Rig Tensioning

Seawind Rig Tunning Guide Posted on June 9, 2021 by Shane Grover

While every Seawind is delivered with a well-tuned rig ready to go sailing, occasionally it will become necessary to adjusting and tune the mast and rigging. Mast tuning is, in reality, a fairly simple process that many people avoid for fear of doing wrong. The result of this is these boats are sailed with loose rigging and improper mast structure, far worse than had the perfect tuning not been achieved with a reasonable attempt at keeping the rig tuned. This article aims to act as a guide to both demonstrate the ease of tuning your rig whilst also giving you the basics on how to proceed.

A number of rig types have been used on Seawinds over the years, in this article, we shall focus on

the two types used on current models. These are a single spreader fractional rig (1160, 1190, 1260) and double spreader fractional rig (1190 Sport, 1370, 1600). Both follow the same basic principles; however, where one differs from the other we shall clarify in the steps that follow.

If tuning your rig for the first time, or retuning a sloppy rig, the first step shall be to back off all the turnbuckles to release pressure and enable you to start from a blank canvas. When doing so, do not unwind turnbuckles past their safe bury limit (there should remain at least 3 threads exposed protruding past the turnbuckle end). Of course if you are needing just a minor adjustment this can be performed without backing off all rigging, simply skip ahead to the section of interest however this guide shall work through all steps based on a completely untuned setting.

Notes: When adjusting rigging screws, it is always good practice to attach a spare halyard to a pad eye or horn cleat near the stay you are adjusting. Apply some pressure and clutch off as a safety backup.

COLLUMN

This is the straightness of the mast when looking at the forward or aft face. The mast should stand straight, it should not lean to either side of their boat and should be perfectly in column with no curves along the way.

Mast leaning to one side

Your mast is leaning to one side? First double check that it is your mast that is leaning and not your boats heel. Take a spare halyard to a datum point on the port chainplate and then again on stbd. The halyard should reach both datum's with equal tension applied. If one side does not touch, or is too loose then you shall need to adjust your cap shrouds to pull the mast back to centerline.

Mast having a curved or S bend

Your mast has a curve or S bend when looking up the forward face: This can be adjusted by tightening or loosening the diamonds accordingly. On a double spreader rig you will have two sets of diamonds, start by adjusting the upper diamonds first then work down from there.

PRE-BEND

Pre-bend is the natural fore-aft curvature of the mast when static and unloaded. To check pre-bend, take the main halyard and attach it to the gooseneck, then pull tension on the halyard to remove any slack, thereby producing a straight line from head to gooseneck. This is an easy way to visualize the amount of pre-bend on your mast.

On all aluminum Seawind masts the pre-bend is set at 50% of the total mast section chord (length).

IE, on an aluminum mast with a fore – aft length of 300mm the pre-bend should be set at 150mm.

The following table can be used when tuning your 1160, 1190, 1260 or 1600:

	Mast Chord (mm)	Pre-bend (mm)
1600	306	153
1260	248	124
1190 Sport	233	117
1190	233	117
1160	233	117

To apply or adjust pre-bend begin by first tensioning the outer diamonds. Adjust each side with equal turns to the turnbuckles. With the correct pre-bend achieved, continue to adjust the diamond wires to get the mast straight in a sideways plane (in column). Second, take up the inner diamonds equally until they are firm and sharing the load. For advanced tuning this pre-bend should match the cut of the mainsail.

RAKE

Rake is the term given to the fore or aft lean of the mast. This fore-aft lean (rake) effects the balance of the helm by shifting the center of effort (COE) further forward or aft of the center of lateral resistance (CLR). Adding rake (leaning the mast further aft) will add weather helm to the boats balance, whereas standing the mast up straighter reduces weather helm, or adds lee helm, depending on the extent of the movement. Changing the rake on a Seawind is as simple as adjusting the forestay and cap shroud turnbuckles.

When adjusting rake for optimum results the rake can be finely tuned after some trial and error setting and re tuning to achieve a setting that provides some weather helm upwind in light air, without becoming unbearable in a blow. You want to ensure that if you were to leave the helm the vessel would gradually round up and stall into the breeze, thus not becoming out of control. Consideration should also be made for the optioned sail wardrobe, a Seawind optioned with a screecher or Code-0 should be set with more rake than a vessel with main and jib only. Doing so will add more weather helm when sailing main and Jib only but will prevent lee helm when sailing with the screecher.

