BG Sails and Design IOM Sail and Rig Tuning Guide

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This Tuning Guide is primarily based on the setup we recommend for our own BG IOM designs and sails. If followed and used in conjunction with our Mast Layout document, you should be able to create a more forgiving setup for not only our own, but any well designed boat allowing you more time to concentrate on sailing the race course.

Mast Rake

A general starting point for a more modern design should have the mast set at 0 - 0.5 of degree aft rake combined with the below numbers with your **A rig**. Each lower rig should rake aft 0.5 degrees from the one above it. Dependent on foil section/placement and other inherent design factors that can alter a yachts ability to achieve a consistent upwind balance without over correction, you may require a little more or less rake than the above base settings. If any adjustments required border on the extreme, you may wish to seek advice from your designer or an experienced skipper as these may be masking inherent design or build faults. See troubleshooting for more detail on rake.

Shroud Tension

Shroud placement on the mast, hull attachment positions and tension, in combination with forward pre bend and spreaders, play a vital role in the control of an IOM mast. This control is not only important for the correct amount of sideways bend, but equally important for fore and aft bend to help keep your forestay firm enough for any given condition, while matching the cut of your mainsail luff curve.

Not enough shroud tension will see the centre of the mast bend forward through the mid section and the rig drop sideways too early, resulting in the mainsail leech falling away excessively and the forestay sagging.

Too much shroud tension and you will restrict the middle of the mast from moving enough to allow the rig to work in a gust, resulting in over use of rudder and sheets to maintain control.

What we are ideally looking for is to control our mast bend in a way that matches the given righting moment stiffness of your design in an automatic way. This principle is similar to the way a dinghy team will match a mast section's bend characteristics and sail setting to their given crew weight which is essentially their ballast to aid righting moment.

Your IOM should have a mast (A Rig in particular) that will bend evenly through its length sideways where the middle of the mast lifts marginally to windward and the head of the mast bends off to leeward. The middle of the mast will also bend a fraction forward. When right, your mainsail leech will open slightly, in harmony with your jib leech having a larger

slot due to sideways mast movement for balanced control upwind without skipper control input.

As a general rule of thumb, shrouds only need to be firm enough so that when your boat is on its side the leeward shroud still has some tension in it and never goes slack upwind. In the lightest of wind in waves you may look to, in partnership with an ease of backstay tension, loosen your shrouds a fraction to allow the rig to soften, keeping a similar top to bottom fore and aft bend but allowing the forestay and jib to deepen forward for more power. Shrouds must be hooked into the front face of the mast for best control.

Spreaders

Given that most modern IOMs have a shroud base on the hull aft of the mast aiding to control mid mast bend, your spreaders may require some slight tweaking. This in conjunction with shroud tension will keep a uniform fore and aft bend through the transition of pre bend from the top and the deck ram at the bottom controlling lower mast bend when backstay tension is applied. For this reason I recommend a simple low windage spreader made from brass tube with a stainless steel pin that can allow the spreaders to be bent aft 1 – 2mm for perfect tune in a way that fixed or clip on spreaders can not.

Spreader Length

If using our mast rigging guide your spreaders should be measured from tip to tip as a percentage of your shroud base on the deck.
For narrower less powerful designs, flat deck older designs or those with thicker section foils creating a tendency of weather helm, a shorter percentage spreader length allowing the mast to bend and depower the sail by opening the mainsail leech earlier in a gust would benefit
A Rig 75% (of shroud base) **B Rig 70%** (of shroud base)

For more modern powerful designs that like a little more power, with the rig set low to the deck and modern section fins used, the need for early automatic bend response from the rigs may not be as favourable, meaning a slightly wider spreader width can be used.
A Rig 80% (of shroud base) **B Rig 75%** (of shroud base)

e.g. A powerful boat that has a shroud base width on the deck of 150mm, will a max spreader width of 80% which equals 120mm from tip to tip when fitted.

Mast in Hull

Both at deck level and at the base of your mast tube or step, your mast should be restricted so that no sideways movement is possible through the mast tube in its lower section. Your gooseneck should rest up against either side of your mast ram cheeks to restrict the mast from rotating. Some designs may have a heel fitting within the mast that also helps to solve any issue here.
Uncontrolled sideways movement at deck level together with incorrect spreader length and alignment, is one of the most common symptoms we see in a poorly setup up rig, with perfectly suitable mast sections often incorrectly labelled as pool noodles or similar.

Mainsail to Mast

When matching the mast bend to suit the mainsail, you are aiming for the luff of the mainsail to follow the bend evenly at approximately 1 - 1.5mm away from the back edge of the mast. If you tie your sail ties, leave a gap between mast and sail of approx 2mm this will aid setting the bend correctly. This is not an exacting science as some make out, with a sail tie that is slightly on the loose side preferred to one that is too tight.

