



**Australian Government**

**UEENEEH127A Set up and adjust  
commercial radio frequency (RF)  
transmission and reception systems**

Release 3

## **UEENEEH127A Set up and adjust commercial radio frequency (RF) transmission and reception systems**

### **Modification History**

Release	Action	Core/Elective	Details	Points
3	Update		Correct Prerequisite title UEENEEH114A - Troubleshoot resonance circuits in an electronic apparatus	

### **Unit Descriptor**

#### **Unit Descriptor**

#### **1) Scope:**

##### **1.1) Descriptor**

This unit covers the setting-up and adjusting of RF transmission and reception systems for optimum performance. It encompasses safe working practices, signal testing and analysis, adjusting equipment, following procedures and documenting.

### **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 or approved training programs. It may be used to augment previously acquired competencies.

## 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 provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. 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.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

## 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

UEENEEH1 02A Repair basic electronic apparatus faults by replacement of components

**Prerequisite Unit(s)**

**4)**

UEENEEH1 13A Troubleshoot amplifiers in an electronic apparatus

UEENEEH1 39A Troubleshoot basic amplifier circuits

UEENEEH1 46A Solve fundamental electronic communications system problems

UEENEEH1 72A Fault find and repair communication systems

AND

UEENEEH1 14A Troubleshoot resonance circuits in an electronic apparatus

UEENEEH1 69A Solve problems in basic electronic circuits

OR

UEENEEG1 01A Solve problems in electromagnetic devices and related circuits

UEENEEG1 02A Solve problems in low voltage a.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 set-up and adjust commercial radio frequency (RF) transmission and reception systems	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
	1.3	Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
	1.4	Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
	1.5	Measurement parameters are identified by reviewing transmission/reception requirements and equipment manufacturer's instructions.
	1.6	Tools, equipment and testing devices needed

**ELEMENT**

**PERFORMANCE CRITERIA**

- for the work are obtained in accordance with established procedures and checked for correct operation and safety.
- 1.7 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with requirements.
- 1.8 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 1.9 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2 Set-up and adjust commercial radio frequency (RF) transmission and reception systems.
- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 Testing/measuring devices are connected and set up in accordance with requirements for a particular control system.
- 2.3 Measuring instruments are set up and adjusted in accordance with transmission/reception requirements and equipment manufacturer's instructions.
- 2.4 Adjustments are made to provide optimum transmission/reception performance within regulatory requirements.
- 2.5 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
- 2.6 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 2.7 Setting-up is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles.

**ELEMENT**

**PERFORMANCE CRITERIA**

- |   |   |     |   |
|---|---|-----|---|
| 3 | Completion and report set-up and adjustment activities. | 3.1 | OHS risk control work completion measures and procedures are followed.  |
|   |   | 3.2 | Work site is cleaned and made safe in accordance with established procedures.   |
|   |   | 3.3 | Adjustment settings are documented and an appropriate person or persons 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 setting-up and adjusting commercial radio frequency (RF) transmission and reception systems.

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

#### **KS01-EH127A Commercial radio frequency (RF) transmission and reception systems**

Evidence shall show an understanding of commercial radio frequency (RF) transmission and reception systems, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Electronic communications, transmission lines

- Time domain reflectometry measurements
- Radio frequency characteristics of transmission lines
- Losses in transmission lines
- Radiation characteristics of antennae
- Directional antennae
- Antennae matching
- UHF and microwave antennae

T2. Electronic communications, antennas and wave propagation

- Antenna fundamentals - characteristics of radio waves, antenna operation, antenna reciprocity and the basic antenna.
- Antenna types, feature and characteristics encompassing:
  - Dipole antennas and characteristics - radiation resistance, dipole length, antenna resistance, antenna Q and bandwidth, conical antennas, dipole polarisation, radiation patterns and directivity, antenna gain and folded dipoles
  - Marconi ground-plane vertical antenna features and characteristics - radiation pattern, ground plane radials and counterpoise, radiation resistance, antenna length and directivity,
  - UHF and microwave antennas
  - Relationship between directivity and gain
  - Antenna arrays - parasitic arrays and driven arrays
  - Impedance matching
- Radio wave propagation characteristics - optical characteristic, propagation through space
- Calculation of received power
- Antenna selection and location



## REQUIRED SKILLS AND KNOWLEDGE

- Transmission lines
- T3. Advanced electronic testing and measuring devices and techniques
- Test/measuring devices and their application - frequency counters, and synthesisers, spectrum analysers, noise and distortion meters and RF communications service monitor.
  - Connection of test/measuring devices into a circuit encompassing:
    - safety procedures
    - loading and matching
    - storage and delay
    - circuit arrangement of test/measuring devices
  - Taking and interpreting readings
  - Notion of decibels including dBm, dBr, dBu, dBo
- T4. Electronic communications, antennas and wave propagation
- Antenna fundamentals - characteristics of radio waves, antenna operation, antenna reciprocity and the basic antenna.
  - Antenna types, feature and characteristics encompassing:
    - Dipole antennas and characteristics - radiation resistance, dipole length, antenna resistance, antenna Q and bandwidth, conical antennas, dipole polarisation, radiation patterns and directivity, antenna gain and folded dipoles
    - Marconi ground-plane vertical antenna features and characteristics - radiation pattern, ground plane radials and counterpoise, radiation resistance, antenna length and directivity,
    - UHF and microwave antennas
    - Relationship between directivity and gain
    - Antenna arrays - parasitic arrays and driven arrays
    - Impedance matching
  - Radio wave propagation characteristics - optical characteristic, propagation through space
  - Calculation of received power
  - Antenna selection and location
  - Transmission lines

## 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 must 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 accord 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 influence decisions about how/how much 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 shall 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:
  - Set-up and adjust commercial radio frequency (RF) transmission and reception systems as described in 8) and including:
    - A Identifying measurement parameters.
    - B Setting-up and adjusting in accordance with transmission/reception requirements and equipment manufacturer's instructions.

- C Documenting adjustment settings with established procedures.
- D 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.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**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 by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions 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 commissioning commercial radio frequency (RF) transmission and reception systems.

**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 setting-up and adjusting a representative range of two different types of commercial radio frequency (RF) transmission and reception systems.

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)**

Electronics

