International Yachtmaster Training®

Introduction to Boating & International Crew

Passport Series 1 / Modules 1 to 6

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INTERNATIONAL YACHTMASTER TRAINING
TRAINING PROGRAMME

INTRODUCTION TO BOATING
&
INTERNATIONAL CREW CERTIFICATE

This publication is for purposes of guidance and training.
While every effort has been made to ensure accuracy, International Yachtmaster Training is not liable for the consequence of implementing or attempting to implement any instructions or advice contained within these notes.

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MODULE 1 / SECTION 1
INTRODUCTION TO BOATING AND SAILING

Welcome to the wonderful world of boating and sailing. Now that you have taken the first step towards learning a new pastime and skill, we hope that it will lead to rewarding, safe and fulfilling adventures on the water.

Every human activity has its own unique language and this is true of boating and sailing. A number of nautical terms may already be familiar to you as there are a large number of nautical terms used in everyday language, for example, "anchored to the spot" or "taken aback".

As you progress through the IYT Training Program, the volume of the terminology will expand with the knowledge gained. As an aid to understanding the terminology, a comprehensive "Glossary of Terms" has been included as an Appendix at the rear of these notes.

With boating and sailing being an international pastime, and English being the language of the sea, it is essential to use the correct terminology to communicate quickly and effectively with other seafarers. This avoids misunderstandings in the execution of a maneuver or, more critically, in the event of an emergency. As the course progresses, you will be introduced to additional nautical terminology.

The **aim** of this module is to introduce you to the wonderful world of boating and sailing. This module takes the format of basic safety training prior to spending time on the water.

The **objective** of the module is to show people how much fun boating and sailing can be when knowing how to operate a boat safely and confidently. It will allow a successful candidate to assist as a crew member of a sail or power vessel.

MODULE 1 / SECTION 2
SAFETY BRIEFING

It is important to know where all safety items are stored on any vessel you are on and also how to use them.

Life jackets
There should be at least one lifejacket per person on board every boat, including small sizes for any children. A life jacket is designed to keep an unconscious person afloat by turning them on to their back and keeping their head above the water.

There are many other forms of buoyancy aids but these are mainly used for water skiers, dinghy sailors etc. to give additional buoyancy should you end up in the water. Buoyancy aids are NOT lifejackets and will not keep your head above water if unconscious.

Flares (Distress signals) There are four basic types of flares, red parachute, red hand-held, orange smoke and white hand-held.

Red Parachute flare - These are magnesium flares on a parachute which go up to around 30m or 100ft and then gradually float back down. Used to attract the attention of distant vessels.
Red Hand-held flare - These flares are used at night and produce a bright red light for around 40 seconds.
Orange Smoke - These flares are used during the day and produce a plume of orange smoke for around 40 seconds.
White hand-held flare - These flares burn bright white and are used to alert other vessels to the risk of collision.

Life Raft

A life raft is a small inflatable survival craft kept in either a hard plastic canister or a soft valise which should be accessible in the event that the crew need to evacuate the boat in an emergency. There is a saying, that one should only ever "step up" into a life raft, i.e. it is a last resort in the likely event of your boat sinking.

First Aid Kit

Every vessel however small should carry a basic first aid kit. There should also be a First Aid Manual for reference. At least one member of the crew should have some form of training in first aid from a recognized training authority. First aid kits should be in a waterproof container and have the ability to float. They are available from nautical stores worldwide.

Fire Extinguishers

There are four main types of fire extinguishers:

Dry powder for extinguishing fires involving gases.

Carbon Dioxide (CO_2) for electrical fires.

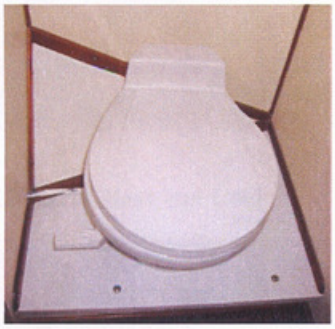
Water for cooling or combustion fires.

Foam for extinguishing burning liquids such as paint, oil, gasoline, fats, thinners etc.

Safety Harnesses

Mainly used on sailing vessels, safety harnesses are worn by crew members when on deck in bad weather, at night or if the crew member feels safer with one on. The harness comprises webbing shoulder straps and a waist band which are adjustable, with a tether of rope or webbing which has a karabiner clip on both ends.

During inclement weather, safety lines are rigged from the front of the boat (bow) to the back of the boat (stern) and the karabiner is attached to allow you to walk safely about the deck.



Marine Toilet (Head)

Location and Use of "Heads" (Marine terminology for toilet, both manual and electric)

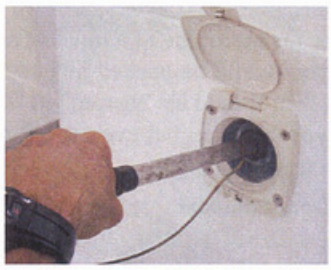
There essentially are two types of heads. A manual head where the operator uses a pump to flush seawater in through the head and to pump out the contents either into a "holding tank" (a tank where the contents are stored until emptied) or overboard. An electric head does the same job by using an electrically operated pump instead of a manual pump.

Bilge Pumps

Even in the most sophisticated yacht there is always an accumulation of water, and sometimes oil and other liquids accumulate in the lowest part of the vessel known as the bilge. There are two types of bilge pumps, manual and electric.

Manual pump which will be mounted so that a crew member can manually pump overboard any water which has accumulated in the bilges.

Electric pump which is operated by pushing a switch and does the same job as a manual pump. Often bilge pumps are operated by a float switch, this works on a simple principal that when the water rises the float on the switch rises and that turns on the pump.



Manual Pump

Electric Pump

Water pumps (manual and pressurized)

Water is delivered on small vessels to taps or faucets which have a pump attached. This may be a simple hand pump on the faucet or a foot pump located beneath the sink. On larger vessels the water system is pressurized by means of an electric water pump. This pressurized container is called an accumulator and prevents the water pump from activating every time a faucet is switched on.

Cooker (Range Top and Oven)

Cooking on most vessels is by means of gas, usually propane. Of prime importance when using a gas cooker is safety. Gas is heavier than air and if left switched on, the gas will accumulate in the bilges and be a potent explosive if triggered by an electrical short or other igniter. These are the basic rules for using a gas stove on a yacht which will be covered in greater depth in further modules.

Battery selector switch

Most yachts will have two sets of batteries, one set will be for engine starting and the other for all other electric systems. There will be a main battery switch, which should at a minimum, allow the 2 banks to be switched off to preserve battery power when the vessel is unoccupied.

Cabin Lights

Electricity is a sparse commodity on most small boats which use battery power. On larger boats power is often derived from a generator. It is important to remember that lights and other electrical systems should only be used when necessary and should always be turned off when not in use to conserve battery power.

General Housekeeping Rules

One of the most important aspects of living on board a vessel is the need to be extremely tidy. There is restricted storage space available for the multitude of items that are required to be carried, and that may need to be found easily and quickly. Personal items should be packed in a soft sports type bag (not a hard suitcase which cannot be rolled up and stored easily) and then should be "stowed" in "lockers" upon arrival on board. The size of storage on a vessel will depend on the hull type and size, but even on all but the largest boats it is important to be selective about what personal gear is brought on board.

Suitable Clothing

Weather conditions can vary from extremely hot to very cold and wet. It is important to dress correctly and thus minimize the effects of heat and cold. In a warm climate the sun is very powerful and when combined with the glare from the water can debilitate a person very quickly. Protection should include a hat, sunglasses, cotton shirt with collar (and possibly long sleeves), cotton shorts or long pants, and plenty of sunscreen. It is easy to get sunburned, and may be more than just uncomfortable, and in extreme circumstances can require medical attention. Dehydration happens easily on the water so do not forget to drink lots of water and try to stay in the shade wherever possible.

In a cold climate the "layer" principal can be used to great effect, and even in warmer climates it can get cold at night on the water. Multiple layers of suitable clothing is

more beneficial than single heavy items of clothing, because each layer traps heat so the flow of heat out from the body is kept to a minimum. With the addition of wet or foul weather waterproof clothing good protection can be made against the effects of both the cold and wet. A good hat and waterproof footwear will round off the attire.

Suitable Footwear
It is recommended that good non slip deck shoes are worn to protect feet against the presence of multiple objects on deck such as cleats. For cold and wet conditions, waterproof seaboots are highly recommended.

Effects of Heat and Cold

High humidity and heat can lead to heat exhaustion, it is advisable to drink plenty of water, wear appropriate clothing offering protection to both head and body, use sunglasses and use a sun block or sunscreen to protect parts of the body exposed to sun or drying winds.

Seasickness

It may take a little while for a person to get their "sealegs" that acclimated to the motion of a boat. There are a number of travel sickness products on the market including sea sickness pills, wrist bands and chemical patches. The best prevention is to watch the horizon and remain as active as possible such as steering the boat.

is,

Do's and don'ts aboard a boat

Do:
*Tell the captain if you are taking any medication, also if you react to any common medications as he will need to know in the event of an emergency.
*Keep all your personal gear tidy and stowed.
*Make sure you put every item away after use in the same place you found it, this is essential so that everyone else can find it if needed. On many boats there will be a diagram in a prominent place showing the location of all the different pieces of safety and survival equipment.
*Be tolerant, a vessel is small and it is easy to become annoyed over small things.

Never:
*Leave lights on, it drains the batteries.
*Waste water, it is limited in supply.
*Throw anything overboard when alongside, in a marina or anchorage and refer to the disposal of garbage placard posted on board .

MODULE 1 / SECTION 3
PASSAGE PLANNING

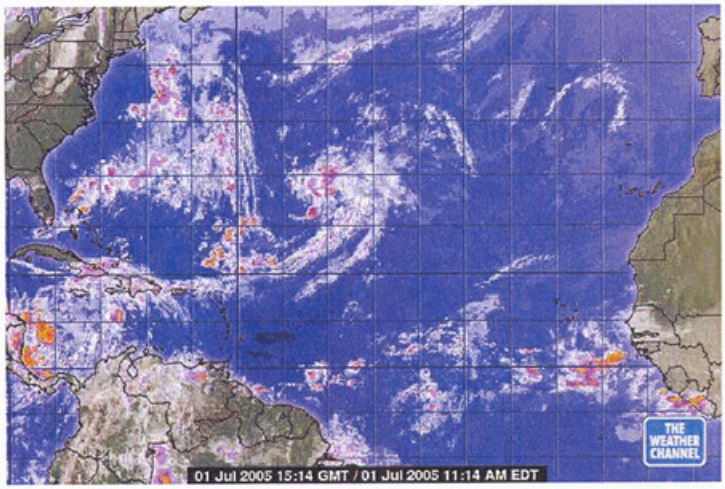
A Passage Plan is an outline of the trip that you intend to make, together with all the relevant information that you will require during the passage, such as weather conditions, tides, hazards to navigation, lights, experience of the crew etc. Information for a passage may be obtained from a number of different sources which will be outlined further as the training program progresses.

Charts

A nautical chart gives detailed information to enable safe navigation at sea from departure point to arrival point. It is an outline of the land area and includes harbors, bays, reefs, underwater hazards and other navigation information. A position on a chart is measured in terms of latitude and longitude, and distance is measured in nautical miles. Charts can either be in a paper or electronic format.

Effects of Tides and Currents

Tides and currents are movements of water which will carry the boat in the direction of their flow, this may either help or hinder the speed of your passage. It is important to obtain as much information as possible about tidal conditions when undertaking a coastal passage.



Weather Forecasts

Weather forecasts give an indication about approaching weather conditions and may be obtained from a variety of different sources. It is very important to understand future weather because decisions about whether to leave on a passage or to alter the destination will be made based on the weather forecast.

Courses

A course is the direction that a boat is steered and is indicated by compass degrees. There are 360For example a boat traveling East will be on a heading of 90 degrees, or South on a heading of 180 degrees.

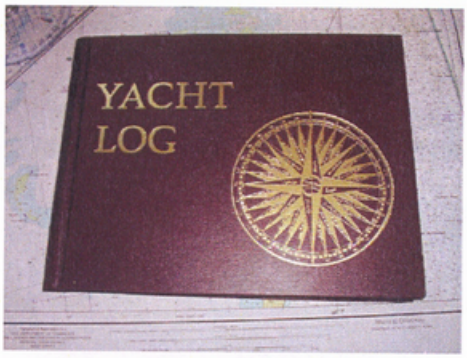
Safe Passage

It is imperative that all precautions are taken to ensure a safe passage. This includes everything that we have discussed to this point.

Lookout and things to Watch for

While making way at sea , it is required by law that someone must keep at watch at all times. Other vessels, boats and ships, floating debris, whales and containers.

Keeping Track of Progress



Unlike being on land, there are no landmarks while out of sight of land. A boat is required to keep a record of progress during a voyage. This is usually in the form of a ships logbook and includes such information as time, distance travelled, speed, compass course, tides, currents and any other relevant information that pertains to safe navigation. It is easier to navigate while in sight of land as known landmarks can be used for cross bearings. However, one must take into accounts areas that are succeptable to fog.

When, after all this careful preparation you get to execute the passage, make sure that you keep track of your progress and monitor all the important factors.

·Time: Are you making the speed that you planned for? Going too fast could be as bad as going too slow. You don't want to arrive before the tide has risen sufficiently for you to get into the har bor.
·Fuel: Monitor consumption if it is higher than expected do you still have sufficient reserve or will you have to start planning a refueling stop? Don't hesitate to refuel if you have any doubts about you range.
·Crew: How are they coping with the conditions, is the watch system working? Are people eating well, sleeping, being affected by seasickness?
·Position: Are you where you should be? Don't just steer the course; plot your position on a regular basis.
·Systems: Oil, fluid and water levels need to be checked as well as bilge's inspected on a regular basis.
·Weather: One of the things that can creep up on you if you ignore it is the weather. Keep monitoring every forecast as the weather can change suddenly sometimes with disastrous consequences but, with a few hours warning of the impending change, precautions can be taken.

Practical Subjects

Section 4 Rope work
Section 5 Short Passage- power
Section 5a Short passage -sail

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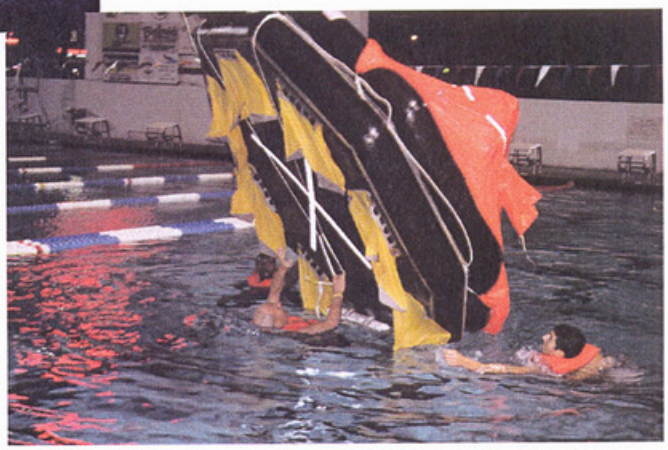
MODULE 2 / SECTION 1
INTRODUCTION

These course notes have been developed as an introduction to the world of recreational boating. While every effort has been made to insure their accuracy, they are designed to be accompanied by additional materials that contain local navigation knowledge, sources of weather information, local tides, currents and weather conditions as applicable to the area of operation.

The course will introduce students to the basics of nautical terminology, rules of the road, safety on board, engine checks, maintenance and various boat handling skills. The objective of the course is to develop the skills and gain the knowledge to be a crew member on board a boat, whether power or sail, that is used for recreational purposes. Whether simply spending a day out on a lake or bay, or crossing an ocean, there is no substitute for safety, common sense and a good foundation of knowledge.

A substantial part of the training will rely on the hands on practical application of the theory modules which will be taught by your practical instructor. As with all IYT courses, the depth of knowledge increases as the candidate progresses through the various modules.



MODULE 2 / SECTION 2
NAUTICAL TERMINOLOGY

Types of Vessels

As the Greek philosopher Archimides discovered over 2000 years ago, all vessels float in water because the water creates an upward buoyant force. Different vessel shapes have evolved over time to maximize the efficiency of different methods of propulsion. For example, a sail boat has a deep keel to help with sailing efficiency and stability whereas a fast powerboat will have very little keel under the water which allows it to minimize resistance in the water and thus go faster. The keel is a weighted projecting fin which provides stability and reduces sideway drift of a vessel. Essentially there are two distinct types of hull, (and within these are many variations), **"displacement"** hulls and **"planing"** hulls.

Hull Types

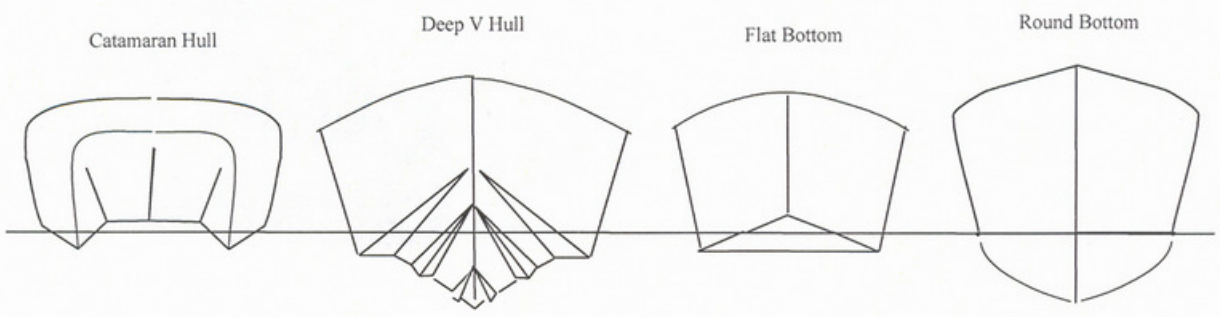
There are many types of vessel with an assorted combination of hull and engine configurations.

Planing Hull

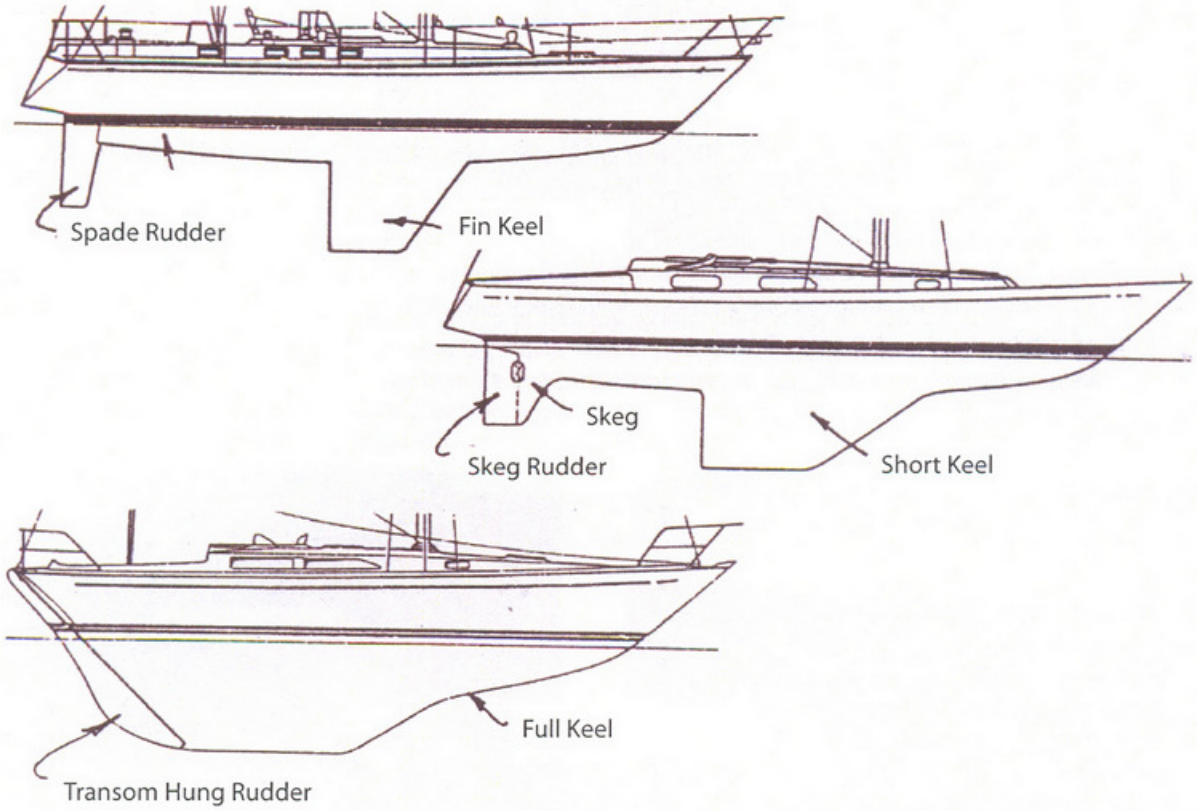
Displacement hulls, such as sailing boats and trawler type boats, are supported by the buoyancy created by the hull in the water. These types of vessels have a maximum speed based on the waterline length and no addition of power will increase this maximum speed. The advantages of a displacement hull are lower power requirements than a planing hull allowing a longer cruising range and increased load carrying ability.

Planing hulls are lifted clear of the buoyant support of the water by means of a combination of hull shape together with high power converted to speed. The vessel is lifted higher in the water as the speed is increased reducing the drag of the water as less of the hull is actually in the water. The advantages of a planing hull are shorter journey times, but this must be offset against the increased cost of larger more powerful engines and consequent increase in fuel consumption.

Power Vessel Hull Shapes



Sailing vessel hull shapes



Vessel Construction

Methods of construction and materials used in vessel construction are a subject in their own right and there are many reference books available for those who wish to pursue this subject in depth.

The earliest vessels were constructed from natural materials, mainly timber construction. Some boats are still built in this fashion. Most modern series production boats are built in a mold from man-made materials and composites such as glass-fiber (glass reinforced plastic (GRP) impregnated with resins) or materials such as carbon fiber and Kevlar. Large yachts are generally constructed from steel or aluminium or a combination of materials.

Inflatables & RIBs (Rigid Inflatable Boats)

The difference between a RIB and an Inflatable is essentially that the bottom of the RIB is made of aluminum or fiberglass, both have inflatable compartments or pontoons (inflated tubes which make the sides of the RIB). Inflatables have no rigid components and as a result are easier to stow. Both have good stability, are relatively lightweight and have generous carrying capacity. Designed initially for the military and rescue/service work they are increasingly popular with recreational users. Each configuration has advantages and disadvantages.

Rigid Inflatable Boat (RIB)

Definitions of types of vessels.
There is no globally accepted definition for when a boat becomes a yacht or when a yacht becomes a ship. However, a yacht can be carried on a ship but a ship cannot be carried on a yacht.

