

# Initial Assembly

## Unpacking

Check all items received against the List of Parts information; advise the Laser Centre of any missing parts.

## Hulls, trampoline and blocks

### Front beam

Remove the casting from one end of the front beam (secured by a single screw) and feed the front edge of the trampoline into the top track on the front beam; refit the casting to the front beam.

### Hulls

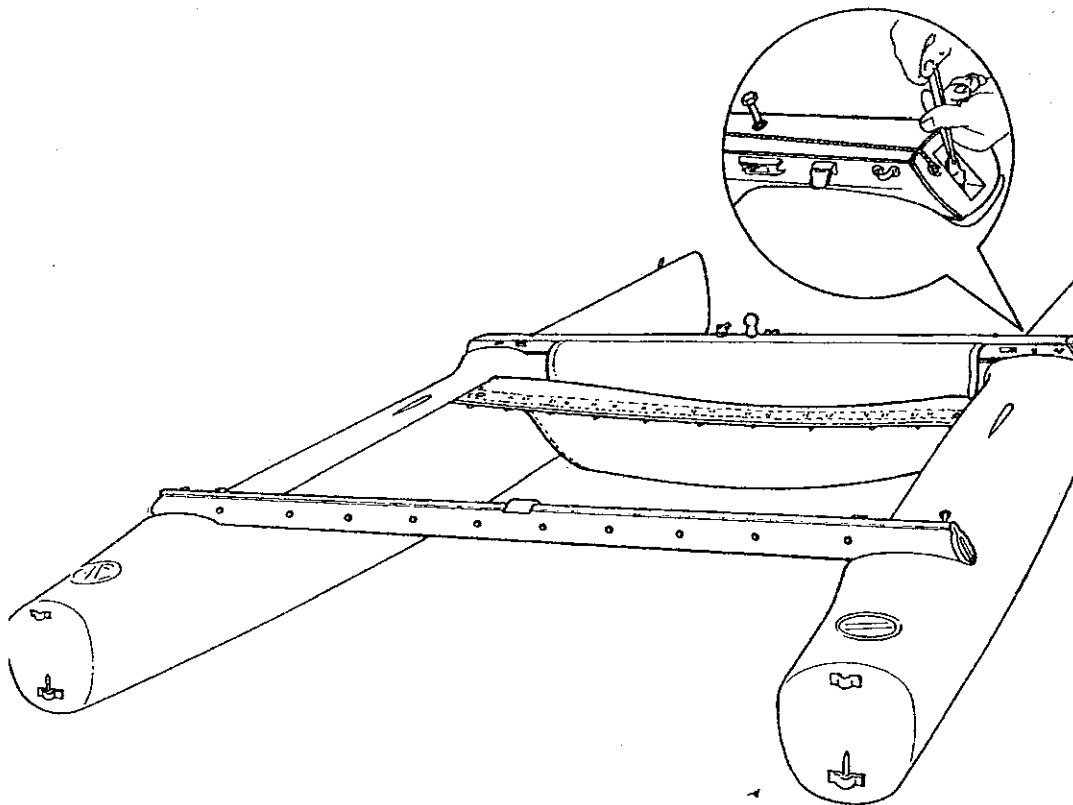
Position the hulls upright, using the launching trolley to support them. Remove the protective packing from the hulls.

Place the front beam in position on the hulls, with the spinnaker pole fitting to the front and the trampoline to the rear; take care that the mating surfaces of the hulls and beam are clean. Check that the correct bolts and washers are selected (a short bolt and washer at each end of the beam, each inboard long bolt with washer). Lubricate the thread of the securing bolts with silicone grease and loosely secure the front beam to the hulls.

Place the front beam in position on the hulls, with the trampoline tensioning rivets to the rear; take care that the mating surfaces of the hulls and beam are clean. Check that the correct bolts and washers/spacers are selected (a short bolt and washer at each end of the beam, each inboard long bolt with shaped spacer for the traveller track). Lubricate the thread of the securing bolts with silicone grease and loosely secure the rear beam to the hulls.

Move around the boat and progressively tighten the bolts, until all bolts are fully tightened.

*NOTE: As a part of routine maintenance, check the tightness of the bolts periodically; re-tension if required.*

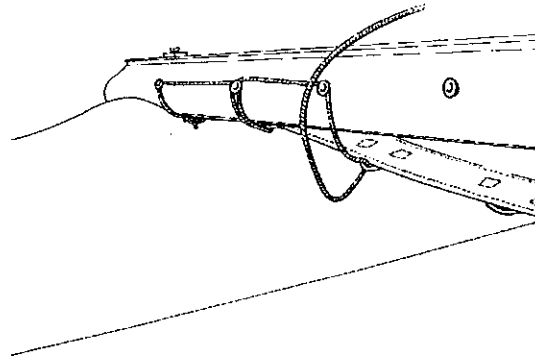


## Trampoline

Feed the trampoline bolt ropes down the slot in each hull, pulling evenly from each side. Attach the trampoline securing cord to one of the two eyes in the rear of the trampoline, using a bowline tight to the eye. Lace the trampoline cord through the eyes in the trampoline and around the securing pegs in the back beam.

Tie off the free end of the trampoline securing cord, then pull through the slack in the trampoline securing cord; continue taking up the slack until the trampoline is tight.

*NOTE: As a part of routine maintenance, check the tension of the trampoline periodically; re-tension if required.*



## Dolphin striker

The dolphin striker below the front beam should be tensioned to resist the downwards pressure from the mast and rig during sailing. Unscrew the mast ball on top of the front beam several turns, then tension the large nut on the dolphin striker to deflect the centre of the front beam upwards. Measure the deflection upwards using a piece of cord across the front beam; the dolphin striker should be tensioned so that the centre of the front beam is deflected upwards by approximately 6mm. Screw the mast ball firmly down onto the front beam.

## Toestraps

Attach the two wire toestrap stops to the fittings on the rear underside of the front beam, using clevis pins and rings.

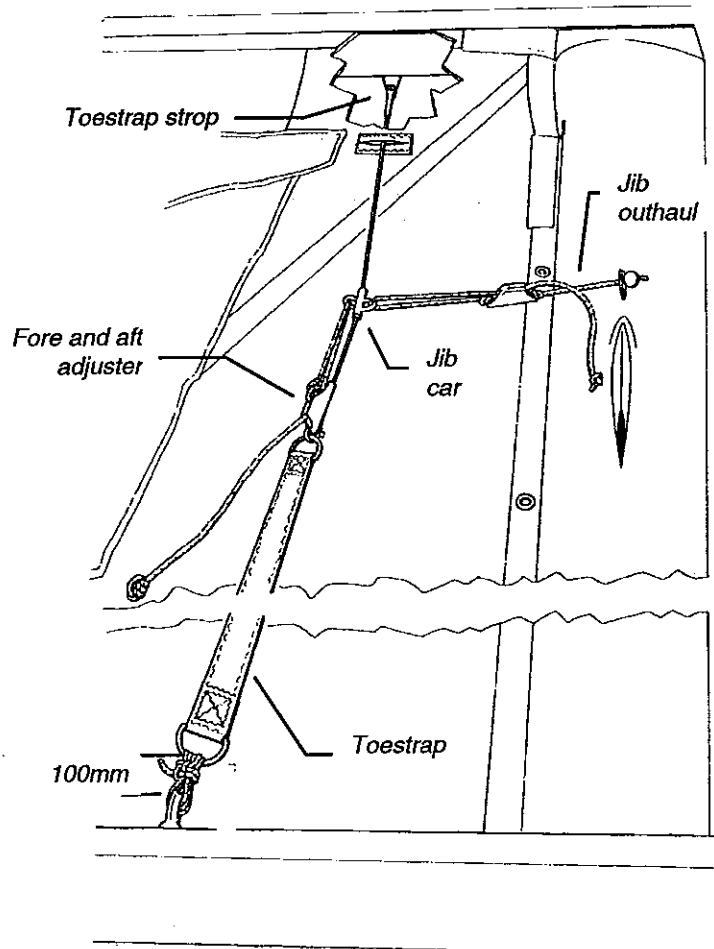
Feed the wire toestrap stops through the slits in the trampoline and attach them to the footstraps using shackles secured by flat-head screws.

Attach the footstraps to the fittings on the rear beam using the footstrap stops; the distance from the footstrap D-ring to the fitting should be 100mm for both footstraps.

## Jib car adjusters

Attach the jib car outhaul lines to the shroud plates: untie the end of the line, feed the line through the bottom hole in the shroud plate, fit a plastic ball onto the end of the outhaul line and tie a stop knot in the outhaul line. Feed the free end of the outhaul line through the side ring of the jib cars and back through the clamcleat; tie stop knots in the outhaul lines.

