NORTH SAILS FAST COURSE GENOA TRIM

Contents:

Introduction

The genoa is very important because it provides a relatively large share of the driving force for your boat. There are two reasons for this: First, the genoa has no mast in front of it to create turbulence and spoil clean flow. Second, it sails in a continual lift that is caused by the mainsail's upwash.

(Animation 1 (Upwash)

Upwash is the bend that a sail induces in the approaching air flow. For example, the wind begins to curve around a mainsail well before it actually touches the sail. Sitting in this upwash region, the genoa thinks it is in a lift, so it can be trimmed farther off the centreline of the boat than the main.

(Animation 2 Genoa Driving force)

This makes the genoa more efficient by rotating its forces (perpendicular to the chord line) more forward and less sideways. If your main is the sailplan's rudder, then the genoa is its motor. Of course, their functions overlap, but in general you should trim your genoa for drive and your main primarily for helm balance.

Describing a genoa

The most obvious characteristics of a genoa are its size and shape. We measure genoas by the length of their LP, or luff perpendicular. To construct an LP, draw a line from the sail's clew to its luff, intersecting the luff at a right angle. The length of the LP divided by J (the distance from the forestay to the front of the mast) equals the overlap of the sail. LP divided by J = Overlap (%) On IOR boats, the largest headsails usually have a 150% overlap; No. 2s have a 130% overlap; No. 3s have a 98% overlap, and so on. Most PHRF boats are allowed 155% genoas without a penalty.

(Animation 3 Measuring the overlap of a genoa)

The sails that are less than full size are used in heavier winds once the maximum amount of force for a given boat has been reached. Beyond this point, maximum sail area simply overburdens the boat, and it's better to reduce drag by changing down to a smaller jib. This will improve the lift-to-drag ratio (one of the best indicators of upwind performance) by holding lift at a maximum while lowering drag. Note that smaller headsails are almost always shorter on the foot, but still nearly full hoist. The reason for this is that a high-aspect-ratio sail is more efficient. The sailmaker preserves the maximum wing span of the boat's air foils, but shortens their width to the limits of construction technology.

Genoa trimming procedure

Like the mainsail trimmer, the person who tends the genoa needs a methodical approach to cover all variables and maintain fast shapes. Here is a trimming procedure that you can use when you set up your genoa.

The six basic steps are:

1. Determine overall power by selecting the correct genoa.

2. Determine the efficiency of the genoa with the lead angle.
3. Set depth and twist with sheet.
4. Set depth and twist with the fore-and-aft lead position.
5. Set depth and twist with backstay.
6. Set draft position with halyard.

Step 1: Determine overall power by selecting the correct genoa.

This first step isn't too tough if you sail in a one- design class that allows only one jib, but it can be perplexing on big boats with up to 14 headsails. The best way to make good sail selection choices is to keep a record of the headsails you use with wind velocities and boat performance. After a while you'll have an extensive chart as a guide.

Genoa Wind Ranges

SAIL	APPARENT WIND (Knots)	
	Range	Maximum
Light # 1	2 - 12	12
All-purpose # 1	6 - 20	20
Heavy # 1	15 -23	23
# 2	21 - 27	27
# 3	24 - 34	34
# 4	31 -45	45
Use this table as a guide. Your boat's displacement and stability will affect upper and lower limits. Ask your sailmaker for specific wind ranges for each of your sails. Be sure to write these limits on each sail.		

Since your genoa determines your ultimate sailpower and the total heeling force, heel angle is a very important indicator when choosing a sail. As a rule, if your heel exceeds about 25 degrees, change down to a smaller genoa. Long and narrow boats may be able to maintain speed with a bit more heel than this, but modern, lighter boats must be sailed considerably flatter. Helm balance is another consideration. If you have too much helm, changing to a smaller genoa might be a good idea. This relieves windward helm by reducing the angle of heel, removing sail area from the back of the genoa, and opening the slot, which permits the traveller to be eased further. Don't forget that each of your headsails is designed for a maximum wind velocity. This number (specified as true or apparent wind) should be written clearly on the genoa clew, so you'll be sure to change before exceeding that limit.

Step 2: Set genoa efficiency with the lead angle.

In the Preparation chapter, we explained how to measure the angle between the boat's centreline and your genoa's sheeting base. Many new boats today are able to move their jib leads sideways as well as fore and aft, which gives them much better control over their lead angle. A narrow sheeting angle works best for high-efficiency conditions when the hull is easily driven. Narrowing the sheeting angle rotates the sail's forces to the side, cutting down on drive and increasing heel (see right), but letting you point higher. Though this makes the genoa more efficient, the sail is also very critical – more prone to stall and less able to accelerate.

(Animation 3 Wide lead angle – Narrow lead angle)

Sheet inboard when you have some or all of the following conditions:

- Medium air
- Flat water
- Experienced helmsman
- You'd rather point than foot
- A boat that's efficient underwater
- No backwind in the main

Use a wider sheeting angle when conditions demand that you sacrifice some efficiency for more reliable power:

- Very strong or very light wind

- Genoa at the top of its range
- Excessive backwind in the main
- Heavy chop or sea
- A boat that's inefficient
- Inexperienced helmsman
- You need to foot, not point

In summary, sheet inboard in ideal conditions and sheet outboard to play it safe at other times. Use the chart below as a rough guide, and start to make your own chart. On well-sailed boats, the lead angle is adjusted quite often with an athwartships jib lead puller. If your boat isn't rigged for this, use a barberhauler, a short sheet that pulls the genoa clew outboard or inboard.

Genoa Lead Angles

SAIL	LEAD ANGLE (DEGREES)	
	Smooth	Waves
Light # 1	8	10
All-purpose # 1	7.5 - 8	9.5
Heavy # 1	7.5	9.5
# 2	9	11
# 3	9	11
# 4	11	12
Use these numbers as guidelines only. The optimum lead position will vary from boat to boat. If you can't easily move your leads inboard or outboard, choose a lead angle that will work best over a range of wind and sea conditions.		

Step 3: Adjust twist and depth with sheet tension.

The genoa trimmer's primary responsibility is to maintain optimal sail shape as wind velocity and other conditions change. More than any other control, sheet tension must be adjusted to preserve the same basic trim. The trimmer's secondary responsibility is to help the helmsman steer the boat. For example, he should ease the sheet for big waves or sudden lifts, and trim for flat spots and headers. Then, as the helmsman brings the boat back up to speed on the wind, the trimmer must slowly re-trim the sheet. All this requires constant communication. Trimming the sheet affects the genoa in several ways. It reduces twist and narrows the sheeting angle at the same time. These changes combine to let you point higher. Easing the sheet has the opposite effect – more speed and less pointing ability. As a guide for proper sheet tension, observe how far the genoa is from the upper spreader and from the chainplates (be sure your spreaders are marked as described in Preparation). We cannot prescribe exact distances without knowing more about your boat and sailing conditions. These are measurements you'll have to get through trial and error.

Step 4: Set twist and depth with fore-and-aft lead position.

The fore-and-aft position of the genoa has a significant effect on twist and depth in the foot (See right). Remember that twist is the change in chord angles (relative to the foot) from the bottom to the top of the sail, and is necessary because of wind twist aloft due to gradient and (sometimes) sheer. When sail twist matches wind twist, the genoa is perfectly trimmed from top to bottom. Now the sail should luff simultaneously up and down the luff when you head up slowly past close-hauled. Set your lead position by luffing up slowly and watching your telltales. The wind- ward telltales should "break" evenly from top to bottom at the same time.

(Animation 4 Move sheet aft – Forward)

If the top telltales flutter before the bottom, the sail is twisted too much- (see top right). Move the lead forward to pull down on the clew, increase leech tension and reduce twist. If the bottom telltales luff first (or the top ones stall), the sail needs more twist (see lower right). Move the lead aft to relax leech tension.

Moving the genoa lead position also affects foot depth, much as the outhaul controls foot depth on a mainsail. To add depth, move the lead forward. This shortens the distance from clew to tack, and moves the foot of the sail farther away from the chainplates. (The upper two-thirds of the genoa will keep about the same shape.)

Use your Sailscope to measure the depths of your sail at each of the three draft stripes (the middle one is most important).

(Animation 5 Alter twist)

When the upper windward telltale lifts before the others, the genoa has too much twist, and the lead should be moved forward until all the telltales behave consistently.

The table below gives approximate target depths for the various genoas. If your boat has an unusual sailplan, hull shape or sheeting angle, these suggested depths might not work.

GENOA Target depths and draft positions							
SAIL	APPARENT WIND (Knots)	Lower Stripe		Middle Stripe		Upper Stripe	
		Depth	Position	Depth	Position	Depth	Position
Light #1	3 - 12	15 - 16%	46%	18 - 19%	47%	19 - 20%	47%
Medium #1	10 - 18	14 - 15%	45%	16 - 17%	46%	17 - 18%	46%
Heavy #1	16 - 23	13 - 14%	43%	15 - 16%	44%	16%	44%
#2	20 - 26	10 - 11%	38 - 40%	14 - 15%	41 - 43%	15%	41 - 43%
#3	24 - 35	10 - 11%	40%	14 - 15%	40%	15%	40%
#4	33 - 40	10 - 11%	40%	14%	40%	14%	40%
These numbers are general targets only. Even with the best sail-measuring equipment, it is typical to have errors of plus/minus 1-2 percent for depth and 2-8 percent for draft position.							

Step 5: Adjust depth and twist with backstay tension.

The backstay (masthead) and running backstay (fractional) affect depth in the middle and upper genoa sections by controlling sag. To a lesser extent, they affect twist.

When you have power-hungry conditions – light air, choppy water – you need a deep sail. Sag the headstay by easing off backstay tension. This moves the luff of the sail to leeward and aft, which adds depth to the genoa because the luff moves closer to the leech (see right). On a fractional boat, easing the running backstay will accomplish the same purpose (see right).

(Animation 6 Backstay and runner tension affect headstay sag)

The added depth will be noticeable in the upper half of the sail where the sag is large relative to the chord length. Also, sag will add depth mainly to the front of the sail, making a rounder entry and a more forgiving shape.

In light air, take care to ease the backstay enough to increase sag and fullness, especially in the lulls. Light-air backstay tension should be about 25% of maximum. You'll know it's too loose when the luff curls like a spinnaker.

To check sag visually, sight up the forestay from the tack while someone plays the backstay. You'll notice that gusts automatically add a lot of sag. This is exactly the opposite of what should happen. When a gust hits, you want to flatten the sail and de-power it.

Your backstay will need a lot of range and power simply to counteract undesirable sag, let alone lessen sag as the wind strengthens. For each of your genoas, you'll have to adjust the backstay quite a bit to change the sail's shape from the low to the high end of its wind range.

The chart below will help with backstay and runner tension.

(Animation 7 Backstay tension chart)

To Use Animation 7 :

Sail closehauled in 12 knots apparent. Tension backstay (masthead rig) or runner (fractional rig) gradually while sighting up the headstay. When added tension no longer reduces sag, you have reached maximum backstay tension (100%). Fill this number (measured as pounds or inches) in the blank below. Then fill in blanks on the chart according to suggested percentages of maximum.

Maximum Backstay Tension = _____ (100%)

The nice thing about fractionally rigged boats is that the runners are so easy to play. Consequently, they should be adjusted continuously, in concert with the genoa trimmer and helmsman, to keep the boat sailing fast.

Twist

Besides adding depth, head- stay sag adds power by reducing twist. It does this by letting the luff drop slightly to leeward and aft, which rotates the leech slightly to windward (see right). This is fine for medium air and a chop, but disastrous in a breeze because it adds power where it contributes most to heeling force – at the top of the rig. In these conditions you need a tighter head- stay to open the leech and de-power the sail (see right).

(Animation 8 Headstay sag adds power by reducing twist)

Step 6: Set draft position with halyard tension.

Draft position in a genoa is controlled primarily with halyard tension. This works a lot like the cunningham, more tension moves the draft forward and less moves it aft. Be sure to put a reference mark on each halyard (as described in Preparation) so you can compare and duplicate settings

Adjusting the halyard is a less effective technique for genoas built from Mylar or KEVLAR®, because the material doesn't stretch as much. With these sails, you have to rely more on headstay sag to control draft position. You should tension the halyard just enough to remove most of the horizontal wrinkles.

Animation 9 Draft forward)

Use your Sailscope to locate the position of maximum draft on each of your draft stripes. (Refer back to Step 4 for draft position targets for each headsail.)

A draft forward shape (40%-45%) is more forgiving than a draft aft shape (47%-50%). Move the draft forward (See right) when you need a wider groove, such as in a chop or with an inexperienced helmsman. Move draft aft (See right) in ideal conditions (i.e. smooth water and medium air) to give your boat maximum pointing ability.

The "groove"

Let's examine the importance of draft position a little more closely. What do we mean when we say a draft-forward sail is more forgiving and has a wider groove?

(Animation 10 Headstay sag)

The groove is that optimal combination of sail trim, boatspeed and pointing ability at which your boat comes alive. We're always searching for the groove when we sail upwind (and downwind).

We can make the groove easier to find by increasing halyard tension or headstay sag to make the genoa more draft forward (see right). A draft-forward shape is more forgiving because it's harder to stall. In other words, the helmsman can make wider course changes and still keep flow attached on the leeward telltales.

The disadvantage of widening the groove is that it harms your flat-water pointing ability. So the groove should only be wide enough in each condition for the helmsman to control the telltales with the helm.

Telltales

(Animation 11 Telltales)

The leeward telltales should always flow aft (see above). If they hang limp, the sail is stalled (see above), and the trimmer should ease the sheet immediately to re-attach flow.

It's important for the trimmer to help the helmsman respond to changes in the wind. The trimmer can react faster than the helmsman, especially in light air when the boat turns slowly. If the helmsman tries to hurry by jamming the tiller hard over, the rudder will brake the boat. He has to let the sails turn the boat. If the sheet is eased first, it will help the helmsman head up slowly, and the jib can be re-trimmed in concert. This maintains the best speed.

Recording Optimum Sail Settings

Genoa Trim Card

Just like the main, every genoa has certain trim adjustments and settings that seem to make it go fast. Whenever you feel like you're in the groove, notice how you have the sail trimmed. Your ultimate goal is to create a reference chart for each of your genoas that will give you good target settings for each variable.

Make a copy of the chart below for each of the headsails in your inventory. Then begin to keep track of the trim adjustments that seem to give you the best speed. Fill in the numbers to make trim guidelines like the sample below. These numbers will be good starting adjustments, and should be reviewed each time you use a genoa in a race. Change the numbers here as you discover faster settings.

Sample Chart:

GENOA: Medium # 1 (North)	**LOW END**	**MID RANGE**	**HIGH END**
Wind Range (knots apparent)	6-11	11-15	15-2
MAXIMUM Apparent Wind Speed (from sailmaker) 11			
Lead Angle (degrees)	9°	9°	10°

Lead Position (hole number)	4	3	2
Distance to Upper Spreader	200mm	150mm	150mm
Distance to Chainplates	100mm	25mm	Touching
Depth (% at mid stripe)	18 %	17 %	16 %
Draft Position (% at mid)	48 %	46 %	45 %
Backstay Tension (% of max)	60 %	80 %	Max
Halyard Tension	6	3	Two-blocked

When your genoa gets old.

Sooner or later, all genoas get old and their shape starts to change from the optimum. They drag across the rig a few hundred times, flog, are stuffed into turtles, and get used in a little too much wind. Ageing is inevitable and, unfortunately, so is the fact that some of these sails will have to be used for racing. What can be done to give an older sail a fighting chance?

(Animation 12 Growing old shape)

First of all, it's important to understand that, compared to a new sail, an older genoa is more draft aft, further away from the spreaders, flatter in the forward sections, fuller overall, and tighter-leeched (see right). When you put all this together you have a slow sail, unless you take a few steps:

- Trim the foot harder (closer to the chainplates) to bring the upper part of the sail closer to the spreader.
- Use more halyard tension to pull the draft forward so you have a rounder entry (with a wider groove) and more power.
- Increase the lead angle slightly to reduce main backwinding caused by roundness near the leech.
- Move the lead back slightly to twist the leech more.

As with the main, take pictures of any headsail you think could be improved, and show these to your sailmaker. It may be possible to bring the sail back to life with a bit of surgery.

Reaching without a spinnaker.

Trying to sail fast on a close reach can often be frustrating. If the wind angle is too far forward for a spinnaker, it's very hard to find a good lead for the genoa. You could really use a special set of tracks suspended two feet to leeward of the gunwale.

Here are some of the problems when ever your apparent wind is in the 35 to 65 degree range:

Animation 13 The problem

Animation 14 The problems

In these conditions, you should certainly move your jib lead out to the rail, and forward somewhat from its upwind position. Unfortunately, there is not always much more you can do. Unless you carry a special reaching sail, you'll just have to wait for the wind to go aft so you can set your chute.

Genoa Shape Controls

Quick Reference Guide

Genoa Sheet:
Affects twist, depth and angle of attack. Adjust to shift gears and help steer the boat.

Genoa Halyard:
Controls draft position. Begin with halyard just tight enough to eliminate horizontal wrinkles. Has more of an effect on sail made with stretchier material.

Backstay Or Runner:
Limits headstay sag. Controls overall depth of genoa, and effects draft position. More sag gives more power and makes steering easier.

Genoa Lead:
Fore-and-aft position alters twist. Athwartship position affects twist and sail efficiency.

Telltales:
Should break evenly from top to bottom. Leeward telltales should (almost) never stall.

Crew Manoeuvres

Tacking

	BEFORE	DURING	AFTER
HELM	"Prepare to tack"	"Tacking" Release traveller.	Verbalise acceleration. Watch boatspeed.
COCKPIT #1	Prep old sheet. Take winch handle out.	Release jib sheet.	Trim mainsheet and adjust traveller.
COCKPIT #2	Load new sheet on drum.	Tail new sheet.	Trim jib sheet.
COCKPIT #3	Stay on rail.	Grind in jib.	Move weight.
PITMAN		Overhaul old sheet.	Move weight.
MASTMAN	Clear jib sheet.	Move weight.	
FOREDECK	Clear jib sheet.	Make sure jib clew goes freely around mast.	Skirt jib foot. Move weight.

Key Points:

- Make absolutely sure old genoa sheet runs free (pitman).
- Tailer of new sheet needs lots of room in cockpit. Sometimes it works better for tailer to stand on weather side. Use as few turns on winch as possible to prevent overrides.
- Extra crew should help roll-tack the boat.
- Genoa trimmer must communicate to helm and others: "You're a little high." "I can trim more." etc.

Genoa Change

	BEFORE	DURING	AFTER
HELM	"Let's change"	Concentrate on boatspeed.	"Great job!" Go fast.
COCKPIT #1	Run changing sheet forward.	Adjust new sheet and lead. Don't trim until full hoist.	Adjust genoa trim. Watch target speeds.
COCKPIT #2		Release old sheet when new one is sheeted in.	
PITMAN	Ensure old jib halyard runs free. Prep new jib halyard..	Tail new jib halyard. Release old jib.	Clean up new halyard. Store old jib halyard.
MASTMAN	Haul new jib on deck	Jump new jib halyard. Gather in old jib.	Fold and store old jib.
FOREDECK	Attach new jib halyard. Attach changing sheet. Stay off bow as long as possible.	Attach jib to tack or jib cunningham. Feed jib into groove. Guide jib up foil. Pull down old jib.	Fold old jib.

Key Points:

- Options are tack change or straight line change (with new jib to windward or leeward). Tactician must be aware of groove in use to decide best tactical option.
- Must have a very good reason to change, since this will cost distance. It's very helpful to figure out how much distance you will lose each time you do this.
- Keep only one person to leeward in cockpit when changing sheets. A person can sit to weather to release or tail if necessary.
- For a tack change, add the #3 cockpit person to help tack the boat. Helm steers through the tack; Mastman drops old jib halyard during tack.

Sailtrim ABCs: The Jib & Genoa

David Dellenbaugh

Last month we discussed the basics of fast mainsail trim. I talked about the main first because every boat has one, and it's bigger than the headsail on most boats. It's also the only sail I can really see when I'm steering. This is not to say, however, that your jib or genoa deserves any less trimming attention. In fact, the opposite may be true. Because a headsail flies in beautifully clear air ahead of the main, it actually provides more than its share of your boat's power. A jib feels no mast disturbance and sails in an eternal lift created by flow around the main. For these reasons, I try to spend a bit of time on the leeward rail before every race, making sure my jib looks nice and goes fast. Here are some of my trim suggestions:

The Basics

A. Like the main, there are two important things about the shape of your jib or genoa, depth and draft position. Depth refers to the overall fullness of the jib, while draft position is how far aft the point of maximum draft is from the luff.

B. Genoas are typically fuller than mains and have their draft farther forward (40 to 45 percent aft instead of 45 to 50 percent). The primary way to adjust the amount of fullness in your headsail is by changing headstay sag (using the backstay or mainsheet). The position of maximum draft is controlled by luff tension (usually using the jib halyard).

C. In general, make your headsail fuller in light air and flatter in heavier air. Move the draft position forward whenever you have waves or need good acceleration (e.g. tacking duel). Move the draft aft in optimum pointing conditions.

D. Before going sailing, put telltales along the luff of your sail, about 6 to 12 inches aft of the luff rope. I like to put green yarn on the starboard side and red on the port. Put the green telltales a couple inches lower than the red ones so it's easier to tell them apart. Also, keep telltales away from seams, where they might catch.

E. Use reference marks to help record and duplicate fast trim settings. Number the jib track holes for lead position. Put marks near your spreader tips to help gauge leech position; calibrate halyard tension; and on big boats, write the sail name, lead position, and maximum wind velocity on the clew.

F. Use jib trim (in conjunction with mainsail trim) to help steer the boat. If you want the boat to turn toward the wind, ease the jib sheet. This reduces wind pressure on the jib, and allows the bow to head up move easily. Conversely, trimming the jib will help the boat turn away from the wind.

G. A good example of steering with the genoa occurs while sailing a big boat on a shifty beat. When the boat gets a lift, the leeward telltales stall. The jib trimmer can react quickly by easing the sheet to make the telltales stream. This not only helps the helmsman head up, it's also fast.

H. Keep a log where you can record everything you learn about your headsails. Here are some things to remember: wind range, optimum lead position, optimum distance off spreader, halyard tension, etc.

I. To maximise the racing life of your headsails, take good care of them. Never use a genoa without spreader patches. Wash your sail(s) with fresh water frequently, and protect them from sunlight. Store your sails wrinkle-free (always roll if possible), and minimise flogging.

Upwind.

J. Set the fore-and-aft position of the jib lead so the telltales break evenly along the luff. For example, if the top (windward) telltales flutter first, it means you should move the lead forward. One exception to this is in over-powered conditions, when you should move the lead back (and let the top telltales break) in order to depower the sail.

K. Position your jib leads athwartships so your lead angle is roughly 8 to 11 degrees. On some one-designs (e.g. Flying Scots) and bigger boats (e.g. older designs that have jib tracks close to the rail), the existing leads are too far outboard, and it's faster to "barberhaul" the clew to windward slightly. Other times, such as when overpowered, you'll want to barberhaul outboard (or move the leads out, if possible) to depower.

L. If you steer by a telltale on the luff of the jib, use one that's about halfway up the sail. This may be harder to see, but it will give you a more accurate reading for the whole sail than one that's closer to the tack.

M. Telltales are a good indicator of the upwind "groove" (see diagram). (**Animation** 15 Telltales)

You should usually sail to windward with the weather telltales just lifting (from a horizontal position). In flat water and medium to heavy air, you can sail in a "feathering" mode with the telltales lifting almost vertically. When you need maximum speed (and pointing is not a concern), sail with the telltales horizontal.

N. If it's hard to find the upwind groove, use sailshape controls to move the draft forward and make your genoa or jib rounder in the front. This will make the boat easier to steer.

O. Adjust the jib-cloth tension (often controlled by the halyard) so you can just start to see wrinkles ("crow's feet") appearing along the luff. With older sails, you'll have to pull harder than this to keep the draft forward in the jib. Tighten the leech and foot cords just enough to eliminate flutter.

P. In general, trim the genoa sheet until the curve in the leech matches the curve in the deepest part of the main. If your jib has battens, trim the sheet until the top batten is parallel to the boat's centreline. It may help to put a piece of dark-coloured tape on each side of the batten so you can see it better.

Q. There are two other good references for jib trim. On a one-design (where it's often hard to see the top of the jib while racing), note the position and shape of the sail's foot when you're going fast. On bigger boats, the distance from your top spreader to the genoa is a great reference. Some one-designs have a window in the luff of the main for this.

R. Once you feel your jib trim is fast, put a piece of tape or a magic marker mark on the sheet just forward of the turning block. This will give both the jib trimmer and skipper a quick reference for jib trim during the race.

S. The jib should generally be trimmed the same on each tack, but watch out for races where the waves are not aligned with the wind. You'll have to power up on one tack and trim for pointing on the other. It's not uncommon to vary lead position and sheet tension from tack to tack.

T. The jib trimmer must adjust the sheet tension for changes in wind direction and velocity. Keep communicating with the helmsperson about what you are doing. If you eased the jib slightly to power up, for example, tell the skipper something like, "I can trim in two inches when you're ready."

U. When tacking, many crews release the old jib sheet too soon. Hold it until the boat is almost head to wind; in some boats it actually helps to backwind the jib slightly to help get the boat onto the new tack. If you have an overlapping genoa, ease the sheet just far enough so the clew goes to the shrouds. Then let it go the rest of the way when you get head to wind.

Downwind.

V. How you handle the jib is a critical part of any spinnaker set. In light air, drop the jib as soon as possible (even before the spinnaker halyard is all the way up). In heavy air, don't worry about getting the jib down right away. Just be sure you don't ease the jib sheet too fast as you round the mark, or the spinnaker will get caught under its foot.

W. If you use the jib on a reach or run, ease the luff tension and move the lead outboard as far as possible to open up the slot. (On small boats the crew can actually hold the jib sheet outside the leeward rail.)

X. If you're flying a jib or staysail under a spinnaker, it's much better to have the sail under-trimmed than over-trimmed. Keep the windward telltales lifting all the time, and make sure someone is ready to dump the jib/staysail sheet whenever the spinnaker gets fickle.

Y. Ideal conditions for a staysail are smooth water, moderate breeze, and a beam reach. If there's any doubt about whether a staysail will help you, it's best not to use it.

Z. On a run, if you don't fly a spinnaker, it's fastest to "wing" your jib or genoa to windward. Use a spinnaker (or whisker) pole - unless class or event rules prohibit it - to push the clew as far to windward as possible and maximise projected area. Be sure you also hold the clew down to minimise twist. Making your jib or genoa go fast is an art that requires as much skill as any other position on a racing boat. I haven't spent much time trimming jibs myself, but I highly recommend it for all sailors, including helmspeople and tacticians. With a bit of perspective from the leeward rail, you'll have a much better idea of what really goes on behind the main.

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Trimming the genoa for speed

Mike Toppa details procedures for adjusting to changing conditions

The genoa is the most important sail on the boat. Whether it's blowing 5 knots or 25, this is the sail undisturbed wind reaches first and the one on which it has the greatest effect. The mainsail lives in the backwash of the genoa; the headsail is the power generator for boatspeed.

The difference between a fast genoa and a slow one is its shape. You wouldn't think of getting on an airplane if you saw the fat part of the wing in the back. Similarly, you can't hope to go fast on a boat with misshapen sails

Today, because of widespread use of low-stretch materials like KEVLAR® and Mylar, the shape built into the sail won't change much during use. While every sailmaker uses a particular panel orientation to limit stretch, the original sail shape is what counts, and achieving the designed genoa shape makes the difference between going fast or dogging it.

Most boats have different size genoas for different wind strengths. Rating rules determine the maximum size, and these biggest sails are used in lighter winds until the boat reaches its stability limit. As wind increases, the bigger sails overpower the boat and drag overcomes the lift produced, so a smaller sail is needed. Sail area is reduced by shortening the LP (luff perpendicular). Sails are reduced along the foot rather than the luff because a higher-aspect sail is more efficient.

You have onboard controls that affect the shape of the genoa; knowing how to use them will increase all-round performance and get you to the finish line sooner. Even if you've bought the world's fastest genoa shapes from your

sailmaker, it's still up to you to make them perform. You must first decide which size sail is appropriate. Your boat's stability and the amount of crew weight you carry determine the maximum wind strength for your biggest genoa, but normally you start reducing headsail area when the boat's heel angle exceeds 23 degrees or the wind gets up to about 20 knots true. From 20 to 25 knots, the #2 genoa is most efficient. In higher winds, use the #3.

Once you have hoisted the genoa, the halyard should be tensioned so the sail's maximum draft is about 45% of the total girth distance the luff in lighter air, but it's the draft location in the sail that's important. In flat water you can set the halyard at minimum tension to keep the draft at 45 percent back from the luff. Low-stretch materials enable sail shape to be built reliably into the sail, with the draft located where it should be. For this reason, the halyard should be used more to hold the genoa up in the air than to force the draft forward in the sail.

When you're using a new Mylar or KEVLAR® genoa, be sure not to over-tension the halyard, In most cases, bring it up hand tight, and then take a look at the draft location. If the sail is properly designed, this halyard setting should be very close to correct. You may see wrinkles or creases along the luff in lighter air, but it's the draft location in the sail that is important. As the wind increases, you may have to increase luff tension with the halyard to keep the draft forward, but this adjustment should be very minor.

In flat water you can set the halyard at minimum tension to keep the draft at 45% and the luff as flat and as straight as possible (see below). This shape allows you to point higher because the angle of attack of the wind to the sail is at a minimum. In waves or harder steering conditions, however, you want to shape the genoa so the entry is rounder and the draft is a bit farther forward. The rounder entry creates a wider angle of attack; even though you won't be able to feather the boat quite so high into the wind, the wider angle of attack makes the boat easier to steer and is more forgiving.

(Animation 16 The effectiveness of sail shapes…)

The next step is to adjust the fore-and-aft lead on the deck to set up the desired leech twist and vertical profile. Because of wind sheer, the difference between the wind angle at deck level and the wind angle at the top of the sail, the leech must be twisted off to match this difference in wind angles.

During the America's Cup summer of 1983, the sophisticated wind instruments on the 12-Meters accurately showed wind sheer. When the boats were sailing in a strong established wind, there was little difference in the apparent wind angles. But when a new sea breeze was developing, for example, crews found that the wind direction at the masthead varied by as much as 10 degrees from the direction at deck level.

The correct fore-and-aft lead for a genoa varies from one day to the next, depending on the wind sheer. The more wind sheer there is, the more twist you need in the sail (see right), You should mark the average lead setting for your genoa on the deck. Before every race, though, take a good look at the sail; you may want to change the lead for the day's race in response to the wind sheer.

(Animation 17 This computer generated illustration …)

Telltales on the genoa luff also can help tell you if the twist is correct. Too much twist causes the upper telltales to luff before the bottom ones. If this is the case, try moving the lead forward. Too little twist, with the lead placed too far forward, makes the bottom section of the genoa too full, and the sail will luff here first. Move the lead back until the sail luffs evenly from top to bottom. The vertical profile of the sail should be aligned so the leech is the same distance from the upper spreader or shroud as the foot is from the shroud base. That's a good starting point for lead adjustment, but always check the settings against boatspeed.

Twist adjustment is needed when the wind increases and you become overpowered. You depower the genoa by moving the lead back and twisting off the top of the sail. The top of the sail opens up, making it less efficient, and the bottom quarter of the genoa is pulled tighter and flattened out. The end result is a flatter sail working at 80 percent of its efficiency. This technique provides a good safety valve until you can change to a smaller sail.

Another genoa control is headstay tension, which controls the depth of the genoa. Imagine a genoa attached to the boat by the tack, the halyard at the masthead, and the clew. If the backstay is eased, the headstay sags; this makes the sail fuller. The more tension you apply to the headstay, using the permanent backstay on a masthead rig or the runners on a fractional sailplan, the less the headstay will sag. Headstay sag has the opposite effect on the jib as mast bend has on the main. When you straighten the mast, the mainsail gets fuller. When you straighten the headstay, the genoa becomes flatter.

Determining the correct amount of depth of a genoa depends on the conditions, your boat's stability, and the tactical situation. I think of the depth adjustment in the sail as the boat's accelerator and gear shift. In power situations, when you need maximum speed, going off the starting line, for example, or when you want to roll over a boat that has just tacked on your lee bow, you want to have a fuller setting. These are the times when you need to step on the gas. Ease the backstay and sheet in the genoa to make the headsail shape fuller. You can gain as much as 5 percent in boatspeed. Even though velocity made good to windward won't be 100 percent, you'll have the extra speed you need to get your bow out in front of the competition.

The same situation applies when you are sailing in waves and generally sloppy conditions. A strong wind that's been blowing for some time will generate waves that slow you down. Similarly, in the light air after a hard blow, there are left over waves that stop the boat. This is when you need fuller than normal settings to power up the genoa to keep the boat moving at top speed.

Once the genoa is set up for the prevailing conditions, the sheet becomes the most important control. It's hard to describe exact sheet tensions for all boats because spreader lengths and sheeting angles vary from boat to boat.

Some general rules apply:

- Trimming in the sheet flattens the sail and reduces twist. It allows you to point higher, but it also reduces the chord depth, which reduces power.
- Easing out the sheet makes the sail fuller and more powerful. It reduces your pointing ability but increases boatspeed.

Sheet tension should be changed with every change in wind velocity and direction. When a puff hits, the sail does stretch some and get fuller. To compensate, trim in the sheet to counteract the change and maintain the basic design shape. If you sail into a hole and wind velocity decreases, the genoa becomes less pressurised and flatter. In this situation, you should ease out the sheet to make the sail fuller and maintain speed through the water.

Sailing in shifty conditions requires constant changes in sheet tension because many times the helmsman can't react fast enough to these changes. For example, if you sail into a big lift, the jib will become stalled before the helmsman has a chance to steer up into the wind; he or she simply can't turn the boat fast enough. This is when the jib-sheet should be eased out to respond to the new wind direction and then slowly re-trimmed as the boat comes up onto the wind. Boatspeed increases concurrently, so the genoa can be trimmed very tight as the boat heads up to burn off that extra burst of speed and to point higher. Conversely, if you sail into a header, the jib will luff and the boat will slow down. Now the helmsman has to head off to adjust to the new wind direction. The trimmer should pull the sheet in hard when the jib luffs and then ease it back out to a speed-building setting as the boat starts to head down. Once boatspeed is back to normal, the sail can be trimmed in to the normal setting.

Sailing through oncoming waves requires the same kind of sheet tensioning adjustments. To keep the boat moving, the helmsman should steer up the front of a wave and down its back. The trimmer has to adjust the sails constantly to meet these changing apparent wind angles.

The hardest condition for the jib trimmer is when the boat is sailing upwind, while a swell left over from some previous wind condition is coming up from astern. The waves hitting the stern sections of the boat increase boatspeed, and apparent wind changes constantly as a result. The helmsman must use the helm much more in these conditions, and the jib must be trimmed in and out continuously to maintain the basic trim setting. The only efficient way to keep the jib correctly trimmed for these changes is to maintain constant communication between the helmsman and the trimmer. To enhance communication on the new crop of12-Meters, the deck layouts have been changed so the steering wheels are farther forward and as close as possible to the jib trimmers.

The genoa trimmer must continually change the setting and the trim for every change in wind, wave, and steering conditions. If you can work your boat through the ever-present windshifts and the continuously changing motion of the waves, you should be able to sail past a good part of the fleet, certainly past all those who are not trimming their sails as aggressively as you are. If you are the trimmer, keep your eyes on the shape of the sail, keep talking to the helmsman, and try hard to adjust the sheet to every new bit of wind and waves that comes your way.

Mike Toppa has sailed everything from dinghies to 12-Meters. He is a co-author of Speedsailing (Hearst Marine Books), the sail designer and trimmer aboard the 12-Meter Eagle, and the president of North Sails, Florida.

Upwind Sail Trim Techniques

World champion Andreas Josenhans explains how to optimise the role of your sail trimmers when sailing upwind.

The factors that contribute to winning performance on the racecourse are endless, and on any given day one factor may seem to override all others. But I've learned over and over again that a good boat with a good crew can gain an edge over their competition if the sail trimmers really concentrate on and co-ordinate their efforts to keep the boat up to speed.

The importance of speed is especially evident when sailing upwind, and was reinforced to me again in the at America's Cup Challenger Series. Aboard Heart of America, we quickly discovered (to my amazement) that despite all the brainpower we had on board, it was very tough to outsmart the competition. It was much more common to win (or lose) races because of speed differences. As we discovered, a mere 0.15 of a knot increase in speed over the 25-mile course produced a time difference of more than 2 minutes across the finish line.

This is true no matter what kind of boat you race, which is why your sail trimmers are so important.

Mainsail Trimmer

Sail trimmers are generally very focused team players who want to do their specific job to perfection and expect no less from all other crewmembers. The job of the mainsail trimmer is to create a specific shape for the given wind and sea conditions using the controls at hand. Mainsail shape is defined by the following factors:

- Camber - Depth of the sail at each speed stripe.
- Draft Position - Location of the greatest depth in relation to the luff and leech.
- Twist - Difference in the angles of chord lines various points on the sail
- Angle of attack - Sail's position relative to the boat's centreline, controlled primarily by the traveller

A careful look at the mainsail trimmer's role that he (or she) should look at the sail in six mutually overlapping ways:

1. Look at the three draft stripes from luff to leech, with the goal of defining camber, draft and twist.
2. Sight the top telltale behaviour and the top batten position relative to the boom to quantify mainsheet tension.
3. Read positions and tensions of all variables that affect speed of mainsail: mainsheet, outhaul, Cunningham, backstay, genoa shape, mast position at the deck, running backstay load, lower running backstay, jumper tension and backstay. (Smaller boats will obviously have fewer controls.) It's a good idea to develop a written, easily accessible trim guide for the basic settings (see chart below).
4. Watch the instrument readouts for boatspeed, wind angle, etc. As boat size increases, it is more and more difficult to feel the boat's performance change as a result of trim changes. Therefore, an incredible amount of instrumentation has been developed. Only five numbers are of real interest to the main trimmer: boatspeed, true wind speed, wind angle, rudder angle and heel angle. The information from these five readouts is basically simple, but you should develop a "target" (optimum value) for each one. Targets are to racing sailors what sheet music is to musicians; they eliminate unnecessary "noise," and therefore help each crewmember focus on the task at hand. There are two types of targets: a) those supplied by naval architects relating to the potential performance of your specific boat; and b) those that are developed each day by the sail trimmers and helms- man after on-the-water discussion. These targets usually correspond to true wind velocity, but they need further modification due to sea state, wind sheer (wind blowing from different directions at different heights), and wind gradient (wind blowing at differing velocities at different heights).
5. Watch the wheel or tiller for range/rate of motion and rudder angle readout. For example, if the rudder angle exceeds the target, you need to drop the traveller (or otherwise reduce helm). Also listen to and watch the helmsman so you have a continual idea of how the helm feels
6. Watch the competition. The ultimate test of main- sail shape is your boat's performance in relation to the other boats. The trick, of course, is to see position changes when they occur. Then you have to figure out which variable(s) are responsible for good or bad speed. For example, let's say you are losing slight forward ground to your nearest competitor without any loss of height. You notice this happens mostly when the wind breaks 22 knots and the main is back-winded by the headsail. As a main trimmer, your solution might be to add twist, open both sheeting angles and flatten the sail a touch.

Génoa trim guide

Sail	Wind Range True	Lead Position	Halyard	Headstay Tension
#1 Light	0-8	#2	wrinkles	15-60%
#1 Medium	8-14	#2	smooth luff	30-80%
#l Heavy	13-21	#3	3" beyond smooth	40-100%
#2	18-26	#4	3" beyond smooth	50-100%
#3	22-85	#7	3" beyond smooth	50-100%
#4	32-45	#5	3" beyond smooth	100%

Trim Guide

Every sail trimmer should develop a guide like the one shown here. This produces consistency and allows settings to be easily duplicated. It also defines a common language for crew communication.

Genoa Trimmer

To look at the role of the genoa trimmer, I'd like to use an example from this year's SORC. I sailed on *Advantage*, a Farr 48 owned by John McBride of Boston. In the Miami-Nassau Race, we had a great battle with *Sprint* (first overall) and finished only 20 seconds apart! During 37 hours of beating in 20-25 knots, we did a lot of sail trimming. We also tried to keep a fresh trimmer on the genoa sheet, which meant we had to do frequent handoffs from one trimmer to another. Here's how we'd do a typical handoff in order to keep the boat going as fast as possible. Prior to the actual

handoff, Sandy (the new trimmer) stayed on the weather rail but positioned himself close to the present trimmer, Rolf, who was crouched on the boat's centreline with sheet in hand, looking at the headsail. Sandy observed for 30 minutes before the actual handoff.

Sandy: Who is the boat to leeward and ahead?

Rolf: *Sprint.*

Sandy: How long has she been there?

Rolf: Just tacked there, maybe 5 minutes ago.

Sandy: What's happening?

Rolf: We lose sometimes and then we gain. In general, we gain in lulls and lifts.

Sandy: What sail does he have up?

Rolf: Looks like the No. 3. (Now Sandy goes to the leeward side and they continue chatting.)

Sandy: What is your true wind speed?

Rolf: 17 to 19.

Sandy: What is your boat speed and target speed?

Rolf: Boatspeed is 7.1, which is also target. Speed varies from 6.7 to 7.3.

Sandy: How do you like our set up? Should we think about changing genoas?

Rolf: I think we're OK for now. The actual handoff of the sheet occurred without cleating. Following the handoff, the old genoa trimmer sat down on the rail and answered any questions that the new trimmer had. No other hand-off was allowed on the boat for at least half an hour in order to ensure continuity. The new trimmer (Sandy) then went through a process that should be followed by any genoa trimmer:

1. Check backstay and running backstay tension according to absolute readout values and angle of the genoa entry.
2. Watch halyard tension and telltale behaviour over a two-minute period to see how steering variations and changes in wind velocity affect the flow. Also check the halyard relative to its mark on the deck for the heavy No.l.
3. Gauge draft, camber and twist by running the eye along the draft stripes.
4. Analyse the sheet tension. How far off the top spreader? How far away from the turnbuckle at the shroud base? How far from the middle spreader?
5. Finally he looked at the lead position, to see how much twist there was in the leech and how the luff telltales were breaking.

After all this analysis, Sandy reported: "We're holding *Sprint*, but it looks like we're at the top end of the heavy No. 1. The wind is 19 true, the lead is way aft, and the headstay is at max. How does the boat feel?" The main trimmer answered: "The wind is the highest we've seen it, and we've got too much helm. Let's go with the 'five minute rule' before we do a tack change to the No. 2. Which groove is free?" (The five minute rule is a tool to prevent unnecessary sail changes. In theory it gives the sail trimmers five minutes to re-tune and adjust trim for the conditions, while the tactician tries to anticipate the next wind velocity change.) Sandy's next request was to add more twist to the genoa by getting more halyard tension, easing the sheet slightly and moving the lead aft an inch. This was done and observed relative to *Sprint*. Each time we would have a new genoa trimmer or a change in conditions, we followed a similar method:

1. Define the situation;
2. Change variables only if needed;
3. Make careful small changes and observe results;
4. Use the five-minute rule to study cause and effect; and
5. Study basic grid and target data for what to change next.

Co-ordinating Upwind Trim

Besides the mainsail and genoa trimmer, there are at least two other people absolutely critical to making the boat go fast upwind. These are the helmsman, of course, and the person who I call the "seeing eye dog." Let's look quickly at the role of each.

Helmsman The person who actually steers the boat has to concentrate on keeping the boat in the groove. He must watch the target speed and listen to the "seeing eye dog" in order to anticipate the need for helm adjustments. He should also continuously talk to the trimmers about how the boat feels, so they can help find the right balance.

"Seeing Eye Dog" This person is essentially a lookout, in charge of watching for waves, puffs and anything else that may affect sail trim and speed. On small boats, the skipper has to perform this role, while on larger boats it's a good idea to appoint a special person. The seeing eye dog is actually the conductor of the boatspeed orchestra. He or she must tell everyone else (helmsman and trimmers) what is coming, so they can make the appropriate adjustments.

It's very important to co-ordinate trim and communication between the lookout (seeing eye dog), helmsman, mainsail trimmer and genoa trimmer. When a change is needed, all four must work together to keep full target boatspeed (see chart below).

Upwind trim coordination

Lookout's Call	Helmsman	Mainsail Trimmer	Genoa Trimmer
"Puff"	Hold steady	Trim 2"	Hold tension, then trim
"Lull"	Bear away until speed peaks	Ease 4"	Ease 2"
"Flat water"	Head up until speed bleeds off	Trim 2"	Ease 1"
"Wave"	Bear away	Ease 4"	Hold, then ease 2"

The secrets behind every successful sail trimmer are concentration and the ability to use each day's experience to improve tomorrow's performance. With good communication and record-keeping, you should be able to find those extra bursts of upwind speed that make such a difference.

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Tips For The Genoa Trimmer

While every crewmember plays an essential role on the race course, the jib trimmer is especially important for maximizing overall boatspeed. Al Gooch provides a hands-on explanation of this critical job.

A good genoa trimmer can give a boat the extra speed needed to win. To do the best possible job, the trimmer needs to have a real feel for the boat and anticipate what will happen next. He or she must work in close harmony with the helmsman to get optimum speed at all times. He must also communicate with other crewmembers to help optimize the shape of the genoa. To illustrate all the functions of a good genoa trimmer, we will run through a typical race on a 30- to 35-foot masthead club racer. Before the start is the time to set the boat up for the first leg. For a typical upwind first leg, you should check all the controls when the boat is sailed closehauled on each tack. While the tactician and helmsman check the compass headings, make sure the correct jib is up, the headstay and halyard tension are proper, and the lead is in the right location.

Choosing a headsail

Your number one job is to select the correct jib. If available, use the boat's jib chart based on true or apparent wind. If there is neither a sail chart nor working instruments, a good rule of thumb is that genoas should cover the following apparent wind ranges:

- Light No. 1 0-15 knots
- Heavy No. 1 12-22 knots
- No. 2 19-24 knots
- No. 3 21-30 knots
- No. 4 26-plus knots

As a rough guideline, white caps start at 12 knots true and solid white caps indicate at least 16 knots of true wind. Add the boat's upwind speed (roughly 6 knots on a 30-footer) to the true wind speed to get the apparent wind speed. In any case, the boat should have enough power to feel good in the existing wind and sea conditions. If the breeze is diminishing, it is better to be a little overpowered, since this won't last for long and you don't want to be caught underpowered at the start, or shortly after it, when you need maximum acceleration. Likewise, if the breeze is building and the water is relatively flat, it is better to have just enough power at the start, so you don't become overpowered too quickly.

