J/24 Tuning Guide

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WHY TUNING IS IMPORTANT

The J/24 is the most successful keelboat design in the world. However, like many other boats it has flaws. Most of the tuning we do, especially in the boat preparation area, is to overcome these flaws and make the boat faster through the water.

A characteristic of the J/24 is the boat develops lee helm in light air. A boat that has lee helm will be slow upwind, because it will not point and will be slow due to the increased drag of the rudder always needing to be forced off centerline to keep the boat going upwind. We need to modify the boat and it's sail plan in order to reduce this lee helm as much as possible.

The other reason tuning (here we mean rig tuning) is important with the J/24 is that we are asking a very limited sail inventory to perform over a very wide range of conditions. J/24's are commonly raced from 0-30 knots of wind and to ask four sails to cover that entire range is really asking a lot. We need the sails to be board flat in heavy air yet full and powerful in the light stuff.

The best way to accomplish this is through aggressive adjustment of the shroud tensions (which directly affects sail shape) and sail trim changes through the wind range.

INTRODUCTION

Our Sail loft in Portsmouth has been obsessed with J/24 sailing for the last decade. During that time we have experimented with hundreds of sails, dozens of deck layouts, a spectrum of keel shapes and every possible combination of rig settings. As any of you who have been talked into sitting on the rail for us can attest, tuning sessions are typically dull affairs. But we have been rewarded by watching our sails win 5 of the last 8 World Championships and hundreds of National, Regional and Local titles.

We have learned how to tune and fine-tune the J/24 in an attempt to fool four sails through a range that could be covered by eight. The 150-percent genoa must be a drifter in light slop, and flat and twisty in 18 knots. The main needs to be

flat enough to avoid excessive backwind, but not invert when the big breeze and backstay comes on. The spinnaker is asked to float in the drifters and reach in 25 knots. The 100-percent blade jib is brought well below its range by light crews, but must stand up to near gales too.

Picture a starting line of 50 to 80 ultra- aggressive racing fanatics and you can see how Darwin's theory of evolution applies to sailboat racing. Very often one boat length separates the front row from the cheap seats at the start, so attention to boat preparation has become imperative to survival in the class. Following is our list of preparation ideas that will allow your team to stay competitive.

THE STRAIGHT MAST TUNING SYSTEM

BOAT PREPARATION

Boat preparation is critical in the J/24 class. Sails, deck layout, keel and rudder shape, and mast tuning all share equal importance. Often newcomers to the class prioritize one of these factors as "the project I'll tackle this year". These are also typically the same people who sell their boats for a major financial loss at the end of one season of mediocre and poor finishes. To be competitive in the J/24 ranks, you must tackle all these important factors.

The J/24 has a balance problem. Most of our tuning features are attempts to alleviate the lee helm that J/24s experience in less than 10 knots of wind.

KEEL

Over the years we have found that the minimum keel offsets will provide adequate lift upwind and reduce drag downwind. When fairing the keel to minimum thickness it should also be moved forward by removing material from the trailing edge and building up the leading edge. This moves the underwater center of effort forward, helping to reduce lee helm.

RUDDER

The rudder should also be minimum thickness, but old rudders don't stand up well to being faired—that's how they break. Since 1986 the rudders have come from builder Tillotson Pearson at minimum thickness, so buying a new rudder is better than fairing an old one.

HULL

In general, the bottom should be smooth and fair. The class rules allow factory imperfections to be filled. Grinding down highs in the gelcoat is not allowed. Wet sanding to 600 grit adds the finishing touches to your fast underwater shape.

MAST PREPARATION

Rig preparation is quite simple and can be completed in a few hours. First, remove the spare genoa halyard since nearly all J/24s sail with hanks on the forestay.

If your halyards need replacement, we recommend minimum-diameter Spectra mainsail (8 mm) and genoa (6 mm) halyards, both with spliced wire tails for less weight and low stretch. A 6 mm Dacron spinnaker halyard is adequate. Depending on your local regulations and plans for the boat, you can take out the mast lights and wiring. On older Proctor mast the wiring conduit should be taken out by removing the five pop rivets on the front side of the spar. This allows the mast to bend properly in the lower third. You should also install a masthead fly—we recommend a dinghy-size Windex.

