

Crew Preparation Checklist

Lightning 10745

Crew Preparation Checklist

[Key things a crewmember should know about, and/or be able to do, to be prepared to race on a Lightning sailboat]



Intense competition

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01. Sources of information

Objective: You should review one or more of sources of information, as needed, to refresh your knowledge of sailing fundamentals.

Summary: There are many good books, magazine articles, Internet web sites, video recordings, and other sources of information. Here are a few recommended references:

- Annapolis Sailing School *Primer*, a copyrighted course outline and set of course notes for students in their Basic Sailing Course (60 pp).
- Blake, Peter: *An Introduction to Sailing*; Auckland New Zealand: David Bateman Ltd, 1993. ISBN 1-86953-141-8 (128 pp; fantastic photos).
- Colgate, Stephen: *Sailing, Cruising, and Racing*. Nabeel Alsalam, Fleet 50 Captain, says that this book is well written and covers all the fundamentals.
- Gladstone, Bill: *Performance Racing Trim*. This book is used as the basis of a one-day seminar Bill conducts every February at the Naval Academy. Nabeel says that both the course and the book provide very concise and clear descriptions of the fundamentals.
- Gladstone, Bill: *Performance Racing Tactics*. This book is used as the basis of another one or two day course. Same comment as above.
- Goodman, Di and Brodie, Ian: *Learning to Sail - The Annapolis Sailing School Guide for All Ages*; Camden, Maine: International Marine, a division of McGraw Hill, 1994. ISBN 0-07-024014-0 (104 pp; local slant).
- Huck, Michael, Jr.: *Around the Buoys*. Nabeel likes this book because it goes around the racecourse from before the start until the finish and covers everything that you should be thinking about at each stage of the race. It is not as basic as the Gladstone books above.
- International Lightning Class Association (ILCA) website: <http://www.lightningclass.org>
- *International Lightning Flashes*, the newsletter of the International Lightning Class Association, published monthly, Murfreesboro, TN
- *International Sailing Federation (ISF) Website*: <http://www.sailing.org>
- *Learning to Crew on a Lightning*, a professionally produced 40-minute video, distributed by Bob Glassman, PO Box 1841, Evanston IL
- Lightning Fleet 50 website: <http://www.lightningfleet50.org>
- Perry, Dave: *Racing One Designs*. Nabeel says this book also is very well written. Individual chapters are packed with useful information.
- Rousmaniere, John: *The Annapolis Book of Seamanship (Third Revised Edition)*; New York: Simon & Schuster, 1999. ISBN 0-684-85420-1 (403 pp; a complete reference)
- Toghil, Jeff: *Sailing for Beginners*; Chatswood NSW, Australia: Reed Publishing, 1992. ISBN 0-7301-0083-9 (111 pages, Australian slant).

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02. Vocabulary

Objective: you should know and understand the meanings of all important sailing terms.

Summary: go to the Glossary, review the definitions of terms, and study any that are unfamiliar.

Now it's your turn! Use some of the terms you just learned in a conversation with your friends.

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03. What Makes a Sailboat Go

Objective: You should be able to describe how the forces acting on a boat cause it to go along the intended course.

Summary: It's the wind!

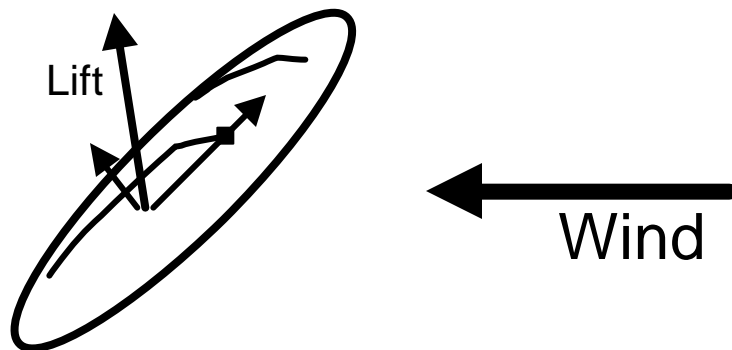
Actually, it's a little more complicated than that, but not too much. The Sailboat needs a sail (one or more), spars to hold the sails, rigging to support and adjust the spars, a hull to sail on, a keel and/or centerboard to help direct the forces on the boat, and a rudder to steer with.

When the boat is sailing downwind (the wind is coming from a position exactly behind the boat) the force of the wind on the correctly adjusted sail makes the boat go in the direction of the wind, absent any rudder-provided steering to the contrary. In that condition there is little need for a centerboard or keel to direct the forces on the boat. The wind is blowing you in the direction you want to go!

But crews don't always want their sailboats to go directly downwind!

In all other sailing configurations the force on the boat comes, at least in part, from the lift generated by wind passing over the curved surface of the sail, in exactly the same way that lift is produced when an aircraft wing moves through the air.

To make the sailboat go where the crew wants it to go, a centerboard or keel must be deployed, to provide resistance to lateral motion. This directs the net force on the boat into a larger net component in the direction of the boat's long axis, and a smaller net component perpendicular to that. The following picture illustrates this.



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A sailboat cannot use the sails to go directly into the wind. Actually, the range of bearings from + or - 45 degrees to the direction the wind is coming from is termed the "no sail zone" because it is not possible for a sailboat to use sailpower to move anywhere in that direction, except for very brief periods when the momentum of the boat keeps her going.

But other than that, any bearing is possible, and it is the force of the wind on the sails, optimized by the trim of the spars, directed by the keel or centerboard, and steered with the rudder, that makes the sailboat go.

Now it's your turn! Describe, to a friend, what makes a sailboat go.

04. Points of Sail.

Objective: You should be able to state what point of sail your boat is on, as well as stating the point of sail for any other sailboat within a 100-yard radius of the boat you are on. You should also be able to visualize a given point of sail when stated by someone else.

Summary: In the illustration below, compass directions are used to help you visualize each point of sail. However, points of sail are relative to the direction of the wind. Do not assume that a given compass course is needed to achieve a given point of sail. It may be helpful, as you read, to draw pictures illustrating each point of sail.

Imagine a steady wind coming directly out of the north (and not changing direction), and a body of water large enough to allow a boat to sail in any direction for some period of time.

Imagine a boat headed at a clockwise 45-degree angle to the wind. Its heading will be (in this case) northeast. If this is a sailboat, it is up against the limits of the no-sail zone, so the sails will be trimmed in as close as they can be to the centerline of the boat. The wind will be coming from the boat's port side, at an acute angle, and the sails will be on the starboard side of the boat's centerline. The boat's point of sail is said to be *close-hauled on a port tack*, beating to windward.



Close-hauled on a port tack

Now, imagine that the boat has changed course and is sailing due east, i.e., 90 degrees clockwise from the direction of the wind. The wind is coming directly from the port side, perpendicular to the boat's course. The sails are still on the starboard side of the boat's centerline, at about at about a 45-degree angle. The boat is said to be on a *beam reach on a port tack*.

A course between *close-hauled* and a *beam reach* is called a *close reach*. In our imaginary scenario, the boat, if it is between *close-hauled on a port tack* and a *beam reach on a port tack*, is said to be on a *close reach on a port tack*.

Now imagine that the boat has changed course and is sailing 180 degrees clockwise from the direction of the wind, i.e., due south. The point of sail is called *running before the wind*. The sails will be set as perpendicular as they can be to

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the long axis of the boat, and there may be a large wind-catching sail called the Spinnaker (also called a parachute or chute) set to help the boat move more rapidly in the direction of the wind. If the sails are still on the starboard side of the centerline, the boat is still on a port tack, even though it is running before the wind. The point of sail would be said to be *running on a port tack*.

A course between a *beam reach* and *running* is called a *broad reach*. In our imaginary scenario, the boat, if it is between a *beam reach on a port tack* and *running on a port tack*, is said to be on a *broad reach on a port tack*.

Now imagine that the boat has changed its course and is sailing at an angle greater than 180 degrees clockwise from the direction of the wind, still on a port tack. This is described as *sailing by the lee*. This can be dangerous to the boat and the crew, and is not recommended (but sometimes necessary). The reason it is dangerous is that a puff of wind could catch the back side of the sail and start it moving rapidly towards the centerline of the boat and over to the port side. The crew may not be expecting this and could be caught by surprise, and get hit in the head by the rapidly moving main boom, rendered unconscious, and even knocked overboard. Even if the crew avoids being struck by the boom, the force generated by its movement could break the boom or the mast and could rip the sail. Even worse, it could lead to a capsize. This rapid unexpected swinging of the boom when sailing by the lee is called an *accidental jibe*. Precautions should always be taken when sailing by the lee to ensure there is not an accidental jibe. First among them is to warn the skipper and the other crew whenever you detect that your boat is sailing by the lee.

The condition following an accidental jibe that can lead to capsizing is called a *broach*. More about that later.

Back to our boat sailing at greater than 180 degrees clockwise to the direction of the wind. Assume that the skipper wishes to avoid an accidental jibe, so he puts the boat back on a due down wind run. Then he commands the crew to execute an *intentional jibe*. Following a well-practiced procedure, the crew and skipper working together bring the sails over to the boat's port side. Once the sails are there, the boat has changed over to a starboard tack. Its point of sail is said to be *running before the wind on a starboard tack*.

Now imagine that the skipper swings the boat over to a course 270 degrees clockwise from the direction of the wind. The boat will be headed due west. The boat's point of sail will have changed from running, to being on a *broad reach*, to being on a *beam reach*, all on a starboard tack.

Now imagine that the skipper brings the boat to a point of sail that is *close-hauled on a starboard tack*. The boat will be about 45 degrees counter-clockwise to the direction of the wind. It will have gone from a *beam reach* to a *close reach* to *close-hauled*, all on a starboard tack.

The boat has now sailed through all points of sail except those in the no-sail zone.

Finally, imagine the skipper wants to do that again. To put the boat back on a point of sail *close-hauled on a port tack*, he will swing the boat in a clockwise direction though about 90 degrees of arc. During that time the wind will cause the sails to flutter and then move to the center of the boat and then over to the starboard side.

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This maneuver is called *coming about* (also called *tacking*). Now the boat is back on the original port tack course in our imaginary scenario.

So, now it's your turn! Draw pictures that show a boat going through all points of sail, starting with a boat close-hauled on a port tack.

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05. Lightning Sails, Spars, Rigging, Hardware, and Equipment

Objective: You should be able to find any named sail, spar and piece of equipment, rigging, and hardware when asked, and should be able to provide the correct name of this equipment, rigging, spars, and hardware when asked.

Summary:

A. Sails

There are three sails on a Lightning. They are the *mainsail*, the *jibsail*, and the *spinnaker*. The spinnaker is often called a parachute or just a chute; sometimes a bag, and sometimes a kite. The other sails are usually called the main and the jib.

The mainsail is the driving engine of the boat. Its leading edge is attached to the mast, and its foot to the boom.

The jibsail serves to channel air over the backside of the main. Its leading edge is attached to the forestay, and its foot is left free.

The spinnaker is used when running or reaching, and is designed to catch the maximum amount of air that can be captured for a boat going downwind.

All triangular sails have three corners. They are named the *head*; the *tack*, and the *clew*. The head is at the top; the tack is the forward lower corner; and the clew is the rearward lower corner.

All triangular sails have three sides. They are named the *luff*, the *foot*, and the *leech*. The luff is the forward-facing edge; the foot is the bottom; and the leech is the rearward-facing edge.

The mainsail fastens to the mast and the boom with a *boltrope* that is fed into a channel cut into the edge of these spars. The jibsail fastens to the forestay with hooks called *jib hanks*. The spinnaker has no fastenings other than the halyard and the sheets (see rigging, below). The leading edge of the jibsail contains a wire and can be adjusted up or down on this wire.

The jib and the main have plastic stiffeners embedded in their leeches. These are called *battens*. There may also be short pieces of colored yarn attached to the main and jib at strategic locations. These are called *tell-tales*. These help the crew decide if the sails are properly trimmed.

B. Spars

There are three spars on a lightning. They are the *mast*, the *boom*, and the *spinnaker pole*.

1. Mast

The vertical pole that extends from below deck to a point 28 feet above is the *mast*. The mast is used to support the sails. The top of the mast is called the *masthead*. The place in the bottom of the boat where the mast sits is called the *step*. The hole in the deck where the mast passes through is called the *partners*. The mast has a large circular channel on the back-facing edge that is used to fasten the sail to the mast. There will be several fittings on the

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mast, most for the purpose of securing the rigging. See the discussion below for details.

2. Boom

The horizontal pole that attaches to the mast and extends to the back of the boat is called the *boom*. The foot of the mainsail attaches to the boom. The boom's position on the boat is adjustable. It can be set to be anywhere between perpendicular to the boat's long axis on the port side and perpendicular to the boat's long axis on the starboard side. When the boom is moved from one side of the boat to the other, the crew may need to duck under this spar to avoid being struck in the head as it swings. Hence the name, boom.

3. Spinnaker Pole

The horizontal pole that attaches to the mast and extends forward, used to help hold the spinnaker, is called the *spinnaker pole*, or simply *pole*. The pole is set, or "made" before the spinnaker is hoisted, and is re-set during an intentional jibe.

C. Rigging

Rigging comprises wire and rope that holds the spars in place and allows their adjustment. Rigging that is not adjustable is called *standing rigging*. Rigging that is adjustable is called *running rigging*.

1. Standing Rigging

On a Lightning, the standing rigging consists of *stays* and *shrouds*. The stays stabilize the mast by restraining movement in the direction of the boat's long axis (fore and aft). The shrouds stabilize the mast by restraining movement in the other direction (port and starboard). The *forestay* or *jibstay* is at the front of the boat. It leads from a point part way up the mast to a fastening on the deck at the very front of the boat. It helps keep the mast from tilting backwards, and also supports the jibsail. Its length is fine-tuned through attachment to a turnbuckle. The *backstay* is at the back of the boat. It leads from the masthead to an adjustable cable that is at the very back of the boat. It helps keep the mast from tilting forward. It also is used to make the mast to bend (curve) towards the back of the boat, to help fine-tune the shape of the mainsail and the tension on the jibstay.

There are four *shrouds* on a Lightning, two on each side, fairly close together. On each side, the most forward shroud is called the upper shroud because it attaches to the mast at a point close to the masthead. The other shroud is called the lower shroud. The upper shroud has a second attachment to the mast, about halfway down from the top, via a horizontal rod called a *spreader*. The attachment points for the shrouds at the deck are called *chainplates*. Turnbuckles make the connection between the shrouds and the chainplates, and are used to adjust the tension on the shrouds.

2. Running Rigging

On a Lightning, the running rigging consists of *halyards*, *sheets*, *uphauls*, *downhauls*, and other *tensioners*.

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Halyards are used to hoist sails. Since there are three sails, there are three halyards. The *main halyard* is used to hoist the mainsail; the *jib halyard* is used to hoist the jib; and the *spinnaker halyard* is used to hoist the spinnaker. A section of each halyard sits inside the center of the mast, protected from the elements. At the lower end each exits the mast through a *halyard exit plate*; at the upper end it exits via a pulley called an *exit sheave*. The spinnaker halyard is all rope, but the other two have a length of rope attached to a length of wire. The rope is for ease of gripping by the crew that is hoisting a sail; the wire is for strength to hold the hoisted sail. When a sail is hoisted, the bottom end of the halyard will fit into a fitting on the mast called a *halyard lock* to hold it in place (except for the spinnaker halyard, which is held in place by a *cam cleat*).