Headstay sag and halyard tension

In order to check headstay sag and halyard ten- sion, you need to go up on the foredeck. In most conditions, the headstay on a 30-footer should have between five and seven inches of sag. A good way to see the sag is to put your eye on the stay and look up to the masthead. You can pull a spare halyard tight from the masthead to the stem to make headstay sag easier to see. The backstay tension should be adjusted to get the proper headstay sag. I suggest having three backstay settings (calibrated in either hydraulic pressure or distance on the backstay adjuster) for light, medium and heavy air. This makes it a lot easier to shift gears as conditions change.

After getting the right sag, you should check the halyard tension. A good starting point in light air is to ease the halyard until small horizontal wrinkles start to appear. Then tighten the halyard until the wrinkles just disappear. If there are

vertical wrinkles, it means the halyard is too tight. Once the cloth in the luff area is smooth, look up from the center of the foot to check the draft location. It should be roughly 40-47 percent aft at the middle speed stripe. If the draft is farther aft than 47 percent, tighten the halyard. If more halyard tension does not move the draft forward, consult your sailmaker. Reference marks on the halyard and the deck near the winch make it easy to keep track of halyard tension and duplicate fast halyard settings.

Lead location and sheet tension

The position of the jib lead and the tension on the sheet are your most important controls. A quick check for the fore and aft location of the lead is to pull the jib sheet all the way in and see if the foot and leech hit the shrouds at the same time. If the leech hits the shroud first and the foot is still away from the shrouds, move the lead aft (and vice versa). This method will even work at the dock when you don't have much wind.

To fine-tune the lead location, sail the boat closehauled and slowly luff up. The telltales should all break at the same time, or just slightly early at the top. If the lower telltales are breaking early, move the lead aft. If the top telltales break too early, move the lead forward.

You can best monitor sheet tension by observing the distance between the leech of the genoa and the top spreader. Four to five inches off the spreader is a good average. In smooth water and medium wind, this distance can be less. For sloppy water and light air, the distance should be more. For No. 3 and 4 jibs, which sheet inside the lower spreader, you can set sheet tension by keeping the leech between two and six inches inboard of the lower spreader's tip.

Tacking pointers

It's a good idea to make at least several practice tacks before the race. This not only warms up the crew, but lets everyone review their positions. As jib trimmer you should prepare for a tack by making sure the new sheet is made up with two or three turns on the winch and the new handle is in. Use at least enough turns so the sail can be tailed in most of the way before turns need to be added; but don't use so many turns that an override develops. Take up all slack from the new sheet, and raise the line above deck hazards (e.g. poles, hatches and cleats). The grinder should position his shoulders square to the winch and have his feet planted solidly so he can keep grinding as the boat heels on the new tack.

Just before the skipper puts the helm down, remove the old winch handle and take turns off the winch until the sheet can just be held. As the boat starts to luff, ease the sheet slightly to maintain the distance between the top spreader and the leech. After the forward third of the sail luffs, release the sheet completely by flinging it off the winch with an upward spiral motion. A clean release is all in the wrist.

The foredeck crew can help an overlapping genoa around the mast and shrouds. In windy conditions it's also good to have a crewmember in the middle of the boat run the clew aft. In order to tail properly, you need room to really haul in on the sheet as the boat passes head to wind. There is no load on the sail at this time and a fast trim- mer makes the grinder's job a lot easier and maximizes speed through the tack. The tricky part is to regulate the speed at which the jib is trimmed in for the last foot. In general, you shouldn't trim all the way until the boat speed increases. This can be anywhere from five seconds to over a minute, depending on the wind and sea conditions and size of the boat.

Starting maneuvers

During the maneuvers immediately prior to and at the start, it is important that you always trim the jib for maximum speed unless instructed otherwise. Keep an eye on the windex, the telltales and all the boats in your immediate vicinity. Keep track of the time to the start, and anticipate what the helmsman will do.

If you will be tacking from a reach, you'll have to "grind into the tack." Start with a non-lock-in handle and only three or four wraps on the winch. Also make sure there is enough slack in the windward sheet. As the boat heads up from a reach to closehauled, have someone help you grind in the jib. Then you'll have to remove the handle and release the sheet very quickly.

At the start, the tactical situation will generally dictate how the jib needs to be trimmed. With boats in close proximity, the trimmer should work with the helmsman to implement the upwind strategy. This could be either footing off to get clear from boats to weather or pinching up to squeeze out someone on your hip. When you're footing, ease the sheet and, if possible, the backstay as well, to power up the genoa. When pointing, trim the jib in to a couple inches off the spreader and tighten the backstay a bit. As you approach the line, remember that if you ever come close to luffing head to wind, you must be ready to let the jib sheet out quickly. This prevents the jib from backing.

Trimming for the upwind leg

By being in the cockpit, the jib trimmer is in a good position to see the compass and any other instruments that are available. For most helmsmen it is very helpful to have the trimmer keep track of the compass heading and boatspeed

on each tack. Many times the jib trimmer will also be the only person on the leeward side and therefore should keep the helmsman abreast of any boats or obstructions in the area as well.

A good trimmer will continuously monitor sheet tension by watching the distance from the genoa leech to the spreader tip. As puffs and lulls come in, you have to adjust the sheet (and other controls) to maintain proper shape in the genoa. You can actually use the genoa to help the helmsperson steer the boat. For example, easing the sheet will help the helmsman head up (e.g. when you get a lift), while trimming the sheet will help him head off (e.g. when you get a header).

It is good to keep an eye out for new wind, waves from powerboats, starboard-tackers, etc., and relay all pertinent information to the helmsman. Since you are on the leeward side, you will have to depend on someone sitting on the windward rail for much of this info. Just make sure you appoint one person to do this.

Heavy air and changing jibs

As the wind builds and the genoa approaches its upper limit, you can optimize sail shape by tightening the back- stay and halyard. Another trick is to move the lead back one or two holes. This will open the leech and let the top of the jib twist off. The effect will be to de-power the sail and reduce backwind in the main. It is also helpful to move the lead outboard; in very heavy conditions ease the jib sheet as well to reduce the load on the jib and give the main more room to be eased.

If you've de-powered as much as possible yet the wind continues to build, it's time for a jib change. For a tack change, the trimmer only needs to be sure the lead for the new jib is set on the weather side. For a straight-away change, the best system is to leave the old jib on the regular sheet and run another sheet to the new jib. If you use all these techniques in your next race, you will help your boat move up to the winner's circle.

Al Gooch, the manager of North Sails New Orleans, has many years of international yacht racing experience under his belt, including more than 2O SORCs and the stormy 1979 Fastnet Race.