



HARKEN[®]
**System B Batten Traveler
Installation Manual**

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

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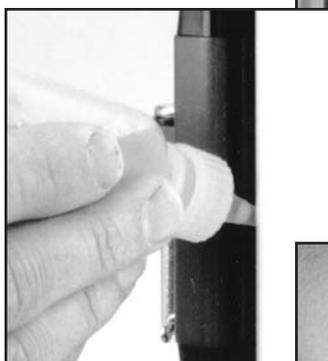
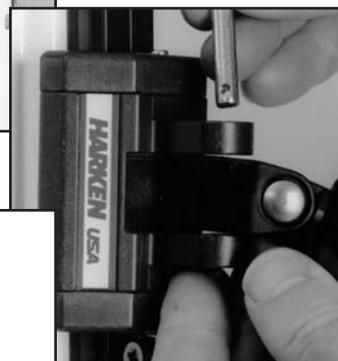
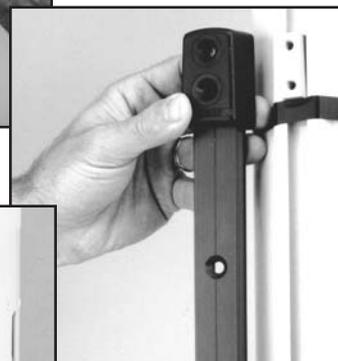
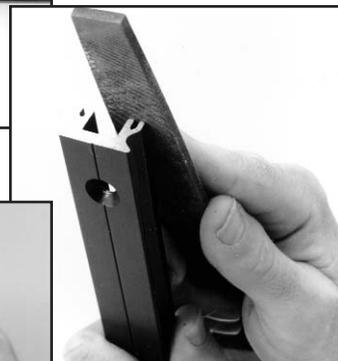
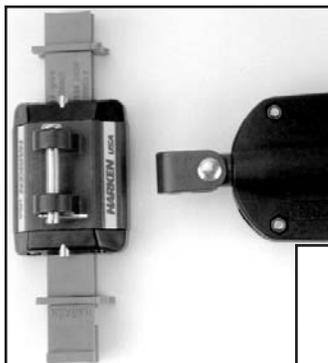
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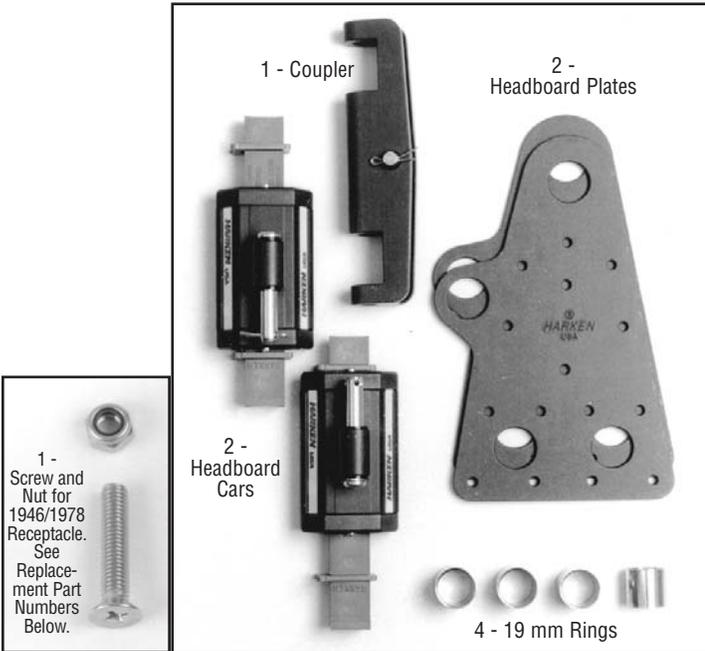
Sizing

Make sure that you have the correct size Battcar system for your boat.

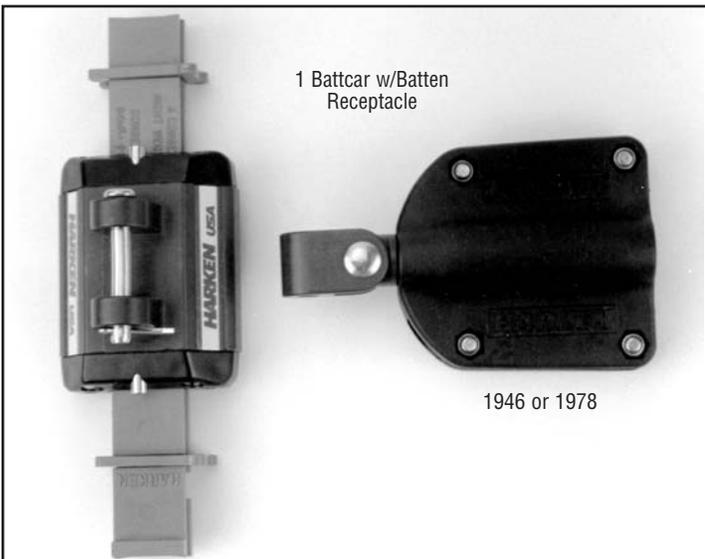
System "B" is available in two load ranges based on sail area.

Maximum Sail Area		Maximum Boat Length	System	Headboard	Part No. Battcars	Luff Car
Monohull	Multihull					
675 ft ² 63 m ²	550 ft ² 51 m ²	58 ft 17.7 m	B	1793	1794, 1826, 1902, 1946, 1978, 1979, 1980	1895
800 ft ² 74 m ²	650 ft ² 60 m ²	60 ft 18.3 m	B High-Load	1793HL	1794HL, 1826HL, 1902HL, 1946HL, 1978HL, 1979HL, 1980HL	1895HL

Parts List



HEADBOARD ASSEMBLY

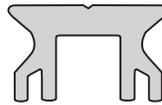


BATTCARS

Harken fitting is shown. You may have Battslide®, Rutgerson or SDA batten receptacles supplied separately.

1946/1978 Replacement Parts

Part No.		
HFS322	Flathead Screw	M5 x .8 x 16 mm
HFS340	Nylock Nut	M5 x .8



1808 TRACK: 6'9/8" (2.06 m) long track. Number of sections will vary according to luff length.

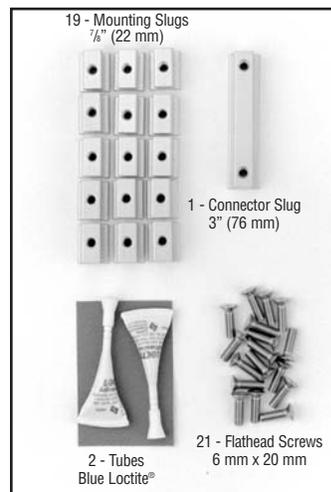
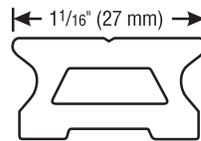
Make sure you have the correct size track. System B track is 1'1/16" (27 mm) wide.

Track for Drilling and Tapping

1535/1616 Track: You must use 1535 or 1616 track for drilling and tapping. Use 1/4" (6 mm) screws, not included.

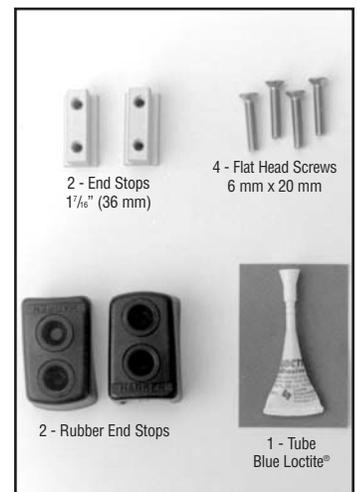
Do not use 1808 open backed track for drilling and tapping the mast. This track must have the support of the mounting slugs.

See page 9 for mounting instructions.



MOUNTING KIT

One required for each track.



END KIT

One required for each system.

LUFF CARS

Luff cars not required if battens are close enough to support sail.



Ball Replacement Chart

Battcar Part No.	Car Length	Balls per Car	Ball Part No.	Balls per Bag	Ball Ø
1793	4 3/8"	48	1526**	25	5/16"
	111 mm				8 mm
1979	3 3/16"	40	1583*/1526**	25	5/16"
	97 mm				8 mm
1895	2 3/4"	30	1583*/1526**	25	5/16"
	70 mm				8 mm
1978, 1946					
1980, 1794	3 3/16"	40	1583*/1526**	25	5/16"
1826, 1902	97 mm				8 mm

* Delrin® balls changed from white to black in 1979.

** Torlon® (brown) for high-load aluminum endcaps.

"HL" follows part number.

Required Tools

Phillips screwdriver	Drill
Tape measure	$1\frac{7}{64}$ " (6.5 mm) drill bit
Putty knife	File
Hacksaw	Tape
Hammer	Socket wrench
Center punch	Power driven screwdriver

Step Ladder: If you are installing the system with the mast up, use a step ladder that can be secured to the boat near the mast.

You will need to work at a hand height of about 7' (2.13 m) above the gooseneck.

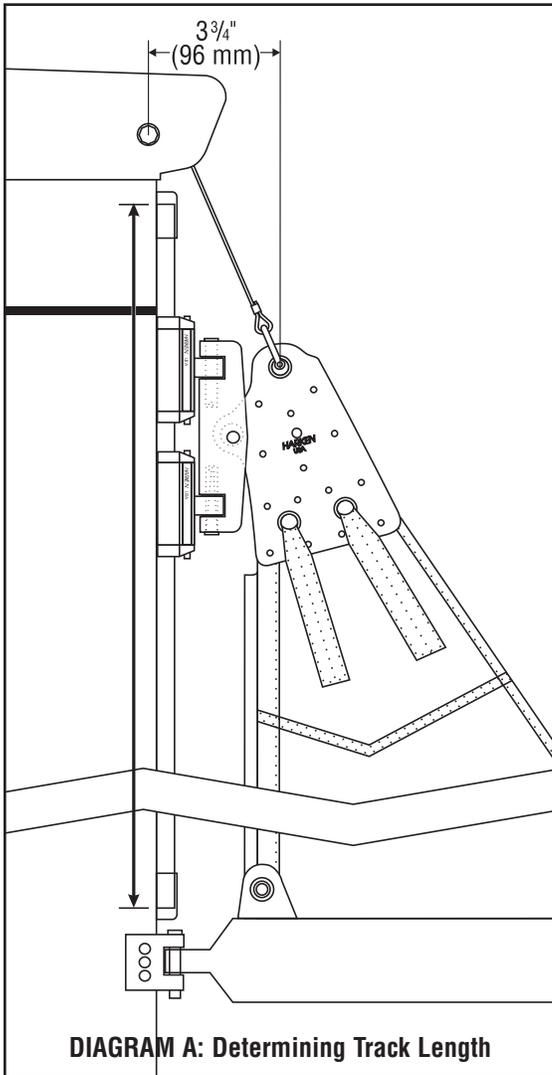


DIAGRAM A: Determining Track Length

Determining Track Length

Note: Track length is *greater than* luff length of sail.

