



MARH015 Manage &
maintain a navigational
watch on board vessels
up to 80 metres

Watchkeeping

Navigational watchkeeping

- ▶ The intended voyage must be planned, taking into account all pertinent information and any course laid down shall be checked before the commencement of the voyage.
- ▶ Frequent checking of the vessel's position utilising all the available navigational aids, cross-referencing the accuracy of one method with another, ensuring that the vessel follows the desired course.
- ▶ The watchkeeper should also have a full understanding of the operation and limitations of all the safety and navigational equipment available.
- ▶ The watchkeeper's duty is primarily that of keeping watch and should not be required to carry out any additional duties that could interfere with the keeping of a safe navigational watch.

Navigational equipment

- ▶ The watchkeeper should have a good working knowledge of the navigational equipment at their disposal, taking into account the limitations, errors and idiosyncrasies of the equipment in use. The watchkeeper shall not hesitate to use the helm, engines or sound signalling appliances of the vessel.

Master's instructions to watchkeepers

- ▶ The watchkeeper should inform the Master immediately in the following circumstances: o if restricted visibility is encountered or expected.
- ▶ if the traffic conditions or the movement of other vessels is causing concern.
- ▶ if difficulty is experienced in maintaining course.
- ▶ on failure to sight land, a navigational mark or to obtain soundings by the expected time
- ▶ if, unexpectedly, you sight land, a navigational mark or to obtain soundings.

Master's instructions to watchkeepers

- ▶ on the breakdown of engines, steering gear or any essential navigational equipment.
- ▶ if the radio equipment malfunctions. o in heavy weather if in any doubt about the possibility of weather damage. o if the vessel meets any hazard to navigation such as ice or derelicts.
- ▶ in any other situation in which he/she is in any doubt.
- ▶ Despite the requirement to notify the Master immediately in the foregoing circumstances, the officer in charge of the navigational watch shall in addition not hesitate to take immediate action for the safety of the ship, where circumstances so require.

Watchkeeping principles

- ▶ It is essential at **ALL TIMES** to maintain a watch on the vessel, adequate to the prevailing circumstances and conditions. The following are some of the factors that should be taken into account when determining the composition of the watch.
- ▶ at no time should the bridge be left unattended.
- ▶ weather conditions, visibility, daylight or darkness;
- ▶ proximity of navigational hazards;
- ▶ use and condition of navigational aids in use;
- ▶ whether the vessel is fitted with automatic pilot;
- ▶ any additional unusual demands that may be placed on the watchkeeper by the operational activities of the vessel.

Watchkeeping principles

- ▶ It is essential that the watchkeepers are well rested and not impaired by fatigue. The watchkeeper should not be under the influence of alcohol or narcotics so as to be able to maintain an efficient and competent watch. If the watchkeeper is not satisfied with the fitness of the relieving watchkeeper to take over the watch, the watch should not be handed over and other arrangements made with the Master's instructions as to the relieving watchkeeper.
- ▶ The watchkeeper should have a good working knowledge of the navigational equipment available, taking into account the limitations, errors and idiosyncrasies of the equipment in use. The watchkeeper shall not hesitate to use the helm, engines or sound signalling appliances of the vessel.

Watchkeeping duties and responsibilities

- ▶ **A watchkeeper is not to leave the bridge unless properly relieved.**
- ▶ Regardless of the presence of the Master in the wheelhouse, the watchkeeper continues to be responsible for the safe navigation of the vessel until the Master expressly takes over the con of the vessel. If in any doubt as to the safety of the vessel the watchkeeper shall notify the Master immediately.

Taking over the watch

- ▶ When taking over the watch the relieving watchkeeper shall satisfy him/herself of the vessel's position, confirm its intended course/track and speed and note any dangers to navigation or alterations of course expected during the watch.
- ▶ The hand over should include but not be limited to:
 - ▶ standing orders and other special instructions of the Master relating to navigation of the vessel
 - ▶ position, course, speed and draught of the vessel
 - ▶ prevailing and predicted tides, currents, weather, visibility and the effect of these factors upon course and speed

Taking over the watch

- ▶ navigational situation of the operational condition of all navigational and safety equipment
- ▶ the errors of magnetic and gyro compasses the presence and movement or' any vessel in sight or known to be in the vicinity
- ▶ the conditions and hazards likely to be encountered during the watch
- ▶ machinery state
- ▶ cargo state o state of auxiliary vessels/tenders
- ▶ operational activities

Lookout

- ▶ A proper look-out shall be maintained at all times in compliance with rule 5 of the International Regulations for Preventing Collisions at Sea, 1972 and shall serve the purpose of:
- ▶ Maintaining a continuous state of vigilance by sight and hearing as well as by all other available means, with regard to any significant change in the operating environment.
- ▶ Fully appraising the situation and the risk of collision, stranding and other dangers to navigation.
- ▶ Detecting ships or aircraft in distress, shipwrecked persons, wrecks, debris and other hazards to safe navigation.

Lookout

- ▶ The lookout must be able to give full attention to the keeping of a proper lookout and no other duties shall be undertaken or assigned which could interfere with that task.
- ▶ The duties of the lookout and helmsperson are separate and the helmsperson shall not be considered to be the look-out while steering, except in small ships where an unobstructed all-round view is provided at the steering position and there is no impairment of night vision or other impediment to the keeping of a proper look-out.
- ▶ The officer in charge of the navigational watch may be the sole lookout in daylight provided that on each such occasion:

Lookout

- ▶ The situation has been carefully assessed and it has been established without doubt that it is safe to do so.
- ▶ Full account has been taken of all relevant factors, including, but not limited to:
 - ▶ state of weather
 - ▶ visibility,
 - ▶ traffic density
 - ▶ proximity of dangers to navigation

Lookout

- ▶ the attention necessary when navigation in or near traffic separation scheme.
- ▶ Assistance is immediately available to be summoned to the bridge when any change in the situation so requires.

Watchkeeping at anchor

- ▶ The watchkeeper will ensure that the vessel maintains her position at anchor. In addition keeping the following points in mind:
- ▶ Ensure that an effective lookout is maintained
- ▶ Ensure that periodic inspection rounds of the vessel are carried out.
- ▶ Notify the Master and undertake all necessary measures if the vessel drags anchor.
- ▶ Ensure the engines and auxiliary machinery is ready as per the Master's instructions.
- ▶ State of tide
- ▶ Position of other vessels at anchor or passing traffic in relation to the swinging circle of the vessel.

Watchkeeping at anchor

- ▶ State of the weather and the latest forecast.
- ▶ Position of appropriate beam bearings for early warning of dragging anchor.
- ▶ The condition and lay of the anchor and cable/rope.
- ▶ Ensure that the correct lights or shapes are exhibited at all times
- ▶ Take measures to prevent environmental pollution and comply with pollution regulations.

Watchkeeping in port

- ▶ Ensure that the vessel is moored securely at all times.
- ▶ Ensure that there is adequate and safe access to the vessel from the wharf
- ▶ The state and range of the tide and the effect this would have on the mooring ropes and the gangway.
- ▶ Appropriate signs are up in relation to the working of the vessel.
- ▶ Know who is onboard the vessel both from the vessels crew or shore personnel.
- ▶ Put up appropriate notices with regards to the sailing time of the vessel etc. for the benefit of the crew.



Emergency procedures

Grounding

- ▶ Grounding of a vessel can be an intentional situation or occur accidentally. There are three different types of grounding; eg. 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 cover the following criteria::
 - ▶ that no further damage will result from the beaching
 - ▶ that repairs will be expedited
 - ▶ that the vessel can be refloated easily.

Beaching

- ▶ 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 (tidal heights, direction, tide times).
- ▶ Beach approximately 1-2 hours after high water (to ensure sufficient water to refloat) if unable to beach around this time period ballast the vessel to its maximum draft by whatever, reversible, means needed to refloat it.

Beaching

- ▶ 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, should be formed one to lay out anchor/s and the other to commence the repairs.

Beaching

- ▶ Anchor/s should be laid out from the stern as it is the stern that should come off first when refloating. The anchor/s can be carried out in the vessel boats. The most important function of the stern anchor/s is to prevent the vessel's stern from being forced further up the beach as weights (ballast) is being removed during the refloating. If two anchors are to be used they should be laid out in a single line in tandem (backed up) rather than laid out separately.
- ▶ If deep keel vessel, consider shoring up, to keep the vessel upright.

Refloating

- ▶ Once repairs have been completed:
- ▶ attempt to refloat as soon as vessel nears flotation draft. Haul on the anchor/s until the weight is taken, but be careful not to dislodge the anchor/s
- ▶ remove all added weights and pump out ballast
- ▶ when the vessel refloats, commence hauling in the anchor until the vessel is in deep water. Recover the anchor/s and proceed.

Stranding or grounding

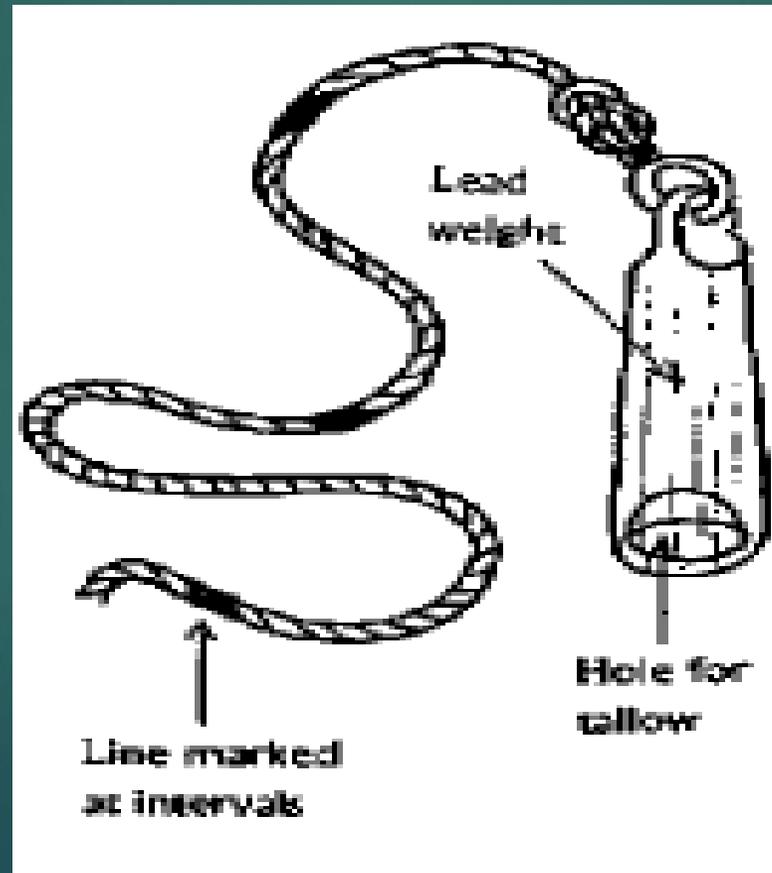
- ▶ Stranding is the accidental grounding of a vessel on a beach, reef or shoreline while grounding is the accidental contact with the seabed other than the shoreline.
- ▶ Actions to take (accidental stranding or grounding):
- ▶ sound the alarm to muster the crew/passengers (7 long, 1 short) · stop engines and auxiliaries if grounding is severe
- ▶ account for all personnel and check for injuries
- ▶ sound all bilge's and tanks to ascertain whether the ship has been holed

Stranding or grounding

- ▶ using a leadline sound all around the vessel to ascertain the extent of the grounding, This will determine whether the vessel's stern is still afloat or grounded for her whole length, and indicate where the deepest water lies
- ▶ take bearings and plot your position - then attempt to determine type of grounding from the chart
- ▶ determine the tide and tidal stream
- ▶ check weather predictions for the area
- ▶ check for hull damage (if damage has occurred it may be best to stay grounded, while repairs are carried out).

Stranding or grounding

A leadline.



Refloating

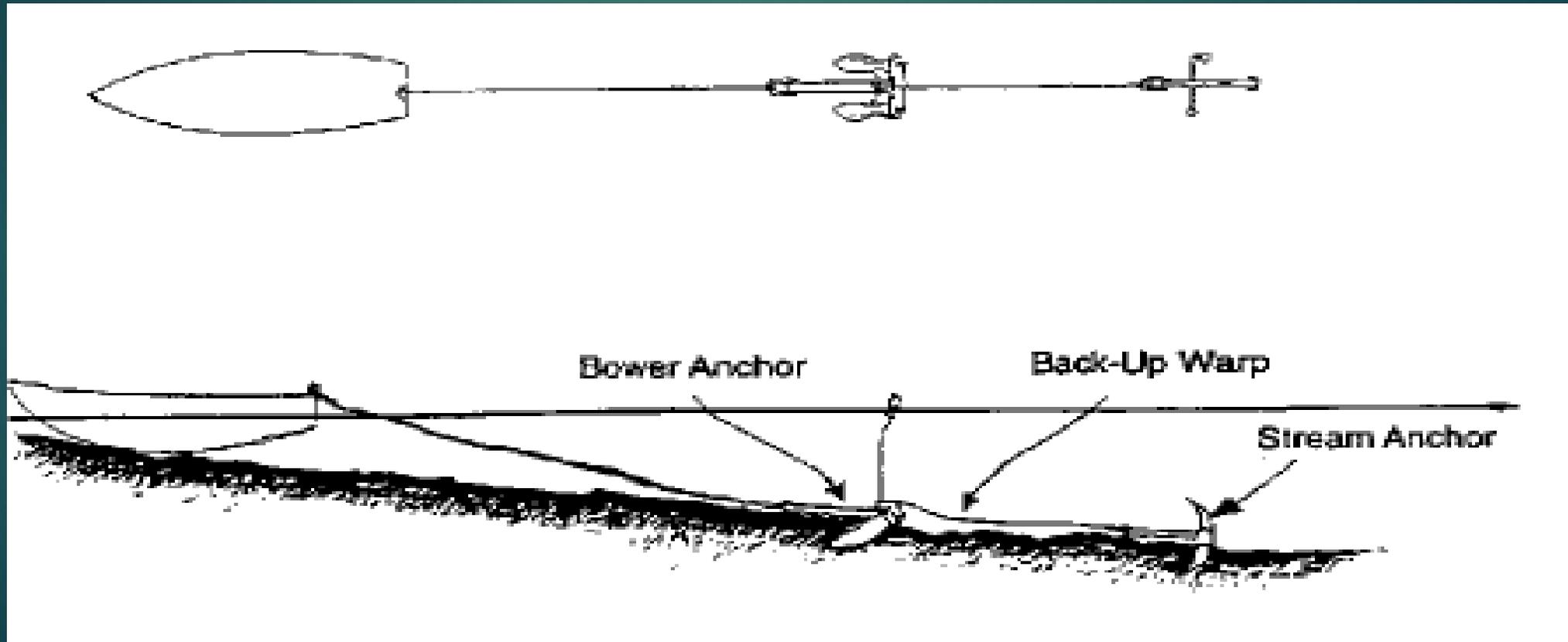
- ▶ If the hull is found to be intact and the stern of the vessel is floating. The first attempt at refloating is to go astern on the engines. However, this should not be too prolonged because the wash may tend to build up sand or mud against the vessel's side making matters worse.
- ▶ If this fails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

Refloating

- ▶ 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 refloat 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 to try and haul the vessel off.

