MARINE RESCUE NEW SOUTH WALES

Registered Training Organisation

Crew

Learner Manual

Document Owner

Marine Rescue NSW has prepared this document.

Marine Rescue NSW
Building 1, 202 Nicholson Parade
Cronulla NSW 2230
P: 02 8071 4848
F: 02 9882 2869
E: training@marinerescuensw.com.au
RTO Number: 70223
ABN: 98 138 078 092

Version: 5 30052016

Abbreviations and Definitions

Abbreviations and Definitions	Meaning
MRNSW	Marine Rescue NSW
AMSA	Australian Maritime Safety Authority
COLREGs	International Collison Regulations While at Sea
DCN	Discrete Communications Network
DP	Designated Person
GMDSS	Global Maritime Distress and Safety Systems
GSD	General Safety Duties
IMO	International Marine Orders
LOPs	Local Operating Procedures
MR	Marine Rescue
MRB	Marine Radio Base
MRO	Marine Radio Operator
MRU	Marine Rescue Unit
MRV	Marine Rescue Vessel
MSDS	Material Safety Data Sheet
NATSAR	National Search and Rescue
NSCV	National Standards for Commercial Vessels
OIC	Officer In Charge
OSC	On Scene Coordinator
PPE	Personal Protective Equipment
RC	Regional Controller
RV	Rescue Vessel
SAR	Search and Rescue
SARCC	Search and Rescue Coordination Centre
SARMC	Search and Research Mission Coordinator
SITREP	Situation Report
SMS	Safety Management System
SOP	Standard Operating Procedure
SRB	State Rescue Board
TO	Training Officer
TSO	Training Support Officer
UC	Unit Commander
WHS	Work, Health and Safety
WO	Watch Officer

Required Resources

Members completing the MR Crew rating should use the following resources.

Standard Operating Procedures (SOPs)

SOP	Title	SOP	Title
OP 01	Training	OP 02	Appointments Ratings Insignia and Uniforms
OP 03	Vessel Documentation and Compliance	OP 04	Wearing of Lifejackets on MRNSW Vessels
OP 05	Vessel Towing	OP 06	Notifiable Incidents
OP 07	Using Identifiers for Communication MRB / SARCC, Vessels, and Other Assets	OP 08	Search and Rescue Coordination Centres and Marine Radio Bases
OP 10	Distress, Urgency, Safety and Calling Channel Monitoring	OP 15	Discrete Communications Network (DCN) Procedures
OP 16	Operational Communications Fault Reporting	OP 17	Incident Reporting
OP 18	Incident Response	OP 20	Procedure for Person or Vessel in Distress
OP 21	Procedure for Vessel Requiring Assistance	OP 22	Flare Sightings
OP 23	Emergency Position Indicating Radio Beacons (EPIRB)	OP 24	Australian Maritime Safety Authority (AMSA) Accident Reporting
OP 25	Critical Incident Support Services	OP 26	Vessel Offshore Operating Limits V 1.2
OP 27	Body Recovery	OP 30	Minimum Equipment Requirements
ADM 04	Health, Safety and Welfare	ADM 05	Discipline of Members
ADM 06	Grievances	ADM 07	Media Relations
ADM 08	Members Code of Practice	ADM 13	Injury
ADM 14	Drugs, Alcohol and Tobacco	ADM 16	Child Related Activities
ADM 17	Infectious Diseases		

Presentations

Title
COLREGs – Lights, Sounds and Shapes
Leading Crew – COLREGs

Other Resources

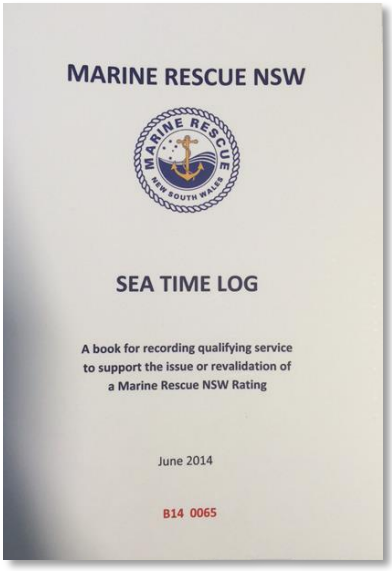
Title
WHS Checklist
Crew Skills Log
Sea Time Log
RMS Boating Handbook
Australian Boating Manual
First Aid Manual (received at first aid workshop)
Local Operating Procedures (LOPs)
MRNSW Crew Learner Manual
International Regulations for Preventing Collisions at Sea
State Emergency and Rescue Management Act 1989
State Rescue Policy

How to obtain the rating of Marine Rescue Crew

You must complete the following steps to achieve your MR Crew rating:

How do I maintain my level of competency for this rating?

As a member of Marine Rescue NSW, you are required to maintain your level of skill and knowledge for the rating/s you hold. You will be issued with a Sea Time Log Book (pictured).



The Sea Time Log Book includes:

- information about you
- ratings and qualifications achieved while with Marine Rescue NSW
- your MRB or SARCC details
- annual sea time details
- daily sea time record
- Marine Rescue NSW contacts.

The Sea Time Book has been designed to allow you to record your achievements and the time you spend with your Unit as a Crew Member. This document will assist in demonstrating ongoing competence.

Maintaining and completing the relevant information while ensuring that it is not misplaced will be your responsibility.

Shipboard Safety

Overview

This chapter covers the skills and underpinning knowledge required to carry out the duties and responsibilities as crew on-board a coastal vessel. It includes effective communication and basic seamanship skills applicable as a general purpose deck hand to maintain standards required on board a coastal Marine Rescue vessel.

Commercial Vessels

MRNSW operates commercially surveyed vessels within NSW.

Australian Maritime Safety Authority (AMSA)

Since 1 July 2013, all domestic commercial vessels in Australia are regulated by AMSA under the *Marine Safety (Domestic Commercial Vessels) National Law Act 2012* (National Law). Marine Rescue vessels are captured by the Act.

National System

The *Marine Safety (Domestic Commercial Vessel) National Law Act 2012* forms the foundation for the National Standards for Commercial Vessels (NSCV). This system aims to:

- simplify maritime safety laws
- apply nationally agreed standards clearly and consistently across the country to make it easier for seafarers and their vessels to work and move around the nations without barriers
- deliver a uniform approach to maritime safety requirements
- outline operator qualifications

Marine Orders

The law is implemented through Marine Orders that set out the processes and requirements for national certificates, vessel identification, approved training organisations and administrative requirements. Marine Orders also allow the law to keep pace with rapid technical and technological change in marine safety and provide a way for Australia to implement our international maritime obligations.

National Law Certificate of Operation / Survey

A Certificate of Operation / Survey is required for all commercial vessels. The certificate identifies one or more vessels, areas of operation, service categories and activities relating to the operation.

General Safety Duties (GSDs)

The National Law sets out the General Safety Duties (GSDs) required of owners, masters, crew and passengers to ensure the safety of vessels, marine safety equipment, and operations. The GSDs are not significantly different to the similar obligations that apply to commercial vessel operators under Workplace Health and Safety Laws.

The GSDs are designed to encourage the development, maintenance and continuous improvement of a safety culture by every party involved in the operation of a domestic commercial vessel. There are penalties for failing to meet GSDs, and for doing something that result in the loss, destruction or serious damage to a commercial vessel.

For further information regarding relevant GSDs, please refer to your vessel's Safety Management System.

Vessel Call Sign Requirements

A vessels call sign is made up of the MRNSW geographic designator prefix that describes the vessel's Unit (or Region). A two-digit numerical suffix that denotes the vessel class (determined by the vessel survey length, not the State Rescue Board Accreditation Category) and indicates the number of vessels of the same category attached to the Unit.

For example:

Unit/District/State (Theoretical Examples)	Vessel Identification Class (VIC)	Number of Assets	Vessel Identifier
PORT MACQUARIE (Operates 2 x VIC 1 vessels)	1	2	PORT MACQUARIE 11 PORT MACQUARIE 12
NAROOMA (Operates 2 x VIC 2 vessels)	2	2	NAROOMA 21 NAROOMA 22
ULLADULLA (Operate 1 x VIC 4 vessel)	3	1	ULLADULLA 40
BATEMANS BAY (Operates 1 x VIC 3 vessels)	4	1	BATEMANS BAY 30

For further information regarding call signs, please refer to SOP OP 07 – Using identifiers for communication MRB / SARCC, Vessels and other assets.

Safety Management System (SMS)

All MRNSW vessels (commercial vessels) must have an SMS.

> All crew members must have access and understand the SMS documents

An SMS sets out the core parameters of how each vessel is safely operated in order to manage risks to life, to the vessel and the environment. It states what policies, procedures and risk management practices should be implemented and followed. The SMS must also be regularly reviewed through a continuous improvement process.

The SMS provides information on:

- How your MR Unit and vessel(s) operate on a day to day basis
- What you will do if there is an emergency on your vessel, for example, a fire or a person overboard
- Vessel details, including what it does and where it operates
- The Designated Person (DP) including their contact details
- How you do things on your vessel, who does what role, how they do it and when
- How you identify hazards, assess and manage risk
- How you record what happens on your vessel
- How you do drills and train
- How you keep a record of drills and training

Why do I need an SMS?

You need an SMS because:

- It can help to keep your operation safe
- It can reduce the risk of accidents
- It could save you money
- It is a survey requirement
- It is the law and covered by but not limited to the National Law
- Work Health and Safety Act 2011 requires it
- National Standard for Commercial Vessels (NSCV) states it is required
- Protection of the Environment Operations Act 1997 also states that an SMS is required

How will I know that my SMS is appropriate?

- The SMS is 'tailored' to your vessel
- The crew of the vessel follows the procedures in the SMS
- The SMS states 'who does what' in different situation

The nine (9) sections of an SMS are:

1. General
2. Responsibility and safety policies
3. Company organisation flowchart
4. Resources and personnel, crewing safety policies competency assessment and briefings
5. Operating procedures
6. Environmental procedures
7. Emergency procedures
8. Planned maintenance and repairs
9. Vessel SMS audits and management

> Vessel SMS must be approved by the MRNSW HQ and Roads and Maritime Service (RMS)

SMS 1 – General

Provides the details of your organisation, including:

- The organisation's name (Marine Rescue NSW and Unit name)
- The address and contact details
- Names and contact details of senior management
- Name and contact details of the designated person (DP)
- What your company does, for example, marine rescue
- Where it operates
- The number and type of vessels operated

SMS 2 – Responsibility and safety policies

Provides details of:

- Responsibilities of the Unit Commander
- Master responsibility and authority
- Crew responsibilities
- Workplace Health and Safety Policy
- Drugs and Alcohol Policy
- Prescribed medication
- Smoking
- Electromagnetic radiation
- Privacy Policy

SMS 3 – Company organisation flowchart

Shows how your organisation is structured. It explains who does what in your company. A simple flow diagram showing 'who is responsible to who' is very useful.

SMS 4 – Resources and personnel

Provides information about the members of the organisation, for example:

- What qualifications they need
- How they are trained and who trains them
- Where training records are kept
- How long the records should be kept

SMS 5 – Operating procedures

Provides details about the normal operations of your organisation and vessel(s). It provides information on:

- Not only what you do but also how you do it, for example, marine rescue assists, rescues
- Who is responsible for doing particular jobs
- How you work safely
- How and where you keep your records

SMS must include procedures for the following as a minimum:

- Crew briefings and initial safety training
- Passenger briefings

- Other safety training
- Refueling
- Disposal of sewage, garbage, waste oil and grey water
- Recording crew lists
- Recording passenger numbers / manifests

There is no maximum number of procedures. Each vessel is different and may have different equipment and different ways of doing things that need a procedure. You need to think about who is responsible for different tasks on your vessel and how you do things. A meeting with the crew to discuss how things are done will provide valuable information to develop your SMS. A crew meeting also helps crew members develop a better understanding of the responsibilities of others. Flip charts can be a useful way of summarising procedures as well as being an effective training tool.

SMS 6 – Environmental procedures

Provides the procedures for handling:

- Sewage
- Disposal of garbage
- Disposal of waste oil
- Pumping bilges
- Refuelling

SMS 7 – Emergency procedures

Details procedures for responding to emergencies on your vessel. It provides information on:

- Who is responsible for doing particular things in an emergency
- How you practice for dealing with emergencies by doing drills
- How and where you record drills
- How often you do drills

SMS must include procedures for the following as a minimum:

- Fire
- Fire in engine room (if applicable)
- Prepare to abandon ship / abandon ship
- Person overboard / search and rescue
- Collision / flooding
- Environmental protection / spill
- Serious injury
- Terrorism and bomb threat

SMS 8 – Planned maintenance and repairs

Describes the minimum requirements for:

- Maintenance checks (weekly)
- Specific maintenance by vessel servicing and repair contractor
- Specific maintenance and repairs
- Maintenance and repair documentation

SMS 9 – Vessel SMS audits and vessels

All Masters and Crew will be required to attend a formal, mandatory vessel / SMS induction and training conducted by the Regional Controller and the Regional Training Manager on first joining the unit or receiving a new vessel. This induction will include a detailed SMS briefing and participation in all emergency drills listed in this SOP / SMS.

No Master or Crew will be considered 'vessel-accredited' by the Regional Controller and Unit Commander until they have conducted vessel / SMS induction training. Masters will be responsible for their respective crew members six monthly training and drill currency (marine drills), including their own currency.

The original SMS document and all supporting data will be housed at the corresponding unit and a copy on each vessel. The AMSA flip chart and AMSA Log book will be required on-board the vessel at all times.

A current copy of this SMS will be kept at MRNSW HQ and any changes to this document at the unit level need to be reported to the Regional Controller who will then notify HQ. The Regional Controller along with the Unit Commander will be responsible for conducting an annual review of this SMS in consultation with the Masters and Crew.

Risk Management

Hazard: A hazard is something with the potential to cause harm.

Risk: Risk is the likelihood that harm will occur from exposure to the hazard.

This section is about how you try and prevent things going wrong and what you do if they do go wrong. It provides information on:

- How you identify things that could be a problem (hazards) e.g. water on deck
- How you identify things that could happen because of this (risks) e.g. slip or fall
- What you do to reduce the risks (controls)
- How you report something on the vessel that needs repairing
- Who is responsible for implementing the control
- How people are informed that the issue has been fixed
- What you do if someone gets hurt on your vessel
- What you do if your vessel is involved in an accident

How do you manage risks?

Maritime law and the *NSW Work Health and Safety Act 2011* require you to eliminate any reasonably foreseeable risk. Eliminating risks is the most efficient way to make the vessel safer. Always try to remove the risk in the first instance.

Consider:

- Repairing or replacing faulty equipment
- Eliminating dangerous work processes or practices

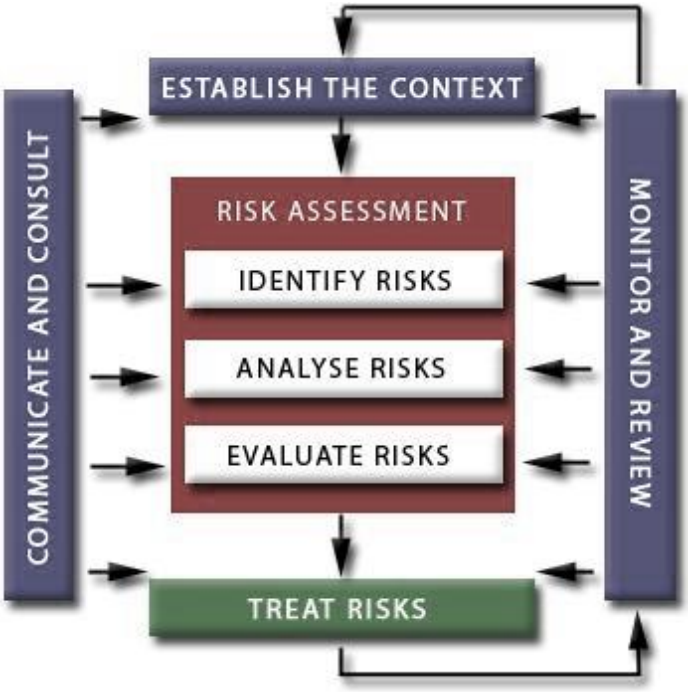
You must do everything you can to eliminate risks to the health and safety of yourself and other people on the vessel. Sometimes however this is not possible, so you will need to manage the risks through the following process.

