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SPEED&Smarts™
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JH Peterson photo

Keep the big picture in mind

The start of any race is usually a critical moment because it determines which boats get clear air and which can choose where they go on the first leg. But even though the start is very important, it's not an end in itself. The start is simply one step toward achieving a larger goal.

The measure of a good start is not whether you're ahead at the beginning of the first leg, but how well you are doing at the end. If you round the first mark in the top part of the fleet, then your start accomplished its goal.

Obviously, you don't have to win the start in order to win the race (and you don't have to win the race in order to win the series). In fact, the boat that 'wins' the start usually had to take a fairly substantial risk to do so. Therefore, when you are planning a start, keep the macro view in mind.

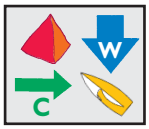
Starting is only one piece of the overall racing puzzle. Of course, it's very important, but you shouldn't normally take huge risks to get a great start. Better to have just a good one.

There are many factors to consider in your starting plan. For example, how much risk are you willing to take? Which side of the first beat is favored? Which end of the line is farther upwind? How can you be sure to avoid a disaster like being OCS, fouling another boat or starting in the second row?

The start is not an isolated incident that is good or bad by itself. It is part of a larger process, so it must be planned and evaluated in a broader context. That's what this issue is all about.

STARTING
A Macro View

"You don't have to win the start in order to win the race."



STRATEGY

Assess your risk level at the start

Every race is full of choices. You can go to the left side or the right; start at the pin end or in the middle; cover the other boats or sail your own race; duck a starboard tacker or lee-bow them. The chance to make hundreds of choices in each race is part of the challenge and fun of sailing.

Each of the decisions that you make in a race involves a certain amount of risk. If you go all the way to the left corner you may lose everyone on the right. If you start in the middle (where it's harder to judge the line), you might be OCS.

Risk is not inherently good or bad. But if you don't think about your own situation and how much risk you are willing, or need, to take, then your choices may not turn out to be very successful.

For example, let's say the windward (RC boat) end of the starting line is quite favored. Should you fight for a good start right at that end, or move farther down the line?

The answer depends a lot on your situation in the race and/or series. If this is the first race of a big regatta and you have great boatspeed and a chance to win, you'd be crazy to risk getting stuck in a crowd at the favored end. If, however, it's the last race of a series and you need to win the race in order to win the regatta, then this might be a good risk to take.

Same starting line, different choice. Every time you must make a decision, the level of risk varies and so does your interest in assuming risk. The important thing is to be aware of your big-picture situation so the choices you make will match your overall risk strategy. This is especially important at the start.

Strategic risk

When you're planning an approach to the start, there are several kinds of risk involved. One is 'strategic' risk – the chance that you will put yourself into a position where you lose distance to other boats because of changes in the wind, current or other factors.

Since you cannot be everywhere at once, the start always involves a certain degree of strategic risk. If you start near the pin end, maybe the right side will pay off, or vice versa. If you start in the middle, both sides may come out ahead. You cannot eliminate strategic risk at the start, but you can do certain things to minimize it if you want.

Tactical risk

A second type of risk is tactical, relating to other boats. Of course, some of this involves individual boats around you. But in this issue (on the macro view of starting) we are looking at fleet tactics rather than boat-to-boat tactics. For example, we know that both ends of the line often draw a crowd. Since it's fairly risky to start in the middle of a pack, it's usually a higher-risk move to start close to either end.

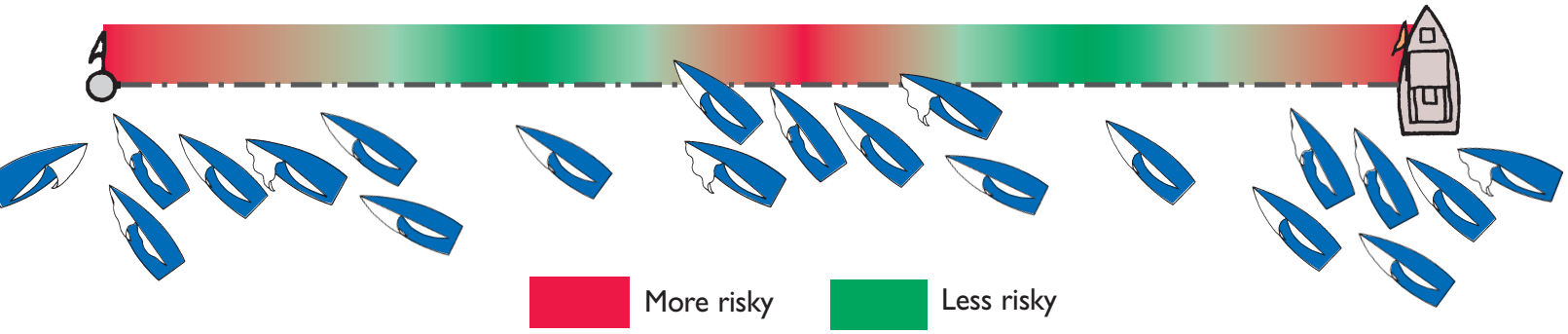
Low risk or high risk?

While you are preparing for the start, there is usually a certain level of risk that you want to take, or that you are willing to tolerate. This depends on a wide variety of differing circumstances.

Low Risk: Here are some situations when you would not want to take very much risk at the start:

- It's the first race of a big series.
- You are the fastest (or biggest) boat in your fleet.
- It's the last race of the series and you have a 10-point lead.
- You are sailing in a large fleet.
- It's very windy or wavy with a fair chance of capsize or breakdown.

High Risk: Here are situations when you might be willing to take more risk on the starting line:



There are certain areas of the line you should avoid when you want to minimize risk at the start. Both ends are at the top of this list. Tactically, they are high-risk because the fleet often crowds together at each end, even when it's not 'favored.' Strategically, starting at an end is risky because you are committing to be all the way on one side of the fleet. The middle of the line usually gives you a more conservative start, unless you're in the middle of a pack. When you're fighting other boats, you have a much lower chance of getting off the line with clear air and speed.

- You are one of the slowest (or smallest) boats in your fleet.
- It's the last race of a series and you need to win the race in order to win the regatta.
- You are sailing in a small fleet that is very competitive.
- You have not yet used your throwout(s) in the series.

How to manage risk

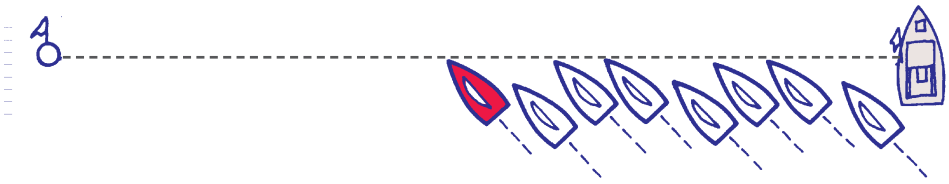
One key to success in sailboats is matching your risk exposure to your situation. It's fairly easy to think of ways to increase your risk on the starting line. For example, you could start on port tack, fight for "the" start at either end, or poke your bow ahead of the fleet in the middle of the line.

It's also easy to be conservative by starting in the third row, or at the unfavored end. The hard thing is finding a strategy somewhere in the middle. Ideally, a start should minimize your risk of making a big mistake, but not be so safe that you aren't competitive with other boats.

Here are some strategies you can use to help achieve this:

- Stay away from packs of boats. These tend to push over the line early, and make it hard to get off the line with clear air.
- Avoid the edges of the fleet. These extremes are usually risky, both tactically and strategically.
- Know where the starting line is by using a line sight (*see pages 8-9*). Make sure you are right up on the line without being over.

