



2.4mR Yacht Sailing

YACHT SETUP

by Peter Russell

- Mast position - aft pin in fourth hole from back of track (Björndahl rig), mast will be more upright with this position to balance boat, check J measurement = 1560mm).
- Shroud tension - 25-29 Loos gauge (Björndahl rig), not critical – make sure mast will go forward on the run.
- Mast rake - 5500mm (light winds) to 5620mm (heavy winds), or even more upright to balance boat subject to sail fullness and leech tension.
- Backstay – check range of travel gives mast forward of vertical (5°) on the run to 100mm mast deflection on the beat (with mast rake @ 5620mm), mark 0mm and 100mm mast deflection on backstay control.
- Rudder - on centreline.

PREPARATION

- Put the bung in the keel drain hole.
- Check battery voltage and recharge if required for electric pump.
- Check that pump hoses are in good condition.
- Check that the pump works.
- Check that lead ballast is forward in keel.
- Check calibration marks on all systems.
- Check that ropes and fittings are in good condition.
- Check that ropes have stopper knots.
- Read the sailing instructions.
- Look at the flags on the committee boat.
- Count the laps required.

READING

- Check the articles on the 2.4mR website.
http://www.inter24metre.org/files/technical_articles.htm

FUNDAMENTALS

1. KEEP THE BOAT BALANCED (min. weather helm)
2. SPEED = LOOSE LEACH (lumpy water)
3. HEIGHT = TIGHT LEECH (flat water)
4. BACKSTAY/TRAVELLER FOR GUST RESPONSE
5. NEED TWIST AND RIG RESPONSE TO PUSH ¼ TON THROUGH WAVES

good start-clear air-sail to pressure

2.4mR SAILING

by Michael Leydon

Light weather

Sails full to create drive and as you pick up speed change gear by flatten the main a little and sheeting the jib in a little closer. It is very important to keep the leaches straight with only minimum twist in the head. As the wind lightens, bag the jib and hold the tack in your hand, outside the gunwale, (sub one and a half knots). As you sheet in the jib till the main starts back winding, flatten the main entry with pre-bend, pull the mast forward at the gate, no back stay unless there is no other way. If you are sailing with lowers have them tighter than the uppers and disregard the previous sentence, as the lowers will hold the mast in position allowing you to use the backstay.

As the wind increases, maintain the jib leach tension and start sheeting it on harder till the foot creases. The main, open the head, not too much backstay, traveller down just a little. Keep the mainsail shape at all costs by letting the traveller down until it back winds and then go to backstay. Remember that mainsheet tension is critical to all this so not too much. You are setting the boat up to go high as well as fast.

Downhill

In light winds, assuming that the mast doesn't go over the bow, but only to vertical, get the main boom square and control the leach tension with the vang. Pull the vang on as the wind increases. Steer lower as the wind increases so in light winds 5+ degrees higher than dead. Remember, position, position, position. The jib pole is let in a little to allow the jib to be set square on a vertical rig.



Brian Perkins – Metung Regatta 2006

2.4mR SAILING

by Michael Leydon

Rounding the top mark procedures

On approaching the top mark determine if you are going to do a gybe set to maintain the inside running to the next mark or if you are just going to set the pole and run down to the bottom mark.

1. Within one boat length or so, uncleat the main Cunningham/downhaul and uncleat the mainsheet and hold it in your hand.
2. As you start rounding the mark, dump the mainsheet and roll the boat to windward to help with the turning of the boat. (You may need to ease the vang before the mark if you are unable to roll the boat to windward as this will keep the boom out of the water but you will need to pull it back on again once you settle down on the run. This is slow as it is double handling.)
3. Leave the jib cleated or ease the jib as you turn the boat round the mark, using the jib to blow the bow away along with the roll to windward.

The following needs to be done but in your own order:

Keep your head out of the boat so that you know where you are going and what is going on around you, especially boats still on the wind coming to the mark.

