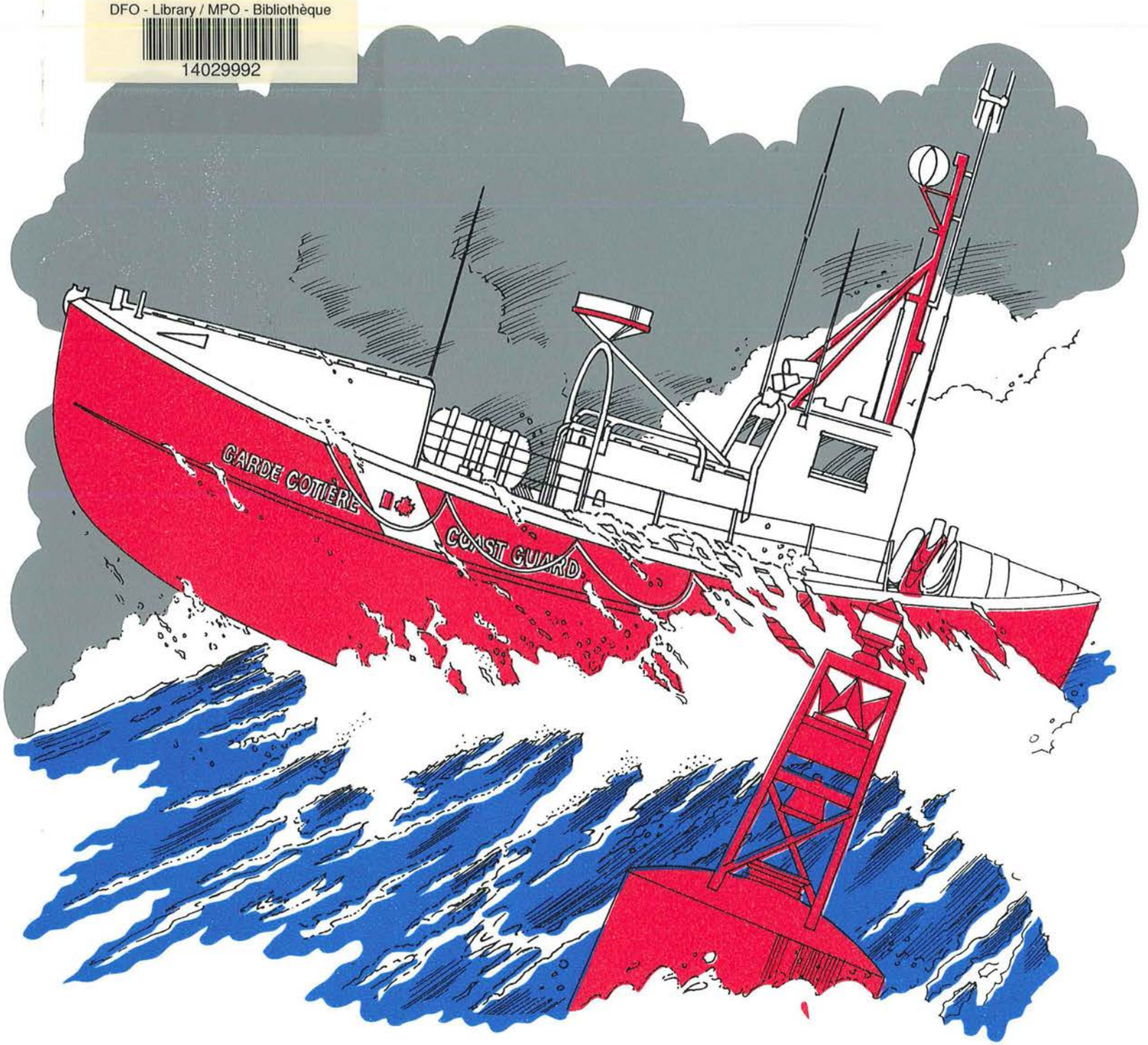
Canadian Coast Guard | Garde côtière canadienne

Operational Guidelines for Search and Rescue Units

(Type 100 and 300)

DFO - Library / MPO - Bibliothèque
14029992



One of the three self righting wooden lifeboats in operation in Canada in the 50's and 60's.

Canada

195974

Operational Guidelines for Search and Rescue Units

(Type 100 and 300)

TP 11637

JL
103
.G37
063
REF/QC

Table of Contents

Introduction

Section One: General

1-1 Briefing New Crew Members
1-2 Boat, Fire and Safety Drills on Small SAR Vessels
1-3 Man-Overboard Guideline
1-4 Lookouts
1-5 Operational Checklists for Small SAR Vessels
1-6 Heavy-Weather Preparation Checklist
1-7 Care and Maintenance of Personal Safety Equipment
1-8 Capsizing Causes and Prevention: Types 100 and 300 Lifeboats

Section Two: SAR Operations

2-1 Rescue
2-2 Removing Persons from Shore
2-3 Removing Persons from Other Vessels
2-4 Rescue of Persons from Burning Vessels
2-5 Rescue from Survival Craft
2-6 Rescue from Disabled Vessels
2-7 Aircraft Rescue
2-8 Rescue Operations with DND Aircraft
2-9 Passing the Canister Pump

Section Three: FRC Operations

3-1 SAR Operational Standards for Fast Response Craft (FRC)

Section Four: Towing Operations

4-1 Towing Checklist
4-2 Towing Procedures
4-3 Towing Equipment
4-4 Approaching a Vessel to Render Assistance
4-5 Passing the Towline
4-6 Weighing Anchor of a Disabled Craft
4-7 Connecting the Towline
4-8 Towing Astern
4-9 Towing Speed
4-10 Towing Alongside
4-11 Towing in Current
4-12 Towing Aircraft
4-13 Man-Overboard Operations with a Tow Astern
4-14 Tandem Towing
4-15 Sinking Tow and a Tow on Fire
4-16 The Drogue
4-17 Maintenance of Towing Equipment

Section Five: Grounded Vessels and Damage Control

5-1 Assisting Grounded Vessels
5-2 Damage Control in SAR Incidents

Section Six: Training

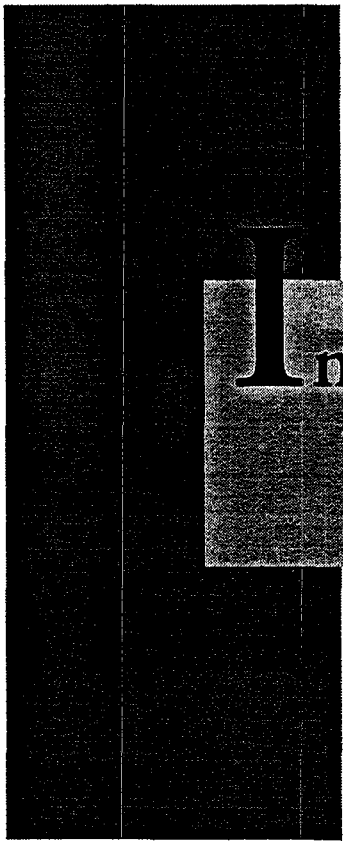
6-1 Practical SAR Training and Exercises
6-2 Sample Exercises
6-3 Debriefing

Section Seven: Miscellaneous

7-1 Legal Issues
7-2 Crew Change: Coxswain Responsibilities
7-3 Release of Information to the Media and the Public
7-4 On-Scene Commander Responsibilities
7-5 Search Reduction
7-6 Critical-Incident Stress Management
7-7 Refusal to Accept Towing Waiver
7-8 Fire Fighting Guidelines for Small SAR Units

Appendices

1 Procedures for a Grounded CG SAR Vessel
2 Damage Control Onboard CG Vessels Types 100 and 300
3 Lifeboat Station Performance Evaluation
4 Small SAR Equipment Use and Maintenance
5 Life Rafts, Lifeboats, and Survival Craft
6 Amendment of Manual



Introduction

Introduction

A. Purpose

The operational effectiveness of Search and Rescue Units is dependent on properly trained crews as well as SAR vessels and equipment maintained in safe and ready operating condition. Marine Search and Rescue requires highly specialized skills to which there are few comparisons. A successful SAR mission is dependent on a number of factors, but none so critical as an effective and efficient SAR crew, SAR vessel, and SAR equipment. It is therefore imperative that there be criteria by which we can measure our effectiveness, at the unit level, in delivering SAR services to the general public.

A manual program will provide an avenue for exchanging knowledge of operational and maintenance techniques and expertise, and will serve as both a training medium and a consolidation of operational guidelines.

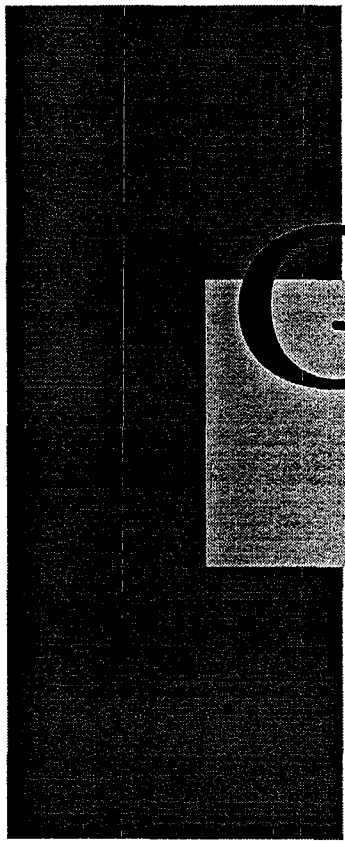
The manual program will improve operational readiness. Increased crew professionalism and equipment reliability will provide a higher level of operational readiness without resource increases at operational units. Standards will promote safe and efficient use of existing equipment and support systems.

B. Authority of Commanding Officer or Coxswain

Nothing in these guidelines should be construed as restricting the commanding officer or coxswain's authority or judgment as the practice of good seamanship may require. The ultimate decision of which method is used to perform a particular task in a SAR operation rests with the commanding officer or coxswain, keeping in mind that the first priority is the crew's safety. The only authority to coordinate, control, and conduct SAR operations is that vested with RCC/MRSC. RCC/MRSC are responsible for tasking and dispatching SAR units in their respective areas. Therefore, it is the commanding officer's and coxswain's responsibility to keep RCC/MRSC informed of any ongoing situations.

☞ **NOTE**

Nothing in this manual is intended to supersede the National SAR Manual, CGFOs or any regional procedures. This manual is intended to provide guidelines only.



General

Section One: General

1-1 Briefing New Crew Members

A. General
B. Safety
C. Objectives
D. Exercises
E. Transfers
F. Equipment Checklist

Annex 1
Sample checklist, briefing new crew members

1-2 Boat, Fire and Safety Drills on Small SAR Vessels

1-3 Man-Overboard Guideline

1-4 Lookouts

A. General
B. Night Vision
C. Lookout - Search
D. Lookout - Steering
E. Lookout - Towing

1-5 Operational Checklists for Small SAR Vessels

A. Getting Underway
B. Underway
C. Post-Operations

1-6 Heavy-Weather Preparation Checklist

1-7 Care and Maintenance of Personal Safety Equipment

A. General
B. Coast Guard Approved Floater Jackets and Working Suits
C. Dry Suits
D. Thermal Underwear
E. Helmets
F. Strobe Lights
G. Whistle
H. Personal Distress Flares
I. The Emergency Signalling Mirror

1-8 Capsizing Causes and Prevention: Types 100 and 300 Lifeboats

A. General
B. Factors in Capsizing
C. Minimizing the Dangers of Capsizing
D. Handling the 41-Footer in Heavy Seas

Briefing New Crew Members

A. General

The restricted crew size and space requirements on small CG SAR vessels dictate that each member of the crew be able to carry out certain tasks independently. Other tasks require various degrees of teamwork with every crew member contributing essential elements to the task. In the event of a new crew member joining a lifeboat, it is desirable to assimilate that person into the operation as quickly and efficiently as possible. This chapter addresses the basic guidelines for this indoctrination.

B. Safety

Every new member should be instructed in the procedures and policies of using personal safety equipment. This instruction will include practical demonstrations where required. Personal safety equipment will include but not be limited to:

(1) PFDs and lifejackets,

(2) hypothermia protection,

(3) helmets for FRCs/RHIs and lifeboats,

(4) eye protection,

(5) aural protection,

(6) safety belts,

(7) personal strobe lights,

(8) personal flares.

The SAR vessel or region may have other particular requirements for personal safety gear which should be added to this list.

The new crew member will "tour" the SAR lifeboat with the commanding officer or coxswain, or his delegate, and be instructed in the location and use of all standard lifesaving equipment. Included in Annex 1 of this section is a sample checklist to be handed to the new crew member, which will facilitate and verify his/her introduction to the vessel's equipment. The tour will include all fire extinguishers, Halon or $C0_2$ systems, emergency fuel shutoffs, power shutoffs, fire dampers, pumps, hoses and nozzles, foam systems, self-contained breathing apparatus, turnout gear, fire detection and alarm systems, first aid or medical equipment, life jackets, immersion suits, distress flares, EPIRBs, emergency radios, emergency packs, life rings, and life rafts.

A complete Boat, Safety, and Fire Drill will be held after the crew member has been instructed in the use of the lifesaving equipment and in his or her duties according to the muster list if there is one.

C. Objectives

The crew member will be informed of the objectives of the Coast Guard SAR vessel in the SAR role to create an awareness of potential SAR incidents. This will be in the form of a verbal briefing with the coxswain or commanding officer and be supplemented with Station Standing Orders, Regional Orders or Objectives, CGFOs, and the National SAR Manual.

D. Exercises

As soon as practical, after initial indoctrination and briefing, the new crew member should be included in SAR exercises using the SAR vessel and SAR equipment. These exercises should include the common evolutions of lookout, docking, towing, etc., and graduate into the more complex SAR evolutions. The coxswain or commanding officer will track the individual's progress and ensure a sound training base is achieved.

E. Transfers

It is appreciated that some "new" crew members may have transferred from other SAR lifeboats or other vessels within the fleet. In these cases the coxswain /commanding officer may adjust the indoctrination process to the individual's needs, but must ensure that the crew member is aware of all safety considerations and is able to carry out all of the SAR duties expected of a crew member on a small SAR vessel.

F. Equipment Checklist

The crew member should be given his/her own copy of the vessel equipment list. This must include a diagram showing the designated stowage locations of the equipment on the vessel, so that the crew member can familiarize himself/herself with the vessel/equipment layout in an efficient and effective manner.

Annex 1

Sample checklist, briefing new crew members

☞ **NOTE**

Some lifeboat stations might have an onboard inventory checklist which would fulfil this purpose.

Fire Fighting Equipment	Quantity	Location
Fire Extinguishers		
Halon System and Release Handles		
CO_2 System and Release Handles		
Fire Dampers		
Hoses (and sizes)		
Nozzles		
Foam and Its Accessories		
Pumps		
Breathing Apparatus		
Fire Detection and Fire Alarm		
Fire Helmet		
Fire Coat		
Fire Boots		

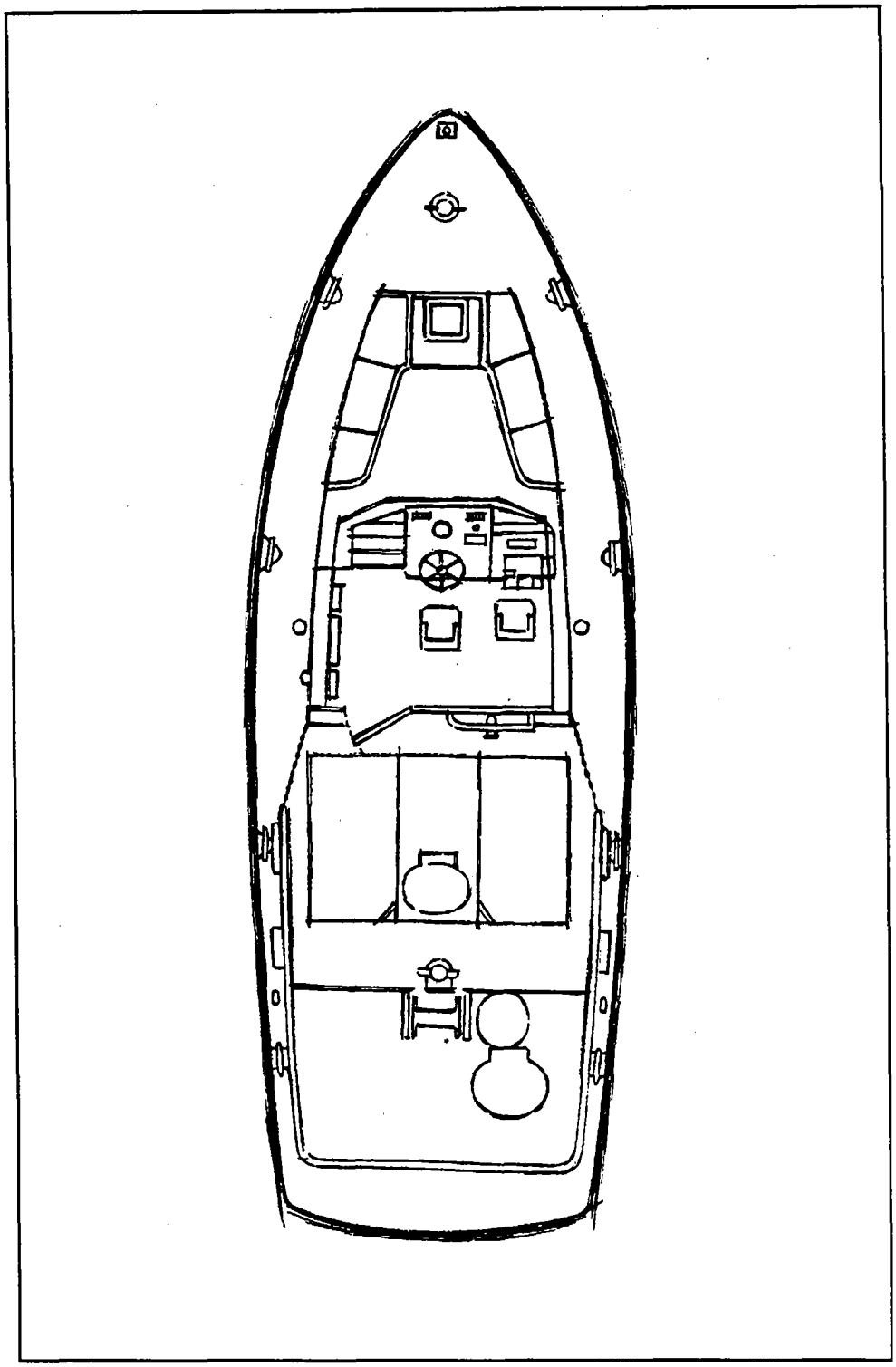
Safety Equipment	Quantity	Location
Life Jackets		
Life Raft		
Immersion Suits		
Safety Belts/harness		
Individual Strobe Lights		
Floater Suits		
Emergency Packs		
Emergency Radios		
EPIRB		
Radio Beacons		
Distress Flares		
Eye and Aural Protection		
Life Rings		

SAR Equipment	Quantity	Location
Towing Lines		
Towing Bridles		
Shackles and Other Hardware		
Kicker Hook		
Swimmer Suit		
Illumination Flares		
Boat Hook		
Salvage Pumps		
Horseshoe Collar and Life Line		
Man Overboard Marker		
Damage Control Kit		
Throwing Apparatus		
Heaving Lines		

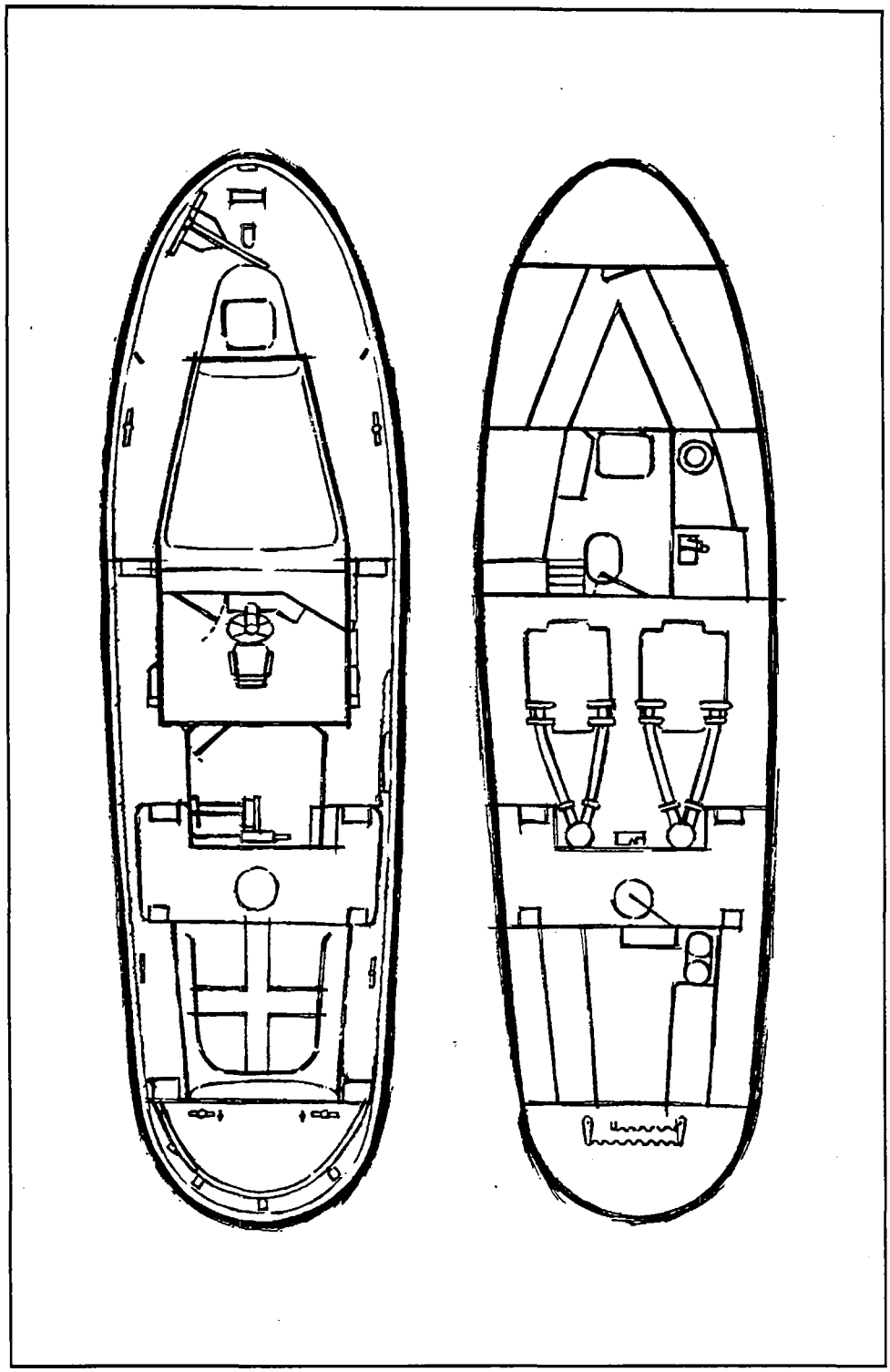
First Aid and Medical Equipment	Quantity	Location
First Aid Kit		
Jump Kit (Bag or Case)		
Stretchers		
Oxygen and Spare Tank		
Heat Treat		
Blankets		
Thermal Blankets		
Watergel Blankets		
Retrieval System (Ked or Similar)		

☞ **NOTE**

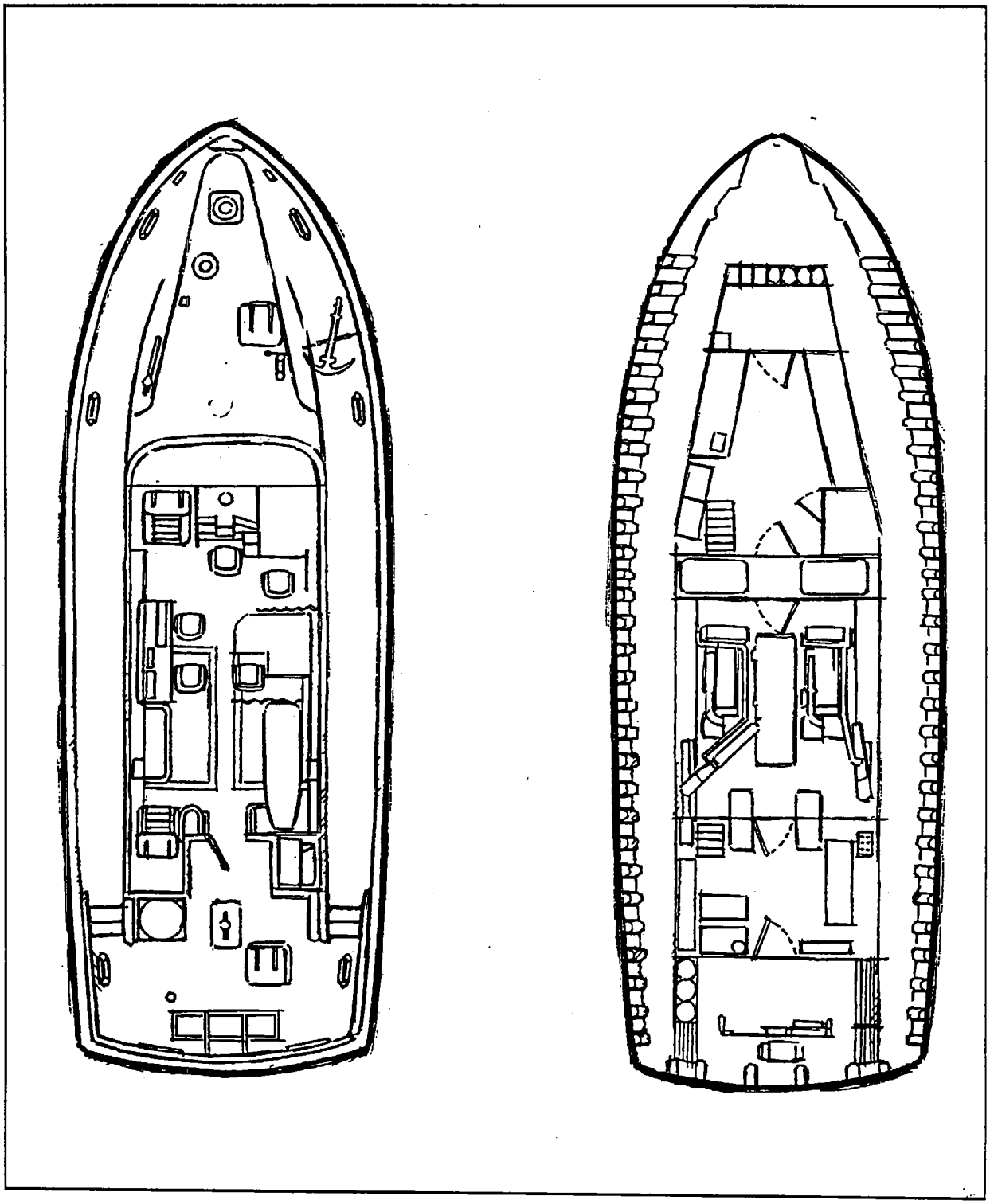
This list is provided as an example only, and is in no way intended to be exhaustive.



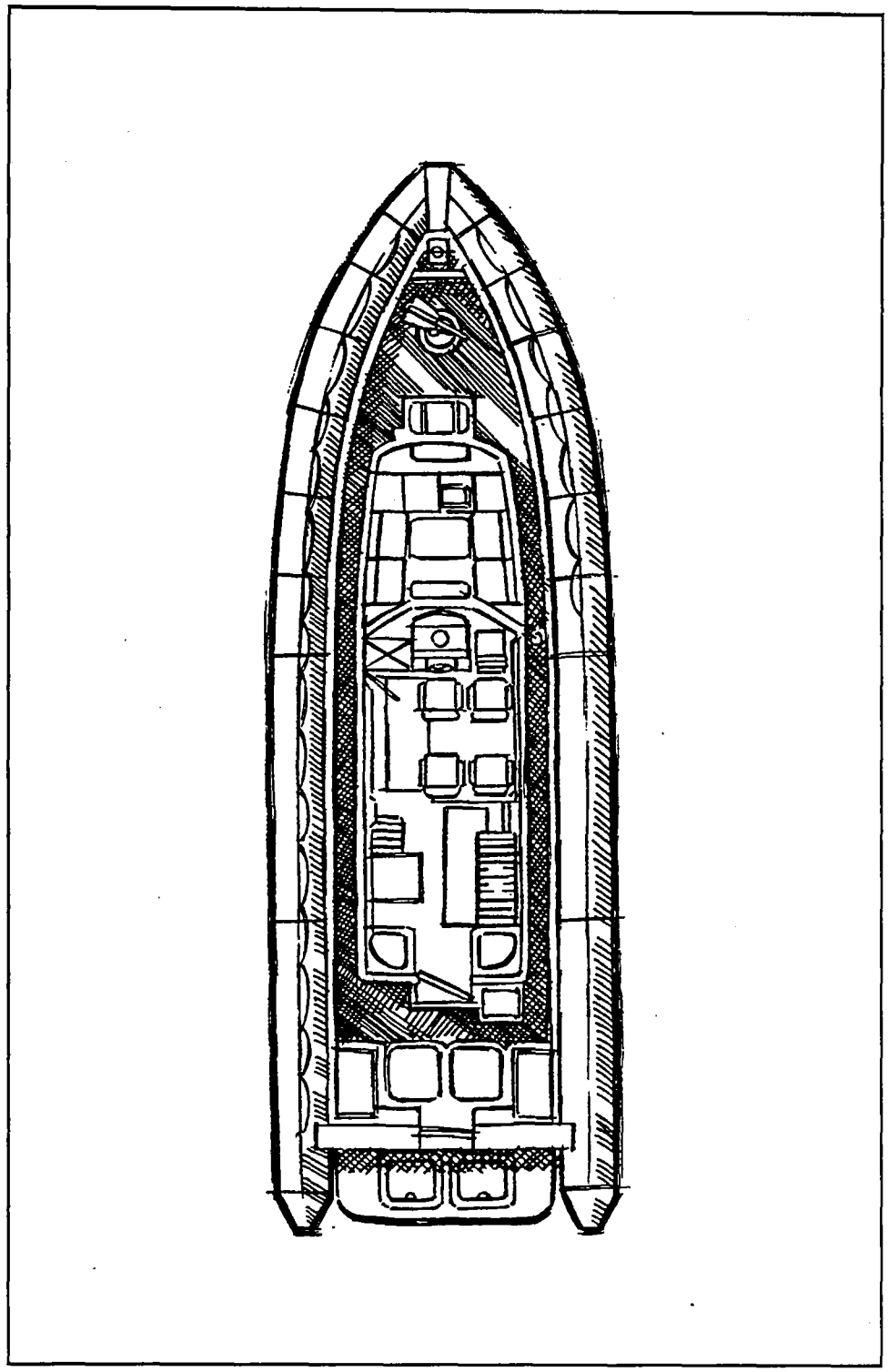
Type 100 Diagram



Type 300 Diagram



Type 300 A Diagram



Type 300 B Diagram

Boat, Fire and Safety Drills on Small SAR Vessels

All SAR vessels will practise abandon-ship and fire drills once every crew change. These drills are to be scheduled within 24 hours of crew change or when practicable.

All fire, emergency, and survival equipment is to be inspected and tested at each drill (in accordance with the appropriate checklist).

All crew members must be trained and competent in their assigned emergency duties. Periodic exercises simulating possible emergency situations such as engine-room fire, electrical fire, compartment flooding, etc., should be routinely practised in a realistic manner so that the crew would react to, and manage, any real emergency methodically and effectively. (See Section Six, "Practical SAR Training and Exercises".)

Immersion suits carried on small SAR vessels are often stowed by necessity in a location that, though convenient for stowage, is not easily accessible for abandoning ship. Crews should be practised at retrieving and donning suits on their vessel. An ideal rotation is to have a least one suit unpacked and donned at each drill so that every suit is unpacked at least once every four weeks. Crews must be instructed in the basic care and maintenance of the suits.

All crew must be completely familiar with donning procedures for immersion suits. During each drill, at least one person should enter the water while wearing an immersion suit to become familiar with wearing the suit in water. A rotation should be applied so as to ensure that all personnel enter the water during drills on a periodic basis. Stations should have spare suits for this drill.

Man-Overboard Guideline

The nature of the task of Search and Rescue vessels exposes crew members to a high risk of involuntarily entering the water. A MAN OVERBOARD situation is one of the most serious occurrences aboard a SAR vessel. Every second counts, particularly in heavy or cold weather. Every crew member must know the following procedures thoroughly. Even more important than knowing the procedures is **training**. Every crew member must be able to carry out these procedures with instantaneous precision. The only way this can be achieved is by training and practice. Your life may depend on it.

(1) The first crew member to realize that someone has gone overboard calls out "MAN OVERBOARD" and, if known, indicate on which side of the boat the person went over. For example, if a person fell over the port side, the crew member would call "MAN OVERBOARD, PORT SIDE!" In the case of a witnessed man-overboard situation, this crew member keeps the person in the water continuously in sight while calling out the alarm and until rescue is achieved.

(2) While maintaining visual contact with the person in the water, the person calling the man-overboard alarm takes up station as the pointer. He continually points to the person in the water and positions himself as required in order to maintain visual contact.

(3) A mark datum is triggered physically or electronically by activating the memory function on the Loran-C to mark datum. On vessels with a pilothouse-mounted loran, the memory mark datum function is carried out by the helmsman. On vessels with the loran mounted below, this is carried out by a second crew member.

(4) At the sound of the alarm, the helmsman makes an appropriate man-overboard manoeuvre. At the same time the danger signal (oscar) is sounded. While this manoeuvre is taking place, a crew member will cast a life ring over the side that was indicated in the alarm. Consider using a tender if appropriate.

(5) The coxswain assigns one or more crew members as recovery and pick-up men and, in the case of injury or unconsciousness of the person in the water, may request the rescue swimmer if available to enter the water. The person that raised the initial alarm maintains sight of the person in the water and continues to function as pointer unless relieved of this duty by another crew member.

(6) The coxswain will determine the direction of approach and on which side of the vessel the recovery will be made. The final approach to the victim should be made slowly and as close as safety allows without striking the victim. The coxswain must be vigilant of the screw rotation, particularly on the retrieving side. The propeller rotation must be stopped while the actual recovery is made.

(7) The coxswain informs the crew of his choice of approach and the means by which the recovery is to be made (e.g., life slings, recovery nets, tender, etc.). Recovery persons will position themselves in the well deck or at another assigned station and prepare for the recovery.

(8) In fair weather, the best position for the pointer is on the bow. Otherwise he should be positioned where he

(a) is safe,

(b) can see the person in the water, and

(c) can be seen by the coxswain or helmsman.

The coxswain may assign the pointer to assist in recovery when the final approach is being made.

(9) As soon as practical, and without interfering with the actual recovery, the Coast Guard Radio Station is informed of the emergency.

(10) If a rescue swimmer is used, he must wear a PFD or approved suit for a rescue swimmer, a swimmer's harness and a safety line. A crew member must attend the rescue swimmer's line.

☞ **NOTE**

These procedures must be practised on a regular basis. Every member of the SAR crew must practise each routine. The coxswain can not always be in charge. He may be the person in the water.

Lookouts

A. General

The duty of a lookout is to observe, listen, and report any sighting or audible sounds to the commanding officer or coxswain as detailed in the lookout briefing. The lookout may be posted for a variety of reasons (search, man overboard, navigation, visibility, towing watch, anchor watch, etc.) and will report according to the details and conditions of the particular task. The commanding officer or coxswain must always provide a thorough brief on the requirements of the lookout's task, including lookout placement, what sectors are to be monitored, and what is to be reported. Coxswains of small units, with a total of three on board or less, must keep in mind that a proper visual search coverage may not be achievable due to the lack of personnel.

B. Night Vision

A lookout's duties may be identical in day or night operations, but extra caution must be exercised during night watches. It can take up to 30 minutes for the eyes to become accustomed to the darkness. Vision will have a slower response than in daylight. Moving objects will be seen more readily than stationary objects. Night vision is achieved by the eyes receiving and interpreting different light patterns than those of daylight. Objects which are coloured will most likely appear in shades of grey. The process of the eyes adjusting from daylight to darkness is called dark adaptation. Your night vision can be destroyed in seconds by looking at a bright light, and the process of dark adaptation would have to begin over again.

The following measures will help to protect your night vision:

(1) Avoid looking at bright lights. When light must be used, use red lights.

(2) When scanning, do not look directly at the horizon, but rather above it. Keep your eyes fixed and move the entire head from side to side. This will make stationary objects in your field of vision appear to be moving and aid in their detection.

(3) When you do have to scan the horizon, look out of the corners of your eyes.

(4) When looking for an object, scan the sky, horizon, and sea slowly and methodically from left to right and back again or from top to bottom and back. If binoculars are used to scan an object, hold them straight forward, but move your eyes off centre to the perimeter of the field of vision.

(This section will have to be updated when cutters acquire infrared hardware.)

C. Lookout - Search

Too often, during Search and Rescue exercise debriefs, it has been reported that the lookouts were casual in their tasks. The lookout must be cognizant that he is the only person detailed to search his particular sector. If he misses an object sighting, it will probably not be detected by others on the vessel. A methodical approach is needed to ensure that an object is not missed due to random lookout scanning.

Basic procedures for improving lookout techniques are as follows:

(1) To reduce eye fatigue, keep the eyes focused straight ahead and move the entire head to scan.

(2) Focus the eyes on a spot in the water every 10-15 degrees. This is about one fist width of the horizon if the arm is extended straight out in front of the body.

(3) Search out and back a few times, and then give the eyes a rest by focusing on something on board for a short period, preferably not more than 15 seconds.

(4) Sunglasses should be used when scanning up-sun and are recommended for continuous use during days of bright sun or high-glare conditions. Infrared and ultraviolet impervious sunglasses provide the best protection to the lookout.

(5) Binoculars should not be used for scanning. They should be kept available for immediate use in identifying an object spotted.

(6) The faster the vessel is proceeding, the faster the lookout must scan to complete the assigned area. The preferred search speed is between 10 and 15 knots. This speed should be reduced when searching for small objects, e.g., people in water.

(7) If the lookout spots an object in the water, visual contact must be maintained with the object. An easy way to maintain contact is to point to the object. This method will also help the lookout direct the commanding officer or coxswain to the object's location.

(8) Bearings in degrees are used to direct the vessel to a sighted object. The vessel must be imagined to be in the centre of a compass rose. The bow is at 0° and the stern at 180°. An object sighted straight off the port side would be reported as an object at 270°. The lookout would continue reporting the object's relative position until the helmsman had the object in sight.

(9) Lookouts will suffer from fatigue and should be rotated at least every 30 minutes. A rest period should be incorporated into the rotation but, if this is not possible, a new search sector will increase the lookout's effectiveness somewhat.

(10) Post lookouts as high as safety allows in the existing conditions. This increases the visible horizon and allows the lookout to look down on the search area.

(11) A lookout reporting a sighting to the master should repeat the sighting information until he is acknowledged by the master.

(12) A complete knowledge of recognized distress signals is imperative for a lookout in a Search and Rescue operation.

(13) Take into account the weather conditions when positioning the lookouts. It might be appropriate to position them inside due to heavy weather in order to reduce fatigue and exposure and increase their efficiency.

Search Briefing: Lookouts must be fully briefed in order to effectively carry out their duties. A briefing must contain all details known about the search object, including the nature of the distress and the possibilities that may have evolved from the situation. Known details of vessel descriptions, life rafts, clothing colours, etc., are essential information in a briefing.

D. Lookout - Steering

(1) Steering lookouts are posted to provide a means of identifying ships, land, aids to navigation, drift, discoloured water, or any other obstacle to the commanding officer or coxswain. The helmsman alone cannot identify all visual objects or aids in sight from the SAR vessel.

(2) Brief and post steering lookouts at all times, but provide additional vigilance in situations of low visibility, tight quarters, dense traffic, SAR cases or any other ongoing events.

E. Lookout - Towing

(1) Always designate a towing watch to provide constant observation of the tow and towing equipment. The towing watch should be instructed on what he is to report and should have a means of cutting the towline close at hand to release the tow or as instructed by the commanding officer or coxswain.

(2) Instruction to the towing watch should include guidelines to report how the tow is riding (in step, veering, etc.), equipment failure, chafing gear out of position, and any unusual circumstances.

(3) The towing watch must be situated in a safe and secure location, have communication with the coxswain or commanding officer and stay clear of the towline.

(4) Increased vigilance is required by the lookout when in confined channels or harbour entrances to monitor veering or yawing of the towed vessel.

Operational Checklists for Small SAR Vessels

A. Getting Underway

(1) Brief crew. Include purpose, special circumstances, destination, course to steer, ETA, intentions on arrival, weather/sea conditions to be expected.

(2) Check for loose gear. Secure as required.

(3) Load extra gear (as required for mission) from ready locker.

(4) Secure watertight doors.

(5) Crew wearing appropriate safety and survival gear. Deck safety harnesses ready for use.

(6) Sea suction valves open. Electrical systems energized. Navigation lights on for reduced visibility or night operations. Alarms on and tested. Engines started. Check gauges.

(7) Start loran, radar, radios, sounder, fog signal and loud hailer on standby, and have appropriate chartwork ready when necessary.

(8) Test steering (hard over to hard over) and compare to rudder angle indicator. Test engine controls (forward and reverse), noting reaction time to engagement.

(9) Cast off when ready.

(10) Inform the Coast Guard Radio Station of underway time and number of persons aboard.

(11) Secure removable safety lines. Secure decks (fenders, tie-up lines, etc.).

B. Underway

(1) Keep at least two persons on watch at all times if possible. One must be a lookout and know what is required of a lookout (i.e., detecting (with eyes and ears) and reporting other vessels, aids to navigation, and hazards or any other unusual sighting). In good conditions with excellent visibility, and no SAR mission underway, set a watch rotation.

(2) Maintain a vigilant radio watch.

(3) Maintain log book, chart work, regular position checks, and regular engine space checks.

(4) Maintain a regional defined communication schedule with RCC/MRSC via the Coast Guard Radio Station (i.e., ops. normal message). This schedule may be more frequent in heavy weather conditions or in accordance with regional practice. Vessels operating in a vessel traffic reporting system may report in accordance with the VTS rather than the CGRS.

(5) Know where the crew is at all times.

(6) Observe aids to navigation (position, condition, operation).

(7) Maintain routine crew training in man-overboard procedures, emergency steering, search patterns, use of DMB, firefighting ops., helo ops., navigation, vessel handling, and Collision Regulations.

(8) In reduced visibility, SLOW DOWN, SOUND A FOG SIGNAL, post extra lookouts and explain their duties. Maintain a speed that will enable you to take appropriate action to avoid a collision and stop within a distance appropriate to the prevailing circumstances and conditions.

(9) In heavy-weather operations, use safety harnesses on deck. Maintain a vigilant safety watch of personnel on deck. Consider wearing of helmets or "bump caps" by all crew members.

C. Post-Operations

(1) Advise Coast Guard Radio Station / RCC / MRSC that vessel is on station.

(2) Complete appropriate logs.

(3) Check that lines are properly secured. Reconnect shore power.

(4) Shut down all electronic equipment in accordance with the manufacturer's specifications. Report any problems encountered to ETs.

(5) After engines have idled down for a period of not less than five minutes, shut them down.

(6) Check engine spaces thoroughly for any signs of leaks from engines, waterlines, oil lines, hydraulic lines, packing glands, reverse gears, bilge pumping systems, or any other possible source. Inspect for broken or loose wires or electrical connections.

(7) Thoroughly check bilges.

(8) Check engine and gearbox fluid levels (oil, water). Check hydraulic steering fluid level. Check fuel level.

(9) Wash complete exterior with fresh water.

(10) Clean interior and replenish supplies. Clean, service and re-stow any used SAR gear.

(11) De-energize electric circuits not needed. Secure hatches and watertight doors. Check shore-powered heaters. Check engine heaters. Set alarms. Close vessel.

Heavy-Weather Preparation Checklist

At times SAR vessels are required to operate under extreme weather conditions. When things start to go wrong in these conditions, they will happen quickly and may compound to make your task even more difficult. The SAR vessel must be prepared for heavy-weather operations at any given time. A few preventive measures can go a long way in making your voyage successful and as "close to pleasant" as possible.

In any case, the CO/coxswain will ascertain that heavy-weather conditions exist or are forecasted. Although a SAR vessel should be ready for full response at any time, before venturing into heavy weather take the time to check your vessel's preparedness.

(1) Is all loose equipment or personal gear in its proper stowage place and secured for sea? Are hatches, windows, ventilators, etc., secured? Is shore-based standby equipment required? (Ready locker?) Stow required standby equipment securely.

(2) Are life lines and harnesses rigged or in the ready position?

(3) Are all personnel dressed in proper protective clothing / personal safety equipment? Are helmets to be worn? Are seat belts ready?

(4) Is the engine room secure? Have final checks been made? Is there adequate fuel for an extended period of time at sea?

(5) Prepare required charts and equipment before leaving the harbour. Are intended courses, clearing lines, etc., laid out on the charts?

(6) Consider removing non-essential towline covers or similar ancillary equipment in order to eliminate the requirement to do so at sea.

(7) Is crew briefed on any special considerations or hazards particular to the tasking or conditions expected to be encountered?

Care and Maintenance of Personal Safety Equipment

A. General

Personal safety equipment is issued on a loan basis to individual Coast Guard crew members. Crew members in custody of personal safety equipment are cautioned that the quality of maintenance and care of this equipment may be instrumental in the saving of lives, including your own. Consider it lifesaving equipment and treat it as such.

Personal safety equipment on loan to an individual must be maintained in appropriate condition in accordance with the manufacturer's maintenance guidelines. The onus for keeping the gear in proper condition is on the individual to whom the gear is issued. Faults or problems which are beyond the scope of maintenance by the individual are to be reported to the commanding officer or coxswain for appropriate followup (e.g., personal strobe-light batteries must be changed annually).

B. Coast Guard Approved Floater Jackets and Working Suits

Typical of the floater suits used in Coast Guard is the Meta model 2175-2176. This model incorporates an inflatable flotation collar that is inflated by an oral inflation hose. The flotation collar provides additional buoyancy about the head and shoulder area, to keep the wearer's head clear of the water.

The suits have an approval as a TYPE II Personal Flotation Device in Canada and provide some hypothermia protection if worn properly. Maximum hypothermia protection is gained by wearing the hood over the head, having all zippers fully closed, and tightening all straps.

Suits which are damaged by small tears, broken zippers, open seams, or small burns may be repaired by sewing or patching. Suits which are more severely damaged should be removed from service. It is recommended that suits in SAR operational use for five years should be removed from service and replaced.

After use, suits should be rinsed with fresh water and hung in a ventilated area to dry; do not expose to direct sunlight. Zippers should be periodically lubricated with paraffin or beeswax both to act as a lubricant and to retard corrosion.

Floater suits should not be dry-cleaned. Areas which become soiled may be washed with a mild soap solution and rinsed with fresh water and then hung to dry in a ventilated area. Do not wring the suit. Do not attempt to use solvent or thinner to clean suits exposed to a substance containing acetone.

C. Dry Suits

(1) General

The dry suit will protect the wearer from exposure to cold, wind, rain, and spray, as well as immersion in water for short periods of time. However, a dry suit will not provide sufficient buoyancy, and a PFD must be worn at all times with the dry suit.

Dry suits alone do not provide adequate insulation or hypothermia protection. Thermal underwear must be worn beneath the dry suit to provide insulation. In areas of very cold water temperatures, layering of underwear is recommended (15-10°C, one pair; 9°C and under, two pairs).

Dry suits are among the most expensive items of personal protection for SAR crews. To perform their function of providing you with protection from the elements, they do require some specialized maintenance routines. With proper care and maintenance, they can fulfil their purpose for extended periods of time. Always refer to manufacturer's guidelines in order to make a proper usage of the dry suit in matters such as donning and removing the suit.

(2) Cleaning Routines

To prolong the life of the dry suit and ensure that it is ready for your next use, the following steps should be performed after each use:

(a) Close the zippers and rinse the suit thoroughly to remove salt or other contamination. Pay special attention to folds and creases.

(b) Clean the zipper teeth and outer zipper guard (if fitted) with a soft wet brush, such as a toothbrush, to remove dirt and salt.

(c) Thoroughly wash all seals, inside and out, using a mild soap-and-water solution to remove body oils or other contaminants.

(d) If required, turn the suit inside out and rinse with fresh water.

(e) When cleaning is completed, hang the suit on a sturdy wooden or plastic hanger to dry. The inside of the suit should be dried first, and then the outside. Do not expose it to bright sunlight or excessive heat. Do provide adequate circulation.

(f) After the suit has thoroughly dried, lubricate the zippers with paraffin wax or beeswax on both the inside and the outside of the teeth.

(g) Lubricate the seals in accordance with the manufacturer's recommendations by means of a "food grade" silicone or unscented talcum powder. Do not use petroleum-based lubricants. Do not apply lubricants to seals that are contaminated. The contaminants will be trapped and will speed deterioration.

(3) Storage

Dry suits should be stored with the entry zipper completely open. They should be either hung on a sturdy wooden or plastic hanger or folded and stored in a protective bag. Folding should be done according to the following steps:

(a) Lay the suit out flat with the back side up.

(b) Fold the boots up to about the knee height.

(c) Hold the boots in place and fold the legs upward at the crotch.

(d) Fold the arms inward across the back. Be sure that the wrist seals are laid out flat with no folds.

(e) Hold the arms in place and fold the upper torso back over the legs and lower torso. Straighten the neck seal to ensure that no folds are present.

(f) Insert the suit into the protective bag. Store away from petroleum products, ultraviolet light, heat, and fumes.