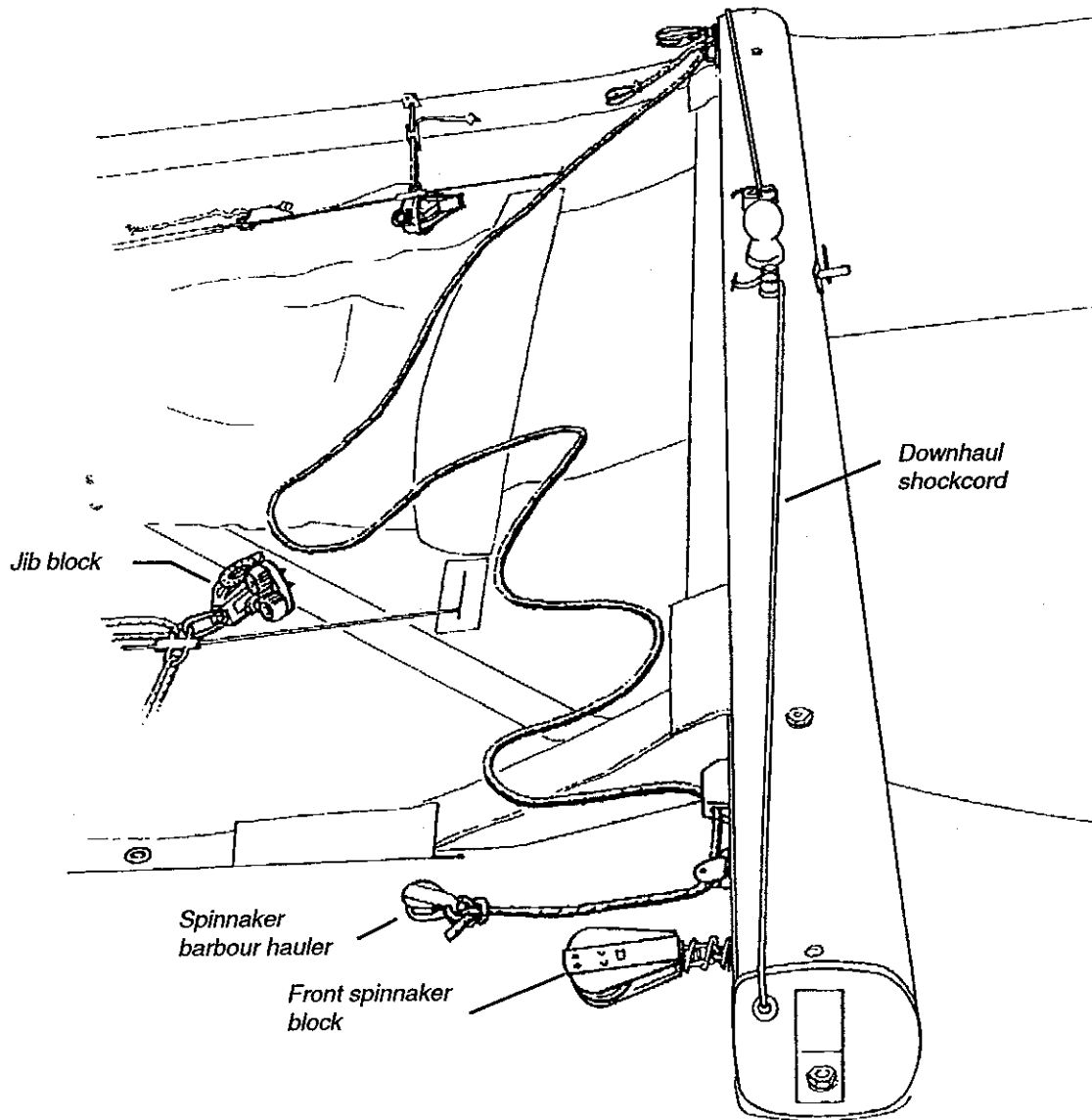
Feed the free end of the fore/aft line through the rear ring of the jib cars and back through the clamcleat; tie a stop knot in the fore/aft lines.



## Jib and spinnaker blocks

Attach the jib blocks to the inner ring on the jib cars with a shackle; fit the shackle pin so that the head is upwards, to reduce wear on the trampoline.

Attach the frontspinnaker blocks to the two fairleads on the rear of the front beam, using a shackle and large spring. Feed the spinnaker barbour hauler control line through the turning block and clamcleat on each side of the front beam; attach a bearing block to each end of the control line.



## **Mast**

Raising the mast is simplified if the mast support on the boat trailer is used to support the top of the mast while the rigging is being attached.

Position the boat and trailer so that the mast can be placed on its side, with one end on the front beam (use some packing to protect the beam and mast) and the top of the mast on the trailer mast support.

Secure the foot of the mast to the mast foot using a short length of 4mm spectra rope through the holes in the mastfoot casting and the mast ball; only use spectra or rope of equivalent strength. Check that the downhaul blocks have been taped together, to reduce the possibility of damage against the front beam.

Attach the port and starboard shrouds to the top hole on each shroud plate using clevis pins and rings; ensure that the shrouds are not twisted.

### **Spinnaker Halyard and Outhaul (Fig. xx)**

Feed the spinnaker halyard from sheave ① on the spinnaker pole, through the turning block ② on the front beam. Feed the spinnaker halyard up over the front of the lower diamond wires, then through the starboard spreaders, over the front of the upper spreaders, shrouds, forestay and trapeze wires, through the halyard turning block ③ on the mast. Take the halyard down the mast outside all of the standing rigging and loosely tie the end of the halyard to the spinnaker outhaul rope from sheave ④ on the spinnaker pole.

Feed the spinnaker halyard from sheave ⑤ on the spinnaker pole through the fairlead and cleat on the front beam; tie a stopper knot in the end of the halyard.

### **Raise the Mast**

Check that the forestay, shrouds, trapeze wires and spinnaker halyard are not tangled.

Raise the mast and attach the forestay to the shackle on top of the jib furler using the forestay strop. An average forestay strop dimension is 120mm from the shackle to the eye of the forestay.

Attach spinnaker pole strop

Attach trapeze wires and shockcord

Downhaul - through blocks, attach to shockcord in beams

## Mast and rigging

### Spreaders and diamond wires

Place the mast on the ground and remove the protective packing.

Adjust the outer fittings on the spreader assemblies so that the securing bolt is through the centre of three holes.

Attach the rear spreader fittings to the corresponding fittings on the mast, using clevis pins and rings; tape the rings for security.

Screw the front spreader fitting fully in on both spreaders, and then unscrew both fittings out by the same amount (i.e. five complete turns on each spreader); this is an approximate setting for initial assembly - accurate spreader rake setting is discussed in the *diamond wire tension adjustment* below.

Fit the front spreader fittings to the mast, using clevis pins and rings; these pins and rings will be removed later for accurate spreader rake adjustment, so need not be taped at this stage.

