



Australian Government

Department of Education, Employment and Workplace Relations

UEENEEE123A Solve basic problems electronic and digital equipment and circuits

Release: 1

UEENEEE123A Solve basic problems electronic and digital equipment and circuits

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers determining correct operation of basic electronic and digital equipment and circuits, and providing solutions as they apply to various electronic and computer work functions. It encompasses working safely, problem solving procedures, including the use of basic measuring devices, providing solutions derived from equipment behaviour and measurements to predictable problems.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE1 04A Solve problems in d.c. circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills
The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to work electronic and digital equipment.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The nature of the problem 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 that may be required for the work are identified and accessed in accordance with established 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 electronic and digital equipment problems.	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established methods are used to solve electronic and digital equipment problems from

ELEMENT**PERFORMANCE CRITERIA**

		observation or equipment behaviour and measured values.
	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3	Complete work and document problem solving activities.	
	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and appropriate person(s) notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in electronic and digital equipment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE123A Basic electronic and digital principles

Evidence shall show an understanding of basic electronic and digital principles to an extent indicated by the following aspects:

T1 Fundamental concepts

- insulators and conductors
- basic electrical units and engineering prefixes
- voltage, current and resistance
- Ohm's Law
- electrical power
- digital and analogue multimeters

T2 Alternating Currents and Waveforms

- waveforms (sine and square wave)
- the AC mains supply
- electrical safety
- fuses
- lamps and indicators

T3 Electromagnetic Waves and Signals

- electromagnetic waves
- the Radio Frequency spectrum
- wave propagation
- signals and bandwidth
- transmission lines and antennas
- harmonics

T4 Capacitance and inductance

- inductors and capacitors

T5 Electromagnetic Interference

- electrical noise
- induced currents and voltages
- cross-talk
- electromagnetic Interference

T6 Batteries

REQUIRED SKILLS AND KNOWLEDGE

- types of battery
- battery capacity
- care of batteries

T7 Techniques in the use of analogue and digital multimeters - broad overview of electronics theory applicable to commonplace electronic and computer equipment servicing and support tasks, and includes general appreciation of the topics and concepts rather than rigorous theoretical calculations and designs

T8 Analogue versus digital

- digital waveforms

T9 Number systems

- binary
- hexadecimal
- binary addition and subtraction
- number system conversions

T10 Codes

- ASCII
- ANSI
- error detecting codes
 - - parity
 - - check sums
 - - CRC
- error correction

T11 Basic logic

- AND, OR, NOT, XOR
- truth tables

T12 Data manipulation

- clocks and data rates
- basic storage cell
- registers
- ripple counter (binary counting)
- shift register (serial to parallel conversion)
- multiplexer and de-multiplexer
- bus architecture
 - - encoding / decoding
 - - addressing methods

T13 Analogue to digital conversion

T14 Digital to analogue conversion - broad overview of digital electronics theory applicable to everyday computer servicing and support tasks and encompasses topics and concepts and is not for in depth theoretical calculations and designs. Also

REQUIRED SKILLS AND KNOWLEDGE

there are no specific logic gates or logic levels involved.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the

assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met. Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Solving problems in electronic and digital equipment as described in 8) and including:

A Using methodical problem solving methods.

- | | |
|---|--|
| B | Taking and recording measurements correctly and accurately using relevant measuring equipment. |
| C | Deducing equipment behaviour correctly and accurately. |
| D | Providing written justification for the solutions to problems. |
| E | Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items. |

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving basic problems electronic and digital equipment.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are

assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit. The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Electronic and digital equipment problems as they apply to setting-up, fault finding, maintenance or development work functions in any of the following disciplines:
 - Computers
 - Data Communications
 - Electronics, and
- In relation to the following types of electronic and digital equipment problems
 - Determining the operating parameters of existing operating equipment
 - Altering existing equipment to comply with specified operating parameters.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Electrotechnology