PERFORMANCE SAILING

SPINNAKER HANDLING MANUAL

Introduction

Flying a spinnaker is one of the most sensually rewarding experiences a sailor can have. The boat is fast, the sail colorful and the crew focused. Flying it well, however, is both complicated and challenging, requiring good teamwork, quick reflexes and a heightened sense of boat speed and control. Things happen much more quickly and the forces at work are greater and more variable. This is due, in large part, to the fact that the spinnaker is your largest sail. It is also attached to the boat at only three corners, rather than at two sides and three corners like the main sail. These two characteristics make it the least manageable of your sails. However, once you've mastered the basics of spinnaker control, the grin you'll wear while flying a spinnaker will be as big as any you've had while sailing! Welcome to Performance sailing!

Course Format

The focus of this class will be on the use and control of the spinnaker. To use the spinnaker most effectively, all the people on the boat need to work as a team. In addition to developing the skills necessary to do this, we will also work on a broad set of skills including advanced sail shaping, which will allow you, regardless of whether you are a racer or a cruiser, to get more performance out of your boat—easily and comfortably!

Following is a general overview of the class. Both mornings start at the dock with a chalk talk and review as needed. The first morning will cover rigging the spinnaker gear and packing the spinnaker ("chute") at the dock. Then we will get underway, heading upwind to work on upwind performance, then turning around and getting the chute up. The rest of the morning will be spent this way, going up- and downwind, focusing on sets and douses of the spinnaker and constant refinement of sail trim and shaping, and paying close attention to boat balance. Then we'll come in for lunch.

The afternoon will typically have more wind and we'll focus on refining these new skills in heavy air, rotating people through all the positions and making the boat a more cohesive team.

On the second day, if you all are game, we can pack a lunch and stay out all day, heaving to for lunch. On day two we will introduce gybing. If broaching doesn't occur on its own, the instructor will induce broaches to allow you to learn the early warning signs and how to prevent and recover from them. At some point we will simulate a Person Overboard with the chute up, to drill on the rather complicated process of douse and recovery. All in all, an action packed weekend.

The following material is designed to prepare you for learning to fly a spinnaker this weekend, as well as to serve as a quick reference guide when you are refining your skills later. In an effort to encourage you to become as familiar as possible with the terminology before hand, we have placed the glossary at the beginning of the manual. In addition to the good introduction to spinnaker gear and handling provided by the glossary, it is also important that you know these terms so you can most effectively communicate with your crewmates.

Glossary of Terms

Running Rigging and gear

Spinnaker: (also known as a Chute or Kite) This is a large colorful sail used when sailing down wind. A spinnaker is made symmetrically (when you fold it on a line from the center of the foot to the head, both halves are the same shape). A cruising spinnaker is also known as a gennaker and is not symmetrical. Gennakers or "Asymmetrical" chutes, when flown on some sort of bow sprit, have a distinct tack and clew. They are flown like jibs, although typically much larger. Spinnakers have a distinct tack or clew only when being flown; when down below in the bag a chute has two luffs and two clews.

Turtle bag: The turtle is the bag that the spinnaker lives in. The spinnaker is "launched" from the turtle bag, so the bag is made with a hoop at the mouth of the bag, to hold it open, as the sail is pulled out. The turtle also has clips to hold it to the boat while the lines are being set up and the sail is launched.

Spinnaker sheet: This is the line attached to the leeward lower corner (clew) of the spinnaker, used in conjunction with the afterguy or "guy," used to trim the spinnaker angle to the wind.

Afterguy or guy: This is attached to the windward lower corner (tack) of the spinnaker, used to set the spinnaker pole's angle to the wind.

Twings: (also known as twingers, tweakers, thing-a-mabobs, and spinnaker barber haulers) Small blocks are attached to lines which go to padeyes and cleats at the mid deck. The sheet and guy each pass through one of these small blocks. By tensioning the twing one can control the height and angle of the sheet, or guy, in relation to the deck. When used on the guy, the twing pulls it out and down to improve its mechanical advantage on the pole while reaching.

Spinnaker Halyard: The halyard that pulls the spinnaker up. It is distinguishable from a jib halyard in that it exits the mast above the forestay.

Spinnaker Pole: This is an aluminum pole of fixed length. The pole has fittings at each end that attach it to the guy and the mast. On smaller boats, (under approximately thirty-five feet) the ends are the same, allowing the pole to be gybed end for end (there will be an explanation of end for end gybes later in your reading). The pole is rigged and "flown" on the windward side of the boat. It is used to help shape the chute and hold it in a way to properly use the wind to create lift and power.

Spinnaker Pole Topping Lift: (also known as the "topping lift" or "pole lift") As the name implies, this is a line that raises and lowers the spinnaker pole. It exits the mast about one half to two thirds of the way up.

Spinnaker Pole Down Haul or Foreguy: The down haul is a line running through a padeye, or turning block, on the deck just forward of the mast, which attaches to the pole to keep it from lifting too high. The foreguy serves an additional purpose to the down haul—it runs through a turning block in the middle of the foredeck, or further forward in the deck. This allows it to pull the spinnaker pole forward as well as down, making it oppose the afterguy, or "guy," which pulls aft. It enhances one's ability to control the spinnaker pole.

Pole Bridle: Cable and ring assemblies that are used to connect the pole to the pole topping lift and pole downhaul.

Pole Jaws: Spring and plunger assemblies that attach the pole to the mast ring and guy.

Trip Lines: Cables or lines that retract the pins from the jaws to release the pole from the mast ring/guy.

Tape or Tapes: This refers to the cloth tape used to cover the edges of the spinnaker. When people talk about the edges they may use the term "tapes." Tapes are often color-coded: red for the port leech, green/blue for the starboard leech, and white/yellow for the foot.

Sets, Douses, Gybes, and Commands

Leeward Set: The leeward set is the least complicated and safest way to set the spinnaker. The bag is hooked to the leeward side, and then the sheet, guy, and halyard are attached. It is easiest to attach the bag on a previous tack, then you can set it up on the windward side, tack and be ready to go.

End for End Gybe: In an end for end gybe the pole is removed from both the "guy" and the mast. The pole moves across the boat laterally, then gets reattached to both the new "guy" and then the mast.

Leeward Douse: ("take down" or "drop") The sail is brought to the leeward side, behind the jib and mainsail, then lowered into the companionway.

Port Set: (or starboard pole) This is when the spinnaker is set up and hoisted from the port side. It is generally preferred, if you have a choice, as you are on starboard tack.

Starboard Set: (or port pole) This is when the spinnaker is set up and hoisted from the starboard side.

Windward "takedown": The boat is sailed DDW (dead downwind) or slightly by the lee. The sail is rotated to windward and lowered into the companionway hatch.

Run the Tapes: This is a procedure to ensure that the spinnaker is not twisted in the turtle. The crew pulls one tape together from head to clew, and ensures the sheets and halyard are rigged fairly.

Topping the Pole: Raising the pole into position for setting the spinnaker.

Square the Pole: A procedure which entails bringing the pole back so it is parallel with the beam of the boat.

Prefeed, or Prefeed the Guy: This is done at the beginning of the hoist to help keep the two leeches from wrapping around each other. It entails pulling the afterguy and the tack of the chute towards the bow of the boat.

"Trip the Pole": A command to the foredeck crew, when it is time to detach the pole from the guy and mast, and start a gybe or windward douse.

"Sheet!": The command often given to the trimmer during the one nanosecond the trimmer isn't staring at the spinnaker, and it luffs (usually yelled by every member of the crew). It encourages the trimmer to pull on the sheet. It is also used to let the trimmer know they need to ease the spinnaker sheet when the boat is starting to broach. Hopefully in the heat of the moment, people

will remember to use other descriptive words like "in" or "out". When a sail is over or under trimmed in big wind, it is hard to steer the boat.

"Blow!": We are in big trouble! Let go of the line you are holding. Letting it completely unreave itself and flap in the wind. Example: When the line you are holding is the guy, "Blow the guy!"

Strapped: When the sheet and/or guy are so tight the foot of the spinnaker is touching against the head-stay the sail is strapped, or overtrimmed.

Informational Hails

"Top": A hail from the foredeck, hoisting the halyard, to the rest of the crew when the chute is hoisted all the way

"Made": A hail from the foredeck crew to the rest of the boat to inform the whole boat when the spinnaker pole is finished being Gybed.

"Free (or Clear) to Tack": Said after the douse when lowering the pole on to the deck, this is a hail to tell the helmsperson that the foredeck is organized and the boat can tack without tangling the jib sheet, topping lift, and pole on the foredeck together.

Possible Problems

Wrap, or Twist: This is when the spinnaker wraps around itself, the forestay, the shrouds, or all of the above simultaneously.

Leeward Broach: A sudden and violent heeling that causes loss of control, as the rail goes down and the rudder comes out of the water.

Windward Broach (Round Down): (also called a "Death Roll") A type of broach resulting from severe heeling to windward, and an uncontrolled gybe.

Other Terms

Curl: The fold in the cloth on the windward leech that develops when the spinnaker curls because it is properly trimmed. Look at the upper windward edge (the windward side is the side with the pole). The first 6 inches to a foot of sail will fold in when you are trimmed properly.

Collapse: When the spinnaker is under-trimmed, the whole windward half of the sail will fold into the other half (when a curl increases too far).

Pinching: When sailing closer to the wind, an optimum trim (close hauled), the windward telltales will lift. Commonly used to help keep the boat flat in heavy air.

Footing: When you are "footing" you are sailing a little off the wind from close hauled. Used in light air to help the boat build more power and speed.

Heating it up: While on a deep broad reach or run, heading a few degrees closer to the wind for more speed.

Packing The Spinnaker

As mentioned in the glossary, it is possible for the spinnaker to twist or wrap around itself. To help the spinnaker come out of the turtle smoothly, quickly, and without wraps, it must be put in the turtle in a specific way.

Start by dumping the spinnaker on the cabin sole. Take the turtle and sit on the lid with the hoop of the bag on your lap. Then search in the pile of spinnaker in front of you until you find an edge or corner. If it is an edge, look at the color of the last inch of the edge. If it is a dark color, (red, blue, green), then you have a luff; a light color (white or yellow) designates the foot. Take the edge you have, and run your hand along it until you find a corner. Upon finding a corner, look at the color of the two edges that meet—if two dark colors meet, it is the head. Toss it on the quarter berth opposite from where you are sitting. Run your hand along one of the edges until you come to a corner where a light and dark color come together to form a clew. Tuck the clew under your thigh. Remember, the chute is symmetrical so it doesn't matter which side you put it on. Follow the light colored edge (the foot) to the other corner. The other clew goes under your other thigh. Follow one of the leeches to the head to ensure there are no twists.

Now you need to start packing the spinnaker into the turtle. Start by packing the bottom edge of the sail into the bag, leaving both clews hanging out of the bag about one foot. Then start stuffing the rest of the sail into the bag, leaving both luffs out of the bag until you reach the head of the sail. At this point stuff the two edges into their respective sides of the turtle bag. When this is done put the lid over bag, making sure you leave all three corners hanging out a little less than a foot.

Leave the corners hanging out of the bag so that when you bring the bag on deck to hook the spinnaker gear to it you don't need to remove the top and run the risk of having the sail prematurely blow out of the bag.

Rigging the Spinnaker Gear

The proper way to rig the boat when planning to fly the spinnaker is to rig the jib after the spinnaker gear. This places the spinnaker gear under and outside of the jib, and jib sheets, so that it goes up while hoisting without fouling the jib.

Rigging the Pole

At the dock, with the foredeck clear, bring the pole on deck and hook one end to the top ring on the mast, with the end fitting or "jaws" open end up. There are two bridles with medium sized rings in the middle attached to the pole at the ends. The topping lift goes on the top ring, and the down haul or foreguy goes on the bottom. When this is done, take the pole off the ring on the mast and lower it to the deck. Clip the inboard (mast) end of the pole onto the topping lift line where it rises from the deck at the mast. Pull lots of slack into the topping lift at the pole, and without unhooking the topping lift from the bridle, pull the bight of the line between the forward edge of the mast and the pole bridle down, and clip it in the jaws with the other part of the topping lift. Then snug both the topping lift and the downhaul tight to keep the pole secure under sail.

Rigging the Twings

The twings are two thin lines each with a small block on the end. There are two padeyes that are mounted at about the middeck on the boat for each of the twings to be fed through. One of these padeyes is close to the rail. The tail of the twing goes through it and makes its way inboard and aft through the other padeye. This padeye has a cleat adjacent to it. Tie a stopper knot a few inches from the bitter end of the twing, and pull it tight so the block at the end is up against the outermost padeye.

Rigging the sheets

Run the afterguy on the (planned) windward side. For consistency, use the starboard side since it is usually the windward side during most sets. Starting from the companionway, it should pass through the ratchet block at the forward end of the cockpit then to the aftmost block (fairlead) on the stern pulpit. From there it goes forward to the twing block, then to the bow through the pole jaws, forward of the forestay and above the retaining cord tied from the pulpit to the forestay, and then to the (planned) leeward shroud. At no point should it pass under a lifeline or inside any standing or running rigging.

Set up the sheet on the leeward side through the ratchet from the companionway, aft to the fairlead and through the twing block just like the guy. Tie it off directly to the leeward shroud. Later, you will hook the spinnaker bag (turtle) to the leeward shroud, attach the sheets to each clew and the halyard to the head for hoisting. Notice that the sheet and guy may lie inside the lifelines and stanchions, as long as neither passes *through* the opening between the lifelines and the deck.

The spinnaker sheet tails should never have stopper knots in them. If you must release the sheet or guy in a broach, or other emergency, and the stopper knot stops the sheet from running you could find yourself in a sticky situation.

Setting the Spinnaker

The most basic type of spinnaker set is the "Bear Away Set" in which the spinnaker is hoisted behind the mainsail as the boat bears away to a broad reach. Once the sail is at full hoist and the boat is on a deep broad reach, the spinnaker is trimmed to the wind, the jib is dropped and you're off to the races! Of course it isn't as simple as that. Many things need to be done properly, and in proper order, for things to go smoothly. These are listed in easy to review bullets below. They presume that the spinnaker has been packed properly and the running rigging was reaved properly.

PROCEDURE

1. The middle crew hooks spinnaker to lee shrouds, attaches sheets and halyard.

2. Helm calls "Top the pole!" Foredeck attaches the pole to the higher pole ring on the mast (lower ring in light air). Middle hoists it to horizontal, cleats the pole lift and snugs the spinnaker downhaul.

3. Middle cleats windward twing to deck level and ensures that lee twing is eased.

4. Trimmer hauls after guy to prefeed windward clew 5 feet or so.

5. Helm bears away to broad reach and calls for hoist.

6. As foredeck hoists halyard quickly, Trimmer overhauls afterguy, pulling clew to pole. At full hoist, foredeck yells, "Top."

7. Trimmer hands afterguy to middle, and takes sheet.

8. Foredeck flakes spinnaker halyard to prepare for quick douse.

9. Middle squares pole to wind and cleats guy.

10. Trimmer plays sheet until spinnaker is full.

11. Middle releases jib halyard and foredeck gathers jib on deck.

12. Helm releases backstay, Middle releases outhaul, returns to trim guy.

NOTE: Before filling the spinnaker, be sure that the boat is on a deep broad reach and the spinnaker is at full hoist.

NOTE: If setting the spinnaker from the companionway, the middle must feed the spinnaker out as the guy and halyard are pulled, or the sail will hang up on the vang, boom, genoa, etc.

NOTE: Before hoisting, always trim the headsail inside the lifelines so it won't foul the spinnaker going up.

Standard Downwind Gybe

This gybe is executed from a near run on one tack, to a near run on the other.

1. Helm calls for Gybe preparations.

2. Helm bears away to a run.

3. Middle overtrims pole aft, releases windward twing, and readjusts pole trim so that the pole is perpendicular to boat centerline.

4. Foredeck eases Spinnaker Pole Downhaul six inches and recleats.

5. Trimmer eases sheet until spinnaker is fully on windward side of boat.

6. Standing on the windward side of the mast, aft of the pole, Foredeck takes jibsheet and pulls a bight over the pole at the inboard end, and puts hand through the bight grabbing the pole tip from underneath.

7. Foredeck braces against windward side of mast, grabs pole jaw trip line with other hand and calls "Ready!"

8. Helm calls "Trip the Pole."

9. Foredeck pulls line to release both ends of pole from chute and mast at the same time. Middle and Trimmer ease sheet and/or guy to keep chute flying in place without the pole.

10. Foredeck flips jibsheet over new outboard end of pole (the bight will normally fall into place on its own) and grabs the old spinnaker sheet, placing it in the jaw of the pole.

11. Foredeck crosses in front of the mast and braces against the other side of the mast. Foredeck pushes new outboard end of pole out and forward, attaching new inboard end to mast, then calls "Made!"

12. Helm gybes main and keeps stern into the wind.

13. Trimmer and Middle rotate chute to new windward side by easing new sheet and trimming new guy.

14. Middle and Trimmer more aggressively trim both guy and sheet to bring chute into better trim as Helm brings boat to new course.

15. Trimmer and Middle switch guy and sheet. Middle cleats guy for a moment and pulls twing down on new weather side.

NOTE: If the wind is over 15 knots, ask yourself if you have the collective skills as a team to accomplish this maneuver safely. If not, douse the spinnaker, remove the sheets and move them around to the other side of the boat, reattach them to the chute, gybe, and rehoist the chute from the companionway.

NOTE: Foredeck must always keep the pole tip aimed away from his/her body. A sudden oscillation of the spinnaker could send the pole tip into your face or chest!

NOTE: Foredeck must concentrate on holding the pole at one end or the other. The pole becomes very difficult to manage if you hold it in the middle. Also, stay in the middle of the boat; do not let your hip leave the mast!

NOTE: Helm must keep the boat on a run or very nearly so unless there is a very strong and very experienced foredeck in place. Once the boat is on a reach, even a broad reach, the guy will be so loaded that the foredeck will not be able to reattach the pole to the mast.

