



Australian Government

**MEM27016 Diagnose and maintain
electronic controlling systems on mobile
and stationary plant**

Release: 1

MEM27016 Diagnose and maintain electronic controlling systems on mobile and stationary plant

Modification History

Release 1. Supersedes and is equivalent to MEM18047B Diagnose and maintain electronic controlling systems on mobile plant

Application

This unit of competency defines the skills and knowledge required to test, diagnose and fault find electronic control systems associated with mobile and stationary plant and equipment.

It applies to whole of equipment diagnosis and rectification and complements diagnostic and rectification skills contained in individual system units of competency.

Where electronic systems associated with communication between the mobile or stationary plant and external communication sources such as those used for remote guidance or monitoring unit MEM27018 Test, diagnose and rectify mobile and stationary plant external monitoring and control systems should also be selected.

Where the repair of electronic circuitry associated with these systems. is required unit MEM18056 Diagnose and repair analog equipment and components and unit MEM18057 Maintain/service analog/digital electronic equipment, 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: 4

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

MEM27006	Diagnose and rectify batteries, low voltage sensors and circuits
MEM27023	Diagnose and rectify fieldbus circuits in mobile and stationary plant and equipment

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.
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 Prepare for service or maintenance task	2.1 Check service and operational records and discuss operational history with operator where relevant 2.2 Identify control and bus systems used in mobile or stationary plant and locate control units and modules 2.3 Inspect plant for obvious damage or wear to control units, modules or circuits 2.4 Identify and select diagnostic benchmarks, methods, sequence, tests and testing processes according to manufacturer specification and workplace requirements
3 Perform diagnostic tests on electronic	3.1 Operate plant or equipment and undertake visual, aural and functional checks for obvious faults, including checking for warning gauges, lights and alerts

Elements describe the essential outcomes.

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

	controlling systems	3.2	Access and interpret fault codes, live data and freeze frame data using appropriate test procedures and equipment and precautions to safeguard electronic components and systems
		3.3	Interpret fault codes and other diagnostic test results to determine controlling systems requiring rectification
		3.4	Trace faults from fault codes using specified troubleshooting procedures
		3.5	Determine if fault is related to wiring, interference, components, modules or individual system controller
		3.6	Determine root cause of faults
4	Rectify faulty electronic controlling systems	4.1	Rectify faults through repair, replacement or reprogramming to required specification
		4.2	Clear fault codes from memory according to SOPs
		4.3	Test controlling system and components for correct operation
		4.4	Make adjustments, as required, to mechanical clearances and measured electrical and resistance values
5	Change operating parameters	5.1	Source appropriate specifications from plant/equipment identification and applicable manuals and specifications
		5.2	Select and use appropriate tooling (software/hardware)
		5.3	Obtain relevant security codes using plant/equipment identification
		5.4	Download, enter and verify data for new specifications

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.

Plant and equipment systems include one (1) or more of the following:

- discrete logic
- analogue monitoring
- microprocessor monitoring
- control systems

Maintenance includes one (1) or more of the following:

- wiring harness faults
- testing and identifying faulty:
 - sensors
 - actuators
 - control components
- replacing and making adjustments to:
 - input components
 - output components
- accessing data from electronic control unit and applicable manufacturer software/hardware to change operating parameters

Input components include one (1) or more of the following:

- sensors
- actuators
- resistors
- capacitors
- diodes
- transistors
- integrated circuits (ICs)
- erasable programmable read-only memory (EPROM)
- microprocessors
- joysticks

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- Output components include one (1) or more of the following:**
- hardware
 - software
 - hard copy devices
 - soft storage devices

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM18047B Diagnose and maintain electronic controlling systems on mobile plant

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 MEM27016 Diagnose and maintain electronic controlling systems on mobile and stationary plant

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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, manufacture/technical manuals and other applicable reference documents to diagnose and maintain electronic controlling systems on mobile plant
- identifying applicable control unit and using fault codes correctly to access fault codes with indicators, meters or diagnostic tooling then clearing codes from memory and verifying using applicable procedures and manuals
- tracing the root cause of faults
- identifying and applying procedures to safeguard electronic components and systems when diagnosing and maintaining typical mobile electronic circuits
- locating, identifying and testing applicable input and output components
- repairing/replacing components and selecting replacement parts using manufacturer specifications and data
- adjusting mechanical clearances and measured electrical and resistance values using appropriate tools and techniques
- obtaining security codes using correct protocol from manufacturer, plant/equipment identification and using computer and relevant computer applications to download, enter and verify new specifications in accordance with manufacturer procedures.

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)
- applicable fault codes and their meanings and procedures to clear fault codes and verify clearance
- sources of potential damage to typical mobile plant electronic systems when performing maintenance and diagnostic work and techniques and procedures to safeguard against damage

- correct troubleshooting procedures, including identifying root causes of faults, including faults related to:
 - design
 - manufacturing
 - operator error (e.g. overload and over speed)
 - environment (e.g. contamination, interference and hazards)
 - previous service or maintenance error
- procedures for:
 - removal and replacement of faulty components and techniques and procedures
 - obtaining security code
 - downloading, entering and verifying data
- various types of input components
- operation and principles of transducers used in control systems
- relevant testing procedures
- component types, functions and locations
- techniques for repairing components
- operation and principles of actuators used in control system
- concepts of erasable programmable read-only memory (EPROM) and microprocessors.

Assessment Conditions

- Assessors must:
 - have vocational competency in diagnosing and maintaining electronic controlling systems on mobile plant 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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