



Australian Government

Department of Education, Employment and Workplace Relations

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

Release: 1

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

Modification History

Not applicable.

Unit Descriptor

UNIT DESCRIPTOR:

This unit involves the skills and knowledge required of an Integrated Rating to assist the engineer in the routine maintenance of main propulsion and ancillary machinery and systems.

This includes working as part of a team and under supervision on the basic maintenance of diesel engines, marine steam turbines, steam boilers, pumps, heat exchangers, fresh water generators, compressed air systems, steering systems, engine room safety systems, electrical systems, refrigeration systems and engine room systems. It includes assistance in the checking and keeping of some maintenance data records.

Application of the Unit

Application of the unit	The unit has application in the qualification for an Integrated Rating, i.e. Certificate III in Transport&Distribution(Maritime Operations - Integrated Rating).
--------------------------------	--

Licensing/Regulatory Information

Licensing/legislative requirements	The unit is consistent with the relevant sections of STCW 95 and Marine Orders under the Australian Navigation Act 1912, describing the specific requirements for Integrated Ratings.
---	---

Pre-Requisites

Not applicable.

Employability Skills Information

Not applicable.

Elements and Performance Criteria Pre-Content

<i>Elements describe the essential outcomes of a unit of competency.</i>	<i>Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.</i>
--	--

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
. 1 Assist in the routine maintenance of main and ancillary machinery and associated systems	. a The engineer is assisted to perform planned basic routine maintenance of main propulsion and ancillary machinery and associated systems. b Signs of malfunction in main propulsion and ancillary machinery and associated systems are reported to the engineer c Maintenance tasks on the main propulsion and ancillary machinery and associated systems required of an integrated rating are completed under the supervision of the engineer d Records of maintenance activities are completed as directed and in accordance with established practice

ELEMENT	PERFORMANCE CRITERIA
2 Follow safety and hazard control procedures	a All required safety precautions and regulations are followed when working in engine room and ancillary machinery and associated spaces

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

ELEMENT	PERFORMANCE CRITERIA
2 Follow safety and hazard control procedures (continued)	b Operational hazards are identified and action is taken in conjunction with the engineer and other team members to minimise or eliminate risk to personnel, vessel and the environment c Where relevant, procedures and precautions necessary for entry into confined spaces after authorisation by a responsible officer on a vessel are correctly followed d Understanding of the types of appropriate action that the engineer may initiate in the event of a failure or emergency associated with main propulsion and ancillary machinery and associated systems to isolate and secure the plant and equipment and the vessel and maintain the safety of the vessel and persons involved so that the integrated rating can give assistance if required. e Shipboard emergency and contingency plans are followed in the event of a failure or emergency associated with main propulsion and ancillary machinery and associated systems (including engine room explosion or fire and hull breach)

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

Required Skills and Knowledge

REQUIRED KNOWLEDGE

This describes the knowledge required for this unit.

- 1 Applicable sections of relevant maritime regulations
- 2 Relevant OH&S and pollution control legislation and policies
- 3 Procedures required of an integrated rating if assisting the engineer in the performance of inspections, maintenance and data recording on main propulsion and ancillary machinery and systems, including:
 - a parameters to be measured and recorded
 - b the types of machinery faults that should be recognised by an integrated rating
 - c procedures for soot blowing boiler tubes
 - d procedures for draining scavenge spaces
 - e procedures for assisting the engineer, if required, in the warming through and shut down of a marine diesel engine plant
 - f procedures for the preparation of tools and equipment used in maintenance operations
 - g procedures for the cleaning of propulsion and ancillary machinery (as required of an integrated rating)
 - h procedures for identifying and rectifying basic faults in a lifeboat engine
 - i procedures for the warming through of a steam line and the prevention of water hammer
 - j procedures for the lubrication of machinery (as required of an integrated rating)

