



Australian Government

MEM27006 Diagnose and rectify batteries, low voltage sensors and circuits

Release: 1

MEM27006 Diagnose and rectify batteries, low voltage sensors and circuits

Modification History

Release 1. Supersedes and is equivalent to MEM18030B Diagnose and rectify low voltage electrical systems

Application

This unit of competency defines the skills and knowledge required to use test instruments, test the battery, assess and rectify wiring faults.

It applies to testing and rectification activities associated with 12, 24 36 and 48 volt wiring systems on vehicles, mobile plant and stationary equipment.

Where soldering of wires/connections is required unit MEM05001 Perform manual soldering/desoldering - electrical/electronic components should also be selected.

Where an electrical wiring system is above 48 volts unit MEM18045 Fault find and repair electrical equipment/components up to 250 volts single phase supply or unit MEM18046 Fault find and repair electrical equipment/components up to 1000 volts a.c./1500 volts d.c. should also be selected as appropriate.

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

Band: A

Unit Weight: 8

Pre-requisite Unit

MEM09002	Interpret technical drawing
MEM11011	Undertake manual handling
MEM12023	Perform engineering measurements
MEM13015	Work safely and effectively in manufacturing and engineering
MEM16006	Organise and communicate information
MEM18001	Use hand tools
MEM18002	Use power tools/hand held operations
MEM18055	Dismantle, replace and assemble engineering components

Competency Field

Fixed and mobile plant

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

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|---|-----------------------------------|-----|---|
| 1 | Determine job requirements | 1.1 | Follow standard operating procedures (SOPs) |
| | | 1.2 | Comply with work health and safety (WHS) requirements at all times |
| | | 1.3 | Use appropriate personal protective equipment (PPE) in accordance with SOPs |
| | | 1.4 | Identify job requirements from specifications, drawings, job sheets or work instructions |
| | | | |
| 2 | Use test instruments | 2.1 | Apply principles of electron theory, current, voltage and resistance to diagnose and rectify low voltage electrical systems |
| | | 2.2 | Select, use and maintain appropriate test instruments to determine current, voltage and resistance |
| | | 2.3 | Interpret electrical drawings and manufacturer diagrams |
| | | 2.4 | Determine series, parallel and series parallel circuits |
| | | 2.5 | Interpret and apply basic electrical laws |
| | | 2.6 | Connect amps voltage and resistance (AVR) test instruments into circuits to measure current, voltage and resistance |
| | | 2.7 | Read meters to standard accuracy |
| | | 2.8 | Use and apply multipliers and shunts |
| | | | |
| 3 | Test battery | 3.1 | Interpret and apply chemical battery operating principles when testing batteries |
| | | 3.2 | Determine electrolyte level and record specific gravity readings temperature |

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

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|---|---|-----|---|
| | | 3.3 | Carry out dry charge preparation and recharging of batteries |
| | | 3.4 | Perform discharge testing according to prescribed procedures |
| | | 3.5 | Select replacement batteries for application |
| 4 | Assess and rectify wiring faults | 4.1 | Isolate wiring and sensor fault |
| | | 4.2 | Determine replacement sensors and cables/wires, including size and insulation quality |
| | | 4.3 | Make up wiring looms for application and securely fix |
| | | 4.4 | Strip, fit, prepare and terminate wiring and cables |
| | | 4.5 | Test terminated cables for continuity and to comply with requirements |
| | | 4.6 | Remove corrosion, neutralise and apply appropriate protective coating |
| | | 4.7 | Test sensors, relays, solenoids, contacts and circuits and repair/replace |

Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different 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.

Circuits include one (1) • door and other access locks

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or more or the following for:

- interior and exterior lighting
- seat adjustment
- power windows
- turning and other indicators
- low voltage electric motors
- hazard and brake lights
- sensors

Test instruments include the following:

- multimeters
- amp meters
- circuit testers

Wiring systems include the following:

- wiring
- switching mechanisms
- circuit protection devices

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM18030B Diagnose and rectify low voltage electrical systems

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM27006 Diagnose and rectify batteries, low voltage sensors and circuits

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- identifying and interpreting specifications, charts, lists, SOPs, electrical drawings and diagrams to diagnose and rectify batteries, low voltage sensors and circuits
- selecting and using the correct test instrument, including multimeters, amp meters and circuit testers, for a variety of electrical circuits to measure current, voltage and resistance of specified circuit components or sections of circuitry
- applying Ohm's Law to determine the required values of current, voltage and resistance of a range of electrical circuits, including series, parallel and series parallel
- connecting electrical test instruments into given circuits to determine the required values of current, voltage and resistance in a safe and effective manner
- determining the specific gravity of the electrolyte for temperature variations using a hydrometer
- preparing dry batteries for charging and recharging and performing discharge testing of batteries
- fault finding using fault-finding techniques to identify wiring faults in electrical circuits
- selecting appropriate replacement cables according to size, rating and insulation resistance from supplier catalogues
- making up replacement wiring looms, stripping and preparing cable ends for termination and terminating to specifications
- testing terminations for continuity and compliance with requirements
- removing and/or neutralising corrosion from terminals and connections and applying appropriate protective coating
- testing and fault finding a range of circuits components, including sensors, relays, solenoids, contacts for repair/replacement.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures and use of personal protective equipment (PPE)

- principles of electron theory
- definitions of current, voltage and resistance in terms of electrical circuits
- Ohm's Law and the relationships between current, voltage and resistance for a variety of given electrical circuits
- instruments and procedures to be used to measure current, voltage and resistance and safety precautions to be taken
- procedures for maintaining electrical test equipment
- function of a variety of electrical circuits identified from given electrical drawings/diagrams
- symbols used in electrical drawings/diagrams
- components of a variety of electrical circuits identified by given electrical drawings/diagrams
- differences between series and parallel electrical circuits
- function of a general purpose oscilloscope and procedures for connecting a general purpose oscilloscope into given electrical circuits
- use of wave forms in the testing of electrical circuits
- accuracy to which a range of electrical test equipment can be read
- procedures for:
 - using multipliers and shunts in the measurement of electrical circuits
 - measuring the specific gravity of the electrolyte and the effect of temperature on the specific gravity of the electrolyte
 - preparing and recharging dry batteries
 - discharge testing of batteries and purpose
 - making up and fixing wiring looms can be given
 - stripping, fitting and preparing wiring terminations
 - soft and hard soldering/crimping of wiring terminations
 - corrosion removal and/or neutralisation
- operation of a chemical battery and the function of the electrolyte in batteries and specifications applied to batteries
- examples and causes of common faults in electrical wiring and test procedures for isolating wiring faults
- specifications of cables and wires, including insulation resistance used in given electrical circuits
- test procedures for terminated wiring and cables
- effect of corrosion on the performance of electrical circuits and connections
- coatings available to stop/inhibit corrosion
- correct operational principles of sensors, relays, solenoids and contacts
- common faults and causes in sensors, relays, solenoids, contacts and circuits and procedures for testing circuit components.

Assessment Conditions

- Assessors must:

- have vocational competency in diagnosing and rectifying low voltage electrical systems at least to the level being assessed with relevant industry knowledge and experience
- satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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