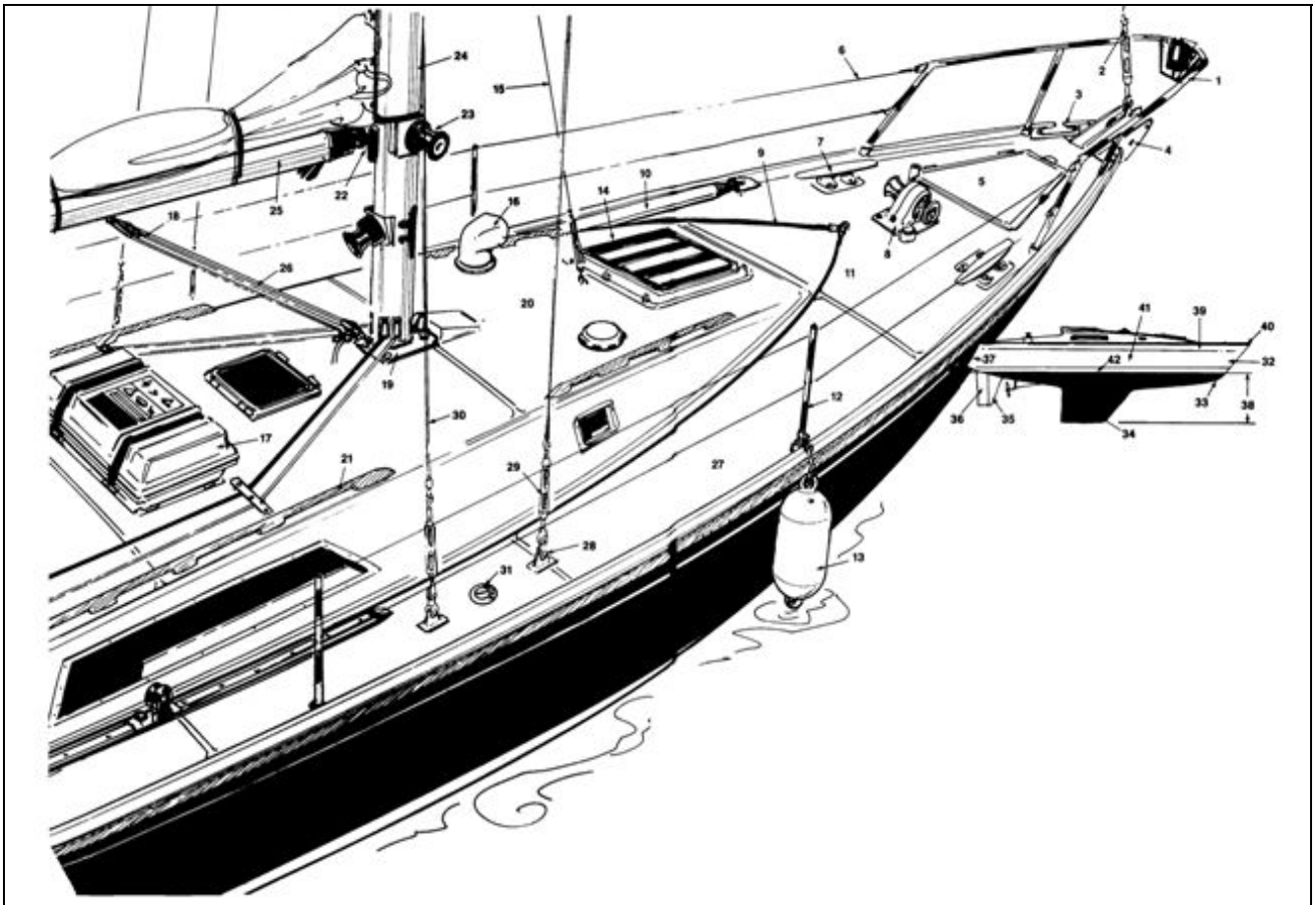
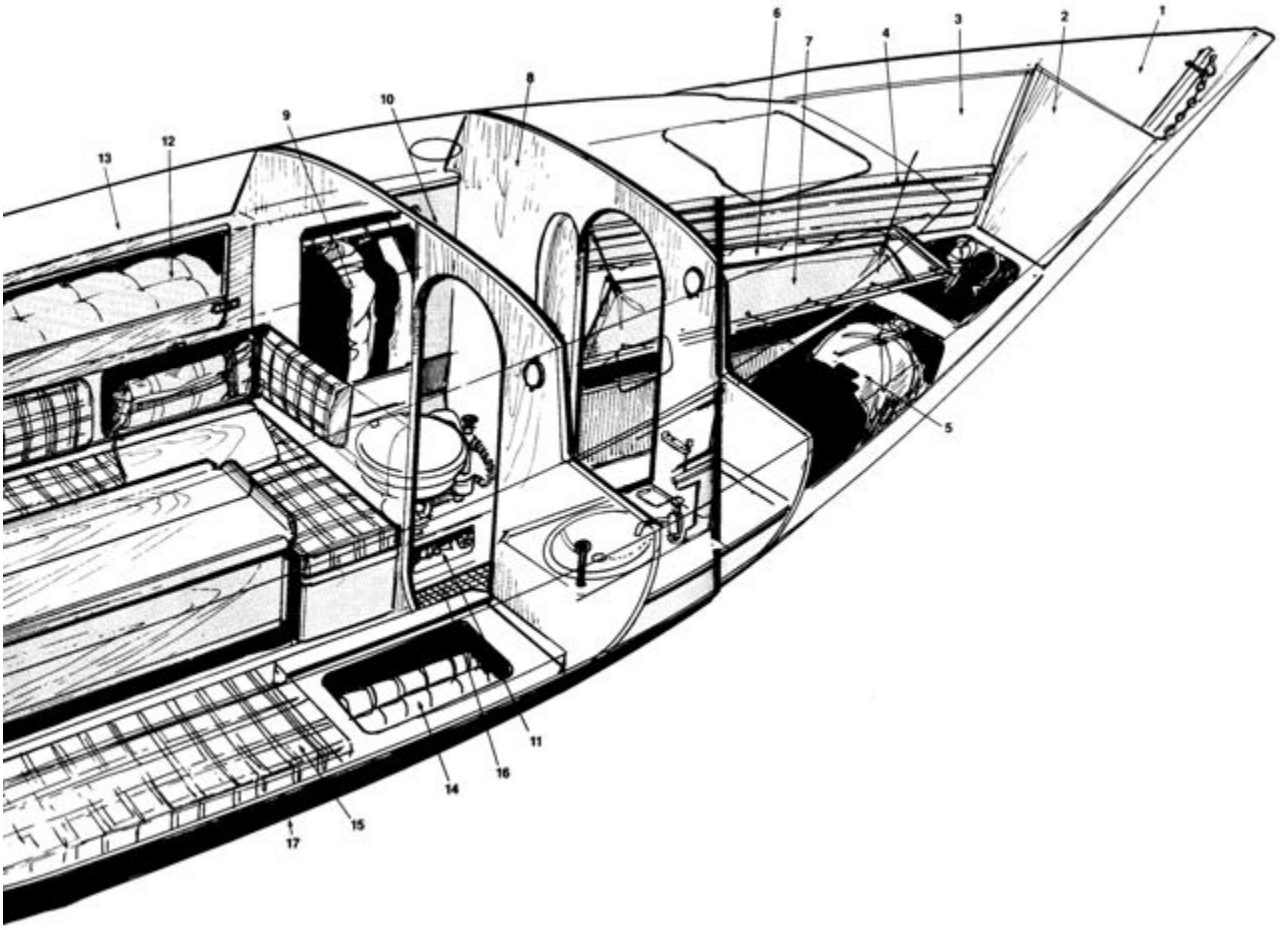
CHAPTER 1 THE SAILING VESSEL ILLUSTRATED



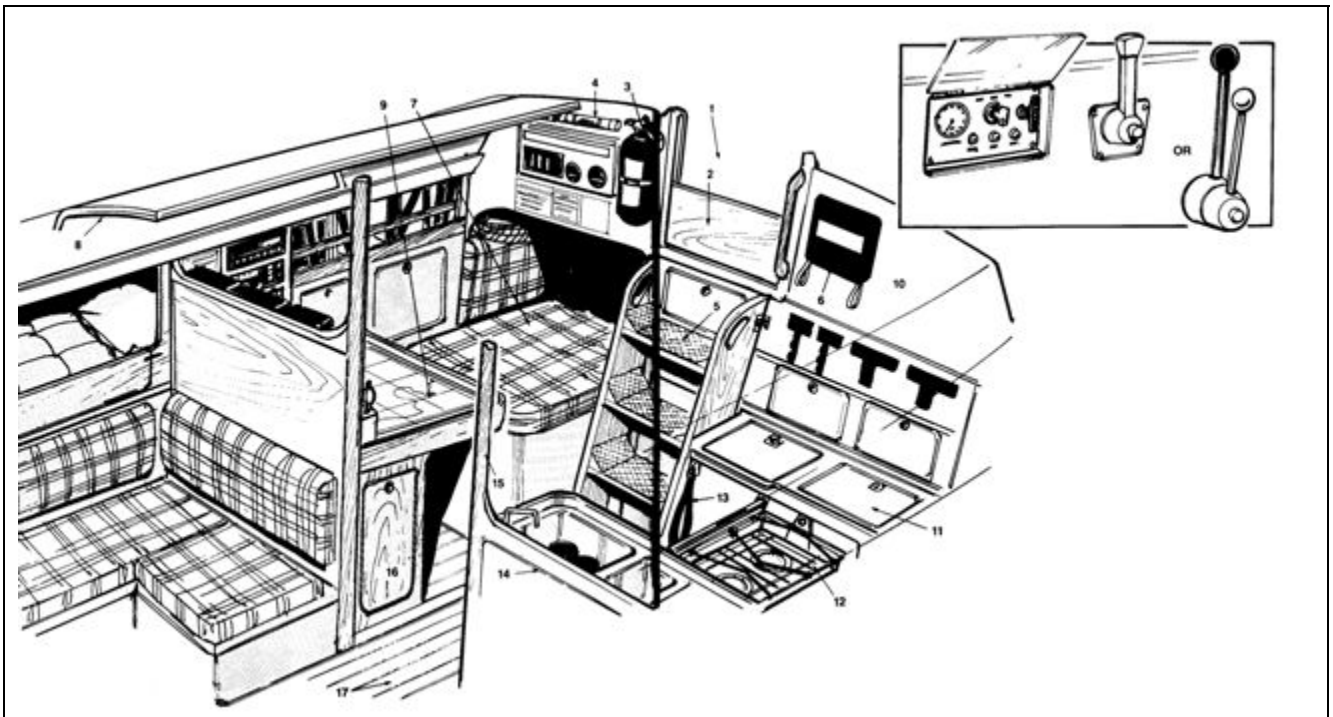
Picture courtesy of RYA

1. PULPIT (front safety rail) 2. FORESTAY (front wire supporting mast) 3. FAIRLEAD (to pass ropes through) 4. BOW ROLLER or STEMHEAD FITTING 5. ANCHOR WELL or LOCKER 6. GUARD RAIL (wire running around boat) 7. CLEAT (to attach rails to) 8. WINDLASS (winch for anchor) 9. JACKSTAY (to clip safety harness to) 10. SPINNAKER POLE 11. FORE DECK 12. STANTION 3. FENDER 14. FOREHATCH 15. INNER FORESTAY (baby stay) 16. VENTILATOR 17. LIFERAFT 18. BLOCKS (pulleys) 19. MAST STEP (bottom of mast) 20. COACHROOF 21. GRABRAIL (handrail) 22. GOOSENECK 23. WINCH 24 MAST 25. BOOM 26 KICKING STRAP 27. SIDE DECK 28. CHAIN PLATE 29. RIGGING SCREW or BOTTLE SCREW 30. SHROUDS 31. DECK FILLER (fuel or water) 32. STEM (sharp bit between deck and water) 33. FOREFOOT (where stem and keel meet) 34. KEEL 35. SKEG 36. RUDDER 37. STERN (back) 38. DRAFT (depth of water of 'what she draws') 39. CAVITA LINE (decorative line) 40. BOW (front) 41. TOPSIDES (between water and deck) 42. BOOT TOP (painted band just above water)



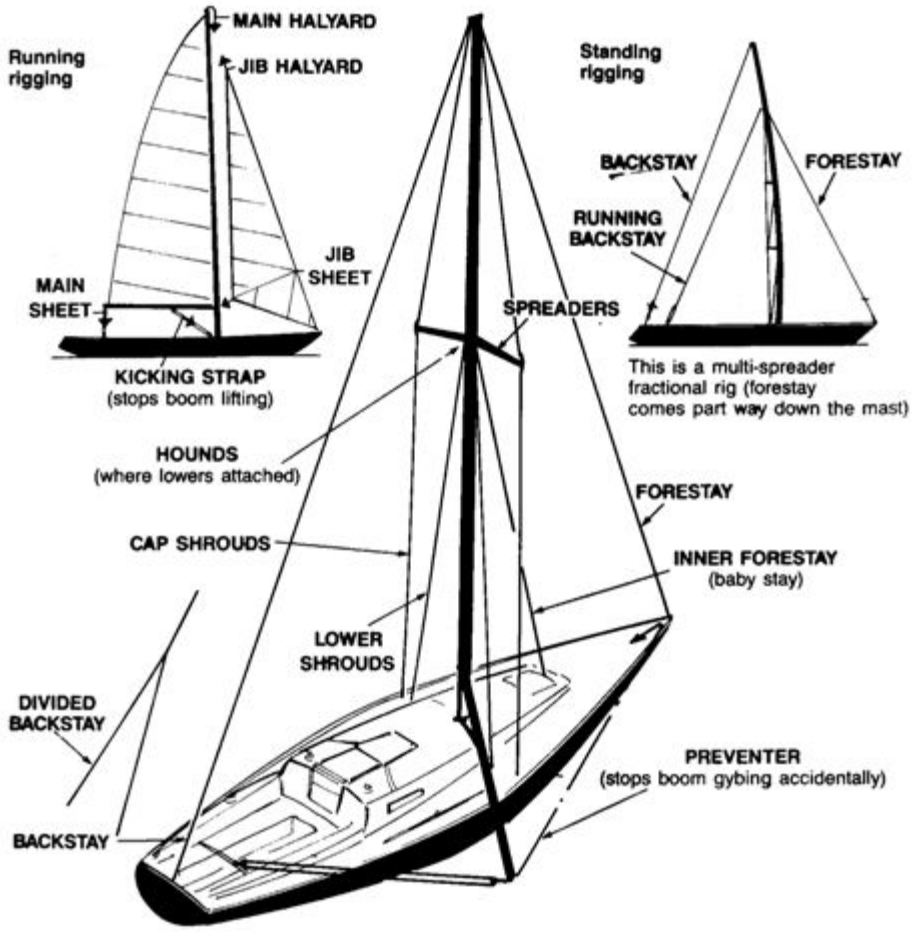
Picture courtesy of RYA

1. ANCHOR LOCKER, ANCHOR WELL or CHAIN LOCKER (Often where the main anchor [bower] is stowed. Anchor cable is sometimes kept here or in a separate chain locker) 2. FORWARD BULKHEAD 3. FORE CABIN, FORE PEAK or FO'C'SLE (cabin in the bows) 4. CEILING (cabin sides) 5. SAIL LOCKER (sometimes aft) 6. PIPE COT (folding bed) 7. LEE-CLOTH (stops you falling out of bed) 8. BULKHEAD (wall) 9. HANGING LOCKER (wardrobe – if used for wet oilies it is called a wet locker) 10. HEADS (lavatory) 11. SEACOCKS (valves to let water in and out) 12. PILOT BERTH 13. MAIN SALOON (cabin) 14. LOCKER (cupboard) 15. SETEE BERTH 16. CABIN SOLE (floor) 17. BILGE (where the bottom of the boat joins the sides or the space under the sole)

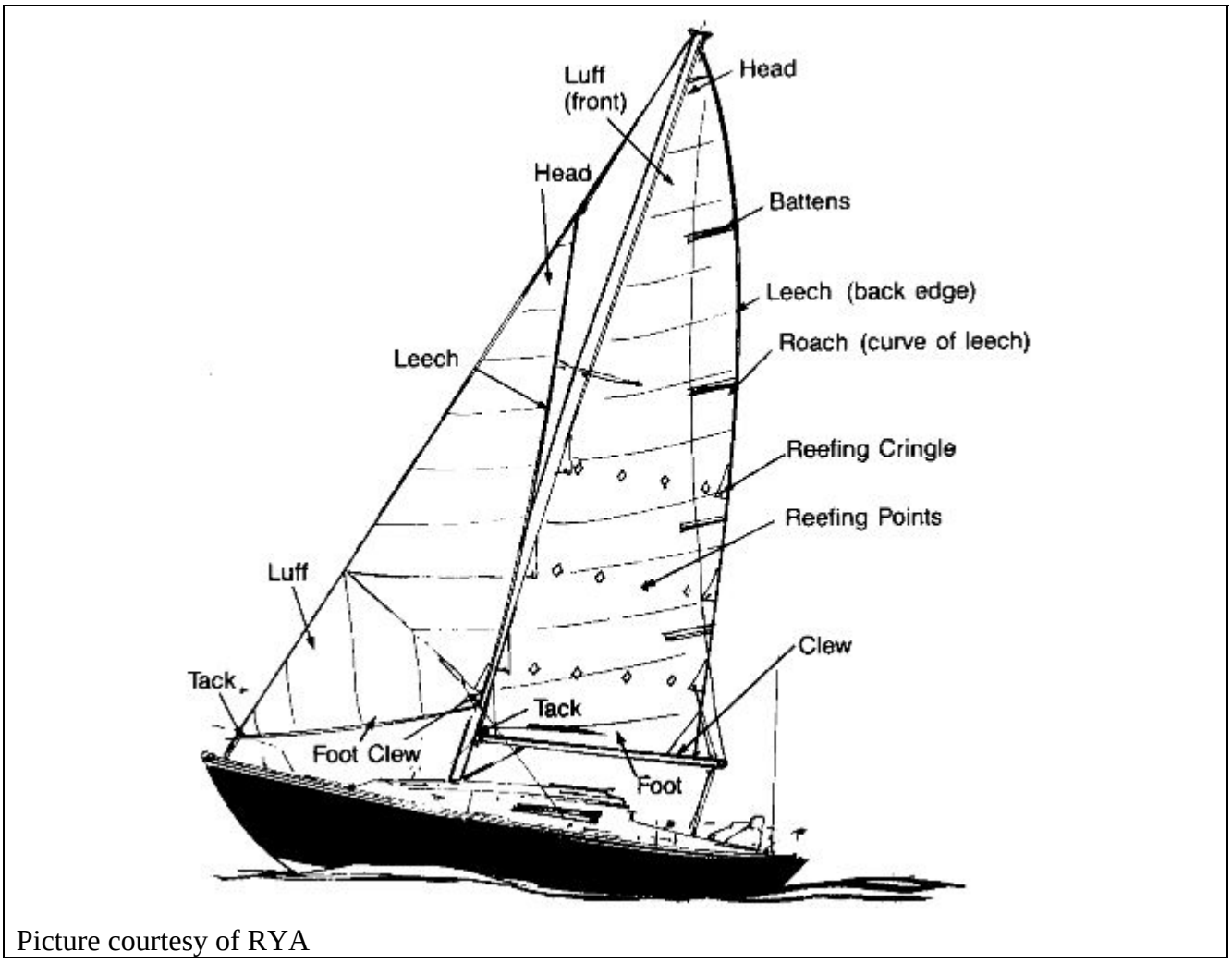


Picture courtesy of RYA

1. COMPANIONWAY (entrance to cabin) 2. WASH BOARDS (drop in boards) 3. FIRE EXTINGUISHER 4. FLARES (not always here) 5. COMPANIONWAY STEPS 6. FIRE BLANKET 7. QUARTER BERTH (bed) 8. DECK HEAD (ceiling) 9. CHART TABLE (navigation area) 10. GALLEY (kitchen) 11. ICE BOX or COOL BOX 12. GIMBALLED STOVE (swings with the ships movements) 13. SAFETY STRAP FOR COOK 14. HALF-BULKHEADS 15. GRAB RAILS 16. LOCKERS (cupboards) 17. CABIN SOLE (floor)

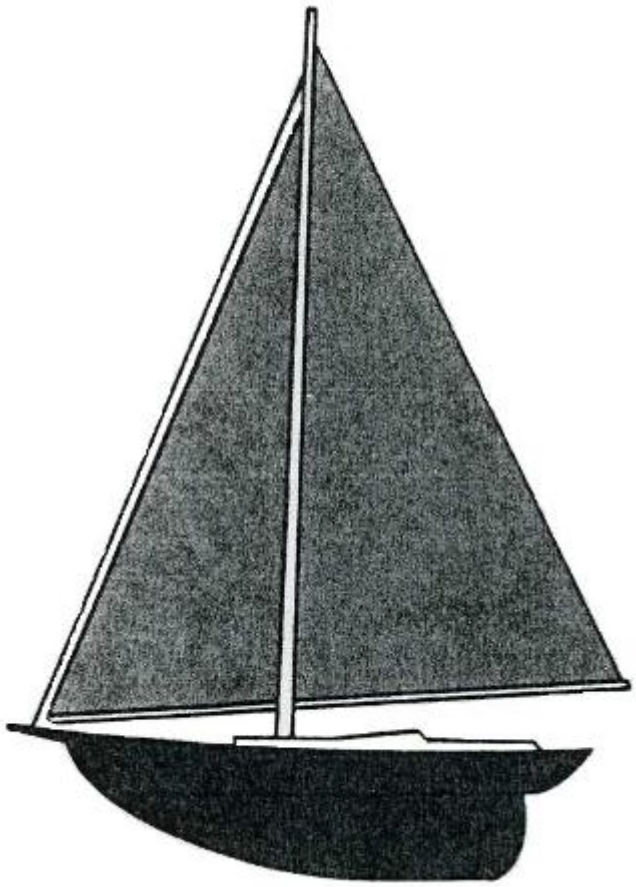


Picture courtesy of RYA

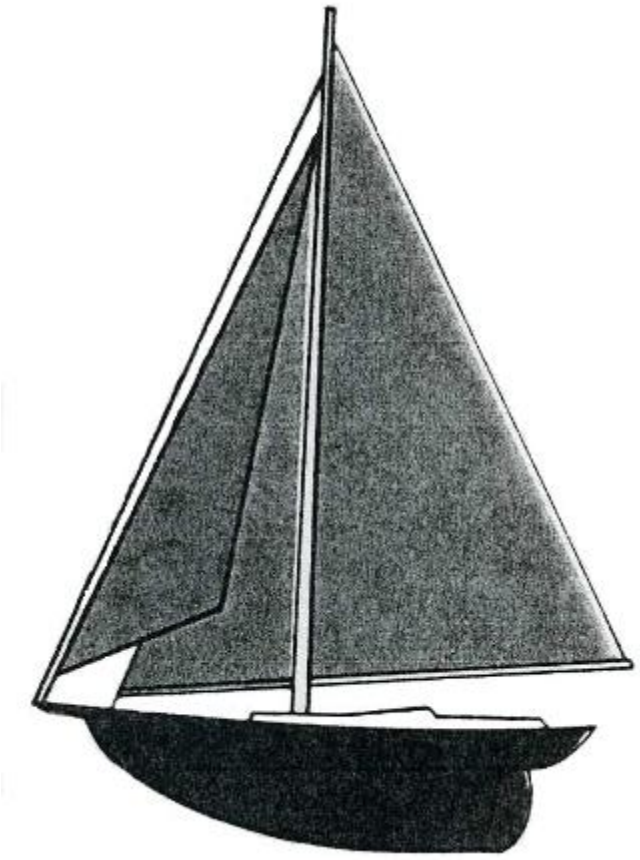


Picture courtesy of RYA

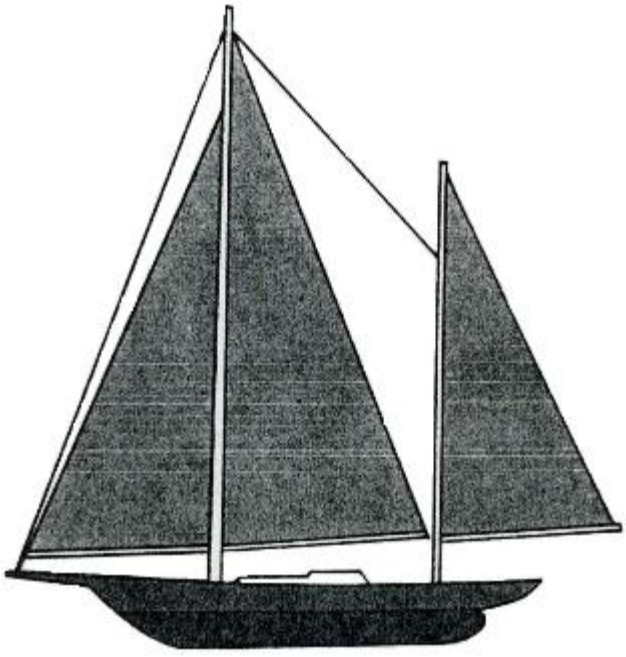
CHAPTER 2 RIGS of SAILING VESSELS

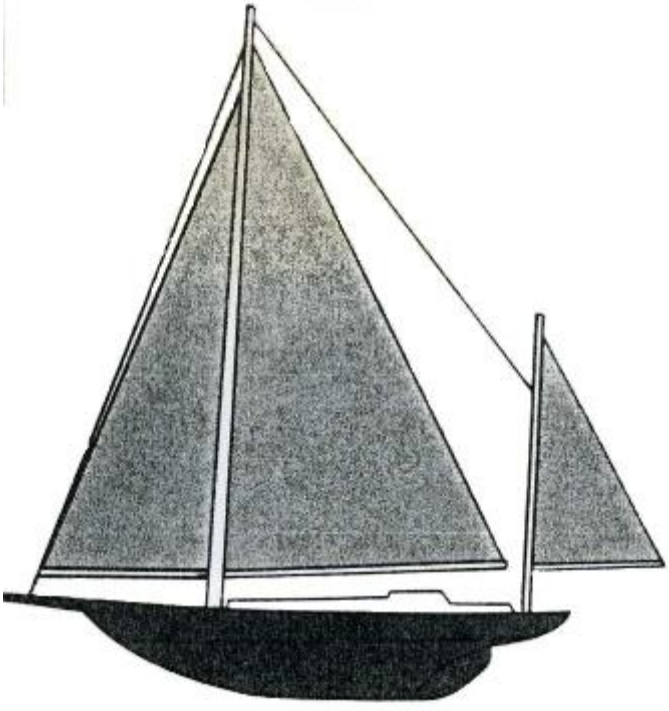


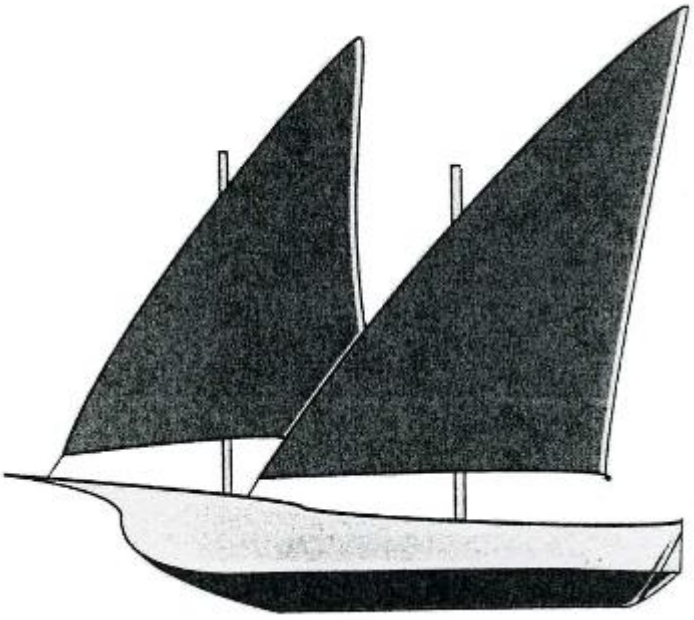
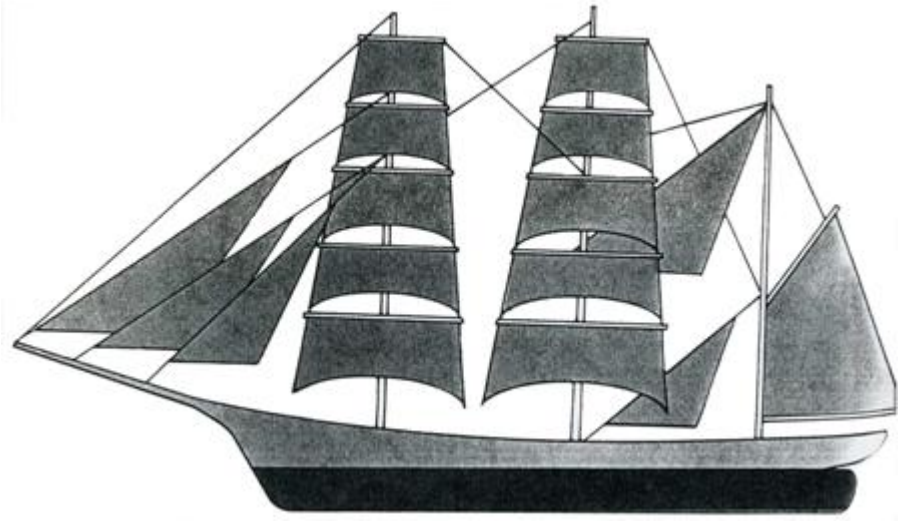
Sloop