In a regatta or series, one thing that works well for me is using a consistent starting technique. I try to avoid starting at the pin end one race and the boat the next (unless something changes drastically). Instead, I use the same approach and aim for roughly the same spot at every start. This way I get into a rhythm that makes starting easier, safer and more successful. •



The red boat may think she is getting a conservative start by positioning herself in the middle of the line, but her start is actually fairly risky. From a strategic point of view, she is all the way on the left side of the fleet. Though she is not fighting with a crowd, this is a lot like starting at the pin, so she will be in trouble if the wind does not go her way.

If you're thinking about starting in a high-risk area, you must consider whether the risk you are taking is worth the potential reward. A couple boats will usually get killer starts at the favored end, but many others will end up in trouble, well behind boats that started with less risk.

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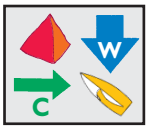


STRATEGY

Figure out the favored side first

Here's one way to approach the beginning of a race: Sail around in the starting area long enough to get a good line sight and figure out which end of the line is farther upwind. Start near that end, right on the line with clear air. Then look around to see which side of the course is better, and head that way.

I must admit I have started this way more than a few times, but I must also say that it is completely backwards. That's because, in most races, your position at the first mark will be influenced much more by where you went on the first leg than by where you were at the start. Therefore, your strategic plan for the windward leg should have top priority.

Consider this typical example: The starboard end of the starting line is favored by 5 to 7°, so you start near the committee boat end because that means you are already several boatlengths ahead of boats starting at the pin. You hit the line with full speed and clear air. About a minute after the start you can see more wind ahead (on the left side of the course) so you continue on starboard tack. That was a good decision, but all the boats that started below you on the line get into the better pressure sooner. By the windward mark, the pin-end starters are 10 to 15 boatlengths ahead of you.

The moral of this story is that you should always try to figure out your strategy for the windward leg first. Listen to predictions and observe the wind direction, wind velocity, current and so on. Talk to local sailors before the regatta, check the wind and weather on the web, and spend a lot of time sailing around in the course area before the start.

After collecting all your data, decide whether you like the left or the right, or possibly the middle. Then comes a very important step:

Figure out a starting plan that will let you follow the strategy you chose for the windward leg.

If there is better pressure on the right, for example, you probably shouldn't start near the pin end. If you expect the wind direction to shift left, starting at the committee boat is not a great idea.

Of course, there will be some times when you have no idea which side of the first beat is favored. This actually happens fairly often, even with the best sailors. When it does, what you need is a starting strategy that gives you flexibility. Typically this means starting in the middle of the fleet. After the start you can watch boats on each side of the course to see which ones are gaining – then head that way.

There are a couple times when you might base your starting plan totally on which end of the line is farther upwind. This would make sense when a) it seems like the wind and other strategic factors will remain fairly steady up the first beat; or b) one side may be favored slightly but it's not enough to make up for a skewed line.

Remember, the strategy you choose on the first leg usually has more of an effect on your race results than where you started on the line. So pick your upwind strategy first, and then execute a start to help you follow that plan.

JH Peterson photo

Should you go left or right? Or up the middle? The answer depends on a number of strategic factors that you must try to figure out before the start. The plan you make will then tell you how to approach the start.

Test the first beat with a partner.

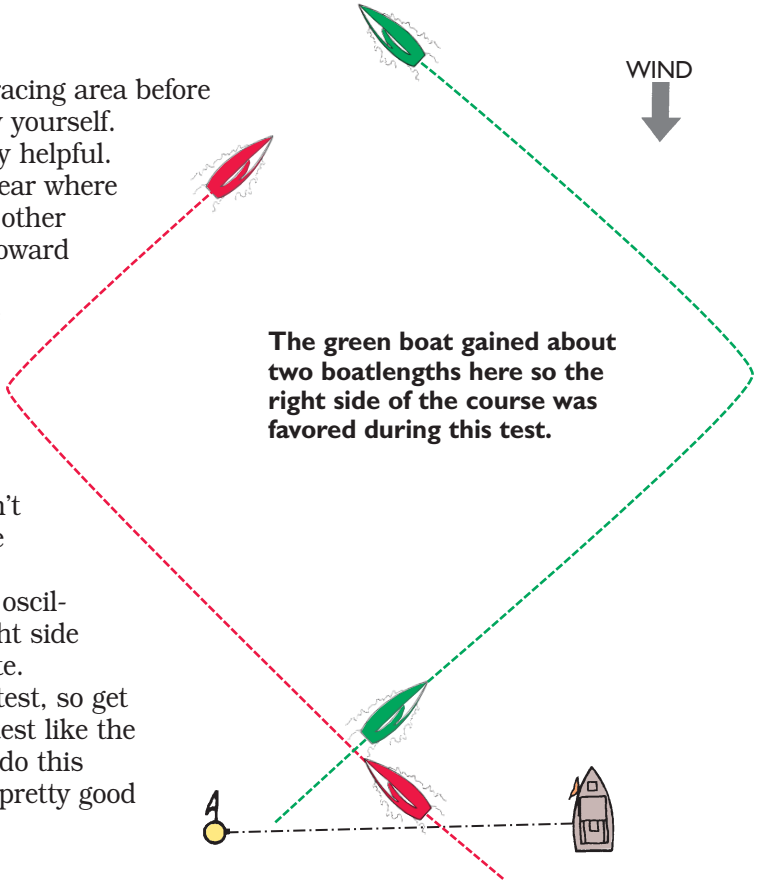
Even when you have time to sail around the entire racing area before the start, it's hard to compare sides of the course by yourself. This is where a friendly 'strategy partner' can be very helpful.

Begin by setting up a 'rabbit' start somewhere near where the starting line will be. One boat ducks behind the other and then both sail closehauled as fast as they can toward opposite sides of the windward leg.

After a while, both boats tack at about the same time and keep sailing fast upwind until they cross. Assuming that both boats were going the same speed, it will be easy to see which side of the course was favored during this test.

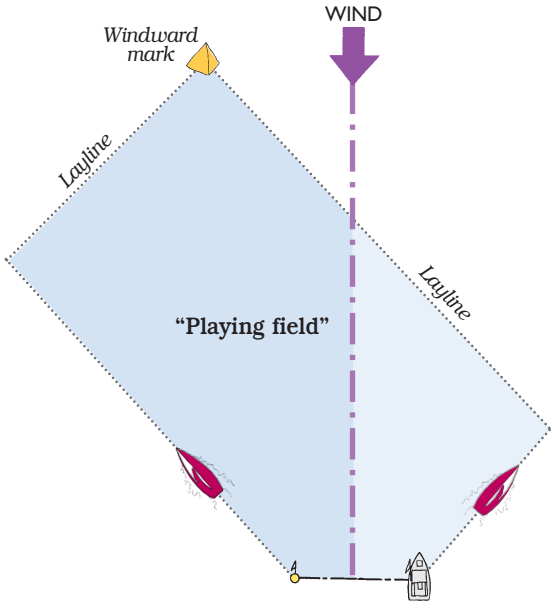
You have to take these results with a grain of salt. Unless you had a lot of time, you probably didn't sail all the way to the corners of the course. And the conditions you experienced during the test may well change before the race. One common example is an oscillating breeze – if you test during a right shift the right side will appear favored, but in a left shift it's the opposite.

For these reasons it's best to do more than one test, so get out to your starting area early. Once you've done a test like the one shown here, repeat it by switching sides. If you do this several times and one side is always better, that's a pretty good indication that it may be favored during the race.

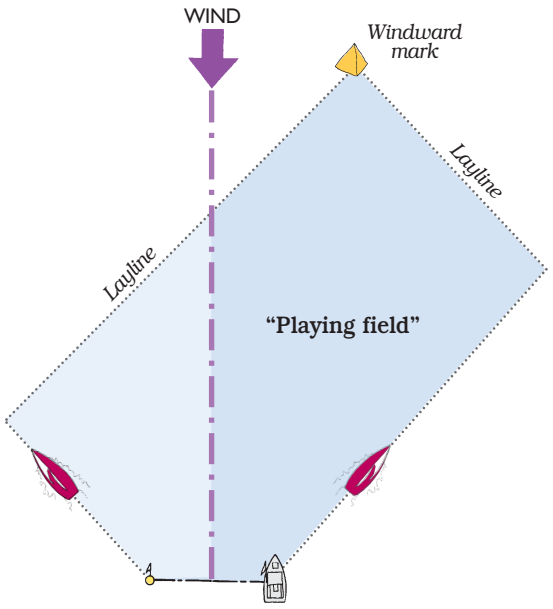


Check the course layout.

The position of the starting line relative to the first mark often has a large impact on your starting plan. As soon as the race committee sets (or signals the position of) the windward mark, take a good look. Is the mark directly upwind of the starting line? Or will you spend more time on one tack than the other?



In this situation, the windward mark has been placed to the left of the wind direction (or perhaps the wind shifted right). As a result, boats will spend more time on starboard tack, and most of the 'playing field' is to the left of the starting line. This will make the pin end of the line more advantageous.



Here the windward mark has been placed to the right of the wind direction (or the wind may have shifted to the left). As a result, boats will spend more time on port tack, and most of the 'playing field' is to the right of the starting line. This will make the committee boat end of the line more advantageous.

BRAINSTORM

Location, location, location

When you're looking at the big picture of starting, one of the most important decisions you must make is where to start on the line. As they say in real estate, location is everything, and often this is true in starting too. I think it's helpful to divide the line into three sections – one near the committee boat, one near the pin, and a longer segment in the middle. You must always choose to start in one of these areas.

Your choice will depend on many variables that change from race to race. Below is a list of questions you should consider about each variable. At right is a chart of brainstormed answers to those questions, organized according to where you might (or might not) start based on your situation in each particular race.

Strategy – Which side of the first beat do you favor? Which end of the starting line is farther upwind? Is the current pushing you toward or away from the starting line? How hard is the wind blowing?

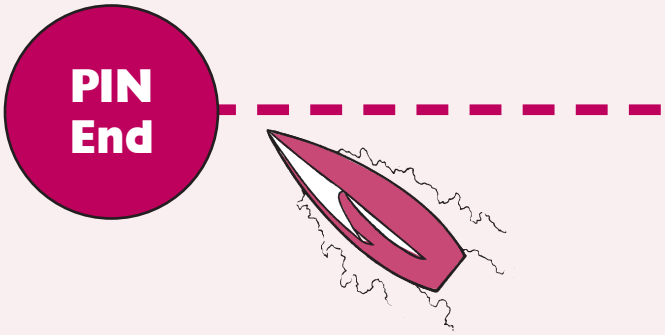
Tactics – How big is the fleet? Will there be a mid-line sag at the start? Which part(s) of the starting line will be most crowded?

Speed and skill – Are you fast or slow? A pointer or a footer? Biggest boat in your class, or smallest? How good are you at carving space out of a crowd?

Other – Is there a starting penalty in effect? How much risk are you willing to take at the start?

JH Peterson photo

Planning to start at the committee boat end? Bring your party hats because there is almost always a crowd here, even when it's not farther upwind!



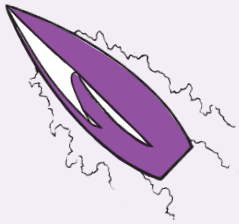
CONSIDER starting here when:

- You like the left side of the first beat.
- The port end of the line is farther upwind, especially if the line is long.
- You are very skilled at getting pin-end starts.
- You need a very good score in this race, and you are willing to take a risk to win the start.
- Your speed is good, but pointing is not great.
- The current is pushing you to windward or it's running from the pin toward the boat end.
- Your fleet is small and the pin is not crowded.
- There's a starting penalty in effect and/or it's hard to judge the middle of the line.

NOT a good idea when:

- The current is pushing you to leeward.
- The right side of the course is favored.
- The committee boat end is farther upwind.
- There is a big crowd of boats fighting to start at the pin end.
- The windward leg is short (and you won't be able to cross all the starboard tackers to windward before you reach the port layline).
- The wind is oscillating (so starting on the left side means you won't be able to play shifts well).
- The leeward-end mark is a committee boat or a buoy with a long anchor line.
- The race committee is hailing OCS sail numbers only from the committee boat end.
- You need a good, conservative start.

MIDDLE



CONSIDER starting here when:

- The windshift pattern is oscillating.
- You expect a significant mid-line sag in the fleet at the start.
- You are able to get a very good line sight.
- You're not sure which side of the first beat will be favored (and you want to keep open your option to go either way).
- The starting line is fairly square to the wind.
- Both your speed and pointing are at least average in your fleet.
- You want to get a good, conservative start away from other boats.

NOT a good idea when:

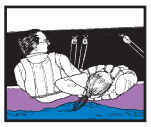
- You expect a windward bulge when the fleet lines up at the start.
- You cannot get a good line sight or another accurate way to judge your position on the line.
- The "Round-an-End" starting penalty applies.
- The line is long or the current is strong and you're not good at judging position on the line.
- Your boat speed or pointing is below average for your fleet.
- You are racing in a big fleet and light air (when either side of the first beat often works out better than the middle).

CONSIDER starting here when:

- You like the right side of the first beat.
- The committee boat end is farther upwind, especially if the line is long.
- The first beat is short and you want to be on the right with the starboard-tack advantage.
- There's a starting penalty in effect and you want to make sure you know where the line is, hear any recalls and are able to round an end.
- Your fleet is small, the boat is not so crowded, and it's important to get a very good start.
- You're sailing a small boat in a handicap fleet.
- The current is pushing everyone to leeward, or it's running from the boat end toward the pin.
- You've lost track of the time to your start and you want to hear the committee countdown.
- Your speed or pointing are not so good and you want the option to tack for clear air.

NOT a good idea when:

- The current is pushing you to windward.
- The left side of the course is favored.
- The pin end is farther upwind.
- There's a big crowd of boats fighting for the committee boat end.
- The wind is oscillating (so starting on the right side means you won't be able to play shifts well).
- The race committee boat is large and casts a significant wind shadow.
- You need a good, conservative start.



