

HARKEN®

BATTCAR SWITCH SYSTEM INSTALLATION MANUAL

26 mm, 32 mm

Installation Manual – Intended for specialized personnel or expert users

4677 12/13



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Please read these instructions carefully before installing, servicing, or operating the equipment.
This manual may be modified without notice. See: www.harken.com/manuals for updated versions.

PLEASE SAVE THESE INSTRUCTIONS

Introduction

This manual gives technical information on installation and service. This information is **destined 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.

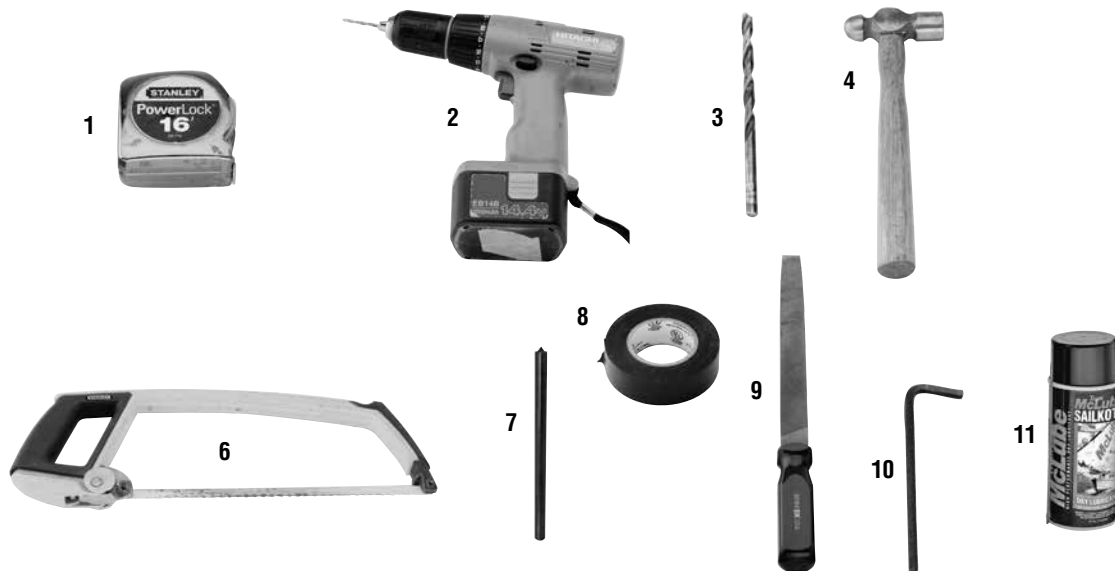


CAUTION! This symbol alerts you to potential hazards that may hurt you and others if you do not follow instructions. The message will tell you how to reduce the chance of injury.



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

Tools



1. Tape measure	8. Tape
2. Power drill	9. File
3. Drill bits	10. Hex key
4. Hammer	11. McLube™ Sailkote™
5. Plastic hammer	12. Tap for mast mounting holes (not shown)
6. Hacksaw	
7. Transfer punch	Threadlocking adhesive for mast screws



Intermediate car



HC7493
HC7322

Tack car



HC8125
HC8099

Trysail car



C9342
C9494

Reef car 26 mm



HC7325

Reef car 32 mm



HC8076



Batten car with threaded stud

HC7324
HC8098
HC7316
C7814

**3876
Web-on
standard**

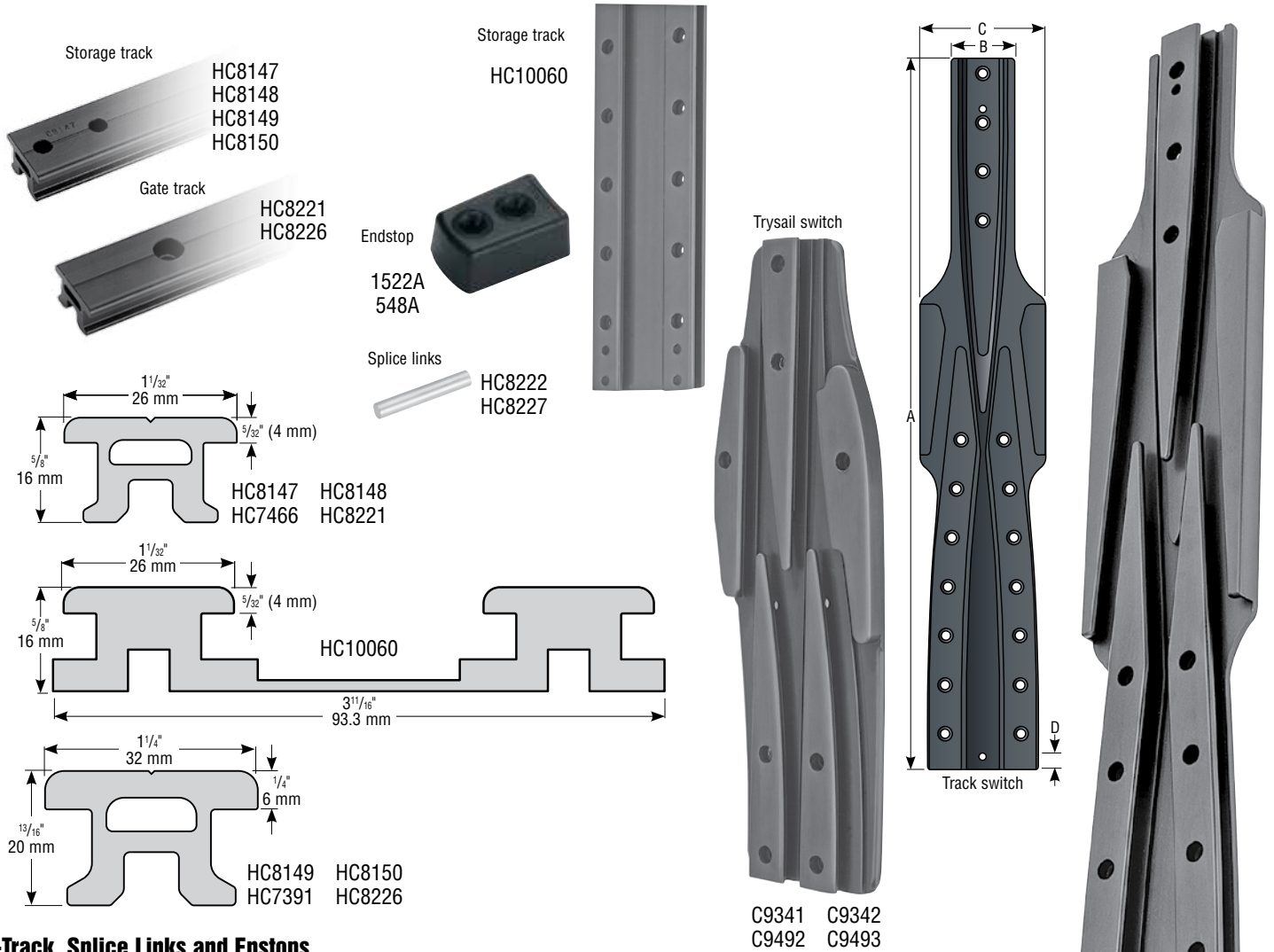


**3877
Web-on
square top**



Main Components

Part No.	Description	System	Comments
HC9045	Headboard car	26 mm	Must use 3876 or 3877 headboard.
HC7493	Intermediate car		Consult sailmaker for quantity required.
HC7324	Batten car		12mm Threaded stud. Purchase batten receptacle separately.
HC7325	Reef car		Use to secure tack when reefing.
HC8125	Tack car		Use with halyard lock to tension luff.
C9494	Trysail car		Use with trysail switch.
HC9046	Headboard car	32 mm	Must use 3876 or 3877 headboard.
HC7322	Intermediate car		
HC8098	Batten car		12mm Threaded stud. Purchase batten receptacle separately.
HC7316	Batten car		14mm Threaded stud. Purchase batten receptacle separately.
HC8076	Reef car		Use to secure tack when reefing.
HC8099	Tack car		Use with halyard lock to tension luff.
C9342	Trysail car		Use with trysail switch.
Headboard Plates			
3876	Standard web-on headboard	26 mm	See sailmaker instructions.
3877	Square top web-on headboard	32 mm	See sailmaker instructions.



T-Track, Splice Links and Endstops

Part No.	Description	Length		Width		Height		Weight		Fasteners		Fastener spacing
		in	mm	in	mm	in	mm	oz	g	in	mm	
26 mm												
HC7466	3 m T-Track	118 ¹ / ₈	3000	1 ¹ / ₃₂	26	5 ⁵ / ₈	16	61.1	1736	1 ¹ / ₄	6	75
HC8879	2 m T-Track/high-load	78 ³ / ₄	2000	1 ¹ / ₃₂	26	5 ⁵ / ₈	16	40.3	1141	1 ¹ / ₄	6	50
HC8222	Splice link	—	—	1 ¹ / ₃₂	26	—	—	0.1	3	—	—	—
1522A	Endstop	2 ⁵ / ₃₂	55	1 ¹⁷ / ₃₂	39	—	—	—	—	—	—	—
32 mm												
HC7391	3m T-Track	118 ¹ / ₈	3000	1 ¹ / ₄	32	1 ³ / ₁₆	20	96.2	2734	5 ¹ / ₁₆	8	75
HC8880	2m T-Track/high-load	78 ³ / ₄	2000	1 ¹ / ₄	32	1 ³ / ₁₆	20	63.1	1790	5 ¹ / ₁₆	8	50
HC8227	Splice link	—	—	—	—	—	—	0.2	5	—	—	—
548A	Endstop	2 ²⁷ / ₃₂	72	2 ¹ / ₃₂	52	—	—	—	—	—	—	—

*Includes spacer tube for cutting adapters. See page 7.

Switch, Storage and Gate Track

Part No.	Description	Length (A)		Width (B)		Switch Width (C)		Height (D)		Weight		Fasteners		Fastener spacing
		in	mm	in	mm	in	mm	in	mm	oz	g	in	mm	
26 mm														
HC8220	Switch	25 ¹ / ₄	641	4	102	4	102	5 ⁵ / ₈	16	43.1	1225	1 ¹ / ₄	6	—
HC8147	500 mm Storage track	19 ¹¹ / ₁₆	500	1 ¹ / ₃₂	26	—	—	5 ⁵ / ₈	16	10.2	291	1 ¹ / ₄	6	50
HC8148	725 mm Storage track	28 ¹⁷ / ₃₂	725	1 ¹ / ₃₂	26	—	—	5 ⁵ / ₈	16	14.8	419	1 ¹ / ₄	6	50
HC10060	725 mm Double storage track	28 ¹⁷ / ₃₂	725	3 ¹¹ / ₁₆	93.3	—	—	5 ⁵ / ₈	16	57.2	1623	1 ¹ / ₄	6	50
HC8221	Gate track	11 ¹³ / ₁₆	300	1 ¹ / ₃₂	26	—	—	5 ⁵ / ₈	16	6.1	174	1 ¹ / ₄	6	75
32 mm														
HC7382	Switch	28 ¹ / ₂	724	5	127	5	127	1 ³ / ₁₆	20	72.8	2068	5 ¹ / ₁₆	8	—
HC8149	800 mm Storage track	31 ¹ / ₂	800	1 ¹ / ₄	32	—	—	1 ³ / ₁₆	20	25.6	728	5 ¹ / ₁₆	8	50
HC8150	1025 mm Storage track	40 ¹¹ / ₃₂	1025	1 ¹ / ₄	32	—	—	1 ³ / ₁₆	20	32.8	933	5 ¹ / ₁₆	8	50
HC8226	Gate track	11 ¹³ / ₁₆	300	1 ¹ / ₄	32	—	—	1 ³ / ₁₆	20	9.6	273	5 ¹ / ₁₆	8	75

Trysail Switch C9340, C9341, C9492, C9493 Trysail Tracks – See page 16

HC8220 26 mm
HC7382 32 mm

Sizing

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

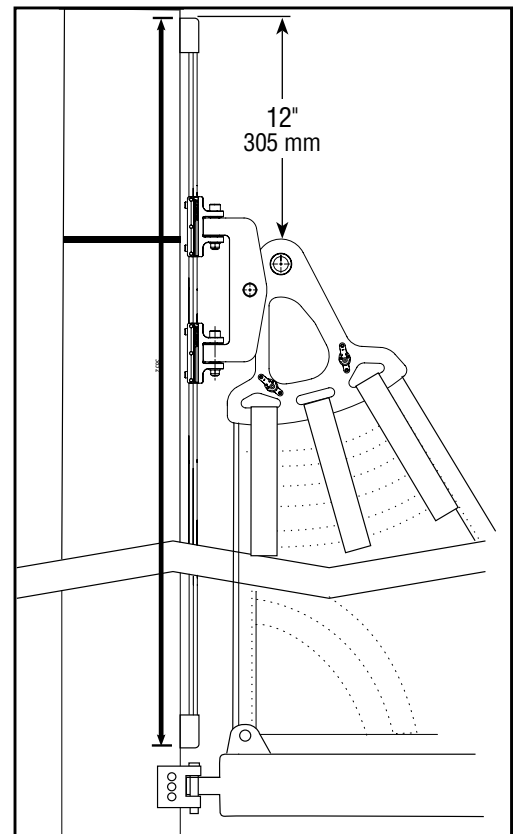
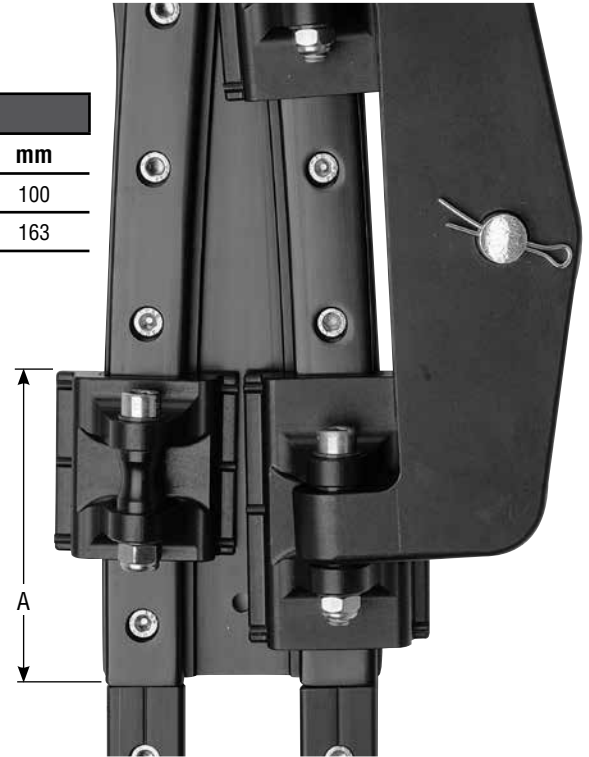
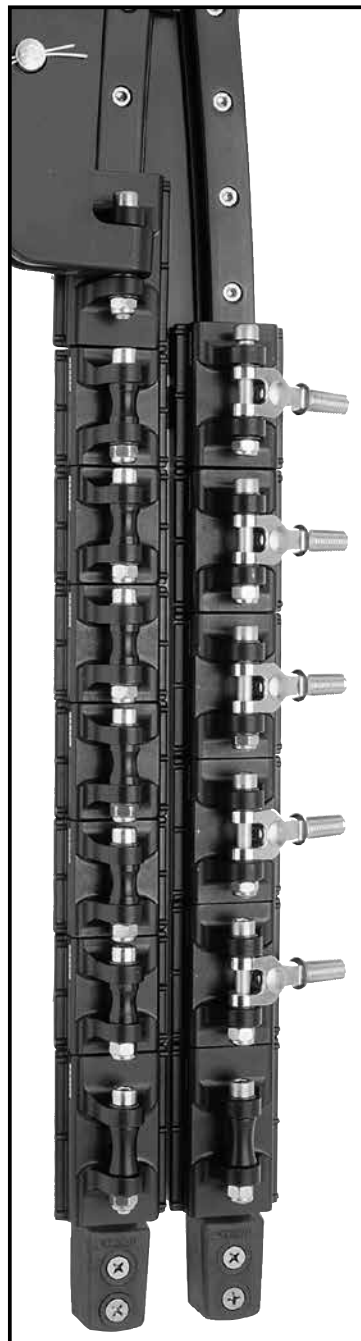
System	Fits Boats		Part No. Headboard Car	Part No. Battcar	Part No. Intermediate Car	Part No. Reef Car	Part No. Tack Car
	Minimum	Maximum					
26 mm	50 ft (15.2 m)	80 ft (24 m)	HC9045	HC7324	HC7493	HC7325	HC8125
32 mm	80 ft (24 m)	130 ft (40 m)	HC9046	HC8098, HC7316	HC7322	HC8076	HC8099

Track length and switch height considerations

Switch height is determined by the number of cars required for system and the length of the storage track.

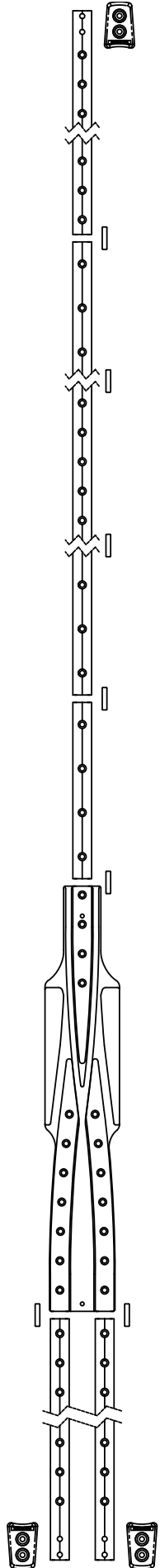
Note: Cars will pass each other when top of car is at "A" distance above bottom of switch. See chart at right.

Unit	A	
	in	mm
26 mm	3.94	100
32 mm	6.44	163



Make sure track is longer than sail luff to allow for stretch as sail ages. Track must not block halyard exit. Using gate track above switch allows bottom storage track to extend down to gooseneck.

Layout system using charts to plan track location and lengths.



A	Variable-Length Top Track (26/32 mm Systems)		
	Length		Hole Spacing
	mm	in	mm
			75
If possible use a storage track with holes drilled for endstops positioned at the upper end for top endstop.			

B	Standard Track (26/32 mm Systems)		
	Length		Hole Spacing
	mm	in	mm
	3000	118.11	75

C	High-Load Track (26/32 mm Systems)		
	Length		Hole Spacing
	mm	in	mm
	2000	78.74	50
Place in reefed headboard areas.			

C1	Trysail Switch—26mm System		Hole Spacing	
	Length		—	
	mm	in	mm	
		368	14.50	Variable
	Trysail Switch—32mm System		Hole Spacing	
	Length		—	
mm	in	mm		
	406	16.00	Variable	

D	Gate Track—26/32 mm Systems		
	Length		Hole Spacing
	mm	in	mm
	300	11.81	75
Removable track - Allows cars to be left attached to sail and removed from top of switch.			

E	Switch—26mm System		—	
	Length		—	
	mm	in	—	
		641	25.24	—
	Switch—32mm System		—	
	Length		—	
mm	in	—		
	724	28.50	—	

F	Storage Track—26 mm System			
	Length		Hole Spacing	
	mm	in	mm	
		500	19.69	50
		725	28.54	50
	Storage Track—32 mm System			
Length		Hole Spacing		
mm	in	mm		
	800	31.50	50	
	1025	40.35	50	

Total track length _____
 - SUM _____
 Top track length A _____

X _____ = _____
 Quantity

+

X _____ = _____
 Length
 Quantity

+

1 _____ = _____
 Quantity

+

1 _____ = _____
 Quantity

+

1 _____ = _____
 Quantity

+

1 _____ = _____
 Quantity

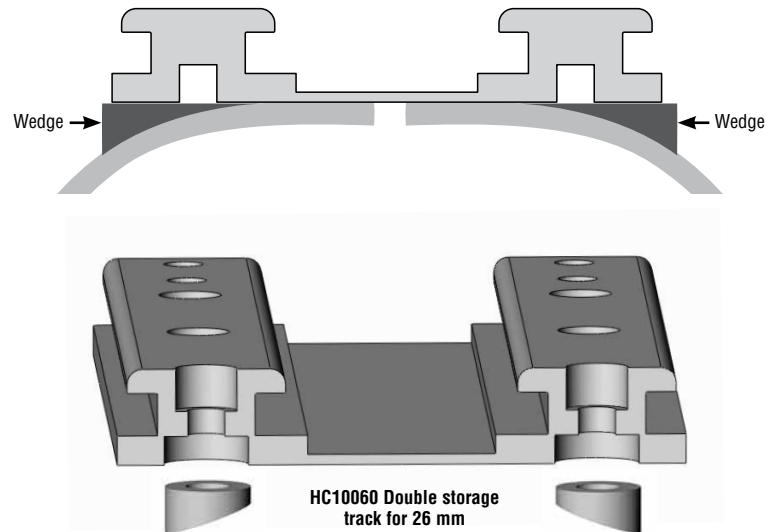
SUM

Enter "SUM" above to calculate "Top track length."

Note width and shape of switch and build a platform on mast for mounting. If using two storage tracks, make sure switch and storage tracks are on the same flat surface. Curved mast surfaces will not allow correct alignment.

HC10060 Double storage track for the 26 mm comes with a tube to cut spacers to adapt to curved mast surfaces.

Note: when mounting to curved surfaces, wedges will be necessary under the switch.



Preassembly

Mounting Track to Mast

Consult with mastbuilder. Use suitable reinforcing plates when fastening track to carbon spars.

Assembly

General Instructions

When mounting tracks work meticulously using a straight edge reference line along mast. Do not let tracks vary from this line. Tape track in place and centerpunch hole at bottom using a transfer punch.

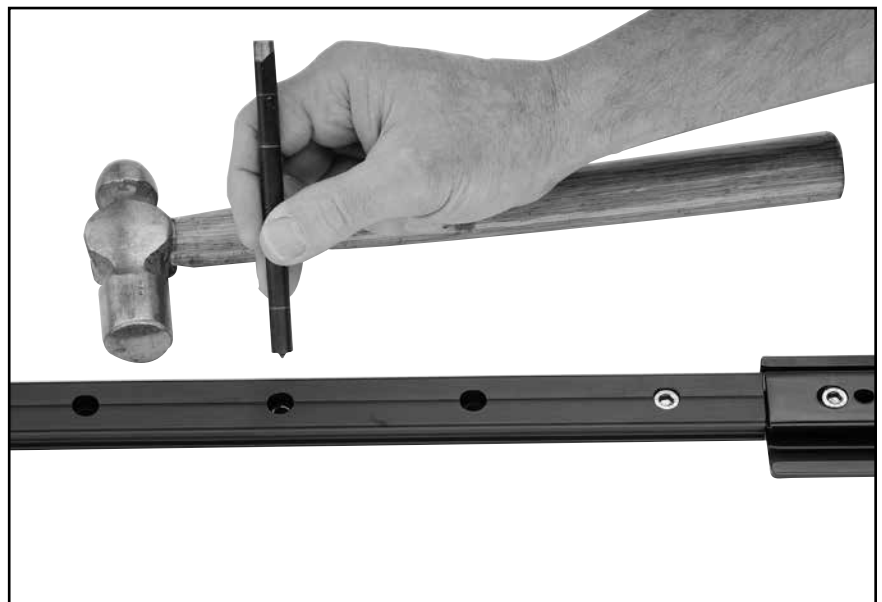
Tip for mounting to aluminum mast: Use low speed drill with tap for cutting threads.

IMPORTANT! Use blue Loctite® instead of oil to lubricate tap.

Remove track and drill and tap single hole. Fasten track using this single screw and align side to side correctly. Use tape to hold in place. **Use longer car to test alignment.** Move up several holes and use transfer punch to mark a second hole. Remove track and drill and tap hole.

Fasten track using two screws. Mark all remaining holes using punch. Remove track and drill and tap all holes. Before installing track make sure upper end has splice piece inserted.

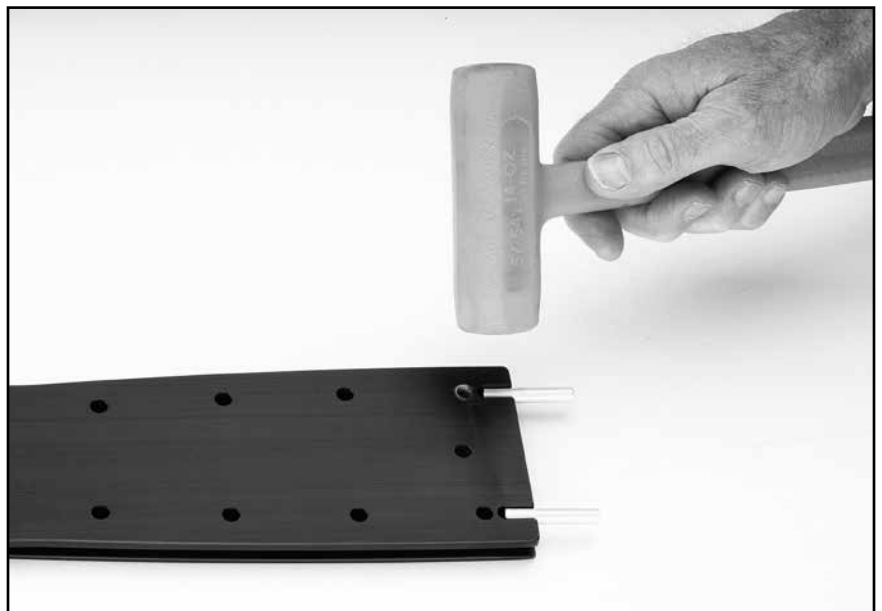
Use threadlocking adhesive to secure screw. See instructions that begin on page 8.



Insert three splice links into switch track.



Using a plastic hammer, tap them in place.



Carefully align track and tape in place. Use a transfer punch to mark a single hole. Remove and drill and tap. Fasten with single screw, **no adhesive**.

Re-align and mark a second hole using transfer punch. Screw to mast using two screws, **no adhesive**.

Mark remaining holes using transfer punch. Remove and drill and tap remaining holes. Mount switch to mast using threadlocking adhesive on screws as required.



Assembly

Mounting Storage Tracks

Make sure storage track ends with holes for endstop are at bottom. If shortening is required, cut track from upper end maintaining holes for endstop.

Fix bottom loader tracks by placing track over splice and tapping into place using plastic hammer.

Align track and tape in place. Use transfer punch to mark hole. Remove track, drill and tap. Fasten track using single screw. Center punch another hole, drill, tap and fasten track. Center punch remaining holes, drill, tap and install using threadlocking adhesive.



Assembly

Mounting Gate Tracks

With gate track off mast, use plastic hammer to tap splice link into upper end of track.



Carefully align track. Use transfer punch to mark holes. Drill, tap and mount as directed above.

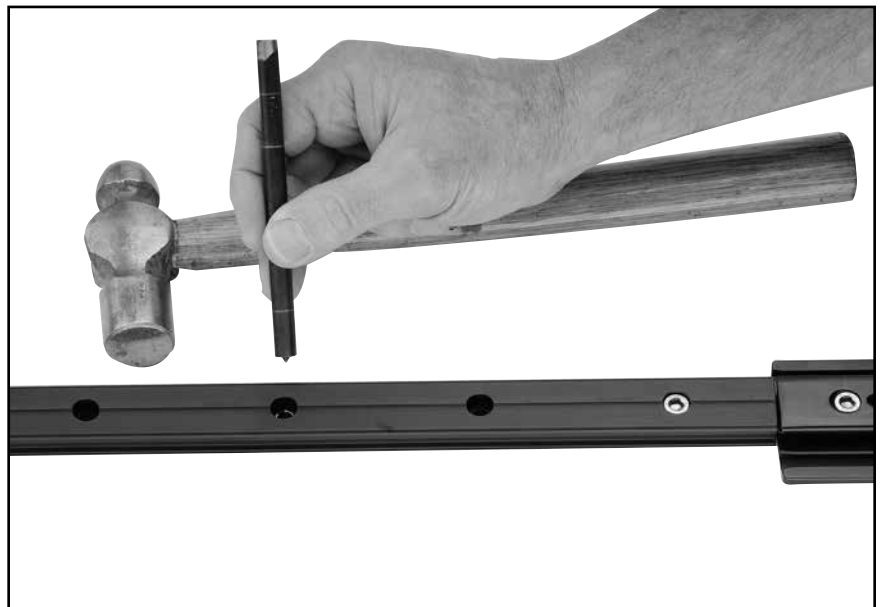
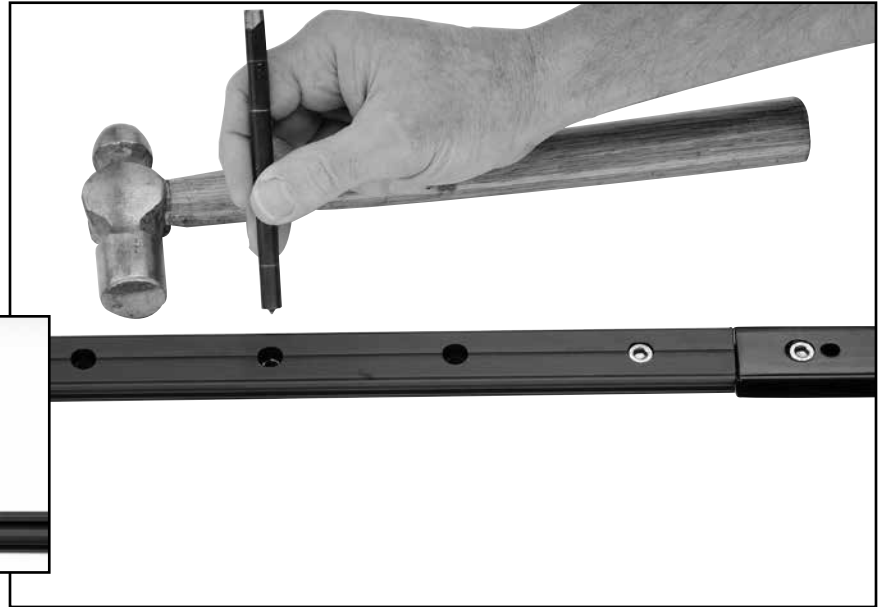
IMPORTANT! Do not use threadlocking adhesive on screws because gate track is removed for loading cars.



Assembly

Mounting Standard/High-Load Tracks

With track off mast, tap upper splice link into track using procedures outlined above. Follow general instructions, page 7, with regard to drilling and taping a single hole, etc. Always make sure to keep tracks aligned.



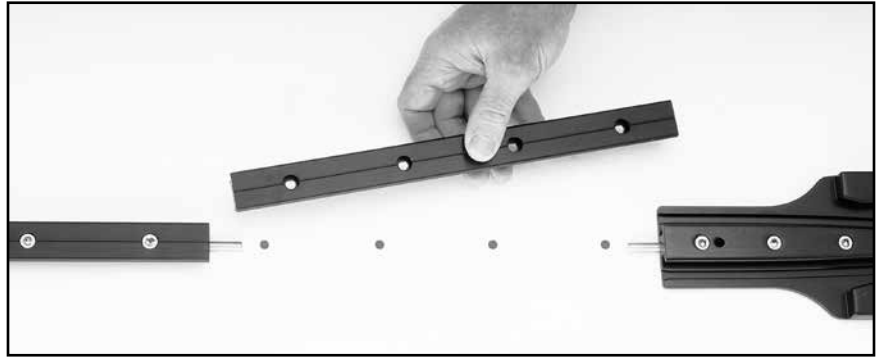
Assembly

Mounting Top Track

If possible use a storage track with holes drilled for endstops positioned at the upper end for top endstop.



Remove gate track.



Install cars from above switch.
Lubricate cars onshore before loading.
Before bringing headboard assembly or cars onboard boat, spray underbody track slot (see arrows above) with a light coating of McLube™ Sailkote™.



WARNING! Overspray from McLube will cause slippery decks which may result in loss of footing. Cover decks or spray cars off boat.



Note: Mustard-colored pegs on foot of car guide it to correct side. Car will go to side of track where there are no pegs.

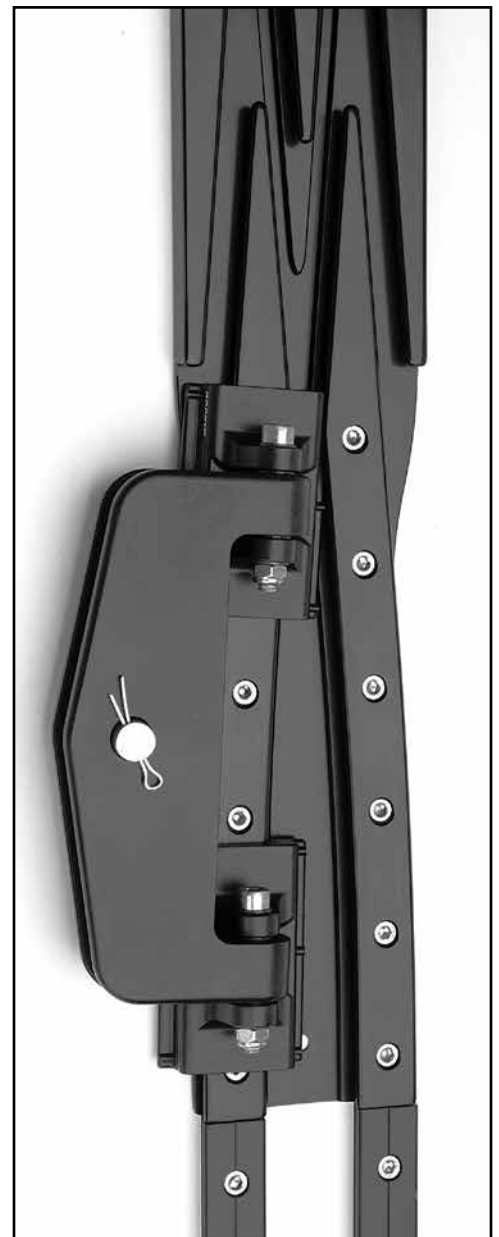
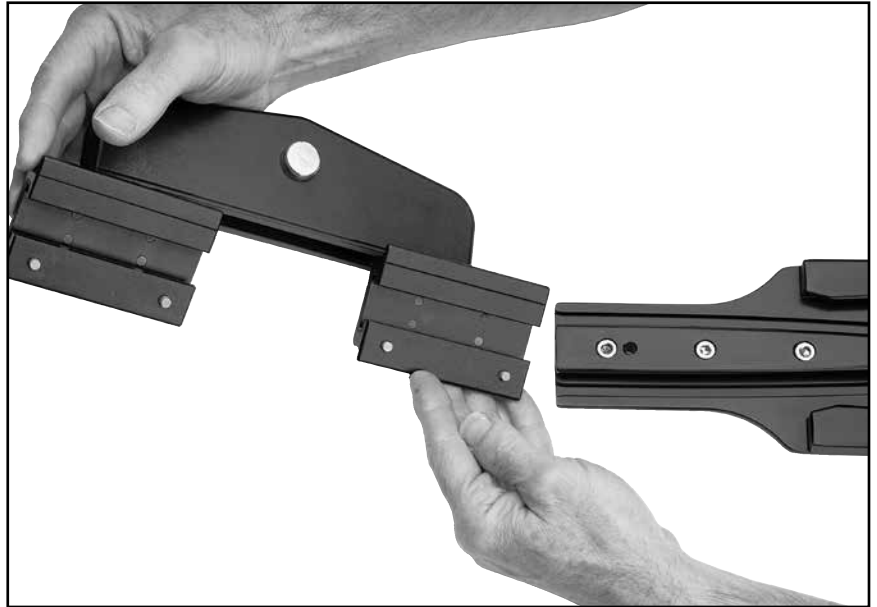
Tip:

Plain foot to right, car goes to right.

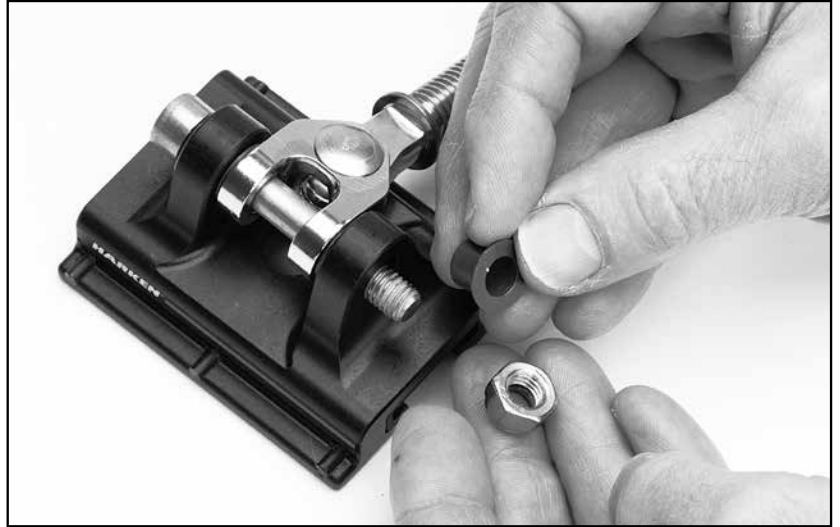
Plain foot to left, car goes to left.



Headboard cars have spherical bearings and are designed to run through switch. Both cars must run through same side of switch. Make sure cars are loaded with pegs on same side.



When removing parts, make sure you retain plastic bushings between vertical pin and hole in car tangs.



Operation

Raising Sail

When raising, lowering, or reefing sail make sure sail is not loaded and cars pass through switch easily. Watch sail and cars carefully and stop hoisting immediately if any binding is detected.

Possible sources of binding:

- Cars bind at switch
- Reef line binds on fingers
- Reef line binds between car and switch
- Headboard or battens bind on lazy jacks
- Battens have draped off boom, leveraging car

Correct the binding problem or luff sail before resuming hoist. If forced, the fingers that extend into switch may be damaged, requiring expensive switch and car replacement. Lazy jacks may also be damaged.

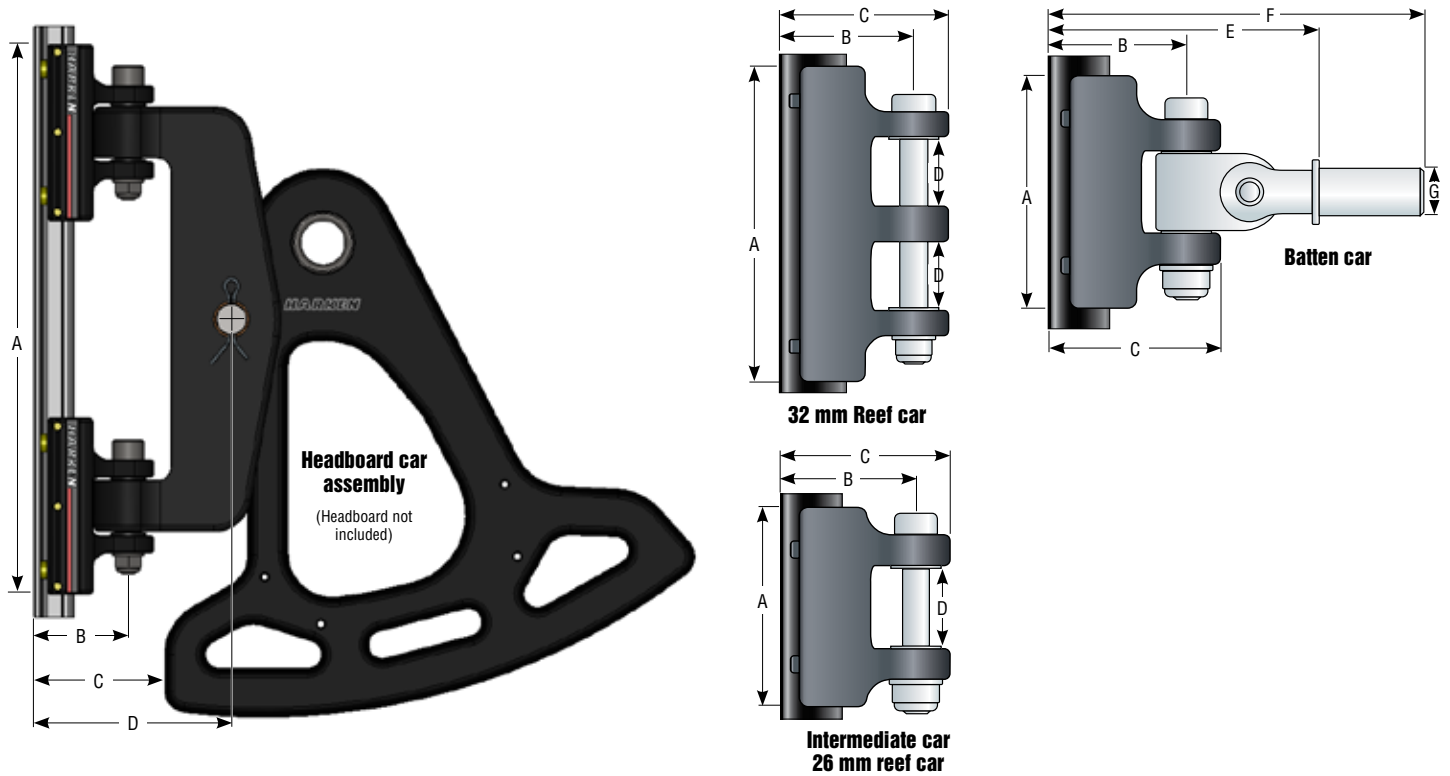
IMPORTANT! When using an electric halyard winch, be especially vigilant when raising sail. Luff sail. Watch for any binding or jamming at the switch and stop hoist immediately if any occurs.

If winch operator does not have a good view of switch cars, station a crewmember with a good view and communication to operator.

If there is a jam, damage to switch and cars will occur very quickly resulting in expensive repairs unless hoisting is stopped.

IMPORTANT! Make sure reef outhaul loads are not applied to cars when in switch. Damage to switch and cars will occur, resulting in expensive repairs.





Part No.	Description	A		B		C		D		E		F		G
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	Stud Ø
26 mm														
HC9045	Headboard car assembly	10 ³ / ₈	270	1 ⁷ / ₁₆	37			3 ⁵ / ₈	92	—	—	—	—	—
HC7493	Intermediate car	2 ⁵ / ₈	60	1 ⁷ / ₁₆	37	1 ²⁷ / ₃₂	47	1 ³ / ₁₆	21	—	—	—	—	—
HC7324	Batten car	2 ¹⁵ / ₁₆	75	1 ⁷ / ₁₆	37	1 ²⁷ / ₃₂	47	—	—	2 ²⁹ / ₃₂	73	4 ¹ / ₁₆	103	12
HC7325	Reef car	3 ¹⁷ / ₃₂	90	1 ⁷ / ₁₆	37	1 ²⁷ / ₃₂	47	1	25	—	—	—	—	—
HC8125	Tack car	3 ¹⁷ / ₃₂	90	1 ⁷ / ₁₆	37	1 ²⁷ / ₃₂	47	1	25	—	—	—	—	—
32 mm														
HC9046	Headboard car assembly	11	280	1 ⁷ / ₈	47			3 ¹⁵ / ₁₆	100	—	—	—	—	—
HC7322	Intermediate car	2 ¹⁵ / ₁₆	75	1 ⁷ / ₈	47	2 ³ / ₈	60	1	25	—	—	—	—	—
HC8098	Batten car/12mm stud	3 ¹⁷ / ₃₂	90	1 ⁷ / ₈	47	—	—	—	—	3 ⁷ / ₁₆	87	4 ¹⁹ / ₃₂	117	12
HC7316	Batten car/14mm stud	3 ¹⁷ / ₃₂	90	1 ⁷ / ₈	47	—	—	—	—	3 ⁷ / ₁₆	87	4 ²¹ / ₃₂	118	14
HC8076	Reef car	4 ¹⁷ / ₃₂	115	1 ⁷ / ₈	47	2 ³ / ₈	60	1	25	—	—	—	—	—
HC8099	Tack car	4 ¹⁷ / ₃₂	115	1 ⁷ / ₈	47	2 ³ / ₈	60	1	25	—	—	—	—	—

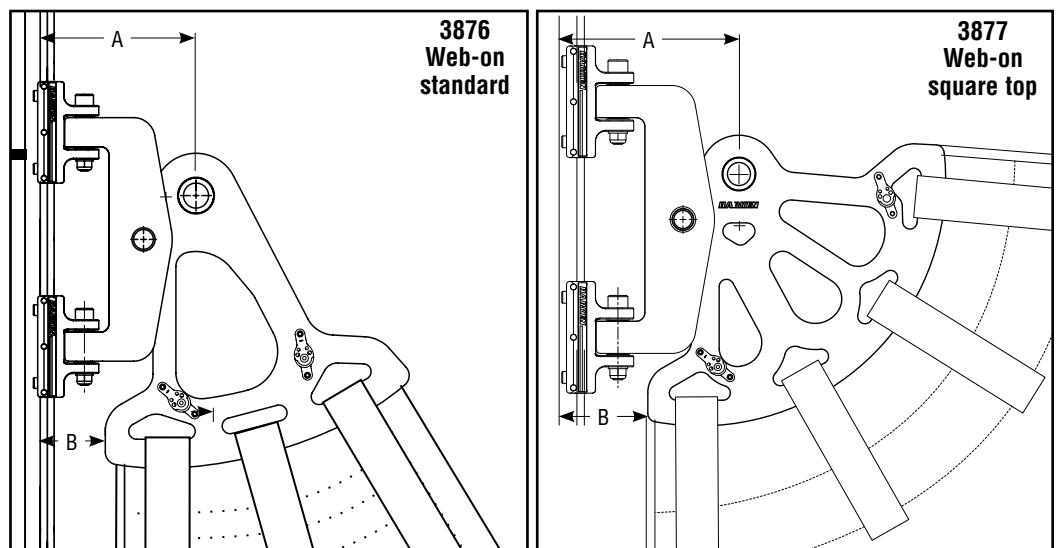
Sailmakers Instructions

Installing Headboard Car Assembly

Use 1³/₄" (45 mm) webbing. Holes in headboard accept 416 16 mm cheek blocks for leech line. Use 4 mm x 10 mm fasteners.

If more reinforcement is necessary, web through lightening holes.

System		3876		3877	
		in	mm	in	mm
26 mm	A	5 ⁷ / ₁₆	138	5 ³ / ₄	146
	B	2 ⁹ / ₃₂	58	2 ⁹ / ₃₂	58
32 mm	A	5 ³ / ₄	146	6 ¹ / ₁₆	154
	B	2 ¹⁹ / ₃₂	66	2 ¹⁹ / ₃₂	66



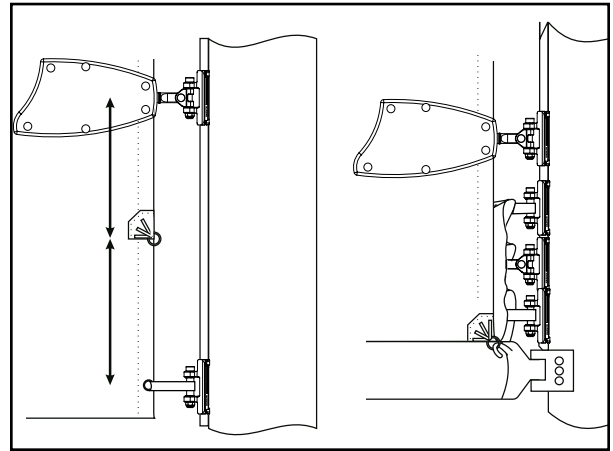
Distance Between Attachment Points

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

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

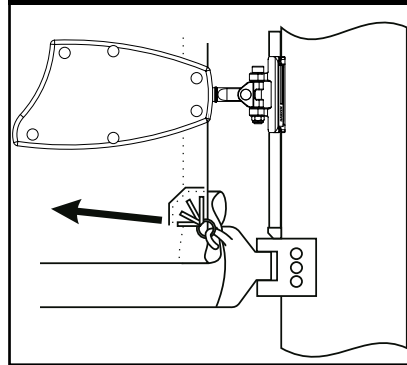
Note: Adding battens may reduce stack height by eliminating luff cars.

DIAGRAM A



While sailing loaded cars must not ride in this area.

CORRECT



INCORRECT

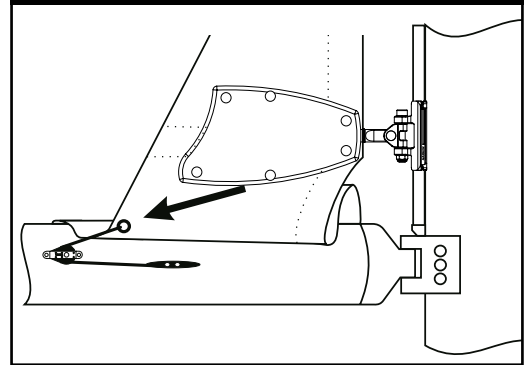


DIAGRAM B

Setting Reef Points

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

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

IMPORTANT! When setting up reef, make sure cars are not loaded when they are in the switch area. If reef outhaul loads are applied to switch, the switch and cars will be damaged resulting in expensive repairs.

Instruct operators to not raise or lower sails with high loads on the cars while in the switch area.

Harken is not responsible for damage to the switch area due to reef loads or raising or lowering a sail when the sail is loaded.

Trysail Switch System

Part No.	Description	Length		Width		Weight		Fasteners	Maximum working load	
		in	mm	in	mm	oz	g		lb	kg
26 mm										
C9493	Port trysail switch*‡	14½	368	4 ²⁵ / ₃₂	121	27	762	6	—	—
C9492	Starboard trysail switch*‡	14½	368	4 ²⁵ / ₃₂	121	27	762	6	—	—
C9494	Car body*‡	2 ³ / ₈	60	1 ¹ / ₃₂	26	5	143	—	1001	454
32 mm										
C9341	Port trysail switch*‡	16	406	5 ⁷ / ₈	149	43	1222	8	—	—
C9340	Starboard trysail switch*‡	16	406	5 ⁷ / ₈	149	43	1222	8	—	—
C9342	Car body*‡	2 ¹⁵ / ₁₆	75	3 ³ / ₃₂	77	11	309	—	595	270

*Available in black or clear anodized ‡Allow 8 weeks lead time

Preassembly

Use standard track and bend to transition between side tracks and switch. The cars should not be under load in this section. Installer is responsible for determining the bend of the track. A compound bend is required to transition from the side of the mast to the aft face.

IMPORTANT! Special care must be taken so that the trysail or standard cars do not hit the adjoining track.

Installing Track

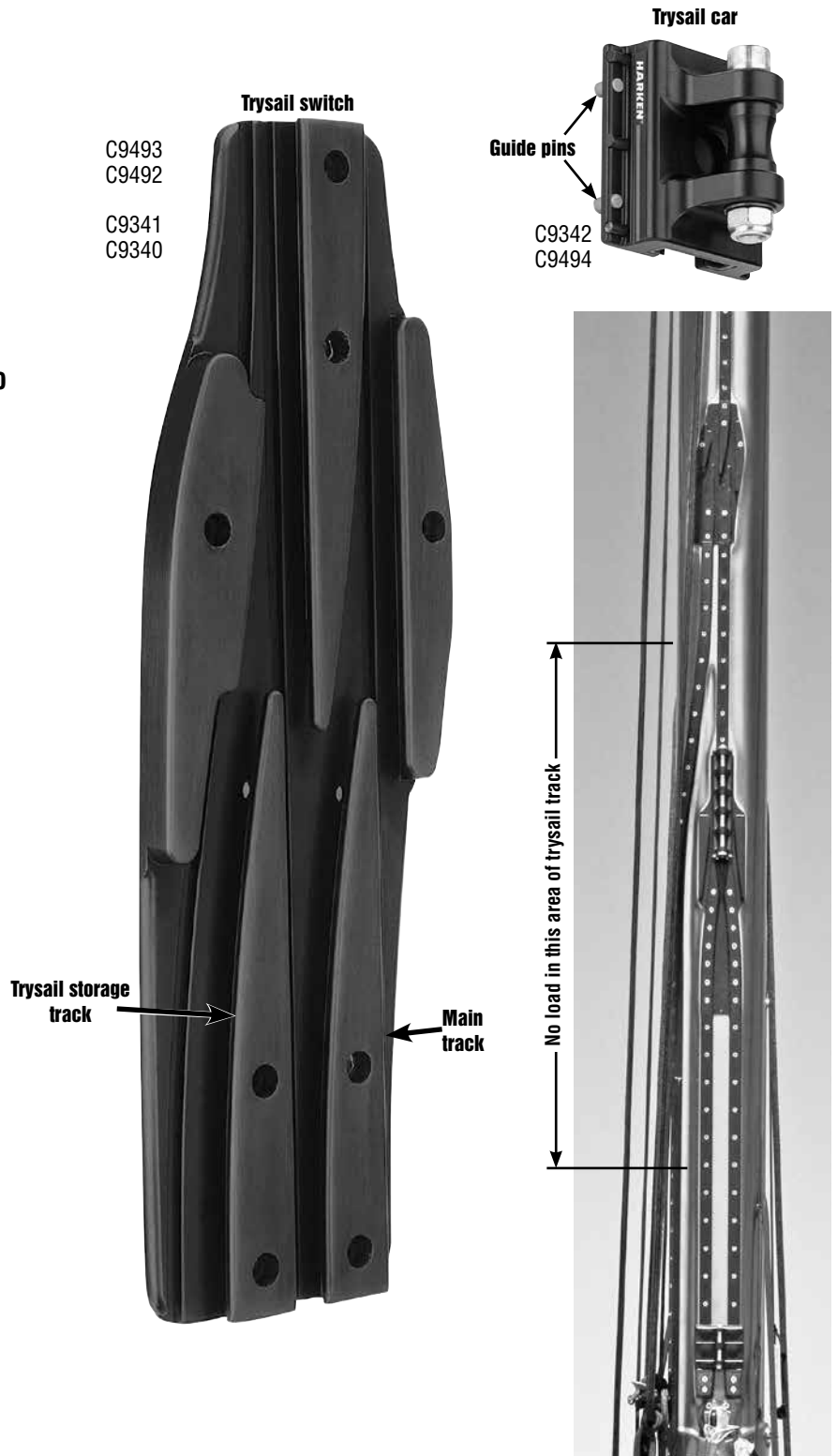
Consult with mast builder. Use suitable reinforcing plates when fastening track to carbon spars.

Loading Cars

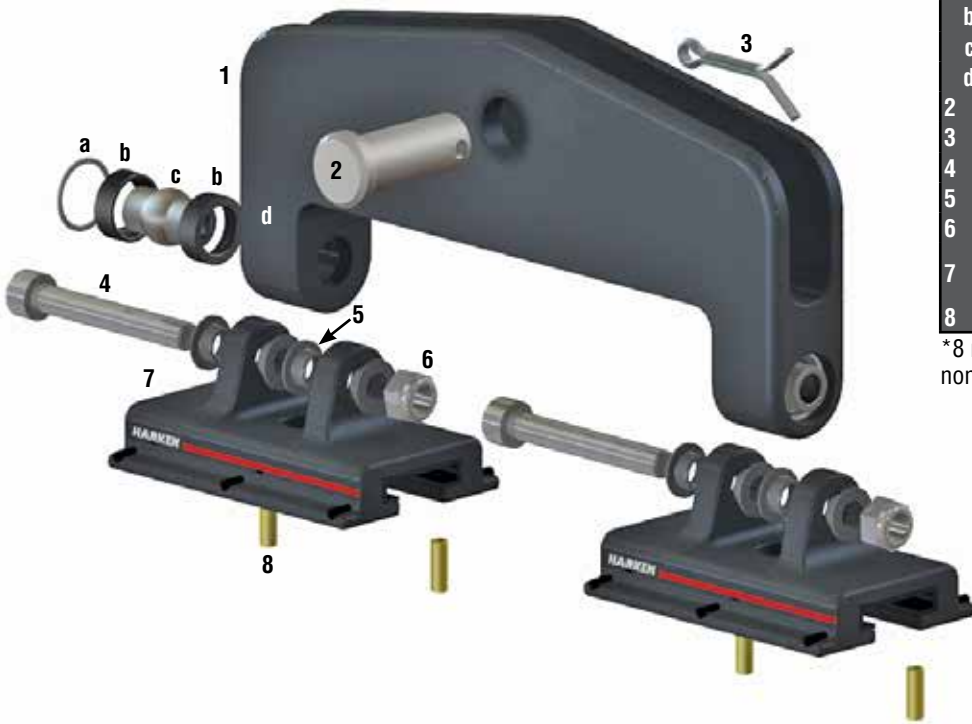
Load cars with guide pins on the same side as the trysail storage track. If storage track is on the starboard side, make sure pins are on starboard side when loading onto track.

Sailmaker instructions

Place cars so that there are none in the special compound bend track section or switch. Cars placed in this area under load will damage fingers of switch.



Replacement Parts



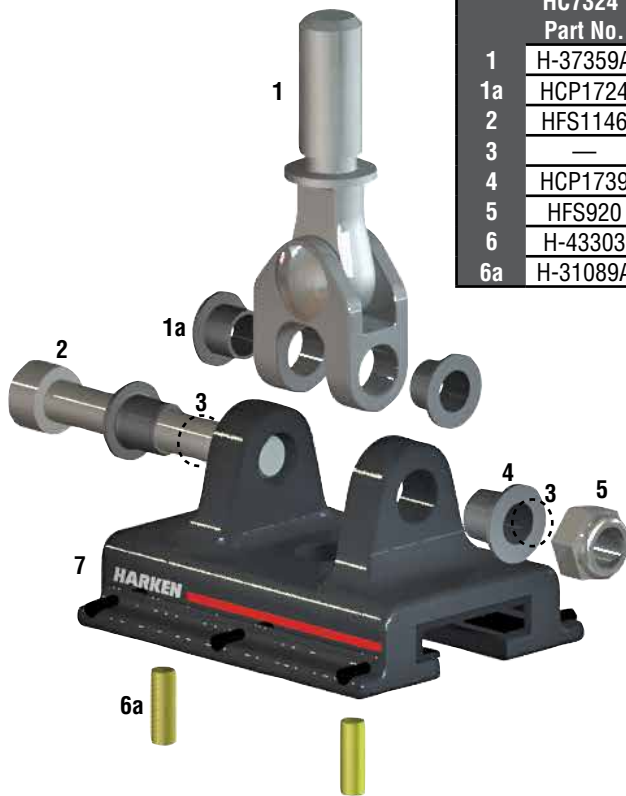
HC9045—26 mm System			
	Part No.	Description	Quantity
1	HC9045	Coupler assembly	1
a	MS-292	Smalley ring	2
b	MS-284	Cup	4
c	MS-285	Spherical becket	2
d	AL-2037	Coupler only	1
2	H-37545A	Clevis pin	1
3	HFS203	Cotter pin	1
4	HFS1146	M8 x 52 SHCS	2
5	H-46463	Igus® bushing	8
6	HFS920	M8 lock nut	2
7	H-43304	Car assembly with sliders and pins	2
8	H-31089A	Guide pin	4

*8 more are listed in bill. They are used to hold non-replaceable insert bearing in place.



HC9046—32 mm System			
	Part No.	Description	Quantity
1	HC9046NP	Coupler assembly	1
a	MS-291	Smalley ring	2
b	MS-288	Cup	4
c	MS-287	Spherical becket	2
d	AL-2047	Coupler only	1
e	MS-265	Igus® bushing	2
2	H-37545A	Clevis pin	1
3	HFS203	Cotter pin	1
4	H-36101A	M10 x 68 SHCS	2
5	HCP1730	Igus® bushing	4
6	HFS191	Flatwasher	2
7	HFS920	Thin lock nut	2
8	Contact Harken	Car body	2
9	H-37242A	Guide pin	4

Replacement Parts



	HC7324 Part No.	HC8098 Part No.	HC7316 Part No.	C7814 Part No.	Description	Quantity
1	H-37359A	H-47961	H-47960	H-39218A	Toggle/stud assembly w/bushing	1
1a	HCP1724	MS-1028	HCP704	HCP1819	Igus® bushing only	2
2	HFS1146	H-36101A	H-36101A	H-48140	Socket head cap screw	1
3	—	H-37226A	H-37226A	—	Delrin® washer	2
4	HCP1739	HCP1730	HCP1730	HCP1819	Igus® bushing	2
5	HFS920	HFS920	HFS920	HFS937	Lock nut	1
6	H-43303	Contact Harken		Car assembly/sliders/guide pins		1
6a	H-31089A	H-37242A	H-37242A	H-41991	Guide pin only	2



	HC8125 Part No.	HC8099 Part No.	Description	Quantity
1	H-40900	H-40891	Socket head cap screw	1
2	HCP1739	HCP1730	Igus® bushing	2
3	H-40902	H-36138A	Bushing/becket roller	2
4	HFS920	HFS920	Lock nut	1

HC7325			
	Part No.	Description	Quantity
1	HFS1146	Socket head cap screw	1
2	HCP1739	Igus® bushing	2
3	H-40902	Bushing/becket roller	2
4	HFS920	Lock nut	1
5	H-43304	Car assembly/sliders/guide pins	1
6	H-31089A	Guide pin only	2



	HC7493 Part No.	HC7322 Part No.	Description	Quantity
1	HCP1739	HCP1730	Igus® bushing	2
2	H-37250A	H-36101A	Socket head cap screw	1
3	H-32605A	H-36138A	Bushing/becket roller	1
4	HFS920	HFS1586	Lock nut	1
5	H-43305	Contact Harken	Car assembly/sliders/guide pins	1
5a	H-37089A	H-37242A	Guide pin only	2

HC8076			
	Part No.	Description	Quantity
1	H-40891	Socket head cap screw M10X107	1
2	HFS130	Flat washer 10 mm	1
3	HCP1730	Igus® bushing	4
4	H-36138A	Bushing/becket roller	2
5	HFS191	Flat washer 8 mm	1
6	HFS920	Lock nut	1
7	H-37242A	Guide pin only	2

Troubleshooting

Operation

Problem	Probable Cause	Solution
Cars bind.	Slider damaged or missing.	Check and/or replace slider.
	Dirt in cars.	Use detergent and fresh water to flush dirt out of cars; move cars up/down do circulate; follow with high pressure water; clean track grooves.
	Stud threaded too tightly into receptacle.	Back off threaded stud two turns.
	Car loaded with guide pins on wrong side.	Check direction car is loaded.
Can't raise sail, cars stop at switch.	Car loaded upside down. Pins in car on wrong side.	Remove car, flip it around and reload.
Nut on battcar is not holding.	Lock nut has been used too many times.	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.

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Inspection

Inspect parts periodically and especially before long passages. Check for loose nuts, cotter pins or track screws. Check toggles or batten threaded studs for wear. If parts are under load during long passages it is important to inspect them carefully while in use.



WARNING: Parts degrade over time and may become weak. Failure to inspect and correct may result in system jamming or breaking under load.

Maintenance

Harken equipment is designed for minimal maintenance, but some maintenance is required for optimum and safest possible operation and to comply with the Harken limited warranty. In general, the most important aspect of maintenance is to keep your equipment clean by frequently flushing with fresh water.

In corrosive atmospheres, stainless parts may show discoloration around holes, rivets and screws. This is not serious and may be removed with a fine abrasive.

With the exception of winches, do not use grease unless specifically recommended in the instruction sheet.

Flush blocks thoroughly with fresh water. Periodically, disassemble the blocks and clean with detergent and fresh water.

IMPORTANT! Exposure to some teak cleaners and other caustic solutions can result in discoloration of part and is not covered under the Harken warranty.

Warranty

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

HARKEN®

Corporate Headquarters

N15W24983 Bluemound Rd, Pewaukee, WI 53072 USA
Telephone: (262) 691-3320 • Fax: (262) 701-5780
Web: www.harken.com • Email: harken@harken.com

Harken Australia Pty, Ltd.

1B Green Street, Brookvale, N.S.W. 2100, Australia
Telephone: (61) 2-8978-8666 • Fax: (61) 2-8978-8667
Web: harken.com.au • Email: info@harken.com.au

Harken France

ZA Port des Minimes, BP 3064, 17032 La Rochelle Cedex 1, France
Telephone: (33) 05.46.44.51.20 • Fax: (33) 05.46.44.25.70
Web: harken.fr • Email: info@harken.fr

Harken Italy S.p.A.

Via Marco Biagi, 14, 22070 Limido Comasco (CO) Italy
Telephone: (39) 031.3523511 • Fax: (39) 031.3520031
Web: harken.it • Email: info@harken.it

Harken New Zealand, Ltd.

158 Beaumont Street, Westhaven, P.O. Box 90689, Victoria St. West, Auckland 1142, New Zealand
Telephone: (64) 9-303-3744 • Fax: (64) 9-307-7987
Web: harken.co.nz • Email: harken@harken.co.nz

Harken Polska SP ZOO

ul. Rydygiera 8, budynek 3A, lokal 101, I piętro, 01-793 Warszawa, Poland
Tel: +48 22 561 93 93 • Fax: +48 22 839 22 75
Web: harken.pl • Email: polska@harken.pl

Harken Sweden AB

Main Office and Harken Brandstore: Västmannagatan 81B
SE-113 26 Stockholm Sweden
Telephone: (46) 0303 61875 • Fax: (46) 0303 61876
Mailing address: Harken Sweden AB, Box 64, SE -440 30 Marstrand
Web: harken.se • Email: harken@harken.se

Harken UK, Ltd.

Bearing House, Ampress Lane, Lymington, Hampshire S041 8LW, England
Telephone: (44) 01590-689122 • Fax: (44) 01590-610274
Web: harken.co.uk • Email: enquiries@harken.co.uk

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Printed in USA 4677 12/13