Rake can be measured by attaching a weight such as a wrench or hammer to the main halyard and taking a measurement from this forward to the gooseneck. On a vessel sitting on it's designed waterline this measurement corresponds to the settings outlined in the following table.

	Rake (mm)								
	1°	1.5°	2°	2.5°	3°	3.5°	4°	4.5°	5°
1600	334	500	667	834	1000	1167	1330	1493	1660
1260	312	450	588	725	862	1000	1136	1275	1410
1190 Sport	270	406	541	676	811	945	1079	1213	1346
1190	453	583	711	840	968	1096	1224	1350	1478
1160	453	583	711	840	968	1096	1224	1350	1478

The rake measurements in blue are the default rake settings used by the Seawind commissioning team.

The rake of your sailboat can be adjusted by simply tightening or loosening the forestay. This should be done whilst also proportionately adjusting the cap shrouds.

RIG TENSION

The rig tension on your catamaran should be firm, but not overly tight. The best way to determine correct tension is to watch the leeward shrouds when sailing. These should become slightly loose when sailing however should not be loose enough to appear sloppy.

To tighten the rigging, begin by taking up the outer side stays on both sides evenly, changing each side a few turns at a time. Do not over tension; take them up evenly until the stays feel firm. While there are tools such as loose gauges available to evaluate tension, these typically do not work on the wire sizes typically used on multihulls. To check whether you have achieved appropriate firmness, grasp the shroud at standing height and rotate the shroud in an arc. You should be able to rotate the stay in no more than a 100mm diameter.

Last, take up the lower stays evenly until they are firm against the pre-bend provided by the spreader diamonds. Their purpose is to contribute to holding the mast in column with the pre-bend and stop it from "pumping" when under sail. If when sailing you notice the mid or lower sections of the mast moving this likely indicates the lowers require adjustment. Like the outer shrouds you should be able to rotate the stay in no more than a 100mm diameter at standing height.

SAFETY

When adjusting rigging screws it is always good practice to attach a spare halyard to a pad eye or

horn cleat near the stay you are adjusting. Apply some pressure and clutch off as a safety backup. After adjusting your rigging, please take care to lock off all the locking nuts and replace any safety pins removed before tuning. On an older boat your rigging should have already been stretched in and should maintain its tension for a reasonable period, as such we recommend inspecting your rig tune every 6 months. On a new vessel you will need to monitor and adjust your rig tune more frequently as the stainless rigging wire stretches in. It is recommended for the first 12 months of owning a new catamaran you inspect rig tune at 1 month, then 6 months then every 6 months after.

Dan of Port Townsend Rigging 2 Mar 2018

Problem

The mast was pumping on the legs from NZ to Seattle and currently shows a gap of about 1/16 of an inch on the leading edge of the mast base, and a smaller gap all along the starboard side but not the port side of the mast base, with no gap at the aft edge of the mast base. In addition, the mast looked to have an excessive rake compared to other seawinds.

Solution

Removed the three mast base bolts and left them out - not needed and may hamper proper seating of the mast step.

Removed the jib.

Removed jib fuller link plates, and released 4 bolt foil clamp on harken hub to let foil gently drop. Lifted the drum and foil along the forestay and secured in a high position with the jib halyard to allow wrench access to the top fo the bottom forestay swage fitting.

Cut the harken link plate by one hole - now only one hole left.

Loosened the toping lift to let the boom lay on deck.

Alternately loosened the outer and inner shrouds while tightening the forestay until the forestay was shortened by about 2". The outer and inner shrouds were completely relaxed by this time. The mast now sits with no gap all around its base.

The topping lift was used to measure the rake which is 260mm at this point. It might have changed after tightening the outer and inner shrouds.

The screecher halyard was used to raise a measuring tape end to the screecher halyard sheave box so as to measure the distance from its sheave to opposing port and starboard stanchion bases. They measured the same indicating the mast was straight.