4. Uncleat the jib sheet and pull the jib pole out and cleat the windward jib sheet.
5. Ease the backstay and pull/push the mast upright. (Adjust your shrouds/side stays if you can)
6. Adjust the vang so as the leach is tight with minimum twist
7. Ease the jib cunningham, main outhaul, and windward jib bar-bar hauler. (This takes the pressure off the leach of the jib and allows it to fill easier.)
8. Run at about 5 degrees off dead with the main boom out as square as you can get it.
9. Keep you weight forward and to windward to induce windward heal.
10. Steer down in the gusts to the point of sailing by the lee if you need to go that low and steer up in the lulls to maximise VMG (velocity made good).
11. If you are getting water over the bow then bring the mast upright and even rake it aft to your windward setting and ease the vang and sheet in. This is done progressively as it gets windier and earlier in the older (pre Stuie) boats. As it gets windier keep a hand on the mainsheet and as the bow goes under pull with all your strength and this will lift the bow out. If you have water on the bow foredeck then you also have to turn the boat, either way to change the angle of the deck to the waves so as the water falls off the deck. Once you have water over your legs back off, ease vang and sail higher and pump like mad as you will swamp on the next wave when it comes and this is really slow and cold!!

Approaching the bottom mark

1. More or less reverse the order. You can start beyond the two boat circle with the set-up for the pole drop and set-up for the windward beat as you will only lose about half a boat length or so.
2. Set-up the outhaul, main cunningham and rig tension. (Remember to let the mast ram off)
3. Set-up the jib bar-bar haulers.
4. Pull the backstay on and set-up the rig tension (if it is adjustable) and adjust the jib cunningham.
5. On approaching the mark check your position and buoy room rights or obligations and call for room or say that there is no overlap.
6. Sort out the pole retriever line and half retract the pole, as you approach the mark, (one boat length) uncleat the pole let it retrieve itself and focus on rounding the mark.
7. Pull the main in quickly to heal the boat and thus turn more quickly and then trim the jib to balance the boat on the work. Settle down and fine-tune the Cunningham's on the jib and main. The backstay can be played as required. As before get your head out of the boat to see what is going on.

All this needs to be practiced often so that you don't have to think about it too much. As you get cold or tired give yourself more time as you tend to forget things or do things out of order and this really stuffs things up. I have thirteen things to adjust to set-up for that run and then the same thirteen things to readjust at the bottom mark. How many do you have??



TUNING GUIDE 2.4mR

by Rikard Bjurström

The Mast

Tuning of the sails always starts by tuning the mast. On a Norlin Mark III, you can use the following system in order to get the mast into the right position.

Start with tightening the top shrouds to a good portion of strain (you do not need lower shrouds at all), when the mast is in vertical position. Use a tape measure that starts from zero, in its very end, and connect it to the main halyard. Hoist and secure the halyard as if you had hoisted a mainsail with it. Read the measurement to the intersection of the deck and the bottom in the stern. This measurement should be 560 cm when the backstay has no tension. With maximum backstay strain this measurement should be 542 cm. Mark the lines to find the right positions when racing.

The Mainsail

Be sure that the sail is fully hoisted. In light air, it is enough to fasten the tack as close to the mast as possible. No cunningham is needed. When beating, the boom should be trimmed to the centerline of the boat, but pay attention that the uppermost batten is parallel to the boom. The foot should be tight (the sail shall be very flat in the lowest third). If the waves are big compared to the wind force, you must ease the outhaul with a couple of centimeters. At a location middle boom, the foot should be about 5 cm apart from the boom. Keep the backstay taut, without bending the mast. When the wind increases, you must tighten the backstay more and more being careful not to exceed its' maximum. At a wind force of 10 m/s, tighten the cunningham until no wrinkles appear near the mast.

In heavy air, the foot should be very tight. A wrinkle from the luff to the clew should occur, at cunningham height. The boom is still kept in the middle and the uppermost batten is still parallel to the boom. This means a very tight sheet. It is quite difficult to sail in heavy air with this kind of trimming, but it is wonder-working, when you find the right pointing.

Downwind you can use two different techniques. The heavier the wind the more I strongly recommend the following:

Let the boom as far out as possible where it is lightly touching the shroud. Be sure the foot is strained. Adjust the boom vang to get the top batten twisting ahead of the shroud. Steer the boat with the wind coming in a little from leeward and let the boat heel to windward. In light winds and shifting conditions, luffing is the way to be fast. You may have to luff even up to 30 degrees. Loose the outhaul, but not to much because it makes the sail area smaller. Make the sail as full as possible and move the mast forward to at least an upright position. Gybe when the wind is shifting in your favor because it will give you more profit than any adjustment to the sail.

