Title	**Demonstrate knowledge of signal distribution systems**		
Level	**4**	**Credits**	**15**

Purpose	This unit standard is intended for service technicians and servicepersons who install, diagnose and repair signal distribution systems and support facilities. People credited with this unit standard are able to: – demonstrate knowledge of signal distribution systems; – read and interpret electrical diagrams to describe signal distribution systems functions; – demonstrate knowledge of types of cables and connections used in signal distribution systems; – demonstrate knowledge of connecting hardware and support facilities used with signal distribution systems; – demonstrate knowledge of the impact of an emerging or converging technology for signal distribution systems; and – describe professional development opportunities regarding new technologies for signal distribution systems.

Classification	Electrical Engineering > Electrotechnology

Available grade	Achieved

Guidance Information

1 Recommended unit standards for entry:
Unit 27912, *Demonstrate knowledge of electrical principles in an electrotechnology or telecommunications environment*;
Unit 30641, *Demonstrate knowledge of electromechanical engineering principles for technicians*;
Unit 30648, *Demonstrate knowledge of installation practices and procedures for customer premises systems*.

2 References
AS/NZS 1367:2016 *Coaxial cable and optical fibre systems for the RF distribution of digital television, radio and in-house analog television signals in single and multiple dwelling installations,* available from https://www.standards.govt.nz/*;*
AS/NZS 3000:2018: *Electrical Installations - Known as the Australian/New Zealand Wiring Rules*, available from https://www.standards.govt.nz/;
AS/NZS 3085:1:2004 *Telecommunications installations - Administration of communications cabling systems - Basic requirements*, available from https://www.standards.govt.nz/;
AS/NZS 11801.1:2019 *Information technology - Generic cabling for customer*

premises Part 1: General requirements (ISO/IEC 11801-1:2017, MOD), available from https://www.standards.govt.nz/;
Consumer Guarantees Act 1993;
Contract and Commercial Law Act 2017, *Part 3 Sale of Goods*;
Electricity Act 1992;
Electricity (Safety) Regulations 2010;
Fair Trading Act 1986;
Hazardous Substances and New Organisms Act 1996 1 October 2018 reprint;
Health and Safety at Work (Hazardous Substances) Regulations 2017;
Health and Safety at Work Act 2015;
New Zealand Electrical Codes of Practice, ISSN 0114-0663, available from https://worksafe.govt.nz;
Privacy Act 1993;
Resource Management Act 1991;
SA/SNZ HB 252:2014 *Communications cabling manual - Module 3: Residential communications cabling handbook,* available from https://www.standards.govt.nz;
TCF Premises Wiring Cable Installers Guidelines for Telecommunications Services, available from http://www.tcf.org.nz;
and all subsequent amendments and replacements.

3 Definitions

Company practice – those practices and procedures that have been circulated by the company for use by their employees.
Industry conventions – a set of agreed, specified, or generally accepted standards.
Industry practice – those practices that competent practitioners within the industry recognise as current industry best practice.
Safe and sound practice – relating to the installation of electrical equipment as defined in AS/NZS 3000:2018 *Electrical Installations - Known as the Australian/New Zealand Wiring Rules.*
Service technicians and servicepersons – for the purposes of this unit standard means, people who hold or who are working towards electrical registration as an Electrical Service Technician, Electrical Appliance Serviceperson (endorsed to disconnect and connect), or Electrical Appliance Serviceperson.

4 Assessment

a Competence may be assessed on:
  i MATV, SMATV, IRS systems or installations may include but are not limited to – ATTV, DTTV, systems for sound transmission, digital satellite TV, cable TV (analogue and digital systems), HDTV, pay-per-view, video-on-demand, Web TV, IPTV, DAB;
  ii Cabling may include but is not limited to – optical fibre, twisted-pair, coaxial copper, data cable or some combination of these;
  iii Connecting hardware may include but is not limited to – servers, aerials, connecting blocks, patch panels, interconnections, cross-connections, set top box, combiner, splitter, IF switch, ethernet switch or some combination of these components;
  iv Support facilities which may include but is not limited to – cable support hardware, fire stopping and grounding hardware.
b All measurements are to be expressed in Système Internationale (SI) units and multipliers.
c Mathematical proof of the subject matter covered by this unit standard is not required.

