

1. Module details**Module name****Television Antenna Systems****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

NUE801

Discipline code

0703230

2. Module purpose

The purpose of this module is to provide students with the knowledge and skills to enable them to select television antennas and associated components for a given application.

3. Prerequisites

NUE101 Introduction to TV.

4. Relationship to competency standards

This module provides some of the knowledge and skills underpinning competence in the following standards: Metals and Engineering Industry National Competency Standards, Units 18.45A, 18.56A, 18.65A. National Electrotechnology Industry Standards, Units NES205, NES302, NES303, NES305, NES306, NES402, NES403, NES406, NES407.

5. Content**TV signal reception**

Inadequate / optimum / excessive signal level
Multipath transmission
Interference

TV antennas

Types
Operating characteristics
TV antenna terminology
Multiple antennas

Transmission lines

Types
Characteristic impedance
Attenuation
Bandwidth
Standing waves

Antenna distribution systems

Identical and adjacent channel interference
Masthead/distribution amplifiers
Diplexors
Triplexors
Splitters and couplers
“T” networks and existing loop wired networks

practical small distribution system design
 Field strength meters
 Attenuators
 VCR output injection

Satellite receivers
 Block diagram
 Operating characteristics

Antenna fault-finding

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

Normally learning and assessment will take place in a classroom / laboratory environment.

7. Learning outcome details

Learning outcome 1

Describe the common difficulties associated with television reception.

Assessment criteria

- 1.1 Describe the characteristics of optimum TV reception.
- 1.2 Describe the visual and audible symptoms of inadequate received signal level.
- 1.3 Describe the common methods used to overcome reception difficulties due to excessive signal level.
- 1.4 Describe the visual effects of a signal undergoing multipath transmission.
- 1.5 Describe the visual and audible symptoms of a signal undergoing various types of interference Identify the cause of various TV reception difficulties from visible symptoms.

Learning outcome 2

Describe the operating characteristics of common types of TV receiving antennas.

Assessment criteria

- 2.1 Describe the antenna terms gain, directivity, beam width, front to back ratio and bandwidth.
- 2.2 Sketch a simple yagi, phased array, log-periodic and co-linear television antenna.
- 2.3 Describe the operating characteristics of simple yagi antenna.
- 2.4 Compare the performance of each antenna for various reception conditions.
- 2.5 Describe the effects upon the picture if excessive antenna SWR is present.
- 2.6 State why baluns are required with most antennas and sketch the circuit of a simplified transformer balun.
- 2.7 Describe the operating characteristics of common types of multiple TV antennas.
- 2.8 Describe the principles of horizontal and vertical stacking of antennas and calculate appropriate parameters.

Learning outcome 3

Select an appropriate coaxial cable for a TV antenna.

Assessment criteria

- 3.1 Describe the term transmission line impedance and state the standard impedance for TV antenna systems.
- 3.2 Describe the effect of mismatching.
- 3.3 Describe the relationship between transmission losses and frequency.
- 3.4 Calculate the attenuation for a specific coaxial cable for the local VHF low, VHF high and/or UHF channels given the cable length and cable specifications.
- 3.5 Interpret the characteristics of antenna cable from manufacturer's data sheets.
- 3.6 Select the appropriate cable for a typical domestic TV antenna.
- 3.7 Use a field strength meter to measure signal attenuation between TV channels.

Learning outcome 4

Describe a multiple outlet TV aerial system.

Assessment criteria

- 4.1 Draw a diagram of a UHF/VHF antenna distribution system with up to four outlets.
- 4.2 Explain the need for various passive distribution components.
- 4.3 Calculate and measure the signal levels at various points and for different TV channels in an antenna distribution system.
- 4.4 Describe the signal problems associated with incorrect termination.
- 4.5 Describe the need for amplification in an antenna system.
- 4.6 Describe how a VCR signal can be mixed with incoming TV signals in an antenna system.
- 4.7 Select distribution components from a manufacturer's catalogue for a four outlet antenna distribution system.

Learning outcome 5

Describe the operation of satellite receiving system.

Assessment criteria

- 5.1 Draw a block diagram of a satellite downlink system.
- 5.2 Define the terms associated with satellite receiving systems.
- 5.3 List each of the components in a satellite television receiving system.

Learning outcome 6

Carry out performance testing and fault-find a multiple outlet antenna system.

Assessment criteria

- 6.1 Describe and carry out performance testing of multiple outlet antenna systems.
- 6.2 Carry out fault finding within an antenna system.

8. Delivery of the module

Delivery strategy

Delivery strategies must be suitable for learning both theoretical and practical aspects described in the module purpose. It is considered that the most effective way to achieve this is by the integration of theory and practice where students learn by experimentation and through research and laboratory reports. It is recommended that learning and assessment be facilitated in a holistic manner which may require a learning outcome sequence other than that indicated in the module.

Resource requirements

Resources should be sufficient for students to carry out experiments on an individual basis. This will require a range of antennas, coaxial cable and test equipment.

Useful references include:

Ibrahim KF 1994, *Television Receivers*
Longman Essex, England
ISBN 0-582-086175

Liff A et al 1993, *Colour and Black and White Television*
Prentice Hall, Englewood Cliffs
ISBN 0-13-150012-0

Zarach et al 1985, *Television: Principles and Practice*
MacMillan, Hampshire

Trundle E 1996, *Newnes Guide to TV and Video Technology*
Butterworth-Weinermann Oxford
ISBN 07506 23748

Botto D 1992, *A Basic Guide to Colour TV and VCRs*
Electronics Australia, Federal Publishing, Alexandria

Hills Industries, *Antenna Installation Manual*
Hills Industries, Edwardstown, SA 5036
ISBN 007573413

ESI, *Antenna Standards*, ESIA
PO. Box 154, Carlingford, NSW
2118

AS 3815-1998, *A guide to coaxial cabling in single and multiple premises*
Standards Australia, Homebush

AS 1367-1885, *Multiple outlet distribution systems – Sound and vision*
Standards Australia, Homebush

Humphris R, *TV Antennas*
in Technician Electronics,
RMIT

**Occupational health
and safety requirements**

A safe and healthy environment will be provided for students and teachers as well as safe procedures with regard to learning / teaching activities.