

Sunfish® Tuning Guide for Racers

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THE SUNFISH celebrated its 30th birthday in 1991 as one of the most popular one-design boats of all time. While the Sunfish has undergone many changes since its origin as an off-the-beach boat, its evolution over the past five years has been particularly astounding. The introduction of the racing sail, the hiking strap, the modernized deck layout, the aluminum tiller extension, and the cunningham system represent just some of the recent developments. These innovations have helped to make the Sunfish a more competitive, and truer, one-design class.

In the spring of 1991, Sunfish/Laser, Inc. purchased the Sunfish from Pearson yachts, and quickly moved to implement several positive changes to the boat. While the Sunfish is still enjoyed "out of the box" by thousands of sailors around the world, today's racers must make several modifications to the hull, foils, sail, and spars in order to pick up some silver. To be sure, the rules governing the allowable changes are strict, resulting in fairer and more enjoyable racing for all Sunfish sailors. Know what "tinkering" is permitted, however is essential for all racers who want to end up in the winner's circle whether they race a new or used boat.

I. HULL PREPARATION

Of primary importance is the maintenance of a light, stiff, scratch-free hull. Extensive sanding or waxing of a new boat is not necessary. Simply ensure that the hull is clean and free of gelcoat bubbles. Today, boats coming off the factory floor average around 126 pounds. If you are purchasing an used boat, try to get one in the 126- to 130-pound range. A boat as heavy as 135 pounds is OK provided that the hull is fairly stiff. If your current boat weighs between 135 and 145 pounds, rest easy. Hundreds of Sunfish regattas, including the midwinter and North American championships, have been won in 15-year-old "clunkers." Good boathandling and sound tactics can easily make up for 20 pounds of extra hull weight.

Whether your boat is brand new or a 1964 vintage, there are several things you can do to enhance its overall performance. First, add an inspection port at the first sign of leaking and find the source. Foam blocks in the hull soak up water and are the primary cause of a boat's weight gain. A five-inch port installed to the side of the daggerboard trunk gives easy access to the most likely point of leakage — the trunk itself. If you are unable to completely stop the flow of water, bring a sponge on the water with you and dry your boat between races. This will guarantee a light boat not only for the next race, but for the seasons to come.

If your boat does not already have a hiking strap, consider installing one for more effective hiking in medium and heavy air. Use your inspection port to through-bolt two eye straps, approximately three inches apart, at the desired height on the front side of the cockpit. For the aft end of the strap, through-bolt two more eye-straps on the lip of the cubby hole, with the ends of the bolts going through the lip and into the cubby hole,

not the hull itself. Finally, tie off your strap using line and shock cord for proper height and tension. This system spreads the load out over eight bolts, and stays very secure even for sailors over 180 pounds.

More damage is done to a Sunfish hull while being transported to a regatta than on the water, even in heavy air. Trailering your boat upside down will add years to its competitive life. I've seen too many people polish the bottom of their boats only to toss them on a trailer right side up and bounce the boat's stiffness right out.

Two operations should be performed to the daggerboard trunk to ensure a scratch- and vibration-free board. First, sand the sides of the trunk, both top and bottom, until any sharp ridge is eliminated. Secondly, add 13-inch by 1-inch carpet or other protective strips to the fore and aft walls of the trunk. Silicone glue or contact cement works well in applying the strips. Before installing the strips, insert your board into the trunk and determine the amount of extra space. Use enough glue to eliminate this play.

Check current rules regarding the bridle.

Replace the standard wire bridle traveler with a 30-inch piece of pre-stretch line, the minimum length allowed by the rules. Some sailors like to tie off-set knots in the traveler to account for the different sail shape and angle of attack on starboard versus port. I have found letting the mainsheet run the full length of the traveler to be effective in all conditions. Finally, mount a ratchet block either on the deck or the lip of the cockpit. I sail without cleats which encourages continuous playing of the mainsheet. If your arms get tired in heavy air, you may want to install Clamcleats on the side of the deck for occasional use.

II. BLADES

The tiller extension, which can be any length, should just skim the ratchet base so that the extension rests comfortably in your lap while you hike and still clears the mainsheet during tacks (37 to 38 inches). Use a rubber universal for maximum mobility and minimum play in the tiller. Concerning the daggerboard, add a handle to the top for easy raising and lowering at marks. A seven-foot piece of 1/4 inch shock cord acts as both a daggerboard retainer and a "JC strap" that holds the sail out in light air downwind. Feed the shock cord through the handle of the daggerboard, around the tack and back to itself, going around the mast and the halyard. In terms of tension, you want the cord tight enough so that the board stays up and the sail out in light air, but not so tight that you have trouble sheeting the sail properly. The seven feet gives you a little extra cord with which to fine-tune the tension.

