

# Respond to Navigational Emergencies



This workbook is intended for Trainees seeking to attain competency as required by the NSW State Rescue Board Minimum Training Requirements for Marine Rescue Personnel (v 4 2005). It should be studied with reference to the accompanying text “The Bare Facts of Marine SAR” and the assessment documents provided by your chosen assessor.

## LOG BOOKS

Trainees should maintain a Log where practical activities and experience should be recorded and witnessed. When you feel confident ask your Trainer to arrange an assessment at your squad or other suitable location. Your assessor will provide feedback on your assessment.

*The Author acknowledges references to material published by ANTA, NATSAR Manual 2003. All content is supplied on the understanding that users exercise their own skill and care with respect to its use. Before relying on the material in any important matter users should carefully evaluate the completeness and relevance of the information for their purposes.*

*Ranger Hope © 2006*

<b>Respond to navigational emergencies</b>	
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## Introduction

The perils of the sea are reduced by good vessel management and by contingency planning.

The safe management of the vessel relies on the Master and his deputy, the duty, watchkeeper, who must be well rested and not impaired by fatigue. The watchkeeper must not be under the influence of alcohol or narcotics so as to maintain an efficient and competent watch.

Murphy's law of the sea ensures that anything that can go wrong will do so, and as a consequence will start the inevitable spiral to disaster unless halted by targeted and timely action. Seafarers who suffer a marine casualty are trained to minimise the dangers by the process of damage control.

The principles of Safety management encourage the development of contingency damage control plans that are practiced and honed by drills.

# **1. Take action prior to and during a navigational emergency**

## **Marine Casualty:**

***1.1 Navigational emergencies are recognised and appropriate action is taken in accordance with Australian and international regulations to avoid or minimise the emergency.***

### **Duties of a Master:**

Both SOLAS and the Commonwealth Navigation Act 1912 require the Master of a vessel to render all possible assistance to any persons from or on a vessel or aircraft that he/she has reason to believe are in need of assistance. State's and Territory's Acts have similar clauses. You must acknowledge and inform the distressed of your expected time of arrival to assist. However, you could be 200 miles away - too far to be of practical assistance - but as the only vessel that has picked up the distress signal you are required to maintain that contact, relay the message to those that can help, and continue to act as a relay station for as long as required.

The obligation to render all possible assistance is only lifted when the distressed advises you that your assistance is no longer required. A release may also be given by another vessel or search and rescue body that has taken charge and has the situation under control.

However, the primary duty of the Master remains to ensure that his vessel is safe for its passengers, crew and cargo, in survey and seaworthy. The crew and passengers are obliged by law to obey any reasonable direction of the Master, and he is required to provide:

- Provisions-*** sufficient for the passage.
- Manning-*** appropriate to the vessel and area of operation.
- Stability-*** not overloaded or poorly trimmed.
- Security-*** from all dangers with effective safety equipment.
- Assistance-*** to others in distress.

In all situations the Master must ensure that the decisions made are in the best interest of the vessel and all that sail in her. If the Master is responding to an emergency situation the priority is to ensure the safety of personnel onboard his/her vessel first, before assisting another.

The varied calls for assistance are often for one or more Marine Casualties, such as:

- Loss of rudder or propulsion.***
- Collision.***
- Fire on board.***
- Founder or rescue from a stricken vessel.***
- Grounding or rescue from wreck.***
- Man overboard, abandonment or lost at sea.***

Such incidents present their own unique hazards to stricken vessels, (as more fully described in Section 2 & 3). Planning for disasters will improve the chances of surviving it.

### **Musters and drills:**

A Master must ensure that musters and drills are carried out to enable you and your crew to confidently handle any emergency situation. An emergency muster station must be nominated for every person on board, and this information be displayed where it can be best seen and at the muster station. In planning drills a Master should consider:

- The relevance of drills to be conducted as they apply to your vessel.
- The time interval between each type of drill.
- The schedules which outline how each drill should be conducted.
- Emergency signals for muster stations and abandon vessel.
- The required Official Log Book/Record Book entries.
- Obligations for keeping crew lists.

When planning drills make best use of your most qualified and experienced crew. Use their expertise to focus on the specific needs of your vessel which will allow you to concentrate on procedures rather than technical knowledge. Drills must be meaningful to be effective and this means your crew must be enthusiastic. Pick a suitable time when they are not all tired at the end of a long day and make the drills short and relevant. Developing a spirit of teamwork and a general 'safety ethic' will make the practical aspect of the drill more rewarding for all.

***Service and maintenance of life rafts-*** All life rafts, whether inflatable or rigid, should be serviced by an approved service centre. It is a survey requirement that servicing be completed annually.

On board servicing requires checking the lashings are secure and the painter is tied to the vessel

## **Effective watchkeeping:**

***1.2 Radar, effective watch keeping and other available means are used to determine and minimise risk of collision with another vessel.***

### **International Regulations for Preventing Collision at Sea:**

***Lookout RULE 5*** - 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 other devices such as radar, binoculars and any other aids should be used to supplement the lookout's sight and hearing. The principal instructions in which radar plays a part are:

- Radar detection compared to visual sighting
- Radar lookout

- Radar and safe speed
- Proper use of radar
- Radar and risk of collision.

### **Radar Detection:**

**General definitions RULE 3** -The term “restricted visibility” means any condition in which visibility is restricted by fog, mist, falling snow, heavy rainstorms, sandstorms or any other similar causes. If there is any doubt at all about whether the visibility is restricted or not, consider it to be restricted.

Vessels shall be deemed to be in sight of one another only when one can be observed visually from the other. It does not apply to vessels detected by radar alone. Consider the case of a large tanker and a small fishing vessel. The fishing vessel will sight the tanker long before the tanker sights the fishing vessel. But, both vessels will be deemed to be in sight of one another at the moment the fishing vessel sights the tanker.

Using radar in clear weather provides practice in using radar when the visibility is poor. Masters have been found negligent in court for not keeping a proper lookout, because they were not using radar on clear nights, and subsequently collided with unlit objects. In regions where fogbanks, storms or unlit objects may be expected, the radar should at least be on standby by day, and in full operation at night.

Masters have been found to be negligent for allowing the radar to remain defective for long periods.

**Safe speed RULE 6** -Additionally, by vessels with operational radar:

- i) the characteristics, efficiency and limitations of the radar equipment;
- ii) any constraints imposed by the radar range scale in use;
- iii) the effect on radar detection of the sea state, weather and other sources of interference;
- iv) the possibility that small vessels, ice and other floating objects may not be detected by radar at an adequate range;
- v) the number, location and movement of vessels detected by radar;
- vi) the more exact assessment of the visibility that may be possible when radar is used to determine the range of vessels or other objects in the vicinity.

A safe speed has been defined, as a speed that a ship will be able to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions. This distance has been determined to be half the distance of the visibility, so that, theoretically at least, if all vessels travelled at this speed collisions between vessels would be eliminated. However, do not place a numerical value (for a specific range of visibility and stopping distance), on a safe speed, as so much will depend upon the circumstances of the particular situation.

Half the range of visibility might be too large a distance for a vessel with good stopping power travelling at 25 knots in visibility of about a mile. Even though the

vessel may well be able to stop in a distance of ½ mile or less, other factors must be taken into account (when determining a safe speed) such as, travelling at a high speed may not allow the watchkeeper sufficient time to assess the situation and take avoiding action, if a vessel is detected or sighted at short range.

Constraints on the radar range scale in use implies that on short ranges targets may not be detected at an early enough to avoid collision and if a long range scale is used, sea clutter may mask targets close to own vessel. Clause (v) the number, location and movement of other vessels detected by radar, may be the most significant of the many factors which should be considered when deciding on a safe speed. Weather conditions affecting the radar picture must also be taken into account, as well as any deficiency of the radar equipment itself.

The final point relates to the ability of the radar to demonstrate by more exact bearing and range information, that a more serious risk of collision may exist than may be apparent by eyesight alone. Also, the accurate range information obtained by the radar will allow the watchkeeper to determine the visibility and (a safe speed) far more accurately than by eyesight alone.

***Risk of Collision RULE 7*** - Proper use shall be made of radar equipment if fitted and operational, including long range-scanning to obtain early warning of risk of collision and radar plotting or equivalent systematic observation of detected objects.

Failure to use a long enough range scale has been a contributing cause in several collisions, often due to the radar been used solely on short range for navigational purposes rather than been switched intermittently to long range for use in it's anti-collision function.

Assumptions shall not be made on the basis of scanty information, especially scanty radar information.

***Radar Watchkeeping*** - The IMO has given the following guidelines for "Officers in Charge of a Navigational Watch", with regard to the proper use of radar.

- 1 The officer of the watch should use radar when appropriate and whenever restricted visibility is encountered or expected and at all times in congested waters having due regard to its limitations.
- 2 Whenever radar is in use, the officer of the watch should select an appropriate range scale, observe the display carefully and plot effectively.
- 3 The officer of the watch should ensure that range scales employed are changed at sufficiently frequent intervals so that echoes are detected as early as possible and that small or poor echoes do not escape attention.
- 4 The officer of the watch should ensure that plotting or systematic analysis is commenced in ample time, remembering that sufficient time can be made available by reducing speed if necessary.
- 5 In clear weather, whenever possible, the officer of the watch should carry out radar practise.

### ***Conduct of Vessels in Restricted Visibility RULE 19-***

a) This Rule applies to vessels not in sight of one another when navigating in or near an area of restricted visibility.

b) Every vessel shall proceed at a safe speed adopted to the prevailing circumstances and conditions of restricted visibility. A power-driven vessel shall have her engines ready for immediate manoeuvre.

c) Every vessel shall have due regard to the prevailing circumstances and conditions of restricted visibility when complying with the Rules of Section 1 of this part.

d) Every vessel which detects by radar alone the presence of another vessel shall determine if a close quarters situation is developing and/or risk of collision exists. If so, she shall take avoiding action in ample time, provided that when such action consists of an alteration of course, so far as possible the following shall be avoided:

i) an alteration of course. to port for a vessel forward of the beam, other than for a vessel being overtaken;

ii) an alteration of course towards a vessel abeam or abaft the beam.

e) Except where it has been determined that a risk of collision does not exist, every vessel which hears apparently forward of the beam the fog signal of another vessel, or which cannot avoid a close quarters situation with another vessel forward of her beam, shall reduce her speed to the minimum at which she can be kept on her course. She shall if necessary take all her way off and in any event navigate with extreme caution until danger of collision is over.

Restricted visibility is mostly associated with fog, these rules however, apply whenever visibility is reduced as a result of any similar condition, such as mist, heavy rain, sandstorm or smoke. But not darkness. It is important that these rules apply when operating in or near an area of restricted visibility, such as a tropical downpour or squall line. While you may not be in restricted visibility yourself the other vessel might be.

#### ***If your visibility is restricted you must-***

- Consider the fact that your visibility is reduced when determining a safe speed
- Maintain a proper lookout
- Display your navigation lights in daylight or darkness
- If you have radar or other aids use them to plot the movement of other vessels
- If the radar plot indicates that a close quarters situation is developing or the risk of collision exists, take early and substantial avoiding action
- If you change your course or speed to prevent a collision, make the alteration large enough to be obvious on the other vessels radar. A least a 60° alteration of course and a 50% reduction in speed
- Avoid a series of small alterations of course or speed as these will not be obvious to the other vessel
- If you detect a vessel forward of your beam avoid an alteration of course to port, except when overtaking another vessel

- If you detect a vessel abeam or abaft the beam, avoid turning toward the vessel if at all possible
- If you hear apparently forward of your beam the fog signal of another vessel, reduce your speed to the minimum to keep the vessel on her course, proceed with caution and be prepared to stop. Avoid helm action unless the direction of movement of the other vessel can be positively established
- Sound the proper fog signal.

### **Action to Avoid Collision RULE 8-**

a) Any action taken to avoid collision shall, if the circumstances of the case admit, be positive, made in ample time and with due regard to the observance of good seamanship

Any action should be taken as soon as it is determined that it is necessary. It could be said that ample time would not be less than half the range at which the target was detected.

b) Any alteration of course and/or speed to avoid collision shall, if the circumstances of the case admit, be large enough to be readily apparent to another vessel observing visually or by radar; a succession of small alterations of course and/or speed shall be avoided.