Alternately tightened port and starboard already relaxed outer shrouds until 20% breaking strength, i.e. 1.4mm stretch over 2100mm length of wood stick taped to the shroud. After the outer shrouds were tightened, the inner shrouds were tightened to "firm", but looser then the outer shrouds.

Reinstalled the jib furler with shorter link plate. Clamped the four bolt foil clamp on harken hub to the same foil clamp position as before.

Check the top of the foil for a minimum 1" gap of threads between the top of the foil (black disk) to where threads disappear into swage fitting.

Hoisted jib and furled it.

Seawind Email

From: **Shane Grover** sgrover@corsairmarine.com
Subject: RE: Sky Pond rig tension
Date: January 31, 2018 at 10:46 PM
To: cp carlpod@icloud.com, Mike Rees mike@seawindcats.com, Van Nguyen vanktn@corsairmarine.com

SG

Hi Carl,

I ran your email by Zam our rig specialist. This is his feedbach:
Pumping would be the result of slightly loose lowers, tighten lowers.

"The lowers do not need to hold the same tension as the cap shroads and will feel slightly looser then the cap.
Note if you tighten the cap shrouds check that the lowers haven't lose any tension.

Rack 400mm is achieved from the hound area, (Cap/forstay area) and is a base point to work from.
If you are using the main halyard you would need to add roughly 150mm to 400mm..
Rake is a guide, so depending balance / feel of boat , breeze strength, anywhere between 350 to 500mm is acceptable.
Once the rig has been tensioned wou should find the gap will close up.
However depending rake , a 1mm gap on leading edge is exceptable.

Prebend can only be achieved by running a messanger line from hound area to the boom location on the aft face .
The 1160 carries a 235 fwd/aft section. So prebend will need to be set 110 to 125mm after tension. Very important that the prebend is no less then 110mm once the lowers have been tensioned. . .
That measured point will be measured closly where the spreaders are located. A good indicater of loose diamond wires , if you are on a beat you will be able to see the wether wire slightly flutter.
Loose diamond wires can also contribute to lose lower wire tension causing the rig to pump.
So you need to establish first , that you have the correct prebend before tension the lowers.
If you adjust the outer diamond wires , you will also need to check and adjust the inner diamond wires.
Noting that you are not putting an S bend through the rig as you adjsut.
If you are adjsuting the diamond wires , have someone eyeball the back of the mast so that the rig stays in collum,

Given the amount of miles the boat has done ,
The rig would need a thorough inspection."

Hope this helps!

Regards,
Shane

-----Original Message-----
From: cp [mailto:carlpod@icloud.com]
Sent: Wednesday, January 31, 2018 7:08 AM
To: Mike Rees; Shane Grover; Van Nguyen
Subject: Sky Pond rig tension

Shane,
I'm about to hire Port Townsend Rigging to tension the rigging. As you know, the mast was pumping on the legs from Tahiti to Seattle and currently shows a gap of about 1/16 of an inch on the leading edge of the mast base, and a smaller gap all along the starboard side but not the port side of the mast base, with no gap at the aft edge of the mast base. Aside from the notes on rig tension in the handbook, are there more detailed instructions and / or hints and / or techniques your rigger can share to make this tensioning exercise as simple and effective as possible? For example, if aft rake is supposed to be 400mm, can I simply let the main halyard hang with a weight and measure this distance (400mm) from the halyard to the aft edge of the mast at the boom? Same with prebend: measure a max of 75mm between halyard and mast somewhere mid mast? Port Townsend, being a wood boat haven, doesn't see many catamarans so any pointers would be great.
Thanks!
Carl=

Owners Manual

Mast, Boom and Rigging

The rig on your Seawind 1160 is designed to be efficient and can be easily handled by two persons. It features a self tacking, roller furled headsail and single line slab reef mainsail with lazy jacks and boom catcher.

The mast, manufactured by Tempo Spars, is a 7/8th fractional rig with single spreader. Both mast and boom are clear anodized aluminum. It is fitted with 10mm spectra 2:1 main halyard, 8mm spectra jib halyard, 12mm braid spinnaker halyard and 10mm braid topping lift.

The mainsail is triple stitched reinforced construction. It has full-length fiberglass battens with adjustable end caps and roller bearing batten cars.

