

SAILING MANUAL II-IV



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\$4.00

Sailing at UCLA

The mission of the Sailing Program at the UCLA Marina Aquatic Center in Marina del Rey is to develop fundamental sailing skills and foster a love of the sport. Our classes open a doorway into a larger world of sailing and, what is for many, a lifelong pursuit of excellence in the sport.

Using This Manual: Everything presented here will be covered in more detail by your instructor. All these fundamental skills will be learned on the water. This manual is offered as a resource to complement material covered in class. *It is not meant to be a substitute.* **To learn to sail, you must get out on the water and practice.** You cannot be an armchair sailor and master sailing skills by reading this manual alone, but it will help you to review material covered by your instructor or read ahead for the next class. If answers to your questions are not found here, then ask your instructor and/or consult one of the numerous excellent references available. As you read this text, new terminology is bold faced and defined, generally the first time it is used. If you see a term and don't know its meaning, please refer to the glossary.

Sailing is a water sport so prepare to get wet. The wind and the Pacific Ocean are moderating coastal influences. In Marina del Rey, weather conditions range from very warm to quite cool even on the hottest Southern California days, so be prepared for both cool and hot days on the water.

What to Bring:

- Shoes with non-marking (light colored, not black!), non-slip soles
- Sunscreen
- Sunglasses (with Croakies® or cord to keep them on)
- Clothing appropriate for water activity and the expected weather (Dress in layers!)
- Change of clothes and shoes
- Towel and bathing supplies
- Lock (for day-use lockers)

What Not to Bring:

- Valuables (flotation is inversely proportional to value)
- Cell phones, pagers or anything that might be subject to water damage

Provided:

- Personal Flotation Device (PFD)
- Wet suits (free during classes; for rent all other times)
- Rack for keys available in the issue room
- Day-use lockers

Recommended:

- Sailing gloves
- Boat shoes with non-skid, light colored non-marking soles
- Dinghy sailing boots or wet suit booties
- Windbreaker (preferably waterproof)



Marina Aquatic Center

SAILING

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Use the Outdoor Adventures Sailing web site to check the current course schedule, find useful sailing links, more information about the boats we sail and more. . .

Stay connected to the UCLA Sailing community when you're off the water:

Sailing List Server:

Find sailing partners, ask & answer technical questions about sailing at UCLA and hear about the latest happenings at the MAC.

Join on-line at:

<http://lists.saonet.ucla.edu/archives/sailing.html>

Sailing Web Board & Chat Room:

View sailing photos & race results (& post your own!).
Engage in sailing discussions and on-line chats and more!

<http://oa.recreation.ucla.edu>



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Links to all three are on the Outdoor Adventures sailing website at:

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Check the current weather conditions at the MAC:

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Sailing Club

The best deal around for small boat sailing!

Sailing Club members sail for free during rental hours on any boat they have qualified on.

In addition, they also get a 50% discount on scheduled Sailing classes, races and other sailing events.

<http://MarinaAquaticCenter.org/SailClub>

More books and references on sailing and boating are available on our reading list at:

<http://library.MarinaAquaticCenter.org>

TABLE OF CONTENTS

II. PERFORMANCE BOATS		AND TECHNIQUES	
Vanguard 15	26	More Knots	42
Rigging		Tacking a Catamaran	44
Derigging		Gybing a Catamaran	44
Laser	28	Catamaran Balance	45
Rigging		Tiller Extension	45
Derigging		Trapeze	46
Catamarans: Hobie 16	31	Capsize	47
Rigging		Dry Recovery	
Derigging		Catamaran Recovery	48
III. PERFORMANCE TOPICS		Stopping: Heave-To	50
Sail Trim	34	Person Overboard Recovery:	50
Sail Shape	34	Heave-To	
Catamaran Sail Trim	36	Waves	50
Vanguard 15 Tips	37	Strong Wind	51
Laser Tips	37	Sail Selection	
Sailing Theory	38	Reefing the Hobie 16	52
Lift and Drag	38	Kinetics	53
Weather and Lee Helm	38	Assistance on the Water	53
Rudderless Steering	40	Sailing Fitness	54
Headers and Lifts/Lulls and Gusts	40	Environmental Awareness	54
		Chart of Marina del Rey	55
IV. PERFORMANCE MANEUVERS		V. GLOSSARY	56

Written and edited by Carla Thorson, Stephen Orosz and the rest of the MAC Sailing Instructors.
Original Artwork by Rob Tokar

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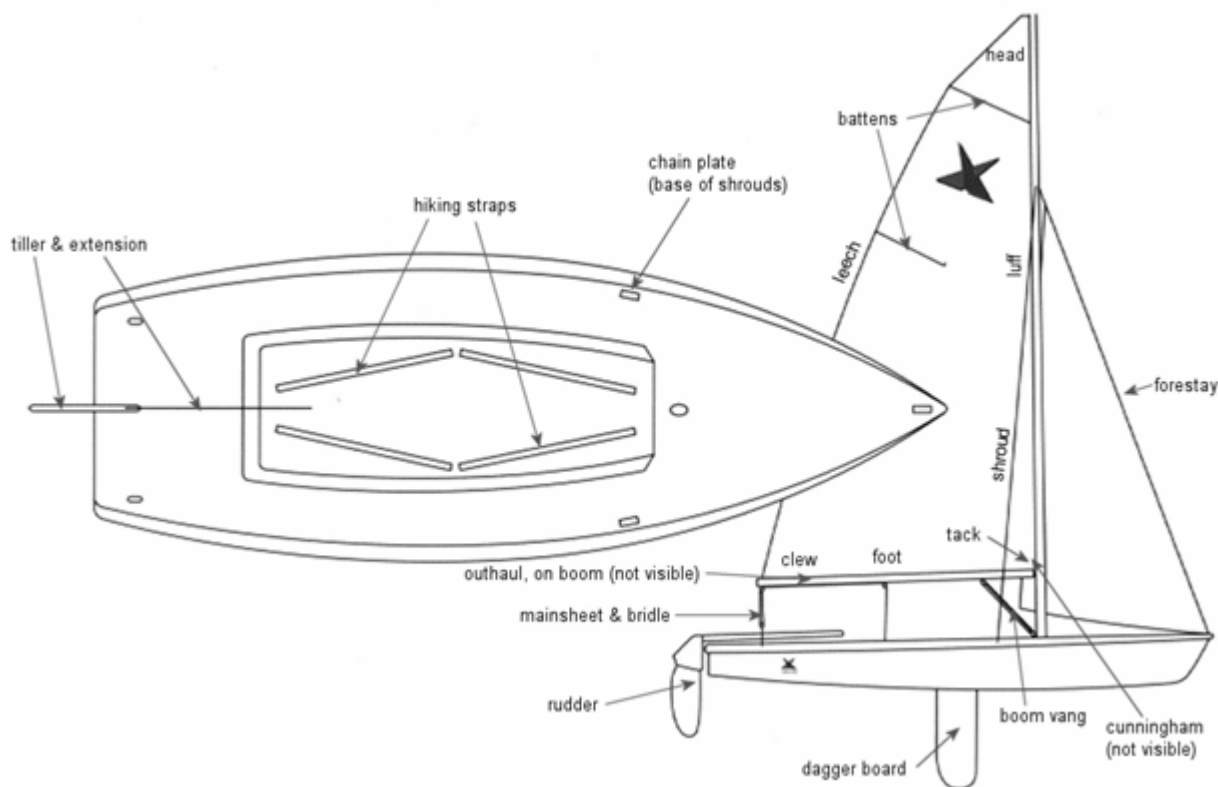
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II. PERFORMANCE BOATS

THE VANGUARD 15: Intermediate and advanced sailors use larger, more powerful, and more challenging boats. The Vanguard 15 is a high performance boat designed to plane easily in moderate air. The wide, flat stern provide good stability and control in all wind and sea conditions. The V-15 is designed to be sailed competitively by crews weighing 260-340 pounds. Higher performance is attained with some additional devices for adjusting and fine-tuning the sails: the **boom vang**, and **Cunningham**. Because the boat is lighter and has more sail area the hiking straps and **tiller extension** are required to maintain control.



Vanguard 15

RIGGING THE VANGUARD 15: The V-15s should be rigged on the ramp then put into the water. While rigging the boat on its dolly, do not climb into it. While rigging, carefully inspect the vessel and equipment to make sure everything is in good working order.

Sail Selection: The Vanguard 15 is equipped with a choice of sails. The full size Regatta sails are issued to crews who have completed Sailing III. The Training sails have a “mini main” that is about 25 percent smaller than the full size main. The Training sails are issued to crews who have completed Sailing II and are also recommended for lighter weight crews sailing in stronger winds. If you are in any doubt as to your ability to handle the conditions, choose the smaller sail.

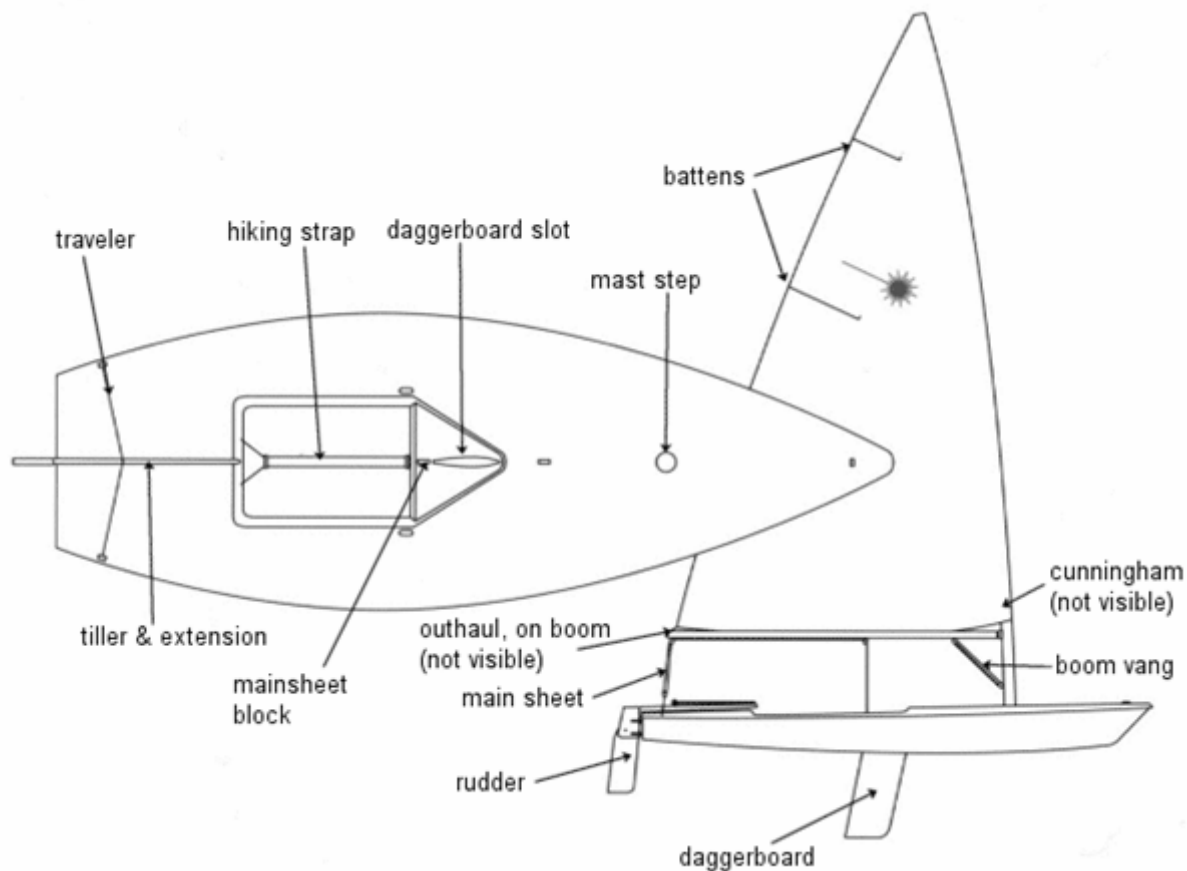
1. **Remove the cover**, roll it and hang it, along with the sail bag, over the railing so they don't blow away.
2. **Feed the mainsail foot** into the track on the boom *from the aft end*. **Attach the outhaul** hook to the clew. **Attach the mainsail tack** using the tack pin. Tighten the outhaul. **Attach the main halyard** to the head of the mainsail. **Feed the mainsail luff into the slot** and cleat it off.
3. **Attach the jib Halyard to the head** of the jib and the tack to the bow fitting. **Lead the jib sheets through the fairleads INSIDE the shrouds (this is opposite from how you did it on the Capris!)**, and secure with figure eight stopper knots in the ends. To keep the sail on deck, sheet in an cleat off the Port jib sheet and tuck the rest of the sail underneath the foot. Don't forget to uncleat the jib before you hoist the sail!

4. **Back the dolly down the ramp.** Ensure the transom of the boat DOES NOT “BOTTOM OUT” at the bottom of the ramp.
5. At the bottom of the ramp, **allow any remaining water to drain from inside the hull, and secure the drain plug** in the stern.
6. **Roll the dolly to the edge of the dock.**
7. **Attach the tiller/rudder assembly** onto the transom of the boat by placing the **pintles** (pins on the transom) into the **gudgeon** (metal fitting on the rudder).
8. **Lift up the bow and put the boat gently into the water.** The trick is to raise the bow until the stern touches the water and is floating, then push the boat out until you can lower the bow into the water. Avoid trying to slide the boat on the dolly until it drops into the water as that can be harsh on the finish of the hull. Tie the painter to the dock with a **slipped sheet bend**. **Never leave the boat unattended** on the windward side of the dock.
9. **Secure the dolly out of the way on the ramp.**
10. **Insert the daggerboard.**
11. **Hoist the mainsail.** Feed the main luff into the track on the mast while hoisting the sail with the main halyard. There is a small stainless steel ring on the main halyard: feed the end of the main halyard through the middle of the cleat, then up through the ring. This will give you added purchase to hoist the sail.
12. **Attach the cunningham**, by passing it through the **cringle** (grommet) several inches above the tack on the mainsail. Tighten the cunningham. NOTE: The “Mini-mains” do not have a Cunningham so skip this step when using them.
13. **Hoist the jib.** Use the block on the halyard to gain additional purchase, and hoist the sail until the forestay goes slack and the jib, itself becomes the forward mast support.
14. **Adjust the boom vang** (system of line and blocks connecting the boom to the base of the mast)

DERIGGING THE VANGUARD 15: Never leave a boat unattended on the windward side of the dock. Once docked, lower the sails, remove the rudder and daggerboard, and get the boat out of the water onto the dolly as soon as possible. The majority of the derigging process should take place on the dock and in the boatyard.

