

1. Module details**Module name****Personal Radio Communications****Module duration**

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 36 - 40 hours.

Module code

NUE034

Discipline code

0703215 Communications Engineering/Technologies.

2. Module purpose

This module will provide students with the knowledge of a range of personal radio communications systems and the skills to service the equipment.

3. Prerequisites

NE39 Communication Fundamentals.

4. Relationship to competency standards

This module provides part of the underpinning knowledge and skills in the 'Evidence Guide' of specific units of competency in the National Electrotechnology Training Package and provides similar support, where mapped, to equivalent units in the National Metals and Engineering Competency Standards. For details refer to the module to unit maps, available from NUEITAB.

5. Content**Spectrum usage**

two-way commercial and industrial radio
CB Radio - 27 MHz, UHF, AM and SSB

Repeaters**Remote area communications**

Radio
Radiophone

Selcall

Satellite
Regulations

System installation**Common faults**

Fault-finding
Servicing
Repair

6. Assessment strategy

Assessment methods

Assessment should be progressive reflecting a holistic approach to ensure the module purpose is met. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests consisting of a number of item types, such as multiple choice, short answer and problem solving.

Conditions of assessment

Learning and assessment will take place in an environment that is conducive to a learner's development.

7. Learning outcome details

Learning outcome 1

List the spectrum allocations for Personal Radio Communications.

Assessment criteria

- 1.1 List the frequency allocations and transmission modes for two-way industrial and commercial wide-area radio communications.
- 1.2 List the frequency allocations and transmission modes for two-way industrial and commercial local-area or in-house radio communications.
- 1.3 List the frequency allocations and transmission modes for two-way non-commercial (Citizen's Band) radio communications.
- 1.4 Compare HF, VHF and UHF voice radio communications in terms of:
 - Handheld, vehicle-mounted and mains-powered equipment
 - Typical transmitter power outputs
 - Coverage expected
 - Types of antennas
 - Classes of interference
 - Influences on propagation, such as terrain and buildings.

Learning outcome 2

Describe the purpose, use and typical locations of repeaters.

Assessment criteria

- 2.1 Describe the practical limitations to HF, VHF and UHF propagation.
- 2.2 Describe a repeater in terms of signal power gain and frequency translation.
- 2.3 Describe the ability of repeaters to form multiple-station communications relays.
- 2.4 Given a communications path that exceeds a simple station-to-station leg, determine whether repeater installations will facilitate the path.

Learning outcome 3

Demonstrate techniques and systems used to provide communications to remote areas.

Assessment criteria

- 3.1 Describe the equipment, frequencies, power levels and transmission modes used for remote area radio communications.
- 3.2 List agencies that provide remote area radio communications networks and state typical operating frequencies.
- 3.3 Describe the frequencies, power levels and transmission modes used for remote area radiophone communications.
- 3.4 Describe the Selcall system and compare it to radio and radiophone systems.
- 3.5 Describe the equipment, frequencies, power levels and transmission modes used for satellite communications.
- 3.6 Describe the equipment inventory and setting up needed to meet nominated remote area communications needs.
- 3.7 Demonstrate operation of typical remote area radio communication equipment in realistic communications situations, and comment on the effectiveness of the systems used in meeting user communication needs.

Learning outcome 4

List regulations that control radio communications systems and name the relevant agencies.

Assessment criteria

- 4.1 List the various regulations that control radio communications.
- 4.2 Name agencies that originate and control radio communications regulations.
- 4.3 Determine agencies to which approaches should be made to resolve nominated communications problems.

Learning outcome 5

Demonstrate installation practices for radio communications equipment.

Assessment criteria

- 5.1 Describe use requirements for handheld radio communications equipment, including battery maintenance and elementary problem-solving.
- 5.2 Describe the installation requirements for vehicle-mounted communications equipment, including correct equipment mounting, antenna cabling and mounting, DC power provision and use of accessories.
- 5.3 Describe the installation requirements for mains-powered communications equipment, including correct equipment mounting, antenna cabling and mounting, radiation hazards and warnings, AC power provision and use of accessories.
- 5.4 Describe the installation requirements for satellite communications equipment, including correct equipment mounting, antenna cabling and mounting, radiation hazards and warnings, AC power provision and use of accessories.
- 5.5 Install radio communications equipment to the required standard(s) given a radio communications installation specification.

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| Learning outcome 6 | Demonstrate logical fault finding, repair and service techniques for common radio communications equipment faults. |
| Assessment criteria | <p>6.1 Name and describe common hazards to be expected during the diagnosis, servicing and repair of radio communications equipment and describe approved methods of dealing with the named hazards.</p> <p>6.2 Describe common faults with radio communications equipment and the effects of faults on equipment operation.</p> <p>6.3 Describe logical fault-finding techniques applicable to radio communications equipment.</p> <p>6.4 Describe approved repair and testing procedures applicable to radio communications equipment.</p> <p>6.5 Demonstrate fault testing and rectification procedures given nominated communications equipment faults.</p> |
| 8. Delivery of the module | <p>Delivery strategies must be suitable for learning both theoretical and practical aspects described in the module purpose. It is considered that the most effective method to achieve this is by integration of theory and practice where students learn by experimentation, research and reports. It is recommended that learning and assessment be facilitated in a holistic manner that may require learning outcome sequence other than that indicated in the module.</p> |
| Delivery strategy | <p>Notes. This module covers a wide variety of radio communications systems. Trainers may not possess extensive HF/VHF/UHF radio communications equipment.</p> <p>Radio amateur services use a wide variety of communications technologies and equipment. Amateur band communications require licensed operators to be in attendance. Given this requirement, trainers should consider using radio amateur facilities to assist in delivering this module.</p> <p>Where actual radio communications equipment is <i>not</i> available (or only a small inventory exists), trainers should consider the following.</p> <ul style="list-style-type: none"> • Visits to equipment manufacturers and distributors showrooms. • Visits to government, community, emergency services and commercial installations. |

- Visits to service/installation workshops.

Trainers should consider the following fault areas: power supply, frequency/channel selection, microphone, modulator stages, modulation mode control, transmitter master oscillator and driver stages, power amplifier stages, antenna cabling, antenna, receiver RF/IF stages, signal muting, demodulator, audio stages, speaker/headphones, front panel display.

Resource requirements

Resources should be sufficient for students to carry out learning activities on an individual basis. This will require the following:

Suitable laboratory equipment: benches, lighting, ventilation, adequate working space, seating.

Representative personal communications equipment, suitable antenna cabling and antennas, access to suitable extramural operating environments.

For specialised communications, such as amateur radio, appropriately licensed supervisors.

Test equipment: power supplies, connecting cables, multimeters, analog and digital signal generators, oscilloscopes, VSWR meters, RF power meters, RF loads, frequency counters.

Equipment/service manuals or textbook descriptions of equipment, including alignment and faultfinding procedures.

Occupational health and safety requirements

A safe and healthy environment will be provided for students and teachers as well as the particular safety procedures followed as part of the learning / teaching activity and content.