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Instructions for rigging  
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*Hints and  
advice on rigging  
and tuning of your  
Seldén mast*

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# Checklist—Rigging and Tuning

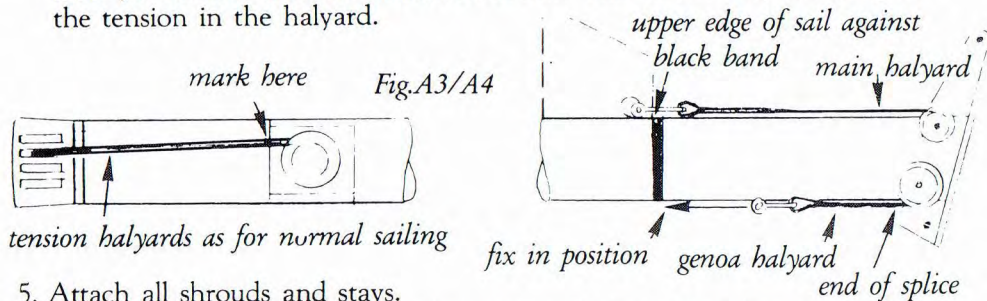
## Rigging and tuning of masthead and fractional rigs

The checklist given below is intended for use when rigging a completely new boat. Some of the points can be omitted for other boats.

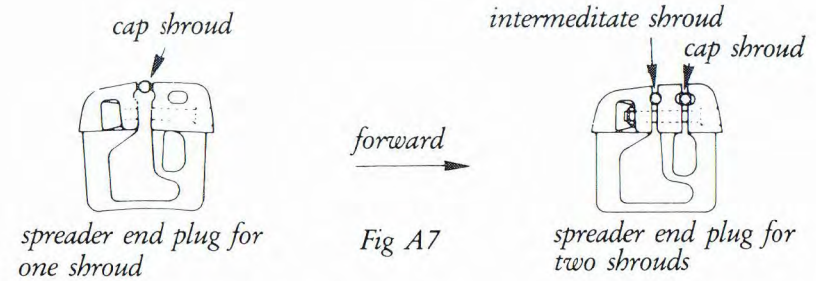
### A. Check of the mast before stepping

1. Check that the lights and deck lights are working, and that the cables are not chafing, particularly at the entry grommets. Smear the contacts with vaseline. Regarding fitting of additional cables see p.23.
2. Check that the anemometer is working, both electrically and mechanically.
3. Mark the genoa halyard: Fix the halyard so that the splice for the shackle lies just outside the pulley sheave at the masthead. Tension the halyard to the normal load as if you were using the foresail. Mark the halyard at the upper edge of the winch plate, for example, using a spot of paint or a piece of whipping twine sewn into the halyard, see Fig.A3. (Foresails with shorter luffs than that of the largest genoa should be fitted with a pennant, so that all the luffs are of equal length).
4. Mark the mainsail halyard: Fix the halyard shackle to the mainsail, so that the head of the mainsail lies at the lower edge of the black band. Mark the halyard after tensioning it in the same way as the genoa halyard, see Fig.A4.

The tension in the halyard can be easily seen by the use of "adjustment label", a transfer with measurement marks. This allows easy checking of the tension in the halyard.



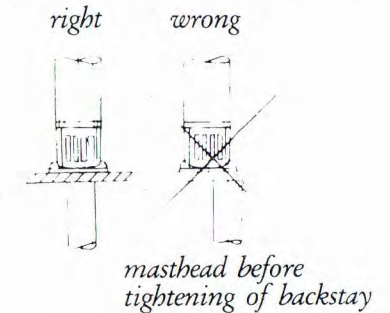
5. Attach all shrouds and stays.
6. Stretch the cap shrouds along the mast, and check that they are of equal length. If this is not the case, then note the difference on a small piece of tape attached to one of the shrouds (e.g. "+ 7 mm").
7. Fit the spreader end plugs to the cap shrouds by bending the ends apart as in Fig.A7. Because of the design of this fitting, it is not important if they break at the inner end. Fasten the spreader end plugs 30-40 mm above the spreader bracket, with the shrouds stretched out along the mast. Tighten up the clamping screws. When the mast has been stepped, it must be possible to stand on the spreader without the plug sliding.



8. Fit the spreaders to the mast brackets and tape over the split pins or the split rings on the fastening pins.
9. In racing boats it is best to measure the position of the I-point and then mark the lower end of the mast at a point which is, for example, exactly 10 metres below the I-point.
10. Check the fastenings of the stays and shrouds. The clevis pin in the U-shaped stay toggle at the masthead should be fitted so that the head faces in towards the halyard.
- \* 11. Fit the mast coat and slip on the lower hose clip.
12. Fit the wind indicator and the anemometer, if the mast can be stepped without risk of damaging these units.
13. Check that all halyards have figure-eight stopper knots to avoid unreeving.

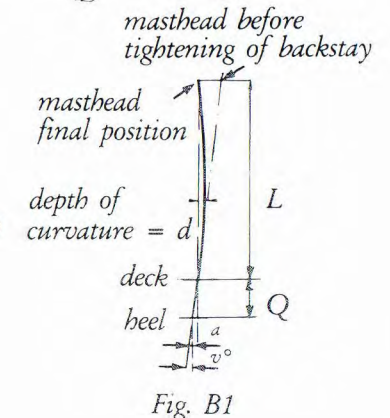
### B. Checking the boat before stepping the mast

- 1a. Check that deck-stepped masts are located with the heel directly over the mast support.



- \* 1b. The heel of keel-stepped masts should be located aft of a line drawn through the centre of the deck ring and the forestay fastening point on the mast (= dimension a)

Standard values for masthead rig:  
 $v = 1^\circ$ ,  $a = 0.017 \times Q$ ,  $d = 0.6\% \times L$   
 (17 mm per metre Q)  
 d must not exceed 2%



\*For keelstepped masts only

- \* 2. Check that the aperture in the deck ring has the correct dimensions. It should be approx. 25% larger than the fore and aft dimensions of the mast, and 35% larger than the athwartship dimension.
- \* 3. Check that the total thickness of the rubber wedges is 25 % greater than the difference between the aperture in the deck ring and the dimension of the mast, measured in the fore/aft direction. The rubber wedge should have a Shore hardness of 40-50.

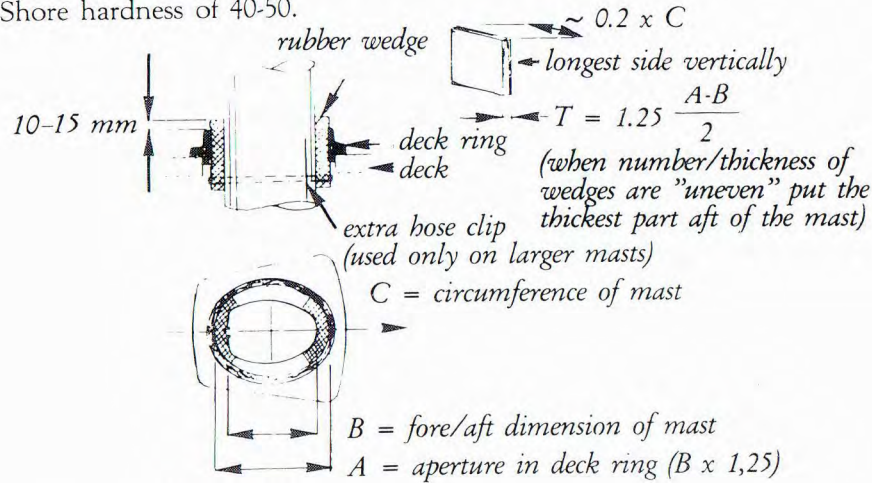


Fig. B2. B3

- 4. Fit the rigging screws to the boat, with the right-hand thread downwards. Lubricate the threads.
- 5. The split pins should have a length of 1,5 times the diameter of the clevis pin, and when opened the legs should be about 20° apart.

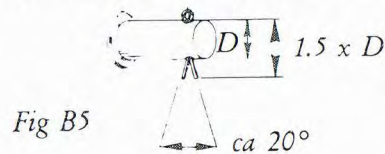


Fig B5

### C. Stepping the mast and adjustments at the quayside

- 1. Place the lifting strop at or near the centre of gravity of the mast. Make sure that it can be removed from the mast in some convenient way. Fit the strop on to the crane hook as shown in the sketch.
- 2. Make sure that the standing and running riggings is lying correctly. In particular, check that no halyards or stays are over the spreaders.



\*For keelstepped masts only

- 3. Raise mast and place it in position on its base. Support it temporarily and remove the lifting strop.
- 4. Tension the cap shrouds to about 15% of their breaking load (or alternatively, 10% of the boats displacement), so that the distance between the lower terminal of the shroud and the deck is the same on starboard and port sides, taking into account any differences in length. (See A6)

One method of checking the tension is to make measurements as shown in Fig. C4 (to be carried out on one side only).