5 Range
- a All activities and evidence presented for all outcomes and performance criteria in this unit standard must be in accordance with:
  - i legislation;
  - ii policies and procedures;
  - iii ethical codes;
  - iv Standards – may include but are not limited to those listed in Schedule 2 of the Electricity (Safety) Regulations 2010;
  - v safe and sound practice;
  - v applicable site, company and industry practice, and industry conventions;
  - vi where appropriate or applicable, environmental requirements, manufacturer instructions, specifications, data sheets and manufacturer, supplier and company health and safety procedures.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of signal distribution systems.

Performance criteria

1.1 Compare the advantages and disadvantages of MATV or IRS types.

Range evidence of five is required.

1.2 Compare head end to distribution.

1.3 Describe system gain, and calculate the system gain.

1.4 Compare modulation of digital signals and cable TV systems.

Range QAM, QPSK, QPSK – QAM transmodulation.

1.5 Describe system interfaces, explain how they work and identify the nature of the interface signals.

Range interface – may include but is not limited to – hardware, human, electronic, optical, signal;
evidence of three is required.

1.6 Describe typical configuration requirements for signal distribution systems.

Range description includes how the configuration is carried out;
evidence of three is required.

1.7 Describe the use of test equipment required to take measurements, and perform adjustments in terms of configuration, commissioning, performance and restoration of operation of systems and hardware.

1.8 Identify hazards associated with installing or servicing systems and interfaces and outline the safety procedures in each case.

Outcome 2

Read and interpret electrical diagrams to describe signal distribution systems functions.

Performance criteria

2.1 Describe signal distribution systems functions using electrical diagrams.

Range diagrams may include but is not limited to – block diagrams, functional flow block diagrams, signal flow graph, schematic; evidence of three different systems using at least two types of diagrams is required.

2.2 Explain the function and theory of operation of an identified segment or section.

2.3 Describe the expected values and identify the test points for expected signals associated with an identified segment or section.

2.4 Identify faults for a segment or section and describe symptoms for the fault conditions in terms of expected changes to signals attributable to the fault.

2.5 Describe the operation of hardware and support facilities used with the signal distribution systems.

Range evidence of hardware and support facilities relevant to two systems is required.

2.6 Describe the expected measurements at given points of the hardware and support facilities described for the signal distribution systems.

Outcome 3

Demonstrate knowledge of types of cables and connections used in signal distribution systems.

Performance criteria

3.1 Compare and contrast the types of cables used to form a signal distribution system.

Range may include but is not limited to – construction, application, installation requirements, performance, interface between cable types.

3.2 Compare categories of Ethernet cables in terms of application and performance.

Range may include but is not limited to – Cat 5, Cat 5e, Cat 6, Cat 6a, crossover.

3.3 Describe the pinout and wiring when using Cat 5 and Cat 5e cabling.

3.4 Compare T568A and T568B colour codes for RJ45 modular plugs in terms of pinout.

Outcome 4

Demonstrate knowledge of connecting hardware and support facilities used with signal distribution systems.

Performance criteria

4.1 Explain the operation of common interfacing methods used with the hardware and support facilities in terms of method and expected data transfer.

Range evidence of four types of interface is required.

4.2 Describe features and specifications of the identified interfaces between the hardware and support facilities and the signal distribution systems.

4.3 Describe common human interface systems in terms of type, user-friendliness, and reliability.

4.4 Identify faults in hardware and support facilities, and describe symptoms for given fault conditions in terms of expected changes to signals and voltages attributable to the fault.

Outcome 5

Demonstrate knowledge of the impact of an emerging or converging technology for signal distribution systems.

Performance criteria

5.1 Describe an emerging or converging technology that may impact on existing systems or hardware with reference to purpose, facilities or services offered.

Range selected technology should be one applicable in the New Zealand environment.

5.2 Explain how the emerging or converging technology will impact upon or integrate with existing technologies.

Range may include but is not limited to customer benefit, business efficiencies, competitive advantage.

Outcome 6

Describe professional development opportunities regarding new technologies for signal distribution systems.

Performance criteria

6.1 Describe professional development opportunities for new technologies in New Zealand.

Range may include but is not limited to – conferences, trades shows, internal and external training courses, product courses, meetings, books, brochures, manuals, surveys, webinars; evidence of three is required.

Planned review date	31 December 2024

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 January 2020	N/A

Consent and Moderation Requirements (CMR) reference	0003

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

Comments on this unit standard

Please contact The Skills Organisation reviewcomments@skills.org.nz if you wish to suggest changes to the content of this unit standard.