

<b>DTC</b>	<b>P0327</b>	<b>Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)</b>
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<b>DTC</b>	<b>P0328</b>	<b>Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)</b>
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<b>DTC</b>	<b>P0332</b>	<b>Knock Sensor 2 Circuit Low Input (Bank 2)</b>
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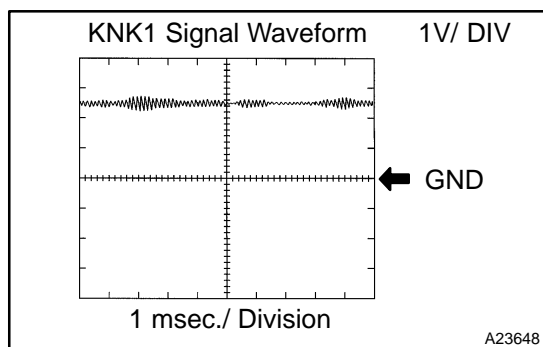
<b>DTC</b>	<b>P0333</b>	<b>Knock Sensor 2 Circuit High Input (Bank 2)</b>
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## CIRCUIT DESCRIPTION

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 right bank and left bank of the cylinder block to detect engine knocking. Each knock sensor contains a piezoelectric element which generates voltage when it becomes deformed. Generation of the voltage occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, the ignition timing is retarded in order to suppress the knocking.

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"> <li>• Short in knock sensor 1 or 2 circuit</li> <li>• Knock sensor 1 or 2</li> <li>• ECM</li> </ul>
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"> <li>• Open in knock sensor 1 or 2 circuit</li> <li>• Knock sensor 1 or 2</li> <li>• ECM</li> </ul>



Reference: Inspection using the oscilloscope.  
The correct waveform is as shown.

Item	Details
Terminal	KNK1 – EKNK or KNK2 – EKN2
Equipment Settings	0.01 to 10 V/Division, 0.01 to 10 msec./Division
Condition	After warming up the engine, keep the engine speed at 4,000 rpm.

## MONITOR DESCRIPTION

The knock sensor located on the cylinder block detects spark knock.

When spark knock occurs, the sensor pick-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.

If there is a defect in the knock sensor or an open or short circuit, the voltage level will deviate outside the normal operating range. The ECM interprets this deviation as a defect in the knock sensor and sets a DTC.

Example:

When the knock sensor voltage output is less than 0.5 V, or more than 4.5 V, and if either the condition continues for more than 3 sec.

## 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 sensors/components	Knock sensor
	Related sensors/components	Crankshaft position sensor, Camshaft position sensor, Engine coolant temperature sensor, Mass air flow meter
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