Identify hazards

Assess

Control

Monitor



Classification of Hazard	
Hazard type	**Examples**
Physical	Confined space, remote location, manual handling, tripping, slipping
Chemical	Explosives, corrosives, oils, flammable liquids, toxics
Biological	Bacteria, fungi, parasites, viral and other infections, human blood, body fluids
Mechanical/Electrical	Powered equipment, material handling equipment, batteries, electronic systems
Environment	Noise (>85 Decibels Adjusted), temperature, vibration, water pollution
Psychological	Poor shipboard relationships, bullying, harassment, workplace bias

Risk Management	
Steps	**Actions**
Identify hazards	Notice something on the vessel or an action you or other crew do that could cause harm to yourself or others, for example, slippery deck
Assess	Think about what could happen and how serious it might be. A slippery deck could cause a person overboard incident or a crew member to fall and break a limb
Control	If you cannot eliminate a risk, you must control it to the lowest possible level. NSW WHS legislation recognises five means of controlling risks: • Substitute for a lesser risk • Isolate the hazard from the person at risk • Minimise (remove or reduce) the risk through engineering means • Implement change through administrative means • Use personal protective equipment (PPE)
Monitor	Check to see if what you've done is working and if it is not, have another look at the problem

Risk Management Plan

Each MR Unit must have a risk management plan for operations. This plan must be incorporated into training and promoted, maintained and improved when required. The Unit Commander (UC), in conjunction with the Unit Training Officer (TO) or vessel master must provide the crew with:

- Information, instructions, and procedural training
- Safe working environment
- Safe entry and exit to the vessel and all spaces in it
- Safe machinery and equipment

The Crew must:

- Inform the master of any risk to their safety, safety of others or the vessel that may result from performing a task
- Take reasonable care for the safety of themselves and others on the vessel
- Cooperate with the master in matters of safety
- Not misuse or interfere with provisions of safety and health

Note:

It is the responsibility of every crew member to cater for their own medical condition. Be prepared for the voyage e.g. Asthma medications diabetic food / sugar / insulin. Advise your UC and vessel master initially and as required.

Crew Behaviours

In MRNSW, all crew members are treated with respect, courtesy, and sensitivity. Cultural differences are considered when working with other members. Verbal and non-verbal communication must be appropriate at all times.

There are laws against discrimination at both the Commonwealth and the State / Territory levels. These laws include a range of grounds on which people may lodge a complaint including discrimination because of:

- race
- sex
- disability
- age

You can lodge complaints about discrimination, harassment and bullying based on these grounds. The circumstances of the complaint will influence where it should be lodged. Individuals and businesses in all jurisdictions may be required to respond to these complaints.

Maritime Laws

The maritime industry is highly regulated to promote safety for the person, vessel and marine environment.

Collision Regulations

The *International Regulations for Preventing Collisions at Sea* (COLREGs) set out the 'rules of the road' or navigation rules to be followed by ships and other vessels at sea in order to prevent collisions between two or more vessels. They are published by the *International Maritime Organisation (IMO)* at www.imo.org. The crew member must know the following requirements of the COLREGS to act as a lookout on a vessel.

Part A – General

Rule 1	Application
Rule 2	Responsibility
Rule 3	General definitions

Part B – Steering and sailing rules

Section I	Conduct of vessels in any conditions of visibility
Section II	Conduct of vessels in sight of one another
Section III	Conduct of vessels in restricted visibility
Rule 5	Lookout
Rule 6	Safe Speed
Rule 7	Risk of Collision for lookouts to be trained to apply the steady bearing test
Rule 8	Action to avoid collision
Rule 13	Overtaking
Rule 14	Head on situation
Rule 15	Crossing situation

Part C – Lights and shapes

Rule 21	Definition (lights)
Rule 23	Power-driven vessels underway
Rule 24	Towing and pushing
Rule 25	Sailing vessels underway and vessels under oars
Rule 26	Fishing vessels
Rule 27	Vessels not under command or restricted in their ability to manoeuvers
Rule 30	Anchored vessels and vessels aground

Part D – Sound and light signals

Rule 34	Manoeuvring and warning signals
Rule 36	Signals to attract attention
Rule 37	Distress signals

State Emergency and Rescue Management Act 1989 (SERM)

MRNSW's core work of marine rescue falls under the *State Emergency and Rescue Management Act 1989.*

Stages of Emergency

This Act defines the stages of emergency as:

Prevention in relation to an emergency includes the identification of hazards, the assessment of threats to life and property and the taking of measures to reduce potential loss to life or property

Preparation in relation to an emergency includes arrangements or plans to deal with an emergency or the effects of an emergency

Response in relation to an emergency includes the process of combating an emergency and of providing immediate relief for persons affected by an emergency

Recovery in relation to an emergency includes the process of returning an affected community to its proper level of functioning after an emergency

State Rescue Board of New South Wales (SRB)

The Act provides for the establishment of the SRB with rescue committees at Regional (RRC) and Local levels (LRC). NSW is divided into eleven (11) Emergency Management Regions (Central West; Far West; Hunter Central Coast; Illawarra; New England; North Coast; South Eastern, Riverina Murray, North West Metropolitan; Sydney Metropolitan and South West Metropolitan). The Regional Controllers are the MRNSW representatives of the regional committees, and MR Unit Commanders (or their delegates) may participate in local committees.

Web link: http://www.emergency.nsw.gov.au/

Rescue Arrangements in NSW

Rescue services in NSW are based on a network of 'accredited' rescue units located throughout the State. The rescue network is managed by the SRB through an accreditation process which is outlined in the State Rescue Policy.

Emergency Services in NSW

NSW Police Force are the combat agency for all Search and Rescue operations in the state.

The following agencies work with NSW Police to provide support for effective search and rescue activities.

NSW State Rescue Policy and Marine Rescue SOPs

MRNSW is bound by the *NSW State Rescue Policy* which establishes the roles and guidelines for our accreditation and SAR responsibilities.

The policy states that Marine Rescue Units (MRU) are those units that have been accredited by the Minister and where the Unit's rescue operators are specifically trained and the Unit equipped with appropriate vessels and equipment to carry out marine rescue operations within their level of accreditation. MRU are accredited to respond on a 24 hour, seven days a week basis. MRNSW is the sole provider of accredited Volunteer Marine Rescue Units in NSW.

MRNSW SOPs provide the core operational parameters under which all MRNSW services operate. SOPs relating to SAR activities are reviewed and endorsed by NSWPF Marine Area Command.

Notification of Rescue Incidents to NSW Police Force

The State Rescue Policy and MRNSW SOPs (ref SOP OP 06 / SOP OP 18) specify when we must notify the NSW Police Force of an incident.

NSWPF Marine Area Command (MAC) must be notified by the MRU in the following circumstances (reportable incidents):

- A MAYDAY is received
- A request for assistance is received from AUSSAR or the NSW Police (other than NSW Police Force Marine Area Command)
- A person involved in an incident has died or sustained a serious / life threatening injury
- Advice is received that a person is in a life threatening situation
- Advice is received that a vessel is seriously disabled and is in danger of sinking
- A vessel requires assistance in the offshore / open waters environment

General Vessel Requirements

Safety Housekeeping

For the safety of all aboard and to avoid injuries on a vessel, equipment should not be left lying around to create potential hazards. All equipment, including Personal Protective Equipment (PPE), must be stored away, ready for use, secured if possible, and in the allocated (same) position in case they are urgently needed. The importance of safety housekeeping aboard a vessel and adherence to it cannot be overemphasised. Housekeeping processes are extensively covered in legislation and SOPs as follows:

SOP ADM 11 – Use of MRNSW/Unit Operational and Support Vessels/Vehicles

MRNSW SMS Operational Procedures (flipchart) – Disposal of sewage, garbage, waste, maintenance checks and pumping bilges

Hazardous Materials

Many products on board vessels are dangerous by themselves and some more so when combined with another product e.g. diesel combined with certain chemicals becomes explosive. Many vessels also have dangerous products on board for their use e.g. gas, cleaning material, detergents, paints, etc. Particular care must be taken with handling, using and storing these materials. By law, suppliers must supply a Material Safety Data Sheet (MSDS) with every hazardous product. Make sure an MSDS is received when purchasing paints, lubricants, solvents chemicals and cleaners for use on commercial vessels.

Every MSDS gives the user:

- Ingredients of the product
- Any hazards and danger to health or safety
- Advice on safe handling, usage and storage
- First aid instructions

Crew must:

- Be aware of all hazardous material on board
- Know the location / storage of hazardous material
- Ensure they understand the information on an MSDS
- Be trained in handling / usage of hazardous material
- Have appropriate PPE on hand for use at all times to minimise risks
- Have appropriate safety equipment on hand
- Check the ‘Hazardous Substances Register’ which needs to be maintained

Vessel Safety Equipment

All Australian maritime authorities require vessels to carry a certain amount of safety equipment.

A check of all equipment, including PPE, should be completed on a regular basis by all crew to confirm that the equipment:

- Is present and in place
- Inspected to check for wear, tear and expiry
- Tested to ensure it is operational
- Location is known to all crew

For further information about the standard equipment required within our MR Units and vessels, please refer to SOP OP – Minimum Equipment Vessels, MRBs and SARCCs.

First Aid

Prior to working on a MR Vessel, all crew members are required to complete the following first aid courses:

- First Aid
- Advanced Resuscitation

Our first aid courses are delivered and assessed by validated MRNSW Trainers and Assessors regularly. All units are strongly encouraged to include the application of first aid and advanced resuscitation techniques in their regular training drills to maintain a high standard of skills and knowledge.

Seamanship

Communications and Teamwork

Lack of effective communication and teamwork can cause conflict and this can be worsened when people are tired and under pressure, especially in confined working environments like onboard vessels.

Appropriate workplace communication is covered in various legislation, regulations, SOPs and literature, including but not limited to:

- Work instructions – Vessel Operational and Emergency Procedures, MRNSW SOPs
- Legislation (e.g. Anti-discrimination, EEO, Privacy and Confidentiality)
- Interpersonal skillset (professional standards and values, behaviors, cultural and social contexts)
- Conflict resolution (e.g. grievances)

Communications on the Vessel

Communication is a learned skill covering:

- Speech
- Listening
- Reading
- Writing

Communication can also be conveyed by:

- Body language
- Eye contact
- Facial expressions
- Hand signals and signs

> A good communicator utilises all of these

Instructions to Crew

MRNSW utilise commonly accepted nautical terms for efficiency, safety and standardisation reasons. When a vessel Master is giving instructions to his / her crew, the following factors should be considered:

- Their experience
- Their training
- Their comprehension of the language
- Any impairments of hearing or mobility
- The tasking of the vessel, that is, on way to, or from an assist or training

Example instruction

Name:	Bill
Where:	aft starboard quarter
Problem:	line trailing
Procedure:	retrieve it

Note:

This instruction does not explicitly require the term ‘please’. This is not rudeness, simply expedience.

When should you seek clarification?

- When you are unsure or unclear about anything
- When in doubt about tasking
- Where you are concerned about the safety implications of an instruction

Instructions to Helm

- Inform the vessel Master of any approaching vessels, even if you think he / she has seen them
- Confirm that the information has been received

What key considerations are required when dealing with members of the public?

- They are our clients, and we need to present a positive image
- Be polite at all times
- Provide up-to-date information e.g weather
- Be professional
- Provide accurate advice
- Seek additional internal or external advice if unsure

Assist Reporting

During an assist, a record of the assist needs to be maintained via Seahawk. This record details all information about the assist, the vessel, and the vessel Master's contact details. This document is for internal use only.

Following each vessel assist, an incident report form is completed and sent to the NSW Police Force Marine Area Command (MAC), SOP OP 06, SOP OP 17 and SOP OP 18.

Teamwork

Seaworthiness and operation of a vessel depend on the knowledge, cooperation and trust of the crew in each other, in one word, 'teamwork'. All crew must know and understand their respective roles and responsibilities so that tasks are completed promptly and safely in achieving a common goal.

Effective teamwork ensures:

- Work is carried out individually and in association with others in accordance with established performance standards
- Assistance and encouragement are provided to others in activities
- Feedback on assessed job performance is acknowledged, discussed and acted upon
- Personal skills and knowledge are developed through onboard training and other means
- Duties are known, understood and followed
- Individual rights and responsibilities on board a vessel are known, understood and fulfilled, including allowance for any cross-cultural differences and differences in personal interests, beliefs and lifestyles
- Appropriate action is taken to avoid and prevent harassment of others

Vessel Equipment

Crews have to be trained in the safe and efficient operations of equipment, prior to operating them.

All vessel equipment has to be regularly checked, with follow-up corrective action, for:

- Correct stowage
- Serviceability

- Maintenance
- Wear and tear

Towing

SOP OP 05 – Vessel Towing

Controlling vessels in heavy weather, bar crossings, and associated rope work are skills largely learned through practice and experience. It takes time to master towing techniques and gain the confidence required.

Vessels engaged in towing as part of their normal activity (e.g. marine rescue vessels) are built and prepared for the task, and coxswains / masters know the proper procedures to follow.

MRNSW crew members need to be proficient with both a long tow and rafting (side tow). The long tow is used more frequently. Rafting is suitable for sheltered water operations when manoeuvring vessels to a marina, pontoons and wharfs. Rafting should never be used when crossing a bar.

Note: manoeuvrability is restricted when attempting to turn towards the side the tug is on. Shortening the tow to the limit, that is, so the tow becomes an extension of the tug and stemming the tide when approaching the berth / wharf is preferable giving better manoeurvrability and control.

Prior to towing (usually while making way) crew members must prepare the towing equipment and be ready to let out the tow line and secure the rescue vessel's end to the Samson post.

Towing checklist for long tow *(sample)*

In addition to the MRNSW Towing SOP a unit may have specific towing LOPs pertaining to each vessel and referenced in that vessel SMS. Here is an example of a LOP below.

On approach:

- Check tow line locker unlocked. Check components OK
- Check helm to cockpit communications working and adjusted
- Radar on standby if it is necessary to move within the range of the Radar's radome
- Fenders in place
- Check for hazards – trailing lines, fishing gear, how lying at anchor, fuel spills
- (Stop > Think > Identify hazards > Assess and control risks > Monitor risks)
- Advise MRB / SARCC of arrival at vessel requiring assistance
- Record position in log
- Ask what assistance is required – ensure master is requesting a tow. All OK?
- If the vessel is anchored, ask Master to retrieve the anchor if in open water and safe to drift. If unsafe, retrieve anchor when tow connected. Assist with retrieval if required
- Set up tow line. Flake first section of tow line and have vessel hook or heaving line ready

Preparation / alongside:

- Coming alongside. If vessel to be assisted has high superstructure, approach bow to stern
- Explain risk. Negotiate destination port or haven
- Deckhand to attach tow and veer line off bollard on instructions of the Master
- When required length of line veered, the tow line should be secured to the Samson post as required by your Vessel LOPs
- Raise Delta Flag or if a night operation, switch on towing lights
- Redeploy radar if considered necessary

Underway:

- Retrieve fenders, if required. Crew member to constantly monitor tow from the cockpit. Stay clear of the tow line at all times, do not be within 45^0 of the line while towing. Do not stand in the bight of the tow line
- Proceed with tow on route set to destination
- Advise MRB / SARCC that tow is under way and give ETA at destination
- Set up FLIR to monitor tow if required
- Record vessel details for Incident Report

Bar crossing:

- Radio for bar report and assess if safe to cross. Check vessel can tow-assisted vessel at speed required for bar crossing, that is, speed of swells on bar
- At destination, adjust tow line to appropriate length, depending on conditions
- If transfer occurred, move assisted crew to open rear deck and instruct to hold on and brace (consider trim, stability, and safety – number may not permit all on the rear deck).
- Be prepared to release the tow line in the event of the tow vessel capsizing
- Secure cabin. Confirm communication method
- Advise MRB / SARCC when safely across the bar or have reached safe waters

Completion:

- Radar on standby
- Ensure all details for the incident report have been collected, return to base and log off
- Safely secure assisted vessel to jetty/mooring/shore and detach tow line and retrieve

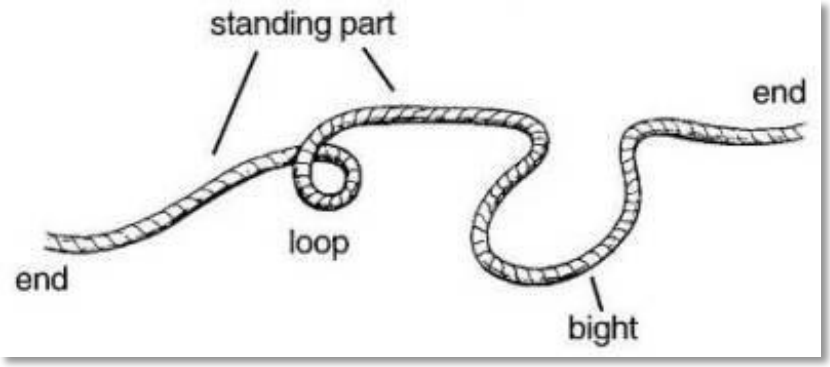
Knots, bends, hitches and splices

Once a rope is onboard a vessel and is given a particular purpose, such as mooring line, halyard (a rope used to raise or lower a sail, flag), it is called a line (not a rope).

Knots can be divided into the following groups:

Bends	Hitches	Stopper	Bindings	Splices	Loops	Plaits
Joining two lines by intertwining them, without splicing, or sewing. A Bowline Bend is a double Figure of Eight	A knot that secures a line to another object	Used to bind strands at the end of a rope to stop fraying or unraveling. Also formed to stop a line slipping through a hole or to provide a weight or handhold	Much like hitches. They are used to bind either lines or objects together. Their aim is to keep objects in place	Describes the act of joining the ends, or the end and a standing part, of rope by interweaving strands. They are not knots in themselves	Loops create structures used to tie, or secure, another object or line to another line. They can be formed at the end or midway a length of rope	Weaving several lines together to form a pattern and a cohesive structure

A crew member's knowledge and skills in common knots, bends and hitches are an essential part of your repertoire that you must be able to apply without notice.