The mast needs to be raked back as far as possible to help the lee-helm problem. A maximum-length headstay combined with a minimum-length mast helps to get the center of the sail plan as far aft as possible. Measuring the mast length and headstay is very critical, and the class rules should be referred to in order to do this accurately. We also suggest you only cut the mast to within 5 mm of the minimum, as different measurers always get different lengths. Complete this process well before your next regatta as your shrouds may need to be shortened too.

The spreader angle must be fixed depending on your mainsail's type and luff curve. For our sail we move the spreaders forward for 160-165 mm of deflection, stiffening the center of the mast to help get headstay tension in heavy air. This also allows a mainsail to be cut with less luff curve, giving the sail plan greater projected area. There are three styles of spreader bracket used. The latest "thru-bar" types ensure the most accurate setting for the longest period of time to maintain the 160-165 mm setting, and any mast can be retrofitted to this type of spreader bracket. The other male-female and female-male brackets require shims to hold the spreaders in the correct position or they will shift aft quickly.

Finally, the fully prepared mast can be stepped and the mast butt fixed. We sail with the maximum J dimension (2925 mm- see class rules for measurement points); most mast-partner blocks will have to be altered to achieve maximum J. We use this maximum-aft setting to move the center of effort aft and open up the slot between the genoa and main.

The mast-butt position is a critical speed factor. Stepping the mast too far aft will add too much pre-bend, resulting in an over-sagged headstay and a mainsail that will invert with just a little backstay tension. Having the step too far forward (the most common problem) creates an over-tight headstay in light air, and too full a mainsail. We position our mast base by crawling around the inside of the forward cabin and taking two measurements. First, find the stem fitting (the metal plate in the very bow of the boat). Locate the 3rd bolt down on the fitting. Measure from beside that bolt, (where the bolt meets the hull) to the "I" Beam on which the mast sits. Put a mark on the beam at 2,730 mm. From that line place the front of the mast exactly 130mm from this mark on the "I" beam. We scribe a line into the beam so that we only have to make the measurement once.

Now you can tighten your uppers to 20 on the scale of a Model B Loos gauge and leave the lowers slack. To center the mast, first measure back from the stem fitting to a point on both rails perpendicular to the front face of the mast. Measure from the marks to the center weld on the mast to determine if the mast is centered at the deck. You may need to make custom shims to secure the mast toward one side of the mast partners. Cleat the genoa halyard at a position where, holding the shackle with two fingers and your thumb, you can just touch the mark on the rail with the halyard shackle. Repeat the process on the other side. Next, adjust the uppers until the mast is centered. Now adjust the lowers to straighten the mast. The backstay should be loose during this process, with the wire blocks about a foot below the intersection of the split wires. With no backstay tension there should be 2.25 inches of pre-bend.

SHROUD TENSION

True Wind Strength	**Knots**	**Uppers‡**	**Lowers‡**
LIGHT	0-9	20	15
On long Olympic courses we sometimes use this as an all-purpose setting, allowing for a light breeze to build and still be in the rig setting's range.			
MEDIUM	10-13	24	21
Pre-bend is reduced to 2 inches. This allows for necessary backstay tension and result- ing headstay tension to begin depowering the rig in the puffs.			
MEDIUM HEAVY	14-17	27	24
This setting is one that we use any time significant depowering is necessary. Lighter crews will go to this setting earlier and find that they are able to sail flatter and faster than if they stay at 24 and 21.			
HEAVY	18+	29	29

Whether at the top end of the 150 or into the 100, it's windy and the backstay needs to be pulled on hard. With this shroud tension the lowers have pulled out nearly all the pre-bend, creating a very stiff mast that can be bent by the backstay to flatten the main. The headstay in turn gets extremely tight with the lowers and backstay forces working against each other.

Sail shape is governed by shroud tension. We use the accompanying chart to move the four sails through the entire wind range. As the shrouds become tighter in the windier conditions, the turnbuckles on the split backstay bridle need to be hand-tightened so you can get adequate tension, and then loosened again in light air to allow the headstay to sag when the backstay is off. Again, the numbers listed in the box correspond to the large size "B" Loos tension gauge settings.

‡ = Large size "B" Loos Tension gauge scale.

DECK LAYOUT/CREW POSITION

In setting up your deck layout, you should consider the strength of your crew and their number. Most of us sail with five, right around the maximum crew weight of 880 lbs. Teams with lighter people have been sailing with six to get to the maximum weight.

Our philosophy on boat set-up is "the simpler the better". Simplicity breeds success, fewer errors and breakdowns, and saves money. A simpler boat also makes it easier to teach new crew members their jobs. We think it is important to get the whole team involved in creating the deck layout, giving each crew the responsibility for his section of the boat.

Starting at the bow of our boat, the tack horns are taken off and a snap shackle is fixed to the stem head for the head- sail tack. A jib Cunningham is led from a check block on the side of the stem fitting through the Cunningham cringle and dead ended into the snap shackle. This creates a 2:1 purchase. The 3:1 purchase is now situated in the center of the main hatch cover. (See diagram for details). The topping lift is never released or lowered with the pole, only fine-tuned when the pole is set. The permanent foreguy remains attached to the topping lift and is only led directly to the pole in light, sloppy conditions. Since our twing lines are forward of the shrouds, the acute angle formed between the end of the pole and the twing prevents the pole from lifting up when the twing is down, eliminating the need for the foreguy in most situations.

We move all the halyards forward to the mast, which diminishes around-the-mark chatter. With the spinnaker halyard eight feet off the deck on the starboard side of the mast, the bow person hoists the spinnaker and then reaches down to release the genoa halyard. The next person back handles the twings, outhaul, and main Cunningham, and monitors

compass headings with the digital compass on the mast. With the halyards cleated on the mast, the winches and all the cleats are eliminated from the middle of the deck, making it an “almost fun” place to cross during maneuvers. Cuts and bruises are not fun, and extra equipment only complicates the boat.

Moving aft, we place spinnaker trimming duties and tactics on the third person. The jib trimmer windward-sheets the genoa and helps with the guy trimming down- wind. We moved the winches forward far enough to allow the trimmer to face forward, which helps with trimming and tacking. This also gives the helmsman room to steer with his weight father forward. We have no jib cleats because the sheet should never be cleated.

The helmsman’s area or “office” has been tweaked for 10 years—it may look basic, but we’ve tried it all! The 2:1 backstay is led across the cockpit and angled to where the helmsman sits upwind. The dual winch handle holders are for the two handles he uses to grind in the genoa after tacks, and the genoa should be fine-tuned constantly. If the helmsman of your boat has difficulty tacking and grinding the winch, pass the handle forward to the tactician to carry through the tacks.

We’ve just finally switched to the Harken self-tacking car for the main traveler and we really like it. We’ve also switched back to a basic 4:1 mainsheet instead of the 2:1/4:1 system. The straight 4:1 system is slower at mark roundings but allows more throw when traveler sheeting in heavy air. This cockpit set-up gives the helmsman plenty do to (backstay, mainsheet, traveler, genoa trim, and steering) which is why we feel it’s important to pass the tactical role forward to the crew.

SAIL TRIM

Once your boat is set up properly, the final piece to the puzzle is your sail trim. There are three sail adjustments that will affect your upwind boat speed more than any other: Backstay tension, mainsheet tension, and genoa sheet tension. All these controls share equal importance and require constant attention.

GENOA

The 150-percent genoa covers the wind range of 0-17 true knots, a range that could be covered by three sails. In conjunction with the proper rig tune, the genoa is affected by halyard tension, lead position, and sheet tension.

Halyard tension affects the draft position of the sail. On our genoa, the draft is designed four percent farther forward than a normal light-air genoa, so in light air we slide the draft back by sailing with 1/2-inch scallops between each luff hank. These wrinkles look pretty

ugly, but they allow the draft to move aft to 44 percent, the proper position for light air. As the breeze builds, halyard tension should be slowly tightened until the wrinkles disappear in 12 knots true and up (usually when whitecaps just appear on the water). A mark on your halyard with a numbered scale will help you duplicate fast settings. Since we don't have any halyard winches, we use the genoa Cunningham to fine- tune the luff tension and the draft position if conditions change in the middle of a beat.

