

Sonar Tuning Guide

The measurements and settings included in this guide are those that we have found to be fastest for the Sonar. Since crew, wind and sailing conditions vary, you may find that slightly different settings work better for you. By following these instructions, you can be confident that you are set up to win at any level.

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Preparation

Your preparation goal should be to ensure that your boat and gear

- are safe and strong enough to sail in any condition without failure
- present a clean sera- and hydrodynamic profile
- allow smooth, easy and hazard-free control of all adjustments

Hull

The gelcoat finish on a new Sonar requires little attention. Wet sanding is not necessary, nor is it recommended, as it will make the finish more porous. In time, this will cause the hull to yellow and absorb water.

Fairing the hull is not permitted except in the vicinity of the bailers. Fairing the bailers is not critical, but it is relatively easy to do. If you decide to fair the bailers, first make sure the surface is clean and dry. Then apply Banda or auto body filler with a plastic spreader to the bottom of the bailer, scraping off any excess filler. Try to keep the actual bailer opening free of filler. When dry, wet sand with 400 grit paper, then polish the area with 600 grit paper.

If you wetsail your boat, choose a very hard bottom paint and wet sand it to achieve as smooth a finish as possible.

Keel and Rudder

One of the most critical and laborious aspects of preparing your Sonar is fairing your keel. Ideally, the keel should match the class templates for minimum thickness. If you sail in predominantly choppy conditions, your keel can be slightly fuller in the forward 30% of each station. An epoxy-faired keel is durable, water-tight, and simple to repair in the event of running aground.

If your boat was built by Ontario Yachts, your keel may not need to be touched. If your boat is older, it may need attention regardless of the builder. A well-faired keel will provide more lift and better pointing ability upwind and less down wind.

The rudder should be at the class minimum thickness. Some rudders have a tendency to vibrate, even at low speeds. This problem can be reduced somewhat by using a

sanding block with wet 200-400 grit paper to sharpen the corner on one side of the trailing edge and round off the corner on the other side.

Try to minimize the gap between the top of the rudder and the hull. According to the rules, the top of the rudder should be parallel to the hull and the aft edge of the rudder cannot be longer than 43 1/2".

Mast

Before stepping the mast you should do the following:

- Replace the rope jib halyard with 1/8" wire or 1/4" Spectra rope. There is an excellent description of a 6:1 jib halyard tackle in the Summer/Fall '89 Echo courtesy of Peter Galloway. If you're still using a winch to tension your halyard, you should make the change.
- Make sure that both your spinnaker halyard and topping lift are long enough to reach at least to the cockpit sole.
- Install a small (dinghy model) windex wind indicator on the back of the masthead crane.
- File the edges of the spreader caps until they are flush with the spreader. This minimizes the chances of the spinnaker or spinnaker halyard catching.
- Give the mast one or two coats of a silicone-based marine wax.

Deck Layout The Sonar comes from the factory with a standard deck layout that is sufficient for racing. However, a couple of additions should be made, and, for maximum efficiency, several improvements can be done.

Barber-haulers are illegal on the Sonar, but you are allowed to have a fixed reaching lead. One way to do this is to attach a snap-hook to the rail and have a bullet block that floats on the jib sheet. When reaching with the jib, you can snap the block into the snap shackle for a friction-free outboard lead.

The Sonar does not come with the spinnaker pole mounted on the boom. This is the most efficient place to stow the pole, and it makes for much smoother sets and douses. This is inexpensive and easy to install. Buy a 1 foot piece of PVC tubing with a wall thickness of approximately 1/8" and an inside diameter of approximately 4-5". Buy two spinnaker pole rings that fit the curve of the boom and are at least 1 1/2" in diameter. Cut the tube in half and cut each piece on an angle at each end so that one side of the tube is the full 6" long while the other side is about 2" long. This will give the tube a broad base making it easier to attach.

Drill two holes in the long side of the tube and, using either poprivets or screws, attach it to the boom about 6 feet aft of the mast. Attach the pole ring to boom about 4" aft of the mast.

