



3.5.8 Oxygen Sensor Heater Monitoring Description

1. Diagnostic Trouble Codes:

O2S Upstream Heater - Hardware driver Open Circuit (both heaters)	P1185
O2S Upstream Heater - Hardware driver Short Circuit	P1186
O2S Upstream Heater - Inferred Open Circuit Fault (one heater)	P1187
O2S Upstream Heater - Inferred Open Circuit Fault 2 (both heaters)	P1188
O2S Upstream Heater Circuit Inferred Low Resistance1 Fault	P1189
O2S Upstream Heater Circuit Low Resistance Fault	P1190
O2S Downstream Heater - Hardware driver Open circuit (both heaters)	P1191
O2S Downstream Heater - Hardware driver Short Circuit	P1192
O2S Downstream Heater - Inferred Open Circuit Fault (one heater)	P1193
O2S Downstream Heater - Inferred Open Circuit Fault 2 (both heaters)	P1194
O2S Downstream Heater Circuit Inferred Low Resistance1 Fault	P1195
O2S Downstream Heater Circuit Low Resistance Fault	P1196

2. Monitoring Procedure

Problems with the oxygen sensor heaters will be diagnosed using a number of tests. The heaters are connected to the ECM in pairs, (one pair upstream of the catalyst, and one pair downstream of the catalyst). Some tests use the ECM hardware to detect faults; other tests use the closed loop tip temperature control system to indicate faults. If the closed loop system is unable to control tip temperature satisfactorily then a number of faults can be detected depending on the type of error. If these tests are not passed then a fault count will be incremented, otherwise it will be decremented. If the count reaches a given threshold then a fault is present.

One Heater Open Circuit

If the value of AVERAGE OUTPUT is lower than HEATER DIAG MIN AVERAGE OUTPUT then it is assumed that one heater in the pair is open circuit and the counter HEATER DIAG OPEN CIRCUIT FAULT2 will be incremented, if not the counter will be decremented. Counting will only take place with engine speed less than HEATER DIAG LOW SPEED THRESHOLD and engine load less than HEATER DIAG LOW LOAD THRESHOLD and the engine has stabilised.
If the fault counter reaches the value HEATER DIAG AVE OP FAULT LIMIT then a fault is present, the fault will remain present until the counter has decremented to zero. The counter will be limited to a maximum value of HEATER DIAG AVE OP FAULT LIMIT.

Both Heaters Open Circuit

Both heaters open circuit can be detected in two ways:

- Firstly, the hardware can detect a complete open circuit directly.
- Secondly, if HEATER CURRENT is less than a threshold HEATER DIAG CURRENT MIN and BATTERY VOLTAGE is greater than a threshold HEATER DIAG MIN BATTERY VOLTAGE then the counter HEATER DIAG HIGH RESISTANCE FAULT is incremented, if not the counter is decremented.

If the fault counter reaches the value HEATER DIAG FAULT LIMIT then a fault is present, the fault will remain present until the counter has decremented to zero. The counter will be limited to a maximum value of HEATER DIAG FAULT LIMIT.