REQUIRED KNOWLEDGE

- k procedures on domestic piping/pumping systems (as required of an integrated rating)
- l procedures for assisting the engineer in the isolation of systems for maintenance activities
- 4 A basic understanding of the operational characteristics and normal performance of the main and ancillary machinery and associated control systems
- 5 Typical hazards and problems that can occur in the engine room at any time as well as during the maintenance of main and ancillary machinery and associated systems
- 6 Elementary principles of diesel engine basic maintenance, including:
 - a the operating cycles and types of diesel engines
 - b the major components of marine diesel engines and their functions
 - c the maintenance running sheets to be recorded by an integrated rating
 - d basic maintenance on diesel engines to be conducted by an integrated rating under the supervision of an engineer
- 7 Elementary principles of basic marine steam turbine maintenance, including:
 - a steam flow through a typical marine turbine

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

- b the major components of marine steam turbines and their functions
- c the maintenance running sheets to be recorded by an integrated rating
- d basic maintenance on marine steam turbines to be conducted by an integrated rating under the supervision of an engineer
- 8 Elementary principles of marine steam boiler basic maintenance, including:
 - a the uses of steam on board a vessel
 - b the methods of generating steam on board a vessel

- b the major components of marine steam turbines and their functions
 - c the features, elements, functions and applications of low, medium and high pressure boilers
 - d basic maintenance on marine steam boilers to be conducted by an integrated rating under the supervision of an engineer
- 9 Elementary principles of marine shafting systems and their basic maintenance, including:
- a propeller types
 - b the features and functions of thrust blocks, intermediate bearings, gear box and stern tube
 - c the methods of achieving astern motion on a vessel
 - d basic maintenance on marine shafting systems to be conducted by an integrated rating under the supervision of an engineer
- 10 Elementary principles and functions of marine ancillary systems and their basic maintenance, including:
- a various valve and pump types commonly encountered on vessels and their functions
 - b various types of heat exchangers commonly encountered on vessels and their functions
 - c fresh water generators
 - d pollution control and waste handling equipment
 - e steering mechanisms
 - f electrical distribution systems, including an awareness of the licence restrictions of the statutory electrical authorities
 - g refrigeration systems
 - h centrifuge purifiers
 - i sea water systems
 - j fresh water cooling systems
 - k lubricating oil systems
 - l fuel oil systems

- b the major components of marine steam turbines and their functions
- m compressed air system
- o steam/condensate system

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

- 11 Manufacturer's warnings and instructions concerning the handling and use of chemicals and cleansing agents
- 12 Procedures for the use of personal protection clothing and equipment (PPE)
- 13 Procedures and precautions for entering, after authorisation by a responsible officer, confined spaces on a vessel
- 14 Freezer space and engine room escape procedures
- 15 Dangers associated with compressed air and high pressure fluids and related precautions
- 16 Hazards and dangers associate with electricity and related precautions
- 17 Dangers associated with lubricating operating steering mechanisms and related precautions
- 18 Operational and maintenance records that must be maintained on a vessel
- 19 Purpose and content of material safety data sheets
- 20 Maritime communication techniques needed during the maintenance of main propulsion and ancillary machinery and associated systems

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

REQUIRED SKILLS

This describes the basic skills required for this unit.

- 1 Use verbal and other communication skills required when assisting an engineer in the routine maintenance of main propulsion and ancillary machinery and systems on a vessel
- 2 Read and interpret maintenance and service manuals and instructions and equipment specifications and drawings for equipment and machinery, including

**TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE
OF MAIN PROPULSION AND ANCILLARY MACHINERY AND
SYSTEMS**

all required OH&S procedures and precautions

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

- 3 Read and interpret material safety data sheets
- 4 Read and interpret machinery performance readings and indications
- 5 Complete any required operational and maintenance records as directed
- 6 Work collaboratively with other crew members when assisting an engineer in the routine maintenance of main propulsion and ancillary machinery and systems on a vessel
- 7 Select and use relevant tools and equipment for the work activity as per instructions
- 8 Recognise faulty equipment and take appropriate action to report it as per standard operating procedures
- 9 Recognise routine problems when assisting an engineer in the routine maintenance of main propulsion and ancillary machinery and systems on a vessel and take appropriate action to report them as per standard operating procedures
- 10 Adapt to differences in vessels, equipment and machinery and standard operating procedures
- 11 Follow all safety precautions and procedures when assisting an engineer in the routine maintenance of main propulsion and ancillary machinery and systems on a vessel

