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# **22586VIC Certificate II in Integrated Technologies (Pre-vocational)**

**Version 1.1 September 2023**

This course has been accredited under Part 4.4 of the Education and Training Reform Act 2006

**Accredited for the period: 01 January 2022 to 31 December 2026**

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Version History:		Date
Version 1.1	Department of Education and Training (DET) details and contact information updated with Department of Jobs, Skills Industries and Regions (DJSIR) details in Section A	September 2023

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## Table of contents

Section A: Applicant and course classification information .....	1
1. Person in respect of whom the course is being accredited .....	1
2. Address .....	1
3. Type of submission .....	1
4. Copyright acknowledgement .....	1
5. Licensing and franchise .....	4
6. Course accrediting body .....	4
7. AVETMISS information .....	4
8. Period of accreditation .....	4
Section B: Course information .....	5
1 Nomenclature .....	5
2 Vocational or educational outcomes of the course .....	5
2.1 Outcomes of the course .....	5
2.2 Course description .....	5
3 Development of the course .....	5
4 Course outcomes .....	11
5 Course rules .....	15
6 Assessment .....	23
7 Delivery .....	25
8 Pathways and articulation .....	27
9 Ongoing monitoring and evaluation .....	27
Section C—Units of competency: .....	28

## Section A: Applicant and course classification information

<p><b>1. Person in respect of whom the course is being accredited</b></p>	<p><b>Copyright of this material is reserved to the Crown in the right of the State of Victoria on behalf of the Department of Jobs, Skills, Industries and Regions (DJSIR) Victoria.</b></p> <p>© State of Victoria (DJSIR) 2022</p>
<p><b>2. Address</b></p>	<p>Deputy CEO Victorian Skills Authority Department of Jobs, Skills, Industries and Regions (DJSIR) GPO Box 4509 MELBOURNE VIC 3001</p> <p><b>Organisational contact</b> Manager, Training and Learning Products Unit Engagement Branch Victorian Skills Authority Department of Jobs, Skills, Industries and Regions (DJSIR) Email: <a href="mailto:course.enquiry@djsir.vic.gov.au">course.enquiry@djsir.vic.gov.au</a></p> <p><b>Day-to-day contact:</b> Curriculum Maintenance Manager (CMM), Engineering Industries Box Hill Institute Private Bag 2014 Box Hill Vic. 3128 Email: <a href="mailto:cmmei@boxhill.edu.au">cmmei@boxhill.edu.au</a></p>
<p><b>3. Type of submission</b></p>	<p><b>This submission is for reaccreditation of 22527VIC Certificate II in Integrated Technologies (Pre-vocational).</b></p>
<p><b>4. Copyright acknowledgement</b></p>	<p>The following units of competency: CPPSEC2021 Install security equipment and systems CPPSEC2023 Install video surveillance systems and equipment CPPSEC2026 Perform routine maintenance on security equipment and systems are from the <b>CPP - Property Services Training Package</b> administered by the Commonwealth of Australia</p> <p>© Commonwealth of Australia</p> <p>The following units of competency: CUAANM301 Create 2D digital animations CUAANM302 Create 3D digital animations</p>

	<p>are from the <b>CUA - Creative Arts and Culture Training Package</b> administered by the Commonwealth of Australia</p> <p>© Commonwealth of Australia</p> <p>The following units of competency:</p> <p>ICTCBL246 Install, maintain and modify customer premises communications cabling: ACMA Restricted Rule</p> <p>ICTDRE301 Install digital reception equipment</p> <p>ICTDRE302 Locate and rectify digital reception equipment faults</p> <p>ICTGAM301 Apply simple modelling techniques</p> <p>ICTGAM303 Review and apply the principles of animation</p> <p>ICTICT302 Install and optimise operating system software</p> <p>ICTICT303 Connect internal hardware components</p> <p>ICTNWK308 Determine and action network problems</p> <p>ICTNWK311 Install and test network protocols</p> <p>ICTNWK425 Build small wireless local area networks</p> <p>ICTPRG302 Apply introductory programming techniques</p> <p>ICTSAS211 Develop solutions for basic ICT malfunctions and problems</p> <p>ICTSAS203 Connect hardware peripherals</p> <p>ICTSAS214 Protect devices from spam and destructive software</p> <p>ICTSAS308 Run standard diagnostic tests</p> <p>ICTSAS303 Care for computer hardware</p> <p>ICTSAS304 Provide basic system administration</p> <p>ICTSAS309 Maintain and repair ICT equipment and software</p> <p>ICTSAS310 Install, configure and secure a small office or home office network</p> <p>ICTTEN208 Use electrical skills when working with telecommunications networks</p> <p>ICTTEN207 Install and test internet protocol devices in convergence networks</p> <p>ICTWHS204 Follow work health and safety and environmental policy and procedures</p> <p>are from the <b>ICT - Information and Communications Technology Training Package</b> administered by the Commonwealth of Australia</p> <p>© Commonwealth of Australia</p>
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	<p>The following units of competency:</p> <p>UEECD0007 Apply work health and safety regulations, codes and practices in the workplace</p> <p>UEERE0021 Provide basic sustainable energy solutions for energy reduction in residential premises</p> <p><b>UEERE0020 Promote sustainable energy practices in the community</b></p> <p>UEERE0001 Apply environmentally and sustainable procedures in the energy sector</p> <p>are from the <b>UEE - Electrotechnology Training Package</b> administered by the Commonwealth of Australia</p> <p>© Commonwealth of Australia</p> <p>The following unit of competency:</p> <p>RIIWHS204E Work safely at heights</p> <p>is from the <b>RII – Resources and Infrastructure Industry Training Package</b> administered by the Commonwealth of Australia</p> <p>© Commonwealth of Australia</p> <p>The following course units:</p> <p>VU22340 Use 3D printing to create products</p> <p>VU22338 Configure and program a basic robotic system</p> <p>are from <b>22470VIC - Certificate II in Engineering Studies</b></p> <p>The following course unit:</p> <p>VU22963 Build and implement a basic network</p> <p>is from <b>22519VIC - Certificate IV in Integrated Technologies</b></p> <p>The following course unit:</p> <p>VU22674 Explore applications and operation of the Internet of Things (IoT)</p> <p>is from <b>22499VIC - Certificate II in Electrotechnology (Pre-vocational)</b></p> <p>The following course units:</p> <p>VU21990 Recognise the need for cyber security in an organisation</p> <p>VU21993 Secure a networked personal computer</p>
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	<p>are from <b>22334VIC - Certificate IV in Cyber Security</b></p> <p>Copyright of this material is reserved to the Crown in the right of the State of Victoria. © State of Victoria (Department of Education and Training) 2022.</p> <p>This work is licensed under a Creative Commons Attribution-NoDerivs 3.0 Australia licence (see website <a href="#">here</a>).</p>
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<b>6. Course accrediting body</b>	Victorian Registration and Qualifications Authority
<b>7. AVETMISS information</b>	<p><b>ANZSCO code</b> 313199 ICT Support Technicians nec</p> <p>ASCED Code 0313 Electrical and Electronic Engineering and Technology</p> <p><b>National course code</b> 22586VIC</p>
<b>8. Period of accreditation</b>	01 January 2022 to 31 December 2026

## Section B: Course information

1 Nomenclature	
1.1 Name of the qualification	Certificate II in Integrated Technologies (Pre-vocational)
1.2 Nominal duration of the course	310 - 535 Hours
2 Vocational or educational outcomes of the course	
2.1 Outcomes of the course	<p>Standard 5.1 AQTF 2021 Standards for Accredited Courses</p> <p>The outcomes of this course will enable graduates to:</p> <ul style="list-style-type: none"> <li>• apply a basic knowledge and skills in the fundamentals of a range of technologies</li> <li>• prepare to work in an integrated technologies environment</li> <li>• demonstrate safe work practices in a workplace where technologies are applied</li> <li>• undertake project work involving the integration/blending of technologies to achieve a specified outcome</li> <li>• use computer aided design (CAD) software applications to aid and support integrated technologies work.</li> </ul>
2.2 Course description	<p>Standard 5.1 AQTF 2021 Standards for Accredited Courses</p> <p>This is a pre-vocational course designed to provide learners with knowledge and skills in the application of technologies to manufacture a range of goods and/or provide services.</p> <p>The course provides preparatory training for school leavers and others seeking an apprenticeship in the electrotechnology field or employment as a technical support person.</p>
3 Development of the course	

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### 3.1 Industry, education, legislative, enterprise or community needs

Increasingly, the impact of integrated technologies is being felt across a number of industry sectors such as building and construction, manufacturing/engineering, electrical/electronics, renewable energy, information technology and telecommunications, transport to name a few.

The integration of technologies is changing the nature of work, the way people work and the skills they need for work. Currently, sixty percent (60%) of all occupations have at least thirty (30%) of activities that are technically automatable. This percentage figure is increasing and the knowledge and skills required for work are changing to match the increasing applications of technology.

Technology is accelerating fast across most industry areas and digital literacy in the workforce needs to keep pace so individuals, enterprises and organisations can maintain their competitiveness in local, national and international markets.

Currently, there is no one training package qualification available that provides the spread of technology coverage or the degree of flexibility in its structure, to address the wide range of knowledge and skills requirements for work in an integrated technologies environment.

The Department of Education and Training (DET) and Victorian Curriculum and Assessment Authority (VCAA) enrolment data indicates there were a total of 177 enrolments in 2020. The majority of the enrolments (102) were secondary school students undertaking this qualification as part of their Victorian Certificate of Education (VCE).

The VCAA continues to support the ongoing availability of the course as a Vocational Education and Training (VET) program for secondary school students.

The course is also supported by the following industry enterprises which are represented on the Course Steering Committee (CSC):

- Ericsson Group
- Nokia Corporation
- Mobile Automation
- ANCA Group

The ongoing availability of the course continues to have the support of two organisations which represent skills development and training for the technologies industry at both the State-wide and national levels. The organisations are:

- Communication and Information Technology Training Ltd.(CITT)

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- Australian Digital and Telecommunications Industry Association Inc. (ADTIA)

Both organisations are also represented on the Course Steering Committee.

Graduates of this course are qualified to:

- seek employment and further training through a career start traineeship, apprenticeship such as the Certificate III in Electrotechnology (Electrical)
- seek employment in a technical support role in industry areas where there is a blend of technologies applied
- enter further study such as the Certificate IV in Integrated Technologies or related fields or Diploma of Electronics and Communications Engineering or related fields.

The course has been reviewed and redeveloped under the guidance of a CSC consisting of the following persons:

Anna Henderson (Chairperson)	Executive Officer, Business Skills Viability (BSV)
Gabriele Giofre	Operations Manager, Australian Digital & Telecommunications Industry Association Inc. (ADTIA)
Omar Hammoud	MS Delivery Service Manager, Ericsson Group
Bobb Swanton	Field Service Manager – Oceania, Nokia Corporation
Craig Taylor	Business Development Manager – Robotics Mobile Automation
Stuart Gurney	Apprenticeship Master, ANCA Group
Daryl Sutton	Manager, VET Curriculum, Victorian Curriculum and Assessment Authority (VCAA)
Ian Turnbull	Director, Applied Technology Training and Consulting Australia
Dominic Schipano	National Executive Officer, Communication & Information

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	<p style="text-align: right;">Technology Training Ltd (CITT)</p> <p>In attendance:</p> <p>George Adda            Project Manager,    CMM-Engineering Industries</p> <p>Trevor Lange            Accreditation Adviser/Writer,    CMM-Engineering Industries</p> <p>This course:</p> <ul style="list-style-type: none"> <li>– does not duplicate, by title or coverage, the outcomes of an endorsed training package qualification</li> <li>– is not a subset of a single training package qualification that could be recognised through one or more statements of attainment or a skill set</li> <li>– does not include units of competency additional to those in a training package qualification that could be recognised through statements of attainment in addition to the qualification</li> <li>– does not comprise units that duplicate units of competency of a training package qualification</li> </ul>
<p><b>3.2 Review for re-accreditation</b></p>	<p>Standards 5.1, 5.2, 5.3 and 5.4 AQTF 2021 Standards for Accredited Courses</p> <p>The course has been reviewed and resubmitted for accreditation fifteen months into the current five year accreditation period. This has occurred in response to a request from the Victorian Curriculum and Assessment Authority (VCAA) on behalf of secondary college’s program coordinators. They have advised not all secondary schools have the resources to deliver the current core unit VU22324 <i>Build a simple network and establish end to end connectivity</i>.</p> <p>Since secondary school students make up the majority of the course enrolments, the CSC agreed to the unit being removed from the core component and be relocated into Computer Network Stream, as an elective unit.</p> <p>This amendment has also provided an opportunity to review the knowledge and skills requirements (separate document), update a number of the imported training package units to the current version which have been recently re-endorsed and again review each enterprise unit written for this course. The course review has also provided the opportunity to include a new elective unit to address developments and applications of wireless</p>

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	<p>communication technologies such as 5G. This elective unit has been added to the Wireless Communications Stream.</p> <p>The unit relocated from the core component has not been replaced by another core unit. The core component of the course structure now comprises of 6 units and the number of elective units has been increased from three (3) to four (4) units. Thus, the overall number of units required to complete the qualification remains at 10 units.</p> <p>This course is deemed to be equivalent to the current course (22527VIC Certificate II in Integrated Technologies). However, <i>all enrolments</i> must be in the new course from 1<sup>st</sup> January 2022.</p> <p><b>The Transition Table below provides a detailed unit by unit comparison between the current and new course.</b></p>
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Transition Table				
Units in the superseded 22527VIC - Certificate II in Integrated Technologies (Pre-vocational)		Units in the new 22586VIC - Certificate II in Integrated Technologies (Pre-vocational)		Relationship
UEENEEE101 A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	Equivalent
VU22819	Prepare to work in an integrated technologies environment	VU23109	Prepare to work in an integrated technologies environment	Equivalent
VU22820	Use routine work practices in an integrated technologies environment	VU23110	Use routine work practices in an integrated technologies environment	Equivalent
VU22821	Apply electrotechnology knowledge and skills in integrated technologies work	VU23111	Apply electrotechnology knowledge and skills in integrated technologies work	Equivalent
VU22822	Use CAD software applications to support integrated technologies work	VU23112	Use Computer Aided Drafting and Design software applications in integrated technologies work	Equivalent
VU22823	Carry out an integrated technologies project	VU23113	Carry out an integrated technologies project	Equivalent
VU22324	Build a simple network and establish end to end connectivity	VU22963	Build and implement a basic network	Equivalent
ICTICT302	Install and optimise operating system software	ICTICT302	Install and optimise operating system software	Same unit
ICTICT303	Connect internal hardware components	ICTICT303	Connect internal hardware components	Same unit
ICTNWK302	Determine and action network problems	ICTNWK308	Determine and action network problems	Equivalent
ICTNWK305	Install and manage network protocols	ICTNWK311	Install and manage network protocols	Equivalent
ICTPRG301	Apply introductory programming techniques	ICTPRG302	Apply introductory programming techniques	Equivalent
ICTSAS202	Apply problem-solving techniques to routine ICT malfunctions	ICTSAS211	Develop solutions for basic ICT malfunctions and problems	Equivalent
ICTSAS203	Connect hardware peripherals	ICTSAS203	Connect hardware peripherals	Same unit
ICTSAS206	Detect and protect from spam and destructive software	ICTSAS214	Protect devices from spam and destructive software	Equivalent
ICTSAS308	Run standard diagnostic tests	ICTSAS308	Run standard diagnostic tests	Same unit
ICTSAS303	Care for computer hardware	ICTSAS303	Care for computer hardware	Same unit
ICTSAS304	Provide basic system administration	ICTSAS304	Provide basic system administration	Same unit

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## Transition Table

Units in the superseded 22527VIC - Certificate II in Integrated Technologies (Pre-vocational)		Units in the new 22586VIC - Certificate II in Integrated Technologies (Pre-vocational)		Relationship
ICTSAS306	Maintain equipment and software	ICTSAS309	Maintain and repair ICT equipment and software	Equivalent
ICTSAS307	Install, configure and secure a small office or home office network	ICTSAS310	Install, configure and secure a small office or home office network	Equivalent
VU22824	Perform basic network and computer assembly	VU23114	Perform basic network and computer assembly	Equivalent
VU22825	Perform basic computer system and network maintenance and upgrades	VU23115	Perform basic computer system and network maintenance and upgrades	Equivalent
VU22826	Install and test a home entertainment system	VU23116	Install and configure a home entertainment system	Equivalent
VU22338	Configure and program a basic robotic system	VU22338	Configure and program a basic robotic system	Same unit
VU22827	Implement a digital circuit using a programmable logic device (PLD)	VU23117	Implement a digital circuit using a programmable logic device	Equivalent
VU22828	Install, test and verify correct operation of a "by-wire" control system	VU23118	Install, test and verify correct operation of a by-wire control system	Equivalent
VU22829	Install, set up and test an embedded control system	VU23119	Install, set up and test an embedded control system	Equivalent
VU22340	Use 3D printing to create products	VU22340	Use 3D printing to create products	Same unit
CPPSEC2021A	Install security equipment and systems	CPPSEC2021	Install security equipment and systems	Equivalent
CPPSEC2023A	Install CCTV equipment and system	CPPSEC2023	Install video surveillance systems and equipment	Equivalent
CPPSEC2026A	Perform routine maintenance on security equipment and system	CPPSEC2026	Perform routine maintenance on security equipment and systems	Equivalent
ICTCBL246	Install, maintain and modify customer premises communications cabling: ACMA restricted rule	ICTCBL246	Install, maintain and modify customer premises communications cabling: ACMA restricted rule	Same unit
UEENEEK112A	Provide basic sustainable energy solutions for energy reduction in residential premises	UEERE0021	Provide basic sustainable energy solutions for energy reduction in residential premises	Equivalent
UEENEEK114A	Promote sustainable energy practices in the community	UEERE0020	Promote sustainable energy practices in the community	Equivalent
UEENEEK142A	Apply environmentally and sustainable procedures in the energy sector	UEERE0001	Apply environmentally and sustainable procedures in the energy sector	Equivalent
VU22830	Set up and operate a small scale stand-alone photovoltaic energy system with battery storage	VU23120	Set up and operate a small scale stand-alone photovoltaic energy system with battery storage	Equivalent
ICTWHS204	Follow work health and safety and environmental policy and procedures	ICTWHS204	Follow work health and safety and environmental policy and procedures	Same unit
ICTTEN208	Use electrical skills when working with telecommunications networks	ICTTEN208	Use electrical skills when working with telecommunications networks	Same unit
ICTDRE301	Install digital reception equipment	ICTDRE301	Install digital reception equipment	Same unit
ICTDRE302	Locate and rectify digital reception equipment faults	ICTDRE302	Locate and rectify digital reception equipment faults	Same unit
ICTTEN207	Install and test internet protocol devices in convergence networks	ICTTEN207	Install and test internet protocol devices in convergence networks	Same unit
VU22831	Plan and build a system using fibre optic equipment	VU23121	Plan and build a system using fibre optic equipment	Equivalent
VU22832	Integrate fibre optic technology into an engineering process	VU23122	Integrate fibre optic technology into an engineering process	Equivalent
VU22833	Integrate fibre optic technology into a communication process	VU23123	Integrate fibre optic technology into a communication process	Equivalent
VU22834	Install and test a wireless intercom system	VU23124	Install and test a wireless intercom system	Equivalent

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## Transition Table

Units in the superseded 22527VIC - Certificate II in Integrated Technologies (Pre-vocational)		Units in the new 22586VIC - Certificate II in Integrated Technologies (Pre-vocational)		Relationship
VU22835	Conduct site survey for a wireless network	VU23125	Conduct site survey for a wireless network	Equivalent
VU22836	Set up and operate a wireless communications link	VU23126	Set up and operate a wireless communications link	Equivalent
VU22837	Install communications antennae	VU23127	Install communications antennae	Equivalent
		RIIWHS204E	Work safely at heights	New unit
ICTNWK405	Build a small wireless local area network	ICTNWK425	Build small wireless local area networks	Equivalent
VU22674	Explore applications and operation of the Internet of Things (IoT)	VU22674	Explore applications and operation of the Internet of Things (IoT)	Same unit
VU21990	Recognise the need for cyber security in an organisation	VU21990	Recognise the need for cyber security in an organisation	Same unit
VU21993	Secure a networked personal computer	VU21993	Secure a networked personal computer	Same unit
CUAANM301	Create 2D digital animations	CUAANM301	Create 2D digital animations	Same unit
CUAANM302	Create 3D digital animations	CUAANM302	Create 3D digital animations	Same unit
ICTGAM301	Apply simple modelling techniques	ICTGAM301	Apply simple modelling techniques	Same unit
ICTGAM303	Review and apply the principles of animation	ICTGAM303	Review and apply the principles of animation	Same unit
		VU23128	Assist with the application of wireless communication in an integrated technologies environment	New unit

### 4 Course outcomes

#### 4.1 Qualification level

Standards 5.5 **AQTF 2021 Standards** for Accredited Courses

**The Certificate II in Integrated Technologies is a pre-vocational course and is consistent with the requirements of level 2 of the Australian Qualifications Framework in that:**