An alteration, made early, should be bold enough to appear rapidly and unmistakably on the other vessel's radar screen or plot. If it is less than 30° for a course alteration or 50% for a speed reduction it is unlikely to do so. Most shipmasters habitually alter course 60° to 70°.

Note: an increase in speed would not normally be an option, as you should already be travelling at a safe speed and an increase in speed would indicate that you would be travelling at an unsafe speed.

d) Action to avoid collision with another vessel shall be such as to result in passing at a safe distance. The effectiveness of the action shall be carefully checked until the other vessel is finally past and clear.

### **Emergency signals:**

***1.3 Where a navigational emergency is unavoidable, appropriate warnings are given to officers and crew and other vessels and persons who may be affected.***

Vessels use a dedicated signal to notify their passengers and crew of emergency. This may be practiced in drills and is commonly:

***Muster at the emergency station- 7 short and 1 prolonged horn blasts.***

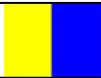
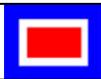
Additional signals may be used:

**Fire on board-** Continuous ringing of the fire bell.

**Abandon Ship-** 1 short and 1 prolonged blast repeated (3 times)

**Unsure of your intentions-** 5 short blasts

Where radio is not available the International Signals Code Book (Interco) provide for signalling by groups of letters in Morse code by lights or sound, or by code flags.

	<b>F - I am disabled, communicate with me.</b>
	<b>J - I am on fire with dangerous cargo.</b>
	<b>K - I wish to communicate with you.</b>
	<b>O - man overboard.</b>
	<b>U - you are standing into danger.</b>
	<b>V - I require assistance</b>
	<b>W - I require medical assistance.</b>

## **Safety procedures:**

**1.4 Where a navigational emergency has occurred, all possible action to minimise risk to officers, crew and other persons is taken in accordance with company procedures and international regulations.**

See section 3.3.

## **Person overboard:**

**1.5 In the event of 'man overboard', appropriate action is taken to manoeuvre the vessel and to deploy survival equipment.**

This is a situation where the person is seen going over the vessel's side. Person overboard situation should never occur if procedures are carried out correctly.

If a person does fall into the water

- yell out “man overboard” and on which side.
- swing the stern clear of the person overboard & select GPS MOB save.
- throw a lifebuoy or any other flotation device.
- maintain visual contact, point to the person in the water.

Make your chosen turn to recover, always take the propeller away from the person in the water. Approach the person from downwind, keeping the bow into the wind to this manoeuvring at slower speeds. Notify the crew of the pick up side of vessel. Warn other vessels in the vicinity of the situation ‘O’ flag.

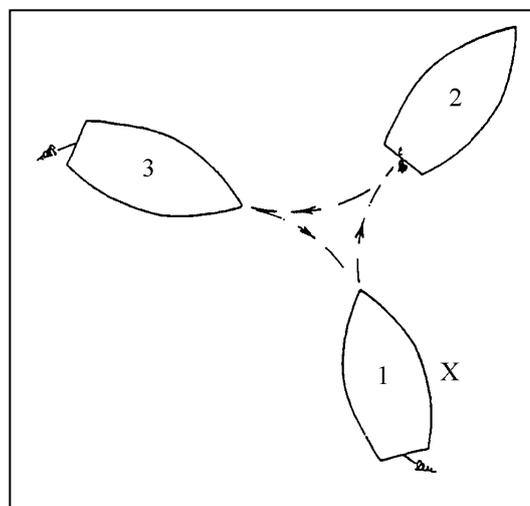
**Conscious-** using a rescue quoit and line, or nets over the side, boarding ladder.

**Unconscious-** consider using a lifeboat, ensure propeller is not operating with the person alongside. If operating in, northern waters during stinger season take extra precaution when recovering the person.

**Turns (to recover of a person overboard):**

The best turn is the quickest for the characteristics of the vessel and the situation.

**Small craft a ‘Y’ turn-** This turn involves turning the helm hard over (in the direction of side person went over). Then stopping the engine and then full astern (with helm still hard over in same direction then full ahead with helm still in same place) then slow and straighten near the person in water, then stop near person.

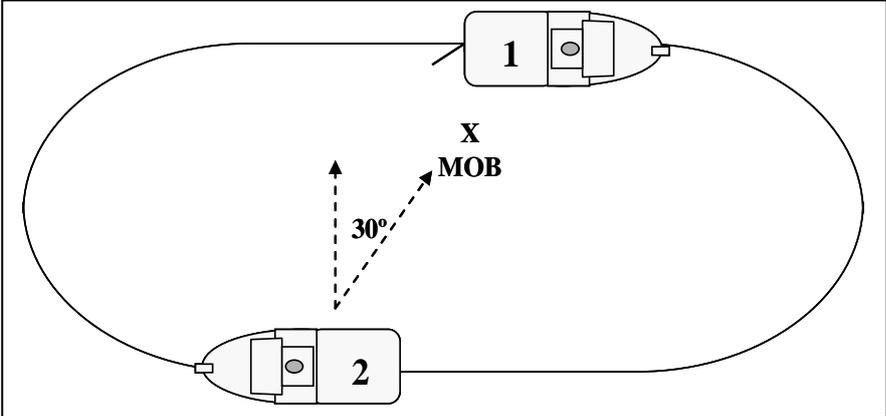


*Y turn.*

*(Drawing courtesy of Trust Publications)*

**The Elliptical (Double) Turn-** On notification that a person has fallen overboard, the helmsman should turn the wheel hard over in the direction to the side that the person fell overboard. At the same time the helmsman should note the compass course that they were on prior to the man overboard (position 1).

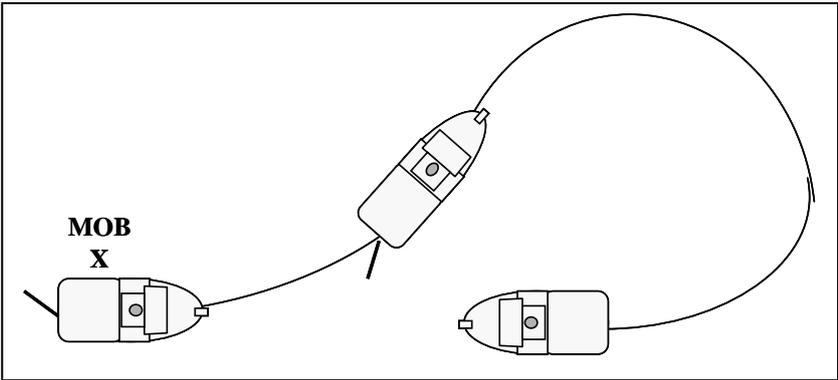
The wheel should be kept hard over until the vessel is on the reciprocal course (plus 180°) and then straightened up to follow this straight run until about 30° abaft the person in the water. The wheel should then be turned hard over in the same direction as before until back on the original course. An assessment should then be made as to how to retrieve the person, given the sea and wind conditions. On retrieval the vessel should be stopped and the propellers stopped as the person is brought onboard.



*Elliptical turn.*

**The Williamson’s Turn-** This is the most popular turn due to its ability to be used for most situations e.g. person overboard, person missing, large vessels, small vessels, rough or calm water. It is a turn, which takes the vessel back along its reciprocal track.

When notified that a person has fallen overboard, the helmsman should turn the wheel hard over in the direction to the side that the person fell overboard. At the same time they should note the compass course they were on prior to the man overboard.



*Williamson’s turn.*

The wheel should be kept hard over until the vessel is 70° off its original course. The wheel should then be put hard over in the opposite direction until the vessel is on its reciprocal course.

The vessel should then be straightened up to follow the reciprocal course, slow down to retrieve the person, given the sea and wind conditions. On retrieval, the vessel should be stopped and the propellers stopped as the person is brought onboard.

It should be noted that to turn away from the person in the water may be between 60° and 70° off the original course. To establish the figure for your vessel it will be necessary to practice man overboard situations.

### **Retrieving personnel from the water:**

When the person is sighted the Master must then consider the best method to bring the person onboard. This exercise could be as easy as stopping the vessel to let the person swim up to and climb aboard or launching a boat to pick the person up. If your vessel has a large freeboard it is definitely going to restrict your options when recovering a person from the water. Vessels with a small freeboard have more options.

***Vessels with small freeboard-*** If the person is conscious you could manoeuvre the vessel close to the person and then assist them aboard by helping them climb over the gunwale. If they are weak from the ordeal or unconscious it may be necessary to rig a rescue net or Jason's Cradle. Both these devices are lashed on the inboard side of the boat and the outer side is held away from the vessel side allowing the net or cradle to form a hammock in the water.

To get the person onboard, manoeuvre them into position, with their legs at the bow end of the vessel, going head first into the sagging net that is in the water. This allows the person to be positioned in the net, without an arm or leg being left out of it. Once in position you gently heave on the outer side of the net/cradle and the person will come inboard. It is essential to be extremely cautious while doing this as the person in the net may be injured as a result.

The above method is also extremely helpful when retrieving persons that are suffering from hypothermia as in this fashion all parts of the body clear the water at the same time and "Hydrostatic Squeeze" is eased off the body simultaneously. If a person suffering from hypothermia is lifted out of the water vertically the loss of the "Hydrostatic Squeeze" and the effect of gravity would cause the blood to rush to the legs causing a loss in blood pressure and collapse or further complications for the casualty. See your Module on "Occupational Health and Safety" for further information.

***Vessels with large freeboard-*** large vessels should rig guest warps at their waterline from bow to quarter (allowing survivors to clutch on) and approach so as to create a lee for those in the water. It may need to launch its lifeboat or rescue boat to facilitate the rescue. If a boat has to be launched manoeuvre the mother vessel to create a lee for the launch and rescue. Always be aware that your vessel will drift rapidly towards a person in the water if you stop manoeuvring, due to the vessel's greater windage than a body in the water.

To calm the sea, oil may be spilt on the windward side of the person in the water so that it drifts down to them as the rescue boat approaches so as to make it easier to pick the person up. To get the person into the boat from the water, a rescue net or Jason's Cradle may be used.

If launching of your vessel's boat is not an option, a scrambling net could be draped over the vessels side dangling in the water, to enable the persons in the water to climb up. It may also be possible to use a vessel's crane or boom with a cargo net attached to it. Once this is dangled in the water the survivors can climb onto it and be hoisted out of the water.



*Getting him aboard will not happen unless a retrieval method is rigged.  
(Photo courtesy of net)*

### **Rescuing persons from a vessel in distress or from a wreck:**

When a vessel is sinking liferafts/boats are not always for abandoning the vessel. Passengers and crew should therefore stay aboard the stricken vessel (if possible) until a rescue vessel arrives and sends boats across to the disabled vessel.

In calm weather it may be possible to go alongside. However, this would be rare as even in calm seas the swell could cause the two vessels to come heavily together. Damaging the vessels and possibly risking the lives of those being transferred. It would usually be better to lower a boat and transfer the personnel.

If the sea is rough the rescue vessel should launch a rescue boat from a position slightly upwind of the stricken vessel. It would assist the operation if both vessels distribute oil to help calm the seas. A disabled vessel would usually lie beam on to the wind and in some circumstances it would be advantageous, (providing that the seas are not too big), to launch the rescue boat from her lee side while lying stopped in the water to windward of the disabled vessel.

In other circumstances the best method may be to launch while slowly motoring ahead with the wind about 2 points on the bow. This would create a lee for the rescue boat without the danger of excessive rolling.

The rescue vessel should give as much lee as possible to the boat as it makes its way across to the stricken vessel and then position itself to leeward so as the boat can make the return journey downwind.

In extreme conditions it maybe too dangerous to use boats and the most effective method to transfer the personnel is to haul a liferaft between the two vessels. A line can be passed to the other vessel by using a rocket line or if not available. With the rescue vessel positioned upwind a liferaft can be released and the wind will take it rapidly down to the disabled vessel. The line attached to the liferaft should be strong enough so that the raft can be hauled back fully loaded. The life raft can then be hauled from one vessel to the other by a strong rope.

### **Person missing:**

#### **Search area descriptions:**

Search patterns and the boundaries of search areas are usually described by:

- Geographical Coordinates.
- Universal Grid Reference.
- Track Line.
- Landmarks.

When a person is reported missing at sea the Master may decide to search the vessel before turning back.

