

Laser/Singlehanded Guide for Coaches

Rosie Chapman and Rob Fox, Summer 2011

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| Class-Specific Knowledge – Evaluation Criteria |
| Ability to communicate technical knowledge in at least one class (rigging, boathandling, boatspeed) |
| Ability to use basic sail theory and knowledge from one class, to learn other classes |
| Sources expert tactical/strategic input when the technical answers are not known. |

This manual was written as a guide for Canadian club and provincial level coaches working with athletes in the Competition-Introduction and Competition-Development streams (usually 13-18 year old sailors from beginner to pre-national team level training and competing in the Laser, Laser Radial, Laser 4.7, and similarly cat-rigged boats like the Byte). While most of the instructions below apply to all cat-rigged type boats, they are based on the Laser Radial, and may require slight adaptations for other types.

The manual is organized into sections as follows:

- Rigging

- Body Position & Hiking Styles

- Upwind Boatspeed – Light, Medium & Heavy Wind

- Downwind Boatspeed – Light, Medium & Heavy Wind

- Boathandling – Tacking & Gybing

- Other skills – Bearing off, Heading up, Start line acceleration, and Reaching

The manual is designed to help coaches give Laser-type athletes a strong base set of skills that they can then expand on with regional center and national team training groups.

It should be noted that styles and techniques sometimes change gradually over time, with equipment changes, and most significantly with changing body size/shape of sailors in this age range. It should also be noted that there are various styles and techniques that work for different people – the styles and techniques presented in this manual are simply one good proven version, used by Rosie Chapman while with the RYA Olympic Development Squad, for beginner and intermediate sailors to build a base off. Any additions or changes to this manual are welcomed and may be included in regular updates of this manual.

Rigging

Laser-type boats are simple to rig and are relatively simple to maintain. For beginner and intermediate sailors, proper rigging and maintenance is often the biggest performance improvement a coach can help them make.

1) Mast

- Mast collar should be really tight for an even mast bend. A loose connection causes point loading and your mast is more likely to break.
- The one rivet at the collar should be lined up over top of the gooseneck when sections are assembled, otherwise the rivet hole will stretch and the rivet will loosen under load (check to see that the rivet isn't popping out)
- You can end-for-end the top section (i.e. switch the end that the mast collar is on)
- Mast tie down is now class rules (make sure mast can't do a 360 – use a knot in the mainsheet – otherwise it will pull out the fittings at the bottom of the mast)
- Wipe the base of the mast before putting it in the mast step to reduce wear
- Line up the sail's leech with the gooseneck

2) Mainsail

- Don't roll it on the mast, don't flake it. Take it off the mast and roll it head to foot (or fold in half and roll middle to ends).
- Batten tips frequently fall off the end of the battens and get trapped in the bungee of the mast end of the batten pocket. Use a good adhesive or electrical tape to make sure the mast end batten tips do not come off.
- Check batten pockets and the strap at the head of the sail where it covers the top of the mast for excessive wear.

3) Outhaul

- Use a clew strap (vs. line)...it moves easier and gets the sail closer to the boom, but wears out earlier, so check it often.
- Tie bungee from clew tie-down to cleat on top of the boom to help bring it forward when outhaul is released
- Clew tie-down needs to be tight

4) Cunningham

- For lighter sailors or an older sail, rig the Cunningham system up to one side to get more range.

5) Vang (Kicker)

- Max. off vang is just above 90 degrees in light air....max off is your max off downwind setting

- Have a block-to-block mark on the vang for starting and leeward mark roundings
- Should run smooth, you need it a lot...also need it to have a handle
- Use a small tight loop of bungee on the boom that can slip over the vang key to prevent it from falling out

6) Boom/Mainsheet

- Through-bolt mainsheet blocks if you're using older equipment
- Mainsheet shouldn't be able to be let out past 90 degrees as gooseneck play and leech will likely go past that anyways. This is done by tying a stopper knot in the mainsheet, which should be shortened in heavy air to 85 degrees to reduce death-rolling to weather.
- Sailors should have either a wind indicator at the top of the mast or one at the front of the bottom section just below the boom to get a good idea for wind angles downwind.
- Double figure of 8 on the mainsheet knot at the end of the boom (especially on thinner mainsheets)...having this knot come untied by itself happens way too often!! Remember that the knot should run from the aft end of the becket block and tied off on the front end of the becket block to enable a good block-to-block fit.
- Make sure your boom has the appropriate inner reinforcement tube (some really old booms do not)