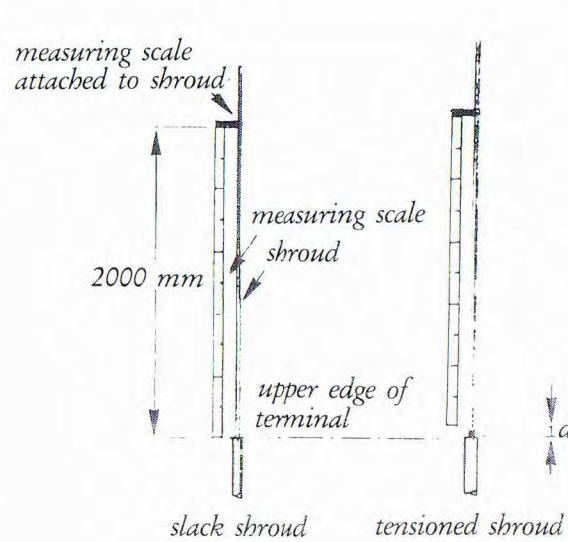


Fig. C4

$d = 1 \text{ mm}$ , corresponds to shroud tension of 5% breaking load of wire (independent of wire diam.)

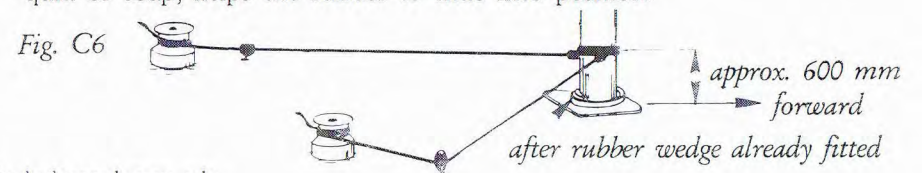
$d = 3 \text{ mm}$ , corresponds to shroud tension of 15% of breaking load of wire.

Breaking load for 19-strand S.S. wire:  
Wire diam. Breaking load (true, excl. swaging loss)

3	800kp
4	1400kp
5	2200kp
6	3200kp
7	4300kp
8	5600kp
10	8700kp

the breaking load can be obtained approximately from the formula  $(\text{diam})^2 \times 90$ .

- \* 5. Fit the tie rod rigging screws.
- \* 6. Fit the aft rubber wedge. Fit forward rubber wedge. In order to do this, the mast must be pulled towards the stern with considerable force. First fasten two lines round the mast, about 60 cm above the deck. (Take a double turn round the mast with two half-hitches, not a bowline). Lead the lines, if necessary, through suitable turning blocks to avoid riding turns, and then to the main winches. Pull the mast aft, using the winches, as far as is required to allow the rubber wedges to be pressed in at the front of the mast. Dipping the rubber in water, containing washing-up liquid or soap, helps the rubber to slide into position.



\*For keelstepped masts only

- \* 7. By sighting along the luff groove from deck level, check that the masthead, in the athwartships direction, lies on a line extended up through the lower part of the mast, see Fig.C7. If this is not the case, the cap shrouds should be adjusted with the rigging screws to bring the masthead into the correct position. The tension in the cap shrouds must not be altered, so the screw on one side should be taken up by the same amount as the screw on the other side is slackened off. The fault may be caused by the heel of the mast and/or the deck ring not being placed at the centre line of the boat, or that the shroud attachment plates are located at different levels.

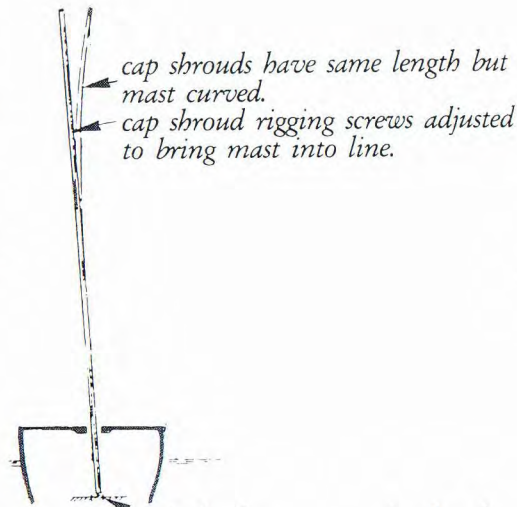


Fig. C7 *heel of mast wrongly placed.*

- \* 8. Fit mast coat to the deck ring.

**Points 9 - 14 apply only to coarse adjustments. Final tuning must be carried out when sailing.**

**(For fractional rigs with spreaders raked aft see also page 8).**

- 9. Tighten up the rigging screws on the lower shrouds, by hand, to straighten the mast. When double lower shrouds are fitted, tension the forward lower shrouds. Then hand-tighten the after lower shrouds.
- 10. Adjust intermediate shrouds, if fitted. These should be sufficiently slack to allow the centre point of shroud to be moved about 30 mm out from the straight line. (This refers to "single spreader intermediates")
- \*\* 11. Tension intermediate shrouds. This tension should be greater than in the lower shrouds but less than in the cap shrouds.
- 12. Tension backstay. In masthead rigged boats tension to about 20% of the breaking load of the wire.
- 13. Hand-tension inner forestay, if fitted.
- 14. Tape over split pins by making a small cushion of tape and fixing it over the split pins with two turns of tape.
- 15. Lock all rigging screws temporarily by freeing a line through them and making it fast.

\*For keelstepped masts only

\*\*For 2-spreader rigs only

## D. Tuning under sail

It is very important for the person responsible for the boat to check the mast at regular intervals, to ensure that it **is kept straight while sailing**. (As a **keelstepped mast** is fixed at deck **and** keelson level it is not possible to get it straight along its entire length. The aim of the tuning is therefore a mast with an even curvature.) This becomes even more important when sailing the yacht at its maximum sailing angle. When sailing fast in rough water the mast should be checked regularly.

The wind strength during final tuning should be sufficient to cause the boat to heel over to about 20°.

1. Check tension in the cap shrouds. The lee-side cap shroud should not be seen to slacken until the angle of heel reaches about 20°. Tensioning above the standard value given in C4 should be carried out, only with caution, and if one is certain of the strength and stiffness of the hull.
2. Adjust the lower shrouds, on both tacks, so that the mast remains straight in the **athwartships** direction, all the way from the deck to the masthead. In the case of rigs with double lower shrouds, this adjustment should be made using the forward lower shrouds. The function of the after lower shrouds is to prevent the mast, in the region of the spreaders, moving too far forward.
3. Trimming of intermediate shrouds, if fitted, should take place at the same time as the trimming of the lower shrouds. The objective is to bring the masthead, the spreaders and mast at deck level all into a straight line, or (particularly when heeling gently) with the masthead slightly to windward.
4. **Fore and aft adjustment**, which (apart from the location of the heel of the mast) is controlled by the backstay, forestay and inner forestay (or double lower shrouds) must be checked. The mast should bend slightly forwards at the spreaders. See also Fig.B1. Check that keelstepped masts do not form an S-curve in the lower part. Sight along the aft face of the mast from deck level. As the load on the forestay increases, the masthead tends to move forward, and this must be stopped. Even if the masthead is well towards the stern in its rest position, it may be necessary to counteract this tendency by the use of some form of backstay tensioner.
5. Reef the mainsail and check the straightness of the mast in the athwartships direction. If the deviation from a straight line is significant when sailing with reefed mainsail, the lower shrouds (intermediate, if fitted) must be re-adjusted, with care, to bring the mast into an acceptable degree of straightness (deviation of 5mm = width of luffgroove), without interfering too much with the straightness when sailing with unreefed mainsail.
6. When the mast trim is satisfactory, lock the rigging screws permanently.
7. New rigging may require adjustment after a period of sailing. When the first season's sailing is finished and the mast is still straight, mark the positions of the rigging screws to assist in tuning the mast for the next season.

P.S. When sailing is finished for the day, the halyards should be secured at a distance away from the mast, to avoid noise and wear. The jib halyard can be made fast to the pulpit, the mainsail halyard to the toe rail, the boom end, or to a strop attached to the after lower shroud attachment plate.

# Instruction for tuning the fractional rig with aft-raked spreaders and without running backstays



1. Step the mast acc. to preceding chapters A,B and C1-C3.
2. Fit the tie rod rigging screws and mast chocking acc. to items C5-C7.
3. Give the mast to give the desired fore and aft rake.
4. Tension the cap shrouds to about 15% of the breaking load of the wire (see C4). This pushes the mast, in the region of the spreaders, in a forward direction.
5. Tension the lower shrouds (thereby pulling the spreader region aft) to give the mast the curve (mainsail luff curve) desired.
6. Adjust the rigging screw of the forestay to give the desired tension. Check simultaneously that the cap shroud tension does not exceed 25% of the breaking load of the wire (see C4). The forestay should not be left highly tensioned when the boat is not being sailed. On smaller yachts the tension can be relieved by attaching the jib halyard to the tack fitting at the stemhead and winching in. The forestay can then easily be released and the force reduced by temporarily joining in a toggle or similar.
7. Tension the backstay and check that the curve of the mast matches the mainsail. Note that tensioning the backstay influences mainly the curvature of the upper part of the mast. As the area round the spreaders is more or less fixed, the curvature of lower part is only slightly affected.
8. Check, when sailing at the optimum heeling angle for the boat (20-30°)
  - that the mast is straight in the athwartships direction. (See also first paragraph of chapter D)
  - that the lee-side cap shroud does not become slack. If this is the case the cap shroud tension, although not more than 25% of the breaking load of the wire, and repeat the procedure from item 5.

