



Australian Government

Department of Education, Employment and Workplace Relations

MEM18030B Diagnose and rectify low voltage electrical systems

Release: 1

MEM18030B Diagnose and rectify low voltage electrical systems

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers using test instruments, testing the battery, and assessing and rectify wiring faults.
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Application of the Unit

Application of the unit	<p>This unit applies to testing and rectification activities associated with 12, 24 and 36 volt wiring systems on vehicles, plant and stationary equipment. The system extends to wiring, switching mechanisms and circuit protection devices.</p> <p>This unit should not be selected with any of the following Units: Unit MEM18045B (Fault find/repair electrical equipment/components up to 250 volts single phase supply), or Unit MEM18046B (Fault find/repair electrical equipment/components up to 1000 volts a.c./1500 volts d.c).</p> <p>Except in exceptional circumstances this unit should not be selected with Unit MEM18056B (Diagnose and repair analog equipment and components) or Unit MEM18066B (Diagnose and repair microprocessor based equipment).</p> <p>If soldering of wires/connections is required, see Unit MEM05001B (Perform manual soldering/desoldering - electrical/electronic components).</p> <p>Band: A</p> <p>Unit Weight: 8</p>
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
Path 1	MEM09002B	Interpret technical drawing
	MEM12023A	Perform engineering measurements
	MEM18001C	Use hand tools
	MEM18002B	Use power tools/hand held operations
	MEM18055B	Dismantle, replace and assemble engineering components

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Use test instruments	1.1. Electron theory, current, voltage and resistance principles are understood. 1.2. Appropriate test instruments are selected, used and maintained to determine current, voltage and resistance. 1.3. Electrical drawings and manufacturers' diagrams are correctly interpreted. 1.4. Series, parallel and series parallel circuits are correctly determined. 1.5. Basic electrical laws are understood and correctly applied. 1.6. AVR test instruments are correctly connected into circuits. 1.7. Meters are read to standard accuracy; and wave form and quantities are determined using general purpose oscilloscope. 1.8. Multipliers and shunts are correctly used and applied.
2. Test battery	2.1. Chemical battery operating principles are understood. 2.2. Electrolyte level is correctly determined and specific gravity readings temperature is corrected. 2.3. Dry charge preparation and recharging of batteries is carried out correctly. 2.4. Discharge testing is performed according to prescribed procedures. 2.5. Replacement batteries are correctly selected for application.
3. Assess and rectify wiring faults	3.1. Wiring faults are correctly isolated. 3.2. Replacement cables/wires are correctly sized. 3.3. Insulation quality is correctly determined. 3.4. Wiring looms are correctly made up for application and securely fixed. 3.5. Wiring terminations are stripped, fitted, prepared and made correctly. 3.6. Corrosion is removed, neutralised and appropriate protective coating is applied. 3.7. Relays, solenoids, contacts and circuits are correctly tested and repaired/replaced.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Look for evidence that confirms skills in:

- reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents
- planning and sequencing operations
- checking task-related information
- checking for conformance to specification
- selecting and using the correct test instrument for a variety of electrical circuits, to measure the current, voltage and resistance of specified circuit components or sections of circuitry
- applying Ohm's law to determine the required values of voltage, current and resistance for a range of electrical circuits
- determining the resistance of series and parallel circuits
- connecting electrical test instruments into given circuits to determine the required values of current, voltage and resistance
- connecting and adjusting a general purpose oscilloscope to a given electrical circuit to measure wave forms at nominated points in the circuit
- determining the specific gravity of the electrolyte for temperature variations
- preparing dry batteries for charging and recharging
- performing discharge testing of batteries
- testing given electrical circuits and, where appropriate, identifying wiring faults
- using supplier catalogues
- making up wiring looms
- terminating wiring
- removing and/or neutralising corrosion from terminals and connections, and applying appropriate protective coatings
- testing a range of circuit components for correct operation and identifying and repairing faulty circuit components

Required knowledge

Look for evidence that confirms knowledge of:

- the principles of electron theory
- definitions of current, voltage and resistance in terms of electrical circuits

REQUIRED SKILLS AND KNOWLEDGE

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

Evidence Guide

EVIDENCE GUIDE	
<p>The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
<p>Overview of assessment</p>	<p>A person who demonstrates competency in this unit must be able to test and rectify low voltage electrical systems. Competency in this unit cannot be claimed until all prerequisites have been satisfied.</p>
<p>Critical aspects for assessment and evidence required to demonstrate competency in this unit</p>	<p>Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.</p>
<p>Context of and specific resources for assessment</p>	<p>This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.</p> <p>This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with testing and rectifying low voltage electrical systems or other units requiring the exercise of the skills and knowledge covered by this unit.</p>
<p>Method of assessment</p>	<p>Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.</p>

EVIDENCE GUIDE

Guidance information for assessment	
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Range Statement**RANGE STATEMENT**

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Test instruments	Multimeters, amp meters, circuit testers
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Unit Sector(s)

Unit sector	
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Co-requisite units

Co-requisite units		

Competency field

Competency field	Maintenance and diagnostics
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