

# ACCUMASURE

KNOW WHEN ITS TIME FOR NEW SAILS



**“In the Fall of 2002,** I made the decision to have Hinckley Yachts restore my 35-year-old Hinckley Bermuda 40 yawl. I went back and forth to Maine many times and made countless decisions about the restoration process. After four long months, the boat was delivered to me in Charleston. The exhilaration, however, was somewhat dampened when I noticed that we had neglected the sails. They were old, tired and frayed and my beautifully restored boat didn’t sail worth a darn. She was like an airhead instead of a wind ship—all looks and no performance.

A month later, my new UK-Halsey- Sailmakers mainsail, genoa, and asymmetrical spinnaker arrived and LEGACY’s rebirth truly happened. Now she is as much a joy to sail as look at. My thanks go out to the craftsmen at Hinckley and UK-Halsey Sailmakers.”

- Dr. Peter VanDorsten  
Charleston, South Carolina



Dr. Peter Van Dorsten aboard his Hinckley Bermuda 40, LEGACY.



## KNOW WHEN YOU NEED NEW SAILS

If your boat has lost its youthful spirit and developed a recalcitrant helm, maybe her sails have reached the end of their useful life. Dressed in a suit of new sails, your boat will heel less and go faster on every point of sail. Racing sailors already know this. That's why they replace their sails almost every season.

Sails age in much the same way children age—stealthily over time. You see your children day after day, year after year, then suddenly they are adults and you wonder how the sneaky little devils grew up without your seeing the process. For most of us, the best way to monitor our children's journey to adulthood is through pictures. Pictures also are the best way to monitor the aging process of our boat's sails.

Season after season, you spend a lot of time looking at your sails, but the aging process is subtle enough to escape your notice. Unless you race regularly or sail boat-for-boat with another cruiser of roughly the same speed, you likely have not noticed that your boat has slowed and that your sails may be the reason.

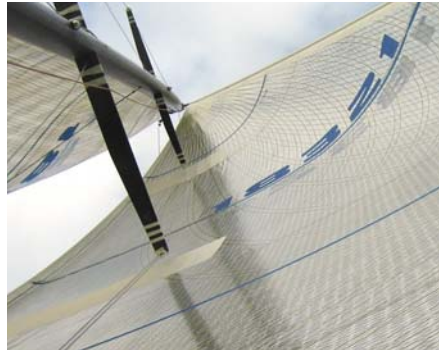
In addition to robbing your boat's top-speed potential, old baggy sails exert more heeling force than drive, which makes the boat react more violently to the seas and causes it to take more water over the deck. Excessive angles of heel caused by baggy sails dramatically increase the difficulty of moving around the boat. Over time, these changes in your boat's performance will force your non-sailing family members and friends to avoid spending an afternoon on the water with you.

If you can't figure out why your boating life has changed for the worse, try analysis—of your sails, that is, using UK-Halsey Sailmakers AccuMeasure software. The new version of AccuMeasure software and its instructions are available for downloading free of charge from [www.ukshalsey.com](http://www.ukshalsey.com).

You'll need a few photographs of your sails underway and a PC. This is the easiest and best way to evaluate the condition of your sails and the tuning of your rig, short of sailing with a boatload of experts.



Sail A.



Sail B.

## WHY NEW SAILS?

Sailcloth stretches—even the high-tech materials flying from the rigging of America’s Cup yachts and Volvo Open 70s. When the sails are new, they recover quickly and almost completely from the stress of each hard day. Think of them as young athletes recovering from a tough game. As your sails age, this stretch, in varying degrees of severity, becomes permanent, and at some point, the fabric crosses into the stretch-of-no-return zone, changing the once beautiful and effective aerodynamic shape into an ugly rag bag.

Sails have two types of life span. The first we’ll call its structural life, or how long it will stay in one piece. This relates to the durability of the sailcloth and the stitching. Some of the telltale signs are weakness along the leech, waffled surface and a loss of crispness.

We’ll call the second type of life span the performance life, or how long it will retain a good aerodynamic shape. This is more difficult to determine

without professional help because the symptoms hide behind cosmetically fine-looking fabric. The difference between these life spans varies with the type of sailcloth the sailmaker used. The performance life and structural life of high-tech racing sails, for example, are pretty much the same. On the other hand, the structural life span of woven Dacron sails can be two to three times the length of their performance life span.

What exactly are we talking about when we say a sail has lost its shape—come to the end of its performance life? Let’s take a look at a couple of pictures to illustrate what we mean. We’ve chosen two racing genoas, but the principles apply to any genoa. Sails “A” and “B” appear to be smooth and look all right to the naked eye, but if you look a little more carefully, you’ll notice that their cross sections differ quite a lot.

The cross section of sail “A” is very round, and the deepest section is in the after third of the sail, nearer the

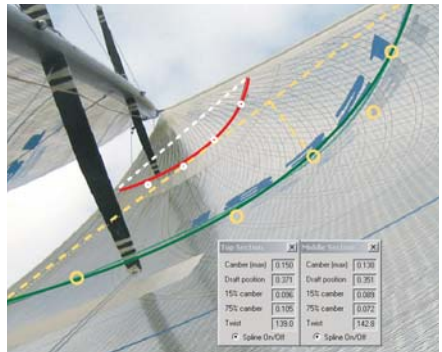


Sail A measured.

leech than is ideal. Also, notice that it has almost no camber (curvature) at the luff. A highly experienced sailor or sailmaker would describe this section as “draft aft with a flat entry.” This is symptomatic of a sail that has passed its prime.

Notice also that the leech of the sail (the back end of the cross section) is converging with the boat, even though the sail is a long way from the tips of the spreaders. This causes the genoa to backwind the forward part of the mainsail. What we have here is an aerodynamic brake. As the breeze comes up, the flat luff reduces the forward drive. The round shape with the draft in the after part of the sail heels the boat beyond its optimum angle for a given wind speed, creating more helm and more leeway. Not the best recipe for good sailing.

Now look at sail “B.” Its cross section looks more like that of an airplane wing. The maximum camber is near the front of the sail. The exit is flat, and little of the sail converges with the centerline of the boat. Even with the sail trimmed right to the spreader tips, the genoa causes very little backwind in the mainsail. The cross section of



Sail B measured.

sail “B” gives us the drive we crave, without all the speed-robbing heel and leeway we get from sail “A.”

Let us go back to genoas “A” and “B” after they’ve been analyzed via AccuMeasure to confirm our suspicions about the shape of each. Unfortunately, we only caught the upper two draft stripes on sail “B,” but the story is no less compelling. Sail “A” at the top section has the maximum camber at 52.8% of its chord line (the straight line from the luff to the leech across a section), and the middle section at 55.1%. These numbers for sail “B” are 40.2% and 36.9% respectively. This bears out the observation that sail “A” is a draft-aft sail. Checking the camber number at 15% bears out our observation of a flat entry.

The transition from a good sail shape to a bad one primarily depends on time and use (or abuse) of the sail. Other variables, such as the sail’s original design and the materials from which it’s made, also play a part, but the deterioration is inevitable. So the question is, “How do I find out when it’s time for new sails?” The answer is easy with UK-Halsey’s AccuMeasure.

# HOW ACCUMEASURE WORKS

UK-Halsey Sailmakers' AccuMeasure lets you view pictures of your sails on your computer and take measurements directly off the images.

## Setting Up and Capturing a Good Image

You won't learn much from analyzing poorly trimmed sails or a badly tuned rig, so make sure you have tuned the rig and trimmed the sails as well as you can. Remember that mainsail trim affects the shape of your genoa.

Sail the boat for a while, adjusting the sails until they are at their best trim and the boat is sailing in the groove. Then, take several pictures of each sail, to capture the changes caused by subtle changes in course and sea state. The shape of your sails will change noticeably when the boat is pointing a bit too high or too low, or coming off a wave.

AccuMeasure relies on digital images, and the easiest way to get these is by using a digital camera and downloading the images to your PC. You may also have someone scan prints or slides, or you can create still pictures from video via video frame grabber technology.

Before taking a shot, know that the look of the sail changes with the angle and camera lens you use. In order to have pictures that will let you compare apples with apples, you need to use the same camera, zoomed out to the same focal length for all your photos. To make your comparisons even more valuable, take all the pictures of a particular sail from the same place. For camber shape shots, you want to be in the middle of the foot of the sail. When shooting the mainsail, take your shot from the middle of the boom and slightly to windward.



Note: For optimum genoa photos, the lowest draft stripe should run diagonally across the frame.



For optimum mainsail photos take your shot from the middle of the boom and aim toward the head of the sail.

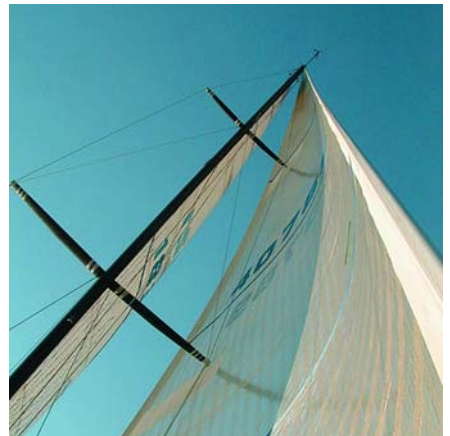
Get as close to the sail as you can and aim the camera toward the head of the sail. When taking camber shots of a genoa, lie on your back to get the camera as low as possible, so that your camera is at the middle of the foot. Then hold the camera so that the lowest draft stripe runs diagonally across the frame. Shooting on a diagonal gets more of the stripe into the picture. If the bottom stripe still does not fit into the frame, make sure to capture the front of the stripe where most of the curve should be. AccuMeasure will let you locate the aft point of the draft stripe during the measuring process.

To ensure that all your pictures can be reliably compared, make marks on the boom and the deck where to shoot from. Since the foot length of your genoas varies, you'll have different marks for your No. 1, No. 2 and No. 3 genoas.

Other angles are also useful. From the bow, looking up the luff of the genoa lets you judge the evenness of the entry. Compose the photo to look up the luff from the tack. See photo on right.

Photos taken from off the boat let you measure the position of the leech. Shoot from directly behind the boat, keeping the mast and headstay in line, then just to leeward with the genoa tack and clew aligned.

The photos are only one part of the analysis process. Without documentation of the conditions when the sail was photographed, your sailmaker's ability to tell you about your sail will be limited and possibly very wrong. With



Alternate angle of genoa photo.

## SAIL-SHAPE TERMS

These basic definitions will help you understand the keys to shape analysis and will be part of the dialog when you are analyzing your sail.

**CROSS SECTION or SECTION:** The shape of a sail is usually measured at several Cross Sections. A cross section is the shape defined by a Draft Stripe or a horizontal cross-wise seam on the sail.

**CHORD LINE:** The straight line from the Luff to the Leech across a Section.

**CAMBER:** The depth of the Section from the Chord Line at any point.

**DRAFT POSITION:** The position along the Chord Line of the Max Camber point, expressed as a percentage of the Chord Line Length.

**MAX CAMBER:** The depth of a Section at its deepest point. This is expressed as a percentage of the Chord Line Length; e.g., the depth of a Section with 16% Camber is .16 x the Chord Length.

**15% CAMBER:** The depth of the Section at a point 15% along the Chord Line from the luff. In AccuMeasure, it is given as the ratio of the depth at the 15% Chord to the depth at the point of Max Camber. It is a measure of the roundness or flatness of the entry of the sail.

**75% CAMBER:** Similar to 15% Camber, it is the depth of the Section at a point 25% from the leech and is a measure of the roundness or flatness of the back end of the sail.

**TWIST:** Twist is measured as the angle of the Chord Line from the centerline of the boat. The Twist angle is greater high in the sail than down low. The important measure is the difference in Twist between Sections. AccuMeasure, measures Twist as the angle of the Chord Line relative to horizontal on the screen, and the difference in Twist between Sections can be calculated.

every picture you need the following information:

- Date of photo
- Which sail is being photographed
- Apparent wind speed
- Apparent wind angle
- Sheet tension
- Lead block position for the genoa
- traveler position for the main
- Halyard tension
- Backstay setting

The last page of the brochure is a template titled: AccuMeasure Photo Documentation Form. Make plenty of photocopies of the form and fill one out for each image shot. AccuMeasure provides places to record this information with each photo. When you print out the photo, these notes and the measurement information will appear below the picture.

To analyze the actual measurements, you'll need to talk with your UK-Halsey Sailmaker. Although no single shape in the main or the headsails is the best for every boat, you can be sure of one thing: If the area of maximum draft of any of your sails is farther than 50% aft, that sail probably has lost its shape and come to the end of its performance life.





Remember: It is best to document your sails at regular intervals.

## MEASURING AND TRACKING SAIL SHAPE WITH ACCUMEASURE

We recommend documenting the shape of your sails at regular intervals throughout their lives. Always get shape shots of your sails when they are new so that you have a baseline.

Sail shape is often difficult to describe in words, but a picture and AccuMeasure lets you quantify the exact appearance of your sail. To get some help understanding what AccuMeasure is telling you, save your photos in “.uki” format and e-mail them to your UK-Halsey Sailmaker. The two of you will then be able to look at the same image and be able to objectively review and discuss your sail.

Measure and compare the changes in the shape of your sail in a variety of conditions and a variety of settings. Photograph the sails when they are drawing as well as they can and the boat is performing at its best in a given set of conditions. Although you can never exactly duplicate a particular set

of conditions, you can come close if you record all the information asked for on the AccuMeasure Photo Documentation form. With this information, and a similar wind strength you can come close to recreating a documented sail shape and therefore similar boat speeds.

Measure and keep a record of the fast sails in your inventory, and track the changes in their shape as they age. How much straighter is it off the head stay? How much rounder in the back? Talk to your UK-Halsey rep. about whether a re-cut or replacement is needed.

Compare the sails in your inventory. Are the differences in shape appropriate for the variety of ranges for which the sails are intended? Analyzing the shape of your sails can explain why one sail in the inventory performs well and another one doesn't. Your UK-Halsey rep. will help you understand their differences.

# SOLUTIONS FOR POORLY SHAPED SAILS



Are your sails limiting your boat's performance potential?

Bring your sail with some shape photos and the information about the trim and conditions when the pictures were taken to a UK-Halsey loft. After analyzing the photos and inspecting the physical condition of the sail, your UK-Halsey Sailmakers representative can tell you if your sail can be re-cut to breathe new life into it.

## How to Determine if Your Sail Can Be Re-Cut?

Only your sailmaker can determine if re-cutting your aging sail will breathe new life into it. To start the decision-making process, take some photos of the sail in question, using the guidelines from Setting Up and Capturing a Good Image section of this booklet. Take your sail, the photos and the information you've

recorded about the trim and conditions when you took the picture to a UK-Halsey loft.

## How to Determine if Your Sail Can Be Re-Cut?

- Is the shape salvageable?
- Does the cloth have enough strength left?
- Can you tear the material along the leech by hand?
- Is the sail material waffled and not smooth?
- Has the material lost all its crispness?

### Is the Shape Salvageable?

After analyzing the photos and inspecting the physical condition of the sail, your UK-Halsey representative can tell you if your sail can be re-cut to get another season or two, or should be replaced. Remember to be realistic about your expectations. Re-cutting a sail is really only a temporary measure.

Sometimes putting full length battens on an old main will flatten out a round leech and push the draft closer to where it should be. Genoas can have luff curve taken out, or seams can be opened and reshaped. But if the material of the sail is shot or close to it, there is no reason to spend another penny on the sail.

### Does the Cloth Have Enough Strength Left?

You can easily determine if the cloth in your sail is beyond hope. A severely deteriorated sail is fragile enough to be torn by hand along the leech. You have nothing to lose by trying this test—if the material is any good, you won't be able to tear it.

You know how new sails sometimes have a mind of their own, how they resist your efforts to flake the main over the boom? Well, an old and tired sail will simply fall into place, because the material has lost most of its crispness. When the crispness goes, so does the sail's performance.



# NEW SAIL OPTIONS

## Dacron

Woven polyester, or Dacron, sails are the heart of UK-Halsey Sailmakers' business, accounting for half the sails our worldwide group makes. Cruising sailors like Dacron for its durability. No material is tougher. Many of our customers come in with sails over 10 years old looking to "get one more season out them." That's because woven polyester stands up to flogging and the sun's UV rays better than any sailcloth.

The trade-off you make by choosing the durability of Dacron is performance. While a Dacron sail can stay in one piece for more than a decade, it starts losing its aerodynamic shape over time because polyester yarn is relatively



stretchy compared to Kevlar, carbon fiber and other high-tech yarns. Go ahead and use AccuMeasure on your seven-year-old sails and see.



ABSOLUTELY!!'s in-mast roller/furling main.

## Tape-Drive® Cruising

PLATINUM-DRIVE™ cruising sails offer the ultimate in cruising performance. Platinum-Drive™ combines the load-path Tape-Drive construction system with Spectra® to make a durable, strong, and lightweight sail that holds its designed shape well. These sails have been

tested on club cruises, across oceans and around the world. Platinum-Drive is a proven product!

The following is an excerpt from an unsolicited letter written by Phil Lever, the owner of the Oyster 68 ABSOLUTELY!! with a set of Platinum-Drive sails:

The boat has just returned from the United States to Europe and, despite over two years' exposure to harsh sunlight, there has been no deterioration at all in the sailcloth and they have retained their original shape perfectly. They are very easy to trim and fast in all wind conditions and points of sail.

After more than two years hard use, I have a set of sails that still look and perform like brand new. They have proved to be a very worthwhile investment and I would heartily recommend UK's Tape-Drive sails to any cruising boat owner.

The secret of Platinum-Drive is in its Tape-Drive construction. The sail is made with a Spectra laminate for durability and then reinforced with high-strength low-stretch Kevlar or carbon fiber tapes. The grid of high-strength tapes married to the Spectra skin locks in sail shape, eliminates Spectra's tendency to creep, and creates a rip-stop grid that prevents

minor sail damage from becoming a major headache.

Platinum-Drive sails hold their shape so well that many of our customers use the same set of sails for racing and cruising. Another benefit for cruising sailors is that Spectra yarns are white, which gives your sails a more traditional look.



### Other Cruising Laminates

For boats under 35 feet, we offer the same performance at a lower cost using polyester or Pentex® laminates in our Tape-Drive construction. Smaller boats put a lighter load on their sails; therefore, the base laminate does not need all the strength and expense of Spectra-based laminates.

### Racing Sails: Tape-Drive®

UK-Halsey has been dedicated for over two decades to improving and refining what are now the most durable racing sails on the market - Tape-Drive sails.

Tape-Drive marries a grid of high-strength, low-stretch tapes—the structural strength—to a three-dimensionally shaped membrane—the fabric or skin.

The grid carries the primary structural loads of the sail, while the membrane produces aerodynamic lift. The tapes radiate across the sail with a heavier concentration at the predicted high-load areas - the corners and along the leech.

Tape-Drive is a high-tech construction method in which the materials can be varied to suit the specific use of the sail. Depending on the size of your boat and its sail requirements, we select the appropriate membrane material from a



wide variety of custom-designed laminates, using scrims of Kevlar, Spectra, Vectran, Pentex or polyester yarns. Our tapes are reinforced with carbon, Kevlar, Pentex, or fiberglass.

Tape-Drive racing sails have proven that they keep their speed longer than any other high-tech sails.

## Racing Sails: UK FST™

As good as Tape-Drive is for racing sails, UK-Halsey Sailmakers' FST is a higher performance option. Instead of making sails with structural tapes and production laminates, we make the laminate with yarns that are laid along the actual load paths. In the FST process, we design and engineer the laminate and the sail at the same time.

Pictured to the right is a Beneteau 40.7 with a set of Carbon/Aramid UK FST sails. These sails are the perfect answer to all the criteria set forth below.

1. The load bearing materials follow the load map of the sail.
2. The density of the materials varies directly with the load concentration.
3. The materials themselves reflect exactly what the sail designer called for. In this case, the laminate consists of carbon fiber and aramid yarns.
4. Secondary and tertiary loads are handled by the addition of a tri-axial aramid scrim, in this case made of Technora.
5. Sail shape is introduced by the best and most time tested method, cross cut seam shaping.



The range of materials used in UK-Halsey FST sails is extensive. We use five different deniers of aramid yarn, two sizes of carbon fiber yarns, as well as Pentex and fiberglass; tri-axial scrims of two types of aramid and one of fiberglass; three thicknesses of film and even a film with a Dacron taffeta covering for high-performance cruising sails.

Mixing and matching these various materials allow us to engineer exactly the right product for your needs. We can go to extremes by building the sail extra light (fewer, lighter yarns, no scrim, light film) or go in the opposite direction and beef up every aspect of the sail's structure.

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To find out what UK-Halsey' sail is right for your boat, you'll need to get together with a UK rep and talk about your boat, how you use it and what your expectations are. To get an idea of the questions we'll ask, go to How to Buy a Sail link on the UK-Halsey home page ([www.ukhalsey.com](http://www.ukhalsey.com)). Then click on the link for 8 Questions to ask.



