SAR Seamanship Reference Manual
**FOREWORD**

This SAR Seamanship Reference Manual is published under the authority of the Manager, Search and Rescue, of the Canadian Coast Guard. Funds associated for the development of this manual were provided by a generous contribution from the National SAR Secretariat’s New SAR Initiatives Fund program. Without this financial contribution, the publication of this manual would not have been possible.

**Purpose**

To be able to perform safely and effectively, a rescue mission involves a huge amount of operational knowledge. Most of that knowledge is already available. However, in the context of small vessels, it is dispersed under a number of specialised and individually prepared courses or, under bits of documented information. In addition, the background and theory that sustains SAR operational knowledge is in many cases developed for larger ships involved in offshore rescue. Although the information is helpful, it does not always reflect the reality of small boat operations. A prime example would be first aid where all courses are developed around a movement free stable ground, which is quite different from a small bouncing boat deck.

Another issue is standardisation. Search and Rescue is essentially a humanitarian activity with the prime purpose of saving lives. In most cases, it involves the participation of number of dedicated people that may not have the same background. In order to make operations more efficient, it is paramount to have people executing operational tasks the same way. Therefore, this manual is aiming at introducing and standardising small boat operations for SAR. In fact, the purpose is to bring together under one manual all known best operational procedures and practices that usually apply to small boat involved in a SAR mission.

This manual targets two main groups of small boat rescuers. One is the Canadian Coast Guard Auxiliary and the other one is the Canadian Coast Guard Inshore Rescue Boat Program. However, other organized response units such a local Fire Department can certainly benefit from this manual. We hope that it will incorporate and standardise the current best practices employed within the Canadian Coast Guard operations community. It is intended to be the primary reference for the above noted two targeted groups, mainly for shore based boat operations and seamanship training.

The standardised methods and procedures presented in this Manual can apply to all boat operations and crew training and, Commanding Officers, Officers in Charge or Coxswains are encouraged to ensure that personnel tasked with boat crew responsibilities are trained or familiar in all methods and procedures in the Manual.

As the scope of this knowledge is quite vast, it will be under continuous review and will be updated as necessary. In addition, errors, omissions or suggestions should be forwarded to:

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**ABBREVIATIONS AND ACRONYMS**

NOTE: The abbreviations are listed alphabetically in the first column, with the French equivalent in brackets. Bold characters indicate that the abbreviation is the same in both languages.

- AMVER: Automated Mutual Assistance Vessel Rescue System
- CASARA (ACRSA): Civil Air Search and Rescue Association
- CCG (GCC): Canadian Coast Guard
- CCGS (NGCC): Canadian Coast Guard Ship
- CCGA (GCAC): Canadian Coast Guard Auxiliary
- CF (FC): Canadian Forces
- CGRS (SRGC): Coast Guard Radio Station
- COSPAS: Russian for: Space system search for distressed vessels
- CSA (LMMC): Canada Shipping Act
- CSS: Co-ordinator surface search
- DF: Direction finder
- DFO (MPO): Department of Fisheries and Oceans
- DND (MDN): Department of National Defence
- DMB: Data marker buoy
- DSC (ASN): Digital selective calling
- ECAREG Canada: Eastern Canada Traffic Zone Regulations
- ELT: Emergency locator transmitter
- EPIRB (RLS): Emergency position-indicating radio beacon
- ETA (HPA): Estimated time of arrival
- FRC (ERS): Fast rescue craft
- F/V (B/P): Fishing vessel
- GMDSS (SMDSM): Global Maritime Distress and Safety System
- GPS: Global Positioning System
- IMO (OMI): International Maritime Organisation
- Inmarsat: International Mobile Satellite Organisation
- IRB (ESC): Inshore rescue boat
- kt (nd): Knot (nautical mile per hour)
- LKP: Last known position
- m: Metre
- MCTS (SCTM): Marine Communications and Traffic Services Centre
- MARB: Maritime assistance request broadcast
- Medevac: Medical evacuation
- MSI: Maritime safety information
- MRSC: Maritime rescue sub-centre
- M/V (N/M): Merchant vessel or motor vessel
- NM (MN): Nautical mile
- NSS (SNRS): National Search and Rescue Secretariat
- OBS (BSN): Office of Boating Safety
- OSC: On-scene co-ordinator
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIW</td>
<td>Person in water</td>
</tr>
<tr>
<td>PLB</td>
<td>Personal locator beacon</td>
</tr>
<tr>
<td>POB</td>
<td>Persons on board</td>
</tr>
<tr>
<td>RCC</td>
<td>Rescue co-ordination centre</td>
</tr>
<tr>
<td>SAR</td>
<td>Search and Rescue</td>
</tr>
<tr>
<td>SARSAT</td>
<td>Search and Rescue Satellite-Aided Tracking</td>
</tr>
<tr>
<td>SART</td>
<td>Search and rescue (radar) transponder</td>
</tr>
<tr>
<td>SERABEC</td>
<td>Sauvetage et recherche aériens du Québec</td>
</tr>
<tr>
<td>SITREP</td>
<td>Situation Report</td>
</tr>
<tr>
<td>SKAD</td>
<td>Survival kit air droppable</td>
</tr>
<tr>
<td>SLDMB</td>
<td>Self-locating datum maker buoy</td>
</tr>
<tr>
<td>SMC</td>
<td>Search and rescue mission co-ordinator</td>
</tr>
<tr>
<td>SOLAS</td>
<td>International Convention of the Safety of Life at Sea</td>
</tr>
<tr>
<td>SRR</td>
<td>Search and rescue region</td>
</tr>
<tr>
<td>SRU</td>
<td>Search and rescue unit</td>
</tr>
<tr>
<td>S/V (B/V)</td>
<td>Sailing vessel</td>
</tr>
<tr>
<td>UTC</td>
<td>Co-ordinated universal time</td>
</tr>
<tr>
<td>VTS (STM)</td>
<td>Vessel traffic services</td>
</tr>
<tr>
<td>VHF</td>
<td>Very high frequency (30 to 300 MHz)</td>
</tr>
</tbody>
</table>
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6 Navigation Safety

