



Australian Government

AURETR123 Diagnose and repair spark ignition engine management systems

Release: 1

AURETR123 Diagnose and repair spark ignition engine management systems

Modification History

Release	Comments
Release 1	This version first released with AUR Automotive Retail, Service and Repair Training Package Version 6.0

Application

This unit describes the skills and knowledge required to diagnose and repair faults in the spark ignition engine management systems of vehicles, vessels or machinery. The unit involves preparing for the task, selecting the correct diagnostic procedure, carrying out the diagnosis and the repair, performing post-repair testing, and completing workplace processes and documentation.

The unit applies to those who work in an automotive service and repair industry. The spark ignition engine management systems include those in agricultural machinery, heavy commercial vehicles, light vehicles, marine vessels, mobile plant machinery, motorcycles or outdoor power equipment.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Unit Sector

Electrical Technical – Electrical and Electronics

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Prepare to diagnose and repair spark ignition engine management system	1.1 Access workplace instructions to identify job requirements and confirm existence of fault according to workplace procedures 1.2 Source and interpret required information for diagnosis activity, including customer complaint, workplace and manufacturer procedures 1.3 Source testing strategy to efficiently identify cause of fault

ELEMENT	PERFORMANCE CRITERIA
	using workplace and manufacturer procedures 1.4 Identify hazards and environmental issues, assess potential risks and implement control measures in line with workplace policies 1.5 Identify diagnostic tools and equipment required for the job and examine them for serviceability
2. Diagnose engine management system	2.1 Carry out diagnostic tests according to manufacturer and workplace procedures, and workplace health and safety requirements 2.2 Analyse diagnostic test results to identify cause of fault, conducting further tests if required 2.3 Confirm and report cause of fault according to workplace procedures 2.4 Develop and report recommendations for necessary repairs or adjustments according to workplace procedures
3. Repair engine management system	3.1 Source and interpret required information for repair activity, including manufacturer specifications, workplace and manufacturer procedures 3.2 Identify repair tools, equipment and materials required for the job and examine for serviceability 3.3 Carry out repairs or component replacements and adjustments according to workplace and manufacturer procedures, manufacturer specifications, workplace health and safety and environmental requirements 3.4 Carry out post-repair testing according to workplace procedures, workplace health and safety and environmental requirements to confirm fault rectification and repair any issues identified
4. Complete work processes	4.1 Carry out final inspection to ensure work meets workplace expectations and vehicle is ready for use 4.2 Clear work area and dispose of or recycle materials according to workplace procedures 4.3 Complete documentation according to workplace procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

SKILL	DESCRIPTION
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SKILL	DESCRIPTION
Learning	• Locates required sources of information efficiently • Develops a sequenced plan for a specific task
Reading	• Organises and interprets technical information from workplace procedures, manufacturer procedures and manufacturer specifications • Interprets text, symbols and wiring diagrams in information relating to electrical system testing and repair equipment from manufacturer specifications and workplace instructions and procedures
Oral communication	• Clarifies instructions • Obtains information from customers and supervisors
Numeracy	• Matches electrical components and part identification numbers to workplace instructions, vehicle, machinery and component part lists, and manufacturer specifications • Interprets vehicle electrical measurements and readings • Measures voltage, current and resistance and uses mathematical operations • Calculates deviations from manufacturer specifications
Planning and organising	• Plans own work requirements • Prioritises actions to achieve required outcomes • Ensures tasks are completed within workplace timeframes
Technology	• Uses specialised diagnostic equipment.

Unit Mapping Information

Supersedes and is equivalent to AURETR023 Diagnose and repair spark ignition engine management systems.

Links

Companion Volume Implementation Guide is found on VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b4278d82-d487-4070-a8c4-78045ec695b1>

Assessment Requirements for AURETR123 Diagnose and repair spark ignition engine management systems

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Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- diagnose and repair a fault in the spark ignition engine management systems of three different vehicles or machinery, including:
 - faults in two system input sensors
 - faults in one system output actuator
- carry out a diagnostic test in the course of the above for at least one of the following faults:
 - low or high pressure in the fuel system
 - damaged sensors, connectors or wiring
 - leaking or restricted injectors.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- methods to locate and interpret information required to diagnose and repair spark ignition engine management systems, including:
 - information provided by customers and supervisors
 - manufacturer specifications and procedures or equivalent documentation
- workplace procedures required to diagnose and repair spark ignition engine management systems, including:
 - establishing serviceability of tools and equipment
 - documentation procedures
 - housekeeping procedures, including:
 - examination of tools and equipment
 - storage of equipment
 - identification, tagging and isolation of faulty equipment

