

Tuning the mast

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It is very dangerous (not to mention expensive) to have your mast collapse. The mast is relatively heavy, hard and can do considerable damage to anything it hits while falling. For this reason, it is important to inspect the standing rigging at least annually. Make sure that the shrouds and stays don't have any little broken wires or rust. Insure that all clevis pins are secured with either cotter pins or split rings. Never use kinked wires or bent turnbuckles. Replace immediately any shrouds or stays that show bent, broken, or cracked swaged fittings.

How long does rigging last? That depends on how often the boat is used; if the boat is raced, cruised or only day-sailed; how often the boat is trailered; if the boat is stored outside during freezing weather; and many other factors.

Sometimes standing rigging will last many years. Other times, a turnbuckle bolt will become bent the first time the mast is raised and will need to be replaced immediately for safety sake. At the very least though, the standing rigging needs to be completely inspected annually and any part of the rig that is not 100% needs to be immediately replaced before going out again.

Relative Tensions

Like everything that has to do with sailboats, compromise and judgement are important factors when you are tuning your rig. Some sailors don't want to "over-tension" the rig; others want to make sure that the rig is very tight; and there are lots of folks who fall somewhere in between these extremes. However, the relative tension between the shrouds and stays are as follows:

Forestay and Backstay have the greatest tension

Upper Shrouds have nearly as much tension as the forestay and backstay

Forward Lower Shrouds have less tension than uppers, but more tension than Aft Lower Shrouds

OK, let's get started with the mast raised and all of the shrouds and stays loosely adjusted -

Start At the Dock:

Step One – Forestay/Backstay

Rake or Not Rake Is The First Question – Raking the mast (tipping it forward of aft from vertical) will directly influence the feel of the helm. Generally, raking the mast aft increases weather helm while raking the mast forward reduces weather helm and can lead to lee helm. Most sailors like a little bit of weather helm for the "feel" this give while steering. Too much weather helm though makes steering the boat difficult and can quickly tire out the boat steerer.

Adjust the Forestay and Backstay – Start by using your main halyard's headboard shackle to make a plumb bob. Shackle the headboard shackle to a large wrench or crescent wrench. Set the halyard so that the headboard shackle/plumb-bob is at the level that the boom gooseneck will be while sailing. If you want the mast straight up and down, adjust the turnbuckles on the forestay and backstay until the plumb-bob is just touching the back of the mast. If you want the mast raked aft a couple inches, loosen the turnbuckle on the forestay and tighten the turnbuckle on the backstay until the plumb bob is the desired distance aft of the mast. Once the desired amount of mast rake has been set, tighten the turnbuckles on both forestay and backstay one turn at a time until the amount of tension you want is "dialed in". Remember that these two wires need to have the greatest tension; so, make sure that these two wires have considerable tension. I know that this is vague, but each rigger/skipper will have a different "feel" for this tension. Check other boats where you sail by pulling on their forestays. Racers will often have much more tension than daysailers.

Loos Gauge – There are shroud/stay tension adjustment gauges available that will give you a numerical method to adjust the wires. You can check with others to see if your tensions are greater or less than the wires you are comparing to.

Step Two – Upper Shrouds

The Kerf is the slot in the back of the mast. Your mainsail's bolt rope or slugs fit into the kerf so that the mainsail's luff is fully supported by the mast. By looking up the kerf you can see if the mast is bending – either bowing or bending in an "S" - curve.

Adjust the Upper Shrouds to insure that the mast is straight up with respect to tipping either to port or starboard (left or right). The easy way to do this is to tape a steel tape measure to your main halyard's headboard shackle. Hoist the halyard and extend the tape measure aloft. You can now measure the distance from the masthead to the toe-rail outside the upper shroud chainplate with the tape measure. Adjust the turnbuckles so that you get the same measurement to both sides of the boat.

Now tension both turnbuckles so that you end up with the mast straight up and nearly as much tension on the upper shrouds as you have on the forestay/backstay. Turn the turnbuckle barrels either one or ½ turn at a time until you get the tension you want.