In general your mast bend is correctly matching your sail if it has a smooth even shape all the way through to the mast. If your mast has too little bend your mainsail will appear 'knuckled' and overly deep at the luff with a distorted cross section camber shape. If you have too much mast bend, your mainsail will be pulling hard at each sail tie point and be loose on the leech with no control of the camber shape.

Mast Ram

Adjust the mast ram so that it is capable to push aft against the mast with easy lake side adjustment.

When sighted down the length of the mast from above what can you see?

A Rig - You should have a gentle curve through from the top and a slight reverse at deck level if all correct showing a very slight 'S' bend where the mast comes out of the boat and a gentle positive curve allowing the mainsail luff curve to match the mast bend.

B Rig - Should have a gentle curve through to match the mainsail luff and appear to straighten where it comes out at deck level.

C Rig - Should show a positive curve matching the mainsail luff right the way through.
The difference of ram aft from rig to rig on average is between 0.5 – 1mm.
e.g. if A rig is say 30mm back from your jib deck loop to front of mast, then B would be approximately 30 - 30.5mm etc.

These numbers are given as a hypothetical example but once fast settings are known for your boat, you should accurately measure the position of each rig on all adjustments and record for easy reference.

Mainsail setting

For a general setup and tuning of your rig, with the above followed, it is best to first set the mainsail tune with leech twist for the run through kicker/vang tension. Your leech tension for upwind work will then be fine tuned using backstay, side stays and your mast ram in harmony for the correct match of mast to sail shape. Each of these control a section of the mast fore and aft bend and getting the right balance is the key with the above guides used from the **Mast Ram** section above.

Downwind
Ease your sails for a running trim then fine tune your kicker/vang to set the correct mainsail leech twist for the prevailing conditions. Now is the time to gybe your mainsail from side to side to check that the mainsail leech is the same tension. If not your mast may be bent sideways due to uneven shroud tension or incorrectly aligned head or gooseneck fittings. This should be attended to.

I will sail with a fraction less kicker in light air to free the leech for a run then tighten a fraction at higher wind to keep mid and top batten at the 90 degrees under the current wind load on a given day when the main boom is in the full out position.

Upwind
When happy with your running trim, sheet your sails back in for a beating trim with mainsail approximately 10mm from the centre of the post and fine tune mainsail twist with the mast ram and backstay for correct upwind twist, matching that of the jib when looked at from behind.
If you find it difficult to get the correct trim on the **A rig** for beating, without having to adjust the kicker/vang from the running trim, then you may need a deck patch shim under the bottom side of your gooseneck body to alter its rotating axis. Two x 5mm wide strips are all that is usually needed under a standard 50mm commonly available gooseneck body which are the best suited choice for keeping vertical alignment and repeatable settings.

Mainsail Foot depth
On All rigs I tend to set around 12-14mm of depth in the foot of the mainsail from the bottom side of the boom (not centreline). This is not as exacting science. I don't tend to adjust these through conditions but as a general rule of thumb I would go a fraction on the deeper side of this range if sailing in choppy lighter conditions and flatter if in flatter water or powered up conditions.

Jib Booms and Pivot Point
For our preferred rig style to work correctly, the jib pivot point is critical to restrict the leech of the sail from lifting too early using the desired mast pre bend setup. Ideally your jib boom will be back close to the mast at the aft end as the further it is set forward away from the mast, the wider the jib will need to be trimmed to avoid mainsail backwind, resulting in a very inconsistent tune.
With jib eyes positioned on the deck to suit, the pivot point position back along your boom from the forestay take off should be approximately
A Rig 78 - 80mm
B Rig 68 - 70mm
C Rig 48 - 50mm

Jib Trim Upwind

With the edge of your mainsail boom set at approx 10mm from the center of the post, each jib boom when sighted from behind should be approximately:

A rig - jib boom 55 - 60mm from centre of mast to inside edge of boom
B rig - jib boom 60 - 65mm from centre of mast to inside edge of boom
C rig - jib boom 65 - 70mm from centre of mast to inside edge of boom
Note - C Rig Jib looks too wide, but it's right!

Most importantly, make sure you check that your jib boom sheeting angle is correct from side to side on both tacks. This can be corrected with rotating the jib boom band around the boom and re setting in place with cyano or similar.

Jib Foot Depth

As with the mainsail, I tend not to adjust these often and rely that accurate shaping has been cut into the sail. Relying on an overly deep foot to power your sail will result in a 'moving' shape through wind pressure changes and often round the exit shape in the sail, making the helm balance alter for a net loss in speed.
A Rig 18 - 22mm
B Rig 15 - 18mm
C Rig 12 - 15mm
Apply the same rules as the mainsail foot depth re conditions.

