There are 4 electronic fuel injectors (one for each cylinder) located in a central position between the four valves of each cylinder. The ECM divides the injectors into two banks of 4 with cylinders.

Each injector is supplied with pressurized fuel from the fuel rail and delivers finely atomized fuel directly into the combustion chambers. Each injector is individually controlled by the ECM which operates each injector in the firing order and controls the injector opening period via pulse width modulation (PWM) signals. Each injector receives a 12V supply from the ECM and, using programmed injection/timing maps and sensor signals, determines the precise pilot and main injector timing for each cylinder. If battery voltage falls to between 6 and 9V, fuel injector operation is restricted, affecting emissions, engine speed range and idle speed. In the event of a failure of a fuel injector, the following symptoms may be observed:

- Engine misfire
- Idle irregular
- Reduced engine performance
- Reduced fuel economy
- Difficult starting
- Increased smoke emissions.

The ECM monitors the wires for each injector for short circuit and open circuit, each injector and the transient current within the ECM. If a defect is found, an error is registered in the ECM for the injector in question.

CHT SENSOR

The CHT sensor is located in the top hose at the coolant manifold junction. The ECT sensor provides the ECM and the instrument cluster with engine coolant temperature status.

The ECM uses the temperature information for the following functions:

- Fueling calculations
- Limit engine operation if engine coolant temperature becomes too high
- Cooling fan operation
- Glow plug activation time.

The instrument cluster uses the temperature information for temperature gauge operation. The CHT signal is also transmitted on the CAN bus by the instrument cluster for use by other systems.

The ECMCHT sensor circuit consists of an internal voltage divider circuit which incorporates an negative temperature coefficient (NTC) thermistor. As the CHT rises the resistance through the sensor decreases and vice versa. The output from the sensor is the change in voltage as the thermistor allows more current to pass to earth relative to the temperature of the coolant.

The ECM compares the signal voltage to stored values and adjusts fuel delivery to ensure optimum driveability at all times. The engine will require more fuel when it is cold to overcome fuel condensing on the cold metal surfaces inside