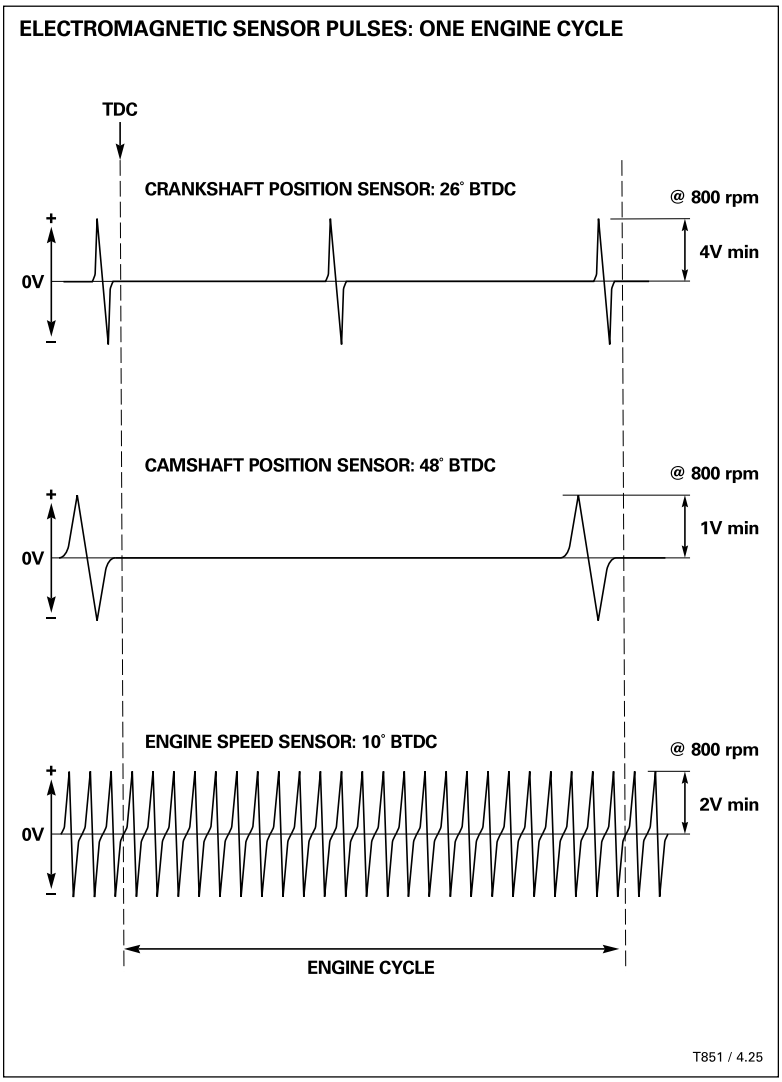
EMS Main Sensing Components: Engine Speed and Position



Three electromagnetic sensors are installed on the engine: the engine speed sensor (RPM Sensor), the crankshaft position sensor (CKPS), and the camshaft position sensor (CMPS).

The ECM uses the engine speed sensor input to determine engine speed and for individual cylinder identification. The ECM uses the camshaft position sensor input for compression stroke identification (A bank). All three inputs are required semisequential fuel injection.

The illustration at left shows all of the pulses provided to the ECM during one engine cycle (two engine revolutions).

NOTES

Engine Speed Sensor (RPM Sensor)

The engine speed sensor (RPM Sensor) is located behind the flywheel at the rear of the engine vee. The sensor is a variable reluctance device that provides a pulse to the ECM at 30° intervals. A disc, mounted to the crankshaft, has twelve "spokes" that pass the RPM Sensor. The spokes are spaced 30° (crankshaft angle) apart on the disc. The ECM uses the RPM Sensor pulses for engine speed information. In addition, the ECM uses the pulse, in conjunction with the CKPS and CMPS pulses for cylinder synchronization.

