



**Australian Government**

# **AURRTE3005 Diagnose and repair marine electrical systems and components**

**Release 1**

## AURRTE3005 Diagnose and repair marine electrical systems and components

### Modification History

Release	Comment
Release 1	Replaces AURE320066B Diagnose and repair marine electrical systems and components Unit code updated to meet policy requirements Reference to OHS legislation replaced with new WHS legislation

### Unit Descriptor

<b>Unit descriptor</b>	<p>This unit of competency describes the skills and knowledge required to diagnose and repair marine electrical systems and components, including dash instrumentation, switch and fuse panels, bilge pumps and lighting.</p> <p>It requires the ability to identify and confirm work requirements, diagnose and repair marine inboard transmissions and complete work finalisation processes.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>
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### Application of the Unit

<b>Application of the unit</b>	This unit applies to individuals who undertake the diagnosis and repair of electrical systems and components in a marine environment.
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### Licensing/Regulatory Information

Not applicable.

## Pre-Requisites

Not applicable.

## Employability Skills Information

<b>Employability skills</b>	This unit contains employability skills.
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## Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
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## Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for work	1.1. Confirm nature and scope of work to be carried out 1.2. Locate workplace health and safety (WHS) and workplace environmental and sustainable procedures and practices applicable to the work 1.3. Access and interpret repair method, workshop manuals and manufacturer information 1.4. Check and prepare tools, equipment and materials 1.5. Set up work area
2. Diagnose faults	2.1. Develop a diagnosis strategy 2.2. Undertake system tests in accordance with workplace procedures and manufacturer and component supplier specifications 2.3. Compare test results with manufacturer and component supplier specifications to identify compliance or non-compliance 2.4. Decide upon a plan of action to rectify faults 2.5. Document results, including evidence, relevant information and recommendations 2.6. Forward report to persons for action in accordance with workplace procedures 2.7. Finalise repair requirements
3. Repair marine electrical systems and components	3.1. Perform repair and adjustment operations in accordance with manufacturer and component supplier specifications, and WHS and workplace environmental and sustainable procedures and practices 3.2. Determine the need for water testing
4. Clean up work area and finalise work	4.1. Clean and inspect equipment and tooling according to workplace requirements 4.2. Tag unserviceable equipment and faults identified in accordance with workplace requirements 4.3. Finalise and process work completion documentation, update customer and warranty information and give to appropriate persons, as required 4.4. Clean work area, dispose of waste and scrap, and store tools and equipment in accordance with workplace procedures

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

#### Required skills

Required skills include:

- technical skills to the level required to use workplace technology related to the diagnosis and repair of marine electrical system components, to use specialist tooling and equipment and computerised measuring equipment, and to report and record actions
- communication skills to the level required to confirm work requirements and diagnosis and repair procedures and specifications, to communicate effectively regarding work requirements with supervisor, other workers and customers, to relate to people from a range of social, cultural and ethnic backgrounds and of varying physical and mental abilities, and to report work outcomes and problems
- literacy skills to the level required to research, analyse and interpret information related to work orders and manufacturer and component supplier requirements, and to record servicing details
- numeracy skills to the level required to correctly complete tests and measurements, including assessing tolerances, applying accurate measurements and calculating material requirements
- problem-solving skills to the level required to identify technical and procedural problems to avoid planning and scheduling problems, and time and material wastage
- team skills to the level required to work effectively and cooperatively with others to optimise workflow and productivity

#### Required knowledge

Required knowledge includes:

- operating principles and construction of marine dash instrumentation, switch and fuse panels, bilge pumps and lighting
- electrical principles and procedures applicable to repair procedures
- wiring diagram interpretation
- diagnostic and repair procedures, including component and assembly removal and placement
- measuring and testing procedures
- construction and operation of jet propulsion drive systems
- types of lubricants and their application
- service and repair manuals (hard copy and electronic)
- manufacturer and component supplier specifications, including workshop manuals and repair guides
- applicable commonwealth, state or territory legislation, regulations, standards and

**REQUIRED SKILLS AND KNOWLEDGE**

codes of practice, including WHS, personal safety and environment, relevant to diagnosing and repairing of marine electrical system components

- organisational policies and procedures, including quality, reporting and recording procedures, related to diagnosing and repairing of marine electrical system components

## Evidence Guide

<b>EVIDENCE GUIDE</b>	
<p>The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
<b>Overview of assessment</b>	
<b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b>	<p>Assessors must be satisfied that the candidate can competently and consistently:</p> <ul style="list-style-type: none"> <li>• observe safety procedures and requirements</li> <li>• communicate effectively with others involved in or affected by the work</li> <li>• select methods and techniques which are appropriate to the circumstances</li> <li>• complete preparatory activity in a systematic manner</li> <li>• test marine electrical systems and components</li> <li>• complete diagnosis of faults correctly</li> <li>• diagnose and repair a range of marine electrical systems and components to manufacturer and component supplier requirements, including dash instrumentation, switch and fuse panels, bilge pumps and lighting within workplace timeframes</li> <li>• test prior to placing in service</li> <li>• complete workplace and equipment records and workplace clean up requirements.</li> </ul>
<b>Context of, and specific resources for assessment</b>	<ul style="list-style-type: none"> <li>• The application of competency is to be assessed in the workplace or a simulated environment that reflects as far as possible the actual working environment.</li> <li>• Assessment is to occur using standard and authorised work practices, safety requirements and environmental constraints.</li> <li>• Assessment is to comply with relevant regulatory requirements, including specified Australian standards.</li> <li>• Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.</li> <li>• The following resources should be made available: <ul style="list-style-type: none"> <li>• workplace location or simulated workplace</li> <li>• faulty marine electrical systems and components</li> </ul> </li> </ul>

