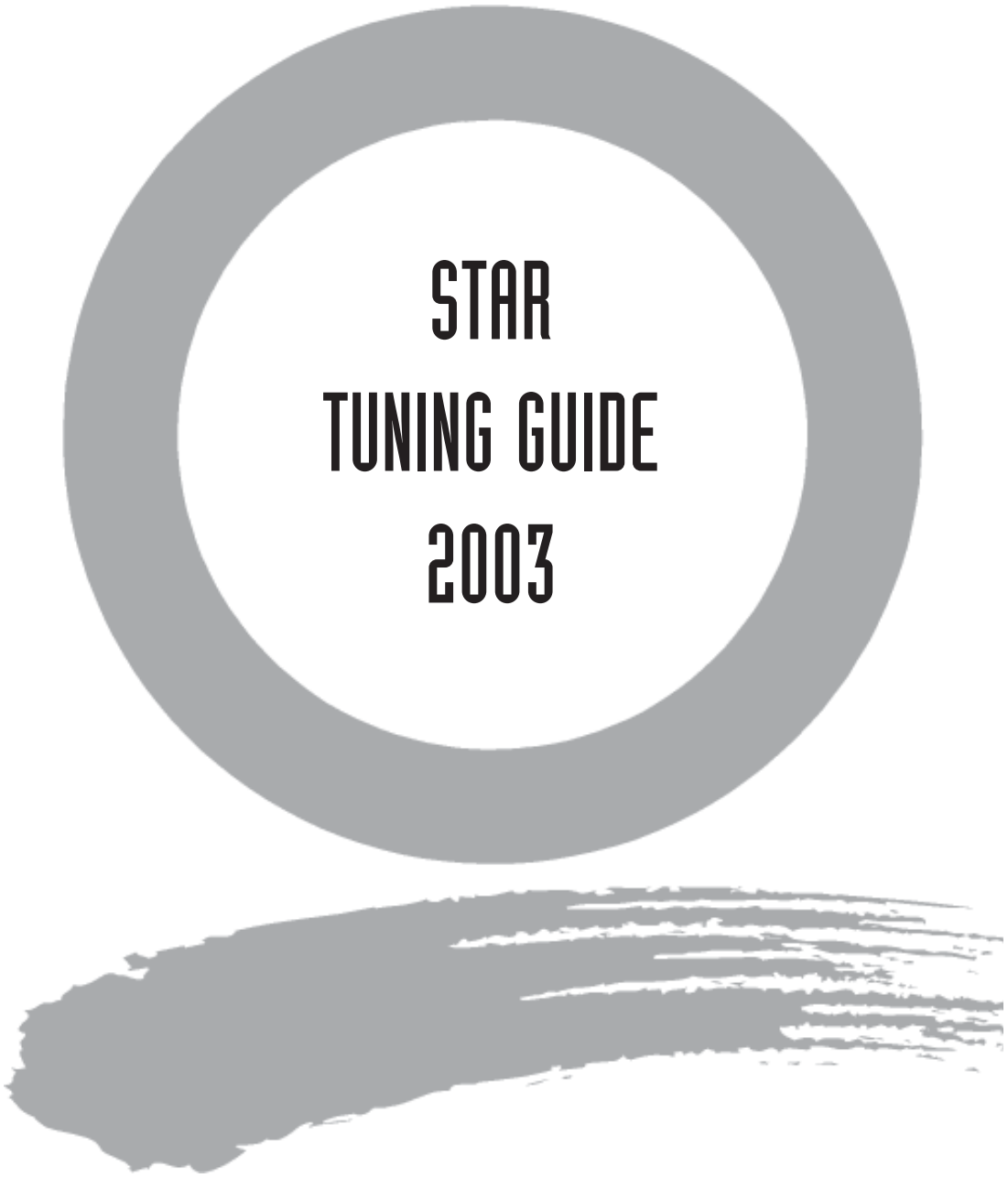

STAR TUNING GUIDE 2003

Quantum San Diego

QUANTUM STAR TUNING GUIDE

Quantum Star Sails are designed to accept a wide range of conditions. By controlling cloth stretch with panel orientation and clew and head designs, our sails will have a powerful light air shape, but will open and flatten in a breeze. This not only makes our sails faster, but easier to set up. Another result of this construction is that our sails will be more durable.

These are some suggestions for tuning to get the best speed from your Quantum Star Sails. Following the Table of Contents is a quick set up guide that includes all the critical measurements. This should get you going quickly and if you wish to go into more detail you can.

These are suggestions and guidelines currently working for us. You may find other ways to get speed from your particular boat in your conditions. There is certainly more than one way to set up a Star. Check out our web pages at **www.quantumsails.com/star** for the latest up to date information.

Mark Reynolds and George Szabo

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Intermediates - Between 73 mm (2 7/8") and 76 mm (3"). We suggest starting at 2 15/16" (75mm).

Spreader sweep back - Set at 127mm (5") to 139mm (5.5")

Shrouds - Uppers should be 23- 24 on the Pro Loos Gauge (31- 32 on the old silver Loos Gauge). This is tight enough that they just barely slide on the tracks with the mast laid all the way forward. Lowers should be looser. If you measure up the mast 915 mm (36") and then measure across from shroud to shroud it should measure close to 735 mm (29").

Mast butt - 4500 mm (14'9). With the rig in measuring position the forward edge of the boom band should be even to 38 mm (1.5") past the stern.

Jib stay - The jibstay (rake) should be set about 410 mm (16") to 435 mm (17"). Most new boats take closer to 435 mm (17"). The boom should end up about 200 mm (8") off the deck in 8- 10 knots.

2. Mainsail Trim

Mainsheet - The top batten should line up with the boom. Have a reference point with a mark on the mainsheet or judge the distance off the deck and experiment with boats around you until you get a good feel where the right point is. Change trim as conditions or your steering changes.

Outhaul - The outhaul has a small range of adjustment when beating and usually will be set once for the beat and left alone. Make sure it is easy to adjust so you can adjust if necessary. Have a mark on the line at the cleat for a reference. The main should be pulled to the band in wind above 10 knots. In lighter air, ease 25 mm (1") or in very choppy conditions, a little more. Off the wind, ease to add fullness.

Boom vang - The vang should be set reaching and running so the top batten is in line with the boom.

Mast lever - Usually no mast lever needs to be used upwind.

3. Jib Trim

Jib Shape - In most conditions the leech should trim to mark on spreaders (458 mm (18") off the side of the mast) with just a little shape in the foot.

Jib lead fore and aft - The lead usually ends up about 2200 mm (86.5") from the headstay.

Jib lead in and out - Jib cars should be set 356 mm (14") from the center line

Jib tack - Set halyard so jib is as low as possible

4. Backstays

Upwind

Lower - With the crew in the cockpit, no tension. With the crew on the deck, just a little tension. When the crew drops over pull more. When overpowered, you may have to ease slightly. Too much lower will make a bubble at the mast which will backwind. You will feel the helm increase as the lower is pulled on. The key is to have the boat feel good and watch the boats around you to check your speed. Generally more lower will keep the crew over the side in marginal conditions and help pointing.

Upper- The upper should be just snug. As you get overpowered then start to pull on the upper.

