

<b>Title</b>	<b>Demonstrate and apply elementary knowledge of wireless transmission</b>		
<b>Level</b>	<b>2</b>	<b>Credits</b>	<b>5</b>

<b>Purpose</b>	<p>This unit standard is intended for use in the training of electronics technicians. It covers the elementary knowledge of signals and transmission of information fundamental to an understanding of electronics and telecommunications.</p> <p>People credited with this unit standard are able to demonstrate:</p> <ul style="list-style-type: none"> <li>– knowledge of waveforms;</li> <li>– knowledge of concepts of bandwidth, communication channels, and transmission media; and</li> <li>– apply knowledge of concepts of wireless transmission.</li> </ul>
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<b>Classification</b>	Electronic Engineering > Core Electronics
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<b>Available grade</b>	Achieved
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### Guidance Information

- 1 This unit standard has been developed for learning and assessment off-job.
- 2 References
 

Duncan, Tom, *Electronics for Today and Tomorrow*. (London, John Murray Ltd, 1997) ISBN: 0719574137;

Health and Safety in Employment Act 1992 and associated regulations; and all subsequent amendments and replacements.
- 3 Definitions
 

*AF* – audio frequency.

*Digital modulation* – the process of varying one or more parameters of a carrier wave as a function of two or more finite and discrete states of a signal.

*Electromagnetic spectrum* – the range of frequencies of electromagnetic radiation from zero to infinity. The International Telecommunication Union (ITU) formally recognizes 12 bands, from 30 Hz to 3000 GHz. Bands from 3 THz to 3000 THz are under consideration for recognition by the ITU.

*Elementary knowledge* – for the purposes of this unit standard means basic operational knowledge of the subject matter with the ability to use that knowledge to understand readily available information.

*Enterprise practice* – those practices and procedures that have been promulgated by the company or enterprise for use by their employees.

*Industry practice* – those practices that competent practitioners within the industry recognise as current industry best practice.

*RF* – radio frequency.

*Simple terms* – for the purposes of this unit standard means a non-mathematical treatment generally employing block diagrams identifying key points.

#### 4 Range

- a Emerging and evolving technologies are to be considered in conjunction with the learning and assessment of this unit standard.
- b Electrical, radiation, and workshop or laboratory safety practices are to be observed at all times.
- c All activities and evidence presented for all outcomes and performance criteria in this unit standard must be in accordance with legislation, policies, procedures, ethical codes, Standards, applicable site and enterprise practice, and industry practice; and, where appropriate, manufacturers' instructions, specifications, and data sheets.

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## Outcomes and performance criteria

### Outcome 1

Demonstrate knowledge of waveforms.

#### Performance criteria

- 1.1 The concepts of frequency, wavelength, and amplitude of sine waves are explained, and wavelength is calculated from frequency and velocity.
- 1.2 The electromagnetic spectrum is described in terms of frequency bands, band characteristics, and typical usage.
- 1.3 The concept of adding sine waves to form more complex waveforms is explained.

### Outcome 2

Demonstrate knowledge of concepts of bandwidth, communication channels, and transmission media.

#### Performance criteria

- 2.1 The concept of a signal is defined as a waveform containing intelligent information.
- 2.2 The concept of bandwidth is explained from the point of view of the range of constituent frequencies of a complex signal.
- 2.3 A communication channel is defined in terms of a means of information transmission and its characteristics are described in non-mathematical terms.  
  
Range characteristics – bandwidth, bandwidth 3 dB points, attenuation, relationship between bandwidth and the amount of information transmitted.

2.4 Signals conveying different types of information are compared from the point of view of bandwidth requirements for satisfactory transmission.

Range types of information – telephone speech, music, video, data, mobile phone text, television.

2.5 Signal impairment is described in terms of noise, distortion, and bandwidth limitations.

2.6 Transmission media are compared from the point of view of their characteristics and bandwidth.

Range transmission media – twisted copper pair, coaxial cable, fibre optic cable, wireless.

### Outcome 3

Demonstrate and apply knowledge of concepts of wireless transmission.

#### Performance criteria

3.1 Electromagnetic wave propagation is described in simple terms.

Range propagation – antenna, attenuation, ionosphere, direct wave, surface wave, sky wave.

3.2 Modulation concepts are described in simple terms, and typical waveforms sketched.

Range amplitude modulation, frequency modulation, digital modulation.

3.3 A radio transmitter is explained in simple terms with reference to sketches of block diagrams and waveforms.

Range transmitter sketch – microphone, AF amplifier, RF oscillator, modulator, RF power amplifier, aerial.

3.4 A simple radio receiver is constructed and its operation explained.

Range simple receiver consisting of – tuned circuit, detector, RF filter, simple audio amplifier stage.

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**This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.**

**Status information and last date for assessment for superseded versions**

Process	Version	Date	Last Date for Assessment
Registration	1	27 November 2002	31 December 2011
Revision	2	17 March 2004	31 December 2011
Review	3	25 May 2007	31 December 2012
Review	4	21 July 2011	31 December 2024
Review	5	25 May 2023	31 December 2024

**Consent and Moderation Requirements (CMR) reference**

0003

This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.