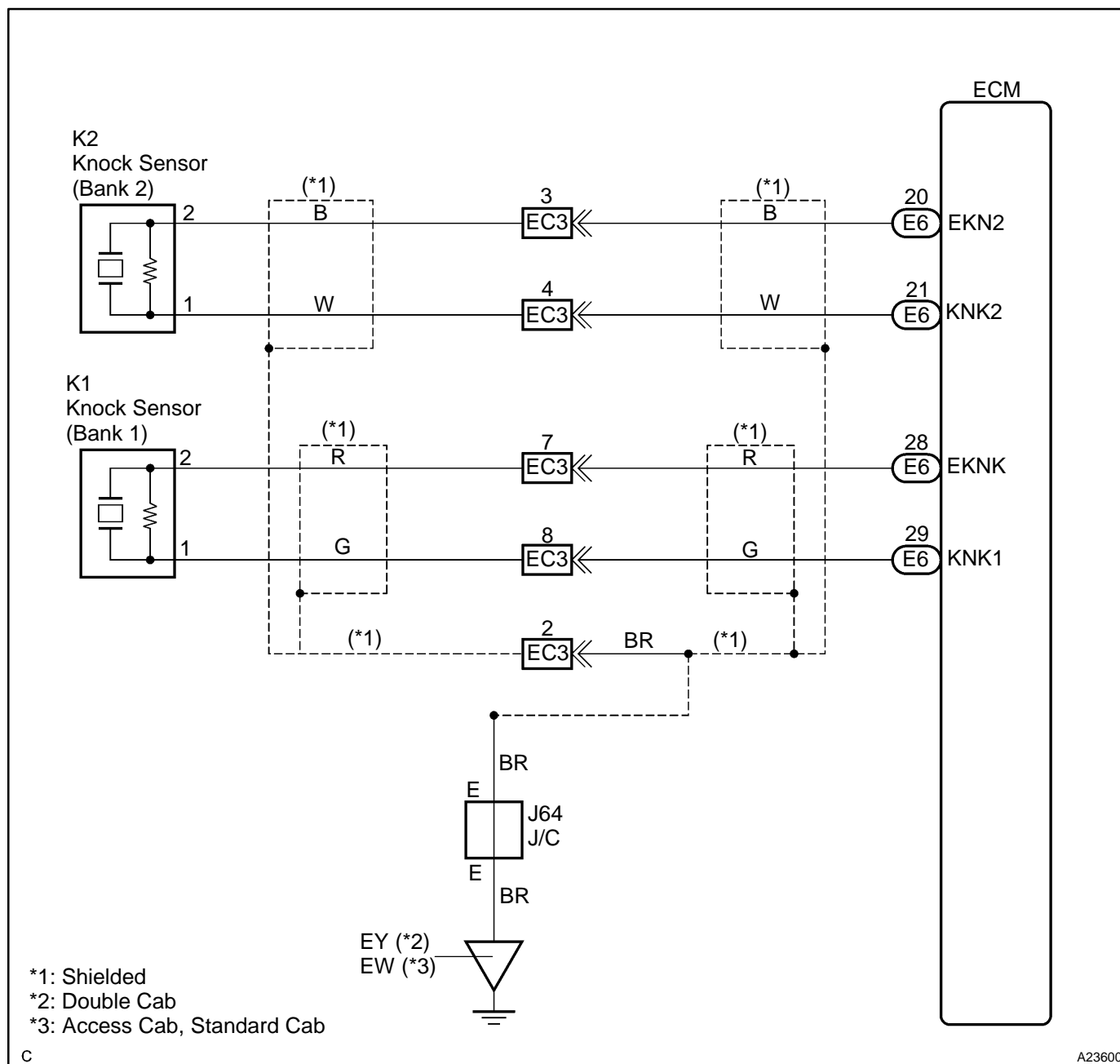
## TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page <a href="#">DI-437</a>	
Battery voltage	10.5 V	–
Time after engine start	5 sec.	–
Ignition switch	ON	
Starter	OFF	

## TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
<b>Knock sensor range check (Low voltage) P0327, P0332:</b>	
Knock sensor voltage	Less than 0.5 V
<b>Knock sensor range check (High voltage) P0328, P0333:</b>	
Knock sensor voltage	More than 4.5 V

## WIRING DIAGRAM

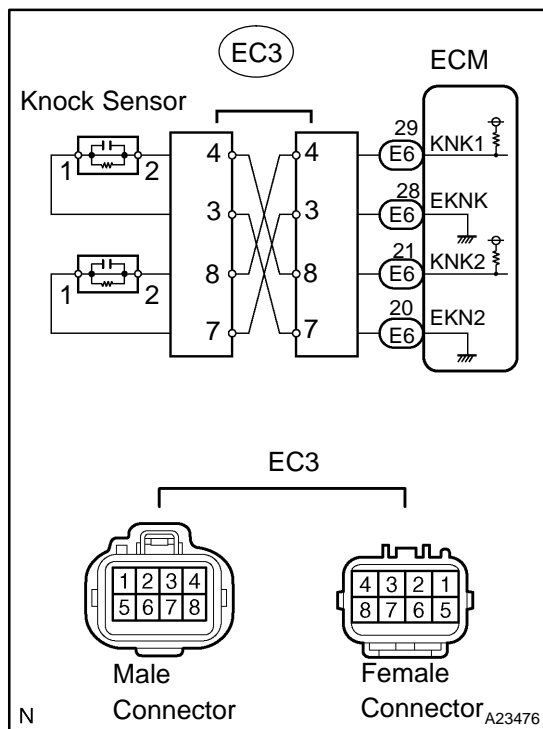


## INSPECTION PROCEDURE

### HINT:

- DTC P0325, P0327 and P0328 are for the bank 1 knock sensor circuit.
- DTC P0330, P0332 and P0333 are for the bank 2 knock sensor circuit.
- Read freeze frame data using the hand-held tester. 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 Connect hand-held tester, and check knock sensor circuit.



