

1. Module details

Module name

Telecommunications Systems Overview

Suggested structured learning time

A learner possessing the prerequisite skills and knowledge should achieve the module purpose in 18 to 20 hours.

Module code

NUE192

Discipline code

Electrotechnology - 0703225.

2. Module purpose

This module provides the students with the knowledge and skills of the principles of sound, voice and the operating principles of basic telephone systems including customer switching systems (CSS) and basic data transmission. It also provides the student with the knowledge in cable handling procedures in handling electronic components to prevent electrostatic discharge damage.

3. Learning pathway

Intended use in the structured learning program

This module is intended to supplement workplace experience in working with telecommunication system. In particular it applies to knowledge of telecommunication system needed to effectively install cabling.

Therefore before undertaking this module a Learner should have a knowledge of standards and regulation, electrical circuitry and the need to work safety.

Recommended prerequisites

For the most effective learning this module should be undertaken only after modules NBB002, NUE056 and NUE190 have been completed.

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

1. Principles and characteristics of sound
2. Transmission of sound
3. Telephone transmitters
4. Telephone receivers

5. Telephone circuits
 - Components
 - Operation of basic telephone
 - Operation of basic facsimile machine
 - Cables used, colour and termination types
6. Overview earthing and protection
7. Customer switching systems (CSS), interfaces and devices
 - System Distribution Frames (SDF)/Test Point Frames (TPF), power fail and line interface requirements (eg Indial, ISDN, Rotary Groups, Extension, Tie-line circuits and the like)
8. Installation of CSS
9. Installation and Termination requirements overview
 - ACA regulations and requirements
 - Technical standards
 - Programming of CSS
 - Metering and Public/Pay Phones
10. Hazards
 - Electronic components and circuits
 - Printed circuit boards
 - Physical
 - Static discharge
 - Chemical

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	Determine the principles of sound techniques.
Assessment criteria	<ol style="list-style-type: none">1.1 State the characteristics of sound.1.2 Explain complex sound wave.1.3 Explain the difference between distortion and attenuation.1.4 Explain the term resonant frequency.1.5 Describe the generation of sound.1.6 Describe the term sound pressure level.
Learning outcome 2	Explain the transmission of sound.
Assessment criteria	<ol style="list-style-type: none">2.1 Describe compression and refraction.2.2 Describe transmission of sound through different media.2.3 Explain the meaning of wavelength.2.4 Explain the square rule for attenuation.2.5 Describe the building blocks of a basic telephone.
Learning outcome 3	Define the function of telephone transmitters.
Assessment criteria	<ol style="list-style-type: none">3.1 State the function of all types of telephone transmitters.3.2 List the types of transmitters used in telecommunications.3.3 Explain the operation of:<ul style="list-style-type: none">• Carbon transmitter• Capacitor (electret) transmitter• Dynamic (moving coil) microphone.
Learning outcome 4	Explain the function of telephone receivers.
Assessment criteria	<ol style="list-style-type: none">4.1 State the function of all types of telephone receivers.4.2 List the types of receivers used in telecommunications.4.3 Explain the operation of both the Rocking Armature receiver and the Dynamic receiver.4.4 State the difference between the Dynamic receiver and a loudspeaker.

Learning outcome 5	Identify the components and functions of the telephone.
Assessment criteria	<p>5.1 Identify the basic circuits of a telephone, including the:</p> <ul style="list-style-type: none">• Incoming signal circuit• 2 wire to 4 wire conversion circuit• Separation of directions of transmission circuit• Answering and release condition of the telephone circuit• Related components and devices <p>5.2 State the functions common to all telephones.</p> <p>5.3 Describe the basic operation of a facsimile machine in terms of transmission across telephone lines</p> <p>5.4 Describe the types of cables used in a basic, customer's telephone system</p> <p>5.5 Describe the cabling termination techniques used in a basic, customer's telephone system</p> <p>5.6 List the colour of cables typically used in a basic, customer's telephone system</p>
Learning outcome 6	Describe the purpose of earthing and protection in a telephone system
Assessment criteria	<p>6.1 Describe the basic function of an earthing and surge suppression system and the requirements set out in the relevant standard – TS009.</p> <p>6.2 Describe the purpose for installing a protection system to a telephone system</p>
Learning outcome 7	Define the basic functions of the Customer Switching Systems, metering and public/pay phones.
Assessment criteria	<p>7.1 Describe the basic functions of a customer switching system.</p> <p>7.2 Describe the difference between a key system and a PABX.</p> <p>7.3 Describe the evolution of Customer Switching Systems (CSS) from manual to digital.</p> <p>7.4 Describe the advanced features for CSS</p>

	7.5	Describe the basic operations of System Distribution Frames (SDF)/Test Point Frames (TPF), power fail and line interface requirements (eg Indial, Rotary Groups, ISDN, Extension, Tie-line circuits & the like).
	7.6	Describe the purpose, use, installation requirements, and types of metering devices used.
	7.7	Describe the purpose, use, metering and installation arrangements of public/pay phones
Learning outcome 8		Describe the method of installation of a CSS.
Assessment criteria	8.1	Using company or manufacturer’s documentation, describe the steps to install a CSS according to ACA technical standards.
	8.2	Describe the Customer Premises Rules associated with the installation of a CSS.
	8.3	Describe the CSS interfaces including: <ul style="list-style-type: none"> • System Distribution Frames (SDF) • Test Point Frames (TPF) • Maintenance Terminal • Operator Console.
	8.4	Describe the Customer Premises Rules associated with the installation of System Distribution Frames (SDF)/Test Point Frames (TPF), power fail and line interface requirements (eg Indial, Rotary Groups, ISDN, Extension, Tie-line circuits and the like).
Learning outcome 9		Briefly state the requirements for installation and termination of CSS
	9.1	State the ACA’s regulations for installing and terminating CSS
	9.2	Identify the technical standards applicable to the installation and termination of CSS
	9.3	State the requirements for programming of CSS
Learning outcome 10		Define the hazard associated the electronic components of CSS.
Assessment criteria	10.1	Identify hazards associated with electronic components and printed board assemblies (PBA’s).

8. Delivery of the module

Delivery strategy

10.2 Describe precautions used to minimise damage to components from:

- Static discharge
- Chemical damage
- Mechanical damage
- Electromagnetic Interference.

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.

Resource requirements

Resources should be sufficient for students to carry out learning activities on an individual basis. This will require a range of support equipment and reference material.

Students will require access to the following reference material or their replacements:

TS008

TS009

AS/NZS 1668

AS 1670

AS1851

AS 2220

AS/NZS 3000 series and related sub-standards

Telecommunications Act 1997 - overview

The Building Code of Australia Volumes 1-3

Australian Communications Authority Cabling Provider Rules, Benchmark Cabler Competency Requirements 2000

Communication Cabling Manual BCL Package

Certified Components List (CCL) or replacement

Labelling

Specialised facilities and equipment required by the training provider include:

- Access to a range of industrial, commercial & domestic sites

In addition learners will require access to:

Standard workshops and equipment should be available for practical exercises:

- Approved telecommunication tools
- Approved safety equipment

Where this module is used in an approved Traineeship or Apprenticeship program learners should be advised to obtain, where available, respective EEQSBA¹ **User Guides** (*these outline in detail what training and work performance the Learner is required to undertake for the program*).

¹ EEQSBA – ElectroComms and EnergyUtilities Qualifications Standards Body of Australia Ltd.

**Occupational health
and safety requirements**

A safe and healthy environment will be provided for learners and teachers. Safety procedures for the particular learning facilities shall be followed as part of the learning / teaching activity and assessment.