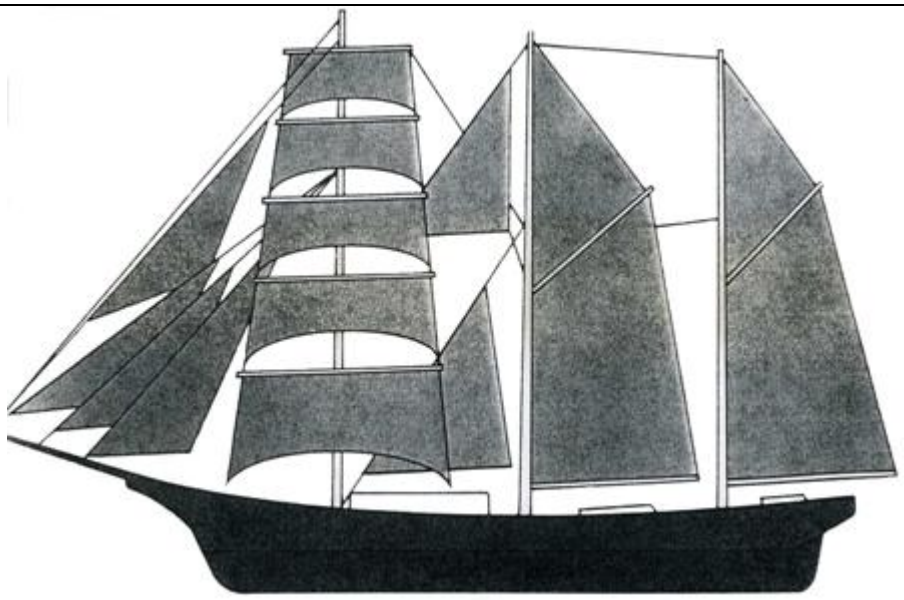


Cutter

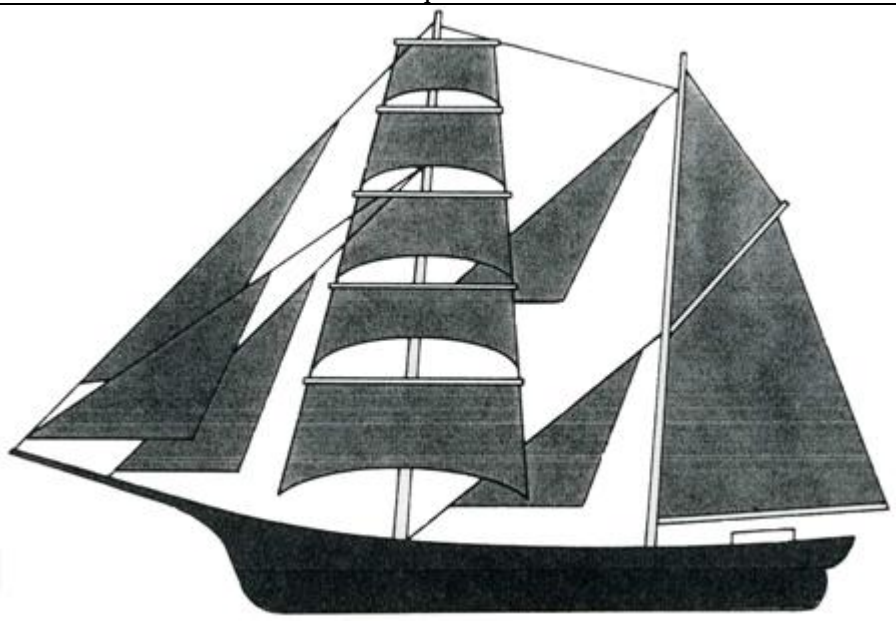




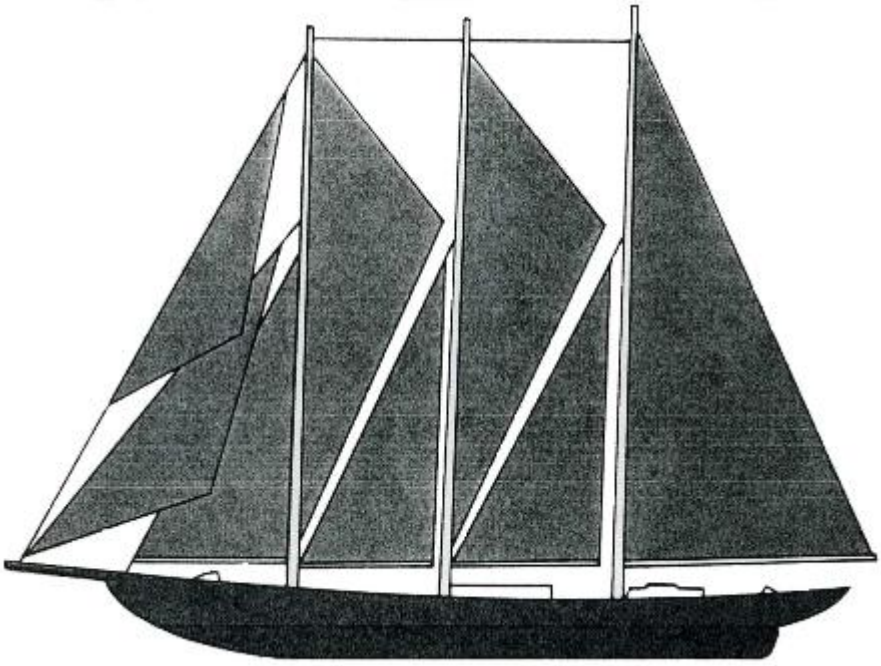
Ketch	Yawl
 Lateen	
 Barque	



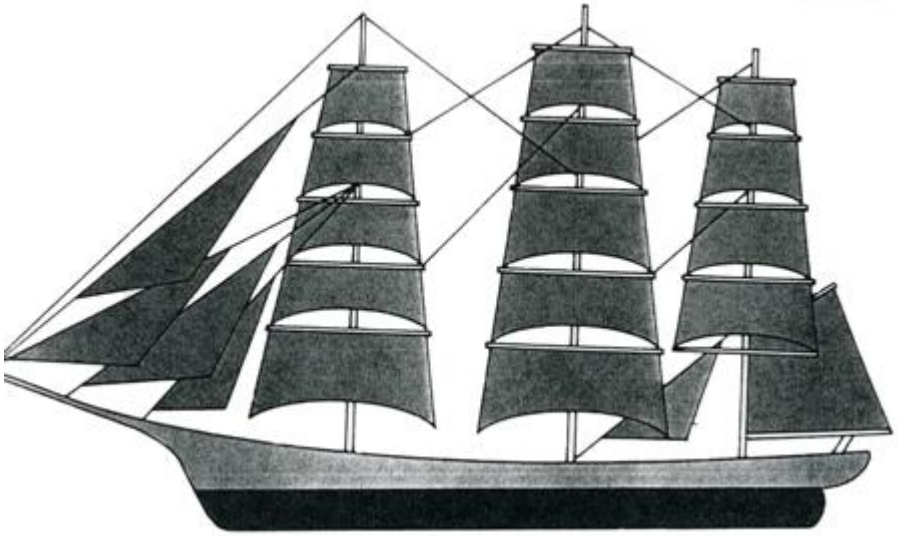
Barquentine



Brigantine



Staysail Schooner



Fully Rigged

CHAPTER 3 HOW A BOAT SAILS

The Theory of Sailing

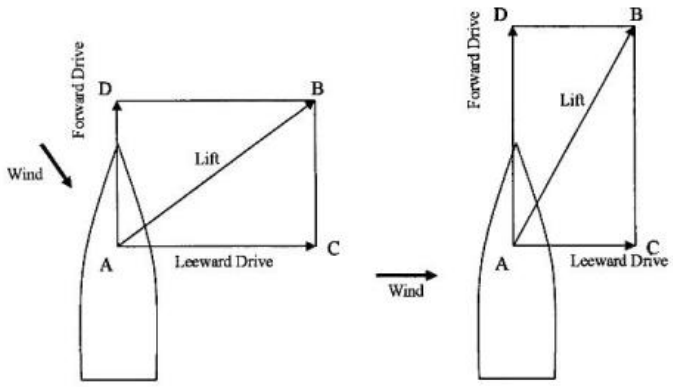
The earliest sailing craft carried a square sail and sailed only before the wind. In any other direction they used sweeps or paddles, or simply waited until the wind was in a favourable direction. The first development of fore and aft rig, with the ability to sail against the wind, was seen in the Arab dhow, a type of rig still basically unchanged to this day. The modern fore and aft rig, with the leading edge of the sail secured to a mast or stay, was a much later development.

As the knowledge and understanding of sailing developed, so the design of ships gradually changed. Keels were deepened to create greater lateral resistance, while the high poops and forecastles were reduced in order to offer less wind resistance. Although it was realised that ships could sail against the wind, it was not until the development of the airplane, and the consequent study of aerodynamics, that the reasons for this were fully understood. It had been discovered that it was not merely pressure under the wings that lifted an airplane into the air, but also the low pressure area created above the wings by flowing more quickly over the curved surface. It was soon realised that the same principle applied to sails of modern sailing vessels.

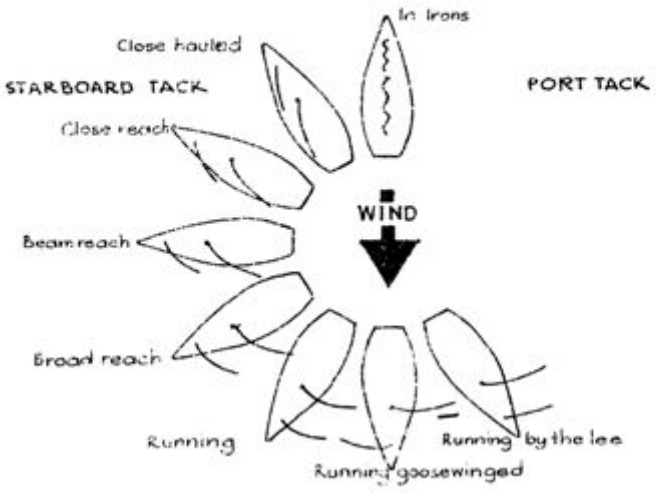
The air accelerates over the arc of the sail, causing a reduction in pressure on the upper side, thus pressure on the underside of the sail is greater than the pressure on the upper side. The natural tendency of different pressures to try to equalize creates a push or lift on the underside of the sail. Since the sail is attached to a body resting in a fluid mass, that body is moved through the mass by the lift on the sail, in other words the vessel is moved through the water.

When a single sail is used the air flow over the sail is not even, turbulence and eddies being formed on the leeward side of the sail of the sail which tends to reduce the venturi effect and consequent lift. If a second overlapping sail is added much of this turbulence is removed, thus increasing the lift created by the mainsail.

When sailing to windward, only a small proportion of the force of the wind is used in driving the vessel forward. Most of the effort is wasted trying to push the vessel sideways or heeling it over against the righting moment of the ballast. This can be illustrated by the use of a parallelogram of forces which divides the lift of the sail into a forward and leeward component. The sketch below shows a vessel sailing close to the wind and reaching off the wind, with lines A-B indicating the direction and force of the forward lift. By completing the parallelogram it will be seen that A-C is proportional to the leeward drive in A-B, while A-D is proportional to the forward drive. As the point of sailing changes, so the proportions of the forces change, this explains why a vessel sails faster on a reach then when close to the wind.

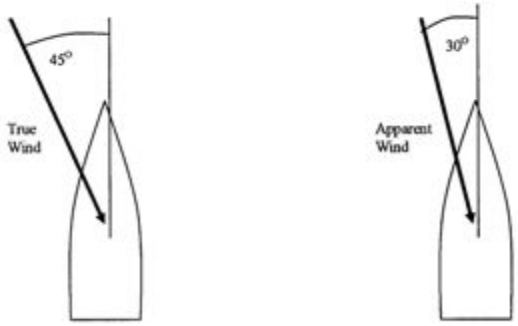

Forward Drive
D
B
Lift
Wind
A
Leeward Drive
C
Wind
Forward Drive
D
B
Lift
A
C
Leeward Drive

CHAPTER 4 POINTS OF SAILING



Close Hauled

The yacht is sailed as close to the wind as possible without losing forward drive, with the sails sheeted in towards the yacht's centre-line. Depending on the design, a modern yacht will normally point between 40^{o} and 50^{o} from the true wind or 30^{o} to 40^{o} from the apparent wind; this is the term used to describe the wind direction when the yacht is moving through the water. Thus a masthead wind indicator would show the apparent wind when the yacht is underway, and the true wind when stationary. As a yacht increases speed on a given course, the apparent wind direction will move forward.



Close Reach

The wind is forward of the beam, but the yacht is not fully close hauled. The sheets are eased as far as possible without spilling the wind and the headsail is set to follow the same curve as the main. This is normally the fastest point of sailing.

Beam Reach

The wind is on the beam and the sheets eased further, using the same principles as for a close reach.

Broad Reach

The wind is abaft the beam and the sheets eased still further.

Running

The wind is over the port or starboard quarter, and the sheets eased until the sails are about right angles to the wind direction. The "lift" effect of the wind over the curvature of the sails has now been lost, and the wind is simply pushing the yacht through the water.

Goosewinging

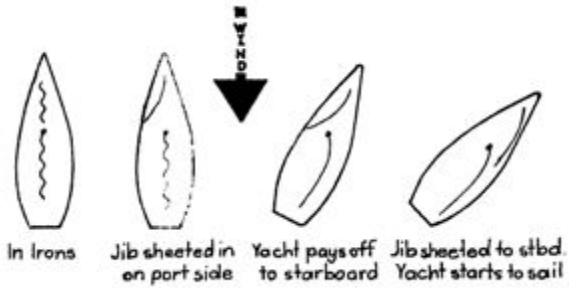
When the yacht is running almost directly downwind, the main and the headsail set on opposite sides, usually with the headsail boomed out to windward. As more sail area is presented to the wind the speed of the yacht will increase. Under running conditions a “lazy guy” or “preventer” rigged from the end of the boom to the bow should be used to prevent an accidental gybe and to keep the mainsail steady.

Running by the Lee

When running, the boom is set on the windward side in the same quarter as the wind. Apart from reducing the efficiency of the sails, this point of sailing may cause a dangerous accidental gybe if no preventer is rigged.

In Irons

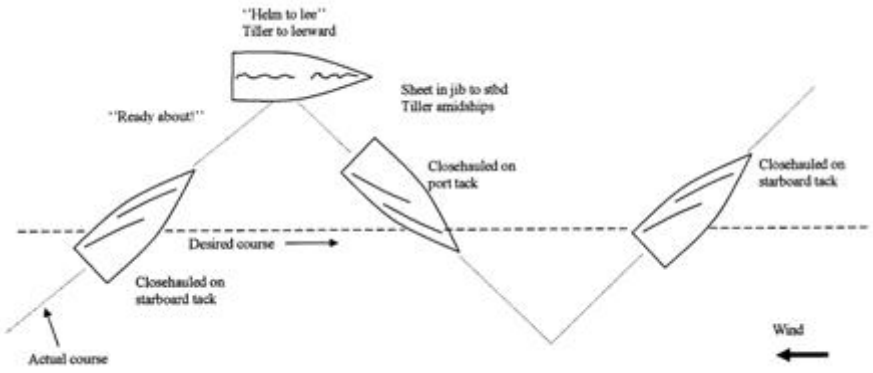
The yacht is lying exactly head to wind without enough momentum to pass through the wind onto another tack. In this situation the sails will not fill and the yacht will gradually lose way. To remedy this situation the headsail must be sheeted in hard either to port or starboard, when the sail will fill and the yacht begin to pay off on the opposite tack. When the normal direction of sailing is reached the windward headsail sheet is freed and the leeward sheet is taken in. As the yacht begins to make steerageway, head and mainsheets are trimmed in the normal way.


WIND
In Irons
Jib sheeted in on port side
Yacht pays off to starboard
Jib sheeted to stbd. Yacht starts to sail

CHAPTER 5 MANOEUVERING UNDER SAIL

Tacking

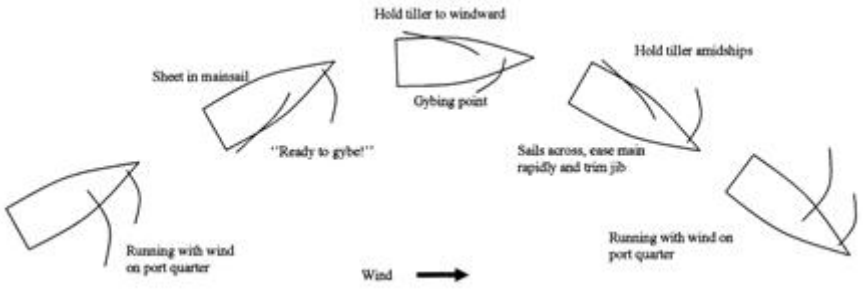
In this manoeuvre the bow of the yacht is steered through the wind from one tack to another. A series of tacks close hauled along a mean course allows the desired course to be made good. This is known as "Beating to Windward"



A good desired course that is not exactly into the wind may also be made good by varying the lengths of legs between tacks. In a modern cruising yacht a tacking angle of 90^{o} to 110^{o} between tacks can be expected.

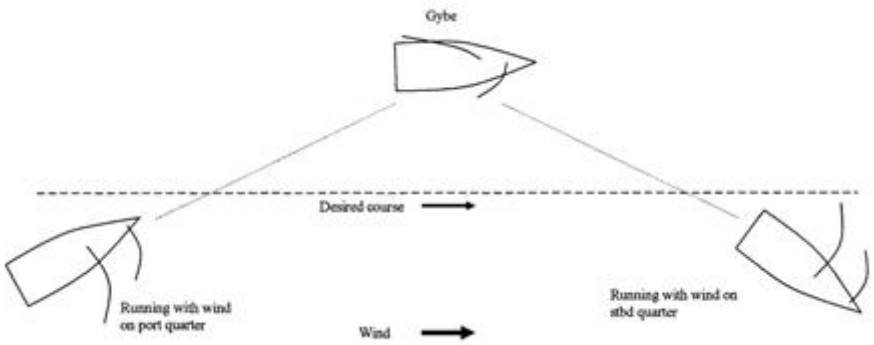
Gybing

This entails turning the stern of the yacht through the wind from one tack or gybe to the other. In strong winds it is a potentially dangerous manoeuvre, and should always be controlled by sheeting in the mainsail to the centre line before the gybe commences.



Tacking Downwind

This is a method of sailing downwind by gybing about the desired course on a series of legs, with the wind first on one quarter and then on the other.



In certain conditions it may be preferable to running dead downwind, with less likelihood of an accidental gybe.

Heaving to

This manoeuvre is used to slow the yacht almost to a halt and to leave the tiller virtually unattended. It can be very useful in bad weather or when all hands are needed to attend to any damage or repairs. It is achieved by sheeting the headsail in to windward, easing the mainsail slightly and lashing the tiller to leeward. The exact position of sheets and tiller can be found only by experiment and experience. Under this rig a modern cruising yacht will normally sail very slowly at about right angles to the wind.

The sequence of progression that occurs when a yacht is hove to is illustrated.

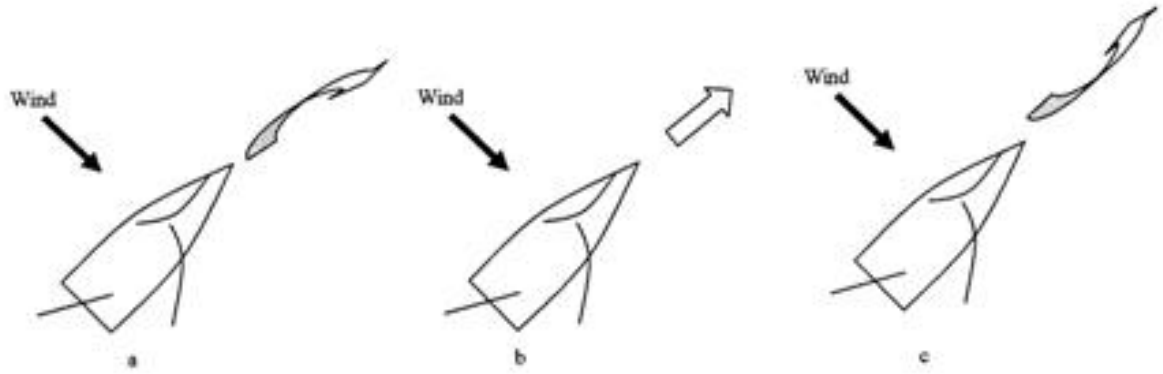
The backed headsail fills and swings the yacht's head to leeward. (Fig a)

As the yacht turns to leeward the mainsail fills and gives the yacht a little headway. (Fig b)

With the tiller lashed to leeward the rudder turns the yacht's head into wind. (Fig c)

The backed headsail then fills again and the process is repeated. When heaving to by reason of heavy weather, the size of headsail and the amount of reefing in the mainsail should be adjusted according to conditions.

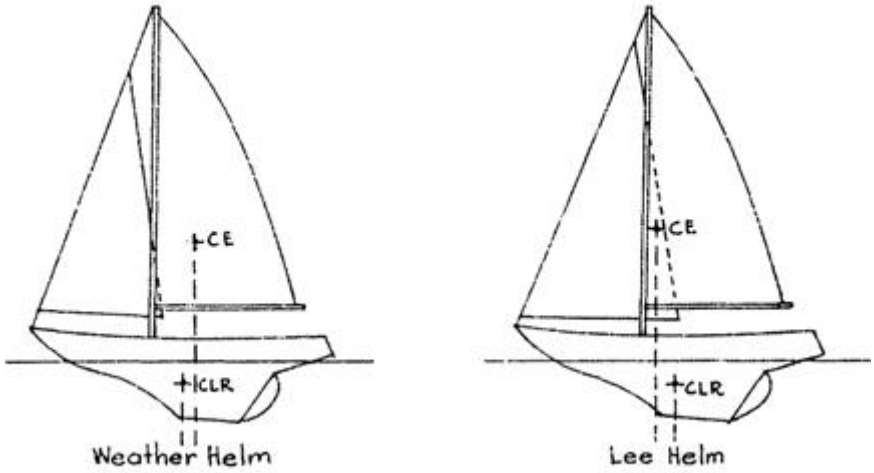
All yachts act differently whilst hove to, a yacht with a long keel will tend to sit quietly.Yachts with a fin keel will tend to fore reach slowly (track forward through the water)


Wind
Wind
Wind
a
b
c

CHAPTER 6 HELMSMANSHIP AND SAIL BALANCE

Helmsmanship can be described as the art of sailing a yacht to the best advantage, and of knowing instinctively whether the sails are correctly balanced and trimmed for the desired course or whether too much or too little sail is being carried for the current weather conditions. To become a good helmsman takes practice and experience, but it is made easier if the principles of sail balance are understood.

The underwater profile of a yacht is designed to create a resistance to sideways movement caused by air pressure on the sails. This is known as Lateral Resistance, and the point through which the resultant of all the lateral forces is designed to act is the Centre of Lateral Resistance (CLR). Similarly, the forces of wind acting on the sails can be reduced to a single resultant acting through one point being called the Centre of Effort (CE). If the CE is aligned exactly above the CLR, the yacht will be perfectly balanced, but if the two points are not aligned a turning moment is created and the yacht will react accordingly. If the CE is aft of the CLR the yacht will tend to turn towards the wind, this is called "Weather Helm". If the CE is forward of the CLR the yacht will tend to turn away from the wind, Called "Lee Helm".



Normally a yacht is designed to carry slight weather helm, which gives a positive feel to the tiller and makes it easier to sail close to the wind. A yacht with lee helm is very uncomfortable to sail, and under certain conditions can be positively dangerous.

The position of the CLR in a fixed keel yacht cannot be changed except by structural alteration, but the position of the CE can be varied by changes in the sail plan, and to some extent the rake of the mast. Excessive weather helm can be corrected by reducing the size of the mainsail or increasing the size of the headsail, thus moving the CE forward and closer to the CLR. Lee helm can be corrected by reducing the size of the headsail and increasing the size of the mainsail, or, if the condition is inherent, by raking the mast further aft. Correct sail balance must be maintained when sail is reduced in heavy weather, thus it may be necessary to set a smaller headsail when the mainsail is reefed.

CHAPTER 7 SAIL TRIM

Trimming the Headsail

The factors affecting headsail trim are the tension on the forestay, the tension on the luff of the sail, the position of the sheet fairleads and the tension on the leech line.

Forestay Tension

Many modern yachts are fitted with some form of backstay adjuster that serves to vary the tension in the forestay according to weather conditions. In light winds the forestay should be just firm enough to prevent the headsail from sagging away to leeward. As winds get stronger the backstay should be progressively tightened to increase the tension in the forestay until it is as tight as the strength of the rig and the condition of the hull will allow. On fractional rigs with aft raked spreaders an over tightened backstay will cause the cap shrouds to become dangerously loose. Over tightening may also cause irreparable damage to the hull of the yacht.

Headsail Luff Tension

Variation in the tension on the luff of the headsail has an effect on the position of the Centre of Effort of the sail. A light tension will tend to move the CE further aft, while increased tension will move it further forward. In light winds the luff tension should be eased slightly, and then progressively tightened as the wind increases.

Sheet Fairlead Position

Most yachts are fitted with tracks on which the position of the sheet fairleads can be altered according to conditions. Every headsail has an optimum position for the fairlead, depending on the cut of the sail, the type of rig and the design of the yacht. Any change in this position will also change the direction of the pull of the sheet on the clew of the headsail, and normally the angle of the sheet should subtend a line just above the bisecting seam of the headsail.

In light airs or when sailing off the wind the fairlead may be moved forward a little in order to increase the curvature of the sail, but when sailing close-hauled care must be taken not to stretch the leech out of shape, or to allow the upper part of the sail to touch the outer end of the spreaders.

Leech Line Tension

If the leech of the headsail flutters when the yacht is close-hauled, it means that it has been made incorrectly or that it has been stretched out of shape. When a leech line is fitted this may be tightened slightly to remove the flutter, but overtightening will produce a pronounced hook to windward in the leech, which in turn distorts the smooth flow of wind over the mainsail. In these circumstances the flutter in the leech may be accepted as the lesser of the two evils.

Trimming the Mainsail

The trim of the mainsail is controlled by the tension of the rig, the luff, the foot of the mainsail and the position of the direction of pull of the mainsheet and kicking strap.

Rig Tension

Tension on the backstay induces a bend in the mast that tends to flatten the mainsail. This is of some advantage when sailing close-hauled in strong winds.

Luff Tension

Tension on the luff in all conditions should always be sufficient to set up the sail so that there are no bags or wrinkles in the luff of the sail. In light winds the luff may be eased slightly and in strong winds it should be tightened. This has the effect of altering the CE and fullness of the sail in the same way as it does with the headsail.

Foot Tension

In light airs the mainsail should be fairly full while in strong winds it should be much flatter. Increasing the tension along the foot of the mainsail helps to flatten the sail and make it more efficient in strong winds, but the tension must be released when conditions do not require it.

The Mainsheet Traveller

Most yachts are fitted with an adjustable mainsheet traveller, and this can be used to advantage in various wind conditions. The direction of pull on the sheet can be altered by changing the position of the traveller, and it should be moved to windward when sailing close-hauled, and pushed leeward when sailing off the wind.