7) Ratchet

- Should turn on & off
- Use shackle, not split ring & pin

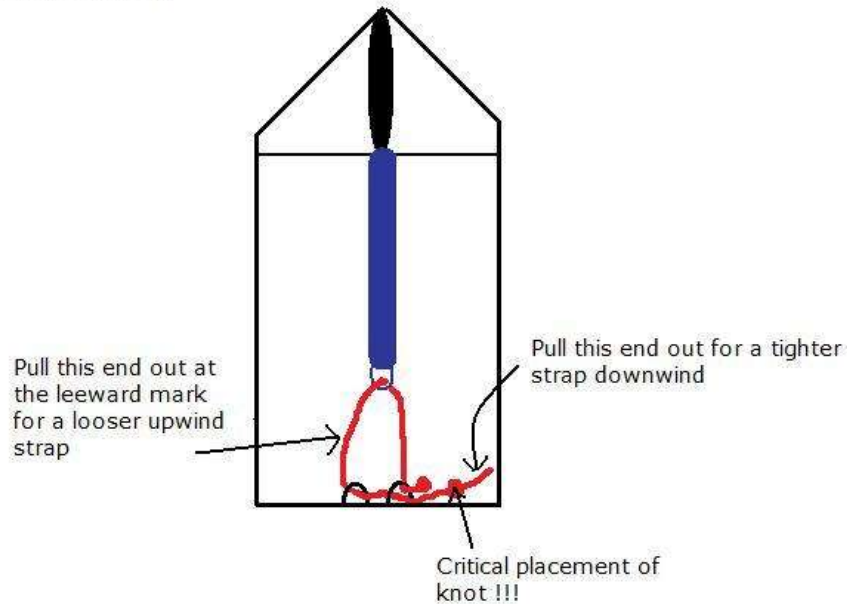
8) Friction Pad/Bungee

- Check to make sure friction pad is not worn out
- Bungee should be one piece only and 1/8" diameter maximum so that it doesn't pull the board away from the friction pad (and therefore make the friction pad useless)...bungee should only be strong enough to keep the board up downwind and may very likely be slack when board is down on the upwinds
- Wrap bungee around bow to keep it flush with the deck when upwind

9) Toe-Strap

- Laser Performance XD Hiking Strap is best (slightly longer)
- Zhik strap also good

LASER ToeStrap



- A thicker line with more friction is necessary for the adjustment line
- A water bottle holder (made of bungee) is good to add more friction

10) Autobailer

- Replace 'O' Rings if you get leaking

11) Traveller

- Bowline at one end, feed through both eyelets, then single hitch back onto bowline
- This triangle should be as tight as possible, even before you try to put it through the traveller cleat to put more tension on (traveller blocks should be able to stand up).

12) Tiller/Rudder

- Should clear traveller cleat
- Don't use the rudder/tiller clevis pin...it doesn't work, so go for a tight 'jammed' fit instead
- Rudderhead/tiller and pintles/gudgeons need to be tight to be perfect (no play). Replace older wooden tillers as they have significant play/wobble issues.
- Rudder downhaul purchase knot can be put inside rudder cheekplates for least amount of stretch
- Tiller extension should have rubber universal and reach past the ratchet block

13) Foils

- They warp easily in the sun. Leave them in the shade whenever possible. Better yet in a padded, rigid case. If you have to leave them in the sun, leave them flat.

Body Position & Hiking Styles

Upwind hiking styles:

There are a lot of varied ways to hike a Laser. People will vary and customize their own style which is great. The things we want to avoid are injuries. Problems occur in the Laser when people hyper-extend their back (this normally occurs when a big gust comes and they arch there back to stretch out further instead of simply sheeting out in the gust to de-power).

You need very strong Legs, core and back muscles to avoid injuries. Coaches should also be aware that hiking technique (and other skills) should be developed using the appropriate sail size – injuries and poor technique are often the result of a sailor using the wrong rig. The Laser platform provides a simple and relatively cheap way to switch sails as the sailor grows (4.7 to Radial, to Full Rig), and more coaches should encourage sailors to use the appropriate equipment for their size:

| Type | Sail Area | ILCA* weight range (kg) | ILCA* weight range (lb) | Recommended weight (kg) | Recommended weight (lb) |
|---|--------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Laser 4.7 (entry) | 4.7m ² | 35-55 | 78-122 | 45-65kg | 100-145lb |
| Laser Radial (Youth and Women's Olympic) | 5.76m ² | 55-70 | 122-155 | 60-75kg | 133-166lb |
| Laser Full Rig (Larger youth and Men's Olympic) | 7.06m ² | 60+ | 133+ | 75-85kg+ | 166-189lbs+ |

*International Laser Class Association – www.laserinternational.org/info/thelaserformula

Getting back to hiking, the most effective style is to have straight legs, upright posture with your arms up high to get extra weight. Upright posture means upper body at approximately 45 degrees to the water, allowing the sailor to move in during lulls and out in puffs. This position will allow athletes to stay hiking longer (aiming 15minutes at a time) vs. hiking flat out (and only being able to hold it for 2 minutes while risking over-extension of the back). Coaches should note that hiking technique is one of the most important things to learn in Laser-type boats and does take time to develop the technique as well as core and leg muscles.

The length of the toe strap also needs to be adjusted for the sailor's size & height. When searching for a straight leg & upright body posture, a shorter crew may have to lengthen their toe strap and hike off toes, while a taller person may have a shorter strap and hike off the top of their ankles (toes pointed up) – in both cases, the strap should not be so short as to pinch the sailor's calves against the windward side of the cockpit where it meets the deck, and not so long that the sailor cannot hike efficiently for extended periods of time (called 'sandbagging'...where the sailor's butt is dragging in the water and their shoulders are hunched in). As a coach, you shouldn't be able to see too much light between the bottom side of the knees and the deck. You will need to vary the length of your toe strap to get the

correct length for the condition. For example, if there are big waves then you will need to have a tighter toe strap to lift your body out of the water (so that you do not get hit by waves).

Upwind Hiking Positions

Straight leg, upright body style – Anna Tunnacliffe



Australians training in breeze



A bit too much outhaul off, but nice hiking style!



