ISAF Guide to Offshore Personal Safety

Simon Jinks
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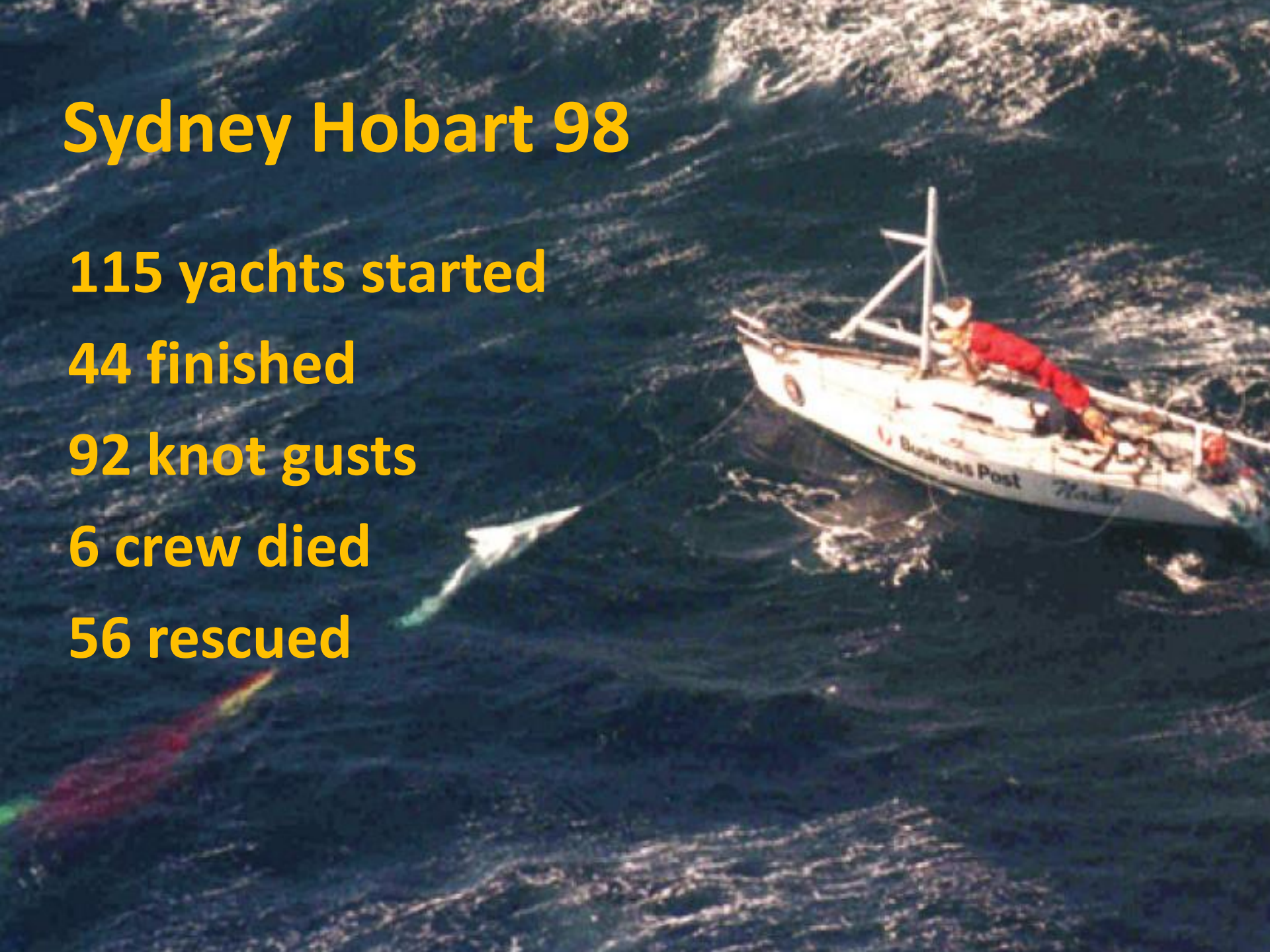

Sydney Hobart 98

115 yachts started

44 finished

92 knot gusts

6 crew died

56 rescued

ISAF OFFSHORE SPECIAL REGULATIONS

APPENDIX G
TRAINING
Model Training Course Offshore Personal Survival

With acknowledgements to IMO (International Maritime Organisation), AYF (Australian Yachting Federation) and RYA (Royal Yachting Association) whose publications have been consulted in the preparation of Appendix G.