Knots used in Marine Rescue NSW			
	Bowline		Figure of Eight
	Many uses including putting a temporary eye in a rope, securing a safety line and joining two hawsers (probably the strongest and most secure bend)		Commonly used to prevent a line from running through a block or fairlead
	Reef Knot		Sheet Bend
	Joining two ropes of equal thickness		Joining two ropes of unequal thickness
	Clove Hitch		Round turn and two half hitches
	A knot by which a rope is secured by passing it twice around a spar or rope that it crosses at right angles		Common for securing line to a bollard, spar or ring

	Eye Splice Used to permanently put a loop in a line or join two lines		Long Splice Join two lines together end to end

Rope Construction

The rope is referred to by diameter with a micrometer (vernier caliper). The centre of the rope is usually named the *Heart* and the centre of the strands, the *Core*. It is constructed in two basic ways, laid and braided, although there are variations on the theme.

Laid line

The direction of twist is called the lay of the rope. Three strands twisted line can be "laid" right or left, and should always be coiled with the lay of the line. This rope is described as S-laid (left laid, twisted counter-clockwise) or Z-laid (right-laid, twisted clockwise) according to whether the twist follows the line of the centre part of the letter S or Z.

Hold the rope out and you will see the twist. Most three strand rope is Z-laid (right-laid). The fibres are twisted in the same direction as the strands, however the yarns are twisted in the opposite direction. This right, left, right for right laid line gives strength, keeps the line from kinking and helps hold its shape.

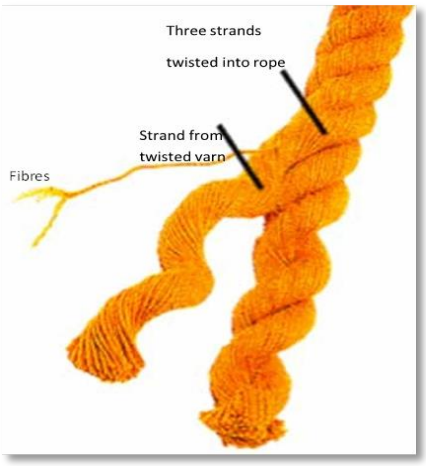
Braided line

This type of line does not stretch to the degree that twisted line does and is harder to splice. However, it goes through a pulley or block very well because of its rounded shape and is stronger than its equivalent sized twisted line.

Braided line will tend to snag when used as docking line if the pilings are rough.

A variety of braided lines are available:

- Braid on Braid has a braided core inside a braided sheath. It will stretch less, and has less flexibility, than a hollow braid
- Multibraid is braided with 2 pairs of Z-laid and two pairs of S-laid strands. It is flexible and does not kink
- Parallel Core has a braided sheath over a core of straight or lightly twisted yarns. It is very strong
- Hollow Braid has no core. It is very flexible but can flatten during use



Rope Tips

- Never stand in the bight (loop) of the rope
- Uncoiling the rope in the wrong direction will insert twists and increase the danger of kinking
- Always coil ropes in the direction of the lay.
  - Left hand lay = anticlockwise / Right hand lay = clockwise
- Chafing (repeated rubbing of an area of the rope against an abrasive surface) will greatly weaken the line and make it unable to bear the strain. Protect the line from chafing by sliding a snug plastic tube over the area that comes in contact with a dock or other surface. Alternatively, cover the surface with a smooth, sturdy material
- Tying knots or hitches in the same place often will cause that part of the line to weaken. Occasionally switch the line ends and try to tie knots and hitches in different areas of the line. Prolonged exposure to rust, dirt, sand or mud deteriorates rope. Any stiff or hard lines should be replaced
- Forming an eye when knotting will reduce a rope's strength by 50%. Reduction in the strength of the rope due to splicing is 10%
- Sudden strain can part ropes that would normally be capable of supporting the same loads under steady pulling conditions
- Never load a kinked rope or pull it through a block as the rope is weaker at the kink and likely to part at that point at a much lower breaking strain
- Before cutting the desired length of rope, whippings (securing the end by wrapping twine) should be applied close to each side of the intended cut. Failure to observe this precaution can cause excessive unlaying of the rope
- Whichever lines you choose to use make sure they are kept clean, unfrayed, dry and coiled neatly out of the sun when not in use. Don't leave knots in a stowed line for long periods of time
- To clean rope, scrub it with a solution of liquid soap and water. Dry completely before storing
- The Flemish coil to finish a rope must only be used for tidiness and never when required to render the rope quickly through a block

Flemish Coil

Rope Materials

There are many materials used today to make rope:

- Synthetic fibre e.g. nylon, polypropylene, polyester
- Natural fibre e.g. cotton and hemp (manila), sisal
- Wire

Synthetic Ropes

When cutting synthetic rope, prevent the ends from fraying with a temporary binding or whipping. Synthetic rope ends can be sealed by melting, either with a special heat tool for the purpose of cutting and sealing or by melting over a flame to fuse the fibres. Adhesive tape wound around the ends can be a temporary binding. Small line ends can be dipped into acetate glue or a commercial 'liquid whipping' material.

Synthetic lines are lighter and stronger and more rot resistant than natural fibre ropes. Synthetic lines are slipperier than natural fibre ropes so be sure to check your knots to make sure they are secure, and excessive heat will melt them. Synthetic lines should be cleaned with fresh water and detergent, kept out of sunlight, frequently inspected for chafe and stored dry.

Nylon is the most popular synthetic rope. It is strong, holds up well to the weather and stress and coils without kinking. Nylon rope has a lot of stretch (up to 40%) and is very strong for its size, allowing it to absorb shock loads well. However when it is wet, it can lose up to 25% of its strength. It wears well, resists mildew and rot, and does not float. Nylon three strand is the preferred line for dock lines and anchor lines since it stretches sufficiently to dampen the shock of wave action and the wind against your cleats. Just make sure it does not stretch too much for the situation in which you use it.

Polypropylen*e* line is the least expensive of the synthetic lines. However, it deteriorates quickly from ultra-violet rays and wear. It is not a good line for dock line because its hard surface tends to slip from cleats and can cause cuts if it runs free through your hands. It floats, so it is good for rescue lines. It is also appropriate for ski lines, dinghy painters, short mooring pendants or other applications where you want to be able to see the line on top of the water. Not for use as a dock, anchor or towing lines.

Polyester rope wears better than polypropylene, is almost as strong as nylon and retains its strength when wet. It does not stretch as much as nylon and does not float. Polyester (such as Dacron) is used for sail vessel running rigging, anchor rope, towing lines and other applications where you do not want line stretch to interfere. It will chafe easily so check it often and protect as necessary.

Natural Fibre Ropes

Natural fibre ropes will shrink when they get wet and also tend to rot or become brittle. Examples are manila, sisal, hemp, and cotton. Manila is still used today on large ships and is the best natural fibre for mooring lines, anchor lines and as running rigging. It remains pliable when wet and is used where a rope with a good 'spring' is required. It is useful attached to a towing wire or as a wrap as it will float. Manila has a minimum of stretch and is very strong, but it has only about one half the strength of a comparable sized synthetic line.

Natural fibre lines should be uncoiled from the inside of a new coil to prevent kinks. Always whip or tape their ends to keep them from unravelling. When natural fibre lines have been in salt water, you should rinse them with fresh water and allow them to dry thoroughly. Excessive heat can make them dry and

brittle, and they may be severely damaged by chemicals. Natural fibre lines should be properly coiled and stored on grates above deck in a dry well ventilated place to help prevent mildew and rot.

Wire Ropes

Wire rope comes in stainless steel and galvanized types. Construction wire, 1 x 19, is formed from 19 strands of wire and is suited to standing rigging, static load bearing, architectural use and most non-flexible applications. It has high tensile strength, low stretch, and low flexibility.

Flexibility may be built into a wire rope by:

- Building the strands around a fibre heart and the wire in each around a fibre core, or
- Building the strands around a fibre heart and increasing the number of wires in each strand while reducing their individual thickness

Wire ropes should be inspected at regular intervals, usually every three months. An accurate log should be kept of inspection dates, rope conditions, replacement, etc. Inspect wire rope for:

- Termination of rope at the drum and other points
- Defective coiling
- Surface wear
- Internal lubrication
- Broken wires
- Corrosion
- Deformation or strand distortion
- Deterioration due to snatch loading
- Lengths that run through blocks, particularly those which lie on the sheaves when the appliance is in the loaded position

Methods of securing ropes	
Bitts	Using natural fibre lines: • Take the first turn once around both bits • Commence figure of eight turns Using synthetic fibre lines: • Take two turns around front bit • Ease or surge line if under strain • Commence figure of eight turns
Cleats 	Using natural fibre lines: • Take a half turn around the cleat • Commence figure of eight turns Using synthetic fibre lines: • Take a full turn around the cleat • Take the figure of eight turns or belaying

Samson Post 	MRNSW vessels have a single post, called a Samson post used for towing
Bollard Hitch or Lighterman's Hitch  	• Take several turns around the single post • Bring a bight of line under the standing part • Drop the bight over the post

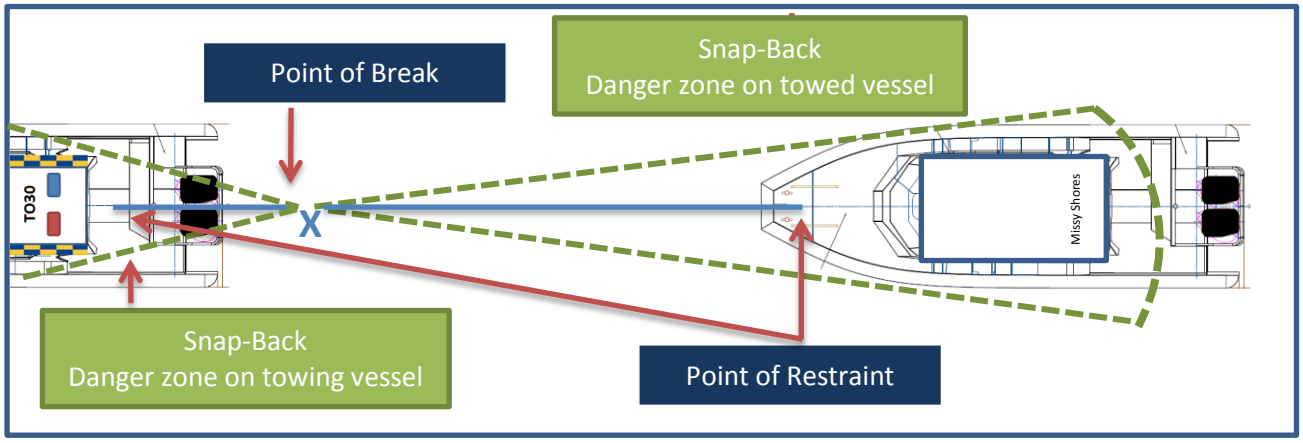
Working Load Limit

Each type of line, synthetic, natural fibre and wire rope has different breaking strengths and safe working loads. The natural breaking strength of the new, unused manila line is the standard against which other lines are compared. The basic breaking strength factor for the manila line is found by multiplying the square of the circumference of the line by 900 lbs. Synthetic lines have been assigned "comparison factors" against which they are compared to the manila line.

Knots and splices will reduce the breaking strength of a line by as much as 50-60%. The weakest point in the line is the knot or slice. A splice is stronger than a knot. You should never stress a line anywhere near its breaking strength. As line is spliced, stretched, wears, is subjected to sustained loads, shock loads, loads of many times the recommended working load, subjected to great heat or periods of time, it will continually loose some of its strength. Each line should be inspected prior to using it in extreme load conditions. If chafe, excess dirt, cut/worn strands, stiffness/hardness are found, the line should not be used.

Line Material	Comparison Factor (greater than Manila)
Nylon	2.5
Dacron	2.0
Polypropylene	1.4

Do not allow anyone to stand in line with, or within 45 degrees on either side of a line under tension. Should the line part, the recoil force may cause serious injury



Rope Safe Working Load (SWL)

Knowing the maximum safe working load for the line can help prevent accidents. The safe working load is thought of as no more than 1/5th of a line's breaking strength. Therefore, the breaking strength should be five times the weight of the object the line is going to hold. Remember this 5 to 1 safety rule. You should always choose a line with its intended safe working load in mind. The load applied should never exceed the safe working load.

Formula (approximate)

SWL rope (kgs) = Diameter (mm) x Diameter (mm) x Safety factor

Rope material	Safety factor	SWL (approx.)
Natural fibre	1	1 x D x D
Polypropylene	1.5	1.5 x D x D
Nylon (polyamide)	2.25	2.25 x D x D
Polyester (Terylene)	2	2 x D x D
Wire	8	8 x D x D

Lookout

The International Regulations for Preventing Collisions at Sea Rule 5 Look-out: "Every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and the risk of

collision". This means that every vessel maintains a watch appropriate to the circumstances and conditions when underway, at anchor or when engaged in the transfer of cargo or passengers.

The fundamental obligation that applies to all is that a proper lookout must be maintained at all times. The bridge must not be left unattended. Therefore maintaining a lookout is an important duty on board any vessel. It requires attention and concentration on the task with a clear sense of direction. The crew member reports the direction and description of anything sighted to the master of the vessel. When you report the sighting of objects or other vessels you have to use the correct nautical terminology.

It is also important that you follow marine conventions such as acknowledging an alarm, giving specific information when handing over the steering and so on. Become familiar with the particular ways duties are performed on your vessel and check the required procedures with your master. As a lookout, you are the eyes and ears of the master.

You should not do any other work while on lookout duty. As a crew member, you need to be able to give your master accurate verbal directional reports. A proper report is brief and clear, covering the essentials of the direction and sightings. Use your knowledge of navigational markers, buoys, lights and ship sounds to give the master all the information needed.

Report to the Master the direction and description of sightings of a navigational mark:

- Light (flashing, steady, or colour)
- Unidentified object
- Sound signal heard especially in poor visibility
- Engine noise of a vessel that has not yet been sighted at night or in times of poor visibility

The lookout needs to be aware of any emergency situations as they arise, including:

- Failure of vessel equipment & navigational lights
- Fire
- Loss of mooring lines
- Person overboard
- Reception of distress signal
- Stranding
- Sudden list or loll
- Synchronous rolling
- Loss of watertight integrity
- Collision
- Anything that threatens the safety of the vessel

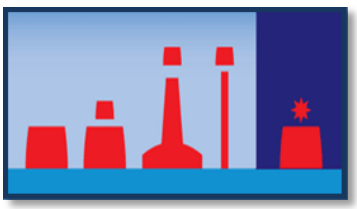
Buoys and Markers

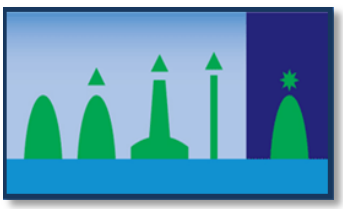
Waterways are marked by navigational markers and buoys to indicate safe water for navigation. As a crew member you need to be able **to recognise** a navigation mark and report it to the master. Common markers are *lateral marks and cardinal marks*. Lateral marks are used to indicate the limits of navigable channels. They are placed on the outer edges of the navigable channel. Cardinal marks are used to indicate danger and deeper water lies in a compass direction away from these dangers.

Lateral Marks (buoys)

The lateral marks (buoy) system consists of:

- Port hand buoys
- Starboard hand buoys





Port hand and starboard hand buoys are given odd and even numbers respectively, beginning from the seaward end of the channel.

Lateral Marker			
Port hand Markers		**Starboard hand markers**	
Shape	Can or spar or pillar	Shape	Conical, spar or pillar
Colour	Red	Colour	Green
Top mark	Can	Top mark	Can
Light	Flashing red	Light	Flashing green

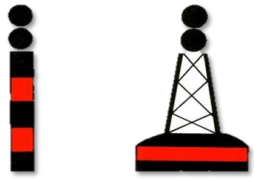
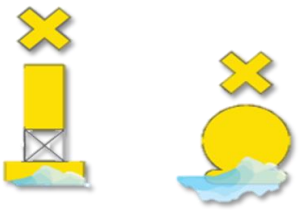
Cardinal Marks

Cardinal marks are placed around danger points to indicate the direction of deeper water and where it is safe to pass. There are four cardinal marks: north, south, east, and west (see below). Note the colour combinations as well:

Cardinal Marks	
	North – black over yellow (BY). Has two cones pointing up. Pass on the northern side of this mark. When lit, a north mark exhibits a continuous quick or very quick flashing white light
	South – yellow over black (YB). Has two cones pointing down. Pass on the southern side of this mark. When lit, a south mark exhibits a flashing white light in groups of six flashing quick or very quick followed by a long flash
	West – yellow black yellow (YBY). Has two cones point to point. Pass on the western side of this mark. When lit, a west mark exhibits a flashing white light in groups of nine flashing quick or very quick

	East black – yellow black (BYB). Has two cones pointing away from each other. Pass on the eastern side of this mark. When lit, a east mark exhibits a flashing white light in groups of three flashing quick or very quick

Other Marks

	Isolated danger mark – This mark shows isolated danger, for example, rocks, reef, wreck or shoal, with good water all round. May have a flashing light in groups of 2" period not defined
	Special Marker – Indicates a special feature or area such as tide poles, spoil grounds or underwater pipes. Where fitted a yellow light will flash. They can be utilized as lateral marks by using can or conical shaped buoys. If so they must be passed as lateral marks.
	Safe water mark – As the name suggests, safe water marks indicate that a passage is safe for navigation. They are usually placed at the entrance or end of a channel and can be passed on either side. Do not approach this mark closely. May have a white isophase / occulting 10 seconds, or Morse A

Flags

During normal vessel operations, two flags must be deployed. These are the Australian National Flag, which is flown from the Jack Mast at the centre of the vessel's cabin top and the MRNSW burgee which is flown on the starboard side of the Australian National Flag.