The problem with this situation is that the time period for the person in the water can only be estimated. You may have to take into account the vessel's leeway but drift should be similar for both vessel and person. At night use searchlights and have people listening for cries of help (engines be slowed/stopped periodically for this purpose).

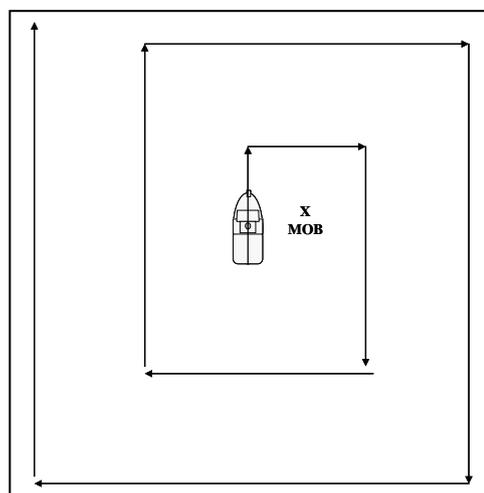
#### **Searching for a person overboard:**

If the casualty is not located immediately a search should be initiated without delay.

Notify the Rescue Authorities, put out a **Pan Pan** message on the VHF and MF radio and display the Man Overboard flag (to notify other vessels that may be in the area). A search datum should be established taking into account the most probable position of the casualty, time elapsed, drift and subsequent information.

#### **Search patterns:**

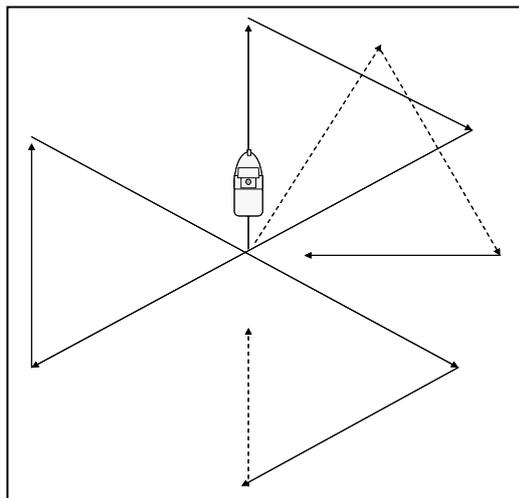
##### ***Expanding square system - one vessel-***



This system starts at the datum point established earlier. The diagram shows the pattern, distance between the tracks will depend on height of lookout and weather conditions but should be such that each sweep should double up on detection.

**Sector searching - one vessel:**

If the incident position was noted and the conditions indicate that the person may not have drifted far from that particular point, the sector search pattern may be used. Remember with this pattern, all changes in course are 120° to starboard.

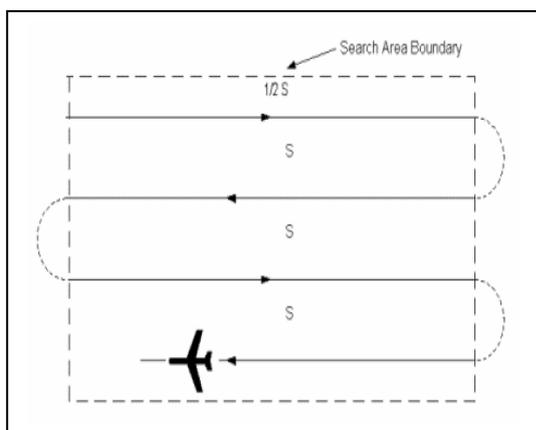


If the person has not been detected on completion of the first search adjust the original line by 30° and recommence the search pattern. Distance for each leg will vary for types of vessels but may be 1-2 nautical miles.

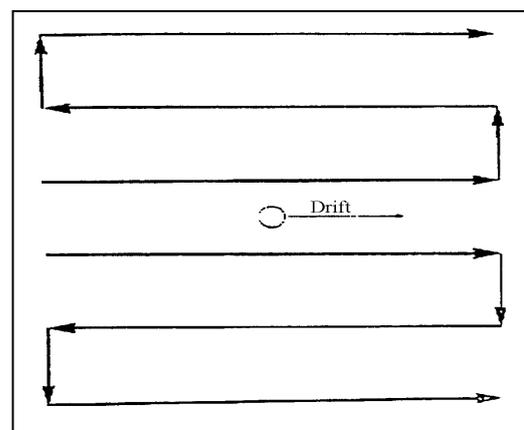
**Parallel track search:**

Parallel Track Patterns are normally used when;

- The search area is large and the terrain is level e.g. Maritime Areas.
- Uniform Coverage is required.
- The location of the target is not known with any precision.



*A parallel search for one craft.*



*A parallel search for two ships.*

Search legs are aligned parallel to the major or minor axis of the individual search area. The pattern is best used in rectangular or square areas.

***A parallel search for two ships-*** A parallel search for two ships, the search vessels proceed from one corner of the search area maintaining parallel tracks. The first is at a distance of one-half the track spacing from the side of the area. Successive tracks are maintained parallel to each other and one track spacing apart.

***A parallel search for two or more ships-***The OSC on the command ship coordinates the convoy of ships, spreading them abreast of him by “radar distance off” to maintain sweep widths appropriate to the individuals observing platform. Covering a combined track width, the convoy now steams to a point of course change for the next track leg. The OSC signals each vessel of their moment to change course in order to reform the convoy on the new heading at the same track spacing.

## **Briefings:**

### ***1.6 Directions are given to officers and crew to manage and control the emergency.***

From the crew’s point of view, they are ordered to carry out the Master’s brief and have to suffer the action and grief of any inadequacy. Musters and drills will hopefully promote an organised response, however cross flow of information will ensure that the briefing expectations are achievable and the crew remains committed.

- Are they comfortable with the plan, or is too much being asked of them?
- Are they familiar with the communication practice and equipment?
- Are they confident that the equipment is up to the proposed task?
- Does each of the participants understand their role as set out in the briefing?

Chain of command may also need to be reviewed with regard to the specific nature of the emergency and the capability or survival of the officers and crew.

- Effectiveness of communications maintained throughout damage situation.
- Manning levels are adequate for the damage control tasks.
- Abandonment of ship is timely, if required.
- Interaction with a SAR authority is sought.

See the accompanying workbook, “Briefing and De-briefing”.

## **Stabilizing the situation:**

### ***1.7 Appropriate action is taken to stabilise the emergency situation.***

These matters are considered fully in Elements 2-5 detailing damage control scenarios.

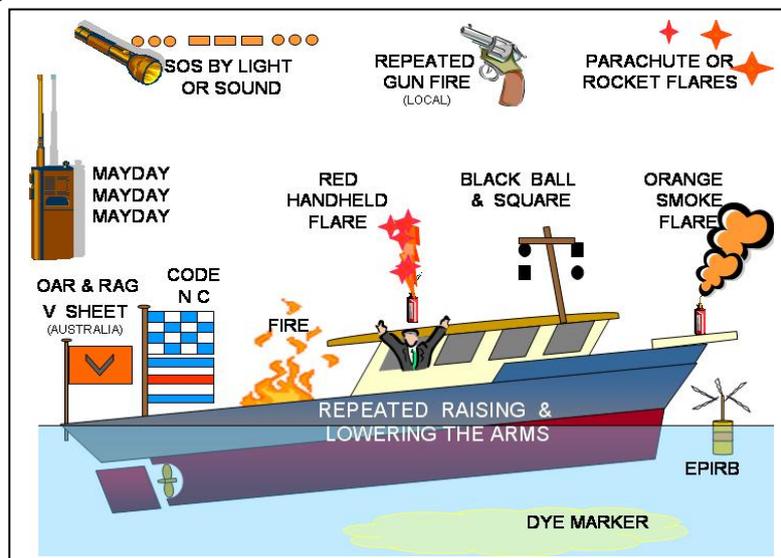
## Distress signals:

**1.8 Distress signals or calls for assistance are made if required in accordance with Australian and international regulations and conventions.**

Radiotelephony priority calls are the most commonly used method of raising a general alarm; the progressive levels described as distress (MAYDAY), urgency (PAN PAN) and safety (SECURITE). Advances in radio technology has greatly enhanced the capability to alert for assistance and is considered separately in element two, “Establish and maintain radio-communications”.

### **International Distress signals:**

The International Regulations for Preventing Collision at Sea identifies distress is a situation of grave and imminent danger to a vessel or her occupants. A variety signalling methods, used singly or in combination, are approved for vessels and aircraft that oblige a Master to assist another in distress. False or deceptive distress signals are illegal.



*International distress signals.*

### **Distress messages:**

The position, direction and distance may be properly described in Latitude and Longitude, true bearings and nautical miles by seafarers, but can be more casually indicated by land based observers. If in doubt, rescuers must investigate further, but are ultimately obliged to respond.

### **Priority Calls:**

Radiotelephony priority calls are the most commonly used method of raising a general alarm; the progressive levels described by as distress (MAYDAY), urgency (PAN PAN) and safety (SECURITE).

**Marine Radio Alarm Signal-** With the full implementation of the GMDSS the automatic 2182 kHz alarm devices are no longer required. However, some maritime communications stations may still use the distinct warbling sound voice alarm signal

to draw attention to a distress broadcast. Merchant shipping complying with the SOLAS now guard the Digital Selective Calling (DSC) distress frequencies.

**RTF Distress Signal-** The distress signal is used to indicate that a craft or person is threatened by grave and imminent danger and requires immediate assistance. It has precedence over all other communications. The distress message is preceded by the word MAYDAY spoken three times.

**RTF Urgency Signal-** The urgency signal is used to indicate that the calling station has a very urgent message to transmit covering the safety of a ship, aircraft or person. It has precedence over all other communications, except distress traffic. The urgency message is preceded by the words 'PAN PAN' spoken three times.

**Safety Signal-** The safety signal indicates that the station is about to transmit a message concerning the safety of navigation or providing an important meteorological warning. The safety message is preceded by the word 'SECURITE' spoken three times. All stations hearing either the urgency or safety signals shall not make any transmissions that might interfere with those signals.

#### **Radiotelephony Distress/Emergency Frequencies:**

The following frequencies have been designated for distress or emergency:

**2182 kHz-** The international MF voice distress frequency primarily for ship-to-ship communications. It is used for follow-on communications after an initial DSC distress alert on 2187.5 kHz for GMDSS shipping.

In Australia 2182 kHz is monitored by a number of Limited Coast Radio Stations operated by Volunteer Marine Groups. The two-tone alarm may still be used on 2182 kHz to draw attention but auto alarms are no longer a Radio Regulation.

**4125, 6215, 8291, 12290 and 16420 kHz-** These frequencies have been authorised for common use by ships and Coast Stations using the HF frequencies for single sideband radiotelephony on a simplex basis for calling, reply and safety purposes.

**121.5 MHz-** The international aeronautical emergency frequency for aircraft and those aeronautical stations primarily concerned with the safety and regularity of flight and having equipment in the 118-136 MHz VHF band. Ships fitted with the capability are authorised to communicate on this frequency with aircraft for safety purposes.

**156.8 MHz (Marine VHF Channel 16)-** The international distress, safety and calling frequency for the Marine VHF bands. State and Territory Limited Coast radio stations, port authorities, merchant ships, fishing craft and pleasure craft use VHF Ch 16. Merchant ships maintain a continuous bridge listening watch on VHF channel 16 to the maximum extent practicable when at sea (review by IMO 2005).

**156.3 MHz-** (Marine VHF Channel 6) is the secondary distress and safety frequency in the VHF band and is used for coordination at the scene of an incident.

**243MHz-** 243 MHz is the international military aeronautical emergency frequency.

## GMDSS Distress/Emergency Frequencies:

Radio Telephone	DSC	NBDP (TELEX)
2182	2187.5	2174.5
4125	4207.5	4177.5
6215	6312.0	6268.0
8291	8414.5	8376.5
12 290	12 577.0	12 520.0
16 420	16 804.5	16 695.0

The AMSA HF DSC network monitors DSC in the 4 – 16 MHz bands.

Ships operating under GMDSS requirements in the Australian SRR can be expected to monitor MF DSC, VHF radiotelephone (Channels 6, 13, 16 and 67) and VHF DSC (Channel 70).