INTRODUCTION

1 **Purpose of the model course**. To help provide training under ISAF Offshore Special Regulation Section 6. The model course is not the only means of providing such training. Other courses meeting the needs of Section 6 may apply to the appropriate MNA for ISAF Approval (see Introduction paragraph 7).

"This book is an invaluable read for both cruising and racing sailors alike. It provides essential reading for racing and cruising sailors alike. It is ideal background for those undertaking the 'ISAF Offshore Personal Survival Course' which equips the sailor with the knowledge to prevent and deal with emergencies at sea. The course satisfies the requirements for the ISAF Offshore Special Regulations (Appendix G) for offshore racing but is equally suitable for sailors undertaking offshore passages.

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TRAINING RESOURCES

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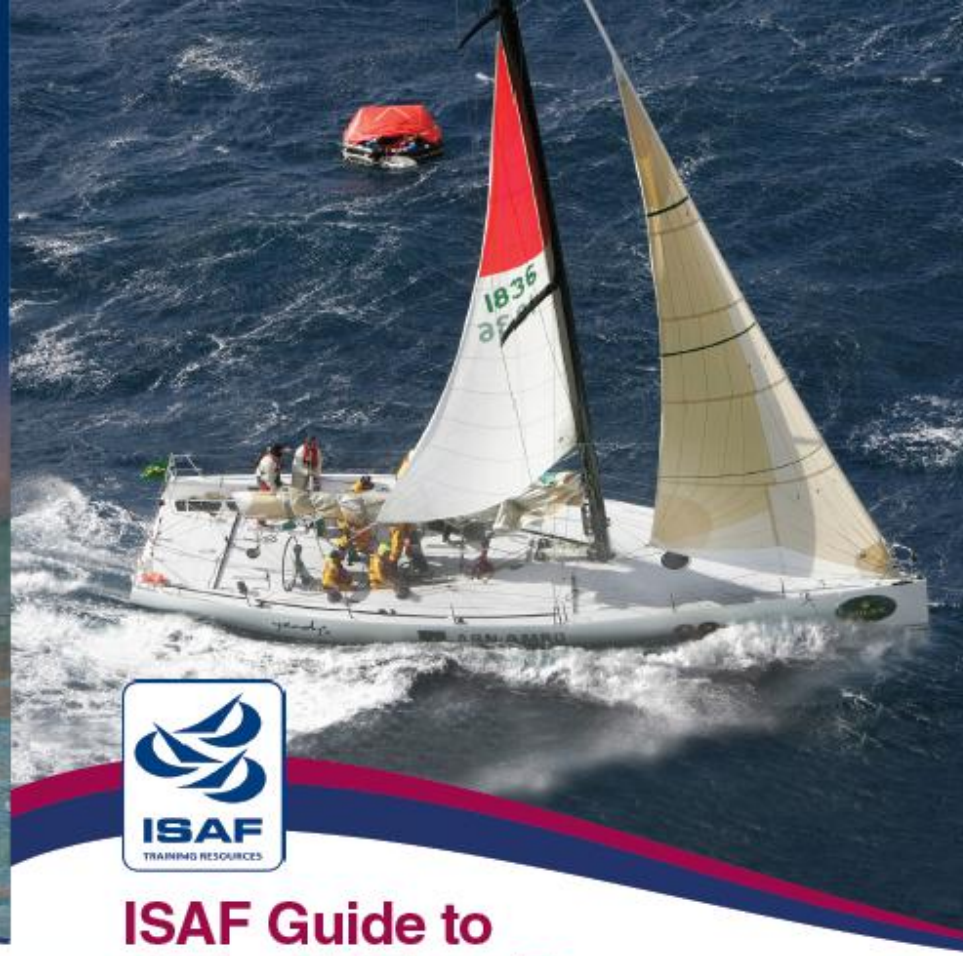

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FOR RACING AND CRUISING

International Sailing Federation
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ISAF OFFSHORE PERSONAL SAFETY

CONTENTS

YACHT PREPARATION & EQUIPMENT

The factors dictating how far offshore you sail are: the type of boat, weather, safety gear, boat equipment and the experience or limitations of the skipper and crew.

3.1. LIMITATION OF THE VESSEL

3.2.1. STRUCTURE

National and international regulatory design standards often identify the safe operating areas for vessels.

The design standards are based on the intended maximum load, crew limit, stability and the maximum engine power. The most far reaching standard is the European (RCD) Recreational Craft Directive. Vessels sold in Europe except those marked as "solely intended for racing" have to comply by law with the RCD category and state the category on the builder's plate and on a declaration of conformity.

