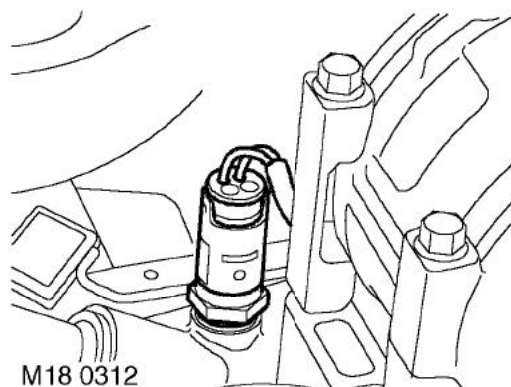


## ENGINE MANAGEMENT SYSTEM - V8

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### Engine Coolant Temperature (ECT) sensor (C0196)



The ECT sensor is located at the front of the engine adjacent to the coolant outlet pipe. The ECT sensor forms a vital part of the ECM operating strategy, and therefore the optimum control of the running of the engine. Richer air/ fuel ratio is required at lower coolant temperatures such as cold starting. Coolant temperature information from the ECT sensor is also vital to enable the ECM to weaken the air/ fuel mixture as temperature rises to maintain low emissions and optimum performance.

For NAS vehicles with secondary air injection, the signal from the ECT sensor is monitored at engine start, to determine whether the conditions are cold enough to warrant secondary air injection to be employed. The ECT sensor is then monitored to switch off the secondary air injection when the required engine coolant temperature has been attained.

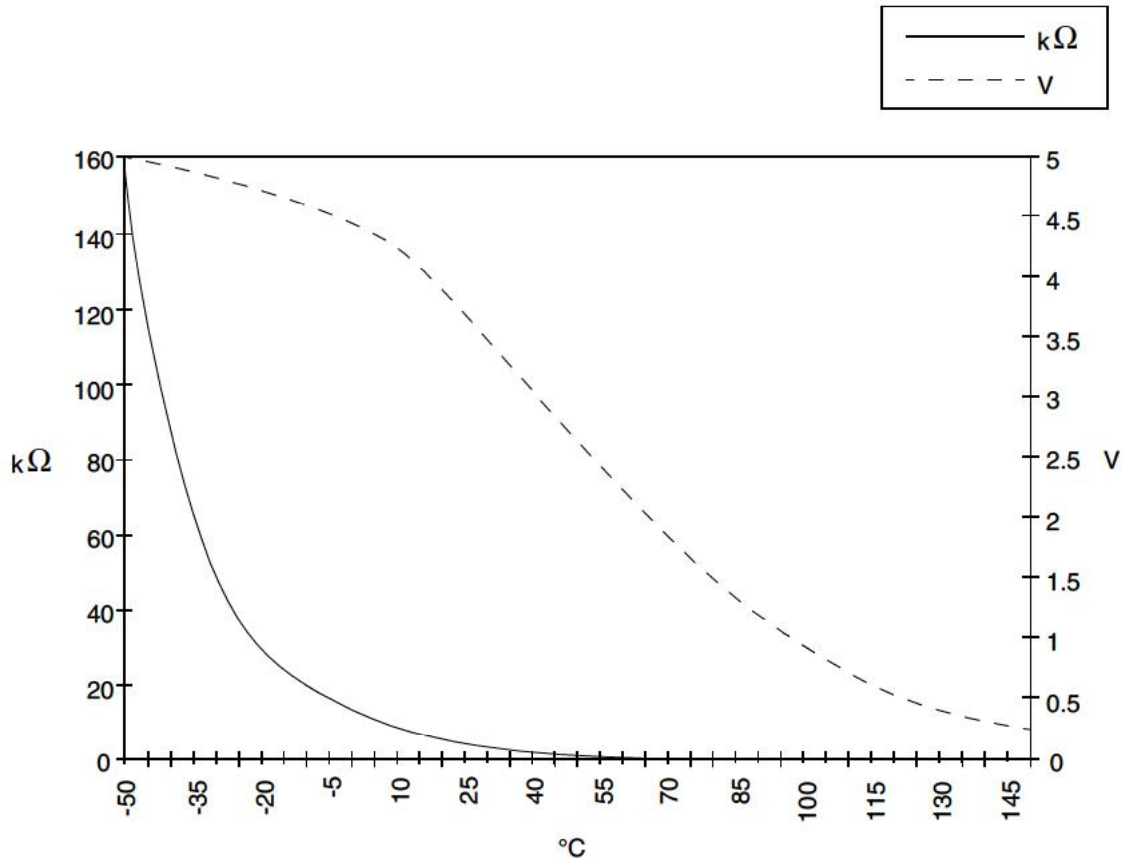
#### **EMISSION CONTROL - V8, DESCRIPTION AND OPERATION, Secondary Air Injection System.**