(4) Repairs

Many suits come with a manufacturer's warranty for repair of defects. Before proceeding with a repair, ascertain whether it should be done by the manufacturer on warranty. Some non-warranty repairs will be beyond the scope of field repairs by the SAR unit. These may include tears in excess of 7.5 cm (three inches) long, large holes with fabric loss, torn or broken zippers, threads broken around zippers, damaged boots, fabric torn across a seam, and broken seams.

Repairs which can be carried out at the SAR unit include neck and wrist seal replacement and repair of fabric punctures and minor tears. SAR units should conduct all repairs according to the manufacturer's recommendations for their particular suit.

(5) Wrist and Neck Seals

Seals generally require replacing every six months to two years. They are moulded of black latex rubber and are subjected to normal wear and deterioration through exposure to sun, salt, ozone, petroleum products, etc. Signs of deterioration may include sticky or gummy latex at the open edges, cracks in the latex surface, hard spots, or a general hardening evident in a lack of flexibility and elasticity. Replacement seals are available from the suit manufacturer.

(6) Punctures and Minor Tears

Punctures and tears are an unavoidable nuisance in the SAR environment. They occur through contact with equipment aboard the vessel or sharp rocks or through abrasions from working on non-skid decks. Patches must be applied in accordance with the manufacturer's recommendations. Patch kits are available from the manufacturers.

D. Thermal Underwear

(1) General

Thermal underwear constructed of polypropylene fibres provides good insulating value in a marine environment. Maximum protection from hypothermia can be achieved by layering thermal underwear. Polypropylene tends to wick moisture away from the wearer, increasing comfort and aiding in reduction of heat stress. The best wicking characteristics are obtained when the fabric is worn next to the skin.

(2) Cleaning

Cleaning routines are limited to laundering after use. Polypropylene underwear should be washed by machine in warm water up to 38°C, and rinsed in cold water. Air drying is recommended, but a dryer on a permanent-press cycle may be used.

E. Helmets

Helmets are provided mainly as head protection to reduce injury in the event of a blow to the head. They can also protect the head against cold and water from rain or spray. If fitted with a visor or face shield, they can protect the eyes and face from rain and spray. If fitted with adequate devices, they can also serve as aural protection.

Helmets must be worn at all times by all personnel sailing in a Fast Response Craft (refer to CGFO 222) and are to be worn in heavy weather conditions (at the coxswain's discretion) on self-righting lifeboats.

Helmets should be washed with mild soap or detergent, rinsed, and wiped down after every use. During this maintenance, the straps and fasteners should be physically checked for damage, and any missing reflective tape should be replaced. If the helmet is fitted with velcro for attaching the personal strobe light to the top (refer to subsection F below), check the condition of the velcro, and replace as required.

F. Strobe Lights

The personal emergency strobe light emits a high-intensity flashing light of 40-60 flashes per minute, visible for long distances. It may be used to attract the attention of aircraft, ships, or ground search parties. A lanyard must be fastened to the light and to the wearer's clothing to prevent loss of the light when in use. The lanyard should be of sufficient length to allow the arm to be extended to the maximum reach with the light held in the hand. The application of velcro to the light and the top of your helmet is recommended. If an individual, in the water, is attempting to attract attention, he or she may place the light on top of the helmet and free both hands.

Personal strobe lights are to be carried by all individuals embarking on an FRC/RHI or working on deck between dusk and dawn.

The strobe light should be activated and checked at least once every patrol. This check includes:

(1) a physical examination of the body, clear light cover, and switch including protective boot cover, for damage;

(2) a check of the battery date for expiry (generally one year from manufacturing date);

(3) a check of the lanyard for security and condition of cord; and

(4) activation of the light to check functional operation.

When donning safety gear for use, you should check the strobe light by activating the switch for a couple of flashes before proceeding with the task.

G. Whistle

The whistle is a sound signalling device which can be heard at distances greater than 300 metres at sea. It is an effective and inexpensive item of personal protective equipment which has been instrumental in locating and saving many lives at sea. Yet, care and maintenance of this simple equipment are often ignored.

In SAR operations it is highly recommended that whistles be attached to every item of personal flotation in the unit. Whistles should be attached securely to the item of personal flotation and in a manner that allows the wearer to reach the whistle with his mouth. Care should also be taken in placing the whistle to protect it from being struck or crushed while the wearer conducts normal work functions. The zipper on jackets and floater suits is the recommended place of whistle attachment.

Whistles should be of a type intended for marine use, such as standard lifejacket whistles. Choose a unit that has no moving parts (peas), is compact, is break resistant and, above all, expels a loud piercing tone in use.

Whistles should frequently be checked for cracks, breaks, or deterioration. Check that the whistle remains securely fastened to the item of personal flotation and that it can be reached by the wearer's mouth without removing the whistle or putting the face down into the water if the wearer is immersed in water. Test the whistle by blowing into it. Replace any whistle which fails the physical examination or fails to sound a loud shrill tone.

H. Personal Distress Flares

(1) General

It is highly recommended that a minimum of three personal distress flares (TYPE B) be carried by all crew members embarking on small SAR vessels operating during hours of darkness. Flares are normally carried in a pocket of the Mustang suit, floater jacket or dry suit or in a fanny pack with other items of personal safety gear.

The TYPE B distress flare produces at least two red stars at an interval of not less than 15 seconds. The stars are projected to an altitude of not less than 90 metres (300 ft.). The stars burn with a luminosity of not less than 5000 candela for a period of not less than four seconds, and burn out before touching the sea. The TYPE B distress signal may contain a firing device capable of throwing the stars automatically or may use a cartridge-firing device that requires loading for each star.

WARNING

SAR crews should not use cartridge-fired devices as personal flares to be carried by a crew member. Firing these devices by a crew member in the water requires a higher degree of coordination and dexterity than the self-contained devices. Coordination and dexterity may be depressed by the effect of hypothermia, causing the act of firing the cartridge type to be very difficult. It is recommended that SAR crews use the compact type of flares to allow easy fitting and comfort in pockets of work suits and clothing.

(2) Maintenance

All distress flares approved for marine use in Canada have an expiry date of four years from the date of manufacturing. Check the dates on your flares regularly and take steps to procure replacements before the expiry date.

(3) Weekly Checks

Flare inspections are carried out by the individual that they are issued to, weekly, outside the vessel or buildings, in a clear area. Handle flares with care, and be particularly careful not to pull on the launch cord or chain while conducting the inspection.

(a) Check the manufacturing date on the flares to ascertain whether they are still within the four-year period of approval. If expired, replace the flares with fresh ones and dispose of the outdated flares in the approved manner for your region.

(b) Check the flares for splitting, cracking, loose caps or any other signs of deterioration.

(c) Check the waterproof wrappings on your flares to ensure that they are still watertight. If the wrapping is not watertight, replace it with a new zip-top bag.

(d) Replace the flares in their designated stowage pouch or pocket.

I. The Emergency Signalling Mirror

In addition to flares, strobe lights, and whistles, some SAR units issue the emergency signalling mirror. The emergency signalling mirror is a compact unit that is used to attract the attention of passing aircraft or boats by reflecting light at them. The reflected light may be seen from two to four miles from the point of origin. The signalling mirror is used and maintained in accordance with the manufacturer's specifications. A weekly inspection of the mirror should be done to ascertain that the surface is clean and polished, and the lanyard secure and in good condition.

Capsizing Causes and Prevention: Types 100 and 300 Lifeboats

A. General

In the late 1950s, US Coast Guard motor lifeboats experienced a series of capsizings with loss of life to crews and survivors on board. Out of the ensuing inquiry into the capsizings came a new design and construction program for motor lifeboats. The steel self-righting 44-foot motor lifeboat was established as the USCG replacement lifeboat. The first was delivered in 1962, and others soon followed to boost the US total to 106 vessels. Several other countries adopted the design of the 44' MLB based on its apparent success record in the US.

The 44' MLB completed thousands of rescue missions without fatalities, but several further capsizes with considerable structural and equipment damage occurred. The lack of fatalities in these capsizings was attributed to the inherent safety of the 44' MLB as well as an upgraded system of crew selection and training.

Capsizings of motor lifeboats will incur severe damage to equipment and injury to personnel even if the vessel does self-right in textbook fashion. To prevent or prepare for such mishaps, we must look at what is known about capsizing of these lifeboats and what can be done by SAR crews to prevent such mishaps.

The conditions that cause a motor lifeboat to capsize are not absolutely clear. Rarely is a clear account of what occurred during those last seconds preceding the capsize available from the surviving crews. Most of us will have only survival in our thoughts during these events.

Most capsizing of motor lifeboats has occurred in breaking seas, over bars, at river mouths and entrances to small harbours, and in inlets with strong tidal current. A capsizing of an intact motor lifeboat in deep open water would require very unusual circumstances.

What is known about these capsizings is that the following conditions seem to be present in most cases:

(1) The motor lifeboat is returning from a tasking with fuel tanks partially empty.

(2) Waves are 15 feet or higher.

(3) The lifeboat is traversing a shallow area of 24 feet or less depth, with the direction of the waves.

(4) The tide is low or receding.

(5) The lifeboat is proceeding against a strong tidal current.

(6) The lifeboat is damaged and has taken water aboard.

(7) The lifeboat is towing or escorting another vessel.

(8) The lifeboat is operating in darkness.

B. Factors in Capsizing

In consideration of the foregoing conditions, the following assumptions can be made:

(1) Low fuel in the tanks can reduce the righting movement of the lifeboat. The free surface effect of the partially empty tanks can be a contributing factor in capsizing.

(2) Large, steep waves overtaking a vessel from astern can cause the vessel to broach and capsize. In extreme cases, motor lifeboats have pitchpoled. This can happen when a steep following wave lifts the stern of the boat to such an angle as to cause the bow to submerge and actually dive under, with the balance of the boat pitchpoling overhead.

(3) Waves in shallow water become steeper when the depth is less than 1.6 times the wave height. Waves will break when the depth is about equal to the wave height.

(4) Low tide will reduce the depth over shallow bars. Outgoing tide tends to make waves steeper and increases the time it takes a boat to traverse a bar in the inbound direction, thus exposing the boat to steep waves for a longer period of time.

(5) Towing or escorting a vessel into a dangerous inlet limits the speed and manoeuvrability of the lifeboat and thereby increases its chance of capsizing.

(6) Operations in darkness are extra dangerous due to the limited visibility.

C. Minimizing the Dangers of Capsizing

The SAR crew can minimize the dangers of a capsize by following a few measures of good common sense. It is a fact that crews will perform and react in an emergency situation in a manner that mirrors that of their training exercises. (For example, if crews are not consistently required to dress and work in full protective equipment during training exercises for emergencies, do not expect them to use this equipment when the genuine emergency situation arises. They will not be programmed to use it.)

(1) Close all doors, ports, windows and hatches prior to entering a dangerous area. Crew, survivors and all loose gear must be secured; protective headgear is highly recommended.

(2) Avoid entering a stormy inlet under adverse conditions, such as darkness, low tide, outgoing tide. If possible, wait outside, anchor in a protected area, or proceed to a safer harbour.

(3) Moderate high speed is an asset; if used prudently, it will permit the boat to follow a wave into an inlet without being exposed to the next wave. Good control is required under these conditions as overtaking a steep wave is extremely dangerous. If the boat is about to be overtaken by a wave, it is best to reduce speed drastically and point the stern directly into the oncoming wave. Any speed while going down the front slope of a large steep wave might result in broaching and loss of control, with the potential danger of capsizing or pitchpoling.

(4) The lifeboat crews should practise "running an inlet" under controlled conditions.

(5) A good coxswain's skills are based on thorough knowledge of local conditions and complete confidence in himself and his vessel. Long practice allows the coxswain to react without delay to a dangerous situation.

D. Handling the 41-Footer in Heavy Seas

(1) Unlike the 44-footer, the 41-footer is not a self-righting boat: it can take a list up to 75°, but will capsize past this point. Therefore, the coxswain will have to handle the boat carefully in heavy seas and avoid breaking waves and surf zone. The following boat-handling characteristics have been outlined:

(2) When running before a sea, you must handle the cutter very carefully. The 41' tends to slide on the back of a wave and heel strongly. When waves reach eight feet, the rudder is sluggish. If possible, avoid running directly before a swell and make your heading at a 15° angle to it. Try to position yourself on the back of the wave and follow it, avoiding overriding it. Since the stern is wider than the bow (and more buoyant), it will push you along on the front of the wave if you overtake it. In this case, the boat has the tendency to dig in at the bow and pitchpole or become broadside to the sea and broach.

(3) In head seas, slow down and preferably approach at a slight angle. Adjust your speed as necessary to keep the screws in the water; if your stern gets high, your screws may race and damage the engines. Also minimize strain on the hull by avoiding slamming over waves and becoming airborne. Over eight-feet-high waves, constant manoeuvring with the throttles will become necessary.

(4) Like the 44-footer, the 41-footer has tended to capsize when some of the following factors were present:

(a) Waves were eight feet or higher.

(b) The boat was traversing a shallow area of 20 feet or less with the direction of the waves.

(c) The tide was low or receding.

(d) The boat was proceeding against a strong tidal current.

(e) The boat was escorting or towing another vessel.

(f) Visibility was restricted or the vessel was operating in the darkness.

(Refer to previous notes on the 44-footer in this section for more details.)

(5) In a capsize situation, any crew member will feel disoriented and a presumable state of panic will arise. Keep in mind that the boat can float for a while and that you have time to escape. Chances are that you will be plunged in complete darkness, especially at night and inside the forward compartment. Touching will be your only means of orienting yourself inside and of making your way out. Check for loose equipment that could float and obstruct your passage, such as carpets and loose gears. Remember that things are inverted when capsized; for example, the passage up to the wheelhouse from the forward compartment on port side will become down and on starboard side.

SAR Operations

Section Two: SAR Operations

2-1 Rescue

A. General
B. Arrival on Scene
C. Persons in the Water
D. Diving Accidents

2-2 Removing Persons from Shore

A. General
B. Evaluating the Situation
C. Preparation
D. Procedures
E. Tender or FRC
F. Life Raft
G. Rescue Swimmer

2-3 Removing Persons from Other Vessels

A. Introduction
B. General Guidelines
C. Use of Life Raft for Transfer
D. Patients in Stretchers
E. Larger Ocean-Going Vessels

2-4 Rescue of Persons from Burning Vessels

A. General
B. Vessel on Fire at Fuel Docks and Marinas

2-5 Rescue from Survival Craft

2-6 Rescue from Disabled Vessels

A. Overturned Vessels
B. Foundered or Sunken Vessels
C. Rescue of a Vessel Drifting onto a Lee Shore
D. Grounded Vessels on Lee Shore or in Other Danger

2-7 Aircraft Rescue

A. Airborne
B. Ditching Nearby - General Guidelines
C. Helicopter Ditching
D. Aircraft Crash - General Guidelines

2-8 Rescue Operations with DND Aircraft

A. Equipment Drops
B. Joint Operations with DND Helicopters: Preliminary Procedures
C. Joint Operations with DND Helicopters: Surface Vessel Deck Operations

2-9 Passing the Canister Pump

A. Passing to a Vessel in Tow
B. Direct Passing

Rescue

A. General

The prime objective of all Search and Rescue operations is to ensure the safety of human life. Rescue operations begin when the search object location is known and include all actions to free persons from suffering, injury, or death.

It is obvious that no two rescue situations at sea will be alike in all respects. Each situation must be evaluated by the rescue crew to determine the strategy and tactics to be employed to bring about a successful conclusion. However, some procedures can be standardized to a certain extent with due regard to the variables of sea, weather, geographic location, and physical characteristics of the disabled craft, persons, and the rescue vehicle.

B. Arrival on Scene

Whatever the search object may be, the initial sighting must be reported to the RCC/ MRSC. The initial report will often be brief, because of the lack of information on approach, but should include:

(1) a description of the search object including the number of persons sighted;

(2) the location and on-scene weather;

(3) any special problems anticipated in approach or recovery;

(4) need for additional resources; and

(5) your intentions.

After the initial sighting, and while still approaching, the coxswain must continue to evaluate the situation, while formulating a rescue plan. (Assessing a rescue situation is a continuous process of evaluating existing conditions. It is more than just a single step in an operation, because the assessment is never completed until the situation is under control.) Communication between the crew members at this phase is extremely important. The coxswain must inform the crew of his rescue plan (and, if he has one, an alternative or contingency plan). Crews must quickly prepare any required equipment or rescue devices.

The coxswain must continue to keep the RCC/MRSC informed of developments throughout the rescue phase and, in particular, the number of persons recovered and/or still unaccounted for. (See National SAR Manual - Chapter 5, paragraph 82 - NOCL Message.)

C. Persons in the Water

The crew must be briefed of the coxswain's intentions for the method of recovery. All required equipment should be prepared in advance (i.e., blankets, hot packs, Heat Treat, ladders, tender, scramble nets, Rescue Swimmer, etc.)

The system for approaching a person in the water should be well rehearsed by all crew members because it is exactly the same as man-overboard recovery operations practised by every Coast Guard vessel. A pointer must be designated and endeavour to always keep the person in the water in sight. The pointer will position himself in visual and verbal contact with the coxswain and direct him to the person until the person is alongside the rescue zone. The coxswain manoeuvres into position under the guidance of the pointer and stops the propellers upon approaching the person. The pickup person or team takes direction from the coxswain regarding the pickup side and positions itself to aid the person out of the water.

People immersed in cold water will rapidly lose muscle strength and coordination, and may not be able to help themselves. They may have to be assisted every step of the way to recovery.

Normally, people in the water receive the highest priority. Seconds count, but bear in mind that suspected hypothermia victims should always be recovered gently and horizontally to reduce the chance of rapid blood-pressure drop.

(1) Recover those persons who are without flotation aid before those with flotation.

(2) Recover those without hypothermia protection before those with hypothermia protection.

(3) Interview all survivors at the earliest opportunity to determine if others are in the water and if they were seen.

(4) In cases of locating numbers of people in the water, provide temporary flotation during recovery operations (life rings, life-raft, utility boat, etc.).

(5) Recovery of unconscious persons often requires a person to enter the water to assist. Consider your crew size and recovery methods for the swimmer. Use only qualified, properly outfitted rescue swimmers.

(6) Treat all immersed victims for hypothermia.

(7) Do not leave the scene until you are sure that all survivors have been recovered and the RCC/MRSC concurs.

D. Diving Accidents

A diving accident is normally the responsibility of the local civil authorities. However, some of our stations located in remote areas may also have diving accidents occur in their vicinity. Such accidents might require the SAR cutter to proceed.

If you are alerted for a diving accident in your area, these actions should be considered:

(1) A diving accident requires medical assistance as soon as possible. You may wish to arrange to be accompanied by medical staff if the delays suffered while waiting for the personnel are reasonable.

(2) A decompression chamber is normally necessary. It is RCC/MRSC responsibility to find out where the closest decompression chamber in your area is located. Plan your best evacuation harbour accordingly.

(3) Bear in mind the option of requesting a helicopter evacuation as this might be the best means of evacuation.

(4) Make sure that all detailed information concerning the patient's accident travels with the casualty.

Removing Persons from Shore

A. General

Several scenarios of SAR incidents require the removal of persons from shore to complete the mission. Some cases may occur in protected waters (or even better at a dock) or, at the other extreme, in exposed or treacherous locations. In all cases, the strategy is to remove the persons safely and to reduce injury or suffering.

B. Evaluating the Situation

(1) Is communication established?

(2) What are the circumstances requiring removal (immediate danger, hypothermia, injured, etc.)?

(3) Do you have the means of safely removing the persons (adequate crew size, rescue swimmer, FRC, tender, etc.)?

(4) What are the consequences of leaving the people until a helo is available, the conditions improve, or another more suitable unit (FRC) arrives to remove the persons?

(5) Is the rescue vessel safely manned to complete the task and able to deal with internal emergencies?

(6) What are the risks in attempting removal (seas, injuries, geographical hazards, etc.)?

(7) Is there another means of evacuating them?

(8) How can the SAR unit best perform the task (straight transfer from shore, pick up with tender or FRC, float in a liferaft, use rescue swimmer and immersion suits)?

C. Preparation

(1) Establish communication (radio, loud hailer, hand signals, etc.).

(2) Brief crew of intentions, including cautions and/or contingency plan.

(3) Brief distressed persons of intentions.

(4) Prepare equipment.

D. Procedures

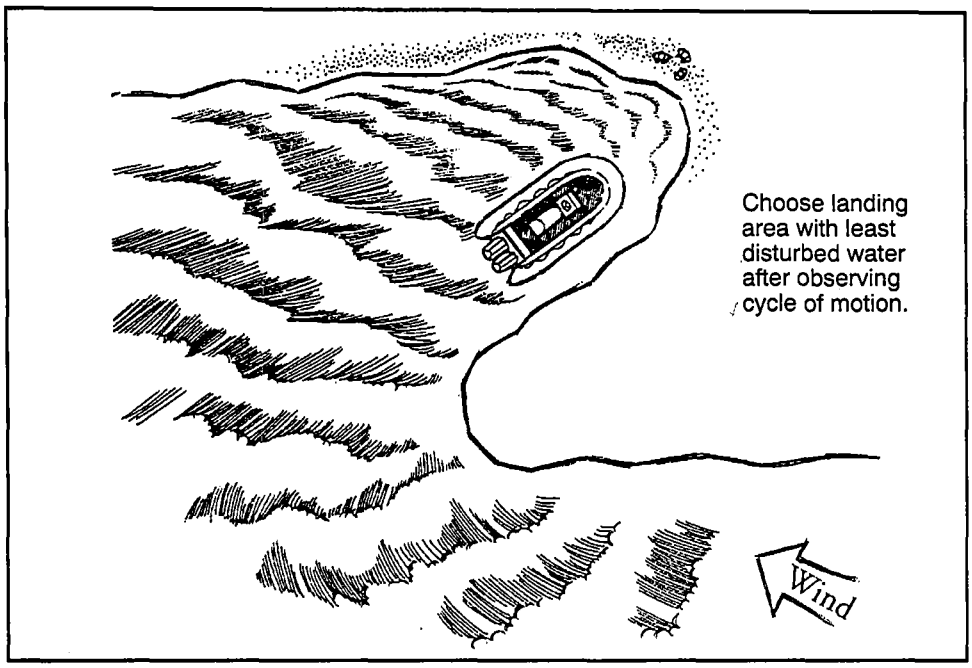
Normally a tender or FRC can be utilized only if a crew of four or more is available. A minimum of two persons must man both the FRC/tender and SAR vessel. In any event the commanding officer or coxswain must assure himself that the FRC could be recovered safely by the SAR vessel.

E. Tender or FRC

(1) Choose a landing area that is free of obstacles (both on shore and in the water) and has the least disturbed (aerated) water. DO NOT LAND ON SURF BEACHES. Approach the landing area and stand off to observe the action of the seas in the chosen area. After observing the cycle of motion, time your approach to take maximum advantage of the waves. Choose an approach angle that will allow you to view the landing zone and protect your stern from the seas. Time your approach to allow persons to board or disembark during lulls or the smallest seas.

(2) In incidents where a secure, protected landing can be effected, the vessel may be beached during the transfer.

(3) All persons must wear PFDs or lifejackets during transfer.



F. Life Raft

(1) Some CG vessels carry a designated "SAR life raft". On vessels that do not carry a SAR life raft, the decision must be made by the commanding officer or coxswain whether the situation necessitates launching the SAR vessel's own life raft.

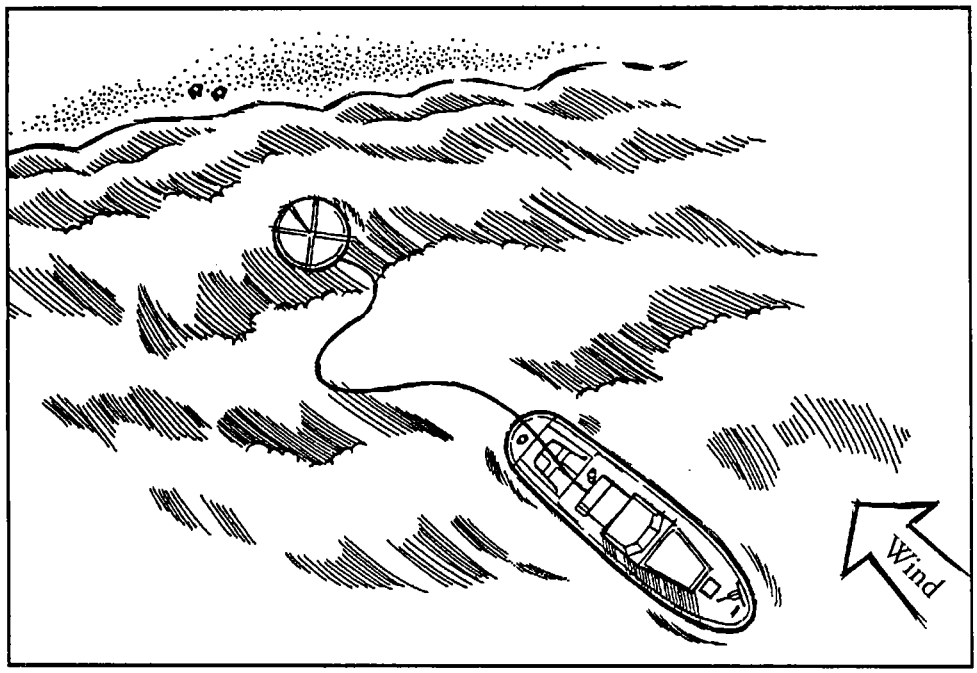
(2) Before launching the life raft, the SAR vessel should be positioned to take advantage of wind and current to drift the raft into the beach.

(3) Consider deflating the canopy of the life raft before sending ashore.

(4) If the situation will not allow the raft to drift in on its own, a messenger line may be sent ashore by line-throwing gun, heaving line, or floating in with a smaller object.

(5) The raft will have to be inflated and have adequate line attached to send it in to the beach. Depending on the circumstances, the coxswain may want to send a crew member in the life raft to assist the survivors. If a crew member does board the raft, he must be dressed in full protective clothing including hypothermia protection and a helmet.

(6) Transferring personnel from a life raft to a rescue vessel can be very difficult, particularly in less than calm sea conditions. The life raft will experience constantly varying motion from the soft bottom and soft floor as well as a constantly changing movement of the whole raft, making safe movement of personnel difficult. Good physical hand holds must be executed on each survivor by the rescue crew before the transfer takes place from raft to rescue vessel.



G. Rescue Swimmer

(1) The decision to use a rescue swimmer will depend on the availability of a qualified and equipped swimmer as well as mutual agreement between the coxswain and swimmer on the suitability of a swimmer for the particular task. Drills should have taken place prior to sending the rescue swimmer. Safety procedures must be understood and known by crew and coxswain. (Refer to TP 9224 for minimum crew, signals and exercises.)

(2) It must be determined whether the swimmer will remove the persons or stay with them to provide aid until they can be evacuated by other means.

(3) If the persons are to be transferred from shore to the SAR vessel, one proven method is to use an immersion suit for the victim. The swimmer can take the suit in or pull it in on a line after reaching the beach. The victim is dressed in the suit and is then pulled out to the SAR vessel, with the swimmer staying with the person to provide aid and encouragement.

Removing Persons from Other Vessels

A. Introduction

Transferring personnel from one vessel to another at sea can be dangerous at all times, but is particularly difficult in dealing with medical injuries or people who are not accustomed to being at sea. To further complicate matters, sea conditions may be miserable. In all cases, consideration must be given to the safety and consequences of proceeding with the transfer or not. The degree of danger anticipated by leaving the person aboard the vessel must be weighed against the dangers of transfer. This decision to proceed or abort the transfer is generally made on scene and involves consultation between the coxswain, the RCC/MRSC, and the master of the vessel concerned. Removal of persons from other vessels can cover a broad spectrum of incident types; however, the basic techniques employed remain much the same for all types of incidents requiring personnel transfers.

B. General Guidelines

(1) Preparation

(a) After determining the need to proceed with a transfer, discuss the intended procedures with the master. Be certain that he fully understands your intentions and what actions are required from his vessel.

(b) Discuss the intended procedures with the SAR crew. Designate duties.

(c) PFDs or lifejackets must be worn by all personnel involved in the transfer operation.

(d) Fenders must be placed on both vessels (where practical).

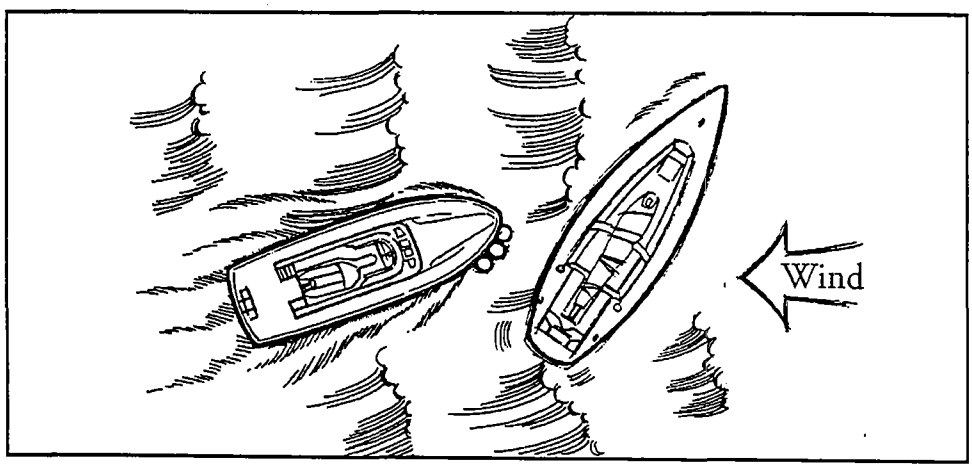
(e) Consider the use of harnesses or life lines on deck.

(2) Approach

(a) Generally the safest approach is upwind to maintain manoeuvrability on your vessel, **except for vessels on fire.**

(b) One crew member on deck should be designated to communicate with the persons on the distressed vessel. Others should refrain from calling instructions to avoid confusion.

(c) Fenders should be tended.



(3) Transfer

(a) In ideal conditions, the SAR vessel may be placed alongside the distressed craft and secured. Lines should be ready to slip quickly if required.

(b) If securing to the distressed craft is not appropriate in the circumstances, manoeuvre your vessel in to touch the craft (**preferably at a point where decks are levelled and where seas are not breaking on the vessel**) and conduct a quick transfer before manoeuvring away from the craft. Have the designated deck person instruct the rescruee when to step aboard. Have personnel ready to assist the person aboard.

(c) If coming alongside is not possible, and persons must be transferred, consider removing them using a tender, having them launch and board their life raft, floating a life raft down to them, or passing lines and pulling them to your vessel using life rings or immersion suits. In these circumstances, people are often hesitant to leave the apparent safety and shelter of a vessel to enter a raft or the sea and may have to be coaxed to do so. Be explicit but reassuring in your instructions and guidance. People often do not think of obvious safety precautions under the strain of the situation and may have to be guided through every step of the rescue procedure.

(d) **Rails in the rescue zone may be removed.**

C. Use of Life Raft for Transfer

If the SAR vessel cannot be moved close to the distressed vessel, the SAR vessel life raft may be used. To conduct the transfer follow these general guidelines:

(1) Remove the raft from its stowage position and place it in the water on the lee side of the SAR vessel.

(2) Pull the painter and inflate the raft.

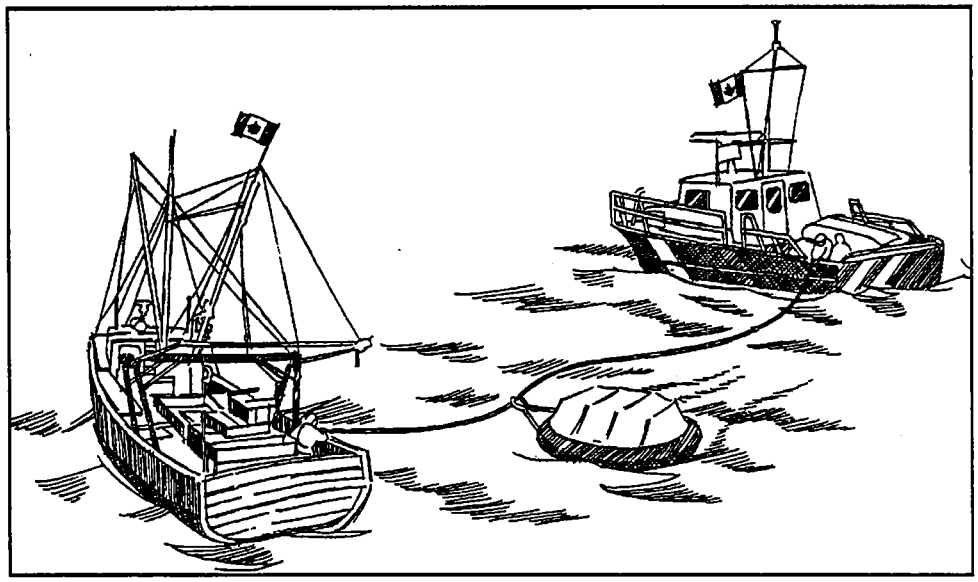
(3) Secure to the towing bridle two lines of sufficient length to span the two vessels.

(4) Pass one line to the persons on the distressed vessel and have them pull the raft to their vessel. As the raft is pulled to the distressed craft, pay out the second line.

(5) When the raft reaches the distressed vessel, the persons should board it and remove or pull aboard the first line. (If there will be more than one raft of people transferred, the persons remaining on the distressed vessel pay out the second line as the raft is pulled to the SAR vessel.)

(6) The SAR crew pull the raft to the SAR vessel. BE GENTLE. Pull the slack and allow the SAR vessel to drift down onto the raft.

(7) After recovering the people from the raft, bring the raft aboard and deflate it. Water may have to be removed from the raft before it can be lifted aboard. If it impossible to recover the raft, consider towing it.



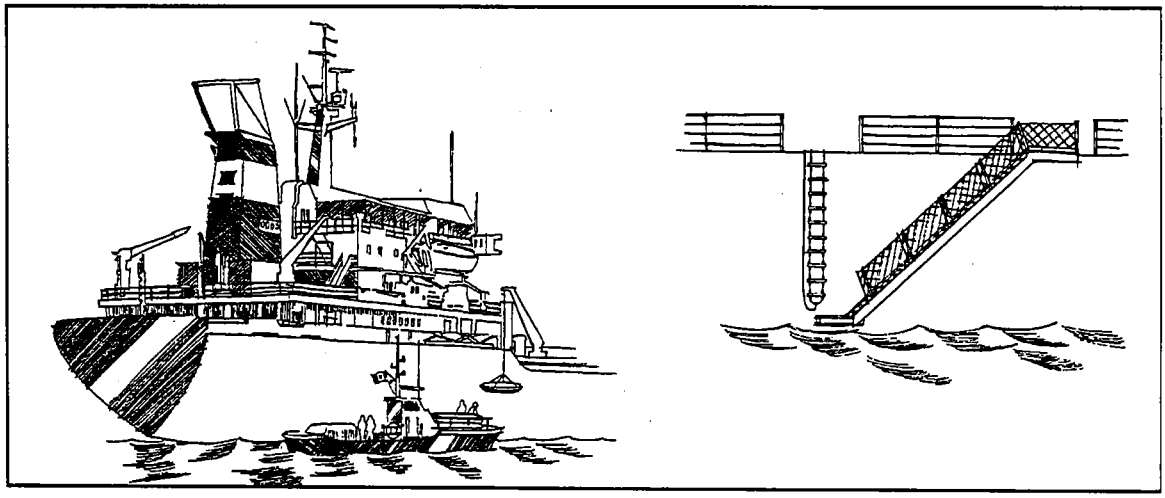
D. Patients in Stretchers

Stretcher patients being transferred from one vessel to another must be secured **with a flotation device** and tended with safety lines **when appropriate** during transfer as a safety precaution for accidental immersion.

E. Larger Ocean-Going Vessels

(1) General

(a) Communication is often difficult with foreign vessels because of language and cultural differences. You will have to speak clearly and slowly and listen carefully. Avoid the use of slang or "joke statements" and presume that the listener will interpret all of your statements in the literal sense. Use of International Code of Signals may lessen confusion in incidents where communication is very difficult.



☞ **NOTE**

When dealing with foreign ships in medical evacuations, ensure that RCC/MRSC has notified Customs.

(b) Means of disembarking from the large vessel will vary widely. Some common configurations include:

- pilot ladder located either close to the accommodation or near midships as on some tankers;
- accommodation ladders located either close to accommodation or near midships;
- stretcher patients lowered by means of a crane; and
- launching of a lifeboat from the ship to transfer persons to the SAR vessel.

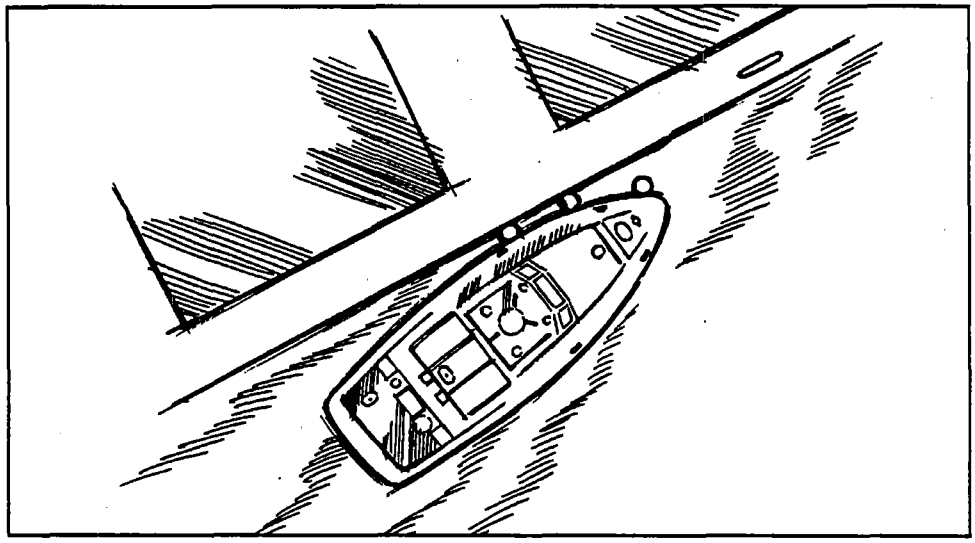
(c) The following procedures apply to larger ocean-going vessels:

- Generally, the safest approach is made with the ship forming a lee for the SAR vessel and keeping way on at slow speed as in boarding a pilot. The SAR vessel should not approach until the ship has stopped reversing its screws and all effects of reverse screw race have cleared. The SAR vessel should approach the ship with the side of approach well fendered. Advise the ship of your approach.
- Pace with the ship alongside the area of disembarkation and get a feel for the action of the seas. Alter course gently to slip in alongside the point of disembarkation. You may pass a sea painter to the ship if needed. NEVER SECURE TO THE STEM OR OUTBOARD SIDE, THE RESULTING FORCES COULD CAPSIZE THE SAR VESSEL.
- If you did pass a sea painter, reduce your engine speed slowly and set back on the painter.
- When the SAR vessel is in place, you may initiate the transfer. Crews must be ready on deck to assist those coming aboard. The coxswain may be fully concentrating on keeping the vessel in place at the point of disembarkation and may not be able to do other tasks. If there are enough crew available, it helps to designate one to handle radio communication during this phase. As with all personnel transfers, only one crew member on deck should be designated to handle verbal communication at the point of disembarkation.
- When the transfer is completed, sheer off the bow by putting your stern into the ship's side.

(d) Transfers from large vessels generally involve transferring the sick and injured. Use all available crew that you think you require to safely conduct the transfer, and bring along all equipment (extra fenders, etc.) that you may need. Generally, the SAR crew will not know what to expect until on scene.

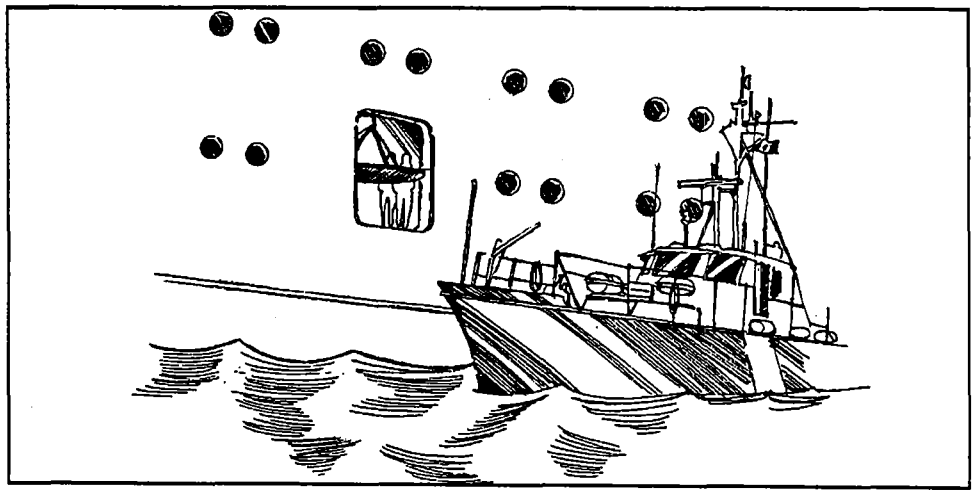
(e) Be aware that you may have to abort the mission. Transferring patients at sea is a potentially dangerous mission for both the patient and the SAR crew. The degree of need for evacuation must be weighed against the dangers involved in transfer.

(f) Be prepared with a contingency plan. A man-overboard situation could occur.



(2) Passenger Ship

Some passenger ships will prefer to evacuate by way of a service door. They are usually located near midships and may be three to four metres above the waterline. The patient may be lowered by crane or davit from the service door or by climbing down an accommodation ladder.

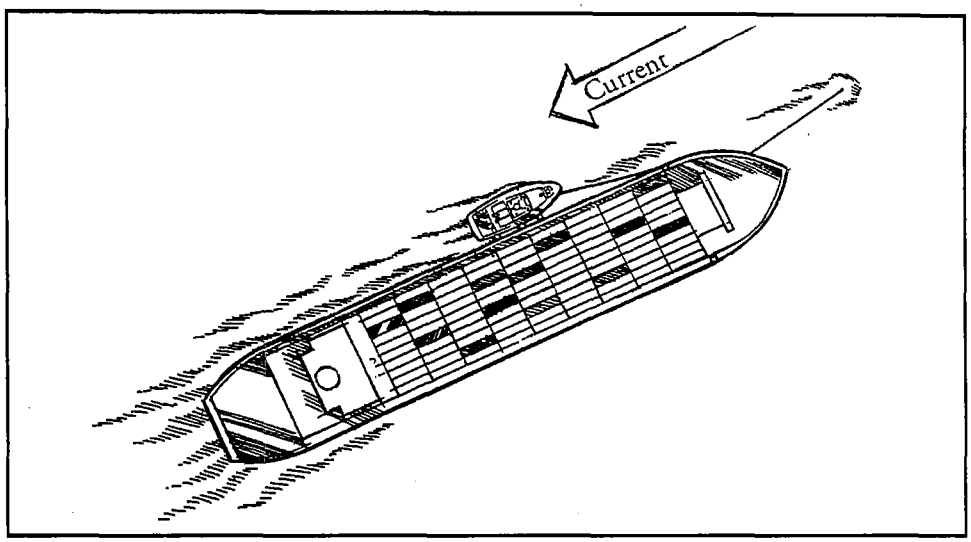


WARNING

Never approach near the stern of the ship; the SAR vessel may be affected by the ship's screw race, sucking the SAR vessel toward the ship's stern. With some ships the SAR vessel may be sucked toward the ship at other points along the ship's side. The coxswain must be aware of these actions and be ready to counter these actions with his vessel.

(3) Ship At Anchor

The anchorage will generally have enough current running to require a sea painter. Approach is made from leeward and against the current.



(4) Heavy Weather

Transfers in heavier weather conditions may not allow the SAR vessel to rest alongside on a painter. If the coxswain decides to proceed with a transfer, it may be conducted by slipping alongside for a momentary transfer (touch and go). This method requires an alert crew and expert boat handling by the coxswain. Generally the person transferring must be reasonably ambulatory and able to make the step aboard on his own. The SAR vessel may have to stay in position at the point of disembarkation for a few minutes, requiring constant station keeping by the SAR vessel. DO NOT SECURE TO THE SHIP IN THIS CASE. After the transfer is completed, the SAR vessel should break away by gently altering course away from the ship's course and slowly increasing power until clear.

Rescue of Persons from Burning Vessels

A. General

Burning vessels present a difficult situation to SAR crews. The problem must be dealt with on a basis of elimination. The first priority is to save lives. The second is to prevent the fire from endangering other vessels or third parties, and the third is to reduce property damage. A small SAR crew is limited in their ability to save persons from a burning vessel and follow by going into a firefighting mode to extinguish and save the burning vessel. Complete emergency systems, including fire departments, emergency health services, and police may accomplish this task ashore, but a SAR crew of three or four cannot be directly compared to such a system. Often when the lifesaving aspects are dealt with, the victims must be treated and evacuated to medical care, leaving the vessel to continue burning.

WARNING

The commanding officer or coxswain must be aware of the unit's limitations and in particular know when to call an operation off. All firefighting operations are inherently dangerous. Any firefighting attempt must take into consideration the limited training and equipment provided to SAR crews for this purpose. Refer to Section 7-8 for additional guidelines.

Burning vessels should be entered only if there is a possibility of rescuing victims. If all persons are accounted for, any firefighting operations to reduce property damage should not include entering the vessel, until the fire is out and the situation is at the overhaul stage.

SAR crews must exercise particular caution when attending a burning gasoline-powered craft. If the gasoline vapours have not already ignited by the time the SAR craft is on scene, the risk of gasoline vapour explosion will be very high. Rescue efforts must be concentrated on securing the safety of the persons aboard. DO NOT EXPOSE THE SAR CREW TO TOXIC FUMES OR UNNECESSARY RISK OF EXPLOSION FROM COMPRESSED GAS, PROPANE, ETC.

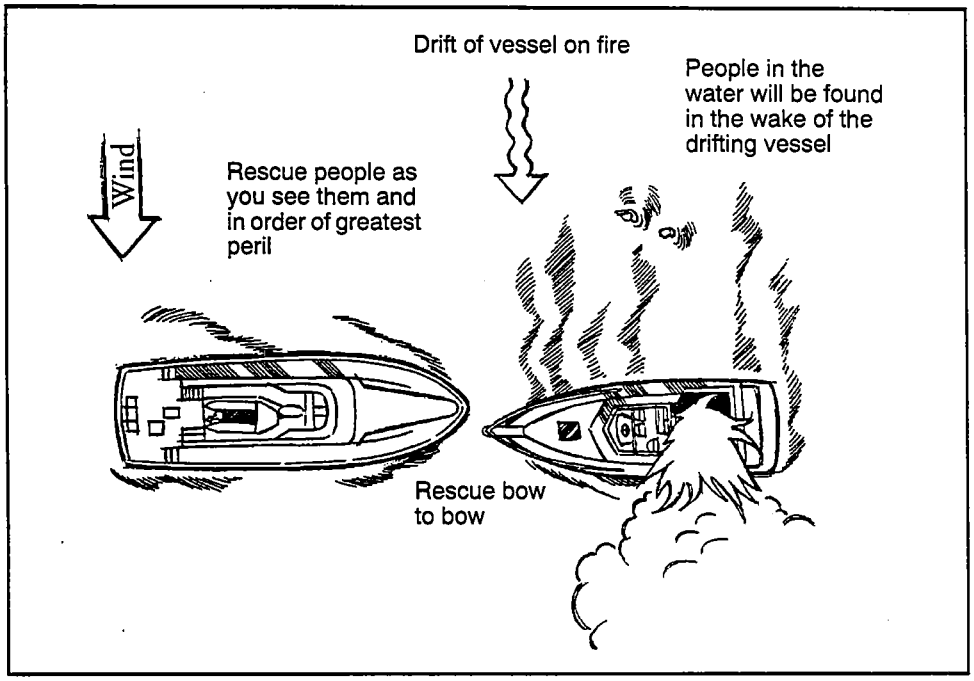
The following are general guidelines for rescue from a burning vessel at sea:

(1) The first task is to establish the safety of all persons aboard. Rescue persons as you see them and in order of greatest peril (i.e., from the vessel or in the water by who looks to be most endangered). Establish the number of persons on board and whether they are accounted for. If the fire is small, putting a crew member aboard to search for victims may be appropriate. If approaching the vessel for transfer, approach from upwind and if possible conduct personnel transfers bow to bow. If a crew member boards, all protective clothing and equipment must be worn and communication maintained between the coxswain and crew member boarding.

(2) People in the water will generally be found on the upwind side of a burning and drifting vessel as the wind will tend to push the vessel faster than the persons in the water.

(3) Employ appropriate techniques for the search and rescue of either victims in the water or of persons on the vessel. The latter may require conducting an aggressive attack on the fire.

(4) After all victims are accounted for and secure, proceed with first aid and evacuation as required. If there is no requirement for first aid or evacuation, the fire may be fought to reduce property damage, but the SAR crew should not be placed at risk. In some cases, the vessel is best left to burn, particularly in the case of smaller vessels as they are often totally destroyed within minutes. However, in situations where the burning vessel is in a confined area that may jeopardize other structures or vessels or block channels, etc., towing the vessel clear of the area may be required. It may also be appropriate to tow a burning vessel clear of a fishing bank.



B. Vessel on Fire at Fuel Docks and Marinas

Vessels may catch fire while secured to fuel docks and marinas, exposing persons and other property to danger. The first task as always is to save lives and reduce injury even though the fire may rapidly spread and destroy adjacent property.