To be more specific and to further clarify the term yacht, these notes refer to "motor yachts" as those vessels that are driven by one or more engine, and those driven by sails as "sailing boats". Sailing boats for the most part also have engines for ease of manoeuvering in crowded marinas and anchorages where there is insufficient room to sail safely. These are commonly called auxiliary engines. In these notes, the word "boat" describes a recreational craft/vessel, either driven by engines or sails, or both, with covered accommodation and facilities which allow the individual to spend a night on board.

The word "yacht" also refers to the very large Motor and Sail vessels that can be seen in such exotic locations as the Caribbean and Mediterranean. Some of the larger Megayachts are really small ships and many operate for commercial purposes. This means that they carry passengers for hire or reward. Below are various types of boats.


Cabin Cruiser


Sailboat


Rigid Inflatable Boat (RIB)


Sportfish


Day Fisher


Day Cruiser


Speedboat


Dinghy


Multihull / Catamaran


Megayacht


Sailing Catamaran

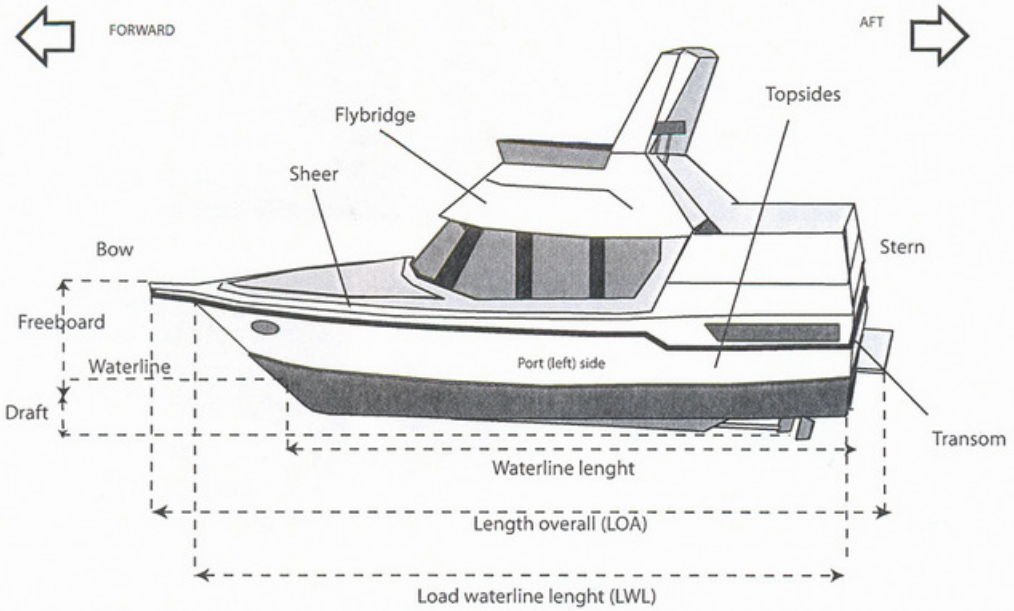
Container Ship

Parts of A Vessel and Nautical Terminology

General Terms to define a vessel.

When any vessel is in the water, the level that the water reaches on the hull is known as the **"waterline"**. The area that is below the waterline is painted with a special paint which inhibits growth of weed and shell fish and is called "antifouling paint"; the depth that this underwater area extends down is known as the **"draft"**. The distance from the water line to the upper edge of the hull is known as **"freeboard"**.

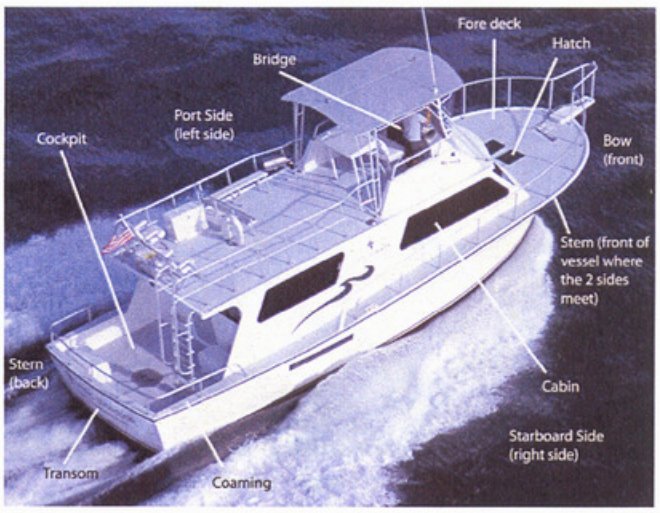
Length overall (LOA), The overall fore and aft length of the hull.
Waterline, The line where the surface of the water reaches on the hull.
Load waterline length (LWL), The fore and aft length of the hull measured at the waterline.
Beam, The width of a vessel at its widest point.
Freeboard, The height of the side of a vessel above the water.
Draught, The depth of the lowest part of the vessel in the water
Keel, A weighted projecting fin fixed on the centerline of a vessel which provides stability and reduces sideways drift.



Parts of a Hull

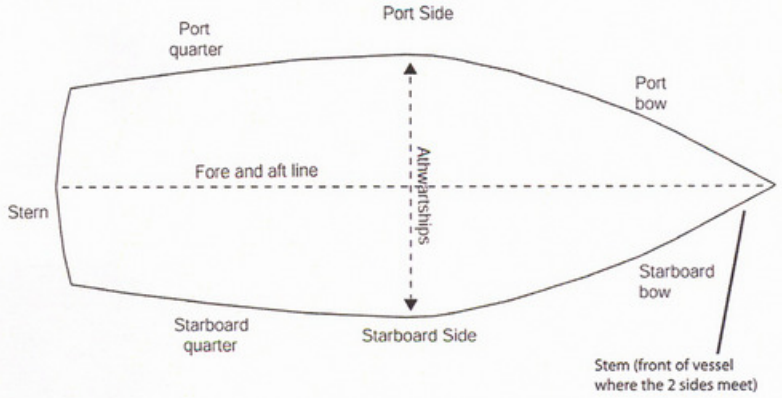
The **"stem"** is the front part of the vessel where the two sides meet. The two sides of the hull where they meet at the stem are known as the **"bows"**. This comprises the **"forward"** section of the vessel. The mid section of the vessel is known as **"midships"** and going towards the rear, **"aft"**, to the back of the vessel which is known as the **"stern"**. The actual flat part of the back of the vessel is known as the **"transom"**.

The right hand side of a vessel is known as the **"starboard"** side, and the left is known as the **"port"** side. A useful memory jogger is the phrase



"There is a no RED PORT LEFT in the bottle", so that red, port and left all refer to the same side. The inclusion of "red" is also a reminder that the color of the port side navigation light is red, and the starboard side is therefore green.

Nautical terminology is vast, and there are nautical dictionaries naming thousands of nautical terms, some of which are contained in the glossary at the back of this book. However, in this module, we will address only the most commonly used terms.



Alongside

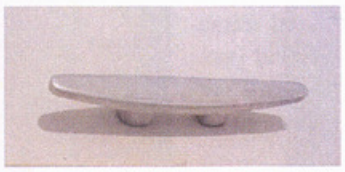
Generally a yacht will be kept in a Marina, which, depending on size, may have spaces for a few boats or thousands of boats. When tied up to a dock there will be a number of lines securing the vessel "alongside". These are known as **"mooring lines"**. The lines will be attached to secure points on the dock called **"cleats"** and lead through special fittings with smooth edges on the vessel known as **"fairleads"**. These are designed to prevent fraying or **"chafing"** and are secured to the vessel's cleats.

Deck Equipment and Fittings

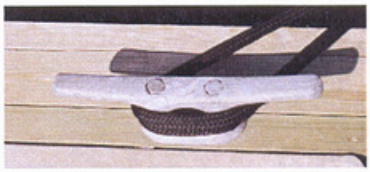
The docking lines required to secure a vessel properly are:

1. Bow line. A line that is lead forward from the bow of the boat.
2. Stern line. A line that is lead aft from the stern of the boat.
3. Spring lines One line leads from the bow of the vessel aft of midships to the dock and one from the stern of the vessel lead forward of midships to the dock. These stop the boat moving fore and aft and should be taut.

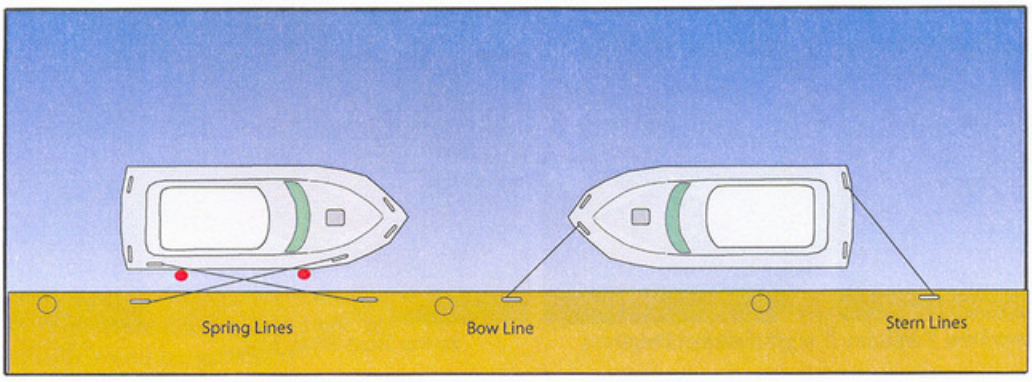
Fairlead



Boat Cleat



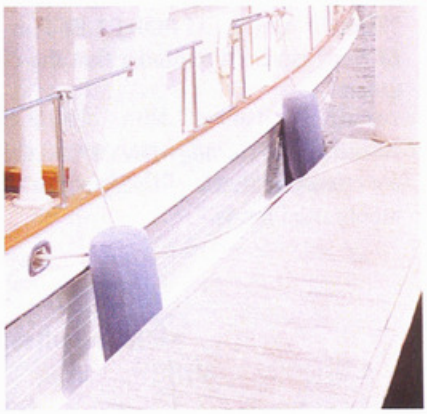
Dock Cleat



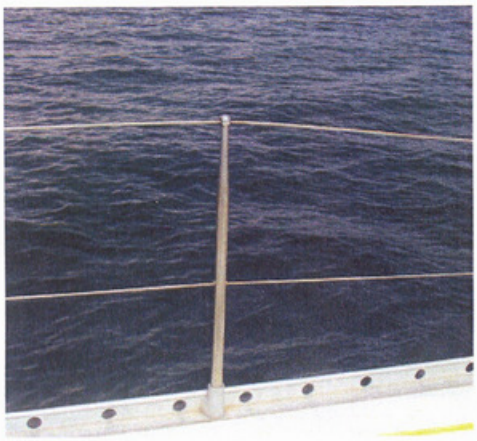
Inflated plastic or rubber cylinders or spheres protect the hull from damage while in contact with the dock or other vessels and are called **"fenders".** Adequate fenders both in size and quantity must be used to protect the hull and topsides.

When the vessel is attached to a **"mooring buoy"** or "anchored" away from the land, access to the vessel will then be by a smaller boat such as a RIB or dinghy. Dinghys and safe operation of dinghys are addressed in a later section.

Mooring Buoy



Fenders



Stanchion

Stanchions On deck there will generally be a protective rail to prevent a person falling overboard. These may be solid walls, "bulwarks" or wire ropes, attached at the bow and stern and supported at intervals by upright metal poles called "stanchions".

Pulpit

Pulpit On most boats there is usually a metal frame around the bows called the **"pulpit".** Additional protection at the stern will be the **"stern rail / taffrail"** or **"pushpit".**

Power Boat Pulpit

Sailboat Pulpit

Power Boat Stern Rail

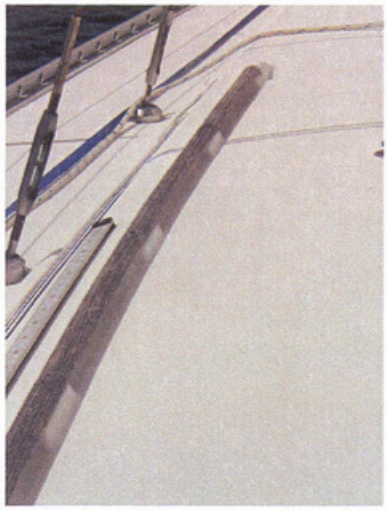
Sailboat Stern Rail

Foredeck The forward part of the deck in front of the mast or raised accommodation on a boat is known as the foredeck. The foredeck houses the anchor chain and line for anchoring a vessel.

Power Boat Foredeck

Sailboat Foredeck

Coach Roof The raised part of the deck to create headroom below decks.



Grab Rails Rails attached either to the coach roof or inside the cabins for holding on to while at sea.

Jackstay A wire or webbing strap attached at the front and back of a vessel along the deck to which a safety harness line may be clipped. (mostly found on sailboats)

Toe rail A low timber or metal strip running around the outer edge of the deck to assist the crew in maintaining a foothold.

Cockpit A self draining recess in the after part of a vessel.

Sailboat Cockpit

Power Boat Cockpit

Companionway Steps giving access from the deck to the cabin.

Washboards Boards used to seal off the companionway to prevent the entry of water.

Hatch An opening in the deck that gives access to the space below.

Bowsprit A spar which projects from the bow of some boats to allow headsails to be secured further forward.

Dodger A demountable cover rigged over the companionway and the forward end of the cockpit to protect the crew from wind and water spray.

Bimini Top: A canvas canopy to shade an area of deck or cockpit from the sun.

Windlass: A winch which is positioned on the fore-deck and used for hauling in anchor chain and rope.

Anchor: A device attached to rope or chain which is lowered to the seabed to hold a vessel in place.

Saloon: This is the living room on board a boat and will consist of seating and possibly contain music, TV and entertainment center. The larger the boat the more lavish the equipment and fittings are likely to be.

Dinette: The dining area of the boat may be simply a small table with bench seating to a full scale dining room setting on a large boat.

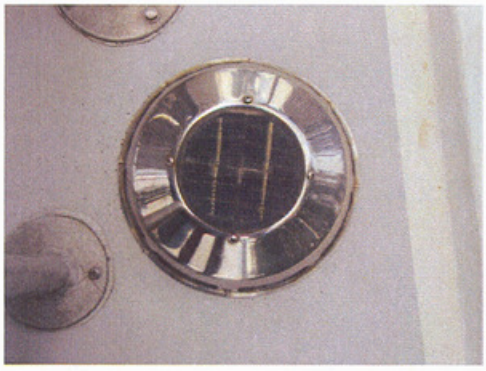
Accommodation: In a vessel the floor is known as the **"cabin sole"**, the walls are **"bulkheads"** and the ceilings are **"deck heads"**.

Cabins/Staterooms: These are the **"bedrooms"** and may consist of a single **"bunk"** or bed to king size suites on megayachts.

Wardrobes are referred to as **"hanging lockers"**.

Forepeak: Is a space forward in the bows of the boat. Often this is where the anchor chain is stored.

Dinette



Ventilators: Movable devices fixed to the deck to carry fresh air below without permitting the entry of water. These are found both on power and sailing vessels.

Galley: The kitchen on a vessel and the equipment contained will depend on the size of the yacht and the number of crew it carries.

Console: Steering console, instrumentation and throttle control

Throttle Control / Transmission Control: Selects forward, neutral and reverse gears and controls propeller speed.

Typical **Twin Outboard** motor set-up.

Engines and Drives

Outboards are by far the most popular type of motor for small craft. They are a demountable self-contained unit available in 2 stroke or 4 stroke configurations with a wide range of power/size applications. Easily removed for maintenance, storage and cleaning they have the ability to be raised/tilted hydraulically or manually for shallow water operations.

A Kill Cord is an engine cut-out device, one end of which is attached to a switch near the throttle and the other to the driver's body. In the event of the helmsman falling overboard this device will stop the engine. Runaway powerboats cause serious injuries and even deaths. Use the cord at all times. Carry a spare one on board so that the engine can be restarted to pick up the person in the water.

Kill Cord

Outboard Motor

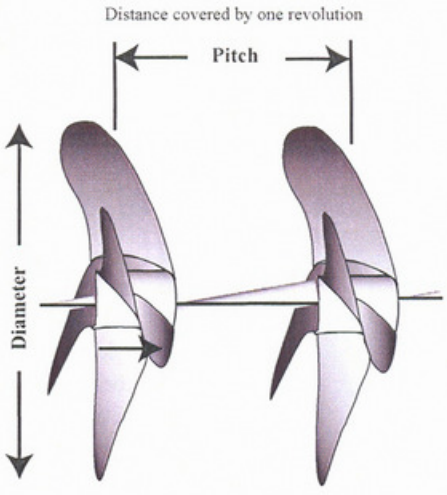
Console Steering & Throttle Control

Steering/Propellers

Smaller outboards steer the boat by turning the whole motor using the attached tiller, which is fitted with a twist-grip type throttle control. On RIBs and larger vessels controls are center console mounted. Steering is normally wheel controlled through hydraulic rams or cables and steers just like a car.

Propellers

A power driven vessel requires an engine or engines to drive a "**propeller**" commonly known as a "**screw**" which is a rotating device with a number of different "blades", from 2 to 5 depending upon hull type and performance requirements. Propellers are classed by 3 different features- "**hand**", "**diameter**" and "**pitch**". For example a 3 bladed prop may be R 10" x 28" which means it will turn "**right hand**" or clockwise in forward gear, has a diameter of 10 inches and the pitch (the angle that the blades are set) is 28 inches which is the (theoretical) distance the prop would travel in one rotation.



Thru hull fitting

Thru hull fitting

Thru hull fittings are designed to allow water to pass through them from inside a boat, such as the sinks, toilets, impellers and for engine water cooling.

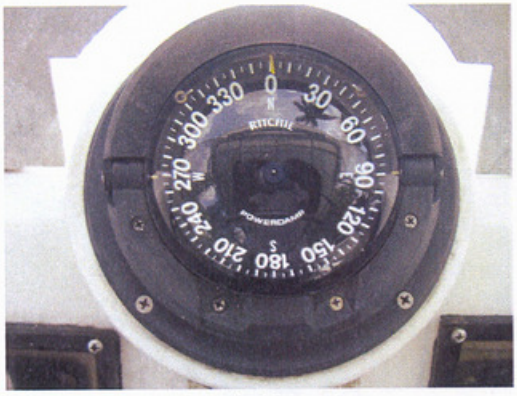
Instruments and Electronic Aids to Navigation

Not all vessels will be equipped with all the instruments discussed below. There are many different types and makes of instruments but the information they relay is the same.

The Magnetic Compass

The compass is perhaps the most important instrument on a boat. It is essential for navigation when out of sight of land, during the hours of darkness and at times of restricted visibility, e.g. fog, rain etc. when the compass is used to steer pre-determined magnetic courses. A hand-bearing compass is also used for some position fixing techniques.

Hand-bearing Compass



Gimballed Compass

How does a Compass work?

A magnetic compass is an instrument used to find direction. All magnetic compasses operate on the same principle; the compass is simply a circular card, graduated with 0° - 360° (degrees) marked on it's circumference and supported on a pivot point in a sealed bowl filled with a water/alcohol mixture which dampens or slows the movement of the card on the pivot. Two or more bar magnets are attached to the underside of the card, aligned to the north/south (0° - 180°) axis of the card. The bar magnets in the instrument follow the magnetic lines of force that circle the earth and the compass card "north point" will always point to the north magnetic pole. (These lines of force are generated by the earth's magnetic field).

The compass is "gimbal" mounted which means that no matter how the vessel heels/rolls or pitches the compass card will remain level.

The inside of the compass bowl is marked with a "lubber line" which is aligned exactly parallel to the fore and aft centerline of the yacht. The direction of the vessel's heading or the "compass course" being steered is indicated by the card graduation nearest the lubber line. There will be a small light in the compass to enable it to be read at night.

Depth Sounder

A depth sounder determines the depth of water beneath a vessel. The equipment comprises of a transmitter with a digital or pictoral display screen close to the helm, and a transducer sensor mounted through the vessels hull near the bottom of the hull. The transmitter sends pulses through the transducer, which picks up the returned pulse after it has "bounced" off the sea floor. The time the returning echo takes to return is interpreted by the transmitter, which displays the water's depth on the screen.

Depth Sounder

Barometer

A barometer is an instrument which indicates the atmospheric pressure. A single reading of barometric pressure gives no worthwhile information, it is the rate of change of pressure that is important in itself and this can only be gained from a series of readings,

Barometer

hence the importance of recording barometer pressure in the boat's log book. A **"barograph" is** available which records the pressure variance either on paper charts or electronically.

Log

The log is an instrument for measuring the vessel's speed through the water. Boat speed is usually measured in "knots" (nautical miles per hour, that is approximately 2000 yards per hour). One "knot" is approximately 1.15 statute mile. The navigator uses this to determine how far the vessel has traveled and to estimate likely arrival time at the destination.

GPS (Global Positioning System)

GPS is a global navigation system using radio signals from a transceiver which communicates with a number of satellites and automatically computes the vessels location, heading and speed. The transceiver will have a display mounted close to the helm. There is a digital read-out of the vessel's speed and position (Latitude and Longitude) together with additional information for use by the navigator. The GPS receiver may have a charting function or may be connected to a "Chart Plotter" which will show the position of the vessel graphically on a chart displayed on the screen.

GPS System

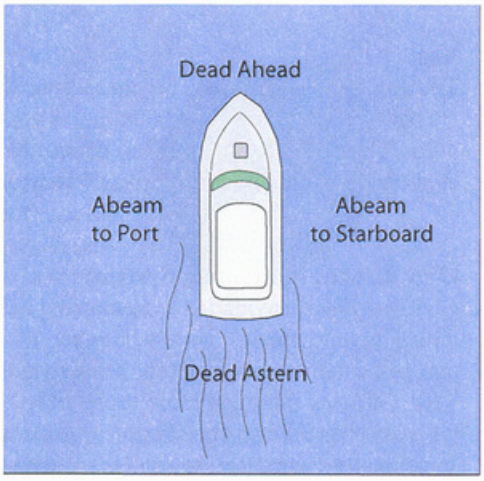
Radar

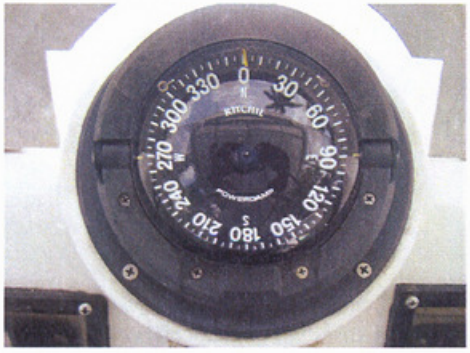
Radar is used to detect another vessel or object, and show the "range" (distance) and bearing to the object. Detection is achieved by transmitting a short burst of electromagnetic energy so that it can strike an object, reflect back, and be detected by the receiver. The data is then processed and displayed on a screen mounted close to the helm.


Radar Screen

Relative Direction and Compass Direction

When on board a vessel there are correct ways of describing the location of surrounding objects. These are known as "relative bearings" and are based on the direction of the object in relation to the vessel. For example, an object directly in front of the vessel is referred to as "dead ahead" and one directly behind as "dead astern". Any object at 90 degrees to the vessel is known as "abeam". This can be abeam to port or abeam to starboard.



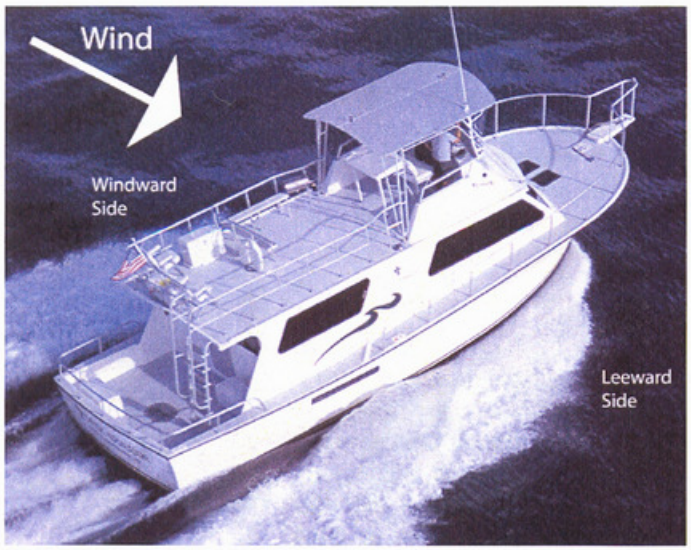


Compass Direction

When a vessel is traveling through the water, the direction it is heading is known as the "course". In order to help determine the direction of travel, a vessel will use a compass which is divided into 360° (degrees) and points to the magnetic north pole. Any object may be described in terms of a "compass bearing" from the vessel, such as another vessel sighted at 45 degrees off the starboard bow where zero degrees represents magnetic north.

Windward/Leeward

On a vessel, reference is made to the direction from which the wind is blowing relative to the vessel, the side of the vessel from which the wind blows is known as the "windward" side, whilst the opposite side is known as the "leeward" side.



Safety Equipment

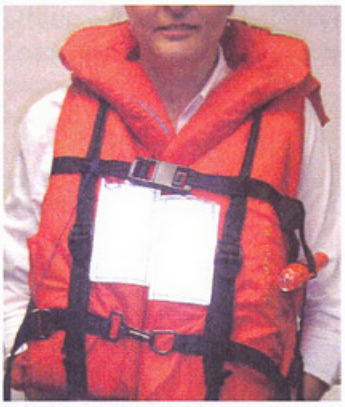
When it comes to survival at sea, there is nothing more important or comforting than being adequately prepared. This preparation could some day save your life. Understanding the dangers that can overcome you and your vessel while at sea is a crucial part of surviving. It is vitally important to thoroughly know your boat, your equipment, your crew, and your safety systems.

Life Jackets / Personal Flotation Devices (PFD's)

There should be at least one lifejacket per person on board every vessel, including small sizes for any children. A life jacket is designed to support a person's weight with their head turned upward with nose and mouth above the water.

There are many different types and designs of lifejackets such as Safety of Life at Sea approved (SOLAS). SOLAS jackets are recommended as they carry reflective tape, a light and a whistle. Essentially the jacket is placed over the wearer's head and is then tied or clipped around the front and sides. The buoyancy may be provided by a solid material that has extremely buoyant properties, or by CO2 or a combination of both. Some CO2 filled jackets have an automatic inflation device which inflates when the lifejacket is submerged in water.

Inflatable Lifejacket



SOLAS Approved Lifejacket

Adult Lifejacket

* Children's Lifejacket

Personal Flotation Device (PFD)

* Children's Buoyancy Aid

Buoyancy Aids / Flotation Aids

Buoyancy aids are designed to provide buoyancy but will not turn an unconscious person upright or provide as much support as a lifejacket. They are mainly used for watersports such as windsurfing, dinghy sailing, water skiing and kayaking. They are best suited to inland waterways, coastal operations and calm waters where there is a good chance

* Note the groin straps on children's lifejackets and buoyancy aids.

of quick recovery. They are useful on smaller vessels where bulky life jackets may be impractical. Generally, they are the most comfortable for continuous wear and are available in many colors and styles. All PFDs must be kept in operable condition by regular checks and maintenance.

Pyrotechnic Distress Signals (Flares)

Flares are used to attract attention in the event of emergencies at sea. There are four basic types of flares. These devices, being pyrotechnic, are in themselves dangerous and must be treated with respect. They must always be kept dry, such as in a watertight container. They must also be in date. They will only be of benefit if they are used when there is a high probability that there is someone in your immediate vicinity that will see the flares. When using one of these devices hold them away from the body and point downwind.

The four types are:

Red Parachute flare - These are magnesium flares on a parachute which go up to around 300m or 1000ft and then gradually float back down. Used to attract the attention of distant vessels.

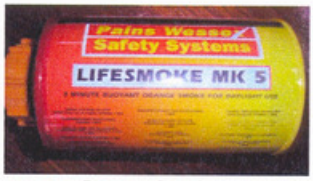
Red Hand-held flare - These flares are used at night and produce a bright red light for around 60 seconds.

Orange Smoke - These flares are used during the day and produce a plume of orange smoke for around 3 minutes.

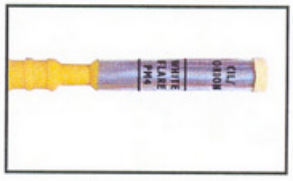
White hand-held flare - These flares burn bright white and are used to alert other vessels to the risk of collission.

Red Parachute

Red Handheld



Orange Smoke



White Handheld

SOLAS flares are recommended above all others due to their high luminescence and burn rate.

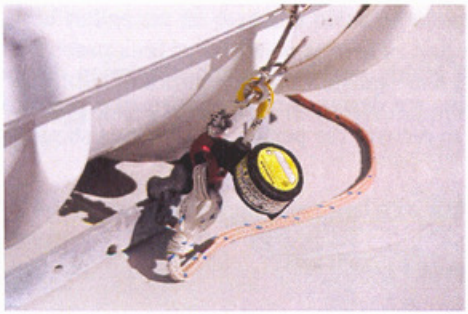
Life Raft (Requires annual inspection to keep in date)

A life raft is an inflatable survival craft packed in either a hard plastic canister or a soft valise which should be accessible in the event that the crew need to evacuate the boat in an emergency. They come in various sizes such as 4, 6, 8, 12, and 24 man capacities depending on the size of the vessel. There is a saying that one should only ever step "up" into a life raft, i.e. it is a last resort. After the disastrous 1979 Fastnet Yacht race in England, many of the yachts that were abandoned were later found afloat, however, many of the life rafts were never found. A liferaft should have a hydrostatic release attached to it for automatic deployment in the event of a sudden sinking (more details to follow). At least one member of the crew should have received basic sea survival training from a recognized authority.


Canister Liferaft


Valise Liferaft


Inflated Liferaft



Hydrostatic Release attached to the liferat

The **Hydrostatic release** unit is mounted between the liferaft and the cradle which holds it. If you do not have a chance to manually deploy the liferaft when the ship is sinking, at a depth of 10-15' the Hydrostatic Release Unit will allow the raft to inflate and float free automatically. It has a 2 year life then it must be replaced.

Basic First Aid Kit

Every vessel however small should carry a basic first aid kit. There should also be a First Aid Manual on board for quick reference. The longer the voyage intended to be undertaken, the more comprehensive first aid contents should be. Any crew member taking prescription medications should ensure an adequate supply and notify the captain. At least one member of the crew should have received some first aid training from a recognized training authority. Contents of a basic first aid kit usually include the following: bandages & various gauze pads, aspirin, antiseptic wipes, motion sickness tablets, antacid tablets, insect bite relief swabs, alcohol prep. pads, cotton swabs, tweezers, synthetic gloves, eyewash & pads, calamine lotion, ice pack, antibiotic cream and first aid instruction booklet.

Fire Extinguishers (Requires annual inspection to keep in date)

It is imperative to know where the fire extinguishers are located on every vessel and how to use them. In general, fire extinguishers on boats will be either a dry powder or foam that smothers the fire or CO2 which starves the fire of oxygen. It is recommended that one of the crew members complete a basic fire fighting course from a recognized training authority.

There are four main types of fire extinguishers:

1. **Water - ordinary combustibles (class A)**
2. **Dry powder/chemical - multi purpose (class A,B,C)**
3. **Carbon Dioxide (CO2) smothering agent for gas, liquid and electrical fires (class B,C)**
4. **Foam - smothering agent for flame inhibition (class A,B)**

If a fire does break out, it must be contained and extinguished as quickly as possible. The correct actions must be taken as promptly and efficiently as possible otherwise the chances of containment are slim. The following is worth remembering:

FIRE: F = Find
I = Isolate and Inform
R = Report and Restrict
E = Extinguish or Escape

Safety Harnesses

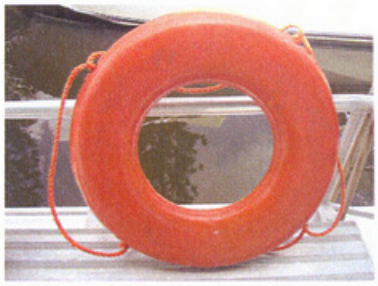
Mainly used on sailing vessels, safety harnesses are worn by crew members when on deck in bad weather, at night and if the crew member feels safer with one on. The harness comprises webbing shoulder straps and waistband which are adjustable, and a tether of rope or webbing which has a karabiner clip on both ends. The wearer clips on to strong points on the vessel or onto a "jack stay" (a rope or webbing line attached at the bows and stern of the vessel) when moving up and down the deck.

Safety Harness

Horseshoe Buoy / Ring Buoy

These are type IV Personal Flotation Devices. They are lightweight, highly visible, throwable flotation devices which are used in the event of a man overboard (MOB). These devices are designed to be thrown to a person in the water to assist in keeping them afloat while the vessel manouvers to recover the person. All vessels should be equipped with at least one.

Horseshoe Buoy



Ring buoy

Lifesling

A lifesling is another type of throwable man overboard (MOB) recovery device. It is normally attached to the sternrail or stanchion. They are commonly used aboard sailboats and are deployed by opening the bag and dropping the sling into the water. Forward momentum of the vessel will draw out a long line. The vessel is then manouvered in a wide circle around the MOB enabling the person to grasp the line and work back to the boat. The person places the sling under his arms, when ready and secure, the crew will recover the MOB by pulling the line back on board. Getting the MOB back on board may be as easy as dropping the swim ladder or may involve the use of a winch, halyard, or block and tackle to assist in MOB recovery.

VHF Radio

The Very High Frequency (VHF) radio is a transmitter and receiver combined in one instrument, called a "transceiver". When a message is sent from one transceiver it can be received by another transceiver provided that it is within range and tuned to the same channel or frequency. Both transceivers MUST be tuned to the same frequency to enable a conversation to take place.

VHF Radio

Microphone

VHF Handheld Radio

VHF radios are an essential piece of equipment in the event of on-board emergencies. Uses also include weather and coastguard information as well as routine ship to ship traffic and are used to transmit "Mayday", "Pan Pan" and "Securite" information. A "Mayday" call is used when danger is imminent, a "Pan Pan" call is used when a vessel has a problem but danger is not yet imminent. A "Securite" call is used to alert other vessels of hazards to navigation.

A full explanation of the operation of a VHF radio is contained in the VHF Radio Operators notes.

Safety Checks, Engine Checks and Checklists (These will be covered in depth in the practical sections.)

A series of checks should be carried out prior to every trip or voyage. It is important to know that the vessel and her equipment are in good order and everything is working properly. It is also a good opportunity to use the checks as a way to introduce the location of equipment and safety gear to new crew and as a reminder to those who have been on board before.

Hull Checks - Check the condition and operation of the following:

- Location and condition of through hull fittings
- Through hulls and sea cocks operate easily, hoses in good condition, hose clamps fitted (double)
- Spare hose clamps should be carried (two or three of each size)
- Through hull plugs attached to each sea-cock
- Bilges are clean and dry, bilge pumps operational
- Grab rails, life-lines in good condition

Safety Equipment

- Check all safety equipment is in date and has not expired
- Fire extinguishers in date
- Signal flares and other signaling devices with current expiration dates
- Life jacket suitable for each person on board, readily accessible, in good condition
- MOB equipment and throwable flotation easily accessible to helmsperson
- Flashlight and extra batteries
- Horn working.
- Bell
- First aid kit, with sunscreen, pain relievers and any special medications for crew
- VHF working and in good condition

Housekeeping Items

- Water tanks full with extra bottled water for emergencies.
- Propane gas including spare bottle, in outside locker with drain

Dinghy - Check the condition and operation of the following.

- Stowed properly
- If inflatable ensure it is in working order
- Paddles or oars.
- Outboard motor maintained and stowed properly
- Spares
- Safety equipment etc for dinghy
- Sufficient fuel for operation

MODULE 2 / SECTION 3
ROPES & ROPEWORK

Ropes are used for a number of purposes on board a vessel, particularly on a sailing vessel. There are a number of different types of rope, each will be used for a different purpose. They will last a long time if looked after properly. If the rope has been stored badly, it will be weakened and it will deteriorate in use. Misuse and incorrect handling will hasten this process. Contact with chemicals, gasoline/petrol/paint etc. cause serious damage to ropes and salt water has an adverse effect on them. Man made fiber ropes are badly affected by ultra-violet radiation and require protection from direct tropical sunlight. Ropes should be inspected and condemned if there are obvious defects such as broken strands, kinks or signs of rot.

Ropes should regularly be taken ashore and washed in fresh water and dried. Salt crystals harden the rope and their abrasive action shortens their life.

Coiling a Line

Ropes and lines should always be coiled neatly so that they are easy to access and use when needed quickly. Properly coiled lines allow the rope to run freely and not become kinked; it is also more easily stowed.

With stranded rope always coil with the lay, and for the more common right lay rope, this will be by coiling clockwise using a slight twist about half a turn, in the direction of lay as each coil is formed. When coiling a braided rope which has no lay less twist must be used.

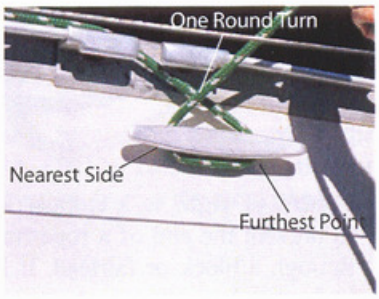


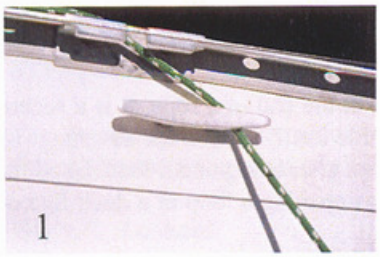


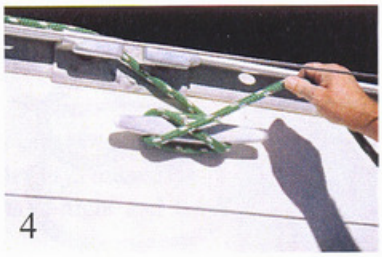


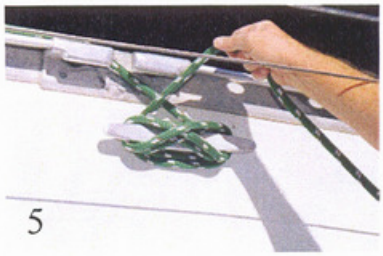

Securing to a Cleat

The rope should be lead to the back of the cleat and a full turn taken around the base. This will hold the load. The second step is to make two figure of eight turns around the cleat finishing with another full turn around the base of the cleat. The general rule for securing a line to a cleat is "nearest side, furthest point, one round turn."









Knots

The correct selection of a type of knot, bend, or hitch for any job on board a boat is essential. Knots, bends, and hitches are all ways of fastening one or more ropes together or for attaching a rope to an object such as a spar, ring or cleat.

The following selection of knots, bends and hitches and their purpose are more than adequate for most requirements on a boat.

Round Turn and Two Half Hitches is mainly used for securing to a post or ring. The round turn creates friction which allows the load to be held while the 2 half hitches are made.

Clove Hitch may be difficult to untie after being under heavy load and is usually used for tying the painter of a dinghy to a bollard or attaching fenders from lifelines.

Figure of eight is a stopper knot used to prevent the end of a rope running out through a block or fairlead. It is easy to undo and is mostly used on the ends of sheets, halyards and deck lines.

A **Bowline** creates a fixed loop in the end of a rope. It is a secure knot that is unlikely to slip or untie itself, and has the advantage of being relatively easy to untie even after being under load. Used for a number of applications such as creating a loop in a dock line or for attaching sheets to a headsail.

Rolling Hitch is used for a number of purposes where a load on one rope needs to be transferred to another, for example, when load need to be taken off a winch with an overriding turn.

Reef Knot

Granny Knot

Reef Knot or square knot is used mainly for fastening reef ties when shortening sail. Because it will undo easily if the load is not constant it should never be used to join two ropes together, especially if the two ropes are of different diameters. A better knot to join two ropes is the "sheet bend' or "double sheet bend" described below. An improperly tied reef knot is known as a "granny knot".

Sheet Bend is used to join 2 ropes together.

Double Sheet Bend is used to join together 2 ropes but is more secure and works better if there is a difference in the thickness of the two ropes.

MODULE 2 / SECTION 4
BASIC COLLISION REGULATIONS (RULES OF THE ROAD)

All activities on the water are governed by a set of international regulations. These regulations are known as the INTERNATIONAL REGULATIONS FOR PREVENTING COLLISIONS AT SEA, (1972). This set of regulations runs to many pages and the full text is beyond the scope of this module, we will however discuss the most important sections.

STEERING & SAILING RULES

This section defines what action must be taken by vessels to avoid collisions under specific circumstances. One of the most important of all the Rules is Rule 5 which is given here verbatim:

"Rule 5. Lookout

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."

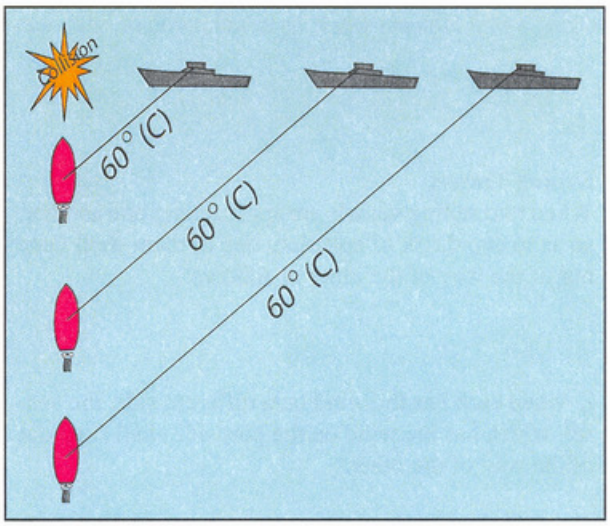
Safe speed

Vessels shall at all times proceed at a safe speed taking into consideration visibility, traffic density, maneuverability of the vessel, background lights at night and sea state.

Determining if risk of collision exists

Vessels shall use all available means to determine if risk of collision exists. Risk of collision shall be deemed to exist if the compass bearing of an approaching vessel does not appreciably change; risk of collision may sometimes exist with a large vessel, a tow or a vessel at close range even if the bearing does change appreciably. If there is any doubt, risk of collision shall be deemed to exist.

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



Risk of collision exists if the compass bearing to the other vessel remains constant.

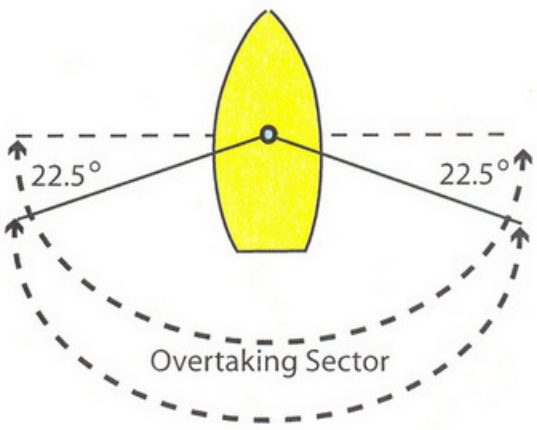
Action when in a Channel

When in a channel all vessels should stay to the right hand or Starboard side, as near to the outer limit of the channel as is safe and practicable (Rule 9)

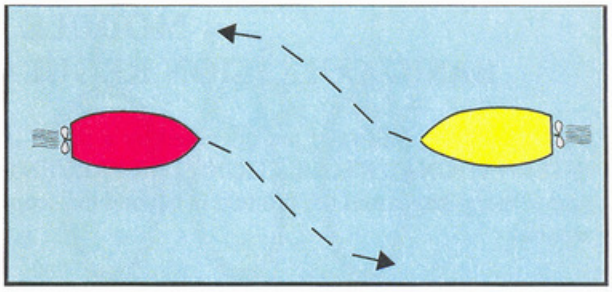
Overtaking

Any vessel overtaking any other vessel shall keep out of the way of the vessel being overtaken. A vessel is deemed to be overtaking if she is coming up with another vessel from a direction more than 22.5° abaft her beam. In other words at night time only the stern light of the vessel being overtaken would be visible.

If a vessel is in any doubt as to whether she is overtaking she must assume that she is overtaking and act accordingly.



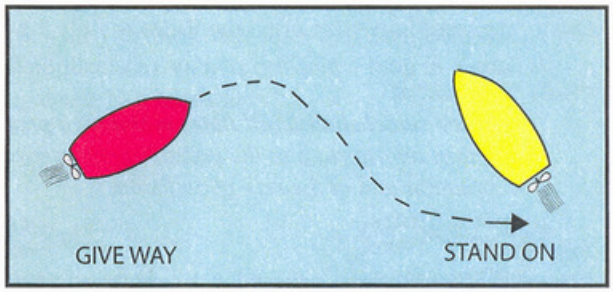
Power driven vessels meeting head on
When two power driven vessels are meeting head on both are required to alter course to starboard.



Power vessels meeting head on - both turn to starboard

Power driven vessels crossing

When two power driven vessels are crossing, or converging, and risk of collision exists the vessel which has the other on her own starboard side must give way.
The give way vessel must not 'give way' by crossing ahead of the other vessel.