Ok, not so good here, but a classic!
Beginners with poor technique often look like this when they first get in breeze – spot the over-extension of the back, pulling the tiller to windward while hiking (which counteracts the benefits of the hiking), the boat not flat.



And here's a good lesson for lighter winds – spot the:

- 1) knees and feet together
- 2) Sitting at the front of the cockpit (likely could be further forward)
- 3) Shoulders outside of the hips. This keeps the head up and able to look around, the body in closer to the center of mass and able to move
- 4) Butt inboard – flat to slight leeward heel

Never mind the traveller!

Downwind hiking positions:



Light to medium wind:
Front knee can be facing forward, this allows you to have more weight forward and to windward to help with windward heel and keeping the transom from dragging. See picture at left.



With a little more breeze here:
Note his back leg is over the top and under the hiking strap, while the front foot is under a tightened hiking strap for a “locked in” feel. The front foot is also against the windward cockpit floor/side ready to push body weight to leeward in case a death roll starts.

Windy positions:

Knees together and up. Front foot still under and back foot over. Generally further back in the boat to prevent the bow digging in and enhance planing. You can also have one knee slightly dropped like picture two above. With knees together you can prevent death roll situation better!



From this position you can see he has shoulders back to lift the bow onto a plane.

Prevention of death roll in breeze



He is using the above “locked in” techniques and has saved the death roll



And what happens if you're not locked in.....

Upwind Boatspeed

Below are the control line settings, body position, sheet tension and techniques used to maximize upwind boat speed in Laser-type cat-rigged boats. Remember they apply specifically to the Laser Radial as sailed by Rosie Chapman during her time on Team GBR and may need adjustment for other types.

Light Air Upwind:

| Control lines: | Body position: | Sheet tension: | Technique: |
|---|--|---|---|
| <p>Toe Strap- tight so you can lock yourself in and each movement you do can be light and effective</p> <p>Cunningham- completely off, speed crinkles running up the mast are fast (horizontal lines at the luff)</p> <p>Outhaul- Half a hand to a hand off. People commonly make the mistake of having their outhaul too loose in light winds, caution to keep it tighter. When the puff hits and stays you can loosen a fraction.</p> <p>Vang- unless you are sailing in a complete drifter, the rule of thumb is to ALWAYS have the vang pulled in to your block to block setting (there should be a mark on your vang, this is put on when you pull your mainsheet until your blocks are together).</p> | <p>You want to be sitting right up by the centerboard case, if it turns in to a real drifter some people like to put their leg up on top of the deck in front of the centerboard case.</p> | <p>In a real drifter you will have your sheet out about three feet and your vang off. As the breeze comes up (3 to 5kts) you will have your sheet off one to two feet and your vang on (past your Block to Block setting to flatten out your sail). Adjust sheet tension for puffs/lulls.</p> | <p>Your feet should be tucked up to the front of the cockpit, one to leeward and one to windward with the toe strap running between them. You can then transfer your weight on to your leeward foot if you need to add leeward heel in a lull or to head up. Your shoulders should be in line with or outside your hips. You may even move your bum and hips really far in board, this means you can move your shoulders in and out on the puffs/ lulls, make sure you are engaging your core all the time!</p> |

Medium Air Upwind:

| Control lines: | Body position: | Sheet tension: | Technique: |
|--|--|---|---|
| <p>Toe Strap- this will completely be based on your size and hiking style. Make sure you don't have to much pressure on your calves and you stay connected to the boat. Shorter people will need a looser toe strap to get further outboard, but still need it adjusted to keep their legs straight.</p> <p>Cunningham- like your light wind setting, speed wrinkles up the mast are ok. Pull it on if you need to start to depower.</p> <p>Outhaul- this condition is where a deeper outhaul is ok, still no deeper than a hand and a half from the cleat. If you are starting to get over powered make sure you go for the Cunno and vang first.</p> <p>Vang- you will have your mainsheet in block to block at all times, snug the vang to this, then put on a touch more. Depending on size you may have to start using more vang earlier (lighter people need to start vang-ing sooner)</p> | <p>You still want to make sure you are forward in the boat, a little back from the centre board case, legs together. You want to make sure you have your toes pointing at the sky if you can while hiking, this eliminates ankle problems, I know for the shorter individuals you may find you need to point your toes more, be aware of any ankle pain!</p> | <p>You will want to be block to block at all times upwind, this is the condition when people get lazy and 'think' they are block to block, make sure you are really squeezing your blocks together.</p> | <p>In this medium wind range it is important that when we start using our controls we bring them on in sequence. I always go for the vang first, then set my outhaul, (knowing I can carry the power lower down), lastly the Cunningham. I play the vang most often, and using Cunningham as last resort.</p> <p>Hiking style: Upright body position so you are free to look around and then drop your shoulders in the puffs</p> |

Heavy Air Upwind:

| Control lines: | Body position: | Sheet tension: | Technique: |
|--|---|--|---|
| <p>Toe Strap- this will completely be based on your size and hiking style. Make sure you don't have too much pressure on your calves and you stay connected to the boat. It is important that your toe strap length allows you to be out the boat while you are able to hold your posture</p> | <p>You want to be a back in the boat, roughly half a foot away from the centre board case, further back if it's choppy/ wavy. Making sure that you are not digging the bow in.</p> <p>Again upright with shoulders outside hips, head up, not hunched over, 45 degree bend at the hips. Strong core holding your shoulders up so you can vang sheet, and then you also have the ability to drop them lower in the bigger puffs.</p> | <p>VANG sheeting! It is VITAL that the blocks are going out to the side and not up, if there blocks are going at all up when they are releasing their main they will in fact be opening the leach, deepening the sail and powering their rig up!</p> <p>If your sailor gets caught in irons through the tack make sure they ease their vang off first.</p> | <p>This is the condition where you often see sailors over extending their back to keep the boat flat in the big puffs (often pulling the tiller to windward making the situation worse). This is something we want to stop happening. It is important that their toe strap is set up so that they can be in a comfortable position and are able to hold this.</p> |
| <p>Cunningham- this is when you can rig the Cunningham to one side of the boom, especially on older sails, it means you can bring the tack eye right down. You want to have your Cunningham as tight as you can upwind.</p> | | | <p>Good sheeting style: Sailors may in fact never be block to block and always playing a sheeting range to keep the boat flat.</p> |
| <p>Outhaul- half a hand, then as the breeze comes up your smaller sailors may have to tighten it even more. Outhaul doesn't need to be strapped to the boom, you can always carry that power lower down.</p> | | | <p>If the chop is big, sailors may need to steer up the wave and bear off at the crest (in steeper waves this may be a 'chopping' motion).</p> |
| <p>Vang- VANG, VANG, VANG! It is in this condition where basically you cannot have enough vang!!</p> | | | |

Downwind Boatspeed

Below are the control line settings, body position, sheet tension and techniques used to maximize downwind boat speed in Laser-type cat-rigged boats. Remember they apply specifically to the Laser Radial as sailed by Rosie Chapman during her time on Team GBR and may need adjustment for other types.

Light Air Downwind:

| Control lines: | Body position: | Sheet tension: | Technique: |
|--|--|--|--|
| <p>Toe strap- Like the upwind you want your toe strap tight so that you can shift your weight from side to side to steer your boat</p> <p>Cunningham- You want your Cunningham completely off, you may have to lean forward as you go around the windward mark and physically slide your Cunno up the mast</p> <p>Outhaul- two hands deep, again measuring from the boom cleat</p> <p>Vang- downwind you want your leech to be opening and closing every few seconds. You can tell that it is doing this by looking at the top two battens. Make sure that your vang is not just constantly sagging as this would mean that you have no leech tension, therefore no leech return and you will be losing power.</p> | <p>As FAR forward as you can be. Some people like to hug the centerboard. I think that this restricts you too much in case of a death roll situation. Put one foot either side of the toe strap. You should have some windward heel on, but never so much so you are digging in the windward rail. Just enough so you keep your sail filled and out of the boat.</p> | <p>You should never have your mainsheet past 90 degrees. But on a real drifter to keep the boom out you may have to let the main go to 95 degrees. Make sure you keep some tension in your sheet downwind, if it is too slack you will be losing power, just like your vang setting.</p> | <p>Using your body weight you need to steer your boat to head up and down. Make sure you are constantly looking behind you for puffs. When it is really light, being on the right angle pointing at the mark either slightly by the lee or on a broad reach is faster than constantly trying to do top and bottom turns...get on a good angle and 'gun it'</p> |

Medium Air Downwind:

| Control lines: | Body position: | Sheet tension: | Technique: |
|---|--|---|---|
| <p>Toe Strap- This is a personal preference in the medium wind range, you will be doing a lot of top and bottom turns. Again stay connected in to the boat.</p> | <p>Locked in to the boat, one foot on either side of the toe strap with it tight between them, weight in the middle of the cockpit with your butt on the windward deck facing sideways to</p> | <p>You will be using your sheet a lot, make sure when you are doing up turns (heading up on to a reach/ wave) that you are sheeting in a lot (hand over hand using both tiller and</p> | <p>Your technique will be changing a lot in the medium breeze, depending on pressure and wave angle. Make sure you get out early and are comfortable with the conditions and being able to adapt.</p> |
| <p>Cunningham- again you want your Cunningham all the way off, if the sail is wet you will need to go forward and push it up the mast</p> | <p>forward. Your aft foot should be tucked under your center of mass near the windward cockpit wall in case you need to transfer weight</p> | <p>mainsheet hands). When releasing the sheet to do a top turn (heading down to by the lea or on to a wave) make sure again you</p> | <p>Sailors may go through a few techniques on one leg, make sure your sailor is comfortable and</p> |
| <p>Outhaul- two hands from the cleat like before. You will find that the difference from your upwind and your downwind setting is not that much (because when you release the cunningham, you will get plenty of outhaul)</p> | <p>to leeward (i.e. in case of a death roll). You should be able to move forward in the lulls or to get on to the plane/ down a wave, and able to move your shoulders back when you get planing in the puffs/ waves.</p> | <p>are letting out what you brought in, but not too much, remember we do not want the boom past 90 degrees, especially in this breeze, as your leech will always be further forward than your boom.</p> | <p>focussed on doing good upturns and downturns for the wave conditions.</p> |
| <p>Vang- You are again looking for the sail to be panting at the top two battens, if your vang is too loose the leech will open and your boat will constantly bear off with death rolling likely. Likewise if it is too tight your boat will try and head up constantly and if this happens in a puff your boom will dig and capsizing is a possibility.</p> | | | |

Heavy Air Downwind:

| Control lines: | Body position: | Sheet tension: | Technique: |
|--|---|---|--|
| <p>Toe Strap- This is a personal preference in the heavy wind range, you will be doing a lot of top and bottom turns. As always, stay connected to the boat to save death rolls.</p> | <p>Depending whether you are going by the lee or heading up onto a broad reach, your body position will be moving forward (by the lee) and back (broad reach) in the cockpit. Make sure your toe strap is set so you can do this.</p> | <p>80- 90 degrees and matching steering. NEVER past 90 degrees. If you have your vang set right and you are still un balanced and constantly saving death rolls you have too much main sheet out.</p> | <p>Be free in the boat, move around lots and WORK the boat to get up on the plane and surfing. Moving fore and aft is going to be as big as in and out. It is important to keep good posture in this condition as it will help you get on the wave and save any near death roll situations when you get it a little wrong.</p> |
| <p>Cunningham- all the way off, it is common for people to think 'it's windy I want to stay de-powered', but in fact all you are doing is putting the centre of effort too far forward and are likely to death roll!</p> | <p>Whatever the mode, the priority here is to keep the boat flat.</p> | | |
| <p>Outhaul- you can leave it where it was for the upwind, (as you ease the Cunningham off it will ease the foot for the sail out enough).</p> | | | |
| <p>Vang- again you want to top two battens panting, but in this much breeze it becomes more of a balance game. If you have too much off you will be forever saving death rolling, too much on and your boat will be heading up constantly. Feel safe to play with your setting, it is roughly 90 degrees.</p> | | | <p>In this wind speed people tend to try and point their bow straight at the mark, crouch in the middle of the boat and hope!! This makes you very slow and very vulnerable. Get your sailors to loosen up in the boat, move body position and force their boat up on a plane, you will need to use bigger angles to get on to and sometimes even skip waves.</p> <p>HAVE FUN!!!</p> |

Boathandling

It is common for Canadian club coaches to work extensively on the tacking, gybing, and other skills that make up boat handling. Remember though that most of the race is spent sailing in a straight line, and that good boat handling technique is not possible without first entering the boat handling manoeuvre with proper straight line technique. Naturally, the boat cannot be sailed without knowing how to tack, gybe, head up or bear off properly (capsize IS the slowest point of sail!), however this manual encourages coaches to spend more time on straight line technique than in the past, to maximize boat handling technique and overall athlete development. Remember “entry often equals exit” when talking about boat handling!

Below are basic skill breakdowns for tacking and gybing Laser-type boats. We will start off with a standard medium air manoeuvre and follow with adaptations for different wind conditions.

Laser / Radial / 4.7 Tacking

Simplified Version

1. Prepare mainsheet and feet
2. Steer into the tack with the same heel angle you had sailing straight line, sheeting in BTB
3. Allow the rig to come over top of you until the sail breaks/luffs
4. Move up to the new windward side, sheeting out 2-4 feet during the cross
5. In ‘twisted’ body position, hike the boat flat, sheet in and exchange tiller and mainsheet hands
6. Fine tune sheeting, controls, d-board, body position as needed on the new tack

Expanded Version

1. Make sure your mainsheet and controls are clear and your feet are positioned for you to move to the new side – often this means maintaining the same hiking posture while taking the back foot out from the hiking strap and placing it on top of the hiking strap.
2. Keeping your heel angle the same as it was when you were sailing straight line, simply steer the boat up into the tack, sheeting in any remaining mainsheet you have as you go until it hits BTB (Block to Block). In most cases, do NOT let tiller go past the far side of inner cockpit, as it will start to act as a brake or may tack too fast.
3. As the boat starts to head up let the boat/rig come over top of you to windward. Don’t panic, be patient in your straight-line position as the sail starts to lose power and the boat starts to heel to windward. As the sail starts to break/luff you may have to lift weight off your bum slightly, one-shuffle it aft and put it down again (all in one smooth half-second motion) – this positions the body slightly further aft to get under the boom and adds a bit of roll to windward as the sail breaks/luffs...this is particularly the case in lighter winds.
4. When the sail breaks/luffs, cross the boat by springing off your feet which should be tucked up under you where the cockpit floor meets the cockpit wall. Mainsheet should be block to block entering this step, but is naturally eased as the sailor crosses the boat (by bringing your hand into centre of boat towards the mainsheet block as you cross). Depending on the breeze, the sailor may need to ease out more mainsheet to get the boat flat on the new tack.

5. As you cross to the new side, you will have twisted your feet around the hiking strap so the old back foot over the hiking strap is now the new front foot under the hiking strap (and vice versa with the other foot). After the cross you are facing forward, hiking out on your new forward hip with your tiller and mainsheet hands reversed and steering with your old tiller hand behind your back (see picture below). Flatten the boat, sheeting in a bit as the boat becomes flat. Switch hands by taking your old mainsheet hand and wrapping it around your body to your tiller (this also has the small effect of sheeting in a bit after the tack). Grab the tiller with your old mainsheet hand - it will be holding both mainsheet and tiller for a moment. Let go of the tiller with your old tiller hand and grab the forward side of the wrapped mainsheet.
6. Trim mainsheet to upwind setting and reposition body as necessary (move forward in most cases, esp. lighter airs). Adjust controls and tap down centerboard with forward foot as necessary.



Step 5: 'Twisted' body position after crossing the boat (note GBR steering behind back), and after flattening the boat on the new tack (note USA 'wrapping' the mainsheet over his body to pick up the tiller).

Light wind tacking Tips:

- Light air is likely the only time sailors should move body weight in before the tack. For step 2 in light air, sailors can initiate small leeward heel by taking the weight off their bum and either leaning forward or transferring weight to their feet. The addition of slight leeward heel in light air causes the boat to head up and reduced the amount of tiller needed to steer the boat into the tack. Use your body weight not tiller to tack- hence using the inner cockpit as a marker to too much tiller being used. When the sail breaks/luffs in step 3, the sailor can then put the weight back down to encourage roll to windward (to get through the tack quicker and create a good heel angle on the new tack to pump down and accelerate).
- In step 2-3, it's a good habit to get sailors to pull the mainsheet block-to-block as the sail breaks/luffs. This is because a tight mainsheet means a tight leech and fully sheeted in mainsail, which helps propel the bow through the tack. Even if the mainsheet is already fully block-to-block at the time of the sail breaking/luffing (and the sailor effectively pulls no more mainsheet in), this habit is desirable. Very important that as you head up you sheet blocks in block to block, if you go into the tack with blocks out, the sail luffs and spills power and you decrease significantly in speed which = SLOW tack

- In step 3, sailors can add a bit of extra windward roll once the sail begins to break/luff. This can be done by moving the shoulders out and aft at the break/luff moment, or if very light sailors can use the hiking strap to hold onto to increase the roll. Additional windward roll should be taught after the basic steps.
- For step 3 it is common for beginner and intermediate sailors to add windward roll before the sail starts to break/luff. This is not desirable as it counteracts the heading up into the tack and either makes the tack slower or causes the boat to stall out. Coaches will need to encourage new Laser-type sailors to be patient in waiting for the sail to break before moving to the new side (sailors will often capsize a few times to windward while getting the timing right in this step).
- Minimize windward heel when completing the tack. In fact keep a small amount of leeward heel on until you trim the mainsail in to where you want it for the upwind. When flattening the boat in light air, sailors will need to scooch their bums into centerline quickly as the boat becomes flat so as not to over-flatten the boat on the new tack (very slow and common with newer sailors).
- If your sailor is coming out the tack sitting too far back they will also be slowing the boat down by digging the transom in.

Medium wind tacking Tips:

- You will not need to add a huge windward roll in medium air. Simply leaving your body weight on the old windward side longer will give significant roll in this breeze. Sailors do not need to focus on a big roll, simply delaying coming in will give enough roll through the tack
- In these conditions it is natural for sailors to try and rush their tack.
- It is very important that they do not release their blocks too early as the boom is coming over
- Again make sure they are not using too much tiller (the cockpit guideline still applies).

Heavy wind tacking Tips:

- Make sure sailors keep hiking hard and the boat does not heel to leeward when they take their aft foot out from under the hiking strap before the tack.
- Because sailors are vang-sheeting and slightly off the wind in this condition, they need to realize they need to head up more (and therefore sheet more) to get through the tack.
- The boom is going to come over quickly, so reactions must be quick as the sail breaks/luffs.
- As the boom is coming across sailors need to be leaping up to the new windward side and releasing the blocks out three to four feet (more than normal) to get the boat flat and moving on the new tack. A KEY skill in this condition is being able to let mainsheet out on the new tack if too much leeward heel develops (done by allowing the mainsheet to slip - under control - through your hand).
- You need to bear away after the boom crosses when it is windy so you can get back up to speed. To do this, after you cross hike hard straight away to get the boat to bear down on the new tack before trimming in to vang sheeting.
- Make sure you commit to the tack, if you do not then you are likely to get caught in irons
- If you get caught in irons when coming out the tack you would have not born away enough through the tack. Release your vang immediately and crouch into the bottom of your boat, remember you will now be steering backwards to get out of irons. Common causes for getting

stuck in irons are steering too slow or hitting a wave as the sail breaks, so encourage your sailors to avoid those mistakes.

'Survival' wind tacking Tips:

- The same steps as heavy wind tacking apply, the only difference is that sailors can release a small amount of vang pre-tack as this will help them to NOT stall out once they are on the new tack. Explanation: In this amount of wind sailors will need to have a lot of vang on to vang sheet while sailing in a straight line, this means sailors will find it hard to get their bow down after the boom crosses, and can result in irons, which is why the vang is released slightly before the tack. It will also make it easier for them and their lifejacket to get under the boom.

Laser / Radial / 4.7 Gybing

Simplified Version

1. Prep for the gybe and ensure you are fully up to speed and far enough downwind
2. Initiate the turn by getting/keeping weight outboard and allowing the tiller to follow
3. As the boat bears away and sail unloads, sheet in 3-4 feet of mainsheet
4. As the boom/leech starts to come over, give one last mainsheet jerk and cross the boat
5. In 'twisted' hiking position on the new side, allow the sail to catch, then flatten and sheet in
6. Exchange tiller and mainsheet hands, then adjust body and sheet trim to new course