Sheets are used to adjust sails, letting the sails move out away from the boat's centerline and helping bring them back in. The *Mainsheet* is used to adjust the mainsail. It starts at the back end of the boom, leads down to, and around a pulley (also called a block) on the deck at the stern, then back up to the back end of the boom, then forward to a point near the center of the boom, then down to a block mounted on a swivel on the centerboard trunk, then through a cam cleat. The remaining length of this line is held in the hands of the mainsail trimmer (who is usually also the helmsman). It is played out or trimmed in when the boat needs the mainsail's position adjusted. The first block may be fastened to an adjustable device called the *traveler* that allows the position of that block to be moved closer to, or farther away from the boat's centerline, and there may also be a bridle that permits adjustment up and down.

Jibsheets are used to adjust the jib. There are two jibsheets. One is used when the boat is on a starboard tack; the other when the boat is on a port tack. A jibsheet starts at the rear corner of the jib, leads down to a turning block attached to an adjustable slide on a track mounted on the deck, then through a slot in the splashguard, and through a cam cleat. The remaining length of line is held in the hands of the jibsail trimmer (usually the forward crew member). It is played out or trimmed in when the boat needs the jibsail's position adjusted (which is almost always constantly, especially in light and variable winds). The block and the adjustable slide together make an assembly called a *jib car*. Sometimes boats will use *double-blocked jibsheets*, to provide mechanical advantage and finer trim adjustment for the jibsail trimmer. A double-blocked jibsheet starts at the jib car, goes to a block at the rearmost corner of the jib, back to the turning block on the jib car, and then through the splashguard and into the cam cleat and then into the jibsail trimmer's hands. For a boat on a starboard tack, the jibsheet that is used is the one on the boat's port side. The other sheet is called the lazy sheet, and is played out far enough to keep it from affecting the trim of the jib.

Spinnaker sheets are used to adjust the spinnaker. There are two spinnaker sheets. One is used when the boat is on a starboard tack; the other when the boat is on a port tack. A spinnaker sheet leads from the clew (rear corner) of the spinnaker back to a turning block at the rear of the boat, then under the deck to a second turning block. This second turning block is located close to the Spinnaker trimmer's hand. The spinnaker trimmer (usually the middle

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crew) uses the spinnaker sheet and the turning blocks to properly position the rear edge of the spinnaker. This sheet is played out or trimmed in when the boat needs the spinnaker's position adjusted (which is almost always constantly). For spinnaker sheets, unlike the jib sheets, the lazy sheet has a big job to do, and gets a different name when doing that job. In that role, the lazy sheet is called a *guy* and it helps keep the spinnaker pole positioned. The *guy* runs from the other corner of the spinnaker, through the end of the spinnaker pole down to the deck, through a hook (called, appropriately, the *guyhook*), then through a cam cleat on the deck, then back to the rear of the boat, around the turning block, then forward under the deck to a second turning block). The position of the spinnaker pole and the forward edge of the spinnaker may need adjustment, but less frequently than the rear edge of the spinnaker. So once the *guy* is cleated on the deck it may not need too much attention after that. [Sorry, guys, but there is not a corresponding *galhook* on a sailboat!]

Uphauls, downhauls, outhauls and *tensioners* are used to adjust the vertical position and/or angle of spars and other equipment. Starting from the front of the boat, there may be a *jib uphaul*, which is used to put tension on the wire located at the leading edge of the jib. On my boat the jib uphaul consists of a sliding jib halyard lock mounted on a vertical track on the mast, plus a cable that runs from the sliding halyard lock to a drum located below deck. The drum provides mechanical advantage, via a line attached to the drum axle, led back up to the deck, around an exit sheave, and through a cam cleat to a position convenient for the forward crew. The purpose served by this uphaul gives the apparatus an alternate name, the *jib wire tensioner*, often called just the *jib wire*. Some other Lightnings use a different arrangement of equipment, for example, jib wire downhaul, to tension the jib wire, but the arrangement is still called the jib wire.

A second uphaul is the *spinnaker pole topping lift* (sometimes called the *topper*). This uphaul adjusts the angle the spinnaker pole makes with the mast. It should be set so that the spinnaker pole is roughly horizontal, and can be adjusted to provide fine-tuning when the boat is under way with the spinnaker up. Like the halyards, it has a portion inside the mast, and it has a length of wire connected to a length of rope, and it has an exit sheave and an exit plate. On my boat, the tailing end is run through a turning block on the deck, then back through a cam cleat to a position convenient for the forward crew.

There is a downhaul used with my jib. It is attached to the forward corner of the jib, and is used to adjust the tension on the jib's leading edge. The effect of putting tension on this edge is to smooth out the wrinkles in the jib cloth at the front of the jib, so this downhaul is called the *jib cloth tensioner*, often called just the *jib cloth*. It runs from the front corner of the jib through fairleads and a slot in the splashguard to and through cam cleat to a position convenient for the forward crew. On some boats the jib cloth may run under the forward deck and emerge just forward of the cam cleat.

A second downhaul can be found at the spinnaker pole, the *spinnaker pole downhaul* (sometimes called a *kicker*). On most Lightnings this is just a length of shock cord. On larger boats and on some newer Lightnings it is an

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adjustable line that is used in conjunction with the topper to set the angle of the spinnaker pole.

Working aft, there is a downhaul that is used to help set the vertical angle of the main boom. It is called the *main boom vang*, or just *vang*. On my boat it consists of a cable that runs from a point on the boom a third of the way from its forward end, into the deck just behind the mast, then down to another under-deck drum. A length of rope runs from the drum axle back through a fairlead and a cam cleat mounted on the left front seat to a position convenient for the middle crew. It is used to bring the main boom to a more horizontal angle when the boat is sailing close-hauled. It is slacked off as needed when the boat is reaching and running.

There is a downhaul located on the leading edge of the mainsail, and it is used to put tension on this leading edge. It is called a Cunningham, after the sailor who invented it. It consists of a metal hook that is inserted into a grommet a few inches up from the foot of the sail, plus a line and a pair of blocks that help the forward crew adjust the tension by pulling the affected part of the mainsail down towards the boom. The line is held in place in a clamshell cleat located on the mast.

There is a downhaul located at the boat's stern that is used to put tension on the backstay. This is called the backstay tensioner. Putting tension on the backstay causes the mast to curve rearward, fine-tuning the shape of the sail. On my boat the helmsman is the one who must tension the backstay, because of the location of the tailing line.

On some Lightnings, the tailing ends of the bridle, the backstay tensioner, the Cunningham, and the vang are routed to a position on the deck amidships where either the helmsman or the middle crew can adjust them. If they are replicated on both the port and the starboard sides the boat is described as having double-ended controls.

The centerboard is raised and lowered with a *centerboard uphaul*. On my boat the uphaul runs from the top front of the centerboard to a drum that provides mechanical advantage. A rope from the axle of the centerboard drum runs through a fairlead and a cam cleat mounted on the right front seat to a position convenient for the middle crew. Some Lightnings use a combination of ropes and pulleys (called a block and tackle) instead of a drum. Note that the centerboard is very heavy (130 pounds), so anytime the centerboard is lowered, it must be done slowly and carefully. The crew adjusting the centerboard should be wearing gloves to prevent rope burns should the rope slip in her hands.

There is often another line associated with the centerboard uphaul. It is called the *preventer*, and its purpose is to keep the centerboard from going back into the centerboard trunk when the boat is upside down after a capsize. The preventer is cleated when the centerboard is down, and must be uncleated before the centerboard can be hoisted. The preventer makes it possible to stand on the centerboard on an overturned boat to help right it.

There is a tensioner that pulls the foot of the sail taught. It is called the *main outhaul*. A fitting at the end of the boom fastens to the clew of the mainsail. This fitting is attached to a line that runs around an exit sheave and through

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the length of the boom to a point near the boom's forward end, where it drops through another exit sheave on the boom's bottom edge. From there it can be pulled to put tension on the foot of the mainsail, then cleated in a cam cleat on the boom's bottom edge. Either the forward crew or the middle crew should be able to adjust the main outhaul, on command from the skipper.

Some Lightnings have jibsheet outhauls called *Barberhaulers*. These are used when the boat is running or reaching, and they bring the deck attachments of the jibsheets farther outboard from the usual attachment points, making it easier to fly the lib correctly.

Some Lightnings have spinnaker sheet downhauls called *Twings*. These are used to help bring a guy down to the deck before hooking it under the guyhook and cleating it in the deck cleat.

D. Hardware

There is quite a bit of hardware on a Lightning. This includes various *fasteners and cleats*. Starting from the bow there is the forward *chainplate*, serving as an attachment point for the forestay and the jib wire. Then there are four more *chainplates* amidships, two on each side, serving as attachment points for the shrouds. Chainplates are molded into the hull and are supposed to be very strong and firmly attached. In fact, a hoisting bridle attaches to the chainplates for the lower shrouds, which take the entire weight of the boat when the boat is hoisted on a crane during launch and recovery. Chainplates should always be inspected prior to launch, to ensure they are not corroded and have not worked loose from the hull.

On the deck in the triangular area near the mast are *cam cleats* for the jibsheets, plus cam cleats for the jib cloth, the jib wire, and the spinnaker pole topping lift. Cam cleats have two pawls mounted on shafts and held in place with small springs. The pawls have teeth molded in or cut in, which work to secure the line. Occasionally the teeth or the spring will wear out, necessitating replacement of the cleat. A worn out cam cleat will allow the line it is securing to slip, an aggravating and potentially dangerous situation.

Cam cleats tend to be expensive and should be cared for appropriately.

There are many more *cam cleats* on the boat. There is one on each side of the deck, used to secure the spinnaker guy whenever the guy is on that side. There are four cam cleats on the forward seats. Two are used to secure the spinnaker sheets, when the sheet is on that side. One on the left is used to secure the vang, and one on the right side is used to secure the centerboard uphaul. There is a cam cleat for the centerboard preventer, and one for the backstay tensioner. Boats with double-ended controls amidships have four more on each side of the deck, at the edge of the cockpit.

There is one cam cleat mounted on the mast, used to secure the spinnaker halyard. It is found below the spinnaker halyard exit plate. There is one cam cleat on the boom, used to secure the main outhaul.

When securing a line in a cam cleat, slide the line in between the pawls, pull the line a bit tighter than is needed, and then let the tension on the line pull it back against the pawls to get a firm grip. To remove a line from a cam cleat, pull on the line to take the tension off the pawls, then lift the line out of the cleat and let it

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go. When you cleat the spinnaker halyard, take the spinnaker as far up as you can, then let it drop about an inch before you cleat it. That way there will be some line to take up when it's time to uncleat it.

On the mast there is one *clamshell cleat*. Located just below the attachment point of the boom, it is used to secure the Cunningham. It looks like a partially opened clamshell, and has teeth cut in to the inside. Securing and removing a line to/from a clamshell cleat is identical to securing and removing one from a cam cleat.

The device that fastens the boom to the mast is called the *gooseneck*.

Turnbuckles are fastened firmly to the shrouds and stays by a hydraulic press that compresses the turnbuckle collars right onto the wire. This press is called a *swage* (rhymes with "age"), and the turnbuckles are said to be *swaged on*.

The other ends of the turnbuckles fasten to the chainplates with fasteners called *shackles*. The pin that locks the shackle onto the chainplate is called a *clevis pin*, and the circular wire that locks the clevis pin in place is called a *cotter*. Cotters should be wrapped in tape, to keep them from slipping out of place.

You'll find many other shackles on the boat, all serving to fasten rigging to the spars and equipment.

E. Equipment

Some equipment is attached to the boat, and some is just carried on and stowed aboard.

The *rudder* is attached to the boat's stern with metal fasteners called *pintles*, which fit into metal attachment points called *gudgeons*. The rudder is used to steer the boat. It does this by changing the direction of motion of the stern, causing the boat to pivot around the bow. You can see that this only works if the boat is moving with respect to the water. If there is no motion, there is no way to steer.

The *tiller* is a wooden or metal pole attached to the rudder. The helmsman pushes or pulls on the tiller in order to turn the rudder. When the boat is moving forward through the water the helmsman pushes the tiller to the left to make the boat turn to the right and he pushes the tiller to the right to make the boat turn to the left. A tiller extension allows the helmsman to sit up on the deck while steering. If the boat is beating to windward in a good breeze, it will heel over to the leeward side quite a bit. Since Lightnings are designed to be sailed flat, the skipper will ask one or more crew members, including the helmsman, to sit on the windward (high) side of the heeled boat to counterbalance the force that makes the boat heel. That's one place where the tiller extension really comes in handy. When the helmsman is sitting on the (high) windward side, pushing the tiller down toward the leeward side causes the boat to head up into the wind, while pulling the tiller up to the windward side causes the boat to fall off the wind.

A Lightning carries *hiking straps*, fabric belts that run across the cockpit. No, they are not for taking a walk back to the dock, they are used to help keep crew in the boat when they are up on the high side counterbalancing the force causing the boat to heel. When the crew hangs torsos and arms overboard to maximize the counterbalancing force, they are said to be *hiking*. A hiking crew will wrap

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ankles around the closest hiking strap, and hang onto a safety rope when leaning out and back.



Swill Dog's Crew goes hiking!

If the cockpit takes on some water (from waves breaking over the bow, or from splash during excessive heel), there needs to be a way to get rid of it. That's where the *bailer* comes in. The bailer is a flap in the bottom of the boat that can be opened and closed. If open when the boat is moving briskly forward through the water, sailing nearly flat, water in the cockpit will drain out (but if the boat is not moving when the bailer is open, water will run in).

If the boat takes on a lot of water (say during a capsize), it will take more than the bailer to get rid of it. That's where the *bailing bucket* comes in. Of course a bailing bucket is of little help if it drifts away or sinks after a capsize, so it should be tied securely in the cockpit when stowed.

A *drybox* is a sealable container that keeps dry those things that must stay dry, like possibly the sandwiches. A drybox should also be securely tied down in the cockpit so that it doesn't drift away during a capsize.

An *anchor* is used to hold the boat in one spot when the crew doesn't want it to drift. There is a lot that needs to be said about using an anchor (the technique of anchoring is a complex subject) but all I'll say here is that if it is your job to cast an

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anchor, first make sure that the anchor is firmly attached to the anchor line, and that the anchor line is firmly attached to the boat!

Paddles are needed when the wind is calm and there are no powerboats available to tow you. Paddles also are helpful when leaving the dock or returning and the wind is not favorable for your maneuvers. There must be two paddles on board.

Personal Flotation Devices (PFDs) [life jackets] are required to be on the boat, one wearable one for each person on board, plus one throwable one. You shouldn't step on board a boat that doesn't have these. You should be wearing one whenever the boat is under way.

A *Compass* tells the direction the boat is sailing, measured in degrees from magnetic North. A boat sailing due magnetic North has a compass bearing of 0 degrees; due East 90 degrees; due South 180 degrees, etc. On a racecourse, the compass is most helpful in determining the direction of the wind and in deciding if a shift in the wind is a header or a lift. To determine the direction of the wind, sail directly upwind, sails luffing with wind equally passing on each side, and record the compass reading. Subsequently, sailing close hauled should give a compass reading of about 45 degrees from the direction of the wind. If the reading is less than that in a shift, the shift is a lift; if more, it is a header.

A *wind vane* is mounted on top of the masthead. It reveals the direction of the apparent wind and is helpful to the skipper and crew for deciding on sail trim.

A *mooring line* is used to tie the boat to the dock during docking. It is normally removed and stowed when the boat is under way.

Now it's your turn! Go on board a Lightning, point out each piece of equipment, item of rigging, spar, and sail, and name, and say a few words about its purpose.

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06. Crew Positions - Roles and Responsibilities.

Objective: You should know and understand the roles and responsibilities for each crew position on your boat, and set a goal to excel in your primary assigned position and be a competent backup in the other positions.

Summary:

A. Forward Crew.

The forward crew has the most demanding job on the boat. She must be able to hoist, lower, and trim the jib; set and remove the spinnaker pole; hoist and lower the spinnaker; sit anywhere in the front seat or deck as needed to make the boat sail flat; move nimbly and quickly around in the forward cockpit, including getting up and over the centerboard; and provide eyes for the skipper, looking forward, rearward, leeward, and windward and constantly updating the skipper and crew with information about what's happening outside the boat. She needs arm strength for hoisting and jib trimming, and a strong voice for communicating with the crew and hailing other boats that are on a collision course. When the boat is on a run, the forward crew should face to the rear and keep the skipper and other crew informed about what is happening behind -- what the other boats are doing, and what wind shifts are coming. The forward crew also ensures that accidental jibes are avoided when the boat is sailing by the lee, by keeping an arm, leg, or back against the boom, and letting the skipper know when she feels the boom lifting. She needs four eyes to go along with the four arms needed to do all these things.

B. Middle Crew

The middle crew has the most critical job on the boat, flying the spinnaker on runs and reaches. The middle crew must also be able to back up and substitute for the forward crew whenever the forward crew needs relief. The middle and forward crew must become a two-person unit when hoisting, trimming, jibing, and dousing the spinnaker, and need to be able to work very closely together. Additional duties include raising and lowering the centerboard, serving as tactician, timer, and lookout, and maintaining communication with the skipper and the forward crew. The middle crew is the first to get up on the deck and hike out when hiking is needed, and back into the cockpit when it is no longer needed. And, the middle crew is the first to grab a paddle when paddling is required.

C. Helmsman

The helmsman steers the boat and must fully understand: how to make the boat achieve maximum boat speed on all points of sail; how to keep the boat upright; how to avoid collisions; how to clearly communicate with the other crew; the racing rules of sailing; and racing tactics and when to use them. Often the skipper fulfills the role of helmsman.

D. Skipper

The skipper organizes the crew, gives direction, provides leadership, and accepts responsibility for everything that happens in and on the boat. The

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skipper ensures the boat is shipshape and ready for racing. The skipper usually also fulfills the role of helmsman.

Now it's your turn! Read the next section (on boat handling) and see how the roles and responsibilities of the crewmembers work together to keep a racing sailboat moving fast.

07. Boat Handling

Objective: You should know and understand your duties in each boat handling procedure, and set a goal to excel in those activities related to your primary crew assignment and to be at least competent in the others.

Summary:

A. Launching

We keep the boat on a trailer in a parking place at the marina. This is called a *dry slip*. That means we need to haul the boat down to the water and launch it before we can go sailing. Responsibilities for launching should be discussed in advance so that all know what to do and no time is wasted waiting for others to show.



Uncovering the boat

On race day, the first crew to arrive begins the preparation for launch. The mooring cover is removed and rolled up, and all running rigging is set up for the day's sailing. As other crew arrive, the main and jib are bent on to the spars and rigging, and the spinnaker is attached to the spinnaker halyard and the spinnaker sheets, and then hoisted, and then lowered into the cockpit. Needed equipment is checked and put aboard. Tell tales on the shrouds are replaced as needed. The bailer is closed, and the hoisting bridle hooked up. The mooring line is attached to the bow of the boat.

When bending on sails, we need to unhook halyards from their secured positions and attach them to the sails. One important rule regarding halyards is that the hauling ends (the ones with the shackles that fastens to the heads of the sails) must always be fastened to something when they are not fastened to their respective sails. Failure to do so will eventually result in a halyard end flying up the mast, with no way to retrieve it except by removing the mast or by sending a brave crew shinnying up the mast to get it. Normally we only remove halyards from sails at the end of the day when we are securing the boat, but sometimes we will do it on the water too.

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The boat is towed down to the crane, backed into line, and, when it's our turn, moved into position. Once there, the hook on the crane is attached to the ring on the hoisting bridle and hauled up until the bridle is taught. The backstay is disconnected from the backstay tensioner, and a visual check is made to make sure that the mast and the standing rigging will not foul on the crane. One crew inspects the hoisting bridle to ensure there are no kinks and that all hooks are secure.

When launching, one crew works the crane controls, one crew keeps hands on the mooring line, and one crew directs. The process is to lift the boat off the trailer, swing it around until the bow points into the wind, then lower it into the water. Once the boat is floating and enough slack on the hoisting chain is provided, the directing crew climbs into the boat and releases the hoisting chain while the crew on the mooring line hauls the boat to a position at the dock. The crew working the controls then raises the hoisting chain to a position convenient for the next boat in line, then removes the trailer and pulls it over to a parking spot.

The crew on the boat attaches the rudder and the tiller and re-inspects the sails and the rigging to ensure the boat is ready.

It normally takes 30 minutes to do all of this, so we allow 45, just to give some cushion. Since the skippers meeting is at 10, the first crew needs to arrive and get started by 9:15 so that the boat is in the water and ready to sail by the time the skippers meeting begins. Immediately after the skippers meeting we will want to depart, in order to get to the racecourse with time to spare.

B. Getting on board

Whenever stepping on board a moored boat, keep in mind two things: 1) your motion as you step aboard will be imparted to the boat, moving it in the same direction you were going, until the mooring lines stop it (at which time the boat will reverse direction as it bounces back); and 2) the boat will tip some as you put your weight on the deck. So, whenever boarding, move slowly and cautiously, and keep one hand on a spar or some standing rigging to balance, and to grip if you lose your balance. Also, warn other crew on board that you are boarding, so that they can be prepared for the motion of the boat. Do not try to board while carrying anything -- hand whatever you are carrying to a crew on board, then get yourself on board. Caution! Lightning sailboats are relatively stable, being fairly heavy and wide. Other boats at the marina are not! In particular, Penguins and Albacores can capsize unless you step into the floor of the cockpit right in the middle.

Before you get on board, attend to last-minute preparations, including locking unneeded personal belongings in the car; putting on sunscreen; and using the marina bathrooms (you'll be out on the water for about 6 hours).

C. Getting away from the Dock.

Ideally the boat is docked on the leeward (downwind) side of the dock, at the end so that no other boats obstruct the path to open water. It is attached to the dock by the mooring line, secured to a horn cleat on the dock. All equipment is on

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board and stowed, and all crew are wearing the appropriate outer garments, including gloves and PFDs. When the skipper determines that the boat is ready to depart, the mainsail is hoisted and the main halyard secured and the mainsheet eased off; the jibsail likewise is hoisted and halyard secured with the jibsheet eased off. The centerboard is lowered; the preventer secured, and the skipper performs a visual check of all running rigging to ensure none is fouled. The skipper outlines, with the crew, the steps of casting off and getting under way, including identifying the initial path, bearings, and points of sail. The forward crew takes her place on the front seat, prepared to trim the jib once the boat is under way.

When the skipper says, "let's go," the middle crew exits the boat, removes the mooring line from the horn cleat on the dock, works the boat so that it's bow is headed out, then pulls the boat smartly in the direction it is headed to give it some forward motion, needed for steering. Once the boat is in motion, the middle crew climbs back on board, landing on the deck amidships, and taking a position needed for the next upcoming maneuver.

As the boat begins moving through the water, the main and jib are trimmed to fill the sails on the designated point of sail, and the boat is under way!

Alternative strategies may be used, depending on where on the dock the boat is parked, and what other boats are obstructing the path to open water. Paddling is sometimes an option; so is backwinding the jib to provide a turning force; moving backwards to get into a clear spot before filling the sails; and/or passing the mooring line around other parked boats to work your way to the end of the dock. In all cases, the crew must understand the strategy and maneuvers that will be used. The most important thing for all to remember is that the steering does not work unless and until the boat is moving forward through the water.

D. Navigating the Channel

Due east of the dock is a large shallow area (the bottom breaks the water surface at very low tides), and even the deeper water is often clogged with *Hydrilla* weeds. So, between the shore on the west and the shallow spot to the east is a narrow channel, marked with buoys, leading south out of the marina. If the wind is blowing from the east or northeast, it is possible to sail south through the channel on a reach on a port tack, which is an easy departure. If there is a high tide, the boat can sail south past the first daymark, then harden up onto a close-hauled point of sail headed east or southeast to the middle of the river. At low tide, the boat may need to sail south to the Alexandria Power Plant before leaving the channel.

A more difficult trip to the middle of the river exists if the wind is blowing from any other direction. If the wind is from the west or northwest, an exit may be made on a reach on starboard tack; however, close to the shore the wind is deflected by the trees and can change direction and velocity dramatically and rapidly, requiring much sail trimming.

If the wind is blowing from the south, southeast, or southwest, the boat must execute a series of tacks to get down channel. The crew must be prepared to execute the tacks smartly, and the helmsman must ensure that the boat

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maintains steerage way at all times. In light winds, paddling may be necessary. If the wind is coming from the southwest, the trees along the shore can deflect the wind, causing many shifts in wind direction and velocity. Sometimes the skipper may want to "tack on a header," that is, tack before getting fully across the channel, to take advantage of a wind shift. Shallow water and weeds on the east side of the channel, and the shore on the west side of the channel severely limit the options for maneuvering. And, other boats in the channel can limit the path that the boat can follow. Worse, *Hydrilla* weeds can catch on the rudder and on the centerboard, destroying all control of the boat until they are removed. The helmsman may need the middle crew to take the tiller when he leans over the stern to remove weeds from the rudder; the middle crew may also need to rapidly raise and lower the centerboard to clear weeds from it. This is the time for all to remember the centerboard preventer and how it must be let off before the centerboard can be raised. This is also a good time to ensure that no loose lines (sheets, halyards, uphauls, mooring line, etc) get fouled in the centerboard drum. And, just to make things a bit more interesting, there is a large sunken wreck right in the middle of the channel, near the second daymark! This wreck is partially visible at low tide.

Once out in the middle of the river, the crew makes ready to get to the racecourse. This is a good time to ensure that the mooring line is removed and stowed, and that all loose equipment is re-stowed, and that the spinnaker sheets and halyard are ready for use. This is also a good opportunity (if there is time) to practice some tacks and jibes.

E. Tacking and Jibing

The important thing about tacking and jibing is to keep up boat speed, and much practice is required to do this successfully. Tacking brings the boat from a point of sail close hauled on one tack to a point of sail on the other tack, by bringing the boat head to wind, and then around. Jibing brings the boat from a point of sail running on one tack to running on the other tack, by letting the boat fall off the wind until it is sailing by the lee. Jibing when the jib is up and the spinnaker down is interesting; jibing with the spinnaker up (and the jib down) is one of the most challenging and exciting maneuvers in sailboat racing!

1. Tacking

When the skipper decides that it is time to tack, he will give the informational command, "Let's get ready to tack!" (Or sometimes, "Prepare to come about!") At that point the crew should prepare to execute the tack. Shortly after, the skipper will give the command, "Ready, about!" (It is actually a question, meaning, "are we ready to come about? I.e., tack). Each crew at that time should call out "Ready!" if they are, and "No!" if they are not. (If "no," it should be followed by a short explanation.)

Assuming that both crew say "Ready!", the helmsman then pushes the tiller to the leeward side of the boat and announces "He Im's-a-lee!"

At that point, both crewmembers and the skipper begin their moves to duck under the boom and get to the other side of the cockpit. The forward crew prepares to let go the jib sheet, but actually keeps it cleated until it begins to

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luff (flutter rapidly). Once the jib luffs, the forward crew lets go the jib sheet, moves over to the other side of the cockpit, and begins trimming in the other jibsheet. The jibsheet should be pulled in just fast enough to get it in the close-hauled position before it fills with wind.

If the wind is strong, the skipper, the middle crew, and possibly the forward crew will then get up on the deck and begin hiking, to keep the boat flat as it sails off on the new tack. If the wind is light, an opposite strategy may be appropriate -- a "roll tack."

In a roll tack, one or both crewmembers will be sitting on the leeward (low) side of the cockpit at the time the tack is initiated. When the helmsman announces "Helm's-a-lee!", both crew members move over to the opposite (high) side of the cockpit and sit down on the seats with some force. This will cause the boat to heel to the side the crew is now sitting on, and gravity will pull the boom over, helping to execute and complete the tack.

2. Jibing

a. Jibing without a spinnaker up

When the skipper decides that it is time to jibe, he will give the informational command, "Let's get ready to jibe!" At that point the crew should prepare to execute the jibe. Shortly after, the skipper will give the command, "Jibe-O!" (It is actually a question, meaning, "are we ready to jibe?"). Each crew at that time should call out "Ready!" if they are, and "No!" if they are not.

Assuming that both crew say "Ready!", the helmsman then pulls the tiller to the windward side of the boat and announces "Jibing!" As the boom begins its swing, the skipper announces, "Coming Over!"

At that point, both crewmembers and the skipper begin their moves to duck under the boom as it swings across. The forward crew lets go the jib sheet, and cleats it in on the opposite side once the jib has moved over to the other side of the boat. Depending on the strength of the wind, the crew will take up new positions in the cockpit that counterbalance the force of the wind and keep the boat flat.

On larger boats a jibe requires an extra step to keep the much heavier boom powered with a much larger sail from swinging violently around and damaging the boat and/or injuring the crew. Before the helmsman pulls the tiller to windward, the skipper gives the command, "Center the Main!" At that point the mainsail trimmer rapidly trims in the mainsheet until the boom is in the center of the boat, and announces "Centered!" Then, once the boat has jibed, the mainsail trimmer eases the mainsheet until the main boom is fully extended on the opposite side of the boat. This strategy is a good idea on a Lightning too, if the wind is strong.

When making a long run before the wind with a jib up and no spinnaker, it is advantageous to fly the jib on the opposite side of the boat from the main. If that isn't done, the jib will be in the wind shadow of the main and will not provide any pulling power. By moving the jib over to the windward

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side of the boat, it is able to contribute. The forward crew will need to hold the jibsheet at a point forward of the upper shroud to keep the jib on the windward side. This is called a "Gull-winged" configuration, or "Wing-on-wing." At any rate, during a jibe in a Gull-winged configuration, the forward crew has the added task of getting the jib over to the new windward side.

b. Jibing with a spinnaker flying

Jibing with the spinnaker up is the acid test of seamanship for a racing crew. The objective is to keep the spinnaker fully drawing during the maneuver (while at the same time maintaining a good tactical position with respect to the mark being rounded and the other boats on the racecourse).

In a jibe with the spinnaker up, the helmsman/skipper does pretty much the same things that are done as described above, with the additional task of synchronizing the timing of the jibe to coincide with the related activities of the forward and middle crew.

When the skipper says, "Let's get ready to jibe," the forward crew must begin a very precise execution of a series of steps, and the middle crew must begin to synchronize her activities with those of the forward crew.

For the forward crew, step one is to remove the guy from the guyhook and from the cam cleat on the weather deck. Using the V between thumb and forefinger on the right hand, push the guy down and forward out of the hook and then back out of the cleat. Next the crew climbs onto the weather side of the foredeck; braces her shoulders and hips against the mast to keep balanced; unfastens the spinnaker pole from the mast and the guy, using the string attached to the pelican hooks at the pole ends. At that point this crew steps over to the leeward side of the foredeck, brings the pole over without changing its orientation, hooks it to the spinnaker sheet (which is about to become a guy) at a point forward of the upper shroud, then hooks it to the mast, and announces "Pole's Made!" At this point the forward crew has completed execution of an end-for-end swap of the pole. Note: see appendix for advanced pole-handling tips. During this time the helmsman will have initiated the jibe and by the time the pole is made the main boom will have started, and possibly completed its swing. The last step for the forward crew is to hook the new guy under the guyhook and cleat it on the cam cleat on the deck, while getting back into the cockpit. After the jibe is complete the forward crew should assist the middle crew with fine-tuning the position of the pole and then cleanup of the spinnaker sheets as the boat begins the run or reach on its new point of sail.

An alternative to the on-the-deck pole swap is the *Red Fehrle in-the-cockpit pole swap* (named after Fleet 50 Skipper Red Fehrle who taught me about this). For this maneuver, step one - remove the guy from the guyhook and the cleat - is the same as above. Then, for step two, the forward crew moves over to the leeward side of the cockpit, sits down on the leeward front seat, and pulls the main boom over to initiate the jibe.

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Then, still in the cockpit, the forward crew reaches up and unhooks the pole from the mast and then from the old guy, using the strings attached to the pelican hooks, then reaches out, grabs the spinnaker sheet, hooks the pole to it and then hooks the pole to the mast. The remaining steps are as before. The advantage of this approach is it keeps weight off the foredeck, and keeps the forward crew in the cockpit, an important consideration if the boat is pitching or rolling in waves. The disadvantage is that the forward crew won't be able to see what's happening on the old guy when the pole is being unhooked, and may have a hard time unhooking the pole from the mast, due to the unusual twist of the wrist needed to grab the string, pull on the pelican hook, and then remove the pole. Also, there is increased likelihood that the pole will be attached to the new guy behind the upper shroud, rather than in front of it, a sure formula for disaster.

When the skipper says, "Let's get ready to jibe," the middle crew must begin a very precise execution of steps that are synchronized with the activities of the forward crew.

Before the forward crew removes the guy from the guyhook, the middle crew must get a hand on the guy, inside the cockpit, and remove any slack. Once the forward crew removes the guy from the guyhook, the middle crew begins easing the sheet and trimming in the guy¹, to bring the spinnaker over to the new leeward side, but going slowly enough to keep the spinnaker full and drawing during the entire maneuver, while ducking under the main boom as it comes across. If timed right, the new position of the spinnaker will be at its proper location at the precise instant that the forward crew is ready to hook the pole into the new guy.

The skipper's role during a jibe is to decide when to jibe, and give the commands, while steering the boat, keeping in mind the tactics to be employed, and attending to what the other boats are doing. The skipper must also be prepared to answer the rhetorical question, "why do we have to jibe now?" usually followed by the unspoken implication, "it's so much work!" (The answer is, "because we have crew!").

See also the appendix article on Advanced Spinnaker Sailing Techniques.

F. Sail Trimming

Ensuring proper sail trim is one of the most important crew responsibilities on the boat. The helmsman works the mainsheet, the backstay, the bridle, and attends to the Cunningham, main outhaul, and vang, to properly trim the main for each point of sail. Adjustments will be made as the wind changes direction and speed with respect to the intended course. The forward crew works the jib sheets and the jib cars to properly trim the jib of each point of sail. The middle crew works the spinnaker sheet and guy to properly trim the spinnaker when the boat is running or reaching.

¹ During this maneuver the line that was the sheet becomes the guy, and the line that was the guy becomes the sheet. The sentence above means to ease the line that, at the start of the maneuver was a sheet, and to trim in the line that, at the start of the maneuver was a guy.

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1. Main

When sailing close-hauled, the main boom should be as close as it can to the centerline of the boat in light to moderate winds; in stronger winds it may need to be set farther out. The mainsheet and the bridle are used to set the trim of the main, along with the vang. Backstay tension is set, depending on the strength of the wind -- the stronger the wind, the greater the backstay tension. Fine-tuning adjustments to the Cunningham and the outhaul are also made to complete the main sail trimming.

When sailing on a reach, the main is let out until it begins to luff, then is trimmed back in just far enough to draw fully.

When running, the main is let out as far as it will go, so that the main boom is nearly perpendicular to the centerline of the boat. The outhaul, backstay, Cunningham, and the vang may be eased off too.

2. Jib

When sailing close-hauled, the jib should be trimmed so that the leech is just outside the upper shroud at the spreader, and the upper battens are horizontal. This may require a change of position of the jib car on the track, and may need frequent readjustment when the wind changes velocity or direction.

When reaching, the jib should be let out until it begins to luff, then brought back in until it is fully drawing. Proper trim on a reach is indicated by the outer (leeward) tell tale laying flat and horizontal on the sail surface and the inner (windward) tell tale aligned parallel to the outer. Jib trim on a reach will need to be adjusted often.

When running without a spinnaker up, the jib should be set and held in a gull-winged configuration, unless the run is just for a short period of time.

3. Spinnaker

The middle crew and the helmsman must work together to attend to the primary task when flying the spinnaker, which is to keep an eye on the spinnaker's leading edge while easing the sheet until such time as the leading edge begins to curl (fold in on itself); then to trim the sheet until the curl disappears, then to repeat the process again and again. The middle crew may also need to adjust the guy to change angle of the pole to fine-tune the spinnaker's position, and may need help from the forward crew when doing that.

See also the appendix article on Advanced Spinnaker Sailing Techniques.

G. Sail hoisting and lowering

Generally, the main is hoisted at the beginning of the day and lowered at the end, but the other two sails will be hoisted and lowered many times over the course of a race day.

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1. Main

When the crew is ready to hoist the main, the helmsman lets off the mainsheet and keeps an eye out and aloft to make sure the sail does not snag on any twisted or fouled rigging. The middle crew feeds the main bolt rope into the channel at the back of the mast, and the forward crew hauls on the halyard to hoist the sail, and keeps hoisting until the ball swaged onto the end of the wire part of the halyard clears the halyard exit plate and can be slipped into the slot in the halyard lock. The long rope tailing end is neatly coiled and attached firmly to a cleat or Velcro strap on the mast.

When the crew is ready to lower the main, the helmsman lets off the mainsheet, brings the boom in so that the lowered sail will drop into the cockpit, and keeps an eye aloft and around the boat to ensure the sail does not snag on any twisted or fouled rigging. The middle crew pulls gently on the luff of the main as needed to bring the sail down, and feeds it out of the exit slot of the channel on the mast. The forward crew first takes off the tension on the Cunningham and removes the Cunningham hook from the grommet, then removes the coiled tailing end of the halyard, shakes out the coils, runs fingers through the uncoiled line to make sure there are no kinks, then pulls the halyard ball out of the halyard lock and lets the sail down.

2. Jib

To hoist the jib, the forward crew first releases and plays out the jib sheets to provide some slack, then looks aloft to ensure that there is no twisted or fouled rigging. Once ready, the forward crew hauls on the jib halyard to hoist the sail, slips the swaged-on ball in the wire end of the halyard into the slot in the sliding halyard lock, and puts tension on the jib wire tensioner by pulling on the rope coming from the drum. Just enough tension should be put on the jib wire to cause a very slight amount of slack in the forestay. Once the jib wire is tensioned, the jib cloth should be tensioned, just enough to remove the wrinkles from the luff of the jib. Once that is done, the forward crew should make ready to trim the jib sheet for the upcoming point of sail. Finally, the tailing end of the jib halyard should be bundled loosely and placed out of the way, either on the deck or just below deck.

To lower the jib, take any tension off the jib sheet, then simultaneously release the jib cloth and the jib wire. Then run your fingers through the bundled tailing end of the halyard to unbundle it and to remove any kinks. Remove the ball on the halyard from the sliding halyard lock, then reach up and grab the leech of the jib at a point as high as you can, and pull sharply down and forward to cause the jib to drop to the deck.

3. Spinnaker

Hoisting and lowering (dousing) the spinnaker is another exercise in extreme teamwork for the forward and middle crew. On hoisting, not only must the sail be raised and lowered while being simultaneously trimmed, but the spinnaker pole too must be attached and adjusted. On lowering, care must be taken to keep the spinnaker in the boat as it comes down. Also, timing is

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critical, both on the hoist and on the douse, to get it up and drawing quickly when hoisting, and to get it down and stowed before arriving at the leeward mark when dousing.

To begin a successful hoist of the spinnaker, the forward crew first removes the windward spinnaker sheet from the cleat on the deck (but leaves it in the guyhook), while the middle crew uncleats both spinnaker sheets from the cam cleats on the forward seats. The forward crew attaches the pole first to the guy, then to the topping lift, then the mast, and adjusts the topper to set the pole to a horizontal position. When all that is done, the forward crew announces "Pole's made!" This should be completed at least a few seconds before the boat arrives at the windward mark, giving the forward crew time to get in position to ease the jib sheet as the boat rounds the mark.



Setting the Pole

In the meantime, the middle crew has removed the spinnaker halyard and sheet from the leeward guyhook and cam cleat on the deck, and has lifted a few feet of spinnaker from the cockpit so that it will feed easily when hoisted. The halyard must be forward of the shrouds and the spreader, and all must be checked to ensure nothing will get fouled during the hoist.

Once the boat has rounded, the skipper commands, "Let's get the spinnaker up!" At that point, the forward crew goes to the mast, grabs the spinnaker halyard, and starts pulling, while the middle crew feeds the spinnaker from the cockpit, out around the shrouds, as it goes up in the lee of the mainsail. Once a good part of the spinnaker is up, the middle crew begins pulling on the windward sheet (that will become the guy) to bring the foot of the spinnaker around to the front of the boat. This will cause the spinnaker pole to move aft, so it will be necessary for the forward crew to push the pole forward. [The guy will not slide through the end of the spinnaker pole unless the pole is as far forward as it can go]. This must be done while the spinnaker is still being hoisted, so it requires coordinated movement on the part of the forward crew.

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Constant communication between the forward and middle crew is necessary here. For example, if either crew feels resistance in either hoisting the spinnaker or in pulling the foot of the sail around, that may be because the spinnaker is snagged on a spreader, or on a chainplate or a shroud or stay. At that point the crew must work together to resolve the problem, and tension must be eased off to keep the sail from ripping. Another possibility is a twist, or a wrap, or a twist with a wrap. The crew must do what it can to resolve these, including abandoning the hoist and bringing the spinnaker back into the boat. A ripped spinnaker is worse than a failed hoist.

During the hoist, the skipper will not be able to help. The skipper is fully attending to the other boats on the racecourse, avoiding collisions, and setting up to be in a good tactical position for the leg. The most he can do is to hope for a successful spinnaker set, knowing full well that without it, the boat cannot win the race.

Once the spinnaker is hoisted, the forward crew fastens the tailing end in the cam cleat on the mast, then throws the surplus halyard below deck, ensuring it doesn't kink or foul as it goes below. Next, the forward crew will need to assist the middle crew in positioning the pole and cleating the guy on the deck. At that point the middle crew begins attending to spinnaker trim, while the forward crew moves over to the main boom and leans with her back against it to help keep it in place.

On the douse, an equal amount of teamwork is needed. The douse starts with the skipper's command, "Time to get the jib up!" At that point, the forward crew hoists the jib and sets what will be the leeward jibsheet to be approximately correctly trimmed for the point of sail after the leeward mark is rounded, and slacks off the other jibsheet. Then, when the skipper says, "Douse it!", the forward crew removes the pole from the mast and the guy, then the topper, and hands it to the skipper to stow it in the cockpit. Next the forward crew finds the spinnaker halyard, gets a good grip on it, removes it from the cam cleat on the mast, and announces, "Ready to douse!" In the meantime, the middle crew has released the guy from the guyhook and the deck cleat, let go the spinnaker sheet, and started pulling on the guy to bring the clew of the spinnaker around to a position close to the cockpit. Once she is able to grab the spinnaker clew with one hand, she grips it firmly, and works the other hand forward on the foot of the spinnaker until the spinnaker tack is in hand. At this point the middle crew has firm control of both corners of the spinnaker and its foot, and announces, "Let it down!" At that point the forward crew begins letting the halyard slip through her grip, but keeps some resistance on it, as the middle crew pulls down on the spinnaker and stuffs it into the cockpit. The spinnaker must not go in the water, and must not snag on the rigging, but must be brought down smartly, so that it is down and stowed just before the boat gets to leeward mark. Since the boat can't turn up into the wind until the spinnaker is down, and may be forced to turn up into the wind to avoid a collision, it is very important that the spinnaker be down and stowed before that leeward mark is reached. If necessary, the douse should begin a bit early to ensure that this happens.

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Dousing at the Leeward Mark

Once the spinnaker is down and stowed, the spinnaker sheets will need to be neaten up and the spinnaker made ready for the next hoist. The halyard and sheet should be hooked under the guyhook to ensure that a wave breaking over the splashguard doesn't pull the spinnaker out of the boat. That will be the job of the middle crew, because by this time the forward crew will be trimming the jib and possibly hiking as the boat heads for the windward mark or the finish line.

See also the appendix article on Advanced Spinnaker Sailing Techniques.

H. Docking

After a day on the racecourse, it is always good to sail smoothly to the dock, tie up, and enjoy the end of the day. Docking can be a challenge, however, depending on the wind and on the other boats docked, or docking, at the same time you are. As crew, the most important thing to remember is to not try to slow or stop the moving boat with your hands on the dock. That won't work, because the boat, at over 1200 pounds loaded, on a frictionless water surface, has too much momentum. If you do need to fend off the dock, do so with your feet and legs as you sit firmly planted on the deck. Even better, if the boat is moving too fast, tell the skipper he needs to bear off and try again.

Ideally, if the wind is right, the boat can sail on a beam reach towards a point about 20 yards downwind from the end of the dock, and, upon reaching that point, turn head to wind and drift, with the sails luffing, to a spot along side the dock where we want to park, and arrive there at a dead stop just an inch from the dock. This takes practice!

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Here are some things we do to make it easier:

- Drop the jib well before docking, to give the forward crew room to move around, and everybody on board better visibility.
- Bring a paddle on deck, and use it to get the last few feet to the dock, if the boat has stopped dead short of the dock.
- Wait our turn -- wait until there is a spot on the dock that we can successfully sail into.
- In certain wind conditions, drop the main after stopping well short of the dock, and paddle in.
- Throw the mooring line to someone on the dock and have them haul you in.

A final word of advice: don't leap from the deck of a moving boat onto the dock. Newton's third law applies - the force you exert in jumping off the deck of the boat will push the boat backwards, and as a result your feet will land short of the dock. That happened to me two years ago, and it was my shins that hit the end of the dock, not my feet. Not only did that really hurt, but also the hospital coinsurance was \$600, almost as much as the cost of a new mainsail!

I. Back to the Slip

Once the boat is docked, and the crew has made a run for the marina bathrooms, its time to haul the boat out and put it on the trailer, rinse it off, stow the equipment, and park it at the dry slip. Once its our turn to use the crane, one crew member goes and gets the trailer, one stays in the boat and removes the tiller and rudder, hoists the centerboard, disconnects the backstay from the backstay tensioner, attaches the hoisting bridle, and uses a paddle to help line the boat up under the hoisting chain on the crane. The third crew uses the mooring line to pull the boat into position for hoisting. The crew who brought the trailer now operates the hoist, and the crew in the boat attaches the hoisting chain to the hoisting bridle. Just before hoisting, the crew in the boat pops the bailer, and all wait until the bilge water has drained out before hoisting the boat farther. Quickly the crew lifts the boat, swings it around (while looking aloft to ensure the crane does not foul on the mast or the standing rigging) and lowers it onto the trailer. Once the boat is on the trailer, the hoisting chain is slacked off and removed, the boat hauled over to the rinsing station, and hosed off, then brought back to the dry slip. Sails are removed and spread out on the ground to dry. The boat is packed up and the cover put on. The sails, when dry, are rolled and put in the car.

Again, we want to remember one important rule regarding halyards, which is that the hauling ends (the ones with the shackles that fastens to the heads of the sails) must always be fastened to something when they are not fastened to their respective sails. Failure to do so will eventually result in a halyard end flying up the mast, with no way to retrieve it except by removing the mast or by sending a brave crew shinnying up the mast to get it.

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Once that's all done, it's time to socialize! There will be an after-race picnic featuring hot dogs, burgers, and refreshingly chilled adult beverages, where crewmembers and skippers can re-live the day's excitement.



Reliving the day's excitement

Now it's your turn. Tell a friend what you now know about Lightning Crew roles and responsibilities as related to boat handling.

08. Capsizing

Objective: You should be able to describe how to recover from a capsize.