TECHNIQUE

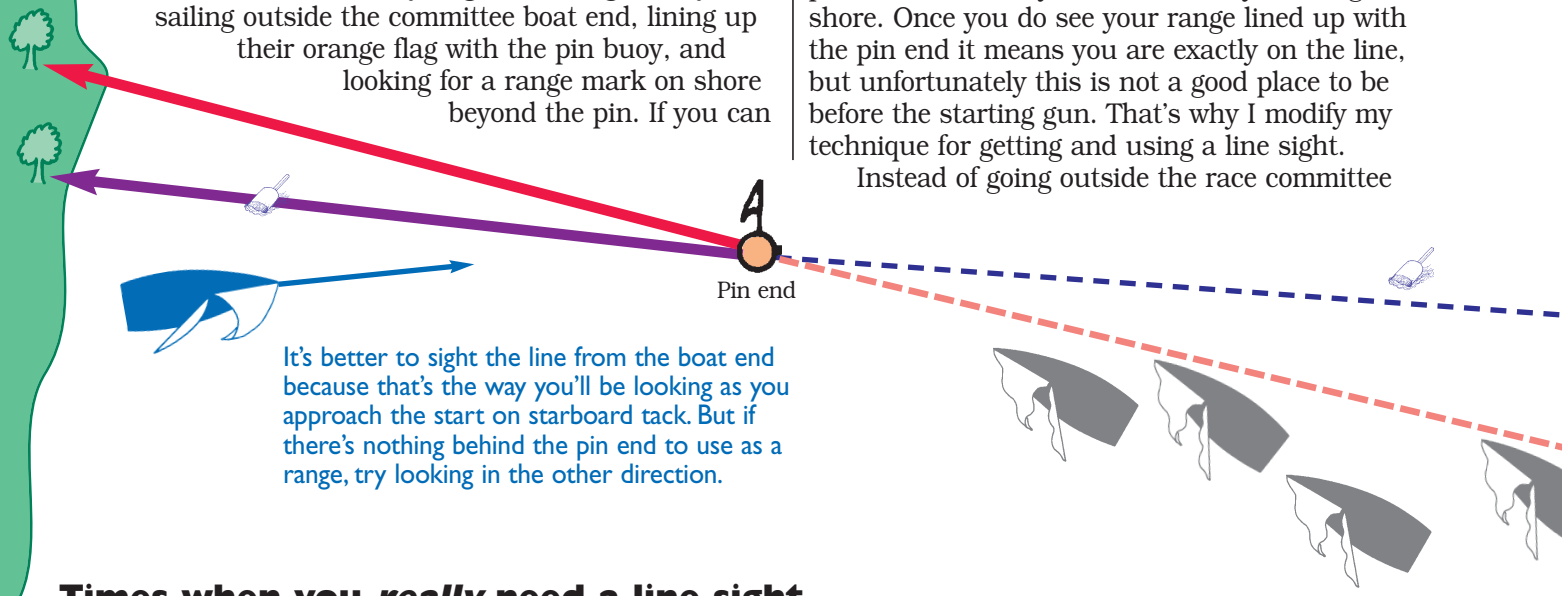
Another strategy for using line sights

Using a line "sight" or "range" at the start is a tried-and-true method for making sure you are as close to the starting line as possible at the gun (but not OCS). I *always* use a line sight whenever I can find one, and this has helped me get some great starts. But there is one thing I do a little differently than many sailors.

The standard way to get a line sight is by sailing outside the committee boat end, lining up their orange flag with the pin buoy, and looking for a range mark on shore beyond the pin. If you can find a house or a big tree, for example, this will help you determine the position of the line as you make your final approach to the start.

This procedure works great, but it has one major flaw: When you are lining up for the start, you are always below the line, and other boats are usually blocking your view to leeward of the pin end. So it's very difficult to see your range on shore. Once you do see your range lined up with the pin end it means you are exactly on the line, but unfortunately this is not a good place to be before the starting gun. That's why I modify my technique for getting and using a line sight.

Instead of going outside the race committee



It's better to sight the line from the boat end because that's the way you'll be looking as you approach the start on starboard tack. But if there's nothing behind the pin end to use as a range, try looking in the other direction.

Times when you *really* need a line sight

It's *always* good to get a line sight so you'll have a little more confidence about your position on the line. But there are certain times when this is especially important. These include situations when you are likely to have a sag (or bulge) in the fleet at the start, plus times when it's simply hard to judge whether you are on the line or not:

- **Current** – When the water is flowing with or against the wind direction, it's particularly difficult to judge the position of the line. In these conditions you are likely to have a sag or bulge in the fleet, so a line sight is critical.
- **Long starting line** – The longer the line, the harder it is to judge exactly where that line is. If you're planning to start near the middle, a good line sight is especially important.
- **Starting penalty** – When the race committee has displayed code flag I or Z or the black flag, get a line sight to make sure you are not over the line early. These penalties often cause a line sag because the fleet holds back, so a good sight can help you start clear ahead of the front row.
- **Pin end favored** – There is more likely to be a line sag when the pin end is favored because it's harder for boats to get up to the line. Use a line sight to make sure you are on the line at the start, not stuck in the sag.
- **Light or heavy wind** – You are likely to have a line sag in light air because it's hard to get up to the line. In wind and waves, boats that are luffing before the start get blown away from the line, so a line sight is very helpful.

When you're lining up for the start, don't give away the position of the line too early. If you luff right up to the line when there are still 30 seconds to go, the fleet will probably follow you there. Instead, hang back in the middle of the line sag as if you think all the boats are very close to being OCS. Hopefully, you can see your line sight so you know how far you are from the line. Then, when you have just enough time to sail to the line at full speed, trim in and accelerate ahead of the pack.

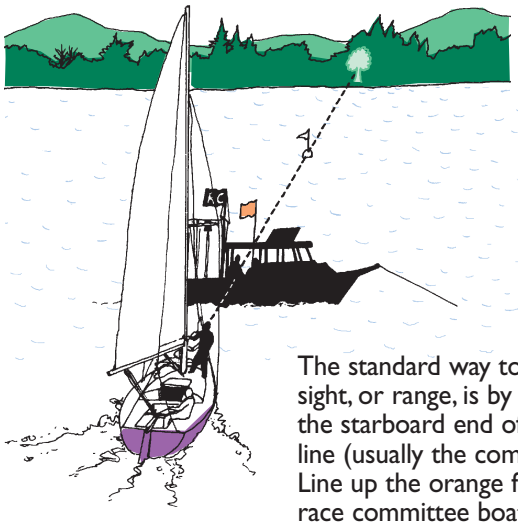
☛ If there's not a good shoreline beyond the pin end, look for government buoys or crab/lobster pot buoys that you can use for a line sight. If you are lucky you may even find a pot buoy right near the middle of the line – then you won't need a line sight.

Flag P, Prep signal

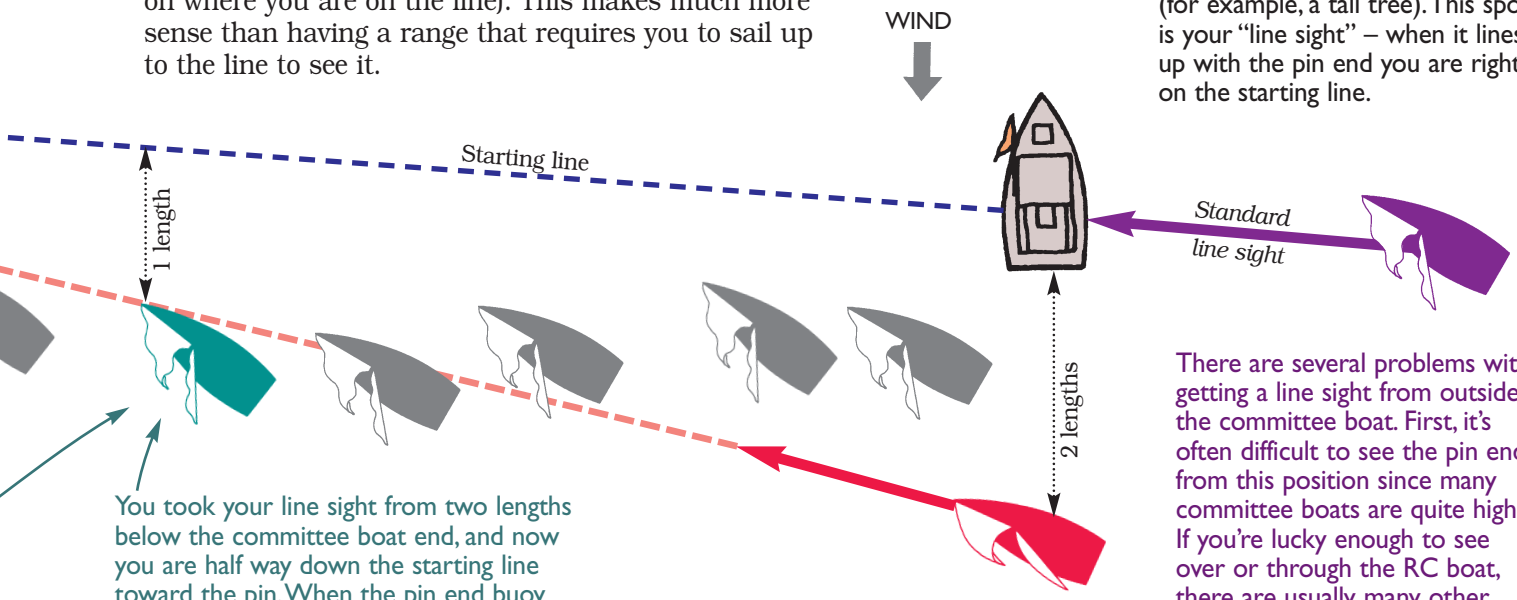
Remember, rule 27.2 allows the race committee to move the ends of the starting line until the preparatory signal (usually the four-minute gun). So make sure to check your line sight after the prep signal in case either end was moved.

boat and trying to line up the two ends exactly, I take my sight from below (1 to 4 boatlengths to leeward of) the committee boat. This is easier and more effective. It eliminates the need to get an exact sight along the starting line, which is difficult when you are trying to dodge other boats, see through the committee boat and find the pin end buoy (which is usually blocked by other competitors' sails).

