

## THE SAILING BOAT

**T**HE SAILING BOAT REFERRED TO IN THIS BOOK, which excludes all racing craft, is not a miniature yacht. Their functions are different; the boatman is dependent on the shore, and has to make his port in good time, the yachtsman can keep the sea as long as he likes. But a sailing boat, as I define the term, is not merely a small yacht stripped for action; the significant difference is in the method of handling them. The yacht is almost uncapsizable, and, if luffed head to wind, heavy enough to carry her headway for some little time after the sails have ceased to draw. The boat stops immediately the propelling force fails. In a yacht the main sheet is belayed, keeping the sail at a constant angle with her keel, and to spill the wind out of the sail in a squall she is luffed, or turned towards the wind's eye with the helm. In a boat the main sheet must be held in the hand, and with it she is played through a squall as a fish is played with rod and line, while she is kept sailing smartly all the time. It is fatal to luff, for if she loses headway she will not recover it till she has fallen off broadside to the wind, and if she is caught in that position with no way on she is easily capsized. Then, if the boat's sails have to be taken in, they must come in at once, while in a yacht there is never great hurry about reducing canvas. These considerations limit the size of a boat's mainsail and enjoin simplicity and certainty in working on her gear. As a set-off it should be remembered that the crew can get about their work with far more ease and safety in an open boat than on a small yacht's deck.

Safety first must be the rule in a small vessel, and the safety of a boat often depends on her ability to run for shelter from increasing wind and sea at a good speed. Since any mistake in the steering may be fatal, the boat should ease this task as far as possible by being steady and light on her helm; that is, by being of suitable design and in correct trim. When she is floating upright her trim can be adjusted by shifting crew or ballast, but when sailing she is heeled over, and the immersed part of her hull has quite a different figure; its centre must coincide with her original centre of buoyancy if her trim is to be preserved. That is not to say that her two ends must be identical, but they must not be markedly dif-

ferent; the narrow bows and wide quarters of many old boats make their hulls badly unbalanced. When heeled their bows sink, and at the same time fall slightly to leeward, and their sterns rise, and move a little to windward. Then either of two things may happen: the increased immersion forward may make the boat fly up into the wind, or, if she has a large fin keel, she may follow her nose and run further off the wind. Between them her steering will be most erratic. We cannot restore her balance by widening her bows above water indefinitely, as in a pulling or a power boat, or the lee one may scoop into a sea and swamp her, so we must narrow her quarters. Then, and then only, will she keep a steady course in all conditions.

A boat under sail is subject to other powerful forces. The increased pressure of the water on her lee bow not only pushes that to windward but lifts it, and at the high speed which can be attained by an unballasted craft she climbs out of the water and planes, her stern sinking to an extent dependent on the height of the centre of effort of the sails. I once had a twentyfour-foot whale-boat which, when running at over ten knots—she was capable of twelve—showed only a few inches of free-board aft, which brought a following sea alarmingly near; but the fact that her stern would sink so far indicated a fine run and narrow quarters, and a consequent absence of wave-making, the chief cause of pooping and of bad steering which leads to broaching to or an unintended gybe. On the other hand, in a short boat with a tall mast well forward in her the depressing effect of the sail-pressure will exceed the lifting effect of the water-pressure; she will go down by the head and become unmanageable, and indeed dangerous with a strong wind abaft the beam.

Boats meant for smooth-water sailing tend to have a lofty rig, for windward efficiency, and great beam, to counteract the leverage of the long mast. But compared with a longer and narrower boat of the same weight and capacity the beamy boat is a poor performer with a free wind, and may be actually dangerous in a rough sea. Her stability is great at small angles of heel, but it soon vanishes. A shallow, flat-floored vessel always floats normal to the surface of the water, at whatever angle that may be; as a steep beam sea passes under her she takes a great list to leeward. As she tops the rise a big expanse of her bilge and bottom is exposed to the wind, and a very small breaking crest on the wave finishes the job of rolling her right over. This has occurred to vessels of some size but of shallow