Summary:

No one intentionally capsizes a Lightning, but it does happen. One way it can happen is sailing close-hauled in a strong breeze. The crew may be hiked out to the maximum, and the helmsman may have eased off the mainsheet to spill wind from the main, but if a big puff comes along it can be more than the boat is prepared for, and the boat will slowly heel over until that the deck gets nearly vertical, the boom hits the water, and the cockpit floods. Or, sometimes during a tack in a strong wind the crew is slow in getting to the high side of the boat. Recovery from this kind of capsize is straightforward.

A more complicated situation can occur in a broach. A boat sailing downwind, especially with the spinnaker up, may get turned partly sideways to the direction of motion. This is called a *broach*. Water piles up against the leeward chine and side of the boat as it moves sideways, and a strong puff lifts the stern right out of the water and cause the boat to tumble out of control, fly through the air, and hit the water mast first, catapulting crew out of the boat in the process. This can happen rapidly at a point on the race course where the crew least expects it. Often it is induced by an accidental jibe or by the failure of the skipper to keep the boat pointed downwind with the breeze on the boat's quarter. For example, puffs often come from a new direction and if one comes from the beam, the boat heels, develops a great deal of weather helm, rounds up, more heel, more weather helm, further rounding up, rudder out of water, and over.

Air tanks in the hull will keep the boat from sinking, but it will be necessary to do some work to get the boat back up and sailing again.

The actions required of the skipper and crew to recover from a capsize are, in priority sequence:

- First, ensure the safety and survivability of the crew. Is everyone accounted for? Is anyone tangled in rigging? Is everyone wearing a PFD? Is anyone unconscious? Are there any injuries? Is anyone becoming hypothermic? Make sure everyone is able to perform the next steps, and if not, get them out of the water and onto a rescue boat pronto.
- Second, try to keep the boat from turning turtle (completely upside down). One crew should hold or stand on the centerboard to counterbalance the force of the turning boat. If the mast hits bottom and sticks in the mud, it will probably break, and rip the sails in the process, and even if it doesn't, it will make the ultimate recovery much more difficult.
- Third, watch for any equipment that is about to wash overboard and sink or drift away, and recover it if you can. But do not swim away from the boat! Staying with the boat is one of the most important things to do to survive a capsize.
- Fourth make sure the mainsheet and spinnaker halyard are uncledated. These sails hold a lot of water and must be free to spill it when the boat is righted.

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- Fifth if the bow is pointed downwind it may be necessary to try to get the bow pulled around toward the wind a little. Otherwise the boat may simply capsize again as soon as it is righted. Sometimes the boat will naturally turn up into the wind if it is righted slowly.
- Next, right the boat. Have crew put weight on the centerboard and deck to bring the boat back up. An assisting recovery boat might lift the end of the mast out of the water to help.
- Once the boat is upright, keep it from flipping back over, by positioning crew on the sides of the boat to counterbalance any turning force.
- Next, get the cockpit bailed out. Use a bailing bucket until the boat will stay upright, then sail away with the bailer open to drain any remaining water. If the boat has good floatation and transom bailers, it can be sailed immediately after it has been righted. The crew's responsibility is to try to keep the bow from "submarining" and the gunwales above water.
- Finally, get dried off and warmed up, leaving the racecourse if needed to do that, or finish the race with the proud knowledge that you rescued yourself.

Now it's your turn. Tell a friend what you now know about capsizing and recovery in a Lightning.

09. Personal Equipment

Objective: You should know what personal equipment to bring to the racecourse.

Summary: There are several items of personal equipment that are important to have aboard with you. Some you'll need to bring yourself, others may be lent to you by the skipper or another crew. Here they are, in no particular priority sequence:

- **Bill cap** -- a baseball-style cap to keep the sun out of your eyes, preferably with a string and an alligator clip to attach it to your shirt or jacket, so that it doesn't blow away in a puff.
- **Hat** -- if your face and neck need to be well protected from the sun, bring a hat that provides full shade for these areas, one that has a string to tie it on.
- **Sunglasses** -- with an attachment called a *croakie* that keeps the glasses from falling off your face in a sudden movement or when receiving a blow from a spar or item of rigging.
- **Sunscreen** -- SPF 30 to 45.
- **Lip Balm, Chapstick, or Blistex**
- **Gloves** -- sailboat style racing gloves, with leather facing, Velcro fastenings, and open fingertips.
- **Shoes** -- with non-skid soles. Some crew like to wear dinghy boots which are waterproof sailing boots with non-skid soles and padding for your instep during hiking, but ordinary *Topsiders* brand deck shoes work fine too. Boat US always seems to have a sale on *Topsiders*.
- **Water bottles** (with water) -- enough water to keep you hydrated for six hours -- at least two quarts per person.
- **Snacks** -- if you expect to get hungry during the day, bring easy-to-eat snacks, such as carrot and celery sticks, granola bars, and fruit. Sandwiches are OK, except that you'll need to keep them dry, and will have only limited opportunities to unwrap them, spread condiments, and eat during the breaks between races.
- **Layered clothing** -- how many layers depends on how warm it is. It is usually cooler and damper on the water than it is on the land, so plan accordingly.
- **Waterproof outerwear** (foul weather gear). This is very important on days when spray from the waves will be splashing on you, regardless of how warm it is, and is critical on rainy days. If you plan to be a regular crew, you'll want to purchase a set for yourself, but if you are not sure, save your money and borrow your foul weather gear for a while. Foul weather gear includes waterproof bib overalls with Velcro closures on the cuffs, and a waterproof pullover jacket with closures at the neck, wrists, and waist. Big boat ocean racing jackets with hoods tend to be bulky and are not needed on Lightnings. Gear made of breathable waterproof fabric such as Gore-Tex is the best (it keeps moisture from accumulating on your skin as you sweat). While top-end foul weather gear, designed for ocean racing in extreme latitudes is available (and expensive), moderately-priced spray tops and bibs can be acquired at a cost of about \$75 each, and even less at end-of-

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season sales. Boat US and West Marine are local suppliers that handle these items.

- **PFDs** -- these should be supplied by the skipper, but you may want to bring your own, to ensure you'll have one with a good fit. Kayaking paddlers' PFDs, available at REI, keep your arms free and are very comfortable to wear. Always wear a PFD when the boat is under way. If you bring your own, make sure it is a Coast Guard approved item suitable for our type of water activity. Inflatable PFDs may be more comfortable to wear (they inflate with a charge of bottled carbon dioxide gas), and if you have one of these, make sure you know how to inflate it and put it on, and make sure the charging mechanism is in good working order.
- **Leave ashore:** jewelry, watches, cash, credit cards, keys, and anything you can't afford to lose overboard. If you need to bring a car key on board, tie it or pin it to an inner garment to make sure it doesn't get lost.
- **Towel and dry clothing** -- Keep a change of dry clothing and a big towel in the car so that you can dry off and warm up after a wet day on the water.

So now it's your turn. Make a checklist of the personal equipment you'll need to bring each time, and plan to use it to ensure you have all needed equipment before you leave for the marina.

10. Rules of the Road

Objective: You should be able to summarize the relevant rules related to right-of-way on the water, and must be able to advise the skipper and crew on the water anytime you see that your boat must alter course in accordance with these rules.

Summary: When a boat is required to *keep clear* it must sail a course that will not interfere with the intended course of the other vessel, and must not collide with that vessel. It may be necessary, for the boat that is required to keep clear, to alter its course to avoid collision or interference. These rules are expressed in terms of two-boat situations, but skippers and crews must be able to apply them in multi-boat situations too -- your boat cannot alter course to keep clear of boat A, if, in so doing, it would interfere with, or collide with boats B, C, D, etc that are also on the water.

If your boat intends to alter course in order to keep clear, it's a good idea to hail the other boat and let them know your intentions. Likewise, the other boat may hail you and ask your intentions. You can indicate that you will keep clear by answering, "Hold your course!"

In any case, if a vessel fails to keep clear when it should, and a collision is imminent, all vessels are required to take whatever evasive action is needed to avoid the collision.

- A boat under way must keep clear of a boat that is stationary.
- A boat that is more maneuverable (such as a small watercraft) must keep clear of one that is not (such as the *Dandy*, the *Spirit of Washington*, a barge under tow, etc)
- A boat that is under way with engine power must keep clear of a boat that is not, except when the boat under power is being overtaken.
- When both boats are under way with sail power only,
 - a boat on port tack must keep clear of a boat on starboard tack;
 - for boats on the same tack,
 - ? a boat to windward must keep clear of a boat to leeward;
 - ? a boat that is overtaking must keep clear of a boat being overtaken;
 - a boat that is tacking or jibing must keep clear of a boat that is not;
 - on a race course, a boat that is not racing should keep clear of a boat that is, although the crew of the boat that is not racing may not know that.
 - (See also the Racing Rules of Sailing for exceptions when both boats are racing)

Note that when sailing, the helmsman has limited visibility and depends on both other crewmembers to serve as eyes, ears, and voices when under way. When the boat is close hauled and the helmsman is on the deck, she can see ahead on the windward side fairly well, from dead ahead to about 45-degree angle windward to the path of the boat. She cannot see anything to leeward, and cannot see anything behind without turning her head way around. She also has her back to anything on the weather side from points behind the mast.

When sailing close-hauled, we ask the forward crew to watch the leeward side and to report on the positions and bearings of all other boats within 100 yards, and

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whether or not we are on a collision course with any of them. If our boat is close hauled in light to moderate breeze, the forward crew will be sitting on the leeward front seat, facing forward, and will have an excellent view of everything to the leeward side. (She will also be in an ideal position to see the trim of the jib and make adjustments as needed). Even when seated on the windward forward seat, the forward crew has good visibility to the leeward. If the forward crew is on the deck, hiking, she will need to look under the main boom and/or through the windows in the sails to see what's happening to leeward. The helmsman must always be able to count on the forward crew keeping him informed on the situation to leeward.

When sailing close-hauled, we ask the middle crew to keep the helmsman informed of what's happening on the weather side and to the rear.

If we are sailing on a starboard tack, boats sailing on a port tack must keep clear of us. If we are on a starboard tack and see a port tack boat on a collision course, one or both crew should hail the other boat by saying "Starboard!", meaning that we are on a starboard tack and they are on a port tack, and we expect them to keep clear of us. The other boat should respond by saying, "Hold your course!" When saying "Starboard!", use your diaphragm to increase the amplitude and the carry of your voice, and enunciate like a foghorn: "Starr-BOARRRD! Do this in enough time to let them turn to avoid a collision.

If we are sailing on a port tack, we must keep clear of boats that are on a starboard tack. When you see that we are on a collision course with a boat on a starboard tack, immediately inform the helmsman, and let him know what his options are (to duck; to tack; or to point up and luff). We are on a collision course with another boat when the bearing to that boat remains constant, but the range is decreasing. (If the bearing is moving forward, our course will take us behind the other boat; if the bearing is moving aft, our course will take us ahead of the other boat). To duck, we bear off (change our course) to sail behind the other boat, then harden up once we are past. To tack, we come about onto a starboard tack. To point up and luff, we head directly into the wind and the boat slows to a stop. Ducking is not a bad choice, but we must be on the lookout for all the other boats sailing a course parallel to the boat we are ducking, for we may need to duck them as well! The helmsman must be informed of the positions and bearings of all those other boats too. Tacking is often a good choice, but we can't tack in front of other boats to our weather side -- remember we need to keep clear when we are tacking or jibing! If there are boats there, the helmsman must be informed of their positions and bearings too. Pointing up and luffing is not a good choice, but sometimes it is the only choice.

Note when ducking that the forward crew should always ease the jibsheet when the boat falls off the wind, and to trim it back in as we harden up, in order to maintain boat speed. It is also critical for the helmsman to ease mainsheet as he bears off. If it isn't, the boat will not bear off.

When describing the other boats around us, state the class (Lightning; Albacore; Hampton; Hobie Cat, etc) and the sail number, and where they are with respect to us. For example, "Lightning 14019 on collision course underneath (i.e., leeward side), 30 yards, at 2 O'clock. We can duck or tack." Or, "Lightning 14019 on collision course underneath; 30 yards, at 2 O'clock. We can't tack [because] - Lightning 14096 is on our weather side on port tack, 10 yards at 3 O'clock, so we'll have to duck!"

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Or, "Lightning 14019 is on collision course underneath, 30 yards at 2:0'clock, and there are four other boats trailing her on a parallel course. We'll have to duck them all!"

In a heavy breeze it may be difficult to bear off to duck. In this case, it may be best to bellow, "OBSTRUCTION, TACK" to the boat to windward of you and to come up head to wind and tack once she tacks.

When hailing other boats, state their class and sail number when calling out to them. And, be as polite as you can be, consistent with the urgency of the situation. Use of the salutation "Skipper"; "Captain"; or "Sir" is appropriate and considered to be good form.

When our boat is reaching or running, the crew's ability to see changes, and other crew must compensate accordingly. If the spinnaker is up, the middle crew will be focused on keeping the spinnaker full and drawing, and will have eyes fixed on the spinnaker luff. The forward crew then needs to pick up responsibility for viewing aft and to the weather side, as well as viewing forward and leeward.

Crewmembers should also report on observed coming wind changes. Upwind boats, and additional ripples or whitecaps on the water announce changes in wind velocity and direction, and can be read by observant crew. These wind changes can alter circumstances for boats on collision courses, providing or eliminating collision avoidance options, so it's important for the helmsman to know about them too.

Now it's your turn! Describe to a friend the rules of the road for sailboats, and options for avoiding collisions.

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11. Race Course Layout

Objective: You should be able to explain how a racecourse is laid out on the water and what is meant by the terms used to describe the racecourse.

Summary: A racecourse is laid out on the water with buoys called marks and pins, and involves a Race Committee boat and one or more auxiliary boats called chase boats or crash boats.

The *start line* is an imaginary line perpendicular to the wind, drawn from the flagpole on the Committee Boat to a buoy carrying a red flag with a white cross in the middle. This buoy is called the starting pin. It will be 90 degrees from the wind in a counterclockwise direction. The starting line may possibly be long enough to permit all the boats in the race to sail to it and cross it gunwale-to-gunwale with clearance in between the boats; then again it may not be. This line is supposed to be perpendicular to the wind, but sometimes it is not.

The *windward mark* (also called the *weather mark*) is a buoy about a mile or so directly upwind from the center of the start line. If the wind is light, it may be closer. While it is supposed to be directly upwind from the center of the start line, sometimes it is not. Boats crossing the start line will need to tack repeatedly to get to the windward mark. Once they are in the vicinity of this mark, they must pass around it in a counterclockwise direction (keeping the mark to port) without touching it and without interfering with other boats that have right-of-way (see the Racing Rules of Sailing for details). Then they will want to set a course for the next mark.



Approaching the Windward Mark

If the course is a triangular course, the next mark will be about even with the start line, but far from the pin in a counter-clockwise direction. This is called the *reaching mark* (or sometimes the *rounding mark*). If the course is an Olympic course (also called a sausage or a hot dog), the next mark will be directly down wind from the weather mark, and will be called the *leeward mark*.

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For a triangular course, the third mark is the leeward mark, due downwind from the windward mark, and also downwind from the start line.

The *finish line* is an imaginary line between the committee boat and the finish pin, which is a buoy with a blue flag, with a white cross in the flag. Normally it is on the opposite side of the committee boat from the start line, and extends to about the same length, perpendicular to the wind.

In a race, boats first sail past the stern of the Committee Boat to read the *course board* that describes the order of start by class; the type of course (triangle or hot dog); the number of times to go around; the type of finish (upwind or downwind); and other special conditions, such as gates (a pair of buoys between which the boat must pass at a mark). We like having the middle crew read and memorize the course board as we sail past, and then assign this crew the responsibility of keeping track of the number of times we have gone around, how many loops to go, what kind of finish, etc.

