Australian Government

Department of Education, Employment and Workplace Relations

MEM18054B Fault find, test and calibrate instrumentation systems and equipment

Release: 2

MEM18054B Fault find, test and calibrate instrumentation systems and equipment

Modification History

Single band identifier removed to clarify dual status

Unit Descriptor

Unit descriptor	This unit covers the testing of instrumentation systems and equipment; applying data collection techniques and localising fault conditions; analysing and reporting test results; and calibrating instrumentation systems and components.

Application of the Unit

Application of the unit	The unit applies to undertaking test procedures to determine the correct operational function of electrical, electronic mechanical, fluid power systems, equipment, components and associated items. It extends to the use of mechanical, pneumatic/electro-pneumatic, electronic (analog/digital) and associated instruments, measuring variables such as temperature, level, pressure, flow rate, current, resistance, voltage, levels, light, density or any other process variable. Tasks are undertaken in workshop/site, laboratory environments. Operational function of instrumentation equipment/components is tested and assessed against operational specifications, and interpreted from data sheets and circuit diagrams in consultation with appropriate personnel where applicable. Soldering/desoldering of electrical/electronic components requires the selection of Unit MEM05001B (Manual soldering/desoldering - electrical/electronic components) or Unit MEM05002B (Perform high reliability soldering and desoldering) as appropriate. High reliability covers soldering/desoldering for the installation and fabrication of electrical/electronic components to advanced or military specifications, or where the reliability of electrical connections is critical. It also covers the soldering of electronic components where prevention of damage through electrostatic discharge or other means is required. **Band:** This unit has dual status and is to be regarded as both a Specialisation and A unit and Specialisation band B unit for progression to C7 (AQF level IV). **Unit Weight**: **8**

Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
Path 1	MEM05001B	Perform manual soldering/desoldering - electrical/electronic components
	MEM09002B	Interpret technical drawing
	MEM12004B	Perform precision electrical/electronic measurement
	MEM12023A	Perform engineering measurements
	MEM18001C	Use hand tools
	MEM18002B	Use power tools/hand held operations
	MEM18055B	Dismantle, replace and assemble engineering components
	MEM18057B	Maintain/service analog/digital electronic equipment
Path 2	MEM09002B	Interpret technical drawing
	MEM12002B	Perform electrical/electronic measurement
	MEM12023A	Perform engineering measurements
	MEM18001C	Use hand tools
	MEM18002B	Use power tools/hand held operations
	MEM18055B	Dismantle, replace and assemble engineering components
	MEM18064B	Maintain instrumentation system

Prerequisite units		
		components

Employability Skills Information

Employability skills	This unit contains employability skills.

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.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Test instrumentation systems and equipment	1.1. Work/test requirements are identified and defined to standard operating procedures. 1.2. Correct test application principles are selected after inspection of instrumentation systems, equipment/components. 1.3. Appropriate test equipment is selected in accordance with defined requirements. 1.4. Device isolation methods/requirements are observed and localised. 1.5. Appropriate test procedures and application principles are applied in assessing operation of instrumentation systems, equipment/components. 1.6. Normal operating characteristics of instrumentation systems, equipment/components are applied to the level necessary to identify and localise faults. 1.7. Characteristics/operational function assessment procedures are applied according to safety and regulatory/site specifications. 1.8. Characteristics and operational function is checked and verified.
2. Apply data collection techniques and localise fault conditions	2.1. Drawings/diagrams and operational specifications are utilised in identifying and localising fault conditions. 2.2. Where appropriate, built-in fault indicators, error codes are examined and correctly interpreted and results are recorded to standard operating procedures. 2.3. Fault condition is localised to major component level using appropriate test equipment principles and procedures.
3. Analyse and report test results	3.1. Test results are analysed/verified against operational specifications and localised faults are confirmed. 3.2. Potential and real faults are reported using standard operating procedures. 3.3. Faulty conditions are evaluated and corrective action is planned. 3.4. Action plan is recorded and documented according to standard operating procedures.
4. Calibrate instrumentation equipment/components	4.1. Zero, span and range checks are undertaken on indicators/controllers using correct and appropriate configuration. 4.2. Where applicable, methods of adjustment using

ELEMENT	PERFORMANCE CRITERIA
	calibration devices are performed and documented to prescribed procedures and operational specifications.