**Knowledge:**

- **Graduates will have basic factual, technical and procedural knowledge in a wide range of technical activities spanning electrotechnology, computing networking, telecommunications, renewable energy, security systems and information & communications.**

**Skills:**

**Graduates will have:**

- **cognitive skills to access, record and act on a defined range of technical information from a range of sources**

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	<ul style="list-style-type: none"> <li>• <b>cognitive and communication skills to apply and communicate known solutions to a limited range of predictable problems related in the use of integrated/blended technologies</b></li> <li>• <b>technical skills to use a limited range of equipment to complete tasks involving known routines and procedures with a limited range of technology options.</b></li> </ul> <p><b>Application of knowledge and skills:</b></p> <ul style="list-style-type: none"> <li>• <b>Graduates will be able to demonstrate the application of knowledge and skills in the use of integrated technologies:</b></li> <li>• <b>with some accountability for the quality of their own outcomes and with some responsibility for their own outputs in work and learning</b></li> <li>• <b>with limited autonomy and judgement in the completion of their own defined and routine tasks in known and stable integrated technologies contexts</b></li> <li>• <b>with limited autonomy and judgement to complete routine, but variable tasks in the use of integrated technologies, in collaboration with others in a work team environment.</b></li> </ul> <p><b>Specifically, a graduate of this course may:</b></p> <ul style="list-style-type: none"> <li>• <b>undertake a work-based apprenticeship or traineeship leading into a range of careers in the electrotechnology, telecommunications, renewable energy installations, security systems or information technology industries</b></li> <li>• <b>enrol directly into another qualification leading to Certificate III/IV, Diploma or Advanced Diploma outcome in a range of technology areas.</b></li> </ul> <p><b>Volume of learning:</b></p> <p><b>Typically, the Certificate II in Integrated Technologies requires 0.5 - 1 year to complete. This is made up of the structured learning component of the course combined with self-directed learning activities such as basic research activities and project work.</b></p>
<p><b>4.2 Foundation skills</b></p>	<p>Standard 5.6 AQTF 2021 Standards for Accredited Courses</p> <p><b>A summary of the foundation skills to be achieve in this course is listed in Table 1.</b></p> <p><b>Foundation Skills not explicit are also listed within each enterprise unit.</b></p>

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**Table 1 Foundation Skills Summary:**

Skill	Description
<b>Reading skills to:</b>	<ul style="list-style-type: none"> <li>• Interpret and follow workplace instructions, standard operating procedures workplace health and safety procedures, technical documentation and data</li> <li>• identify safety signs and symbols</li> <li>• interpret and follow equipment specifications</li> <li>• interpret and follow manufacturer instructions for disassemble and reassemble of technical components and equipment</li> </ul>
<b>Writing skills to:</b>	<ul style="list-style-type: none"> <li>• complete workplace documentation</li> <li>• record technology performance data</li> <li>• document workplace safety issues</li> </ul>
<b>Oral communication skills to:</b>	<ul style="list-style-type: none"> <li>• ask questions relating to work tasks and job instructions</li> <li>• report outcomes and/or any issues of concern or problems</li> <li>• share technical information with other in a work team environment</li> </ul>
<b>Numeracy skills to:</b>	<ul style="list-style-type: none"> <li>• perform basic calculations to determine upper and lower limits of acceptability applicable to data entered on a graph or chart</li> <li>• interpret technical documentation and data to access equipment performance/output</li> <li>• measure the integrity of cabling and interpret results</li> <li>• interpret graphs and charts in relation to technical equipment performance/output and trends</li> </ul>
<b>Teamwork skills to:</b>	<ul style="list-style-type: none"> <li>• work with others to generate and evaluate ideas</li> <li>• work with others to identify work needs and review ideas</li> <li>• work cooperatively with people from diverse cultural backgrounds</li> <li>• work effectively as a member of a team to complete a task</li> <li>• contribute to a positive culture of compliance within an organisation</li> <li>• provide feedback to a range of stakeholders</li> </ul>
<b>Problem solving skills to:</b>	<ul style="list-style-type: none"> <li>• take corrective action to ensure that work meets quality standards and requirements as appropriate</li> <li>• respond to and/or report equipment failure within level of responsibility</li> </ul>

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Skill	Description
	<ul style="list-style-type: none"> <li>• contribute to the solution of job task difficulties within the scope of own responsibilities</li> </ul>
<b>Initiative and enterprise skills to:</b>	<ul style="list-style-type: none"> <li>• safely shut down equipment in emergency situations</li> <li>• apply enterprise best practice and quality systems</li> <li>• ask questions of appropriate personnel to confirm unusual practice/s</li> <li>• report problems outside area of responsibility to designated personnel</li> <li>• identify variation in equipment performance and report maintenance requirements according to enterprise procedures</li> <li>• seek assistance from relevant personnel when difficulties arise</li> </ul>
<b>Planning and organisation skills to:</b>	<ul style="list-style-type: none"> <li>• manage time and priorities to complete work</li> <li>• prepare and plan daily or weekly work tasks</li> <li>• identify and obtain equipment, materials and consumables to undertake designated tasks</li> <li>• establish clear implementation goals and deliverables</li> <li>• collect, analyse and organise work task information</li> <li>• check work requirement specifications and identify the priority in which tasks need to be undertaken and completed</li> </ul>
<b>Learning skills to:</b>	<ul style="list-style-type: none"> <li>• ask questions to gain information and to ensure understanding of own work requirements</li> <li>• maintain current knowledge of tools, devices, instruments, materials, work practices and technologies</li> <li>• seek learning opportunities</li> <li>• adopt an open approach to new ideas and techniques</li> <li>• commit to and promote a culture of continuous learning</li> <li>• set realistic learning goals for self-development</li> </ul>
<b>Self-management skills to:</b>	<ul style="list-style-type: none"> <li>• plan own work within given task parameters</li> <li>• set, monitor and satisfy personal work goals</li> <li>• accept responsibility for given tasks</li> <li>• operate within appropriate time constraints and work standards</li> <li>• seek assistance where appropriate</li> <li>• take control and manage own learning</li> <li>• recognise limitations, ask for help and seek clarification or information about work requirements and procedures</li> </ul>

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Skill	Description
<b>Technology skills to:</b>	<ul style="list-style-type: none"> <li>• use workplace technology related to the particular work tasks including tools, devices, instruments and materials</li> <li>• attain and maintain required technical accreditation/authority under the industry standards</li> <li>• attain and maintain information technology (IT) skills relevant to work requirements</li> <li>• be willing to gain knowledge and skills relevant to new and emerging technologies</li> </ul>
<b>4.3 Recognition given to the course</b>	Standard 5.7 AQTF 2021 Standards for Accredited Courses  <b>Not applicable</b>
<b>4.4 Licensing/regulatory requirements</b>	Standard 5.7 AQTF 2021 Standards for Accredited Courses  <b>Completion of elective unit <i>ICTCBL246 – Install, maintain and modify customer premises communications cabling: ACMA Restricted Rule</i>, meets Australian Communications and Media Authority (ACMA) pathway requirements to apply for Restricted Registration.</b>
<b>5 Course rules</b>	
<p>Standards 5.8 and 5.9 AQTF 2021 Standards for Accredited courses</p> <p><b>Course structure:</b></p> <p>To achieve the qualification <i>22586VIC Certificate II in Integrated Technologies (Pre-vocational)</i> the learner must successfully complete a total of ten (10) units comprising:</p> <ul style="list-style-type: none"> <li>- six (6) core units</li> <li>- four (4) elective units</li> </ul> <p>The elective units:</p> <ul style="list-style-type: none"> <li>- may be selected from any technology stream below</li> <li>- up to two (2) units can be replaced with other training package and/or accredited course units provided each unit is consistent with the vocational outcomes and do not jeopardise the AQF integrity of the course.</li> <li>- Where a unit appears in more than one stream, it can only be <b>counted once</b>.</li> </ul> <p>Refer <b>Table 2</b> for the list of core and streamed elective units.</p> <p>Should a vocational pathway wish to be followed when selecting the four (4) elective units refer <b>Table 3</b> for suggested units.</p> <p>Learners who do not successfully complete all required units will be issued with a Statement of Attainment listing those units they have completed</p>	

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**Table 2 - Core and Streamed Elective Units**

Unit of competency code	Field of Education code	Unit of competency title	Pre-requisite	Nominal hours
<b>Core units:</b>				
UEECD0007	<b>061301</b>	Apply work health and safety regulations, codes and practices in the workplace	None	20
VU23109	<b>031399</b>	Prepare to work in an integrated technologies environment	None	20
VU23110	<b>031399</b>	Use routine work practices in an integrated technologies environment	UEECD0007	40
VU23111	<b>031399</b>	Apply electrotechnology knowledge and skills in integrated technologies work	UEECD0007	80
VU23112	<b>031399</b>	Use Computer Aided Drafting and Design software applications in integrated technologies work	None	20
VU23113	<b>031399</b>	Carry out an integrated technologies project	UEECD0007 VU23110 VU23111	60
<b>Core units total =</b>				<b>240</b>
<b>Elective units:</b>				
<b>Computer Network Stream</b>				
<b>CUAANM301</b>	<b>100399</b>	Create 2D digital animations	None	35
<b>CUAANM302</b>	100399	Create 3D digital animations	None	75
<b>ICTGAM301</b>	020103	Apply simple modelling techniques	None	50
<b>ICTGAM303</b>	020115	Review and apply the principles of animation	None	60
<b>ICTICT302</b>	020113	Install and optimise operating system software	None	20
<b>ICTICT303</b>	031305	Connect internal hardware components	None	20
<b>ICTNWK308</b>	020113	Determine and action network problems	None	50

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<b>ICTNWK311</b>	020113	Install and manage network protocols	None	40
<b>ICTPRG302</b>	020103	Apply introductory programming techniques	None	40
<b>ICTSAS211</b>	029999	Develop solutions for basic ICT malfunctions and problems	None	20
<b>ICTSAS203</b>	029999	Connect hardware peripherals	None	20
<b>ICTSAS214</b>	029901	Protect devices from spam and destructive software	None	10
<b>ICTSAS303</b>	029999	Care for computer hardware	None	20
<b>ICTSAS304</b>	029999	Provide basic system administration	None	20
<b>ICTSAS309</b>	080905	Maintain and repair ICT equipment and software	None	20
<b>ICTSAS310</b>	020113	Install, configure and secure a small office or home office network	None	50
<b>ICTSAS308</b>	029999	Run standard diagnostic tests	None	20
<b>VU23114</b>	031305	Perform basic network and computer assembly	None	30
<b>VU22963</b>	020113	Build and implement a basic network	None	100
<b>VU23115</b>	031305	Perform basic computer system and network maintenance and upgrades	None	30
<b>VU23116</b>	031317	Install and configure a home entertainment system	None	30
<b>VU21990</b>	029901	Recognise the need for cyber security in an organisation	None	60
<b>VU21993</b>	029901	Secure a networked personal computer	None	60
<b>Robotics Control Stream</b>				
<b>VU22338</b>	030703	Configure and program a basic robotic system	None	60
<b>VU23117</b>	031303	Implement a digital circuit using a programmable logic device	None	30

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<b>VU23118</b>	031303	Install, test and verify correct operation of a by-wire control system	None	30
<b>VU23119</b>	031305	Install, set up and test an embedded control system	None	30
<b>VU22340</b>	030103	Use 3D printing to create products	None	40
<b>VU22674</b>	020113	Explore applications and operation of the Internet of Things (IoT)	None	20
<b>Security Systems Stream</b>				
<b>CPPSEC2021</b>	099905	Install security equipment and systems	None	40
<b>CPPSEC2023</b>	099905	Install video surveillance systems and equipment	None	20
<b>CPPSEC2026</b>	099905	Perform routine maintenance on security equipment and systems	None	32
<b>ICTWHS204</b>	061301	Follow work health and safety and environmental policy and procedures	None	40
<b>ICTTEN208</b>	031313	Use electrical skills when working with telecommunications networks	None	40
<b>ICTCBL246</b>	031309	Install, maintain and modify customer premises communications cabling: ACMA Restricted Rule	ICTWHS204 ICTTEN208	60
<b>Sustainable Energy Stream</b>				
<b>UEERE0021</b>	031301	Provide basic sustainable energy solutions for energy reduction in residential premises	None	40
<b>UEERE0020</b>	080317	Promote sustainable energy practices in the community	None	60
<b>UEERE0001</b>	031311	Apply environmentally and sustainable procedures in the energy sector	None	20
<b>VU23120</b>	031301	Set up and operate a small scale stand-alone photovoltaic energy system with battery storage	None	60
<b>Telecommunication Stream</b>				
<b>ICTWHS204</b>	061301	Follow work health and safety and environmental policy and procedures	None	40

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<b>ICTTEN208</b>	031313	Use electrical skills when working with telecommunications networks	None	40
<b>ICTCBL246</b>	031309	Install, maintain and modify customer premises communications cabling: ACMA Restricted Rule	ICTWHS204 ICTTEN208	60
<b>ICTDRE301</b>	031309	Install digital reception equipment	None	30
<b>ICTDRE302</b>	031309	Locate and rectify digital reception equipment faults	None	40
<b>ICTTEN207</b>	031309	Install and test internet protocol devices in convergence networks	None	50
<b>VU23121</b>	031303	Plan and build a system using fibre optic equipment	None	30
<b>VU23122</b>	030703	Integrate fibre optic technology into an engineering process	None	30
<b>VU23123</b>	031307	Integrate fibre optic technology into a communication process	None	30
<b>Wireless Communications Stream</b>				
<b>VU23124</b>	031309	Install and test a wireless intercom system	None	30
<b>VU23125</b>	031307	Conduct site survey for a wireless network	None	30
<b>VU23126</b>	031309	Set up and operate a wireless communication link	None	30
<b>VU23127</b>	031309	Install communications antennae	CPCCCM2012	30
<b>RIIWHS204E</b>	061301	Work safely at heights	None	20
<b>VU23128</b>	031309	Assist with the application wireless communication in an integrated technologies environment	None	60
<b>ICTNWK425</b>	020113	Build small wireless local area networks	None	20
<b>Nominal hours range for elective units =</b>				<b>70 - 295</b>
<b>Nominal hours range for core and elective units =</b>				<b>310 - 535</b>

**Table 3**

<b>5.1 (Cont.)</b>	<b>Vocational Pathways</b>
	<b>Computer Network pathway</b>

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<b>Example # 1</b>	
<b>CUAANM301</b>	<b>Create 2D digital animations</b>
<b>CUAANM302</b>	<b>Create 3D digital animations</b>
<b>ICTGAM301</b>	<b>Apply simple modelling techniques</b>
<b>ICTGAM303</b>	<b>Review and apply the principles of animation</b>
<b>Example # 2</b>	
<b>ICTSAS310</b>	<b>Install, configure and secure a small office or home office network</b>
<b>VU23114</b>	<b>Perform basic network and computer assembly</b>
<b>VU22963</b>	<b>Build and implement a basic network</b>
<b>VU23115</b>	<b>Perform basic computer system and network maintenance and upgrades</b>
<b>Robotics Control pathway</b>	
<b>VU22338</b>	<b>Configure and program a basic robotic system</b>
<b>VU23117</b>	<b>Implement a digital circuit using a programmable logic device</b>
<b>VU23118</b>	<b>Install, test and verify correct operation of a by-wire control system</b>
<b>VU23119</b>	<b>Install, set up and test an embedded control system</b>
<b>Security Systems pathway</b>	
<b>CPPSEC2023</b>	<b>Install video surveillance systems and equipment</b>
<b>ICTWHS204</b>	<b>Follow work health and safety and environmental policy and procedures</b>
<b>ICTTEN208</b>	<b>Use electrical skills when working with telecommunications networks</b>

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	<b>ICTCBL246</b>	<b>Install, maintain and modify customer premises communications cabling: ACMA Restricted Rule</b>
<b>Sustainable Energy pathway</b>		
	<b>UEERE0021</b>	<b>Provide basic sustainable energy solutions for energy reduction in residential premises</b>
	<b>UEERE0020</b>	<b>Promote sustainable energy practices in the community</b>
	<b>UEERE001</b>	<b>Apply environmentally and sustainable procedures in the energy sector</b>
	<b>VU23120</b>	<b>Set up and operate a small scale stand-alone photovoltaic energy system with battery storage</b>
<b>Telecommunication pathway</b>		
<b>Example # 1</b>		
	<b>ICTWHS204</b>	<b>Follow work health and safety and environmental policy and procedures</b>
	<b>ICTTEN208</b>	<b>Use electrical skills when working with telecommunications networks</b>
	<b>ICTCBL246</b>	<b>Install, maintain and modify customer premises communications cabling: ACMA Restricted Rule</b>
	<b>ICTTEN207</b>	<b>Install and test internet protocol devices in convergence networks</b>
<b>Example # 2</b>		
	<b>ICTWHS204</b>	<b>Follow work health and safety and environmental policy and procedures</b>
	<b>VU23121</b>	<b>Plan and build a system using fibre optic equipment</b>
	<b>VU23122</b>	<b>Integrate fibre optic technology into an engineering process</b>

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	VU23123	Integrate fibre optic technology into a communication process
	Wireless Communications pathway	
	VU23124	Install and test a wireless intercom system
	VU23126	Set up and operate a wireless communication link
	ICTNWK425	Build small wireless local area networks
	VU23128	Assist with the application of wireless communication in an integrated technologies environment
5.2 Entry requirements	<p><b>Standard 9 AQTF 2021 Standards for Accredited Courses</b></p> <p>There are no essential entry requirements for this course. However, learners are best equipped to achieve the course outcomes if they have as a minimum, language, literacy and numeracy skills that are equivalent to Level 2 of the Australian Core Skill Framework. See <a href="#">here</a> for more details.</p> <p>Learners with language, literacy and numeracy skills at a lower level than recommended will require additional support to successfully complete the course.</p>	
<b>6 Assessment</b>		
6.1 Assessment strategy	<p><b>Standard 10 AQTF 2021 Standards for Accredited Courses</b></p> <p>All assessment, including Recognition of Prior Learning (RPL), must be compliant with the requirements of:</p> <ul style="list-style-type: none"> <li>Standard 1 of the AQTF: Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 4.1 and 4.2 of the VRQA Guidelines for VET Providers,</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>the Standards for Registered Training Organisations 2015 (SRTOs),</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>the relevant standards and guidelines for RTOs at the time of assessment.</li> </ul>	

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	<p>Assessment strategies must therefore ensure that:</p> <ul style="list-style-type: none"> <li>• all assessments are valid, reliable, flexible and fair</li> <li>• learners are informed of the context and purpose of the assessment and the assessment process</li> <li>• feedback is provided to learners about the outcomes of the assessment process and guidance given for future options</li> <li>• <b>time allowance to complete a task is reasonable and reflect the industry expectations of a junior employee</b></li> </ul> <p>Assessment strategies should be designed to:</p> <ul style="list-style-type: none"> <li>• cover a range of skills and knowledge required to demonstrate achievement of the course aim</li> <li>• collect evidence on a number of occasions to suit a variety of contexts and situations</li> <li>• be appropriate to the knowledge, skills, methods of delivery and needs and characteristics of learners</li> <li>• assist assessors to interpret evidence consistently</li> <li>• be equitable to all groups of learners.</li> </ul> <p>Assessment methods are included in each unit and include:</p> <ul style="list-style-type: none"> <li>• oral and/or written questioning</li> <li>• inspection of final process/product outcome/s</li> <li>• portfolio of documented evidence</li> <li>• third party reports/feedback</li> <li>• demonstration of required physical tasks.</li> </ul> <p>A holistic approach to assessment is encouraged. This may be achieved by combining the assessment of more than one unit where it better replicates working practice.</p> <p>It is recommended the assessment of unit <i>VU23113 – Carry out an integrated technologies project</i>, should not occur until the completion and assessment of the other core units.</p> <p><b>Assessment of the imported units must conform to the Assessment Requirements of the unit as provided in the relevant training package or the Assessment Requirements provided in the accredited course.</b></p>
<p><b>6.2 Assessor competencies</b></p>	<p><b>Standard 12 AQTF 2021 Standards for Accredited Courses</b></p>

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	<p>Assessment must be undertaken by a person or persons in accordance with:</p> <ul style="list-style-type: none"> <li>• Standard 1.4 of the AQTF: Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 3 of the VRQA Guidelines for VET Providers,</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>• the Standards for Registered Training Organisations 2015 (SRTOs),</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>• the relevant standards and guidelines for RTOs at the time of assessment.</li> </ul> <p>Units of competency imported from training packages or accredited courses must reflect the requirements for assessors specified in that training package or accredited course.</p>
<p><b>7 Delivery</b></p>	
<p><b>7.1 Delivery modes</b></p>	<p><b>Standard 11 AQTF 2021 Standards for Accredited Courses</b></p> <p>Units of competency in this course may be delivered using a variety of learning activities. Examples are classroom and workshop instruction, practical exercises and tasks, team based or individual projects, research assignments, use of case studies, enterprise visits and guest speakers.</p> <p>Where possible workplace placement is recommended to provide the opportunity for learners to gain exposure to technologies in action and the responsibilities associated with their upkeep and maintenance. Additionally, workplace exposure will also provide the opportunity for the learner to assess whether a technology career pathway is appropriate for them.</p> <p>Any on-the-job learning opportunities must have specific learning outcomes drawn from the relevant competencies and be supervised by an experienced industry mentor. The training provider will coordinate the assessment of the workplace learning activities in accordance with the relevant units' requirements.</p> <p>Where enterprise placement is not possible delivery activities should be changed to a simulated workshop environment where the learning experience is as close as possible to a real workplace.</p> <p><b>Some learning activities may be relevant to more than one unit and therefore integration may be appropriate. All delivery should actively involve the</b></p>