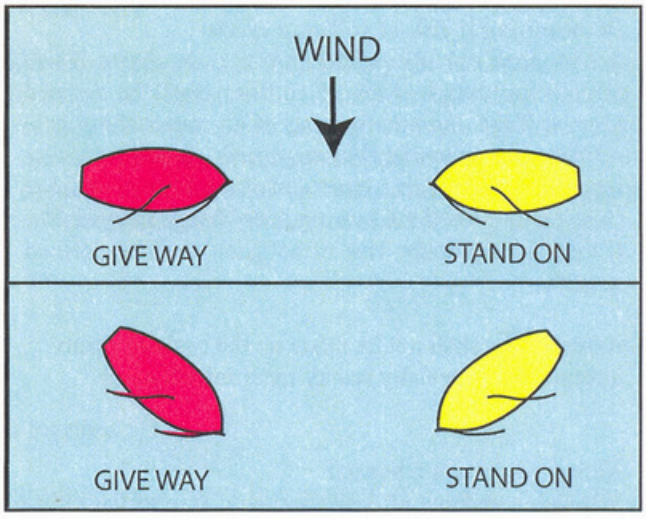
Power vessels crossing or converging:
give way to vessel on your starboard side
stand on for vessel on your port side

Sailing Vessels
When two sailing vessels are approaching one another, so as to avoid risk of collision, one of them shall keep out of the way of the other as follows:

i. when each has the wind on a different side, the vessel which has the wind on the port side shall keep out of the way of the other.

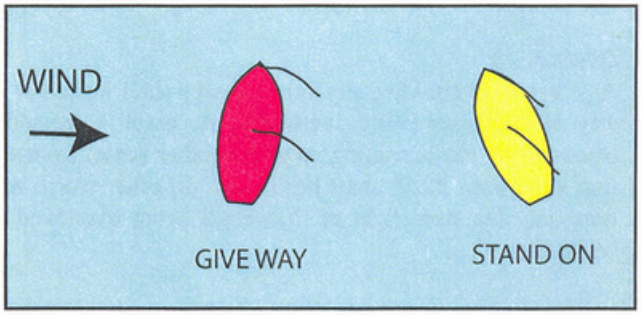
In other words a sailing boat on port tack gives way to a sailing boat on starboard tack. A sailing vesssel with the wind coming over the port side is said to be on port tack, when the wind is coming over the starboard side the vessel is said to be on starboard tack.

The main sail indicates visually which tack the vessel is on as it will be carried on the opposite side to the side over which the wind is blowing.



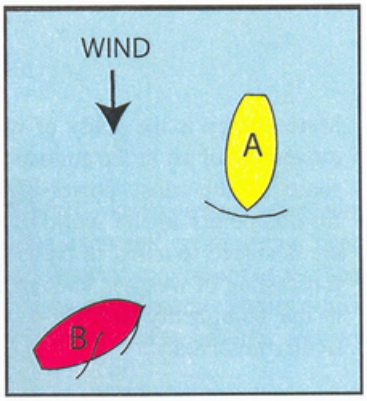
Port tack gives way, *Starboard tack stands on*

ii. When both have the wind on the same side, the vessel which is to windward shall keep out of the way of the vessel which is to leeward;



Same tack: windward boat gives way

iii. If a vessel with the wind on the port side sees a vessel to windward and cannot determine with certainty whether the other vessel has the wind on the port or on the starboard side, she shall keep out of the way of the other.



In this diagram the yacht B, on port tack, cannot see which side the mainsail of the other boat, A, is being carried on as it is obscured by the large headsail.

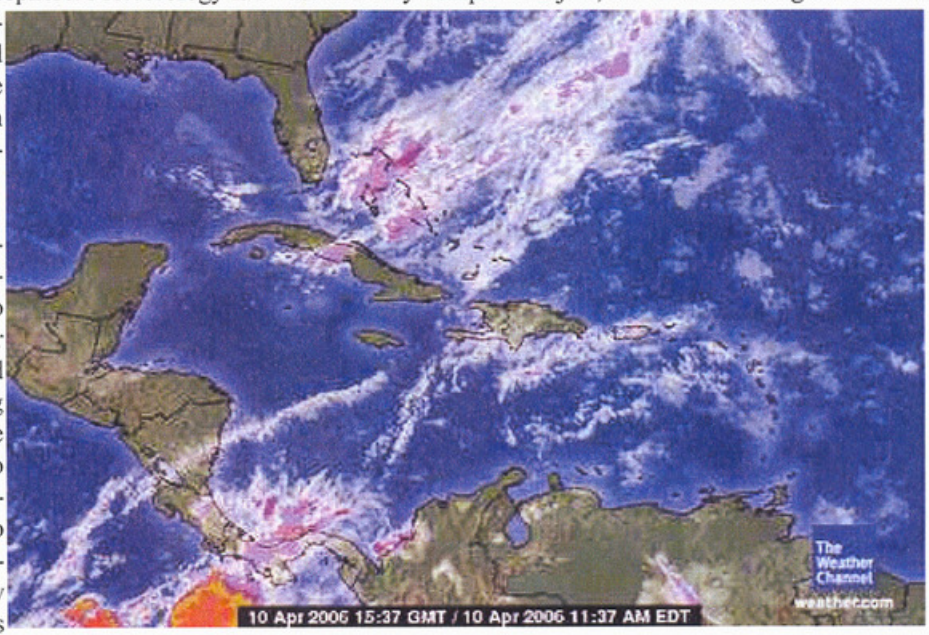
To fully understand the rules it is necessary to read through them carefully, and like any legal document is open to interpretation and every situation is different. If in any doubt, give way, it's usually the safest thing to do.

Power meeting Sail
A power-driven vessel underway shall generally keep out of the way of a sailing vessel (Rule 18)

This rule must be treated with respect and intelligence, for example, in various harbors around the world the working boats like ferries have a right of way under a "local rules" exemption to the general rules in the regulations. Equally if you are in a sailboat and see a large cargo ship in front of you flying a black barrel shaped object at it's mast this means that it is "constrained by draught", or in other words can only go down the deep water channel into a harbor, and cannot get out of your way.

MODULE 2 / SECTION 5
INTRODUCTION TO WEATHER

Meteorology is the study of weather, which is caused by the movement or transfer of energy occurring with the movement of air in the atmosphere. Meteorology is a vast and very complex subject, it is worth bearing in mind that some of the most powerful computers in the world are designed to assist in the forecasting of weather, such is the complexity and difficulty involved.



However, of great importance to everyone who ventures out on the water is to obtain a weather forecast for the duration of the proposed trip. The result of obtaining such a forecast will dictate to the mariner whether to sail or not to sail. The information that is important to know is wind speed , direction and strength, visibility and what may reduce this such as rain, fog, smoke, mist, etc., Wave height, air temperature, barometric pressure, sun strength, and the likelihood of tropical storms or hurricanes must also be taken into account.
Meteorology will be covered in greater detail in further modules.

Sources of Weather Information

There are many sources of weather information available to the mariner, however, it is imperative to get an overall picture upon which to base your decision to sail. Below is a partial list of sources, and depending on where you are in the world, other sources may be available.

a) Internet
b) Radio (both VHF and commercial radio)
c) Newspapers
d) Television
e) Marina Offices
f) Port Authority Offices
g) Coastguard Organizations
h) Telephone Company recorded forecasts
i) Weather fax
j) Meterological Office

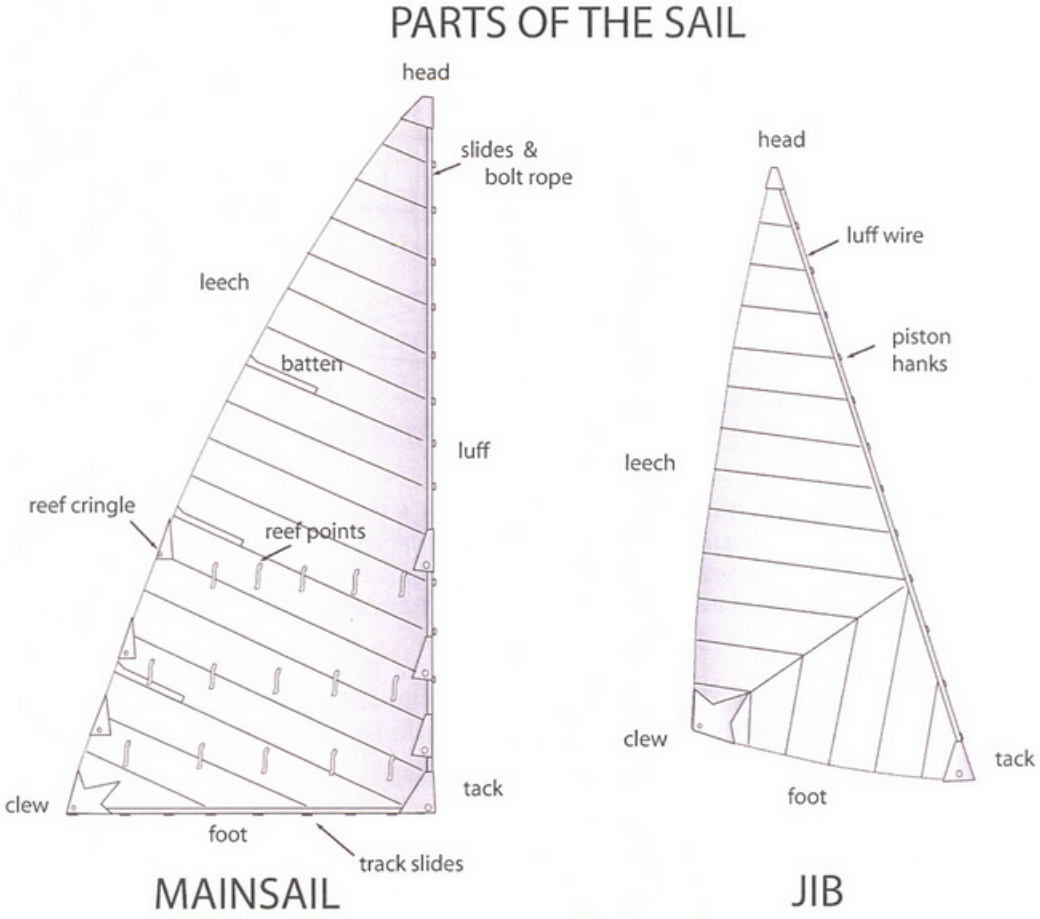
To Go or not to go / sail or not to sail
Once the forecast has been received the decision to go or not to go will have to be made. If in doubt err on the side of caution and postpone the trip.

Having decided to make the passage, weather updates can be received over the radio from Coastguard stations or Marine radio offices or via weather fax. One should plan to receive these updates on a regular basis throughout the passage, preferably twice daily, especially during the North Atlantic hurricane season and the South Atlantic cyclone season.

MODULE 2 / SECTION 6
SAILS AND SAIL HANDLING

How sails work

Very simply stated, sails work when the wind flows over the sails (effectively an aerofoil, like an aircraft wing) thus creating a driving force which moves the yacht through the water. The wind acts on each sail creating two basic forces; the "lift" from the aerodynamics of the sail and sideways drift. The lift causes forward movement of the boat through the water and the sideways drift causes leeway. These two factors generate the aerodynamic forces which interact with the underwater part of the hull and the keel and the water in which it is immersed to produce forward motion of the hull.

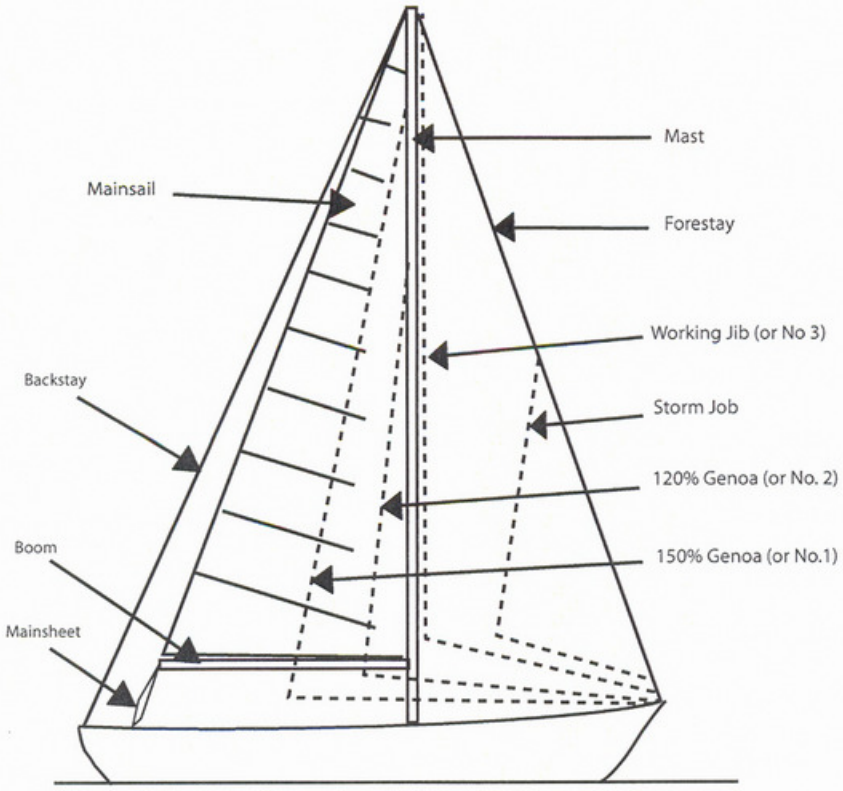


Parts of the rigging, standing and running

Standing rigging is the fixed parts of the rigging that hold the mast in place.. They are the forestay, backstay and sidestay.

Running rigging refers to the lines and sheets that adjust the angle of the sails to the wind.

Most modern sailing yachts use what is called a **"Bermudan Rig" or "Sloop Rig"** where the sails are triangular in shape. The top corner of the sail is the **head**, the bottom corner of the leading or forward edge of the sail is the **"tack"** and the rear corner the **"clew".** The three sides of the sail are the leading edge called the **"luff"**, the back edge is the **"leech"** and the bottom of the sail is the **"foot"**.



Sloop Sail Plan

The simplest rig commonly seen on yachts has one mast. There is a single sail in front of the mast called a **"jib"** or a **"headsail"** attached to the **"forestay"** which is part of the standing rigging; and a second sail the **"mainsail"** that is hoisted up a track in the mast while its foot is attached to the horizontal spar on the back of the mast called the **"boom"**. The foot of the mainsail may either be in a track on the boom or just attached by the corners in which case it is called **"loose footed"**.

The mainsail often has **"battens"** or stiffeners sewn into pockets in the sail to help support it's shape, these can either be just at the trailing edge **"leech"** of the sail or can extend right across the sail. Having full length battens that extend right across the sail helps the sail hold the shape better.

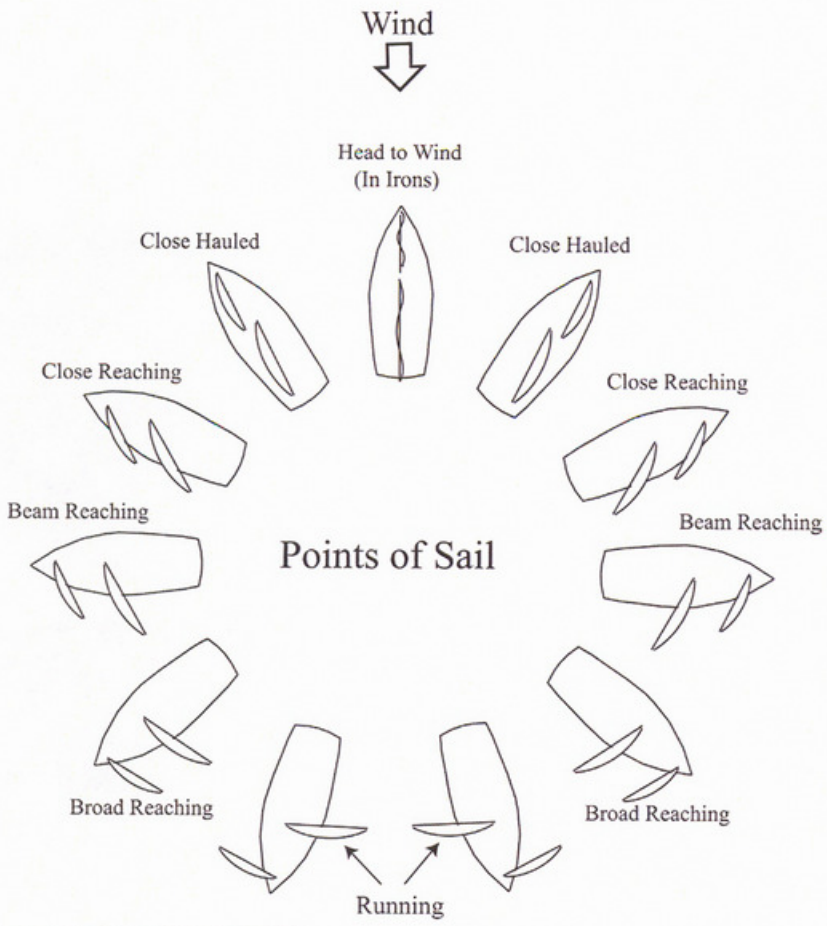
A "jib" becomes a "genoa" as soon as the clew of the sail passes the mast. A 120% genoa means that 20% of the sail is past the mast and a 150% genoa means that 50% of the sail area is past the mast.

Unfurling a roller reef headsail

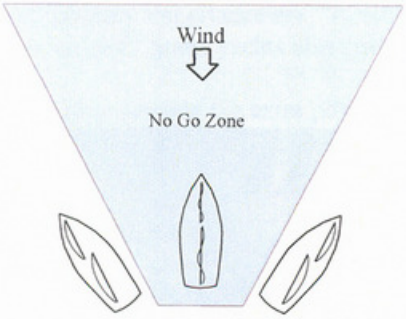
Points of sail and sailing terms

The angle that the wind makes towards the boat dictates how the sails are set to gain maximum performance. Each of these angles and settings are known as a "Point of Sail".

A sailing boat cannot sail directly towards (into) the wind. The wind just passes equally down both sides of the sails and there is no **"lift"** (drive forward). In this situation the vessel is stopped dead in the water this is called being **"in irons"**.



Tacking or
Beating



The closest to the wind a boat can efficiently sail is about 40 degrees either side of the wind's direction, effectively this area is a no go zone . This closest point of sail is known as close hauled. Therefore to sail towards a destination from where the wind is blowing, a boat must **"tack"** or zigzag called **"beating"**).

To tack or **"go about"** the vessel changes from one tack to the other by steering the bow through the wind.

When sailing as close to the wind as possible the point of sail is known as **"close hauled"**. The sails themselves will be **"sheeted"** in tight (pulled in). To establish the closest point to the wind that the yacht can sail, the helmsman, as he turns the yacht upwind watches the front edge, or luff, of the headsail until it starts to flutter, this is called **"luffing"**; once he sees this happening he should ease gently away from the wind. If he turns further upwind then the whole sail will start to flog back and forth and eventually the yacht will stall and come to a stop.

As the boat moves away from the wind, or **"bears away",** the sails will be let out a little and the point of sail becomes a **"close reach"**.

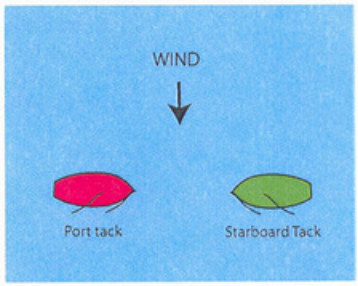
Bearing away still more and easing out the sails a little more the boat reaches the point of sail known as a **"Beam Reach"** (when the wind is over either beam at 90° or half way down the boat). The sails will be about half way out at this stage. This is the most comfortable and controllable point of sail and is also, for most yachts, the fastest.

Further away from the wind again, the sails should be about 2/3rds out, the point of sail is known as a **"broad reach"**, this is when the wind comes from either quarter.

The last point of sail is known as a **"dead run"** or **"running before the wind"** is when the wind is blowing directly from astern and the sails are all the way out.

To go further away from the wind the wind must pass across the stern of the boat. This is called a **"gybe"**; that is to let the sails change sides by putting the stern through the wind.

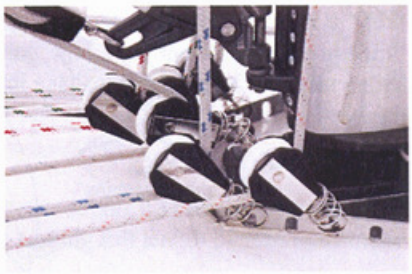
"Starboard Tack" is when the wind comes over the starboard side; **"Port Tack"** is when the wind comes over the port side.



Shackles

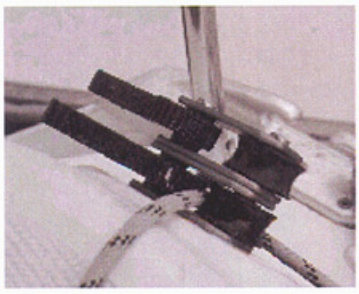
Shackles are a "U" shaped device for attaching for example a halyard (the line that hoists the sail) to a sail. They come in 3 basic forms. The most common is with a screw in pin. Some have a captive pin which is pushed and turned or a snap shackle which is operated by pulling a pin.

Blocks come in different sizes and with up to 4 "sheeves" (wheels that are grooved to take rope). Rigging a line through a series of blocks gives a mechanical advantage allowing that line under load to be more easily handled. For example blocks are normally used on a sailing vessel for the main sheet.



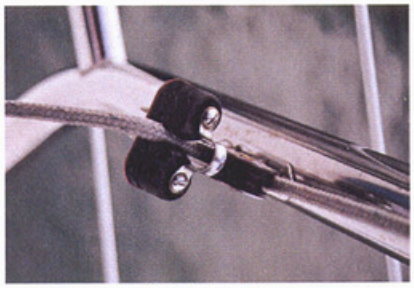
Blocks

Cam cleats, Rope Clutches and Jam Cleats
Used for securing a line under load but that can be quickly and easily released.

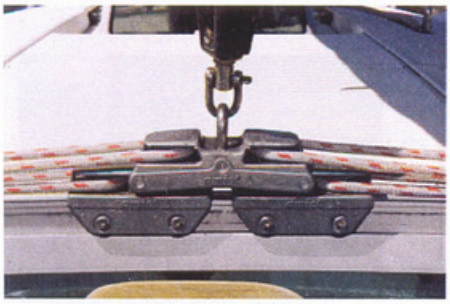


Cam Cleats

Locking Cleats or
Rope Clutches



Jam Cleat



Mainsheet Traveller

Mainsheet traveller is used to adjust the angle of the mainsail to the wind by moving the boom to port or starboard.

Boom topping lift is used to secure the boom in position above deck when the mainsail has been furled.

Boom Topping Lift

Mainsheet

The **Mainsheet** is used to adjust the tension of the mainsail relevant to the wind direction.

Winch Handle

Use of Winches

Of primary importance are "Winches" which are mechanical devices giving extra power for handling these ropes under load. Some yachts also have electrical winches.

Winches provide the extra power necessary to pull in rope under load such as halyards and sheets. Winches often have two or even three speeds provided by internal gearing, giving an increase in power for the same effort applied to the winch handle.

In addition to the fittings described above which will be found on all types of vessels, a sailing vessel will have additional fittings which are designed to enable the crew to use the mast, spars and rigging to harness the power of the wind. Under full sail, even with only a light wind, huge forces are created by the sails and rigging which require fittings to allow the crew to control the sails efficiently.

Most winches have a star shaped hole in the top of the winch into which the star shaped head of the handle is fitted. There is often a locking arrangement to hold the handle securely in the top of the drum.

Self Tailing Winch and sequence of how to operate:


1


2


3


4


5

6

It is imperative when operating a winch to be aware of safety issues. It is recommended that jewelry such as rings and necklaces be removed when operating winches as sheets can carry excessive loads. Many have actually crushed fingers due to lack of care in operating winches.

MODULE 2 / SECTION 7
BOAT HANDLING UNDER POWER

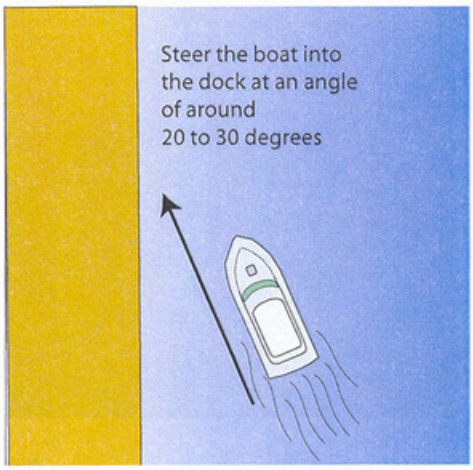
A sailing vessel under the power of its auxiliary engine behaves fundamentally the same as a single engine power vessel. There are some differences in how the vessel responds due mainly to the effect of the deeper keel on sailing yachts compared to most power vessels.

Most propellers on yachts are "right hand" that is to say, they turn clockwise when seen from astern. This will have the effect of swinging the stern to starboard and the bow to port when going ahead. When going astern the opposite happens. The stern swings to port and the bow to starboard. Additionally when going astern the flow of water over the rudder created by the propeller is less efficient and thus will effect the yachts responsiveness to the helm.

The effects of wind, tide and current will also influence power driven vessels. Many power cruisers have quite substantial superstructures and shallow draughts meaning there is little lateral resistance under the water. Wind pressure on these can act as virtual sails and cause the yacht to be blown off course. The same effect can happen to sailing yachts with their sails completely furled there is still pressure on the rig that can push the yacht off course. If going upwind the wind can act on the bow of the vessel and cause it to change direction. Likewise the flow of the tide and currents will need to be considered when holding a course. Both in terms of the drift caused and also the effect on the vessel's speed through the water.

Another point to be aware of is that a vessel has no brakes, its momentum can carry it quite a long way, the only way to slow it down is to engage reverse if one is going forward and vice versa.

When maneuvering a vessel under power particularly in confined spaces we need to keep all of the above in mind. For example, assuming a right hand propeller, it is best to make a right hand turn to maximize the effect of the propeller.



Coming Alongside (wharf or dock)

Steer the boat into the dock at an angle of around 20 to 30 degrees with just sufficient way on the vessel to have good control. When the bow is close to the wharf put the engine in neutral and then reverse, as this is done, it will have the twofold effect of stopping the boat and the reverse thrust will tuck the stern in neatly alongside. Have your mooring line prepared in advance and crewmember designated to step ashore and tie up the vessel. Where there are mooring lines attached to the dock it may be easier to have the crewmembers who step on to the dock pass those lines to people on deck.

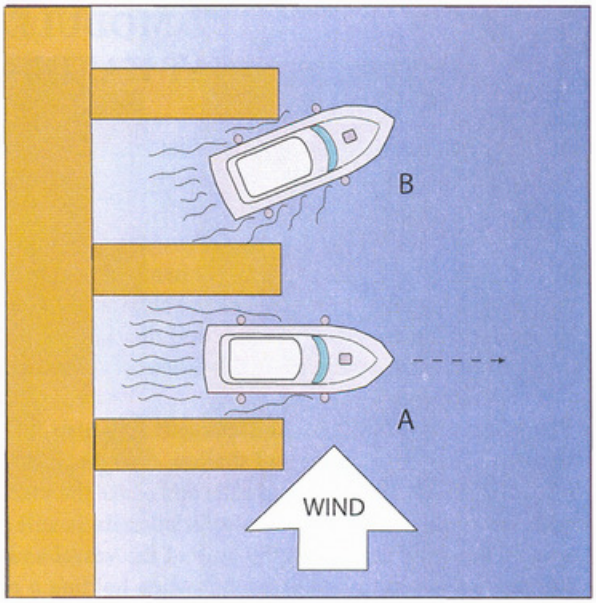
Clearing (wharf or dock)

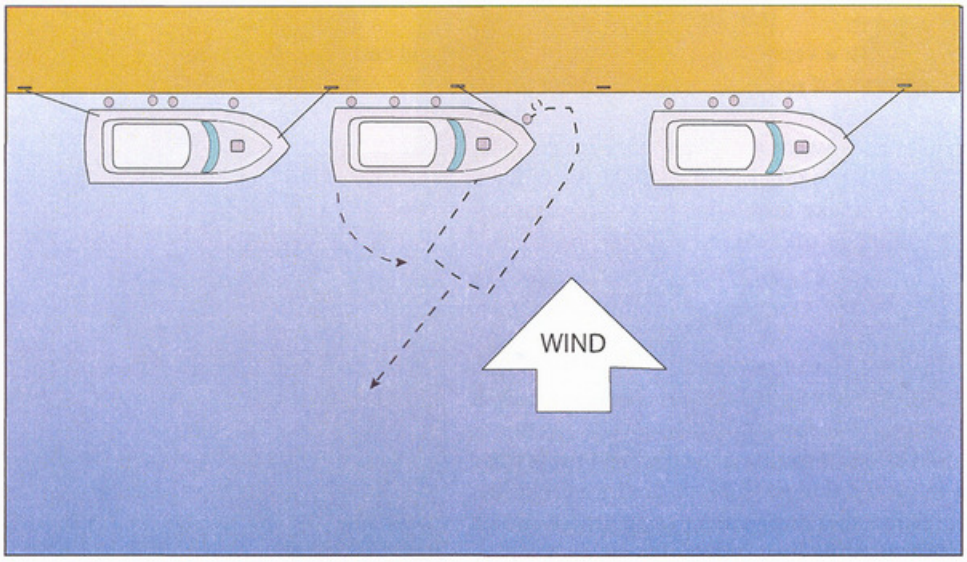
Whenever possible you should try to leave a berth by going forwards though this will always be dependant on the wind and current at the time. The order in which you untie your mooring lines is dependant on the wind and current. If the wind is coming from ahead or off the dock hold the yacht on the after spring line to stop her drifting back onto any vessel astern, the wind will take the bow out and once clear you can leave the dock. Conversely if the wind or current is astern you will swing out on the bow spring until the stern is clear and then you can go astern to clear the berth.

Handling Skills

Departure From a Dock

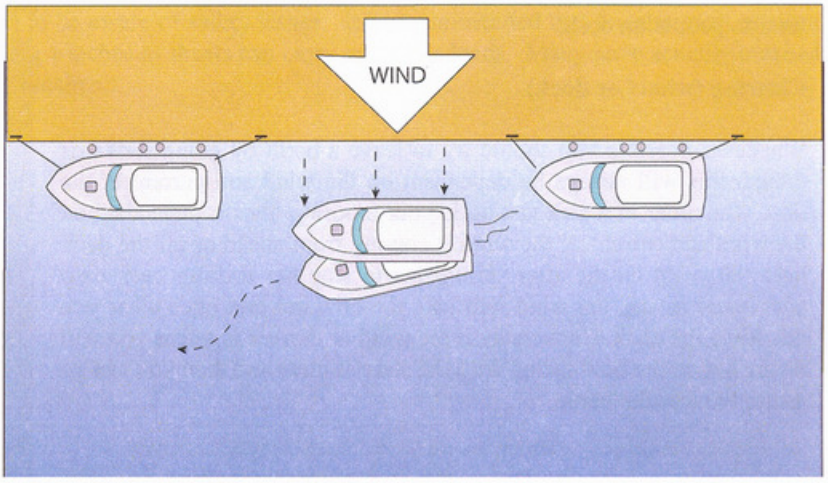
Before departing a dock make sure the engine is running smoothly. In this instance with a cross wind, the vessel must be given enough power to exit the dock quickly (Boat A), or else the wind will blow the boat on to the dock (Boat B). Remove the spring lines, slip bow and stern lines together. See "Nautical Terminology" section for information on lines.





With a wind blowing the vessel onto the dock, slip all lines except the forward spring, power gently ahead to kick the stern out. Slip the spring and motor astern into the channel.

With the wind blowing the vessel off the dock, slip all lines except the stern line. The bow will be blown out into the channel. When clear, the stern line can be slipped.

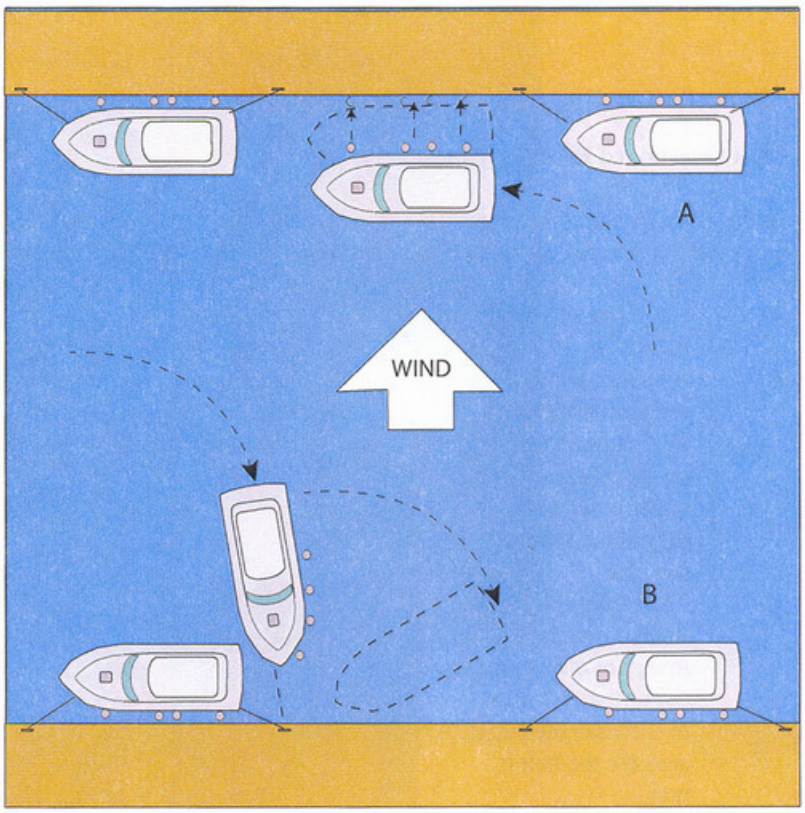


Arrival at a Dock

Always have lines and fenders prepared.

In situation A, the vessel is positioned in the gap by nosing into the space and allowing the wind to push the vessel alongside.

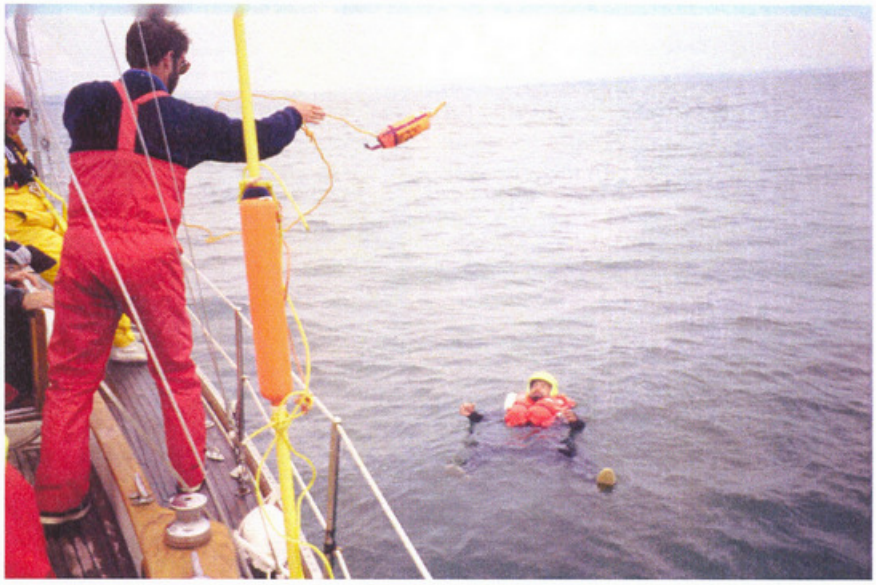
In situation B, with the vessel being blown off the dock, approach the dock bow first, attach a bowline and with the rudder/engine to port, gently go astern which will gradually pull the stern into the dock.



MODULE 2 / SECTION 8
MAN OVERBOARD

Man Overboard Procedure. (Sail)

In the event of a man being lost over the side the process discussed above must be followed. It may be necessary to carry out the process under sail and it is important to know how to do this in a prompt and efficient manner.



Photos by John Rousmaniere and Phil Cowley

- ✓ Call "Man Over board"
- ✓ A spotter is appointed, remember their sole job is to keep an eye on the man in the water at all times; they should do noth ing else.
- ✓ Throw anything that floats towards the man, not only to help them float but also to increase the target area for the helms man.
- ✓ Immediately the helmsman will bring the boat onto a beam reach, one reason is that this is because it is the most comfort able and controllable point of sail.
- ✓ The helmsman or skipper should reassure the crew.
- ✓ After running off for somewhere between five and ten boat lengths the boat should tack. DO NOT GYBE THE BOAT, this is a stressful time and a moment's inattention could cause a violent gybe that might cause damage to the boat or even cause another person to be taken off the deck by the boom making the situation much worse.
- ✓ Come back onto a beam reach on the other tack, this is the other reason for going onto a beam reach after tacking the boat will be on a reciprocal course.
- ✓ Head slightly downwind of the man by approximately two boat lengths, he will be visible on the bow.
- ✓ Keep the yacht de-powered to avoid building too much speed and as the boat comes below the man turn up to windward and the boat will stall and come to a stop with the man on the windward side.
- ✓ The sails will be flapping around at this time if possible drop the sails.
- ✓ If the yacht has a "lifesling" this should be trailed so the man can catch it otherwise one crewmember should prepare a line with a large bowline so that the man can pass it around his body.
- ✓ Do not put another person in the water unless the first person is unconscious the second person must be roped onto the boat.
- ✓ Getting the man back onto the deck is another issue, some modern yachts have a boarding ladder on the "sugar scoop" at the stern which is easy in light weather, however in a heavy swell this could be dangerous as the yacht may rise and fall a substantial distance.

Photos by John Rousmaniere and Phil Cowley

MOB (Power)

This most effective technique should someone fall overboard on a power driven vessel is called the Williamson Turn; the procedure is as follows:

- ✓ Shout Man Overboard and throw over the side any life-rings or flotation aids.
- ✓ Appoint one of the crew to keep a good lookout on the person in the water. This person should do nothing else.
- ✓ Look at the compass for the course you were steering when the person fell.
- ✓ Put the wheel hard over towards the side where the person fell. This will take the stern of the vessel and the propellers away from the person in the water.
- ✓ Turn to about 60 to 70 degrees from your course and then put the wheel hard over to the other side.
- ✓ Come back on to the reciprocal of your original course. For example if you were steering 105 degrees then you would come back onto 285 degrees this will put you on course straight back towards the person.
- ✓ When you reach the person in the water stop the engines so they can be recovered safely.

Note: Under instruction, the candidate will demonstrate good practical understanding and application of MOB procedures.

Photos by John Rousmaniere and Phil Cowley

MODULE 3

ALL SECTIONS
PRACTICAL SUBJECTS

Safety on Board and Safety Equipment

- Location and use of - life jackets, flares, liferaft, first aid kit, fire extinguishers, safety harnesses, vhf radio.
- Do's and Don'ts aboard a yacht
- Emergency situations, MOB, Fire, etc.

Vessel Equipment and instruments

- VHF radio, sounder, log, GPS, Radar (if fitted)
- Dinghy location, inflation, launch and recovery

Engine Checks and Maintenance

- Lubricant condition and levels, coolant condition and levels, drive belt tension and condition
- Tool kit, spare parts and service items
- Visual checks and aids to monitoring the engine
- Engine room discipline and cleanliness

Deck Seamanship

- Stowage for sea, above and below decks
- Correct use of, care and stowing of ropes, lines and fenders, and throwing a line
- Mediterranean bow/stern-to mooring

Sails and Sail Handling

- Headsail furling

EITHER

Sailing Vessel Handling Skills
under power

- Propeller effect when in gear ahead and astern
- Rudder effect, rudder and propeller effect
- Steer a triangular compass course

OR

Power Vessel Handling Skills

- Propeller effect when in gear ahead and astern
- Rudder effect, rudder and propeller effect
- Multi engines, effects of single engine and both engines
- Steer a triangular compass course

MODULE 4 / SECTION 2
NAUTICAL KNOWLEDGE

Seaworthiness and stability factors

Stability
Stability is an important factor in the floatation characteristics of any vessel. Factors which affect the stability are beam (how wide the boat is), freeboard (how high the deck is from the water), loading (how much equipment is mounted on the deck) such as jet ski's, tenders, helicopters, hot tubs etc. and free surface effect (the unstable movement of water, fuel and liquids onboard a vessel). Stability issues are complex and are beyond the scope of this module, but additional information on stability can be found in any nautical bookstore.

Seaworthiness
Seaworthiness is defined as the ability of a vessel to safely complete the passage that it is about to undertake. Characteristics of seaworthiness are a sound hull, working engine and equipment, secure through hull fittings, working rudder and propellers, safety equipment adequate for the particular vessel and sufficient fuel to complete the intended journey.

Types of ropes, qualities and uses

There are many ropes used for a variety of different purposes aboard a boat, and particularly on a sailing boat. Each rope or line as they are called, has a specific name and a specific function. There are lines for tying a boat to a dock, for hoisting and lowering sails, for trimming sails and many other uses. There are a number of different colors, lengths, makes and thickness, each designed for a single purpose. The larger a boat is, the larger the lines will need to be when attaching to a dock or the hoisting of heavy sails.

Rope can be made of either natural fibers such as hemp or of synthetic materials such as nylon or rayon. Rope will generally last a long time if it is cared for properly. If it is left soaking in water, in direct sunlight or not properly stowed then it will deteriorate quickly. Misuse and incorrect handling will quicken this process. Contact with chemicals, gasoline and other corrosive substances can cause serious damage to ropes. Salt water also has an adverse effect. Man made fiber ropes are affected by ultra-violet radiation and require protection from direct tropical sunlight. Ropes should be regularly inspected for obvious signs of wear and tear and discarded if there are signs of broken strands or rot.

Ropes should regularly be washed in fresh water and dried. Salt crystals can harden the strands and this shortens the useful life of the rope.

MODULE 4 / SECTION 3
BASIC RULE OF THE ROAD

Buoys and Marks

To help ensure safety and to clearly mark out obstacles and hazards that exist both in and under the water there exists and internationally agreed sets of marks and lights. These are developed with the assistance of the "International Association of Lighthouse Authorities" (IALA.) There are two major systems.

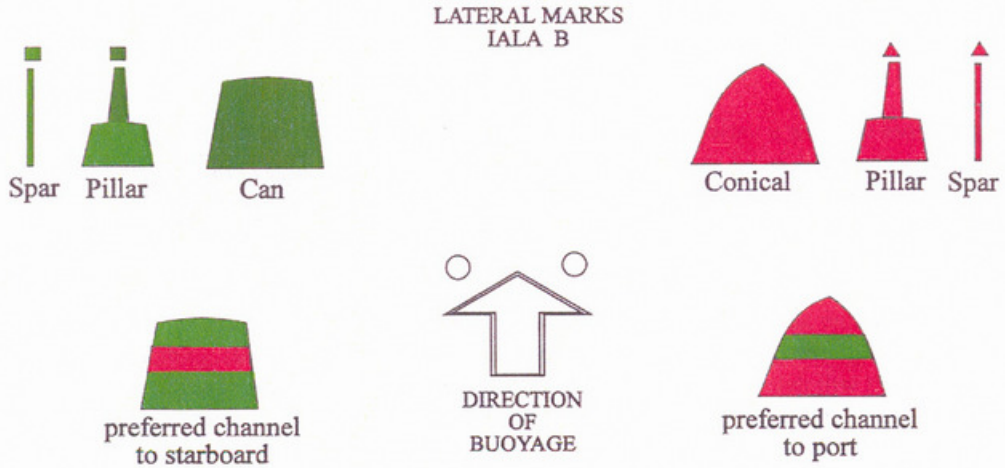
Region A (IALA A) covers all of Europe and most of the rest of the world except for the areas covered in Region B (IALA B) which is The Americas, Japan, The Philippines and Korea. Fortunately most of the differences between the two systems are few. The most important is that which deals with the "direction of buoyage" which defines on which side of a channel the Lateral or Channel Buoys or Marks are placed.

Under IALA B red (port) buoys or marks are on the right hand side of the channel when proceeding in from the sea i.e. going into a harbor. Under IALA A the red (port) markers are on the left hand side of the channel when heading into a harbor. These Lateral or Channel Marks define the limits of the navigable water across a channel, though designed in principle to define the limits for large commercial ships they are also vital for the safety of smaller vessels. It is almost never wise to attempt to pass between a channel mark and the shore behind.

Marks can either be a buoy floating in the water or a pole set into the rocks or sea bed which will be painted in the correct colour and carry the required shape at the top.

Port Marks are Red in color, flash a red light at night and Cone Shaped for IALA B.

Starboard Marks are Green in color, flash a green light at night and are Can shaped for IALA B.



Safe Water Marks are red and white vertical stripes; the other striped marks have horizontal stripes and usually have a continuous white light.