Omission about "new" daggerboard

III. SAIL AND SPARS

The introduction of the North racing sail in 1988 has had several favorable effects on Sunfish racing throughout the world.

The primary impact has been to minimize speed differences between the boats, as seen in the past due to considerable variations in sail shape. The consistent shape and quality from one sail to the next has made for close and fairer racing. Long gone are the days of having to decide which of your four sails you would put on the spars. Now each racer sails with confidence that his or her sail is as fast as any in the fleet. With this in mind, the following suggestions are intended to help every racer get the most out of the racing sail through optimal set-up, tuning, and trimming.

A small number of the sail clips should be replaced with 1/8-inch line to facilitate optimal sail shape. Line should be placed at the head of the sail and the last three grommets on the boom, including the clew. Having line here allows you to get rid of the wrinkles that emanate from the back quarter of the sail. The clips immediately above and below the halyard attachment to the gaff (sprit) should also be replaced with line. Clips tend to bind the sail when it hits the mast on port tack. In addition, substitute the S hook at the tack with a piece of line to ensure the tack remains close to the apex of the spars (the hook often bends, causing the tack to fall out). Finally, make two loops out of duct tape or other flexible material through which your mainsheet is fed, and attach them to the boom. This will keep the mainsheet from hooking on your life jacket during tacks and jibes.

The three most popular types of wind indicators are telltales attached directly to the sail, streamers coming off of wire attached to the gaff spar, and the masthead fly. I like to place two sets of two back-to-back telltales on my sail. I place the first set at the top of the third (middle) panel, approximately 30" from the gaff. The second set of two should be attached to the sail at the bottom of the second panel (the panel with the class insignia), approximately 26" from the gaff. This positioning is far enough back on the sail as to avoid inaccurate readings caused by disturbed air flow from the mast. Recording tape flows well, even in light air, and will dry quickly if the sail gets wet due to rainfall or capsizing. Gaff-mounted indicators, which can be purchased pre-made or constructed out of yarn and a wire hanger, avoid the potential problem of inaccurate readings. These should be mounted at sight level, approximately two to three feet from the apex of the spars. The masthead fly is attached to the top of the gaff, and gives good readings on the downwind leg. It is usually the sailor who knows how to effectively read his or her masthead fly who sails the dead downwind leg on the correct jibe.

IV. HALYARD POSITION

The halyard should be pre-stretch or some other low-stretch line, about 24 feet in length and 1/4-inch in width. By employing a purchase system, you can keep the gaff spar snug against the mast for the entire day. You should have four halyard heights pre-marked with tape on the gaff: light air, medium air, heavy air, and Jens position. (See sidebar for explanation of the Jens Hookanson rig.) Tie the halyard using a clove-hitch just below the given piece of tape for the race's wind condition.

The light-air position, for example allows for maximum power in the sail. Even in light air, however, use a small amount of vang to maintain leech tension downwind. After "vanging-down," your gooseneck will end up in the same height (two to

three inches above the deck), regardless of the wind velocity. Placing the halyard lower on the gaff allows you to vang down harder and still have the gooseneck three inches above the deck.

V. HALYARD POSITION (INSET)

Wind	Halyard Pos.	Gooseneck*	Vang Tension
Light air	10th Clip	3"	Light
Medium air	1-2" Down	4-5"	Medium
Heavy air	2-3" Down	5-8"	Hard
Jens Rig	10-12" Down	5-8"	Hard

*Gooseneck height above deck, before vang tension is applied.

VI. OUTHAUL SYSTEMS

The larger, more powerful North racing sail has placed a premium on effective depowering of the rig. As a result of a rule change in 1988, new outhaul and cunningham systems allow the skipper to alter easily and quickly the shape of the sail while continuing to focus on the race. Install two cleats on the port side of the boom, far enough forward so that the tails of the lines will not get caught in the mainsheet block, yet still be within reach. Make certain to center the cleats between two clips so that there will be no interference as the clips slide fore and aft with adjusting of the outhaul and cunningham.