The Kicking Strap

When sailing off the wind in strong winds the boom tends to lift in the air, thus creating an inefficient belly and twist in the mainsail. The lift of the boom can be controlled by the kicking strap, adjusting the tension to achieve the correct curvature in the sail. When sailing close to the wind tension on the kicking strap will help to prevent the boom from bending, thus keeping the sail flatter and more efficient for the conditions.

CHAPTER 8 GETTING UNDERWAY

From between Piles - Head to Wind

a. Single up stern warps, and rig slip line.

b. Move forward under control of stern and bow warps, and adjust bow warps on piles so that they can be cast off easily, then haul yacht back to original position.

c. Make mainsail and headsail ready for hoisting.

d. Cast off stern warp and haul forward hard on the bow warps, making sure that they are led over the pulpit.

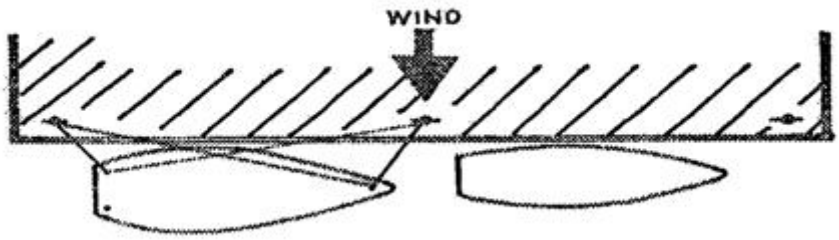
e. When level with piles flick off bow warps and stow them quickly.

f. Ensure yacht head to wind, hoist mainsail, and when clear of obstructions turn yacht until mainsail fills, then hoist headsail.

From between Piles - Wind Astern

As for getting under way when head to wind, except that the headsail is hoisted first, not the mainsail. When the yacht is clear of the piles and has sufficient headway luff up to wind and hoist the mainsail. The mainsail should never be hoisted when the wind is astern.

From a Jetty - Wind Offshore



a. Prepare headsail for immediate hoisting.

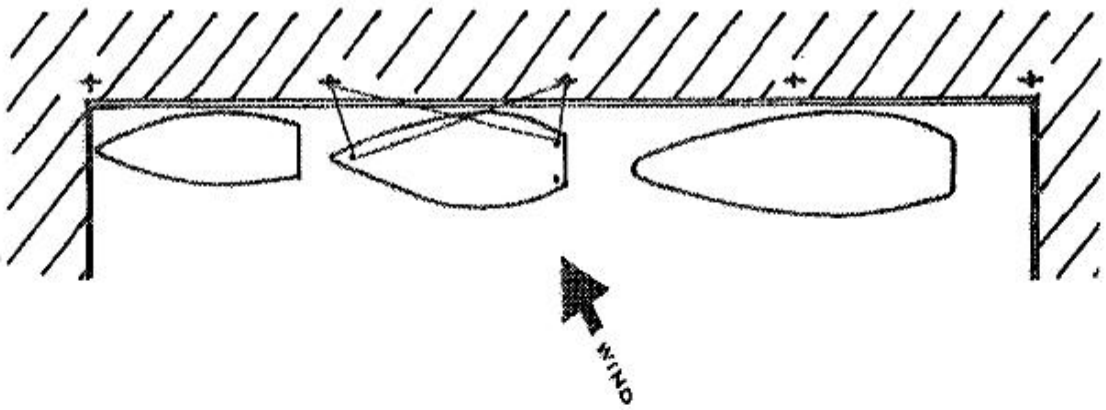
b. Take off springs.

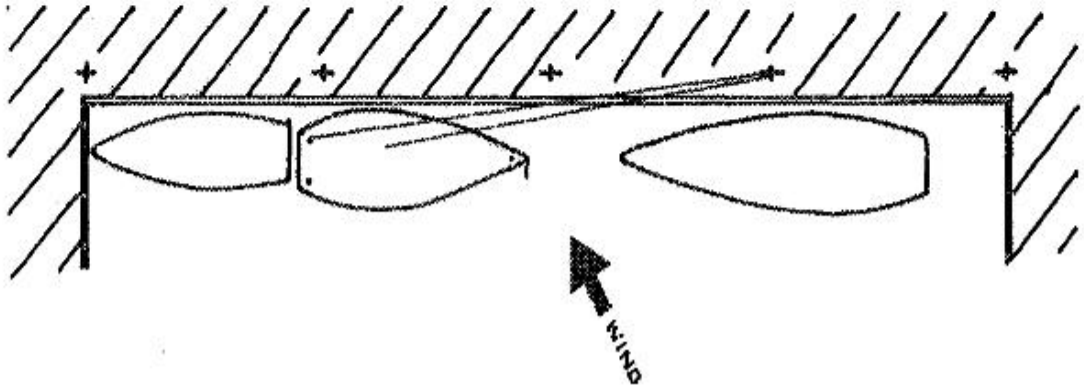
c. Hoist headsail and let go bow warp.

d. When yacht has turned downwind let go stern warp.

e. When sufficient way is on and yacht is clear of any obstruction's luff up and hoist mainsail.

From a Lee Shore Berth





a. If necessary warp the yacht round so that the wind is forward of the beam and adjust warps so that as much space as possible is available forward of the bow.

b. Prepare mainsail for immediate hoisting.

c. Take a long stern warp to a bollard or post as far forward as possible and double it back to the stern of the yacht. (Slip line)

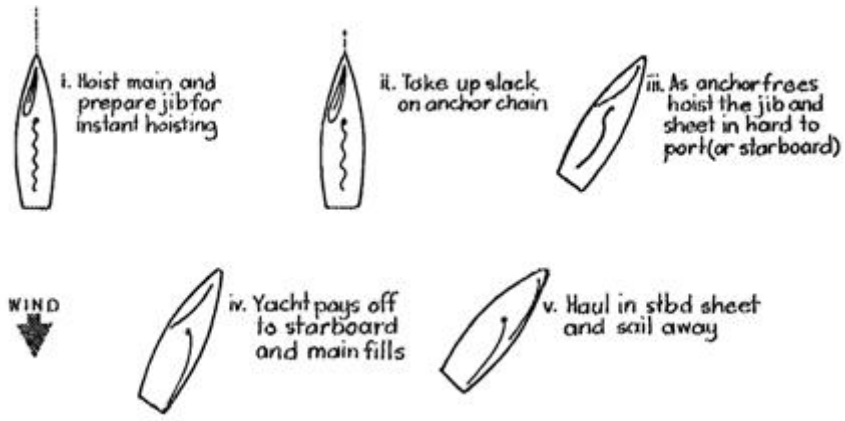
d. Take off all other mooring warps.

e. Steering the yacht to windward and pushing out on the bow with the boathook, pull in hard on the stern slip line, at the same time fending off the stern so that it is just clear of the jetty.

f. When sufficient way is on the yacht slip the stern line and haul in.

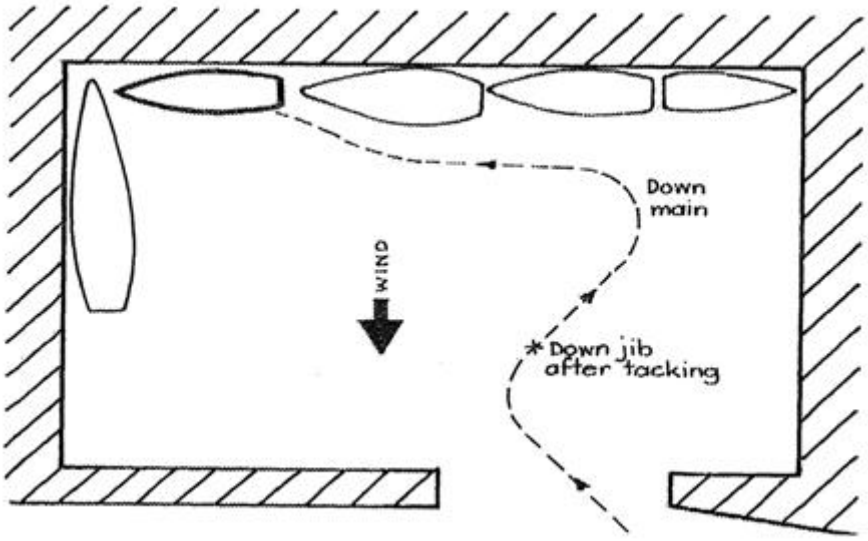
g. As the yacht goes through the wind hoist the mainsail and then the headsail.

From an Anchorage



CHAPTER 9 BERTHING

Berthing into the Wind

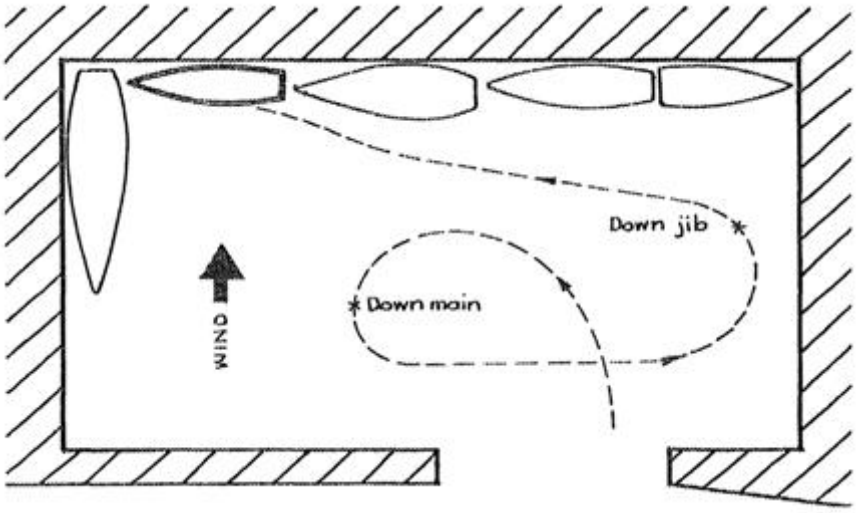


a. Drop headsail when well downwind of selected berth.

b. Allowing for any leeway in a strong wind, luff up and drop mainsail when yacht has sufficient way to reach the selected berth without sails.

Much experience and practice is needed before the exact position to drop sails can be determined. If the approach is too fast the way can be taken off by making a tight circle, and if too slow the headsail can be hoisted and the yacht sailed out of harbour to start the maneuver again.

Berthing Downwind

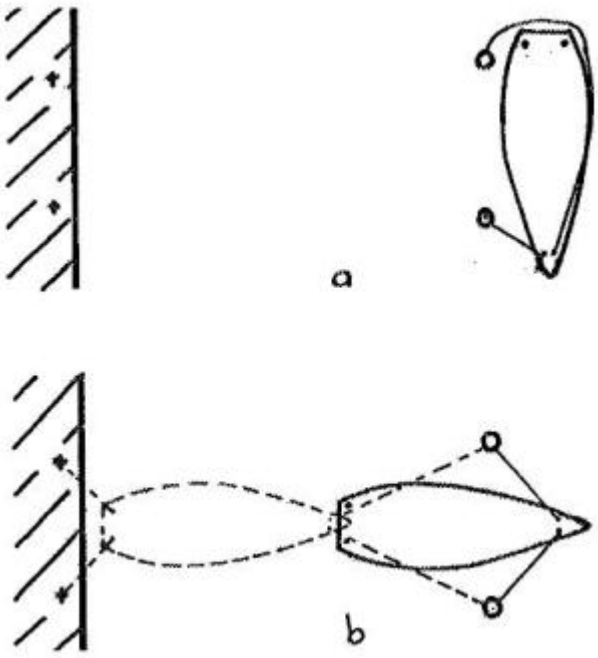


a. When well upwind of selected berth, luff up into wind and lower the mainsail.

b. Lower headsail when the yacht has just sufficient headway and distance off to reach the selected berth without sail.

Although it is sometimes necessary in very crowded harbours, a lee berth, and even a lee harbour, should be avoided if possible.

Berthing Between Piles



The outer line of piles should be treated as a jetty or harbour wall, and the approach made in the same way as described in Berthing into the Wind and Berthing Downwind. The bow warps are laid out as shown in Fig a with the port bow warp laid around the yacht outside all shrouds and rails to the starboard quarter, and the starboard bow warp laid down to the starboard side about midships position, again outside all shrouds and rails. If the approach is made from the opposite direction, the position of the warps will of course be reversed. Both warps should be finished with a bowline or running bowline large enough to pass over the top of piles.

As the yacht comes alongside the line of piles the bowlines are laid over the appropriate piles, any headway on the yacht being taken off by the warp on the after pile. Using the other warp would turn the yacht sharply into the line of piles, and would also prevent the helmsman from steering away from the line in order to bring the stern of the yacht into a more convenient position. Keeping the yacht fended off from the piles, with the help of two bow warps, the stern of the yacht is maneuvered between the piles until it is in the position shown in Fig b. By hauling in on the bow warps the yacht is guided astern with the help of the rudder until the mooring position is reached and a stern warp is attached ashore. Bow and stern warps are then adjusted and made fast.

CHAPTER 10 ANCHORING

As harbours become more crowded and harbour dues continue to rise, more and more people are resorting to anchoring their yachts and, if necessary, going ashore by dinghy. Provided that a suitable anchorage is used and the correct drill is carried out, lying to an anchor has great advantages over berthing in a crowded harbour that more that compensates for the possible inconvenience of not being able to step directly ashore.

Selecting an Anchorage

When deciding upon a suitable place for anchoring the first and most important consideration must be the weather conditions. Anchoring close to a lee shore in a rising wind, or even a weather shore when a complete change in wind is forecast, might lead to a nerve racking and sometimes dangerous experience of trying to beat away from a lee shore at night in a strong wind. Full use should be made of any local knowledge as well as recommendations made in pilot books or given on charts, while information about the quality of the bottom would be used to decide whether the selected anchorage has good holding ground. The proximity of underwater cables or other obstacles should be checked, and where the tidal stream or current may change in direction allowance must be made for the yacht to swing full circle without hitting an obstruction or going aground. The depth of the water in the anchorage is important and selection is to some extent conditioned by the length of the chain or warp carried on board. The depth to be allowed for is the maximum envisaged during the period of time at anchor.

Preparations for Anchoring

It is most important that all preparations are made and all ground tackle laid out ready for use well before the actual approach to the selected anchoring position.

Where a stemhead roller is fitted the chain is shackled directly to the anchor lying in position on the roller. The length of chain required for anchoring is then flaked down on the foredeck. This ensures that no jamming will occur in the hawse pipe or anchor locker. The length of chain required is 4 times (6 if using chain leader and warp) the maximum depth of water that will occur while the yacht is at anchor. The inboard end of the chain must be secured with a stout rope lashing to a strong point in the chain locker.

When anchoring on a rocky bottom, or whenever there is a possibility of the anchor fouling an underwater obstruction, it is good practice to buoy the anchor. A length of strong line at least equal to the depth of the water is attached to the crown of the anchor with a fisherman's bend, seized if anchoring for any length of time, with the other end secured to the buoy. The line and buoy are then laid out neatly on the foredeck ready to be paid out after the anchor is cast.

Anchoring Drill

In non tidal waters the approach to the selected position should be made into the wind, and the anchor cast or lowered when all way is off the yacht. As the yacht begins to fall astern the chain

or warp is veered out slowly to the desired length, snubbing the yacht occasionally with a turn round the samson post or a cleat to encourage the anchor to bite into the bottom. In tidal waters or where there is a strong current the approach should be made against the current and the anchor cast when the yacht begins to make sternway.

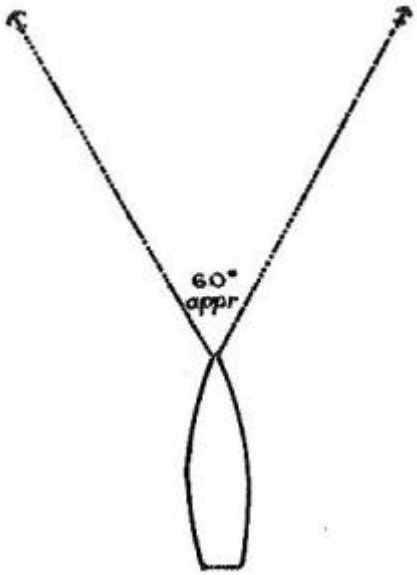
When the yacht comes to rest at the end of the chain or warp, the required day or night signals for a vessel at anchor must be displayed; a black ball by day and an all round white light by night, hoisted at the forward end of the vessel. When finally anchored, it is important to take a bearing on some fixed object ashore, or to get two prominent objects in transit, so that a periodic check can be made on the yachts position to ensure that she is not dragging. Another simple way to check whether dragging is occurring is to lower a weighted line over the side. If the yacht is still the line will remain up-and-down, but if she is dragging, the weight will appear to move forward.

Warp in Place of Chain

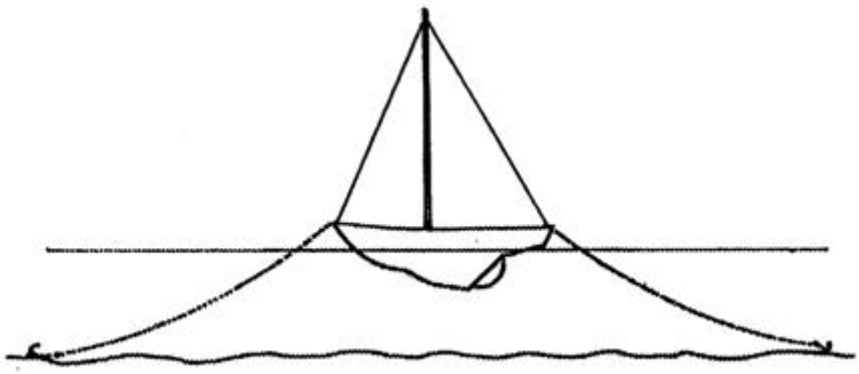
With the great strength an durability of nylon ropes, it is now common practice for a nylon warp to be used instead of a chain. Although it may not give quite the same feeling of security, if the right size of warp is used it can be as strong or even stronger than chain. Other advantages are that it is much quieter in use, easier to handle and far gentler on deck fittings and wooden trim, it has more “give” and elasticity when anchored in a choppy sea, and it can be used in conjunction with the yachts sheet winches when an anchor winch is not fitted. The main disadvantages are that it is not heavy enough to give a good horizontal pull to the anchor, and is liable to chafe if lying on an abrasive bottom. These disadvantages can be minimised by shackling two or three fathoms of anchor chain between the anchor and the warp.

Lying to Two Anchors

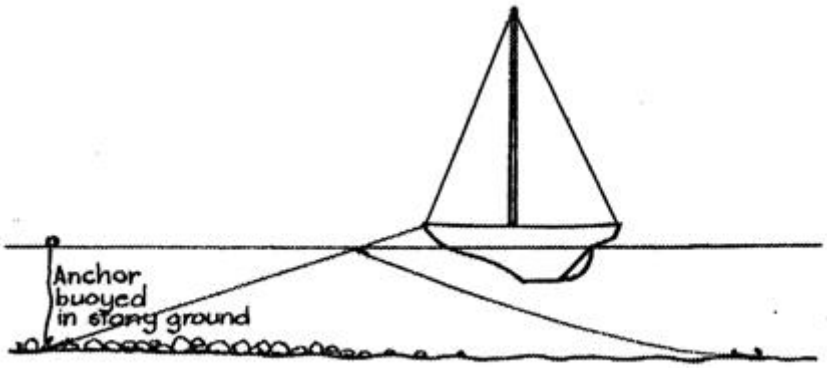
In some circumstances it may be either necessary or desirable to lay to two anchors. For example, in very strong winds two bow anchors would give greatly added security and reduce swing. This method is not suitable for strong tidal waters, as there would be a danger of the two warps becoming tangled when the tide changes.



In restricted areas the swinging circle of the yacht must be controlled, a bow and stern anchor may be used, but this has the disadvantage of exposing the stern to the weather, with all the consequent discomforts.



A better method is shown below. The kedge anchor is lowered as the yacht is approaching the anchorage, and after finally coming to rest on the main anchor the two warps are shackled together just above the waterline. Sufficient bow warp is then veered out to take the kedge warp just below the surface. The yacht will now ride to one anchor or the other as the wind or current changes, with only a small swinging circle.


Anchor
buoyed
in stony ground

CHAPTER 11 GROUNDING

Running aground in non tidal waters sometimes presents problems, there being no rising tide to lift the yacht off. There are many different methods of dealing with this emergency, but experience has shown that the following drill generally gives the best chance of success:

a. As soon as grounding occurs bring all crew weight amidships.

b. Lower all sails and furl them neatly, ensuring that all sheets and halyards are inboard.

c. Take time to stop, think and weigh up the situation.

d. Start motor, and try to motor off in a reciprocal direction to the grounding course.

e. If this fails, stop motor and inflate dinghy.

f. Bending warps together if necessary, lay the anchor and the longest possible warp in the dinghy, row out to known deep water as far from the yacht as possible and cast anchor.

g. Recover the dinghy crew.

h. Using crew weight, fairleads or winches, haul in on the anchor from the most convenient position until the yacht floats off.

i. Stop hauling, establish exact position and decide on the course necessary to reach deep water.

j. Recover the anchor and sail away.

If this is unsuccessful, another variation of the method is to greatly increase the angle of heel either by swinging out the boom with one or two crew members straddling it, or hauling in from the top of the mast by attaching the main halyard to the anchor warp.

Man Overboard

As this is one of the most difficult and potentially hazardous situations that can occur when sailing, it is a sensible precaution for all members of the crew to have a clear idea of the action to be taken in the event of such an emergency.

Many articles have been written and many recommendations made on the subject, often advocating widely different drills for dealing with the situation, but the "Quickstop" method given below has proved itself in many cases. It can also be easily learnt by a novice (and it could be the skipper who is overboard!). The "Reach-Tack-Reach" method also works well in certain cases. This method is also described below.

Whichever method is chosen, it must be practiced until all members of the crew are familiar with it, and action becomes instinctive if an actual emergency arises.

Man Overboard - Quickstop

Shout "MAN OVERBOARD" push the tiller well to leeward and throw a lifebuoy to the man in the water.
On hearing the shout, all hands turn out on deck and the first one is detailed to watch and keep pointing at the man overboard.
With the tiller to leeward the boat tacks through the wind; the headsail is left aback, as soon as the main boom comes across to the new leeward side the tiller is again pushed to leeward and held there. The boat is effectively hove-to and stopped, possibly within talking distance of the man in the water. Adjust sheets if necessary.
Clear any trailing sheets or lines, start engine and motor to the man in the water, lowering or freeing sails as necessary.
If there is no engine, let go the headsail halyard (the sail will fall onto the foredeck); gybe or tack and sail to the man in the water.

Man Overboard - Reach-Tack-Reach

Shout "MAN OVERBOARD" and throw a lifebuoy to the man in the water.
On hearing the shout all hands turn out on deck, the first one being detailed to watch and keep pointing at the man overboard.

At the same time the helmsman immediately turns the yacht onto the nearest beam reach, notes the compass course and starts counting steadily. As soon as the yacht is settled on the reach, the hand pointing at the casualty takes over the count.

As soon as all hands are an deck and ready for action, the helmsman tacks the yacht through the wind, at the same time noting the count that has been reached. The yacht then sails back on a reciprocal course, with the count starting again as the tack is completed.

When the count comes to the same figure that was reached before tacking, the yacht should be in the same position as when the man went overboard, and the casualty spotted in the proximity of the yacht. As soon as this happens, the yacht should be

manoeuvred to a position just downwind of the casualty, who is then approached in exactly the same way as coming alongside a mooring.

Hours of Darkness

During the hours of darkness the problem of keeping the man in the water under observation becomes more difficult or even impossible, and in these circumstances it is essential that a lifebuoy fitted with an efficient light is used. For this reason, regular checks on this equipment should be made.

Recovering Man in Water

When the yacht has been manoeuvred alongside the casualty, he must be made fast to the yacht immediately. Even with a strong crew he will be extremely difficult to lift out of the water without some extra purchase, and this can be provided by passing a rope under his armpits and securing it with a bowline; a bowline on a long bight, with one bight under the armpits and one under the backs of the knees will lift even an unconscious man safely. If he is wearing a harness, a line or a snap shackle on a line can be attached to it.

If the casualty is unconscious or completely exhausted the problem of getting him back aboard becomes more difficult. In these circumstances it may be necessary to put another man into the water to help to attach the lines or lifting tackle, but if this is done he must be wearing a lifejacket and safety harness and be attached to the yacht with a strong line.

One trialled method of lifting a man from the water is to drop the mainsail, and use the main halyard. This has the advantage of running from the back of the mast, and can be easily brought aft of the shrouds. Using the main halyard a man can be winched from the water and safely lowered, even through the companionway and into the saloon.

CHAPTER 13 KNOTS, BENDS & HITCHES, WHIPPING & SPLICING

There are many kinds of knots that have been developed over the years for specific purposes. Those used by seamen have stood the test of time and weather, and there is a correct knot, hitch or bend for every purpose on board. To be fit for their purpose they have to satisfy a number of requirements; they must not come undone when shaken or rocked about, they must not slip under load, they must not jam and they must be easy to undo.

The number of knots with which the average yachtsman must be familiar is not large, but he should be able to make them rapidly and correctly under any conditions, and in the dark if necessary.

Round Turn and Two Half Hitches

A simple and useful method of making fast to a ring or a post. As the load is taken by the round turn, the two half hitches will not jam.

Fisherman's Bend

A variation of the round turn and two hitches in which the first half hitch is made inside the round turn. This prevents the round turn from tightening up on the post or ring. As an added safety measure the free end may be seized with twine to the standing part. The fisherman's bend is invariably used when attaching a warp to an anchor.

Clove Hitch

A simple non-slipping hitch which must be used with caution. It should not be used to secure the end of a rope which may be subjected to strain as it may jam and prove very difficult to release. It may be used for attaching fenders to lifelines, or for attaching the signal halyard to the burgee staff.

Rolling Hitch

This hitch will not slip when a sideways pull is exerted, and is in effect a clove hitch with an extra turn on the side of the pull. It is often used for securing the tail of a purchase to a warp or a sheet so that the strain can be temporarily transferred in order to release a riding turn from a winch or some other jamming of the sheet or warp.

Figure of Eight Knot

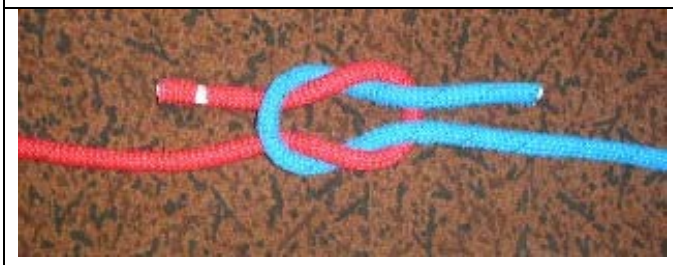
A simple stopper knot formed in the bitter end of a rope to prevent it running through a block, or fairlead. The knot looks just like its name.

Double Overhand Knot

A non-jamming stopper knot used at the ends of sheets or halyards; it is used in preference to a figure-of-eight knot as it can always be released by breaking the two turns apart with the fingers.

Single and Double Sheet Bend

An extremely useful bend can be used for securing the ends of two ropes together, especially when they are wet or of unequal size. In the double sheet bend the running end is passed round twice for added grip and security.

