



Australian Government

AURETE001 Analyse and evaluate electrical and electronic faults in engine management systems

Release: 1

AURETE001 Analyse and evaluate electrical and electronic faults in engine management systems

Modification History

Release	Comment
Release 1	New unit of competency.

Application

This unit describes the performance outcomes required to analyse and evaluate electrical and electronic faults in embedded network engine management systems of vehicles or machinery in order to initiate action to sustain, vary or enhance performance. It involves identifying, evaluating, selecting, justifying and documenting the most appropriate rectification method or variation to the rectification method. The unit includes the analysis of multi-system and intermittent faults which may be caused by operating in adverse conditions.

It applies to those working in the automotive service and repair industry on embedded network engine management systems of vehicles or machinery.

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

Competency Field

Electrical

Unit Sector

Technical - Engines

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
1. Identify and confirm the work requirement	1.1 Objective of the analysis and evaluation is determined from workplace instructions

Elements Elements describe the essential outcomes.	Performance Criteria Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
	1.2 Specifications for engine management system are sourced and interpreted 1.3 System faults, deficiencies or discrepancies are identified and confirmed 1.4 Hazards associated with the work are identified and risks are managed according to workplace procedures and safety requirements
2. Prepare for analysis and evaluation	2.1 Evaluation criteria are developed or adopted to meet the objective of the analysis and evaluation 2.2 Analytical and evaluative methodology is developed or identified from technical information 2.3 Testing equipment is prepared according to manufacturer specifications and workplace procedures 2.4 Tools and materials required to support the diagnostic procedure are identified, selected and prepared for use 2.5 Engine management system and components are prepared for the diagnostic process
3. Carry out failure analysis	3.1 Selected analytical and evaluative methodology is followed according to manufacturer specifications and workplace procedures 3.2 Tests are carried out according to manufacturer specifications, workplace procedures, and safety and environmental requirements 3.3 Analytical and other diagnostic findings are verified, as required, by using reliable alternative or optional processes 3.4 Analytical findings and results are assessed against evaluation criteria 3.5 Valid conclusions are drawn from available evidence and documented according to workplace requirements
4. Make recommendations	4.1 Options for responding to the objective are determined from further research of technical support information 4.2 Rectification method is selected from an analysis of the options, operating conditions, regulatory requirements, Australian Design Rules, and financial implications 4.3 Report is prepared specifying analysis and evaluation process, and detailing and justifying rectification method or variation to the rectification method
5. Complete work	5.1 Final inspection is made to ensure work is to workplace

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
processes	expectations 5.2 Work area is cleaned, waste and non-recyclable materials are disposed of, and recyclable material is collected 5.3 Tools and equipment are checked and stored, and any faulty electrical equipment is identified, tagged and isolated according to workplace procedures 5.4 Workplace documentation is processed according to workplace procedures

Foundation Skills

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

Skills	Description
Learning skills to:	• apply learning and processes to different situations.
Reading skills to:	• research, organise and interpret technical information relating to engine management systems.
Writing skills to:	• legibly and accurately fill out workplace documentation when reporting failure analysis findings • document and complete reports.
Numeracy skills to:	• use mathematical ideas and techniques to complete measurements, calibrate testing equipment and present analytical results.
Planning and organising skills to:	• plan own work requirements and prioritise actions to achieve required outcomes and ensure tasks are completed within workplace timeframes.
Technology skills to:	• use specialised engine management system diagnostic equipment.

Range of Conditions

This section specifies work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included. Bold italicised wording, if used in the performance criteria, is detailed below.

<i>Safety requirements</i> must include:	• work health and safety (WHS) and occupational health and safety (OHS) requirements, including procedures for: • working on vehicle systems with ignition high voltages • identifying hazards and controlling risks associated with wearing jewellery while around high current wiring systems • working with high pressure fuel systems.
<i>Analytical and evaluative methodology</i> must include:	• diagnostic process, sequence, tests and testing equipment.

Unit Mapping Information

Equivalent to AURETE5001 Analyse and evaluate electrical and electronic faults in engine management systems

Links

Companion Volume implementation guides are found in VETNet - <https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b4278d82-d487-4070-a8c4-78045ec695b1>

Assessment Requirements for AURETE001 Analyse and evaluate electrical and electronic faults in engine management systems

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Performance Evidence

Before competency can be determined, individuals must demonstrate they can perform the following according to the standards defined in this unit's elements, performance criteria, range of conditions and foundation skills:

- analyse and evaluate an electrical or electronic fault in the engine management systems of two different vehicles or machinery
- the above faults must involve two of the following systems:
 - direct injection diesel engine management system
 - common rail diesel engine management system
 - distributor-less electronic ignition petrol engine management system.

Knowledge Evidence

Individuals must be able to demonstrate knowledge of:

- work health and safety (WHS) and occupational health and safety (OHS) requirements relating to analysing and evaluating faults in engine management systems, including procedures for:
 - working on vehicle systems with ignition high voltages
 - identifying hazards and controlling risks associated with wearing jewellery while working around high current wiring systems
 - working with high pressure fuel systems
- principles and processes involved in planning and implementing analysis and evaluation of electrical and electronic faults in engine management systems
- design and planning of diagnostic procedures for faults in engine management systems, including procedures for diagnosing:
 - electrical faults
 - electronic faults

- types, functions, operation and limitations of engine management systems, including:
 - spark ignition engine management systems
 - diesel fuel injection systems
 - gateway network control module
 - bus network topography
 - associated network engine management systems
 - sensor and actuator control and monitoring systems
 - control signal circuits
- testing procedures for engine management systems, including the use of:
 - digital multimeter
 - scan tool
 - oscilloscope
- types, functions, operation and limitations of diagnostic testing equipment required to analyse and evaluate electrical and electronic faults in engine management systems
- procedures for accessing and interpreting scan tool system data, including:
 - diagnostic trouble codes (DTCs), including:
 - conditions that set the DTCs
 - conditions for running DTCs
 - live data
 - freeze frame data
 - waveforms
- procedures for documenting and reporting the analysis and evaluation process
- requirements of Australian Design Rules (ADRs) relating to engine management systems.

Assessment Conditions

Assessors must satisfy NVR/AQTF assessor requirements.

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 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 engine management system specifications

- two different vehicles or machinery with faults in the engine management systems specified in the performance evidence
- diagnostic equipment for engine management systems, including:
 - digital multimeter
 - scan tool
 - oscilloscope
- tools, equipment and materials appropriate for analysing and evaluating engine management systems.

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