To set up the cunningham, dead-end the line with an eight knot through the first grommet above the tack. Feed the line straight through the eye on the forward end of the boom, and tie a loop near the cleat. Pass the tail from back to front through the cleat, through the loop, and back to the cleat. Tie a loop for a handle. The head of the sail should be tied off at the "max-looseness" position, the loosest you would ever want the luff tension.

For the outhaul, attach the line to the clew, pass it through the end of the boom, and then forward through the cleat and tie a loop. Bring the tail of this same line forward around the gooseneck and then aft, and tie another loop in this section of the line. Then take the tail aft through the first loop near the cleat, and forward again to the second loop. As with the cunningham, make a loop handle for easier adjustments (see diagram). Finally, use two different color, 5/32-inch or 3/16-inch lines so that the two adjustments are easily distinguishable.

For sail tuning, ease both the outhaul and the cunningham at the weather mark for increased downwind power and speed. Having the cleats on the port side serves two purposes. First, it forces the sailor to "pop" the outhaul and cunningham on his or her final port approach to the windward mark, rather than while rounding on starboard with the focus should be on making the transition to downwind. Secondly, the port-side cleats make for convenient re-tightening upon rounding the leeward mark.

The outhaul tension primarily affects the fullness of the bottom third of the sail, while the cunningham alters the draft of the sail fore and aft. In light air and flat water, the outhaul should be fairly tight, with minimal scallops along the foot. The cunningham should be set just loose enough so that the sail takes on a smooth shape on port tack. A luff that is too tight will cause a large hard spot on the luff of the sail, leading to disturbed air flow. As the wind picks up and the waves get bigger, loosen both the outhaul and cunningham for additional power to get

through the chop. There should be visible scallops along both the foot and the luff of the sail. As the wind increases and the boat becomes overpowered, begin to tighten both controls. In very heavy air, the outhaul should stretch to within an inch of the end of the boom. The cunningham tension should be set so that the luff of the sail is very tight and free of scallops.

VII. GOOSENECK

Today the gooseneck is recognized as one of the most important variables for optimizing upwind speed and pointing in all wind conditions. The gooseneck should be moved fore and aft as the wind changes velocity in order to neutralize the helm and place the center of effort of the sail over the daggerboard. With a permanent black pen, mark a range from 17 to 23 inches at one-inch intervals along the boom, measuring from the apex of the spars. These lines represent your seven-inch range within which you will set your gooseneck.

These numbers are approximate only, and will vary with individual weight and sailing style. In general, the lighter the wind and the flatter the water, the farther forward the gooseneck. Having the gooseneck at 17 inches in these conditions will help pointing. As the wind picks up and the waves increase in size, move the gooseneck back. A pair of wrenches or pliers and a couple of turns are all you need to loosen the bolt which keeps the gooseneck in place. For those who want to minimize the tools you bring on the water and thus the weight in the boat, invest in an "adjustable" gooseneck fitting. These are on the market and advertised in the class newsletter, the *Windward Leg*.

If the wind increases to the point where you install a Jens rig, you should move the gooseneck forward a couple of inches from your heavy air, non-Jens position. The Jens itself helps to neutralize the helm, so you need the gooseneck forward to help your pointing. Ultimately, you want to use the feel of the helm as your litmus test. If you have a great deal of weather helm, move the gooseneck back, regardless of the wind velocity. Conversely, if your pointing is poor, adjust the gooseneck forward until you reach the optimal combination of helm and pointing.

VIII. GOOSENECK POSITION (INSET)

Wind strength	Gooseneck Setting
Under 5 knots	17-18
5-8 knots	18-19
8-12 knots	19-20
12-15 knots	20-21
15-20 knots	21-22
20-25 knots	22-23
Over 25 knots	Jens Rig, 20-21

IX. BOOM VANG

The larger, fuller racing sail requires more vang tension than its predecessors. The vang is rigged with the tail of the hal-yard, and passes over the gooseneck and around the mast, then back down and aft to the cleat. This system is simple, effective and easily adjusted, even during the last minutes of a starting sequence.

Because both the vang tension and the gooseneck position are set for the entire race, it is important to position them for the conditions expected for the majority of the race. For example, if,

at five minutes before the start, the wind is a five-knot seabreeze expected to build to 18 knots within an hour, you should set your gooseneck at around 19 to 20 inches. This setting allows for fairly good pointing off the starting line in addition to neutral helm once the wind kicks in.

