

DTC	P0325	KNOCK SENSOR 1 CIRCUIT (BANK 1 OR SINGLE SENSOR)
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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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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.

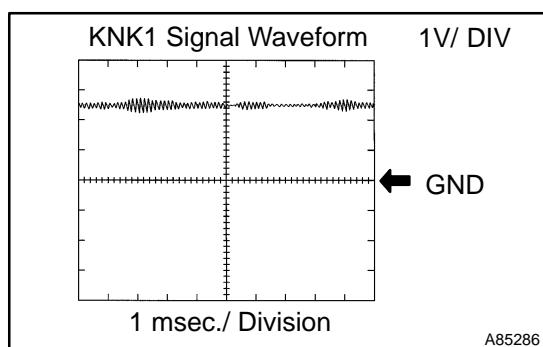
Knock sensors are fitted on the cylinder block to detect the engine knocking.

The 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 Detecting Condition	Trouble Area
P0325	Knock sensor signal level remains at low for more than 10 seconds	<ul style="list-style-type: none"> • Open or short in knock sensor circuit • Knock sensor (under-torqued or loose) • ECM
P0327	Output voltage of the knock sensor is 0.5 V or less	<ul style="list-style-type: none"> • Short in knock sensor circuit • Knock sensor • ECM
P0328	Output voltage of the knock sensor is 4.5 V or more	<ul style="list-style-type: none"> • Open in knock sensor circuit • Knock sensor • ECM

HINT:

If the ECM detects the DTC P0325, it enters the fail-safe mode in which the corrective retarded angle value is set to the maximum value.



Reference: Inspection using the oscilloscope.

- (1) After warming up run the engine at 4,000 rpm, check the waveform between terminal KNK1 and EKNK of the ECM connector.

MONITOR DESCRIPTION

The knock sensor, located on the cylinder block, detects spark knock. When spark knock occurs, the sensor picks-up vibrates 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	P0325	Knock sensor (bank 1) range check or rationality
	P0327	Knock sensor (bank 1) range check (low voltage)
	P0328	Knock sensor (bank 1) range check (high voltage)
Required sensors/components	Main sensors	Knock sensor
	Related sensors	Crankshaft position sensor, camshaft position sensor, engine coolant temperature sensor, mass air flow sensor
Frequency of operation	Continuous	
Duration	10 seconds	
MIL operation	Immediately	
Sequence of operation	None	

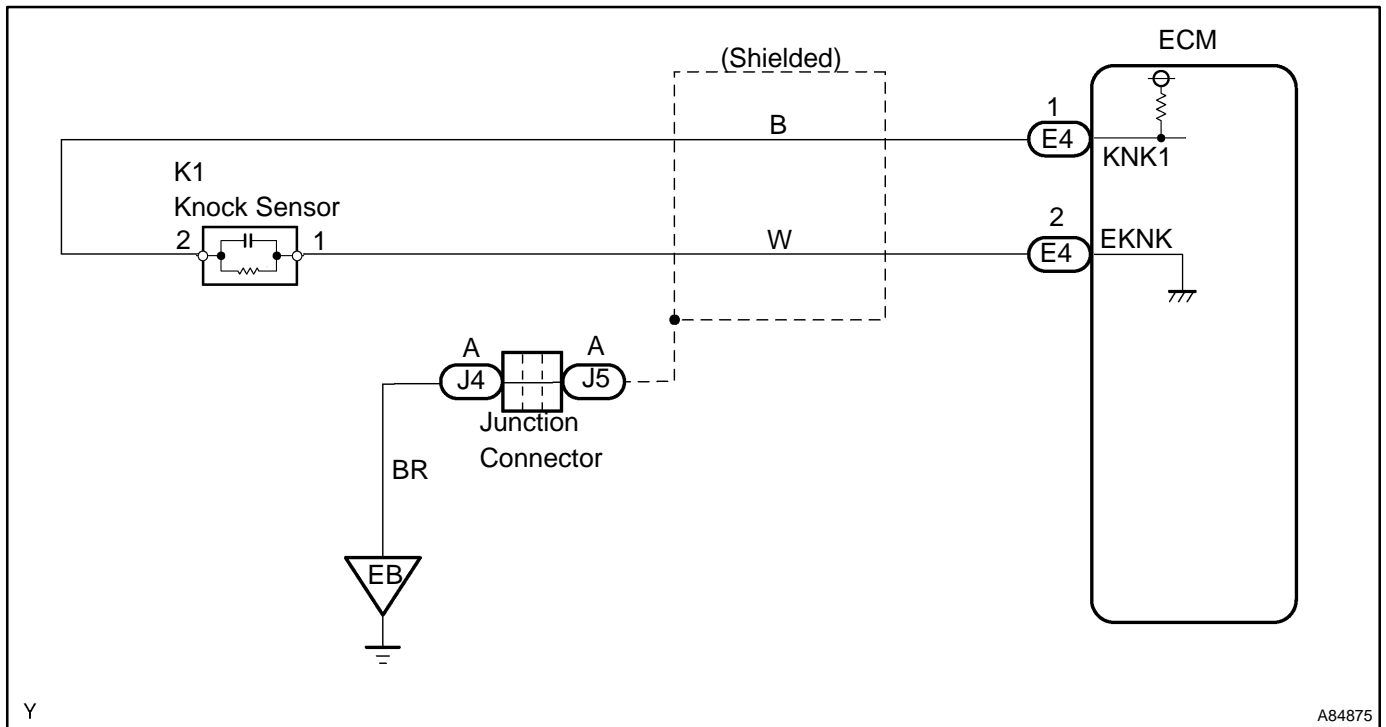
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of Disable a Monitor" (On page 05-25)	
Battery voltage	10 V	–
Idle	OFF	
Time after engine start	5 seconds	–
Engine coolant temperature	60°C (140°F)	–
Intake air amount per revolution	0.3 g/rev	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0325 (Range check/Rationality):	
Time while the voltage output of the knock sensor is below the specific threshold	10 seconds
P0325 (Fluttering):	
Knock sensor voltage	Less than 0.5 V and More than 4.5 V
P0327:	
Knock sensor voltage	Less than 0.5 V
P0328:	
Knock sensor voltage	More than 4.5 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

