

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	P0332	Knock Sensor 2 Circuit Low Input (Bank 2)
DTC	P0333	Knock Sensor 2 Circuit High Input (Bank 2)

DESCRIPTION

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Flat type knock sensors (non-resonant type) have structures that can detect vibrations: 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.

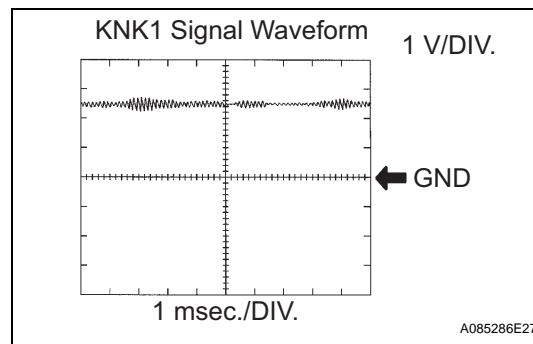
The voltage is generated when the engine block vibrates due to knocking. Any occurrence of engine knocking can be suppressed by delaying the ignition timing.

DTC No.	DTC Detection Condition	Trouble Area
P0327 P0332	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 P0333	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, P0328, P0332 and P0333 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.

Item	Content
Terminal	KNK1 - EKNK KNK2 - EKN2
Equipment Setting	1 V/DIV. 1 msec./DIV.
Condition	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, P0328, P0332 and P0333 begins to run when 5 seconds have elapsed since the engine was started.

If the malfunction is not repaired successfully, DTC P0327, P0328, P0332 or P0333 is set 5 seconds after the engine is next started.

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)	-
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

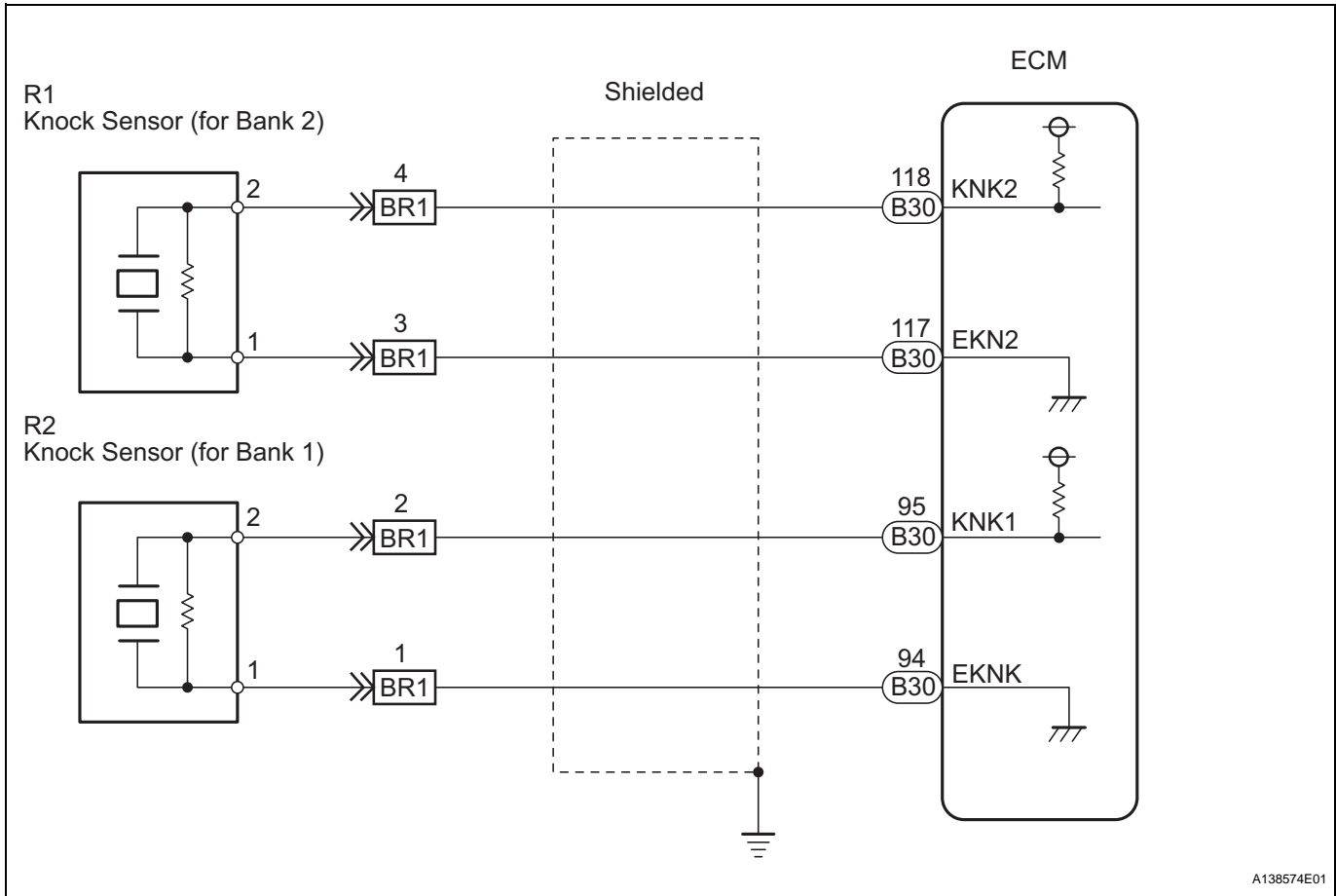
Knock Sensor Range Check (Low voltage) P0327 and P0332:

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

Knock sensor voltage	More than 4.5 V
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WIRING DIAGRAM



A138574E01

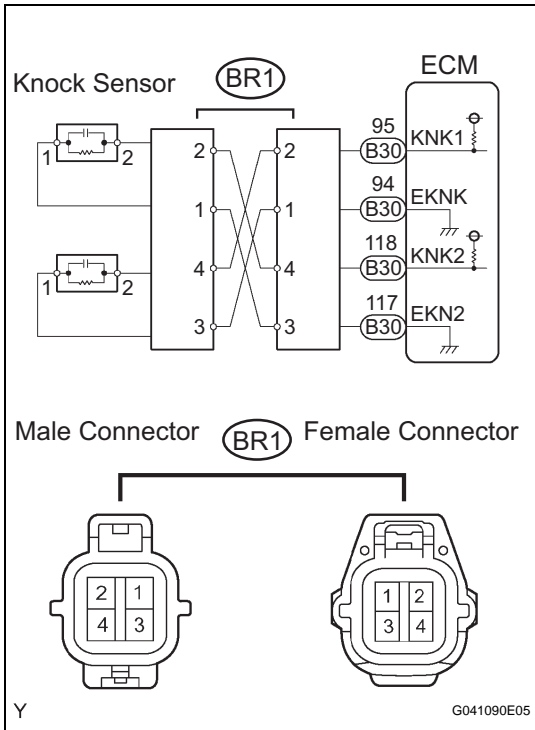
INSPECTION PROCEDURE

HINT:

- DTCs P0327 and P0328 are for the bank 1 knock sensor circuit.
- DTCs P0332 and P0333 are for the bank 2 knock sensor circuit.
- 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.

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1 READ DTC OUTPUT (CHECK KNOCK SENSOR CIRCUIT)



- (a) Disconnect the BR1 connector.
- (b) Using lead wires, connect the connectors as follows:

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

- (c) Warm up the engine.
- (d) Run the engine at 3,000 rpm for 10 seconds or more.
- (e) Connect the intelligent tester to the DLC3.
- (f) Turn the ignition switch ON and turn the intelligent tester ON.
- (g) DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- (h) Read DTCs.

Result

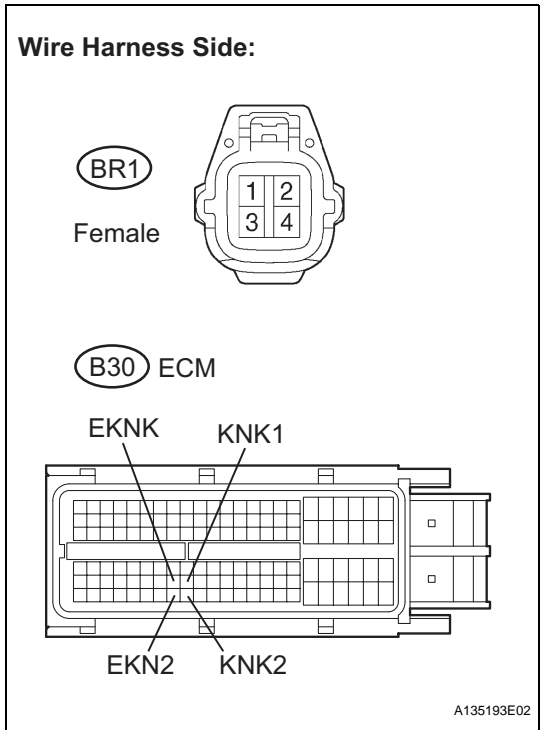
Display	Proceed to
DTCs are same as when vehicle brought in P0327, P0328 → P0327, P0328 or P0332, P0333 → P0332, P0333	A
DTCs are different from when vehicle brought in P0327, P0328 → P0332, P0333 or P0332, P0333 → P0327, P0328	B

- (i) Reconnect the BR1 connector.

B Go to step 4

A

2 CHECK WIRE HARNESS (CONNECTOR - ECM)



- (a) Disconnect the BR1 connector.
- (b) Disconnect the B30 ECM connector.
- (c) Measure the resistance according to the value(s) in the table below.