The RCD categories are defined as follows:

CATEGORY A -
Ocean: Designed for extended voyages where conditions may exceed wind force 8 (Beaufort scale) and significant wave heights of 4m and above but excluding abnormal conditions, and vessels largely self-sufficient.

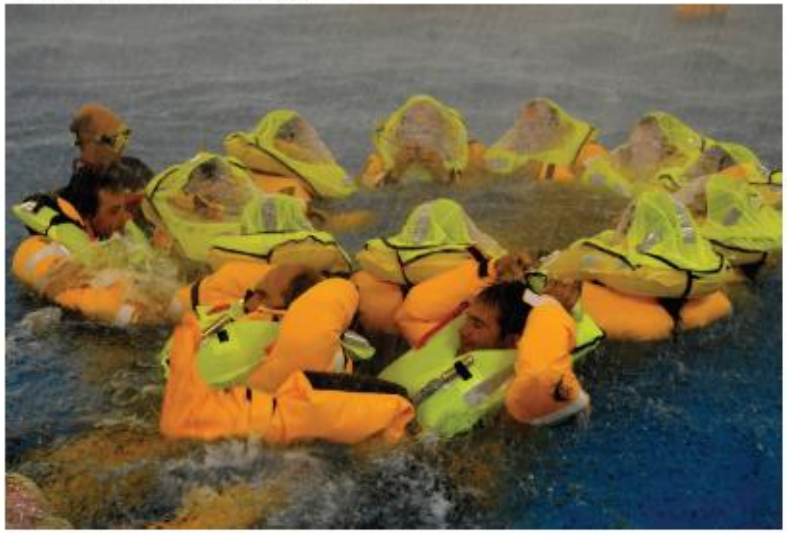
CATEGORY B -
Offshore: Designed for offshore voyages where conditions up to, and including, wind force 8 and significant wave heights up to, and including, 4m may be experienced.

CATEGORY C -
Inshore: Designed for voyages in coastal waters, large bays, estuaries, lakes and rivers where conditions up to, and including, wind force 6 and significant wave heights up to, and including, 2m may be experienced.

CATEGORY D - Sheltered: Designed for voyages on sheltered coastal waters, small bays, small lakes, rivers and canals where conditions up to, and including, wind force 4 and significant wave heights up to, and including, 0.3m may be experienced, with occasional waves of 0.5m maximum height, for example from passing vessels.

PERSONAL SAFETY EQUIPMENT

4.1. LIFE JACKETS & HARNESSES



Lifejackets and buoyancy aids provide buoyancy using; air (inflatable), foam or combining foam and air. Inflatable air jackets are becoming the norm, however some countries require the carriage of full foam lifejackets and the skipper decides whether inflatable jackets are also carried. Inflatable jackets are comfortable to wear therefore are worn more often, but require regular checks. Bulky foam lifejackets work even if the covering is lacerated, however are only realistically worn when abandoning ship.

LEVELS OF BUOYANCY

Lifejackets and buoyancy aids offer different levels of buoyancy and performance in the water. They are often referred to by a number; Level 50, 100, 150 or 275. The numbers roughly relate to the amount of buoyancy in Newtons.

The personal flotation device needs to be appropriate to the activity and in general Level 50 are worn by dinghy sailors and Level 150 for offshore yachting. The following applies:

LEVEL 50 -

are buoyancy aids are designed to keep someone afloat. It allows the wearer full movement whilst an active sporting activity is carried out such as dinghy sailing or small keelboats. However if unconscious, the wearers head could be face down in the water. The international standard is ISO 12402 – 5.

LEVEL 100 -

is intended for those who may have to wait for rescue, but in sheltered water. They are often referred to as lifejackets but may not turn the wearer face up in the water and should not be used in rough conditions. The international standard is ISO 12402 – 4.

LEVEL 150 -

is a life-jacket with buoyancy distribution sufficient to turn the user to a position where their mouth is clear of the water, even when they unconscious. Most commonly used for offshore yachting. The international standard is ISO 12402 – 3.

LEVEL 275 -

is a lifejacket intended primarily for offshore use under extreme conditions especially by people carrying significant weight or wearing clothing which traps air adversely affect the self-righting capacity of the lifejacket. It may require partial deflation to enter a liferaft. The international standard is ISO 12402 – 2.

