UW - Madison Hoofer Sailing Club

Hoofer Badger Tech Racing Manual
Hoofer Sailing Club Badger Tech Racing Manual

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This manual is periodically revised by the Hoofer Sailing Club
Your suggestions for improvement are appreciated
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Welcome to Badger Tech Racing!

Badger Tech Racing is a way of providing the beginning Hoofer sailor with the knowledge essential to sail a tech competently and safely with confidence and pride. This manual includes wind theory, right of way rules, scoring, starting concepts, speed strategy and tactics. These will provide the beginning Hoofer sailor with the knowledge they need to start tech racing.

The most effective way to learn to sail is through lots of practice. The best way to practice is to race. The best way to prepare for a Hoofer race is to attend a Hoofer clinic just before the race. The bulletin board outside the Hoofer boathouse lists races and race clinics which are available. Hoofers Wednesday tech racing is a supplementary means of education for beginning sailors. It is a great way of having fun and learning at the same time. Hoofers Friday tech racing is also available for beginners as well as more experienced sailors.

Winning races is a relative thing in Hoofers. When a skipper says “I won today”, the meanings could be numerous. To win a race a skipper must first find his or her own definition of winning based on their set goals. Winning races with boat speed is a good place to start. Achieving maximum boat speed through knowledge, technique, and confidence is the best goal for any sailboat racing skipper to have.

Some people think it takes much skill and the mastery of countless complicated rules to enter a sailboat race. This may be true in some fleets but not in Hoofer’s Wednesday and Friday Tech series. Although some of the better sailors in the club will be competing more seriously for top honors, there are many more beginners just going out for fun.

Take advantage of one of the best racing programs anywhere in the world. With clinics, instruction, and numerous racing opportunities, it’s no wonder why some beginning Tech sailors eventually go out and win major championships after learning in the Hoofer program.

This manual will assist the beginning sailor in grasping concepts and gaining an awareness of what sailboat racing involves. It provides an assistance to the beginning sailor in gaining the knowledge needed to sail a tech boat competently and safely with confidence and pride.
INTRODUCTION TO TECH RACING

Why race?

The best way to learn how to sail is to race. Hoofer Sailing Club offers many opportunities for both beginning and more advanced racers to learn through racing events. Racing is also a way to advance yourself within the sailing club rating system. The more ratings you achieve, the more boats you’re allowed to sail. Sailors with a Tech Light rating need to race in at least 20 badger tech races to obtain their Tech Heavy rating or get tested out on a blue flag day.

Who can Tech Race?

Any Hoofer sailing member with a Tech Light rating and their guests!

When is Badger Tech Racing held?

Wednesday tech racing is a series of more basic races focused for beginning sailors with more educational needs. Friday tech racing is a series for both beginning and more advanced sailors. Both are open to everyone stated above! All races start with racing clinics. The racing clinics start around five pm.

What do I bring with me to the races?

A lifejacket of course and always bring shoes so your feet don’t damage! Hoofers is not responsible for damaged feet! Optional things you may want to bring along are sunscreen, a beverage bottle, clothes, and a watch which is very helpful for starting the races.

Where do I go?

Schedules and racing information should be located near the boathouse and tunnel. The racing clinics are usually held in the charter room next to the Hoofer lounge.
What do I do first?

Go to a racing clinic! This is a great time to learn about the races being held that day. Clinics are open to questions and discussion. You'll meet the instructors who will be in charge of the races and who will be recording your races on your Hoofer rating card. It is important you sign a sheet w/ your name and sail # (legibly) for the instructor either before or after the races; ask your clinic instructor(s) about this important sheet. Other clinics offered include Tech Practice Sessions, On the Water Racing clinics and Special Topic clinics. Ask your instructor(s) if they're offering any that day or check the sign-up sheets in the tunnel periodically.

Routine Race Preparation After the Sailing Clinic

1 - Go to the boathouse and check-out a tech racing sail and lifejacket with the boathouse staff.
2 - Rigg & launch your selected badger tech boat equipped w/ a bailer. (old laundry detergent bottle or plastic milk container with the bottom cut off)
3 - Sail to the start of the race usually located just past the mooring fields. There should be a motorboat in this area which is usually where the starting line is with orange buoys.
4 - Figure out what the race course is; WL, T, or GC, where the marks are and how many times you need to go around each mark. (Refer to the scoring section of this manual learn the different types of courses set.)
5 - When the race committee whistle blows, listen for the times indicated before the race starts for eg. one long whistle=one minute. (Refer to scoring for sound signal info.)
6 - One of the most confusing aspects of racing to a new racer is the start. The idea is to be on but not over the imaginary line between the race committee boat and an orange buoy at the other end of the line when the starting whistle is blown.
Lifts & Knocks

We normally speak of wind coming from one direction. In reality, the direction is not constant but shifts on either side of the mean direction. A clockwise shift is a veer and a counter-clockwise shift is a back.

A veer lifts a boat on starboard tack allowing it to sail above its mean wind course and it knocks a port tack boat forcing it to sail below its mean wind course. Conversely, a back knocks a starboard tack boat and lifts a boat on port tack. Thus, a knock on one tack is a lift on the other.

<table>
<thead>
<tr>
<th>TACK</th>
<th>VEER</th>
<th>BACK</th>
</tr>
</thead>
<tbody>
<tr>
<td>STARBOARD</td>
<td>lift</td>
<td>knock</td>
</tr>
<tr>
<td>PORT</td>
<td>knock</td>
<td>lift</td>
</tr>
</tbody>
</table>

When racing one usually tries to sail on a lifted tack. The diagram on the next page shows the courses sailed by three boats. The numbers are sailing distances spaced equally apart which shows how a boat sailing on the lift, tacks when it gets knocked, sails the shortest distance upwind.

The best method to determine lifts or knocks uses a reference point on land. First, one determines where on land the boat points on the average wind. Then on starboard tack, when pointing left of that direction one is knocked and when pointing right of it one is lifted.

<table>
<thead>
<tr>
<th>TACK</th>
<th>WIND LEFT OF MEAN</th>
<th>WIND RIGHT OF MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>STARBOARD</td>
<td>knock</td>
<td>lift</td>
</tr>
<tr>
<td>PORT</td>
<td>lift</td>
<td>knock</td>
</tr>
</tbody>
</table>
Mean Wind Direction

Windward Mark

Path of boat sailing all lifts

Path of boat sailing mean wind (half lifts and half knocks)

Path of boat sailing all knocks

Fell off here—should have tacked

Starts

Badger Tech Racing Manual

Wind Theory
Wind Shadow

Upwind

The following diagram illustrates the pattern of wind flow over a Tech dinghy on a close hauled course. The triangular region indicates the wind shadow where there is very little or no wind at all. It extends directly downwind of the boat approximately two mast lengths, farther in light air and less in heavy air.

The diagram also shows that a boat which is a little above and behind or directly behind another boat sails in deflected wind and is being knocked. Anywhere the wind is deflected from its normal course there will be turbulence and directly behind the boat there will be turbulent water. When sailing in one of these positions it is best to tack or reach off a little to obtain clean air and water.
The drawing below shows how the direction of the wind is deflected by the sail of the leading boat and further deflected by the sails of the following boats.

Boat A has deflected air in such a way as to make all of the following boats sail in an apparent *knock*. They will not be able to point as high as boat A. Also, boat B is in boat A's *wind shadow*.
Off the wind

A boat sailing downwind casts a wind shadow affecting boats in front of it as seen in the diagrams below. This can be used as a weapon to attack and pass boats on legs sailed off the wind, which will be discussed later.
RIGHT OF WAY RULES

The International Sailing Federation (ISAF) publishes rules for sailboat racing which the United States Sailing Association follows with a few prescriptions added. The rules are updated every four years coinciding with the Olympics, to reflect changes in the sport as well as suggestions from racers. The club has a few copies of the current rule book, however, a personal copy is a handy thing for a serious racer or racer in training to have.

While reading these rules, keep in mind other sailors will be using them tactically. The US Sailing Association References are given in parentheses in case additional information is desired.

The following rules apply when boats meet. The list is not complete, as there are many rules in the book. This tech racing manual includes the most commonly used rules, and should give you enough information to start racing. Different rules will apply when boats meet in different situations so read carefully and study the diagrams.

Keep Clear

“One boat keeps clear of another if the other can sail her course with no need to take avoiding action and when the boats are overlapped on the same tack, if the leeward boat could change course without immediately making contact with the windward boat.”

Right of Way

“A boat has right of way when another boat is required to keep clear of her. However, some rules in sections B & C limit the actions of a right of way boat.”

