

2002 MY A/F Sensor Monitor (P1130, P1150)

To return to monitor description, see page [As-12](#).

MONITOR STRATEGY

Required sensors/Components	Main	A/F sensor
	Sub	Rear oxygen sensor, Throttle position sensor, ECT sensor
Frequency of operation	Continuous	• A/F sensor voltage stuck LEAN/RICH • A/F sensor slow response
	Once per driving cycle	A/F sensor circuit is open/short
Duration	Within 30 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See page In-39	
Case 1: A/F sensor voltage stuck LEAN/RICH		
Time after engine start	30 sec.	–
A/F sensor status	Activated	
Fuel system status	Closed Loop	
Sub-feedback status	Executing	
Case 2: Open circuit between AF+ and AF–		
Time after the following conditions are met	20 sec.	–
Battery voltage	10.5 V	–
Time after after engine start	120 sec.	–
ECT	20° C (68° F)	–
Fuel system status	Closed Loop	
Fuel cut	Not operating	
Time after fuel cut OFF	5 sec.	
A/F sensor heater	Operating	
Time after A/F sensor heater ON	20 sec.	
Case 3: A/F sensor slow response		
Time after throttle valve closed	–	10 sec.
Time after after engine start	30 sec.	–
Fuel system status	Closed Loop	
Case 4: Short circuit between AF+ and GND		
Case 5: Short circuit between AF+ and +B (or VCC)		
Case 6: Short circuit between AF+ and AF–		
Time after ignition switch ON	5 sec.	
Battery voltage	10.5 V	–

TYPICAL MALFUNCTION THRESHOLDS

Engine Family	Detection Criteria	Threshold (Duration)
Case 1: A/F sensor stuck LEAN/RICH		
–	A/F sensor voltage when rear oxygen sensor voltage is less than 0.85 V	Less than 2.8 V (for 10 sec.)
–	A/F sensor voltage when rear oxygen sensor voltage is 0.15 V or more	More than 3.8 V (for 10 sec.)
Case 2: Open circuit between AF+ and AF–		
1AZ–FE and 2AZ–FE (Camry, Solara)	A/F sensor conductance (1/Ohm)	Less than 0.004 (for 5 sec.)
		0.159 or more (for 5 sec.)
2AZ–FE (Highlander), 1MZ–FE (Camry, ES300) and 5VZ–FE	A/F sensor conductance (1/Ohm)	Less than 0.002 (for 5 sec.)
		0.079 or more (for 5 sec.)
2RZ–FE, 3RZ–FE and 5VZ–FE	A/F sensor conductance (1/Ohm)	Less than 0.008 (for 5 sec.)
		0.159 or more (for 5 sec.)
Case 3: A/F sensor slow response		
1MZ–FE (Except Camry and ES300), 2RZ–FE, 3RZ–FE and 5VZ–FE	• Sum of A/F sensor voltage change • Sum of fuel trim change	Less than 0.02 V (for 30 sec.) 2 % or more (for 30 sec.)
Case 4: Short circuit between AF+ and GND		
1AZ–FE	AF+ terminal voltage	Less than 2.6 V (for 5 sec.)
2AZ–FE, 1MZ–FE (Camry, ES300) and 5VZ–FE	AF+ terminal voltage	Less than 0.5 V (for 5 sec.)
Case 5: Short circuit between AF+ and +B (or VCC)		
1AZ–FE, 2AZ–FE, 1MZ–FE (Camry, ES300) and 5VZ–FE	AF+ terminal voltage	4.5 V or more (for 5 sec.)
Case 6: Short circuit between AF+ and AF–		
1AZ–FE, 2AZ–FE, 1MZ–FE (Camry, ES300) and 5VZ–FE	Difference between AF+ and AF–	0.1 V or less (for 5 sec.)
		More than 0.8 V (for 5 sec.)

OBD MONITOR DRIVE PATTERNS

See page [In-13](#)

MODE 06 DATA (MONITOR RESULT)

- (a) Checking monitor status (See page [In-43](#))
- (b) Detecting Mode 06 data (See page [In-44](#))