Refloating

Anchors laid in tandem.



Refloating

- ▶ 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 (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; however refloating 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.

Refloating

- ▶ If attempts to refloat 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 if possible, make it fast alongside as the scouring effect of the tug's propeller wash will assist to free the vessel. Display the appropriate signal '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 vessel's official logbook or record book and report incident to the authorities.

Foundering

- ▶ Foundering is the adverse effect on the vessel's stability due to the ingress of water resulting in the vessel sinking.
- ▶ Foundering could be the end result of a collision or any other incident causing hull damage or ingress of water. After collision of other 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, if possible, 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.

Foundering

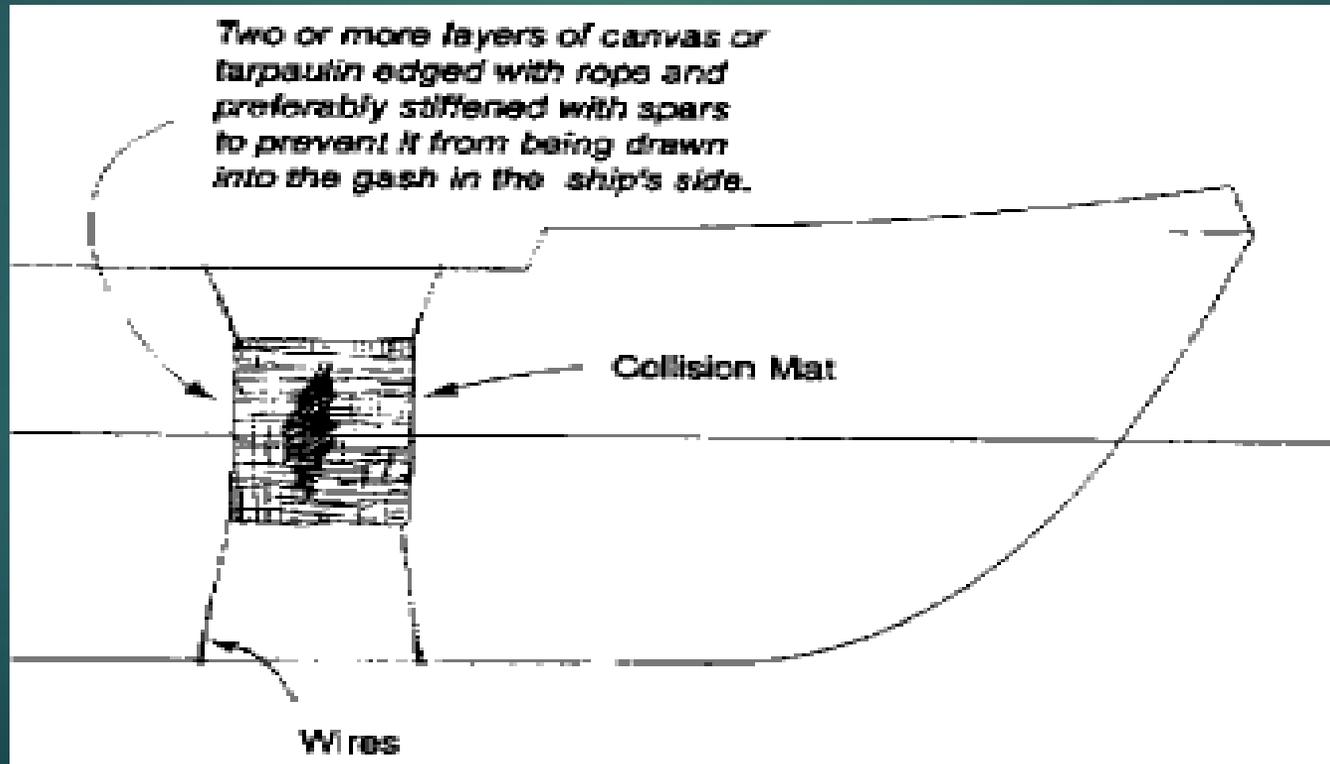
- ▶ Listing the vessel, especially if the damage is near the waterline, will reduce the flow of water into the vessel. This can be achieved by moving weights or ballasting.
- ▶ Thought must be given to the use of any possible material to plug up a hole, this could include timber, pillows, bedding, cushions, 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.

Foundering

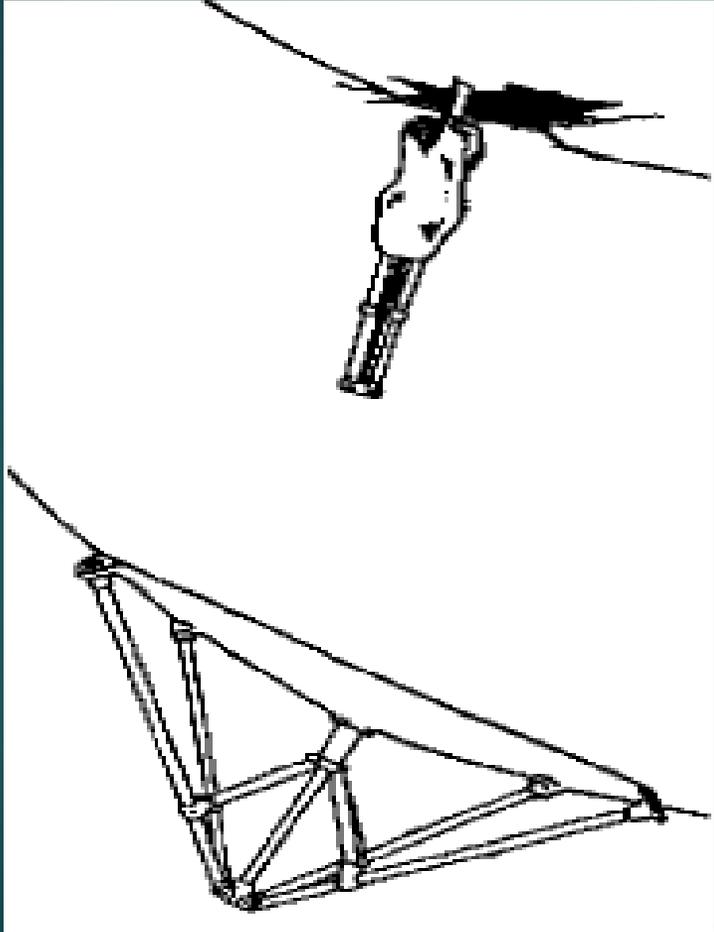
- ▶ "Collision Mats" could also be incorporated. This is usually a strong piece of canvas with spars secured on two opposite sides. The mat is usually rolled up and the lines led under the hull until it is near the hole and then unrolled effectively sealing the holed area and reducing the flow of water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

Foundering

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



Foundering

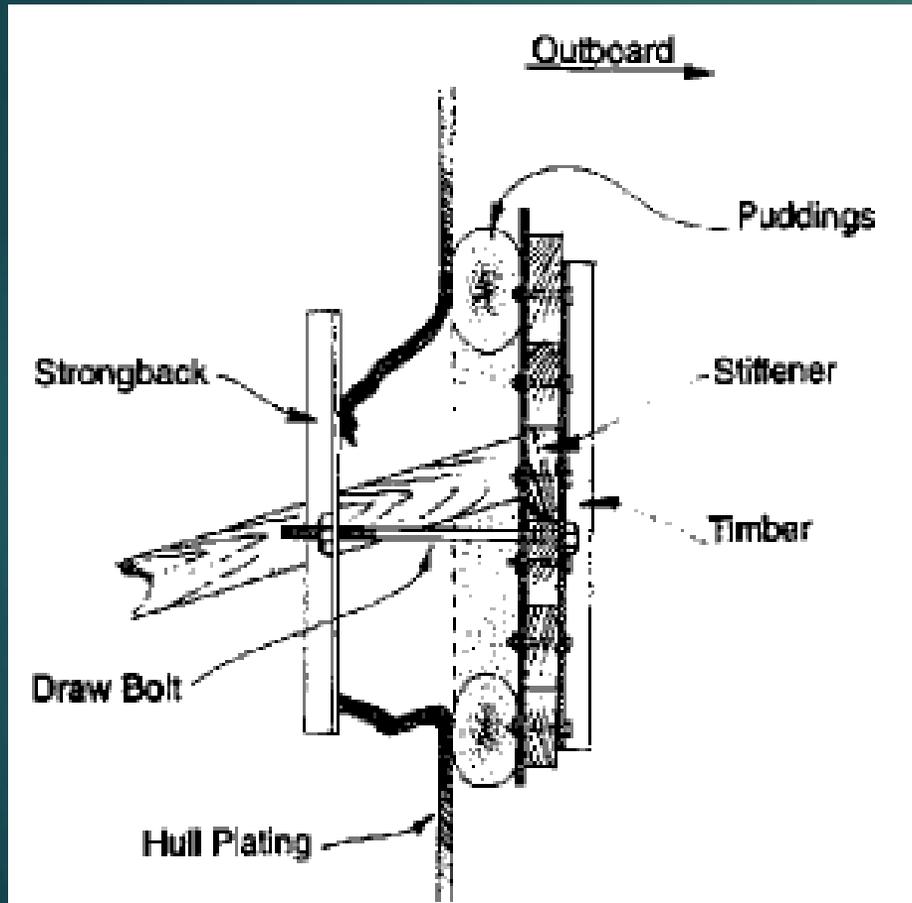


There are commercially manufactured 'collision mats' for small craft. These are of the umbrella principle. The unit is pushed through the hole then opened around the area by pulling on the centre pole.

Foundering

- ▶ **Remember:** - 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.

Foundering

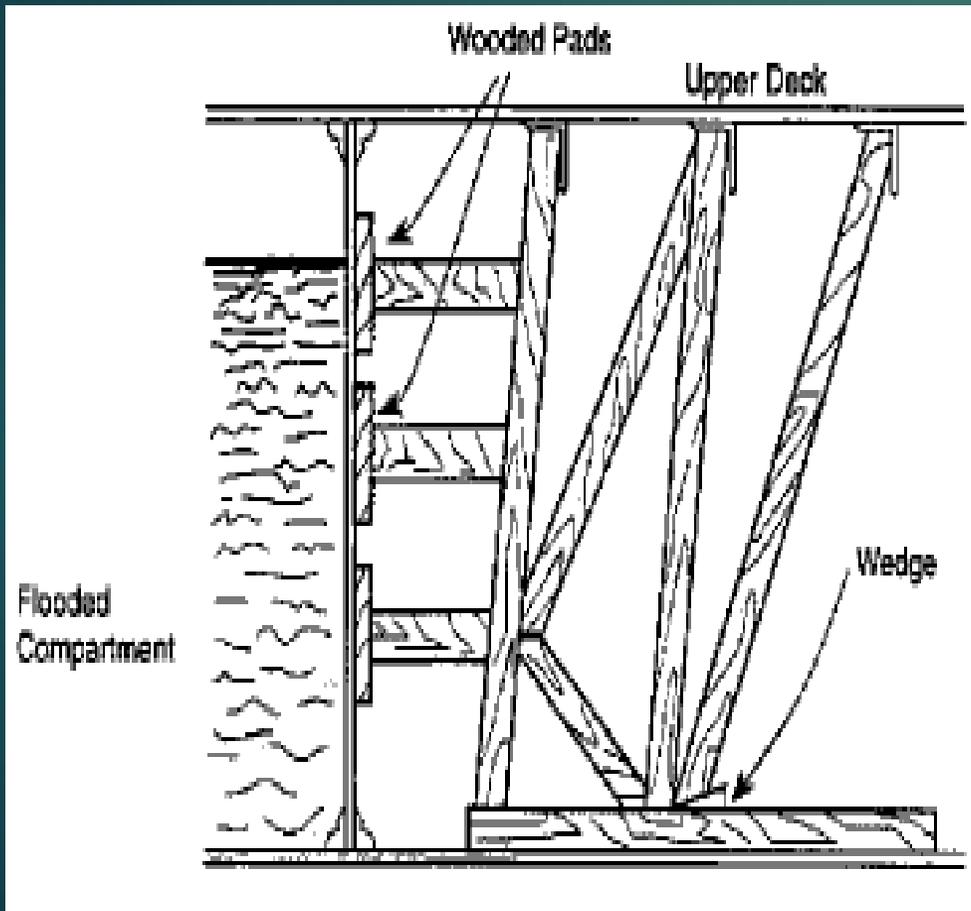


Once control has been gained, more permanent repairs can be undertaken. Such as the construction of a cement box or cutting and welding a steel plate over the hole.

Foundering

- ▶ If a vessel has sustained damage to its 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

Foundering



Shoring using timber as shown will support the bulkheads at the centre of pressure if situated correctly. Many vessels carry timber specifically for this purpose.

Foundering

- ▶ 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.

In class exercise

- ▶ Question 1: Your vessel has grounded for about $\frac{1}{2}$ her length on a gently sloping sandbar. The vessel has full ballast tanks fore and aft. Discuss your actions in the use of ballast and engines to refloat the vessel.
- ▶ Question 2: What would be the problems of trying to refloat the vessel with engines alone?
- ▶ Question 3: What immediate action is necessary on board a vessel that has 'grounded'?

In class exercise answers

- ▶ Question 1: Consider pumping out the aft tank so as to reduce the hull area in contact with the seabed. A wag of the tail might also assist.
- ▶ Question 2: Sand, debris being washed towards the cooling inlets. Scouring in propeller area, with build up of spoil at midships. Possible damage to propeller(s) and rudder (s).