More importantly, having a line sight from below the RC boat is much more useful as you approach the start. You can actually see your range on shore while you are luffing below the line before the starting gun! When this range lines up with the pin end, it functions as a good "safety range" because you know you are below the line. Also, if you noticed how far you were below the RC boat when you took the sight, you can estimate pretty accurately how far you are below the line when your range lines up with the pin (depending on where you are on the line). This makes much more sense than having a range that requires you to sail up to the line to see it.



The standard way to get a line sight, or range, is by sailing outside the starboard end of the starting line (usually the committee boat). Line up the orange flag on the race committee boat with the pin end, and follow an extension of this line to an exact spot on shore (for example, a tall tree). This spot is your "line sight" – when it lines up with the pin end you are right on the starting line.



You took your line sight from two lengths below the committee boat end, and now you are half way down the starting line toward the pin. When the pin end buoy lines up with your range on shore, you know (by geometry) that you are roughly one boatlength below the line.

If you'd like a range that works when you are luffing a little farther from the line, simply change the position from which you take your original line sight (to, say, 4 lengths below the RC boat).

There are several problems with getting a line sight from outside the committee boat. First, it's often difficult to see the pin end from this position since many committee boats are quite high. If you're lucky enough to see over or through the RC boat, there are usually many other racing boats in this area, and most of them seem to be right between you and the pin.

Even when you're able to get a line sight this way, it may not be very helpful because in order to use the sight you must be exactly on the starting line. During your entire approach to the start, you cannot normally see this line sight because other boats are blocking your view to leeward of the pin. If you do manage to line up your spot on shore with the pin end, it means you are exactly on (or slightly over) the line, which is usually not where you want to be just before the start.

☛ On most one-designs the helmsperson uses the line sight for positioning. On bigger boats, however, it's often the bow person who makes the call about where you are on the line. So make sure he or she is part of getting the line sight.

☛ Practice your positioning skills on shore by picking two trees or telephone poles as ends of the starting line. Try to stand exactly on the line half way between the ends. Repeat this using a line sight.

Try this: My recommended position for sighting the line is 1 or 2 boatlengths below the committee boat end. There are several advantages to this:

- You don't have to sight through the committee boat's superstructure.
- You don't have to line up the orange RC flag perfectly with the pin end.
- There are fewer boats here, so it's easier to maneuver and see the pin.
- You don't have to go all the way to the far side of the RC boat. This is good when you check your line sight after the prep signal and you want to start near the pin.
- The **best reason** for getting a line sight from here is that you can actually use it while you are approaching the start! You don't have to be on the line to see it, so you can gauge your position on the line while you are still luffing safely on the pre-start side. When I use this line sight, I still get a standard sight (along the line) to use as a check when I'm very close to the line.

TOOL BOX

Evaluate the 'upwind' end

When most sailors talk about the "favored" end of the starting line, they really mean the end that is farther upwind, or on the higher ladder rung. This language is confusing because the upwind end of the line is not necessarily a better place to start. Consider a race course where the pin end of the line is farther upwind by 5°, but you expect the wind to keep shifting right on the first beat. It would be inaccurate to say the pin end is "favored."

However, the bias of the starting line can be a very important consideration at the start, especially if one end is much more upwind, or if other factors are equal. Since few starting lines are set perfectly square to the wind, you should incorporate the angle of the starting line into your overall starting plan.

In order to do this, you must have some concept of how much difference the starting line bias will make. If you start at the upwind end, for example, how far will you be ahead of a boat that starts at the other end?

By using a little geometry (I won't go into the calculations here), we find that every 5° of bias in the starting line produces an advantage (or disadvantage) of about 10% of the length of the line. For example, let's say the starting line is 100 meters long and the pin end is farther upwind by 5°. This means a boat that starts at the pin end will be roughly 10 meters ahead (100 x 10%) of a boat that starts at the committee boat end.

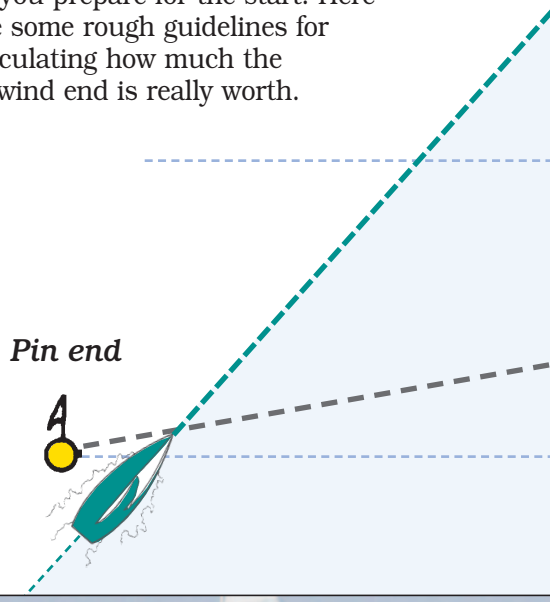
Or, let's say the starting line is 20 boatlengths long and the boat end is farther upwind by 10°. This means if you start near the committee boat you will already be four boatlengths (20 x 20%) ahead of a boat that starts near the pin end.

Since it's obvious that a boat starting at the upwind end will be ahead of other boats, why do we need to quantify this advantage? Basically, when you are deciding on where to start, it's important to know how much you will be giving up by not starting right at the upwind end.

For example, if you'd like to start down the line a little for clear air and speed, you may be willing to sacrifice a boatlength or two to the boats that are fighting for the upwind end. But you may not be willing to go so far down the line that you are willing to give up 5 or 6 boatlengths.

What would you do when the committee boat end is favored by 10° (and the line is 20 lengths long), but there is a lot more wind on the left side of the course? If you start at the pin end, the extra wind velocity you get during the first beat would have to be worth at least 4 boatlengths – otherwise it wouldn't have been worth giving up 4 boatlengths right at the start to boats that started at the upwind end (unless there were other tactical or strategic considerations).