# ACCUMESURE

## PHOTO DOCUMENTATION FORM

**Photocopy this form and fill one out for each image shot. AccuMeasure provides places to record this information with each photo. When you print out the photo, these notes and measurement information will appear with the picture.**

Date of photo: \_\_\_\_\_

Which sail is being photographed: \_\_\_\_\_

Apparent wind speed: \_\_\_\_\_

Apparent wind angle: \_\_\_\_\_

Sheet tension: \_\_\_\_\_

Lead block position for the genoa: \_\_\_\_\_

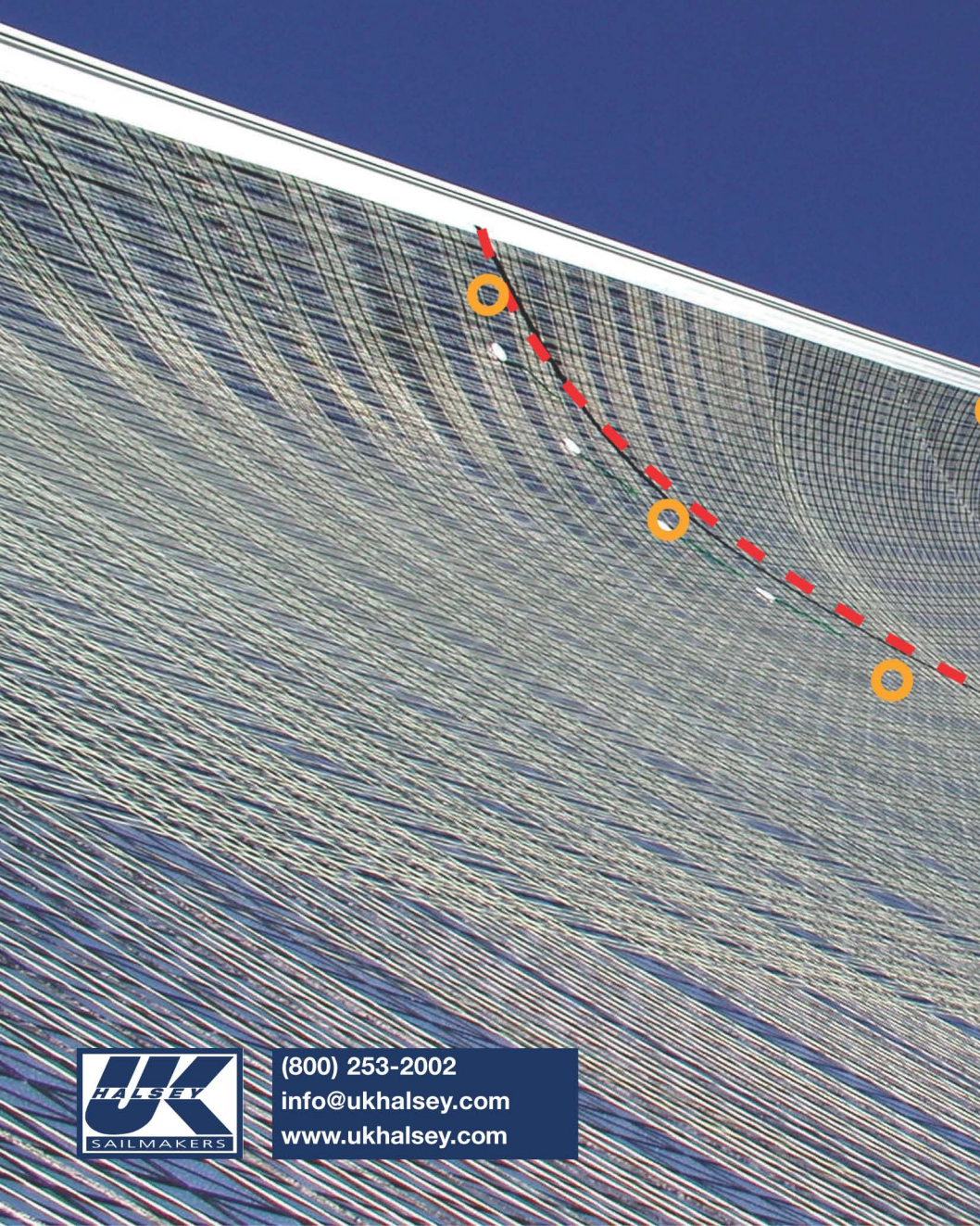
Traveler position for the main: \_\_\_\_\_

Halyard tension: \_\_\_\_\_

Backstay setting: \_\_\_\_\_

“...my beautifully restored boat didn't sail well. She was like an air head instead of a wind ship: all looks and no performance.”

- Dr. Peter VanDorsten  
Charleston, South Carolina



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