



CRAFTSBURY SCULLING:
THE RIGGING GUIDE

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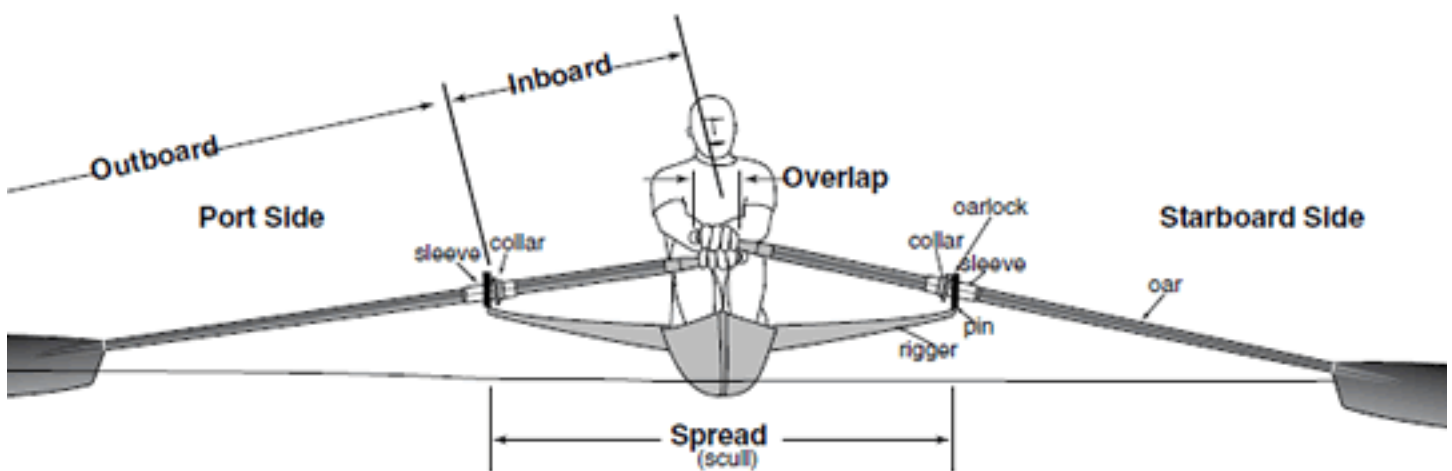
Our main rigging focus for the purpose of sculling camps at Craftsbury is **rigging for comfort**. We want to know that we are coaching you, not the boat you're sculling. This approach is also good for the vast majority of sculler's performance needs as well. In general, the rigging that you can row the most comfortably is also the rigging that will produce the fastest speeds and best performance.

[The information in our 2002 rigging guide](#) is still good for general information about rigging, specific terminology, and the 12-step process for setting up your own single. This updated guide adds pictures and other reference points for adjusting rigging for the individual sculler.

Think of **Part 1** as the mechanics, detailing the processes for measuring and setting up the hardware of the boat.

Think of this **Part 2** as a guide to the "software" of how the individual sculler's anatomy and technique interacts with the customizable pieces of hardware.

We will assume for the purposes of this guide that the fixed hardware pieces are all in their correct positions. Refer to Part 1 for terminology and how to set basic positions of spread, inboard, oar length, oarlock height, pitch, foot stretchers, heel height, footboard angle, and tracks. We will discuss specifics of these as they apply to the individual sculler.



BASIC BOAT SIZING

Here are a few basic numbers for reference based on our fleet of camp boats.

Peinert 26s are designed for **scullers between 150-220lbs**. These scullers are typically taller, and taller scullers typically have broader wingspans.

Typical Rig (exceptions covered ahead):

We set the spread (pin-to-pin) to **160cm**.

Oars are set at **286cm in length** with **inboard set to 87.5cm**.

Peinert 25s are designed for **scullers between 110-170lbs**. These scullers are typically shorter, and shorter scullers typically have smaller wingspans.

