

The Need for Speed

by
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GO-FAST?

We all try to make our boats go as fast as possible. A fast boat pointed in the proper direction is clearly the ultimate goal. Things really get sweet when you are fast, then begin the race with a good start. Wow! It doesn't get any better than that. Well, maybe having to drop first place finishes for throw outs.....

Some skippers will do or try almost anything (even bumping into the rules) to get their boats to be the fastest one on the lake. The need for speed is apparent every race day, yet what are the practical attainable go fast techniques compared to the ones that really don't matter?

700 Horsepower

When I had my Corvette, GM, or the dealer, must have sold my name to the after market parts people, because before I had 500 miles on it, I received all kinds of catalogs. I could buy mufflers that would add 50 hp, a new computer chip to add 35 hp, airfoil for the air box adding 12 hp, a polished plenum and on and on. Just for fun, I added up all available options and found that if they were all installed, I would have a car with well over 700 hp! Add a bigger spoiler and look out Indy cars! Yeah, right! Clearly, the parts people never heard of, or ignored, the Law of Diminishing Returns.

Much the same is going on with our boats. For many, the focus is too devoted to the diminishing returns of parts and hardware. It is all about making sure you have the lightest hull, heaviest legal keel, minimum legal weight, smoothest bottom, largest legal sails, etc. and etc. I have heard many times: "those little things really add up." My question is do they? Sure, your boat needs to be well built, free from hang ups and appropriately finished, but what else? I say given a reasonable threshold, what really matters most, to satisfy the need for speed, is primarily sails and sail trim. Proof? How many times have you seen a frustrated skipper, typically finishing last, blame his boat or some aspect of it. Then, one of the "Fast Guys," sometimes to show off, takes the "cursed" boat, quickly checks for appropriate rig tune and mast rake, adjusts the sails, then proceeds to win the next couple of races. Did he polish the bottom, change keels, the radio or mess with the weight? Well, no..... And, as the *Tiller Monkey* said "smart sailors will beat smart builders every time."

Trim Considerations

Much has been written about sail trim, a lot of it repetitive, but it is rare to see any discussion on the often misunderstood and over-looked trim tool called the "Speed Bubble". No, it has nothing to do with water, but everything to do with improving the efficiency of the sails. It is the judicious use of what many call backwinding of the main. Like setting twist, or foot tension, over doing it is as bad as not enough. In light air, the "Speed Bubble" may not be

visible, or only occasionally visible, but knowing where it is, relative to trim, is important. In heavy air, carrying a well developed speed bubble will make a significant impact on reducing helm, heel angle and can effectively extend the upper range of the sails. So, why the name “Speed Bubble”? Well for one, it is a widely used hold over term and technique from big boat racing. More, backwinding has a negative connotation because it is typically overdone and the effect misunderstood. Setting the “Speed Bubble” is much more subtle and results in more efficient sails, plus a mainsail with a more high speed shape.

OK, sounds interesting, but how do I trim for a “Speed Bubble?” In light air, the main is set just deep enough so that very slight backwinding can be detected just aft of the luff on the lower third of the mainsail. See Photo #1. The ideal light air “Speed Bubble” should only be visible on the high side of the steering groove and barely or not quite visible on the low side of the steering groove. To obtain the deeper main, obviously the outhaul must be eased, perhaps more than you would normally think. Depending on the boat, (Victorias are all pictured here), and type of sails, a more subtle, but dramatically effective technique is setting slight negative mast bend (center of mast bends aft) which can really power up the main. See Photo #2. Whoa! I have heard of mast bend, but not in that direction – How do I do that? First, the boat must be equipped with lower shrouds that are attached to the shroud rack, or deck eyes, in a position that is aft of the center-line of the mast. Next, the backstay is eased so that there is no tension on it. Then, the lowers are equally tensioned to induce negative bend. About one to one and a half mast diameters is a good place to start. Finally, the backstay is tensioned to return the mast to it's normal straight shape, but now you have the ability to ease the backstay a bit and induce negative bend. Plus, a side benefit is that your nominal forestay tension will be increased, since forestay tension equals the vector sum of backstay tension and lower shroud tension. Before we move to heavy air trim, keep in mind, a sail with deep draft has to be trimmed closer to the center-line of the boat than a less deep sail to maintain the same entry angle. Also, as the wind builds, any negative bend would first be removed, perhaps even adding positive bend, and then outhaul tension would be increased as appropriate to further reduce draft.