NOTE: In winds under 15 knots, the easiest way to gybe the main is to gather all four parts of the mainsheet tackle in one hand and pull the sail across all at once, absorbing the shock of the main flopping over with your arm muscles (don't do this in strong breeze). When gybing in over 15 knots of wind, stand up against the backstay and trim/ease the sail through the block and tackle assembly.

Dousing the Spinnaker

There are several types of douses: from the Windward and Leeward Douses to the Float Douse, to the Fisherman's Douse. The Fisherman's douse is named after its similarity to a fisherman's net being cast for fish, with the spinnaker playing the part of the net. The Float Douse is for experienced racing crews, due to the timing that it demands. The spinnaker halyard is released completely and the spinnaker floats on a cushion of air just above the water for a second before being gathered in.

The two methods we'll discuss are the Leeward Douse in which the spinnaker is lowered and retrieved the same way it went up (behind the mainsail), and the Windward Douse in which the spinnaker is pulled down on the windward side of the boat.

Leeward Douse

1. Helm steers to a deep broad reach. Middle and Trimmer re-trim chute.
2. Upwind Mainsail controls are applied.
3. Middle cleats guy and hoists jib.
4. Trimmer loosely trims jib inside the lifelines, and cleats jib sheet.
5. Foredeck checks spinnaker halyard to ensure it will run freely.
6. Middle climbs into companionway and grabs spinnaker sheet under the boom (if Middle can't reach, Foredeck can pull it inboard).
7. Helm calls "Run the guy!"
8. Trimmer releases spinnaker guy from cleat and overhauls it to be sure it runs out freely.
9. At the same moment, Middle pulls the sheet in quickly until the spinnaker clew is in hand. Middle pulls 3-4 feet of spinnaker foot in and calls for halyard.
10. Foredeck uncleats halyard and eases spinnaker sheet in pace with Middle's ability to gather spinnaker and stow in cabin.
11. Once spinnaker is below Foredeck releases pole lift, lowers pole to the deck, and secures it, then checks jib sheet to be sure it's over the pole, and forward of the topping lift.
12. Foredeck calls "Free to tack," letting the crew know that jib sheet will not foul the spinnaker pole if tacked.

Windward Douse

The steps to a windward douse are slightly different from those of a leeward douse.

1. Helm puts the boat on a broad reach.
2. Middle releases windward twing and releases guy.
3. Foredeck releases guy from pole, releases pole lift and lowers pole to deck.
4. Helm calls "Run the Sheet!"
5. Trimmer releases sheet and overhauls to be sure it runs out easily.
6. Middle pulls on guy until the clew of the spinnaker is in hand.
7. Foredeck lowers halyard as middle and trimmer gather spinnaker and stow below.
8. Foredeck secures pole and checks jib sheet, calling "Free to Tack!"

NOTE: Because the spinnaker is on the windward side, it will blow against the rigging and may be more difficult to bring down. Be careful to pull it down and away from the rigging so it comes down more easily and doesn't tear

Typical crew positions and responsibilities while racing

J24s are usually raced with a crew of five, due to the importance of having the maximum crew weight allowable. However, they are sometimes raced with four and your training will be with four, so our descriptions of roles and positions are as such (In most 4 crew boats "mast" and "middle" duties are combined). This is not the only way to distribute jobs; sometimes the specific skill sets of the crew members will require a different distribution. These are the most critical responsibilities. However, there are many more refinements you'll add to this list as you gain experience.

HELMSPERSON

Responsibilities: Steer Boat, Trim Main, Lookout (obstructions/boats)
Focus: Boat speed, Pointing, Collision avoidance, Heeling Angle.
Lines Handled: Mainsheet, traveller, backstay

TRIMMER

Responsibilities: Trim jib/Spinnaker, Manage overall sail trim, lead crew work.
Focus: Sail shape and handling crew placement, clean tacks
Lines handled: Genoa sheet, Spinnaker sheet, Pre-feed afterguy at hoist.

MIDDLE/MAST

Responsibilities: Tactics, Spinnaker hook-up, pre-feed and gather, call start times, call laylines/wind/waves, vertical pole trim, spinnaker twings.
Focus: Clear air, shortest course sailed, help Foredeck & Trimmer, General strategy & tactics.
Lines handled: Outhaul trim, cunningham trim, boom vang trim upwind, pole lift, foreguy/downhaul, afterguy trim after hoist, twings, Genoa sheet overhaul.

FOREDECK:

Responsibilities: Lookout at the start & upwind; set, gybe and douse chute and pole, ensure all lines and pole are clear, genoa overhaul & skirt
Focus: Keep the skipper informed of proximity to starting line, collision avoidance, clean spinnaker work
Lines Handled: Spinnaker Halyard, pole lift, foreguy, boomvang tending on tight reach.