Opposite Tack

“When boats are on opposite tacks, a port tack boat shall keep clear of a starboard tack boat.” (Section A, Rule 10)

The tack your boat is on depends on which side of the boat the wind is coming over, and which side of the boat the sail lies on. A boat with the wind coming over the starboard side of the boat, and sail to the port side of the boat is considered the starboard tack boat. The starboard boat has the right-of-way over the port boat. The starboard boat should hail “starboard!” as a warning, but does not have to do so to be entitled to right-of-way.
Same Tack, Overlapped

"When boats are on the same tack and overlapped, a windward boat shall keep clear of a leeward boat." (Section A, Rule 11)

First of all you must decide if an overlap exists between you and another boat. An imaginary line is drawn perpendicular to the centerline of your boat at the furthest aft point of the boat. If this imaginary line is broken by another boat, or your boat breaks this line of another boat, an overlap has been established.

The windward boat is the one closer to the source of the wind, and the leeward boat is the one further from the wind. The leeward boat has right-of-way over the windward boat.

Same Tack, Not Overlapped

"When boats are on the same tack and not overlapped, a boat clear astern shall keep clear of a boat clear ahead." (Section A, Rule 12)

The clear ahead boat is the one that, when moving forward, is the boat further ahead and no overlap exists. The boat clear ahead as right-of-way over a boat clear astern.

While Tacking

"After a boat passes head to wind, she shall keep clear of other boats until she is on a close-hauled course. During that time rules 10, 11, and 12 do not apply. If two boats are subject to this rule at the same time, the one on the other’s port side shall keep clear." (Section A, Rule 13)

In a nutshell, this rule means that a boat tacking needs to keep clear of boats on a steady course. Your tack is considered complete when your boat is once again on a sailable course (close-hauled tack). Before you tack you must check to make sure you have room to do so without interfering with another boat.

Same Tack, Proper Course

"A boat that establishes a leeward overlap from clear astern within two of her hull lengths of a windward boat shall not sail above her proper course during that overlap while the boats are less than that distance apart, unless as a result she becomes clear astern." (Section B, Rule 17.1)

"Except on a beat to windward, while a boat is less than two of her hull lengths from a leeward boat or a boat clear astern steering a course to leeward of her, she shall not sail below her proper course unless she jibes." (Section B, Rule 17.2)
Rounding Marks

(a) "When boats are overlapped before one of them reaches the two-length zone, if the outside boat has right of way she shall give the inside boat room to pass the mark or obstruction, or if the inside boat has right of way the outside boat shall keep clear. If they are still overlapped when one of them reaches the two-length zone the outside boat's obligation continues even if the overlap is broken later. This rule does not apply if the outside boat is unable to give room when the overlap begins."

(b) "If a boat is clear ahead when she reaches the two-length zone, the boat clear astern shall keep clear even if an overlap is established later. Rule 10 does not apply. If the boat clear ahead tacks, rule 13 applies and this rule no longer does."

(c) "If there is reasonable doubt that a boat established or broke an overlap in time, it shall be presumed she did not." (Section C, Rule 18.2)

Over Early at the Start

"When at her starting signal any part of a boat's hull, crew, or equipment is on the course side of the starting line, the boat shall sail completely to the pre-start side of the line before starting." (Part 3, Rule 29.1)

This rule says that no part of your boat may be over the starting line when the gun goes off. If you are over early you will have to go back and restart. There are some special rules the race committee may set about how you are to restart the race. Be sure to check with the race committee beforehand to find out what any starting penalties are in effect.
Touching A Mark

"While racing, a boat shall not touch a starting mark before starting, a mark that begins, bounds, or ends the leg of the course on which she is sailing, or a finishing mark after finishing." (Part 3, Rule 31.1)

This rule simply says that you cannot touch, or hit any marks you are rounding on the course. If you touch a mark the penalty is one 360-degree turn (consecutive tack and jibe). One exception to this rule would be the starting line marks on the downwind leg of the course, double check with the race committee to see if the line is restricted or not before the race begins.

Propulsion

"Except when permitted in rule 42.3 or rule 45, a boat shall compete by using only the wind and water to increase, maintain, or decrease her speed. Her crew may adjust the trim of sails and hull, and perform other acts of seamanship, but shall not otherwise move their bodies to propel the boat." (Part 4, Rule 42.1)

The rules on propulsion are quite specific about which actions are considered legal and which are not. Basically, you are not to propel your boat by anything but normal sailing maneuvers. A list of specifically banned actions include pumping, rocking, sculling, and repeated tacks and jibes unrelated to wind shifts or tactical considerations. If you are unsure of the legality of your actions, consult the RuleBook or an experienced racer. Most of these rules come from what is generally accepted and unaccepted behavior by racers and take some practice to recognize.

What To Do If A Foul Occurs

"A boat that may have broken a rule of Part 2 while racing may take a penalty at the time of the incident. Her penalty shall be a 720 degree Turns Penalty unless the sailing instructions specify the use of the Scoring Penalty or some other penalty. However, if she caused serious damage or gained significant advantage in the race or series by her breach she shall retire." (Part 4, Rule 44.1)

"After getting well clear of other boats as soon after the incident as possible, a boat takes a 720 degree Turns Penalty by promptly making two complete 360 degree turns (720) in the same direction, including two tacks and two jibes. When a boat takes the penalty at or near the finishing line, she shall return completely to the course side of the line before finishing." (Part 4, Rule 44.2)

The 720-degree turn penalty applies to rules broken like Starboard over Port, and the room at a mark rule. You may not use this penalty to excuse you from illegal means of propulsion or incorrect starting. Also remember that the penalty for touching a mark is only a 360-degree turn and not a 720-degree turn. If you fail to take a penalty and you were in the wrong in a protest situation, you may be disqualified from that race by the race committee or the protest committee after a hearing. If you think you might have been wrong, it's usually best to just spin your circles right away rather than get involved in a protest.
There are numerous scoring systems used in sailboat racing, some of which are described in the Untied States Yacht Racing Union (USYRU) rule book. Hoofer Sailing Club uses a variation on the low point scoring system which is described below.

In this scoring system, the idea is to accumulate as few points as possible. One can really accumulate numerous points when not starting or finishing a race.

<table>
<thead>
<tr>
<th>Place</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>DNF</th>
<th>DNS</th>
<th>DSQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points</td>
<td>.75</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>BS+1</td>
<td>BS+2</td>
<td>BS+2</td>
</tr>
</tbody>
</table>

**BS**     # of Boats which started a race

**DNF** Did not Finish: A boat which started but did not finish a given race receives points for the finishing place; one more than the number of boats which started that race. Note that a boat which intends to start but does not make it across the starting line is considered to have started and is scored as DNF.

**DNS** Did Not Start: A boat that did not start a given race receives points for the finishing place; two more than the number of boats which started that race.

**DSQ** Disqualified: A boat which finishes and thereafter retires or is disqualified receives points for the finishing place of two more than the number of boats which started that race.

**YMP** Yacht Material Prejudice: At Hoofers, YMP is used under extenuating circumstances where boats may score the average of their finishes for the night as their score in a given race.

**AVE** Average: A given night is scored as the average for the season for situations such as someone who has volunteered to do race committee for a whole night.
Race Committee

Before the start of a race, racers will be near the committee boat. The race committee will communicate with them by means of verbal announcements, horns or whistles.

Time Signals

Whistles and sometimes visual signals will tell racers exactly how much time is left until the start. The object is to cross the starting line exactly at the starting signal, at full speed, without being over the line early and having to return and start again.

<table>
<thead>
<tr>
<th>TIME BEFORE START</th>
<th>WHISTLE BLASTS</th>
<th>VISUAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>minutes</td>
<td>seconds</td>
<td>long</td>
</tr>
<tr>
<td>3</td>
<td>00</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>00</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>00</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>START</td>
<td>1</td>
</tr>
</tbody>
</table>

Course Signals

Verbal announcements and/or hand held course signs are used to identify the current course and will tell: 1) Which marks to round and 2) how many times to go round them.
STARTING CONCEPTS

Preparation

Setting Up The Boat
Just putting a boat in the water and raising the sail is not enough to get a boat going fast for racing. Before any sail it is important to:

1 - Check the boat over for weak lines, missing pieces and telltales.
2 - Once on the water, both before the first race and between races, it is important to sail on all points of sail and both tacks. While doing this note whether the boat is under or overpowered. If underpowered, ease off on the control lines. If overpowered, crank in on the control lines. Downwind, note if the sail seems to spill air because the boom rises; if so tighten the boomvang.