The track must extend at least 8" above the point where the halyard is attached to the Harken headboard. Allow for sail stretch.

Make sure the top of the track does not interfere with the halyard exiting from the mast.

The set back for the halyard from the aft side of the mast is $3\frac{3}{4}$ " (96 mm). See Diagram A.

Remember to leave $\frac{1}{4}$ " (6 mm) beyond each end of the track for the end stops.

At the lower end, the track must extend as close to the gooseneck as possible and ideally below the top of the boom.

Adjusting 1808 Track Length

The length of the track is matched to the mast by adjusting the number of $6'9\frac{1}{8}$ " (2.06 m) track lengths and by cutting the top and bottom track pieces to length.

Consult chart below to determine how many total track pieces you will need.

Consult the charts below to determine whether you need to cut your top track to length.

All mast lengths will require cutting the bottom track. A short bottom track allows cars to be easily loaded. See page 10.

How 1808 Many Track Sections?

Use the chart below to determine the total number of full length $6'9\frac{1}{8}$ " (2.06 m) track sections required for installation.

The variable length top and bottom tracks are included in this number.

Track Length of Mast (As Described in Diagram A)	Number of $6'9\frac{1}{8}$ " (2.06 m) Track Sections Required
42'4" to 47'4" (12.903 m to 14.427 m)	7
47'5" to 54'1" (14.453 m to 16.485 m)	8
54'2" to 60'10" (16.510 m to 18.542 m)	9
60'11" to 67'7" (18.567 m to 20.599 m)	10
67'8" to 74'4" (20.625 m to 22.657 m)	11
74'5" to 81' (22.682 m to 2.720 m)	12

Full Length $6'9\frac{1}{8}$ " (2.06 m) Top Track

Round your track length to the nearest 1" (25 mm). If your track length is one of the dimensions shown below, your track system does not need a special length top track. A full length $6'9\frac{1}{8}$ " (2.06 m) track is used as the top track.

42'1" (12.827 m)	48'10" (14.884 m)	55'7" (16.942 m)	62'4" (18.999 m)	69'1" (21.057 m)
42'2" (12.852 m)	48'11" (14.910 m)	55'8" (16.967 m)	62'5" (19.025 m)	69'2" (21.082 m)
42'3" (12.878 m)	49' (14.935 m)	55'9" (16.993 m)	62'6" (19.050 m)	69'3" (21.107 m)

Cutting Top Track To Length

42' 4"(12.903 m)	49' 1"(14.961 m)	55'10"(17.018 m)	62' 7"(19.075 m)	69' 4"(21.133 m)	3' (76 mm)
42' 5"(12.929 m)	49' 2"(14.986 m)	55'11"(17.043 m)	62' 8"(19.101 m)	69' 5"(21.158 m)	4" (102 mm)
42' 7"(12.979 m)	49' 4"(15.037 m)	56' 1"(17.094 m)	62'10"(19.152 m)	69' 7"(21.209 m)	6" (152 mm)
42' 9"(13.030 m)	49' 6"(15.088 m)	56' 3"(17.145 m)	63' (19.202 m)	69' 9"(21.260 m)	8" (203 mm)
42'11"(13.081 m)	49' 8"(15.138 m)	56' 5"(17.196 m)	63' 2"(19.253 m)	69'11"(21.311 m)	10" (254 mm)
43' 1"(13.132 m)	49'10"(15.189 m)	56' 7"(17.247 m)	63' 4"(19.304 m)	70' 1"(21.361 m)	1' (305 mm)
43' 3"(13.183 m)	50' (15.240 m)	56' 9"(17.297 m)	63' 6"(19.355 m)	70' 3"(21.412 m)	1' 2" (356 mm)
43' 5"(13.233 m)	50' 2"(15.291 m)	56'11"(17.348 m)	63' 8"(19.406 m)	70' 5"(21.463 m)	1' 4" (406 mm)
43' 7"(13.284 m)	50' 4"(15.342 m)	57' 1"(17.399 m)	63'10"(19.456 m)	70' 7"(21.514 m)	1' 6" (457 mm)
43' 9"(13.335 m)	50' 6"(15.392 m)	57' 3"(17.450 m)	64' (19.507 m)	70' 9"(21.565 m)	1' 8" (508 mm)
43'11"(13.386 m)	50' 8"(15.443 m)	57' 5"(17.501 m)	64' 2"(19.558 m)	70'11"(21.615 m)	1'10" (559 mm)
44' 1"(13.437 m)	50'10"(15.494 m)	57' 7"(17.551 m)	64' 4"(19.609 m)	71' 1"(21.666 m)	2' (610 mm)
44' 3"(13.487 m)	51' (15.545 m)	57' 9"(17.602 m)	64' 6"(19.660 m)	71' 3"(21.717 m)	2' 2" (660 mm)
44' 5"(13.538 m)	51' 2"(15.545 m)	57'11"(17.653 m)	64' 8"(19.710 m)	71' 5"(21.768 m)	2' 4" (711 mm)
44' 7"(13.589 m)	51' 4"(15.646 m)	58' 1"(17.704 m)	64'10"(19.761 m)	71' 7"(21.819 m)	2' 6" (762 mm)
44' 9"(13.640 m)	51' 6"(15.697 m)	58' 3"(17.755 m)	65' (19.812 m)	71' 9"(21.869 m)	2' 8" (813 mm)
44'11"(13.691 m)	51' 8"(15.748 m)	58' 5"(17.805 m)	65' 2"(19.863 m)	71'11"(21.920 m)	2'10" (864 mm)
45' 1"(13.741 m)	51'10"(15.799 m)	58' 7"(17.856 m)	65' 4"(19.914 m)	72' 1"(21.971 m)	3' (914 mm)
45' 3"(13.792 m)	52' (15.850 m)	58' 9"(17.907 m)	65' 6"(19.964 m)	72' 3"(22.022 m)	3' 2" (965 mm)
45' 5"(13.843 m)	52' 2"(15.900 m)	58'11"(17.958 m)	65' 8"(20.015 m)	72' 5"(22.073 m)	3' 4" (1.016 m)
45' 7"(13.894 m)	52' 4"(15.951 m)	59' 1"(18.009 m)	65'10"(20.066 m)	72' 7"(22.123 m)	3' 6" (1.067 m)
45' 9"(13.945 m)	52' 6"(16.002 m)	59' 3"(18.059 m)	66' (20.117 m)	72' 9"(22.174 m)	3' 8" (1.118 m)
45'11"(13.995 m)	52' 8"(16.053 m)	59' 5"(18.110 m)	66' 2"(20.168 m)	72'11"(22.225 m)	3'10" (1.168 m)
46' 1"(14.046 m)	52'10"(16.104 m)	59' 7"(18.161 m)	66' 4"(20.218 m)	73' 1"(22.276 m)	4' (1.219 m)
46' 3"(14.097 m)	53' (16.154 m)	59' 9"(18.212 m)	66' 6"(20.269 m)	73' 3"(22.327 m)	4' 2" (1.270 m)
46' 5"(14.148 m)	53' 2"(16.205 m)	59'11"(18.263 m)	66' 8"(20.320 m)	73' 5"(22.377 m)	4' 4" (1.321 m)
46' 7"(14.199 m)	53' 4"(16.256 m)	60' 1"(18.313 m)	66'10"(20.371 m)	73' 7"(22.428 m)	4' 6" (1.372 m)
46' 9"(14.250 m)	53' 6"(16.307 m)	60' 3"(18.364 m)	67' (20.422 m)	73' 9"(22.479 m)	4' 8" (1.422 m)
46'11"(14.300 m)	53' 8"(16.358 m)	60' 5"(18.415 m)	67' 2"(20.472m)	73'11"(22.530 m)	4'10" (1.473 m)
47' 1"(14.351 m)	53'10"(16.408 m)	60' 7"(18.466 m)	67' 4"(20.523 m)	74' 1"(22.581 m)	5' (1.524 m)
47' 3"(14.402 m)	54' (16.459 m)	60' 9"(18.517 m)	67' 6"(20.574 m)	74' 3"(22.631 m)	5' 2" (1.575 m)
47' 5"(14.453 m)	54' 2"(16.510 m)	60'11"(18.567 m)	67' 8"(20.625 m)	74' 5"(22.682 m)	5' 4" (1.626 m)
47' 7"(14.503 m)	54' 4"(16.561 m)	61' 1"(18.618 m)	67'10"(20.676 m)	74' 7"(22.733 m)	5' 6" (1.676 m)
47' 9"(14.554 m)	54' 6"(16.612 m)	61' 3"(18.669 m)	68' (20.726 m)	74' 9"(22.784 m)	5' 8" (1.727 m)
47'11"(14.605 m)	54' 8"(16.662 m)	61' 5"(18.720 m)	68' 2"(20.777 m)	74'11"(22.835 m)	5'10" (1.778 m)
48' 1"(14.656 m)	54'10"(16.713 m)	61' 7"(18.771 m)	68' 4"(20.828 m)	75' 1"(22.885 m)	6' (1.829 m)
48' 3"(14.707 m)	55' (16.764 m)	61' 9"(18.821 m)	68' 6"(20.879 m)	75' 3"(22.936 m)	6' 2" (1.880 m)
48' 5"(14.757 m)	55' 2"(16.815 m)	61'11"(18.872 m)	68' 8"(20.930 m)	75' 5"(22.987 m)	6' 4" (1.930 m)
48' 7"(14.808 m)	55' 4"(16.866 m)	62' 1"(18.923 m)	68'10"(20.980 m)	75' 7"(23.038 m)	6' 6" (1.981 m)
48' 9"(14.859 m)	55' 6"(16.916 m)	62' 3"(18.974 m)	69' (21.031 m)	75' 9"(23.089 m)	6' 8" (2.032 m)

Cutting Top Track To Length



If your track length is shown in the chart on page 5, use a hacksaw to cut a special length of top track from a 6'9¹/₈" (2.06 m) track.

Round your track length to the nearest 1/2" (10 mm) and extrapolate to determine the top track length.



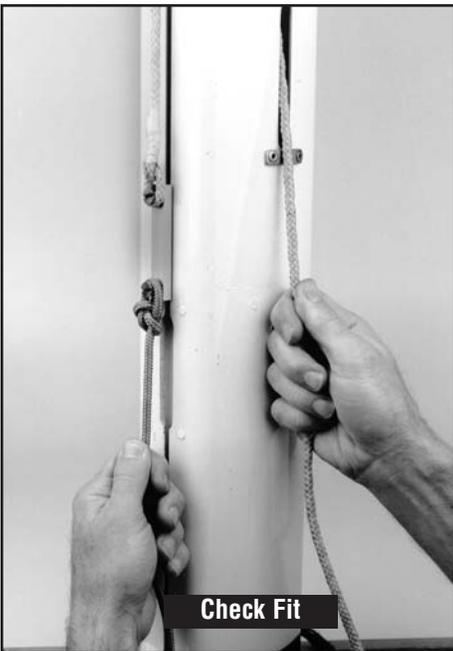
Use a file to deburr the cut. Slightly round off the corners of the track that will slide against the mast so it will not catch when sliding the track up the mast.



Drill two 17/64" (6.5 mm) holes in the cut end of the top track centered at 5/16" (8 mm) and 13/16" (30 mm) from the track end. Slip the rubber end stop over the cut end of the top track.

NOTE: You will cut the bottom track in Step 10.

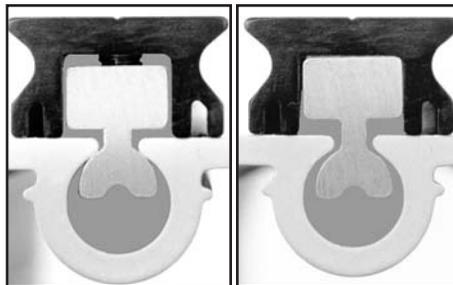
Before You Start...will mounting slugs and cars fit?



Check Fit

Check to make sure the 3" (76 mm) long connector slug will fit in the feeder opening. If necessary, use a file to make the feeder opening longer.

Use a halyard to run the 3" (76 mm) long connector slug up the entire mast. Use a retrieval line. If it jams, clean the groove. If there is prebend in the mast, you may need to straighten it out somewhat to install the battcar system.

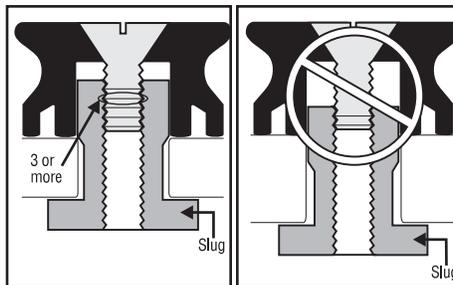


Will Tighten

Will Not Tighten

To make sure the track will tighten against mast, put a mounting slug in the groove, a track section on the mast and use a screw to test.

Also, make sure mounting screw is long enough for your mast groove.

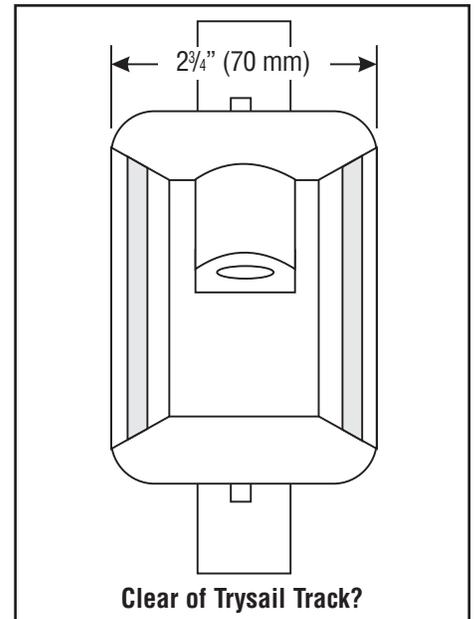


3 or more

Slug

Slug

Warning! Screws must have three (3) or more threads engaged to hold track to mast. Make sure screw makes three (3) full 360° rotations after threads engage in slug.



Clear of Trysail Track?

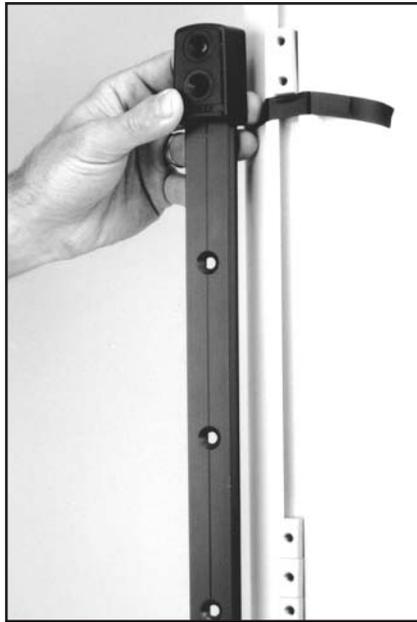
Cars are 2 3/4" (70 mm) wide. Make sure they do not hit trysail track or other obstruction up the entire spar. Tracks often converge above the spreaders.

Installing Track

1 Slip the slugs for the top track into the mast groove starting with 1 $\frac{7}{16}$ " (36 mm) end stop slug. Make sure the 3" (76 mm) connector slug is at the bottom.

If the mast is up, tape 1 $\frac{7}{16}$ " (36 mm) slug in place so it will be even with the top of the upper track.

Tape the other slugs in place.



4 Use a putty knife to slide the next slugs into place and loosely install the $\frac{3}{4}$ " (20 mm) screws.

Tip: Use the putty knife as a feeler gauge to make sure the screws are loose enough to slide easily in the groove.

REMEMBER: The tracks may slide up the lower part of the mast but may hang up when they reach a spliced area of the mast.

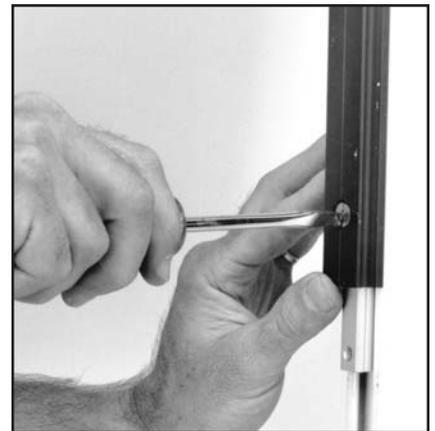


2 Put a drop of blue Loctite into each connector slug hole.



5 Loosen the top screw and slide the top track up far enough to place the next 6'9 $\frac{1}{8}$ " (2.06 m) track in place.

Mast up: tighten bottom screw to hold the track in place.



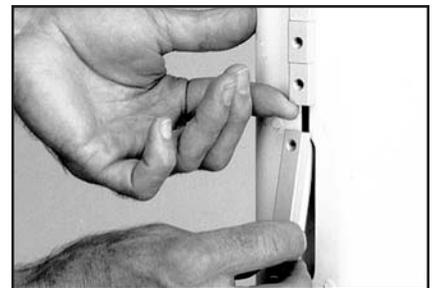
3 Thread a $\frac{3}{4}$ " (20 mm) long end stop screw through the rubber end stop, track and into end stop slug.

If the mast is up, remove the tape and tighten the screw enough to hold the track in place.

Loosely install the other $\frac{3}{4}$ " (20 mm) screw.



6 Slide 19 mounting slugs and a connector slug into the mast groove. Mast up: tape in place. Put a drop of blue Loctite in each hole.



Installing Track

Hold a full-length track piece up to the mast and loosely install the top screw.

Warning! Do not let tracks drop, severe injury can result if the upper track(s) drop down.



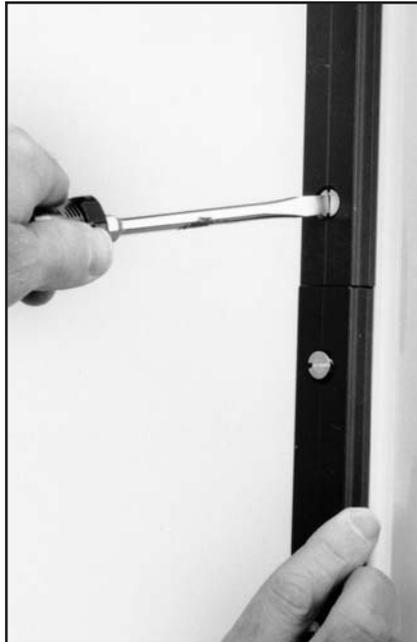
Use a putty knife to slide the next slugs and connector slug in place and loosely install the $\frac{3}{4}$ " (20 mm) screws.



7 Slide tracks up far enough to fit the next track.

Mast up: hold upper tracks, loosen screw that holds the tracks in place and slide track up. Loosen screw enough so the track will slide up the mast.

Securely tighten the new bottom screw.

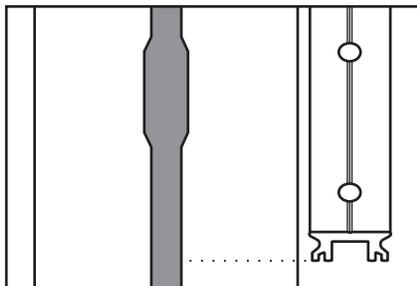


8 Repeat until all full length tracks are installed.

Do not install the 3" (76 mm) connector slugs at this time.