Expanded Version

1. In the preparation step, there are a few quick things the sailor needs to check before they gybe. They need to make sure the boat is up to speed – a fast boat will have less pressure on the sail and will be easier to gybe (a slow moving boat will be loaded up and the sailor will have to turn further to initiate the gybe, losing speed and risking capsizing). They also need to check they are clear to gybe with other boats and puffs around them. Their back foot should already be over the other side of the toe strap and the mainsheet is usually clear when sailing downwind. Sometimes putting down the board helps carve the gybe and may provide stability after the boom has crossed.
2. As you head in to the gybe, initiate the turn by moving/leaning body weight outboard to get some windward heel – the amount will be wind-dependant (more for lighter winds, less for heavier winds). As the windward heel develops, let the tiller come slightly towards you (again like the upwind rule of thumb is to not let it go outside the corners of the inner cockpit). **Do you lean out to initiate roll, or do you steer down and THEN flick your weight out as the sail breaks?**
3. As the boat bears away and the sail starts to lose pressure, sheet in at least three to four feet of mainsheet to take out the slack.
4. As the leech inverts and the boom starts to go over, give the mainsheet one final tug with your forward hand and cross the boat. Timing is everything in this step – in lighter winds you can stay on the old windward side a long time until the sail catches on the new gybe, whereas in heavier winds you need to be on the new side before the boom catches. The

reason for the final mainsheet tug is that it is very common for the mainsheet to get caught on the back corner of the transom, caused by the sheet becoming slack through the gybe. The final mainsheet tug takes up any remaining slack and will help stop the mainsheet getting caught on the back corner. If the sheet does get caught on the back corner, have the sailor look back quickly to check it, then have them fix it by leaning back, but looking forward (to stay on course and avoid collisions).

5. Similar to tacking, the sailor will have crossed the boat by springing off their feet (tucked under their body weight against the windward cockpit floor/wall), and twisting their feet around the hiking strap to remain attached to the boat. Also like tacking, the sailor will be facing forward, hip down on the new windward gunnel and steering behind their back. At this point, the sailor allows the sail to catch on the new side, then flattens the boat with a body pump. Depending on the breeze and the downwind angle desired, at the end of the body pump (as the boat becomes flat), the sailor will ease their body weight back into the boat.
6. As the boat settles into its new course, the sailor exchanges tiller and mainsheet hands using the same method explained in the tack, and fine tunes sheet and body trim to course, in addition to daggerboard and sail controls as needed.

Light wind gybing Tips:

- As the boom starts to come, sailors can pull the toe strap with their front hand to help turn the boat through the tack. The toe strap pull can also give the boat a bigger roll so that on the new side the sailor has more heel with which to flatten and generate speed.
- Sailors will need to wait longer on the old side in light air, likely until the sail fills on the new gybe, before crossing over the boat smoothly and gently, to then flatten with some force. When first learning to wait on the old side longer, it is common for newer sailors to capsize to windward before they get their timing right...ensuring they have their core engaged and feet tucked under their center of mast helps them through this stage of learning.
- Over-flattening the boat on the new gybe is common with newer sailors and is a speed killer (the boom often comes back inboard and wants to gybe back). Sailors will need a smooth touch to begin moving back into the boat before the heel angle becomes flat.
- There are two ways to gybe in light wind – the method mentioned above and a flatter ‘Lee-to-Lee’ gybe. At the top level on the International circuit people use both depending on the situation and the amount of wind, however at the beginner and intermediate level coaches should concentrate on helping their athletes master the standard gybe first.

Medium wind gybing Tips:

- This is the easiest air to gybe in and you do not need much windward heel entering the gybe.
- Newer sailors have a tendency to sail to bigger gybing angles in medium breeze. Get them to focus on minimum angles through the gybe - they should aim to do a tiny ‘snake’ or ‘S-turn’ with their boat, and barely alter their downwind course.

Heavy wind gybing Tips:

- COMMIT, COMMIT, COMMIT!!!! Too many heavy air capsizes occur because sailors try to slow the boat down before the gybe, allowing the sail to load up. Feel for that 'unloaded' sensation in your foils and mainsheet when the boat is moving fast and get it done!
- There is usually only a fraction of dagger board up anyways in this condition, but sailors can put down some dagger board to help with stability through the gybe if they so desire. Beware though that if they exit the gybe on too tight an angle, the boat will 'trip' over the lowered dagger board and likely capsize.
- Make sure you're going as fast as possible entering a gybe, if wavy this is ideally surfing down a wave. If catching a wave, as you bear down sheet in four to five feet really quickly as the boat speeds up, then initiate the gybe.
- Things happen very quickly in this condition. The boom will start to come over straight away in step 4. As the boom flies over, the sailor already needs to be ducking under the boom and moving to the other side. Ideally the sailor wants to be hiking on the new side before/as the sail loads up on the new side ('beating' the boom over!). In breeze it is important to be hiked out as the boom hits the other side.
- Final mainsheet tug is very important in breeze. If the sail only gets half way over, the sailor risks bailing out of the manoeuvre and broaching, or pushing the manoeuvre through with a loaded up sail and either death rolling or broaching on the new side.
- Little body movement to get windward heel is needed to initiate the gybe. The boat should already be flat and the tiller will initiate most of the gybe.
- The main point of a heavy air gybe is to keep the boat flat at all times...there should be little hiking the boat flat on the new gybe, rather the boat should remain relatively flat throughout the manoeuvre. As in a heavy wind tack, the sailor needs to be prepared to let sheet out quickly on the new side if excessive leeward heel develops (but not let go completely as they will capsize to windward on the new side!).