6.1 Collision regulations

6.1.1 General
Navigation, like vehicle driving, has its set of rules of the “road.” The problem is that not everybody using the “road” knows the rules. As an SAR crewmember, you will probably have to maneuver at high speed both among people that are familiar with the rules and among people that know nothing about them. To avoid accidents, you must know how to navigate with these people. Also, everybody expects SAR responders to behave in a professional manner. Knowing the rules is part of a professional attitude. Lastly, the legal consequences of not knowing the rules could be really serious if you were to be involved in a collision.

For all these good reasons, let’s take a few pages of this manual to look at the collision regulations: the rules of the road. You MUST know all the rules presented in the following pages, and there is no magical way to learn them. This is an extremely difficult subject, but always remember that your safety and the safety of other vessels may depend on your knowledge of these rules. Please take the time to study them.

On the Internet (Transport Canada), you will find the current Collision Regulations. Although it is paramount to know every single rule presented in the regulations, the following pages deal with those that are the most relevant when it comes to SAR operations with small units.

6.1.2 Responsibility

Rule 2 of the collision regulations states:

- a) Nothing in these Rules shall exonerate any vessel, or the owner, master or crew thereof, from the consequences of any neglect to comply with these Rules or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstance of the case.
- b) In construing and complying with these Rules, due regard shall be had to all dangers of navigation and collision and to any special circumstances, including the limitation of the vessel involved, which may make a departure from these Rules necessary to avoid immediate danger.

Simply put, then:
- If you are involved in a collision and you did not follow the Rules, you are 100% responsible;
- The Rules are not there to replace good judgment and practice of good seamanship. You should not put your vessel in any danger by blindly following the Rules. You must consider all factors pertaining to navigation (water depth, wind, traffic, current, maneuverability of your vessel, etc.) when complying with the Rules.

6.1.3 Lookout

Rule 5 of the collision regulations states:

Every vessel shall at all times maintain a proper lookout by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.
In other words, you should always have at least one person designated as a lookout at all times when you are on board. Under no circumstances should your vessel be underway without someone on lookout duty. This rule may seem quite obvious, but be remember that on an SAR case, everyone on board may be doing something (looking at charts, taking care of casualties, talking on the radio or cellular phone, etc.), and the lookout position may be overlooked.

6.1.4 Safe speed

Rule 6 of the collision regulations states:

Safe Speed – International

Every vessel shall at all times proceed at a safe speed so that she can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions.

In other words, the speed at which you navigate must be adapted to the prevailing circumstances and conditions. For example, a safe speed in plain daylight may not be safe at night or when visibility is restricted by fog. Coxswains must use good judgment to determine safe speed. In low visibility, it is good practice to be able to stop your vessel in one-half the visibility distance. The rules go on to provide a list of the factors that should be taken into account in determining a safe speed.

By all vessels:

(i) the state of visibility;

(ii) the traffic density including concentrations of fishing vessels or any other vessels;

(iii) the maneuverability of the vessel with special reference to stopping distance and turning ability in the prevailing conditions;

(iv) at night, the presence of background light such as from shore lights or from backscatter of her own lights;

(v) the state of wind, sea and current, and the proximity of navigational hazards;

(vi) the draught in relation to the available depth of water.

In addition to the international rules, some modifications apply in Canadian waters:

Safe speed – Canadian modifications

(c) In the Canadian waters of a roadstead, harbour, river, lake or inland waterway, every vessel passing another vessel or work that includes a dredge, tow, grounded vessel or wreck shall proceed with caution at a speed that will not adversely affect the vessel or work being passed, and shall comply with any relevant instruction or direction contained in any Notice to Mariners or Notice to Shipping.