<b>EVIDENCE GUIDE</b>	
	<ul style="list-style-type: none"> <li>• equipment, hand and power tooling appropriate to the diagnosis and repair of faults in marine electrical system components</li> <li>• specifications and work instructions.</li> </ul>
<b>Method of assessment</b>	<ul style="list-style-type: none"> <li>• Assessment must satisfy the endorsed Assessment Guidelines of this Training Package.</li> <li>• Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of Required Skills and Knowledge.</li> <li>• Assessment methods must be by direct observation of tasks and include questioning on Required Skills and Knowledge to ensure its correct interpretation and application.</li> <li>• Assessment may be applied under project-related conditions (real or simulated) and require evidence of process.</li> <li>• Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.</li> <li>• Competence in this unit may be assessed in conjunction with other functional units which together form part of the holistic work role.</li> </ul>
<b>Guidance information for assessment</b>	Assessment processes and techniques must be culturally sensitive and appropriate to the language and literacy capacity of the candidate and the work being performed.

## Range Statement

<b>RANGE STATEMENT</b>	
<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
<b>Marine electrical systems</b>	Marine electrical systems may include low voltage:



<b>RANGE STATEMENT</b>	
	<ul style="list-style-type: none"> <li>• switch and fuse panels</li> <li>• bilge water, grey water, black water and freshwater pumps</li> <li>• pump control systems (e.g. float switches)</li> <li>• battery motorised ventilation</li> <li>• solar systems</li> <li>• carbon monoxide gas alarm systems</li> <li>• low voltage charging stations</li> <li>• lighting (e.g. incandescent, fluorescent and LED)</li> </ul>
<b>Marine engines</b>	<p>Marine engines may include:</p> <ul style="list-style-type: none"> <li>• 2-stroke petrol</li> <li>• 4-stroke diesel and petrol</li> </ul>
<b>Vessels</b>	<p>Vessels may include:</p> <ul style="list-style-type: none"> <li>• single or multi-hull</li> <li>• inboard or outboard drive</li> </ul>
<b>Repair methods</b>	<p>Repair methods may include:</p> <ul style="list-style-type: none"> <li>• isolation of faults</li> <li>• dismantling, inspection and evaluation</li> <li>• replacement of components parts</li> <li>• assembly</li> <li>• completion of operational tests</li> <li>• completion of records</li> </ul>
<b>Tooling and equipment</b>	<p>Tooling and equipment may include:</p> <ul style="list-style-type: none"> <li>• hand tools</li> <li>• testing equipment, including multimeters</li> <li>• power tools</li> <li>• air tools</li> <li>• specialist tools and equipment</li> </ul>
<b>Safe operating procedures</b>	<p>Safe operating procedures may include:</p> <ul style="list-style-type: none"> <li>• operational risk assessment and treatments</li> <li>• toxic substances</li> <li>• electrical safety</li> <li>• machinery movement and operation</li> <li>• manual and mechanical lifting and shifting</li> <li>• working in proximity to others</li> </ul>

<b>RANGE STATEMENT</b>	
<b>Information/documents</b>	<p>Information/documents may include:</p> <ul style="list-style-type: none"> <li>• verbal, written and graphical instructions issued by authorised internal and external persons</li> <li>• parts listing prices and catalogues</li> <li>• inventory systems</li> <li>• material safety data sheets (MSDS)</li> <li>• diagrams or sketches</li> <li>• engineer's design specifications and instructions</li> <li>• manufacturer specifications</li> <li>• industry standards (e.g. American Boat and Yacht Council, National Marine, Manufacturer's Association and US Coast Guard)</li> <li>• Australian standards</li> <li>• workplace specifications and requirements</li> </ul>
<b>Legislative requirements</b>	<p>Legislative requirements are to be in accordance with applicable commonwealth, state or territory legislation, regulations, certification requirements and codes of practice, and may include:</p> <ul style="list-style-type: none"> <li>• award and enterprise agreements</li> <li>• industrial relations</li> <li>• Australian standards</li> <li>• Australian Design Rules</li> <li>• confidentiality and privacy</li> <li>• WHS</li> <li>• the environment</li> <li>• equal opportunity</li> <li>• anti-discrimination</li> <li>• duty of care</li> </ul>
<b>WHS requirements</b>	<p>WHS requirements are to be in accordance with applicable commonwealth, state or territory legislation and regulations, and organisational safety policies and procedures, and may include:</p> <ul style="list-style-type: none"> <li>• personal protective equipment and clothing</li> <li>• safety equipment</li> <li>• first aid equipment</li> <li>• hazard and risk control</li> <li>• elimination of hazardous materials and</li> </ul>

<b>RANGE STATEMENT</b>	
	substances <ul style="list-style-type: none"> <li>• manual handling, including shifting, lifting and carrying</li> <li>• emergency procedures</li> <li>• road rules</li> <li>• safe driving policy</li> </ul>
<b>Environmental requirements</b>	Environmental requirements may include: <ul style="list-style-type: none"> <li>• waste management</li> <li>• noise</li> <li>• dust</li> <li>• clean-up management</li> </ul>
<b>Organisational policies and procedures</b>	Organisational policies and procedures may include: <ul style="list-style-type: none"> <li>• quality policies and procedures, including Australian standards</li> <li>• WHS, sustainability, environment, equal opportunity and anti-discrimination</li> <li>• manufacturer specifications and industry codes of practice</li> <li>• safe work procedures</li> <li>• reporting and recording procedures</li> </ul>

## Unit Sector(s)

<b>Unit sector</b>	Marine
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## Co-requisite units

Not applicable.

## Competency field

<b>Competency field</b>	Technical - Engines
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