In class exercise answers

Question 3: Action:

- ▶ muster stations
- ▶ stop engines
- ▶ check for injuries, head count
- ▶ sound bilge's and tanks
- ▶ determine the extent of grounding
- ▶ check for hull damage
- ▶ check tides

Collisions

- ▶ 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 the give-way vessel alone cannot avoid collision. The "wake-up" signal of at least 5 short 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 through necessary.
- ▶ If in anchoring depth the anchor/s 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 of the vessel by going full astern

Collision imminent

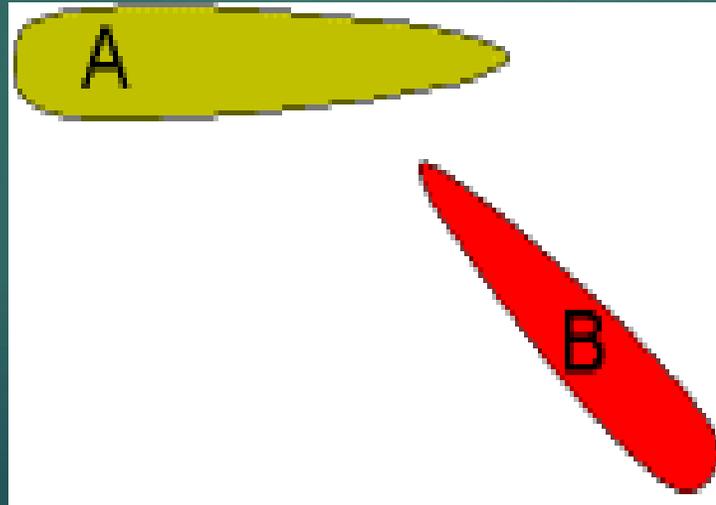
- ▶ attempting to avoid the collision by turning the vessel to cause a glancing blow rather than direct contact. Helm, engine movements, or a combination of both may achieve this. In some cases to achieve a glancing blow the best option maybe to go full ahead with the rudder hard over.
- ▶ a bow to bow situation or bow to quarter situation will be far less damaging than the bow striking the other vessel amidships 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 his/her vessel, crew and passengers. To render to the other vessel and persons aboard all possible assistance 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
 - ▶ notify each other of ports of registry, departure, and destination
 - ▶ enter a witnessed state in the Official Logbook, or Record Book
 - ▶ notify the authorities at the earliest opportunity but within 48 hours of the incident occurring (check your State/Territory legislation as to the exact length of time for reporting and who to report to).

In class exercise

- ▶ Question 1: In the diagram below the two vessels are in the jaws of a collision (a few minutes away). Vessel A is incapable of taking any action. Vessel B has a single screw and no thrusters are available. As the Master of vessel B what emergency action you are going to take?



In class exercise answers

- ▶ Question 1: Going astern at this late stage will have little effect in reducing the impact of the collision. Indeed going astern may make matters worse in that the transverse effect of the propeller canting the vessel's stern to port may increase the attack angle. The best action here may be; with the wheel over hard to port to go full ahead on the engine. This may bring the vessel's head around enough to result in a glancing blow.

In class exercise

- ▶ Question 2: List the legal requirements when involved in a collision.
- ▶ Question 3: You have struck a floating obstruction, holing your forepeak on one side and to 0.2 metres below the waterline. The hole is nearly 1 metre long. What means would you use to make temporary repairs?

In class exercise answers

- ▶ Question 2: Provided there is no danger to personal on your own vessel. Provide all possible assistance to the crew and passengers of the other vessel and stay close until no longer required. Also:
 - ▶ Exchange names of vessels
 - ▶ Notify other vessel of port of registry, departure and designation
 - ▶ Enter details in logbook
 - ▶ Notify authorities
- ▶ Question 3: Trim by stern to expose the hole. Construct a wooden cofferdam over the hole and fill with cement or wedge mattresses into the hole and shore up. (Collision mats not appropriate for damage close to the bow).

Action to take (collision has occurred)

- ▶ sound emergency muster alarm - (7 short, 1 long)
- ▶ stop the vessel
- ▶ transmit distress or urgency signal (if necessary)
- ▶ evacuate passengers and crew to emergency stations
- ▶ ensure all people are accounted for and check for injuries
- ▶ ensure the safety of the vessel and all on-board - Master's responsibility
- ▶ determine the extent of damage
- ▶ sound tank/s inspect bilge's or sound if enclosed
- ▶ look for any oil, fuel spills in water around the vessel

Action to take (collision has occurred)

- ▶ if damage has occurred take damage control measures:- (refer to previous section)
- ▶ prepare lifesaving equipment
- ▶ prepare to abandon (if situation deteriorates).
- ▶ With situation controlled:
- ▶ contact the other vessel and give whatever assistance is necessary (without endangering your vessel) to ensure safety of life of people from both vessels
- ▶ attend to any injured person
- ▶ undertake an on-board inquiry and detail information

Action to take (collision has occurred)

- ▶ if required show the appropriate signals undertake necessary repairs.
- ▶ If assistance from other vessels is non-existent and vessel looks like foundering with a coastline nearby consider, 'beaching' the vessel.
- ▶ **Remember:** - If the collision between the two vessels has resulted in the vessel piercing the other and becoming wedged, the striking vessel should refrain from going astern immediately as this may result in the one or both vessels' sinking. If abandonment of either vessel is essential, transfer to the stable vessel, while wedged, may be easier than by doing so via the water.

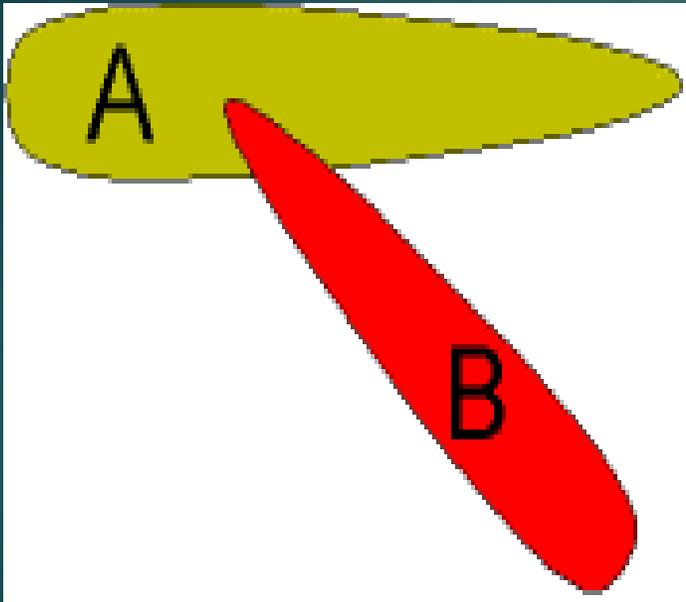
Partially or completely disabled

- ▶ 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 'if' and 'what' dangers there may be to crew or passengers
- ▶ deploy a sea anchor (drogue) to bring the bow into the wind or tide. This reduces the movement and possible injuries
- ▶ notify the safety authorities of your situation and position
- ▶ display the appropriate lights or shapes and generate sound signals if necessary
- ▶ maintain an adequate lookout until the situation is corrected

Partially or completely disabled

- ▶ consider alternative means of propulsion/steerage etc. to get under way
- ▶ consider a tow and prepare vessel accordingly (check rules for salvage and if possible obtain a tow from vessel of same company or nationality).

In class exercise



In the diagram on the left Vessel B has pieced 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?

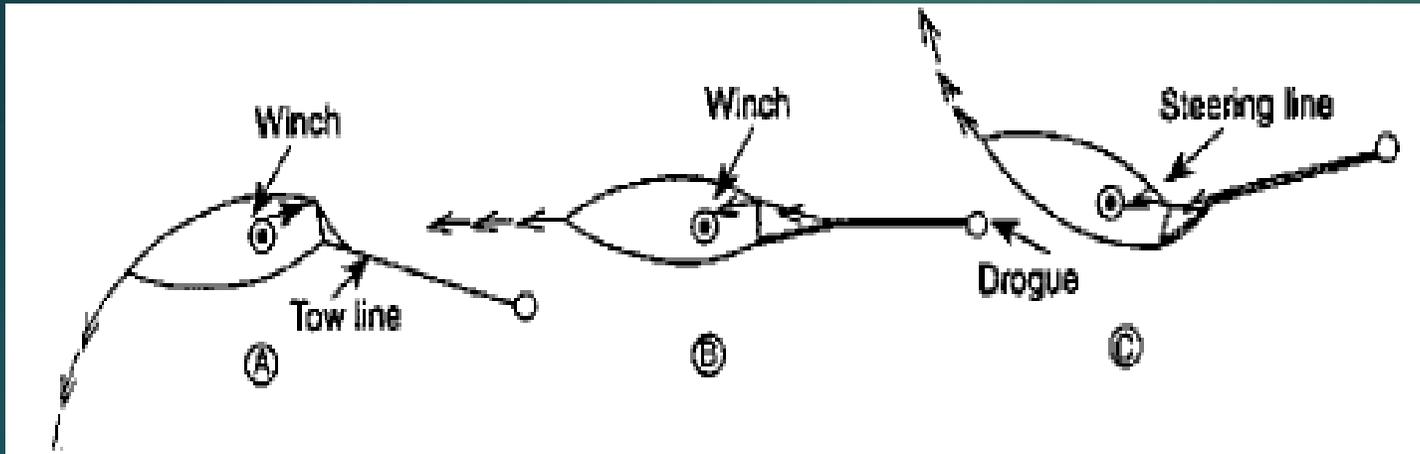
In class exercise answers

- ▶ While the two vessels are locked together, the hole in vessel B is effectively plugged by Vessel A; damage to the two vessels can be assessed. Premature action by either vessel to separate could result in one or both vessels sinking. While the two vessels are locked together Vessel A could begin 'shoring up' the damage to the bulkheads forward. While this is being done an orderly abandonment of Vessel B could be completed before a separation is attempted.

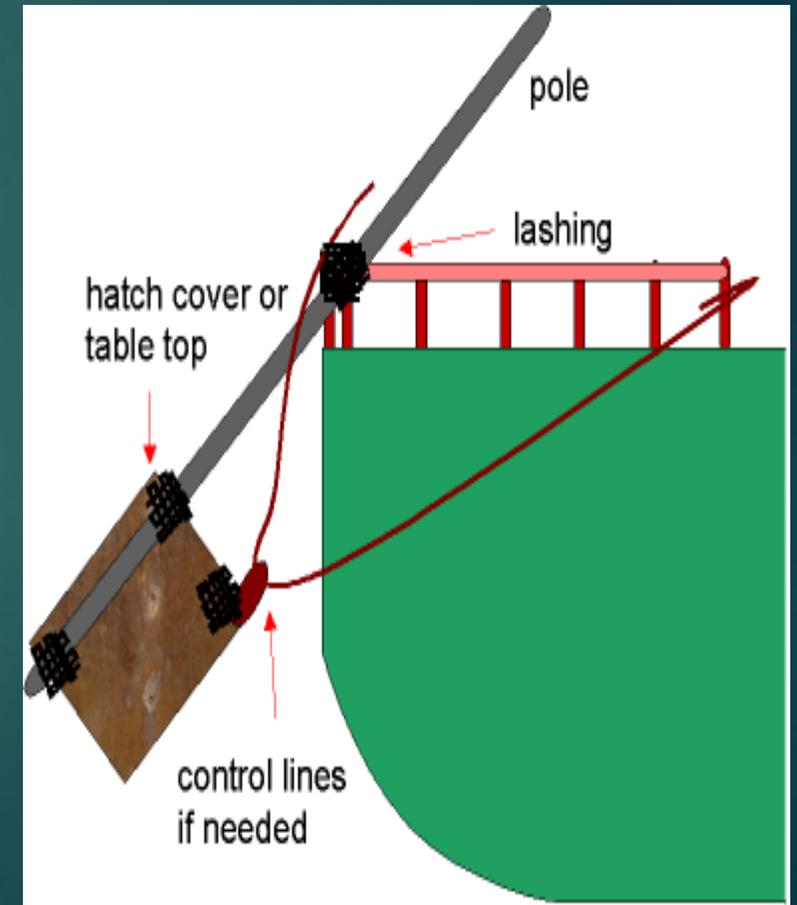
Loss of rudder

- ▶ If the vessel experiencing rudder loss is a twin screw then the problem is lessened. Use can be made of the revolutions of each engine to control the direction of the vessel.
- ▶ In a single screwed vessel a different situation applies and can best be met by towing an object offering drag such as: - fish basket, bundle of nets, a 205 litre partly filled drum or bundles of boards attached to a length of line.
- ▶ When secured to centre of the transom this arrangement will keep the vessel moving in a straight direction.
- ▶ To steer the vessel it will be necessary to attach the line (with the drag attached) to one quarter of the vessel with a lighter line made fast to the other quarter as shown in the following figure.

Loss of rudder



Alteration of tension on the light line will cause a change in direction of the vessel. An alternate method to rig a jury rudder as illustrated right.



Loss of rudder

- ▶ If the rudder has been lost it must be remembered that there is a good possibility of ingress of water into the vessel via the rudderpost area. Make sure area is secured. If rudder is in place but damaged, use knotted chain or rope across the trailing edge to position and secure in midship 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.

Action to take (single propeller)

- ▶ sound muster stations alarm (7 short, 1 long)
- ▶ stop engine (consider anchoring or sea anchor)
- ▶ check cause of failure · remove covers (if fitted) and fit emergency tiller
- ▶ fit operating tackle and tie off
- ▶ once secure, remove hydraulic or mechanical actuating mechanism and secure clear of tiller or rudder stock
- ▶ rig operating gear so that you have a clear view from the steering position (if possible)

Action to take (single propeller)

- ▶ Be aware of the consequences of astern propulsion while in emergency steering mode. 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 (if hand operated).
- ▶ One person can achieve operation of the twin gear for a single rudder 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.
- ▶ Don't forget when steaming in this manner to display 'Restricted in Ability to Manoeuvre' lights and shapes.
- ▶ Record events in vessels official logbook or vessel record book.

In class exercise

- ▶ Your 27-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.

In class exercise answer

- ▶ Try to secure the rudder amidships. Rig boom and drag loads from each side.

Loss of propulsion

- ▶ muster crew
- ▶ stop engine and determine the extent of damage
- ▶ has the propeller been lost?
- ▶ has shaft broken?
- ▶ is there any water ingress through stern tube?
- ▶ request assistance if propulsion is lost
- ▶ display the "not under command" signal

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.
- ▶ Whatever the fouling, ensure that the engine is shut down and there is no possibility of it been started during clearing procedures · have an observer for the person undertaking the work at all times.

Propeller fouled or damaged

- ▶ Display the appropriate signal (Not Under Command). 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 transmission. Then start 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 stern gland. It could be possible that the aft bearing or propeller may have sustained damage.