1. **Lower jib the mainsail.**
2. **Remove the daggerboard** and lay it gently in the cockpit.
3. **Haul the boat out of the water onto the dolly.** Lift the bow of the boat as high as possible and walk it back over the dolly. When the boat is as far over the dolly as possible, pull down on the bow and slide the boat forward to the bow stop. Good teamwork makes a big difference here! Secure the painter around the dolly handle, back through the bow shackle and then tie it off to the handle using a cleat hitch.
4. **Remove the tiller/rudder assembly** and place it gently in the cockpit.
5. **Open the drain plug.**
6. **Pull the dolly up the ramp.**
7. **Remove the sails.** If they are wet with salt water, hose them off and lay them to dry over the railing on the ramp with battens on the windward side.
8. **Lay the jib on top of the mainsail** with the battens parallel. **Roll the mainsail and jib together** from head to foot keeping the leeches even so as not to bend the battens. This can be done either inside the boathouse, or on the boat. NEATNESS COUNTS!
9. **Wrap the jib sheets around the rolled sails** in a series of loose half-hitches and put the sails in the bag. Return it to the issue room.
10. **Rinse the boat and all rigging with freshwater.** Dry off the deck with boat towels.
11. **Straighten out all lines in the boat.** Lay the daggerboard in the cockpit under the hiking straps with the handle on top of the mainsheet block. Lay the rudder and tiller in the aft part of the cockpit under the hiking straps. Secure the halyards so that they will not bang against the mast. **On the port side, connect the main halyard ball and the jib halyard purchase to the jib halyard shackle and hook them outside the shrouds behind the spreader tip. Take up the slack by cleating the jib halyard pennant. On the starboard side, hook the tail of the main halyard outside of the shrouds and behind the spreader tip and take up the remaining slack and cleat it off.**
12. **Put the cover over the boat, and back the dolly into the boatyard.** Return all equipment, wetsuits, PFDs and the completed “Vessel Inspection Checklist to the Dockmaster. Ensure that any new damage is noted and the Dockmaster initiates a Repair Request.

LASER: An Olympic class single-handed dinghy, the Laser is arguably the most popular racing dinghy in the world. Many of the best sailors in the world learned on Lasers. With a large mainsail and a lightweight hull, the Laser is capable of planing over the water and reaching great speeds. It is highly responsive and a lot of fun to sail. Once you learn to sail a Laser, you never need wait for crew again to go sailing.



Laser

RIGGING THE LASER: Do most of the rigging for the Laser in the yard, and only move it onto the dock and into the water when you are ready to sail. While this may seem like a lot of complicated steps, rigging a Laser is really quite straightforward — the main difference from other boats you may be used to is stepping the mast. With a little practice you should be able to rig and be off sailing in a very short time.

Sail Selection: The Laser is equipped with a choice of rigs for different weight sailors. The Standard rig is designed for sailors weighing 130 pounds and up. The Radial rig is designed for sailors weighing 120 to 150 pounds. As you can see, there is some overlap. Generally speaking, in light winds most people should be able to handle the Laser Standard rig but as the wind increases, lighter weight sailors may need to switch to the smaller Radial rig. If you are in any doubt as to your ability to handle the conditions, choose the smaller sail.

The Standard rig uses a sail with approximately 76 square feet of sail area. The Radial rig uses a shorter, bendier lower mast section and a sail with approximately 62 square feet of sail area. When selecting your sail make sure that you also select the correct lower mast section. The Standard and Radial sails are on separate parts of the sail rack and labelled accordingly. The Radial lower mast sections are noticeably shorter than the standard sections and they also have three red stripes and the letter “R” above the boom vang tang for easy identification. Both rigs use the same topmast section and are rigged identically.

When rigging, thoroughly inspect your equipment to make sure everything is in good working order. You can use the lawn or the deck of your Laser or even the carpet inside the boathouse (if there is room) for rigging up your sail.

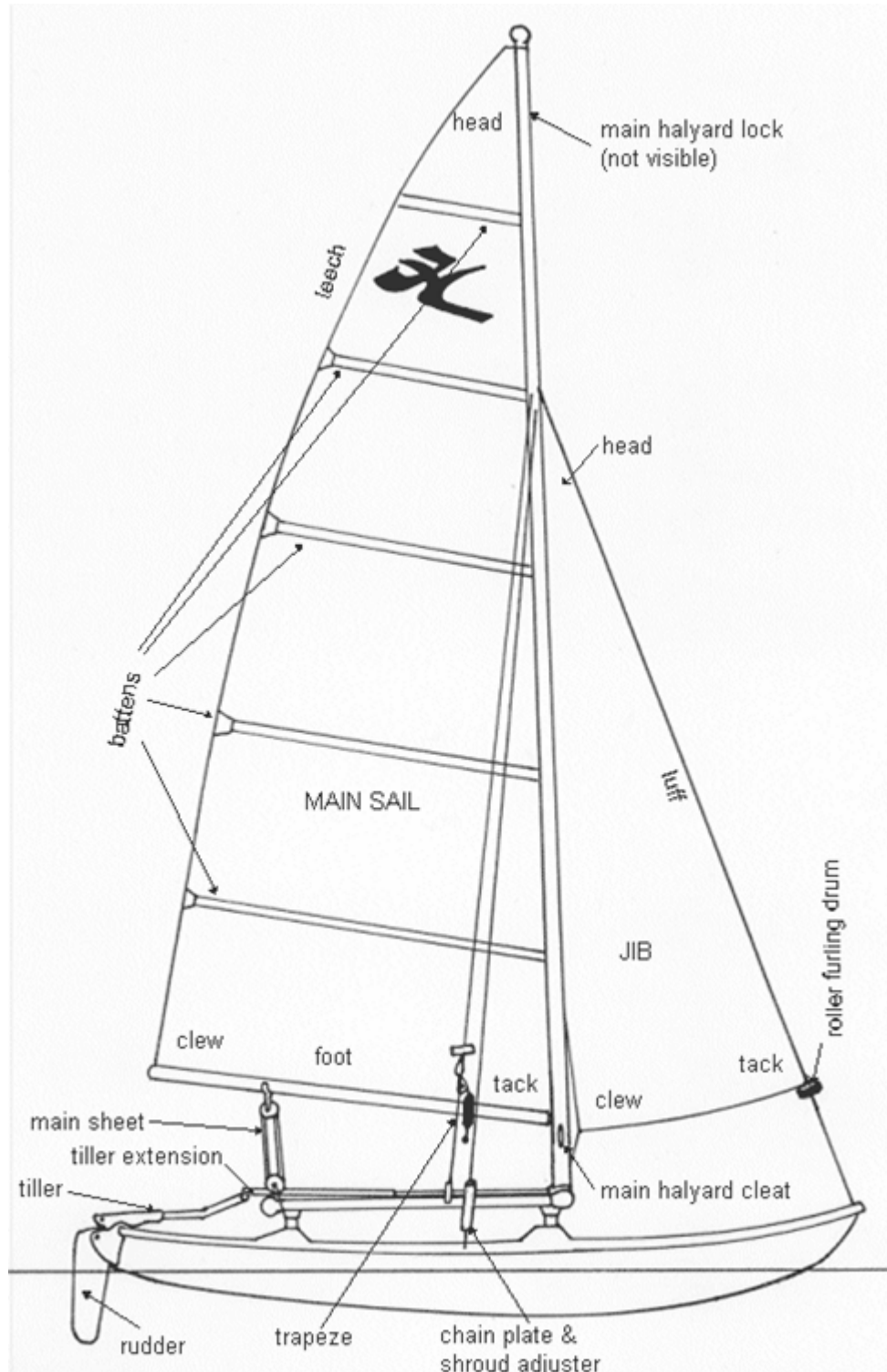
1. **Select a boat from the rack.** Inspect your boat carefully before you pull it down. Pay particular attention to the line holding the hiking strap as well as all the fittings and fairleads on the deck and any damage to the hull. **Lower the boat onto a dolly.** Ask for help if you need it – it's much better than dropping the boat on your head! Leave the stern dolly (the wood piece with two wheels) in the slot the boat came from.
2. **Select the spars (mast sections & boom) you will be using.** Ideally all three spars will have the same number as this helps ensure everything fits together properly. Inspect all the line and fittings on your equipment to make sure everything is in good shape!
3. **Insert a top mast section into a bottom section, aligning the rivet/black lines with the gooseneck** (failure to do this can cause the top mast section to break in half, ruining the mast and tearing the sail — it will be extremely difficult to sail if this happens).
4. **Slide the sail onto the mast.** Ensure the body of the sail is on the same side as the gooseneck.
5. **Uncoil the boom vang and cunningham lines.** Pass the cunningham line through the cringle.
6. **Lay the boom** on the deck of the boat and **Uncoil the mainsheet and pass it through the mainsheet block.** Make sure you run it through the right way! When you sheet in you should hear a clicking sound from the ratchet, if you don't and the block is only turning one way you will have a hard time sheeting in.
7. **Tie a Figure-Eight stopper knot in the mainsheet so the boom won't go out much past 90°.** Do not just tie the knot near the end! Your instructor will be able to show you why this matters.
8. **Clip the brummel hooks (sister clips) on the boom block and the traveler block together.**
9. **Place a rudder, daggerboard, tiller & extension in the cockpit.** Don't drop your blades—they will break! Some of the tillers and extensions are different sizes. Generally you should take the longest that you are comfortable with. If you still find the tiller extension a bit of a challenge start with one of the shorter ones until you get more comfortable on the Laser.
10. **Lay the mast on the deck, with the masthead pointing aft** (there is a reason for doing it this way, ask your instructor. . .).
11. **Wheel the boat and all your gear down the ramp to the dock.** Make sure the stern of the boat doesn't "bottom out."
12. **Check for any remaining water draining from the hull, and insert drain plug** in the transom.
13. **Lay the mast on the ramp** until you have the boat in the water.
14. **Insert the rudder pintles into the gudgeon and insert the tiller into the rudder head.** Make sure the tiller goes underneath the top traveler line. **Tighten and cleat the rudder downhaul line.**
15. **Put the boat in the water.** Just like with the Vanguards, lift the bow until the stern is floating in the water and then push the boat out until you can lower the bow gently into the water. Tie the painter to the dock with a slipped sheet bend. Stow the dolly out of the way on the ramp.
16. **Insert the daggerboard into the slot.**
17. **Stepping the mast** can be difficult until you master the technique, especially in strong winds. If you are uncertain of your ability to control the mast then **GET HELP!** If you lose control of the mast you can hurt yourself, someone else, or the boat. **Point the head of the mast into the wind** (this is why you wanted to lay the masthead pointing aft on the boat — so it is already pointing into the prevailing wind). **Stand on the dock next to the mast step. Raise the mast, allowing the wind to do most of the work.** Keep a wide stance for balance, hold the mast with one arm high over your head, the other low, braced against your torso for leverage and the butt of the mast on the dock. **Raise the butt of the mast vertically** and move it over the mast step. Use your legs, not your back. **Carefully lower the mast into the mast step.** This is where two people can really help to stabilize the mast and boat and to guide the butt into the step.
18. **Pick up the aft end of the boom and attach the outhaul to the clew.** It helps to stand with your back to the wind and hold the boom and clew under one arm leaving the other free to hook up the outhaul. **Place the forward end of the boom onto the gooseneck.**
19. **Insert the boom vang key** into the slot on the boom. Adjust the boom vang. **Adjust the outhaul.**
20. **Pass the cunningham from the sail, around the boom, back through the cunningham grommet and then through the deck fairlead and then the deck cleat. Secure the daggerboard bungee.**
21. **Check your rigging.** Make sure the mainsheet is running free and the tiller is clear. Adjust your sail controls for the expected wind conditions (Cunningham, Outhaul, Boom Vang, and Traveller).
22. **Check for traffic. Untie the painter** from the dock and secure it around the mast. **Cast off. Sail!**

DERIGGING THE LASER: To protect the boat and equipment it is important that you get the sail down and the boat out of the water without delay. Once the sail is down and the boat out of the water you can then take your time with derigging. While derigging note any damage that may have occurred while sailing and report it to the Dockmaster.

1. **Detach the boom.** First, release the boom vang by loosening it and then sliding the vang key out of the slot on the boom. Pull the boom from the gooseneck pin and disconnect the outhaul from the sail. Lay the boom on the deck.
2. **Untie the cunningham** and pull it out from the cleat and the fairlead.
3. **Undo the daggerboard bungee.**
4. **Carefully lift the mast vertically until the mast butt is clear of the mast step and lower the mast head towards the water so anyone behind you does not get hit on the head. Then lay the mast on the ramp.** If you had trouble raising the mast on your own, then **get help to lower the mast.**
5. **Remove the daggerboard** and lay it in the cockpit—not on the dock!.
6. **Get the dolly in position and slide the boat onto it.** The easiest way to get the boat out of the water is to lift at the bow as high as you can and walk the boat back over the dolly (the stern is still floating in the water at this point). Once you've gotten the boat over the dolly as far as you can, pull down on the bow and then slide it forward the remaining distance.
7. **Remove the tiller and rudder** and lay them gently in the cockpit.
8. **Undo the drain plug.** Hook it under the traveler. If you don't, the drain plug will catch and break off when you slide the boat onto the rack.
9. **Rinse off the boat, the blades, and the spars.**
10. If the sail is wet with salt water, **rinse it with fresh water**, and drape the sail over the railing with the battens on the weather side so it won't blow away.
11. **Wheel the boat up the ramp** making sure the stern does not bottom out.
12. **Coil all the lines: mainsheet, cunningham, and boom vang.** Leave enough slack in the mainsheet so you can hang the coil on the aft end of the boom.
13. **Wipe dry all blades and spars** before placing them in the rack.
14. **Install the stern dolly and slide the boat back onto the rack.** Get help if you need it! The boat is liable to be wet and slippery and you may be tired from your sail so don't risk dropping the boat and getting hurt or damaging the boat.
15. **Fold the sail using an accordian fold** in the boathouse on the carpet, and return it to the sail rack. Make sure you haven't forgotten anything. Make sure any damaged or worn equipment is reported to the Dockmaster. Now it's time to hit the showers.