The ECT works as a Negative Temperature Coefficient (NTC) sensor. As temperature rises, the resistance in the sensor decreases, as temperature decreases, the resistance in the sensor increases. The ECT sensor forms part of a voltage divider chain with a pull up resistor within the ECM. Consequently as the ECT sensor resistance changes, the analogue voltage at the input signal from the ECT sensor to the ECM will be adjusted which corresponds to the temperature of the engine coolant. With this information, the ECM can implement the correct strategies for cold start, warm up etc. The ECM supplies the instrument cluster with a pulse width modulated (PWM) coolant temperature signal to drive the temperature gauge.



### Input/Output

The electrical input and output to and from the ECT sensor are reference voltage and sensor earth. The ECM provides the ECT sensor with a 5 volt reference via pin 22 of connector C0636 of the ECM, and earth via pin 21 of connector C0636 of the ECM. The normal operating parameters of the ECT sensor are as follows



M124704A

Should the sensor fail the ECM has a back up strategy that uses a changing default value during warm up based on the signal from the inlet air temperature sensor. When the strategy default value reaches 60 °C (140 °F), the ECM implements a fixed default value of 85 °C (185 °F). It will also illuminate the MIL.

The ECT sensor can fail the following ways or supply incorrect signal:

- Sensor open circuit.
- Short circuit to vehicle supply.
- Short circuit to earth.
- Incorrect mechanical fitting.
- Signal fixed above 40 °C (140 °F) will not be detected.
- Signal fixed below 40 °C (140 °F) will be detected.

In the event of an ECT sensor signal failure any of the following symptoms may be observed:

- Difficult cold start.
- Difficult hot start.
- Driveability concern.
- MIL illuminated.
- Instrument cluster temperature warning lamp illuminated.
- Temperature gauge reads excessively hot.
- Temperature gauge reads excessively cold.
- Cooling fan will not run.