Evidence Guide

Evidence Guide

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

1 Critical aspects | Assessment must confirm appropriate knowledge and skills to:

of evidence required to demonstrate competency in this unit	- a Assist the engineer in the planned basic routine maintenance of the main propulsion and ancillary machinery and associated systems - b Identify and report to the engineer signs of malfunction in the main and ancillary machinery and associated systems - c Exercise all required safety, environmental and hazard control precautions and procedures when assisting in the planned basic routine maintenance of the main propulsion and ancillary machinery and associated systems - d Communicate effectively with the engineer and other team members others during maintenance activities
2 Evidence required for demonstration of consistent performance	- a Performance is demonstrated consistently over a period of time and in a suitable range of contexts - b Consistently applies underpinning knowledge and skills when: 1 assisting the engineer in the planned basic routine maintenance of the main propulsion and ancillary machinery and associated systems 2 applying safety precautions relevant to the main propulsion and ancillary machinery and associated system 3 completing documentation and records as directed - c Shows evidence of application of relevant workplace procedures, including: 1 applicable sections of relevant maritime regulations 2 OH&S regulations pollution control and hazard prevention regulations and policies 3 ISM Code safety management system procedures, quality procedures and work instructions 4 on-board housekeeping processes - on-board security procedures - d Action is taken promptly to report signs of malfunctions in main and ancillary machinery and associated systems in

accordance with regulations, shipboard procedures and the ISM Code

Evidence Guide (continued)

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

2 Evidence required for demonstration of consistent performance (continued)	e Work is completed systematically to required standard f Recognises and adapts appropriately to cultural differences in the workplace, including modes of behaviour and interactions among crew and others
3 Context of assessment	a Assessment of competency must comply with the assessment requirements of the relevant maritime regulations b Assessment of this unit must be undertaken within relevant marine authority approved and audited arrangements by a registered training organisation: 1 As a minimum, assessment of knowledge must be conducted through appropriate written/oral examinations, and 2 Appropriate practical assessment must occur: - i at a recognised maritime training institution through practical exercises and case studies that suitably simulate the operation of main and ancillary machinery and/or associated systems; and/or - ii during seetime on a working or training vessel of 3,000 kW propulsion power or more
4 Specific resources required for assessment	Access is required to opportunities to: a participate in a range of practical and theoretical assignments, exercises, case studies and other assessments that demonstrate the skills and knowledge to assist the engineer in the planned routine maintenance of the main propulsion and ancillary machinery and associated systems

- | | |
|---|--|
| | on a vessel; and/or |
| b | assist the engineer in the planned routine maintenance of the main propulsion and ancillary machinery and associated systems on a commercial or training vessel of 3,000 kW propulsion power or more |

Range Statement

Range Statement

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

VARIABLE

SCOPE

1. GENERAL CONTEXT

a. Work must be carried out:	1 in accordance with relevant regulations
b. Work is performed:	1 under the direction and supervision of the engineer, within defined practice and procedures with limited accountability and responsibility for self and others in achieving the prescribed outcomes
c. Work involves:	1 assistance to the engineer in the planned basic routine maintenance of the main propulsion and ancillary machinery and associated systems on a vessel