A few go-fast rigging ideas, which are not essential but can make the boat much easier to sail, are a 6:1 jib halyard system, a 2:1 jib sheet system, a 6:1 backstay and a split traveler bridle.

The jib halyard system described in the Summer/Fall '89 Echo is a great idea for several reasons. First, it eliminates the winch from the center of the cabin top, which is an unnecessary piece of hardware. This winch is perfectly situated to grab every line that comes near it. Secondly, it is very difficult to change mast blocks when the jib halyard tension is pulling the mast aft at the deck. Finally, and most importantly, the 6:1 halyard is much more easily adjusted.

The 2:1 jib sheet system eliminates the jib sheet winches and makes tacking much easier. You will, however, require some muscle when trimming the jib in heavy air.

This system is installed by removing the cabin top winches and mounting Harken Hexaratchet cheek blocks in their places. Be careful when purchasing these that you buy a left-hand block and a right-hand block so you can trim the sheet properly. You can move the cam cleat to the side opposite the block so that the jib trimmer can cleat the sheet from the windward rail. It is helpful to add some a foot brace to the aft face of the cabin so that the trimmer has something to brace against.

You will have to buy longer jib sheets for this system, but they should be 5/16" or even 1/4" instead of the standard 3/8". Tie the ends of the sheets to the base of the jib lead car and lead them through the clew ring of the jib. Then lead them back through the jib lead block and through the ratchet.

If you install both the 6:1 jib halyard and the 2:1 jib sheet systems, you will have a boat that is winch free. This is always good because it removes obstacles, reduces weight, and eliminates the need for winch handles, which always go swimming when they're needed most. Best of all, you can now adjust these controls without moving from the windward rail.

A standard Sonar comes with a 4:1 backstay system. This should be increased to the class maximum 6:1 purchase for ease of adjustment in heavy air.

Installation of the split traveler bridle is described in detail by Peter Galloway in the Summer 1990 Echo. This system is inexpensive, relatively easy to install and will make your traveler virtually self-tacking.

You should make a point of simplifying your boat by keeping the size and length of your control lines to a minimum. Tie knots in the tails of halyards and control lines where you think you may be able to cut them off, then go sailing with your crew. If the knots are still in place at the end of the day, cut the line.

Tuning the Rig

Before Stepping the Mast

The headstay should be 25' 10" measured from the attachment point on the mast to the center of the pin at the bow. This is the best setting for maximum versatility. Be sure

that the turnbuckle cannot spin freely or your headstay might change length while you are stepping the mast.

After Stepping the Mast

You need to center your mast. To properly center the mast, measure 7' aft from the jib tack shackle to each rail and mark the rail on each side. Using the jib halyard, measure down to each mark, and adjust the upper shrouds until the measurement is the same on each side, then tighten the uppers an equal number of turns.

You should use a Loos gauge to read your shroud tension. Tighten the uppers to 250 lbs. Tighten the lowers until they are just taut, and adjust them to move the center of the mast in line with the hounds and mast tip. Once you have the mast straight, you can tighten and loosen the lowers an equal number of turns, depending on the wind strength and wave conditions. You should just remove the slack in the lowers, which is not quantifiable on the Loos gauge, since they are generally so loose that you cannot get a reading.

Fine Tuning the Rig

Now that you are set to go sailing, you are ready to fine-tune the rig. You will set up the rig to the wind conditions you have and will need to adjust it for windier or lighter breezes on other days.

The two primary adjustments are the mast blocks and the lower shrouds. First we'll take a look at the effects that these adjustments have on the sails.

Mast Blocks. The mast blocks control the amount of sag in the headstay. Headstay sag is your primary power control, so having the mast blocked correctly at the deck is very important. If you feel like you are not going well, this is more than likely the problem.

By adding blocks behind the mast and pushing the mast forward, you are sagging the headstay and adding power to the jib. This power comes at the expense of some pointing ability, but in light air and chop, it is important to keep the boat moving fast. Forward speed will allow you to point the boat, and it will get your underwater foils working to create lift.

