

Electronic Fuel Injection Systems

Course Aims

To provide the delegate with the ability to service and repair electronic automatic fuel injection systems from circuit diagrams, as per instructions and in accordance with procedures, in a safe and aware manner.

Duration

10 Evening Sessions
(2 to 3 hours per session) or
3 consecutive days

Course Contents / Criteria

- **Discuss and explain the operation of a fuel injection system**
Engine management systems — includes electronic concentrated control system (ECCS), electronic engine control system (EEC).
- **Discuss and explain the function of petrol fuel injection management related input and output devices**
Input devices — includes air conditioning compressor switch, air mass sensor, engine speed sensor, engine temperature sensor, throttle valve angle sensor, air intake sensor, ignition switch, knock sensor and knock control unit, MAF sensor and MAP sensor.
Output devices — includes fuel injectors, air-conditioning circuit relay (idle, on/off), fuel pump, solenoid valve (fuel pressure, emission control), fuel pump resistor/relay, electronic spark timing, ignition coil and radiator fan.
- **Identify and select fuel injector system components**

- **Diagnose and test fuel injection systems and related components**
Using appropriate measuring equipment, diagnostic procedures and manufacturer specific manuals (test equipment includes digital code checker, multi meter, test lamps oscilloscope, pressure gauge, vacuum pump and fuel flow meter);
Basic faults include hard starting, rough idle, runs rough and poor acceleration;
Diagnosing includes the analysing and interpretation of diagnosing codes on the ECU and clearing.
- **Apply the relevant system safety and servicing precautions when repairing and making adjustments to the fuel injection systems**
Servicing precautions as specified in the manufacturer's servicing manual.
- **Discuss and report incidents and problems related to fuel injection systems and complete fault finding reports & requisition forms**

Pre-requisites

- An understanding of electricity, magnetism and electro-magnetism
- Ability to apply standard electrical formulae to practical situations
- Can set-up and use automotive multimeters and oscilloscopes

Qualification Outcome

The course outcome will provide evidence for Technical Certificate Level 3 Diploma and could be incorporated as a part of an NVQ programme, towards an APL process or a CPD.

Course Theory & Practical Work

Names and functions

Input sensors, output sensors, the electronic control unit & feedback loop control.

The Purpose of

Testing circuits and components.

Applying electronic safety.

Diagnosing fault conditions.

Exhaust gas re-circulation.

Attributes, descriptions, characteristics and properties

Fuel injection systems; electronic control units; electronic test equipment; fuel pressure regulator; fuel pumps; fuel injectors; air sensors; temperature sensors; speed and position sensors.

Sensory cues

Use of senses to detect faulty component in a circuit; use sight to read circuit diagrams and test equipment.

Causes and effects, implications

Causes of damage and injury; implications of using incorrect source voltages; implications of incorrect testing applications; implications of incorrect component selection; implications of not observing manufacturer's specification.

Procedures and techniques

Safety Procedures; fault finding procedures for components and fuel injection systems; diagnostic techniques for fault location (codes); repairing procedures; regulations, legislation, agreements, policies, standards; relevant manufacturer's standards; applicable safety, health and environmental legislation.

Theory: rules, principles & laws

Control system; air & fuel systems; electronic control unit; communication medium.

Relationships between systems

Relationships between the fuel injection and electronic ignition system; the fuel injection system and electronic control unit; the fuel injection system and related sub-systems.