5.3.2. MF & HF

Medium frequency and high frequency (MF HF) radio communication offers longer range communication. MF range is about 150nm and HF is up to 2000nm but varies due to conditions. It is a popular choice for offshore sailors as it offers free long range communication and distress alerting. It also handles short email messaging, weather and social communication.

5.3.3. INMARSAT

The INternational MARitime SATellite organisation formed in 1979 and is the longest running satellite communications system in existence. It covers the globe except for the extreme Polar Regions. Inmarsat uses satellites in geostationary orbit 22,223 miles above the equator, covering the Americas, Europe/ Africa and Asia/Pacific.

Inmarsat satellite calls from a boat are relayed to antennas ashore called Land Earth Stations routing the call through an ordinary telephone network. Inmarsat offers a range of systems offering everything from distress alerting and general text messaging through to voice and broadband/video communication.

The most common systems seen onboard yachts are:

- FleetBroadband offers video streaming, plus voice and data.
- Fleet 33 is an 'always-on' system for voice and continuous email/internet provision
- Inmarsat C which has distress alerting and text messaging
- Inmarsat Mini M providing voice and data.

5.3.4. SAT PHONE

Satellite communications have revolutionised maritime communications over the last decade. There are several providers many offering prepay packages. Some providers only offer coverage in certain areas, such Europe or Asia. Sat phones can be used for general calling and pre-programmed with emergency numbers such as a Maritime Rescue Coordination Centre.

5.4. SARTS

Search And Rescue Transponders send out a distinctive 'line of dots' signature when interrogated by radar. On closing the SART, the 'line of dots' becomes concentric circles on the radar screen.

SARTS are commonly carried on yachts travelling long distance but are standard fit on commercial ships. The radar signal is picked up and tracked by nearly all vessels fitted with the most common X band 9 GHz radar. The range is just over line of sight: range to another vessel is about 5 miles and about 40 miles to aircraft.

WHILST AFLOAT - HEAVY-WEATHER SAILING

6.1. PREPARATION

If heavy weather is on its way, use the time before it arrives wisely. Heavy weather makes simple tasks difficult and the unpredictability of the boats motion will make every situation more hazardous.

Establish the weather systems track and work out a plan or shortest route through. A day's notice of heavy weather can be used to put the boat in a better location to deal with it. If it is safer to stay at sea, stay there and look for more sea room, alternatively look for sheltered water.

PREPARATION FOR HEAVY WEATHER

Brief the crew of the expected conditions, possible duration and tactics. When the boat is down to storm sails; shorter watches with less crew may reduce crew vulnerability on deck.

6.2. CREW ROUTINES

Crew need to stay warm, dry, well fed and rested to combat long periods of heavy weather. An effective watch routine and prior preparation of food, drink and the boat helps. Before the gale is upon you, rest the crew starting with the most experienced as they may be required the most in the early stages.

6.6.2. HOVE-TO

Heaving-to is possible on many yachts and often calms the whole boat down. It is achieved by either; tacking and leaving both mainsail and headsail set or by hauling the headsail to windward and backing it. Once the headsail is backed, the helm is slowly put to leeward making sure that the yacht does not tack back in the process. The headsail pushes the bow downwind, the rudder and mainsail turning her upwind resulting in the boat pointing at a 60 to 90 degree to the wind and sea.

Whilst this steadies the boat, it may leave you vulnerable to knockdown; sail adjustment may achieve a better angle to the sea. It comfortably 'pauses' the yacht; allowing rest, reefing and repairs.

LAYING A HULL

Take all sails down and sit tight. Sometimes the only option especially if the yacht or crew are disabled but leaves the boat vulnerable to breaking waves.

6.7. KNOCKDOWN

Knockdowns occur through pressure of wind, waves and often a combination of both. Wind knockdown's and broaches are often shorter because once the sheet is released the boat often comes back upright. Waves however may continue to rotate the yacht and roll it over. The yachts destiny lies in its stability, strength and size of the wave. Dismasting, rig damage and MOB is a common result of knockdown or rolling.

A knockdown rolls the boat 90 degrees or more and gravity creates problems:

- Cockpit lockers open taking on vast quantities of water; ensure they have efficient closures.
- Companionway hatches fall out, allowing water in the boat; ensure they lock from inside and out.
- The anchor locker falls open and anchor and chain fall out; fit efficient closures.
- Battery banks, cooker gimbals and heavy items launch into the cabin; ensure they are secured.
- Water may run from the exhaust into the engine; check it before starting

DRIFT OF MARKERS

When arriving at the last known position, throw down a marker as a datum point, if you did not do so when the crew member fell over. However do consider how much your marker will drift in comparison to the MOB.