A race starts with a pre-start signal -- a horn and a flag -- exactly four minutes prior to the time of the class start. During that four minutes, the boats reach along the starting line, going out beyond it, tacking or jibing, coming back along it, sailing past the committee boat, and repeating, all trying to be exactly on the starting line, close-hauled on a starboard tack, moving at maximum boat speed, and well ahead of all the other boats, at exactly the time that the start signal sounds. There is a lot of excitement as boats jockey for position (often one end of the starting line is accidentally favored -- closer to the windward mark --); much yelling and shouting as skippers defend their rights-of-way; and some muttering under their breaths as they are forced to comply with the racing rules of sailing to avoid contact with other boats. [A violation requires the boat at fault to sail a 720-degree circle as a penalty]. Starting is not too difficult with a small number of boats and a starting line long enough to accommodate all of them easily, but it gets really tense when there are more boats than there is room for them.



Excitement at the start

Crew Preparation Checklist

At any rate, once a boat crosses the starting line, it heads for the windward mark, trying to be the first to get into clear air -- air not disturbed by the significant wind shadow of boats ahead. It tacks several times until it is able to round the windward mark, then falls off the wind, hoists the spinnaker and sails for the reaching mark. The boat may or may not jibe during the reach. If it does not, it may need to jibe as it rounds the reaching mark and heads for the leeward mark. Additional jibes may be advantageous during the run to the leeward mark. At the leeward mark, the spinnaker is doused, the boat hardens up to a close-hauled point of sail and heads for the windward mark once again, or possibly to the finish line. The boat may tack before, during, or after rounding the leeward mark.

There is another imaginary line on the racecourse, called the layline. This is a line drawn to the windward mark from a point directly ahead of your boat, when your boat is close hauled. It is a line along which your boat can theoretically sail directly to the mark without needing to tack. There is seldom any advantage to sailing past the layline on a tack, but sometimes the boat will want to sail right up to it before tacking.

Now it's your turn. Tell a friend about the layout of a racecourse and how boats traverse it during a race.

Crew Preparation Checklist

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12. Race Committee

Objective: You should develop an interest in serving as a member of a Race Committee for one or more race days each season.

Summary: Approximately twice a year your boat will need to provide volunteers for Race Committee duty. Race Committee (RC) duty is fun, social, and educational, and always enjoyable. If you are not crewing on a particular day and want to get out on the water, always consider volunteering for RC duty.

A RC consists of a Chairman ("the Chair") and 6 to 8 other volunteers. Two of the volunteers will drive an auxiliary launch called a Chase Boat or Crash Boat, the other 4 to 6 will be on the Committee Boat. If you have powerboat driving experience, you'll want to be on the Crash Boat; if you like social activity and an opportunity to be up close to starts and finishes, you'll want to be on the Committee Boat.

The crew of the Crash Boat sets (and sometimes re-sets) the marks, observes roundings at the windward, rounding and leeward marks, and helps rescue capsized boats as needed, cruising up, down, and all around the Potomac River without paying a nickel for fuel or boat rental. What a gas!

The crew of the Committee Boat runs the starts, observes and records the finishes, directs the Crash Boat in setting of marks, and makes all the day's decisions regarding the race. Often the crew on the Committee Boat have a chance to take some dramatic photographs of racing activity on the water, and to socialize when all the boats are out on the course.

You don't need prior experience to serve on a Race Committee -- just a desire to have some fun while contributing to the success of a day's race. You will learn a lot about racing tactics and the racing rules of sailing just by being there and observing.

Serving on the RC is fun and rewarding! Do it whenever you can, and plan on doing it twice a year.

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13. Crew Overboard!

Objective: You should be able to describe, from memory, the appropriate things to do when a crew member falls overboard, and should be able to demonstrate the needed skills during a crew overboard drill.

Summary: Nobody intentionally falls overboard, but we have to be prepared when someone does. Of course, if nobody does fall overboard, we will never need to do a recovery, so the first lesson in this chapter is to never fall overboard! The rule of thumb, "one hand for the boat and one hand for yourself," pays big dividends if faithfully followed. Whenever you are in the boat, keep one hand on something that you can grip firmly if needed -- to keep your balance or to keep yourself inside the boat when it rolls, pitches, or heels. Also, it helps to be prepared, by always wearing a PFD whenever you are on board (Which is often a RC-imposed requirement too).

But suppose that the inevitable happens, and a crewmember does go overboard. If the boat is not moving, this is not much of a problem -- just toss the overboard crew a flotation device, such as a floatable cushion, and help them get back in the boat. One crew will need to counterbalance the boat by sitting on one side while the other helps the overboard crew up onto the deck and into the cockpit. One of the two remaining on board will need to take charge and provide direction, and there should be a pre-arranged plan to determine who that will be -- Skipper first; Middle Crew second; Forward Crew third is a good choice.

If the boat is moving under sailpower, several things need to happen fairly quickly. The first person to discover an overboard crew loudly announces "Crew Overboard!," then tosses a flotation device (or asks the person closest to the flotation devices to toss one or more). The order of precedence above should then determine who takes charge. The in-charge crewmember immediately takes the helm, and directs the other crewmember to maintain visual contact with the overboard crewmember and point to him in the water. This is important, because if there is any wave activity, the helmsman will not be able to see the overboard crewmember in the water.

If it is a light air day, the best next step may be to just point the boat into the wind and let it stop, allowing the overboard crewmember to swim back to the boat.

But if the boat is moving fast and the overboard crewmember is very far astern, the boat must execute a classic Crew Overboard recovery. The idea is to quickly get the boat to a position about 10 yards downwind of the overboard crew, then bring the boat head to wind and drift up to the overboard crewmember, coming to a dead stop with the in-the-water crewmember alongside the weather quarter. Once there, pull the overboard member into the boat. It is very important that the boat coasts to a stop without hitting the person in the water, as the force of the impact could inflict serious injury.

The Classic Crew Overboard procedure involves falling off and jibing to accomplish a U-turn to reverse direction, sailing to the desired downwind position, then coming head to wind to drift to a stop.

An alternative approach is to immediately fall off onto a reach, sail about five boat lengths away, then tack around and sail back on a reach to the desired downwind

Crew Preparation Checklist

location and then point up head to wind to coast to a stop. This is slower than jibing, but is safer, and more easily executed, especially in a strong wind.

Now it's your turn. Discuss crew overboard procedures with a friend.

14. Racing Rules of Sailing

Objective: You should know that there is a publication called the Racing Rules of Sailing and that it spells out all the rules that boats are required to follow as they traverse a racecourse in a race. You should know how to obtain a copy of the current set of rules and how to find in it the answer to any question you have about the rules.

Summary: The International Sailing Federation (website <http://www.sailing.org>) maintains the Racing Rules of Sailing. You may also find the rules at the website <http://www.ussailing.com/rules>. These rules are updated every four years. The current edition is for races during calendar years 2001 - 2004.

While the entire rulebook, with appendices, is extensive (130 pages), the part of the rulebook that racing crews need to know most about is compactly stated in just 6 pages, in rules number 10 through 22.2. These rules are organized into four sections: Right-of Way; General Limitations; At Marks and Obstructions; and Other Rules. To correctly interpret the rules, you'll also need to know the formal definitions of a few technical terms, which are in a Glossary.

There are uncountable books and magazine articles written on the subject of how to understand the Racing Rules of Sailing, and all kinds of seminars too. If you are really into this subject, one of these books will be good to acquire for your personal library, and you'll want to attend seminars when you can.

Frequently, sailing magazines publish articles on how certain rules should be interpreted, and provide quizzes to test your understanding. These are interesting, and often lead you to the conclusion that there is more to this than appears in those six pages!

Now it's your turn! Download a copy of the first 38 pages of the Racing Rules of Sailing and study it.

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15. Racing Tactics

Objective: You should know that your skipper will employ certain tactics during a race, in attempts to [legally] put the boat in the most advantageous position on the racecourse.

Summary: There is no shortage of books and magazine articles on the subject of sailboat racing tactics. If you are interested, go read some!

Some basic principles:

- Boat speed beats tactics every time! It doesn't matter much what tactics you know about and employ if your boat cannot constantly sail at its maximum boat speed. Achieving maximum boat speed involves getting into clear air so that the boat is not impeded by the wind shadows of other boats on the racecourse; keeping the sails always full and drawing and properly trimmed, especially when tacking and jibing; hiking to keep the boat flat; finding and staying in the strongest and most favorable breezes and the most favorable currents; minimizing the impact of waves; having properly tuned rigging and good sails; and keeping the boat weight down to the minimum 700 pounds plus crew.
- Discover and get to a favored position on the start line. To work into an available spot on the starting line, approach the line early, with sails luffing, keeping up just enough speed to maintain steering, then just a few seconds before the start signal, trim in the sheets and accelerate. Just don't cross the line early. Avoid the turbulence behind the lee bow of the boat immediately to leeward, and try to keep leeward boats from crowding you. Pay attention to the Racing Rules of Sailing that apply, and don't commit a foul. If you do commit a foul before the start, do your penalty quickly if you can, and you may be able to get it done before the start. Otherwise, take your time, get a good start and do your penalty off to one side of the course when you have cleared yourself of the other boats.
- Be the first to cross the start line, close-hauled at full speed with some room to leeward, when the gun goes off.
- When beating to windward, find and stay in clear air; tack on headers; tack when doing so will bring you closer to the mark; and tack before reaching the layline, so you can take advantage of wind shifts. If in the lead, position on the last windward leg, keep your boat between the wind and the nearest competitor behind.
- When reaching, stay in clear air, and never let anyone pass you to windward!
- When running, get position on the other boats to be inside at the leeward mark.
- When finishing, sail the shortest distance to the finish line.

Now it's your turn. Discuss racing tactics with an experienced skipper.

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16. Local Conditions

We sail on the Potomac River, and almost always the racecourse is located between Ronald Reagan National Airport and East Potomac Park, bounded on the north by the 14th St. Bridge, and going as far south as needed to make a course long enough for the wind conditions. Generally there is enough depth in this area to help us avoid grounding, although there are some shallow spots south of the channel buoy that is south of Haines Point.

There are a few local hazards we need to deal with. One is jet noise from aircraft operations at Reagan National. This can be distracting, and it can interfere with crew communication, but it generally is intermittent and can be dealt with. There are some others:

Low Flying Aircraft: Another, more serious hazard is low-flying large commercial aircraft, especially when they are landing to the north and the boats are on their way back into the marina and sailing under the flight path south of the airport runway. There is little danger of having our masts struck by the aircraft -- the aircraft are much too high for that. However, these aircraft often have vortexes spilling off the trailing edges of their wings -- mini-tornadoes -- and these can cause a boat to capsize! Sometimes the vortexes will reach the surface of the water and become waterspouts, and we can see them, but sometimes they don't, and we can't. About all we can do is to maintain vigilance and be prepared for sudden heeling in an unexpected direction. If we see one coming, dropping the sails quickly may be a good strategy, if we can pull it off.

Shallow Water: A much more frequent hazard is shallow water, not so much on the racecourse, but in the trip to and from the racecourse. Sailing at low tide is always more challenging than sailing at high tide, because there are many more shallow spots to deal with at low tide.

In an unexpected shallow spot, the first important thing to do is to get the centerboard up, high enough to keep it off the bottom. The centerboard sits about five feet below the boat when fully extended, and can easily be pulled half way up to keep clear of the bottom. But remember to remove the preventer from the cleat before trying to hoist the board! If pulled up farther, there is some danger that the rudder may hit the bottom, putting pressure on the gudgeons and possibly tearing the transom off the boat. If we are moving slowly, we can put crew weight forward to tilt the nose down, lift the stern up, and get extra clearance at the rudder, allowing us to pull the board up farther.

If we strike bottom on a gravel surface, we will hear it -- there will be a noticeable grinding sound -- and the boat will decelerate, giving us warning that we need to take action. On the other hand, if we strike bottom in silt, we may not notice it at all! We may just drift slowly to a stop and wonder why.

If we are grounded we can quickly lose steering control, so it is important to resolve the issue quickly, hoisting the board, heeling the boat, getting the nose down, and sailing into deeper water. Occasionally grounding will lead to an accidental jibe as the boat falls off the wind when steering becomes ineffective. In a light breeze this only requires the crew to duck the boom as it comes across, but in heavier winds,

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the crew must be reactive enough to get over on the high side as the boat heels sharply, especially if the mainsheet is cleated.

Weeds: We can also lose steering way when the board and /or rudder become clogged with *Hydrilla* weeds. These are thick and strong and form large tangles, especially in the fall. Here the strategy must be to quickly remove the weeds, hoisting and dropping the centerboard, and reaching a hand around the rudder to clear it.

Grounding and weeds can both require us to recover by sailing downwind into deeper water, then reaching before hardening up. That's a bummer if we were trying to beat to windward in a narrow channel, as much progress may be lost in the process.

Tides: We also have tidal currents in the Potomac so its important to know the tide schedule and whether or not the tide will be favorable or unfavorable to our course at any time we are on the river. The tidal current is not all that forceful on the racecourse, and its effect is only noticeable on extremely light air days. But it is always there. Tide schedules can be downloaded from the Internet, and there is a link to the site from the Fleet 50 home page (<http://www.lightningfleet50.org>).

Other Watercraft: There is a marked navigation channel on the river, close to the river's east shore, adjacent to Boling Air Force Base. One branch then goes up the Anacostia River. North of the Anacostia, a second channel, cleared to the 14th St. Bridge, stays close to East Potomac Park. South of Boling, the channel moves into the middle of the river, and stays there south to the Wilson Bridge. Much boat traffic moves up and down this channel. The good news is that we know the water is deep there; the bad news is that we often have to share the channel with large, unmaneuverable vessels that require us to keep clear.

Waves: The waves we need to deal with on the Potomac are almost always made by powerboats throwing wakes. We need to keep eyes out for these, as they can bring the sailboat to an unexpected stop if struck head-on.

Winds: Wind on the Potomac is usually from the Southeast or the Northeast, but varies day by day, and on any given day can come from most any direction. Strong winds from the north have the additional effect of pushing water downstream, making the river shallower, most noticeable at low tide, while strong winds from the south have the opposite effect, most noticeable at high tide. Generally the winds are gentle, but on any given day they can be stronger. Since we sail right in front of the airport, it is easy to find out the current local and forecasted future wind conditons, from the National Weather Service.

Here is my guide to sailing conditons, based on wind speed:

- 0 to 6 knots: the six isn't bad, but the zero is, especially when your boat is on the course side of the finish line and you can't get across! Tidal currents have a noticeable effect on the outcomes of races when the winds are this light.
- 6 to 12 knots: perfect for sailing! The boat moves along smartly at twelve, and keeps moving at six.
- 10 to 16 knots: makes for exciting, but safe sailing.
- 12 to 20 knots: watch out for the gusts!

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- 20 to 24 knots: only for the most experienced and skillful crews!
- Higher: skippers are either desperate or crazy (or sailing in a regatta).

Thunderstorms: I've never been on the river in a thunderstorm, and prefer not to be. Experts tell us that in a thunderstorm there is not much likelihood that the boat will be struck by lightning, in spite of the 28-foot metal mast that seems like it would be a perfect lightning rod. Still, given the chance, I'll get off the river before a thunderstorm arrives, if I can. What the experts do say is that the biggest danger in being in a thunderstorm is facing the strong winds that often accompany the storm. They say It's best to get sails down and stowed before the winds hit, and possibly to get an anchor out if there is a chance for your boat to be blown onto shore by the strong winds.

Now it's your turn! Tell a friend about local conditions on the Potomac.

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17. Knots

Objective: You should be able to tie a few knots consistently, quickly, correctly, and expertly.

Summary: Consult a book with diagrams that show how to tie these knots, then get some rope and practice until you are proficient.