Offwind

Reaching - When reaching, ease the upper backstays enough to make the mast straight.

Running - On the run let it off far enough so that the mast just starts to reverse with the lever on all the way. In light wind with a 3-1 purchase system you will go up to 1525 mm (60") off. In strong wind don't go as far!

2. RIG TUNING

Your rig pretty much gets tuned before the boat goes in the water. In this next section we pretty much describe what you need to do in the correct order. Both the intermediates and the spreader angle need to be adjusted before the mast goes in the boat. After stepping the mast you will check the other measurements. The final check will be on the water primarily checking your side bend by looking up the back and front of the mast when sailing upwind in different conditions. The best way to judge your side bend is by taking a photograph from straight behind and tipping it on edge and checking the sidebend. The goal is to make sure the mast is straight or even slightly bent to leeward in the middle. A little bend to leeward in the middle can power up the boat some. In light to moderate wind the rig should look like it's sagging to leeward in the middle a little when viewed up the back of the mast with your head at the boom. When looking up the front of the mast it should look as straight as possible. *The side bend is affected by four points*. The uppers, the intermediates, the lowers and the mast partner. The intermediates control the side bend from the spreaders to the jib intersection. Looser intermediates tend to be better in light air and choppy conditions.

A) Intermediates (mast down)

Assuming your intermediates don't come to the deck you need to adjust them before the mast goes in and before attaching them to the spreaders. Pull the upper shroud down along the front of the mast and mark the bearing point on the mast. If you have a Spar Tech mast be sure to include the small spacer that goes inside the upper. Measure down from this point and make another mark to adjust your intermediates to. This should be between 73 mm (2 7/8") and 76 mm (3"). Most are now 74 mm (2 15/16"). Lighter crews may want to go slightly tighter in areas of stronger winds. Now pull the intermediates down and adjust so that the inside bearing point is in line with this mark. Make sure you tighten the locking nut but also don't overtighten as this fitting is a bit fragile. Further adjustments may have to be made after sailing, especially with a new mast where the wires may settle in some. It seems that the upper swedge loops elongate slightly.

B) Spreader Angle (mast down)

You should check your spreader angle for two things. Check to see if they swing back to the same angle on both sides and measure the sweep back. After installing the spreaders tie a small line or shockcord between the tips even with the shroud bolts and check the sweep of the spreaders. The measurement from the mast to the line should be about 127 mm (5"). If

they sweep back more it will require a little more lower backstay but makes it easier to get bend in light air. If your spreader doesn't come back as far on one side you will need less lower on that tack. Check that they are even with the same line from tip to tip. It should be parallel to the side top of the mast butt plug. This can be checked best by laying a batten on the butt plug and lining it up with the line between the spreaders. You can also check this in the boat by pulling hard enough on the forward lever to bring the spreaders back to their stops. Check to see if they hit simultaneously. The mast manufactures usually do a good job with these measurements but they can change over time.

If your spreaders don't already have a mark put a jib trim mark on the spreaders 457 mm (18") out from the side of the mast. I use a felt tip pen or tape to put a 1" band around the spreader. In winds under 18 knots the jib leech will line up with this mark. In more wind it will be slightly outside.

Before standing up the mast check the screws at the jib box, wipe the wires off and tie on the shockcord to keep the backstays from catching the spreader tips. Put on your mast head fly if you use one and stand the mast up.

C) Shrouds

After the mast goes in lay it forward and hook up the headstay and slide on the lower and upper shrouds. With the right upper tension, the uppers should just slide on the shroud track with the mast in the forward position. If the uppers are too tight then the mast will have too much prebend in light air and the spreaders may pop forward when sailing on a broad reach. Your shrouds will also cut in the main going down wind. If they are too loose then the whole rig will not be upright in the boat. The lowers should be fairly loose. Now hook up and set the backstays. Put on enough forward lever to pop the mast in a positive bend and check that the lower backstays are loose and that the upper backstays have the same amount of tension. Set them at 5 units on the Loos gauge. Then by using a tape measure hooked on the main halyard measure down to the chine to see that the mast is centered and check the mast at the partner. I think it's best to have at least 3 mm (1/8") of space on both sides of the mast.

A helpful method for monitoring upper stay tension is using the small model Loos gauge. A good starting point 23 to 24 on the new Pro Loos gauge (31 or 32

Shrouds cont...

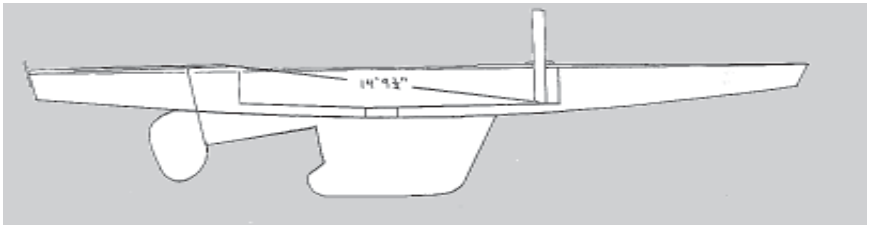
on the old Loos gauge). The new gauge tends to be more accurate from gauge to gauge but we have still found some that read as much as 2 units different. Be sure to setup the boat consistently when taking this measurement. First put 5 units on the backstays. The mast bender should be neutral and the spreaders swung back in the upwind position.

For the lowers measure from the top of the band at the boom up the mast 915 mm (36") and make a mark. Then measure across from shroud to shroud it should measure close to 735 mm (29"). It may have to be adjusted on the water to get mast straight. Lighter crews or for sailing in constant moderate winds you may want to tighten a little on the lowers to reduce power.

The shroud tension varies slightly between top boats but the common goal is to make sure that the mast is straight sideways when sailing upwind. When sailing upwind in 6 knots, the leeward upper just loosens so in wind above 6 knots the uppers do not affect prebend. The lowers can be fine tuned when sailing to make sure the mast is straight sideways. Normally when the right position is found no further adjustments are necessary regardless of wind strength.

D) Mast Butt

If you have a new boat start out with the builder's suggested mast step location. On my Folli I sail with the mast in Folli's standard location which is 4502 mm (14'9 1/4") from the transom/deck intersection to the center of the aft mast step bolt. Light crews may want the mast a little forward compared with heavy crews. This



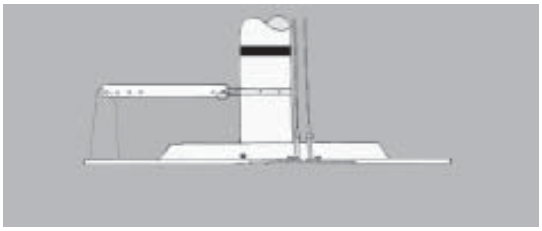
will help balance the helm from more healing.

After stepping the mast, the mast butt location can be quickly checked. With the jibstay connected and backstays set, the forward edge of the outhaul boom band will be even with the stern, or slightly behind the stern. On my Folli the band is 35 mm (1.5") behind the stern. On the Mader you will find the band about even with the stern. Make sure that the mast is straight with the spreaders back and not reversed when you check this. You may need some forward lever on. At the same time I check the shroud car position.