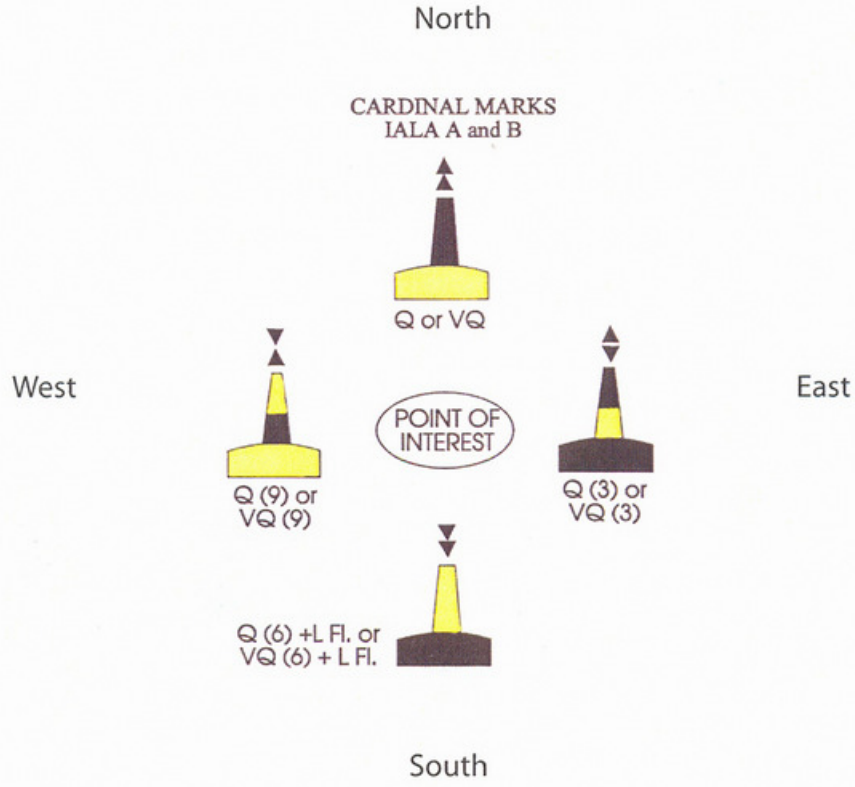
Isolated Danger Marks indicate a point of potential hazard, are Red and Black in Colour, have two round black balls at the top and flash a white light in a group (e.g. two flashes) at night.

Special Marks are yellow in color and display a yellow light if lit. They are not intended to assist in navigation but rather to alert the mariner to some special feature such as: spoil reas, Pipelines, Traffic Separation Schemes, jetties or exercise areas.

Cardinal Buoyage System

Cardinal Marks (while rare in the United States) indicate the safe side to pass a hazard on. For example, a North Cardinal Mark indicates that a vessel should pass to the North of the marker and a South Cardinal Mark would indicate passing to the South of the mark. Each Cardinal Mark has a unique pattern, color scheme and is defi\ned by a white flashing light. Cardinal Marks are used extensively throughout the world and are an excellent system for making safe passage around shallows, sunken objects, reefs, rocks and other hazards.

North Cardinal	Black over Yellow	Triangles point up	Continuous flash
East Cardinal	Black/Yellow/Black	Triangles point away	Flash in a Group of 3
South Cardinal	Yellow over Black	Triangles point down	Flash in a Group of 6, followed by 1 long flash
West Cardinal	Yellow/Black/Yellow	Triangle points in	Flash in a Group of 9



Introduction to lights, shapes and sound signals

Lights

Lights using combinations of white, red, green and yellow colors are used at night to convey information regarding a vessel's

Direction of movement;
Method of propulsion;
Size.

Additional lights are used to indicate if the vessel is:

Towing;
Fishing;
Not Under Command;
Restricted in Ability to Maneuver;
Constrained by Draft;
Aground;
At anchor.

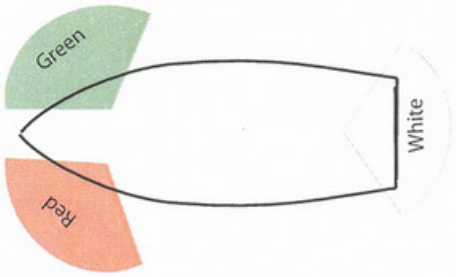
When attempting to decipher the meanings of a vessel's lights, try breaking the lights down into sections by identifying the basic lights and then concentrate on the lights that remain. Usually the most important decision is whether risk of collision exists. If risk of collision does exist it is obviously necessary to work out details of the other vessel before deciding on the correct course of action.
Perhaps the best sequence is to decide the vessels':

1. Aspect (ahead, astern, port, starboard);
2. Propulsion (i.e. under power, under sail, being towed);
3. Length;
4. Other information (i.e. towing, fishing, Restricted in Ability to Maneuver, Not Under Command, etc.)

Side lights and stern light

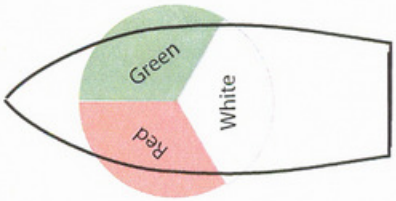
A sailing vessel underway (not at anchor, or made fast to shore, or aground) shows three basic lights, two sidelights and a stern light:

a green light on the starboard side,
a red light on the port side, and
a white light at the stern.



Sidelights and stern light of vessel underway

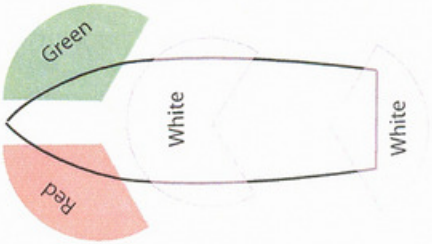
Or a sailing vessel less than 20 meters (65 ft) in length may combine side and stern lights in one lantern carried at or near the top of the mast. Note that this combined lantern must not be used when the yacht is using her auxiliary engine.



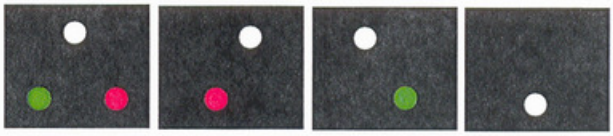
Sailing vessels less than 20 meters may use a combined side and stern light

Seen From: Ahead Port Starboard Astern

A power driven vessel underway less than 50 m (164 ft) in length shows a white masthead light above the sidelights. A masthead light covers the same arc as the sidelights combined. Also a white stern light.

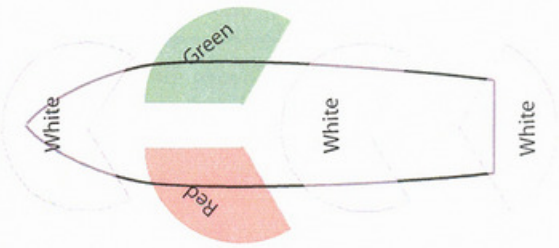


Power driven vessel underway, less than 50 meters in length

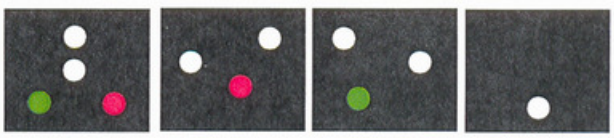


Seen From: Ahead Port Starboard Astern

A power driven vessel underway greater than 50 m in length shows a white masthead light forward and a second masthead light behind and higher than the forward masthead light.



Power driven vessel underway, greater than 50 meters in length



Seen From: Ahead Port Starboard Astern

Vessels at Anchor

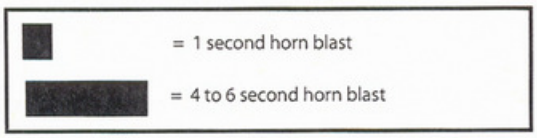
A vessel at anchor, less than 50 m in length, must show an all round white light where it may best be seen.

A vessel at anchor, greater than 50 m in length, must show in the fore part an all round white light and a second all round white light at or near the stern which is lower than the forward light.

If a vessel at anchor is greater than 100 m in lenght she shall use available lights to illuminate her deck.

Vessels at Anchor

< than 50 m *> than 50 m, side, starboard* *> than 50 m, port side*



Morse 'U'

Means "You are running into danger":
This signal is often used by oil rigs, etc.

Sound Signals In Poor Visibility

Sound Signal		Every
	Power underway, making way	2 min
	Power underway, not making way	2 min
	Vessel sailing; vessel fishing; restricted in ability to maneuvre; constrained by draft; not under command; vessel towing or pushing	2 min
	Last vessel of tow	2 min
	Warning from vessel at anchor	when required
	Pilot vessel on duty	
5 secs	Vessel at anchor: Rapid bell for 5 secs. (+ gong aft for 5 s if vessel > 100 m)	1 min
1 2 3 — — 1 2 3 (5 secs)	Vessel aground As for at anchor + 3 strokes on bell before & after rapid bell rings	

Maneuvering and Warning Signals For Vessels In Sight Of Each Other	
	I am altering course to starboard
	I am altering course to port
	I am operating astern propulsion
(Or More)	I do not understand your intentions! I doubt you are taking sufficient or appropriate action to avoid collision
	I intend to overtake on your starboard side
	I intend to overtake on your port side
	Agreement by overtaken vessel
	Approaching blind bend in channel
	Reply from vessel on other side of bend

ALL the different configurations of lights and shapes MUST be learnt by the seafarer in order to be safe at sea. These are just an introduction.

Learning the "Rules" is not easy, it takes lots of time and patience, however it is essential to know everything about the other vessels around you.

The above is an abridged version of the 'Rules'. The prudent mariner will undertake a full and thorough study the Rules.

MODULE 4 / SECTION 4
CHARTS & COMPASS

Charts

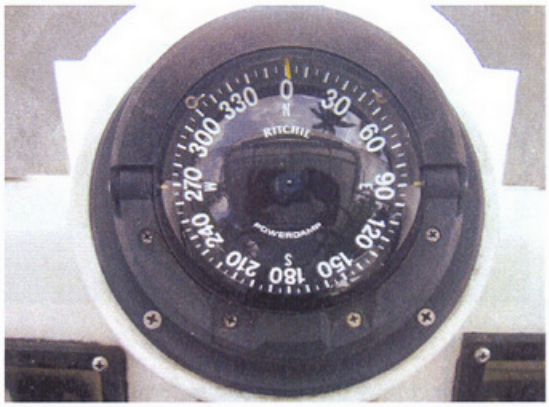
Charts are essentially maps of sea areas showing coastlines and their prominent features, depths, objects in, on and under the water and also includes other useful information. They are intended primarily for use by mariners to assist in route planning, pilotage and navigation, as well as to find information concerning the depth of water, hazards to navigation, aids to navigation, channels, anchorage areas, harbors, tides, water levels, magnetic variation and information on currents. Many maritime nations have agencies that publish charts which are readily available through maritime suppliers worldwide.

Nautical Chart

How to Use A Compass

The Magnetic Compass

The magnetic compass comprises a magnetic needle mounted on a pivot and a card that is divided into 360° increments, called degrees, 0° and 360° being the same, also labeled north. Most modern compasses have the needle attached to the card and it operates by the needle pointing to magnetic north whilst the compass card indicates the vessels magnetic direction of travel.



The vessel's compass is mounted on or parallel to the fore and aft centerline of the vessel.

A compass is used to steer a course, that is, the direction in which the vessel wishes to travel, or to take bearings, which is the direction/bearing of an object for charting purposes.

Lubber Line

A lubber line is located on the fixed part of the compass and is positioned on the fore and aft line of the vessel, to enable accurate reading of a course or bearing. Most compasses have lubber lines etched on the forward and after part of the compass (to indicate reciprocal direction). Remember, it is the boat that moves, not the compass.

True North

True North is taken to be the North Pole, the point at the top of the globe where all the meridians of longitude meet.

Magnetic North

Magnetic North is not at the same place as True North. The magnetic north pole is situated in the vicinity of Bathurst

Island in northern Canada, about 1600 km (about 1000 miles) from the North Pole (it is also permanently in motion). This means that from almost everywhere on the earth's surface True North will vary from Magnetic North. The direction of Magnetic North is shown on the compass rose on the chart, as is the annual change.

Variation
Variation is the angular difference between the direction of True North, and the direction of Magnetic North. If the compass points east of True North, variation is named east and vice versa. The variation can be found printed in the center of the compass rose on a chart.

Deviation
The earth's magnetic field will cause the compass to point to Magnetic North, however any magnetic effects on a particular vessel will cause the compass to be deflected east or west from Magnetic North. This is called deviation and is also calculated east or west. Deviation is caused by ferrous objects (those containing iron) being close to the compass. Engines, iron and steel keels, electric motors and cookers can all cause deviation and small portable objects such as pen knives, can cause deviation if they are close enough to the compass.

Using a hand bearing compass

One way of checking quickly whether the ship's steering compass is subject to deviation is to stand in a deviation free area at the aft end of the cockpit and sight along the fore and aft line of the boat using a hand bearing compass. Both the boat's steering compass and the hand held compass should show the same bearing, if they do not the difference between the two readings is the deviation of the steering compass on that particular heading.

In order to use this method it is obviously necessary to know that the area in which the hand bearing compass is being used is free from deviation; furthermore if an area in the boat can be proved deviation free this area can be used with confidence for all future bearings taken with a hand bearing compass.

Any object may be described in terms of a "compass bearing" from the vessel, such as another vessel sighted at 45 degrees off the starboard bow where zero degrees represents magnetic north.

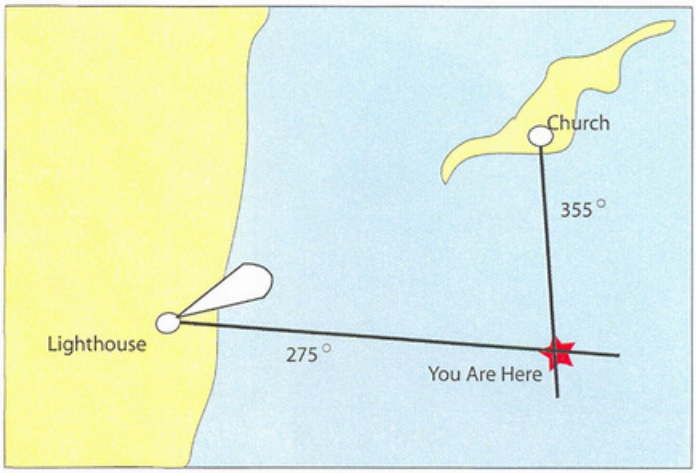
"Courses, True, Magnetic
True north - The direction to the geographic North Pole.
Magnetic north - The direction to the 'magnetic' North Pole.
Compass north - The direction towards which the compass actually points.
Variation - The angle between the direction of true north and magnetic north.
Deviation - The angle between the direction of magnetic north and the direction towards which the compass actually points.
True Course - The angle between a boat's centerline and the direction of true north.
Magnetic course - The angle between a boat's centerline and the direction of magnetic north.
Compass course - The angle between a boat's centerline and Compass north.

Compass Direction

When a vessel is traveling through the water, the direction it is heading is known as the "course". In order to help determine the direction of travel, a vessel will use a compass. Any object may be described in terms of a "compass bearing" from the vessel, such as another vessel sighted at 45 degrees off the starboard bow where zero degrees represents magnetic north.

Basic fix using a hand bearing compass

A quick method of estimating your position is with a 2 point fix using a hand bearing compass. Choose 2 prominent landmarks and using your compass take a bering to the objects and draw corresponding lines on the chart. Where these lines intersect on the chart is your estimated position (EP).



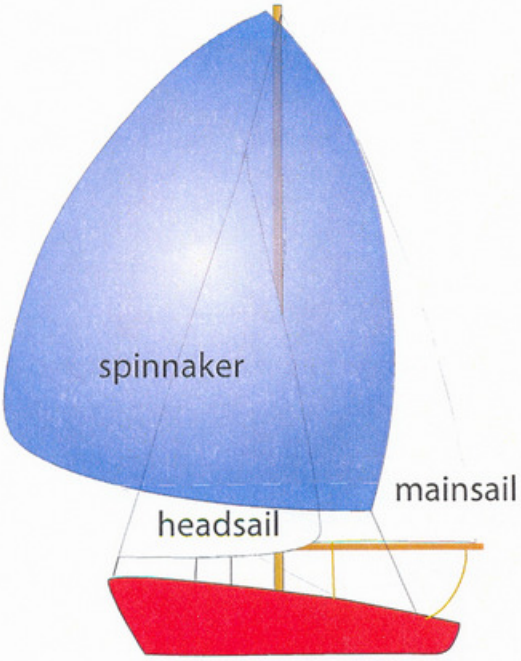
Two point fix

Course to steer

Coure to steer would be given in magnetic degrees such as "steer 030° or 070° as required by the helmsman. Distance is given in nautical miles where one nautical mile equals 1.15 statute miles.

MODULE 4 / SECTION 5
SAILS AND SAIL HANDLING

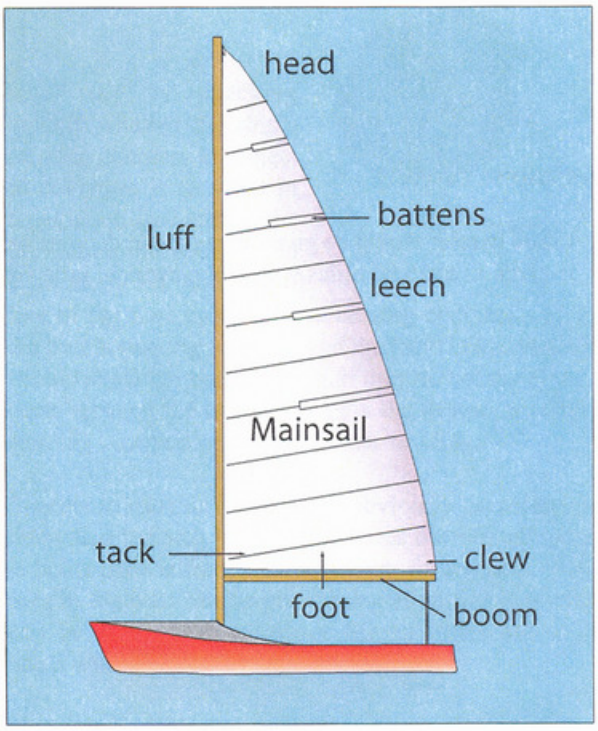
Types of Sails



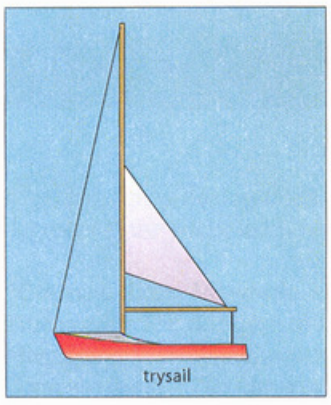
Traingular sails are the most commonly used sails and will be the focus of this section. This sail configuration is known as a "Bermuda" or "Sloop" rig.

The **Mainsail** is the large sail situated behind the main mast or the sail that is attached to the boom. It is tensioned by an outhaul at the end of the boom.

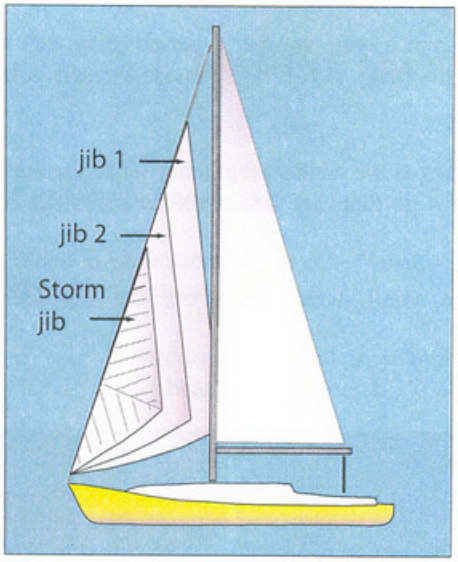
The **leech** can be stiffened by **battens** inserted into the batten pockets.



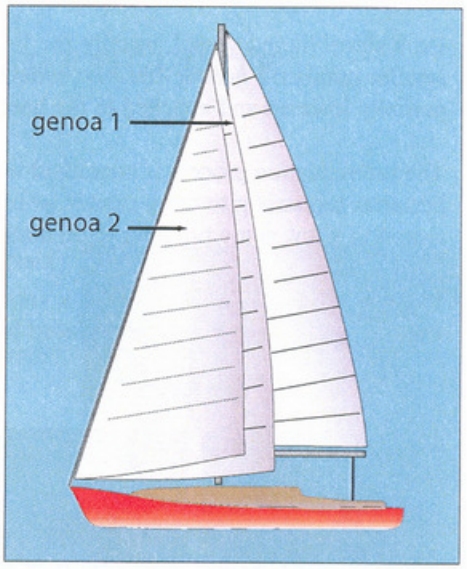
In stormy weather a trysail may be used instead of a main-sail. This is a very strong sail made of very thick canvas specifically for bad weather.



A **headsail** is the sail (such as a jib) located immediately in front of the main mast. It is attached to the forestay.



Headsails vary in size to allow the optimum sail area for most conditions. For example, jibs and genoas (see diagrams)



The **Spinnaker** is the largest sail on a boat. It is a very light headsail used when sailing downwind (running), or on a broad reach. Just like the main, the top of the spinnaker is the head, and the bottom is the foot. The luff is the windward edge, and the leech is the leeward edge.

Spinnakers have various designs, which are determined by the design of the cloth panels: vertical (radial), horizontal, star, and tri-radial. The tri-radial cut is a combination of the remaining three, and is the most universal of them, with good handling and power characteristics. The radial head cut is a lighter weather sail, the star cut is a good strong wind reaching sail, and the horizontal cut is also a good light wind sail.

Horizontal Cut

Radial Head Cut

Tri-radial Cut

Sails and Sail Handling

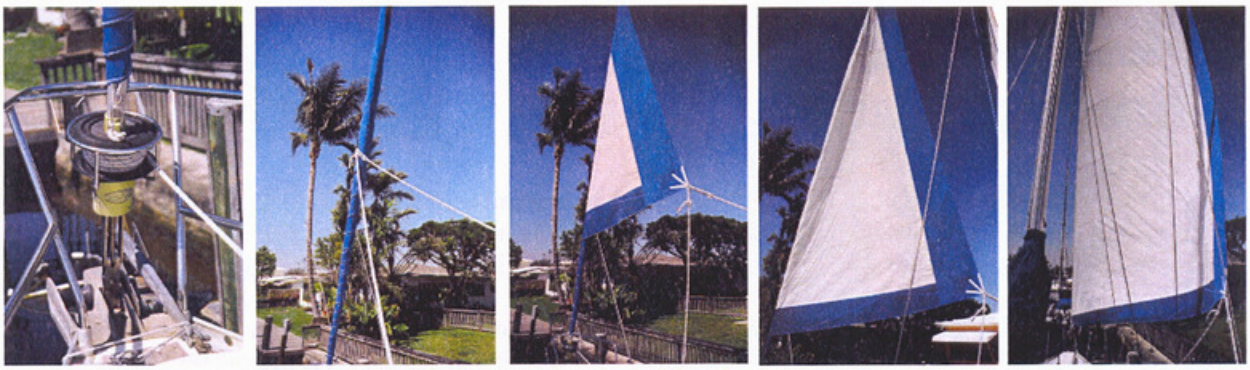
As the wind increases the boat gradually becomes overpowered. This makes the boat hard to handle and so the amount of sail carried will need to be reduced. This sail reduction is carried out progressively as the wind increases.

