

3.23 Ignition Coils

3.23.1 Description

1. Diagnostic Trouble Codes:

Ignition Coil 1 - early ignition coil activation fault	P1371
Ignition Coil 2 - early ignition coil activation fault	P1372
Ignition Coil 3 - early ignition coil activation fault	P1373
Ignition Coil 4 - early ignition coil activation fault	P1374
Ignition Coil 1 - no ignition coil activation fault	P1361
Ignition Coil 2 - no ignition coil activation fault	P1362
Ignition Coil 3 - no ignition coil activation fault	P1363
Ignition Coil 4 - no ignition coil activation fault	P1364

2. Monitoring Procedure

Summary

Problems with the ignition coils will be detected using two tests.

The tests work by monitoring the coil current status signal when the ignition coils are turned on during normal engine running. The status signal indicates that a threshold coil current has been reached, fully charging the coil. The coils are monitored to detect lack of full charge activation or early activation of the coils, a coil fault event occurring in either case.

If these tests are not passed then appropriate fault counter will be incremented, otherwise it will be decremented. If the count reaches a given threshold then a fault is present.

No Activation Test.

If the coil current status signal has not been asserted between the start and end of the coil activation period then there is a coil fault event, as long as the engine and battery conditions would normally guarantee that the signal would be asserted. Thus a coil fault event occurs if the COIL_CHARGE_EXPECTED flag is set, yet this logic signal was not asserted between the coil turn-on point and the coil turn-off point.

If a coil fault event has occurred, the relevant ignition fault event counter is incremented up to a predetermined limit. If this limit is reached then a no ignition coil activation fault is present. If the ignition coil fault event does not occur after a test then the relevant fault event counter is decremented, down to a limit of zero. When a fault event counter reaches zero then there is no fault present.

Early Activation Test

When the coil is requested to be activated, if the above coil charge signal is asserted earlier than would normally be expected, then there is a coil fault event. Thus a coil fault event occurs if a measured dwell time is less than the minimum expected dwell time. If the relevant fault counter reaches a predetermined limit then an early ignition coil activation fault is present.

If the ignition coil fault event does not occur after a test then the relevant ignition fault event counter is decremented, down to a limit of zero. When the fault event counter reaches zero no fault is present.



3. Primary Detection Parameter

Primary coil current status provided by the ignition coil drive ASIC, which compares coil current with a fixed (fully charged coil) threshold.

4. Fault Criteria Limits

No Activation Test

The presence or not of coil charge status signal within coil turn-on and turn-off point

Early Activation Test

Minimum expected time to fully charge the coil of 2ms

5. Monitoring Conditions

Lack of Activation Test

There must be a minimum battery voltage of 10 Volts for either test.

There is a maximum engine speed during which the tests will operate, i.e. 3500 rpm, to allow sufficient coil charge discharge time.

6. Monitoring Time Length / Frequency of Checks

The tests will be run every engine revolution, (double ended coils).

7. Criteria for Storing a Diagnostic Trouble Code

Two successive trips where the diagnostic routine indicates a failed coil/charging circuit.