- **Bowline:** The most important knot to be able to tie is the bowline. This knot holds well and is easy to untie. You can use a bowline to fasten sheets and halyards to sails and spars; to fasten a mooring line to an eye; to fasten an anchor line to an anchor, and even to fasten two lines together (by tying a bowline in each one and passing one through the other). The traditional way of learning to tie a bowline is to use the end off the rope to make a loop that represents a rabbit hole in front of a tree. The very end of the rope represents a rabbit. To tie the knot, have the rabbit come up out of the hole, go around the tree. And then back down the hole. Once properly turned, firm the knot up tight (one fault of the bowline is that if it is not cinched up tight, it easily comes undone).

You should be able to tie a bowline even when lying on the deck in a choppy sea, waves breaking over the deck, on your back, upside down, with your eyes closed, and a gale-force wind trying to blow you away, in 3 seconds or less.²

- **Figure Eight Knot:** A second useful knot is the figure-eight knot. This is used at the ends of uphauls, downhauls, halyards and sheets to keep them from accidentally pulling through exit plates and blocks. [Caution -- never knot the end of a spinnaker sheet - there are times when it may be necessary to let the spinnaker sheet fly!]

To tie this knot, bring the end up, around, and back under itself so that it describes a figure eight. This is not just a single loop (which is difficult to untie), but a somewhat more complex looping.

- **Reef Knot:** A third useful knot is the reef knot, also called a square knot, known and loved by every Boy Scout and Girl Scout who ever existed. A rope is wrapped around something to be tied up, such as where the boat cover wraps around the mast, then the ends are brought around each other, first front-over-back, then back-over-front. An unsuccessful attempt produces a Granny Knot -- which doesn't hold -- and you will quickly know what they look like!
- **Cleat Fastening:** Finally, you should know how to turn a line around a horn cleat. With the right amount of slack on the remaining part of the line, make one

² This sounds extreme and, for our environment on the Potomac, it is. But in Australia, where I crewed on a 37-foot sloop racing off shore, we stowed the spinnaker in a bag, below deck, and took it out and fastened it on to the halyard and sheets each time, just before the hoist. The skipper wanted the forward crew to fasten the spinnaker to the spinnaker sheets and halyard (using bowlines), while lying on the foredeck of a boat pitching in the waves, with spray and wind blowing all over, in 10 seconds or less (that's 3 seconds per knot)!

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turn clockwise around the base of the cleat - no more, no less. Then bring the line up over one horn of the cleat, then put a twist in it to bring it over the other horn so that both loops now describe a figure eight, with the loose end under one of the loops. Pull tight, wrap the remaining line twice more around the base of the cleat, and stop.

Now it's your turn! Get some rope, and a book with pictures of knots, and practice until you are good!

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18. Etiquette

Objective: You should know and understand sailing etiquette.

Summary: Sailing is supposed to be fun and rewarding for all participants. Do what you can to make the experience enjoyable for all. If anyone is doing anything that spoils your experience, gracefully let him or her know what changes they could make to improve the situation.

If you are scheduled to crew and have an unavoidable conflict, let the skipper know as early as possible -- more than a week's notice should be adequate. If less than a week's notice is all you can give, offer to help find a replacement.

Show up on race day early enough to do your part to help launch the boat, and stay long enough to help put it away and secure it. If you have plans that require you to arrive late or leave early, discuss them with the skipper in advance, so that he can plan to cover for you.

Bring needed personal equipment with you, or make arrangements in advance to borrow what you need. Leave ashore anything not needed in the boat for racing.

Offer to bring snacks for the other crew, and if you do, select snacks that are easy to pack, carry, and eat.

Socialize with other crews, as well as with your own, before and after racing.

If you know you made a mistake, apologize gracefully, but don't make a big deal out of it. This is a competitive recreational activity, not an affair of State!

When on board, do your best to excel at your assigned position, and do everything you can to help the other crew do their jobs.

Enjoy the day!

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19. Glossary of Terms

360 -- A penalty imposed on a racing sailboat for committing a foul. The boat is required to turn through 360 degrees of arc (one full circle) as penance for committing the foul.

720 -- A penalty imposed on a racing sailboat for committing a foul. Twice as severe as a 360, a boat required to "do a 720" must turn through 720 degrees of arc (two full circles) as penance for committing the foul.

Above – in the windward direction.

Aft – when facing forward in the boat, the direction directly behind you.

Aloft -- up above, towards the sky.

Amidships – the middle of the boat.

Anchor -- a metal device for holding the boat in place on the water, with hooks that dig in to the river bottom. The anchor should be attached to the boat with a line (called a rode) at least 7 to 9 times the depth of the water. This will keep the angle, between the rode and the anchor, small enough to prevent the boat from pulling the anchor's hooks out of the bottom, and provides some slack to absorb the shock of the boat tugging on the anchor as it bobs on the waves.

Apparent Wind -- the wind relative to the boat, a combination of the true wind plus the wind caused by the motion of the boat. The apparent wind will be forward of the true wind.

Backing (the Jib) -- holding the jib on the opposite side of the boat from where it would normally be, to help induce a turning moment in the direction opposite the side of the boat on which the jib is backed. Also done to make the boat **hove-to**.

Backstay -- an item of standing rigging that goes from the top of the mast to the stern of the boat.

Backstay Tensioner -- an item of running rigging used to put tension on the backstay, causing the mast to bend backwards towards the stern of the boat, for the purpose of adjusting the trim of the mainsail and the tension on the jib wire.

Bailer -- a closeable hole in the bottom of the boat used to drain surplus water from the bilge.

Bailing Bucket -- a bucket used to bail the boat when the bailer is not doing the job fast enough.

Barberhauler --an item of running rigging that serves to haul and hold the jibsheet outboard, helping to correctly trim the jib when the boat is running or reaching.

Battens -- plastic stiffeners inserted into the leech of a sail to help maintain its aerodynamic shape.

Beam -- the width of the boat, at its widest point. Also, the perpendicular direction from the center of the boat to and beyond the sides of the boat.

Bearing -- a representation of a direction.

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Below – in the leeward direction.

Bilge -- the area in the cockpit between the floorboards and the bottom of the boat.

Block -- a pulley.

Block and Tackle -- an apparatus consisting of two blocks (possibly with multiple sheaves each) and a rope, that provides mechanical advantage for hauling or tensioning equipment and lines.

Bolt rope -- a rope sewn into the luff and the foot of a mainsail, to strengthen those edges and to provide a way to fasten the sail to the mast and boom.

Boom -- a horizontal spar used to hold the foot of the mainsail.

Bow – the front of the boat.

Brace -- see **Guy**.

Broach -- a situation where the boat slides in a direction perpendicular to its long axis. If sustained, it causes water to pile up against the chine and side of the boat on the side facing the slide, providing resistance that helps heel the boat over.

By the Lee -- a point of sail where the boat, when running, makes an angle greater than 180 degrees from the direction of the wind.

Cam Cleat -- a cleat consisting of two jaws or pawls that swing in or out to engage or release a cleated line.

Centerboard -- a retractable metal fin that extends below the boat and provides resistance to lateral boat motion in the water.

Centerboard Uphaul -- an item of running rigging used by a crewmember to haul up the centerboard.

Chainplate -- a metal fastener laminated into the hull upon which is fastened the lower end of a shroud or stay.

Cleat -- a device onto which a line is secured and held fast.

Clew -- the rear corner of a triangular sail.

Clamshell Cleat -- a fastener, shaped like a partially-opened clamshell, used to secure a line.

Clevis Pin -- a large-diameter pin used with a shackle to secure the fastening.

Close-hauled -- a point of sail that is closest to the direction of the wind, with sails trimmed in as close as possible to the center of the boat.

Come About -- to bring the wind from one side of the mainsail to the other, with the forward edge of the main leading. Same as **Tack**.

Committee Boat -- in a race, the on-water headquarters for the Race Committee. Races start and finish near the Committee Boat; competitors check in with the Race Committee at the Committee Boat, and read the Course Board as they sail past the Committee Boat.

Compass -- a device that indicates the boat's bearing relative to magnetic North.

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Cotter -- a piece of wire used to secure a Clevis pin in place. This may be straight or circular.

Cunningham -- an item of running rigging that puts tension on the luff of the mainsail, removing wrinkles from the sail's surface.

Double Blocked -- an arrangement using two pulleys to provide mechanical advantage.

Double-ended controls -- placement amidships of the ends of selected items of running rigging, replicated port and starboard for ease of access by the helmsman and/or middle crew..

Downhaul -- an item of running rigging used to haul something down, for example the spinnaker pole downhaul.

Downwind -- the direction directly opposite the direction the wind is blowing from.

Drum -- a cylindrical apparatus consisting of a large-diameter wheel to which is attached a pulling rope, and a small-diameter shaft, to which is attached a cable connected to something being pulled. The drum provides mechanical advantage for the crewmember doing the pulling.

Drybox -- a sealable container used to keep critical items dry when the boat is sailing.

Dry Slip -- a place on land to stow the boat when the boat is not sailing.

Ease -- to release tension on a sheet, to adjust the trim of the sail.

Exit Plate -- an aperture in the deck or on a spar from which exits an item of running rigging.

Exit Sheave -- a pulley located at the edge of a spar or on the deck that routes an item or running rigging through the spar or the deck.

Finish Pin -- a buoy on the racecourse that helps identify the finish line.

Foot -- the bottom edge of a triangular sail.

Fore -- see **Forward**.

Foredeck -- the area of the deck forward of the cockpit.

Forestay -- a piece of standing rigging that goes from the top of the mast to the bow of the boat.

Forward -- when standing in the boat, the direction towards the front of the boat.

Forward Crew -- a crewmember who sits forward of the helmsman and the middle crew.

Gooseneck -- the connection between the main boom and the mast; a universal joint allowing the boom to move through any horizontal and vertical angle.

Gudgeons -- metal fasteners attached to the transom of the boat, used to secure the rudder in place.

Gull-winged -- a sail configuration used on a run where the jib is on the opposite side of the boat from the main.

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Guy -- an item of running rigging used to hold the tack of the spinnaker, and the end of the spinnaker pole in place. Also called a Brace.

Halyard -- an item of running rigging used to hoist sails -- to haul up yards of cloth, as in haul-yard.

Halyard Lock -- a fastener on the mast into which the wire end of the halyard is inserted and held fast.

Hanks -- metal fasteners used to secure the luff of the jib to the jibstay.

Head -- the top corner of a triangular sail.

Head to wind -- a position of the boat relative to the wind where the boat points directly into the wind.

Heel, Heeling -- the angle that the boat's bottom makes with the water. In a Lightning, the boat should, to achieve maximum boat speed, be heeled over no more than 10 degrees to leeward.

Helm -- the place from where the boat is steered.

Helmsman -- the person who steers the boat.

Hiking -- sitting on the edge of the deck, with buttocks hanging over the gunwales, leaning out as far as possible, to counterbalance the heeling force on the boat.

Hoisting Bridle -- a wire and rope apparatus used to lift the boat off the trailer and into the water on launch, and to hoist the boat out of the water and on to the trailer at the end of the day.

Hove-to -- using the force of the wind to keep the boat stationary, with the sails up and no anchor out, accomplished by fully trimming in the main, backing the jib, and lashing the tiller slightly to leeward. The position of the tiller and the trim of the main will cause the boat to go head to wind, and the backed jib will counteract that, keeping the boat stationary, except for a slight drift to leeward.

Hull -- the part of the boat below the deck, the part of the boat on which it floats, including the boat's bottom.

Hydrilla -- nasty weeds that clog the channels, fouling the centerboard and rudder, rendering the boat unsteerable.

Jib -- see **Jibsail**.

Jibe -- a maneuver that brings the wind from one side of the sail to the other, led by the back edge of the sail.

Jibsail -- the smaller triangular sail on a sailboat, fastened to the jibstay.

Jibsheet -- an item of running rigging that is used to adjust the position of the clew (and the foot) of the jib inward or outward from the boat's centerline.

Jibstay -- an item of standing rigging that goes from a point 2/3 of the way up the mast to the bow of the boat.

Jib Car -- a block on a slider that runs in a track that is used to adjust the location on the deck where the jibsheet is anchored.

Crew Preparation Checklist

Jib Cloth -- an item of running rigging used to put tension on the luff of the jib, removing the wrinkles on the surface of the jibsail.

Jib Wire -- a wire cable sewn in to the luff of the jib. One end attaches to the bow chainplate, the other to the jib halyard. This supports the luff of the jib, allowing it to have a straight, taught edge facing the wind.

Keel -- a boat's backbone at the waterline, around which the hull is laid; an extension through the hull running part way or the entire way along the length of the boat, designed to resist forces pushing the boat sideways and keep the boat moving straight ahead.

Kicker -- see **Spinnaker Pole Downhaul**.

Lazy Sheet -- one of a pair of jib sheets, the one that is not currently holding the jib in place.

Leech -- the rear edge of a triangular sail.

Leeward -- the direction opposite the direction of the wind (pronounced "loo-ard").

Leeward Mark -- a buoy on a racecourse that marks the most downwind point of the course. Boats, once they round the leeward mark, will "harden up" that is, change their point of sail to close-hauled.

Lift -- a force generated by the wind on the sail, perpendicular to, and forward of the plane of the sail. Also, a favorable wind shift.

Lightning -- a popular 19-foot, one-design racing sloop, designed by Sparkman and Stephens in the late 1930s. The first Lightning was launched at Lake Skaneateles New York in 1938. As of today, more than 15,000 have been built.

Lowers -- the rear shrouds, called lowers because they fasten to the mast near the mast's middle (lower than where the uppers are fastened).

Luff -- the forward edge of a triangular sail. Also, what a sail does when it is not filled with wind, and is thus shaking and fluttering with the wind blowing equally on both sides.

Mainsail -- the large triangular sail on a sailboat, hoisted on the back edge of the mast, footed on the boom.

Mainsheet -- an item of running rigging used to position the main boom (and hence the foot of the mainsail) inward or outward from the centerline of the boat.

Mark -- a buoy on a racecourse.

Mast -- a vertical spar that supports the sails.

Masthead -- The top of the mast.

Middle Crew -- the crewmember who sits between the helmsman and the forward crewmember.

Mooring Line -- a rope used to secure the boat to a dock or a buoy.

Newton's Third Law -- every action is accompanied by an equal and opposite reaction.

Crew Preparation Checklist

No Sail Zone -- a 90-degree arc, measured + and - 45 degrees from the true wind direction. A sailboat cannot move, under sail power alone, in any direction within the no-sail zone, because the wind will not fill the sails, but rather will cause them to flutter and shake.

Outhaul -- an item of running rigging used to pull something out, for example, the Main Outhaul pulls the clew of the mainsail out towards the aft end of the boom.

Paddles -- devices for moving the boat when the wind is not blowing.

Partners -- the slot in the deck through which the mast passes.

PFDs -- Personal Flotation Devices (Life Jackets) -- wearable items that provide flotation for crewmembers who have gone overboard.

Pintles -- metal fasteners on the rudder that attach to the Gudgeons on the boat's transom to hold the rudder in place.

Point of Sail -- a description of the direction a sailboat is moving, relative to the direction of the wind, discernable by noting the side (port or starboard) of the boat on which the mainsail sits, and the degree of trim on the mainsail.

Pole -- see **Spinnaker Pole**.

Port -- when looking forward, the direction that is to your left.

Pre-bend -- curvature induced in the mast, by use of partners blocks, after the mast is tensioned by properly adjusted stays and shrouds -- before any tension is put on the backstay.

Preventer -- an item of running rigging designed and placed to prevent something from happening. For example, a centerboard preventer prevents an extended centerboard from dropping into the centerboard trunk when the boat is upside-down after a capsize. A preventer may be rigged to the main boom to prevent an accidental jibe when sailing by the lee.

Quarter -- the rear half of the side of the boat.

Race Committee -- a group of volunteers that serve as officials for a sailboat race. Usually abbreviated **RC**.

Reach -- any point of sail, other than close-hauled or running, where the wind comes from the side of the boat.

Reaching Mark -- a buoy on a triangular racecourse located about halfway between the windward mark and the leeward mark. Often, boats will intentionally jibe as they go around the rounding mark. Same as **Rounding Mark**.

Rigging -- ropes and wires that secure sails to spars, and spars to the boat.

Rounding Mark -- a buoy on a triangular racecourse located about halfway between the windward mark and the leeward mark. Often, boats will intentionally jibe as they go around the rounding mark. Same as **Reaching Mark**.

Rudder -- a device that steers the boat by resisting the flow of water more in one direction than in the other, causing the stern to swing in response to the resistance.

Running -- sailing directly downwind.

Crew Preparation Checklist

Running Rigging -- rigging that is adjustable, such as sheets and halyards.

Sail – a triangular arrangement of cloth panels sewn together to make a precise 3-dimensional shape over which the wind blows to put forces on a boat to make it move.

Shackles -- U-shaped fasteners used to attach items of equipment to fasteners, for examples to fasten turnbuckles to chainplates.

Sheet -- an item of running rigging used to position the foot a sail inward and outward from the center of the boat.

Shrouds -- standing rigging that secures the mast and prevents lateral (port-to-starboard) movement of the mast.

Spar – a wooden or metal pole to which sails are attached.

Spinnaker -- a very large triangular sail on a sailboat, used only when the boat is running or broad reaching, fastened to the mast at only one point (at the peak), and to the boat with one sheet and one guy.

Spinnaker Pole -- a spar used to hold the tack of the spinnaker out away from the mast, to enable the spinnaker to fill with air.

Spinnaker Pole Downhaul -- an item of running rigging used to keep the spinnaker pole from rising up past horizontal when under load from a drawing spinnaker.

Spinnaker Pole Topping Lift -- an item of running rigging used to set and adjust the vertical angle of the spinnaker pole to its desired, nearly-horizontal position.

Spinnaker Sheet -- an item of running rigging that is used to adjust the position of the clew (and the leech) of the spinnaker fore and aft.

Spreader -- a horizontal shaft, located half way up the mast, which holds a shroud out away from the mast i.e., the two spreaders serve to spread the shrouds apart.

Standing Rigging -- rigging that is not adjustable, such as shrouds and stays.

Starboard -- when looking forward, the direction to your right.

Start Line -- an imaginary line between the flag on the Committee Boat and the Starting Pin.

Starting Pin -- a buoy on a racecourse that helps identify the Start Line.

Stays -- standing rigging that secures the mast and prevents fore-and-aft movement of the mast.

Stern -- the back end of the boat.

Step - the place in the bottom of the boat where the butt of the mast sits. Also, what you do to the mast when setting it in place in the boat.

Swage -- (rhymes with age) a tool used to put pressure on a crimpable fitting, to secure the fitting onto the item to which it is attached.

Swaged -- (rhymes with aged) describes how an item of equipment is fastened and secured to an object. For example, turnbuckles are swaged on to the ends of the stays and shrouds.

Crew Preparation Checklist

Tack -- the forward corner of a triangular sail. Also, a maneuver that brings the wind from one side of the sail to the other, led by the forward edge of the sail.

Tell-tale -- a short length of yarn or lightweight plastic tape, used to help the crew determine wind direction and whether or not a sail is correctly trimmed.

Tensioner -- an item of running rigging that helps put tension on a sail or another item of rigging.

Tiller -- a wood or metal pole attached to the rudder that is used by the helmsman to turn the rudder and thus to steer the boat.

Tiller extension -- a swiveled shaft at the end of the tiller that allows the helmsman to sit on the deck and steer.

Topper -- see **Spinnaker Pole Topping Lift**.

Transom -- the end of the boat at the stern.

Trimmer -- a crew assignment, for a crewmember responsible for adjusting the position of a sail.

Trim -- to adjust a sail. Also, to adjust a sail by pulling its foot in closer to the centerline of the boat (opposite of **Ease**).

Turnbuckle -- an adjustable fastener used to tension shrouds and stays.

Turning Block -- a pulley placed to help an item of running rigging make a 90-degree (or more) bend.

Twing -- an item of running rigging used to haul and hold a spinnaker guy down to the deck -- an alternative to, or a supplement for the guyhook. A Twing can also be used to adjust the vertical position of the spinnaker sheet.

Uphaul -- an item of running rigging used to haul something up, for example the jib halyard uphaul.

Uppers -- the forward shrouds, called uppers because they fasten to the mast near the mast's upper end.

Vang -- an item of running rigging that allows crewmembers to set the vertical angle of the main boom, keeping it in a desired nearly-horizontal position.

Way -- forward motion of the boat, needed for steering.

Weather -- in the windward direction.

Weather Mark -- a buoy on a racecourse that marks the most windward point on the course. Boats will tack to the weather mark, round it, then "fall off" the wind onto a reach or a run and hoist spinnakers as they sail for the rounding or leeward mark. Same as **Windward Mark**.

Wind Vane -- a device mounted on the masthead that shows the direction of the apparent wind.

Windward -- the direction to the place the wind is coming from.

Windward Mark -- a buoy on a racecourse that marks the most windward point on the course. Boats will tack to the windward mark, round it, then "fall off" the wind

Crew Preparation Checklist

onto a reach or a run and hoist spinnakers as they sail for the rounding or leeward mark. Same as Weather Mark.

Wire -- a length of stainless steel cable sewn into the luff of the jib. One end fastens to the forward chainplate, the other to the jib halyard. Also, the material from which shrouds and stays are fashioned, 1 x 19 stainless 1/8-inch diameter wire, for our boat.

Crew Preparation Checklist

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20. Appendix

Advanced Spinnaker Sailing Techniques

By Nabeel Alsalam, Captain, Lightning fleet 50.

We had a very productive on-trailer practice session, setting, jibing, and dousing the spinnaker. Mike Beaver (MB) stopped by and added some very useful high-performance tips. Below are some notes.

Preparation

- Cleat topping lift in advance, in the position marked for a level pole.
- The spinnaker halyard should be forward of the spreaders on the upper shrouds. (Middle crew should check this before the hoist.) If it is behind the spreaders the spinnaker will get wedged between the mainsail and the shrouds as it is hoisted. (MB)
- With your hand, follow one luff of the spinnaker from the head to the clew to be sure it isn't wrapped around the halyard or the other luff. The head and both clews should be free to come out.

The Set

Pole: Forward crew

- First, using left hand, open jaw of outboard pelican hook with thumb. With jaw down, using right hand put guy into jaw, then release the left thumb's hold on the hook.
- Second, clip on topping lift.
- Third, push pole forward and snap it into the pole bracket on the mast. (Forward crew should have previously uncleated the guy on the starboard side to give the slack needed to set the pole.)

Spinnaker: Middle crew

- Squat facing the spinnaker on the balls of your feet. (MB)
- Unhook spinnaker halyard and sheet from the guyhook where it has been secured. Pull end of spinnaker out from the cockpit. Spinnaker head and starboard clew are free to be pulled up and forward, respectively.

Hoist:

- Skipper trims the guy until the starboard clew is forward of the shrouds), bears off around the weather mark, pulls board up, and calls for hoist.
- Forward crew hoists spinnaker using LONG pulls, reaching high and pulling low. Spinnaker should be raised in 4 pulls. If more are required then the strokes are too short. Simultaneously, skipper is pulling guy around. The pole will pull back because of the pressure of the guy on the pole. So the forward crew takes a ½ second after the 2nd and 4th pull to bang the pole forward. **1-2-bang, 3-4-bang.** Meanwhile, middle crew finds sheet, trims it some, waits for spinnaker to fill, and starts flying it.

Crew Preparation Checklist

Variation on previous:

- Middle crew holds spinnaker between hands like a basketball. Skipper calls: Ready-Set-Hoist. Simultaneously on Hoist, the forward crew hoists the halyard in big strokes, the skipper trims guy, and middle crew **THROWS** spinnaker forward over the water at a 45-degree angle off of the bow (behind the shrouds and using a basketball pass motion). This method prevents the pole from pulling back and the spinnaker from rubbing on the shrouds as the skipper pulls the guy around. So what if the foot gets a little wet.

Returning to our story:

- Forward crew cleats the spinnaker halyard **securely**. One disaster we had last year was when the halyard didn't cleat well and the spinnaker fell back down into the water and the boat sailed over it.
- Forward crew then 1) takes down the jib (release cloth and wire, pull ball out of halyard lock, pull down, stow under bungee, uncleat jib sheet on port and cleat it on starboard) 2) eases the mainsail's outhaul for downwind (the bottom panel on the mainsail forms a shelf), 3) on a run holds the boom out or on a reach hikes to keep the boat flat, and, finally, 4) looks back and warns skipper/spinnaker trimmer when puffs are going to hit or a competitor is positioning themselves to sail over us to windward.

Meanwhile

- Spinnaker trimmer is fully focused on the spinnaker, mostly the luff (the edge above the pole), the masthead fly, the center seam, and the foot. Unlike the upwind leg, she does not have the luxury of looking around at other boats. A crook in the neck is an occupational hazard. She is excused to take a quick look over her right shoulder to see what the wind that is coming looks like.
- She is constantly easing the sheet slowly until the luff starts to curl and then trims it back fairly quickly to prevent the spinnaker from collapsing. A collapsed spinnaker is **NOT GOOD** for speed. A little curl of a foot or less **IS** good. This cycle repeats itself every 5 seconds or so.
- She glances at the mast head fly to make sure the wind hasn't changed directions too much and the pole is still in about the right position (perpendicular to the wind).
- She looks at the center seam to see if it is vertical (parallel to the mast). If the spinnaker is tilted one way or another, she may ask the forward crew to raise or lower the pole to fix it.
- She looks at the foot. If it is dragging on the forestay, the guy **AND** sheet need to be eased to let the spinnaker go forward some. In heavy air, it may be too far out and both the guy and sheet need to be trimmed back to bring it in some. In any case, the foot should have a nice rounded shape that matches the roundness of the spinnaker up higher.

Crew Preparation Checklist

The Jibe:

Forward crew jibes the pole. Jibing the pole starts with unhooking the guy and ends with hooking the new guy. For some reason, these steps are often forgotten. Everything below is for the jibe from starboard to port. Reverse everything, especially right and left hands for the port to starboard jibe.

HIGH PERFORMANCE METHOD (MB)

- First thing after hearing the call for the jibe is to make sure the middle crew is holding onto the guy with slack removed. Using the V between your thumb and forefinger on your RIGHT hand, push the guy down and out of the hook (forward of the hook). This works well even in heavy air so get used to doing it this way even in light air.
- Second, as you step up onto the deck, grab the string on the pole with your RIGHT hand near the mast, so that the string is across the palm of your hand and you have closed your fingers around it to make a fist. Twist your fist 90 degrees. This will open the pelican hook jaws on both ends. Still holding the line with you fist in the 90 degree twisted position, raise the pole up and off of the mast pole bracket as you are completing your climb to the deck. The pole is now off the mast and, if you are lucky, off the old guy as well. If not, as you are stepping across the boat with you back on the mast through the triangle formed by the mast, topping lift, and shock cord, rock the inboard end of the pole down and forward to lift the outboard end up and back and, hopefully, off of the old guy. As a last resort, twist the pole a bit.
- Now with you LEFT hand reach out and grab the new guy, FORWARD OF THE SHROUDS, and manually put the new guy into the jaw near your still twisted right fist. Untwist your fist to secure the new guy in the jaws.
- Push this end of the pole forward, reach back with your RIGHT hand and grab the pole near the other jaw. As you are stepping back into the boat, slam the jaw onto the pole bracket, and with your LEFT hand reach out and grab the guy, hook, and cleat it. Yell POLE'S MADE.

SLIGHTLY LESS ATHLETIC METHOD

- In the fist twist method is too difficult for you and the pole you are using allows it, as you step up grab the pole near the mast with your right hand and with your THUMB open the jaw. Then as you step across grab the end that you just took off the mast with your LEFT hand and pull the string with your RIGHT hand to release the old guy. Finally switch hands again, holding the pole end you took off the mast with your RIGHT hand and with your thumb again open the jaws while reaching out with your LEFT hand to grab the new guy and manually placing it in the awaiting jaws.

METHOD THAT BRIAN HAYES AND CHED PROCTOR DEMONSTRATED AT SKANEATELES AND IS GOOD IN ROUGH WEATHER

- Instead of taking pole off as you are stepping up on deck, step up, duck under pole and go to the leeward side. With foot braced to leeward, lean against mast.

Crew Preparation Checklist

This is a very stable position. However, if the pole is under pressure, be careful not to be in a position to be speared by it once it comes off the mast.

- Proceed as before. I use my right hand to take pole off of mast.

The Douse

This is how I think it is done, but my regular crew may have some better ideas. This is for the usual approach to the leeward mark on port jibe, dousing to windward, and hardening up onto a beat still on port.

Skipper calls for jib to be raised about a minute before the mark.

- Forward crew raises jib and sets wire and cloth to positions determined when sailing upwind. Jib-wire setting is a number between 6.5 (light air) and 4.0 (heavy air). The jib cloth should be marked with a black pen at the approximate setting.
- She tensions the outhaul on the main to its upwind position.
- If on a run, the pole can be taken down first and the spinnaker flown for a few more seconds without pole while forward crew completes the job. If approaching on a reach, the pole and spinnaker come down together.

Skipper calls for pole to be taken down about 30 seconds before the mark.

- Forward crew removes pole, first from mast, then from guy.
- Middle crew continues flying the spinnaker.
- If time allows forward crew unclips pole from topping lift and stows on starboard side. Moving pole straight back parallel to boom avoids poking fellow crew in the face.
- If time doesn't allow, let the pole hang on the topping lift. It won't get in the way of hardening up onto a beat. Remember going fast is more important than housekeeping chores. After rounding the mark and hardening up onto a beat, unclip pole and stow so that skipper is free to tack to starboard.

Skipper calls for douse about 15 seconds before the mark.

- Middle crew lets go of sheet and turns to face spinnaker. Actually, it might be a good idea to gather up the extra sheet line before the skipper calls for the douse, and when he does, toss it to the leeward side so not to be stepping on it (common problem) during the take down. The sheet has to run freely for the take down to go quickly.
- Middle crew unhooks guy and QUICKLY gathers in foot of spinnaker turning the spinnaker into a tube instead of a sail. It may be sufficient just to get the foot aft of the shrouds. It would be good if the method of gathering the foot did not twist the two luffs. For example, if the middle crew is holding the port luff in his left hand and reaches over his right hand that is holding a part of the foot, he may unintentionally create a twist, wrapping the port luff around the foot.
- Meanwhile forward crew reaches around mast and grabs halyard.

Crew Preparation Checklist

- Once middle crew has foot of spinnaker and is ready to pull the spinnaker down, she calls “release halyard.”
- Immediately, forward crew releases halyard from the cleat but DOES NOT LET GO. When told to let it go, she lets the spinnaker fall a little faster than the middle crew is pulling it down, but doesn’t let the spinnaker fall in front of the boat.
- Middle crew pulls spinnaker down in long strokes. Preferably, she is standing and can reach high, grab a fistful of spinnaker, pulls it down all the way to the cockpit, and repeat process. (MB)
- Middle crew secures spinnaker halyard in hook and cleats it. This is all that is really needed to prevent disasters. (FG)
- Forward crew turns attention to trimming jib as the boat rounds the leeward mark. But -- DON’T TRIM TOO QUICKLY. Trimming too quickly prevents the bow from coming up into the wind. Trim with the turn.
- The spinnaker may not be neatly stowed at this point, but that housekeeping chore can wait until later when you are sailing upwind on port and you have caught your breath.
- Everyone HIKES HARD as skipper steers boat around mark. Some skippers like the middle crew to help pull in the mainsheet. It is 44 feet long.