The following are general guidelines for responding to vessel fires at fuel docks and marinas:

(1) Ensure that all persons from the vessel and immediate surroundings are accounted for. Explosions often throw people from the vessel into the water or onto adjacent vessels and structures. Check the vessel and surrounding areas for victims.

(2) Towing the burning vessel away from other vessels and structures is often necessary to protect property. Often when a SAR vessel arrives on scene, people have already slipped the vessel and pushed it off. This can have drastic consequences if the vessel drifts into others and further spreads the fire. The safest method of removal is to throw a grapnel hook and chain aboard the vessel and tow into clear water, where the fire may be attacked or allowed to burn out. Always have a crew member ready to cut the towline when towing a burning vessel, should it sink or endanger the SAR vessel.

(3) If the burning vessel cannot be removed, remove other vessels that may be in danger of fire spread. Cool exposures with a fog fire stream.

(4) Do not endanger crew members by entering burning vessels which have no persons to be rescued aboard. The fire may be attacked from outside the vessel.

Rescue from Survival Craft

Rescue from survival craft may involve dealing with life rafts, open lifeboats, enclosed lifeboats, or any of a number of types of survival capsules. Rescue and transfer of personnel may be complicated by the physical condition of the survivors and by the physical characteristics of the survival craft. Modern totally enclosed survival craft are designed to provide an optimum survival platform and are often not conducive to sea-kindly riding and manoeuvring. Many of the enclosed survival craft are by nature of their construction very buoyant and have an extremely lively motion at sea. Each situation requires careful evaluation before approaching the survival craft to determine whether

- immediate removal of personnel is safe or required;
- standby is required to await improvements in weather/sea conditions or removal by other means (such as helicopter); or
- towing the craft without removing personnel is safe and appropriate (i.e., enclosed survival craft).

Cases have occurred in which survivors were found safe in a survival craft only to be accidentally rammed in heavy seas by their would-be rescue ship trying to manoeuvre alongside. Modern enclosed survival craft can safely and effectively maintain survivors in relative protection for long periods of time. In some cases, there is no need for immediate removal of personnel from the craft.

Some survival craft are self-righting with all hatches sealed and all personnel strapped into their seats. These vessels are capable of operating at full capacity and at six knots for a period of 24 hours and can operate in fire or a toxic atmosphere safely for a period of six minutes. The hatches on these craft are very small to accommodate both the self-righting and fire-survivability features. However, the small hatches also make transfer of personnel difficult. Transfer of injured or sick personnel may be extremely dangerous in even a moderate sea.

Approaching survival craft in a seaway may require the SAR vessel to get close enough to remove personnel or to pass a line to the craft. The lee provided by a vessel is approximately triangular in shape and extends about one and one half ship lengths downwind at its farthest point. The exact size and shape of this lee will depend on the freeboard, length, and shape of the vessel's house works.

Wave oil may be used effectively to flatten out the tops of the waves (broken water), provided that there is a continuous film of oil on the water surface. Oil will not flatten out swells. It will only reduce the amount of white water on top.

SAR crews should familiarize themselves with the configuration of the basic types of survival craft in use today. Some basic configurations are included in Appendix 5.

Rescue from Disabled Vessels

A. Overturned Vessels

Overturned vessels present the possibility that occupants may be trapped inside. The following are general guidelines for rescue of persons trapped inside a capsized vessel:

(1) Search the immediate area for survivors that may have escaped from the vessel.

(2) Approach the vessel slowly to eliminate wash that may break a sealed air pocket. Try to determine whether any persons are trapped in the vessel and, if so, their location. Question other survivors to assist in determining possible locations of survivors and the vessel layout.

(3) Do not put rescue personnel directly on the overturned vessel. Work from the rescue craft or tender. Communicate through the hull by tapping on it and calling to the occupants. If contact is made, reassure the survivors that rescue efforts are underway. Instruct them to stay calm, to move out of the water as far as possible, and to minimize their physical activity to aid in conserving air. Keep them informed throughout the operation on steps that are being taken in their rescue. Any changes, movement, or noise that takes place will be very frightening to them. If they don't know the source, they may panic and try to climb out.

(4) Request passing or approaching vessels to reduce their speed and wash.

(5) If necessary, hold the vessel off a lee shore (especially if potential survivors are still inside).

(6) Rescue may be achieved by trained divers. Request divers with rescue training (such as DND or RCMP divers).

(7) If possible, locate someone familiar with the vessel layout.

(8) Stabilize the hull by using emergency air bags, boats secured alongside, or heavy shipboard lifting tackle. If using vessels secured on either side, pass a line under the capsized vessel and secure between the two vessels. DO NOT ATTEMPT TO RIGHT THE VESSEL AT THIS STAGE.

(9) Tag the vessel with a line and marker to mark the position in case it sinks.

(10) If a person familiar with the vessel layout is contacted, consider having that person coach the survivors on how to escape or divers on how to locate the trapped person/s.

(11) If divers arrive, fully brief them on all known details and assist them as required.

(12) If you must tow the vessel, tow extremely slowly to avoid breaking the air seal.

WARNING

Never attempt to cut through the vessel's hull while it is still afloat unless some procedures to keep afloat have been undertaken.

B. Foundered or Sunken Vessels

If the search object has been located after it has sunk, follow these general guidelines:

(1) Deploy a DMB.

(2) Inform RCC of the location, depth, and evidence of the sunken vessel.

(3) Commence a search for survivors.

(4) If survivors are located, determine whether any others may be trapped in the vessel. If persons are suspected to be trapped, request divers.

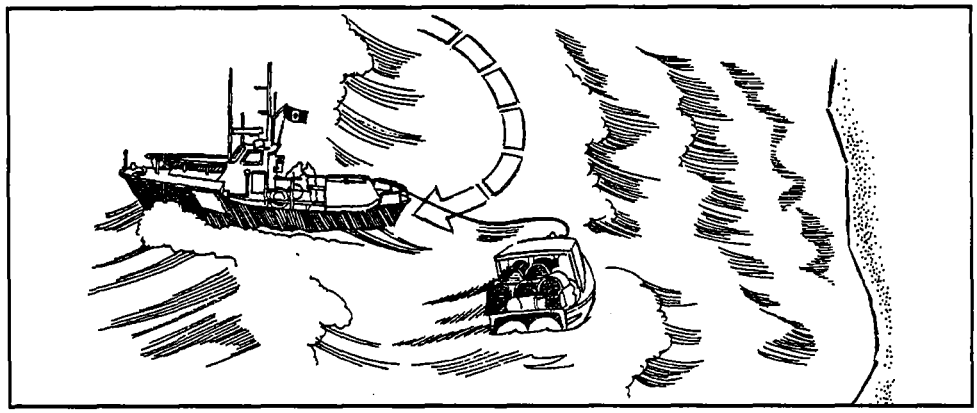
(5) If an Emergency Position Indicating Buoy (EPIRB) is found, do not recover it. Leave it to mark the position.

C. Rescue of a Vessel Drifting onto a Lee Shore

A vessel drifting onto a lee shore in rough seas can incur serious consequences if rescue is not effected in a timely manner. If you encounter such circumstances, follow these general guidelines:

(1) Enroute, advise the vessel operator to have everyone aboard don lifejackets and to drop anchor. (There have been cases involving vessels drifting ashore in which a ready and available anchor was not used. People may forget that they have an anchor for use in just such an emergency.)

(2) If anchoring is not possible or will not hold, it is important to get the towline passed as quickly as possible. Have all required towing equipment ready for arrival on scene, bearing in mind that the seas on scene may be agitated (i.e., secure towline to prevent the possibility of fouling screws). Approach the disabled vessel in an arc from seaward, keeping the SAR vessel to windward of the disabled vessel. The path of the arc should bring the stern of the SAR vessel across the beam of the disabled vessel. At this point the line should be passed, but at no time should way be taken off or the SAR vessel allowed to drift toward the shore. When the line is secured, the SAR vessel should start towing immediately to slowly pull the distressed vessel out of danger.



(3) Once the disabled vessel is clear of the lee shore danger, the towline should be checked and adjusted as necessary to carry on with the tow.

(4) If water depth or sea conditions are such as to endanger the SAR vessel, the towline should be passed by floating down to the casualty or firing a line from a line-throwing apparatus.

D. Grounded Vessels on Lee Shore or in Other Danger

Grounded vessels on a lee shore or in other dangerous circumstances require immediate assistance to ensure the safety or rescue of the crew. The following general guidelines should be considered in assisting a grounded vessel in a dangerous position:

(1) Enroute, establish communication, advise the crew to don lifejackets and prepare emergency equipment. Try to determine the degree of danger and urgency of abandoning.

(2) On arrival on scene, further assess the situation and determine

(a) the danger and need to remove the crew;

(b) your ability to remove the crew;

(c) need for helicopter assistance to remove the crew;

(d) any danger to your vessel; and

(e) whether you can assist the vessel off.

(3) If the situation will allow the SAR vessel to assist the vessel off, take precautions to ensure that the vessel will not take on water and sink when it is refloated (see Section Four, "Towing Operations"). Take precautions to ensure the crew's safety (i.e., remove crew, provide a tender, pass pumps, etc.).

(4) If the vessel will not be refloated and the crew will be taken off, consider your vessel's ability to approach the disabled vessel and remove the personnel. Is the depth of water adequate? Are there underwater obstructions, debris in the water, or appendages on the vessel below or above the waterline? Is there a lee or a safe position to approach with the least aerated water? Could wave oil be used to reduce the risk?

(5) If the decision is made to approach the vessel and remove the crew directly, discuss your plan with the master. Maintain communication. Have the crew ready to abandon on your approach. You may want to divide a large crew into more than one pass.

☞ **CAUTION**

Do not take your vessel into the surf line.

(6) If the vessel cannot be approached to conduct a direct removal of personnel, consider using a tender or RHI to conduct the transfer, either by manning the craft or floating it down on a line. A life raft may also be floated down to the vessel.

Aircraft Rescue

A. Airborne

Aircraft planning to ditch usually report their intentions beforehand. You may be tasked to attend a planned ditching. Ditched aircraft usually sink within minutes. For full information regarding rescue of ditched aircraft, see CANMERSAR.

Seaplanes or float-equipped aircraft commonly transit almost every stretch of water in Canada. In addition, large commercial aircraft use flight paths all across the country. The number of aircraft in service today necessitates SAR operational preplanning for aircraft incidents. (Be prepared for incidents involving large numbers of people by familiarizing yourself with your local Major Marine Disaster Plan.)

Some common occurrences with smaller aircraft are

- structural or mechanical problems which require a SAR vessel on standby during landing on the sea;
- fog or low visibility which may cause the aircraft to land in a dangerous area and require guidance or towing by a SAR vessel to a safe area.

B. Ditching Nearby-General Guidelines

☞ **NOTE**

In the case of aircraft carrying large numbers of people preparing to ditch, activate your local SAR Contingency Plan.

(1) Take extra SAR equipment aboard, (life rafts, first aid, blankets, etc.). Take extra crew members, if necessary and immediately available.

(2) Prepare to provide information to the pilot, including wind direction and speed, sea state, primary and secondary swell size and direction, visibility, and any other pertinent weather information.

(3) Clear the ditching area of all vessels not involved in the rescue effort. Instruct vessels involved in the rescue effort to stay well clear of the ditching area until the aircraft has stopped and they are instructed to approach the aircraft. In darkness, instruct them not to shine any lights on the aircraft until it has stopped moving on the water. Instruct them to be alert for aviation fuel spilling after the ditching and to avoid any action which produces open flame or spark.

(4) If requested, transmit signals for the aircraft to take a bearing.

(5) Prepare heaving lines, life rings, life rafts, tenders, and means of boarding your vessel. Prepare first-aid equipment and blankets. If available, have a rescue swimmer prepare to go over the side.

(6) The pilot of the aircraft will choose his own ditching heading. If it is made known to you, set your course parallel to his. If the course is not known, set your course parallel to the primary swell and as much as possible into the wind.

(7) In darkness, turn on all deck lights, turn on blue SAR light, and direct a searchlight vertically. Do not direct any lights toward the aircraft, until it has stopped moving on the water, to avoid blinding the pilot's vision.

(8) In a prepared ditching, survivors should be wearing aviation life vests. Be alert for survivors in the water and on the aircraft.

(9) If the aircraft crashes or breaks up on impact, there is a strong possibility of aviation fuel being spilled. Allow no smoking, use of electrical equipment, or outboard motors in the vicinity of the fuel.

(10) Immediately deploy a datum marking buoy (DMB) at the ditching site to aid in search efforts in case of missing persons. Get an accurate fix on the ditching site. The aircraft may not be afloat long.

(11) Start rescue efforts immediately. Deploy extra life rafts if you are dealing with large numbers of people or rescue efforts will take too much time.

C. Helicopter Ditching

A helicopter making a successful ditching will generally still have power or momentum to turn the rotors. Stay away from the rotors until they have stopped turning.

Helicopters have a high centre of gravity, which makes them quite unstable when sitting on the water. In all but the calmest of sea conditions, the aircraft can be expected to roll over. Most helicopters operating offshore in Canadian waters are equipped with emergency inflation bags. (Exceptions are the Sikorsky S-61N and DND's Labrador, which are equipped with sponsons.) Emergency inflation bags are generally secured to the skids or the underside of the aircraft. During normal operations, the bags are deflated and protected by a protective cover. The bags can be inflated by a control at the pilot's position in the cockpit, which opens a flow of nitrogen or helium to the bags. The purpose of the emergency inflation bags is to allow sufficient time for the occupants of the aircraft to evacuate.

Ditching procedures in a helicopter require that persons to remain in their seat with the seat belt fastened if the aircraft rolls over. Once the aircraft has settled in its inverted position, the survivors should start the escape routine.

D. Aircraft Crash - General Guidelines

(1) If large numbers of people are involved, activate your local contingency plan.

(2) Consider sending an FRC ahead of the SAR vessel with a life raft and standard jump kit.

(3) Take extra SAR equipment (life rafts, first aid, blankets, etc.). Take extra crew members, if necessary and immediately available.

(4) Prepare SAR equipment enroute. If a rescue swimmer is available, have him prepared to deploy.

(5) A SAR vessel arriving on scene should

- deploy a datum marking buoy (DMB) and get an accurate fix;
- send a NOCL message to the RCC.

(6) Allow no smoking, open flame, or any means of creating an arc by anyone in the area in case aviation fuel has spilled.

(7) If the aircraft is afloat, commence removal of survivors immediately. Flag the aircraft with a line and float in case it sinks. If the aircraft has sunk, commence search efforts immediately.

(8) Deploy life rafts or life rings for temporary survivor support.

(9) Interview survivors regarding the number of persons aboard and where they may be. Request divers if there are persons trapped inside.

Rescue Operations with DND Aircraft

A. Equipment Drops

(1) Survival Kit Air Droppable (SKAD)

☞ CAUTION

If you are operating near a deployed SKAD, be alert for the polyline in the water.

Fixed-wing SAR aircraft carry survival kits consisting of two 10-man life rafts and two survival containers. These kits are referred to as SKAD kits and can be dropped either to persons in the water or to persons who must abandon their vessel, but who do not have life rafts. The following procedure will be used:

(a) The aircraft will make several passes at an altitude of approximately 300 to 500 feet to check the wind drift. It may drop several smoke canisters to check wind speed and direction and mark the target.

(b) Depending on the target's rate of drift, the aircrew will try to lay the kit in a line either upwind or downwind. All the components of the SKAD are linked by 280 feet of polyline. The objective is to allow the target to make contact with this line so that the components may be hauled in by the line. DO NOT CUT THE LINE.

(c) The rafts will inflate in the air after they are jettisoned out of the aircraft. No parachute is used.

(2) Air-Droppable Pump

An emergency floatable pump kit may be passed to a vessel in need of emergency dewatering by fixed-wing or rotary SAR aircraft. The pump may be dropped by parachute, lowered by hoist, or dropped to a SAR vessel for transfer to the distressed vessel.

(3) Parachute Drops

☞ CAUTION

When recovering an air-droppable pump, be alert for the recovery line and parachute in the water. Keep them away from your propellers.

(a) The aircraft will make several low passes dropping smoke canisters to check wind drift and direction and mark the target.

(b) The pump will be dropped to windward of the target. The objective is to drop the pump attached to a 600-foot line with a drogue at the other end so that the line drifts down onto the vessel and the pump can be pulled aboard with the line.

(c) The pump canister is orange in colour, weighs 90 lb., and contains a 3.5 hp fire and salvage pump. It also contains oil for the pump, gasoline, intake and discharge hoses, and instructions. It can lift water a maximum of 25 feet and will run for approximately two hours on one gallon of fuel.

B. Joint Operations with DND Helicopters: Preliminary Procedures

(1) Objective

To standardize joint operations involving SAR vessels and helicopters and to allow hoisting evolutions to be carried out with maximum safety.

(2) Control

The aircraft captain will control the conduct of all hoisting operations, and his directions will be followed by the operator of the SAR surface vessel, unless there is evident danger to the vessel or crew in so doing.

(3) Communications

Communication may be established on 123.1 mhz VHF-AM prior to commencing a hoisting evolution. If this frequency is not available, any other mutually agreeable working frequency may be utilized, this frequency to be determined by opening communications on 156.8 mhz (channel 16) or 157.1 mhz (channel 22A). A backup frequency shall also be established. VHF-FM is suitable for this purpose.

(4) Surface Vessel and Aircraft Identifiers

Assigned SAR vessel names will be utilized by surface craft. The designator "rescue helicopter" may be utilized to establish communications with a SAR helicopter whose numerical designator is unknown. Once the numerical designator has been determined, the numerical designator will be utilized. For example: "307".

(5) Content of Initial Communication

(a) Aircraft

The aircraft commander will advise the surface vessel of the details of the planned evolution and the number of persons aboard the aircraft.

(b) Surface Vessel

The surface vessel operator will advise the aircraft of wind velocity and magnetic direction, and the number of persons aboard the vessel. He will also advise when his vessel is prepared to receive the aircraft for the hoisting evolution.

C. Joint Operations with DND Helicopters: Surface Vessel Deck Operations

(1) Emergency Equipment

The surface vessel will have readily at hand, away from working areas and properly secured, a fire axe and fire extinguishers.

(2) Personnel

Two persons only will normally be on the deck of SAR vessels during hoisting evolutions to assist the SAR technicians to get safely aboard. Non-essential personnel will be off the decks.

(3) Dress

Deck crew shall wear floater suits and protective helmets, with chinstraps fastened, and use eye protection and gloves. Safety harnesses shall be utilized as required.

(4) Deck Equipment

All lines and loose equipment shall be secured prior to beginning a hoisting evolution. Antennas should be so tied as to provide added clearances for the helicopter.

(5) Lights/Pyrotechnics

No searchlight or other glaring light source shall be directed toward the aircraft. No illumination flares or rockets shall be discharged without the prior concurrence of the aircraft commander.

(6) Radar

Ship's radar should be selected so that it is not transmitting during hoisting operations to prevent hoisting cable from being tangled with the rotating scanner.

(7) Electrical Grounding

Allow the hook, line or cable from the aircraft to touch the water or the surface vessel prior to handling it, to avoid shock from static electricity. If spilled fuel is present on the deck of the surface vessel, the aircraft must be advised so it can ground the hoist cable safely. Vessels with gasoline stored on deck must be especially cognizant of this caution.

(8) Fouled Lines

Beware of lines from the aircraft fouling on the surface vessel. Attach nothing to the vessel which is also attached to the aircraft. Carry no attached equipment inside the vessel.

(9) Rotor Wash

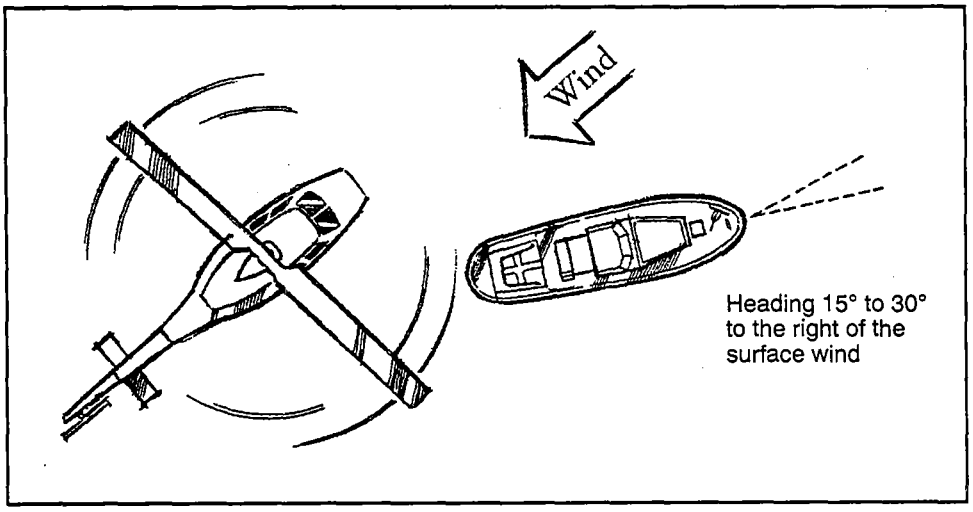
Rotor wash can blow personnel overboard. Be aware that it will fill the air with flying spray and reduce visibility. The accompanying noise levels will render voice communication difficult or impossible. Thus visual signals and leadership amongst deck personnel must be finalized by the coxswain or commanding officer before the aircraft is overhead.

(10) Control of Deck Operations

Once the military SAR technician is on deck of the surface vessel, he will direct the hoisting evolution, and surface vessel crew members will follow his directions. All visual signals to the aircraft commander will be given by the SAR technician.

(11) Positioning of Vessel and Conduct of Normal Hoist Evolutions

Normally, the vessel will direct her heading 15° to 30° to the right of the surface wind, thus keeping the wind on her port bow. This allows the aircraft commander visual reference to the vessel and places the rescue hoist, which, like the pilot, is located in the starboard forward area of the aircraft, over the vessel's stern. Vessel speed should be five to eight knots. A military SAR technician will usually be lowered directly onto the stern of the vessel to take charge of preparing the person or item to be hoisted into the aircraft, with the assistance of the deck crew of the surface vessel. If the aircraft, due to weather or sea conditions, is unable to lower the SAR technician directly, a line will be lowered to the surface vessel from the aircraft. When this line has been "grounded" electrically and is held by the surface vessel crew, the aircraft will take up a position clear of the vessel, but still attached to the line which is extending to the vessel. The SAR technician will then be lowered on the hoist and simultaneously pulled to the surface vessel manually by means of the line held by the vessel. This line will at no time be attached to the vessel.



(12) Stretcher Patients

Injured or sick persons to be hoisted into helicopters will be kept inside the vessel, and not on deck, until the SAR technician is aboard the vessel to supervise their placement in the aircraft's stretcher, which is specially fitted for hoisting. All clothing and lines are to be well secured to avoid fouling the hoist system of the aircraft.

(13) Special Instructions for Motor Lifeboats, Hovercraft and other small Crafts

The lively motion of these vessels in a seaway dictates special attention to the safety of SAR technicians during hoisting evolutions.

(a) Crew Positioning

Crewmembers on deck shall be positioned so as to offer maximum assistance to SAR technicians as they alight on, and leave, the vessel. In the case of class 300 motor lifeboats, crewmembers will be positioned on the deck area on either side of the aft cabin, equipped with safety harnesses if required in the judgment of the vessel operator.

(b) Work Area

Deck areas to be utilized in hoisting evolutions will at all times be kept treated with a heavily textured non-slip coating. The material chosen for this coating must retain its effectiveness even if flooded with water or fuel.

(c) Workboats

Workboats should be streamed 80 to 100 feet aft of the main craft or secured close alongside. Be aware that rotor wash may overturn small inflatable craft.

(d) Hovercraft

Hovercraft will shut down engines prior to the commencement of hoisting operations, which will be conducted from the side decks of the craft.

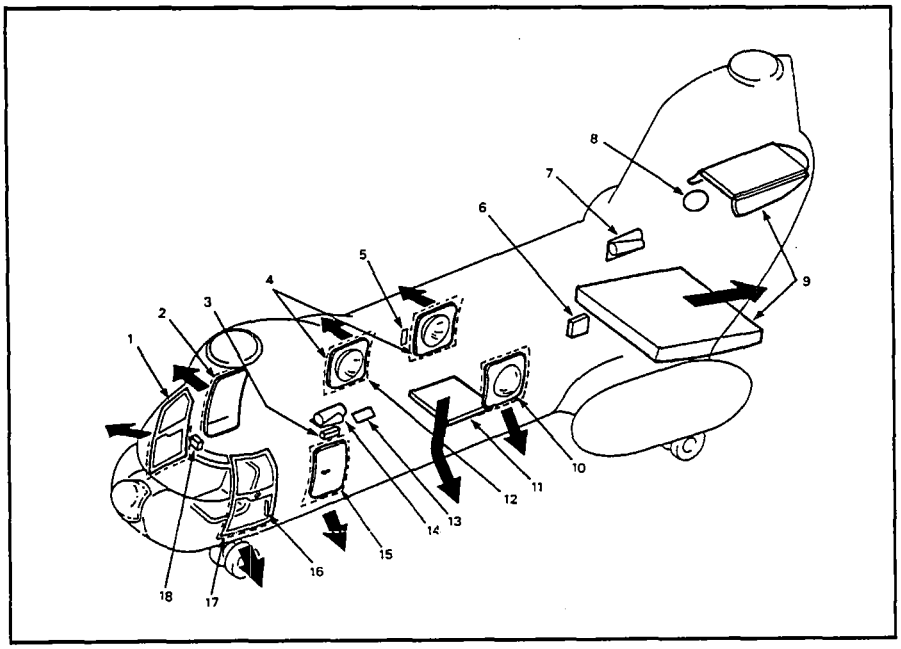
(14) Emergencies

(a) Aircraft Engine Failure

In the event of aircraft engine failure, the aircraft will break away to the nearest safe area. If a person is on the hoist at this time, the aircraft commander will sever the hoist cable and drop the person into the sea, whilst simultaneously making a decision whether to land the aircraft itself in the sea. If such a landing is made, the first priority for the surface vessel crew is to manoeuvre the vessel to avoid damage or injury from the helicopter rotors whilst picking up the person cut free from the hoist, and assisting the rest of the crew of the aircraft as required. The larger SAR units should immediately launch a workboat to effect recovery of the aircraft crew and assist in salvage operations.

(b) Aircraft Emergency Entry

Generally, the aircraft crew, if necessary, will carry out their own craft's abandonment, utilizing an onboard 10-man inflatable raft for flotation. If assistance must be given by the crew of a surface vessel, do not approach the helicopter whilst the rotors are still turning. When alongside the aircraft, utilize the information indicated on the attached outline drawing of the Labrador/Voyager helicopter to determine the best entry route. The entry of choice is the upper portion of the main entry door indicated by the numeral "2" on the attached drawing. Use of this door should retain the watertight integrity of the aircraft, which may be lost if other emergency entrances are opened. However, if necessary, either the emergency exit door, item "9", or the escape window panels, items "3" and "7", may be released by means of external pull tapes. Either the pilot's or copilot's side windows in the cockpit, item's "l" and "12", may be released by first pressing the button on the side window's external handle to activate the spring-loaded emergency release handle. When this handle is turned, the side window will be released.



1 Pilot's Jettisonable Window
2 Cabin Main Door
3 ELT
4 Cabin Escape Window Panels
5 Acoustic Beacon
6 First Aid Kit
7 Fire Extinguisher
8 CPI
9 Ramp and Aft Hatch
10 Cabin Escape Window Panel
11 Alternate Rescue Hatch
12 Cut-Out Panel Markings (Both Sides)
13 Pyrotechnic Kit (Front of Avionics Rack)
14 Fire Extinguisher
15 Forward Emergency Escape Panel
16 Fire Extinguisher
17 Copilots Jettisonable Window
18 First Aid Kit

Passing the Canister Pump

A. Passing to a Vessel in Tow

(1) If a permanent bridle is not fitted, a bridle must be rigged to both handles of the pump container.

(2) Estimate the distance from the bow of the towed vessel to the lowest point of freeboard in an accessible working area of the vessel. Attach a mooring line of appropriate length to the bridle with a shackle.

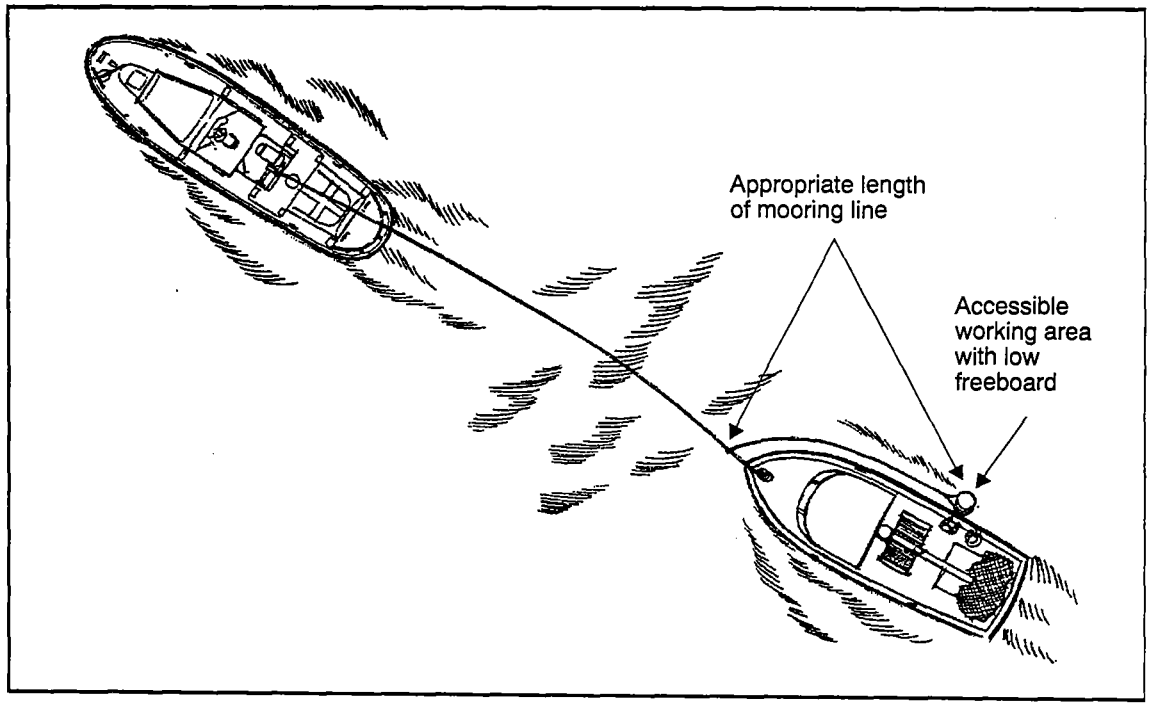
(3) Secure the other end of the mooring line to the towline by means of a bowline, with the towline passing through the eye of the bowline. A shackle of suitable size may be used instead of the bowline. The mooring line must be able to run freely along the towline.

(4) The pump is lowered over the side and allowed to float freely to the towed vessel.

(5) Maintain only enough headway for steerage. This will keep the pump from submerging and prevent unnessesary damage to the towed vessel.

(6) The towed vessel is instructed to turn his rudder to port or starboard into the wind or current. This will aid in allowing the pump to drift down the side of the vessel clear of the bow.

(7) When the bowline (or shackle) contacts the bow of the towed vessel, the pump should be alongside the vessel in the appropriate location for recovery. The crew of the towed vessel recover the pump by pulling it aboard.



B. Direct Passing

(1) If the casualty is underway, instruct the operator to stop his vessel. The SAR vessel coxswain determines the rate of drift to ensure that he will not drift into the casualty while the pump is being passed.

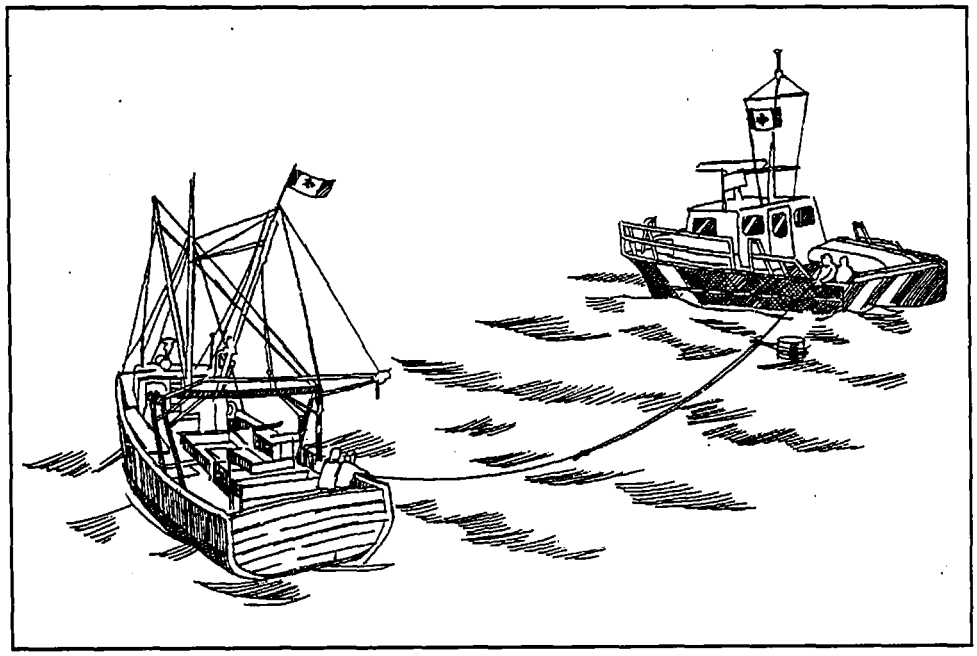
(2) A mooring line is secured to the pump canister bridle.

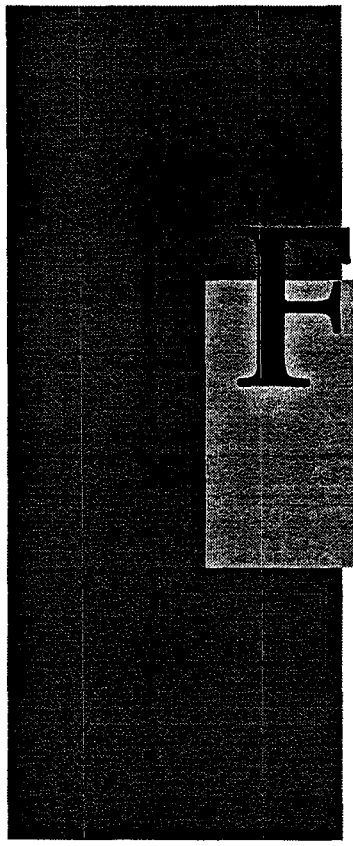
(3) A heaving line is secured to the mooring line.

(4) A tending line is attached to the pump canister bridle to allow you to control the cannister's movement in the water or to retrieve it in the case of an emergency breakaway.

(5) At the coxswain's direction, the heaving line is passed to the casualty and the casualty is directed to haul it in.

(6) Lower the pump canister into the water and instruct the casualty to haul it in. As the pump is hauled in, pay out slack on the tending line.





FRC Operations

3-1 SAR Operational Standards for Fast Response Craft (FRC)

A. General
B. Equipment
C. Operations
D. Training

A. General

In recent years many primary SAR units have been supplemented with FRC to provide rapid response to critical SAR incidents. To provide guidance and training in safe operating practices of these craft, a standard FRC training package was created (Rigid Hull Inflatable Operator Training (RHIOT)) and was later incorporated into the SAR Skills Training Standards, TP 9224. Every operator of Coast Guard FRC must have RHIOT. This section is intended to complement FRC training with standard guidelines for SAR operations.

☞ **NOTE**

Nothing in this section is intended to supersede CGFO 222, Operations of CCG Fleet Fast Rescue Craft.

B. Equipment

(1) Every individual embarking on a FRC must wear a work suit which provides thermal protection during immersion and provides reasonable freedom of physical movement to conduct SAR operations. Dry suits and floater suits are acceptable. (This requirement may be lifted by the unit OIC/CO temporarily, during **training exercises only.**)

(2) Every individual embarking on a Cast Guard FRC must at all times wear an approved buoyant device. (NOTE: Dry suits are not approved buoyant devices and when worn must be accompanied by a PFD.)

(3) In addition to the above each individual must wear

- (a) a "Coast Guard FRC approved" helmet (to be identified) on the head, with the chin strap fastened;
- (b) goggles or a faceshield attached to the helmet, providing eye protection from wind, rain, spray, bugs, etc.;
- (c) gloves or mitts if needed;
- (d) an accessible knife;
- (e) a whistle; and
- (f) a personal strobe light, during night operations.

(4) The following **optional** equipment is also recommended as alternative means of drawing attention in case of emergency:

- (a) emergency signalling mirror;
- (b) sea dye; and
- (c) a large bright-coloured plastic garbage-type bag (orange or yellow).

(5) Each craft must carry safety equipment in accordance with the Small Vessel Regulations for the particular craft. Safety equipment carried aboard the craft must be maintained in full working condition and serve as an example to the boating public. This is best achieved by conducting meticulous daily inspections of the craft and equipment.

(6) All equipment carried, permanently or temporarily, must be safely stowed in compartments or fastened into the craft, to lessen occurrences of injury to personnel or loss of equipment.

(7) All Coast Guard SAR FRC shall carry an Emergency Position Indicating Beacon (EPIRB) at all times.

C. Operations

(1) Manning

FRC, when underway, shall be manned at all times by not less than two qualified crew members, including the craft operator. (Refer to section 3.1, CGFO 222.)

(2) Use

FRC are to be used only with the authority of the OIC/CO and only for official purposes.

(3) Safe Operation

The FRC must be operated, at all times, with full regard to the SAR tasking at hand and the safety of the crew, at a safe speed for the conditions, and in full compliance with the Collision Regulations.

(4) Kill Switches

All FRC must be fitted with kill switches which will shut off the craft's engines if the operator is thrown from the controls. All craft operators must wear the kill switch fastened to their persons in accordance with the manufacturer's specifications. Kill switches must be maintained in full operating condition and tested daily in the daily inspection routine.

(5) Communications

VHF communications must be carried aboard the craft at all times in accordance with the following guidelines:

(a) Fitted VHF Radio - carry one additional portable unit.

(b) No fitted VHF - carry two portable units.

Radio checks must be conducted before the unit leaves the base/ship and the FRC must "report in" at intervals of not less than every 30 minutes. A radio watch is to be maintained on the designated frequency at all times when the craft is underway.

(6) Surf

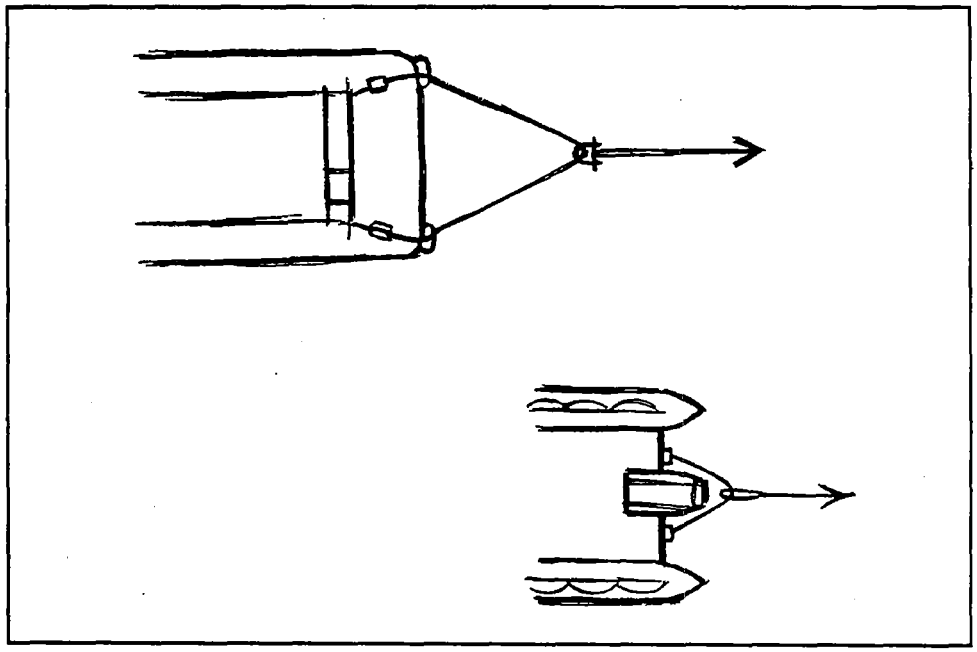
Coast Guard FRC are not designed or authorized to operate in surf conditions. Surf operations are to be avoided at all times.

(7) Equipment Checks

Complete pre-operational and post-operational checks must be carried out on every FRC used in SAR operations.

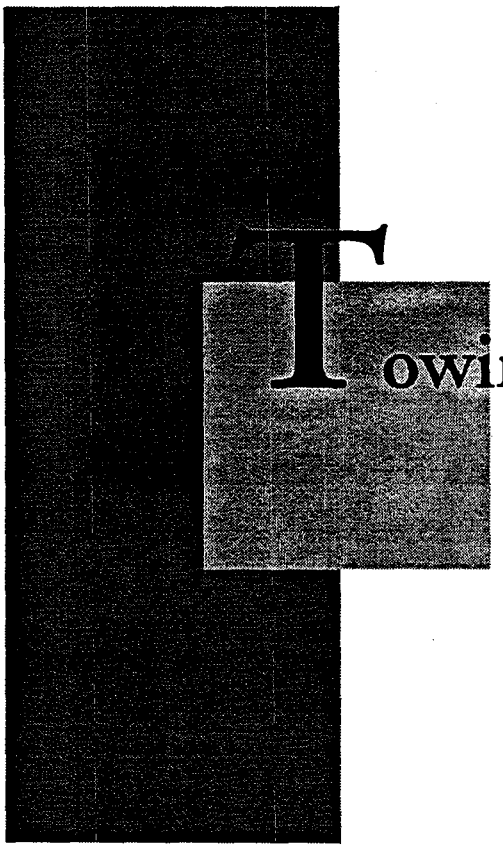
(8) Towing

If the FRC is not equipped with a towing bit, a towing arrangement can be made with a bridle. You must keep in mind that the bridle must be short enough to allow the propeller to run free when there is no strain applied to it. Also, the angle of the bridle must be kept as small as possible. The angle of the bridle must never exceed 120°.



D. Training

Training, in addition to RHIOT, must be ongoing at the SAR unit. New personnel must be trained in the use of FRC, and all personnel must be trained to meet current changes in FRC equipment or changes in craft type used by the particular unit. Familiarity and competence with the equipment can be maintained only through ongoing exercises in a controlled environment.



Towing Operations

4-1 Towing Checklist

4-2 Towing Procedures

A. Introduction
B. General Guidelines

4-3 Towing Equipment

A. General
B. Towing Safety
C. Communications
D. Equipment
E. Recommended Line for Towing Operations
F. Towing Hardware
G. Illustrations of the Different Arrangements

4-4 Approaching a Vessel to Render Assistance

A. Approach Checklist
B. Before Approaching the Vessel
C. Towing Approaches
D. Determining the Towing Approach to Use
E. Basic Approaches

4-5 Passing the Towline

A. General
B. Preparation and Use of Heaving Line
C. Preparation and Use of Float Line
D. Preparation and Use of Line-Throwing Appliances

4-6 Weighing Anchor of a Disabled Craft

A. General
B. The Shackle Method
C. The Towing Assist Hook (Kicker Hook)
D. The Bowline Method

4-7 Connecting the Towline

A. Connection Checklist
B. Selection of Connecting Points
C. Use of Bridles

4-8 Towing Astern

A. Towing-Astern Checklist
B. Preliminary Procedures
C. Procedures Underway

4-9 Towing Speed

A. General
B. Determining Safe Towing Speed - Displacement Hull
C. Determining Safe Towing Speed - Planing Hull

4-10 Towing Alongside

A. Alongside-Towing Checklist
B. General
C. Shortening the Tow
D. Securing Alongside
E. Docking the Alongside Tow

4-11 Towing in Current

A. General
B. Towing Upstream
C. Towing Downstream
D. Towing Across the Current and/or from Current to Still Water

4-12 Towing Aircraft

A. General
B. Approach
C. Passing the Line
D. Towing
E. Lights

4-13 Man-Overboard Operations with a Tow Astern

A. General
B. Method

4-14 Tandem Towing

A. Tandem-Towing Checklist
B. Methods

4-15 Sinking Tow and a Tow on Fire

A. Managing a Sinking Tow
B. Fire on a Towed Vessel

4-16 The Drogue

A. General
B. Fabric Cone
C. The Tire Drogue
D. Makeshift Drogues

4-17 Maintenance of Towing Equipment

A. Towline
B. Towing Bridles

Preparations		
Discuss situation with master of casualty.	**Crew briefed on intended procedures.**	**Casualty briefed on towing procedures.**
• Nature of disabling • Number of POB and condition • Overall condition of vessel, flooding, pumps, etc. • Waiver agreed to before towing, CGRS to monitor or log • Nets, lines, or other obstructions in water • Strength of towing fittings • Hull speed of casualty	• Safety gear (dress) • Duties assigned • Passing a drogue • Approach • Passing towline • Emergency breakaway	• Use of drogue • Passing of drogue • Proper rigging of drogue • Procedures for passing towline • Use of chafing gear • No crew on bow during tow • Emergency communication procedures established • Don PFD

Passing the Towline
• Complete visual inspection of casualty • Evaluation of set and drift • Proper approach chosen for situation • Pass towline • Pass drogue (if appropriate) • Line payed out correctly and away from screws • Set initial course and adjust towline • Chafing gear rigged • Adjust to proper towing speed • Casualty kept in step • Comms schedule with casualty, check status, advise casualty of change of course heading, traffic, etc.

Towed Vessel Flooding

- Nature and rate of flooding ascertained
- Dewatering capability of casualty determined
- Plugging capability of casualty determined
- RCC advised (backup requested, if appropriate)
- Appropriate dewatering method selected
- Casualty briefed on dewatering intentions
- Passing the portable pump:
  - (1) Direct Method:
    - Towline retrieved
    - Casualty retrieves drogue
    - Proper approach to casualty
    - Pump passed
  - (2) Towline Method:
    - Speed reduced/Towline shortened
    - Tag line set to reach lowest freeboard of vessel
    - Pump passed
  - (3) Operating instructions passed
  - (4) Pump should be started within six pulls of the cord
- Using the eductor: (if applicable)
  - (1) Towline retrieved
  - (2) Casualty retrieves drogue
  - (3) Fenders set on both vessels
  - (4) Sidelines prepared and used
  - (5) Passengers removed from casualty, if appropriate
  - (6) Eductor properly rigged
  - (7) Dewatering should be underway within five minutes

Towing Alongside

- Discuss procedure and brief crew
- Discuss procedure with casualty
- Fenders rigged on both vessels
- Set and drift of both vessels ascertained before making approach
- Approach made properly
- Breast and spring lines properly passed and secured
- Lines properly adjusted
- Mooring procedures discussed with casualty
- Bow pointer assigned and briefed
- Proper approach to dock
- Bow pointer passes timely and accurate information to coxswain
- Casualty moored on spring line
- Proper disconnecting procedures followed
- Documentation of particulars for reports

Crew Teamwork And Coordination

- Crew members aware of specific task and incident responsibilities
- Crew members communicate effectively with other members of crew
- Crew members assist each other as necessary
- Crew members always aware of others location on board
- Coxswain effectively supervises crew by:
  - (1) Ensuring that crew is aware of incident and individual responsibilities
  - (2) Ensuring sufficient guidance is provided in a timely manner when necessary
  - (3) Ensuring that crew safety and survival equipment is properly worn
  - (4) Ensuring that safety of casualty or SAR crew is not jeopardized
  - (5) Ensuring that RCC is advised of all appropriate matters

Towing Procedures

☞ **NOTE**

Nothing in this section is intended to undermine the commanding officer's or coxswain's authority or good judgment as the particular case may require. The guidelines in this section form only the basic elements that all personnel must be familiar with in order to safely carry out SAR towing operations. Guidance to the implementation of the Towing Policy will be found in the CGFOs 204.01 and 204.01.00.

A. Introduction

Towing can be viewed as a very simple or a very complex operation depending on the magnitude of the towing operation being examined. A complete SAR incident involving towing may be regarded as a series of evolutions which are closely related to one another. The degree of success (or failure) of one component is dependent on the efficient accomplishment of another.

Safety is the principal reason why standard procedures exist. Every evolution that takes place in a towing operation is inherently dangerous. Unless organized procedures are observed, someone may get injured or killed.

The procedures in this section are based on many years of Coast Guard towing experience and are intended to provide you with the most efficient and effective means of safely managing a towing incident. They encompass basic guidelines to assist with most towing situations and have been proven effective by SAR units.

B. General Guidelines

(1) Direct the persons aboard the distressed craft to don lifejackets / immersion suits / PFDs.

(2) Assemble all equipment and quickly scan for defects or deficiencies.

(3) Establish and maintain scheduled communications with the distressed vessel in order to ascertain the physical and mental state of the personnel involved, the physical condition of the vessel and any other condition that may affect their health and safety in the conduct of the tow. If boat-to-boat communications cannot be established through installed radio equipment, provide a portable radio to someone on the distressed craft and give the person instructions on how to use it. Establish visual or sound signals with the other boat, to be used in the event of radio failure.

(4) Consider the effects the following will have on the operation:

- existing and forecasted weather;
- current and tides; and
- sea conditions on scene and at the destination where the disabled boat will be towed.

(5) Maintain a navigational plot.

(6) Determine the following:

- the advantages of placing a crew member on board the disabled craft; and
- the need of removing the people from the disabled boat.

☞ **NOTE**

When conditions warrant, remove all POB from the disabled boat. The determining factor in this decision should be the overall safety of personnel and the boats involved.