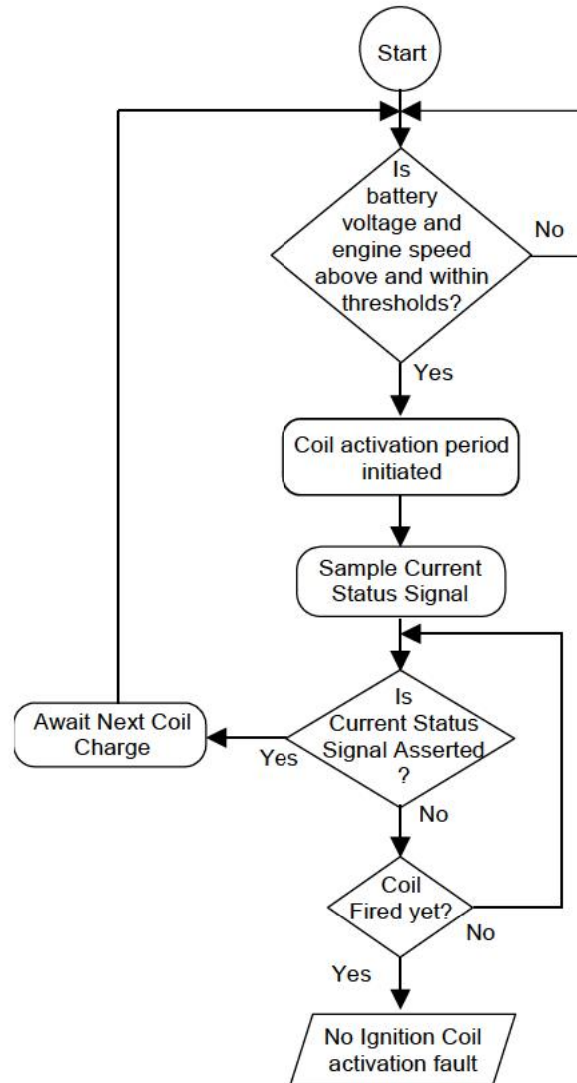
8. Criteria for Illuminating MIL

Two successive trips where the diagnostic routine indicates a failed coil/charging circuit.

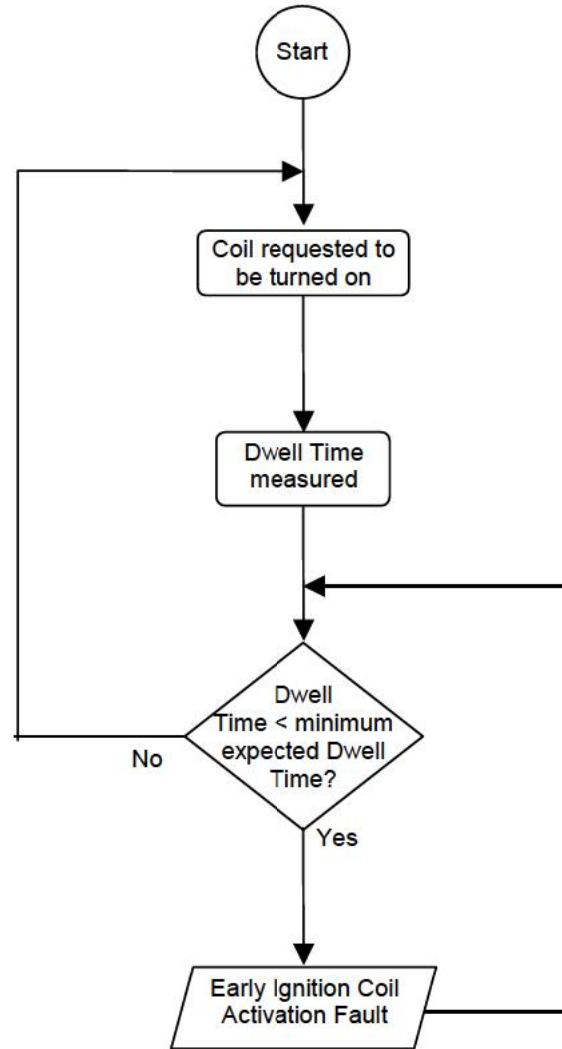
9. Criteria for Determining Out of Range Input Signals

The coil current status signal is input as a digital high/low signal.

3.23.2 Monitoring Structure – No Activation Test



3.23.3 Monitoring Structure – Early Activation Test





Ignition Coils								
Component/ System	Fault Codes	Monitoring Strategy Description	Malfunction Criteria	Threshold value	Secondary Parameter	Enable Conditions	Time Required	MIL Illumination
IGNITION COIL	P1361- P1364 P1371- P1374	Coil tenderisation verification	Coil fault counter – Maximum primary circuit Current	≥254 6.2 amps	Battery voltage Engine speed Ignition status	≥ 10 v ≤ 3500 RPM Coil activation interval	254 revolutions	2 successive trips
		Early activation check	Dwell time	< 2msec			254 revolutions	

If the above table does not include details of the following enabling conditions: - intake air and engine coolant temperature, vehicle speed range, and time after engine start-up then the state of these parameters has no influence upon the execution of the monitor.