### Radar/IFF/SSR:

Besides the obvious radar target of the distressed craft itself, IFF (Identification Friend or Foe) may be used not only to indicate distress but also to increase the detectable range by radar. The basic equipment consists of an interrogator and a transponder.

Secondary Surveillance Radar (SSR) is the name used to describe similar equipment in use by Airservices Australia and civil aircraft.

### Radio and Distress Beacons:

In addition to the obvious uses of standard radio for transmitting emergency signals and messages, there are a variety of types of emergency equipment designed for use by survivors. These include:

- Hand held VHF transmitters found in life rafts.
- 406 MHz distress beacons (GMDSS approved).
- Inmarsat E (L-Band) EPIRBS (GMDSS approved).
- 121.5 MHz distress beacons.
- 9 GHz SAR Transponders.

### Radar SAR Transponder (SART) Overview:

The SAR transponder (SART) developed which will respond to the normal 3cm X-band radar fitted to merchant ships. It will NOT respond to 10cm S-band radar. It is a short-range homing device, which enables ships and other suitably equipped craft to home on the source of the signal.

Tests have shown that the operation of a SART inside the canopy of a liferaft will significantly decrease its detection range, so every effort should be made to operate it from outside the canopy and as high as possible.

### Termination of a distress call and message:

When a distress is resolved the termination must be generally broadcast.



## **Written Activity- Take action prior to and during a navigational emergency**

Describe to your assessor or write a short answer, using diagrams if required, to the following questions.

### **Question No.1**

Describe what is meant by musters and drills.

### **Question No.2**

What collision regulation rules apply to use of radar?

### **Question No.3**

List five International code single letter signals.

### **Question No.4**

What is Rule 5.

### **Question No.5**

What is the best method to turn a vessel to recover a MOB?

### **Question No.6**

List the elements of a masters brief to the crew when organising a search for a person lost overboard?

### **Question No.7**

How is the probable position is found from the LKP (allow for wind and current)?

### **Question No.8**

What is the relationship of coverage factor to sweep width and track spacing?

### **Question No.9**

How would you navigate an expanding square search?

### **Question No.10**

When can a sector search be most effective?

### **Question No.11**

List twelve distress signals.



### **Practical Activity- Take action prior to and during a navigational emergency**

Your Skipper will provide as many opportunities as possible to practice the previous skills during simulated rescue operations or “on the job training”. Practice activities for this element of competency include:

- Engage in a fire and survival drill.
- Practice MOB drill.
- Determining simulated rescue locations from task information.
- Devising a simulated search plan with LKP and probable position after delay.

Discuss as a team. Read the accompanying workbook, “Bare Facts of Marine SAR.” Remember to complete your log book.

## **2. Perform damage control measures after a navigational emergency**

### **Musters:**

**2.1 Shipboard equipment and areas are shut down and isolated in accordance with the nature and extent of the emergency, company procedures and limits of responsibility.**

Refer to section 2.6, 3.1 and 4.1.

**2.2 On-board personnel are mustered in accordance with company procedures relevant to the identified emergency.**

Refer to section 1.1 and 1.4.

**2.3 On-board personnel and external agencies are notified of the navigational emergency and action being taken.**

Refer to section 2.6, 3.1 and 4.1.

### **Damage control:**

**2.4 Emergency equipment and damage control materials are prepared in accordance with the nature and extent of the threat or danger.**

**2.5 Nature and extent of damage to vessel is assessed and an appropriate damage control strategy is devised using available equipment, materials and personnel.**

**2.6 Directions are given to officers and crew on action to be taken to manage and control damage to the vessel**

Seafarers who suffer a marine casualty are trained to minimise the dangers by the process of damage control. Murphy's law of the sea ensures that anything that can go wrong will do so, and as a consequence will start an inevitable spiral to disaster unless halted by targeted and timely action. The principle of Safety management should have encouraged the development of preparatory damage control plans, practiced and honed by drills. The damage control will be also a priority in the planning of the rescuers and may be simplified as a process to FIRM up the deteriorating situation.

F	find the problem.
I	inspect and isolate the fault.
R	report, repair or remove to safety.
M	monitor for effectiveness of actions.

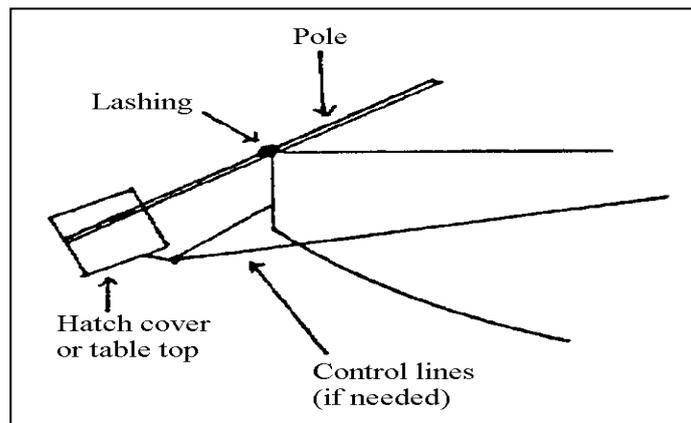
Techniques specific to rescue situations has been described in the accompanying workbook "Participate in a marine rescue operation", but an appreciation of the common techniques of damage control will be helpful for the rescuer to understand the nature of the problem and what has already been done.

### **Loss of Rudder or Propulsion:**

If the rudder loss is on a twin screw vessel then the problem is less. Use can be made of the revolutions of each engine to control the direction of the vessel. But if the rudder has been lost there is a high possibility of water ingress from the rudder post area. Check the bilges, inspect and isolate any damage. Secure watertight doors.

If rudder is in place but damaged, use rope across the trailing edge to secure it in amidships position. Some rudders will have an access hole for lifting gear. This could be used to hold shackles and enable the rudder to be tied off. When secured to the centre of the transom, this arrangement will keep the vessel moving in a straight direction.

An alternate method for small vessels may be to rig a jury rudder as illustrated below.

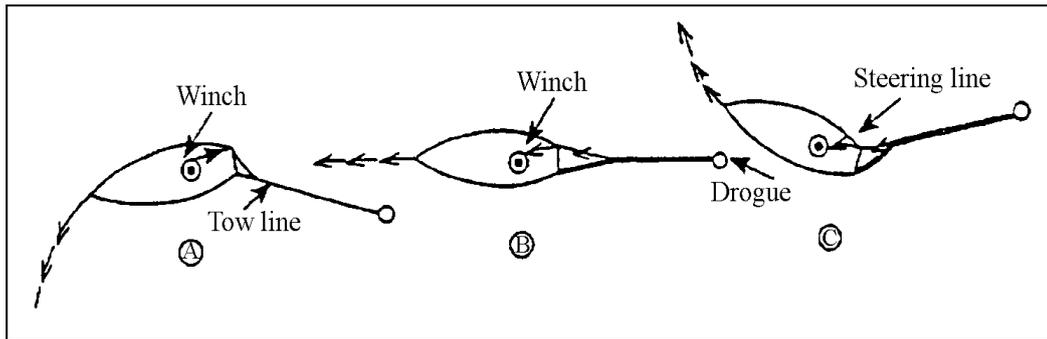


*Using a jury rudder.*  
(Drawing courtesy of Trust Publications)

In larger vessels the force on the lashing and the effort required to move the jury tiller will be too great. An alternative control method can be achieved by towing an object such as a fish basket or bundle of nets.

It will be necessary to attach the line (with the drag attached) to one quarter of the vessel and a lighter line made fast to the other quarter. Alteration of tension on the light line will cause a change in direction of the vessel. One person can achieve operation of the twin gear if a drum is mounted with the running part of the tackle from the two units being wound in opposite direction around the operating drum.

Be aware of the consequences of astern propulsion while using emergency steering. The action of the water being drawn across the blade will place more load on the operating lines and could cause the lines to be pulled through the hands.



*Using a drogue and tackles as emergency steering.*

*(Drawing courtesy of Trust Publications)*

### **Steering loss damage control plan-**

- stop engine and secure ignition if divers to go down.
- muster crew, anchor or sea anchor, display Not Under Command.
- check cause of failure.
- fit emergency tiller or operating tackle and tie off.
- disengage failed steering linkages, secure from fouling the emergency gear.
- rig the jury gear so you have a clear view from the steering position.

### **Loss of propulsion:**

Has the propeller been lost? Has shaft broken? Is there any water ingress through stern tube? Catastrophic damage to shafting is rare, but it does happen. As with loss of steering, immediate checks for watertight integrity are required as are strategies to avoid collision and grounding due to lack of control.

### **Propeller fouled or damaged:**

A fouled propeller can usually be cleared. The course of action will depend on the type and severity of the fouling. On rare occasions it may be cleared by going astern for a short period but usually a line or net entwined around the propeller or its shaft must be cut free by a diver. Heavy fouling such as wire rope or chain may call for a more detailed operation which could include ballasting or shifting weights to raise the aft end of the vessel to enable work to be carried out and the use of cutting equipment to remove the fouling.

A damaged propeller may be caused by striking an object in the water, other equipment failure or partial grounding. Problems associated with a damaged propeller can usually be detected by noise or vibration through the vessel. If you feel a thump and vibration commences there is a good chance that you have struck something and damage has occurred in the propeller region. If the vibration occurs and there is noise from the aft end of the vessel it could be the propeller loose, fouled or even rudder damage causing interference with the propeller.

After the obstruction has been cleared and people are out of the water and clear, bar the propeller for at least one complete revolution and feel for any drag prior to starting the engine and engaging the transmission. Then start the engine and check for any unusual noises or vibration in the propulsion system. Power on gradually and

monitor area for any vibration, heat, noise and or leaks through the stern gland. It could be possible that the aft bearing or propeller may have sustained damage.

***Propulsion loss damage control plan-***

- stop engine and secure ignition if divers to go down.
- muster crew, anchor or sea anchor, display Not Under Command.
- check watertight integrity of the vessel.
- check cause of failure using a lookout observer at all times.
- ensure all are back aboard.
- start up and monitor for smooth running.

**Collision:**

Every vessel which is directed to keep out of the way of another vessel must take early and substantial action to keep well clear (Rule 16). The other vessel is initially required to keep her course and speed but may take action to avoid collision if it becomes apparent that the other vessel is failing to keep out of the way. The stand-on vessel must take action so as to best avoid collision when collision cannot be avoided by the give-way vessel alone. The “wake-up” signal of at least 5 short rapid blasts on the whistle must be used in such circumstances and this may be supplemented by a light signal of at least five short and rapid flashes.

***Collision Imminent-*** If collision is unavoidable the first duty of the Master is to prevent loss of life or injury. Muster stations should be called and preparations taken to abandon the vessel if necessary.

If in anchoring depth the anchor should be let go when a collision is imminent. The anchors may be lost but that is a better option than a collision. Use of the anchor may well result in a collision being averted or cause a beneficial sheer away from the danger, resulting in a glancing blow. In confined waters it may be preferable to run the vessel aground, by driving the vessel head-on ashore to minimise damage to sensitive parts of the vessel. If collision is unavoidable damage can be reduced by:

- taking speed off the vessel by going full astern.
- turning the vessel to cause a glancing blow rather than direct contact.

A bow to bow situation or bow to quarter situation will be far less damaging than the bow striking the other vessel amidships or in the region of the engine room resulting in serious and disastrous flooding.

***Legal Requirements-*** In the event of a collision the Master, or person in charge, is required, provided there is no danger to their own vessel, crew and passengers to render assistance to the other vessel and persons aboard to save them from danger, and to stay close by the other vessel until no further assistance is required. The Master, or person in charge, shall also:

- exchange names of vessels, ports of registry, departure, and destination.
- enter a witnessed statement in the Official Logbook.
- notify the authorities at the earliest opportunity but within 48 hours of the incident occurring.

