

**Fehler! Textmarke nicht definiert.Fehler! Textmarke nicht definiert.**  
**CONTENDER RIG TUNING**

Black Art or Simple Science?

By Graham Scott of Wavelength Designs

Many sailors are mystified by the term tuning. Some may imagine that it is a sort of Black Magic performed instantly by experts such as sailmakers and other so called professionals. However in reality, there is no short cut for anyone and "tuning" usually means small adjustments made over a long period of time to ensure a close working match between mast, sail and helmsman.

*Wavelengths Hand*  
Obviously, a good place to start is by choosing a mast and sail that in theory should already match each other, taking advantage of any development and tuning done by the sailmaker. It should be easy to find out from race results whose equipment is winning and who is involved with the class.

The following is a guide to setting up your Wavelength rig in a way that will enable you to commence your own fine tuning programme. Some suggestions may appear insultingly simple but are still necessary and sometimes overlooked because they are "basic and obvious".

### MAST POSITION *- Mast position*

Step the mast, leaving the lowers off, and adjust the forestay and shrouds until there is reasonable rig tension with the forestay lever on. Now use a tape measure to check the distance from the top of the transom (not including any overlap) to the aft face of the mast (including the sail track or any extension of it) at deck level. I prefer this measurement to be set as near to the minimum of 3050mm as possible. This keeps the weight of the rig as far back as is allowed helping to prevent the bow sticking on a reach and enables the boom to be squared out more on the run. It also provides the right amount of weather helm for medium conditions.

The next thing to sort out is mast rake. The general rule is to rake the mast back as much as possible while still leaving some room to get under the boom! Obviously you could take this to extremes by using a sail with a very short leech but the trade off would be a slight loss of sail area. As usual, a compromise seems to work best with a leech cut 75mm short of maximum and a mast rake of about 6570mm. The actual rake is not critical to a few centimetres or so as long as you feel OK with the boom height when tacking. The rake is measured by hoisting a tape measure on the halyard and fastening the halyard off so the tape runs from the lower edge of the measurement band at the top of the mast to the crown of the transom.

### SETTING THE MAST STRAIGHT - OUR REFERENCE POINT

First you must ensure the mast is straight sideways. Attach the lower shrouds and tension the forestay lever. Now place your head below the gooseneck and sight up the mast track to see if it is straight sideways. Assuming it is not, adjust one of the lowers to bring the masthead into line (this is where the Sta-master turnbuckles come into their own). If you are unsure which lower needs to be altered, then simply push one of them with your hand to effectively tighten it whilst simultaneously sighting up the mast. You will immediately see if you are making the mast straighter or bending it off more to one side. If you cannot straighten the mast using the lowers, then check the spreaders are of equal length and the same angle each side.

Now for the fore and aft bend. As a starting point try to aim for a straight mast (zero fore and aft bend). This will generally be good in medium conditions and will provide a reference point around which you can experiment. There are two ways of controlling fore and aft bend: spreader angle and lower shroud tension. Spreader angle is tied in with spreader length and I suggest you adjust your spreaders to a length of 440mm and leave them for a while - it's one less variable to think about for now.

Release the lowers, and with the lever on, sight up the mast adjusting your head position so you can see the amount of fore and aft bend. The spreader angle should be adjusted until the amount of forward bend halfway up the mast is about 25mm.

REMEMBER SWINGING THE SPREADERS FORWARD WILL STRAIGHTEN THE MAST AND SWINGING THEM AFT WILL INDUCE BEND.

Then re-attach the lowers and adjust each side equally (or you will upset the sideways bend) until they are just tight enough to straighten the mast to a point where you can detect virtually no fore and aft bend.

#### RIG TENSION

Buy or borrow a rig tension gauge and check the shroud tension, which should be somewhere between 115kg (250lbs) and 150kg (340lbs) depending on your weight and the type of mast you have. Generally the heavier you are the more rig tension you should carry. Remember when you push out on the trapeze in a force 2-3, your bodyweight is causing the windward shroud to lose tension, which in turn allows the mast tip to fall off to leeward, depowering the rig at just the wrong time - so the more you weigh the more rig tension you need to counter this. However, if you overdo it (especially lightweights) the rig will not depower properly in more wind and waves. If the gauge shows that you need to adjust shrouds or forestay to arrive at a suitable rig tension then immediately repeat the whole cycle of adjustments from rake through to bend, until you have the correct settings.

Finally, make a note of all shroud adjuster positions so you can easily return to this reference rig setting. Any future experiments can then be related to this example:

*Ref. setting but with forestay tensioned one hole, or:*

*Ref. setting with lowers one hole tighter.*

#### SAIL CONTROLS & REFERENCE MARKS

The aim of any sailmaker these days is to produce a good all round sail capable of being adjusted through a wide range of shapes to suit differing conditions. By definition this means that it is quite likely that some sailors will have their sail adjusted to the wrong shape for a particular condition just by having say, too much cunningham on, or too little vang. This sail adjusting skill, and the ability to change gear quickly on the race course makes a huge difference to boatspeed.

There are two ways of working on improving these skills. Firstly you can look at the sail as you are sailing along, assess its shape, comparing it to the prevailing conditions and to the ideal shape required for those conditions (which may or may not be stored inside your brain!). Sail control adjustments can then be made to achieve this perfect shape. We all employ this method, some with more success than others, but the facts are that the less proficient you are, the more it will distract you from the job of steering the boat and what is happening on the race course. This is where the second method comes in, which involves extensive use of reference marks.

This system is as old as sailing itself, but is rarely used properly. Basically, instead of having to keep a memory bank of sail shapes, you build up over a period of time a memory bank of sail control settings which you have found to be fast in particular conditions. The beauty of this is that you can, for example, round a leeward mark in a choppy force 4, set outhaul, cunningham, vang and mainsheet to exact marks, knowing you will be going as fast as you can and without even looking up at the sail; thereby allowing more concentration to be applied to steering, tactics, shifts etc. Obviously to arrive at these fast settings requires a lot of time in the boat but the sooner you start the better!

Hoist the sail on land and stand back from the boat to check the head of the sail is right on the lower edge of the measurement band. Adjust the halyard until this is correct and mark the position and always use this. There is no point having a cunningham reference mark if the head of the sail is in a different place each time. Use a low stretch halyard (I use 2.5mm wire).

Check the boom measurement band position (2700mm from aft edge of the mast track or its extension). Put a reference mark 50mm in from this (one should be enough).

Put a cunningham reference mark 50mm below the track exit on the mast. Attach a mark to one of the vang wire purchases with PVC tape and mark the mainsheet roughly where it would pass through the boom block in medium conditions.

If you have a clubmate or tuning partner, try to put your marks in the same places so you can compare settings after sailing. Remember to write down combinations of settings on the boat or when you get ashore as they are easy to forget if you don't sail for a month or so! You should gradually build up some consistently fast combinations eg:

*Force 3. Flat water. Trapezing straight legged. Outhaul on ref., Cunningham 1" above ref., Vang 2" beyond ref., Mainsheet ref. mark between boom block and jammer. Rig set to reference but lowers one hole tighter.*

Believe me, it is very reassuring in the heat of a race when things are going wrong to set the sail to exact settings and say I know I've had reasonable boatspeed before with these, so let's get on with it!

Good sailing and good luck!!

**Graham Scott**