form, which have broached to when running under bare poles. Length as well as beam contributes to stability, but to a lesser extent, and in a degree which varies with the boat's size; a small boat must be proportionately wider than a large one. A twelve-foot boat would hardly have less than 4 feet 3 inches beam—the four-foot beam I advocated in the preceding chapter was for a rowing boat—while my twentyfour-foot whaler had only 6 feet, and she carried more than 200 square feet of sail on long open sea passages, some of them dead plugs to windward. It is a pity that small boats, of every type, are so much the fashion; they are not cheap, for a costly and complicated rig is required to show off their virtues in the one kind of sailing in which they excel. In a seaway, longer craft, more simply rigged, might hold their own even to windward because of their greater speed, and with the wind free there is no comparison. I do not deny that a racing dinghy will plane, and may therefore attain any speed, but it can seldom be safe to allow her to do so. The canoe for which Uffa Fox claims sixteen knots was 17 feet long and 3 feet 6 inches wide. My whaler felt perfectly safe at twelve, with the wind on the quarter, provided there was room to run her off dead before the worst seas.

A long boat, having easier lines, does not want as much sail to drive her as a shorter one of the same weight; and since her sail can be spread out fore and aft instead of towering upwards, her lack of beam is no disadvantage. Her length allows fine lines aft, and the stern is generally allowed to be the most important part of any craft, though, because it is the custom to sell boats by length, it is too often docked most objectionably for the sake of economy. I have a preference for a sharp or whale-boat stern, not due only to sentiment—my whaler was my first and most enduring love—but because it is a safer buy than a transom stern. There are many degrees of suitability in a square stern, and that of the racing dinghy, nearly as wide and flat-bottomed as a speed-boat's, is not suitable for our sea-boat. Her stern should be narrow and triangular in section, so that when she is heeled she puts no more of it into the water than when she is upright. The construction of a sharp stern practically requires such sections, and if they are distorted the result is so conspicuously ugly that the boat is rejected without hesitation. There is no reason why the same sections should not be finished with a narrow triangular transom, which is lighter and cheaper than a sharp stern and has the great advantage of giving the sheets a better lead, but in spite of all logic it isn't done.



A transom should be well above the water when the boat is on an even keel, but if she trims much by the stern when planing it will, of course, be more or less immersed. A slight immersion does not matter, because at high speeds the water leaves the stern cleanly and without eddies and hardly touches the flat transom. But if the immersion is considerable the water pours in behind the transom and a great mass of it is dragged along behind the boat. All this perhaps seems rather theoretical, because common boats very seldom attain planing speeds, but their transoms ought to be small and high enough to keep them out of the water in all normal conditions. It is because this rule is so often neglected that I say the whale-boat is the safer buy.

A word of warning about sailing boats built for rowing only. This is by no means an unprofitable amusement. Neither my twentyfour-footer nor my twelve-footer ever had sails before I bought them, but both proved quite conspicuously successful. But they were not constructed to stand the strains of the masts—in the case of the larger boat pulling against nearly half a ton of crew and ballast—when driven hard, and sooner or later they developed weaknesses. The case of the larger one is the commoner. She was rigged with two lug sails, the mainmast stepped through the second thwart and stayed with wire shrouds. The luff of the jib served as forestay, but the mast thwart showed no tendency to shift fore and aft, for it was connected by a centre plank to the bow thwart. Now that boat's bottom had been stiffened, to resist the strains of grounding, those most likely to occur in the coastguard service, for which she was built, by half-frames or floors between all the common frames, extending as far as the turn of the bilge. When she was sailed hard the shroud pulled her weather side inwards, while the mast thwart pushed her lee side out; the stiffened floor could not bend, so she bent at the turn of the bilge, and in the course of time broke most of the frames along that line. A boat with a hard bilge would be particularly liable to this straining, so some extra strong frames extending from keel to gunwale should be fitted in the way of the mast.

I sailed a twenty-footer during the last war with the whaler's mainsail, which I admit was a bit big for her, on a mast stepped through a thwart; it had no permanent shrouds, the halyards being expected to serve the purpose. That thwart came adrift altogether, being fastened in the usual inadequate way, that is to say, it merely rested on the risings or stringers and was only held in place by single

fastenings through the knees and the gunwales seven inches above it. In theory it was kept from shifting fore and aft by having its ends notched to the frames, but they were very thin frames, and rounded at that, so they soon slipped out of the notches. It should have been easy to screw the thwarts down to the risings, and to put a fastening in the knee as low down as possible (Fig. IIc). But builders generally round off the risings as well as the frames. When I build a boat I leave the rising square and thick enough to hold a good fastening; and I make the frame in the way of a thwart, flat and extra wide, and fasten the knee to that as well as to the gunwale. One knee so fitted is stronger than the usual two as usually fitted, and only half as much trouble to make.

