

FITTING OUT

Rigging & Spars

by Peter Barnes

The rigging and spars of the Mirror Dinghy, although of a one design, can, because of certain optional features, become a little varied and correspondingly confusing for the beginner. The keynote for the efficient rig is simplicity, to ask yourself "is it easy to use?" and "is it absolutely necessary?"

In the following, I have tried to pick out some of the best ideas.

Mast

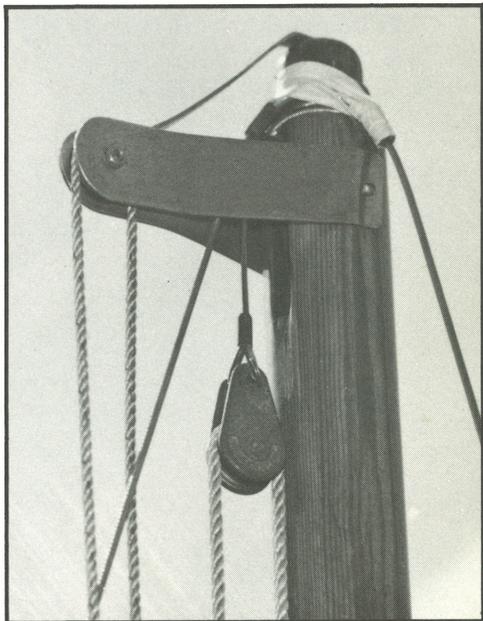
Whether fir or spruce it should be straight and stiff, adjusted on the stays to give a slight rake aft. Metal masts should be of minimum weight permitted in the Rules with hard wearing mahogany end pieces. The position of the mast step on the foredeck should initially be in the mid position of the tolerance, the best reason for this is that two particular past National Champions have theirs at the extreme opposite ends.

Fittings

Halyard cleats. Best buy are the Clamcleats Junior with lead set at 90 degrees to each other facing aft, this stops the jib sheet catching when tacking.

Spinnaker pole fixing eye. Choose one that the jib does not snag. The position of this fitting should be about 6– 8in. (153 mm – 204mm) above the gooseneck, depending on whether a crane is used or not.

Spinnaker cranes. It is essential to prevent the halyard snagging on the spars by using a crane or a strop similar to that used for the jib.