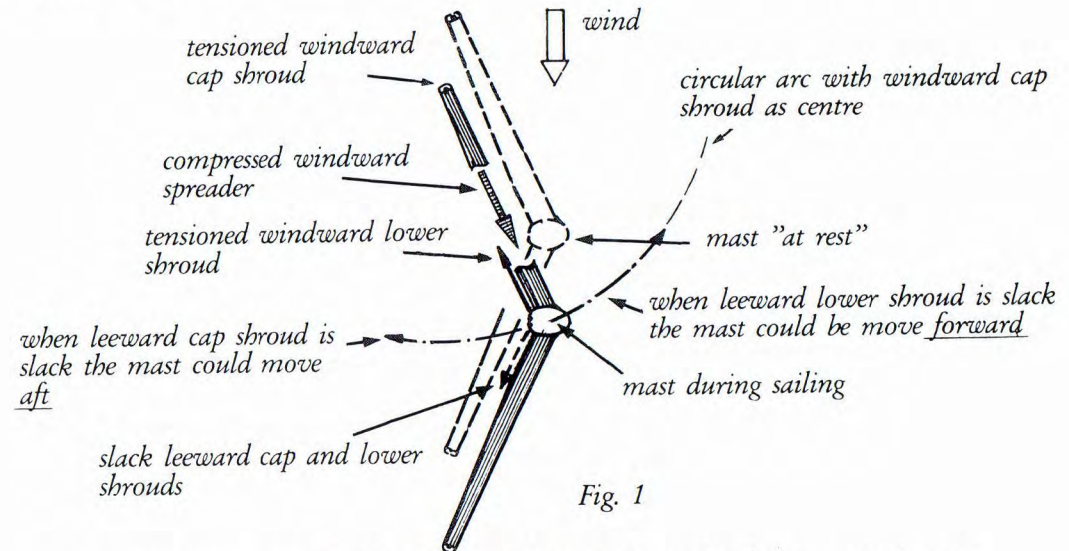
With this rig type it is essential that the leeward shroud must not go slack. Low cap shroud tension causes:

- poor longitudinal stability of the mast.
- poor forestay tension with, among other things, a decrease in pointing ability.

## COMMENTS

### 1. Longitudinal mast stability achieved by the system of aft raked cap shrouds/spreaders/lower shrouds

The interaction between the forward force of the spreaders and the aft force of the lower shrouds secures this region of the mast, in the fore and aft plane. However, leeward and windward shrouds must both be tight, simultaneously, for correct control. If the cap shrouds need increased tension it must not exceed 25% of ultimate wire load.



Some rigs are equipped with diamond shrouds (from the forestay attachment via the spreader tip to the mastheel). These diamonds are rigged to ensure compression on the leeward spreader. Consequently none of the diamonds must go slack.

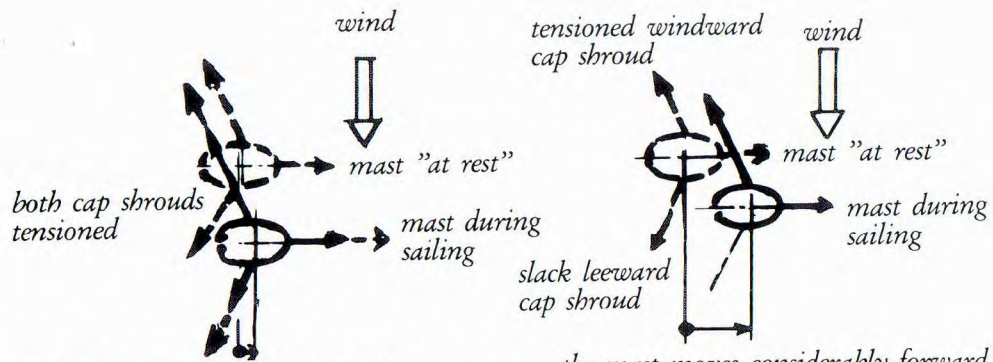
### 2. Forestay tension

Forestay tension can be affected by:

1. The cap shrouds
  2. The backstay
- Regarding running backstays see page 12.

#### 2.1 Influence of the cap shrouds

Forestay tension is mainly controlled by the tightness of the angled cap shrouds. If the leeward cap is slack the forestay tension decreases drastically as the forestay mast attachment moves forward and the forestay sags. To avoid stretch, cap shroud dimensions should not be too small.



both cap shrouds tensioned  
both shrouds together restricts forward motion

tensioned windward cap shroud  
slack leeward cap shroud  
the mast moves considerably forward as the forestay attachment can freely move forward

Fig. 2a. Correctly tuned cap shrouds

Fig. 2b. Incorrectly tuned cap shrouds

## 2.2 Influence of the backstay

Increased backstay tension increases forestay tension. However, the following consequences occur (the effect increases with ratio length of top mast to length of foretriangle).

1. Forestay tension caused by the aft raked spreaders decreases. This is because the mast bends and the forestay stretches causing:
  - The "bent" line described by the shroud is "straightened".
  - The vertical distance between the shroud terminal on the mast and the chainplate is reduced.
  - The forestay attachment on the mast moves aft.

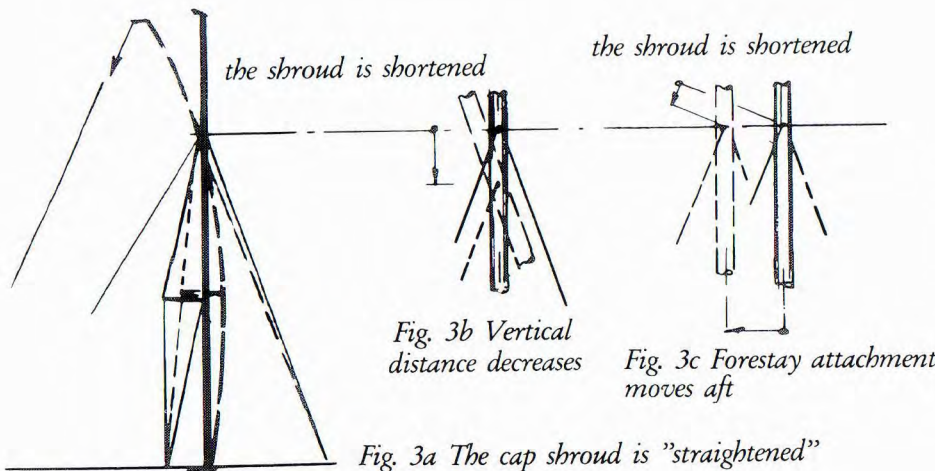


Fig. 3b Vertical distance decreases

Fig. 3c Forestay attachment moves aft

Fig. 3a The cap shroud is "straightened"

2. Lateral tuning is changed. This is due to the decrease in the cap tension (see 2.2.1) and increase in lower shroud tension caused by bend.
3. Backstay tension mostly alters the bend in the upper part of the mast. The bend in the lower part of the mast is only slightly effected, as the area around the spreaders is more or less fixed.

The main sheet affects the mast in the same way as the backstay as it tensions the leech of the mainsail.

## 3. Factors contributing to mast stability

1. Correct tuning
2. A backstay, which has the slack taken up, (not tensioned hard) will decrease the possibility of the mast buckling aft at the spreader region. When the middle of the mast moves aft, the masthead tends to move forward. The inability of the head to move forwards reduces the aft movement of the middle.
3. The mainsail, if it is not too full, decreases the possibility of the middle of the mast collapsing in a forward direction. A full (unreefed) main sheeted for windward sailing, has the same effect as a tight backstay.
4. A structurally stiff hull. The pretension of shrouds and stays are then not "consumed" by hull deflections.

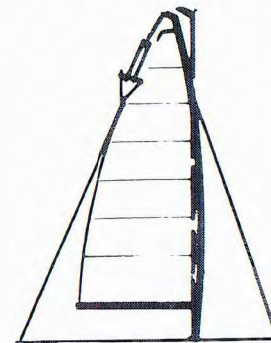


Fig.4 A Stretched backstay decreases the risk for mast buckling aft at spreader position

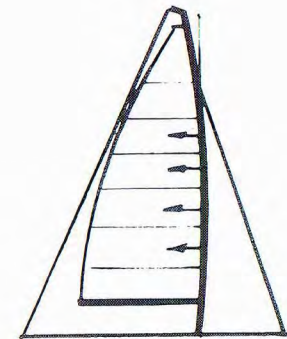


Fig.5 The main decreases the risk for mast buckling forward

#### 4. Factors decreasing mast stability

1. Improper tuning (this could be caused by the use of runners see item 9 below).
2. Excessive mast bend (see "Hints and Advice" p.3. item B6b). "Max permissible depth of curvature: 2% of the height of the foretriangle".
3. Large gyration forces on the mast, caused by its own mass, when pitching in a seaway. A yacht pitches around an imaginary point, contained within the hull and any item at a distance from this point, is subjected to an acceleration, proportional to that distance. So, heavy fittings or heavy mast areas, depending on their distance from the pitch centre, can have a major adverse effect on the mast's longitudinal stability.
4. Reefing - so that the mainsail headboard drops well below the forestay attachment. The mast achieves reverse bend, i.e. the middle of the mast bows aft. The problem can be counteracted by tensioning the backstay, to give slight pre-bend.
5. Main boom thrust caused by a tight kicker or severe rolling, during reaching or running conditions, which causes the boom to hit the water. This effect can be decreased, on a reach, by releasing the kicker. However, kicker release, when running, should be avoided, as it will aggravate rolling.
6. Spinnaker pole thrust:
  - when close reaching (spinnaker pole close to the forestay)
  - when running the pole end hits the water due to severe rolling.
7. Excessive static mast compression. This can be decreased by reefing earlier and sailing with less heel or less crew weight on the windward gunwhale.
8. High dynamic forces caused by pitching and rolling. These can be decreased by better steering through waves.
9. Running backstays:
 

If runners are used forestay tension will increase. However, when the windward running backstay is tensioned, the forestay stretches, the mast moves aft and cap shroud tension decreases and consequently the forestay tension (see fig. 3c). The increase achieved at the first stage is partly "consumed". The changed cap shroud tension changes the lateral tuning. If the lower ends of the runners are attached to the deck at some distance from the fore and aft centreline of the hull (e.g. on the toe rail), the top of the mast will be pulled to windward. The windward cap shroud will be slackened and lateral tuning can be affected.
10. Flexible hull/chainplate construction:
 

If hull and chainplate deflect under rigging loads the tuning will change. The wire itself has a very small plastic elongation (i.e. elongation at a constant load.)