(d) For the purpose of paragraph (c), where it cannot be determined with certainty that a passing vessel will not adversely affect another vessel or work described in that paragraph, the passing vessel shall proceed with caution at the minimum speed at which she can be kept on her course.
6.1.5 Conduct of vessels in sight of one another

Traffic on roads and highways would be chaos without laws to regulate the right of way. On the water, where movement is less restricted, rules of the road are even more important. This is particularly true of crossing situations.

![Diagram of meeting situations]

**Port**: If a power driven vessel approaches within this sector, maintain with caution, your course and speed.

**Starboard**: If any vessel approaches within this sector, keep out of its way. *(Note: this rule may not always apply if one or both vessels are sailboats.)*

**Stern**: If any vessel approaches this sector, maintain with caution your course and speed.

A blows one blast and alters course to starboard.
B blows one blast and alters course to starboard.

A keeps clear of and must avoid crossing ahead of B.

Any vessel overtaking another must keep clear.

A keeps clear of B
B keeps clear of D
C keeps clear of A and B
D Keeps clear of A and C

A power-driven vessel keeps clear of a sailing vessel.

*Figure 6.1: Meeting situations*
6.1.5.1 Meeting, Crossing and Overtaking

There are three situations which may lead to boat collisions: meeting head on, crossing each other's paths, and one vessel overtaking and passing another.

**Meeting**

Neither boat has the right of way, and each should swing right, then straighten course to pass left side to left side, as vehicles on the road do. Meeting situations would almost never involve risk of collision if all boats adopted this practice. Unfortunately, they don't.

If you must change your boat's heading to avoid collision, then give one blast on your horn to indicate you are changing course to your right, or two blasts to signal that you are changing course to your left. Note that if your boat and the other craft are on the left side of the channel, it is better to pass right side to right side then to try to exchange positions.

**Crossing**

When two boats are approaching each other at right angles, they may be in danger of colliding with each other. To help determine whether the two vessels are on a collision course, visually align some vertical part of your boat – a flagstaff or antenna, for example – with any point on the other boat. If this bearing remains the same over a period of time, then a danger of collision exists.

When boats are in a crossing situation, the boat on the right has the right of way. This does not mean that the skipper can do as he or she pleases. The skipper is required to maintain course and speed, so that the other boat operators can calculate the best method of keeping clear. Both should use the proper manoeuvring and warning signals. Very few operators do.
Overtaking

The boat being overtaken always has the right of way, and the overtaking boat should take
the following steps if it wishes to pass:

- Swing clear of the wake of the overtaken boat, preferably so that the overtaker will
  pass as an overtaking vehicle does, on the slower vessel’s left side;
- Both should use the proper manoeuvering and warning signals;
- Pass safely, the passing boat must be clear ahead of the other vessel before the pass-
  ing situation is ended.

Note: Actual rules for crossing situations can be found in Section II of the Collision Regulation booklet.

6.1.5.2 Sailboats and special situations

As a general rule, sailing craft have the right of way over engine-driven vessels, but it is
important to remember the exceptions:

- A sailboat overtaking a powerboat does not have the right of way (the overtaken
  vessel always has the right of way);
- A sailboat does not have the right of way over a commercial fishing boat while it is
  fishing; no small vessel, power or sail, has the right of way over a large vessel in a
  narrow channel, when the large vessel cannot safely leave the channel.

In fact, with respect to large commercial craft (tugs, freighters, ferries, etc.) small pleasure
boats would do best to stay completely clear of them. Large ships and tugs cannot
manoeuver easily or stop quickly. Right of way aside, it is very foolish to approach large
ships closely. This applies even when a large vessel is tied to a pier. Her propeller may still
turn over, and it can reduce a small boat to kindling in the wink of an eye.

When passing commercial docks and piers, be alert for one long blast of a ship’s whistle,
which means that a vessel is about to pull clear from a slip. Three blasts of a whistle mean
that ship’s engines are in reverse and that she is beginning to back up.

6.1.6 Conduct of vessels in restricted visibility

In restricted visibility, every vessel shall proceed at a safe speed adapted to the prevailing
circumstances and conditions of restricted visibility. Additional sound signals tell other
boats what you are up to before your boat is visible. Besides using these signals, every skip-
per must operate his or her boat so that she can be stopped in order to avoid collision. A
rule of the thumb suggests that the skipper should operate the boat so that she can be stopped in one-half the visibility distance. In addition to using sound signals, all vessels
should show proper lights and shapes. Section III of the Collision Regulation covers all
these topics. The reader is encouraged to read this section carefully.

6.2 Lookout procedures

6.2.1 General

Under the direction of the coxswain, crewmembers are assigned various watches, which
are described in this section.
6.2.2 Requirement
The Collision Regulations state that “Every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.”

6.2.3 Assignment and station
Coxswains must assign and station lookouts properly in order to comply with the requirement noted above. While the boat is underway, lookouts must report to the coxswain everything seen, smelled, or heard that may endanger the boat or may indicate a situation to investigate (e.g., distress, law enforcement or pollution). Some examples are:

- ships;
- land;
- obstructions;
- lights;
- buoys;
- beacons;
- discoloured water;
- reefs;
- fog signals;
- anything that could affect safe navigation.

Note: It is most important for the coxswain to consider the experience level and abilities of individual crewmembers when making assignments. In the past, the inappropriate assignment of crew duties has contributed to mishaps resulting in fatalities.

6.2.4 Guidelines
Use the following guidelines to stand a proper lookout watch:

- Remain alert and give full attention to your assigned duty;
- Remain at your station until you are relieved;
- Do not distract yourself or others with excessive conversation, (however, some conversation among crewmembers may be beneficial in reducing fatigue and maintaining alertness);
- Speak loudly and distinctly when making a report;
- If you cannot positively identify the object sighted, smelled or heard, report what you think at that moment;
- Repeat your report until it is acknowledged by the coxswain;
- When conditions impair your ability to see, smell, or hear, report the condition so that the coxswain can take corrective action;
- Report everything you see, including floating material, even if you have to report it several times;
- Make certain you understand your duties. If you do not understand your duties, ask for more information.
6.2.5 Lookout positioning

Lookouts must be posted by the coxswain so that they have the best possible chance of seeing and hearing an approaching vessel or searching for an object in the water. The coxswain should use the following steps when positioning lookouts:

- Choose a boat speed that enables lookouts to effectively and safely perform their duties;
- Position lookouts so they can effectively and safely perform their duties under the operating conditions (e.g., restricted visibility, boat speed, sea state, weather);
- During periods of rain, sleet, and snow or when taking spray over the bow, select lookout positions that minimize impairment of vision;
- During a search, post two lookouts when possible. Lookouts should be positioned on each side of the vessel so that each can scan a sector from dead ahead to directly aft;
- Select a stable location that will not place the lookouts in danger of being blown or swept overboard.

6.2.6 Object identification

Lookouts must report what they see, smell or hear with as much detail as possible. Object type is immediately important (vessel, buoy, breaking waves), but additional details may help the coxswain in decision making. Some obvious characteristics of objects include colour, shape and size.

At night, lookouts must identify the colour of all lights. This is the specific reason why all boat crewmembers must have normal colour vision.

6.2.7 Relative bearings

Lookouts make reports using relative bearings only. This means that the bearings are measured with reference to the vessel’s heading, or to the fore and aft line of the boat’s keel. These bearings run clockwise from zero degrees (000°) or dead ahead, through one-eight-zero degrees (180°) or dead astern, around to three-six-zero degrees (360°) or dead ahead again.

The following steps are important in reporting relative bearings:

- Study figure 6.3 on major reference points of relative bearings. Picture in your mind the complete circle of relative bearings around your boat in 10-degree increments;
- Bearings are always reported in three digits and distinctly spoken digit by digit.

To ensure one number is not mistaken for another, the following pronunciation is required.

<table>
<thead>
<tr>
<th>Numeral</th>
<th>Spoken as</th>
<th>Numeral</th>
<th>Spoken as</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero (0)</td>
<td>ZERO</td>
<td>Five (5)</td>
<td>FI-YIV</td>
</tr>
<tr>
<td>One (1)</td>
<td>WUN</td>
<td>Six (6)</td>
<td>SIX</td>
</tr>
<tr>
<td>Two (2)</td>
<td>TOO</td>
<td>Seven (7)</td>
<td>SEVEN</td>
</tr>
<tr>
<td>Three (3)</td>
<td>THUH-REE</td>
<td>Eight (8)</td>
<td>ATE</td>
</tr>
<tr>
<td>Four (4)</td>
<td>FO-WER</td>
<td>Nine (9)</td>
<td>NINER</td>
</tr>
</tbody>
</table>
The following are examples of how to report bearings:

<table>
<thead>
<tr>
<th>Bearing</th>
<th>Reported as</th>
</tr>
</thead>
<tbody>
<tr>
<td>000°</td>
<td>ZERO ZERO ZERO</td>
</tr>
<tr>
<td>010°</td>
<td>ZERO WUN ZERO</td>
</tr>
<tr>
<td>045°</td>
<td>ZERO FO-WER FI-YIV</td>
</tr>
<tr>
<td>090°</td>
<td>ZERO NINER ZERO</td>
</tr>
<tr>
<td>135°</td>
<td>WUN THUH-REE FI-YIV</td>
</tr>
<tr>
<td>180°</td>
<td>WUN ATE ZERO</td>
</tr>
<tr>
<td>225°</td>
<td>TOO TOO FI-YIV</td>
</tr>
<tr>
<td>260°</td>
<td>TOO SIX ZERO</td>
</tr>
<tr>
<td>270°</td>
<td>TOO SEVEN ZERO</td>
</tr>
<tr>
<td>315°</td>
<td>THUH-REE ONE FI-YIV</td>
</tr>
</tbody>
</table>

A modified application of this method is by using port and starboard with degrees. For example: Starboard 30° or Port 30° (from dead ahead).

An easy method of informing the coxswain of the sighted object is by using the “clock method” of reporting. The lookout must imagine the vessel in the centre of a clock face.

The bow will be at 12 o'clock and the stern at 6 o'clock. Sightings would be reported as an “object at 9 o'clock.” This would inform the vessel coxswain to turn 90° to port. The lookout would continue reporting the position until the vessel coxswain has the object in sight.

The crew must be briefed on the method being used.

**6.2.8 Position angle**

Objects in the sky are located by their relative bearing and position angle. The position angle of an aircraft is its height in degrees above the horizon as seen from the boat. The horizon is 0° and directly overhead is 90°. The position angle can never be more than 90°. Position angles are reported in one or two digits and the words “position angle” are always spoken before the numerals.

**6.2.9 Distance**

Report distances in nautical miles or fractions of nautical miles. Knowing the distance to the horizon, land, or other reference point will help estimate distance. By dividing the distance from you to your reference point, you can estimate the distance to another object. Ranges in nautical miles are reported digit by digit.
6.2.10 Making reports

When making reports, the lookout names or describes the object sighted, the direction (in relative degrees) and the range to the object in nautical miles or parts of miles (1/4', 1/2'). Give reports in the following format:

- object name or description;
- bearing;
- range.

For example:

- discoloured water on a bearing of 340° relative to the bow of the boat and at a distance of 0.5 nautical miles;
- REPORTED AS: “Discoloured water Bearing THUH-REE FO-WER ZERO, Range ZERO DECIMAL FI-YIV;”
- an aircraft bearing 280° relative to the bow of the ship, 30° above the horizon, and at a distance of 2 nautical miles;
- REPORTED AS: “Aircraft TOO ATE ZERO, Position Angle THUH-REE ZERO, Range TOO.”

6.2.11 Scanning

The lookout’s method of eye search is called scanning. Scanning is a step-by-step method of visually searching for objects. Good scanning techniques will ensure that objects are not missed. Scanning also reduces eye fatigue. Development of a systematic scanning technique is important. There are two common scanning methods:

- left to right and back again;
- top to bottom and bottom to top.

In either case, move your eyes in increments. This creates overlaps in your field of vision and fewer objects will be missed.

6.2.12 Scanning procedure

- When looking for an object, scan the sky, sea and horizon slowly and regularly. Scan from left to right and back again or from top to bottom and bottom to top;
- When scanning, do not look directly at the horizon; look above it. Move your head from side to side and keep your eyes fixed. This will give any stationary objects in your field of vision the appearance of moving and make them easier to see;
- One technique is to scan in small steps of about 10 degrees and have them slightly overlap as you move across your field of view;
- Fatigue, boredom and environmental conditions affect scanning. For example, after prolonged scanning, with little or no contrast, your eyes develop a tendency to focus short of where you think you are looking. To prevent this problem, periodically focus on a close object such as whitecaps or the bow of the boat.
6.2.13 Night scanning

When binoculars are used for night scanning, hold them straight forward and shift your line of sight in a circular path around the inside of the binocular field. When you think you see an object, look all around it, not at it. The chances are it will appear in dim outline. Using binoculars at night on a stable platform increases your range of vision significantly. However, objects will not appear in clear detail.

6.2.14 Fog scanning

Fog lookouts scan slowly and rely on their ears. The best position for a fog lookout is where sight and hearing receive no interference from radios, conversation, or other distractions. Usually the bow is best, if conditions permit.

6.2.15 Night lookout watch

Although the duties for day and night lookout watches are the same, safety and caution during night watches are especially important. Your eyes respond much more slowly at night and pick up moving objects more readily than fixed objects. It takes about 30 minutes for your eyes to become accustomed to the limited light available at night.

The guidelines for lookout watches also apply for night lookout watches.

Note: Night vision means that your eyes receive and interpret a different type of light than the one that exists during daylight.

6.2.15.1 Dark adaptation

Dark adaptation is the improvement of vision in dim light. It is very difficult to see colours at night. Most objects are seen in various shades of gray. Although dark adaptation requires at least 30 minutes, a bright light will destroy night vision in a fraction of a second. In this brief period, the eyes readjust themselves to daylight conditions and the process of dark adaptation must begin all over again.