The Jib

The jib should be hoisted just until the roach of the foot touches the deck when sailing close hauled. No matter what the conditions the cunningham is used only for flattening the wrinkles. In light air, the leech should nearly touch the spreader end and the foot should follow the sheerline. In heavy air, the leech should be at the same position but the foot is straight. World Champion Marko Dahlberg does not use barberhaulers at all in heavy air. Going downwind the two former mentioned techniques have to correspond to each other. When running, you have to use a short whiskerpole and sheet the jib quite strongly. The clew should be much more backwards than the tack. The idea is to make the wind flow enter the mainsail at the leech and to leave the jib at the leech as well. When luffing, the whiskerpole should be as long as possible and the sail should have a fuller shape. In both cases, the jib halyard should be loosened, in order to allow the jib to "fly" away from the mainsail. Remember that loosening the halyard gives you the same effect that shortening the whiskerpole does. This is why luffing, at bigger angles, needs a tighter halyard.

Finally

The 2.4 Metre is a boat with a smooth shape moving easily in the water. Consequently, you can sail a very small angle to the wind when beating. The windward telltale can be in an almost vertical position where you do not loose any speed at all. Healing is not critical which means that the 2.4 Metre can be driven with tight sheets even in heavy air. In very light air, with only some puffs now and then, you have to make the sails fuller and ease the sheets, as well as bear off a little. This works also in conditions where the waves are big, compared to the wind force.

The 2.4 Metre is a very good sailor and offers you many options in tuning & trimming. This is why the above mentioned should be regarded as one suggestion of how to sail the boat. In no way it is meant to exclude other techniques to be fast on the course. Happy sailing!!

For more information contact Rikard at: rikard.bjurstrom@nebsails.fi or website: <http://www.nebsails.fi>



One-Design

TUNING GUIDE 2.4mR

North Sails Tuning guide is written to help you get the best performance from your 2.4mR. We hope the guide will help you to more successful racing and, most of all, more enjoyable sailing.

The tuning guide is written by Björn Österberg of North Sails—Sweden and Patrik Forsgren, 1993 World Champion.

Preparations

Mast Step Position

The forward bolt should be in the 4th hole from the bow.

Mast Rake

Mast rake is best measured from the lower edge of the black band in the top of the mast to the aft end of the transom. The backstay should be pulled just enough to remove the sag. Pull the backstay hard and then release before the measurement is taken, to make sure the forestay is straight. When the mast is raked in this position, mark the position on the forestay. The mark can be made on the forestay at the bow of the boat or on the adjustment line at the cleat.

The distance is 5.50 m for all conditions.

We have tried different mast rakes. A more upright mast is hard to point well with in light and medium conditions, but gives less weather helm in heavy weather. In light winds, a more raked mast can point better but it also affects speed in a negative way.

Backstay

Adjust the mast rake as described above. Mark the backstay line at the cleat when the backstay is pulled just enough to remove the sag from the headstay. Pull the backstay to the point where the mast bends 95 mm at spreader height. Put another mark on the line. Put two more marks on the rope by dividing the distance between the original marks in equal parts. Put a 5th mark with the same spacing from the 95 mm bend mark for very strong winds. The backstay tension is referred to as 1 being at the first mark, 1.5 being half way between mark 1 and 2 etc.

Shroud Tension

The shroud tension does not need adjustment for different wind speeds. With the backstay loose, the cap shrouds should be tight and the lowers significantly looser. With the backstay pulled to 4 units, the cap and lower shrouds should have equal tension.

Mast Ram

Mast bend can be induced or restricted by the two ropes at deck level. The number we use is ½ inches (1 unit on the small North speed decal) for and aft compared with unrestricted mast position.

Main Sheet

Place the small North speed decal just in front of the mainsheet cleat. Mark the mainsheet on a position where the mark is on the middle of the scale in about 8 knots of wind. This is to help you get back to proper trim at the start, in the beginning of a beat, or after ducking another boat. This reference is not used as reference for different sailing occasions because only a few millimeters of difference in mainsheet affects the sail shape a lot.