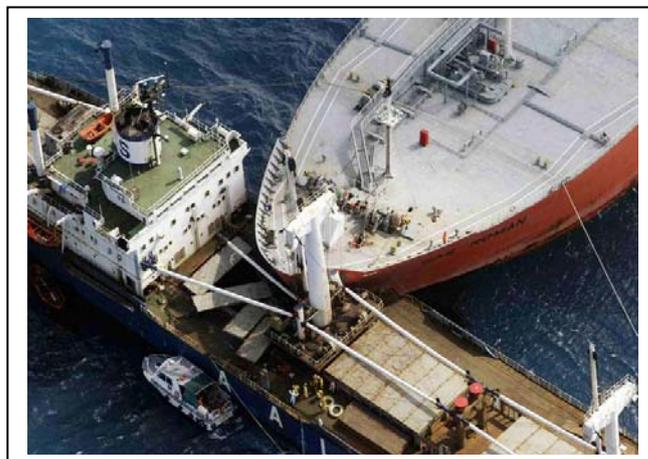
### ***Post collision damage control-***

- stop vessel, sound emergency stations alarm, head count and injuries check.
- transmit distress or urgency signal (if necessary).
- determine the extent of damage.
- inspect bilges, sound tanks, look for fuel spills in water around the vessel.
- repair the lost watertight integrity, and monitor repairs (see founder section).
- prepare to abandon ship (if situation deteriorates).

### ***With Situation Controlled-***

- contact the other vessel and give whatever assistance is necessary.
- show the appropriate signals and undertake necessary repairs.
- undertake an on-board inquiry and detail information.

If the vessel looks like foundering then consider 'beaching'. If the collision has resulted in the vessel piercing the other and becoming wedged, refrain from going astern immediately as this may result in sinking. If abandonment of either vessel is essential, transfer while wedged, may be easier than by doing so via the water.



*Lash vessels together to lessen water ingress*

### **Fire:**

- |   |                             |
|---|-----------------------------|
| F | find the problem.           |
| I | inspect and isolate.        |
| R | report or remove to safety. |
| E | extinguish.                 |

A vessel on fire may be able to position herself so that the spread of smoke and flame is away from the heart of the vessel. A close approach will be needed to pick up survivors and decisive action can quell a small fire. Approaching the vessel into the wind removes the risk of a Rescue Vessel drifting onto the fire, but exposes it to radiant heat, smoke and cinders.



*Positioning stricken vessel to lessen the spread of fire.*

The RV's fire pump will be most useful as misting to cool personnel from radiant heat; the deck hose for boundary cooling and extinguishing cinders that drop aboard. Approaching the vessel with the wind risks the RV drifting onto the fire, but reduces radiant heat, smoke and cinders. With the wind behind, the fire hose will have more range to attack the fire. The deck hose may be needed to pump out the bilges of the vessel being filled with water.

After an explosion or fire a vessel may be salvaged. If the damage is in the superstructure or accommodation block only, it is likely that the engine is serviceable and can make its own way back to port. If the steering gear is damaged set up the emergency steering gear or use a jury rudder. If the hull is damaged and water is flooding the vessel consider the following:

- if the vessel is bilged the holed compartment should be isolated by closing watertight doors or openings and the section pumped out. If the pump cannot contain the flooding other means may be needed to reduce the ingress of water.
- try to reduce the ingress of water by blocking the hole in the hull using anything handy.
- listing the vessel, especially if the damage is near the waterline, will reduce the flow of water into the vessel. This can be achieved by moving weights or ballasting.

Most likely, after a major machinery fire the vessel will require a tow to the nearest port. Depending on the extent of the damage passengers may need to be transferred to another vessel.

## **2.7 Records are maintained of damage control measures taken during the emergency and their outcomes**

It is a requirement that all distress radio traffic is logged. As a legal document the logs must be factual (not contain opinion, observations or course language), the date, time, details and author must be identified. If an error is made it must not be erased, but crossed out and initialled. As tempting as it may be to include a humorous comment, this may not be appropriate if the document is later read out in court and may lead to unintended consequences for the squad or the author. Additional scribble notes during incidents must be stored with the logs.

**SARcc log-** This will record date, time and detail of all communications in and out at the SARcc (radio, phone, fax, email, persons in and out). An SRB incident report form should be forwarded to the NSW Police Marine Command as soon as is practical after the conclusion of a rescue.

### **Radio traffic logs-**

- The date and time.
- Traffic in or out.
- Names of persons or vessel assisted.
- Frequency used.
- Detail of the message.
- Any supporting notes.
- The difficulties encountered and their resolution.
- The names recording officer and signatures.



## Written Activity- Perform damage control measures after a navigational emergency

Describe to your assessor or write a short answer, using diagrams if required, to the following questions.

### **Question No.1**

Life buoys with buoyant line and light must:

- be stowed in a life boat or life raft.
- be stowed in the bridge and permanently secured to the vessel.
- not be permanently secured to the vessel in any way.
- be stowed on the main deck secured to the gang way or gang plank.

### **Question No.2**

Routine maintenance of portable fire extinguishers should include a check of the:

- shell thickness.
- makers name.
- metal maintenance tag.
- approval number.

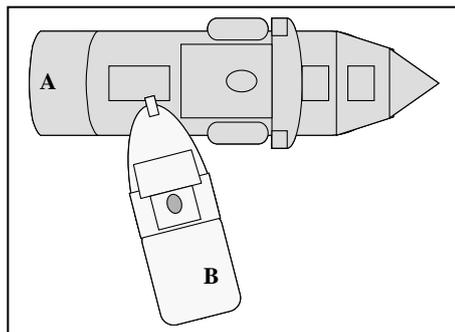
### **Question No 3**

Your vessel has developed a severe list so you decide to throw surplus deck gear overboard. By law, the only time you can jettison material is if:

- it is putting your vessel or crew in danger.
- it will sink.
- it is slowing your vessels progress.
- it is no longer required for the safe operation of the vessel.

### **Question No.4**

In the diagram below Vessel B has pierced the hull of Vessel A and it is clear that the engine room and two other compartments are going to flood. Discuss as Master of Vessel B, what action you will take?



**Question No.5**

Your 12 metre single screw vessel has suffered a fractured rudder stock. Describe how you could achieve basic steering control for a slow speed return to harbour.

**Question No.6**

List the legal requirements when involved in a collision?

**Question No.7**

Freeing ports should be blocked in heavy weather to prevent water from flooding the decks.

TRUE FALSE

**Question No.8**

Describe the usual symptoms of a propeller fouled by rope or wire. What measures can be taken to clear the propeller?

**Question No.9**

Whilst at sea in your 10 metre 2C rescue vessel, with 10 passengers onboard, you see smoke curling up from the engine room hatch. Describe your actions.



**Practical Activity- Perform damage control measures after a navigational emergency**

Your Skipper will provide as many opportunities as possible to practice the previous skills during simulated rescue operations or “on the job training”. Practice activities for this element of competency include:

- Studying Squad SOP's and Emergency Safety Management plans.
- Audit of emergency equipment.
- Practice of emergency procedures.

Discuss as a team. Read the accompanying workbook, “Bare Facts of Marine SAR.” Remember to complete your log book.

## **3. Manage the abandonment of the vessel**

### **The Operational plan**

**3.1** *Where it is assessed that the emergency is a serious risk to on-board personnel, correct procedures are initiated to abandon the vessel.*

See section 3.3

**3.2** *On-board personnel are mustered in accordance with company procedures and international regulations and are given the required directions and instructions as per practiced drills.*

See section 3.3

**3.3** *Preparation and deployment of survival equipment by officers and crew is correctly coordinated.*

#### **Launching a life raft:**

- 1** Remove any fittings or railings from the side of the vessel.
- 2** Check that the painter is made fast to a strong point.
- 3** Remove lashings—or manually activate on the hydrostatic release unit.
- 4** Ensure that all is clear over the side. In other words, check that there is:
  - no survivor in the water
  - no debris floating in the water which can damage the raft
  - no machinery space discharge or projections from the vessel.
- 5** Throw the life raft overboard.
- 6** Pull the remaining painter and give it a hard tug if required to activate the gas bottles.

The raft should inflate in about 20 to 30 seconds. Once the life raft is inflated, pull the raft alongside the vessel for boarding. If you hear air escaping from the liferaft (a hissing noise) after the raft has inflated then ignore it. The cylinder has extra gas and the noise is the over pressure relief valves venting off.

***Jumping into the water-*** Jumping into the water should be avoided.

What if you need to jump into the water? The survivors should jump from the lowest point and then swim to the survival craft. Before jumping, ensure that life jackets are correctly put on. Survivors with loose or wrongly put on life jackets can break their necks!

While jumping into the water, make sure the following is observed:

- Keep elbows to the sides.
- Cover nose and mouth with one hand.
- Hold the life jacket downward and close to chest with the other hand.

- Keep legs stretched out straight.
- Never jump head first into water.
- Jump with legs first.
- Jump close to the life raft or other survival craft.
- Persons scared of heights should look straight at eye level while jumping.

### ***How to board a life raft-***

- 1 Before boarding a life raft, ensure that no one:
  - has any sharp objects
  - is wearing hard-soled shoes which can damage the life raft.
- 2 Check that everyone has put on his or her life jackets properly.
- 3 Bring the life raft alongside the vessel.
- 4 Board directly from the sinking vessel wherever possible. This avoids getting wet. Use the embarkation ladder from the sinking vessel if fitted.

You can board the life raft by jumping onto it, but avoid doing that. Jump into the life raft only when the raft is empty or if there are only a few people in it. Be careful when you jump not to injure those already in the life raft.

The life raft can be boarded from the water but this should be avoided. If the life raft cannot be brought alongside the vessel, it should be brought close to the vessel and survivors should enter the water at the lowest level and swim across to the life raft. A fire hose, rope or ladder can be used.

- 5 Once everyone has boarded the life raft:
  - cut the painter as far away from the raft as possible
  - retrieve the balance of the line inboard for later use.

A knife is provided for that purpose close to the painter attachment point on the life raft. The position of knife and painter attachment point is clearly marked on the life raft by writing and picture.



*Getting into the raft from the water*



*Survivors being picked up*

If survivors are seen in the water, the survival craft should be moved towards them.

If this cannot be done:

- the rescue quoit should be thrown towards them or
- a swimmer, wearing life jacket and carrying a rescue quoit, should be sent towards the survivor.

The volunteer swimmer should wear the rescue quoit in the arm, rather than holding it in his or her fingers. If there are injured people, they may be pulled along using the rescue strop of the life jacket. The survivor in the water should be picked up in a way that is convenient to the survivor. Depending on how injured they are, survivors can be taken into the raft with their backs towards the survival craft.

If you are taking the survivor into the survival craft, you should:

- place one hand on their shoulder
- place the other hand below the armpit on each side of the survivor
- lift the survivor up, sliding him or her over the buoyancy tube of the life raft.

The survivor, depending upon the injury and the risk of inhaling water, may be pushed down to obtain a boost from buoyancy. The person in the water can help by putting an arm around the legs of the survivor and pushing their legs up.

***How to right the life raft-*** There may be occasions when the life raft inflates upside down. When this happens, send a volunteer or a good swimmer wearing a lifejacket into the water to turn the life raft upright. Do this right away, because it may become difficult if the water fills in the canopy of the life raft, making it heavier.

Life rafts have the righting position marked

### ***To right the life raft-***

- 1 Turn the life raft until the gas bottles are downwind.
- 2 Get onto the inverted floor of the life raft.
- 3 Standing on top of the gas bottles, heave the raft over by pulling the righting strap.
- 4 When righting the life raft, make use of the direction of the wind.



*Righting a life raft*

### **Abandoning Vessel:**

If all attempts to save a damaged vessel prove to be ineffective then the vessel must be abandoned. ***This must be carried out in an orderly manner***, discipline must be maintained and panic controlled. All members of the crew and passengers will be required to exercise self-control, courage and leadership. Failure to do so may result in unnecessary loss of life. It is essential that the public address system (if operating) be used to inform crew and passengers of the true urgency of the situation and clear, concise instructions issued to crew and passengers.

It is usually best to wait as long as possible before abandoning as your vessel is your best life saving appliance. Before giving the order to shut down ship and taking to the liferafts the engines must be stopped and all watertight doors and openings closed. Once you have followed the abandonment procedure that is established onboard your vessel it is essential to do the following:

- clear the vessel, take a head count and appoint a leader.
- deploy the drogue.
- activate the EPIRB.
- keep a lookout.
- give first aid.
- take anti sea-sickness tablets.
- use all available means to signal your predicament.
- check equipment/food pack, schedule rations.
- read the survival at sea manual.
- keep up morale.
- keep out of the heat or cold.