Standard resistance

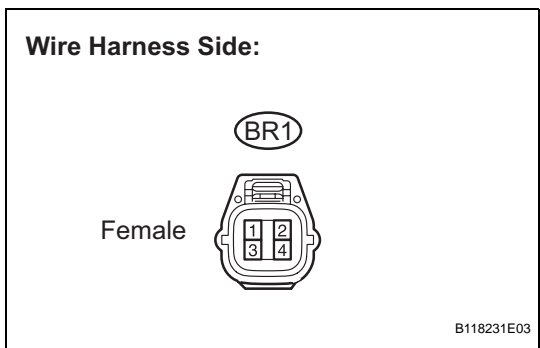
Tester Connection	Specified Condition
BR1 female connector 2 - B30-95 (KNK1)	Below 1 Ω
BR1 female connector 1 - B30-94 (EKNK)	Below 1 Ω
BR1 female connector 4 - B30-118 (KNK2)	Below 1 Ω
BR1 female connector 3 - B30-117 (EKN2)	Below 1 Ω
BR1 female connector 2 or B30-95 (KNK1) - Body ground	10 kΩ or higher
BR1 female connector 1 or B30-94 (EKNK) - Body ground	10 kΩ or higher
BR1 female connector 4 or B30-118 (KNK2) - Body ground	10 kΩ or higher
BR1 female connector 3 or B30-117 (EKN2) - Body ground	10 kΩ or higher

- (d) Reconnect the BR1 connector.
- (e) Reconnect the ECM connector.

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3 INSPECT ECM (VOLTAGE)



- (a) Disconnect the BR1 connector.
- (b) Turn the ignition switch ON.
- (c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
CV1 female connector 2 - 1	4.5 to 5.5 V
CV1 female connector 4 - 3	4.5 to 5.5 V

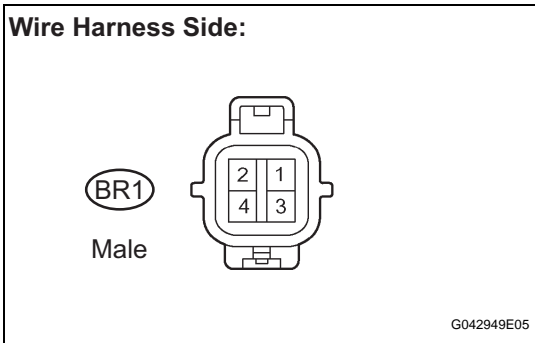
- (d) Reconnect the BR1 connector.

NG REPLACE ECM

OK

CHECK FOR INTERMITTENT PROBLEMS

4 INSPECT KNOCK SENSOR



- (a) Disconnect the BR1 connector.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
BR1 male connector 1 - 2	20°C (68°F)	120 to 280 kΩ
BR1 male connector 3 - 4	20°C (68°F)	120 to 280 kΩ

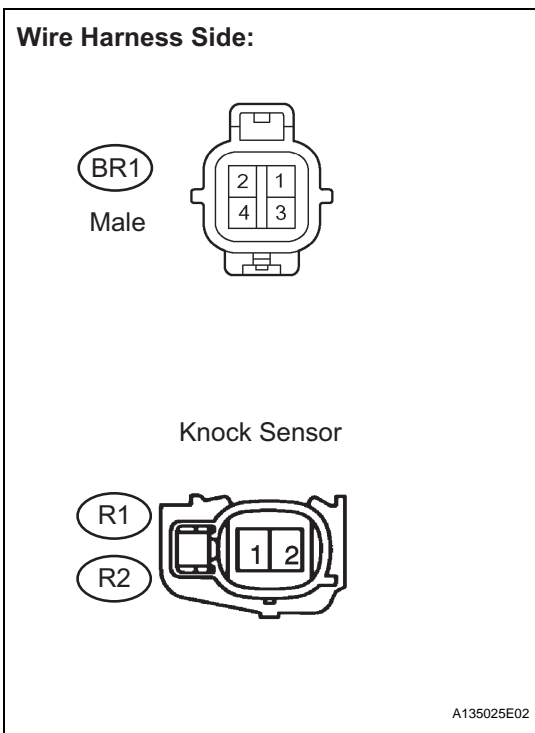
- (c) Reconnect the BR1 connector.

OK → **CHECK FOR INTERMITTENT PROBLEMS**

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5 CHECK WIRE HARNESS (CONNECTOR - KNOCK SENSOR)



HINT:

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

- (a) Disconnect the BR1 connector.
- (b) Disconnect the R1 and R2 knock sensor connectors.
- (c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
BR1 male connector 2 - R2-2	Below 1 Ω
BR1 male connector 1 - R2-1	Below 1 Ω
BR1 male connector 4 - R1-2	Below 1 Ω
BR1 male connector 3 - R1-2	Below 1 Ω
BR1 male connector 2 or R2-2 - Body ground	10 kΩ or higher
BR1 male connector 1 or R2-1 - Body ground	10 kΩ or higher
BR1 male connector 4 or R1-2 - Body ground	10 kΩ or higher
BR1 male connector 3 or R1-2 - Body ground	10 kΩ or higher

- (d) Reconnect the BR1 connector.
- (e) Reconnect the knock sensor connectors.

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE KNOCK SENSOR