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	<p><b>learner and learning should be experiential, and appropriate for the age group.</b></p> <p><b>This course can be delivered either full-time or part-time or a mixture of both to suit the needs of the client group.</b></p> <p><b>Contextualisation of imported units if required must be consistent with the guidelines provided in the relevant training package or delivery advice provided in the accredited course.</b></p>
<p><b>7.2 Resources</b></p>	<p><b>Standard 12 AQTF 2021 Standards for Accredited Courses</b></p> <p>The resources that should be available for this course relate to normal work practice using procedures, information and resources typical of an electrotechnology workplace.</p> <p>This should include access to:</p> <ul style="list-style-type: none"> <li>• relevant WHS and electrical safety policies/procedures and codes of practice</li> <li>• an actual or simulated integrated technologies workplace</li> <li>• relevant testing/diagnostic equipment, tools, materials and consumables</li> <li>• computer hardware and relevant software including but not limited to Microsoft Office suite, Web search programs and computer aided drawing and design (CAD0 software)</li> <li>• relevant plans, drawings and instructions to the level of operation.</li> </ul> <p>Training must be undertaken by a person or persons in accordance with:</p> <ul style="list-style-type: none"> <li>• Standard 1.4 of the AQTF: Essential Conditions and Standards for Initial/Continuing Registration and Guideline 3 of the VRQA Guidelines for VET Providers,</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>• the Standards for Registered Training Organisations 2015 (SRTOs),</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>• the relevant standards and guidelines for RTOs at the time of assessment.</li> </ul> <p>Units of competency imported from training packages or accredited courses must reflect the requirements for resources/trainers specified in that training package or accredited course.</p>

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8 Pathways and articulation	
	<p>Standard 8 AQTF 2021 Standards for Accredited Courses</p> <p>There are no formal articulation arrangements into other VET or higher education qualifications.</p> <p>When arranging articulation providers should refer to the: <a href="#">AQF Second Edition 2013 Pathways Policy</a></p> <p>Participants must negotiate their own individual study pathway arrangements with other training providers.</p> <p>Applicants who have already successfully completed any endorsed or accredited unit of competency from previous study will receive direct credit transfer for the same unit/s in this course. Likewise, graduates of this course will also gain direct credit transfer for unit/s successfully completed in any future course containing the same unit/s.</p>
9 Ongoing monitoring and evaluation	
	<p>Standard 13 AQTF 2021 Standards for Accredited Courses</p> <p>The Certificate II in Integrated Technologies (Pre-vocational) is monitored and maintained by the Curriculum Maintenance Manager (CMM) - Engineering Industries.</p> <p>A review will take place at the mid-point during the accreditation period. The review will be informed through feedback and consultation with teaching staff and graduates of the course and will consider any changes required to meet emerging technologies or developing needs in the industries served by this course.</p> <p><b>Any significant changes to the course resulting from course monitoring and evaluation procedures will be reported to the VRQA.</b></p>

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## Section C—Units of competency:

### Endorsed Training Package units:

Nationally endorsed units are available to download from the [National Register of VET](#)

<b>CUA Creative Arts and Culture Training Package</b>	
CUAANM301	Create 2D digital animations
CUAANM302	Create 3D digital animations
<b>CPP Property Services Training Package</b>	
CPPSEC2021	Install security equipment and systems
CPPSEC2023	Install video surveillance systems and equipment
CPPSEC2026	Perform routine maintenance on security equipment and systems
<b>ICT Information and Communications Technology Training Package</b>	
ICTCBL246	Install, maintain and modify customer premises communications cabling: ACMA Restricted Rule
ICTDRE301	Install digital reception equipment
ICTDRE302	Locate and rectify digital reception equipment faults
ICTGAM301	Apply simple modelling techniques
ICTGAM303	Review and apply the principles of animation
ICTICT302	Install and optimise operating system software
ICTICT303	Connect internal hardware components
ICTNWK308	Determine and action network problems
ICTNWK311	Install and test network protocols
ICTNWK425	Build small wireless local area networks
ICTPRG302	Apply introductory programming techniques
ICTSAS203	Connect hardware peripherals
ICTSAS211	Develop solutions for basic ICT malfunctions and problems
ICTSAS214	Protect devices from spam and destructive software
ICTSAS303	Care for computer hardware
ICTSAS304	Provide basic system administration
ICTSAS308	Run standard diagnostic tests
ICTSAS309	Maintain and repair ICT equipment and software
ICTSAS310	Install, configure and secure a small office or home office network
ICTTEN207	Install and test internet protocol devices in convergence networks
ICTTEN208	Use electrical skills when working with telecommunications networks
ICTWHS204	Follow work health and safety and environmental policy and procedures
<b>UEE Electrotechnology Training Package</b>	
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEERE0001	Apply environmentally and sustainable procedures in the energy sector

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UEERE0020	Promote sustainable energy practices in the community
UEERE0021	Provide basic sustainable energy solutions for energy reduction in residential premises
<b>RII Resources and Infrastructure Industry Training Package</b>	
RIIWHS204E	Work safely at heights

### Units from other Accredited Courses:

Accredited units of competency are available from the [Victorian DET website](#)

<b>22470VIC - Certificate in Engineering Studies</b>	
VU22340	Use 3D printing to create products
VU22338	Configure and program a basic robotic system
<b>222519VIC - Certificate IV in Integrated Technologies</b>	
VU22963	Build and implement a basic network
<b>22499VIC - Certificate II in Electrotechnology (Pre-vocational)</b>	
VU22674	Explore applications and operation of the Internet of Things (IoT)
<b>22334VIC - Certificate IV in Cyber Security</b>	
VU21990	Recognise the need for cyber security in an organisation
VU21993	Secure a networked personal computer

### Enterprise Units (Units developed for this course):

VU23109	Prepare to work in an integrated technologies environment
VU23110	Use routine work practices in an integrated technologies environment
VU23111	Apply electrotechnology knowledge and skills in integrated technologies work
VU23112	Use Computer Aided Drafting and Design software applications in integrated technologies work
VU23113	Carry out an integrated technologies project
VU23114	Perform basic network and computer assembly
VU23115	Perform basic computer system and network maintenance and upgrades
VU23116	Install and configure a home entertainment system
VU23117	Implement a digital circuit using a programmable logic device
VU23118	Install, test and verify correct operation of a by-wire control system
VU23119	Install, set up and test an embedded control system
VU23120	Set up and operate a small scale stand-alone photovoltaic energy system with battery storage
VU23121	Plan and build a system using fibre optic equipment
VU23122	Integrate fibre optic technology into an engineering process
VU23123	Integrate fibre optic technology into a communication process
VU23124	Install and test a wireless intercom system
VU23125	Conduct site survey for a wireless network

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VU23126	Set up and operate a wireless communication link
VU23127	Install communications antennae
VU23128	Assist with the application of wireless communication in an integrated technologies environment

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<b>UNIT CODE</b>	<b>VU23109</b>
<b>UNIT TITLE</b>	<b>Prepare to work in an integrated technologies environment</b>
<b>APPLICATION</b>	<p>This unit describes the performance outcomes, skills and knowledge required to prepare a person for work within an integrated technologies environment. The unit includes investigating industries where the application of integrated technologies are utilised and identifying potential employment opportunities. It also includes assessment of own aptitude and capabilities for this type of work and developing a career development plan to enter the industry.</p> <p><b>This unit of competency applies to persons preparing to work with integrated technologies. It is also suitable for use in a secondary school program such as the Victorian Certificate of Education (VCE) with an appropriate level of supervision and support.</b></p> <p><b>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication</b></p>
<b>ELEMENTS</b>	<b>PERFORMANCE CRITERIA</b>
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1	<p><b>Investigate personal career opportunities within industries engaging integrated technologies</b></p>
	<p>1.1 <b>Employment opportunities in industry where integrated technologies are applied for manufacturing goods and/or providing services are identified</b></p>
	<p>1.2 <b>Organisations which promote and support the application of integrated technologies in an industrial context are identified</b></p>
	<p>1.3 <b>Guidance and support is sought to align personal strengths with possible career pathways in integrated technologies</b></p>
	<p>1.4 <b>A career self-assessment tool is selected and completed to assess personal strengths and weaknesses in relation to preferred career pathway</b></p>
	<p>1.5 <b>Study pathways options to prepare for employment in the integrated technologies industry are identified</b></p>

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2	Develop a strategy to address personal career goals	2.1	Areas of particular interest in integrated technologies industries are prioritised for further investigation
		2.2	Self-assessment outcomes, professional advice and training pathways are aligned with job profiles of interest
		2.3	VET provider and/or higher education open day are attended to access course information relevant to study pathway of interest
		2.4	Information and/or advice from relevant industry organisations or other professionals is sought to complete the development of the career plan
		2.6	A personal career development plan is prepared to maximise the opportunity to achieve career goals
		2.7	Personal career development plan is presented and discussed with relevant person to determine its completeness to provide a pathway to achieve employment of interest in integrated technologies

### FOUNDATION SKILLS

Foundation skills essential to performance in this unit are *not explicit* in the performance criteria are listed here:

Skill	Description
Reading skills to:	Undertake desk top search for information on the application of integrated technologies in a range of industry areas
Writing skills to:	Email and/or write to enterprise career centres seeking information on employment opportunities
Teamwork skills to:	Work with another student/s to exchange ideas and share resources to gain wider overview of the applications of integrated technologies
Technology skills to:	Use technology to gather information on the application of integrated technologies in a range of industry areas, to use a career assessment tool and to create a personal development plan

UNIT MAPPING INFORMATION	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23109 Prepare to work in an integrated	VU22819 Prepare to work in an integrated	Equivalent

OFFICIAL



	technologies environment	technologies environment		
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## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23109 Prepare to work in an integrated technologies environment</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit and includes a portfolio of evidence that demonstrates:</p> <ul style="list-style-type: none"> <li>• At least six examples of integrated technologies applications have been identified in different industry areas including an overview of the technologies involved and the product and/or service provided</li> <li>• Consultation with a career counsellors/advisers and/or other industry experts on career opportunities and study pathways for employment in the electrotechnology/information, communication and technology industries or related areas</li> <li>• At least one computer based career assessment tool has been utilised such as Myer Briggs, What Career is Right for Me, Sokanu Careers test and others</li> <li>• Attendance to at least one VET provider or university open day</li> <li>• The ability to prepare a personal career development plan that sets out a study or study/work (i.e. traineeship apprenticeship) pathway for employment in integrated technologies or related industries areas.</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The candidate must be able to demonstrate essential knowledge to achieve the tasks outlined in the elements, performance criteria and foundation skills of this unit. This includes:</p> <ul style="list-style-type: none"> <li>• Examples of the integrated technologies applications in range of industry areas</li> <li>• Types of technologies domains and connectivity applications</li> <li>• Various jobs roles of persons responsible for the design/development, installation and maintenance of integrated technologies applications in various industries areas</li> <li>• Purpose and examples of career self-assessment resources/tools</li> <li>• Sources of information on career options and learning pathways</li> <li>• Components of a personal career development plan</li> </ul>
<b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i>	<p>Both training and assessment should take place in a learning environment with access to the internet and resources library.</p> <p>The primary piece of evidence for assessment is a portfolio of documentation (refer performance assessment above) submitted by the student to the teacher/trainer/assessor. Assessment may also include written and/or oral questioning.</p> <p><b>Assessor requirements:</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>

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<b>UNIT CODE</b>	<b>VU23110</b>
<b>UNIT TITLE</b>	<b>Use routine work practices in an integrated technologies environment</b>
<b>APPLICATION</b>	<p>This unit describes the performance outcomes, skills and knowledge required to apply routine work practices in an integrated technologies environment. It encompasses carrying out work instructions, safe use of hand and power tools, basic workshop tasks such as dismantling, tagging reassembling, cable joining and the utilisation of technologies to achieve a required outcome.</p> <p>This unit of competency applies to persons preparing to work with integrated technologies. It is also suitable for use in a secondary school program such as the Victorian Certificate of Education (VCE) with an appropriate level of supervision and support.</p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>
<b>PREREQUISITE UNIT</b>	UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
<b>ELEMENTS</b>	<b>PERFORMANCE CRITERIA</b>
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1	Select components, and materials in accordance to work instructions
1.1	Work instructions are interpreted and any issues of concern are clarified with the supervisor
1.2	Components or device and materials required for the job are identified and sourced in accordance with workplace procedure
1.3	Selection of components or device and materials required for the job are confirmed with the supervisor
2	Dismantle technology system
2.1	Plant and/or machine circuits are checked for isolation before work is commenced in accordance with work health and safety (WHS) requirements
2.2	Appropriate tools to dismantle technology system are selected and used in accordance with system manufacturers instructions

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		2.3	Components and parts are marked or tagged during the dismantling process to ensure correct and efficient re-assembly
		2.4	Dismantled components and parts are stored to protect them against loss or damage in accordance with workplace procedure
3	Install device into technology system to meet job requirements	3.1	WHS procedures and safe work practices are followed to minimise harm to self and others
		3.2	Technology component or device is installed and networked in accordance with manufacturer instructions
		3.3	Cable joining techniques such as soldering, brazing and crimping are applied if required in accordance with workplace procedure
		3.4	Test equipment is used to check the operation of component or device before reassembling the system in accordance manufacturers' instructions and safe work practices
		3.5	Contingencies or unexpected situations are escalated to the supervisor for further instructions in accordance with workplace procedure
		3.6	Stored technology system components and parts are reassembled using the marking or tagging of the components as a guide
4	Complete technology system installation	4.1	Final checks and reprogramming of the system are conducted to ensure its operation complies with job requirements
		4.2	Supervisor is notified of the work completion in accordance with workplace procedure
		4.3	Any improvements that could be applied to the work procedures are identified and recorded in accordance with continuous improvement procedures
5	Clean up the work area and complete maintenance records	5.1	Tools, equipment and any surplus materials are cleaned, checked and stored in accordance with workplace procedures
		5.2	Any unserviceable components and waste are disposed of in an environmentally sustainable manner and in accordance with workplace procedures

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		5.3	Work activities are recorded in accordance with workplace procedure
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**FOUNDATION SKILLS**

Foundation skills essential to performance are *not explicit* in the performance criteria of this unit of competency

Technology skills to:

safely use and maintain hand tools and hand held power tools used for disassembling and reassembling machine components

**UNIT MAPPING INFORMATION**

Code and Title Current Version	Code and Title Previous Version	Comments
VU23110 Use routine work practices in an integrated technologies environment	VU22820 Use routine work practices in an integrated technologies environment	Equivalent

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## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23110 Use routine work practices in an integrated technologies environment</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>To be considered competent in this unit assessors must be satisfied the participant can demonstrate the achievement of each element to the level defined in the performance criteria. Specifically, they must be able to provide evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Interpret and follow job instructions to disassemble and tag components of an integrated technology system in readiness to install an electrical component and/or device</li> <li>• Install component and/or device and reassemble reprogram and test system to confirm performance complies with work requirements</li> <li>• Demonstrate safe work practices in an electrotechnology environment including use of hand tools and hand held power tools</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Safe work practices in a electrotechnology workplace environment</li> <li>• Integrated technologies system may include but not limited to:             <ul style="list-style-type: none"> <li>– Computer network system</li> <li>– Telecommunication system</li> <li>– 3D printing system</li> <li>– Robotics control system</li> <li>– Sustainable energy system</li> <li>– Wireless communication system</li> <li>– Security system</li> <li>– Lighting system</li> <li>– home entertainment system</li> </ul> </li> <li>• Technologies component may include but not limited to:             <ul style="list-style-type: none"> <li>– Transistors</li> <li>– Resistors</li> <li>– Batteries</li> <li>– Transducers</li> <li>– Transformers</li> <li>– Capacitors</li> <li>– Motors</li> <li>– Switches</li> <li>– Diodes</li> <li>– Condensers</li> </ul> </li> </ul>

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	<ul style="list-style-type: none"> <li>- Software programs</li> <li>- Wireless communications device</li> <li>- Telecommunication device</li> <li>- Electrical/electronic device</li> </ul> <ul style="list-style-type: none"> <li>• Safe use of hand tools and hand held power tools and workshop equipment</li> <li>• Disassembling, tagging and reassembling procedures</li> <li>• Cable joining techniques such as soldering, brazing, crimping</li> <li>• Software programs and wireless communication systems for technology integration</li> <li>• Sources of technical information</li> </ul>
<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Both practical skills and knowledge can be assessed in a simulated workshop environment. It should reflect real workplace conditions with suitable facilities, tools and equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures relevant to an electrotechnology environment</li> <li>• relevant electrotechnology componentry and connectivity application/s for meeting project requirements</li> <li>• relevant componentry specifications and references</li> </ul> <p>Recommended assessment methods to assess skills and knowledge should include:</p> <ul style="list-style-type: none"> <li>• direct observation of the practical tasks including safe work practices</li> <li>• inspection of the installation</li> <li>• written and oral questioning</li> <li>• third party report/feedback</li> </ul> <p><b>Assessor requirements:</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>

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<b>UNIT CODE</b>	<b>VU23111</b>		
<b>UNIT TITLE</b>	<b>Apply electrotechnology knowledge and skills in integrated technologies work</b>		
<b>APPLICATION</b>	<p>This unit describes the performance outcomes required for a person to use basic electrotechnology knowledge and skills in an integrated technologies environment.</p> <p>It encompasses the application of mathematical principles, and a range of basic electrical/electronic skills including testing and fault finding procedures relevant to integrated technologies work. The unit also includes the cable selection and connecting skills.</p> <p>This unit of competency applies to persons preparing to work with integrated technologies It is also suitable for use in a secondary school program such as the Victorian Certificate of Education (VCE) with an appropriate level of supervision and support.</p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>		
<b>PREREQUISITE UNIT</b>	UEECD0007 - Apply work health and safety regulations, codes and practices in the workplace		
<b>ELEMENTS</b>	<b>PERFORMANCE CRITERIA</b>		
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.		
1	Determine the work requirements	1.1	Required electrotechnology work outcomes are identified from the job instructions
		1.2	Relevant work health and safety (WHS) policies and procedures for a electrotechnology work environment are identified and followed
		1.3	Any potential work site hazards and/or WHS issue/s identified are escalated to the supervisor
2	Apply appropriate formulae and calculations to work requirement	2.1	Formulae and/or calculations required for the work requirements are determined and applied
		2.2	Calculations for the work requirement are checked using estimating and approximating techniques
		2.3	Concepts of ratio and proportion, if necessary, are applied to the selected formula for the work requirement

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3	Connect, test and verify voltage and direct and alternating current circuitry	3.1	A series and a parallel extra-low voltage (ELV) direct current (d.c) and extra low voltage (ELV) alternating current (a.c) circuit configuration are connected following safe work practices
		3.2	Values of electrical quantities of the circuits are measured using appropriate test equipment
		3.3	Measured values of the electrical quantities in a series and in a-parallel circuit configuration are calculated and verified using the correct formulae
		3.4	Measured values are compared to the calculated values to determine the reason for any variations
		3.5	ELV a.c and ELV d.c supply voltage is measured to confirm the value is within the limits of the equipment or power supply specifications
		3.6	Test equipment to measure ELV a.c and ELV d.c voltage is used in a safe manner that does not require the ELV circuit to be disconnected
		3.7	Results are evaluated to determine any faults in accordance with workplace procedures
4	Produce charts and graphs	4.1	Applications of the various charts and graphs used in the electrotechnology industry are identified
		4.2	Data to produce charts and graphs is transposed for the different circuits in electrotechnology equipment
		4.3	Scales applicable for the axis of the charts and/or graphs to be produced are determined from testing equipment readings
		4.4	Upper and lower limits of acceptability for the charts and/or graphs to be produced are identified for determining equipment performance
		4.5	Charts and graphs produced are utilise to verify the relationship between the electrical quantities in the circuits
		4.6	Trends indicated by the slope or gradient of a graph are interpreted to gather data
5	Evaluate analogue and digital signals	5.1	Analogue signal and digital signal characteristics are compared for their differences
		5.2	A layout using building blocks to represent a typical analogue and digital circuit is produced to show the different characteristics of each