(7) Determine the rate the disabled vessel is drifting.

(8) Determine the best towing approach to employ.

(9) Brief the people on the disabled craft regarding the following:

(a) hookup procedure;

(b) breakaway procedure;

(c) safety;

(d) line-handling procedure, i.e., instruct the operator of the disabled vessel not to cast off any lines unless directed to do so by you;

(e) operating procedure, i.e., instruct the operator of the other boat to man its helm and ensure the operator clearly understands what you want done;

(f) the route to be followed, sea conditions to be expected enroute, destination and estimated time of arrival;

(g) display of proper lights and shapes as required by COLREGS, and

(h) radio frequency to be guarded and a comms schedule to be maintained.

Towing Equipment

A. General

Towing is one of the most common evolutions performed by SAR units. Yet, no tow is the same as the next. There are several different methods of towing. The chosen method depends upon the size of the tow and the weather conditions at the time. Safety is of primary consideration regardless of which method is chosen. Crews on SAR lifeboats must be fully capable of rigging and safely towing all types of vessels. This section covers basic towing principles and functions relating to SAR units.

☞ **NOTE**

Attention is drawn to CGFO 204.1 and CGFO 204.01.00 (provision of towing assistance by Canadian Coast Guard Fleet units).

Nothing in this section is intended to replace or supersede these fleet orders.

B. Towing Safety

The principal concern in Search and Rescue is the safety of life. Ensure the safety of the personnel aboard your lifeboat and the vessel being assisted. The saving of property is of secondary importance. If in doubt about the safety of persons aboard a distressed craft, consider removing them before commencing a tow.

C. Communications

Effective communication is a prime factor in achieving a safe and efficient tow. There is no room for assumptions. Communication with the distressed vessel and with your SAR crew is of utmost importance. The SAR vessel must know as much as possible regarding the distressed vessel's problem, and the distressed vessel must know what the SAR lifeboat's intentions are and what is expected of him. Communication between the coxswain and the crew is also of prime importance. There is no room for second-guessing what the coxswain or crew will do.

D. Equipment

(1) Towline

This piece of equipment is certainly the most used of the towing gear. The ideal towline length is 180 metres (600'). A SAR unit should never carry less than 155 metres (500') of towline, especially if the SAR unit is required to operate in heavy weather or offshore. Otherwise, the stress of surging on the towline will be transferred to the towline connection fittings.

(2) Towline Reel

The towline reel provides effective storage and availability for the towline. The towline should be secured to the towline reel with small stuff to allow the line to lie evenly on the reel. If it is necessary to slip the towline, the small stuff can easily be cut. A minimum of four turns

should be kept on the towline reel at all times. Paying out the entire length can result in loss of the tow and towline should a surge occur. The bearings on the towline reel should be kept clean and lubricated for proper performance.

(3) Towing Bridle

Towing bridles are required when a single attachment point on the bow of the towed vessel is not available. Towing bridles are generally constructed of double-braided nylon or wire and may be single- or double-legged. Wire bridles are generally employed for heavier displacement craft such as larger commercial fishing vessels.

Single-leg bridles are normally used to tow sailing vessels. *If the mast is capable of withstanding towing stresses,* the bridle is secured by taking one round turn around the base of the mast and securing the bridle to the towline with a shackle.

Double-leg bridles are used in situations where they can be rigged so that both legs exert an equal pull on the hull. They are generally rigged to both bows of the towed vessel. No specific length is required, but the legs must be long enough to reduce the tendency to yaw. The breaking strength of the legs must be equal to or greater than the towline. The legs may have eyes spliced in the bitter ends or be left without the eyes. (See subsection 5 below, "Recommended Line for Towing Operations".)

The cabin and hull bridles are used if the towed vessel does not have adequate deck fittings. These bridles are **NOT RECOMMENDED** for use. They require a good deal of time to rig properly and require more line to construct than is normally carried aboard a SAR unit. The line's waist and tag lines (lines used to secure the bridles in position) are subject to high stresses from static and dynamic towing forces. Furthermore, the way in which these are rigged makes towing control very difficult even in calm waters. There are many different methods of constructing these bridles, depending on the vessel being towed. It is impossible in this manual to recommend a **SAFE** procedure for constructing them. *If the vessel does not have adequate deck fittings for towing, it may be prudent to remove the POB and advise the owner to seek commercial assistance.*

(4) Kicker Hook or Towing Assist Hook

Generally, the larger craft have adequate deck fittings for securing the towline. However, some vessels will require the line to be attached to the trailer eyebolt. A shackle or a kicker hook may be used for this purpose.

The kicker hook assembly is a stainless steel snap hook to which a welded six-inch-long and 3/8-inch-diameter stainless steel round stock is fitted. A double-braided nylon line is then spliced into the eye of the hook using a thimble in the splice. The breaking strength of the line must not be any higher than the breaking strength of the snap hook. Finally, a hole is drilled at the end of an eight-foot boat hook. The hole must be large enough to allow the round stock to fit into it smoothly.

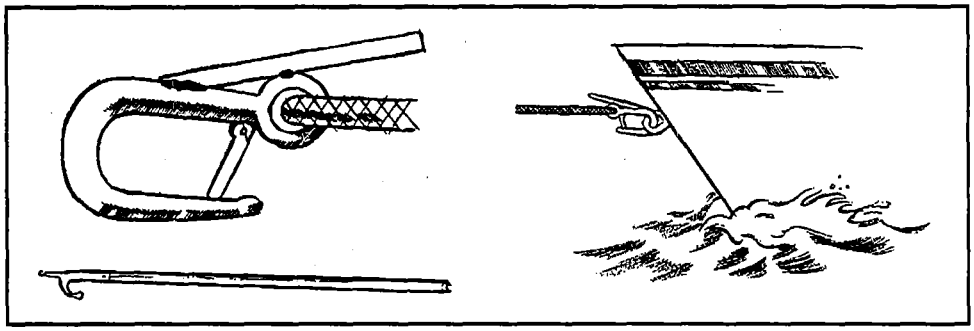
The procedure for attaching the kicker hook is as follows:

(a) Slide the kicker hook rod into the hole drilled in the end of the boat hook.

(b) Hold the kicker hook in place by pulling the double-braided line taut.

(c) Extend the boat hook and attach the kicker hook to the trailer eyebolt.

(d) Remove the boat hook. (See the following figures.)



(5) Chafing Gear

Chafing gear must protect towlines or bridles where they are exposed to heavy wear due to chafing on hard surfaces such as gunwales and chocks. Chafing gear may be No.1 canvas duck or split rubber hose covering the lines at the points of chafing. They are attached to the line using small stuff.

☞ **NOTE:**

Messenger lines and drogues are dealt with in sections 4-5 and 4-16, respectively.

E. Recommended Line for Towing Operations

All Coast Guard SAR vessels are designed with specific strength criteria "built in" to the towing arrangements. In simple terms, the strength of the deck towing fittings must exceed the strain of the vessel's "bollard pull". The last thing a SAR vessel crew needs is to pull the towing bollard off its own vessel.

Bollard pulls are forces which can be measured by a gauge attached to the towing arrangement. The towing arrangement is secured to the wharf, and the engines are run at different RPMs. The different forces at various engine RPMs will be obvious on the gauge. For example, the Type 100 vessels attain a bollard pull of 3000 lb. at 800 RPM. The Type 300 (44' MLB) has several differing engine packages providing maximum bollard pulls between 6500 lb. to 8000 lb., and the aluminium ARUN has reached a bollard pull close to 14,000 lb.

F. Towing Hardware

The recommended towing hardware for the Type 100, Type 300 (44' MLB) and 300-A (ARUN) is based on these bollard pulls and bollard strengths discussed above. A V-bridle system should be used where the towline never touches the vessel being towed. Three different bridles are used:

(1) A double-braid nylon bridle used with pleasure craft. The nylon rope bridle will not scratch or damage the finish on fibreglass vessels, and does minimum damage to painted surfaces.

(2) A 5/8" diameter wire rope bridle used with large commercial or fishing vessels. The wire rope has a better abrasion resistance than a rope bridle and is less likely to part during tows in adverse sea conditions. Commercial vessels are not as concerned about scratches and wear marks caused by the wire rope chafing on their vessels.

(3) A 1/2" diameter wire rope bridle used with smaller commercial or fishing vessels. It has the same characteristics as the stronger 5/8" bridle but is lighter and easier to handle.

All lines must be fitted with appropriate-sized thimbles at the ends connected to the shackle or shackle/swivel. A soft eye is fitted at the other end of the bridle legs. This eye must measure at least one metre. The different specifications for the towing hardware are available in the Type 100 and Types 300 tables at the end of this subsection.

☞ **NOTE**

These recommended sizes for the towing hawser are not specified in CGFO 207 and the relevant Fleet System Circular no 6-91. Therefore, it is important to keep in mind that these recommended sizes are based on safety factors applicable to the towing fittings on board the SAR unit. The towing bridles and hardware in this section are not stipulated in the FSC and consequently are not compulsory as "SAR equipment".

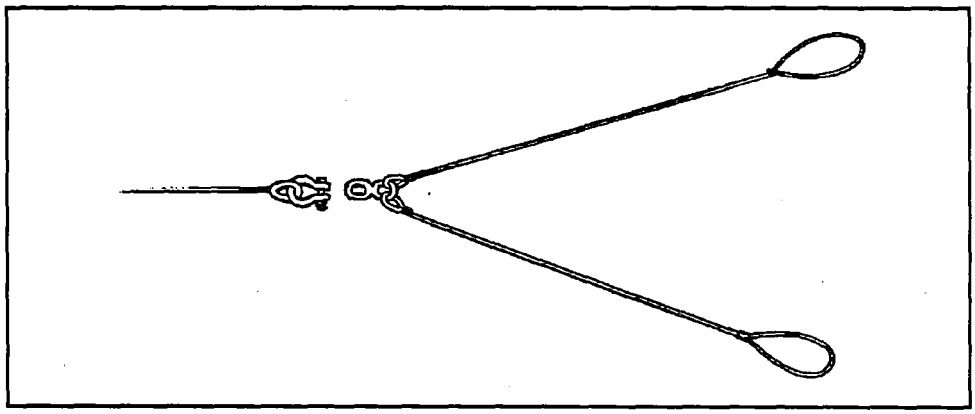
G. Illustrations of the Different Arrangements

(1) Double-Braid Nylon V-Bridle

–thimble–DBN leg–soft eye

–DBN towline–thimble–shackle–regular swivel

–thimble–DBN leg–soft eye

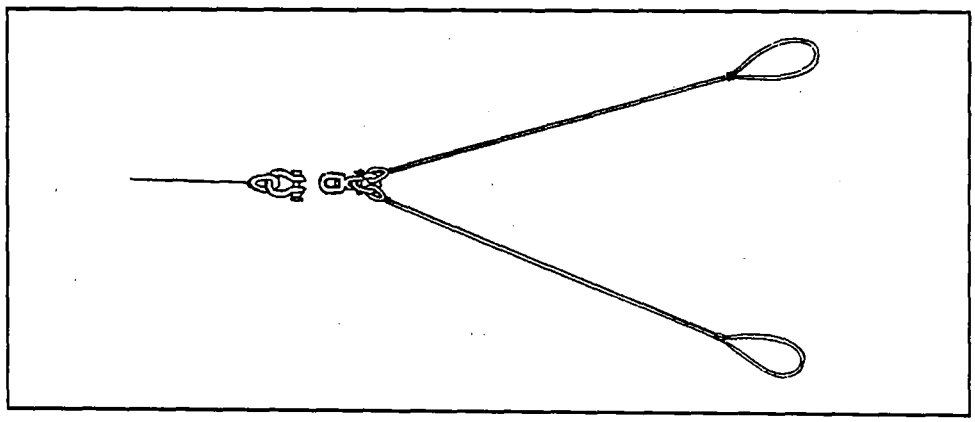


(2) 1/2" Wire Rope Bridle

– thimble–wire leg–soft eye

–DBN –thimble–shackle–jaw end swivel–link

– thimble–wire leg–soft eye



(3) The 5/8" Wire Bridle

It is similar to the 1/2" wire rope bridle, but rather uses a regular swivel and the weldless sling link that joins the swivel to the legs is not necessary.

Description	Size	SWL	BS	Comments
Class 100	41' UTB	—	—	Bollard Pull Unknown
Double Braid Nylon Towline	600 ft 7/8"	5300 lb	26500 lb	Single Line, Direct Pull
Wire Rope V-bridle	5/8" dia.	6600 lb 11400 lb	33000 lb 57000 lb	• single line rating • when used v-bridle
Wire Rope V-bridle	1/2" dia.	4400 lb 7600 lb	22000 lb 38000 lb	• single line rating • when used v-bridle
Double Braid Nylon V-bridle	7/8" dia.	5300 lb 9200 lb	26500 lb 45900 lb	• single line rating • when used v-bridle
Towline Shackle	3/4" dia.	9500 lb	57000 lb	Class IV Shackle, Bolt Type & Cotter Pin
Regular Swivel	3/4" dia.	7200 lb	36000 lb	Used with 5/8" V-bridle
Jaw End Swivel	3/4" dia.	7200 lb	36000 lb	Used with 1/2" V-bridle
Weldless Sling Link	3/4" dia.	6000 lb	36000 lb	Used with 1/2" V-bridle

WARNING

Never attempt to change your towing cable for a cable having a breaking stress higher than your towing bitt's design.

Description	Size	SWL	BS	Comments
Class 300	44' mlb	—	—	Bollard Pull of 6500 to 8000 lb
Double Braid Nylon Towline	600 ft 1 1/4"	8400 lb	42000 lb	Single Line, Direct Pull
Wire Rope V-bridle	5/8" dia.	6600 lb 11400 lb	33000 lb 57000 lb	• single line rating • when used v-bridle
Wire Rope V-bridle	1/2" dia.	4400 lb 7600 lb	22000 lb 38000 lb	• single line rating • when used v-bridle
Double Braid Nylon V-brid.	7/8" dia.	8400 lb 14700 lb	42000 lb 73500 lb	• single line rating • when used v-bridle
Towline Shackle	1" dia.	17000 lb	102000 lb	Class IV Shackle, Bolt Type & Cutter Pin
Regular Swivel	7/8" dia.	10000 lb	50000 lb	Used with 5/8" V-bridle
Jaw End Swivel	3/4" dia.	7200 lb	36000 lb	Used with 1/2" V-bridle
Weldless Sling Link	3/4" dia.	6000 lb	36000 lb	Used with 1/2" V-bridle

WARNING

Never attempt to change your towing cable for a cable having a breaking stress higher than your towing bitt's design.

Description	Size	SWL	BS	Comments
Class 300-A	(ARUN) 52 ft	—	—	Bollard Pull up to 14,000 lb
Double Braid Nylon Towline	600 ft 1"	6000 lb	30000 lb	Single Line, Direct Pull
Wire Rope V-bridle	5/8" dia.	6600 lb 11400 lb	33000 lb 57000 lb	• single line rating • when used v-bridle
Wire Rope V-bridle	1/2" dia.	4400 lb 7600 lb	22000 lb 38000 lb	• single line rating • when used v-bridle
Double Braid Nylon V-brid.	7/8" dia.	8400 lb 14700 lb	42000 lb 73500 lb	• single line rating • when used v-bridle
Towline Shackle	1" dia.	17000 lb	102000 lb	Class IV Shackle, Bolt Type & Cutter Pin
Regular Swivel	7/8" dia.	10000 lb	50000 lb	Used With 5/8" V-bridle
Jaw End Swivel	3/4" dia.	7200 lb	36000 lb	Used With 1/2" V-bridle
Weldless Sling Link	3/4" dia.	6000 lb	36000 lb	Used With 1/2" V-bridle

WARNING

Never attempt to change your towing cable for a cable having a breaking stress higher than your towing bitt's design.

Approaching a Vessel to Render Assistance

A. Approach Checklist

Before Approaching the Vessel
Communication: a) Communication is established with the casualty, position and status of casualty are maintained, and casualty is aware of your ETA and initial intentions. b) Your crew has been briefed on the intended procedures on arrival. c) RCC informed of ETA and actual on-scene arrival. d) Towing waiver agreed to by casualty.
Approaching the Vessel
Assess the situation: a) Vessel size/type/appendages b) Manoeuvring characteristics of SAR vessel c) Hazards/angle of rest d) Drift rates **Approaches:** a) Based on assessment of situation b) Parallel Approach - good weather - slow drift rate c) Crossing - the - T - Approach - heavy seas - fast drift rate d) 45 - Degree Approach - calm to moderate seas e) Back - Down Approach - least recommended

B. Before Approaching the Vessel

Effective communication sets the stage for safe towing operations. Before arrival on scene, the commanding officer/coxswain should have established communication with the disabled vessel and determined the nature of the disabling problem. The disabled vessel should be made aware of your ETA and intentions on arrival. The SAR crew should be briefed on what equipment is to be prepared for arrival on scene and on the signal and procedures for the release of the tow under emergency conditions. Before taking a vessel in tow, the coxswain must fully brief all crew members on the intended procedures to be applied in the particular case. Of specific significance in a briefing is the type of approach, when and from which side to pass the towline, how to pass the towline (with or without a messenger), how much towline is to initially be payed out, and any particular safety concerns that the case may warrant. In most situations, the coxswain will make one complete circle around the disabled vessel, inspecting it as closely as possible. Before starting the approach, the coxswain should ensure that all crew members are prepared for their tasks and personnel on the disabled vessel are ready to receive the towline and understand what is expected of them in attaching the towline. (This may be conducted by SAR crew if conditions allow and the coxswain chooses to place a crew member aboard the disabled craft.)

C. Towing Approaches

The approach chosen by a coxswain will be based on his assessment of the situation with regard to the prevailing weather conditions and the nature of distress. This will be a discretionary decision which must be left to the coxswain. However, a coxswain must be capable of carrying out all approach types as incidents will occur where only one approach is appropriate.

D. Determining the Towing Approach to Use

The chosen approach depends on several factors including the following:

(1) the size and type of the disabled vessel;

(2) the manoeuvring characteristics of the SAR vessel;

(3) the position of the casualty relative to nearby hazards and both vessels' attitude to wind and sea; and

(4) the rate at which the vessels are drifting.

The casualty will generally be lying in one of four generally stated conditions:

(1) beam to the wind;

(2) oblique to the wind;

(3) head to the wind; or

(4) stern to the wind.

Different vessels will take up widely differing angles of rest, when allowed to drift freely in a seaway. Factors affecting this angle are:

(1) vessel size and type;

(2) hull form;

(3) lading;

(4) ballast;

(5) trim; and

(6) underwater appendages.

The angle of rest will determine the motion of the vessel in a seaway. In simplest terms, this may range from a pure roll in the case of a vessel lying with her beam to the elements, to a true pitching motion, in the case of a vessel lying with her bow or stern to the wind and seas. When a vessel lies at broad angles to the weather, the resultant action is more complex. In this case the bow and stern yaw considerably as the sea action affects the hull form before and after the midships section.

The vessel's angle of rest will determine the rate of lee drift. The aspect of the vessel presented to the wind will determine the total wind pressure on the vessel and affect the rate of drift.

This will permit the coxswain to designate the most advantageous position from which to pass and connect the towline. The rate of drift is determined by manoeuvring your vessel onto the same heading as that of the disabled vessel and stopping astern of it. If the distressed vessel begins to drift away, its rate of drift is faster than your vessel's. Use caution when approaching leeward of a vessel that you intend to take in tow or bring alongside. The disabled vessel may block the wind, particularly if the boat is larger than yours and has high cabins. The wind force, instead of affecting both vessels, is greatly reduced on your vessel. The disabled craft will drift toward you quite rapidly. BE ALERT for this sudden change-of-wind effect as you make your approach, and be ready to manoeuvre as necessary.

WARNING

Collision severe enough to seriously damage both vessels may result should this loss-of-wind factor not be taken into consideration in determining your towing approach.

E. Basic Approaches

(1) The Parallel Approach

The parallel approach is used in good weather conditions when the casualty's rate of drift is slow. The SAR vessel will approach from the stern on the windward side of the casualty. The SAR vessel passes close enough to pass the towline and stops a safe distance ahead of the casualty while the connection is made.

(2) Crossing-the-T Approach

If a heavy sea is present or the casualty's rate of drift is brisk, the crossing-the-T approach is used. The SAR vessel crosses the bow of the casualty on a heading perpendicular to it, heading into the sea or wind if possible. The towline is passed just before the towing boat passes the bow of the casualty.

(3) The 45-Degree Approach

If sea conditions are calm to moderate, the 45-degree approach may be used. The SAR vessel will approach on a heading about 45 degrees from the casualty's bow. The towline is passed just before the SAR vessel's bow crosses the casualty's.

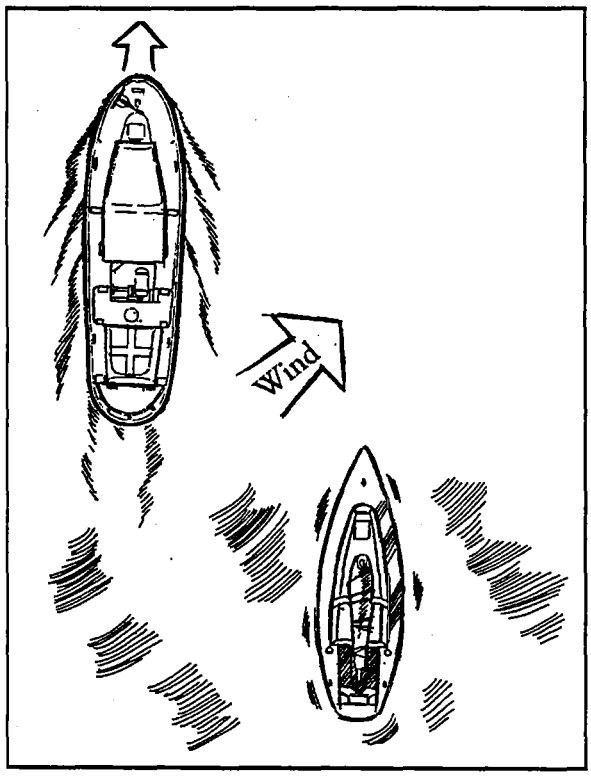
(4) The Back-Down Approach

The manoeuvre is similar to backing into a berth. The SAR vessel backs down to the bow of the casualty, passes the towline and moves a safe distance ahead to complete the connection. This approach does not offer the coxswain a clear view of what is going on with the towline. There is increased danger of picking up the towline in the screws.

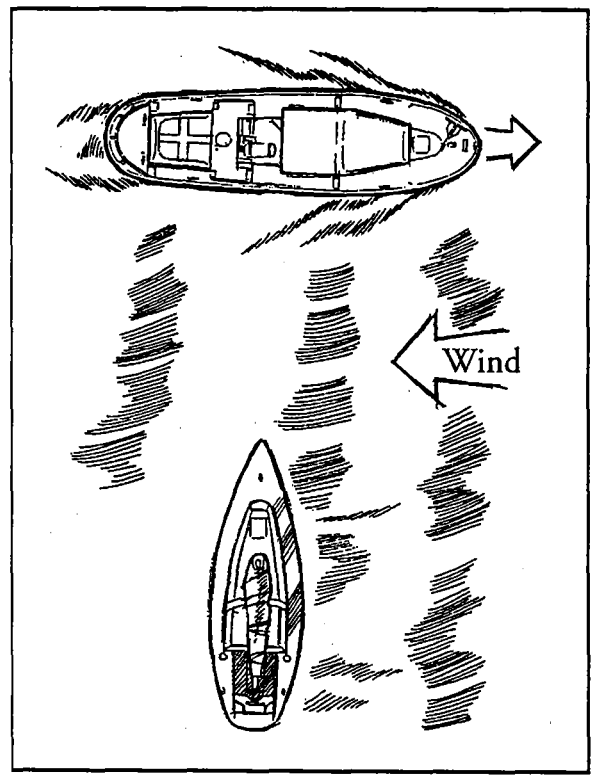
(5) Choosing an Approach

The above approaches cover the spectrum of basic open-water approaches. The coxswain may have to use a variation on one approach to meet a particular set of circumstances. The key to success is familiarity with your vessel's manoeuvring characteristics and the knowledge and ability to conduct the basics. This knowledge and ability is best gained through towing experience or regular practice exercises under controlled conditions.

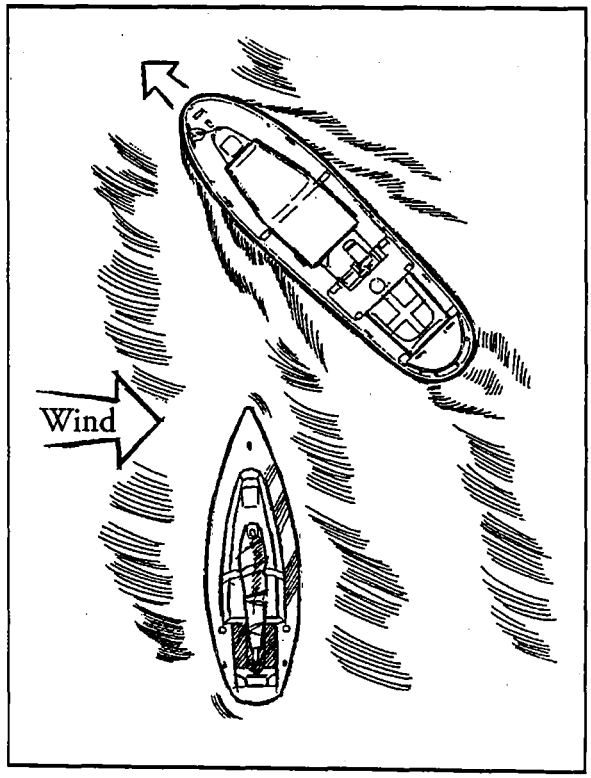
Parallel Approach



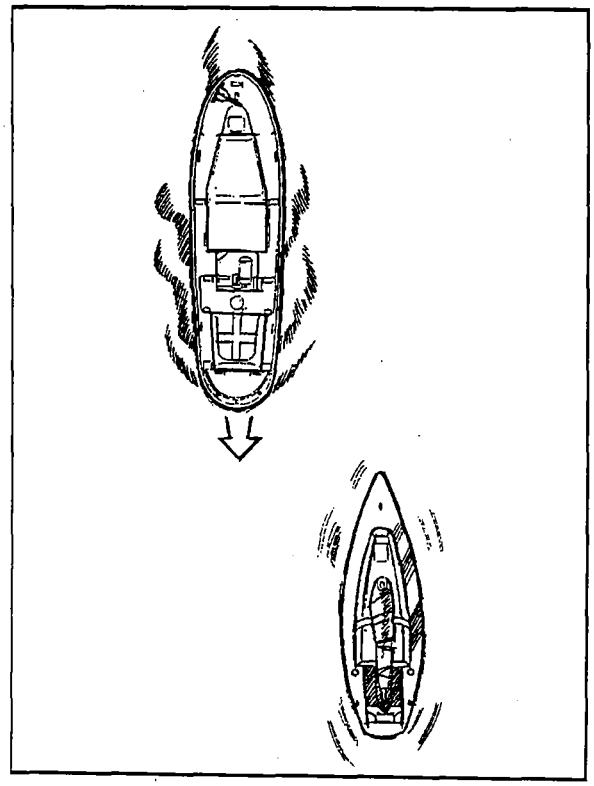
Crossing-the-T Approach



45° Approach



Back-Down Approach



Passing the Towline

A. General

In calm conditions the SAR vessel may manoeuvre close to the casualty and pass the towline directly to the casualty. The towline should be passed from the well deck of the SAR vessel. The length of line payed out should be sufficient to allow the casualty to handle it without being pulled by the SAR vessel. However, excessive lengths of line should not be passed for the connection. Excess line in the water seems to always gravitate to your screws. Deck crews must be particularly alert to line handling during this phase. Line should be controlled and payed out directly from the towline reel.

When conditions do not favour approaching close enough to pass the line directly, a messenger line must be used. The heaving line with a monkey fist at the throwing end is the simplest and most common method of sending a messenger. It should be used whenever practical.

B. Preparation and Use of Heaving Line

(1) Wetting the heaving line will cause it to become more pliant and less susceptible to tangles.

(2) Bend the heaving line onto the towline, using a bowline or a clove hitch with two half hitches.

(3) Coil the line in the casting hand with the monkey fist hanging at the outside turn of the coil and below the same turn.

(4) Take two-thirds of the coil in the right or casting hand, and let the rest lie loosely in the left or other hand.

(5) Warn personnel on the casualty to be prepared to receive the heaving line.

(6) Cast the heaving line using a sweeping side-arm movement (this is the preferred method), keeping the casting arm straight and using the body. (For the uninitiated, this takes some practice. All SAR crew should be capable of delivering a heaving line a couple of boat lengths with reasonable accuracy. Second throws should be rare.)

(7) The line should not be tossed directly at the casualty or personnel on it. It should be thrown so that it falls across the deck of the vessel or catches the rigging and slides down to the deck.

☞ **NOTE**

It is highly recommended that two heaving lines be prepared (bent to the towline) for passing a line. If the first pass is unsuccessful, the second line can be tossed by a second crew member immediately. This will allow the connection to be made without the coxswain having to manoeuvre the SAR vessel back into position.

(8) The personnel aboard the casualty will pull the heaving line and towline aboard to make the towing connection. Be sure to allow enough slack to permit this without pulling the line from the hands of the people. (Usually they don't want to let go!)

C. Preparation and Use of Float Line

The float line may be particularly useful in situations where a line cannot be passed by a heaving line and the line-throwing apparatus would be overkill (e.g., a small vessel on a shoal or beach).

(1) Select a suitable float to bend to the messenger (e.g., life ring, fender, scotchman, life jacket). Bend a messenger line of sufficient length to float to the casualty.

(2) Position the SAR vessel up current from the casualty, and pay out the line until the float nears the casualty.

(3) With the line secured to the SAR vessel, run down current, passing the casualty so that the float will cause the messenger line to contact the casualty.

D. Preparation and Use of Line-Throwing Appliances

(1) General

There are two categories of line-throwing appliances. A Type 1 appliance must be capable of carrying a line not less than 228 m (708 ft.) in calm weather. A Type 2 appliance shall be capable of carrying a line not less than 182 m (600 ft.) in calm weather. Both types must include four projectiles and four lines of suitable length as well as a watertight case for the lot. The projectiles, cartridges, or other means of ignition are limited to four years' service life from the date of manufacturing.

Small Coast Guard SAR vessels carry a variety of different models of line-throwing appliances. The correct stowage, maintenance, and operation of these appliances are extremely important. Remember that line-throwing appliances are very powerful and should always be treated as firearms. Always follow the manufacturer's recommended procedures for stowage, maintenance and operation.

SAR crews must be fully familiar with the recommended operation of their particular equipment. **ALWAYS FOLLOW THE MANUFACTURER'S OPERATING SPECIFICATIONS.** Crosswinds will carry the bight of the line to leeward, causing the rocket projectile to turn into the wind. The rocket may pass over the target, but the line may fall to leeward. Be prepared for a second shot.

The following gives a brief overview of the operation of the most common line-throwing appliances.

(2) The Speedline

The speedline is a completely self-contained unit. Where required to meet regulations, four units must be on hand to make up a line-throwing apparatus.

(a) Operation

(Always follow the instructions displayed on the unit container.)

- Check that the safety pin is secured in the handle.
- Remove the large transparent front cover only. DO NOT REMOVE OTHER COVERS.
- Allow the asbestos line to hang down, clear of the other line.
- Secure the "tail" (marked) end of the line to the messenger line.
- Ensure that the area is clear and everyone is clear of the lines.
- Position yourself for support to counteract the vessel movement. Do not fire until cleared by the coxswain. When ready to fire, remove the safety pin, aim, and squeeze the trigger to fire.
- DO NOT MOVE THE UNIT until the rocket has pulled out all the line.

(b) Speedline Rocket Projectile Replacement

- Be sure that the safety pin is in place in the handle.
- Remove the large transparent cover and the small cover over the rocket tube.
- Slide out the rocket, and disconnect it from the asbestos line.
- Secure the asbestos line to the wire tail on the new rocket.
- Fold the stirrup downwards, and slide the rocket into the tube.
- Replace the small cover over the rocket tube, coil in the lines, and replace the large front cover.

(c) Speedline Cartridge Replacement

- Be sure that the safety pin is in place in the handle.
- Remove the large rear cover.
- Squeeze the blue locking latch on the cartridge, and rotate the cartridge counter-clockwise until it is free of the firing rod and the tab slots.
- Withdraw the cartridge.
- Insert the new cartridge by lining up the tabs and slots and rotating clockwise until the firing rod engages in the metal tab.
- Be sure that the blue locking latch is engaged. Replace the cover.

(3) Shoulder Line Gun (Bridger 44 Cal. Model 7094)

(a) Operation

- Check that the rifle bore is clear and free of oil or grease.
- Place a projectile in the bore of the gun, large end first. The projectile must slide in smoothly. If it must be forced, do not use the particular projectile.
- Place a coil of line in the canister so that the line may run freely from the coil centre. If the line is wound on a spindle, knock out the spindle, so that the line can run freely from the centre.
- Wet 1200 cm (4 ft.) of line, and attach to the projectile using three loose half hitches. Do not secure the loose end of the line.
- DO NOT INSERT BLANK CARTRIDGES INTO THE GUN UNTIL YOU ARE READY TO FIRE.
- Be absolutely sure that the projectile rests against the cartridge wad.
- Raise the gun to an angle of approximately 35 degrees with the butt hard against the shoulder and the left hand well over the receiver to keep the gun from jumping. Do not place your face near the stock. The recoil is considerable, but not excessive.
- Make allowance for wind.
- After use, clean the bore with powder solvent, and grease the gun thoroughly inside and out.

(b) Rewinding

The lines may be easily rewound by hand, as follows:

- Attach the end of the line to the slit in the small end of the spindle.
- Wind slowly up the spindle once to within about 5 cm (2 in.) of the end, then continue winding diagonally to and fro, constantly turning the spindle and whole reel to allow the line to wind evenly and prevent bunching at the middle or ends.
- When the line is rewound to approximately 3.67 m (12 ft.) from the end, wind closely once over the whole reel and fasten the end.
- The winding must be quite tight and even so that the line will pay out from the centre readily. Lines must be thoroughly dried before re-winding.

☞ CAUTION

The rifle and projectile must be kept well oiled and free of rust. The projectile fits the bore closely, and rust might make it difficult to seat the projectile properly in the barrel and allow it to move freely. Clean the rifle often, as the compression is so great that a considerable amount of burned powder is likely to be left in the chamber of the barrel.

(c) Gun Kit Contents

1 gun box	1 line-throwing gun
10 projectiles	4 service lines
1 canister	3 rewinding spindles
25 blank cartridges	1 cleaning rod with brush
1 bottle powder solvent	1 can of oil
12 wiping patches	1 set of plastic instructions

(4) E-Z Liner

(a) General

All potential users should be made familiar with the operation and varied uses of the E-Z Liner. Accurate shots come easy after only a little practice.

The E-Z-Liner throws a soft plastic projectile that can be dangerous at close range. It uses "line-pack", containing 600 feet of specially wound and packed line.

WARNING

This product is not a firearm, but handling, care, and safety precautions should be exercised as though it were.

- ***Never load the launcher unless you intend to fire.***
- ***Never point in any direction other than the intended target area.***
- ***Never set your launcher down and leave unattended while it is loaded.***
- ***When detonated, the blank powder charge releases burning gases and small pieces of debris that can cause bodily harm at close range. When firing, make sure that no one is in front of or below the flight path of the missile.***

(b) Operation

- Ensure the trigger is secured in the safety slot and the firing pin is retracted, to prevent accidental firing.
- **Load Line** - Open the housing, unwrap a line-pack and insert into housing, replace end cover onto housing, secure line to projectile.
- **Load Charge** - Open E-Z Liner by releasing thumb-latch and swinging back the handle, insert projectile over barrel, insert power charge into chamber, gently close E-Z Liner and secure thumb-latch.

CAUTION

NEVER insert a charge before loading missile, as pressurized air may cause premature firing.

- **Firing** - Gently remove trigger from safety slot, aim unit and raise 45°, pull back on trigger, release trigger to fire.
- Line may be recovered and re-used after firing or another line-pack quickly loaded.

☞**CAUTION**

When re-using a previously fired line, any snags may cause the projectile to recoil or pull the E-Z Liner from the operator's hands.)

These guidelines are a summary only and do not include different procedures required for use of a shoulder stock. Refer to the user's instructions for further details.

Weighing Anchor of a Disabled Craft

A. General

At times, during a SAR incident, SAR vessels encounter a disabled craft that cannot pull its own anchor either because it is physically too heavy to pull without power or because the anchor is imbedded in the sea bottom and cannot be freed by hand.

In some cases, the coxswain may determine it prudent to advise the vessel operator to buoy and release his anchor line for later retrieval. However, if the anchor is to be pulled aboard the disabled craft before towing, there are three methods for accomplishing this from a small SAR vessel. These methods use either a shackle, bowline or towing assist hook (kicker hook) and are described below.

Determine from the vessel operator whether there are any obstructions or appendages on the disabled vessel that you should be aware of. Brief the operator on your intentions. Approach the vessel from a direction astern and parallel to the vessel, as if coming alongside.

B. The Shackle Method

(1) Secure an appropriate-size shackle (screw pin type) into the eye of the towline.

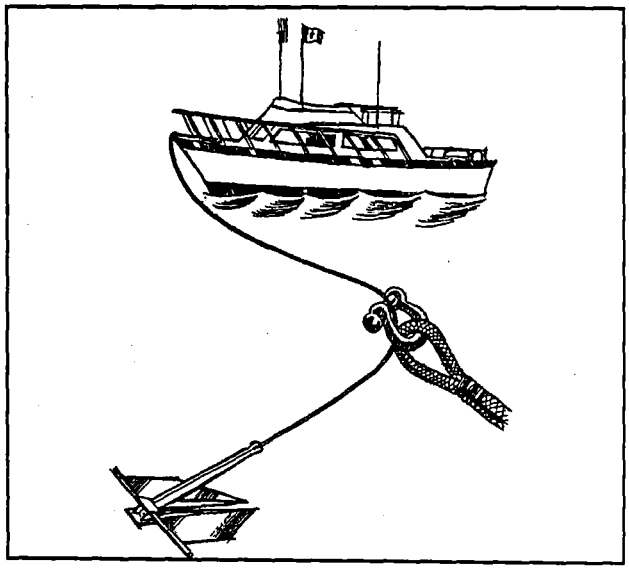
(2) Pass your towline to the vessel with the shackle secured in the eye.

(3) Instruct the operator of the disabled vessel to secure the shackle and towline to his anchor line by securing the shackle out board of all rigging and rails so that it may travel freely on his anchor line.

(4) Obtain an estimate of the anchor line payed out from the vessel operator.

(5) Move ahead slowly while paying out a length of towline equal to the length of the anchor rod. (Ensure that the shackle has reached prior to securing the towline.)

(6) Secure your towline when this line is out.



(7) Move slowly ahead. As you move ahead, the shackle will slide down the anchor line of the disabled vessel. The shackle must slide all the way to the anchor. At this point you have the other vessel in tow with both the anchor line and your towline serving as the towline. Continue moving slowly ahead until the disabled vessel's anchor reaches the shackle. The shackle may slide up the stock of the anchor, particularly with light-weight anchors, causing the towline to jerk. This situation should not cause a problem. The towline will be secure for towing in this position.

(8) Slowly tow the disabled vessel free of danger. Once you are out of the danger zone, stop your vessel and instruct the operator to pull in his freed anchor. This should be conducted as soon as safety permits because you will not know the breaking strength or condition of the disabled vessel's line. Take care not to begin shortening up in shallower water, or the disabled vessel may become anchored again. This situation is to be avoided as you would have no control over the disabled vessel and it may become grounded in the process.

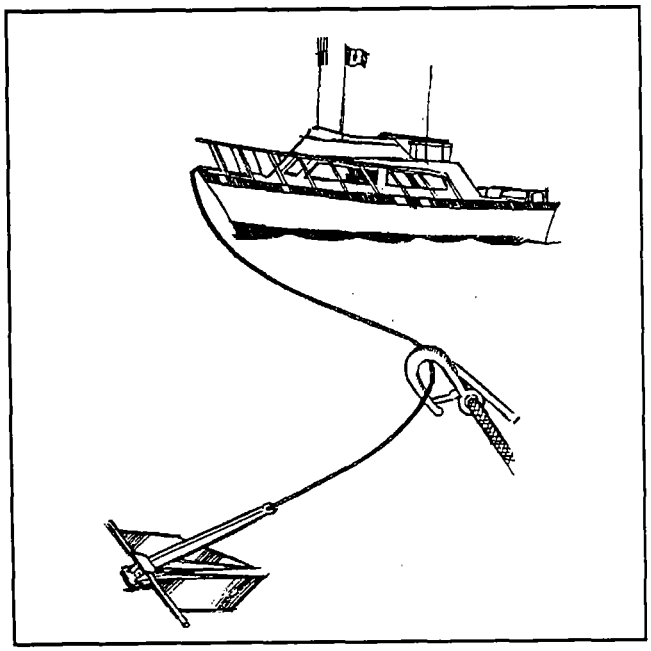
(9) After the anchor line is hauled aboard the disabled vessel, secure the towline in the normal manner and commence your tow.

C. The Towing Assist Hook (Kicker Hook)

(1) Using a bowline or double becket bend, secure the bitter end of the towing assist hook line to your towline.

(2) Come alongside the disabled vessel's anchor line and secure the towing assist hook to the anchor line by holding the handle and placing the hook as you would when securing to a trailer eyebolt.

(3) Follow the steps 4 though 9 above, (under "Shackle Method"), substituting the term **towing assist hook** in place of **shackle.**

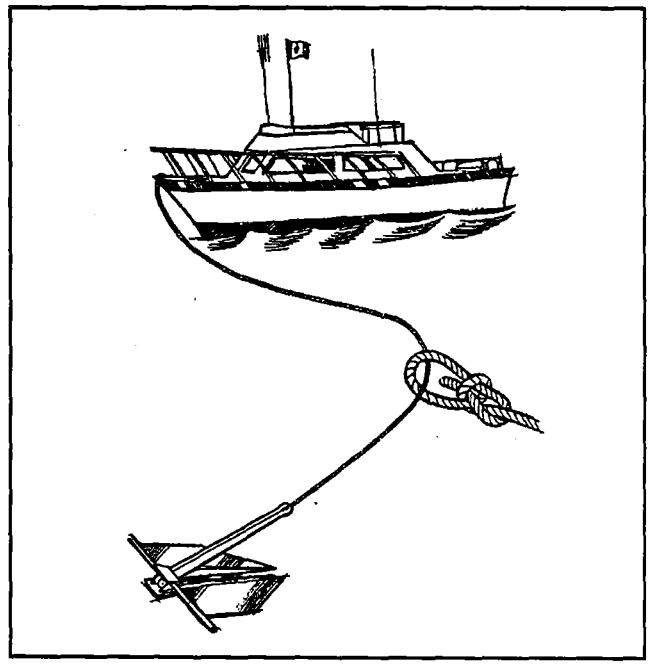


D. The Bow line Method

(1) Attach a suitably sized mooring line to your towline with a shackle, bow line or double becket bend.

(2) Pass the bitter end of the mooring line to the operator of the disabled vessel and instruct him to secure the bitter end around the anchor line (clear of all obstructions) with a bow line large enough to travel down the anchor line.

(3) Follow the steps 4 though 9 above, (under "Shackle Method"), substituting the term **bow line** in place of **shackle.**



☞ CAUTION

Check whether the line may need to be weighted. Also check to prevent the bow line from being cut by the anchor "line".

A. Connection Checklist

Connection or Attachment Points
1. Select fittings suitable for attaching towing gear: (a) Consultation with operator. (b) Visual inspection. (c) Crew member boarding and connecting. 2. Trailer Eyebolt: (a) Strength. (b) Close to waterline. (c) Kicker hook or shackle attachment. 3. Bow cleat, bow bitt, or Sampson post: (a) Cleats - secured with through-bolts and backing plates. (b) Sampson posts and bitts - secured to keel and at deck level to deck. (c) Inspect for condition and strength if possible.

Methods of Attaching
1. Direct Connection to vessel: (a) Trailer eyebolt - kicker hook or shackle. (b) Bow bitts, cleats, Sampson posts - pass under fitting, twist, and drop over horns. 2. Bridles: (a) Double leg - equalize towing forces - longer legs lessen strain - legs to be of equal length - joining shackle must be positioned on the centreline. (b) Single leg - for sailing vessels - attached to mast - mast must be strong and secure - one round turn about the mast and passed forward through available chocks - connect to towline on centreline - may have lines running back from towline connection to winches aft, spreading the towing forces.

B. Selection of Connecting Points

(1) General

The selection of suitable connecting points on the casualty must be carefully considered. Some vessels have very poorly secured cleats or attachment points which will not withstand towing stresses. Consultation with the master of the casualty is recommended, but consider that he may often have a jaded opinion of the quality of his vessel, including the strength of the fittings. Visual inspection, if possible, is highly recommended.

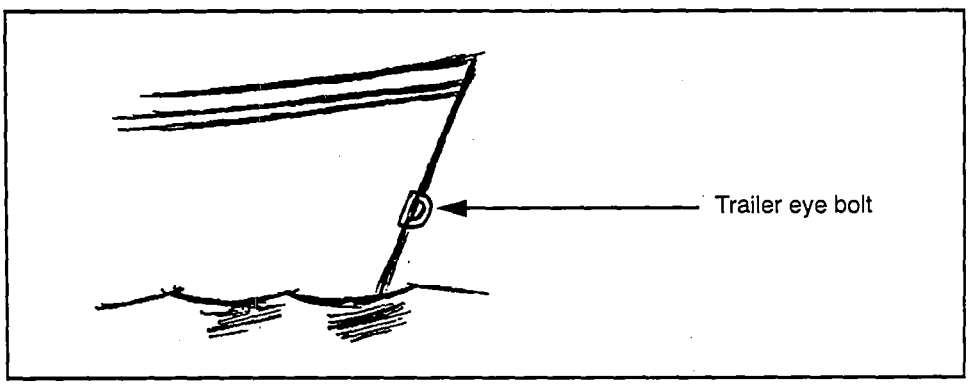
(2) Trailer Eyebolt

WARNING

Securing the towline to the trailer eyebolt can be hazardous to the SAR crew and the persons on the disabled craft because of the low attachment point and the requirement to position the two vessels close together. Extreme care must be practised to protect the crew member from being struck by the vessels.

The trailer eyebolt is generally a strong securing point at the stem and close to the waterline on smaller pleasure craft. When constructed it is designed to withstand the force of twice the weight of the craft. However, SAR crews are cautioned that, on older craft, foreign craft, damaged craft, altered or home-built craft, eyebolts may have much less than adequate strength. A visual inspection by the SAR crew is highly recommended. Another consideration in towing by the trailer eyebolt is that its restricted size may not allow attachment of a shackle or hook with a SWL equal to or greater than that of the towline. A compromise of the largest size that will fit is often required. Before deciding to tow by the trailer eyebolt, the coxswain must consider all of these factors as well as the load on the casualty and the sea conditions.

The towing assist or kicker hook is an effective method of attaching the towline to the trailer eyebolt and reduces the chances of injury to all personnel. Kicker hooks employed must be stamped and inspected with a breaking strength greater than the breaking strength of the attached towline. A shackle may also be used to secure a towline to a trailer eyebolt. This requires a crew member to lean over between the vessels to attach the shackle and should only be considered in calm to moderate sea conditions. As with the kicker hook, the shackle selected must fit the eyebolt, but also be of a breaking strength greater than that of the towline which it is attached to. The shackle pin must be moused with wire before commencing the tow.

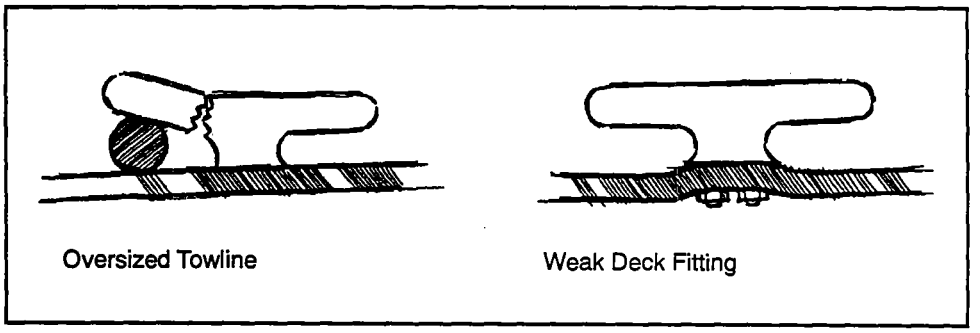


(3) Bow Cleat, Bow Bitt or Sampson Post

The bow cleat, bow bitt, and Sampson post are common deck fittings on the bow of many vessels. Before securing the towline, make sure cleats are secured to the deck with through-bolts and backing plates. Check that Sampson posts and bitts are secured to the deck, by being secured to the keel and braced at deck level. If they are not, there is a potential of failure under the strain of towing. If there is concern over the strength of these fittings, the master of the casualty should be informed and, if the case dictates, the SAR crew should continue with appropriate care.

☞ **NOTE**

If there is ANY doubt about the strength of the boat's fittings or the vessel operator's capability of making proper towline connections, it would be PRUDENT to place a crew member on the disabled vessel for the purpose of visually inspecting the fittings and making the towline connection. If deck cleats are to be used for attaching the towline, make sure that the cleats and the towline are of compatible size. A towline whose diameter is too large for a cleat will apply unnecessary stress to the cleat's arms and may break them.



(4) Method of Connection

(1) If possible, delegate a crew member to board the casualty to check the overall condition and suitability of the deck fitting to be used. If a crew member is not boarding, discuss the condition and suitability of fittings with the master.