Other Laser / Radial / 4.7 Boathandling – Bearing off and Heading up

Bearing away (i.e. at a windward mark):

- Before the bear away, the sailor should ensure the mainsheet is free to run. One of the most common causes of poor bear aways are tangles that prevent the mainsheet from running through the ratchet.
- Make sure the vang is off (to the downwind setting described in the Rigging section) before bearing away.
- Depending on the breeze, the sailor needs to keep the heel angle flat (or to windward) to encourage the boat to bear away. Often this is hiking hard and aft/back.
- During the turn, the sailor needs to ensure the sheet ease matches the tiller/boat's turning rate. Mainsheets let out too slowly cause leeward heel and broaches, mainsheets let out too fast cause windward heel and death rolls.
- Always look forward to maintain awareness of the situation around you and maintain a good feel for heel angle and waves.
- Fine tune body position, sail trim, sail controls, and dagger board at the end of the bear away.

Heading up (i.e. at a leeward mark):

- Pre-set the cunningham and outhaul before the turn. Vang can be snugged to the block-to-block setting (as described in the Rigging section), but can also be done after the rounding.
- Depending on the wind speed, heel angle is critical to a smooth, fast turn. In light winds some leeward heel (which can then be flattened out for a pump to generate speed) is desired. In heavy winds the goal is to keep the boat flat throughout the turn.
- As with the bear away, rate of sheeting in must match the rate of turn. Coaches of newer sailors should do a lot of work with their athletes practicing correct hand-over-hand mainsheet technique, using both main and tiller hands equally to get the mainsheet in quickly when heading up.
- If heading up around a mark, the sailor should attempt a 'wide and close' rounding to generate maximum speed and distance on the new upwind leg. This means having enough distance from the mark at the beginning of the rounding to ensure the boat is sailing close hauled when it reaches the mark. More advanced sailors should practice improvised closer roundings that will occur tactically against other boats in races.
- Fine tune body position, sail trim, sail controls, and dagger board at the end of the bear away.

Start Line: Accelerations

There are many skills to be learned on the laser start line, among them double tacking, (legal) crabwalking, and bailing out of bad situations. At the basic level however, the coach must focus on start line accelerations – getting the boat moving from stopped to top speed as quick as possible. Described below is one technique for the Laser Radial, which may need to be adapted for other types.

General Accelerations:

- Set the vang block-to-block before start. Make sure cunningham and outhaul are also set correctly for the conditions so you will not have to adjust them in the crucial 2 minutes after the start.
- Sit the bow pretty high into the wind (without being in irons) to avoid the vang engaging and pulling you forward over the line. Have the main luffing, but take the slack out of the mainsheet. Note: In wavy conditions you will not be able to sit as close to the wind.
- Use aggressive tiller movements to get the bow down and the sail starting to pull.
- Add heel if necessary in lighter range winds by standing, kneeling, or leaning in.
- Flatten aggressively to flick leech and propel the boat forward. Move inboard if necessary to avoid over-flatten in lighter airs. Sheet in as boat becomes flat. Beware of sheeting in too far before flattening, as when you attempt to flatten the boat will only move sideways – a common mistake for new sailors.
- Sheet in final amount of mainsheet to close-hauled and fine tune sail controls and body placement once up to speed. Clean out mainsheet tail if necessary. Concentrate on holding your lane for the crucial 2 minutes after the start (coaches are encouraged to make sailors concentrate on looking forward...not messing around with sail controls, looking back, etc, during the post-acceleration period).

Acceleration Tips for coaches:

- Once your sailors have the basic acceleration skills, have them practice gunnel to gunnel accelerations (being close to other boats on either side during acceleration drills), as is the way with most Laser / Radial / 4.7 starts.
- A reminder to get your sailors to flatten, then sheet shortly after during the acceleration, not other way around!

Reaching Technique

Reaching is fast and fun (at least in wind it is!), but takes some time to develop good technique. Below are some basics coaches should be teaching their sailors:

- The vang setting on reach is critical and needs to be trimmed appropriately for different wave angle, wind speed, and wind angles.
- Sailors need a tight toe strap to keep their bums out of the waves & water
- There should never be any windward heel. This is a common mistake for newer sailors. If anything, encourage a slight heel to leeward.
- In wavy conditions, sailors may want to change angles to catch surfs. In windy conditions, quick hand over hand sheeting is required to keep an even heel angle in gusts and lulls.
- Hand over hand sheeting and body weight placement needs to match any steering done during mode changes.

Conclusion/Wrap-up:

Hopefully, this manual was helpful in aiding Canadian Club and Provincial level coaches to understand the important base technical skills required to sail cat-rigged Laser-type boats properly. Being able to transfer to your athletes a strong base set of skills will put them in a great position to enjoy their singlehanded sailing and potentially join a regional center training groups to further develop their skills.

Again, it should be noted that styles and techniques sometimes change with personal preferences, gradually over time, with equipment changes, and most significantly with changing body size/shape of sailors as they age. The styles and techniques presented in this manual are simply one good, proven version for beginner and intermediate sailors to build a base off. Any additions or changes to this manual are welcomed and may be included in regular updates of this manual.

Good luck with your upcoming training and feel free to get in touch if you have any questions!

Cheers,

Rosie Chapman (rosail41@msn.com)

Rob Fox (robwfox@gmail.com)