Australian Government

MEM18061 Maintain/calibrate complex control systems

Release: 1

MEM18061 Maintain/calibrate complex control systems

Modification History

Release 1. Supersedes and is equivalent to MEM18061B Maintain/calibrate complex control systems

Application

This unit of competency defines the skills and knowledge required to determine system specification and control loop characteristics, and test, monitor and record system operation.

It applies to localising the fault condition; repairing or replacing faulty condition; calibrating, configuring and adjusting complex control systems; and recommissioning the system.

Where soldering of components is required to advanced or military specifications, where the reliability of electrical connections is critical, or where surface mounted devices are being soldered/desoldered then unit MEM05002 Perform high reliability soldering and desoldering should also be selected.

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

Band: **B**

Unit Weight: **8**

Pre-requisite Unit

Path 1	MEM05001	Perform manual soldering/desoldering - electrical/electronic components
	MEM09002	Interpret technical drawing
	MEM11011	Undertake manual handling
	MEM12004	Perform precision electrical/electronic measurement
	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

	MEM18054	Fault find, test and calibrate instrumentation systems and equipment
	MEM18055	Dismantle, replace and assemble engineering components
	MEM18057	Maintain/service analog/digital electronic equipment
	MEM18062	Install, maintain and calibrate instrumentation sensors, transmitters and final control elements
	MEM18069	Maintain, repair instrumentation process control analysers
Path 2	MEM09002	Interpret technical drawing
	MEM11011	Undertake manual handling
	MEM12002	Perform electrical/electronic measurement
	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
	MEM18054	Fault find, test and calibrate instrumentation systems and equipment
	MEM18055	Dismantle, replace and assemble engineering components
	MEM18064	Maintain instrumentation system components
	MEM18069	Maintain, repair instrumentation process control analysers
Path 3	MEM05001	Perform manual soldering/desoldering - electrical/electronic components

	MEM09002	Interpret technical drawing
	MEM11011	Undertake manual handling
	MEM12004	Perform precision electrical/electronic measurement
	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
	MEM18054	Fault find, test and calibrate instrumentation systems and equipment
	MEM18055	Dismantle, replace and assemble engineering components
	MEM18057	Maintain/service analog/digital electronic equipment
	MEM18060	Maintain, repair control instrumentation - single and multiple loop control systems
	MEM18062	Install, maintain and calibrate instrumentation sensors, transmitters and final control elements
	MEM18067	Tune control loops - multi controller or multi element systems
Path 4	MEM09002	Interpret technical drawing
	MEM11011	Undertake manual handling
	MEM12002	Perform electrical/electronic measurement
	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
MEM18054	Fault find, test and calibrate instrumentation systems and equipment
MEM18055	Dismantle, replace and assemble engineering components
MEM18060	Maintain, repair control instrumentation - single and multiple loop control systems
MEM18062	Install, maintain and calibrate instrumentation sensors, transmitters and final control elements
MEM18064	Maintain instrumentation system components
MEM18067	Tune control loops - multi controller or multi element systems

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.
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

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
2	**Determine system specifications and control loop characteristics**	2.1	Examine engineering specifications, technical information and historical records and trends and document relevant data
		2.2	Obtain, read and interpret system specifications and operational data, including those for multiple loop control systems and devices
		2.3	Obtain, read and interpret circuit and logic diagrams and configuration data
		2.4	Consult with system operators and other relevant plant personnel and extract and document relevant data by appropriate means
		2.5	Obtain appropriate work clearances for monitoring and testing the system
3	**Test, monitor and record system operation**	3.1	Collect all relevant data by appropriate means from all sources
		3.2	Analyse fault detection and diagnostic data against predetermined operational specifications, and document conclusions
		3.3	Observe system operation by applying all individual/multiple element loop device characteristics, controller mode principles, testing, calibration and adjustment methods
		3.4	Set up and undertake tests using appropriate test equipment in accordance with procedures
		3.5	Set up and use signal transmission test equipment, where applicable
		3.6	Determine adjustment/maintenance needs through interpretation and analysis of pneumatic, electrical, electronic, logic diagrams and configuration data for all control system devices
		3.7	Connect and test field instrumentation for selected control operation, and monitor performance against specifications

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
		3.8	Carry out diagnostics checks to ensure correct operation
		3.9	Undertake fault finding and diagnostic tests on faulty control system components or elements using appropriate equipment, procedures and techniques
		3.10	Analyse and evaluate fault condition and plan corrective action
4	**Replace faulty items or repair faulty condition**	4.1	Dismantle faulty items for repair or replacement using appropriate tools, equipment and techniques according to manufacturers' recommendations
		4.2	Select replaceable items from manufacturers' catalogues, spare parts lists or data sheets
		4.3	Establish correct maintenance procedures for faulty items using manufacturers' handbooks
		4.4	Repair faulty items and/or faulty condition, where applicable
		4.5	Reassemble repaired and replaceable items to meet specifications
5	**Calibrate, configure, adjust complex control systems**	5.1	Carry out diagnostic checks to ensure correct operation of system and take appropriate corrective action, as necessary
		5.2	Select/set up calibration and test equipment to enable calibration to manufacturers' specifications
		5.3	Undertake mechanical alignment of control devices, where applicable
		5.4	Configure system using appropriate programming tools and techniques
		5.5	Perform all relevant alignment procedures for optimum control and in accordance with specifications
		5.6	Set up recording equipment for adjustment and

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
	monitoring during alignment
	5.7 Perform calibration and adjustment function on multi-loop devices, multi-element control loops, controller modes and actions according to operational specifications using appropriate techniques applicable to the type of control loop being serviced
	5.8 Make online changes to parameters in the system to meet specified requirements
	5.9 Connect field instrumentation for selected control operation and system and ensure it is operated to a satisfactory level of control
6 **Return system to service**	6.1 Undertake final adjustments to align system operation to operational specifications, including process and optimum control efficiencies
	6.2 Return system to service
	6.3 Complete service reports 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.

Control loop includes:

- a process of documenting and recording measurements and variables within the process

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.

Relevant data includes one (1) or more of the following:

- maintenance records
- fault indicators
- chart recorders
- data loggers
- error codes
- operational symptoms
- observation monitoring
- tests

Test equipment includes one (1) or more of the following:

- engineering level
- laser alignments
- appropriate equipment for the measurement of:
  - alignment
  - flatness
  - squareness
  - straightness
  - temperature
  - vibration
  - load deflection
  - noise level
  - RPM

Control system includes one (1) or more of the following:

- pneumatic control
- analog and/or digital electronics
- distributed programmable logic controller (PLC)
- distributive control systems (DCS)
- supervisory control date acquisition (SCADA)
- computer-based control systems which include supervisory mode

Field instrumentation includes:

- test and measuring equipment which includes specialised testing fixtures or equipment

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Control strategies include one (1) or more of the following:	• ratio • cascade • selector • duplex • feed forward • adaptive • dynamic compensations • computations • energy management • environmental control/systems
Return system to service includes one (1) or more of the following:	• configuring • calibrating • adjusting • tuning • final validation of system performance

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM18061B Maintain/calibrate complex control systems

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2