Damaged propeller

- ▶ This may be caused by fouling, 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.
- ▶ With any possible damage to the propulsion system, the action to take will be:

Damaged propeller

- ▶ sound muster stations (7 short, 1 long)
- ▶ reduce engine speed and attempt to determine the cause of the problem
- ▶ check watertight integrity of the vessel
- ▶ if at reduced speed the problem shut down the engine and visually inspect the propeller region for damage.
- ▶ The inspection result will determine the next course of action whether it is safe to proceed at reduced speed, repairable, or a tow is required. Display the "Not Under Command Signal".

In class exercise

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

In class exercise answer

- ▶ Vibration, drop in RPM, rise in exhaust temperature. Run slow astern, or "bar" astern while hauling on free part of the line or send diver down.

Salvage after fire

- ▶ After an explosion or fire a vessel may be salvaged. Depending on the damage incurred by the fire/explosion and the area of the vessel affected. You will need to appraise the situation and decide the course of action.
- ▶ 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 the jury rudder described in earlier.
- ▶ If the hull is damaged and water is flooding the vessel consider the following:

Salvage after fire

- ▶ if the vessel is bilged the holed compartment should be, if possible, 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
- ▶ 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. Moving weights or ballasting can achieve this.
- ▶ Most likely, after major a 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.

Master's obligation to personnel

- ▶ It is the duty of the master or person in charge to ensure that the vessel is safe, in survey and in a seaworthy condition at all times.
- ▶ Not only is the person responsible for the vessel's safety but also to safety of all persons on-board including the behaviour of the people onboard, either crew or passengers. If the master is responding to an emergency situation one of his/her priorities is to ensure the safety of the personnel onboard his/her vessel, even before considering assisting the other vessel.
- ▶ The crew and passengers of a vessel are obliged by law to obey any reasonable direction of the master or person in charge.
- ▶ As Master it is your responsibility to ensure:

Master's obligation to personnel

- ▶ that there are sufficient provisions including water for passengers and crew that sufficient protection from elements for passengers and crew
- ▶ that the vessel is manned as per the relevant requirements that the vessel is operated within its area of operation
- ▶ that the required safety equipment is carried and operational
- ▶ that the drills and practices a required by the NSCV are carried out
- ▶ that the vessel is not overloaded
- ▶ security of passengers and cargo.

Master's obligation to personnel

- ▶ **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**

Person overboard

- ▶ This is a situation where the person is seen going over the vessel's side. This 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
- ▶ throw a lifebuoy (as far as possible to the person) or any other flotation device
- ▶ maintain visual contact or have an observer take over the roll, point towards the person in the water
- ▶ manoeuvre to recover

Person overboard

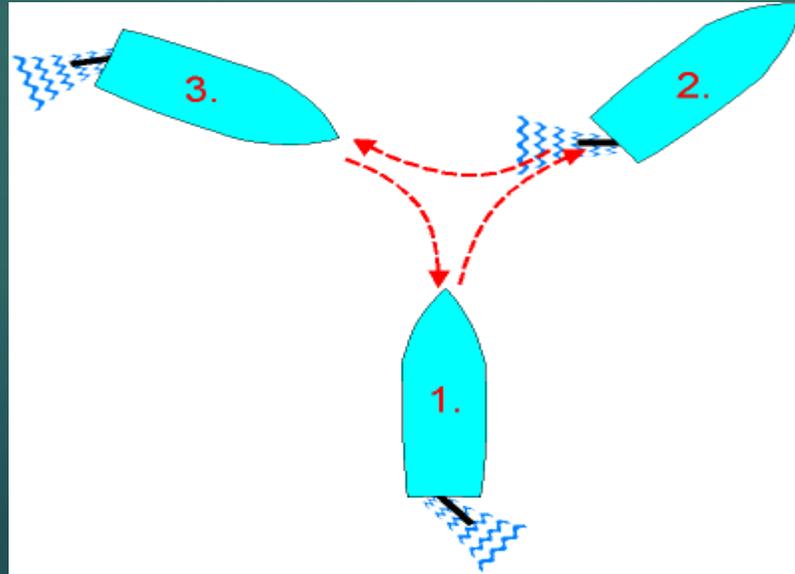
- ▶ warn other vessels in the vicinity of the situation by VHF and raise flag 'Oscar'
- ▶ mark position on chart or on GPS/plotter
- ▶ turn depending on type of vessel and operation undertaken - always take the propeller away from the person in the water
- ▶ bring vessel back near the person, approach the person from downwind, keeping the bow into the wind as this enables manoeuvring at slower speeds
- ▶ notify the crew of the pick up side of vessel
- ▶ stop vessel when person is near the beam section
- ▶ recover the person

Person overboard

- ▶ **if conscious:** by means of rescue quoit and line, or nets over the side, boarding ladder, Jason's cradle, or litter
- ▶ **if unconscious:** consider using a boat
- ▶ ensure propeller is not operating with the person alongside.

Types of turns to recover a person overboard

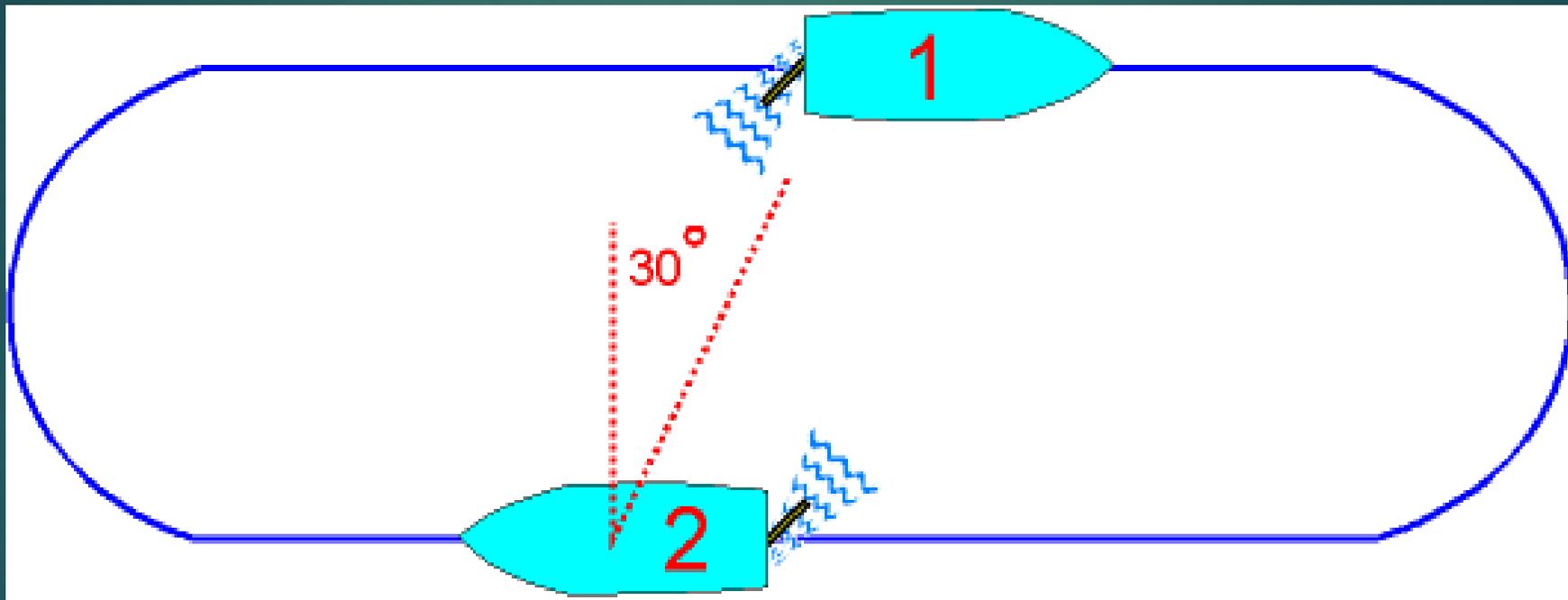
- ▶ For small craft a 'Y' turn can be adopted. This turn involves turning the helm hard over (in the direction of side person went over). Then stopping the engine and then full astern (with helm still hard over in same direction then full ahead with helm still in same place) then slow and straighten near the person in water, then stop near person.



Elliptical (or 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 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 (or double turn)



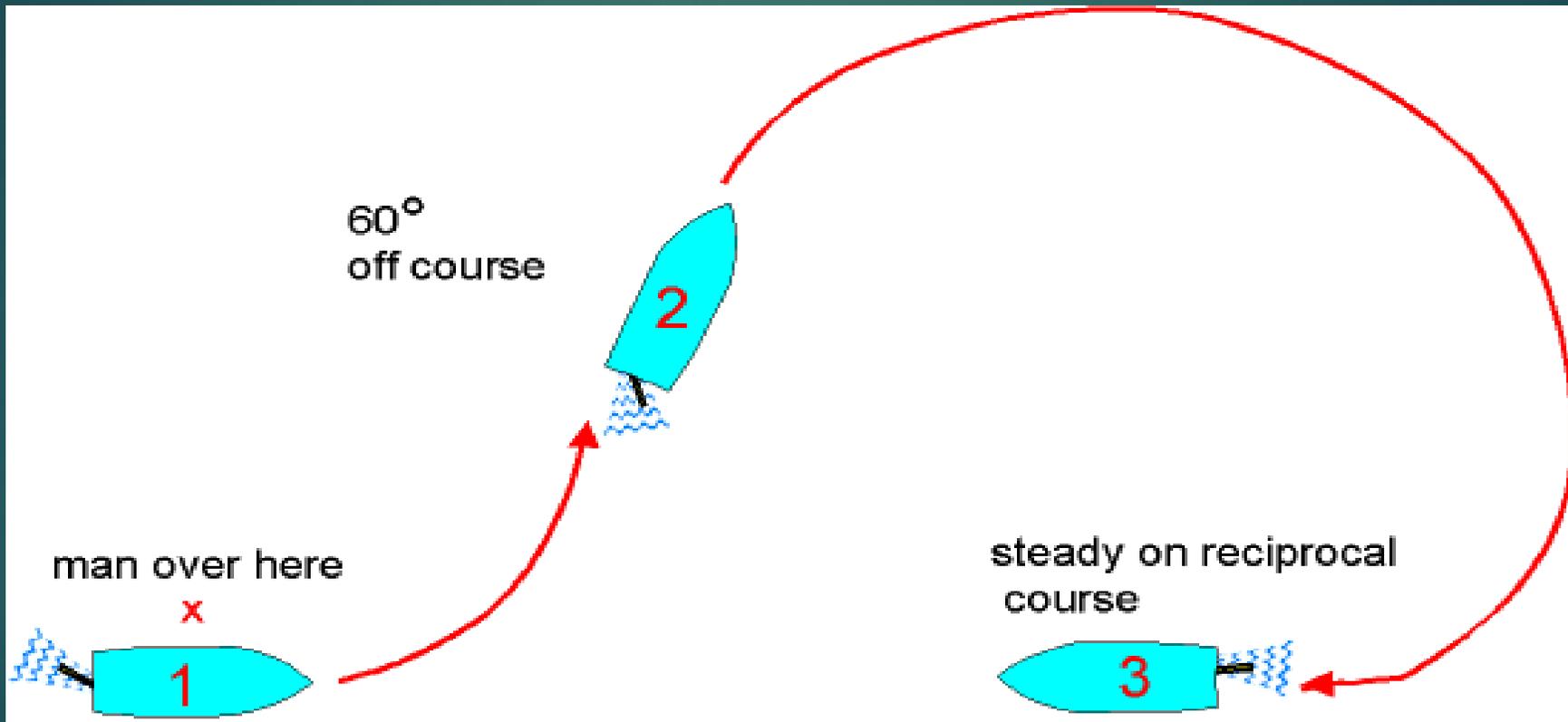
Williamson's turn

- ▶ This is the most popular turn due to its ability to be used for most situations eg, 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 (position 1).

Williamson's turn

- ▶ The wheel should be kept hard over until the vessel is 60° off its original course (position2). The wheel should then be put hard over in the opposite direction until the vessel is on its reciprocal course (position3).
- ▶ 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 get to position 2 it 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 working between 60° and 70° .

Williamson's turn



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 any tendency to panic controlled.** All members of the crew and passengers will be required to exercise self-control, courage and selfishness. 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 abandon ship and taking the liferafts/boats the engines must be stopped and all watertight doors and openings closed.

Abandoning vessel

- ▶ Once you have followed the abandonment procedure that is established onboard your vessel (see your module 'Occupational Health and Safety'), it is essential to do the following:
- ▶ clear the vessel
- ▶ deploy the drogue
- ▶ close up the survival craft
- ▶ keep a lookout
- ▶ activate the EPIRB
- ▶ use all available means to signal your predicament
- ▶ take anti sea-sickness tablets

Abandoning vessel

- ▶ give first aid
- ▶ read the survival at sea manual
- ▶ learn how to operate flares/heliograph
- ▶ check equipment/food pack
- ▶ keep morale up
- ▶ 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.

Person missing

- ▶ Person missing situation is one in which a person is presumed to be lost over the side but was unnoticed doing so. This maybe the case but it is also possible that the person is incapacitated (or hiding) somewhere in the vessel. 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. The most appropriate action in this instance is to use the Williamson's turn and back track along the original course for the period of time from when the person was last seen, but don't assume that because a person was last seen two hours ago that he/she fell overboard two hours ago. You may have to take into account the vessel's leeway but drift should be similar for both vessel and person.

