



HARKEN®

System A Batten Traveler Installation Manual

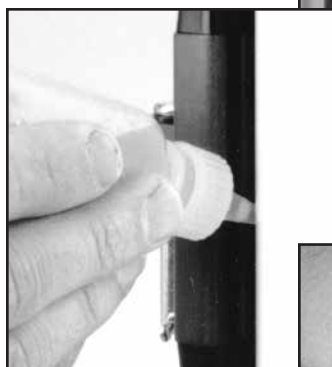
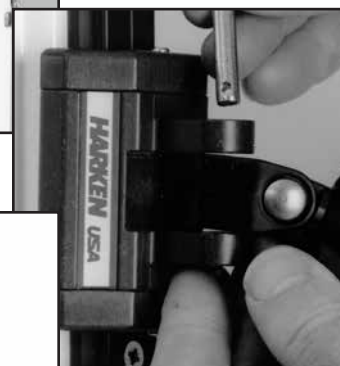
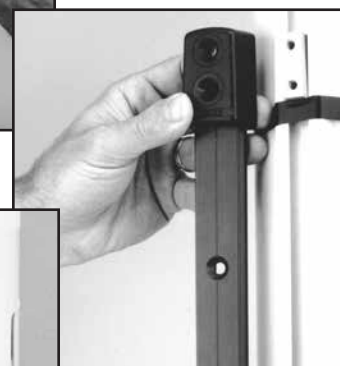
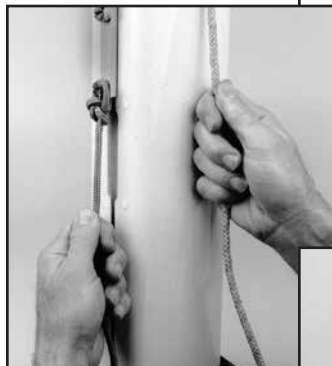
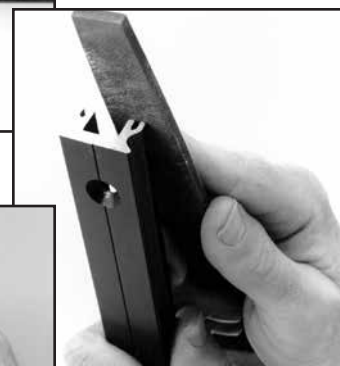
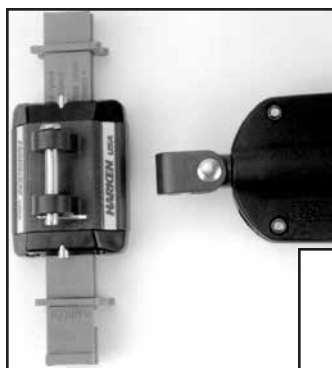
Thanks for buying a Harken Battcar System. It will give you reliable service with minimal maintenance, but does require proper assembly and basic care. This manual is an important part of your mainsail handling system. Please take the time to read it carefully before assembling or using your Battcar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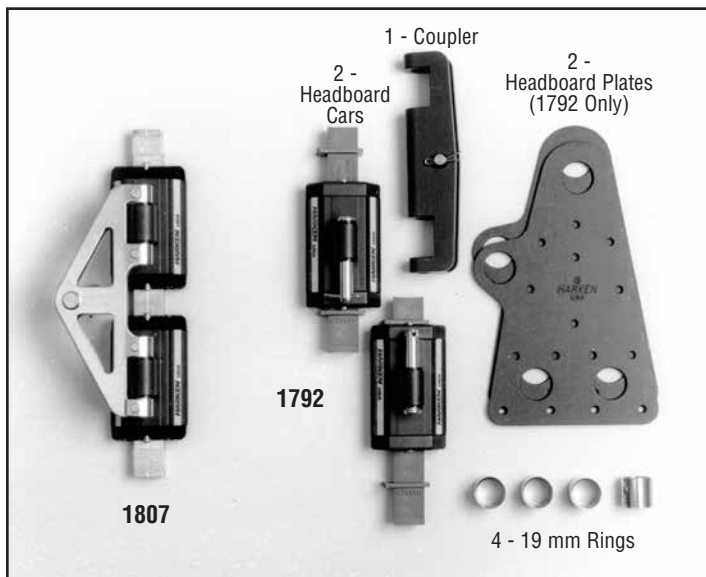


Sizing

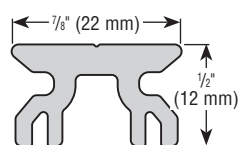
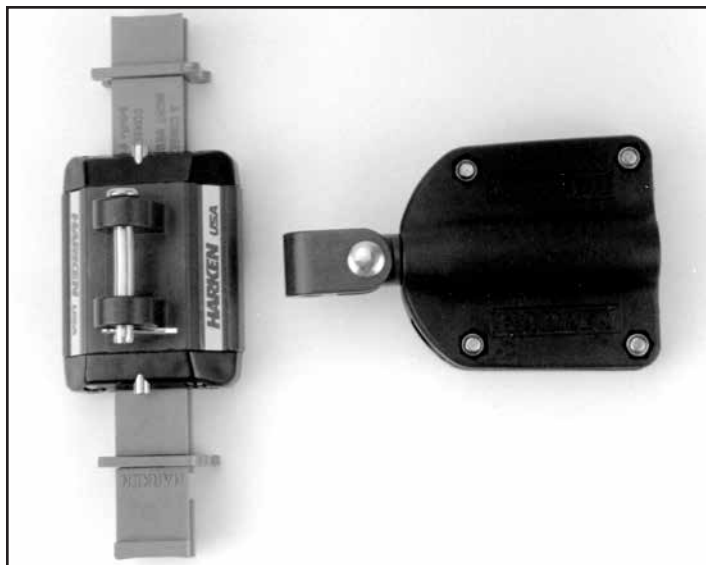
Make sure that you have the correct size Battcar system for your boat.

Maximum Sail Area		System	Headboard	Part No. Battcars	Luff Car
Monohull	Multihull				
350 ft ² 33 m ²	300 ft ² 28 m ²	A Low Load	1807	1901, 1944, 1976, 1977	1777
425 ft ² 39 m ²	350 ft ² 32 m ²	A	1792 1807	1825, 1901, 1944, 1976	1894
550 ft ² 51 m ²	475 ft ² 34 m ²	A Hi-Load	1792HL	1825HL, 1901HL, 1944HL, 1976HL, 1977HL	1894HL

Parts List

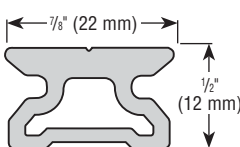


HEADBOARD ASSEMBLY



1800 TRACK, 6' 8³/₄" (2.05 m) long: Number of sections will vary according to luff length.

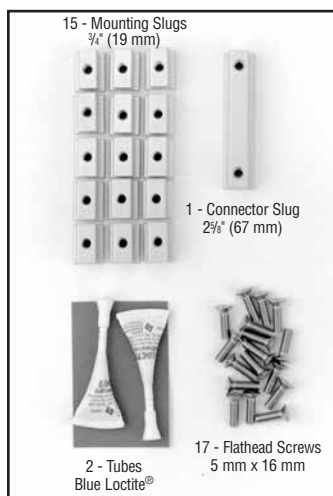
Make sure you have the correct size track. System A track is 7/8" (22 mm) wide.



2720 Track: for drilling and tapping you must use 2720 track. Use 10-32 (5 mm) screws, not included.

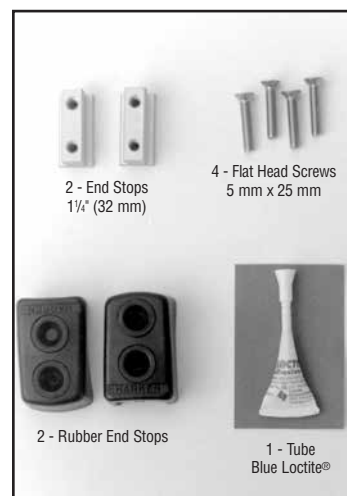
Do not use 1800 open backed track for drilling and tapping the mast. This track must have the support of the mounting slugs.

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.

BATTCARS

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



Required Tools

Phillips screwdriver Drill
Tape measure $\frac{13}{64}$ " (5.5 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.

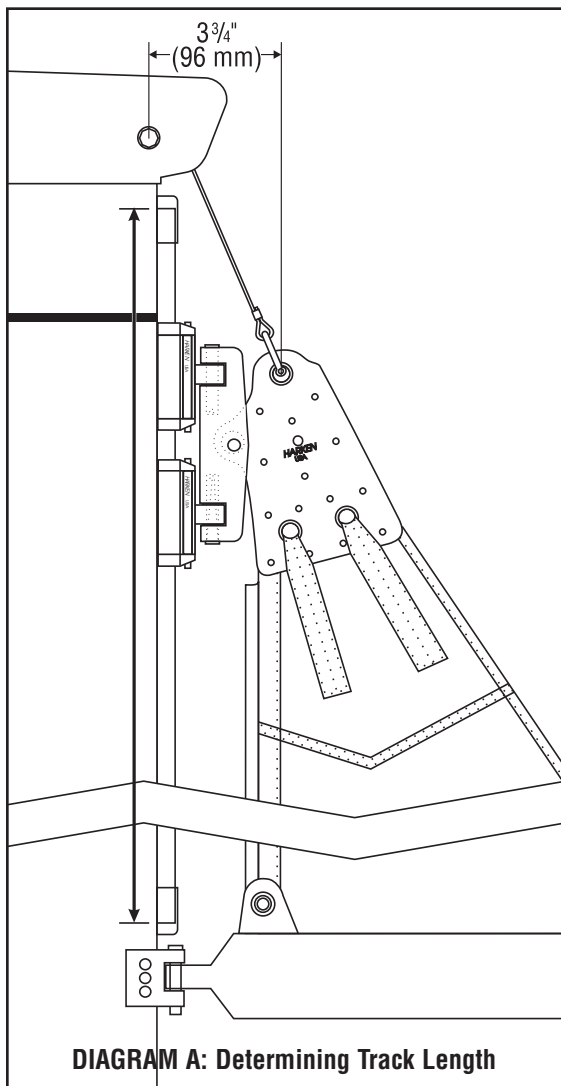


DIAGRAM A: Determining Track Length

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 $\frac{3}{4}$ " (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 1800 Track Length

The length of the track is matched to the mast by adjusting the number of 6'8 $\frac{3}{4}$ " (2.05 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 Many 1800 Track Sections?

Use the chart below to determine the total number of full length 6'8 $\frac{3}{4}$ " (2.05 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 6'8 $\frac{3}{4}$ " (2.05 m) Track Sections Required
28'9" to 33'8" (8.763 m to 10.262 m)	5
33'9" to 40'5" (10.287 m to 12.319 m)	6
40'6" to 47'2" (12.344 m to 14.376 m)	7
47'3" to 53'11" (14.402 m to 16.434 m)	8
54' to 60'7" (16.459 m to 18.466 m)	9
60'8" to 62' (18.491 m to 18.898 m)	10

Full Length 6'8 $\frac{3}{4}$ " (2.05m) Top Track

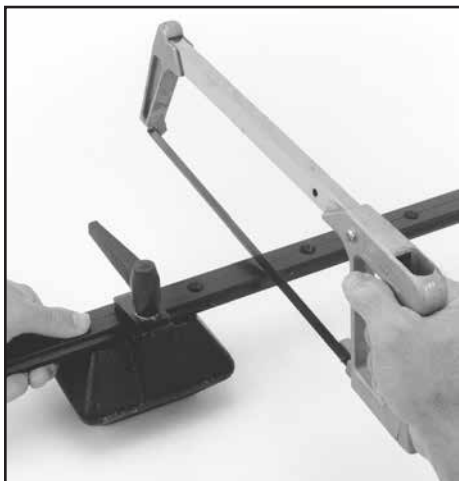
Round your track length to the nearest 1" (25 mm). If your track length is one of the dimensions shown below, your track system does not need a special length top track. A full length 6'8 $\frac{3}{4}$ " (2.05 m) track is used as the top track.

28'5" (8.661 m)	35'2" (10.719 m)	41'11" (12.776 m)	48'08" (14.834 m)	55'4" (16.866 m)
28'6" (8.687 m)	35'3" (10.744 m)	42' 0" (12.802 m)	48'09" (14.859 m)	55'5" (16.891 m)
28'7" (8.712 m)	35'4" (10.770 m)	42' 1" (12.827 m)	48'10" (14.884 m)	55'6" (16.916 m)

Cutting Top Track To Length

Total Track Length (as defined on page 4)					Top Track Length
28' 8" (8.738 m)	35' 5" (10.795 m)	42' 2" (12.852 m)	48'11" (14.910 m)	55' 7" (16.942 m)	3" (76 mm)
28'10" (8.788 m)	35' 7" (10.846 m)	42' 4" (12.903 m)	49' 1" (14.961 m)	55' 9" (16.993 m)	5" (127 mm)
29' 0" (8.839 m)	35' 9" (10.897 m)	42' 6" (12.954 m)	49' 3" (15.011 m)	55'11" (17.043 m)	7" (178 mm)
29' 2" (8.890 m)	35'11" (10.947 m)	42' 8" (13.005 m)	49' 5" (15.062 m)	56' 1" (17.094 m)	9" (229 mm)
29' 4" (8.941 m)	36' 1" (10.998 m)	42'10" (13.056 m)	49' 7" (15.113 m)	56' 3" (17.145 m)	11" (279 mm)
29' 6" (8.992 m)	36' 3" (11.049 m)	43' 0" (13.106 m)	49' 9" (15.164 m)	56' 5" (17.196 m)	1' 1" (330 mm)
29' 8" (9.042 m)	36' 5" (11.100 m)	43' 2" (13.157 m)	49'11" (15.215 m)	56' 7" (17.247 m)	1' 3" (381 mm)
29'10" (9.093 m)	36' 7" (11.151 m)	43' 4" (13.208 m)	50' 1" (15.265 m)	56' 9" (17.297 m)	1' 5" (432 mm)
30' 0" (9.144 m)	36' 9" (11.201 m)	43' 6" (13.259 m)	50' 3" (15.316 m)	56'11" (17.348 m)	1' 7" (483 mm)
30' 2" (9.195 m)	36'11" (11.252 m)	43' 8" (13.310 m)	50' 5" (15.367 m)	57' 1" (17.399 m)	1' 9" (533 mm)
30' 4" (9.246 m)	37' 1" (11.303 m)	43'10" (13.360 m)	50' 7" (15.418 m)	57' 3" (17.450 m)	1'11" (584 mm)
30' 6" (9.296 m)	37' 3" (11.354 m)	44' 0" (13.411 m)	50' 9" (15.469 m)	57' 5" (17.501 m)	2' 1" (635 mm)
30' 8" (9.347 m)	37' 5" (11.405 m)	44' 2" (13.462 m)	50'11" (15.519 m)	57' 7" (17.551 m)	2' 3" (686 mm)
30'10" (9.398 m)	37' 7" (11.455 m)	44' 4" (13.513 m)	51' 1" (15.570 m)	57' 9" (17.602 m)	2' 5" (737 mm)
31' 0" (9.449 m)	37' 9" (11.506 m)	44' 6" (13.564 m)	51' 3" (15.621 m)	57'11" (17.653 m)	2' 7" (787 mm)
31' 2" (9.500 m)	37'11" (11.557 m)	44' 8" (13.614 m)	51' 5" (15.672 m)	58' 1" (17.704 m)	2' 9" (838 mm)
31' 4" (9.550 m)	38' 1" (11.608 m)	44'10" (13.665 m)	51' 7" (15.723 m)	58' 3" (17.755 m)	2'11" (889 mm)
31' 6" (9.601 m)	38' 3" (11.659 m)	45' 0" (13.716 m)	51' 9" (15.773 m)	58' 5" (17.805 m)	3' 1" (940 mm)
31' 8" (9.652 m)	38' 5" (11.709 m)	45' 2" (13.767 m)	51'11" (15.824 m)	58' 7" (17.856 m)	3' 3" (991 mm)
31'10" (9.703 m)	38' 7" (11.760 m)	45' 4" (13.818 m)	52' 1" (15.875 m)	58' 9" (17.907 m)	3' 5" (1.041 m)
32' 0" (9.754 m)	38' 9" (11.811 m)	45' 6" (13.868 m)	52' 3" (15.926 m)	58'11" (17.958 m)	3' 7" (1.092 m)
32' 2" (9.804 m)	38'11" (11.862 m)	45' 8" (13.919 m)	52' 5" (15.977 m)	59' 1" (18.009 m)	3' 9" (1.143 m)
32' 4" (9.855 m)	39' 1" (11.913 m)	45'10" (13.970 m)	52' 7" (16.027 m)	59' 3" (18.059 m)	3'11" (1.194 m)
32' 6" (9.906 m)	39' 3" (11.963 m)	46' 0" (14.021 m)	52' 9" (16.078 m)	59' 5" (18.110 m)	4' 1" (1.245 m)
32' 8" (9.957 m)	39' 5" (12.014 m)	46' 2" (14.072 m)	52'11" (16.129 m)	59' 7" (18.161 m)	4' 3" (1.295 m)
32'10" (10.008 m)	39' 7" (12.065 m)	46' 4" (14.122 m)	53' 1" (16.180 m)	59' 9" (18.212 m)	4' 5" (1.346 m)
33' 0" (10.058 m)	39' 9" (12.116 m)	46' 6" (14.173 m)	53' 3" (16.231 m)	59'11" (18.263 m)	4' 7" (1.397 m)
33' 2" (10.109 m)	39'11" (12.167 m)	46' 8" (14.224 m)	53' 5" (16.281 m)	60' 1" (18.313 m)	4' 9" (1.448 m)
33' 4" (10.160 m)	40' 1" (12.217 m)	46'10" (14.275 m)	53' 7" (16.332 m)	60' 3" (18.364 m)	4'11" (1.499 m)
33' 6" (10.211 m)	40' 3" (12.268 m)	47' 0" (14.326 m)	53' 9" (16.383 m)	60' 5" (18.415 m)	5' 1" (1.549 m)
33' 8" (10.262 m)	40' 5" (12.319 m)	47' 2" (14.376 m)	53'11" (16.434 m)	60' 7" (18.466 m)	5' 3" (1.600 m)
33'10" (10.312 m)	40' 7" (12.370 m)	47' 4" (14.427 m)	54' 1" (16.485 m)	60' 9" (18.517 m)	5' 5" (1.651 m)
34' 0" (10.363 m)	40' 9" (12.421 m)	47' 6" (14.478 m)	54' 3" (16.535 m)	60'11" (18.567 m)	5' 7" (1.702 m)
34' 2" (10.414 m)	40'11" (12.471 m)	47' 8" (14.529 m)	54' 5" (16.586 m)	61' 1" (18.618 m)	5' 9" (1.753 m)
34' 4" (10.465 m)	41' 1" (12.522 m)	47'10" (14.580 m)	54' 7" (16.637 m)	61' 3" (18.669 m)	5'11" (1.803 m)
34' 6" (10.516 m)	41' 3" (12.573 m)	48' 0" (14.630 m)	54' 9" (16.688 m)	61' 5" (18.720 m)	6' 1" (1.854 m)
34' 8" (10.566 m)	41' 5" (12.624 m)	48' 2" (14.681 m)	54'11" (16.739 m)	61' 7" (18.771 m)	6' 3" (1.905 m)
34'10" (10.617 m)	41' 7" (12.675 m)	48' 4" (14.732 m)	55' 1" (16.789 m)	61' 9" (18.821 m)	6' 5" (1.956 m)
35' 0" (10.668 m)	41' 9" (12.725 m)	48' 6" (14.782 m)	55' 3" (16.840 m)	61'11" (18.872 m)	6' 7" (2.006 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 6'8 $\frac{3}{4}$ " (2.05 m) track.

Round your track length to the nearest $\frac{1}{2}$ " (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.

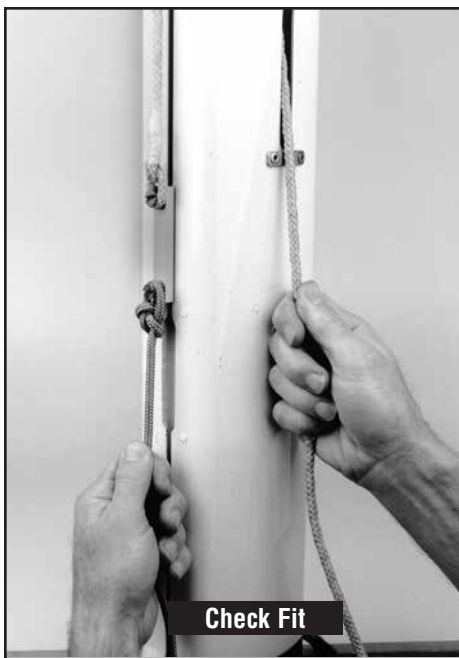


Drill two $\frac{13}{64}$ " (5.5 mm) holes in the cut end of the top track centered at $\frac{5}{16}$ " (8 mm) and $1\frac{1}{16}$ " (27 mm) from the track end.

Slip the rubber end stop over the cut end of the top track.

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

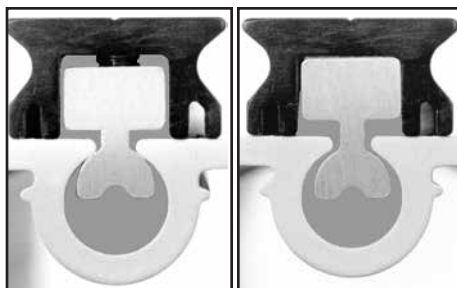
Before You Start...will mounting slugs and cars fit?



Check Fit

Check to make sure the 2 $\frac{5}{8}$ " (67 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 2 $\frac{5}{8}$ " (67 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.

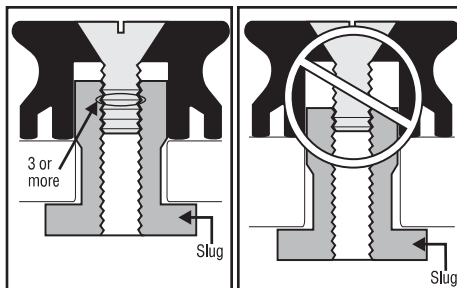


Will Tighten

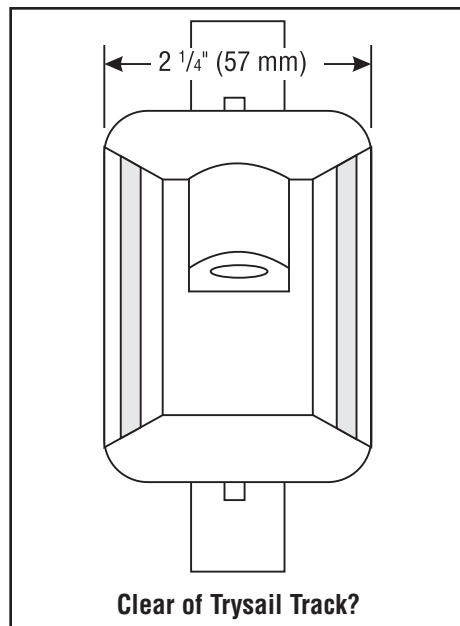
Will Not Tighten

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.



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 $\frac{1}{4}$ " (57 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 1/4" (32 mm) end stop slug. Make sure the 2 5/8" (67 mm) connector slug is at the bottom. If the mast is up, tape 1 1/4" (32 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 5/8" (16 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.*

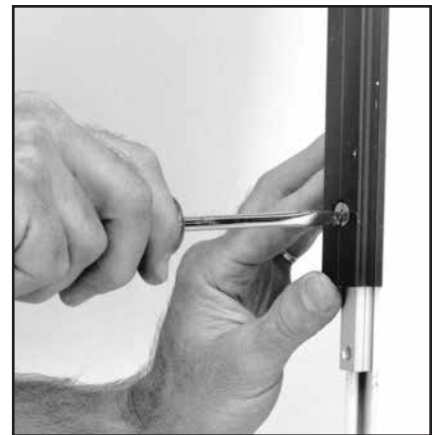
***REMEMBER:** The tracks may slide up the lower part of the mast but may hang up when they reach a spliced area of the mast.*



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



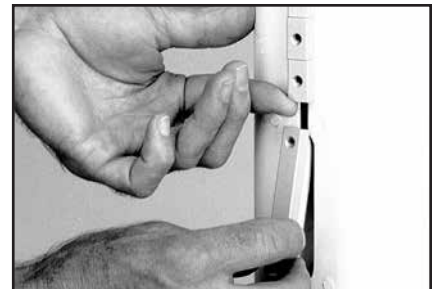
5 Loosen the top screw and slide the top track up far enough to place the next 6'8 1/4" (2.05 m) track in place. Mast up: tighten bottom screw to hold the track in place.



3 Thread a 1" (25 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 1" (25 mm) screw.



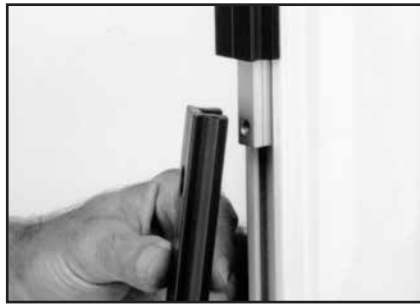
6 Slide 15 mounting slugs and a connector slug into the mast groove. Mast up: tape in place. Put a drop of blue Loctite in each hole.



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.



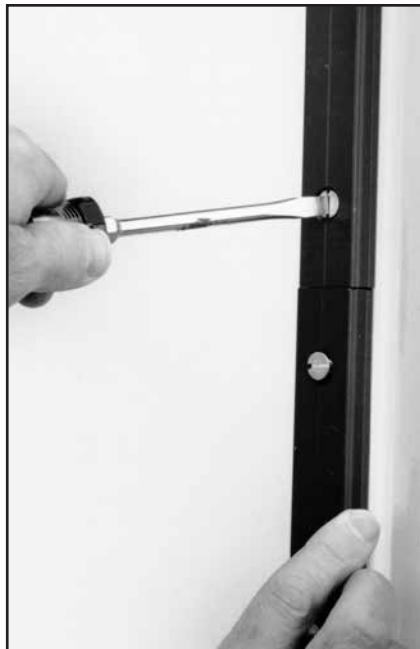
Use a putty knife to slide the next slugs and connector slug in place and loosely install the $\frac{5}{8}$ " (16 mm) screws.



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.

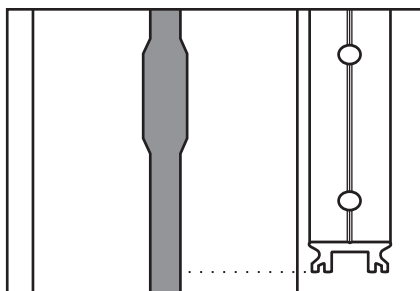


8 Repeat until all full length tracks are installed.

Do not install the $2\frac{5}{8}$ " (67 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 $1\frac{1}{4}$ " (32 mm) end stop slug, followed by four $\frac{3}{4}$ " (19 mm) mounting slugs, and the $2\frac{5}{8}$ " (67 mm) connector slug on top.



9 Push tracks up so the $17\frac{3}{4}$ " (451 mm) to $19\frac{3}{4}$ " (502 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 $17\frac{3}{4}$ " (451 mm) if not listed below

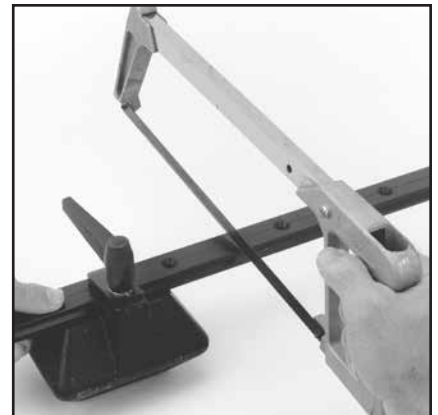
Make bottom track $18\frac{3}{4}$ " (476 mm) if length is listed below

28'6"	35'3"	42'	48'9"	55'5"
(8.687 m)	(10.744 m)	(12.802 m)	(14.859 m)	(16.891 m)

Make bottom track $19\frac{3}{4}$ " (502 mm) if length is listed below

28'7"	35'4"	42'1"	48'10"	55'6"
(8.712 m)	(10.770 m)	(12.827 m)	(14.884 m)	(16.916 m)

11 Drill two $\frac{13}{64}$ " (5.5 mm) holes in the cut end of the track centered at $\frac{5}{16}$ " (8 mm) and $1\frac{1}{16}$ " (27 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

2720 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.**

#10 (5 mm) Flathead Screws (not included)

Number of fasteners needed:

2720 Track — 10 fasteners/meter of track

2724 Splice Pieces

263 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.



2720



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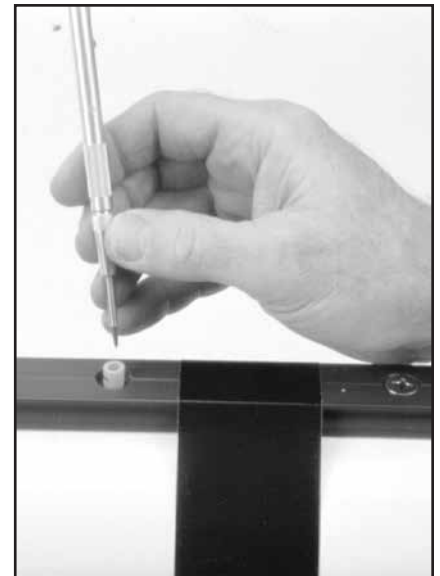
2724

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.

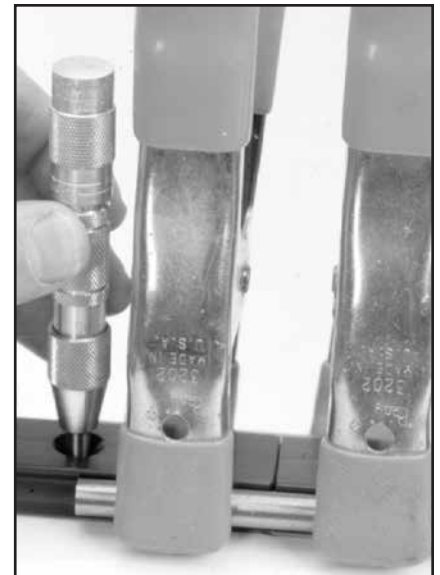
Tip: For accuracy and ease of punching use a spring loaded machinist's center punch. Use the narrow shaft model with a centering tube fashioned from a piece of plastic tubing.



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 2724 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 (1792 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.

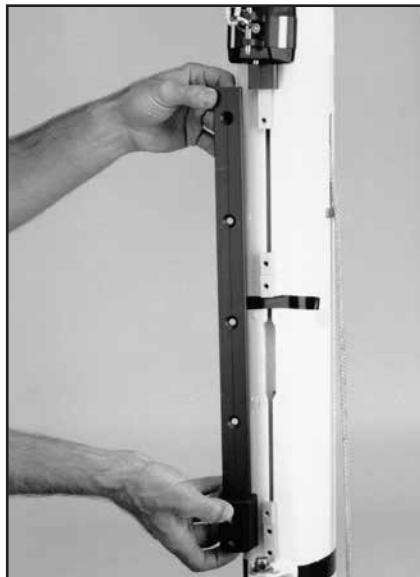


16 Ease cars onto bottom section.



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.



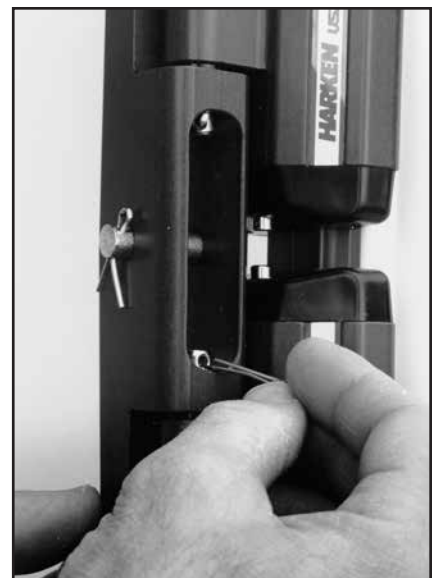
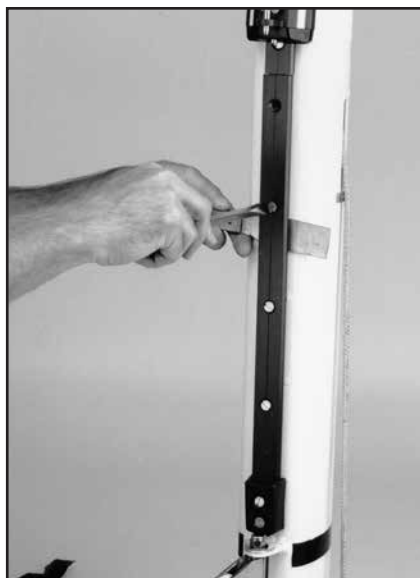
17 1792: Install the headboard coupler so that the cotter pin end of the clevis pin is toward the middle of the coupler. 1807: Coupler will be pre-assembled. Ignore this step.



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.

Track
Mast
Screws



Loading Sail On Car

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

Luff cars

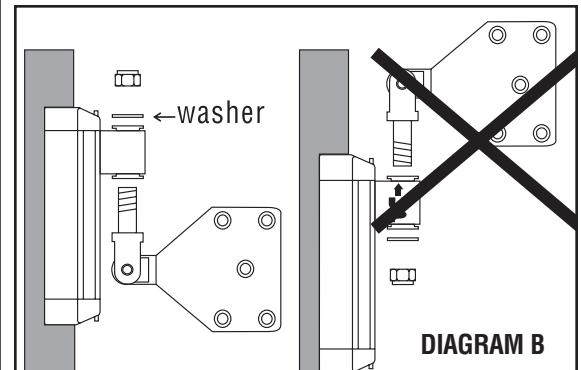
Remove clevis pin, place plastic center sleeve between tangs and slip clevis in place. Secure with cotter pin. Make sure that webbing is not twisted.

1944 Car

Slip clevis pin through car and secure with cotter pins.



1976, 1901 cars With Battslide Receptacle



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 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.

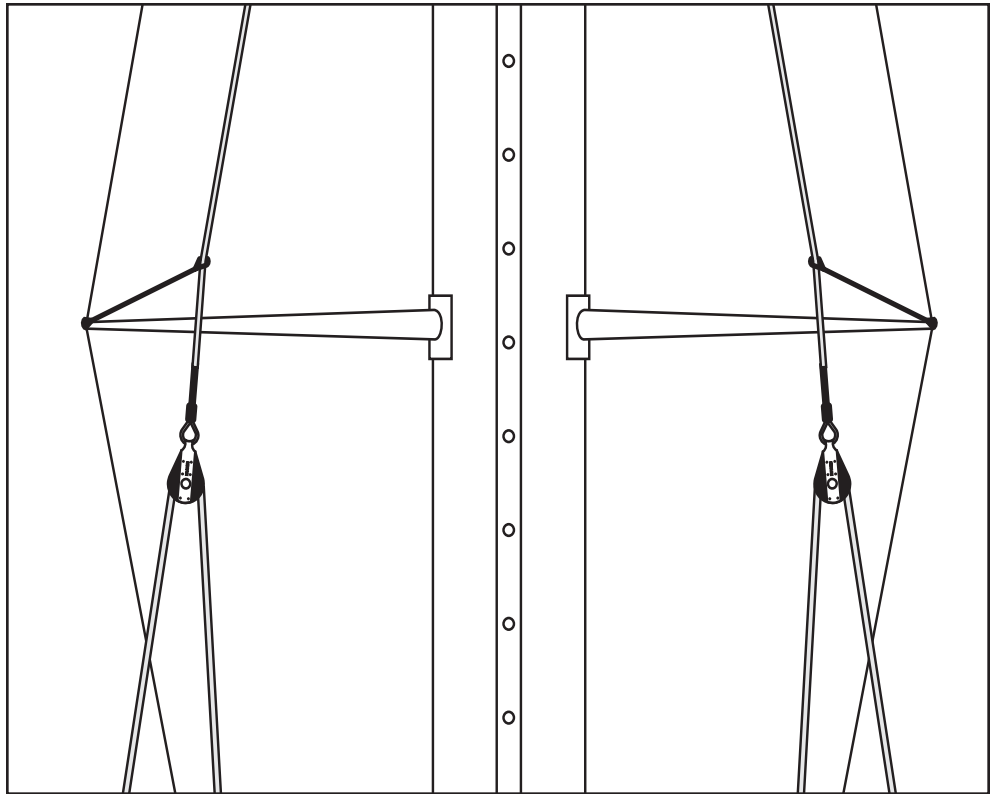


DIAGRAM C

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.

Clean tracks 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

1944

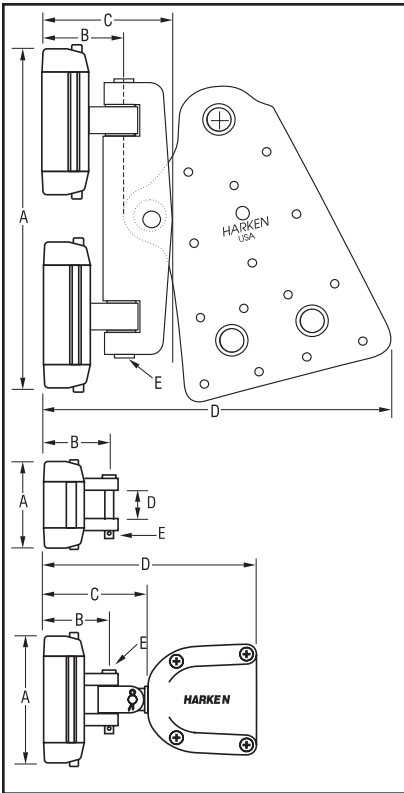
Remove Clevis Pin & Cotter Pin.

Battslide Receptacles

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
1777	Luff Slider car	—	—	—	2" 51 mm	1 1/8" 28 mm	—	3/4" 19 mm	3/16" 5 mm
1792	Headboard car assembly w/headboard	—	—	—	7 7/8" 200 mm	1 5/8" 41 mm	2 13/16" 71 mm	7 3/4" 197 mm	3/8" 9.5 mm
1807	Light duty headboard coupler car assembly	—	—	—	7 7/8" 200 mm	—	2 13/16" 71 mm	—	3/8" 9.5 mm
1825	Battcar w/10 mm stud	Flat 1 5/8" 41 mm Round 5/8" 17 mm	—	Round	3" 76 mm	1 5/8" 41 mm	2 5/8" 67 mm	—	3/16" 5 mm
1894	Luff car	—	—	—	2 1/8" 54 mm	1 5/8" 41 mm	—	3/4" 19 mm	3/16" 5 mm
1901	Battcar w/adjustable flat or round Battslide	Flat 1 5/8" 41 mm Round 1 1/2" 12 mm	Flat 3/8" 10 mm Round 1 1/2" 12 mm	Flat or round	3" 76 mm	1 5/8" 41 mm	2 1/2" 64 mm	8 1/2" 216 mm	5/16" - 18**
1944	Battcar w/40 mm batten receptacle	Flat 1 5/8" 41 mm Round 5/8" 16 mm	Flat 1/4" 6 mm Round 5/8" 16 mm	Flat or round	3" 76 mm	1 5/8" 41 mm	2 13/16" 71 mm	5 3/4" 146 mm	1/4" 6 mm
1976	Battcar w/midi Battslide	1 5/8" 41 mm	1 1/2" 12 mm	Flat	3" 76 mm	1 5/8" 41 mm	2 1/2" 64 mm	4 11/16" 119 mm	5/16" - 18**
1976	Battcar w/fixed round Battslide	7/16" 11 mm	1 1/2" 12 mm	Round	3" 76 mm	1 5/8" 41 mm	2 1/2" 64 mm	4 11/16" 119 mm	5/16" - 18**
1976	Battcar w/maxi Battslide	2" 51 mm	1 1/2" 12 mm	Flat	3" 76 mm	1 5/8" 41 mm	2 1/2" 64 mm	4 11/16" 119 mm	5/16" - 18**
1977	Universal Battcar*	—	—	—	—	—	—	3/4" 20 mm	1/4" 6 mm
HL	Hi-load Battcars and headboard cars are required for larger mainsails.								

*Batten receptacle not included. **Use locknuts

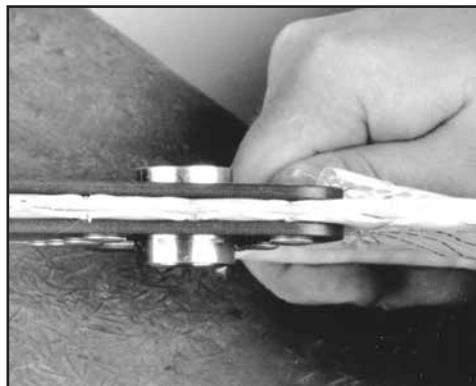
Installing 1792 Headboard Plates



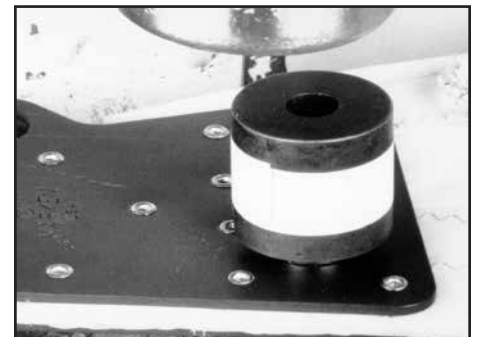
Make sure that height of sail is correct and setbacks are uniform. Refer to the chart above for the correct setbacks and alignment of the headboard.

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.

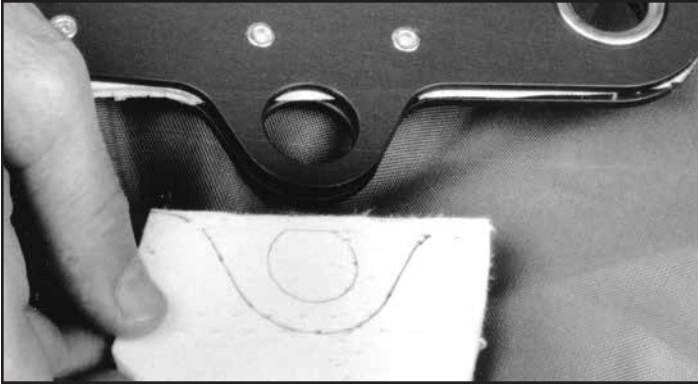
Closing Tools:

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 .535" (14 mm).

Make sure the ring fits inside the coupler.

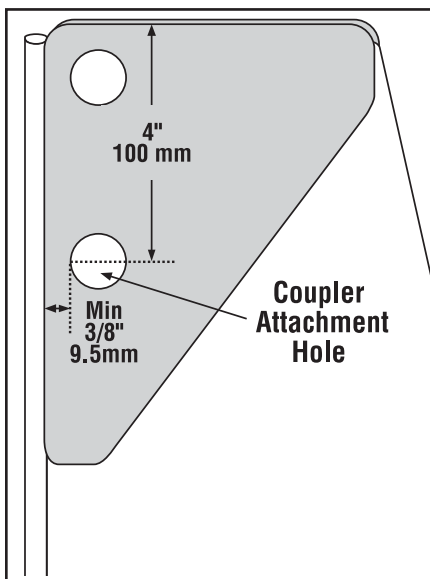


Installing 1807 Light Duty Headboard Coupler Car Assembly

The 1807 light duty headboard coupler is designed to attach to standard headboards with some headboard modification.

Note: If $\frac{1}{16}$ " (1.5 mm) plates are used, a stainless steel headboard liner must be used in the hole for the coupler.

Maximum Mainsail Area	
Monohull	425 ft ² (40 m ²)
Multihull	350 ft ² (33 m ²)
Headboard Plate Thickness	
$\frac{1}{16}$ " (1.5 mm) or $\frac{1}{8}$ " (3 mm) per plate	
Maximum Thickness of Headboard Plates and Sail	
$\frac{9}{16}$ " (14 mm)	

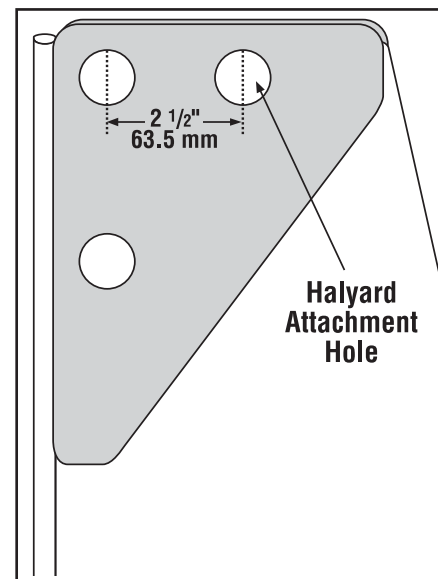


Coupler Attachment Hole

Use a stainless steel headboard liner with an inside diameter of at least $\frac{1}{2}$ " (12.7 mm). Although a liner is recommended, $\frac{1}{8}$ " (3 mm) thick headboard plates could be used without a liner.

Drill the coupler attachment hole so the center is 4" (101 mm) down from the top of the headboard and approximately $1\frac{1}{2}$ " (38 mm) from the front edge of the boltrope.

You must leave at least $\frac{3}{8}$ " (9 mm) between the front of the headboard plate and the front edge of the coupler attachment hole.



Halyard Attachment Hole

If the headboard has two halyard attachment holes, use the aft hole. If not, drill a second hole large enough to accept the halyard shackle pin. Locate hole approximately $2\frac{1}{2}$ " (63.5 mm) aft of the existing hole.

If the halyard attachment hole is not moved aft, the top of the headboard will cock aft, pushing the bottom of the plate into the coupler.

Sailmaker's Instructions

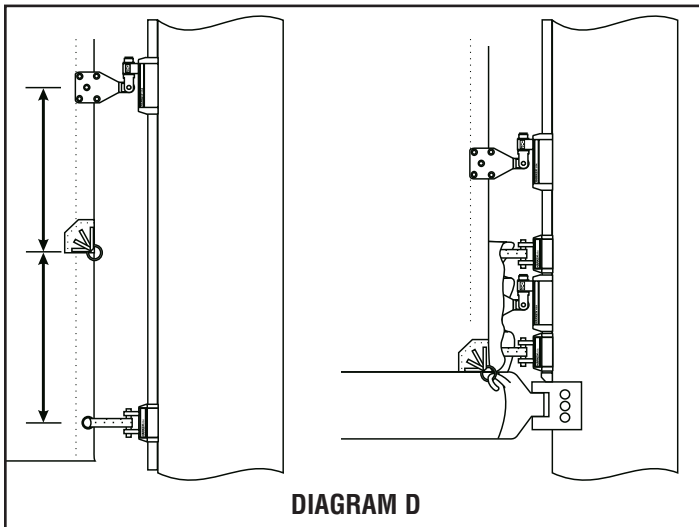
Distance Between Attachment Points

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).

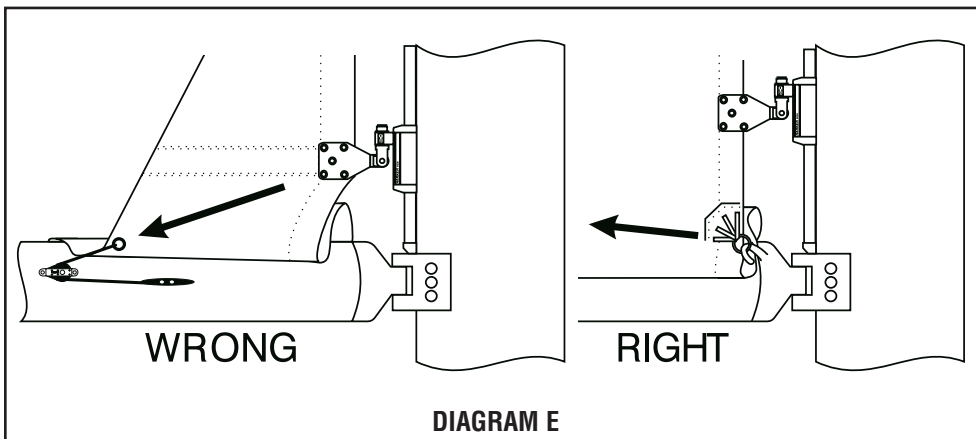
The distance may be greater if luff is stiffer. If attachment distance is greater, pretension the boltrope so that there is no flapping between attachment points.

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

Setting Up Reef Points

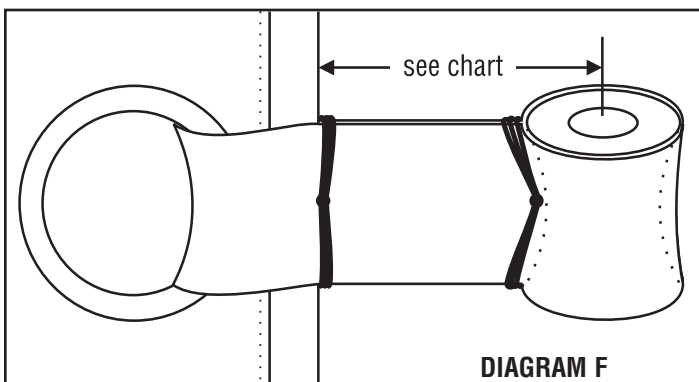


Space reef points so that they are halfway between sail attachment points. Especially with upper reef where sail needs to extend past the stack of cars to the reef tack fitting. Battens or reef points may need to be moved to allow this.



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



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

		1944 Car	1901/1976 Car
1777	Plastic Luff Car	1 3/4" (44 mm)	1 3/8" (35 mm)
1894	Luff Car	1 1/4" (32 mm)	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.

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

1944, 1944HL Battcars with Batten Receptacle

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

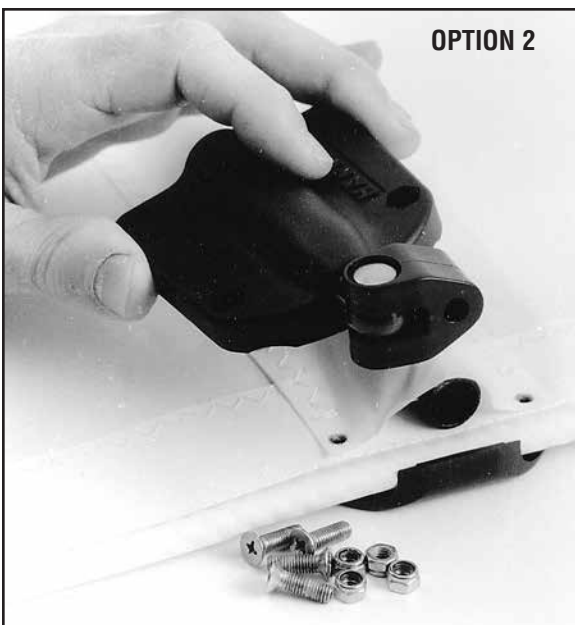
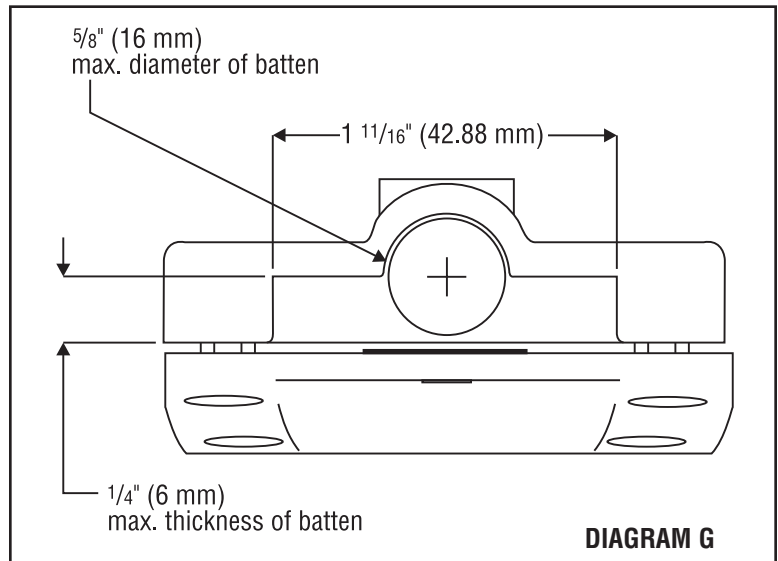
- Option 1 - End batten pocket about 10" (254 mm) from the receptacle. If this is done, the optional rubber shim may be required.
- Option 2 - Test to see if the batten will fit inside the receptacle with cloth in place. If necessary, pucker the batten pocket, drawing the edges together to allow batten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



Assembling Battslide® Midi and Maxi Batten End Fittings

Midi fits battens with width up to 1⁵/₈" (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.

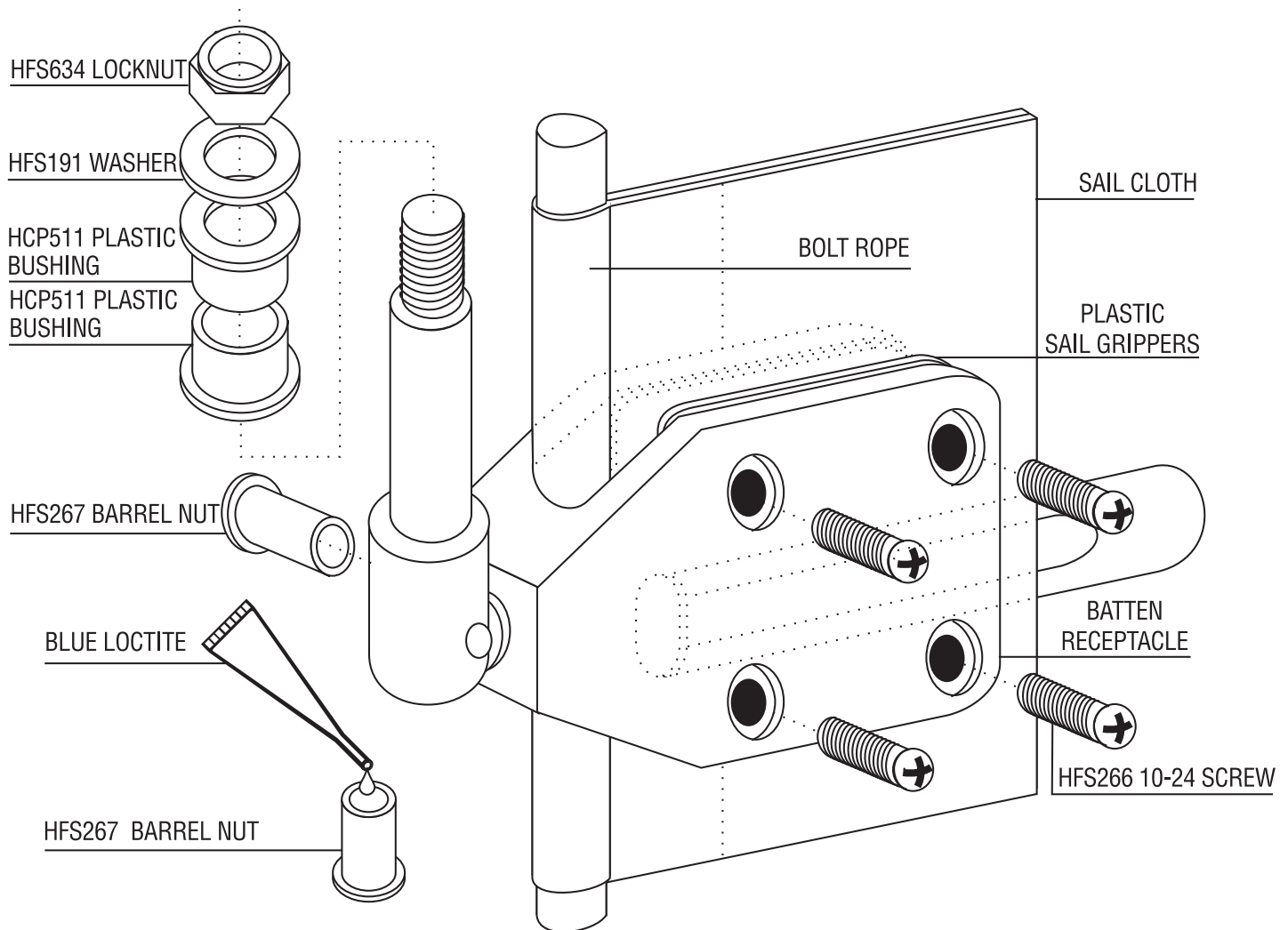


DIAGRAM H: Midi/Maxi

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 5/32" (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 1901 Harken Battcar with Adjustable Round or Flat Battslide® Receptacle

Flat Battens: The 1901 receptacle fits flat battens up to 1 5/8" (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 1901 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).

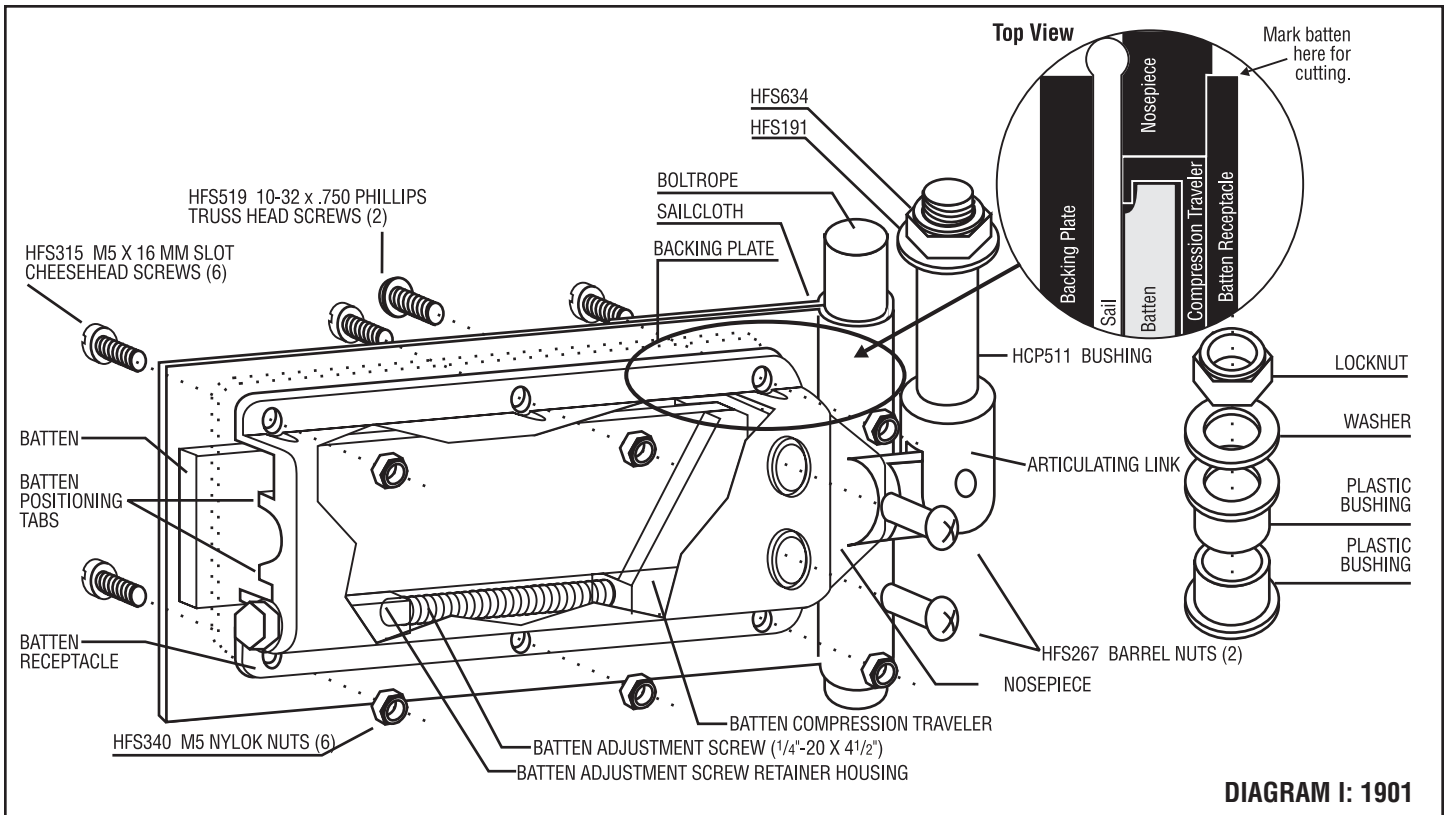


DIAGRAM I: 1901

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 5/8" (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 I). 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 fresh water to flush dirt out of cars; move cars up/down to circulate; follow with a high pressure water rinse. 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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HARKEN®

BATTCAR INSTALLATION MANUAL

System A CB and Slider

Installation Manual – Intended for specialized personnel or expert users

4248 10/14



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Please read these instructions carefully before installing, servicing, or operating the equipment.

This manual may be modified without notice: www.harken.com/manuals for updated versions.

PLEASE SAVE THESE INSTRUCTIONS

Introduction

This manual gives technical information on installation and service. This information is **written exclusively** for specialized personnel or expert users. Installation, disassembling, and reassembling by personnel who are not experts may cause serious damage to property, or injury to users and those in the vicinity of the product. If you do not understand an instruction, contact Harken.

The user must have appropriate training in order to use this product.

Harken accepts no responsibility for damage or harm caused by not observing the safety requirements and instructions in this manual. See limited warranty, general warnings, and instructions in www.harken.com/manuals.

Purpose

Harken Battcars are designed to reduce the size of, or completely drop the mainsail on a sailboat so wind has little effect on the sail. Use of this product for other than normal sailboat applications is not covered by the limited warranty.

Safety Precautions



WARNING! This symbol alerts you to potential hazards that may kill or hurt you and others if you don't follow instructions. The message will tell you how to reduce the chance of injury.



CAUTION! This symbol alerts you to potential hazards that may hurt you and others if you do not follow instructions. The message will tell you how to reduce the chance of injury.



WARNING! Strictly follow all instructions to avoid potential hazards that may kill or hurt you and others: www.harken.com/manuals for general warnings and instructions.

Headboard Car Assemblies

CB BALL BEARING CARS

SLIDER CARS



Intermediate Cars

CB BALL BEARING CARS

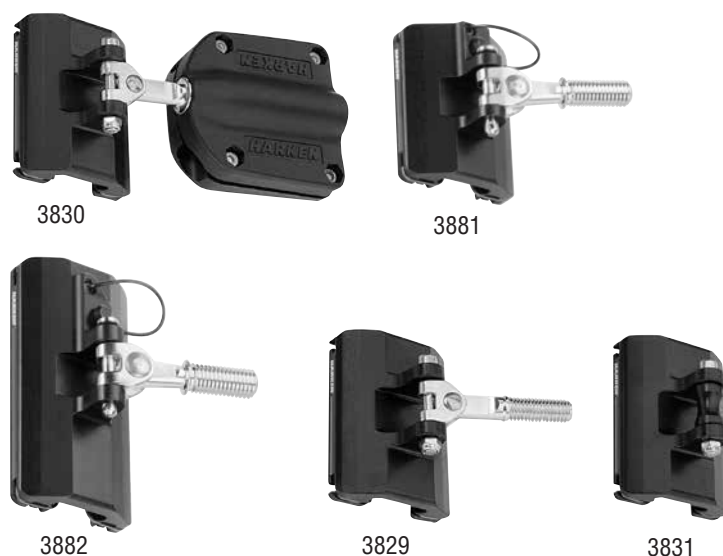
SLIDER CARS



Batten Cars

CB BALL BEARING CARS

SLIDER CARS

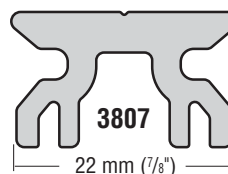
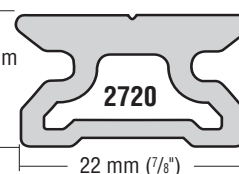


Part No.	Description	Length		Width		Weight		Max headboard thickness		Max batten Ø				Batten	Maximum working load	
		in	mm	in	mm	oz	g	in	mm	in	mm	in	mm		lb	kg
CB Cars: Typical Boat Length: Monohulls 11.3 - 15.2 m (37 - 50 ft); Multihulls 9.1 - 12.2 m (30 - 40 ft)																
3811	Headboard car assembly	8⅞	213	2¼	57	18	518	9/16	14	—	—	—	—	—	1600	725
3812	Intermediate car	2¼	57	2¼	57	4	109	—	—	—	—	—	—	—	—	—
3829	Battcar/10 mm stud**	2⅞	73	2¼	57	6	157	—	—	—	—	—	—	—	600	272
3830	Battcar/40 mm receptacle	2⅞	73	2¼	57	9	253	—	—	1⅝	41	⅝	16	Flat/round	600	272
3881	Battcar/12 mm stud**	2⅞	73	2¼	57	6.4	182	—	—	—	—	—	—	—	600	272
3831	Universal Battcar**	2⅞	73	2¼	57	4.3	122	—	—	—	—	—	—	—	600	272
3882	Batten car/12 mm stud**	4⅞	105	2¼	57	8.2	232	—	—	—	—	—	—	—	875	397
3883	Reef car	4⅞	105	2¼	57	6.1	174	—	—	—	—	—	—	—	875	397
Slider Cars: Typical Boat Length: Monohulls 11.3 - 15.2 m (37 - 50 ft); Multihulls 9.1 - 12.2 m (30 - 40 ft)																
3827	Headboard car assembly	6	153	1¼	35	10	269	9/16	14	—	—	—	—	—	1600	725
1777	Low-load intermediate car*	2	51	1¼	32	1.1	32	—	—	—	—	—	—	—	200	91
3828	Intermediate car	1¾	44	1⅜	35	1.6	45	—	—	—	—	—	—	—	350	159
3802	Battcar/10 mm stud**	1¾	44	1⅜	35	2.8	80	—	—	—	—	—	—	—	350	159
3803	Battcar/40 mm receptacle	1¾	44	1⅜	35	6.4	181	—	—	1⅝	41	⅝	16	Flat/round	350	159

**Track mounting kit
3804, 3805, 3806**

**Screwpin endstop kits
3824, 3825, 3826**

**Spare
car screws**

**Endstop kits
3808, 3809, 3810**
Track (slug type)

Track (drill and tap)

Track and Accessories

Part No.	Description	Includes
Mounting Slug Method		
3804, 3805 3806	Track mounting kit	(a) 15 mounting slugs 19 mm (3/4"); (b) 1 connector slug 67 mm (2 5/8"); (c) 2 tubes blue Loctite® adhesive; (d) 17 HFS1015 flathead screws 5 x 20 mm
3824, 3825 3826	Screwpin endstop kt	(e) 1 end track with screwpin stop; (f) 1 top stop slug 32 mm (1 1/4"); (g) 1 top endstop 263A; (h) 1 mounting slug 19 mm (3/4"); (i) 2 HFS320 flathead screws 5 x 25 mm; (j) 2 HFS1015 flathead screws 5 x 20 mm; (k) 1 tube blue Loctite® adhesive
3808, 3809 3810	Endstop kit	(g) 2 endstops 263A; (i) 4 HFS320 flathead screws 5 x 25 mm; (f) 2 stop slugs 32 mm (1 1/4")
3807	Track	Section length: 2.05 m (6'8 7/8"). Number of track sections will vary according to luff length of your mainsail.
Drill & Tap Method		
2720	Track	Use for masts without grooves or when slugs will not fit. Purchase stainless steel #10 (5 mm) screws separately. Do not use 3807 open-backed track. It requires mounting slugs. See page 8 for drill/tap sizes and mounting instructions.

Loctite is a registered trademark of Henkel AG & Company KGaA.

Tools You Will Need

1. Tape measure	10. Putty knife
2. Tape	11. Hex wrench (4 mm)
3. Power drill (screwdriver)	12. Nut driver (8 mm) or open wrench
4. Drill bit 5.5 mm ($\frac{13}{64}$ ")	Drill & Tap (additional)
5. Phillips screwdriver	13. Spring clamp
6. Hammer	14. Spring-loaded center punch (not shown)
7. Hacksaw	15. Drill bit 4.2 mm ($\frac{5}{32}$ ") (not shown)
8. Center punch	16. Tap 5 x .80 mm (10-32) (not shown)
9. File	17. Transfer punch (5.2 mm or .205")

Mast-Up Installation: Stepladder secured to the boat.

Work Height: 2.13 m (7') above boom



Sizing

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

Car part numbers			Car type	Maximum sail area			
Headboard	Battcars	Intermediate		Monohull		Multihull	
3811	3829, 3830	3812, 3831	CB	600 ft ²	56 m ²	500 ft ²	46 m ²
3827	3802, 3803	3828	Slider	600 ft ²	56 m ²	500 ft ²	46 m ²
—	—	1777	Slider	350 ft ²	33 m ²	300 ft ²	28 m ²

Sail Modifications (See page 12)

- Mainsail headboard
 - Drill new halyard location
 - Drill attachment to accept clevis pin for 3811/3827 headboard car coupler.
- Batten receptacle on sail to accept 10 mm threaded stud.
Note: Harken does not supply receptacle.
- Becket spacer on sail for 1777, 3812, 3828, or 3831 intermediate cars.

Determine Track Length

Measure track length from point 1 to point 2. See diagram at left. Use this measurement in two charts to follow.

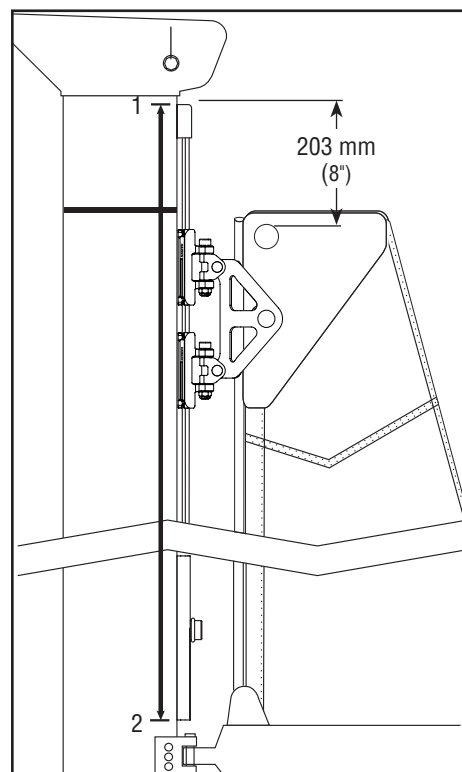
- Upper end:** 203 mm (8") above black band. Track is longer than sail luff length to allow for stretch as sail ages. Track *must not* block halyard exit.
- Lower end:** Bottom of track will be approximately 10 mm (3/8") above gooseneck fitting. When installed 3824, 3825, 3826 endstop kit track should be as low as possible yet you should still be able to install long headboard cars. Test measurement by using long headboard car. See photo at right.

3808, 3809, 3810 Endstop kit: Cut a 203 mm (8") piece from finished end of one of the 2.05 m (6'8 7/8") 3807 tracks. You will remove this track when loading cars so it can be lower on mast. See page 7, step 11. Drill lower hole for stop. See page 5, step 3.

Number of Track Sections

Bottom 203 mm (8") endstop track and variable length top track included in measurements below. See example below:

Track Length	Number of 2.05 m (6'8 7/8") Track Sections	Track length example
8.458 m to 10.490 m (27'9" to 34'5")	5	2.05 m (6'8 7/8")
10.516 m to 12.522 m (34'6" to 41'1")	6	2.05 m (6'8 7/8")
12.548 m to 14.580 m (41'2" to 47'10")	7	2.05 m (6'8 7/8")
14.605 m to 16.637 m (47'11" to 54'7")	8	2.05 m (6'8 7/8")
16.662 m to 18.694 m (54'8" to 61'4")	9	2.05 m (6'8 7/8")
		Total 10.49 m (34'5")

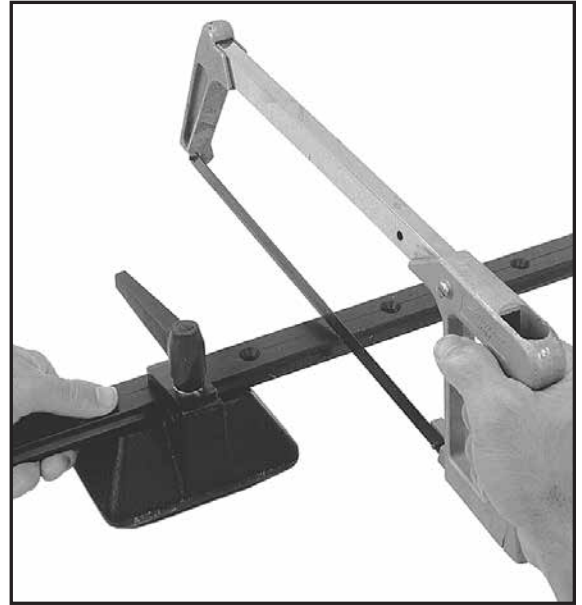


Top track length chart: (use for 3807 slug mount track). Round track length to nearest 25 mm (1").

Note: Chart is based on using 8" (203 mm) end track at bottom.

Total Track Length (as defined on page 3)										Top Track Length	
27' 9"	8.458 m	—	—	41' 2"	12.548 m	47' 11"	14.605 m	54' 8"	16.662 m	1 ⁵ / ₁₆ "	41 mm
27' 10"	8.484 m	34' 6"	10.516 m	41' 3"	12.573 m	48' 0"	14.630 m	54' 9"	16.688 m	2 ¹ / ₁₆ "	52 mm
27' 11"	8.509 m	34' 7"	10.541 m	41' 4"	12.598 m	48' 1"	14.656 m	54' 10"	16.713 m	3"	76 mm
28' 1"	8.560 m	34' 9"	10.592 m	41' 6"	12.649 m	48' 3"	14.707 m	55' 0"	16.764 m	5"	127 mm
28' 3"	8.611 m	34' 11"	10.643 m	41' 8"	12.700 m	48' 5"	14.757 m	55' 2"	16.815 m	7"	178 mm
28' 5"	8.661 m	35' 1"	10.693 m	41' 10"	12.751 m	48' 7"	14.808 m	55' 4"	16.866 m	9"	229 mm
28' 7"	8.712 m	35' 3"	10.744 m	42' 0"	12.802 m	48' 9"	14.859 m	55' 6"	16.916 m	11"	279 mm
28' 9"	8.763 m	35' 5"	10.795 m	42' 2"	12.852 m	48' 11"	14.910 m	55' 8"	16.967 m	1' 1"	330 mm
28' 11"	8.814 m	35' 7"	10.846 m	42' 4"	12.903 m	49' 1"	14.961 m	55' 10"	17.018 m	1' 3"	381 mm
29' 1"	8.865 m	35' 9"	10.897 m	42' 6"	12.954 m	49' 3"	15.011 m	56' 0"	17.069 m	1' 5"	432 mm
29' 3"	8.915 m	35' 11"	10.947 m	42' 8"	13.005 m	49' 5"	15.062 m	56' 2"	17.120 m	1' 7"	483 mm
29' 5"	8.966 m	36' 1"	10.998 m	42' 10"	13.056 m	49' 7"	15.113 m	56' 4"	17.170 m	1' 9"	533 mm
29' 7"	9.017 m	36' 3"	11.049 m	43' 0"	13.106 m	49' 9"	15.164 m	56' 6"	17.221 m	1' 11"	584 mm
29' 9"	9.068 m	36' 5"	11.100 m	43' 2"	13.157 m	49' 11"	15.215 m	56' 8"	17.272 m	2' 1"	635 mm
29' 11"	9.119 m	36' 7"	11.151 m	43' 4"	13.208 m	50' 1"	15.265 m	56' 10"	17.323 m	2' 3"	686 mm
30' 1"	9.169 m	36' 9"	11.201 m	43' 6"	13.259 m	50' 3"	15.316 m	57' 0"	17.374 m	2' 5"	737 mm
30' 3"	9.220 m	36' 11"	11.252 m	43' 8"	13.310 m	50' 5"	15.367 m	57' 2"	17.424 m	2' 7"	787 mm
30' 5"	9.271 m	37' 1"	11.303 m	43' 10"	13.360 m	50' 7"	15.418 m	57' 4"	17.475 m	2' 9"	838 mm
30' 7"	9.322 m	37' 3"	11.354 m	44' 0"	13.411 m	50' 9"	15.469 m	57' 6"	17.526 m	2' 11"	889 mm
30' 9"	9.373 m	37' 5"	11.405 m	44' 2"	13.462 m	50' 11"	15.519 m	57' 8"	17.577 m	3' 1"	940 mm
30' 11"	9.423 m	37' 7"	11.455 m	44' 4"	13.513 m	51' 1"	15.570 m	57' 10"	17.628 m	3' 3"	991 mm
31' 1"	9.474 m	37' 9"	11.506 m	44' 6"	13.564 m	51' 3"	15.621 m	58' 0"	17.678 m	3' 5"	1.041 m
31' 3"	9.525 m	37' 11"	11.557 m	44' 8"	13.614 m	51' 5"	15.672 m	58' 2"	17.729 m	3' 7"	1.092 m
31' 5"	9.576 m	38' 1"	11.608 m	44' 10"	13.665 m	51' 7"	15.723 m	58' 4"	17.780 m	3' 9"	1.143 m
31' 7"	9.627 m	38' 3"	11.659 m	45' 0"	13.716 m	51' 9"	15.773 m	58' 6"	17.831 m	3' 11"	1.194 m
31' 9"	9.677 m	38' 5"	11.709 m	45' 2"	13.767 m	51' 11"	15.824 m	58' 8"	17.882 m	4' 1"	1.245 m
31' 11"	9.728 m	38' 7"	11.760 m	45' 4"	13.818 m	52' 1"	15.875 m	58' 10"	17.932 m	4' 3"	1.295 m
32' 1"	9.779 m	38' 9"	11.811 m	45' 6"	13.868 m	52' 3"	15.926 m	59' 0"	17.983 m	4' 5"	1.346 m
32' 3"	9.830 m	38' 11"	11.862 m	45' 8"	13.919 m	52' 5"	15.977 m	59' 2"	18.034 m	4' 7"	1.397 m
32' 5"	9.881 m	39' 1"	11.913 m	45' 10"	13.970 m	52' 7"	16.027 m	59' 4"	18.085 m	4' 9"	1.448 m
32' 7"	9.931 m	39' 3"	11.963 m	46' 0"	14.021 m	52' 9"	16.078 m	59' 6"	18.136 m	4' 11"	1.499 m
32' 9"	9.982 m	39' 5"	12.014 m	46' 2"	14.072 m	52' 11"	16.129 m	59' 8"	18.186 m	5' 1"	1.549 m
32' 11"	10.033 m	39' 7"	12.065 m	46' 4"	14.122 m	53' 1"	16.180 m	59' 10"	18.237 m	5' 3"	1.600 m
33' 1"	10.084 m	39' 9"	12.116 m	46' 6"	14.173 m	53' 3"	16.231 m	60' 0"	18.288 m	5' 5"	1.651 m
33' 3"	10.135 m	39' 11"	12.167 m	46' 8"	14.224 m	53' 5"	16.281 m	60' 2"	18.339 m	5' 7"	1.702 m
33' 5"	10.185 m	40' 1"	12.217 m	46' 10"	14.275 m	53' 7"	16.332 m	60' 4"	18.390 m	5' 9"	1.753 m
33' 7"	10.236 m	40' 3"	12.268 m	47' 0"	14.326 m	53' 9"	16.383 m	60' 6"	18.440 m	5' 11"	1.803 m
33' 9"	10.287 m	40' 5"	12.319 m	47' 2"	14.376 m	53' 11"	16.434 m	60' 8"	18.491 m	6' 1"	1.854 m
33' 11"	10.338 m	40' 7"	12.370 m	47' 4"	14.427 m	54' 1"	16.485 m	60' 10"	18.542 m	6' 3"	1.905 m
34' 1"	10.389 m	40' 9"	12.421 m	47' 6"	14.478 m	54' 3"	16.535 m	61' 0"	18.593 m	6' 5"	1.956 m
34' 3"	10.439 m	40' 11"	12.471 m	47' 8"	14.529 m	54' 5"	16.586 m	61' 2"	18.644 m	6' 7"	2.007 m
34' 5"	10.490 m	41' 1"	12.522 m	47' 10"	14.580 m	54' 7"	16.637 m	61' 4"	18.694 m	6' 8 ⁷ / ₈ "	2.054 m

1. Cut special length top track from 2.05 m (6'8 3/4") track.



2. Deburr cut.

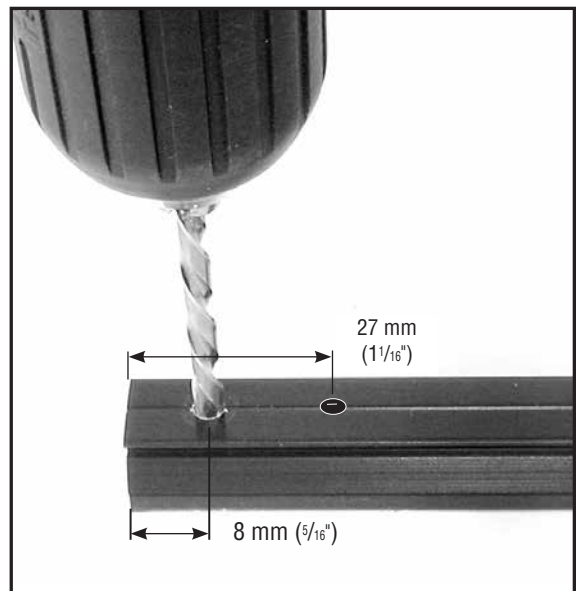
Slightly round track corners that will slide against mast.



3. Drill two 5.5 mm (13/64") holes in cut end of track.
Center at 8 mm (5/16") and 27 mm (11/16").

Short top track lengths

41 mm (1 5/16")	Use existing hole. Do not drill second hole.
52 mm (2 1/16")	Use existing hole, drill hole 5/16" (8 mm) from cut end.



67 mm (2 5/8") connector slug must fit feeder opening.
File opening to make longer.

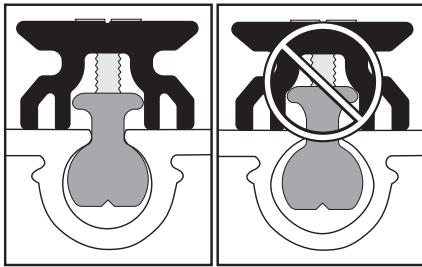
Use halyard with retrieval line to hoist 67 mm (2 5/8") connector slug up mast to check for burrs in groove.

Mast prebend: May require straightening before installation.

Storm Trysail Track

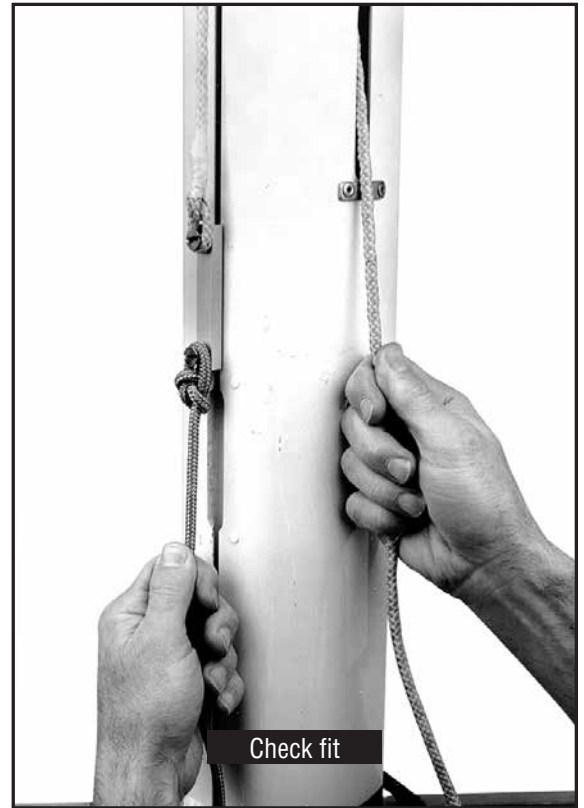
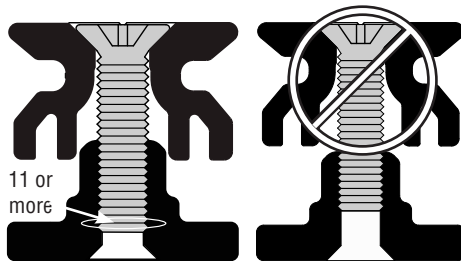
Cars must clear storm trysail track. Tracks often converge above spreaders.

Aft face of mast must be flat or convex.



Test track: Put mounting slug in groove, track section on mast. Tighten with screw. Track must be drawn tightly to mast.

Mounting screw must be long enough for mast groove.
If necessary, purchase longer screws.



Warning! Screws need minimum of 5 threads (turns) engaged to hold track to mast. Turn screw 360° five times after threads engage slug.

1. Slip top track slugs into mast groove. Use 32 mm (1 1/4") mounting slug for top stop.

Short top track lengths	Top slug
41 mm (1 5/16")	67 mm (2 5/8")
52 mm (2 1/16")	19 mm (3/4")

Mast up: Tape 32 mm (1 1/4") slug even with top of upper track. Tape other slugs in place.



2. One drop blue Loctite® adhesive into each connector slug hole.



3. Thread 5 mm x 25 mm endstop screws through endstop, track, and into endstop slug.

Short top track lengths	
41 mm (1 5/16")	Use one screw in stop
52 mm (2 1/16")	Use both screws

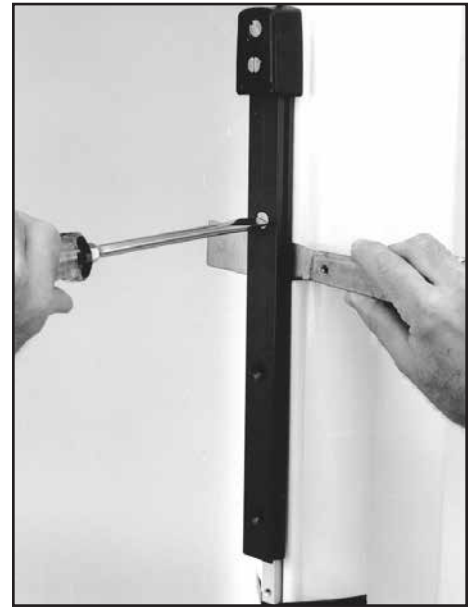
Mast up: Remove tape. Tighten screw to hold track.



4. Slide slugs into place with putty knife.
Loosely install 5 mm x 20 mm screws.

Tip: Use putty knife to see if screws are loose enough to slide in groove.

Remember: Tracks may stick when reaching a spliced area on mast.



5. Loosen top screw. Slide top track up and position next 2.05 m (6'8 3/4") track.

Mast up: Tighten bottom screw to hold track.



6. Slide 15 mounting slugs and then the connector slug into mast groove.

Mast up: Tape in place.

One drop blue Loctite® adhesive into each hole.



7. Hold full-length track piece up to mast. Loosely install top screw.

Use putty knife to slide additional slugs and connector slug into place. Loosely install all fifteen 5 mm x 20 mm screws.

8. Slide tracks up enough to fit next track.

Mast up: Hold upper tracks. Loosen screw that holds tracks. Slide track up. If screws bind in mast groove opening, loosen them untill track slides. Tighten new bottom screw securely.



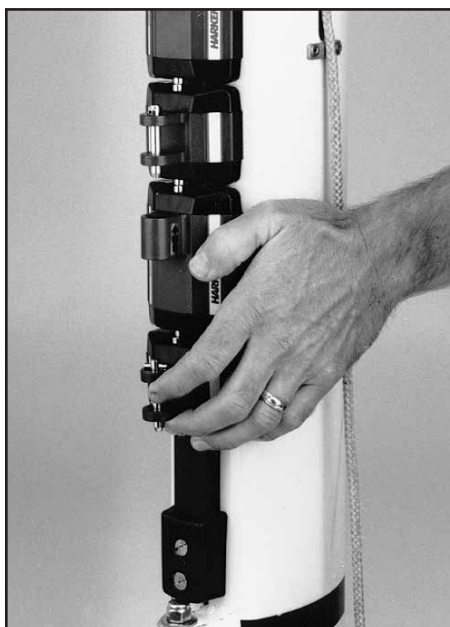
CAUTION! Do not let tracks drop. Severe injury to hands and/or fingers can result.

9. Repeat until full-length tracks installed.

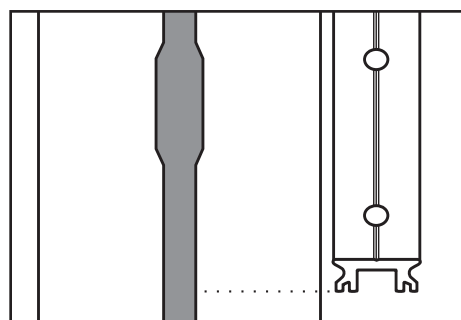
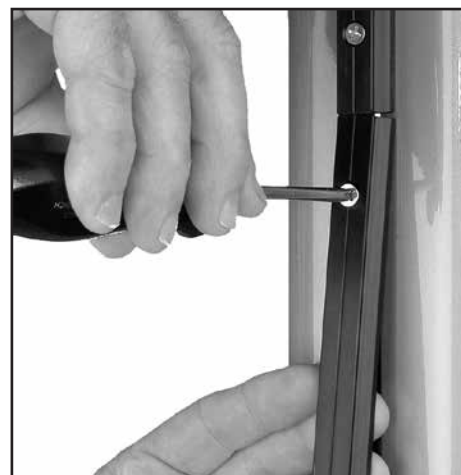


10. Raise tracks so 203 mm (8") bottom track fits.

11. Install screwpin endstop kit.



3808, 3809, 3810 Endstop Kit
Leave bottom 203 mm (8") track off untill cars are installed.



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

Track and Accessories

Part No.	Description	Includes
Purchase from Harken		
2707	Track (Micro CB)	Use for masts without grooves or when slugs will not fit. Purchase stainless steel #8 (4 mm) screws separately. Do not use 3817 open-backed track. It requires mounting slugs. See page 11 for drill/tap sizes and mounting instructions.
2724	Splice links	One needed for each track joint
263	Endstop set	
Purchase Separately		
#10 (5 mm) Flathead screws	Purchase 10 fasteners/meter of track	
Drill	4.2 mm (5/32")	
Tap	10-32 (5 x .80 mm)	

**Determining Track Length**

Bottom track must be short enough to remove easily. Use 457 mm to 609 mm (18" to 24") length. **Do not use 3807 track for drilling and tapping.**

Remove Old Track

IMPORTANT! Before removing old track, scribe pencil line down either side.

Drill, Tap, and Fasten

After old track is removed, attach string to mast to line up track during installation.

1. Start at one end of track and work down: Do not drill and tap from both track ends.

Clamp or duct tape track on mast. Center punch in center of track hole using a narrow shaft spring-loaded machinist's punch with plastic centering tube or a transfer punch. Track hole size is 2.05" or 5.2 mm.

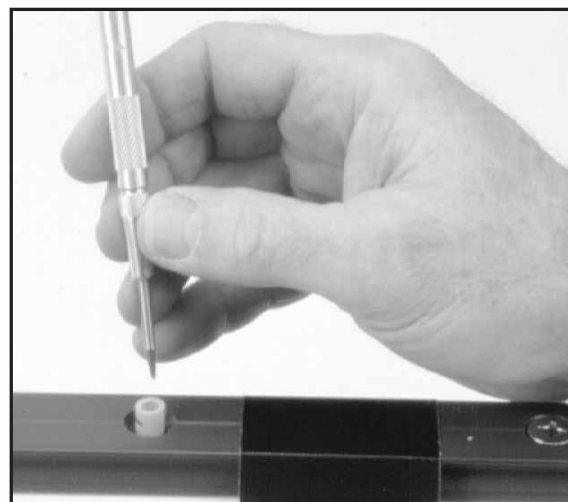
2. Drill track hole, holding drill perpendicular to mast face. Tap threads and install screws using blue Loctite® adhesive.

Tip: Use low speed drill with tap for cutting threads.

IMPORTANT! Use blue Loctite® adhesive instead of oil for tapping lubricant.

3. Align track at joints. Use 2711 splice links and round rods or dowels on outside of track to align during installation. Hold in place with spring or "C" clamps until track is secured.

Load all cars before installing bottom track and endstop.



IMPORTANT! To keep balls captive we recommend loading cars onto track without sail installed. Chart below shows correct number of balls for each car.

1. **Headboard cars:** Hold car so cap screw head faces up. Align car on guide section of loader track and gently roll onto upper tracks. If car sticks, realign and roll onto track.

Tip: To load headboard car assembly, angle headboard coupler, roll car onto track. If necessary, remove headboard assembly.



2. Load intermediate car (if used). Alternate with batten cars until all cars are loaded.

Mast up: Use halyard to hold cars up.



3. Install screwpin stop.

**3808, 3809, 3810
Endstop kit**
Remove bottom 203 mm (8") track and install cars.

Tip: Use halyard to hold tracks up.

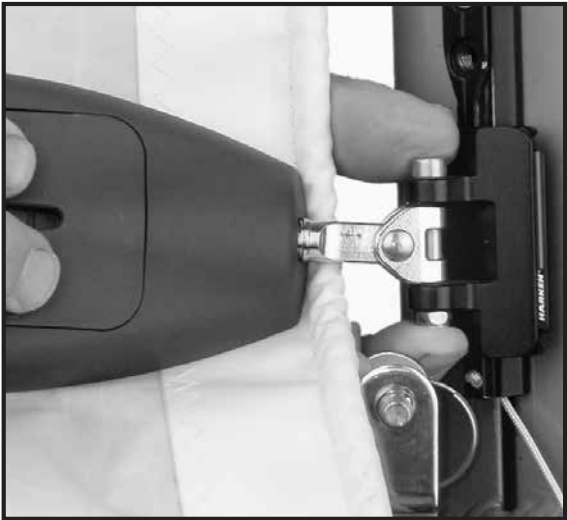
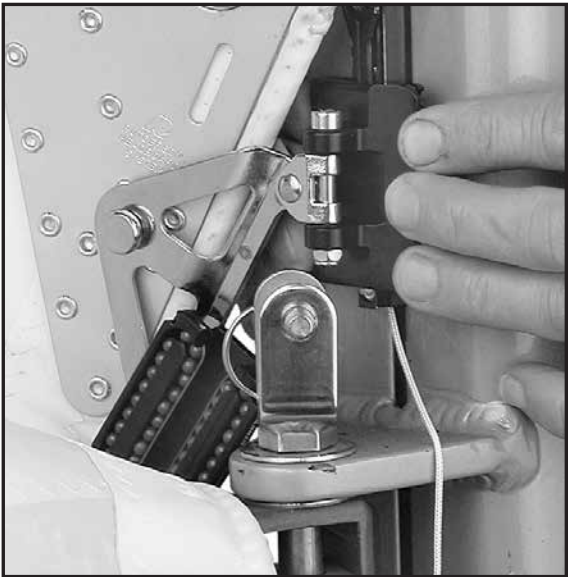


CB System

Load Cars on Track with Sail Attached

Cars with sail attached can be loaded by carefully aligning car with track and supporting sail to keep weight off cars.

Line up car on guide portion of loader. Press car toward mast and carefully roll car onto track. Begin with upper cars and work down.



Tip: Have another person help hold sail while you load cars.

CB System

Lost Balls

Consult chart for ball type: Torlon® or Delrin® ball bearings. Place car on edge with retaining clip in place. Insert balls one-by-one from center of clip and roll into return race. **Do not overfill car.**



Part No.	Car Type	Car Length		Bearings		Number per Car	Purchase Part No.	Balls/Set	Ball Ø	
		in	mm	Color	Material				in	mm
3811	Headboard cars (2)	8 ³ / ₈	213	Brown	Torlon	60	177	21	1/4	6
3812	Intermediate car	2 ¹ / ₄	57	Brown	Torlon	32	177	21	1/4	6
3829	Batten car w/threaded stud	2 ⁷ / ₈	73	Brown	Torlon	40	177	21	1/4	6
3830	Battcar w/40 mm receptacle	2 ⁷ / ₈	73	Brown	Torlon	40	177	21	1/4	6
3831	Universal car	2 ⁷ / ₈	73	Brown	Torlon	40	177	21	1/4	6
3881	Batten car w/12 mm threaded stud	2 ⁷ / ₈	73	Brown	Torlon	40	177	21	1/4	6
3882	Batten car w/12 mm threaded stud	4 ¹ / ₈	105	Brown	Torlon	60	177	21	1/4	6
3883	Reef car	4 ¹ / ₈	105	Brown	Torlon	60	177	21	1/4	6

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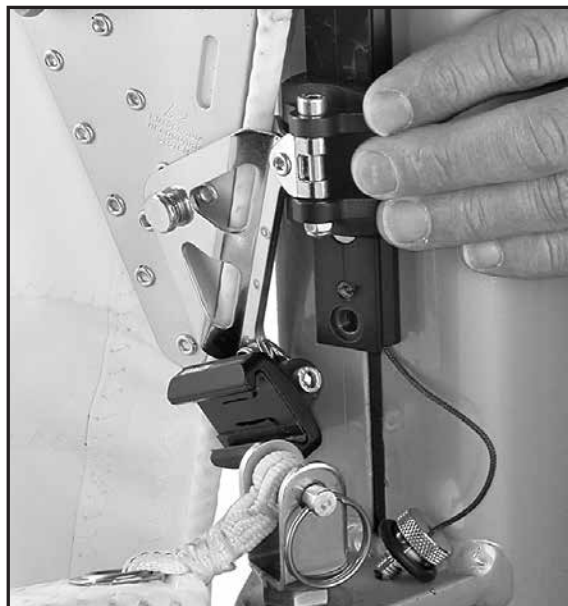
Slider System

Slider cars can be loaded onto tracks with or without sail attached.

Line up car on guide portion of loader. Press car toward mast and slide car onto track. Begin with upper cars and work down.

Tip: To load headboard car assembly, angle headboard. Roll car onto tracks. If necessary, remove headboard assembly.

Load Cars on Track with Sail Attached



3883 Reef Car

1. Beginning with lower cars, use 4 mm hex key and 8 mm wrench or nut driver to attach sail to cars. Tighten lock nut until bottom tip of fastener is flush with nut.

For 3883 reef car, line up plastic becket spacer and insert clevis pin.



Load Sail on Cars



2. Screw threaded stud to sail batten receptacle. Thread completely in and then back off two turns. Receptacle must be allowed to rotate on stud.



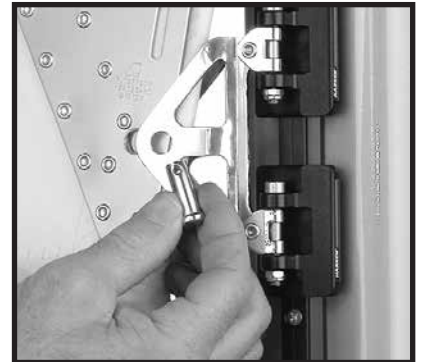
3. Load toggle using 4 mm hex key and 8 mm wrench or nut driver. Tighten lock nut. **Do not over tighten.** Make sure toggle can pivot.



3a. For 3881 and 3882 battcars, line up toggle and insert clevis pin.



4. Attach head of sail to headboard car with clevis pin and cotter pin.



4a. For 3881 and 3882 battcars, press quick release button and push up on bottom of pin. Remove clevis pin.



Removing Sail (CB System)

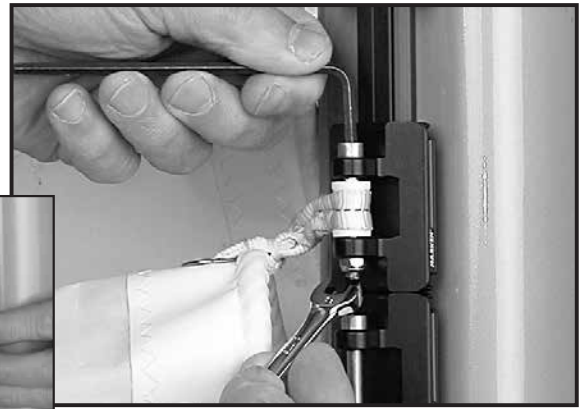
From cars: Remove clevis pin from head of sail. Use a 4 mm hex wrench and a 8 mm wrench or nut driver on other cars.

Cars and sail: Keep cars lined up with track when sliding off.

Inspect cars: 20 balls per side. Replace 5 mm locknut after two removals.

Removing Sail (Slider System)

If your system has slider Battcars without ball bearings, leave slides attached and slide cars off, beginning at the bottom.


Car Maintenance/Cleaning (CB System)

Clean beginning of season, or if cars bind. Squirt detergent and water into ball bearings. Circulate by moving cars up and down. Let stand. To remove detergent, spray water into ball bearings and circulate. Clean tracks with detergent and water.

Use OneDrop™ Ball Conditioner (CB System)

Once dry, use *only* a single drop of McLube® OneDrop™ ball bearing conditioner. Do not use spray lubricants because ball bearings may skid not roll. Apply one to two drops of McLube OneDrop to ball contact surfaces of track. Roll car back and forth through OneDrop several times to distribute onto bearings. Wipe remaining OneDrop off track. OneDrop is preferred, but you can also use one to two drops of a light machine oil. Too much attracts dirt.

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Inspect

Inspect Battcars for loose locknuts. Replace. Inspect batten receptacles for loose screws.

CB/Slider Systems
Lazy Jacks

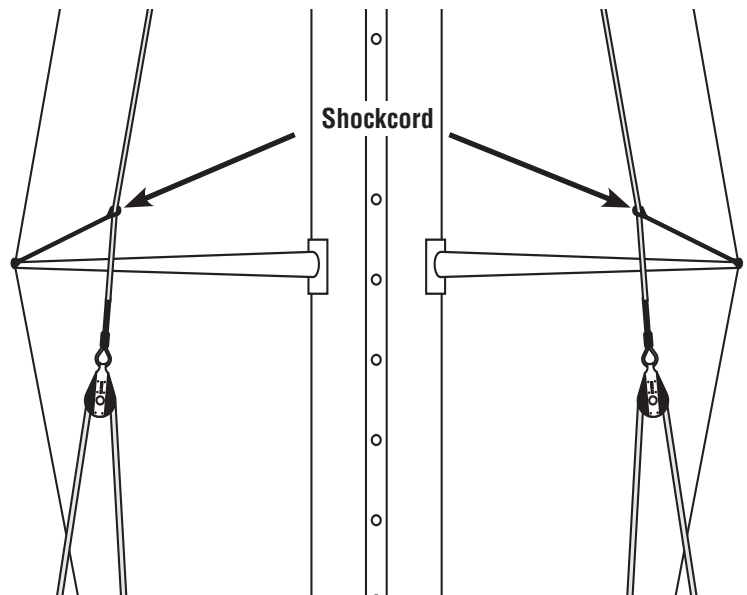
Use shockcord to hold Lazy Jacks open so Battcars and battens will not catch on them when hoisting sail. This will also help stop Lazy Jacks from slapping on sail. Attach one end to lower spreader tips and the other to Lazy Jacks. Make sure shockcord is long enough so boom can swing out all the way without damaging spreaders.

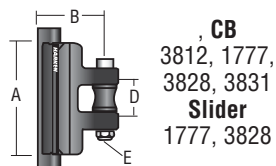
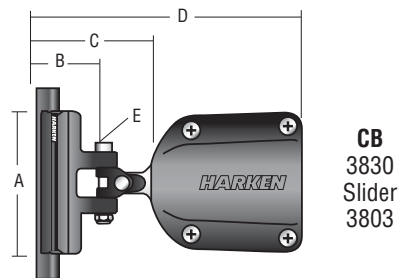
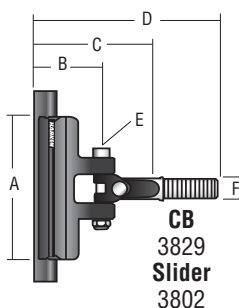
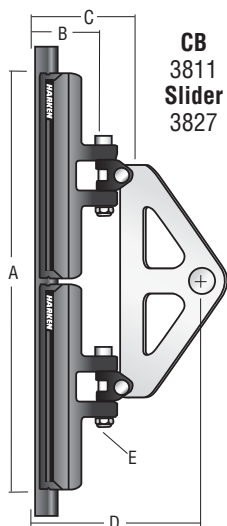
Operating Precautions

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

IMPORTANT! On unstayed masts, avoid over-rotation of sail.

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





Dimensions (measured from aft face of mast)

Part No.	Description	A		B		C Boltrope setback		D		E Pin Ø		F Stud Ø
		in	mm	in	mm	in	mm	in	mm	in	mm	mm
System A CB												
3811	Headboard car assembly	8¾	213	1⅜	35	2¼/2⅞*	57/73*	4	102	⅝	5	—
3812	Intermediate car	2¼	57	1⅜	35	—	—	¾	19	⅝	5	—
3829	Battcar/10 mm stud	2⅞	73	1⅜	35	2¼	57	3⅜	94	⅝	5	10
3830	Battcar/receptacle	2⅞	73	1⅜	35	2⅞	73	5¾	146	⅝	5	—
3831	Universal Battcar	2⅞	73	1⅜	35	—	—	¾	19	⅝	5	—
3881	Battcar/12 mm stud	2⅞	73	1⅜	35	2¾	69	3⅞	99	¼	6	12
3882	Long batten car/12mm stud	4⅞	105	1⅜	35	2¾	69	3⅞	99	¼	6	12
3883	Reef car	4⅞	105	1⅜	35	—	—	¾	19	¼	6	—
System A Slider												
3827	Headboard car assembly	6	153	1⅜	27	2⅞	54	3⅜	94	⅝	5	—
1777	Intermediate car/low-load	2	51	1⅞	28	—	—	¾	19	⅝	5	—
3828	Intermediate car	1¾	44	1⅜	27	—	—	2⅜	17	⅝	5	—
3802	Battcar/10 mm stud	1¾	44	1⅜	27	2⅞	54	—	—	⅝	5	10
3803	Battcar/receptacle	1¾	44	1⅜	27	2⅞	54	5⅞	130	⅝	5	—

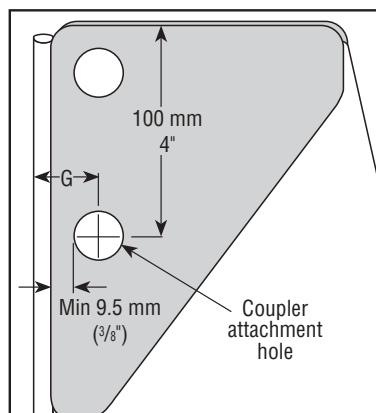
CB/Slider Systems

Installing Headboard Car Assembly

Headboard coupler attaches to standard headboards - some headboard modification required.

Maximum thickness of headboard plates and sail: 14 mm (9/16")

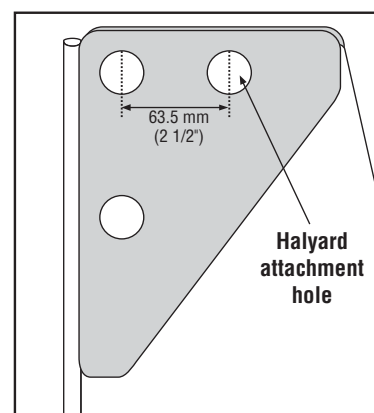
G Center of coupler attachment hole to front edge of boltrope	
3802	40 mm (1 ⁹ / ₁₆ ")
3830	30 mm (1 ³ / ₁₆ ")
3829	44 mm (1 ³ / ₄ ")
3803	43 mm (1 ¹¹ / ₁₆ ")



Coupler Attachment Hole

Drill 11 mm (7/16") coupler attachment hole so center is 101 mm (4") from top of headboard. Consult chart to determine "G" based on Battcar used.

Leave at least 9 mm (3/8") between front of headboard plate and front edge of coupler attachment hole.



Halyard Attachment Hole

Use aft hole if headboard has two.

If not, drill second hole to accept halyard shackle pin. Locate hole approximately 63.5 mm (2 1/2") aft of existing hole.

Option 1**Round battens**

End batten pocket 254 mm (10") from receptacle.

Flat battens

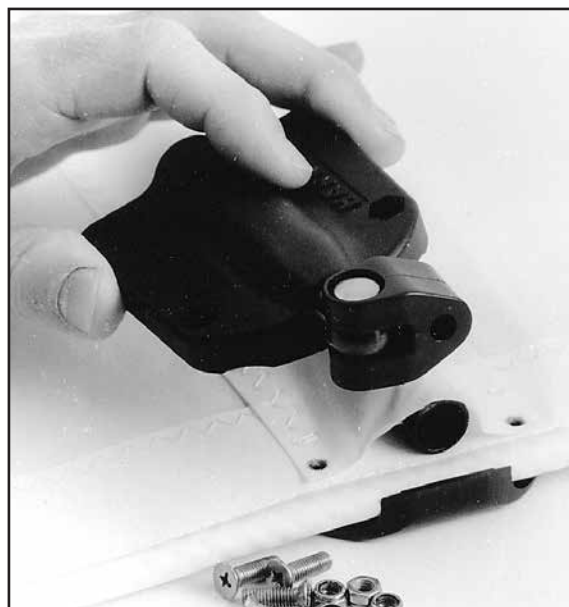
End batten pocket 254 mm (10") from receptacle.

**Option 2****Round battens**

Pucker batten pocket; draw edges together before inserting batten.

Flat battens

Fit batten into receptacle. If necessary, pucker batten pocket and draw edges together before inserting. May require optional shim.

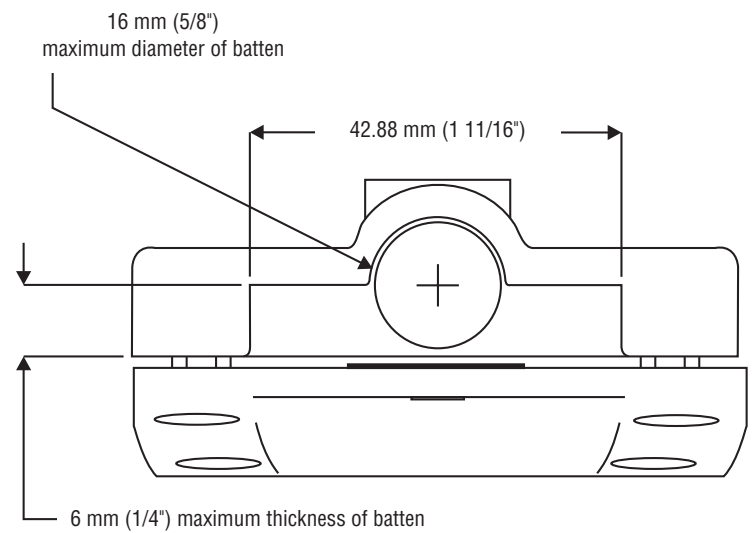
**Optional Shim**

Use enclosed rubber shim so thin flat battens or small diameter round battens fit correctly inside receptacle. To insert shim, take apart batten receptacle with batten inside. Place rubber shim on one side of the batten. Assemble. **Note:** screw and nuts are not captive.



Assembly

Place batten receptacles on same side of sail. Make sure front of coverplate presses on swivel pin retainer that secures swivel pin. Tighten screws and nuts.



CB/Slider Systems

Distance Between Attachment Points

Battens and intermediate cars placed at sailmaker's discretion. Maximum distance between attachment points is 1.2 m to 1.35 m (4' to 4'6").

Distance may be slightly greater. Contact Harken to discuss sail reshaping to eliminate luff flutter.

Note: Adding battens may reduce stack height by eliminating luff cars.

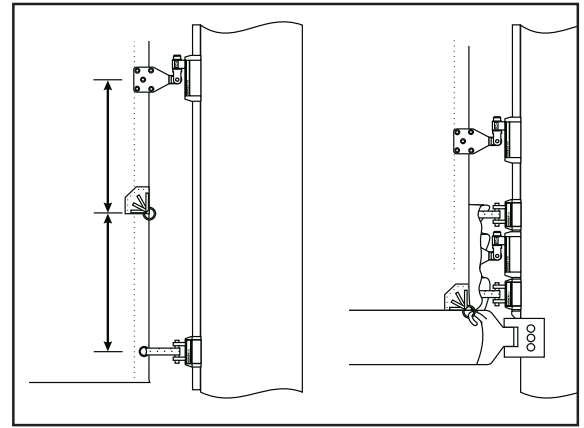


Diagram A

Setting Reef Points

Space reef points halfway between sail attachment points. Battens or reef points may need to be moved. Diagram A.

Note: Batten fittings and cars cannot handle reefing outhaul or downhaul loads. Transfer loads to a tack fitting. Diagram B.

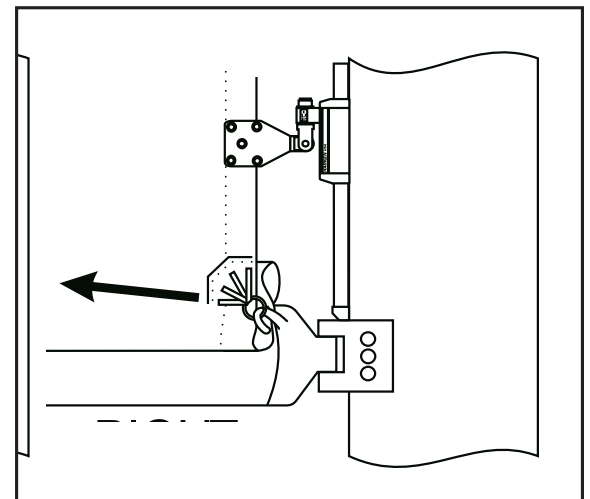
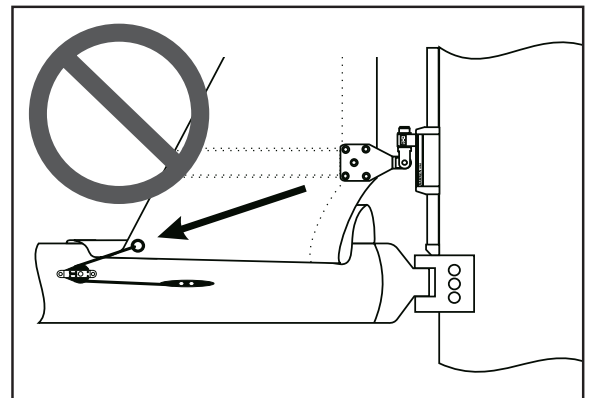
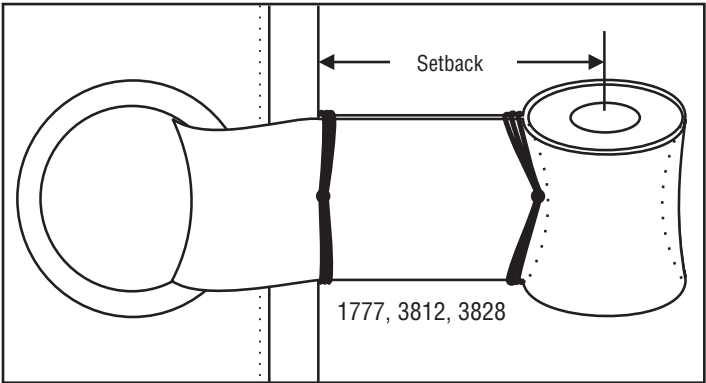


Diagram B

Sail setback from luff tape to intermediate car clevis pin will vary depending upon intermediate and batten car.

Intermediate Cars		Batten Cars	
	3802/3803 Slider cars	3829 CB Cars w/10 mm stud	3830 CB car w/batten recpt.
Setback – Luff tape to pin			
1777	26 mm (1")	30 mm (1 ³ / ₁₆ "	44 mm (1 ³ / ₄ "
3812	—	23 mm (7 ⁷ / ₈ "	37 mm (1 ⁷ / ₁₆ "
3828	27 mm (1 ¹ / ₁₆ "	30 mm (1 ³ / ₁₆ "	44 mm (1 ³ / ₄ "

Plastic spacers come with 1777, 3812, and 3828 intermediate cars. Seize spacer to webbing by stitching just behind plastic spacer. Seize webbing to sail by stitching up against sail.



Problem	Probable Cause	Solution
Tracks do not butt up against each other.	Cut end of top or bottom track is at joint.	Make sure the anodized end is toward the full-length track.
	Track weight pulling tracks apart.	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 and/or straighten mast.
	Paint or other material clogging mast groove.	Clean out groove.
CB/slider cars do not fit on track.	Track and cars are not the same size.	Contact your dealer or Harken.
CB cars do not fit on track.	Balls are missing.	Remove cars, 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.

CB/Slider Systems

Operation Troubleshooting

Problem	Probable Cause	Solution
Cars bind.	Dirt in cars.	Use detergent and fresh water to flush dirt out of cars; move cars up/down to circulate; follow with high-pressure water; clean track grooves. Condition balls using McLube One-Drop. See below.
	Stud threaded too tightly into receptacle.	Back off threaded stud two turns.
	Balls missing from car.	Remove cars, load balls and slide cars back on track.
Mounting screws will not tighten.	Incorrect mounting slug used.	Get new 6 mm lock nut.
Batten receptacle does not rotate.	Nuts are too tight.	Loosen nuts slightly.
Cars jam when raising sail.	Headboard or cars are catching on lazy jacks.	Use topping lift or rod vang and shock cord to pull lazy 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.	Move intermediate car sail attachment.

Maintenance

Clean beginning of season, or if cars bind. Squirt detergent and water into ball bearings. Circulate by moving cars up and down. Let stand. To remove detergent, spray water into ball bearings and circulate. Clean tracks with detergent and water.

Do not use spray lubricants because ball bearings may skid, not roll. Once cars and tracks are dry, apply one to two drops of McLube® OneDrop™ conditioner to ball contact surfaces of track. Roll car back and forth through OneDrop several times to distribute onto bearings. Wipe remaining OneDrop off track. OneDrop is preferred, but you can also use one to two drops of a light machine oil. Too much oil attracts dirt.



Warranty

For additional safety, maintenance, and warranty information: www.harken.com/manuals or the Harken catalog.

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