



Australian Government

UEEEEC0023 Diagnose and rectify faults in digital transmission circuits and systems

Release: 1

UEEEEC0023 Diagnose and rectify faults in digital transmission circuits and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in digital transmission circuits and systems.

It includes fault finding and repair of faults in digital transmission systems. It also includes working safely, applying logical diagnostic methods of digital transmission systems circuit components, rectifying faults, safety and functional testing, and completing the necessary service documentation.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

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

Pre-requisite Unit

UEEEEC0024 Diagnose and rectify faults in electronic display circuits

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Prepare to diagnose and rectify digital

PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

1.1 Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

transmission circuits and system faults	for a given work area are obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for digital transmission circuits and system work
	1.3 Safety hazards which have not previously been identified are risk assessed, documented and risk control measures devised and implemented in consultation with appropriate person/s
	1.4 Extent of faults is determined from reports, documentation and discussions with appropriate person/s
	1.5 Appropriate person/s is consulted to ensure digital transmission circuits and system work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Diagnose and rectify digital transmission circuits and system faults	2.1 WHS/OHS risk control measures and workplace procedures for carrying out digital transmission circuits and system work are followed
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and, as required, conducted in accordance with workplace safety procedures
	2.3 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Logical diagnostic methods are applied to diagnose digital transmission apparatus faults using measurements of circuit operating parameters in accordance with apparatus operating specifications
	2.5 Suspected fault scenarios are tested as being the source of digital transmission circuit system problem
	2.6 Faults in the electronic components of the digital transmission apparatus are rectified to circuit and system operation standard

- | | | |
|----------|---|---|
| | 2.7 | Circuits are inspected and tested to verify that digital transmission circuit apparatus operates as intended and to specified requirements |
| | 2.8 | Unplanned situations are responded to in accordance with workplace procedures, discussions with appropriate person/s and consistent with job specifications and requirements in a manner that minimises risk to personnel and equipment |
| | 2.9 | Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices |
| 3 | Complete and report fault diagnosis and rectification activities | |
| | 3.1 | WHS/OHS work completion risk control measures and workplace procedures are followed |
| | 3.2 | Worksite is made safe in accordance with workplace safety procedures |
| | 3.3 | Rectification of digital transmission circuit and system faults is documented in accordance with workplace procedures |
| | 3.4 | Appropriate person/s is notified in accordance with workplace procedures that apparatus faults have been rectified |

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying faults in digital transmission circuits and systems must include at least the following:

- two circuit faults in two different types of digital transmission systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH180A Diagnose and rectify faults in digital transmission circuits and systems.

Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>

Assessment Requirements for UEEEC0023 Diagnose and rectify faults in digital transmission circuits and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using fault scenarios to test the source of circuit faults
- identifying the cause faults using logical diagnostic methods
- rectifying faults effectively
- verifying that the apparatus operates correctly
- documenting fault rectification
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- digital television transmission faults, advanced digital television principles, digital television transmission towers and equipment, applying safe working practices and relevant standards, codes and regulations, including:
 - audio component encompassing:
 - audio encoding
 - audio masking
 - audio sub-band encoding
 - Dolby AC-3
 - MPEG-2 system layer encompassing:
 - PES packet construction
 - time stamps
 - programme clock reference (PCR)

- transport packet header
- programme specific information (PSI)
- channel encoding:
 - forward error correction (FEC)
 - bit error rate (BER)
 - puncturing
- interleaving
- modulation:
 - phase shift keying (PSK)
 - quadrature amplitude modulation (QAM)
 - orthogonal frequency division multiplexing (OFDM)
 - coded orthogonal frequency division multiplexing (COFDM)
- hierarchical modulation:
 - terrestrial channel encoder
 - satellite channel encoder
 - carrier to noise ratio (C/N)
- single frequency networks:
 - guard interval
 - mega-frames
- the requirements of digital television terrestrial broadcast (DTTB) program input and monitoring equipment encompassing:
 - basic system arrangement: a central router connected to a number of control rooms
 - terminologies: vertical, multi-level; tie-line routing and cross point
 - typical signal types processed by a router
 - the purpose of redundant central processing units (CPUs) and power supply units
 - common control protocols used in routers
 - typical analogue audio and video output voltage levels present at the router
 - typical specifications for digital data signals present at the router
 - function of various test equipment used in DTTB measurements
- the operating characteristics of a DTTB transmitter encompassing:
 - typical DTTB digital transmission system
 - safety precautions required when working with high power radio frequency (RF) transmitters
 - operating characteristics of a typical MPEG encoder
 - operation of a COFDM modulator
 - arrangement of sub-system components in a DTTB transmitter
 - purpose of an up converter in a DTTB transmitter
 - typical characteristics of a DTTB power amplifier
 - advantages and disadvantages of air and liquid cooling systems used in transmitters
 - typical DTTB transmitter measurements techniques

- the performance requirements of the DTTB combiner and antenna systems encompassing:
 - minimum channel separation required between digital and analogue television channels
 - typical specifications of an antenna combiner system
 - the need for combiner systems in DTTB systems
 - typical system faults in combiners and antenna system
- the requirements of remote monitoring and measurement equipment encompassing:
 - purpose of control panel indicators and controls
 - process by which the system manages a critical failure: power supplies and CPUs
 - different system alarm signals
 - periodic equipment self-tests and diagnostic routines on DTTB systems
 - DTTB systems fault diagnostic and rectification techniques
 - function of the basic components of a DTTB system
 - typical units of a DTTB telemetry system
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults in digital transmission systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>