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THE MAST BASE ANGLE

By Stuart Walker

The rig is stabilized and windward performance greatly improved when the bottom of the mast is kept flat on the deck - so as to prevent the jibstay from pumping, jumping or quivering as the boat moves beneath it. Many sailors now believe that the rig should be adjusted primarily to control this problem and that all other adjustment should be modified accordingly. Controlling rig motion is very important in heavy air and in waves, but seems (surprisingly) to be equally important in light air and smooth water.

Keeping the mast base flat on the deck plate also increases the independence of jibstay and mast bend The jibstay can be tensioned or loosened without altering mast bend (very much) and mast bend can be altered without altering jibstay tension (very much). This permits the jibstay to be loosened and sagged (slightly) in light air while the desired mast bend is maintained and the jibstay to be tensioned in heavy air without increasing the mast bend (very much).

The first step is to cut the bottom of the mast to the angle of rake so that at the desired jibstay length the mast rests absolutely flat on its deck plate. (The appropriate angle may be achieved by cutting at an angle from the bottom of the mast's forward edge to approximately one cm above a perpendicular at the after edge and then filing to get the exact angle desired.) The correct effect is best achieved by filing the bottom of the mast into a slight hollow fore-and-aft so that the forward and after edges of the mast base bear the load (rather than attempting to make the surface absolutely flat). Of course, the stainless steel collar that reinforces the base angle must be cut or displaced and refastened to align with the new base.

Once the desired base angle is created the intent is to keep the angled mast base flat while sailing - constantly - despite the motion of the boat and despite the necessary modifications of the rig. Until the necessary rig adjustments are determined a knife blade can be carried by the forward crew and periodically inserted beneath the forward edge of the mast to demonstrate whether the mast is lifting from the deck plate.

I most frequently sail in moderate air (6-10 knots) so my presumption is that the mast base should be cut for the rake I think is optimal in these conditions. This means that in stronger winds rig adjustments will be required to prevent the forward edge of the mast base from lifting. The effects of each rig adjustment must be understood and those that adversely affect the proximation of the mast base and the deck plate countered.

1. In very Eight air the jibstay can be loosened beneficially (up to one cm) without the forward edge of the mast fitting from the deck plate. It is important to reverse this procedure and tension the jibstay as the wind increases. At a true wind strength of about eight knots as the jibstay begins to sag excessively, it can and should be tensioned directly (without altering mast bend significantly). Between 0 and 10-12 knots when sailing to windward in smooth water the only adjustment (affecting the jibstay) that is ordinarily required is of the jibstay tension itself. The upper shrouds are full forward, the lowers loose, no yang is required, and the backstay is set for optimal mast bend.

2. At about 10-12 knots, when maximum power through maximally full sails is sought, the upper shroud cars should be brought after (to diminish the progressive sagging of the jibstay and keep the main full) - but not beyond the midline of the mast. However, as the upper shroud cars are brought aft, the front edge of the mast base begins to lift from the deck plate and the mast becomes free to pump. To counteract this lifting the jibstay must be tensioned additionally (check with the knife to determine how much). Between 10-14 knots increased jibstay tension (without altering the backstay) is usually sufficient to achieve the following:

- To keep the helm balanced while maximum power is produced by the full sails (the main traveller car should be to windward of the midline and the mainsheet should be tensioned to keep the upper leech telltales stalled 90% of the time)

- To keep the mast flat on the base plate

- To produce little or no additional mast bend and keep the mainsail full and powerful

- To restore the jibstay to the appropriate sag

3. When heeling becomes a problem that cannot be counteracted by full hiking (at 14-16 knots depending on crew weight), four additional adjustments are required:

- Tensioning the yang: flattens the lower main (reducing heeling force) and forces the forward edge of the mast base downward (counteracting the lifting effect of shifting the upper shroud cars aft)

- Tensioning the backstay: tightens the jibstay, flattens the upper main, and opens the main leech

- Dropping the main traveller car to the midline and easing the mainsheet (if necessary): opens the main, ensures that the upper leech telltales cease to stall, and reduces the heeling force.

- Tightening the lowers: eliminates lateral mast sag and flattens the main.

4. In strong winds (above 16-18 knots) jibstay sag and mast pumping become major detriments and the main must be flattened and opened to “keep the boat on its feet” and to increase drive forward while reducing heeling force. The upper shroud cars should be brought aft of the midline of the mast and the lower shroud cars should be brought aft with them to maximally tension and stabilize the jibstay and to eliminate the lateral sag of the mast. However, bringing the shroud cars aft lifts the forward edge of the mast base from the deck plate again and requires that the jibstay and the yang be tensioned additionally. Bringing the upper shroud cars aft also diminishes mast bend so that backstay must be tensioned additionally. These adjustments achieve the following:

- Keep the jibstay at a minimal degree of sag

- Keep the mast base flat on the deck plate

- Flatten both the upper and lower main and open its leech

If the amount of yang or jibstay tension required to keep the mast base flat on the deck in strong winds is excessive (the lower main too flat, the rake too much reduced, etc.), it may be necessary to alter the mast base angle directly. Some competitors are using screw-adjusted base plates; some shims that are inserted beneath the after edge of the mast base; some even more complicated gadgets. Dave Curtis says that the mast (and jibstay) should never be allowed to pump - and if ever this principle is important, it is in strong winds.