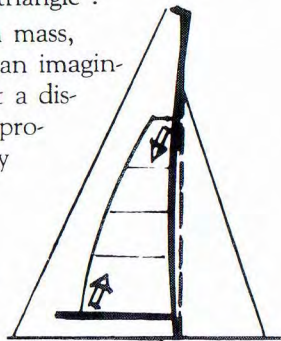
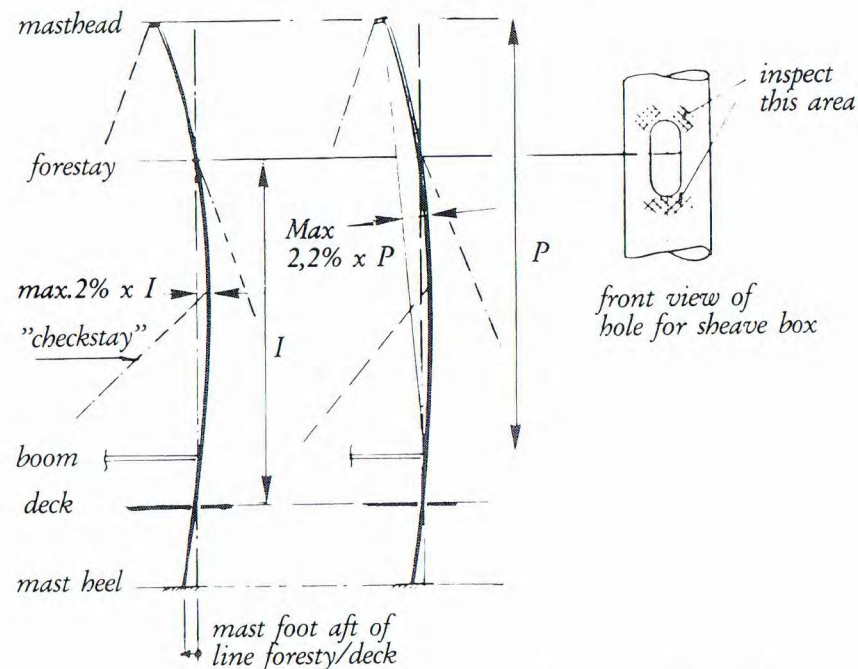


Fig. 6 A reefed main decreases stability

#### Racing fractional masts. General instructions.

1. The mast and its associated fittings are designed for a fore/aft curvature of 2% of the foretriangle height, I. Alternatively, the maximum permissible curvature for tapered masts is 2.2% of the maximum luff length P. The above figures only apply if the mast has a uniform curvature (convex forward face) throughout its length. In the case of keel-stepped masts it is particularly important to check that the mast does not have an S-shape immediately above the deck. The foot of the mast must be located aft of a line through the forestay attachment and the deck ring hole. See figure.



Overloading of the mast usually occurs, tacking or gybing, if the crew fail to tension the runners. The backstay must then take the whole of the horizontal force and a large bending moment in the mast will be the consequence.

2. Crew errors can also result in the foresail halyard taking a part of the forestay load. This can happen, for instance, when running before the wind, the halyard is tightened and the forestay is relatively slack. Marking the halyard at the winch or halyard stopper, will avoid excess tension. Note that changes in the length of the forestay require changes in halyard marking. The foresails should be fitted with a pennant to bring all luffs to the same length.



# Working aloft

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Three things are important when working aloft.

1. to use right equipment.
2. to have the right technique.
3. to have a skilled and reliable assistant.

## 1. Equipment

- Use a proper bosun's chair that fits comfortably round waist and legs.
- It is best to keep tools in a canvas bag fastened to the chair with a short line. Always take aloft screwdriver, pliers, knife and tape. The pockets in a bosun's chair are often too shallow for practical use. Plastic buckets are not good for holding tools, as they easily tip over if they catch on an obstruction.
- Take a short piece of rope with you, so that you can tie yourself to the mast or rigging (see also Technique section below). An ordinary safety harness can also be used. The hooks of the harness can then be used for hanging on tools and other equipment.
- Check that the halyard you are about to use is in good condition and that splices and Talurite swages in good order.
- To increase safety a second halyard can be used; this can be hauled in and eased off at the same time as the first.

## 2. Technique

- To minimise swinging when going aloft use the "lowest" of the halyards that reach up to the workplace. The most important point, however, is to make sure that the halyard and splices are in good condition. One method of reducing swinging is to attach the bosun's chair to a snatch block running on a second halyard which is kept tight.
- Attach the chair directly to the eye-splice of the halyard, using a screw shackle. Never use a snap shackle.
- It is very laborious and time-consuming to winch a person up to the masthead - especially with small winches; two people are required on the winch. The person going up the mast should help. The following are some suggestions.
  1. Climp up the mast using the same technique as when climbing a rope.
  2. "Walk" up the mast, holding on to the halyard and the stays
  3. When the boat is heeled over it may be easier to walk up the lee shroud or on the foresail.

- Before going up, think carefully about the work you have to do and plan it, so that the time up the mast is kept as short as possible.
- When you reach the "workplace", fasten yourself to the mast or rigging in such a way that you can move within a circle of about an arm's length.
- During longer periods of work, a further safety measure is to make the bosun's chair fast to a strong in order to relieve the load on the halyard.
- Work as quickly as possible, but do not neglect safety and thoroughness. Do not drop anything - remember that a spanner dropped from the masthead can punch a hole in the deck or injure one of the crew.
- On the way down make sure that you do not snag any of the fittings or other projections.

## 3. Assistant

- Lead the halyard round a winch in the right direction, but with the smallest possible number of turns, so as to avoid riding turns. (Two turns are normal). If possible, use a winch fixed some distance from the mast - to avoid the risk of anything dropping on the assistant's head. This also makes it easier for the assistant to look up the mast.
- The halyard must be cleated, when the person aloft is in position.
- If it is difficult to communicate, because of noise or darkness for instance, then a signal system must be agreed beforehand. Knocking on the mast with a tool can be easily heard. For example, the code could be: 3 taps for "up", 2 taps for "down" and 1 tap for "stop".
- When a person is being winched to the masthead while under sail, the winching should be temporarily stopped, if the boat sails into a particularly heavy sea.
- Before lowering the person, the line should be checked to ensure that it is free from kinks. Lower at a steady speed and not too slowly.

# Autumn overhaul

1. Check all running rigging (halyards, lifts, tackles etc) for stranding, frayed whippings etc. If any **abnormal** wear is found the cause of this should be discovered and corrected. Usually the wire parts of the halyards can be left inside the mast. If one wants to be very careful, pull the wire part out of the mast (check that the rope tail is provided with a stopper knot so that the tail is not pulled out as well). Coil the wire and attach it to the mast **avoiding contact with anodised surfaces. Contact between stainless steel and aluminium (even anodised) may cause corrosion. The risk is particularly great in very humid and salty conditions.** Halyards, which are to be completely removed from the mast, should be joined to a messenger line which is used to feed the halyard back into position.  
Rinse all ropes in fresh water. Clean shackles and snapshackles and oil them lightly.
2. Remove all standing rigging and check the wires and terminals. If one chooses to leave the standing rigging attached to the mast, make sure that the wires do not come in contact with anodised surfaces.
3. Clean all rigging screws and lightly grease the threads.
4. Check mast, boom and spinnaker pole including fittings for wear, corrosion, fasteners etc.
5. Check that all sheaves turn easily and that other moveable parts (jam levers etc) have not jammed. Screws (for example those holding the outboard boom end) must be lubricated annually or they will corrode in place and be impossible to remove. Clean and lubricate where necessary.
6. Clean and lubricate the winches according to the manufacturers manual.
7. Wash and rinse mast, boom and poles with fresh water. The inside should be hosed as well, as the anodising is less effective there. Brush all narrow crevices and corners (try an old tooth-brush). This is particularly important at the heel of the mast where it is especially prone to corrosion. One could add a mild washing powder, but rinse carefully after washing, as most washing powders contain substances which could cause corrosion on aluminium surfaces.
8. Smear all cast aluminium fittings with wax polish. Coat liberally and mop dry afterwards. This is particularly important in places where salt crystals still may be remaining.
9. Smear anodised surfaces with wax as well. Either boat or car polish is ideal.
10. **An unwashed or damp mast should under no circumstances be wrapped in plastic sheeting or other impervious material.**
11. The mast should not be used as a ridge for a hull cover unless arrangements are made to avoid contact between the cover and the mast. Even if both are clean from the beginning, there is a risk that particles, which could cause corrosion or wear, could settle at the area of contact. The anodising coat has a thickness of only 0,02mm.
12. Carry out repairs and additions during the autumn - this makes life easier for you and for us. Make a "do-not-forget"-list and make notes of items found during the sailing season as well as items found during this inspection. (items 1-6)

## Points to remember when mounting fittings

To minimize corrosion, one should insulate between spars and fittings. Use vaseline, zinc chromate primer or similar material. An insulation made of a 1 mm nylon sheet could also be used. Special care must be taken to provide insulation beneath larger stainless steel fittings. In general brass and other copper alloys should not be used in conjunction with aluminium or aluminium alloy. The risk of corrosion increases with the size of the contact area. With regard to corrosion the first choice of fasteners should be pop-rivets. This is especially important for thin-walled (3mm or less) extrusions.