Markers at night should be lit or seen by a searchlight so should be fitted with retro reflective tape and lights.

DETECTION RANGE

The detection range (D) is the maximum distance that the rescue craft can see an object of the same characteristic size in the water. It is often used to establish the width of the sweep in a search pattern. To calculate (D) launch a fender or marker as your starting datum then motor away at a constant speed, timing the leg. When you start to lose sight you have established the detection range. Depending on the search pattern used and the amount of boats involved, sweeps are often a 75% to 200% (D).

SECTOR SEARCH

The Sector search is effective when the search area is small or the last known position of the object is recent. After each completion of a sector, the original datum is passed, therefore the immediate area is covered over and over again from different angles and the extremities of the area are searched less thoroughly at first.

Sector searches comprise of timed turns of 120 degrees. It is simpler to start the first run at North (000) so the sums are easier (000 - 120 - 240), however if you are quick with your mathematics, an initial course downwind or down-tide of the start position bring faster results.

Go to the datum, and drop a visual marker such as a horseshoe lifebuoy.

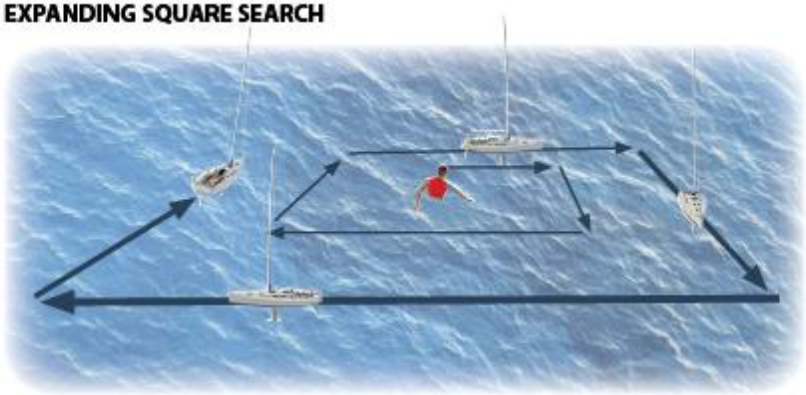
Motor away from the horseshoe steering (000) at a steady speed and count until the horseshoe disappears, this is the Detection Range (D).

Continue counting three times (D) then turn 120 degrees to starboard.

Continue on this course (120) for 1x (D), and then turn to starboard once more.

After the datum is passed on course (240), continue on that course for another 3X (D), then turn to starboard. If the casualty is not found after one complete circuit, rotate the pattern by 30 degrees to fill in the initial quadrants of the search area.

EXPANDING SQUARE SEARCH



The Expanding Square search is effective if the datum of the object is known to have moved a short distance or as a secondary search after a Sector search and searches an ever increasing area. The initial leg is 75 - 100% of (D). The (D) range for a MOB is likely to be less than a cable depending on conditions.

A datum mark will give you valuable information on visibility.

Each leg consists of a 90 degree course alteration increasing in length after every second turn. North, East, South and West can be used for simplicity or motor downwind for the first leg, then turn to keep the wind on the beam for the second, then into wind for the third and so on. If the engine is not working, an Expanding Box search can be carried out under sail by a series of Broad Reaches and Close Hauled courses; however speed and visibility will need careful monitoring.

PAR-BUCKLING

This method uses a sail to roll a person up the hull and onboard. The sail is placed in the water and once the MOB is positioned, the sail hoisted. Some MOB recovery devices work on the same principle, but use mesh matting instead of sailcloth which is easier to manage and smaller to stow.

LIFESLINGS

Lifeslings are padded floating slings connected to the boat with 30-50m of floating line. They feature a strong lifting point so once the MOB has the sling under their arms, a halyard is attached to winch them out. Methods exist to sail a lifesling in a circle around the MOB so they catch hold of the rope and the sling.

PURCHASE

A hoisting system requires the use of a block and tackle, winch or both to increase purchase. A hoist and derrick can often be improvised using the mainsheet and boom. Use a strong halyard to support the boom end and back up the topping lift. Raise the boom sufficiently to allow the person to be hoisted. A fore-guy braces the boom to the shrouds.

7.4. DISMASTING

Check for injuries and don lifejackets as the boats motion changes dramatically and guardrails are often damaged.

Spar failure needs dealing with quickly as spars may punch a hole in the boat.

Retrieve parts of the rig as they are invaluable for a jury rig; the whole rig is often too heavy to get onboard.