Rules of thumb for crew weight distribution

In general, crew should stay out of the ends of the boat whenever possible, remaining between the mast and the traveler.

UPWIND

Crew weight moved to windward or leeward to maintain 10 degrees of heel upwind. In light air, move crew to leeward, in moderate to heavy air have them hike to windward.

DOWNWIND

In light air, move crew over keel, and around the leeward shrouds, to get the stern out of the water and reduce drag. In heavy air, move crew as far aft as practical to keep the rudder in the water and help induce planing.

REACHING

In light air, keep crew forward and to leeward. In moderate air, move crew to windward as necessary to keep heel angle at 10 degrees. In heavy air, move crew WELL aft and hiked out hard to windward. Everyone except foredeck (playing vang in puffs) should be aft of the halyard winch to keep the boat from broaching and to induce planing.

Broach Prevention and Recovery

Broaches are not a good thing. They do happen, however, especially with a spinnaker up on San Francisco Bay! They also are not the end of the world. If you take appropriate action, you can recover quite quickly.

There are basically two types of broaches. The more common and less severe is the Leeward Broach, usually occurring on a reach, where the majority of the chute is to leeward and pulls the boat over.

The less common, and more severe variety is the Windward Broach, also called a Gybe Broach (also called a death roll...really!) which usually occurrs on a run where the spinnaker is so far to windward that it pulls the boat over to windward with it! In this case the boat goes over faster and farther than in a Leeward Broach, and causes the main to slam gybe.

Regardless of the type of broach, you need to know what causes it, how to prevent it, and how to recover if you experience one. A spinnaker broach occurs when the center of effort of the spinnaker shifts well to one side of the boat's centerline and pulls the boat over.

The following conditions add to the risk, frequency, and severity of broaches:

1. Slow boat speed in high wind.
2. Improper distribution of crew weight.
3. Spinning the boat around after waves lift the boat’s quarter

Let's discuss each of these in turn.

In all aspects of sailing boat speed determines control. Nowhere is this more important to remember than when flying a spinnaker. The forces at work are much greater, and so water flow over the rudder must be that much greater as well. The faster you are going, the more control you have with your rudder. If you let the boat slow down from poor sail trim or inattention at the helm, a good broach will get your attention, and help train you to pay closer attention in the future.

However, there will inevitably be times when your boat speed will be slow. These are common, even for skilled sailors. Below are examples:

1. After hoist as the chute fills
2. After any collapse of the chute as it refills
3. During a gybe
4. Just as you leave another boat's wind shadow
5. Just after recovering from a broach.

Pay special attention to your helm and point of sail after these occurrences because the boat can be quite unstable and prone to broach.

Crew weight placement plays a critical role in increasing or reducing the risk of a Broach. If crew weight is distributed on the same side as the spinnaker's center of effort, your risk of broach is increased. In light air it is not significant, but in over 12 knots, the risk goes up dramatically. The spinnaker only needs to pull the boat over far enough to stall the rudder to cause a broach. Proper crew weight distribution provides the essential counter balance to the force of the spinnaker, and without it the boat will be at great risk of broaching.

If you sail regularly at OCSC you've already experienced what following waves can do to the control of your boat. If they are hitting the stern of the boat at any angle, they will tend to pivot the boat in one direction or another. Once the boat starts pivoting off the face of a wave with the spinnaker up, the inertia of the turn can spin the boat into a broach quite easily.

As you might expect, these factors in combination have the potential to wrest control of the boat from you, despite your having taken a precaution or two. Your defense lies in employing all of the precautions and preventive measures in concert. However, the prevention techniques for leeward and windward broaches are quite different from one another. First let's consider the Leeward Broach.

Reducing the Risk of a Broach

Remember the most important aspect of broach prevention? That's right, Speed. In addition to speed, there are a few others. Let's review them in order of importance.

1. Crew weight placement. A severe angle of heel is never good, but it is especially bad when flying a spinnaker. Keep your crew moving from leeward to windward as the boat heels to keep the angle at no more than 10 degrees on a reach. Fully powered sails with crew weight to windward is very fast...

2. Sail trim. If you still have excessive heeling and weather helm after crew weight is moved, depowering the main is a great way to further reduce heeling while minimally effecting boat speed. This is best achieved by implementing the following steps in turn:

    1. Tension outhaul and cunningham (no need for fine tuning here-put them both on full). The outhaul will be loaded and difficult to turn. Try to keep your weight as far to windward as possible.
    2. Tension the backstay again. If you have lots of weather helm and heeling, it’s best to put it on fully.
    3. Ease the vang so the boom tip rises 3-4 inches. If you are still overpowered, try another 3-4 inches. This adds twist and depowers the top of the main.
    4. Ease the main out until the boom is just short of the shrouds.
    5. Overtrim the pole aft slightly and ease the sheet. It will be harder to trim, but the effort in the spinnaker will be more forward and less leeward.