# Slab reefing booms

Seldén's slab reefing system is based on oval boom sections with internal T-tracks on the sides and bottom which take adjustable sliders for reef lines, mainsheet and kicking strap. In the sail track on the top is fitted an outhaul slider/car. The outboard end contains several sheaves for various functions, plus an attachment for the topping lift and preventer guy. The inboard end has a smoothy rounded sail entry and contains sheaves and jam levers.

Because of the jam levers, one winch can handle all the reef lines. This winch is mounted on the aft face of the mast, well away from the boom. The winch may also be deck mounted, and when the reef lines are led to the cockpit no jam levers are fitted.

If reef lines are ordered the boom is equipped according to Seldén's "System 80", which is an international standard code for coloured ropes.

Choose the correct colour when changing or adding a rope:

Reef I: blue, Reef II: red, Reef III: green, Reef IV: black

## Jam levers

The jam levers are friction mounted i.e. they can be set in different positions, where they will stay. This means that they do not lock unintentionally when a reef is released. The jam levers for the larger booms are provided with colour markings in the same colour as the reef lines. This enables you to find the correct line easily.

## Boom sliders

REEF LINE SLIDERS: These sliders are always locked when the boom is made. The correct position is 50-100 mm aft of the reef cringle (see fig.)

The slider can easily be adjusted by drilling extra  $\varnothing$  6mm holes.

Always use a bowline around the central part of the slider when attaching the reef line.

SLIDERS FOR MAIN SHEET AND KICKING STRAP: Usually these sliders are locked in position when the boom is made. If a solid vang (Seldén's rod-kick or a hydraulic vang) is to be used, self tapping M 6-screws are supplied for locking the slider in position. Holes should be drilled  $\varnothing$  5,3mm.

## Maintenance

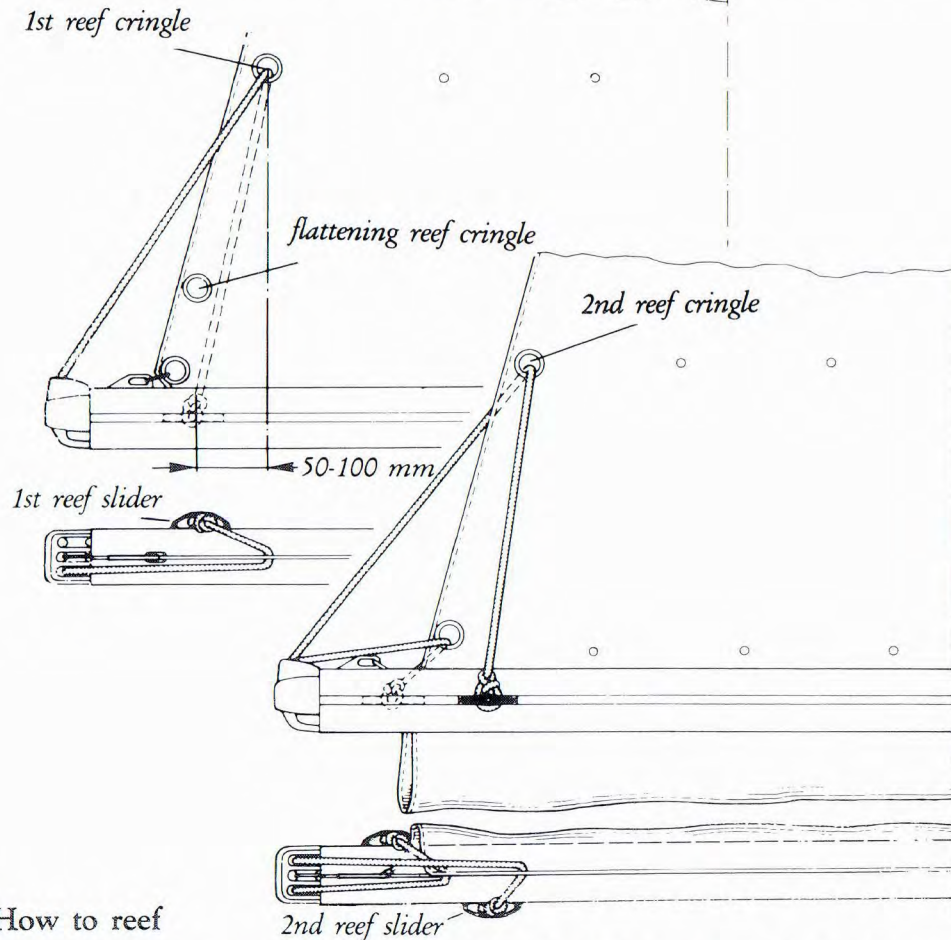
The annual (autumn) overhaul should include rinsing with fresh water and polishing with liquid wax. Lubricate all moving parts as well as the screws holding the outboard fitting. Check all ropes for chafe.

## Important

It is important that the sailmaker should be informed of the type of boom used so that the tack and clew are cut to suit the tack fitting and outhaul car. Check that the sailmaker has an updated version of Seldén's Instruction for sailmakers.

## Internal reef lines

When the boom is equipped with internal reef lines the centre sheave in the inboard and outboard end is used for the outhaul ("foot tensioner"). The outhaul has a purchase of 3:1 or 4:1 laying inside the boom. The reef lines are attached to the side mounted sliders with a bowline around the central part of the slider. The line is led through the reef cringle in the sail and from there straight to one of the sheaves in the outboard fitting. Reef 1 to the starboard side, reef 2 to the port side etc. Text for reference is cast on both inboard and outboard fittings. This system can also be used for a flattening reef and for adjustments to the mainsail leach.



### How to reef

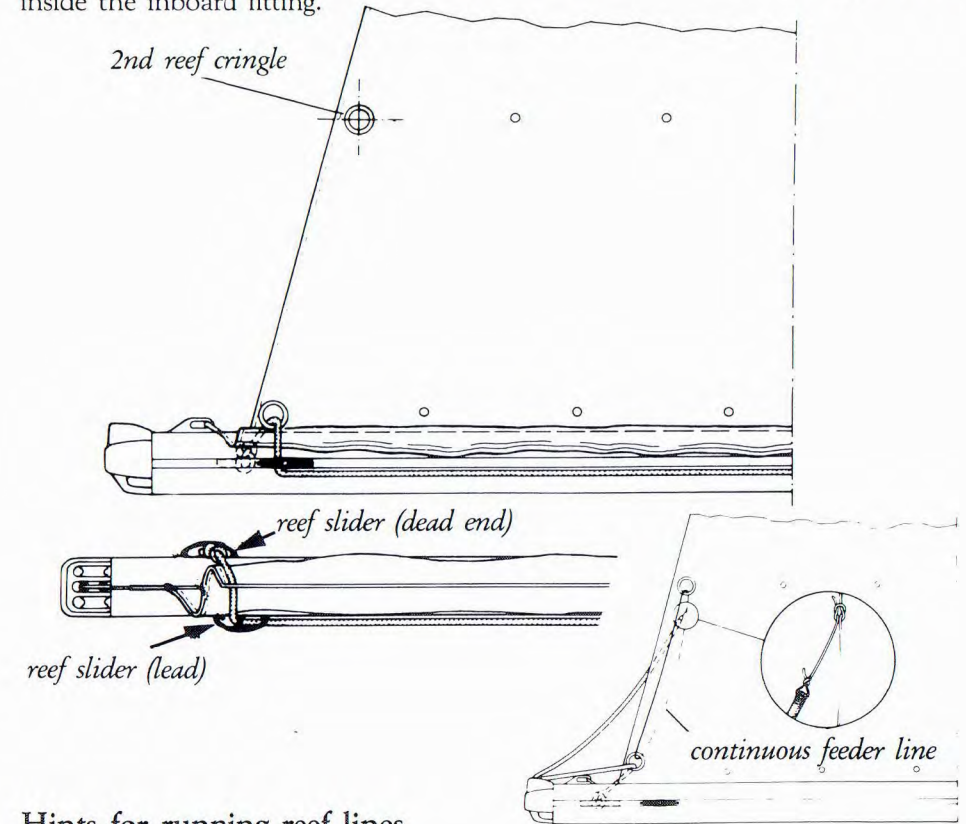
Start by tightening the topping lift, release the kicker and ease the main sheet. Ease the main halyard so that the inboard reef cringle can be hooked on to one of the tack hooks. Tighten the main halyard.

