



Australian Government

UEEEEC0072 Troubleshoot microcontroller-based hardware systems

Release: 1

UEEEEC0072 Troubleshoot microcontroller-based hardware systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to troubleshoot microcontroller-based hardware systems.

It includes solving microcontroller hardware and firmware problems by determining correct operation of microcontroller system, and providing solutions derived from measurements and calculations to predictable faults in microcontroller hardware.

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

Pre-requisite Unit

Not applicable.

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Prepare to work on microcontroller hardware

PERFORMANCE CRITERIA

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

1.1 Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are obtained and applied

1.2 WHS/OHS risk control work preparation measures and

- procedures are followed
- 1.3** Nature of microcontroller hardware problems is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
 - 1.4** Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
 - 1.5** Sources of materials required for the work are established in accordance with workplace procedures
 - 1.6** Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
- 2 Solve microcontroller hardware and firmware problems**
- 2.1** WHS/OHS risk control work measures and procedures are followed
 - 2.2** Need to test or measure live work is determined in strict accordance with WHS/OHS requirements and, as required, conducted within established safety procedures
 - 2.3** Circuits are checked as being isolated, as necessary, in strict accordance with WHS/OHS requirements and workplace procedures
 - 2.4** Established methods are used to solve problems from measured and calculated values as they apply to microcontroller hardware
 - 2.5** Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
 - 2.6** Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
- 3 Complete work and document problem-solving activities**
- 3.1** WHS/OHS work completion risk control measures and procedures are followed
 - 3.2** Worksite is cleaned and made safe in accordance with established procedures
 - 3.3** Justification for solutions used to solve circuit problems are documented

- 3.4** Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Troubleshooting must include at least two of the following types of microcontroller hardware problems:

- determining the operating parameters of an existing circuit
- altering an existing circuit to comply with specified operating parameters
- developing circuits to comply with a specified function and operating parameters

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH166A Troubleshoot microcontroller based hardware systems.

Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>

Assessment Requirements for UEEEC0072 Troubleshoot microcontroller-based hardware systems

Modification History

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- calculating parameters correctly and accurately
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- providing solutions to microcontroller component/circuit problems
- providing written justification for the solutions to problems
- taking measurements correctly and accurately
- using an industry standard programming environment to load, test and debug code
- using methodical problem-solving methods
- using a microcontroller's internal communications peripherals to communicate with a secondary device, including microcontroller, computer and/or sensor.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- dealing with intermittent faults
- electronic fault-finding techniques and fault identification techniques
- fault-finding methods, including visual inspection, sectional testing, split-half tests and component isolation
- input/output (I/O) ports: analogue/digital
- integrated peripherals, including timers, interrupts, hardware multiplier, internal oscillators, comparators, analogue to digital converter's (ADC's) and digital to analogue converter's (DAC's), pulse width modulation (PWM) modules and serial ports
- interfacing different logic level voltages in a microcontroller circuit
- microcontroller-based systems troubleshooting

- microcontroller internal peripheral communication circuitry and associated hardware and protocols (examples include but not limited to recommended standard 232 (RS-232), I²C, SPI, and 1 wire
- microcontroller systems, including:
 - digital systems concepts associated with microcontroller-based systems
 - microcontroller architecture
 - microcontroller instruction set
 - microcontroller manufacturers
 - microcontroller system block diagram
- relevant data storage types
- relevant job safety assessments or risk mitigation processes
- relevant logic level standards
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- reset circuit
- system clock circuitry.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

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.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to fault finding microcontroller-based hardware
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

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