The Race Before The Race

There's no questioning the importance of the start in racing. The start can be thought of as "the race before the race" because it is an intense time (three minutes for Hoofer races) during which boats jockey for position, rights and speed. Many factors influence a good start:

1 - Starting at the favored end of the line is important because it minimizes the distance sailed upwind.
2 - Having the bow positioned near the line, not 10 seconds behind it at the starting signal is important so that precious seconds are not lost sailing to the line after the start.
3 - Get the boat in front to avoid the bad air behind other boats.
4 - Speed is equally important because a boat sitting head to wind at the favored end when the gun goes off does not gain anything over the boat that sails away 2 boat lengths to leeward at 4 knots.
5 - Do not foul anybody at the start because what is gained in position will be more than lost by the time taken to complete a 720.
Determining the Favored End of the Line

Because the line is often times not square to the wind, one end is farther upwind than the other. The boats which start at the upwind end will have an immediate head start over those at the other end. Even if one end of the line is closer to the mark in distance, one will still do better to start at the upwind end of the line. Determining the favored end can be done with one of two methods illustrated below.

1) Luffing head to wind in the middle of the line allows the bow to point toward the favored end. Note, it is best to do this from starboard tack to maintain right of way over the fleet.

![Diagram A](image1)

Boat points into wind when headed up and the sail is allowed to luff. The same is true on a starting line.

If one end of the line is favored - boat points to it upon luffing.

![Diagram B](image2)

2) Sailing along the line and trimming optimally for the wind direction, then tacking leaving the sail trimmed as is and sailing towards the other end yields an undersheeted sail if the end being sailed towards is favored, and an oversheeted sail if the end being sailed from is favored.

![Diagram C](image3)

If boat in (A) going to pin tacks and leaves sail sheeted the same - it is now oversheeted and the end behind it (pin) is favored.

If boat in (A) going to RC tacks and leaves sail sheeted the same - it is now undersheeted and the end in front of it (pin) is favored.
Planning

1 - Picking how to approach the favored end.
2 - Choosing how to be the right of way boat.
3 - Having options in case of plan failure.

Being able to pick an approach and decide how to maintain rights comes with practice, as does being able to develop alternative plans when needed. Factors such as the number of boats, the length of the line, the windspeed, and the ability of the other competitors all play a role, as do many other factors in these decisions. *Always* have a second way out or an escape route in case the first starting strategy fails. Some possible approaches are illustrated below but these are only a sample of what can happen during the starting sequence.

![Wind
Starboard Luff
Tack Start
Dip Start]

**Right of Way**

During the starting sequence sailors will use the rules aggressively. It is important to be familiar with at least the basic rules and know at all times which boats have right of way. Both the *Opposite Tack Rule* and the *Same Tack, Overlapped Rule* are used heavily at the start to gain and defend position.
BOAT SPEED

**Weight Steering**

Any light-displacement dinghy can be steered by changing the heel of the boat. Because the rudder creates considerable hydrodynamic drag when used to turn the boat, it is more efficient to steer the boat by transferring the weight of the crew to heel the boat while minimizing the rudder motions. Because of the asymmetrical shape of the hull, increased heel to leeward will cause the boat to head-up and increased heel to windward will cause it to bear away as summarized in the box below.

This attribute of a hull is very useful, especially at windward mark roundings when the boat has not quite made the lay line. Because the hull will point higher at greater angles of leeward heel, a good skipper can "squeeze around the mark" rather than having to tack again. When approaching the mark, heel the boat to leeward so that it will head up and clear the mark. Once the mark has been cleared, it is best to heel the boat to windward to bear away from the mark.

At the starting line it is also advantageous to heel the boat to leeward to force a windward boat up into irons while maintaining some boat speed. When the gun goes off, heel the boat slightly to windward to help the boat bear away and build speed.

The best way to practice weight steering is to take off the rudder and sail by hull and sail trim alone. It is very difficult at first, but after some practice weight steering will come easier and it's often a competitive edge that many dinghy sailors don't have. See Appendix A for drill.

<table>
<thead>
<tr>
<th>Weight Steering Techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head Upwind</td>
</tr>
<tr>
<td>Bear Off</td>
</tr>
</tbody>
</table>

Weight steering, often referred to as *kinetics* is a controversial subject amongst many racers, some of whom think it should be banned altogether. The fact remains that kinetics are allowed when steering, tacking or jibing the boat. When these actions are executed properly, boat performance can be significantly improved. Bearing this in mind, it is best to learn these techniques so as to improve a boat's standing in the fleet.

**Propulsion Rule:** A boat should compete only when Sailing, and the crew shall not otherwise move their bodies to propel a boat **Except:** (USYRU Rule 54)

1) before, during and after a tack or jibe such it does not:
   a) advance the boat further in the race than the boat would have without tacking.
   b) move the mast away from vertical more than once.

2) On a free leg of the course, the crew may pump the sheet *once* per wave or gustin order to initiate surfing or planing. Only the part of the sheet between the skipper and the first block may be used.
**Roll Tacking**

This tacking technique utilizes the transfer of body weight to help "roll" the boat through a tack. A roll tack has two main functions:

1) minimize the rudder motion so as to reduce drag
2) keep the sail full while the boat is tacking

During a properly executed roll tack the rudder should cause little drag and the sail should snap from side to side as it fills with air. Roll tacks are especially beneficial in light winds to keep the boat moving and sometimes cause the boat to actually gain speed and distance through the tack if the tack is properly executed.

---

**Proper Roll Tacking Technique**

1 - Always begin a roll tack like any other tack: with speed

2 - Heel the boat slightly to leeward and let the helm go to leeward so the boat heads up into the wind.

3 - As the boat swings through head to wind, quickly heel the boat to the new leeward side as the sail fills.

4 - Once the boat has reached the new close hauled course move quickly and smoothly to the new windward side

5 - As the weight is moved to the windward side quickly trim the sail to the proper close-hauled position

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By moving quickly and smoothly to the new windward side while sheeting in to normal close-hauled trim, a large mass of air is moved across and aft which squirts the boat forward for one or two seconds. Quickly bring the sail in to proper close-hauled trim but don't overtrim the sail or it will stall. Remember that when in the process of tacking, all right-of-way privileges are lost until the sail fills on the other tack. At that point, all rights of a yacht on a tack are reinstated.

It will probably take many roll tacks to get the hang of it and another hundred more to get it right but the technique pays off in the end. A good roll tack will beat a regular tack by a couple of boat lengths per tack in light wind. Too much heel and the boat will wallow, too little and the roll is ineffective.
Roll Jibing

Similar to roll tacking, roll jibing also uses the transfer of crew weight to steer the boat through the jib. Normally, the flying jibe results in greater boat speed than does a controlled jibe as it forces the sail to remain full for a greater portion of time while allowing the wind to do most of the work. In order to get every bit of speed from the jibe, steer the boat under the sail as in a controlled jibe but do it as fast and as smoothly as possible.

Proper Roll Jibing Technique

1 - Heel the boat slightly to windward and let the helm go to windward so the boat bears away from the wind.

2 - When the boat begins to sail by the lee, *snap* the mainsail over by pulling sharply on the sheet.

3 - As the sail comes across the boat, duck under and quickly move, with the tiller in hand, to the new windward side.

4 - Once on the new windward side, hike the boat flat so as to pump the sail and avoid a capsize.

5 - Try to avoid catching the sheet on the tiller or rudder and use crew weight instead of the rudder to steer the boat.

Remember that when in the process of jibing, all right-of-way privileges are lost until the sail fills on the other tack (it does not have to out to its normal trim position). At that point, all rights of a yacht on a tack are reinstated.

Good jibing takes practice. Keep in mind the techniques used to perform a proper roll jibe and the rules that apply and the roll jibe can be effectively used to improve a boat's performance.
At some point in sailing most sailors will feel they are doing everything correctly, yet they are still not winning races. Several excellent books have been written by top-notch sailors to help the advanced sailor sail complicated boats well. The following tips are aimed at the Tech racer who can't quite seem to get to the front of the fleet and doesn't know why.

In each area, strategy will be dealt with first and tactics added later. Strategy has to do with the wind; how to sail a boat fastest on different legs of the course in the absence of other boats. Tactics covers how to sail the boat in relation to the competitors on the course. For most good sailors the race shouldn't begin at the 3 minute whistle but at least an hour before the gun goes off.

Starting

Strategy

If there were no other boats on the course starting would be fairly simple. One would just want to know the favored end and be there at the starting signal going full speed. It would involve knowledge of the wind and how it is shifting, boat handling skills, and a good sense of timing so that the line is crossed at the right speed and time. While this situation isn't a common occurrence it is worth looking at how to achieve the perfect one boat start.

First, consider the wind direction. In the previous section, methods of determining the favored end of the line were discussed. These methods work perfectly if the wind is from a constant direction, a rarity at best. What must also be considered is the wind shift pattern and timing and whether the end that is upwind with 2 minutes to go will be upwind at the start. By timing the wind shifts with a stop watch and checking the favored end a couple of times before and during the sequence, one can determine not only which end should be favored at the start but also when the next shift will occur and which way the wind will be shifting. The former is important in picking where to start and the latter in determining which way to go immediately after the start (to be discussed later).

Once one has determined where they want to start on the line they must get there on time. This involves both boat handling and timing. One must have a good sense of boat speed at various points of sail in varying wind conditions in order to time a start well. The only way to achieve this is by sailing the boat in many different conditions and being in tune with the feel of the boat in various winds on all points of sail.

The boat handling comes into play strategically, in order to correct for poor timing or a sudden change of conditions. Types of maneuvers which are important before the start are: tacking and jibing in order to start a new approach to the line if one is early, as well as being able to slow the boat down and accelerate again with ease. Refer to Appendix A for drills and exercises.
**Tactics**

While all of the above are important and central to a good start, things become complicated quickly as other boats enter the scene and one must begin to think about tactics and rules which must be followed. Most starting lines create the situation where only one boat can be at the best spot on the line at the start. The challenge is to be that boat. This involves more boat handling than just getting to the line on time and a working knowledge of a few specific starting rules.

Once one has determined where they want to start, they must get there and keep other boats from making them give up that position. Getting to the position often involves aggressive sailing and is sometimes referred to as *making a hole*, while maintaining a position involves defensive work and can be called *protecting a hole*.

There are an infinite number of methods to make a hole but two common methods include 1 - luffing windward boats into irons or across the starting line so that they must circle back and rethink their start and 2 - simply looking for a hole already present and tacking into it.

When luffing other boats before the start the rules to keep in mind are that there is no proper course before the start so the mast of beam rule takes on a slightly new form. If the windward boat is in a mast of beam situation this means that the leeward boat can only luff them to a close-hauled course. Otherwise the leeward boat can luff them into irons if the windward boat tacks first.

Protecting a hole once it is established is probably the harder of these two concepts. Since other boats will be trying to luff a boat with an established hole one must know how to *curtail a luff*. A good method is to leave the main undersheeted to keep a leeward boat from getting close enough to begin to luff up.

Another common rule that comes into play at the start is the *anti-barging rule* (USYRU RULE 42.4). This rule states that there is no buoy room at a starting mark and it is legal for a leeward boat to luff a windward boat into or past one end of the line. The rule prevents a boat from coming in at full speed on a reach at the favored end and calling for room to start.

Also try to anticipate where other boats will be 30 seconds or so in the future to avoid unnecessary conflicts. While this is important throughout a race, it is especially so at the start since all of the boats are in a very small area and maneuvering in all directions. Finally, remember that starts, like everything about sailing and especially racing, are something that are learned best with practice. This is why Tech racing is a good learning place to learn since there are usually 4 starts a night.
Upwind

Strategy

The area of the course is outlined in the diagram below. The area the boats will tack up to the mark is shown by the square in the figure below. No boat will sail outside the square unless they have overstood a mark.

The areas marked as the "danger zone" are the areas closest to the layline. Once in this area, most strategical and tactical options are severely limited and should be avoided as much as possible. For every boat that has taken a flyer to the danger zone and been successful, there are at least 20 more that have failed. A conservative strategy which avoids the laylines is best because it reduces the chance of failure.

By starting in the middle of the course a sailor retains the flexibility of going left or right if an obvious advantage exists. Although there is a lot of disturbance in the middle of the course from the lead boats which tends to slow the pack down, this doesn't mean the layline is the answer. The shaded area is where the boats will most frequently meet each other and where one should expect to suffer the most disadvantage because of deflected wind and general disturbances. This turbulent area must be taken into consideration when there are very big fleets, especially on the first windward leg.

If the better side of the course and the better end of the starting line are not the same, the area of greatest disturbance should be crossed at its narrowest point. Unless one is in the lead boat it is best to stay on either side of the disturbed area and leeward or downwind of the danger zone. The side to pick depends on which side of the course has more wind, smaller waves, less seaweed or more of a lift coming into the mark. The point here is to find the area of the course that has the best conditions to make a boat go fast.
Oscillating Winds

Oscillating winds are winds that shift back and forth from a mean direction on a regular basis. Because the Tech Dinghy tacks very quickly, it is best to tack quickly when knocked if the wind is oscillating regularly. Often a boat ends up tacking 20 times on the weather leg. To get the most advantage from oscillating wind shifts remember the general rule: sail on the lifts and tack on the knocks. More specifically, this means:

**Oscillating Wind Strategy**

1. Sail the lifts fully, taking the path pointing closest to the mark
2. Sail toward the expected knock, remembering that it will be lift on the opposite tack
3. Try to get in phase with the wind shifts from the beginning so as to maximize the advantage of every shift

In a Tech race, with a short course, an alert skipper usually takes advantage of all of the shifts, large and small. Remember that a little distance is lost every time the boat tacks so be sure that the wind shift will be beneficial before the tack is made. Often, there are shifts that are so small that it is better off to stay on the same tack. Take advantage of the larger shifts, they will help more in the long run.

If the wind is fairly steady, sail with as few tacks as possible, taking long legs between tacks. In very light winds or near drifter conditions, a crew may only tack a few times on an upwind leg.

Persistent Shifts

Another type of wind change is called a persistent shift. Unlike oscillating shifts, a persistent shift is one that gradually keeps changing in the same direction. Consequently, the strategy for a persistent shift is quite different from the strategy used in oscillating shifts:

**Persistent Shift Strategy**

1. Sail on a knock, towards the persistent shift
2. Tack to keep to the inside of competitors so the boat is gradually lifted right up to the mark
3. Avoid tacking to early so as to avoid the great circle route
The 4 boats above react differently to a persistent wind shift. This is a persistent shift which is a lift on the starboard.

Boats A and D ride out the lift sailing "A Great Circle Route" and thus a longer distance to the weather mark.

If the persistent shift is a lift it is best to sail as shown by B and get to the inside of the lift. The crew will have to suffer through the knock for a while but if the wind change is persistent it will end up on the inside. Also try to judge your tack so that the boat will be lifted gradually up to the mark like Boat B.

Boat C tried to get too far inside and consequently overstood the weather mark causing it to sail a longer distance.

Picking up windshifts will not increase boat speed it but will reduce the distance sailed to the windward mark. The skipper who sails the shortest distance at the fastest pace will naturally get there first. How does one tell the difference between persistent shifts and oscillations? When are the shifts persistent? Will this knock last long enough to warrant tacking on it? The answer is a knowledgeable eye that comes from experience and practice; there are no shortcuts.

If a race has been sailed and something has been done right, remember it and do the same again. If something has gone wrong be sure to understand why and think about how the shifts should have been played. Most skippers will probably come across a similar situation in the future. Rest assured that even the best sailors can not pick every wind shift correctly all of the time.

If what looked good in the beginning but turned out bad (e.g. sailing a lift which turned out to be persistent) make the best of it by bailing out of the original strategy early and formulating a new one. Don't get into a hole at the beginning of the race by insisting on carrying through with the original strategy if it appears to be wrong.
Don't get to the layline too early

It is a mistake to sail for great distances along the "layline" to the weather mark. Once on the layline a boat must begin sailing toward the mark rather than playing the wind shifts. If a knock occurs a boat cannot tack because it is still heading for the mark. If a lift occurs the boat will be off on a reach, meaning it has sailed extra distance upwind. If a boat has sailed past the layline it will again have sailed extra distance and is said to have overstood the mark.

In the diagram below, Boat A has gotten to the layline too early. Boat B has been sailing in the middle tacking on the shifts.

Level a - The wind is at 1 and both boats are even.
Level b - The wind shifts to 2 and boat A gains no advantage as it is already on the layline. Boat B tacks on the header and takes advantage of the port lift.
Level c - The wind shifts back to 1 and boat B has gained by sailing a more direct course to the mark.
Level d - A starboard lift to 3 and boat B tacks to take advantage while boat A must fall off. Boat A cannot tack because it was already on the layline.
Level e - Boat B has a good lead because it took advantage of the wind shifts while Boat A was stuck on the layline.
**Tactics**

Tactics are most often utilized to obtain a position therefore executing a particular strategy. The ideal situation is to obtain clear air so as to execute a strategy without interference from other boats. In reality, however, boats meet all the time on the course and tactics come into play. Although rules were developed to keep some order on the course, they are the primary weapon when it comes to tactics. A good skipper may try to use the racing rules to slow down other boats.