Then tighten the reef line, using the winch, and lock the reef line with the jam lever and the reefing procedure is completed. When releasing the reef the sequence is carried out in the reverse order. To make reefing easier marking halyards and lines at "stopping" positions is recommended.

## External reef lines

Smaller booms may be equipped with external reef lines. These lines are tied to side-mounted sliders and then led through the mainsail cringle, through a slider on the opposite side and finally to a cleat close to the inboard boom end.

The sliders should be staggered in relation to each other as in the illustration. This decreases the friction in the cringle considerably. This type of boom is equipped with a 3:1 purchase internal outhaul and a cam action stopper block inside the inboard fitting.

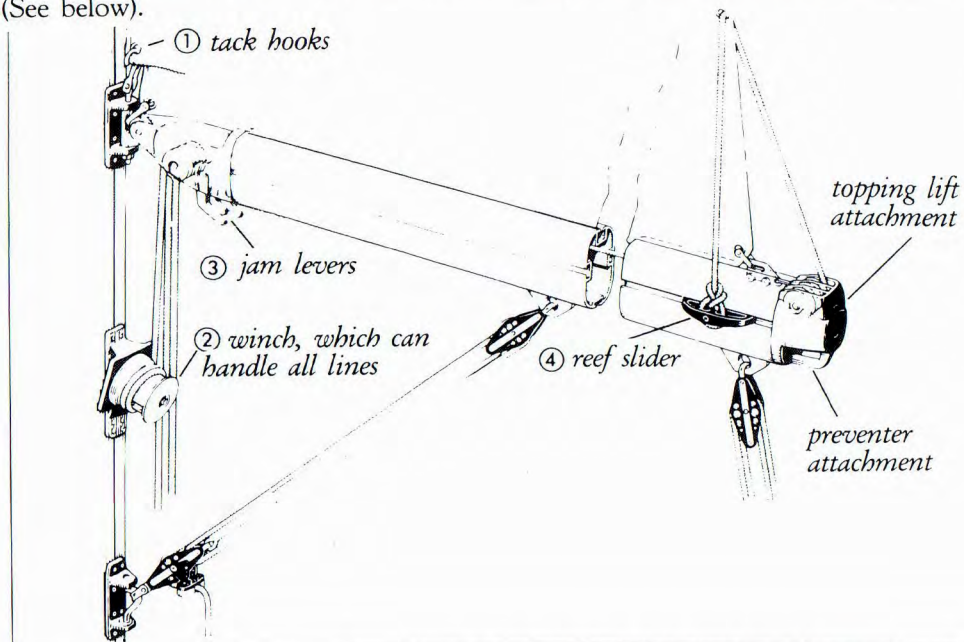


### Hints for running reef lines

To help in the feeding of a reef line (2nd reef for example) a thin, continuous feeder line is mounted between two adjacent reef cringles (see fig.). Provide the end of the reef line with a little loop and the line can easily be attached to the feeder line.

## Complementary equipment

It is a simple task to complete these booms if they have not been supplied fully equipped. The outboard fitting is screwed to the extrusion and can easily be removed to fit additional sliders either for reefing or sheeting. For small booms there are kits for internal outhauls as well as two internal reef lines. (See below).



EQUIPMENT	BOOM SECTIONS (HEIGHT/WIDTH)				
	85/58 86/59	111/75	128/90	150/105	162/125 189/132-206/139
Complementary kit internal outhaul	511-519-02	507-602-10	507-602-10	-	-
Compl. kit: 2 complete internal reef lines with jam levers	511-062-02	511-061-02	511-061-02	-	-
Shaft with tack hooks ①	536-101-01	536-102-01	536-102-01	536-108-01	536-108-01
Ditto for through mast roller reefing gear ①		536-105-01	536-105-01		
Winch pad (mast) ②	523-037-02	523-037-02	523-037-02	523-037-02	523-037-02
Suitable winch size: (Andersen)	3S91	RF10	RF10	RF10	RF16
Jam levers ③	511-062-01	511-061-01	511-061-01	511-061-01	511-064-01
Sheaves	504-304 ø 45 × 13	504-304 ø 45 × 13	504-304 ø 45 × 13	504-318 ø 57 × 13	504-018-02 ø 70 × 16
Reef sliders ④	511-555-01	511-549-01	511-549-01	511-549-01	511-549-01
Diam. of reef line + length (superbraid line)	ø 8 7 m/9 m	ø 10 8 m/11 m	ø 10 8 m/11 m	ø 12	ø 14

# Winch bases

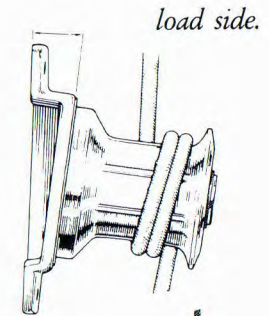
A new idea in winch bases. Fits all mast sections. Easy to install.

*inscribed text for fitting winch base.*



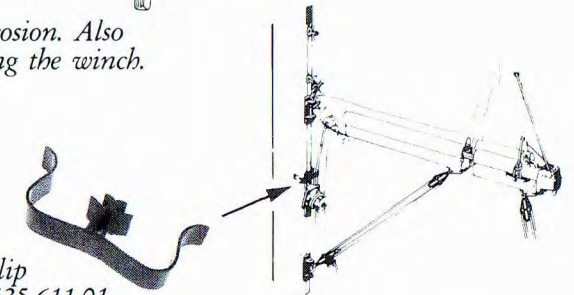
*plastic insulator prevents corrosion. Also contains instructions for fitting the winch.*

*the angle prevents "override" on the winch.*



*well-rounded corners prevent the genoa sheet from catching.*

*reef line clip part no. 535-611-01*

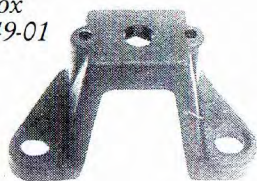


	Halyard winch pads				Reef winch pads		
	523-043	523-041	523-042	523-044	523-037	523-045	
I N F O	Dimension	85 × 85	110 × 110	140 × 140	180 × 180	100 × 100	140 × 140
M A X	Insulator sheet	530-624	530-622	530-623	530-626	530-621	530-623
	Max work. load	3000 N	5000 N	10000 N		5000 N	10000 N
W I N C H	Andersen	.90,6,10	100,16	28,46		91,10,16	28,46
	Arco	6	7,8,16	10,30,44	48	6,7,8	10,30,44
	Barlow	14,15	16	19,20,23	25	14,15	19,20,23
	Bariant		10	18,19,21	22-27	10	18,19,21
	Lewmar	6	7,8,16	10,30,40	43,46	6,7,8	10,30,40
	Enke	KS2-KS6	KS8-AR12	AR18,20 SS12-20	AR22,26 SS22,26	KS2-AR12	AR18,20 2212-20
	Gibb	571,575	6A,7A 573,577	16,28,1070	40,48	571,575 7STA	16,28,107

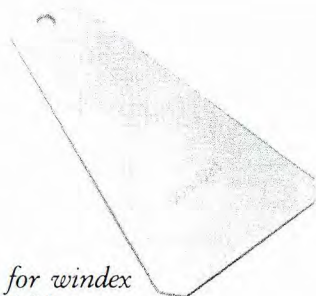
# Windex- and aerialbase

## Windex base

Windex base for 15°  
inclined headbox  
part no 508-549-01



extension arm for windex  
part no 508-521-01



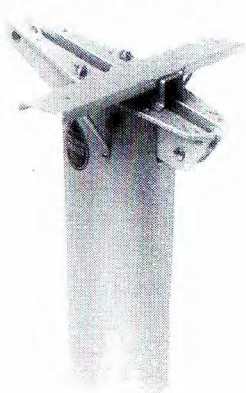
## Base for aerial and windinstrument for 15° inclined headbox.

medium part no 508-508-01  
large part no 508-541-01

## Aerial base

medium  
part no 508-534-01

## Base for aerial and windinstrument with room for several units.



medium  
part no 508-556-01  
+ 508-508-01



same with large base  
part no 508-556-01  
+ 508-541-01



# Fitting of cables

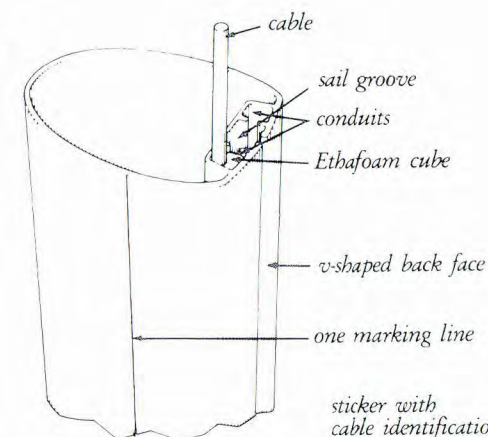
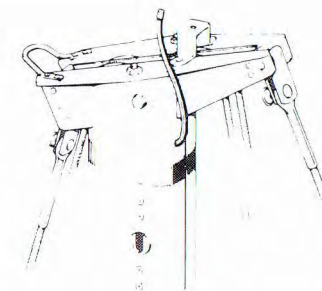
All mast sections with a v-shaped backface have integral cable conduits according to the illustration. (There are two exceptions: Sections with two marking lines and section 274/185). Each conduit can hold at least one cable diam. 11mm or one diam. 9mm + one diam. 6,5mm (for further information see separate instruction "K13"). As the conduits are open towards the sail groove it is very simple to fit extra cables. To avoid the cables rattling small cubes of a special plastic foam are squeezed into the conduit (through the sail groove) at approx. 0,6m intervals.

