

|            |              |   |
|------------|--------------|---|
| <b>DTC</b> | <b>P0327</b> | <b>KNOCK SENSOR 1 CIRCUIT LOW INPUT<br/>(BANK 1 OR SINGLE SENSOR)</b> |
|------------|--------------|---|

|            |              |  |
|------------|--------------|--|
| <b>DTC</b> | <b>P0328</b> | <b>KNOCK SENSOR 1 CIRCUIT HIGH INPUT<br/>(BANK 1 OR SINGLE SENSOR)</b> |
|------------|--------------|--|

## CIRCUIT DESCRIPTION

A flat type knock sensor (non-resonant type) can detect vibrations in a wide band of frequency (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. If engine knocking occurs, the ignition timing is retarded to suppress it.

| DTC No. | DTC Detection Condition                             | Trouble Area   |
|---------|---|--|
| P0327   | Output voltage of the knock sensor is 0.5 V or less | <ul style="list-style-type: none"> <li>• Short in knock sensor circuit</li> <li>• Knock sensor</li> <li>• ECM</li> </ul> |
| P0328   | Output voltage of the knock sensor is 4.5 V or more | <ul style="list-style-type: none"> <li>• Open in knock sensor circuit</li> <li>• Knock sensor</li> <li>• ECM</li> </ul>  |

## MONITOR DESCRIPTION

The knock sensor, located on the cylinder block, detects spark knock. When a spark knock occurs, the sensor picks up vibrations 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                            | P0327: Knock Sensor Range Check (Low voltage)<br>P0328: Knock Sensor Range Check (High voltage) |
| Required sensors/ components (Main)     | Knock sensor  |
| Required sensors / components (Related) | MAF meter, Crankshaft position sensor, ECT sensor   |
| Frequency of operation                  | Continuous  |
| Duration                                | 1 second  |
| MIL operation                           | Immediate   |
| Sequence operation                      | None  |

## TYPICAL ENABLING CONDITIONS

All:

|  |                                |
|--|--------------------------------|
| The monitor will run whenever these DTCs are not present | See page <a href="#">05-16</a> |
|--|--------------------------------|

### Knock Sensor Range Check:

|                 |                |
|-----------------|----------------|
| Battery voltage | 10.5 V or more |
| Starter         | OFF            |
| Ignition switch | ON             |

## TYPICAL MALFUNCTION THRESHOLDS

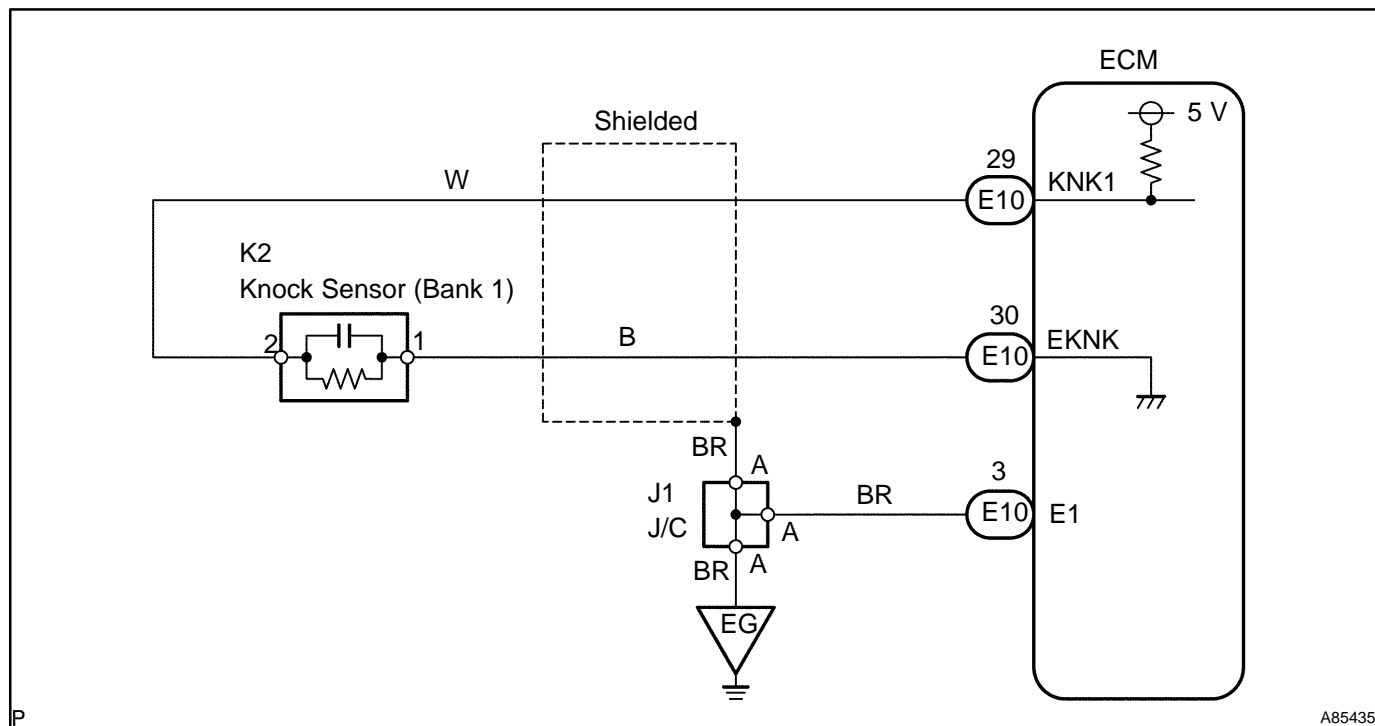
### Knock Sensor Range Check (Low voltage):

|                      |                 |
|----------------------|-----------------|
| Knock sensor voltage | Less than 0.5 V |
|----------------------|-----------------|