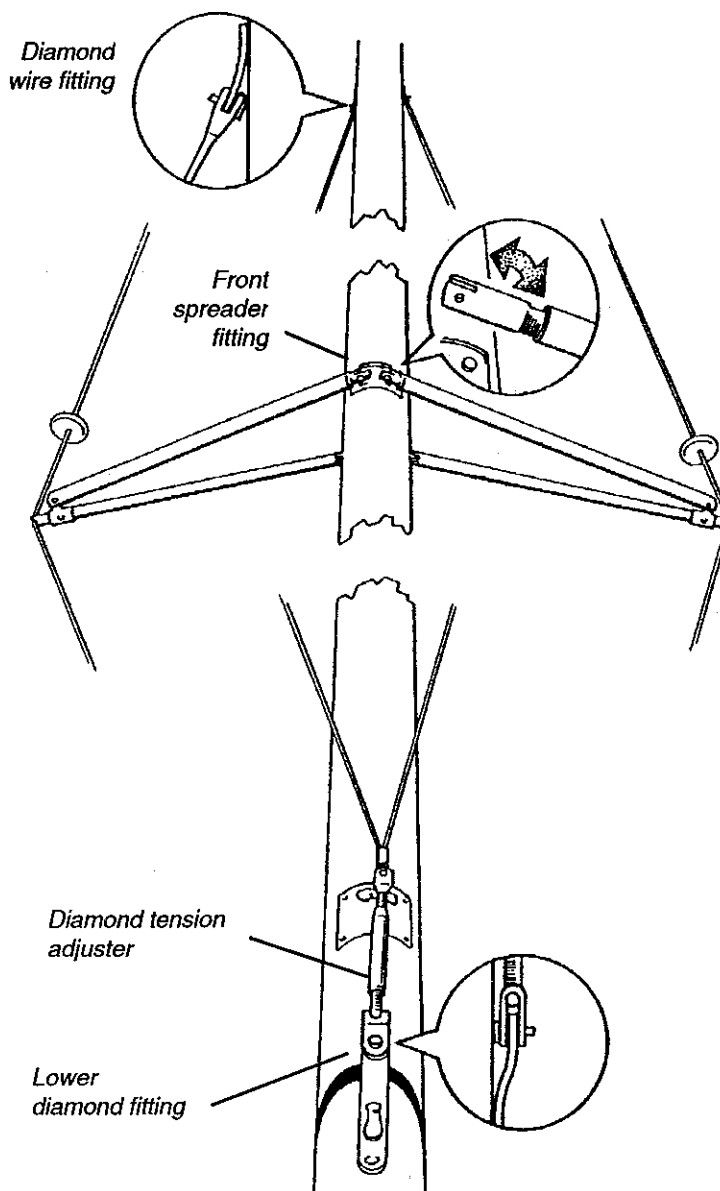
Carefully bend up the lower end of the diamond wire fitting on each side of the mast, to allow the diamond wire to be attached with a clevis pin. Apply a small piece of tape on the mast where the clevis pin will be fitted, to prevent the clevis pin damaging the mast anodising. Attach a diamond wire on each side of the mast, using a clevis pin fitted through from the mast side. Carefully bend the diamond wire fitting back down on each side of the mast, to secure the clevis pins against the mast.

**NOTE:** It is not necessary to fit a ring in the clevis pins, since the clevis pin cannot be removed without bending up the diamond wire fitting again; fitting a split ring is not recommended, as split rings can catch on the spinnaker when gybing.

Carefully bend up the top end of the lower diamond wire fitting on the front of the mast, to allow the diamond tension adjuster to be attached with a clevis pin. Apply a small piece of tape on the mast where the clevis pin will be fitted, to prevent the clevis pin damaging the mast anodising. Attach the diamond tension adjuster to the diamond wires and to the mast fitting, using a clevis pin fitted through from the mast side. Carefully bend the diamond wire fitting back down to the mast, to secure the clevis pin against the mast.

**NOTE:** It is not necessary to fit a ring in the clevis pin, since the clevis pin cannot be removed without bending up the fitting again; fitting a split ring is not recommended, as split rings can catch on the spinnaker when gybing.

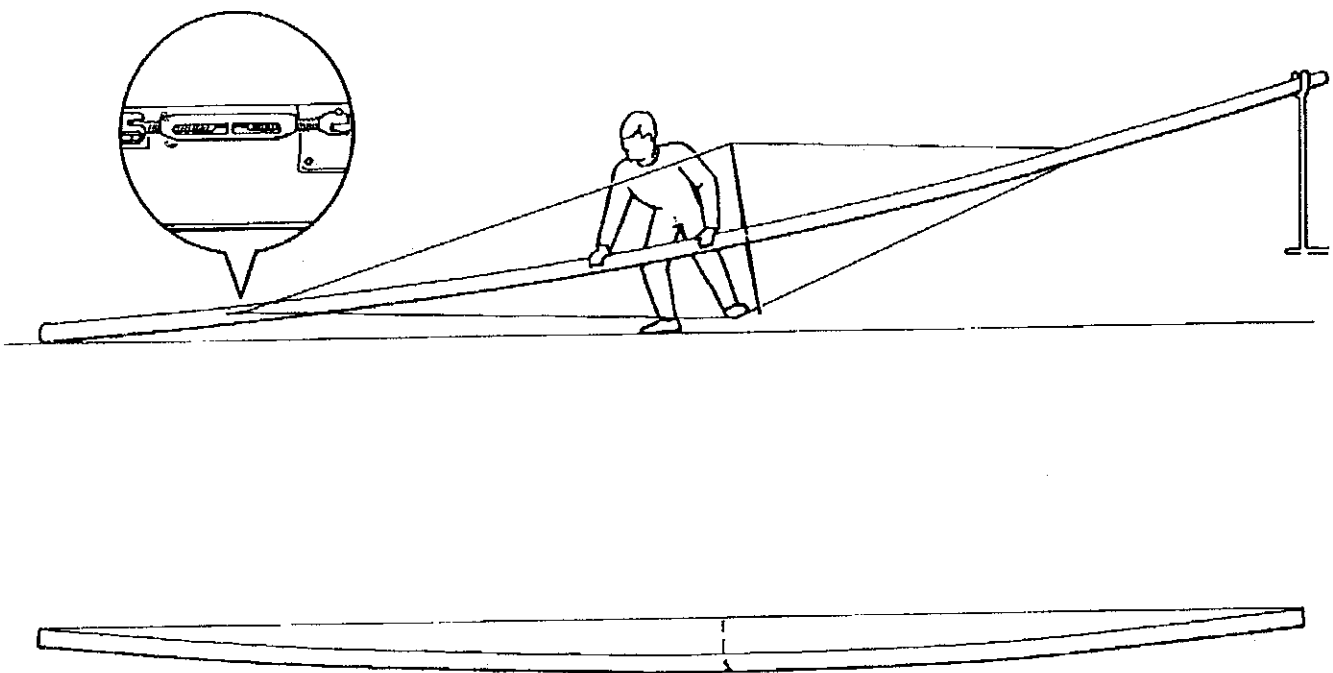
Proceed to the diamond wire tension adjustment.



## Diamond wire tension

Diamond wire tension (and also spreader rake described below) determines the response of the mast (and therefore the mainsail) to gusts and to crew/helm weight. If the diamond wire tension is set correctly, the mast shape will remain stable and powerful to a suitable point for your helm/crew weight; then as the wind becomes too powerful for your helm/crew weight, the forces in the rig will exceed the supporting tension of the diamond wires and the mast will flex and start to de-power the rig. The theory behind this setting procedure for diamond wire tension and spreader rake is to end up with a setting based upon the weight of the crew, so that the rig will remain fully powered with the crew on trapeze, with the mast prebend at an efficient setting for the mainsail.

Lift up and support the tip of the mast (for example on the boat trailer mast support), with the mast lying on its side. Bend the mast downwards by the crew leaning most of their weight on the mast at the spreaders; fit the upper diamond wire into the groove at the end of the spreader. With the crew still leaning on the mast at the spreaders, take up the slack in the diamond wires by turning the adjuster on the front of the mast by hand until it is done up finger tight. Grasping the mast firmly and using your foot against the lower diamond wire, press down with your foot until the lower diamond wire can be fitted into the groove at the end of the lower spreader.



Proceed to the spreader rake and mast prebend adjustment.

## Spreader rake and mast prebend

Turn the mast over so that the front of the mast is down towards the ground. Pull a thin cord tight from tip to bottom of the mast and measure the distance from the mast track to the cord - this distance is the mast prebend. The mainsail is cut for a mast prebend setting of 38mm, so this measurement should be 38mm. In the previous step you have adjusted the diamond wire tension so that it is suitable for your crew weight; to adjust the prebend setting, you should adjust the spreader rake, and NOT the diamond wire tension.

If it is necessary to adjust the prebend setting, turn the mast on its side and using your foot unclip the lower spreader from the groove in the end of the spreader, then unclip the upper spreader from the groove in the end of the spreader. Remove the rings and clevis pins from both front spreader fittings. Adjust both spreaders by screwing the adjusters in or out by equal amounts (e.g. 1/2 turn, 1 turn, 5 turns as appropriate).