International Code Flags

These flags must be displayed during specific operations.

Flag	Name and meaning
	Manoeuvring with difficulty. This is the Delta Flag, MR Vessels use this when towing.
	Taking in, carrying or discharging dangerous goods. This is the Bravo flag. It must be presented when a vessel is refuelling.
	This is the Charlie flag. Used to communicate “Yes”.
	This is the November flag. Used to communicate “No”.
	International Code Signal of Distress. When the November is placed above the Charlie flag, this represents I am in distress and require immediate assistance.
	Anchoring Day Shape. A vessel at anchor must display a black ball.

Lights, Sounds and Shapes

MR Crew during a shift may be appointed the responsibility of lookout. It is important that you are able to identify different vessel lights and day shapes when displayed to maximise the safety of the crew and vessel.

To understand the different lights and shapes used by vessels, please view the presentation COLREGs – Lights, Sounds and Shapes.

Use the following steps to access and view the presentation COLREGs – Lights, Sounds and Shapes.

1) Open OTTER and view the MR Training folder
2) Open the Crew folder
3) Double click on the COLREGs – Lights, Sounds and Shapes presentation

This will download onto your computer Once downloaded, save it to a location where you will be able to find the presentation. Once saved, locate the file and open the presentation as normal.

Opening / Closing Rescue Vessels

This topic covers the steps required to make your Marine Rescue Vessels (MRV) ready for duty. The Crew member must:

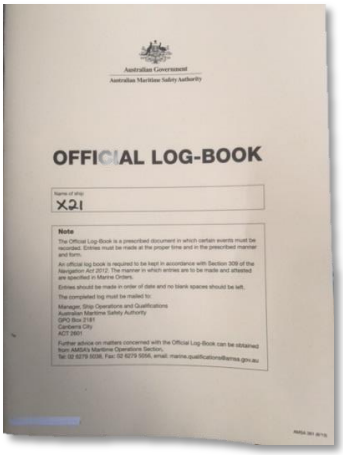
- Follow instructions from the vessel Master and locate the relevant Unit procedures and records that apply to the opening and closing of your unit's MRV
- Know when the open and close procedures are performed
- Demonstrate the open and close procedure for each unit MRV

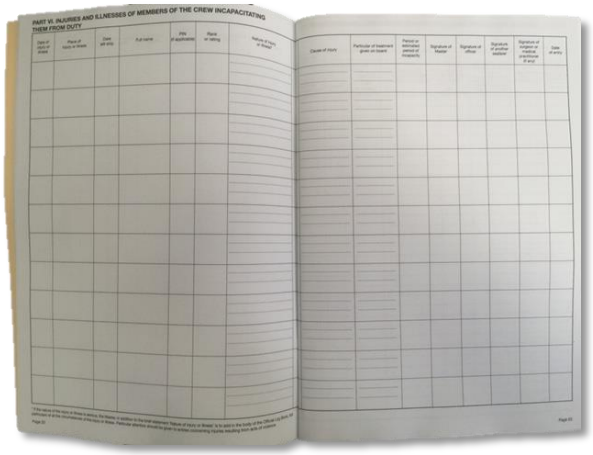
Vessel Opening Procedure

This section outlines an opening procedure for a MRV. Compare your vessel opening procedure with the points raised.

Vessel Log

The vessel log has three sections. The first section is to be completed when the vessel is OPENED at the beginning of each duty. The master is solely responsible for correct completion of the opening procedure.





Stowage

All items should be stowed in their correct location. This means that whichever individuals are manning the vessel, the equipment can be located easily. Items should not be left on the "Dash" where they can easily fly around in rough seas and become dangerous projectiles, become lost or damage other equipment.

Padlocks

Padlocks are removed and stowed to protect them from salt spray. The padlock usage may be different for each vessel.

Batteries

Most MRVs have two batteries. One is a "cranking" battery for starting the engine and the second is a "house" battery for running the auxiliary equipment. When the link switch is activated, both batteries will charge.

Others may have an electronic charging circuit that will automatically link both batteries to the charging circuit when the cranking battery has reached its normal operating voltage. In each vessel's case, the cranking battery is charged immediately the alternator reaches charging revs. There is an emergency

parallel switch that will force both batteries to charge when activated. The automatic charging circuit may take up to fifteen minutes to deactivate when the vessel is closed down and will not deactivate if any electrical equipment is left running.

Battery Switches

Battery switches drive remote servo motors and take about three seconds to activate fully. During the activation phase they flash. When they are fully engaged, they show steady green. "Starting" and "House" switches should be activated. "Emergency Parallel" should ONLY be activated if the starting battery fails to crank the starter motor for the engine.

Other vessels use three manually operated battery link switches that are located in the engine compartment. They are:

1. Main battery switch
2. Link switch
3. Anderson plug switch

> DO NOT use the manual override switches in the stern battery compartment

Radios

MRVs have the following key radios:

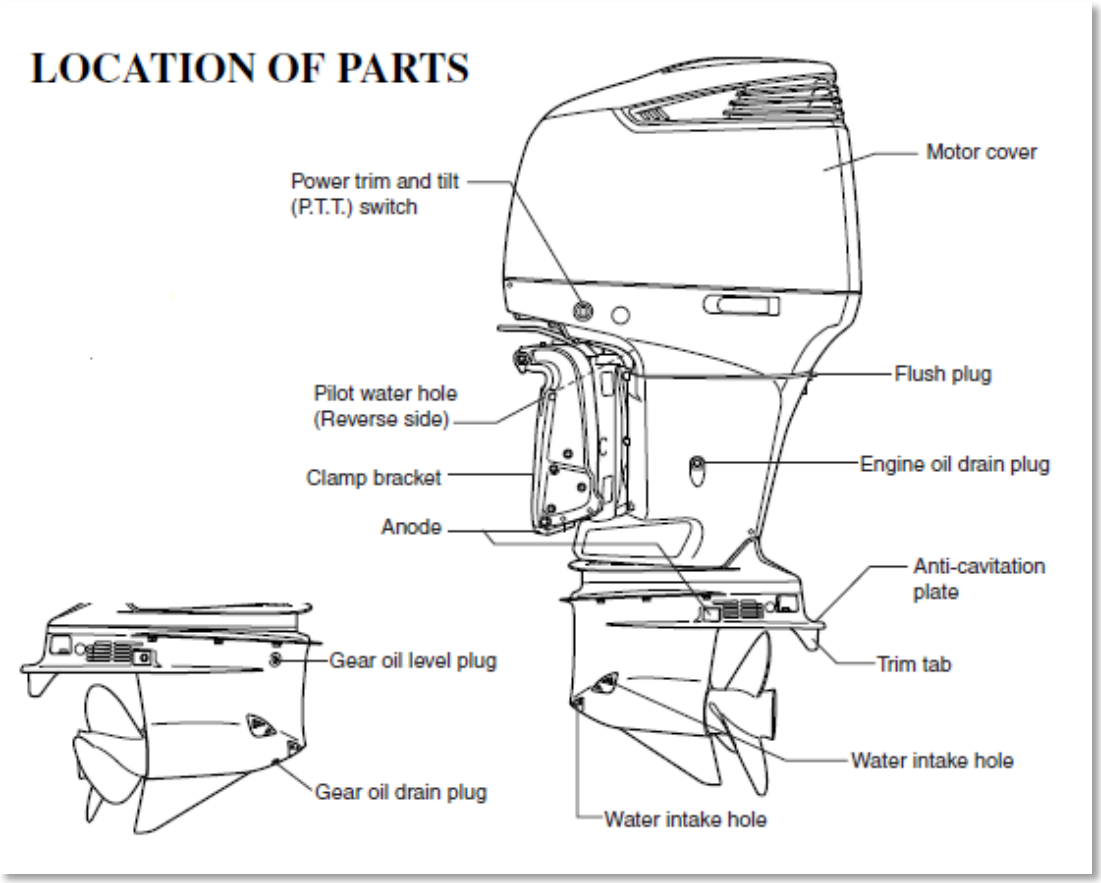
1. 27 MHz
2. Marine VHF
3. DCN (internal MRNSW network)

These should be tested each time the vessel is opened. They are activated by their ON / OFF switches.

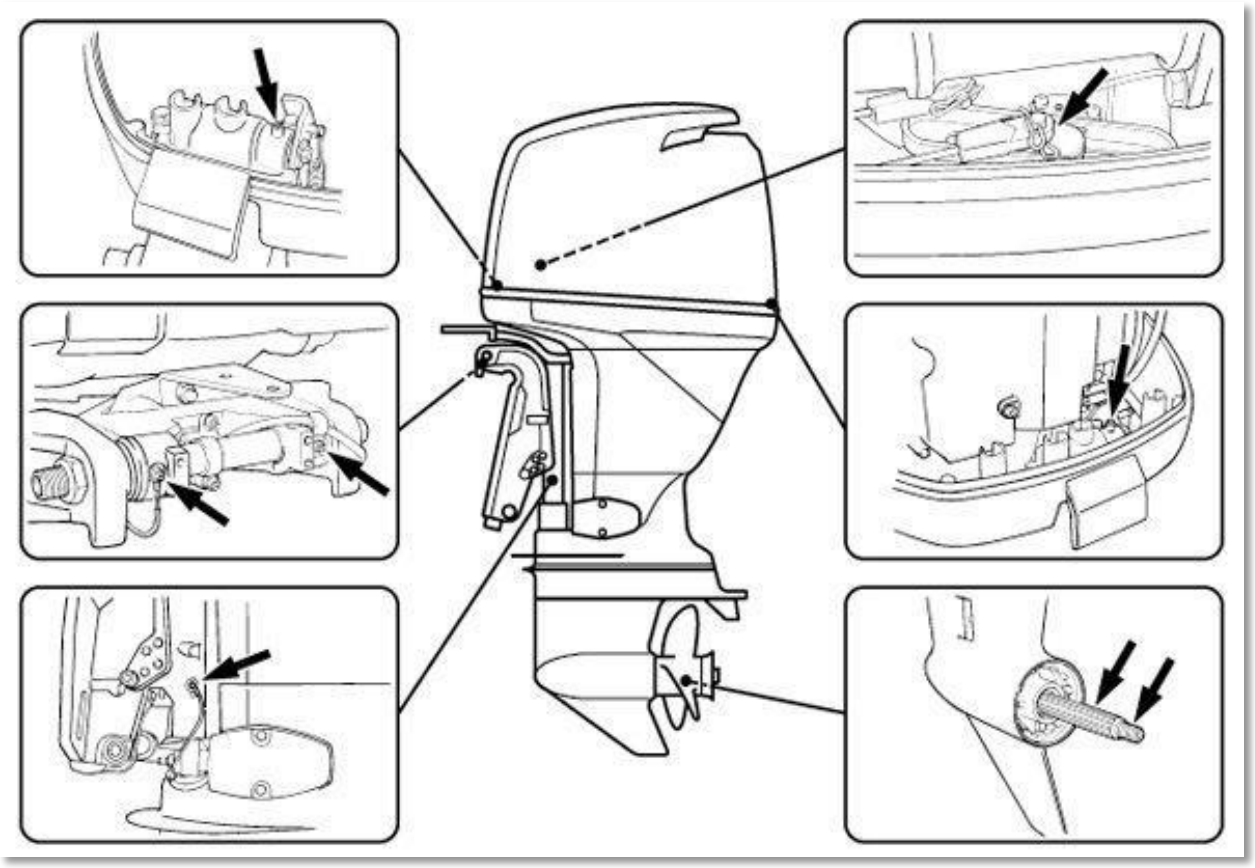
Outboard Engines

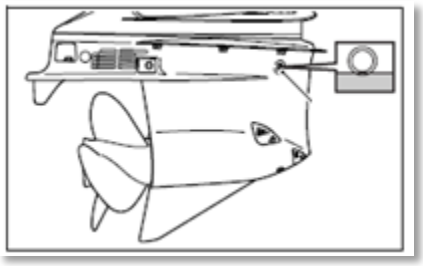
Prior to any maintenance, members should be referring to the manufacturer's instructions. All maintenance must be in accordance with SOPs / LOPs, the manufacturer's specifications and the vessel SMS.

Compare the numbers on the picture to the table on the following page to understand the different components that make up an outboard engine.



General Lubrication Spots





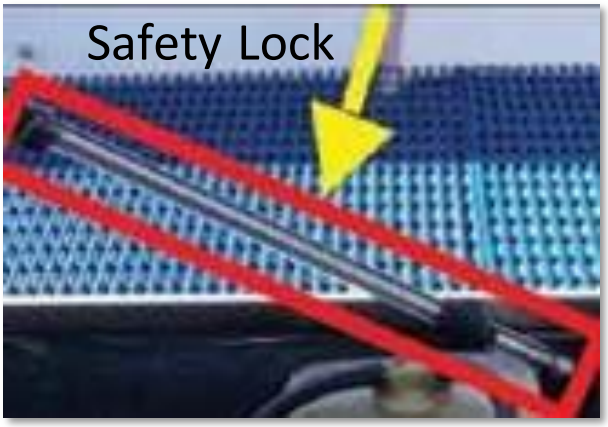
Outboard Engines – General Maintenance

Greasing, lubrication and other routine servicing of vessel machinery and equipment must be carried out according to supervisor and manufacturer instructions.

Routine adjustments and repairs are made to vessel machinery and equipment according to supervisor and manufacturer instructions.

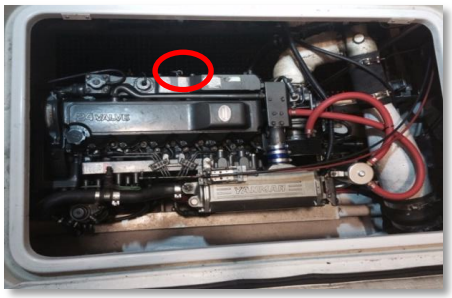
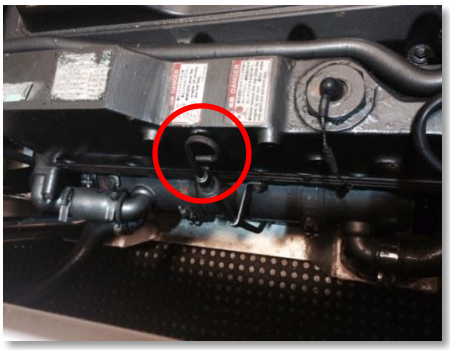
Pre-start Engine Checks

Some vessels have a gas-filled strut that aids opening of the engine bay. This MUST have a safety locking device fitted before any engine bay checks are performed.



Lubricant Levels

This vessel has four different oil reservoirs as shown below. Check your vessel's oil reservoirs.

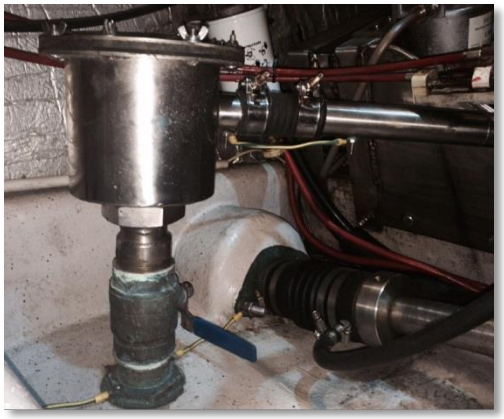
Engine sump	Gearbox	Steering
		
		

Engine Coolant

The engine coolant is checked at the coolant reservoir located in the engine bay. There is a different level expected depending on whether the engine is hot or cold.

Cooling Water Intake for Inboard Engines

Vessel engines are cooled using seawater that is passed through a heat exchanger. The heat exchanger is where the engine coolant (hot fluid) is interacted with the sea water (cold fluid) to regulate the engine temperature. The sea water intake has a strainer that prevents seaweed and other debris from entering the heat exchanger. Failure to regularly clean the strainer will cause a blockage that will inhibit the correct operation of the cooling system.



Engine Alarm (where applicable)

The engine will emit an alarm when the ignition switch is turned to the on position, but the engine is not started. This indicates the batteries are not charging. When the engine is first started it may be necessary to increase the engine revs slightly to activate the voltage regulator (which ensures correct voltage is attained before charging is attempted). The engine alarm may be de-activated by a dashboard switch. Engine warning lights are in a test phase while the ignition is on, and the engine is not running. Engine alarm indicator lights should be tested during the vessel opening using this procedure.

Vessel Close Down Procedure

The second section of the vessel log is used at the end of any activity or end of the day. It is a procedure that makes sure the vessel is ready for immediate deployment should an emergency occur at any time. The procedure checks the engine's vital systems as well as shutting down the electrical system and the security of the vessel. The engine running hours for the day will be noted for statistics.

