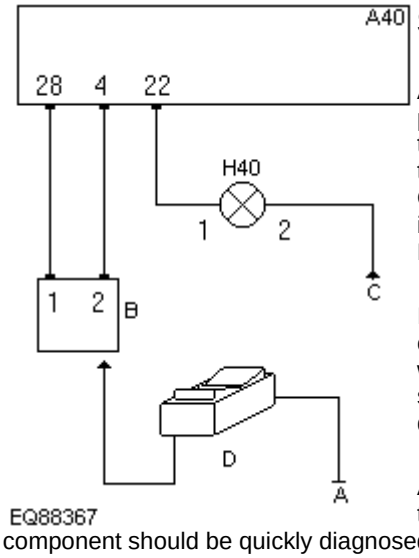

Self-Diagnosis

Print

A sensor or actuator measurement that falls outside of the system parameters will be captured by the ECM, and flagged as a fault in the form of a Fault Code. A hand-held Scantool is required to read these codes and must be attached to the ECM serial connection. Once a Fault Code has been flagged by the ECM, it must be initialised by the Scantool - otherwise the fault will remain on file. However, disconnection of the battery will also erase the codes.

In addition, if a major fault occurs, the MIL on the dash will be turned on. Only major faults will turn the MIL on. Faults of a minor nature will not turn on the MIL although the ECM will log the occurrence of such faults. A Scantool can be used to interrogate the ECM to determine if such faults have indeed occurred.

As a general rule, the Scantool will indicate a faulty circuit - but not the faulty component. By following relevant test routines, the faulty component should be quickly diagnosed. A Scantool could be attached to the SD serial connector and used for the following purposes:

1. obtain Fault Codes
2. clear Fault Codes
3. datastream
4. Make adjustments
   - Ignition timing advance
   - CO value (non-cat models only)
5. Actuate the following actuators:
   - fuel pump relay
   - fuel injectors
   - ISCV
   - CFSV (where fitted)
   - A/C compressor (where fitted)

Clear Fault Codes

1. Although the Scantool should normally be used to clear the Fault Codes from memory, it is possible to clear the codes by disconnecting the battery for approximately 15 minutes.

Clearing Fault Codes from the memory of the ECM

1. Repair all circuits indicated by the Fault Codes.
2. Switch on the ignition.
3. Perform the test as detailed above to reveal code 11 with no Fault Codes (optional).
4. Close the accessory switch for more than ten seconds.
5. The MIL will remain extinguished.

Datastream

This system captures live data in real time from the various engine sensors and actuators and allows this data to be displayed upon the Scantool. Irrespective of whether a Fault Code is generated or not, this is a very useful method of checking that the relevant circuits are operating within their parameters.

Ignition timing adjustments

1. The ignition timing should normally be considered as non-adjustable. However, if adverse operating conditions dictate that a change is necessary, the timing advance curve can be retarded with the aid of the Scantool. Timing retard must be performed as a last resort and all other reasons for poor engine performance must first be investigated.
2. Conditions where timing retard may be necessary:-
   - Engine knock under part or full load conditions.
   - Use of poor quality unleaded fuel.
   - Use of RON 91 unleaded fuel. In this instance, reduce the advance by 3 steps (6°).
3. Timing advance adjustment will affect the ignition timing at 3/4 load, during vehicle cruising and under acceleration conditions.

CO adjustment (non-cat only)

The CO value should normally be considered as non-adjustable. However, if operating conditions dictate that a change is necessary, the CO value can be altered with the aid of the Scantool. CO adjustment must be performed as a last resort and all other reasons for an incorrect fuel mixture must first be investigated.

Obtaining codes without a Scantool (2 pin SD plugs only)

1. Outline of method: The Fault Codes logged by the ECM are output as 'slow codes' and are generally able to be captured by LED flashing tools or a dash mounted MIL. The various two digit Fault Codes output are indicated by the flashing of the diagnostic MIL on the instrument cluster. The first series of flashes indicates the number of tens, the second series of flashes indicates the single units.
2. Attach an on/ off accessory switch between the Scantool green multi-plug terminal 2 (see Diagram) and ground.
3. Switch on the ignition.
4. Close the switch for three seconds (the dash MIL will remain off).
5. Open the switch, the MIL will :-
   - flash once (indicating 10).
   - pause for 1.5 seconds.
   - flash twice (indicating 2).
6. This indicates the code of twelve (12) which is the test start code.
7. The MIL will extinguish.
8. Close the switch for three seconds (the dash MIL will remain off).
9. Open the switch, the MIL will flash to indicate a code.
10. Example :-
    - lamp flashes 2 times (indicating 2 tens).
    - pause for 1.5 seconds.
    - lamp flashes 1 times (indicating 1 units).
    - This indicates a Fault Code of 21.
11. Once the lamp has extinguished, wait for three seconds before continuing.
12. Close the switch for three seconds & repeat the test to obtain further codes. When code 11 is obtained this indicates End of Test.
13. After code 11 is obtained the complete test may be repeated.
14. If code 11 is the first code obtained after code 12, no faults are logged by the ECM.

Actuating components through the Scantool

1. This is a very useful method of checking the relevant circuits for operation and continuity.
2. A code (see Fault Codes) indicates the actuator that has been selected.
3. Select the actuator, press the actuator key on the Scantool keypad and then listen for the sound of the component operating.
4. If the component does not actuate, check the circuits and components as described in the relevant topics for the particular component.

Checking operation of the fuel injectors and ISCV without a Scantool

1. Close the accessory switch
2. Switch the ignition on.
3. Wait 3 seconds.
4. After a moment the fuel injectors will function. This can be determined by vibration and the sound of the injectors clicking.

   Warning: Avoid the injection of excess fuel into the cylinders by completing the test quickly.

   - f the injectors fail to operate, refer to the fuel injector tests.
5. If the the vehicle is equipped with an ISCV (not all models) continue with the next test.
6. Close the accessory switch for three seconds once more.
7. After a moment the ISCV will function and vibrate to the touch.
   - If the ISCV fails to operate, refer to the ISCV tests.

Adaptive Function

The ECM is adaptive to changing engine operating characteristics and constantly monitors the data from the various sensors (i.e. AFS or MAP sensor, ATS, CTS, TPS & OS, etc.). As the engine or its components wear, the ECM reacts to new circumstances by adopting the changed values as a correction to the basic system map.

When one or more system components have been renewed, the ECM should be re-calibrated so that the ECM can readily relearn the new values. This is accomplished by starting the engine and running it to normal operating temperature (fan operates once). then driving the vehicle for a period of approximately 15 minutes. During that time, the engine should be run at various speeds including several periods of 2500 to 3500 rpm, full load and idle.

Rogue Adaptive Function

The danger with an adaptive function is that sometimes an erroneous signal may be adopted as a valid measurement and this may create an operating problem. If the erroneous signal is not serious enough to generate a Fault Code the fault may remain undetected.

Where this problem is suspected, the sensors should be checked for correct operation within their own operating parameters. Any faults should be corrected and the ECM should then be recalibrated as described above.

In some instances the ECM can become confused and the adaptive values could become corrupted. This may cause operational problems and a system check will reveal 'no fault found'. Recalibrating the ECM as described above may effect a cure since the re-calibration will reset the ECM default base values.