In high medium to heavy air, establishing a “Speed Bubble” is much more straight forward as it is always visible. Basically, the position and angle of the jib boom stays constant while the main boom is eased out. This is done after the main has been appropriately depowered by mast bend and increasing outhaul tension. See Photos #3 & 4. The main boom angle (sheet length) is the course adjustment, while vang tension is used to fine tune the bubble. Some call this “sailing by the leech”, but basically, a balance has to be reached between the boom angle and leech tension. If the leech is flogging more than occasionally, the vang must be tensioned. Alternatively, on mainsails cut particularly flat, mast bend may have to be reduced, or limited, to allow the vang to adequately tension the leech. The goal is to have a stable leech so that the size of the bubble can be controlled to help manage helm and heel angle.

Why this Works

If you remember or refer back to Issue #166, the article “Its not the Slot”, minimizing air flow, or leakage, between the main and jib increases up-wash around the jib and speeds the lee airflow of the main, which improves the efficiency of both sails. The trade off of a small, or

occasionally visible Speed Bubble, in light air, that only minimally disrupts the main's circulation flow is significantly increased up-wash. More up-wash increases the lift the jib can generate and adds to the speed of the air flow on the lee side of the main, also increasing the lift from the deep set sail. Further, the "Speed Bubble" moved the lower main's effective draft position aft, creating a faster shape. In essence, we have created a higher speed gear than we would have had without the influence of the "Speed Bubble". As with any high gear, reasonable speed must be attained before shifting to it. This means that as the boat begins to move, the sails need to be gradually sheeted to their full in position; either manually, or with a programmable mix switch, or both.

In heavy air, the purpose of the "Speed Bubble" is to intentionally disrupt the main's circulation flow, negating some of the main's effective area. Carrying a well developed "Speed Bubble" will make a significant impact on reducing helm, heel angle and effectively extending the upper range of the sails. This is done upwind, while preserving the boat's entire sail area for downwind runs when the apparent wind is less and those inevitable lulls occur. The reduced effective sail area does move the center of effort aft, but trades that for an also significantly lowered center of effort of the main. As in light air, but much more dramatic, the entire main's effective draft position moves aft, providing a higher speed shape to match the high winds. The increased up-wash from both reduced slot leakage and increased heel angle significantly helps to power up the jib, further reducing helm.

Need speed? Focus on sail trim and add the "Speed Bubble" to your trim techniques. Oh, and remember to point that "speed" boat in the correct direction.



Photo #1 by Susan Allen

Note the very slightly visible “bubble,” evidenced by the minor distortion shown by the draft stripes in the mid to lower portion of the main by the luff. This is consistent with the light air conditions. Both sails are set full and tightly sheeted, but only after the boat was moving well.



Photo #2 by Jay Niggli

Very powerful light air trim attained by the almost too aggressive use of negative bend. Note that the “Speed Bubble” is well formed and located well up the luff.



Photos #3 & 4 by Susan Pissuto

Very fast upper mid-range trim. The main boom is well off the center-line, moderate mast bend is depowering the mid and upper main. Vang tension controls the leech and size of the "Speed Bubble". Good job Hew! (Hew Hamilton won this regatta)



Very fast heavy air trim with dramatically depowered main. The leech is under control. Only the forward edge of the reflection on the sail aft is the effective mainsail area. Note too that the helm is also well under control, evidenced by almost no rudder offset.