Vessel Log – Activity Reporting

The third section of the vessel log is a record of any activity that the vessel has undertaken during a voyage. The type of activity should be noted, as well as the engine hours for each activity. When activity changes mid- voyage, it must be reflected on the Vessel Log sheet. The engine hours must be noted at the transition from one activity to another. Any anomalies in vessel operation or damages incurred should be reported in this section.

Vessel Inventory Checklist

The Vessel Inventory Checklist procedure will be carried out at different times by MRUs. Crew should be familiar with all equipment listed on this report and how to deploy, assess for damage and currency.

Logging On / Off

The Crew member must:

- Know how to correctly login and logoff with an SARCC or MRB.
- Understand what records need to be completed during a voyage

You should log on and off the MRV on departure and return to the MRU, being mindful of the Master's requirements to maintain a lookout, to fend off and aid in safe berthing as required.

Log on particulars are the same as required for any vessel logging on and are:

1. Vessel call sign, master of the vessel and vessel contact phone number
2. POB
3. Purpose of voyage
4. Destination
5. ETA and or ETR

Radio Log

A radio communications log will be kept on the vessel.

Voyage sheet

The *Voyage Sheet* (Part 3 of the Vessel Log) is ultimately the responsibility of the Master in charge of the vessel but is often completed by the Crew. This sheet details the activities of the vessel during a voyage, and its accuracy is vital. Crew members' names are required for insurance and correct manning levels. The master will report damages, repairs or equipment faults so these can be escalated for maintenance and also items needing replacement or replenishment, including first aid supplies.

Prepare for Sea

Preparations for sea should be made with the worst possible conditions in mind. The sea can be harsh, and conditions may change in a short time regardless of weather forecasts and the best plans. Preparation for the sea has an important personal component that relates to fitness for the duties you are about to perform. Standard pre-deployment checks should include PPE as per SOPs / LOPs and the completion of an Operational Risk Assessment (ORA).

Making sure the crew is ready for all conditions is the first step when putting to sea. You do not know how long you may be at sea, and in what conditions. Consider when you have last eaten and taken ablutions.

Although the MRV will have a grab bag, you might consider a personal grab bag with additional items such as, some easily eaten snack bars, personal water and medicines, etc.

Consider if a mixture of anxiety and rough seas or the sight of a medical casualty is going to affect your ability to perform your duties. Have you already undertaken hours of work or other activities that will impact your performance? You must disqualify yourself if you have taken alcohol or drugs (prescription or other).

Make sure you are prepared to cross your bar and contend with open seas. Unfavorable conditions may induce bouts of sea sickness. Vital time can be wasted by accepting a job you are not fit to handle. ***IT is OK TO SAY "NO IT is TOO ROUGH"***. It is much better to anticipate the worst possible conditions rather than have to make allowances for them when it is too late. Other crew members will be relying on you. You must be fit for duty!

As you head for the sea, prepare the equipment you may need for a rescue / assist and use your time wisely. Ensure you know where all safety equipment is located, including a safety harness, drogue and EPIRB flares. Prepare a personal plan to access them in an emergency.

Operational Risk Assessment (ORA)

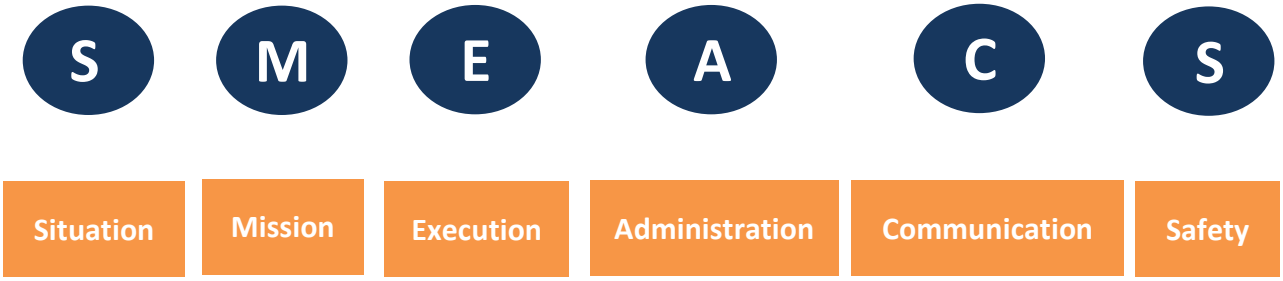
In accordance with the Marine Rescue NSW SOP OP 03 Vessel Documentation and Compliance, the master will conduct an operational risk assessment of the incident by covering the following areas:

- Crew readiness, sufficient crew and willing to proceed, fit for duty, correct PPE, briefing conducted
- Available daylight hours
- Vessel readiness, check sufficient fuel, pre op checklist completed, logged on and RC/MAC notified if required
- Environmental factors, wind, sea state, tide, visibility

Crew Briefing

The briefing informs your team of a strategy that will allow an efficient, effective and safe response. It also provides the background information to help the crew with situational awareness during the incident.

The Master will brief the crew, typically in the SMEACS format, before departing:



Situation: What is happening? (Overall situation – last known position; warnings; wind; sea state, available daylight hours, dangers and problems).

Mission: What needs to be achieved?

Execution: How will we complete our mission? Crew roles and responsibilities: search area, method, and size; actions when target is located.

Administration: How will the mission be supported? MRB / SARCC / Regional Controller / MAC; food, drink, personal medications.

Communication: There are several levels of command and control; these may be filled by the OSC, WO, RC, SARMC, Police, etc. Communications between the RV and MRU will usually be on DCN or VHF.

Safety: What are the risks? How will we keep people and vessels safe?

Berthing

The Crew Member must learn to:

- Secure the appropriate lines from the vessel to the berth under instructions from the vessel master
- Deploy the fenders in the best manner for the berth
- Berth your MRVs from a port and starboard approach with control and confidence
- Fend off as required
- Depart the berth under instructions from the master with control and confidence
- Instruct other crew members about their methodology and intentions to complete the manoeuvre

A berth is defined as a fixed structure where a vessel is to be tied alongside so that it is held on a fixed heading. Therefore at a specific berth point, there are only two directions 180 degrees apart for the vessel to be held. The aim is to secure the vessel to the berth with a set of lines to hold the vessel in the required position. The choice of direction depends primarily on the prevailing and expected weather, mainly the wind. In nearly all circumstances, the choice will be to have the vessel bow into the wind. However when berthing in a strong current there will often be no choice but to approach into the current.

The following factors need to be considered before attempting the berthing manoeuvre:

- Wind direction
- Current direction
- Water depth
- Hazards (environmental or human)
- Tide rise and fall
- Protection
- Securing arrangements
- Length of the stay at the berth

The process of berthing can be greatly assisted by standing off for a brief period to observe the effects the prevailing conditions are having on the vessel.

On-berth Wind *(where the wind is forcing you onto the berth)*

With an on berth wind, the final approach is at about 20 degrees of the line of the berth swinging the bow out to parallel the berth while still a metre or so away and slowing down to zero.

The fore and aft position can be controlled as the craft is pushed close enough for the crew on the forward line to secure a headline as far forward as possible so that it can act as a temporary spring line.

Ensuring that the fenders are correctly positioned, the engine can be placed in slow reverse (astern) until the stern line is secured. From this point, all other required berthing lines can be set and adjusted at leisure.

Off-berth Wind *(where the wind is forcing you away from the berth)*

The major difference with the off berth wind is the need for good judgment by the helmsperson to place the vessel gently alongside on the fenders with no vessel speed and the crew stepping smartly ashore to get ahead and stern line secured as quickly as possible.

Until spring lines are in place, the vessel may need to be positioned fore and aft using the engine. When springs are in place, all other required lines can then be set and adjusted. In circumstances where other

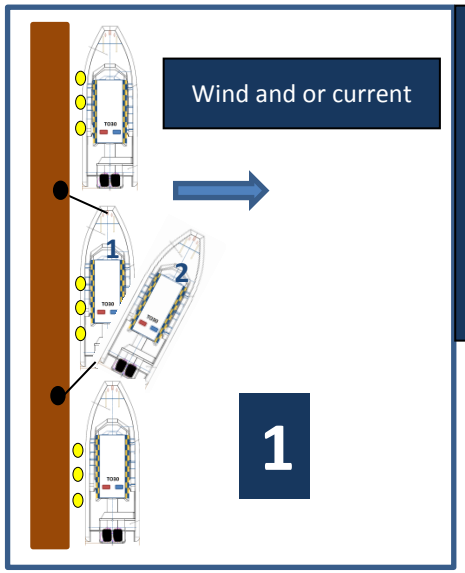
vessels or obstructions on the berth reduce the space available, it may be necessary to simply nose in into the wind and have a line taken ashore from the bow and secured in such a place as to allow the vessel to be reversed to swing the stern in close enough for a stern line to be secured. Alternatively, the vessel can be pulled in by a long stern line taken ashore or a forward spring line can be rigged from well forward of the intended final position to allow reverse power to pull the stern in.

Leaving a Berth

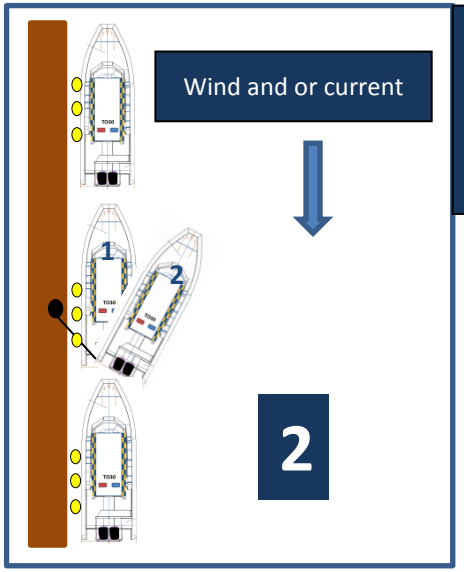
Usually, the best way to leave a berth will be to go slow ahead on a forward spring to swing the stern out and then go astern as the spring is let go. This practice is especially recommended when the vessel has overhanging gear at the stern (davits, marlin board, wind generator or solar panels), and there are obstructions on the berth protruding above or near the level of the deck. Other methods are better when the wind and current influences are stronger.

Without someone ashore to let go lines, replace the necessary lines with slip ropes, at least two lines running from the vessel around bollards or other posts and then back on board. With the engine running and a helmsperson at the controls, other unnecessary lines can be brought on board and stowed where they will not be a hazard.

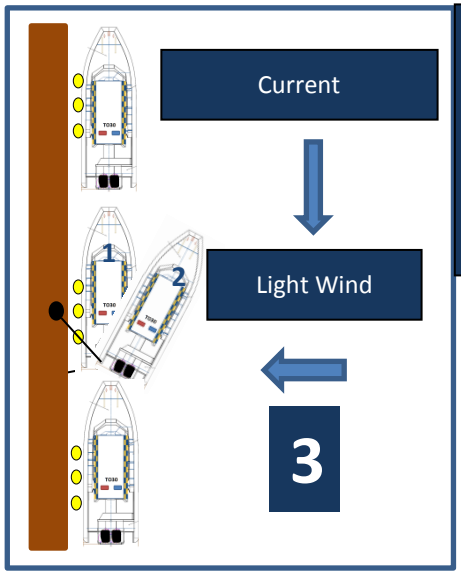
When one of the following methods is selected, the second last line is slipped on board just before leaving the berth, with the last and final line being slipped on command from the helmsperson



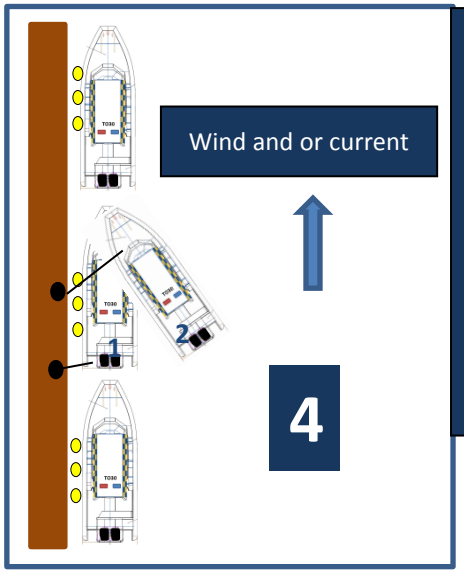
Let go headline first, then stern line. When vessel clear of berth, go ahead on motor.



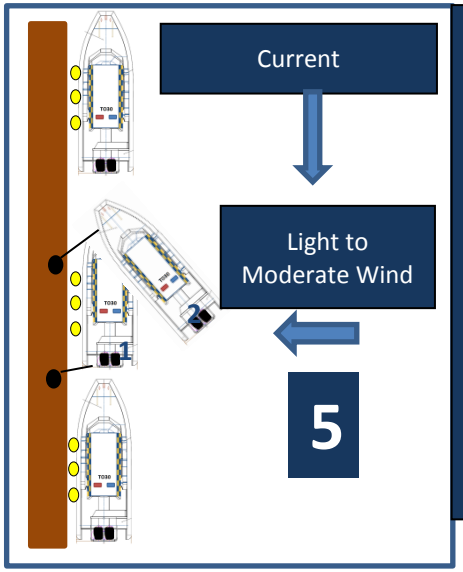
Provide aft spring. Let go lines, push the bow out.



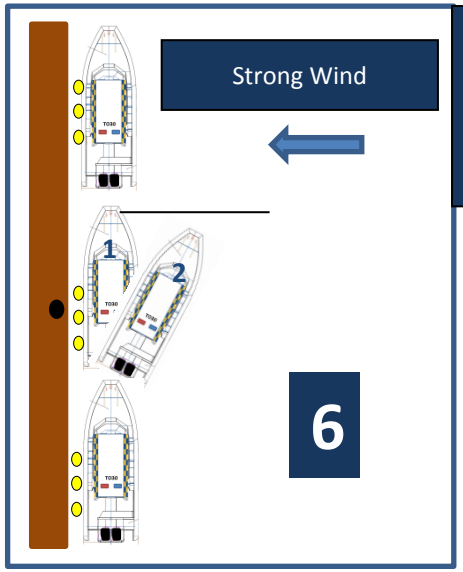
Provide aft spring. Let go forward. Go astern on motor until the bow swings out.



Provide forward spring. Let go lines, go slow ahead with wheel to port. When sufficiently canted, go astern.



Provide a forward spring. Go ahead on motor with hard a-port until stern well out. Then go astern until clear of berth.



Run out anchor, and pull the head out. Watch the stern.

Air Berthing

Some units have an Air Berth® system for their vessels. As Crew, it is important that you are aware how these systems work and how your vessels are berthed and launched from an Air Berth® system.

- An Air Berth® systems benefits are:
- Single person operation
- Safe entry during mooring
- Greatly reduce maintenance cost for your hull and engines
- Elimination of anti-fouling from your hull resulting in faster speed and better fuel economy

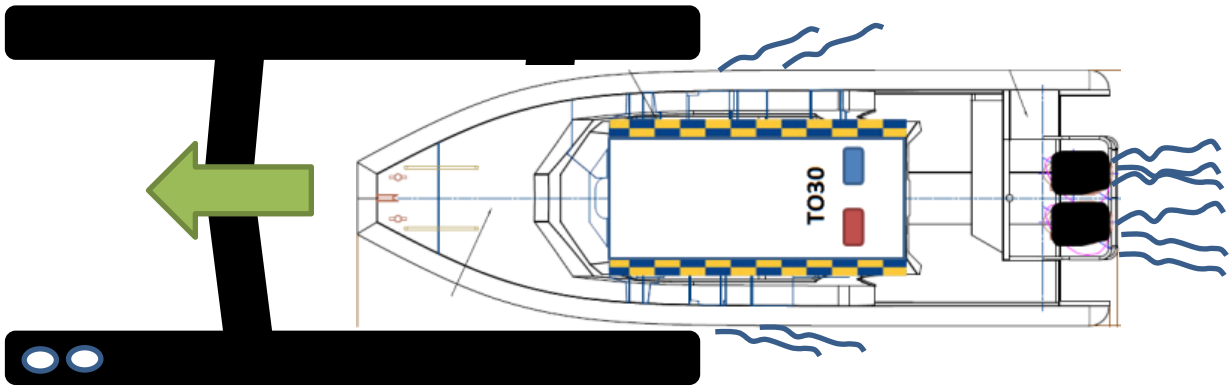
The Air Berth® is a calm water device and must not be installed or used in mooring locations with an excessive wave or swell action due to exposure or commercial marine activity.

The Air Berth® requires a minimum operating water depth to raise and lower. The water depth should be checked at low tide to ensure that the Air Berth® can operate freely without restriction.

Before Operating an Air Berth®:

- No one is on the vessel during raising and lowering
- The operator must supervise the Air Berth® at all times during the raising and lowering procedure
- No ropes restrict the Air Berth® as it raises and lowers into the water
- There is sufficient water depth to operate the Air Berth®.
- The vessel's stern cleats are strong and firmly fitted to the vessel
- Your power source has an RCD (Residual Current Device) or Earth Leakage Circuit Breaker, standard on most marinas, fitted to the circuit.
- The Blower Box is clear of any flammable material (fuel or gas) or pools of water before operating.
- The Blower Box is placed on a dry and clean surface and that the vents on the base of the box are not blocked or restricted during operation.