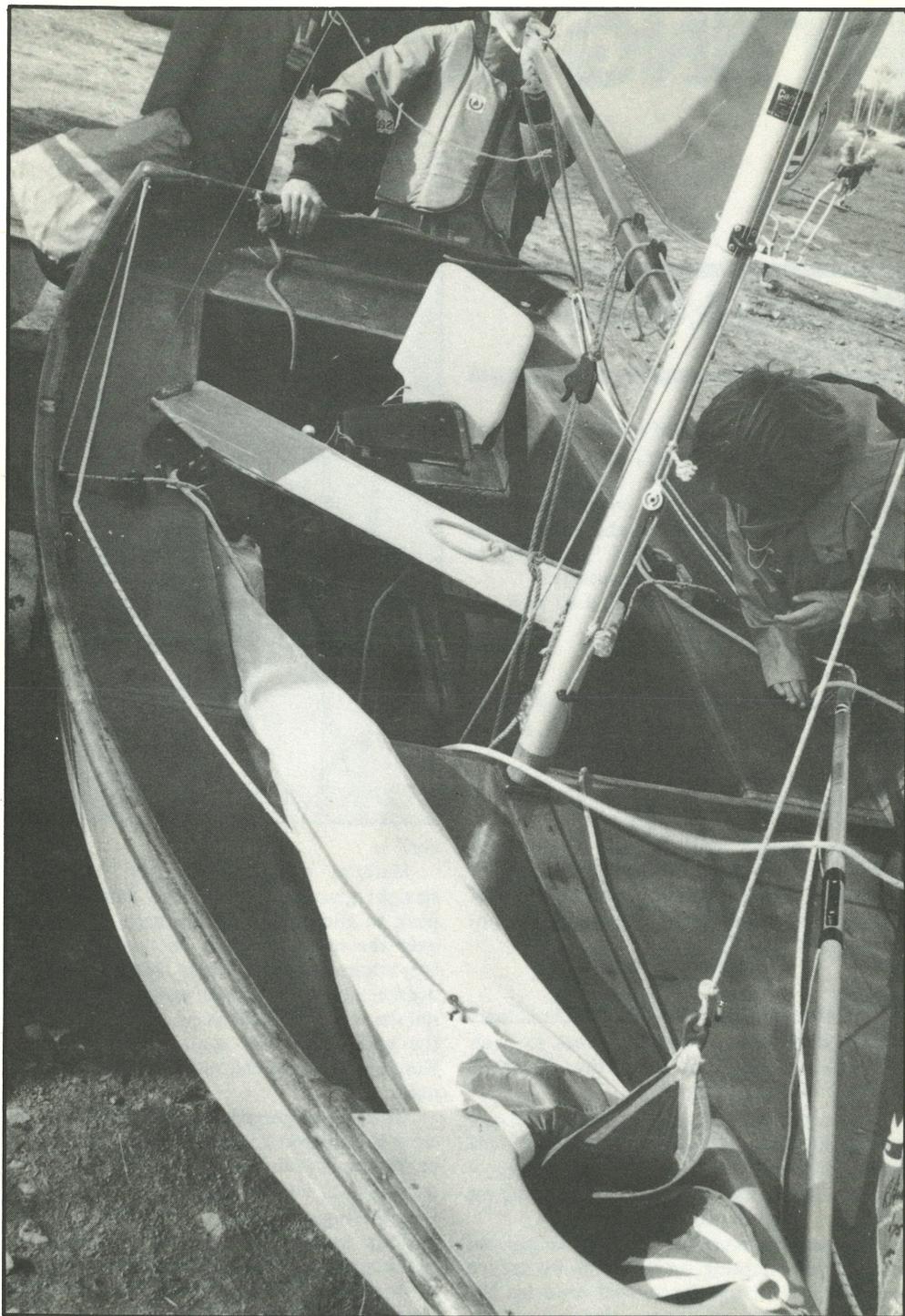
Gaff

Material should preferably be spruce, straight grained, and tapered from band to peak to allow the easiest passage of the wind over the spar. It would be unwise to go to the minimum tolerance as this would give a degree of bend which would destroy any sail shape set up. Bear in mind the bending of the gaff is a buffer against strong gusts of wind so reducing the resultant shocks to the mast.

While some people believe the lighter the crew the thinner the gaff, I prefer my gaff to be in the middle of the tolerance allowed, regardless of crew weight.

Gaff Fittings

Gaff band. The stainless steel type has advantages over the brass, enabling the gaff to be held closer to the mast, and has less tendency to bend out of shape.



Boom

Material preferably spruce, full size and straight.

Boom Fittings

Outhaul. This permitted fitting allows easier adjustment to the fullness of the mainsail and consists usually of a length of track, a single pulley, dead eye and cleat. This arrangement, however, if fitted badly can be dangerous. The pulley, if fixed on the side of the boom and not protected with a guard, could catch someone else's shroud and dismast them, also as the boom is at head height, lead cleats forward of the kicking strap block, or only fit them on top.

Downhaul. This fitting is to allow the flow of the mainsail to be moved fore or aft; by tightening the downhaul the flow is moved forward. The best is once again the simplest; from a dead eye on top of the boom a cord is passed through the tack back through the dead eye or a cheek pulley on side of the boom and then to a cleat.

Mainsheet block. Simple single pulley type positioned vertically over the transom to give a downward pull and not a combined forward and down.

Kicking Strap. Tensioned according to the strength of the winds, very light winds — no tension. Heavy winds — arm over the boom tension. Expensive goodies are not necessary, a clamcleat and pulley are quite adequate for the job.

Hull Fittings

Mainsheet block. It would be advisable not to use the swivelling becket type, but to tie with nylon cord and seal to a dead eye, this will give the right amount of flexibility without the tendency to spin or jamb over.

Shroud Plates. Chain plates are the best buy to give adjustment to the standing rigging as they are relatively fool proof. Bottle screws are, for the Mirror, expensive and totally unnecessary. The standard method of tying the forestay is by far the best as it allows a tight rigging but will stretch under load taking unnecessary strains from the mast.

Shrouds

The 'as supplied' galvanized are more than strong enough for the job and should last at least three to four years before considering replacement; as opposed to stainless they

will show obvious signs of deterioration before failure and apart from appearance are adequate for the job. When stainless are used, which I personally prefer, a good buy is 3/32in. dia. or 2.5mm with the jibstrop and forestay combined.

Halyards

Pre-stretched or non-stretch Terylene is the best to use; light for the jib — say — 4mm and 6mm for the main.

Jib Sheets

As with the main, it is sometimes a disadvantage to have several different thicknesses to choose from, particularly choosing your ultra light hollow sheets to go to sea on a hot summer's day chasing zephyrs, when at the finish of a race a gorilla on a trapeze wire would be more helpful. Choose a sheet easy on the hands of an average size about 12mm braided and stick with it.

The Hull

by Derek Beere

The hull of your boat will need careful attention if you want to win races.

Start by checking the alignment of your skeg and rubbing strakes. Just sight along them. If you cannot see an obvious error then there is nothing to worry about. The slot in the skeg will need to be faired off fore and aft and the trailing edge radiused as much as permissible. Ensure the leading and trailing edges of the bilge pieces are faired off. Check that most, if not all, the hull taping is smooth.

Go over the hull surface, filling any blemishes in with Plastic Padding or similar fillers, followed by rubbing down with 400 or 600 wet and dry. Do not worry about lumps or bumps provided the surface is smooth. For polishing, use metal or car polish — it does help.

On the inside, the hull will need a non-slip surface on the floor. The cheapest is sand or sawdust sprinkled on wet varnish.

A self-bailer fitted level with the aft end of the centre board casing, is a great help in strong winds. In these conditions, toe straps are also important. The fitting of these has to suit individual requirement, but do not skimp. Look at other boats and ensure that

your toe straps inspire confidence in a force six or seven. Seepage into the buoyancy tanks should not be tolerated. Find out where it is getting in, seal up and paint over.

Most hulls weigh over the minimum, but do not have the heaviest hull in your Club. Use lightweight fittings and keep everything simple.

Storing the hull under cover between races helps it to dry out. With careful launching and recovery a hull that has been brought to racing trim will require very little effort to keep it that way.

Centreboard and Rudder

by John Reece

The centreboard and rudder should be the maximum size allowed by Class rules. The leading edge of the centreboard is rounded and the rear is faired off from two inches (51mm) in, to a one eighth cut off (3mm). This one eighth width helps to prevent the shock-cord being cut when raising and lowering the centreboard; it also creates less turbulence as the water flows off the board. The rudder should also have a rounded leading edge. The trailing edge is faired off, but here only one inch (26mm) fairing is allowed. Together, the centreboard and rudder blade add up to over seven square feet of wetted surface area; as smooth a surface as possible should be obtained. The smoother they are the faster you go.

Too much sloppyness at the tiller caused by wear in the tiller slot and rudder head is best eliminated by screwing and glueing them together. Although this makes it more difficult to stow in the boat or boot of the car, it is well rewarded by the absence of free movement, which is essential for good helming.

You will need a 2in. (51mm) number ten countersunk stainless steel screw, Araldite or Aerolite 306 glue, a 1/8in. (3mm) and a 7/32 in. (5mm) drill and a countersink bit. Assemble the tiller and rudder using the pin to hold them together, line up the tiller with the rudder blade. Using the 1/8in. drill, drill a pilot hole roughly two inches deep half an

inch behind the tiller slot. Remove the tiller and drill through the tiller pilot hole with the 7/32in. drill then countersink the hole just deep enough to take the screw.

Using coarse grit sandpaper, rub down the faces to be joined. Following the makers instructions, glue the tiller to the rudder, holding them in place with the stainless steel screw. When the glue has thoroughly hardened, cut off the rudder tongue which projects through the tiller, at the same time cut off the end of the tiller which overhangs the rudder stock – there is nothing the main sheet can catch on to. Now sandpaper smooth and varnish.

Another cause of free play is wear in the rudder pintles. Too much wear, and the extra strain in strong winds, when you're both hanging out, will snap them off.

It's quite probable you will then capsiz. Even if you do manage to stay upright your racing is over. In a National or Area Championship that's a day's enjoyment spoilt.