Your actions are not limited to the above you will need to use your initiative and experience to deal with additional factors that may be peculiar to your situation.

It is prerequisite that trainees at this level will be qualified to at least a MROCP.

While radiotelephony remains the commonly used method of small craft communication, for larger vessels the roll out of DSC and has seen a corresponding decline in Telex (NBDP/TLX) and Radiotelegraphy (RTG) services. Advances in satellites and radio/radar beacons have additionally enhanced the capability for routine calling and emergency alerting. This workbook looks at radio systems used by SAR World wide as described more fully in the NATSAR manual. Some of these technologies are now superseded or unsupported in Australian Waters. You should consult your Radio Operators Handbook for current radio practice in Australia.

## **Conditions and limitations**

### ***3.6 Manoeuvres of vessel are made safely with due regard to the limits of propulsion, steerage and vessel stability and the prevailing weather and sea conditions.***

Maritime units must be capable of carrying out the operation safely in the prevailing and forecast sea and weather conditions in the area. All search preparations should be completed before the surface units enter the search area.

#### **Rescue at sea**

The SMC is responsible for the coordination of surface vessels engaged in the rescue of survivors in or on the sea except that in-shore rescue may be arranged and coordinated by the police.

The RCC shall make flotation equipment available for use by survivors whilst awaiting transportation to the shore. Details of the availability and types of equipment held by SAR Resources and Training (AusSAR) may be obtained from RCC Australia.

When an aircraft has ditched or a vessel is in danger of sinking, or sunk, it is imperative that rescue action is taken immediately. The time that a craft will float may be very limited, entry to life rafts is difficult, especially for aged or infirm personnel in rough seas, and the sea is a hostile survival environment.

When both maritime rescue units and helicopters are dispatched to the same distress scene, it may be advisable to transfer survivors to the helicopters for a more rapid delivery to medical facilities.

### **Use of rescue boats and vessels**

Specialised rescue boats are available only in scattered localities and their capacity is small. Each boat dispatched to a distress scene should, if possible, carry additional life-saving devices to enable those survivors, who cannot be immediately rescued, are able to stay afloat while awaiting the arrival of another boat.

If neither specialised rescue boats nor rescue vessels are available, merchant vessels may be the only means of implementing an early rescue. However, if possible, support or alternative rescue units should be considered because merchant ships have significant limitations as a rescue platform, including:

- generally not readily available.
- relatively slow speed.
- restricted manoeuvrability.
- high freeboard, making retrieval of survivors difficult.
- small crew numbers.
- language difficulties if foreign crewed.

It is desirable that SAR vessels be equipped to lift survivors from the water without expecting any help from the survivors.

### **Use of aircraft for rescue**

When considering the use of aircraft to bring about the recovery of survivors, care must be taken to ensure that the rescue aircraft and crew are not exposed to inordinate danger.

Fixed wing aircraft should only be used to retrieve survivors when there is significant advantage over the use of surface transport and when there is a suitable aerodrome or landing area near the scene. Pilots shall be discouraged from attempting to land at other than prepared landing areas to pick up survivors. However, should this prove to be the best or only viable option, all available specialist advice concerning the operation shall be obtained. It may be possible to have a qualified person lowered or parachuted in to survey the area. Helicopters may be employed to shuttle survivors from a distress site to a suitable fixed-wing landing area.

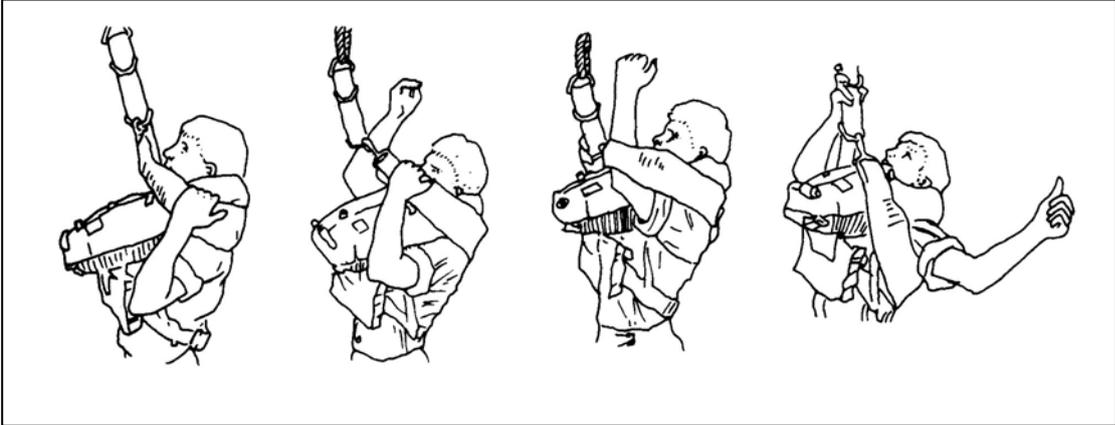
### **Use of helicopters for rescue**

When available, helicopters should be considered for rescue work. While eminently suited to the task in many respects, helicopters do have specific limitations that may be summarised as:

- the adverse effects of turbulence.
- the need for a level, or near level, landing area.
- a cleared landing area of specific dimensions to avoid rotor blade damage.
- a requirement for safe approach and take-off paths.
- potential for adverse effects on certain serious injuries.
- limited endurance.
- inability to hover with loads at high altitudes.
- limited accommodation.

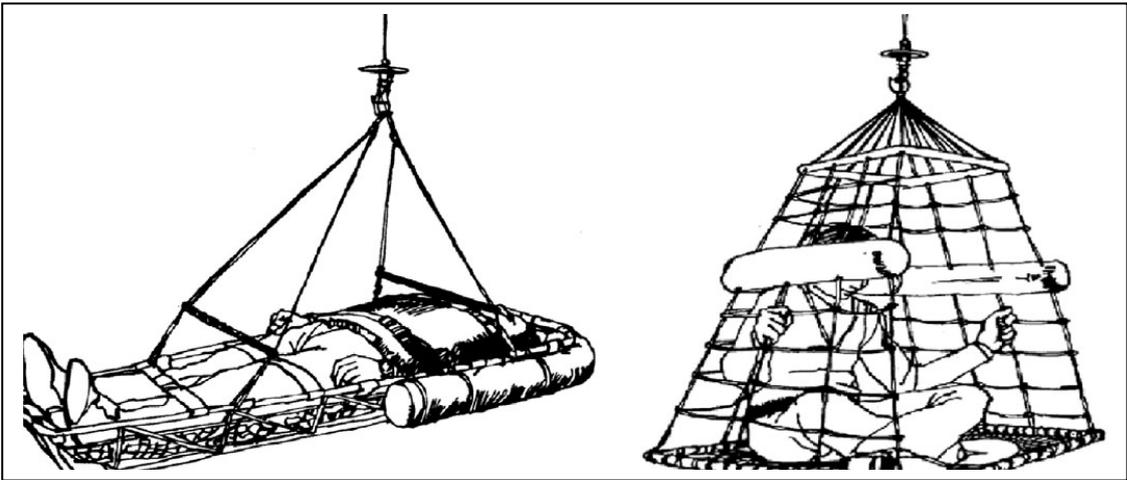
Owing to their unique flying characteristics, helicopters should be considered for use as a rescue unit as a matter of course. However, operations by surface parties may be hampered by the noise and rotor wash produced by helicopters. To avoid damage to rotor blades, the landing site should

**Removing by helicopter** - The helicopter will communicate on VHF Ch 6 or Ch 16. On approach to an incident scene at sea they will make a hazard reconnaissance. They may ask the RV to maintain a heading into the wind, or provide smoke to assist in their hover plan. The helicopter will not allow any chance of ground attachment of their hi-lift wire which could cause them to crash. They often will not want to approach a high masted vessel and may ask for casualties to take to a life raft streamed behind or transfer into an attending inflatable RV. The wire can give a static electrical shock if not dunked in the sea.



*Attaching a strop for a hi-lift*  
(Drawing Dept Transport Marine Information Manual)

A thumbs down hand signal indicates you are not ready for the lift; thumbs up that all is ready to go. These same signals are used if a stretcher or basket is used for the lift. A basket can be used to pick up several persons from the water. Climb in and hold on tight.



*Stretcher and basket.*  
(Drawing Dept Transport Marine Information Manual)



## **Written Activity- Manage the abandonment of the vessel**

Describe to your assessor or write a short answer, using diagrams if required, to the following questions.

### **Question No.1**

What is the signal to abandon ship?

### **Question No.2**

The emergency pack inside a liferaft usually contains:

- a. warm clothing and hats for the survivors.
- b. tents and other materials for when you get ashore.
- c. water, tinned food and fruit, with a first aid kit.
- d. water, first aid kit, rations and survival equipment.

### **Question No 3**

List the steps to launch, right and board a liferaft.

### **Question No.4**

Vessels operating more than 30 nautical miles to sea are required to carry:

- a. SOLAS lifejackets.
- b. personal flotation devices Type 1.
- c. life rings for every person.
- d. coastal lifejackets.

### **Question No.5**

If being lifted by a rescue helicopter, the signal to lift is

- a. body arched backwards, arms crossed
  - b. arms extended, hands performing circling motion
  - c. arms held in front, hands clasping wrists
- arms extended horizontally, fingers clenched, thumbs up.



## **Practical Activity- Manage the abandonment of the vessel**

Your Skipper will provide as many opportunities as possible to practice the previous skills during simulated rescue operations or “on the job training”. Practice activities for this element of competency include:

- Practice of emergency procedures.

Discuss as a team. Read the accompanying workbook, “Bare Facts of Marine SAR.” Remember to complete your log book.

## **4. Re-float a grounded vessel**

### **Beaching and Grounding**

**4.1** *The extent of grounding of the vessel is assessed including possible damage to the integrity of the hull.*

See Section 4.7

**4.2** *The timing of tides are checked and an appropriate plan for the re-float the vessel is devised in accordance with company procedures and maritime principles.*

See Section 4.7

**4.3** *External assistance to re-float the vessel is sought where necessary.*

See Section 4.7

**4.4** *Action is taken to control any identified damage to the hull using appropriate means.*

See Section 4.7

**4.5** *Preparations for re-floating are made in accordance with company procedures, good nautical practice and vessel manufacturer's instructions.*

See Section 4.7

**4.6** *On-board personnel are advised of re-floating plan and their responsibilities.*

See Section 4.7

**4.7** *Vessel is re-floated in accordance with company procedures and plan of action.*

#### **Grounding:**

Grounding of a vessel can be intentional or occur accidentally. There are three different types of grounding; e.g. beaching, stranding, or grounding.

**Beaching-** A vessel may be beached for many reasons, maybe to save it foundering in deep water or to flood her, at a recoverable location, in the event of an uncontrolled fire, or simply to carry out repairs, inspections, or cleaning of a foul bottom.

If a vessel has suffered damage but is not in immediate danger of foundering but such that a voyage to the nearest repair facility is an unacceptable risk, beaching maybe the best option. Care should be taken to ensure that the beach selected should cause no further damage, will have facilities to repair and the vessel can be re-floated easily.

If time permits consider the following points:

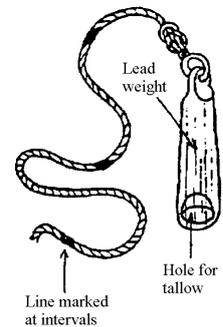
- study a large scale chart of the available sites. Ideally the beach should be sandy or shingle and gently shelving. If only a steeply shelving beach is available it can still be used but the vessel must be beached broadside to. With a gently shelving beach there is a choice but it would usually be prudent to put the damage to shoreward.
- check details of tide and beach approximately 1-2 hours after, high water (to ensure sufficient water to re-float) if unable to beach at this time, ballast the vessel to its maximum draft.
- do not use anchor/s when making the approach. If the manoeuvre is misjudged the cables may be fully paid out with the vessel still not aground or take the ground sooner than expected and sit on the anchor/s. Also, the anchor cables will lead aft from the hawse pipes which will not make a good lead when it comes time to haul off.
- approach the beach as slow as possible taking soundings from the bow. When the soundings approach the vessel's draught, stop engines. Let the vessel take the ground gently. Ideally the keel should take the ground for its entire length. When the vessel has grounded, add extra weights (or ballast) to prevent the stern from bumping in the sea.
- when firmly aground, form two working parties, one should layout the anchor/s and the other, to commence the repairs. Anchor/s should be laid out from the stern as it is the stern that should come off first when re-floating. The most important function of the stern anchor is to prevent the stern from being forced further up the beach as the ballast is being removed during the re-floating. If two anchors are being used they should be laid out in a single line in tandem (backed up) rather than laid out separately.
- if in a deep keel vessel, consider shoring up, to keep the vessel upright.