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		5.3	4-bit binary codes with their decimal equivalent is produced to represent output voltages of a digital to analogue converter
		5.4	Appropriate test equipment is chosen to measure the output voltage of a digital device for “high” and “low” logic states
6	Select, connect and test cable performance	6.1	Different types of cables used in telecommunications and the transmission characteristics of each are identified
		6.2	Appropriate cable type is selected to suit the characteristics of the transmission application
		6.3	Two devices are connected with a patch cable and the connection is tested for correct functionality

**RANGE OF CONDITIONS:**

*Work practices and assessment must be completed in a simulated environment utilising equipment supplying an extra-low voltage as defined in AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules).*

**FOUNDATION SKILLS**

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

<b>UNIT MAPPING INFORMATION</b>	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23111 Apply electrotechnology knowledge and skills in integrated technologies work	VU22821 Apply electrotechnology knowledge and skills in integrated technologies work	Equivalent

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## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23111 Apply electrotechnology knowledge and skills in integrated technologies work</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>To be considered competent in this unit assessors must be satisfied the participant can demonstrate the achievement of each element to the level defined in the performance criteria. Specifically, they must be able to provide evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Work safety in a electrotechnology environment</li> <li>• Interpret and follow work instructions</li> <li>• Select appropriate formulae and perform simple mathematical calculations</li> <li>• Prepare charts and graphs to represent technical data</li> <li>• Apply fundamental electrical principles to solve basic ELV a.c. and ELV d.c. electrical problems</li> <li>• Connect and test and ELV a.c. and a ELV d.c. circuit</li> <li>• Illustrate the layout of a typical analogue and digital circuit</li> <li>• Identify cable types and select the appropriate cable/s for a given application</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Personal Protective Equipment (PPE) for working in an electrotechnology workplace</li> <li>• Work, health and safety (WHS) requirements in a electrotechnology environment including:             <ul style="list-style-type: none"> <li>– Component tolerances are not exceeded</li> <li>– Correct use of power supply and test equipment</li> <li>– Identifying electrical safety hazards</li> <li>– Current overloads protection</li> <li>– Power isolation during set-up procedure</li> <li>– Well laid out circuitry avoiding:                 <ul style="list-style-type: none"> <li>○ contact with external sources</li> <li>○ shorting of components</li> </ul> </li> </ul> </li> <li>• Application of a.c. and d.c. theory and electrical quantities</li> <li>• ELV d.c. and ELV a.c. circuit configuration includes:</li> <li>• a.c. to d.c. supply</li> <li>• d.c. circuits including:             <ul style="list-style-type: none"> <li>– Resistances</li> <li>– Single d.c. voltage source, such as:</li> </ul> </li> </ul>

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	<ul style="list-style-type: none"> <li>○ Battery</li> <li>○ d.c. voltage supply</li> <li>○ Solar panel</li> <li>- Power loads</li> <li>● a.c. circuit including:             <ul style="list-style-type: none"> <li>- Inductors, capacitors and resistances</li> <li>- Single a.c. voltage source, such as:                 <ul style="list-style-type: none"> <li>○ a.c. generator</li> <li>○ a.c. voltage supply</li> <li>○ Alternator</li> <li>○ Low voltage a.c. source</li> </ul> </li> </ul> </li> <li>*ELV d.c. - Low voltage is defined by the International Electrotechnical Commission (IEC) as &lt;120 Volts</li> <li>*ELV a.c. - Extra low voltage is defined by the International Electrotechnical Commission (IEC) as being &lt;50 Volts</li> <li>● ELV a.c. and ELV d.c. fault finding techniques and the use of test equipment such as multimeters Ohmmeters, voltmeters for measuring electrical quantities such as current power, voltage and resistance</li> <li>● Probable electrical faults such as:             <ul style="list-style-type: none"> <li>- Cracked circuit board</li> <li>- Failed components</li> <li>- Faulty power supply</li> <li>- Intermittent faults</li> <li>- Loose connections</li> <li>- Open circuit</li> <li>- Short circuit</li> <li>- Short to ground</li> <li>- Split pairs</li> <li>- Water damage</li> </ul> </li> <li>● Typical formulae and calculations used in a electrotechnology workplace such as:</li> <li>● Applications of Ohm's Law</li> <li>● Power calculation Power consumption and efficiencies</li> <li>● Voltage, resistance and current calculations</li> <li>● Application of binary to decimal conversion and vice versa</li> <li>● Techniques for estimating approximate answers</li> <li>● Sources of appropriate formulae</li> <li>● Building blocks and characteristics of an analogue and digital signal which include:             <ul style="list-style-type: none"> <li>- Analogue signal includes:                 <ul style="list-style-type: none"> <li>○ Amplifiers</li> </ul> </li> </ul> </li> </ul>
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	<ul style="list-style-type: none"> <li>○ Attenuators</li> <li>○ Displays</li> <li>○ Filters</li> <li>○ Oscillators</li> <li>○ Transducers</li> <li>- Digital signal includes:             <ul style="list-style-type: none"> <li>○ Analogue to digital convertor (ADC)</li> <li>○ Digital to analogue convertor (DAC)</li> <li>○ Computers</li> <li>○ Counter</li> <li>○ Data routers, switches and bridges</li> <li>○ Digital amplifier</li> <li>○ Digital display</li> <li>○ Input and output transducers</li> <li>○ Multiplexer</li> </ul> </li> <li>• Distinction between analogue and digital signals and devices</li> <li>• Techniques to convert analogue to digital and vice versa</li> <li>• Application of charts and/or graphs in integrated technology</li> <li>• Types of cabling and their applications.             <ul style="list-style-type: none"> <li>- Types of cabling includes:                 <ul style="list-style-type: none"> <li>○ Coaxial cable</li> <li>○ Multi-pair communications cable</li> <li>○ Optical fibre</li> <li>○ Performance data cable CAT 5 and higher</li> <li>○ Rack and sub-rack alarm and power distribution cables</li> <li>○ Shielded twisted pair (STP) communications cable</li> <li>○ UTP communications cable</li> </ul> </li> </ul> </li> </ul>
<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Both practical skills and knowledge can be assessed on the job or in a simulated workshop environment. If a simulated workshop environment it should reflect real workplace conditions with suitable facilities, tools and equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• Personal Protective Equipment (PPE)</li> <li>• work, health safety (WHS) regulations and procedures relevant to an electrotechnology environment</li> <li>• relevant electrotechnology resources and specifications</li> </ul> <p>Recommended assessment methods to assess skills and knowledge should include:</p> <ul style="list-style-type: none"> <li>• direct observation of the practical tasks</li> <li>• written and oral questioning</li> </ul>

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	<ul style="list-style-type: none"><li>• portfolio of materials including: mathematical calculations, reference materials etc.</li><li>• third party report/feedback</li></ul> <p><b>Assessor requirements:</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>
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<b>UNIT CODE</b>		<b>VU23112</b>	
<b>UNIT TITLE</b>		<b>Use Computer Aided Drafting and Design software applications in integrated technologies work</b>	
<b>APPLICATION</b>		<p>This unit describes the performance outcomes, skills and knowledge required to use computer aided drawing and design (CAD) software to support the application of technologies in an integrated environment. Skills include: preparing charts and diagrams, generating two and three dimensional drawings, performing calculations and simulations</p> <p>This unit of competency applies to persons preparing to work in an industry where integrated technologies are applied and/or undertake further study in integrated technologies or related field.</p> <p>The unit is suitable for use in a secondary school program such as the Victorian Certificate of Education (VCE) with an appropriate level of support and supervision.</p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>	
<b>ELEMENTS</b>		<b>PERFORMANCE CRITERIA</b>	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Prepare to carry out work requirements	1.1	Work requirements are interpreted and any issues of concern are clarified with the supervisor
		1.2	Software application needed for the work requirements is obtained in accordance to workplace procedure
		1.3	Appropriate commands to load and run the software application for the work requirements are applied
2	Use software application to generate the work requirements	2.1	Software program is navigated to access the required information/data for the work requirements
		2.2	Information/data is retrieved using organisational procedures and checked for relevance to the work requirements
		2.3	Information/data is manipulated to meet work requirement by performing application tasks in accordance with workplace procedures

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		2.4	Drawing aids are employed to generate block diagrams and flowcharts for work requirements
		2.5	Two dimensional (2D) and three dimensional (3D) component drawings that comply with drafting conventions are prepared to meet work requirements
		2.6	Calculations and appropriate simulation techniques are performed to confirm work requirements have been met
		2.7	Appropriate files are produced and saved using techniques relevant to the software package
3	Complete the software application task	3.1	Work tasks are printed and completed files are stored in accordance with workplace requirements
		3.2	Logging off and shutting down the computing system is carried out in accordance to workplace procedure
		3.3	Prints of completed work tasks are collated and submit to workplace supervisor for approval

**FOUNDATION SKILLS**

Foundation skills essential to performance in this unit, but not explicit in the performance criteria are listed here, along with a brief description and how the skill is applied.

Skill	Description
Reading skills to:	interpret data/instructions on screen when navigating CAD software program
Oral communication skills to:	seek guidance when required to carry out computing tasks in accordance with work requirements
Technology skills to:	operate computer hardware and software to perform a range of drawing and mathematical tasks gather relevant technical data and information to generate flowcharts and diagrams

UNIT MAPPING INFORMATION	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23112 Use Computer Aided Drafting and Design software applications	VU22822 Use CAD software applications to support integrated technologies work	Equivalent

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OFFICIAL



## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23112 Use Computer Aided Drafting and Design software applications in integrated technologies work</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	To be considered competent in this unit assessors must be satisfied the participant can demonstrate the achievement of each element to the level defined in the performance criteria. Specifically, they must be able to provide evidence of the ability to: <ul style="list-style-type: none"> <li>• Apply computing knowledge and skills to:             <ul style="list-style-type: none"> <li>– use appropriate commands to load and run a CAD software program</li> <li>– enter, manipulate and retrieve data</li> <li>– employ drawing aids to generate block diagrams and flowcharts</li> <li>– produce 2D and 3D component drawings that comply with drafting conventions/rules and meets work requirements</li> <li>– perform calculations and simulations tasks as required</li> <li>– save and store created files in accordance with workplace procedures</li> </ul> </li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of: <ul style="list-style-type: none"> <li>• Functions and capabilities of various CAD software programs</li> <li>• User interfaces including:             <ul style="list-style-type: none"> <li>– Working with commands</li> <li>– Cartesian workspace</li> <li>– Help menu</li> <li>– Search tools</li> </ul> </li> <li>• CAD software application tasks such as:             <ul style="list-style-type: none"> <li>– Generating an electrotechnology block diagrams</li> <li>– Performing calculations and simulations</li> <li>– Generating flow charts and diagrams to comply with specifications</li> <li>– Generating 2D and 3D component drawings</li> </ul> </li> <li>• Drafting symbols, dimensioning conventions and rules</li> </ul>
<b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i>	Both practical skills and knowledge can be assessed on the job or in a simulated environment. If a simulated environment it should reflect real workplace conditions with:

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	<ul style="list-style-type: none"><li>• computing hardware and CAD software</li><li>• printing equipment</li><li>• work instructions</li><li>• reference on Australian drafting symbols conventions and rules</li></ul> <p>Recommended assessment methods to assess skills and knowledge should include:</p> <ul style="list-style-type: none"><li>• direct observation of the tasks being performed</li><li>• written and oral questioning</li><li>• portfolio of printed assignment tasks</li></ul> <p><b>Assessor requirements:</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>
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<b>UNIT CODE</b>	<b>VU23113</b>
<b>UNIT TITLE</b>	<b>Carry out an integrated technologies project</b>
<b>APPLICATION</b>	<p>This unit describes the performance outcomes, skills and knowledge required to carry out an integrated technologies project by merging two or more distinct electrotechnology domains to achieve an integrated technologies solution.</p> <p>It requires the ability to choose a project in line with the individuals' or work team capabilities and access to resources, preparing a project brief and project action plan. Different technology domains and connectivity applications will need to be assessed for their suitability to achieve the project outcome/s. The unit also includes the requirement to monitor the projects' progress in accordance with the action plan, seek assistance when required and reviewing the process upon completion.</p> <p>Examples of projects may include but not limited to:</p> <ul style="list-style-type: none"> <li>- basic robotic system</li> <li>- model renewable energy system</li> <li>- automated extra low voltage (ELV) lighting system</li> <li>- model ELV security system</li> <li>- smart watering system</li> </ul> <p><b>The unit applies to persons preparing to work in a technologies environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</b></p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>
<b>PREREQUISITE UNIT</b>	<p>UEECD0007 - Apply work health and safety regulations, codes and practices in the workplace</p> <p>VU23110 – Use routine work practices in an integrated technologies environment</p> <p>VU23111 – Apply electrotechnology knowledge and skills in integrated technologies work</p>
<b>ELEMENTS</b>	<b>PERFORMANCE CRITERIA</b>
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1	1.1
Plan an integrated technologies project	Project team is established and the scope of the integrated technologies project is determined in accordance with the knowledge, skills and interests of team members

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		1.2	Technologies and connectivity programs are evaluated for their suitability to meet project requirements using basic mathematical concepts and/or specification references
		1.3	Project brief is prepared specifying project outcomes, selected technologies, connectivity program and resource requirements
		1.4	Project action plan is drawn up identifying the stages of the project build, timelines, required resources and key responsibility of each team member
		1.5	Project brief and action plan are documented and presented to supervisor for review and feedback
		1.6	Feedback from supervisor is reviewed by team and adjustments to brief and/or action plan are made as required and approved by supervisor
2	Build an integrated technologies project	2.1	Technologies, resources, tools and equipment to meet the project build are accessed
		2.2	Project build activities are carried out in accordance with the requirements of the action plan
		2.3	Safe work procedures and practices for an electrotechnology work environment are followed by team members
		2.4	Project build progress is reviewed against action plan timelines and variance if any is addressed by team members to maintain timely completion
		2.5	Decisions for dealing with unexpected situations that will impact the outcomes and/or timelines of the project are confirmed with supervisor and implemented
3	Finalise project and review team work	3.1	The integrated technologies project is tested and/or trialled to evaluate the performance against specified outcomes within the project brief
		3.2	Technology adjustments and/or modifications to improve project performance are determined and implemented
		3.3	Project performance is demonstrated to supervisor by team members to verify outcomes of the project brief are met
		3.4	Project team in conjunction with supervisor undertake a review of the team's performance against the action

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			plan to determine what activities and processes worked well and areas for improvement
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### RANGE OF CONDITIONS

Although a person can achieve the elements of the unit working alone it is recommended small project teams (consisting of two to four persons), are established to enhance the learning experience for each participant.

The required performance outcomes of this competency are more suited to a training environment with an appropriate level of supervision and support, than on the job.

### FOUNDATION SKILLS

Foundation skills essential to performance in this unit, but *not explicit* in the performance criteria are listed here.

Skill	Description
Reading skills to:	assess written specifications of electrotechnology componentry to determine suitability to meet the required outcomes for the integrated technologies project
Writing skills to:	contribute to the development of the project brief and action plan
Oral communication skills to:	contribute to the discussion for the preparation of the project brief and action plan with other team member/s present project brief and action plan supervisor, respond to questions and contribute to the discussion
Numeracy skills to:	read and interpret technical data and make basic calculations to determine if project performance parameters will meet required outcomes
Learning skills to:	extend own knowledge and skills from working with other team members
Initiative and enterprise skills to:	contribute to keeping the project on track when unexpected situation occur such as componentry failure or non - performance of a team member
Self-management skills to:	ensure as a team member allocated project tasks are completed in-line with projects needs and action plan
Technology skills to:	apply basic engineering skills and safe use of hand tools and equipment as required in the project build process

UNIT MAPPING INFORMATION	Code and Title	Code and Title	Comments

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	Current Version	Previous Version	
	VU23113 Carry out an integrated technologies project	VU22823 Carry out an integrated technologies project	Equivalent

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## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23113 Carry out an integrated technologies project</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Contribute to the development and drafting of a project brief and action plan which includes:             <ul style="list-style-type: none"> <li>– project brief:                 <ul style="list-style-type: none"> <li>○ statement detailing the type of project and its' objective/s</li> <li>○ description of at least two integrated technologies to be merged</li> </ul> </li> <li>– action plan:                 <ul style="list-style-type: none"> <li>○ start and finish date</li> <li>○ project stages /steps with timelines</li> <li>○ activities and resources required for each stage</li> <li>○ responsibilities of each team member</li> </ul> </li> </ul> </li> <li>• Contribute to the build of an integrated technologies project which includes the merging of at least two distinct technology domains by a connectivity application to achieve the specified requirements of a project brief and action plan</li> <li>• Participate and contribute to a review process with the supervisor to:             <ul style="list-style-type: none"> <li>– evaluate the teams' performance in achieving the project outcomes in-line with project brief and action plan</li> <li>– identify what worked well and areas for improvement</li> </ul> </li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The candidate must be able to demonstrate essential knowledge to achieve the tasks outlined in the elements, performance criteria and foundation skills of this unit. This includes:</p> <ul style="list-style-type: none"> <li>• Distinct technology domains and connectivity software programs</li> <li>• Basic mathematical concepts to interpret and compare performance of technical component specifications/connectivity option</li> <li>• Application and safe work practices in a electrotechnology work environment</li> <li>• Purpose and content of a project brief and components of an action plan</li> <li>• Team work fundamentals</li> <li>• Elements of an effective project evaluation process</li> </ul>

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<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Both practical skills and knowledge can be assessed in a simulated workshop environment. It should reflect real workplace conditions with suitable facilities, tools and equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures relevant to an electrotechnology environment</li> <li>• relevant electrotechnology componentry and connectivity application/s for meeting project requirements</li> <li>• relevant componentry specifications and references</li> </ul> <p>Recommended assessment methods to assess skills and knowledge should include:</p> <ul style="list-style-type: none"> <li>• direct observation of individuals contribution to the project outcome and evaluation process</li> <li>• examination of the final project against project brief</li> <li>• written and oral questioning</li> <li>• third party report/feedback</li> </ul> <p><b>Assessor requirements:</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>
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<b>UNIT CODE</b>		<b>VU23114</b>	
<b>UNIT TITLE</b>		<b>Perform basic network and computer assembly</b>	
<b>APPLICATION</b>		<p>This unit describes the performance outcomes, the knowledge and skills required to plan, construct and configure stand-alone computers into a local area network (LAN).</p> <p><b>The unit applies to a person preparing to work in a technology environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</b></p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication</p>	
<b>ELEMENTS</b>		<b>PERFORMANCE CRITERIA</b>	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Plan for computer system and network assembly	1.1	Established work, health and safety (WHS) requirements and risk control measures procedures are determined and followed
		1.2	Computer system and network assembly requirements are determined from, work instructions and/or consultation with the supervisor
		1.3	Required network topology is selected to meet job requirements and is confirmed with the supervisor
		1.4	Other personnel in the work area are consulted and informed of the networking activities to minimise disruption to work program
		1.5	Resources and equipment needed for the job are obtained in accordance with enterprise procedures and checked as fit for purpose
2	Assemble and set up stand-alone computers	2.1	Computer components and devices are selected and assembled to manufacturers' specifications
		2.2	The computers are tested and the desktops are customised to job requirements
		2.3	Basic computer system information is checked and, if appropriate, adjusted to specified requirements
		2.4	Decisions for dealing with unexpected situations are guided by work requirement and discussion with supervisor

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3	Assemble and configure a local area network	3.1	Local area network computers are connected to the network using required network interfaces and connections according to manufacturers' specifications and enterprise procedures
		3.2	The network server is configured for a dynamic host configuration protocol in accordance with manufacturers' specifications and enterprise procedures
		3.3	Assembled and configured network is tested for operation and any faults are corrected in accordance with enterprise procedures
		3.4	Decisions for dealing with unexpected situations are made from discussions with appropriate personnel, job specifications and enterprise procedures
4	Complete computer system and computer network assembly	4.1	The computer system and network is checked to verify overall functioning and problems if any, are rectified as required
		4.2	Implement procedures to protect network data and privacy from cyber threats in accordance enterprise procedures
5	Clean up work area and document network installation	5.1	Hand tools and equipment used in assembly task are check and stored in accordance with enterprise procedures
		5.2	Work area is cleaned up and made safe in accordance with WHS/OHS requirements and enterprise procedures
		5.3	Specifications of assembled systems are documented and stored in accordance with enterprise procedures

### FOUNDATION SKILLS

Foundation skills essential to performance in this unit, but *not explicit* in the performance criteria are listed here.