E) Shroud Cars

I put the lowers just in line with the front of the mast and the uppers an inch or

two forward of the lowers. If you don't have a method of loosening the shrouds for downwind (with adjustable tracks, levers or a sliding mast butt) putting the uppers further forward will allow them to loosen more as the mast goes forward.



F) Jibstay

The jibstay (rake) should be set between 384 mm (15") to 435 mm (17") from the clevis pin to the deck. You need to take some care in using this measurement. Some boats have different shear heights, mast lengths, forestay locations and the forestays may vary. My headstay is 117 mm (4 5/8") longer than the point B punch mark on the front of the mast. On the Melges and Gerard the rake will be about 406 mm (16") and for Folli's, Lillia's, and Mader's about 432 mm (17"). Boats made in the last 10 years have the headstay further forward than the older boats so the measurement is slightly longer. My headstay is currently 429 (16 7/8"). Use these measurements for a reference and watch the boom height off the deck in various conditions. In medium conditions you should normally be about 152 mm - 203 mm (6"- 8") off the deck. In light air the boom will be 203 mm-305 mm (8" to 12") off the deck. I don't adjust my jibstay during the race. As you change your rake you affect many things including main-sheet tension, backstay tension, jib halyard, and jib lead position. It can get very complicated and it's easy to get really messed up.

3. MAINSAIL TRIM

A) Mainsheet

The mainsheet control is the most important control on the boat. Often it may be the only control you adjust on the windward leg. The mainsheet needs to be adjusted every time you get a wind velocity change, a change in water conditions, when the helmsman falls in or out of the groove and sometimes when tacking. The other time the mainsheet gets adjusted is just to experiment to see if a change will produce more speed.

We start out by pulling in the main until the sail "looks right" and "feels right". The "looks right" position is from previous experience and what we have learned from others as the correct look. The "feels right" position also comes from

previous experience and what input we are feeling at the time from the boat. If the tiller is telling us that we have too much weather helm maybe the mainsheet is too tight. Getting the trim right takes experience and experimentation.

The mainsheet is similar to the jibsheet. As we trim tighter, the twist is reduced and the sail flattens. The mainsail flattens through increased mast bend rather than a pulling aft on the foot like the jib. We have given that control to the outhaul on the mainsail. What we are concentrating most on is the twist. The general rule on the Star, like most boats, is to line up the top batten with the boom. This means that the bottom batten points up the most with each batten dropping down until the aft end of the top batten is parallel to the boom. In very light air it will hook up some from the weight of the boom. In very heavy air it will twist off a bit to leeward to de-power. This is where the experimenting comes in. Every condition takes a little different trim. Bill Buchan felt one key to his success in the 1984 Olympics was knowing how to trim his main. The weeks of tuning in Long Beach before the Olympics had helped narrow down the range for the correct place for the mainsheet. The next year in Nassau when Bill won the Worlds he said he had started the regatta with the mark on his mainsheet moving though a large range and through the week that range narrowed as he found the fastest position. The key is to constantly watch the boats around you and try different trim until you begin to learn what is too tight and what is too loose. A mark on the mainsheet is very handy here so you can reproduce this trim on the next weather leg or at a later date. You must be careful though because conditions change and with it your trim must also. What worked for Bill in Long Beach wasn't exactly what was needed in Nassau.

Like all controls on the boat you want the mainsheet to be as friction free as possible and to have the proper purchase. All new boats now have the mainsheet going right to the transom. This gives as much leverage as possible and allows the boom to be trimmed closer to the center line. There are two different systems used for the mainsheet. The most popular is the single system that starts on the aft end of the boom goes down to the boat, back to the boom, forward to mid boom and down to a ratchet and cleat. The advantage of this system is that it is simple and it allows a mark to be put on the line for reference. The other system is the double mainsheet. Instead of stopping at the aft end of the boom it goes through a pulley and goes back forward to mid boom and down to another ratchet and a double cleat. The advantage of this system is that both lines can be pulled simultaneously cutting the purchase in half. It is much faster for mark rounding, jibing and pumping. When fine tuning, only one line is pulled, giving a bit more purchase than the single system although hardly a noticeable amount. The big disadvantage is that you make a reference mark on the line. Whatever system you use, make sure that the blocks all line up and if you go inside the boom, that the lead is straight. Some people have gone back outside the boom to make sure no friction is added. If you do this put webbing around the mainsheet so when jibing you will not get hung up.

As you discover the best trim for your main put a mark on the sheet for reference. If you have a double mainsheet look at the distance of the boom off the deck at the transom. When you go around the leeward mark or start the next race you can get in the ball park much faster. I've found that after I get a good feel for the boat and see how far I'm off the deck (I have the double mainsheet) I rarely look up at the sail. I may try a little more or less trim when I'm around another boat and if it works I'll then look at the distance off the deck again and then maybe also look at the sail. Tuning before the start is a good place to experiment to see what the best trim for the day is.

When you are going to windward and are really in the groove you can usually trim a bit tighter. This will flatten the sail a bit forward but power up the leech like the flaps on a wing and give you more lift with possibly less drag. As you fall out of the groove you must be quick to ease to keep the boat going. This also explains why in flat water you can trim a bit tighter than in rough water. When coming out of a tack it's often necessary to ease the mainsheet some because the speed is down and you may be out of the groove for a few seconds. Also in a breeze if the crew doesn't get over right away the boat may heal too much and a ease on the sheet will keep the boat on its feet.

B) Outhaul

You want to be able to adjust your outhaul upwind in all conditions without using both hands, and changing course at the same time. The outhaul should have about 12-1 purchase with cascading blocks. The best setup is a 3-1 followed by a 2-1 in the boom, followed by a 2-1 on the floor. The cascading system will not only be easier to pull but will also release much easier. The outhaul adjustment should end with 1/4 inch line at the center of the boat next to the mainsheet cleat.

Upwind

The main thing to remember is that the outhaul adjustment should be rather subtle and the effect is probably even more subtle. The most common mistake is to try to use too big a range of adjustment. I remember a few years back seeing Pete Bennett keep the outhaul very near the band in all conditions. It just doesn't work to try to add a whole lot of fullness with the outhaul in light air. For the most part, you only need to make small adjustments with the outhaul as the conditions change.

The main variables to consider when setting the outhaul are the wind strength, sea conditions and angle of heel. The simplest rule is when you are overpowered, and therefore healing too much, the outhaul should be pulled to the band. In conditions under this point you must consider the sea conditions more than the wind strength. If the water is smooth you can probably have the sail out fairly close to the band. If you need a little more power to drop the crew over the

Outhaul cont...

side let it off a little. Often when I have to start leaning in or I can't keep the crew over the side, I'll let the outhaul off a little. If you have a lot of chop then you also want to let off the outhaul a little. Remember it doesn't take much.

I do several things to gauge the outhaul adjustment. I look at the distance from the sail to the boom band but this is a little hard to judge because of the angle and the fact that you have to look aft to check it out. It's much better to have a felt tip mark on the line at the cleat for the average setting and maybe another at the maximum setting (sail out to band). This makes it easy to return to the proper place after a mark rounding. These marks are very useful and this is why I don't like a double ended set up. As far as looking at the sail, I look right along the boom. When pulled to the band in light air the sail will be flat as a board for the first few feet up and the very bottom of the sail will be all rolled up and wrinkled. When eased a bit you will see a little shape and when eased the most in chop or when you want to keep the crew over, the first seam will be just dropping away from a straight line.

Offwind

Sailing offwind the outhaul gets eased. On an overpowered reach , you may not want to ease it all the way but otherwise, it should be eased to make the sail full. You can only ease it to the point that the lens is let out, any more and you will just be giving away sail area. You can usually see when you have gone far enough when the foot bolt rope next to the mast goes slack.

C) Cunningham

Keep some horizontal wrinkles in the main up to about 8-10 knots to keep draft aft. As the wind increases, trim the cunningham to move the draft forward and to flatten the mainsail. The most important thing is to make sure the cunningham is not too tight in light air. In variable conditions it's best to be a little too loose than too tight. Off the wind make sure that the cunningham is as loose as possible. The crew may need to push the tack slug up and slacken the cunningham purchase system.

D) Main Traveler

The only time I have found the main traveler to be useful is when overstanding a mark or on a very close reach. These two things shouldn't happen too often so the traveler was taken off Stars in the early 80's to save weight and simplify the boat.

E) Boom Vang

The vang should be set so the top batten is in line with the boom. When reaching the vang should be set fairly hard to prevent too much twist. On the run the tendency is to have the vang too tight. The crew should check the leech at the top batten to make sure that it is not too tight. You will find that very little vang needs to be used on a run. The rule is the same as trimming the leach

upwind, keep the aft end of the top batten parallel to the boom.

F) Mast forward at deck

Normally no mast lever needs to be used upwind. In light air some forward lever can be experimented with. When reaching only use enough forward lever to keep the mast from reversing, don't induce any bend. The crew should check the mast to make sure that it is straight. I set up my forward adjustment so it just barely goes loose when sailing upwind in light air. This keeps the mast from every reversing on a reach without having to pull any forward puller on. On the run the it should be pulled on until the mast is straight. A good way to judge if you have the right amount of forward puller on is to look at the windward spreader. The spreader should be straight out from the mast. It may swing forward in the puffs slightly and maybe in the light spots swing aft but normally it's straight out.

G) Sliding mast butt

Some boats use a sliding mast butt. It originally was used on older boats that didn't have enough room forward at the mast partner allowing the mast to go further forward. It was discovered that it also loosened the shrouds so the leeward spreader wouldn't cut in the main as much.

4. JIB TRIM

Pull the jib in until the leech lines up with the mark on the center of the spreader and make sure the foot's not too tight". This is what we do about 95% of the time. There are about 10 separate adjustments that affect the trim of the jib. The adjustments that affect the jib are: jib halyard, jib tack downhaul, jib stay position, rake, jib lead fore and aft, jib lead in and out, jib sheet tension, upper backstay, lower backstay and even the mainsheet. For the most part you don't even have to worry about many of them, but I'll discuss all of them and what effects they have. First, I'll try to describe the shape we are looking for.

A) Upwind Jib Shape

There are a lot of guidelines used for determining proper jib trim. What you are determining is fullness and twist. The twist is the change in angle of the sail as it goes up. An untwisted sail will have a small slot between itself and the main. The top of the sail will be over trimmed and the sail will luff first down low. A sail with too much twist will be real open at the top and will luff first. A good way to look at twist is by using the battens. You will find that with the proper twist the lower batten will be pointing to windward of the center line, the middle batten straight back and the top batten pointing down to leeward. From experience we have found that with the proper twist the leech intersects the spreader half way out. You should have a mark on the spreader at 458 mm (18") off the side of the

mast. It becomes quite simple because we trim to this mark in all but the lightest and windiest conditions where we may twist off a little more. The fullness is the other half of the formula. Judge the fullness by the foot. If the foot is too flat or tight, the cloth will roll up and even flap sometimes. Too much fullness will hurt pointing. In changing wind conditions the crew must constantly adjust the sheet to keep the leech in the same spot. Get down to leeward and look at the jib before the start and use the window in the main when racing. Watch the foot fullness and leech battens and position at the spreader. The skipper can provide input to the crew also. When the skipper is having trouble steering the jib can be eased out a bit and when he is really in the groove it can be sheeted tighter. The following are the various adjustments that affect the trim and how to set them.

B) Jib Sheet

We already discussed the jib sheet tension above in Upwind Jib Shape. This is the most important adjustment and often the only one that gets changed once the correct place is found for the other adjustments. I prefer the 2 to 1 system because it's a little easier to make minor adjustments.

C) Jib Stay Position (Fore and Aft)

This is something you don't have control over. Twenty years ago many boats did have an adjustment but it was determined that max aft was the best and boat builders just started to fix it there. In the last 10 years it has been creeping back forward to the point where on new boats it's maximum forward. The range is 102 mm or 4". It can be argued that it's best maximum forward to separate the sails more. I did have one boat where it was adjustable and it didn't seem to make much difference one way or the other. It will change a few things though on how things set up. With the tack position maximum aft like on most Gerard's and Melges's you will find that the jib leech comes really close to the spreader when sheeted in tight. Your rake measurement when using the jibstay clevis pin measurement will also change. My suggestions is that you don't make any changes to your boat but be aware that there is a difference between boats when comparing with others or when moving into a new boat.

D) Jib Halyard

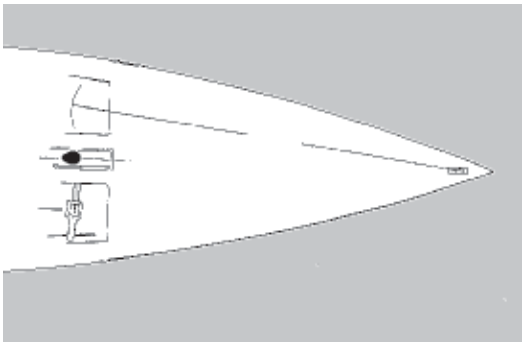
The jib halyard determines the height of the jib off the deck. The tack usually ends up about 25 mm (1") off the deck, depending on your make of boat. The angle in the foot of the jib, near the clew, should just touch when trimmed in moderate breeze. If the jib is too high you will not get a good end plate with the deck and on some older boats the leech may start hitting the spreader. If the jib is too low you will not be able to sheet tight enough in stronger conditions. I set my halyard so my jib is as low as possible and we almost two block the jib sheet in the condition when we trim the tightest. We even made some changes to the blocks on our leads to get everything a little lower. We use Harken bullet blocks with the smallest pad eye bolted to the top of the cars. When using 2-1 purchase jib sheets, the blocks on the jib should be drilled out and bolted or riveted right

on the O-ring. If you don't use the 2-1 purchase system then you gain even more room. If you don't have the tracks sunk in the deck you have to sail with the jib a bit higher.

Most older boats are set up using the lock on the side of the mast for the jib halyard balls. With a ball system I found that I usually ended up using the second ball from the bottom on the jib halyard with the Spar tech mast. The newer boats all use an adjustable halyard control in the boat. This allows you to hoist the jib on a run to keep the pole out of the water in heavy air and to fine tune the height off the deck. If you hoist the jib on the run be very careful to lower it back at the leeward mark to the very same upwind position or you can damage the jib. Some boats are set up with an adjustment in the boat with the other end tying into the rake so a change in rake will adjust the halyard correspondingly. I find that I never adjust the rake when I find the right place so this isn't a big deal. When you find the right ball to use mark it and leave it there because a change in the height will change the angle of your jib sheet requiring a change in fore and aft lead position.

E) Jib Lead Fore and Aft

After the jib sheet tension, the lead position fore and aft is the most important adjustment. For the fore and aft setting, you should have some fullness in the foot with the mid batten pointing straight back. If the foot vibrates or flaps it's too tight and the lead needs to go forward. The lead usually ends up about 2200 mm (86.5") from the headstay, but this will vary depending on the boat and how high off the deck the jib is set. You can watch the jib leech through the spreader window in the main and line up the leech with the mark on the spreader for a trim guide. I find that the jib leech is at this mark in all but very light or windy conditions. The in and out track should be angled so the distance from the jibstay to the inboard end, and to the outboard end is about the same. This way when you go in and out you will not affect the fore and aft adjustment. It's best to start out with the suggested measurement then go out and after getting your halyard right, fine tune the lead position. I find I always come really close to the same number on different boats. I also find that an adjustment in different conditions is rarely needed. I've had an adjustable lead but only used it when tuning or sail testing. The big disadvantage of an adjustable lead is it's really easy to accidentally change it. I put felt tip marks on the line and on the deck under the track to make sure it's always in the right spot.



F) Jib Lead In and Out

In most conditions, the jib cars should be set at 356 mm (14") from the center line (9.5 degrees). I have found that I rarely have to make a change from this measurement unless I overstand the mark. Even in the extremely rough conditions at the '88 Olympics we found that 356 mm worked fine although we learned that we had to sheet the jib a little looser. Only when you overstand a mark or a boat is trying to roll over you will you need to let the leads out some. It's very important to let the cars down to leeward when reaching or use barberhaulers to pull the lead outboard.

G) Jib Tack Downhaul

You only should use enough tension to take out the wrinkles. Any more is slow. You may want to leave in a few small wrinkles to make sure you are not too tight. Check the jib halyard section for jib height, you don't want the jib too far off the deck.

H) Backstays and Rake effect on Jib

The backstays have an affect on the jib by changing the headstay sag. Pulling on both the upper and the lower will decrease sag and flatten the jib. The mainsheet will also pull back on the rig and effect the headstay sag some. I prefer a jib that requires no backstay tension in light conditions but will handle a little less sag in moderate conditions. This way you can power up the main a little when the crew drops over with the lower backstay, and not over flatten the jib entry making steering more difficult. In very strong conditions I like to use a lot of upper and lower tension to reduce sag so I don't get any lee helm.

As you change the rake you change almost all the above adjustments. This is why it's important to be very careful when changing the rake adjustment. As the rake goes out the jib halyard must be eased (or jib cloth), the backstays loosen, the foot flattens, the jib leech opens and the mainsheet trim changes. Most of these changes in the jib are probably all right, but you really have to stay on top of all the changes when the breeze drops, so everything returns to where it had been before. I have found that it's much simpler to leave the rake alone.

5. BACKSTAYS

After the mainsheet and jibsheet the backstays are adjusted more than anything else on the boat. When sailing upwind they are used for fine tuning the sails and off the wind they are also important for boat speed and critical for holding up the mast. Since there are quite a few variations in backstay setups a good starting point is to go over some of these systems.

A) Track system

All boats built since the mid 80's have not used the track system but this is still a very good way to control the backstays. The tracks have the advantage of transferring load to the boat so they are easy to pull back. It is also easy to see on a jibe when they are back far enough to hold up the mast. The control lines can be back at the end of the track or led forward so the crew can face forward. I like the standard aft location with a fairlead after the cleat so the crew faces aft on the jibes and it can be trimmed from anywhere in the boat and the line will stay in the cleat. On the tacks release the old windward backstay in the tack so the backstays don't cut in to the sail. If you need to duck another boat or go around the windward mark you are ready. The crew then resets it right before tacking. With Harken tracks shockcord is unnecessary to pull the car forward. Shockcord pulls the backstays too far forward when released on tacks. The big disadvantage of the track system is that to get the rig far enough forward on the run you usually have to let the cars forward and you always need to let off the upper and lower on each side which means you have three adjustments to make instead of one.

B) Under the Deck Systems

The under the deck purchase systems have become the standard system today. The under the deck system has the advantage of having only one control to let the rig forward on the run and after the first jibe. It's also easier to pull everything back at the leeward mark. There are basically three variations.

The first under the deck system, and still used by many Europeans, has a coarse adjustment of 2 to 1 adjusted by the crew with a fine tune for the skipper with about 12 to 1 that controls both the lower and the upper. There is then a separate lower adjustment directly on the backstay. The problem is in repeating the adjustments after each tack or mark rounding. You basically have to retune the backstays each time. On the current boats the backstay is further forward and outboard so you can leave them set when tacking but it's still hard to repeat the tune you had on the last weather leg. You also can't adjust the upper independently.

The final simplification that made the under deck system overtake the track system is when Buchan took off the fine tune. He also moved the backstay forward and outboard so the backstays would never cut into the main. Bill also added a purchase, making it 3 to 1 under the deck, so it is easier for the crew to pull the backstay back off the wind.

A third system is used in Switzerland on Josi Steinmayer's boats and the newer Lillia's. It's similar to the Buchan system but is above the deck. It is very simple just consisting of a two to one purchase and a cleat right at the backstay attachment point. The upper and lower adjustments are just like the track and Buchan systems. You jibe facing aft like with the track system.

I feel the Buchan System is the best. Going upwind the course adjustment stays set all the time. Any adjustment can be made independently with the upper or lower adjustment just like on the track system. Off the wind only the course adjustment is used so when you arrive at the leeward mark the backstays are just pulled back to the stops and you are set up just like you were on the last weather leg. The 3-1 makes it a little easier to pull back the backstay at the leeward mark. Some cross the backstays so it's easier for the crew to let off the leeward backstay at the weather mark and to pull it back on at the leeward mark.

If you have a problem with the wire under the deck twisting, you can get a non-rotating wire. All boat builders are using a non-rotating wire or Kevlar line now.

C) Adjusting The Backstays

Upwind

When sailing upwind the backstays control mast bend and headstay sag. The lower backstay controls the lower mast bend but also reduces headstay sag. The upper backstay also affects the headstay sag. This is an area where the mainsail and jib interact. A mainsail designed for a lot of lower backstay needs a jib designed for less headstay sag. The upper is not really even used until the boat is overpowered and the lower is only used slightly to power up in moderate air and then used to prevent overbend in heavy air. When you pull on the lower you will see the main get fuller especially near the mast. Too much lower will make a big bubble at the mast which will backwind. You will also feel the helm increase as the lower is pulled on. The key is to have the boat feel good and watch the boats around you to check your boat speed and pointing. Generally a little more lower will help keep the crew over the side in marginal conditions and will make the boat point higher. It can also put on the brakes. If you aren't going well and the boat also doesn't feel good try letting off the lower all the way and start over pulling on just a little at a time.

In light and lumpy conditions you don't need any backstay tension. In this condition just pull the backstays enough to keep the rig from swinging around. As the breeze increases and the crew comes up on the high side then pull a little on the lower and when he drops over pull a little more. This will power up the rig some. The amount of lower required will depend slightly on the angle of your spreaders. If the spreaders come back further you will need more lower tension. You don't need any upper yet as this flattens the jib by taking out luff sag and bends the mast by adding compression. Keeping the upper loose gives you the wide groove necessary to maintain boatspeed. The upper should be just snug. You must be careful though, a snug upper in 10 knots becomes a tight one when the wind drops to 6 knots and the main gets eased a few inches. Always recheck your backstays as conditions change. In medium conditions, it is probably better to be a little too loose, rather than too tight on the backstays.

As you get overpowered then start to pull on the upper. When over powered I have found it very fast at times to pull very hard on the upper and the lower. This reduces headstay sag flattening the jib. With the looser intermediates some are sailing with higher upper backstay tension. In flat water you can tighten the upper a little quicker than is possible in rough water. I use 5 to 1 on the lower and 8 to 1 on the upper. I find it really helpful to put felt tip pen marks on the upper and lower adjustment lines for reference.

Try to use the feedback from the tiller as well as your speed compared to other boats to keep the adjustment correct.

Backstays Reaching

When reaching, ease the upper backstays enough to make the mast straight and main full. On a reach without the pole ease the backstay about 75 mm (3") at the deck or about 230 mm (9") on the line. This also makes the jib fuller and more powerful.

Backstays Running

On the run let off the backstay to lay the mast way forward. In light to medium wind you will let off the backstay course adjustment line about 1525 (60") if you have a 3-1 system. In strong wind don't go as far. The biggest mistake I see at clinics is that people don't let the rig far enough forward. The mast should be so far forward that the spreaders start to reverse before pulling on the mast ram. Make sure that your mast partner is cut as far forward as is legal so you can ram the mast forward to keep it straight. In breezy conditions don't let the mast as far forward as in lighter winds or you can risk breaking it. See the section on the mast forward adjustment at the deck for proper mast set up when running.

If you have tracks let off the lower first then the upper all the way then in light air let the car forward some on the track. The crew should then reach under the boom and let off the lower then the upper on the other side so you will be ready for the jibe.

6. RIGGING A NEW MAST

Fortunately today the new masts come quite ready to go. The mast manufacturers also provide great instructions. This is my check list I go through when installing a new mast.

If the mast isn't already cut to length that is the first step. You need to know the point B measurement for your boat. Point B controls the height of the mast. This point on the mast must be at the height of the shear. The measurement is from the bearing point of the bottom of the mast to the shearline. Your point B may be

on your measurement certificate, if it isn't the log describes how to measure it. Use this measurement by measuring down from the punch mark on the mast and make a mark on the mast which will be the bearing point of the mast on the step. Subtract for the butt plug length and cut off the extra mast. Be very careful to make sure an accurate cut is made by wrapping a piece of paper around the mast. After installing the plug check to make sure it's square in all directions.

All wires are already finished except the backstays. You will need to cut the lower and upper to length for your particular backstay system. I like to make them as long as possible to make it easy to reach and to reduce the windage. I have found that with my system I make the lower 305 mm (12") longer than the band at the boom and the upper 165 mm (6.5") shorter than the band.

See section 2 (a) and 2 (b) on intermediates and spreader angle.

7. SAIL CARE

With a little extra care the life of your sails can be extended. Today's sails are made from yarn tempered Dacron. It is a Dacron cloth that is heavily coated with resin keeping the fibers from moving, producing less stretch and adding durability. Constant folding and luffing will cause breakdown of the resin and the sail shape can change. There is not much we can do about the luffing on the race course but some care at the dock can help.

A) Raising and Lowering the Sails

The main should be folded with the clew out so it can be slid right on to the boom. Put the tack slug in and then hook up the outhaul.

Insert the battens from the leech end. To lock the batten in the pocket you must use the short loader stick that is included with your sail. Put the loader stick in the small fold at the end of the webbing strap and insert it in the pocket over the batten tip. With the webbing strap pushed all the way in, push down on the pocket and pull out the stick. The Velcro on the webbing strap will meet up with the Velcro on the inside of the pocket and the batten will stay in the pocket. To remove the batten, pull on the string attached to the webbing strap and yank out the strap. The top batten has an external velcro system and takes about as much tension as you can get. The lower 3 need to be tight but it's possible to over tighten them. If they are too tight the front section may get a buckle in it. If the battens are too loose you will get wrinkles perpendicular to the batten.

Tape the main shackle to make sure it can't come undone or take out the standard pin and replace it with a pin and ring to make sure that it can't come apart accidentally.

Before raising the main hook up the jib tack, jib sheets and get the jib head out ready for the halyard. If it is windy we will raise the sails as quickly as possible and get away from the dock to prevent excessive luffing. To raise the main have one person feed the luff in as the other pulls the halyard. Make sure the head-board clears the backstays and don't go too fast because it is possible for the sail cloth to also get caught in the upper backstay. After the main is up make sure to feed the lower part of the luff rope, at the tack, into the mast groove. With the jib one person should zip while the other pulls the halyard.

We are careful when dropping the main to stack it on one side, then fold it at the first batten and start rolling. This is good for the sail in two ways. One, it eliminates some folding wrinkles and the old wrinkles usually are less prominent the next day. With the stiff cloth it's hard not to get knots in the cloth and when pulled out can actually cause small fractures in the cloth. I've never known these fractures to turn into rips or to affect the sail shape but it's better to avoid them if possible.

When lowering the jib, make sure to keep some tension on the halyard when unzipping the luff. This will prevent the zipper car from getting caught and possibly taking teeth out of the zipper. I usually try to lower and unzip the jib before reaching the dock if I come in on a dead run. This will prevent the jib from luffing at the dock before it can be lowered.

B) Folding and Storage

The ideal way to store the sails is by rolling them up. This is no problem with the jib but can be difficult with the main. Some people have a large pipe mounted on their trailer and the new boat box have longer boxes to hold the mainsail rolled up. I usually fold my main between regattas but I do roll it and keep it on the boom during regattas. I leave my battens in but make sure to roll the sail in line with the battens so they aren't bent in the sail.

When folding the main, it's usually easiest to do it on the deck. When lowering the sail keep it on one side of the boat. I usually then put the head in the cockpit on the other side of the boat then stack the rest on top until I get to the foot. Pull the foot off the boom then fold on the clear side of the deck making sure not to fold the windows. I don't try to use the same fold every time. Many small wrinkles are probably better than a few big ones. While folding check for any tears or worn areas. Areas to check are around the middle of the foot where the runners hit and the batten pockets. If you are getting any rips in the foot you probably need to tape up the runner shackles and pins. When you're done flaking the sail then fold again from the luff so the clew is on the outside and it's ready to go on the boom the next time.

Please let me know how everything is going with your Star sailing this season. We look forward to adding you to our winning list.

If you have any other questions regarding tuning, drop us an email or give us a call at anytime.