- disposal of excess materials
 - recycling procedures
- workplace health and safety (WHS) relating to diagnosing and repairing spark ignition engine management systems, including procedures for:
 - using specialised tools and equipment, including multimeters, scan tools and oscilloscope
 - using appropriate personal protective equipment (PPE)
- identifying hazards and controlling risks associated with:
 - working on vehicle high voltage ignition systems
 - wearing jewellery while working around high current wiring systems
 - working with high pressure petrol fuel systems
- environmental requirements relating to diagnosing and repairing spark ignition engine management systems
- diagnostic testing procedures for spark ignition engine management systems, including:
 - diagnostic flow charts
 - fuel system testing, including:
 - low pressure fuel system testing
 - high pressure fuel system testing
 - testing electrical systems, including procedures for:
 - accessing electrical terminals and using test probes without damaging connectors, fuse holders or wiring
 - injector testing
 - sensor testing
 - actuator testing
 - accessing and interpreting industry-relevant test equipment data, including:
 - fault codes
 - live data
 - freeze frame data
 - waveforms
- repair procedures for spark ignition engine management systems, including procedures for:
 - removing and replacing the following electrical or electronic components:
 - sensors
 - actuators, including fuel injectors and fuel pumps
 - adjusting and recalibrating components and associated systems
- post-repair testing procedures, including procedures for:
 - clearing fault codes
 - assessing engine performance
 - checking for electrical connector mating
- operating principles of spark ignition engine management systems and associated components, including:

- combustion, including:
 - air-fuel ratios and chemistry of combustion
 - composition of petrol fuel, including octane rating
 - indirect and direct fuel injection
- purpose and operation of spark ignition engine management systems and components, including:
 - fuel system, including:
 - fuel filters
 - fuel pumps
 - fuel pressure regulators
 - fuel injectors
 - electronic control system, including the following system inputs:
 - throttle position sensors
 - coolant temperature sensors
 - oxygen sensors
 - load sensors and air flow meters
 - intake air temperature sensors
 - crankshaft position sensors
 - camshaft position sensors
 - battery voltage
 - accessory load sensors
 - knock sensors
 - key features of electronic control units (ECUs), including:
 - read-only memory (ROM)
 - programmable read-only memory (PROM)
 - electronically erasable programmable read-only memory (EEPROM)
 - random access memory (RAM)
 - multiplexing
 - adaptive learning
 - short-term fuel trim (STFT)
 - long-term fuel trim (LTFT)
 - sensor reference voltages and sensor grounds
 - system outputs, including:
 - injectors
 - idle speed control devices
 - fuel pump relays
 - engine cooling fans
 - air conditioning compressor controls
 - broadband intake manifolds
 - exhaust gas recirculation solenoid controls

- carbon canister purge controls
- throttle motor (drive by wire) controls
- variable valve timing controls
- assembly line diagnostic link (ALDL)
- ignition systems and components, including:
 - spark plugs
 - ignition leads
 - ignition coils, including electromagnetic induction
 - ignition timing, including varying ignition timing according to engine load, speed and knock sensor input
 - dwell period
- ECU control of ignition coil switching and methods of generating timing signals, including:
 - crankshaft position sensor signals, including inductive pick-up, Hall effect and light emitting diode (LED)
 - waste spark ignition systems
 - coil-on-plug ignition systems
 - integrated ignition systems.

Assessment Conditions

Competency is to be assessed in the workplace or a simulated environment that accurately reflects performance in a real workplace setting.

Assessment must include direct observation of tasks.

Where assessment of competency includes third-party evidence, individuals must provide evidence that links them to the spark ignition engine management systems that they have worked on, e.g. repair orders.

Assessors must verify performance evidence through questioning on skills and knowledge to ensure correct interpretation and application.

The following resources must be made available:

- automotive repair workplace or simulated workplace
- workplace instructions
- manufacturer specifications for spark ignition engine management systems
- three different vehicles or machinery with spark ignition engine management system faults
- diagnostic equipment for spark ignition engine management systems, including:
 - multimeter
 - scan tool
- tools, equipment and materials appropriate for repairing spark ignition engine management systems.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

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