Skill	Description
Reading skills to:	assess the suitability of computer and network systems hardware/software and components specifications
Writing skills to:	document computer and network system specifications in accordance to workplace procedure

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Oral communication skills to:	discuss hardware and software installation requirements with appropriate person (client)		
Problem-solving skills to:	take steps to resolve unexpected situations when carrying out installation and connectivity issues for computers and/or network systems		
Technology skills to:	safely use and maintain hand tools and test equipment		
<b>UNIT MAPPING INFORMATION</b>	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23114 Perform basic network and computer assembly	VU22824 Perform basic network and computer assembly	Equivalent

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## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23114 Perform basic network and computer assembly</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Interpret and follow work instructions written and/or verbal</li> <li>• Work in accordance relevant WHS procedures</li> <li>• Assemble and configure stand-alone computers into a small network</li> <li>• Troubleshoot common computer, computer network and peripheral device problems</li> <li>• Employ procedures to protect network data and privacy</li> <li>• Complete documentation in accordance with workplace procedure</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The candidate must be able to demonstrate essential knowledge to achieve the tasks outlined in the elements, performance criteria and foundation skills of this unit. This includes:</p> <ul style="list-style-type: none"> <li>• Computer types, systems and programs</li> <li>• Basic features of a graphical user interface environment</li> <li>• Software applications including: work processing; spreadsheets; databases; graphics applications; presentation applications; web browser and email.</li> <li>• Safety work practices in a electrotechnology environment</li> <li>• Appropriate tools for networking and computer assembly work</li> <li>• Computer and network testing equipment</li> <li>• Procedures to protect network data and privacy from cyber interference</li> <li>• Computer system overview including: input process, output and storage</li> <li>• Network system boot process</li> <li>• Hardware components including: case; power supply; cooling systems, motherboard, motherboard form factors; motherboard components, CPUs; BIOS; expansion slots, riser cards, bus types</li> <li>• Other computer components including: memory, display, connector, storage, network</li> </ul>
<b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i>	<p>Both practical skills and knowledge can be assessed in a workplace or a simulated workplace environment. If a simulated environment it should reflect real workplace conditions with suitable facilities, hand tools and test equipment. Assessment must ensure access to:</p>

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	<ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures relevant to an electrotechnology environment</li> <li>• relevant hardware and software requirements</li> <li>• relevant componentry specifications and references</li> </ul> <p>Recommended assessment methods to assess skills and knowledge should include:</p> <ul style="list-style-type: none"> <li>• direct observation of practical tasks</li> <li>• examination of the final outcomes</li> <li>• third party report/feedback</li> <li>• written and oral questioning</li> </ul> <p><b>Assessor requirements</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>
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<b>UNIT CODE</b>		<b>VU23115</b>	
<b>UNIT TITLE</b>		<b>Perform basic computer system and network maintenance and upgrades</b>	
<b>APPLICATION</b>		<p>This unit describes the performance outcomes, skills and knowledge required to maintain, upgrade and troubleshoot stand-alone computers and small networks consisting of a maximum of five computers.</p> <p>This unit of competency applies to a person working freelance or for an enterprise providing computer installation, set up and maintenance services.</p> <p><b>The unit is also suitable for persons preparing to work in a technology environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</b></p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>	
<b>ELEMENTS</b>		<b>PERFORMANCE CRITERIA</b>	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Plan for computer system and network maintenance and upgrades	1.1	Established work, health and safety (WHS) requirements and risk control measures and procedures are followed in the workplace
		1.2	Preventative maintenance tasks and upgrades for computer system and network are determined in consultation with-client and/or supervisor and documented in accordance with enterprise procedure
		1.3	Computer system and network components requiring upgrading are identified and appropriate upgrade components are accessed in accordance with enterprise procedures
		1.4	Other personnel in the work areas are informed of the planned work tasks to ensure the work is coordinated effectively with others
		1.5	Resources, tools and equipment needed for the tasks are obtained in accordance with enterprise procedures and checked as fit for purpose
2	Perform maintenance on computer system and network	2.1	Preventative and corrective maintenance on computer system and network is carried out in accordance with enterprise procedures

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		2.2	Faults in computer system and network are identified and rectified in accordance with enterprise procedures
		2.3	Decisions for dealing with unexpected situations are made from discussions with appropriate personnel, job requirements and enterprise procedures
3	Perform computer system and network upgrades	3.1	Upgrades to computer system and network are installed and configured in accordance with manufacturer's instructions
		3.2	Upgraded computer system and network is tested and all functions are verified in accordance with manufacturers' specifications and enterprise procedures
		3.3	Any malfunctions with computer system and/or network are identified and rectified in accordance with manufacturer's instructions
		3.4	Decisions for dealing with unexpected situations are made from discussions with appropriate personnel job requirements and enterprise procedures
4	Document work activities and clean-up work area	4.1	Resources, tools and equipment are checked, maintained if required and stored in accordance with enterprise procedures
		4.2	Work area is cleared and made safe in accordance with WHS requirements and enterprise procedures
		4.3	Specifications of upgraded computer system and network are documented in accordance with enterprise procedures

**FOUNDATION SKILLS**

Foundation skills essential to performance in this unit, but not explicit in the performance criteria are listed here.

Skill	Description
Reading skills to:	assess the suitability of systems upgrade software and components specifications
Writing skills to:	document computer system maintenance records and upgrades specifications
Oral communication skills to:	discuss preventive maintenance requirements and upgrades with appropriate person (client)

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Initiative and enterprise skills to:		take steps to resolve unexpected situations when carrying out preventive maintenance and upgrades to computers and/or network	
Technology skills to:		safely use and maintain hand tools and test equipment	
<b>UNIT MAPPING INFORMATION</b>	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23115 Perform basic computer system and network maintenance	VU22825 Perform basic computer system and network maintenance	Equivalent

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## Assessment Requirements

<p><b>TITLE</b></p>	<p>Assessment Requirements for: <b>VU23115 Perform basic computer system and network maintenance and upgrades</b></p>
<p><b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i></p>	<p>The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Follow workplace WHS processes and procedures</li> <li>• Read and interpret job instructions, equipment specifications and manuals</li> <li>• Safely use a range of hand tools and test equipment</li> <li>• Undertake preventative maintenance and upgrades for computer system such as:             <ul style="list-style-type: none"> <li>– resizing a desktop window</li> <li>– setting clock and date</li> <li>– setting and altering desktop settings</li> <li>– characterise computer displays</li> <li>– upgrading video with a video acceleration board</li> <li>– adding audio capabilities with a sound card</li> <li>– increase memory</li> </ul> </li> <li>• Undertake preventative maintenance and upgrades for a computer network such as:             <ul style="list-style-type: none"> <li>– configuring external peripherals</li> <li>– adding hardware to a server</li> <li>– upgrading server components</li> <li>– adding a network interface card (NIC) and set the IP address</li> <li>– replacing routers and switches</li> <li>– adding and connecting a network printer</li> </ul> </li> <li>• Troubleshoot common computer, computer network and peripheral device problems.</li> </ul>
<p><b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i></p>	<p>The candidate must be able to demonstrate essential knowledge to achieve the tasks outlined in the elements, performance criteria and foundation skills of this unit. This includes:</p> <ul style="list-style-type: none"> <li>• IT fundamentals such as: computer systems and programs, computer types, connecting computer systems</li> <li>• Basic features of graphical user interface (GUI) environment</li> </ul>

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	<ul style="list-style-type: none"> <li>• Laboratory safety and tools including: electrostatic discharge (ESD); basic safety principles, practices to reduce ESD; tools, cleaning supplies, testing equipment; safety agreement</li> <li>• Computer system overview including: boot process; hardware components; memory components; display components; connector components, storage components; network components; network interface card (NIC); system resources; portable devices</li> <li>• Hardware for multimedia upgrades including: video adapter; sound cards and speaker systems, common media file formats used in multimedia applications; m-peg hardware versus software, optical drives</li> <li>• Network server overview including hardware Redundant Array of Independent Disks (RAID) versus software RAID; hardware based RAID configuration</li> <li>• Networking fundamentals including: file, print and application services; mail services; directory and name services; internet</li> <li>• Types of networks</li> <li>• Dynamic Host Configuration Protocol (DHCP) servers</li> <li>• Network components including: network topologies, physical versus logical topology; networking media; common devices; server components</li> <li>• LAN architectures including networking protocols, OSI model; TCP/IP utilities</li> <li>• Printers and printing</li> <li>• Elements of a preventative maintenance program including: tools and equipment; environmental guidelines; electrostatic discharge</li> <li>• Basic troubleshooting techniques for computer and network systems</li> </ul>
<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Both practical skills and knowledge can be assessed in a workplace or a simulated workplace environment. If a simulated environment it should reflect real workplace conditions with suitable facilities, hand tools and test equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures relevant to an electrotechnology environment</li> <li>• relevant hardware and software requirements</li> <li>• access to a small computer network and devices</li> <li>• relevant componentry specifications and references</li> </ul> <p>Recommended assessment methods to assess skills and knowledge should include:</p> <ul style="list-style-type: none"> <li>• direct observation of practical tasks</li> <li>• examination of the final outcomes</li> </ul>

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	<ul style="list-style-type: none"><li>• third party reports/feedback</li><li>• written and oral questioning</li></ul> <p><b>Assessor requirements</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>
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<b>UNIT CODE</b>		<b>VU23116</b>	
<b>UNIT TITLE</b>		<b>Install and configure a home entertainment system</b>	
<b>APPLICATION</b>		<p>This unit describes the performance outcomes, skills and knowledge required to plan, install and configure a home entertainment system. This includes interconnecting domestic video, audio and control equipment to create an integrated home entertainment system.</p> <p>This unit of competency applies to person working as a freelance technician or for an enterprise providing entertainment systems installation and maintenance services to customers/clients.</p> <p><b>The unit is also suitable for persons preparing to work in a technology environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</b></p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication</p>	
<b>ELEMENTS</b>		<b>PERFORMANCE CRITERIA</b>	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Plan to install a home entertainment system	1.1	Established work, health and safety (WHS) requirements and risk control measures and procedures are followed in the work area
		1.2	Home entertainment equipment installation requirements are determined from documentation, job sheet or discussions with client and/or supervisor
		1.3	Suitability of the installation site is assessed and the installation task is planned in consultation with client and/or supervisor
		1.4	Resources and equipment needed for the task are obtained in accordance with enterprise procedures and checked as being fit for the purpose
2	Install and test a home entertainment system	2.1	Any existing equipment is checked as being isolated, where necessary, in-accordance with WHS requirements
		2.2	Home entertainment equipment is unpacked and checked for completeness and any form of damage prior to installation

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		2.3	Home entertainment equipment is installed, connected and configured according to the job requirements and manufacturers' specifications/instructions
		2.4	Home entertainment system is tested for functionality and problems if any, are rectified in accordance with enterprise procedures
		2.5	Decisions for dealing with unexpected situations are made based on discussions with client and/or supervisor and job specifications
		2.6	Client is instructed on operating the home entertainment system
3	Clean up, store tools and document installation	3.1	Equipment and tools used for the installation task are collected, checked and stored and the work area cleaned up and made safe
		3.2	System installation documentation is completed in accordance with enterprise procedures

**FOUNDATION SKILLS**

Foundation skills essential to performance in this unit but *not explicit* in the performance criteria.

Skill	Description
Reading skills to:	determine the of suitability of components and parts of the entertainment system determine installation requirements
Writing skills to:	complete documentation after the completing the installation of the entertainment system
Oral communication skills to:	inform customer/client how to operate the entrainment system explain unexpected situation/s with customer/client and supervisor
Initiative and enterprise skills to:	deal with unexpected situation/s before and during the installations
Technology skills to:	use hand tools and equipment correctly and safely during the installation

UNIT MAPPING INFORMATION	Code and Title	Code and Title	Comments
	Current Version	Previous Version	

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	VU23116 Install and configure a home entertainment system	VU22826 Install and test a home entertainment system	Equivalent	
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## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23116 Install and configure a home entertainment system</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The candidate must be able to demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Follow WHS requirements and procedures for a electrotechnology work area</li> <li>• Plan, install and configure a home entertainment system with at least four (4) different pieces of entertainment equipment including:</li> <li>• Use relevant hand and hand held power tools and test equipment correctly</li> <li>• Read and interpret equipment manuals and installation instructions</li> <li>• Test the installation for correct any functionality issues</li> <li>• Troubleshoot connections, picture and sound issues</li> <li>• Demonstrate the operation of the system</li> <li>• Complete relevant workplace documentation</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Input devices including: wireless input devices; electronic game players; television receivers; computers; satellite dishes; programmable remote; CD players; turntables; surge protection devices</li> <li>• Connectors including: SCART; AV; coaxial; S video; wireless links</li> <li>• Surround sound including: components (receivers, amplifiers, speakers); data decoding; dolby decoding; dolby surround sound; digital theatre systems; MPEG; MP3</li> <li>• Output devices including: televisions (CRT, LCD, plasma, rear projection, digital, overhead projectors); speakers (wired, wireless; in wall speaker systems, sub woofers); surround sound formats (5.1, 7.1)</li> <li>• Control devices including remote controls; universal remotes,</li> <li>• Test procedures/troubleshooting methodology</li> <li>• WHS requirements/safe work practices when working with electrical powered devices and equipment</li> </ul>
<b>ASSESSMENT CONDITIONS</b>	Both practical skills and knowledge can be assessed in a workplace or a simulated workplace environment. If a simulated environment it should

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<i>Mandatory field</i>	<p>reflects real workplace conditions with suitable facilities, hand tools and test equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures relevant to an electrotechnology environment</li> <li>• job instructions, componentry specifications and manuals</li> <li>• access to entrainment system componentry and devices</li> </ul> <p>Recommended assessment methods to assess skills and knowledge may include:</p> <ul style="list-style-type: none"> <li>• direct observation of practical tasks</li> <li>• examination of the final outcomes</li> <li>• third party reports/feedback</li> <li>• written and oral questioning</li> </ul> <p><b>Assessor requirements:</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>
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<b>UNIT CODE</b>		<b>VU23117</b>	
<b>UNIT TITLE</b>		<b>Implement a digital circuit using a programmable logic device</b>	
<b>APPLICATION</b>		<p>This unit describes the performance outcomes, skills and knowledge required to implement, from a given design file, digital circuits on programmable logic devices (PLD). The unit includes planning for and programming a PLD and verifying the digital circuit functionality.</p> <p>This unit of competency applies to a person working in a commercial technology environment where programmable logic devices are required for a range of electronic control applications.</p> <p><b>The unit is also suitable for persons preparing to work in a technology environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</b></p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>	
<b>ELEMENTS</b>		<b>PERFORMANCE CRITERIA</b>	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Plan for programming a PLD	1.1	Established work, health and safety (WHS) requirements and risk control measures and procedures are determined and followed in preparation for the work task
		1.2	PLD programming requirements are established from job instructions and discussion with supervisor
		1.3	Other personnel in the work area are consulted and informed of the work activities to ensure it is coordinated with other activities
		1.4	Resources and equipment needed for the task are obtained in accordance with enterprise procedures and checked for correct operation and safety
2	Program a PLD and test functionality	2.1	Equipment/machines/plant are checked as being isolated where necessary in accordance with WHS requirements
		2.2	PLD is programmed according to requirements, manufacturers' specifications and enterprise procedures

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		2.3	PLD circuit implementation is tested for functionality, according to requirements and enterprise procedures
		2.4	Decisions and methods for dealing with unexpected situations are made from discussions with supervisor and job specifications
3	Clear work area, store tools and document implementation	3.1	Work site is made safe in accordance with established safety procedures
		3.2	Equipment and tools used in the implementation task are maintained and stored according to enterprise procedures
		3.3	Digital circuit function and requirements are verified, documented and information stored according to enterprise procedures.

### FOUNDATION SKILLS

Foundation skills essential to performance in this unit, but are *not explicit* in the performance criteria are listed here.

Skill	Description
Reading skills to:	interpret PLD programming instructions and job sheet
Problem-solving skills to:	deal with unexpected situations during programming and testing functionality tasks
Technology skills to:	safely use hand tools and hand held power tools

UNIT MAPPING INFORMATION	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23117 Implement a digital circuit using a programmable logic device	VU22827 Implement a digital circuit using a programmable logic device (PLD)	Equivalent

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## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23117 Implement a digital circuit using a programmable logic device</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The candidate must be able to demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Apply WHS procedures for working in an elctrotechnology environment</li> <li>• Interpret job instructions and implement a digital circuit by programming a programmable logic device (PLD)</li> <li>• Confirm functionality of the digital circuit and document PDL circuit implementation</li> </ul> <p>on at least two (2) occasions and each in a different context or situation.</p>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Programmable logic devices including; Complex Programmable Logic Devices (CPLDs); Field Programmable Gate Arrays (FPGAs)</li> <li>• Programmable logic device characteristics including size; macro cells; speed</li> <li>• Integrated software environment (ISE) e.g. Xilinx; Altera; Lattice</li> <li>• Hardware description languages e.g. Very High Speed Integrated Circuit (VHSIC), Very High Speed Hardware Description Language (VHDL)</li> <li>• WHS issues when working in an electrotechnology environment.</li> </ul>
<b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i>	<p>Both practical skills and knowledge can be assessed in a workplace or a simulated workplace environment. If a simulated environment it should reflect real workplace conditions with suitable facilities, hand tools and test equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures relevant to an electrotechnology environment</li> <li>• job instructions, componentry, specifications and manuals</li> <li>• access to PLD componentry and devices</li> </ul> <p>Recommended assessment methods to assess skills and knowledge may include:</p> <ul style="list-style-type: none"> <li>• direct observation of practical tasks</li> <li>• examination of the final outcomes</li> <li>• third party reports/feedback</li> </ul>

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	<ul style="list-style-type: none"><li>• written and oral questioning</li></ul> <p><b>Assessor requirements:</b> No specialist vocational competency requirements for assessors apply to this unit.</p>
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<b>UNIT CODE</b>	<b>VU23118</b>
<b>UNIT TITLE</b>	<b>Install, test and verify correct operation of a by-wire control system</b>
<b>APPLICATION</b>	<p>This unit describes the performance outcomes, skills and knowledge required to install, test and verify correct operation of a by-wire control system.</p> <p>It requires the ability to plan for the installation of a by-wire control system, installing the system in accordance with job instructions and diagnostic testing and verification of the control systems' functionality.</p> <p>This unit applies to a person working in an industry where by-wire technology is utilised for a range of control applications.</p> <p>The unit is also applies to a person preparing to work in a technology environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>
<b>ELEMENTS</b>	<b>PERFORMANCE CRITERIA</b>
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1	Plan to install and test a by-wire control system
1.1	Established work, health and safety (WHS) requirements and risk control measures and procedures are followed for the work task
1.2	Safety hazards, which have not previously been identified, are documented and risk control measures devised and implemented in consultation with supervisor
1.3	Control application installation and testing requirements are determined from, job instructions and clarified with supervisor
1.4	Other personnel are consulted and advised of the work task to ensure the work is coordinated effectively with others at the work site
1.5	Resources and equipment needed for the task are obtained in accordance with enterprise procedures and checked for correct operation and safety

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2	Install and test by-wire control system	2.1	Equipment, machines or plant are checked as being isolated, where necessary, in strict accordance with WHS requirements
		2.2	By-wire control system is installed in accordance with requirements, manufacturers' specifications and enterprise procedures
		2.3	By-wire control system is tested for functionality and, if necessary, faults are located and rectified
		2.4	Decisions and methods for dealing with unexpected situations are made from discussions with appropriate personnel, job specifications and enterprise procedures
3	Clear work area, store tools and document implementation	3.1	Work site is made safe, in accordance with established safety procedures
		3.2	Equipment and tools used for the task are checked and stored according to enterprise procedures
		3.3	By-wire control system function and requirements are verified, documented and information stored according to enterprise procedures

### FOUNDATION SKILLS

Foundation skills essential to performance in this unit, but are *not explicit* in the performance criteria are listed here.