(2) Pass your towline to the distressed vessel.

(3) If your crew member is aboard, he will place the eye of the towline over the deck fitting and pass it under the fitting horns.

(4) The crew member on the casualty will pull the towline snug up against the base of the fitting (where the eye splice begins), twist the eye of the towline to the left or right, thus forming a bight, and finally drop the bight over the top of the deck fitting and under the horns.

(5) If the towline connection is made by personnel other than a crew member placed on the casualty, ensure that the towline is properly secured to the appropriate fittings on the distressed boat. You may have to direct the correct way to make the towline attachment.

C. Use of Bridles

(1) Double-Leg Bridles

Double-leg bridles, when properly fitted, equally distribute the pulling force on the casualty's deck fittings. They are attached to the two forward cleats, bitts, or Sampson post of the casualty. Long bridle legs will decrease the angle formed by the towing bridle and reduce strain on the casualty's deck fittings and on the towline.

(a) If possible, assign a crew member to board the casualty and perform the connection.

(b) Pass the towline and bridle to the casualty.

(c) The crew member will secure the bridle legs to the designated deck fittings on the distressed boat, so that the stress during towing will be equally distributed on the deck fittings. Be sure to allow for long bridle legs and a narrow angle to the towline.

(d) If a crew member cannot be placed on the disabled vessel, ensure that the towline is properly secured to the appropriate fittings on the distressed boat. You may have to advise the casualty of the procedures for making the towline attachment.

(e) Be certain that the bridle legs are of equal length and that the shackle connecting the bridle to the towline is in line with the centreline of the casualty.

(2) Single-Leg Bridles

Single-leg bridles are generally used only in towing sailing vessels, and are secured to the base of the sailing vessel's mast. The mast must be designed to deal with the stress of towing. This information must be obtained from the operator of the sailing vessel. (Ensure that it is keel slipped.)

☞ **CAUTION**

In all instances the attachment point of single-leg bridles should be aft of the casualty's bow and fairlead through a point forward (bow chocks) to be in line with the boat's centreline. Ensure that the shackle connecting the bridle to the towline is also in line with the centreline of the towed vessel.

(a) Request information from the sailing vessel operator concerning the condition of the mast and the amount of tension it can withstand.

(b) Assign a crew member to board the sailing vessel and perform the task.

(c) The crew member will visually inspect the mast to ensure it can withstand the stress of towing.

(d) The crew member will advise the coxswain of the results of the visual inspection. If the mast is found unsafe, the procedure must be halted.

(e) Pass the towline and bridle from the SAR vessel to the sailing vessel.

(f) The crew member will take one round turn with the bridle leg around the base of the sailing vessel's mast and fairlead it forward through the chocks, if available.

(g) The crew member will then secure the towline to the bridle with a bowline or shackle, ensuring that the shackle is in line with the boat's centreline, if used. For particularly heavy or long tows, additional stress may be transferred to the sailing winches aft by rigging additional lines from the towline attachment to the sailing winches. Strain is taken on the winches to reduce towing forces on the mast.

(h) If the towline connection is made by personnel other than a crew member placed on the disabled vessel, ensure that the towline is properly secured to the appropriate fittings on the distressed boat. You may have to direct the correct way to make the towline attachment.

Towing Astern

A. Towing-Astern Checklist

Before Towing	Underway
1. Communication schedule established. 2. Emergency breakaway procedures discussed. 3. Axe or knife positioned near towline. 4. Shaft secured, sails down, rudder midship. 5. Towing speed and steering discussed. 6. Lights, shapes, and sound signals. 7. RCC/MRSC, VTM notified.	1. Increase speed slowly. 2. Slow course alterations. 3. Disabled vessel to steer on SAR vessel's stern. 4. Appropriate towline length. 5. In step. 6. Reduce or eliminate yawing effects. 7. Maintain towing lookout.

B. Preliminary Procedures

Most SAR incidents involving towing will require you to take disabled vessels in tow astern. This is considered the safest method employed in open-water situations.

Before getting underway with the tow, do the following:

(1) Establish communication procedures and schedules with the casualty for the duration of the tow. Discuss emergency breakaway procedures. Have a means of cutting the towline in a ready position.

(2) When towing some vessels with hydraulic reverse gears, damage may occur if the free-wheeling propeller causes the shaft and reverse gears to rotate without sufficient lubrication for the gears. It is advisable to have the operator secure the shaft by means of a shaft brake or by mechanically stopping it off with a pipe wrench. Line can also be used to tie off some shaft couplings.

(3) Explain to the operator of the disabled vessel that he will have to steer the vessel while being towed. Discuss the appropriate towing speed with the operator.

(4) Ensure that both the SAR vessel and the casualty are displaying the proper lights or shapes and in restricted visibility have changed to the proper sound signals. The SAR vessel will often have to advise the casualty on the proper signals, lights, or shapes. As the towing vessel, you are responsible for the safety of the tow.

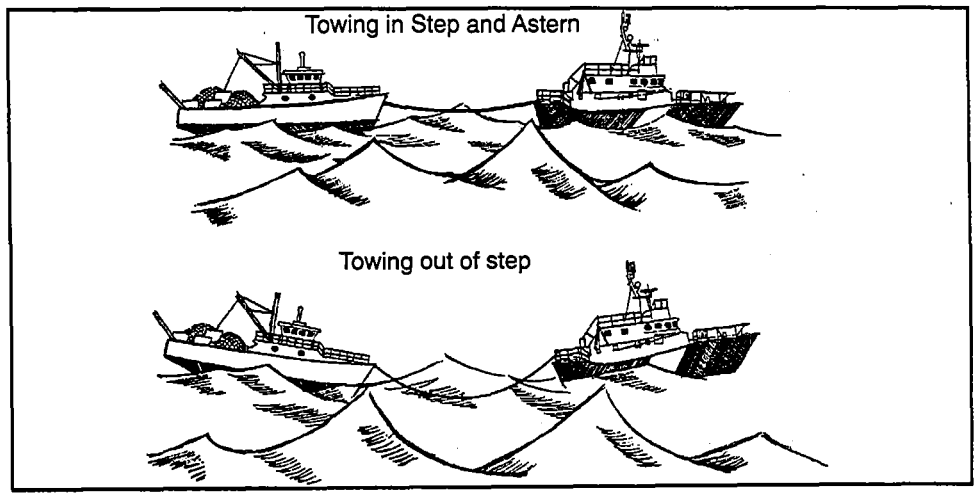
(5) Advise the RCC/MRSC of the situation and your intentions. Advise VTM of intended route, description of tow, etc.

C. Procedures Underway

(1) Increase speed slowly, and make any required course alterations after both vessels are moving. Course alterations should be made slowly, and the towed vessel should be advised to steer on your stern.

(2) Pay out enough towline to keep a dip or catenary in the line at towing speed. The catenary provides a shock absorber in the towline to prevent sudden changes in forces between the two vessels from putting undue strain on the towline and the vessels' fittings.

(3) Keep the towed vessel in step. The towed vessel must be in the same position as your vessel relative to the sea/swell patterns so that your boat and the towed boat ride over the seas meeting the wave/swell crests at the same time. If one vessel is in a trough while the other is on a crest, the towline will become slack and then taut as the attitude of the vessels interchange. The towline snapping tight is termed "jumping the line". This action can be forceful enough to part the towline or tear out deck fittings. In the situation where the SAR vessel rides up a face while the towed vessel slides down the back of a wave or swell, the towline will become slack. At this time there will be no control of the towed vessel. To correct an out-of-step situation, let out more towline or alter course to meet the seas diagonally.



(4) Some towed vessels have a tendency to veer or yaw to one side or the other of your vessel relative to the towline and heading. Yawing is extremely dangerous and must be corrected or reduced as much as possible. Yawing can put excess forces on deck fittings and attached structures, causing damage or failure. Extreme yawing can capsize vessels. Corrective action may include one or more of the following:

- decreasing the towing speed;
- letting out or shortening the length of the towline;
- adjusting the trim of the tow, such that it is trimmed slightly by the stern;
- towing a drogue from the disabled vessel's stern.

(5) Post a towing lookout to continuously monitor the tow and report any unusual situations to the coxswain immediately.

Towing Speed

A. General

The primary consideration in determining towing speed is the safety of the casualty and its occupants. Towing too fast can at the least damage property and at the extreme sink the vessel with the possible loss of life. Several factors must be considered in determining a safe towing speed. However, if ever in doubt,..SLOW DOWN. Factors in determining safe speed include:

- hull type;
- waterline length;
- condition of vessel and its fittings;
- load and trim of casualty;
- limitations of the towing vessel;
- weather conditions;
- current or tidal conditions;
- location, traffic density, etc.

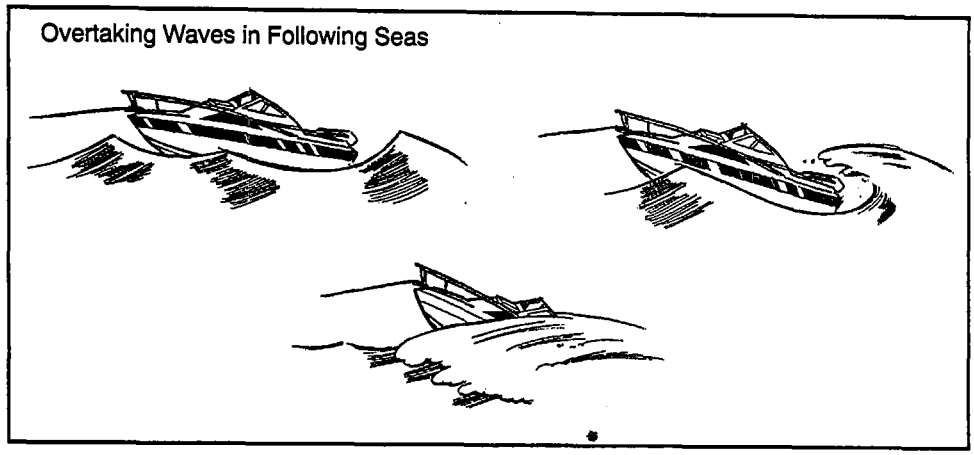
B. Determining Safe Towing Speed - Displacement Hull

A displacement-hulled vessel's maximum speed is determined by its waterline length (1.34 X the square root of the Waterline Length (ft.)). When the vessel is under its own power, it physically cannot exceed this speed. Additional power will not increase speed, but will be transferred to the hull of the vessel and can seriously damage it. This speed may also be referred to as design or critical speed. The same principles apply whether the force propelling a displacement hull is a pushing or pulling force. If a displacement-hulled vessel is in tow, the engine(s) propelling the towing vessel becomes a "pulling force" propelling the tow. Coast Guard small-boat hulls are NOT displacement hulls and can safely be propelled at speeds in excess of that of a displacement-hulled craft of similar size. Therefore, you must be careful when taking a displacement hull in tow not to tow it beyond its DESIGN or MAXIMUM TOWING speed.

The following table demonstrates several waterline lengths for displacement-hulled vessels and their APPROXIMATE design or MAXIMUM towing speeds whether the propelling force is a pushing or pulling force. SPEED has been taken to nearest tenth of a knot. REMEMBER, towline size and a hull's design speed are NOT the only factors to be considered in determining towing speed.

WARNING

DO NOT tow displacement hulls faster than their design or maximum speed. ANY attempt to increase this speed may cause the vessel to ride up on its bow wave and become unstable. Tension on the towline and towing hardware becomes enormous. You may also pull this hull under if you exceed the design or maximum speed. In following seas, a small boat with an open stern is in danger of being flooded by a breaking wave if the towing speed is too slow.



SAFE recommended towing speed for displacement hulls is determined as follows:

(1) Calculate the hull's design or maximum displacement (towing) speed. To determine maximum towing speed use the equation S = 1.34 √Lw, where S = Maximum Speed (displacement mode) in knots, 1.34 = Hull Design Factor, and Lw = Waterline Length in feet.

(2) Calculate **SAFE** towing speed by reducing the "maximum" displacement towing speed by no less than ten percent. Towing at this speed reduces frictional resistance and increases stability and safe control of the towed vessel. For example, let us calculate the safe towing speed for a displacement vessel with a waterline length of 40 feet (length of the underwater portion of the hull):

Step 1 S = 1.34 √Lw

Step 2 S = 1.34 √40

Step 3 S = 1.34 x 6.324

Step 4 S = 8.4 knots MAXIMUM towing speed

Step 5 8.4 x .10 = .8

Step 6 8.4 - .8 = 7.6 knots SAFE towing speed.

☞ **NOTE**

ALWAYS take into consideration the additional factors listed above when ascertaining both maximum and safe towing speeds. Maximum towing speed should NOT be assumed unless ideal conditions exist. On the other hand, minimal towing speed should be maintained to avoid the tow to surf before a wave or being overtaken by a breaker.

C. Determining Safe Towing Speed - Planing Hull

A planing hull is generally a deep-V'ed hull. It reacts in a similar manner to the displacement hull at lower speeds (i.e., considerable increases in power produce little increase in speed). At a certain point, however, the planing hull is lifted up onto the water surface and reacts very differently from the displacement hull. At this point the increase of power will produce large increases in speed. As the power is backed off, the hull will sink back to the displacement mode. If this transition is rapid, fairly violent motion can result. The forces of the water acting on the hull will produce rapid deceleration.

The planing hull naturally allows a faster towing speed. The limiting factors are primarily your boat's weight and engine power and the weight of the vessel being towed. If the towing attachment point (e.g., trailer eyebolt) is low and close to the centreline, the planing hull can readily be placed in the planing mode, permitting a greater towing speed. Towing is POTENTIALLY dangerous if compounded by poor weather conditions, poor sea conditions and many unknown factors of the vessel being assisted, such as structural conditions, strength of deck fittings and stresses being placed on these fittings. Every effort must be made to ensure the SAFETY of LIFE and PROPERTY in ALL instances. Although higher towing speeds are obtainable with planing hulls, RECOMMENDED towing speeds for displacement-hulled vessels apply to planing hulls as well.

Displacement and Planing Hull Maximum Towing Speeds

Vessels Waterline Length (ft.)	Square Root	Maximum Towing Speed
20	4.5	6.0
25	5.0	6.7
30	5.5	7.4
35	6.0	8.0
40	6.3	8.4
45	7.0	9.4
50	7.1	9.5
60	7.8	10.5
70	8.4	11.3
80	9.0	12.0
90	9.5	13.0
100	10.0	13.4
110	10.5	14.1

Safety of life is of the highest priority in SAR incidents and takes precedence over a speedy return to base. High-speed towing in any case is not recommended.

Towing Alongside

A. Alongside-Towing Checklist

Shortening the Tow
1. Brief the crew. 2. Brief the operator of disabled vessel. 3. Prepare lines/fenders. 4. Consider traffic, current, manoeuvring area, hazards. 5. Gradual speed reduction. 6. Towline to bow or drop towline. 7. Towing shape removed, lights adjusted.
Securing Alongside
1. Fenders placed. At least one fender hand tended. 2. Lines ready. 3. Securing sequence followed. 4. Forward and after springlines adjusted. 5. Slow ahead. 6. Alternative method - short towline - proceed to dock - hand pull vessel to dock.
Docking
1. Adjust speed slowly. 2. Test steering and stopping characteristics. 3. Consider all local conditions. 4. Consider approach angle, spotter-use wind and current. 5. Consider anchoring vessel if moorage is unsuitable.

B. General

Towing alongside is generally employed in protected waters to gain maximum manoeuvring control over the towed vessel. This control is gained by securing the two vessels together so as to enable them to function as one vessel.

When preparing for the alongside tow, consider the following:

(1) Brief your crew.

(2) Follow safe procedures.

(3) Break out the lines and fenders.

(4) Rig fenders on the side that you intend to take the vessel alongside.

(5) Keep lines clear of the water and particularly your propellers.

Fenders are employed to prevent damage to both vessels. They should be carefully placed to have the maximum effect. Remember, the forces acting between the two vessels will be quite intense. Compare the profile of the two hulls, and place fenders where they will cushion the

areas of contact before coming alongside. It is good practice to retain at least one fender tended by hand to place as required when coming alongside. After coming alongside you may have to reposition fenders to provide the greatest protection.

C. Shortening the Tow

(1) Before stopping to shorten the tow, inform the disabled vessel's occupants of your intentions. Brief them on exactly what you expect them to do during the shortening process.

(2) Brief your crew on the intended shortening procedure.

(3) Choose an area that is away from traffic and provides room to manoeuvre. Be alert for set and drift or local hazards.

(4) Reduce speed gradually and watch your towline at all times. The effect of sudden speed reduction could result in the towed vessel closing on you quite rapidly. An overtaking or ramming situation could result.

(5) Heave in the slack from the towline to bring the disabled boat alongside, or have the disabled vessel drop the towline and manoeuvre your vessel alongside the other craft.

(6) Remove towing shape and/or adjust towing lights.

(7) An alternative docking procedure with smaller vessels is to tow them directly to the dock or mooring on a short stay and pass the line ashore. The vessel can then be hand-pulled into the berth or mooring. This is at times the safest method in the case of a larger vessel towing a smaller one.

(8) If suitable dock space is unavailable, it may be prudent to anchor the disabled vessel rather than risk damage by placing it in unsuitable moorage.

D. Securing Alongside

This is best achieved by the use of four securing lines:

- The **bow line** is connected from your bow to the towed vessel's bow. The purpose of this line is to keep the disabled vessel's bow in to your bow. If it is too loose, the two vessels will form a wedge as you move ahead.
- The **stern line** is connected from inboard of your stern to outboard of the disabled vessel's stern and serves to keep the two sterns secured together.
- The **forward springline** is secured from your bow to the towed vessel's stern. This line bears the strain resulting from forward movement.
- The **after springline** passes from your stern to the towed vessel's bow. This line bears the strain effects from backing down.

The springlines serve to reduce surging between the vessels. They should be positioned as close to the fore and aft line as possible to provide more control by concentrating the forces in line with the keel. The springlines will be carrying most of the towing strain. Increasing the length of the springlines decreases the shock load and reduces the chances of a line parting under strain.

The positioning of alongside lines will differ, depending on the size of the disabled vessel and the location of securing places on the disabled vessel. However, a generic procedure for securing alongside is detailed below.

(1) Lead the towline to your bow for the bow line or pass a bow line if you have retrieved the towline. Secure the after springline to gain control of the vessel. Always pass the eye of the line to the disabled craft and maintain the working end aboard your vessel. If you do not have a crew member attaching lines aboard the disabled vessel, you must direct the line placement.

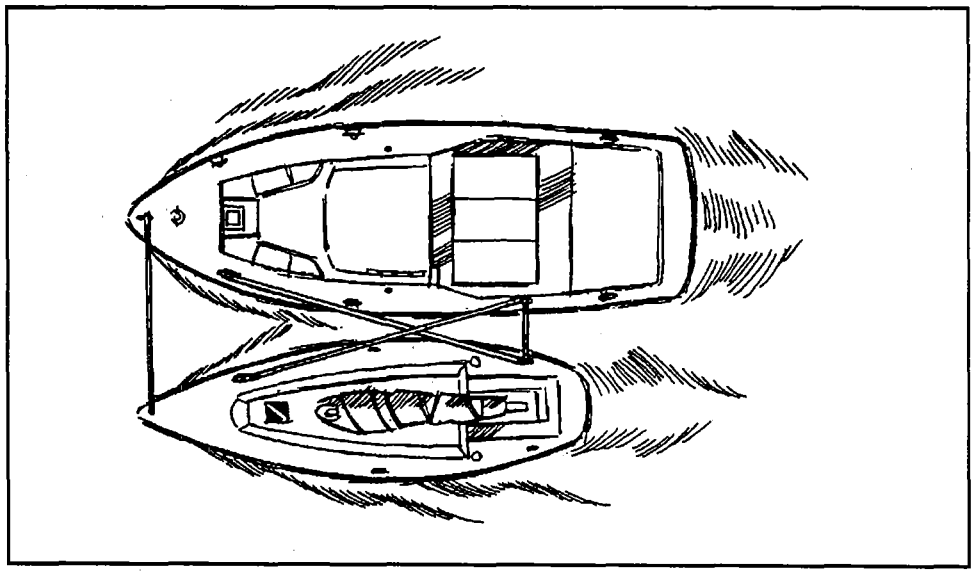
(2) Secure the bow line, keeping the bow of the towed vessel slightly "toed" in to your bow.

(3) Secure the forward springline.

(4) Place your stern well aft of the towed vessel to maintain the effectiveness of your screws and rudders.

(5) Secure the stern line.

(6) Slowly back down to remove slack from the forward springline. Go ahead slowly to remove slack from the after springline. After these lines are tightened, the vessel is ready to proceed to docking.



E. Docking the Alongside Tow

(1) Adjust speed slowly to maintain control of the towed vessel. Once you are underway, test the steering and stopping characteristics with the alongside tow. This will give you a feel for the manoeuvring characteristics before you approach the mooring or dock.

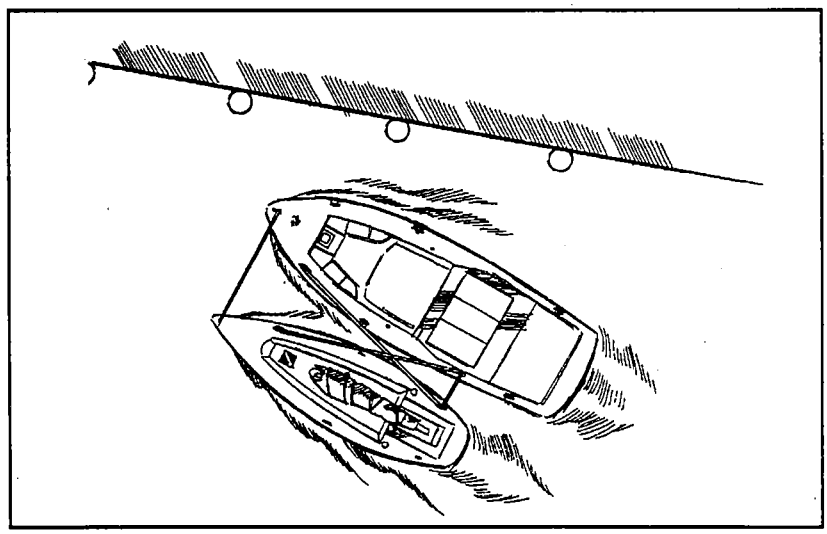
(2) Consider:
   (a) wind;
   (b) current;
   (c) height of tide;
   (d) type and location of mooring;
   (e) obstructions in the vicinity of the mooring/dock; and
   (f) location of personnel and docking lines.

(3) Determine the angle of approach and make use of a bow spotter when your visibility is obstructed by the disabled vessel. Take full advantage of the wind and current to assist in the docking procedure.

(4) Do not remove lines between the two vessels until the disabled vessel is properly secured and all SAR equipment and personnel are aboard the SAR vessel.

(5) Before leaving the disabled vessel, ensure that you have all information necessary for completing the SAR Incident Report, and offer to conduct a Courtesy Examination on the subject vessel.

When dealing with a casualty smaller than the SAR unit, there is a greater potential for damaging or "crushing against the wall" the casualty in the docking approach. Therefore, the option to dock with the casualty on the outside should be considered. The SAR unit will dock first in a usual manner and, once secured, heave by hand the casualty to the dock. Consideration should be given to the wind direction and allowing sufficient space to secure the casualty.



Towing in Current

A. General

Towing in current contributes an additional dimension to the forces acting on both vessels. Towing in strong currents can be as potentially dangerous as any other effect of sea or weather condition. One-knot current can produce an effect on the vessels equal to that of 15 knots of wind. The commanding officer/coxswain must allow for the effect of the current on the SAR vessel as well as on the vessel being towed. The commanding officer/coxswain must ascertain the predicted current in the area and measure the effects of existing conditions, calculated by observing the wake trailing from objects such as buoys, dock pilings and rocks. Take particular caution to avoid towing near strong eddies and whirlpools.

Towing in current can be said to fall into one of three situations:

(1) towing upstream;

(2) towing downstream;

(3) towing across or diagonal to the current.

B. Towing Upstream

Towing a vessel against the current is dependent on two basic factors:

(1) the power and manoeuvring capabilities of the SAR vessel;

(2) the strength of the towing gear.

The commanding officer/coxswain must be alert and aware of the effects of course changes in a current or a stream. The towed vessel will tend to drift down current at an extreme angle to the direction of tow. One method of reducing this effect is to shorten the towline and proceed towing upstream at an acute angle to the current. As the vessels cross the current, they will drift downstream together in a line and under full control until they enter the slower-moving water at the edge of the current.

If the towed vessel requires a slow towing speed and a strong current prevents you from making headway or sets you astern, do not increase power to make headway. You may place excessive strain on the towing gear and connecting fittings on both vessels. The prudent action may be to anchor the vessel and wait for the current to slacken or choose another location for berthing the vessel.

C. Towing Downstream

As indicated above, the current will influence both boats in a similar manner. As you gradually slow your speed through the water, the towed vessels' speed through the water will likewise slow. However, both boats will continue to be carried in the direction of the current.

CAUTION

High speed towing should NOT be used to keep tension on the towline.

D. Towing Across the Current and/or from Current to Still Water

Current speed may vary greatly from place to place in a narrow passage or river. The current will be stronger in the deep water. Be aware that back eddies will be present in some locations and may suddenly alter or reverse current influence on both vessels. The current may influence the tow with varied forces as you cross the current. Exercise extreme caution. Keep a constant towing watch posted. In certain circumstances, it may be preferable to shorten the towline before entering the current in order to maintain maximum control.

Towing Aircraft

A. General

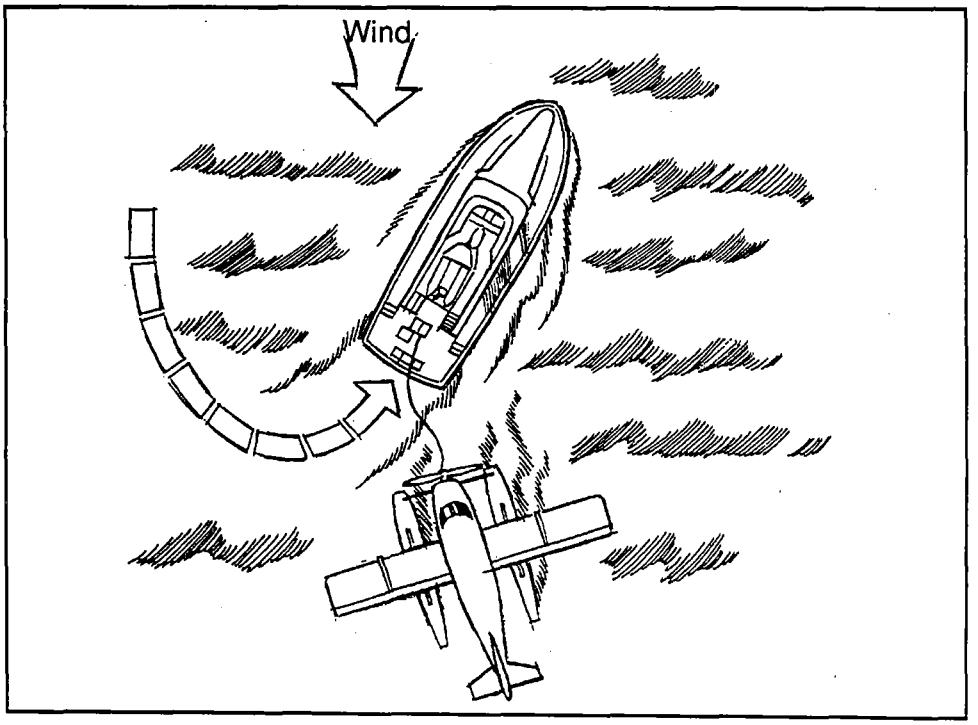
Towing seaplanes or float-equipped aircraft requires special considerations. Aircraft are very fragile and can easily be damaged on contact with a vessel or object. The centre of gravity on a float-equipped aircraft can easily be moved off centre by pulling it in a lateral motion, thus upsetting the aircraft. Careful and slow acceleration in a forward direction is recommended. Aircraft also react to wind and sea conditions in a much different way from that of vessels. Heavy seas can severely damage a float plane if the wing tips touch the surface of the water. Wind will propel the aircraft at a rapid rate of drift, and the aircraft will tend to drift facing into the wind.

B. Approach

Aircraft fuel is highly flammable. When approaching an aircraft, secure all open flame and allow no smoking at any time during the towing operation.

Approach the aircraft from upwind only and preferably from port side at an angle of 30 to 40 degrees to be in the pilot's best field of vision (note that usually the pilot is on the right side on an airplane and on the left side on a helicopter). Aircraft drift rapidly. Approaching from downwind would place the SAR vessel in a position at the tail of the aircraft with the aircraft drifting at a much faster rate than the vessel. Approaching from outside the pilot's field of vision leaves the SAR vessel in a very vulnerable position if the pilot should start his engine and power away without knowledge of your presence. A collision could occur. Propellers kill.

If the aircraft has power, it should maintain station by idling into the wind. Without power it will usually lie head to the wind, but it will drift rapidly. The SAR vessel turns bow into the wind and backs down to the aircraft. DO NOT APPROACH UNTIL THE AIRCRAFT ENGINE IS SECURE.

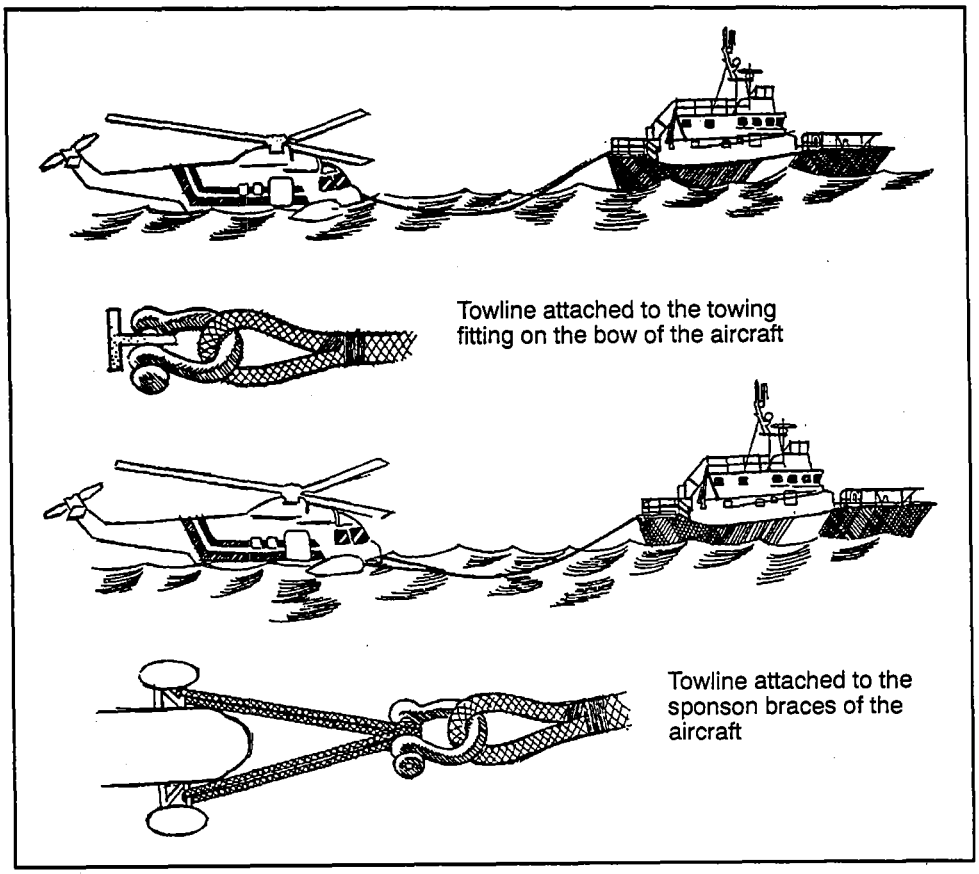


C. Passing the Line

Do not contact the aircraft while passing the towline. Protect the aircraft from accidental touching by placing fenders between the vessel and aircraft. Fend off by hand if required. DO NOT USE BOATHOOKS.

It is preferable to have the aircraft crew secure the towline but, if this is not possible, be very careful in approaching to secure the line. On float-equipped aircraft, you can secure the line to the forward towing fitting on the floats, but you must keep in mind that they are very fragile. You may also use straps around the sponson braces. Do not attach the line to any part of the aircraft not designed for towing. Use a bridle. Keep clear of the propeller.

Aircraft that float with the fuselage in the water (i.e., seaplanes - such as a "Seabee" or "Goose") have a towing fitting on the bow of the aircraft. These aircraft will float with one wing float in the water and the other wing float lifted out of the water. A bridle is not required for towing these craft.



D. Towing

Tow slowly and gently. A short line will help to reduce yawing. Be extremely careful in berthing operations. Contact between an object and any part of the aircraft wings or body can cause damage.

E. Lights

Aircraft being towed on the water are required to display the same lights as a vessel being towed.

Man-Overboard Operations with a Tow Astern

A. General

☞NOTE

The following description is an optional method to use only if the C/O or coxswain is familiar with it and confident of his ability to perform it. Otherwise, drop the tow and recover the PIW in a manner appropriate for the situation.

When a man-overboard situation occurs, recovery action must begin immediately. Every second counts toward saving the life of the person in the water. If you happen to be towing at the time of the man overboard, there is no time to drop the tow. The pickup must be conducted with the casualty on the towline.

As with a man overboard in a non-towing situation, all crew members must be capable of instantly responding to their duties. Proficiency can be maintained only through practice.

B. Method

(1) Coxswain

(a) After the "man overboard" signal is called, allow the tow to pass the person in the water.

(b) If he/she is off your vessel, notify the tow and have its crew throw flotation (life ring, etc.). Warn the tow to steer clear of the man overboard.

(c) Sound the danger signal (Oscar, man overboard).

(d) Mark the position by touching loran memory, throwing a datum marker, etc.

(e) Once the tow has passed the person, turn your vessel in the direction which will best position you to approach the person in the water. The preferred side is to windward.

(f) When 45 degrees about into your turn, apply full power as the tension on the towline is falling, and run back down your towline.

(g) When the towline starts picking up tension (i.e., when the towed vessel is starting to tip toward you), cut the power back, SLOW DOWN, pay out the towline if necessary, and place the person on your leeward side for pickup. Try to position the towline away from the pickup man. THE FIRST APPROACH MUST BE A SUCCESS.

(2) Pointer

(a) If the person is off your vessel, the pointer should be the person who saw him or her go overboard.

(b) Throw a datum marker.

(c) Move to the bow, keeping the person in sight and pointing until the person is recovered.

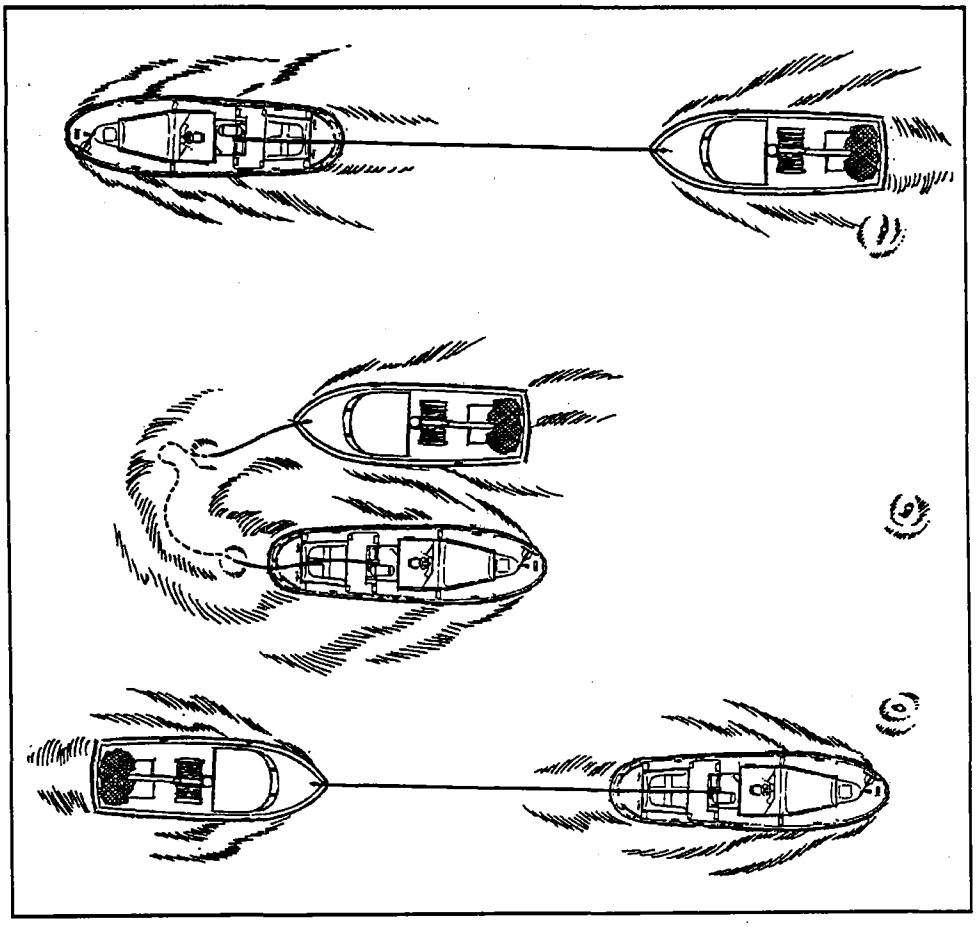
(d) When the person is approached, keep the coxswain informed of the person's position until he or she is recovered on board.

(3) Pickup Man

(a) Prepare a heaving line.

(b) Listen for instructions for the side from which the pickup will occur, and stand by at that side.

(c) Conduct pickup.



Tandem Towing

A. Tandem-Towing Checklist

General Guidelines		
1. Coxswain and crew training confirmed. 2. No reasonable alternative. 3. Weather and traffic conditions favourable. 4. Equipment available. 5. Disabled vessels agree to tandem tow.		
Honolulu	Daisy Chain	"Y" Method
• Under 8 metres. Fair weather. • Vessels must be able to steer off from each other. • Most manoeuvrable placed forward and least manoeuvrable placed aft.	• Short distance. Fair weather. • Strong, secure fittings required. • Heaviest/largest first and lightest last. Bridles recommended.	• For large/heavy vessels against wind, current, or seas. • Requires two SAR vessels. • Tow off at 45-degree angle from bow of casualty. • No bridles are used.

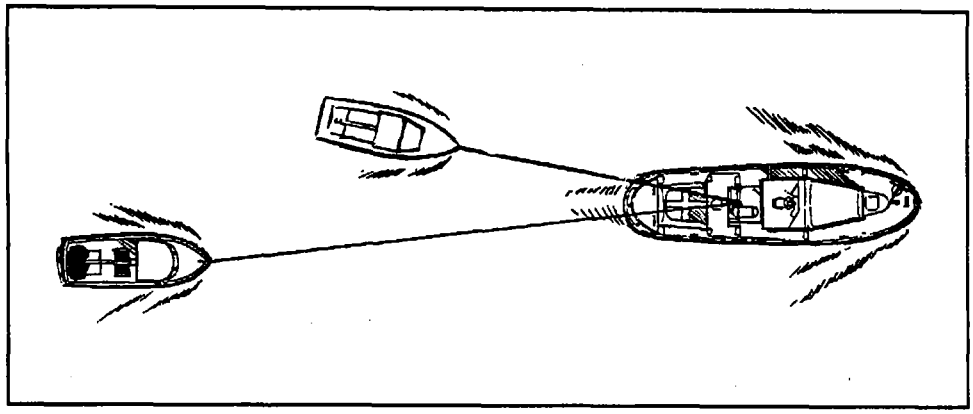
B. Methods

Some SAR incidents require a SAR vessel to tow two or more boats at the same time. The same principles and procedures applied to single tows are used in tandem towing. However, tandem towing requires much more planning, preparation, and coordination than a single tow. Communication is the key to success. The SAR crew and the personnel aboard the disabled vessels must be fully aware of what is to take place and what is expected of them. There is a much higher risk of mishaps with tandem towing than with a single tow. The coxswain must know his limitations in tandem towing and, most importantly, when not to use this application. Tandem towing should not be undertaken by untrained or unseasoned coxswains.

For small CCG SAR vessels, there are three basic methods of tandem towing.

(1) Honolulu Method

This method is used for towing smaller vessels (up to 8 metres) in fair weather conditions.

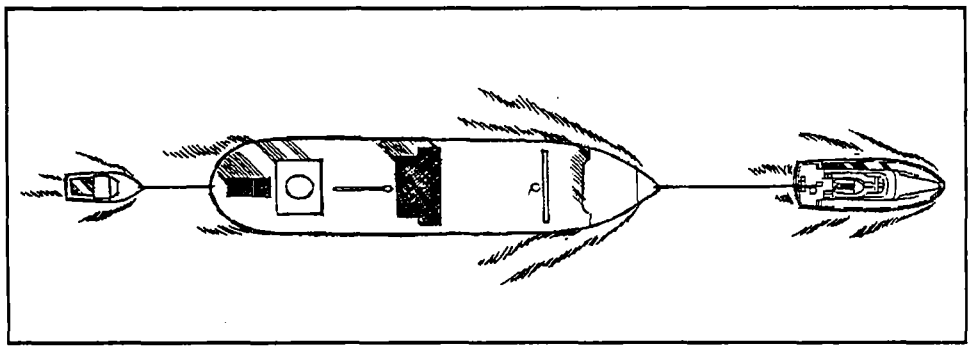


(a) Both disabled vessels must steer off from each other. If one has steering problems causing it to sheer off in one direction, place it accordingly.

(b) The most manoeuvrable craft should be placed forward and the least manoeuvrable last. Towlines should be separated as much as possible. Bridles and drogues should be used if required. Connect the least manoeuvrable vessel on the long towline first. Then pick up the more manoeuvrable vessel on the shorter line.

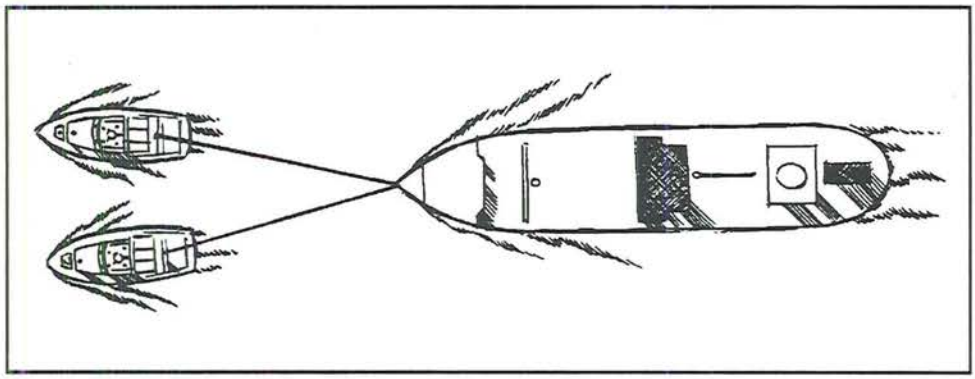
(2) Daisy Chain

The daisy-chain method should be used only over short distances in good weather conditions because of the extra stresses imposed on the stern fittings of the first or forward towed vessels. This method places one vessel directly in line with the other. The first or middle vessels must agree to this type of tow. The stern fittings on these vessels will be subjected to higher than normal stresses. The second or subsequent vessels are towed by a line from the stern of the first or forward towed vessel. The largest and/or heaviest should be the first in line, with the smaller vessels strung out astern in order of decreasing size. The use of bridles on all vessels in tow is recommended, and care must be exercised to ensure that the deck fittings are suitable, particularly the stern fittings on the disabled boats to which the bridles are attached.



(3) "Y" Method

The "Y" method is used for towing larger heavier vessels against currents, seas, or wind. This method uses two SAR vessels towing off the casualty's bow at a 45-degree angle. One SAR vessel must be in command and control of the operation. A bridle is not used in this operation.



Sinking Tow and a Tow on Fire

A. Managing a Sinking Tow

Managing a sinking tow is an emergency situation requiring teamwork and coordination on the SAR vessel. A sinking tow can:

- pull the stern of the towing boat under;
- yaw and capsize the SAR vessel by pulling it over sideways with the force of the towline.

Usually sinking-tow situations do not allow time for slipping the towline from the towed boat. Rescue of personnel is of highest priority, but the danger to the SAR vessel must first be eliminated before rescue proceeds.

The following are the recommended procedures for managing the dangers of a sinking tow:

(1) Do not cut or slip the towline until the boat is actually submerging.

(2) Slip the towline and, if necessary, cut the towline with the axe or knife at the towing bit. Proceed with rescue operations of personnel.

(3) If in shallow water and safety permits, pay out the towline until the sinking tow reaches the bottom. Then, do the following:

- Secure a lifejacket or floatable object to the towline so that it is visible on the surface. This object will mark the location of the boat so that it can be salvaged by the owner later.

- Cut the towline.

B. Fire on a Towed Vessel

Fire occurring on a towed vessel requires immediate and astute action by the SAR crew. The response criteria will be no different from those for any other fire, except for the fact that the SAR vessel is tethered to the vessel on fire by a towline. The following actions are to be taken immediately by the C/O and/or coxswain:

- RELEASE TOW.
- EVACUATE CREW.
- ASSESS SITUATION.

In situations when the fire is in a early stage or has not build up to a point where fighting the fire would expose both crews to any risks, it might be advisable to fight the fire. All firefighting activities should be conducted by an appropriately dressed and equipped SAR crew. Keep in mind that the breathing apparatus is essential in order to prevent any risks of inhaling toxic gas even if the heat level or the smoke appears negligible. Make full use of any information that the crew of the towed vessel can provide to assist you. **DO NOT ALLOW THE VESSEL CREW TO RE-BOARD THE VESSEL AND FIGHT THE FIRE.** Though possibly difficult in the case of an excited vessel owner and crew, such restraint is essential to protect their personal safety.

The Drogue

A. General

The drogue is an effective device when used to reduce or prevent an astern tow from yawing or overtaking the towing vessel. A stabilizing effect is generated by the drogue pulling on the stern of the towed vessel. This is most effective in a following-sea condition with the waves approaching from astern. Prominent among the towing dangers in following seas are these three:

(1) A sudden surge could increase towline slack enough to foul your screws.

(2) Larger waves could force the towed vessel to override the towing vessel, creating a potential disaster for both.

(3) Avoidance of an overriding tow by steering off could cause tipping of the towed vessel as it passes your stern. The sudden towing force applied athwart ships could easily result in capsizing if the towing vessel is not significantly larger than the tow.

The drogue must be fully submerged in order to fulfil its function. Submersion is normally maintained by paying out sufficient scope. This is normally 1.5 wave lengths (distance from one wave crest to the next wave crest). If the waves are steep and short, a scope of 2.5 to 3.5 times the wave length is recommended. If the drogue line is too long, it may jerk or not hold when needed.

The following are three areas of consideration in deploying a drogue for astern towing:

(4) The drogue must be far enough behind the tow to remain submerged. It must be pulling into the base of a wave; it cannot be out of the water at the crest of a wave.

(5) There must be adequate slack in the tripping line to prevent the drogue from inverting and losing its resistance.

(6) The objective when using a drogue is to maintain a constant strain on the towed vessel's stern.

The drogues may also be effective in towing a vessel with a jammed rudder. For example, if a vessel has a rudder jammed to port, deploying a drogue off the starboard side will keep the vessel from veering to port.

Always deploy the drogue when it is needed.

Drogues may be of three types: fabric cones, tire drogues, and makeshift drogues (e.g., a bucket).

B. Fabric Cone

The fabric-cone type is the most common for use in towing operations and can be used on any type of vessel.

Advantages

- light weight
- compact stowage
- incorporation of a trip line

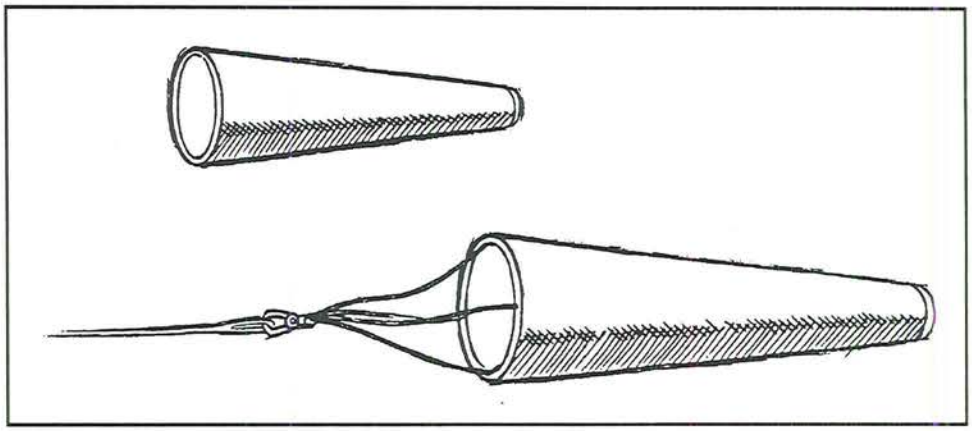
Disadvantages

- rapid deterioration
- easily tangled
- easily damaged by screws

Sizing the drogue to the tow is important. A 75 cm (30") drogue can exert three tons of pull on the stern of a vessel. Care must be exercised to determine whether the vessel's stern and fittings can withstand the strain. A general rule of thumb is:

6 metre (20') vessel	50 cm (20") diameter drogue
15 metre (50') vessel	75 cm (30") diameter drogue

The fabric-cone drogue can be fabricated from canvas or double-strength herculite. Care must be taken with such material to keep it clean and dry to prevent rot. Some experimentation may be required to suit the drogue to the type of vessels being towed in your particular area. However, a general guide is as follows:



C. The Tire Drogue

The tire drogue is used in the same manner as the fabric cone drogue, but does not incorporate a trip line.