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:

- obtaining relevant data with respect to the operation of the instrumentation systems/equipment
- locating, inspecting and testing a range of instrumentation system components
- isolating instrumentation system/equipment
- interpreting all relevant instrumentation circuits, drawings, instructions, manuals and data sheets
- checking the individual components within the instrumentation system for correct operation
- dismantling, repairing and reassembling faulty components
- selecting correct replacement parts from the manufacturer/supplier catalogues
- checking repaired/replaced instrumentation system components for correct operation
- complete service reports, and language and literacy skills for recording/documenting test results
- checking and verifying the operational functions of the instrumentation system/equipment including reading/recording built-in indicators
- obtaining error code interpretation documents
- undertaking zero, span and range checks on instrumentation systems/equipment
- calibrating instrumentation system/equipment

Required knowledge

Look for evidence that confirms knowledge of:

- instrumentation principles such as controlling density, level, flow, temperature, 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

REQUIRED SKILLS AND KNOWLEDGE

- principles of hydraulic, pneumatic and electrical flow
- calibration procedures of instrumentation systems and equipment/components
- purpose/operational function of instrumentation system
- procedures and equipment for inspecting and testing instrumentation system
- specifications of each instrumentation system and acceptable deviations from specifications
- procedures for repairing faulty instrumentation system
- dismantling, reassembly and testing techniques
- correct operation of the instrumentation system including the procedures for isolating instrumentation systems
- range of faults in instrumentation system/equipment components
- procedures for checking and verifying the operational function of the instrumentation system/equipment
- procedures for recording and completing service reports
- hazards associated with fault-finding, testing and calibrating instrumentation systems/equipment
- the operational specifications of the instrumentation system/equipment
- variations between test results and operational specifications
- probable causes of faults in instrumentation system/equipment components
- action to be taken to rectify the causes of faults in instrumentation systems/equipment
- the sequence of events to be undertaken to correct faults in the instrumentation system/equipment components
- errors indicated by built-in devices
- methods of determining procedures
- procedures for reporting faults
- the difference between real and potential faults
- procedures for recording/documenting test and calibration results
- the function and procedures for zero, span and range checks on instrumentation systems/equipment
- equipment required to carry out the calibration of instrumentation systems/equipment

Evidence Guide

EVIDENCE GUIDE	
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.	
Overview of assessment	A person who demonstrates competency in this unit must be able to fault find, test, calibrate instrumentation systems and equipment. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	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.
Context of and specific resources for assessment	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. This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with fault finding, testing, calibrating instrumentation systems and equipment or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	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.

EVIDENCE GUIDE	
Guidance information for assessment	

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.	
Instrumentation systems	Made up of more than one interdependent component controlling and processing multiple inputs and/or outputs
Equipment	Process machines, temperature control systems, sterilisation units, water cooling/filtration systems; equipment utilising mechanical, pneumatic/electro-pneumatic or electronic principles, associated instruments measuring level, pressure light, flow, current, resistance, voltage, density, temperature
Components	Sensors, transmitters, converters, indicators, analysers, controllers, transducers, power supplies, removable circuit boards and sensor units associated with determining/controlling density, level, flow, temperature, composition etc. of a range of materials
Test equipment	System calibrators, manometers, dead weight testers, wheatstone bridge, potentiometers, frequency/signal generators, logic probes, multimeters, (analog/digital), test gauges, cathode ray oscilloscopes and other associated equipment

Unit Sector(s)

Unit sector	

Co-requisite units

Co-requisite units		

Competency field

Competency field	Maintenance and diagnostics