



Australian Government

UEERE0034 Diagnose and rectify faults in renewable energy (RE) control systems

Release: 1

UEERE0034 Diagnose and rectify faults in renewable energy (RE) control 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 diagnose and rectify faults in renewable energy (RE) control systems.

It includes preparing to diagnose and rectify faults, diagnosing and rectifying faults in RE control systems, and completing and reporting fault-finding and repair activities.

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

Pre-requisite Unit

UEERE0022 Solve basic problems in photovoltaic energy apparatus and systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Prepare to diagnose and rectify faults

PERFORMANCE CRITERIA

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

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|------------|--|
| 1.1 | Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for relevant work area are identified and applied in accordance with workplace procedures |
| 1.2 | Risk control measures are applied in accordance with |

- workplace procedures prior to commencing work
- 1.3** Extent of work to be undertaken is determined from fault/breakdown reports and/or discussions with relevant person/s
 - 1.4** Instructions for coordinating work with others is obtained from relevant person/s and applied
 - 1.5** Materials required for the work are identified and accessed in accordance with workplace procedures
 - 1.6** Tools, equipment and testing devices required to locate faults are obtained in accordance with workplace procedures and checked for correct operation and safety
- 2 Diagnose and rectify faults in RE control systems**
- 2.1** Workplace risk control measures and procedures are applied
 - 2.2** Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
 - 2.3** Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
 - 2.4** Safety hazards resulting from the fault or breakdown are documented and risk control measures identified and implemented in consultation with relevant person/s
 - 2.5** Fault finding of RE systems and interconnecting circuits is approached methodically using measured and calculated values of circuit/apparatus parameters
 - 2.6** Circuit/apparatus components are dismantled, as required, and parts stored to protect against loss or damage
 - 2.7** Faulty circuits/components are rechecked and their fault status confirmed
 - 2.8** Materials/replacement parts required to rectify faults are sourced and obtained in accordance with workplace procedures
 - 2.9** Effectiveness of repair is tested in accordance with workplace procedures
 - 2.10** Apparatus is reassembled, tested and prepared for return

		to service
	2.11	Unexpected events are dealt with safely and with approval of authorised person/s
	2.12	Fault-finding and repair activities are completed without damage to apparatus, circuits, the surrounding environment and services using sustainable energy practices
3	Complete and report fault-finding and repair activities	
	3.1	Workplace risk control measures and procedures are applied
	3.2	Work area is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for repairs to apparatus is documented in accordance with workplace procedures
	3.4	Work completion is documented and relevant 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.

RE system fault finding and repairing must include at least four of the following:

- open circuit
- short circuit
- incorrect connections
- insulation failure
- unsafe condition
- apparatus/component failure
- related mechanical failure

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK127A Diagnose and rectify faults in renewable

energy control 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 UEERE0034 Diagnose and rectify faults in renewable energy (RE) control 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 one occasion and include:

- envisaging the likely extent of work from fault/breakdown reports and discussions with appropriate person/s
- using methodical fault-finding techniques
- finding faults efficiently
- rectifying faults effectively
- completing documentation correctly
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- applying sustainable energy principles and practices
- checking isolation of circuits/machines/system
- determining live electrical testing/measurement requirements
- dismantling and reassembling circuit/apparatus components
- identifying and accessing materials, tools, equipment and testing devices
- testing repairs.

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:

- renewable energy (RE) system electronics, including:
 - fault-finding techniques encompassing:
 - factors to consider in clarifying the nature of a fault:
 - initial fault report
 - confirmation of symptoms of the fault
 - comparison of symptoms with normal operation

- effect to cause reasoning — assumptions of possible causes
- methods for testing assumptions:
 - visual inspection
 - sectional testing
 - split-half tests
 - component isolation
- dealing with intermittent faults
- semiconductor components encompassing:
 - symbols for common semiconductor components, including rectifier diodes, light-emitting diodes (LEDs), zener diodes, bipolar transistors, darlington pairs, MOSFETs, IGBTs, SCRs and triacs
 - basic function of these devices above
 - major rating parameters of devices above
 - applications for each device
 - I-V curve characteristics of diodes and the current gain characteristic of bipolar transistors
- linear regulated direct current (d.c.) power supplies encompassing:
 - label circuit diagrams for half wave and full wave, single phase and three phase rectifiers
 - voltage and current waveforms for these rectifier circuits with and without capacitor filtering
 - peak output voltages from single phase and three phase rectifier circuits
 - block diagram showing the structure of a regulated d.c. power supply
 - main features of linear integrated circuit and voltage regulator integrated circuits
 - each of the major components and their physical location in a regulated power supply
- switching power control circuits encompassing:
 - power dissipation of a transistor when operated as a switch
 - how pulse width modulation (PWM) can provide a variable output voltage from a switch mode regulator
 - advantages and disadvantages of switch mode power circuits compared with linear power circuits
 - block diagram of a basic photovoltaic (PV) switching voltage regulator for battery charging
 - applications of switch mode circuits found in RE systems
 - how power control in alternating current (a.c.) circuits is achieved using SCRs and triacs
 - methods used to reduce radio frequency interference (RFI) in d.c. and a.c. circuits utilising high-speed switching
- digital electronic circuits encompassing:
 - characteristic features that distinguish analogue and digital devices and circuits
 - how numbers or text information can be represented using binary numbers and how

- these are represented in digital circuits
- operation of voltage comparators, analogue to digital (A-D) converters, and digital to analogue (D-A) converters, and examples of each one's use in a RE application
 - basic function of microcontrollers, volatile and non-volatile memory devices
 - operation of a solar hot water (SHW) system pump differential controller as an example of the use of logic in digital circuits
 - inverters encompassing:
 - basic function of inverters and d.c converters and their use in RE systems
 - the operation of an inverter bridge and half-bridge
 - output voltage waveforms for square wave, modified square wave and synthesised sine wave inverters showing typical voltages and timing
 - the function of PWM techniques in modified square wave and synthesised sine wave inverters
 - block diagrams showing the structure of common forms of d.c converters and inverters used in RE applications
 - maintenance encompassing:
 - safety procedures for work on electronic systems, circuits and apparatus
 - hazards that may be encountered when performing tests on inverters, battery chargers or other equipment containing low voltage (LV) circuits
 - functionality of electronic equipment through appropriate client questioning and application of systematic tests and observation
 - various types of common faults and their causes in RE electronic equipment
 - typical test equipment used to repair electronic and electrical equipment
 - safe and correct use of tools and test equipment to locate electronic equipment faults under the direction of an electronics technician
 - replacement of circuit boards, observing appropriate handling precautions for static sensitive devices
 - replacement of socketed integrated circuits such as EPROMs or microprocessors using appropriate tools and methods
 - relevant manufacturer specifications
 - relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
 - relevant WHS/OHS legislated requirements
 - relevant workplace documentation
 - relevant workplace policies and procedures
 - RE control systems.

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, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing faults in RE control systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

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