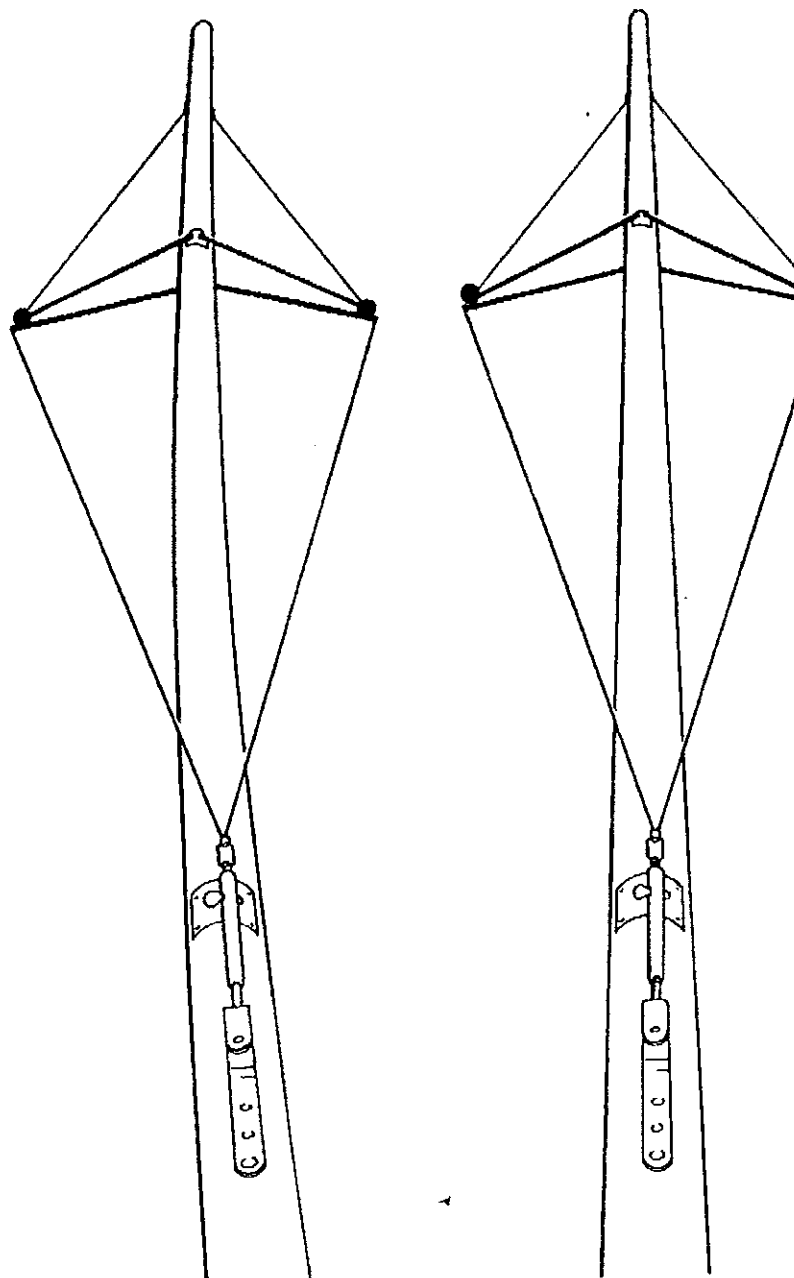
Refit the spreaders to the mast using clevis pins and rings, then reattach the diamond wires into the grooves in the spreaders. Measure the mast prebend again using a thin cord from tip to bottom of the mast. If the measurement is 38mm, proceed to the next stage in assembly; if the dimension is not 38mm, repeat the procedure for re-adjusting and re-checking the measurement until a 38mm setting is achieved. Once the correct pre-bend setting is achieved, turn the mast so that the front is facing down towards the ground. Holding the mast up by the tip, look down the mast track towards the bottom of the mast. If the spreaders and diamond wires are equal in length, the mast track will be straight; if one is slightly shorter, the mast will bend to one side (away from the longer spreader). The illustration below identifies the "long" spreader to adjust to correct a curve in the mast.

To adjust the "long" spreader, turn the mast on its side and using your foot unclip the diamond wire from the groove in the end of the short spreader. Remove the ring and clevis pin from the front spreader fitting. Adjust the spreader by screwing in the adjuster by 1/2 turn. Refit the spreaders to the mast using clevis pin and ring, then reattach the diamond wire into the groove in the spreader. Holding the mast up by the tip, look down the mast track towards the bottom of the mast and check whether the mast track is straight; re-adjust and re-check as necessary until the mast track is straight.

*NOTE: If 1/2 turn adjustment is too much to achieve a straight mast, fine adjustment can be achieved by filing small amounts from the groove in the end of the "long" spreader.*

Once the mast prebend is correct and the mast is straight, secure the diamond wires in the grooves in the spreaders using whipping twine.

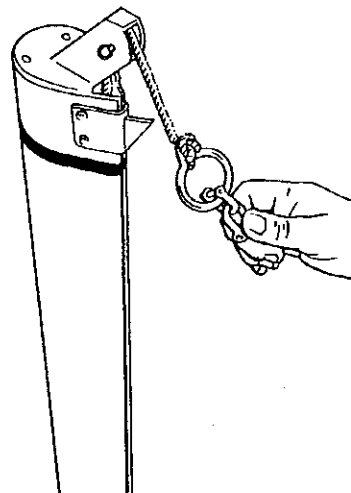
Proceed to fitting the halyards, shrouds, forestay and trapeze wires.



## Main halyard

Feed the end of the main halyard around the turning block at the tip of the mast. Use a screwdriver or knife to feed the halyard down the mast and out around the turning block at the foot of the mast; tie a stop knot at the bottom of the main halyard. Attach the main halyard to the halyard ring and two shackles; the ring attaches to the corresponding hook at the top of the mast when the sail is raised, and the two shackles allow effective rotation of the top section of the sail.

*NOTE: It is NOT recommended to use a conventional mainsail hook with attached shackle; these fittings restrict rotation of the top section of the sail.*





## Spinnaker halyard turning block

Attach the spinnaker halyard turning block to the fitting above the hounds on the front of the mast.

## Shrouds, forestay and trapeze wires

Turn the mast over so that the front of the mast is facing upwards. Lay the trapeze wires, shrouds and forestay alongside the mast. Feed the forestay and shrouds onto the large bow shackle, then attach the shackle to the bottom hole in the hound fitting on the front of the mast; use a trapeze wire fitting either side of the hound, to act as spacers between the shackle and the hound. Fully tighten the shackle. Attach the forestay strop to the bottom of the forestay.

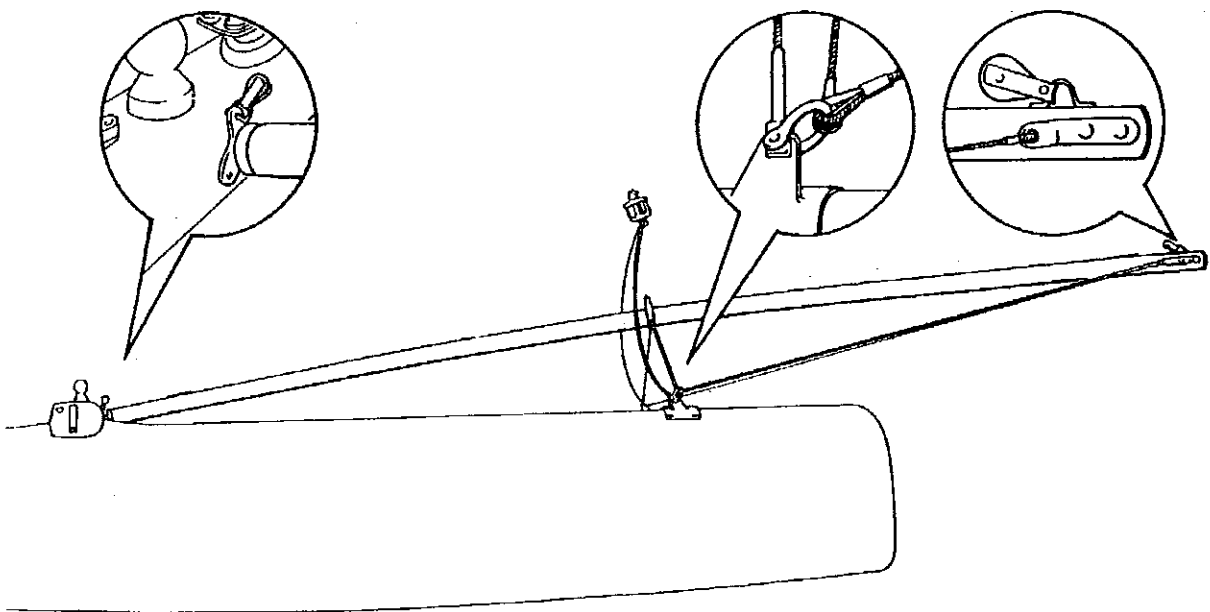
## Downhaul blocks

In preparation for raising the mast, the downhaul blocks should be secured together at the rear of the mast (for example with tape); this will reduce the chance of damaging the blocks on the front beam while the mast is being raised.