How to Berth onto an Air Berth®:

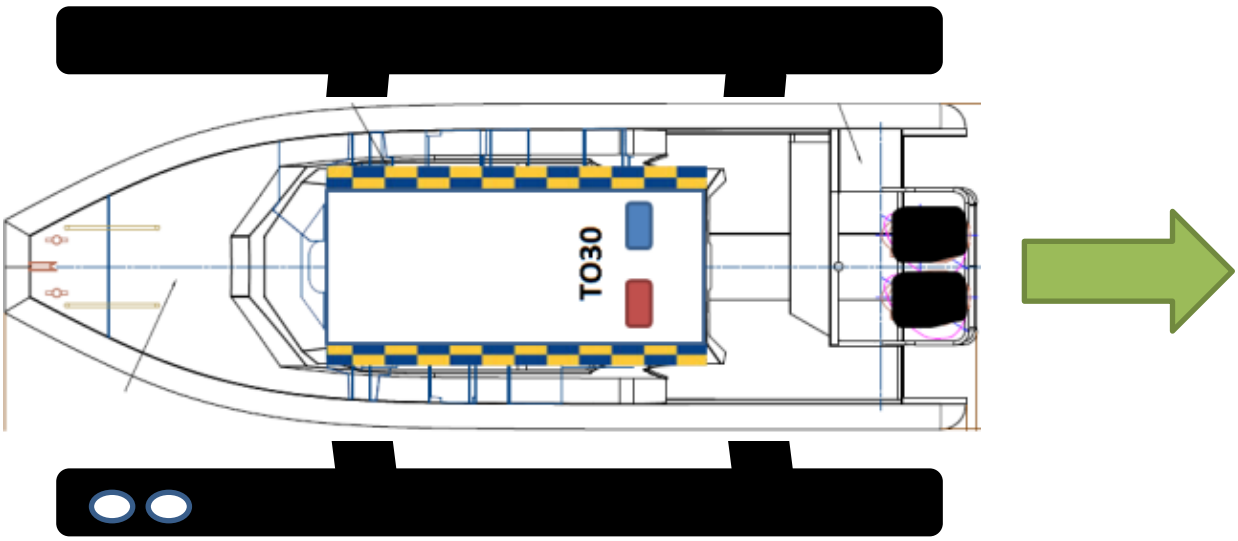


Task	
1	Drive the vessel in between the mooring guides
2	Fit the position ropes onto the cleats of the vessel
3	Attach the Blower Hoses from the Blower Box Outlet to the Air Controls. Turn the blower to the far side first, and then, after 2 seconds, switch remaining blower on
4	Once you see bubbles appear at the rear of the Berth®, wait 30 seconds before raising both snorkels and tying them off to the Snorkel Rope Cleat
5	Turn off the blowers, remove the hoses and fit the Air Sealing Caps onto the Air Control. If you wish you can secure the Air Sealing Caps with a Padlock

Berthing Tips

1. Berthing lines are made ready in advance (Crew)
2. Fenders are made ready in advance and set correctly (Crew)
3. Line management is carried out with consideration for conditions (Vessel Master / Crew)
4. Correct knots are tied and used (dipping eye when using eyes) (Crew)
5. Communications – master has discussed his intentions for arrival and departure

How to Launch from an Air Berth®:



Task	
1	Release both the ropes to both Snorkels ensure that they are both fully in the water
2	Remove both Air Sealing Caps simultaneously to allow water to enter the Air Berth®
3	Once the unit is fully submerged, start the vessel's engine/s
4	Remove both Positioning Ropes and store them on the Rope Stores on the Mooring Guides

Safety around an Air Berth®:

- The Air Berth® may get very hot in direct sunlight and may be slippery when wet
- Take care when moving around the Air Berth®. Use the blue non-slip pads for a better footing when alighting on and off the vessel

Anchoring

The **anchoring system** consists of an anchor and its attachment to the vessel. The **anchor** is a device designed to engage the bottom of a waterway or sea as part of an anchoring system, to maintain a vessel's position through its resistance to drag. **Sea anchor** is a device attached to a vessel and deployed underwater that is designed to produce drag to stabilise the motion or reduce drift and enhance control.

A crew member must:

- Know the components of the anchor tackle
- Know the suitable deployment for varying conditions
- Deploy the anchor and secure the anchor tackle appropriately for the conditions, under the vessel master's instructions
- Retrieve the vessel's anchor

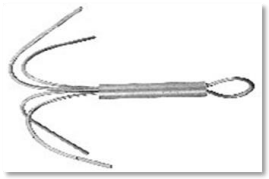
Anchoring Terms

Term	Definition
Holding power	The force needed to break out an anchor embedded in the seabed expressed in Newtons
Holding ratio	The ratio of anchor holding power to anchor weight
Super high holding power anchor	An anchor with a minimum holding ratio of 12
High holding power anchor	An anchor with a minimum holding ratio of 6
Break out the anchor	Remove the anchor from its stowage – get it ready for use
Let go	Lower the anchor to the bottom

Veer cable	Lets out line under strain
Setting the anchor	Embedding the anchor in the seabed
Anchor dragging	Anchor not holding bottom
Freshen the nip	To move a line slightly, so that a part being chafed is moved away, and a fresh part takes its place
Weigh anchor	Commence recovering anchor
Anchor aweigh	Anchor just clear of the bottom
Clear/foul anchor	Whether anchor is free or tangled
Lee shore	Windward shore (wind blowing onto)
Bitter end	Attachment point of anchor line to vessel
Rope warp	Line attaching the anchor to the vessel
Swinging range	Arc of travel the vessel will move from the anchor

Anchor Types

Anchor	Advantage	Disadvantage
 Admiralty	• holding power • penetration	• size • stowage
 Danforth (sand)	• holding/weight ratio • stowage	• jamming/fouling
 CQR (plough)	• holding	• stowage • jamming/fouling

 Reef (grapnel)	• rock/reef holding	• light weather only • rock/reef only
 Bruce	• excellent holding	• stowage • jamming • poor for weed/grass • cost

Anchor Selection

Size:

- Various tables indicate size/weight
- Allow for the vessel's design

Type:

Select according to the:

- Nature of the seabed
- Duration of stay
- Sea and wind conditions
- Anchorage

Considerations:

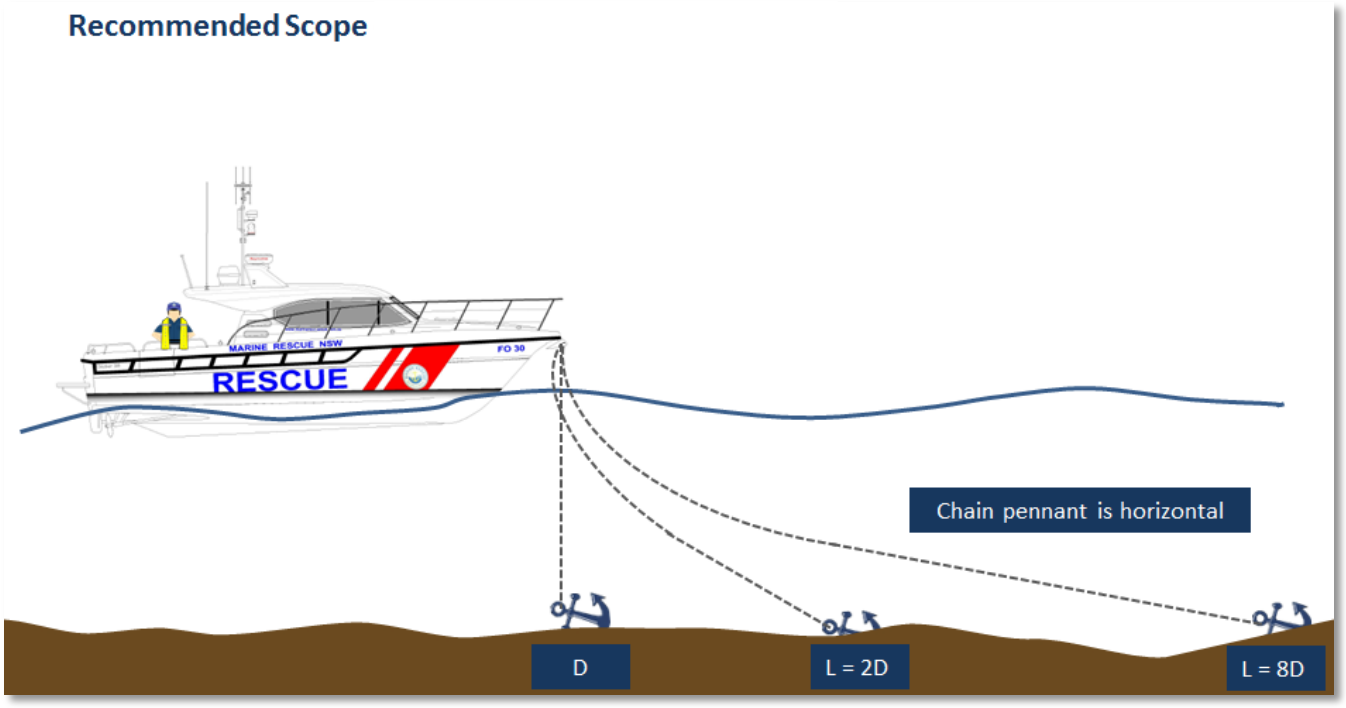
- Nylon is the best line for anchoring (silver is alternative)
- Elasticity of a line (shock absorber) and high breaking strain
- Carry at least 40 metres of line
- Place a length of chain between anchor and line
- Deck fittings should be bolted and back plated
- Secure the bitter end
- Allow for tidal (and wind) changes
- Don't anchor in channels
- Don't anchor off lee shores
- Swinging room (Allow for the arc the vessel will travel around from the anchor point)
- Always have the anchor in readiness condition for immediate deployment especially when crossing a bar

Scope:

This is the ratio of the length of an anchor line (let out), from a vessel's bow to the anchor, to the depth of the water. The scope must be such as to provide a horizontal pull on the anchor and the following scope ratios are accepted.

Ideal conditions	Minimum 3:1
NORMAL Conditions and OVERNIGHT	Minimum 5:1
Storm conditions	Minimum 10:1

Recommended lengths of rope and chain				
Vessel length	Anchor rope		Chain pennant	
	Size	Length	Size	Length
Up to 5 m	8 mm	50-75 m	6 mm	3 m
5-8 m	10 mm	75-00 m	6 mm	6 m
8-12 m	12mrn	100-125 m	6 mm	10 m



How to Anchor

Before anchoring, help get the gear ready to ensure it will run free when required. Ensure the bitter end is secured on board and inform the master who will brief the anchoring crew.

Considerations:

- Depth of water
- State of the tide
- Weather and forecast (direction and probable strength)

- Nature of the bottom
- Any obstacles in the vicinity
- Swinging room
- Time of anchoring
- Which anchor is to be dropped
- Rode (length of cable)

Anchor Chain

The anchor chain is used to keep the shaft of the anchor lying straight on the sea floor. This allows the best holding conditions. The chain should be dragged out by reversing the vessel. The anchor should bite into the sea bottom.

Dragging Anchors

As the vessel settles back on the anchor, a check needs to be made to see if it is dragging. This is done by selecting two prominent, fixed features on one side and around 90 degrees to the vessel, that is, abeam on one side. The features selected should be one close and the other as far away as possible. In this way, a transit bearing is obtained. If the vessel holds on this selected line, it is not dragging.

Securing the Anchor

- Make anchor line fast to cleat/bollard
- Vessel “has its cable” when line goes slack after the anchor bites
- Tie off securely
- Take a sighting to check for drift anchor should set with moderate reverse propulsion
- Turn off engine once anchor is holding well

Weighing Anchor

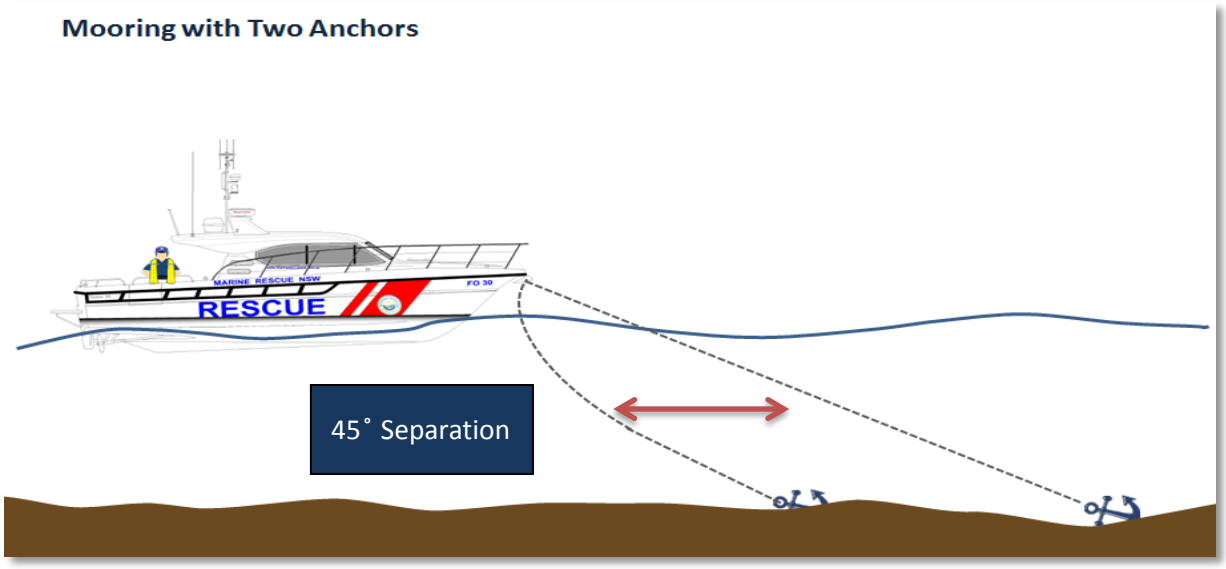
Effectively, weighing the anchor is opposite of setting the anchor:

- Start engines and test controls
- Move slowly towards anchor while taking in and correctly stowing the line. Anchor should break out when line is straight up and down if not, take a few turns and proceed slowly ahead
- Secure the anchor when recovered
- Never overrun a slack line

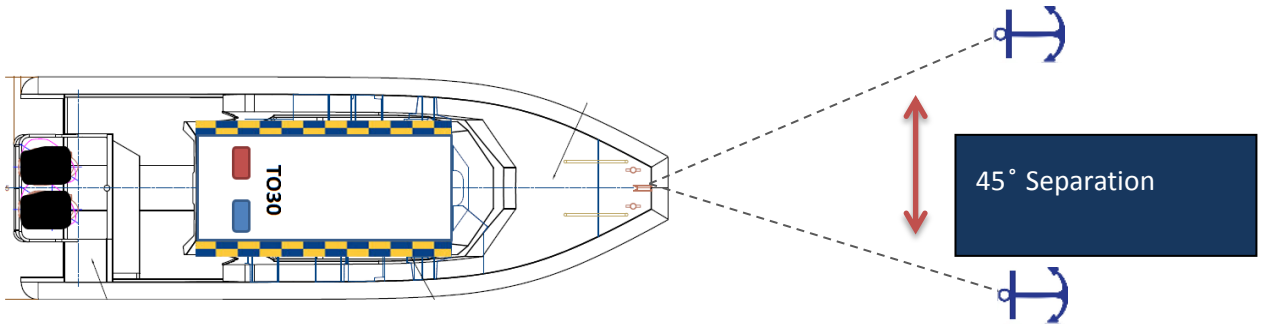
Setting Two Anchors

Setting two anchors is performed to reduce the swing radius or to increase the holding power in heavy weather.

- The tension on the anchor rodes is important especially when one is swinging up to set the second anchor.
- Too much tension may cause the first anchor to break loose; too little tension on the rode may cause it to go astern and foul the propeller.



Top View



Anchor Safety Issues

- Anchors are heavy, always ensure you use correct lifting techniques
- Keep fingers well clear of pinch points
- Keep feet out of loose coils
- Do not try to contain an out of control line
- Always stow correctly

Anchoring Tips

- Hand signals should be established prior to setting or weighing anchor hand signals should be plain, clear and easily understood
- Lower / recover anchor with gloves and correct lifting technique (Crew)
- Setting anchor / rode length appropriate (Crew / Master)
- Anchor Watch (Master)
- Anchoring practice should occur with particular emphasis on setting the anchor and maintaining an anchor watch for a short time after setting

Debriefing

At the completion of the activity, whether this is the end of duty, completion of an incident the Master will carry out an After Action Review. This should be done using the SOP OP 03 - After Action Review Form available on OTTER. There are basically two types of debriefing:

- "Hot Debrief" carried out immediately following the exercise or rescue event
- Organised debriefs carried out no later than three days after the event / incident, to discuss the outcomes of the activity

In a debrief the three **Ws** should be considered, these are (right):

What worked?

What did not work?

What could be done better?