The rule for reducing sail is to do it sooner rather than later, if left too late the vessel will be harder to control as conditions worsen.

On a sloop rigged vessel, usually the first reduction will be to change from a large number 1 genoa (diagram) to smaller number 2 genoa. The next reduction will be to take in a reef in the main. A reef will require the sail to be partially lowered and attached to the boom by a series of ties.

The sail reduction process is continued with reductions of headsail and main as the wind strengthens. Once the wind becomes too strong to carry double or triple reefed mainsail and number 4 jib there are 2 storm sails which can be rigged to allow some progress to be made in very strong winds.

These are the Storm jib, which is a very toughly constructed triple sewn, small jib attached to the fore stay and a trysail. The main sail can be replaced by a storm trysail.



Unfurling a roller reef headsail

Where boats are equipped with a roller reefing system, it is possible during heavy weather to reduce the sail area by rolling in the headsail. The same applies to mainsails that have an in-mast or in-boom roller furling system.

Sail Materials and Construction

Originally sails were made of canvas and cotton. As man made fabrics became available these natural fibers were replaced by polyester, known as Dacron. This has now been eclipsed by more modern materials such as Mylar, Kevlar and Spectra.

The advantages of modern materials are their strength, weight and ability to create a better shape.

Sail construction will depend on the type of sail and material used. However, generally the head, luff and tack are all reinforced to allow cringles to take big loads. The remainder of the sail will usually be panels of sailcloth sewn together, double stitched. The panels will be aligned to maximize the finished sail shape.

In Mast Roller Furling
(Mainsail)

MODULE 4 / SECTION 6
MARINE MANNERS, CUSTOMS AND ETIQUETTE

Etiquette in Anchorages

When in close proximity to other vessels in a marina or harbour it is important to remember the following:

1. It is common courtesy to maintain a noise level that does not disturb other boats or their guests.
2. Any noise from radios or other electronic equipment should be kept to a minimum.
3. Always travel slowly through moorings and anchorages, particularly in tenders, dinghies and Personal Water Craft, speed creates a wake, which disturbs others and may cause damage.
4. When selecting a spot to anchor, allow plenty of room for swing between you and other boats.
5. Should a change of tide or wind move you close to a vessel which was anchored before you arrived, you should have the courtesy to move.
6. At night, sound travels across water. Voices should be kept low, this avoids the embarrassment of com ments being overheard and will allow others peace and quiet.
7. When leaving an anchorange early in the morning leave as quietly as possible

Ettiquette in Marinas and Alongside

1. If lying alongside another boat for more than a short duration, lines from the bow and stern should be made fast directly ashore. If not, vessels sometimes tie themselves together forming a "raft".
2. Adequate fenders must be placed between boats or between the boat and the dock/pontoon.
3. Sailboat spreaders should be staggered to avoid clashing in a swell.
4. When crossing another boat's deck, it should be done forward of the mast/deck house and not across the cockpit. Obviously cross as qui etly as possible, taking care not to bring on dirt from shoes. If pos sible obtain permission first if there is someone aboard.
5. If on a sailboat, rig frapping lines to prevent halyards slapping the mast.
6. Keep noise to a minimum.

Personal Safety

Onboard:

1. It is important to understand emergency procedures and the value of participating in training / drills enthusiastically. No crew is immune to emergencies at sea.

2. 80% of accidents are caused by human factors, such as
   stress
   fatigue
   poor health
   poor communications

3. It is important to know your boat and safety equipment, especially VHF radio operational procedures.

4. All crew are required to help in the following incidents:
   man overboard
   abandon ship
   collision
   stranding or running aground
   pollution incident
   flooding
   fire / explosion
   injuries

When ashore:

1. Be wary when using public transportation. Pick-pockets love crowded places.

2. Be aware that foreigners and tourists are often viewed as easy targets.

3. Some cities are very dangerous. When in cities that are viewed as dangerous it is important to take the necessary precautions such as concealing your jewelry and securely holding your bags.

Responsibility of Skipper, authority and stress factors

The skipper is responsible at all times for operation and safety of the vessel and the crew, even when asleep or down below. This responsibility can lead to pressure at certain times, such as manoeuvering in confined areas and or in deteriorating weather conditions, it is important to recognise when this is the case and be responsive to instructions and commands quickly and efficiently.

Crew's duties and responsibilities

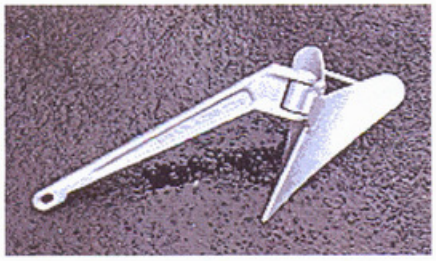
The crew members are required to carry out all instructions and orders of the skipper and to maintain a watch and help in the general running of the vessel.

MODULE 4 / SECTION 7
ANCHORS & ANCHORING

Types of Anchors

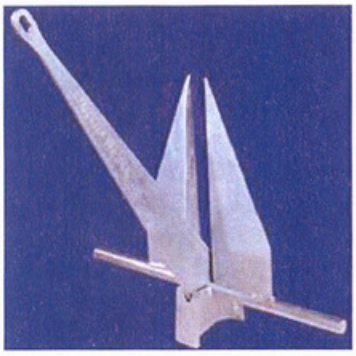
There are a number of different types of anchor; each has its own advantages and disadvantages. The principle types are:
(a) Fisherman/Admiralty anchor
(b) CQR/Plough anchor
(c) Danforth anchor
(d) Bruce anchor
(e) Grapnel anchor (folding type). Some manufacturers produce their own "improved " versions based on these basic types.

Fisherman/Admiralty
The traditional type of anchor is sometimes known as an Admiralty Pattern anchor.



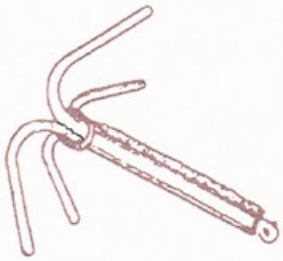
CQR/Plough Type
The CQR is a proprietary type of anchor as shown in (b). It is also called a plough. Copying manufacturers' versions are sometimes of inferior quality.

Delta
A fixed version of the Plough. Easy to stow in bow roller



Danforth
The Danforth is a flat twin fluke anchor with the stock built into the head.

Bruce
The Bruce anchor is usually a solid piece of aluminum and has no moving parts.

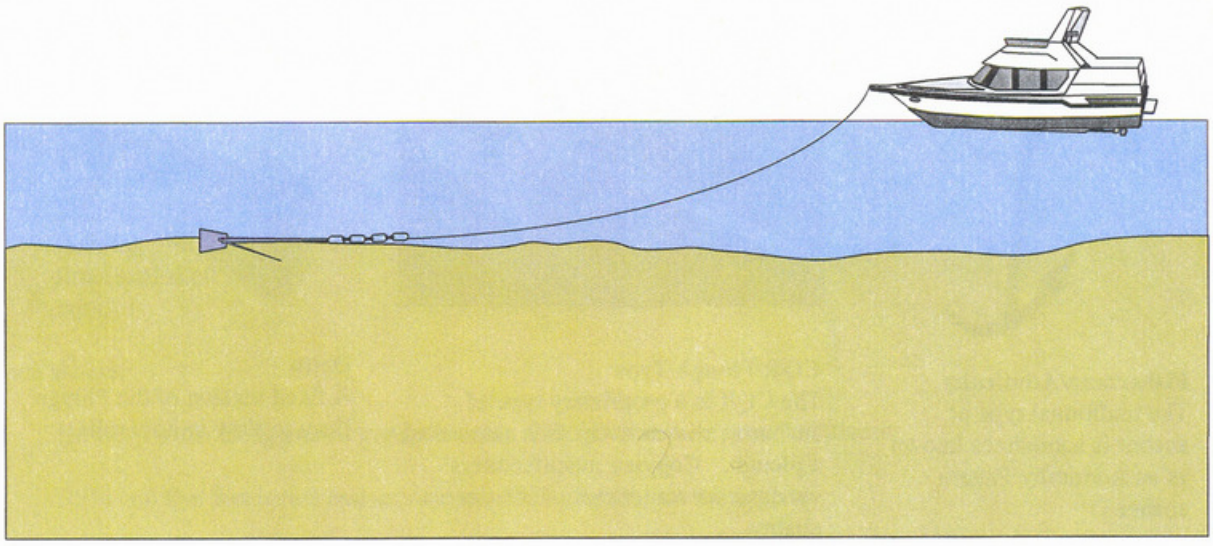


Grapnel
A good holding anchor on coral and rock and useful to use as a kedge for such use as a stern anchor or for assisting the main anchor

Anchoring

Anchors hold best in soft bottoms such as sand and mud, but will hold in hard sand, shingle or pebbles. Smooth rock and weed are not good holding. The Fisherman is probably the best for holding in rock. It is best to carry two main anchors of different types, and a kedge.

Whichever type of anchor is used, to hold the vessel without dragging, a horizontal pull along the seabed must be created. This requires the correct amount of scope; at least 5 times the maximum depth of water for chain and at least 7 times the maximum depth for warp. **Warp** is defined as the rope part of the anchor line which is attached to the chain. **Scope** is defined as the ratio of length of anchor line in use to the vertical distance from the bow of the vessel to the bottom of the water. Larger boats generally carry all chain while smaller boats are more likely to carry a short length of chain attached to a nylon warp. The anchor line is called **"rode".** The rode may be line (nylon warp or fiber rope), chain, wire rope or a combination of line or wire rope and chain.



Vessel at Anchor

MODULE 5 / ALL SECTIONS

PRACTICAL SUBJECTS

Safety Checks

- Location fittings/through hulls and sea cocks
- Engine warning lights and alarms
- Emergency stopping of runaway engine, fuel cut off, etc.

Deck Seamanship

- Slipping from and mooring to:
    i. An alongside berth
    ii. A mooring buoy
    iii. Fore and aft buoys

Sails and Sail Handling

- Bending on, hoisting, lowering and reefing mainsails etc.
- Handling and coordination of main sheets and jib sheets
- Sail controls, effect of halyards, outhauls, topping lift and kicking strops or vangs
- Sail trim, tension, kicking strops/vang etc.

EITHER

Sailing vessel handling skills

Under Sail

- Steering, tacking, gibing, turning upwind/downwind, luffing up, bearing away, trim
- Sail a triangular course
- Sail a compass course
- Heaving to, lying ahull
- MOB, anchoring, pick up a mooring buoy

Under Power

- Steer a compass course
- MOB, anchoring, pick up a mooring buoy

OR

Power vessel handling skills

- Multi engines
- Use of Bow Thrusters, trim tabs
- High and slow speed turns, turning in restricted space
- Crash stops. Williamson turns
- MOB, anchoring, pick up a mooring buoy

MODULE 6 / SECTION 2
DINGHYS

Types, advantages and disadvantages

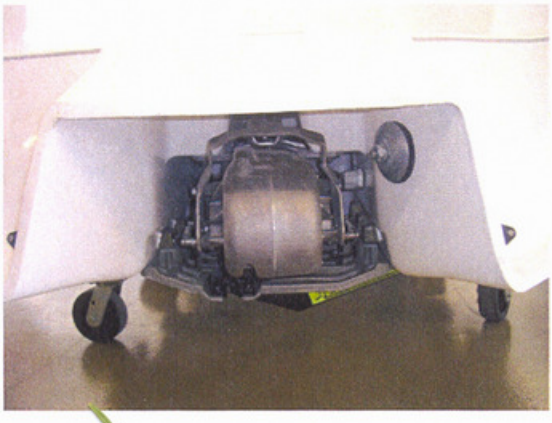
Types: Rigid (made of wood or fiberglass)
Inflatable

	Advantage	Disadvantage
Wood & Fiberglass	Puncture Resistant	When coming alongside another vessel they can scratch the hull
Inflatable	They will not damage vessels when coming alongside as they are flexible.	Can be easily punctured by sticks reefs or sharp debris.

Inflatable Dinghy

Rigid Dinghy

Inboards
Only large dinghys (10 passengers or more) tend to have inboard engines and are very heavy to lift. Due to their weight they are more popular on megayachts.



Jet Drive

Jets
Jet drive dinghys have the same propulsion system as a jet ski or personal watercraft. They have no propellers, therefore, they are safe to use around swimmers. A disadvantage of jet drives is that they can easily suck in plastic bags, debris or jellyfish which will shut down the motor.

Out board Motors

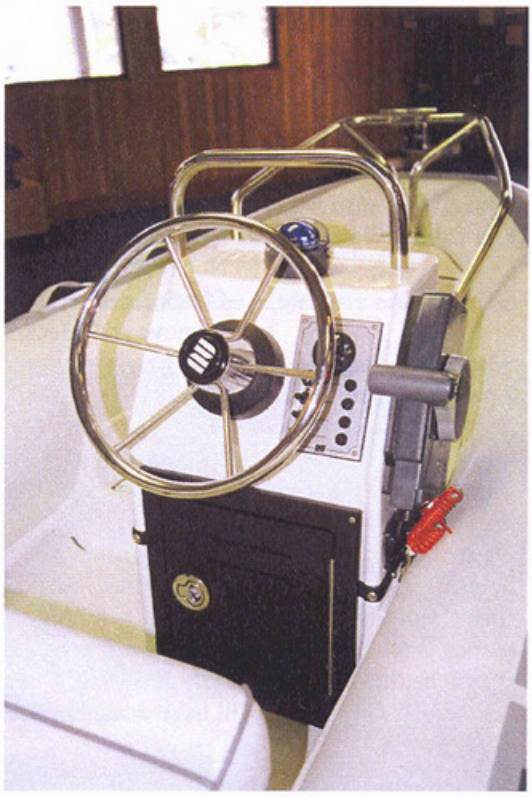
The outboard motor is fitted to the transom of the dinghy either by means of a stern bracket and clamps or on larger dinghys by bolts and nuts. There is a tilt mechanism, which may be either manual on small engines or electric on larger ones. This allows the engine to be raised when in shallow water or when launching. Most outboard engines are fuelled by petrol/gas and may be 2 stroke or 4 stroke. A 2 stroke engine has oil mixed into the petrol/gas tank (newer engines have a separate oil reservoir and pump which mixes the oil and petrol/gas before injection). 4 Stroke engines are petrol/gas driven with a separate oil lubrication system. The 2 stroke engines are generally cheaper then 4 stroke ones, but require a bit more attention when fuelling. 4 stroke engines generally run smoother, quieter and are more environmentally friendly.

Multiple Outboard Motors

Outboard Motor

Pre Launch Procedures

Check that the outboard motor is firmly clamped or bolted to the transom and safety cable/chain is connected to a strong point on board. Stow safety, signaling and PFD equipment, where it will not be in the way but is readily available if needed. Fuel tank should be full and positioned safely to assist in overall stability. Anchor and warp should be checked for utility and 'bitter end' for security. (Make sure the end of the anchor line is tied on!) Drain hole bung in place? Take adequate personal supplies of food and water for the duration of voyage.



Dinghy Console

Engine Starting and Stopping

Pre-Start Checks:

1. Ensure the fuel tank is full, shake the fuel tank to mix the contents.
2. Check fuel lead is connected.
3. Prime the engine by squeezing the primer bulb.
4. Check the engine is firmly secured.
5. Check the tilt mechanism is locked in the 'run' position.
6. Ensure the kill cord is connected.
7. Put gear shift into neutral.
8. If the engine is cold, use choke, be careful not to over-choke and flood the engine.

Starting the Motor

Kill Cord

Do not start the motor unless you know how to stop it! The stop device is usually a red button that is pushed and held until the motor stops. Can also be a key operated mechanism much like a car ignition or the kill cord. (consult your manual)

Check that the motor is securely mounted and water intake is submerged so that cooling water is pumped around the motor. Connect the fuel line, open the breather vent on the fuel tank and pump the bulb to prime the system. (bulb will become firmer) Make sure kill cord/cut out device is in place and gear lever in neutral. Use choke if starting from cold. Gear lever on side has three positions Forward, Neutral and Reverse.

Throttle Control & Gear Lever

With the throttle position on 'start' either pull the starter cord firmly until motor starts or turn ignition key for electronic starting. If motor fails to start after a few pulls open choke and try again. Be careful of back-elbowing an unsuspecting crewmember! As soon as the motor fires, push in the choke and ease the throttle. (no choke when hot). Check for cooling water circula tion. Do not engage gears at high RPM.

Fault Finding

Sometimes an outboard will not start for simple reasons, however with larger and more modern engines utilizing electronics all but the very simplest prob-lems will need to be dealt with by a qualified mechanic.

Common reasons for an outboard not to start are:

No Fuel Flow	Check for fuel in the tank.
	Check fuel line is properly connected and primed, some tanks have a rubber hand squeeze pump in the fuel line used to prime the engine.
	Clean fuel filter in power head.
Kill Cord	Make sure this is connected.
	Not Turning over, check battery, battery switch and all electrical connections.
	Check fuses.
	Remove and check spark plugs.

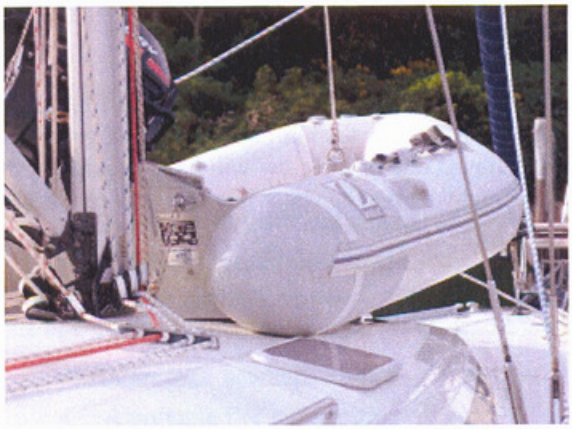
Launching Procedures

Often rigid dinghys are carried on davits at the stern of the vessel from where they may be low-ered to the water. If the dinghy has been stowed on deck it may require the use of a halyard to help lift it over the lifelines and down into the water, this should be done before attaching the outboard motor. Make sure the dinghy's painter is attached to the yacht before lowering it over the side. Larger yachts will have crane operated launching facilities.

Crane Launch

One crewman should then get in the dinghy and make it secure alongside the yacht, the outboard motor can then be passed down, again use a halyard to help lift it over the lifelines and down into the dinghy. It can then be located on

the transom, the fuel tank passed down and connected to the motor. Fuel for outboard engines should be treated with extreme care on a yacht; the yachts main engines and auxiliary generators are usually run on diesel fuel which is far less flammable than petrol/gas, store the dinghy fuel on deck or in a separate vented locker.



Halyard Launch

Stern Launch

Dinghy Stability and Handling

Crew or passengers must take great care when entering or leaving a dinghy and be aware that their weight and position in the vessel affects its stability. Before casting off from the yacht or the dock the coxswain should make sure that he is satisfied with the distribution of weight in the dinghy both in the port to starboard plane and also fore and aft as this will affect stability. Weight distribution may be changed according to sea conditions and speed, especially if the dinghy is capable of getting up on the 'plane', which may require weight forward to assist.

Once in the dinghy, passengers should sit down and hold on. To preserve stability passengers and any other items should be placed to spread the load evenly, both from side to side and fore and aft. For example if there are four passengers and the crewmember in charge of the dinghy, traditionally known as "the coxswain" then they should sit two and two evenly with the coxswain at the stern to operate the outboard and steer. Being low in the water the visibility for the coxswain is not good and passengers must take care not to obscure his vision.

If the coxswain is satisfied with the trim, he/she should ensure that all crewmembers or passengers are seated and holding on before casting off. Acceleration should be applied smoothly and evenly and the speed adjusted to the conditions and to safety requirements. The coxswain should always ensure that proper control of the vessel is maintained at all times. On a smaller vessel he will steer the dinghy with the tiller on the outboard, which also serves as the mount for the (twist-grip) throttle control. On larger dinghys/RIBs with fixed equipment it is advisable to keep one hand on the wheel and the other on the throttle at all times. When throttling back to come off the plane this should be done smoothly to ensure that the stability of the dinghy is not compromised. The boat should be allowed to slow before going into neutral and should never be taken from full speed ahead to going astern.

Beaching

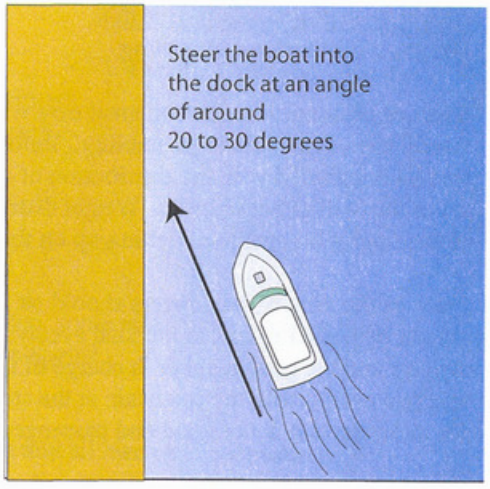
If there are big breakers or a deep swell, simply **do not try to beach the vessel**. It can be an unnerving and dangerous experience. It is relatively easy in quiet seas with little swell or breaking waves near the beach. The type of shoreline will also have to be taken into account, smooth sand will present few problems, however, rocky coastlines will need to be treated with respect.

Approach with controlled speed, shift weight aft to raise the bow. Have someone at the bow looking out for rocks/coral heads. When getting close to the beach, tilt your outboard up 1/3 of the way then kill the engine and coast onto the beach. If the approach is wrong and the desired effect is not achieved one of the crew will have to jump in the water to pull the dinghy ashore. Before leaving the beach, pull the dinghy above the water line and tie it to a tree or a rock if you can.

When launching it will be necessary to carry/drag it down the beach until it is floating. Initially one may have to row or paddle until the water is deep enough to lower the outboard back to its normal operating position and start the motor.

Coming Alongside

Whenever possible bring the vessel port side to. When coming alongside a dock, a yacht at anchor or on a mooring, approach at an angle of about twenty degrees using as little speed as is necessary to keep way-on, then gently put the engine into reverse which will stop the boat and at the same time pull the stern in. One should approach upwind if possible, coming in to a moored or anchored yacht should be relatively easy as the vessel will probably be lying head to wind.