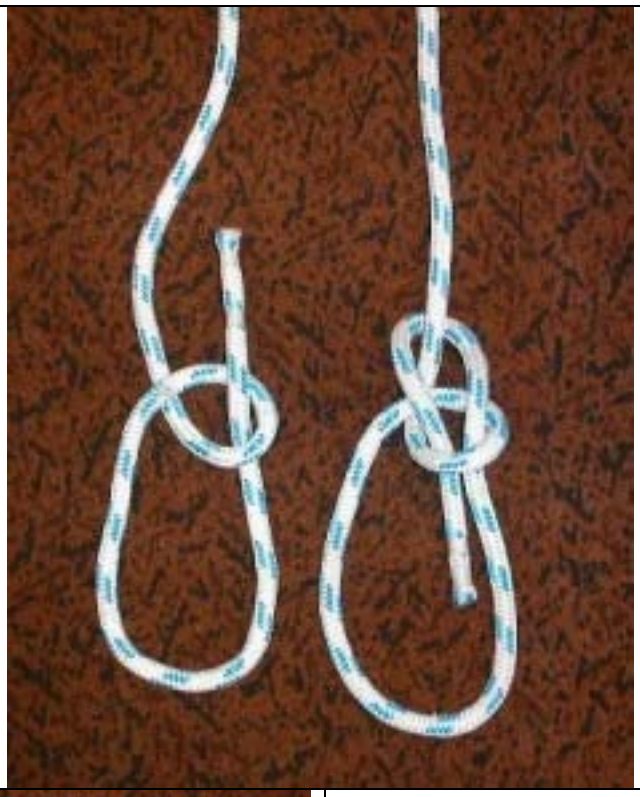


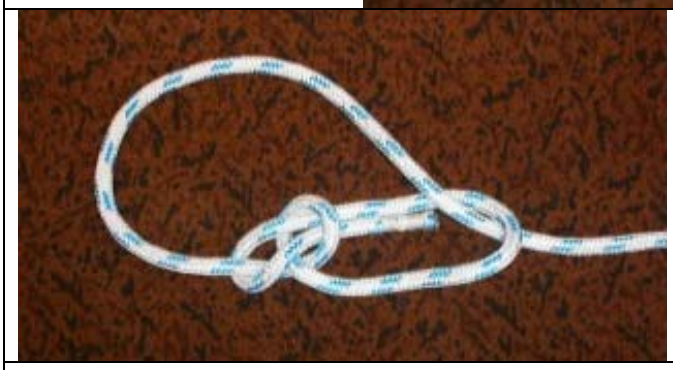
Reef Knot

A useful knot for joining two ends of two small ropes, but it should not be used for large ropes or ropes of different sizes, as it may capsize and fail under load.

Bowline

An essential knot for use at sea whenever a non-slip loop is required in the end of a rope. It will never jam, however much strain is put on the rope.





Running Bowline

A bowline with the standing part passed through to form a slipping loop. It can be used when a very large loop is required to be passed over the top of a mooring post and then tightened up when in position.

Bowline on a Bight

This can be used to form a loop in the middle of a line, as an emergency bosun's chair, and, with long loops, as a cradle for lifting a body.

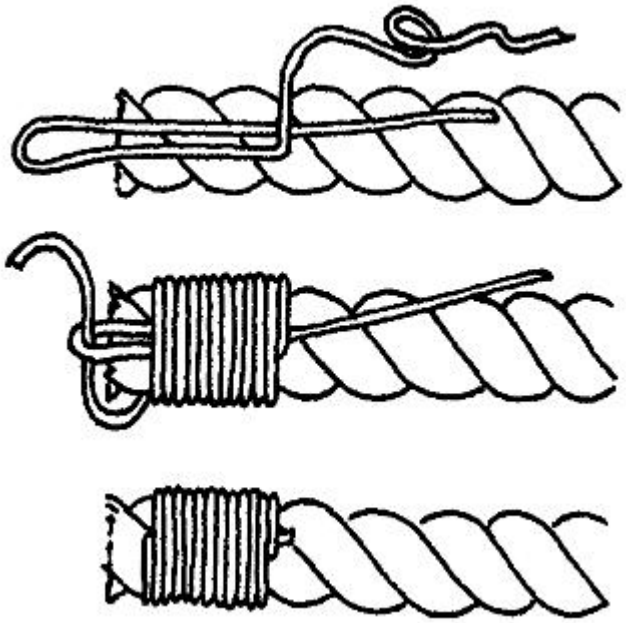
To form a bowline on a bight, take a bight of the rope, and begin the knot as if the bight were a single line. When the loop is passed through the twist in the standing part, the protruding "ear" is spread and passed completely over the two hanging parts of the bight and the twist, to form the completed bowline on a bight.

Whipping

The usual method of whipping the end of synthetic rope is to heat-seal it by melting the ends of the fibers into a solid mass. This should be backed up by whipping.

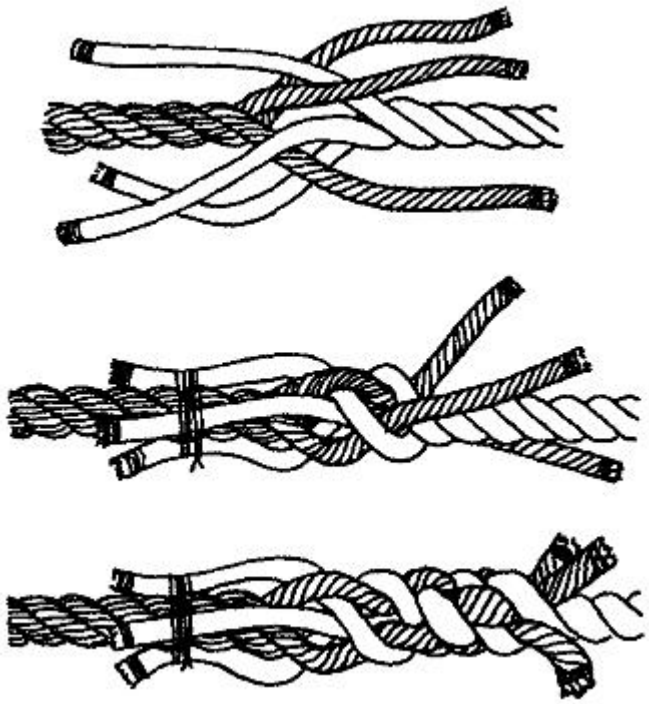
Common Whipping

There are a number of ways to make a common whipping, the differences being only in the ways in which the loose ends of twine are secured and concealed. One method, which works as well as any, is to lay a bight of twine along the rope, wind the long end of the twine tightly around the rope and both parts of the twine until the whipping is long enough, usually about 12 turns. Hold the whipping tight and feed the spare through the bight. Pull the other end of the twine until the bight and the spare end disappear under the whipping. Cut off spare ends



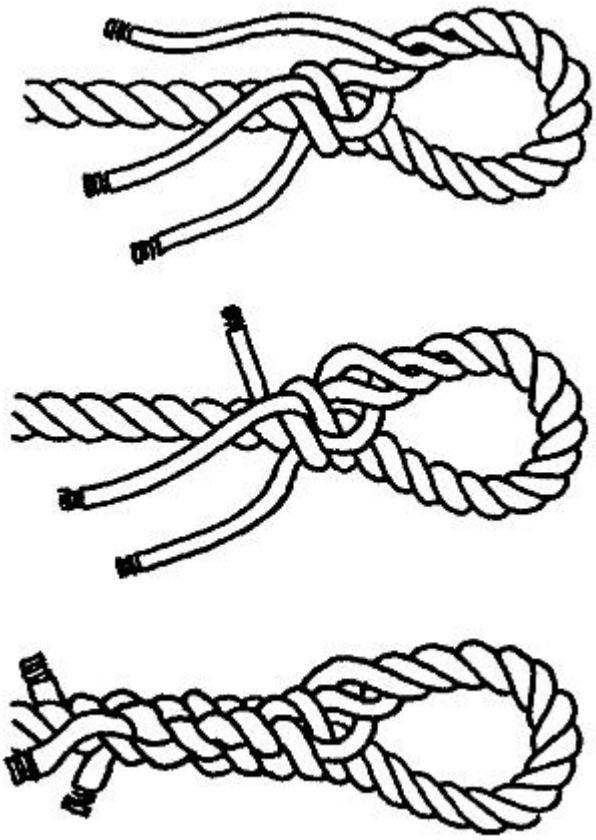
Short Splice

A strong splice used for joining the ends of two ropes together: it's only disadvantage is that the splice is thicker than the rest of the rope. To form the splice, unlay the two ends of the rope to be joined and tape or whip the ends of each strand. Marry the two ends, so that each strand is between two opposite strands. Tape or whip one set of strands temporarily. Tuck each of the free strands in turn under and over the adjacent strands of the other rope, against the lay. After three or four tucks of each strand, remove tape or whipping from the free strands and repeat. Cut off the excess from the strands leaving a small amount protruding. Roll the splice underfoot to settle it.

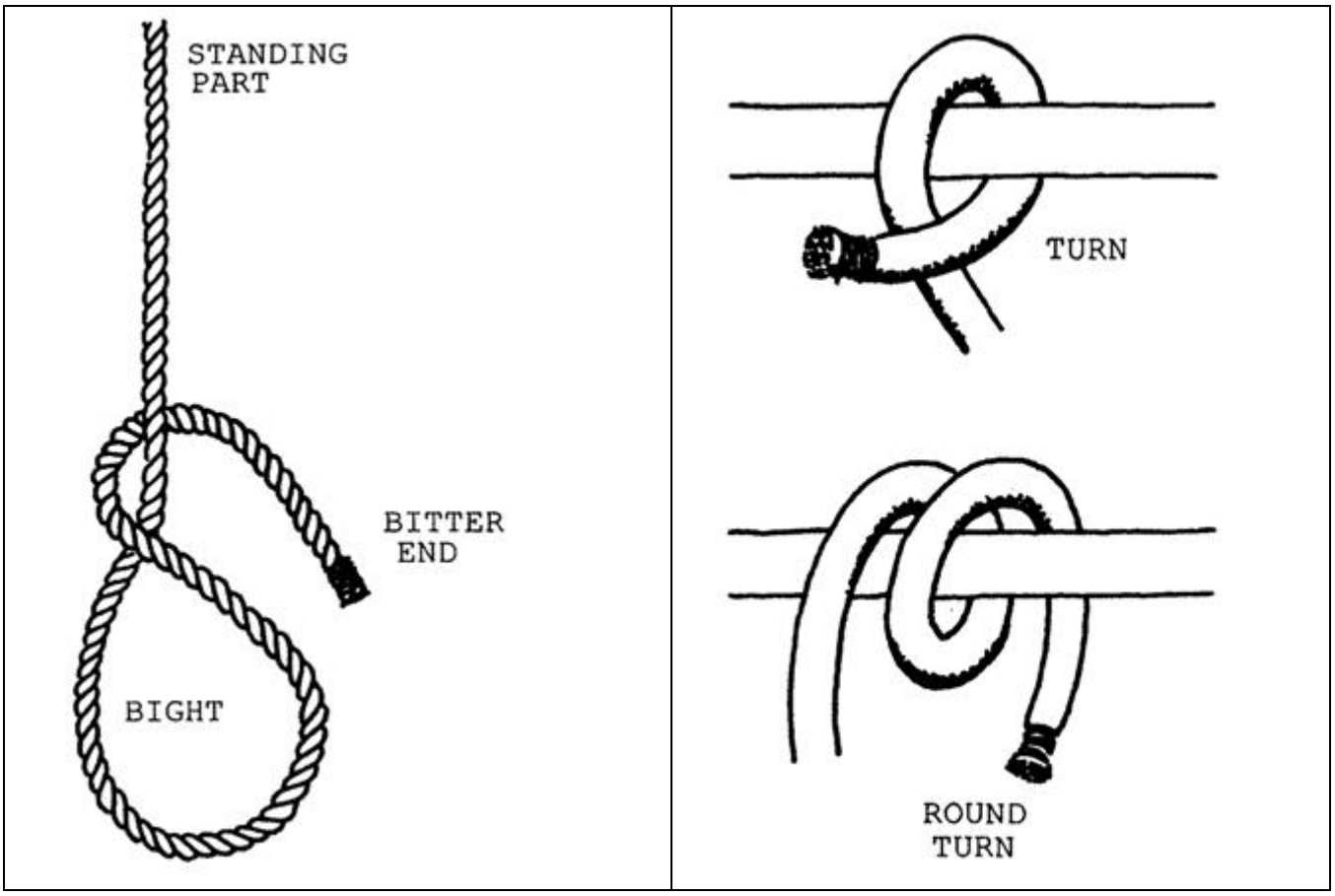


Eye Splice

A strong permanent eye in the end of a rope. Unlay a length of the rope and whip or tape the end of each strand. Tuck the middle strand under a strand of the rope at the point where the throat of the eye is required. Now tuck the strand nearest the middle of the eye under the strand next to the first, both against the lay. The third strand is then tucked under the remaining free strand of the rope, but from around the back, with the free strand being turned so that it can be tucked under against the lay. Finish as for a short splice



Definitions


STANDING
PART
BITTER
END
BIGHT
TURN
ROUND
TURN

CHAPTER 14 THE WEATHER

Weather Forecasting

In order to understand properly and to make use of weather forecasts, it is necessary to have some knowledge of simple meteorology. As the yachtsman is essentially interested only in the direction and strength of the wind and the possibility of fog or poor visibility it does not require an expert knowledge, but merely an understanding of certain basic principles.

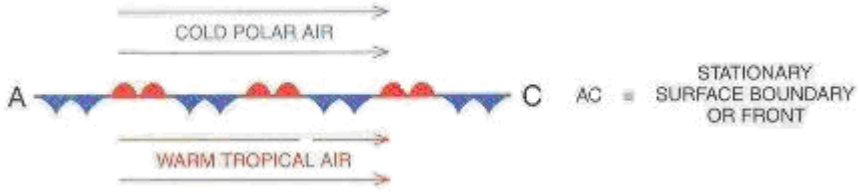
The weather in the sea areas of the Western Baltic is considerably influenced by the depressions which form on the Polar front and move across the area in an easterly or north-easterly direction. These depressions usually have ridges of high pressure between them. The low pressure areas are caused by warm air rising and cooling, bringing with them rain and strong winds, while high pressure areas are caused by air from the upper regions dropping towards the earth, the associated weather normally being dry with light winds.

The air movement round a low pressure area travels in an anti-clockwise direction (in the Northern Hemisphere) and increases in strength towards the centre, while round a high pressure area it travels in a clockwise direction and decreases in strength towards the centre. From this knowledge an important rule, known as Buys Ballot Law, may be learned and understood. This states that in the Northern Hemisphere an observer facing the wind have low pressure on his right and high pressure on his left.

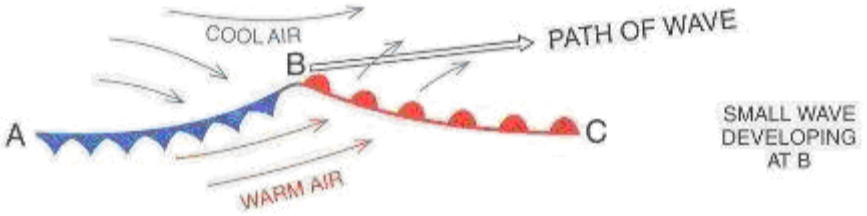
Another important and helpful rule is called Cross Winds Rule. This rule lays down that if an observer with his back to the surface wind has the upper wind, indicated by the movement and direction of high cloud, coming from his left, the weather can expect to deteriorate, and if coming from his right it will normally improve.

Due to gravity the air exerts a force called atmospheric pressure, expressed in units of measurements called millibars. The average atmospheric pressure at sea level is about 1000 millibars, written as 1000 mb. On a weather or synoptic chart, the line joining the points of equal atmospheric pressure at any given time is called an isobar, and as the wind is caused by air moving due to changes of pressure, it follows that a stronger wind will be experienced where the isobars are closer together, while light winds can be expected where they are widely spaced. The function of the barometer is to indicate visually changes of atmospheric pressure as they occur, while the barograph will also record these changes of pressure. Changes of pressure should be recorded at regular intervals so that a barometric gradient may be built up. The greater the gradient, the closer will be the isobars and thus the stronger the winds. When the barometer remains steady more settled conditions can be expected, although there will always be some slight variation in pressure during the day even during long settled periods. This is known as Diurnal Wave. Gale warnings are normally issued when a rise or fall of 10 millibars in 3 hours has been recorded, but even a change of 5 millibars in the same time will usually herald a strong blow.

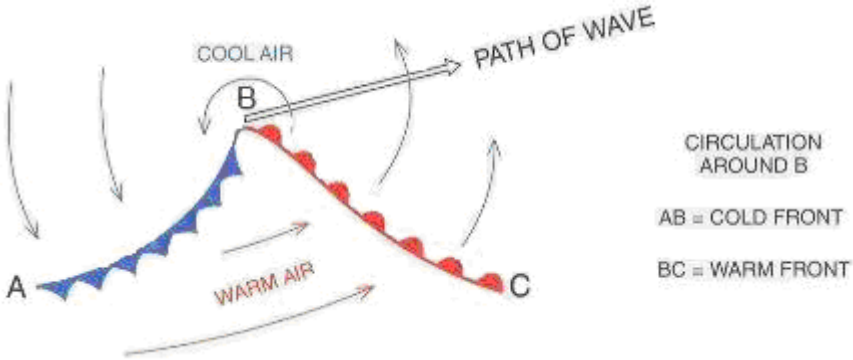
Stationary Surface



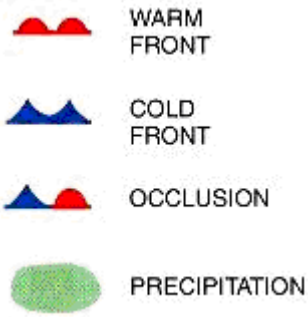
Small Wave



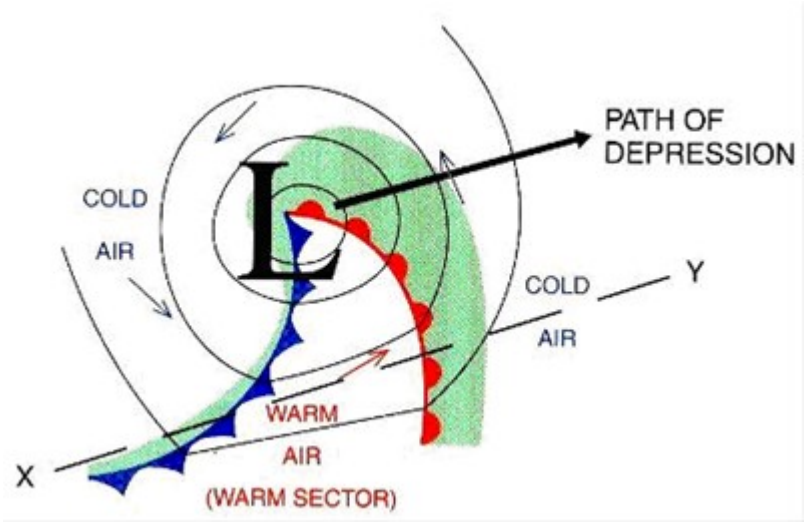
Wave Path



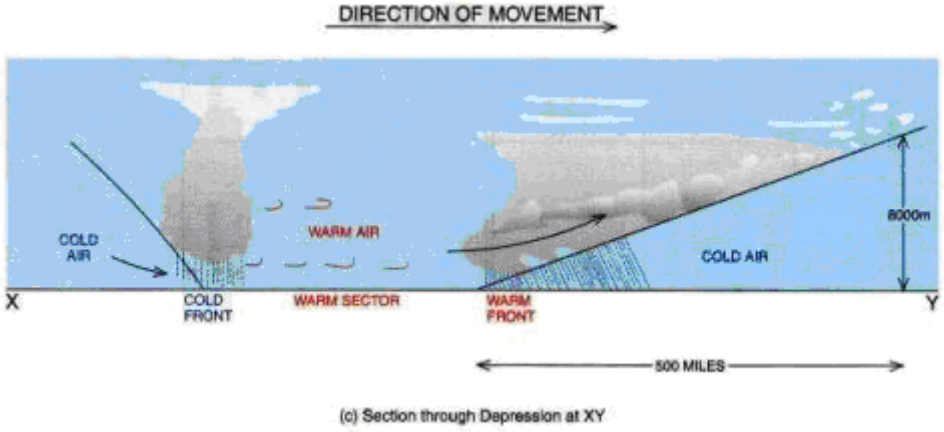
Fronts



Depression



Direction



(c) Section through Depression at XY

CHAPTER 16 THE BEAUFORT SCALE

Force	Wind Speed		Description	Sea State
	Knots	m/sec		
0	0 - 1	0.0 - 0.2	Calm	Like a mirror
1	1 - 3	0.3 - 1.5	Light Air	Ripples only
2	4 - 6	1.6 - 3.3	Light Breeze	Small wavelets, not breaking
3	7 - 10	3.4 - 5.4	Gentle Breeze	Large wavelets, crests breaking, white horses
4	11 - 16	5.5 - 7.9	Moderate Breeze	Small waves with frequent white horses
5	17 - 21	8.0 - 10.7	Fresh Breeze	Moderate waves, many white horses, some spray
6	22 - 27	10.8 - 13.8	Strong Breeze	Large waves with white crests, some spray
7	28 - 33	13.9 - 17.1	Near Gale	Sea heaping up, foam streaks blowing from crests
8	34 - 40	17.2 - 20.7	Gale	High waves with crests breaking into spindrift
9	41 - 47	20.8 - 24.4	Severe Gale	High waves with tumbling crests, streaks of foam
10	48 - 55	24.4 - 28.4	Storm	Very high waves with long overhanging crests
11	56 - 63	28.5 - 32.6	Violent Storm	Exceptionally high waves, sea covered with foam
12	64 Plus	32.7 & Over	Hurricane	Air filled with foam, sea white with driving spray
NOTE: It will be observed that there is a steady approximate ratio of 2 : 1 between metres per second and knots for each wind force in the Beaufort scale. In Danish and Swedish weather forecasts wind strength is given in metres per second, not in the Beaufort Scale.				

CHAPTER 17 HEAVY WEATHER SAILING

The most frequent reason for being caught out in heavy weather is lack of time. When planning a cruise, allowance should always be made for an element of time to be used for the purpose of sheltering in bad weather. In this way the necessity of sailing when it would be more prudent not to do so may be avoided.

Given the availability of weather forecasts a yacht should never have to face heavy weather without some prior warning. Even without a weather forecast, the tell-tale signs in the sky and a quickly falling barometer will give early warning of deteriorating conditions ahead.

When it is obvious that the weather will deteriorate, there are a number of precautions and preparations that the prudent skipper should make. One of the most important is to decide on how much sail is to be carried. This must always be done in advance of immediate necessity, for the longer the decision to reef or to change headsails is deferred, the harder it will be to carry out. A cruising yacht should carry enough sails to suit the squalls and gusts, not the mean force of the wind, which may sometimes be much less. When sailing off the wind, there is an inclination to carry more sail than is prudent in the conditions. In heavy weather it is good seamanship to carry only sufficient sail to suit close-hauled sailing, whatever the actual point of sailing. This enables the helmsman to react immediately in any emergency and be in complete control even if having to round up head to wind.

Bad weather usually brings poor visibility, and every effort must be made to determine the yachts exact position, and then to keep an accurate plot of dead reckoning (DR) and estimated position (EP). The fact that leeway will be more pronounced in strong winds should be allowed for when calculating EP.

If no suitable shelter is available within a reasonable distance the only safe alternative is to stay at sea. In this case it will be necessary to have plenty of sea-room and be well clear of the shipping routes and shallow water.

All the crew should wear warm clothing, safety harnesses and life jackets, and all gear on deck, especially halyard and sheet ends, should be checked and made secure. The bilge should be pumped dry and checked regularly, and the engine checked for easy starting in an emergency. Moveable gear below should be safely stowed away, and safety items such as torches, flares, foghorn, warps and reefing gear be readily available. Cockpit drains must be checked and the main companionway closed and washboards fitted. Meanwhile sandwiches or similar food and vacuum flasks of soup or coffee should be prepared before conditions make it impossible to work in the galley.

As winds and seas increase it may be impossible to make any real progress and it may become necessary to heave-to. Most yachts, especially long-keeled types, will heave-to satisfactorily, but this is something that should have already been practiced under less demanding conditions. It is quite surprising how comfortable a yacht can be properly hove-to even in a gale force wind.

As conditions get even more severe it may be necessary to lie a-hull, that is with all sails lowered, and the yacht allowed to drift as she pleases. As seas will break on board, the crew should stay below if possible, and be well prepared for violent movement of the hull. Even in less severe weather in the Baltic, for example when sudden violent line squalls pass during comparatively easy sailing weather, it is often advisable to lie a-hull for the short period that the squall will last, with no discomfort and no danger of sails or rigging being damaged.

Provided there is ample sea-room to leeward, it may be an advantage to run downwind under bare poles, streaming warps over the stern in order to reduce speed and keep the yacht end on to the sea. To have any effect the warp must be the longest and largest available and towed in a bight over the stern, each end being made securely fast to opposite quarters.

A more modern concept of riding out gales in light displacement vessels is to run at speed under much reduced canvas with the seas being taken on the quarter. This manoeuvre requires a good deal of sea-room and some skill and experience on the part of the helmsman, and is rarely advisable or even possible in the restricted waters of the Baltic Sea.

Anyone who has read accounts of sailor's experiences of storm conditions will be aware that not all advocate the same course of action. However, two points are common to all recommended methods for dealing with such conditions: the boat must be properly prepared, crew properly dressed and warm, everything lashed and stowed, sail plan adjusted to the conditions and plan of action; and there must be plenty of sea-room.

CLOUD FORMATIONS

Stratocumulus

Picture courtesy of K Pilsbury

Stratus

Picture courtesy of K Pilsbury

Altostratus

Picture courtesy of K Pilsbury

Altocumulus

Picture courtesy of K Pilsbury

Cirrostratus

Picture courtesy of K Pilsbury

Picture courtesy of K Pilsbury

Cumulus

Picture courtesy of K Pilsbury

Cirrus

Picture courtesy of K Pilsbury

Cumulonimbus

Picture courtesy of K Pilsbury

CHAPTER 18 FOG

Radiation (Land) Fog

Radiation fog occurs at night over land, and is caused by the rapid radiation of land heat into the lower atmosphere. This causes the land temperature to drop sharply and so cool the layer of air immediately above it until the dew-point is reached. Although it does not actually form over the sea, it can drift out from land for two or three miles and persist for several hours.

Advection (Sea) Fog

Advection fog may occur on land or sea at any time, and is caused by the horizontal movement of warm air over a cold surface, with the air temperature falling to dew-point. It often occurs in spring, when the land mass has begun to warm up but the sea remains cold. Advection fog is invariably accompanied by wind, which sometimes can be quite strong, but which will not necessarily disperse the fog; this will occur only when the wind changes and a warmer drier air stream appears, or when the sun becomes strong enough to raise the air temperature above dew-point. Radiation fog however, will not persist in anything more that the lightest of breezes.

Sailing in Poor Visibility

When there is any possibility of sailing into conditions of reduced visibility, it is of vital importance to obtain an accurate position fix before visibility deteriorates so much that nothing can be seen. The time, log readings an speed should be noted, and the course to steer adjusted as necessary according to the circumstances.

Unless the wind is strong which is unlikely though not impossible in foggy conditions, there is little point in trying to reduce speed of a yacht under sail, on the principle that the slower the speed the less the ability to take avoiding action, although, it is good practice to clear the foredeck by handing the head sail and sailing under main sail alone. Under these conditions a forward watch will be easier to maintain, and preparations for anchoring, if necessary, can be made without much trouble.

The principle danger to a yacht in fog is the risk of being run down by a larger vessel, but this can be avoided by sailing out of the shipping lanes into shallow water. There remains the danger of collision with other small craft, but in this respect a vessel under sail has one great advantage over other vessels, and that is silence, thus for early warning of approaching danger a really good listen out is probably more important than a good look out. The prescribed fog signal should be sounded if necessary, but otherwise the crew should maintain silence and look and listen.
The steps to be taken when sailing into reduced visibility may be summed up as follows:

a. Obtain an accurate fix, note time, log readings and speed. Adjust course to steer according to circumstances.
b. Reduce speed, if necessary by shortening sail or handing the head sail.
c. Hoist radar reflector if not permanently hoisted.
d. Have foghorn ready and prepare to sound prescribed signal.
e. Record depths at regular intervals.

f. Post a good look and listen-out in the bow, and tell him to point in the direction of anything he sees or hears.
g. If conditions warrant it, life jackets should be worn.
h. Check life raft and/or dinghy is ready for launching.
i. Prepare the anchor for letting go in the prescribed manner.
j. At night have signal flares and a powerful torch ready for use.
k. Check that the engine is ready for instant starting. The best advice that can be given in respect of fog is to try to avoid it. If there is a forecast of poor visibility or it is already poor it may be advisable to stay in harbour, particularly if the planned course involves crossing shipping lanes.

CHAPTER 19 SAFETY EQUIPMENT

Most accidents at sea are caused through carelessness and inefficiency, and seldom through stress of weather or the caprice of the elements. A well found yacht handled by an efficient crew will rarely run into serious trouble but it must be equipped with the proper safety gear and equipment. All crew members must know where each item of safety equipment is, and how, and in what circumstances, to operate it.

Fire Extinguishers

Extinguishers should be of the dry powder type, and should be located at exits, cooker and engine compartments.

Lifebuoys

Two lifebuoys with sea anchors should be provided, located near the cockpit so that they can be easily removed and used in an emergency. At least one of the buoys should be equipped with a safety light, and this should be checked daily. A danbuoy on a line attached to one of the buoys is an additional safeguard.