### Knock Sensor Range Check (High voltage):

|                      |                 |
|----------------------|-----------------|
| 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, 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 READ OUTPUT DTC

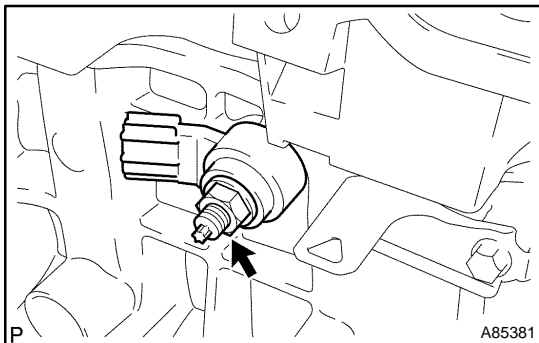
- (a) Clear the DTC (see page 05-41).
- (b) Warm up the engine.
- (c) Run the engine at 3,000 rpm for 10 seconds or more.
- (d) Connect the hand-held tester or the OBD II scan tool to the DLC3.
- (e) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
- (f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- (g) Read the DTC.

#### Result:

| Display (DTC output)                           | Proceed to |
|--|------------|
| Only P0325 is output again                     | A          |
| P0325, P0327 and/or P0328 are output again     | B          |
| P0325, P0327 and/or P0328 are not output again | C          |

**B****Go to step 3****C****CHECK FOR INTERMITTENT PROBLEMS****A**

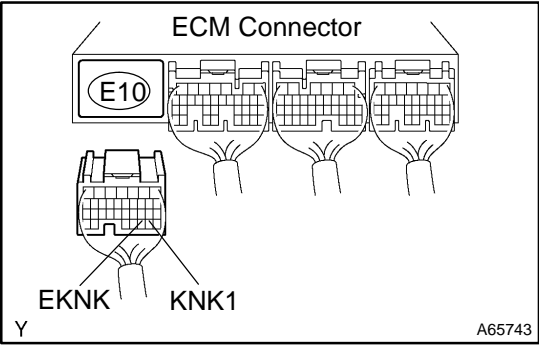
### 2 INSPECT KNOCK SENSOR



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

**NG****TIGHTEN SENSOR****OK****REPLACE KNOCK SENSOR**

**3 CHECK WIRE HARNESS (ECM - KNOCK SENSOR)**



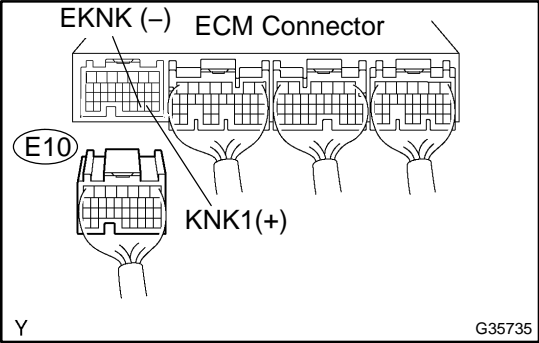
- (a) Disconnect the E10 ECM connector.
  - (b) Check the resistance of the wire harness side connector.
- Standard:**

| Tester Connection             | Condition   | Specified Condition |
|-------------------------------|-------------|---------------------|
| E10-29 (KNK1) - E10-30 (EKNK) | 20°C (68°F) | 120 to 280 kΩ       |

**NG** Go to step 5

**OK**

**4 INSPECT ECM (KNK1 VOLTAGE)**



- (a) Disconnect the E10 ECM connector.
  - (b) Turn the ignition switch ON.
  - (c) Check the voltage of ECM terminals.
- Voltage:**

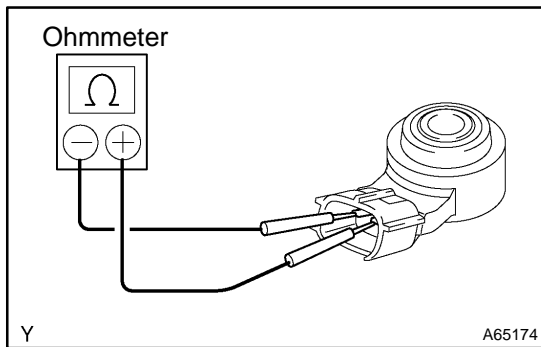
| Tester Connection             | Specified Condition |
|-------------------------------|---------------------|
| E10-29 (KNK1) - E10-30 (EKNK) | 4.5 to 5.5 V        |

**NG** REPLACE ECM (See page 10-9)

**OK**

**CHECK FOR INTERMITTENT PROBLEMS**

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

**5 INSPECT KNOCK SENSOR**

- (a) Remove the knock sensor.
- (b) Check the resistance between the terminals.  
**OK: Resistance is 120 to 280 k $\Omega$  at 20°C (68°F)**

**NG****REPLACE KNOCK SENSOR****OK****REPAIR OR REPLACE HARNESS AND CONNECTOR**