Skill	Description
Reading skills to:	interpret by-wire control system installation job sheet and required specifications
Oral communication skills to:	ask questions and discuss installation with supervisor and others in the workplace impacted by the isolation of plant or equipment
Problem-solving skills to:	deal with unexpected situations before and during installation and testing the functionality of the 'by wire' control system
Technology skills to:	safely and correctly use hand tools and hand held power tools and test equipment for the 'by wire' control system installation

UNIT MAPPING INFORMATION	Code and Title	Code and Title	Comments
	Current Version	Previous Version	

OFFICIAL



	VU23118 Install, test and verify correct operation of a by-wire control system	VU22828 Install, test and verify correct operation of a 'by-wire' control system	Equivalent	
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## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23118 Install, test and verify correct operation of a by-wire control system</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The candidate must be able to demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Follow established WHS requirements and procedures for a electrotechnology workplace</li> <li>• Interpret job instructions and ask questions if required to clarify installation requirements</li> <li>• Plan and prepare for the installation of a by-wire control system</li> <li>• Isolate machinery or plant if required and install a by-wire control system in accordance with job instructions</li> <li>• Test and verified the functionality of the system and rectify faults if any</li> <li>• Ensure work area is made safe after the installation and complete documentation is completed in accordance to workplace procedure</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Control input fundamentals including positional information; potentiometers; incremental (feedback requirements) and absolute</li> <li>• Control output fundamentals including motors; servos; solenoids; valves; pneumatics; hydraulics</li> <li>• Control channel media including wire; fibre; wireless RF; remote control</li> <li>• Serial bus fundamentals including serial data asynchronous and synchronous; closes – separate and embedded; device addressing</li> <li>• Serial bus technology e.g. CAN bus; I2C bus; 1-wire bus</li> <li>• Multiplexing including TDM time division; STDM statistical time division; FDM frequency division</li> <li>• Control technology applications e.g. aviation (fly-by-wire); automotive; home automation; remote control</li> <li>• Control setup and testing procedures including isolation; safety requirements; interlocks; documentation</li> <li>• Work, health and safety practices in an electrotechnology environment</li> </ul>

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<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Both practical skills and knowledge can be assessed in a workplace or a simulated workplace environment. If a simulated environment it should reflect real workplace conditions with suitable facilities, hand tools and test equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures relevant to an electrotechnology environment</li> <li>• job instructions, componentry specifications and manuals</li> <li>• access to 'by wire' componentry and devices</li> </ul> <p>Recommended assessment methods to assess skills and knowledge may include:</p> <ul style="list-style-type: none"> <li>• direct observation of practical tasks</li> <li>• examination of the completed task/s</li> <li>• third party reports/feedback from workplace supervisor</li> <li>• written and oral questioning</li> </ul> <p><b>Assessor requirements:</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>
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<b>UNIT CODE</b>	<b>VU23119</b>
<b>UNIT TITLE</b>	<b>Install, set up and test an embedded control system</b>
<b>APPLICATION</b>	<p>This unit describes the performance outcomes, skills and knowledge required to install, set up and test an embedded control system used for automatic or semi-automatic operations of a wide range of consumer and industrial equipment.</p> <p>It requires the ability to plan for the installation of an embedded control system, installing the system in accordance with job instructions and carry out diagnostic testing and verification of the control systems' functionality.</p> <p>The unit applies to a person preparing to work in or working in an environment where embedded control systems are utilised to operate a range of consumer and industrial equipment.</p> <p>The unit is also applies to a person preparing to work in a technology environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>
<b>ELEMENTS</b>	<b>PERFORMANCE CRITERIA</b>
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1	Plan to install, set up and test an embedded control system
1.1	Established work, health and safety (WHS) requirements and risk control measures and procedures are followed in preparation for the work task
1.2	Embedded control system installation and set-up requirements are determined from job sheet or instructions from client and/or supervisor
1.3	Other personnel in the work area are consulted and informed of the installation to ensure the work is coordinated effectively without disruption
1.4	Resources and equipment needed for the task are obtained in accordance with enterprise procedures and checked for correct operation and safety
1.5	Equipment, machines or plant are checked as being isolated, where necessary, in accordance with WHS requirements

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2	Install and program an embedded control system	2.1	Embedded control system is installed, set up and configured according to job requirements, manufacturers' manuals and enterprise procedures
		2.2	Embedded control system is programmed either in circuit or in a programmer according to requirements, and manufacturers' specifications
		2.3	Decisions and methods for dealing with unexpected situations are made from discussions with client and/or supervisor, job specifications and enterprise procedures
3	Verify operation and complete documentation	3.1	Embedded control system is tested for correct operation in accordance with requirements, manufacturers' specifications and enterprise procedures
		3.2	Client and/or supervisor is informed of the completion of work and provided with a demonstration of the operation of the embedded control system
		3.3	Embedded control system installation and configuration is documented and stored, in accordance with enterprise procedures
4	Clean up work area and store tools	4.1	Work site is made safe in accordance with established safety procedures
		4.2	Equipment and tools used in installation and set-up are maintained and stored in accordance with enterprise procedures

### FOUNDATION SKILLS

Foundation skills essential to performance in this unit, but are *not explicit* in the performance criteria are listed here.

Skill	Description
Reading skills to:	<ul style="list-style-type: none"> <li>interpret job sheet and specifications requirements for the embedded control system installation</li> </ul>
Oral communication skills to:	<ul style="list-style-type: none"> <li>ask questions and discuss the installation with supervisor</li> <li>advise others in the workplace impacted by the isolation of plant or equipment</li> </ul>

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<p>Problem-solving skills to:</p>	<ul style="list-style-type: none"> <li>deal with unexpected situations before and during installation and testing the functionality of the embedded control system</li> </ul>		
<p>Technology skills to:</p>	<ul style="list-style-type: none"> <li>safely and correctly use hand tools and hand held power tools and test equipment for the embedded control system installation</li> <li>key up workplace documentation following completion and verification of the installation</li> <li>use programming tools and diagnostic software to test and verify functionality of an embedded control system</li> </ul>		
<p><b>UNIT MAPPING INFORMATION</b></p>	<p>Code and Title Current Version</p>	<p>Code and Title Previous Version</p>	<p>Comments</p>
	<p>VU23119 Install, set up and test an embedded control system</p>	<p>VU22829 Install, set up and test an embedded control system</p>	<p>Equivalent</p>

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## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23119 Install, set up and test an embedded control system</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The candidate must be able to demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Follow established WHS requirements and procedures for a electrotechnology workplace</li> <li>• Interpret job instructions and prepare for the installation of a embedded control system</li> <li>• Isolate machinery or plant if required and install and set up an embedded control system in accordance with job instructions</li> <li>• Test and verify the functionality and program/reprogram an embedded control system</li> <li>• Make work area safe after the installation and complete documentation as required.</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Embedded controller applications including industrial; commercial; domestic</li> <li>• Embedded controller features including: fabrication techniques; architecture; memory features and options; power management; input and output features; interrupts; special features (e.g. watchdog timers, digital signal processors, clock monitor, resident program loader)</li> <li>• Embedded controller software including machine language, assembler language, interpreters; compilers; development tools; simulators; debuggers</li> <li>• Test procedures for embedded controllers including power up routine; resetting; booting; reprogramming; functional testing</li> <li>• Safe work practices in an electrotechnology environment</li> </ul>
<b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i>	<p>Both practical skills and knowledge can be assessed in a workplace or a simulated workplace environment. If a simulated environment it should reflects real workplace conditions with suitable facilities, hand tools and test equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures relevant to an electrotechnology environment</li> <li>• job instructions, componentry specifications and manuals</li> <li>• access to embedded control system, componentry and devices</li> </ul>

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	<p>Recommended assessment methods to assess skills and knowledge may include:</p> <ul style="list-style-type: none"><li>• direct observation of practical tasks</li><li>• examination of the final outcomes</li><li>• third party report/feedback from workplace supervisor</li><li>• written and oral questioning</li></ul> <p><b>Assessor requirements:</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>
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<b>UNIT CODE</b>		<b>VU23120</b>	
<b>UNIT TITLE</b>		<b>Set up and operate a small scale stand-alone photovoltaic energy system with battery storage</b>	
<b>APPLICATION</b>		<p>This unit describes the performance outcomes, skills and knowledge required to plan, set up and operate a small scale (<i>not to exceed 32V</i>), stand-alone, photovoltaic (PV) energy system with battery storage.</p> <p>It requires the ability to identify the relevant Australian Standards and clean energy guidelines for renewable energy installation, plan the installation including site assessment, select components, set up and operate the system including storage capability</p> <p>The unit applies to a person <i>preparing to work</i> in the renewable energy or electrotechnology industry and is suitable for use in a secondary school program with an appropriate level of supervision and support.</p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>	
<b>ELEMENTS</b>		<b>PERFORMANCE CRITERIA</b>	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Plan to set up a small PV energy system with storage capability	1.1	Relevant work, health and safety (WHS) requirements and risk control measures and procedures are determined for the work area and system installation
		1.2	Clean Energy Council (CEC) guidelines for renewable energy installations with battery storage are reviewed prior to the installation
		1.3	System installation site is identified and assessed as suitable for the installation
		1.4	System energy output requirement is estimated and suitable system components are investigated and evaluated <del>discussed</del> with supervisor before selection
		1.5	Battery type, storage capacity and location requirements are determined and confirmed with supervisor
		1.6	Any actual or potential hazards are identified and confirmed with supervisor

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		1.7	Energy system with battery storage layout diagram is prepared in accordance with installation requirements and approval by the supervisor
2	Set up a small PV energy system with storage capability	2.1	Tools, equipment and consumables needed for the installation are obtained and checked before use
		2.2	System components are sourced, assembled and installed in accordance with the layout diagram and manufacturers' requirements
		2.3	Storage battery is installed in a protected location in accordance to layout diagram and CEC guidelines
		2.4	System cabling is installed, connected and tested in accordance with layout diagram and manufacturers' specifications
		2.5	Methods for dealing with unexpected situations are based on safety considerations, specified work outcomes and discussion with supervisor
		2.6	Final checks are undertaken to ensure the installed system and battery location are consistent with the CEC guidelines and approved layout diagram
3	Test the operation of PV energy system and its energy storage capability	3.1	Energy system is charged and trialed to test the operation and ability to meet output requirements
		3.2	Modifications are implemented if required and final operation of the system is demonstrated to the supervisor
4	Clean up and store tools and equipment	4.1	Tools and equipment collected, checked, cleaned and returned to storage in accordance to workplace procedure
		4.2	Work area is cleaned and made safe in accordance with relevant WHS requirements and workplace procedures.

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**FOUNDATION SKILLS**

Foundation skills essential to performance in this unit, but are *not explicit* in the performance criteria are listed here.

Skill	Description
Reading skills to:	interpret relevant renewable energy industry Australian Standards, Clean Energy Council guidelines and specification details for the selection of system components
Numeracy skills to:	estimate energy system output and battery capacity
Learning skills to:	prepare a renewable energy system layout diagram showing location of components including battery and component specifications
Problem-solving skills to:	deal with unexpected situations when planning and installing and trialling the renewable energy system trial and troubleshoot the energy system following set up to determine if energy output meets requirements
Technology skills to:	safely and correctly use hand tools and testing equipment

UNIT MAPPING INFORMATION	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23120 Set up and operate a small scale stand-alone photovoltaic energy system with battery storage	VU22830 Set up and operate a small scale stand-alone photovoltaic energy system with battery storage	Equivalent

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## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23120 Set up and operate a small scale stand-alone photovoltaic energy system with battery storage</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Follow established WHS requirements and procedures for a electrotechnology workplace</li> <li>• Research and select suitable system components including battery storage capacity</li> <li>• Select an installation site free from actual or potential hazards</li> <li>• Prepare a layout diagram of a small scale stand-alone PV energy system with battery storage to meet specified output requirements</li> <li>• Install the components of the system in accordance to the layout diagram and manufacturers' requirements</li> <li>• Test functionality of the system to determine energy output and battery storage capability meet requirements</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Relevant industry Australian Standards such as: AS/NZS 5139, 5033</li> <li>• Renewable energy guidelines such as: Clean Energy Council (CEC) guidelines, Energy Storage Council (ESC) guidelines</li> <li>• Procedures and considerations for working safety Work Health in an electrotechnology environment</li> <li>• PV renewable energy system components including:             <ul style="list-style-type: none"> <li>– inverters including types, output waveforms and efficiency</li> <li>– isolators, and cabling and electrical infrastructure</li> <li>– charge controllers including blocking diode; low voltage disconnect; charge regulators; over-voltage shunt; connections</li> <li>– photovoltaic modules including types, efficiency and applications</li> <li>– metering equipment</li> <li>– battery types, storage capacity, installation and enclosure requirements</li> </ul> </li> <li>• Site considerations such as:</li> </ul>

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	<ul style="list-style-type: none"> <li>- available space for the solar array and other system components/infrastructure</li> <li>- actual and potential shading</li> <li>- surface level and drainage considerations for ground level PV array</li> <li>- mounting material, angle and orientation considerations for elevated PV array</li> <li>- location to other assets e.g. water, gas, electricity</li> <li>- access to installation site</li> </ul> <ul style="list-style-type: none"> <li>• Testing and troubleshooting the installed system</li> </ul>
<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Both practical skills and knowledge must be assessed in a simulated workplace environment. With access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures relevant to an electrotechnology environment</li> <li>• job instructions, componentry specifications and manuals</li> <li>• access to a ranges of suitable componentry, devices and consumables</li> <li>• appropriate hand tools and test equipment</li> </ul> <p>Recommended assessment methods to assess skills and knowledge may include:</p> <ul style="list-style-type: none"> <li>• direct observation of practical tasks</li> <li>• examination of the final outcomes</li> <li>• written and oral questioning</li> </ul> <p><b>Assessor requirements:</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>

OFFICIAL



<b>UNIT CODE</b>	<b>VU23121</b>		
<b>UNIT TITLE</b>	<b>Plan and build a system using fibre optic equipment</b>		
<b>APPLICATION</b>	<p>This unit describes the performance outcomes, skills and knowledge required to plan and build systems using fibre optic equipment. This includes identifying fibre optic components and equipment, interconnecting them and measuring circuit parameters to verify performance against requirements.</p> <p>The unit applies to a person working in an industrial environment where fibre optics are used for telecommunications or industrial control purposes.</p> <p>The unit also applies to a person preparing to work in an electrotechnology environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>		
<b>ELEMENTS</b>	<b>PERFORMANCE CRITERIA</b>		
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.		
1	Plan a fibre optic circuit	1.1	Established work, health and safety (WHS) and risk control measures and procedures for the work area are determined and followed
		1.2	The requirements for building a fibre optic circuit are identified from job sheets and confirmed with supervisor
		1.3	A diagram of the circuit meeting established requirements, is prepared according to enterprise procedures and approved by supervisor
		1.4	Other personnel in the work area are advised of the planned work task to ensure the work is coordinated effectively with others
		1.5	Resources and equipment needed for the task are obtained in accordance with enterprise procedures and checked for correct operation and safety
2	Build a fibre optic circuit	2.1	Machines or plant are checked as being isolated where necessary in accordance with WHS requirements

OFFICIAL





		2.2	Fibre optic circuit components are interconnected according to a connections diagram, and manufacturers' specifications
		2.3	The fibre optic circuit is checked for functionality and if necessary faults are rectified in accordance with enterprise procedures
		2.4	Decisions and methods for dealing with unexpected situations are selected on the basis of safety, specified work outcomes and discussion with supervisor
3	Perform functional measurements and complete work activities	3.1	Required circuit parameters are measured, verified against requirements and documented in accordance with enterprise procedures
		3.2	Client and/or supervisor is informed of the work completion and provided with a demonstration of the operation of the fibre optic circuit
4	Clean work area and document work activities	4.1	Equipment, tools used in the task are maintained and stored according to enterprise procedures
		4.2	Work site is made safe in accordance with established workplace safety procedures

### FOUNDATION SKILLS

Foundation skills essential to performance in this unit, but are *not explicit* in the performance criteria are listed here.

Skill	Description
Reading skills to:	interpret work instructions and component specifications requirements for the fibre optic control system installation
Oral communication skills to:	ask questions and discuss the installation with supervisor advise others in the workplace impacted by the need to isolate plant or equipment for the installation
Problem-solving skills to:	deal with unexpected situations during installation and testing of the fibre optic circuit
Technology skills to:	safely and correctly use hand tools and testing equipment to measure the circuit parameters

OFFICIAL

<b>UNIT MAPPING INFORMATION</b>	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23121 - Plan and build a system using fibre optic equipment	VU22831 - Plan and build a system using fibre optic equipment	Equivalent

OFFICIAL



## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23121 - Plan and build a system using fibre optic equipment</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Follow established WHS requirements and procedures for a electrotechnology workplace</li> <li>• Plan and prepare a fibre optic circuit diagram to meet job instructions</li> <li>• Source and interconnect fibre optic circuit components according to circuit diagram and manufacturers' specifications</li> <li>• Test and confirm fibre optic circuits' parameters meet job requirements</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Relevant workplace WHS requirements and procedures</li> <li>• Fibre optic circuit components and their function/application including:             <ul style="list-style-type: none"> <li>– optical fibre cabling</li> <li>– lasers</li> <li>– optical connects</li> <li>– couples</li> <li>– attenuators</li> <li>– wavelength division multiplexers</li> <li>– patch cords</li> <li>– optical sensors</li> <li>– splitters</li> </ul> </li> <li>• Light sources in fibre optics including lasers and LEDs</li> <li>• Light receivers in fibre optics including photo diodes and photo transistors</li> <li>• Wave guides and transmission media including air, water and optical fibre</li> <li>• Measurement and test equipment use in fibre optic circuit installations such as:             <ul style="list-style-type: none"> <li>– power tester</li> <li>– fibre amplifier</li> </ul> </li> </ul>

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	<ul style="list-style-type: none"> <li>- bit rate tester</li> <li>- band width tester</li> <li>• Power sources for fibre optic circuits</li> </ul>
<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Both practical skills and knowledge can be assessed in a workplace or a simulated workplace environment. If a simulated environment it should reflect real workplace conditions with suitable facilities, hand tools and test equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures for an electrotechnology environment</li> <li>• job instructions, componentry to build a fibre optic circuit and vendors instructions/manuals</li> <li>• access to relevant test and measuring equipment</li> </ul> <p>Recommended assessment methods to assess skills and knowledge may include:</p> <ul style="list-style-type: none"> <li>• direct observation of practical tasks</li> <li>• examination of the fibre optic circuit installation</li> <li>• third party reports/feedback from workplace supervisor</li> <li>• written and/or oral questioning</li> </ul> <p><b>Assessor requirements:</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>

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<b>UNIT CODE</b>	<b>VU23122</b>		
<b>UNIT TITLE</b>	<b>Integrate fibre optic technology into an engineering process</b>		
<b>APPLICATION</b>	<p>This unit describes the performance outcomes, skills and knowledge required to integrate fibre optic technology into an engineering process to perform a specific requirement. The requirement may include calculating and detecting distance, movement, size, colour or shape.</p> <p>It requires the ability to apply safe work practices in an electrotechnology/engineering environment, plan and setting up for the installation according to job instructions, assemble the fibre optic devices and components in accordance with a connection/circuit diagram and using diagnostic tools to solve predictable problems</p> <p>This unit of competency applies to a person working in an industrial environments where fibre optic technology is used in engineering tasks or for engineering control purposes.</p> <p>The unit also applies to a person preparing to work in an electrotechnology/engineering environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>		
<b>ELEMENTS</b>	<b>PERFORMANCE CRITERIA</b>		
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.		
1	Prepare to install fibre optic technology within an engineering process	1.1	Established work, health and safety (WHS) requirements and risk control measures and procedures in preparation for the work task are followed
		1.2	The requirement for the use of fibre optic devices and components in an engineering process are identified from documentation, job sheet and/or discussion with supervisor
		1.3	A connections diagram for the task is drawn up according to enterprise procedures and approved by supervisor
		1.4	Other personnel in the work area are advised of the planned work activity to ensure the work is coordinated effectively and to-minimise potential disruptions

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		1.5	Resources and equipment needed for the task are obtained in accordance with enterprise procedures and checked for safe and correct operation
2	Install fibre optic devices and components within an engineering process	2.1	Machines or plant are checked as being isolated where necessary in accordance with WHS requirements
		2.2	Using connections diagram and relevant resources and equipment, the fibre optic devices and components are incorporated into the engineering process according to manufacturers' specifications and enterprise procedures
		2.3	The fibre optic devices and engineering process are checked for functionality and if necessary, faults rectified in accordance with enterprise procedures
		2.4	Decisions and methods for dealing with unexpected situations are selected on the basis of safety, specified work outcomes and discussion with the supervisor
3	Store equipment/tools, clean work area and document installation	3.1	Equipment, tools used in assembly tasks are maintained and stored according to enterprise procedures
		3.2	Work site is clean and made safe in accordance with established safety procedures
		3.3	Installation is documented in accordance to enterprise procedures

### FOUNDATION SKILLS

Foundation skills essential to performance in this unit, but are *not explicit* in the performance criteria are listed here.