Mainsail Tack

The mainsail tack should be fixed in a way to make sure it stays in the same position with different outhaul tension. At the same time, it is an advantage if the tack can move an inch or so along the mast. The best way to achieve this is to have a slug slide sewn to the tack of the sail. If the opening in the mast track is extended all the way down to the boom, you can't use a slide. Instead, a 5 mm rope with low friction is tied through the tack grommet and around the mast. Make sure the tack of the sail is close to the mast to prevent the clew to go beyond the black band when the outhaul is pulled tight.

Main Halyard

The mainsail is always hoisted all the way up to the black band in the top of the mast. One way to make sure the sail is properly hoisted is to wrap woven tape a few times around the measurement band. Ease the backstay and hoist the main all the way. Pull the cunningham and tighten the halyard again.

Spreader Reference for Jib Leech

The sheeting of the jib is described as the distance between the spreader tip and the leech of the jib. The small speed decal (½ inch spacing between numbers) on the spreader helps to judge the distance. The measurements

later described are valid for the standard 295 mm spreaders. If you have different length spreaders, you have to compensate for the difference.

Footcamber, Jib

The depth of the jib, at deck level, is described as the distance between the point where the jib hits the deck and the rail. The distance is measured 850 mm back from the forestay. A small speed decal is put at right angle to the edge of the deck with the "0" at the rail.

Sheeting Angle, Jib

The standard angle, 250 mm from the centerline, works well in all wind conditions.

Jib Halyard

The jib is always hoisted to the same point. The twist is adjusted by the barberhaulers on the jib sheet. To be able to use a mark on the halyard, a shackle must be used to attach the halyard to the sail. Sail in light winds, 2 - 4 knots. Adjust the halyard to get the foot of the sail on the deck about 200 mm aft of the tack. The jib cunningham should be just tight enough to take the slack out between the luff buttons. Mark this halyard position with a mark on the halyard. As it is hard to get a good view of the halyard cleat, it is often better to put the mark at the plate for the bilge pump. Pull the halyard up past the plate. Put one mark on the rope and one on the plate when they line up.

Rudder Angle

It is hard to judge the rudder angle when steering with pedals. Put the rudder straight when the boat is on land. Pull the rudder lines tight and mark the lines at a point where they are visible when sailing. Put marks at ½ inch distances forward and aft of the original mark. When the rudder lines are on one of the ½ inch marks, the rudder angle is approximately 4 degrees.

Sail Trim

Mainsail

Sheeting

The helmsman's position, in the 2.4mR gives him/ her a perfect "sailmakers view" of the sail shape. Therefore, we use both the angle of the top batten relative to the boom and the leech telltales as references for sheeting. In very light conditions, around 2 knots, the top batten should point a few degrees to leeward to help the wind pass over the sail. When the wind increases to 4 - 8 knots the mainsheet is adjusted to make the top batten parallel to the boom. The telltale, at the top batten, is then flowing about 60% of the time. At 10 - 14 knots the mainsheet is kept the same and the leech is opened by pulling the backstay. If the seas are rough, the mainsheet can be eased a little. In smooth waters and even wind strength, the sheet can be pulled a little tighter to focus on pointing. In winds over 14 knots, when the backstay is pulled to 4 or 5 units, the mainsheet is pulled so that the top of the sail luffs in the bigger waves but the leech of the sail keeps flat without luffing.

Mastbend Inducer/ Restrictor

In very light conditions up to about 4 knots, the mastbend inducer is used to make it possible to bend the mast and at the same time keep a relatively loose forestay. Bending the mast gives you a mainsail with less depth and open leech. That way the wind is flowing over the sail with less drag.

When the wind is stronger than 14 knots, the mastbend restrictor is used to prevent the mast bending too much in the lower part. When the mast and the luff curve is the same, at about 4.5 units backstay, slight over bend wrinkles start to be seen from the middle of the mast to the clew. When the restrictor is set, more backstay tension will twist the mainsail and increase forestay tension without bending the lower part of the mast too much.

Backstay

In up to 4 knots, when the mastbend inducer is set, the backstay primarily defines the headstay sag (see further under jib trim). The right amount of sag, and mast bend, is achieved when the top of the backstay is pulled to about 2 units. When the wind increases, the bend inducer is released and the backstay tension is increased. The determining factor for backstay tension is the helm of the boat. This means that the backstay is the most important adjustment when sailing in varying wind strength. As soon as a tack (or other maneuver) is finished, get your hands on the backstay adjuster and keep the boat in balance. Keep an eye on rudder angle!