Typical Rig (exceptions covered ahead):

We set the spread (pin-to-pin) to **158cm**.

Oars are set at **284cm in length** with **inboard set to 86.5cm**.

Maas Aeros are designed for **open water or beginner scullers up to 240lbs**.

Typical Rig (exceptions covered ahead):

We set the spread (pin-to-pin) to **160cm**.

Oars are set at **286cm in length** with **inboard set to 87.5cm**.

Maas 24 are designed for **intermediate scullers up to 240lbs**.

Typical Rig (exceptions covered ahead):

We set the spread (pin-to-pin) to **160cm**.

Oars are set at **286cm in length** with **inboard set to 87.5cm**.

Flyweight Shells (Maas, Kaschper, etc.) are designed for **scullers up to 130-140lbs**.

Typical Rig (exceptions covered ahead):

We set the spread (pin-to-pin) to **158cm**.

Oars are set at **284cm in length** with **inboard set to 86.5cm**.

MAIN CHECKPOINTS

Regardless of boat, we have three main checkpoints to assess a sculler's rigging. Each checkpoint offers different information about the positioning of the hardware and the sculler. While each checkpoint has adjustments, scullers should know that **no rigging move can be made in isolation.**

This is the **“Law of Rigging:” There is always a give-and-take to adjusting equipment.** Making an adjustment at one checkpoint necessarily affects the other checkpoint as well. Individualizing rigging requires a knowledge of each element's give-and-take and a strategic approach to determining where to maximize and how to compromise.

An inherent flaw of the checkpoint system is that these are static positions within a moving system of human variability. We check scullers' positions before leaving the dock, especially the first time they row a boat. **We recommend that scullers check these positions when rowing boats at home, too, unless you know for sure that you are the last person to row the boat (ie. your own private single).** The goal for the sculler is to continue achieving those positions at each checkpoint while actually rowing. There is therefore necessarily an intersection of rigging, technique, fitness, and strength. This is a central theme detailed further throughout this document.

CHECKPOINT #1: AT THE RELEASE

Sit at the release position (aka “finish,” “layback,” or “backstops” depending on your vernacular) as you actually row it or as you want to row it. Important technical features at the release include: Maintain pressure against the footboard with the feet; Sit on the seat so your “sit bones” are propping you into an upright position, and avoid tucking the tailbone under. Sit up straight with a body angle at approximately the “one or two o'clock” position. A different physical position than any of these broad fundamentals will also affect your rigging.

At the release position, draw the handles toward your body until they contact, or are close to contacting, the belly. We recommend a starting point of approximately a fist width of distance between the ends of the handles at the release. This is enough distance to allow for smooth clearance of the handles from each other and from the sculler while removing the blades from the water on the drive to begin the recovery phase of the stroke.

Why not give yourself even more room at the release? Moving the foot stretcher further toward the bow increases the amount of work the rower must do with the blades past the perpendicular position. Modern shells and blades are designed to do more work before the perpendicular position, ie. at the front-end of the stroke just after the catch. Rigging the hands wider at the back-end can compromise efficiency at the front-end. Some scullers may prefer a wider or narrower position. **Start with a fist width between the handles and adjust from there.**

We also check oar height at this position. The forearms should be approximately parallel to the water with the blades flat on the water (feathered) or squared and buried. **If the hands are higher than the elbows, remove spacers from the bottom of the oarlock** and replace them on top of the oarlock to decrease the height. **If the hands are lower than the elbows, remove spacers from the top** of the oarlock and replace them on the bottom of the oarlock to increase the height. If you are rowing a team boat, this may need to be done with coach permission or in coordination with your teammates.

Make sure you are sitting at the release position with good technique as you want to row it. Scullers may sit up too straight and fail to achieve adequate layback at the release position. This brings the handles closer together at the release, making scullers think that they need to move the foot stretcher closer toward bow. Scullers may also slump or lay back too far at the release position. This moves the handles further apart at the release, making scullers think they need to move the foot stretcher away toward stern. This is the intersection of technique and rigging.