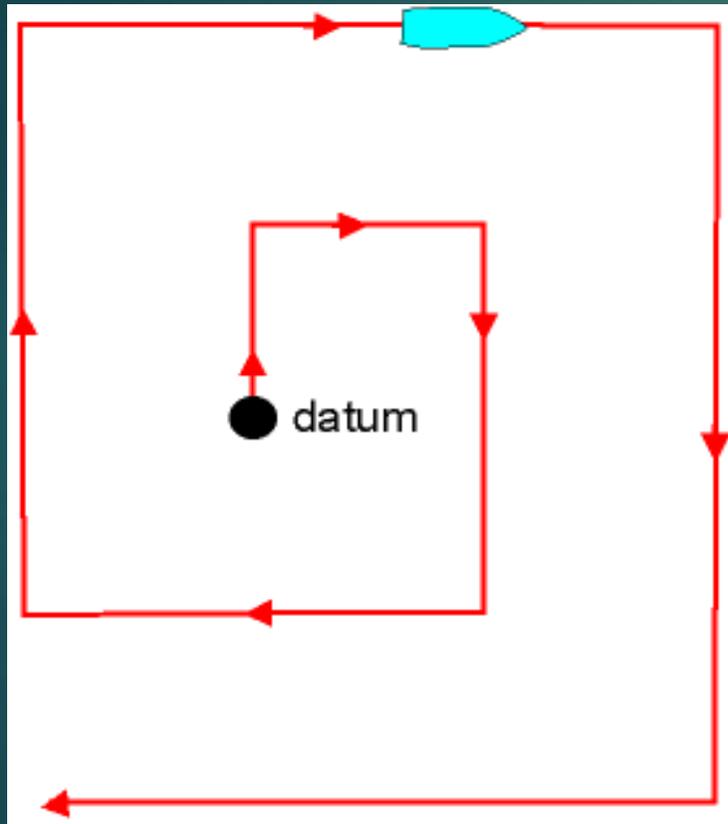
Person missing

- ▶ 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

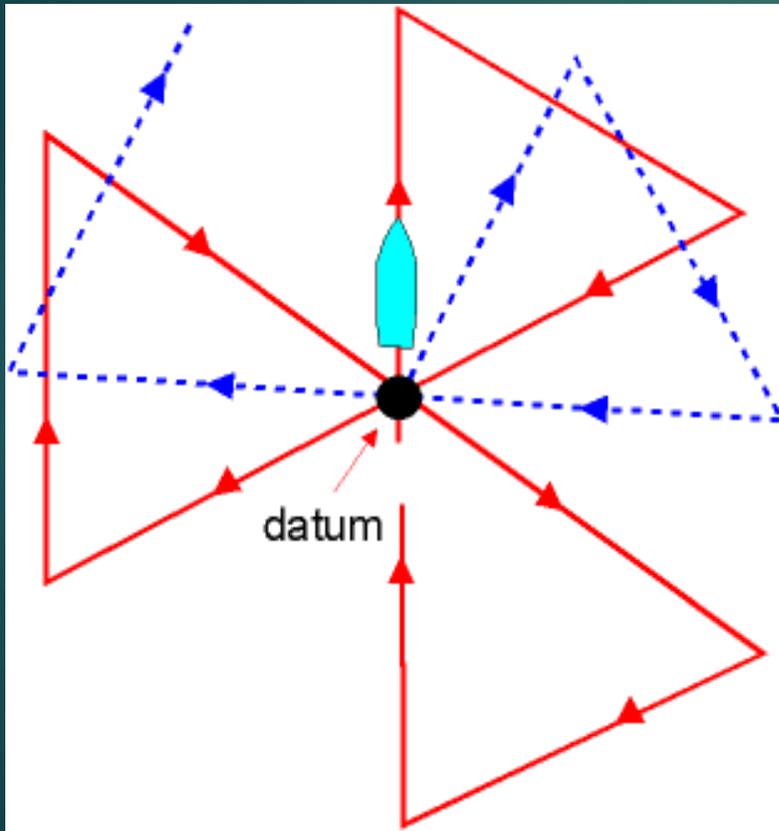
- ▶ If the casualty is not located immediately a search should be initiated without delay. A search datum should be established taking into account the most probable position of the casualty, time elapsed, drift and subsequent information.
- ▶ Remember: notify the Rescue Authorities, put out a “**Pan Pan**” message on the VHF and/or HF radio and Display the Man Overboard flag 'Oscar' (to notify other vessels that may be in the area). There are three recommended search patterns.

Expanding square - 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

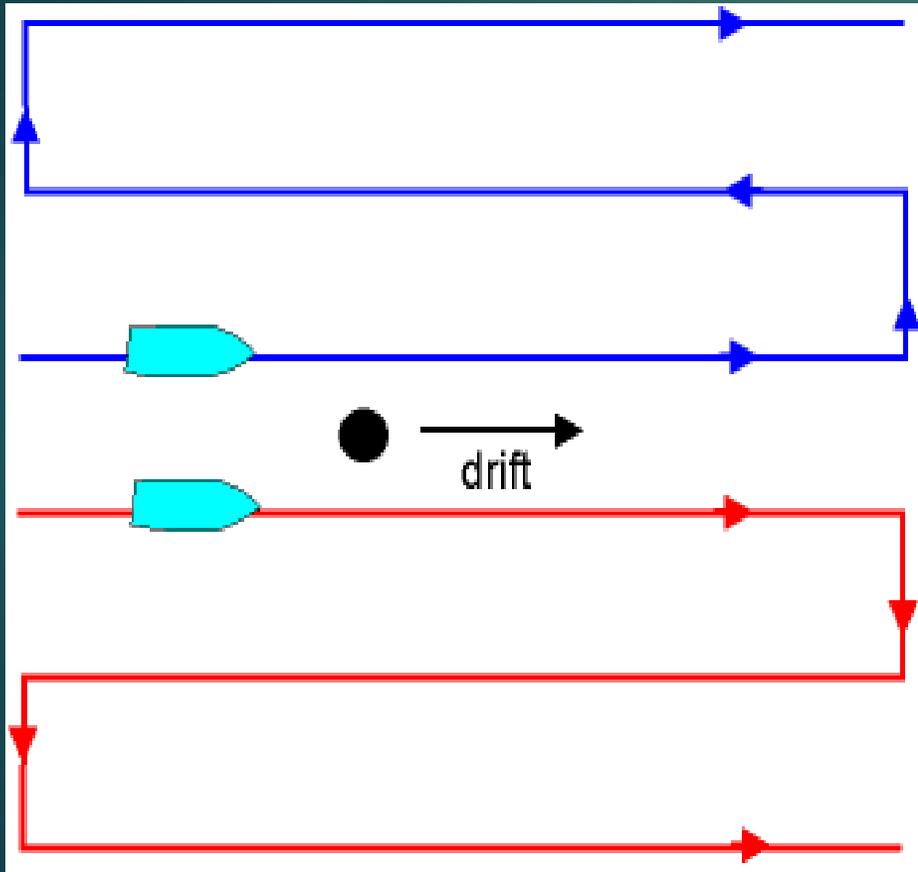
Sector search - one vessel



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



When two or more vessels are available for the search a parallel search should be made. The diagram above shows a parallel search pattern for two ships. Refer to "Annual Notices to Mariners" for more information.

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 a 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.

Vessels with a small freeboard

- ▶ 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 get injured as a result.

Vessels with a small freeboard

- ▶ 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.

Vessels with a large freeboard

- ▶ For a vessel with a large freeboard, the vessel may need to launch its lifeboat/dinghy/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 your vessels 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.

Vessels with a large freeboard

- ▶ If launching of your vessels 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 vessels 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.

Assisting another vessel in distress

- ▶ The master of a vessel has a obligation under law to render all possible assistance to any persons from or on a vessel or aircraft that are or he/she has reason to believe are in need of assistance.

Assisting another vessel in distress

- ▶ However, there are a few points that need further clarification. Your position may be 300 miles away - too far to be of practical assistance - but you may be the only vessel that has picked up the distress signal. You are required to maintain that contact, inform a coastal radio station or, if that is not possible, some other vessel that may be closer, and continue to act as a relay station for as long as required.

Assisting another vessel in distress

- ▶ Your obligation to render all possible assistance is only lifted when the distressed vessel advises you that your assistance is no longer required, either because others are already there or some other satisfactory arrangement has been made. This same release may be obtained from the master of another vessel that has reached the area or the relevant search and rescue body that has taken charge of the operation and has the situation under control.

Limits of responsibility

- ▶ The primary aim of the master of a vessel rendering assistance is saving life. In achieving this aim the best option may be to take the vessel in tow or, some other way, save it from total loss. The action taken will depend on the circumstance of the case that he/she is faced with - **but there is no legal responsibility on the master of the rescuing vessel to save property.**

In class exercise

- ▶ List the procedure for a person-missing situation.

In class exercise answer

- ▶ Search vessel. If person not found use Williamson's turn and back track along original course and begin search after determining datum. Send out Pan Pan.

Towing salvage

- ▶ As has already been mentioned, taking the distressed vessel in tow may be the best and safest method of effecting a rescue - that is your decision - but it is in no way incumbent upon you to do so. **The safety of your own vessel and her personal must be your first consideration.**
- ▶ The circumstances of the case could be that the distressed vessel is drifting rapidly onto a lee shore or reef. In this case you may need only to tow the vessel a sufficient distance away from the danger so that the personal on the distressed vessel can be transferred safely using one of the methods discussed in the following section.
- ▶ However, once the immediate safety of the vessel's personal is ensured, if you decide to tow the vessel to a port or a safe haven. Before passing a tow you should carefully consider the following points:

Towing salvage

- ▶ you should be satisfied that your vessel is large and powerful enough to handle the tow (unless your vessel is designed as a towing vessel you should not attempt to tow anything larger than a sister ship)
- ▶ decide what sort of risk there is to the safety of your own vessel
- ▶ ensure that you have sufficient fuel, with the added drag of the tow and the slow anticipated progress, to make your destination
- ▶ advise your owners of your intentions (they may well veto the operation)
- ▶ establish that the operation does not invalidate your insurance

Towing salvage

- ▶ establish beyond any argument with the master or owners of the other vessel whether the operation is a salvage or contract towing.
- ▶ With regard to the last point, this may be done between the owners ashore or between yourself and the master of the distressed vessel.

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 personal.

Rescuing persons from a vessel in distress or from a wreck

- ▶ 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.

Rescuing persons from a vessel in distress or from a wreck

- ▶ 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 personal 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 other by a strong rope.

Emergency procedures review

- ▶ Question 1: List the actions you would take to refloat your vessel if you accidentally grounded your vessel.
- ▶ Question 2: You have been given a datum point to begin a search for a ditched pilot in a single-seat liferaft. You assess the sighting distance of the survivor would be 1 ½ miles. Describe and sketch a suitable search pattern.
- ▶ Question 3: You are on watch on a 35 metre vessel at night when you see a person fall off the starboard bow. Describe the action you would take till the person is safely brought aboard.
- ▶ Discuss your responsibilities as Master in the rescue of a vessel in distress.

Emergency procedures review answers

- ▶ Question 1: Once repairs completed are completed. Attempt to refloat as soon as vessel nears flotation draft. Haul on anchor until taut, remove all added weights and/or ballast. When vessel refloats, commence hauling in the anchor until vessel is in deep water. Recover anchor
- ▶ Question 2: Expanding square search would be the most appropriate. First leg one mile, then 90° to starboard for one mile, then 90° to starboard for 2 miles, then 90° to starboard for 2 miles and etc.

Emergency procedures review

answers

- ▶ Question 3: Sound muster stations, throw over lifebuoy with a light attached, send out Pan Pan (if required). Have someone keep person in sight (if possible, otherwise keep buoy in sight). Commence Williamson's turn, turning wheel towards the person in the water and steady up on reciprocal course. If person not found immediately, stop engines, yell and listen. If found recover person, if not seek help and commence expanding square search after establishing suitable datum.
- ▶ Question 4: The master of a vessel is obligated by law to render all possible assistance to any persons from or on a vessel or aircraft that are or he/she has reason to believe are in need of assistance.



Master's duties

Official logbooks and record books

- ▶ The number and type of records you will need to keep on board will depend on the **size, function and area of operation** of the vessel.
- ▶ Generally, all unlimited sea-going vessels, limited sea-going vessels of 35 metres and over and restricted sea-going vessels 50 metres and over, must keep an Official Log Book. Most others are required to keep a Vessel Record Book save those operating in smooth or partially smooth water. Even then it would be usual and sensible to record the main events of the day.

Official logbooks and record books

- ▶ Other types of records, which all vessels should maintain, include Engine Room and Vessel's Radio Logs. Vessels engaged in cargo handling are also required to keep a record of all of the lifting equipment in a 'gear' or 'cargo register'. Details in such a register would include date of purchase, test certificates, SWL, inspections, repairs etc. You will go further into these types of records in the appropriate sections.
- ▶ There are many reasons why the keeping of accurate records is important.

Official logbooks and record books

- ▶ In court proceedings, entries in the Official Log Book are admissible as evidence and may be accepted as proof of an offence or occurrence in the absence of contrary evidence. It is therefore essential that all entries are made in the correct manner, within the prescribed period and are signed and witnessed.
- ▶ All accurate details of incidents recorded at the time of the event will assist in later investigations and in the preparation of reports and insurance claims.
- ▶ Daily records of crew, passengers carried, weather etc. can help in making future business plans.
- ▶ Accurate engine room records are essential for planned preventative maintenance and trouble shooting.

Vessel record books

- ▶ The entries to be made in the vessel record book should include but are not limited to:
- ▶ the date and time of arrivals and departures at each port of call or destination;
- ▶ any deaths and disappearances
- ▶ illness or injury of persons on board
- ▶ emergency procedures and drills
- ▶ details of any casualty to the vessel

Vessel record books

- ▶ details of any assistance given to another vessel
- ▶ details of engine running and maintenance of machinery and equipment.
- ▶ Entries are to be made as soon as possible after the occurrence to which they relate. The date and time of the entry should be evident and all entries must be signed.
- ▶ In the event of a vessel being lost or abandoned the vessel record book is to be sent to a Superintendent/Authority as soon as possible. If practicable, all entries should be made out to the time of loss or abandonment.
- ▶ The Master is required to produce the Vessel Record Book, for inspection when requested by the Authority.
- ▶ It is an offence to:

Vessel record books

- ▶ willfully destroy the Vessel Record Book, or an entry in it
- ▶ willfully render illegible an entry
- ▶ willfully make a false entry or an omission
- ▶ sign an entry knowing it to be false.
- ▶ As can be seen, this is a much more informal record of the days events and is often kept in a one page per day diary. There are no limits to the number and type of entries made but once again they should be accurate and reflect the entire events of the day.
- ▶ Other information that is often found in a Vessel Record Book would include:
 - ▶ names of crew and passenger numbers
 - ▶ weather conditions

Vessel record books

- ▶ departures from normal routine.
- ▶ Specific pages can be set aside for use as your:
 - ▶ radio log
 - ▶ compass checks - record of deviation errors
 - ▶ summary of musters and drills held.
- ▶ Details of exact times and sequences of events can be easily confused with the passage of time. Always make a detailed record of any incident, check the facts, and if necessary have the entry witnessed. This may help to protect you at a later date, but remember it is an offence to make a false entry or to omit facts that should have been included.

