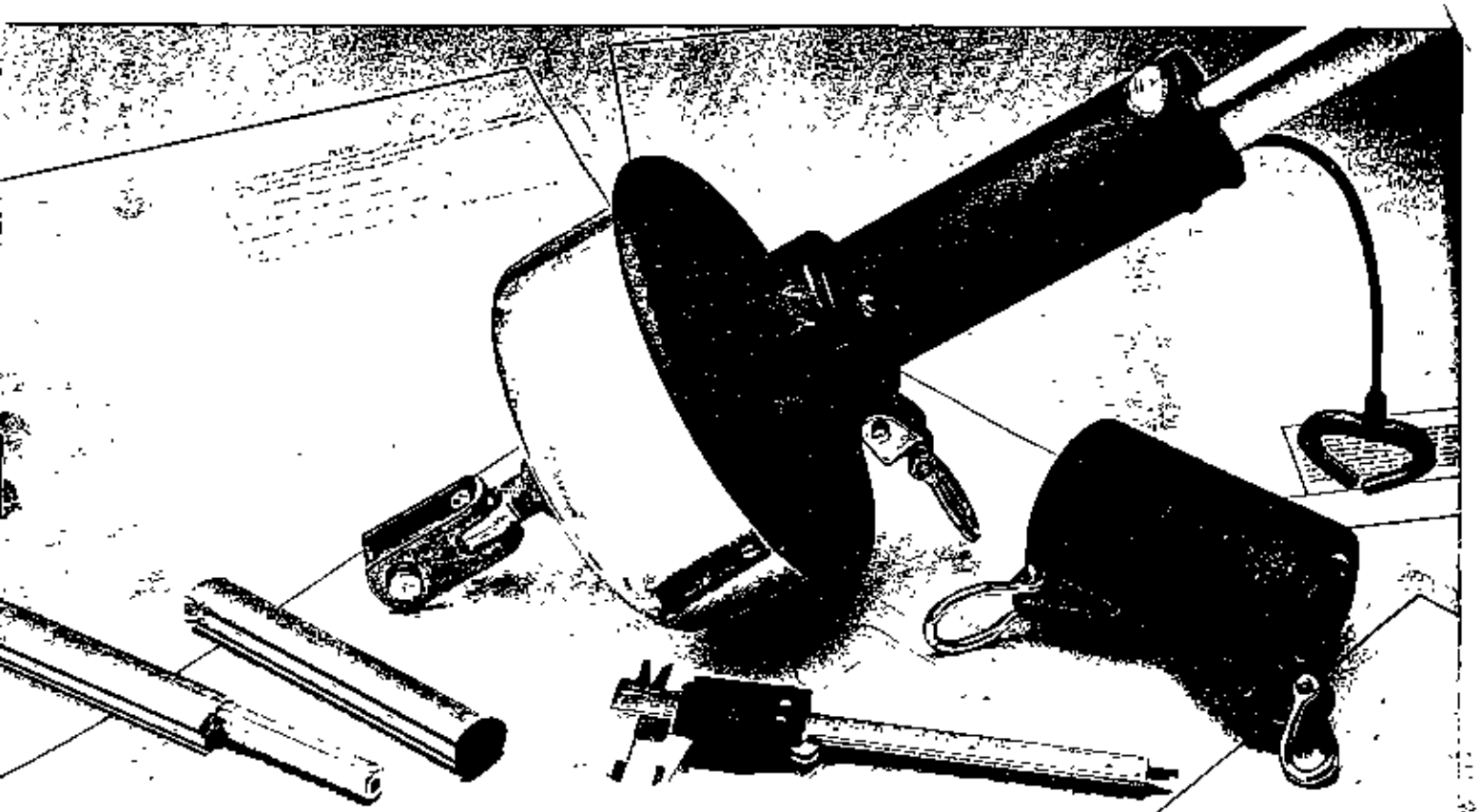
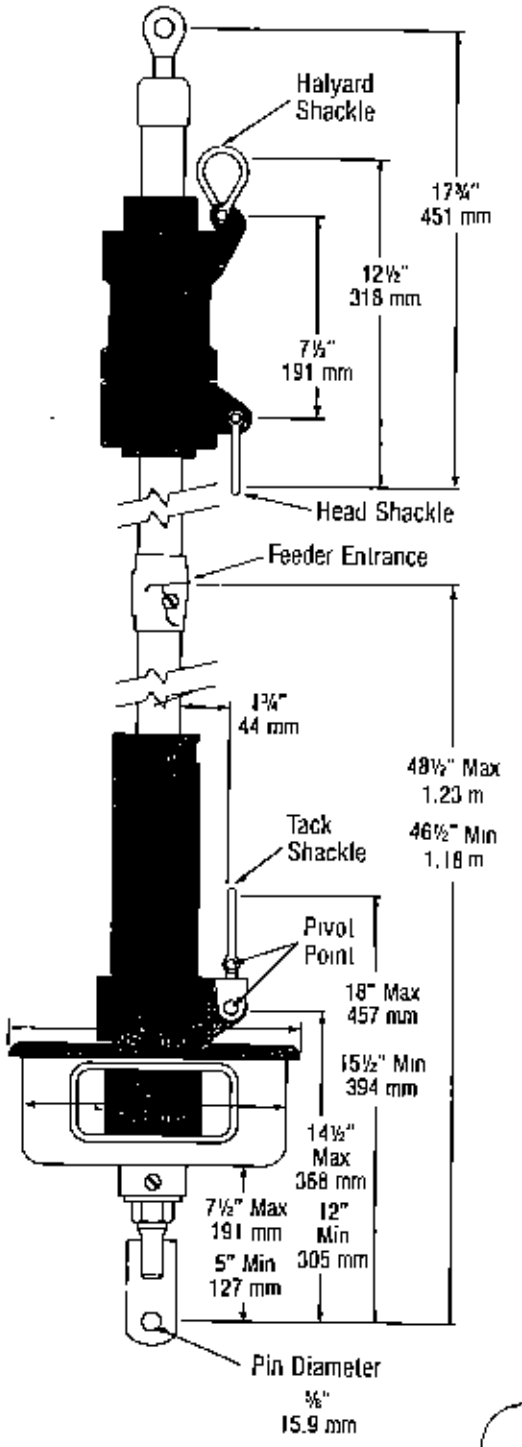


JIB REEFING & FURLING SYSTEMS

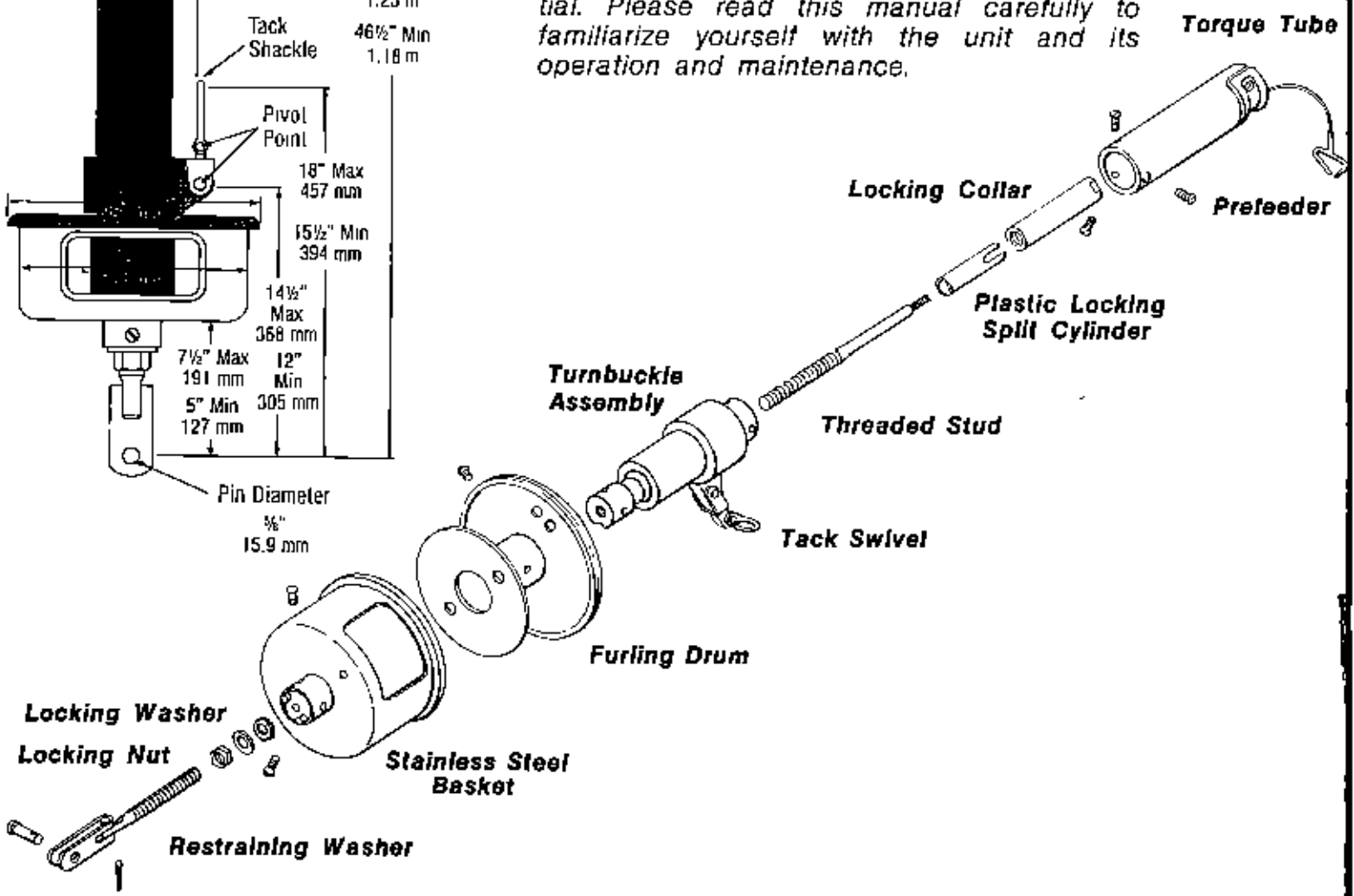
INSTRUCTION MANUAL UNIT 2

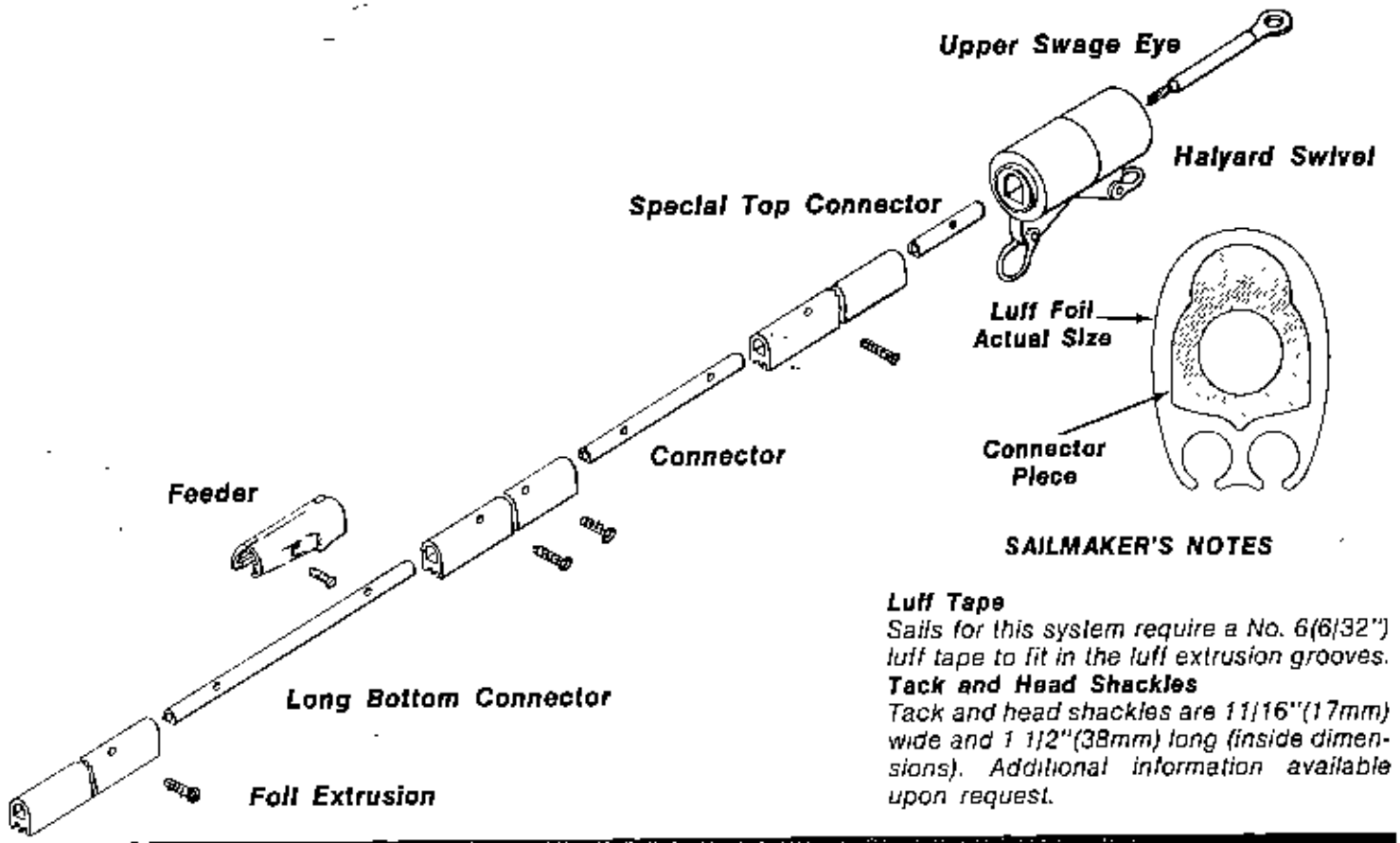


This instruction manual is an essential part of your new furling system. Keep it on board and refer to it to insure trouble-free operation of your furling system.

Your new jib reefing and furling system is the most advanced furling system on the market. It incorporates a Duratron plastic ball bearing system that requires only an occasional cleaning and light lubrication and will never rust or gall. Separate swivels for the tack and head make the system ideal for reefing the sail while keeping the sail shape efficient. A turnbuckle built into the system allows adjustment. Installation as you will see in this manual, is very simple.

The finest combination of materials, engineering and production procedures will insure years of trouble-free use with little maintenance, but some care and service is essential. Please read this manual carefully to familiarize yourself with the unit and its operation and maintenance.





SAILMAKER'S NOTES

Luff Tape
Sails for this system require a No. 6(6/32") luff tape to fit in the luff extrusion grooves.

Tack and Head Shackles
Tack and head shackles are 11/16"(17mm) wide and 1 1/2"(38mm) long (inside dimensions). Additional information available upon request.

WARRANTY

The Harken system is guaranteed for a period of five years against defects in materials or workmanship. Defective items may be returned to the point of purchase or to Harken, and Harken shall, at its option, replace or repair such product. Return of defective products should be accompanied by a letter giving name, address, date of purchase, as well as an explanation of the defect or malfunction, and the conditions under which the product was being used.

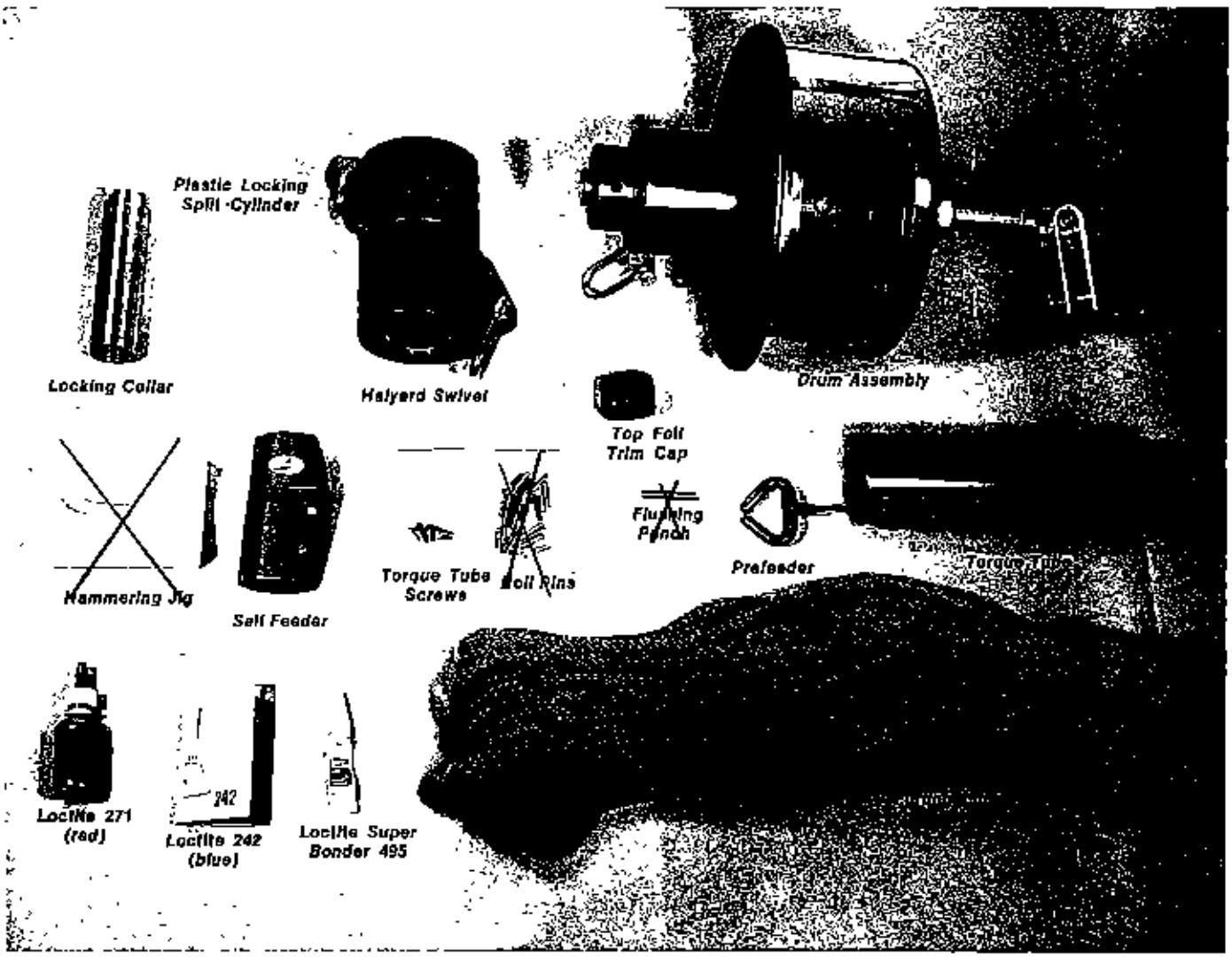
The warranty does not apply to or include any part of the system or the complete system if it was improperly installed or maintained or used under load conditions exceeding the rating or wire size or its equivalent rod size as published in the Harken catalog or in this manual. Swage fitting and lower threaded stud guaranteed for two years.

IMPROPER INSTALLATION INCLUDES: *faulty swaging or improper assembly of Norseman® or Sta-Loc® fittings or Navtec® adapter; drilling out roll pins; not threading lower toggle and upper stud fittings far enough into the body; not securing properly with locking mechanisms; not using toggles at both ends of stay; improper halyard leads; failure to use a pennant at head of sail if needed or any other procedure that is not a normal and prudent rigging procedure.*

IMPROPER MAINTENANCE INCLUDES: *failure to clean salt and dirt out of bearings; failure to spray or apply light lubrication periodically; failure to check locking mechanisms and wire and foils for damage; failure to check stainless swages and threaded rods for crevice or stress corrosion, expecially in tropical waters.*

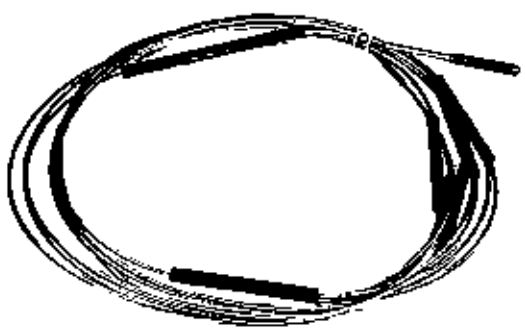
IMPROPER OPERATION INCLUDES: *forcing the drum to turn if it or the halyard swivel is stuck by winching or other means; not using a ratchet block or other means to put drag on furling line; putting too much or too little halyard tension on the sail and unseamanship like use of the system under adverse conditions.*

This warranty is in lieu of all other implied, express and statutory guarantees, and in no event shall Harken be liable for special, incidential or consequential damages. The laws of each state may vary, giving you additional rights, and some of the above limitations or exclusions may not apply to you.



PARTS

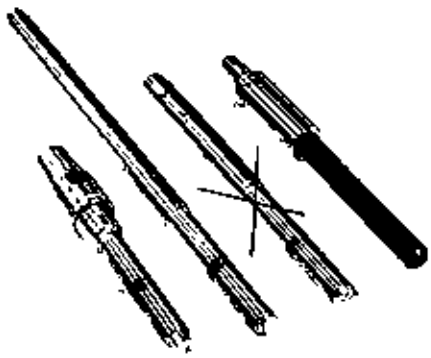
- 1 Drum assembly which includes: drum, drum basket, turnbuckle body with bearings, tack swivel and shackle, lower threaded toggle, notched locking plate, restraining washer and locking nut.
- 1 Furling line
- 1 Feeder assembly with screw
- 1 Bag foil connector screws; 1 bag foil connector wedges
- 1 Halyard swivel with two shackles
- 1 Torque tube assembly which includes: torque tube, foil clamp, clamp screws and prefeeder on wire pennant
- 1 Bag of three torque tube screws
- 1 Bottom foil extrusion 26" (660mm) long, 7' (2.13m) main foil extrusions. Number of foils vary with length of your headstay. A standard kit contains 8 foils.
- 1 Top foil trim cap
- 1 Top foil extrusion. Length varies with length of headstay. Note: this foil is cut from one of the 7' (2.13m) foils and if you have elected to cut your own foil to length, this top foil will be "missing."
- 1 Special top connector



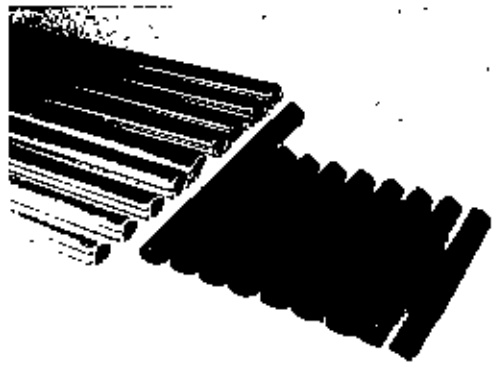
Typical wire headstay with marine eye and swage stud showing connectors, top foil trim cap and special top connector strung on wire.

1 - 11"(280mm) bottom connector piece
9" (229mm) regular connector pieces. Number varies with length of headstay--standard kit contains 7 connectors. Note: connectors will be strung on wire unless you have elected to do this yourself.

1 - Chromed bronze locking collar with plastic split cylinder.
1 - Loctite 242
1 - Loctite 271 (Red)
1 - Loctire Super Bonder 495



Every furling unit is provided with one of these 4 threaded studs. From left to right Norseman stud; extra long swage stud for use with existing headstay wire; and Navtec adapter stud



Extrusion connectors and foils

TOOLS

You will need the following tools to assemble your jib furling system:

1 - Screwdriver

1 - 1 1/8" wrench
1 - 1 1/4" wrench
> or large adjustable wrench

1 - Large Vice Grips® type pliers
- Electrical tape
- Paper towels or clean rags

If you have elected to cut your own foils to length you will also need:

1 - Hacksaw
1 - Fine round file
Sandpaper or emery cloth

If you have elected to use a Norseman® or Sta-Loc® fitting you will also need:

1 - Sharp cutter designed for 1 x 19 wire.

NORSEMAN® & STA-LOC® FITTINGS

Norseman® and Sta-Loc® fittings may be used with Unit 2. A special locking collar is required with these fittings and can be provided by your jib furling distributor.

Special assembly instructions are provided for use with Norseman® and Sta-Loc® fittings and are shipped with special locking collars.

The assembly instructions are clearly marked with a stop sign STOP to indicate when the special instructions for Norseman® and Sta-Loc® fittings should be referred to.

NAVTEC ROD AND FITTINGS

Navtec® -12 and -17 rod may be used with Unit 2. A special adaptor stud and locking collar are required when using Unit 2 with a Navtec® rod headstay. Special instructions are shipped with the Navtec adaptor package which is available from your jib furling distributor.;

The assembly instructions are clearly marked with a stop sign STOP to indicate when the special instructions for Navtec® fittings should be referred to.

SECURING THE MAST

Use a halyard to rig a secure, temporary headstay to support your mast during installation of your jib furling system. **Do not attach this temporary headstay to the stemhead fitting of your boat as this may interfere with installation of the furling unit.**

WORK AREA

Select a flat work area that is longer than the stay and free from gravel, dirt and sand

PRELIMINARY ASSEMBLY

Most jib reefing and furling systems will be shipped with the headstay wire cut to length and swaged, the proper number of connectors strung on the wire in the proper order, and the top foil cut to length and marked.

Section A of this manual (pages 6-9) explains:

- *Measuring headstay length*
- *Measuring and cutting headstay wires*
- *Placing the correct number of connectors on the wire in sequence*
- *Cutting the top foil to length*
- *Special foil length considerations*

If you have chosen to complete these steps yourself, carefully read and follow these instructions before proceeding with the basic assembly procedures which begin on page 10 of this manual.

If your jib reefing and furling system has been supplied ready to install, you may proceed to the basic assembly instructions on page 10.

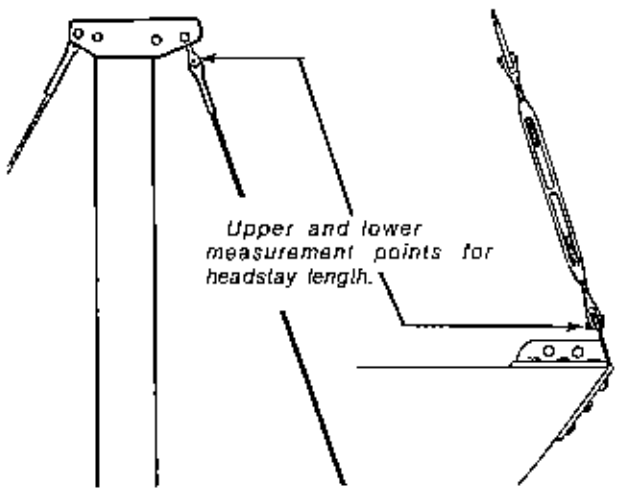
MEASURING HEADSTAY LENGTH

All headstays are measured from the center of the pin holding the headstay to the masthead toggle to the center of the pin holding the headstay assembly to the stemhead chainplate.

This measurement should include all turnbuckles and toggles at the lower end, but should not include the masthead toggle.

All headstays must be secured to a toggle fitting at the masthead. Your jib furling system is provided with an integral toggle on the lower stud fitting. An additional toggle is not required at the lower fitting, but may be fitted if the stay is too short or if it is desirable to mount the drum higher off the deck than normal, say to provide more clearance for an anchor fitting.

Should an additional toggle be fitted to the headstay, be sure to subtract the pin to pin length of the toggle from the overall length of the headstay.



CUTTING HEADSTAY WIRES TO LENGTH

EXTRA LONG STUD

The extra long swage stud is designed to compensate for length lost when an existing turnbuckle is cut off of an existing headstay. The extra long threaded stud may be used whenever cutting off the existing turnbuckle will shorten your headstay less than 26"(660mm). Shortening a wire this amount will limit turnbuckle adjustment.

To use the extra long swage stud, subtract 24"(610mm) from your overall headstay length and ***cut*** *the wire at that point. Measure from the center of the hole in the marine eye at the top of your headstay wire. This measurement will result in a turnbuckle which is one half to two thirds open.*

It is important to use the swage stud provided by Harken to insure that the length is correct when this formula is used. Be sure that the stud is properly swaged by a reputable rigger.

CHART B

Overall length of headstay (pin-to-pin measurement) as determined according to instructions on page 6:				Cut Top Foil To This Length
39' 4" (11.989m)	46' 4" (14.122m)	53' 4" (16.256m)	60' 4" (18.390m)	0
39' 5" (11.989m)	46' 4" (14.148m)	53' 5" (16.281m)	60' 5" (18.415m)	0 27" (686mm)
39' 6" (12.039m)	46' 6" (14.173m)	53' 6" (16.307m)	60' 6" (18.440m)	0 28" (711mm)
39' 7" (12.065m)	46' 7" (14.199m)	53' 7" (16.332m)	60' 7" (18.466m)	0 29" (737mm)
39' 8" (12.090m)	46' 8" (14.224m)	53' 8" (16.358m)	60' 8" (18.491m)	0 30" (762mm)
39' 9" (12.116m)	46' 9" (14.249m)	53' 9" (16.383m)	60' 9" (18.517m)	0 31" (787mm)
39'10"(12.141m)	46'10"(14.275m)	53'10"(16.408m)	60'10"(18.542m)	0 32" (813mm)
39'11"(12.167m)	46'11"(14.300m)	53'11"(16.434m)	60'11"(18.567m)	0 33" (838mm)
40' 0" (12.192m)	47' 0" (14.326m)	54' 0" (16.459m)	61' 0" (18.593m)	0 34" (864mm)
40' 1" (12.217m)	47' 1" (14.351m)	54' 1" (16.485m)	61' 1" (16.618m)	0 35" (889mm)
40' 2" (12.242m)	47' 2" (14.376m)	54' 2" (16.510m)	61' 2" (18.644m)	0 36" (914mm)
40' 3" (12.268m)	47' 3" (14.401m)	54' 3" (16.535m)	61' 3" (18.669m)	0 37" (940mm)
40' 4" (12.294m)	47' 4" (14.427m)	54' 4" (16.561m)	61' 4" (18.694m)	0 38" (965mm)
40' 5" (12.319m)	47' 5" (14.453m)	54' 5" (16.586m)	61' 5" (18.720m)	0 39" (991mm)
40' 6" (12.344m)	47' 6" (14.478m)	54' 6" (16.612m)	61' 6" (18.745m)	0 40" (1.016m)
40' 7" (12.370m)	47' 7" (14.503m)	54' 7" (16.637m)	61' 7" (18.771m)	0 41" (1.041m)
40' 8" (12.395m)	47' 8" (14.529m)	54' 8" (16.662m)	61' 8" (18.796m)	0 42" (1.067m)
40' 9" (12.421m)	47' 9" (14.554m)	54' 9" (16.688m)	61' 9" (18.821m)	0 43" (1.091m)
40'10"(12.446m)	47'10"(14.580m)	54'10"(16.713m)	61'10"(18.847m)	1' 6" (457mm)
40'11"(12.471m)	47'11"(14.605m)	54'11"(16.739m)	61'11"(18.872m)	1' 7" (483mm)
41' 1" (12.522m)	48' 1" (14.656m)	55' 1" (16.789m)	62' 1" (18.923m)	1' 9" (533mm)
41' 3" (12.573m)	48' 3" (14.707m)	55' 3" (16.840m)	62' 3" (18.974m)	1'11" (584mm)
41' 5" (12.624m)	48' 5" (14.757m)	55' 5" (16.891m)	62' 5" (19.025m)	2' 1" (635mm)
41' 7" (12.674m)	48' 7" (14.808m)	55' 7" (16.942m)	62' 7" (19.076m)	2' 3" (686mm)
41' 9" (12.725m)	48' 9" (14.859m)	55' 9" (16.991m)	62' 9" (19.126m)	2' 5" (737mm)
41'11"(12.776m)	48'11"(14.910m)	55'11"(17.043m)	62'11"(19.177m)	2' 7" (787mm)
42' 1" (12.827m)	49' 1" (14.961m)	56' 1" (17.094m)	63' 1" (19.228m)	2' 9" (838mm)
42' 3" (12.878m)	49' 3" (15.011m)	56' 3" (17.145m)	63' 3" (19.279m)	2'11" (889mm)
42' 5" (12.929m)	49' 5" (15.062m)	56' 5" (17.196m)	63' 5" (19.329m)	3' 1" (940mm)
42' 7" (12.979m)	49' 7" (15.113m)	56' 7" (17.247m)	63' 7" (19.380m)	3' 3" (991mm)
42' 9" (13.030m)	49' 9" (15.164m)	56' 9" (17.297m)	63' 9" (19.431m)	3' 5" (1.041m)
42'11"(13.081m)	49'11"(15.215m)	56'11"(17.348m)	63'11"(19.482m)	3' 7" (1.092m)
43' 1" (13.132m)	50' 1" (15.265m)	57' 1" (17.399m)	64' 1" (19.533m)	3' 9" (1.143m)
43' 3" (13.183m)	50' 3" (15.316m)	57' 3" (17.450m)	64' 3" (19.583m)	3'11" (1.194m)
43' 5" (13.233m)	50' 5" (15.367m)	57' 5" (17.501m)	64' 5" (19.634m)	4' 1" (1.245m)
43' 7" (13.284m)	50' 7" (15.418m)	57' 7" (17.551m)	64' 7" (19.685m)	4' 3" (1.295m)
43' 9" (13.335m)	50' 9" (15.469m)	57' 9" (17.602m)	64' 9" (19.736m)	4' 5" (1.346m)
43'11"(13.386m)	50'11"(15.519m)	57'11"(17.653m)	64'11"(19.787m)	4 ' 7"(1.397m)
44' 1" (13.437m)	51' 1" (15.570m)	58' 1" (17.704m)	65' 1" (19.837m)	4' 9" (1.448m)
44' 3" (13.487m)	51' 3" (15.621m)	58' 3" (17.755m)	65' 3" (17.755m)	4' 11"(1.499m)
44' 5" (13.538m)	51' 5" (15.672m)	58' 5" (17.805m)	65' 5" (19.939m)	5' 1" (1.549m)
44' 7" (13.589m)	51' 7" (15.723m)	58' 7" (17.856m)	65' 7" (19.990m)	5' 3" (1.600m)
44' 9" (13.640m)	51' 9" (15.773m)	58' 9" (17.907m)	65' 9" (20.041m)	5' 5" (1.651m)
44'11"(13.691m)	51'11"(15.824m)	58'11"(17.958m)	65'11"(20.091m)	5' 7" (1.702m)
45' 1" (13.741m)	52' 1" (15.875m)	59' 1" (18.009m)	66' 1" (20.142m)	5' 9" (1.753m)
45' 3" (13.792m)	52' 3" (15.926m)	59' 3" (18.059m)	66' 3" (20.193m)	5'11"(1.803m)
45' 5" (13.843m)	52' 5" (15.977m)	59' 5" (18.110m)	66' 5" (20.244m)	6' 1" (1.854m)
45' 7" (13.894m)	52' 7" (16.027m)	59' 7" (18.161m)	66' 7" (20.295m)	6' 3" (1.905m)
45' 9" (13.945m)	52' 9" (16.078m)	59' 9" (18.212m)	66' 9" (20.345m)	6' 5" (1.956m)
45'11"(13.995m)	52'11"(16.129m)	59'11"(18.263m)	66'11"(20.396m)	6' 7" (2.007m)
46' 1" (14.046m)	53' 1" (16.180m)	60' 1" (18.313m)	67' 1" (20.447m)	6' 9" (2.057m)
46' 3" (14.097m)	53' 3" (16.231m)	60' 3" (18.364m)	67' 3" (20.498m)	6'11"(2.108m)

Bottom Foil Length

Cut the top foil to length from one of the 7' (2.13m) foil extrusions packaged with your standard Unit #2. **If your top foil length is shown as zero see page 8.** On some occasions an assembled foil may be slightly too long. If this is the case, simply trim the excess length with a hacksaw and deburr the cut. **Be careful not to get metal shavings into the bearing assembly.**

Revised 3/25/98

CUTTING TOP FOIL TO LENGTH

The length of your jib furling system is matched to your boat's headstay length by adjusting the number of 7'(2.13m) foil extrusions used and by cutting the top foil to length

Consult Charts B and C to determine:

- *The number of full length 7'(2.13m) foil extrusions used in your system.*
- *The length to which to cut your top foil extrusion.*

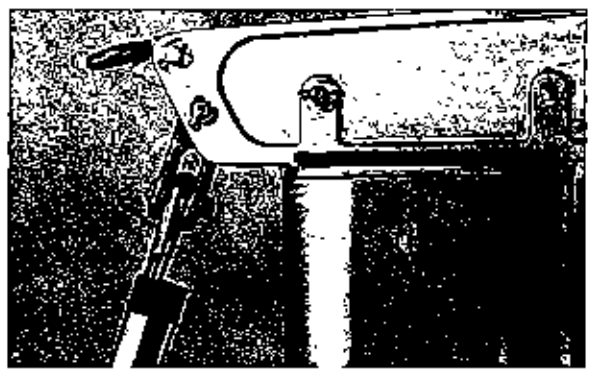
After determining the length of your top foil extrusion, use a sharp hacksaw to cut this piece from a 7'(2.13m) extrusion.

Using emery cloth, sandpaper or a fine file rough up the surface of the top 1"(25mm) of the top foil to provide a grip for the adhesive used to secure the top foil trim cap to the foil.

Carefully deburr the inside of the foil cavity and clean all shavings from the inside of the foil. (Failure to deburr or to clean the inside of the top foil may cause it to seize on a connector when it is being installed.)

TOP FOIL LENGTH- SPECIAL CONSIDERATIONS

Your jib furling system is designed to ride over the swage fitting at the top of your headstay. It is important that the foils be cut to the correct length to insure that your foil does extend well up onto the swage fitting and it is also critical that the foils be clamped in a fully raised position before operation (See assembly stage 7 on page 13 of the instruction manual).



Typical masthead detail showing foil riding over shank of swage stud and within 2"(51mm) of the pin in the upper marine eye.

In some rare cases it is not possible for the foil to ride over the shank of the upper swage fitting. These cases include.

- *Headstays with no upper swage fitting because the upper wire terminal is a Norseman-type fitting.*
- *Some rod headstays. (Most rod headstays have a shank that the foil can ride on.*
- *Other headstays without swage fittings such as those with wire splices.*

In cases where the top foil cannot ride over the swage fitting, you may need to cut the top foil shorter to adjust the length. The figures in Chart B are based on the upper end of the foil riding 2"(51mm) from the center of the pin in the upper marine eye. If the foil cannot ride that close, shorten the top foil by the additional distance from the 2"(51mm) point to where it can ride.

If your foil cannot ride over the swage shank it should be shortened as little as possible. In these cases it may be ***possible*** *for the halyard swivel to ride off of the foil and use of an optional head swivel end stop should be* ***considered.*** *Boats using a short foil may also require a block on the front of the mast to minimize the possibility of halyards wrapping on the foil while furling.*

TOP FOIL LENGTH OF ZERO

If your top foil length is shown as zero, your unit does not use a special top foil. In this case, the top 7' (2.13m) foil extrusion is treated as your top foil and the special top connector fits in this extrusion.

If your top foil length is shown as zero and is followed by a number in parenthesis, [eg. 0(25")]], your unit does not use a special top foil. In this case, the top 7' (2.13m) foil extrusion is treated as your top foil and the special top connector fits into this extrusion and a new bottom foil is cut to the length shown, i.e. 25" (635mm), from a 7' (2.13m) foil extrusion and is used in place of the 2' (610mm) bottom foil section. This 7' (2.13m) foil is in addition to the number of 7' (2.13m) foils shown in Chart C.

STRINGING CONNECTORS SWAGING HEADSTAY WIRES

After the headstay wire has been cut to length, but before the threaded stud is swaged onto the wire, the proper number of connector pieces must be strung onto the wire in the correct order.

- *Every unit uses a top foil trim cap.*
- *Every unit uses a special top foil connector.*
- *Every unit uses a number of 9" (229mm) connectors which varies according to the length of the headstay and is determined by consulting Chart C.*
- *Every unit uses one 11" (280mm) bottom connector.*

Consult Chart C to determine the correct number of 9" (229mm) connectors to use.

Slide the top foil trim cap onto the wire so that the open end faces down the wire.

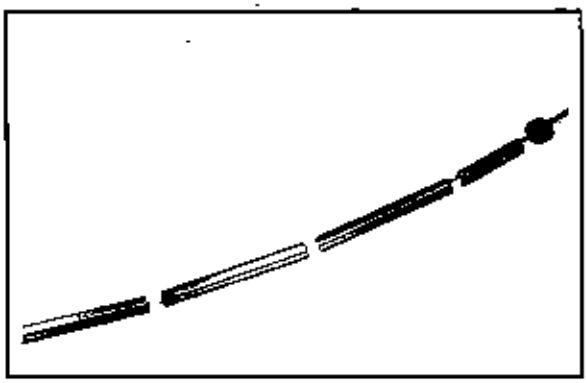
Slide the special top connector onto the headstay wire so that it is nearest the marine eye at the top of the wire. The special top connector has two beads of silicone rubber.

Slide the proper number of 9" (229mm) connectors onto the headstay wire.

Slide the 11" (280mm) connector onto the wire last so that it is closest to the threaded stud at the bottom of the wire.

HAVE THE THREADED STUD SWAGED TO YOUR HEADSTAY WIRE BY A REPUTABLE RIGGER.

DO NOT USE SUBSTITUTIONS FOR THE SWAGE STUD PROVIDED BY HARKEN.



Top foil trim cap, special top connector and 9" (229mm) connectors strung on headstay wire.

CHART C

Use Chart C to determine the proper number of 9" (229mm) connectors and the proper number of 7" (2.13m) foil extrusions for your headstay.

Pin-to-pin length of headstay (as defined on page 6)	Number of 9" (229mm) connectors to use	Number of 7' (2.13m) foils to use plus top foil
39'4" to 40'9" (11.989m to 12.421m)	4	5
40'10" to 46'3" (12.446m to 14.097m)	5	5
46'4" to 47'9" (14.122m to 14.554m)	5	6
47'10" to 53'3" (14.580m to 16.231m)	6	6
53'4" to 54'9" (16.256m to 16.688m)	6	7
54'10" to 60'3" (16.713m to 18.364m)	7	7
60'4" to 61'9" (18.390m to 18.821m)	7	8
61'10" to 67'3" (18.847m to 20.498m)	8	8

Unit #2 – Revised 10/18/88

- ***Remember That Every Unit Uses One 11" (280mm) Bottom Connector.***
- ***Every Unit Uses One Special Top Connector.***
- ***The Variable length foil is cut from one of the 7' (2.13 m) foil extrusions and is used IN ADDITION TO the number of 7' (2.13 m) foils shown above.***

Norseman, Sta-Lok and Navtec: Refer to special instructions

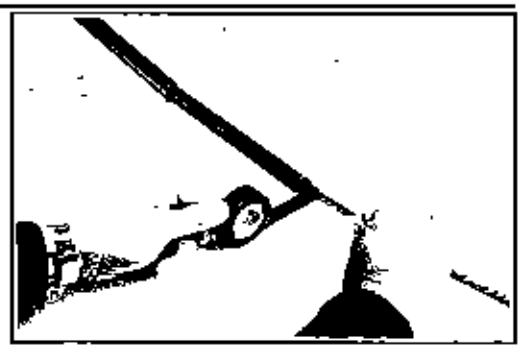
STOP ASSEMBLY-ON SHORE

1 *Stretch the headstay wire out straight. The end with the threaded stud is the bottom. Slide the top foil trim cap to the top of the wire.*

Slide all of the extrusion connectors ***except the special top connector*** *to the bottom of the stay. The special top connector has two beads of silicone rubber and should be strung on your headstay wire closest to the marine eye at the top of the wire.*

Secure the regular connectors loosely against the threaded stud by placing several wraps of tape around the wire immediately above the connectors.

Slide the special top connector to the top of the wire.

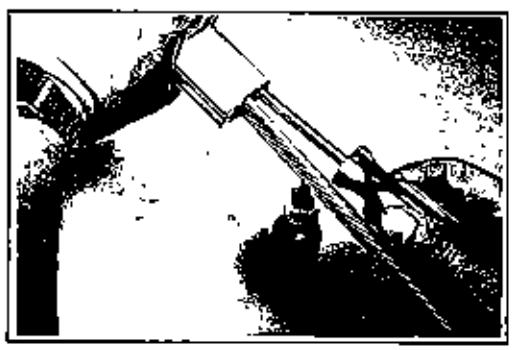


Check the top foil extrusion, ***Which has been cut to length****, for burrs or shavings at the cut end. Clean and deburr as needed.* ***Note: do not confuse the top foil with the 26"(660mm) bottom foil extrusion.***

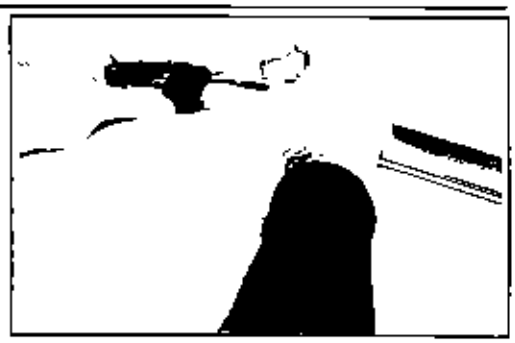
Slide the top foil extrusion, screw holes down, over the threaded stud and connectors to the top of the stay.

Liberally coat the surface of the special top connector with Loctite 271 (red). Push this top connector into the top of the top foil.

Use a screwdriver to push the special top connector into the top foil so that it is completely recessed inside the top foil 5" or 6" (127 or 152mm). The special top connector must be recessed sufficiently to permit the top foil to ride over the shank of the marine eye at the top of the headstay wire. Check the depth of the recess by comparing the depth to the length of the swage shank with your screwdriver blade.



Coat the top 1" (25mm) of the top foil extrusion with Loctite Super Bonder 495 and press the top foil trim cap onto the top of the top foil.



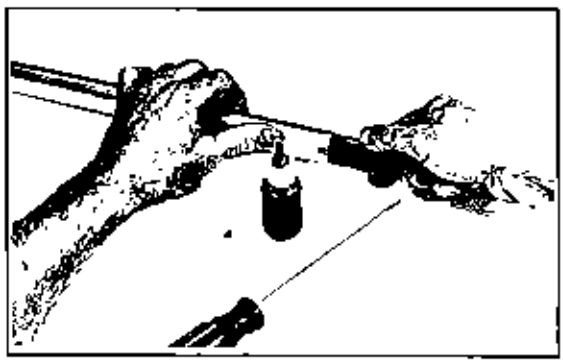
2 *Remove the tape holding the connectors against the threaded stud and free one connector from the group.*

Retape the wire to restrain the remaining connectors loosely against the threaded stud.

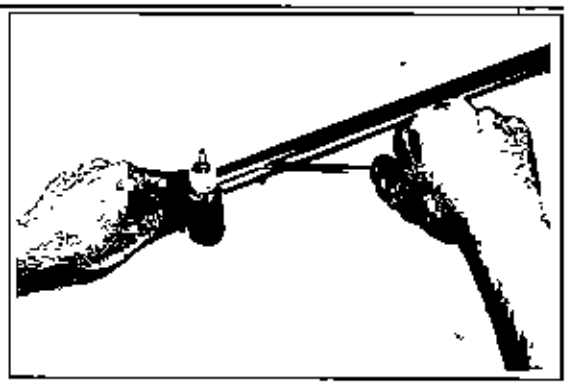
Slide the free connector to the top of the stay. ***Liberally*** *coat the* ***top half*** *of the connector with Loctite 271 (red).*

Place the plastic connector wedge in an indentation on the front of the connector ***with the wedged side up.***

Push the connector into the top foil, using care to keep the plastic wedge in place in the slight indentation in the connector. Continue to push the connector into the foil until the threaded screw holes in the connector line up with the holes in the foil extrusion.



3 ***Liberally*** *coat two foil connector screws with Loctite 271 (red) and screw them into the connector until they are tight.*



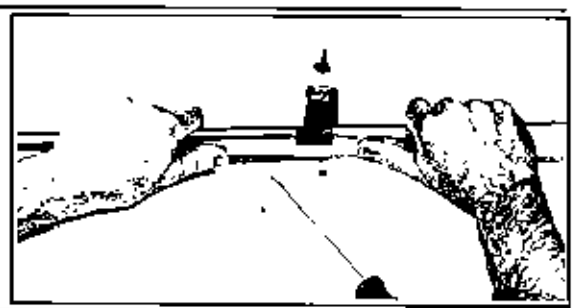
Select a 7' (2.13m) foil extrusion and carefully check for burrs, metal shavings or dirt on the inside surface. Remember that the best way to see dirt is to look down the foil while pointing it towards a light source.

Slide the 7' (2.13m) foil extrusion onto the stay over the threaded stud and connectors and up to the top foil piece.

Liberally *coat the half of the connector which is sticking out of the top foil extrusion with Loctite 271 (red).*

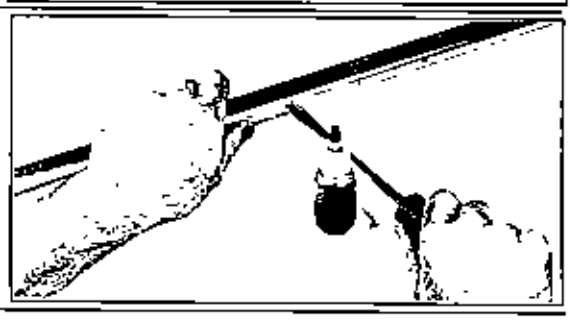
Place the plastic connector wedge in the indentation on the front of the connector with the ***wedged side up.***

Push the 7' (2.13m) foil over the connector until the holes align. Be sure that the plastic connector wedge slides into the foil.



4 ***Liberally*** *coat two foil extrusion screws with Loctite 271 (red), insert into the connector and tighten firmly with a screwdriver.*

Clean all the excess Loctite from around the joint with paper towels or rags. Be sure to clean excess Loctite from inside the grooves.



STOP. REFER TO NORSEMAN/STA-LOK INSTRUCTIONS.

Repeat this process until all of the 9" (229mm) connectors have been used.

Slide the 11" (280mm) connector up to the bottom foil extrusion. ***Liberally*** *coat the top 4 1/2" (114mm) of the long bottom connector with Loctite 271 (red). Place one foil connector wedge in the indentation nearest the foil.*

Push the long bottom connector into the foil until the screw holes align with the holes in the foil extrusion. ***Liberally*** *coat the foil connector screws with Loctite 271 (red), insert into the connector hole and tighten securely with a screwdriver.*

Liberally *coat the bottom 4 1/2" (114mm) of the long bottom connector with Loctite 271 (red). Place one foil connector wedge in the indentation nearest the foil.*

Push the 26" (660mm) bottom foil extrusion onto the wire and over the long bottom connector until the screw holes align with the holes in the foil extrusion. When properly assembled a 2 3/8" (60mm) gap will be left between the bottom foil and the first 7' (2.13m) foil.

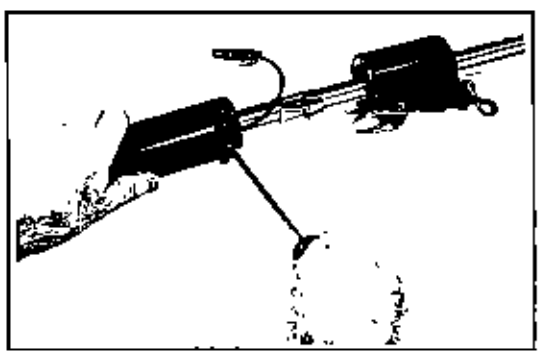
Clean excess Loctite 271 from all joints with rags or paper towels. Be sure to clean excess Loctite from the grooves and from the exposed connector between the 26" (660mm) bottom foil extrusion and the first 7' (2.13m) foil extrusion.

STOP. REFER TO NORSEMAN/STA-LOK INSTRUCTIONS.

5 *Slide halyard swivel onto the foil with the small shackle up.* ***Do not place the halyard swivel on the foils upside down.*** *Slide the halyard swivel up* ***past*** *the 2 3/8" (60mm) gap in the foils.*

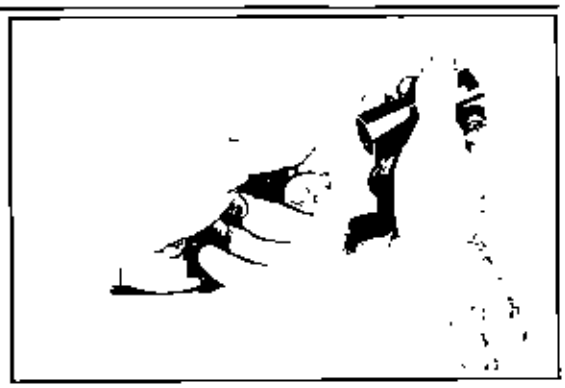
Remove the screw from the stainless steel feeder casting. Carefully open the feeder, position it over the 2 3/8" (60mm) gap in the foils with the thick end up, and secure it over the gap with the screw. Use Loctite 242 (blue) on the screw. ***The feeder uses a "loose hinge" and care must be taken not to drop one of the parts.***

Slide the torque tube assembly onto the foil, prefeeder end up, and clamp it to the foil near the feeder where it will be out of the way during the remaining assembly.

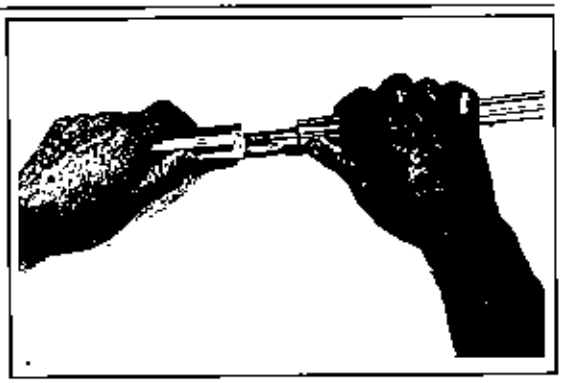


STOP. REFER TO NORSEMAN/STA-LOK INSTRUCTIONS.

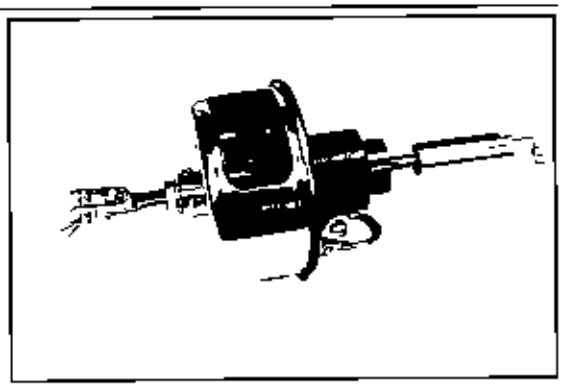
Slip the plastic locking split cylinder into the chromed-bronze locking collar, split end first.



Slip the chromed bronze locking collar onto the stay over the threaded stud with the threaded end of the collar down.



Thread the drum assembly onto the threaded stud just until the colored mark on the threads is completely engaged in the turnbuckle body and does not show.



Please be aware that the coloring on the threads is only provided for your convenience during installation. It may wear off and the only positive means of insuring that you have proper engegement of the threads onto the turnbuckle is to measure the exposed threads. ***At no time should more than 2 1/4" (57mm) of thread be exposed at either the top or bottom of the turnbuckle.***

Check to see that the bottom stud with toggle is engaged in the drum just to the point where the colored mark on the side of the threads does not show.

Clean foils and grooves of any dirt or excess Loctite which may have accumulated during assembly.

Carefully check to see that all of the screws are set flush with the surface of the foil. Excess Loctite should be cleaned before it cures.

Raise the headstay and secure it to the masthead toggle and stemhead chainplate. Use care while raising the furling system to support the headstay to prevent bending or kinking of the foils.

ASSEMBLY-ON BOARD

6

Adjust the headstay to normal sailing tension by turning the entire drum assembly while holding the swage stud with a Vise Grips® type pliers. (Place a rag under the pliers to protect the stud from damage.)

If the colored portion of the threads or more than 2 1/4"(57mm) of thread is exposed at either the top or the bottom of the drum assembly, the headstay is too short and a toggle MUST be added to the system.

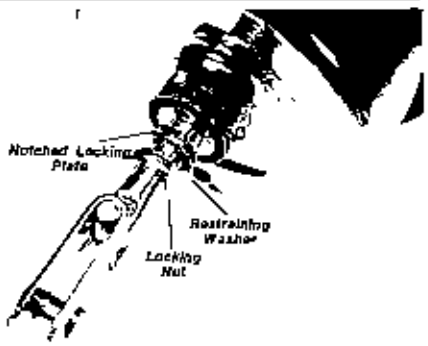
Align the opening in the stainless steel drum basket with the proposed furling line lead.

You may wish to install the furling line lead blocks at this time to insure that your alignment is accurate. For the proper alignment procedure, consult the section describing leading the furling line to the cockpit on page 15 of the instruction manual.

Slide the notched locking plate up the lower stud until the notches slip over the two pins which protrude from the bottom of the drum assembly. It may be necessary to turn the drum slightly to align the pins with the notches.

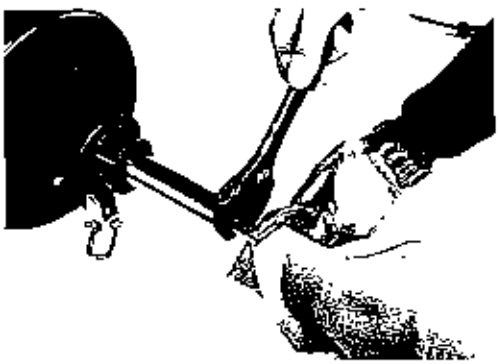
Slip the restraining washer up the stud until it rests against the notched locking plate.

Thread the locking nut up the lower stud and tighten it firmly against the restraining washer with a 1 1/4" wrench.



STOP ***Norseman, Sta-Loc and Nav-tec refer to Special Instructions.***

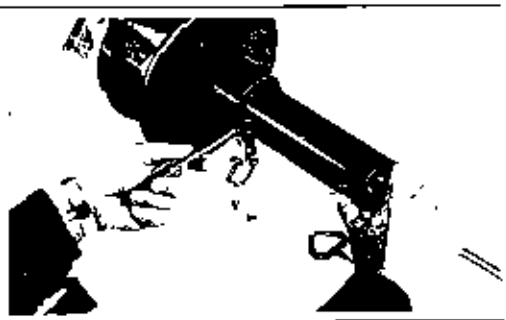
Thread the chromed bronze locking collar down onto the top of the drum assembly. Tighten firmly with a 1 1/8" wrench while holding the swage stud with a Vise Grips® type pliers. (Place a rag under the pliers to prevent damage to the stud.)



Tightening the chromed bronze locking collar while holding threaded swage stud with Vise Grips Note use of rag to protect stud.

7

Slide the torque tube down the stay and secure to the drum assembly using the three screws provided (use Loctite® 242-blue).



Securing torque tube to the drum assembly using three screws provided

Lift the foil extrusions up the wire so that the top of the foil rides over the swage fitting at the top of the headstay wire and is within 2" of the center of the pin securing the wire to the masthead toggle.

Failure to raise the foils will cause considerable friction in furling. Raising the foils too high may prevent the foils from rotating.

Tighten the torque tube clamp tightly to secure the foils in the raised position.

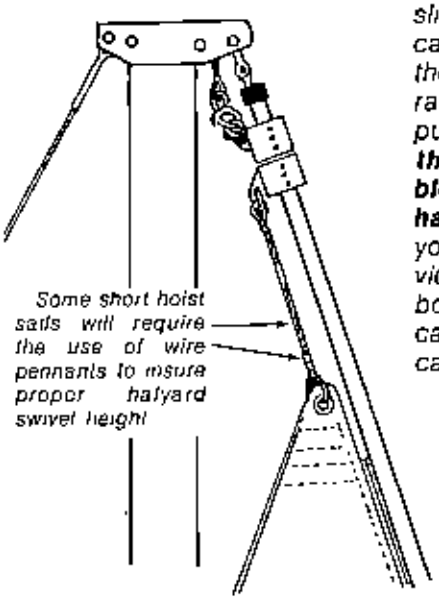
Securing foils to torque tube while holding in raised position. Foils must be raised to correct height or difficulty in furling will result.

HALYARD SWIVEL HEIGHT

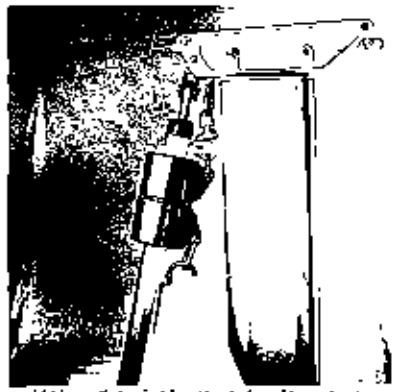
To insure proper operation of your jib furling system it is important that the halyard swivel be within the top 6"(152mm) of the foil when the sail is fully raised and adjusted to normal sailing tension. This will allow ample room for additional luff tensioning to control sail shape while minimizing the possibility that the jib halyard will wrap around the headstay while furling.

It may be necessary to add a wire pennant to the top of short hoist sails to insure that the halyard swivel reaches the proper hoist height.

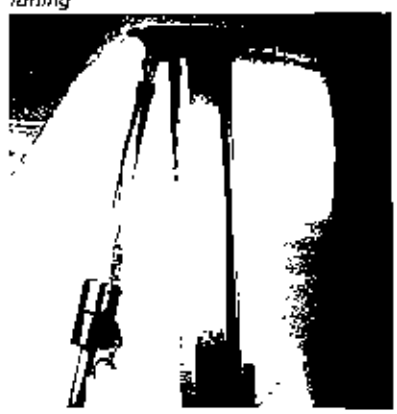
It is also important that the halyard pull slightly to the rear to prevent wraps. In some cases the jib halyard will lay nearly parallel to the headstay when the halyard swivel is fully raised and as a result will not exert sufficient pull to the rear to prevent halyard wraps ***In these cases it may be necessary to add a block to the front of the mast to hold the halyard to the rear to prevent wraps.*** *Consult your dealer or an experienced rigger for advice on how this can best be done on your boat. (Note: Too extreme a pull to the rear will cause difficulty in raising sails and could cause damage to the foils.)*



Some short hoist sails will require the use of wire pennants to insure proper halyard swivel height



Halyard swivel properly close to top of foil to prevent halyard wraps while furling



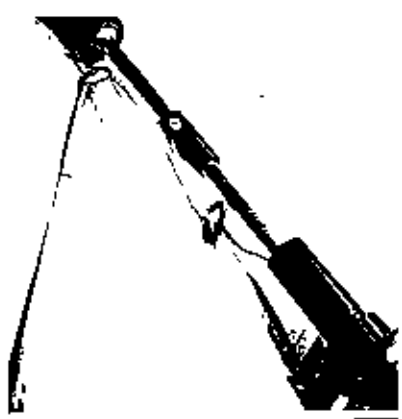
This halyard swivel is too low and jib halyard has wrapped around foil during furling. Halyard wraps will prevent furling and may cause serious damage

ADJUSTING HEADSTAY TENSION

1. *Remove the sail from the headstay and the furling line from the leads*
2. *Carefully loosen the torque tube clamp and lower the foils.*
3. *Remove the screws holding the torque tube to the drum assembly, slide the tube up the stay and clamp lightly near the feeder.*
4. *Loosen the bottom locking nut and washers and top chromed bronze locking collar.*
5. *Adjust headstay tension by turning the drum assembly and realign the opening in the drum basket with the furling line lead.*
6. *Check to be sure that no more than 2 1/4"(57mm) of thread is exposed at either the top or bottom of the turnbuckle.*
7. *Tighten the top locking collar and bottom locking plate.*
8. *Resecure the torque tube to the drum assembly.*
9. *Lift the foils, being sure that the foil slips onto the shank of the top swage as described in assembly stage 7 on page 13. Secure the foils in the raised position.*
10. *Reload the furling line.*

RAISING A SAIL

Jib secured to halyard swivel and being fed into foil groove through the prefeeder and the feeder



1. *Shackle the tack of the sail to the tack swivel located on the top of the drum assembly.*
2. *Secure the genoa sheets to the clew of the sail.*
3. *Attach the genoa halyard to the top shackle on the halyard swivel*
4. *Feed the luff tape at the head of the sail through the prefeeder and through the feeder into either groove in the foil.*
5. *Attach the head of the sail to the shackle on the bottom of the halyard swivel.*
6. *Be sure that the sail is flaked near the headstay and is not tangled*
7. *Hoist the sail.*

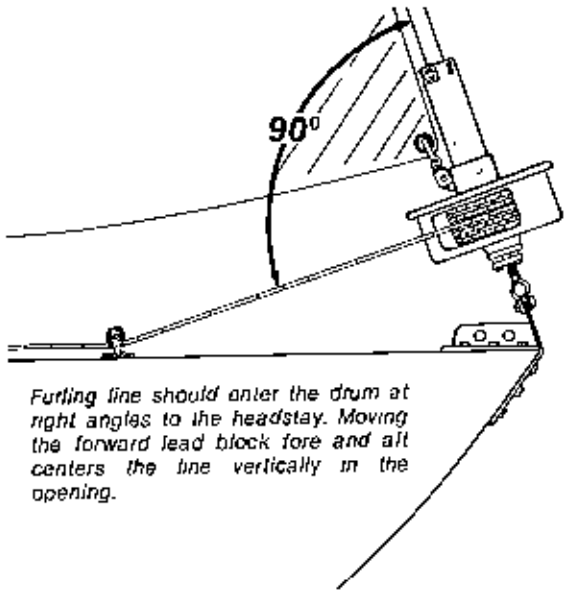
LEADING FURLING LINE TO COCKPIT

Furling lines should be led to the cockpit through a series of Harken big bullet blocks—Kit No. 869 (1-019, 1-150, 3-125, 5-137) placed along the gunwale. Big bullet blocks may be shackled to the toe rail or stanchion bases where appropriate or mounted on Harken 137 eye straps secured to the deck or gunwale.

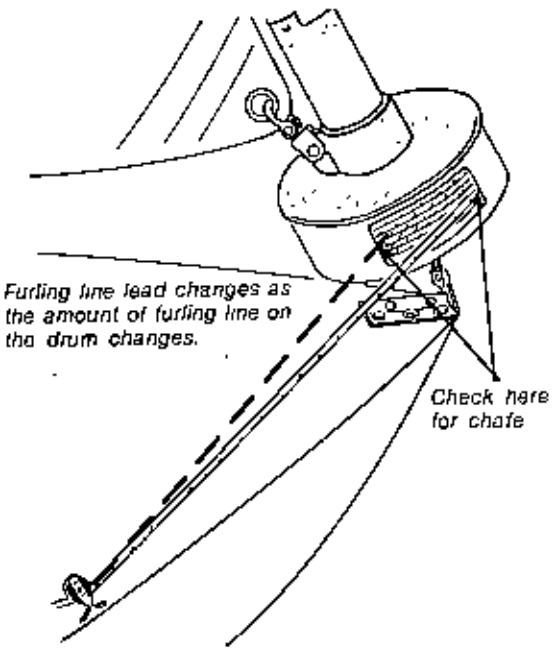
The furling line may be led down either side of the boat.

Position the forward lead block (ideally a Harken 125) so that the furling line enters the drum at right angles to the headstay and is centered vertically in the opening of the drum basket. Moving the forward lead block forward or aft will center the line vertically in the opening.

Care must be taken when aligning the opening in the basket horizontally to see that the furling line leads properly at all times. Note that the angle at which the line exits the basket changes as the amount of line on the drum changes.



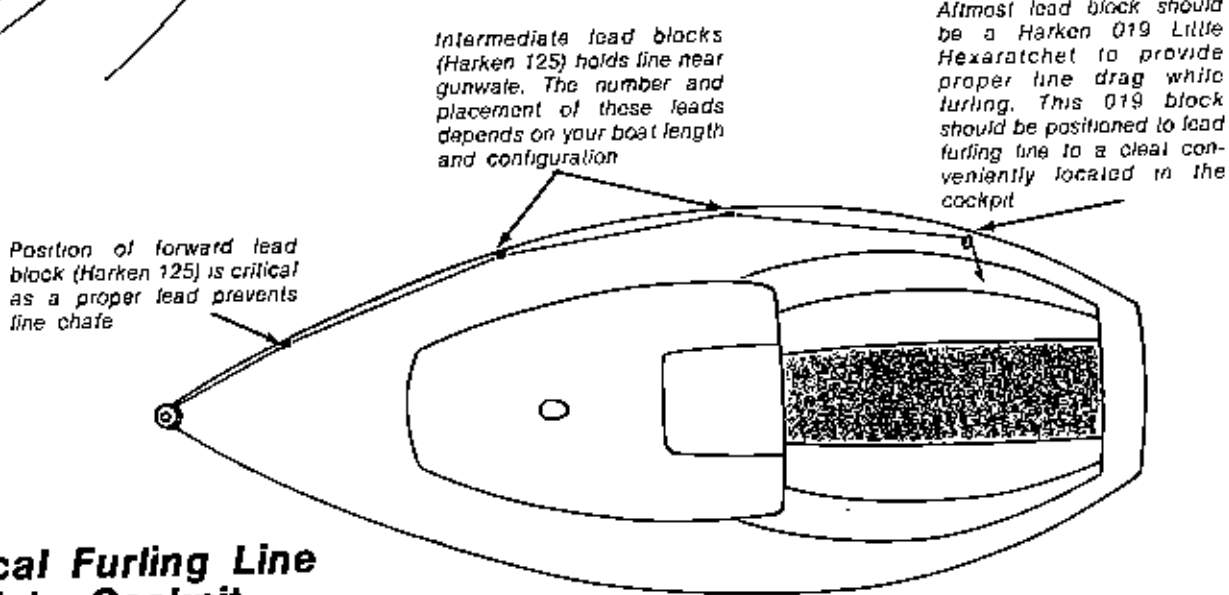
Furling line should enter the drum at right angles to the headstay. Moving the forward lead block fore and aft centers the line vertically in the opening.



When furling line is wrapped on the drum in a clockwise direction the opening will generally appear off center to starboard. (The opposite is true for counterclockwise wraps). Be sure to check the lead for chafe with varying amounts of line on the drum before tightening the locking devices.

The aftermost lead block **must** *be a 019 little Hexaratchet block. This block insures proper drag during unfurling to prevent line overrides in the drum.*

The line must normally be wrapped on the drum so that the drum rotates in a clockwise direction when a sail is being furled. Improper rotation may result in your sail's ultraviolet protector cover being wrapped inside the furl. See the Troubleshooting Guide on page 18 for a solution should this occur.



Typical Furling Line Lead to Cockpit

FURLING AND REEFING

1. Slack both jib sheets **completely** . Unless the sail is **totally** luffed it will be difficult to furl the sail. In extremely light air it may be necessary to place a very slight drag on the jib sheets to insure a neat furl.
2. Pull the furling line. The line should pull readily. If the sail will not furl, or if furling requires a great deal of effort, there is a problem with the system. Please consult the Troubleshooting Guide. **DO NOT USE A WINCH TO FURL!**
3. Cleat the furling line and secure the sheets.

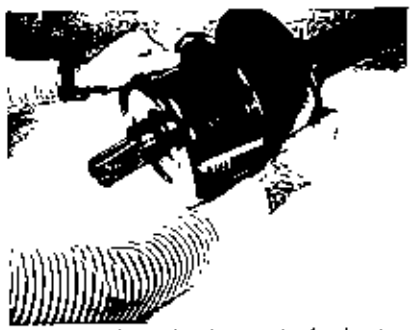
REEFING A SAIL: Reefing is the same as furling, but stop furling when the sail is reefed to the desired overlap.

Your jib reefing and furling system is provided with holes in the drum and basket which may be aligned and used to lock your system when furled or reefed. Simply drop a pin or shackle through these holes or secure with a piece of line. Locking the system will prevent accidental unfurling of your reefed or furled sail.

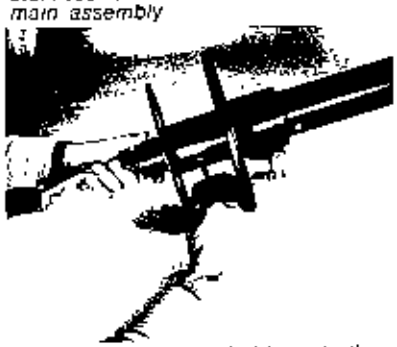
CONVERSION TO RACING

1. Remove the sail from the headstay and the furling line from the leads and drum.
2. Remove the sail feeder from the stay, lower the halyard swivel to the top of the drum assembly and remount the sail feeder.
3. Slack your backstay, rig a secure temporary headstay to support the mast, and remove the lower end of the headstay from the boat.
4. Remove the screws holding the stainless steel basket to the drum and slide the basket off of the stay over the lower toggle fitting.
5. Remove the screws holding the drum to the turnbuckle body and slide the drum off of the stay over the lower toggle fitting.
6. Reattach the headstay to the boat and tune the rig. Secure the tack of the sail directly to the tack fitting on the boat and attach halyards directly to the sails.

Removing screws holding the stainless steel drum basket to the main assembly



Sliding the stainless steel drum basket off of stay over toggle



Removing screws holding furling drum to turnbuckle body. Drum will slide off of stay over lower toggle

Main assembly with drum basket and drum removed and halyard swivel lowered below feeder for racing

HALYARD SWIVEL REMOVAL

If you wish to remove the halyard swivel for more serious racing, proceed as before, removing the basket and drum, but before reattaching the headstay to the boat complete the following steps:

1. Loosen the torque tube clamp, lower the foils, and remove the torque tube from the drum assembly.
2. Loosen the top locking collar and mark the threads of the threaded stud to indicate the proper adjustment position of the drum using a magic marker.
3. Thread the drum assembly off of the stay. Do not loosen the bottom locking plate or unthread the bottom toggle stud.
4. Using care to prevent the wire from slipping up into the foils, remove the bronze locking collar, plastic locking cone, torque tube and halyard swivel.
5. Slide the torque tube back onto the foils, slip the bronze locking collar and plastic locking cone onto the threaded stud, and thread the drum assembly onto the stud to its proper position as previously marked.
6. Firmly tighten the top locking collar to the drum assembly, raise the foils, and secure in this raised position by tightening the torque tube clamp.

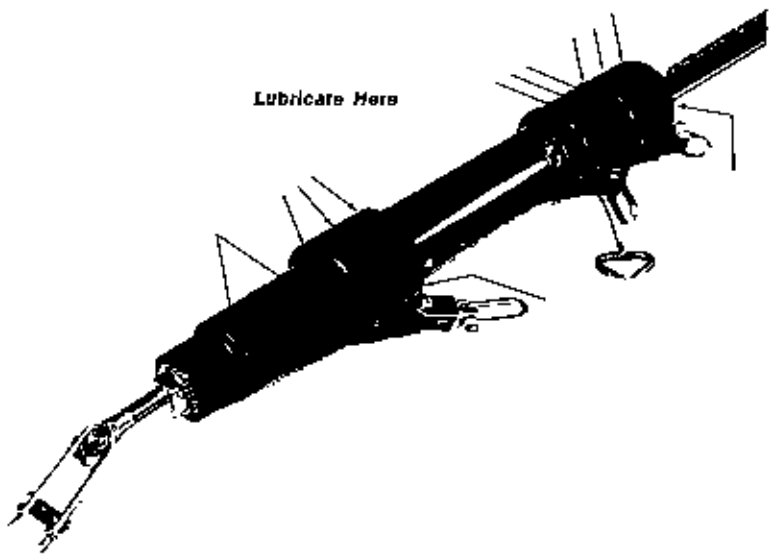
Lower end of headstay with drum and halyard swivel removed for more serious racing

MAINTENANCE

The Hardkote anodized Teflon® impregnated aluminum, stainless steel, silicon bronze, and Duratron used in the construction of your jib furling system require very little maintenance.

The bearings are open and a heavy rain will flush most salt and dirt from the races. An occasional rinse with a freshwater hose should be sufficient to purge any remaining salt or dirt from the bearings.

It is strongly recommended that a light lubricant such as WD 40 or LPS-1 be sprayed directly into the bearing races of the halyard swivel and the tack swivel where you can see the bearings. There are red plastic lubrication points on the halyard swivel, tack swivel, and on the main bearing assembly. The latter are exposed by removing the furling drum. The small plastic tube usually packaged with these lubricants will fit into these lubrication points. Lubrication sprayed down into the torque tube will also find its way into the main bearing assembly.



It is very important to thoroughly examine the swage fittings and lower toggle stud for signs of fatigue or stress corrosion on a regular basis. Carefully inspect each fitting for hairline cracks or signs of corrosion. This is especially important in tropical climates. Replace any fitting which shows signs of cracking or corrosion at once.

The strength of your headstay assembly depends upon sufficient engagement of the turnbuckle threads into the body. Both the top threaded stud and the lower toggle stud were colored to aid in initial assembly, but this dye may wear off and the only positive check of proper thread engagement is to measure the exposed threads. ***At no time should more than 2 1/4"(57mm) of thread be exposed at either the top or bottom of the drum assembly.***

ASSEMBLY TROUBLE-SHOOTING

Problem	Probable Cause	Solution
Connector missing	Piece was not secured at stud and was carried up inside of foil	Check for missing connector inside of foil extrusions.
Too many connectors	Too many strung on wire.	Leave extra connector loose inside last 7'(2.13m) foil.
Foil will not slip past threaded stud:	Dirt in foil or on stud.	Clean foil and stud
	Swage stud is bent.	Return stay to distributor. **Do not attempt to straighten swage!**
Connector will not fit into foil extrusions.	Dirt in foil or on connector.	Clean connector and foil.
Warning color shows on threads at turnbuckle when rig is tuned or more than 2 1/4"(57mm) of thread is exposed at the top or bottom of the turnbuckle.	Stay is too short.	Add a toggle to the headstay to increase length. **Do not sail with colored portion or more than 2"(51mm) of threads exposed.**

OPERATION TROUBLE-SHOOTING

Problem	Probable Cause	Solution
Sail will not furl	Jib halyard is wrapping around headstay because angle between mast and halyard is too shallow or halyard swivel is too low.	See installation instructions regarding optimal halyard angle and halyard swivel height. A wire pennant may be needed at the head of the sail to raise the halyard swivel to the proper height.
	Foils riding on locking collar	Raise foils per Assembly Stage 7
	Foils too high, binding on swage eye	Lower until 2"(51mm) from pin or until clear
	Spare halyard is wrapping in sail as it furls	Secure spare halyards away from the furling headstay, possibly by flipping halyard behind spreaders
	Furling line is tangled in drum	Overrides are best prevented by using a 019 Little Hexarat-chet block as the last furling line lead to maintain proper drag on line while unfurling
	Sail or dirt in bearings.	Flush bearings with fresh water and lubricate
	Jib sheets are not free	Free jib sheets
	No wraps of furling line on drum	Remove sheets. Rotate stay counterclockwise to wrap as much furling line on the drum as possible.
	Line through 019 backwards	Rerun line
Sail will not furl completely	Insufficient furling line on drum	Add line to drum as above
	Halyard is catching in sail as it furls	Move halyards away from furling headsail as above
Headstay rotates in jerks or elliptically	Insufficient tension on headstay	Tighten headstay and/or backstay to eliminate sag in head-stay
Sail does not furl neatly	Insufficient drag on sheets while furling	Maintain drag on sheets while furling, especially in light wind
Sail does not stay furled	Sail not furled tightly on stay	Maintain drag on sheets while furling
	Furling line not secure	Secure furling line
Sail will not go up	Luff tape will not go into groove	Check luff tape for fraying
		Check luff tape size
	Sail catching at prefeeder	Flake sail more loosely on deck
	Dirt in groove	Clean grooves
Sail will not raise completely or luff will not tension	Halyard swivel is hitting end stop	Luff of sail is too long and must be recut
	Angle between halyard and mast is too sharp and halyard is pulling too much to the rear.	Halyard must be routed from point higher on the mast. This may require that any halyard turning blocks aloft be replaced. Consult your dealer for advice.
Sail will not come down	Halyard is wrapped on headstay	Angle between headstay and halyard is too shallow and must be optimized per the installation instructions
	Halyard swivel off foil	Foil too short or too low
Ultraviolet cover rolls up inside of sail	Furling line is wrapped on drum in wrong direction	Remove sheets. Pull line to remove all furling line from drum. Turn stay to rewind line on drum in opposite direction. Note—basket alignment may need to be adjusted