Snipe Sailing 101: Less Rudder = More Speed

By Merrill Varn

The rudder is your Snipe's steering wheel – but it's also a brake. Every time you move the tiller, you create drag with the rudder. Learning to sail by using as little rudder as possible will optimize your forward speed. This article tells you how and why.

The fundamentals of moving a Snipe forward are simple: the mast transfers energy from the sail to the hull and moves the boat forward. In practice, maximizing forward motion is a delicate act of balancing the aerodynamic force on the sails and hull (above the waterline) with the resistance and hydrodynamic lift generated by the centerboard, rudder, and hull (below the waterline). Depending on the point of sail, the wind tends to move the boat varying amounts forward and leeward. Some of this leeway translates to headway because of the lift generated by the centerboard, rudder and hull - but much of the energy is lost in the wake. Constant attention to sail trim, heel, and wetted surface goes a long way toward maximizing headway.

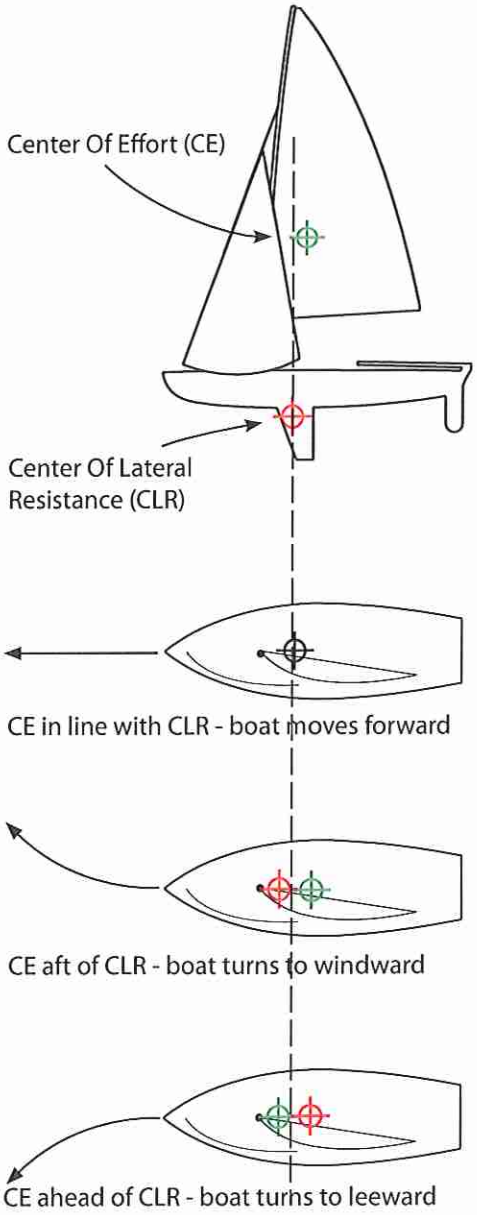
Another tactic is to minimize resistance from the rudder. Every swirl of water off the rudder represents more energy lost to the wake… more energy that could have gone into headway. Sheet tension on both sails, moving crew weight in/out and forward and aft, and moving the centerboard up and down helps steer the boat and minimize use of the rudder. This is especially critical in a Snipe, since the transom is slanted and thus the rudder does not move in a vertical plane when rotated. If you can learn to sail with little to no pressure on the tiller, you will be maximizing the power of the sails as well as the lift off the hull appendages.

Before getting into steering strategies, a couple of definitions are in order. The center of lateral resistance (CLR) is the point on the underwater portion of the hull at which lateral pressure moves the boat exactly sideways.It is located between the forward third of the centerboard and the mast on most boats. A force either forward or aft of the CLR will pivot the boat around the CLR. The force on the sails generated by the wind is focused at a point called the center of effort (CE). The exact location is determined by sail trim and mast rake. For our purpose, picture a point about one third of the way from luff to leech of the main as the "normal" position. It is the relative locations of the CLR and CE that determine whether a boat will go straight ahead (CE directly above CLR), head up (CE aft of CLR), or head down (CE forward of CLR) (see illustration at right).

With those definitions in mind, you can more easily understand the strategies to move CLR and CE fore and aft.

Sail trim. Sail trim determines the position of the boat's CE, and the relative positions of CE and CLR determine direction. If you reduce the load on the main by easing the sheet or increase the load on the jib by trimming the sheet, the CE moves forward. If the CE is forward of the CLR, the boat's stern will pivot toward the wind and the bow will head down. If you trim the main or ease the jib the CE moves aft; if the CE moves aft of the CLR then the boat's stern will pivot away from the wind and the bow will head up.

Crew weight and boat trim. Moving crew weight forward and aft changes the position of the boat's CLR. Weight forward puts more of the forward portion of the hull in the water and moves the CLR forward; weight aft moves more of the forward hull out of the water and the CLR aft. If the forward weight shift is adequate to get the CLR forward of the CE, then the boat will head up. Likewise, if skipper and crew can move aft enough so that the CLR is aft of the CE, then the boat will head down. Using forward/aft weight to steer the boat is often not possible if wave conditions override steering opportunities.



Weight can also be used to steer the boat by means other than the relative position of CE and CLR. Exposing different footprints of the hull to the water result in direction changes. A symmetrical footprint (i.e., no heel) will allow for equal water pressure on both sides of the hull as the boat moves forward, and will not produce any change in direction; that's the reason to keep the boat flat. A boat heeled to leeward will expose more of the curved forward surface to the water, resulting in more pressure on the leeward bow; the bow will be pushed to windward

(head up). Similarly, a boat heeled to windward will head down (see illustration at right).