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, 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

- (a) Clear the DTC.
- (b) Warm up the engine.
- (c) Run the engine at 3,000 rpm for 10 seconds or more.
- (d) Connect the hand-held tester or the OBD II scan tool to the DLC3.
- (e) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
- (f) Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES".
- (g) Read the DTCs.

Result :

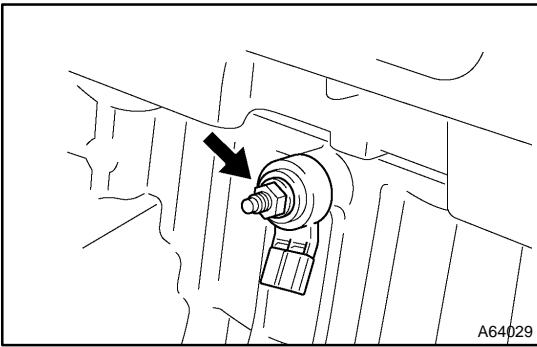
Display (DTC output)	Proceed to
P0325	A
"P0325, P0327 and/or P0328"	B
No output	C

B Go to step 3

C CHECK FOR INTERMITTENT PROBLEMS (See page 05-41)

A

2 INSPECT KNOCK SENSOR

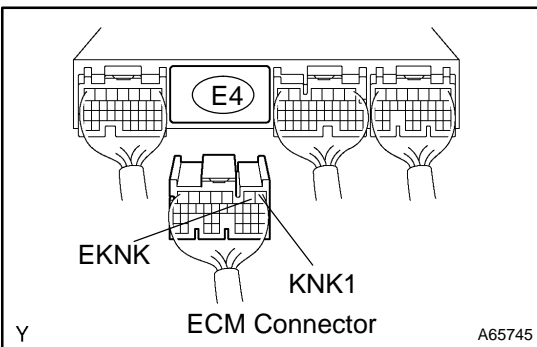


- (a) Check the knock sensor installation.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

NG TIGHTEN SENSOR

OK

3 CHECK HARNESS AND CONNECTOR(ECM - KNOCK SENSOR)



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

Standard:

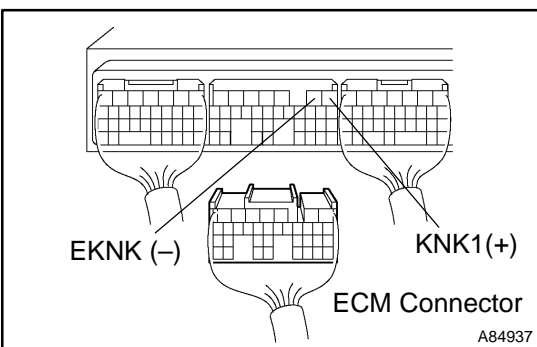
Tester Connection	Specified Condition
KNK1 (E4-1) - EKNK (E4-2)	120 to 280 KΩ at 20 °C (68 °F)

- (c) Reconnect the ECM connector.

NG Go to step 5

OK

4 INSPECT ECM(KNK1 VOLTAGE)



- (a) Disconnect the E4 ECM connector.
- (b) Turn the ignition switch ON.
- (c) Measure the voltage between terminals of the E4 ECM terminals.

Standard:

Tester Connection	Specified Condition
KNK1 (E4-1) - EKNK (E4-2)	4.5 to 5.5 V

- (d) Reconnect the ECM connector.

NG REPLACE ECM (See page 10-11)

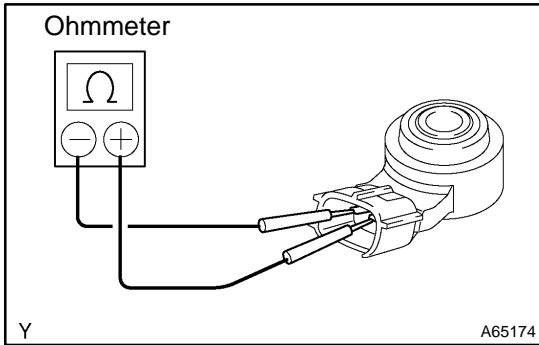
OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05-41)

NOTICE:

Fault may be intermittent. Check harness and connectors carefully.

5 INSPECT KNOCK SENSOR



- (a) Remove the K1 knock sensor.
- (b) Measure the resistance between the terminals.

Standard:

Tester Connection	Specified Condition
KNK1 (K1-1) – EKNK (K1-2)	120 to 280 KΩ aKt 20 °C (68 °F)

- (c) Reinstall the knock sensor.

NG → **REPLACE KNOCK SENSOR**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR