

# 49er Owner's Manual

Ovington Boats Ltd.



*Special Edition  
for  
Ovington number 566*

*(Lay-out: Savinien de Lembeye)*

# ***49er***



<b>1 INTRODUCTION</b> .....	4
<b>2 SPECIFICATION AND DRAWINGS</b> .....	5
<b>3 ASSEMBLY, RIGGING AND TUNING</b> .....	6
3.1 RIGGING THE MAST .....	6
3.2 ASSEMBLY OF LOWER MAST AND TOPMAST .....	6
3.3 SPREADER ASSEMBLY .....	6
3.4 STEPPING THE MAST .....	6
3.5 SETTING UP THE RIG .....	7
3.6 RIGGING FOR SAILING .....	7
3.7 HANDLING ON THE BEACH .....	8
<b>4 CARE AND MAINTENANCE, REPAIR, AND STORAGE</b> .....	9
4.1 MAINTENANCE OF THE HULL .....	9
4.2 MAINTENANCE OF MECHANICAL PARTS .....	9
4.3 SAILS .....	10
4.4 FIBREGLASS REPAIR .....	10
4.5 CENTREBOARD AND RUDDER .....	12
4.6 STORAGE .....	12
<b>5 HANDLING</b> .....	14
5.1 LEAVING THE BEACH .....	14
5.2 RETURNING .....	15
5.3 TACKING .....	15
5.4 GYBING .....	16
5.5 TWO-SAIL TECHNIQUE .....	17
5.6 SPINNAKER SETS .....	18
5.7 SPINNAKER DROPS .....	20
5.8 ROUNDING ONTO THE WIND .....	20
5.9 TROUBLESHOOTING .....	21
5.10 MEASUREMENT TERMS .....	22
<b>6 HANDLING</b> .....	23
6.1 MAST TUNING .....	23
6.2 MAINSAIL .....	23
6.3 JIB .....	23
6.4 SPINNAKER TRIM .....	24
6.5 CENTREBOARD .....	24
6.6 SAIL CARE .....	24
<b>7 PARTS LIST</b> .....	26



# 1 INTRODUCTION

Congratulations on your choice of the 49er. Welcome to the worldwide group of 49er sailors.

The 49er has a noble lineage from the skiffs of Sydney Harbour. Skiffs enjoyed their first official regatta in 1827 and have raced continuously ever since. Elsewhere in the world skiffs have been increasingly seen, as the regatta circuit has expanded to Europe and the USA, and also via television coverage.

This manual will explain some of the 49er's more unusual features, and provide the practical information which will enable you to assemble, rig, tune, launch, sail, race and handle this remarkable boat as it likes to be handled, and how to look after it, how to repair it, and where to look for help whenever needed.

## **49er owners are democratically organised into:**

**Regions** e.g. North America, Australia, UK/Europe, Scandinavia, Japan, South Africa, Hong Kong, New Zealand, etc. The Presidents of the regions constitute the 49er class' World Council.

**Districts** e.g. New South Wales and Western Australia within the Australian region. These will be joined by Victoria, Queensland, etc. as numbers grow. The Presidents of Districts govern the Region.

**Fleets** e.g. Double Bay (a "Saturday" club on Sydney Harbour); Woollahra (a "Sunday" club a mile away), and Gosford (50 miles North on Brisbane Water). These clubs are in NSW.

The delegates from Fleets govern the affairs of their District.

*This whole organisation of owners is called the 49er Association.* One of the really important things about any boat is "who owns the other one?". So much of the fun of owning a 49er is to meet and race against crews from other clubs, districts, and regions. All the information to enable you to do this is contained in newsletters which are produced and posted every three months. These advise the names of the contact people in your area, the racing programme for the months ahead, the results of recent regattas, who sailed fastest, how they did it, plus world, regional, district and fleet news, and other items of interest. One or two recent newsletters are enclosed with this manual.

Every new 49er owner has their first year's subscription to the 49er Association paid. This entitles you to receive the newsletters, to vote and take office in the association's committees and councils, and to enter 49er races anywhere in the world. Please complete the membership application form enclosed in this manual, so that we will know where to address your newsletters in the future.

If you use the internet and e-mail, a 49er web page has been set up at: [www.49er.org](http://www.49er.org).

Welcome to the 49er group, and good sailing.

Julian Bethwaite, Designer.

This manual has been compiled to help you to operate your craft with safety and pleasure. It contains details of the craft, the equipment supplied or fitted, its systems and information on its operation and maintenance. Please read it carefully and familiarise yourself with the craft before using it.

If this is your first craft, or you are changing to a type of craft you are not familiar with, for your own comfort and safety, please ensure that you obtain handling and operating experience before assuming command of the craft. Your dealer or national sailing federation or yacht club will be pleased to advise you of local sea schools, or competent instructors.

Please keep this manual in a secure place, and hand it over to the new owner if you sell the craft.

From all at Ovington Boats, Happy Racing!

## EC DECLARATION OF CONFORMITY TO DIRECTIVE 94/25/CE

I declare that the craft described as:

### **49er**

complies with the following Standards:

ISO/DIS 9094-1, ISO 10087, ISO 10240, ISO/DIS 11192, ISO/CD 11812, ISO/DIS 12215-1, ISO/DIS 12215-4, ISO/DIS 12217-3, ISO/DIS 14945, ISO/CD 15085.

Signed \_\_\_\_\_ Date \_\_\_\_\_  
David Ovington Managing Director (This date does not indicate date of manufacture)

## 2 SPECIFICATION AND DRAWINGS

### Identification

Hull Identification Number (HIN): G B O V B

Record the HIN of your boat in the space above – it is moulded into the starboard side of the transom.

### Dimensions

Length Overall (LOA) 1: 4.90 m

Waterline Length (LWL): 4.80 m

Beam: 2.90 m

Draft<sup>2</sup>: 1.08 m

Air draft<sup>3</sup>: 8.58 m

Displacement, Light Craft Condition: 125 kg

Towing Weight: 125 kg

Maximum upwind Sail Area: 21.2 m<sup>2</sup>

Maximum downwind Sail Area: 38 m<sup>2</sup>

### Notes:

1 Spinnaker pole retracted.

2 Draft measured with centreboard down.

3 Air draft is distance from water surface to top of mast, excluding any windex.



## 3 ASSEMBLY, RIGGING AND TUNING

### 3.1 RIGGING THE MAST

After unpacking the mast but prior to disposing of the packaging check that you have located:

1. The topmast and lower mast which will be attached via the 3 halyards.
2. Two sets of spreaders with wires attached.
3. 12 x 3/16" Metal Thread Screws.
4. 4 x #6 gauge screws.

Once you have these you should dispose of the packaging in an environmentally friendly manner.

### 3.2 ASSEMBLY OF LOWER MAST AND TOPMAST

1. Sleeve the Topmast into the Lower mast until the track ends are aligned and lie 1mm apart. (They must not touch, else they will buckle when the mast bends.)
2. Drill 5/32" through the four holes marked in Step 21. Tap 3/16", and lock the topmast into the lower mast with 4 - 1/2 x 3/16 PH MTS.
3. Drill the sailtrack with four further 1/8" holes at app. 15 and 50mm above and below the sail track ends. Secure with 4 - 3/4" x #6 CSK PH screws.

### 3.3 SPREADER ASSEMBLY

In the factory, we find it convenient to set up a mast step channel vertically on a wall. This holds the mast centreline truly vertical, and makes it easy to set the spreaders horizontally by sighting against a horizontal mark on the wall. This method is described.

1. Set up the mast, centreline vertical, with the sail track uppermost.
2. Fit the lower spreaders around the base of the topmast with the band against the top of the lower mast. Use a spanish windlass to pull the spreader tips together until the band clamps the topmast firmly.
3. Fit the upper spreaders around the reinforcing at the hounds, with the bottom of the band just touching the upper rivet of the forestay keyplate. Again, tighten the band with a spanish windlass.
4. Use a spirit level, or horizontal mark on the wall, to adjust the windlass cords of both spreaders level and level with each other.
5. Drill 5/32". Tap 3/16". Secure with 8 - 3/16" x 1/2" PH MTS.

In the field, the recommended method is to set the boat on its side, and adjust until the centreline is horizontal. The spreaders can then be set true vertically with a spirit level.

When the mast is stored, the shrouds should be attached to the travel saddles near the mast base.

### 3.4 STEPPING THE MAST

Now that the mast is together it is time to step it in the boat. The recommended method of stepping is as follows:

1. Carry the mast with the track facing downwards and the tip aft until the mast plug talon is positioned above the mast step, then pin the talon to the step with the 6mm / 1/4" clevis pin through the third hole from aft end of step.
2. Prop up or get someone to continue to hold the mast and spreaders clear of the deck of the boat. If the mast is held at the lower spreaders then the weight of the mast will naturally bend the mast allowing the shrouds to be easily removed.
3. The cap shrouds (which run from the top of the mast) and the primary shrouds (which run from the hounds) are attached to the same adjustable fitting. Remove the caps and primary shrouds from the travel saddles and attach them to the chainplates.
4. Run the lower shrouds (D1s) and attach them to the inner chainplates.
5. Uncoil the forestay and fit the T-ball into the key-plate at the hounds.
6. Uncoil the trapeze wires and attach them to their respective key plates, also run one of the trapeze wires on each side, outside the primary shrouds but inside the cap shrouds, forward and tie the end of the spinnaker sheet to the trapeze rings.

**(NB:** The trapeze wires should run straight from the mast forward, they should not be around anything. Their "lie" out of the mast looks a little "uncomfortable" in this position but it appears to have no adverse effects on their life or performance.)

7. With the spinnaker sheets in hand attached to the trapeze wires, walk to the front of the boat and pull firmly on the spin. sheets. The person holding the mast may either throw the mast upwards, or walk the mast up.
8. Pull the spin sheet quickly so that the mast is pulled forward and held by the shrouds without any chance of the mast going sideways and falling over.
9. Attach the "boat bender" to the forward most hole in the forestay fitting and attach the other end to the trapeze rings. If you have the adjustable trapeze system it is advisable to allow the trapeze adjuster rope out to full extension so that the load is taken on the knots and not the cleats. This will prolong the life of the adjuster cleats and ropes.
10. Tension the boat bender until you can attach the forestay. Then release the boat bender and allow the forestay to take the load.
11. Remove the boat bender.

### 3.5 SETTING UP THE RIG

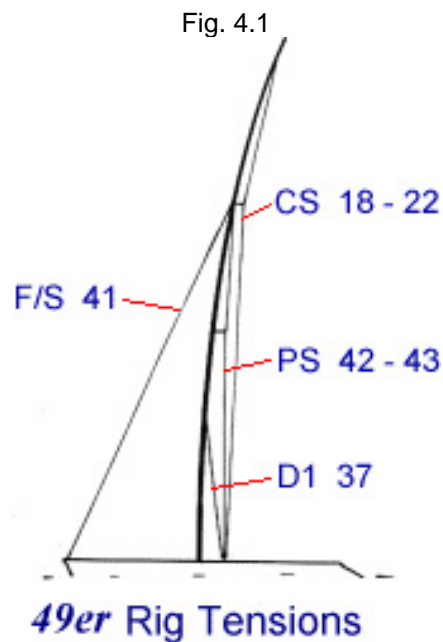


Fig. 4.1 gives the recommended initial setup tensions for all crews in winds of 8 to 12 kts, using a Loos Tension Gauge for calibration.

### 3.6 RIGGING FOR SAILING

After the boat has been assembled and set up with the shroud tensions recommended above:

1. Place the hull on its trolley or cradle headed into wind.
2. Step the mast as described above.
3. Insert the battens. These go in tight. They are not adjustable. They stay in the sail. They stay under full tension during storage unless you are not going to sail for several weeks.
 

In the days of cotton sails such behaviour would have been unthinkable. With woven polyester sails all that might happen was that the sail might stretch fractionally. Kevlar and carbon-reinforced Mylar sails do not stretch, and there is no longer any need to ease batten tension when off the water.

  - Hoist the mainsail, pull the halyard very tight, and hook the bight onto the rack.
  - Offer the boom fitting into the mast gooseneck, and secure by engaging and securing the clevis pin.
  - Hook the outhaul hook into the small tape loop at the clew of the sail, and let the outhaul control go loose. This will allow the boom to hang about 300mm below the clew.
  - Engage the pin to secure the ram vang arms to the vang lever.
  - Lift the aft end of the boom, and slip the large tape loop around it to hold the clew to the boom. Tighten the outhaul. At this stage, do not zip up the cuff.
4. Hoist the jib. Hank it to the forestay as it hoists. Set the luff tension with the halyard. It should be almost slack in light airs, grading to very tight in really strong winds. Make up the common rope halyard fall, stow it in the pocket inside the mainsail cuff, zip up the cuff, and hook in the two downhaul hooks.





## 4 CARE AND MAINTENANCE, REPAIR, AND STORAGE

### 4.1 MAINTENANCE OF THE HULL

The 49er is designed to be lively and is light in weight. Apart from providing exhilarating performance, this lightness makes the boat easy to lift and carry but does require the owner to be conscious of the fact that the 49er needs care in handling on shore. The lightness and stiffness of the hull is obtained by using foam sandwich panels made up of a rigid PVC closed-cell foam core between a thin layer of epoxy-bonded fibreglass on each side. This structure is much lighter and stiffer than solid fibreglass, and it is strong and durable, but because the two skins are each thin, abnormal point loads on deck or hull can cause denting or puncturing, and this is where the extra care is needed.

Never put the hull on the ground unless the surface is soft grass or similar, free of all pebbles, stones, nail heads, etc. The boat will always tilt over onto one side or the other of the bottom, and the wind may swing it around, and this is when damage is likely to occur. If for any reason the boat is resting on a poor surface then never, under any circumstances, allow anybody to step into it, as any object underneath is then almost sure to dent the outside skin.

Always use a cradle, launching trolley or padded rigging board to support the hull when rigging. This will eliminate the otherwise inevitable scratching. Australian practise is to attach the 49er securely to the launching trolley with quick-release hooks, so that the hull cannot move independently of the trolley when the boat is out of the water.

Never leave a rigged boat unattended. An unexpected gust can capsize an unattended boat. On the outside of the sandwich there is a layer of polyester gelcoat. This is thinner than industry standard because it contributes nothing to the strength of the boat - it contributes only colour and weight. To keep the boat light we use the minimum thickness necessary.

While the epoxy resin underneath shrinks almost not at all, gelcoat undergoes a certain amount of shrinkage during the first few months as it cures, and this can result in what the industry calls "print through" in which the fibre pattern of the underlying weave begins to be detectable on the surface. This microscopic surface pattern does not affect speed. It can be removed if you wish by lightly wet-sanding the surface with 1200 grit water sandpaper, then rebuffing to a mirror finish with a buffing compound.

Fading and ageing of the fibreglass surface is due to the usual agents; the ultra-violet rays of sunlight, moisture, chemical attack by saline solution, and the almost inevitable mechanical scratches, which all contribute to the deterioration of the gelcoat surface. The hull can be kept looking new for a very long time by following a few simple common sense guidelines:

- Keep your boat clean.
- Rinse off sand, dirt and salt with fresh water.
- Remove stains periodically with a soft bristle brush, fresh water and soap or detergent. Do not use an abrasive cleanser.
- For stubborn stains a rag dampened with a little xylol or acetone will do the trick. Do not allow liquid acetone to stay in contact with the gelcoat for more than a few seconds.

### 4.2 MAINTENANCE OF MECHANICAL PARTS

#### Ball Bearings

The best possible advice for keeping ball bearings working well is to keep them clean, and as free from salt as possible. If you sail in salt water, always try to rinse the boat and all fittings thoroughly with fresh water after sailing. Otherwise salt crystals inevitably form. These are abrasive and wear the ball bearings and races of the roller blocks and the jib sheet car, and cause grief with all sliding fittings. In general, it is best not to lubricate with a liquid lubricant. Particularly in sandy or dusty environments any oil, etc. will attract and retain all particles which contact it, and the mix soon becomes an efficient grinding paste which is worse than salt crystals.

#### Cam Cleats

These can sometimes become fouled to the point where they remain wedged open due to an accumulation of salt crystals, sand or dust, or too tight a through bolt. If this occurs ease the bolts or

screws until freedom is restored, then sluice with fresh water to dissolve the salt crystals or wash out the sand. In extreme situations, disassemble the cleat. Be careful not to lose whatever spring is inside (different makes have different "innards"). Wash the parts, spray lightly with silicone, reassemble and make sure that there is adequate bolt pressure to keep the assembly together but not so much as to jam the cam open.

## 4.3 SAILS

The full-length battens make the 49er mainsail a little more difficult to hoist than a conventional leech-batten only mainsail. The problem can be alleviated by spraying the bolt rope at the head with a dry silicone spray - this will lubricate the whole track. (Suncream lotion seems equally good.) Do not use a "wet" lubricant because this will accumulate dirt. For easiest hoist face the boat head to wind, otherwise the batten protectors will be forced hard against the track and add to the friction.

Inspect the sails periodically, and have a sailmaker restitch, add doublers or other correction wherever wear starts to appear. Prevention is much less expensive than repair.

### Sail Maintenance

The sails are the engine of your 49er. and they are the best engine we can produce. They are made from the best materials for the job, cut by computer and built to rigid standards of accuracy and quality. They will last a long time if you give them proper care. The following are a few do's and don'ts:

1. Don't wad the spinnaker into a tight bundle or stuff it hand-over-fist into its bag. Follow the instructions in the rigging manual and fold it properly. Roll the mainsail and the jib. Don't let the jib flog in the wind at the dock or on the beach. This weakens the stitching and creases the Mylar unnecessarily.
2. Don't wash sails in hot water or in the washing machine. Don't try and iron out any wrinkles, it will destroy the cloth. If you wish to wash it, use a mild soap, and soft brush and a two-hour soak in a tub. Don't allow chemicals, oil, tar or paint to come in contact with the sale. There is no known cure for a stained sail.
3. Don't store the sail for long periods while it is wet. A weekend won't matter, even with salt on, but try and rinse with fresh water and let dry as a rule.
4. Never put your sails on a radiator or up against any hot object. Sailcloth deforms and shrinks with too much heat.
5. Ensure that your sails too are dry before prolonged storage. The nylon or dacron spinnaker is porous and so can "breathe", but the Mylar mainsail and jib are not porous and any trapped moisture cannot escape. The best way to store for a long period is to ease all batten tensions, dry thoroughly, roll lightly, and store loosely in bags away from UV and dirt.
6. Inspect your sails before winter storage and have a local sailmaker attend any repairs and maintenance needed before the pre-season rush.

## 4.4 FIBREGLASS REPAIR

Scratches in the gelcoat surface can often be removed by wet sanding and subsequent polishing of the sanded area. Deeper gouges or cracks which leave the glass laminate exposed should be repaired as soon as possible.

### Minor Gelcoat Repairs

Scratches in the gelcoat surface can often be eliminated by wet sanding. Use about 400 grade wet paper to cut the scratch out followed by 1200 grade wet sandpaper, then buffing compound. Remember that the gelcoat is very thin. If a dark-coloured tinge begins to appear, stop sanding as you are wearing through the gel-coat and getting too close to the fibreglass laminate underneath. Polish the sanded area with a buffing compound as used for polishing cars.

### Deeper Gouges and Dents

These will require filling with gelcoat. The tools and materials required are:

- Chisel
- Dry sandpaper, grade 60 or 80
- Clean rags
- Paper cup or other non-metallic disposable container
- Polyester Gelcoat of the correct colour.
- Catalyst (hardener), sold at hardware stores (MEK Peroxide - 60%)
- Acetone solvent
- Suitable brush (small artist's brush)
- Wooden spatula or coffee sticks
- Masking tape
- Wet sandpaper, grade 400, 800 and 1200.

- Sanding block - wood or hard rubber
- Bucket of water
- Polishing compound (any good automotive finish polishing compound).

1. Remove all loose gelcoat from the damaged area with a chisel.
2. Mask around the damage leaving about 5 to 8mm of undamaged gelcoat clear.
3. Sand the whole area with dry sandpaper to provide a rough clean surface (clean in the sense that the sanding will remove any residual grease or salt). Taper the 5mm exposed gelcoat from nothing removed at the tape to completely removed at the edge of the damage.
4. Blow clean and wash with acetone to remove all loose dust.
5. Put sufficient gelcoat in a paper cup and add 2 parts catalyst to 100 parts gelcoat. That's about a quarter of a teaspoon to two fluid ounces. Mix thoroughly with the wooden coffee stick for at least two minutes. The catalyst sets off a chemical reaction which will progressively harden the gelcoat. If any part of the gelcoat has not come into contact with catalyst it will never harden. The time required to cure will vary with the ambient temperature and humidity, and the amount of catalyst in the gelcoat. The warmer it is, the F) reaction may be very slow and ° C (50 ° faster the reaction. (Under 10 additional catalyst needed.) Let gelcoat sit in cup for about 5 minutes to start reaction going.

**Warning:** The catalyst is an active peroxide. Keep away from children. Avoid catalyst contamination with other materials. Avoid catalyst contact with skin and clothing. Should this accidentally happen, flush with plenty of water. If eyes are affected immediate flush with fresh water for at least 15 minutes, and seek medical attention.

6. Apply excess gelcoat with brush. The gelcoat will shrink as it cures. The object is that the cured gelcoat should be proud of the surface, and will be cut to the final level after it has hardened. Deep scores may need two applications.
7. On horizontal surfaces smooth out to a slightly raised surface over the entire area.
8. When filling scores on sloped surfaces it may be convenient to form a "dam" with masking tape to hold the liquid gel in place until it hardens. For larger scores it may be useful to add a little talcum or baby powder to the gel-coat/catalyst mixture to give it a firmer consistency. This will lighten the colour of the gelcoat slightly but makes the application much easier.
9. For gunwale edge repairs, put a strip of masking tape horizontally along the gunwale edge below the damaged area to stop the liquid gel from dripping off.

Let the gelcoat harden - 1 to 2 hours, depending on temperature. Fill the cup of leftover gelcoat with water and let it cool down completely before throwing it away. Catalysed gelcoat in a large mass can generate enough heat to cause combustion and is a source of many "fibreglass fires".

10. Remove the masking tape. Those areas which have been exposed to air will have a thin layer which still feels tacky, because gelcoat does not cure in the presence of oxygen. The rest should now be hard. Scrape or sand off the tacky gelcoat first then start sanding with the 400 grade wet sandpaper dipped frequently in water. Wrap the sandpaper around a small wooden block when fairing the patch into the hull or you will almost certainly sand a dent into the area all around the patch. Check the patch constantly while sanding. If a dark-coloured tinge appears, stop sanding. You are wearing through the gelcoat and getting too close to the fibreglass laminate underneath. Repaint and repeat the sanding if necessary.

When the surface is fair and true finish with 1200 grade paper, then buff and polish to blend the repair with the surrounding surface.

#### Small Repairs to the Laminate

Holes smaller than a small coin do not need repair of the outer glass skin. Proceed as in b) above, but follow step 4 by filling the hole with an automotive filler, preferably epoxy but polyester will be satisfactory. (Epoxy will never shrink. Polyester will shrink a little.) Allow the filler to harden, then fair it to a level just below the final surface. Degrease it with a rag damp with acetone, as some fillers contain wax. Then proceed as in steps 5, 6 et seq.

#### Structural Damage - Larger Repairs to the Laminate

Only the gelcoat - the surface "paint" of the 49er - is polyester. All the rest of the structure is epoxy. All repairs to the structure will call for use of epoxy resin up to the "ready to paint" surface, after which the smooth surface and visual appearance will be restored by using the polyester materials and techniques described above.

#### Materials:

- Epoxy resin and hardener
- Fibre (Aerosil or similar)
- Filler (Q cells or similar)
- Foam (only for large trauma)
- Woven glass fabric, about 200gm

For larger holes - for any break or tear longer than say 5cm or a hole or crushed area bigger than a medium size coin, it is essential to restore the outer glass skin.

**i) If the inner glass skin is still intact:**

Start by grinding away all damaged laminate, remove all loose foam, and taper the laminate at an angle of about 15 degrees. Taper skin 5mm thick for about 25mm and 40mm for thicker skin. A circular disc on a drill is perfect for this job. Then carefully remove the remaining foam until you expose the glass laminate underneath. Do not cut it.

**ii) If the inner glass skin has been punctured:**

Remove all damaged material, then taper all edges as in i) above. Reach in through the hole with your fingers and sandpaper and scuff the inner surface near the hole to remove salt, etc.

Cut a piece of thin plywood a little larger than the hole, but able to be inserted through the hole. Thread a string through two small holes drilled near the middle. Mix resin and fibre to make glue, apply liberally to the ply, insert the ply and draw it to the inner surface with the string.

When cured, clean off excess squeeze-out. Cut two pieces of glass cloth a little larger than the whole damaged area. Mix resin, and laminate these two layers of cloth onto the ply and up the tapered sides of the hole. When cured but still green, cut off the excess with a sharp knife or chisel.

**iii) For holes smaller than say 75mm:**

Mix resin and filler, and fill void with slight excess. The epoxy filler will not shrink. When cured, sand fair and smooth at a level say 1mm below the final surface.

**iv) For larger holes:**

Trim one or more pieces of foam to fill the depression. When the whittling is done, mix resin and fibre to make thick glue, spread liberally, and bed the foam in the glue. When cured, sand fair and smooth as in iii) above.

Taper the outer glass laminate for 12 to 15mm all around, to give a good bond area between the old and the new outer glass skin. Cut three pieces of glass cloth oversize, and laminate them over the whole repair. If the foam or filler surface has any voids, mix and fill with a little filler so that the bond between the glass and the substrates is everywhere perfect. When cured, cut off excess, and sand fair.

From this point discard the epoxy materials, and proceed with polyester gel-coat as in 2. to 10. above to complete the job.

## **4.5 CENTREBOARD AND RUDDER**

These are constructed in exactly the same way as the hull, deck, wings and throat, and can be repaired in exactly the same way.

## **4.6 STORAGE**

Always dry out your boat before storing. Open the drain plug and drain the hull with the bow well up, to get all the water out. This is particularly important if you live in a cold climate because water left in the hull can freeze, expand and cause damage by ice heave. Also, do not leave it outside on the ground under snow. Snow melting in the spring can move as it melts and do strange things with shifting mass, and may crush a light boat.

Store the boat away from direct sunlight, or if this is not possible, a cover is a good investment. Two good coats of wax applied to a clean hull will help to inhibit sun fade. In addition to preserving the finish, it makes subsequent cleaning easier.

Check that the boat is supported over relatively large areas and on dry support. Do not store your boat with high point loads, as these may bruise and dent it. Do not leave your boat for long periods on any surface which can hold moisture against large areas of the hull, e.g. sand, grass or periodically rain-soaked carpet. The epoxy is impervious to water vapour, but the gelcoat is not..

If you sail in salt water the wires and ropes of the rig inevitably become salt-saturated. Rinse the salt off the alloy and FRP spars. Make sure that when the boat is stored no wires nor ropes lie against the alloy, otherwise residual salt will attack and corrode the anodising and the alloy. The hard electrolytic "analok" anodised dark bronze surface of the spar extrusions will delay this process but cannot prevent it.



***49er***

## 5 HANDLING

### 5.1 LEAVING THE BEACH

The 49er is different from most other boats because of the effect of the fully battened main and the light hull weight. It has often been said that leaving the beach is the hardest part. Here are a few tips to make leaving the beach easier.

#### **Holding the Boat in the Water**

A 49er with its sails up has to be thought of in terms of those sails and where the person holding the 49er is with respect to them and the boat. First, by holding onto the boat via the wing, this places the crewperson another 1m further outboard from the centreline of the boat, and in particular, another 1m from the centre of effort of the sail (CofE), a technical term for the point around which the sail is operating. What this means is that in any gust the boat has relatively more arm to try and spin it around. Do this by heeling the boat to windward. The more the boat is pulled over to windward, the more the distance is reduced between the crewperson holding the boat and the sails' centre of effort. Don't go too far or it will spin around the other way. With practice one person holding the forward tip of the wing can easily control the boat and point it in any desired direction. Do not be concerned if the battens pop to windward; this in fact further reduces the turning tendency.

#### **Leaving a Windward Shore**

The forward hand is in the water holding the boat. The helm gets in and puts as much rudder down as possible; then also enters the centreboard but leaves it up 500 mm or so. The forward hand holds the boat heeled to windward and at the appropriate moment the jib is sheeted in, the main is left unsheeted and the crew heels the boat even further to windward so that the wing is in the water and slides over it into the boat. The skipper bears away hard and steers the boat away from the beach.

The reasons for these actions are as follows:

- The boat is heeled to windward so that it remains under control.
- The centreboard is left half up so that the boat can side slip while leaving the beach, allowing the boat to attain the correct courses and speed in the quickest time possible.
- Only the jib is sheeted in, again to blow the bow away from the shore.
- The boat is heeled to windward excessively so that the centre of effort of the sails is to windward of the hull also helping the boat bear away.
- The crew slides onto the wing because as the boat does bear away and the boat starts to heel, that is where they will be needed if there is any wind.

Further, if the wind is fresh then getting a fair bit of downhaul on prior to leaving the beach, will help depower the main and also allow it to twist off a lot more and make the manoeuvre easier.

#### **Leaving a Leeward Shore**

First establish the best angle for leaving the beach and set up for that tack. Again the forward hand should hold the forward wing tip while the skipper hops aboard and puts as much rudder and centreboard down as possible. About 400mm of each is required to be able to get underway, so this can all happen in quite shallow water. Again the crew heels the boat to windward for control. When everything is ready the skipper first trims the jib but not right in and then trims main sheet but again not right in. As the forward hand feels the wing start to lift he/she climbs aboard by sliding on or rolling in. The skipper should concern him/herself first with speed rather than height especially if there is a seaway running, so do not be concerned if not much distance is made on the shore - it is more important to accelerate freely. Unless it is a case of trapeze or capsize, it is important during the acceleration phase to curb the tendency to get out on the wire, because with only 400mm of centreboard down a high side load will only lead to a massive increase in drag. To maximise drag reduction, keep the weight forward. As the boat starts to move more freely more height can be obtained, also more side load can be applied and once adequate depth of water is achieved, increase the amount of foil down.

While there is little rudder down, it is particularly easy to over power the rudder with the sails, so it is necessary to help steer the boat with the sails, if the jib is trimmed on, the boat will tend to bear away, if the main is trimmed on then it will tend to round up. If a tack is made while there is only limited foils down then use the sails to help the tack by sheeting in the main prior to the tack and easing later and ensuring the jib is on once the boat is past head-to-wind to pull the boat away.

The heavily twisted sails in the first instance will lower the centre of effort and therefore ensure that whatever centreboard is down is used to maximum effect to drive the boat forward rather than resisting crew induced side load.

## 5.2 RETURNING

### Returning to a Windward Shore

Simply remember that the centreboard draws only 1200mm when fully down and the rudder around 800mm, if the centreboard is pulled up 300-400mm then the boat can be brought right in to the shore and the crew can jump out without getting too wet. If the wind is fresh the boat will be hard to control as it is manoeuvred onto its trolley. It is better to drop the jib while holding the boat in the water, and the main too if necessary. The boat can then be manoeuvred onto its trolley with ease.

### Returning to a Leeward Shore

Plan your approach and come in with speed to within about 30m of the shore or in about 2m of water. Round the boat up head to wind. If conditions are difficult send the crew over the side to hang onto the bow (this can happen in the rounding up procedure) and simply drift backwards onto the shore. It is a good idea to get the rudder out first and then the centreboard so that if there is a side gust the boat cannot pivot around the rudder in an uncontrollable manner.

There are many variations on this theme especially if the conditions are mild, in that the boat can be steered backwards and positioned very accurately by using the mainsail as a wind rudder in reverse. This requires practice.

### Returning to a Narrow Ramp

This is the same as for the leeward or windward shore but have the main and jib halyards prepared for a very rapid drop. Sometimes it is a good idea to have them off their hooks and tied with a slip knot to the travel saddles.

## 5.3 TACKING

Even though a 49er is about the same all up weight as a 470, tacking can be more tricky because the 49er will be travelling at a higher starting speed, during the tack the rig will develop more aerodynamic drag due to its size so the 49er will slow down at a greater rate and there is a greater distance to cover during the tack, as well as the added task of the skipper getting onto the trapeze.

Additional dynamic factors are that the 49er has quite big sails, as a % substantially bigger than the rudder, and although the rudder is more than big enough to do its job while under way, the situation when it is moving slowly through a tack is one area where some assistance is a good thing. So experiment with easing the jib sheet while going up wind and pulling the main sheet on. Try differing amounts of easing. By easing the jib sheet and pulling the main on this will move the Centre of Effort (CofE) of the rig aft, well behind the Centre of Lateral Resistance (CLR) of the centreboard and therefore make the boat want to round up, and if not countered by the rudder, the boat will go into a tack.

Also, the lines of a 49er are such that if the boat is allowed to heel to leeward, two things will happen:

- The first is the most obvious, the leeward chine will be driven deep into the water, which in turn will severely limit the rate of turn.
- The second is that by allowing the boat to heel the CofE (Note 1) will be moved to leeward of the CLR instead of being directly above which in turn will generate a yawing or turning action to leeward (due to the drag of the rig), counteracting the action of the tack. Conversely a heel to windward will have rig drag assisting the rotation of the tack.

**(NB:** The Centre of Effort of a 49er is approximately 2.7m above the sheer line and in the normal operating windward set-up is 350-450mm behind the mast.)

On a technical note, due to the rapidly slowing speed of the hull during the period of the tack, the rate of turn at the start of the tack should be substantially slower than at the end.

In a perfect tack with constant speed, the rate of turn will be accelerated into the tack, maximum at the middle and progressively decelerated towards the end, much like a sinusoidal curve. But due to the rapid deceleration during the tack, this sinusoidal curve will be skewed towards the final stages rather than the middle.

### The universal rules for a good tack are:

- Keep the boat flat or heeled to windward, especially prior to the tack.
- Ease some jib sheet, about 100mm in normal conditions, 200mm in fresh to frightening, keep the main in as the tack is commenced and ease it as the tack is completed.
- Steer in slowly to a maximum rate of turn about 70% of the way through and pick a spot 90 degrees to the initial heading prior to the tack so the boat is on the correct heading with the jib pulling the 49er out and forward and everything in control.

Something that works on all boats is that as a boat is turned into a tack the boat pivots around the centreboard, which in turn means that the jib will be moving to windward and the main to leeward, which in turn means that the apparent wind with respect to the jib is lifting and with respect to the

main, is knocking. This reinforces the need to ease the jib and keep the main on, so that the sails more closely reflect the changing apparent winds and so that they more easily allow the boat to turn. It is a natural tendency to move aft in a tack; in hydrodynamic terms this is like applying a drag brake to the boat. Keep as far forward as practical especially in light airs. There are two commonly used techniques which can easily be denoted as skipper first or crew first, choose which suits the best.

#### **Tacking Technique - Skipper First**

1. Skipper calls a tack, crew eases the jib.
2. Skipper has the main in his/her hand and moves off the wire and onto the wing, unhooks off the trapeze.
3. Skipper calls the final stage of the tack and pushes the helm down.
4. Boat starts to turn and crew (who has already unhooked and is hanging by the handle) watches the balance and starts to move inwards as the boat starts to heel to windward.
5. By this stage the skipper has moved onto the new wing, has turned and is facing forward.
6. Crew comes across and moves straight onto the wire.
7. Crew takes the main sheet and trims both it and the jib sheet as the boat comes up to speed.
8. Skipper hooks up and moves on to the wire.

#### **Tacking Technique - Crew First**

1. Skipper calls a tack, crew eases the jib sheet and unhooks.
2. Skipper starts to head up and crew moves inward across the boat. (Once experienced the crew grabs the main sheet close to the block as he/she goes past the centre line.)
3. As the boat starts to roll to windward the skipper pulls him/herself up vertically on the trapeze wire (which unhooks the trapeze) and starts across the boat (running) which also takes the helm further down and accelerates the tack.
4. By this stage the crew has reached the other side and assumes the responsibility of balance as the skipper, looking forward, lets go of the old tiller extension and grabs the new one and the trapeze handle with the new respective hands and moves straight onto the wire (if needed), unhooked but hanging by his/her arm. The crew may be in exactly the same situation.

The manner in which they get hooked up and settled varies. Julian's technique, when in form, is that he does not touch the handle at the end of a tack but hooks up on the fly and does a bit of a twist so as not to hit the wire with a thud. Good crews simply tack so that they complement the balance and timing of the helm and if the helm is slow then the forward hand will hook the helm up. If conditions are such that two crew on trapeze are not needed immediately then the helm may take the main back again or trim in the jib for the crew so they can concentrate on main trim.

The jib sheet should not be re trimmed in until the boat is "almost up to speed". If the jib is retrimmed too early the time will be dramatically prolonged for the boat to get up to speed. If a crew has crash tacked and did not get the jib sheet off or for whatever reason couldn't get it off, then sail for a few seconds with the main overly eased and a bit fat (low).

This works well but not as well as a pre-eased jib.

The "crew first" technique allows the fastest tack but it also requires a fair degree of practice and that practice normally results in many swimming lessons. The "skipper first" method is the survival technique and the normal technique initially adopted.

## **5.4 GYBING**

### **Gybing with Spinnaker**

The key points:

1. The skipper must always look forward.
2. Gybe just after having accelerated in a gust or running down the face of a wave, as at this point the apparent wind will be at its least but most importantly the boat will have the greatest speed and therefore the helm will have the greatest amount of control.
3. Keep the 49er flat.
4. Be positive.

Again there are two techniques and again they can be designated by Crew first and Skipper first. The "Skipper first" is quite common as the skipper will often be sitting on the wing downwind.

#### **Gybing Technique - Skipper First**

1. The skipper moves in first, onto the wing or into the cockpit, whichever is the most comfortable to steer the boat through the gybe from. He/she must be able to move easily across the boat while steering. It is more important that the boat is steered through the gybe flat, than try to get onto the wire fast.



2. Once the skipper is ready then he/she calls the gybe, the crew moves off the wire and into the boat and at the same time should trim the spinnaker in about 500 mm (sometimes the skipper may take the spinnaker sheet and do this procedure).
3. While this is happening the skipper is pulling the helm towards himself and initiating the gybe.
4. The crew goes straight across the boat and sits on the new wing, well out, watching the spinnaker and waiting for it to back and fall onto the jib/rig.
5. During this procedure the skipper has pivoted in the middle of the boat and is sitting also on the new wing well out.
6. Once the spinnaker has backed, the crew releases the old sheet and starts pulling on the new one, the spinnaker will blow past the luff of the jib and fill on the new side and adopt its new setting.
7. While this is happening the skipper is trimming the main and ensuring that the battens have popped across to the new gybe.

This whole manoeuvre requires timing. Don't spend too much time setting up, as speed will be lost, and this will result in the boat being too loaded up to gybe safely. With speed maintained it is a smooth, easy manoeuvre. Without speed it is usually rather "wet".

As the boat comes out of the gybe it often pays to bear away quite sharply, so as to neutralise the turning and heeling moments generated by the gybe. If this can be delayed until the spinnaker has collapsed into the jib, this bearaway has the tendency to lift the spinnaker off the jib and rig - this in turn makes its slide through to leeward toward its new setting much easier and faster.

### **Gybing Technique - Crew First**

The same rules apply as above:

1. The crew passes the spinnaker sheet to the skipper and moves into the boat.
2. The crew adopts a bent-over position with the old sheet in one hand and the new sheet in the other.
3. Skipper calls the gybe, and as this is done drops the main, pulls himself upwards on the trapeze and pulls the helm towards himself initiating the gybe.
4. As the boat starts to turn the crew trims in the old sheet about 500 mm and rocks his/her body to the new windward side ending up sitting on the wing a fair way out. The skipper stands up and runs straight across the boat, dropping the old tiller extension on the way and not picking up the new one until he/she is on the new side and facing the right way. (If in form, the skipper will also grab the mainsheet on the way through.)
5. Skipper moves straight out onto the wire while the crew waits for the spinnaker to start to collapse and fall into the jib/rig.
6. The crew then pulls in the new sheet and trims it for maximum speed before moving out onto the wire, grabbing the main on the way if the skipper missed it.

The same tricks apply to both techniques. Again the second system is much faster and often the skipper will swap places with the crew in light airs so as to be better able to execute it.

The same rules apply as with tacking as far as keeping the boat flat, except that in the gybe the boat can be heeled a little to leeward at the start of the turn. Also the apparent winds on the spinnaker/main are reversed so it pays to trim the spinnaker in and ease the main at the start of the turn.

## **5.5 TWO-SAIL TECHNIQUE**

### **Gybing**

This is the same as a spinnaker gybe but there is greater emphasis on the need for speed and it must be done flat, or not at all. Hitting the new wing without delay is essential. Once again, the skipper must gybe the boat under the crew, and fast.

In a good gybe the main will come over by itself, sometimes though even in a good gybe it needs some help and a friendly hand from the crew will ensure success.

Steer the boat quite square out of the gybe until crew has control of balance.

Again, as the boat comes out of the gybe, it often pays to "bear away" quite sharply so as to neutralise the turning and heeling moments generated by the gybe. This is even more important with a two-sail gybe!

### **Bearing Away at the Top Mark**

A 49er has a large amount of sail and the technique of bearing away at the top mark is often referred to in skiff circles as the "twilight zone" - that is there is a great deal of uncertainty as to the success of the manoeuvre and sure and certain skills are required.

First the reasons why it is a "twilight zone" (let us assume 20 knots plus).

- The boat speed coming into a top mark is probably 9-11 knots. The process of a well executed bear away will take 5-7 seconds at the end of which the 49er will be moving at double the entry speed, so the first problem is the rate of acceleration. It takes a bit of getting used to.
- The boat's ability to keep its bow up is proportional to hull speed so for a great proportion of the manoeuvre, the still slowly-moving hull will be resisting a larger force from the rig than is usual at that lower speed.

- Also the variation in apparent wind is working against the boat. As the skipper bears away, the apparent wind on the main will be moving aft faster than the boat will be turning. Also while the boat goes through the bear away manoeuvre the skipper will be moving from the upwind technique of feathering to the downwind technique of steering for balance.
- This swap over period (especially when two sail reaching) also has some skiffie speak and is termed the "mystery zone".

**Firstly**, on the beach, if the forecast is for fresh winds then tighten the cap shrouds another hole, one to two holes below standard is not a problem.

**Secondly**, boat speed makes life easier, so when coming in to the mark, crack off a couple of degrees and lift the hull's speed. Even an extra two knots will make a big difference.

**Thirdly**, dump the vang. Let it up a few inches in moderate conditions and flat water or dump it completely in fresh, lumpy seas so that the leech of the main opens as much as possible.

**Do not ease the cunningham. Do that after you are away. Easing the cunningham prior to the bear away will only fatten up the main and make matters worse.** As a side note dumping the vang will result in the head of the main twisting right off, and that can cause you to nose-dive or roll in to windward after the manoeuvre, so if the vang is too loose, bring it back on quickly once the new course has stabilised.

**And of course**, get right down to the back of the boat and make sure the boat is flat when you start the bear away, because if it is flat to start with there is a much better chance of it being flat (and upright) when you end it the turn. The crew should shuffle back on the wing to help keep the nose up prior to commencing the turn.

Provided there is sufficient speed up, don't slowly ease the boat away. It is best be very positive with the turn. The apparent wind speed will be dramatically altered and centrifugal force will be used during the bearaway to help overcome the additional heeling force.

In reality it is a very controlled, deliberate and coordinated but very fast manoeuvre.

While this manoeuvre is being executed, ease the main in a controlled manner which is coordinated exactly with the turn. Even with a sheet hand available on an Eighteen, most skippers tend to handle the sheet themselves as well as steering so that they can better coordinate the two controls during the turn. The jib must be released, and the crew needs to move both into the boat and aft and also control balance as the skipper will not be able to do so.

All the sails should be undertrimmed in a bear-away, and if the boat is initially slightly rolled to windward, this makes the turn easier. It is almost impossible to do it too fast. Do not overdo the manoeuvre as it is possible to crash into a gybe unless the steering is very positively controlled.

**(NB: If, in powered up conditions, the boat is brought away in a slow arc, this will result in a massive and uncontrollable increase of force, which will more than likely result in heavy bowdown trim / nose diving, loss of control (steering) and will probably end up in a capsize.)**

Once the boat is away, the crew can go into the boat, if it is for a spinnaker set, go straight into that procedure and the skipper will remain on wire and balance the boat.

## 5.6 SPINNAKER SETS

### Setting the Spinnaker

There are two types of set - windward and leeward. Most people try and rig the spinnaker for leeward sets because they tend to be simpler and smoother but there are benefits in windward sets and at some stage a windward set will need to be performed. A windward set is when the spinnaker will come out of the chute on the windward side of the forestay and leeward is the converse.

### Windward Sets

The crew moves into the boat and starts the initial hoist by simply pulling on the halyard, the skipper stays out on the wing or on the wire and sails the boat flat bearing away all the time. He/she also calls the hoist, i.e. '1st spreader', '2nd spreader', '1 meter', '½ meter', 'You're there!'. It does not matter what is called but it is a big help and a good discipline.

1. About the time the skipper calls '1st spreader', the boat should be squared away and running dead down wind and shortly thereafter the skipper will also be in the middle of the boat, it even helps to run by the lee at this stage.

What this does is help the spinnaker to blow away from the mast and especially the forestay area. If this can be done in one smooth arc, then as the turn slows, the spinnaker will, in effect be thrown away from the mast exactly as the head of the kite passes the hounds.

2. The skipper maintains this running dead square/by the lee attitude until the head of the spinnaker is about a meter from the tip.

At this point the skipper starts to round the boat back up to its "proper course". This will help to blow the spinnaker through to leeward. It will also require the skipper to move back out onto the wing and possibly the wire.

Once this process is mastered the skipper may even take the new sheet out with them as the boat rounds up and he/she moves out, and this will aid in the setting of the spinnaker and also aid the crew in getting the new sheet on faster, the rounding up process also exaggerates the apparent air flow across the newly setting spinnaker, again aiding in the setting/filling process.

3. As soon as the skipper calls, 'You're there!', or the crew knows the kite is at the top he/she moves to grab the new sheet and trims it in while moving out onto the wing.

It is far more important to get the spinnaker trimmed in than to jump on the wire as jumping onto the wire in most cases will only result in an aggravated round up and slowing of the skiff. If the crew moves onto the wing to balance, trims the kite on and gets it working, then moves out onto the trapeze, the boat will accelerate the fastest and achieve VMGs sooner.

It also happens to be the least strenuous and the more predictable option.

### **Leeward Sets**

*Very similar to the above:*

1. The crew moves into the boat and starts the initial hoist by simply pulling on the halyard, the skipper stays out on the wing or on the wire and sails the boat flat bearing away all the time. He/she also calls the hoist - '1st spreader', '2nd spreader', '1 meter', '½ meter', 'You're there!'.

2. The skipper stays out and maintains boat speed, this also helps maintain cross flow which keeps the spinnaker away from the mast. As the spinnaker continues up it will be necessary to continue to bearaway, but not to the same extent as with a windward set as the skipper (in 12 knots) would not come off the wire.

3. As the spinnaker reaches the tip, the crew rapidly moves out onto the wing with the new sheet and the spinnaker should pop!

This can happen much faster than in a windward set because the skipper tends not to come off the wire, therefore the boat tends to be moving faster and the crew are able to control the boat better due to the speed and weight.

4. As soon as the skipper calls, 'You're there!', or the crew knows the kite is at the top he/she moves to grab the new sheet and trims it in while moving out onto the wing.

Same rule applies, set the spinnaker first then get the crew out, with the skipper still on the wire the boat will move very quickly to high VMGs.

### **Gybe Set**

Gybe sets allow the two functions to be combined and are a very potent tactical manoeuvre.

The start is the same as the windward set but the bearaway process is continued into a gybe, and with the right timing the crew gets the spinnaker to the top of the mast as the boom comes across and takes the new sheet (leeward after the gybe) out with them as he/she moves out onto the wing and wire. This is one case where it pays for the crew to move straight onto the wire as they will be able to do it much faster than the skipper.

The combination of the spinnaker being blown well away from the mast and the high cross wind component of the apparent wind mean the hoists are very fast and the filling of the kite is almost immediate. The unexpected nature of the manoeuvre also can leave your competitor in a mess!

## 5.7 SPINNAKER DROPS

### Dropping the Spinnaker

Again there are windward, leeward and gybe drop options, with the gybe drop always the fastest, the windward drop the safest but the leeward drop the cleanest.

The technique for a windward drop is:

1. Skipper is on the wire or moves out onto the wire and once settled takes the spinnaker sheet from the crew.
2. The crew moves off the wire, into the boat and takes the slack out of the retrieving line.
3. Then the crew reaches in and releases the halyard. This is the signal for the skipper to let go of the spin. sheet and the crew then rapidly pulls in the retrieving line.
4. The crew should pull very quickly and the skipper should momentarily (1-3 secs) bearaway, quite sharply but possibly not even come off the wire. If this manoeuvre is done correctly the core of the spinnaker will pop on the windward side of the forestay, if it does not then the process is slower.  
(**NB:** Once the pull patches are together even on the leeward side of the forestay (but against it) the kite will not "prawn", i.e. fill with water, and other adjustments can be made, such as, get the centreboard down or move out on to the wing, provided the tension is not released on the retrieving line.)
5. Then simply pull the kite into the sock.

In the case of a leeward drop, it is exactly the same operation except that the spinnaker is safe once the 3 patches are hard against the spinnaker throat.

The bearaway manoeuvre outlined in 4. will dramatically reduce the effort required to start the patches into the throat and once they have entered the chute it becomes exponentially easier with every cm away. This can also be enhanced by running square but tends not to be necessary.

### Gybe Drops

Gybe drops come from the Eighteen days with hand drops rather than spinnaker chutes but an adaptation of those processes can again be used tactically and to help with a difficult mark rounding. There are two types of gybing: a windward drop and a leeward drop. Gybing to a leeward drop is a bit pointless as you will in fact gybe the spinnaker to drop at some stage so there is little or no benefit, but gybing to a windward drop is very safe and very fast and you have the added advantage of gybing with speed which as stated before is the key.

So the Gybe (to windward) drop is as follows:

1. The crew passes the spinnaker sheet to the skipper and moves into the boat.
2. The crew adopts a bent-over position with the old sheet in one hand and the new sheet in the other.
3. Skipper calls the gybe, and as this is done drops the main, pulls themselves upwards on the trapeze and pulls the helm towards themselves, initiating the gybe.
4. Pull on the old sheet until it is very tight.
5. Once the boat has gybed and the spinnaker has blown onto the rig, while still hanging onto the old spin sheet with one hand release the halyard. This will allow the top of the spinnaker to blow around to leeward of the jib and simply hang.
6. Quickly grab the retrieving line and pull very fast, and then the spinnaker will fall in a bunch on the windward side of the jib, as a mass and then be very easily and quickly sucked down the chute.

The big thing about this style is that the gybe is controlled with plenty of speed and there is no need to pull the spinnaker around to the weather side of the forestay. Also the spinnaker falls right on top of the throat making it very available and easy to be sucked away.

## 5.8 ROUNDING ONTO THE WIND

Ensure the crew weight is properly balanced. The skipper should already be on the wire, the crew poised to get move. (If there is sufficient breeze or pressure, the crew would also already be on wire.)

As the mark rounding approaches, if possible, come away slightly to bring the boat over to windward, then steer it up onto the breeze. This will enable the main to be brought on early. Keep the boat flat in the turn.

If the approach is too shy for this, try and ease the boat over to windward, by easing the sheet.

Keep the jib well eased in the turn, then sheet on hard once the boat is on the breeze. With the boat spinning around the centreboard there will be a high cross wind component of the jib and the main will be backed.

If the boat is not flat before the turn, the heel will become exaggerated as the rig throws its centrifugal force out into the turn, and will not allow the main to be sheeted on until the boat is on the breeze. By

that stage the crew will be very wet as the boat will have rolled in to windward. Communication from the skipper and crew is paramount.

Again the skipper needs to keep the windward chine in and steer around gusts and lulls.

## 5.9 TROUBLESHOOTING

### Spinnaker Hard to Pull Up

The first area to look at is the top block and the run of the wire main halyard, the wire should run along side the spin. halyard block and not over the top of it. This can easily be done by taking the cap shroud T balls out and looking through the opening to see where it is. If it is over the spin. halyard block then you need to slacken the main halyard and persuade it over to one side or the other. This may take some fiddling and bending of the wire to get it past the rivets but the up side is once it is there it won't come back. Then put the T balls back in.

With respect to the run of the wires, it is possible to get them twisted. The easiest way to fix that is to:

- Pull the spin halyard right out of the mast;
- Pull all the other lines very tight;
- Elevate the tip of the mast 4- 5 m (stand on a roof or balcony), with it laid on its side;
- Use a hose and allow the water to run down inside the mast at the fastest rate you can (you may need to take off the base plug); and then
- Feed the halyard in from the top. The water will pull the rope down and it will also ensure that the rope does not twist around anything else due to gravity.

With respect to the exit hole for the halyard at the bottom, while doing the above file it clear if there is any friction at all to the run of the rope.

With respect to the bend of the mast and friction inside, once the halyard is clear then there should not be very much. To minimise it further then use a 16 (or 24 is better) braid line, such as Vectran, for very low friction. Keep the size under 5mm diameter.

If the block at the top of the mast is worn then use an RF 1985 HL or Harken 302 and it can also help to use a guide saddle right below the block to ensure that the rope always runs straight onto the sheave.

Also while the base plug is off, look at the block in the bottom and ensure it is up to speed, if it is damaged then try replacing it with a block of a bigger diameter sheave and high load bearings, such as an RF 1017HL or Harken 306 or 106 (the 306 is better). Just for comparison Eighteens use a 302 at the top and a 310 at the bottom.

### Spinnaker is Hard to Set and Drop

Buy a can of McLube or another good silicon spray and be very liberal around the throat, sock and the spinnaker itself. Thread a small, 20mm diameter ball onto the spinnaker retrieval line between the first and second retrieval patches on the spinnaker so that the last/top pull point is separated from the middle one by 200- 300 mm , by tying a second knot. Use a reverse 1:2 purchase on the spinnaker pole extension system, if it is not already being used as this has become very common and almost standard. That is, where the rope comes around the front deck block just in front of the throat, run it through the strap on the back of a block and secure it to the throat by drilling a hole or using the one that is there. This block should also be a high load block, with some 49er owners using wire sheaved blocks. The friction around the strap on the back of the block is needed to make the whole thing work.

What this will do is to slow the launch of the spinnaker foot and allow the head to move further up the mast before the rest of the kite comes out and causes a problem. The plastic balls and separating the pull points further enhances this by keeping the two bodies of the spinnaker apart in the chute.

## 5.10 MEASUREMENT TERMS

In the notes above the measurements are metric with the exception of wind speed, which is in knots. For those who wish to convert, rounded equivalents are:

1 kg = 2.2 lbs

1 m = 3.3 ft

1 m<sup>2</sup> = 11 ft<sup>2</sup>

1 knot = 1.7 ft/sec

2 knots = 1 m/sec

The wind speeds quoted in these pages are the speeds registered on an instrument such as a Turbometer. Sailors' estimates tend to be accurate up to 10kts, but 15kts is usually estimated as 20kts, and 20kts is frequently estimated as nearer 30kts.



## 6 HANDLING

(By Chris Nicholson – Two times World Champion.)

The 49er puts the thrills and spills of high performance skiff racing within reach of the general sailing public. I would like to share with you some of my experience, which may help with your skiff learning curve. The following is a sound starting point.

### 6.1 MAST TUNING

Measure rig tensions with a "LOOS" gauge with the mast stepped, without sails hoisted:

Forestay 40

Backstays 17

Side Stays 28

Intermediates 26

### 6.2 MAINSAIL

#### Vang - Upwind

Rigged ashore pull mainsheet on until "overbend" creases just start to appear on the main diagonally from the clew to the spreaders. Take up the vang to this tension and mark the control rope for a maximum reference. Note it is easy to over vang the mainsail which will induce more mast bend than luff curve, resulting in inconsistent pressure in the rig when sailing. The rig does not like to be over vanged.

#### Vang - Downwind

Release vang pressure considerably prior to bearing away. This will reduce mainsail leech and rudder loads. When you have born away onto the new course retension vang to similar tension as upwind to control leech pressure.

#### Luff Tension - Upwind

Is the key to controlling upwind power. Luff tension induces mast bend which will reduce power to the rig. Be sensitive to this control.

#### Luff Tension - Downwind

Release luff tension to prevent overloading the tack area of the sail as the mast straightens (thus lengthens) under spinnaker.

#### Outhaul - Upwind

I set up my mainsail with firm outhaul in most conditions. Only when under powered with crew off the trapeze do we ease outhaul.

#### Outhaul - Downwind

Generally remains in upwind position unless both crew are off the trapeze at which time we ease outhaul for more power.

### 6.3 JIB

#### Luff Tension - Upwind

Use enough luff tension to remove scallops between the hanks. As wind pressure increases so must the luff tension.

#### Clewboard And Traveller - Upwind

The following is a set up chart:

True wind, knots	0-8	12 to 14	15 to 17	18 to 19	20+
Clewboard hole	Top	Middle	Middle	Bottom	Bottom
Travel pin hole	1	2	3	4	5

#### Sheet Tension - Upwind

Generally firm trim. Range from the blocks kissing to blocks sprung 25mm apart. Light and fresh winds ease out 25mm, medium air firm trim.

### **Sheet Tension - Downwind**

Have trim well eased so only bottom half of jib is drawing when sailing under spinnaker. This prevents the jib from drawing wind away from the spinnaker and helps the bow lift as the boat accelerates with rapid changes in apparent wind angle.

## **6.4 SPINNAKER TRIM**

### **Running**

The key is to sail the boat heeled to windward with the windward chine in the water. Do not under trim the spinnaker as this will allow the leech to rotate up and twist around the luff resulting in a lack of power. Do not over trim as this will not allow spinnaker to exhaust around the mainsail. An exception to this is in fresh conditions where over trimming is an effective way to "throttle" back if you are going to fast for the sea conditions.

### **Reaching**

Ease sheet as far as possible without making the luff unstable. If the skipper is uncomfortable steering around the spinnaker it is often a sign that the sheet is eased a little to far

## **6.5 CENTREBOARD**

The underwater surface area of the board has a dramatic effect on performance both up and down wind. You control area by raising and lowering the board, basically when your looking for pressure you want maximum board area in the water and as you become overpowered progressively lift the board. The maximum up is 200mm as beyond this point the board fouls the crew and equipment when tack- ing.

## **6.6 SAIL CARE**

The design and construction of the sails give excellent performance through a wide wind range. The 49er offers thrills and when not handled correctly spills.

It is important for all crews to respect that light weight equipment is the key to performance and sails are no exception.

### **Avoid Landing on the Mainsail or Jib in a Capsize**

In a capsize the sails can not be expected to withstand the load of crews free falling from the wing height and using the sails to break their fall. If unavoidable spread the load on impact by landing on the whole length of your body, either face down or on your back, by somersaulting. Feet, head / arms first is most likely to cause damage to the sail. The best escape is aft diving beyond the mainsail leech and in this case if you do land towards the back of the sail there will be more give to absorb the shock load than landing around the luff area which is supported by the mast.

### **Main and Jib Care Tips**

Spray the main luff tape and track regularly with silicon to reduce wear on the bolt rope around the batten ends.

Minor repairs can be carried out with adhesive Sailcloth or ideally Mylar stickyback. Ensure the damaged area is dry and salt free, by wiping it down with methylated spirits.

### **Avoid handling the sails on hard surfaces such as concrete.**

Wash the mainsail zipper with fresh water regularly. Do not spray with lubricant as this attracts grit.

Tie a stopper knot in the jib sheet with the clew 900mm away from the traveller block. This helps to restrict the jib from wrapping around the forestay when capsized, reducing the possibility of breaking the jib battens.

### **Spinnaker Care Tips**

Your spinnaker cloth has a silicone finish which reduces friction in the launching chute and when gybing and with care you shall prolong the life of your sail.

*Avoid drying in direct sunlight or flapping in the wind.*

Check the mouth of your spinnaker chute for any sharp edges by running your fingers firmly over all surfaces. Sharp surfaces will not only cut the cloth, they will also "pull" seam threads.

Spray your launching chute regularly with silicone to reduce friction.



"Pulled" threads can often be addressed by holding the gathered area of the seam out on a flat surface and carefully adjusting the tension of the thread back into the form of the original stitch by re-tensioning the thread with a needle, unpicker or similar tool.

Tears can be easily repaired with the use of silicone sealant / glue and some .75oz spinnaker cloth. Wash the damaged area with fresh water and/or methylated spirits (clear alcohol). Cut a patch that is 25mm larger than the damaged area, smear a thin layer of silicone around the edge of the patch, spread the damaged area out on a flat surface and apply the patch. When dry the damaged cloth may be cut away leaving the patch.

Good Sailing,  
Chris Nicholson



## 7 PARTS LIST

Fitting Part Number Options or Restrictions (Where no comment, as per class rules)

### **Mast**

Top Spreader 49er/LowSpr  
IRS Licensed supplier only  
Bottom Spreader 49er/TopSpr  
IRS Licensed supplier only  
Spin Halyard block (top) RM 830 2mm +/- dia sheeve  
Main halyard exit box RF 1985 2mm +/- dia sheeve  
Jib Halyard exit box RF 1985 2mm +/- dia sheeve  
Spin Halyard block (base) RF 1017 2mm +/- dia sheeve  
Vang Pivot/Gooseneck RM680(m) IRS Licensed supplier only  
Vang lever 49er/Vang  
IRS Licensed supplier only  
HA halyard hook HA345  
Mast Plug 49er/Plug  
IRS Licensed supplier only

### **Wires**

1/8 Swage Toggle RF1506-04  
Shroud Chainplate RF 2331 Minimum of 4mm adjustment and commercially available

### **Boom**

Boom section 49er/Boom  
IRS Licensed supplier only  
Boom Gooseneck RM678(m) IRS Licensed supplier only  
Vang Plates RMT 30 IRS Licensed supplier only  
Vang arms 49er/Vang,Arms IRS Licensed supplier only  
Exit box (outhaul) RF1985 2mm +/- sheeve dia  
Outhaul hook block RM 421  
Single block (outhaul) RF666 2mm +/- sheeve dia  
Cleat (outhaul) RF5106  
Bullet blocks RF892 5mm +/- sheeve dia  
Ratchet Block RF1720 5mm +/- sheeve dia

### **Bowsprit**

Bowsprit 49er/Bowsprit IRS Licensed supplier only  
Small Exit Box RF 1985 2mm +/- sheeve dia  
Extension Block RF 9611043 2mm +/- sheeve dia

### **Forestay**

Forestay fitting 49er/FS,Chain IRS Licensed supplier only  
Aft bearing 49er/Aft,Bearing IRS Licensed supplier only

### **Jib Sheet**

Micro cheek block RF1978 2mm +/- sheeve dia  
Micro block with Becket RF 1951 2mm +/- sheeve dia

### **Jib System**

Cleat and Swivel RF 9508033

### **Chainplates**

Chainplates hull RF 314M IRS Licensed supplier only  
Alloy Bar 49er/Chainplate IRS Licensed supplier only

### **Mast Step**

Mast Step Channel 49er/MastStep IRS Licensed supplier only

### **Other**

Small Fairlead saddle RF 5003  
Small cleat and guide RF 5001p/y  
Stand up blocks RF1014 2mm +/- sheeve dia

Micro Cheek Blocks RF1978 2mm +/- sheeve dia

**Rudder**

Rudder Gudgeon/Pin 49er/RudderPin IRS Licensed supplier only

Rudder Frame 49er/RudFrame IRS Licensed supplier only

Anchor Gudgeons RF254

**Wings**

Wing Slides RF 9506046 IRS Licensed supplier only

Wing Slides with Stopper RF 9506045 IRS Licensed supplier only

Guides (set for 1 slide) RF 987 IRS Licensed supplier only

T Tracks RF 9506003 IRS Licensed supplier only

Track End RF 982 IRS Licensed supplier only

Ratchet Block RF 1720 5mm +/- sheeve dia

