



Australian Government

MEM27023 Diagnose and rectify fieldbus circuits in mobile and stationary plant and equipment

Release: 1

MEM27023 Diagnose and rectify fieldbus circuits in mobile and stationary plant and equipment

Modification History

Release 1: New Unit

Application

This unit of competency defines the skills and knowledge required to carry out diagnosis and rectification of circuits used in controller area network (CAN) and other fieldbus systems and control technology components in mobile and stationary plant.

It applies to systems and components that do not require a host computer. The unit can apply to circuits used for communication with and between systems and components, including systems for engine management, suspension, hydraulics and pneumatics, chassis and body management, braking systems, mechanical, electrical and hydraulic drives, lighting control, air conditioning, vehicle guidance and telemetry.

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

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 | Identify bus and control system components and location | 2.1 | Examine appropriate drawings, specifications and manuals for bus and control system information |
| | | 2.2 | Perform a visual inspection of equipment and identify location and any obvious faults in bus and control system wiring and components |
| 3 | Check bus and control system wiring and rectify faults | 3.1 | Ensure battery is charged and charging system is operating correctly |
| | | 3.2 | Test voltage supply, input voltage and ground |
| 4 | Assess and rectify wiring faults | 4.1 | Isolate wiring and sensor faults |
| | | 4.2 | Determine replacement sensors and cables/wires, including size and insulation quality |
| | | 4.3 | Make up wiring looms for application and securely fix |
| | | 4.4 | Strip, fit, prepare and terminate wiring and cables |
| | | 4.5 | Test terminated cables for continuity and to comply with requirements |
| | | 4.6 | Remove corrosion, neutralise and apply appropriate protective coating |
| | | 4.7 | Test sensors, relays, solenoids, contacts and circuits and repair/replace |

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.

Circuits include one (1) or more of the following:

- bus communication
- module (node) power
- input power
- grounding

Control module applications include one (1) or more of the following:

- engine control
- hydraulic systems
- pneumatic systems
- traction control
- mechanical drives
- chassis and body control
- braking
- air-conditioning
- load control
- exhaust and environmental systems
- tyre and track monitoring
- remote guidance and control
- doors and other access locks
- interior and exterior lighting
- seat adjustment
- power windows
- turning and other indicators
- low voltage electric motors
- hazard and brake lights
- sensors

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 MEM27023 Diagnose and rectify fieldbus circuits in mobile and stationary plant and equipment

Modification History

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, standard operating procedures (SOPs) and safe work practices
- identifying and interpreting specifications, standards, charts, lists, SOPs, electrical drawings and diagrams to diagnose and rectify fieldbus circuits in mobile and stationary plant and equipment
- selecting and using the correct test instrument, including multimeters, amp meters and circuit testers for bus and control system circuits and components
- assessing condition and serviceability of components, including connectors, resistors, harnesses, boards, sensors, switches, fuses and seals
- applying Ohm's Law to determine the required values of current, voltage and resistance of a range of electrical circuits, including series, parallel and series parallel
- connecting electrical test instruments into given circuits to determine the required values of current, voltage and resistance in a safe and effective manner
- connecting and adjusting multi-channel and general purpose oscilloscopes to a given electrical circuit to measure wave forms at nominated points in the circuit
- fault finding using fault-finding techniques to identify wiring faults in electrical circuits
- selecting appropriate replacement cables according to size, rating and insulation resistance from supplier catalogues
- making up replacement wiring looms, strip and prepare cable ends for termination and terminate to specifications
- testing terminations for continuity and to comply with requirements
- removing and/or neutralising corrosion from terminals and connections and applying appropriate protective coating.

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

- Ohm's Law and the relationships between current, voltage and resistance for a variety of given electrical circuits
- instruments and procedures to be used to measure current, voltage and resistance and safety precautions to be taken
- procedures for maintaining electrical test equipment
- principles and functions of two wire differential serial bus systems, including:
 - communication and power cables for bus systems
 - voltage states relative to shield or ground and role in information transfer
 - logic states
 - channels
 - communication protocols, including message priority and identification
 - electronic control modules (ECMs)
 - engine control modules
 - power distribution boards
 - ground modules
 - typical diagnostic codes and faults
 - cabin displays
- symbols used in electrical drawings/diagrams
- components of a variety of electrical circuits identified by given electrical drawings/diagrams
- differences between series and parallel electrical circuits
- function of a general purpose and multi-channel oscilloscopes and procedures for connecting oscilloscopes to bus and control system circuits and components
- use of wave forms in the testing of circuits
- accuracy to which electrical test equipment can be read
- examples and causes of common faults in electrical wiring and test procedures for isolating wiring faults
- specifications of cables and wires including insulation resistance used in given electrical circuits
- test procedures for terminated wiring and cables
- effect of corrosion on the performance of electrical circuits and connections
- common faults and causes in sensors, relays, solenoids, contacts and circuits and procedures for testing circuit components.

Assessment Conditions

- Assessors must:
 - have vocational competency in diagnosing and rectifying fieldbus circuits in mobile and stationary plant 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* 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

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>