Ensure rigging cutters are suitable for the type and size of rigging; wire, rod or fibre. Bolt croppers are hard to use; consider hydraulic cutters, hacksaws with spare blades, cordless angle grinders and a plentiful supply of sharp knives. Fit lanyards to the cutters so they are not lost overboard.

Standing and running rigging may be under pressure: cutting a shroud may transfer load onto a loose halyard, injuring someone or something. Release the running rigging and use it to taking the weight of the mast whilst the standing rigging is cut.

Shut off the ships electrics or isolate the mast-light, instrument and radar switches.

JURY RIG

Wire clamps can shorten and secure rigging wire.

Mainsheets and vang can tension or hoist spars.

Spinnaker poles make a yard or mast on which a jib could be flown.

Remove the stump of keel stepped masts and fit the remaining rig down the hole for support.

COMMON FEATURES OF A LIFERAFT

Liferaft designs and standards differ. Look before you buy or attend your rafts service to see the liferaft inflated. Here are the common parts of a good liferaft - not all rafts have all of these items.

CANOPY
Brightly coloured. Canopy doors have a variety of closing mechanisms. Consider what will be effective and useable with cold hands.

AUTOMATICALLY INFLATING ARCH
Supports the canopy and inflates automatically. Some rafts do not have a canopy or the arch requires inflating manually.

EXTERIOR AND INTERIOR LIGHTS
Often activated automatically, with a switch to conserve batteries.

LADDER OR RIGHTING LINE
Used to right the raft in the event of capsize.

UNDERNEATH
Brightly coloured base or bright ballast bags and retro reflective tape – to aid recognition when inverted.

CO2 GAS CYLINDER
Hung underneath the raft and activated by a trigger system attached to the painter line.

RESCUE QUOIT
Used to pull survivors in the water to the raft. Ensure it is attached before use.

INFLATABLE OR THERMAL FLOOR
Reduces heat loss by increasing insulation; may also raise you out of puddles.

TWIN TUBES
Each tube should be capable of supporting the compliment of the liferaft.

DROGUE
Attached to the side or rear of the raft and led inside for deployment by survivors. Drogue reduces drift, the likelihood of capsize and positions the raft entrance away from the wind and waves.

LIFELINES
Line or tape positioned around the exterior raft enabling survivors to hold or hook their arms through.

INTERNAL LADDER/LIFELINES
An internal ladder led from the raft entrance to the floor aids entry from the water. Threading arms through lifelines keeps survivors positioned correctly in a seaway.

RETRO REFLECTIVE TAPE
Shows up well to a spotlight.

INFLATABLE RADAR REFLECTOR
Hoisted on pole, but do not use if SART is activated.

RAIN CATCHER/GUTTER
V channels on the outside canopy to funnel rain - often drains to the inside of the raft where rainwater is harvested in bags.