Skill	Description
Reading skills to:	interpret work instructions and component specifications requirements for the fibre optic control system installation
Writing skills to:	complete enterprise documentation outlining details of the installation
Oral communication skills to:	ask questions and discuss the installation with supervisor advise others in the workplace impacted by the need to isolate plant or equipment for the installation

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Problem-solving skills to:	deal with unexpected situations during installation and testing of the fibre optic circuit		
Planning and organising skills to:	prepare a connection diagram for the installation process		
Technology skills to:	safely and correctly use hand tools and testing equipment to ensure the functionality of the engineering process		
<b>UNIT MAPPING INFORMATION</b>	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23122 Integrate fibre optic technology into an engineering process	VU22832 Integrate fibre optic technology into an engineering process	Equivalent

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## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23122 – Integrate fibre optic technology into an engineering process</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Follow established WHS requirements and procedures for a electrotechnology workplace</li> <li>• Prepare a connection diagram to guide the installation of a fibre optic device and components into an engineering process to meet job instructions</li> <li>• Assemble and install fibre optic components according to a connection diagram and job instructions</li> <li>• Use diagnostic test equipment to check functionality of the installation and rectify predictable problems</li> <li>• Document completed installation, store tools and equipment and clean work area in accordance to workplace procedure</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Work, health and safety procedures for an electrotechnology/engineering environment</li> <li>• Requirements for using fibre optics technology include: measure, calculate detect such as:             <ul style="list-style-type: none"> <li>– distance</li> <li>– movement</li> <li>– size</li> <li>– colour</li> <li>– shape</li> </ul> </li> <li>• Types of fibre optic devices and components including:             <ul style="list-style-type: none"> <li>– optical fibre cabling</li> <li>– lasers</li> <li>– detectors</li> <li>– optical connectors</li> <li>– couplers</li> <li>– attenuators</li> <li>– wavelength division multiplexers</li> <li>– patch cords</li> <li>– optical sensors</li> <li>– splitters</li> </ul> </li> </ul>

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	<ul style="list-style-type: none"> <li>• Interfacing including electronics systems; communications systems; computer systems; mechanical systems</li> <li>• Control technology including positional information; input/output; control media; feedback technology</li> <li>• Fibre optics test equipment:             <ul style="list-style-type: none"> <li>- power meters</li> <li>- fibre amplifiers</li> <li>- bit rate testers</li> <li>- bandwidth testers</li> </ul> </li> </ul>
<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Both practical skills and knowledge can be assessed in a workplace or a simulated workplace environment. If a simulated environment it should reflect real workplace conditions with suitable facilities, hand tools and test equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures for an electrotechnology environment</li> <li>• job instructions, devices and components to build a fibre optic circuit and vendors instructions/manuals</li> <li>• access to relevant test and measuring equipment</li> </ul> <p>Recommended assessment methods to assess skills and knowledge may include:</p> <ul style="list-style-type: none"> <li>• direct observation of practical tasks</li> <li>• examination of the fibre optic installation</li> <li>• third party reports/feedback from workplace supervisor</li> <li>• written and/or oral questioning</li> </ul> <p><b>Assessor requirements</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>

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<b>UNIT CODE</b>		<b>VU23123</b>	
<b>UNIT TITLE</b>		<b>Integrate fibre optic technology into a communication process</b>	
<b>APPLICATION</b>		<p>This unit describes the performance outcomes, skills and knowledge required to integrate fibre optic technology into a communication process to generate, transmit and detect data.</p> <p>It requires the ability to use safe work practices in an electrotechnology environment. Plan and set up for an installation, assemble the fibre optic devices and components in accordance with the connection/circuit diagram and to use diagnostic tools to solve a range of predictable problems.</p> <p>The unit applies to a person working in an industrial environment where fibre optic technology is used in communication systems.</p> <p>The unit also applies to a person preparing to work in an electrotechnology/engineering environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>	
<b>ELEMENTS</b>		<b>PERFORMANCE CRITERIA</b>	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Prepare to install fibre optic technology into a communication process	1.1	Established work, health and safety (WHS) requirements and risk control measures for the work area are followed
		1.2	The requirement for the use of fibre optic devices and components within a communication process are identified from job instructions and discussions with the supervisor
		1.3	A connection diagram for the task is drawn up according to enterprise procedures and approved by the supervisor
		1.4	Other personnel in the work area are advised of the planned work activity to ensure the work is coordinated effectively and to minimise potential disruption

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		1.5	Resources and equipment needed for the task are obtained in accordance with enterprise procedures and checked for correct operation
2	Assemble fibre optic devices and components into a communication process	2.1	Machines or plant are checked as being isolated where necessary in accordance with WHS requirements
		2.2	Using connection diagrams and relevant documentation fibre optic devices and components are incorporated into the communication process according to manufacturers' specifications and job instructions
		2.3	Fibre optic devices and components are checked for functionality and if necessary, faults rectified in accordance with enterprise procedures
		2.4	Decisions and methods for dealing with unexpected situations are selected on the basis of safety, specified work outcomes and discussion with supervisor
3	Test for functionality, document installation and clear worksite	3.1	The installation is tested for functionality against job requirements and documented according to enterprise procedures
		3.2	Equipment, tools used in assembly tasks are maintained and stored according to enterprise procedures
		3.3	Work site is made safe in accordance with established safety procedures

**FOUNDATION SKILLS**

Foundation skills essential to performance in this unit, but are *not explicit* in the performance criteria are listed here.

Skill	Description
Reading skills to:	interpret work instructions and component specifications requirements for the fibre optic control system installation
Writing skills to:	complete enterprise documentation outlining details of the installation
Oral communication skills to:	ask questions and discuss the installation with supervisor

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	advise others in the workplace impacted by the need to isolate plant or equipment for the installation		
Problem-solving skills to:	deal with unexpected situations when preparing for and during the installation and testing of the fibre optic circuit in a communication process		
Planning and organising skills to:	deal with unexpected situations during installation and testing of the fibre optic circuit		
Technology skills to:	safely and correctly use hand tools and test equipment to install fibre optic components and test their functionality in a communication process		
<b>UNIT MAPPING INFORMATION</b>	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23123 Integrate fibre optic technology into a communication process	VU22833 Integrate fibre optic technology into a communication process	Equivalent

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## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23123 - Integrate fibre optic technology into a communication process</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Follow established WHS requirements and procedures for a electrotechnology workplace</li> <li>• Prepare a connection diagram to guide the installation of a fibre optic device and components into a communication process</li> <li>• Correctly use relevant hand tools and hand held power tools throughout the installation process</li> <li>• Assemble and install fibre optic components according to a connection diagram and job instructions</li> <li>• Use diagnostic test equipment to check functionality of the installation, rectify predictable problems</li> <li>• Check and store tools, equipment and document installation</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Work, health and safety procedures for an electrotechnology/engineering environment</li> <li>• Requirements for using fibre optics technology in a communication process</li> <li>• Types of fibre optic devices and components including:             <ul style="list-style-type: none"> <li>– optical fibre cabling</li> <li>– lasers</li> <li>– detectors</li> <li>– optical connectors</li> <li>– couplers</li> <li>– attenuators</li> <li>– wavelength division multiplexers</li> <li>– patch cords</li> <li>– optical sensors</li> <li>– splitters</li> </ul> </li> <li>• Interfacing including electronics systems; communications systems; computer systems; mechanical systems</li> <li>• Control technology including positional information; input/output; control media; feedback technology</li> </ul>

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	<ul style="list-style-type: none"> <li>• Fibre optics test and diagnostic equipment:             <ul style="list-style-type: none"> <li>– power meters</li> <li>– fibre amplifiers</li> <li>– bit rate testers</li> <li>– bandwidth testers</li> </ul> </li> </ul>
<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Both practical skills and knowledge can be assessed in a workplace or a simulated workplace environment. If a simulated environment it should reflect real workplace conditions with suitable facilities, hand tools and test equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures for an electrotechnology environment</li> <li>• job instructions, devices and components to build a fibre optic circuit and vendors instructions/manuals</li> <li>• access to relevant test and diagnostic equipment</li> </ul> <p>Recommended assessment methods to assess skills and knowledge may include:</p> <ul style="list-style-type: none"> <li>• direct observation of practical tasks</li> <li>• examination of the fibre optic installation</li> <li>• third party reports/feedback from workplace supervisor</li> <li>• written and/or oral questioning</li> </ul> <p><b>Assessor requirements:</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>

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<b>UNIT CODE</b>		<b>VU23124</b>	
<b>UNIT TITLE</b>		<b>Install and test a wireless intercom system</b>	
<b>APPLICATION</b>		<p>This unit describes the performance outcomes, skills and knowledge required to install, configure and test a wireless intercom system.</p> <p>It requires the ability to plan and prepare for the installation, safely install and configure the system in accordance with job and component manufacturers' instructions, interface the system with a wired communication system and test and verify the overall function.</p> <p>The unit applies to a person working for an enterprise which installs and services electrical/electronic equipment for domestic or commercial applications.</p> <p>The unit also applies to a person preparing to work in an electrotechnology environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>	
<b>ELEMENTS</b>		<b>PERFORMANCE CRITERIA</b>	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Prepare for wireless intercom system installation	1.1	Established work, health and safety (WHS) requirements and risk control measures for the work area are followed
		1.2	The requirement for the use and interfacing of the wireless intercom system are examined and discussed with the supervisor
		1.3	A detailed work schedule is prepared for the task and approved by the supervisor
		1.4	Resources and equipment needed for the task are obtained in accordance with enterprise procedures and checked for correct operation
2	Install, configure and interface a wireless intercom system	2.1	Other personnel in the work area are advised of the planned work activity to ensure the work is coordinated effectively and to minimise any potential disruption

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		2.2	Wireless intercom system components are installed and configured in accordance with job and equipment suppliers manufacturer instructions
		2.3	Wireless intercom system is tested for functionality and if required, any faults are identified and corrected
		2.4	Wireless intercom system is interfaced with wired communication system where identified in the job instructions
		2.5	Decisions and methods for dealing with unexpected situations are selected on the basis of safety, specified work outcomes and discussion with supervisor
3	Complete installation and demonstrate operation for client	3.1	Intercom system is checked to verify overall correct functioning and problems are rectified as required
		3.2	Client is provided with written instructions and given a demonstration of operating the system
4	Store tools and document installation	4.1	Equipment and tools used are maintained and stored in accordance with enterprise procedures
		4.2	Wireless intercom system installation and configuration details are documented and stored in accordance with enterprise procedures

**FOUNDATION SKILLS**

Foundation skills essential to performance in this unit, but are *not explicit* in the performance criteria are listed here.

Skill	Description
Reading skills to:	interpret work instructions and component specifications requirements for the wireless intercom system installation
Writing skills to:	document wireless intercom system installation and configuration details in accordance with enterprise procedure provide systems operating instructions to the client
Oral communication skills to:	ask questions and discuss the installation with supervisor advise others in the workplace impacted by the need to isolate plant or equipment for the installation

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Problem-solving skills to:	deal with unexpected situations during the installation and testing the functionality of the system		
Technology skills to:	safely and correctly use hand tools and test equipment during the installation and testing the functionality of the intercom system		
<b>UNIT MAPPING INFORMATION</b>	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23124 Install and test a wireless intercom system	VU22834 Install and test a wireless intercom system	Equivalent

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## Assessment Requirements

<b>TITLE</b>	Assessment Requirements for: <b>VU23124 – Install and test a wireless intercom system</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Follow established WHS requirements and procedures for a electrotechnology workplace</li> <li>• Interpret job instructions for the installation of an wireless intercom system</li> <li>• Select and correctly use relevant hand tools and hand held power tools throughout the installation process</li> <li>• Select, assemble and install wireless intercom system in accordance with job and component manufacturers' instructions</li> <li>• Use diagnostic test equipment to check functionality of the system and rectify predictable problems</li> <li>• Check and store tools, equipment and document installation</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Work, health and safety procedures for an electrotechnology environment including risk control against exposure to radio frequency (RF) and electromagnetic radiation (EMR) hazards</li> <li>• Types of wireless intercom systems including: analogue systems, digital system, duplex, door/phone intercom</li> <li>• Range of applications of wireless intercom systems</li> <li>• Wireless technology such as:             <ul style="list-style-type: none"> <li>– electromagnetic waves</li> <li>– signals in time</li> <li>– signals in frequency</li> <li>– radio systems</li> <li>– multiple access</li> <li>– radio wave propagation</li> <li>– signal strength</li> <li>– noise interference</li> </ul> </li> <li>• Wireless intercom components including:             <ul style="list-style-type: none"> <li>– base station</li> <li>– antennas</li> <li>– headsets belt packs</li> <li>– microphones</li> </ul> </li> </ul>

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	<ul style="list-style-type: none"> <li>- repeaters</li> <li>• Interfacing with other systems such as:             <ul style="list-style-type: none"> <li>- electronics systems;</li> <li>- communications systems;</li> <li>- computer systems;</li> <li>- mechanical systems</li> </ul> </li> <li>• Wireless systems protocols and rules</li> <li>• Testing and diagnostic equipment used for identifying and troubleshooting system faults</li> </ul>
<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Both practical skills and knowledge can be assessed in a workplace or a simulated workplace environment. If a simulated environment it should reflect real workplace conditions with suitable facilities, hand tools and test equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures for an electrotechnology environment</li> <li>• job instructions, components to build a wireless intercom system and vendors instructions/manuals</li> </ul> <p>Recommended assessment methods to assess skills and knowledge may include:</p> <ul style="list-style-type: none"> <li>• direct observation of practical tasks</li> <li>• examination of the final operating wireless intercom system</li> <li>• third party reports/feedback from workplace supervisor</li> <li>• written and/or oral questioning</li> </ul> <p><b>Assessor requirements:</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>

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<b>UNIT CODE</b>	<b>VU23125</b>		
<b>UNIT TITLE</b>	<b>Conduct a site survey for a wireless network</b>		
<b>APPLICATION</b>	<p>This unit describes the performance outcomes, skills and knowledge required to conduct a site survey for a wireless network and produce documentation for network implementation or upgrade.</p> <p>It requires the ability to prepare a facilities floor plan diagram for the installation, review the performance of any existing technology at the site and determine the suitability of locations for the new or upgraded network components.</p> <p>The unit applies to a person working for an enterprise where wireless network communications are installed and serviced.</p> <p>The unit also applies to a person preparing to work in an electrotechnology environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>		
<b>ELEMENTS</b>	<b>PERFORMANCE CRITERIA</b>		
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.		
1	Plan a wireless site survey	1.1	Established work, health and safety (WHS) requirements and risk control measures for the work area are followed
		1.2	Wireless network requirements are determined from documentation, job sheet and/or discussions with appropriate person
		1.3	Facilities floor plan diagram is drawn depicting the areas for installation
		1.4	Current wireless networking equipment layout, parameters and any other relevant information, if existing, is documented
		1.5	Other personnel in the work area are advised of the planned work activity to ensure the work is coordinated effectively and to-minimise potential disruption

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		1.6	Resources and equipment needed for the survey are obtained in accordance with enterprise procedures and checked for correct operation and safety
2	Assess suitability of site	2.1	WHS requirements for conducting a site survey are followed in accordance with enterprise procedures
		2.2	Appropriate contingency actions are taken if site survey is hindered by lack of access, or other issues
		2.3	Current wireless network performance, if available, is determined and documented according to enterprise procedures
		2.4	The survey area is visually inspected and potential barriers to radio frequency (RF) propagations are identified and confirmed with client and/or supervisor
		2.5	Areas for fixed and mobile users are identified and noted on facilities diagram in accordance with enterprise procedures
		2.6	Access point locations are identified provisionally using appropriate RF site survey tools and/or software
		2.7	Locations of access points are verified by temporary installation and operational testing, in meeting operational requirements
3	Document site survey, store equipment and clean work site	3.1	Findings of the site survey are documented and final location of access points recorded on the floor plan diagram in accordance with enterprise procedures
		3.2	Equipment and tools used are maintained and stored in accordance with enterprise procedures
		3.3	Worksite is cleaned and made safe in accordance with WHS requirements and enterprise procedures
		3.4	Appropriate personnel are notified of completion of site survey

### FOUNDATION SKILLS

Foundation skills essential to performance in this unit, but are *not explicit* in the performance criteria are listed here.

Skill	Description
Reading skills to:	interpret work instructions and documentation relevant to the site inspection and survey

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Writing skills to:	make notes on the facilities diagram of existing network components and other relevant information for the site survey		
Oral communication skills to:	ask questions and discuss issues relevant to the site survey with appropriate person/s e.g. client and/or supervisor inform others in the work area of the site survey		
Numeracy skills to:	take measurements to show the location of wall, walkways etc. on the facilities floor plan diagram		
Problem-solving skills to:	deal with unexpected situations during the site survey such as potential radio frequency barriers restricted access for cabling etc.		
Planning and organising to:	prepare a facilities diagram as part of the site survey		
Technology skills to:	set up temporary installation to verify access point locations correctly use hand tool and test equipment		
<b>UNIT MAPPING INFORMATION</b>	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23125 Conduct a site survey for a wireless	VU22835 Conduct a site survey for a wireless	Equivalent

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## Assessment Requirements

<b>TITLE</b> <i>Mandatory field</i>	Assessment Requirements for: <b>VU23125 – Conduct a site survey for a wireless network</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Carry out a site survey for a wireless network system installation or upgrade including:             <ul style="list-style-type: none"> <li>– interpreting and following job instructions</li> <li>– follow established WHS requirements and procedures for a electrotechnology workplace</li> <li>– inspecting the site and drafting a floor plan diagram of areas for the installation</li> <li>– assessing the site to identifying potential barrier to radio frequency (RF) propagations and document details</li> <li>– assessing suitability any existing network equipment and document details on the floor plan diagram</li> <li>– identifying areas for fixed and mobile users and recording details on the floor plan diagram</li> <li>– verifying access points by using appropriate FR site survey tools and software</li> <li>– documenting location of access points on the floor plan diagram</li> </ul> </li> <li>• Check and finalise site survey documentation in accordance with enterprise requirements</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Work, health and safety procedures for an electrotechnology environment including risk control against exposure to radio frequency (RF) and electromagnetic radiation (EMR) hazards</li> <li>• Wireless network equipment including:             <ul style="list-style-type: none"> <li>– routers. switches, hubs</li> <li>– antennas</li> <li>– lightning arrestors</li> <li>– bridges</li> <li>– amplifiers</li> <li>– network interface cards (NICs)</li> <li>– desktop/laptop computers</li> <li>– printers</li> </ul> </li> </ul>

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	<ul style="list-style-type: none"> <li>• Wireless network protocols and rules</li> <li>• Wireless radio technology including electromagnetic waves, signal frequency, radio wave propagation including potential barriers</li> <li>• Wireless topologies including: WLAN topologies, channel set up, bridge topologies</li> <li>• RF site survey tools and software to determine access points locations</li> <li>• Documentation requirements for a site survey</li> </ul>
<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Both practical skills and knowledge can be assessed in a workplace or a simulated workplace environment. If a simulated environment it should reflect real workplace conditions with suitable facilities, hand tools and test equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures for an electrotechnology environment</li> <li>• job instructions, vendors instructions/manuals</li> </ul> <p>Recommended assessment methods to assess skills and knowledge may include:</p> <ul style="list-style-type: none"> <li>• direct observation of practical tasks</li> <li>• examination of site survey documentation</li> <li>• third party reports/feedback from workplace supervisor</li> <li>• written and/or oral questioning</li> </ul> <p><b>Assessor requirements:</b></p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>

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<b>UNIT CODE</b>		<b>VU23126</b>	
<b>UNIT TITLE</b>		<b>Set up and operate a wireless communications link</b>	
<b>APPLICATION</b>		<p>This unit describes the performance outcomes, skills and knowledge required to set up and operate a wireless communications link. This includes point to point links for a range of purposes using a range of frequency bands and may extend into the infrared and visible portion of the electromagnetic spectrum.</p> <p><b>It requires the ability to plan for setting up a wireless communications link, set up and operate a wireless communications link and verify overall correct functioning and rectifying problems as required.</b></p> <p><b>The unit applies to a person working for an enterprise where wireless communication networks are installed and serviced.</b></p> <p>The unit also applies to a person preparing to work in an electrotechnology environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</p> <p><b>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</b></p>	
<b>ELEMENTS</b>		<b>PERFORMANCE CRITERIA</b>	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	<b>Plan for setting up a wireless communications link</b>	1.1	<b>Established work, health and safety (WHS) requirements and risk control measures and procedures for the work area are identified and obtained</b>
		1.2	<b>Wireless communications link requirements are determined from documentation, job sheets or discussions with appropriate personnel</b>
		1.3	<b>Regulatory requirements for setting up and operating the wireless communications link are interpreted and followed throughout installation procedure</b>
		1.4	<b>Wireless communications link components are selected and the installation is planned taking operational requirements into consideration</b>
		1.5	<b>Other personnel in the work area are advised of the planned work activity to ensure the work is</b>

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			<b>coordinated effectively and to-minimise potential disruption</b>
		1.6	<b>Resources and equipment needed for task are obtained in accordance with enterprise procedures and checked for correct operation and safety</b>
2	Set up and test wireless communications link	2.1	WHS procedures and specific safety requirements for conducting the work tasks are followed
		2.2	Wireless communications link components are installed and configured in accordance with manufacturers' specifications and enterprise procedures
		2.3	Wireless communications link is tested for functionality and, if appropriate, diagnostic tools are used to solve predictable problems
		2.4	Wireless communications link is interfaced with any existing wireless communication system if required
		2.5	Decisions for dealing with unexpected situations are made based on discussions with appropriate personnel, job specification and enterprise procedures
3	Complete and document installation	3.1	Wireless communications link is checked to verify overall correct functioning and initial problems are rectified as required
		3.2	Wireless communications link installation, configuration and operation details are documented and stored in accordance with enterprise procedures
4	<b>Clean work area and demonstrate operation of the link</b>	4.1	Equipment and tools used are maintained, stored and work area cleared in accordance with enterprise procedures
		4.2	Appropriate person is informed of the completion of the installation and provided with a demonstration of the wireless communication system

### FOUNDATION SKILLS

Foundation skills essential to performance in this unit, but are *not explicit* in the performance criteria are listed here.