RELEASE SLUMP



RELEASE TOO UPRIGHT

CHECKPOINT #2: AT THE ENTRY

Next, sit at the entry position (aka “catch” or “frontstops”) as you actually row it or want to row it. It’s okay to rest the blades flat on the water (feathered) if you cannot sit at the front end with them square. Sitting at the front with blades square is often challenging for even experienced scullers and, not coincidentally, is a common exercise we use at camp to improve comfort in the boat.

Important technical features at the entry include: Shins approximately vertical with a slight lift of the heels off the foot stretcher; Position your butt forward on the seat so that your sit bones align with the dimples of the seat; Sit up straight with a body angle at approximately the “ten or eleven o’clock” position, with shoulders ahead of hips. A physical position that is different than any of these broad fundamentals will also affect your rigging.

A good starting position for the entry results in the ends of the handles being outside the gunwales of the boat when viewed from the front. We often call this the “hug the horizon” position. When viewed from the side, the sculler’s hip joint should be approximately in-line with the pin. This maximizes the amount of work that the sculler is able to do at the front-end of the stroke with the oars at an acute angle to the boat. As with the release position, there are individual preferences and you’ll certainly see people set up differently. **Start here and then make gradual adjustments.**



ENTRY GOOD FRONT



ENTRY GOOD SIDE

If the foot stretcher position at checkpoint #1 (release) is correct, it should be correct at the front-end as well. However, sometimes scullers' individual anatomy or boat hardware can interfere. For example, a sculler with shorter arms compared to a longer torso may achieve a more forward body position ("ten o'clock") due to the longer torso, but not reach handles outside the gunwales due to the shorter arms.

Scullers sometimes hit the front (stern) ends of the tracks. This can only be adjusted with the sculler out of the boat, so it's an important part of this checkpoint to make sure we get this right before launching. **There are two things to make certain of before you move the tracks.** The first is **checkpoint #1 and the release position**, making sure that the foot stretcher is in the correct position. The second is that **the technique of the entry position is correct**. Scullers who tuck their hips under their shoulders, tilt their hips backwards, or sit up very upright at the entry may hit the front stops due to insufficient forward body angle. This is a technical problem, not a rigging problem. The sculler should focus on achieving good body angle by preparing the body angle right after the release, and carry this and technique to the entry, even if it means reducing their stroke length and reach at the front end. Better technique will result in better boat movement and speed versus a longer stroke with worse technique.



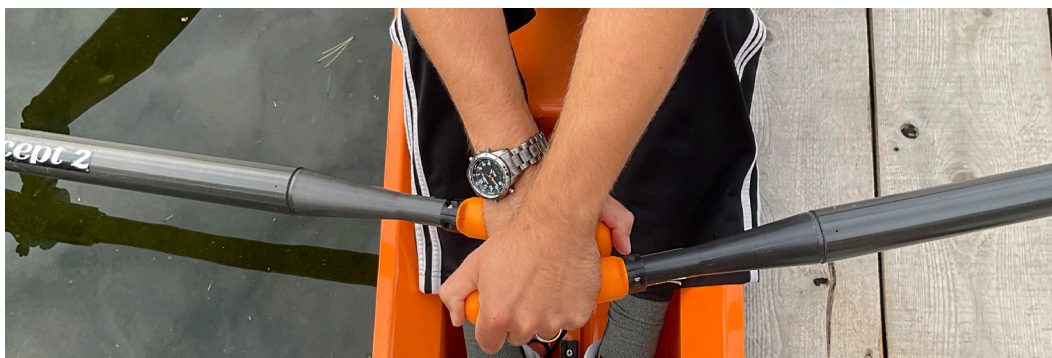
ENTRY BAD ANGLE

If the foot stretcher is in the correct position and the sculler's technique at the front-end is good, then (and only then) the answer is to slide the tracks forward. There are usually wingnuts beneath the tracks (check inside the hull) that can be loosened to slide the tracks forward. Use restraint when retightening the wingnuts after adjusting the tracks, as they can become permanently stuck when excessive force is used. Why not just slide the tracks forward right away? The downside of forward tracks is that they can dig into the calves at the release position, aka "slide bite." Remember the Law of Rigging and the corresponding reaction for every rigging action! Please ask camp staff for help with this if you're using a Craftsbury boat.