Sails

by Roy Partridge

They are the only part of the boat to promote forward direction using hull shape, centreboard and rudder to convert this power to sail against the wind, so are we getting the most out of our sails?

Mainsail

Slide the head up the luff groove of the gaff and tie to the peak so that the head of the sail is no higher than the bottom of the black band when under tension.

The gaff is partly raised to facilitate winding the rope on the sail below the gaff jaws loosely round the mast without trapping underneath any halyards or downhauls. Raise the gaff until tight against the mast, slip the downhaul round the eye on the boom and into the clam cleat. Also tie the bottom of the tack round the mast. Both ropes around the mast need to be tightened without distorting the line of the luff. Shackle the clew of the sail to the outhaul. Now all you have to do is adjust the downhaul and outhaul to obtain maximum drive. For medium airs, maximum camber should be

about 12in. (305mm) away from the boom, slightly less for heavy airs and a little more for light airs. The maximum camber when sailing should under all strengths of wind be on, or just ahead of, an imaginary line drawn from the peak of the sail down the middle to the foot. Except under the lightest of winds, try and remove any wrinkles on the sail by adjustment of downhaul and outhaul. The tension of the kicking strap will pull the gaff down and away from the mast enough for most airs, but in the lightest of airs let off the main halyard by about 1in. (26mm) instead. The top batten must be very flexible and the forward ends of the other battens should be well thinned. It is far better to be a little shorter in length than too long. If the sail does not look smooth and curvy, work on the basis that it is far more likely to be you that's wrong, not the sailmaker.

The jib's job is to deflect the wind faster on to and over the leeward side of the main in order to lower the pressure, increasing the pressure difference between leeward and windward side of mainsail and therefore drive. With the simple and efficient fittings mentioned under 'Rigging,' it is fairly easy to adjust your sails on the water providing it is not blowing a gale — so always try and improve the shape and drive.



Although the jib is so small compared with the mainsail, on beating it helps to develop power from itself and the mainsail far in excess of its size. Make sure that you adjust the main in conjunction with the crew's jib who is endeavouring to keep it full while the helm pinches too much again and slows down.

The jib luff takes some of the strain on the forward shroud when beating to windward, as the pull down on the boom from the mainsheet is quite considerable. If the non-stretch tape on the luff takes too much strain, you will cause a gully to form behind the luff tape and spoil your windward performance. Providing the jib is attached as low as possible to the deck and the mast raked back a little, the jib sheet will be pulling equally on the foot and the leech if the fairlead is where it was designed to go on the boat. If not, move fairlead back to reduce tension on the leech, and as this hollows out in strong winds it will lessen any backwinding of the main. Aim to get a flattish jib shape as this seems to increase windward ability and speed.

Now that the sails are pulling well, your position and weight in the boat must be considered to reduce friction as much as possible.

On beating:—

1. Keep the boat upright above a Force 1.
2. Anticipate gusts by leaning into the wind as it hits you.
3. Shelter behind the crew so that there is only one body in the wind.
4. Sit in the bottom of the boat in light winds.
5. Have your weight well forward in flat seas.

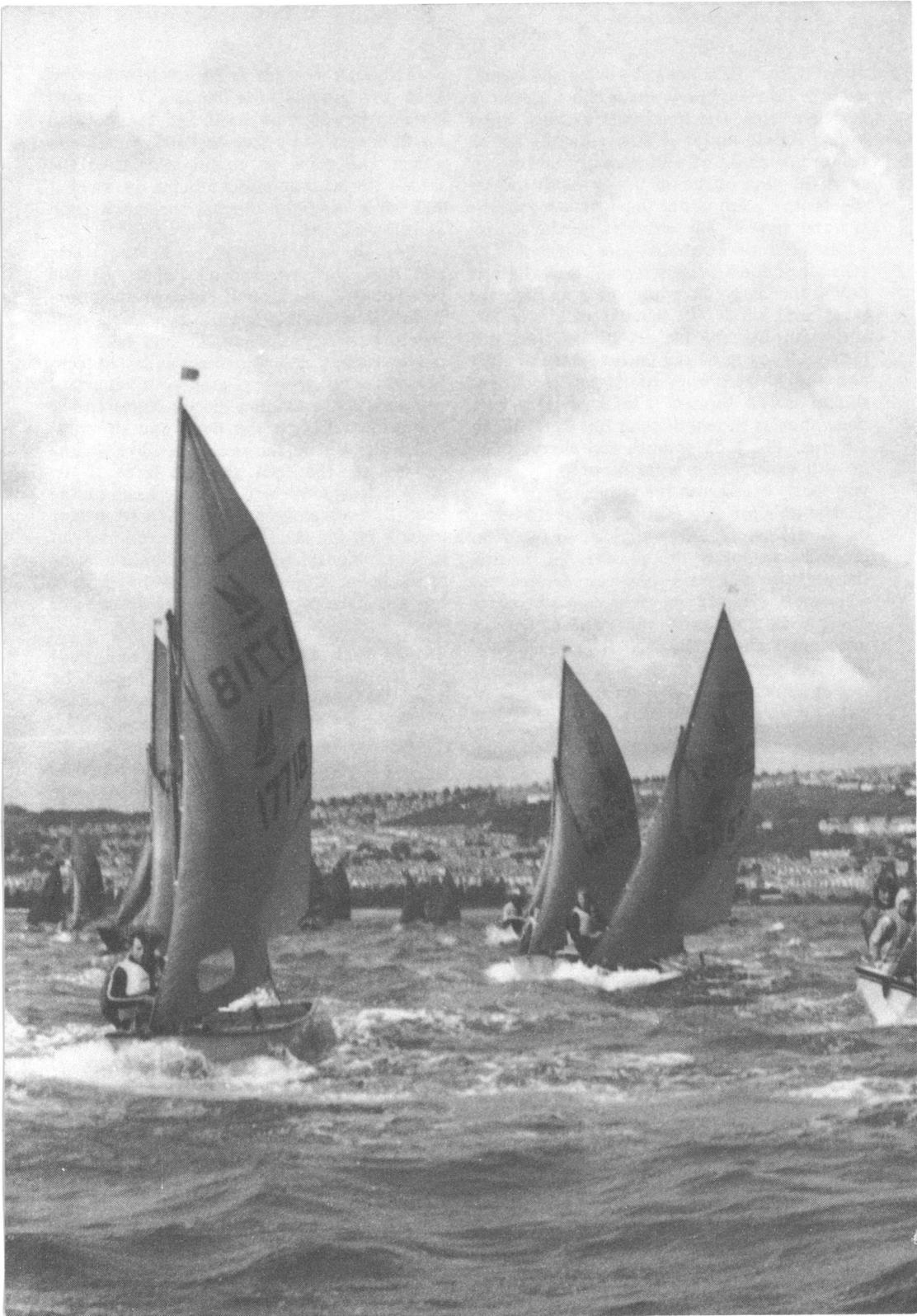
On Reaching:—

Much the same as on beating except 3 is not very practicable and in 5 your weight comes back with strong winds.

6. Downhaul and outhaul may be slackened off slightly, provided they can be re-adjusted easily for the beat.

On Running:—

7. Lean boat to windward until the boat stays on a straight course without pressure on the tiller.
8. Weight well forward except in strong winds.





Sail setting

by Raymond Jeckells

Sails are very much like the English weather, they are always changing and are a never failing prime topic of conversation particularly in Yacht Club Bars after a big race. Consequently with such a propensity of talent expounding their knowledge on this subject it is inevitable that any article on sails will cut across the ideas and theories of a number of people. I have endeavoured to set out below tips and suggestions which I hope will be found generally useful.

At the present time, every Mirror sailing dinghy comes equipped with a suit of our standard sails. Both boat and sails are built in large production runs and inevitably we are encouraged to keep the price of our products as low as possible so that the boat may appeal to a wide range of enthusiasts. Over the years we have improved and altered our manufacturing techniques, so that we now give extremely good value for money. Obviously in a production of this type we are only able to make sails to a specific shape and it is not practical to vary this to suit individual requirements.

