



Australian Government

MEM18109 Troubleshoot instrumentation systems and equipment

Release: 2

MEM18109 Troubleshoot instrumentation systems and equipment

Modification History

Release 2. Prerequisite units updated

Release 1. New unit

Application

This unit has been developed for Engineering Tradesperson – industrial electrician apprenticeship training and the recognition of trade-level skills in fault-finding and troubleshooting techniques that are instrumental in reducing instrumentation down-time.

It covers performing functional tests under normal, extreme, overload and environmental conditions using hardware and software techniques across a wide range of instrumentation systems used in an industrial environment.

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

Band: A

Unit Weight: 4

Pre-requisite Unit

Path 1	MEM12023	Perform engineering measurements
	MEM18001	Use hand tools
	MEM18104	Dismantle, replace and assemble electrical components and equipment
	MEM18108	Troubleshoot analog and digital electronic equipment

Competency Field

Maintenance and diagnostics

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. Prepare to troubleshoot systems and equipment	2.1 Observe and localise device isolation methods/requirements 2.2 Apply appropriate test procedures and application principles in assessing operation of instrumentation systems and equipment 2.3 Apply normal operating characteristics of instrumentation systems and equipment to the level necessary to identify and localise faults 2.4 Apply characteristics/operational function assessment procedures according to safety and regulatory/site specifications 2.5 Check and verify characteristics and operational function
3. Troubleshoot systems and equipment and localise fault conditions	3.1 Utilise manufacturer manuals, history files and maintenance and repair records as a source of information when troubleshooting 3.2 Utilise drawings/diagrams and operational specifications in identifying and localising fault conditions 3.3 Examine and interpret built-in fault indicators and error codes and record results, where appropriate 3.4 Conduct appropriate tests to establish fault condition to major component level using appropriate test equipment, procedures and techniques

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| 4. | Repair/replace faulty condition/component | 4.1 | Repair faulty condition using appropriate tools, equipment and techniques to meet specifications, where applicable |
| | | 4.2 | Source replacement item and replace in accordance with manufacturer specifications |
| 5. | Functionally test instrumentation equipment/components | 5.1 | Undertake tests on equipment/components using appropriate test equipment, procedures and techniques |
| | | 5.2 | Verify system/equipment to meet specifications and operational requirements |
| | | 5.3 | Document all repairs, including results of tests carried out in accordance with SOPs |

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.

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Tests include one or more of the following:

- determining the correct operational function of electrical, electronic, mechanical, fluid power systems, equipment, components and associated items
- tests conducted under:
 - normal
 - extreme
 - overload
 - environmental conditions using hardware and software techniques

Equipment includes one or more of the following:

- process machines
- temperature control systems
- sterilisation units
- water cooling/filtration systems
- equipment utilising mechanical, pneumatic/electro-pneumatic or electronic (analog/digital) principles
- associated instruments measuring variables, including level, pressure, light, flow, current, resistance, voltage, density and temperature

Components include one or more of the following:

- sensors
- transmitters
- converters
- indicators
- analysers
- controllers
- transducers
- power supplies
- removable circuit boards
- sensor units associated with determining/controlling density, level, flow, temperature and composition of a range of materials

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- Test equipment includes one or more of the following:**
- system calibrators
 - manometers
 - dead weight testers
 - wheatstone bridge
 - potentiometers
 - frequency/signal generators
 - logic probes
 - multimeters (analog/digital)
 - test gauges
 - cathode ray oscilloscopes (CROs)
 - other associated equipment

Unit Mapping Information

No equivalent unit

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 MEM18109 Troubleshoot instrumentation systems and equipment

Modification History

Release 2. Prerequisite units updated

Release 1. New unit

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, SOPs and safe work practices
- identifying and interpreting specifications, drawings, manufacturer manuals, history files and maintenance and repair records, and other applicable reference documents and obtaining relevant data with respect to troubleshooting instrumentation systems/equipment
- isolating instrumentation system/equipment in accordance with procedures
- checking and verifying the operational functions of the instrumentation system/equipment, including reading/recording and interpreting built-in fault indicators and error codes
- conducting appropriate tests to establish fault condition using applicable test equipment using hardware and software techniques
- repairing fault condition to meet specification requirements
- isolating and removing faulty major component and selecting replacement item from appropriate sources
- undertaking appropriate tests on instrumentation system/equipment in accordance with SOPs
- verifying system to meet operational requirements
- completing all documentation in accordance with SOPs.

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 PPE
- instrumentation principles controlling density, level, flow, temperature and composition of a range of materials
- effects of resistance, capacitance, inductance and impedance (R, L, C) upon electrical circuit
- interpretation requirements of schematic, wiring and block diagrams and circuits
- principles of hydraulic, pneumatic and electrical flow
- purpose/operational function of instrumentation system

- equipment and techniques to be used to test instrumentation systems and equipment, including the use of specialised test equipment
- procedures for running built-in test functions and recording identified faults
- functional tests to be carried out under normal, extreme, overload and environmental conditions
- specifications of each instrumentation system and acceptable deviations from specifications
- correct operation of the instrumentation system, including the procedures for isolating instrumentation systems
- range of faults in instrumentation system/equipment components
- variations between test results and operational specifications
- probable causes of faults in instrumentation system/equipment components and action to be taken to rectify the causes of faults
- sequence of events to be undertaken to correct faults in the instrumentation system/equipment components
- difference between real and potential faults
- function and procedural checks on instrumentation systems/equipment.

Assessment Conditions

Assessors must:

- have vocational competency in troubleshooting instrumentation systems and equipment 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* and comply with the *National Vocational Education and Training Regulator Act 2011* or equivalent legislation covering VET regulation in a non-referring State 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 that 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 manufacturer 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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