*NOTE: This precaution should be followed whenever the mast is raised or lowered.*

## Bridle wire and spinnaker pole

Attach the two bridle wires to the bottom of the jib furling mechanism. Lay the spinnaker pole on the ground between the hulls at the front of the boat, with the white plastic end cap towards the front beam; fit the end of the spinnaker pole onto the fitting on the front beam. Attach the bridle wires and spinnaker pole restraining wires to the bridle plates, using shackles; ensure that the wires are attached as shown below; fit the shackle pins so that the heads point downwards, to reduce the chance of catching the spinnaker sheets. Attach the spinnaker pole strop to the ring on the spinnaker pole. Attach the spinnaker halyard lower turning block to the fitting on the front beam.



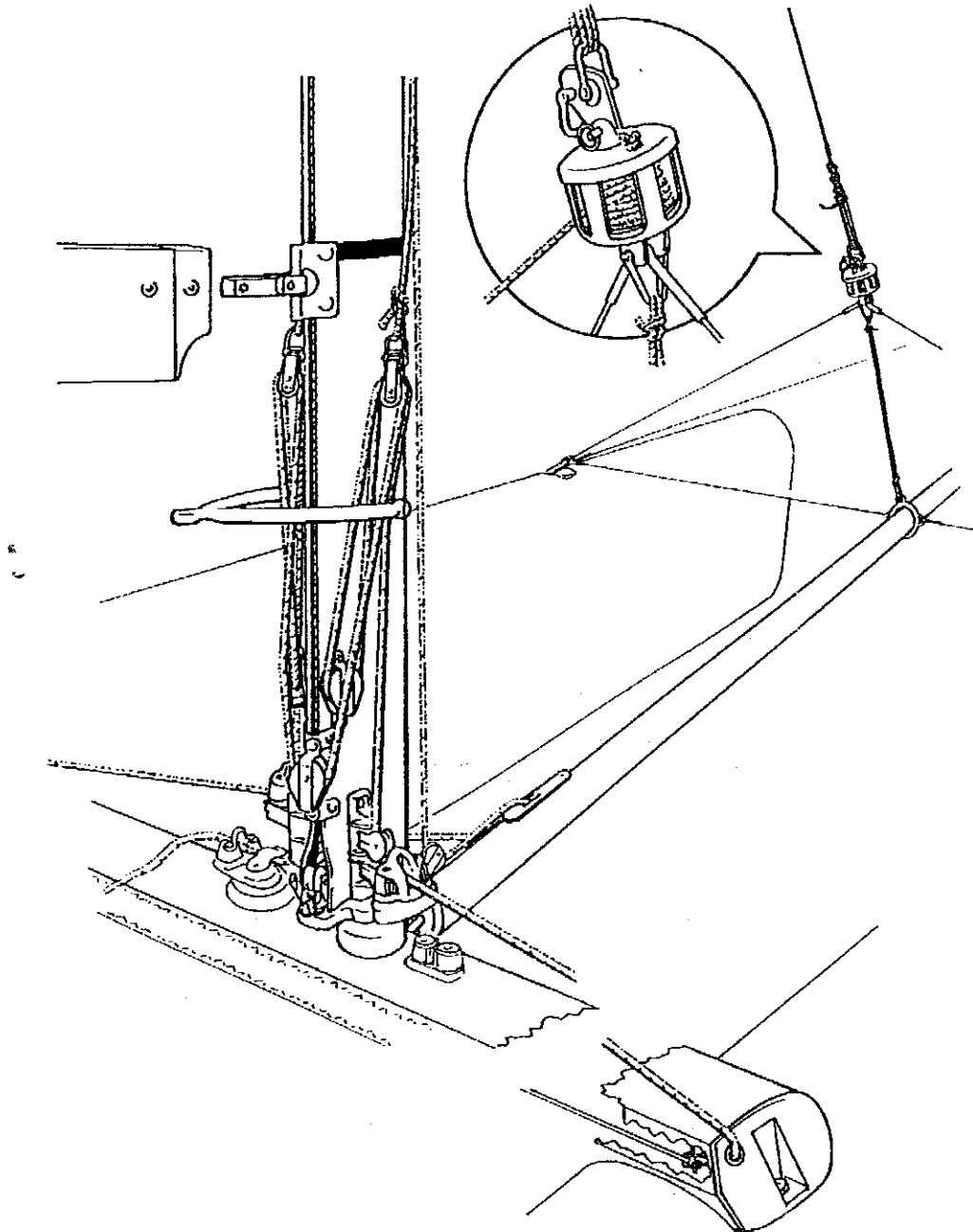
## Rig security

Tape up all clevis pins and rings. Ensure that all shackles are fully tightened; it is recommended that shackles are secured with locking wire.

*NOTE: As a part of routine maintenance, check the tightness of shackles periodically and re-tension if required; check that all clevis pin rings are still fitted and taped.*

## Boom

Attach the boom to the goose-neck on the mast with a stainless steel bolt and nut. The mainsail clew outhaul is built into the boom, and the mast-rotation and de-rotation cleats are attached to the sides and base of the boom.



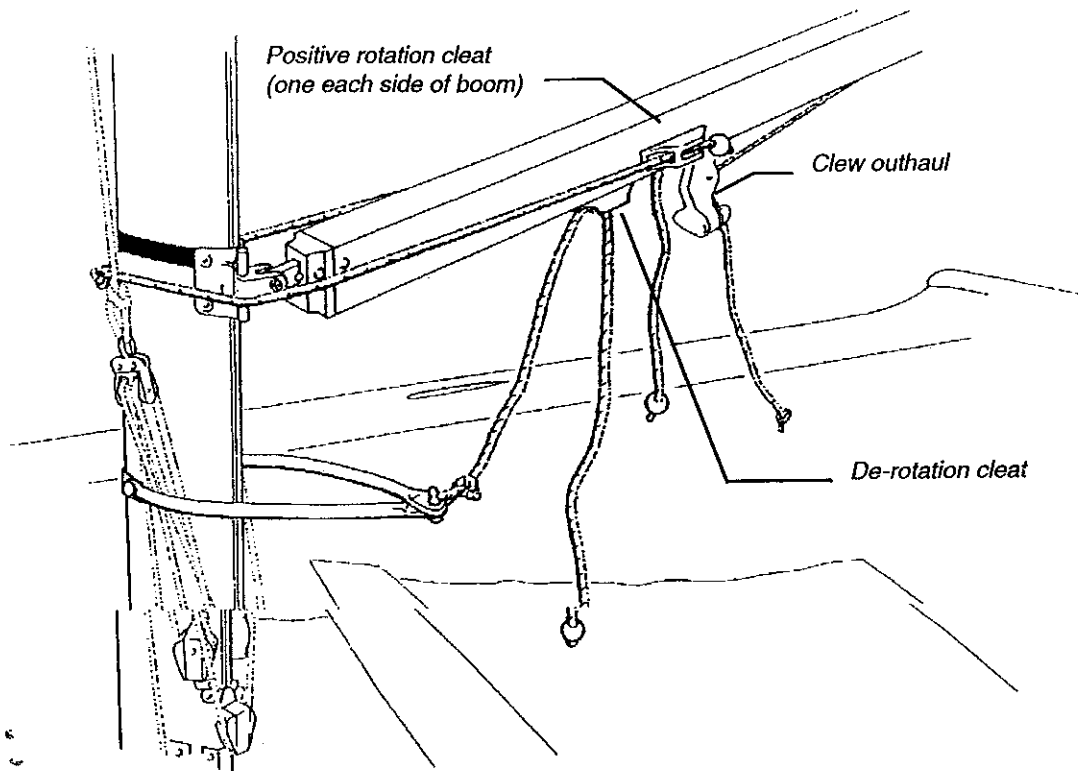
### Positive rotation control

Attach the positive rotation line as shown in Fig. ##. Use a stop-knot at each end to secure the line. The positive rotation control is used to lock the mast in a rotated position, for example when sailing in wavy conditions, or if there is insufficient wind strength to rotate the mast.