The upper end of the cable exits through a hole drilled in the aft face of the mast. The lower end exits in the same way or through one of the holes that all heel fittings are provided with.

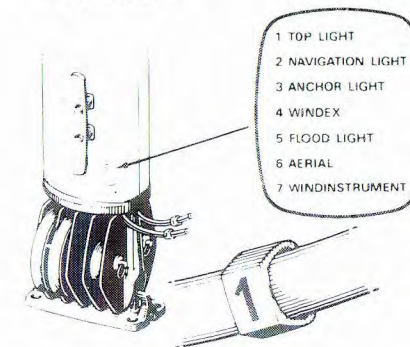
If the mast is fitted with several cables the system for identification illustrated to the right is essential. Detailed instructions and parts can be ordered from SELDEN MAST AB. The instruction is marked "K13".

Among its contents are:

- available conduit room for each section.
- detailed description of fitting cables according to the standard system described above.
- detailed description of fitting cables on masts with conduits with a design different from the standard type.



sticker with cable identification



# Deck ring system

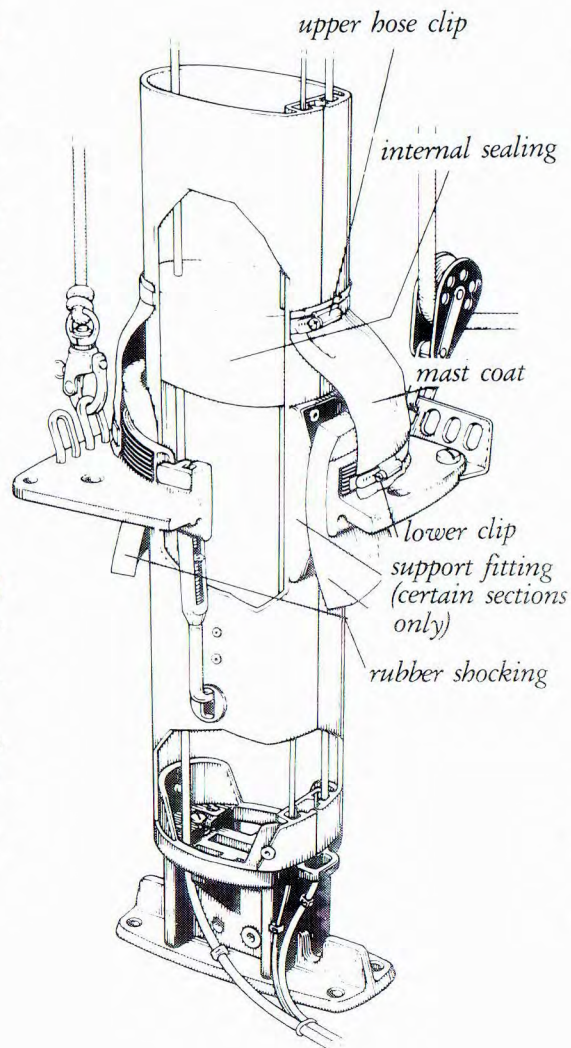
## For keel stepped masts.

The mastheel should be located in the hull so that minor leakage will not cause any inconvenience.

The Seldén deckring system is designed to make the addition of turning block attachments easy (if you would like to lead halyards and reef lines to the cockpit). An easy to fit "rail" is inserted under the flange of the ring and fitted with three screws. No need to remove the ring from the deck.

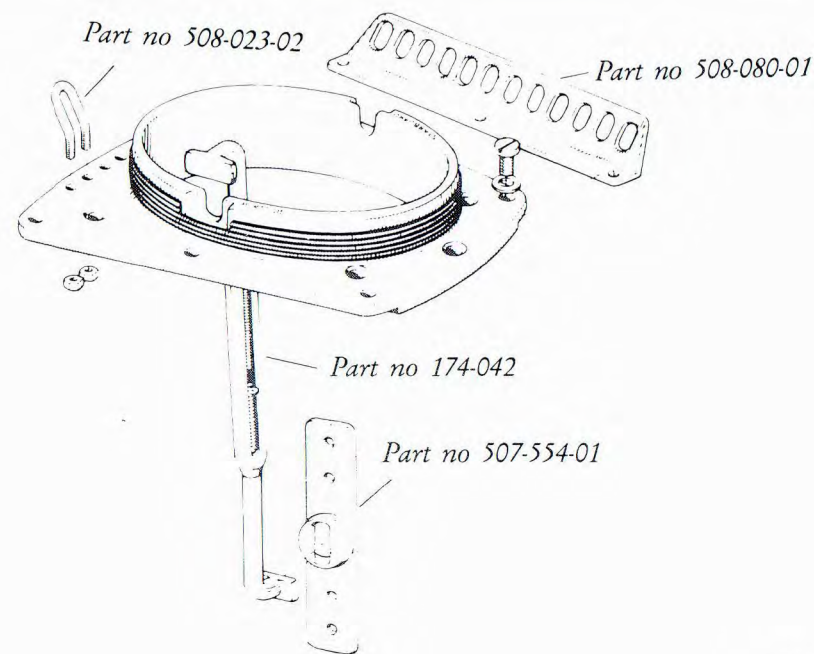
There are also two tie-rod fittings which counteract the lifting force of the halyards and fittings for stowing the halyards when they are not in use.

The aperture in the deck ring is designed in accordance with the well tested PLAN 111 from Sparkman & Stephens - which means that it is 25% too large in the longitudinal direction. The gap between mast and deck ring is filled with rubber inserts which hold the mast firmly in place whilst allowing a certain amount of movement athwartships. In this way the bending of the mast at deck level caused by shroud stretch is minimized.



## Tierod, "Rail" for turning blocks, halyard attachments

Mast section	Deckring (tierod not included)			Rail starboard/port	Tierod rigging-screw, backing plate incl.
	No extra function (aperture dim.)	+ Rail	+ Rail + 4 Halyard attachment		
E-130/93 E-138/95 D-129/100	533-008-01 Size 1 (187 × 144)	533-008-03 Incl. in deckring		Incl. in deckring	174-042-01
E-155/104 E-170/115 D-137/113 D-146/112	533-011-01 Size 2 (214 × 154)	533-011-02	533-011-04	508-080-01 MRX 8 × 16	174-042-01
E-177/124 E-189/132 E-206/139 D-160/132	533-009-01 Size 3 (253 × 200)	533-009-02	533-009-04	508-080-02 MRX 8 × 18	174-042-01
E-224/150 E-237/162	533-010-01 Size 4 (302 × 232)	533-010-02	533-010-04	508-080-02 MRX 8 × 18	174-042-01
E-274/185	533-012-01 Size 5 (338 × 248)	533-012-02	533-012-04	508-080-02 MRX 8 × 18	174-042-01



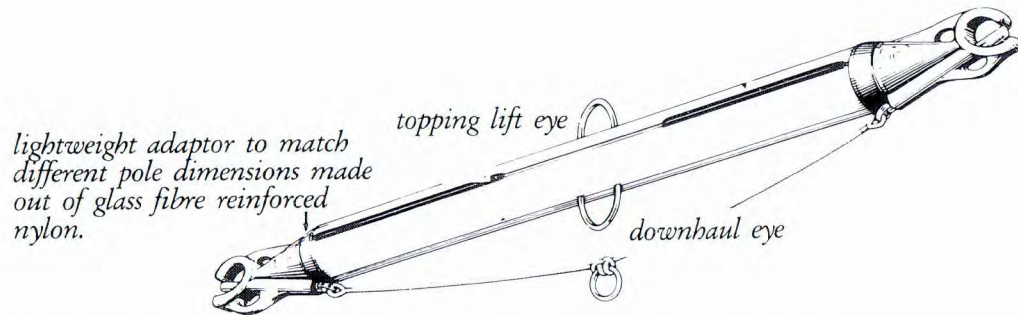
# Spinnaker poles

This is a complete range of spinnaker poles lightweight, high strength with several technical innovations which make spinnaker handling faster and safer.

Both the cruising and the racing man will benefit from the design features.