Life-Raft

A self inflating life-raft is carried on deck in an easily accessible position, with the painter firmly secured to a strong point on the yacht. All crew members of the crew must be familiar with the drill for launching the life-raft.

Lifejackets

One lifejacket for each member of the crew is provided on board. It must be worn by all non-swimmers when on deck, and by all hands at the skippers discretion, when abandoning to the life-raft and when going into the dinghy.

Safety Harness

On the principle that prevention is better than cure, a safety harness is probably more important than a lifejacket. It should be fitted individually and be made ready for use at all times, and be worn by clipping on in heavy weather, especially when moving forward out of the cockpit. Safety harnesses will always be used at night and any crew member who is seasick is to be clipped on for his own safety.

Distress Flares

Flares should be securely stored in a dry place where there is no danger of accidental ignition or deterioration through damp. All members of the crew should be familiar with the operation of the flares.

Bilge Pumps

All yachts carry two hand operated bilge pumps, one in the cockpit and one below decks, this is in addition to any other type of pump. The bilge pumps should be checked for efficient operation before departure, checks must also be made to ensure that any limber holes are clear for the passage of bilge water.

Fog Horn

A “lung” operated fog horn is provided. One short blast is a sufficient check for correct operation.

First Aid Kit

Every yacht is equipped with a first aid kit. Hints on first aid afloat are in a later Chapter of this handbook.

CHAPTER 20 RADIO TELEPHONY

All yachts are fitted with VHF radios capable of simplex two way communication. All members of the crew must be able to use the radio telephone in an emergency and to this end a plaque, giving step by step instructions for sending a distress message, including the MMSI number, should be mounted near the set.

The most important details of operation should be known by the skipper, even though he may not be qualified as an operator; these are listed and described below:

The vessel requires a ship's licence.

Transmissions must be controlled by the holder of a Short Range Certificate. (VHF only).

The set must have: Digital Selective Calling (DSC). Channel 16 Distress, Safety and Calling Frequency. Channel 6 Primary Inter-ship Channel. One other Channel.

A listening watch should be maintained on Channel 16, at all times, when at sea.
No one may operate the Radio Telephone without the authority of the skipper.
Except in an emergency, no one may operate the Radio Telephone unless under the control of a licensed operator.

The following only may take place on Channel 16: Distress Working. Urgency Traffic. Initial contact with another station.

The definitions of Distress and Urgency are:
Distress: A vessel or a life is threatened by grave and imminent danger and requests immediate assistance.

Urgency: The station sending has a very urgent message to transmit concerning the safety of a vessel or the safety of a person.

To make a distress call: Check the set is switched on and high power is selected, ensure Channel 16 is selected. Press and hold the red DSC button for five seconds to send an undesignated distress call. Follow immediately with voice message. Hold microphone a short distance from mouth, press press-to-talk switch and say:

MAYDAY MAYDAY MAYDAY
THIS IS (Yacht's name) THIS IS (Yacht's name) THIS IS (Yacht's name)
MY MMSI NUMBER IS ……. (Nine digit number)
MAYDAY ..... (Yacht's name)
MY POSITION IS .....(Bearing and distance FROM a prominent object or Lat and Long)
..... (Nature of distress)
.....(Any other relevant information)
I REQUIRE IMMEDIATE ASSISTANCE

OVER.

RELEASE PRESS-TO-TALK SWITCH.
Repeat and continue to repeat (leaving time (approx. 30 seconds) between transmissions to hear any answer) as necessary.

The obligation to accept distress calls is absolute.

To make an urgency call: prepare the equipment as for distress calls. Say:
PAN-PAN PAN-PAN PAN-PAN
HELLO ALL STATIONS ALL STATIONS ALL STATIONS
THIS IS (Yacht's name) THIS IS (Yacht's name) THIS IS (Yacht's name)
MY MMSI is ..... (Nine digit number)
MY POSITION IS.....(Bearing and distance FROM a prominent object or Lat and Long)
..... (Nature of urgency)
..... (Any other relevant information)
OVER.

RELEASE PRESS-TO-TALK SWITCH.

Examinations for the Short Range Certificate (VHF/DSC only) are held regularly by the KTC, details can be obtained from the Courses Clerk.

CHAPTER 21 INTERNATIONAL REGULATIONS FOR PREVENTING COLLISIONS AT SEA

RYA Book G2 explains fully all aspects of the regulations, a summary of which is given below.

Rules for Sailing Vessels

A vessel sailing on the port tack keeps out of the way of a vessel sailing on a starboard tack.

When two vessels are sailing on the same tack, the windward vessel keeps out of the way of the other vessel.

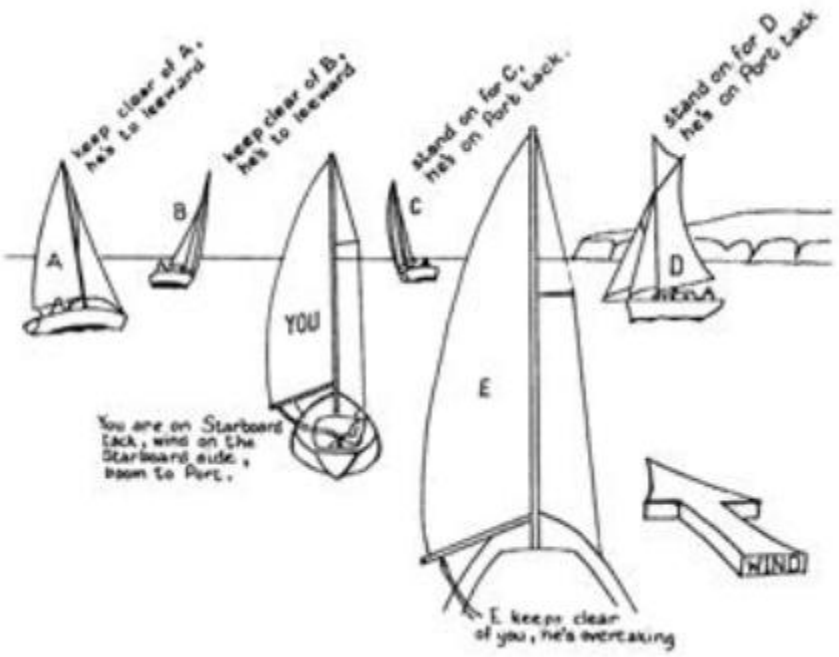
A vessel under power normally keeps out of the way of a vessel under sail, but attention is drawn to the necessity of giving a safe passage in restricted waters to vessels, which by virtue of there size and lack of manoeuverability cannot alter course.

Any vessel overtaking any other vessel shall keep out of the way of the vessel being overtaken.

A vessel shall be deemed to be overtaking when coming up with another vessel from a direction more than 22.5 degrees abaft her beam, that is, in such a position with reference to the vessel she is overtaking, that at night she would be able to see only the stern light of that vessel but neither of her sidelights.

Any subsequent alteration of the bearing between the two vessels shall not make the overtaking vessel a crossing vessel within the meaning of the Rules or relieve her of the duty of keeping clear of the overtaken vessel until she is finally past and clear.

Most of the rules applying to sailing vessels are illustrated below. The diagram shows how the rules affect the yacht sailed by YOU, while how they affect yachts A, B, C and D.



Yacht A Keeps clear of B, as she is to leeward.

Stands on for C, close hauled on port tack.

Stands on for D, who has wind on her port side.

Stands on for E and YOU.

Yacht B Stands on for A, who is windward.

Stands on for C, close hauled on port tack.

Stands on for D, who has wind on port side.

Stands on for E and YOU.

Yacht C Keeps clear of A, who has wind on starboard side.

Keeps clear of B, close hauled on starboard tack.

Stands on for D, who is windward.

Keeps clear of E and You, both on starboard tack.

Yacht D Keeps clear of A, who has wind on starboard side.

Keeps clear of B, who has wind on starboard side.

Keeps clear of C, who is to leeward.

Keeps clear of E and YOU, both on starboard tack.

in addition, a sailing vessel underway keeps out of the way of a vessel not under command, a vessel restricted in her ability to manoeuvre and a vessel engaged in fishing.

Rules for Power Vessels (including sailing vessels under power)

When two power vessels are meeting on reciprocal or nearly reciprocal courses so as to involve risk of collision, each shall alter her course to starboard so that each shall pass on the port side of the other.

When two power vessels are crossing so as to involve risk of collision, the vessel which has the other on her starboard side shall keep out of the way and shall, if the circumstances of the case permit, avoid crossing ahead of the other vessel.

Important Local Rules

Within the confines of Kiel Fiord, inside a line drawn from Bulk Lt through Kiel Lt to Stein, all yachts and pleasure craft must keep out of the way of commercial traffic passing through the shipping lanes.

If it is possible, it is advisable for sailing vessels to keep outside the shipping channels in the Fiord.

CHAPTER 22 LIGHT AND SHAPES CARRIED BY VESSELS

Daymarks

These are shown by day on vessels to denote activities in which the vessels are engaged.

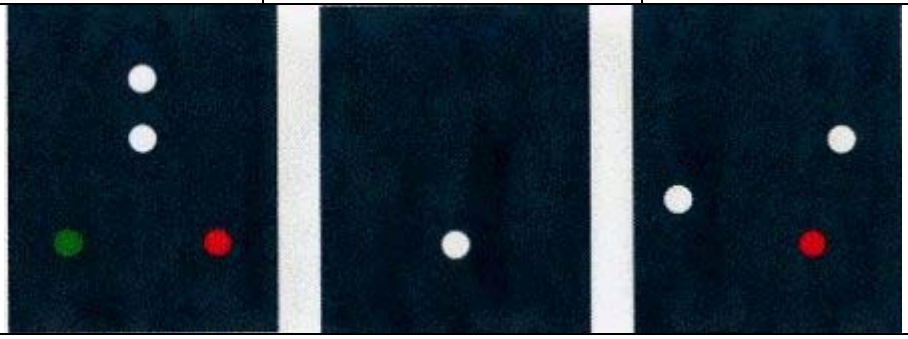
Lights

Lights are shown by vessels from Sunset to Sunrise and during the day in poor visibility.

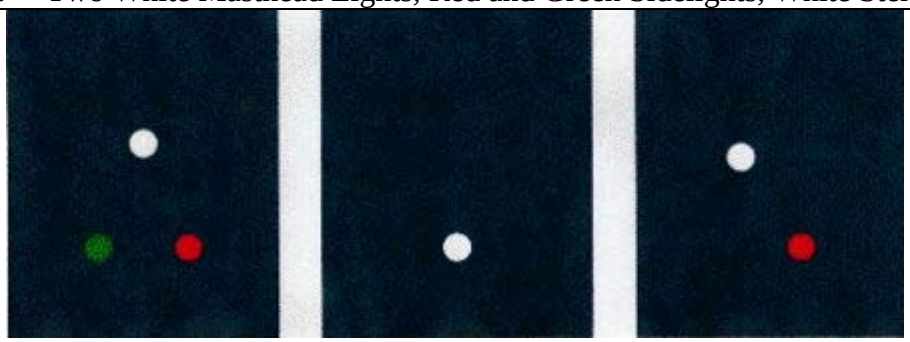
ARCS OF VISIBILITY OF A VESSEL'S NAVIGATION LIGHTS

LIGHTS

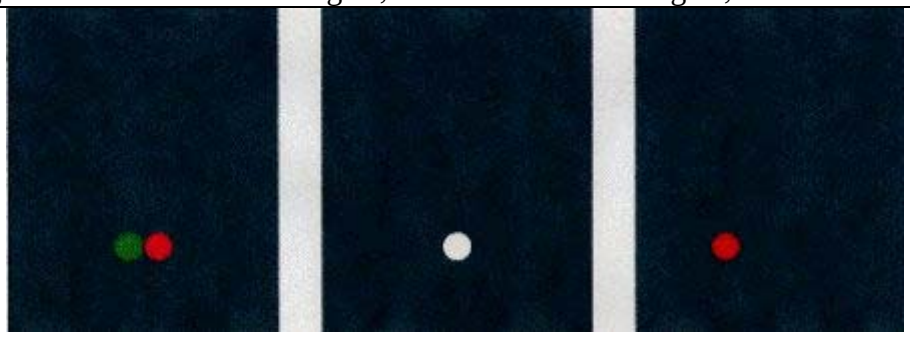
View from Ahead	View from AsternView	from Port Side



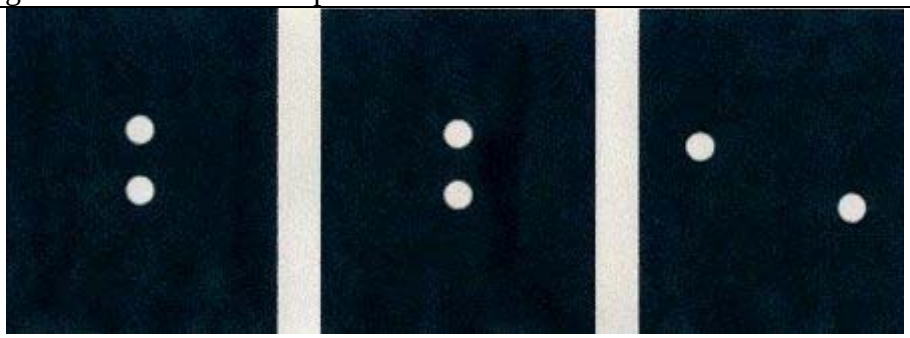
Power Driven Vessel Over 50m Underway
Daymark None
Lights Two White Masthead Lights, Red and Green Sidelights, White Sternlight



Power Driven Vessel Under 50m Underway
Daymark None
Lights White Masthead Lights, Red and Green Sidelights, White Sternlight



Sailing Vessel Underway Not Using Power
Daymark None
Lights Red and Green Sidelights, White Sternlight
Vessels Under 12m
Sidelights and Sternlight may be combined into one Masthesd Lantern
Vessels Under 7m and Vessels Under oars
White light in sufficient time to prevent collision

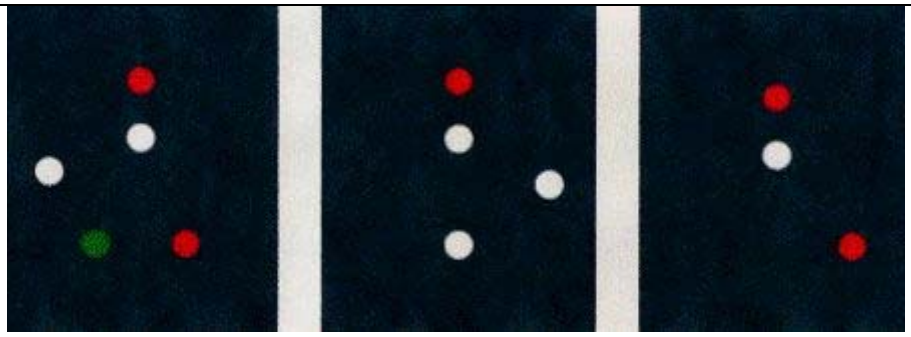


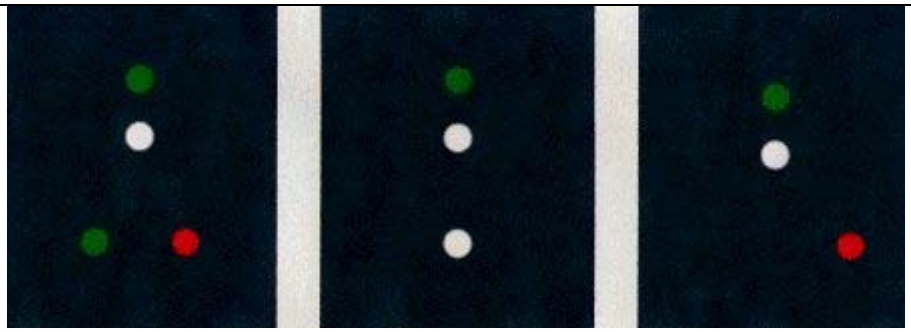
Vessel At Anchor

Daymark  One Black Ball in forepart of Vessel
Lights Two all-round White Lights, Aft lower that Fore; Vessels under 50m need only show the higher light; Vessels over 100m also illuminate their decks

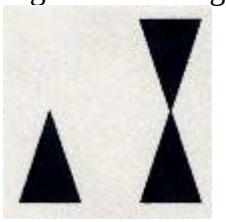
FOR THE REST OF THIS SECTION THE FOREGOING ARE REFEERED TO AS

NORMAL NAVIGATION LIGHTS OR MARKS AND ANCHOR LIGHTS AS APPROPRIATE





Vessels Fishing and Trawling



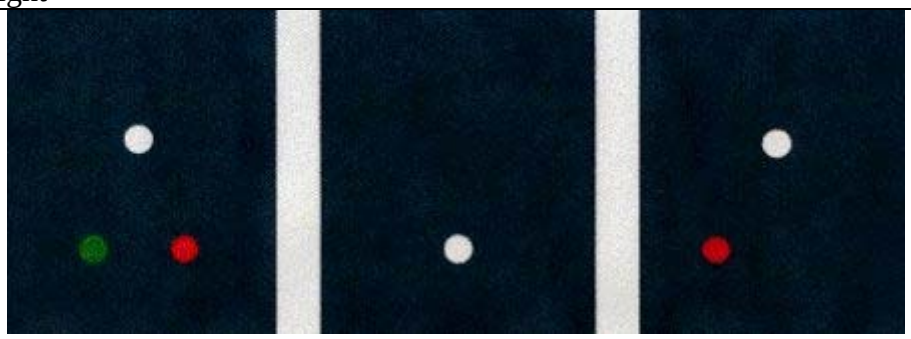
Daymark Two Black Cones points together

If gear extends over 150m from vessel, One Black cone point up in direction of gear

Lights

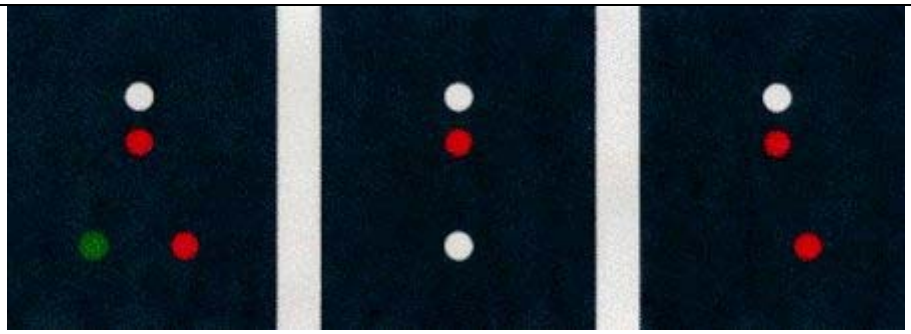
Vessels Fishing Two all-round Lights Red over White, White Masthead Light (optional for vessels under 50m), If gear extends over 150m from vessel, One all-round White Light in direction of gear; If underway Red and Green Sidelights and White Stern Light

Vessels Trawling Two all-round Lights Green over White, White Masthead Light (optional for vessels under 50m), If underway Red and Green Sidelights and White Stern Light



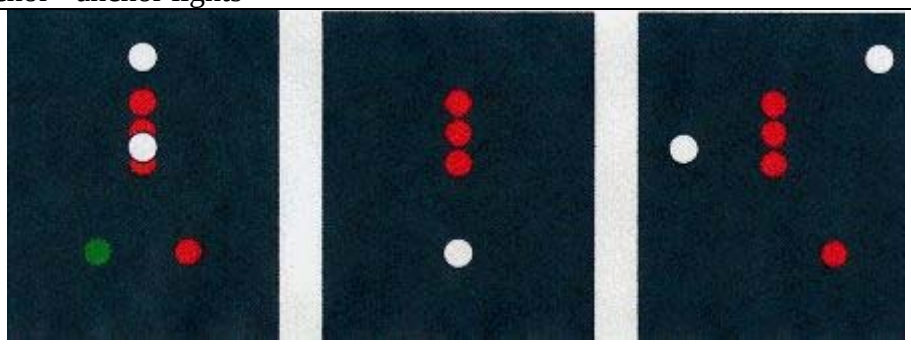
Sailing Vessel Motorsailing

Daymark  One Black cone point down, forward where best seen
Lights As for Power driven Vessels



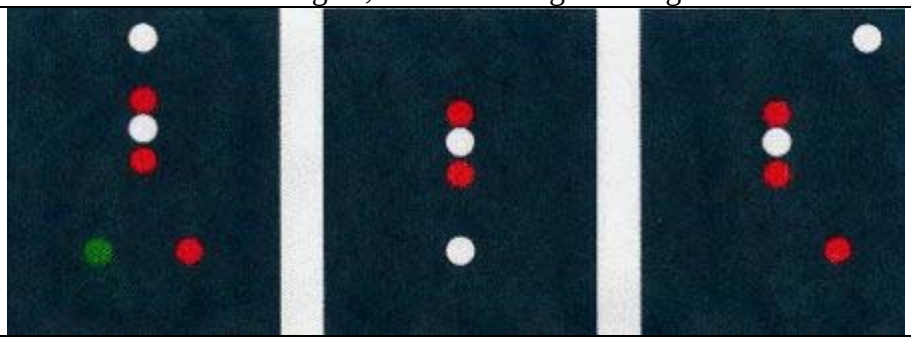
Pilot Vessel on Duty

Daymark Pilot Jack
Lights Two all-round lights - White over Red,
If underway Red and Green Sidelights and White Sternlight.
If at anchor - anchor lights



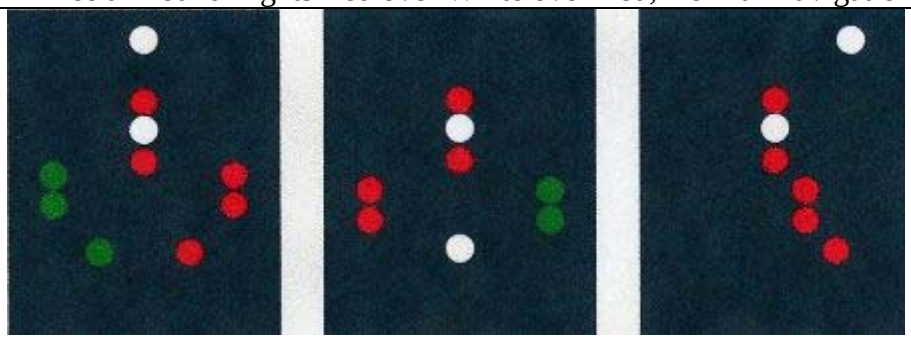
Vessel Constrained by Her Draught

Daymark One Black Cylinder
Lights Three all-round Red Lights, Normal Navigation Lights

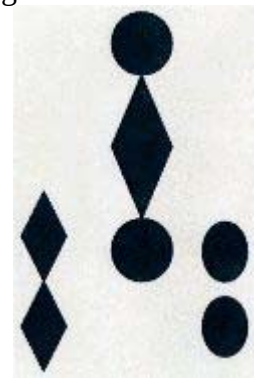


Vessel Restricted in Her Ability to Manoeuvre

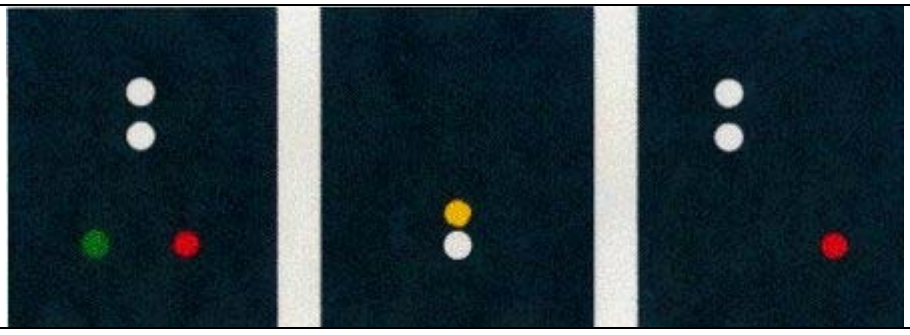
Daymark Black Ball over Black Diamond over Black Ball;
Plus anchor shape when at anchor
Lights Three all-round Lights Red over White over Red; Normal Navigation Lights



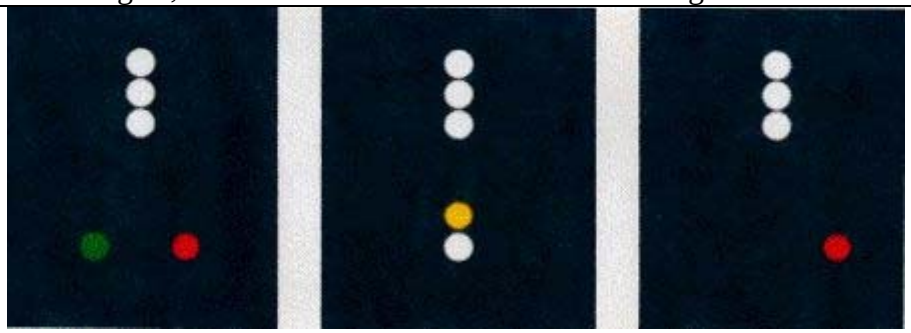
Vessel Engaged in Underwater Operations or Dredging



Daymarks
As for vessel Restricted in Her Ability To Manoeuvre, plus Two Black Balls on the side of the Obstruction, and Two Black Diamonds on the side on which the vessel may pass. Vessels too small to show the above marks show a rigid replica of code flag 'A' at least 1m high
Lights As for vessel Restricted in Her Ability To Manoeuvre, plus Two all-round red Lights on the side of the obstruction, and two all-round Green Lights on the side the vessel may pass
When making way, normal Navigation lights are shown but Anchor Lights are not shown when the vessel is at anchor

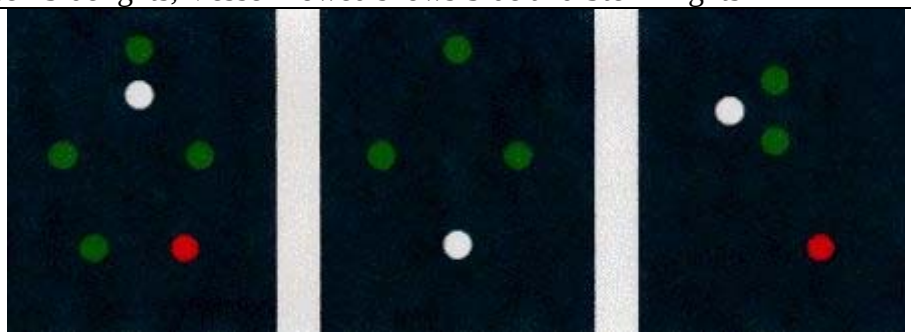


Vessel Towing - Length of Tow less than 200m (Measured from Stern of Towing Vessel to Stern of Vessel Towed)
Daymark None
Lights Two White Masthead Lights, Yellow Towing Light above Stern Light, Red and Green Sidelights, Vessel Towed shows Side and Stern Lights

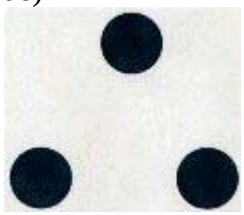


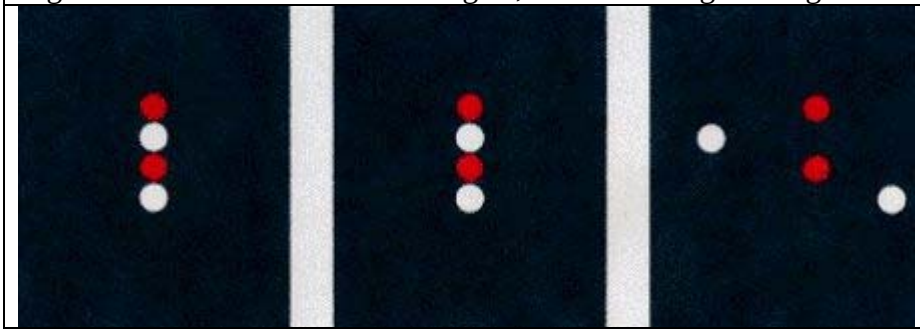
Vessel Towing - Length of Tow over 200m

Daymark 
One Black Diamond on Vessel Towing, One Black Diamond on Vessel Towed
Lights Three White Masthead Lights, Yellow Towing Light above Stern Light, Red and Green Sidelights, Vessel Towed shows Side and Stern Lights



Vessel Engaged in Minesweeping (Dangerous to approach within 1000m astern or 500m each side)

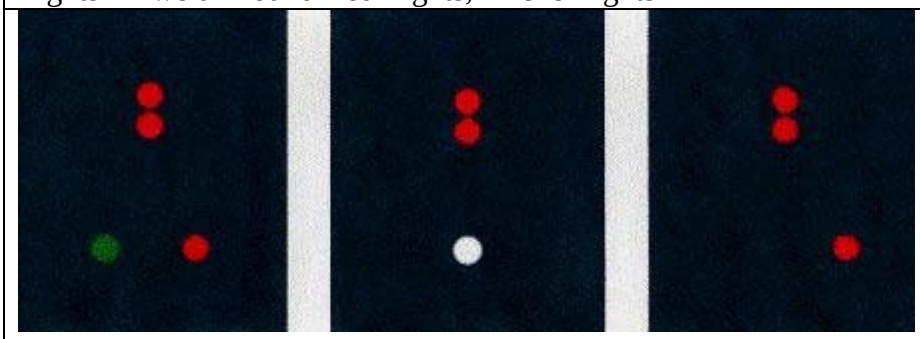
Daymarks  Three Black Balls
Lights Three all-round Green Lights, Normal Navigation lights



Vessel Aground (NOT Distress)

Daymark Three Black Balls

Lights Two all-round Red Lights, Anchor lights



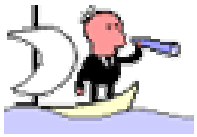
Vessel Not Under Command

Daymark Two Black Balls

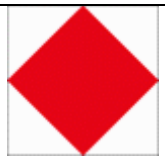
Lights Two all-round Red Lights, If underway Red and Green sidelights, White sternlights

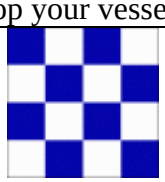
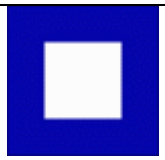
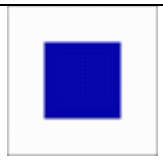
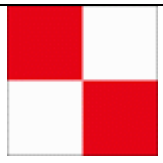
CHAPTER 23 SOUND SIGNALS

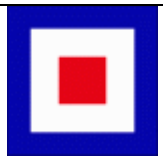
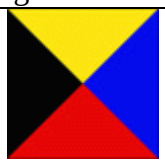
Short Blast - About 1 second in duration. Prolonged Blast - 4-6 seconds duration.	
Sound Signals given in Clear Visibility	
	I am altering course to starboard.
	I am altering course to port.
	I am operating astern propulsion.
	or more, I fail to understand your intentions or actions / I doubt if you are taking sufficient action to avoid collision.
	I intend to overtake you on your starboard side.
	I intend to overtake you on your port side.
	I understand your overtaking intentions.
	Vessel approaching bend in channel, and reply.
Sound Signals given in Restricted Visibility	
	Power driven vessel making way, sounded at intervals of not more than two minutes.
	Power driven vessel not making way, sounded at intervals of not more than two minutes.
	A vessel not under command, a vessel restricted in ability to manoeuvre, a vessel constrained by draft, a sailing vessel, a vessel engaged in fishing, or a vessel towing or pulling
	A manned vessel being towed or the last vessel of the tow, at intervals of not more than two minutes, immediately after the signal made by the towing vessel.
 5 Sec 5 Sec	A vessel at anchor shall at intervals of not more that one minute ring a bell rapidly for about five seconds. In a vessel of 100m or more in length the bell shall be sounded in the forepart of the vessel and immediately after the ringing of the bell, a gong shall be sounded for about five seconds in the after part of the vessel.