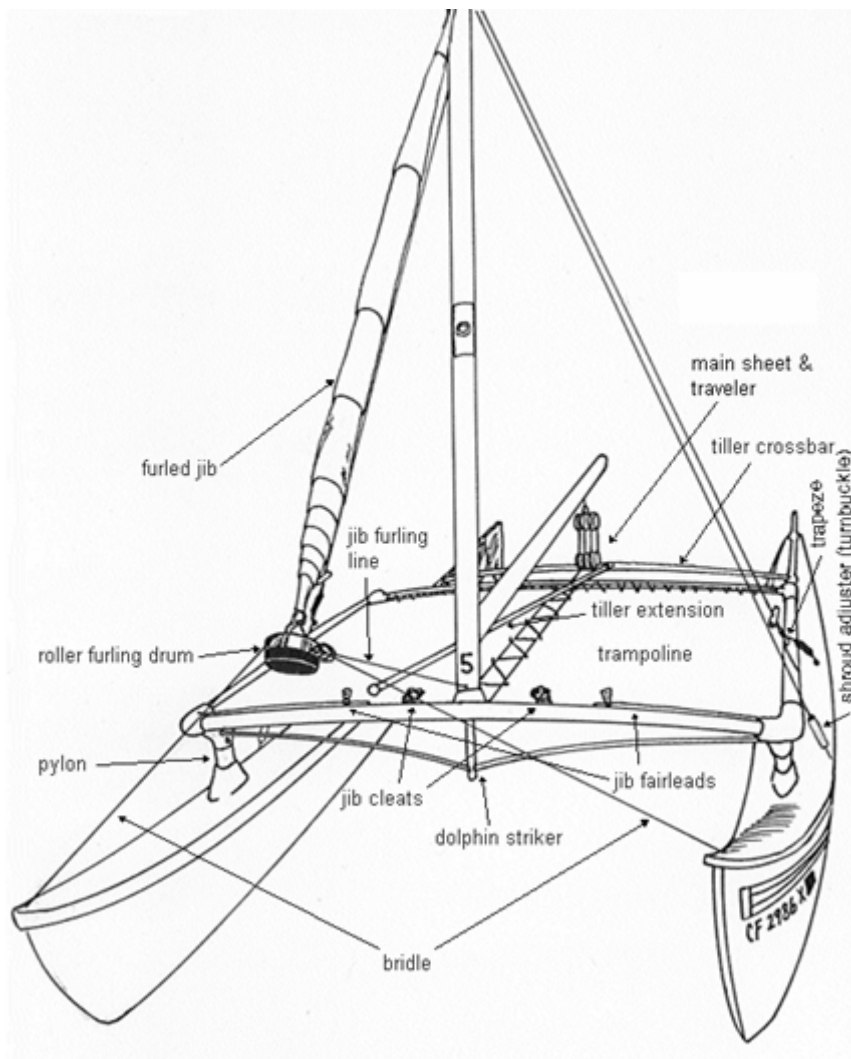
CATAMARANS: **Hobie 16's** are exciting boats. With two asymmetrical hulls, they are lighter and faster than monohulls, but without a centerboard they are less maneuverable than a racing dinghy like the Vanguard 15 or Laser. The basic sailing principles are the same, but catamarans also require that you learn some special techniques for maneuvering, sailing efficiently, and capsize recovery. They also have some different rigging arrangements: a **roller-furling jib** (a mechanism for wrapping the jib around the forestay), an adjustable **traveler** (sliding car for the main sheet block), and a **full-battened** mainsail.

While rigging, carefully inspect your equipment to make sure that everything is in good working condition.



RIGGING THE HOBIE 16: Prepare the boat for launching in the boatyard, and then complete rigging once the boat is in the water. Do not climb onto the boat while it is on the dolly. While the boat is tied up on the windward side of the dock, one person should hold the boat to keep the hull from banging into the dock.

1. **Get the sails and tiller extension. Remove the cover** and hang it with the sail bag on the sail rack.
2. **Attach the tiller extension to the tiller crossbar** (a bar connecting both rudders).
3. **Uncleat the main sheet and traveler** and disconnect the main halyard from the outhaul at the aft end of the boom.
4. **Remove the boom from the mast and lay it across the trampoline.**
5. **Unroll the mainsail.** Make sure that the battens are securely inserted into the plastic pockets on the luff and tension the batten caps so they stay secured.
6. **Feed the foot of the mainsail into the track on the boom. Attach the tack** of the mainsail using the tack pin. **Attach the outhaul** to the clew.
7. **Attach the main halyard to the head of the main** and feed the first few inches of the main into the luff track.
8. **Back the dolly down the ramp.** One person should use the line at the front of the dolly to steer the boat carefully down the ramp. At least one person should place both hands on the aft crossbar of the trampoline and help keep the boat moving slowly backward.



9. **Allow any remaining water to drain from the two hulls and replace both plugs.**
10. **Roll the dolly** to the edge of the dock. **Detach the dolly** tie downs which hold the two hulls at the **pylons** (metal supports which attach the trampoline to the hulls).
11. **Lower the rudders.** With one hand lower the rudder and hold it firmly down, with the other hand firmly press the tiller down until the rudder locks in the cam. **Do not slam the tiller crossbar into the cam;** it should lock easily with a little pressure.
12. **Slide the boat into the water.** Tie the **righting line** (green knotted line attached to the mast for uprighting a capsized Hobie Cat) to the dock.
13. **Stow the dolly out of the way on the ramp.** Place a front wheel over the edge.
14. **Adjust the battens at the leech** and make sure they are fully inserted in the plastic pockets at the luff.
15. **Hoist the mainsail.** One person feeds the bolt rope of the mainsail smoothly into the luff track on the mast while the other hoists the sail.

When the mainsail is completely hoisted, clip the **swage** (metal slug) on the halyard below the v-shaped halyard catch at the top of the front edge of the mast. Note: you may need to stand on the hull to do this. Cleat the main halyard on the starboard side of the mast.

16. **Adjust the downhaul** and cleat it. **Adjust the outhaul,** cleat it, and tie excess line out of the way.
17. **Unfurl the jib when ready to launch.** Release the furling line and pull one of the jib sheets to unfurl the sail which is wrapped around the forestay.

DERIGGING THE HOBIE 16: Do not leave a catamaran unattended on the windward side of the dock. Remember to prevent the hull banging into the side of the dock. Furl the jib (ideally while you're still sailing downwind before you get to the dock), lower the mainsail and get the boat out of the water as soon as possible.

1. **If the sails are wet with salt water, rinse them** with freshwater.
2. **Furl the jib** — the jib furls best when you do it while sailing down wind before you get to the dock. It's easier and one less thing to do at the dock too. Make sure only the UV sail cover that is sewn on the leech and foot is all that shows of the jib. The furling line should not be too tight — it's not a guitar string!
3. **Lower the mainsail.** Uncleat the main halyard and pull it down and forward until the swage releases from the halyard lock.
4. **Haul the boat out of the water onto the dolly.** You need at least 2 people (preferably more). Bring the dolly down to the edge of the dock. Bring the boat upwind from the dolly. Turn the boat perpendicular to the dock. Center the bows of the boat on the dolly and lift the hulls out of the water onto the dolly.
5. **Lift the tiller crossbar up to unlock the rudders and raise them.**
6. **Attach the dolly tie downs around the aft pylons.**
7. Pull the dolly up the ramp until the boat is angled sharply. **Remove the plugs and drain any water in the hulls.** Leave the plugs out. **Attach the forward dolly tie downs** around the pylons.
8. **Pull/push the boat up the ramp to the staging area.**
9. **Slide the boom off the mainsail.**
10. **Stow the main halyard and secure the boom** on the mast with the main halyard attached to the outhaul. Secure the mainsheet and traveler.
11. **Rinse the boat thoroughly with freshwater.**
12. **Ease the batten pocket lines. Roll the mainsail** starting with the second batten from the head.
13. **Straighten out/coil all the lines on the boat. Replace the cover.**
14. **Park the boat and dolly into the boatyard.** Return the mainsail to the sail rack and the tiller extension, wetsuits and PFDs to the gear cage. Ensure that any new damage is noted and the Dockmaster initiates a Repair Request.

III. PERFORMANCE TOPICS

The performance topics discussed below are presented with the assumption that you have already mastered basic sailing skills and have reviewed the material presented in the first section of this manual. Please refer to or review the Basic Sailing Skills section if you have questions about any basic maneuvers or boat handling before attempting any of the techniques discussed here.

SAIL TRIM: The first step to sailing efficiently is to make sure your sails are trimmed at the proper angle so that the wind flows smoothly over both sides of the sail (**angle of attack**). For every point of sail, there is a perfect angle of attack. Sails can be either perfectly trimmed, oversheeted (stalled), or undersheeted (luffing). It is easy to tell when your sails are luffing, but it may be difficult to tell if your sails are stalled.

***Rule of thumb:** *When in doubt, let it out!*

Use the telltales to adjust your angle of attack. Telltales attached to the sail are good indicators of the wind flow over both the windward and leeward sides of your sail. The telltales on the leading edge of your jib generally catch the wind first and are the best way to judge your sail trim on any particular point of sail. Remember that the mainsail and jib should be trimmed similarly.

- **Perfect trim:** Both telltales are parallel and flow straight back.
- **Oversheeted:** Telltales may look perfect or the telltales may lay limp.
- **Undersheeted:** The windward telltale flows straight back, while the leeward telltale luffs or dances about.

Remember: Sheet toward the direction of the luffing telltale.

—If the windward telltale is luffing, sheet in.

—If the leeward telltale is luffing or limp, sheet out.

—If the telltales don't seem to be responding to the wind, ease out the sail until it luffs and sheet in until it stops.

**Also, note that when sailing close-hauled, your sails will already be sheeted in tight, so if the windward telltale luffs, the boat is too close to the wind and you need to adjust the angle of attack by falling off.*

SAIL SHAPE: Aside from angle of attack, there are other aspects of sail shape that are adjustable and will affect the performance of the boat. The three important features of sail shape are:

- **Depth:** The fullness of the sail determined by its deepest point.
- **Draft Position:** The location of the sail's deepest point.
- **Twist:** The amount the angle of attack changes as you look up the sail from bottom to top. Less twist means the leech has a similar curvature all the way up the sail. More twist means the leech curves inward at the bottom and twists open toward the top.

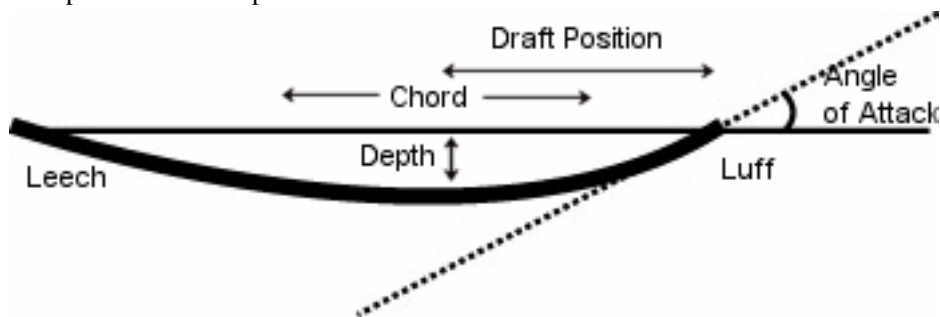


Figure 1 - Draft Position

Different points of sail and different wind speeds require slight variations in the depth, draft position and twist of the sail in order for the boat to sail as fast as possible. Shaping the mainsail is achieved with 5 basic controls. Three you already know:

1. **Main sheet** controls the angle of attack.
2. **Main halyard** adjusts the luff tension.
3. **Outhaul** tightens the foot.

Two additional controls found on the Vanguard 15s and Lasers are:

4. **The cunningham** is a line attached to a cringle in the mainsail a few inches above the tack (an alternative to the Holder 14 and Hobie 16 downhaul which serve the same function). The cunningham and the main halyard combine to control luff tension.
5. **The boom vang** is a system of line and blocks connecting the boom to the base of the mast, and its most obvious function is to prevent the boom from rising (particularly useful when gybing). It also controls twist by tightening the leech.

Adjusting the mainsail: Using these controls, three basic adjustments can be made: draft depth, draft position, and twist:

- **Depth:** The outhaul affects the draft depth in the lower half of the sail. As you tighten the outhaul the depth decreases in the lower half of the sail. The cunningham also decreases depth in the upper part of the sail, flattening the sail as it is tightened.
- **Draft Position:** The main halyard and the Cunningham (or the Downhaul on the Holder 14 and Hobie 16) affect draft position. As you tighten the cunningham, the draft moves forward.
- **Twist:** The main sheet primarily controls twist upwind. As the mainsail is sheeted in the leech also curves inward reducing twist. The boom vang takes over the main sheet's job when sailing downwind, As the main sheet is eased out, the boom vang takes over and keeps the leech curved inward. The tighter the boom vang, the less twist on reaches and runs.

Unfortunately, there are no exact rules for sail shape, only some basic principles which are outlined here (consult numerous excellent references for more information on applying these principles):

Adjusting Depth:

1. In very, very light air, the sail should be very flat (tight cunningham and outhaul).
2. In light air, the sail should be deeper (ease cunningham and outhaul).
3. As the wind increases, the sail should be flattened (tighten cunningham and outhaul).
4. When sailing downwind, the sail should be deepened (ease cunningham and outhaul).

Adjusting Draft Position:

1. In light air, the draft should be further aft in the sail (cunningham eased).
2. As the wind increases, the draft should be moved forward (cunningham tightened).
3. When sailing downwind, draft should be aft and deepest in the bottom of the sail (ease cunningham, but mostly ease outhaul).

Adjusting Twist:

1. In light air, reduce twist. (The sail should not twist open at the top; tighten the boom vang.)
2. As the wind increases, less twist (tight boom vang and main sheet) gives the boat more power, but greater twist can help reduce heeling (easing the main sheet and/or the boom vang). At the same time, if the top of the sail is twisted open it decreases the angle of attack up high, so the ability to point the bow upwind decreases. There are always tradeoffs. On a Laser when beating in strong winds, a tight vang keeps the mainsail from getting too full, and thus overpowered, when sheeting out in gusts
3. When sailing downwind, reduce twist (Keep the boom vang tight).

Adjusting the Jib: The jib, too, has angle of attack, depth, draft position and twist. The same principles of sail shaping listed above apply to the jib, but it is not as easy to adjust this sail's shape.

1. The jib sheet adjusts the angle of attack and (with adjustable fairleads) also controls depth.
2. The jib halyard controls luff tension (very important on the Vanguard 15, hence the added purchase) and, to a degree, draft position. On the Hobie 16's little adjustment is possible, but the same rules for the mainsail apply.

Catamaran Sail Trim: Just as in the monohulls, pay attention to the telltales. Keep them flowing smoothly and follow the same principles for sail shape discussed above. Three controls on the catamaran are different from those found on the Holder 14, Vanguard 15, or Laser.

