

Title	Performance test and repair faulty electronic communications equipment		
Level	4	Credits	15

Purpose	<p>This unit standard is intended for electronics technicians who are responsible for performance testing and the diagnosis and repair of faults in electronic communications equipment to unit or component level.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – performance test electronic communications equipment; – diagnose faulty electronic communications equipment; and – repair, test, and restore electronic communications equipment to service.
----------------	--

Classification	Electronic Engineering > Electronic Installation and Maintenance
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26725 <i>Demonstrate and apply knowledge of electronic product reliability and advanced electronic measurement and diagnosis</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- 1 This unit standard has been developed for learning and assessment on-job or off-job.
- 2 References
AS/NZS 3760:2010, *In-service safety inspection and testing of electrical equipment*;
AS/NZS 4836:2001, *Safe working on low-voltage electrical installations*;
Electricity Act 1992;
Electricity (Safety) Regulations 2010;
Health and Safety in Employment Act 1992 and associated regulations;
IPC-7711/7721 B *Rework, Modification and Repair of Electronic Assemblies*,
(November 2007);
Radiocommunications Act 1989;
Radiocommunications Regulations 2001;
Radio spectrum management licensing requirements available from the Ministry of Economic Development website at <http://www.rsm.govt.nz/cms>;
and all subsequent amendments and replacements.

3 Definitions

AM – amplitude modulation.

BITE – built in test equipment.

BER – Bit Error Rate

Communications equipment – dedicated receiver or transmitter equipment or the receiver or transmitter section of transceivers and includes any of – LF, HF, UHF, VHF, SHF, using AM, FM, or DM.

DM – 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.

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

FM – frequency modulation.

HF – high frequency.

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

LF – low frequency.

RF – radio frequency.

SHF – super high frequency.

SINAD – *signal to noise and distortion ratio, frequency, modulation, distortion, signal noise and distortion.*

UHF – ultra high frequency.

VHF – very high frequency.

4 Range

- a The type of diagnosis and repair work required to achieve this unit standard must include:
 - i diagnosis and repair of equipment to unit and/or component level depending on servicing data and enterprise policy;
 - ii use of test instruments to identify faults, measure and adjust equipment, and confirm proper performance. Typical instruments include multimeters, oscilloscopes, signal generators, and signal tracers. More specialised instruments may be required depending on the nature of the equipment.
- b Candidates are expected to meet the outcomes of this unit standard without direct technical supervision, and with complete responsibility for the quality and quantity of output.
- c Electrical, radiation, and workshop or laboratory safety practices are to be observed at all times.
- d Measurements may be expressed in Système Internationale (SI) or Imperial units, and, where required, converted from Imperial units to SI units and vice versa.
- e Recognised industrial standards are to be used for calculations.
- f All activities and evidence presented for all outcomes and evidence requirements 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.
- g Evidence for the number and type of equipment chosen are left to the discretion of the assessor, but must be sufficient to assess competence in all outcomes of the unit standard.

Outcomes and evidence requirements

Outcome 1

Performance test electronic communications equipment.

Evidence requirements

- 1.1 Equipment operation is tested and compared against specifications.
- Range for analogue receivers – includes but is not limited to – tuning, bandwidth, selectivity, modulation and distortion, automatic gain control, correct mode of operation;
for digital receivers – includes but is not limited to – tuning, bandwidth, sensitivity at specified BER, bit error rate testing, fading tests, correct mode of operation;
evidence is required for either analogue or digital receivers;
for transmitters – includes but is not limited to – frequency tuning, expected gain and power output, correct mode of operation.
- 1.2 Equipment performance is tested and compared against specifications.
- Range for analogue receivers – includes but is not limited to – BITE tests, measurements of selectivity, noise figure, signal to noise ratio, frequency, modulation, distortion, SINAD, audio measurement, spurious emissions;
for digital receivers – includes but is not limited to – BITE tests, measurements of BER, adjacent channel selectivity, fading tests, spurious emissions;
evidence is required for either analogue or digital receivers;
for transmitters – includes but is not limited to – BITE tests, measurements of RF output power, standing wave ratio, frequency, modulation, inter-modulation products, spurious emissions.
- 1.3 Test results are recorded in accordance with enterprise practice.

Outcome 2

Diagnose faulty electronic communications equipment.

Evidence requirements

- 2.1 Fault symptoms or substandard equipment performance are identified.
- 2.2 Diagnosis uses diagnostic techniques, tools, instruments, BITE where available, and servicing data.

- 2.3 Diagnosis identifies the lowest replaceable or repairable faulty unit or component in accordance with servicing data and enterprise practice.
- 2.4 Anti-static precautions are observed to protect components from static damage.
Range includes but is not limited to – packaging, storage, transport, handling.
- 2.5 Diagnostic processes do not damage the equipment.
- 2.6 Diagnostic report is in accordance with enterprise practice.

Outcome 3

Repair, test, and restore electronic communications equipment to service.

Evidence requirements

- 3.1 Replacement or repair of faulty units or components is in accordance with servicing data and enterprise practice.
- 3.2 Replacement or repair does not damage other parts of the equipment.
- 3.3 Equipment is reassembled in a manner that prevents damage and conforms to the manufacturers' layout.
Range layout – lead dress, screw location, shields and screens, board positioning and securing, cover positioning and fastening.
- 3.4 Testing confirms electrical safety.
- 3.5 Testing confirms that the repaired equipment is ready for service.
- 3.6 All actions are recorded in accordance with enterprise practice.

Replacement information	This unit standard replaced unit standard 6062 and unit standard 6063.
--------------------------------	--

Planned review date	31 December 2016
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 July 2011	N/A

Consent and Moderation Requirements (CMR) reference	0003
--	------

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

Please note

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMRs). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

Comments on this unit standard

Please contact the ElectroTechnology Industry Training Organisation reviewcomments@etito.co.nz if you wish to suggest changes to the content of this unit standard.