As the wind increases, it is necessary to add blocks in front of the mast, moving the mast back and tightening the headstay. This removes power from the jib, and results in better pointing ability. It would be simple to say that the mast should be in a certain position at the deck for every wind range, but the real determining factor is the sea condition. In light air and flat water, you may actually sail with a tighter headstay than in medium air and big chop.

Lower Shrouds. The lower shrouds affect the rig in two important ways. First, they restrict bend in the middle of the mast and tighten the headstay because the chainplates on a Sonar are positioned aft of the partners. Second, they control the side bend of the

mast. These two considerations are of primary concern when setting the Sonar mainsail.

Side bend is a power control for the mainsail in much the same way that headstay sag is a power control for the jib. The lowers should be adjusted so that, in light air, the mast is perfectly straight. This adds power to the front of the sail and makes the overall shape fuller, matching the shape of the jib with the headstay sagged.

As the wind increases, you should tighten the lowers to keep the mast straight until the boat becomes overpowered. In heavy air when the boat is overpowered, ease the lowers as much as four full turns to help depower the middle of the mainsail. Tight lowers will restrict fore and aft mast bend and counteract the flattening effect of the backstay on the mainsail. Your crew weight will determine when and how much you have to depower the mainsail.

Your main is cut to fit a mast that bends evenly along its entire length, Because of this, it is important to check your lower shroud tension anytime you adjust your mast blocks. If you add blocks behind the mast, pushing it forward to sag the headstay more, the lowers will become tighter.

As they become tighter, they will restrict bend and possibly invert the top of the mast. The mast is being held forward at the hounds by the headstay, aft at the spreaders by the lowers, and fixed at the butt. Thus, if you push the section of the mast between the spreaders and the butt forward, the section between the spreaders and the hounds will actually move aft, straightening the top.

This is why it is important to check lower shroud tension whenever you change your mast blocks. They may not need adjusting, but we have found that 1/2-1 turn on the lowers approximately equals one 1/2" mast block.

Keep in mind that it is illegal to adjust the shrouds while racing, so leave yourself plenty of time before the race to 'get up your rig.

Sail Trim

Mainsheet. The main should be trimmed to that the top batten is parallel to the centerline of the boat. Check this by sighting up the sail from beneath the boom. You don't need to do this every time, but if you do it once or twice you can get a feel for where the sheet should be set. The exception to this rule is in heavy air when the top batten should be twisted 4-7 degrees to reduce weather helm. This makes the boat easier to steer through waves.

Traveler. The traveler should be pulled to windward so that the boom is on centerline. As the wind increases, and you need to tighten the mainsheet to keep the top batten parallel, you will have to lower the traveler to keep the boom on centerline.

As the wind increases further, and you start to get overpowered, you can drop the traveler to stand the boat up and reduce helm. It is important to prevent the boat from heeling too much, as the keel is very small, and the boat will go sideways when it tips over.

When it starts to really blow, you will find that dropping the traveler only makes the main flap. The boat becomes difficult to steer, since it is sailing only on the jib, and it tends to want to bear off which makes it heel over even more. This is because the sail is in the backwind of the jib.

Two adjustments will reduce your feeling of being overpowered. Ease the jib slightly. Then, ease the mainsheet so that the top of the sail twists off 7 degrees and pull the traveler up until the leech fills. This should balance the boat and make it possible to feather and reduce heel.

Backstay. The backstay should be used to fine tune the amount of headstay sag. As you sail upwind, wind strength is always changing. It is important to shift gears to maximize your boat speed at all times. Since adjusting the mast blocks would be difficult to do every time the wind changes, you should use the backstay to make small changes in the amount of headstay sag.

Keep in mind, however, that the backstay will have an effect on the fullness of the mainsail and on its leech tension. When you adjust the backstay, you must adjust the mainsheet tension, too.

The backstay should be pulled hard in heavy air to help bend the mast and tighten the headstay. Keep an eye out for diagonal wrinkles developing in the mainsail from the clew to the spreaders. These are overbend wrinkles, and they are a good guideline to use when judging backstay tension. When you get to the point where you cannot pull these wrinkles out with the cunningham, you are at your maximum backstay. When you are overpowered, these wrinkles should be just starting to appear.

