P0171 - Fuel System

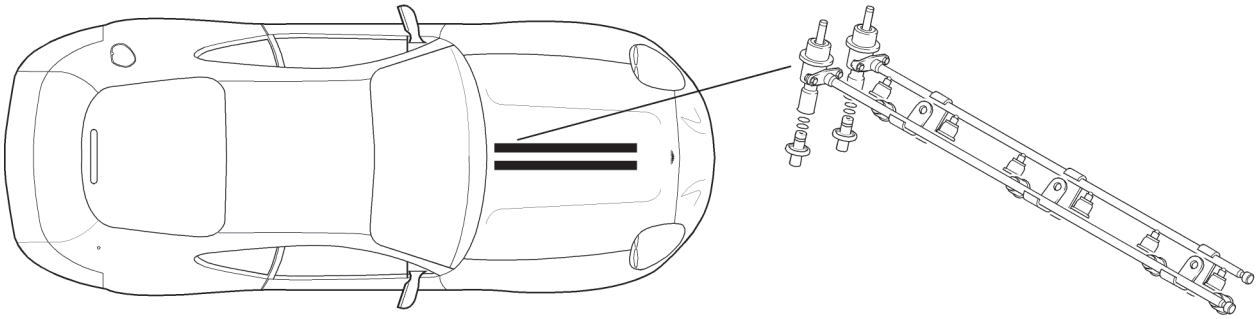

Figure 1. Fuel System Components

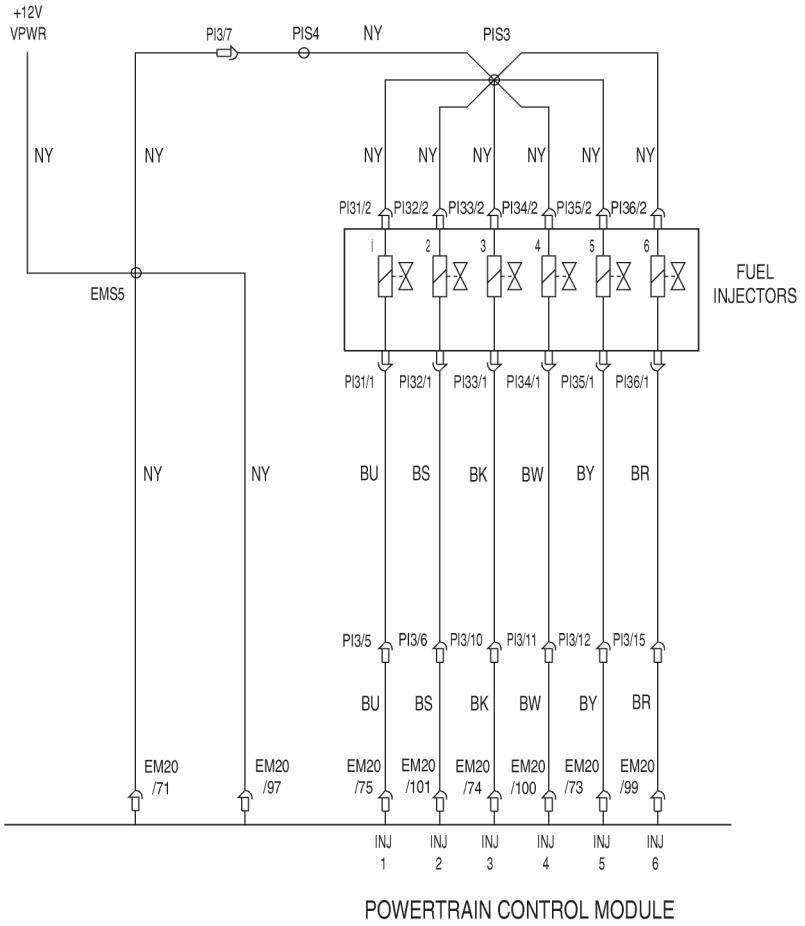

Figure 2. Fuel Injector Circuits

Fault Code Definition

P0171 - HO2S1 Fuel/air ratio too lean

Adaptive fuel correction at the limit.

CAUTION: This code may be generated in the Primary or Secondary Powertrain Control Module (PCM). Check that you are working on the correct half of the engine.

P0171 Fault Analysis

1. Verify that the vehicle did not run out of fuel before the Check Engine light came on.

   If a 'No Fuel' condition has been present, connect the PDU or scan tool and clear the P0171 code. Perform the KOER test sequence to check that the fuel adaption is now functioning correctly.

   If the vehicle has not recently run out of fuel, analyse the problem using the following procedure.

2. Carry out a thorough visual inspection of the vehicle, concentrating on the following possible causes of the lean mixture:

   Fuel System
   - Leaking fuel injectors
   - Leaking fuel pressure regulator
   - Low fuel pressure
   - Blocked fuel injectors

   Damaged/disconnected HO2S circuits
   Induction System
   - Air leaks after the air flow meter
   - Vacuum leaks
   - Restricted air inlet

   Positive Crankcase Ventilation system
   Base Engine
   Oil overfill
   Cam timing
   Compression pressure
   Ignition System
   - Ignition coil windings
   - Ignition coil connection
   - Spark plugs

   Repair any problems identified in the visual inspection, clear the P0171 fault code and repeat the KOER Test. If the P0171 code is detected again, proceed as follows.

3. If any adaptive fuel codes are detected in step 2, go to step 4. For other codes, go to the appropriate procedure in this section of the fault analysis manual.

4. Check the fuel pressure (Workshop Manual 2.7.02) as follows:

   Switch off the ignition. Install the fuel pressure gauge using an adaptor at the schrader valve on the front of the fuel rail. Verify the pressure source to the fuel pressure regulator.

   Start the engine and run at idle speed. Record the fuel pressure.

   Increase the engine speed to 2500 rpm and maintain for 1 minute. Record the fuel pressure.

   The fuel system must be capable of maintaining 55 psi above manifold pressure.

   If the fuel pressure is low, repair or service the fuel system to meet fuel pressure specification.

5. Check the fuel system ability to hold fuel pressure.

   Cycle the ignition key on and off several times. Verify that there are no external fuel leaks (repair as necessary)

   Verify that with the ignition key off, the fuel pressure remains within 5 psi of the highest reading after 1 minute. If excessive pressure loss is detected, service or repair the fuel system to correct the problem.

6. Again cycle the ignition key on and then off several times. Turn the key on, engine off and monitor the fuel pressure.

   The fuel pressure must remain within 5 psi of the highest reading after 10 seconds.

   If excessive pressure loss is detected, there is a problem in the fuel injectors or their electrical circuits.

7. Key off. Disconnect the fuel injector connectors. Check the resistance of the fuel injectors.

   Each resistance should be in the range 11 - 18Ω

   Low resistance - check the affected circuits for shorts to power or ground.

   High resistance - check the affected circuits for high resistance connections or complete open circuits.

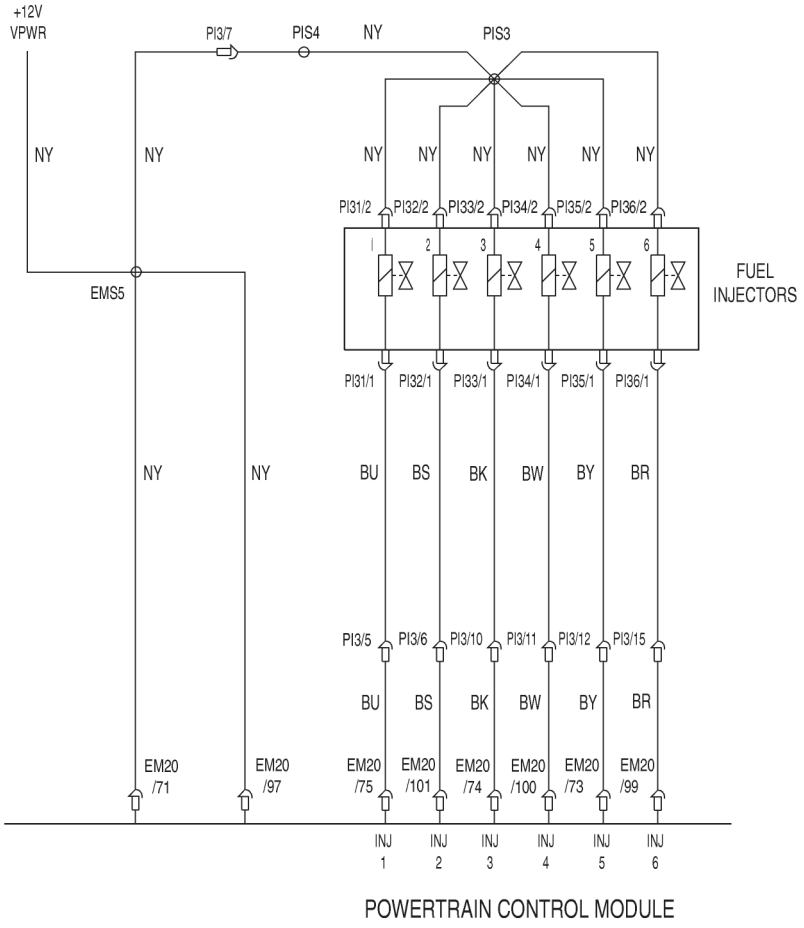

Figure 3. Fuel Injector Circuits

8. Check for codes P0201 - P0206 and analyse these codes if present. Return to step 9 of this procedure if P0171 is logged again after clearing the P0201 - P0206 codes.

9. Flow test the injectors:

   Use a Rotunda Injector Tester or equivalent to flow test the injectors according to the manufacturers instructions.

   If any injector flow rate is not within specification, replace the defective injector. Refit the injectors and rerun the KOER Test.

   If the injector flow rates are all within specification, the problem is not fuel related.

10. Check the cylinder compression pressures using the service manual procedure 1.0.02.

    If any compression pressure is low, repair the engine as necessary.

    If the compression pressures are in specification, carry out further analysis as for DTC P1131 to check the heated oxygen sensors and circuits.