The tire drogue is fabricated by cutting a 180-degree section out of the tire, keeping the inner belt intact. The tire selected should be free of structural damage (e.g., ruptured sidewalls, blowouts).

Invert the tire inside out to give it a flared shape and a wider drogue mouth. Cut holes in the base of the tire to allow water to pass through. The holes should be at least 7.5 cm (3") in diameter. The number of holes to cut depends on how the tire reacts when deployed. Some experimentation is required.

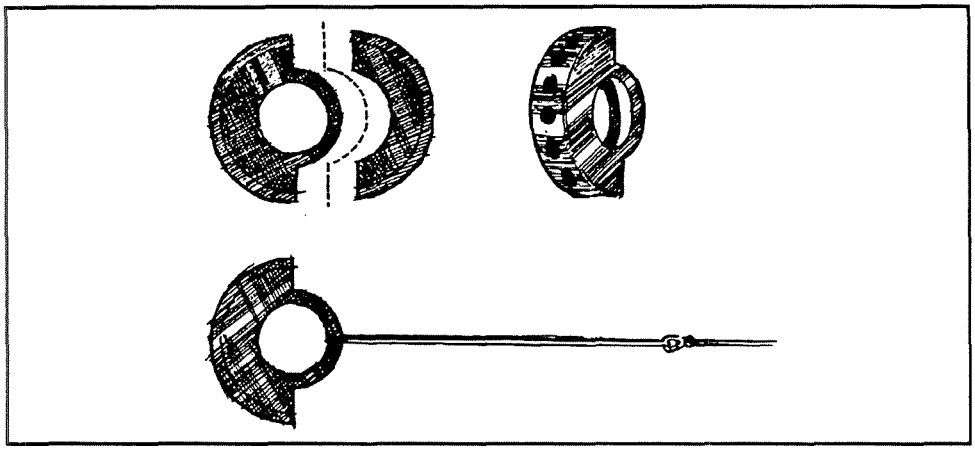
Attach a bridle assembly to a ring or the tire rim. Connect the bridle to 100 metres (200') of drogue line with a swivel.

Advantages

- durability
- stowage (smaller tires only)
- used on various vessels
- strength

Disadvantages

- weight
- skips out of water with excess speed
- can not be tripped
- tendency to sheer to one side



D. Makeshift Drogues

A makeshift drogue may be fashioned from a bucket, icebox, tire, or any large-mouthed container in an emergency.

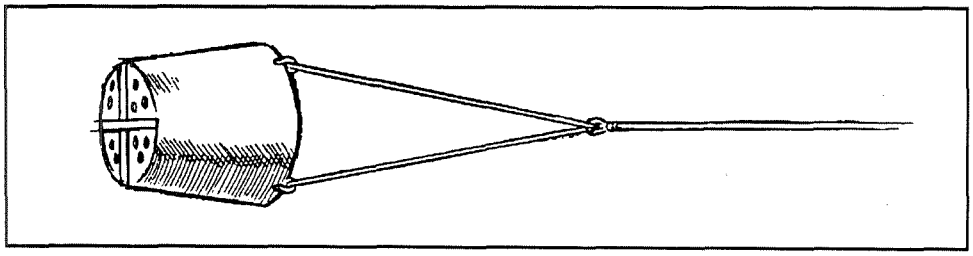
Bucket Drogue: Choose a bucket with cross bands on the base to provide extra support. Remove the handle and attach three or four small shackles to the rim of the bucket for attaching a bridle. Attach the bridle to a drogue line with a swivel. Drill small holes in the bottom of the bucket to allow water to escape.

Advantages

- compact stowage
- lightweight/ easily passed
- durable

Disadvantages

- cannot be tripped for retrieval
- not suitable for large heavy vessels



Maintenance of Towing Equipment

A. Towline

All lines must be inspected for wear or natural deterioration at frequent intervals. Inspection of lines should be a part of every SAR vessel's crew change routine.

(1) Synthetic Line

Synthetic line includes all line constructed of man-made fibres. Inspection of synthetic line should include checks for the following:

(a) Hardness

Synthetic line becomes hard to the touch when it has been overloaded. The test is to gently squeeze the line with your hand to detect hardened fibres. Hardened overloaded line should not be used.

(b) Fibre Damage

Individual synthetic fibre threads may break when a line is overloaded. These are detected by carefully examining the outer surface of the line.

(c) Chafing

Examine the line for fraying, burns, or other friction wear.

☞ **NOTE**

The inner core of double-braided nylon cannot be inspected without damaging the outer layer of fibres.

(2) Natural Line

Natural line is line constructed of natural (plant) fibres. Moisture is very detrimental to natural line. Lines which have been exposed to moisture must be allowed to thoroughly air-dry before being stowed.

Inspection of natural-fibre line should include checks for the following:

(a) Age

Natural fibres break down as they age and cause the line to become brittle. Break the lay of the line and inspect the interior fibres. Old line will become grey in colour.

(b) Internal Wear

As you check the internal fibres for ageing, examine them for signs of internal wear, which is caused by the friction between fibres, as strands and yarns wear against each other under strain. The wear residue appears as a white powder and is actually small particles of line worn off by friction.

(c) Internal Fibre Damage

As you check the inside fibres, you can also check for internal fibre damage. If a line under strain exceeds 75% of its breaking strength, some of the internal fibres will part. The line will stay intact, but the internal fibre damage will have weakened the line. When the lay of the line is opened, check for broken fibres.

(d) Chafing

Chafing is simply wear on the outer surface of the line, caused by the friction of the line rubbing against other objects or surfaces. To check for chafing damage, visually inspect the line surface for frayed threads or broken or flattened strands.

(e) Distortion

Distortion damage (or disfiguring) drastically reduces the line strength. Examples are kinks, hockles, and excessive stretching.

A kink or curl is formed when a line doubles back on itself. A line that is kinked should not be placed under strain because the tension will put a permanent distortion in the line. Make sure that all kinks are removed before a line is used.

A hockle or cockle is a kink in an inner yarn that forces the yarns to the surface. These can be corrected by stretching the line and twisting the free end to restore the original lay.

B. Towing Bridles

Towing bridles are a major link in the towing system between the towing vessel and casualty and must be inspected with the same care and attention to detail as the towline. Bridles incorporating synthetic line will require the same inspection given the synthetic towline. Thimbles and shackles require visual inspection to determine whether there is any evidence of distortion, spreading, excessive wear or stripped shackle pins. Any component displaying these problems should be replaced.

Bridles incorporating wire legs should be serviced and inspected as follows:

In addition to checking the thimbles and shackles, the line must be visually inspected for fishhooks, kinks, and worn, corroded, or shiny flattened surfaces. The line can be checked for wear with vernier callipers or a micrometer. You must know the original line diameter (as new), the present diameter at the wear location, and the diameter of a single wire strand. Subtract the measured rope diameter from the original diameter. If the difference is half the diameter of a single strand, the SWL of the rope is significantly reduced. If the difference is equal to or more than the diameter of a single strand, the rope should be replaced. Even if no damage is apparent to the wire rope, the line should be measured in about three locations

more than one metre apart to determine the average diameter. Another method of judging the wire is to replace it if more than 5% of strands are broken over a length equal to three times the circumference.

If the outer wires of wire rope are worn to one half of their original diameter, the rope should be replaced. If the wire rope is hard, it should be removed from towing service.

All wire and fittings should be kept lubricated. Various products are available for this purpose, such as "Lube-it", which is a clean, non-solvent and non-toxic lubricant.

Grounded Vessels and Damage Control

Section Five: Grounded Vessels and Damage Control

5-1 Assisting Grounded Vessels

A. Assist Checklist
B. Situational Analysis
C. Refloating Procedures

5-2 Damage Control in SAR Incidents

A. On-Scene Damage Control Checklist
B. General
C. Water Flow Control Methods
D. Suggested Damage Control Kit for Ready Locker

Assisting Grounded Vessels

A. Assist Checklist

Analysis of Situation
• Safety of persons aboard / injuries / all accounted for / life jackets / hypothermia protection / life rafts / etc. • Damaged? Taking on water? • Leaking contaminants or pollutants into the sea? • Can vessel be safely anchored to await a higher tide? • Sea conditions, tidal conditions, weather forecast? • Will vessel remain afloat if it is pulled off? • Disabled vessel's towing attachment points adequate? • SAR vessel's capabilities? • SAR pumps adequate to handle leakage? • Towing waiver? (Unless life-threatening) • **RCC/MRSC briefed?**

Damage
1. If vessel damaged, consider anchoring, getting people off. 2. Consider effects of broaching or pounding. 3. Can simple repairs be made? 4. Will SAR pumps assist until tide recedes and repairs can be made for next tide?

Refloating Procedures
1. Considerations: Tidal set. Anchors out. Shore Party. Hull survey, damage, repairs. Pumps. Towing capability, fittings on stranded vessel, SAR unit's capability. Area sounded. Need for shoring materials if vessel will not be moved. 2. Determine Method: Scouring. Straight Pull. Wrenching and Pulling. Bow-on Pull. Heeling Sailing Vessels. 3. Brief crew. 4. Brief disabled vessel. 5. Maintain communication with RCC. 6. Maintain safe working practices throughout.

B. Situational Analysis

(1) General

Before assisting a boat aground, the coxswain must make a thorough analysis of the situation. The following are some key points to consider:

(a) Was anyone injured in the grounding? Are all occupants safe and accounted for? Is there any risk of having to enter the water? Advise them to don life jackets, and hypothermia protection as the circumstances dictate. Advise them to prepare life raft/lifeboat as the circumstances dictate. Is medical aid required? Above all, remember your number-one priority is to save lives. In some cases, that may be all that you do in your tasking.

(b) Is the vessel damaged or taking on water or leaking contaminants into the sea?

☞ **NOTE**

No immediate attempt should be made to pull off a vessel that has been or is suspected to have been seriously damaged. If there is any doubt as to the vessel's ability to remain afloat, no attempt to refloat the vessel should be made by the SAR unit.

(c) Is it necessary to refloat the vessel, or can anchors be set to await the tide?

(d) What are sea conditions, tidal conditions, and weather (both present and forecasted)?

(e) If the vessel is to be refloated, are its towing attachment points of adequate strength?

(f) Is the SAR vessel capable of pulling the vessel off?

(g) Are your pumps ready and adequate to handle the situation should damage occur in towing the vessel off?

(h) Does the operator agree to the towing waiver?

Immediately after arriving on scene and conducting an initial assessment, the coxswain should inform RCC of the situation and request any additional aid required (Medevac, pollution equipment, etc.).

If the vessel is damaged, anchors should be set to prevent further damage, and no immediate attempt should be made to pull the vessel off.

Even if there is no damage at the time of your arrival on scene, there is the ever-present danger of the situation deteriorating in a short time. Two severe dangers are broaching and pounding.

(2) Broaching

Broaching is the result of surf striking a vessel on the side or quarter and throwing the vessel broadside. It is particularly dangerous for two reasons:

(a) Broaching tends to drive the vessel harder aground.

(b) Currents are established about the bow and stern. Sand will be scoured away from the bow and stern and deposited amidship on the leeward side of the vessel, consequently leaving the vessel supported only amidships. This situation often results in breaking the keel of the vessel, rendering the vessel a total loss. Refloating should not be attempted in these incidents.

(3) Pounding

Pounding is caused by the varying degree of buoyancy in a grounded vessel. The waterline changes continuously as waves influence the forces of buoyancy in the beached vessel. Simply stated, an alternate increase and decrease in the vessel's total buoyancy occurs. Bottom damage occurs when the buoyancy increases sufficiently to lift the vessel off the bottom and drop it back again as the buoyancy decreases. Damage may range from tearing a few seams open to serious holing of the vessel. Each wave striking tends to drive the vessel further aground.

C. Refloating Procedures

(1) General

Guideline procedures for assisting a grounded vessel are as follows:

(a) Ascertain set, and plan to use it to your advantage.

(b) Ensure that anchors have been laid out to seaward to prevent the vessel from being driven further aground.

(c) If hull damage exists, determine the location and extent. If the boat is beached, have a beach party from your unit visually inspect and evaluate the condition of the vessel (if possible). Ensure the vessel's interior hull is free of sand, water and leaks. Be sure that it is not leaking pollutants into the sea. If the vessel is holed, temporary repairs will be required to reduce leakage to a minimum. If the vessel has a wooden hull, ascertain whether any seams have worked open. Effect temporary repairs if possible.

☞ **NOTE**

Consideration must be given to the fact that a damaged vessel that is refloated by a SAR unit will have to be towed or escorted to safety. The SAR unit cannot be laboured with the responsibility of assisting the vessel for long periods of time, effectively keeping the SAR unit from responding to other SAR incidents.

☞ **CAUTION**

If there is ANY doubt as to the vessel's ability to remain afloat, NO attempt to refloat the vessel should be made by the SAR unit.

(d) If the assessment determines that the vessel will remain afloat and if the SAR unit intends to attempt refloating, further action must be planned carefully to avoid unnecessary and excessive stress of the grounded vessel's hull and/or towing equipment. The following are factors to be considered:

(i) Does the towing vessel have adequate power?

(ii) Does the towing equipment have a sufficient SWL to carry the static load?

(iii) Are the attachment points and hull structures of both vessels adequate? Employ the strongest fittings on both vessels.

(iv) What are the sea conditions?

(v) What are the tidal conditions? What was the state of tide on grounding? Unless weight is removed from the grounded vessel, refloating should not be considered at a lower tidal height than that at which it went aground.

(vi) What is the present and forecasted weather?

(vii) Has the vessel's stability changed since the grounding? (E.g., have tanks been pumped out, fish holds emptied, ice dumped? Removal of "low" weight in an attempt to lighten vessel may mean that the vessel will no longer be stable when partially afloat or afloat.)

(viii) Is shoring required to support the vessel while awaiting the tide?

CAUTION

Any attempt to refloat a vessel before the tide rises to the level of the vessel's draft will result in excessive strain to towing hardware and damage to the hull of the stranded vessel.

(e) Sound around the grounded vessel and the general area of the grounding. The soundings assist in determining the direction in which the boat will be pulled in refloating.

(f) Carefully determine the refloating procedures to use.

NOTE

Some sailing vessels and deep-keeled vessels will require prompt action to either refloat or shore up. On an ebbing tide, they can shift position quickly, causing immediate structural damage and/or allowing the vessel to flood through above-deck openings on the flood tide.

(2) Straight Pull

When the vessel is slightly aground (bow into the bottom and the stern afloat), a straight pull-off is the simplest and most effective method of assistance. The straight pull is conducted as follows:

(a) Ascertain the direction of current.

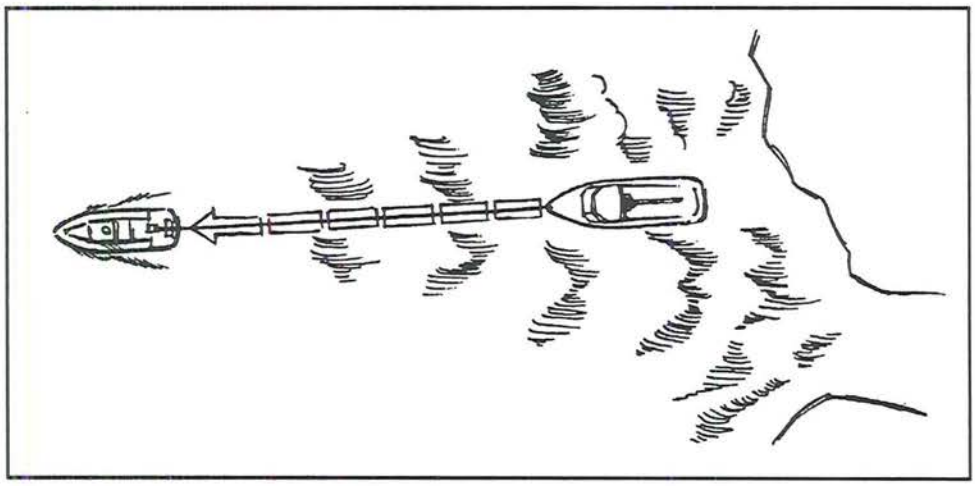
(b) Consider anchoring at a safe distance and backing down on your anchor line to the stranded vessel.

(c) If you can safely approach close enough, hand the towline directly aboard. If you must use a messenger line, the hand-thrown heaving line is preferred. Another method to pass this line is by using a buoyed, floating line. This must be done cautiously in order to avoid fouling your propellers with the line and putting your own vessel aground. The line should not be floated straight down to the vessel. Pay it out parallel to the shore. Position your vessel upstream from the grounded vessel, and pay out the messenger until the end is near the shore. Turn about and manoeuvre past the stranded vessel, paying out the messenger as you go.

(d) Instruct the disabled vessel on securing the towline, clearing personnel from the deck area and letting go the anchor after it clears the beach or shoal.

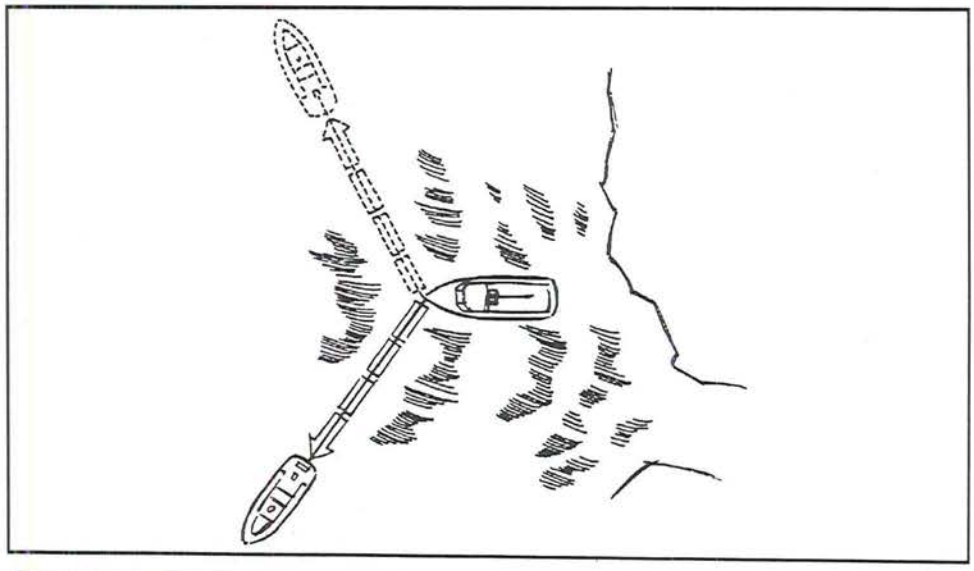
(e) After the towline is secured and the crew clear of the danger area on deck, go ahead slowly, weighing anchor and paying out the towline to maintain a generous catenary. This requires pre-planning and flawless crew communication and coordination.

(f) Commence pulling so that optimum force can be applied at a maximum high water. The stranded vessel can best be pulled off in the direction opposite to that in which it ran aground.



(3) Wrenching and Pulling

Although the name sounds violent, this method is much the same as the straight-pull method. The difference is that the vessel is pulled alternately from side to side. This method is utilized when the grounded vessel is on bottom which cannot be scoured or the water is too shallow to allow work alongside the grounded vessel. The goal of this method is to break the grip of the hull on the bottom by pulling from side to side (wrenching) and rotating the hull.



(4) Bow-on Pull

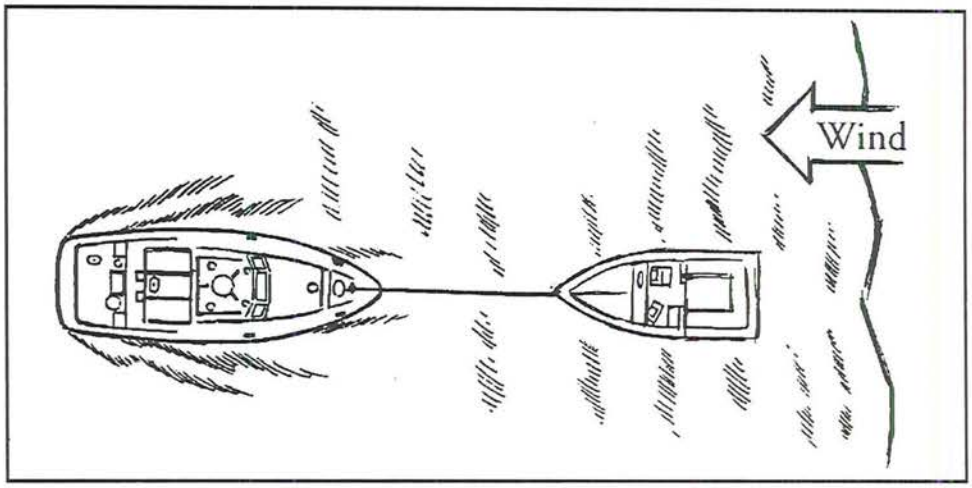
The bow-on pull is employed when the wind and current are offshore or from inland and no surf conditions are present. This method is as follows:

(a) Fully brief the disabled vessel on the procedures. Approach the casualty bow on from windward or up current, drifting toward the stern of the vessel.

(b) Pass the messenger and towline from your bow.

(c) Secure the towline to a suitable connection point aft of your bow. You will lose pivoting ability if the towline is secured directly at the bow.

(d) Apply power gradually and back down slowly.



(5) Scouring

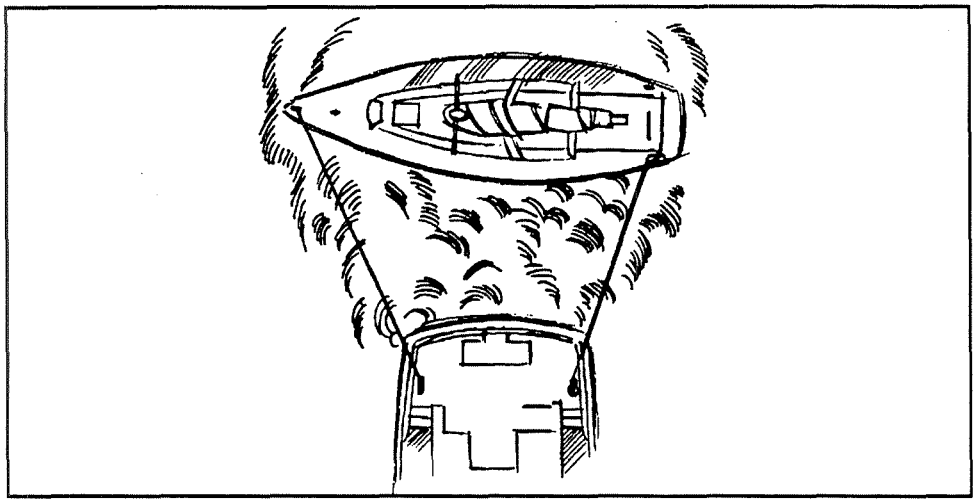
NOTE

The scouring method is not recommended for use on vessels which have grounded in a broaching situation (see subsection B(2) above, "Broaching"). Such vessels may be in a very unstable and precarious position because of the sand accumulated in the midships region. Use of the scouring method in a broach situation may cause severe damage to the vessel and/or injury to personnel.

Scouring is a very effective aid in refloating a stranded vessel. However, **the damaging effects the bottom material will have on your shaft bearings and raw-water cooling systems must be considered.** Scouring a channel for the distressed vessel can be done only when the endangered vessel is grounded in sand, mud, or gravel bottom and only when water depth permits you to work alongside the other vessel. Scouring a channel is accomplished as follows:

(a) Moor alongside the stranded vessel amidship so that your boat's screw current will be directed diagonally down and under the grounded vessel.

(b) Initiate scouring amidships and, as the application advances, move your vessel aft or forward as required.



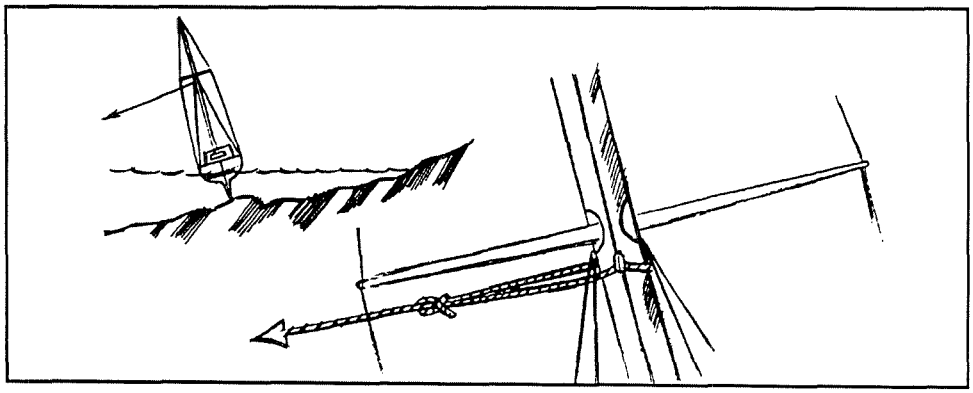
(6) Heeling Sailing Vessels

Sailing vessels with deep keels, aground on an ebb tide, will have to be either shored up or removed from the grounded position as quickly as possible. If action is not taken, the hull may sustain severe damage from pounding. By heeling the sailing vessel over to one side, the corresponding change in angle of the deep keel reduces the effective draft. To free a grounded sailing vessel, proceed as follows:

(a) Lead a spinnaker halyard from the mast to another vessel or a fixed object. Pull on the line either by hand or by gently towing.

(b) Often the vessel will drift off on its own when heeled by the mast. If it does not, either have the operator apply power or gently tow it off.

(c) When the vessel is free of the shallow area, immediately release the line used to heel it over.



NOTE

An additional checklist and procedures for a grounded CG SAR vessel are included in Appendix 1.

Damage Control in SAR Incidents

A. On-Scene Damage Control Checklist

(1) Account for all persons on board.

(2) Ensure their safety.

(3) Ensure that the current location of the vessel is safe for carrying out damage control procedures.

(4) Determine the extent of the vessel's stability.

(5) Determine how the damage occurred.

(6) Find the location and the extent of the damage.

(7) Assess the current level of flooding and the flow rate if possible.

(8) Locate other possible dangers; isolate fuel tanks and batteries.

(9) Check for fuel tank leaks; report if there is pollution.

(10) Determine whether the structural integrity of the vessel has been compromised to a dangerous level.

(11) Determine whether the vessel can withstand a towing if required.

B. General

WARNING

If there is any doubt as to the vessel's ability to remain afloat or if there is a danger to which the crew could be exposed, no action should be undertaken to dewater the disabled vessel. Always bear in mind that the primary role of your SAR unit is saving life, not salvaging.

Performing damage control in SAR incidents is a very hazardous task. Often it is very difficult to assess the extent of damage and to determine what, if any, actions are appropriate. In addition, panic might exist on the disabled vessel, especially if the water level is rising. In most cases, passing the pump is the only required action. Sometimes, however, greater help is needed, and this section gives some consideration of this.

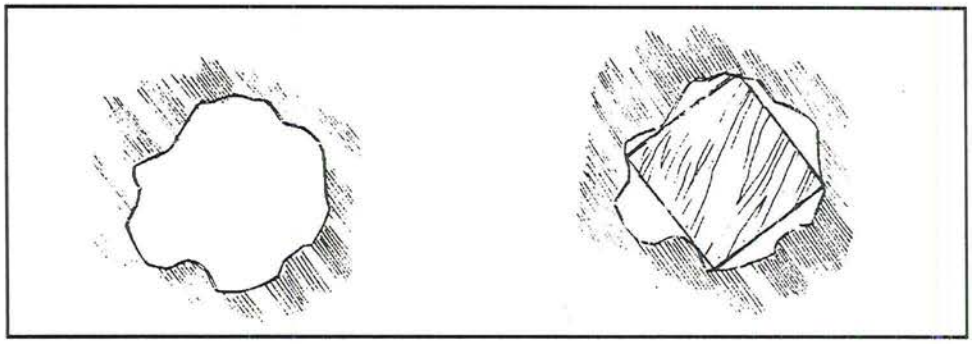
With small holes, dewatering can be attempted right away, but with larger holes the water flow must be reduced. Various methods exist to perform this task, requiring a variety of materiel. Due to the lack of space on board our cutters, it would be wise to have a Damage Control Kit in the ready locker at the station. A suggested list appears in subsection C below.

C. Water Flow Control Methods

There is no standard method of controlling the flow of water. It is the coxswain's responsibility to determine which of the following methods will be used.

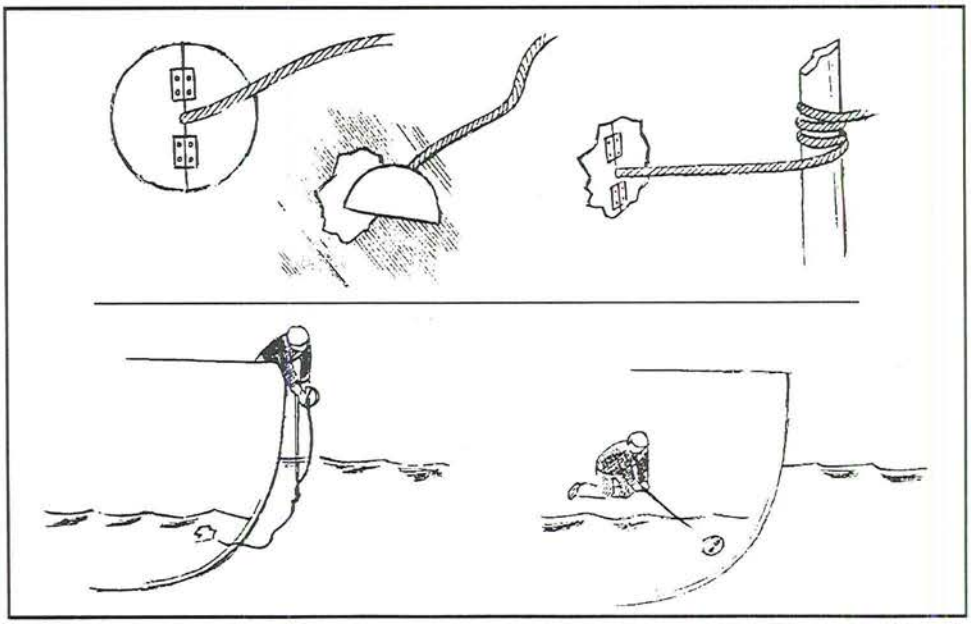
(1) Wood Plugs and Wedges

Use them from inside when the hole is accessible; it could be very hazardous to try to plug a hole from outside the hull. Wrapping a piece of cloth around wood plugs or wedges will increase their efficiency.



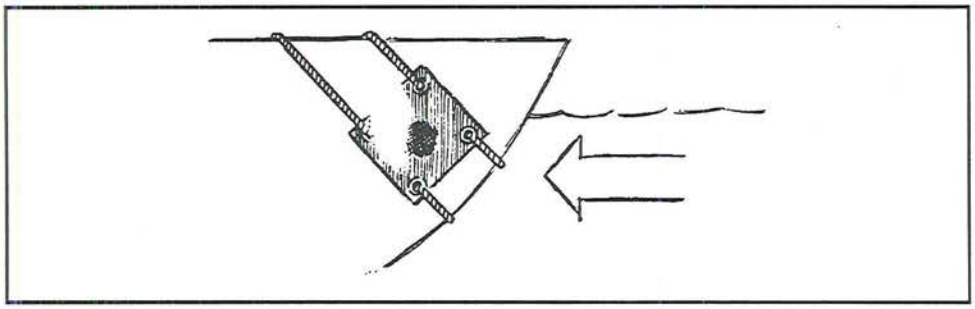
(2) Hinged Patch

Patching below the waterline can be done with a hinged patch. To use it, fold the patch and push it through the hole. Then, pull it back tightly against the hole by means of the line and secure it to a fixed point. If the water pressure is too high or the hole is not accessible, the line can be floated through the opening from outside. It has to be guided to the opening, and with the water flow it will be sucked through. The line should be of polypropylene as this will allow the line to float inside and then be pulled as stated above.



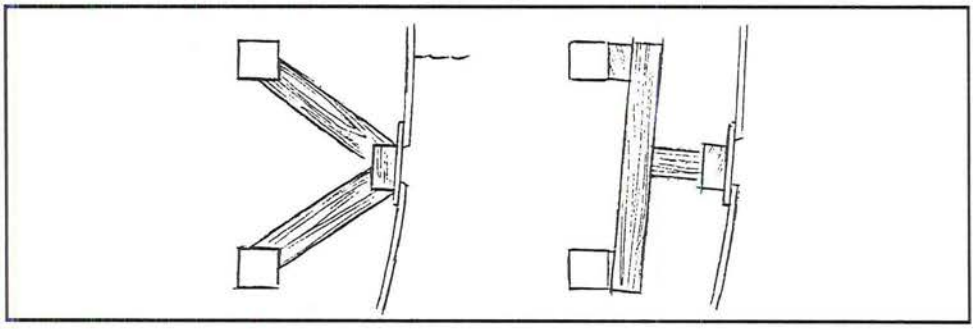
(3) Collision Mats

These can be a very effective way to control flooding, particularly if the damage is on the bow and if the vessel is underway. The water pressure will keep the mat in place. It will also be possible to place additional patching on the inside.



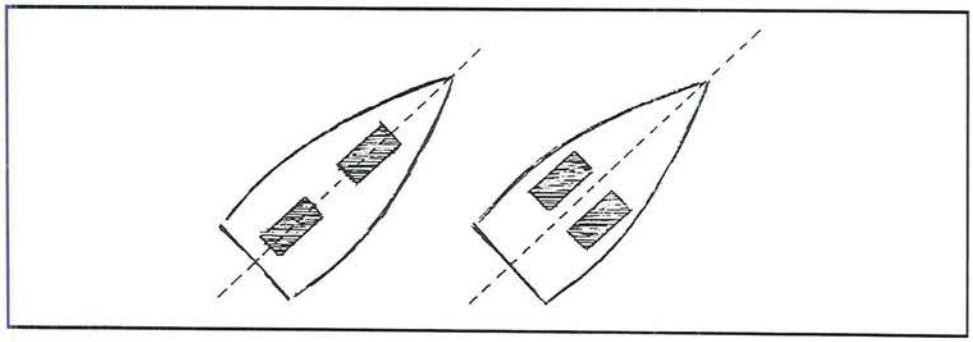
(4) Shoring

As every hull has a different shape, it is difficult to provide guidelines for installing shoring. Using what is available in accordance with the damaged environment is the best rule to apply. The following figures show different approaches to shoring.



(5) Dunnage Bags or Emergency Air Bags

One of the objects of damage control is to increase the vessel's stability and then increase the chances of saving the vessel. Using dunnage bags can help achieve this goal. They must be secured inside in such a manner as to increase the stability: usually longitudinally along the centreline or sideways close to the midship line.



(6) Other options

The use of the disabled vessel's pump is obviously an option to take into account. Using the seawater cooling pump by diverting its suction to the bilge may be possible on some vessels. Use of eductors is also possible with the SAR unit's fire pump.

D. Suggested Damage Control Kit for Ready Locker

A Damage Control Kit can be made up of readily available materials and stored in the station "ready locker" for quick retrieval in case of SAR incidents which may require its use:

- Soft wooden wedges (six 2"x2"x8"; six 4"x4"x12"; eight 2"x4"x12")
- Plywood patch (twelve 8"x8"x1/4")
- Soft wooden plugs (three 3"x4"; three 2"x4"; three 1"x4")
- One box of nails - no. 10, 2"
- Set of saws
- Hammers (one 16 oz. and one 24 oz. ball pean head)
- Putty knife
- Lineman's pliers, 8 inch.
- Roofing caulking
- 36" canvas, oakum, rags, rubber sheets, etc.
- Tie wire and tarred marlin
- One tube of RTV (silicone rubber)
- One roll of tape, Scotch Brand No. 33
- Waterproof flashlight with spare batteries
- One 16-ft. measuring tape
- One bit & brace and 7/16 wood auger
- Plywood (two 2 ft x 4 ft x 1/2 in.)
- Hinged patches (one 12 in. and one 18 in.)
- Quick-set cement
- Four 2 x 4s, 4-feet long

Training

Section Six: Training

6-1 Practical SAR Training and Exercises

A. General
B. Designing Meaningful SAR Training Drills
C. Developing Meaningful SAR Exercises

6-2 Sample Exercises

A. General
B. Exercises With Your Unit
C. Exercises With Another Unit

6-3 Debriefing

A. General
B. Debriefing During Training
C. Debriefing after SAR Incidents

Practical SAR Training and Exercises

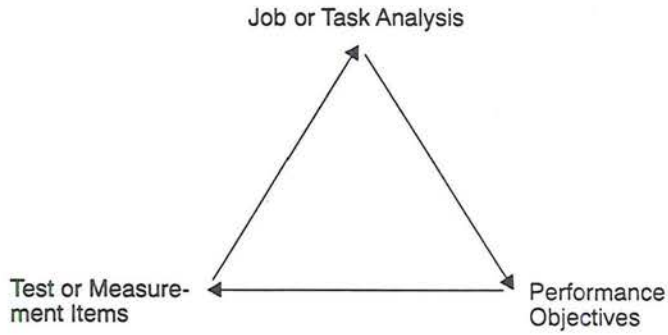
A. General

Training is essential to any emergency service. It is a fundamental component of delivering the service in a professional manner, and it must be seen as an important routine task. This section governs the development of SAR training, while section 6-2 outlines sample exercises and reporting requirements.

The focus of a training and exercise program is to exercise skills which are not routinely used in order to retain proficiency. However, there is also merit in practising the fundamental SAR skills. People tend to "get a little rusty" and acquire their own particular methods or routines over a period of time. Sometimes without even realizing it we slowly change our method of conducting a task. We have to be able to conduct the basics effectively and efficiently to successfully incorporate them into more complex operations. The proper way to achieve this objective is to divide a task into small "chunks" or steps. The rationale of this method or approach to training follows.

B. Designing Meaningful SAR Training Drills

One way to reach this goal is to use a method already known in the Coast Guard as the "Approach to Training". As a CO/coxswain, you can use a version called the "Training Triangle" as depicted in the following figure.



The job analysis corresponds to the training-needs analysis found in the "systems approach to training". The analysis breaks a particular job or position down into a number of tasks and subtasks that can be clearly articulated in performance terms. For example, one of the tasks of a crew member may be to perform the duties of a lookout during a marine search; a subtask of the lookout task may be "scanning techniques".

These tasks and subtasks can be described using statements known as performance objectives. If the subtask is complicated, it may be further broken down into a series of enabling objectives expressed as easily defined steps.

Each of these objectives describes a portion of training that can be managed in a session or exercise. Furthermore, these objectives may be used to develop the test and/or evaluation items. These may take the form of a checklist. For example, the test item for an exercise

concerning the daily inspection procedures on an FRC could be a checklist of steps or procedures that the examiner/exercise monitor uses to determine whether the crew member successfully demonstrates competency in making the daily inspection.

The triangle is completed when the student achieves training in the performance objective and is evaluated using a "measurement instrument". This measurement instrument in an exercise situation should include feedback in a debrief that enables crew members to learn from their mistakes or lets them know that they are doing their job correctly. The triangle closes with improved on-the-job performance by the crew member.

C. Developing Meaningful SAR Exercises

Although the methodology described above may seem complex, you can use it to design measurable SAR exercises that will allow you to give valuable feedback to your crew members. In other words, breaking down every step of an exercise will permit you to "fine tune" the exercise instead of only having a general objective. In this way, your assessment will be precise and pertinent.

For example, consider an exercise involving the launching and recovering of the FRC. The task is FRC Operations; launching is one subtask and recovering is another. Each of the subtasks can be broken down into a series of simple steps that you can monitor and evaluate. At the completion of the exercise, you will then be able to give more meaningful feedback to your crew members by commenting on each step.

Since every lifeboat station is unique in its physical arrangement and equipment, subtasks will have to be defined at the station. However, exchanging exercise planning with other units from the same region and units of the same type nationally is encouraged. These exchanges will enhance training among lifeboat stations.

Sample Exercises

A. General

Exercises should take place on a regular basis, and a minimum of 10% of each shift must be spent on training.

Exercises must simulate real situations as closely as possible, and in the usual sequence: collect information, brief crew, make pre-departure preparations, get underway, take underway actions, update crew briefing, arrive on scene, execute SAR tasks, return to station, check and put away equipment, hold a debriefing session, and prepare reports.

We can divide exercises into two categories: exercises involving only your craft, and exercises held with another vessel or craft, such as a CMRA vessel from your area, a fishing vessel, another SAR cutter, another Department's vessel, or whatever is available. It is advisable to plan your exercises with the other vessels first, as this implies scheduling with somebody else. You have more flexibility when planning your own vessel's participation. The following are exercises proposed, and need not be considered mutually exclusive. They can be combined into one whole exercise. Not included are exercises with DND helicopters since these are usually planned through the office (refer to Section 2-8, "Rescue Operations with DND Aircraft").

B. Exercises With Your Unit

(1) Emergencies

(a) Simulate a fire onboard your cutter, for example, in forward compartment, engine room, etc.

- Isolate the fire, shut off air intakes, use fuel cutoff, shut doors, shut off electrical distribution.
- Prepare fire pump, rig Honda pump for fire.
- Discuss firefighting tactics.
- Don SCBA and protective clothing.
- Compose a radio message.
- Simulate evacuation of a crew member in smoke from somewhere within the fire area.

(b) Simulate abandon ship.

- Prepare raft for launching.
- Don survival suit, in the dark if possible, and note how much time it takes.
- Gather survival equipment; portable VHF, EPIRB, flares, supplies.
- Compose a radio message.

(c) Simulate a man overboard using a life ring, a life jacket or a mannequin.

- Shout "Man overboard on port (or starboard) side".
- Steer to keep your stern away, and stop propeller if appropriate.
- Throw datum or radio marker, and/or life ring.
- Enter position on the Loran C receiver.
- Manoeuvre to pick up.

(d) Simulate taking on water:

- Assess extent of ingress.
- Rig main bilge pump and the Honda pump as a backup pump.
- Isolate compartment by closing all watertight doors and hatches.
- Compose message.
- Note how much time it takes to set the main pump.
- Note the best rigging of the Honda pump (where to put the suction, the pump and discharge hose for every compartment).

(2) Boat handling

(a) Have the crew let go and secure the unit.

(b) Practise boat handling:

- In confined waters.
- In marinas.

(c) Note the characteristics of your vessel:

- Stopping distance.
- Turning diameter, with or without props in gear.
- Idle speed.
- Astern speed.
- Manoeuvrability in shallow water.

(d) Practise approaches:

- Other boats, small open boats, large vessels.
- Different docks and different harbours in different sea states.
- A buoy in different sea state.
- A man overboard, in calm and rough weather. Have the crew practise.

(e) Deploy anchor:

- In different types of holding grounds.
- In calm water, in current and in swell.
- Note whether the anchor is holding; deploy double anchors if needed (deployed in line, if two anchors are stored on board).
- Retrieve anchor; practise appropriate signals with crew; note steps.

(3) Search patterns

(a) Deploy a radio beacon with different floating devices:

- A life jacket.
- A life ring.
- High flyer.
- Inflatable raft or dingy.
- Note distances at which object is visible in different sea states.

This exercise will help you to determine the right track spacing in different weather conditions in accordance with the searched object in a real SAR incident. It will also give a good practice for recognizing SAR targets.

(b) Practising different search patterns:

- Parallel track.
- Creeping line track.
- Expanding square.
- Sector search.
- Barrier search.
- Use different methods of navigation; Loran C, radar, land marks, etc.
- Study the characteristics of your operational area and determine the appropriate patterns for different parts of your coast line: bay entrances, river, strait, at sea, etc.

(4) Towing and salvage

(a) **Towing:** It might not seem necessary to practise towing procedures since towing is a routine task. However, new crew members might have recently joined the team, or some bad habits might exist that it is best to correct in training.

- Get the towline ready, and flake the required length of it on deck.
- Get the heaving line and a backup ready.
- Have a throwing apparatus quickly accessible in case it is needed.

- Check for the correct positioning of crew on deck, and have the different steps and tasks well understood by everyone.
- Secure the towline to the towing bit, and make sure it is secured in the proper manner.
- Establish a towline watch, and brief crew on safety procedures (keep clear of towline; don't get caught between towline and a fixed point on the vessel).
- Recover the towline and practise the proper way to use the line puller and/or the winch and/or to effect manual recovery. Check for the proper positioning of the vessel and of crew on deck.
- Check towing equipment. Make sure its use is well understood by everyone.

(b) **Salvage:** Simulate a salvage operation on whatever could be available at the moment.

- Make an intervention plan.
- Make a patch on a wood surface or other surfaces.
- Rigging and use of collision mats, hinged patch and shoring.
- Check adequacy of equipment.

(5) First aid

(a) Simulate an injured crew member:

- Conscious or unconscious.
- Broken arm, leg or neck.
- With no vital signs and reanimating.
- Compose radio message.
- Put on stretcher, secure patient the proper way for helicopter evacuation, practise moving the stretcher around in confined spaces on board and evacuating ashore.

(b) Simulate the coxswain falling unconscious:

- Apply first aid.
- Immobilize in a stretcher.
- Compose radio message.
- Return cutter to station.

First-aid exercises can be varied with infinite possibilities; therefore, there is no need to make a limited list here. However, it is important that all crew members know where and why medical equipment is stored on board. Now is the time to practise first aid in a manner that works with space available on board. Prior to executing these exercises, establish objectives. Until the rescue specialist program is put in place at our stations, some of us may find first aid to be a nebulous and undertrained part of our duties. Don't forget that, in a SAR incident, medical support is available by radio and that, for the majority of us, taking vital signs and executing appropriate steps as ordered by medical staff may be the extent of our participation in first aid.

C. Exercises With Another Unit

As stated before, training exercises with other units or vessels from your area and, more specifically, with CMRA members will be mutually beneficial. Once a rendezvous is set up, in accordance with the regional office, all parties should agree to a minimal planning of exercises to be practised. It is expected that primary SAR cutters will lead in this aspect, but the specific needs of the other parties must be addressed as well.

(1) Firefighting

(a) Simulate a fire onboard the other vessel (and vice versa if it is with CMRA):

- Establish radio contact.
- Gather information.
- Prepare intervention plan.
- Brief crew.
- Prepare firefighting equipment.
- Approach and fight fire.
- Don SCBA and protective clothing.
- Look for survivors in other vessel.

(b) Simulate a fire onboard a vessel at dock:

- Contact the local fire department and arrange an exercise.
- Make an intervention plan.
- Determine appropriate way of fighting the fire and/or assisting.
- Determine whether other actions are appropriate (like towing away the burning vessel; or towing away the adjacent vessels or cooling them down).

(2) First Aid

(a) Simulate a medical evacuation:

- Establish communication and a working frequency.
- Gather all pertinent information (how it happened, medical background, whether patient is taking medication, conscious or unconscious, etc.).
- Prepare first-aid equipment (stretcher, jump kit bag, portable VHF, etc.).
- Immobilize patient in stretcher and apply first aid.
- Discuss proper way to evacuate, taking into account the other vessel's configuration. Plan every step: use other vessel's crew, use extra ropes and lines, use a crane or any other equipment.
- Agree on signals and transfer stretcher onboard cutter.
- Choose proper harbour to evacuate, taking account of proximity of hospital.
- Compose radio message and sitreps for RCC.

Depending upon the circumstances, different exercises can be practised and varied almost to infinity. Look for mistakes or weak aspects of operation and practise as needed.

(3) Boat Handling

(a) Practise towing procedures:

- Prepare towline.
- Practise approaches: side on, bow on, etc.
- Pass the towline.
- Pay out the towline to its appropriate length. Check crew positioning on deck, proper use of towing bit and safe methods of paying out the line.
- Have crew practise.

(b) Harbour approaches and manoeuvres with a vessel in tow:

- Determine best approaches to the different harbours in your area in different sea states and wind directions.
- Have the other vessel in tow, and shorten the towing line.
- Secure the other vessel alongside, and practise docking and manoeuvres in confined waters.
- Have the crew practise.

(c) Man overboard with a vessel in tow:

- Tow other vessel at normal speed.
- Throw floating object in water.
- Establish contact with other vessel.
- Practise appropriate methods of approaching and retrieving (see Section 4-14).

(4) Search Patterns

(a) Deploying a datum marker:

- Make a search plan.
- Determine best search pattern.

(b) Practise On-Scene Commander duties, especially if many vessels are involved in the exercise:

- Determine your level of participation (will you make a search pattern, or drop anchor, or drift while directing operations?).
- Assign search area and search patterns with track spacing to each vessel, taking into account vessels' characteristics (which one should be closest to shore, etc.).
- Determine working frequency.
- Determine reporting timeframe.
- Take note of all reports.
- Prepare sitreps for RCC.
- Manage the operation, and adapt to the different situations that could arise.

Like first-aid simulations, search-pattern training exercises can be varied infinitely. Each area has different configurations, coast lines, weather, sea conditions and potential clientele or local activities. It rests with the coxswain or OIC to determine the appropriate extent of these exercises.

(5) Reporting

Training reports must be produced, with a copy kept at the station and another one sent to regional office. Information to be included is who participated in the exercises (SAR crew and other vessel), where they took place, weather conditions and, obviously, what exercises were practised, their description and the results achieved, including equipment shortfalls identified, lessons learned, and so on. This helps to keep all crew members at a satisfactory level of training and avoid having the same crew repeat the same exercises. This also applies to other involved vessels.

NOTE:

You will find at the end of this manual Appendix 3 entitled "Lifeboat Station's Performance Evaluation". This appendix is to be used to assess program performance through simulated SAR scenarios. These scenarios are inspired by the preceding sample exercises.