[redacted]	In addition to the above a vessel at anchor may sound one short, one prolonged and one short blast in succession to give warning of her position to an approaching vessel.
 3 Times 5 Sec 3 Times  5 Sec	A vessel aground shall in addition to the bell and gong signal, give three distinctive strokes on the bell immediately before and after the rapid ringing of the bell.
	A vessel less than 12m in length is not obliged to give the signals mentioned above, but if she does not, shall make some other sufficient sound signal at intervals of not more than two minutes.

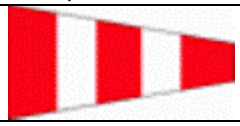
CHAPTER 24 DISTRESS SIGNALS AND INTERNATIONAL CODE SIGNALS

INTERNATIONAL CODE OF SIGNALS, CODE FLAGS, MORSE SYMBOLS AND SINGLE LETTER SIGNALS	
 A Alfa I have a diver down, keep well clear at slow speed	 *B Bravo I am taking in, discharging, or carrying dangerous goods
 *C Charlie Yes (affirmative)	 *D Delta Keep clear of me; I am manoeuvring with difficulty
 *E Echo I am altering course to starboard	 F Foxtrot I am disabled, communicate with me
 *G Golf I require a pilot	 *H Hotel I have a pilot on board
 *I India I am altering my course to port	 J Juliet I am on fire and have dangerous cargo on board: keep well clear of me

 K Kilo I wish to communicate with you	 L Lima You should stop your vessel instantly
 *M Mike My vessel is stopped and making no way through the water	 N November No (negative)
 O Oskar Man overboard	 P Papa In harbour: all persons should report on board as the vessel is about to proceed to sea
 Q Quebec My vessel is healthy and I request free pratique	 R Romeo (no single letter meaning)
 *S Sierra I am operating astern propulsion	 *T Tango Keep clear of me; I am engaged in pair trawling
 U Uniform You are running into danger	 V Victor I require assistance

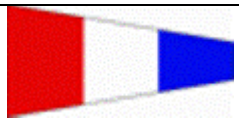
 W Whiskey [redacted] I require medical assistance	 X X-ray [redacted] Stop carrying out your intentions and watch for my signals
 Y Yankee [redacted] I am dragging my anchor	 *Z Zulu [redacted] I require a tug

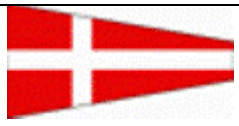
Notes:
1. Single-letter signals may be made by any method of signalling. Those marked * when made by sound must comply with the International Regulations for Preventing Collisions at Sea, Rules 34 and 35.

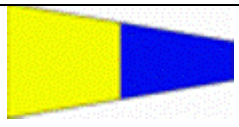
	Code and Answering Pendant

1.  [redacted]

2.  [redacted]

3.  [redacted]

4.  [redacted]

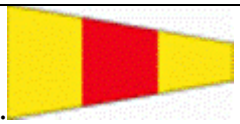
5.  [redacted]

6.  [redacted]

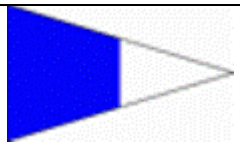
7.  [redacted]

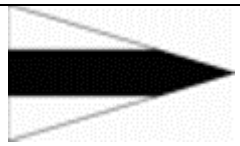
8.  [redacted]

9.  [redacted]

0.  [redacted]


First Substitute


Second Substitute


Third Substitute

DISTRESS SIGNALS

When a vessel is in distress and requires assistance the following signals may be used or displayed, either together or separately:-

A gun or explosive signal fired at intervals of one minute.

A continuous sounding of the fog siren or signal.

Rockets or shells throwing red stars fired one at a time at short intervals.

A smoke signal giving off a volume of orange coloured smoke.

The International Code Signal of distress NC, flags or sound signal

[redacted] / [redacted]

A signal consisting of a square or anything resembling a square having above or below it a ball or anything resembling a ball.

A spoken radio message using the "Mayday" procedure.

Slowly and repeatedly raising and lowering the arms outstretched from side to side.

CHAPTER 25 NAVIGATION INSTRUMENTS

Dividers

Dividers are used for measuring or marking off distance on a chart. They are usually bronze and should be rust proof.

Parallel Rules

These rules are used to transfer course lines from the compass rose on a chart. They can be difficult to use in the restricted space of a small chart table.

Set Squares

A pair of set squares fitted with large handles for easy movement are often more convenient than parallel rules for the transfer of course lines.

Plotter

Most yachts carry a plotter, which is usually made up of a compass rose etched into a transparent square, with a straight edge which swings about the centre of the compass rose. This is a simple and convenient means of plotting courses and bearings.

Log

Most yachts are fitted with mechanical or electronic logs which provide distance and speed, derived from the rate of revolution of a hull mounted impeller or sensor.

Lead Line

This consists of a weighted line marked at intervals to show depths. It is now almost entirely replaced by the electronic echo sounder, which is quicker, easier and more accurate, although a good skipper will check his echo sounder with a lead line from time to time.

Deck Log

The information contained in the yacht's Deck Log is a most important and useful aid to navigation, for examples: the hourly record of barometric pressure will give indication of weather tendencies, a record of course and distance run is essential information.

Steering Compass

Every yacht has a steering compass, normally fixed in a position easily visible to the helmsman. Deviation and Variation errors are explained in the section on chartwork.

Hand Held Compass

Most instruments listed in this section need no further explanation, but obtaining accurate bearings using the hand held compass is so fundamental to safe navigation that its properties and use are described in more detail. Most position lines drawn on a chart are obtained using this instrument. It should be treated with care.

Many styles of hand held compass can be obtained. All are similar, and simple to use, and most can be read at night by means of built in illumination.

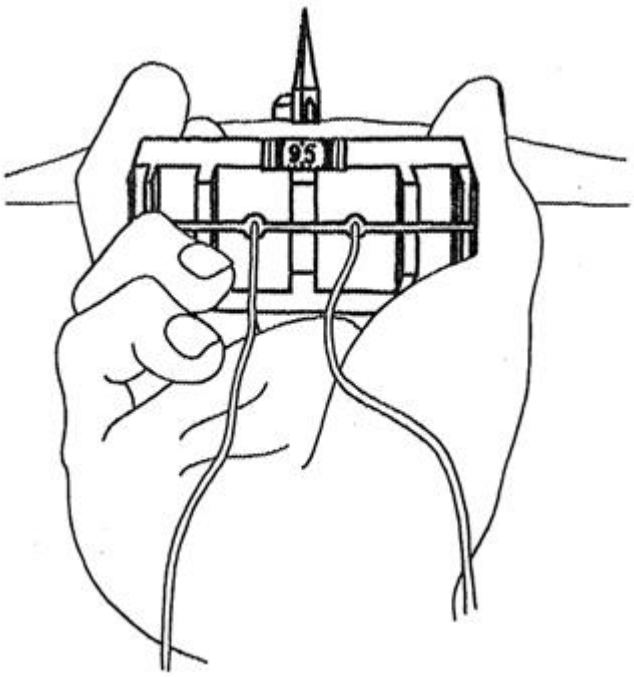
The compass normally consists of a body enclosing a damped compass card marked in divisions of 10 with numerical notation every 50. It has marks or grooves whereby an observer can align the compass body with an object on which a bearing is to be taken, and at the same time read off the bearing from the card, usually through a prism.

Practice in use of the compass is essential if accurate bearings are to be obtained.

Errors result from:

Trying to take bearings to quickly.
Not holding the compass body level.
Not aligning the compass body properly in relation to the line of sight.
Allowing metal objects - rigging, radios, contents of pockets - to deflect the card.

THE HAND HELD COMPASS



Horizontal, steady and properly aligned.

CHAPTER 26 CHARTS

There are three basic types of chart normally used by the cruising yachtsman.

The passage chart is a small scale chart that covers the whole area of a planned passage from point of departure to point of arrival.

Coastal charts are larger scale charts that give details of the coastline, navigation marks, channels and approaches to harbours.

Harbour charts are drawn to a very large scale in order to show full details of harbours. They may be given as inserts on coastal charts or included in pilots and guide books.

Chart Projection

There are two main types of projection used in the preparation of charts.

Most charts are drawn to Mercator's projection, in which meridians (lines of longitude) are shown as equally spaced parallel lines running from top to bottom of the chart, and not converging towards the poles. The parallels of latitude, which in reality are equally spaced, are drawn on the chart as being further and further apart from the equator to the poles; (this compensates for the non-convergence of the meridians).

On a Mercator's chart, angles on the earth's surface are equal to corresponding angles on the chart, and the scale of distance as given on the latitude scale at the latitude concerned is correct. The disadvantage of a Mercator's projection is that the shortest distance between two points, that of a great circle, would appear as a curved line on the chart, but this has no material effect except for very long direct passages.

To overcome this difficulty, Gnomic projection is used for great circle charts, and also for large scale harbour charts. Gnomic projection is made from the centre of the earth to a tangential plane on the earth's surface, so that meridians converge to the poles, lines of latitude are drawn as curves and great circles appear as straight lines. Large scale Gnomic charts used as harbour charts give a truer representation of the area, and may be treated as Mercator's charts. The slight distortion involved has no effect at such a large scale.

Chart Scale

The amount of detail shown on a chart depends on the scale to which it is drawn. Coastal charts are usually at a scale of about 1 : 50 000, while passage charts will be about 1 : 1 000 000. The scale of harbour charts normally depends on the actual size of the harbour.
It is important that the largest scale chart practicable is used, because much inshore detail is deliberately omitted from small scale charts.

CHAPTER 27 CHARTWORK

Navigation

Navigation can be defined as the science of determining a vessel's position at sea and calculating a safe course to another position.

Coastal navigation is used when a vessel is within sight of or close to land, when it's position can be established by the observation of prominent objects or physical features.

Astro navigation is used in long sea passages out of sight of land, where position is determined by taking sights of celestial bodies.
Radio navigation can be used in all waters, when position is found by taking bearings of radio transmitters, or by the interpretation of special radio signals.

Chartwork

The principle requirements of chartwork are:
1. To calculate the compass course required to move a vessel in safety from one point to another on a chart.
2. To keep up a continuous running plot of the progress of the vessel.
3. To obtain fixes of the position of the vessel at regular intervals.
4. To maintain the chart in good condition.

Points to note:
a. All chartwork must be done with a 2B pencil, anything harder makes grooves in the chart, which cannot be erased.
b. Chartwork should not be erased when the chart is wet.
c. Chartwork should not be erased until the end of a passage when it should be erased, unless required for record purposes.

Measurement of Distance
The unit of measurement on the chart is the nautical mile, which in fact is one minute of arc measured along a meridian. The actual length of the arc varies slightly between the equator and the poles, but a mean length of 6080 feet or 1852 metres is now universally adopted as the International Nautical Mile.

Distances on the chart are measured on the degree and minute scale that forms the border margin of the vertical side of the chart. They must be taken at the latitude of the measurement required, because in Mercator's projection the distances between lines increase towards the poles, and so the scale will vary at different latitudes.

One tenth of a nautical mile is called a cable, and for all practical purposes this is taken to measure 600 feet or 200 metres.
Measurement of Speed

The speed of a vessel is measured in knots, one knot being the equivalent of one nautical mile in one hour. A speed of ten knots is equal to about 11.5 statute miles per hour or 20 kilometres per hour.

Magnetic Variation

Magnetic North does not coincide with True North, but varies on either side of it by reason of a slow continuous movement that takes place over the centuries. The difference between true and magnetic north is called Magnetic Variation, and this varies over the surface of the earth and does not remain constant anywhere.

In the Baltic magnetic variation is, at present, from about 003^0 W to almost nil, the actual variation for any area given on the compass rose or roses printed on the chart. For example, it may be given as "Var 20^0 10' W (1991) decreasing abt 3' annually", and this will indicate the variation at the actual location of the compass rose on which it appears, not necessarily for the whole area of the chart.

The conversion of Magnetic to True North or vice-versa can easily be understood by simply visualising the True North point of the compass rose. If Magnetic North is to the left of True North, that is westerly variation, then obviously the compass bearing of any given course will be more than the true bearing. Similarly if Magnetic North is to the right of True North, that is an easterly variation, the compass bearing will be less than that of the true bearing.

Compass Deviation

Compass deviation is created when the local magnetic field in a yacht deflects the compass needle away from Magnetic North, to which it would otherwise be pointing. Unlike variation, deviation alters according to the direction in which the yacht is heading. Temporary deviation can be caused by placing a ferrous or magnetic article near the steering compass, but this can be avoided with proper care, eg don't put the portable radio right underneath the bulkhead compass!

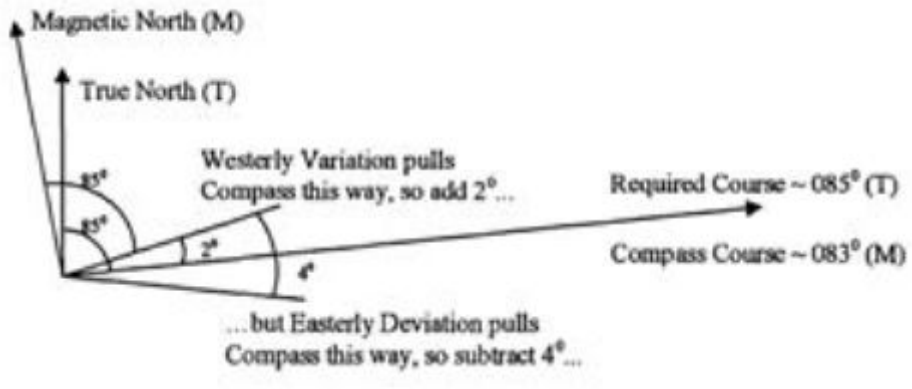
Permanent deviation caused by engines and other fixed installations can be eliminated by the use of small corrector magnets, and this is normally done by a skilled compass adjuster. Afterwards the vessel is "swung" through various headings, preferably on a proper compass swinging range, and any residual deviation recorded on a deviation card. Ideally compasses should be swung at the start of every sailing season and a new deviation card compiled.

Deviation is applied to a compass course in exactly the same manner as variation, westerly deviation being added and easterly deviation subtracted in order to ascertain the correct magnetic course.

Apart from the deviation table, it is good practice to check the accuracy of the steering compass from time to time by comparing the heading shown with known bearings such as leading marks and transits.

The Basic Calculation

a. From a start point, A, on the chart, plot the required course to B. Find the true (T) bearing of this line by using the plotter, or transferring the line to the compass rose.
b. Apply Variation to this bearing by adding Westerly Variation or subtracting Easterly - this is then the Magnetic (M) bearing.
c. Apply Deviation in the same way to get the Compass Course (C).



True bearing 085^o (T)
Apply Variation, say, 2 W 085^o (T) + 2^o = 087^o (M)
Apply Deviation, say, 4^o E 087^o (M) - 4^o = 083^o (C)
083^o is the compass course Note that bearings and courses are always given in three figures. The calculation is always done in the same order, and in reverse when working from compass to chart.

To Compensate for Tide or Current

If a boat was steered straight across a fast flowing river, it would be swept downstream before reaching the far bank, in order for it to get straight across, the boat would have to point partly upstream. Tides and Currents have the same effect, and the solution is also the same, except that out at sea, there are few convenient banks from which to judge the amount of compensation required.
a. Plot the desired course between A and B as before. The remainder of this calculation does not have to be done on this line, or even on the chart at all, although it is usually most convenient to do it there. See page 27 - 5.
b. From point A draw a line in the direction that the tidal stream or current is flowing, say one hours worth of flow, eg: for a one knot current, mark off one nautical mile to C.
c. From C scribe an arc, of radius equivalent of the boat's speed through the water for one hour, to cut line AB at D. eg: for a boat speed of 4 knots, the radius of arc is four nautical miles at the same scale at which the current was measured.
d. Join CD, this is the True Bearing of course required, now repeat the basic calculation to find the compass course.

To Compensate for Leeway

Leeway is created by the wind pushing the yacht sideways through the water. The amount of leeway depends on a number of factors, the principle of which are the design of the yacht, the point of sailing and the weather, and it may be estimated by observing the angle between the fore and aft line of the yacht and the "wake course"

stretching out astern. Compensation for leeway can be made by adding or subtracting this angle to or from the magnetic course.

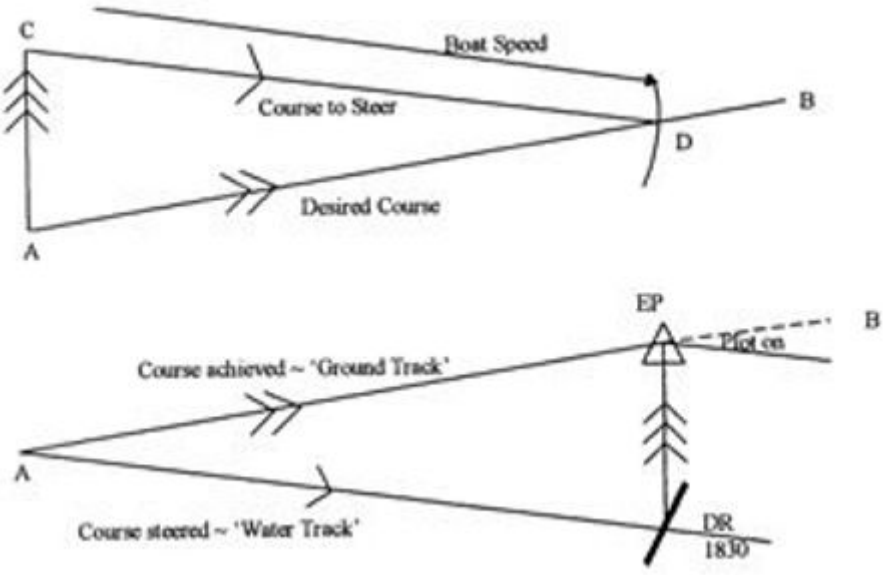
In conditions where the total amount of correction for variation, deviation, current and leeway adds up to a considerable difference between the true course and the course to steer, correction for deviation should be the last to be applied, otherwise the changes in deviation for various headings may create an unacceptably large error.

Plotting the Course

A continuous running plot of the course is maintained by plotting Dead Reckoning positions (DR) and Estimated Positions (EP) at intervals during the passage.
The yacht's DR position is assumed to be at the distance logged from the last fixed point on the magnetic bearing steered, with no allowance made for either current or leeway. The DR position is marked with a cross.

The yacht's EP is then calculated by allowing for current and leeway, and this is done by drawing a current vector diagram as already described. The EP is marked with a triangle, and the time and log readings entered alongside.

The DR and EP should be plotted during the course of a passage until each definite fix of the yacht's position is made, from where it is continued until the next fix is obtained.



Position Fixing

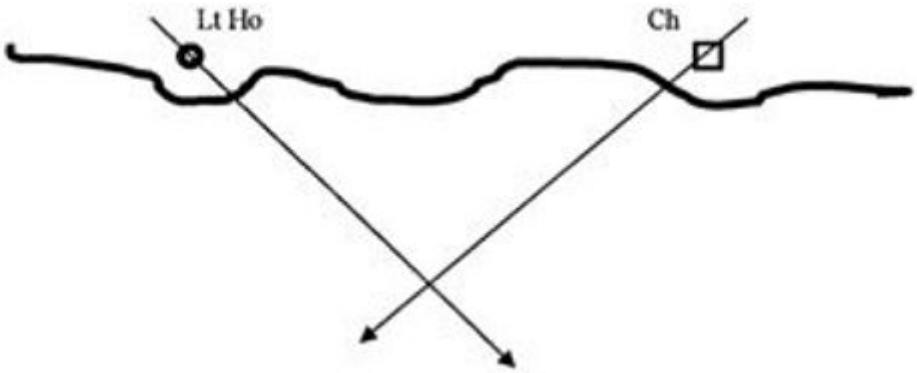
Position fixing is a means of determining the position of a vessel at sea and is normally done by establishing the intersection of two or more position lines. A fix is marked on the chart with a circle, and a dot where necessary. The time, and log reading or estimated log reading should be entered alongside.

Position Lines

If an observer on a boat takes an accurate compass bearing on a positively identified object, and transfers that bearing to the appropriate chart as a line from the object, the line is known as a position line, and for as long as it remains in the same place, the boat must be on the position line somewhere. It follows two or more position lines, from bearings taken within a short space of time, will "fix" the boat's position on the chart. Bearings marked on the chart are always shown with an arrow pointing away from the object on which the bearing was taken. Position lines do not have to be bearings - as will be seen.

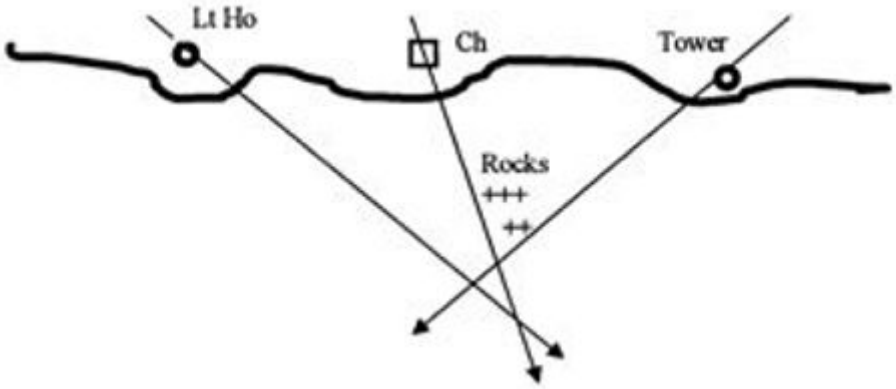
Simple Cross Bearings

The bearings of two positively identified objects on shore are taken, converted to reverse and then plotted on the chart. The intersection of the two lines will give a reasonable fix, particularly if the two objects chosen are roughly at right angles to each other.



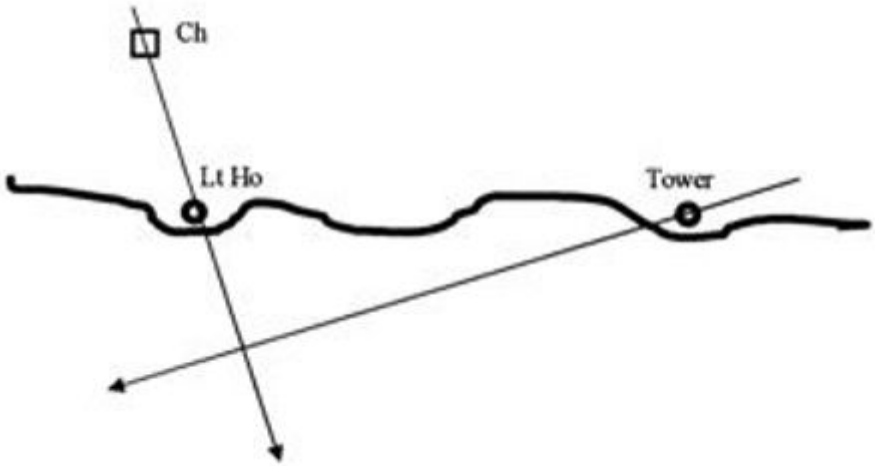
Three Cross Bearings

The intersection of the position lines plotted from three objects on shore will usually result in a triangular" area of doubt", known as a Cocked Hat. Traditionally the fix is taken as being in the centre of the Cocked Hat, but if there is any nearby hazard or danger the yacht's position is assumed to be at the point of the triangle nearest to the danger.



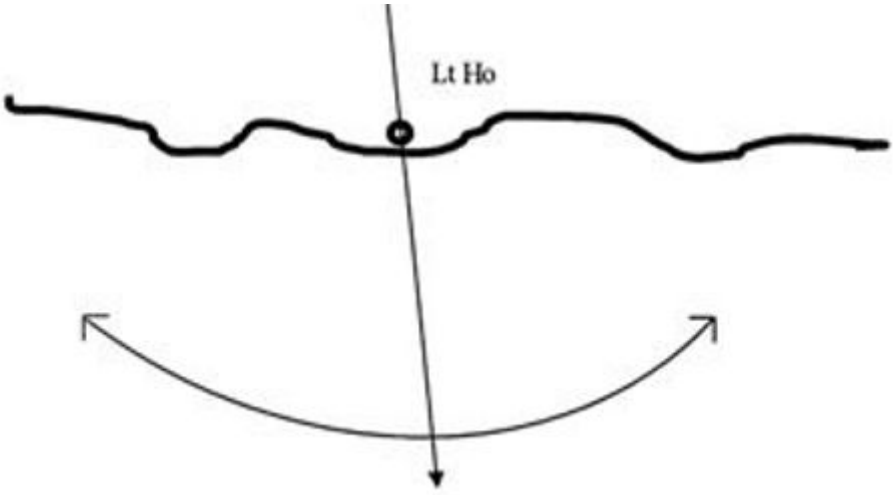
Transit and Compass Bearing

The most accurate position line is a transit bearing, when two positively identified objects on shore are observed to be in line with each other. At the time of observation the yacht's position must be somewhere on a line drawn through the two positions and extended to seaward, and if at the same time a compass bearing of a third object is taken, the intersection of the two position lines will give an accurate fix.



