



Australian Government

AURETR032 Diagnose and repair automotive electrical systems

Release: 1

AURETR032 Diagnose and repair automotive electrical systems

Modification History

Release	Comment
Release 1	New unit of competency.

Application

This unit describes the performance outcomes required to diagnose and repair faults in the electrical systems of vehicles or machinery. These systems are single wire (non CAN-bus) networked circuits and include entry-exit locking systems, power windows, interior and exterior lighting, turning indicators, brake and hazard warning lights and electric drive motor circuits. It 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.

It applies to those working in the automotive service and repair industry. Automotive electrical systems include those in agricultural machinery, heavy commercial vehicle, light vehicle, mobile plant machinery, motorcycles or outdoor power equipment.

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

Competency Field

Electrical

Unit Sector

Technical - Electrical and Electronic

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. Prepare to diagnose and	1.1 Job requirements are 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.
repair electrical system	1.2 Diagnostic information is sourced and interpreted 1.3 Diagnostic options are analysed and those most appropriate to the circumstances are selected 1.4 Hazards associated with the work are identified and risks are managed 1.5 Diagnostic tools and equipment are selected and checked for serviceability
2. Diagnose electrical system	2.1 Diagnostic tests are carried out according to workplace procedures and safety requirements without causing damage to components or systems 2.2 Faults are identified from diagnostic test results and causes of faults are determined 2.3 Diagnosis findings and recommendations for necessary repairs or adjustments are reported according to workplace procedures
3. Repair electrical system	3.1 Repair information is sourced and interpreted 3.2 Repair options are analysed and those most appropriate to the circumstances are selected 3.3 Repair tools, equipment and materials are selected and checked 3.4 Repairs and component replacements and adjustments are carried out according to manufacturer specifications, workplace procedures and safety requirements, and without causing damage to components or systems 3.5 Post-repair testing is carried out according to workplace procedures to confirm fault rectification, and any further problems detected as having been introduced during the repair process are rectified
4. Compete work processes	4.1 Final inspection is made to ensure work is to workplace expectations and vehicle or machinery is presented ready for use 4.2 Work area is cleaned, waste and non-recyclable materials are disposed of, and recyclable material is collected 4.3 Tools and equipment are checked and stored and any faulty electrical equipment is identified, tagged and isolated according to workplace procedures 4.4 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:	identify and locate various sources of information efficiently.
Reading skills to:	interpret text, symbols and wiring diagrams in information relating to electrical system testing and repair equipment from manufacturer specifications and workplace instructions and procedures.
Writing skills to:	legibly and accurately fill out workplace documentation when reporting diagnostic findings, making repair recommendations, and recording parts and material used.
Oral communication skills to:	- clarify instructions - report diagnostic findings and make repair recommendations.
Numeracy skills to:	- match electrical components and part identification numbers to workplace instructions, vehicle and component part lists, and manufacturer specifications - interpret vehicle electrical measurements and readings - measure voltage, current and resistance and use basic mathematical operations, including addition and subtraction, to calculate deviations from manufacturer specifications.
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 equipment, including multimeters.

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: - using specialised tools and equipment - using appropriate personal protective equipment (PPE) - identifying hazards and controlling risks associated with: - working on high voltage ignition systems
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	• wearing jewellery while working around high current wiring systems.
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Unit Mapping Information

Equivalent to AURETR3032 Repair electrical 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 AURETR032 Diagnose and repair automotive electrical systems

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Performance Evidence

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

- diagnose and repair a fault in three of the following electrical system single wire (non CAN-bus) circuits:
 - entry-exit locking systems with electric motor control circuit
 - power windows circuit
 - interior or exterior lighting circuit
 - turning indicator circuit
 - brake light circuit
 - hazard warning light circuit
 - electrical drive motor circuit
- carry out four of the following electrical connector repairs to a vehicle or machinery wiring harness:
 - crimp two different terminal types and sizes
 - remove two faulty connectors from the back of different terminals
 - solder two different wire gauges to electrical terminals
 - apply heat shrink insulation to two different crimped or soldered joints
 - check terminal retention on two different female terminals and connectors.

Knowledge Evidence

Individuals must be able to demonstrate knowledge of:

- work health and safety (WHS) and occupational health and safety (OHS) requirements relating to diagnosing and repairing automotive electrical systems, including procedures for:

- using specialised tools and equipment
- using appropriate personal protective equipment (PPE)
- identifying hazards and controlling risks associated with:
 - working on high voltage ignition systems
 - wearing jewellery while working around high current wiring systems
- operating principles of automotive electrical systems and associated components, including:
 - current, voltage, resistance and power
 - series circuits
 - parallel circuits
 - series and parallel circuits
 - Ohm's law
 - Faraday's law
 - Kirchhoff's law
 - magnetism and direct current (DC) motor operation
 - electromagnetic interference and radiation
 - cable types and sizes and current carrying capacity
 - circuit protection devices
- application, purpose and operation of automotive electrical systems and components, including:
 - wiper motors
 - electric windows
 - electric door locks
 - fan motors
 - horns
 - lighting
 - radio aerials
- diagnostic testing procedures for automotive electrical systems, including:
 - visual, aural and functional assessments of electrical system components, including:
 - component damage and wear
 - component or connector corrosion
 - component water or moisture ingress
 - common faults in electrical circuits, including:
 - open circuits
 - high resistance circuits
 - short circuits
 - damaged insulation
 - frayed wires
 - burnt wiring
 - water and moisture ingress

- connector damage
- terminal damage
- using diagnostic flow charts
- testing electrical systems, including procedures for:
 - accessing electrical terminals and using test probes without damaging connectors, fuse holders or wiring
 - checking resistance, current flow and voltage drop of system circuits
- procedures for using:
 - digital multimeters
 - test lights and probes
 - oscilloscopes
- repair procedures for automotive electrical systems, including:
 - selecting and soldering wires
 - selecting and crimping terminals
 - removing and replacing connectors
 - removing and replacing electrical systems and their components
- post-repair testing procedures for automotive electrical systems, including:
 - checking for electrical connector mating
 - checking circuit current flow
 - static and dynamic performance tests of automotive electrical 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 electrical 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 automotive electrical system specifications
- three different vehicles or machinery with electrical system faults
- diagnostic equipment for electrical systems, including multimeter
- tools, equipment and materials appropriate for repairing automotive electrical systems, including:
 - automotive wiring

- heat shrink
- soldering iron.

Links

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