2. WORKSITE ENVIRONMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

a The vessel may be:	1 any Australian or international commercial vessel of 3,000 kW propulsion power or more
b Assistance in the basic maintenance of the main propulsion and ancillary machinery and associated systems may be carried out:	1 by day or night in both normal and emergency situations 2 under any permissible conditions of weather 3 while underway 4 during berthing and unberthing operations 5 while anchored or moored 6 while in dry dock
c Propulsion plant configurations may include:	1 low speed, medium and high speed diesel propulsion 2 stern tube bearing 3 CPP 4 direct drive shaft 5 diesel electric 6 steam turbine 7 gas turbine

Range Statement (continued)

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

VARIABLE	SCOPE
c Propulsion plant configurations	8 reduction gears 9 thrust blocks, detuners and shaft bearings

VARIABLE may include: (continued)	SCOPE
d Main propulsion and ancillary machinery and associated systems may include:	1 steam turbine, diesel, diesel electric and gas turbine propulsion systems and controls 2 steam boilers 3 steering gear, stabilizers, bow thrusters, rudders 4 fluid power systems and controls 5 pumps and pumping systems 6 ancillary systems and controls, including - i fresh and salt water cooling systems - ii lubricating oil cooling systems - iii fuel, oil, gas, coal - iv air starting - v lubrication - vi on-board air compressors and compressed air and control air systems - vii waste management and pollution control systems as per the MARPOL Convention - vii sewage plant - i 7 fixed firefighting installations and fire control systems
e Emergencies may include:	1 loss of propulsion power or steering 2 flooding of engine room 3 fire or explosion in engine room 4 loss of refrigeration

VARIABLE

SCOPE

- 5 loss of water making ability
- 6 fuel oil, lubrication oil, steam and gas leaks
- 7 loss of electrical power
- 8 pump failure
- 9 overheating and overspeed of machinery, governors, emergency trips
- 10 electric shock

Range Statement (continued)

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

VARIABLE

SCOPE

- | VARIABLE | SCOPE |
|--|---|
| f Potential hazards during operation of main propulsion and ancillary machinery and associated systems may include: | 1 operating equipment beyond safe working limits |
| | 2 moving and rotating machinery |
| | 3 working in confined spaces |
| | 4 faulty machinery equipment handling equipment and lifting gear |
| | 5 non-compliance with safe working procedures |
| | 6 hot pipes and valves (steam, fuel oil, lubricating oil) |
| | 7 cold pipes and valves (refrigeration and liquefied gas cargoes) |
| | 8 flammable liquids, vapours and fuel |
| | 9 working at heights |
| | 10 moving heavy loads using unsafe lifting procedures |
| | 11 unsecured machinery, components or equipment |

VARIABLE	SCOPE
	12 slippery deck 13 poor housekeeping procedures 14 sharp tools and implements 15 power tools 16 dangerous atmosphere 17 overspeed of electrical machinery, emergency trips 18 noxious and dangerous cargoes 19 machinery overload
g Documentation and records may include:	1 ISM Code safety management system plans, procedures, checklists and instructions 2 planned maintenance systems, procedures and engineer's instructions 3 running sheets, operations logs and other records 4 computer database of running information 5 vessel's survey procedures and instructions as they relate to the main propulsion and ancillary machinery and associated systems 6 vessel's safety and emergency contingency plans and procedures 7 relevant sections of national and international regulations, IMO Conventions and Codes

Range Statement (continued)

TDMMB2007B ASSIST ENGINEER IN THE ROUTINE MAINTENANCE OF MAIN PROPULSION AND ANCILLARY MACHINERY AND SYSTEMS

VARIABLE	SCOPE
h Applicable legislation, regulations and codes may include:	1 sections of national and international regulations, IMO Conventions and Codes, including AMSA Marine Orders and classification society rules related to the main propulsion and ancillary machinery and associated systems on vessels of 3,000 kW propulsion power or more 2 relevant international, Commonwealth, State and Territory OH&S legislation

Unit Sector(s)

Not applicable.

Field

Field B Equipment Checking and Maintenance

Relationship to other units

Relationship to other units	The unit must be assessed in conjunction with other units that relate to the functions of the occupation(s) concerned.
------------------------------------	--