Marine casualties

- ▶ State and Territory legislation concerning Marine Casualties may vary slightly and can be referred to by another term (in Queensland the Marine Safety Act 1994 refers to a 'marine incident'). You are required to consult your local legislation for specific detail, but generally a 'casualty' or 'incident' is deemed to have occurred when:
 - ▶ a vessel is lost, abandoned, stranded, grounded, or materially damaged (whether by fire or otherwise), or has been in a collision with another vessel or with any other thing;
 - ▶ there is a loss of life or injury to a person due to an accident occurring on a vessel.

Marine casualties

- ▶ No matter how minor you may consider the grounding, fire, injury etc. to be, you must still follow the procedures of recording and reporting as:
- ▶ you are not qualified to assess damage done to your vessel
- ▶ there could be legal ramifications at a later date which could leave you unprotected.

Action to take in a collision with another vessel

- ▶ The Masters of each vessel involved must, without further endangering his vessel or persons on board:
- ▶ render all help necessary to the other vessel to save them from danger caused by the collision
- ▶ stand by until the other vessel requires no further help
- ▶ provide the other Master with sufficient particulars to allow identification of your vessel and its owners
- ▶ obtain the above information for your own records. The type of information sought would include the vessel's name and port of registry and the names of the ports from which the vessel sailed and to which it is bound. From that the Authorities will be able to ascertain all the other information required.

Action to be taken in all casualties or incidents

- ▶ If appropriate, sound muster stations and initiate emergency procedures. **This is when you will know if your drills have been effective!**
- ▶ Take whatever action you deem necessary as per your planned responses to minimise the danger while noting the chronological order of all the events leading up to and during the incident.

Action to be taken in all casualties or incidents

- ▶ Make a detailed entry into your Official Log Book/Record Book noting times, actions taken, response of other vessel, weather and visibility details, etc. These details will be required to substantiate reports, insurance claims and will be invaluable if the incident leads to an official investigation.
- ▶ Make a full written report to the appropriate authority at the earliest opportunity. (Maximum 48 hours after arrival in port in most States - 24 hours in Tasmania).
- ▶ Failure to fulfill your obligations can result in fines and failure to offer assistance to another vessel in a collision can lead to imprisonment.

Lifesaving equipment

- ▶ Items requiring specific attention include:
- ▶ inflatable liferafts
- ▶ pyrotechnics
- ▶ fire fighting equipment
- ▶ miscellaneous equipment.

Inflatable liferafts

- ▶ Liferafts are supplied with survey certificates. The hydrostatic release is supplied with its own certificate. Every year the liferaft is to be landed ashore and sent to approved service centre, where they are inspected. All deficiencies are made good and the liferaft is repacked and reissued a new certificate. In exceptional cases where it is impracticable for the liferaft to be serviced annually, the appropriate Authority may extend the validity of the certificate for periods of up to 5 months. Application must be made in writing prior to the expiry date.

Pyrotechnics

- ▶ All pyrotechnics required to be carried by a vessel have to be properly packed and stowed and maintained in good condition at all times. This usually translates into keeping the pyrotechnics in a watertight container, properly marked and stowed in an easily accessible position.
- ▶ If the pyrotechnics have been maintained as above they are accepted as complying with the requirements for the following periods:
 - ▶ Vessel and Lifeboat/Liferaft Pyrotechnics - 3 years from date of manufacture.
 - ▶ Lifebuoy Smoke Signal - 3 years from date of manufacture.
 - ▶ Lifeboat Buoyant Smoke Signals - 3 years from date of manufacture.

Fire fighting equipment

- ▶ All of your fire equipment must be kept fully charged and operational at all times. This means that if any of it is used at any time it must be recharged immediately. Replacement equipment must be brought on board if any is taken away for recharging or testing. Regardless of usage, each different type of extinguisher must be recharged at nominated intervals. All containers must be tested by hydraulic pressure to within 345 kilopascals of the pressure they were tested at the time of manufacture every 5 years.
- ▶ To ensure that your appliances comply it is necessary for them to be covered by Annual Test Certificate, which can only be issued by a body or firm, approved by the appropriate Authority.
- ▶ Inspection of all equipment should form part of your regular fire drills.

Miscellaneous equipment

magnetic compass

- ▶ Refer to **NSCV PART C SUB-SECTION 7C – NAVIGATION EQUIPMENT** for detailed requirements.

Adjustment

The compass/compasses fitted on a vessel are to be adjusted by a licensed adjuster of compasses before an initial Certificate of Survey is issued for that vessel.

Miscellaneous equipment

Thereafter vessels are required to have their compass/compasses adjusted b) an adjuster of compasses at intervals not exceeding 3 years, and on any other occasion, if:

- the vessel has undergone repairs or alterations which are likely to effect the accuracy of the compass
- the compass of the vessel is unsatisfactory or unreliable, in the opinion of the appropriate Authority
- the compass/compasses are replaced.

Miscellaneous equipment

If for any reason, the appropriate Authority determines that a compass adjustment is not required or that it can be deferred without detriment to the vessel, the appropriate Authority may exempt the vessel from compass adjustment for such period as the appropriate Authority may determine, if for example, you keep accurate and comprehensive records of compass checks in your log which show no change in deviation from that of your issued deviation card, you could be exempted.

The deviation card issued by an approved compass adjuster has to be displayed at all times in the wheelhouse of the vessel.

Miscellaneous equipment

- ▶ LPG Gas All gas installations must be inspected annually by a licensed and approved gas fitter and an appropriate safety certificate issued. Such an inspection would cover gas bottles, pipe work, safety valves and all appliances.

Towage

- ▶ 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.

Salvage

- ▶ Salvage is covered under Australian Federal Law - **NAVIGATION ACT 2012 - SECT 241**
- ▶ 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 eminent 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

Salvage

- ▶ the services must be successful in saving or helping to save the property at risk.
- ▶ 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.
- ▶ Before the Master of a vessel engages in salvage he should consider the following factors, amongst others.
- ▶ The Master should ensure that he does not endanger his own vessel or his crew in the subsequent operation.
- ▶ The Master should be totally satisfied that his endeavours will lead to success.

Salvage

- ▶ The Master should advise his owners of his intention to salvage.
- ▶ The Master should establish that the operation does not invalidate the insurance of his vessel.
- ▶ The Master should inform his charterers and check for the "Deviation Clause" in his Charter Party or Bills of Lading.
- ▶ 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.

Salvage

- ▶ 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".

Advantages of "LOF80"

- ▶ To the salvor: •It is prima facie evidence of the nature of the service to be rendered preventing the owner from contesting the claim on the basis that the property was not maritime, not in danger or that the salvor was not a volunteer.
- ▶ •It provides for disputes to be settled by arbitration.
- ▶ •Provides for out of pocket expenses incurred rendering the service to be paid almost immediately.
- ▶ • Provides that the salvor will not exercise his maritime lien for 14 days if in this time the owners of the property put up bail. This saves the cost of arresting the vessel and provides a bail fund to which the salvor alone has access.

Advantages of "LOF80"

- ▶ • The agreement is reached quickly and the reward arrived at fairly by arbitration.
- ▶
- ▶ To the owners of salvaged property: • Prevents unsuccessful salvors claiming payment under the guise of a towage or hiring agreement.
- ▶ • Benefit by the arbitration provisions in the same way as the salvor.
- ▶ • Avoids loss of earnings by property being arrested provided they put up the bail within 14 days.

Signing the agreement

- ▶ At the time of entering into agreement it is not necessary nor is it usual, to physically sign the "LOF 80" form so long as there is good evidence that the parties have agreed to carry out the salvage under this form of agreement.
- ▶ It is sufficient for a simple agreement on a sheet of paper to be signed stating that the services are to be rendered under the terms of "LOF 80". Even a witnessed Log entry would suffice.
- ▶ At the time of contracting it is important to obtain a clear and unambiguous agreement on a Place of Safety, as this will be used as a measure of success of the operation.

Salvage fund

- ▶ For any remuneration to be paid something of tangible value must have been saved from which to generate a salvage fund. The ultimate value of this fund will depend on the following criteria:
- ▶ the sound market value of the vessel at the time of becoming a casualty, less the cost of repairs
- ▶ the value of all cargo saved
- ▶ the value of any remaining bunkers.
- ▶ In no case can the final award paid exceed the value of the salvaged property. In determining the amount of remuneration to be paid to salvors, the following factors are mainly taken into account:
- ▶ the value of the property saved

Salvage fund

- ▶ the skill and efforts of the salvors
- ▶ the actions and skill of the salvors in preventing and/or minimising pollution and any threat to the environment
- ▶ the measure of success obtained by the salvor
- ▶ the nature and degree of danger involved
- ▶ time used and expenses/losses incurred
- ▶ the risks to equipment
- ▶ the promptness of the service rendered
- ▶ the efficiency of the salvor's equipment.

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 the salvage award.

Master's duties summary

- ▶ This section has attempted to put into perspective your duties as Master with respect to various pieces of legislation. As you have no doubt concluded, things can get pretty confusing. The amount of legislation, its changing nature and the differences between State and Territory and Commonwealth rules and regulations add to our woes.
- ▶ Unfortunately, ignorance is not bliss! It is essential that you have a good working knowledge of any legislation that affects your activities so as not to fall foul of the law.
- ▶ It has not been possible to provide you with all of the answers, so you are now left with the basics to help further your research of relevant State/Territory legislation. It will be a continuing project!
- ▶ Good luck!

In class exercise

- ▶ Question 1: Outline the requirements for Log/Record Book entries regarding musters and drills.
- ▶ Question 2: Should you make an error while making an entry into a Log/Record Book, how would you correct it?
- ▶ Question 3: What information must you supply to the Master of the other vessel in the event of a collision?
- ▶ Question 4: What 'casualties' or 'incidents' must be reported to the Authority?
- ▶ Question 5: How often do life rafts require survey checks?
- ▶ Question 6: Can an extension be gained on this time?
- ▶ Question 7: How often do pyrotechnics need to be replaced?

In class exercise

- ▶ Question 8: State the pressure test interval for water, foam and dry chemical fire extinguishers.
- ▶ Question 9: Assuming no major changes or damage to the vessel, how often does a magnetic compass have to be 'swung'?
- ▶ Question 10: Gas installations require a safety inspection every?

In class exercise answers

- ▶ Question 1: The details of all drills and safety procedures carried out must be entered in the LOG/Record Book. Should a scheduled drill not have been carried out due to weather or other reasons, these reasons must be noted in the log and the drill carried out as soon as practical after the cancellation.
- ▶ Question 2: Cancel the entry by drawing a line through it while leaving it legible. Sign the correction.
- ▶ Question 3: Sufficient to allow identification of your vessel and its owners.
- ▶ Question 4: All incidents, however minor.
- ▶ Question 5: Annually.

In class exercise answers

- ▶ Question 6: Yes, for a period of 3 months.
- ▶ Question 7: Every 3 years. The date of manufacture and expiry date are stamped on them.
- ▶ Question 8: 5 years.
- ▶ Question 9: Every 3 years.
- ▶ Question 10: 1 year.

Signals



Morse signalling

- ▶ Morse signalling is carried out by flashing a light, sound or flags. The symbols, which represent letters, are expressed by two elements called a dot (short) and a dash (long) signalled singly or in combination. The procedure for Morse signalling and the code itself is listed in the International Code of Signals, which is produced by the International Maritime Organisation.
- ▶ At sea, the most common method of signalling by "flashing" is by using an "Aldis" lamp. An "Aldis" lamp looks like a car headlight except that it cylindrical. It is held in the hand and the light directed toward the other vessel through a sight. The flashes are initiated by a trigger action. They can be used by day or night; the more powerful ones have a daylight range of about 8 miles. In an emergency any light source can be used such as a torch or searchlight or whatever.

Morse signalling

Alfa • —

Bravo — • • •

Charlie — • — •

Delta — • •

Echo •

Foxtrot • • — •

Golf — — •

Hotel • • • •

India • •

Juliet • — — —

Kilo — • —

Lima • — • •

Mike — —

November — •

Oscar — — —

Papa • — — •

Quebec — — • —

Romeo • — •

Sierra • • •

Tango —

Uniform • • —

Victor • • • —

Whisky • — —

Xray — • • —

Yankee — • — —

Zulu — — • •

1 • — — — —

2 • • — — —

3 • • • — —

4 • • • • —

5 • • • • •

6 — • • • •

7 — — • • •

8 — — — • •

9 — — — — •

0 — — — — —

How to learn morse code

- ▶ A 'dot' is considered to be one unit and a 'dash' to three units. That means that a 'dash' when flashed or sounded is three times as long as a 'dot'. The pause between each 'dot' and 'dash' is one unit: between each letter is three units, and between each word is seven units.
- ▶ **Learn the individual letters in-groups as shown next.**

How to learn morse code

- ▶ 1 T, M, O
- ▶ 2 E, I, S, H
- ▶ 3 A, U, V
- ▶ 4 N, D, B
- ▶ 5 A, W, J
- ▶ 6 C, K, P, G
- ▶ 7 R, L, Q, Z
- ▶ 8 F, X, Y
- ▶ 9 figures 0 to 9

How to learn morse code

- ▶ **Learn one column at a time before proceeding to the next column.**
- ▶ It is best to learn Morse with at least one other person. When practising 'flashing' it is best to have a third person to write down each letter as the reader calls it out. Where a partner cannot be found it's possible to learn to recognise the different letters by "flashing" into a mirror and watching the reflection. As always practise makes perfect. One day your very life may depend on being able to recognise a single 'flashed' letter such as U, (you are running into danger).

Phonetic alphabet

- ▶ The Phonetic alphabet was designed for the pronunciation of letters and figures by radiotelephony or voice over the loud hailer. Each letter of the alphabet is given a code word that starts with the same letter. These words are pronounced in such a fashion that they cannot be mistaken.
- ▶ This phonetic alphabet is found in the "International Code of Signals" and also in the "Handbook for Radiotelephone Vessel Station Operators".
- ▶ Note: There are two versions of "International Code of Signals" one produced in Britain and the other in the United States. As you would expect the two versions are arranged differently.

Phonetic alphabet

- ▶ Use the phonetic alphabet whenever you are required to spell a word. Remember practise makes perfect. Continued use of it will make you proficient.

Phonetic alphabet

Phonetic Alphabet

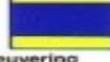
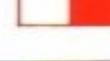
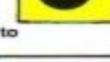
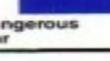
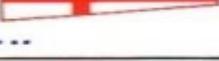
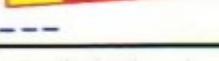
A - alpha	N - november
B - bravo	O - oscar
C - charlie	P - papa
D - delta	Q - quebec
E - echo	R - romeo
F - foxtrot	S - sierra
G - golf	T - tango
H - hotel	U - uniform
I - india	V - victor
J - juliet	W - whiskey
K - kilo	X - x-ray
L - lima	Y - yankee
M - mike	Z - zulu

Single flag meanings

- ▶ The single letter flags used for signalling have individual meanings. These flags may be hoisted individually to indicate their meaning or in a group, to be decoded using the International Code of Signals.

