

Fuel System/Engine Management

Engine Management System

System Description

The Thunderbird is fitted with an electronic engine management system which encompasses control of both ignition and fuel delivery. The electronic control module (ECM) draws information from sensors positioned around the engine, cooling and air intake systems and precisely calculates ignition advance and fueling requirements for all engine speeds and loads.

In addition, the system has an on-board diagnostic function. For additional information, see page 10-22.

System Sensors

- **Intake air temperature sensor** - situated in the left hand side of the airbox. As the density of the air changes with temperature (therefore the amount of oxygen available to ignite the fuel), an intake air temperature sensor is fitted. Changes in air temperature are compensated for by adjusting the amount of fuel injected to a level consistent with clean combustion and low emissions.
- **Barometric pressure sensor** - situated beneath the motorcycle seat, in the top of the airbox. The barometric pressure sensor measures atmospheric air pressure. With this information, the amount of fuel per injection is adjusted to suit the prevailing conditions.
- **Manifold Absolute Pressure (MAP) sensor** - situated below the fuel tank, connected to each of the throttles by equal length tubes. The MAP sensor provides information to the ECM which is used at shallow throttle angles (very small throttle openings) to provide accurate engine load indications to the ECM. This degree of engine load accuracy allows the ECM to make very small adjustments to fuel and ignition which would otherwise not be possible from throttle angle data alone.
- **Clutch switch** - situated on the clutch lever. The clutch must be pulled in for the starter motor to operate.
- **Crankshaft position sensor** - situated in the alternator cover. The crankshaft position sensor detects movement of teeth attached to the alternator rotor.
The teeth give a reference point from which the actual crankshaft position is calculated. The crankshaft position sensor information is used by the ECM to determine engine speed and crankshaft position in relation to the point

where fuel is injected and ignition of the fuel occurs.

- **Engine coolant temperature sensor** - situated towards the rear of the cylinder head, on the right hand side, below the throttle bodies. Coolant temperature information, received by the ECM, is used to optimise fueling at all engine temperatures and to calculate hot and cold start fueling requirements.
- **Throttle position sensor** - situated between the throttle bodies. Used to relay throttle position information to the ECM. Throttle opening angle is used by the ECM to determine fueling and ignition requirements for all throttle positions.
- **Road speed sensor** - situated in the lower crankcase, at the rear of the engine. The road speed sensor provides the ECM with data from which road speed is calculated and displayed on the speedometer. A vehicle speed limitation device also receives information from the road speed sensor.
- **Oxygen sensors** - situated in the exhaust header system upstream of the catalyst box. The oxygen sensors constantly feed information to the ECM on the content of the exhaust gases. Based on this information, adjustments to air/fuel ratio are made.
- **Side stand switch** - situated at the top of the sidestand leg. If the sidestand is in the down position, the engine will not run unless the transmission is in neutral.
- **Fall detection switch** - situated under the battery. The fall detection switch will detect if the motorcycle is on its side and will cut power to the ECM immediately. This prevents the engine from running and the fuel pump from delivering fuel. In the event of a fall, the switch is reset by returning the bike to an upright position and switching the ignition off then back on again.
- **Gear position sensor** - situated in the lower crankcase, below the final drive belt pulley. The gear position sensor provides the ECM with selected gear information. This is used to prevent the engine from starting if the transmission is in gear. The sensor also provides information to the neutral lamp in the instruments.

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Sensor Locations