**Re-floating-** Once repairs have been completed:

- attempt to re-float as soon as vessel nears flotation draft. Haul on the anchors until the weight is taken, but be careful not to dislodge them.
- remove all added weights and pump out ballast.
- when afloat, haul in the anchor until the vessel is in deep water.

**Stranding or Grounding-** Stranding is the accidental grounding of a vessel on a beach, reef or shoreline while grounding is the accidental contact with the seabed other than the shoreline.

- sound the alarm, head count and check for injuries.
- stop engines and auxiliaries if grounding is severe.
- sound bilges and tanks to see whether the ship is holed.
- sound all around the vessel to find the deepest water lies.



(Drawing courtesy of Trust Publications)

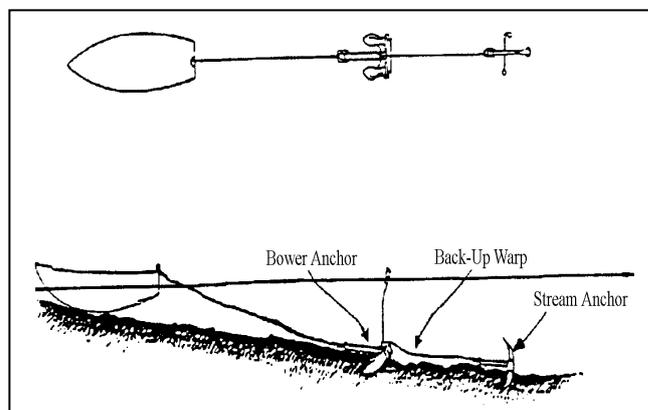
- plot your position and determine the type of grounding from the chart.
- determine the tide, tidal streams and weather forecast.
- check for hull damage (if damage has occurred it may be best to stay grounded, while repairs are carried out).

If the hull is intact and the stern floating, a first attempt at re-floating is to go astern on the engines. However, this should not be too prolonged because the wash may tend to build up sand or mud against the vessel's side making matters worse.

If this fails it is probably because the force of the impact has forced out the water between the vessel's hull and the seabed creating a vacuum seal. The most effective method to break the vacuum seal is to lighting the vessel aft so that the stern lifts allowing water to find its way under the forward part of the vessel's hull. This can be done by pumping out aft ballast tanks, or jettisoning weights.

If the ship is not in immediate danger and the tide is rising it may be prudent to wait for a rise in the tide before attempting to re-float again. If grounded on a reef at night in an uncertain location, it may be prudent to stay grounded and add ballast to prevent further damage to the hull due to movement of the vessel on the reef.

If the vessel has grounded for her entire length the situation is more serious. Two anchors will have to be carried out from the stern and laid out in tandem.



**Anchors laid in tandem**  
(Drawing courtesy of Trust Publications)

Another method is to lay two anchors out from the stern - one from each quarter. By hauling on each anchor in turn it may be possible to yaw (wag the vessel's tail) thus helping to break the vessel free. Engines may be used ahead with the rudder hard over first one way and then the other to assist the operation.

If the vessel has grounded on a rocky coast then the danger of hull damage is much greater. However, the vessel is likely to have only a small portion of her hull in contact with the seabed. A vacuum seal is not a possibility in this case and re-floating may be very difficult or impossible. If contact is made with the seabed at one point only, pumping ballast, shifting (or jettisoning) weights in an attempt to alter trim or to list the vessel may help.

If attempts to re-float the vessel by the above means fail. Then assistance will have to be obtained. Another vessel or a tug may be required to tow the vessel off. If a tug is used, make it fast alongside if possible as the scouring effect of the tug's propeller wash will assist to free the vessel. Display the appropriate signal for a 'vessel aground'.

Once clear of the obstruction it will be necessary to again check the vessel for any damage or ingress of water. Also check propulsion, steering systems and engine cooling systems. Note events in the vessel's official logbook or record book and report the incident to the authorities.

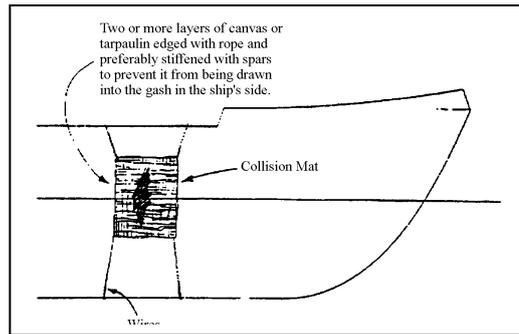
### **Foundering:**

Foundering has the adverse effect on the vessel's stability due to the ingress of water resulting in the vessel sinking. It could be the end result of a collision or any other incident causing hull damage. After collision or another incident resulting in the ingress of water action must be taken to reduce/stop the ingress or the vessel may founder.

To prevent foundering several steps can be taken. If the vessel is bilged the holed compartment should be isolated by closing watertight doors or openings and the section pumped out. If the pump cannot contain the flooding other means may be needed to reduce the intake of water. Listing the vessel, especially if the damage is near the waterline, will reduce the flow of water into the vessel. This can be achieved by moving weights or ballasting.

Thought must be given to the use of any possible material to plug up a hole, this could include timber, pillows, bedding, cushions, mattresses etc. Many vessels also carry cement (that sets even under water) to temporarily seal or fill a hole. A wooded frame is first constructed over the hole then filled with cement, reinforced if necessary with iron bars.

"Collision Mats" could also be incorporated. This is usually a strong piece of canvas with spars secured on two opposite sides. The mat is usually rolled up and the lines led under the hull until it is near the hole and then unrolled effectively sealing the holed area and reducing the flow of water into the compartment.

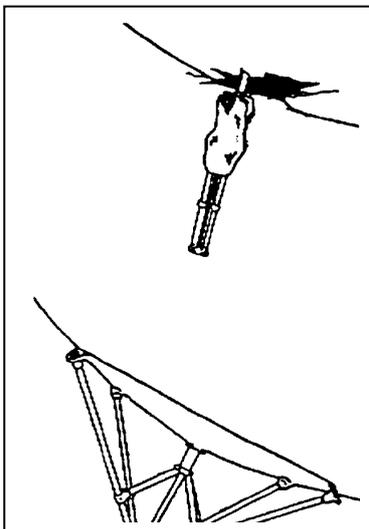


**Collision mat.**

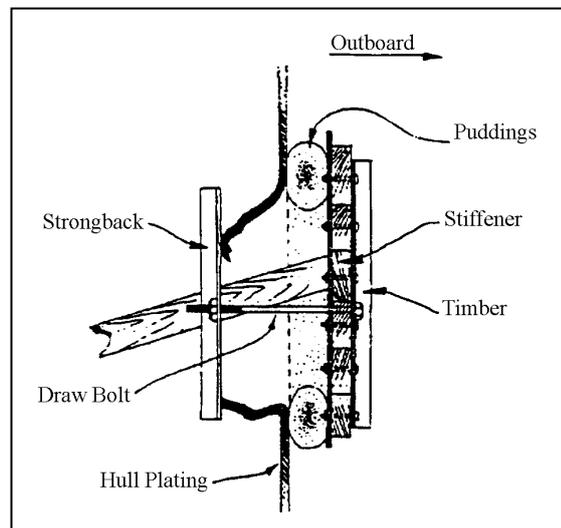
*(Drawing courtesy of Trust Publications)*

If spars are not used the water pressure may prevent the 'tarps' (collision mats) from fully covering the holed section.

There are commercially manufactured 'collision mats' for small craft. These are of the umbrella principle. The unit is pushed through the hole then opened up.



**Umbrella plug**



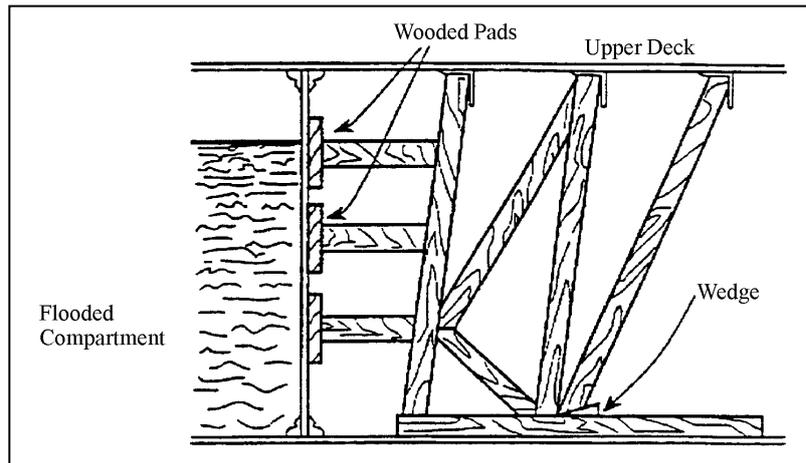
**Preparing a cement box.**

*(Drawings courtesy of Trust Publications)*

Collision Mats are designed to reduce the ingress of water to a level where the pump discharge is of a greater capacity than the flow of water into the vessel. Once control has been gained, more permanent repairs can be undertaken. Such as constructing a cement box or cutting and welding a steel plate over the hole.

If a vessel has sustained damage to it's bow section or a compartment, which leaves a bulkhead exposed to the sea, support must be given to these particular areas. The water pressure on the bulkhead will increase dramatically once the vessel gets underway - without support more damage may occur resulting in loss of the vessel.

Shoring using timber as shown below will support the bulkheads.



*Shoring a bulkhead.*  
(Drawing courtesy of Trust Publications)

Remember that in an emergency you may use anything that is handy (**except life saving equipment**) to slow the ingress of water into the hull.

**Partially or completely disabled:**

If due to an incident, whether collision or grounding, the vessel is left in a state such that assistance is required, consider the following:

- determine the dangers to crew or passengers.
- display the appropriate lights, shapes and generate sound signals.
- maintain an adequate lookout until the situation is corrected.
- notify the safety authorities of your situation and position.
- deploy a sea anchor to stabilize and control.
- 

Consider alternative means of propulsion/steerage etc. to get under way, or if a tow is necessary prepare the vessel accordingly (check salvage rules and if possible obtain a tow from a vessel of the same company or nationality).



## **Written Activity- Re-float a grounded vessel**

Describe to your assessor or write a short answer, using diagrams if required, to the following questions.

### **Question No.1**

Using full astern immediately after grounding is the best way to get off safely.

TRUE FALSE

### **Question No.2**

A steep shelving shore is a most suitable site to beach a vessel.

TRUE FALSE

### **Question No 3**

If your vessel touches bottom, but quickly floats off on the rising tide you should:

- a. monitor the soundings in bilges, integral tanks and void spaces.
- b. radio a securite and continue your passage as normal.
- c. trim the vessel by the bow in case of damage to the stem and keel.
- d. close all the hatches and speed back to your berth to assess the damage.

### **Question No.4**

On a falling tide, in sheltered waters, your vessel has grounded and is holed. You should:

- a back it off into deep water before the tide goes out.
- b close watertight compartments and limit further damage while aground.
- c abandon ship immediately.
- d lay out an anchor in front to pull you over the bank.

### **Question No.5**

If you run aground:

- a. it is not necessary to tell anyone about it.
- b. you only need to report this if it occurs within Port Limits.
- c. it is not necessary to report this if there is no damage to the vessel.
- d. all groundings must be reported to the appropriate Marine Authority.

**Question No.6**

In order to carry out of maintenance to your vessel's hull, you are planning to beach it for a few days. The best time of the month would be:

- a before the full moon.
- b a few days after the full moon.
- c at night time.
- d on the top of the king tides.

**Question No.7**

Listing a deep keeled vessel that has gone aground may enable her to float off.

TRUE FALSE

**Practical Activity- Re-float a grounded vessel**

Your Skipper will provide as many opportunities as possible to practice the previous skills during simulated rescue operations or “on the job training”. Practice activities for this element of competency include:

- Practice damage control for watertight integrity.

