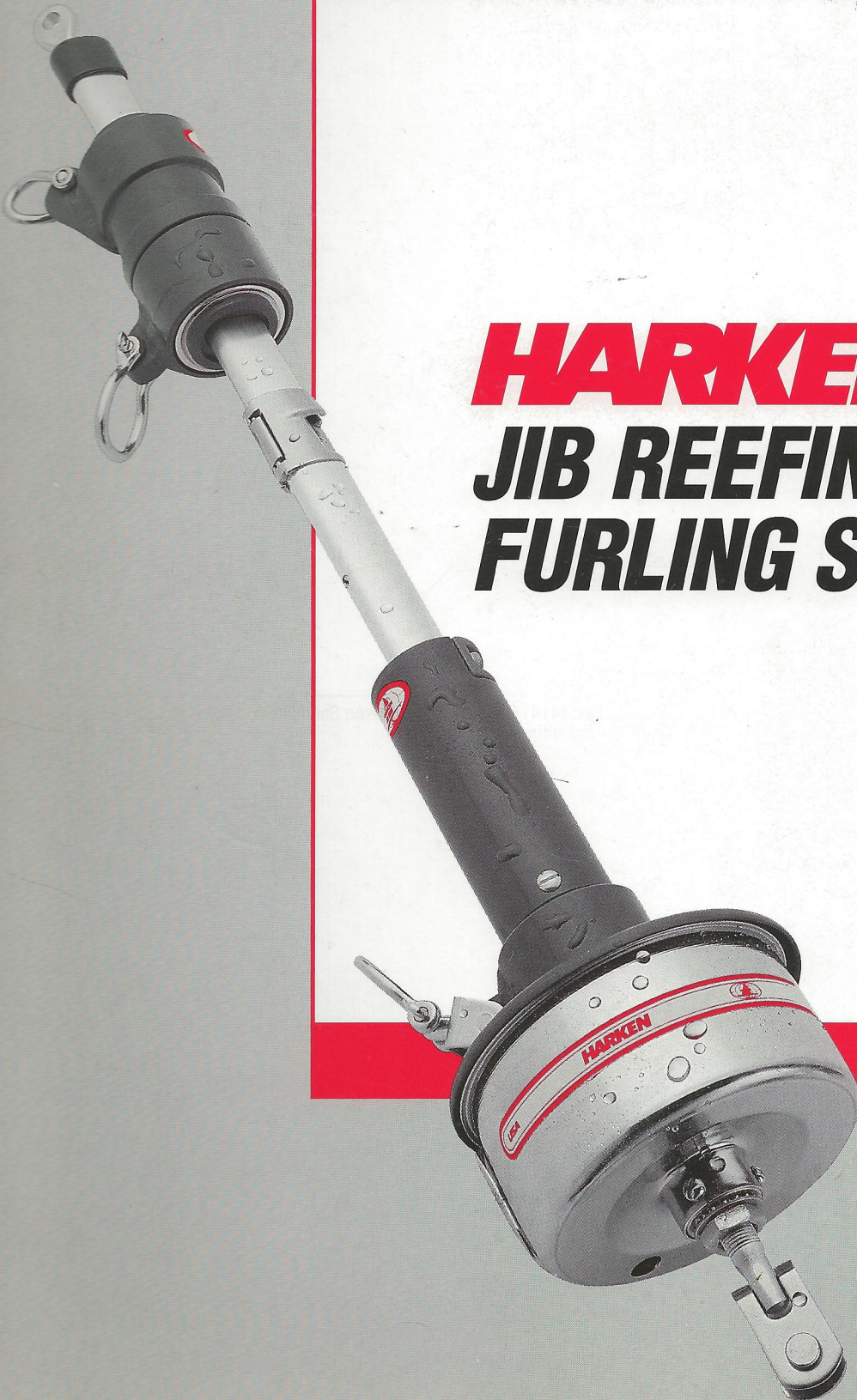


Instruction Manual

HARKEN **JIB REEFING & FURLING SYSTEMS**

- ☐ **Unit 1**
- ☐ **Unit 1.5**



Thanks for buying a Harken Jib Reefing and Furling System. It will give you reliable service with minimal maintenance, but it does require proper assembly and basic care. This manual is an important part of the total reefing system. Please take the time to read it carefully before assembling or using your furling system.

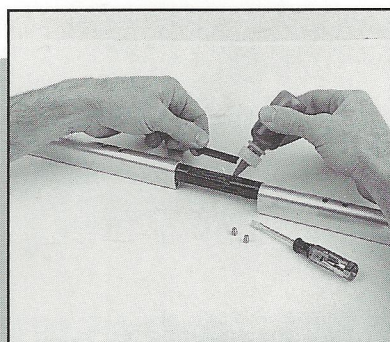
These instructions may look intimidating, but they are very simple and use photos and drawings throughout to make assembly easy. Many sections will not apply to your boat or to your installation.

If you have questions which cannot be answered by the manual or your dealer, please feel free to give us a call. We'll be happy to do anything we can to make your sailing safer and more fun.



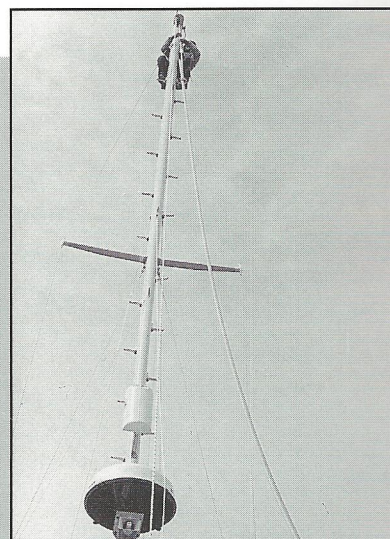
Preparation For Assembly Pages 4 to 12

This section tells how to measure headstays, prepare wires and cut foils to length if they have not been supplied ready to assemble.



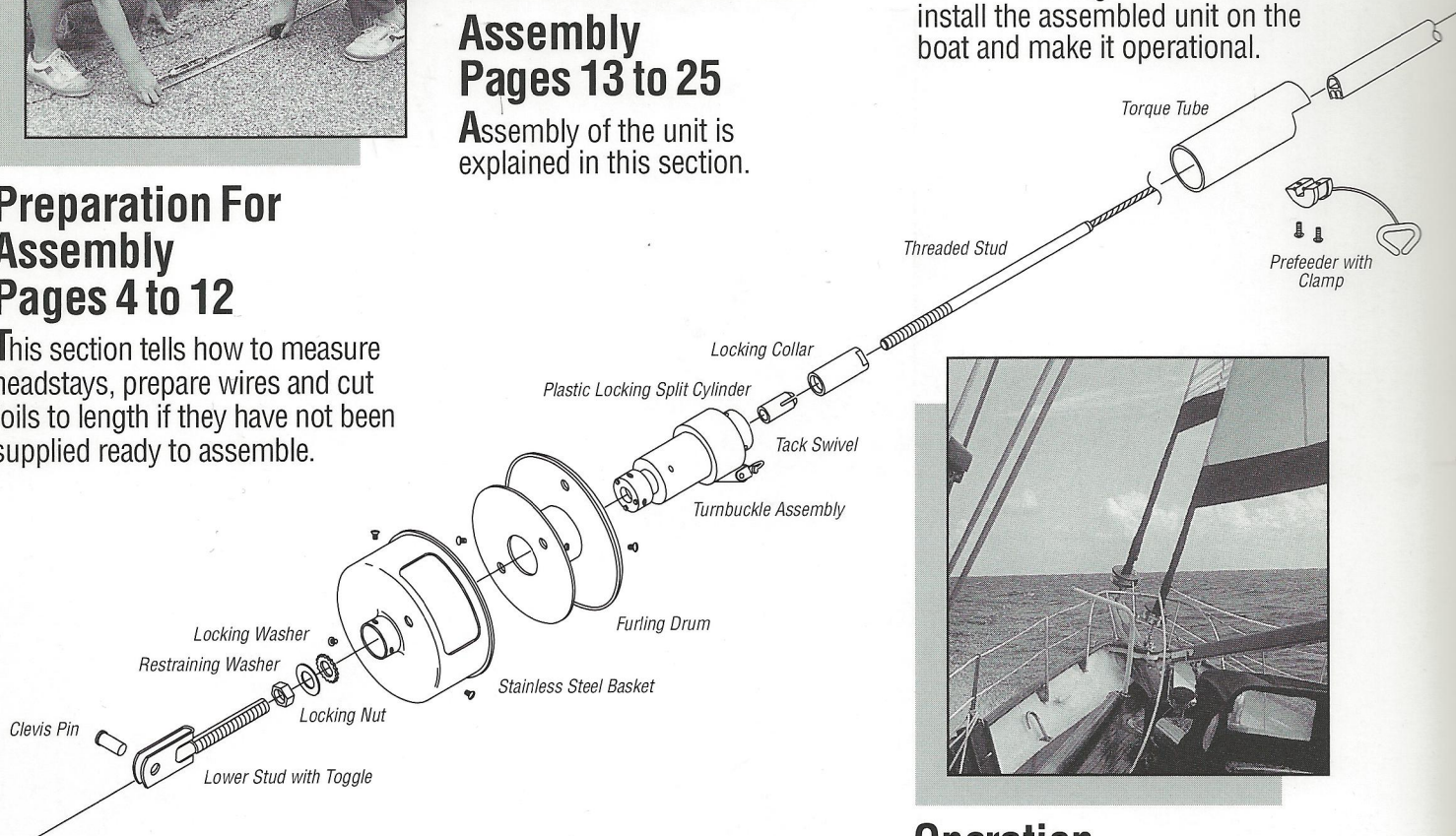
Assembly Pages 13 to 25

Assembly of the unit is explained in this section.



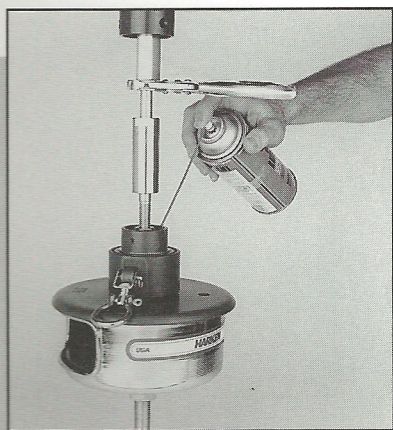
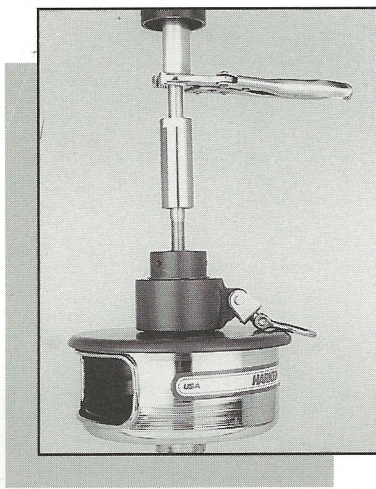
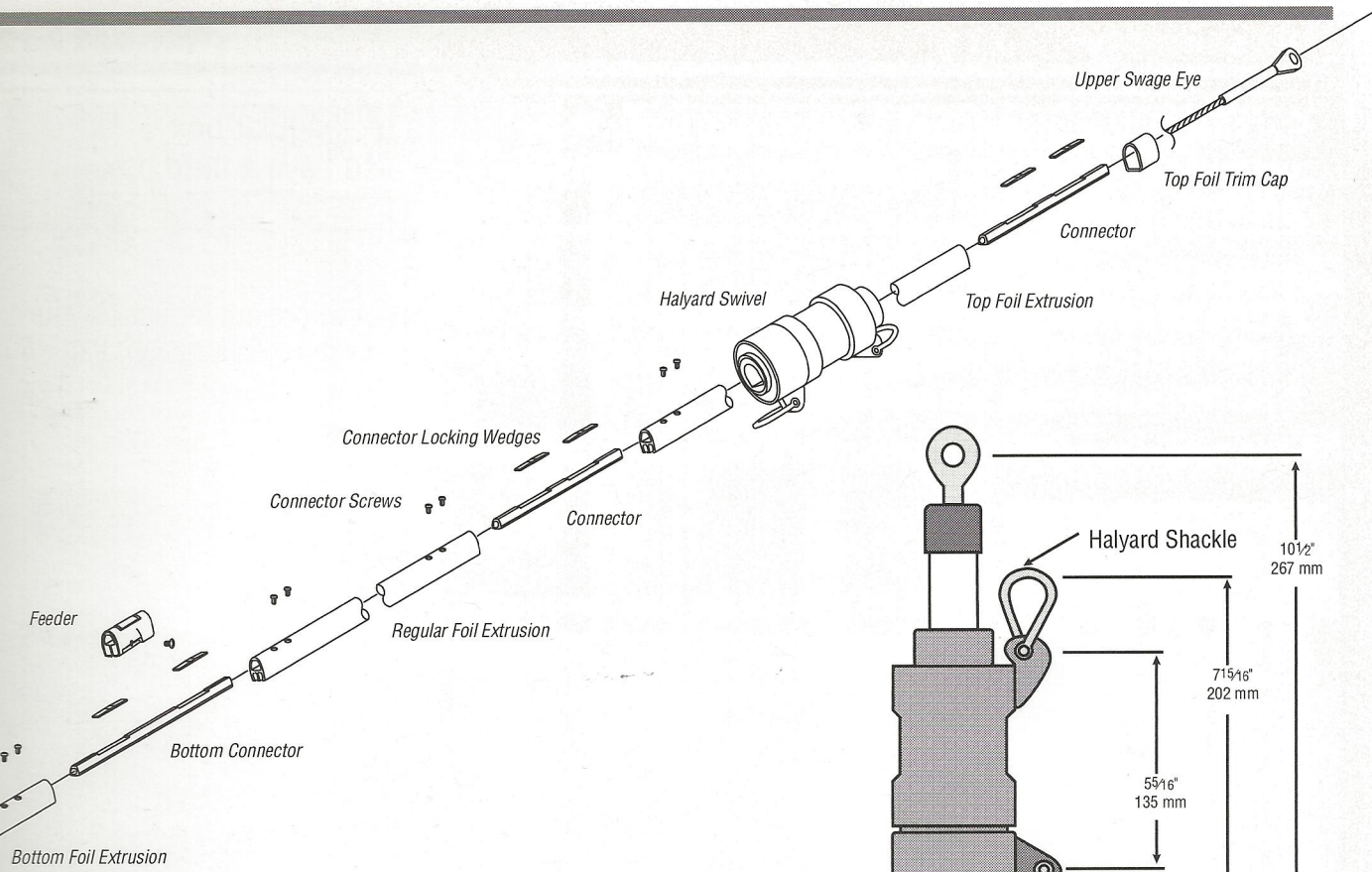
Commissioning Pages 26 to 28

Commissioning covers how to install the assembled unit on the boat and make it operational.



Operation Pages 29 to 32

This section explains system use. It also discusses tensioning the headstay and converting to racing.

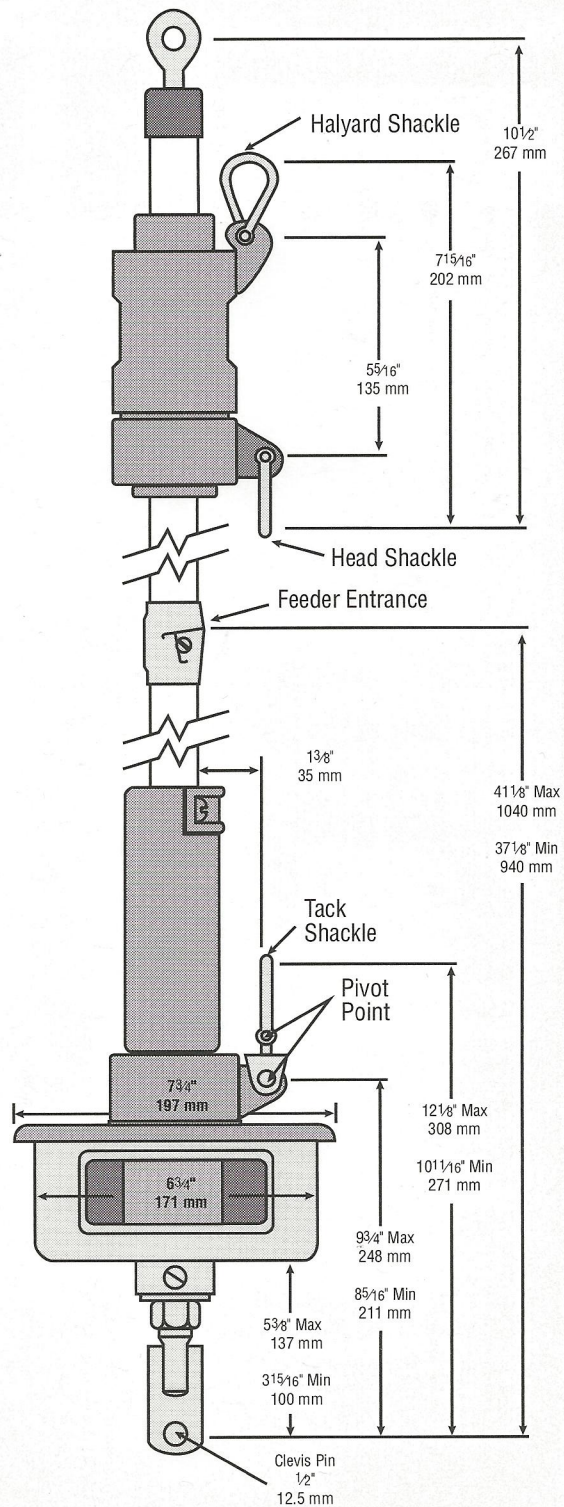


Troubleshooting and Repair Pages 33 to 34

The Assembly and Operation Trouble-Shooting guides explain how to correct problems. Your seven-year limited warranty is explained in simple language on page 35.

Maintenance Page 33

The maintenance section tells how to keep your furling system working properly.



You should have at least two boxes: a long box with foils and a rectangular box containing the drum and miscellaneous components. You may also have a third box containing the headstay.

The foil box contains:

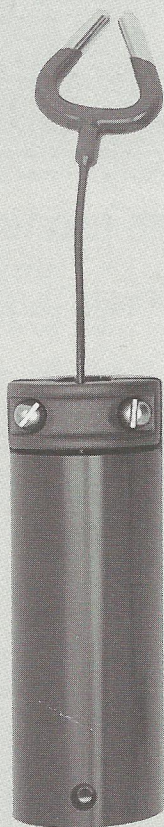
7' (2.13 m) Foil Extrusions. A standard kit has six foils, but one may have been pre-cut for use as your top foil. If your headstay is longer than 45'8" (13.92 m) you should order one extra foil extrusion, Part #807.

1 24" (610 mm) Bottom Foil Extrusion.

The main components box contains parts packaged on three cards:

Card 1

Card 1 contains the main components.



Torque Tube



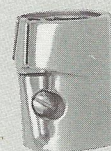
Drum Assembly



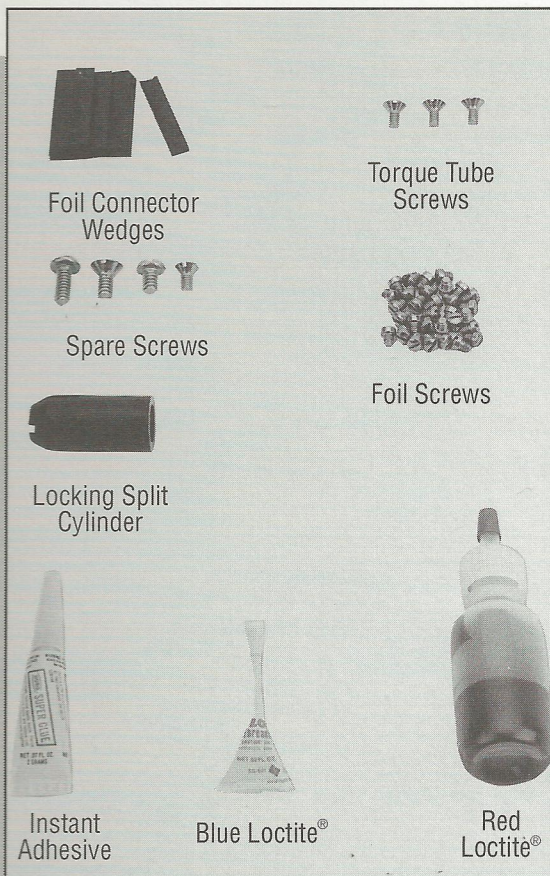
Halyard Swivel



Locking Collar



Feeder



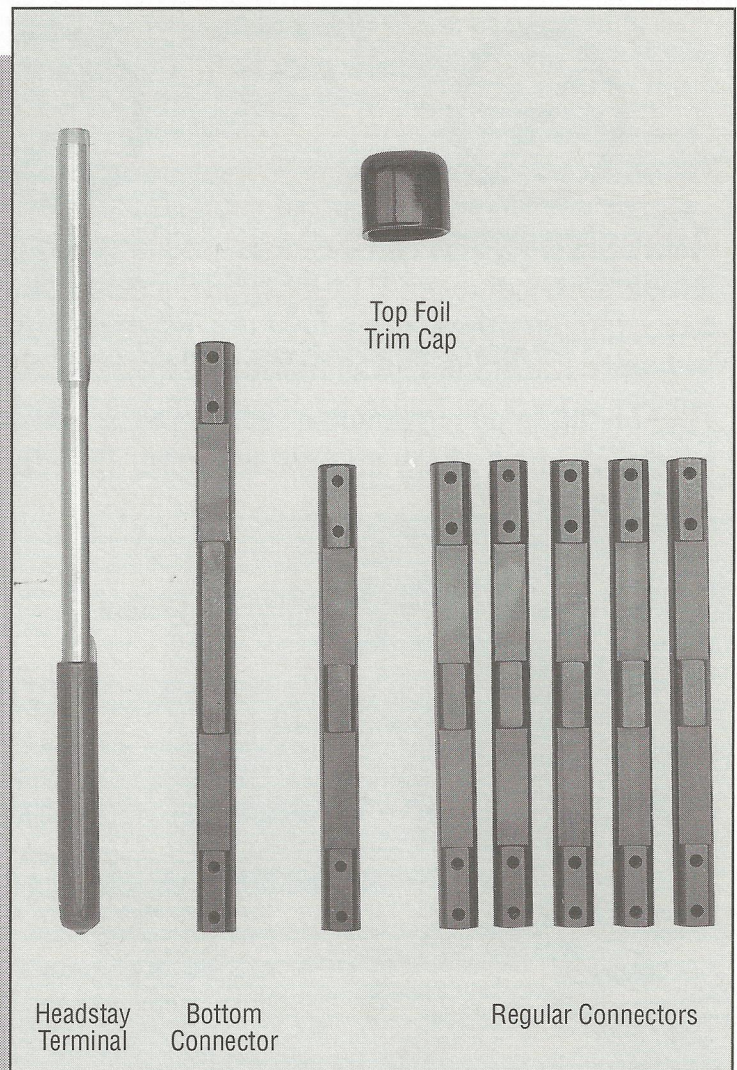
Card 2

Card 2 contains miscellaneous parts.

- 1 Bag of 17 **Connector Wedges**. There is 3 spare wedges.
- 1 Bag of three **Torque Tube Screws**.
- 1 Bag of 30 **Foil Screws**. Contains 6 extra screws.
- 1 **Locking Split Cylinder**. Used only with swage terminals. Norseman®, Sta-Lok® and rod installations do not use this.
- 1 **Instant Adhesive**.
- 1 **Loctite®** (Blue).
- 1 **Loctite®** (Red)
- 1 Bag of **Spare Screws**. Contains one spare screw for every application. They are not required for installation.

Packed loose in the box

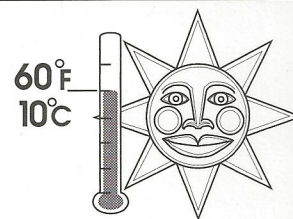
- 1 **Furling Line**. 60' (18.3 m) of 5/16" (8 mm) Dacron braid.
- 1 **Owner's Package**. Contains the instruction manual, warranty card and other information.



Card 3

Card 3 contains parts which are placed on the headstay before assembly. This card and its contents may be "missing" as the parts may have been placed on your headstay.

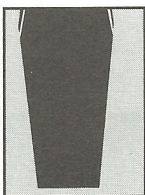
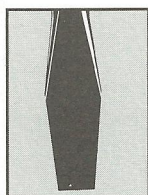
- 1 **Top Foil Trim Cap**.
- 1 **8 7/8" (225 mm) Bottom Connector**.
- 7" (178 mm) Regular Connectors**. A standard kit has 6 connectors. If your headstay is longer than 46'8" (14.224 m) you will need one more connector. Order part #810.
- 1 **Headstay Terminal**. Check to be sure that the size and type of terminal is correct.



Adhesive Alert: Foil assembly requires red Loctite® adhesive. Loctite cures properly in temperatures above 60° (10° C). Surfaces must also be dry. If you assemble your unit at lower temperatures, use a heat gun like a hair dryer or hand held butane or propane torch to **gently** warm the parts for about 5 minutes after assembly.

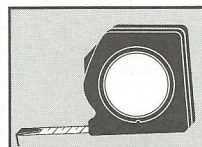
Red Loctite only cures when no oxygen is present. Excess adhesive on the surface of the foils will remain sticky and will not cure. This does **not** mean that the adhesive inside the joint has not cured.

You will need these tools to build your system



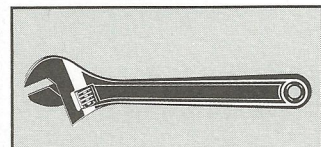
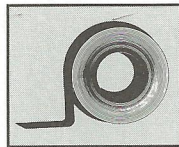
Screwdriver – Flat blade
1/8" (3 mm) wide

Screwdriver – Flat blade
5/16" (8 mm) wide



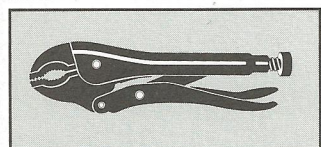
Tape Measure

Plastic tape – not
needed with Norseman
or Sta-Lok units

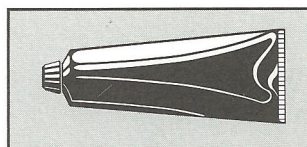


7/8" (23 mm) and 1 1/16"
(27 mm) wrenches or one
large adjustable wrench

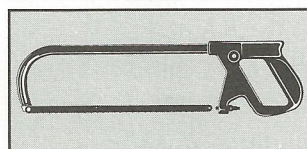
Wrenches for Norseman or Sta-Lok Units	
Wire Size	Wrench Sizes
1/4" (6 mm)	16 mm or 5/8" and 17 mm
9/32" (7 mm)	19 mm or 3/4" and 20 mm
8 mm Type 316	20 mm and 21 mm



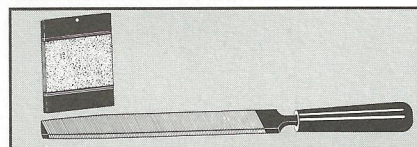
Large Vise Grips® type
pliers (for rod units only)



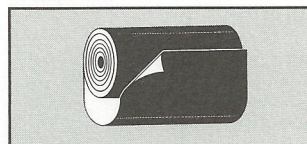
Tube of polysulfide marine
sealant – for Norseman® or
Sta-Lok® units only. Do not
use silicone marine sealant.



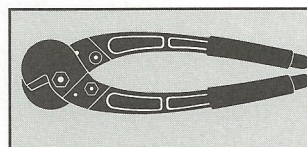
Hacksaw



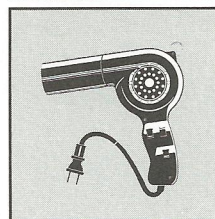
File, sandpaper
or emery cloth



Roll of paper towels or
disposable rags



Wire cutters – only needed
if you are cutting your own
headstay wire



Heat gun – only needed if you will
be working during cool weather
(see above)

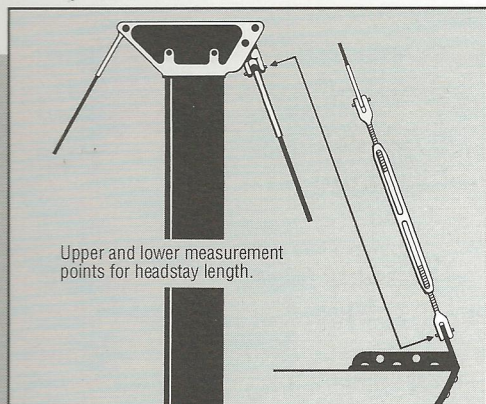
Work Area

Select a flat work area longer than the stay and free from gravel, dirt or sand. Generally, the best work area is the dock next to the boat. **Your furling system is designed to be assembled on the ground and must not be assembled with the headstay in a vertical position.**

Norseman, Sta-Lok or Rod Headstay Installations

The assembly instructions show assembly of a swaged wire headstay. Norseman, Sta-Lok and rod headstay installations differ slightly in a few areas. Differences are noted at the bottom of each page in shaded boxes.

Pin-to-pin headstay length is a measurement which is used in many steps of assembly and also for measuring sails. After determining the length of your headstay, write the length on the outside back cover of this manual for easy reference in the future.

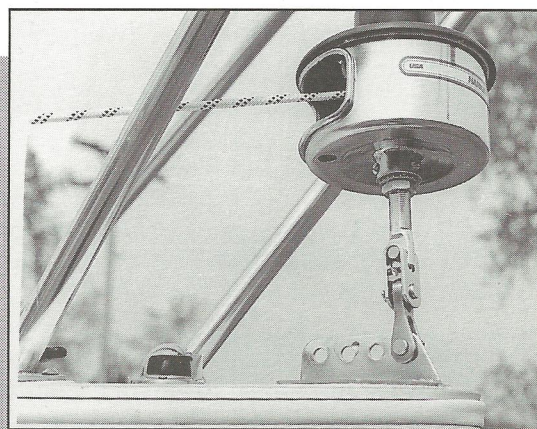


All headstays are measured from the center of the pin holding the headstay to the masthead toggle to the center of the pin holding the headstay assembly to the stemhead chainplate.

Be sure that the turnbuckle is set to the correct length before measuring.

The 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 at the masthead.



Additional Stemhead Toggles

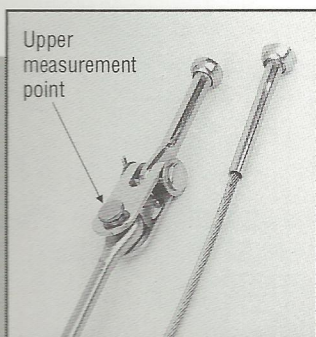
Your furling system has an integral toggle at the lower turnbuckle fitting. An **additional** toggle is not required at the lower end but **may** be fitted if the headstay wire is too short, or if it is desirable to mount the drum higher off the deck than normal, say to provide more clearance for an anchor.

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.

Some boats with very narrow bows or with bowsprits may find that the furling drum, in its normal position, will not fit inside the pulpit. It may be necessary to use a toggle to raise the drum to avoid these problems.

The system is designed to keep the sail as close to the deck as possible. While it may be necessary to raise the drum to provide clearance for an anchor or to fit inside a pulpit, do not mount the drum higher than required. Raising the drum reduces sail luff length and increases heeling. If you need better visibility under your genoa, mount the drum as low as possible and see the instructions on page 28 of the manual.

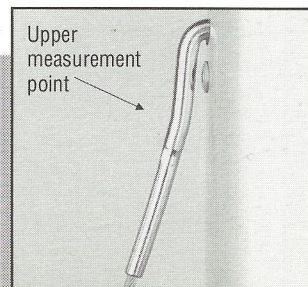
Furling units should not be mounted above turnbuckles or long link plates. If you are considering this, discuss your installation carefully with Harken before proceeding.



Isomat Masts

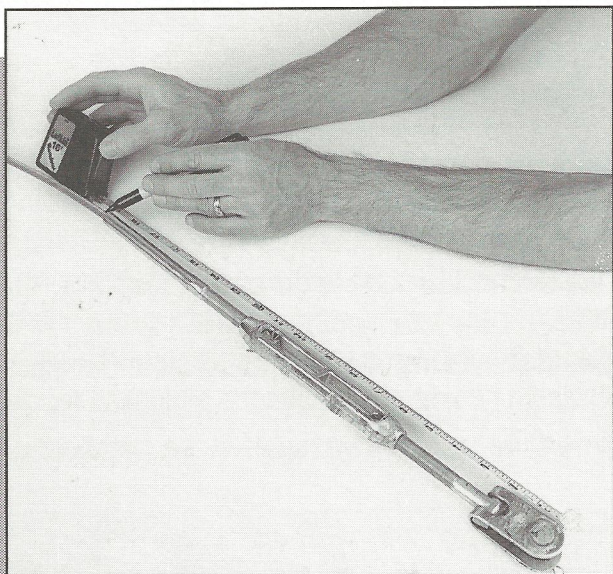
Isomat type masts have an unusual fitting at the top of the headstay. This "stemball" must be cut off and a special stemball adapter placed on the upper end of the headstay. This adapter, Harken part #941 for Unit #1 and #942 for Unit #1.5, may be purchased from your Jib Furling dealer or distributor. You will also need a standard marine eye which can be purchased from your rigger. This marine eye will be swaged to the upper end of the headstay.

When measuring headstay length, use the center of the new eye on the wire as the upper measurement point.



T-Ball Fittings

Some boats have T-ball swage fittings as the upper terminal. They do not require an additional toggle. Use the elbow in the fitting as the upper measurement point. See diagram.



Reusing Existing Headstay Wire

Your system is designed to allow use of your existing headstay wire. Examine your headstay carefully to be sure that it is in good condition before you reuse it. On wire headstays look for corrosion and cracks at swage fittings and end terminals and for abrasion, corrosion or damage to the wire itself. On rod headstays look for corrosion or damage to the coldheaded ends and terminals and for abrasion, nicks or kinks to the rod itself.

Headstay condition will vary depending upon climate and use, but as a general rule do not reuse wire which has been in saltwater for more than four seasons or any wire which is more than six years old. Rods generally have a longer life than wire, but evaluate your rod carefully before reusing.

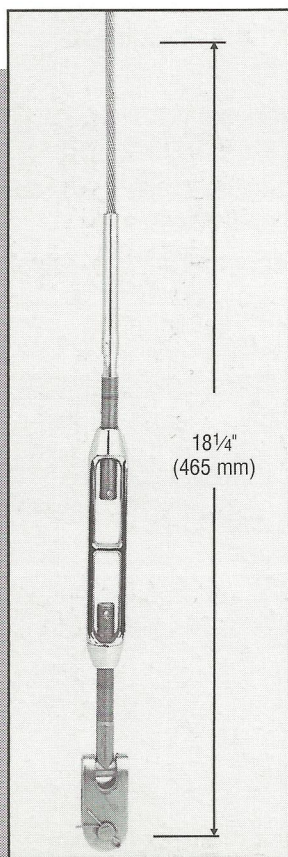
Cutting Headstay to Length

Before cutting headstay wire to length, be sure that you have determined pin-to-pin headstay length and written it on the outside back cover for easy reference.

To determine the cut point of the headstay, measure up from the lower measurement point of the headstay.

Swage fittings (for Unit #1 only)

Subtract 18¼" (465 mm) from your overall headstay length and **cut** the wire at that point.



Tip: Remember the old adage, "measure twice, cut once."

When the headstay is shortened 18¼" (465 mm) the turnbuckle will be one half to two thirds open, allowing adjustment of the headstay length.

If necessary, you may shorten your headstay up to 20" (508 mm), but shortening a wire more than 18¼" (465 mm) will limit headstay adjustment.

Use only swage fittings provided by Harken to insure that the length and threads are correct.

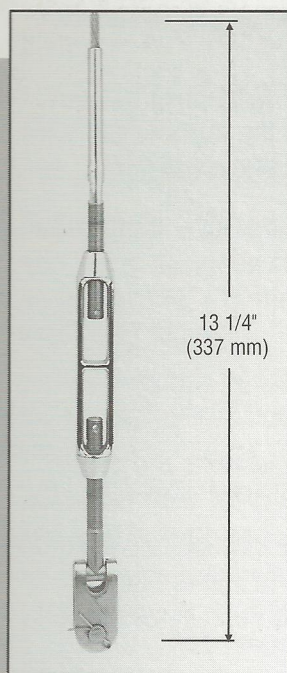
Have the wire swaged by a reputable rigger. Improperly applied swage fittings are prone to failure and bent or "banana" swages cause difficulty with furling.

Length Check: Check the length by slipping the swage stud on the wire. The distance from the center of the eye at the top of the wire to the end of the swage stud should be equal to headstay length less 9" (230 mm).



■ Norseman and Sta-Lok Fittings

Subtract $13\frac{1}{4}"$ (337 mm) from your overall headstay length and **cut** the wire at that point.



Tip: Remember the old adage, "measure twice, cut once."

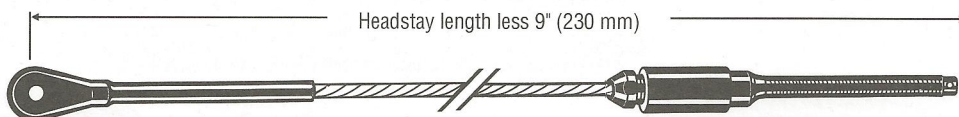
When the headstay is shortened $13\frac{1}{4}"$ (337 mm) the turnbuckle will be one half to two thirds open, allowing adjustment of the headstay length.

If necessary you may shorten your headstay up to 15" (380 mm), but shortening a wire more than $13\frac{1}{4}"$ (337 mm) will limit headstay adjustment.

Use of a Norseman or Sta-Lok fitting may occasionally result in a headstay which is too short and a toggle must be used to compensate. Be sure to change the headstay length measurement to reflect the use of this toggle.

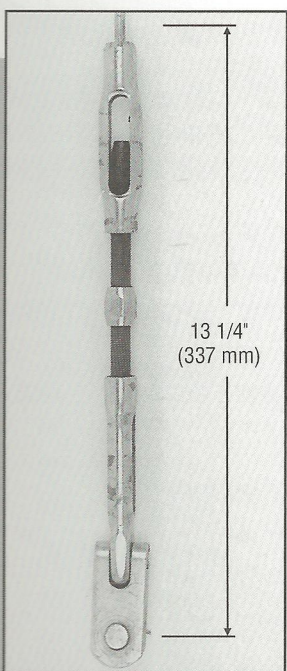
Use only Norseman or Sta-Lok fittings provided by Harken to insure that the length and threads are correct.

Length Check: Check your length by opening the terminal, removing the "cone", and placing the fitting on the wire. The distance from the center of the eye at the top of the wire to the end of the stud should be equal to the headstay length less 9" (230 mm).



■ Rod Fittings

Subtract $13\frac{1}{4}"$ (337 mm) from your overall headstay length and **cut** the rod at that point.



Tip: Remember the old adage, "measure twice, cut once."

If the cut point is on the upper part of your turnbuckle, but below the actual rod, tap the turnbuckle up the rod to free the coldhead from the turnbuckle and cut the rod at the correct point.

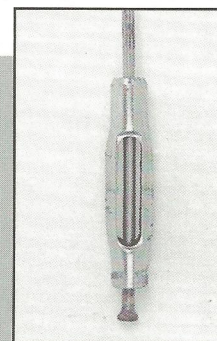
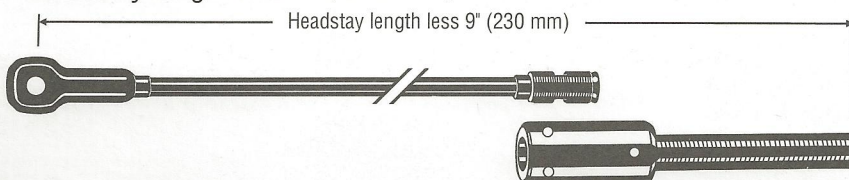
When the headstay is shortened $13\frac{1}{4}"$ (337 mm) the turnbuckle will be one half to two thirds open, allowing adjustment of the headstay length.

If necessary you may shorten your headstay up to 15" (380 mm), but shortening a rod more than $13\frac{1}{4}"$ (337 mm) will limit headstay adjustment.

The length of a rod fitting may occasionally result in a headstay which is too short and a toggle must be used to compensate. Change the headstay length measurement to reflect the use of this toggle.

Use only rod fittings provided by Harken to insure that the length and threads are correct.

Length Check: Check your length by placing the rod fitting alongside the rod with the nosepiece in its proper position. The distance from the center of the eye at the top of the headstay to the end of the stud should be equal to the headstay length less 9" (230 mm).



Pin-to-pin Length of Headstay (As Described on Page 7)	Number of 7" (178 mm) Connectors Used
24' 8" to 25' 8" (7.518 m to 7.823 m)	3
25' 9" to 32' 8" (7.849 m to 9.957 m)	4
32' 9" to 39' 8" (9.982 m to 12.090 m)	5
39' 9" to 46' 8" (12.116 m to 14.224 m)	6
46' 9" to 52' 7" (14.249 m to 16.027 m)	7 (One additional connector required order Part #810)

How Many Connectors?

Use the chart at left to determine the proper number of 7" (178 mm) connectors for your headstay.

Every unit uses one 8⁷/₈" (225 mm) bottom connector **in addition to** the number of 7" (178 mm) connectors shown at left.

Pin-to-pin Length of Headstay (As Described on Page 7)	Number of 7' (2.13 m) Foils Used
24' 9" to 31' 8" (7.54 to 9.652 m)	3
31' 9" to 38' 8" (9.667 to 11.786 m)	4
38' 9" to 45' 8" (11.811 m to 13.919 m)	5
45' 9" to 52' 7" (13.945 m to 16.027 m)	6 (One additional foil required order Part #807)

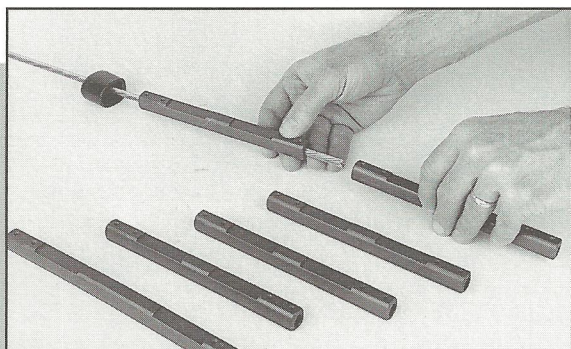
How Many Foils?

Use the chart at left to determine the proper number of 7' (2.13 m) foils for your headstay.

The variable length top or bottom foil is cut from one of the 7' (2.13 m) foils and is used **in addition to** the number of foils shown at left.

Stringing Connectors

After the headstay has been cut to length, but **before** the lower terminal is attached, the proper number of connectors must be placed on the headstay in the correct order.



- Every unit uses a top foil trim cap.
- Every unit uses a number of 7" (178 mm) connectors which varies according to the length of the headstay and is determined by consulting the chart above.
- Every unit uses one 8⁷/₈" (225 mm) bottom connector

Slide the trim cap onto the stay so that the open end faces down.

Slide the proper number of 7" (178 mm) connectors onto the headstay.

Slide the 8⁷/₈" (225 mm) bottom connector onto the headstay so that it is closest to the bottom of the headstay.

Have the wire swaged by a reputable rigger.

Norseman/Sta-Lok Instructions

Because Norseman and Sta-Lok terminals are applied to the headstay wire after the foil is built, it is not necessary to place the connectors or trim cap on the wire at this time. Norseman and Sta-Lok units require the same number of foils and connectors as shown above. Identify the parts you need and set them aside at this time.

Rod Instructions

Rod installations are identical to swaged wire at this point except that the rod fitting is "coldheaded" to the rod rather than swaged on. If you ship a rod headstay to a service center do not coil tighter than 200 times the rod's diameter.

Adjusting Foil Length

The length of the furling system is matched to the headstay length by adjusting the number of 7' (2.13 m) foil extrusions used **and** by cutting **either** the top or bottom foil to length from one of the 7' (2.13 m) foils provided.

Consult Chart on page 10 to determine how many full length 7' (2.13 m) foils you need to use. Set these aside.

Consult the charts below to determine whether you need to cut your top or bottom foil to length.

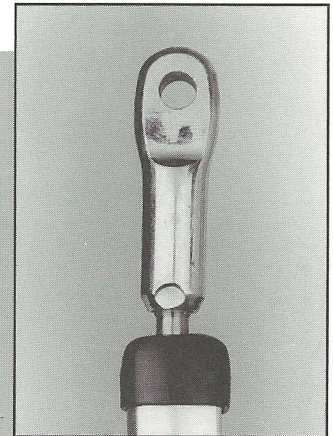
Foil Length – Special Considerations

The top foil is designed to ride over the shank of the upper swage fitting and to within 1½" (38 mm) of the center of the pin holding the headstay to the masthead toggle.

On some boats this is not possible. For example, a Norseman or Sta-Lok upper terminal or rod upper terminal does not have a shank. If for any reason your foil cannot ride within 1½" (38 mm) of the pin center, shorten the top or bottom foil lengths to compensate.

Top Foil Length of 7' (2.13 m)

If your headstay length is one of the dimensions shown below, your unit does not need a special length top foil. A full length 7' (2.13 m) foil is used as the top foil. Rough up the top ¾" (19 mm) of the top foil with a file or sandpaper.



24' 8" (7.518 m)

31' 8" (9.652 m)

38' 8" (11.786 m)

45' 8" (13.919 m)

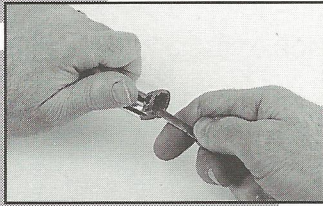
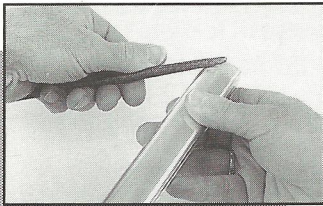
Cutting Bottom Foil to Length

If your headstay length is shown in the chart below use a hacksaw to cut a special length bottom foil from a 7' (2.13 m) foil. Round to the nearest ½" (12 mm). Mark this foil "bottom foil".

Discard the 24" (610 mm) bottom foil which was shipped with your unit.

Deburr the foil. Clean all shavings from inside the foil. Failure to deburr or clean the inside of the foil may cause it to seize to a connector when it is being installed.

Pin-to-Pin Headstay Length (as defined on page 7)			Extra Foil Extrusion Needed	Cut bottom Foil To This Length
24' 9" (7.543 m)	31' 9" (9.677 m)	38' 9" (11.811 m)	45' 9" (13.945 m)	25" (635 mm)
24' 10" (7.569 m)	31' 10" (9.703 m)	38' 10" (11.836 m)	45' 10" (13.970 m)	26" (660 mm)
24' 11" (7.595 m)	31' 11" (9.728 m)	38' 11" (11.862 m)	45' 11" (13.995 m)	27" (686 mm)
25' 0" (7.620 m)	32' 0" (9.754 m)	39' 0" (11.887 m)	46' 0" (14.021 m)	28" (711 mm)
25' 1" (7.645 m)	32' 1" (9.779 m)	39' 1" (11.913 m)	46' 1" (14.046 m)	29" (737 mm)
25' 2" (7.671 m)	32' 2" (9.804 m)	39' 2" (11.938 m)	46' 2" (14.072 m)	30" (762 mm)
25' 3" (7.696 m)	32' 3" (9.830 m)	39' 3" (11.963 m)	46' 3" (14.097 m)	31" (787 mm)
25' 4" (7.722 m)	32' 4" (9.855 m)	39' 4" (11.989 m)	46' 4" (14.122 m)	32" (813 mm)
25' 5" (7.747 m)	32' 5" (9.881 m)	39' 5" (12.014 m)	46' 5" (14.148 m)	33" (838 mm)
25' 6" (7.772 m)	32' 6" (9.906 m)	39' 6" (12.040 m)	46' 6" (14.173 m)	34" (864 mm)
25' 7" (7.798 m)	32' 7" (9.931 m)	39' 7" (12.065 m)	46' 7" (14.199 m)	35" (889 mm)
25' 8" (7.823 m)	32' 8" (9.957 m)	39' 8" (12.090 m)	46' 8" (14.224 m)	36" (914 mm)



Cutting Top Foil to Length

If your headstay length is shown in the chart below use a hacksaw to cut a special length top foil from a 7' (2.13 m) foil.

Mark this foil "top foil".

Rough up the top $\frac{3}{4}$ " (19 mm) of the top foil with a file or sandpaper.

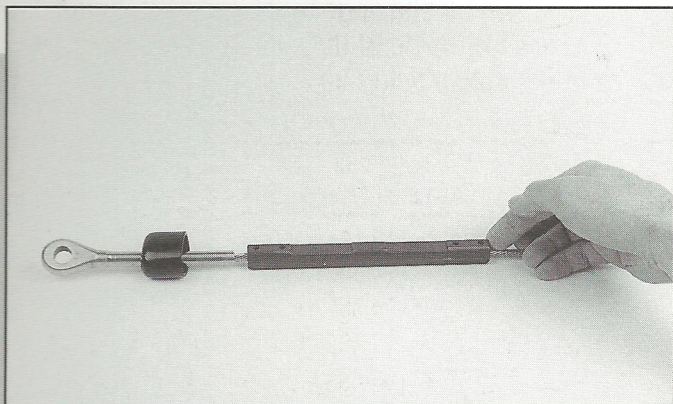
Deburr the foil. Clean all shavings from inside the foil. Failure to deburr or clean the inside of the foil may cause it to seize to a connector when it is being installed.

Pin-to-Pin Headstay Length (as defined on page 7)				Extra Foil Extrusion Needed	Cut Top Foil To This Length
25' 9" (7.849 m)	32' 9" (9.982 m)	39' 9" (12.116 m)	46' 9" (14.249 m)		1' 1" (330 mm)
25' 11" (7.899 m)	32' 11" (10.033 m)	39' 11" (12.167 m)	46' 11" (14.300 m)		1' 3" (381 mm)
26' 1" (7.950 m)	33' 1" (10.084 m)	40' 1" (12.217 m)	47' 1" (14.351 m)		1' 5" (432 mm)
26' 3" (8.001 m)	33' 3" (10.135 m)	40' 3" (12.268 m)	47' 3" (14.402 m)		1' 7" (483 mm)
26' 5" (8.052 m)	33' 5" (10.185 m)	40' 5" (12.319 m)	47' 5" (14.453 m)		1' 9" (533 mm)
26' 7" (8.103 m)	33' 7" (10.236 m)	40' 7" (12.370 m)	47' 7" (14.503 m)		1' 11" (584 mm)
26' 9" (8.153 m)	33' 9" (10.287 m)	40' 9" (12.421 m)	47' 9" (14.554 m)		2' 1" (635 mm)
26' 11" (8.204 m)	33' 11" (10.338 m)	40' 11" (12.471 m)	47' 11" (14.605 m)		2' 3" (686 mm)
27' 1" (8.255 m)	34' 1" (10.389 m)	41' 1" (12.522 m)	48' 1" (14.656 m)		2' 5" (737 mm)
27' 3" (8.306 m)	34' 3" (10.439 m)	41' 3" (12.574 m)	48' 3" (14.707 m)		2' 7" (787 mm)
27' 5" (8.357 m)	34' 5" (10.490 m)	41' 5" (12.624 m)	48' 5" (14.757 m)		2' 9" (838 mm)
27' 7" (8.407 m)	34' 7" (10.541 m)	41' 7" (12.675 m)	48' 7" (14.808 m)		2' 11" (889 mm)
27' 9" (8.458 m)	34' 9" (10.592 m)	41' 9" (12.725 m)	48' 9" (14.859 m)		3' 1" (940 mm)
27' 11" (8.509 m)	34' 11" (10.643 m)	41' 11" (12.776 m)	48' 11" (14.910 m)		3' 3" (991 mm)
28' 1" (8.560 m)	35' 1" (10.693 m)	42' 1" (12.827 m)	49' 1" (14.961 m)		3' 5" (1.041 m)
28' 3" (8.611 m)	35' 3" (10.744 m)	42' 3" (12.878 m)	49' 3" (15.011 m)		3' 7" (1.092 m)
28' 5" (8.661 m)	35' 5" (10.795 m)	42' 5" (12.929 m)	49' 5" (15.062 m)		3' 9" (1.143 m)
28' 7" (8.712 m)	35' 7" (10.846 m)	42' 7" (12.979 m)	49' 7" (15.113 m)		3' 11" (1.194 m)
28' 9" (8.763 m)	35' 9" (10.897 m)	42' 9" (13.030 m)	49' 9" (15.164 m)		4' 1" (1.245 m)
28' 11" (8.814 m)	35' 11" (10.947 m)	42' 11" (13.081 m)	49' 11" (15.215 m)		4' 3" (1.295 m)
29' 1" (8.865 m)	36' 1" (10.998 m)	43' 1" (13.132 m)	50' 1" (15.265 m)		4' 5" (1.346 m)
29' 3" (8.915 m)	36' 3" (11.049 m)	43' 3" (13.183 m)	50' 3" (15.316 m)		4' 7" (1.397 m)
29' 5" (8.966 m)	36' 5" (11.100 m)	43' 5" (13.233 m)	50' 5" (15.367 m)		4' 9" (1.448 m)
29' 7" (9.017 m)	36' 7" (11.151 m)	43' 7" (13.284 m)	50' 7" (15.418 m)		4' 11" (1.499 m)
29' 9" (9.068 m)	36' 9" (11.201 m)	43' 9" (13.335 m)	50' 9" (15.469 m)		5' 1" (1.549 m)
29' 11" (9.119 m)	36' 11" (11.252 m)	43' 11" (13.386 m)	50' 11" (15.519 m)		5' 3" (1.600 m)
30' 1" (9.169 m)	37' 1" (11.303 m)	44' 1" (13.437 m)	51' 1" (15.570 m)		5' 5" (1.651 m)
30' 3" (9.220 m)	37' 3" (11.354 m)	44' 3" (13.487 m)	51' 3" (15.621 m)		5' 7" (1.702 m)
30' 5" (9.271 m)	37' 5" (11.405 m)	44' 5" (13.538 m)	51' 5" (15.672 m)		5' 9" (1.753 m)
30' 7" (9.322 m)	37' 7" (11.455 m)	44' 7" (13.589 m)	51' 7" (15.723 m)		5' 11" (1.803 m)
30' 9" (9.373 m)	37' 9" (11.506 m)	44' 9" (13.640 m)	51' 9" (15.773 m)		6' 1" (1.854 m)
30' 11" (9.423 m)	37' 11" (11.557 m)	44' 11" (13.691 m)	51' 11" (15.824 m)		6' 3" (1.905 m)
31' 1" (9.474 m)	38' 1" (11.608 m)	45' 1" (13.741 m)	52' 1" (15.875 m)		6' 5" (1.956 m)
31' 3" (9.525 m)	38' 3" (11.659 m)	45' 3" (13.792 m)	52' 3" (15.926 m)		6' 7" (2.007 m)
31' 5" (9.576 m)	38' 5" (11.709 m)	45' 5" (13.843 m)	52' 5" (15.977 m)		6' 9" (2.057 m)
31' 7" (9.627 m)	38' 7" (11.760 m)	45' 7" (13.894 m)	52' 7" (16.027 m)		6' 11" (2.108 m)

Assembly

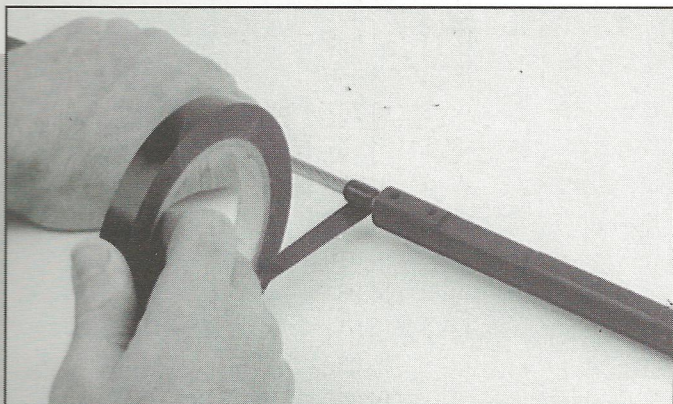
1

In this step, the top connector is recessed into the top foil to serve as a bushing and the trim cap is attached.



Lay the wire out straight on a clean work area such as a dock.

Slide the trim cap and one connector to the top of the headstay.



Slide the rest of the connectors to the bottom of the stay.

Secure the connectors at the bottom of the headstay with tape as shown.



Tip: Leave at least 1" (25 mm) between each connector. Wrap enough tape on the wire so that the connectors cannot pass over it.

Norseman/Sta-Lok Instructions

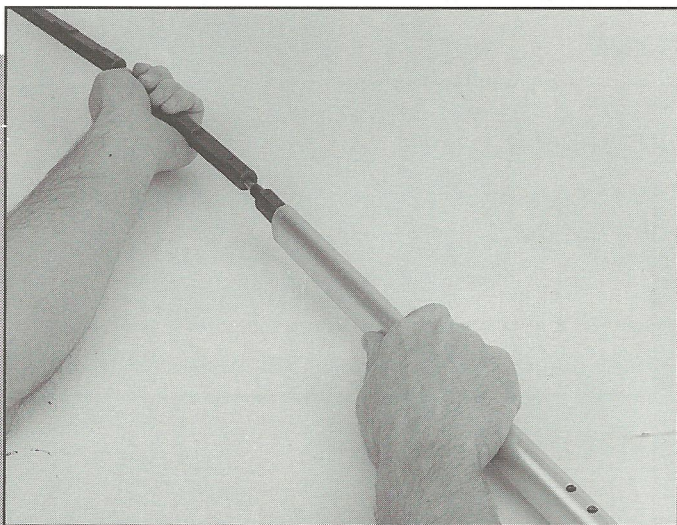
Because the lower end of the wire is open, you will not place the connectors on the headstay until needed so you should ignore references to taping the connectors at the bottom of the headstay.

Rod Instructions

Rod installations are identical to swaged wire at this point. You may find that the rod is difficult to lay flat and two people may be required to hold the rod straight while foils are slipped up the headstay.

Assembly

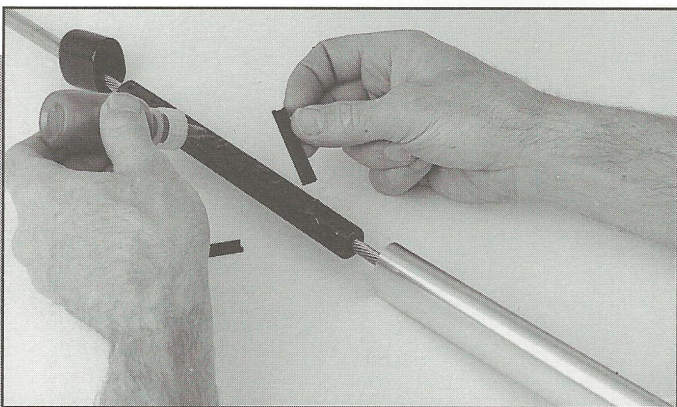
See details on pages 11 and 12 for cutting the top foil to length. Do not confuse the top foil with the 24" (607 mm) bottom foil.



Check the top foil for burrs or shavings at the cut end.

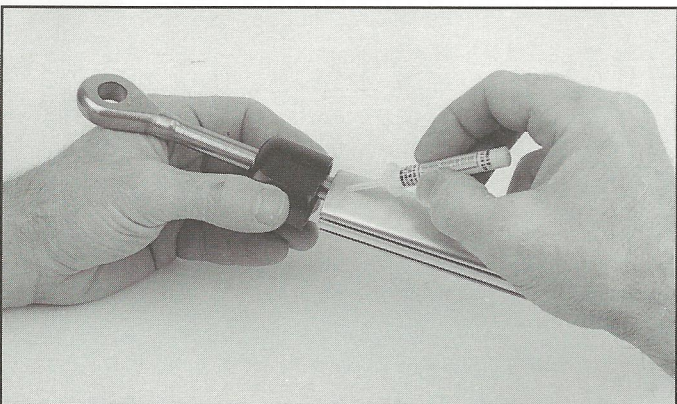
Slide the top foil extrusion over the threaded stud and connectors, to the top of the stay. The screw holes on the top foil must face the bottom of the stay.

Tip: Do not force the foil over the connectors. If you feel resistance, check the foil and connectors carefully for burrs and dirt. The best way to see dirt or burrs is to look into the foil while pointing it towards a light source. Be sure that the connectors are spaced with enough room to align properly inside the foil section.



Coat the top connector with red Loctite®. Place a plastic wedge in each indentation and push the connector into the top foil until it is recessed about 4" (100 mm).

Tip: This connector must be recessed sufficiently to allow the foils to ride over the shank of the swage fitting at the top of the wire. Use your screwdriver to compare the depth of the recess to the length of the swage shank.



Use Instant Adhesive to secure the trim cap to the roughened surface of the top of the foil.

Norseman/Sta-Lok Instructions

For Norseman or Sta-Lok installations recess the top connector only 1" (25 mm) into the top foil.

Rod Instructions

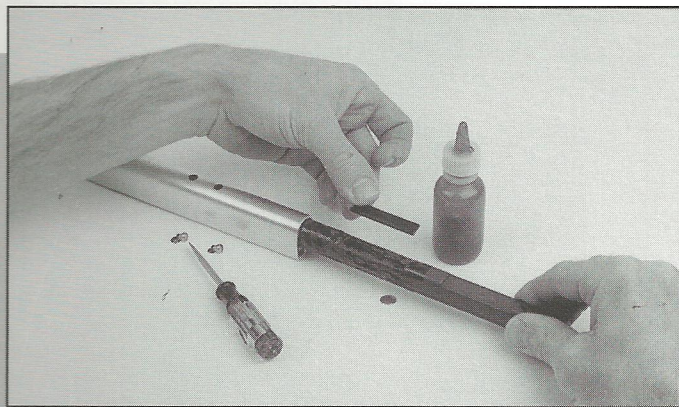
The curves in the rod may make it difficult to slide extrusions over the connectors. The straighter the rod can be held, the more easily foils will pass over the connectors. Check to see if the shank of the rod fitting on your stay will fit into the top foil. If it does, recess the top connector as far as needed to clear the shank of the terminal. If it does not fit into the top foil, recess the top connector 1" (25 mm).

Assembly

2

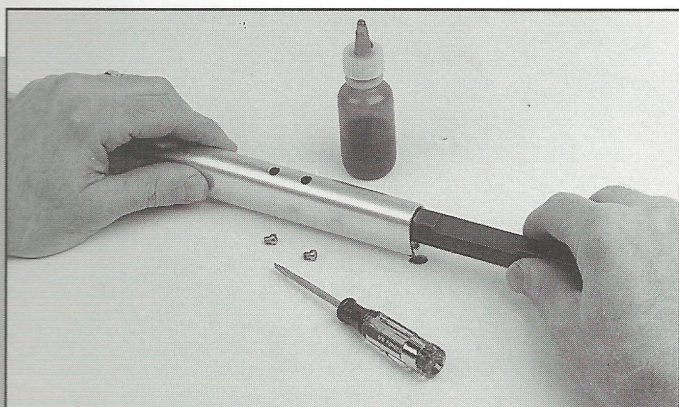
In this step, the first foil connector is inserted into the top foil and secured using wedges, adhesive and screws.

Free one connector and slide it towards the top of the stay. **Completely remove the tape. Tape can jam or damage the unit if left on the wire.**

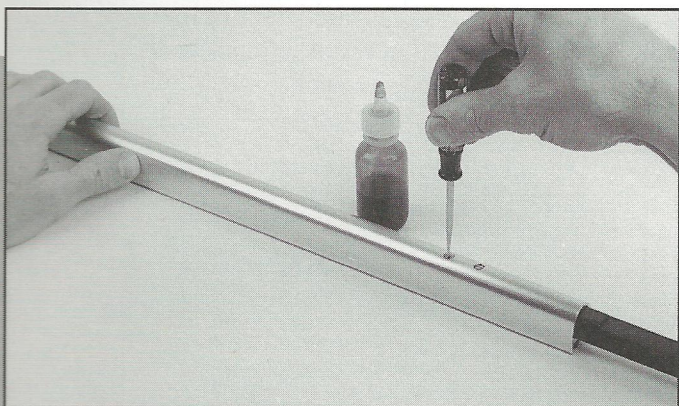


Coat the top half of the connector with red Loctite. Place a plastic connector wedge in the indentation closest to the top foil.

*Tip: Proper use of the adhesive is the most important element of proper foil assembly.
USE PLENTY OF ADHESIVE.*



Push the connector into the foil until the screw holes in the connector line up with the holes in the foil.



Coat two foil connector screws with red Loctite and screw them into the connector until they are tight.

Norseman/Sta-Lok Instructions

Because the lower end of the wire is open you will not "free" a connector, but will simply slip one onto the wire and to the top of the headstay.

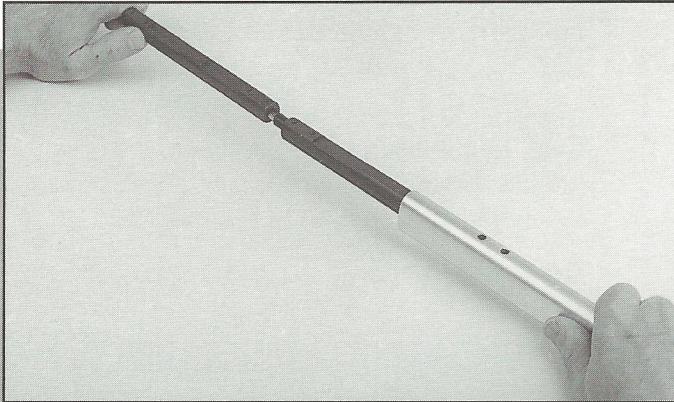
Rod Instructions

Rod installations are identical to swaged wire at this point.

Assembly

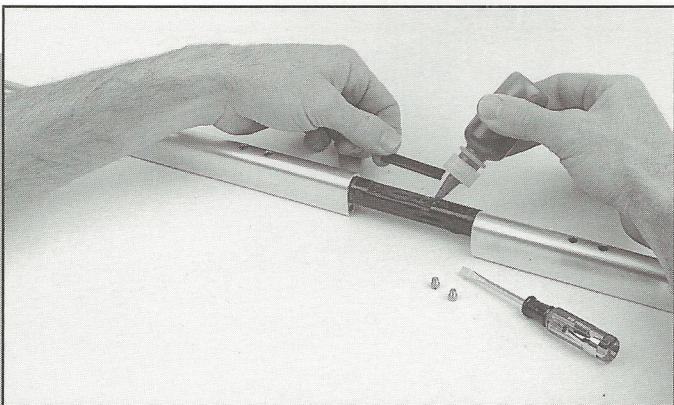
3

In this step, the first main foil extrusion is slipped onto the headstay and connected to the top foil.

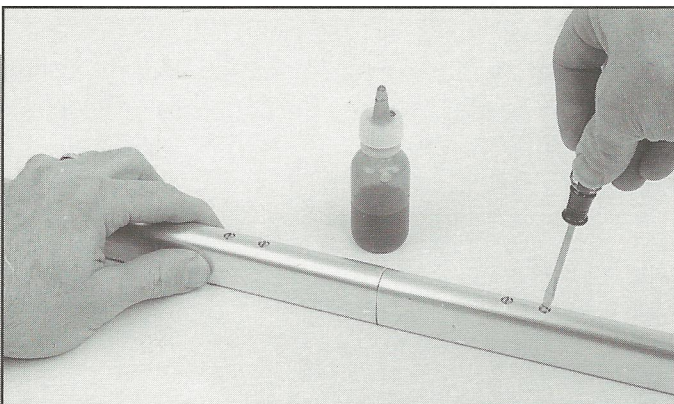


Select a 7' (2.13 m) foil and slide it onto the headstay over the threaded stud and connectors and up to the top foil piece.

Tip: Do not force the foil over the connectors. If you feel resistance, check the foil and connectors carefully for burrs and dirt. The best way to see dirt or burrs is to look into the foil while pointing it towards a light source. Be sure that the connectors at the bottom of the wire are spaced with enough room to align properly inside the foil section.



Coat the exposed half of the connector with red Loctite. Place a plastic wedge in the indentation on the front of the connector.



Push the foil over the connector until the holes align. Coat two connector screws with red Loctite. Insert into the connector and tighten.

Tip: The connector screw holes should align with the foil holes when the foil is pushed tightly against the foil above. If the foil does not slip onto the connector easily, check the alignment of the joint. It may be necessary to hold the 7' (2.13 m) foil up to achieve proper alignment.

Norseman/Sta-Lok Instructions

Because the lower end of the wire is open you will simply slide the foil onto the stay and assemble as described.

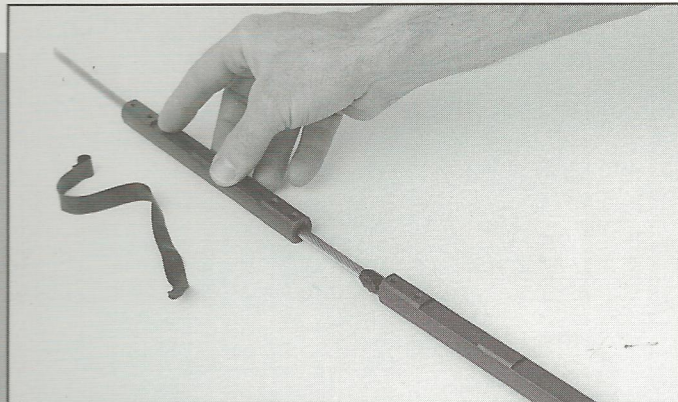
Rod Instructions

Rod installations are identical to swaged wire at this point. You may find that the rod is difficult to lay flat and two people may be required to hold the rod straight while foils are slipped up the headstay. The curves in the rod may make it more difficult to slide extrusions over the connectors. The straighter the rod can be held, the more easily foils will pass over connectors.

Assembly

4

In this step, you complete assembly of the main body of the headstay foil using the techniques learned in Steps 2 and 3.

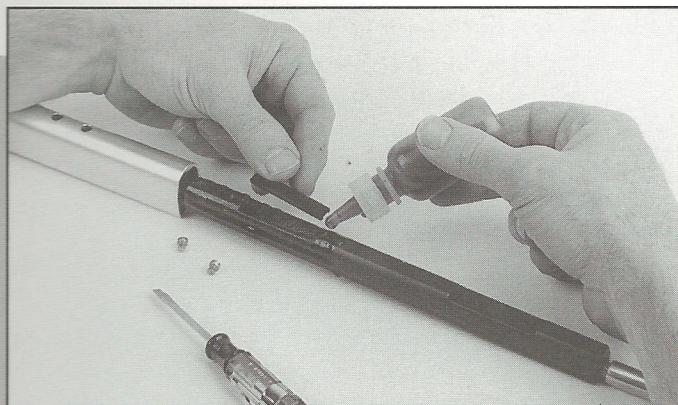


Free one connector and slide it towards the top of the headstay.

Attach this connector to the foil above using red Loctite, a plastic wedge, and screws as described in Step 2.

Slide a 7' (2.13 m) foil over the threaded stud and connectors and to the top of the headstay.

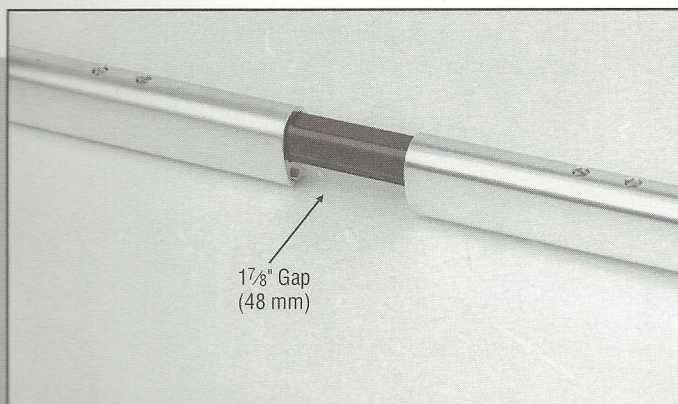
Attach this foil to the connector above using red Loctite, a plastic wedge, and screws as described in Step 3.



Repeat this process until all of the 7" (178 mm) regular connectors have been used.

Attach the 8 $\frac{7}{8}$ " (225 mm) long bottom connector and the short bottom foil in the same manner.

Tip: The bottom foil is either the standard 24" (610 mm) bottom foil, or a foil which has been cut to length from a 7' (2.13 m) foil. See pages 11 and 12.



When the bottom foil is properly attached a 1 $\frac{7}{8}$ " (48 mm) gap will remain between the bottom foil and the first 7' (2.13 m) foil extrusion.

Norseman/Sta-Lok Instructions

Because the lower end of the wire is open you will simply slide the foils and connectors up to the top foil and assemble as described. DO NOT secure the bottom foil to the exposed long connector until after the Norseman or Sta-Lok terminal has been assembled.

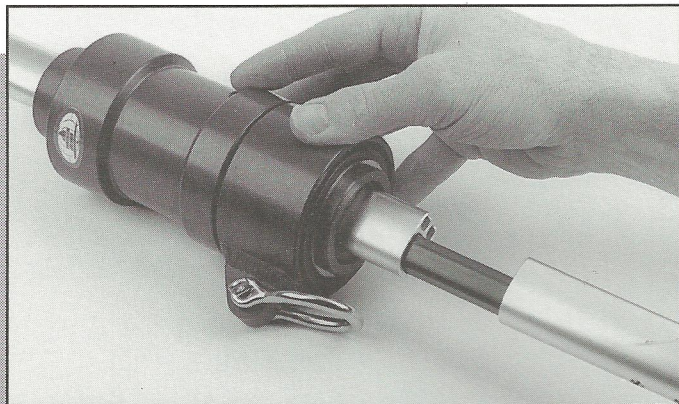
Rod Instructions

Rod installations are identical to swaged wire at this point. You may find that the rod is difficult to lay flat and two people may be required to hold the rod straight while foils are slipped up the headstay. The curves in the rod may make it more difficult to slide extrusions over the connectors. The straighter the rod can be held, the more easily foils will pass over connectors.

Assembly

5

In this step, the halyard swivel, feeder and torque tube are attached to the foil.



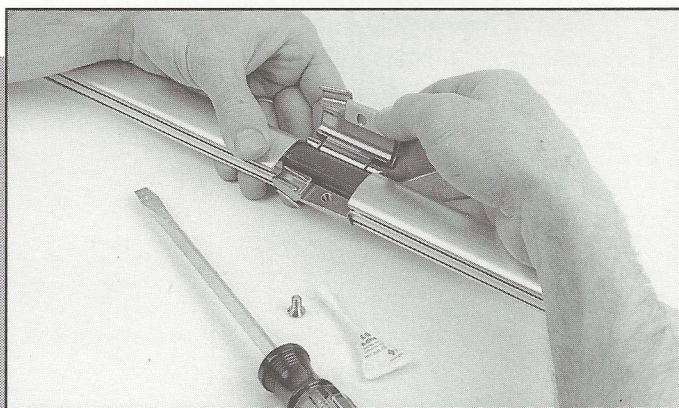
Slip the halyard swivel onto the foil and up past the 1 $\frac{7}{8}$ " (48 mm) gap in the foils.

The halyard swivel has a "top" and a "bottom" and must be placed on the foil with the longer half facing up.

Tip: When positioned correctly, the small Harken label will be right side up.

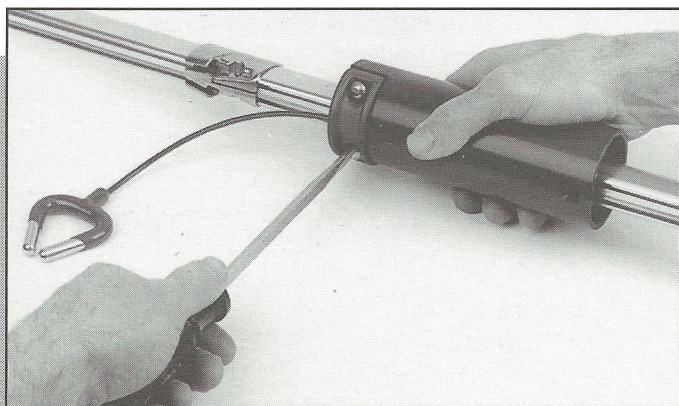


NORSEMAN, STA-LOK OR ROD – refer to special instructions below before proceeding.



Attach the feeder to the gap in the foils. Use blue Loctite on the screw. The end of the feeder with the screw should be at the bottom of the gap.

Tip: The feeder uses a "loose hinge." Place the half with the pin sockets into place on the exposed connector, slip the half with the pins into the sockets and snap it shut.



Slip the torque tube onto the foil with the prefeeder end up and clamp it to the foil near the feeder.

Norseman/Sta-Lok Instructions

After the swivel has been placed on the wire you must install the Norseman or Sta-Lok terminal. See pages 24 and 25 for details. For easier installation, push the bottom foil completely over the bottom connector to expose as much wire as possible. After the terminal is attached, secure the bottom foil as described in Step 4.

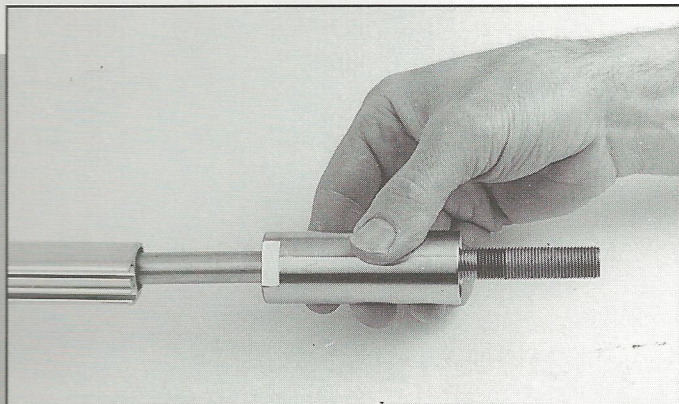
Rod Instructions

After the swivel, feeder and torque tube have been attached per the above instructions, you must attach the rod adapter to the wire. See page 25 for details.

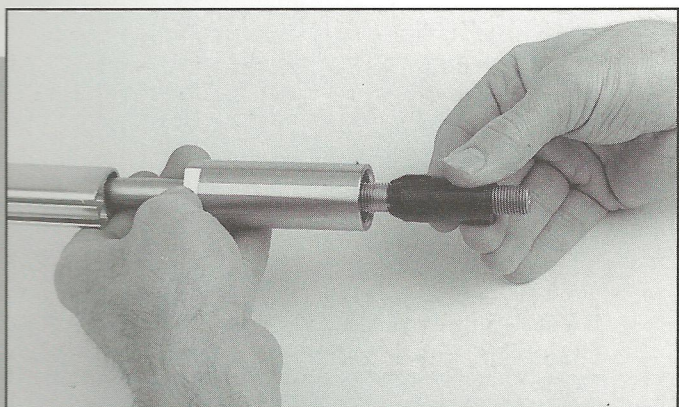
Assembly

6

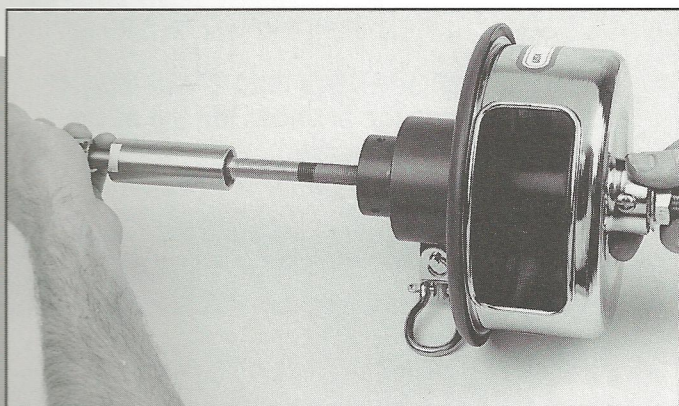
In this step, the drum is attached and the unit is readied for installation on the boat.



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



Slip the plastic locking cylinder onto the threaded stud and into the locking collar, split end first.

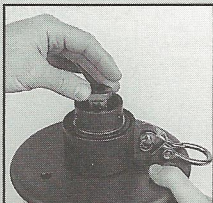


Thread the drum assembly onto the stay until the colored mark on the threads does not show.

The coloring on the threads warns of insufficient thread engagement. It is provided only for your convenience and may wear off. The only positive means to insure proper thread engagement is to measure the exposed threads. At no time should more than 2" (50 mm) of thread be exposed at either the top or the bottom of the turnbuckle.

Norseman/Sta-Lok and Rod Instructions
Do NOT use the plastic locking cylinder.

Thread the locking collar onto the drum assembly as far as it will go.



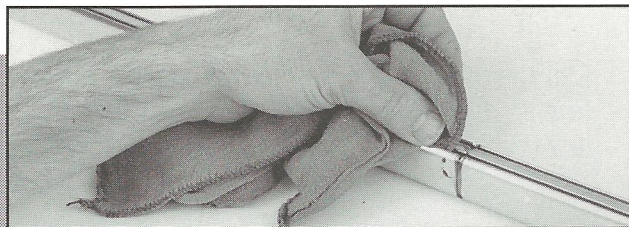
Thread the drum assembly onto the stay until the colored mark on the threads does not show.



Assembly

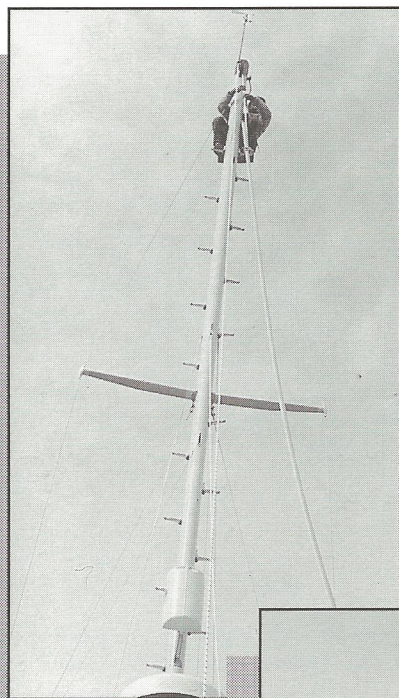
7

In this step, the unit is raised into position on the boat.



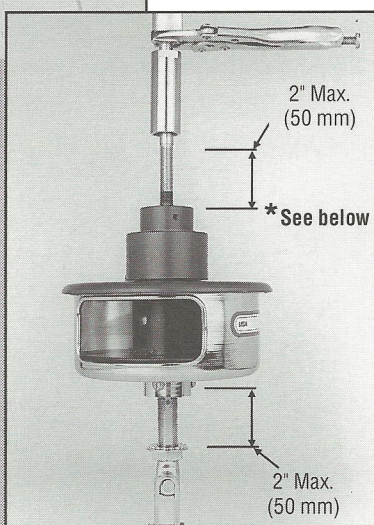
Clean excess Loctite and dirt from the foils. Be sure that the adhesive has cured before raising the foil. See page 6.

Tip: Be careful to clean Loctite from inside the foil grooves – it may stain your sail.



Raise the unit and attach to the masthead toggle and stemhead chainplate.

Tip: The foils are not fragile and will not collapse under their own weight. Don't let the unit catch under deck fittings or scrape along the dock. Place the lower end of system inside the lifelines before the headstay is attached to the mast.



If the headstay is not long enough to reach the chainplate, check to be sure that the upper and lower studs are open to the marks but **do not open the turnbuckle past the marks on the studs**. A toggle must be added to lengthen the headstay.

At no time should more than 2" (50 mm) of thread be exposed at either the top or the bottom of the turnbuckle.

Tip: A headstay that looks short may be long enough after the turnbuckle is tensioned to remove sag and stretch.

Norseman/Sta-Lok Instructions

Norseman/Sta-Lok installations are identical to swaged wire at this point.

*Tip: To check amount of exposed thread, measure from top of *hub extension which is even with top of the turnbuckle.*

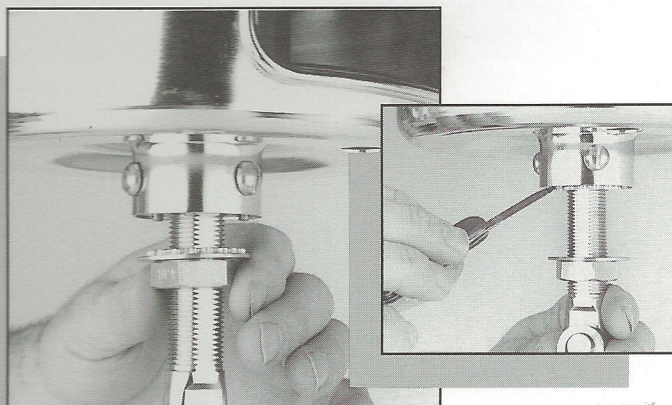
Rod Instructions

Rod installations are identical to swaged wire at this point.

*Tip: To check amount of exposed thread, measure from top of *hub extension which is even with top of the turnbuckle.*

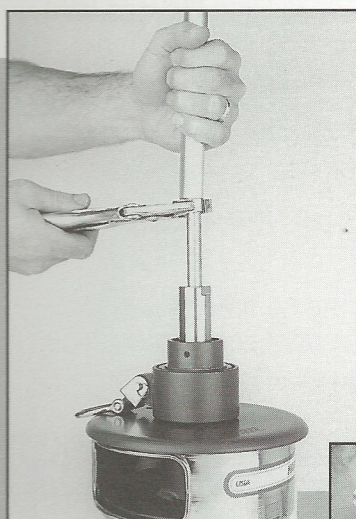
8

In this step, the headstay tension is adjusted.



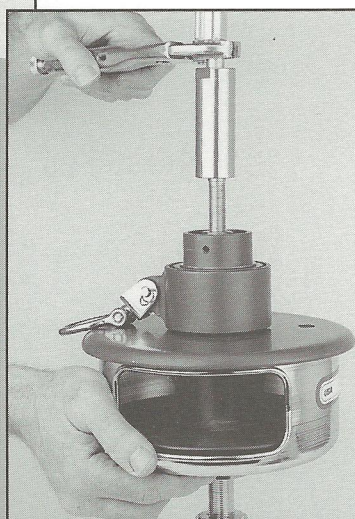
Loosen the nut on the lower stud to allow the restraining washer and notched locking washer to fall away from the bottom of the furling unit.

Tip: Sometimes the notched locking washer "hangs up" on the pins on the bottom of the furling system. Gently turn the stainless basket to free the washer or gently pry it free with a pen knife or screwdriver.



Raise the foils as high as possible. Place a Vise-Grips type pliers on the stud to hold them up.

Tip: Use a rag under the Vise-Grips to prevent damage to the stud. The Vise-Grips serve two roles: 1) they hold the foils out of the way; 2) They prevent the wire from turning during adjustment.



Hold the Vise-Grips to prevent the wire from turning.

Turn the stainless basket to adjust the headstay to normal sailing adjustment. The system tightens when turned counterclockwise when you are looking down at the drum.

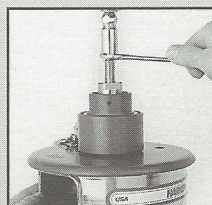
The headstay must be **tight** for proper operation of the furling unit.

Tip: For easiest adjustment, completely release tension on the backstay, mainsheet and vang before adjusting the headstay.

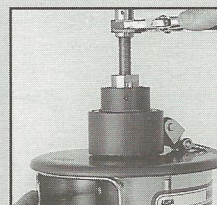
Norseman/Sta-Lok and Rod Instructions

There is no need to hold the foils up out of the way. During tensioning hold the terminal to prevent it from turning.

Norseman/Sta-Lok Installation



Rod Installation

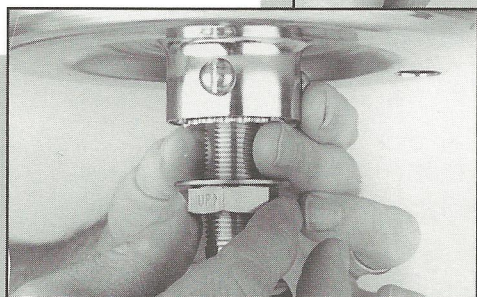


Assembly



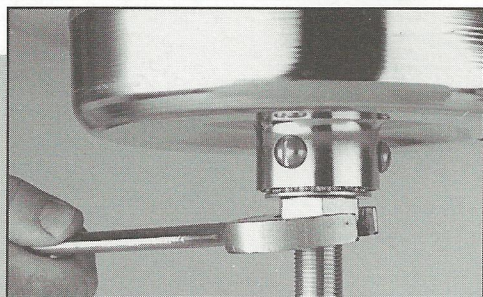
After the headstay is tensioned, align the opening with the furling line lead by turning the stainless basket.

Tip: You may wish to install the furling line before proceeding. See page 26.



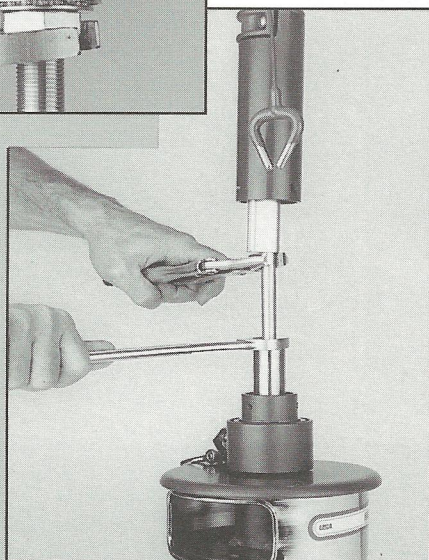
Slide the notched locking plate up the lower stud until the notches slip over the three pins on the bottom of the furling unit. It may be necessary to turn the drum slightly to align the pins with the notches.

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



Thread the locking nut up the lower stud and tighten it against the restraining washer with a $1\frac{1}{16}$ " (27 mm) wrench.

Tip: The locking nut is special. Check to see that it is on the stud with the "up" arrow facing up.

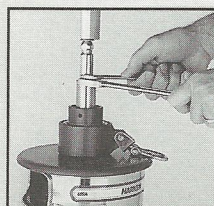


Thread the locking collar down onto the top of the drum assembly. Tighten with a $\frac{7}{8}$ " (23 mm) wrench while holding the swage stud with the Vise-Grips pliers.

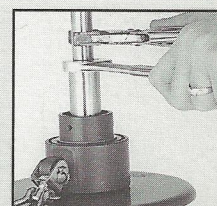
Norseman/Sta-Lok and Rod Instructions

Secure the lower locking device as described above. To lock the upper terminal, thread the locking collar UP until it touches the terminal body, then tighten it firmly while holding the terminal.

Norseman/Sta-Lok Installation

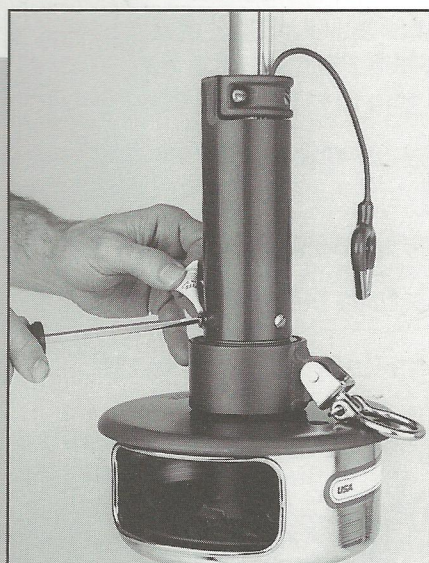


Rod Installation



9

In this step, assembly is completed by attaching the torque tube and raising and clamping the foils.

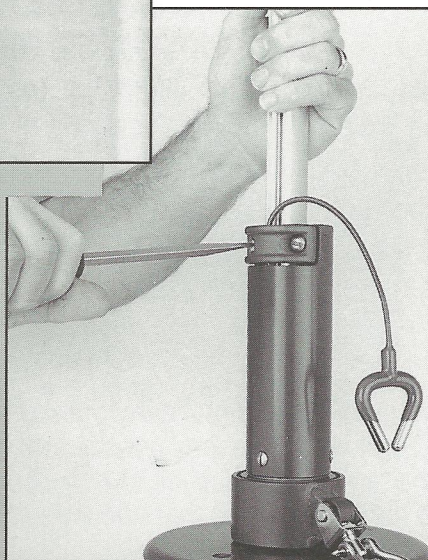
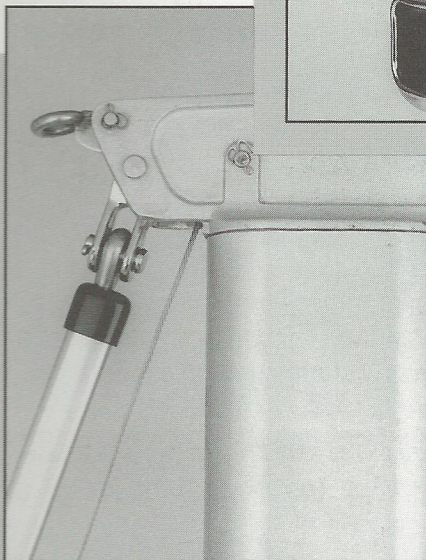


Slide the torque tube down the foils and secure to the drum assembly using the three screws provided. Use blue Loctite.

Tip: Insert all three screws BEFORE tightening.

Raise the foil so the top rides over the swage fitting at the top of the headstay wire and is within 1½" (38 mm) of the pin holding the stay to the masthead toggle.

Tip: Walk away from the boat and check the height by looking at the top of the foils with binoculars. Failure to raise the foils will result in considerable friction while furling. Raising foils too high may prevent the foils from rotating.



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

Use blue Loctite.

Tip: After you are sure that the foils are raised to the correct position, make a pencil mark on the foil where it enters the torque tube. This will allow you to check foils for slippage during use.

Norseman/Sta-Lok Instructions

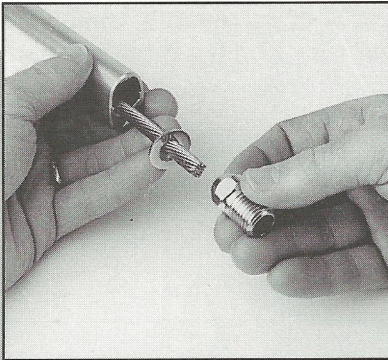
Norseman/Sta-Lok installations are identical to swaged wire at this point.

Rod Instructions

Rod installations are identical to swaged wire at this point.

Norseman/Sta-Lok terminal assembly

In this step, the Norseman or Sta-Lok terminal is secured to the headstay and the bottom foil is secured to the headstay.

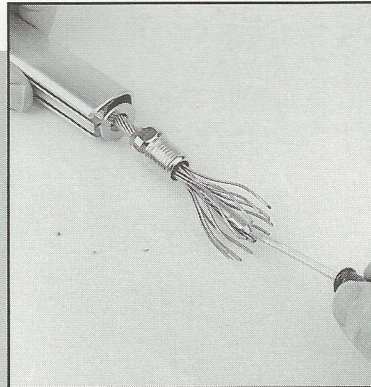
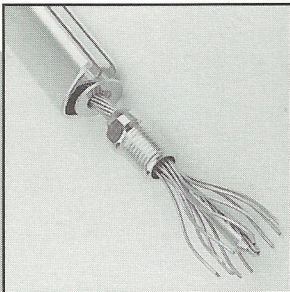


When the bottom foil is slipped onto the headstay wire, do not Loctite or screw it to the bottom connector. Push it up across the gap in the foils to allow more wire to project beyond the foil.

Slip the washer provided with your unit onto the wire before assembly of the Norseman or Sta-Lok fitting.

Be sure that the wire is cut cleanly.

Slide the socket head of the terminal onto the wire, open end down.

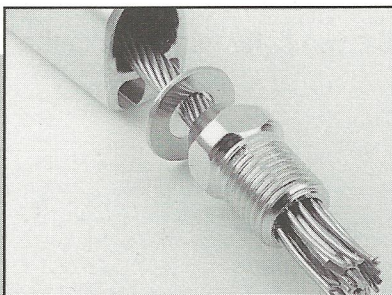


Unlay the outer strands of wire to expose the core for a distance slightly longer than the "wedge".

Tip: In most cases you will expose the core for a distance much greater than the length of the core. This is okay.

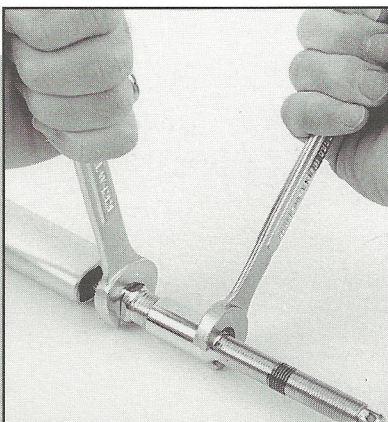
Slip the "wedge" over the core, narrow end first, until the core protrudes $\frac{3}{32}$ " (2 mm) beyond the "wedge".

Reform the wire around the "wedge", using care to keep the "wedge" in position with $\frac{3}{32}$ " (2 mm) of core protruding. Slip the socket down the cable and over the "wedge" during this process to prevent the cable from unlaying.



Check to see that the strands are evenly spaced around the "wedge" and that none are in the slot.

On Sta-Lok terminals insert the "former" into the threaded stud. Norseman fittings do not use a "former".



Thread the stud onto the terminal body and tighten firmly with a wrench to form wires. Even when properly assembled, a few threads will show. Disassemble the terminal and check to make sure strands are evenly spaced around the "wedge" and that none are in the slot.



Place a drop (about the size of a marble) of polysulfide marine sealant (such as BoatLIFE's, Life Calk) onto the end of the wire. **Do not use silicone marine sealant.** Apply three drops of blue Loctite to the threads and reassemble the terminal.

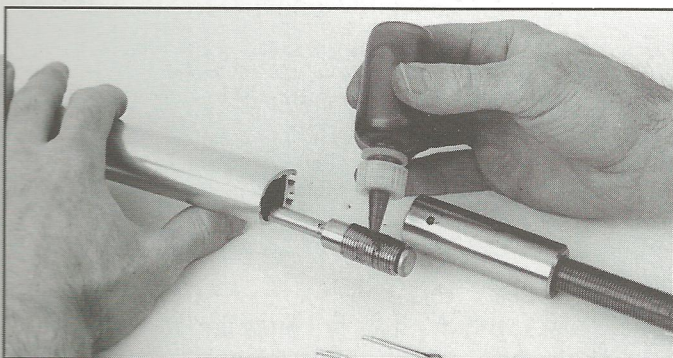
After the terminal is assembled, attach the bottom foil to the long bottom connector using red Loctite, a plastic wedge and screws as described on page 17.

Attach the feeder as described on page 18.

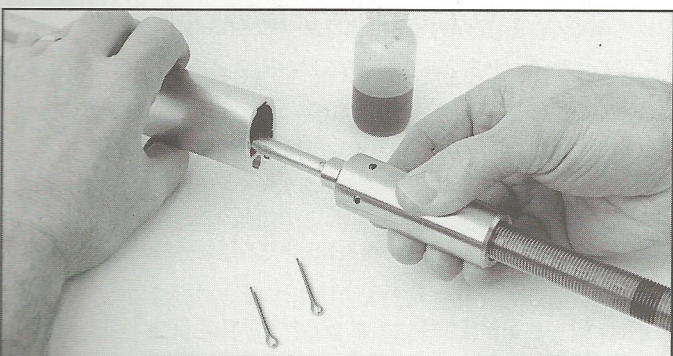
Norseman and Sta-Lok terminals may be opened for inspection. Always reassemble with fresh polysulfide marine sealant, blue Loctite and a new "wedge". **Do not reuse** the "wedge" after you've sailed with your furling unit.

Rod Terminal Assembly

In this step, the rod terminal is attached to the nosepiece and secured with red Loctite and cotter pins.

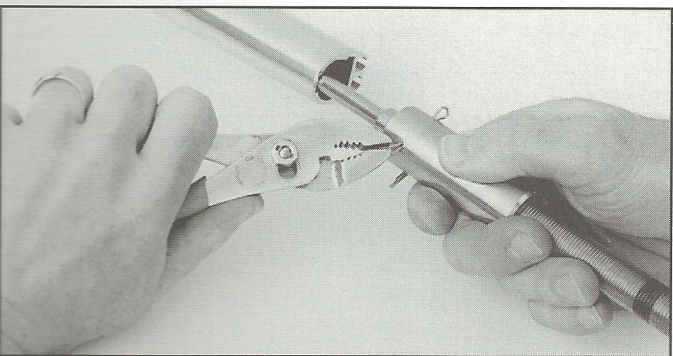


Apply a few drops of red Loctite to the threads of the nosepiece.



Screw the terminal onto the nosepiece until the flats align with the two cotter pin holes in the terminal body.

Tip: The flats will align with the holes when the threads of the nosepiece are flush with the top of the terminal body. Slowly turn the nosepiece while easing a cotter pin into one hole. The cotter pin will slip through the terminal when the holes align with the flats.

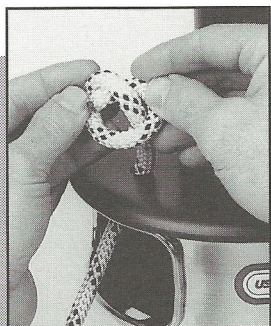


Insert the two cotter pins and spread.

Clean excess Loctite from the terminal body using special care to insure that no red Loctite is present on the threaded stud.

The furling line is attached to the drum and led to the cockpit in five steps.

Use Harken bullet blocks for the forward and intermediate lead blocks. Use a #019 little Hexaratchet® or other ratchet for the aftermost lead block. Harken part #266 is a lead block kit with three #166 bullet blocks; four #061 stanchion mount bases; one #019 ratchet block; and a 3" (75 mm) cleat. Use the lead block kit or choose the best configuration of blocks for your needs.



1

Pass the rope up through the hole in the top of the drum and tie an overhand knot. Make the knot as small as possible.

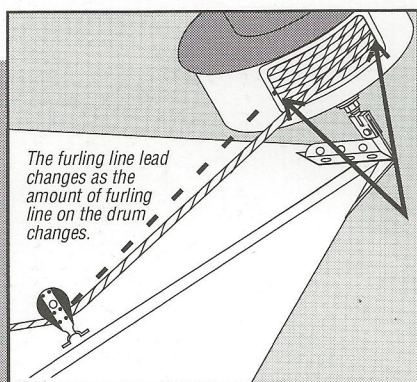
"Charge" the system by turning the foils to wrap line on the drum.

Tip: The position of the sun cover on the sail determines the direction of rotation: Suncover to starboard – "charge" by turning clockwise. Suncover to port – "charge" by turning counterclockwise. Keep tension on the line while "charging".

2

Align the opening in the basket so the furling line leads properly at all times. The angle at which the line exits the basket changes as the amount of line on the drum changes. Check for chafe with varying amounts of line on the drum before locking the unit.

Tip: When line is wrapped on the drum in a clockwise direction, the opening will appear "off center" to starboard. The opposite is true for counterclockwise.



The furling line lead changes as the amount of furling line on the drum changes.

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

3

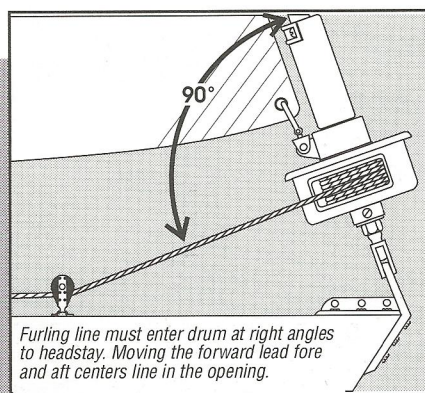
Position the forward block so that the line enters the drum at right angles to the headstay and is centered vertically in the opening. Move the block fore or aft to adjust the line vertically in the opening.

Improper positioning will result in chafe or cause line to wrap unevenly on the drum. In many cases, proper placement cannot be achieved by using a stanchion mount lead base and the forward lead block must be attached to a padeye mounted on the deck.

4

Mount a #019 little Hexaratchet (or other configuration of ratchet block) as the after lead block to insure proper drag on the furling line to prevent line overrides in the drum.

Tip: Position the ratchet block so the line turns at least 90°.



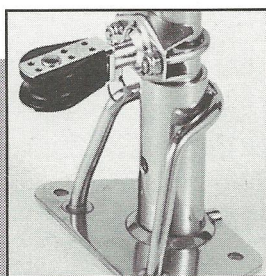
Furling line must enter drum at right angles to headstay. Moving the forward lead fore and aft centers line in the opening.

Position a standard horn cleat in a convenient location in the cockpit.

5

Lead the line through the forward and after lead blocks. The aft block must be a little Hexaratchet®. If the line has been led correctly you should hear a clicking sound. Then, position the intermediate blocks to keep the line clear of the side decks and to insure a fair lead.

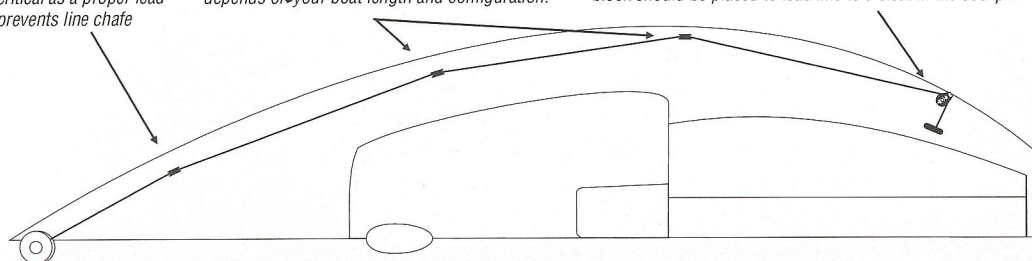
Aft-most lead block **must** be a Harken little Hexaratchet to provide the proper line drag while furling. If the line has been led correctly you should hear clicking when you pull the line. If not, the ratchet switch may not be engaged or you must relead the line through the block in the opposite direction. This block should be placed to lead line to a cleat in the cockpit.



Position of forward lead block (Harken #082) is critical as a proper lead prevents line chafe

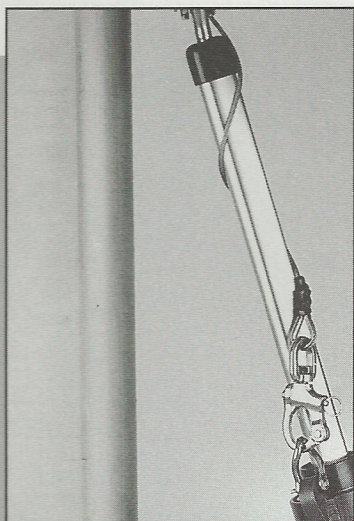
Intermediate lead blocks hold the line near the gunwale. The number and placement of these leads depends on your boat length and configuration.

#061 stanchion mount bases provide an ideal attachment method for furling line lead blocks. The ball joint socket accepts most small boat swivel blocks, including ratchet blocks.



Unit #1/#1.5

July 1, 1992



The most serious problem with furling systems occurs when the jib halyard wraps around the headstay foil. Halyard wraps will prevent furling or unfurling and may cause serious damage to the furling system and the halyard. In severe cases, halyard wraps may cause loss of the headstay.

Halyard wraps are prevented by the halyard swivel which allows the headstay to turn while the halyard remains stationary. To prevent wraps, the halyard must exert a slight pull to the rear.

To prevent halyard wraps:

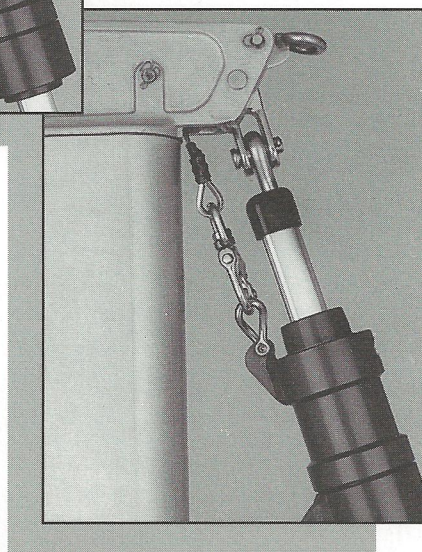
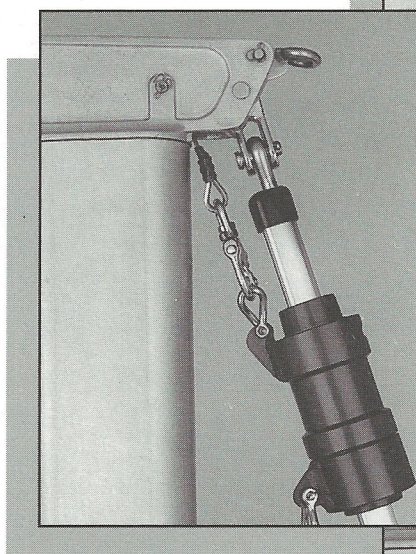
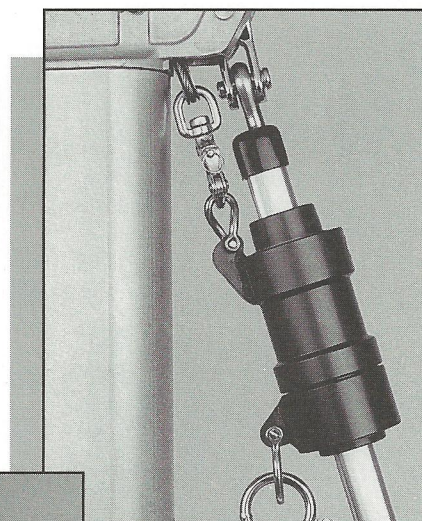
- The halyard swivel should be within the top 4" (100 mm) of the foil.

Tip: With the sail raised, walk away from the boat and look at the masthead with binoculars. Use the halyard swivel as a measurement reference. 4" (100 mm) is 1/2 the length of the swivel. There should be less foil exposed above the swivel than 1/2 length of the swivel.

- The halyard must pull slightly to the rear.

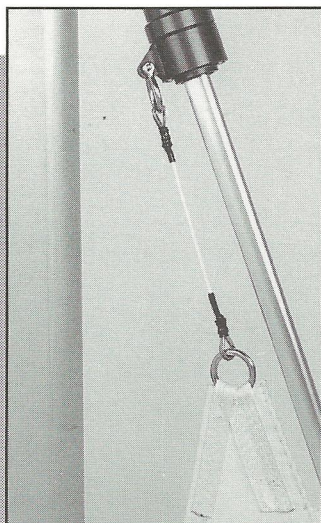
- The halyard must be snug but not too tight.

If a halyard wraps, do not force the unit to turn. Attempt to open the sail by alternately pulling the sheets and the furling line. If the sail can be unfurled, lower the sail by releasing the jib halyard. Severe halyard wraps can only be cleared by going aloft and freeing the halyard. If the sail will not furl or unfurl, it may be possible to remove the jib sheets and manually wrap the sail around the headstay.



■ Pennants

If your sail is not long enough to position the halyard swivel properly, you must add a pennant to the sail. Pennants should be plastic coated wire permanently attached to the sail so that whenever the sail is raised the height will be correct. Adjustable length pennants are not acceptable as they may not be adjusted correctly during a sail change.



■ To Install a Pennant

- 1) Raise the sail, but do not attach the tack shackle.
- 2) Position the halyard swivel correctly near the top of the headstay and secure the halyard.
- 3) Secure a piece of rope to the tack of the sail. Lead the line through the tack shackle on the furling drum and tension the sail.
- 4) Measure the distance from the tack shackle to the tack of the sail and have a pennant of this length permanently attached to the head of the sail.
- 5) Repeat this procedure for every jib.

Tip: Pennants are most properly used at the head of the sail. Short pennants may be added at the tack when necessary to improve visibility under the genoa but remember that visibility is already improved by positioning the tack of the sail on the furling drum. Tack pennants increase heeling moment by raising the sail plan. You may install pennants at both the head and tack of the sail, if desired.



■ Halyard Restrainer

To prevent wraps, the jib halyard must pull to the rear. On most boats, the halyard lead angle is acceptable if the halyard swivel is raised to the top of the foil.

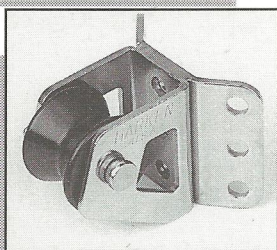
On some boats the halyard sheaves are located too close to the headstay and a halyard restrainer must be used.

Halyard restrainers should be used only when they are required by the masthead geometry. Restrainers tend to limit sail luff length and may cause problems if not properly installed.

If your boat needs a halyard restrainer, use Harken part #944.

The restrainer should be mounted as high as possible on the face of the mast. Position the restrainer so that the foils will not hit it when under load.

The restrainer should deflect the halyard as little as possible or you may experience difficulty in tensioning the sail luff, friction in furling, and possible damage to the foils. To decrease deflection angles, shorten the luff of the sail.

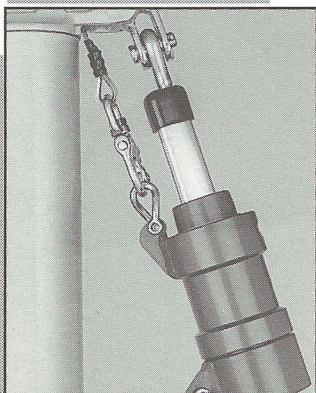


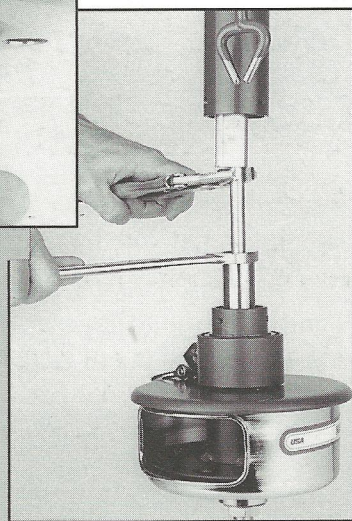
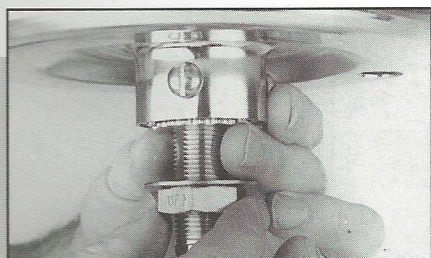
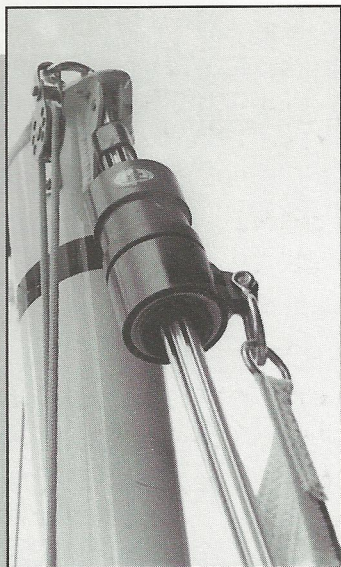
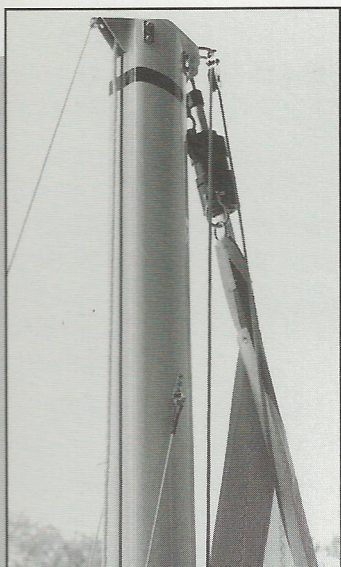
Tip: Boats which are used in charter service should consider use of a halyard restrainer, regardless of masthead geometry.

■ Halyard Tension

The jib halyard should be firm, but not too tight.

Tip: The luff foil system supports the sail along its entire length so halyard tension is required only to shape sails, not to support them. Use only enough halyard tension to remove some of the wrinkles along the luff of the sail. Do not tension the halyard enough to cause vertical wrinkles in the luff of the sail. Use halyard tension to adjust the position of the draft of the sail to suit the conditions in which you are sailing. Your halyard should be firm but not tight. If in doubt release halyard tension. To protect the sail, ease the halyard when the boat is not in use.





■ Spinnaker Halyards

Spinnaker halyards occasionally cause problems with furling.

On many boats it will not be possible to attach the spinnaker halyard to the bow pulpit or it may be "sucked" into the jib when you are furling.

On some boats the spinnaker halyard lays across the headstay and will catch on the halyard swivel, foils or jib halyard. It may be necessary to install a masthead bail to move the spinnaker halyard block forward and to one side to prevent problems.

Many boats with external halyards will find it necessary to flip both ends of the spinnaker halyard behind the spreaders to prevent fouling with the furling system.

■ Headstay Tension

A furling system will work best if the headstay is tight.

A loose headstay is difficult to rotate and can cause unusual wear on the foil joints.

To adjust headstay tension, remove the sail and furling line from the unit. Loosen the two screws at the top of the torque tube and remove the three screws at the base of the torque tube. Clamp the torque tube up near the feeder. Refer to pages 21 through 23 for detailed instructions for tensioning and relocking your turnbuckle.

Tip: Before adjusting headstay tension, completely slack the backstay, mainsheet and vang.

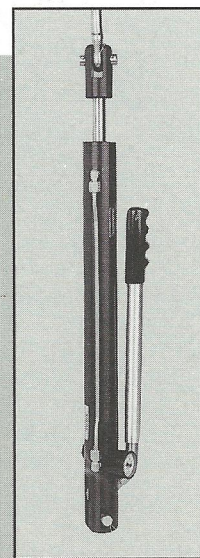
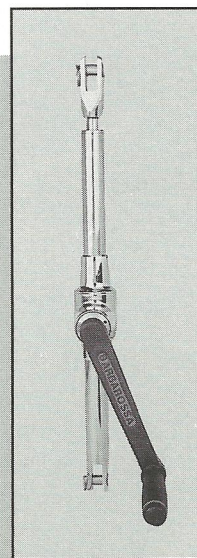
■ Backstay Adjusters

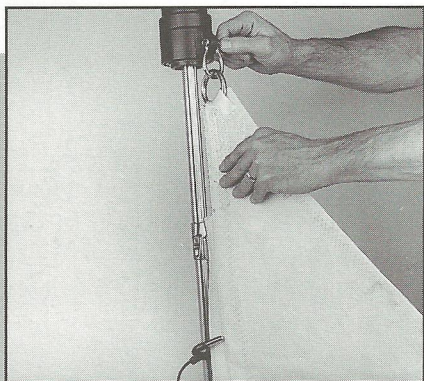
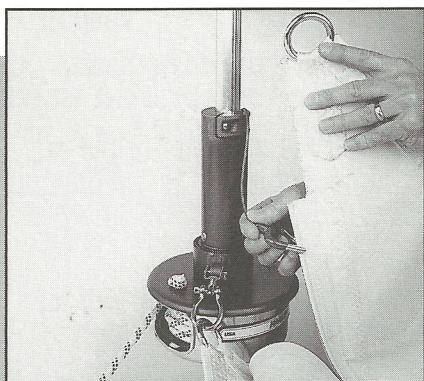
Backstay adjusters allow headstay tension to be varied to change sail shape to match the conditions. They permit a very tight headstay to be eased when the boat is not in use. For best performance, consider adding a backstay adjuster, either a block and tackle, a mechanical adjuster like those offered by Harken, or a hydraulic adjuster.

Remember to keep the headstay tight for best performance when furling or reefing.

If your boat is fitted with an adjuster be sure that it is tensioned **before** the halyard is tensioned. If not, the backstay adjuster may adjust halyard tension and could damage the sail or furling system.

Racing boats often slack the headstay completely when sailing downwind. Check to be sure that the foil does not jam against the upper headstay terminal when the backstay is released. It may be necessary to shorten the foil slightly to prevent this.





Raising Sails

- 1) Shackle the tack of the sail to the drum.
- 2) Secure the genoa sheets to the clew.
- 3) Attach genoa halyard to halyard swivel.
- 4) Pass luff tape through prefeeder and feeder and feed into the foil groove.
- 5) Attach the head of the sail to the halyard swivel.
- 6) Hoist the sail.

Tip: New sails are often stiff and may hang up on the prefeeder during raising. Do not force sails when they hang up – lower them and remove the twist. Sails "break in" with use and will become easier to raise.

Storm Sails

Most people will use one multi-purpose genoa for all of their sailing, but it is not good seamanship to go offshore without storm sails.

Heavy air working jibs and storm sails may be used with your unit. These sails need to have luff tape added to allow them to be raised in the headstay foils.

These sails will generally require pennants to insure that the halyard swivel is properly positioned at the top of the headstay. See page 28.

Remember that heavy air working jibs and storm jibs may be reefed and furled like any other sail.

Furling and Reefing

To furl or reef, ease the jib sheets and pull the furling line.

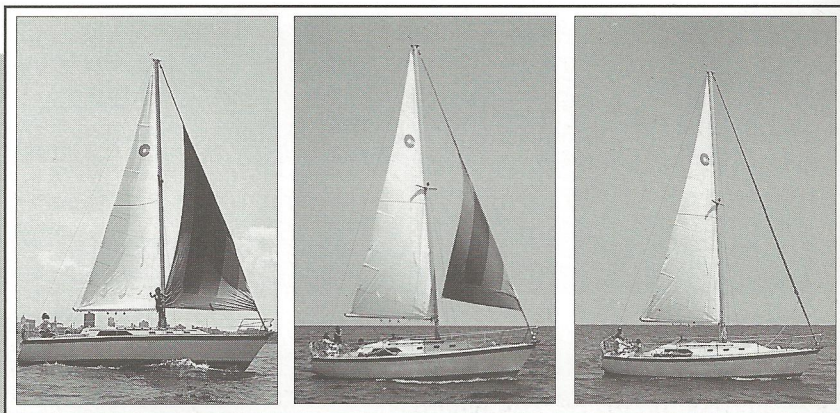
In very light air, it may be necessary to place some tension on the jib sheet to insure a tight furl.

In a breeze, you must **completely** luff the sail by **totally** slacking the jib sheets before furling.

The furling line should pull readily.

The amount of force required is related to the amount of wind, but a Unit 1 should never require the use of a winch to furl. If the sail will not furl, or if furling requires a great deal of effort, there is a problem with the system. Consult the Troubleshooting Guides on pages 33 and 34. Do not use a winch to force a system to turn.

You may use a winch to make furling easier, if you are certain that the system is operating properly.



Reefing

A sail may be partially furled before you resume sailing. This is known as reefing.

Many sailors find it helpful to place marks on the foot of the sail so that they can reef to a variety of predetermined jib sizes. This allows marks to be placed on the jib lead tracks or toe rail so that lead block position can be changed to correspond to the reefed jib.

Your system is provided with a "locking" device. To lock the unit in a reefed configuration, align the holes in the bottom of the drum and basket and insert a shackle or pin. Use of the lock removes tension from the furling line and prevents accidental release of the line which could expose a full sized genoa to heavy winds.

Use of the lock requires that you go onto the foredeck after reefing and again before the sail can be reefed further or unreefed. Since one purpose of a reefing system is to allow you to change sail size while remaining in the safety of the cockpit, many people will choose not to use the locking device. Use of the locking device is not required during reefing.

Sails are generally reefed to balance the boat and to reduce heeling moment. Sails may also be reefed to improve visibility or to slow the boat while sailing in congested areas or while entering or leaving harbors.

Leaving Your Boat

When furling prior to leaving your boat in the slip or on the mooring, be sure that you get a tight furl and to continue furling the system until the sheets wrap around the rolled sail two or three times. Some people like to secure the sail with shock cord or sail ties.

You may also lock your system by aligning the holes in the bottom of the drum and the basket and inserting a shackle or padlock.

Be sure that mooring lines are not placed across the furling line where they may cause chafe.

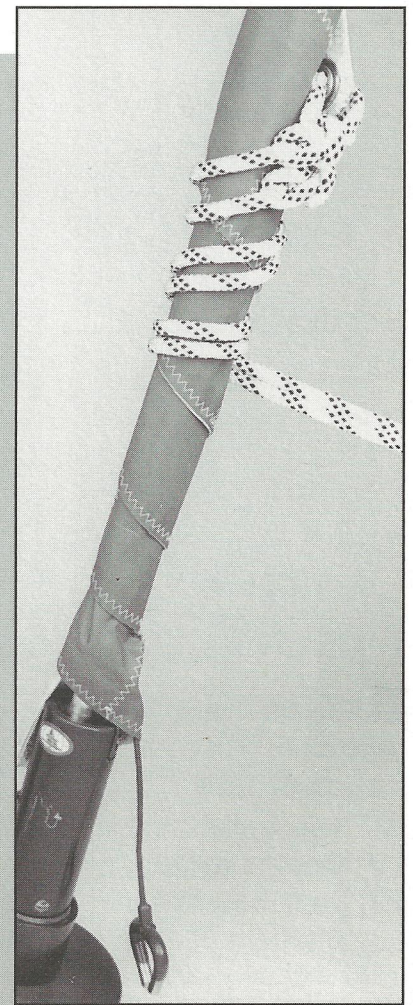
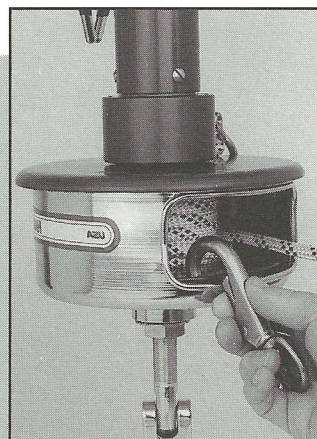
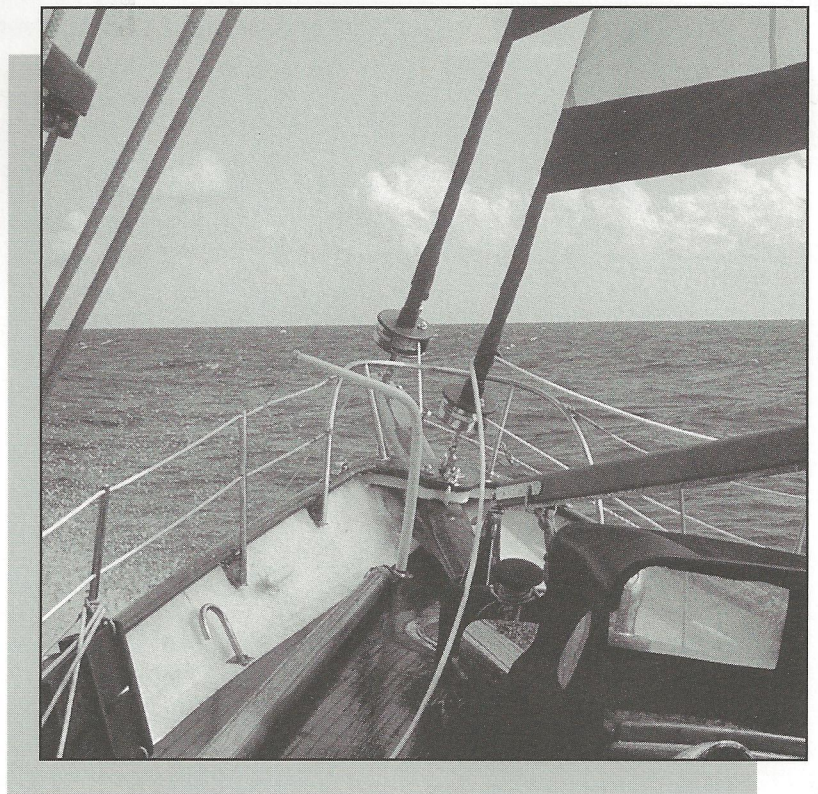
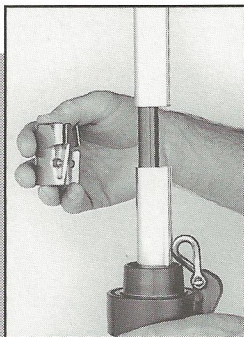
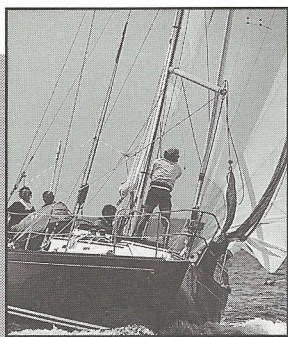
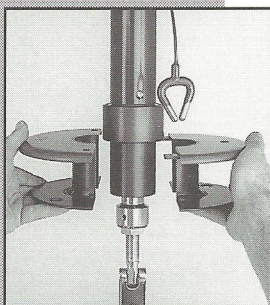
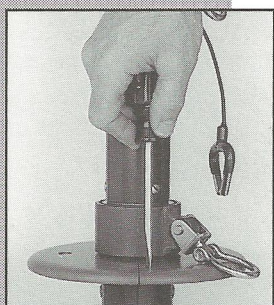
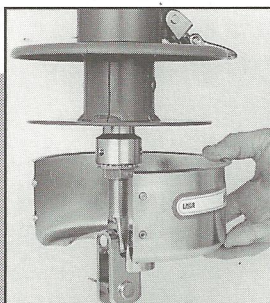
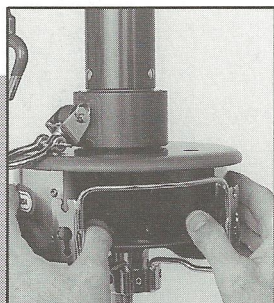


Photo courtesy Henry R. Hinckley & Co.



Drum Removal – Standard Units

- 1) Rig a secure, temporary headstay.
- 2) Remove the sail and line from the system.
- 3) Loosen the backstay, mainsheet and vang so that the headstay goes slack.
- 4) Remove the clevis pin holding the furling unit to the chainplate.
- 5) Remove the screws holding the stainless basket to the furling system. Slip the basket off of the headstay.
- 6) Remove the screws holding the drum to the furling system. Slip the drum off of the headstay.
- 7) Reattach the headstay and tune the rig by tightening the backstay.

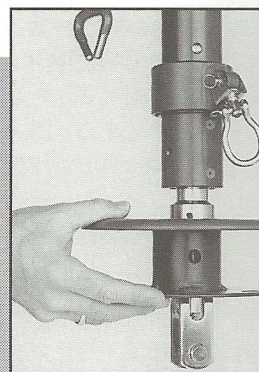
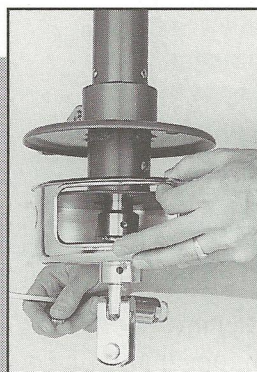


Conversion to Racing

For racing, lower the halyard swivel below the feeder and remove the drum and basket from the headstay. This allows you to use both grooves for sail changes and to tack genoas on the deck for maximum luff length.

Lowering Halyard Swivel:

To lower the halyard swivel, remove the feeder and lower the swivel until it rests on the torque tube. Replace the feeder. Use blue Loctite on the screw.



Drum Removal – Split Drum Units

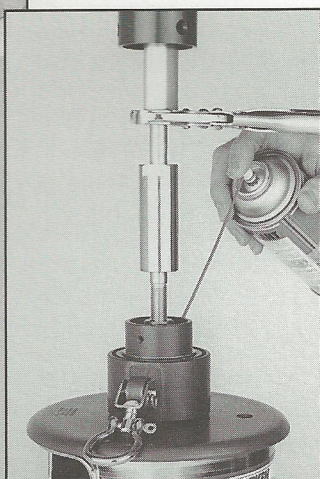
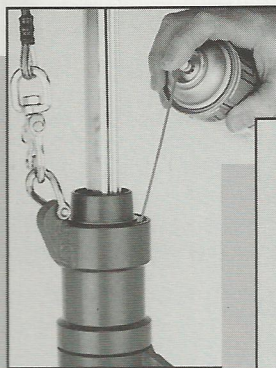
- 1) Remove the sail and line from the system.
- 2) Remove the two screws which hold the chafe guard to the turnbuckle.
- 3) Remove the four screws which hold the guard to the basket.
- 4) Remove the screws on top of the drum.
- 5) Remove the screws holding the drum halves to the turnbuckle assembly.

Halyard Swivel Removal

For serious racing you may want to remove the halyard swivel.

- 1) Remove the drum and basket as with a standard unit.
- 2) Keep the headstay detached from the boat.
- 3) Open the torque tube to release the upper locking collar, thread the drum off and slip the halyard swivel off.
- 4) Reattach the lower unit.
- 5) Reattach the headstay to the boat.





■ Cleaning and Lubricating

Keep the unit clean. When you wash the boat, flush the unit with soap and freshwater. Occasionally lower the sail and flush the halyard swivel with soap and freshwater.

At least twice a year the unit should be cleaned more thoroughly by flushing the bearings with WD-40, LPS-1 or similar light penetrating lubricant to remove built-up salt and dirt deposits. Flush the bearings, allow them to sit for 10 minutes, then flush again. Wash away the penetrating lubricants thoroughly with soap and freshwater. After the unit has dried, apply a dry spray lubricant such as dry Teflon® or silicone spray.

Foils may be cleaned by washing with soap and water. A scrap of luff tape may be run up the foil to scrub inside the grooves. Foils may be sprayed with dry Teflon or silicone lubricants to reduce friction during sail changes.

■ Inspection

Inspect the unit for signs of chafe, wear or damage.

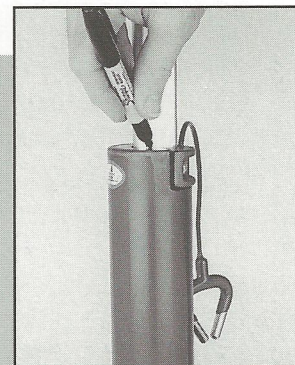
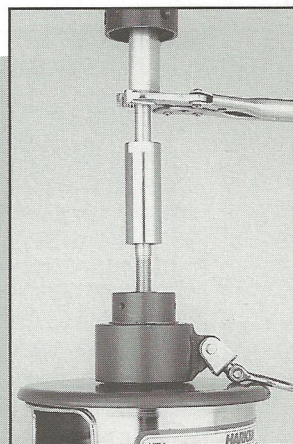
Inspect the locking devices below the drum and inside the torque tube for signs of loosening. Check headstay tension for signs of loosening.

Inspect the swage fitting and lower toggle for signs of stress corrosion.

Inspect the Norseman or Sta-Lok terminal or rod terminal for signs of loosening.

Inspect all screws on the unit to be sure they have not loosened.

Inspect the foil to make sure that it has not dropped into the torque tube. When the foils are raised to the correct height, make a pencil mark where they enter the foils for quick reference.



Assembly Troubleshooting

Problem	Probable Cause	Solution
Connector Missing	Piece was not secured at stud and was carried up inside of a foil	Check for missing connector inside of foil extrusions. If connector is not inside extrusion call Harken for a special split top connector
Too many connectors	Too many strung on wire	Leave extra connector loose inside last 7' (2.13 m) foil
Foil will not slip past threaded stud	Dirt or burrs in foil or on connector	Clean connector and foil. Deburr as needed
	Swage stud is bent	Return stay to distributor. Do not attempt to straighten swage!
	Connectors too tight on wire	Tape connectors again leaving 1" (25 mm) between connectors
Connector will not fit into foil extrusions	Dirt or burrs in foil or on connector	Clean connector and foil. Deburr as needed
Warning color shows on threads at turnbuckle when rig is tuned or more than 2" (51 mm) 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" (51 mm) of threads exposed
Foil too long	Measurement error	Minor errors up to 6" (152 mm) may be corrected by shortening the bottom foil extrusion
Foil too short	Measurement error	Errors of up to 14" (356 mm) can be corrected by removing the 24" (610 mm) bottom foil extrusion and replacing with a longer piece of foil

Operation Troubleshooting		
Problem	Probable Cause	Solution
Sail will not furl or is difficult to furl	Jib halyard is wrapping around headstay because angle between mast and halyard is too shallow	See installation instructions regarding optimal halyard angle. It may be necessary to mount a halyard restrainer on the front of your mast to hold the halyard to the rear
	Jib halyard is wrapping around the headstay because the halyard swivel is too low	See installation instructions regarding optimal halyard swivel height. A wire pennant may be needed at the head of the sail to raise the halyard swivel to the proper height.
	Jib halyard too tight	Ease jib halyard
	Foils riding on locking collar	Raise foils per Assembly Step 9
	Foils too high, binding on swage eye	Lower until 1½" (38 mm) 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
	Salt or dirt in bearings	Flush bearings with freshwater and lubricate
	Furling line is tangled in drum	Overrides are best prevented by using a #019 little Hexaratchet block as the last furling line lead to maintain proper drag on line while unfurling
	Bent or "banana" swage stud	Consult professional rigger
	Sail full of wind	Luff completely before furling or reefing
	Jib sheets are not free	Free jib sheets
	Foil out of torque tube	Reinstall foil in torque tube and tighten clamp
	Torque tube loose from drum	Replace 3 screws holding torque tube to drum
	No wraps of furling line on drum	Remove sheets. Rotate stay to wrap as much furling line on the drum as possible
	Line through #019 backwards	Rerun line
	Halyard swivel installed upside down	Remount swivel correctly
Sail will not unfurl or will not unfurl completely	Jib halyard is wrapping around headstay because angle between mast and halyard is too shallow	See installation instructions regarding optimal halyard angle. It may be necessary to mount a halyard restrainer on the front of your mast to hold the halyard to the rear
	Jib halyard is wrapping around the head-stay because the halyard swivel is too low	See installation instructions regarding optimal halyard swivel height. A wire pennant may be needed at the head of the sail to raise the halyard swivel
	Foils riding on locking collar	Raise foils per Assembly Step 7
	Foils too high, binding on swage eye	Lower until 1½" (38 mm) from pin or until clear
	Jib halyard is too tight	Ease jib halyard
	Spare halyard is wrapping in sail as it furls	Secure spare halyards away from the furling headstay, possibly by flipping halyard behind spreaders
	Salt or dirt in bearings	Flush bearings with freshwater and lubricate
	Furling line not free	Free furling line
Sail will not furl completely	Insufficient furling line on drum	Remove sheets. Rotate stay to wrap as much furling line on the drum as possible
	Too much line on drum	Adjust amount of line on drum or change position of forward block to allow line to roll evenly on drum
	Spare halyard 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 headstay
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 groove
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 a point higher on the mast. This may require that any halyard turning blocks aloft be replaced or the sail shortened
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 low and must be lengthened or raised
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. Basket alignment may need to be adjusted

Warranty

Harken Jib Reefing and Furling System Seven-Year Limited Warranty

What does the limited warranty cover?

Any defect in materials or workmanship.

How long is the warranty in effect?

For seven years from the date of purchase.

Are all parts of the system covered for seven years?

No, the swage fitting is covered for two years and is not warranted against stress corrosion or failure due to improper installation.

Are there other exceptions to the warranty?

This warranty does not cover any part of a system if it was improperly operated, improperly installed, improperly maintained, or used under load conditions exceeding the rating or headstay size as published in the Harken catalog or other Harken literature.

How do you define improper operation?

Improper operation includes not following any of the procedures in the installation manual. Examples include but are not limited to: using a winch or other means to force the unit to turn if it is jammed; failure to use a ratchet block or other means to place drag on the furling line; failure to maintain adequate headstay tension; use of too much or too little halyard tension; and any unseamanlike use of the system.

What is defined as improper installation?

Improper installation includes not following any of the procedures in the installation manual. Examples include, but are not limited to: failure to use adhesives on foil joints; failure to use toggles at both ends of the headstay; faulty installation of Norseman, Sta-Lok, rod or swage terminals; failure to secure locking mechanisms; improper halyard leads; failure to use pennants on sails when required; any other procedure which is not a normal and prudent rigging procedure.

What is defined as improper maintenance?

Improper maintenance includes not following any of the procedures in the installation manual. Examples include, but are not limited to: failure to clean dirt or salt from the bearings or other parts of the unit; failure to apply proper lubricants periodically; failure to periodically inspect locking mechanisms, foils, headstay wires, swage fittings, rod fittings and Norseman or Sta-Lok fittings for damage or stress corrosion.

What will Harken do if I have a problem?

Harken will provide technical support by telephone, fax or letter to help diagnose and correct your furling problem. We will, at our option, repair or replace any part of your furling system which fails in normal service. Parts must be returned to Harken. Replacement parts must come directly from Harken. You will not be reimbursed for the cost of any part supplied by a dealer in the repair of a furling system.

Will Harken pay for labor charges?

No, labor charges are not covered by the warranty.

Is Harken responsible for special, incidental or consequential damages?

Special, incidental, or consequential damages resulting from a warranty problem with a Harken furling system are not covered by this warranty.

How do I get service for my Harken system?

Most problems are installation related and can be solved by referring to the instruction manual. Many other problems can be solved by discussing them with your dealer or rigger. If you cannot solve the problem in this fashion, call Harken at (414) 691-3320. Customers outside of the United States should contact the Harken distributor in their country.

What should I do if I need parts?

After Harken determines that you need replacement or repair parts under warranty, we will ship these parts directly to you or to your dealer or rigger at no charge. Do **not** purchase repair parts! Harken will not reimburse you for the expense of buying repair parts.

How does state law relate to this warranty?

This warranty gives you specific rights but the laws of each state vary and you may also have other rights under the laws of your state.

The pin-to-pin headstay length of my boat as defined on page 7 is _____

HARKEN

1251 E. Wisconsin Ave., Pewaukee, Wisconsin 53072 USA, Tel: (414) 691-3320, Fax: (414) 691-3008 • **Art Nelson Sailmakers**, 1163 Kona St., Honolulu, **Hawaii** 96814 USA, Fax: (808) 523-3045, Telephone: (808) 537-9958 • **Argentina**: Harken Argentina, C. Pellegrini 2725, C.P. 1702 Ciudadela Norte, Argentina, Fax: (54) 1-313-7267, Telephone: (54) 1-757-5990 • **Australia**: Thomas H. Sutton Pty. Ltd., 27 Madeline Street, Enfield NSW 2136 Australia, Fax: (61) 2-642-5537, Telephone: (61) 2-642-1647 • **Austria**: Peter Prokes GmbH, Argentinierstrasse 43, 1040 Vienna, Austria, Fax: (43) 222-5054103, Telephone: (43) 222-5057332 • **Bermuda**: Bermuda Marine Supply, P.O. Box HM 808, Hamilton HMCX, Bermuda, Fax: (809) 295-7665, Telephone: (809) 236-0951 • **Brazil**: Regatta Sport, Ltd, Avenida Pedrosa de Moraes, 1484, Pinheiros - CEP 05420 Sao Paulo, Brazil, Fax (55) 11 814 7015, Telephone: (55) 11 211 1522 • **Eastern Canada**: North Marine Guidance Ltd., 2242 Lakeshore Blvd. West, Toronto, Ontario, Canada M8V 1A5, Fax: (416) 252-2994, Telephone: (416) 252-7841 • **Western Canada**: Northwest Marine Distributors, 1648 West 2nd Avenue, Vancouver, B.C., Canada V6J 1H4, Fax: (604) 733-4869, Telephone: (604) 733-4897 • **Caribbean**: Rodney Bay Ship Services, Ltd., In Rodney Bay Marina, Box 2172, Gros-Islet, **St. Lucia**, West Indies, Fax: (809) 45-29974, Telephone: (809) 45-29973 • Budget Marine N.V., Vrausquim Blvd. 2, P.O. Box 434, Phillipsburg, **St. Maarten**, Netherlands Antilles, Fax: (599) 5-23804, Telephone: (599) 5-22068 • Richardson's Rigging Services, Box 97, **Tortola**, British Virgin Islands, Fax: (809) 494-5436, Telephone: (809) 494-2739 • Island Rigging & Hydraulic (Alan's Rigging), 6 Long Bay Rd., **St. Thomas**, US Virgin Islands, Fax: (809) 774-5024, Telephone: (809) 774-6833 • Thomas Peake & Co. Ltd., P.O. Box 301, 177 Western Main Road, Cocorite, **Trinidad**, West Indies, Fax: (809) 622-4295, Telephone: (809) 622-4293 • **Chile**: Harken Chile, Lo Recabarren 6575, Las Condes - Santiago, Chile, Fax: (56) 2-231-1634, Telephone: (56) 2-242-7147 • **Cyprus**: Ocean Marine Equipment Ltd., 245B, St. Andrews Street, P.O. Box 1370, Limassol, Cyprus, Fax: (357) 5-352976, Telephone: (357) 5-369731 • **Denmark**: Columbus Trading A/S, Naverland 26 B, 2600 Glostrup, Denmark, Fax: (45) 43 63 3459, Telephone: (45) 43 63 3600 • **Finland**: Tallberg Nautica Oy, Tukkuosasto, Veneentekijantie 7, 00210 Helsinki, Finland, Fax: (358) 0 692 7358, Telephone: (358) 0 692 6055 • **France**: Harken France, ZA. Port des Minimes, 17000 - La Rochelle, France, Fax: (33) 46.44.25.70, Telephone: (33) 46.44.51.20 • **Germany**: Peter Frisch GmbH, Isar-Ring 11, D-8000 Munich 40, Germany, Fax: (49) 89-365078, Telephone: (49) 89-365075 • **Greece**: Tecrep Marine, S.A., 38, Akti Mutsopulu, 185 36 Piraeus, Greece, Fax: (30) 1-4184280, Telephone: (30) 1-4521647 • **Holland-Belgium**: Imhoff b.v., Leimuiderdijk 478a, 2156 MX Weteringbrug, Holland, Fax: (31) 1713-15866, Telephone: (31) 1713-15900 • **Hong Kong**: Far East Yacht Specialists, 3rd Floor, Hong Kong Diamond Exchange Building, 8-10 Duddell Street, Central, Hong Kong, Fax: (852) 877-2222, Telephone: (852) 525-7015 • **Hungary**: Yacht Service kft., 8623 Balatonfoldvar, Babits Mihaly ut 18, Hungary, Tel/Fax: (36) 1-112-3288 • **Italy**: Harken Italy S.P.A., Via Ceresio 12, 22074 Lomazzo (Como), Italy, Fax: (39) 2-963-70-998, Tel: (39) 2-96-77-90-28 • **Japan**: Harken Japan, Ltd., 2-21-9 Nishinomiya-Hama, Nishinomiya City Hyogo Pref., Japan 662, Fax: (81) 798-33-2100, Telephone: (81) 798-22-2520 • New Zealand: A. Foster & Co. Ltd., 30-36 Fanshawe Street, Auckland 1, New Zealand, Fax: (64) 9 307-7987 Telephone: (64) 9 -303-3744 • **Norway**: HNS Norge A.S., Bygdoy Alle 111, P.O. Box 271, Skoyen, 0212 Oslo 2, Norway, Fax: (47) 2-43-10-45, Telephone: (47) 2-43-07-17 • **Portugal**: Luiz Godinho Limitada, Rua de Pedroucos, 89 - A, 1400 Lisboa, Portugal, Fax: (351) 1-301 6658, Telephone: (351) 1-301 7753 • **Singapore**: Marintech Marketing (S) Pte. Ltd., 101 Kitchener Road, #02-05 Jalan Besar Plaza, Singapore 0820, Fax: (65) 2923869, Telephone: (65) 2988171 • **South Africa**: Wilbur Ellis Co. (Pty) Ltd., P.O. Box 4258, Cape Town 8000, South Africa, Fax: (27) 21-4484177, Telephone: (27) 21-4484517 • **Spain**: Trimer i.p.m.s.a., Regas, 33, 08006 Barcelona, Spain, Fax: (34) 3-238.01.34, Telephone: (34) 3-238.26.42 • **Sweden**: Rutgersson Marin AB, Mjölkekilsgatan 21, 440 30 Marstrand, Sweden, Fax: (46) 303-60889, Telephone: (46) 303-61060 • **Switzerland**: Lambelet Diffusion, Port du Nid-du-Cro, 2007 Neuchatel, Switzerland, Fax: (41) 38-259960, Telephone: (41) 38-259963 • **United Kingdom**: Harken UK Ltd., 17 East King Street, Helensburgh, Dunbartonshire, G84 7QQ, Scotland, Fax: (44) 436-71697, Telephone: (44) 436-71415 • **Yugoslavia**: Seaway, Igreska 12, YU-61000 Ljubljana, Slovenia, Fax: (38) 61 224 673, Telephone: (38) 61 224 675.