INTERNATIONAL CODE FLAGS AND PENNANTS

WITH MEANINGS

ALPHABET FLAGS			
ALFA -- Have diver down, keep clear		KILO --- Wish to communicate	UNIFORM --- You are running into danger
BRAVO --- Dangerous goods		LIMA --- Stop instantly	VICTOR --- Require assistance
CHARLIE --- Yes		MIKE --- My vessel is stopped making no way	WHISKEY --- Require medical Assistance
DELTA --- Keep clear, maneuvering with difficulty		NOVEMBER -- No	XRAY --- Stop your intentions, Watch for signals
ECHO - Altering course to Starboard		OSCAR --- Man overboard	YANKEE --- Dragging my anchor
FOXTROT --- Disabled, communicate with me		PAPA --- In harbour: All persons report on board	ZULU --- Require a Tug Fishing: Shooting nets
GOLF --- Require a pilot Fishing: Hauling nets		QUEBEC --- Request free pratigue	SUBSTITUTES
HOTEL --- Pilot on board		ROMEO --- .	1st 
INDIA .. Altering course to Port		SIERRA --- Engines going astern	2nd 
JULIETT --- On Fire, have dangerous cargo, keep clear		TANGO - Keep clear, engaged in pair trawling	3rd 
			7 
			8 
			9 
			0 

International code of signals

- ▶ The International Code of Signals also contains meanings for signals using more than one flag in the hoist. The purpose of the Code is to provide ways and means of communicating in situations relating to safety of navigation and persons, especially when language difficulties arise.
- ▶ The material in the 'International Code of Signals' is arranged according to the subject and meaning in the following order:
 - ▶ 1. Single-letter signals.
 - ▶ 2. Single-letter signals used with conjunction with numerals.
 - ▶ 3. Single-letter signals to be used when operating with Icebreakers.

International code of signals

- ▶ 4. Two-letter signals supplemented if necessary with a numeral.
- ▶ 5. A table of complements which can be used with one or two-letter signals.
- ▶ 6. Three letter signals.
 - ▶ • Single-letter signals are allocated to signification's, which are urgent, important, or of very common use.
 - ▶ • Two-letter signals are from the general section.
 - ▶ • Three-letter signals beginning with M are from the Medical Section.

International code of signals

- ▶ The code follows the basic principle that each code should have a complete meaning; in certain cases complements are used when necessary to supplement the available groups. Complements express variations in the meaning of the signal. For example:
 - ▶ TE I am bottom trawling
 - ▶ TE1 I am trawling with a floating trawl

International code of signals

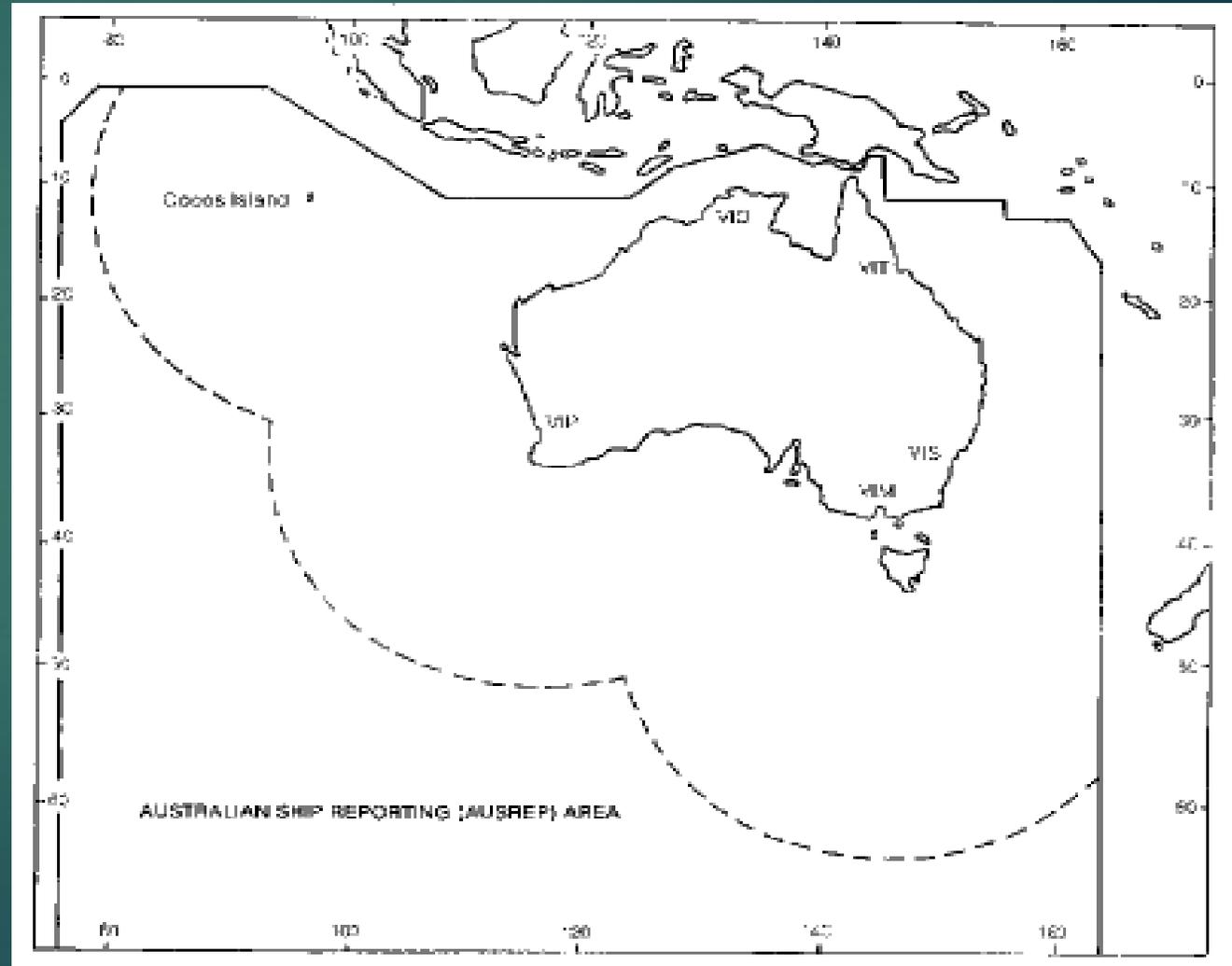
- ▶ To be able to hoist signals from the International Code of Signals you will require at least 26 alphabetical flags, 10 numerical flags, 3 substitutes and an answering pendant onboard. Detailed instructions for signalling by flags are given in the 'International Code of Signals

Search and rescue

- ▶ **For the latest information on SAR in Australia be sure to consult the current "Annual Australian Notices to Mariners".**

Search and rescue

- ▶ The oceans of the world have been divided into 13 areas for **SAR** purposes; the Australian area of responsibility is designated as **NAVAREA X**.



Search and rescue

- ▶ On 1 July 1997, a new Commonwealth civil search and rescue organisation, **AusSAR** was established. **AusSAR** is a discrete business unit of the Australian Maritime Safety Authority (**AMSA**) and has assumed responsibility for both aviation and maritime search and rescue.
- ▶ When a vessel or an aircraft is in distress in the Australian Search and Rescue Region (**SRR**), assistance may be given by ships in the vicinity and/or the following authorities may give assistance:

Search and rescue

- ▶ **AMSA** through **AusSAR**, specifically the the Rescue Co-ordination Centre Australia (**RCC Australia**) is responsible for **SAR** for all civil aircraft, for merchant ships outside port limits and for small craft beyond the capacity of local **SAR** resources. **RCC Australia** is located in Canberra and co-ordinates aircraft and surface vessels involved in **SAR** operations within the Australian (**SRR**). **RCC Australian** is also the Australian Mission Control Centre (**AUMCC**) for the International **COSPAS/SARSAT** distress beacon detection system. **RCC Australia**, which is manned continuously, may be contacted through any Australian Coastal Radio Station (**CRS**) or **INMARSAT**.

Search and rescue

- ▶ Limited Coastal Radio Stations (**LCRS**) keep watch on the International RTF distress frequencies. The INMARSAT Land Earth Station (**LES**) at Perth provides communications through both the Indian Ocean Region (**IOR**) and Pacific Ocean Region (**POP**) satellites. Details of **Australian Maritime Communications Stations (MCS)** can be found in relevant Admiralty List of Radio Signals and International Telecommunications Union publications.
- ▶ Royal Australian Air Force (**RAAF**) is responsible for **SAR** operations involving Australian and foreign military land-based aircraft: but may provide assistance to other **SAR** authorities.

Search and rescue

- ▶ Royal Australian Navy (**RAN**) is responsible for **SAR** in respect of naval ships and shipborne aircraft, but may provide assistance to other **SAR** authorities.
- ▶ State and Territory Police Forces are responsible for **SAR** operations involving fishing vessels and pleasure craft within the limitations of their **SAR** resources.
- ▶ Vessels fitted with suitable radio equipment can make a significant contribution to safety by guarding an appropriate International distress frequency for as long as practicable whether or not it is required to do so by the regulations

Merchant ship search and rescue

- ▶ Guidance for Masters involved in SAR operations is contained in the International Aeronautical and Maritime Search and Rescue Manual (**IAMSAR**) Volume III. It is a SOLAS requirement that mariners carry a copy of **IAMSAR** Volume III for guidance during **SAR** operations.

Obligation to render assistance

- ▶ **Under the international Convention for the Safety of Life at Sea 1974 and the Australian Navigation Act, the Master of a ship at sea is bound to render assistance in distress situations unless he considers it unreasonable or unnecessary to do so.**

Assistance by SAR aircraft

- ▶ Aircraft (other than helicopters) employed on search and rescue duties usually carry droppable survival equipment and marine markers. These aircraft may be able to assist a vessel in distress by confirming location, marking position, dropping survival equipment or directing rescue vessels to the area.
- ▶ Droppable equipment may consist of life rafts with bright yellow or orange buoyant rope attached or heliboxes containing survival equipment.
- ▶ Australia maintains no dedicated **SAR** aircraft, but semi-dedicated aircraft and helicopters may be available at short notice. Where possible aircraft will be equipped with **VHF** Direction Finding, equipment for the location of **EPIRB** transmissions.

Assistance by SAR aircraft

- ▶ To assist in recognition by aircraft, the position of the vessel should be given as accurately as possible. When time permits, a description of the ship, including any unusual features, colour of hull, funnel and superstructure should be given.

Use of helicopters

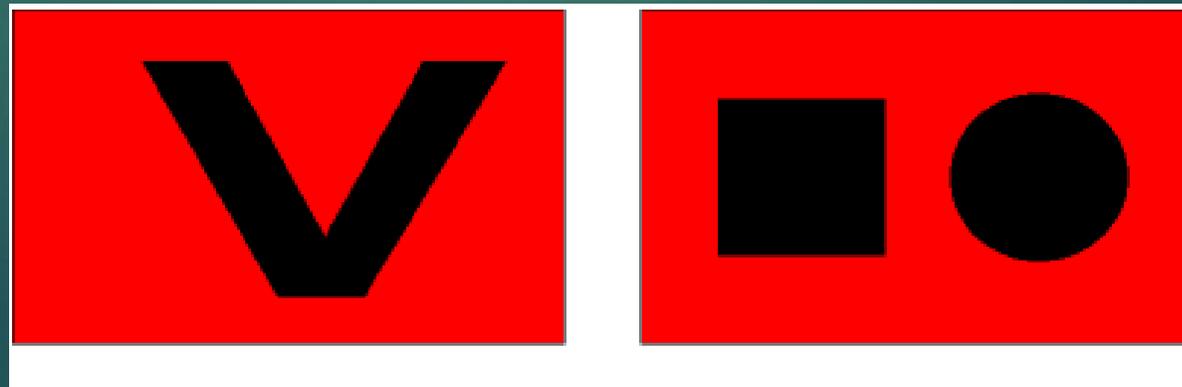
- ▶ Helicopter assistance in the Australian **SRR** is generally limited by relatively short ranges and low operating speeds. Helicopters may be used to supply equipment and/or rescue or evacuate personnel. Advice concerning helicopter-ship operations is contained in **MERSAR** and **IAMSAR** or may be sought from **RCC** Australia.
- ▶ On no account should the strop or winch wire, when lowered from the helicopter to the vessel, be secured to any part of the vessel or allowed to become entangled with any rigging or fixtures.

Use of helicopters

- ▶ Where a helicopter is unable to safely operate over the deck of a ship, the helicopter may be able to lift a man from a boat or raft towed astern on a long painter. In bad weather, survivors are sometimes more easily recovered from the sea than the ship itself, particularly if it is a yacht.
- ▶ If a ship wishes to contact a helicopter during a **SAR** operation it may do so by visual signals, direct radio communication (if the correct type of radio is carried), or through **RCC** Australia.

Distress signals for SAR

- ▶ Searching aircraft frequently experience difficulty in locating small vessels to help overcome this problem in the Australian SRR area either of the two signals illustrated below may be used to indicate a vessel in distress requiring assistance. These signals are not meant to replace pyrotechnic signals already carried by small craft, but should be carried in addition to those signals.
- ▶ These signals are supplementary to the international distress signals and if possible, the international signal NC (i.e. flag N over flag C) should be hoisted.



Use of ships in assisting aircraft

- ▶ Aircraft, which ditch in the sea generally, remain afloat for only a short time. In view of this, Masters of ships proceeding to assist should do so with the greatest possible speed.
- ▶ Merchant ships may receive information of distress on any of the internationally recognised RTF distress frequencies or by **TOR**, **INMARSAT** or **RADPHONE**. Additionally, information may be received by visual signals from a distress aircraft, by an aircraft directing a vessel to the location of a distress or by signals emanating from survivors. Further advice concerning action to be taken in any of these eventualities can be found in **MERSAR** or **IAMSAR**.

Use of ships in assisting aircraft

- ▶ All information concerning an aircraft in distress at sea is to be passed to the **RCC Australia** by the most expedient method; further action will then initiated shore authorities. Where possible, if **DF** equipment is fitted, bearings of any radio signal should be obtained.