Circle of Position and Compass Bearing

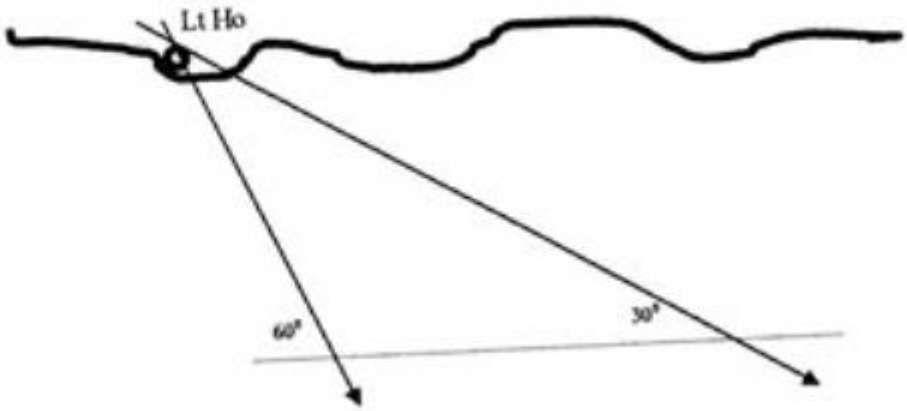
A useful method of position finding at night in good visibility is to observe a lighthouse that is just seen to appear over the horizon. By reference to the appropriate Rising and Dipping Tables, or by calculation, distance off can be found and an arc of position plotted. A compass bearing on the light will give a second position line, and thus a fix is obtained.



Doubling the Angle on the Bow

The same procedure as in a four point bearing is used, except that the observer can take a bearing on the object at any time and at any angle less that 45o. The second bearing is taken when the first included angle has doubled, when the distance run between the two bearings will be equal to the distance from the position of the second

bearing to the observed object. It will be seen that in both these methods an isosceles triangle is constructed, where two sides and two included angles are equal.

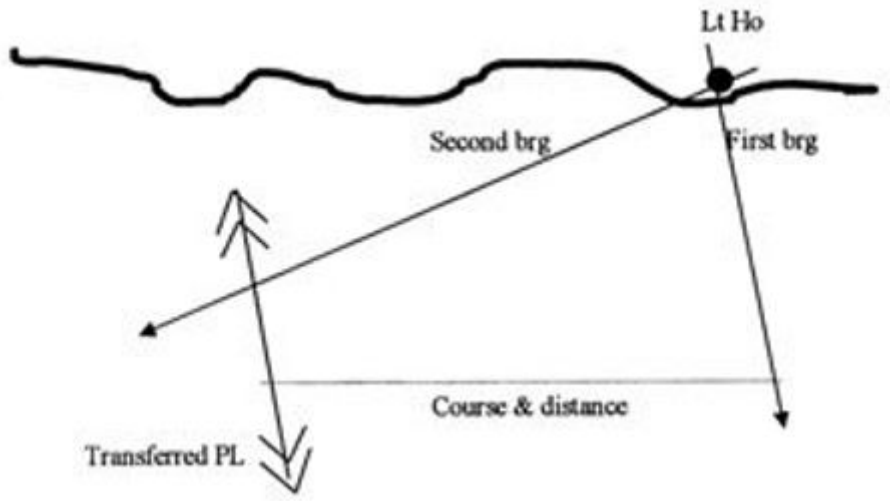


Transferred Position Line

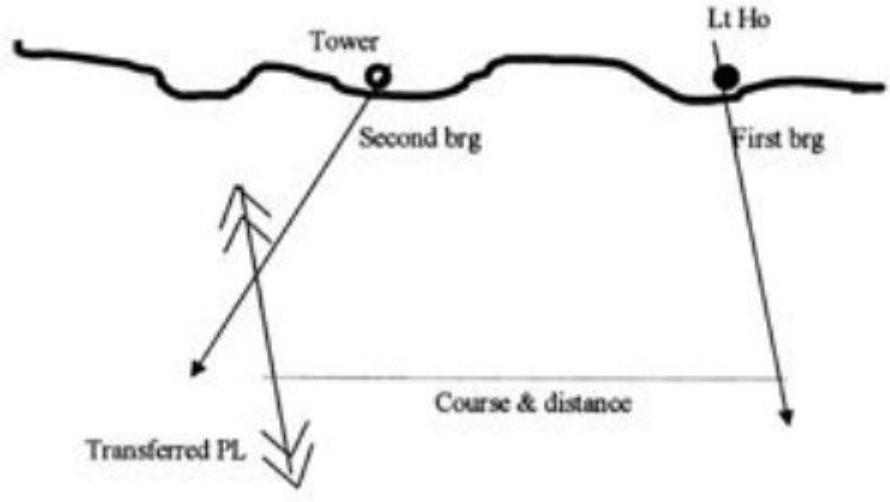
This method may be used where a bearing can be taken on an object on shore, or where a bearing can be taken on one object that then goes out of sight and a second bearing taken on another object further along the coast. Once again speed and course must be accurately determined, and maintained.

In the first case, the yacht's course and speed is known, however the distance off the coast is not known and may be to one side or the other of the assumed course plotted on the chart. A bearing is taken on an object ashore and log and time noted. After the vessel has continued on her course until the bearing of the object has changed by about 60o or more, a second bearing is taken on the object and the time and log recorded. The actual distance covered is then calculated, making adjustments for current or tidal stream.

This distance is then plotted from any convenient point on the first position line on a line parallel to the course line, and the first bearing transferred to the new position. The point where the transferred line crosses the second bearing line is the position of the vessel at the time of taking the second bearing. (The transferred position line is marked with an arrow at each end).



When taking bearings on two objects on shore at different times, speed and course must again be known. A bearing is obtained on the first object seen, which later passes out of sight. A bearing is then obtained on a second object that has appeared on shore, and the actual distance covered between the two bearings is calculated. As in this example, this distance is plotted on a line drawn from the first position line, parallel to the course line, the first bearing transferred to this position, and the point where it crosses the second bearing is the fix at the time the second bearing was taken.

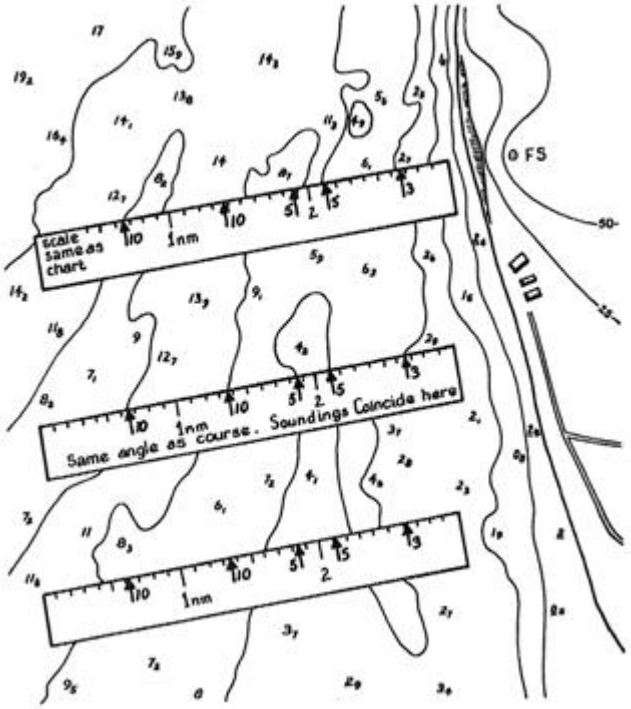


Any method of obtaining a fix that requires the speed and course to be known is called a running fix. Owing to the inevitable errors that will occur in assessing distance run and steering a steady course a running fix is usually less accurate than cross bearings.

Line of Soundings

As well as taking bearings from objects on shore, an estimate of position and distance off can sometimes be made with the help of soundings taken with the echo sounder. A line of soundings is taken at regular intervals, reduced to chart datum if necessary, and

the resulting line plotted on tracing paper or the edge of ordinary paper. From this trace, an approximate distance off shore can be deduced by laying it on the chart parallel to the course being steered and moving it about until the soundings coincide with those on the chart. In poor visibility this method can be very useful, particularly where the seabed has a distinctive contour line.



CHAPTER 28 PILOTAGE

Pilotage is the name given to the navigation of inshore waters and channels by the use of buoys, beacons, leading marks or lights and topographical features in conjunction with the chart, pilot book, compass and echo sounder.

It usually demands concentration and attention to detail on the part of the navigator, as well as a complete knowledge of the meaning of various types of buoys and beacons.

Leading Marks and Lights

Leading marks and lights are set up in pairs on or near the shore, the inshore mark is always behind and above the other. They indicate a safe channel or approach to a harbour when they are in transit. By day they are clearly visible marks in a distinctive colour. They may be lit at night with lights of the same or different characteristics and shown on the chart thus "Lights in Line 353^{o}", this being the true bearing of the transit from seaward.

A single leading light or sectored light may sometimes be used, in which case it will normally be split into three adjacent sectors, the centre safe sector white, the port sector red and the starboard sector green. When beating against the wind in an approach channel, the change of colour from white to red or white to green gives a perfect warning of when to change tack, particularly when at some distance from the light source.

CHAPTER 29 LIGHTS

Lights used as aids to navigation may emanate from lighthouses, light vessels, buoys or beacons.
Lights on lighthouses and shore beacons may show a different colour light in adjacent sectors in order to indicate danger areas or a safe channel. Some important lighthouses may also show different light characteristics in adjacent sectors. Where arcs of visibility are given on the chart, the bearings are true from seaward, measured clockwise from 000^{o} to 360^{o}.
On the chart a full description of all lights is given in abbreviated form in the following order:-

a. Name or number of light (if any).
b. Characteristics or appearance of the light.
c. Colour or colours of the light.
d. Time taken to complete one complete cycle of the light pattern of illumination.
e. The height of the light source above mean sea level in metres / feet (in the Baltic).
f. On lighthouses and shore beacons, the visible range of the light in clear weather.
g. Any other details such as fog signal, signal station, radio beacon, etc.

The principle characteristics are:-

Class of Light		Description	Abbreviation
a.	Fixed	A continuous steady light	F
b.	Flashing	Lit period shorter than the eclipsed period	Fl
c.	Group Flashing	Two or more flashes followed by longer eclipsed period	eg Fl(3)
d.	Quick Flashing	Continuous flashing at to 60 times a minute	Q
e.	Very Quick Flashing	100 or 120 flashes a minute	VQ
f.	Ultra Quick Flashing	More than 160 flashes a minute	UQ
g.	Interrupted Quick Flashing	Quick flashing periods followed by eclipsed periods	IQ
h.	Group Quick Flashing	Two or more eclipsed periods followed by longer lit periods	eg Q(2)
i.	Occulting	Long lit period followed by short eclipsed period	Occ
j.	Group Occulting	Two or more eclipsed periods followed by longer lit period	eg Occ(3)
k.	Isophase	Lit and eclipsed periods of equal duration	Iso
l.	Alternating	Alternate colours shown at equal and regular intervals	eg Al WR
m.	Fixed and Flashing	Fixed lights showing regular flashes of greater brilliance	F Fl
n.	Morse Code	Continuous flashing of one or more letters in the Morse Code	eg Mo(K)

The colours of lights are abbreviated and shown as follows:-

White W (may be omitted)
Red R
Green G
Yellow Y
Blue Bu
Violet Vi

The time period of a light, is the time taken to complete one whole cycle of the characteristics of the light, which is from the start of one cycle to the start of the next. This is shown on the chart in seconds, abbreviated to 's'.

The theoretical range of visibility of a light, is given in sea miles, either as a single figure, or two figures where different colours of varying visibility are used. They are shown thus:-

Single Range eg 20M
Two Ranges eg 16/12M
Three or more Ranges eg 20-16M

Other details such as fog horn or radio beacon will be added in abbreviated form at the end of all other information concerning the light. From this information a full description of any lighthouse is shown as:-

Fl(3) WRG 20s 15m 18-12M

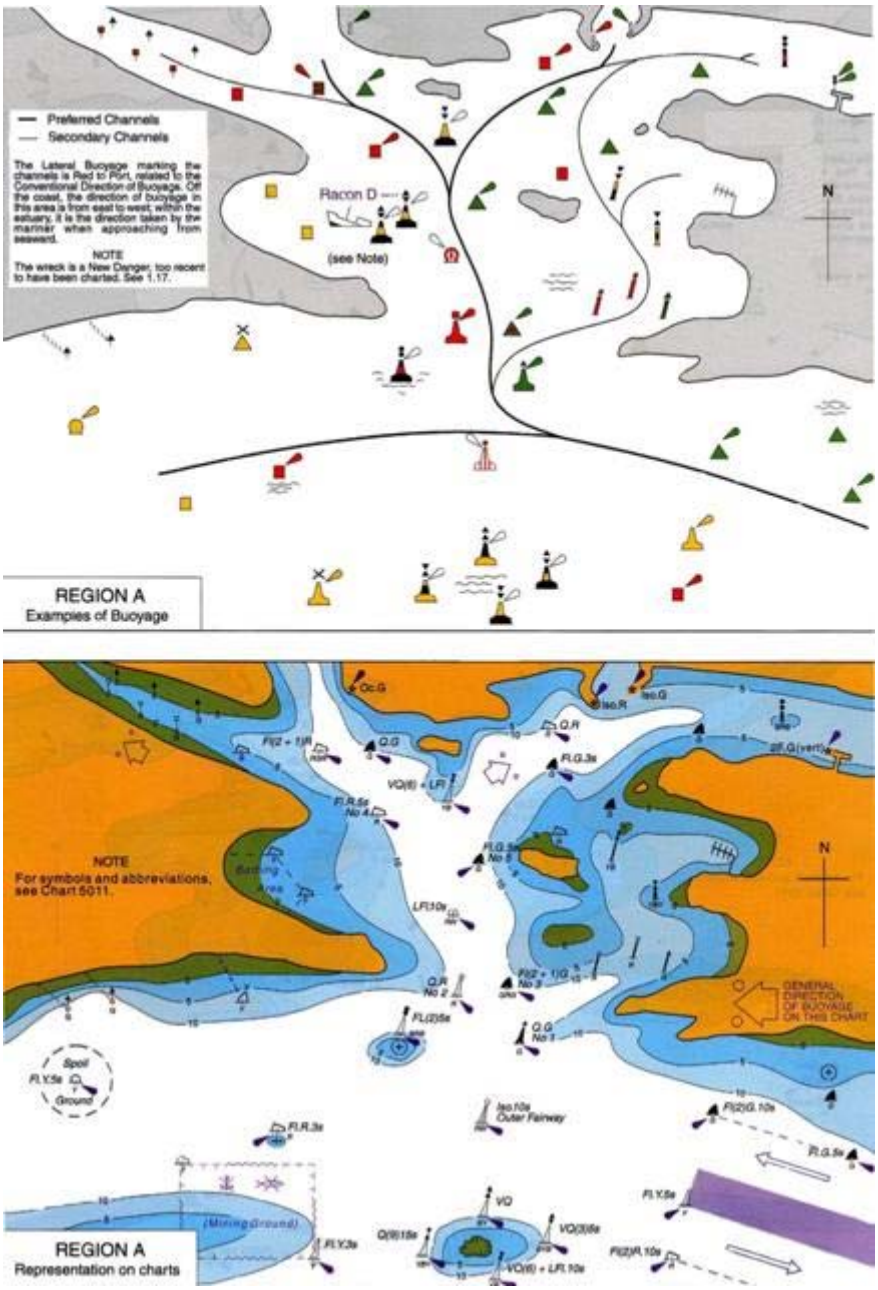
This would indicate that it is a group flashing three lights with white, red and green sectors, the light period is twenty seconds, the elevation is 15 metres, and the range of the three different colours is from eighteen to twelve sea miles.

Admiralty List of Lights

Names, descriptions, locations in Latitude and Longitude and characteristics of individual lights can be found in the Admiralty List of Lights. The list is particularly useful for confirming the identification of a light structure in daylight. It also contains tables of distances of visibility.

CHAPTER 30 IALA BUOYAGE SYSTEM 'A'

All European and Mediterranean countries conform to the IALA Buoyage System A.



In this system there are five types of mark which may be used in any combination.

Lateral marks indicate the port and starboard sides of a channel in the direction coming from seaward. In tidal waters the direction is normally defined as the direction of the rising tide or stream, while in non-tidal waters it is decided arbitrarily by the buoyage authorities. In Danish waters the direction from seaward is generally north to south and west to east, with variations to suit local geographical conditions. These variations will be shown on the chart.

Cardinal marks are used to indicate the direction in which a hazard or danger lies, and the marks are named according to the quadrant in which they lie in relation to the hazard or danger. They may be placed in a group of two, three or four round the area of the hazard, or individually to indicate the extremity of a hazard or danger, the limit of an area of shoal water or a bend in a channel.

Isolated Danger marks are placed on or above an isolated danger such as a rock or wreck with navigable water all round.

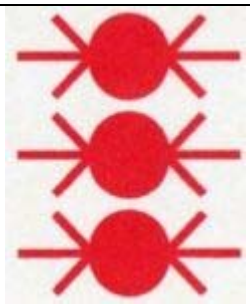
Special marks are used to indicate areas or features that do not primarily affect navigation, such as restricted or prohibited areas, firing ranges and pipe lines.

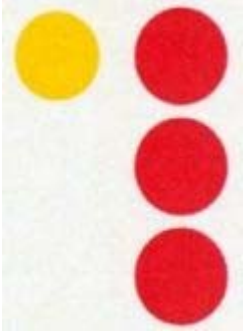
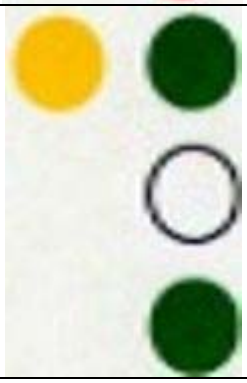
Safe water marks indicate mid-channel, routes or landfalls.

Details of all marks, symbols and abbreviations used an charts of the IALA system A are given in the British Hydrographic Office Publication Chart Number 5011.

CHAPTER 31 PORT TRAFFIC SIGNALS

1. The main signal is always 3 vertical lights.
2. Exemption signals are made by a yellow light to the left of the main signal.
3. Special local signals may be displayed to the right of the main signal.

	Flashing	Serious emergengy Stop, or obey instructions
	Fixed or Slow	Vessels shall not proceed
		Vessels may proceed One way traffic
		Vessels may proceed Two way traffic

	Occulting	A vessel may proceed only when she has specific orders to do so
		Vessels may not proceed, except that vessels which navigate outside of the main channel need not comply with the main message
		A vessel may proceed only when she has received orders to do so, except that vessels which navigate outside of the main channel need not comply with the main message

CHAPTER 32 RESPONSIBILITIES OF A SKIPPER

The skipper is responsible at all times for the safety and well being of his ship and his crew, and is always the final decision maker on board. In official documents in the Merchant Service he is referred to as "Master under God" and this description, with all that such a title implies, is equally true of the skipper of a small sailing yacht.

He is, in the first place responsible for ensuring that his yacht is seaworthy, well found and in all respects ready for sea before leaving harbour. He must be certain that both he and all members of his crew are familiar with the stowage plan of the yacht, the position and method of use of all safety equipment and the action to be taken in case of fire.

Briefing the Crew

A novice will not know Port from Starboard, or how to coil a rope or that he must not fiddle with flares, or that he is not going to drown when the boat heels.

An experienced hand will want to know where he's going and when, which sails to bend on, and the plan for getting underway.

The skipper will need his crew to know these things, and more, they won't if he doesn't tell them. At the start of a trip, and frequently thereafter, a good skipper will tell his crew what he expects of them, and how to achieve it if they don't know, where they are going, and what is going to happen next. He will reassure the inexperienced, and make sure that all know how to behave on his boat, and what to do in an emergency.

A short, but comprehensive briefing must be a skippers first action on taking on a new crew.

Takeover of a Club Yacht

This is one of the skippers responsibilities. Club yachts carry an inventory that is written in the form of a stowage plan and this should be studied carefully by all crew members. This will facilitate the handover at the end of the charter period.

The following procedure for taking over and checking the ship's stores and equipment should be followed by the skipper or delegated member of the crew:-

a. Check and take over the inventory of stores and equipment (skipper).
b. Check all safety equipment.
c. Check all sailing gear, including sails, sheets, spinnaker gear, handybilly, main sheet, kicking strap, as well as mooring warps, lines and fenders.
d. Check engine, starting, batteries, fuel, oil, water, maintenance and tools.
e. Check the heads, including pumps and seacocks and method of operation.

f. Check electric light circuits, ensuring that all navigation lights are functioning.

g. Check all navigation equipment, including the compass and all instruments, pilot books and other publications such as list of lights or nautical almanac, and the ship's log book.

h. Check that the ship's papers, showing proof of ownership are on board.

i. Ensure that the fuel tank and water tank are full, and that a spare gas cylinder is carried and emergency water cans are filled.

j. Re-stow all stores and gear according to the inventory, bearing in mind the maxim

"A place for everything and everything in its place".

Passage Planning

After completing the takeover of a club yacht and stowing food and drink, inexperienced skippers may be tempted to cast off and sail away without any further preparation. However, the more experienced and seamanlike skipper will know that additional preparations are necessary if the first passage of the cruise is to be successfully completed.

The first and most important consideration must be the state of the weather, both actual and forecasted. Conditions inside a sheltered harbour can be misleading, and very different from what may be faced at sea. If in any doubt, a walk or ride to a vantage point where open sea conditions may be observed could be time well spent. A reliable weather forecast must always be obtained before starting a passage. BBC transmissions do not cover Baltic Areas, the nearest areas being Fisher and German Bight, but they give a good overall picture of the weather state, and are very helpful in assessing the possible future conditions.

Another important factor in passage planning is the strength and competence of the crew. It may happen that a skipper finds himself in charge of a novice crew, in which case it may be wiser to spend a couple of hours sailing in sheltered waters in order to give everyone a chance of learning the ropes and finding their sea legs before setting off on the actual passage.

The time of departure on passage is also important. It is generally most un-seamanlike to take a novice crew in a strange craft straight off into the rigours of a night passage. This should only be done in settled weather with an experienced crew; otherwise it is often better to plan for a night's sleep and a crack of dawn departure. There will be time enough for night sailing later in the cruise, when the crew is more familiar with the yacht and the cruising area.

If the cruise has no particular objective it could be good planning and even better psychology to make the first passage sailing in a free wind if possible. Nothing could do more to dismay and disenchant a novice crew than a long hard flog to windward on their first day at sea. Such conditions are almost certain to occur at some time during an extended cruise, but when they do the crew should be well settled down and able to cope with whatever nature has in store.

Having to spend long periods working below deck in even a moderate sea is a common cause of seasickness, and this unpleasant possibility can be minimised if not avoided by a little forward planning. The navigator should decide on and record his passage plan before departure, thus avoiding having to spend much time at the chart table under sail. Similarly, a midday snack and beverages prepared beforehand would lessen the time required to be spent in the least congenial of all places during rough weather, the galley.

The skipper will finally have to decide which sails he will use, bearing in mind the weather forecast and his own observation of conditions. He should also remember that, at sea, it is far easier to increase sail area than reduce it.

When considering the extent of the cruise, some thought must be given to the unpopular subject of the return journey. Changes of weather can play havoc with a well planned itinerary, with adverse weather conditions resulting in a hold up of the yacht a long way from the home port. It is a wise precaution to keep some time in hand to allow for this eventuality.

Once underway and on passage, a proper system of watchkeeping should be brought into use and maintained throughout the cruise. A good watchkeeping routine ensures that all duties, both pleasant and otherwise, are fairly shared by all, and will do wonders for the morale of the crew. If either by choice or force of circumstances a passage is extended to include night sailing it will also reduce the possibility of key members of the crew becoming overtaxed and overtired, with all the attendant dangers of such a situation.

Boat Husbandry

This is the general term covering every aspect of the day to day maintenance of the yacht, and implied in the term is good knowledge of the correct way to maintain all the items of the yachts inventory. The more important of these are given below, but the list is by no means comprehensive, there is always something to be done.

The Hull

Normally a GRP hull needs no day to day maintenance except cleaning. This must never be done with any type of abrasive cleaner, as this will eventually wear through the waterproof coat of the hull. Oil and grease should be removed with a liquid solvent, while the hull itself can be cleaned with a warm soap or detergent solution. Any impact or other damage to the hull should be reported as soon as possible.

The Sails

Modern sails are normally made of synthetic materials. While they are impervious to rot and mildew, they should not be stored in damp conditions for any length of time, but hung up and dried out in the open air at the first opportunity. Continuous exposure to the ultraviolet rays of the sun can also have a damaging effect on the fibres, but this can be minimised by the use of sail covers and sail bags when the sails are not in use.

Synthetic materials can be stored in bags in a random manner without detriment, but if they are "sail-maker folded" in concertina fashion from the foot, they will occupy much less stowage space and will be far easier to hank onto the forestay when being set.

All stitching on the sails should be checked occasionally, particularly at any points where chafe is likely to occur. "A stitch in time saves nine" is a doubly true saying in the matter of sail maintenance.

When folding the mainsail on the boom the sail battens should be arranged to lay flat along the length of the boom. This will prevent possible breakage of the battens and consequent damage to the batten pockets.

The Rigging

An adjustment to the tune of the standing rigging is a job for experts only. Others should leave it severely alone, or in cases where something is obviously wrong, ask for help.

Rigging screws and shackles should be checked regularly to ensure that they are not slacking off, and that the split pins or other locking devices on the rigging screws are still doing there job. Any sharp projections such as the ends of split pins should be firmly taped over to prevent the snagging of sails or sheets. Running rigging should also be regularly checked, particularly where wire and rope are spliced together, ensuring that there are no fraying strands.

Mooring Warps, Lines and Springs

Chafe at the fairleads or at the dockside is the commonest cause of wear to warps, this can be minimised by parcelling the rope with cloth or plastic tube at the crucial points. If a warp passes over the sharp edge of a concrete or steel wall, wear can be reduced by placing a small piece of timber under the warp, so as to raise it clear of the sharp edge. An even better method is to find mooring points on the face of the wall if possible thus eliminating the source of wear altogether.

At least two warps and two springs should be carried on board, for it is bad practice to make one warp or spring do the work of two. All rope ends should be securely whipped, and in the case of synthetic ropes this can easily be done by meting the end strands with a flame and then squeezing them together This should not be done with the bare hands! A whipping should then be added for greater security.

When not in use warps should be neatly coiled and stowed, and prepared and laid out in position well beforehand when approaching a mooring. For a normal mooring only the ends of the warps are ashore, any spare length being neatly coiled on deck, turned over in readiness to run out or take in as required.

The Bilges

The bilges should be cleaned out thoroughly with salt water at regular intervals. Fresh water will turn rancid and smell abominably if allowed to lie in the bilges for

only a few days. Limber holes must be kept clean and open so as to allow bilge water to flow freely to the pump pick up position. Diesel fuel in the bilge should be cleaned up with a strong detergent, and the reason for it being there checked and rectified immediately.

Labelled bottles or cans should never be stowed in the bilges, as the labels will inevitably float off and choke the limber holes and strum box. It is in any case a most unhygienic practice, and should be avoided if possible.

The Engine

Before starting the engine, the oil level in the sump and gearbox should be checked and topped up if necessary.

As soon as the engine is running, a check should be made on the exhaust and cooling water outlet, to ensure that the cooling water is circulating correctly. If not, the engine must be switched off immediately and a check made on the inlet valves, water pump and pipes.

Most damage to engine transmissions, thrust bearings and propeller shafts is caused by panic gear changing from forward to astern or vice-versa at full throttle. Before engaging or changing gear the throttle must always be returned to the tickover position, and then opened up again after the gear has been engaged.

The level of diesel fuel in the tank must never be allowed to fall so low that there is any danger of air being drawn into the fuel pipes.

Navigation Lights

When there is any possibility or intention of sailing at night, all navigation lights should be checked and any faults rectified during the hours of daylight. After darkness has fallen it is usually too late.

The Galley

The comfort and well being of the crew depends to a large extent on the cleanliness and efficiency of the galley and those who use it. Frying in fat is a popular and easy method of cooking, but it causes most problems, with oil-laden fumes depositing a greasy layer over the deck head and spilled fat congealing in some hidden corner and turning rancid and evil smelling in a matter of days. These effects can be reduced by keeping fried meals to a minimum and by making sure that pans are covered when frying. This may also have the bonus of reducing the incidence of sea sickness in the crew.

With the restricted space available, it is also good practice for the cook to wash up and stow all utensils as he uses them, rather than leave the task until an unmanageable pile of washing up has collected. The actual stowage of food onboard is an important subject, perhaps the two most important factors being dry conditions and a good air circulation, the latter much easier to achieve than the former.