CHECKPOINT #3: AT THE CROSSOVER

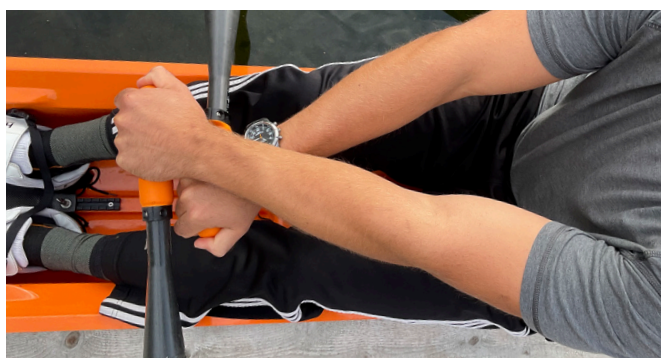
The final checkpoint is the crossover of the hands. This is the midpoint of the drive or recovery when the right hand nests slightly beneath and inside the left hand.

If the spread, footplate, and oars are all perfectly suited to the sculler, the right hand should be all but obscured by the left hand at the crossover when viewed from the front or overhead.



CROSSOVER GOOD ABOVE

The hands are too overlapped if the pinky fingers are closer to each other at the crossover. The hands are not overlapped enough if the thumbs are closer to each other at the crossover. "Why not rig for no crossover?" asks every sculler tired of cutting the top of the right hand with the nails of the left hand or banging the thumbs together in rougher water. Having zero crossover would require a very wide spread or very short oars, which would mean that the rower has to do a lot more work to achieve the same amount of speed or movement. Crossover is a compromise for the necessary evil of being two-handed athletes.



CROSSOVER TOO MUCH



CROSSOVER TOO LITTLE

Assuming that checkpoint #1 and #2 are both correct, adjusting the crossover requires adjustments to the oars. There are numerous differences in oar design between manufacturers and years of oar production. Feel free to experiment with hardware adjustments on your own equipment, but please make sure to ask your boathouse rigging specialist for permission or advice on adjusting any club equipment.

Generally speaking, **too much overlap indicates that the oars' total length and/or inboard is too long** for the sculler. **Too little overlap indicates that the oars' total length and/or inboard is too short** for the sculler. Scullers who have too little overlap or want more inboard can use a CLAM (clip-on load adjusting mechanism). These plastic rings clip onto the outboard side of the oar collar and add a small amount of inboard length. Rowers often use CLAMs when rowing with a tailwind or downriver to increase their leverage against the blade, increasing the per-stroke load to increase output for the easier rowing conditions of the tailwind or current. There is no CLAM-equivalent for decreasing inboard, so a sculler with too much overlap or who wants less inboard will need to perform a hardware adjustment. See the next section for information on rigging adjustments via the oar.

OAR ADJUSTMENTS

We have two main sizes of oars to go with our two main sizes of boats and their two spread settings.

Most scullers **over 5'10 height and/or 170lbs using a Peinert 26** (set to 160cm spread). This sculler will use **oars set to 286cm total length with 87.5cm inboard.**

Most scullers **under 6'0 height and/or 170lbs using a Peinert 25** (set to 158cm spread). This sculler will use **oars set to 284cm total length with 86.5cm inboard.**

These settings get most scullers to the correct positions at the checkpoints described above. Our goal for camps is that scullers can just get in the boat, move the foot stretcher and spacers a bit to get it just right, and get sculling. However, oars are very adjustable, so there are many ways that scullers can individualize their settings for different builds and preferences, and a few major exceptions to the boat-oar matching rules above.

Boats are limited in carrying capacity of the hull.

For Example: A shorter sculler over 170lbs may sit too low to the water in a Peinert 25 and therefore need to use a Peinert 26. However, they will probably not be able to achieve the checkpoint #1 fist-width-between-handles standard at the release position with 286cm long, 87.5cm inboard oars, even with the foot stretcher moved all the way toward the bow (especially without running calves into the tracks or seatdeck). One solution is shorter oars with a shorter inboard.

For Example: A taller sculler under 160lbs may be a better fit in height and arm length for the Peinert 26, but would ride too high in the water in the larger shell designed for heavier scullers. They are a better fit for the Peinert 25, but the 284cm long, 86.5cm inboard oars would likely leave them with too much room between the hands at the release position, even with the foot stretcher moved all the way to the stern (especially without hitting the front of the tracks with the seat). One solution is longer oars with a longer inboard.

Another, more hardware-oriented solution is to adjust spread (distance from pin-to-pin).

Both **Peinert 25 and 26 boats** can be rigged **between 155-162cm spread**. Increasing the spread will have a similar effect to decreasing the inboard, lightening the load and making a smaller arc in the water. Decreasing spread is similar to increasing inboard, also increasing load with a bigger arc through the water. When adjusting spread, make sure that the pins are an equal distance from the centerline of the boat. 160cm of spread with 82cm on the port side and 78cm on the starboard side will create a challenging sculling experience.

As with rigging, we cannot make an adjustment to only inboard, outboard, or oar length without affecting at least one other measurement as well. **Concept2 oars adjust total length within a range of 5cm via the handle**. Loosen the clamp at the blade-side of the handle and then turn the screw at the end of the handle to increase or decrease the length. The collar is still in the same position, but we've lengthened the oar on the inboard side via the handle, so if this is the only adjustment we make, we have changed both the total length AND the inboard length. If we want to change the total length while keeping the same ratio of inboard and outboard, we need to move the collar as well.

A longer blade will do more work. The largest, strongest, longest-armed scullers typically use wider spreads and longer oars and row at lower rates with greater force per stroke. This is again the intersection of rigging, technique, fitness, and strength. A longer oar with more force per stroke is only better if the sculler has the technique, fitness, and strength to support it over their race distance. No rigging numbers can be purely good or bad without considering the context of the sculler.

Think of the collar as the fulcrum between the two seesaw ends of inboard (handle and sculler) and outboard (blade and water). With the same length of oar, a longer inboard (collar proportionately closer to the blade) increases the sculler's leverage so they can produce more force per stroke. A shorter inboard decreases the sculler's leverage to reduce force per stroke. More force per stroke typically facilitates lower stroke rates, while less force per stroke typically facilitates higher stroke rates. Remember in the example of the CLAM that rowers rowing with a tailwind or with a current will often quickly increase inboard. This does not change total length, but alters the ratio of inboard and outboard to increase the sculler's leverage against the blade and increase force output. Decreasing the inboard without also decreasing the total length increases the load per stroke.

First and foremost, the boat, spread, and inboard generally needs to set the scullers up for comfort at the three checkpoints described above. Most scullers simply need to know which oar adjustments are possible and how to make these adjustments strategically in order to facilitate the three checkpoint positions when foot stretcher adjustments alone do not. **For example, in checkpoint #3** at the cross-over, it is sometimes necessary to adjust inboard (and total length) to achieve the desired amount of hand overlap.

Some scullers will develop a performance preference with slight variations on these positions. We commonly see high-performing scullers with a wider or narrower hand position at the release, with varying degrees of proximity to the gunwales at the entry. These variations may be due to foot stretcher position and/or oar measurements, as well as individual biomechanics. These adjustments are much more complex due to the intersectionality of rigging, technique, fitness, and strength.