The debriefing may occur as a meeting or phone / video teleconference. All MRNSW participants in the activity, including both vessel and radio personnel, need to be involved. Hence, it is best to decide on the timing of the debriefing before you all leave the MRU on the day of the incident / activity. The debriefing is also a valuable help in completing the necessary documentation.

Crew members have an active role in the debriefing by:

- Listening and providing feedback
- Confirming an understanding or asking for clarification of the issues under discussion
- Discussing the risk assessment process and any perceived hazards
- Discussing how situational awareness was maintained during the evolving incident / activity
- Reflecting on the order of events and if process or equipment changes could / should be made in future
- Participate in the making of recommendations for the implementation of changes in light of the debriefing that leads to continuous improvement and skills development

Refuelling

Proper fuelling procedures are very important in preventing onboard fires. In some cases, you will be refueling your vessel with unleaded petrol that gives off highly flammable vapours. You must be aware of the vessel's emergency procedures for fire. Always ensure you follow your vessel's SMS operational procedure for refuelling. To prepare for refuelling, crew should:

- Secure vessel to the dock
- Switch off engine(s), radios, and mobile phones
- Turn off vessel batteries (power)
- Close all ports, hatches and doors to ensure no spills or vapors enter these areas
- Have a spill kit available
- Ensure no smoking or open flames
- keep extinguisher at the ready
- Raise the B flag

Refuelling Tips

- Dip the fuel tanks before refueling to determine how much fuel will be required
- Monitor the amount of fuel being pumped into the vessel
- Observe that the tank is not overfilled

Emergencies

Vessel Emergency Plan and SMS

Emergency plans have been established in accordance with NSCV Part E. The primary objective of these plans is to provide a timely, appropriate and coordinated response to identified emergencies and assist with their effective management. It includes the identification and management of any foreseeable risks associated with these emergency situations.

Crew must ensure that they:

- Understand the primary objective of the emergency plans – flip chart
- Know their designated roles and responsibilities detailed in the emergency plans
- Demonstrate proficiency in fulfilling their designated roles and responsibilities through practical application during emergency drills

Note: Crew must know the vessel's emergency plan and understand the SMS/ SOPs for emergency response

Emergency Preparedness

Emergency preparedness practice ensures that all crew of our MRVs understand and are ready in case there is an emergency. All safety equipment is to be constantly inspected as previously mentioned, and emergencies procedures practiced regularly.

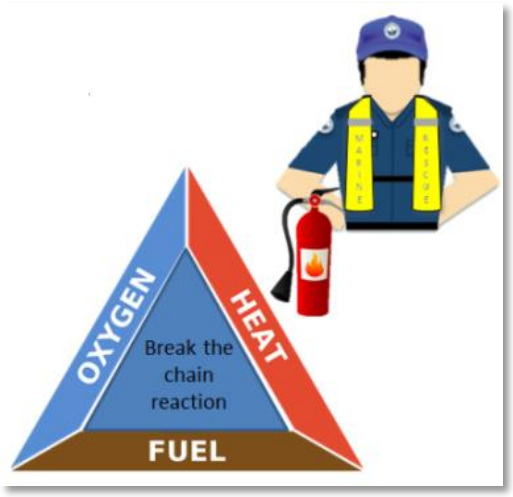
Fire

Fire – The Chemistry of Fire

Fire is a fast chemical reaction that produces HEAT, LIGHT, and ENERGY. For a fire to occur you need four (4) elements:

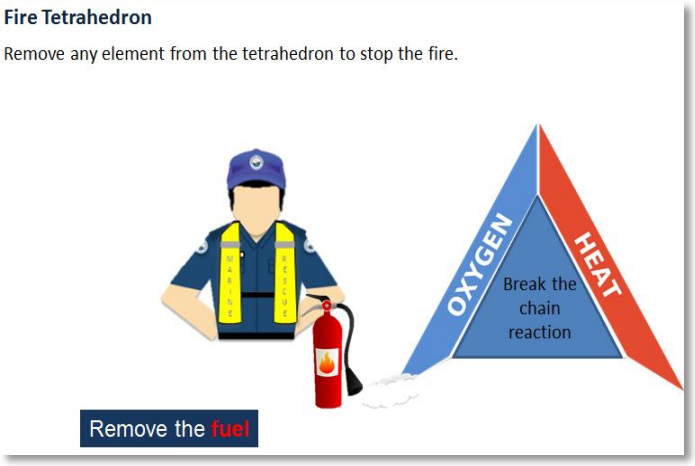
1. Fuel (solids, liquids or gases)
2. Heat or ignition source
3. Oxygen
4. Chemical reaction

This is called as the **FIRE TETRAHEDRON.** Fire is extinguished or prevented by removing one element.



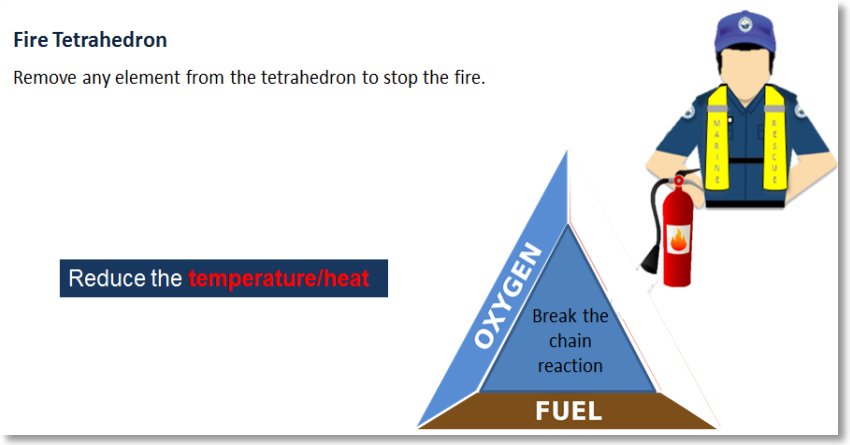
Fire – Fuel

- Without fuel, a fire will stop
- Fuel can be removed naturally (by all the fuel being consumed) or manually (by mechanically or chemically removing the fuel from the fire). An example is hazard reduction burns that reduce the ground fire fuel load



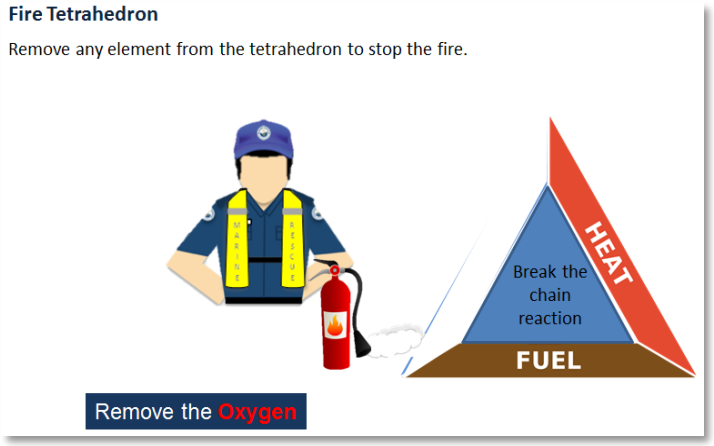
Fire – Heat

- Without sufficient heat, a fire cannot begin nor continue
- Heat can be removed by the application of a substance that reduces the amount of heat available to the fire reaction
- This is often water that uses the latent heat of vaporization when returning from the liquid state to steam thus reducing temperature
- Scraping embers from a burning structure also removes the heat source
- Turning off electricity to an electrical fire removes the ignition source



Fire – Oxygen

- Without sufficient oxygen, a fire cannot continue. With a decreased oxygen concentration the combustion process slows



Fire – Chemical Reaction

- Remove substances that are likely to react
- Remove substances that emit poisonous fumes when burning, particularly from confined spaces

Heat Transfer

The process of heat transfer is concerned with only two things; temperature and the flow of heat. Temperature represents the amount of thermal energy available, whereas heat flow represents the movement of thermal energy from place to place.

Heat travels in different ways:

Direct contact – touching the fire

Convection – air is heated by the fire and moves around, generally upwards

Conduction – heat one end of something and the heat may travel through that substance, e.g. hold a metal spoon in a flame and the other end will get hot

Radiation – radiation is independent of atmosphere and only heats the surface it hits, not the air in between, e.g. radiation travels from the sun and can burn us although it has travelled 93 million miles

Classes of Fire

Users should always check the label on the extinguisher to ensure it is the correct one for the fire at hand

Class	Fuel	Symbol
Class A	Wood, Paper, Plastics	
Class B	Combustible liquid	
Class C	Flammable gasses	
Class D	Metals	
Class E	Electrical fires	
Class F	Cooking oils and fats	

Class of Fire and Extinguisher Types

	A Wood, Paper & Plastic	B Flammable & Combustible Liquids	C Flammable Gases	E Energised Electrical Equipment	F Cooking Oils & Fats
Powder ABE	☺	☺	☺	☺	☹
Powder BE	☹	☺	☺	☺	☺
Carbon Dioxide (CO_2)	LIMITED	LIMITED	☹	☺	☹
Water	☺	☹	☹	☹	☹
Foam	☺	☺	☹	☹	LIMITED
Wet Chemical	☺	☹	☹	☹	☺

Fire Extinguisher Servicing

Extinguishers are required to be serviced at 6 monthly intervals by an approved service agent, and each unit is fitted with a maintenance tag that is date and service coded.

How to Operate a Fire Extinguisher

Firefighting Risk Assessment

Before attempting to fight a fire on board a MRV we Before attempting to fight a fire on board a MRV we need to be sure of:

- Our safety
- Fire is small enough for us to be safe when approaching it with an extinguisher
- We have a safe avenue of escape at all times

We must wear appropriate low or non-flammable clothing when approaching fires and use PPE where provided. At all times follow the instructions from the Master including abandon vessel.

Other Firefighting Equipment	
	**Fire bucket with lanyard** A fire bucket is a simple but versatile piece of firefighting equipment suitable for use with sand or water to extinguish Class A fires. It can also double as a bailer. A fire bucket must be made of metal.
	**Fire hose reels** These reels are designed to supply water just like a garden hose. They do not supply as much water or pressure as a proper fire hose and are used like extinguishers to provide first aid firefighting. They are fitted with a clever safety feature, as can be seen by the picture the nozzle is captured in a locking device so you have to turn the water on to release it.
	**Fire blanket** Fire blankets are designed to only be used on something like a frying pan or a small waste basket. To operate, grab the tags that hang down and pull. To protect yourself, fold the top over your hands and approach the fire, making sure that you can see the floor and there is nothing to trip over. Then reach out and place the blanket over the fire and back away. The fire blanket is then removed by a trained fire fighter. Your trainer will demonstrate the technique.
	**Portable fire pumps** Portable fire pumps can be either petrol or diesel powered and can be used from the shore, on jetties, wharfs or carried on vessels. Care must be taken to use proper manual handling techniques when transferring a portable pump onto a vessel.

	**Sea / bilge pump manifolds** Sea water or bilge water manifolds can be used to help suppress a fire onboard a MR Vessel.
	**Fixed firefighting system** To comply with the requirements of Section 11 of the USL Code and Part C4 of the NSCV, commercial vessels of classes 1 (A-E), 2 (A-C) over 12.5 metres in length are required to be fitted with a fixed fire extinguisher or bulk system in their machinery space. These systems can utilize various extinguishing media e.g. • CO2 • Pyrogen • FM-200

Care of Fixed Firefighting Systems

Fixed firefighting systems must be designed to conform to the relevant codes and regulations.

The installation must be undertaken by an approved company:

- The system must be serviced annually
- Alarms and detectors must regularly be tested for correct operation of audible and visual alarms
- Condition of piping and discharge heads must also be regularly monitored
- Place instructions next to the control panel
- Ensure control panel is free from obstruction

Boundary Cooling

Hoses may be used to keep an area near the fire cooled down so that the fire cannot spread. You might for instance spray the decks above and below the fire as well as the adjoining bulkheads to slow a fire down.

Stability

A continual flow of water into a vessel, for example sea water or from firefighting, will eventually destabilise the vessel and it will eventually sink. If you flood the compartments on one side, the stability of the vessel will be compromised. Consideration should be given to either pump water out of the vessel or filling an even number of compartments on the other side of the vessel. It is safer to fill completely a compartment with water, thereby inducing a stable list, than half filling it and inducing a free surface effect.

Smoke

- Smoke is the main cause of death in fires
- It contains many toxic chemicals like hydrogen cyanide, carbon monoxide, sulphur dioxide, hydrogen sulphide, etc
- To escape from the smoke you must stay as low as possible "get down low and go-go-go"
- Smoke is one of the few things that can harm you now and also have an effect years later e.g. inhalation of carcinogens

Fire Hazards

- Spontaneous combustion – piles of oily rags, Bilges – fuel and oil leaks. Keep bilges pumped out and dry
- Oxidation
- Overloaded electrical circuits
- Oil spills
- Buildup of gases
- Arcing from small electrical motors, e.g. vacuum cleaners

Fire Drills

A large fire can be a cause for major concern. This being the case, abandonment of the ship may be your only recourse. Small fires or fires confined to particular compartments may be extinguished or controlled by following a procedure of containment, smothering, and cooling. Emergency response, whether it is to fire, flooding, or a man overboard, is about doing things quickly, correctly and with little forewarning. It depends on t*eamwork, pre-planning and good timing.* Regular fire drills serve the same purpose. They give the crew an opportunity to practice the fire plan and hone their skills as a team.

- Fire alarm activated or fire reported
- Sound emergency muster alarm
- Muster passengers and crew (move to safe area if required and available)
- Attempt to extinguish or control fire with fire extinguishing equipment
- Determine extent of damage
- Transmit an Urgency or Distress message (if appropriate)
- Prepare lifesaving equipment (if appropriate)
- Shut down engine (if fire in engine room)
- Contain fire
- Isolate fuel supply (if in engine room)
- Shut down all ventilation (fans, flaps, vents)
- Close Hatches
- Isolate power

Ship Abandonment

The order ***'Abandon Ship'*** must only to be given by the Master (or the next in command if incapacitated). Your vessel is your best life raft and should not be abandoned unless necessary. The decision may reflect one or a combination of the following:

- No further attempts to save the vessel or prolong its integrity are feasible
- The vessel is becoming uninhabitable
- Evacuation routes are becoming unsafe
- Lifesaving equipment is seriously threatened

Preparation for Abandoning

Priorities for Immediate (crash) Abandonment

- Stop engines
- Send distress message
- Muster
- Launch life raft – ensure painter is secured
- Obtain EPIRB
- Abandon and clear vessel
- Look for survivors and floating safety equipment

General Preparations

- Send distress signal and activate EPIRB
- Muster and account for all members
- Prepare life raft for launch – ensure painter is well secured
- Deploy ladder(s)
- Stop overboard discharges

General Preparations

- Assemble additional items for vessel's grab bag
- Additional water and food rations
- Pyrotechnics
- Blankets and waterproof sheeting
- Waterproof torches
- First aid supplies
- Charts, notebooks, and pencils
- Ropes
- Buckets
- Portable communications

Personal Preparation

- Wear warm clothing and soft soled footwear
- Drink to your full if available
- Secure lifejacket with strobe and whistle
- PLB if available
- Carry a knife (pocket or sheafed)
- Personal grab bag (suggested content);
- Extra water and food rations (include sweets with high glucose content)
- Torch
- Gloves

Survival Equipment

Vessel safety equipment includes survival equipment. In the next section, we will look at equipment for survival in more detail.

Survival Craft Equipment – Safety of Life At Sea (SOLAS) Reginald Foster Dagnall (RFD)

Item	Description / Usage
Sea anchors	Two (one permanently attached to the life raft and one spare)
Buoyant bailer	One (two for rafts larger than 12-person)
Pump/bellows for topping up-raft (inflatableonly)	One
Puncture repair kit (inflatable life rafts only)	One
Buoyant paddles	Two
Waterproof torch	One (spare set of batteries and spare bulb)
Whistle	One
Rescue signal table used by, marine rescue units and ships andpersons in distress	One copy
Buoyant smoke signals	Two
Instructions for immediate action and instructions on how to survive	One copy of AMSA *'Survival at Sea.'*
Thermal protective aid	Two minimum (for 10% of capacity)
Seasickness bag	One per person
Buoyant rescue quoit	One with at least 30 metres buoyant line
Sponges	One for each person
Parachute distress rockets	Four
Hand flares	Six
Safety knife	One (two for rafts larger than 12-person)
Heliograph	One
Fishing kit	One fishing line and six hooks
Food ration	Approx. 667g per person (food at least 10,000 kilojoules perperson)
Water ration	1.5 litres of fresh water for each person the life raft is permitted to accommodate, of which 0.5 litres may be replaced by a de-salting apparatus

	capable of producing an equal amount offresh water in two days
Drinking vessel, graduated	One
Tin openers	Three + one pair of scissors
Sea sickness tablets	Six for each person (with instructions)
First aid kit	With waterproof instructions

Equipment available for attracting attention

Item	Comments
EPIRBs	Average detection time in MRNSW area of operations is within 1 hour. However, response and location times depend on various factors: • An EPIRB with GPS capability will also send its position • Remoteness and time for rescue unit/s to reach search area
Portable two-way radio transceiver	Primary purpose is to communicate with Search and Rescue (SAR) aircraft or vessel
PLB	GPS encoded Personnel Locator Beacons can identify a person in water to 100 metre radius
V Sheet	These can be displayed on the cabin top of vessel to draw attention to search and rescue aircraft and vessels
Parachute distress rockets	Only to be used on the instruction of person in charge of survival group. Mainly for night use, daytime greatly reduces its visibility
Red handheld flares	Ideal for day or night-time when ships or aircraft are in view
Buoyant and handheld orange smoke signals	For daytime use only. Produce a large amount of orange smoke for at least 3 minutes. More easily seen from aircraft than from vessels.
Signaling torch / strobe light	For night-time use. Torch only for simple message like 'SOS.' • • • – – – • • •
Heliograph (signal mirror)	The reflection of the sun can be seen at a range of 32 kilometres in good conditions and lesser range in hazy conditions. Instructions are on the packet.