Cunningham. This control positions the draft in the main. In no wind, with no cunningham, the maximum draft should be located approximately 45% of the way back in the main from the mast. As the wind increases, and the mast is bent fore and aft and side-to-side (see Lower Shroud Tension above), the draft will tend to move aft, and you should tighten the cunningham to keep the draft at 45-50% aft in the main.

Outhaul. Your main comes equipped with a shelf foot. This allows it to behave like a loose footed sail, and it makes it easier to judge the amount of outhaul tension you have. It should be no looser than 1 1/2" off the band at the end of the boom. The general rule of thumb is 1 1/2" off in light air, 1" off in moderate air, and all the way to the band in big breeze.

Downwind. You should use the vang to control the amount of twist in the sail downwind. The rule of having the top batten parallel to the boom applies, and it will not take much vang tension to achieve.

When reaching in heavy air, it is important to have a crew member playing the vang, because it is necessary to ease it quickly when you get hit by a gust. If the vang is not eased with the mainsheet, the end of the boom catches in the water as the boat heels, keeping the main full and tipping the boat over.

Jib Trim

The three things that effect the jib are headstay sag, halyard tension, and lead position.

Headstay Sag. The effect of headstay sag on jib power were discussed earlier (see Mast Blocks above). In general, more sag equals more power for lighter air and less sag equals less power for heavier air.

Halyard Tension. You should be careful not to pull the jib halyard too tight. It should be used, like the main cunningham, to position the draft in the sail. In most conditions, the halyard should be pulled just tight enough to remove wrinkles and scallops from the luff. This will require gradually more tension as the wind increases. It is one of the controls that should be adjusted whenever there is a change in wind strength. This is a good reason to install the 6:1 halyard system discussed earlier.

Lead Position. The best way to determine the lead position is to sail upwind and slowly pinch the boat up into the wind. You are looking for an even break along the entire luff. If the top of the sail breaks first, the lead probably needs to go forward, and, conversely, if the jib breaks first down low, the lead should be moved aft. To develop power, the bottom of the sail needs to be rounder than you think, so you will probably have your leads positioned just forward of the center of the track.

In heavy air, it is helpful to move the lead aft so that the top of the sail breaks first. This helps keep the boat on its feet by opening the slot between the jib and main and by depowering the top of the jib.

Keep in mind that large changes in jib halyard tension will affect the lead position. As the halyard is tightened, it pulls the leech of the jib tighter, effectively moving the lead forward. To counteract this effect, move the lead aft one hole.

Sheet Tension. Jib sheet tension is critical to the Sonar. Many people have a tendency to over trim the jib. In most conditions, the middle of the foot of the jib should be just inside the rail, and there should be 4" of sheet between the block and the clew.

A good guide to use is the top batten of the jib. This should always be 0-3 degrees off parallel to the centerline. Be sure that it never angles in toward the luff of the main. The top batten is marked with dark draft stripe tape to make it easy to see, and you can use the spreader window in the main to sight the batten.

Spinnaker Trim

Spinnakers are cut with powerful shapes. The fullness in the head is pushed out toward the leeches so that the sail will hold a curl nicely and will project maximum area when running. Here are suggestions for trimming your spinnaker in light, moderate, and heavy air.

Light Air

Ventilate the chute. In very light air, the large area of the Sonar spinnaker needs to have a fair amount of air flowing across it to lift. Don't try to go dead downwind until top speed for the conditions has been reached. In light air and chop, you should not attempt to sail lower than 80-90 degree jibing angles.

Moderate Air

When broad reaching or running in winds below 10 knots, your pole should be on the lower ring and the outboard end positioned so that the tack is slightly lower than the clew. This helps to project the maximum area of the spinnaker. When the wind exceeds 10 knots, you can raise the pole to the upper ring.

Heavy

When tight reaching, the tack and clew should be even. When sailing dead downwind, it is sometimes helpful to pull the leeward twing halfway, or all the way, down. This helps keep the spinnaker under control and reduces the tendency for the bow to dig in.