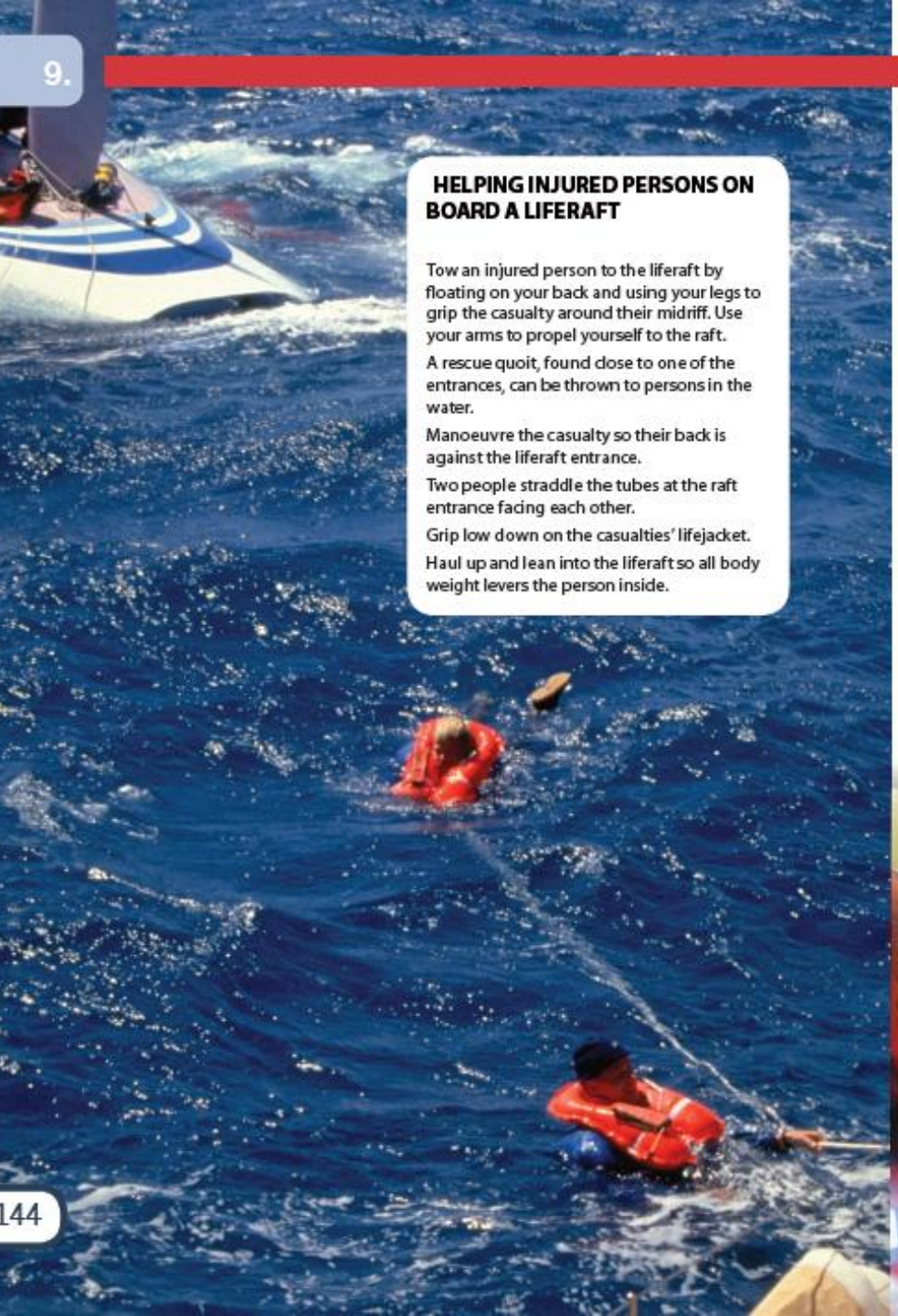
BALLAST BAGS
Fitted around the outer edge of the raft and fill with water acting as a keel increasing grip and stability.

KNIFE
Safety knife in a sheath positioned near the entrance and used to cut the painter line.

BOARDING SYSTEM
Often a basic ladder and quite ineffective when boarding from the sea; look for a system with an inflatable ramp or bolster to aid entry.

PAINTER LINE
Attaches raft to the vessel before and after deployment. Sharp tug on the painter-line activates the trigger mechanism on the CO2 bottle to inflate the raft.

LOOKOUT HOLE
Useful for ventilation, lookout and for erection of a SART or radar reflector on a pole.



HELPING INJURED PERSONS ON BOARD A LIFERAFT

Tow an injured person to the liferaft by floating on your back and using your legs to grip the casualty around their midriff. Use your arms to propel yourself to the raft.

A rescue quoit, found close to one of the entrances, can be thrown to persons in the water.

Manoeuvre the casualty so their back is against the liferaft entrance.

Two people straddle the tubes at the raft entrance facing each other.

Grip low down on the casualties' lifejacket.

Haul up and lean into the liferaft so all body weight levers the person inside.

INITIAL ACTIONS INSIDE A LIFERAFT

CUT – STREAM – CLOSE – MAINTAIN

CUT THE PAINTER Assist survivors boarding the liferaft. Cut the painter line close to the vessel if possible; the line may be useful later. A knife is housed at the raft entrance. Paddle to manoeuvre the liferaft clear of the vessel's side or obstructions.

STREAM THE DROGUE

Once clear of obstructions and vessel, stream the drogue. Drogues reduce drift from survivors and the distress area and are designed to keep the the raft entrance downwind and steady the raft. Often a spare drogue is carried in the emergency pack and may be used as a towline or to secure multiple rafts together aiding detection.

CLOSE THE RAFT ENTRANCES

Closing entrances retains heat and keeps out water. Inflate the floor to reduce heat loss. Frequently vent the raft to reduce carbon dioxide build up from breath exhalation or CO2 venting from deflated lifejackets or liferaft venting. Use slip knots on raft entrances using ties so escape is possible.

