

<b>Title</b>	<b>Demonstrate knowledge of electrical and electronic systems for marine use</b>		
<b>Level</b>	<b>4</b>	<b>Credits</b>	<b>8</b>

<b>Purpose</b>	People credited with this unit standard are able to demonstrate knowledge of: marine electrical and electronic systems; marine battery and voltage supply requirements; marine accessory wiring systems; and lighting and navigation systems on powered boats and yachts.
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<b>Classification</b>	Motor Industry > Automotive Electrical and Electronics
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<b>Available grade</b>	Achieved
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### Guidance Information

- 1 It is recommended that people hold credit for Unit 915, *Service multiple lead-acid battery installations on vehicles, machines or units*; and Unit 30571, *Demonstrate knowledge of the principles and testing of automotive electrical circuits* before being assessed against this unit standard.
- 2 Evidence presented for assessment against this unit standard must be consistent with safe working practices and be in accordance with applicable service information, and company requirements and legislative requirements. This includes the knowledge and use of suitable tools and equipment.
- 3 Performance of the outcomes of this unit standard must comply with the following:  
Health and Safety at Work Act 2015;  
Maritime New Zealand Rules for recreational boating:  
[www.maritimenz.govt.nz/recreational/rules/](http://www.maritimenz.govt.nz/recreational/rules/).
- 4 Any new, amended or replacement Acts, regulations, standards, codes of practice, guidelines, or authority requirements or conditions affecting this unit standard will take precedence for assessment purposes, pending review of this unit standard.
- 5 Definitions  
*Company requirements* refer to instructions to staff on policy and procedures that are available in the workplace. These requirements may include – company policies and procedures, work instructions, product quality specifications and legislative requirements.  
*Service information* refers to technical information for a vehicle, machine, or product detailing operation; installation and servicing procedures; manufacturer instructions; technical terms and descriptions; and detailed illustrations.

*Suitable tools and equipment* means industry approved tools and equipment that are recognised within the industry as being the most suited to complete the task in a professional and competent manner with due regard to safe working practices.

- 6 Information on marine electrical and electronic systems can be found from: training providers, industry and/or manufacturer courses; marine workshop manuals; marine electrical textbooks (contact a local book retailer, school or polytechnic library or the public library lending service).

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## Outcomes and performance criteria

### Outcome 1

Demonstrate knowledge of marine electrical and electronic systems.

#### Performance criteria

- 1.1 The range of electrical and electronic systems fitted to powered boats and yachts is identified.
- Range two-wire wiring systems, battery banks, inboard and outboard ignition systems, marine charging systems, starter systems, accessory systems, navigation equipment, deck winch, bilge pump and blower, capstan, lights – interior and exterior, depth finder, radio telephone, trim circuit, accessory outlets, instrumentation and monitoring systems.
- 1.2 Earthing requirements for marine electrical and electronic components are described.
- Range common return system, insulated earth.
- 1.3 The use of relays for high loading circuits is described.
- Range protection of switches and wiring, prevention of voltage drop.
- 1.4 The use of parallel switching in marine wiring circuits is described.
- Range second control station (flybridge), alternative double sensing for instruments and control devices.
- 1.5 The uses of sealed and waterproofed components are described.
- Range ignition system, engine components, exterior components, open cabin and flybridge components.
- 1.6 Corrosion protection for electrical and electronic components is identified.
- Range sealing, protective coverings and coatings, compatible materials, earthing.

## Outcome 2

Demonstrate knowledge of marine battery and voltage supply requirements.

### Performance criteria

2.1 Marine battery types are identified.

Range constructional differences compared to automotive types, deep cycle types, characteristics.

2.2 Battery installation requirements are identified.

Range circuit hook-ups of multiple batteries; separate battery systems – starter, mains; secure hold down; ventilation requirements.

2.3 Battery testing and charging methods and procedures are described.

Range hydrometer testing; battery monitoring; precautions for on-board charging; requirements for on-shore charging; single charging operation; split charging operation – blocking diodes, separator relay, battery switch.

2.4 240 volt supply systems for marine use are described.

Range on-shore hook-up, inverters, regulation requirements.

## Outcome 3

Demonstrate knowledge of marine accessory wiring systems.

### Performance criteria

3.1 Engine monitoring systems are described.

Range purpose and extent of monitoring and instrumentation – type of engine, proposed application; range – basic, standard, optimum; direct measurement; indirect measurement; sensor devices; display instruments; warning lights; acoustic warning systems.

3.2 On-board instrument functions and purposes are explained.

Range pressure monitoring – oil, air; temperature monitoring – direct cooled engines, coolant, oil, exhaust; contents gauges; hours counter; electrical system monitoring; navigation; communication.

## Outcome 4

Demonstrate knowledge of lighting and navigation systems on powered boats and yachts.

**Performance criteria**

4.1 Lighting requirements are described.

Range positioning of navigation lights, colour.

4.2 Cabin and accessory light requirements are described.

Range spot lights, deck lights, map reading lights, access lights, cabin lights.

4.3 Emergency lighting and warning lights are identified.

Range independent breakdown lights, distress flares.

4.4 Radio-telephone and transceiver types are identified.

Range boat-to-shore, frequency range.

4.5 Navigation instruments are identified.

Range rudder positioning, wind measuring system, compass, echo sounding system, log system, global positioning system (GPS), associated map references and terminology.

<b>Planned review date</b>	31 December 2025
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**Status information and last date for assessment for superseded versions**

Process	Version	Date	Last Date for Assessment
Registration	1	31 October 1995	31 December 2022
Review	2	29 March 1999	31 December 2022
Review	3	21 September 2007	31 December 2022
Review	4	25 March 2021	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	0014
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

**Comments on this unit standard**

Please contact MITO New Zealand Incorporated [info@mito.org.nz](mailto:info@mito.org.nz) if you wish to suggest changes to the content of this unit standard.