Three single line reefing points are provided with the first interchangeable with

the third by snatch blocks. Each reef takes in around 20% of the sail area. The

third reefing point meets AYF Cat1 1⁄2 luff storm sail requirements.

The standing rigging consists of forestay and side stays of 10mm 316-grade 1x19 dieform wire. The diamonds are 8mm 316 grade 1x19 wire. All are terminated with open body rigging screws.

All halyards, reefing lines and sheets lead through turning blocks and organizers to clutches, cleats and winches in the cockpit. The self tacking headsail on curved traveller track sheet and tack control is also in the cockpit.

The Jib may be controlled or put away with the headsail furler control in the cockpit. The headsail has Sunlight UV Protection in its fully furled position. The mainsail is also protected from Sunlight UV while zipped in the lazy jack and main sail catcher system.

Rig Tension

When your boat was first launched the mast was stepped and the rig set to the correct tension. During the first month or so of sailing the wire rigging will stretch a small amount. This is quite normal and any slack can be taken out by taking up the rig tension. After this initial “bedding down” period, the rigging wires should not change too much and examination on a six monthly basis should be sufficient.

The spreader diamonds control the mast pre-bend and ensure that it cannot bend sideways. The mast is initially set up with approximately 75mm of pre- bend, that is, the mast has a gentle bend along its length so that at the midpoint it is approximately 75mm from an imaginary straight line between each end of the mast. This is achieved by first tensioning the outer diamonds. With the correct pre-bend achieved, continue to adjust the spreader wires to get the mast straight in a sideways plane. Second, take up the inner diamonds equally until they are firm and sharing the load. For advanced tuning this pre- bend should match the cut of the mainsail.

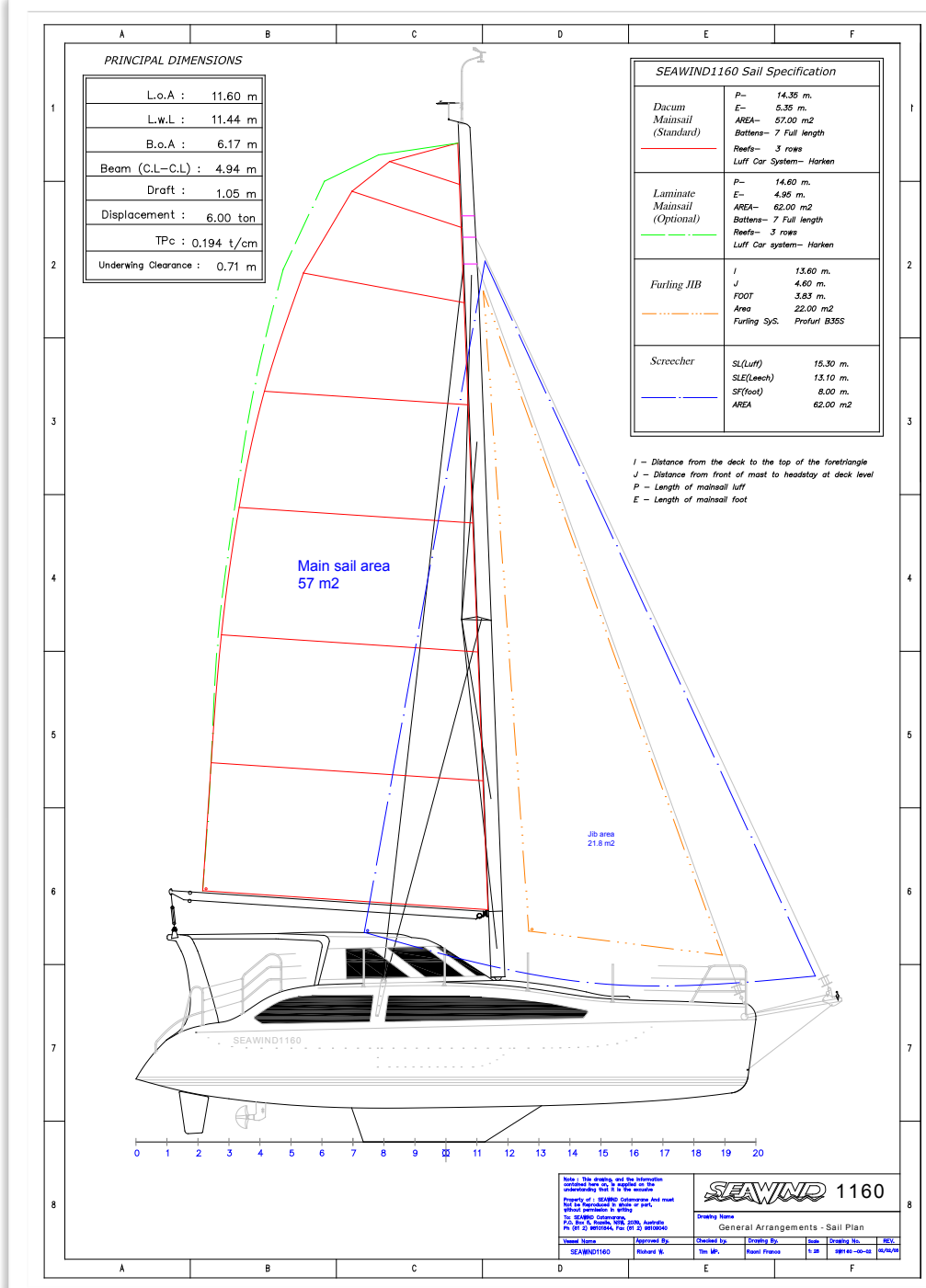
Having set pre-bend you now need to look at the stay tension. The forestay length has been determined to allow the top of mast to have an aft rake of approximately 15ins (400mm). This rake affects the overall balance of center of effort for the boat. Take up the outer side stays on both sides evenly, changing each side a few turns at a time. Do not over tension; take them up evenly until the stays feel firm.