Discuss as a team. Read the accompanying workbook, “Bare Facts of Marine SAR.” Remember to complete your log book.

## **5. Coordinate emergency towing operations**

### **Limits of responsibility:**

#### ***5.1 Vessel is prepared for towage in accordance with company and vessel's manufacturer's instructions.***

The primary aim of the Master of a vessel rendering assistance is saving life. A distressed vessel could be drifting rapidly onto a lee shore. She may need only a short tow away from the danger so that the personnel can be transferred safely. Once the immediate safety of personnel is ensured, the decision to tow the vessel to a safe haven should carefully weigh up the capabilities of the tug, her power and fuel reserves and the owner's and insurer's consent. There is no legal responsibility on the Master of the rescuing vessel to save property.

**Towage**- is a service by which a vessel is assisted in its movements on or through the water, by another vessel, which is usually operating under the specific terms and conditions of a Towage Contract. This contract is based on an agreed amount of remuneration which is usually much lower than what could be expected in the case of a salvage claim decided on by a Court. The majority of tug owners operating in the field of coastal and deep sea towage normally utilise their own particular form of towage contract which will include, apart from the main terms such as price, payment details, free time and demurrage, a section to cover general towage conditions which basically define the insurance and liability aspects. As discussed in section one unless your vessel is a purpose built tug due consideration should be given to attempting any towing operation.

**Salvage** - Salvage is covered under Australian Federal Law - Navigation Act 1912, sections 315-329c.

The basic principle of salvage is that when a person or persons save or help to save a vessel and/or her cargo from a danger, then the successful salvor is entitled to a reward provided that:

- The property must be exposed to an imminent marine peril and would have been lost without the salvors efforts.
- The salvor must have no pre-existing covenant with the vessel involved and the danger must be real.
- The salvor must act voluntarily.
- The services must be successful in saving or helping to save the property at risk.

Before the Master of a vessel engages in salvage he should consider the following factors, amongst others.

- a) The Master should ensure that he does not endanger his own vessel or his crew in the subsequent operation.
- b) The Master should be totally satisfied that his endeavours will lead to success.
- c) The Master should advise his vessel's owners of his intention to salvage.
- d) The Master should establish that the operation does not invalidate the insurance of his vessel.
- e) The Master should inform his charterers and check for the "Deviation Clause" in his Charter party or Bills of Lading.
- f) Remember you are responsible for, and could be sued for, any damage that you cause to the vessel during salvage attempts

Many salvage agreements can be made between the salvor and the vessel being salvaged. The salvor can bargain for the reward beforehand but it is not necessary/prudent to do so as it is very difficult to correctly estimate the amount of effort that may have to be put in to effect success. Therefore salvage agreements are usually "OPEN" which means that a specific amount is not fixed but will be decided by arbitration.

The form of agreement most commonly employed nowadays is the Lloyd's Standard Form of Salvage Agreement, the latest version was introduced in May 1980 and is known as The Lloyd's Open Form 1980 or "LOF 80".

It is most important not to confuse salvage with your statutory obligations to render assistance to a vessel in distress or in the case of a collision. In salvage your services are voluntary and offered toward property as opposed to saving human life.

**Life Salvage-** You may have noticed in the earlier broad definition of salvage, that the saving of life was not mentioned. The fact of the matter is that internationally, life is not a salvageable item, because the Master has an international obligation, so far as he is able and without the risk of serious damage to his own vessel or the safety of his crew and passengers, to render assistance to every person who is found at sea and in danger of being lost, even if the person concerned is the subject of a foreign State at war with the flag country. Hence the saving of life is placed outside the context of salvage. It is a duty and therefore will not constitute grounds for a salvage award. Be this as it may, however, in Part VII of the Navigation Act, which relates to wrecks and salvage, and in particular Section 315, the Minister is empowered to award a payment for services rendered within Australian waters for the saving life from any vessel, or elsewhere in saving life from any vessel registered in Australia.

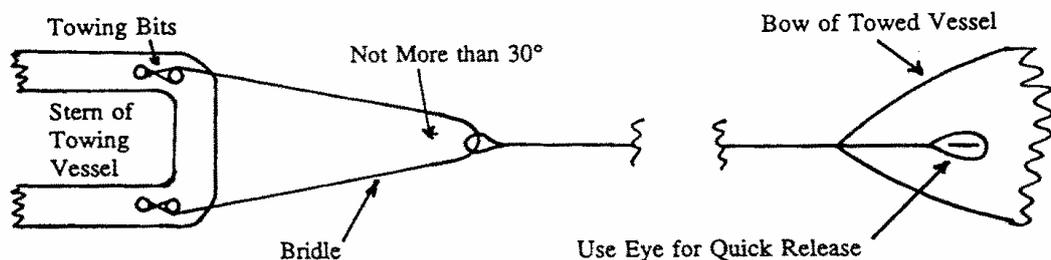
**Dedicated rescue vessels** - While other vessels are carting tourists, containers or coal for its owners, the rescue vessel's job is to save life as tasked by the accrediting organisation. This potentially hazardous activity needs to be risk managed with the owners, master and crew. The Rescue Skipper, however, has the same duties as any other Master, and during passage is primarily responsible for the safety of his vessel and crew. Salvage is a legal entitlement for the rescue of abandoned property, but it is a rare claim from accredited rescue organisations.

Towage

## Towing operations:

### **5.2 Towing operation is carried out in accordance with accepted maritime practice.**

In the event of being towed or towing, establish contact with the other vessel and establish who can supply the strongest and most efficient towing gear, preferably rigged as shown in the sketch. When the most efficient towing arrangement is rigged, the next thing is to pass over the tow, this may call for a degree of thought with particular emphasis on safety. The circumstances and weather conditions may govern this, it may be as simple as coming alongside the other vessel or as complicated as floating or transferring a messenger line prior to connecting the tow.



Tow rope at least 20 mm diameter. Length of tow lines 3 times towing vessel's length.

During the tow contact must be maintained either by radio or prearranged signals and a visual watch should be kept on the tow. Remember the vessel being towed is in charge. The appropriate lights and shapes required by the collision regulations should be displayed if possible. Towing is dangerous. Keep all personnel well clear.

## Precautions:

### **5.3 Towing lines are carefully monitored during towing operation and appropriate action is taken if there is excessive risk to either the towing or towed vessel.**

If towing in heavy weather ensure that you use a long and heavy towing line which should dip in the water (catenary). This prevents the movement of either vessel from jerking the towing line reducing the chance of it parting. Also:

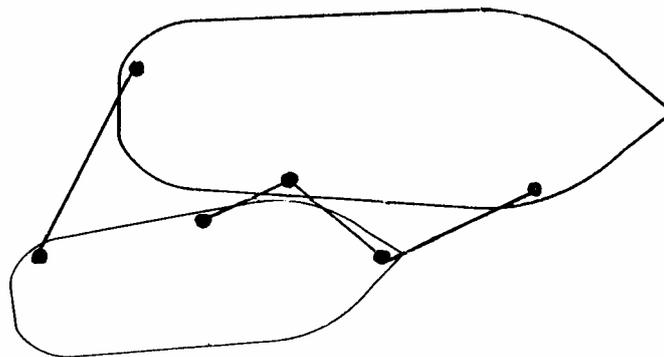
- Ensure the towing line is not chafing.
- Freshen the nip, i.e. pay out the tow line to reduce chafing.
- Grease the line at the point of contact with the vessel.
- Ensure that the tow line can be released in an emergency under all conditions of load.
- If the towed vessel is manned use its steering gear.

To reduce yawing or sheering by the towed vessel:

- Stream a sea anchor behind the vessel being towed
- Trim it by stern by transferring weights.
- Alter course and/or speed.
- Increasing speed tends to correct a yaw directly caused by list.
- Decreasing speed tends to correct a yaw produced by adverse trim.
- Set the towed vessel's rudder at an angle to counteract the sheer.

Remember when commencing the tow increase speed slowly and monitor the tow line, the towed vessel and your own vessel's performance.

It is possible to assist a vessel in sheltered or confined waters, by simply coming alongside the other vessel and making fast with bow, stern and spring lines. The two vessels must be positioned so that the propulsion and steering gear of the assisting vessel are well aft of the other vessel and in clear water, in this manner even larger vessels can be assisted and manoeuvred. Using this method of towing in confined waters gives the towing vessel better control over the tow.



Understudy the master of your vessel for a number of towing operations and when you and the master are confident of your progress, carry out the operation under supervision of the master/facilitator. Keep a log of all the checks carried out and the procedure followed and the briefing of the crew as required.



## **Written Activity- Coordinate emergency towing operations**

Describe to your assessor or write a short answer, using diagrams if required, to the following questions.

### **Question No.1**

List the precautions prior to and during the taking of a tow.

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### **Question No.2**

You are off the coast, and about to take a small vessel in tow. You should:

- a. always increase speed quickly after connecting up.
- b. take the strain as soon as possible after connecting up.
- c. always increase speed slowly after connecting up.
- d. let the other vessel fall downwind after connecting up.

### **Question No 3**

When towing in heavy weather, the towline should be:

- a. as long as practicable.
- b. weighted to provide elasticity.
- c. as short as practicable.
- d. doubled up to provide elasticity.

### **Question No.4**

- a. periodically "freshen the nip".
- b. regularly vary the towing speed.
- c. only use synthetic rope.
- d. only tow from the stern.

**Question No.5**

The responsibility to direct a towing operation lies with the towed vessel.

TRUE FALSE

**Question No.6**

The shorter the towrope used in a towing operation, the less chance the tow will yaw.

TRUE FALSE

**Question No.7**

When the tug is positioned behind the beam of the vessel she is parallel towing, she will have the tow under the best control.

TRUE FALSE

**Question No.8**

When towing across a coastal river bar using a floating towline, its length should be:

- a. the length of the wave crest to wave crest outside the bar.
- b. the length of the wave crest to wave crest on the bar.
- c. half the length of the wavelength on the bar.
- d. one and a half times the length of the wavelength on the bar.

**Question No.9**

The concern for a tug with a short tow on a heavy vessel going down a river "with" a strong current is that:

- a. of the tugs ability to get the tow moving.
- b. the towed vessel will have no steering.
- c. the towing operation will be prolonged and slow.
- d. manoeuvres to stop an overtaking tow would put the tug at risk of capsize.

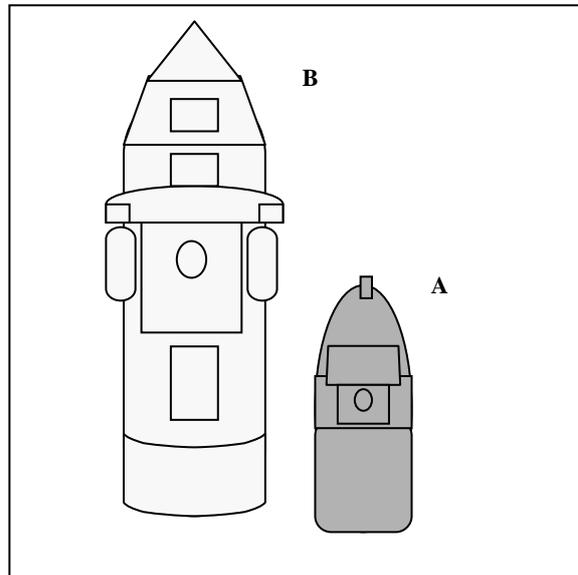
**Question No.10**

To approach a vessel of similar drift rate to your own in order to pass a tow you should:

- a. approach him at 90 degrees and stop upwind, to pass the tow.
- b. approach him at 90 degrees and stop downwind, to pass the tow.
- c. overtake on his side then manoeuvre to just ahead on his heading.
- d. overtake on his weather side, then manoeuvre to just ahead, facing his bow.

**Question No.11**

Draw and name on the sketch below the ropes that you would use to parallel tow the vessel B. by using the vessel marked A. as the tug:



**Practical Activity- Coordinate emergency towing operations**

Your Skipper will provide as many opportunities as possible to practice the previous skills during simulated rescue operations or “on the job training”. Practice activities for this element of competency include:

- Practice towing a simulated marine casualty.

Discuss as a team. Read the accompanying workbook, “Bare Facts of Marine SAR.” Remember to complete your log book.