

Sailboat Rigging: Controls/purchase systems part 1.

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What purchase should I use? What are some rigging options?

The personalization of purchases helps to make a great equalizer on the race course. Physically weaker sailors can add purchase power thus helping them keep up with physically stronger sailors.

Rig your boat based on crew. 1 or 2 crew? Age? Experience? Height? Strength? Customize locations and power for ease of use in your specific needs. *Ease of use = more fun & better performance* ☺

An example of “*personalized*” leading to better team performance is spinnaker pole length. The Interlake class allows a range of 7’ to 8’1.” Theory and commonsense say “longer = clearer air + more projected area = better performance.” Yet, my “*Take Five*” had better performance when I used the shortest length as my young daughter (*Marija*) started working the front of the boat. I also used a lower spin pole ring on mast. That didn’t make for the recommended pole angle, yet the combination allowed a shorter and weaker sailor to safely, smoothly and confidently handle the pole. These positives far outweighed the negatives. Thus, what is often a strenuous task became the leg my young daughter most looked forward to. We love breeze. *Game on!*

There are two parts to rigging: Blocks & line (don’t *dare* say ropes, *arrgh!*)

Standard Interlake purchases (*note: purchase strength is unregulated, rig as you will.*)

Outhaul. 6:1 or 8:1	Cloth (jib Cunningham) 4:1 or 6:1
Jib Wire (Halyard) 6:1 or 8:1	Cunningham 4:1 or 6:1
Centerboard: 6:1	Topping lift 2:1
Vang: Adjusted from boom/mast step: 10 or 12:1	
Adjusted from cb trunk range of 9 to 16:1	
Double ended led to side deck ranges from 12 to 20:1	

BLOCKS: Smaller lines permit smaller (cheaper, lighter) blocks. Modern blocks are amazing, yet you must still check working loads and be sure that the line does not rub against the block itself.

Modern lines, such as spectra, don’t need to be larger than 1/8” on dingys under 20’ (can often be thinner). However, you can’t hold this piano wire plus it doesn’t cleat for diddly.

Example: The savings of the Harken 084 double bullet vs Harken 16mm is 71g vs 27g per block (60%), 33% cheaper, and 25% stronger. (YES, the smaller block has a *higher* working load.) There is much less friction in the smaller system. The breaking loads of this fat, all-polyester line vs this thin, all spectra 78 line are similar. These are real gains to be had in rigging. (*Warning...see anchoring blocks below.*)



Compound systems use two different sizes of lines thus taking advantage of modern materials while taking care of your hands. Compound systems also require fewer blocks to create the same purchase with improved performance, saving weight and money.

Cascade/ size matters. Cascade systems are multi-part purchases. They multiply the purchases of the part together, usually are cheaper and permit using a line with nice hand in one part and aggressively thinner spectra in the other part. The biggest downside is that they require more “throw-length” than a standard pulley setup.

Check out these two variants to an 8:1 cascade system. Both are lighter, cheaper and more efficient (pulls and eases easier) than a pair of quad pullies. Note: Crew will appreciate it if you let them handle the thick line. System “A” is a common set up to double the purchase of an existing purchase. System “B” is the least costly and most efficient. “B” is a useful way to rig “double ended” systems...the ones that are often run to either side of the deck.

A)



B)



C). Side deck pocket. These systems are “double ended.” A 3/16” is line in hand...except my vang is 1/4” so I can select it without looking.



Placing the majority of the system on the cb trunk centers weight plus increases accessibility. The shock cord is to facilitate easing on my outhaul (not needed if outhaul system is contained on boom.)

D) Port side: Wire (black). Cloth, led forward then double ended.

E) Starboard side: outhaul, part of vang, Cunningham, part of cb, uphaul lead and downhaul shock cord.

D)



E)



Easing is just as important as tightening. Everyone loves pulling on strings as the wind builds. Few are as quick to ease in lulls. Gains can be made here. Problem is that pushing on lines doesn't work so well. Friction is the enemy of easing. Hunt down and reduce friction. Thinner, spectra lines run best. They are also smooth. Compound systems usually ease with ease.

Knots/Splicing/SAFETY: Lines are weakest at knots. The typical knot weakens a line by 40-50%. (Bowline maintains approx. 60% of full strength) (1). A proper splice can retain 90% of strength (2). Recommended application is no more than 25% of the weakest part of the system (3). That is usually way less than the line rating (perhaps 1/8 of max line rating).

(1) <http://www.geospectra.net/kite/knots/knots.htm>

(2) https://en.wikipedia.org/wiki/Rope_splicing

(3) <https://www.premiumropes.com/rope-advice/breaking-strength-sheets-halyards>

Anchoring blocks: The loads don't diminish just because you are using space aged thin line and equivalently smaller blocks. The screws anchoring a small block see the same loads as their big lined, big blocked alternative. Use beefy screws. The anchoring fasteners need to be as large as possible for little blocks. Stainless. Include washers. Fender washers are your friend. Proper sized pilot holes are required. Too small cracks fiberglass and weakens the screw head. Too large just doesn't hold and lets in water in *(not to mention that it is rather challenging to find drill bits that make holes smaller ;)*

Use "glassed in" blocks when anchoring underneath the deck. Be sure to remove the surface sealer from under the deck before glassing in to ensure proper adhesion. Seal all holes with silicone, even those with screws in them. Water ingress might be slow but it is persistent and is the top five reasons decks go bad.

LINE TYPES:

Three basic types of materials in modern boating: Polypropylene, Polyester, Dyneema/Spectra. These are often blended. Here are the fundamental characteristics.

Polypropylene: Lightest of lines. Does not absorb water. Floats. Often slippery in hand. Weakest for given size. UV eats it like Superbowl chips. Also, extremely stretchy. The line of choice for waterski tow lines. Not recommended for any control lines, sheets or halyards.

Polyester: Longtime workhorse on sailboats and working boats. UV & chafe resistant. Strong enough for low and medium load applications. Stretches a bit. Heaviest for a given diameter. Absorbs water. Usually has good "hand" (grip-able) depending on finish. Cleating champ. The most common dock line for PHRF and cruising boats. Works well for main/jib sheets and the handled part of control lines. Examples: the long beloved "Trophy Braid," and "Bzzzzz" line.

Spectra/Dyneema (depending on brand). Spinoff tech from Kevlar. Newest formulations (SK75 & 78) are all a dingy sailor could ask for. Use as halyards, internal purchase systems and great in blended lines. Strong as steel for diameter. Light. UV resistant. Slippery. Easy to tie/splice. Affordable. Not good in cleats or hand due to slippery coating and thinness of line for equivalent strength. I love this line.

Vectran: Almost identical to spectra. Slightly less creep but more expensive and doesn't melt to seal ends. Recent spectra formulations (SK78+) have essentially equaled the performance difference on boats under 20'.

Blended lines: These gain the benefits of multiple materials. Example: Alpha Ropes SSR (replacement for Maffioli Swift Cord) is a blend of cordura and spectra. It has great hand, is light, cleats and wears like a champ... my other favorite line.

When in doubt: KISS (*Keep It Simple, Stupid*)...and always have fun 😊

Cheers! Bob