*NOTE: The positive rotation control MUST be released before gybing. Failing to release the positive rotation control prevent the mast rotating correctly onto the new gybe, which will place enormous stress on the mast and may result in breakage.*

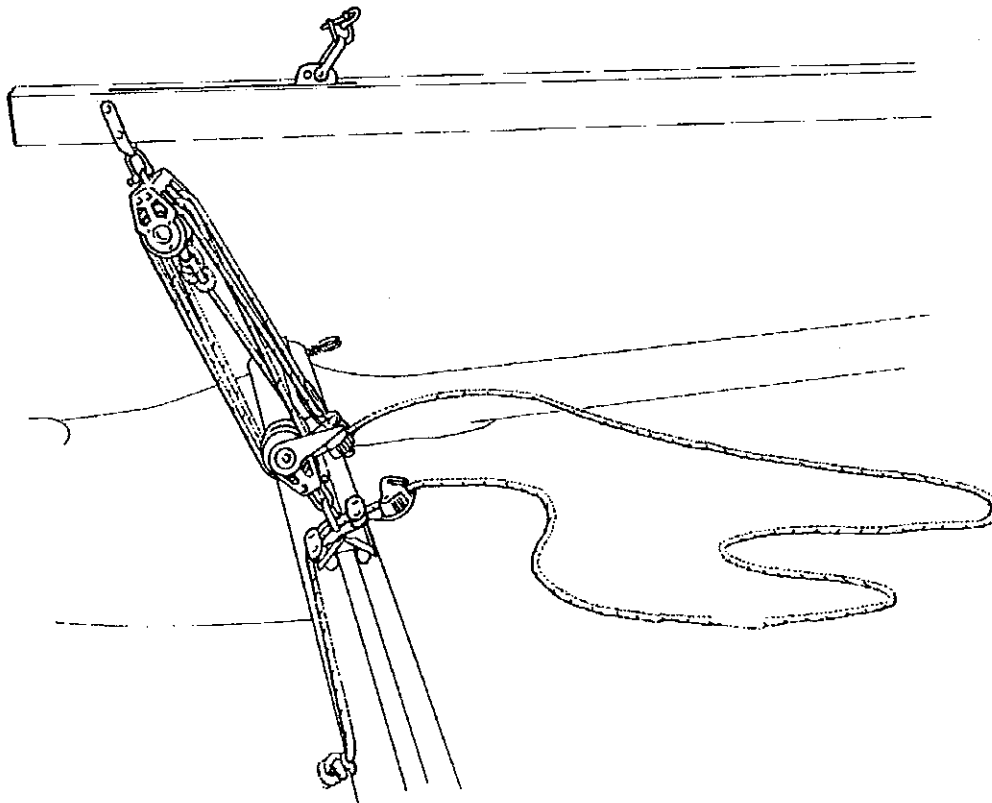
### De-rotation control

Attach the de-rotation line as shown in Fig. ##. The de-rotation control is used to prevent the mast fully rotating, for example when beating or fine reaching.



### Mainsheet blocks/traveller

Feed the mainsheet through the upper and lower mainsheet blocks as shown in Fig. ##. The free end of the main sheet feeds through the traveller cleat and traveller assembly and is attached to the rear of the back beam with a stop knot.



## Main sail

The flat-top dacron mainsail has an area of xx square metres, with xx full length foam-cored battens. Sail shape and power is controlled by downhaul, mast rotation, outhaul, mainsheet and traveller controls.

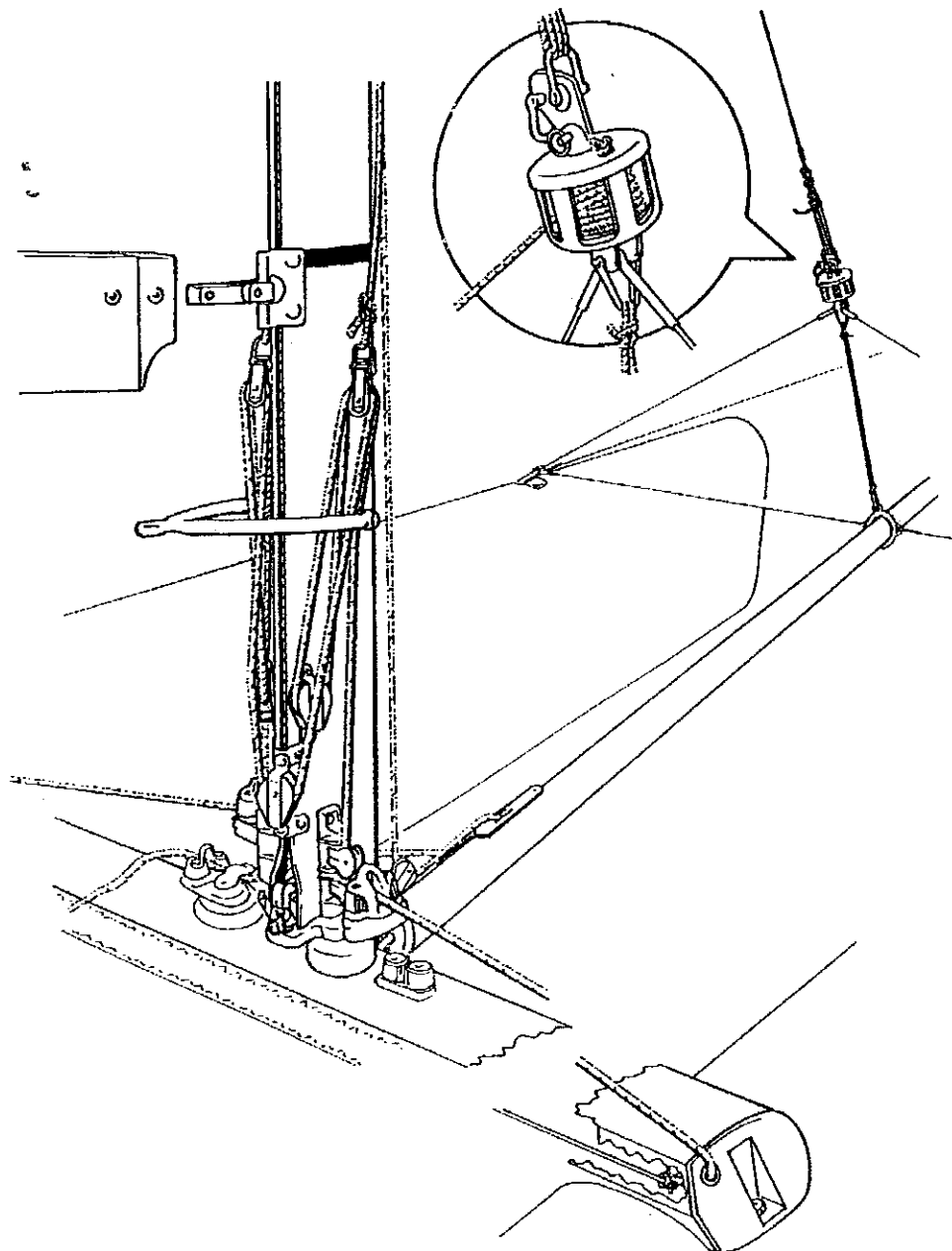
The mainsail is attached to the main halyard by a ring and two shackles; the ring attaches to the corresponding hook at the top of the mast when the sail is raised, and the two shackles allow effective rotation of the top section of the sail.

*NOTE: It is NOT recommended to use a conventional mainsail hook with attached shackle; these fittings restrict rotation of the top section of the sail.*

## Downhaul

The downhaul has an 8:1 purchase, controlled by 4mm line with free ends taken up by shockcord through the front beam. Feed the downhaul line around the double micro-blocks and down through the downhaul fittings on the bottom of the mast, as shown in Fig. ##. Attach the shock cord from the ends of the front beam to the end of the downhaul line, taking care not to let go of the shock cord before it is securely attached to the traveller line. Once attached the shock cord will take up any slack in the downhaul line.