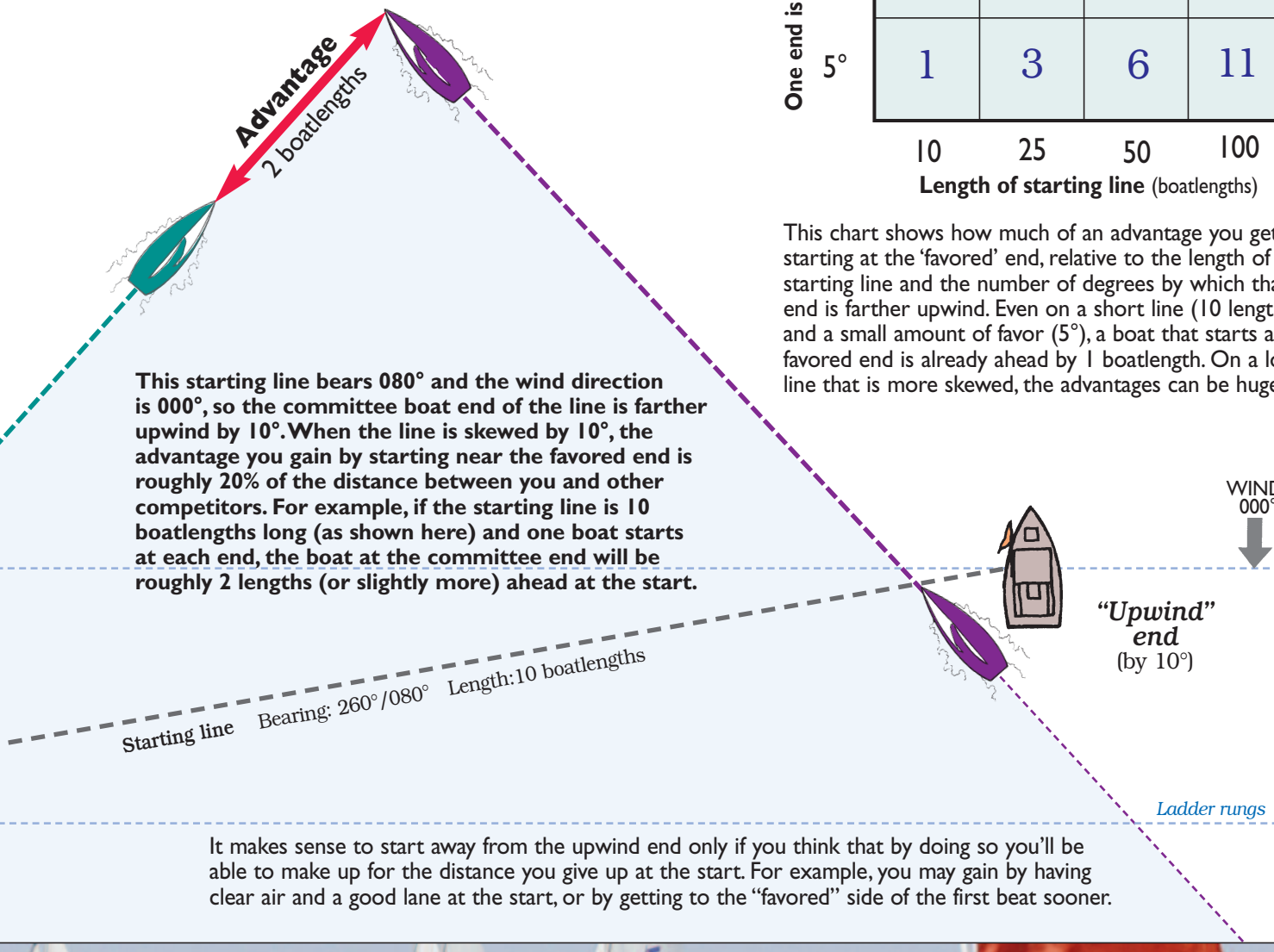
For these reasons, it's important to evaluate the line bias at every start. Which end is farther upwind and by how much? If you don't start at the favored end, how much will you be giving away? The answers to these questions will help determine your priorities as you prepare for the start. Here are some rough guidelines for calculating how much the upwind end is really worth.



JH Peterson photo

Testing the starting line

One good way to find the 'favored' (i.e. upwind) end of a starting line is to work with a buddy before the start. Cross the line simultaneously on opposite tacks at opposite ends, and sail until one boat crosses ahead. This is an easy way to visualize how much advantage (or disadvantage) you will get by starting at either end.



This starting line bears 080° and the wind direction is 000°, so the committee boat end of the line is farther upwind by 10°. When the line is skewed by 10°, the advantage you gain by starting near the favored end is roughly 20% of the distance between you and other competitors. For example, if the starting line is 10 boatlengths long (as shown here) and one boat starts at each end, the boat at the committee end will be roughly 2 lengths (or slightly more) ahead at the start.

Advantage starting at favored end

One end is farther upwind by	10	25	50	100
15°	3 Boatlengths	8	17	33
10°	2	6	12	22
5°	1	3	6	11

Length of starting line (boatlengths)

This chart shows how much of an advantage you get in starting at the 'favored' end, relative to the length of the starting line and the number of degrees by which that end is farther upwind. Even on a short line (10 lengths) and a small amount of favor (5°), a boat that starts at the favored end is already ahead by 1 boatlength. On a longer line that is more skewed, the advantages can be huge!

It makes sense to start away from the upwind end only if you think that by doing so you'll be able to make up for the distance you give up at the start. For example, you may gain by having clear air and a good lane at the start, or by getting to the "favored" side of the first beat sooner.

PHOTO OP

Two sagging starts

Your whole approach to the start depends on a number of factors such as wind strength and direction, current and line bias. Here are two photos that show boats starting in completely different conditions, but with a very similar result.

These Melges 24s are starting a race on windy San Francisco Bay. With such a good breeze, why are so many boats late for the start? First, there is probably a strong flood current here pushing everyone to leeward. In current, you never want to get too far away from the line. Second, when boats are luffing as they approach a heavy-air start, the wind is very effective in slowing them down and actually pushing them to leeward. The waves associated with strong breeze also move the boats downwind. When you combine these effects, you'll often find a mid-line sag, which may be unexpected when there is enough wind to get up to the line.

JH Peterson photos

Here is a fleet of E scows starting in light to medium air. It looks like the boats in the middle of the line are several boatlengths below it, well behind the boats starting at the pin end. This mid-line sag is probably the result of two things: First, the wind is light so it takes longer to get up to the line. Second, and more importantly, the leeward end of the line is quite a bit farther upwind, which makes it harder for boats to converge with the line. Everyone should have been able to get a great line sight here (since there is high land just beyond the pin end), so perhaps the wind shifted left just before the start. That's one thing to watch out for in shifty wind.

Answers to the IQ Test from Issue 92

Tactics & STRATEGY IQ TEST

As promised in the last issue, here are expanded explanations for the 60 questions from our Tactics & Strategy IQ Test. To understand these answers, you need the IQ Test in front of you. If you don't have the last issue, you can view the test questions at our web site: *www.SpeedandSmarts.com*. Or send us an e-mail (SpeedandSmarts@optonline.net) and we'll send you a .pdf file or a paper copy of the questions for free. After reading these answers, if you still have questions or comments, please write to us at the above e-mail address. Thanks.

1. *B) 500 feet (150 meters).* For every knot of speed, a boat travels roughly 1.7 feet per second. So at 5 knots, a boat will be going 8.5 feet/second (5 x 1.7). If a boat maintains this speed for one minute, she will travel about 510 feet (60 secs x 8.5 feet/sec).

2. *C) 150 feet (45 meters).* While you go from 0 knots to 6 knots, your average speed will be roughly in the middle, or 3 knots. At a speed of 3 knots you will travel about 5.1 feet/second (3 x 1.7). If you sail at this speed for 30 seconds (the time it takes to accelerate to 6 knots) you'll travel 150 feet (30 secs x 5.1 feet/sec).

3. *C) The boat is favored by 5°.* If the starting line bears 310°, the wind direction needed to make the line exactly square is 220° (310° minus 90°). Since the wind is actually 225°, it is closer to the committee boat end. Therefore, that end is favored by 5°.

4. *B) The pin end.* At an upwind start, you want to start near the end of the line that is farther upwind. When you are coming to an upwind finish line, however, you should cross at the end that is farther *downwind*. For the line in problem #3, this is the pin end.

5. *C) 1.5 boatlengths*. When you took your initial range, you were 3 lengths below the committee boat. Then you moved half way down the line toward the pin, so you are half as far below the line (3 x 1/2 = 1.5).

6. *C) 10 boatlengths.* When the starting line is biased by 10°, the boat that is closer to the upwind end will gain approximately 20-25% of the lateral separation between boats. If the line is 300 meters long, a boat that starts at the pin end will be about 70 meters (300 x 23%) ahead of a boat that starts at the other end. With Melges 24s, 70 meters is roughly 10 lengths.