Mark Reynolds and George Szabo

Notes

Crewing in a Star

By Magnus Liljedahl

I always loved sailboat racing. There was nothing that I would rather do. To

I always loved sailboat racing. There was nothing else that I would rather do. To line up on the starting line and then play the game is what it is all about. To succeed, you must stick with the sport for a long time. There is always another race, so don't get down on yourself, whenever things turn against you. The ultimate reward is the one, which we all will gain, that is if we play it fair and square. It is the friendship and respect from other people, from all over the world. I wouldn't want to trade any of them, for any victory, that I have been fortunate enough to achieve. Remember, it is only a game and there is always another race.

The following is a brief instruction on how you can improve your skills and get the most out of your race. Our sport is filled with exceptions and variables. There are different techniques that could lead to the same success. It would take a book to try to cover them all.

Preparing for a season:

As always in life, it starts with a vision, a dream and the setting of goals to achieve. You are building a team with someone that you will be spending a lot of time with. You should both know that conflicts are to be expected, but as long as mutual trust exists, your foundation is solid.

Top priority ought to be the combined crew weight. All the top teams in the world weigh in at maximum weight. It used to be that the skipper would make the crew gain all the weight, but today it is different. Some top teams believe in having the skipper and the crew weighing the same is ideal. This may hold true if the skipper can hike as efficiently as the crew, but there are not many (if any) like that. As a crew, ideal weight is about 10% more than the skipper. This combination is favorable for tacking, since the crew is usually first over the rail and it is good for boat handling.

Physical training is a basic must for any athlete and the Star crew is no exception. Even though the most important training you can do is to sail the boat, spending countless hours hiking and tacking, it is practically impossible for two people to hook up and spend the required time working out on the water. Our sport is mostly aerobic, but it is also important to build up on anaerobic strength. The off season is usually when I hit my gym the hardest and the rest of the season becomes a maintenance phase. I was always keen on going to the gym and lift weights, but the last few years I have also included other forms of cross training. Power walk-

ing, biking, rowing and kayaking are some of my favorites. Stretching and maintaining a good diet are other important factors that you should make a part of your daily routine. You may want to consider a licensed Health Fitness Instructor i.e. a personal trainer. It makes a world of difference.

Getting down to the boat:

This is actually when the race starts. Your focus should be total and your concentration on top. Have your clothing planned out and your sun lotion applied. Make sure that you will stay comfortable in all conditions. It is your responsibility that your clothing weighs in.

I was never a great boat worker and some things are better to be left for the skipper. You can always make sure that the tanks are empty from water, that your backstay has the proper markings and that there is drinking fluid on-board. Check out your hiking straps and customize them if needed. How about a little Teflon polish where you sit, it sure helps sliding in and out. Learn your digital compass to perfection. If you don't have one on the boats, encourage your skipper to get one, they are a must. Hang around your boat; don't let your skipper be looking for you all over. Your main job is to help him do well in the race and he may need you for a last minute change.

Going sailing:

Hoisting the sails in heavy air could be a very difficult task, but if you follow these steps, it may ease the task. The sails are expensive and not only that, you need to have them fresh for the race. Flapping them in the breeze is not an option.

- The jib should be hoisted first in most circumstances.
- Facing forward, with the jib (rolled up) between your legs, hook up the clew, then turn around and hook up the sheets. If your jib has blocks, use the top block for the starboard sheet (it will help when you set the pole). If it is windy, you will need to have your skipper to help you from this point on, but if it is under 12 knots you can hoist it yourself.
- With one foot on each side of the jib and the head in your hand, you stand up, facing forward. In heavier air I lean, heavily, with my back on the mast and allowing it to support me from falling.
- Hook up the halyard and then (still with the jib between your legs and feet) move forward and zip up the luff as far down as you can.

- Hoist the jib some and then continue zipping it up. If it is windy, your skipper will have to help you. As you lean up against the mast, hand the head back to him so that he can hook it up and start hoisting while you are holding on to the forestay, standing up, zipping the luff.. Once it is 3/5th of the way up, you must move your leeward leg, allowing the jib to fly freely. Your skipper can now move back in the boat while holding the halyard. It is your job to get back to the mast and lock it in.

- If the luff is not zipped up all the way, get back up to the bow and do so.

While hoisting the main in windy conditions, I like to start out on my knees, in front of the mast, facing aft.

- Help un-roll the sail, while keeping the luff tightly together on the leeward side of the boom. It is very important that you keep the luff together thus preventing it from falling in the water. Unless you are still tied up to the dock, keep in mind that your jib is up and the boat is moving. Losing the luff in to the water is not an option and it could easily ruin your day. If it is very windy, I would sit on one knee, using the foot of the other leg to lock in the luff. If the conditions are moderate, I would stand up and hoist, still locking in the luff with my foot.

- Now your sails are up, the Cunningham is on, your lines are organized and your clothing and harness is on (I suggest that you get dressed before hoisting the sails. Don't make the skipper wait for you to do so. You may lose valuable time to check out the wind and the racecourse).

To avoid "assholes" in the jib sheet, I often undo one end and throw it in the water so that it will straighten out. Don't coil it back up. Simply pull it back in to the boat in a pile. If you coil it, chances for another "asshole" to develop increases. I usually gather the jib sheet on the port side, under the deck. I do the same with the back stay line, except I put it under the starboard side. In windy and wavy conditions, where you get a lot of waves rolling in to the boat, the ropes have a tendency to float aft and they end up around the Barney post. To prevent this, simply keep kicking the ropes forward.

Final preparations:

- Calibrate the compass to the heading given on the committee boat. Adjust the tacking angel if needed. It should be somewhere between 65-72 degrees. I usually read the high and low indicator on our compass while my skipper reads the actual course we are steering. It is very helpful for the crew to be aware of the fact if you are on a header or a lift. If you pay attention to this, no more tacks will come as a surprise.

- Try to find the weather mark before the start. This will be your job all day, so the sooner you will find it, the better off you are.

- Look for the breeze and don't block the compass as your skipper tries to find the favored end of the line.

- Keep an eye on the committee boat and be prepared for the sound signal. An added benefit with the digital compass is the timer function. Even though the display is visible for the skipper, I still count the time down.

- Make sure that all the lines are cleaned up. In my case I stuff the excess vang- and out-haul line inside the Barney post.

- Keep the bailers open if needed but let's not forget to close them if the conditions permit.

- Inform your skipper where the "hot teams" are on the line and help him keep clear of other boats.

On the final approach to the line, I make sure that the weather jib-sheet is pulled in. The same applies to the leeward back-stay. You may have to tack right away so you got to be prepared. Keep the bulk of the jib sheet to one side under the deck and the backstay on the other side, under the deck (I don't believe in storage bags). If it is real windy, keep kicking the sheet and the backstay line, up underneath the deck, or else it will float back to the Barney post area and may cause a tangle. Try to help your skipper by looking behind him and up the line, informing him about approaching boats and also if you can see the committee boat. Chances are that if you can't see them, they can't see you. Again, make sure that your weather sheet is pulled in after each and every time that you let the jib out to slow down the boat. By the time the gun goes off, you boat-speed should be "full throttle".