1. There is no boom vang on the Hobie 16, but the **main traveler** controls the boom and sail twist even more effectively. As you fall off, ease out the main traveler rather than the main sheet so that the mainsail maintains its shape and reduces twist. Keep an eye on the telltales attached to the leech of the mainsail to make sure that they are all flowing smoothly from head to foot. Generally, if the uppermost telltale is not flowing smoothly, there is too much twist. So, ease out the main traveler a little and sheet the mainsail in a little to reduce twist.
2. The Hobie 16 mainsail also has **full battens** which help hold the sail shape and reduce twist. The battens are adjustable: the tighter the battens are in the pockets, the rounder and deeper the sail will be. Tighten the battens in light air and ease them in heavy air. Keep the top batten tight in its pocket to reduce twist. When sailing in choppy seas, tighten the battens for more power. When sailing in flat seas, loosen the battens.
3. The jib sheets are led through **adjustable fairleads** which adjust laterally (**athwartship**). This lateral adjustment controls the angle of attack, depth, and twist of the sail. Move them in toward the mast when sailing upwind and out when sailing downwind.

Learn more about Hobie 16s from the **International Hobie Class Association** <http://www.hobieclass.com>

VANGUARD 15 TUNING TIPS —

Rig Tension. Set up the rig tension for light to moderate wind conditions by having the lighter member of the crew use their weight on the jib halyard purchase. Have the heavier crew member do the same for moderate to breezy conditions. The tighter the rig, the flatter the jib and the less **weather helm**. Watching the leeward shroud is another way to judge rig tension. While sailing upwind the shroud should be just starting to go slack when eased and footing. The shroud should go completely slack when the mainsheet is trimmed hard.

Jib Trim. A general guideline is to trim the jib sheet until the seam between the two leech battens is pointing straight aft. Look under the boom to sight the battens on the jib leech, once set hike out and see how the top batten looks through the spreader window.

Main Trim. Set the outhaul so the foot of the main is almost touching the boom. A general outhaul setting is with the foot of the main about 3.5" from the boom. Ease out to about 4.5" in light wind and lumpy seas. In heavy wind tighten the outhaul until the main is 2.5" off. Adjust the main halyard and/or Cunningham until there are only slight wrinkles in the luff. In heavy air there should be no visible luff wrinkles. Tension the boom vang until the boat does not feel overpowered — which can be a lot in strong winds. Vang tension can be critical since it also bends the mast and affects the power and fullness of the main. In winds over 17 knots the total vang purchase should be tensioned by 3 inches.

Centerboard Adjustments. Leave the board all the way down in most conditions. Raise the board to dump power in a breeze and if you want to plane upwind. Raise the board as the wind increases from 1 inch in 16 knots to 3 inches in 20 plus knots of wind. To plane upwind ease the sheets some (the boat will point 15 –20 degrees lower). You will also need the vang tensioned hard as well as the centerboard raised.

Learn more about Vanguard 15s from the **Vanguard 15 Class Association**: <http://www.v15.org>.

LASER TUNING TIPS —

The Laser sail can be very full or very flat and you can set the sail up by using “guidelines” or by the feel of the boat. As you develop in skill you will become more adept at the second method. These are just the basics — there is a huge volume of information about Lasers available from the internet and many books.

Cunningham. When sailing upwind use the Cunningham as a “wrinkle remover” (as the mast bends, wrinkles appear along the luff so pulling on the Cunningham smoothes out the sail and moves the draft back where it belongs) until it gets breezy. In a strong wind more Cunningham opens the leech at the top and depowers the sail. Downwind, except on power reaches it should be all the way off.

Boom Vang. In light air take the slack out of the vang when the main sheet traveler blocks are about one inch apart. When it is windy, more vang is needed so it bends the mast and flattens the sail (like the mainsheet). Upwind, a very tight vang is needed so when the sheet is eased it allows the boom to move to leeward without allowing it to rise which is necessary to depower. Downwind ease the vang until the mast straightens up (or nearly so). A tight vang has a number of drawbacks downwind.

Outhaul. The initial adjustment should be with the foot four to eight inches from the boom (about the distance from one’s extended thumb to pinkie). If there is too much weather helm (boat is hard to steer) it is too loose. If the boat lacks power, it is too tight. A common mistake is having the outhaul too tight when it is really windy which opens the bottom leech too much. Easing it about an inch will make the bottom leech more parallel to the wind when easing the sail in gusts. Downwind easing the outhaul too much will disturb the air flow — the loosest outhaul would only be used in about 10-14 knots and chop.

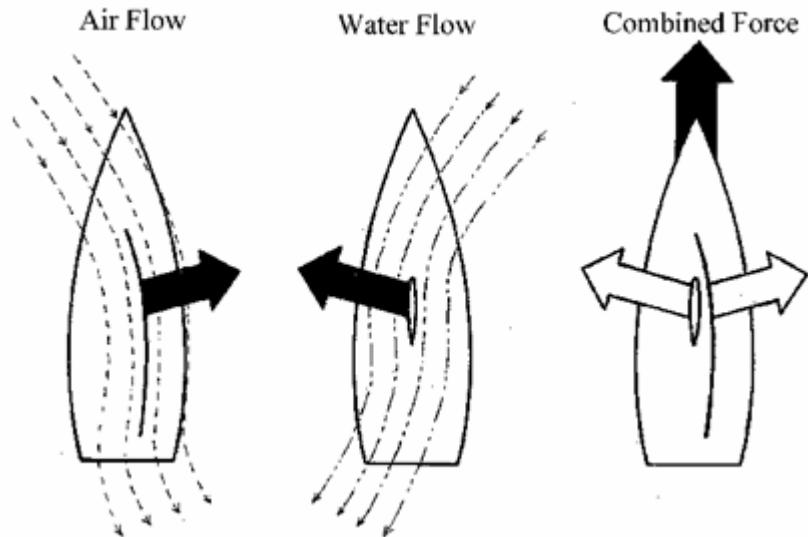
Daggerboard. Keep it all the way down upwind. Raise it slightly if overpowered when it is windy. Raise the board the highest on planning reaches. On a run the board should be about half way up. Leaving the board down on windy runs makes it more difficult to maintain control.

Learn more about Lasers by joining the **International Laser Class Association**: <http://www.laser.org>.

SAILING THEORY: To be a good sailor, you need not completely understand how a sailboat works, but at some point, every sailor wonders. The answer is complicated and a full explanation, for those with an appetite for it, can be found in the numerous excellent references available. Only a brief description is offered here.

Lift and Drag: The basic forces that affect the motion of a sailboat are wind over the sails (lift) and water over the centerboard (drag). When a sailboat is moving downwind, the forces that affect it are pretty obvious. The wind pushes against the sails, pushing the boat downwind. However, once a sailboat turns and tries to sail at an angle to the wind, the dynamics get more interesting.

Sails are **airfoils** (wings) and the forces which allow birds and airplanes to fly are similar to those which make sailboats move upwind. A simple airfoil generates lift. For example, when you put your hand out the window of a moving car with your palm facing forward, it gets pushed backward by the wind. But when you rotate your hand into the wind, tipping your palm downward, you feel your hand begin to lift up. Lift is generated by wind passing both above and below your hand. As you twist your hand, the wind traveling above your hand speeds up relative to the wind traveling below your palm. The area above your hand is a low pressure area and the area below is a high pressure area. Lift is created when a low pressure area is adjacent to a high pressure area. Sails work much the same way. As the wind passes over both sides of the sail, a low pressure region is established on the leeward side of the sail and high pressure is established on the windward side of the sail. The net effect of this circulation is that the wind on the leeward side accelerates in the low pressure region to leeward while the wind on the windward side of the sail slows down, creating lift to leeward.



Air & Water Flow

An Underwater Foil System: If airflow over the sails were the only force involved in sailing, then sailboats would slip sideways as well as move forward. A sailboat, however, has wings both above and below the water. The centerboard and rudder act as a counter-foil to the sails. As the boat is lifted to leeward by the wind passing over the sails, the moving water is diverted by the centerboard just as the sail diverts wind. Like any other wing, the water passing over the backside of the centerboard and rudder speeds up relative to the water passing over the front side. But, the backside (low pressure region) of the centerboard and rudder is actually the windward side of the boat, while the front side (high pressure region) is the leeward side of the boat. So, the resulting difference in water pressure pulls the boat forward and sideways—but in the opposite sideways direction of the sail force. The sails lift the boat to leeward while the centerboard and rudder lift the boat to windward. The two forces combined make the boat go forward. A sailboat is literally "sucked" upwind.

The asymmetric shape of the hulls on the Hobie 16 make a daggerboard unnecessary since the flat inner side of the hulls helps reduce leeway (slipping to leeward). This hull shape makes for a versatile and durable boat. However, catamarans that have daggerboards generally will have better upwind performance and overall hull speed than those with asymmetric hulls.

Weather and Lee Helm: Helm is a technical term referring to the balance of forces affecting the rudder. If the boat has a tendency to fall off and the Skipper often needs to push the tiller toward the sails to keep a straight course, the boat has **lee helm**. If the boat sails straight without keeping any constant pressure on the tiller, the boat has a **neutral helm**. If the boat has a tendency to head up and the Skipper must pull the tiller slightly away from the sails to maintain a course, the boat has **weather helm**.

Slight weather helm makes the centerboard/rudder foil system more efficient. Moreover, if the boat is unmanned, it will turn into the wind and stop, so most boats are designed intentionally with a slight weather helm. You can check this by setting a course, trimming the sails properly, and letting go of the tiller; it will swing toward the sail and the boat will head up.

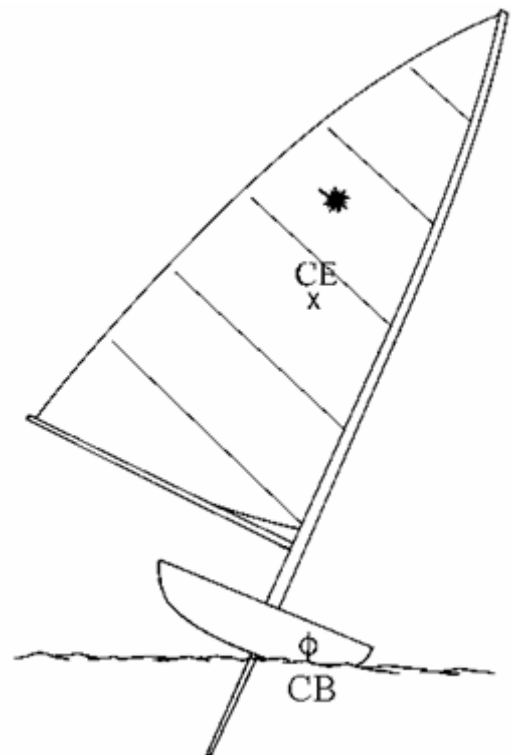
Slight weather helm when sailing upwind and slight lee helm when sailing downwind can prove advantageous and improve your boat speed, while too much weather or lee helm can cause problems. There are ways to change the helm, but to understand how, you need to have a basic idea of the forces on the boat above the water as they relate to the forces under the water. The two parts of this relationship are the **Center of Effort** and the **Center of Lateral Resistance**.

The **Center of Effort (CE)** refers to the focal point of the wind's pressure on the sails (mainsail and jib together). The center of effort, in a boat with sails trimmed properly, is about midway up the mainsail not far astern of the luff. The **Center of Lateral Resistance (CLR)** is the focal point of resistance to the force of water on the boat which keeps it from slipping sideways. It is about midway down the centerboard and slightly closer to its aft edge. When the CE is directly above the CLR, the boat will have neutral helm. When the CE is aft of the CLR, the boat will have weather helm. When the CE is slightly forward of the CLR, the boat will have lee helm.

There are several ways to alter the relationship between the CE and the CLR while sailing:

- **Raking the mast forward** will move the CE forward. This can be done by increasing tension on the jib halyard (which rakes the mast forward).
- **Raising the centerboard or daggerboard** will move the CLR toward the stern, reducing weather helm. (Useful when sailing downwind.)
- **Altering the trim of your sails** will affect the helm. If you sheet out the mainsail (leaving the jib trimmed properly), the CE moves forward toward the jib and weather helm decreases. So, sheeting out the mainsail makes the boat fall off more easily. The opposite is also true: sheeting out the jib (leaving the mainsail trimmed properly) will increase weather helm and cause the boat to head up more easily.
- **Shifting your weight** toward the stern will move the CE toward the stern. This will, in a sense, rake the mast back and the centerboard forward (increasing weather helm). Shifting your weight forward will do the opposite, decreasing weather helm. (So sit further forward when sailing downwind).
- **Heeling the boat** also affects the helm. The drag of the hull in the water increases on the side to which it is heeling. This effectively shifts the CLR laterally (the CE is no longer on the same vertical plane as the CLR) and the sails, traveling faster than the hull, will cause the boat to round up. A heel to leeward increases weather helm. A slight heel when sailing upwind (10°) can therefore be a good thing (but not too much). Hiking out to keep the boat flat also allows you to fall off more easily. A heel to windward decreases weather helm and can be effective when sailing downwind. Heeling a Laser to windward when sailing downwind "by-the-lee" balances the CE over the Center of Buoyancy (since the daggerboard is usually pulled up when sailing downwind the Center of Buoyancy becomes more significant than the Center of Lateral Resistance). Heeling to windward on Vanguard 15s and even Holder 14s can also improve performance when sailing wing and wing.

Heeling to Windward and Sailing "by-the-lee"



Rudderless Steering: By using techniques that alter the relationship between CE and CLR, you can improve your control over the boat's direction. In the event that you lose your rudder, manipulating the sails and shifting your weight will allow you to steer the boat. Steering the boat without a rudder is difficult, but it can be done. Using these same techniques you can also improve your boat's performance by minimizing the use of the rudder when changing direction. First, raise the centerboard about half way to tune the boat as close to neutral helm as possible. Then use the sails and body position together to turn the boat. To head up: sheet in the mainsail, luff the jib, and lean to leeward. To fall off: luff the mainsail, sheet in the jib, and lean to windward.

Catamaran sailors must be particularly aware of how body weight affects sailing. Since, the catamaran lacks a centerboard, establishing the center of lateral resistance in the water is based on stable weight distribution on the trampoline and the hull or hulls in the water. This is especially important for tacking maneuvers, discussed in the Advanced Maneuvers and Techniques section below.

Headers and Lifts/Lulls and Gusts: Sailing efficiently on a close-hauled course takes concentration and practice. It is the fastest way to move upwind, but can be the most challenging point of sail. Turning slightly to windward will bring you into the no sail zone, while turning slightly too far to leeward will cause you to heel over and slow down. There is a narrow groove in which the boat sails well; and this groove is always changing as the apparent wind shifts. Use the telltales on the luff of the jib to keep your boat on course and your sails trimmed correctly. When the apparent wind shifts toward your bow, this is called a **header**. When it shifts away from your bow, it is called a **lift**.