At 10 knots, the backstay is at around 3 units, and at 14 knots around 4 units. In winds over 18 knots, the backstay is pulled to 4.5 - 5 units, and if the wind is increasing to over 24 knots, the backstay can be pulled even a little more. In survival conditions, don't worry about how the sails look but how the boat feels!

Cunningham

Cunningham affects the camber position. In light winds, the mast is relatively straight and therefore the main is enough draft forward without using cunningham tension. Short horizontal wrinkles are seen along the luff of the sail. When the backstay is pulled to 3 units, the cunningham is set just enough to make the wrinkles disappear. If the wind is puffy, adjust the cunningham for the lighter winds and cleat it. It takes a few seconds for the draft position to move back when the cunningham is eased and its easy to get out of rhythm with the puffs if you adjust cunningham too often. In strong winds, the cunningham is used to keep draft position forward. The exact amount of cunningham tension varies with the age of the sail. A new sail needs less cunningham than a sail with many sailing hours. The rule of thumb is to keep the camber position at 50% of the cord length. In winds over 18 knots, the cunningham should be pulled real tight.

Outhaul

Outhaul adjustment is not as sensitive as cunningham. Up to 4 knots, the distance between the boom and the foot of the main is about 50 mm (2 inches). At 8 knots, the outhaul is pulled so the slot is closed, and at 12 knots the outhaul is pulled to create a wrinkle along the boom. At this point, the clew (which is impossible to see) is all the way to the black band at the end of the boom. It is important to have the tack attached to prevent it from moving aft as outhaul tension is increased.

Traveler

The main traveler is always kept in the middle. We have tried to use the traveler to keep the boom on the centerline in light conditions and also to let the traveler down to leeward in heavy winds. Neither has proven faster than keeping the traveler in the middle. It is just two more lines to worry about.

Jib

Spreader Reference

Up to 14 knots, the jib leech should be 1.5 units out from the spreader tip. If you need to point extra high, you can sheet the leech all the way in to the spreader a short while provided you feel that the speed is sufficient. If the priority is on speed rather than pointing, the sheet can be eased to make the distance between sail and spreader to about 3 units. In rough seas the leech can be between 3 and 5 units from the tip. The barberhauler does not normally need adjustment in winds under 14 knots; it is enough to use the jib sheet. In winds over 15 knots, the barberhauler is gradually eased to increase twist. At 22 knots, the jib leech is about 10 units from the spreader tip.

Foot Camber

The foot of the jib should not be too deep. The barberhauler has the same position in winds up to 14 knots. In light winds, the foot of the sail is all the way out to the edge of the deck. At 5 knots, the foot is at 3 units on the decal on the foredeck. From 8 knots and up, the jib is almost straight at the foot, at 7 units. If you need extra speed, ease the sheet a little to open the leech which will also make the jib a few units deeper at the foot.



Sport the Library, **Jeff Crow** - Sail Melbourne 2007

CONTROL WINDWARD HELM—And Go Fast!!

By Patrik Forsgren (1993 World Champion, two time Swedish Champion and bronze medalist at the 1997 World Championship)

All of us want to go fast. But all of us, even we who sail a lot, have a limited amount of time to spend on speed training. Therefore, it is important to concentrate on those factors which, for the particular type of boat we are sailing, have the most impact on speed. For the 2.4mR as well as most other boats, the windward helm is definitely one of those factors. The difference between the 2.4mR and other yachts is that it is much more difficult, on the 2.4mR, to feel when you have the right windward helm, especially if you steer with your feet. It is very easy to go upwind with up to twice as much windward helm as optimal. Therefore, it is very important to keep control of the windward helm. You can easily spend many days, speed training with a 2.4mR, trying to find the best adjustment of outhaul, cunningham, or shroud tension, for example without acquiring hardly any extra speed at all. However, you can almost immediately acquire significantly better speed by decreasing your average windward helm from, for example, 8 to about 4 degrees. The ideas presented here have helped me keep the 2.4mR better "in the groove", especially in choppy, puffy/ windy conditions.