The most common tactical situation on upwind legs occurs when two boats cross on opposite tacks. The starboard boat can force the port tack boat to alter its course to avoid a foul. The common dilemma for either boat is whether to tack or cross. A good general rule is to be on the favored tack. For example, if the port tack boat is on the lifted tack in an oscillating wind, it would be best to duck the starboard tack boat and continue on the favored tack.

On the other hand, if the port tack boat is being knocked, it would be best to Leebow the other boat by tacking directly in front and slightly to leeward of the boat on starboard. If the leebow is executed properly, it will give the other boat a lot of bad air which will slow it down (see wind shadow upwind). As a port tack boat, it is good idea to ask the crossing starboard tack boat, "Tack or Cross?" This gives a the starboard tack boat a chance to let the port tacker cross before it places a leebow.

The Tech Dinghy moves relatively slowly so there will normally be ample time to plan any moves in advance. Remember, the main objective is to have clear air. If a boat is in the middle or back of the fleet the best tactic is to get clear air and full speed.

At the **Windward Mark**

**Strategy**

The best strategy at the windward mark is to round it with maximum speed so the boat will move quickly away from the opponents. As the boat rounds the mark, do so in a sweep, adjusting the sails as the boat falls off. This technique maintains good rhythm between the crew, the sail and the wind rather than the jarring effect which would occur if the turn was too violent. Many beginning and intermediate sailors turn too quickly without letting the sail out where in heavy air this causes a lot of heeling and possibly capsizing. Other times new racers will let the mainsheet out faster than the boat can turn. Naturally, this will cause the main to luff which causes the boat to slow down.

**Tactics**

Tactics at the windward mark are far more important than strategy. Often 3 or 4 boats can be passed in a large or closely bunched fleet if tactics are properly executed. One of the worst situations at a windward mark occurs when a boat on the port tack layline approaches a line of boats on starboard tack called the "Starboard tack parade". Sometimes, due to a favorable wind shift, it is best to approach the mark on port and tack underneath a starboard tack boat before rounding the mark.
When coming in on port with a head of steam while facing many starboard tackers, it is best to look for the gap in the starboard tack parade approaching the mark. Most times a gap will be there so slow down or speed up by reaching to get the boat in the gap and make a clean tack. Make sure, however, that the tack is not made so close such that it causes a collision or forces the starboard tacker to alter course. If the hole isn't there, jibe around and try again. Be wary of the area of greatest disturbance at the mark which increases to one side or the other of the mark.

**Squeezing around the mark**

When approaching the mark on the starboard layline and a knock occurs at the last minute, a good crew can still probably make it by squeezing around the mark. It is a simple procedure that only takes good timing and good boat speed. Fifteen feet (about a boat length) before the mark, foot off a bit to get up speed and right before hitting the mark luff up, head to wind and the boat's momentum should carry itself around the mark. Be sure that conditions are right before attempting to squeeze around the mark. For instance, it is hard to do in light air when the boat is moving very slowly.

Also beware in heavy air with large waves. The waves will stop the boat causing it to drift backwards. If a leeward boat below tries it remember that they have the right of way, so luff up to keep clear. Always keep several options open when approaching the mark. If it is obvious that the boat will not make it try to tack out early and get up to the layline.

The worst thing to do is to try to pinch up to the mark. All this does is stall the boat causing it to sag farther to leeward. Often it is best to overstand the starboard layline during the last several boat lengths to avoid such a problem. Keep in mind that other port tack boats will be trying to tack underneath so don't overstand too much or they will not have enough room to tack.
Reaching

Strategy

Reaches in Tech Dinghies are primarily boat speed contests unless the waves are very large or if it is very windy, there are a few considerations to bear in mind. First, avoid areas of disturbed air and water and always look for clear sailing. A good skipper should always be working on a reach to make the boat go faster. By continually playing the main, having one eye looking at boat direction and the other eye watching for puffs on the water it will be easy to pass other boats.

In heavy winds and planing conditions, keep the boat as flat as possible. If the boat is leaning to leeward chances are good that the crew will be swimming instead of sailing when the next puff hits. In lighter air keep the boat heeled as it would be on an upwind leg and concentrate hard on sail trim.

When the wind is puffy do not head straight for the mark. There is a common rule that all good sailors use fall off in the puffs and head up in the lulls. The reasons for this are simple. By falling off in the puff a boat will often accelerate onto a plane which will leave the competition behind. Also, by falling off, the boat will stay in the wind a bit longer than the competitor who sails straight for the mark. When the puff subsides it is time to head up on a close reach to find the next puff. This will usually be a faster angle of sailing than beam reaching all the way to the mark. So the boat may sail a further distance, but because it was closer to maximum speed it will reach the buoy well ahead of the competitors who failed to play the puffs.

Tactics

One of the most important decisions that has to be made on the reaching leg is whether to go high or to go low. There are obvious dangers in going low, such as wind shadow of other boats in the early part of the leg, but if this tactic works out it usually enables the crew to overtake several boats. After rounding the weather mark most skippers go high searching for puffs (which would hit them first) and hoping they will increase the distance from their competitors.

The only downside to this tactic is that luffing duels often ensue. This means that one boat will go high, the next boat higher, and the 3rd boat even higher. The first boat has to protect itself from being blanketed so it will go higher and they all end up going much higher than the course they had originally planned upon. This can be disastrous if the boats then have to approach the jibing mark on a dead run - a slow point of sailing. Beware of the middle road because some skippers who try this maneuver find that it does not work for them, because they did not fall off low enough and soon enough.

If the reach is fairly broad and a boat can go to leeward without being blanketed by windward boats, it usually pays off. At no point should a boat sail a dead run unless it is unavoidable.

It is best to reach off considerably more than the competitors to keep free of their wind shadows. It may not look all that good at the beginning of the leg, but on the last half the boat will be sailing on a higher and faster angle than the opponents, such that it will usually be ahead at the mark.
At the Jibe Mark

Strategy

A frequent error made by skippers is to aim directly at the jibe mark. The best strategy for rounding a jibe mark is start wide and round tight. Round smoothly if possible sheeting in as fast as you can. It is fastest to perform a roll jibe (see roll jibing section) which maintains momentum and gives more time to sheet in.

Tactics

Tactics are more important than strategy when rounding the jibe mark. Be sure to approach the mark wide and round it tight; this prevents a boat behind from taking an inside position. Keep in mind that an overlap must be established at the two boat length circle to obtain the inside position. If an overlap isn't established the inside position is lost; however, that doesn't mean the battle for the rounding is over.

A competent crew should know how to slow their boat down to enable them to sneak inside of an unaware sailor in front. If the lead boat fails to round closely to the mark there should be ample room to gain that inside position. Even if there isn't a gap to fill it is better to slow down and stay right on the transom of the lead boat rather than to stay to the outside and sail a wide route.

At the Leeward Mark

Strategy

The leeward mark rounding is similar to the jibe mark in both strategy and tactics. As for strategy, it is best to approach the mark wide and round it tight. The tricky part is that as the boat heads up the skipper has to sheet in as fast as possible while steering around the mark. Often times beginning sailors have a little trouble coordinating both actions and they tend to round too wide / too slow.

Tactics

Inside position is most pertinent when rounding the leeward mark. As was discussed in the jibe mark roundings, try to establish an overlap and then make the fastest possible rounding to leave the competitors far behind. Again be wary of someone lurking behind who is trying to sneak in any gap that is left due to a wide rounding.

In an overlap cannot be obtained remember to slow down and stay directly on the stern of the lead boat. If a gap opens up and it is possible to fill, go for it. It is much more important to perform a clean rounding (without fouling anyone) rather than pushing one's luck too far and getting disqualified. Remember that there is ample opportunity on the next upwind leg to pass those lead boats.
Running

Strategy

On straight downwind legs much of the strategy used on reaches still applies. In light air it is best to sit way forward to lift the stem out of the water which reduces the wetted surface and creates a more efficient hull shape. As the wind picks up however, move back to the thwart to keep the bow from plowing. Also, it is best to heel the boat slightly to windward; as a result, the form of the hull will make the boat want to turn to leeward balancing the weather helm created by the sail and eliminating excess rudder drag. This is very important to increasing your downwind speed. Just as on reaches remember to *fall off in the puffs and head up in the lulls*.

Tactics

The best weapon when close behind an opponent is to blanket their wind which will slow them down. The boat that is behind also has the advantage that the new wind will get to it first. Keep one eye looking behind for puffs and threatening boats. Sail toward the wind and away from the competitors.

On a run, leave the board down just enough to prevent the boat from rolling unduly or just enough for proper steerage. With the board almost up a boat is vulnerable to a sudden luff from leeward. If a crew waits until they are luffed to uncleat the board it will be too late. Try to avoid luffing duels whenever possible as they tend to take the dueling boats out of contention with the other boats. If someone attacks from astern the best defense is to jibe, as long as it does not carry the boat away from the mark.

When in a downwind tacking duel at close quarters, time jibes to take best advantage of position and wind. For example, if a puff is spotted on the lee quarter when on a port tack and the boat to leeward is also on port, jibe quickly to starboard to catch the leeward boat sleeping. Such a jibe will force an unaware boat to jibe quickly and will probably slow the boat down and will be easily passed.

Beside the advantage of the puff, the original boat is now the leeward boat and, has the right-of-way. Of course, two can play that game, so be wary of a similar move if the situation is reversed. Maintain clear air and sail on whichever tack takes the boat to the mark. Remember to seek an inside spot at the mark.
Finishing

Strategy
Contrary to popular belief, a lot of races are won or lost in the last 200 yards of the race. The golden rule of finishing is always finish at an end. Never finish in the middle of the line. Secondly, try to finish at the favored end of the line.

Strategy for finishing
1 - If the starting and finishing line is the same, with constant wind, the favored end is opposite of the end that was favored at the start.
2 - Avoid the illusion that the larger end (race committee boat) is closer.
3 - Watch the leaders and see how they are finishing.
4 - Finish on the favored tack and shoot the line.

Tactics
It is often wise to finish on a starboard tack to retain the right of way. As with any upwind leg avoid the laylines. Although it is best to finish at the end of the line, this does not mean sailing on the layline for half of the last upwind leg.