The RPM Sensor provides twelve pulses per engine revolution starting at cylinder A1 at 10° BTDC and thereafter at every 30° of crankshaft rotation.

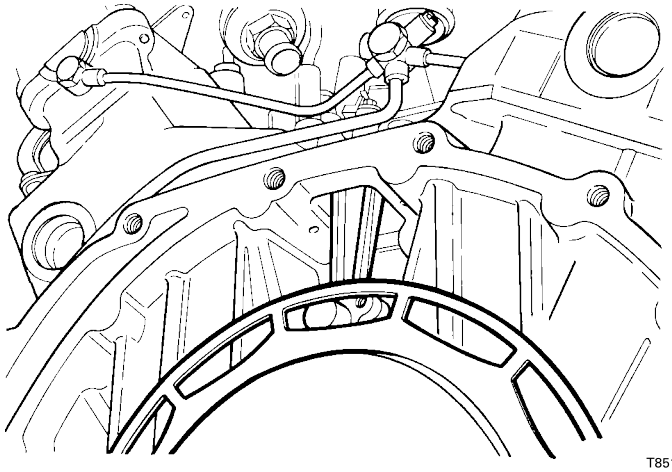
RPM Sensor monitoring for OBD II

The RPM Sensor signal is monitored during engine cranking (determined by the "cranking" signal input to the ECM). If there is no RPM Sensor signal while a "cranking" signal is present, a DTC is flagged and the CHECK ENGINE MIL is activated immediately. Refer to DTC Summary: Group 14, page 60.

The RPM Sensor signal is also compared to the crankshaft position sensor input when the engine is running. If the expected number of RPM Sensor pulses are not received, a DTC is flagged and the CHECK ENGINE MIL is activated immediately.

NOTES

ENGINE SPEED SENSOR LOCATION



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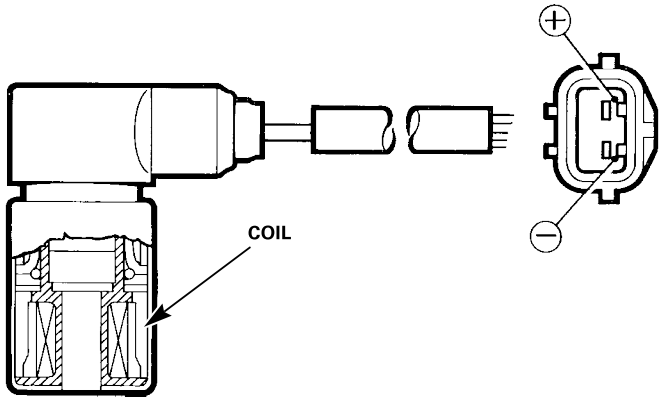
ENGINE SPEED SENSOR CROSS-SECTION



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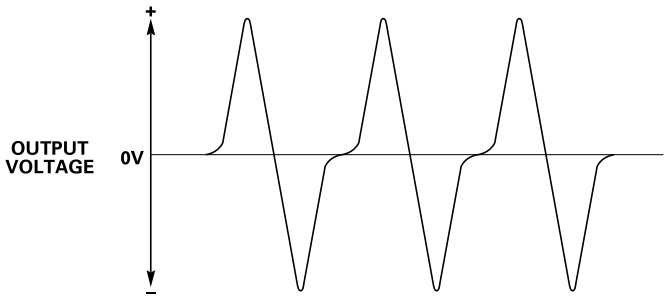
ENGINE SPEED SENSOR CHARACTERISTIC



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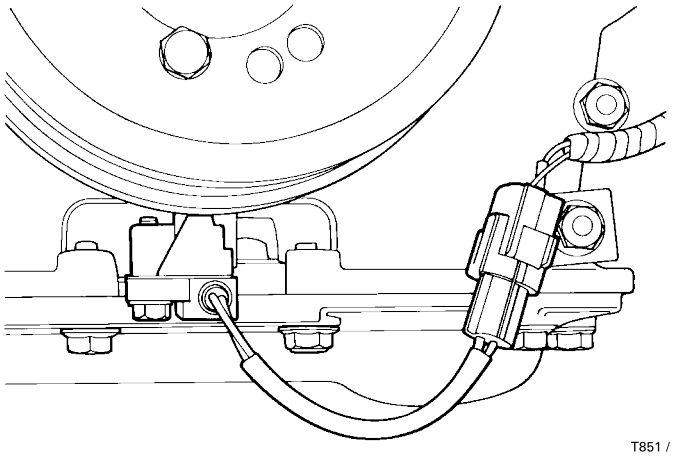
EMS Main Sensing Components: Engine Speed and Position (continued)

CRANKSHAFT SENSOR LOCATION



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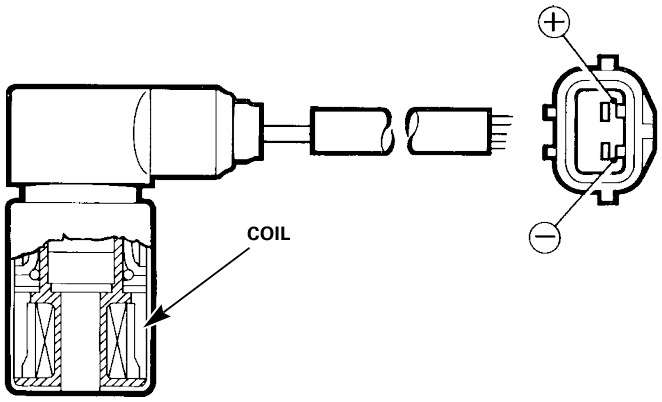
CRANKSHAFT SENSOR CROSS-SECTION



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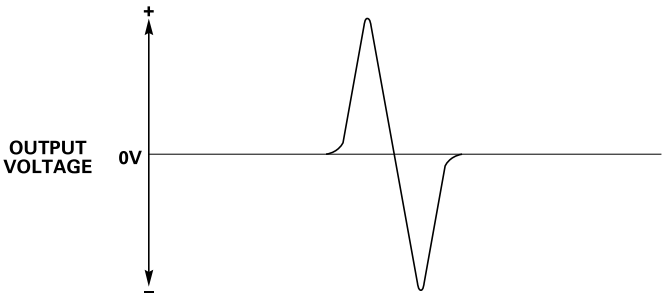
CRANKSHAFT SENSOR CHARACTERISTIC



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Crankshaft Position Sensor (CKPS)

The crankshaft position sensor (CKPS) is located at the bottom of the crankshaft front pulley. The sensor is a variable reluctance device that provides a pulse to the ECM once each engine revolution. A disc, mounted to crankshaft damper has one tooth that passes the CKPS. The ECM uses the CKPS pulse for semisequential fuel injection in conjunction with the RPM Sensor and CMPS pulses. In addition, the ECM uses the pulse, in conjunction with the RPM Sensor pulses for grouped (bank) fuel injection and ignition timing.

The CKPS provides a pulse once per engine revolution synchronized to cylinder A1 at 26° BTDC.

CKPS monitoring for OBD II

The CKPS signal is compared to the RPM Sensor signal. If there are 36 RPM Sensor pulses and no CKPS pulse, a DTC is flagged and the CHECK ENGINE MIL is activated immediately. Refer to DTC Summary: Group 14, page 60.

The three sensors (RPM Sensor, CKPS, and CMPS) are also continuously compared to one another when the engine is running. If an unexpected signal is detected, a DTC is flagged and the CHECK ENGINE MIL is activated immediately.

NOTES

Camshaft Position Sensor (CMPS)

The camshaft position sensor (CMPS) is located on the A bank camshaft cover at the front of the engine. The sensor is a variable reluctance device that provides a pulse to the ECM once each engine cycle (two engine revolutions). A single peg on the A bank camshaft passes the CMPS once per camshaft revolution (two engine revolutions). The ECM uses the CMPS pulse in conjunction with the RPM Sensor and CKPS pulses for timing semisequential fuel injection in the engine firing order.