## Standard pole (type A)

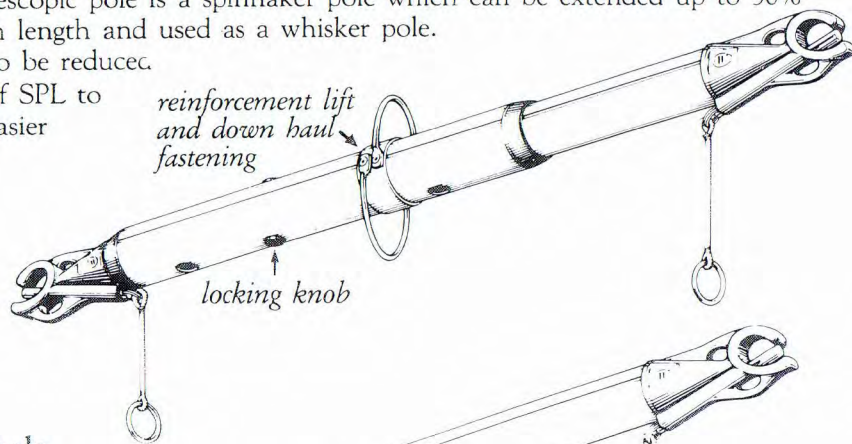
Easy to replace plastic pole savers prevent chafe damage from the forestay. A thoroughly tested endfitting which really stands the loads. The design also makes attachment and release easy.



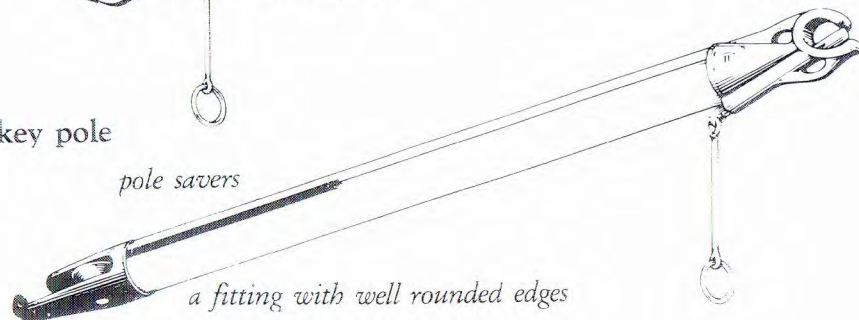
## Telescopic pole

The telescopic pole is a spinnaker pole which can be extended up to 50% of its own length and used as a whisker pole. It can also be reduced by 20% of SPL to make it easier to store.

by 20% of SPL to make it easier to store.



## Jockey pole



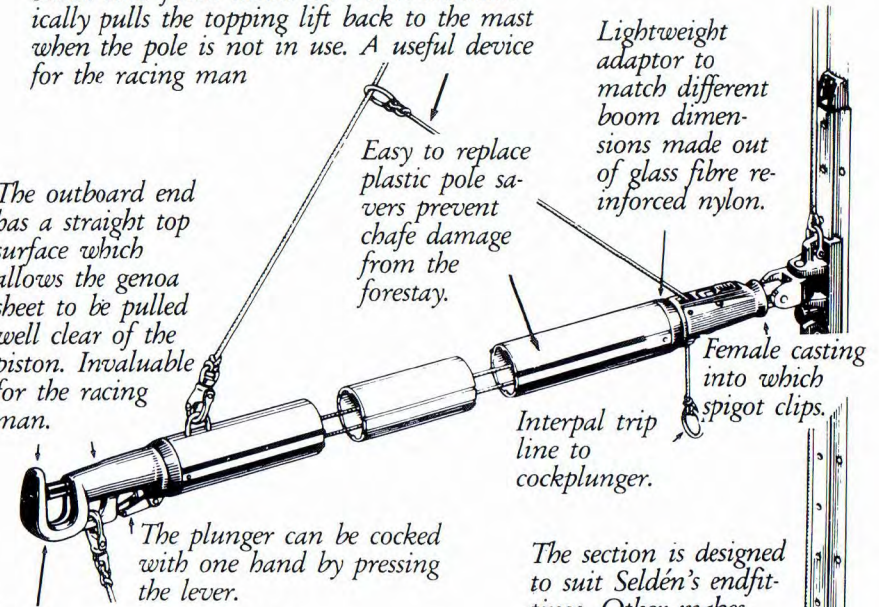
## Large spinnaker pole (type B)

Shock cord fitted inside the boom automatically pulls the topping lift back to the mast when the pole is not in use. A useful device for the racing man

Lightweight adaptor to match different boom dimensions made out of glass fibre reinforced nylon.

The outboard end has a straight top surface which allows the genoa sheet to be pulled well clear of the piston. Invaluable for the racing man.

Easy to replace plastic pole savers prevent chafe damage from the forestay.



The plunger is the "trip trigger" type which can be cocked open. When the spinnaker sheet is pushed into the bottom of the aperture the plunger is released automatically.

Plunger with "trip trigger".

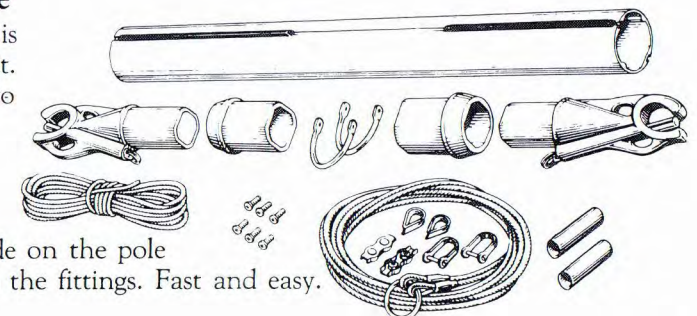
Female casting into which spigot clips

Slider with low friction inserts.

## Kit spinnaker pole

Spinnaker pole A is also available as a kit. The kit is designed to make the assembly fast and simple. Just follow the instructions.

Cut the sections, slide on the pole savers, and screw on the fittings. Fast and easy. The bridle is extra.

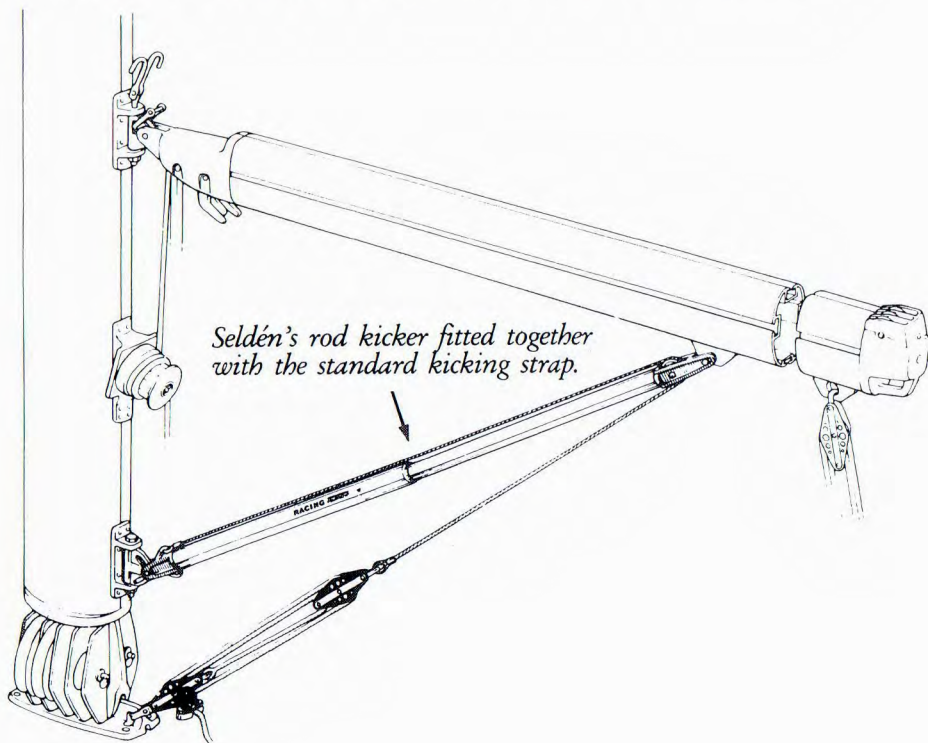


# Rodkickers

This vang is an effective aid both for the racing and the family sailor. It replaces the topping lift and doubles the purchase of the standard kicking strap. In addition it makes it easier to handle the sail during reefing.

This vang is easily fitted on all masts and is supplied together with detailed instructions. It is best used in combination with Seldén's series of booms, which have the necessary grooves for adjustable travellers. The old kicking strap, which is already fitted, can be used as a purchase.

Our rod kicker, manufactured of anodised aluminium, has been carefully tested and meets the highest requirements of quality and function.



Seldén's rod kickers are now available in two sizes:

Type 1  
 Max. working load: 10.000 N  
 Ult. load: 20.000 N  
 (Max boom section 128/90)

Type 2  
 Max. working load 20.000 N  
 Ult. load: 40.000 N  
 (From and incl. boom section 150/115  
 up to and incl. 206/139)

# Notes

## Standing rigging

Tuning	Starboard	Port	Rigging screw/Tension
Cap shroud .....			mm/. . . . .kp
Forward lower .....			mm/. . . . .kp
Aft lower .....			mm/. . . . .kp
Intermediate shroud .....			mm/. . . . .kp
Forestay .....			mm/. . . . .kp
Permanent backstay .....			mm/. . . . .kp
Inner forestay .....			mm/. . . . .kp
Running backstay .....			mm/. . . . .kp
Check stay .....			mm/. . . . .kp

## Running rigging

### Sheeting points

Genoa 1 .....	
Genoa 2 .....	
.....	
.....	

## Sail combinations

Apparent windspeed	Apparent wind angle	Sail combination
.....m/s	.....degrees	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

## Misc.

.....
.....