A header is caused either by the true wind shifting toward your bow, or by a decrease in the true wind speed. If true wind moves toward your bow, the apparent wind will also shift toward your bow so this type of header is easy to detect. However, a **lull or velocity header** (decrease in true wind speed) will also cause a shift in the apparent wind toward your bow. In a lull, the relative speed of the headwind created by your boat's movement forward becomes stronger and the apparent wind will move forward. As your boat speed decreases in the lull, this type of header will become more obvious. When you encounter a header you have two choices: fall off (if close-hauled) or sheet in (if not close-hauled). Net Result: **Pointing** (your bow is aiming) farther away from an upwind destination.

A **lift** is the opposite of a header and occurs either when the true wind direction shifts away from your bow, or when the true wind speed increases (**gust or velocity lift**), which moves the apparent wind away from your bow (as the headwind created by your boat's speed becomes a smaller component in the apparent wind). When you encounter a lift you have two choices: head up or sheet out. Often, sudden increases in wind speed will cause your boat to heel dramatically, so be ready to hike out. When sailing upwind, lifts allow you to head closer to your destination, sailing a shorter distance. Net Result: **Pointing** closer to an upwind destination.

Wind shifts can be either **oscillating** (moving back and forth) or **persistent** (a shift in the mean or average direction of the wind). A persistent header on one tack will be a persistent lift on the opposite tack, so it is often a good time to tack. There is no real advantage to tacking in a velocity header because it will have the same effect on both tacks.

You can detect the arrival and duration of velocity headers and lifts by looking for dark patches or glassy areas on the water. When the wind speeds up, it disturbs the surface water making it look darker. Conversely, when the wind dies, the surface becomes smooth, and looks glassy. The size of the affected water surface will give an indication of how long the lift or header will last. The Crew should keep the Skipper informed of approaching wind shifts. Anticipating and reacting to wind shifts, or "playing the gusts," will allow you to keep to a close-hauled course.

Sometimes gusts can overpower your boat. You are overpowered when you cannot keep the boat from heeling too much when your sails are trimmed properly. If this is happening repeatedly, try flattening your sail more with the cunningham and outhaul. Another technique to use is **feathering**—head up from a close-hauled course just until the windward telltale dances up, but the sails are still smooth and not yet luffing. Feathering will reduce boat heel. Your leeward telltale should continue to flow straight back and the boat will not slow down much if you do this for very short periods of time. If feathering does not sufficiently reduce heel, sheet out the mainsail to twist open the top of the leech and allow wind to spill off the sail. Maintain clean close-hauled trim when you can, but large gusts or big winds often require feathering or easing the main sheet.

If gusts overpower you unexpectedly, there are two temporary solutions: luff your sails to spill the wind or **pinch** into the no sail zone. **Pinching** is when you turn your bow just inside the no sail zone until your sails just start to luff (ie slightly farther and for longer into the no sail zone than feathering). You will be able to maintain some forward motion, but lift is disrupted and the boat will slow dramatically. Pinch only if the boat is at risk of capsizing.

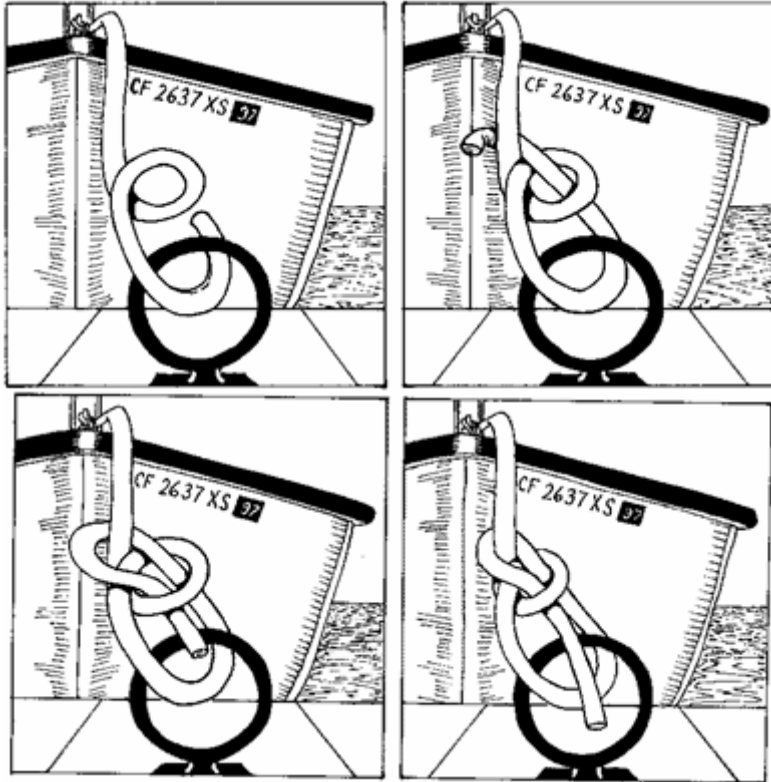
**There is no real difference between feathering and pinching, except one you do on purpose (feathering), and the other usually happens by accident (pinching).*

IV. PERFORMANCE MANEUVERS AND TECHNIQUES

KNOTS: Here are some additional knots you need to learn.

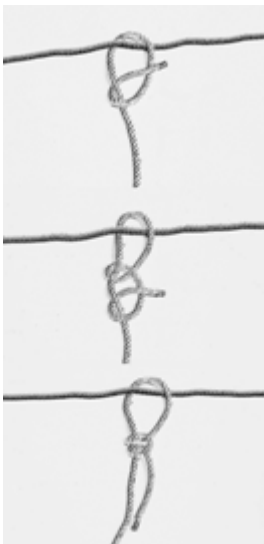
Fixed Loop Knot (to make a non-slipping fixed loop)

Bowline: Most useful way to tie a fixed loop, and is used for securing all manner of lines, and on occasions when a very strong knot is required such as fastening a boat at a mooring or for towing. It is the most important knot in seamanship because it is easy to tie and untie, never slips or jams, and is very strong.



Bowline

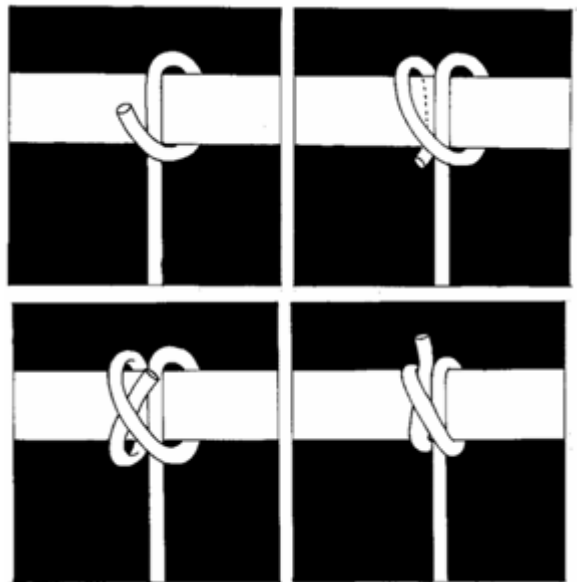
Hitches: (for tying rope to other objects)



Half hitch: Used to complete and make other knots stronger. Used in pairs for a quick way to attach a line temporarily to a ring, post or spar.



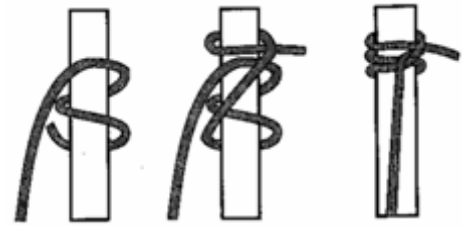
Clove hitch: Used to make a painter fast to a post or railing.



Clove Hitch

Round Turn & Two Half Hitches

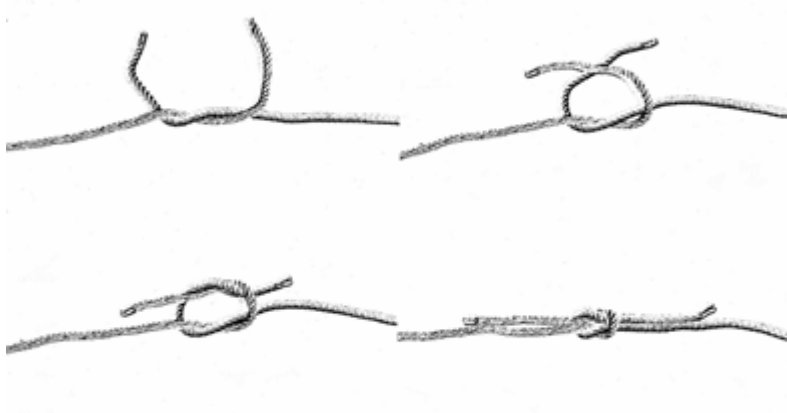
Rolling Hitch: Used to tie one line to another or to a spar so that strain may be taken nearly parallel to the standing part. The rolling hitch is a sort of double clove hitch. Very useful for tying dinghy painters to a tow line or for quickly making an adjustable loop step for capsized recovery.



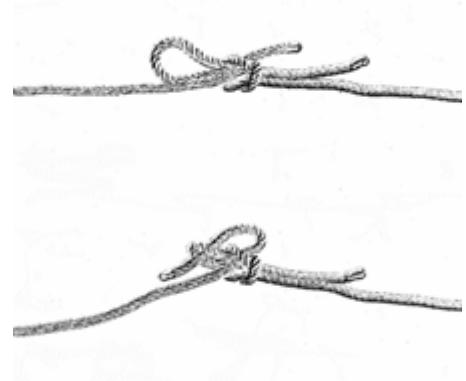
Rolling Hitch

Bends: (for tying two ropes together)

Square (Reef) knot: To tie together two ropes of equal diameter. When used to secure the folds of a reefed sail it is often tied with a slip to make it easier to untie. Pass the bitter end of the slip back through the loop to keep it from coming undone.



Square or Reef Knot



Slipped Reef Knot

TACKING A CATAMARAN: Tacking a catamaran is quite different from tacking a monohull. A monohull pivots on its centerboard when turning, but a catamaran does not have a clear pivot point. The long hulls and wide base that make cats so stable and fast resist tight turns. Catamarans are also lighter so they slow down more quickly, and the twin hulls act like a brake when turned abruptly, often stalling the boat in irons. Cats require a different approach to tacking compared to a monohull but once you learn the right techniques you will find that they are easy to tack. The keys to tacking a catamaran are:

- Speed into the turn
- A slow smooth turn
- Fluid Crew movement
- Backing the jib

1. **Check for oncoming boats or obstacles.** Do not attempt to cut it close. The catamaran requires quite a bit of room to tack.
2. **Communicate.** “Prepare to tack”
3. **Sailing close-hauled with good boat speed** (your main traveler should be close to the centerline of the boat) is required to begin a tack. **Do not tack from a reach!**
4. **Make sure the jib is cleated tight. Do not release the jib!**
5. **Communicate.** “Tacking!”
6. **Push the tiller firmly but gradually** toward the mainsail. **Do not push the tiller hard over!** Quickly turning the tiller or pushing it hard over will kill boat speed and the tack. Usually turning the rudders halfway is all that is required.
7. **The Crew should move their weight aft, but do not bounce around on the trampoline.** (This will help the boat round into the wind).
8. **Ease the main sheet about six inches to a foot.** Don’t keep the mainsail in too tight — doing so can prevent the mast from rotating.
9. **As the bows pass across the wind, switch sides. The Crew should move forward** on the new side (this will help the boat fall off on the new tack). Moving too soon can unbalance the boat and cause it to stall in the tack. Don’t jump or bounce across, move smoothly. **The Skipper swings the tiller extension around the back of the main sheet** while crossing to the new side.
10. **Wait until the mainsail fills with wind and the battens "pop"** over to the new side.
11. **Uncleat the jib and switch it to the new side.**
12. **Straighten your tiller and sheet in on the mainsail** on the new course.
 - Don’t tack from a reach.
 - Don’t start a tack when moving slow.
 - Don’t push the tiller hard over.
 - Don’t try to tack while flying a hull.
 - Don’t trim the sails in hard too soon after a tack. If the tack has not been completed, sheeting in too hard or too soon will cause the boat to go into irons.

If you blow the tack and get caught in irons, back out by pushing both the boom and the tiller toward the direction you want to go. Catamarans will not pivot out of irons, so you need to push the boom out first, get a little momentum up, then move the tiller. The Crew should trim the jib in tight on the opposite side from which you want to go. Wait until you clearly have backward motion before pulling out of irons. Wait until the mainsail battens "pop" and the mast pivots before switching the jib and straightening out.

GYBING A CATAMARAN: Gybing a catamaran is relatively easy, however, accidental gybing is more likely to lead to a capsize. Catamarans are light and will capsize easily if you are suddenly caught on the wrong side of the boat.

1. **Fall off until you are running.** Your main traveler should be all the way out. Mark your current course.
2. **Communicate.** “Prepare to gybe”.
3. **Face aft and swing the tiller extension over** to the new side so you will have immediate control after the gybe.
4. **Grab all the lines in the main sheet block and tackle about a foot down from the boom.** Check back over your shoulder frequently to ensure that you are still sailing on course.
5. **Communicate.** “Gybing!”

6. **Gently pull both the main sheet and the tiller crossbar away from the sails.**
7. As soon as the wind catches the mainsail, allow the sheets to move quickly to the other side, but do not simply let them go.
8. **Switch the jib** to the new side
9. **Switch sides, re-balance** the boat.

CATAMARAN BALANCE: The catamaran's large trampoline allows you a great variety of ways to move your body position and adjust boat trim.

- **Heel:** The catamaran sails most efficiently with the windward hull skimming the water or flying slightly so that the boat is heeling up to 15°. In light air, the Crew will have to sit toward the center of the boat, or even on the leeward side. In heavy air, when the boat heels too much, hike out using the hiking straps, or use the trapeze.
- **Fore and Aft Trim:** The hulls of the boat should be level, the trampoline parallel to the water, both the bows and sterns above the surface of the water. You can adjust fore and aft trim easily by moving forward or aft on the trampoline. When sailing upwind, the Crew must keep a careful eye on the fore and aft trim to ensure that the leeward bow does not **pearl** or plow under the water (which will pitchpole the boat, likely causing a capsize or turtle). Move your weight as far aft as you need to keep the leeward bow above the surface. Just as in monohulls, you will need to move your weight aft when sailing upwind and forward downwind in order to maintain proper balance. Remember, as the wind increases, you may need to shift weight forward on the trampoline to reduce weather helm.
- **Flying a Hull (above 15°):** On a Catamaran, for optimum boat performance, you should not heel the boat more than 15°, however, sometimes it is fun to fly the hull higher than that. When flying a hull at sharp angles you will need to learn how to keep it up without "dropping" it back down in the water or capsizing. By trimming in and easing out the main sheet slightly, and constantly, you will be able to keep the hull in the air. Do not head up sharply to flatten the boat, for this risks pearling the leeward bow. Instead, simply ease the main sheet slightly. If you feel like the boat is about to capsize, sheet out both sails, keep weight to windward and fall off; do not head up. In general, make sure you have a lot of sea room when flying a hull.

TILLER EXTENSION: Allows you to hike out much farther, so that you can control the boat with more power in your sails. The Vanguard's and Laser's increased sail area and the Hobie Cat's rudder and hull design make it essential that you use the tiller extension, especially when sailing upwind. When sailing downwind, the extension allows you to sit farther forward in the boat so that the stern does not drag in the water. You will need to learn to hold it comfortably on all points of sail and how to tack and gybe using the extension.

- Steering:** With the extension, the tiller becomes double-jointed. You will learn quickly to manipulate it so that you have the greatest flexibility in your body position. Hold the extension like a microphone in your aft hand, palm facing down, with your arm across your chest. As you lean out into a full hike your tiller hand will end up over your hips.
- Tacking:** The extension allows you to push the tiller hard to leeward without moving your weight into the center of the boat. As you turn, pass the tiller behind you to your sheet hand. When you have switched to the new side, pull the tiller straight along the centerline of the boat. This will straighten the rudder and stop the turn. Now you can take the sheet in your new hand and adjust your course.
- Gybing:** Although you may put the extension away for a gybe, it is a good idea, to learn how to gybe with it because you may need to hike out quickly after the gybe. When tacking, the tiller is pushed hard over, so the extension is out of your way. During a gybe, the extension can get in your way. Avoid this by flipping it over to the leeward side of the boat (away from you) at 90°. Hold the extension close to where it connects to the tiller and gybe as usual. When you switch sides, the extension is already over there, waiting for you if you need to hike out.

TRAPEZE: As you move up to the full regatta sails, the Hobie 16 can become overpowered. Even with both Skipper and Crew hiking out as far as possible (legs straight, center of gravity out over the water), you cannot always counter-balance the force in the sails. Trapeze lines are rigged from the mast next to the shrouds to allow your weight to be distributed farther away from the sails. With the aid of a harness, the Crew can hook onto the trapeze and be suspended well out over the water. The mast will support the weight. You can adjust your position fore or aft by moving your feet along the edge of the trampoline, and you can adjust your weight distribution over the water by bending or straightening your legs. Using the trapeze is easy, but steering while someone is on the trapeze takes a great deal of concentration.

- Getting on and off the Trapeze:** First check that the trapeze line is not wrapped around the shroud. Then, hook the ball into the harness. Hold the jib sheet in your forward hand and sit on the edge of the trampoline. Allow your body to sag over the edge so that the trapeze line is holding your weight. Grab the **suicide line** (line along the edge of each hull which prevents the Crew from swinging forward around the forestay while on the trapeze) with your aft hand and move your aft foot to the edge of the tramp and straighten your legs to extend out over the water. Keep you aft leg bent to adjust for waves. Maximum righting power is achieved by keeping your body weight parallel to the water. To come back in off the trapeze, lift your aft foot on top of the trampoline and bend your forward leg to swing gently back onto the trampoline and unhook.
- On the Trapeze:** Communicate with the Skipper. Sudden movements without informing the Skipper could make the boat unbalanced and even cause a capsize to windward. The trapeze has a tendency to swing you toward the bow, so keep your aft leg slightly bent and your weight balanced. Hold the suicide line, rigged expressly to prevent swinging forward. Do not hold the trapeze handle; the jib sheet will serve to help you balance. It is your job to keep the boat level. When moving fore and aft, take small sliding steps, and keep your knees a little bent. By bending and straightening your legs, you will be able to change the heel of the boat. If it heels too much, straighten your legs. If it is too flat, or begins to heel to windward, bend your legs. The trapeze line can also be lengthened (allowing you to lean out further) or shortened. The stronger the wind, the longer you will want your trapeze line to be. Simply adjust the length of the line by using the clam cleat. Remember to tie the loose end in a half-hitch around the trapeze handle; this will keep it from slipping.
- Steering with Crew Trapezing:** Again, make sure to communicate with each other. As the Crew moves out over the water, you will need to compensate by either sheeting in or falling off slightly. The goal is to steer the boat in unison with the Crew's weight adjustments. This takes practice, especially in gusty weather. If you are not careful the crew can suddenly get dunked in the water on the windward side (tea bagging), and even pull the boat into a windward capsize.

CAPSIZING — The Walkover or Dry Capsize: When hiking out using the tiller extension you can react more quickly to an imminent capsize and use your position up on the high side to your advantage. The walkover is a quick and effective method of getting onto the daggerboard without getting wet. As the boat heels, you will be hiking out over the water in an attempt to flatten the boat. If you are unable to flatten it and the boat capsizes, you can swing your legs over the gunwale onto the centerboard. Remember, if you don't make it over onto the centerboard while the boat is capsizing, don't keep trying. Once the boat has fully capsized, your weight hanging on the high side gunwale will quickly turtle the boat. With practice, you will be able to step back into the boat from the centerboard as it rights and not get wet. The walkover is especially suited for Lasers which are easy to capsize and recover. Both the Skipper and Crew on the Vanguard 15 can try to walkover, however the very narrow daggerboard usually means someone ends up in the water, and will need to get scooped back in.

**Note: This method is not possible on a Hobie Cat!*

Mast Position in a Capsize: Usually the boat capsizes so that the mast is pointing downwind. When the mast is downwind, the boat will right to the safety position. For most conditions, this is fine. There are certain circumstances, however, where you might want to change the mast position before righting the boat. In order to change the position of a capsized boat you can swim the boat around by holding the mast head.

- In very high winds the bow of the capsized boat should be pointing upwind. The mast will be perpendicular to the wind. This way, the boat will come up in irons.
- When you cannot get enough leverage to right the boat, you can use the sails to help. In this event, you might want to swim the mast into the wind, so that the wind will catch the sails as you lean out on the centerboard.

Never try to right the boat if the bow is pointing downwind. First, it will likely re-capsize. Second, the boat might sail away without you.

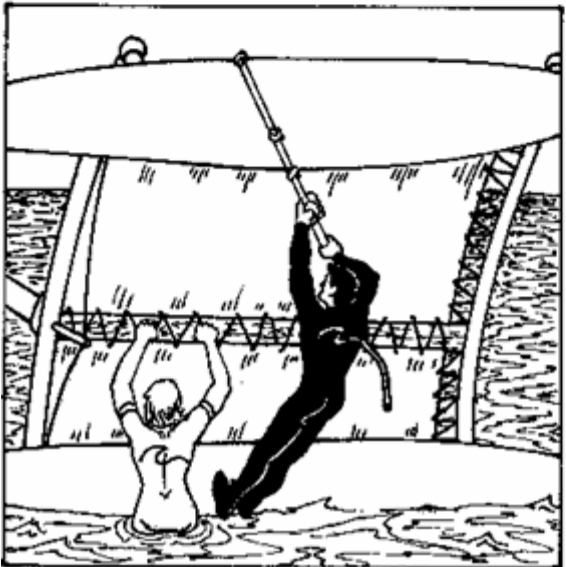
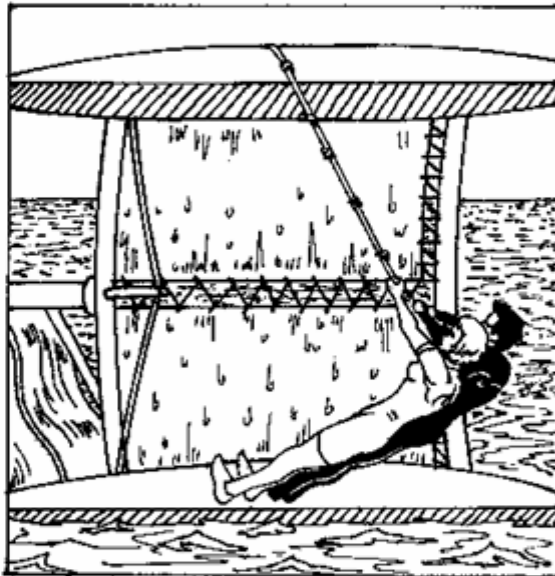
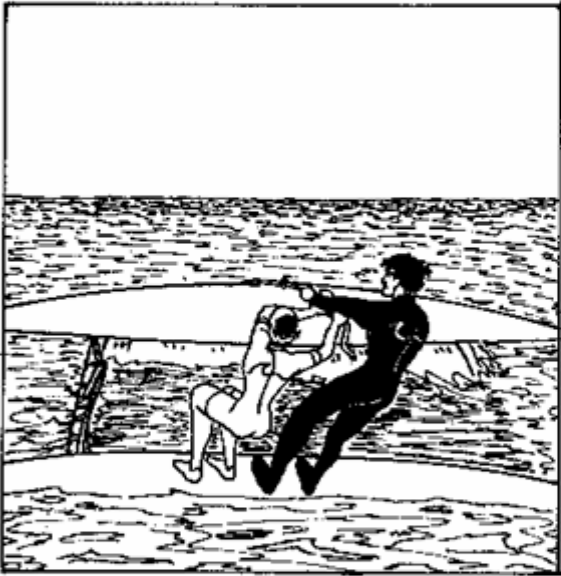
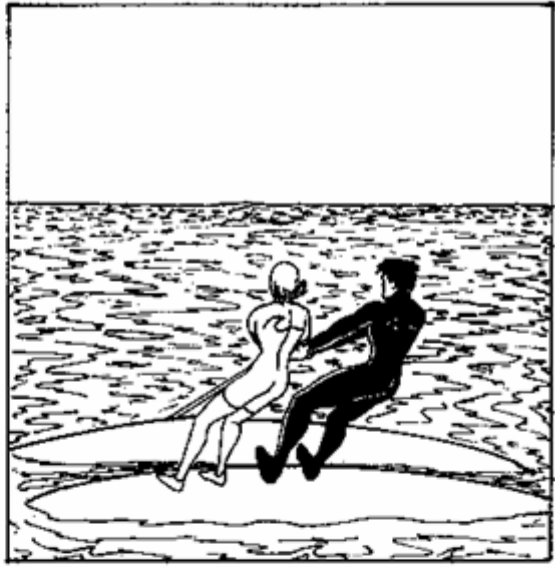
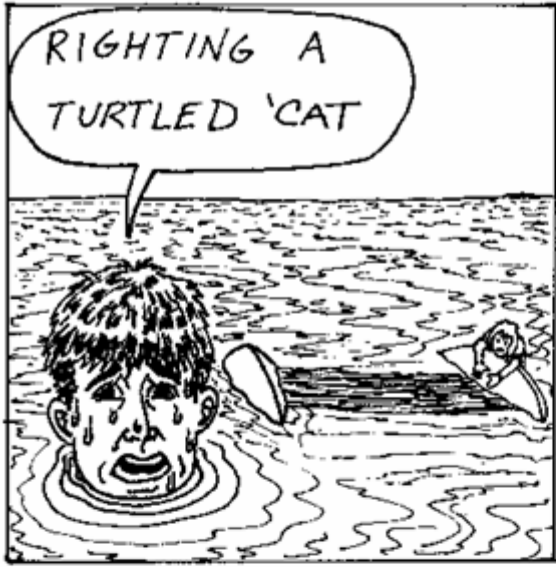
California Roll: The California Roll is a method used to keep a lightweight boat such as a Laser or Vanguard 15 from capsizing repeatedly in succession in high winds (pinwheeling). The California Roll is very straight forward: the person on the daggerboard takes a deep breath as they right the boat and holds on tight to the board as the boat comes upright. They end up under water momentarily acting as a keel to keep the boat from capsizing again. Once the boat is stable they can pop up on the windward side, climb aboard and resume sailing.

Capsize Recovery on a Catamaran: The minimum righting weight for a Hobie 16 is 275 pounds, so choose your sailing partners accordingly. You cannot dry capsize a catamaran so just slide into the water if the boat goes over. Also, if the boat pitchpoles, the suicide line is designed to keep the crew on the trapeze from flying out in front of the forestay, so remember to use it. Once capsized, check that everyone is OK and not tangled in the rigging and proceed with the recovery.

1. Check that everyone is O.K.
2. Uncleat both sails. Determine how you want the boat to lie in relation to the wind.
3. Make sure the righting line is brought from the mast over the "high" hull.
4. Both Skipper and Crew must stand on the hull in the water and hold the righting line. You must balance the boat laterally by moving side-to-side until the hull lies level in the water.
5. Both Skipper and Crew lean back out over the water. You may have to lean far out, but do not let your body down into the water. It may be necessary to "stack" yourselves back to front in order for you both to get a firm hold of the righting line and the combined weight for sufficient leverage to right the boat.
6. As the boat comes up, "walk" your hands up the righting line.
7. When the boat finally rights, be careful to avoid the hull coming down toward you, and stop the boat from recapsizing by grabbing the **dolphin striker** (metal rod across the beam and beneath the forward crossbar).
8. Make sure the bows are pointing upwind before climbing back on the boat to avoid recapsizing. Steer the boat from the water if necessary.
9. Once safely aboard, check all lines and rigging.

Turtle Recovery on a Catamaran:

1. Check that everyone is O.K.
2. Uncleat both sails.
3. Pass righting line under windward side of the trampoline and over both hulls to the leeward side.
4. Both Skipper and Crew must stand on the lip-edge of the gunwale or bottom of the leeward hull, hold the righting line and lean back out over the water. Hold this position until the boat comes up to a capsize. (Note: it is also possible for both Skipper and Crew to straddle the leeward stern, allowing the boat to pivot up to a capsize - this technique is useful if the mast gets stuck in the bottom.) Proceed with the normal capsize recovery.



Righting a Turtled Catamaran

STOPPING—Heave-To: You already know how to turn the boat into irons, and the safety position, but there is also another method to stop actively sailing and create a kind of auto-pilot known as **Heaving-to**. The maneuver sets the boat so that it will sail on a slow downwind course without active steering or trimming. It is useful if you are waiting for the next start in a race, need to rest, make a repair, or retrieve a person overboard. It has an advantage over the safety position in that the sails are not luffing and you do not need to actively control the helm. Heaving-to is achieved by balancing the boat and sails so that it will slowly fall off, then head up, then fall off, etc.