Note: Avoid looking at bright lights during nighttime operations. When a light must be used, use a red light.

6.2.15.2 Scanning

Scan the sky, sea, and horizon slowly and regularly when looking for an object. Scan from left to right and back again or from top to bottom and from bottom to top.
6.2.16 Helm watch
The helm watch or helmsman is responsible for the following:
- safely steering the boat;
- maintaining a course;
- carrying out all helm commands given by the coxswain.

The helm watch can be carried out by the coxswain or by any designated crewmember. All crewmembers should learn to steer and control the boat. They must learn to use both the primary steering system and the emergency steering system (if present), to ensure safe operations of the boat under normal and abnormal conditions.

6.2.16.1 Guidelines
When a boat uses a helmsman, there are several guidelines for the helm watch:
- Check with the coxswain for any special instructions and for the course you will steer;
- Repeat all commands given by the coxswain;
- Execute all commands given by the coxswain;
- Maintain a given course within 5°;
- Remain at the helm until properly relieved;
- Execute manoeuvres only when expressly ordered. However, minor changes in heading to avoid debris, which could damage propeller or rudders, are essential;
- Operate the emergency tiller (if present) during loss of steering;
- Properly inform relief of all pertinent information.

6.2.17 Towing watch
6.2.17.1 General
A towing watch is normally performed aft on the boat. The primary duty of the towing watch is to keep the towline and the boat being towed under constant observation. (For more information on towing procedures, see Chapter 10.)

6.2.17.2 Guidelines
The guidelines for standing this watch are as follows:
- Note how the tow is riding (e.g., in step, listing or veering);
- Report any unusual conditions to the coxswain;
- Ensure chafing gear is riding in place;
- Adjust the scope of the towline upon command of the coxswain;
- Report any equipment failure or problems observed to the coxswain immediately;
- Keep deck space area clear of unnecessary gear and people;
- Stay clear of the immediate area around the towline in case of possible line snap back;
- Know when and how to do an emergency breakaway.
6.2.17.3 Observed danger
The towing watch must be aware of and report any signs of danger. They include:

- yawing: disabled boat veers from one side to the other, which may cause one or both boats to capsize;
- list increasing on towed boat;
- in step: the proper distance between the towed boat and the towing boat to maintain control and prevent breaking the towline;
- towed boat taking on water;
- deck hardware failure due to stress, no backing plates, etc.;
- towline about to give way due to stress, chafing, or other damage;
- towed boat overtaking your boat due to sudden reduction in speed;
- positioning of towed boat’s crew.

6.2.17.4 Maintaining watch
Maintain a tow watch until the disabled boat is moored or until relieved. When relieved, make sure that all important information is passed on to the relief (e.g., problems with chafing gear, towed boat yaws, etc.).

6.2.18 Anchor watch
When the boat is anchored, an anchor watch is set. The person on watch must ensure that the anchor line does not chafe and that the anchor does not drag. The individual on watch also looks for other vessels in the area. Even when the boat is anchored, there is the possibility that it can be hit by another boat.

6.2.18.1 Guidelines
Use the following guidelines when standing anchor watch:

- Check the strain on the anchor line frequently;
- Check to ensure that the anchor line is not chafing;
- Confirm the position of the boat at least every 15 minutes, or at shorter intervals as directed by the coxswain;
- Report bearing or range (distance) changes to the coxswain immediately;
- Report approaching vessels to the coxswain immediately;
- Report major changes in wind velocity or direction;
- Check for current or tidal changes;
- Report any unusual conditions.
6.2.18.2 Check for chafing

Once the anchor is set, apply chafing gear to the anchor line. It is the job of the anchor watch to ensure that chafing gear stays in place and the anchor line does not chafe through.

6.2.18.3 Check for dragging

There are two methods for determining whether your anchor is dragging:

- check for tension on the anchor line;
- check the boat’s position.

If the anchor is dragging over the bottom, you can sometimes feel vibration in the line. Periodically check your position by taking a navigational fix. Always use both methods.

6.2.18.4 Check your position

It is important to routinely check your position to ensure that you are not drifting or dragging anchor:

- Take compass bearings to three separate objects spread at least 45° apart. Any bearing changes may indicate that you are beginning to drift;
- On a boat equipped with radar, determine the distance (range) to three points of land on your radar screen. Any change in the ranges may indicate anchor drag;
- On a Loran or GPS equipped boat, mark your position with your equipment. Periodically check your LAT/LONG readout. Any change would show that your position is changing;
- Make a note of each time you check your bearings or ranges. Also note your position and the depth of water regularly. A small note pad is acceptable for this purpose. If the water depth or position changes, the anchor may be dragging.