Crew Position

in light air and chop, it is especially critical to keep the crew weight together, forward and to leeward. The bottom of a Sonar is fairly flat, so the objective is to keep the flat part from pounding into waves. A new class rule prohibits placing crew members in the cabin, so you should have two crew seated on the rail and one crew seated at the forward end of the cockpit seat.

As the wind increases, move crew members across the boat, keeping the weight forward, until you have everyone on the weather rail to keep the boat flat. As the wind increases beyond this point, everyone should slide aft.

Crew Organization

In organizing the crew of your Sonar, your goals should be to:

- involve all crew members in each maneuver
- keep maximum weight on the weather rail in a breeze
- avoid having crew members cross paths

The Sonar is most effectively sailed with four people, although you can get by with three, and, in heavy air, five can make for blazing upwind speed. This organization is for a crew of four. If you organize your crew by assigning a job description to each position along the rail, a new crew member can easily be integrated into your team without sacrificing boathandling.

Moving from the back of the boat forward, we label each position as follows:

- 1. Helmsman**
- 2. Traveler**
- 3. Twings**
- 4. Jib Trimmer**

1. Helmsman

Upwind - Mainsheet, backstay, sometimes traveler in heavy air. Dictate crew weight adjustment.

Tacking - Ease mainsheet to build speed.

Weather Mark - Call hoist, ease mainsheet and backstay

Jibe - Steer and pull boom across with mainsheet,

Leeward Mark - Pre-set traveler and backstay, sheet main.

2. Traveler

Upwind - Watch compass and wind shifts. Discuss speed and height relative to other boats. Adjust traveler.

Tacking - Tack traveler.

Weather Mark - If Jib Trimmer is setting the pole, pull spinnaker guy back and cleat it. Grab spinnaker sheet.

Jibe - Fly both sheet and guy.

Leeward mark - Uncleat guy, feed out sheet or guy depending which side the chute comes down, help helmsman with mainsheet, if necessary.

3. Twings

Upwind - Adjust outhaul, look up the course, feed information to traveler man. Check spinnaker for next hoist and pre-set twings.

Tacking - Carry winch handle from side to side, if necessary.

Weather Mark - Raise topping lift as jib trimmer sets pole. Ease jib and hoist chute if jib trimmer is still on the bow. Pull guy back if jib trimmer is easing and hoisting. Ease outhaul.

Jibe - Trim new twing halfway. Ease old twing, Trim new twing all the way once pole is on mast. Take guy from traveler man, if necessary.

Leeward Mark - Pre-set outhaul. Gather chute. Release halyard if jib trimmer is stowing pole. Go for jib sheet if jib trimmer is still stowing pole.

4. Jib Trimmer

Upwind - Adjust jib sheet, jib halyard and cunningham.

Tacking - Tack jib.

Weather Mark - Set pole, ease jib, hoist chute, drop jib if necessary, ease cunningham, coil spinnaker halyard.

Jib, - Jibe pole,

Leeward Mark - Raise jib, pre-set jib halyard, pre-set cunningham. Take down pole, release halyard, trim jib,

Practice Having Fun

Nothing helps you win as much as time in the boat.

Sit down with your crew and go through each maneuver verbally. Then put some old sails up and go out and thrash around some moorings, lobster pots, or whatever is available. Concentrate on doing your own job well and not on instructing each other. After a disastrous rounding, stop, take a break, and then discuss how it might have gone better.

Remember, this is supposed to be fun. If you finish the day laughing and you haven't destroyed your equipment, you've had a good day. And if your whole team has fun, there's a good chance that they will come back for the next race and do even better.

Sail care

Sails are made of firm, resinated cloth. This cloth makes the sails versatile and easy to trim but it also requires maintenance.

The main and jib should be rolled down the leech to keep the battens parallel to the roll, and stored in their sailbags in a cool, dry place. The worst thing you can do to resinated cloth is roll it up wet and leave it for a couple of weeks in the hot cabin of a Sonar. Make sure the sails are dry before you leave them for a long period of time.

Spinnakers should be dried and flaked, If they are put away wet, their colors can bleed, and the cloth will break down vary quickly.

Don't leave salt on the sails for too long. It is not necessary to wash the sails every time you use them, but it is a good idea to do it every few weeks.