The Main Cabin

The main cabin or saloon is the living room for the whole crew, and as such it should be kept as clean, dry, and as tidy and habitable as possible. It should be ventilated thoroughly whenever conditions allow all lockers and cupboards opened and mattresses and cushions aired and dried out to get rid of the effects of condensation.

The Ship's Log

All yachts should carry a Deck Log. This is the legal log, and must be completed at regular intervals when at sea, usually every hour. It will normally record the time, course, distance run, weather, barometric pressure, wind direction and strength and sailing speed. Other information which may be recorded are course changes, weather forecasts, sail changes, passing vessels or navigation marks and any other happening that affects the running of the yacht. The Deck Log is an invaluable aid to navigation and weather forecasting, and in the event of an incident likely to lead to an insurance claim, a properly completed Deck Log is a most important legal document.

The Fair Log is sometimes carried and records of the cruise written in narrative form, and is compiled for the benefit of the club records and for the information and interest of future users of the yacht. For this reason it should not be a slavish copy of the Deck Log, but an interesting and informative account of the cruise that will become part of the yacht's history.

Flags and Flag Etiqette

Over the years flag etiquette has become less formal, and varies from country to country. Traditionally, flags are flown from sunrise to sunset, sunrise being taken to be at 0800 hours during the summer months. Club yachts should maintain a high standard of flag etiquette, particularly when visiting foreign harbours.

The Red Ensign is normal flag of any British registered or British owned vessel, and may be worn by British nationals without restriction. It is the ensign of the British Kiel Yacht Club.

The Blue Ensign, undefaced or defaced, is worn by certain Services and Government departments and by yacht owners who have been granted an Admiralty Warrant by virtue of being members of certain privileged yacht clubs. The privilege of wearing a special ensign applies only when the owner is on board or in charge of the warranted vessel, but in the case of vessels that are owned by privileged clubs a special dispensation has been made whereby trustees are appointed by the club as owners, and the special ensign may be worn when a qualified club member is in charge of the vessel. The Admiralty Warrant and Certificate or British Registration must always be carried on board when the special ensign is worn, and any abuse of the privilege can lead to very heavy fines, as well as the loss of the warrant.

The White Ensign is worn by the Royal Navy, and also by warranted vessels owned by members of the Royal Yacht Squadron.

Ensigns are flown from 0800 to sunset when in harbour, and when sailing in coastal waters or within sight of other vessels at sea. Should a yacht be left unattended in harbour until after sunset, it is acceptable practice to lower the ensign before leaving the vessel.

Paying compliments or Saluting is made by lowering the ensign two thirds of the way down the ensign staff and holding it there until the saluted vessel has responded and begins to re-hoist her ensign. Salutes should be given to the Royal Navy or foreign warships and to Flag Officers of the saluting vessel's club, or to any other vessel as a mark of greeting or respect.

The burgee is a triangular pennant worn at the mast head or close up on the port spreader signal halyard, and will normally identify the club to which the owner of the vessel belongs. Flag Officers' burgees are swallow tailed broad pennants carrying various marks to indicate the Flag rank of the owner. Theoretically the burgee should be flown by day and night when the vessel is in commission, but in practice it is acceptable to lower it at night when in harbour. A vessel wearing a privileged ensign must also wear the burgee of the club to which the privileged pennant pertains. When racing the burgee is replaced with a rectangular racing pennant.

The Courtesy Flag is a small maritime or national flag of a foreign country being visited, worn as a mark of courtesy, as the name implies. It is normally worn close up on the starboard spreader signal halyard, and never subordinate to any other flag.

House flags, association flags or the burgees of other clubs may be worn on the port spreader signal halyard subordinate to the BKYC burgee. All ensigns and flags must always be worn close up on tight halyards.

Salvage

The laws relating to salvage at sea are very complex, and well outside the scope of this handbook. RYA Pamphlet G6 gives some explanation of the laws as they apply to yachtsmen

In the event of a Club yacht being involved in a situation where outside assistance is required to safeguard the lives of the crew, this would not normally lead to any claim for salvage. However, when assistance is required in other circumstances the most important precaution is to obtain some form of agreement on payment of compensation beforehand, preferably based on the "no cure - no pay" principle. If assistance is rendered by a fellow yachtsman, or member of a recognised yacht club, it should not be necessary to obtain any special agreement, but it is a wise precaution to do so for all others. The form of agreement included in the ships papers will give adequate legal cover.

Another sensible precaution is to demonstrate that all hope has not been abandoned and the yacht and crew is not left to the mercy of the elements, a most unlikely situation in the Baltic in any case. This can be done by the crew being active in their attempts to retrieve the situation, by using the yacht's warps and gear rather than that of the assisting vessel, and by generally showing that while help may be welcome, the situation is not hopeless as far as the crew is concerned.

CHAPTER 33 FIRST AID AFLOAT

All Club yachts are supplied with a small first aid outfit sufficient to deal with the treatment of minor injuries and illnesses. The following notes are given in amplification of the instructions contained in these outfits.

Seasickness

Medication is too late when the patient has succumbed to seasickness. Anyone susceptible to seasickness should commence a course of proprietary seasickness tablets at least four hours before going to sea. Stugeron is a highly recommended brand of tablets. If seasickness has already begun the patient must be encouraged to continue to eat some dry food such as bread or biscuits to avoid retching on an empty stomach. Some brands of tablets enhance the effects of alcohol and cause drowsiness, and this combined with lethargy brought on by seasickness may result in a lack of safety consciousness in the patient. For this reason seasick crew should be watched with special care when on deck or in the cockpit, and clipped on when heaving over the side!

Cuts and Wounds

Apply a standard dressing as directed on the package. If bleeding is severe the dressing should be applied, and a further dressing applied over the first one if bleeding does not stop. For a leg injury the patient should be laid down and the leg supported as high as possible in comfort. For an arm injury the arm should be secured across the chest with the hand on the opposite shoulder. Always bandage from joint to joint to prevent oedema.

Fractured Limbs

A suspected fracture should not be set with a splint by other than a qualified person. The broken limb should be secured to the body as firmly as possible so that the body itself acts as the splint. An arm should be secured across the chest with the hand on the opposite shoulder and padding placed in the hollows between the arm and chest. If the elbow cannot be bent, secure the arm along the side, with the palm touching the thigh and again pad the hollow places. For a leg or thigh fracture the feet and legs should be lashed together, again padding the hollow places between ankles, calves and knees.

Fractured Ribs

The patient should be put into a comfortable position, that does not impede normal breathing. If unconscious the patient should not be laid down on the injured ribs as this may cause further damage to the lungs.

Nosebleed

Nosebleed is best treated by sitting the patient up and leaning forward, not laying them down, and by pinching the nostrils until the bleeding stops. Cold compresses may also help, by causing constriction of the blood vessels.

Head Injuries

The patient must be kept warm and at rest, the use of alcohol as a stimulant must not be allowed. If unconscious, no form of fluids should be given and any obstructions must be removed from the mouth, eg false teeth, and make sure the tongue is forward. Place the patient in the recovery position.

Sprains

These are stretched or torn ligaments, the best treatment being to keep them firmly bandaged with a standard dressing, with a pad of the dressing over the area of the injury. A cold compress assists in reducing swelling.

Burns

Burns can be treated by flooding with cool, CLEAN water. This relieves pain, reduces shock and aids healing, if this is not possible, a standard burn dressing is the best treatment, laid on dry without any form of ointment. Blisters should not be broken. Do not remove burnt clothing, it may have adhered to the skin. If clothing is soaked in boiling water, this may be removed gently, as it will hold the heat.

Boils and Skin Eruptions

These may occur on skins not accustomed to rough clothing, limited washing facilities and the effect of sun and salt water, or through a change of diet and an excess of greasy food. Boils should be treated carefully, cutting away any hair, gently washing and drying the area and covering the boil with an Elastoplast dressing. Within a couple of days the boil will have resolved itself either by discharging completely or fading away under the dressing. It is best to allow nature to take its course rather than trying to hasten things by squeezing the boil. Once the contents of the boil have been discharged, the area should be cleaned and a new dressing applied to protect the wound.

Stomach Upsets

Most stomach upsets are due to indigestion brought on by over indulgence in fried food, stews and curries, the easiest meals to cook on board a small yacht. If the pain does not respond to a dose of bicarbonate of soda, or if the patient remains feverish after two or three hours, medical attention should be obtained as soon as possible. In any case aperients such as castor oil should not be given under these circumstances. Until treatment can be obtained the patient should be kept lying down and warm, and nothing given but liquids in small quantities.

Toothache

Aspirin or Codeine crushed in the mouth near the offending molar will often give some relief from pain, but nothing short of a visit to the dentist will remove the cause. Clove oil will give quick relief.

Fever

It is difficult for the layman to interpret a single reading on a thermometer. It is preferable to check a feverish condition by noting the patients' apparent temperature from signs such as perspiration, trembling and breathlessness. If the feverish conditions persist medical attention should be obtained as soon as possible. Liquids such as soup or beef tea may be given if the patient feels like it, but not if he also has a stomach ache. No form of alcohol should be given.

Choking

The patient should be bent over and given up to 5 backslaps followed by 5 abdominal thrusts, continue this cycle until obstruction clears or casualty becomes unconscious then CPR. If this does not remove the obstruction the patients mouth should be held open with a cork or piece of wood and have the back of the mouth searched with fingers in order to dislodge whatever is stuck there. Dentures lodged in the back of the throat are a common cause of obstruction.

Apparent Drowning

Unconsciousness and collapse due to apparent drowning and shock must be treated immediately by means of artificial respiration, which must be continued until the patient recovers or medical assistance arrives. Where no pulse is evident External Cardiac Massage must be applied immediately.

External Cardiac Massage

The patient must be on his back on a firm surface, e.g. cabin sole. Kneel alongside the patient's chest and place one hand over the other so that the heel of the lower hand is in the middle of the patient's chest. Push the chest down firmly about 4-5 cm and release quickly, at a rate of one push per 2 seconds. Push less hard in case of young children or if the patients ribs are cracked. Inflate the patient's lungs at least 12 times a minute - this can be done by a second person. A pink warm skin and constricting pupils are good signs, and returning consciousness means success.

Mouth to Mouth Resuscitation

PLACE CASUALTY ON HIS BACK IMMEDIATELY

Loosen all clothing around neck and chest, QUICKLY.

QUICKLY CLEAR MOUTH AND THROAT

By removing all mucus, food dentures and any other mouth or throat obstructions to ensure a clear airway.

TILT HEAD BACK AS FAR AS POSSIBLE AND PUSH CHIN UP

The head should be in a "chin up " or "sniff" position. Placing a pad under the back of the neck may help.

LIFT LOWER JAW

Grasp the jaw by placing thumb in the corner of mouth, and pull forward. Do not hold or depress the tongue.

PINCH THE NOSE SHUT WITH THE FINGERS

This is in order to prevent air leakage during resuscitation.
OPEN YOUR OWN MOUTH WIDE AND BLOW INTO THE PATIENTS MOUTH

Take a deep breath and blow into the patient's mouth until you see their chest rise.

REMOVE YOUR MOUTH AND LISTEN FOR EXHALATION
Quickly remove your own mouth when chest rises. Lift jaw higher if gurgling or snoring sound is heard.

REPEAT THE LAST TWO STAGES TWELVE TO TWENTY TIMES A MINUTE

Resuscitation must be continued until the casualty begins to breathe normally and regularly. Beware of any relapse, and keep the patient warm.

In case of an infant casualty, both the mouth and nose should be covered and sealed with your mouth, and gentle puffs of air blown in from your cheeks, watching the chest rise so that you do not damage the infant's lungs.

The current CPR cycle is 30 compressions to 2 inflations.

CHAPTER 34 GLOSSARY

ABAFT	Behind. On the after side of.
ABEAM	At right angles to the centreline of the boat.
AFT	Near the stern.
A HULL; TO LIE	To lie under bare poles.
APPROACHES	The waterways that give access or passage to harbours, channels, etc.
BACK	Change of wind direction in anti-clockwise direction
BACKSTAYS	Rigging leading aft from masthead to support a mast.
BAR	A shallow patch extending across some harbour entrances.
BATTEN	Flat stiffener to after edge (Leech) of a sail.
BEACON	A fixed artificial navigation mark, lit or unlit, set on the shore or rocks.
BEAM	Width of a boat.
BEAM-ENDS	A vessel is on her beam-ends when hove over until her decks are nearly vertical
BEAM, ON THE	In a direction abeam of the vessel.
BEAR AWAY	Turn away from the wind.
BEAR DOWN	To approach from windward.
BERTH; TO GIVE A WIDE	To keep well away from another vessel or any feature.
BEAT, TO	The process of gaining towards the direction from which the wind blows by sailing a zigzag course towards the wind.
BEND ON; TO	Secure a rope. To fit a sail.
BERMUDAN RIG	Rig where a tall triangular sail is set aft of the mast.
BILGES	Bottom of boat where water collects.
BLOCK	Pulley.
BLOWN OUT	A sail blown to pieces by a strong wind.
BOBSTAY	A stay holding the bowsprit down.
BOLLARD	Strong vertical post to receive mooring lines.
BOOMKIN	Spar extending aft of stern to which mizzen sheets are secured.
BOOT-TOPPING	A band of paint at the waterline between "wind and water".
BOSUNS CHAIR	Canvas or wood seat with bridle to carry a man aloft.
BOWSPRIT	Spar extending forward of bow to which headsails are secured.
BREAST ROPES	Mooring lines from the bow and stern of a vessel to a dockside or another vessel which prevents the bow or stern from swinging out. Used in conjunction with springs. (See definition)
BROACH; TO	To swing uncontrolled broadside to wind or heavy seas.

BULKHEAD	Partition separating different compartments of a vessel.
BULWARKS	A low wall surrounding the yacht, sometimes referred to as the TOERAIL on small yachts.
CABLE	A unit of measurement, being one tenth of a sea mile. (See Knot)
CARVEL-BUILT	Built smooth sided with planking edge to edge.
CATAMARAN	Twin hulled vessel.
CELESTIAL NAVIGATION	A method of calculating a vessel's position on the chart by measuring the angle of celestial bodies.
CENTREBOARD	Plate lowered through the bottom of a vessel to increase keel area.
CDI (GPS)	Course Deviation Indicator
CHART DATUM	A level so low that the tide will not frequently fall below it. It is the level below which soundings are given on Admiralty charts, and above which are given the drying heights of features.
CHRONOMETER	Special accurate watch or clock necessary for celestial navigation.
CLAW OFF	To beat or reach to windward away from a lee shore.
CLEARING MARKS	Selected marks, natural or otherwise, which in transit clear a danger or which mark the boundary between safe and dangerous areas for navigation.
CLINKER BUILT	Built with overlapping side planks.
CLOSEHAULED	Sailing as close to the wind as a vessel can lie with advantage
CLOSE-REEFED	Reefed down to smallest sail area.
COACHROOF	A part of the deck which is raised for increasing headroom inside.
COCKED HAT	The triangle sometimes formed by the intersection of three lines of bearing on the chart.
COCKPIT	Open area where steering is situated.
COG (GPS)	Course Over Ground.
COME ABOUT(or TACK)	To head the boat into the wind and then steer a course with the wind coming over the opposite side of the boat when beating or tacking to windward.
CONTOUR	A line joining points of the same height above or depths below, the chart datum.
CORIOLIS FORCE	An apparent force acting on a body in motion, due to the rotation of the Earth, causing deflection (e.g. winds and currents), to the right in the northern hemisphere and to the left in the southern hemisphere.
COUNTER	An overhang of the stern.
COURSE	The intended direction of the vessel’s head.
COURSE MADE GOOD	The resultant horizontal direction of actual travel. The direction of a point of arrival from a point of departure.

CTS (GPS)	Course to Steer
CROSS TREES / SPREADERS	Cross bars on the main mast to spread the load of the rigging and lessen strain.
CURRENT	The non-tidal horizontal movement of the sea which may be in the upper, lower or in all layers. In some areas this may be nearly constant in rate and direction while in others it may vary seasonally or fluctuate with changes in meteorological conditions.
CUT	The intersection on the chart of two or more position lines.
CUTTER	A vessel rigged with two foresails in line.
DEAD BEFORE	With the wind exactly aft of the vessel.
DISPLACEMENT	The weight of water displaced by a vessel.
DEAD RECKONING(DR)	Finding the vessel's position by using the compass, the log (or estimate of miles run).
DEGAUSSING RANGE	An area about 2 cables in extent set aside for measuring ship’s magnetic fields. Sensing instruments are installed on the seabed in the range with cables leading to a control ashore.
DEPTH	The vertical distance from the sea surface to the seabed, at any state of the tide.
DOWNHAUL	A rope for pulling down a sail or boom.
DRAUGHT	The depth of water occupied by a vessel at any time.
DSC	Digital Selective Calling.
EARRING	Rope used for bending a clew cringle to a boom.
ECHO SOUNDER	An electronic device which measures the depth of water under the sounding head by means of electrical impulses.
ESTIMATED POSITION (EP)	Vessel's position after wind and current effects have been applied to DR.
EPE (GPS)	Estimated Position Error
ETE (GPS)	Estimated Time En route
ETA (GPS)	Estimated Time of Arrival
FAIRWAY	The main navigable channel, often buoyed, in a river, or running through or into a harbour
FATHOM	A unit of measurement used for soundings. Equal to six feet.
FETCH	The area of the sea surface over which seas are generated by a wind having a constant direction and speed.
FENDER	Any device placed between a vessel's topsides and a jetty or another vessel to avoid damaging contact. Normally of tough plastic, air filled.
FILL	When the wind stretches the sheets and "fills" the sail.
FIX	The position of the vessel determined by observations.

FLUSH DECKED	Vessel without a coachroof.
FOREPEAK	The forward compartment of a vessel.
FORCE	A system of designating the winds force called the Beaufort Scale and graduated from zero (complete calm) to force 12 (hurricane).
FORE-REACHING	To make headway when hove to.
FORESTAY	The stay on which the foresail or headsail is attached and which also holds the mast upright.
FOLLOWING SEA	One running in the same direction as the ship is steering.
FREEBOARD	The distance from the waterline to the deck.
FULL AND BY	Closehauled on the wind with the sails filled.
FULL MAIN	A mainsail which is not reefed.
GAFF	The spar supporting the head of a gaff mainsail.
GAT	A swashway, gut or natural channel through shoals
GENOA	A large headsail overlapping the mast.
GIMBALS	Arrangements of suspending a ship's stove or lamps so that they remain level when the ship rolls.
GMDSS	Global Maritime Distress and Safety System.
GPS	Global Positioning System
GYBE	Turning the vessel so the wind will strike from the opposite side by turning downwind as opposed to tacking. Gybing is considered dangerous by many, but is only so when the crew is taken unawares. It is then called accidental gybing and a severe accidental gybe can dismast a vessel.
GOOSENECK	A swivel fitting that secures the boom to the mast.
GUY	Forward line to prevent a spar from slamming at sea.
HALYARD or HALLIARD	A rope or wire used for hoisting a sail.
HAND, TO	To lower, take in or furl a sail.
HANDY BILLY	A system of blocks and tackles to reduce the effort required to do any task
HARD	A strip of gravel, stone or concrete, built on a beach across the foreshore to facilitate landing or the hauling up of boats.
HEADS	The toilet.
HEADSAIL	Any sail set forward of the mast.
HEAD SEA	A sea coming from the direction in which a vessel is heading; the opposite to a following sea.
HEADING	Synonymous with vessel’s head.
HEAVE TO	To slow down a vessel by making one or more sails counteract the other. Heaving to also helps steady a vessel in strong winds and keep her head into the wind.
HELM	A vessel's steering device. Usually a tiller or a wheel.
IALA	International Association of Lighthouse Authorities.

JAMMING CLEAT	Cleat with V-shaped jaws that "jam" and hold a rope fast.
JIB	Triangular sail set at the forward end of vessel.
JURY RIG	Improvised rig to work a disabled vessel to port.
KEDGE	Auxiliary anchor for mooring a vessel.
KEDGE; TO	To carry out an anchor and haul or winch a vessel up to it, also used to moor for short stops.
KETCH	A twin masted vessel with the aft mast stepped forward of the rudder post.
KNOT	A nautical speed measure equalling one nautical mile per hour. A nautical mile is 6080 feet (1852m) and is the distance subtended by one minute of latitude.
KNOCKED DOWN	Violently heeled over and out of control.
LATITUDE	Degrees North or South of the equator.
LEADING LIGHTS	Lights at different elevations so situated as to define a leading line when in transit.
LANYARDS	Small lines to make anything fast. Formerly rope rove through deadeyes to set up rigging.
LEEBOARD	Large board that suspends over the side to lessen leeway, also bunk boards or cloths.
LEESHORE	A shore downwind of a vessel (no longer such a danger to modern sailing craft as it was to the square riggers, provided the wind is not so strong that no sail can be carried. However still beware).
LEEWARD	Downwind
LEEWAY	The drift of a vessel sideways due to the pressure of the wind. The smaller the keel the greater the leeway.
LET DRAW	To allow a vessel to fill on the correct tack.
LOA	Abbreviation of length overall of a vessel.
LOG	An instrument which measures the distance covered through the water.
LOG BOOK	Concise daily record of things of importance aboard ship, often abbreviated to log.
LONGITUDE	Degrees East or West of Greenwich Meridian.
LWL	Abbreviation for load waterline length which is the length of the hull immersed in water when the vessel is floating normally.
MAST TRACK	A track running up the mast to carry the luff of the mainsail.
MIZZEN MAST	The aft mast of a ketch or yawl.
MOORED	To secure a vessel, craft, or boat, or other floating object by ropes, chains, etc, to the shore or to anchors. Also, to ride with both anchors down laid at some distance apart and the vessel lying midway between them.
NAVIGATION	The art of determining a vessel’s position and of taking her safely from one place to another.

OUTHAUL	A line used to haul a sail out to the extremity of a spar.
OVERHANG	That part of a vessel which overhangs the water measured from the waterline of a hull.
PAY OFF	A vessel is said to pay off when her head falls away from the wind.
PILOT (Book)	A guide book for seamen describing the sea and coast.
PITCH	Angular motion of a vessel in the for-and-aft plane.
PORT SIDE	Left side of vessel looking towards the bow.
POSITION LINE	A line on a chart, representing a line on the earth's surface, on which a vessel's position can be said to lie, such as might be obtained from a single bearing, or an arc of a range circle.
POOPED; TO BE	To be buried below a wave, when running ahead of big seas.
PREVENTER	Extra rope to prevent spars slamming at sea.
PULPIT	Protective railing fixed to bows or stern (when known as stern pulpit, or colloquially, pushpit).
QUARTERING WINDS	A wind blowing from aft at about 45^{o} to the centerline of the boat.
REACHING	Sailing with the apparent wind 45^{o} either side of the beam.
REEFING	Reducing the area of sail normally carried.
RIDE TO THE ANCHOR	To lie at anchor with freedom to yaw and swing.
RIGGING	The fixed wires holding the mast upright are called the standing rigging. The ropes and wires controlling the sails are called running rigging.
ROLL	The angular motion of a vessel in the athwartship plane.
ROLLER REEFING	A device for reefing by rolling the mainsail around the boom, or the headsail or mainsail around a luff spar or wire.
RUNNERS	The stays holding the mast aft and which have to be quickly released each time a boat comes about. The weather runner is always tensioned.
RUNNING	Sailing before the wind.
SAMSON POST	Strong vertical post passing through the foredeck for making fast mooring lines or the anchor chain.
SCHOONER	Fore and aft rigged vessel with generally two masts in which the fore mast is no taller that the other.
SEA ANCHOR	A stout open mouthed bag used in stormy weather by small ships in an effort to slow down the boat by trailing the bag at the end of a heavy rope or the anchor chain.
SEACOCK	A valve bonded or bolted to the hull which can be shut off to prevent the inflow of water. Used in conjunction with sink outlets, toilet intake and outlet, cooling water intake etc.

SEA ROOM	Space clear of the shore which offers no danger to navigation and affords freedom of manoeuvre.
SET; OF THE STREAM	The direction in which a tidal stream or current is flowing.
SEXTANT	A navigation instrument used by seaman for measuring angles of heavenly bodies.
SHACKLE	A connecting link easily removed by unscrewing a pin.
SHACKLE OF CABLE	The length of a continuous portion of chain cable between two adjoining shackles. In British vessels the standard length of a shackle of cable is 15 fathoms (27.432m).
SHEER	A vessel is said to take a sheer if, usually due to some external influence, her bows unexpectedly deviate from her course.
SHEER LINE	The curved fore and aft profile of a vessel's deck.
SHEER STRAKE	The upper line of planking on a vessel's side.
SHEET	A rope controlling the angle of a sail to the wind.
SHIP'S HEAD OR HEADING	The direction in which a vessel is pointing at any moment.
SHOAL	Shallow water.
SHROUDS	The permanent wires supporting the mast on either side.
SLOOP	A single masted fore and aft rigged vessel with only one sail forward of the mast.
SOG (GPS)	Speed Over Ground.
SOUND	A passage having an outlet at either end. An arm of the sea or large inlet
SOUNDING	Measured or charted depth of water or the measurement of such a depth.
SPINNAKER	Large triangular sail boomed out on the opposite side from the mainsail when running before the wind.
SPRINGS	Mooring warps put out from the extremities of a vessel to the shore, at the opposite end of the vessel, to prevent the vessel surging backwards and forwards.
SPRIT	A spar which crosses a mainsail diagonally from the lower part of the mast to the peak of the sail.
STAND ON	To continue on the same course.
STARBOARD SIDE	The right side of a vessel when facing forward.
STAY	A fore and aft wire supporting a mast.
STAYSAIL	A headsail set on an inner forestay (from any mast).
STEERAGE WAY	The minimum speed necessary before the rudder will have control of the vessel's direction.
STEM THE TIDE	To proceed against the tidal stream at such a speed that the vessel remains stationary over the ground. Also, to turn the bows into the tidal stream.
STERN GLAND	A lubricated bearing at the point where the

	propeller shaft exits from the hull.
STORM JIB	A very small jib made out of heavy canvas and used in stormy weather.
SURGING	The horizontal movement of a vessel alongside due to waves or swell.
TACK	A yacht is said to be on port tack when the wind is coming from that particular side and the main boom is being carried on the opposite side.
TACKLE	A rope running through pulleys in order to gain a mechanical increase in power.
TOERAIL	See Bulwarks.
TOPPING LIFT	A rope or wire from the end of the boom to the top of the mast to prevent the boom from hitting the deck when lowering the sail, and to relieve the sail from the weight of the boom.
TOPSIDES	The side of the boat between water and the deck.
TRANSIT	Two objects in line are said to be 'in transit'
TRANSOM	The flat part of the stern of a vessel, at right angles to the fore and aft line of the vessel.
TRIMARAN	A triple hulled vessel.
TRIM	To adjust the sail for the best possible speed. Also to balance the weight in the hull.
TROT	A line or system of mooring buoys between which a number of small craft can be secured, head and stern.
TROUGH	The hollow between two waves.
TRYSAIL	A small sail of very strong canvas used instead of the mainsail in heavy weather.
UNDER WAY	When a vessel is not at anchor, or made fast to the shore, or aground.
UTC	Co-ordinated Universal Time. To pay out rope or chain. Also shift of wind in clockwise direction.
VEER	To pay out rope or chain. Also shift of wind in clockwise direction.
VMG (GPS)	Velocity Made Good.
WAY	The motion of a vessel through the water.
WARPS	Heavy ropes for towing or mooring.
WARP; TO	To move a vessel by handling warps.
WEATHER HELM	The tendency of a sailing vessel to try to turn up into the wind unless the helmsman holds the helm up.
WIND; HARD ON THE	When sailing as close to the wind as possible with advantage. PINCHING is sailing the vessel so close to the wind that the sails shiver. LUFFING is turning into the wind.
WINDLASS	Winch to haul up anchor and chain.
WIND-RODE	An anchored or moored vessel is wind-rode when heading, or riding, into the wind.
WORKING	The slight movement of the vessel's various parts

	which cause it to leak.
WORKING SAIL	The fore and aft sails ordinarily used under average force wind.
XTE (GPS)	Cross Track Error
YAW	Unavoidable oscillations of the vessels head either side of the course being steered or when at anchor, due to wind and waves.
YAWL	A twin masted vessel with the aft mast considerably smaller than the main mast. The aft mast is stepped aft of the rudder post.
The names of other parts of a yacht, sails and rigging are shown in the drawings in chapters 1 and 2.	