Debriefing

A. General

Debriefing is probably the most neglected aspect of completing a proper training session. Usually it is not our habit to overview or discuss operations, thus leaving potential dangers and misunderstood duty assignments unresolved.

A crew member, especially if his background experience was acquired on a larger vessel, will tend to see the CO/coxswain as the supreme authority on board, whose word is law. Likewise, a CO/coxswain sees himself as the supreme person responsible for everything on board and therefore may tend to think he need not seek the advice of others.

In a SAR incident, decisions cannot be discussed or called into question. Time is too precious. But during training or after a SAR incident, a debriefing session has to take place. The attitudes described above usually have the result that nobody talks to each other and nothing gets improved. It is the coxswain's responsibility to foster a confident climate among the crew. Obviously, on a small cutter involved in a SAR incident, **teamwork** is the key to success. Debriefing of exercises and SAR incidents, will improve teamwork and ensure that operations will be conducted in accordance with the highest standards.

B. Debriefing During Training

Faults detected during training exercises should be addressed right away, and discussion should take place to improve SAR techniques. All deficiencies should be noted and taken into account, and then a new exercise or training session should take place until a satisfactory level is reached. Some of the following general questions should be raised to help determine whether there are or were problems:

(1) Was the boat handling appropriate to the circumstances?

(2) Was the crew exposed to any danger?

(3) Were the preparations adequate?

(4) Was the execution of the tasks or certain tasks too slow?

(5) Were the communications adequate? Was there anything misunderstood?

(6) And, most important, did everyone work and do what the others expected? (Between the crew and the coxswain, and among the crew itself.)

C. Debriefing after SAR Incidents

In a SAR incident there might not be time for endless discussion on how to perform the operation. The coxswain has to take decisions, and they have to be obeyed. If proper training sessions combined with proper debriefing sessions have taken place before, few surprises should arise. In addition to the above questions, the following cover other possible aspects of a SAR incident that should be discussed in a debriefing session.

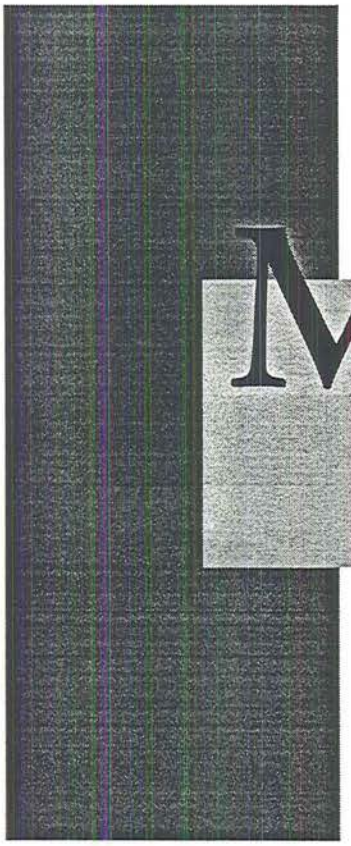
(1) Was the crew well prepared to face the situation?

(2) Did survivors have unexpected reactions?

(3) Were the survivors briefed on safety rules on board, and what was expected from them?

(4) Did all direct communications with shore services such as ambulances or hospitals work well?

There is no better way of acquiring self-confidence and experience than regular debriefing sessions held during training or exercises and after SAR incidents. In this manner, the more you train, the more you talk to each other, and the more you gain confidence and professionalism, the more you and the crew will be capable of saving lives.



Miscellaneous

Section Seven: Miscellaneous

7-1 Legal Issues

A. Coroner's Inquests
B. Personal Liability for CCG Personnel

7-2 Crew Change: Coxswain Responsibilities

7-3 Release of Information to the Media and the Public

7-4 On-Scene Commander Responsibilities

7-5 Search Reduction

A. General
B. Cessation of Searches

7-6 Critical-Incident Stress Management

7-7 Refusal to Accept Towing Waiver

7-8 Fire Fighting Guidelines for Small SAR Units

Legal Issues

A. Coroner's Inquests

(1) General

Each province and territory has its own death inquiry system. This provides for the investigation of deaths which are unusual, requiring further investigation to resolve such issues as the identity of the deceased, the medical cause of death, when death occurred and why it came about and whether it was preventable.

A coroner's inquest serves as a means for a public ascertainment of facts relating to deaths, as a means for formally focusing community attention on and initiating community response to preventable deaths and as a means for satisfying the community that the circumstances surrounding the death of one of its members will not be overlooked, concealed or ignored.

The proceedings at an inquest are not accusatory and adversarial but inquisitorial. No one can properly be described as an "accused" in the proceedings. There is no final judgment. The result is a verdict containing findings of fact, sometimes recommendations for the prevention of such deaths in the future and in some cases allegations that certain individuals bear responsibility for the death in question.

The proceedings at an inquest, which are normally held in public to achieve their purposes most effectively, and the findings which result, possess great practical significance and may substantially influence public opinion, private reputation and the course of potential subsequent civil and criminal proceedings arising out of the death.

(2) Steps to be Taken Before Appearing at an Inquiry

The coxswain should review the incident in question in his mind. Only after he has exhausted his own independent recollection of the incident should he consult his notes and the case file concerning the incident. He should make copies of his notes and the case file pertaining to the incident as they may be required at the hearing. He should ensure that the copies are accurate copies by comparing them with the originals.

The coxswain should obtain form the departmental legal advisers a clear idea of the procedure involved. Will he be in the hearing room prior to being examined before the inquiry? By whom will he be questioned and in what order? Will he be permitted to remain in the hearing room once he has testified?

The coxswain should not talk to anyone concerning the incident unless he is expressly authorized to do so by departmental legal advisers.

(3) Legal Advice Available to a Coxswain

The following is taken from TB Circular No. 1983-52, entitled "Provision of Legal Services to Public Servants":

It is the policy of the government to provide counsel in those cases where employees have acted within the scope of their duties and generally in accordance with departmental expectations. The policy reflects the Crown's recognition that, as an employer. it should protect it employees from certain financial costs arising from the performance of their duties.

Employees are responsible for informing their supervisors when an incident takes place that could give rise to the need for legal counsel or which may occasion a claim against the Crown.

For Public Servants in the Coast Guard, the Department of Justice is responsible for advising departments on the need and justification for legal counsel in each case, whether the Department of Justice or its agents should represent the employee, and on the selection of private counsel.

Any Employee or servant may request the provision of legal counsel at public expense when he is:

(1) sued, or threatened to be sued, in the Civil Courts;

(2) charged with an offence;

(3) interviewed by representatives of the Crown, including Local Police Forces and Crown Attorneys, in circumstances that, in the opinion of the employee's Deputy Head, could lead to legal proceedings against the employee or the Crown; or

(4) required to appear before a Judicial, Investigative or other inquest or inquiry.

In civil cases, employees or servants shall state, in their request for counsel at public expense, whether they are willing to be defended by the Department of Justice. An employee who prefers to be represented by private counsel shall state the reasons for doing so, and provide the name and fee schedule of a preferred counsel. An employee who instructs counsel to begin work without the requisite departmental or Treasury Board approval may be personally responsible for payment of resulting legal fees.

The Department of Justice, as a matter of policy, does not defend employees who have been or may be charged with an offence. The name and fee schedule of private counsel should always be provided for approval prior to preceding in such cases.

B. Personal Liability for CCG Personnel

The following statement on personal liability for CCG Personnel appears as CGFO 28:

28.01 Purpose

The purpose of this Order is to promulgate the Government's practice regarding the personal liability of Coast Guard personnel in respect of legal proceedings taken against them by an individual who is injured or sustains the loss or damage of personal property arising out of and in the course of executing their duties and responsibilities.

28.02 General

Personnel operating Canadian Coast Guard craft of all kinds ships, boats, helicopters, hovercraft, etc. - are constantly called upon as a part of regular Coast Guard operations to undertake work that differs considerably from that in similar commercial craft. This work may not only expose them to personal risks greater than those in commercial operation, but may also involve them in situations where some infringement of normal accepted standards and practices is unavoidable, or in situations that can lead to lawsuits for injury or damage. An

example of where this could happen is in search and rescue operations conducted in extreme weather or difficult operating conditions that could result in or cause unavoidable damage to property or even injury, or the aggravation of an existing injury, to an individual.

28.03 Government Practice

(1) Government experience is that when a situation of this kind leads to court action, it is usually the Government that is sued. There are, however, occasional situations where for one reason or another the individual bringing suit does so against a Government employee personally. When this occurs, it is the Government's practice:

(a) To attempt to persuade the litigant to sue the Crown rather than the individual, and if this fails,

(b) for the Government to assume responsibility for defence and to bear all costs involved in the defence, and

(c) for the Government to assume responsibility for the cost of any settlement.

(2) This course of action is followed when a suit arises from an incident that occurs in the course of duty, that is, where the individual was either doing something that he had been directed to do by competent authority, or where he was undertaking something on his own initiative that is a normal part of Coast Guard duty, e.g., conducting a rescue or assisting a vessel in difficulties at sea that for one reason or another only he was aware of. The procedure will not apply where the individual was using a Coast Guard vehicle for an illegal activity, or some strictly personal project that was not a normal part of Coast Guard responsibility, e.g., using a Coast Guard boat without permission to poach lobsters out of season.

28.04 Exceptions Owing to Negligence

Exceptions could arise in situations where suit was brought for damage or injury which was the result of negligence on the part of the Ministry employee. Generally speaking, however, negligence would be treated as an internal Ministry disciplinary matter in the same way as it would be if no suit resulted, and only in cases of gross and completely unjustifiable negligence would the general principle of Government acceptance of responsibility not be followed.

Crew Change: Coxswain Responsibilities

Every lifeboat station will probably have a different way of making its crew changes. This section details standards as to what information must be exchanged.

One of our operational priorities is to have the lifeboat always "ready for ops". This is achieved by following a regular maintenance schedule for the vessel and its equipment. By making all the routine inspections, crews can detect faults in the equipment and take appropriate actions before breakdowns occur.

Thus, information must be passed to the incoming crew to ensure they are advised of all problems experienced and potential problems discovered by the outgoing crew at the station. Neglecting or "forgetting" to do so could give rise to a dangerous situation if the fault remains undiscovered by the incoming crew until it is too late.

It is very important to have a complete overall picture of the vessel and its state of operational readiness. A complete crew change must include a report on all of the following:

- Malfunctioning of engine room systems, electronics, SAR equipment, firefighting and safety equipment.
- Missing equipment that is expected to be there: lost, stolen or worn out. This includes equipment moved from its usual stowage place on board or moved to the base.
- Replacement or new equipment added; special instructions for using the new equipment.
- Missing inventory; on order or back order.
- Ongoing SAR cases and expected calls.
- All other miscellaneous matters that are important to the station operations, such as new orders or instructions.

A checklist can be very helpful in achieving a proper crew change.

Release of Information to the Media and the Public

In a lifeboat station, we are sometimes solicited by the media or the public for information about SAR operations. Facing them is not an easy exercise. Often the local journalists will call you first even if they know that they should call the closest RCC/MRSC in your area. Their general objective is to have you express emotion or shocking declarations for their own audience, particulary in remote stations where the crew is part of a small community. An unsuccessful search is all the more likely to affect you emotionally if the missing souls are people you know from your own town.

Annex 4-K of the *National Search and Rescue Manual* stipulates the following guidelines for facing the media. It is more prudent to respond than to give the impression of being unaware or unresponsive. Once clearance is obtained from the RCC/MRSC, the facts given in an interview should be limited to the following (remember to limit your answers to what you know):

- numbers of resources engaged in the search;
- number of crew aboard the search unit;
- numbers of hours your unit has been engaged in the search;
- the area searched, and search results of your unit;
- weather conditions;
- your unit's search capabilities; and
- referral of other questions, particularly concerning decisions to carry on with the search, to RCC/MRSC.

Personal opinions, your feelings about the outcome of the operation, the conduct of the operation or departmental policy must not be discussed. Always refer these types of questions to your RCC/MRSC.

On-Scene Commander Responsibilities

CAUTION

Always refer to the* National SAR Manual *for terms of reference and responsibilities.

When there is more than one SRU engaged in an operation, one unit should be designated to coordinate the operation at the scene. The units engaged may be either SAR units or vessels of opportunity or a combination. Since the crews of SAR units will be trained in SAR operations, it will normally be preferable to designate the commander of one of these units as On-Scene Commander (see *Canmersar* regarding duties of OSC).

It will be the responsibility of the OSC to:

(1) carry out the plan for the conduct of the operation as directed by the RCC/MRSC controller;

(2) modify the plan as facilities and on-scene conditions change, and report on these changes to RCC/MRSC;

(3) monitor weather and sea conditions and report on these at regular intervals to RCC/MRSC;

(4) maintain communication with the RCC/MRSC and the SRUs on scene;

(5) maintain a detailed record of the operation, including on-scene arrival and departure times of SRUs, areas searched, track spacing used, sightings and leads reported, actions taken and results obtained;

(6) issue regular situation reports to the RCC/MRSC, which should include, but not be limited to, weather and sea conditions, the results of search to date, any actions taken, and any future plans or recommendations;

(7) advise RCC/MRSC to release units when their assistance is no longer required.

Before appointing an OSC, RCC/MRSC should ensure that the vessel appointed is capable. For example, a Type 400 may be suitable for most incidents, but if the wind is blowing 40 knots and it looks as if the search is going to involve a large number of units and aircraft, perhaps an alterative should be considered, if possible.

If there is a sufficient number of units involved, the OSC does not have to take part in the physical search, thus reducing his navigational responsibilities.

It is advisable that the OSC delegate some responsibilities to another SRU, preferably another primary unit, thus reducing his workload and the chance of a mistake.

As the search progresses, one of the OSC's more important duties is to update the search action plan. Verify the facts, and make sure the original information still holds true. An excellent means of doing this is a patch with RCC or a cellular telephone. Don't forget, the marine controller working your case may be involved in several other cases, so it is important that you give him direct feedback.

In the real world of operations, a small SAR unit may be designated OSC of a search operation involving several search units in an area where the SAR unit can give expert advice on local knowledge.

In certain circumstances, due to the workload, the OSC may physically remove himself from the search. This action should be taken in consultation with RCC/MRSC.

Often, developments can happen very quickly and cannot be accurately recorded by writing all details. One method that has been used with success is to record the details on a tape recorder along with the current time of day. The tape can be transcribed at a later time. However, one must be cautious that the tape recorder and tape are functional and that the tape is preserved. A combination of taped and written records is probably ideal in such situations.

Search Reduction

A. General

RCC/MRSC is the only authority which can recommend the reduction of a search. The decision is then passed in certain circumstances to NDHQ, which can either approve or deny the recommendation.

The Search Master will make a recommendation for reduction of the search only after the search area has been adequately covered and there is no likelihood that survivors will be recovered. To make the reduction decision, RCC/MRSC needs to have a complete list of facts **from the SAR crews involved.** These facts include:

(1) all important times (time on scene, time commenced search, etc.);

(2) the weather and especially the visibility in the area;

(3) the area covered in each search and the type of search;

(4) all sightings of debris and other objects in the water;

(5) other relevant information such as crew fatigue; and

(6) any change in any condition on scene (change in wind direction, increased wave height, etc.).

The above facts should be passed to the RCC/MRSC, as applicable, with the regular sitreps.

B. Cessation of Searches

The ending of a search is looked upon as a reduction in the search. Searches may be reopened whenever new evidence is uncovered which indicates that survivors may be located.

Critical-Incident Stress Management

Transport Canada has a new policy on Critical-Incident Stress Management, effective June 1st, 1992. Details of this policy are found in the *Transport Canada Personnel Manual* (TP 116), Volume 1, section 5-7.

The policy describes in general terms what critical incidents are, and the stress management program related to them. All regions have a counselling service to provide support to all employees, *such as SAR crews,* who are exposed to critical incidents. In order to increase awareness of critical-incident stress, this section will deal more specifically with this subject.

Critical-incident stress is the reaction of an employee involved in a critical incident. TP 116 lists various types of critical incidents as follows:

- death or severe injury in the line of duty;
- suicide or sudden death of a co-worker;
- multiple-casualty incidents;
- incidents in which victims are severely injured;
- prolonged rescue or recovery operations especially when children are involved or where the victim is known to rescue personnel;
- situations with intensive media coverage and scrutiny;
- situations of violence in the workplace.

We can supplement the list by adding situations more specific to lifeboat stations:

- recovery of bodies by lifeboats;
- witnessing a suicide from a bridge, a dock, a ferry;
- operating in full view of public and/or media;
- failing to succeed in a rescue attempt;
- failing at CPR, in a case where the victim still had vital signs when recovered.

Other situations can be very stressful. For example:

- exposure for very long periods to the motion of a lifeboat in a violent storm;
- failing to assist in cases of damage or property loss;
- being unfairly criticized for response to an incident.

There are as many types of critical incidents as there are incidents. However, COs/coxswains are responsible to their crew for their safety and for preventing injuries, including psychological injuries. They must monitor their own reactions to stress and watch reactions of their crew, bearing in mind *that these are only normal reactions by normal people in an abnormal situation.* In critical incidents where the potential psychological injury is obvious, remember that some normal emotional reactions can be expected.

Often, individuals will react according to their respective experience or age, especially younger crew members who have a preconceived picture of SAR operations (the tendency to see SAR as saving life and forgetting that loss of life can also occur in any SAR operation). One way of

avoiding stress is a short debriefing, just to check, inform and reassure. A critical-incident stress debriefing (CISD) can be provided by your counselling service. An affirmative answer to any of the following questions after a critical incident may indicate that the job-related stress has reached a danger point and you need a CISD.

- Do I have trouble putting the incident out of my mind?
- Do I experience persistent nervous jittery feelings?
- Am I forgetful, short-tempered or fearful?
- Do I have nightmares, sleep disturbances, or a preoccupation with death?
- Am I withdrawn from friends or family and less interested in sex or other activities that I used to find enjoyable?
- Do I find myself drinking too much or depending on drugs to calm my nerves or get me through the day?
- Am I simply feeling out of sorts?

Many things can be done on the job to attenuate a building of stress:

- Plan for appropriate rest breaks, when possible. (This applies equally to the coxswain/commanding officer: if the commanders don't take a break, it is hard to order the crew to take a break). A rule of thumb is 15 minutes break for every hour under intense stress.
- Rotate crew assignments, if possible, to avoid boredom from repetition.
- Keep everyone informed and updated frequently.
- Provide adequate and suitable food (avoid, for example, serving anything raw or containing bones after incidents involving mutilated bodies or serving burnt food after incidents involving fires at sea).
- Avoid excessive coffee or sugar, since both tend to increase stress reactions in the body.
- If the crew is large enough, do not assign the same person to recover dead bodies that is also assigned to search for them.
- Cover bodies.

Refusing to recognise a stressful situation may have a serious impact on you and your colleagues. For example, a few years ago personnel from different services worked at a crash site in Chicago, where there were no survivors. No psychological support was provided to them. A year later, only 71 of the 351 individuals involved remained in their jobs. It is cheaper to support the individual than train a new team.

To conclude, the coxswain/commanding officer must create a climate of open discussion where feelings and reactions can be expressed. It is not a weakness to request help from your Regional Counselling Service; however, denying the problem is a weakness.

Refusal to Accept Towing Waiver

What do we do when a client requests towing assistance, but refuses to sign or agree to the waiver?

The towing policy is quite clear about its intention. Article 1.2 states as follows:

> " The Coast Guard recognizes that the timely provision of towing assistance to distressed and disabled vessels can be an effective way of meeting the objective of the National SAR Program and of an emergency situation under certain circumstances.
>
> This policy is not intended, however, to convey to the public that the Coast Guard is prepared to tow disabled vessels merely on request, nor is it the Coast Guard's intention to compete with private commercial interests in this regard.."

And the procedures state:

> "Towing assistance shall be provided by Coast Guard units only with the understanding that the operator of the disabled vessel waives of action against the Government of Canada or the employees thereof."

Therefore, in a situation where no emergency exists and the user requests towing assistance without agreeing to the waiver, the unit shall decline to provide assistance, and refer the matter to RCC/MRSC. In the mean time, the resource may offer to transfer POB onboard the cutter or to stand by on scene until other help in available.

Commanding Officers and coxswains are reminded that under section 384 of the Canada Shipping Act that:

> "The master of a Canadian ship at sea, on receiving a signal from any source that a ship or aircraft or survival craft thereof is in distress, shall proceed with all speed to the assistance of the persons in distress, informing them if possible that he is doing so ... "

Therefore in certain cases, when towing is determined to be the optimum method of resolving a distress situation, it may be necessary to tow without a waiver.

Commanding Officers and coxswains are also reminded that all of the circumstances surrounding the refusal to accept the waiver be entered into the log book.

Fire Fighting Guidelines for Small SAR Units

The national SAR objective is to prevent loss of life and injury, and, including where possible and directly related thereto, reasonable efforts to minimize damage to or loss of property. Therefore, you may expect your unit to be tasked to incidents involving fire on board other vessels or at a shore facility adjacent to the water.

Determining what the level of participation of the unit should be is not an easy process. Many components have to be taken into account, the first one being the safety of the crew and/or people you are assisting. Common sense and good judgment are your only tools to plan a strategy according to the circumstances. However, those decisions are always difficult and in the heat of the action, the following points may help you to frame the limits in which you should pursue your action.

(a) Assistance shall be provided only in the following three circumstances:

- To fight a fire on board a Coast Guard ship;
- To save lives on a vessel on fire;
- When no lives are at risk, to prevent property loss by having the SAR unit fight the fire; efforts will be restricted to what can be accomplished from the deck of the SAR unit.

(b) The fire fighting training level of SAR crews is limited to MED course, on the job training, routine fire drills and accumulated experience. These will vary for each crew member and therefore it is very difficult to determine a standard safe level of participation in fire fighting. The on-scene commander/coxswain should be the person who will decide the extent of participation of the SAR unit, bearing in mind safety concerns and the accumulated capabilities of his unit and crew.

(c) Keep in mind the level of protection that is provided to the crew by means of protective clothing; i.e. Is the main piece of gear have a fire entry level or is it only a flashfire protection level? You should ensure that ancillary pieces of equipment such as gloves, masks, helmets and boots match the same level of protection as the main piece of gear and not be rated lower.

(d) Be aware of any potential hazards such as explosions an/or toxic fumes..

In conclusion, you must carefully consider the capabilities and limitations of your crew and your vessel when involved in incidents requiring a fire-fighting response.

Appendices

Appendices

1 Procedures for a Grounded CG SAR Vessel

A. Accidental-Grounding Checklist
B. Accidental Grounding

2 Damage Control Onboard CG Vessels Types 100 and 300

A. General
B. Bilge Flooding
C. Holes in the Hull

3 Lifeboat Station Performance Evaluation

A. Introduction
B. Evaluation Team
C. Evaluation Form
D. General Instructions for Conducting the Evaluation
E. Equipment Checklist and Maintenance
F. Towing Procedures Checklist
G. Man-Overboard and Retrieving-People-in-Water Procedures
H. Firefighting Procedures
I. Injured Crew Member Evacuation
J. Final Observation/Recommendation on Evaluation

4 Use and Maintenance of Portable Pumps 1

A. General
B. Gasoline
C. Weekly test
D. Inspection
E. Fitness for Service
F. Honda Generator
(10 amp to 30 amp)

5 Life Rafts, Lifeboats, and Survival Craft

A. General
B. List of Life Raft and Life Craft Manufacturers
C. Elliot Life Raft
D. Beaufort Life Raft
E. Dunlop Life Raft
F. R.F.D. Life Raft
G. Typical Four-Person Life Raft
H. Typical U.S. Coast Guard-Approved Raft
I. Switlik Life Raft
J. B.F. Goodrich Davit-Launchable Inflatable Life Raft
K. B.F. Goodrich Life Raft
L. Watercraft Totally Enclosed Survival Craft
M. Watercraft Partially Enclosed Lifeboats
N. Typical Life Float

6 Amendment of Manual

A. General
B. Amending Form: Operational Guidelines for Search and Rescue Units (Type 100 and 300)

Procedures for a Grounded CG SAR Vessel

☞ **NOTE**

Reporting procedures for the provision of timely and complete information of incidents involving fleet units (including accidental grounding) are contained in CGFO #205.

A. Accidental-Grounding Checklist

(1) Stop engines.

(2) Head check / injuries.

(3) Inform RCC/MRSC of situation and maintain communication.

(4) Do not back off before evaluating.

(5) Set anchors to seaward if possible.

(6) Inspect bilges for water.

(7) Check for leaks.

(8) Check for damage to hull.

(9) Sound around the vessel.

(10) Determine the effects of backing off, including the capability of pumps.

(11) Stay aboard until assistance arrives or you are refloated.

B. Accidental Grounding

The nature of Search and Rescue work can expose SAR vessels to a high risk of grounding. SAR vessels can work in the worst of situations with few tools and no backup. There is no room for error. The prudent navigator plots a safe passage through all situations. However, should you have the unfortunate experience of running your SAR vessel aground, your day is already ruined. Why not try to salvage what is left of it by following a few simple steps?

If a SAR vessel does run aground, the coxswain must evaluate the situation immediately and take steps to secure the situation.

The engines must be shut down without delay to prevent engine damage caused by drawing sand or other matter into the cooling-system intakes. Conduct a head check of the crew to be sure everyone stayed aboard and is uninjured. Inform RCC of the situation immediately so that assistance, if required, can be tasked. DO NOT TRY TO BACK OFF IMMEDIATELY. EVALUATE THE SITUATION FIRST. If the bottom is soft matter, an attempt to back off could direct more material forward with the propeller wash, depositing more material around the hull and putting the vessel harder aground. Keep the RCC informed of the situation and your intentions. Deploy anchors to seaward to prevent being forced further aground. Inspect

the bilge spaces to determine whether there is any leakage from hull damage, and if so secure the damage. Determine the amount of water, if any, in the bilges, and take steps to remove it. Determine the extent of hull damage. Take soundings around the entire vessel to determine the depth of water and the characteristics of the bottom. Ascertain whether backing off would be expedient or cause further damage. You must also consider whether your pumps could control flooding if you were to back off. If it is safe to do so, stay with your vessel until you are refloated or other assistance arrives.

Damage Control Onboard CG Vessels Types 100 and 300

A. General

Coast Guard SAR vessels put to sea every day on SAR missions in nearly every climatic condition occurring in Canada. SAR vessels can operate in areas and sea conditions in which most operators would not even consider entering. In order to meet operational requirements in these conditions, SAR vessels must be built and maintained to the highest standards.

But what happens when things do go wrong on a SAR vessel? Who will come to your assistance if you are taking on water? What vessel will they use, and how long will it take them to reach you?

Failure of a vessel's hull can occur through the forces generated from grounding, collision, or operation in heavy weather conditions. Water can quickly enter the vessel. What do you do? The water must be stopped from entering, and the water which has entered must be removed. Water may contact the engines or electrical systems and further complicate your situation. Depending on the amount of water taken on, your stability may be threatened.

SAR crews must be prepared to stop flooding and conduct emergency damage control operations on their own vessel as well as others. We all know that emergencies can occur at any time and can throw unprepared personnel completely off guard (PANIC), but with preplanning for such emergencies the effects can be minimized. Help may not be immediately available. The SAR crew must be as self-sufficient as possible and prepared to handle all emergencies arising onboard their own vessel.

B. Bilge Flooding

The bilge is a void space where considerable water can collect, seriously affecting a boat's operation (stability). Water accumulation may be the result of the normal slow accumulation of leakage from shaft packing glands, sea cocks, and the like. On the other hand, massive amounts of water may collect very suddenly because of flooding through an open hatch or engine vents in heavy weather or through a damaged hull as a result of grounding or collision.

(1) Type 300 (44' MLB)

(a) General

Bilge draining may be accomplished by any of the following three means:

(i) **The automatic/manual electric bilge pump**, a low-volume pump normally on automatic function and capable of pumping approximately 1750 US gallons per hour.

(ii) **The hand-operated pump**, located inside the engine space on or near the after starboard side of Bulkhead 9.

(iii) **The main bilge suction unit**, which uses the fire-pump discharge water and water jet eductor, connected to a portable suction hose. The suction hose is led around the engines in the engine room bilge and controlled by a gate valve placed between the hose and the eductor. Additional lengths of hose should be aboard. They can be connected to the bilges piping from the litter, void, messing, and passenger spaces.

(b) Forepeak

To drain the forepeak, use the sluice valve located in Bulkhead 1. This valve is operated by a "T" or round handle that leads through the passenger space deck and up the bulkhead to the handle located adjacent to the forward escape hatch on deck on the port side of the lifeboat. Some vessels do not have the spindles that extend to the deck, but operate the sluice valve handle located under the settee in the passenger compartment adjacent to Bulkhead 1. The water will drain into the passenger space bilge and can be pumped from the deck scuttle. Some vessels have a sluice valve between these two spaces.

(c) Mess Deck

In some vessels the mess deck compartment bilges have no sluice valves and they must pump from the deck scuttle. Other vessels utilize a pumping system which pumps this space directly through piping to the engine space.

(d) Well Deck Void Space

Water in the void between Bulkheads 15 and 17 can be sluiced at Bulkhead 15 into the engine room, from where it can be pumped. The valve handle is located either on deck adjacent to the tow post on the starboard side or in the engine space at Bulkhead 15.

(e) Aft Compartment

Water in the after compartment can be sluiced into the well deck void space at Bulkhead 17. The valve handle is located low on the after compartment cabin in the well deck, on the starboard side.

(f) Aft Steering Space

Water in the aft steering space can be sluiced into the aft compartment through a valve located at Bulkhead 21.

WARNING

Use of the bilge eductor system requires a crew member in the engine room at all times during operation. The reason for this is that you can flood the engine room with this system if it is not used in the proper sequence. The following steps shall be followed to the letter:

- ***Check bilge suction hose to ensure that it is connected to the suction side on the eductor.***
- ***Be sure gate valves in firestation supply, eductor supply, and suction lines are CLOSED.***
- ***Open sea chest gate valve to fire pump.***
- ***Engage fire pump.***

- ***When 100 lb psi is reached on fire main gauge, slowly open gate valve in EDUCTOR supply line and OVERBOARD discharge valve.***
- ***Slowly open gate valve in EDUCTOR SUCTION line, and pump bilges as necessary.***
- ***When pumping is complete, reverse the procedure.***

☞ **NOTE**

After the 44' MLB has experienced a grounding, heavy sea, and/or surf, check all bilges. If any amount of water exists, investigate the source. Take corrective action as necessary.

(2) Type 100 (41' UTB)

(a) The bilge alarms provide an early-warning system to advise you of flooding problems at the earliest stage. Always check all bilges before securing, and regularly when underway, especially in heavy weather. Pay particular attention to the well deck bilge; watch for the presence of fuel here, which could indicate a fuel tank overflow or rupture, leading to fuel contamination or a possible explosion.

(b) If a grounding has been felt or suspected, check the skeg sounding tube, which is located in the engine compartment just aft of the engines, to starboard of the centreline. If water is present in the tube, the keel is damaged.

(c) Be sure the bilge alarm system is activated at all times. When the alarm sounds, check all bilges for signs of flooding, and check to be sure each pump is working, if needed.

(d) Each of the four compartments below the main deck is provided with a 24-volt direct-current bilge pump. These pumps are located forward of Bulkheads 2, 6, and 10, and aft of the fuel tanks. Bilge water is drawn through the bilge pumps, passes through a 1" ID hose, and a stopcheck valve, and then is discharged overboard. The overboard discharge hull connections are located so that the outlets are one inch below the top edge of the waterline. The pumps operate manually and are activated by switches located on the cox-swain console. A 12-volt float switch is wired to the loud-hailer, which sounds if a flood-ing condition exists. Obviously, it is important to empty the bilge of water as soon as possible. When this cannot be accomplished with pumps, the engine WATER INTAKE LINE may be used following the procedures below:

(i) Secure the water intake line seacock.

(ii) Disconnect and remove the engine water intake line from its through-hull fitting.

(iii) Place the intake hose in the bilge so that it will suck up the bilge water and remove it through the exhaust; watch for floating debris that could clog up the engine water pump.

(iv) After the bilge has been pumped, secure the engine or reconnect the intake hose to its fitting (open seacock) to avoid overheating the engine.

☞ CAUTION

Care must be taken to ensure that the bilge is free of any floating debris that could clog up the engine water pump. After the bilge has been pumped, the engine must be secured or the intake hose reconnected to its fitting to avoid overheating the engine.

C. Holes in the Hull

(1) General

The difficulty in making jury (temporary) repairs to a hull is that patches cannot be nailed on steel or fibreglass hulls and the curved surfaces on which you are working make the seating of patches difficult. One of the first steps after dealing with the immediate problem is to notify the RCC so that assistance can be sent.

The following general guidelines give basic methods of temporary repairs to small vessel hulls. These methods can be employed on Coast Guard SAR vessels or on other vessels requiring assistance.

(2) Small Holes

Temporary repairs can be made by driving unpainted, soft wooden plugs or wedges into small holes. Bare, soft wood soaks up water and swells, holding the plugs or wedges firmly in place. PAINTED OR HARD WOOD WILL NOT SOAK UP WATER. If you wrap the plugs with cloth (rags), you will get an additional seal. RTV (silicone rubber) may also be used as it sticks to wet surfaces and will set up under water.

☞ CAUTION

Wedges should not be driven into a crack, because they will cause the crack to enlarge and expand.

(3) Cracks

To fill a crack, use RTV and lay a flat piece of rubber and/or canvas over the crack, back it up with a board, and hold the patch in place with Scotch Brand NO. 33 plastic tape and shoring.

☞ CAUTION

This type of patch must be inspected frequently because it tends to shift and slip with the movement of the boat.

(4) Large Holes

Water pouring through large holes is difficult to control. The only control possible may be to establish watertight integrity to isolate the damage and confine it to as small an area as possible.

(5) Holes Above the Waterline

These may be more dangerous than they appear. When the boat rolls, these holes may admit water into spaces above the centre of gravity and REDUCE STABILITY of the boat. These holes are given high priority, but they are not too difficult to patch. You can use either inside or outside patches on them. Inside patches may be made with pillows, seat cushions, blankets, etc., backed up with boards and shoring. A good patch can be made with a pillow or cushion which has a hole punched in the centre. The backup board also must have a hole in the centre. Line or marline is passed through the padding and board and tied securely behind the board. Then the entire patch is placed on the outside of the hull. The line is passed through the hole and secured to a firm structure inside the vessel.

Lifeboat Station's Performance Evaluation

A. Introduction

Evaluations are a managerial tool which provide management with a means of measuring the success of the entire organization, from training and equipment procurement to operations. For the unit involved, an evaluation will provide the commanding officer/coxswain and crews with an assessment of their training, equipment, procedures and operating environment. As an added benefit, the evaluations should generate self-awareness that leads toward SAR professionalism. In addition, it helps the crews define their own limitations, so that they do not endanger themselves during operations. The evaluations are not intended to discredit or punish individuals or crews. It is assumed that stations are already performing in a satisfactory manner in real life situations. The evaluations will focus on the capability of the unit as a whole.

Ensuring SAR response consistent with national standards is a responsibility of the Chief of SAR Operations and Development. For this reason, evaluations are conducted at regular intervals and all lifeboat stations will be evaluated according to a multi-year cycle, established by Headquarters. One staff officer from Headquarters will normally be appointed to conduct the evaluations of selected regional lifeboat stations. This officer will also be in charge of coordinating and defining the tasks for the evaluation year. To maintain a national perspective and consistency between Regions, the same simulated tasks will be used nationally. Note that a secondary objective to the evaluation is to assess specific pieces of equipment as required through designated tasks for a given year.

As it is almost impossible to evaluate in adverse conditions, the rational behind the evaluation process is to evaluate basics or essential tasks that crews will be aware of, well before the evaluation will take place (for example, a man overboard situation). This will maintain a certain uniformity throughout evaluations and between lifeboat stations. As the tasks evaluated will be known and prepared well in advance, we can judge them more rigorously and expect professionalism from the unit. If the task is very well performed, we can presume that in very severe conditions, the unit will do as well. On the other hand, if the unit is encountering problems performing simple tasks, presuming that the unit will do fine in severe conditions may not be as valid.

A negative aspect of such prepared exercises is that it creates an artificial ambience for the time the crew is evaluated. Therefore, if a real SAR call were to occur during the evaluation, it would be used, to the extent possible without interfering, as one of the evaluation's exercises. On the other hand, a surprise exercise may take place in addition to the basic tasks in order to have at least one "live or as close to live as possible exercise". For example, the crew will be informed a few minutes prior to the exercise and this exercise could be one of the following:

fire on board a vessel at a sea;

or a fire at a dock etc;

a missing person and/or man overboard reported in a specific area;

medical evacuation;

evacuation from a remote beach or a remote area;

an exercise aimed at the rescue specialist or the rescue swimmer, etc.

This list does not limit the variety of such exercises and they will be chosen according to circumstances by the evaluation team at that time.

B. General Instructions Conducting the Evaluation

(1) 1.For reasons of safety, it must be clearly understood by all evaluation participants that the commanding officer/coxswain is, as always, ultimately in charge of the boat and any mission assigned. If, at any time while underway, concern for personnel or their safety, or vessel safety should arise, the commanding officer/coxswain must call a halt to the exercise until the unsafe situation is corrected or clarified.

(2) Boat crews are encouraged to perform naturally and professionally. Evaluation team members should try to create as relaxed an atmosphere as possible. Only those methods and procedures appropriate for the situation at hand should be selected. "Textbook" responses are not required nor encouraged. For example, a line throwing apparatus should not be used to pass a towline when a direct pass could be made more quickly and safely.

(3) Performance evaluation is based on:

(a) Procedures and methods appropriate for that particular boat and the real-time situation at hand.

(b) How well each crew member knows the boat and outfit, and also, performs as an individual and as part of a team. (Note that the crews will not be individually identified in the evaluation report)

(4) Marking the evaluation's checklist:

(a) Marking each exercise is a two-step process and recognizes that one person can not always witness all phases of an evolution. A preliminary evaluation is made by each Evaluation Team member while underway, each using the same checklist. Once ashore, the exercise should be discussed by the Evaluation Team in detail before any conclusions are decided upon concerning each checklist item. All doubts should be resolved in favour of the crew. If appropriate, these discussions may be held in the presence of the crew being evaluated.

(b) The intended purpose of the annotations is to provide Regions and Headquarters with a tool for monitoring the performance of lifeboat stations and equipment. The system illustrates strong and weak points. It is not intended for measuring performance of one crew or unit against another and not intended to criticize the manner in which things are done when this is based on personal opinions from the evaluation team. For example, communications will be judged on their efficiency, not how it is done (hand signals, loudhailer, etc). However, opinions concerning safety shall be discussed.

(c) There is no marking scale system. Instead, observations and recommendations are encouraged and will have to be written in a positive manner; it must be useful and applicable. An absence of comments will be interpreted as entirely satisfactory.

(5) Efficient communications have as always been essential in any operations. Therefore, all communications required by the tasks will be checked out, including communications with shore based facilities that are to be simulated verbally.

C. Evaluation Team

The role of the evaluation team is:

a. to evaluate the effectiveness of the unit;
b. to identify problems affecting the unit;
c. to identify problems affecting SAR specialized equipment;
d. to recommend corrective action by appropriate agencies (or persons).

The team will evaluate the station according to a one day schedule with the following order if possible:

a. review training records;
b. assess level of accumulated experience and training of the station;
c. examine any intervention plans, local procedures, or any other locally prepared response procedures to a SAR incident;
d. check all SAR equipment at the station including its proper storage, maintenance and functioning.
e. evaluate the performance of the unit personnel on duty through simulated SAR tasks;
f. may video the SAR tasks for debriefing purposes;
g. recommend corrective action for operational deficiencies or problems affecting unit operations.
h. write the final report which will be completed accordingly to the subsequent debriefing which may use the video.

Note that there is no intention of keeping a video record of the exercises and the cassette will be either erased or left at the station if required by the crew.

Typically of two persons or less, the evaluation team shall be composed of:

- Headquarters staff;
- Regional staff;
- SAR experienced OICs, commanding officers or coxswains;

Note that ideally, the second person on the evaluation team is a representative from another region and shall be a C/O or a coxswain with experience related to the type of lifeboat station being evaluated.

D. Example of a Checklist

The following pages are an example of a checklist to be used for a man overboard simulation. The last page is the consolidated form for the evaluation.

E. Man Overboard and Retrieving People in Water Procedures

Objective: To demonstrate the ability to retrieve people in the water by simulating a man overboard situation from the SAR unit.

Task: Returning to station, a crewmember, while going aft, is knocked unconscious and falls overboard.

Guidelines: It is assumed that the matter is witnessed by another crew member and therefore it is not intended to simulate a search pattern. Action is to begin with a dummy thrown overboard.

Man-Overboard Procedures	Observation/Recommendation
1. Was report of man overboard properly reported to coxswain? 2. Life ring or other datum marker thrown overboard. 3. Position punched in the Loran C (or GPS). 4. Coast Guard Radio station notified. 5. Proper pointer/lookout watch maintained. 6. Boat turned in direction of MOB. 7. Crew properly briefed on pickup and which side will be used for recovery. 8. Heaving lines and/or life lines and/or boat hook ready. 9. Rescue swimmer properly dressed and ready to assist (if applicable). 10. Proper approach made to man in water; MOB not endangered by unit. 11. Man safely recovered. 12. Recovering done within reasonable time. 13. Crew teamwork and coordination: (a) Crew member(s) aware of specific job responsibilities. (b) Crew member(s) communicated effectively. (c) Crew members assisted each other as necessary. 14. Coxswain supervised effectively: Sufficient guidance in a timely fashion provided when necessary.	

F. Evaluation Form

Life Boat Station:_____

Name of Vessel and Type:_____

Date :_____

Task's Descriptions and Specific Scene of Evaluation : _____

_____

_____

On Scene Weather Conditions And Any Other Appropriate Comments :

_____

_____

_____

Final Observation/Recommendation on Evaluation :_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Name	Position

Use and Maintenance of Portable Pumps

A. General

Portable pumps are among the most versatile and most utilized items of SAR equipment aboard the small SAR vessels. They may be used to dewater vessels, fight small boat fires, assist other agencies (e.g., fire departments), and clean up pollution.

A problem with portable pumps in a marine environment is that they require constant maintenance in order to prevent rust and corrosion, moisture damage, seizing of components, and refusal to start. Most of these problems can be eliminated entirely with a good preventive maintenance program. Experience has shown that servicing of SAR pumps significantly increases their efficiency and dependability. SAR pumps have been maintained in near-showroom condition for a number of years. Most importantly, they function for you during that SAR incident when you need them the most.

All pumps should be maintained and serviced to the manufacturers' specifications. (Refer to the maintenance section of the handbook supplied with the particular pump.) However, manufacturers' maintenance programs generally do not address use in a marine or saltwater environment. This section provides guidance for maintenance of Coast Guard SAR pumps (HONDA 3.5 and 5 hp) beyond the maintenance routine recommended by the manufacturer.

☞ **NOTE**

This section may not apply to a region where regional procedures require the usage of sealed pumps.

B. Gasoline

Always ensure that gasoline for use in SAR pumps is fresh. In cases where the pumps have been infrequently used, rotate the gasoline supply to ensure that the pump gas is not stale.

Pumps to be stowed inside cabins or cabinets must be stowed only when all gasoline has been drained from the supply tank and carburetor. Pump gasoline should be stowed in regulation gasoline containers, on deck or in a properly ventilated locker which has been specifically designed and approved for stowing gasoline.

C. Weekly test

(1) Ensure that the engine switch is in the "off" position.

(2) Disconnect the spark plug wire.

(3) Slowly pull out the starter cord and inspect for cuts, broken strands, burns, etc.

(4) Release the cord slowly back into the casing, ensuring that the cord rewinds all the way.

(5) Inspect the "on/off" switch for smooth operation.

(6) Remove the spark plug and clean it. Re-gap the spark plug to **.026** (or replace if required). Check the compression. It should be approximately **80 p.s.i.** Return spark plug to socket.

(7) Inspect the spark plug wire boot for signs of cracks or the wire pulling out of the boot. Replace on spark plug.

(8) Ensure that the fuel tank is full and oil level is at proper mark.

(9) Remove the drain and fill plugs. Inspect the plug threads and the threads in the pump housing.

(10) Inspect the suction hose, suction screen, and all fittings.

(11) Inspect the discharge hose and nozzle. (See section on fire hose.)

(12) Prime pump and start.

(13) Once a good flow is established, throttle in nozzle and check pump seals (visually) for leaks.

(14) Run pump for 5 to 10 minutes.

(15) Drain pump case and flush thoroughly with fresh water.

(16) Allow pump to cool.

(17) If the pump is to be stowed in an enclosed cabin space or a floatable pump canister, all fuel must be drained from the fuel tank and carburetor.

(18) Wipe the entire pump and engine structure down with a rag to remove salt, dirt, and grease. While doing this give the pump and engine a thorough visual inspection to ensure that there are no loose bolts, nuts, screws, or other components.

(19) Wipe the entire engine and casing down with a protective film of light oil, such as WD40.

(20) Return the entire pump kit to its designated storage position. If problems have been detected which you cannot resolve, report them to the duty coxswain before stowing the pump.

(21) Enter the maintenance routine and any non-routine maintenance conducted in the particular pump's log book.

D. Inspection

In the weekly check on a floating-pump kit, the contents should be compared with the following list:

- One pump, inside a plastic bag.
- One desiccant bag inside the plastic bag with the pump.
- One small bucket to prime the pump, with lanyard attached to the handle.
- One gallon container with fresh gas.
- One litre of motor oil.
- One plastic-coated bilingual instruction card.
- One strainer.
- One discharge hose.
- One suction hose.
- One flashlight.

E. Fitness for Service

A pump should be pulled from service and repaired or replaced under any of the following conditions:

(a) It fails to start within six pulls on the starter cord and all settings (on/off switch, choke, throttle, etc.) have been re-checked and another six pulls fail to start the pump.

(b) It stops or stalls after initial warmup.

(c) Pumping efficiency is noticeably less than normal.

(d) It misfires or fails to run smoothly.

(e) There is evidence of physical damage or excess rust.

(f) Compression testing shows compression below 70 p.s.i.

F. Honda Generator (10 amp to 30 amp)

(1) Inspection

(a) Ensure that the engine switch is in the "off" position.

(b) Disconnect the spark plug wire.

(c) Slowly pull out the starter cord and inspect for cuts, broken strands, burns, etc.

(d) Release the cord slowly back into the casing, ensuring that the cord rewinds all the way.

(e) Inspect the "on/off" switch for smooth operation.

(f) Remove the spark plug and clean it. Re-gap the spark plug to **.026** (or replace if required). Check the compression. It should be approximately **80 p.s.i.** Return spark plug to socket.

(g) Inspect the spark plug wire boot for signs of cracks or the wire pulling out of the boot. Replace on spark plug.

(h) Insure that the fuel tank is full and oil level is at proper mark.

(i) Plug a 1500-watt heater into the alternator output and run for 15 minutes to ensure that the generator is capable of maintaining the load. (Heater should be set to run at highest output setting.)

(j) Allow the unit to cool, and then wipe down with a clean rag.

(k) The generator must be stored in a warm and dry location. If it is to be stored in an unventilated inside compartment, the fuel must be drained from the tank and carburetor before storing.

(l) Log the service on the log sheet for the particular unit.

(2) Formula to Ensure 90% Load

$$\text{Amps} = \frac{\text{watts}}{\text{voltage}}$$

to achieve 90% load take generator rating

$$\frac{90}{100} = \frac{\quad}{\text{Generator Rating}}x\frac{\quad}{\quad}$$

x = load to be applied in amps.

Therefore, Amp (90%) x voltage = wattage to be used.

NOTE

The 1500-watt heater is used because it meets the requirement for the smaller generators and comes up to about 70% on the larger models. If you wish to apply an accurate test on the larger models, you will have to add more load.

Life Rafts, Lifeboats, and Survival Craft

A. General

In recent years research and development has produced a number of alternative survival craft to the old standard open lifeboats and rafts. Some of these new craft incorporate some very innovative features for escape and survival under very extreme weather and sea conditions.

Because of the growing numbers of survival-craft types, it is important for rescue crews to keep abreast of general developments, layouts, and features to aid them in effecting a rescue involving survival craft. This information is paramount in assisting the master of the rescue vessel with decisions such as when to stand by, escort, tow, board, or remove survivors from rescue craft. One of the best means of keeping abreast of these evolutions is to read the various marine journals that feature developments in survival craft.

This appendix encompasses the features and layouts of some basic models of survival craft and ancillary equipment currently in use by mariners worldwide. The following list contains the Ship Safety approved liferafts and life crafts listed in the TP 4479. The proceeding pages in this section contain diagrams illustrating different survival crafts.

Note that small life rafts approved for Aviation are similar to the ones approved for Marine. However, the large raft approved for large commercial airplanes, which are part of the escape slides, are different. The color may vary for the air chambers. Nevertheless, the canopy, if provided, remains orange.