As well as the obvious transverse and fore and aft strains a boat under sail is subject to diagonal ones, but it is very exceptional to see these guarded against by fitting horizontal or 'lodging' knees to the thwarts. It is not much trouble to prolong the life of a boat which really suits one and is in other respects well-built, by these simple additions.

A boat of 14 feet or less is I think best rigged with one sail on a mast right up in the eyes of her. There is no thwart there to support it, but we can put in something much better (Fig. IIb). The mast is clamped to a beam fastened across the gunwales. As one of the virtues of an open boat is that you can go unobstructed from end to end in her, this beam is only tolerable right forward, where it impedes neither the working of the ship nor landing on a beach; a mast amidships must be clamped to a common thwart. The exact length of the mast below this beam will of course depend on the shape of the bows, but it is not likely to be less than 18 inches. The length from a thwart to a mast-step under it would be 12 inches or less. That means that the leverage on the forward mast-clamp is only two-thirds of that on a thwart, and the mast will stand up without any stays, which indeed would be useless there, for they would have no spread. The structure is properly triangulated; the mast-beam makes with the gunwales converging to the stem a horizontal triangle, and with the bow frames converging to the keel a vertical one; the mast could hardly move in respect to the stem. But it is now a lever applied to one end only of the boat, not to the middle of her, and it must put a great twisting strain on her. There is no way of counteracting this; she must just be strongly enough built to stand it.

Most people, when they think of a sailing boat, think of a centreboard. But it is not easy to put a centreboard into an old boat without weakening her. One could of course add enough stiffening to make her actually stronger than before, but it is likely to be a clumsy job. It can be made a very much smaller job if one uses a dagger-board or drop keel instead of the pivoted centreboard; the slot in the keel need not be more than a foot or so long. This handy and economical device has only one fault; it does not rise up when it hits a rock, as a centreboard is supposed to do. For that reason I would not make it of metal, which might bend and jam, but of very thin wood, which is certain to break (though in point of fact a boat I built some fifteen years ago has broken only one of them). But the simplest and cheapest way of making a boat sail, because it entails no structural alterations at all to her, is to fit her with a leeboard, as will be described later (p. 76 and Fig. VII D).

When choosing a boat one should ask one's self—though apparently it isn't always done, or there would not be so many misfits—What do I want her for? Is it to get me somewhere, or just to go sailing in? If it's the first, shallow draught is the most desired feature. You haven't got anywhere if you can't reach a landing-place and there isn't a longshoreman within hail. Do not sacrifice your greatest advantage over the owner of the small yacht, which is the most inefficient sort of craft. A good open boat can beat him, except on a turn to windward—and can probably do so then, if he's towing a dinghy nearly as big as his yacht in the open sea. The second essential is lightness. A boat is not a yacht, and it is no good pretending she is by cluttering her up with gear and gadgets. No boat is fit for the sea unless she can be got into port with a pair of oars, but how often one sees perfectly good hulls so loaded and obstructed by vain additions that they cannot be pulled at all! They are given motors, and that damns them, as boats, for all time.

It is not only for the sake of rowing that a boat should be kept light. If she is used on a coast ill-provided with deep-water creeks and harbours she must be beached some time; if in an estuary with a big range of tide she will spend half her time on a mud-bank, and her owner doesn't want to have to wait impotently till she floats. He must be able to haul her up or at least to launch her with the help likely to be available. As a general utility boat she must be strongly built, so her

size will be limited by the weight her crew can handle and by the nature of the coast she is used on. My twentyfour-foot whaler was my ideal sailing boat, but we nearly always managed to keep her afloat. If we were left on a sandy beach we were in trouble, because even with all the ballast and spars out of her she was too heavy to move, and of course hauling her up was out of the question. Two of us could handle that twenty-footer I mentioned on a beach, and beaching, if there is any surf, requires a crew of two, even for a much smaller boat, so it looks as if 20 feet was a suitable maximum for that kind of work. She was a very able boat, and put in some hard war-service in a Hebridean winter, though I never had quite the same confidence in her as in the larger whaler.