7. *D) Finish on a course that's perpendicular to the line.* You can get to an upwind finish as quickly as possible by shooting head to wind (to maximize your VMG) and crossing the line right at the favored end.

8. *C) Slightly below the layline.* The quickest way to get to an upwind finish is by shooting head to wind about a boatlength before you reach the line. To finish right at the pin, you should start to shoot roughly one boatlength below the layline to the pin.

9. *False.* Some people think in a dying breeze it's better to be upcurrent of the mark when the wind gets lighter. But as long as the wind and current are equal for everyone, no one goes outside the laylines, and the wind direction doesn't change, it won't matter which tack you sail first or last. All boats are on the same "moving rug" and will be pushed in the same direction.

10. *False*. The mythical "lee-bow effect" does not work! Since the current is like a moving rug, it pushes everyone in the same direction at the same speed, no matter where your bow is pointed. In current, your best sailing angle is still the one that gives you your optimum VMG.

11. *False*. When boats are on a 'moving rug,' the current will affect their sailing wind, and therefore their apparent wind, equally. It doesn't matter which way they are headed or how fast they go over the bottom.

12. *True.* When you are racing in current, rougher water indicates areas where the current is going stronger against the wind (or less strong with it). This is where you want to be on a beat. On a run, head for smoother water, which indicates the strongest current running downwind (or the least current going upwind).

13. *D) Watch the RC boat flag.* In current, all but one of the answers will give you an accurate read on the direction of your sailing wind (the combined true wind and current wind). The only exception is the flag on the race committee boat, which shows just the true wind direction (unless the RC boat is not anchored).

14. *C) They'll get there at the same time.* If the starting line is square to the sailing wind, both boats will be exactly even in the race when they start. Since the current is equal for both, it does not affect their ladder rungs (because they are both on the same "moving rug"), so they remain equal on the beat (as long as the wind direction does not change).

15. *False*. A bow-to-bow position will produce a good lee-bow tack only in perfect conditions – when you have smooth water, moderate breeze and a boat that loses very little in a tack. In most other situations, you won't be able to make a safe lee-bow until you're in a position where S will hit you at least amidships.

16. *False*. The best time to "bite the bullet" and go behind boats that are crossing ahead is when you want to dig deeper into a persistent shift. In an oscillating breeze, the rule of thumb is "don't let 'em cross you." Tack to leeward and ahead of the other boats so you will be first to the next shift.

17. *False*. The wind that reaches another boat is coming from the direction of their apparent wind. Therefore, to block that wind you should line yourself up between the other boats and their *apparent* wind direction (not the true wind direction).

18. *A) Cross ahead of the other boat.* When you are looking at a port tacker and the compass numbers get lower, it means you are gaining on them. Since you have gained 2° of bearing in 15 seconds, you will most

Tactics & Strategy IQ Test – Answers

(continued from page 13)

likely cross in front of the boat on port tack.

19. ***B) Cross behind the other boat***. When you ducked the other boat you were just behind them in the race. Then you sailed for a few minutes to the right. Now you are converging gain and the wind has shifted 4° to the left. Since the other boat was closer to this shift, they should cross ahead of you.

20. ***A) The left side is favored***. It's OK to tack on S when you're headed or close to the port-tack layline. But if you like the left side, keep going. Tacking will only aim you in the wrong direction and force the other boat to go the right way.

21. ***B) Let them cross in front of you.*** If you like the left side, the last thing you should do is yell "Starboard" or pinch up so the other boat tacks on your lee bow. It would be much better to bear off a little, wave the other boat across and keep going left.

22. ***True.*** If you sail the shorter tack first, you will get to a layline much faster. That's bad because you lose the ability to play windshifts, among other things. By sailing the longer tack or jibe first, you stay closer to the middle of the course and keep more options.

23. ***A) Starboard tack is longer***. If the wind direction (240°) is to the right of the bearing to the windward mark (230°), it means you will have to sail longer on starboard tack to get there.

24. ***C) Port jibe.*** If you sail 065° on starboard tack and 025° on port, then dead downwind is right in between these, or 045°. If the bearing to the mark is 045°, you'll spend equal time on each tack. But when the mark bears 040°, you'll have to spend more time on port tack to get there.

25. ***A) Starboard tack***. The sailing wind makes both tacks even, but the current changes your course over the bottom. Since it is moving from left to right, it pushes you to the starboard layline sooner. So you will spend less time on port tack and more on starboard.

26. ***C) You're not sure what the wind will do next.*** It is usually wise to sail the longer tack first. It might pay to sail the shorter tack if that's the best way to get a persistent windshift, find better current or cover boats behind. But if you're not sure about the wind, improve your chances by sailing the longer tack first.

27. ***True.*** For example, say the wind is shifting steadily toward the west. This favors the west side of a beat because you want to sail toward the expected shift. However, it favors the east side of a run because when you're going downwind you want to sail *away from* the next shift (to end up on a lower ladder rung).

28. ***False***. It's true that, on a beat, the boat that's farther from the new wind direction will lose. However, if the boats are on a run, the one that's farther from the shift will gain (because she gets to a lower ladder rung).

29. ***True***. Changes in wind direction often occur first higher off the water, away from surface friction. For example, if you sense the wind is sheered to the left at the top of your mast, a similar change may soon happen with the wind closer to the water.

30. ***True.*** In an oscillating breeze, the main reason to tack on a header is to sail toward the next shift. If you are close enough to the windward mark that the wind will not shift back the other way, then it's like you're in a persistent shift. Therefore, sail toward the next shift by continuing into the header.

31. ***True.*** By footing slightly when you are on a lift, you will get to the next shift (header) sooner. This technique will also maximize your velocity made good in the direction of the median wind.

32. ***False.*** If the wind is shifted to the left aloft, you will have better speed on port tack because the top of your sailplan is in a lift on that tack. However, left sheer aloft means the wind will likely shift left – for that reason you would want to sail on the slower tack first.

33. ***True.*** The relationship is not perfectly linear, but if a boat gains 10 boatlengths in a 10° shift, she will gain approximately 20 boatlengths in a 20° shift.

34. ***True.*** The farther you are from another boat, the more you will gain or lose when the wind shifts. This relationship is not exactly linear, either, but if a boat that is 10 boatlengths away gains 2 lengths in a shift, a boat that is 20 lengths away will gain roughly 4 lengths.

35. ***False.*** When the wind is shifting persistently, you want to go all the way to one side of the course. But usually it's better to tack slightly shy of the layline. Typically the wind will keep shifting after you tack in the corner; if you go all the way to the layline, you will end up overstanding.

36. ***C) You have a building thermal***. All of the conditions described in A, B and D are usually associated with a wind that is oscillating. But when you have a building seabreeze, it typically shifts gradually in one direction as it gets stronger.

37. ***C) A cold front recently passed.*** All of the conditions in A, B and D are usually associated with a wind that is shifting persistently. After a cold front passes, however, you typically have the shifty, unstable conditions that produce an oscillating wind pattern.

38. ***B) "Up 5."*** All your compass readings should be given relative to your median heading on each tack. So even though you were just headed 5°, you are still lifted "up 5°" compared to the median. If you said "Down 5" it would mean you are steering 5° below the median.

39. ***A) True wind speed.*** The presence of wind sheer aloft can affect many different things from tack to tack, including your sail trim, boatspeed and apparent wind angle. However, it will not affect the true wind speed that you measure on each tack.

40. *B) 315°.* A common mistake in shifty winds is to wait until you are headed all the way (305° in this case). But if you do that you will be sailing below your median heading for a good part of the beat. A better strategy is to tack when you are headed to the median (315°). This way you will sail almost the entire beat above your median heading.

41. *A) You're ahead.* You are even with other boats on the same "ladder rung." If the wind is 240°, your ladder rung bears 330° (240+90) on one side and 150° (240-90) on the other. Since the other boat bears 335° from you, she is 5° behind your ladder rung. So you are ahead in the race (and your lead depends on the lateral separation).

42. *C) Both boats are even.* If you bisect your headings, you find that the dead downwind direction is 170° and the wind direction is therefore 350° (170°+180°). Your ladder rung extends at bearings of 080° and 260° (350° +/- 90°). Since the other boat bears 080° you are on the same rung and therefore equal in the race.

43. *B) You're behind them.* You're behind because in a minute you lost 6° of bearing (004°-358°). The other boat is on a higher ladder rung and will cross ahead.

44. *C) B will be ahead of A.* Statements A and B will definitely be false. Statement D might be true, depending on how far the wind shifts. The only statement that will definitely (in most cases) be true is C, because Boat B is closer than A to the shift.

45. *B) 7 boatlengths.* When the wind shifts 1°, boats will gain or lose just over 2% of the lateral separation between them. Since the boats are 6,080 feet apart, the gain or loss here will be about 122 feet (6,080 x 2%). For 20-foot boats, this is about 6 or 7 boatlengths.

46. *True*. Sailing away from the direction of the next expected shift is the best way to move to a lower ladder rung, which is your goal when running. One exception is when the new wind direction is accompanied by greater wind velocity.

47. *False.* It's always good to take advantage of changes in *both* wind direction and speed, but on a run it's usually better to go for the puff. That's because when you're sailing downwind, a little more wind pressure will often make a huge improvement in boat performance. A puff will make you go faster, and it will also let you sail lower, just as if you were in a header.

48. *B) You can fetch the leeward mark on port jibe.* You don't really want to do a jibe set in light air, with an inexperienced crew or when you are headed (since you want to stay on the header downwind). But if you can fetch the leeward mark, you should almost always jibe.

49. *B) 060°.* If your jibing angle is 60°, your true wind angle when you're sailing downwind will be 150° (180°-60°/2). On port tack, therefore, your heading will be the sum of your TWA (150°) plus the wind direction (270°), or roughly 060°. Tell this number to your helmsperson just before you round the mark.

50. *B) Left.* If strategical factors are equal on the run and you are rounding the leeward mark to port, choose the left side (looking downwind), This way you'll be on starboard tack as you converge with boats later and you will be on the inside as you approach the mark.

51. *B) The wind velocity is decreasing; and D) Current is going to windward.* Sailing high on a reach is good when you expect a header or when the boats behind you are going high. But if the wind velocity is dying or the current is pushing you to windward, go low!

52. *D) Boats ahead are going high; and E) Low is inside at the next mark.* If boats ahead of you go high you have a chance to pass them by going low, especially if sailing low will put you inside at the next mark.

53. *True.* Velocity shifts are similar upwind and downwind: When you get a lull, the apparent wind goes forward ('velocity header') because the wind created by your speed is stronger until your boat slows down (to match the new wind speed). In a puff, your apparent wind goes aft ('velocity lift') until the boat speeds up.

54. *False.* A velocity header just indicates a drop in wind velocity. It is not a 'real' header, so there is not necessarily any reason to tack here. In fact, tacking in a lull is usually a bad idea, so it's often smart to sail through a velocity header and get into more wind before making your next move.

55. *False.* The negative effects of dirty air are definitely more significant in light air than they are in heavy air. Being in another boat's wind shadow may reduce the wind you feel by 2 or 3 knots – this will have much more of an impact on your performance when the true wind is only 7 knots than when it is 15.

56. *D) All of the above.* In most cases, at least on a beat, you should sail on the lifted tack. However, you might stay on the headed tack when you are sailing into a persistent shift or trying to clear your air. On a run, it's usually better to sail on the headed tack.

57. *A) Right.* If strategic factors are equal, it's better to stay on the right side of the beat because this will give you the starboard-tack advantage when you converge with other boats.

58. *F) None of the above.* All the variables listed in A through E can have an impact (sometimes quite large) on the location of the laylines to a windward mark.

59. *A) 190°.* If you are sailing 260° on port tack and the wind direction is 225°, your true wind angle is 35° (260°-225°), and your tacking angle is 70° (35°x 2). Therefore, your heading on starboard tack will be 190° (260° - 70°), and this would be your ideal layline call.

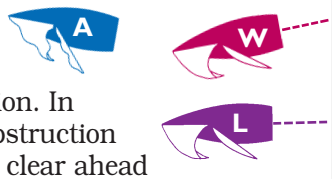
60. *D) 80°.* If your headings are 115° on port tack and 035° on starboard, this means your tacking angle is 80° (115°-035°). That's the angle you must see on your windward side tacking lines before you can tack on the layline and fetch the mark. •

Updated for the 2013-2016 rulebook

Two questions about rule 19

Q I'm re-reading a past issue about rule 19, and I don't understand one of your examples about when rule 19 applies. You show two boats overlapped on starboard tack, overtaking another boat on starboard that is luffing before the start.

Though the boat clear ahead is an obstruction, it seems to me that rule 19 doesn't apply because the two overlapped boats are not required to pass this obstruction on the same side. The leeward boat could pass close to the obstruction on her starboard side, and the windward boat could easily pass the obstruction to port. Wouldn't this be a "clean pick"? – GC, CO

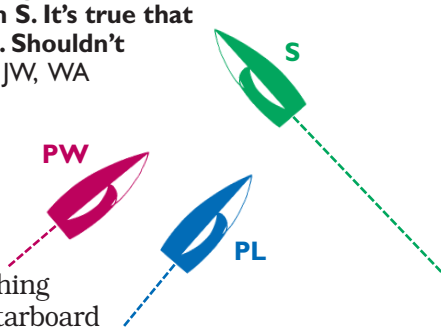


According to rule 19 (Room to Pass an Obstruction), rule 19 applies between boats at an obstruction. In this situation, Boat A is an obstruction to both W and L because A is clear ahead on the same tack and therefore both boats must keep clear of her. Rule 19.2(a) says that L may choose to pass this obstruction on either side (because she has the right of way over W). So L can bear off to go below A, or head up to pass above A.

If L decides to pass to windward of A, we have two overlapped boats passing an obstruction. Rule 19.2(b) says the outside boat (W) must give room to the overlapped inside boat (L). However, this requirement is really a moot point because, more importantly, W has to keep clear of L.

If L is going to pass on the leeward side of the obstruction (A, the boat clear ahead) and the windward boat (W) also wants to pass on that same side, rule 19.2(b) says L must give W room to pass between her (L) and the obstruction. One thing L cannot do is sail so close to leeward of A that she 'peels off' W and prevents W from passing on the same side as L.

Q When two closehauled boats that are overlapped on port tack approach a starboard tacker (S), I don't see why the windward port tack boat (PW) should have the right to force the leeward port tacker (PL) to give her room to duck S. PW must keep clear of both S and PL; she can do this by tacking, or she can luff up and wait. Just because PW would rather not tack doesn't bestow upon her any rights over PL, or over S for that matter. The leeward boat has a right to hold her course, and she is no less privileged than S. It's true that S is an obstruction, but so is PL. Shouldn't PW keep clear of both? – JW, WA



You're right that PW must keep clear of both S and PL (under rules 10 and 11, respectively). However, rule 19 applies here because the two boats on port tack are approaching an obstruction (i.e. a boat on starboard tack, S, which has right of way over both).

According to rule 19.2(a), PL can decide to pass the obstruction on either side (because she has the right of way over PW). PL could bear off to pass S on her port side or tack (by hailing for room under rule 20) to pass S on her (PL's) starboard side. Once PL bears off to go behind S she is required by rule 19.2(b) to give room to an inside overlapped boat (PW) to pass between her (PL) and S.

ISAF Case 11 covers a situation that was almost exactly the same and gives a very clear answer to your question. In their decision, the appeals committee said, "When boats are overlapped at an obstruction, including an obstruction that is a right-of-way boat, the outside boat must give the inside boat room to pass between her and the obstruction." There's a lot more in this Case that is worth reading.

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