Step Three – Forward Lowers

Two Considerations that you have now are Is The Kerf Bent and Do You Want To Pre-Bend The Mast.

Look up the Kerf to determine if the mast is bent, bowed or in an "S"-curve. Usually, there will be a bow, if anything. If you see one, increase the tension on one of the forward lower shrouds until the bow has been straightened out. Tension the opposite side now to balance the previously tensioned forward lower

shroud. At this point, the mast should be raked the amount that you want and exactly straight up and down with relation to a starboard/port lean.

The reason that you might want to have "pre-bend" in the mast has to do with the amount of draft your mainsail has. Another way to look at this is – If your sails are old and "full" as opposed to newer and relatively "flat", you might want to pre-bend the mast forward in the middle so that some of the fullness is pulled out for better upwind pointing.

If you decide to Pre-Bend the mast all you have to do is increase the tension on both forward lower shroud turnbuckles until two or three inches of bend is pulled into the middle of the mast. When you are done with this, your mast will be bowed forward in the middle and when you hoist your mainsail, it will be flatter than before and you'll notice that you can sail higher on the wind than before. Make sure that you sight up the mast as you pre-bend it to make sure that you aren't getting an "S" or a bow left-right.

Step Four – Aft Lowers

The Aft Lowers balance the forward lowers, fine-tune the rig, and give additional support to the mast. All you need to do with the aft lowers is tighten the turnbuckles about one turn past "finger-tight". Sight up the kerf to make sure that the mast is still straight.

With these steps complete at the dock, it's time to set sail and make your final adjustments. Go Sailing -

Step Five – Fine Tuning

Fine tuning the Rig is fairly easy. On a day with moderate breezes in the 8 to 12 knot range sail the boat on a series of upwind tacks. What you are looking for is a couple of things:

That there isn't too much slack in the leeward (downwind) shrouds

That the jib luff doesn't sag more than a few inches in the puffs

That the kerf stays straight on both starboard and port tacks.

Adjust the shroud turnbuckles to fine tune the standing rigging. Remember that it's OK to have a little bit of slack in the leeward shrouds.

Step Six – Securing the Turnbuckles

When you get back to the dock, it's time to Recheck the Tensions and the Alignment of the mast. First, check that the relationship in tensions between the forestay/backstay and upper shrouds is still about the same. The forestay/backstay should still be slightly tighter than the uppers. Next, secure your tape measure to your main halyard again and hoist the tape aloft so that you can measure the distance from masthead to toe-rails again. The measurement should be the same to both starboard and port toe-rails. Sight up the kerf again and make sure that the kerf forms a straight line. Make the appropriate adjustments to the turnbuckles.

When everything is set, you will want to Secure the Turnbuckles so that they won't back themselves off and loosen the rigging. With closed barrel style turnbuckles, there is a locking nut on both bolts. Turn these nuts down to the barrel and use a small wrench to secure the nuts against the barrel tightly. With open style turnbuckles; use cotter pins, split rings, or seizing wire through the little holes in the bolt ends that you can see in the openings of the barrel. The cotter pins, split rings, or seizing wire will prevent the bolts from turning just like the locking nuts on the closed barrel style.

Later

Step Seven – Check the System

Over time, there is every chance that your rig will loosen somewhat. This may be due to sailing in strong winds, or to changes in temperature, or combinations of other factors. At any rate, you will want to periodically check your standing rigging from time to time (at least annually) for tension and condition. Make your checks of the system both while at the dock and while sailing.

As your sails age and get fuller, you may want to pre-bend the mast (or pre-bend it more than you already have). This will help your upwind pointing ability and will decrease the amount of heel your boat develops in stronger breezes (you won't have to reef as soon).

As your sails age, you may feel as if your boat is developing more weather helm. If you've raked your mast aft, it may be time to adjust the rake forward so that the mast is straight up instead of raked.

The combination of pre-band and mast rake can change the weather helm feel of the boat; the boat's pointing ability, and the boat's speed and efficiency through the water. So, don't forget to check the standing rig from time to time.