29) - EKNK (E4-30)	4.5 to 5.5 V

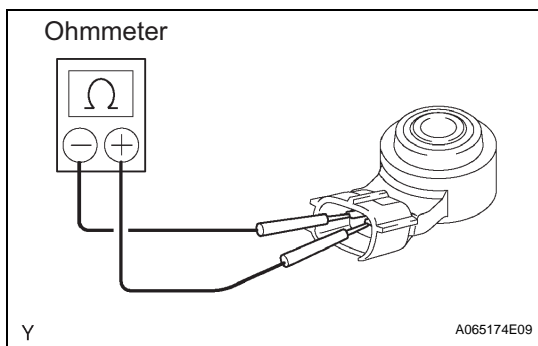
- (d) Reconnect the ECM connector.

NG → **REPLACE ECM**

OK

CHECK FOR INTERMITTENT PROBLEMS

3 INSPECT KNOCK SENSOR



- (a) Remove the knock sensor.
 - (b) Measure the resistance between the terminals.
- Standard Resistance**

Tester Connections	Specified Conditions
KNK1 (K1-2) - EKNK (K1-1)	120 to 280 kΩ at 20°C (68°F)

- (c) Reinstall the knock sensor.

NG → **REPLACE KNOCK SENSOR**

ES

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR