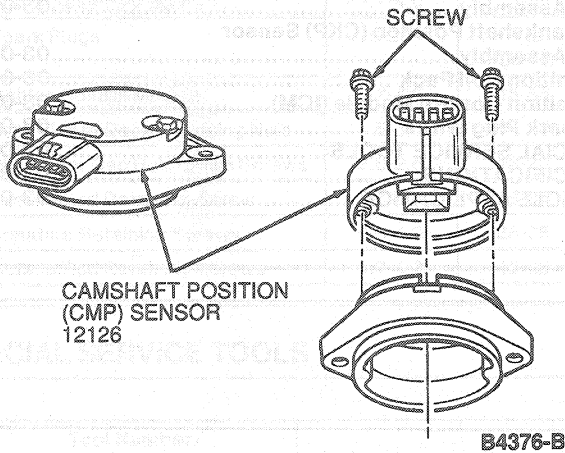


DESCRIPTION AND OPERATION (Continued)

Camshaft Position (CMP) Sensor

This sensor is a single Hall effect magnetic switch, which is activated by a single vane driven by the camshaft. This sensor provides camshaft position information. The ICM uses CMP for coil fire sequencing and is also used by the PCM for fuel synchronization.

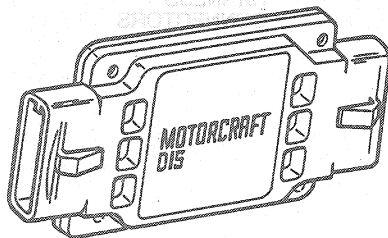


CAMSHAFT POSITION (CMP) SENSOR
12126

B4376-B

Ignition Control Module (ICM)

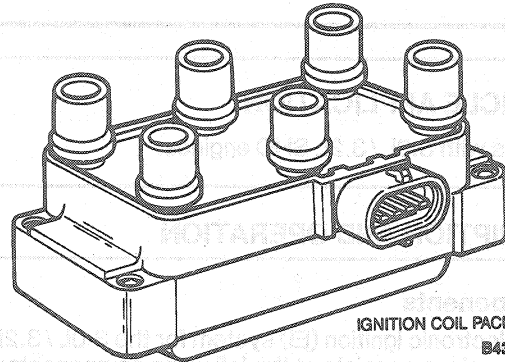
The ICM receives the CKP signal from the crankshaft position sensor, the CMP signal from the camshaft position sensor, and SPOUT (spark out) signal from the PCM module. During normal operation, CKP is sent to the PCM module from the crankshaft timing sensor and provides base timing and RPM information. The CMP signal provides the ignition control module with the information required to synchronize the ignition coils so that they are fired in the proper sequence. The SPOUT signal contains the optimum spark timing and dwell time information. The spark angle is determined by the rising edge of SPOUT, this is when coil current "turns off" and spark occurs. The dwell time is controlled by varying the duty cycle (duration) of the SPOUT signal. Current flows in a coil (dwell) when SPOUT is "low". This feature is called CCD (Computer Controlled Dwell). With the proper inputs of CKP, CMP and SPOUT the ICM turns the ignition coils on and off in the proper sequence for spark control.



B4377-C

Ignition Coil Pack

The ignition coil pack contains three separate ignition coils which are controlled by the ICM through three coil leads. Each ignition coil fires two spark plugs simultaneously, one spark plug on the compression stroke and one on the exhaust stroke. The spark plug fired on the exhaust stroke uses very little of the ignition coil stored energy. The majority of the ignition coil energy is used by the spark plug on the compression stroke. Since these two spark plugs are connected in series, the firing voltage of one spark plug will be negative with respect to ground, while the other will be positive with respect to ground. Refer to the Powertrain Control / Emissions Diagnosis Manual¹ for additional information on spark plug polarity.



IGNITION COIL PACK

B4378-A

Ignition Diagnostic Monitor

The ignition diagnostic monitor (IDM) is a function of the ICM. The ICM sends information on system failures to the PCM which stores the information for diagnostic self tests. The IDM signal is also used to drive the vehicle instrument tachometer and test tachometer for system diagnosis.

Failure Mode Effects Management

During some EI system faults, the failure mode effects management (FMEM) portion of the ICM will maintain vehicle operation. If the ICM does not receive the SPOUT input, it will automatically turn the ignition coils on and off using the CKP signal. However, this will result in fixed spark timing (10 degrees BTDC) and fixed dwell time (no CCD). If the ICM does not receive the CMP input during engine cranking, random coil synchronization will be attempted by the ICM. Therefore, several start attempts (cycling ignition switch from OFF to START) may be required to start the engine. If the ICM loses CMP input while engine is running, the ICM will remember the proper firing sequence and continue to fire to maintain engine operation.

¹ Can be purchased as a separate item.