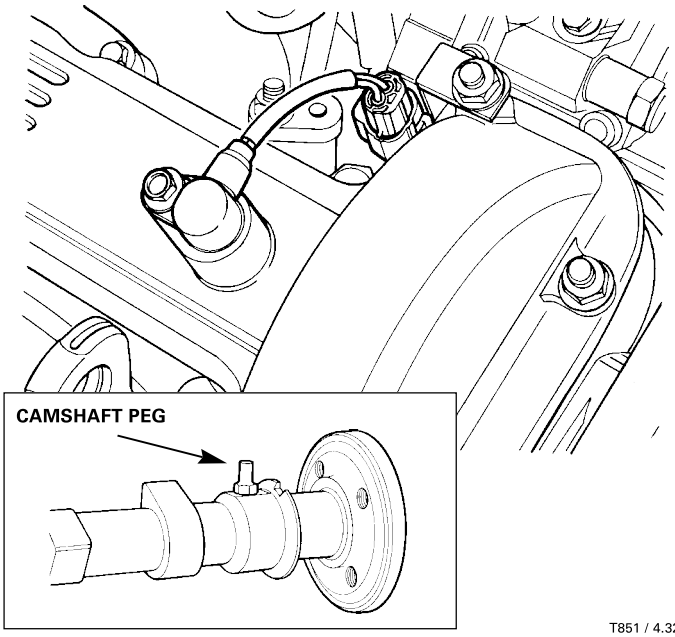
The CMPS provides one pulse per engine cycle (two engine revolutions) synchronized to cylinder A1 at 48° BTDC on the compression stroke.

CMPS monitoring for OBD II

The CMPS signal is compared to the CKPS signal. If there are 5 CKPS pulses and no CMPS pulse, a DTC is flagged and the CHECK ENGINE MIL is activated immediately. Refer to DTC Summary: Group 14, page 60.

NOTES

CAMSHAFT SENSOR LOCATION



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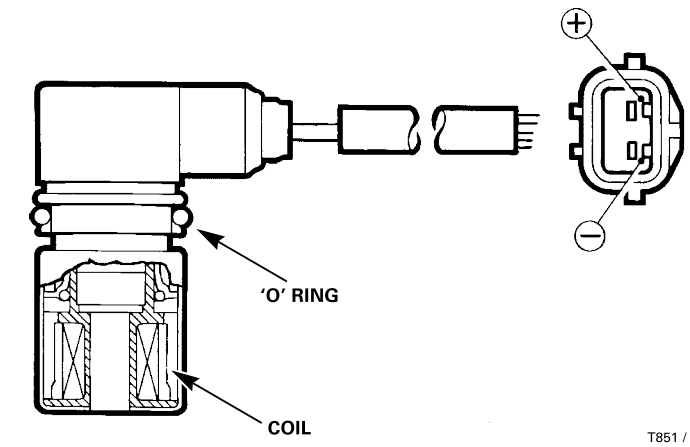
CAMSHAFT SENSOR CROSS-SECTION



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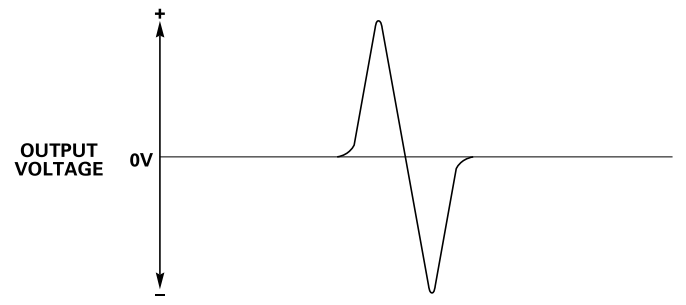
CAMSHAFT SENSOR CHARACTERISTIC



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