### PREPARATION:

- Disconnect the EC3 connector.
- Using lead wires, connect the EC3 connectors as follows.

Male Connector – Female Connector
Terminal 4 – Terminal 8
Terminal 3 – Terminal 7
Terminal 8 – Terminal 4
Terminal 7 – Terminal 3

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

### CHECK:

- Connect the hand-held tester to the DLC3.
- Turn the ignition switch to ON and turn the hand-held tester ON.
- Select the item: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- Read DTCs.

### Result :

Display	Proceed to
DTCs same as when vehicle brought in P0325, P0327, P0328 → P0325, P0327, P0328 or P0330, P0332, P0333 → P0330, P0332, P0333	A
DTC different from when vehicle brought in P0325 → P0330 or P0330 → P0325	B
DTCs different from when vehicle brought in P0327, P0328 → P0332, P0333 or P0332, P0333 → P0327, P0328	C

- Reconnect the EC3 connector.

**B**

**Go to step 4.**

**C**

**Go to step 5.**

A

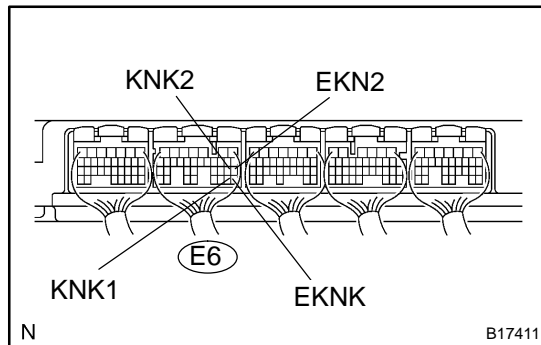
- 2** Check for open and short in harness and connector between EC3 connector and ECM (See page [IN-30](#)).

NG

Repair or replace harness or connector.

OK

- 3** Measure voltage between terminals KNK1 and EKNK, KNK2 and EKN2 of ECM.

**PREPARATION:**

- (a) Disconnect the E6 ECM connector.  
 (b) Turn the ignition switch to ON.

**CHECK:**

- (a) Measure the voltage between the specified ECM terminals.

**OK:****Standard:**

Tester Connection	Specified Condition
KNK1 (E6-29) – EKNK (E6-28)	4.5 to 5.5 V
KNK2 (E6-21) – EKN2 (E6-20)	4.5 to 5.5 V

- (b) Reconnect the ECM connector.

NG

Replace ECM (See page [SF-82](#)).

OK

Check for intermittent problems  
 (See page [DI-430](#)).

- 4** Check knock sensor installation.

**CHECK:**

Check the knock sensor installation.

**OK:**

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

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Tighten the sensor.

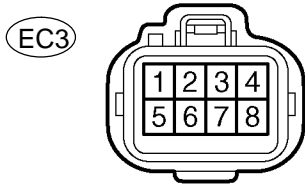
OK

Replace knock sensor (See page [SF-68](#)).

## 5 Check knock sensor.

### Wire Harness Side:

Male Connector



Front View

A23513

### PREPARATION:

(a) Disconnect the EC3 connector.

### CHECK:

(a) Check the resistance between the terminals of the EC3 male connector.

### OK:

### Standard:

Tester Connection	Specified Condition
EC3 male connector 3 - 4	120 to 280 kΩ
EC3 male connector 7 - 8	120 to 280 kΩ

(b) Reconnect the EC3 connector.

OK

Check for intermittent problems  
(See page [DI-430](#)).

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## 6 Check for open and short in harness and connector between EC3 connector and knock sensor (See page [IN-30](#)).

### 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.

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Repair or replace harness or connector.

OK

Replace knock sensor.