6. Point of Sail. The more the wind increases, the further you must sail away from the wind to keep from broaching. In 5 knots, you can overtrim the spinnaker and head up to a close reach. In 20 knots, the wind must be on your quarter, at least 40 degrees aft of the beam. You can find a safe angle by easing the boat closer to the wind until you feel the boat heel too much, then bear away until it comes back under comfortable control.

Stopping an Imminent Leeward Broach

OK, so you've done everything I've asked but a big sailboat goes by to windward, collapses your spinnaker and as it refills, you feel the tiller load up and the boat heel dramatically. All is not lost! If you aggressively do the following you may prevent a broach:

1. All crew weight immediately to windward as far as possible.
2. Pump the tiller aggressively to windward in a wide arc that extends from near the boat's center line to near your chest. You are trying to reattach smooth water flow over a rudder that is stalling. This also shoves the bow to leeward.
3. Release the vang and mainsheet completely.
4. Run the sheet until the spinnaker collapses.
5. As soon as you have rudder control, bear away substantially before retrimming. If you go immediately to a high point of sail, you will start the broach cycle over again.
6. Once you have the wind further aft, retrim everything and then, as your speed increases, gradually return to your original course.

Recovering from a Broach

Well, the boat is on its side, the boom tip is in the water and the rudder is waving in the air. Your crews' eyes are wide and searching yours for reassurance. It's noisy and a little scary. Depending on the severity of the broach, you may need to do different things.

To recover from the garden variety broach (winds less than 20 knots) you need only to continue to implement the above mentioned procedure more fully.

1. Mainsheet and vang are completely released.
2. Spinnaker sheet released completely (without a stopper knot it will probably run out through the blocks). Crew hikes hard to windward.
3. As soon as the boat comes upright enough for the rudder to be re-immersed, pump the tiller hard and don't stop until the boat is bearing away nicely; continue bearing away until you are on a deep broad reach.
4. As the boat comes level, be sure to move your crew weight into the boat, or you will roll to windward and be at risk of a windward broach.
5. Only after the boat is sailing upright do you retrim the spinnaker (or douse, if the sheet has come unreaved), and retrim the vang and mainsheet.

NOTE: In a leeward broach, DO NOT ease/release the guy! The pole will slam against the forestay, the spinnaker will stay full and be even more efficient at pulling you over.

NOTE: With the sheet out of reach, to douse the spinnaker, you'll need to perform a windward douse.

Reducing the Risk of a Windward Broach

Preventing a gybe or windward broach is different than preventing a leeward broach. In fact, in some ways the techniques are opposite!

A Windward Broach usually occurs in lots of breeze (16+ knots) while the boat is on a run or deep broad reach. The boat is level, sandwiches are out and all is right with the world. Then the boat starts to roll to windward and develop severe lee helm as it bears away. This action accelerates until the spinnaker pole nears the water and the main boom is pointed up at 45 degrees. The main gybes causing the boat to spin beam on to the wind. The spinnaker pole goes into the water, the main boom goes into the water and water covers the primary winch! yeack!

Again, speed, crew weight placement, sailtrim, and point of sail are the keys. However, except for the maintenance of speed, the responses are opposite those described for a leeward broach:

1. Keep a focused eye on your boat speed. Going downwind fast has two advantages: you have more control with your rudder and the apparent wind spped is further reduced as your speed increases. That makes the sail plan and boat easier to control.
2. Keep your crew weight to leeward as much as is necessary to maintain a slight heel to leeward. Have all of your crew prepared to shift their weight quickly if the boat rolls excessively to windward. Helm will even find that steering from the leeward side is a little easier under these circumstances. If you have not had experience steering a boat from the leeward side, try to practice it whenever you are sailing in light wind when crew weight doesn't matter. Then you'll have control in this situation.
3. Sail trim: having the backstay and outhaul on is OK, but less important here.
    a. Keep the vang on because it powers up the main which in turn balances out the power of the spinnaker.
    b. Move the spinnaker pole forward of where it would be for optimum sail trim, and trim in the sheet. This moves the power (center of effort) of the spinnaker more in front of the boat, where it is less likely to pull the boat over.
    c. To prevent the spinnaker from oscillating, pull on both twings to life line level. This chokes the spinnaker a little and holds it closer to the centerline of the boat.
4. If all this fails to stabilize the boat, head up 10-15 degrees and retrim sails for the higher point of sail. This will move the spinnaker and its center of effort even further out in front of the boat.

