



Australian Government

ICTTEN435 Solve electrical-based telecommunications circuitry and cabling problems

Release: 1

ICTTEN435 Solve electrical-based telecommunications circuitry and cabling problems

Modification History

Release	Comments
Release 1	This version released with ICT Information and Communications Technology Training Package Version 5.0.

Application

This unit describes the skills and knowledge required to solve electrical-based problems encountered in analog and digital signal equipment, signal cabling and wireless networking in the telecommunications sector.

It applies to technicians who undertake a range of functions requiring advanced techniques in testing, fault-finding and rectification for electrical circuitry common to telecommunications signal transmission and operation. These technicians may work in domestic, commercial or industrial situations.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

ICTTEN208 Use electrical skills when working with telecommunications networks

Unit Sector

Telecommunications – Telecommunications Network Engineering

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Prepare to solve problems within given telecommunications circuitry/cable	1.1 Determine need to test live or isolate circuitry 1.2 Use specifications or job documentation to verify circuit/signal parameters that are to be measured for a given problem 1.3 Select appropriate test equipment and measure output voltage of

ELEMENT	PERFORMANCE CRITERIA
	digital device for <i>high</i> and <i>low</i> logic states 1.4 Identify by calculation or given specifications and record expected values within given electrical circuit 1.5 Determine appropriate fault-finding technique to be used for given problem 1.6 Select appropriate test equipment and measure circuit according to methodologies already determined 1.7 Select and source required hand tools/equipment for problem-solving telecommunications circuitry
2. Test and record electrical operating parameters within given telecommunications circuitry/cable	2.1 Apply work health and safety (WHS) procedures to given task 2.2 Isolate circuitry from live source when risk process has indicated that action be taken 2.3 Connect appropriate test devices within electrical circuit to obtain operational measurements as pre-determined 2.4 Reduce circuit path following accepted fault-finding methodologies and test 2.5 Record measured results obtained
3. Analyse and report findings	3.1 Analyse results obtained against specifications and parameters provided 3.2 Determine appropriate circuits and actions to rectify circuitry necessary to resolve given problem 3.3 Supply customer with report on fault/s and options to resolve issue/s

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance, but not explicit in the performance criteria.

Skill	Description
Reading	Reads and responds to complex workplace information contained in specification manuals and standards
Writing	Writes reports for customer on complex issues
Oral Communication	Uses oral communication skills to participate in workplace teams and to liaise with customers and stakeholders.

Skill	Description
Numeracy	• Calculates with whole numbers, decimals and percentages for work • Uses common functions of a scientific calculator for work • Uses and calculate with complex measurements for work
Learning	• Uses strategies for work-related learning • Plans and manages complex workplace tasks
Get the work done	• Works logically and systematically to undertake clearly defined tasks • Analyses task requirements to decide on appropriate equipment and practices • Applies problem-solving processes to locate and resolve faults, and reviews impact of decisions • Determines WHS and risk mitigation required for given tasks

Unit Mapping Information

No equivalent unit. New unit.

Links

Companion Volume Implementation Guides are available from VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2>

Assessment Requirements for ICTTEN435 Solve electrical-based telecommunications circuitry and cabling problems

Modification History

Release	Comments
Release 1	This version released with ICT Information and Communications Technology Training Package Version 5.0.

Performance Evidence

The candidate must demonstrate the ability to perform the tasks outlined in the elements, performance criteria, and foundation skills, and to:

- apply work health and safety (WHS) procedures to problem-solving electrical circuitry and cables
- connect suitable test devices incorporating a multimeter and an oscilloscope to investigate operational parameters within AC and DC circuit/s
- perform measurements and calculations on both series and parallel circuits by comparing actual readings with calculated values
- calculate and verify through tests the voltage, current and resistance in both a series and parallel AC/DC given circuit
- apply fault-finding techniques to rectify at least three electrical issues in telecommunications AC/DC circuits
- use circuit characteristics including inductance, impedance and capacitance to improve electrical or signal performance for two basic electronic filter designs
- resolve three electrical issues in an AC/DC circuit.

Note: Evidence must be provided at least once when a specific volume or frequency is not stated.

Knowledge Evidence

The candidate must demonstrate the knowledge required to perform the tasks outlined in the elements, performance criteria, and foundation skills, which includes knowledge about:

- safe work practices in electrical work including relevant codes of practice
- localised electrical regulatory requirements including limitations of certain electrical work
- hazards and risks involved in using electrical instruments and the safety control measures within a telecommunications system
- principles of AC and DC electricity and how they impact telecommunications work including:
 - AC and DC electrical International System of Units (SI units)

- symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in a circuit diagram including:
 - series and parallel circuits for AC and DC circuits
 - Ohm's Law and other relevant calculations for AC and DC circuits
 - common circuit configurations
 - current and voltage phase relationships
- waveform characteristics caused by resistance, inductance and capacitance in AC and DC circuits
- common faults that cause an increase or decrease in resistance, voltage and current found in telecommunications circuits
- definitions of electrical terms: period, peak, peak-to-peak, instantaneous, average, root-mean-square value in relation to electrical waveforms
- AC electrical generation producing a sinusoidal waveform including:
 - differences between analog and digital signals and devices
 - sinusoidal, pulsed, and static value waveforms found in AC circuitry
 - characteristics of resonance in AC circuits
- transformer use in electrical circuits including:
 - basic construction, operating principles and use of transformers
 - step-up, step-down, turns ratios, voltage and current ratios
 - verification of operation of transformer circuit
- fault-finding techniques including:
 - half circuit split
 - quarter circuit split
 - towards or away from source
- selection and use of testing equipment in telecommunications circuitry including:
 - test devices used for signal measurement
 - test devices for voltage, current and resistance
- telecommunications signal conversion characteristics including:
 - analog and digital signals
 - signal transmissions
 - application of binary to decimal conversion and vice versa
 - 4-bit binary codes with their decimal equivalent to represent output voltages of a digital to analog converter
 - techniques to convert analog signals to digital and digital signals to analog
 - principles of analog and digital electronics limited to block diagrams common to analog and digital circuits
 - components, circuits and uses of common electronic signal filters in telecommunications (high-pass, low-pass and band-pass)
- transformer use in electrical circuits including:
 - construction and operating principles and uses
 - step-up, step-down, turns ratios, voltage and current ratios

- verification of operation of transformer circuit
- typical telecommunications electronic devices, cable types and their applications
- common telecommunications cables, their characteristics of use and application
- features and applications of shielding within telecommunications cables, ‘skin effect’ in cables and transmission losses.

Assessment Conditions

Skills must be assessed in a workplace or simulated environment where conditions are typical of those in a telecommunications work environment or workplace.

Access is required to:

- appropriate AC and DC testing equipment
- test devices that include a multimeter and an oscilloscope for waveform observation
- manufacturer documentation and equipment
- safety equipment
- codes of practice.

Assessment in a simulated environment will require extra low voltage to be used.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guides are available from VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2>