MAINTAIN

Bail and sponge out water. Tie the pump and emergency equipment to the raft to prevent loss. Check for leaks and use the repair kit provided in the emergency pack.

RESCUE

Rescue has its own dangers, stay alert and remember you are not safe until you are ashore again.

Even a short time in the water or a raft can have a debilitating affect on survivors. Whilst impending rescue gives hope to survivors, it may not be backed up with the strength to help themselves up a steep ladder. Help each other and ensure anyone transferring from a liferaft to the boat is attached by a line so they do not drift away.

9.1. BY OTHER ANOTHER YACHT →

The drogue will be upwind of the raft so a rescue craft should approach the liferaft into wind so that the drogue does not snare it. Alternatively, the raft hauls in the drogue and any other lines allowing the rescue craft to drift down onto the raft. Have lines ready to tie alongside.

9.2. BY SHIP

Ships are daunting. Use a VHF to talk to the ships master. IMO guidance gives little advice to ships masters but does say that bringing a large ship alongside a liferaft is hard and if they have a small rescue craft they should use it.

A ship will often drift alongside providing shelter. Wear lifejackets just in case the raft gets caught on the ship and you need to get out. Climbing a net can end up with the casualty tiring and falling. A cargo net lowered using cranes on the side of the ship is a better alternative. Ships may have windlasses, winches and stores cranes that could be used.

Some vessels have a RIB (fast rescue craft) that are lowered for rescue and hoisted back onboard with the survivors.

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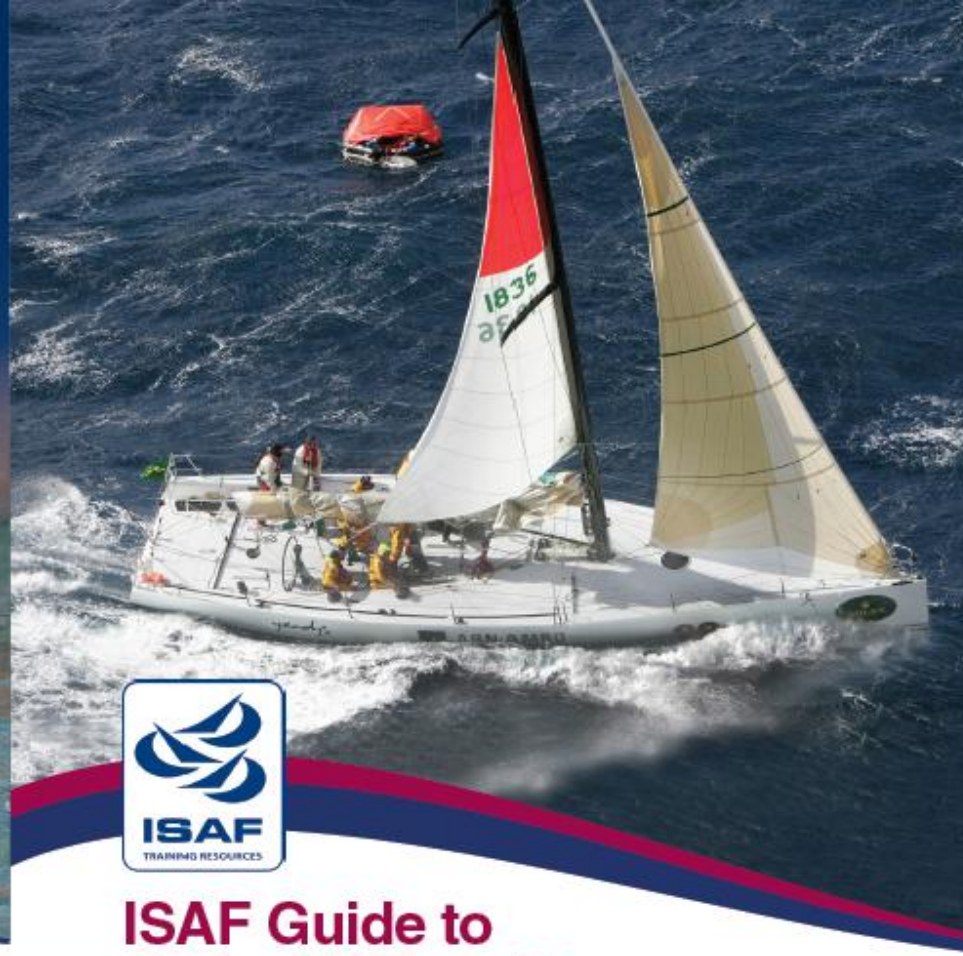

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