When leaving the dock the procedure will be dictated by the wind and current direction. If it is being blown off the dock then once the dinghy is loaded and stable, merely letting go of the lines will likely suffice though it will be better to let the bow be blown off first. In the reverse situation it may be necessary to hold the dinghy on one of the lines and use the motor's thrust to pivot the dinghy about the attached point until the bow or stern are clear enough to allow letting go of the other line.

Small boats are quite susceptible to the effect of wind and current and will generally make a fair amount of leeway, careful course and speed corrections may have to be made by the coxswain to counter leeway effects. It may even at times make sense to traverse a strong current at an angle rather than try to fight directly against it. This is analogous to a sailing yacht tacking across the direction of the breeze.

If you wish to come alongside the boat while it is moving you will first need to match speeds and will require communication between the two vessels. As the dinghy comes alongside the motion through the water will pull it in towards the larger vessel. At this point crewmembers on the boat should be ready to take on the dinghy's painters and make them fast. This should be done prior to turning off the dinghy's motor.

Recovery of the dinghy is the reverse of the process of launching it and will possibly require the use of halyards to help lift the dinghy aboard. The motor should, of course, have been removed first and stowed aboard.

Dinghy Equipment –

- ❖ This is very dependant on the size and intended use of the dinghy, ideally it should have the following:
- ✓ Lifejackets
- ✓ Flashlight, this will be also used at night as a navigation light. If the dinghy is less than 7m (20') in length it is not required to have the standard navigation lights.
- ✓ Sufficient oars or paddles, in addition to an outboard motor, if fitted.
- ✓ A bailer.
- ✓ Compass
- ✓ A painter of sufficient length.
- ✓ Whistle or equivalent sound signal.
- ✓ A first aid kit.
- ✓ A boat hook.
- ✓ A knife or hatchet.
- ✓ A portable fire extinguisher.
- ✓ Flares
- ✓ Anchor and line.
- ✓ VHF radio, most conveniently a hand-held.
- ✓ GPS

DINGHY PRACTICAL

- Safety checks
- Handling with oars, engine and sails (if appropriate), steering by compass
- Safety - lookouts near swimmers, keeping a lookout, speed in anchorages
- Launch and recovery, stowage
- Transfer to and from dinghy to vessel, and dinghy to dock
- Coming alongside, beaching and launching from beach
- Handling with wind and/or current

GLOSSARY OF TERMS

A

Aback.	A sail sheeted so that the wind fills the "back" of the sail.
Abeam.	At right angles to the side of the boat.
Aboard.	Situated on the boat.
Adrift.	A boat drifting without being propelled.
Aft.	At or towards the stern or behind the boat.
Aground.	A boat whose keel is touching the bottom.
Amidships.	Towards the center of the boat.
Apparent wind.	The wind aboard a moving boat
Astern.	Behind the stern of the boat.
Athwartships.	Across the boat from side to side.

B

Backstay.	The standing rigging running from the stern to the top of the mast, keeping the mast from falling forward.
Back.	1. To Sheet a sail to windward and fill the back of the sail and thus stop the boat or propel it backwards. 2. In the case of the wind - to shift counter clockwise from its previous direction.
Bail.	To empty the boat of water.
Ballast.	Weight in the keel of a boat that provides stability.
Barometer.	An instrument that measures air pressure, an aid to forecasting the weather.
Batten.	A thin wood or fiberglass slat that slides into a pocket in the leech of a sail, helping to maintain an aerodynamic shape.
Beam.	The width of a boat at its widest point.
Beam reach	(Point of sail) Sailing in a direction at approximately 90° to the wind.
Bear away.	To "fall off" or head away from the wind.
Bearing.	The direction from one object to another expressed in compass degrees.
Beating	A course sailed up wind.
Below.	The area of a boat beneath the deck.
Bend.	To attach a sail to a spar or a headstay or to attach a line to a sail.
Bight.	A loop in a line.
Bilge.	The lowest part of the boats interior where water on board will collect.
Bitter end.	The end of a line.
Blanket.	To use the sail or object to block the wind from filling a sail.
Block.	A pulley on a boat.
Boat hook.	A pole with a hook on the end used for grabbing hold of a mooring or retrieving something that has fallen overboard.
Boat speed.	The speed of a boat through the water.
Boltrope.	The rope that is sewn into the foot and luff of some mainsails and the luff of some jibs by which the sails are attached to the boat.
Boom.	The spar extending directly aft from the mast to which the foot of the main sail is attached.
Boom vang.	A block and tackle system, which pulls the boom down to assist sail control.
Bottom.	The underside of a boat.
Bow.	The forward part of the boat.
Bow line.	A line running from the bow of the boat to the dock or mooring.
Bow Spring.	A line running from the bow of the boat parallel to the dock or mooring that stops the boat from moving forward along the dock.
Bowline.	A knot designed to make a loop that will not slip and can be easily untied.
Breastline.	A short line leading directly from the boat to the dock.
Broach.	An uncontrolled rounding up into the wind, usually from a down wind point of sail.
Broad reach.	(Point of sail) Sailing in a direction with the wind at the rear corner (the quarter) of the boat. Approximately 135° from the bow of the boat.

Bulkhead. A wall that runs athwart6ships on a boat, usually providing structural support to the hull.
Buoy. A floating navigation marker.
Buoyancy. The ability of an object to float.
Bulwark. A solid side wall, often about waist high, from the outside edge of the deck to prevent someone falling overboard.
Burdened vessel. The vessel required to give way for another boat when the two may be on a collision course.
By the lee. A sailboat running with the wind coming over the same side of the boat as the boom.

C

Cabin. The interior of the boat
Can. In the U.S. an odd numbered green buoy marking the left side of the channel when returning to harbor.
Capsize To tip or turn a boat over.
Cast off . To release a line when leaving a dock or mooring.
Catamaran. A twin hulled vessel with a deck or trampoline between the hulls.
Catboat. A boat with only a mainsail and an unstayed mast located at the bow.
Centerboard. A pivoting board that can be lowered and used like a keel to keep a boat from slipping to lee ward.
Centerline. The midline of the boat running from bow to stern.
Chafe. Wear on a line caused by rubbing.
Chainplates. Strong metal plates which connect the shrouds to the boat.
Channel. A (usually narrow) lane, marked by buoys, in which the water is deep enough to allow a vessel safe passage.
Chart. A nautical map.
Charter. To rent a boat.
Chock. A guide mounted on the deck through which docklines and anchor rode are run.
Chop. Rough, short, steep waves.
Cleat. A nautical fitting that is used to secure a line.
Clew. The lower aft corner of a sail. The clew of the mainsail is held taut by the outhaul. The jib sheets are attached to the clew of the jib.
Close hauled. (Point of sail). The point of sail that is closest to the wind, when the sails are hauled close to the centerline of the boat.
Close reach. (Point of sail) Sailing in a direction with the wind forward of the beam (about 70° from the bow).
Coaming. The short protective wall that surrounds the cockpit or hatch.
Cockpit. The lower area of the deck in which the steering and sail controls are located.
Coil. To loop a line neatly so it can be stored, or a reel of line.
Come about. See tack.
Companionway. The steps leading from the cockpit or deck to the cabin below.
Compass. The magnetic instrument which indicates the direction in which the boat is headed.
Compass rose. The circles on a chart which indicate the direction of true and magnetic north.
Course. The direction in which the boat is being steered.
Crew. Besides the skipper, anyone on board whom helps run the boat.
Cunningham. A line running through a grommet a short distance above the tack of the mainsail which is used to tension the luff of the main.
Current. The horizontal movement of water caused by tides, wind and other forces.
Cutter. A single masted boat rigged with both jib and staysail.

D

Daysailer. A small sailboat.
Dead downwind. Sailing in a direction straight downwind.
Deck. The mostly flat area on top of the boat.
De-power. To reduce the power in the sails by:

1. Luffing, pointing the boat too close to the wind so that the sails are unable to draw power.

2. Easing the sheets so that the sails flutter.
3. Stalling. Sheeting the sails in so hard that the airflow over them stalls.

Dinghy. A small sailboat or rowboat.

Displacement. The weight of the boat; therefore the amount of water that it displaces.

Dock. 1. The quay or pontoon where a boat may be tied up.
2. The act of bringing a boat alongside to rest alongside.

Dockline. A line used to secure a boat to the dock.

Dodger. A canvas protection in front of the cockpit of some boats that is designed to keep spray off the skipper and crew.

Downhaul. A line used to pull down on the movable gooseneck on some boats to tension the luff of the mainsail. The cunningham has the same function.

Draft. The depth of a boat's keel from the waters surface.

E

Ease. To let out a line or sail.

Ebb. An outgoing tide.

F

Fairlead. A fitting that guides sheets and other lines in a way that reduces friction and therefore chafe.

Fairway. The center of a channel.

Fake (flake). Lay out a line on the deck using large loops to keep it from becoming tangled.

Fall off. (See also head down & bear away) Alter course away from the wind.

Fast. Secured.

Fathom. A measure of the depth of water. One fathom equals six feet.

Fender. An inflated rubber or plastic bumper used to protect a boat by keeping it from hitting the dock.

Fend off. Push off.

Fetch. The distance of open water to windward between the shore and the boat

Fid. A tapered spike used to open the lay of a rope when splicing.

Flood. An incoming tide.

Following sea. Wave pattern hitting the stern of the boat.

Foot. The bottom edge of the sail.

Fore. Forward.

Forepeak. An accommodation or storage area in the bow below the deck.

Foresail. A jib or genoa.

Forestay. The standing rigging running from the bow to the mast top and to which the foresail is secured.

Forward. Towards the bow.

Fouled. Tangled.

Fractional rig. When the forestay is attached to the mast some distance below the top.

Foul weather gear. Water resistant clothing.

Freeboard. The height of the hull above the water's surface.

Full. Not luffing.

Furl. To fold or roll up a sail.

G

Gaff. On some boats, a spar along the top edge of a four sided fore and aft sail.

Genoa. A large fore sail whose clew extends aft of the mast.

Give way vessel. The vessel required, by the regulations, to give way in a collision situation.

G.M.T. Greenwich Mean Time. The time at the prime meridian in Greenwich, London, England. Now referred to as Universal Time Coordinated U.T.C.

Gooseneck. The strong fitting that connects the boom to the mast.

Great Circle A line drawn on a chart which is accurate over a long distance, a section of the Earth which intersects the center of the Earth.

Grommet. A reinforcing ring set in a sail.

Ground tackle. Collective term for the anchor and rode (chain and line).

Gudgeon. A fitting attached to the stern into which the pintles of a rudder are inserted.
Gunwale. (gunnel) The edge of the deck where it meets the topsides.
Gybe. See jibe.

H

Halyard. A line used to raise or lower a sail.
Hank. A snap hook which is used to secure the luff of a foresail to the forestay.
Hard a-lee. (also Helms a-lee, lee oh, lee ho) The call given to the crew that will initiate the action of tack ing.
Hard over. To turn the helm or tiller as far as possible in one direction.
Hatch. A large covered opening in the deck.
Haul in. to tighten a line.
Head. 1. Top corner of a sail.
2. The toilet on a boat.
Headboard. The small reinforcing board affixed to the head of a sail.
Headed. A wind shift which causes the boat to head down or causes the sails to be sheeted in.
Heading the direction of the boat expressed in degrees.
Head down. To fall off , changing course away from the wind.
Head off. See head down.
Head up. To come up, changing course towards the wind.
Headsail. A jib, genoa attached to the forestay.
Headstay. See forestay. The standing rigging running from the bow to the top of the mast.
Head to wind. When the bow of the boat is dead into the wind.
Headway. Forward progress.
Heave. To throw.
Heave to. To hold one's position in the water by using the force of the sails and the rudder to counteract each other.
Holding ground. The seabed or bottom ground in an anchorage.
Hove to. A boat that has completed the process of heaving to with its aback, its main trimmed and its rud der positioned to hold the vessel close to the wind.
Heavy weather. Strong winds and large waves.
Heel. The lean of the boat caused by the wind.
Helm. The tiller.
Helmsman. The person responsible for steering the boat.
Hull. The body of the boat, excluding the rig and sails.
Hull speed. The theoretical maximum speed of a sailboat determined by the length of its waterline. The for mula is 1.4x the square root of the waterline length in feet.

I

Inboard. Inside of the rail of the boat.
In irons. A boat that is head to wind and unable to move or maneuver.

J

Jackstay. A wire or webbing strap attached at the front and back of a vessel along the deck to which a safety harness line may be clipped.
Jib. The small forward sail of a boat that is attached to the forestay.
Jibe. See also gybe. To change the direction of the boat by steering the stern through the wind.
Jibe oh. The command given to the crew when starting a jibe.
Jiffy reef. See slab reefing. A quick reefing system allowing a section of the mainsail to be pulled down and tied to the boom.
Jury rig. An improvised temporary repair.

K

Kedge.	A smaller anchor than the main or bower anchor. Often used for maneuvering or kedging off.
Kedge off.	To use an anchor to pull a boat into deeper water after it has run aground.
Keel.	The heavy vertical fin beneath a boat that helps keep it upright and prevents it from slipping sideways in the water.
Ketch.	A two masted sailboat on which the mizzen (after) mast is lower than the mainmast and is locat ed forward of the rudderpost.
Knockdown.	A boat heeled so far that one of its spreaders touches the water.
Knot	one nautical mail per hour.

L

Land breeze.	A wind that blows over the land and out to sea.
Lash.	To tie down.
Lay.	To sail a course that will clear an obstacle without tacking.
Lazerette.	A storage compartment built into the cockpit or deck.
Lazy sheet.	The windward side jib sheet that is not under strain.
Lead.	To pass a line through a fitting or block.
Lee helm.	The boats tendency to turn away from the wind.
Lee shore.	Land which on the leeward side of the boat. A potential danger because the wind will be blowing the boat towards it.
Leech.	The after edge of a sail.
Leeward.	The direction away from the wind that is the direction that the wind is blowing to.
Leeward side.	The side of the boat or sail that is away from the wind.
Leeway.	The sideways slippage of the boat in a downwind direction.
Lifeline	Rope or wire supported by stanchions, around the outside of the deck to help prevent crew mem bers from falling overboard.
Lift.	1. The force that results from air passing by a sail or water past a keel that moves the boat forward and sideways. 2. A change in the direction of the wind which allows the boat to head up.
Line.	A rope.
LOA.	The maximum Length Overall fore and aft along the hull.
Lubber line.	A line on a magnetic compass to help the helmsman steer the correct course.
Luff.	1. The leading edge of a sail 2. The fluttering of a sail caused by aiming too close to the wind.
Lull.	A decrease in wind speed for a short duration.
LWL.	The length fore and aft along the hull measured at the waterline.

M

Magnetic.	In reference to the magnetic north rather than true north.
Mainmast.	The taller of two masts on a boat.
Mainsail.	The sail hoisted on the mast of a sloop or cutter or the sail hoisted on the mainmast of a ketch or yawl.
Mainsheet.	The controlling line for the mainsail.
Marlinspike.	A pointed tool used to loosen knots.
Mast.	The vertical spar in the middle of a boat from which the mainsail is set.
Masthead.	The top of the mast
Maststep.	The fitting in which the foot of the mast sits.
Mizzen.	The small aftermost sail on a ketch or yawl hoisted on the mizzenmast
Mizzenmast.	The shorter mast aft of the main mast on a ketch or yawl.
Mooring.	A permanently anchored ball or buoy to which a boat can be tied.

N

Nautical mile.	Standard nautical unit of distance, equal to one minute of arc of the Earth's latitude or 6080 feet.
Navigation rules.	Laws established to prevent collisions on the water.

No-go zone. An area into the wind in which a sailboat cannot produce power to sail.

Nun. A red even numbered buoy marking the right side of a channel when returning to port. Nuns are usually paired with cans.

O

Offshore wind. Wind blowing off (away from) the shore and out to sea.

Offshore. Away from or out of sight of land.

Off the wind. Not close-hauled.

On the wind. Sailing up wind, close-hauled.

Outboard. Outside the rail of a boat.

Outhaul. The controlling line attached to the clew of a mainsail used to tension the foot of the sail.

Overpowered. A boat that is heeling too far because it has too much sail up for the amount of wind.

P

Painter. The line attached to the bow of a dinghy.

Pay out. To ease a line.

P.F.D. Abbreviation for Personal Flotation Device such as a life jacket.

Pinching. Sailing too close to the wind.

Pintle. Small metal extension on a rudder that slides into a gudgeon on the transom. The gudgeon/pintle fitting allows the rudder to swing back and forth.

Point.
1. To steer close to the wind.
2. A compass point equals 11¼ degrees. Compass annotation used before headings were referred to in 360° notation.

Points of sail. Boats direction in relation to the wind - i.e., close hauled, reaching etc.

Port.
1. The left hand side of the boat when facing forward.
2. A harbor.
3. A window in a cabin on a boat.

Port tack. Sailing on any point of sail with the wind coming over the port side of the boat.

Prevailing wind. Typical or consistent wind direction.

Puff. An increase in wind speed.

Pulpit. A guardrail at the bows of a vessel.

Q

Quarter. The sides of the boat near the stern.

R

Rail. The outer edges of the deck.

Rake. The angle of the mast.

Range. The alignment of two objects that indicate the middle of a channel.

Reach. One of the several points of sail across the wind.

Ready about. The command given to the crew to prepare to tack.

Ready to jibe. The command given to the crew to prepare to jibe.

Reef. To reduce the area of a sail.

Reeve. To pass a line through a ring or block.

Rhumb line. A straight line drawn on a Mercator chart, which intersects all meridians at the same angle. Accurate enough for courses of less than 600 miles. For great distances a Great Circle route is used.

Rig.
1. The design of a boat's masts, standing rigging and sail plan.
2. To prepare a boat to go to sea.

Rigging. The wires and lines used to support and control sails.

Roach. The sail area aft of a straight line running between the head and clew of a sail.

Rode. The line and chain attached from the boat to the anchor.

Roller-furling. A mechanical system to roll up a headsail around the headstay.

Rudder. A vertical blade attached to the bottom of the hull which is used to steer the boat.

Run. Point of sailing when the wind is coming from dead astern.
Running rigging. The lines used to control the sails.

S

Sail ties. Lengths of line or webbing used to secure sails when they are dropped or to secure the unused portion of a reefed sail.
Schooner. A two masted boat whose foremast is the same height or shorter than its mainmast.
Scope. The length of anchor rode paid out in relation to the maximum depth of water.
Scull. To propel a boat with a single oar fixed in a notch through the transom.
Scupper. A cockpit or deck drain.
Sea breeze. A wind that blows from the sea onto the land.
Seacock. A valve which opens and closes a hole used as an intake or discharge from the boat.
Secure. The make safe or tie down.
Set. 1. The direction of the current
2. To trim the sails.
Shackle. A metal fitting at the end of a line used to attach the line to a sail or another fitting.
Shake out. To remove a reef.
Sheave. The wheel inside a block or fitting over which the line runs freely.
Sheet. A line used to control a sail by pulling it in or easing it out.
Shoal. An area of shallow water.
Shroud. Standing rigging at the side of the mast.
Singlehanded. Sailing alone.
Skeg. A vertical fin in front of the rudder.
Sloop. A single masted sailboat with mainsail and headsail.
Sole. The floor in a cockpit or cabin.
Spar. A pole used to attach a sail on a boat, for example the mast, the boom or a gaff.
Spinnaker. A large down wind headsail not attached to the head stay.
Splice. The joining of two lines together by interweaving their strands.
Spreader. A support strut extending athwartships from the mast used to support and guide the shroud from the top of the mast to the chainplate.
Spring line. A dockline running forward or aft from the boat to the dock to keep the boat from moving fore or aft.
Squall. A fast moving short intense storm.
Stanchions. Stainless steel or aluminum supports at the edge of the deck which hold the lifelines.
Standing rigging. The permanent rigging of a boat, including the forestay, backstay and shrouds.
Starboard. The right hand side of the boat when looking forward from the stern.
Starboard tack. Sailing on any point of sail with the wind coming over the starboard side of the boat.
Stay. A wire support for a mast, part of the standing rigging.
Staysail. On a cutter, a second small inner jib attached between the bow and the mast. Any sail which is attached to a stay.
Steerage Way. The minimum speed of the boat through the water that allows the rudder to function efficiently.
Stem. The foremost tip of the boat.
Stern. The aft part of the boat.
Stern Spring. A line running from the stern of the boat parallel to the dock or mooring that stops the boat from moving backward along the dock.
Stow. To store properly.
Swamped. Filled with water.

T

Tack. 1. To alter course so as to cause the bow of the boat to pass through the eye of the wind.
2. The forward lower corner of a sail.
Tackle. A series of blocks and line that provide a mechanical advantage.
Tail. To hold the end of a line so as to keep it under tension on a winch.

Telltales.	Short lengths of yarn or cloth attached to the sails which indicate when the sail is properly trimmed.
Tide.	The rise and fall of water level due to the gravitational effects of the sun and the moon.
Tiller.	A long handle attached to the rudder which is used to steer the boat.
Toe rail.	A low rail around the outer edge of the deck.
Topping lift.	A line used to hold the boom up when the mainsail is lowered or stowed.
Topsides.	The sides of a boat between the waterline and the deck.
Transom.	The vertical surface of the stern.
Trim.	To adjust the sail controls to create optimum lift from the sails.
Trimaran.	A three hulled vessel.
True wind.	The actual speed and direction of the wind as you would feel when standing still.
Tune.	To adjust the boats standing rigging.
Turnbuckle.	A mechanical fitting (a bottlescrew) attached to the lower ends of stays allowing the standing rig ging to be adjusted.

U

Underway.	A boat that is not attached to the ground by either anchor or mooring lines is said to be under way.
Upwind.	Towards the direction of the wind.
USCG.	United States Coast Guard.
U.T.C.	Universal Time Coordinated. The modern term for Greenwich Mean Time, this is the standard reference time which is used internationally for navigational information.

V

Vang.	See boom vang.
Veer.	A clockwise change in the wind direction.
Vessel.	Any sailboat, powerboat or ship.

W

Wake.	Waves caused by a boat moving through the water.
Waterline.	The horizontal line on the hull of a boat where the surface of the water should be.
Weather helm.	The tendency of the boat to head up towards the wind, this increases as the sailboat becomes overpowered.
Weather side.	See windward side.
Whip.	To bind together the strands at the end of a line.
Whisker pole.	A pole temporarily mounted between the mast and the clew of the jib. Used to hold the sail out and keep it full when sailing down wind.
Winch.	A deck-mounted drum with a handle offering mechanical advantage when used to trim sheets. Winches may also be mounted on the mast to assist with raising sails.
Windward.	Towards the wind.
Windward side.	The side of the boat closest to the wind.
Wing-and-wing.	Sailing downwind with the jib set on the opposite side to the mainsail.
Working sails.	The mainsail and the standard jib.
Working sheet.	The leeward sheet that is under tension.

Y

Yawl.	A two masted vessel on which the mizzenmast is mounted aft of the rudderpost.

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