Also remember that buoy room does apply at the finish as long as the proper overlap was established at the two boat length circle.
# Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Abeam</td>
<td>Any location either side of the boat, located on a line at right angles to one run from the bow to the stern.</td>
</tr>
<tr>
<td>Ahead</td>
<td>In front of.</td>
</tr>
<tr>
<td>Amidships</td>
<td>The portion of a vessel midway between bow and stern; also midway between starboard sides.</td>
</tr>
<tr>
<td>Anchorage</td>
<td>A sheltered place or area where boat can anchor.</td>
</tr>
<tr>
<td>Apparent wind</td>
<td>Wind felt on a moving vessel.</td>
</tr>
<tr>
<td>Astern</td>
<td>Behind or backwards.</td>
</tr>
<tr>
<td>AVE</td>
<td>Average.</td>
</tr>
<tr>
<td>Back</td>
<td>A counter-clockwise wind shift.</td>
</tr>
<tr>
<td>Backwind</td>
<td>To hold the mainsail or jib off to the side to cause the wind to blow onto the backside of the sail.</td>
</tr>
<tr>
<td>Bail</td>
<td>To remove water from a boat by hand.</td>
</tr>
<tr>
<td>Beam</td>
<td>The greatest breadth of the boat.</td>
</tr>
<tr>
<td>Beam reach</td>
<td>Sailing perpendicular to the wind.</td>
</tr>
<tr>
<td>Bearing away</td>
<td>Altering course away from the wind; falling off; heading down.</td>
</tr>
<tr>
<td>Bearing off/away</td>
<td>Altering course away from the wind on any course from head to wind until the boat begins to jibe.</td>
</tr>
<tr>
<td>Beat</td>
<td>To sail towards the direction from which the wind blows by making a series of tacks while sailing close-hauled.</td>
</tr>
<tr>
<td>Beating</td>
<td>Sailing upwind; close-hauled.</td>
</tr>
<tr>
<td>Before the wind</td>
<td>Sailing with the wind from astern, in the same direction toward which the wind is blowing</td>
</tr>
<tr>
<td>Blowing stink</td>
<td>A term made famous by Hoofer instructors. High winds! It is advised that at the first sign of the Big Stink one should Rig and Go!</td>
</tr>
<tr>
<td>Boom vang</td>
<td>A wire or rope running from the boom to or near the bottom of the mast which holds the boom down.</td>
</tr>
<tr>
<td>Boom</td>
<td>Pole or spar attached to the mast to which the foot (lower edge) of the sail is fastened.</td>
</tr>
<tr>
<td>Bow</td>
<td>Forward part of the hull.</td>
</tr>
<tr>
<td>Broaching</td>
<td>A sudden swooping around broadside to the wind and waves while running.</td>
</tr>
<tr>
<td>Broad reach</td>
<td>Sailing with the wind coming from any direction from abeam to on the quarter.</td>
</tr>
<tr>
<td>BS</td>
<td># of boats which started a race.</td>
</tr>
<tr>
<td>By the lee</td>
<td>Sailing before the wind with the wind coming from the same side that the boat is on.</td>
</tr>
<tr>
<td>Capsize</td>
<td>To tip the boat over so that the mast is parallel with the water.</td>
</tr>
<tr>
<td>Cast off</td>
<td>To let go.</td>
</tr>
<tr>
<td>Center of effort</td>
<td>Center point of sail area where all the force of the wind can be said to be centered.</td>
</tr>
<tr>
<td>Center of lateral resistance</td>
<td>Center point of all underwater area of the hull where the hull's lateral resistance can be said to be centered.</td>
</tr>
<tr>
<td>Centerboard line</td>
<td>A rope or wire attached to the top of the centerboard with which it is raised or lowered.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<td>-----------------------</td>
<td>---------------------------------------------------------------------------</td>
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<tr>
<td>Centerboard truck</td>
<td>Watertight housing for the centerboard.</td>
</tr>
<tr>
<td>Centerboard</td>
<td>A fiberglass or metal blade projecting through the bottom of the hull in center which prevents the boat from sliding sideways. It pivots up and back into the centerboard trunk.</td>
</tr>
<tr>
<td>Clear ahead</td>
<td>A boat not overlapped w/ a following boat. (see overlapped)</td>
</tr>
<tr>
<td>Clear astern</td>
<td>A boat not overlapped w/ a leader boat.</td>
</tr>
<tr>
<td>Close hauled</td>
<td>Sailing close to the wind (sails all the way in).</td>
</tr>
<tr>
<td>Close reach</td>
<td>Sailing with sheets eased and the wind forward of the beam (sails out 1/4).</td>
</tr>
<tr>
<td>Coming about</td>
<td>Changing tacks by heading up, bow into the wind and past head to wind on the other tack (tacking).</td>
</tr>
<tr>
<td>Dinghy</td>
<td>A small handy rowing boat, sometimes rigged with a sail.</td>
</tr>
<tr>
<td>Displacement</td>
<td>The weight of the water displaced by the vessel.</td>
</tr>
<tr>
<td>DNF</td>
<td>Did not finish.</td>
</tr>
<tr>
<td>DNS</td>
<td>Did not start.</td>
</tr>
<tr>
<td>Downhaul</td>
<td>Line attached to the bottom of the boom used to flatten the sail by pulling the boom down, and thus tightening the luff of the sail.</td>
</tr>
<tr>
<td>Downwind</td>
<td>In the direction the wind is going. A boat sailing downwind is running with the wind.</td>
</tr>
<tr>
<td>Draft</td>
<td>The depth of water to a vessel's keel.</td>
</tr>
<tr>
<td>DSQ</td>
<td>Disqualified.</td>
</tr>
<tr>
<td>Ease sheet</td>
<td>To let the sheet out.</td>
</tr>
<tr>
<td>Eye of the wind</td>
<td>An unsailable sector between close hauled headings.</td>
</tr>
<tr>
<td>Fathom</td>
<td>Measurement of six feet.</td>
</tr>
<tr>
<td>Foot</td>
<td>The bottom edge of a sail from Tack to Clew.</td>
</tr>
<tr>
<td>Fore and aft</td>
<td>In the direction of the keel.</td>
</tr>
<tr>
<td>Head to wind</td>
<td>Having the bow pointing directly into the wind.</td>
</tr>
<tr>
<td>Head</td>
<td>Uppermost corner of a sail, or the toilet.</td>
</tr>
<tr>
<td>Heading up</td>
<td>Turning closer to the wind, up wind.</td>
</tr>
<tr>
<td>Headway</td>
<td>Moving ahead.</td>
</tr>
<tr>
<td>Heave in</td>
<td>To haul in.</td>
</tr>
<tr>
<td>Heel</td>
<td>To tip to one side, due to wind pressure on the sail or crew on the side.</td>
</tr>
<tr>
<td>Helm</td>
<td>The tiller.</td>
</tr>
<tr>
<td>Helmsman</td>
<td>The one who steers the boat.</td>
</tr>
<tr>
<td>Hiking stick</td>
<td>See TILLER EXTENSION</td>
</tr>
<tr>
<td>Hiking straps</td>
<td>Straps to hook toes under in cockpit.</td>
</tr>
<tr>
<td>In irons</td>
<td>When a tack is not completed and the boat stalls out with the bow pointed directly into the wind.</td>
</tr>
<tr>
<td>In phase</td>
<td>Sailing optimal angles to the next mark; tacking on knocks and sailing on lifts.</td>
</tr>
<tr>
<td>Inshore</td>
<td>Toward the shore.</td>
</tr>
<tr>
<td>ISAF</td>
<td>International Sailing Federation.</td>
</tr>
<tr>
<td>Jibe</td>
<td>To go from one tack to the other when running with the wind coming over the stern.</td>
</tr>
<tr>
<td>Jibing</td>
<td>Turning the stern through the eye of the wind.</td>
</tr>
<tr>
<td>Knock</td>
<td>A wind shift that forces a boat to sail below its mean wind course.</td>
</tr>
<tr>
<td>Layline</td>
<td>Imaginary line of fastest course across the start line.</td>
</tr>
<tr>
<td>Leeward side</td>
<td>The side of the boat away from the wind.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Leeward</td>
<td>The direction away from the wind (opposite of WINDWARD).</td>
</tr>
<tr>
<td>Lift</td>
<td>A wind shift that allows a boat to sail above its mean wind course.</td>
</tr>
<tr>
<td>Luff up</td>
<td>To steer the boat more into the wind, thereby causing the sails to flap or luff.</td>
</tr>
<tr>
<td>Luffing</td>
<td>Altering course towards the wind; heading up.</td>
</tr>
<tr>
<td>Lull</td>
<td>When the forward part of the sail is fluttering.</td>
</tr>
<tr>
<td>Mainsheet</td>
<td>The line that controls the angle of the mainsail in its relation to the wind.</td>
</tr>
<tr>
<td>Mark</td>
<td>Any floating object within the water specified as so.</td>
</tr>
<tr>
<td>Mast</td>
<td>The vertical pole or spar that supports the boom and sails.</td>
</tr>
<tr>
<td>On a tack</td>
<td>A boat is always on one tack or the other; that is the sail is always on one side or the other.</td>
</tr>
<tr>
<td>Outhaul</td>
<td>A line used to haul out the clew or after corner of a sail on the boom.</td>
</tr>
<tr>
<td>Overlap</td>
<td>The condition where a line drawn across the transom of the leading overlapped by a middle boat.</td>
</tr>
<tr>
<td>Overtaking</td>
<td>Passing another vessel.</td>
</tr>
<tr>
<td>Pinch</td>
<td>To sail too close to the wind so that the sails start to luff.</td>
</tr>
<tr>
<td>Plane</td>
<td>When a sailboat rises up on its own bow wave and reaches speeds far in excess of those normally associated with its waterline length.</td>
</tr>
<tr>
<td>Port tack</td>
<td>The tack a boat is sailing on when the wind is coming over the port side.</td>
</tr>
<tr>
<td>Port</td>
<td>The left-hand side of the boat as you face the bow.</td>
</tr>
<tr>
<td>Privileged vessel</td>
<td>One that has the right of way.</td>
</tr>
<tr>
<td>Puff</td>
<td>A sudden burst of wind stronger than what is blowing at the time.</td>
</tr>
<tr>
<td>Reaching</td>
<td>Sailing across the wind or any course between close-hauled and running (close, beam, broad).</td>
</tr>
<tr>
<td>Rudder</td>
<td>A movable flat blade hinged vertically at the transom of a boat as a means of steering. It is controlled by a tiller or wheel.</td>
</tr>
<tr>
<td>Running rigging</td>
<td>The part of a ship's rigging which is movable and reeves through blocks, such as halyards, sheets, etc.</td>
</tr>
<tr>
<td>Running</td>
<td>Sailing with the wind coming from behind the boat with the sail out at right angles to the wind.</td>
</tr>
<tr>
<td>Sailing</td>
<td>Using only the wind and water to increase, maintain or decrease speed.</td>
</tr>
<tr>
<td>Sailing by the lee</td>
<td>Sailing on a run with the wind coming over the stern from the same side as the boom (danger of jibing).</td>
</tr>
<tr>
<td>Secure</td>
<td>To make fast; to make safe.</td>
</tr>
<tr>
<td>Sheet</td>
<td>A line that controls the angle of the sail in its relation to the wind.</td>
</tr>
<tr>
<td>Shove off</td>
<td>To leave; to push a boat away from a pier or vessel's side.</td>
</tr>
<tr>
<td>Side slipping</td>
<td>When the boat is moving sideways (to leeward).</td>
</tr>
<tr>
<td>Slack</td>
<td>Not fastened; loose. Also, to ease off.</td>
</tr>
<tr>
<td>Squall</td>
<td>A sudden and violent gust of wind often accompanied by rain.</td>
</tr>
<tr>
<td>Stalling</td>
<td>The turbulent effect of air on the lee side of a sail when trimmed in too far.</td>
</tr>
<tr>
<td>Starboard tack</td>
<td>The tack a boat is sailing on when the wind is coming over the starboard side.</td>
</tr>
<tr>
<td>Starboard</td>
<td>The right side, facing the bow from aft.</td>
</tr>
<tr>
<td>Staying clear</td>
<td>Avoiding collision by altering course when not the right-of-way boat.</td>
</tr>
<tr>
<td>Stow</td>
<td>To put in place.</td>
</tr>
<tr>
<td>Swamp</td>
<td>To sink by filling with water.</td>
</tr>
<tr>
<td>Tack</td>
<td>Lower forward corner of a sail.</td>
</tr>
<tr>
<td>Tacking</td>
<td>Coming about; turning the bow through the eye of the wind.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Telltales</td>
<td>Ribbon or yarn strips attached to rigging or sails to indicate wind action or direction.</td>
</tr>
<tr>
<td>Tiller extension</td>
<td>Hinged extension of the tiller which allows the skipper to control the tiller while hiking or sitting forward.</td>
</tr>
<tr>
<td>Tiller</td>
<td>A bar used to control the rudder.</td>
</tr>
<tr>
<td>Trim</td>
<td>To sheet in.</td>
</tr>
<tr>
<td>True wind</td>
<td>The direction the wind is actually coming from, not what you feel.</td>
</tr>
<tr>
<td>Turtle</td>
<td>To tip the boat over so that the mast is pointing to the bottom of the lake.</td>
</tr>
<tr>
<td>Underway</td>
<td>Said of a boat moving and under control of the helmsman. Technically, a boat is underway when not aground, at anchor, or made flat to the shore.</td>
</tr>
<tr>
<td>Upwind</td>
<td>In the direction from which the wind is coming. A boat sailing upwind is sailing toward the wind.</td>
</tr>
<tr>
<td>USYRU</td>
<td>United States Yacht Racing Union.</td>
</tr>
<tr>
<td>Veer</td>
<td>A clockwise wind shift.</td>
</tr>
<tr>
<td>Weather helm</td>
<td>When the tiller has to be held off the center line and toward the weather side or wind to keep a boat on its course.</td>
</tr>
<tr>
<td>Weather side</td>
<td>The windward side.</td>
</tr>
<tr>
<td>Wind shadow</td>
<td>The area affected by the turbulent air from a sailboat's sails.</td>
</tr>
<tr>
<td>Windward side</td>
<td>The side of a boat which the wind crosses first.</td>
</tr>
<tr>
<td>Windward</td>
<td>The direction from which the wind is coming.</td>
</tr>
<tr>
<td>YMP</td>
<td>Yacht Material Prejudice</td>
</tr>
</tbody>
</table>
APPENDIX A - EXERCISES & DRILLS

Exercises

In addition to on the water training, one's sailing can be improved by getting in shape physically. Both aerobic (running, swimming, biking) and anaerobic (weight work, etc.) workouts are helpful. Since, most people know what they like to do for an aerobic work out these won't be discussed further. Anaerobic conditioning for sailing can include the following, but could also include other exercises.

One of the hardest things to get in shape for during the off season is hiking. The best conditioning for this is to work out on a hiking bench (one can often be found in the chart room). When working out on the bench one should do both situps and survival hiking (just hanging out and timing how long this can be done for).

A word of caution however, be careful of too much knee strain from hiking, especially if it has been a few months since the last sail of the season. If a hiking bench is not available, or in addition to hiking bench workouts, good old fashioned situps will also help one stay in shape. If possible, these can be done on an incline to increase their effectiveness.

Other muscles can be kept in shape by weight training. No details will be included here but exercises which are helpful include: leg presses, rowing, arm curls, lat pulldowns, and leg extensions, as well as miscellaneous arm exercises performed with dumbbells. Before starting any weight work out it is wise to talk to someone who knows what they are doing, or at least get some printed material with illustrations of proper form to follow as a guide.