Preventing an Imminent Windward Broach

1. Crew dives to leeward.
2. Helm pumps tiller to leeward, forcing bow to windward.
3. Guy trimmer eases guy quickly to allow Pole forward to within 2-3 feet of headstay, while spinnaker trimmer sheets in hard to pull spinnaker back in front of the boat.

Recovery from a Windward Broach

Let's return to that scenario described at the beginning of this section. It's important to get the power out of the spinnaker as soon as possible. It is probably in the water now and collecting water, which will hold the boat down. If you release the guy, you must not release the sheet. Remember in the leeward broach, you release the sheet and keep the guy cleated.

1. If the pole and spinnaker have stayed out of the water ease the vang, run the guy, and get all crew weight to windward. Pump the tiller as soon as the rudder is back in the water to get the wind behind the boat.
2. Execute a douse by removing the pole from the guy and mast, and performing a leeward douse. If the guy has run out in front of the boat, then take the pole down and pull the spinnaker down on the windward side with the sheet. This is a windward douse and is a little tougher, but certainly possible (see notes on windward douse).
3. If the pole tip and spinnaker are in the water, you should releas the spinnaker halyard (this is when religious flaking of the halyard after hoists really pays off!), release the spinnaker pole from the mast and guy. Haul the spinnaker in by the guy as fast and hard as you can. You'll be pulling it out of the wter, so get two crew members on the job. Put the tiller toward the mainsail to keep the boat from speeding up and making the spinnaker retrieval any more difficult than it already is.
4. IMPORTANT! Before gybing, or heading up, check for damage to the rig! Are spreaders bent or broken? Is the spinnaker pole broken? Is the pole ring pushed into the mast? Any shrouds broken? Is the gooseneck bent or broken? It is possible that you will need to douse your main and proceed home under power or call/wait for assistance.

Judgement

If the wind is under 20 knots, the preceding information should be sufficient to help you prevent or recover from broaches. In wind over 20 knots, the forces are great enough that broaches usually result in damage and have even caused boats to sink. That is why we have a safety limit of 20 knots for flying spinnakers on our J24 and Olson 25 rentals.

If you are out on a friend's boat or your own and flying a spinnaker in over 20 knots, consider the following questions:

1. How strong and agile are we as a crew?
2. How well have we been working together?
3. What is the operational readiness of the boat?
4. Is the boat's keel heavy enough to bring us back up if we put the mast tip in the water? If not are we in a sailing area where it would be safe to scramble onto the keel to right the boat? And subsequently into the water as the boat rights itself?
5. Can we secure all lockers and hatches including the companionway, to prevent water from entering the boat?
6. Are there other vessels around to provide assistance if we have difficulties?
7. Are any of the crew unwilling to wear a PFD?

PERFORMANCE SAILING CLASS

J-24 Spinnaker handling quick reference

The set

H: "PREPARE TO HOIST"
F: Raises pole. Ensures halyard is forward of spreaders--"READY"
M: Prefeeds---"READY"
T: Frees spinnaker sheet, helps prefeed--"READY"
H: "HOIST"
F: Hauls sail to top--"TOP"
M: Helps sail out of bag or companionway, then hauls on guy until pole is square.
T: Lets sheet pay out until pole is square and sail is topped, then sheets in to fill.
(Remember: top, square, fill.)
H: "DROP THE JIB"
M Releases jib halyard
F: Pulls jib down on deck

The Gybe

H: "PREPARE TO GYBE"
M & T: Trade sheet and guy; oversquare pole--"READY"
F: Prepares to trip pole---"Ready"
H: "TRIP"
F: Frees pole, puts new guy in jaws, makes inboard end to mast--"MADE"
M: Eases new guy as necessary.
T: Tries to keep sail full.
H: Once sail has disappeared behind main, says "GYBE HO!" Keeping to a low course after the gybe.
F: Keeps pole tip pushed up to spinnaker clew.
M: Ducks, squares pole.
T: Ducks, trims chute.

The Douse

H: "RAISE THE JIB"
M: Trims and cleats leeward jib sheet. Hoists jib.
F: Ensures smooth hoist.
T: Keeps trimming.
H: "PREPARE TO DOUSE"
F: Gets ready on halyard--"READY"
M: Grabs spinnaker sheet forward of twing block, ready to gather into companionway—"READY"
T: Cleats sheet, gets ready to blow and overhaul guy--"READY"
H: "DOUSE"
T: Blows and overhauls guy.
M: Gathers spinnaker foot first, keeping corners separate. "HALYARD"
M: Lowers halyard, but no faster than sail is being gathered. Drops pole, ensures that the jib sheets are clear for tacking or gybing. "FREE TO TACK"