Tuning Guide for Catalina 22 *Sport*

Written by: Tom Clark ("*Fuzzy Logic*" #15597)

(Updated May 2010 after the National Championship Regatta)

These adjustments are likely only appropriate for C22 Sports due to the added stiffness of these newer boats. They were developed over a lengthy trial and error period aimed at making "Fuzzy Logic", #15597 competitive with the early boats. Based on our boat speed at the 2010 Nationals I feel this Tuning Guide is suitable for all conditions except perhaps at wind speeds less than 1 knot TWS. This Tuning Guide has been modified specifically for C22 Sports from the Tuning Guide originally written by Pete Harper for Bartlett Sails.

Tuning at the Dock

Tools Required - 50 foot tape measure, Model PT1 Loos tension gauge, and tools to adjust turnbuckles.

Mast Rake – The keel strongly influences this dimension. We have re-faired our keel to the template provided by Catalina Direct. After fairing, the rake had to be essentially removed (plumb mast). I now believe our original keel was NOT representative of standard Sport keels. This guide sheet appears to work for all Sports. The best guide for determining proper mast rack is the amount of weather helm. The objective is to have essentially neutral helm when normal crew weight is on the high side in about 8 knots of true wind. Increasing mast rake will increase weather helm and reducing rake will reduce weather helm. Once a proper setting has been determined, the actual rack must be measured at the dock. With the boom in position and just enough backstay tension to take all the slack out of the forestay measure the distance from the top of the mast to the outboard edge of the rudder cut out in the transom. Include the main halyard shackle in the overall distance. This distance will likely vary boat to boat. Whatever your measurement is should be constant for all wind and sea conditions, so remember it! With the re-faired keel on "Fuzzy Logic", the length is 29' 1". For reference, the same method yielded 28' 8" with the stock keel.

Mast Side to Side – Using the main halyard, run the 50 foot tape to the top of the mast. With the lower shrouds loose, measure to the same point on the toe rail on both the Port and Starboard sides; make adjustments to the upper shrouds as necessary until the measurements are equal on both the Port and Starboard sides. Adjust the cap shroud tension equally until the settings match the table below for the anticipated winds speeds.

Forward Lowers – For these adjustments be sure the backstay is just tight enough to remove slack from the head stay which keeps the mast tips at a fixed location. Also be sure the lowers are not influencing the mast position. The forward lowers are set to maintain a straight mast AND the desired pre-bend. Be sure the aft lowers are completely slack while working on the forward lowers. Continue to change the forward lower tension until the desired pre-bend is achieved. Increasing the tension

will increase the pre-bend. Adjust the tension equally on the forward lowers until the desired pre-bend is achieved. The forward lowers settings in the table below are a good ball park guide. To check the mast for being in column sight up the main sail track and make the necessary adjustments to the lowers so that the mast is as straight as possible. Use the main halyard stretched tight from the masthead to the gooseneck on the boom at the mast; sight the mast pre-bend at the spreaders.

Aft Lowers – The main objective of the aft lowers changes depending on wind and sea conditions. In relatively flat water and winds below 15 knots the objective of the aft lowers is to restrict forward movement of the mast when sailing downwind. In choppy seas or winds above 15 knots their main purpose is to stabilize the mast upwind to prevent mast pumping which could lead to mast breakage. To set for <15 knots loosen the backstay completely, adjust the aft lowers so that when the forestay is hand tensioned, by rotating about the axis between the mast tip and stem fitting a circle of 18" – 24" diameter can be formed just as the slack is removed from the aft lowers. Be sure not to load the forestay to the point of taking the mast out of column. The backstay control line should be stopper knotted at his length to prevent accidental forward bending of the mast while sailing. To set for higher winds or choppy seas the backstay first return the backstay base setting (just remove slack in forestay). Next tension the aft lowers until the Loos gauge reads about 6 (just removing all slackness).

Shroud tension settings vs. true wind speed

Wind Conditions	**Uppers (cap)**	**Forward Lowers (pre-bend)**	**Aft Lowers**
Light (1-7 kts)	10	8 (none – ¼")	Loose
Medium (8-15 kts)	14	12 (¼"– ½")	Loose
Heavy (>15 kts)	20	20 (½" – 1")	6

Tuning Under Sail

Headstay Sag - To measure the sag in the headstay use the spinnaker halyard or spare jib halyard and pull it tight from the mast head to the tack of the genoa. The amount of sag is measured halfway up the luff of the genoa horizontally to the spare halyard. When sailing, check the tune in different wind ranges. In light air (0-7 knots) the forestay should be allowed to sag six to eight inches with the backstay eased. In medium air (8-15) the backstay should be applied to reduce the sag to three to four inches. In heavy air (15+) the sag should be as little as possible.

Sail Trim

Light Air (1-7 knots)

The mainsail traveler should be pulled to windward with the sheet eased so that the boom is on the centerline and the second batten from the top is parallel to the boom. The cunningham should be eased so that horizontal wrinkles (speed wrinkles) begin to appear along the luff of the main and the outhaul eased so that the shelf foot fills out. Have telltales on the top two batten aft tips. With the traveler to windward and no boom vang; sheet the main until the telltales start to curl; ease the sheet back out until they just fly again.
Fine tune the block position so that the luff breaks evenly top to bottom. The genoa should be sheeted so that the foot at the midpoint is directly over the edge of the deck and the leech is four to six inches off the spreader tip. The halyard should be tensioned just enough to remove the horizontal wrinkle along the luff and the backstay eased to allow six inches of headstay sag.

Medium Air (8-15)

Center the traveler and use the boomvang to control leach tension. Increase vang tension as the wind builds, again use the leach telltales to control the mainsail trim. Keep them flying at all times. The outhaul should be adjusted for the amount of power needed (pull until the shelf foot folds on the boom if overpowered). Adjust the cunningham to remove all horizontal wrinkles along the luff. The backstay should be tensioned to remove as much headstay sag as possible without de-powering the boat too much.

Heavy Air (15+)

Center the traveler and increase vang tension until the boom doesn't rise when you let the main out in a puff (i.e. vang sheeting). Play the mainsheet in and out to control the heel of the boat. Don't be afraid to completely luff the sail in the puffs. Don't let the boat roll up as you will only go sideways. Adjust the cunningham to remove all wrinkles along the luff and pull the outhaul so that the shelf foot is folded tightly along the boom. Tensioning the backstay will open the leach and de-power the rig as well as giving additional headstay tension. Move the genoa block back one notch if you are still overpowered.

Spinnaker - The best indicator for adjusting pole height is to keep the clews level. This will mean keeping it low in light air and raising it as the wind increases. When broad reaching and running, set the guy so that the pole is perpendicular to the wind and continually ease the sheet so that the luff curls slightly. Remember that over-trimming can slow the boat radically. "When in doubt let it out." The genoa should

be dropped when using the spinnaker, but the class jib may remain up when reaching.