Skill	Description
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Reading skills to:	interpret work instructions, component specifications and installation instructions  ensure compliance with regulatory requirements for setting up and operating a wireless communications link		
Writing skills to:	document the wireless communications link installation, configuration and operational details in accordance with enterprise procedure		
Oral communication skills to:	ask questions and discuss issues relevant to the installation with appropriate person/s e.g. client, supervisor  inform others in the work area of the installation and how it may impact on their work activities  provide a demonstration of the wireless communication system to appropriate person/s		
Problem-solving skills to:	deal with unexpected situations during the installation, configuring and testing of the communications link within a limited range of options		
Technology skills to:	correctly use and maintain hand tool and test equipment		
<b>UNIT MAPPING INFORMATION</b>	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23126 Set up and operate a wireless communications link	VU22836 Set up and operate a wireless communications link	Equivalent

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## Assessment Requirements

<b>TITLE</b> <i>Mandatory field</i>	Assessment Requirements for: <b>VU23126 - Set up and operate a wireless communications link</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Follow established WHS requirements and procedures for a electrotechnology workplace</li> <li>• Interpret and follow job <del>instruction</del> and equipment installation instructions and install wireless communication link</li> <li>• Select, and install wireless communications link in accordance with job and component manufacturers' instructions</li> <li>• Configure and interface the wireless communications link with existing system</li> <li>• Test wireless communications system functionality and if required use diagnostic tools to solve predictable problems</li> <li>• Document details of the installation in accordance with workplace procedure</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Wireless fundamentals and technology including:             <ul style="list-style-type: none"> <li>– radio wave propagation/electromagnetic waves</li> <li>– signals in time and signals in frequency</li> <li>– radio systems</li> <li>– multiple access; radio</li> <li>– antennas</li> <li>– modulation and signal strength</li> <li>– noise sampling</li> </ul> </li> <li>• Wireless links technology including:             <ul style="list-style-type: none"> <li>– communications channel</li> <li>– regulations and limited bandwidth</li> <li>– power and security issues</li> <li>– equipment e.g. fixed, mobile, base</li> <li>– applications</li> <li>– operating protocols</li> </ul> </li> <li>• Wireless communication system components including:</li> </ul>

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	<ul style="list-style-type: none"> <li>- transmitters and receivers</li> <li>- antennas</li> <li>- head and handsets</li> <li>- microphones</li> <li>- repeaters;</li> <li>- computer and network interfaces</li> </ul> <ul style="list-style-type: none"> <li>• Wireless network basic troubleshooting methodologies</li> <li>• Established WHS regulations and workplace procedures</li> <li>• Risk control measures to avoid exposure to radio frequency and electromagnetic waves</li> </ul>
<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Both practical skills and knowledge can be assessed in a workplace or a simulated workplace environment. If a simulated environment it should reflect real workplace conditions with suitable facilities, hand tools and test equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures for an electrotechnology environment</li> <li>• job instructions, vendors instructions/manuals</li> </ul> <p>Recommended assessment methods to assess skills and knowledge may include:</p> <ul style="list-style-type: none"> <li>• direct observation of practical tasks</li> <li>• examination of the final installation</li> <li>• third party reports/feedback from workplace supervisor</li> <li>• written and/or oral questioning</li> </ul> <p>Assessor requirements:</p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>

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<b>UNIT CODE</b>	<b>VU23127</b>		
<b>UNIT TITLE</b>	<b>Install communications antennae</b>		
<b>APPLICATION</b>	<p>This unit describes the performance outcomes, skills and knowledge required to install communications antennae. It covers basic receiving and transmitting antennae for domestic, small commercial and short distance communications application.</p> <p><b>It requires the ability to follow work, health and safety regulations when working in an electrotechnology environment and at heights, follow job instructions to plan, install, configure and connect an antenna to communications equipment.</b></p> <p><b>The unit applies to a person working for an enterprise which undertakes the installation and servicing of wireless communications systems for both domestic and commercial applications.</b></p> <p><b>The unit also applies to a person preparing to work in an electrotechnology industry.</b></p> <p><b>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</b></p> <p><b>Note:</b></p> <p><b>This unit does not cover the installation of antennas in complex communications networks and broadcasting applications and where the installation requires substantial mechanical support structures.</b></p>		
<b>PREREQUISITE UNIT</b>	<b>RIIWS204E - Work safely at heights</b>		
<b>ELEMENTS</b>	<b>PERFORMANCE CRITERIA</b>		
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.		
1	<b>Plan for antenna installation</b>	1.1	<b>Established work, health and safety (WHS) requirements and risk control measures and procedures are followed in the preparation for the installation</b>
		1.2	<b>Installation requirements are identified from documentation, work sheets or consultation with appropriate personnel</b>
		1.3	<b>Installation is planned taking operational requirements into consideration</b>

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		1.4	<b>Relevant Australian Communication and Media Authority (ACMA) regulations are taken into account when planning installation task, if appropriate</b>
		1.5	<b>Other personnel in the work area are advised of the planned work activity to ensure the work is coordinated effectively and to minimise potential disruption</b>
		1.6	<b>Resources and equipment needed for the task are selected and checked for correct operation before use</b>
2	Install antenna	2.1	WHS requirements for carrying out the work are followed
		2.2	For above ground installations relevant working at height regulations are followed in accordance with enterprise WHS procedures
		2.3	Communications antenna equipment is selected according to job requirements and, if required, future communication needs are taken into account
		2.4	Communications antenna equipment is fixed into position and configured in accordance with job requirements and manufacturers' instructions
		2.5	Decisions for dealing with unexpected situations are made from discussions with appropriate personnel, job specifications and enterprise procedures
3	Connect, test and complete antenna installation	3.1	Antenna is connected to communications equipment, tested and communications link is verified in accordance with enterprise procedures
		3.2	Diagnostic tools are applied to solve predictable problems in accordance to enterprise procedures
4	Clear work site and document the installation	4.1	Equipment and tools used for the installation are cleaned and stored in accordance with enterprise procedures
		4.2	Worksite is cleared and made safe in accordance with WHS requirements and enterprise procedures
		4.3	Documentation is completed in accordance with enterprise procedures
		4.3	Appropriate personnel are notified of the completed installation

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<b>RANGE OF CONDITIONS</b>			
<p><b>This unit applies to both ground level and above ground level antenna installations therefore working at heights regulations and requirements apply.</b></p> <p><b>As indicated in the units' application, this unit does not cover the installation of antennas in complex communications networks and broadcasting applications and where the installation requires substantial mechanical support structures.</b></p>			
<b>FOUNDATION SKILLS</b>			
Foundation skills essential to performance in this unit, but are <i>not explicit</i> in the performance criteria are listed here.			
<b>Skill</b>	<b>Description</b>		
Reading skills to:	interpret work instructions, component specifications and installation instructions ensure compliance with regulatory authority requirements if required		
Writing skills to:	document the antenna installation in accordance with enterprise procedure		
Oral communication skills to:	ask questions and discuss issues relevant to the installation with appropriate person/s e.g. client, supervisor inform others in the work area of the installation and how it may impact on their work activities		
Problem-solving skills to:	deal with unexpected situations during the installation and configuring of the antenna and interfacing with other communications equipment		
Technology skills to:	correctly use and maintain hand tool, test equipment and general equipment such as a ladder		
<b>UNIT MAPPING INFORMATION</b>	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23127 Install communications antennae	VU22837 Install communications antennae	Equivalent

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## Assessment Requirements

<b>TITLE</b> <i>Mandatory field</i>	Assessment Requirements for <b>VU23127 - Install communications antennae</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• Follow WHS procedures for a electrotechnology workplace and working at heights procedures</li> <li>• Interpret job requirements and equipment installation instructions</li> <li>• Plan the antenna installation and select the components to meet the work task requirements</li> <li>• Install and configure the communications antenna to meet the job requirements</li> <li>• Diagnostic tools are used to solve predicable problems</li> <li>• Complete workplace documentation for the installation of the communication antenna</li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• WHS legislation and procedures for:             <ul style="list-style-type: none"> <li>– working in a electrotechnology environment</li> <li>– working at heights</li> <li>– avoidance of exposure to electromagnetic radiation sources</li> </ul> </li> <li>• Wireless radio technology including:             <ul style="list-style-type: none"> <li>– radio wave propagation</li> <li>– electromagnetic waves</li> <li>– signals in time</li> <li>– signals in frequency</li> <li>– radio systems</li> <li>– multiple access</li> </ul> </li> <li>• Wireless topologies: including:             <ul style="list-style-type: none"> <li>– components</li> <li>– WLAN topologies</li> <li>– channel set up</li> <li>– bridge topologies</li> </ul> </li> <li>• Antenna applications including:             <ul style="list-style-type: none"> <li>– wireless networks</li> <li>– short and long range communications</li> <li>– radio and television communications</li> </ul> </li> </ul>

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	<ul style="list-style-type: none"> <li>- microwave communications</li> <li>- satellite communications</li> <li>• Antenna types and equipment: <ul style="list-style-type: none"> <li>- types <ul style="list-style-type: none"> <li>○ omnidirectional</li> <li>○ directional</li> <li>○ Yagi</li> <li>○ TV and FM</li> <li>○ microwave</li> </ul> </li> <li>- equipment: <ul style="list-style-type: none"> <li>○ cabling and connectors</li> <li>○ mast and pillar</li> <li>○ dish</li> <li>○ lightning arrestors</li> <li>○ bridges</li> <li>○ splitters</li> <li>○ attenuators</li> <li>○ amplifiers</li> </ul> </li> </ul> </li> <li>• Wireless organisations and certifications standards, regulators vendors and products</li> <li>• Radio frequency (RF) connectors including types, uses and conventions</li> <li>• RF cabling including: coaxial; balanced; antenna wire</li> <li>• Cable identification, preparation and management</li> <li>• Connector identification, preparation and management</li> <li>• Grounding materials</li> <li>• Role of the Australian Communications and Media Authority (ACMA)</li> </ul>
<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Both practical skills and knowledge can be assessed in a workplace or a simulated workplace environment. If a simulated environment it should reflect real workplace conditions with suitable facilities, hand tools and test equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• work, health safety (WHS) regulations and procedures for an electrotechnology environment and for working at heights</li> <li>• job instructions, vendors instructions/manuals</li> <li>• antenna and associated equipment</li> </ul> <p>Recommended assessment methods to assess skills and knowledge may include:</p> <ul style="list-style-type: none"> <li>• direct observation of practical tasks</li> <li>• examination of the final installation</li> </ul>

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	<ul style="list-style-type: none"><li>• third party reports/feedback from workplace supervisor</li><li>• written and/or oral questioning</li></ul> <p>Assessor requirements:</p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>
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<b>UNIT CODE</b>	<b>VU23128</b>		
<b>UNIT TITLE</b>	<b>Assist with the application of wireless communication in an integrated technologies environment</b>		
<b>APPLICATION</b>	<p>This unit describes the performance outcomes, skills and knowledge required to assist with the application of wireless communication in an integrated technologies environment.</p> <p>It requires the ability to investigate the developments, advantages/disadvantages, applications and operational principles of wireless communication technologies. It also includes knowledge of radio frequency (RF) waves and the application of work, health and safety (WHS) requirements to minimise exposure to electromagnetic radiation (EMR).</p> <p>The unit also describes the performance outcomes required to assist with the planning, building and testing of the operational functions of a wireless communication system.</p> <p>The unit applies to a person working for an enterprise where wireless communication networks are installed and serviced.</p> <p>The unit also applies to persons preparing to work in an integrated technologies environment and is suitable for use in a secondary school program with an appropriate level of supervision and support.</p> <p>No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>		
<b>ELEMENTS</b>	<b>PERFORMANCE CRITERIA</b>		
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.		
1	<b>Investigate the history of wireless communication technologies</b>	1.1	<b>The historical developments in wireless communication technologies are identified</b>
		1.2	<b>Correct and current industry terminology is used in verbal or written correspondence on wireless communication technologies</b>
		1.3	<b>Advantages and disadvantages of wireless communication technologies are identified</b>
		1.4	<b>Applications of wireless communication and relevance to the integration of technologies are explored</b>

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2	Examine the operational principles for a wireless communication system	2.1	<b>Basic concepts of a carrier are investigated and the three forms of carrier modulation are identified</b>
		2.2	Basic elements of a wireless communication system are illustrated using a simple block diagram
		2.3	Characteristics of the electromagnetic wave forms and radiation patterns from aerials used terrestrially and in space from satellites are investigated
		2.4	Allocation of the electromagnetic spectrum and its regulation by the Australian Communications and Media Authority (ACMA) is examined
		2.5	Applications of wireless technology relevant to daily activities are investigated
		2.6	Use of radio communication applications within a telecommunications network are identified
		2.7	Function of converting an analogue voice signal to a digital signal that can be used to modulate an RF carrier is examined
3	<b>Investigate safe work practices in a RF EMR environment</b>	3.1	Effects of exposure to the characteristics of RF EMR on the human body are identified
		3.2	Regulations and standards that apply to working with and controlling RF EMR hazards are investigated
4	<b>Assist with the planning to build a wireless communication system</b>	4.1	Job instructions for wireless communication system requirements including distance between beginning and end points and location are confirmed
		4.2	Technology for the particular wireless communication application is identified in accordance to operational requirements
		4.3	Regulatory requirements for setting up and operating a wireless communication system in the designated location are confirmed
		4.4	Final approval to commence the system build is obtained in accordance to workplace procedure
		4.5	Resources and equipment needed to build, setting up and configuring the wireless communication system are determined and obtained

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5	<b>Assist with the build of a wireless communication system</b>	5.1	Relevant WHS policies and procedures for the integrated technologies work environment is followed
		5.2	Wireless communication system is assembled, integrated and configured in accordance to manufacturer instructions to achieve the required outcomes
		5.3	Basic troubleshooting procedures are applied if required in accordance to operational requirements
		5.4	Any unresolved issues or faults are escalated to the supervisor in accordance to operational requirements
6	<b>Assist with completing the build of a wireless communication system</b>	6.1	Integrity of the cable/ing is measured and the results are interpreted for compliance in accordance to operational requirements
		6.2	Advice on security of the system is provided in accordance to operational procedures
7	<b>Assist with the documentation and store equipment</b>	7.1	Hand over pack (HOP) is completed confirming construction of the system meets specifications and compliance requirements
		7.2	Equipment and unused resources are checked and returned to storage in accordance to operational procedures

#### **RANGE OF CONDITIONS**

**Range of conditions are advisory in nature and aimed at assisting in the delivery of the unit of competency by providing additional context. This includes essential operating conditions and any other variables essential to the work environment.**

**It is recommended the knowledge components of this unit in particular, Elements 1, 2 & 3 are assessed in a training environment rather than on the job to enable adequate coverage before the practical tasks are commenced.**

**Training for the practical tasks such as planning, building, testing, and troubleshooting of a wireless communication system (Elements 4, 5, 6 & 7) can occur either on the job or in a suitably equipped training facility with an appropriate level of supervision and support. If in the workplace, the person would be a junior member of a work team assisting with the application of the work tasks as directed by experienced team members or team leader.**

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<b>FOUNDATION SKILLS</b>	
<b>Skill</b>	<b>Description</b>
Reading skills to:	interpret technical information as part of background research into the developments and fundamentals of wireless communication technology  become familiar with the requirements of the standards and regulations that apply to avoiding exposure to radio frequency waves and electromagnetic radiation
Writing skills to:	complete hand over pack (HOP) requirements following completion of the wireless communication system build
Oral communication skills to:	ask questions to clarify job instructions and request information and/or advice using correct industry terminology
Numeracy skills to:	read and interpret test results and their alignment with job specifications
Learning skills to:	investigate the historical developments and fundamentals of wireless communication technology  be aware of the consequence of exposure to radio frequency electromagnetic radiation
Problem-solving skills to:	assist with testing and applying basic troubleshooting procedures to a wireless communication system
Teamwork skills to:	work with others in an integrated technologies environment
Technology skills to:	apply basic technology knowledge and skills to assist with the planning, building and testing of a wireless communication system
<b>UNIT MAPPING INFORMATION</b>	New unit, no equivalent unit

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## Assessment Requirements

<b>TITLE</b> <i>Mandatory field</i>	Assessment Requirements for: <b>VU23128 Assist with the application of wireless communication in an integrated technologies environment</b>
<b>PERFORMANCE EVIDENCE</b> <i>Mandatory field</i>	<p>The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• <b>Investigate the following:</b> <ul style="list-style-type: none"> <li>– historical development of wireless communication technologies</li> <li>– advantages and disadvantages of wireless communication technologies</li> <li>– types of applications of wireless communication systems (at least three (3) examples)</li> <li>– basic elements of a wireless communication system using a simple block diagram</li> <li>– characteristics of radio frequency electromagnetic radiation</li> <li>– steps to be taken to control the risk of exposure to electromagnetic radiation</li> </ul> </li> <li>• <b>Apply basic wireless communication technologies skills to assist (as part of a work team or with an experienced technician), with the planning, building and applying basic troubleshooting techniques of a wireless communication system to meet specified functional requirements</b></li> <li>• <b>Assist with completion of the Hand Over Pack (HOP)</b></li> </ul>
<b>KNOWLEDGE EVIDENCE</b> <i>Mandatory field</i>	<p>The candidate must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> <li>• Historical developments in wireless communication technologies (i.e. AM/FM radio, TV, landline/mobile telephone - 2G, 3G,4G, 5G, GPS)</li> <li>• Advantages and disadvantages of wireless communication             <ul style="list-style-type: none"> <li>– advantages:                 <ul style="list-style-type: none"> <li>○ cost</li> <li>○ mobility</li> <li>○ ease of installing</li> <li>○ reliability</li> <li>○ disaster recovery</li> </ul> </li> <li>– disadvantages:                 <ul style="list-style-type: none"> <li>○ interference</li> <li>○ security</li> <li>○ signal loss</li> <li>○ health concerns</li> </ul> </li> </ul> </li> <li>• Basic elements of a wireless communication system</li> <li>• Types of wireless communication systems:</li> </ul>

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	<ul style="list-style-type: none"> <li>- Satellite communication</li> <li>- Mobile telephone communication system</li> <li>- e.g. 4/5G</li> <li>- Global positioning system (GPS)</li> <li>- Bluetooth</li> <li>- Wi-Fi</li> <li>- Paging</li> <li>- Wireless local Area Network (WLAN)</li> <li>• Types of modulation:             <ul style="list-style-type: none"> <li>- Amplitude modulation (AM)                 <ul style="list-style-type: none"> <li>○ signal frequencies</li> <li>○ carrier frequencies</li> </ul> </li> <li>- Frequency modulation (FM)</li> <li>- Phase modulation (PM)</li> </ul> </li> <li>• Radio wave propagation:             <ul style="list-style-type: none"> <li>○ characteristics of an electromagnetic wave</li> <li>○ different field intensity and power density for various distances</li> <li>- Behaviour of ground waves</li> <li>- Behaviour of sky waves                 <ul style="list-style-type: none"> <li>○ various radio bands and their uses</li> </ul> </li> </ul> </li> <li>• Electromagnetic waves:             <ul style="list-style-type: none"> <li>- gamma waves</li> <li>- X – rays</li> <li>- ultra violet light</li> <li>- visible light</li> <li>- infrared light</li> <li>- microwave</li> <li>- radio</li> </ul> </li> <li>• Regulation and standards for RF EMF exposure hazards such as:             <ul style="list-style-type: none"> <li>- Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) Radiation Protection Standard Maximum Exposure levels to Radiofrequency Fields – 3kHz to 300GHz</li> <li>- Australian Communication and Media Authority (ACMA) Rules for EME (Electromagnetic energy)</li> <li>- AS/NZS 2772.2 Radiofrequency fields: Principles and methods of measurement and Computation – 3kHz to 300GHz</li> </ul> </li> <li>• Modulation techniques used in wireless communication systems:</li> </ul>
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	<ul style="list-style-type: none"> <li>- typical equipment used to achieve modulation-demodulation</li> <li>• Principles underpinning the telecommunications systems:             <ul style="list-style-type: none"> <li>- safety signs used for telecommunications systems</li> <li>- detailed quality pictures and photographs</li> <li>- technical animations/video wherever possible</li> <li>- block diagrams to explain concepts as applicable</li> <li>- simplified line diagrams or schematics as applicable</li> </ul> </li> <li>• Principles underpinning LAN and internet technologies:</li> <li>• Basic antenna applications and types:</li> <li>• Principles for testing RF cabling:             <ul style="list-style-type: none"> <li>- Distance to Fault (DTF)</li> <li>- Voltage Standing Wave Ratio (VSWR)</li> <li>- Return Loss (RL)</li> <li>- Cable loss (CL)</li> </ul> </li> <li>• Basic troubleshooting procedures for wireless communications</li> <li>• Requirements of a hand over pack (HOP)</li> </ul>
<p><b>ASSESSMENT CONDITIONS</b> <i>Mandatory field</i></p>	<p>Skills can be demonstrated in a real or simulated workshop environment. If simulated it should reflect real workplace conditions with suitable facilities, tools and equipment. Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• regulation and standards relevant to a RF EMR hazard environment</li> <li>• job instructions</li> <li>• relevant wireless communications componentry</li> <li>• relevant specifications and reference charts</li> </ul> <p>Recommended assessment methods to assess skills and knowledge include:</p> <ul style="list-style-type: none"> <li>• direct observation and/or feedback from workplace supervisor on practical tasks</li> <li>• written and oral questioning</li> <li>• portfolio of documented evidence to demonstrate research activities such as historical developments, applications, systems componentry specifications etc..</li> </ul> <p>Assessor requirements:</p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>

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