Drills - One Boat

Tack and Jibe on Timer

For this drill one needs a timer with a repeat function equipped with an alarm. When beginning, set the time interval at 1 minute and tack each time the alarm goes off. With increased proficiency, lesson the interval 5-10 seconds at a time. Try to attain 10 seconds. Repeat entire exercise jibing.

Tack and Jibe ASAP

This drill is similar to the above drill, but no timer is necessary. Start by tacking, then as soon as way is gained tack again, etc. Repeat the entire exercise jibing.

Spins

Start by tacking, follow immediately with a jibe. Then repeat the sequence as quickly as possible as many times as possible. Then switch directions of the spin.

Weight Steering

First, (to get used to the feel of weight steering), sail on a close reach course on either tack, keeping the boat flat. Holding the tiller loose enough to move freely but firm enough so that the boat does not head up due to weather helm while still flat.

Now, lean or move to the leeward side of the boat (amount of motion depends on wind strength), and by allowing the tiller to slide freely watch how the boat heads up. After getting back to the starting position, lean or move to windward, again keeping the tiller in a loose grip, and watch the boat fall off. Repeat this until the motion feels comfortable and natural. Repeat on other tack.

Second, repeat the above, but try to let go of the tiller during the lean. While doing this, the hiking stick tends to get stuck between the tiller and the floatation tank. To avoid this, tie the stick to the tiller using the end of the halyard passed under the thwart.

Third, remove the rudder and pull the centerboard about half way up. Now sail. Don't be surprised to be going in circles at first.

Blind Sailing

Try to get a better feel of the boat under various points of sail by sailing with a blindfold. If sailing in a boat without a crew, it is advised that instead of using a blindfold, one should just close their eyes. Also, this should be done away from other boats and heavy traffic areas.

Backwards Sailing

Start by sailing upwind, then slow down and push the sail out so that it backwinds. Soon the boat should begin to sail backwards. Use care at first since the boat will feel more skiddish sailing this way, also note that the steering is reversed. If one is feeling brave, they can try to jibe while doing this.
Drills - Two Boats

Tail to Pass
The two boats set up so that one is just behind the other, then the one behind tries to pass the one ahead while the one ahead tries to stop them.

720’S - Go & Sail - Sail & Go
The two boats set up so that they are sailing towards a specific point on any point of sail such that they are each the same distance from said point. Then the first boat does a 720 while the second boat just sails, after which the second boat does a 720 while the first boat sails. They then compare their current distance to the point to see whose 720 was performed more effectively.

Luff and Accelerate
The two boats set up as above except that both are going up wind and luffing their sails. Then on GO shouted from one of the boats (which boat is predetermined), they both accelerate and start sailing upwind and after sailing about 30 seconds see which boat has sailed farther and thus accelerated better.

Head Start (10 Sec) on a Course
On either a triangular or windward leeward course, one boat starts sailing for speed around the course. The second boat waits 10 seconds and then also starts sailing the course. The second boat tries to overtake the first in one lap around the course.

Drills - 3 or More Boats

Preset Number of Tacks and Jibes
On a windward leeward course the boats start at the leeward mark and sail towards the windward mark. However, they must do exactly a preset number of tacks determined by either someone helping with the practice session or the lead boat. Once upwind they round the mark and similarly do a set number of jibes downwind. This drill can be continued indefinitely, however, if the boats get too spread out it is wise to consolidate and start over.

Follow the Leader
The entire fleet lines up so that all of the boats are sailing single file as close as possible to each other. The leader then sails, doing as many boat handling maneuvers as quickly as possible and those following imitate all moves and try not to lose distance or overtake the leader.

Tack & Jibe on Whistle
The fleet sails either upwind for tacking or dead downwind for jibing and every time a whistle is blown by a determined person everyone must either tack or jibe.

Slalom Course - Stagger - Feedback and Timing
Buoys should be set up as a slalom course from windward to leeward. Boats then sail the course rounding the buoys as close as possible without hitting them. Boats should be staggered to start this. More can be gained from this exercise if someone is observing and giving feedback to those sailing and/or timing those sailing so sailors can see speed differences generated by various technique changes.

Repetetive Starts
A starting sequence (2-3 minutes) is run and boats start as usual. However, immediately after clearing the starting line the boats must circle back (keeping clear of those not yet having cleared the line), and set up for another start, the countdown for which started at the starting signal of the last start.

Timed Starts
All boats must be on the windward wide of the line at one minute, and sail downwind across it after this point. Each boat must then only tack or jibe once before the actual starting signal.
APPENDIX B - OTHER RACING

Racing Opportunities For Hoofer Sailors

Series at Hoofers:

Tech series are offered Wednesday & Friday nights. Both are open to all Hoofer sailors and are another great chance for beginners to learn how to race. More series are held for Sailboards, Interlakes, M20's and 470's throughout the sailing season. Talk to the racing coordinator or refer to the calendar and general information sheet for more details.

Other series in Madison:

1. Mendota Yacht Club offers series for a variety of boats including M20's, E and A-scows, and Cruiser boats. Races are held on Wednesday nights as well as Saturday and Sunday depending on the particular fleet. Check the racing board for more information.

2. Lake Monona Sailing Club offers series for five fleets of boats: C-scow, Flying Scot, Multi-hull, Thistle and a one design fleet which accommodates any boat not belonging to one of the above categories. Series are held on Wednesday night and Saturday. Check the racing board for more information.

Neither boat ownership nor commitment to an entire series is necessary to race with these clubs. Sometimes skippers from either club need a crew for just one race. This is an excellent chance to observe and participate in top quality racing.

Undergraduate Sailing Team:

Any full time undergraduate is eligible to sail with the intercollegiate sailing team. The team competes during the fall and spring in regattas against other universities from around the country. This is excellent way to hone your racing skills since college regattas feature fast paced short courses. Other benefits include meeting other sailors from Wisconsin as well as from the Midwest and participating in what many college sailors call "The best four years of their lives."
SUGGESTED READING

Coles, K. Adlard. HEAVY WEATHER SAILING. Found at the Madison Public Library.

Copley, Peter. DINGHY RACING. Well written but no pictures.


Dallenbaugh, David and Brad. SMALL BOAT SAILING: A COMPLETE GUIDE. Produced by Sports Illustrated Magazine.

Dent, Nicholas. HOW TO SAIL: A PRACTICAL COURSE IN BOAT HANDLING.

Elvstrom, Paul. ELVSTROM EXPLAINS THE NEW RACING RULES.

Farnham, Moulton H. SAILING FOR BEGINNERS. Found at the Madison Public Library.

Goodman, Di. LEARNING TO SAIL. Found at the Madison Public Library.

Hoyt, Garry. GO FOR THE GOLD. Breezy writing but lightweight.

Imhoff, Fred and Lex Pranger. BOAT TUNING FOR SPEED. Better than the Fletcher book. Part of the Sail series. Good graphics.

Jobson, Gary and Mike Toppa. SPEED SAILING.

Lewis, Larry. SAIL IT FLAT. Good reading for Laser sailors.

Marchaj, C. A. SAILING THEORY AND PRACTICE. A classic book for a technical/mathematical explanation of how a boat works. If you ever wondered why a boat works, read this.

Melges, Buddy. SAILING SMART. An autobiography of sorts. It offers excellent tips on many aspects of sailing, especially on racing on inland lakes.

Moore, James. STARTING SAILING. Found at the Madison Public Library.

North Sails Inc. NORTH U: SMART COURSE.

North Sails Inc. NORTH U: FAST COURSE.

O’Day, George D. SAIL IN A DAY! Found at the Madison Public Library.

Pinaud, Yves-Louis. SAILING FROM START TO FINISH. Excellent book, good photo spread of tacking a 505, (e.g. 470). Includes physical fitness, diet, etc. Make sure to get the edition with the current rules.

Rousmaniere, John. A GLOSSARY OF MODERN SAILING TERMS.

Toghill, Jeff E. SAILING FOR BEGINNERS. Found at the Madison Public Library.

Twiname, Eric. DINGHY TEAM RACING. The bible for this cut-throat sport, but its rules section is out of date.

Twiname, Eric. START TO WIN. Written by a dinghy sailor for dinghy sailors. Excellent text and graphics.

Walker, Stuart. THE TACTICS OF SMALL BOAT RACING. Found at the Madison Public Library.

Walker, Stuart. A MANUAL OF SAIL TRIM.


Whidden, Tom and Michael Levitt. THE ART AND SCIENCE OF SAILS: A GUIDE TO MODERN MATERIALS, CONSTRUCTION, AERODYNAMICS, UPKEEP AND USE. Most recent book on the topic. Will likely become the bible for aerodynamic theory and sail trim.

Badger Tech Racing Manual 40 Suggested Reading
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