The genoa lead has three basic settings. Stock genoa tracks should have two new car holes drilled between each factory hole, allowing you to adjust the genoa lead in half-hole increments. When using the light-air shroud setting in under 5 knots of wind, the car should be positioned so when the genoa is overtrimmed the leech hits the spreader while the foot remains one inch off the chainplate. In medium air, move the lead aft one hole. At this setting the overtrimmed genoa will touch the chainplate and spreader tip simultaneously. At the heavy air setting (one more hole aft) the over-trimmed genoa will touch the chainplate while the leech is two inches off the spreader tip. (Remember, these trimming distances are to check the lead position, not for sailing upwind).

You need to get creative with your lead position in between shroud adjustments, as the mixture of twist induced by easing the sheet or by moving the lead aft is critical for maximum speed. The rule of thumb is to twist by moving the lead back to depower in flat water, and twist by easing the genoa sheet in choppy water. Check the trim chart for the Genoa's proximity to the spreader in different conditions.

MAINSAIL

Mainsail trim is rather straightforward. Again, the shroud tension and mast step position have the most to do with your mainsail shape. Once the rig is set, the mainsail is trimmed (or overtrimmed) to assist the balance of the boat. We trim the mainsail tighter on a J/24 than any other type of boat we've ever sailed. In up to 13 knots, the top batten points as much as seven degrees to windward of parallel with the boom, and the telltale on the top batten is stalled as much as 50 percent of the time— but the boat doesn't seem to slow down: it just points higher!

Position the traveler to windward and center the boom in very light air. Once the crew is all hiking, the traveler slowly goes down until the car is centered as the boat becomes overpowered. At this point it's important to remember that J/24s hate to heel, and should be sailed flat, or with less than 12 degrees of heel. Once the traveler is centered, the backstay/traveler trade off begins. In around nine knots of wind, we pull on six inches of backstay (on the wire bridle) to every two inches we drop the traveler.

Many times you will depower by dropping the main traveler, and the main will flog. Avoid this by easing the genoa sheet so that the leech of the genoa is at 6-8 inches off the spreader tip. This allows you to drop the traveler lower and keep the boat on its feet

without losing pointing. Also remember that the backstay affects the leech tension of the mainsail dramatically, so every time the backstay is adjusted, the mainsheet must also be adjusted.

The outhaul is a simple adjustment: We ease it two inches forward of the black band in under five knots of wind, one inch in 6-13, and right to the band in any- thing over this. The Cunningham is rarely touched on our main. We sail with a float- ing tack (a sail slide webbed on the tack of the sail) that can move up and down the luff groove. The halyard is simply cleated with the headboard at the masthead band, and we only pull on the Cunningham in overpowering conditions with just enough tension to smooth out the luff wrinkles.

Once the traveler and backstay options are exhausted and the boat is still overpowered, we go to vang sheeting. As the wind picks up, the top batten should go from seven degrees to windward in up to 13 knots, then parallel to the boom in 13 to 16 as the crew starts to hike and the boat starts to develop weather helm naturally, then twisted five degrees off parallel when sailing at the top end of the genoa with the traveler down and the backstay on. Vang sheeting is used in the twisted mode because the traveler is too short. We tighten the vang enough to control the leech tension at the five-degree setting, allowing the boom to travel beyond the end of the traveler, depowering the sail plan. Once the 100-percent blade jib is up, we shift back to traveler sheeting and get the top batten back to parallel to cover the 17 to 21 range. In over 21 knots true, we become overpowered again and shift back to vang sheeting.

BLADE JIB

Since it's always windy when racing with the blade jib, the sail is easy to set up. The halyard is always tightened just enough to pull out the scallops between the hanks.

The lead is set at one of two holes; an all-purpose setting, used 85 percent of the time, and the "death hole", 1.5 inches farther back. It needs to be really windy to go to the death hole, but if you're over- powered you have to do whatever you can to keep the boat flat.

The all-purpose lead sets up the sail with six inches of depth from tack to clew, with the jib leech two to four inches inside the spreader tip. With our jib, the center of the jib lead block is one inch forward of the chainplate. At the all purpose setting, sheet tension should be varied so that the leech moves from 3 inches inboard of the spreader tip in 17 knots to 3 inches outboard in 25 knots. In the aft hole the leech will be trimmed between even with the spreader tip to 6 inches outboard.

