

**1 Module Details**

**Module Name**

**Digital Television Transmission Towers and Equipment**

**Nominal duration**

36 - 40 Hours

**Module code**

NUE409

**Discipline code**

0703230

**2 Module purpose**

This module aims to provide the student with knowledge of the digital transmission chain and an understanding of the procedures necessary for installation and commissioning Digital Television Transmission Towers & Equipment.

**3 Prerequisites**

Communications Fundamentals NE039  
Digital Electronics 2 NE180  
Amplifiers 2 NE183

**4 Relationship to competency standards**

This module provides some of the knowledge and skills underpinning competency in the following standards:  
National Electrotechnology Industry Standards, Units:  
NES207, NES302, NES403, NES502, NES703.

**5 Content**

1. Program Input and Monitoring Equipment
  - Digital baseband;
    - routing issues
    - measuring equipment
  - Digital Radio Frequency (RF) measuring equipment
2. Digital Television Terrestrial Broadcast Transmitters
  - Digital modulators
  - Digital transmitters
  - Transmitter:
    - (a) cooling systems (air, liquid).
    - (b) signal measurement techniques.
3. Digital Television Terrestrial Broadcast Transmitters
  - Combiner and Antenna systems
    - performance requirements of combiners and
    - antenna systems

	<p>4. DTTB Telemetry</p> <ul style="list-style-type: none"><li>- alarm types</li><li>- simulate various equipment failures</li><li>- overall system to confirm validity of telemetry</li><li>- responses</li></ul>
<p><b>6 Assessment strategy</b></p> <p><b>Assessment methods</b></p>	<p>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.</p>
<p><b>Conditions of assessment</b></p>	<p>Learning and assessment will take place in an environment that is conducive to a learner's development.</p>
<p><b>7 Learning Outcome Details</b></p>	
<p><b>Learning Outcome 1</b></p>	<p>Describe the requirements of DTTB program input and monitoring equipment.</p>
<p><b>Assessment criteria</b></p>	<p>1.1 Sketch a block diagram of a basic system using a central router connected to a number of control rooms.</p> <p>1.2 Describe the terminologies "Vertical, Multi-level and Tie-line Routing".</p> <p>1.3 Identify typical signal types processed by a router.</p> <p>1.4 State the purpose of "<i>redundant CPU's and power supply units</i>".</p> <p>1.5 Identify common control protocols used in routers.</p> <p>1.6 Explain the meaning of the term "<i>cross point</i>".</p> <p>1.7 State typical analogue audio and video output voltage levels present at the router.</p> <p>1.8 State typical specifications for digital data signals present at the router.</p> <p>1.9 Describe the function of a range of test equipment used in DTTB measurements.</p>

**Learning Outcome 2**

**Assessment criteria**

Describe the operating characteristics of a digital television terrestrial broadcast (DTTB) transmitter.

- 2.1 Draw a block diagram of a typical DTTB digital transmission system.
- 2.2 State the safety precautions required when working with high power RF transmitters.
- 2.3 Identify the operating characteristics of a typical MPEG encoder.
- 2.4 Describe the operation of a coded orthogonal frequency division multiplex (COFDM) modulator.
- 2.5 Draw a simplified block diagram of a DTTB transmitter
- 2.6 Outline the purpose of an up converter in a DTTB transmitter.
- 2.7 List typical characteristics of a DTTB power amplifier.
- 2.8 Discuss the advantages and disadvantages of air and liquid cooling systems used in transmitters.
- 2.9 Perform typical DTTB transmitter measurements.

**Learning Outcome 3**

**Assessment criteria**

Describe the performance requirements of the DTTB combiner and antenna systems.

- 3.1 Identify the minimum channel separation required between digital and analogue TV channels
- 3.2 List typical specifications of an antenna combiner system.
- 3.3 State the need for combiner systems in DTTB systems.
- 3.4 Diagnose and repair fault systems in combiners and antenna system.

**Learning Outcome 4**

**Assessment criteria**

Describe the requirements of remote monitoring and measurement equipment

- 4.1 Describe the purpose of a range of control panel indicators and controls.

- 4.2 Describe how the system manages a critical failure (such as a power supply or a CPU).
- 4.3 Identify three different system alarm signals.
- 4.4 Perform periodic equipment self tests and diagnostic routines on DTTB systems.
- 4.5 Diagnose and rectify faults in DTTB systems.
- 4.6 State the function of the basic components of a DTTB system.
- 4.7 Identify the typical units of a DTTB Telemetry system

## 8 Delivery of 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 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.

Useful references include:

AS4933.1/2000 Digital Television – Requirements for Receivers Part 1: VHF/UHF/DVD-T Television Broadcast

Where this module is used in an approved Traineeship or Apprenticeship program learners should be advised to obtain, where available, respective EE-Oz Training Standards<sup>1</sup> *User Guides* (these outline in detail what training and work performance the Learner is required to undertake for the program).

### 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 content.

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<sup>1</sup> EEQSBA – ElectroComms and EnergyUtilities Qualifications Standards Body of Australia Ltd trading as EE-Oz Training Standards ([www.ee-oz.com.au](http://www.ee-oz.com.au))