As the wind or water current change direction, your boat will swing about its anchor. This is a swing circle centred around the position of the anchor, with a radius equal to the boat’s length plus the horizontal component of the length of anchor line in use; simply stated, horizontal component + boat length = radius of swing circle at its greatest length. (The horizontal component decreases as the water depth increases.) Ensure your swing circle is clear of other vessels and underwater obstructions. When checking your position, be sure that it falls inside the swing circle.
6.3 Aids to Navigation

6.3.1 General
It is essential that you know how to use the various aids to navigation. Here is a list of common aids to navigation and how to use them. The following paragraphs are a summary of the information available in a brochure called “The New Canadian Buoyage System”. If you need more details, you should refer to this brochure.

6.3.2 Buoys
The Canadian buoy system involves extensive use of many kinds of buoys. Everyone involved in marine SAR must know the meaning of every important buoy.

The Canadian Aids to Navigation system is a combined Lateral-Cardinal system. It is important for vessel operators to know the characteristics of each of these systems to ensure safe navigation on our waterways.

### Lateral Aids to Navigation
Lateral aids may be either buoys or fixed aids. They indicate the location of hazards, and of the safest or deepest water, by indicating the side on which they are to be passed.

**The general rule is:** Red, Right, Returning.
Keep the starboard hand (red-coloured) markers/buoys/lights to the starboard side when your vessel is:
- returning from the sea;
- heading in an upstream;
- entering a harbour; or
- proceeding clockwise around the North American continent.
Keep the red markers on your port side when your vessel is:
- proceeding out to sea;
- heading in a downstream direction;
- leaving a harbour; or
- proceeding North along the East Coast of North American.

#### 6.3.2.1 Lateral buoys
Lateral buoys indicate the path to the safest, deepest channel. These buoys can be green (port buoy), red (starboard buoy), red and green (bifurcation buoy) or red and white (fairway buoy). To use lateral buoys, first find the upstream direction. When a boat is going upstream, it is proceeding from the sea toward upstream waters, toward a port (or marina) or in the direction of a rising tide. When you are proceeding in the upstream direction, you should keep the:
- port buoy (green) on your port side;
- starboard buoy (red) on your starboard side.

Bifurcation buoys indicate that one channel is dividing into two different channels, usually a main and a secondary channel. You may navigate safely on either side of a bifurcation buoy, but the main channel is always indicated by the topmost band. If the topmost band
is red, keep the bifurcation buoy on your starboard side if you wish to use the main channel (i.e. the bifurcation buoy is considered a starboard buoy).

Fairway buoys indicate the beginning or the middle of a channel. You can go on either side of these buoys. However, since it is good practice to remain on the sides of a channel, you should keep this buoy on your port side when you are going upward.

There is a little mnemonic that can be used to remember which way to keep red end green buoys. This mnemonic is RRR for Red Right Returning. In other words, red buoys should stay on your right (starboard) side when you are returning to a port or going upward.

6.3.2.2 Cardinal buoys
Cardinal buoys indicate the location of the safest and deepest water by reference to the cardinal points of the compass. There are four cardinal buoys: North, East, South and West. Since the cardinal buoys refer to the cardinal points of the compass, it is useful to have a compass in good condition to work with them. All cardinal buoys are yellow and black, and may have white lights and topmarks.

A North cardinal buoy indicates that safe water can be found to the north of it. Its topmost colour is black and its lowermost colour is yellow. Topmarks consist of two black cones pointing upward. If it has a light, it is either a quick flashing light or a very quick flashing light. Refer to your nautical chart for further details.

An East cardinal buoy indicates safe water to the east. Its topmost colour is black, its middle colour is yellow and its lowermost colour is black. Topmarks consist of two black cones base to base. If it has a light, it will usually quickly flash 3 times.

A South cardinal buoy indicates that safe water exists to the south of it. Its topmost colour is yellow and its lowermost colour is black. Topmarks consist of two black cones pointing downward. If it has a light, that light will usually flash quickly 6 times.

A West cardinal buoy indicates safe water exists to the west. Its topmost colour is yellow, its middle colour is black and its lowermost colour is yellow. Topmarks consist of two black
cones point to point. If it has a light, that light will usually flash quickly 9 times. Be aware that to the untrained eye, this may look like an SOS signal (... — ...).

If you take a closer look, you will see that topmarks are pointing toward the black portion of the cardinal buoy.

At night, it is easy to determine the kind of cardinal buoy since the number of flash refers to a direction in the clock system. Three flashes means 3 o’clock (east if we consider 12 o’clock to be north); Six flashes means 6 o’clock (south) and nine flashes means 9 o’clock (west). The only exception is the north cardinal buoy.