Both of these were entirely open boats, with no other additions than their centreboards, with the help of which they would work to windward fairly well against the big seas of the Atlantic and even against the chop in the Minch, and they were incredibly fast off the wind. Does any reasonable person want more, unless it be a wholly decked yacht big enough to live aboard? If you are going to camp out under an awning there is more room in a boat 24 feet by 6 than in one 18 by 6 with 6 feet of a rabbit-hutch in the bows of her, which seems to be the popular type. Boat-sailing in a climate where you can't guarantee fine weather must involve some risk of discomfort; do not let vain precautions against it interfere with sailing qualities.

The half-decked boat claims two advantages, one of which is more apparent than real. She throws off any water that may come over the bows—but does anything more than spray come over them? I think before it did it would come over amidships—and that if she has side decks you can safely carry on with the gunwale awash. I question that word 'safely'; side decks are a temptation to heel a shallow boat beyond her limit of stability in a seaway. In fact they reduce potential stability, for the crew does not generally sit right out to windward on them.

The other claim is a good one. The mast is clamped to a deck-beam, not to a thwart; a much stronger job, if the beam is properly fastened; and the same beam stiffens the gunwales against the pull of the shrouds. This is a real sailing boat, with worthwhile rigging, and, so, no mechanical limit to the height of the mast. The owner is tempted to go modern, and ship a towering stick with a tall narrow sail on it. Whether this is a good rig for sea work I shall not discuss here; I am

only concerned with the position of the mast. We are free from the small yacht's temptation of putting it right forward to keep it out of the cabin; we can follow the old rule for cutters and put it at two-fifths of the water-line length from the bow, or, since the taller the rig the farther aft the mast should be, even right amidships. But then we are up against a practical difficulty, the disproportion between the sails; the mainsail, safe and easily handled, too small, and the headsail, difficult and dangerous—indeed the most frequent cause of dismasting—too big. Personally I would keep the canvas, of any boat low, so as not to impair her stability, for I want plenty of it, to take advantage of a fair wind, since windward work is apt to be unprofitable; and I would keep the units small, for easy handling. I would rig any boat more than 20 feet long on two masts.

Unless the fittings on the stern absolutely preclude it there ought to be a rowlock on the transom so that if necessary one could steer with an oar. The rudder of a shallow boat, hanging down below the keel, is liable to be broken or lost; or, when she is running before a very steep sea, it may come right out of the water at a critical moment, and let her broach to. On one such occasion I felt that the situation was saved only by a sixteen-foot steering oar. Let it be the longest oar on board. It isn't an easy thing to handle anyway, and unless the boat were very light on her helm would not be much good in a strong beam wind.

Sixteen feet is a good length for a pair of oars for a boat of 6 feet beam, and there should be a 10-foot pair of paddles. But observe that if you have side decks the beam, as far as the rower is concerned, is only the width between the coamings, and wherever you put the rowlocks you do not get a really free use of the oars; another argument, if one were needed, against side decks. Oars may be used only in a calm, but there may be no wind and a great deal of sea, and the tide sweeping you on to a reef; then you want to be able to get your oar into the water and out of it again at the right time, without being hampered by obstructions in the boat.

A boat will handle all right in smooth water without ballast, but it is heart-breaking trying to get her to windward against any sea if she is light. In my twenty-four-foot whaler we carried 5 cwt. in the form of iron 56 lb. weights, rectangular, with fixed handles, very handy for shifting—we trimmed them across when tacking—and useful for mooring, but it was not enough when I was alone in her. Some

people object to iron ballast in an open boat. They can use water ballast in petrol tins, which has the advantage that if you are becalmed you can pour the water away. But 20 or 30 take up a lot of space, and you don't want to throw them away at three shillings a time. Good heavy shingle in small sacks makes the best ballast; the empty sacks take up no room, and you can get the shingle almost anywhere.