Australian Government

MARL058 Demonstrate basic knowledge of marine electrical systems

Release: 1

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Modification History

Release 1. This is the first release of this unit of competency in the MAR Maritime Training Package.

Application

This unit involves the skills and knowledge required to operate alternators, generators and control systems to supply shipboard electrical power onboard a commercial vessel.

This unit applies to people working in the maritime industry in the capacity of:

- Electro-Technical Officer (STCW Electro-Technical Officer Unlimited)
- Engineer Class 3 Near Coastal
- Engineer Watchkeeper (STCW Engineer Watchkeeper Unlimited).

Licensing/Regulatory Information

Legislative and regulatory requirements are applicable to this unit.

- Regulatory requirements include STCW International Maritime Organization (IMO) model course competencies and areas of knowledge, understanding and proficiency, together with the estimated total hours required for lectures and practical exercises. Teaching staff should note that timings are suggestions only and should be adapted to suit individual groups of trainees depending on their experience, ability, equipment and staff available for training.

Near Coastal Qualifications:

- This unit is one of the requirements to obtain Australian Maritime Safety Authority (AMSA) certification as an Engineer Class 3 Near Coastal as defined in the Marine Order 505 (Certificates of competency - National Law) 2013.

Blue Waters Qualifications:

- This unit is one of the requirements to obtain Australian Maritime Safety Authority (AMSA) certification as an Electro-Technical Officer (STCW Electro-Technical Officer Unlimited) or Engineer Watchkeeper (STCW Engineer Watchkeeper Unlimited) and to meet regulatory requirements this unit must be delivered consistent with Marine Orders and with the relevant sections of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW).

Pre-requisite Unit

Not applicable.

Competency Field

L - Engineering

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Explain hazards and isolation procedures associated with live electrical components	**1.1** Effects of electricity on the human body are outlined
	1.2 Procedures to be taken in the event of a person suffering an electric shock are clarified
	1.3 Correct procedure for isolating an electrical circuit is clarified
	1.4 Electrical hazards in a vessel at sea or port are identified
2 Explain principles of power generation and transmission in alternating current (AC) and direct current (DC) circuits	**2.1** Excitation methods used to produce AC and DC voltages are outlined
	2.2 Basic voltage control of generated AC voltages is outlined
3 Outline key features of basic electrical diagrams used on vessels	**3.1** Types of diagrams used to depict electrical systems on ships are outlined

		3.2	Electrical symbols used in basic electrical diagrams are identified
		3.3	Electrical devices used in basic electrical circuits are clarified
4	**Use common electrical measuring and testing instruments**	**4.1**	Different types of multimeters are used appropriately
		4.2	Functions of insulation and 'tong' testers are explained
		4.3	Safety requirements when using test equipment are applied
5	**Rectify basic electrical faults**	**5.1**	Fault situation is determined by appropriate questioning of client or operator
		5.2	Safe working practices are demonstrated when carrying out fault-finding work
		5.3	Basic common faults of equipment and techniques used to find faults are outlined
		5.4	Knowledge of various types of basic common faults of circuits and techniques is used to find faults
		5.5	Basic common faults in electrical equipment are identified and rectified
6	**Outline basic components and layout of a marine electrical switchboard**	**6.1**	Layout of a typical three-wire insulated electrical system is sketched
		6.2	Interconnections between main switchboard, emergency switchboard and shore supply are explained
		6.3	Procedure for changing over to emergency switchboard for testing or during loss of mains power is outlined
		6.4	Safety features on a typical marine switchboard are identified
7	**Explain operation of shipboard alternators**	**7.1**	Types and construction methods of alternators used on a marine vessel are outlined
		7.2	Principles of operation of a marine type alternator are outlined

	7.3	Relationship is shown between voltage and speed in regulation of alternator
	7.4	Operational characteristics of a marine alternator are outlined
	7.5	Excitation and automatic voltage regulation systems used with marine alternators are clarified
8 Explain procedures for paralleling of alternators	**8.1**	Process of measuring voltage, frequency and phase angle is outlined
	8.2	Automatic and manual procedures for synchronising and paralleling marine alternators, including machines of different capacities, are clarified
	8.3	How two machines can be adjusted to share kilovolt-ampere reactive (kVAR) and kilowatt (kW) loads is confirmed
	8.4	Process of removing an alternator from the bus is outlined

Foundation Skills

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

Range of Conditions

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

Unit Mapping Information

This unit replaces and is equivalent to MARL007 Demonstrate basic knowledge of marine electrical systems.

Links

Companion Volume implementation guide can be found in VetNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2