Figure 6.5: The four cardinal buoys (B = black, Y = yellow)
6.3.2.3 Special purpose buoys

These buoys can indicate many things. Some may mark the perimeter of designated anchorage areas, while others may mark dangers. Here are some examples:

**Anchorage buoys** mark a designated anchorage area. These buoys are yellow and usually have a black anchor painted on them. If they possess a light, that light will be yellow.

**Cautionary buoys** mark dangers such as firing ranges, underwater pipelines, race courses, seaplane bases and areas where no through channel exists. Such buoys are yellow. If a light is present, that light will be yellow as well.

**Mooring buoys** are used for mooring or securing vessels. These buoys are white with a yellow stripe at their top. If a light is present, that light will be yellow. Be aware that boats or seaplanes may be moored to such buoys.

**Keep out buoys** are used to mark areas in which boats are prohibited. These buoys are white with an orange cross within an orange diamond. Orange stripes are also present below and above the diamond. If that buoy has a light, this light will be yellow.

**Control buoys** usually indicate some kind of restriction (speed limit, wash restriction, etc.). These buoys are white with an orange circle. Orange stripes are also present below

![Figure 6.6: Special buoys](image)
and above the circle. Within the circle, you will find the nature of the restriction. These buoys, if illuminated, will also have a yellow light.

**Information buoys** are used to display specific information (locality name, marina, campsite, etc.) about an area. These buoys are white with an orange square. Like the two previous buoys, they have orange stripes above and below the square. The information is written inside the square. If a light is present, that light will be yellow.

**Swimming buoys** are used to mark the perimeter of swimming areas. Such buoys are white and may have a yellow light.

**Diving buoys** mark a zone where underwater activities are performed. Such buoys are white and possess a diver down flag (red with a white diagonal stripe). These buoys may be attached to the diver or secured to the bottom near the divers. All boats should stay well clear of such buoys to avoid risk of injury to the divers. If you need to approach, proceed at slow speed with extreme caution.

### 6.3.3 Lights, leading lights, sector lights and direction lights

When you have to navigate by night, lights can be very helpful to guide you. If you know how to use these aids to navigation properly, you will probably be able to travel at greater speed without compromising safety.

#### 6.3.3.1 Lights

Sometimes, lights are set up on shore to mark the entrance of a port or any other important area. On a chart, characteristics of such lights are given. Once you learn to recognize the various lights present on your territory, you might be able to orient yourself a little more easily.

#### 6.3.3.2 Leading lights (also known as range lights)

Leading lights usually consist of two lights separated by some distance. One light is low above the ground while the other is higher. To follow the course indicated by these lamps, you must try to align the two lights so that they appear to be one above the other.

#### 6.3.3.3 Sector lights

Sector lights will visible only when you are within a certain area (or sector). Some sector lights will have more than one colour. You might see a white light when you are perpendicular to the light (on the desired course) and coloured lights (red or green) if you are looking at the light from an angle (on the sides of the desired course). Other sector lights will show only one colour. Sector lights will become invisible once you reach the limits of their arc of visibility.

#### 6.3.3.4 Direction lights

These are quite similar to sector lights, but they have a much narrower arc of visibility. Usually, when you see such a light, you are steering a specific course (indicated on the map). If you do not stay on course, the direction light will eventually disappear.
Avoiding Human error among SAR Personnel, IMO LSR 26/5, 1994.

Beaulé, Étienne: Module de formation Chefs d'équipe, Canadian Coast Guard, Laurentian Region, 1998.


Canadian Coast Guard Auxiliary, Central and Arctic region: Fundamentals of SAR, 1996.

Canadian Coast Guard Auxiliary, National Guidelines Respecting Canadian Coast Guard Auxiliary Activities, 1998.

Canadian Coast Guard, Bridge Resource Management Course, Canadian Coast Guard College, 1998.

Canadian Coast Guard, Central & Arctic Region IRB Training Manual.

Canadian Coast Guard, Courtesy examination manual for small craft.

Canadian Coast Guard, Gaetan Gamelin, Mécanique préventive, Laurentian Region.

Canadian Coast Guard, Jacky Roy & Jean-Michel Boulais, L’équipage ESC devant la loi, Laurentian Region.

Canadian Coast Guard, Mathieu Vachon, Formation des équipages en embarcation rapide de secours, Laurentian Region, 1999.

Canadian Coast Guard, Operational guidelines for Search and Rescue units, 1993.


Canadian Coast Guard, René Paquet, Les effets du stress post traumatique, Laurentian Region.

Canadian Coast Guard, Robert Jinchereau, Notes de cours, Laurentian Region.

Canadian Coast Guard, RHIOT Manual, Pacific Region, Bamfield RHIOT Shool.


Fisheries and Oceans Canada, Coast Guard, Maritime Search and Rescue in Canada, T 31-87/1996E.


Fisheries and Oceans Canada, Coast Guard, Safe Boating Guide, 2000.


