



Australian Government

UEECD0046 Solve problems in single path circuits

Release: 1

UEECD0046 Solve problems in single path circuits

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 solve problems in single path circuits.

It includes working safely; applying problem-solving procedures, including the use of basic voltage, current and resistance measuring devices; and providing known solutions to predictable circuit problems.

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

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Prepare to work on single path electrical circuits

PERFORMANCE CRITERIA

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

- | | |
|------------|--|
| 1.1 | Scope of work to be undertaken is determined from relevant documentation, electrical drawings or relevant person/s |
| 1.2 | Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied |

- | | | |
|--|------------|---|
| | 1.3 | Electrical hazards are identified, risks are assessed, and control measures are implemented |
| | 1.4 | Advice is sought from the relevant person/s to ensure the work is coordinated effectively with others |
| | 1.5 | Materials required for work are identified and accessed in accordance with workplace procedures |
| | 1.6 | Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety |
| 2 Solve problems in single path electrical circuits | 2.1 | The need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and, when necessary, conducted in accordance with workplace procedures |
| | 2.2 | Circuits are checked as isolated in accordance with workplace procedures and regulatory requirements |
| | 2.3 | Expected circuit parameters are calculated from relevant component ratings/specifications |
| | 2.4 | Circuit parameters are measured in accordance with industry standards and checked against expected values |
| | 2.5 | Circuit problems are assessed using measured and calculated values as they apply to single path, single source circuits |
| | 2.6 | Circuit solutions are determined from measured and calculated values of resistance, voltage, current, and power in single path circuits |
| | 2.7 | Solutions are tested in accordance with workplace procedures and industry standards |
| | 2.8 | Problems are resolved without damage to equipment, circuits, the surrounding environment or services using sustainable energy practices |
| | 2.9 | Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment |
| 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 workplace procedures
- 3.3 Justification for solutions used to solve circuit problems is documented
- 3.4 Work completion is documented, and relevant personnel are 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.

- Installation, fault finding, maintenance or development work functions of single source series circuits containing more than one load must be demonstrated in one of the following disciplines:
- computers
 - data communications
 - electrical
 - electronics
 - fire protection
 - instrumentation
 - refrigeration and air conditioning
 - renewable and sustainable energy systems
 - security technology

Unit Mapping Information

No equivalent unit

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 UEECD0046 Solve problems in single path circuits

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 work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures, including:
 - identifying and assessing hazards and risks
 - implementing control measures
 - safely measuring the parameters for the whole or any part of a d.c. circuit
- working safely with electric circuits in the electrotechnology sector, including:
 - checking circuits are isolated in accordance with workplace procedures and regulatory requirements
 - applying protections against the physiological effects of electrical currents
- determining the operating parameters of an existing circuit
- calculating values of voltage, current and resistance in single source series circuits given any two of these quantities
- calculating power in single source series circuits from known values of voltage and current and/or resistance
- connecting a series circuit: power supply, protection device, switch and load
- measuring values of voltage and current in single source series circuits
- measuring values of resistance
- altering an existing circuit to comply with specified operating parameters
- developing circuits to comply with a specified function and operating parameters
- identifying loss of supply
- using methodical techniques to solve circuit problems from measure and calculated values
- ensuring compliance with relevant Australian Standards and legislation
- completing work and documenting activities.

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:

- electrical concepts, including:
 - static and current electricity
 - production of electricity by renewable and non-renewable energy sources
 - transportation of electricity from the source to the load via the transmission and distribution systems
 - utilisation of electricity by the various loads
 - basic calculations involving quantity of electricity
- electrical circuits, including:
 - symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in a circuit diagram
 - purpose of each component in the circuit
 - effects of an open circuit, a closed circuit and a short circuit
 - multiple and sub-multiple units
- Ohm's Law including:
 - direct current (d.c.) single path circuit
 - voltage and currents levels in a basic d.c. single path circuit
 - effects of an:
 - open circuit
 - a closed circuit and a short circuit on a basic d.c. single path
 - relationship between voltage and current from measured values in a simple circuit
 - determining voltage, current and resistance in a circuit given any two of these quantities
 - graphical relationships of voltage, current and resistance
 - relationship between voltage, current and resistance
- electrical power, including:
 - relationship between force, power, work and energy
 - power dissipated in circuit from voltage, current and resistance values
 - power ratings of devices
 - methods for measuring electrical power in a d.c. circuit
 - effects of power rating of various resistors
- effects of electrical current, including:
 - physiological effects of current
 - principles by which an electric current can produce heat, light, motion and a chemical reaction
 - typical uses of the effects of current
 - mechanisms by which metals corrode
 - fundamental principles listed in AS/NZS 3000 for protection against the damaging effects of current
- electromotive force (EMF) sources and conversion of electrical energy, including:
 - input/output (I/O), efficiency and losses of electrical systems and machines

- principles of generating an EMF, including:
 - when a mechanical force is applied to a crystal
 - when moving a conductor in a magnetic field
 - by the application of light falling on the surface of photovoltaic (PV) cells
 - from the heating of one junction of a thermocouple
- principles of producing an electrical current from primary, secondary and fuel cells
- resistors, including:
 - types and applications of fixed and variable resistors used in the electrotechnology industry
 - identification of fixed and variable resistors
 - characteristics of temperature, voltage and light dependent resistors and typical applications of each
 - power ratings of a resistor
 - power loss (heat) occurring in a conductor
 - resistor colour code tables
 - specifying a resistor for a particular application
- series circuits, including:
 - circuit diagram of a single source single path circuit
 - identification of the major components of a series circuit: power supply, protection device, switch and loads
 - applications where series circuits are used in the electrotechnology industry
 - characteristics of a series circuit - connection of loads, current path, voltage drops, power dissipation and effects of an open circuit in a series circuit
 - the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities
 - relationship between voltage drops and resistance in a simple voltage divider network
 - techniques for setting up and connecting a single source single path circuit
 - methods for measurement of resistance, voltage and current values in a single source single path circuit
 - effect of an open circuit on a series connected circuit.

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, manufacturer instructions, 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>