How to Get Ready for Going Fast

In order to always know how much windward helm you have, prepare your boat as follows, on shore:

1. Set the rudder in the centerline of the boat. Then make a mark at each steering line in a place where you can see at least one of the marks, all the time.
2. Then, straighten the steering ropes, and put fixed marks on the inside of the hull or on the inner module, exactly at the marks located on the steering ropes.
3. Measure, in centimeters, from the top of the rudder, the horizontal distance from the rudder axis to the stern-end of the rudder, and multiply this distance by 0.07. For example, if the length of the rudder is 20 cm, you get: $20 \times 0.07 = 1.4$. Let's call this product y.
4. Finally, turn the rudder to the right until its stern-end is y centimeters from the centerline of the boat. Straighten the steering ropes, and, using another color. Put new marks on the hull, exactly at this new position of the marks on the steering ropes. Then, turn the rudder to the left, and repeat the procedure.

On each side, you now have one visible mark on the steering rope and three marks on the boat. When sailing with the mark on the steering rope just by the middle one of the fixed marks, your boat has no helm at all. When the mark on the rope is just by one of the other marks, your boat has about 4 degrees of windward (or leeward) helm.

How to Go Fast

For most yachts, about 3-5 degrees of windward helm gives the best windward performance, in most conditions. I therefore continuously keep an eye on these marks to try to sail the boat with about that helm.

A lot of things can be done to increase or decrease the windward helm, but in medium and heavy air, the most efficient way to keep the helm under control is to continuously adjust the backstay. As soon as more than 4 degrees rudder is needed to keep the boat on course, immediately de-power your mainsail by tightening the backstay, and vice versa. In light winds you will probably find it difficult to get as much helm as you want. For this reason and under this condition, I always sit on the leeward side. By doing so, the boat heels, at least a little, and gets a little more windward helm.

Patrik Forsgren



Ted Grubb – Hobart Nationals 2007

TRIMMING THE 2.4 METRE

By: Tom Björndahl (1999 World Champion, 5 time Finnish National Champion, 2 time European Champion, and builder of the Norlin Mk III)

Before you launch your boat, make sure that the hull has no damage. If there are damaged spots in the gelcoat these must be repaired, the reparation sanded and the spot (or the entire boat) waxed. Be sure you do not use wax containing silicon!

Mast Trim

I have a general rule for stepping the mast: the distance between the front edge of the floor plate and the aft pin for the mast foot should be 16.5 cm. The next step is tensioning the shrouds. Take out all the slack in the upper shrouds as a rough trim. Then, fine tune one side at a time until the shrouds are as tense as the thick string in a guitar. Many people are sailing without lower shrouds. My opinion is that this kind of boat should have the lower shrouds, but this is only my opinion. The 1997 World Champion, Marko Dahlberg, is sailing with main shrouds only and is going fast, especially in strong winds. The lower shrouds (if you use any) are tightened so that they are a bit slack to allow the mast to bend forward. The rake of the mast is very important for the balance of the boat. The rake is checked by attaching a ruler to the main hoist shackle and measuring the distance between the black band, on the top of the mast, to the stern of the boat. I started with 555 cm for my present sails, but have more recently changed it to 562 cm. Both the main and jib have to be hoisted when doing the check!

Sail Trim

The first thing to do is to check the balance of the boat in the wind. Take your feet off the pedals (or hands off the tiller) and let the boat luff up into wind. If the boat luffs very rapidly, move the rake forward and, continue adjusting the rake until the weather helm is moderate. Conversely, if the boat tends to bear away, move the rake more aft. My way of trimming the boat speed upwind is as follows. In light to moderate winds, I pull the backstay a little until the luff of the jib is straight with a minimum amount of sag. The middle part of the mainsail will be flattened by this procedure. If there are "old sea" or crossing waves I pull the mast backwards at the deck level to make the main more powerful. In stronger winds, the main is flattened by tensioning the cunningham, outhaul, and by using the vang and backstay. The forestay should be kept as straight as possible except in light winds and "old sea" when you need power to go through the waves. In light and moderate winds, the leach of the jib is kept fairly tight and, as the wind increases, ease the barberhaulers to loosen it. I hoist the jib so that the foot just barely touches the deck. The jib cunningham is more important than many sailors believe. By pulling it too hard you will get a jib that is too flat with the draft too much forward.

And now the only thing remaining is to start at full speed and be ahead of the crowd at all times.

Tom Björndahl



Greg Omay – Hobart Nationals 2007