1. Trim (**back**) the jib tightly to windward (backwind it), or simply tack the boat slowly and leave the jib cleated in tight. When the bow is upwind, the jib will block the mainsail. The boat will fall off.
2. Ease the mainsail out, about the setting for a beam reach. As the boat falls off, the mainsail will no longer be blocked by the jib. It will fill with wind and the boat will head up.
3. Hold the tiller about 45° to leeward. As the mainsail fills, the tiller will turn the boat back to windward, until the bow is upwind again and the jib takes over and the boat falls off again. Adjust tiller and mainsail as needed to balance the boat.

The cycle repeats endlessly and the boat will move in slow arcs in a general direction of about 120° off the wind.

Since a Laser only has a mainsail you cannot, of course, oppose its force with a backed jib but you can “heave-to” after a fashion.

1. Let the sail out to where it would be trimmed for a beam reach and hold it there (perhaps with your foot on the sheet).
2. Luff up very slowly until the sail is completely luffing and hold the boat in that position until it stops and starts to go backwards.
3. Put your tiller to leeward and leave it there.

The bow will fall off and the boat will slowly go astern until the aft part of the sail starts to fill and causes the bow to head up again. Once you have mastered balancing your boat you can relax and take a well-deserved breather whenever you wish. If you are racing and heave-to on starboard tack in the pre-start sequence then no one is likely to bother you and you can focus on your upcoming strategy.

PERSON OVERBOARD—Heave-to Recovery: When sailing upwind and a person goes over board, you can quickly heave-to and retrieve them. It has the advantage of being very quick, and it requires little sail handling. Once you have the person near the boat, the heave-to maneuver will keep the boat slow and stable while you get them back aboard. When someone falls overboard:

1. Continue sailing for about two to three boat lengths upwind.
2. Tack the boat without releasing the jib.
3. Point the boat toward the person in the water.
4. With the jib backwinded, ease the mainsail out to a beam/broad reach and keep the person just off your leeward bow, and the boat will slowly work its way downwind to them in the water.
5. When you are close to the person, push the tiller to leeward to head up and completely heave-to.

WAVES: Once you begin sailing outside the marina on the ocean you will encounter waves and swells. Sailing in waves requires concentration and constant minor adjustments in sail and boat trim. These techniques will work on either the monohulls or the catamarans.

- **Upwind:** Attempt to climb the waves at an angle so that your boat moves smoothly up the crest and down into the trough, without slamming down after the crests. Head up slightly toward the crest and fall off slightly into the trough. If you are on the trapeze in large waves, keep your knees slightly bent in order to ride the rocking motion created by the waves. When you tack in large waves, try to execute your tack on the crest. You will gain momentum as you ride down the other side of the wave, making it easier to fall off onto the new tack. In the event that a wave or the wake of a large motorboat seems dangerously high, point directly into it for a moment. Although this will bounce and slam your boat a little, it will protect against a capsize.
- **Reaching:** Do not sail parallel to the waves unless the distance between them is large enough to avoid dramatically rocking the boat. If the wavelength is short, you risk **broaching** (capsizing due to a wave hitting your beam)*.

- **Downwind:** Keep your weight aft when sailing downwind in large waves. This will keep your bow from plowing underwater in the trough which risks **pitchpoling** your boat (flipping the boat stern-over-bow). Again, sail at an angle to the wave. Do not let the wave hit you square on the transom - especially with your weight aft, you do not want the wave to crash over your stern. With practice, you can surf the wave. Head up slightly to gather boat speed until the wave lifts your stern, then fall off in the direction of the wave and let it propel you forward. **Pumping** the mainsail (by sheeting in and easing out in a sharp fanning movement) and at the moment when you fall off can help maintain speed to ride the wave. **Ooching** (shifting weight quickly toward the bow) will also jerk the boat forward and can help the boat catch the wave. Remember to head up again as the boat slows, or you risk wallowing in the trough.

*Note: If you capsize in waves, you may need to turn the bow into the waves to right the boat.

STRONG WIND: Your instructor(s) repeatedly emphasize the importance of sailing often and in a variety of conditions in order to fully develop your skills as a sailor. You may already have noticed how sailing can become more difficult as the wind builds. With practice and experience, sailing in strong winds can be quite exhilarating but without it, a windy day can turn your day of sailing into an unpleasant experience.

The reason that increased wind speed makes sailing more difficult is because *the force exerted by the wind increases with the square of the velocity*, not proportionately. Doubling the wind speed does not double the force of the wind, it increases it fourfold!¹

Another way of viewing this is by the approximate total force you would encounter with say, the 76 square feet of a standard Laser sail. In 12 knots of True Wind the Laser sail at a 90° angle to the wind will experience roughly 0.76 pounds of pressure per square foot or almost 58 pounds of force for the entire sail. Increasing just two knots in wind speed (16%) to 14 knots True Wind the force involved increases by 36% to over one pound of pressure per square foot or 78.8 pounds of pressure for the entire sail. Another two knot increase, to 16 knots True Wind, raises the force on the sail to almost 103 pounds of pressure. Increasing the True Wind Speed again by two more knots to 18 knots makes the force felt on the sail over 130 pounds.

Since most people weigh between 120-180 pounds you can clearly see why sailing in stronger wind becomes more challenging. The solution to sailing in strong wind however is relatively straightforward. Practice, practice, practice. Perfect your skills at lower wind speeds before challenging yourself at higher velocities. Use smaller sails until you have improved your skills enough to switch to the full size sails. Start your day's sailing earlier in the day before the wind has built in strength. You will adjust as the wind gradually increases throughout the afternoon. The more experience you get on handling your boat the better able you will be to respond to changing conditions on the water. And of course, know when you have reached your limit.

SAIL SELECTION: Both the Lasers and the Vanguard 15s have two sets of sails to choose from. The Laser has the full sized Standard rig and the smaller Radial rig. The Radial rigs use a smaller, bendier lower mast section to keep the proper sail shape. The Vanguard 15s have full size Regatta sails and a set of Training sails with a "mini-main". The reduced sail area lets novices and lighter weight sailors learn without being overpowered. Start off with the smaller sails and as your skills develop you can move up into the larger sails.

REEFING: When the wind increases so that you are overpowered you can reduce the sail area on the Hobie 16 by reefing the main sail. Reefing is a time-honored act of good seamanship that helps to balance the forces of the wind with the boat's stability by reducing the overall sail area. Often, once a boat has been reefed it will handle better and sail faster in spite of the reduced sail area. With a reefed sail, weather helm is reduced and so is heeling and leeway. With less weather helm the boat will have much less drag from the rudders.

¹ *Heavy Weather Guide*, Kotsch and Henderson, 1984 Naval Institute Press

Your boat will give you signs that you are overpowered and should think about reefing:

- To stay upright, you are forced to ease the traveler and main sheet so the sail is luffing.
- Excessive weather helm
 - A tendency to round up
 - A lot of load on your rudders.
 - Difficulty steering
- Excessive heel
- The white knuckled, death grip your crew has on the boat.
- The little voice in the back of your head is saying, “Maybe we should reef. . .”

Reefing the Hobie 16: The Hobie 16 sails have a set of reef points about one-quarter of the way up from the foot of the main sail. The forward most reef point will become the new tack. The aftermost reef point will become the new clew. The points in the middle are only there to secure the resulting fold of the sail. It is not necessary to use the middle points but doing so can help improve visibility when reefed.

1. Steer a Close Reach Course.
2. Ease the main sheet so that the sail is luffing.
3. Lower the main halyard until the Forward Reef Point is at the tack fitting.
4. Secure the Forward Reef Point into the tack fitting.
5. Hoist the main halyard and tension the sail. Make sure the main sheet is still eased.
6. Attach the outhaul to the Aft Reef Point.
7. Tension the outhaul. DO NOT do this before the halyard is hoisted.
8. Sheet in the reefed main sail. Sail on!
9. (Optional) Secure the folds of the reefed sail using light line through the middle reef points. This is what a square or reef knot is traditionally used for.

Caution: If the new tack is not secured properly and/or the new clew is attached and tightened before the sail is hoisted you risk putting undo tension on the leech, which can cause the sail to tear.

KINETICS—Sculling, Rocking, and Roll Tacking are techniques used to accelerate a boat using body weight. Understanding kinetics is important to your overall understanding of how to sail, and these techniques can also be useful. By and large, these techniques rely on the rounded hull of a monohull dinghy and will not work well on a catamaran.

- **Sculling** (moving the tiller rapidly back and forth) can propel the boat slowly forward.
- **Rocking** the boat gently from side to side will also propel the boat forward. It works much like sculling. If the wind dies completely, you can rock and scull the boat home.
- **Roll Tacking.** This is a technique using Crew weight to force the boat through the no sail zone without losing speed. Roll tacking takes a great deal of coordination between Skipper and Crew, and practice, practice, practice.
 1. When you are ready to tack, allow the boat to heel to leeward while you push the helm alee. This will cause the boat to turn more quickly into the wind.
 2. As soon as the sails luff, hike out hard to windward until it becomes the leeward side and the gunwale touches the water (or you feel very close to it). Remember to keep the tiller over while you hike.
 3. Quickly move to the new windward side and hike out hard to flatten the boat on the new tack.

ASSISTANCE ON THE WATER: There may be a time when you need to communicate with the dockmaster while on the water. The dockmaster at the Marina Aquatic Center monitors VHF channel 71. If you have your own hand held marine VHF radio you could contact them by hailing “UCLA MAC” on channel 71. More likely, you could ask another vessel that has a radio to relay a message for you. Or, if you are willing to risk getting a cell phone wet you could always bring one and phone the dockmaster.

There are times when you may need to receive assistance from another vessel.

- **When Capsized:** Have the other boat go to the head of your mast and raise it out of the water. Have them "walk" their hands down the mast and shroud as they bring the boat upright in the water. From their position, they will be able to easily right your boat for you.
- **When Turtled:** Tie a line to the shroud where it connects to the deck across the bottom of your boat. Then have the other boat slowly, very slowly, move away from your boat to help lift it to a capsize position. Don't let anyone try this if you suspect the mast may be stuck in the mud!
- **When In Need of a Tow:** Lower your sails. Tie the tow line to the base of your mast or crossbar on a catamaran. The length of the tow line should be the same as the distance between the crests of the most prominent waves or swells (this will keep both boats moving in unison as they rise and fall with the waves). Raise your centerboard three-quarters of the way. Sit as far aft as you can. Steer your boat to follow the towing boat. If you have lost your rudder, lash your boat side-to-side with the towing boat, with plenty of fenders in between, and have them tow you very slowly.

SAILING FITNESS: While sailing can be extremely relaxing, if you have ever been puffing hard during a long beat to weather in strong winds or felt sore after a hard day of sailing, you know that sailing small boats can be very physically demanding.

Perhaps the best exercise for sailing is sailing itself. But when ashore there is a lot that you can do to help improve your on the water performance. Of course, before embarking on a new exercise program it is always wise to consult with your health care provider. Generally speaking any activity that improves your agility, flexibility, strength and stamina will help your sailing performance. What follows are a few suggestions:

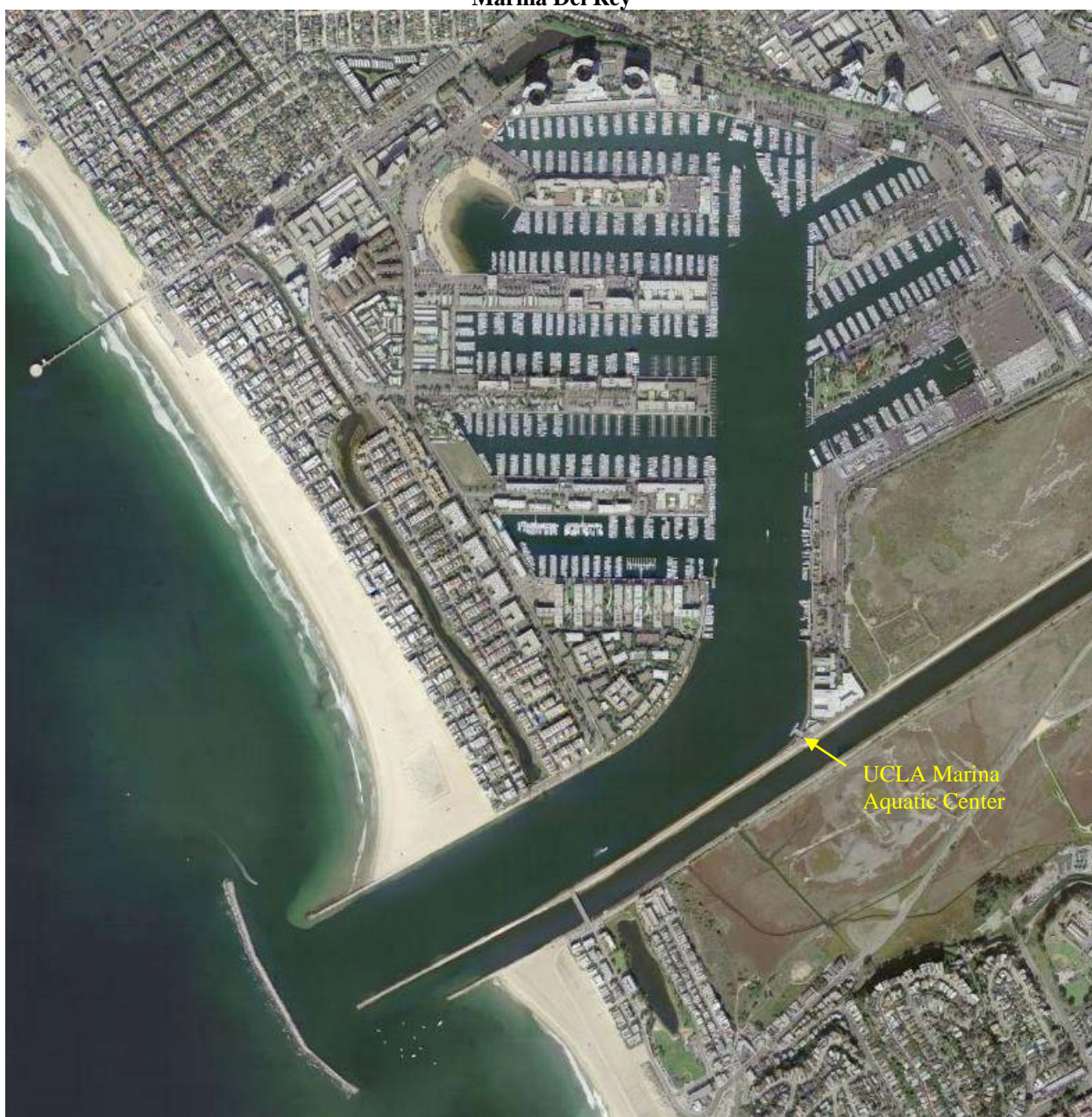
The most notable areas many sailors could use some work on is developing the lower abdominal muscles, quadriceps and lower back. This will allow you to hike longer and harder with less post-sail soreness. Upper body strength is important for trimming and to help with the occasional capsized recovery. Flexibility is all too often neglected. Improving your agility will help improve your range of motion, increase your comfort level while sailing and reduce muscle soreness afterwards. Warm up and stretch before and after sailing. Although much of sailing requires static muscle contractions such as hiking or holding the mainsheet, don't neglect your cardiovascular fitness. When hiking in gusty winds you might find yourself using a surprising amount of energy. Increased stamina can make a big difference in whether your sailing is an exhilarating challenge or a gruelling trial.

As your sailing fitness improves, you will likely find that many of the skills you found difficult at first will become progressively easier. As you strive for greater performance, your fitness level will need to keep pace. For more sailing specific fitness tips refer to "**Sailing Fitness & Training**" by international Laser sailor Dr. Michael Blackburn.

ENVIRONMENTAL AWARENESS: Now that you're a sailor we hope you appreciate the beauty of the marine environment as much as we do. Unfortunately, Los Angeles is a highly urbanized environment and the waters of Marina del Rey and Santa Monica Bay suffer accordingly. Urban runoff is a major concern and with our proximity to Ballona Creek we see the effects firsthand. Although the problem can seem insurmountable, there is a lot that we can do as individuals. Rather than being repelled by the trash you see in the water, take action. Small changes in our lifestyles can make a positive impact on the environment. Grab that piece of plastic you see floating in the water and dispose of it properly. Reduce, re-use, and recycle at home and work. Maintain your car and have any oil or radiator leaks fixed promptly. Ride the bus, walk or ride your bike more often. Avoid buying products with excessive packaging. Patronize establishments that you know are environmentally conscious and avoid those who are not. Do not buy anything in styrofoam. GET INVOLVED! Organizations such as Surfrider, Heal the Bay and the California Conservation Society, among others, desperately need your time and support. Let your local, state and national representatives know that you care about the marine environment and will vote accordingly. Acting together, we make a difference and can all continue to enjoy a beautiful marine environment.

A FINAL NOTE: Once you have completed UCLA's series of courses and have achieved the Ocean Sailing qualification, you will be free to sail on the ocean in Santa Monica Bay. The classes are designed to help prepare you for the rigors of ocean sailing, however there is no way to prepare for all possible contingencies in the scope of these classes. When you sail on the ocean you are ultimately responsible for yourself, your crew, and the boat. Exercising good judgment and seamanship when on the water is vital. Part of that seamanship and good judgment is the ability to recognize when the conditions may exceed your skill level. Sometimes the best decision is to head back to the dock or even wait for another day to get more practice. The classes will have provided you with the basic skills, but remember that the only real difference between a competent sailor and a great sailor is time on the water. The more you sail, the better you will be. This manual only touches upon those basic aspects of sailing you need to get started. A suggested reading list is available on the Outdoor Adventures Sailing website to help you find out more. Above all, your training at UCLA should have taught you to exercise caution and good judgment on the water. **HAVE FUN AND BE CAREFUL OUT THERE!**

Marina Del Rey



V. GLOSSARY OF NAUTICAL TERMS

To those who have never sailed before, or been around boats, nautical terms and their meanings are very strange and unusual. Many of the words used in sailing today are derived from similar words in Old and Middle English, Old Norse, French, ancient Greek and Latin, and even ancient Egyptian and Phoenician which reflects the globe spanning history of sailing. Sailors have their own vocabulary, just as doctors and scientists have theirs . . . not to impress but to convey a precise meaning quickly. It is important to become familiar with many of the terms listed here in order to respond quickly to a command or to give directions.

aft —at, near, or towards the stern.

apparent wind —wind flowing over a vessel when it is moving; the vector sum of the true wind and the wind of motion created by the vessel.

athwartship —across the keel of a vessel, at a right angle to the line from bow to stern.

back, backing—pushing a sail out so that the wind fills it from the opposite side. Used to slow a boat or turn the bow away from the wind when in irons; **backwinding** —a sail backwinds another with the wind funneling on the “wrong” side.

batten —thin rigid strip of wood or fiberglass held in pockets on aft edge of sail used to support the leech.

beam —1. maximum width of a vessel; 2. the direction away from a boat at right angles to its length as in abeam or “on the beam.”; **beam reach** —sailing at approximately 90 degrees to the wind with the wind coming from abeam and the sails eased about half way.

beat —advance to windward on alternate tacks; **beating** —to sail to windward, close-hauled, tacking to make way to windward.

belay —1. make fast or secure a line to a cleat or pin; 2. change an order.

bight — a loop or semi-circle of a line.

bitter end —end of a line.

block —nautical term for a pulley. It is comprised of one or more sheaves (wheels).

bolt rope —sewn around luff and foot of sails to give added strength to sail where it attaches to mast or boom.

boom —horizontal spar to extend the foot of a sail, from the sound it makes as it strikes someone’s head.

boom vang —a control line, usually a multi-purchase tackle secured at one end to the boom and the other to the deck or the mast to prevent the boom from lifting.

bow —the forward part of a vessel, the pointy end.

bowline —very useful knot with eye at end, principle characteristics are strength, ease of tying, will not jam, and the eye will not slip.

broad reach —sailing with the wind coming over the rear corner of the boat (quarter), or with the bow approximately 120-160 degrees from the source (eye) of the wind.

by-the-lee —running with the wind on the same side as the boom, increasing the possibility of an accidental gybe.

capsize —a boat turned over on its side or upside down (turtled).

catamaran —boat with two parallel hulls, like the Hobie 16.

centerboard —wood or fiberglass blade; vertical foil that pivots up and down used to reduce leeway when sailing upwind; **centerboard trunk** — housing or well for the centerboard.

center of effort —center of sail area, the focal point of the forces generated by the sail area.

center of lateral resistance —center of underwater hull profile, the focal point of the forces generated by the underwater foils.

cleat —plastic or metal fitting used to secure lines or act as a stopper; **cam cleat**—moveable arms which hold lines like the main and jib sheets; **clam cleat**— metal or plastic fitting which uses friction to hold lines like the downhaul and outhaul; **horn cleat**—two pronged fitting on which lines like halyards are wrapped around (belayed) in a figure 8 pattern to secure; and **jam cleat**—like a horn cleat, but with one side flat.

clew —aft corner of sail.

close-hauled —sailing as close to the wind as possible.

close reach —sailing with the wind forward of the beam, or with the bow approximately 60 degrees from the eye of the wind.

clove hitch —two half hitches around a spar or coiled line.

coil —to lay a line in circular terms.

course —the direction a vessel is steered to reach a destination or the compass heading or the angle a vessel is sailing relative to the wind.

crew —the people who help the helmsperson sail a boat.

cringle —metal thimble on a sail usually near a tack and/or clew used to pass a line or hook through the sail (as with the cunningham), i.e. grommet.

cunningham —a control line used to tension the forward edge (luff) of a sail, similar to a downhaul.

daggerboard —foil raised and lowered vertically used to reduce leeway, different from centerboard which is pivoted instead of raised.

dinghy —an open boat, or one partially decked over without a cabin.

dolphin striker —cross bar on a catamaran beneath the mast and the cross bar of the trampoline.

downhaul —rope and tackle used to tension and adjust the forward part of a sail (luff), attached to the mainsail where the boom meets the mast (gooseneck), similar to cunningham.

ease —1. to slack; 2. momentarily luff a sailing vessel with too much wind pressure, i.e. ease out or sheet out.

eye of the wind —from the source of the wind; directly into the direction from which the wind is blowing from, the no-sail-zone.

fairlead —block or fitting used to change the direction of a running line such as a jib sheet.

fall off —sail farther from the eye of the wind, or turn the bow away from the eye of the wind.

feathering —sailing upwind so close to the wind that the forward edge of the sail is stalling or luffing (indicated by the weather telltale lifting up), reducing the power generated by the sail and the angle of heel without stalling completely and going into irons.

fenders —cushions to reduce the chafe between a boat and its dock or other boats.

figure eight knot —stopper knot in the shape of a figure eight used for the end of a line to prevent it from passing through a fairlead or eye.

foot —lower edge of a sail.

fore —forward, nearer to the bow; opposite of aft.

forestay —forward support of mast, usually wire lead from bow to mast, part of the standing rigging, i.e. headstay.

give way —the vessel which must alter course to avoid the stand on vessel, the burdened vessel in the Rules of the Road.

glide zone —the distance a sailboat takes to coast to a stop after turning head to wind or letting out the sails.

gooseneck —a universal joint that connects the boom to the mast.

grommet—metal thimble on a sail usually near a tack and/or clew used to pass a line or hook through the sail (as with the cunningham), i.e. cringle.

gudgeon —eye supports for rudder pintles, the part that is on the transom.

gunwale —edge of a boat where hull and deck join.

gybe —changing wind and tack of a sailing vessel over a vessel's stern; alternative spelling, jibe.

halyard —line used to raise sails or flags (from “haul yards”), i.e. halliard.

hanks —clips or rings to “hank on” or “bend on” jibs to their stays.

head —1. upper corner of sail to which halyard is attached; 2. lavatory on ships.

heading —the direction a boat is travelling at any given moment.

head up —turn the bow of the boat toward the wind and sheet in; sail closer to the eye of the wind.

header —a wind shift further forward relative to the boat, forces a boat to point lower to a given upwind destination.

heave to —bring a vessel's bow to windward and hold it there, usually with the jib aback and the tiller about 45 degrees to leeward.

heel —incline to one side.

helm —1. a bar through the head of a rudder used to steer, i.e. tiller; 2. the tendency of a sailboat to turn towards the wind (weather helm) or away from the wind (lee helm).

helmsperson —the person who steers a boat, i.e. skipper.

high side —the side of a sailboat nearest the wind source, i.e. weather side, windward side, upwind side.

hike —move crew weight to windward to reduce heel; **hiking straps** —cloth straps on the bottom

of the cockpit used to brace your feet when leaning out or hiking.

hitch —a knot used to secure a rope to another object or to another rope or to form a loop or noose in a rope; a turn with the end under the standing part.

hull —body of vessel excluding rig and sails.

in irons —a sailing vessel head to wind with all sails luffing with no maneuverability.

jib —triangular sail forward of mast.

knot —1. one nautical mile per hour =1.15 statute miles per hour; 2. to form a loop or noose, tie a cord to an object, or tie two cords together.

lee —the area sheltered from the wind, to leeward, downwind; **lee helm** —sailboat out of balance, with a tendency for the bow to turn downwind; **leeward** —the direction the wind is blowing to, the side furthest away from the wind

leech —aft edge of a sail.

lift —a wind shift further aft relative to the boat, allows a boat to point higher (closer) to a given upwind destination.

luff —forward or leading edge of a sail; **luffing** —1. fluttering of sail because the boat is headed too far into the wind or the sail is sheeted out (eased) too far, 2. to head the boat into the wind until the sail luffs.

mainsail —fore and aft sail set on the after side of the mast.

mast —vertical spar supporting rigging, yards, and sails.

monohull —a vessel with one hull.

no sail zone —term describing area into the wind where a sailboat cannot sail, usually 45 degrees on either side of the eye of the wind.

offshore —away from the shore; **offshore wind** —wind blowing from the shore.

onshore —toward the shore; **onshore wind** —wind blowing toward the shore.

outhaul —sail control, hauls out the clew of mainsail to change sail shape.

painter —short piece of line used to make fast a boat, i.e. bow line.

pearl —to dig the leeward bow of a catamaran into the water causing the boat to slow and capsize or pitchpole.

PFD —Personal Flotation Device, lifejacket.

pinch —higher than closehailed with sails beginning to luff or shiver, indicated by weather telltale on jib flying up; too close to the wind.

pinbles —pins on the rudder used to support rudder in gudgeons.

pitchpole —to capsize stern over bow.

point —to sail close to the wind.

point of sail —the heading of a sailboat in relation to the wind, i.e. close-hauled, close reach, beam reach, broad reach, downwind (or running).

pointing — how closely a vessel is heading to an upwind destination.

port —left side of a vessel when facing towards the bow, mnemonic: “There is a little red port left in the bottle.”; Prior to 1846 (U.S.) And 1844 (U.K) the term was “larboard” because of the connotation of loading on the port side (the other side having the steering oar, see starboard). Larboard was officially changed to port to avoid confusion from the similarity of the sound of “larboard” and “starboard.”; **port tack** —a vessel is on port tack when the wind is on its port side.

reef — reduce sail area.

reach —sail with the wind approximately abeam, i.e. beam reach, close reach, or broad reach.

rudder —movable underwater part of a vessel used for steering.

run —sail downwind, with the wind aft or nearly so, i.e. with the wind, downwind.

running rigging — a general term for the lines which are used to raise, set, and trim sails.

sailing —the fine art of getting wet and becoming ill while slowly going nowhere at great expense.

sea breeze —breeze from the ocean caused by warm air rising off the land.

shackle —a U shaped bar with a pin or bolt in one end used to connect wire or line to fittings or sails.

sheet —trimming line used to control sails, attached to the clew or boom.

shrouds —wires that provide athwartship support to a mast, part of the standing rigging.

skipper —the person in charge of the boat, usually the helmsperson

stand on —to hold course, the privileged vessel in the Rules of the Road.

standing rigging — the (usually) wire that supports the mast; the shrouds and stays.

starboard —the right side of a vessel when facing forward, derived from the old northern languages, Anglo-Saxon, and Middle English. Prior to the invention of the stern rudder vessels used a steering oar on their right or starboard side; **starboard tack** —a vessel is on starboard tack when the wind is on its starboard side.

stays —provide fore and aft support for a mast, i.e. forestay, and backstay.

stern —aft end of a vessel.

stopper knot —a knot on the end of a line to prevent it from passing through a block like the figure-eight knot.

tack —1. sailing course or heading; 2. to turn the bow of a boat through the eye of the wind, 3. lower forward corner of a sail.

telltails —small lengths of light weight material like wool, nylon or cassette tape attached to the shrouds and sail near the luff or to batten pockets of main sail to indicate the air flow over the sail.

tiller —bar secured to rudder post or head used to steer a vessel.

transom —stern planking on a square sterned vessel, i.e. stern.

traveler —track to adjust sheeting angle.

trim —fore and aft balance of a vessel or the adjustment of sails to take the best advantage of the apparent wind.

true wind —the speed and direction of the wind felt by a stationary object.

turtle, turn turtle —when a vessel is capsized and completely inverted so that its hull is above the water and its mast is submerged.

windward —towards the point from where the wind blows.

wing and wing —running before the wind with the main sail and jib on opposite sides of the boat.