During the course of production runs, a frequent periodic test is taken to ensure the standard is maintained. The Mirror mainsail is notoriously difficult to set efficiently, but this also means that it is capable of a number of variations which allow for different shapes to the same sail to accommodate different conditions. For the complete beginner we suggest that the sails are set in accordance with our detailed leaflet. It is usual to set the jib first and to get the best performance it should be hoisted so that the luff is as straight as possible under all conditions.

The mainsail requires a different technique. Basically this requires that the mainsail head be drawn along the gaff to the top black band (after the insertion of the battens). The tack should be attached with 100 – 150mm freedom; and the clew loosely attached to the aft end of the boom. The mainsail should then be hoisted so that the main halyard shackle is as nearly through

the mast sheave hole as possible thus ensuring that the gaff is virtually upright and is hard against the mast on all points of sailing.

The tack of the sail should be tensioned to the boom so that a girt or strain line appears from the peak to the tack (this can be varied later to get a different shaped sail for different winds). After this the clew of the sail should be hauled along the boom so that the foot is just tight. Incidentally, it is a good idea, when using the standard equipment, to use the two ends of the line on the clew for different purposes. One to haul the sail aft towards the end of the boom and the other to be lashed around the boom pulling it up to the foot of the sail thus increasing the headroom for the helmsman. The luff lacing should be passed around the mast through the next eyelet below and so on down to the tack corner tensioning it in such a way that it just holds the luff at its natural distance from the mast – no attempt should be made to draw the luff into the mast as this will set unfair strainlines into the sail.

The sail, having been tensioned and hoisted as above, should fill out into a reasonable curve when on the wind, and the greatest depth of flow will be approximately 60cm aft of the mast. Experience will soon enable the helmsman to adjust the tensions at the tack and clew corners, so that the flow position is varied to suit the prevailing wind conditions. Decreasing the tension on the luff of the sail will make the sail set with greater flow depth and will move the flow further aft. Increased tension will have the reverse effect. Generally speaking a full sail is required for downwind and lightweather sailing and a flat sail is required for windward work and heavyweather sailing. Finally the kicking strap should be tensioned so that the twist in the mainsail is reduced to the minimum. By twist we mean that the leech at the top twists out of the plane of the foot and boom. Thus with the addition of the sheets the boat should now be ready for sailing.

In drafting these descriptions a conscious attempt has been made to keep to the standard equipment supplied with the boat, but one of the joys of this dinghy is the ability to add simple improvements to the rig whilst maintaining the strict one-design principles, thus allowing the ingenious to

exercise their talents and the mere mortals amongst us to copy them slavishly, thereby effecting an all round improvement in the handling of one's boat and equipment. Given below are one or two simple sail setting devices to make for better sail 'handleability.' A thicker tack line fastened to the boom on one side of the sail, led up through the eye in the tack of the sail, down through an eye on the other side of the boom, then aft to a suitably placed jamb cleat, will enable the helmsman (or crew) to adjust the luff tension while underway without greatly upsetting the balance of the boat, i.e. producing a Cunningham hole effect.

Many methods have been tried which enable the gaff to be hoisted more vertical than the standard equipment allows. Perhaps the most simple is for a flatter brass or stainless steel gaff span to be employed and the halyard knotted through this span rather than attached to the shackle as in the normal equipment.

The other moveable point on the mainsail is the clew outhaul: a short (25cm) length of mast track and slide attached to the top of the aft end of the boom, with a line from the slide through a small fairlead at the aft end of the track forward to a jamb-cleat positioned for easy adjustment by the helmsman (or crew). This should be coupled with a piece of strong shock cord which is led from the slide forward and fastened with sufficient tension to make the outhaul slide forward when the aft tension is released. The clew can then be shackled or tightly lashed to the slide and the tensions readily adjusted. One of the proprietary single purchase kicking strap blocks with integral jamb-cleat, makes the kicking strap very much easier to handle.

A jib window, while not really essential for sailing in open waters, gives one a feeling of added security when manoeuvring close. Incidentally, the Rules allow for a window with an internal dimension not exceeding 457mm. A round window is the largest one allowed, but this is a large slice out of a small sail and we recommend a rectangular window to be the most suitable.