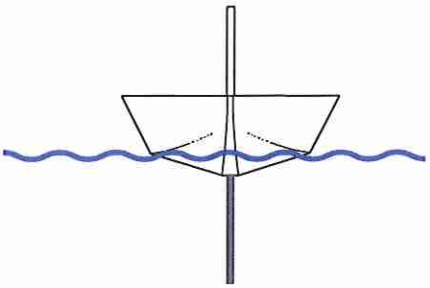
Small dinghies such as Snipes can literally be jerked in one direction or another by definitive weight shifts by the crew. For example, if skipper and crew simultaneously torque forward, the boat will be forced to pivot around the centerboard and head down. A simultaneous torque aft will cause the boat to head up.

Centerboard. Because the front of the Snipe centerboard is slanted aft, raising the centerboard moves the CLR aft. Again, relative position of CE and CLR determine the direction the boat will head. If CE is held constant, then raising the centerboard moves the CLR aft and makes the boat head down; lowering the centerboard moves the CLR forward and makes the boat head up.

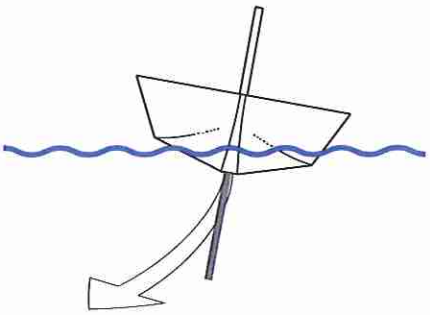
Next… get out on the water and be sure all this makes sense and really works like "they" say it does. A simple drill is to sail upwind toward a mark which is a half boat length to leeward. As you approach the mark, ease the main a little, heel the boat slightly to windward and sail to the mark. The boat should head down with minimal tiller movement. As the boat comes athwart ship of the mark, trim the main, ease the jib a touch, and heel the boat slightly to leeward. The boat should head up with minimal tiller movement. Repeat this drill 5-10 times on each tack. Then do a similar drill going downwind and on a reach.

Now that you have a better feel for the boat and the interactions of trim, heel, and rig control, let's reapply your newly found skills to reducing weather helm on the upwind leg.

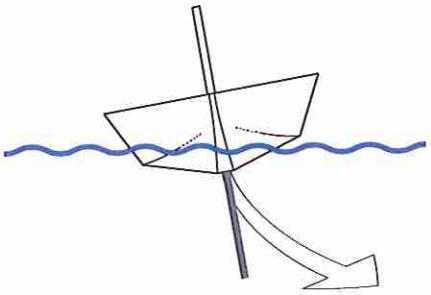
We will also introduce the use of several control lines to adjust CE. As we said before, you should strive to sail with almost no pressure on the tiller, in other words no weather or lee helm. In reality a little weather helm is desireable because it is easier to feel pressure changes on the rudder, and because the centerboard and rudder can produce a lift generating hydrofoil similar to the airfoil produced by the sails. However, remember that excessive weather helm slows the boat.



No heel - equal water pressure on both sides of hull, boat goes straight..



Leeward heel - more water resistance on leeward side of hull, boat turns to windward.



Windward heel - more water resistance on windward side of hull, boat turns to leeward.

Excessive weather helm means that the CE is too far aft of the CLR (the boat is tending to head up too much). To reduce weather helm you must either move the CE forward or move the CLR aft. In addition to crew weight, sail trim, and centerboard position, control lines can help with positioning CE. As the breeze builds, rig tension increases and the sail plan moves aft. This means that the CE moves aft - and as soon as it is aft of the CLR, the boat begins to head up and you counteract by pulling the helm to windward to keep the boat on course. This constant pressure is weather helm. You might even try easing the main slightly to counteract the weather helm. Easing the main will counteract weather helm for the same reason it will help steer, but it is also slow. There are a number of control lines that you should try first. To counteract weather helm, the cunninghams and outhaul can be tightened to flatten the sail and move the CE forward to its ideal location 1/3 of the way from luff to leech. Jib leads provide an additional CE adjustment for forward sails.

The vang can also help maintain balance, but be careful. The vang should be just tight enough to keep the leech taut but curved. With the vang too tight, the CE will move too far aft. With the vang too loose, the skipper will tend to ease the main too much and most of the power will be coming from the jib, thus moving the CE forward. If CE is actually forward of the CLR, the boat will head down and the skipper will be constantly pushing the helm to leeward to keep the boat on the wind. Lee helm can also happen in very heavy air when the skipper is vang sheeting and eases the main but the crew cannot simultaneously ease the jib in big puffs. Again, you must move the CE aft or the CLR forward (get the boat to head up) by easing the vang. Another alternative that may still allow you to vang sheet is to trim the traveler.

And now it's time to hit the water again. Try sailing upwind with the sails trimmed in. Find the angle of heel that results in being able to sail while not touching (or barely touching) the tiller. Do the same downwind with the pole up. When the boat is in perfect balance and trim, it will track with minimal helm. Now if you can find a buddy, sail parallel with all the control lines set exactly the same (be sure to take turns being leeward and windward boat). Next adjust one control line and try the drill again. Record which adjustment was faster. Then try a different line, then another, then a combination of control lines. You get the picture…practice, practice, practice. Get out and go sailing. As you get a feel for the interactions of sail trim, heel, and rig control, you'll do nothing but get faster.