Jib Leech Twist

Our preferred rig setup and sail cut is designed to sail with ever so slightly tighter leeches than most in general A rig conditions, relying on sideways mast bend when powered up to open the slot between the leech and mainsail luff to keep steady helm balance. In lighter conditions or open water some may like to sail with a little more twist (open leeches) and this naturally come down to what the skipper feels comfortable with.
Max depth as measured from the jib leech line to the deepest part of the jib leech.
A Rig 25 - 28mm
B Rig 22 - 25mm
C Rig 20 - 23mm

As a good guide for the mainsail and Jib leech twist, IOMs do tend to like more twist in the sails when moving to lower rigs. When set correctly, your boat should have an almost neutral helm balance through all conditions or the slightest touch of weather helm to suit your feel, accelerating in gusts without needing excessive corrections with your rudder or sheeting. The more practiced you become in understanding your boat, it will virtually tell you when the trim is not quite right, and through small leech adjustments you can easily correct any imbalance.

Sheeting Width

The mainsail set at 10mm is for your base setup of both sails relative to each other only. You may find trimming in a fraction closer on the sheets may help in sailing a higher course in lighter flat water conditions. In open water conditions the boat will enjoy the sheets trimmed wider where maintaining speed is more favourable than pointing high. In open B & C rig conditions it is not uncommon to have the main boom pointing at the corner of the transom for speed in waves.

Luff Tension – Both Sails

As a general guide it is best to sail with a fraction less luff tension than one that is too tight. For lighter winds it is easier to read your sails with a few light wrinkles up the luff, then slowly remove them once in a fully powered up mode. Only ever use enough tension to just remove wrinkles! Any more tension than this and you will not only distort the sail shape but risk longer term damage by stretching the sail. Always remove all tensions after use for storage between race days.

Trimming for Up Range - A Rig

Your boats balance when set correctly should not need constant correction or adjustment through gusting or changing winds over each rig. This is the key to a well balanced design and setup that allows you to concentrate on racing the course, not worrying about 1mm here or there. I would say the only adjustments I make to a single rig would be in de-powering the **A rig** from light wind to top end setup. I usually follow these steps.

Apply 1-2mm of forestay tension (closes jib leech and straightens rake to reduce weather helm)
Firm down both luff tensions just enough to remove wrinkles.
Tighten kicker/vang for correct running trim
Check from behind that mainsail and jib leech match in twist and adjust backstay/ram to match.

Trimming for Up Range - B and C Rigs

Both lower rigs are pretty much set and forget outside of the slightest tweaks for balance. It is important not to be consumed in trying to outpoint others on the race course. Well set up IOMs like to be driven hard and fast which means often sailing a fractionally lower but in a faster mode upwind.

Base guide on helm balance (basic troubleshooting)

Boat has weather helm and wants to luff upwind

- Add a little more mainsail twist by applying backstay 1 - 2mm only
- Check the jib leech is not too twisted and that sheeting width is correct relative to mainsail.
- If the above does not rectify, try raking the mast in a more vertical position by 0.5 - 1 degree and reset all trims to suit.
- Your rig and shroud tension may be a little loose with the jib lifting too early. Firm up the shrouds a little then run through your basic setup from running through to beating trim.

Boat has lee helm and wants to fall off upwind (boat not pointing)

- Add a little less mainsail twist by easing backstay
- Check the jib leech is not too closed and that sheeting width is correct relative to mainsail.
- If the above does not rectify try raking the mast backwards by .5 to 1 degree and reset all trims to suit

Some points to remember

- Use the above numbers and specifications as a base point
- Don't be afraid to try different settings, knowing you can go back to a known base point at any time. Experiment to know what each adjustment does and how it affects your tune.
- Settings on sail depth may differ from the above guides for different cuts in sail shape or designs not ideally suited to extreme ends of the wind range or that may have less than desirable balance due to other underlying design factors.
- Be careful not to get too bogged down in finite adjustments on every moving part of your boat. A well designed and tuned yacht with overall balance up and downwind, will not need 1mm here or there for every 2 knots of wind change. It will perform steadily through gusting winds and conditions we often sail in without excessive adjustments needed. It will accelerate in speed with the slightest click of the sheets eased and climb as high as the rest when a high mode is required. It will tack effortlessly, with rig wind limits easily identified with upwind and downwind upper extremes of control matching perfectly.

- Most importantly, once you find a nice tune record your settings for quick repeatability when making quick rig changes or using a rig after a long layoff. With your ball park trim set, concentrating on racing the course will make up for more than an outhaul or other adjustment being 1mm out.

It is important to remember that our tuning guides are a general overview on what has worked for our designs and a number of others, some thought of as long past their use by date, that we have managed to upgrade and perform with over the years.

What works here may not work in harmony with other ideas, designs or sail cut styles and setups to give the same level of performance but provides a solid background to the notion there is far more to consider than just hull design or fashion in getting the most from any boat.

If anything is not clear, please get in touch if there is anything we can help you with to get more from your yacht.

Cheers

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