Radio transponders and radar reflectors	Must deploy in accordance with operating instructions.
Other means of attracting attention	• Smoke and flames (burning oil soaked rags in floating bucket) • Lights on surviving craft • Retro-reflective tape or items • Colour of canopy or exposure cover • Whistles • Oil slick • Personal strobe lights

Man Overboard (MOB)

All Marine Rescue Vessels are different and require operating procedures to reflect these differences in the event of a MOB.

Marine Rescue Units (MRU) must ensure that their vessel's Safety Management System (SMS) details the events the vessels Master and crew must follow in the event of a MOB.

The vessel's SMS may refer to a Local Operating Procedure (LOP) developed and implemented by the unit.

Units should consult with their Regional Controller for assistance in developing their SMS and LOPs for each of their vessels.

> Note: Man overboard procedures should be practices on a regular basis as part of emergency drills

Sea Survival

Emergency Regulations and Codes

Applicable legislation, regulations and codes may include:

1. Relevant maritime regulations including:
    i. Relevant sections of State and Territory maritime regulations, National Standards Commercial Vessels (NSCV)
    ii. International Maritime Organisation, Standards, Training, Certification and Watch keeping for Seafaers 95 (IMO STCW) Convention and Code dealing with survival at sea and use of survival craft and equipment
    iii. Relevant sections of Australian Maritime Safety Authority (AMSA) Marine Orders dealing with survival at sea and use of survival craft and equipment
2. Safety of Life at Sea (SOLAS) regulations
3. Relevant international, Commonwealth, State and Territory WHS legislation

AMSA

The Australian Maritime Safety Authority (AMSA) is the government agency with the charter of enhancing efficiency in the delivery of safety and other services to the Australian maritime industry. AMSA publication, '*Survival at Sea*' is a valuable learning and reference document - available from Stores.

SOLAS – Safety of Life at Sea

Australia is a signatory to many conventions relating to the provision of search and rescue services. This includes SOLAS, which requires signatories to:

"...ensure that any arrangements are made for coast watching and the rescue of persons in distress at sea around its coasts. These arrangements should include the establishment, operation and maintenance of such maritime safety facilities as are deemed practicable and necessary having regard to the density of the seagoing traffic and the navigational dangers, and should, so far as possible, afford adequate means of locating and rescuing such persons" (Chapter V Regulation 15).

Australia has a cooperative search and rescue plan with AMSA, Defence, Police and volunteers all contributing to very effective search and rescue response arrangements in a search and rescue region covering about 52.8 million square Kilometres.

Operating 24 hours, AMSA's Rescue Coordination Centre (RCC Australia) in Canberra is responsible for the national coordination of both maritime and aviation search and rescue.

Survival Techniques

Immediately after abandoning ship many may be suffering from exhaustion and varying degrees of shock. Every effort must be taken to resist this to complete the 'immediate action instructions' to survive.

Once in a life raft (if available), the person in charge should decide the order in which these actions are carried out. Many actions may be taken concurrently, and some actions are of greater importance than others in the *initial phase*, such as rescuing survivors from the water and gathering the craft together to increase the chances of detection.

Immediate Action

- Right life raft if it is inverted
- Board life raft *(Survivors entering inflatable life rafts should, of course, remove all items likely to damage the rafts, such as shoes, buckles, sharp objects, etc.)*
- Cut painter

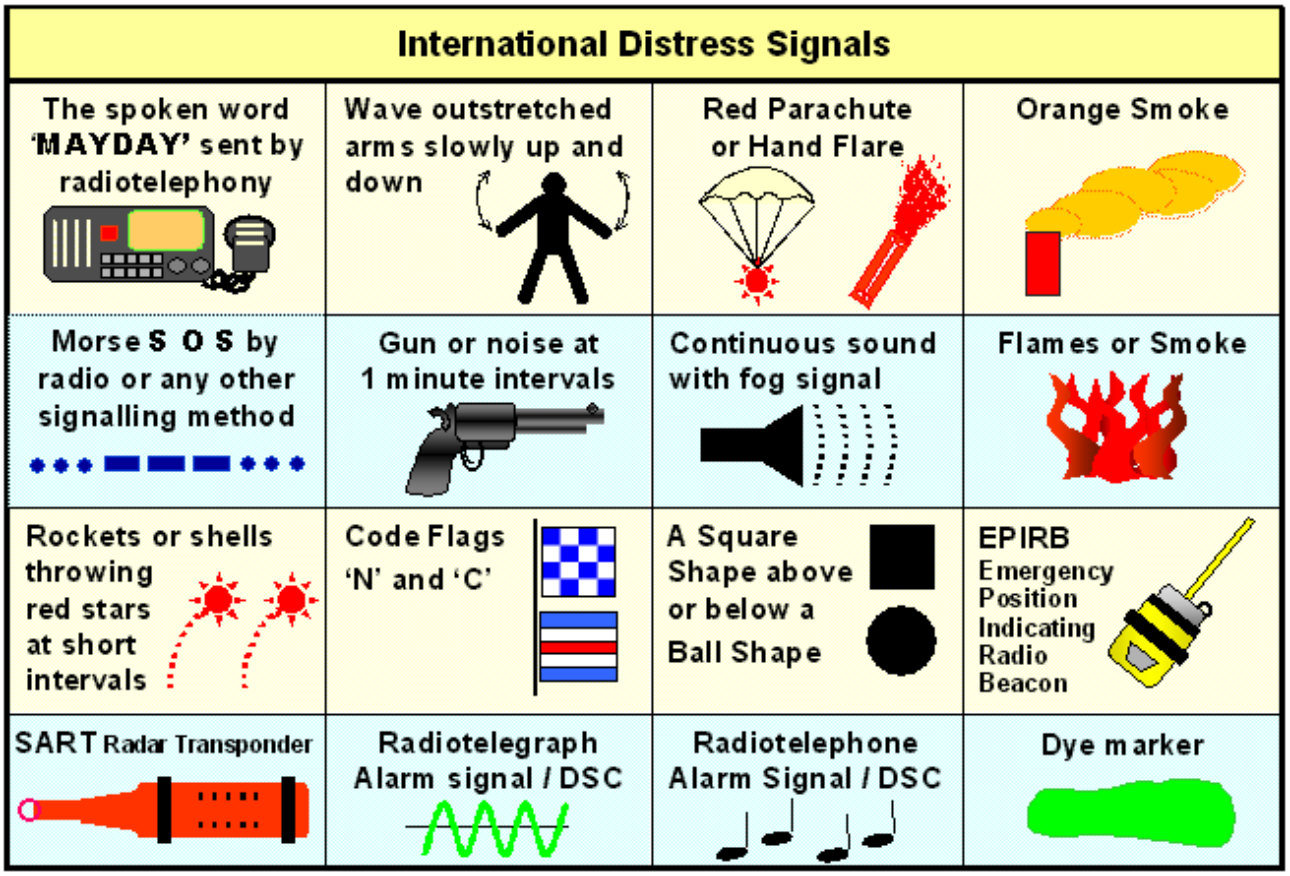
- Have lookout(s) look and listen for survivors in the water and to look for other survival craft
- Distance yourself/make clear of the abandoned vessel
- Activate one EPIRB *(only one EPIRB or PLB should be activated at a time to conserve the devices and prevent confusion for search agencies)*

Lookout 'immediate action' Duties

Lookouts should look and listen for:

- Lifejacket lights
- Lifebuoy lights
- Lights from other surviving craft
- Retro reflective tapes on lifejackets, lifebuoys, and other craft
- Gas 'blow off' from inflatable life rafts
- Whistles from survivors in the water
- Shouts from survivors in the water
- Passing ships and aircraft

Methods of Signalling Distress



Other Functions and Procedures

- Join surviving craft together
- Treat the injured (apply first aid)
- Deploy drogue to prevent the raft spinning, reduce drift
- Inspect the raft(s) and commence repair and bailing immediately if required
- Deploy radar reflector(s)

Long-term Survival Procedures

- Evenly distribute survivors and equipment within survival craft
- Rations – calculate and allocate food and water rations
- Issue seasickness tablets to survivors whether or not they feel seasick
- Maintain a watch for radio signals, aircraft or any vessels

Threats to Survival

Threats to survival after abandoning vessel may include:

1. Cold water shock
2. Hypothermia
3. Psychological response to disaster
4. Loss of will to live
5. Seasickness
6. Dehydration
7. Injuries
8. Starvation

Cold Water Shock

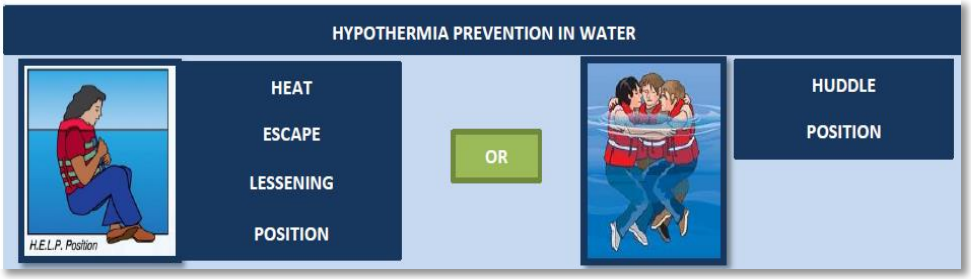
Cold shock response is perhaps the most common cause of death from immersion in very cold water. It can cause heart attack and inhalation of water from hyperventilation. Hypothermia will cause the body to cut off blood flow to “non-essential” muscles after about 10 minutes.

Hypothermia

Hypothermia is the condition of heat when the body’s core temperature is lowered to less than 35 degrees Celsius (normal body temperature is 37 degrees). This can develop with exposure to water temperatures below 10 degrees or after prolonged immersion in cold water of less than 20 degrees. It affects the brain, heart, and other internal organs.

Avoid or delay onset of hypothermia by:

- Wearing warm and protective clothing
- Conserve heat by remaining calm and minimal movement
- Adopt the ‘heat escape lessening position’ or ‘huddle’ in the water
- Huddle with others in a life raft



Psychological Response to Disaster

The reaction and response to a disaster differs from person to person. When people are under stress and packed together tightly their behaviour changes. If there appears to be a problem it must be corrected as soon as noticed. Special care should be taken in establishing a proper procedure for the normally private acts of urination and defecation.

One of the greatest problems for survivors is filling in time when not carrying out their dedicated duties. The manual *'Survival at Sea'* (copy in life raft) should be read by all survivors and can form a basis for discussion. Morale may be sustained by singing, by prayer, by discussions on the achievement of survival, by telling jokes, stories and so on. Do not assume that others feel exactly like you feel. Morale can, and often will, fluctuate from good to extremely low, and it is of utmost importance to support each other.

Loss of will to live

Extreme low morale with a defeatist attitude can be the catalyst for losing one's will to live. It is through a strong team spirit built up during training, which will come to your aid in times like this.

Seasickness

The motion of a life raft, together with stress makes almost everyone seasick. It is for this reason that seasickness tablets are included in the provisions of a life raft and should be taken by all as soon as possible. Symptoms include dizziness, nausea and vomiting that in turn can lead to dehydration.

Dehydration

Dehydration is a loss of water and body fluids. It can be mild, moderate or severe, based on how much of the body's fluids are lost and not replenished. When it is severe, dehydration is a life-threatening emergency. Infants, children, the elderly and people with illnesses have a higher risk of becoming dehydrated.

Injuries

All injuries and sickness need to be attended to as soon as possible, taking into account the remote situation and not knowing when professional medical assistance will be available. For this reason, the life raft has a first aid kit.

Starvation

The human body can go about three to eight days without water. However, remarkably, people have been known to live up to 70 days without food. So long as fresh water is available, the body adjusts to buy some valuable time.

Search and Rescue (SAR)

Introduction

Search and Rescue (SAR) comprises the search for and provision of aid to persons who are, or are believed to be in imminent danger of loss of life. It is necessary that the available resources are organised and coordinated so that effective and expeditious search and rescue operations can be assured.

The *National Search and Rescue Manual (NATSAR Manual)* is the standard reference document for use by all Australian search and rescue authorities and describes the agreed methods of coordination through which search and rescue operations are conducted within Australia.

Web link: http://natsar.amsa.gov.au/natsar-manual.asp

Overall management of SAR responsibilities by SAR authorities:

- Management of individual SAR incidents by SAR mission coordinators (SMCs)
- Direction of SAR activities at an incident by on-scene Coordinators (OSCs) specifically designated by the SMC

Emergency Phases

Emergency phases are based on the level of concern for the safety of persons, vessels or aircraft:

a) Uncertainty Phase – DOUBT
b) Alert Phase – APPREHENSION, or
c) Distress Phase – GRAVE or IMMINENT DANGER

Search Stages

Stage One	Stage Two	Stage Three
Immediate response. An initial visual and/ or electronic search along the missing craft's planned route	Nominated area either side of track. Normally a search conducted in an area 10 nautical miles either side of track but this can be varied depending on circumstances	Mathematically derived area. An expanded search of a probability area calculated using the navigational tolerances of the missing and search craft, allowing for drift if applicable and the application of a safety factor

Stage 1 and 2 searches can be run concurrently, that is, if a distress incident occurs at the end of daylight or during the night when the first visual search cannot be undertaken until the following day, then it may be appropriate to conduct both stages simultaneously.

Response to Incident Notification

The majority of maritime search and rescue incidents occur within 25 nm off the coast. MRNSW Search and Rescue Coordination Centres (SARCC) or Marine Radio Bases (MRB) must be ready to respond at all times in accordance with SRB requirements.

On receipt of a MAYDAY or PAN PAN call or a relay of such an incident or advice of such an incident:

- Your unit vessel may be tasked to proceed to a LKP (Last Known Position). The vessel class that is tasked will depend on the nature and location of the incident
- An Operational Plan Part A will be provided to inform the vessel Master of all relevant details of the incident. The Master will brief the crew prior to departure The Master will conduct an Operational Risk Assessment (ORA) to determine suitability of crew, weather status, and other factors to ensure the task can be performed as per SOPs and Policies.
- The Operational Plan Part B will be used to record operational activity during the SAR incident. Your will establish (if possible) contact with the DV (distressed vessel) to confirm location and advise ETA.
- The will provide continual updates (SITREPS) of the vessels location, condition and welfare of the crew sea and wind conditions including significant milestones according to SOP OP 18.
- Upon arrival at the incident scene. The RV at this point may be required to conduct a search of the area or provide assistance to the distressed vessel and its occupants.

Conducting a search of an area can be stressful and challenging. The crew will be required to maintain observation seaward for prolonged periods. A response to an incident usually results in taking a Distressed Vessel in tow. SOP OP 05 - Vessel Towing must be adhered to when providing this service.

After finalising the rescue operation, an After Action Review (Debrief) will be carried out. This is an opportunity for all members of the vessel and MRB / SARCC to discuss the process and outcomes of the incident.

The MRB / SARCC in consultation with the Regional Controller will dispatch the closest, appropriate MR vessels to respond to the incident. The crew then effectively runs through the steps in the Emergency Resource Management (ERM) process.

ERM	Emergency Resource Management (ERM) Process Overview
1	**Prepare** • Equipment – choose vessel and complete checklist • People – check crew sufficient, competent and fit for duty • Know SOPs – follow throughout incident
2	**Performance required** • Allocate roles / responsibilities • Crew need to know "technical rules" (applicable SOPs, maritime laws, standards, etc.) for vessel operations in the given situation
3	**Plan response strategy** • Complete Operational Risk Assessment (ORA) • Develop an Incident Plan • Conduct crew briefing • Communicate with team members using appropriate terminology, techniques • Consider personnel reactions and behaviours that may arise in stressful situations
4	**Situational awareness** • Keep gathering and processing information about the situation • Re-assess situation and make incident plan adjustments as developments occur on scene • Maintain situational awareness • Ensure workload and stress is managed
5	**Resolve the incident** • Liaise with 3rd parties as required (MAC, other services) • Provide first aid to causalities • Return to Wharf • Complete casualty handover as necessary • Finalise all documentation • Ensure equipment is recovered, cleaned and maintained to SOPs, manufacturer's instructions • Participate in the debriefing
6	**Continuous improvement** • Review the incident response • Analyse the sequence and outcomes of your crew's actions • What would you do differently next time? • Do you need to revise any SOPs, protocols, etc.?


MARINE RESCUE
NEW SOUTH WALES