Sanding down the inboard end of the battens so that they blend more readily into the sail, at the forward end helps the sail to set, although there are now a number of

fibreglass battens on the market and these are very successful, and are usually obtainable in different degrees of stiffness. It should be noted that Mirror Rules stipulate that batten pockets must be of the standard width and, therefore, if one is using a narrower batten it is best to use it in conjunction with the spade ends as an additional item. We recommend that the more flexible type of battens are required but it might be found that the centre batten could be a stiff one.

Spinnakers

A spinnaker, while not being part of the original equipment of the boat, is a must if serious racing is contemplated. The standard pack for the spinnaker comprises the sail complete with guys and racing numbers plus spinnaker boom, halyard, boom rings and halyard blocks, together with a complete set of fitting instructions. The spinnaker is a running sail and is intended for this purpose. However, it is becoming more and more apparent the sail should be cut for reaching so that it can be used on a great number of occasions. By cutting the sail with the cloths offering minimum distortion and by reducing the width it is possible to cut a reasonably acceptable reaching sail.

The actual movements of hoisting and setting a Mirror spinnaker are very similar to those of any other dinghy and it is not proposed to deal with that aspect in this article. It is becoming more and more usual to set a spinnaker from a chute and a number of excellent designs are now finding their way onto the market, but one very cheap and simple spinnaker chute has been seen to work very efficiently and that is a plastic sink tidy (like the one normally used to drain knives and forks in the washing up bowl) — it is doctored by having its perforated end cut out. This makes an ideal mouth. The sock of a spinnaker chute can easily be made from a piece of nylon cloth with a tape at the small end. The spinnaker chute is then screwed to the gunwale on one side of the boat about 30cm aft and its sock end tied to a point about halfway along the boat. Incidentally when ordering the spinnaker it is not necessary to ask for a chute patch to be fitted as they are standard articles on all our sails. In response to many requests we have now developed what we call Hi Fli



rating quality sails. These are designed for the very keen championship enthusiasts. They are individually made in crisp non-porous minimum distortion material. The jib is fitted with wool feelers so that the helmsman can get immediate response to wind variations and 'feel' the boat to windward. The mainsails are supplied with tapered fibreglass battens. Continual experiment and development is always happening to sailmaking materials and cutting techniques.

We have recently been carrying out experiments on a cloth which is showing 30% less distortion than the normal cloth. It is hoped that this will be on the market shortly.

Sail Maintenance

Sailcloth is very hard material and as such the stitches do not bed into the cloth but lie flat on the surface, therefore, there is a tendency for them to chafe through over a period of time.

The points of danger to watch in this respect are primarily the batten pockets and the clew of the mainsail and jib and the tablings (hems) on both sails. It is not a good idea to leave the sails flapping head to wind between races, this is very noticeable on the clew of the jib which very quickly shows wear when it is allowed to bang against the mast.

When stowing sails salt water should always be rinsed out as the salt dries on the surface and unnaturally hardens the cloth. Creasing should be avoided in the sails and it is recommended that the sails be loosely folded so that the marbling effect is resisted as much as possible. Also, although the window plastic material is very strong it can

sometimes crack when pulled undone in cold weather.

The numbers and insignia on modern sails are now stuck onto the sail surface and, whilst this is quite satisfactory in normal use, care should be taken to see that the edges of the numbers do not lift, and if they do, press them firmly back into position. With reasonable care and attention the sails should give two/three years adequate service. The jib usually pulls out of shape first.

When ordering a second suit of sails they should be ordered to complement the original suit. A standard suit of sails is made with a medium flow and we would think that a complementary mainsail should be cut full so that it is kept for light weather. Also it is easier to flatten a full sail (if you require it flatter later on in its life,) than it is to make a flat one into a full one.

Adjustments and Alterations

Should your sails require any adjustments or alterations to overcome slack or tight leeches, tight or loose foots, it is usually a matter of tightening or easing seams and the adjustments are normally of a comparatively simple nature. However, when sending a sail for adjustment, it is much easier for the customer to describe the fault by means of a diagram, than to enter into a lengthy description of the fault.

The above article has purposely kept away from discussion of the relative advantages of differing sheet lead positions as these are fairly tightly controlled on the dinghy.

In conclusion we have a full technical staff available at Wroxham and they will be pleased to help you on any point to do with the handling or setting of your sails.