First beat:

Feed information back to your skipper throughout the race. Let him know what you see, especially after the start. Let him know if there is an opportunity to tack, if he should put it in a point mode or foot and avoid being run over. Feed information about where other boats are going. Who passes behind your transom? Did the boat that just crossed us on port clear the boats to windward? Keep feeding the information. My skipper usually knows before I tell him, but I keep talking to him as much as I can. I won't hurt. Some info needs to be edited in order not to distract the skipper but that usually works itself out, as the two of you become a team. It is helpful if you can develop an eye for the trim and crew position of your competition.

Keep looking for that mark. You got to find it. Not only do you need to find the weather mark, your job is also to find the leeward gates. If you know where they are

before you get around the weather mark, it will be of great help for your team. Keep looking back. You will eventually find them.

As you approach the weather mark your job is now to find the offset mark. Is it up or down from the weather mark? Will we be reaching to it or is it going to be tight? Are we lifted going in to the mark or are we headed? This information will help in deciding what gybe will be favored on the run. A final check to make sure that the keel is clean is in order. If you know that there is current you may want to remind your skipper.

Offset leg:

Make sure that your skipper got the vang tight, before the rounding. This will help maintaining an optimum sail-shape as you get around the mark. While on the offset leg, I start looking for the breeze. Depending on the conditions for the day, I will keep looking for puffs all the way down to the leeward gate, and then some. Adjust your trim according to the apparent wind. Usually, you need to drop the jib leads out-board and sometimes start bringing the mast forward but it all depends on the angle to the offset mark. Talk about which way you want to go on the run, pole-set or jibe-set

The run:

Once around the offset mark I usually let the mast forward first of all. If we do a gybe-set, we may gybe first but the standard rounding would be mast forward, pole up, jib up, get forward in the boat and never ever cause a leeward heel. Stay on the weather side of the boat at all times (yes there are exceptions, but not many). Since the standing-up technique is now prohibited I believe that it is critical to move as far forward as possible. You have to keep the bow down (with a Folli for sure). One advantage is to keep a longer water line, but there are other advantages as well. After years of testing we have found this to be faster.

Look at the boats that are still sailing upwind and approaching the mark (hopefully, there are some boats behind). Can you detect either of them being lifted and or in a puff? Let's say that you are running on a starboard gybe and when you look back, you see a group of boats, lifted on starboard tack and also in more breeze. This may indicate that you should gybe right away.

A basic technique is to have your skipper put the boat in the direction of the next mark. You would want to stay on the gybe were the main wants to be. If you programmed your Tactick before the start, you did the right thing because the display will tell you how many degrees off course you are.

Other then balancing the boat and finding the next mark, the most important task for the crew, while sailing down wind, is to keep your air clean. Obviously, if your boat has a masthead fly, you will find your apparent wind easily. The problem is, so

will your competition. We have substituted the masthead fly with two pieces of yarn (each about six inches) on each shroud, below the spreaders. It is a good practice to keep calling the distance you are in front of disturbed air. This way you give your skipper has chance to "double check" your information, before it is too late.

Similar to the up-wind leg, it is great if you can develop an eye for how your competition is set up. Look at crew position, main trim, vang tension, mast position and jib hoist. In addition, I try to see how the spreaders are angled on the fast boats. The information can be valuable in adjusting your own boat. Look up your mast from time to time. Chances are that your vang is too tight.

As you approach the leeward mark, you have to be "lightning" quick with the takedown and putting the boat back in the upwind mode. It is always helpful to talk about your next upwind leg strategy while you are on the run. Ask you skipper what his plan is, or even better yet, tell him what you see and make suggestions. Make sure that your jib leads are back in up-wind mode. By now it should also be determined which gate marker to round.

If you know that you will stay on the same tack for a while, after the rounding, you may put less emphasis on making the boat tack ready and perhaps make a later takedown. If you plan on tacking right away, obviously your leeward backstay needs to be tight and the slack taken out of the weather jib sheet.

Our standard rounding would be:

As I move back to put my feet in the hiking straps, I put my hand on the slug (the fitting attached to the sail below the Cunningham). My skipper now pulls the cunningham, then:

- Slug down
- Out haul on
- Jib down
- Mast aft (pull backstay – ram off)
- Pole down
- Trim your sheet and take up as much slack as you can in the weather jib sheet and leeward backstay
- Balance the boat as needed.

Critical here is that your skipper trims in the weather jib sheet for you. He will not be able to get it all the way, but the more the merrier. The advantage with pulling

the mast back before you take the pole down is that it is a lesser chance that the jib will blow around the forestay.

Pay attention to any course change as you get around the mark. Make sure that the leeward backstay is in tight. Be observant as always.

Reaching:

To be fast on the reach, spells hard work and proper technique.

To be successful, you need to:

- Know were the next mark is.
- Get out of the wakes from any boats ahead of you.
- Keep clean air.
- Pull the vang very tight
- Drop the mast forward, sooner rather then later.
- Adjust your sail trim.
- Drop the jib-leads.
- Hike as hard as you can.

A good skipper will keep the boat moving all the way. Keep telling him to head up in the lows and, very important, to bear-off in the puffs (this is key).

No crew could straight leg hike the entire distance. Similar to a wrestling match, you need to put your system in a recovery mode now and then, in order to go the distance. An added benefit by bearing-off in the puff, or on the top of a wave, is that it gives your team that opportunity.

Once you gybe on to the next reach, you have got to know were the bottom mark is. Keep looking for the puffs. Again, head up in the lows and leave yourselves with plenty of space to leeward so that when the next puff hits, you have room to bear off and make gigantic gains.

Next lap:

Now, the upwind game starts all over again. Keep reporting where the competition is headed and start looking for the next mark. Whatever your position might be, do not give up! Think of it as a basket ball game, where you may end up winning at the buzzer.

Once you cross the finish line, you may rest.

Sail trim and boat handling:

I usually trim the jib, keeping the leach at the band on the spreader. I do trim and ease a fair amount as we sail along. In general, if it isn't too choppy, I will sometimes sheet block-to-block (when both fully hiked). This is usually for short periods when my skipper rides the momentum of the boat and is pointing super high. It is very important to ease out as the boat starts to slow down and your skipper comes back to build speed. If we encounter exceptional chop (like power boat wake) I sometimes ease the jib briefly, from time to time.

I usually hike from the forward cleat on a Folli and I believe that it is very important to keep the weight as far forward as possible, not only down-wind, but up-wind as well.

A roll-tack can make a big difference. It takes timing between you and your skipper to perfect it. The best roll-tack is when you can stay on the old tack as long as possible, give it an extra hike (push) at the last possible moment and then jump over to the new weather side and hike out fully. However, there are many variations. The first part is often the same, but the amount of hiking required on the new tack will vary.

The gybing techniques are many, but if we narrow it down, you either gybe the pole first or the main first. The tendency today is a serious roll-gybe, with the pole first. The advantage is that once the main is gybed the jib is already full, aiding in keeping the bow down and you are ready to ride. Obviously, you need to work on both techniques. Gybing the main first provides an "anonymous" gybe. It also enables you to gybe in heavy air whenever you have top speed i.e. the least amount of pressure on the rig.

See you on the race course!

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