Communications with aircraft searching for survivors

- ▶ An aircraft engaged on **SAR** operations would be briefed to listen on a specified frequency and merchant ships will be advised by the **RCC Australia** of the frequency adopted.
- ▶ In the absence of specific advice, the primary air/sea communications frequency is **156.8 MHz (Channel 16)**. If aircraft are not fitted with Channel 16, the secondary frequency of **4125 kHz** may be used.

Communications with aircraft searching for survivors

- ▶ When it is necessary for an aircraft to direct a surface craft to the place of distress the aircraft may do so by transmitting precise instructions by any means at its disposal. If such instructions cannot be transmitted, or if considered desirable for any other reasons the following manoeuvres performed in sequence means that the aircraft wishes to direct a surface craft towards a distress position:
- ▶ Circling the surface craft at least once.
- ▶ Crossing the projected course of the surface craft close ahead at low altitude and:
 - ▶ rocking the wings or
 - ▶ opening and closing the throttle, or

Communications with aircraft searching for survivors

- ▶ changing the propeller pitch.
- ▶ **Note:** Due to high noise level on board surface craft, the sound signals in (2) and (3) may be less effective than the visual signal in (1) and are regarded as alternative means of attracting attention. Repetition of such manoeuvres has the same meaning.
- ▶ Heading in the direction in which the surface craft is to be directed.
- ▶ A vessel receiving the above signals should reply in the following manner: ·
- ▶ When acknowledging receipt of the signals:
 - ▶ hoist the "ANSWERING" pendant close up, or
 - ▶ flash the Morse Code procedure signal "T" by light, or

Communications with aircraft searching for survivors

- ▶ change heading onto the indicated direction.
- ▶ When indicating inability to comply:
 - ▶ hoist the international flag "N (NOVEMBER), or
 - ▶ flash the Morse Code procedure signal "N" by light.
- ▶ The following manoeuvre by an aircraft means that the assistance of the surface craft to which the signal is directed is no longer required: crossing the wake of the surface craft close astern at low altitude, and:
 - ▶ rocking the wings or
 - ▶ opening and closing the throttle, or
 - ▶ changing the propeller pitch.

Night search by aircraft

- ▶ An aircraft searching at night for pyrotechnic equipped survivors or small craft will either fire a green flare or, in the case of non military aircraft, switch on landing lights at three to five minute intervals and at each turning point in the search pattern. Survivors in the area should see at least two successive signals. Aircraft crew will acknowledge the sighting of distress flares by firing a succession of green flares and/or switching on the aircraft's landing lights.

Response action by survivors

- ▶ Survivors can assist in their detection by a searching aircraft if optimum use is made of what ever pyrotechnics they have available. A flare should not be fired until after the aircraft's signal has ended. A second flare should not be fired until a full minute after the first flare. When the aircraft is about a mile away a further flare should be fired.
- ▶ To increase the chances of being located, survivors should always attempt to maintain a continuous all-round visual lookout at night, as well as by day.

GMDSS

- ▶ **To obtain the latest information regarding GMDSS in Australia be sure to consult the current "Annual Australian Notices to Mariners".**
- ▶ The Global Maritime Distress and Safety System (**GMDSS**) came into effect on 1 February 1992. All ships over 300 gross tonnes on international voyages, and hence subject to the convention, have been required to comply with carriage requirements of the GMDSS system since 1st February 1999.

GMDSS

- ▶ Australia's maritime area (search and rescue region, and Navarea X) has been declared a **GMDSS 'A3'** area; that is for distress and safety purposes the area will be supported by both satellite and **HF** terrestrial radio services. The Australian GMDSS HF DSC network is provided by the Commonwealth with stations located at Charleville Queensland and Wiluna Western Australia, and controlled from a single manned network control centre located in Canberra. (**MMSI 005030001**). The network will serve commercial vessels to which the **SOLAS** Convention applies and be accessible to other non-SOLAS vessels such as fishing vessels and pleasure craft provided they fit compatible radio equipment.

GMDSS

- ▶ Australia operates **INMARSAT** Land Earth Stations (**LES**) located in Perth and linked to both the Pacific Ocean Region (**POR**) and Indian Ocean Region (**IOR**) satellites. Communications via these satellites include distress priority channels and a Safety NET service for Maritime Safety Information (**MSI**) using enhanced group calling (**EGC**). The Safety NET service enables vessels to automatically receive Marine Safety Information (**MSI**) appropriate to their area of operation.
- ▶ The Perth (**LES**) is fitted with a digital receiver processor to accept data from satellite Inmarsat E Emergency Position Indicating Radio Beacons (**EPIRBs**) transmitting in the L-band (**1.6 GHz**) and relayed through **INMARSAT** satellites.

GMDSS

- ▶ **Inmarsat E Beacons will be withdrawn from service in December 2006.**
- ▶ Australia is associated with the international **COSPAS/SARSAT** system as a Ground Segment Provider. This satellite system is designed to assist search and rescue operations using **EPIRBs** operating on **both 121.5 /243 MHz** EPIRB's and **406 MHz** EPIRB's, and providing alert and location data to rescue coordination centres (**RCC**). The regional ground segment includes satellite data receiving antennas and processing equipment located at Cave Point, Albany (Western Australia), Bundaberg (Queensland) and Wellington, (New Zealand). These provide data to the Mission Control Centre, which is located at the RCC in Canberra.

GMDSS

- ▶ **121.5/243 MHz Epirb's will be withdrawn from service on 1st February 2009.**
- ▶ HF distress and safety services for SOLAS equipped vessel's is provided by AMSA based in Canberra with stations at Wiluna, (WA) and Charlwille (QLD), by two means HF Digital Selective Calling (DSC) and HF Narrow Band Direct Printing (NBDP) after initial contact is made by a DSC call..
- ▶ MSI (Maritime Safety Information) services are provided by INMARSAT- C only by EGC (Enhanced Group Calling)..

GMDSS

- ▶ **HF DSC.** Canberra, station/network identifier **RCC Australia** using the callsign **VICTOR JULIETT CHARLIE**, (MMSI 005030001) maintains a continuous watch on the following DSC distress and safety channels. These are **4207.5, 6312.0, 8414.5, 12577.0 and 16804.5 kHz** It should be noted that AMSA HF and NBDP networks can only be accessed by making the initial contact by DSC.
- ▶ **No aural (voice) watch is kept on the HF radio telephony distress and safety frequencies.**

HF NBDP. RCC Australia are capable of operation on the following NBDP distress and safety channels. These are **4177.5, 6268.0, 8376.5, 12520.0 and 16695.0 kHz.**

GMDSS

- ▶ HF distress and safety services are provided for non-SOLAS vessels through Limited Coast Radio Stations (LCRS) and Maritime Rescue Stations (MRS) in the Inshore Boating Radio Service. Stations monitored are **4125 kHz, 6215 kHz and 8291 kHz**. Navigation warnings (MSI) will be broadcast twice daily on **8176 kHz** and at other times if urgent

Use of emergency position indicating radio beacons (EPIRB's)

- ▶ The **AUMCC** is the regional Nodal Mission Control Centre for the **COSPAS/SARSAT** satellite distress beacon detection system.
- ▶ The COSPAS/SARSAT system is capable of detecting two types of EPIRB's. EPIRB's operating on 406 MHz are detectable throughout the whole of the Australian SRR area with a high degree of accuracy

Use of emergency position indicating radio beacons (EPIRB's)

- ▶ Satellite compatible EPIRBs operating on 121.5 and/or 243 MHz are also detectable, but with a slightly lesser degree of accuracy. With the older type of beacons operating at 121.5 MHz, the system coverage is neither global nor continuous because detection of the distress depends on the ground receiving station being in the satellite field of view at the same time that the satellite receives the beacon signal. Ground antennas are at Albany (Western Australia) and Bundaberg (Queensland) Wellington (New Zealand) giving excellent coverage around the coast of Australia and in the Coral and Tasman Seas, but decreasing coverage towards the mid-Indian Ocean region.

Use of emergency position indicating radio beacons (EPIRB's)

- ▶ EPIRBs should be switched on as soon as a distress situation occurs and **MUST REMAIN SWITCHED ON** until the rescue is concluded or until otherwise instructed by the rescue unit or rescue authority.
- ▶ Should inadvertent or accidental operation of an EPIRB occur, the beacon must be switched off and every effort made immediately to inform RCC Australia through CRS, INMARSAT, relay via another vessel or any other means of communication. The report should include the position, and if known, the time of activation.
- ▶ **No action will be taken against any person reporting the inadvertent or accidental operation of an EPIRB.**

Use of emergency position indicating radio beacons (EPIRB's)

- ▶ In an emergency the **406 MHz EPIRB** should be activated as soon as possible as it provides global coverage. Global coverage is achieved due to the fact that even if the satellite does not have both the LUT and the EPIRB in sight at the same time, it will store the message received from the EPIRB till it comes across the next LUT, anywhere in the world, and then downland the information to it. That LUT will get in touch with the RCC closest to the emergency.
- ▶ The operation of the EPIRB is easy. The instructions are printed on the side for clarification. To activate most EPIRBs' it will be necessary to extend the antenna, which in turn moves the disc that is preventing the switch from being accidentally activated. Flick the switch to the "ON" position and a light will come on. This light is the only indication that the EPIRB is transmitting.

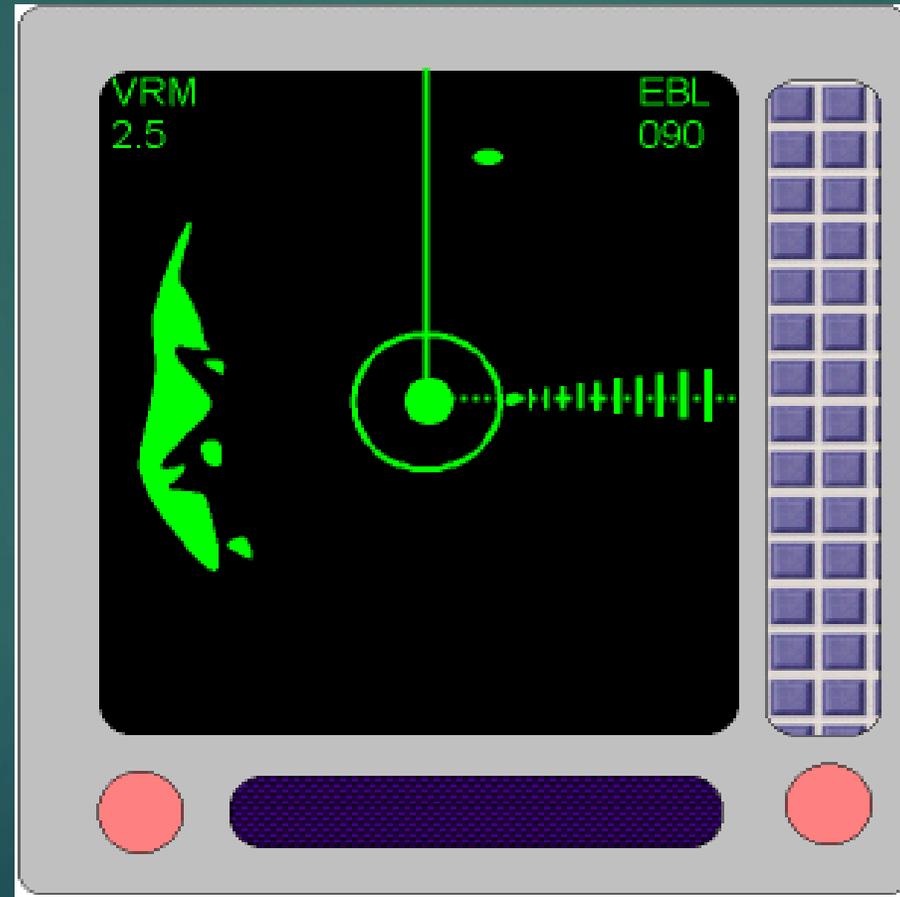
Use of emergency position indicating radio beacons (EPIRB's)

- ▶ EPIRBs' are designed to float upright in the water with their antennae extended, using the water as a reflector for its' signal. It is therefore of no practical use to hold the EPIRB out of the water.
- ▶ The EPIRB is designed to transmit continuously for a minimum period of 48 hours.

SART's

- ▶ A **SART** is a **S**earch **A**nd **R**escue Radar **T**ransponder which operates on X band or 3 cm radar.
- ▶ When the SART is switched on it stays in standby mood until triggered by another ship's radar. When triggered by a radar signal it automatically transmits its own unique signal, which is displayed on the other ship's radar screen. This signal consists of 8, 12 or 20 blips in a straight line radiating, outwards on the screen. The first blip on the radar screen is the position of the SART. See figure next.

SART's



SART's

- ▶ When switched on the SART can stay in standby mode for 96 hours and then transmit continuously for a further 8 hours. It is fitted with a small speaker at its base and when transmitting sounds a beep. Unless the SART's instructions say different the SART should be kept **OUT** of the water and mounted as high as possible , like radar, it works in the line of sight.
- ▶ Both the SART and the EPIRB are recognised internationally as distress signals and must be treated as such. They form part of the requirements for the GMDSS equipment.

In class exercise

- ▶ Question 1: What are the general principles behind GMDSS?
- ▶ Question 2: Describe a SART and its function?
- ▶ Question 3: Explain how an EPIRB works and the use that the RCC Australia makes of EPIRBs.

In class exercise answers

- ▶ Question 1: Global Maritime Distress and Safety System. Communications network dedicated to SAR, compatible with EPIRB transmissions on 406 MHz and VHF, HF and INMARSAT.
- ▶ Question 2: A search and rescue transponder which operates on x band or 3 cm radar. When triggered by a radar signal it automatically transmits its own unique signal, which is displayed on the interrogating radar screen.
- ▶ Question 3: Transmits a signal on VHF and UHF frequencies compatible with satellite system (GMDSS). RCC can obtain location of the casualty, which narrows the search area and identifies ships in the area, which may be able to assist.

In class exercise

- ▶ Question 1: How would you operate an EPIRB for 'short bursts' or leave it activated when in use? Give reasons.
- ▶ Question 2: You are steaming at night in a heavy rainstorm with the radar on the blink, when through the rain and dead ahead you see a very powerful light flashing 'short short long' repeatedly. What does the signal mean?

In class exercise answers

- ▶ Question 1: EPIRBs should be switched on as soon as a distress situation occurs and **MUST REMAIN SWITCHED ON** until the rescue is concluded or until otherwise instructed by the rescue unit or rescue authority.
- ▶ Question 2: You are running into danger.

The End