



Australian Government

Assessment Requirements for UEEIC0018

Diagnose and rectify faults in digital controls systems

Release: 1

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Modification History

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

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 logical diagnostic methods
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- completing and reporting fault diagnosis and rectification activities
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- diagnosing and rectifying faults
- documenting fault rectification
- identifying faults, causes and rectification methods
- isolating circuits/machines/plant
- obtaining tools, equipment and testing devices
- preparing to diagnose and rectify faults
- rectifying faults in digital subsystems
- testing and measuring live electrical components
- using scenarios to test causes of system faults
- verifying system operates as intended.

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:

- digital control systems, including:
 - comparison between analogue and digital signals
 - advantages of digital control systems
 - digital/analogue control system
 - logic gates

- truth tables
- digital testing devices
- numbering systems, including:
 - the binary number system
 - the octal number system
 - the hexadecimal number system
 - binary addition and subtraction
 - conversion between numbering systems
 - binary coded decimal (BCD)
 - Gray code
 - the American Standard Code for Information Interchange (ASCII)
- combinational logic networks, including:
 - precautions when handling electronic devices due to electrostatic discharge (ESD)
 - truth tables
 - basic operation and characteristics of logic devices
 - logic probes
 - verification of operation of logic circuits
- logic families and specifications, including:
 - logic families and specifications
 - transistor-transistor logic (TTL)
 - complementary metal oxide silicone (CMOS) logic families
 - the unit load concept
 - specifications and features of TTL, TTL low power Schottky (LS) and CMOS logic families
 - three state and open collector logic
 - input and output voltage characteristics for CMOS and TTL
 - comparison of TTL with CMOS logic families
 - unit load
 - noise margin
 - interfacing different logic families
 - tri-state logic devices
- encoders and decoders, including:
 - weighted and unweighted codes
 - Gray
 - BCD
 - ASCII
 - half and full adder
 - error detection
 - decoder and encoder integrated circuits
 - multiplexer and demultiplexer integrated circuits

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- flipflops, including:
 - RS flipflops
 - D flipflops
 - JK flipflops
 - truth tables and operation
 - debouncing a switch
 - timing diagrams
 - sequential logic
 - state tables and timing diagrams
- registers, including shift registers and data latches
- counters, including:
 - ripple counters using JK flipflops
 - typical integrated circuit types
 - characteristics and operation
 - ripple counters
 - use of feedback to modify count
 - circuit verification of a ripple counter
 - synchronous counters
 - series and parallel data transfer
 - multivibrators
 - interconnecting digital circuits to perform an application
- digital-to-analogue (D/A) conversion, including:
 - industrial applications of D/A converters
 - summing D/A converters
 - R-2R D/A converters
 - verification of circuit operation of an IC D/A converter
- analogue-to-digital (A/D) conversion, including:
 - industrial applications of A/D converters
 - digital ramp, dual slope, successive approximation and simultaneous (flash) A/D converters
 - verification of circuit operation of an IC A/D converters
- display devices, including:
 - liquid-crystal display (LCD) devices
 - light-emitting diode (LED) devices.
 - operation and characteristics
 - seven segment LED displays
 - drive requirements
 - current limiting
 - multiplexed displays

- seven segment encoding chips
- emerging display technologies
- digital fault finding, including:
 - general fault-finding principles
 - common digital faults
 - digital test equipment
 - locating a fault
- interfacing logic devices to external loads, including:
 - interfacing with a transistor
 - interfacing with a relay
 - solid state switches
 - opto-isolator
 - verification of circuit operation of an opto-coupler
- programmable logic devices, including:
 - programmable logic devices
 - applications of programmable logic devices
 - types of programmable logic devices
 - comparison between different programmable logic devices
 - programmable array logic (PAL)
 - programmable logic devices (PLD)
 - field programmable gate arrays (FPGA)
 - programming and verifying correct operation of a programmable array logic device
- relevant job safety assessments or risk mitigation processes, including risk control measures
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices
- system testing and verification techniques
- diagnostic methods including digital fault finding, including:
 - diagnostic tools, equipment and testing devices
 - digital control systems, including comparison between analogue and digital signals
 - numbering systems, including binary number system, octal number system and hexadecimal number system.

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 workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in 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, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - -

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