Last, take up the lower stays evenly until they are firm against the pre-bend provided by the spreader diamonds. Their purpose is to contribute to holding the mast in column with the pre-

bend and stop it from “pumping”.

Now go sailing. The correct rig tension can be best checked at sea. In a reasonable sail to windward (say, in 15 knots or more), the lee stay will normally go slack but not flop around. This is acceptable. If it does “flop” around take up the slack with a few turns (count the number of turns). Tack and take up the same amount on the opposite side so as to balance the tension on each side. Once you have completed all the above steps, the rig should be well set up and should not need further adjusting. However, one last check is worthwhile. When sailing hard to windward (say, in 15 knots), go to the base of the mast & look up its length. It should be perfectly straight in its side ways plane all the way up to the jib halyard exit. Above this point, the mast is unsupported & it is normal that this top part will fall away to leeward. In a fore & aft plane, the mast will be bending slightly aft but not S bending or pumping.

Sail Plan


PRINCIPAL DIMENSIONS
L.o.A : 11.60 m
L.w.L : 11.44 m
B.o.A : 6.17 m
Beam (C.L–C.L) : 4.94 m
Draft : 1.05 m
Displacement : 6.00 ton
TPc : 0.194 t/cm
Underwing Clearance : 0.71 m
SEAWIND1160 Sail Specification
Dacum Mainsail (Standard)
P– 14.35 m.
E– 5.35 m.
AREA– 57.00 m2
Battens– 7 Full length
Reefs– 3 rows
Luff Car System– Harken
Laminate Mainsail (Optional)
P– 14.60 m.
E– 4.95 m.
AREA– 62.00 m2
Battens– 7 Full length
Reefs– 3 rows
Luff Car system– Harken
Furling JIB
I 13.60 m.
J 4.60 m.
FOOT 3.83 m.
Area 22.00 m2
Furling SyS. Profurl B35S
Screecher
SL(Luff) 15.30 m.
SLE(Leech) 13.10 m.
SF(foot) 8.00 m.
AREA 62.00 m2
I – Distance from the deck to the top of the foretriangle
J – Distance from front of mast to headstay at deck level
P – Length of mainsail luff
E – Length of mainsail foot
Main sail area
57 m2
Jib area
21.8 m2
SEAWIND1160
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
SEAWIND 1160
General Arrangements - Sail Plan