Note: If the bottom full length track blocks the feeder gap, load slugs for the bottom track **before** installing the full length track.

Slip slugs below the gap. Begin with $\frac{7}{16}$ " (36 mm) end stop slug, followed by four $\frac{7}{8}$ " (22 mm) mounting slugs, and the 3" (76 mm) connector slug on top.



9 Push tracks up so the $18\frac{1}{8}$ " (460.5 mm) to $20\frac{1}{8}$ " (511 mm) bottom track will fit below. See step 10. The rubber end stop extends $\frac{1}{4}$ " (6 mm) below the bottom of the track.

Do not install the bottom track yet.



10 Refer to the chart below to find your bottom track length.

From the track that is remaining, measure from the anodized end and cut the track.

**Round your track length to the nearest 1" (25 mm).
Make bottom track $18\frac{1}{8}$ " (460.5 mm) if not listed below.**

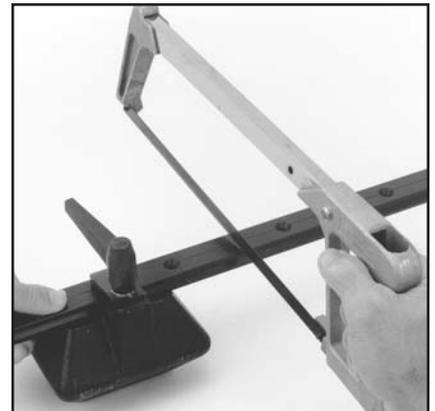
Make bottom track $20\frac{1}{8}$ " (511 mm) if length is listed below

42'3"	49'	55'9"	62'6"	69'3"
(12.878 m)	(14.935 m)	(16.993 m)	(19.050 m)	(21.107 m)

Make bottom track $19\frac{1}{8}$ " (486 mm) if length is listed below

42'2"	48'11"	55'8"	62'5"	69'2"
(12.852 m)	(14.910 m)	(16.967 m)	(19.025 m)	(21.082 m)

11 Drill two $\frac{17}{64}$ " (6.5 mm) holes in the cut end of the track centered at $\frac{5}{16}$ " (8 mm) and $1\frac{3}{16}$ " (30 mm) from the track end.



12 Check the fit of the bottom track, **but do not install it.** See step 13.

Securely tighten those screws that you can reach from your mounting position. Go to the top of the mast and come down securely tightening all screws.



Installing Track by Drilling and Tapping

Required Parts

1602 Track

See page 4, Determining Track Length. The bottom track length needs to be short enough to remove easily to put cars on or take them off the track. We recommend an 18" to 24" (457 mm to 609 mm) bottom track length.

Do not use 1800 track for drilling and tapping.

1/4" (6 mm) Flathead Screws (not included)

Number of fasteners needed:

1602 Track — 10 fasteners/meter of track

1619 Splice Pieces

1522 End Stop Set

Before You Remove Old Track

Before taking old track off, scribe a pencil line down either side of track to use as a guide for keeping track straight. If the track is off the mast, use a string attached to the mast to help line up the track while installing.

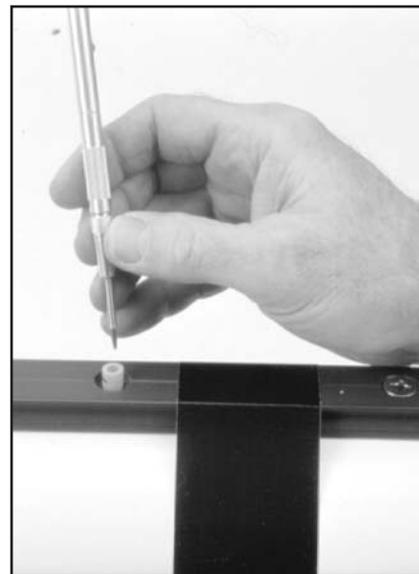


Drilling and Tapping

Start at one end of track and work down: drilling, tapping and screwing. Do not drill and tap both track ends and then expect to drill and tap the center holes.

Clamp or duct tape track in place on mast. Center punch hole being careful to locate center of track hole.

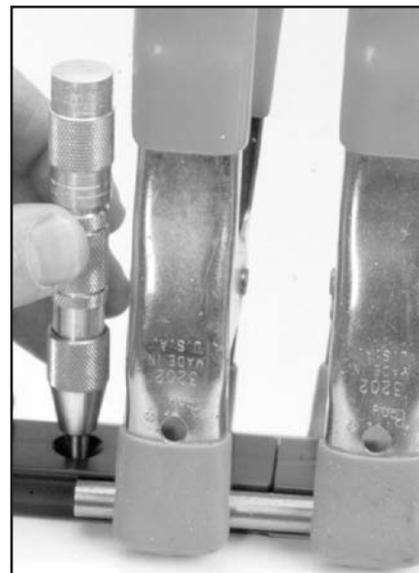
Tip: For accuracy and ease of punching use a spring loaded machinist's center punch. Use the narrow shaft model with a centering tube fashioned from a piece of plastic tubing.



Drill through track hole, making sure drill is perpendicular to face of mast. Take care to not let the chuck hit the track. Tap threads and install screws using blue Loctite.

Aligning track at joints: The 1619 splice pieces will help align the track as you are installing the track. In addition, use round rods or dowels to align tracks. Use spring clamps or "C" clamps to hold them in place until the track is drilled, tapped and screwed in place.

Follow instructions on page 10 regarding loading cars and installing bottom track.



Loading Cars On Track

13 Slide cars onto the track beginning with the two headboard cars (1793 headboard cars have lug in the center).

Slide Battcars onto the track so that the housing for the vertical shaft is at the top of the car.

If the mast is up, use a halyard to hold the cars.

Tip: Hold car loader against the track firmly until the car is completely on the upper tracks.

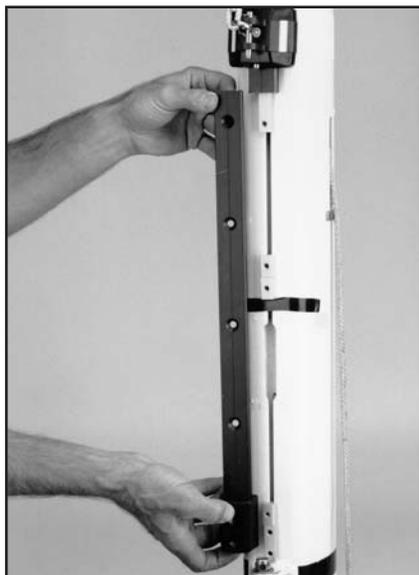


16 Ease cars onto bottom section.



14 Slip the connector slug into the mast groove and install this on the bottom full length track piece.

Slip the remaining three or four mounting slugs and end stop slug in place and tape them if necessary.

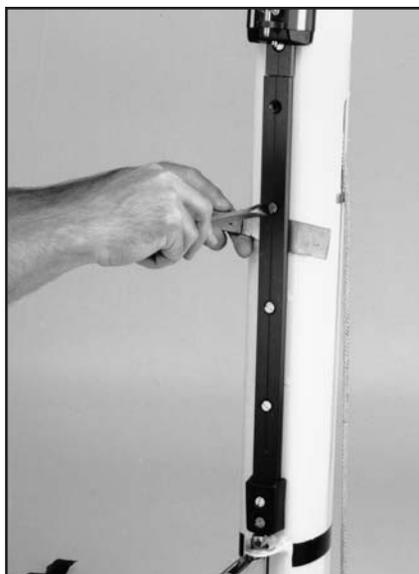
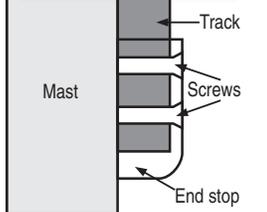


17 1793: Install the headboard coupler so that the cotter pin end of the clevis pin is toward the middle of the coupler.



15 Install bottom track and lower end stop using blue Loctite on screws. Securely tighten all screws.

Note: End stop screws must go through track or stop is not effective.



Loading Sail On Car

Once hardware is installed on sail, load it on cars beginning with the lower ones.

Luff cars

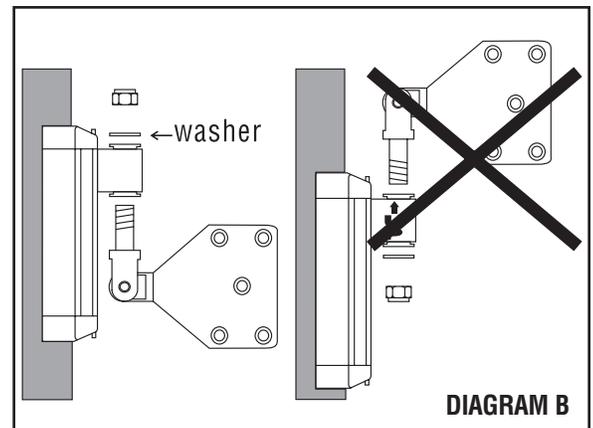
Remove clevis pin, place plastic center sleeve between tangs and slip clevis in place. Secure with cotter pin. Make sure that webbing is not twisted.

1946/1978 Car

Slip clevis pin through car and secure with cotter pins.



1974/1902/1979 Cars With Battslide Receptacles



Battcars: Slip a plastic bushing into each end of the car lug.

Insert the shaft of the Battslide fitting into the barrel so the threaded end points up.

You must use a $\frac{5}{16}$ " (8 mm) washer between the plastic shaft-bushing and the nut. See Diagram B.

Tighten the locknut until you begin to feel the shaft of the Battslide bind when you rotate it in the car. Loosen the locknut $\frac{1}{8}$ turn from this point.

Tightening the locknut too tightly or failing to use a washer will damage the plastic liner.

Headboard

Attach headboard of sail to the headboard coupler.

Raise sail and check to make sure that sail is not too tall.

If necessary, have sail shortened.



Lazy Jacks

Use shock cord to hold lazy jacks open so that the battcars and battens will not catch on them. This will also help stop slapping of lazy jacks on sail.

Attach one end to the lower spreader tips and the other to the lazy jacks.

Make sure the shock cord is long enough so the boom can swing out all the way without damaging the spreaders.

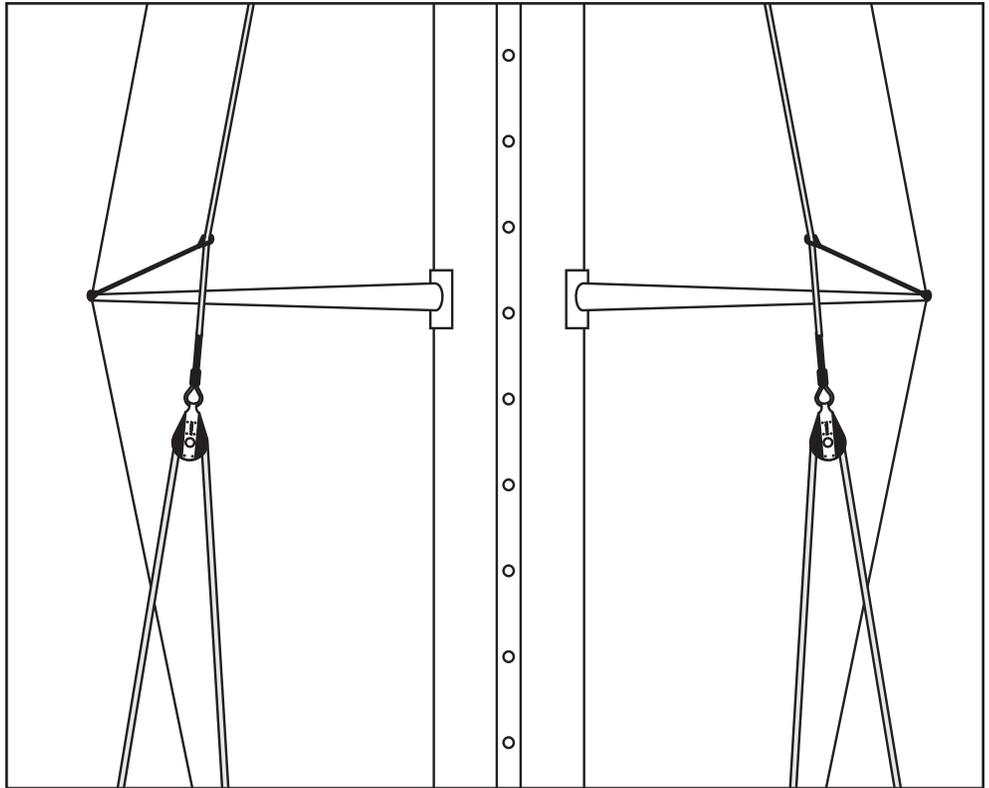


DIAGRAM C

Operating Precautions

When lowering sail, do not simply let the halyard go. Ease cars down by keeping a wrap on the winch.

On boats with unstayed masts, vang must be used to prevent over rotation of upper part of sail. Over rotation can damage batten receptacles.

Maintenance

Clean the cars at the beginning of the season or if the cars begin to bind. Squirt detergent and water into the ball bearings and move the cars up and down to circulate the detergent. Let the detergent sit a few minutes and then spray water into the balls and circulate to remove detergent. Do not use spray lubricants on cars or tracks.

Clean track by washing with detergent and water.

Inspect Battcar fittings for signs of locknuts loosening or plastic bushings wearing. If $\frac{5}{16}$ -18 locknuts are not holding, replace them. Inspect batten receptacles for signs of screws loosening.

Inspect plastic bushings in Battcars for wear. Replace bushings if necessary.

If it is necessary to remove the cars for any reason, use a car loader. See step 13.



Removing Sail

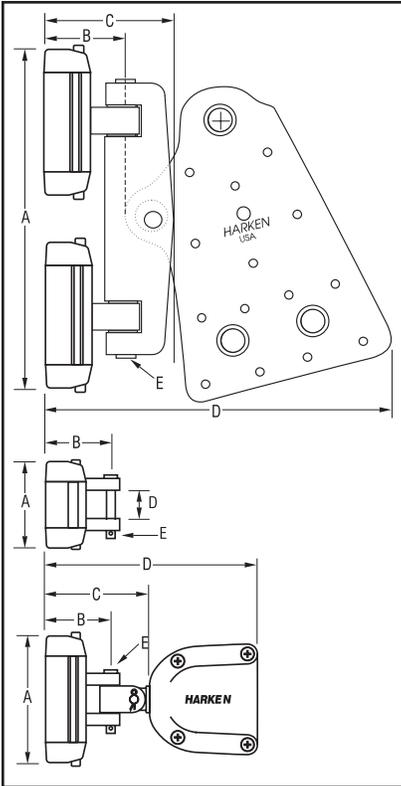
1946/1978

Remove Clevis Pin & Cotter Pin.

1794/1902/1979

Taking care not to lose the stainless steel washer and plastic bushings, remove nut and slide the vertical post out of the Battcar. See page 11. Note: Replace $\frac{5}{16}$ - 18 locknut after two uses.

Sailmaker's Instructions



Part No.	Description	Max Batten Width or Diameter	Max Thickness Batten	Batten Shape	A	B	C Bolt Rope	D	E Fastener
1793	Headboard car assembly w/headboard	—	—	—	8 ¹⁵ / ₁₆ " 227 mm	1 ¹¹ / ₁₆ " 43 mm	3 ¹ / ₈ " 79 mm	7 ⁵ / ₈ " 194 mm	1 ¹ / ₂ " 12 mm
1794	Battcar w/adjustable Battslide for round batten	3/4" 19 mm	—	Round	3 ¹³ / ₁₆ " 97 mm	1 ¹³ / ₁₆ " 46 mm	2 ³ / ₄ " 70 mm	8 ¹ / ₄ " 210 mm	5/16-18**
1826	Battcar w/10 mm stud for SDA fitting	1 ³ / ₁₆ " 21 mm	—	Round	3 ¹³ / ₁₆ " 97 mm	1 ¹³ / ₁₆ " 46 mm	—	—	1/4" 6 mm
1895	Luff car Used w/1946, 1948 Luff car used w/1794/1902/1980	—	—	—	2 ⁵ / ₈ " 67 mm	1 ¹³ / ₁₆ " 46 mm	3 ¹ / ₈ " 79 mm 2 ³ / ₄ " 70 mm	7 ⁷ / ₈ " 22 mm	1/4" 6 mm
1902	Battcar w/adjustable flat or round Battslide	1/2" 12 mm	3/8" 10 mm	Flat or Round	3 ¹³ / ₁₆ " 97 mm	1 ¹³ / ₁₆ " 46 mm	2 ³ / ₄ " 70 mm	8 ⁵ / ₁₆ " 211 mm	5/16-18**
1946	Battcar w/50 mm batten receptacle	Flat 2" 51 mm Round 3/4" 19 mm	5/16" 8 mm	Flat or round	3 ¹³ / ₁₆ " 97 mm	1 ¹⁵ / ₁₆ " 49 mm	3 ¹ / ₈ " 79 mm	6 ¹ / ₁₆ " 154 mm	1/4" 6 mm
1978	Battcar w/40 mm batten receptacle	Flat 1 ⁵ / ₈ " 41 mm Round 5/8" 16 mm	1/4" 6 mm	Flat or round	3 ¹³ / ₁₆ " 97 mm	1 ¹⁵ / ₁₆ " 49 mm	3 ¹ / ₈ " 79 mm	6 ¹ / ₁₆ " 154 mm	1/4" 6 mm
1799	Battcar to accept Battslide w/3/8" stud*	—	—	—	3 ¹³ / ₁₆ " 97 mm	1 ¹⁵ / ₁₆ " 49 mm	—	—	5/16-18**
1980	Universal Battcar*	—	—	—	3 ¹³ / ₁₆ " 97 mm	1 ¹⁵ / ₁₆ " 49 mm	—	3/4" 20 mm	1/4" 6 mm
HL	Hi-load Battcars and headboard cars are required for larger mainsails. Add "HL" to the part number.								

*Batten receptacle not included. **Use locknuts

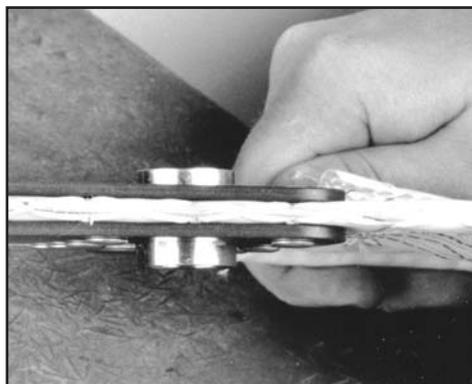
Installing 1792 Headboard Plates



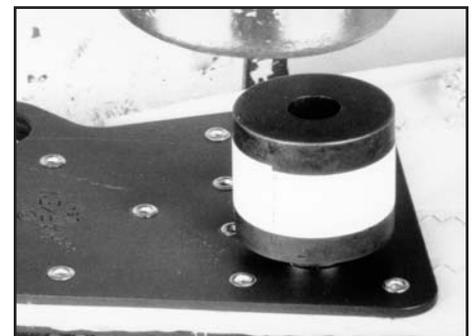
Make sure that height of sail is correct and setbacks are uniform. Refer to the chart above for the correct setbacks and alignment of the headboard.

Install headboard with narrow corner facing upwards.

Use 3/16" aluminum semi-tubular rivets in the 15 smaller holes.



Place the liner in the headboard so it is equally spaced above and below the headboard.



Use a closing tool for the 19 mm stainless liners supplied with the headboard.

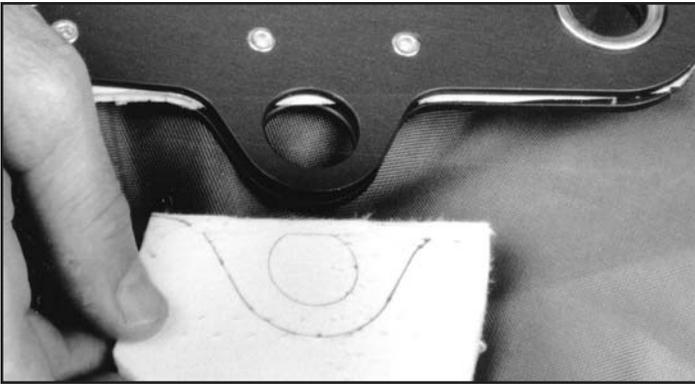
Closing Tools:

Rutgerson 19 mm closing tool.

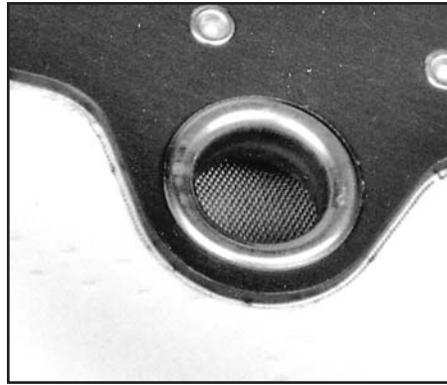
C423 Howe & Bainbridge for 7/8" ring (used with #23 ring).

C410 Howe & Bainbridge for 7/8" ring (used with 210 Innox ring).

Sailmaker's Instructions



Use a cloth to fill in the space between the ears of the headboard plates.



Use enough pressure so rings will fit in coupler. The inside dimension of the coupler is between $\frac{5}{8}$ " and $\frac{9}{16}$ " (15 mm).

Make sure the ring fits inside the coupler.



Distance Between Attachment Points

Battens and luff cars should be placed according to sailmaker's discretion. Usual distance between attachment points is 4' to 4'6" (1.2 m to 1.35 m).

The distance may be greater if luff is stiffer. If attachment distance is greater, pretension the boltrope so that there is no flapping between attachment points.

Note: In some cases adding battens may reduce the stack height because luff cars may not be required.

Setting Up Reef Points

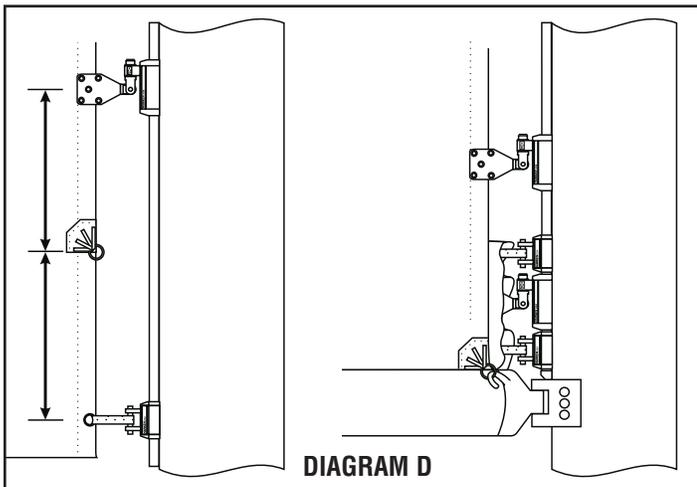


DIAGRAM D

Space reef points so that they are halfway between sail attachment points. Especially with upper reef where sail needs to extend past the stack of cars to the reef tack fitting. Battens or reef points may need to be moved to allow this.

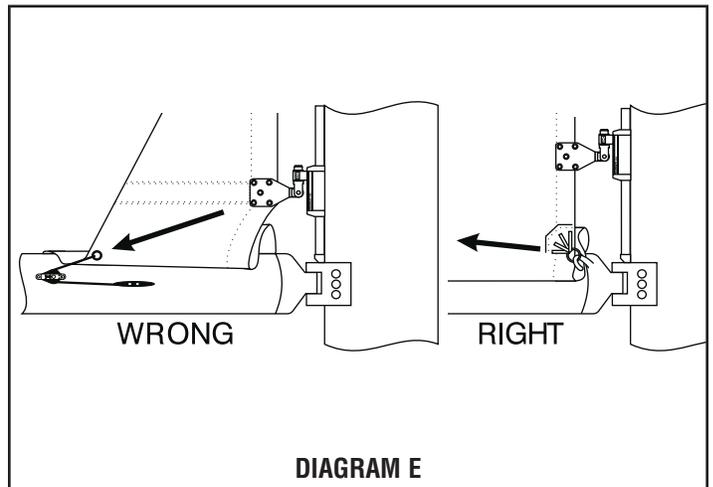


DIAGRAM E

NOTE: The batten fittings cannot handle reefing outhaul or downhaul loads. Make sure these loads are transferred to a tack fitting such as a reefing hook.

Attaching Sail to Luff Cars

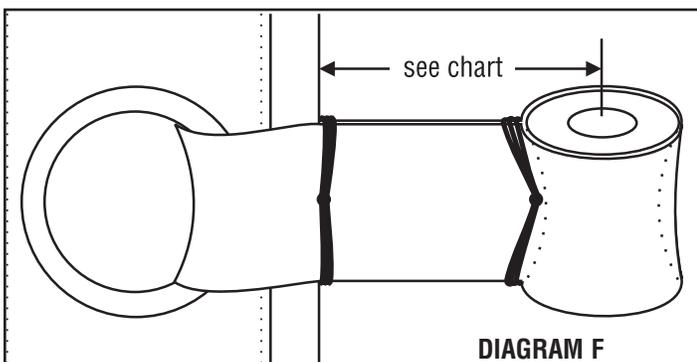


DIAGRAM F

The sail setback from the luff tape to the clevis pin of the luff car will vary depending on the car and receptacle use:

1895 Luff Car	Use with:	
	1946/1978	1794/1902/1979
$1\frac{5}{16}$ " (34 mm)	$\frac{7}{8}$ " (22 mm)	

Plastic hourglass-shaped spacers are shipped on the luff cars.

Seize the spacer to the webbing by stitching just behind the plastic spacer. This will make it easier to slip the pin into the strap and will reduce wear on the strap. See diagram F.

Also seize the webbing to the sail by stitching up against the sail.

Sailmaker's Instructions

1946, 1946HL, 1978, 1978HL Battcars with Batten Receptacles

Round Battens

- Option 1 - End the batten pocket about 10" (254 mm) from the receptacle.
- Option 2 - Pucker the batten pocket, drawing the edges together. The batten cannot be inserted unless this is done.

Flat Battens

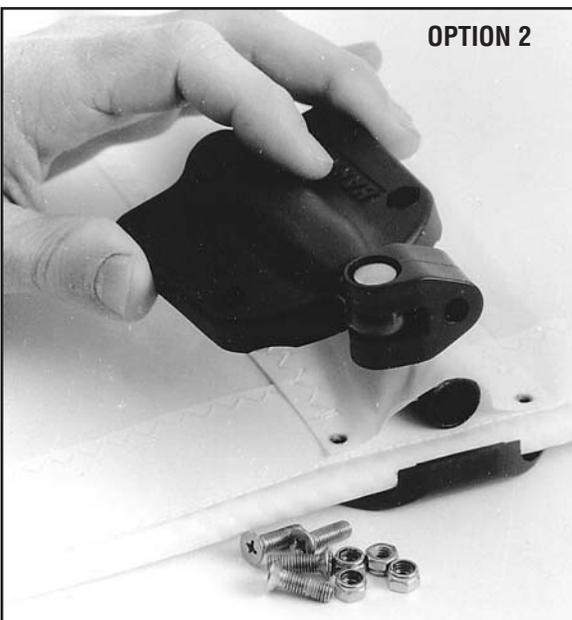
- Option 1 - End batten pocket about 10" (254 mm) from the receptacle. If this is done, the optional rubber shim may be required.
- Option 2 - Test to see if the batten will fit inside the receptacle with cloth in place. If necessary, pucker the batten pocket, drawing the edges together to allow batten insertion into the receptacle.

Optional Shim

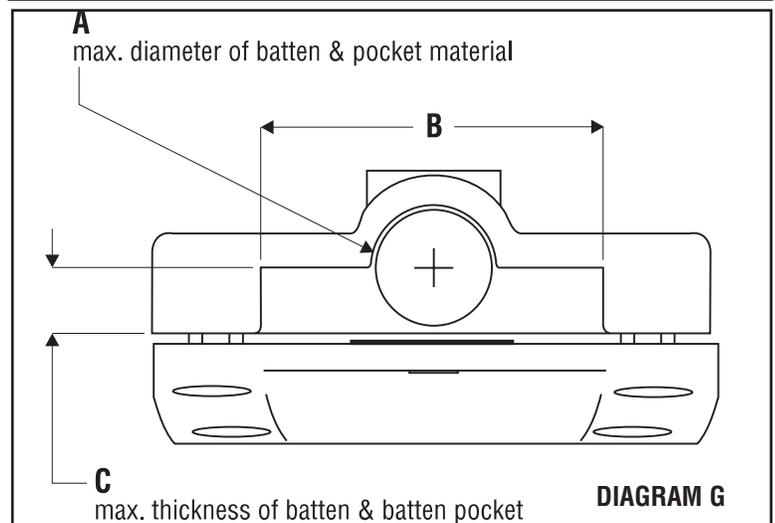
For thin flat battens or small diameter round battens you may wish to use the enclosed rubber rectangular piece to shim out the batten to fit inside the receptacle. To insert the shim, take apart the batten receptacle with the batten inside and place the rubber piece on one side of the batten and then assemble. **Note: Do not lose screw and nuts; they are not captive.**

Assembly

When assembling system, choose which side of the sail to put the receptacle and maintain the same side with each batten, Make sure screws and nuts are tight and that the front of the batten receptacle is pressing on the "puzzle piece" which secures the swivel tang.



Part No.	A	B	C
1946	3/4" (19 mm)	2" (52 mm)	1/4" (7.14 mm)
1978	1 1/16" (17.48 mm)	1 11/16" (42.88 mm)	



Assembling 1979 Battcar with Midi and Maxi Battslide® End Fittings

Midi fits battens with width up to 1 5/8" (41 mm).

Maxi fits battens with width up to 2" (51 mm).

Note: Remove sharp edges from the forward end of battens with a file or sanding block.

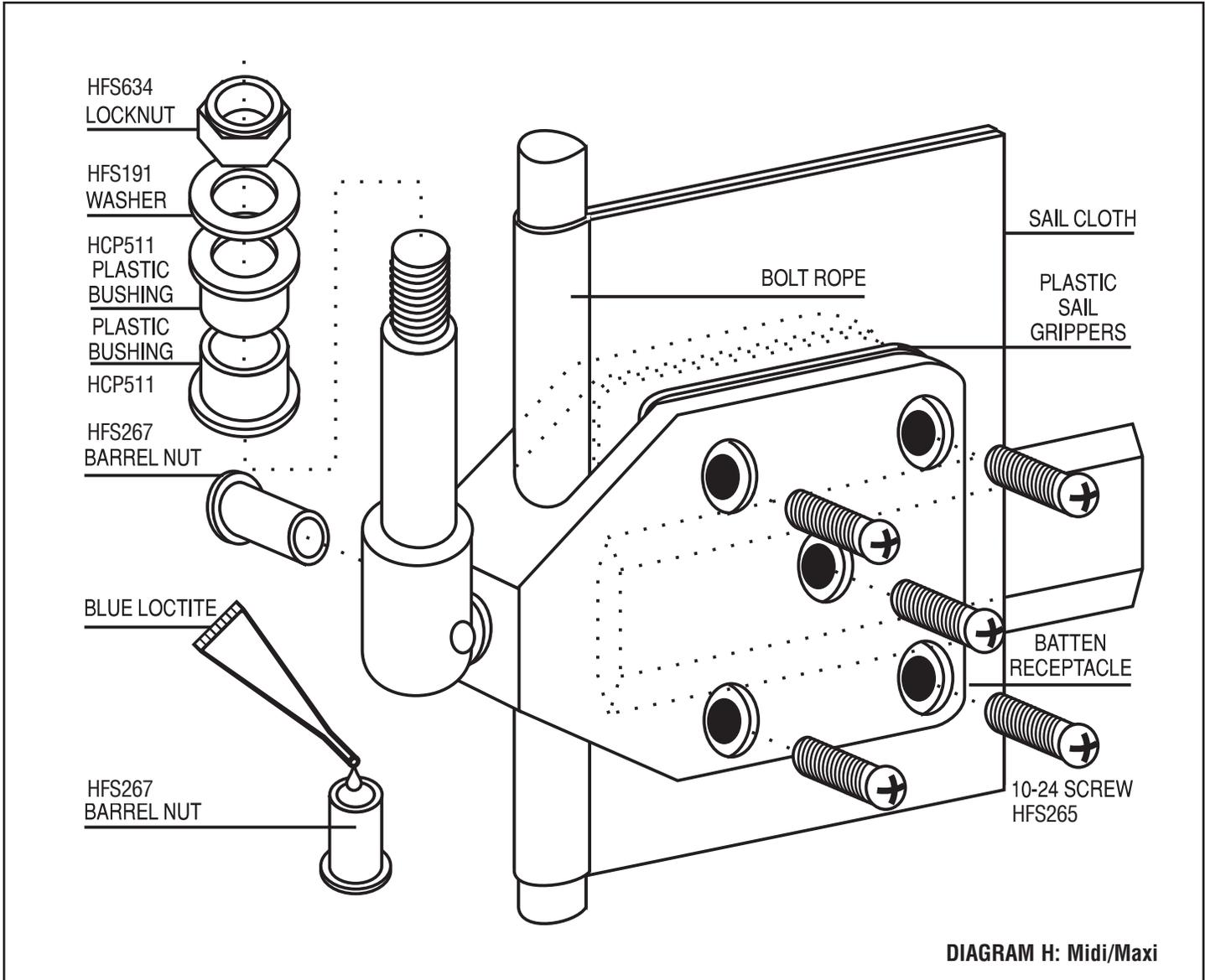


DIAGRAM H: Midi/Maxi

1 With batten installed loosely in pocket, place Battslide batten receptacle over boltrope, centered on batten pocket tape. Make sure receptacle is snug against boltrope and that bolt rope is straight.

2 Mark the mounting screw holes. Punch them with a 1/4" or 5/8" (7 mm) punch.

3 Choose a combination of plastic sail grippers that suit the thickness of the sail. Put at least one gripper on each side of the sail. Grippers should fit as snugly as possible with no space between them and the cheeks of the batten receptacle.

4 Install a barrel nut and 10-24 screw through one of the forward holes; align the sail grippers and tighten the first screw to maintain position of entire assembly. Use blue Loctite on barrel nuts.

5 If there is slack between the side of batten and receptacle cheek, fill it with appropriate thickness of green laminated batten material.

6 Install the remaining barrel nuts, sail grippers and screws. Tighten firmly. Note: when using tubular battens, **do not overtighten** to the point of cracking the batten.

7 The fifth (center) hole is an optional bolt hole for flat battens. This is recommended.

Assembling 1794 Battcar with Adjustable Round Batten Battslide

Harken #1794 Battcar fits round battens up to $\frac{3}{4}$ " (19 mm) diameter. Sleeves are included for battens below $\frac{3}{4}$ " (19 mm) diameter.

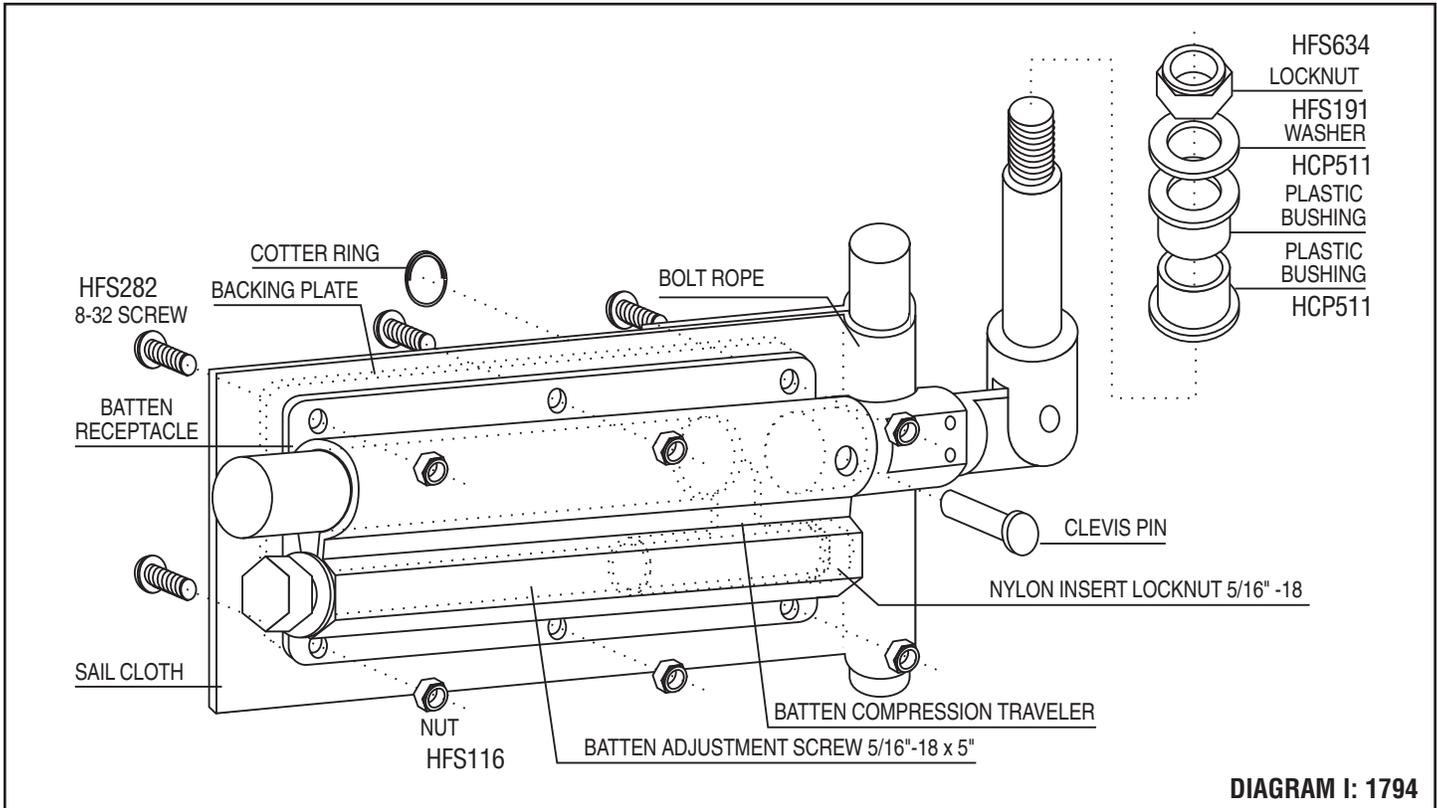


DIAGRAM I: 1794

1 Determine which side of sail to mount battens. The batten receptacle may be installed on the port or starboard side of the sail.

The receptacle is shipped ready for starboard-side installation. For port-side, reverse the batten compression assembly and install the link holder on the opposite end of the batten receptacle.

Port or starboard batten location is a matter of preference, but may be influenced by the location of a storm trysail track along one side of the mast.

2 Align the Battslide fitting with the batten pocket and with the bolt rope. Make sure the round batten chamber is above the hexagonal chamber.

Mark and punch six holes for the 8-32 mounting screws and one larger hole at the forward end for the $\frac{1}{4}$ " (6 mm) diameter clevis pin.

1794 Battslides are intended for use on sails with horizontally oriented battens; however if the upper battens are slightly inclined, Battslides will accommodate this.

3 Use six 8-32 screws and locknuts to sandwich the sail between the backing plate and the batten receptacle.

The screw heads must be on the backing plate side and the nuts on the receptacle side, as shown in the illustration.

4 To fit the battens, loosen the batten adjustment screw and remove the batten compression traveler.

Round the aft end of the batten, insert it through the forward end of the receptacle and push it as far aft into the leech end of the batten pocket as possible.

With a pencil, mark the batten at the forward end of the receptacle. Pull the batten out of the receptacle a slight distance and cut it off about 1" (25 mm) aft of the pencil mark to allow room for the batten compression traveler and the link holder.

Note: If the diameter of the batten is less than $\frac{3}{4}$ " (19 mm), use enclosed 3" (76 mm) long cylinders to sleeve the batten. Glue the sleeves to the forward end of the battens. Sleeves are available from Harken in limited sizes or they can be made from plastic tubing.

5 Reinstall the batten compression traveler and $\frac{5}{16}$ "-18 locknut. Tighten the traveler about $\frac{1}{4}$ " (6 mm) after it contacts the batten.

Align the $\frac{1}{4}$ " (6 mm) holes into the receptacle, backing plate and link holder. Install the clevis pin with the head on the receptacle side and secure it with the cotter ring.

6 Batten compression can be adjusted using a $\frac{1}{2}$ " (13 mm) socket wrench with a 3" (76 mm) extension. Some adjustment will be required after the first sail.

Assembling 1902 Harken Battcar with Adjustable Round or Flat Battslide® Receptacle

Flat Battens: The 1902 receptacle fits flat battens up to 1 1/8" (41 mm) wide and up to 3/16" (5 mm) thick. To use thicker battens, up to 3/8" (9.5 mm), use a coarse file or Shurform plane to reduce the height of the batten positioning tabs (see Diagram I). Do not plane the tabs down too much; they should hold the batten snugly against the sail.

Round Battens: The 1902 receptacle fits round battens 1/2" (12 mm) in diameter. To use smaller diameter battens, sleeve the front of the batten to 1/2" (12 mm).

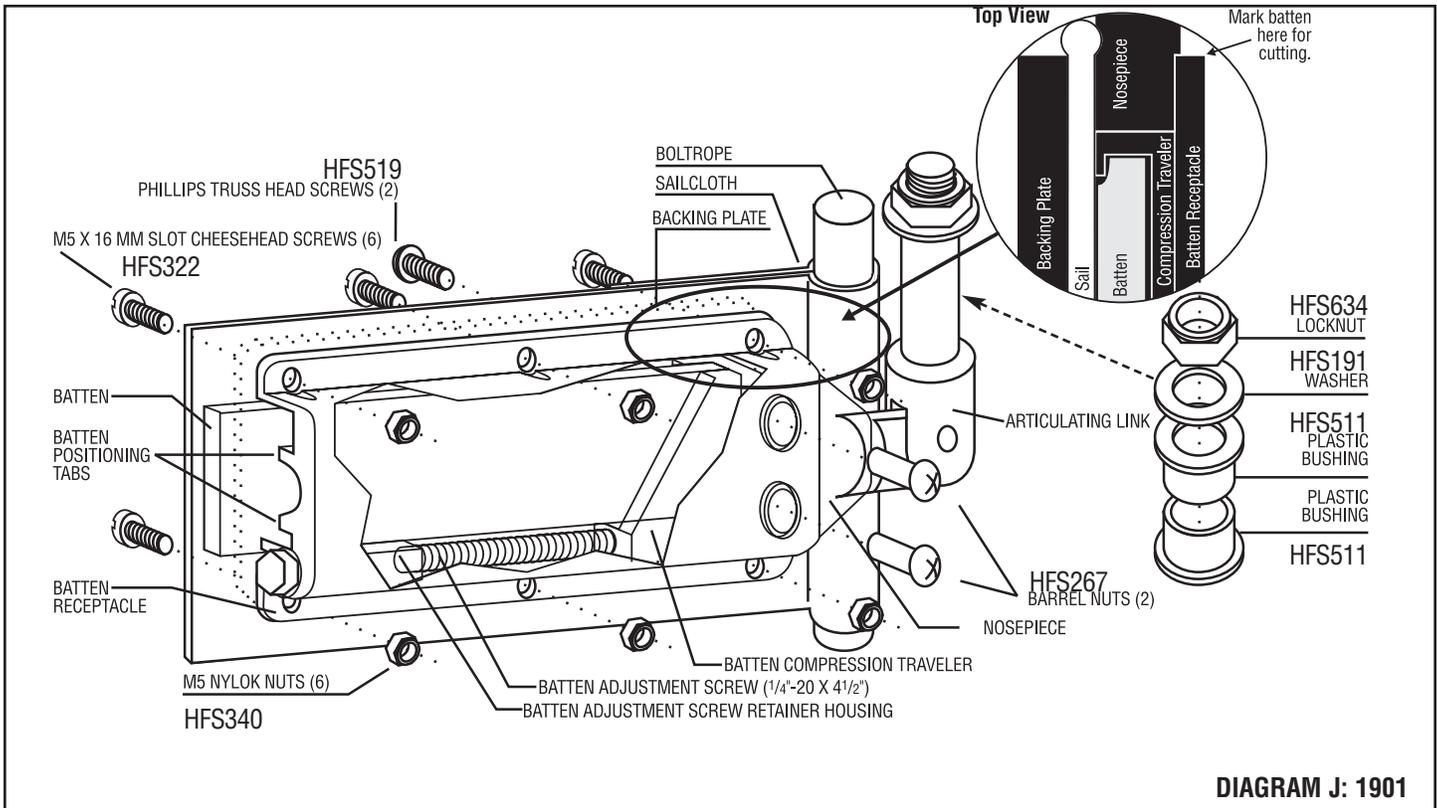


DIAGRAM J: 1901

1 Determine which side of sail to mount battens. Note: The receptacle is primarily designed for starboard side installation but may also be installed on the port side so the adjusting screw is towards the top.

Port or starboard batten location is a matter of preference, but may be influenced, for instance, by the location of a storm trysail track along one side of the mast.

Note: the batten is aligned close to the slide centerline.

2 Slide batten into sail and center it in the batten pocket. Remove all other parts from the batten receptacle. Place receptacle over batten and align it so the front of the receptacle is snug up against the aft edge of the boltrope and the receptacle axis is parallel to the batten.

Note: For flat battens less than 1 1/8" (41 mm) wide, the receptacle should be positioned so that one edge of the batten is flush against the batten adjustment screw retainer housing.

With the receptacle correctly positioned, mark and punch 6 holes for the 5 mm receptacle mounting screws and two holes (same diameter) for the Phillips head screws that hold the nosepiece into the receptacle.

Note: the 1901 receptacle is intended primarily for use on sails with battens exactly perpendicular to the luff. However, if the upper battens have a slight incline, the receptacle can be inclined slightly.

3 Remove batten. Using the six M5 x 16 mm screws and M5 Nylock nuts, sandwich the sail between the backing plate and the

batten receptacle. The screw heads must be on the backing plate side and the nuts on the receptacle side. (See Diagram J). Tighten screws securely.

4 Insert the batten through the foreword end of the receptacle and push it as far aft into the leech end of the batten pocket as possible. With a pencil, mark the batten at the forward end of the receptacle. Pull the batten out of the receptacle a slight distance and cut it off approximately 3/4" (19 mm) aft of the pencil mark to allow room for the nose piece and batten compression traveler.

Flat Battens: Use a saw and file to shape the front of the batten as shown in the top view in Diagram I. This assures that the batten will snug itself over against the sail when the batten compression traveler is tightened.

5 Install the batten compression traveler and batten adjustment screw with flat washers.

Note: Position the washer so it is held away from the sail by the two small bosses on the aft side of the batten receptacle.

Tighten the traveler approximately 3/8" (9 mm) after it contacts the batten to make room for the nose piece. Slide the nose piece into the receptacle and secure with the barrel nuts and Phillips head screws as shown above. Use a small amount of blue Loctite on the threads of the screws.

6 To adjust the batten compression (cloth tension) use a 7/16" (76 mm) extension. Usually some adjustment will be required after the first sail.

Installation Troubleshooting

Problem	Probable Cause	Solution
Tracks do not butt up against each other	Cut end of top or bottom track is at joint Track weight pulling tracks apart	Make sure the anodized end is towards the full length track Tracks will come together when you loosen the bottom screw and push the tracks up the mast
Mounting slugs do not fit	Slugs wrong size	Different size slug required. Contact your dealer
Mounting screws will not tighten	Incorrect mounting slug used	Different size slug required. Contact your dealer
Track will not slide up mast	Slugs catching on mast splice	Loosen screws slightly. If necessary have someone at splice area to wiggle the slug past the splice
	Corners of cut track catching	Use file to round off corners of track
	Mast has too much prebend	Ease backstay
	Paint or other material clogging mast groove	Clean out groove
Headboard coupler does not fit	Cars are loaded on mast in the wrong order	Remove cars onto car loaders and load in the correct order
Cars do not fit on track	Track and cars are not the same size	Contact your dealer or Harken
	Balls are missing	Remove cars onto car loaders, load balls and slide cars back on track
Sail headboard does not fit inside coupler	Ring was not pressed far enough	Take sail to sailmaker

Operation Troubleshooting

Problem	Probable Cause	Solution
Cars bind	Batten receptacle upside down	Remove nut on batten receptacle post, install so nut is at the top of the car
	Car is on upside down	Remove cars onto car loader and install so barrel is near the top of the car
	Balls missing from car	Remove cars onto car loader, load balls and slide cars back on track
	Dirt in cars	Use detergent and water to flush dirt out of cars, follow with high pressure water, clean track grooves.
Nut on Battcar is not holding	Locknut has been used too many times	Get new 5/8" - 18 locknut
Batten receptacle does not rotate	Nuts are too tight	Loosen nuts slightly
Plastic bushings in Battcar are breaking	Washer not used	Install washer under nut for vertical post
Cars jam when raising sail	Headboard or cars are catching on lazy jacks	Use topping lift or rod vang and shock cord to pull lack jacks out to shrouds
Sail will not go all the way up	Sail is too tall or sheave is too far forward	Have sail shortened or move sheave aft
Vertical post or pin on batten receptacle bending	Reef loads are being transferred to batten receptacle	Transfer reef downhaul and outhaul loads to mast or boom gooseneck
Reef tack fitting will not reach reef hook	Reef point too close to sail attachment	Have sailmaker move reef point or change reef tack fitting

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