OTHER VARIABLES OF RIGGING FOR COMFORT

SEAT PADS

There are two different types of seat pads with two different intents.

The first type is designed to improve comfort of the butt on the seat. These typically have a low profile and are contoured, textured, or cushioned to modify the impact of the seat on the flesh or bone of the sculler.

Comfort on the seat is a fairly straightforward proposition. Scullers purchasing seat pads intended for comfort should try to find one with as little height as possible while still achieving the goal of improving comfort. **Comfort seat pads should not alter sculling technique.**

The second type is typically more rigid, non-compressible foam designed to modify the seat-to-heel relationship of the sculler. These are two totally different products with two totally different intents, so scullers need to know which they are purchasing or using for which reason.

Seat pads aimed at increasing the seat height relative to the heel height are intended to modify the sculler's technique, with comfort as a secondary outcome. Scullers with proportionately shorter torsos compared to longer legs, or those with restricted forward hip mobility, often cannot achieve an upright torso posture with adequate body angle at the entry or front end of the stroke. Rather than compensate for this by rounding the spine, raising the seat height has the effect of making the torso longer. This allows the rower to get the torso over the knees and the shoulders ahead of the hips at the front end of the stroke.

Why wouldn't everyone just use a seat pad to improve comfort and body angle? *The Law of Rigging* that every adjustment has a give-and-take and an effect somewhere else in the system applies to seat pads as well in a few significant ways. Increasing the height of the seat also increases the sculler's center of gravity relative to the water. Scullers using a seat pad may improve their body angle, but feel challenged by the instability that this adjustment can cause. One way around this is lowering the heel instead of raising the seat. This is a hardware adjustment that some foot stretchers allow, lowering the shoe on the foot stretcher to increase the seat-to-heel relationship from the other side of the equation. The downside of increasing seat-to-heel height is that it also decreases the horizontal nature of force application, decreasing the efficiency of the drive. This decrease is only worth it if the increase of greater body angle is worth it to the sculler's performance.

FOOTPLATE ANGLE

Some foot stretchers have the ability to adjust angle. By default, the angle is typically between 39-42 degrees. Scullers with poor ankle mobility or very long shins may wish to decrease angle to facilitate a deeper position at the entry with vertical shins. However, *the Law of Rigging* applies here as well. Similar to seat-to-heel relationship, decreasing footplate angle decreases the horizontal nature of force application and decreases efficiency of the drive. This decrease is only worth it if the increase in foot force contact area and lower leg angle at the front end is worth it to the sculler's performance.

TRACKS

We discussed tracks in checkpoint #2 at the entry, and a few things bear repeating here in their own section. We only adjust the tracks once we are sure that the sculler is in the correct position at checkpoint #1 (release), and has good technique at checkpoint #2 (entry) with shoulders ahead of hips and shins in a vertical position. This is because adjusting tracks takes time and requires the sculler to exit the boat, and also because moving the tracks forward often increases "slide bite" at the calves. When it is necessary to move the tracks, use the smallest amount of force possible on the wingnuts holding the tracks in place. This is much less force than when tightening bolts or other rigging components, as there isn't much force on the tracks under normal sculling conditions. Wrenching them down with great force can cause them to become permanently stuck in an awkward position.

BLADES, SHAFTS, HANDLES

Other than the few general guidelines for length and inboard measurements, nearly everything about oars is subject to intense personal preference. The various blade shapes and sizes, amount of shaft flexibility, and the size and contouring of the handle are just some of the myriad options for scullers.

We are currently stocking our camp fleet with Concept2 oars with a Smoothie2 blade, softflex or medflex shaft, and green or orange grips. The shorter oars (284cm) for smaller boats tend to have softflex shafts with smaller, uncountoured green grips. The longer oars (286cm) for larger boats tend to have medflex shafts with medium, countoured orange grips. Campers report liking all sorts of **different equipment combinations for different reasons, so we recommend trying things out and seeing what works for you.**

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