B. List of Life Raft and Life Craft Manufacturers

(1) Life Raft

- Beaufort Inflatable Life Rafts
- Dunlop Beaufort Canada Ltd
- Dunlop Inflatable Life Rafts
- Elliot Inflatable Life Rafts
- R.F.D. Inflatable Life Rafts
- Tul Inflatable Life Rafts
- Viking Inflatable Life Rafts
- Seaco/Elliot Inflatable Life Rafts

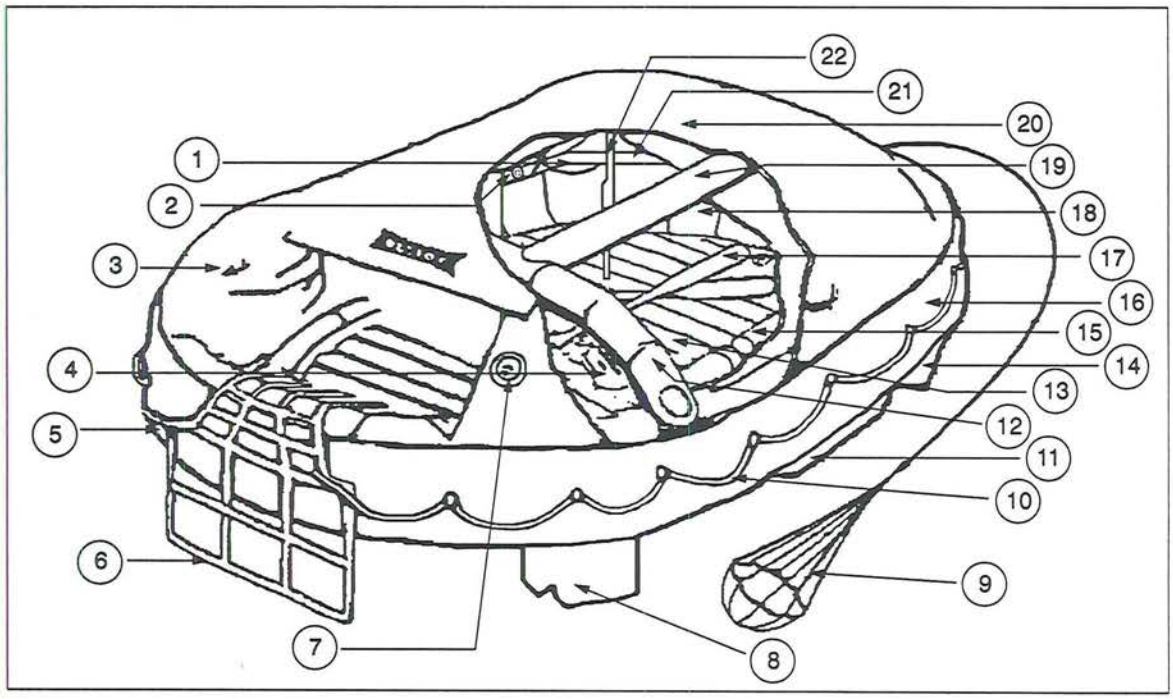
(2) Totally Enclosed Lifeboats

- Harding
- Viking
- Watercraft
- Fiskars
- Lambie
- Balmoral
- Waterman OY
- Welin-Lambie
- Whittaker (for oil rigs only)

(3) Inflatable Rescue Platforms

- Dunlop-Beaufort Canada
- Tul Inflatable Platforms
- Seaco/Elliot
- Viking Inflatable Platforms

C. Elliot Life Raft



1 Water-Activated Light
Helps survivors to locate raft at night

2 Safety and Topping-Up Valves
For topping up and relieving excess pressure

3 Safety Knife
To cut painter - cannot damage raft

4 Accessories Bag
Contains bellows/bailer/repair kit, etc.

5 Non-return Valve
To seal arch tubes in event of buoyancy damage

6 Combined Boarding Ladder and Towing Bridle
To give easy access for survivors in water

7 Rescue Line Outfit
To recover survivors who may drift away from raft

8 Water Pockets
Fill with water to stabilize raft

9 Drogue or Sea Anchor
To reduce drift and keep raft head to sea

10 Life Line
Provides grip for survivors in water

11 $C0_2$ Cylinder and Operating Head
For primary inflation of raft

12 Arch Tubes
Autom. erected to support canopy

13 Floor (Inflatable)
Inflate when cold, deflate when hot

14 Inlet Valves and Manifold
Non-return valves for primary inflation

15 Emergency Pack
Aids for survival, rations, pyrotechnics, first-aid, etc.

16 Deflation Plugs
For deflating raft when testing

17 Paddles
To assist in getting away from sinking vessel

18 Seat 20 and 25 man rafts only
Slung seat gives additional comfort

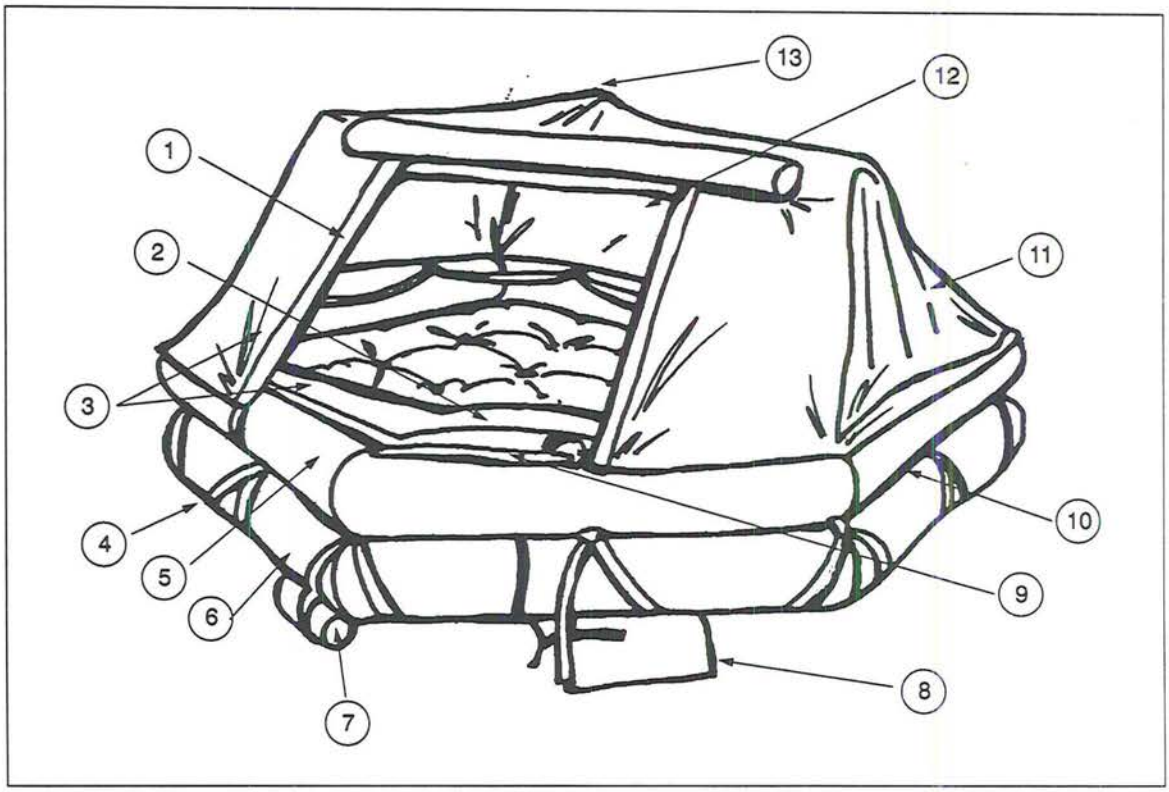
19 Inflatable Longitudinal Canopy Brace
Gives rigidity to arch tubes

20 Canopy
Double walled to provide exposure protection

21 Survivor Safety Strap
Keep survivors secure in rough waters

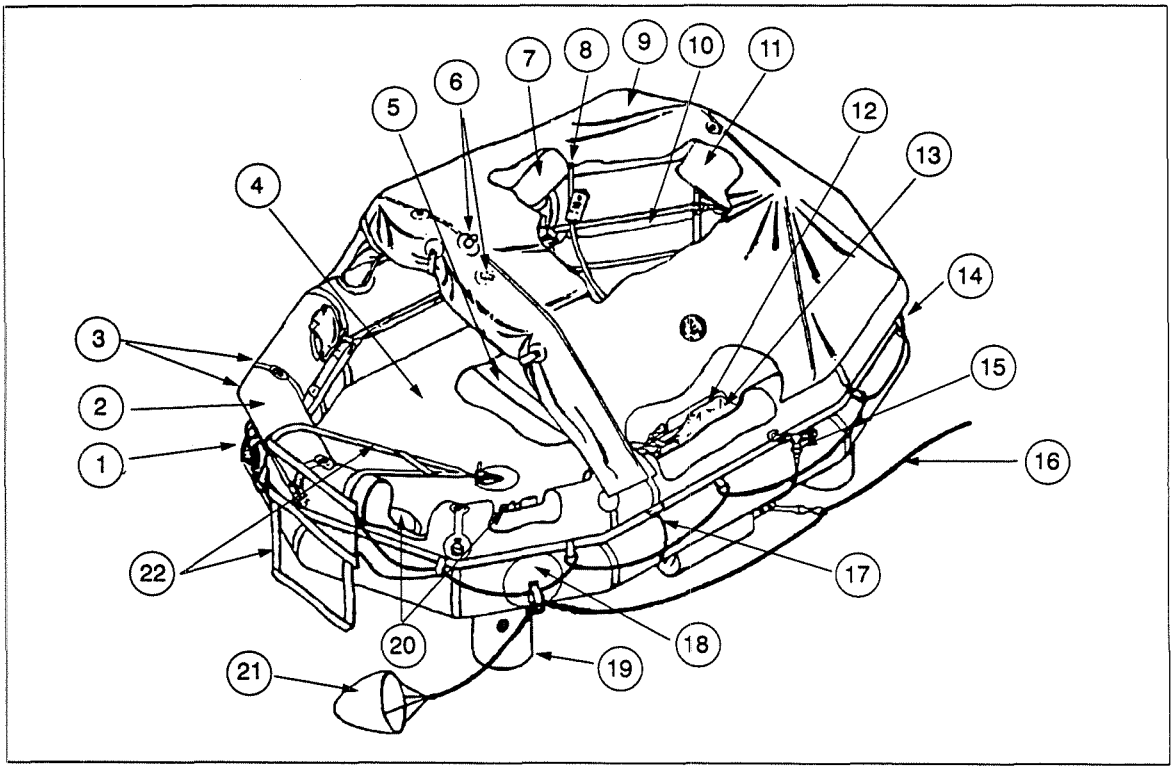
22 Rain Water Catchment
To provide additional supplies of drinking water

D. Beaufort Life Raft



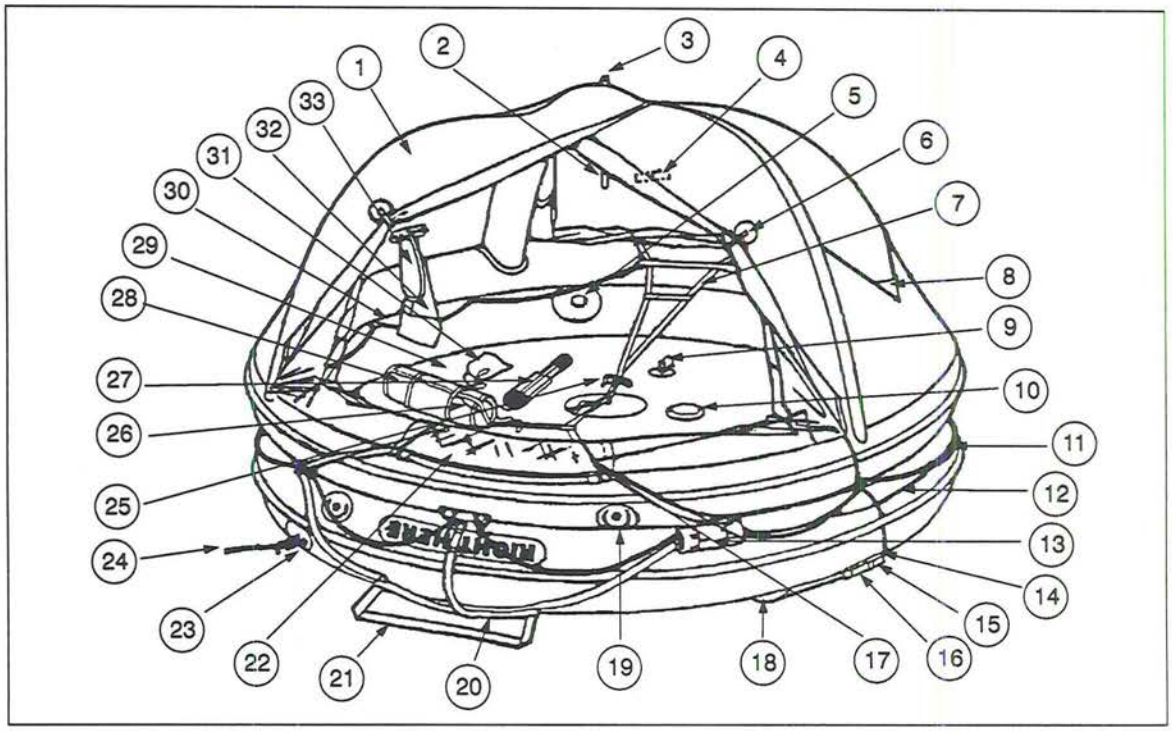
1 Self-erecting Arch
2 Survival Pack
3 Waterproof Entrance
4 Sea Anchor and Painter Line
5 Upper Buoyancy
6 Lower Buoyancy
7 Stabilizing Pockets
8 CO_2 Cylinder
9 Boarding Handles
10 Life line
11 Blaze Orange Canopy
12 Ventilation Observation Point
13 Water-Activated Lights

E. Dunlop Life Raft



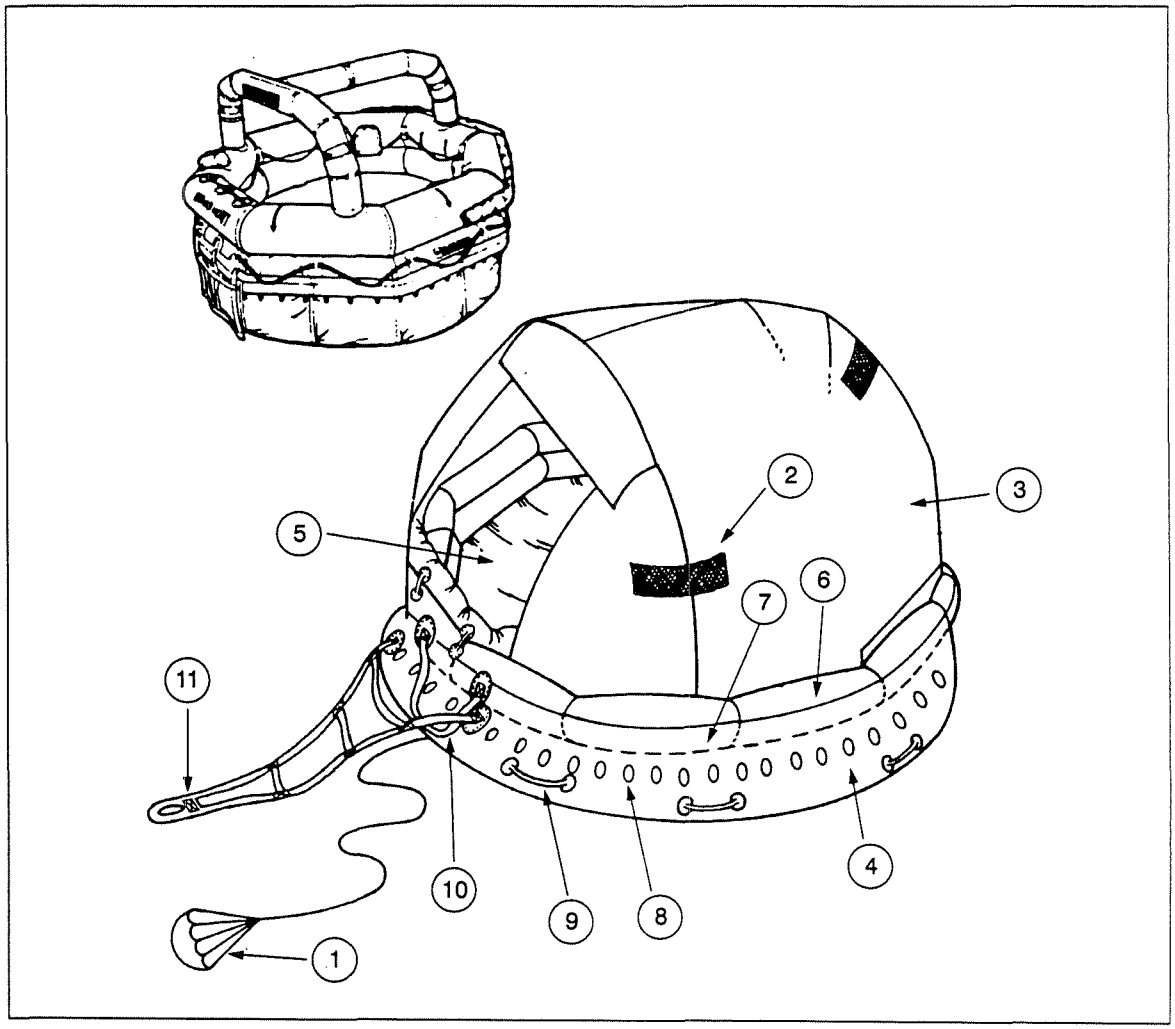
1 Lower Buoyancy Chamber
2 Upper Buoyancy Chamber
3 D-rings and Press Studs for securing canopy
4 Single Skin, Non-inflatable Floor
5 Handling Line
6 Internal and External Light
7 Arch Tubes
8 Rainwater Catchment Hold and Tube. Handbook
9 Single-Layer Canopy
10 Internal Handhold
11 Lookout Sleeve with Drawstring
12 Paddles
13 Emergency Pack and International Rescue Signal Table
14 External Handhold
15 Inflation Gear
16 Painter Line
17 Cable from lights to sea-activated cell on sea floor
18 Towing Loop Patch
19 Stabilizing Water Pockets
20 Rescue Line and Quolt. Knife
21 Drogue
22 Boarding and Hauling-in Ladder

F. R.F.D. Life Raft



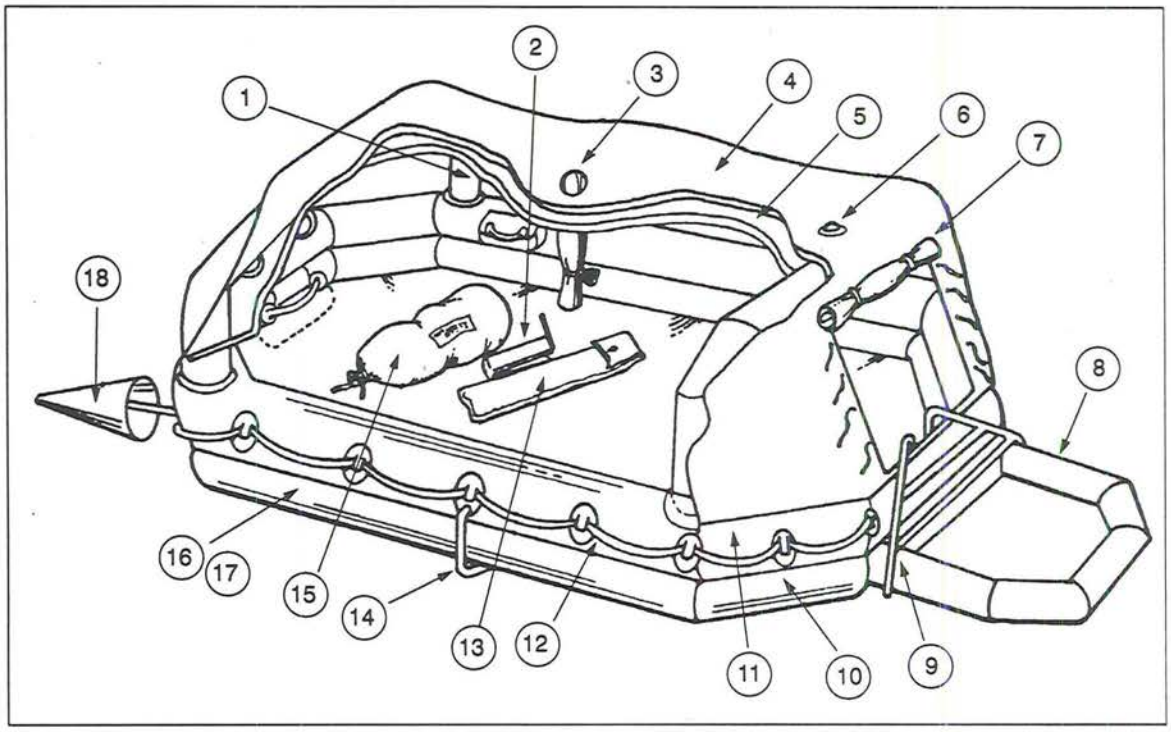
1 Double Canopy
2 Internal Light
3 External Light
4 Knife (stuck on Arch Tube)
5 Safety/Topping-up Valve
6 Canopy Furling Tapes
7 Hauling-in Line
8 Rain Catchment
9 Floor Inflation Valve
10 Rescue Line
11 External Life Line
12 Drogue Line
13 Drogue
14 Cell Pocket
15 Plug
16 Sea Light Cell
17 Canopy Furling Tapes
18 Water Stabilizing Pocket
19 Deflation Plug
20 Inflation Hose
21 Boarding Ladder and Righting Strap
22 Window in Inner Door
23 Painter Patch
24 Painter
25 Quick Release for Hauling-in Line
26 Lanyard
27 Paddles
28 Emergency Pack
29 Double Floor
30 Internal Life Line
31 Equipment Bag
32 Canopy Instruction Label/Bag (Life Raft Hand-book inside bag)
33 Rain Catchment Tube and Bung

G. Typical Four-Person Life Raft



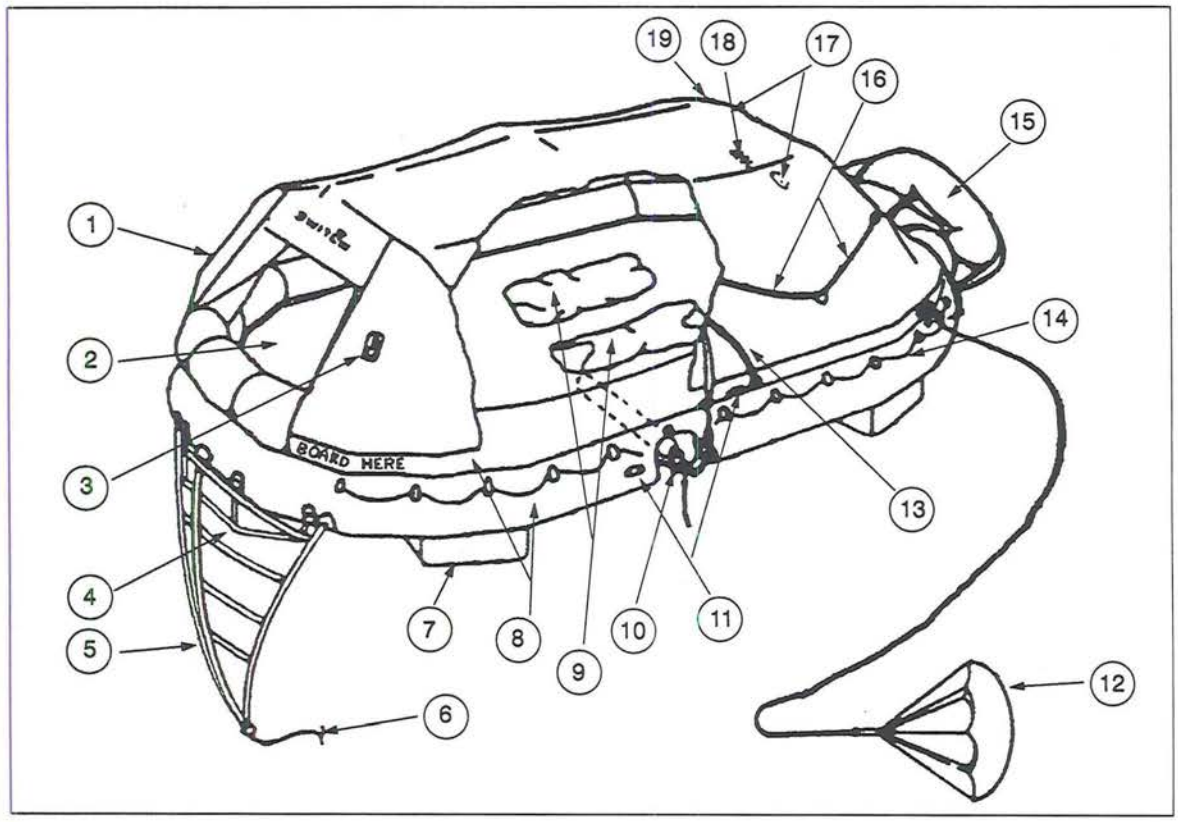
1 Sea Anchor
2 Retroreflective Material
3 Canopy Cover
4 Ballast Bag
5 Floor
6 Buoyancy Tube (Upper)
7 Buoyancy Tube (Lower)
8 Ballasting Port
9 Deballasting Handle
10 Boarding Ladder
11 Towing Bridle

H. Typical U.S. Coast Guard-Approved Raft

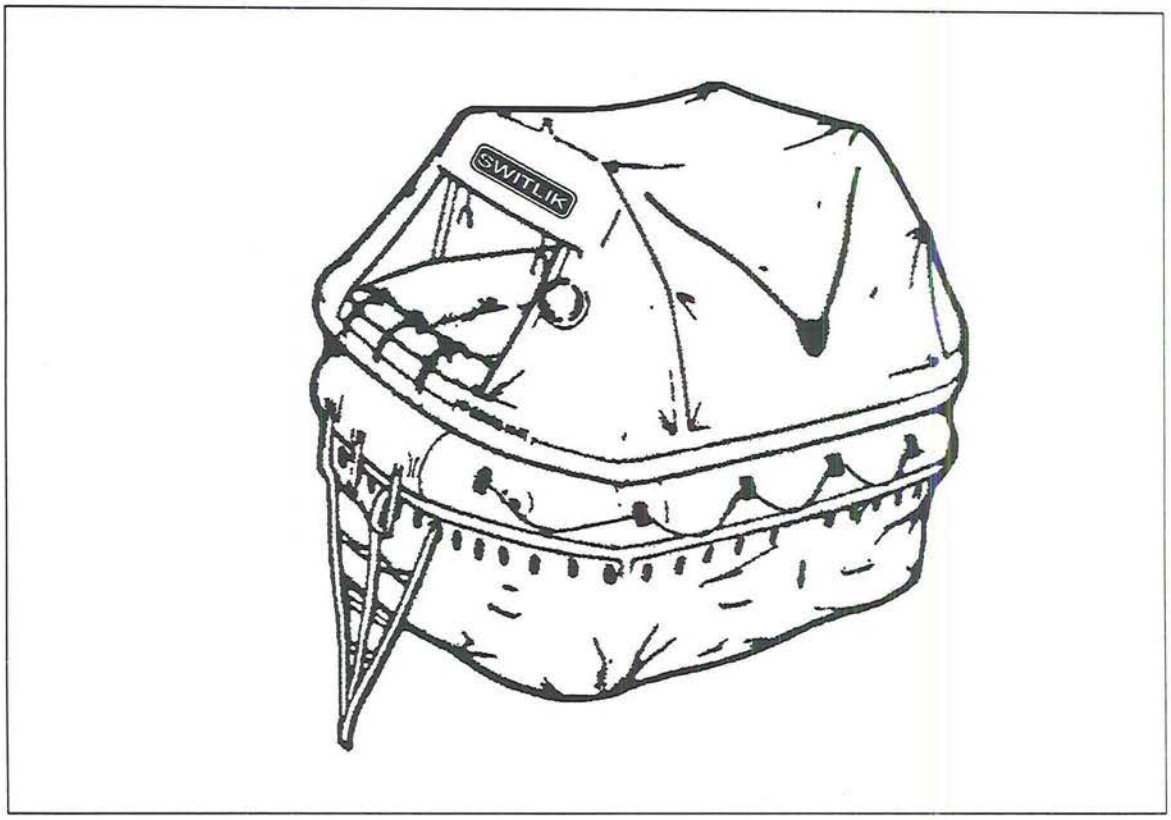


1 Canopy Arch
2 Pump
3 Rain Catcher with Tie-Down Line
4 Exterior Canopy
5 Inner Canopy
6 Outside Light (Recognition)
7 Canopy Closure
8 Boarding Ramp
9 Boarding Handles
10 Hull Tube
11 Gunwale Tube
12 Life Line
13 Paddle Bag
14 Righting Line
15 Equipment Container
16 Hull CO_2 Bottle
17 Gunwale CO_2 Bottle
18 Sea Anchor

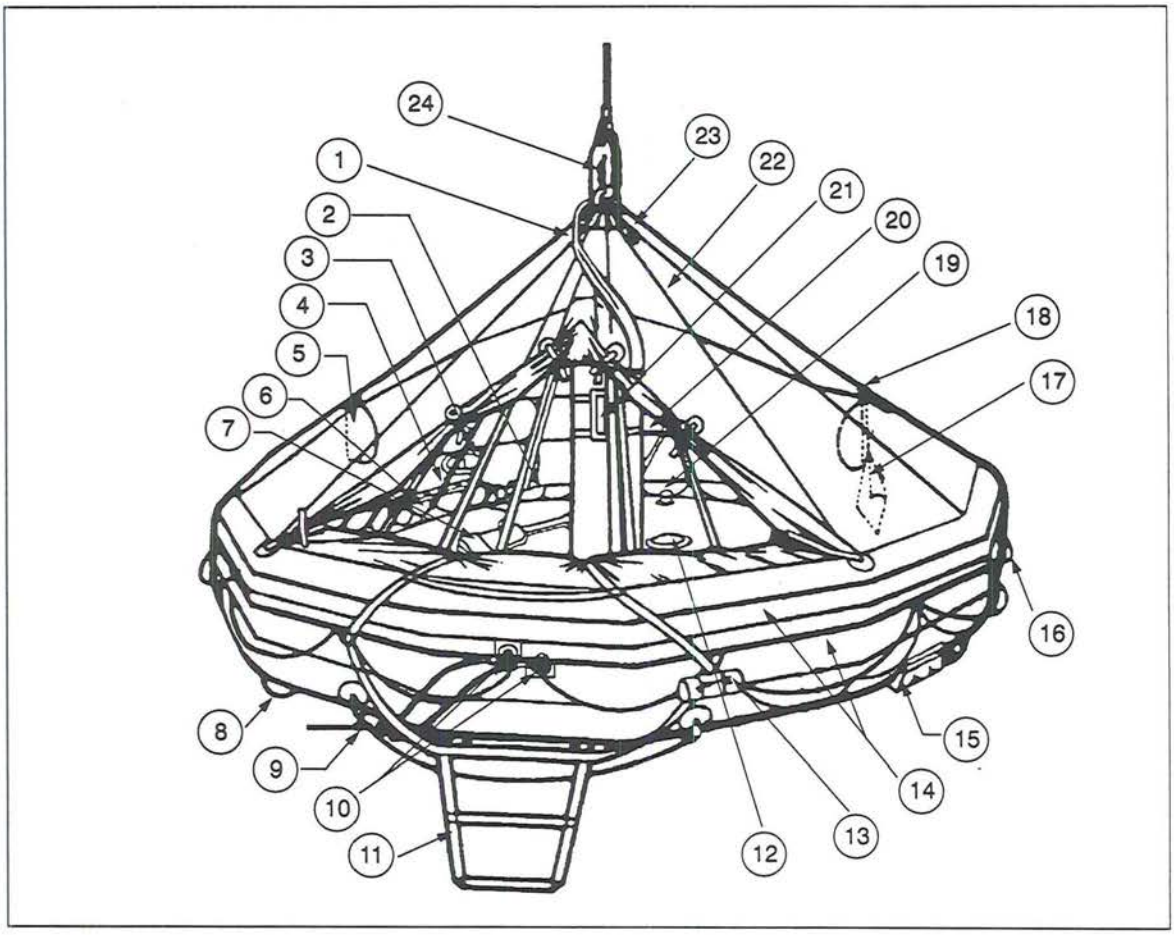
I. Switlik Life Raft



1 Main Weather Cover
2 Inflatable Floor
3 Floating Sheath Knife
4 Boarding Ladder
5 Towing Bridle
6 Operating Painter/Lanyard
7 Water Stabilizing Pocket
8 Buoyancy Tubes
9 Survival Equipment and Emergency Pack
10 CO_2 Inflation System
11 Deflation Plug
12 Sea Anchor
13 Righting Strap
14 External Lifeline
15 Boarding Ramp
16 Rainwater Catchment
17 Pressure Relief Valves
18 Heaving/Rescue Line
19 Recognition Light

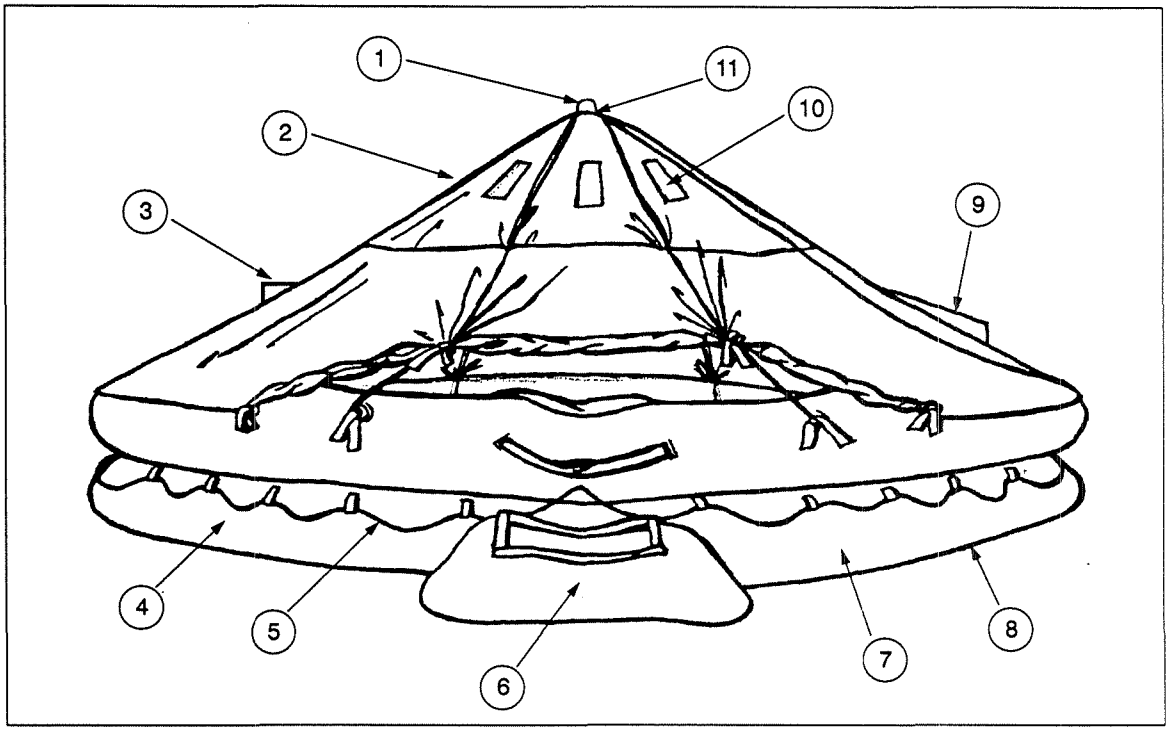

SWITLIK

J. B.F. Goodrich Davit-Launchable Inflatable Life Raft



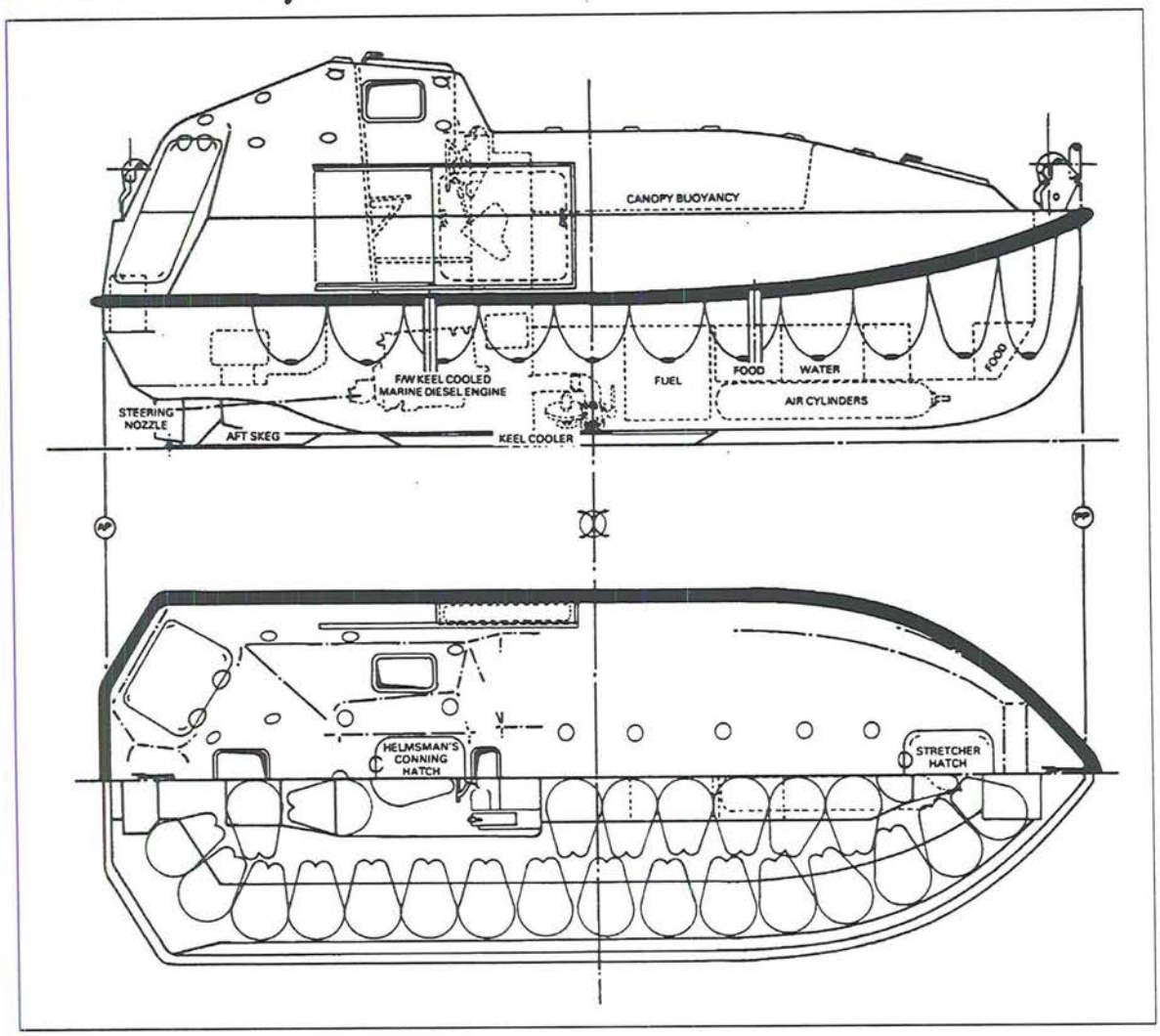
1 Hook Release Lanyard
2 Equipment Bag
3 Topping-up Valve
4 Inner Lifting Strap Assembly
5 Rain Catchment Tube and Bung
6 Emergency Pack
7 Paddles
8 Water Stabilizing Pocket
9 Painter Bridle
10 Inflation Valves
11 Boarding Ladder (Righting Strap Beneath)
12 Rescue Line
13 Sea Anchor
14 Buoyancy Chambers
15 Sea Light Cell
16 Life Line
17 Plastic Water Bag
18 Rain Catchment Tube and Bung
19 Floor Inflation Valve
20 Hauling-in Line
21 Knife
22 Canopy
23 External Light
24 Release Hook

K. B.F. Goodrich Life Raft



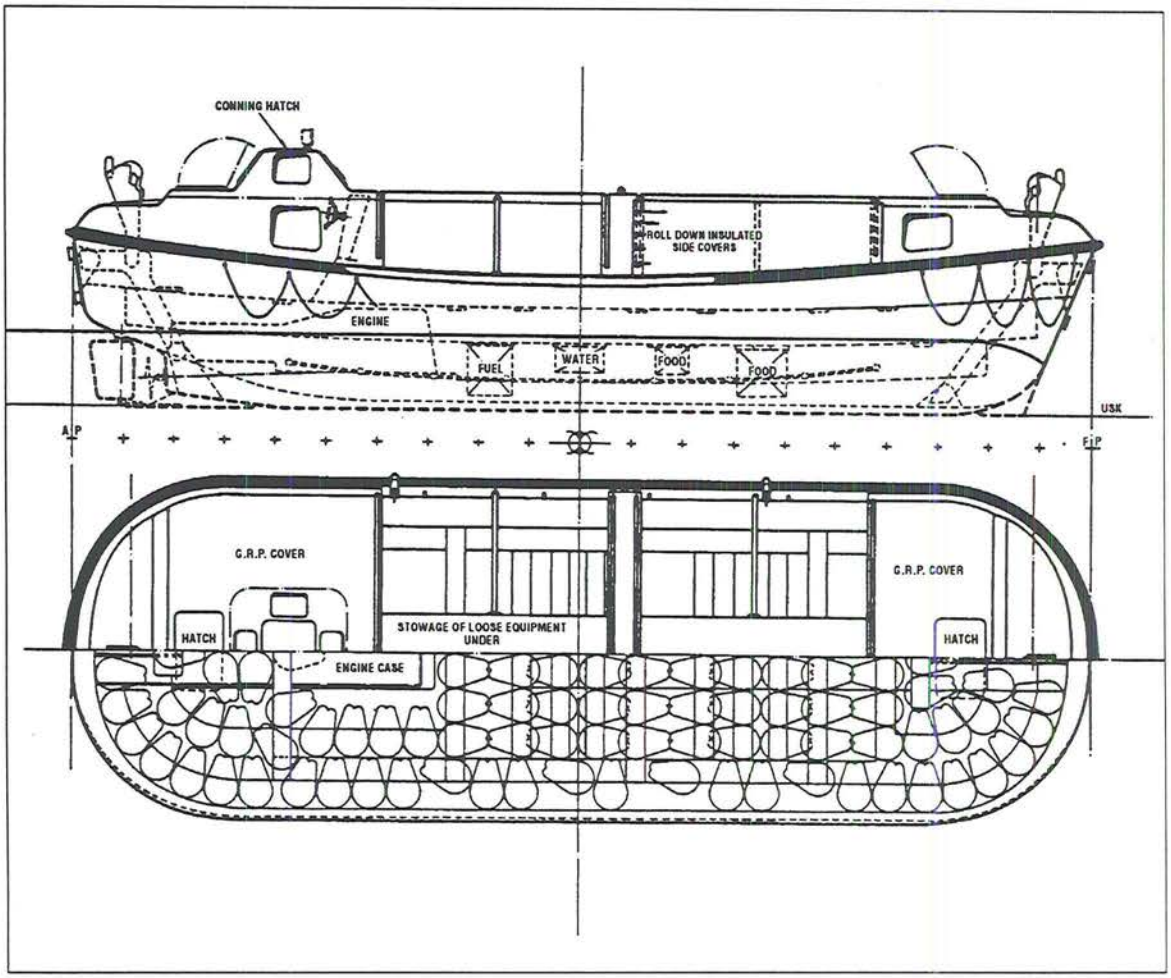
1 Interior/Exterior Lights
2 Double-Wall Canopy
3 Rain Catchment Tube
4 Double Buoyancy Chambers
5 Auxiliary Life Lines
6 Inflatable Boarding Ramp
7 Water Stabilizing Pockets (beneath)
8 Righting Strap (beneath)
9 Viewport
10 Reflective Strips
11 Antenna Port

L. Watercraft Totally Enclosed Survival Craft



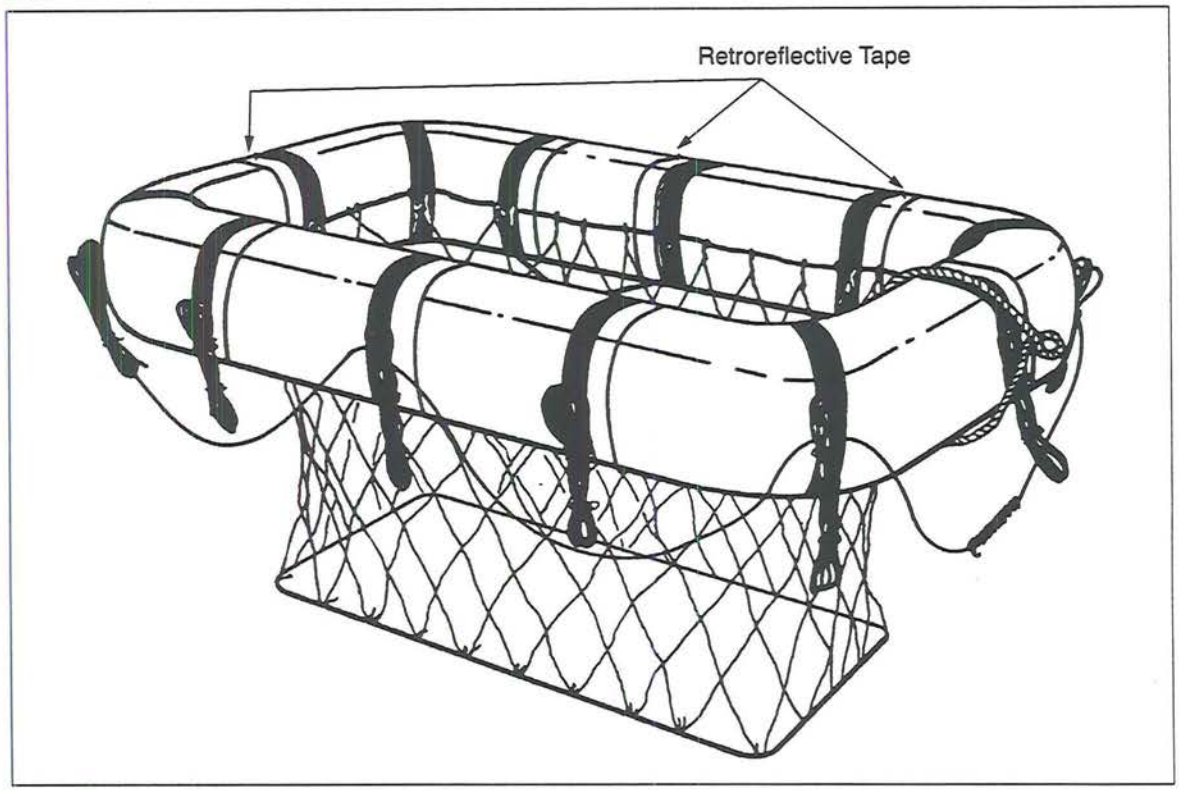
Moulded Dimensions	With external water sprays and compressed air cylinders (WS0092/WS0139)				Without external water sprays and compressed air cylinders (WS0096/WS0153)				Lifting Hook Centres
	Max. persons	Light weight	Weight persons	Total Davit load	Max. persons	Light weight	Weight persons	Total Davit load	
6.50 x 2.25 x 2.275	32	2844	2400	5244	32	2644	2400	5044	6.245
7.30 x 2.25 x 2.275	38	3120	2850	5970	38	2900	2850	5750	7.045
7.50 x 2.75 x 2.35	50	4500	3750	8250	50	4015	3750	7765	7.020
8.50 x 2.75 x 2.35	60	4835	4500	9335	60	4350	4500	8850	8.020
9.40 x 3.50 x 2.92	70	6800	5250	12050	70	6070	5250	11320	8.870
9.40 x 3.50 x 2.92	80	6800	6000	12800	80	6070	6000	12070	8.870

M. Watercraft Partially Enclosed Lifeboats



Moulded Dimensions	Max. persons	Light weight	Weight persons	Total Davit load	Lifting Hook Centres
7.30 x 2.25 x 0.95	38	2900	2850	5750	7.045
8.00 x 2.70 x 1.18	50	3568	3750	7318	7.00
8.50 x 2.75 x 1.05	60	4350	4500	8850	8.02
8.50 x 2.75 x 1.373	40	4400	3000	7400	7.50
9.75 x 3.353 x 1.43	85	6388	6375	12763	8.78
10.973 x 3.81 x 1.576	106	7322	7950	15272	9.50

N. Typical Life Float



Model No.	Persons Cap.	Length	Width	Shell Dia.	Shipping Weight
LF-6	6	49 1/2	35 3/4	8 x 10	60
LF-10	10	72	44	8 1/2 x 11	95
LF-12	12	72	44	8 1/2 x 11	95
LF-15	15	90	48	9 1/2 x 11 1/2	125
LF-25	25	108	60	11 1/2 x 11 1/2	150

Amendment of Manual

A. General

This manual is not intended to be definitive. As is typical of operational manuals, it will require regular amending.

There are many reasons to change, amend and improve the contents and illustrations of this manual. They include: operational reasons where users of this manual think that a better method of performing a task should be included; mistakes that have not been identified yet; adding new subjects that users consider essential; and updating to new standards, regulations or equipment.

Therefore, the following amendment form has been developed to facilitate modifications. Note that amendment forms should be forwarded to the address shown on the form.

Please do not hesitate to submit any comments; they are welcome and will all be considered. If a new illustration is suggested, it will be copied by an artist from your own handdrawing. As you are the end users of this manual, you will find it to your benefit to provide your input. Please remember, this manual can be an asset to the SAR community only if you are willing to contribute your thoughts and suggestions.

B. Amending Form: Operational Guidelines for Search and Rescue Units (Type 100 and 300)

Please circle the statement most appropriate to your suggestion:

(1) Correction to a present section.

(2) Addition to a present section.

(3) Addition of a new section.

Section affected:

Proposed by:
Position:
Unit:

Nature of change:

(Attach any other pertinent material including illustrations)

Send this form to:
Rescue and Environmental Response
Equipment Definition and
Small Craft Operations Officer
344, Slater Street
Ottawa Ont. K1A 0N7
(613) 990-5882 Fax: (613) 990-8902