SPINNAKER

J/24 spinnakers are an odd shape. The rules measure 1/4 girth (head girth) and mid girth the lower half of the sail can be pushed out as far as the shaping will allow. These sails are also deeper than most all-purpose spinnakers, as J/24 race courses rarely have super-tight

reaches.

A deep spinnaker is an easy spinnaker to trim, with forgiving leech shapes, so most of the normal spinnaker techniques work in this class. We put the spinnaker pole on the lower ring in up to 12 knots, then switch to the top ring on broad reaching and running legs in strong breezes. If we ever get caught on very tight reaches, we over-lower the pole to open up the leeward leech. In general the pole end clew should be kept slightly lower than the leeward clew. Keep the pole squared back as much as possible for the jibing angles. A low, squared pole helps project the extra area in the lower leeches of the pear- shaped J/24 spinnaker.

SUMMARY

The key to successful J/24 racing is not the memorization of this information, but the understanding of it. Why is mast rake so important? Why does a particular deck lay- out work, and will it work for your crew? Why do we sail with wrinkles in the luff of the Genoa in light air? You can only go so far by copying others without understand- ing why the technique is fast.

The J/24 is continuously optimized to a high level. The product of this enhanced performance is a boat that is far more pleasurable to sail. Stepping up to the next level of competitiveness will only make your racing experience more fun and worthwhile.

At North Sails we test and tinker on a year-round basis in an attempt to improve the speed, durability and ease of use of our sails. We do our best to share anything that we learn with other members of the J/24 class. If you have any questions about our sails or tuning procedures, or have found that some other technique that works better, please feel free to give us a call.

UPWIND SAIL TRIM

Wind Strength	**0-4**	**5-10**	**11-15**	**16-19**	**20-24**	**25+**
JIB SELECTION	150 Genoa			100 Jib		
GENOA FOOT Inches from chain plate	5	3	2	6-8	Use jib	
GENOA LEECH Inches from spreader tip	5	3	2	6-8	Use jib	

JIB HALYARD TENSION	Wrinkles	Slight wrinkles		Smooth		
OUTHAUL Inches from band	2	1	0	0	0	0
TRAVELER / VANG SHEETING	Traveler		Vang / Traveler		Vang	
TOP BATTEN TWIST When top batten points to windward, leech is closed; when twisting to leeward, leech is open.	Parallel to 5° Closed		Parallel	5° Open		
TRAVELER	Middle	3-6		8-12	12-18	
BACKSTAY Wire blocks, inches pulled down bridle	Loose	6	8-16	20-30	20	24+

J24 SAIL CARE

Your North Sails are constructed out of the best materials on the market today. We make sure of this by testing every roll of cloth we use. Through proper care and maintenance your sails will give you the performance you have come to expect from a North sail.

The most important factor for a long life for your sails is to watch them for signs of wear and tear in high load and chafe areas. Be sure to wash the sails off with fresh water and dry the sails thoroughly before storing. A dry, mild climate is best. Excessive heat can cause problems with the sails due to the possibility of shrink- age. It is best to roll the mainsail, genoa, and jib.

MAINSAIL

When hoisting and lowering the sail try to minimize the amount of creasing or wrinkling of the sail. Every time the sail gains a crease the cloth breaks down that much faster. Always have someone contain the leech and luff during these procedures.

GENOA

The battens can be left in the sail without any problems. Be sure to roll the sail down the leech so that the battens will not twist. This could cause damage to the battens.

With today's laminates becoming softer this process has become more difficult. When folding, creasing can develop from folds and accelerate the breaking down of the laminate. The worse case scenario is for the sail to be rolled and then folded.

JIB

When rolling the jib keep the battens perpendicular to the leech. Pay special attention to the battens and batten pockets for wear and tear. Since this sail is manufactured from yarn tempered Dacron, problems can arise due to mishandling.

SPINNAKER

The spinnaker is fairly straightforward. Be sure to repair all tears and pulled stitches. Folding the sail when storing is best.

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