X. SAIL TRIM

A unique quality of the Sunfish is the fact that the sail is flatter on port tack than on starboard. This has several consequences when it comes to upwind sailing and tuning. In medium air (five to 15 knots), the boat is generally sailed the same on both port and starboard tacks. The "mast phenomenon" becomes a factor in light and heavy air (under five and over 15). In light air, especially if there is any chop, it is important to avoid over-sheeting on port tack. Letting the sail "breathe" helps the boat reach maximum speed, which is essential for effective pointing. The fuller sail on starboard allows for tighter sheeting without stalling.

In heavy air, the flatter sail on port tack allows you to sheet tighter without overpowering the boat. On starboard, you will need to sheet out faster when a puff hits in order to keep the boat flat and driving forward. When tacking from port to starboard in heavy air, make certain to sheet in slowly enough to keep the boat flat and to prevent the daggerboard from stalling. If you are having pointing problems, the first solution is to ease out, gain additional speed, and then slowly try to point closer to the wind. If you are still pointing poorly, it is time to consider adjusting sail shape.

While we have discussed the various components to proper sail set-up, tuning and trimming on an individual basis, it is important to recognize that these variables must work together in harmony to achieve optimal performance. A tight outhaul and cunningham along with a loose vang in 15 knots will not combine for maximum speed. As the conditions change so must each sail adjustment, if only marginally. Think of the Sunfish as a fine instrument that must be tuned on a continual basis.

XI. BOATHANDLING

Good boathandling techniques, combined with proper rig set-up, can make for body weight disparities in virtually all wind conditions. While the optimal all-around weight for a Sunfish skipper is around 165 pounds, the heavyweights can hold their own in light air while thin can still win when the wind is over 15 knots. Given that the average skipper weighs more than the boat, each movement made is translated directly into the hull and rig. The goal, then is to be what I call "subtly aggressive." That is, the skipper must be smooth and cat-like in the boat, but aggressively anticipating and reacting to every small change in the wind and sea conditions. In light air and flat water, sit far forward, with your legs snug against the forward edge of the cockpit. In flat water, the boat should have minimum heel, about five degrees. If the wind is light to medium and the sea choppy, or if you are approaching a set of waves, increase the heel to about 10 degrees. Given that the Sunfish has a hard chine, the boat will continue to "track" in light air, even with a fair amount of heel. When you get through the chop, however, flatten the boat back down.

Downwind in light air, sail with considerable windward heel. Sailing the boat on one chine reduces wetted surface area of the hull and neutralizes the helm, thus minimizing overall drag. You should raise the daggerboard as high as possible without losing steering ability. In breeze under 10 knots, this means about six inches of the board under water on a run, and six to 12 inches on a reach depending on the wind angle.

As the wind picks up, flatten the boat upwind, in both flat and choppy conditions. In addition, slide your weight back, especially in waves. The bow tends to plow through waves, so keeping your weight aft will help to reduce the amount of water that flows over the bow and into the cockpit.

Since the Sunfish has a small, inefficient daggerboard, it is important that you maximize its performance. This means sailing the boat very flat upwind in heavy air. You may feel as though the boat is heeling to windward, but there will likely still be some leeward heel. Anticipating puffs is an important element to upwind speed in heavy air. The sailor who waits until a puff hits, lets the boat heel, and then eases the sheet, will slip sideways for several seconds. The skipper who starts to ease the main *before the puff even hits* will maintain a flat boat, and thus a forward path. Skippers should always be active in the boat, rarely cleating the main. Downwind in medium and heavy air, heel the boat to windward slightly less than in light air. Your control of the boat should dictate the board height. If the boat becomes "squirrely," drop the board a few inches for increased stability.

With over 150 regattas a year, from the annual around Shelter Island Race to the World Championship, there is truly an event for everyone. While the Sunfish is still a family-oriented boat, attracting sailors of all ages and skill levels, the recent changes surrounding the hull and rig have made the boat a machine that can be enjoyed by hard-core racers as well.

Scott Kyle has been racing Sunfish for over 15 years, and has won every major Sunfish title including two World, three North American, one junior North American, one midwinter, and countless regional championships. He is the current U.S. Sunfish Class Association President and attends Harvard Business School. For more information on the Sunfish class: USSCA, P.O. Box 128, Drayton Plains, MI 48330; 313/673-2750, or Sunfish/Laser, Inc., P.O. Box 10, Portsmouth, RI 02871; 401/683-5900