Rotation settings - upwind, reach, downwind, strong winds



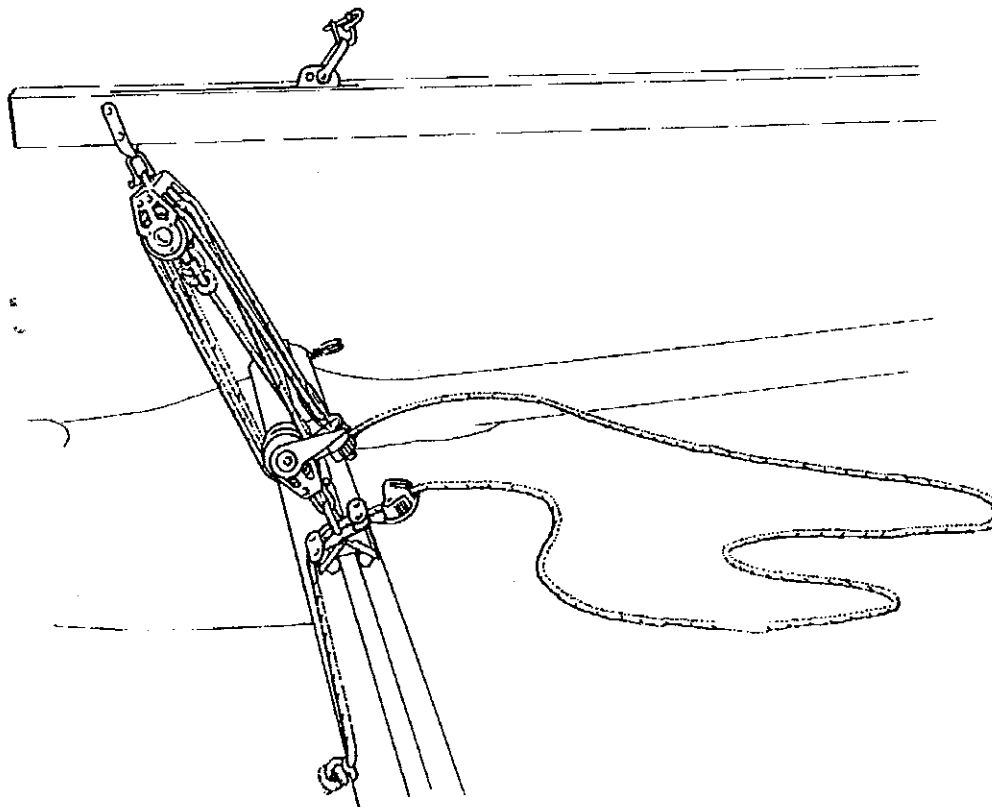
## Batten tension

The battens are numbered from 1 to XX. Insert all of the battens into the mainsail and check that the batten length is correct; shorten any battens if necessary, so that there is a minimum amount of batten protruding from the back of the mainsail. Remove the battens and file the end that protrudes from the mainsail so that it is smooth and rounded; this will reduce the chance of damaging the spinnaker if it accidentally catches the back of the mainsail during a hoist or drop.

Insert and tension the battens using the tension cords (Fig. xx); aim to tension all battens equally, so that they are a snug fit in the mainsail. In strong winds it may be helpful to loosen the batten tension in the top three battens, allowing the top section of the mainsail to fall away in gusts.

## Outhaul

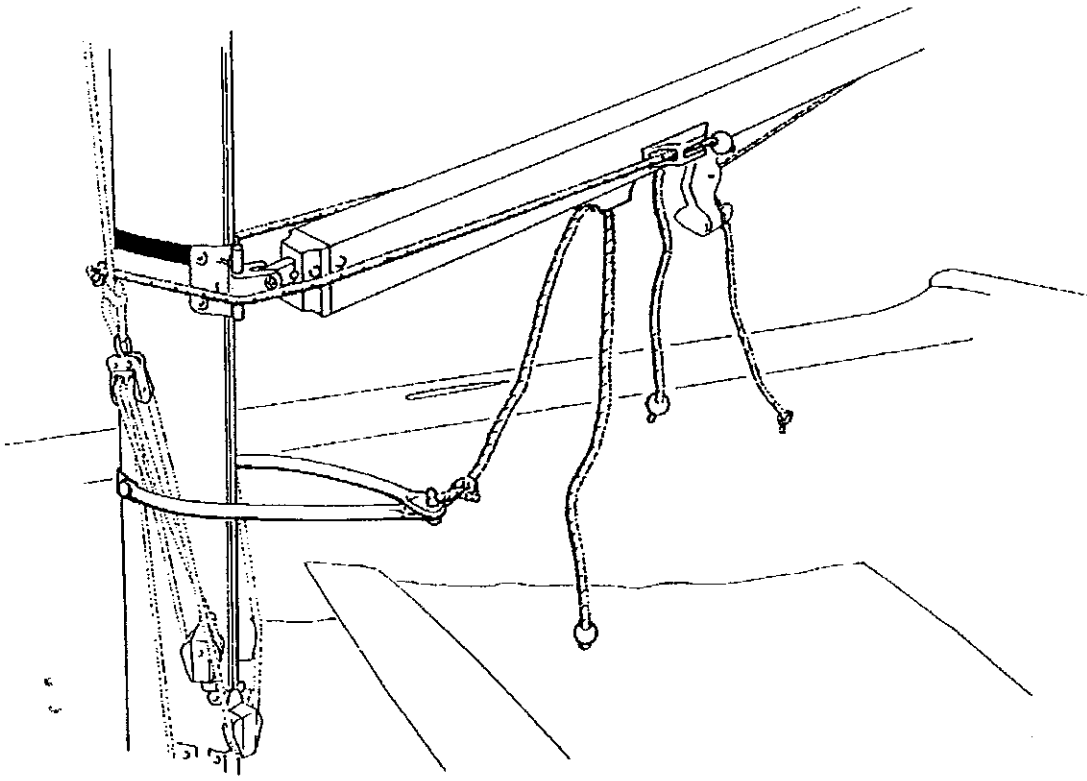
Attach the clew of the mainsail to the outhaul car on top of the boom. Attach the sail so that the shackle pin passes through the eye in the sail, not through the outhaul car: having the curve of the shackle



through the car allows the clew of the sail more flexibility and movement as the outhaul is eased.

## Mast rotation

The rotation of the mast determines the shape of the mainsail, the effect of the other rig controls, and the gust response of the mainsail. There are two rotation controls:

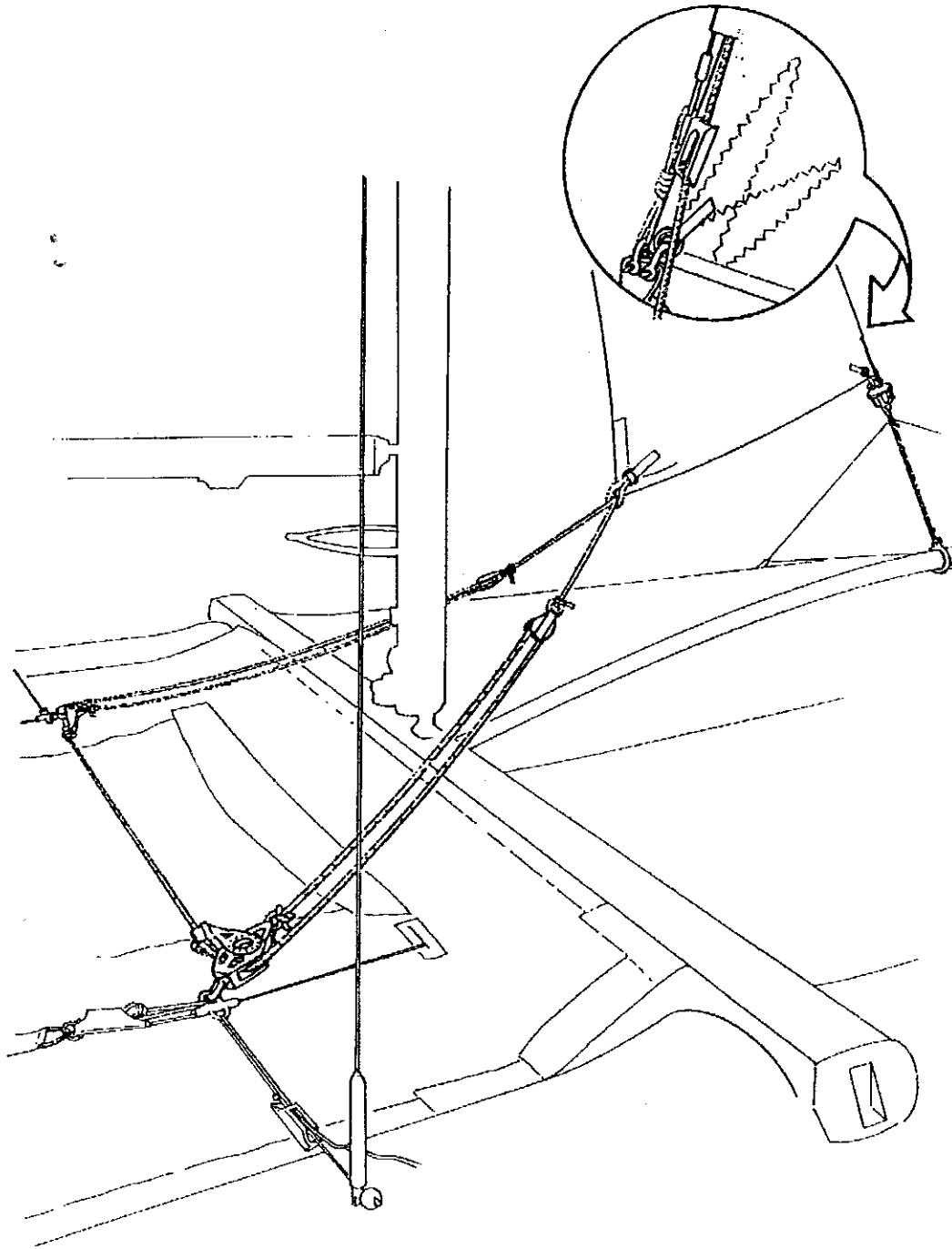


# Rig Controls

## *Jib*

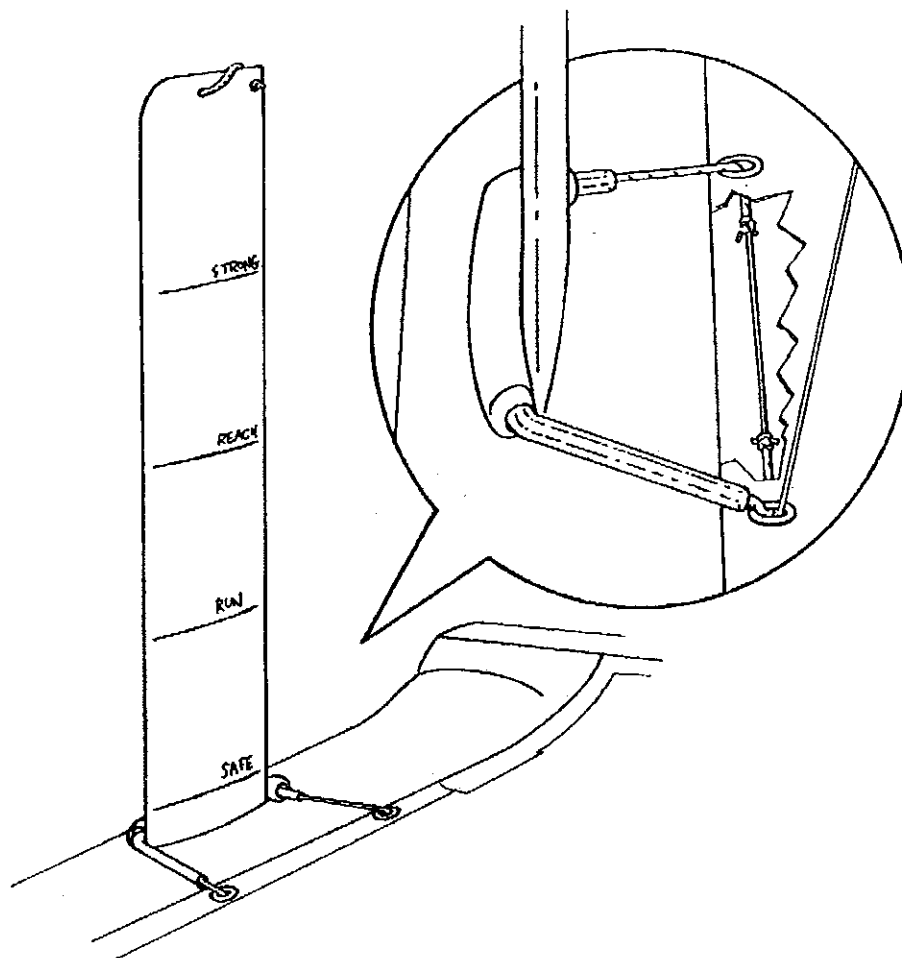
The diagonal battened dacron jib has an area of xx square metres (full rig), or xx square metres (small rig). Sail shape and power is controlled by downhaul, jibsheet and jib car controls.

The zip-luff sail is raised on a rotation mechanism allowing the sail to be furled for launching and recovery. The head of the jib is attached to the wire halyard by a small shackle. The luff zip is done up around the forestay and the halyard cord; as the jib is raised the zip is done up. When the sail is almost fully raised, attach the tack of the jib with a shackle to the rotation mechanism; tension the jib luff using the luff downhaul rope and clamcleat mounted on the foot of the jib. The halyard cord can be removed and stored safely whilst sailing, but remember to re-attach the halyard cord before lowering the sail!



The bottom line should be marked on the board to indicate that the daggerboard is retracted fully in the hull. The three lines above are spaced and marked using an A4 notepad or booklet, so that the lines are spaced approximately 210mm apart: the "SAFE" line is for launching and recovering the boat; "RUN" is the position for running, "REACH" is for reaching, and "STRONG" is for sailing upwind in strong winds.

## Restrainers



The restrainers provide friction against the daggerboards, to hold them in position whilst sailing; this is particularly important when sailing in waves, when it is likely that hulls and daggerboards will be completely out of the water at times.

Make up and fit a restrainer for each side of the boat (Fig. xx). Each restrainer consists of a length of thick shock cord running through a plastic pipe, attached to a thin cord with a loop at one end; it may be more effective to add a piece of foam pipe cladding around the plastic pipe to give better friction against the daggerboard. The thin cord is fed through the two eyes in the trampoline, and should be thin enough so that it doesn't restrict free movement of the trapeze shockcords. Insert the daggerboard and run the restrainer around the daggerboard and feed the thin cord through the two eyes in the trampoline. Adjust the tension of the restrainer so that a positive effort is required to raise or lower the daggerboard.



## **De-rotation**

The de-rotation control line runs from the cleat on the bottom of the boom through a micro block on the mast spanner (giving 2:1 purchase) back to the de-rotation cleat on the boom. Releasing the de-rotation control line allows the mast to rotate fully; pulling in the de-rotation control line prevents the mast rotating fully.

Typically the de-rotation control line would be set so that the mast spanner points towards the leeward shroud for beating and fine-reaching, releasing the de-rotation control line to allow the mast to rotate fully for downwind sailing.

## **Positive rotation**

The positive rotation control line is fitted by tying a stop-knot at one end, then feeding the line through the positive rotation cleats on each side of the boom, back through the fairlead on the front of the mast to finish in a second stop knot (Fig. xx). With the control line attached in this way it is possible to pull the loop of control line fully forward between the cleats, preventing accidental cleating.

The positive rotation control line is useful for downwind sailing in light wind or wavy conditions to lock the mast in the fully rotated position (once the de-rotation control line has been released).

*NOTE: When the positive rotation control is used, take great care to uncleat the control line before gybing. Failing to uncleat the positive rotation before gybing will leave the mast rotated in the wrong direction, putting great strain on the mast and rig.*

## **Mainsheet, traveller**

Settings for upwind, reach, downwind, strong wind, spinnaker

## **Calibration**

It is important that all the rig controls are calibrated, so that you can experiment with the effect of the various controls and then accurately reproduce settings that give good boat speed.

## **Outhaul**

With the mast fully de-rotated, apply full outhaul and mark the position of the eye in the mainsail clew on both sides of the boom. Then mark forwards on both sides of the boom at 1" to 1.5" intervals, numbering the increments.

## **Downhaul**

Take a pen on the water - mark etc etc.

## **Daggerboards**

### **Calibration**

To allow easy setting of daggerboard position whilst sailing, mark the daggerboards using a permanent marker, as shown in Fig. xx.

## ***Rudders***

### ***Assembly***

10mm spanners

### ***Kick up adjustment***

4mm allen key, 13mm spanner

### ***Alignment / rudder bar adjustment***

## ***Spinnaker***

There are two sizes of spinnaker permitted: small (19.0 sq. m); large (21.0 sq.m). The small spinnaker is identified by a red self-adhesive circular label near the tack of the sail.

### **Attaching - sheets, halyard, outhaul.**

#### **Spinnaker outhaul**

The spinnaker outhaul attaches to the cringle (eye) at the tack of the spinnaker, using a bowline. It is advisable to tie a permanent stop knot (or use a small plastic ball) in the outhaul, approximately six inches from the end of the rope; this will prevent the outhaul rope from being pulled through into the pole when the spinnaker is not attached.

#### **Spinnaker halyard**

The spinnaker halyard attaches to the cringle (eye) at the head of the spinnaker, using a bowline.

#### **Spinnaker sheet**

The spinnaker sheets attach to the cringle (eye) at the clew of the spinnaker, using a stopper knot on each sheet.

#### **Spinnaker barbour hauler**

The barber hauler line runs across the front of the trampoline area, passing through two cleats on the front beam. The barber hauler control is used to change the sheeting angle of the spinnaker: sheeting the barber hauler in tightly will tighten the leech of the spinnaker, closing the slot between the mainsail and the spinnaker; easing off the barber hauler will loosen the leech of the spinnaker, opening the slot between the mainsail and the spinnaker.

*Note that having the barber haulers sheeted in too tightly will close the slot and backwind the mainsail, losing power and slowing the boat down.*

Stowing - under jib sheet

Hoisting

Recovery

Sailing angles

Capsize recovery