



Light Vehicle Engine Management and Fault Diagnosis Course: Petrol, Diesel, Scan Tools and CAN



Light Vehicle Engine Management and Fault Diagnosis Course: Petrol, Diesel, Scan Tools and CAN

Introduction:

Light vehicle engine management and fault diagnosis for petrol and diesel engines, with scan tools and CAN network checks, is a 5-day course for workshop technicians, diagnostic specialists and fleet garage staff, ending with a Workshop Diagnostic Procedure and Tooling Plan for a case fleet garage. Garages lose bay hours and money when misfires, poor fuel trims and network faults are chased by swapping parts instead of testing circuits. Nominees already service cars and vans, and teaching is by lab work on sensor signals, injector waveforms and live data. CoreConcept Training Center delivers this light vehicle engine management course.

Course Objectives:

- Explain how the engine control unit uses sensor inputs and closed-loop lambda feedback to command injectors, ignition coils and the electronic throttle
- Test crankshaft, camshaft, MAF, MAP, knock and oxygen sensor circuits with a multimeter and oscilloscope against expected signal patterns
- Diagnose petrol port and direct injection, ignition and common rail diesel faults from fuel trims, rail pressure data and injector waveforms
- Retrieve and interpret OBD-II trouble codes, freeze frame records, readiness monitors and monitor test results with a scan tool
- Locate CAN network faults by measuring termination resistance and CAN-H and CAN-L signals and by reading U-code patterns
- Produce a Workshop Diagnostic Procedure and Tooling Plan that sets fault-tracing steps, tool kits and repair verification for a fleet garage

Target Audience:

- Workshop technicians who service, repair and road test petrol and diesel cars and vans
 - Diagnostic specialists who handle electrical, drivability and warning-lamp complaints referred from the service bays
 - Fleet garage technicians who keep pool cars, pick-ups and delivery vans available for daily operations
 - Service bay leads who allocate diagnostic jobs and check repairs before vehicles are released
 - Technical trainers and quality checkers who set diagnostic methods and review comeback jobs
-

Course Outline:

Day 1: Engine Management Architecture, Sensors and Diagnostic Method

- Engine Control Unit Inputs, Processing and Output Driver Stages
- Closed-Loop Lambda Control and Short and Long Term Fuel Trims
- Crankshaft and Camshaft Position Sensor Signal Types and Synchronisation
- MAF, MAP, Throttle Position and Coolant Temperature Sensor Roles
- Structured Fault-Tracing Method From Customer Complaint to Verified Repair

Day 2: OBD-II Diagnostic Standards, Scan Tools and CAN Network Architecture

- OBD-II 16-Pin Data Link Connector Pinout and Supply Checks
- OBD-II Diagnostic Services for Live Data and Freeze Frame
- Trouble Code Letter Prefixes and Generic Versus Manufacturer Codes
- Readiness Monitors for Catalyst, Oxygen Sensor, EVAP and EGR Systems
- ISO 11898-2 High-Speed and ISO 11898-3 Fault-Tolerant CAN Layouts

Day 3: Petrol and Diesel Fuel Injection, Ignition and Sensor Testing

- Petrol Port Injection and Direct Injection High-Pressure Pump Checks
- Coil-on-Plug Ignition Primary and Secondary Waveform Capture
- Common Rail Pressure Sensor and Pressure Control Valve Tests
- Solenoid and Piezo Diesel Injector Current Waveforms and Leak-Off Tests
- Digital Multimeter Voltage Drop Tests on Sensor Supply Circuits

Day 4: Emissions Control, Network Faults and Intermittent Problem Cases

- Catalytic Converter Efficiency Using Upstream and Downstream Oxygen Sensors
- EGR Valve, EVAP Purge and Diesel Particulate Filter Fault Patterns
- Misfire Counters and Relative Compression Tests for Cylinder Isolation
- CAN-H and CAN-L Oscilloscope Patterns With Termination Resistor Checks
- Intermittent Fault Capture Using Scan Tool Recording and Wiggle Tests

Day 5: Diagnostic Lab Practice and the Workshop Diagnostic Procedure and Tooling Plan

- Lab Case on a Petrol Engine Lean Fuel Trim Complaint
 - Lab Case on a Diesel Engine Low Rail Pressure Fault
 - Lab Case on a Vehicle With Lost Communication U-Codes
 - Diagnostic Tool Kit Specification for Scan Tools and Oscilloscopes
 - Workshop Diagnostic Procedure and Tooling Plan Completion and Review
-

Skills You Will Gain:

- Sensor Signal Analysis
- Fuel Trim Interpretation
- Oscilloscope Waveform Diagnosis
- Ignition System Testing
- Common Rail Fault Finding
- OBD-II Code Interpretation
- CAN Network Troubleshooting
- Repair Verification Practice

Why Attend This Course:

- Deliver a Workshop Diagnostic Procedure and Tooling Plan to the garage manager and the fleet maintenance lead
- Decide whether a fault lies in a sensor, its wiring, the actuator or the control unit before any part is ordered
- Avoid unnecessary part replacement, repeat repairs and vehicles held in the bay waiting for a diagnosis
- Coach other technicians in the bay on waveform capture, fuel trim reading and CAN resistance checks

Conclusion:

Back at work, the participant hands the Workshop Diagnostic Procedure and Tooling Plan to the garage manager and the fleet maintenance lead, who use it to standardise how warning-lamp, misfire, low power and no-communication complaints are traced, which scan tools and oscilloscopes to buy and how each repair is proven before release. Service bay leads use its test sequences to allocate jobs. After the first month of use, the garage should review comeback jobs, parts returned unused and diagnostic hours per vehicle against the plan and refine the fault-tracing steps.

Frequently Asked Questions FAQ:

What should participants know before a light vehicle engine management and fault diagnosis course?

Participants should already service cars or vans, read wiring diagrams and use a digital multimeter. No prior oscilloscope work is needed. Bringing anonymised fault records or scan tool reports from their own garage helps them apply the lab cases and the final plan.

How does light vehicle engine management and fault diagnosis differ from a heavy equipment or electric vehicle course?

It stays with petrol and diesel engine control on cars and light commercial vehicles: sensors, injection, ignition, emissions control, OBD-II and CAN. Heavy equipment courses cover mobile plant hydraulics and undercarriage, and electric vehicle courses cover high-voltage isolation and traction batteries.

Why does light vehicle engine management fault diagnosis rely on fuel trims and waveforms rather than trouble codes alone?

A trouble code shows which monitor failed, not which part caused it. Fuel trims reveal whether the control unit is compensating for air leaks or fuel delivery, and waveforms prove whether a sensor, its wiring or an actuator is at fault before a part is replaced.

What do participants take back from the light vehicle engine management and fault diagnosis course?

Participants take back a Workshop Diagnostic Procedure and Tooling Plan with fault-tracing sequences for common complaints, sensor and actuator test values, CAN network checks, a diagnostic tool kit list and repair verification steps that a fleet garage can adopt.