## ENGINE MANAGEMENT SYSTEM - V8

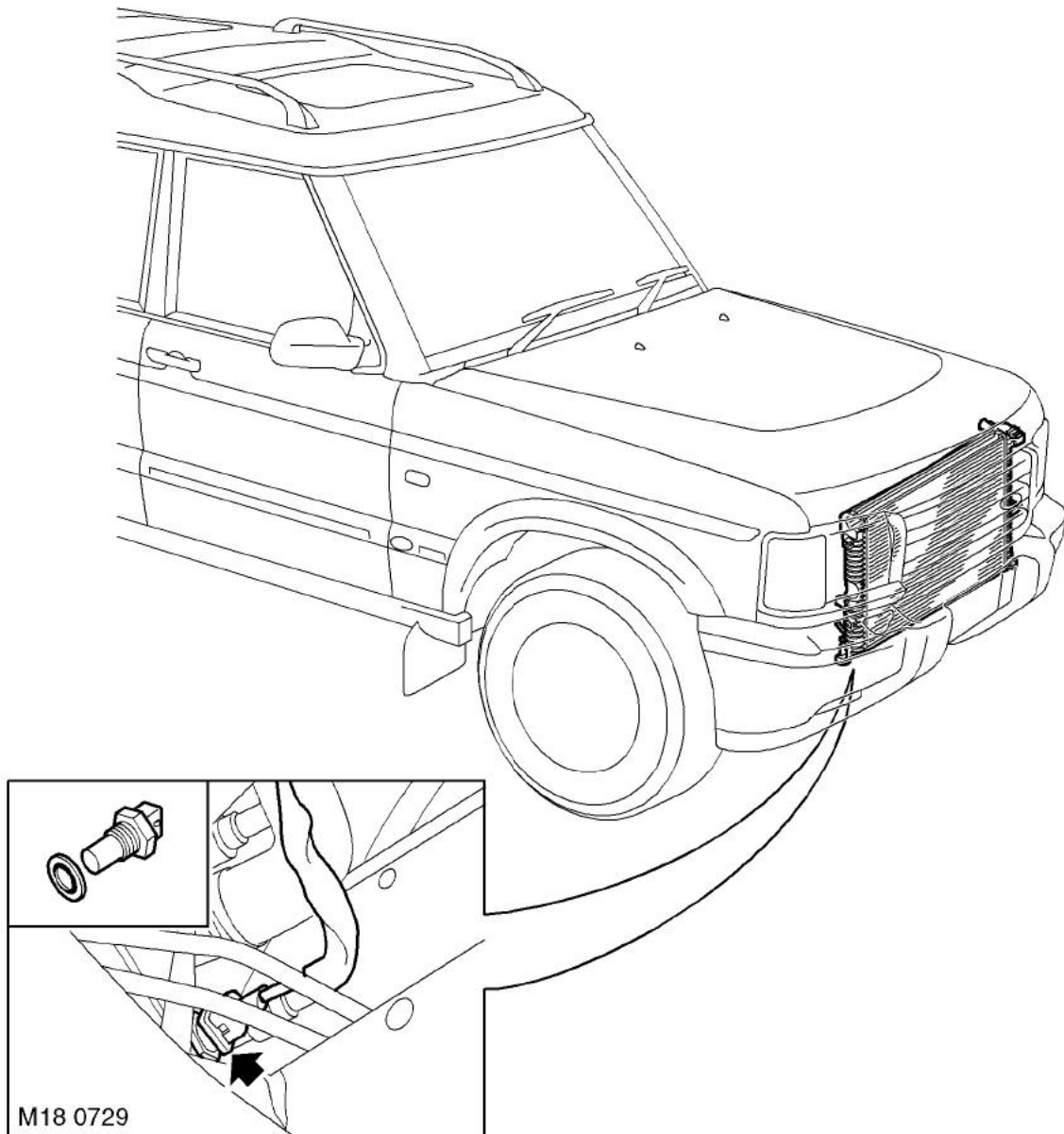
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There are three types of ECT sensor diagnostic checks:

- The ECT sensor signal is within limits, but is inaccurate – the engine has to be running and the signal indicates a coolant temperature below 40°C (104°F). The signal differs too much from the coolant temperature model for longer than 2.53 seconds.
- The ECT sensor signal is greater than the maximum threshold value – the ECM has to be powered up to perform the diagnostic, but the engine does not need to be running.
- The ECT sensor signal is less than the minimum threshold value – the ECM has to be powered up to perform the diagnostic, but the engine does not need to be running.

Should a malfunction of the component occur the following fault codes may be evident and can be retrieved by TestBook:

P code	J2012 description	Land Rover description
P0116	Engine coolant temperature circuit/range performance problem	Signal differs too much from temperature model for longer than 2.53s
P0117	Engine coolant temperature circuit low input	Open circuit or short circuit to battery supply
P0118	Engine coolant temperature circuit high input	Short circuit to earth

**Thermostat Monitoring sensor**

The thermostat monitoring sensor is located in the radiator, adjacent the bottom hose. The ECM compares the temperature measured by the thermostat monitoring sensor to the temperature measured by the ECT sensor. If the difference between the two readings is too great, the ECM determines the thermostat is stuck. In this case, the ECM registers a fault code in its memory.

The thermostat monitoring sensor works as a Negative Temperature Coefficient (NTC) sensor. As temperature rises, the resistance in the sensor decreases, as temperature decreases, the resistance in the sensor increases. With this information, the ECM is able to monitor the performance of the thermostat. The normal operating parameters of the thermostat monitoring sensor are as follows: